



July 09, 2024

The Honorable Board of Commissioners
Los Angeles County
Development Authority
383 Kenneth Hahn Hall of Administration
500 West Temple Street
Los Angeles, California 90012

Dear Commissioners:

ADOPTED

BOARD OF SUPERVISORS
COUNTY OF LOS ANGELES

2-D July 9, 2024

Edward Yen
EDWARD YEN
EXECUTIVE OFFICER

ADOPT A UNIT PRICE CATALOG AND SPECIFICATIONS, ADVERTISE AND AWARD 20 JOB ORDER CONTRACTS FOR THE REPAIR, REMODEL, REFURBISHMENT, AND MAINTENANCE OF VARIOUS PROPERTIES (ALL DISTRICTS) (3 VOTES)

SUBJECT

This letter recommends adoption of the Job Order Contract (JOC) Unit Price Book from the Los Angeles County Development Authority's (LACDA) current JOC Consultant. The Gordian Group, Inc., dated May 2024; authority to award to the lowest responsive and responsible bidders for 20 separate Job Order Contracts 106 to 125, and authority to issue JOC work orders for County facilities, public housing, commercial buildings, and private residences.

IT IS RECOMMENDED THAT THE BOARD:

1. Find that the adoption of the JOC unit price book from The Gordian Group, dated May 2024, approval for advertisement for bids, and the proposed award of JOCs and related actions are not a project under the California Environmental Quality Act for the reasons stated in this Board letter and in the records pertaining to the JOCs.
2. Adopt the JOC Construction Task Catalog and Technical Specifications prepared by The Gordian Group, Inc., dated May 2024.
3. Direct the Executive Officer of the Board to advertise for bids to be received and opened on August 13, 2024, using The Gordian Group, Inc.'s JOC System for 20 separate JOCs (106-125) in accordance with the Notice For Bids.

4. Delegate authority to the Executive Director or designee to make the determination that a bid is nonresponsive and to reject a bid on that basis; to award to the next lowest responsive and responsible bidder; to waive inconsequential and nonmaterial deficiencies in bids submitted; and to determine, in accordance with the applicable contract and bid documents, whether the apparent lowest responsive and responsible bidder has satisfied all conditions for contract award. Upon such determination delegate authority to the Executive Director or designee to award and execute 20 JOCs, each not to exceed \$6,023,368.73, in the form previously approved by County Counsel; and to establish the effective date of the contracts upon receipt by the LACDA of acceptable performance and payment bonds and evidence of required contractor insurance.

5. With respect to JOCs 106 to 125, authorize the Executive Director or designee, subject to a finding of exemption under the California Environmental Quality Act (CEQA), to issue work orders for projects that are not subject to the State Public Contract Code including maintenance work, as applicable, not to exceed \$6,023,368.73 per work order; subject to the limitation that the aggregate amount of all work orders issued under a particular JOC does not exceed the \$6,023,368.73 maximum contract amount of the JOC.

6. Authorize the Executive Director or designee, upon his determination and as necessary and appropriate under the terms of the JOCs, to amend the JOCs; to terminate any of the 20 JOCs for convenience; to terminate the contractor's right to proceed with the performance of the JOCs; to accept projects and file notices upon completion of the projects; to release retention money withheld pursuant to the applicable provisions of the Public Contract Code; to grant extensions of time on projects, as applicable, and assess and collect liquidated damages as authorized under Government Code Section 53069.85 and the contract specifications.

PURPOSE/JUSTIFICATION OF RECOMMENDED ACTION

Approval of the recommended actions will make necessary findings under CEQA; adopt the JOC Construction Task Catalog Unit Price Book from The Gordian Group, Inc., dated May 2024; advertise for bids to be received and opened for 20 JOCs; and authorize the LACDA to determine that a bid is nonresponsive to the mandatory requirements of the bid solicitation and to reject a bid on that basis, including the authority to waive inconsequential and nonmaterial deficiencies, award and execute 20 JOC agreements, and issue JOC work orders for County facilities, public housing, commercial buildings, and private residences subject to finding of exemption, if appropriate, findings for the work orders under CEQA at the time of issuance.

JOC is a competitive bid, flexible, and cost-effective unit price contracting method used by the LACDA to efficiently deliver a wide variety of projects, including repair, remodeling, refurbishment, alteration, and maintenance for public facilities, public housing, commercial buildings, and private residences participating in LACDA programs without extensive plans and specifications. The State Public Contract Code (PCC) provides that JOCs are contracts of a single- year duration and cannot be used for new construction.

Approval of the recommended actions will allow the LACDA to issue work orders for projects that are subject to PCC, including repair, remodeling, and refurbishment work, in an amount not to exceed the monetary limits set forth in PCC Section 20145, and authorized to the LACDA by ordinance in accordance with PCC Sections 20128.5 and 20145, subject to the limitation that the aggregate amount of all work orders issued under a particular JOC does not exceed the \$6,023,368.73 maximum contract amount of the JOC. For projects subject to PCC, the LACDA will seek Board approval prior to issuing JOC work orders for any project that exceeds the LACDA's delegated

monetary limit authorized by ordinance.

Approval of the recommended actions will also delegate authority to the LACDA to issue work orders for projects that are not subject to PCC, including maintenance, demolition, or procurement and installation of equipment, as applicable, not to exceed \$6,023,368.73 per work order, subject to the limitation that the aggregate amount of all work orders issued under a particular JOC does not exceed \$6,023,368.73 maximum contract amount of the JOC. In accordance with the October 31, 2017, Board Motion, the LACDA will provide notification to the Board a week prior to issuance of work orders in excess of \$150,000 for projects not subject to PCC. In the case of emergency or critically needed deferred maintenance projects not subject to PCC, LACDA will provide notification to the Board no later than 24 hours after the issuance of such work orders.

In order to have adequate JOC capacity available on a continuous basis, the aggregate requested amount of JOC authority is \$120,467,375 (20 JOCs). Six (6) JOCs will be used for public housing refurbishment projects, six (6) will be used for the Community Care Expansion and Preservation Program, six (6) will be used for County facilities and the Renovate Commercial Façade Revitalization program, and two (2) will be used for the Residential Sound Insulation Program.

This capacity is based on the anticipated need for various projects to be performed under JOC, including repair, remodeling, refurbishment, and maintenance work for LACDA projects. These proposed projects will primarily address sustainability, improve Americans with Disabilities Act accessibility, and provide upgrades that conform to current Building Code requirements. Therefore, the LACDA has made the determination that the use of a JOC is the most appropriate contracting method to deliver these projects.

FISCAL IMPACT/FINANCING

There is no impact on the County general fund. The projects anticipated to be performed under the JOCs, including repair, remodeling, refurbishment, alteration, and maintenance work will be financed with approved budgets of programs for which these services will be provided and are included in the LACDA's approved Fiscal Year 2024-2025 budget. Funds for future years will be included in the LACDA's annual budget approval process. The total not-to-exceed program amount to be expended per Contract is \$6,023,368.73 per year. The potential aggregate, not-to-exceed amount across the 20 Contracts is \$120,467,375.

FACTS AND PROVISIONS/LEGAL REQUIREMENTS

The JOCs will be in the form previously reviewed and approved by County Counsel.

Each JOC will contain terms and conditions in compliance with the Board's ordinances, policies, and programs.

Data regarding the bidders' minority participation will be on file with the LACDA. The contractors will be selected upon final analysis and consideration without regard to race, creed, color, or gender.

The JOCs are subject to the Board-adopted Countywide Local and Targeted Worker Hire Policy.

ENVIRONMENTAL DOCUMENTATION

Pursuant to Title 24 of the Code of Federal Regulations, Section 58.34 (a)(3), these actions are

exempt from the National Environmental Policy Act (NEPA) because they involve administrative actions of government. JOC construction activities are generally categorically excluded from NEPA pursuant to 24 CFR 58.35 (a)(3)(i), (ii) and (iii). NEPA review and clearance will be completed for each JOC project prior to approval of specific work orders.

Award of the JOCs, adoption of the JOC unit price and technical specifications books from The Gordian Group, Inc., each dated May 2024, delegation of authority to take actions related to award and execution of JOC agreements do not constitute a project under CEQA because the activity is excluded from the definition of a project under Section 21065 of the Public Resources Code and Section 15378(b)(4) and (5) of the State CEQA Guidelines. These activities are administrative actions of government and involve the creation of government funding mechanisms or other government fiscal activities that do not involve any commitment to any specific project that may result in a potentially significant environmental impact or direct or indirect changes to the environment. JOC projects for which work orders are issued under the recommended contracts include repair, remodeling, refurbishment, and maintenance of existing structures and facilities as requested by the LACDA and are, therefore, likely categorically exempt from CEQA. The Board's award of the JOCs does not include approval of any work under the contracts. The future implementation of each work order proposed under the JOCs will be subject to prior determination and documentation by the Executive Director of the LACDA or his designee that the work is exempt from CEQA, if appropriate. In the event that the proposed work is not determined to be exempt, the LACDA will ensure that any necessary CEQA documentation is prepared and any necessary CEQA findings by the Board are recommended prior to issuance of the work orders.

CONTRACTING PROCESS

Advertising for bids for 20 separate JOCs 106 to 125 will be in accordance with the County's standard Instruction Sheet for Publishing Legal Advertisements (Enclosure A).

As requested by the Board on February 3, 1998, the Invitation for Bids will be listed on the County's "Doing Business with the County" website, and the LACDA's website. The proposed JOCs will be solicited on an open-competitive basis and in accordance with applicable Federal, State, and County requirements.

Bidders will be required to submit a set of cost adjustment factors that would be applied to the unit prices for work using The Gordian Group, Inc.'s JOC System for the 20 separate JOCs 106 to 125 with the book dated May 2024. The unit price book from The Gordian Group, Inc. will be made available to bidders and be on file with the LACDA's Construction Management Unit.

Bids will be determined by calculating a composite factor using a predetermined advertised formula. The lowest responsive and responsible bidder for each JOC will be awarded that JOC. The JOC consultant and their corresponding unit price book dated May 2024 and each of the lowest responsive and responsible bidder's adjustment factors will be incorporated in the awarded JOCs. Contracts will be in the form previously reviewed and approved as to form by County Counsel and in compliance with the Board's requirements.

To ensure the JOCs are awarded to responsible contractors with a satisfactory performance history, bidders will be required to report violations of the False Claims Act, their civil litigation history, and information regarding prior criminal convictions. The information reported by the lowest responsive and responsible bidders will be considered before awarding the JOCs.

The LACDA has evaluated and determined that the Living Wage Program (County Code, Chapter

2.201) does not apply as these contracts are for non-Proposition A services.

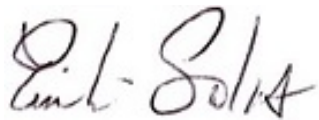
Participation by Community Business Enterprises for these contracts will be encouraged through LACDA's Business Outreach Program and by reporting the good faith efforts of contractors to utilize Community Business Enterprises.

In addition, the contracts require contractors to report Small Business Enterprises/Local Small Business Enterprises and Community Business Enterprises utilization for all subcontractors used.

IMPACT ON CURRENT SERVICES (OR PROJECTS)

The use of these JOCs will expedite the completion of repair, remodeling, refurbishment, alteration, maintenance, and other repetitive-type work for various LACDA projects.

Respectfully submitted,



Emilio Salas

Executive Director

ES:LJ:SO

Enclosures

ADOPT UNIT PRICE CATALOGS AND SPECIFICATIONS ADVERTISE AND AWARD
20 JOB ORDER CONTRACTS FOR
REPAIR, REMODEL, REFURBISHMENT, AND MAINTENANCE OF VARIOUS
PROPERTIES
(ALL DISTRICTS)
(3 VOTES)

PUBLISHING LEGAL ADVERTISEMENTS: In accordance with the State of California Public Contract Code Section 20125, you may publish once a week for 2 weeks in a weekly newspaper or four times in a daily newspaper. Forward a reprint of this advertisement to the Los Angeles County Development Authority, Construction Management Unit, 700 W. Main Street, Alhambra, CA 91801.

OFFICIAL NOTICE
INVITING BIDS

Notice is hereby given that the Executive Director of the Los Angeles County Development Authority will accept sealed bids for furnishing all materials, labor, and equipment required to complete construction for 20 separate Job Order Contracts (106 to 125).

A bid package containing all submission requirements may be downloaded from the LACDA website at www.lacda.org, scroll to and click on "Vendors," click on "View Open Solicitations," and under the "Title" column, select the solicitation of interest, then click on "Download Documents Below," and follow the instructions. For assistance with downloading bid documents, please contact Susana Oliveros at (626) 586-1782.

A Pre-Bid meeting for this project will be held at 2:00 p.m. on July 25, 2024, via an online meeting. Attendance at this meeting is mandatory for award of the Contract. Bidders who desire to attend the virtual meeting must RSVP by sending the name of their company, attendee names, and attendee email addresses to susana.oliveros@lacda.org by 5:00 p.m. on July 24, 2024. Bidders will receive an invitation to a Microsoft Teams meeting with link.

The prime contractor shall possess a valid California Class B contractor's license.

Bids must be submitted electronically on the LACDA's website. Bid submission instructions can be found in the bid package. Bids must be uploaded to the LACDA website before 2 p.m. on August 13, 2024, and no bids may be submitted after that date and time. Bids will be opened and publicly declared on August 13, 2024, at 2 p.m., via online webcast.

GORDIAN[®]

Job Order Contract Construction Task Catalog[®]

CSI Division 01-43 May 2024

Los Angeles Community Development Authority



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About the CTC:

- ☑ This Construction Task Catalog® (CTC) was developed and customized by The Gordian Group, Inc. specifically for **Los Angeles Community Development Authority**, priced locally using current labor, material and equipment costs, and published in **May 2024**.
- ☑ The Gordian Group, Inc. licenses the use of this CTC and other proprietary information and software for the sole purpose of providing Job Order Contracting services to **Los Angeles Community Development Authority**. Use of this CTC and other proprietary information and software for any other purpose, or for any other entity, is expressly prohibited without the express written consent of The Gordian Group, Inc.

MasterFormat™

- ☑ The tasks in this Construction Task Catalog are organized using CSI's *MasterFormat*.



The Unit Prices Include:

LABOR COSTS:

- ☑ Labor costs include direct labor through the working foreperson level at straight-time prevailing wage rates including fringe benefits and an allowance for Social Security, Medicare taxes, worker's compensation, payroll taxes, unemployment insurance, and employee benefits.
- ☑ Labor costs include unloading equipment, traffic control, materials, and tools, and transporting the same up or down 2 stories and 125' to reach the project site; layout; measuring and cutting to fit;

performing the task; disposal of excess material; and time for lunch and breaks.

EQUIPMENT COSTS:

- ☑ Equipment costs include all equipment required to accomplish the task.
- ☑ Mobilization and Delivery are included for all equipment except large equipment (e.g. cranes, bulldozers, excavators, backhoes, bobcats etc.), which exclude mobilization.
- ☑ Equipment costs include all operating expenses such as fuel, electricity, lubricants, etc.

MATERIAL COSTS:

- ☑ Material costs include the cost of the material, delivery, traffic control personnel, and all incidentals and accessories integral to the installation.
- ☑ Material costs include manufacturer's and/or fabricator's shop drawings.
- ☑ Material costs for roofing, drywall, VCT, carpet, wall covering, ceiling tile, pipe, conduit, concrete, etc. include an allowance for waste. This list is not intended to be all inclusive, but descriptive of the types of construction materials that are typically sold in standard lengths, sizes and weights.
- ☑ Material costs for imported materials (e.g. aggregate, sand, soil, etc.) include delivery up to 15 miles from the closest approved source.

The Adjustment Factors Include:

The Adjustment Factors include the following costs, unless specifically excluded by the terms of the Contract Documents:

BUSINESS COSTS:

- ☑ Office overhead, including, but not limited to, office space, office equipment, office and management personnel, office supplies, and employee transportation.

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- Insurance and bonding.
- Profit.
- Job Order development services, Owner meetings, and other administrative services required by the Contract Documents.
- Subcontractor's overhead and profit.
- Cost of financing the work.
- Business risks such as the risk of a lower than expected volume of work, smaller than anticipated Job Orders, poor Subcontractor performance, and inflation or material and labor cost fluctuations.
- Payroll taxes, workers compensation, insurance costs and any other payment mandated by law in connection with labor, and inflation or material cost fluctuations.

PROJECT RELATED COSTS:

- Project trailer, equipment and supplies, and portable toilets for Contractor's use.
- Project management and project supervision.
- Services required to complete project filings and obtain permits.
- Preparation and modification of sketches, drawings, submittals, as-built drawings, and other project records.
- Incidental engineering and architectural services.
- Gang boxes and storage containers for Contractor's tools, equipment and materials.
- Basic safety and warning signage, minor barricades (e.g., construction tape, reflective cones, etc.) and personnel safety equipment (e.g., hard hats, safety harnesses with lifeline or cabling, protective clothing, safety glasses, face shields, etc.).
- Meeting Owner's security requirements.
- All taxes for which a waiver is not available including material sales tax and equipment rental.
- Removing and returning Owner's furniture and furnishings (e.g. chairs, tables, pictures, etc. but excluding modular furniture, furnishings fastened to the wall or floor, safes and other furniture requiring disassembly).

- Sealing windows doors, and other openings with plastic to contain construction dust and debris within the work area, or to protect existing surfaces.
- Working in extreme temperatures (below or above normal) or adverse conditions such as rain, wind, sleet or snow.
- Costs resulting from inadequate supply of building materials, fuel, electricity, or skilled labor.
- Daily clean-up.
- Final professional clean-up.
- Protection of all surfaces including those not in the scope of work from dust, debris or damage during construction is part of Adjustment Factors. The methods of protection including plastic, paper, Masonite, sealing of doors or windows, etc. are the Contractor's responsibility.
- Costs resulting from productivity loss.

PRICE VARIATIONS:

- Contractors may experience direct costs that are different than the unit prices set forth in the Construction Task Catalog. While diligent effort was made to provide accurate, unit prices, it is the Contractor's responsibility to review and analyze the unit prices, and to calculate, prior to bidding, the Adjustment Factors accordingly.

SUMMARY:

- This list is not exhaustive and is intended to provide general examples of costs to be included in the Contractor's Adjustment Factors.
- The only compensation to be paid to the Contractor for unit price tasks will be:

Unit Price X Quantity X Adjustment Factor

- No additional payments of any kind whatsoever will be made.
- All costs in excess of the unit prices, must be included in the Adjustment Factors.

General Rules:

- ☑ Unit prices are for complete and in-place construction and include all labor, equipment and material required to complete the task as described in the CTC.
- ☑ If the Contractor uses a crane or other lifting equipment (except a truck mounted boom lift or other equipment as part of the delivery process) to lift material onto a roof, even if that roof is less than 2 stories, the contractor will be paid for such crane or lifting equipment as a separate task.
- ☑ Unit prices include all fasteners such as anchor bolts, lag bolts, screws, adhesive, wedge anchors, expansion bolts, roofing clips (excluding hurricane clips) required. Fasteners listed separately in the CTC are for use with Owner furnished material and equipment or relocating or reinstalling existing material and equipment.
- ☑ Unit prices exclude more substantial mounting material such as threaded rod or angle iron unless the task description states otherwise.
- ☑ Unit prices for doors and windows, duct work, plumbing fixtures, seamless floors, countertops, roof flashing, pitch pockets, skylights, roof curbs, exterior trim, etc. include sealant and caulking.
- ☑ Unit prices include testing, calibrating, balancing, Programming, start-up services and the like required to ensure proper installation, construction and performance of the work (e.g. compaction test for backfill, balancing of heating ventilation and air conditioning, Programming of Controls, pneumatic or hydrostatic testing, soaping of joints, disinfection and flushing of water lines, etc.). Contractor may be paid for testing, calibrating, balancing, start-up services and the like for Owner supplied materials and equipment, or when working on or tying into existing materials and equipment.
- ☑ For the purpose of calculating the quantity of a task, quantities are calculated on a per project basis. The quantity so determined shall be used for the task and all appropriate modifiers, unless the task states otherwise.
- ☑ Whenever there are alternative tasks that may be selected to complete work, the Contractor shall

select the most practical and economical tasks available (e.g. rental of equipment by weeks or months rather than days, or painting by roller or spray rather than brush).

DEMOLITION:

- ☑ Unit prices for demolition include all labor, equipment and material required for the complete removal of the items; clean-up of the area; and transporting the demolished items up or down 2 stories into a truck, dumpster, or to an owner designated area, located within 125' of the project site.
- ☑ Unit prices for demolition exclude costs for hauling (See 01741900), dump fees (See 01741900), dumpsters (See 01741900), and trash chutes (See 01741900).
- ☑ If the item being demolished is attached to another item being removed and can be removed as one item, then that item shall not be priced as a separate demolition task, unless the component alone must be demolished to accomplish the task (e.g. demolition of pipe includes pipe fittings unless the fitting must be demolished separately to accomplish the task; demolition of a wood door includes hinges, hardware, closures, kick plates, etc.).
- ☑ The word "replace" includes removal of the existing item and installation of the new item.
- ☑ The words "remove and relocate" or "remove and reinstall" include removal, cleaning, and installation of the existing item in either the same location or another location.
- ☑ Salvageable materials are the property of the Owner and shall, if directed, be turned over to the Owner.

WORKING HEIGHT:

- ☑ Typical working height for work other than masonry is up to 14' above the finished floor or stationary working surface. The Contractor will not be paid for scaffolding, lifts, or similar equipment for work below 14'.
- ☑ Typical working height for masonry work is up to 4' above the finished floor or stationary working

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surface. The Contractor will not be paid for scaffolding, lifts, or similar equipment for masonry work below 4'.

FIELD ENGINEERING:

- Surveying tasks shall be used only when the Owner requests the Contractor to perform topographic surveys, property line surveys or to establish horizontal and vertical control points. If the Owner provides horizontal and vertical control points within or adjacent to the project site, all other surveying required to complete the work shall be considered construction staking or layout, and the cost thereof is included in the appropriate tasks.

ASSEMBLIES:

- Assembly tasks take precedence over individual component tasks.

RESTRICTED AND CONFINED SPACES:

- Restricted Working Space is defined as any area with less than 3' vertical or horizontal clearance and includes areas such as crawl spaces, ceiling plenums where the grid is not removed, narrow piping tunnels, and equipment rooms where the space to install the new work is congested as a result of equipment and piping placement that meet these dimensional restrictions. A Restricted Working Space modifier is available for certain mechanical piping and piping accessories tasks and for certain electrical conduit and conduit accessories tasks. Only those tasks with a modifier for Restricted Working Space are eligible for a price adjustment, and then only if the modifier applies to the contemplated tasks. A non pre-priced task will not be allowed because of Restricted Working Space for any CTC task.
- Confined Working Space is defined according to the OSHA definition 29 CFR 1926.21(b)(6)(i): "Any space having limited means of egress, which is subject to accumulation of toxic or flammable contaminants or has an oxygen deficient atmosphere, including, but not limited to, storage tanks, process vessels, bins, boilers, ventilation and

exhaust duct, sewers, underground vaults, tunnels, pipelines and open top spaces more than 4 feet in depth such as pits and tubs." The Contractor shall conform to all OSHA and Owner requirements for working in Confined Working Spaces. Required ventilation and air monitoring equipment tasks shall be priced from the CTC.

TECHNICAL SPECIFICATIONS:

- Technical Specifications for tasks shall be interpreted as follows: All labor, material, equipment, spare parts, services, and work required by a Technical Specification shall be considered included in the unit price, unless the task description states otherwise.

Or Equals:

- Whenever material, products, or equipment is identified in the CTC, or in the Technical Specifications, by reference to a manufacturer's name, make or model number, the identification is intended to establish a standard. Any material, product, or equipment of another manufacturer may be considered an or-equal provided that, in the opinion of the Owner, the material, product, or equipment so proposed is of equal quality, substance and function to the named item. The Contractor shall not install any proposed material, product, or equipment without the prior written approval of the Owner. The burden of proof, and all costs related thereto, concerning whether the proposed material, product, or equipment is an or-equal, shall be borne by the Contractor.

Useful Information:

UNIT OF MEASURE DEFINITIONS:

ACR – Acre, **BAG** – Bag, **BBL** – Barrel, **BCY** - Bank (In-place) Cubic Yards, **BF** - Board Foot, **BOX** - Box (each), **BTU** - British Thermal Unit, **C** - One Hundred, **CCF** - One Hundred Cubic Feet, **CCY** - Compacted

2024

Cubic Yards, **CF** - Cubic Foot, **CFM** - Cubic Feet Per Minute, **CI** - Cubic Inch, **CLF** - One Hundred Linear Feet, **CSF** - One Hundred Square Feet, **CSY** - Hundred Square Yards, **CWT** - Hundred Weight, **CY** - Cubic Yard, **CYM** - Cubic Yard Mile, **DAY** - Day, **DRM** - Drum (each), **EA** - Each, **FLR** - Floor (Per Floor), **FT** - Foot, **GAL** - Gallon, **GSF** - Ground Square Foot, **HR** - Hour, **HWT** - Hundred Carton Weight, **HYR** - Half Year, **IN** - Inch, **JOB** - Job, **LAN** - Lane, **LB** - Pound, **LCY** - Loose (Excavated) Cubic Yards, **LF** - Linear Foot, **LFD** - Linear Feet Per Day, **LIT** - Liter, **LOT** - Lot, **MBF** - One Thousand Board Feet, **MBH** - One Thousand British Thermal Units, **MCF** - One Thousand Cubic Feet, **MF3** - One Thousand Cubic Feet Per Minute, **MGL** - One Thousand Gallons, **MI** - Mile, **MLF** - One Thousand Linear Feet, **MO** - Month, **MSF** - One Thousand Square Feet, **MSY** - One Thousand Square Yards, **MT** - Metric Ton, **MTK** - Metric Ton Kilometer, **M2** - Square Meter, **M3K** - Cubic Meter Kilometer, **NTE** - Note, **OPN** - Opening, **OUT** - Outlet or Output (each), **OZ** - Ounce, **PKG** - Package, **PNT** - Point, **PR** - Pair, **QT** - Quart, **ROL** - Roll (each), **ROM** - Room, **ROW** - Row, **RSR** - Riser (Per Rise), **SEA** - Seat, **SET** - Set, **SF** - Square Foot, **SHT** - Sheet, **SI** - Square Inch, **STP** - Stop (each), **SQ** - Square or One Hundred Square Feet, **SY** - Square Yard, **SYI** - Inches per Square Yard, **TNM** - Tons per Mile, **TON** - Ton, **TRK** - Truck Load, **UI** - United Inch, **UNT** - Unit, **VLF** - Vertical Linear Foot, **WK** - Week, **YD** - Yard, **YR** - Year

Earth, Rock Mix. (75% E/ 25% R)	3380	2370	3720
Earth, Rock Mix. (50% E/50% R)	3750	2710	4000
Earth, Rock Mix. (25% E/ 75% R)	4120	3140	3680
Gravel (Average)	3280	2730	3570
Limestone	4380	2690	3220
Riprap Rock (Average)	4500	2610	3150
Granite	4540	2640	3170
Basalt	4950	3020	3640
Clay	3220	2150	3570
Gneiss	4550	2720	3180

MATERIAL WEIGHTS:

EARTHEN MATERIAL

- The following engineering values for establishing shrink/swell factors shall be used unless otherwise directed by the Owner.

Material	Material Weight (Lbs Per CY)		
	In-place (Bank)	Loose (Excavated Materials)	Compacted
Earth, Common (Average)	3170	2536	3520
Sand	2880	2590	3240

BULK FACTORS FOR DEMOLITION:

- The following bulk factors shall be used to calculate the volume of demolished material to be transported from the project site.
 - Asphalt** = 1.25
 - Concrete** = 1.40

CONVERSIONS:

- 1 Acre** = 43,560 Square Feet = 4046.8 Square Meters
- 1 Board Foot** = 12" x 12" x 1" = 144 Cubic Inches
- 1 Centimeter** = 0.3937 Inches = 0.0328 Feet
- 1 Cubic Foot** = 0.03704 Cubic Yards = 0.02832 Cubic Meters
- 1 Cubic Meter** = 1.3080 Cubic Yards = 35.3147 Cubic Feet
- 1 Cubic Yard** = 27 Cubic Feet = 0.7646 Cubic Meters
- 1 Foot** = 12 Inches = 0.3048 Meters
- 1 Inch** = 2.54 Centimeters = 0.0254 Meters
- 1 Kilogram** = 2.2046 Pounds
- 1 Kilometer** = 0.6214 Miles = 3280 Feet
- 1 Meter** = 100 Centimeters = 3.2808 Feet

Using The Construction Task Catalog®

1 Mile = 5280 Feet = 1.6093 Kilometers

1 Pound = 0.4536 Kilograms

1 Square Foot = 144 Square Inches = .0929 Square Meters

1 Square Meter = 1.1960 Square Yards = 10.7639 Square Feet

1 Square Yard = 9 Square Feet = 0.8361 Square Meters

1 Ton = 2000 Pounds = 907.185 Kilograms

1 Yard = 3 Feet = 0.9144 Meters

- Volume = $(4 \pi \text{ radius}^3) / 3$
- Surface Area = $4 \pi \text{ radius}^2$

$\pi = 3.14159$

United Inch

- The industry standard for measuring windows is the United Inch or UI. The UI is determined by adding the width and the height in inches.

TRADEMARKS

- Gordian JOC Solution, JOC Complete Solution, JOC Complete Solution Plus, PROGEN, eGordian, eziQC, Construction Task Catalog, Catalog of Construction Tasks, DMAP, The Standard for Job Order Contracting and 6 Phase Development and Implementation Process are either registered trademarks or trademarks of The Gordian Group, Inc. The names of actual companies and products mentioned herein may be the trademarks of their respective owners.
- companies and products mentioned herein may be the trademarks of their respective owners.

Sheet Metal Thickness (inches)				
Gage No.	Steel Sheet	Galvanized Steel Sheet	Stainless Steel Sheet	Aluminum Sheet
10	.135	.138	.141	
11	.120	.123	.125	
12	.105	.108	.109	
13	.090	.093	.094	.072
14	.075	.079	.078	.064
15	.067	.071	.070	.057
16	.060	.064	.063	.051
17	.054	.058	.056	.045
18	.048	.052	.050	.040
19	.042	.046	.044	.036
20	.036	.040	.038	.032
21	.033	.037	.034	.028
22	.030	.034	.031	.025
23	.027	.031	.028	.023
24	.024	.028	.025	.020
25	.021	.025	.022	.018
26	.018	.022	.019	.017

STANDARD GEOMETRY:

Circle

- Circumference = $2 \pi \text{ radius} = \pi \text{ diameter}$
- Area = $\pi \text{ radius}^2 = \pi (\text{diameter}^2 / 4)$

Cylinder

- Volume = $(\pi \text{ radius}^2) \text{height}$
- Surface Area = $2 \pi \text{ radius}^2 + (2 \pi \text{ radius}) \text{height}$

Sphere



General Requirements		01
Summary		01 10
Summary Of Work		01 11

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 General Requirements

01 10 Summary ⁽⁰¹⁾

01 11 Summary Of Work ^(01 10)

01 11 13 Work Covered by Contract Documents ^(01 11)

Note: For specification publishing. Review specifications for requirements.

01 11 13 00-001	NTE Work Covered by Contract Documents	0.00
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Note: For specification publishing. Review specifications for requirements.

01 20 Price and Payment Procedures ⁽⁰¹⁾

01 22 Unit Prices ^(01 20)

01 22 16 Unit Price Payment ^(01 22)

01 22 16 00-001 Reimbursable Fees ^(01 22 16)

Note: Reimbursable fees include but are not limited to permits, special inspections, special insurance, additional warranties, tolls, expedited shipping costs, etc, which are not included in a task or an Adjustment Factor as explained in the Contract or The Construction Task Catalog®.

01 22 16 00-002	EA Reimbursable Fees.....	1.00
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Note: Reimbursable Fees will be paid to the contractor for eligible costs as directed by Owner. Insert the appropriate quantity to adjust the base cost to the actual Reimbursable Fee. If there are multiple Reimbursable Fees, list each one separately and add a comment in the "note" block to identify the Reimbursable Fee (e.g. sidewalk closure, road cut, various permits, extended warranty, expedited shipping costs, etc.). A copy of each receipt, invoice, or proof of payment shall be submitted with the Price Proposal.

01 22 20 Wage Rates ^(01 22)

01 22 20 00-001 Local Labor/Wage Rates ^(01 22 20)

Note: Welders receive the rate prescribed for the craft performing the operation to which the welding is incidental.

01 22 20 00-002	HR Asbestos Removal Worker	101.04
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	5.05
	For Apprentice, Deduct	-20.21
01 22 20 00-003	HR Insulator	106.27
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	5.31
	For Apprentice, Deduct	-21.25
01 22 20 00-004	HR Boilermaker.....	102.35
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	5.12
	For Apprentice, Deduct	-20.47
01 22 20 00-005	HR Brick Layer.....	95.10
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	4.76
	For Apprentice, Deduct	-19.02
01 22 20 00-006	HR Carpenter.....	107.23
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	5.36
	For Apprentice, Deduct	-21.45
01 22 20 00-007	HR Carpet, Linoleum	87.52
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	4.38
	For Apprentice, Deduct	-17.50
01 22 20 00-008	HR Cement Mason	92.10
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	4.61
	For Apprentice, Deduct	-18.42
01 22 20 00-009	HR Drywall Finisher	101.40
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	5.07
	For Apprentice, Deduct	-20.28
01 22 20 00-010	HR Electrician	121.51
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	6.08
	For Apprentice, Deduct	-24.30
01 22 20 00-011	HR Equipment Operator (Crane Group 3)	120.70
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	6.04
01 22 20 00-012	HR Equipment Operator (Crane Group 5)	121.22
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	6.06
01 22 20 00-013	HR Equipment Operator (Crane Group 7)	121.55
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	6.08
01 22 20 00-014	HR Equipment Operator (Crane Group 8)	121.79
	Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	
	For Foreperson, Add	6.09

01	General Requirements
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 20 00-0015	HR		Equipment Operator (Crane Group 9)122.04 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.10	
01 22 20 00-0016	HR		Equipment Operator (Crane Group 10).....123.48 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.17	
01 22 20 00-0017	HR		Equipment Operator (Crane Group 11).....124.91 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.25	
01 22 20 00-0018	HR		Equipment Operator (Crane Group 12).....126.35 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.32	
01 22 20 00-0019	HR		Equipment Operator (Crane Group 13).....127.79 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.39	
01 22 20 00-0020	HR		Equipment Operator (Group 2).....118.34 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	5.92	
			<i>For Apprentice, Deduct</i>	-23.67	
01 22 20 00-0021	HR		Equipment Operator (Group 3).....118.76 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	5.94	
			<i>For Apprentice, Deduct</i>	-23.75	
01 22 20 00-0022	HR		Equipment Operator (Group 4).....120.90 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.05	
			<i>For Apprentice, Deduct</i>	-24.18	
01 22 20 00-0023	HR		Equipment Operator (Group 6).....121.22 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.06	
			<i>For Apprentice, Deduct</i>	-24.24	
01 22 20 00-0024	HR		Equipment Operator (Group 8).....121.38 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.07	
			<i>For Apprentice, Deduct</i>	-24.28	
01 22 20 00-0025	HR		Equipment Operator (Group 10).....121.55 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.08	
			<i>For Apprentice, Deduct</i>	-24.31	
01 22 20 00-0026	HR		Equipment Operator (Group 12).....121.79 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	6.09	
			<i>For Apprentice, Deduct</i>	-24.36	
01 22 20 00-0027	HR		Glazier .....111.91 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	5.60	
			<i>For Apprentice, Deduct</i>	-22.38	
01 22 20 00-0028	HR		Laborer .....96.60 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
01 22 20 00-0029	HR		Lather.....99.45 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	4.97	
			<i>For Apprentice, Deduct</i>	-19.89	
01 22 20 00-0030	HR		Marble Setter .....95.10 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	4.76	
			<i>For Apprentice, Deduct</i>	-19.02	
01 22 20 00-0031	HR		Millwright.....100.70 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	5.04	
			<i>For Apprentice, Deduct</i>	-20.14	
01 22 20 00-0032	HR		Mold Removal Worker .....100.63 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	5.03	
			<i>For Apprentice, Deduct</i>	-20.13	
01 22 20 00-0033	HR		Painter, Ordinary.....80.04 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	4.00	
			<i>For Apprentice, Deduct</i>	-16.01	
01 22 20 00-0034	HR		Painter, Structural Steel.....85.67 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	4.28	
			<i>For Apprentice, Deduct</i>	-17.13	
01 22 20 00-0035	HR		Paperhanger .....80.04 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	4.00	
			<i>For Apprentice, Deduct</i>	-16.01	
01 22 20 00-0036	HR		Pile Drivers .....106.25 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	5.31	
			<i>For Apprentice, Deduct</i>	-21.25	
01 22 20 00-0037	HR		Plasterer99.59 Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			<i>For Foreperson, Add</i>	4.98	
			<i>For Apprentice, Deduct</i>	-19.92	



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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 20 00-0038	HR		Plumber	113.43	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	5.67	
			For Apprentice, Deduct	-22.69	
01 22 20 00-0039	HR		Powderman	105.84	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	5.29	
			For Apprentice, Deduct	-21.17	
01 22 20 00-0040	HR		Rodman (Reinforcing)/Ornamental Steel Worker	107.07	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	5.35	
			For Apprentice, Deduct	-21.41	
01 22 20 00-0041	HR		Roofer, Composite	123.54	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	6.18	
			For Apprentice, Deduct	-24.71	
01 22 20 00-0042	HR		Roofer, Metal	148.67	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	7.43	
			For Apprentice, Deduct	-29.73	
01 22 20 00-0043	HR		Roofer, Tile/Slate	119.91	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	6.00	
			For Apprentice, Deduct	-23.98	
01 22 20 00-0044	HR		Sheet Metal Worker	120.81	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	6.04	
			For Apprentice, Deduct	-24.16	
01 22 20 00-0045	HR		Sprinkler Installer	112.31	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	5.62	
			For Apprentice, Deduct	-22.46	
01 22 20 00-0046	HR		Steam / Pipe Fitter	113.43	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	5.67	
			For Apprentice, Deduct	-22.69	
01 22 20 00-0047	HR		Stone Mason	95.10	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.76	
			For Apprentice, Deduct	-19.02	
01 22 20 00-0048	HR		Structural Steel Worker	110.36	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	5.52	
			For Apprentice, Deduct	-22.07	
01 22 20 00-0049	HR		Tile Layer	91.74	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.59	
			For Apprentice, Deduct	-18.35	
01 22 20 00-0050	HR		Terrazzo Worker	85.00	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.25	
			For Apprentice, Deduct	-17.00	
01 22 20 00-0051	HR		Truck Driver (Group 2)	93.63	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.68	
			For Apprentice, Deduct	-18.73	
01 22 20 00-0052	HR		Truck Driver (Group 3)	93.82	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.69	
			For Apprentice, Deduct	-18.76	
01 22 20 00-0053	HR		Truck Driver (Group 4)	94.10	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.71	
			For Apprentice, Deduct	-18.82	
01 22 20 00-0054	HR		Truck Driver (Group 5)	94.15	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.71	
			For Apprentice, Deduct	-18.83	
01 22 20 00-0055	HR		Truck Driver (Group 6)	94.19	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.71	
			For Apprentice, Deduct	-18.84	
01 22 20 00-0056	HR		Truck Driver (Group 7)	94.56	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.71	
			For Apprentice, Deduct	-18.91	
01 22 20 00-0057	HR		Truck Driver (Group 8)	94.93	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.75	
			For Apprentice, Deduct	-18.99	
01 22 20 00-0058	HR		Truck Driver (Group 9)	95.23	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		
			For Foreperson, Add	4.76	
			For Apprentice, Deduct	-19.05	
01 22 20 00-0059	HR		Class I Diver	209.34	
			Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.		

01	01	General Requirements
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 20 00-0060	HR		Class III Diver Tender Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	117.45	
01 22 20 00-0061	HR		D1 Certified Welder..... Note: For tasks not included in the Construction Task Catalog® and as directed by owner only.	124.61	
01 22 20 00-0062			Rates For Services (01 22 20)		
01 22 20 00-0063	HR		Watch/Guard Person, Unarmed.....	40.00	
01 22 20 00-0064	HR		Watch/Guard Person, Armed.....	51.40	
01 22 20 00-0065	HR		Senior Surveyor (Party Chief).....	136.41	
01 22 20 00-0066	HR		Surveyor (Instrument person).....	126.19	
01 22 20 00-0067	HR		Surveyor (Rod Person).....	125.21	
01 22 20 00-0068	HR		On-Site Certified Materials Testing Technician.....	95.98	
01 22 20 00-0069	HR		Certified Industrial Hygienist.....	129.38	
01 22 20 00-0070	MI		Mileage For Professional Services (Engineering, Surveying, Etcetera)..... Note: For use only when the Owner directs the contractor to use personnel whose base of operations is more than 100 miles from the site. Quantity shall be miles that exceed 100.	0.67	
01 22 20 00-0071	HR		Fire Watch Laborer..... Note: Fire watchers shall be required whenever welding or cutting is performed in locations where other than a minor fire might develop, or any of the following conditions exist: (1) Appreciable combustible material, in building construction or contents, closer than 35 feet (10.7 m) to the point of operation. (2) Appreciable combustibles are more than 35 feet (10.7 m) away but are easily ignited by sparks. (3) Wall or floor openings within a 35-foot (10.7 m) radius expose combustible material in adjacent areas including concealed spaces in walls or floors. (4) Combustible materials are adjacent to the opposite side of metal partitions, walls, ceilings, or roofs and are likely to be ignited by conduction or radiation.	96.60	
01 22 20 00-0072			Rates For Project Management Services (01 22 20)		
01 22 20 00-0073	HR		Project Manager.....	156.25	
01 22 20 00-0074			Rates For Architectural And Engineering Services (01 22 20) Note: For preparation of contract documents, structural and/or design drawings, special investigating requirements or services outside required architectural and engineering services.		
01 22 20 00-0075	HR		Principal Engineer.....	205.00	
01 22 20 00-0076	HR		Senior Engineer.....	170.00	
01 22 20 00-0077	HR		Engineer.....	133.75	
01 22 20 00-0078			Rates For Traffic Control (01 22 20)		
01 22 20 00-0079	HR		Flagperson For Traffic Control.....	96.60	
01 22 20 00-0080			Mobilize Equipment (01 22 20)		
01 22 20 00-0081	HR		Escort Vehicle With Driver.....	108.52	
01 22 20 00-0082	HR		Transport Vehicle With Driver.....	140.25	
01 22 23			Equipment Usage (01 22) Note: Includes fuel costs unless otherwise stated. These tasks shall be used for owned, leased or rented equipment. Excludes mobilization unless otherwise stated. See CSI section 01 22 20 00-0078 for traffic control (where required), 01 71 13 00-0000 for equipment delivery, pickup, mobilization and demobilization.		
01 22 23 00-0001			Aerial Equipment (01 22 23)		
01 22 23 00-0002			Man Lifts (01 22 23 00-0001) Note: Excludes operator, delivery, set-up, and removal.		
01 22 23 00-0003			Telescoping Boom Man Lifts With Platform (01 22 23 00-0002)		
01 22 23 00-0004			Engine Powered, Telescoping Boom Man Lifts With Platform (01 22 23 00-0003) Note: Diesel or dual fuel (gasoline or liquid propane gas). Two-wheel drive. For use on unpaved or paved surfaces.		
01 22 23 00-0005	DAY		40' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i>	482.20 108.50	
01 22 23 00-0006	WK		40' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i>	1,213.29 272.99	
01 22 23 00-0007	MO		40' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i> <i>For >6 Months (>26 Weeks), Deduct</i>	2,722.12 612.48 -108.88	
01 22 23 00-0008	DAY		60' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i>	707.75 159.24	
01 22 23 00-0009	WK		60' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i>	1,687.72 379.74	
01 22 23 00-0010	MO		60' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i> <i>For >6 Months (>26 Weeks), Deduct</i>	3,694.31 831.22 -147.77	
01 22 23 00-0011	DAY		80' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i>	1,376.62 309.74	
01 22 23 00-0012	WK		80' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i>	3,336.55 750.72	
01 22 23 00-0013	MO		80' Engine Powered, Telescoping Boom Man Lift With Platform..... <i>For Four-Wheel Drive, Add</i> <i>For >6 Months (>26 Weeks), Deduct</i>	6,999.75 1,574.94 -279.99	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0014 DAY 110' Engine Powered, Telescoping Boom Man Lift With Platform <i>For Four-Wheel Drive, Add</i>	1,959.93 440.98	
01 22 23 00-0015 WK 110' Engine Powered, Telescoping Boom Man Lift With Platform <i>For Four-Wheel Drive, Add</i>	4,719.39 1,061.86	
01 22 23 00-0016 MO 110' Engine Powered, Telescoping Boom Man Lift With Platform <i>For Four-Wheel Drive, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	11,759.58 2,645.91 -470.38	
01 22 23 00-0017 DAY 120' Engine Powered, Telescoping Boom Man Lift With Platform <i>For Four-Wheel Drive, Add</i>	2,387.69 537.23	
01 22 23 00-0018 WK 120' Engine Powered, Telescoping Boom Man Lift With Platform <i>For Four-Wheel Drive, Add</i>	6,089.78 1,370.20	
01 22 23 00-0019 MO 120' Engine Powered, Telescoping Boom Man Lift With Platform <i>For Four-Wheel Drive, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	13,843.95 3,114.89 -553.76	
01 22 23 00-0020 Articulating (Up/Over) Boom Man Lifts With Platform <small>(01 22 23 00-0002)</small>		
01 22 23 00-0021 Engine Powered, Articulating (Up/Over) Boom Man Lifts With Platform <small>(01 22 23 00-0020)</small> <small>Note: Diesel or dual fuel (gasoline or liquid propane gas). Four-wheel drive. For use on unpaved or paved surfaces.</small>		
01 22 23 00-0022 DAY 34' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	464.83	
01 22 23 00-0023 WK 34' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	1,166.31	
01 22 23 00-0024 MO 34' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	2,805.90 -112.24	
01 22 23 00-0025 DAY 45' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	591.60	
01 22 23 00-0026 WK 45' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	1,293.08	
01 22 23 00-0027 MO 45' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	3,209.88 -128.40	
01 22 23 00-0028 DAY 60' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	760.64	
01 22 23 00-0029 WK 60' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	1,757.91	
01 22 23 00-0030 MO 60' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	3,929.95 -157.20	
01 22 23 00-0031 DAY 80' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	1,326.89	
01 22 23 00-0032 WK 80' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	3,127.06	
01 22 23 00-0033 MO 80' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	7,604.66 -304.19	
01 22 23 00-0034 DAY 125' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	2,577.71	
01 22 23 00-0035 WK 125' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform	6,085.08	
01 22 23 00-0036 MO 125' Engine Powered, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	14,874.64 -594.99	
01 22 23 00-0037 Electric, Articulating (Up/Over) Boom Man Lifts With Platform <small>(01 22 23 00-0020)</small> <small>Note: For use on paved surfaces.</small>		
01 22 23 00-0038 DAY 30' Electric, Articulating (Up/Over) Boom Man Lift With Platform	464.83	
01 22 23 00-0039 WK 30' Electric, Articulating (Up/Over) Boom Man Lift With Platform	1,166.31	
01 22 23 00-0040 MO 30' Electric, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	2,805.90 -112.24	
01 22 23 00-0041 DAY 35' Electric, Articulating (Up/Over) Boom Man Lift With Platform	464.83	
01 22 23 00-0042 WK 35' Electric, Articulating (Up/Over) Boom Man Lift With Platform	1,166.31	
01 22 23 00-0043 MO 35' Electric, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	2,805.90 -112.24	
01 22 23 00-0044 DAY 40' Electric, Articulating (Up/Over) Boom Man Lift With Platform	574.70	
01 22 23 00-0045 WK 40' Electric, Articulating (Up/Over) Boom Man Lift With Platform	1,242.37	
01 22 23 00-0046 MO 40' Electric, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	3,084.80 -123.39	
01 22 23 00-0047 DAY 45' Electric, Articulating (Up/Over) Boom Man Lift With Platform	574.70	
01 22 23 00-0048 WK 45' Electric, Articulating (Up/Over) Boom Man Lift With Platform	1,242.37	
01 22 23 00-0049 MO 45' Electric, Articulating (Up/Over) Boom Man Lift With Platform <i>For >6 Months (>26 Weeks) , Deduct</i>	3,084.80 -123.39	
01 22 23 00-0050 Platform Lifts <small>(01 22 23 00-0001)</small> <small>Note: Excludes operator, delivery, set-up, and removal.</small>		
01 22 23 00-0051 Electric, Scissor Platform Lifts <small>(01 22 23 00-0050)</small> <small>Note: For use on paved surfaces.</small>		
01 22 23 00-0052 DAY 17' Electric, Scissor Platform Lift	171.29	
01 22 23 00-0053 WK 17' Electric, Scissor Platform Lift	342.58	
01 22 23 00-0054 MO 17' Electric, Scissor Platform Lift <i>For >6 Months (>26 Weeks) , Deduct</i>	700.74 -28.03	
01 22 23 00-0055 DAY 20' Electric, Scissor Platform Lift	186.86	
01 22 23 00-0056 WK 20' Electric, Scissor Platform Lift	373.73	
01 22 23 00-0057 MO 20' Electric, Scissor Platform Lift <i>For >6 Months (>26 Weeks) , Deduct</i>	747.46 -29.90	
01 22 23 00-0058 DAY 25' Electric, Scissor Platform Lift	241.37	
01 22 23 00-0059 WK 25' Electric, Scissor Platform Lift	482.73	
01 22 23 00-0060 MO 25' Electric, Scissor Platform Lift <i>For >6 Months (>26 Weeks) , Deduct</i>	1,035.54 -41.42	
01 22 23 00-0061 DAY 30' Electric, Scissor Platform Lift	311.44	
01 22 23 00-0062 WK 30' Electric, Scissor Platform Lift	615.09	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 22 23 00-0063	MO	30' Electric, Scissor Platform Lift.....	1,362.55	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-54.50	
01 22 23 00-0064	DAY	33' Electric, Scissor Platform Lift.....	334.80	
01 22 23 00-0065	WK	33' Electric, Scissor Platform Lift.....	654.02	
01 22 23 00-0066	MO	33' Electric, Scissor Platform Lift.....	1,479.34	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-59.17	
01 22 23 00-0067	DAY	40' Electric, Scissor Platform Lift.....	436.02	
01 22 23 00-0068	WK	40' Electric, Scissor Platform Lift.....	1,082.25	
01 22 23 00-0069	MO	40' Electric, Scissor Platform Lift.....	3,013.18	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-120.53	

01 22 23 00-0070 Engine Powered, Scissor Platform Lifts (01 22 23 00-0050)

Note: Diesel or dual fuel (gasoline or liquid propane gas). Two-wheel drive. For use on unpaved or paved surfaces.

01 22 23 00-0071	DAY	25' Engine Powered, Scissor Platform Lift.....	423.74	
		<i>For Four-Wheel Drive, Add</i>	84.75	
01 22 23 00-0072	WK	25' Engine Powered, Scissor Platform Lift.....	828.65	
		<i>For Four-Wheel Drive, Add</i>	165.73	
01 22 23 00-0073	MO	25' Engine Powered, Scissor Platform Lift.....	2,024.55	
		<i>For Four-Wheel Drive, Add</i>	404.91	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-80.98	
01 22 23 00-0074	DAY	33' Engine Powered, Scissor Platform Lift.....	433.16	
		<i>For Four-Wheel Drive, Add</i>	86.63	
01 22 23 00-0075	WK	33' Engine Powered, Scissor Platform Lift.....	988.73	
		<i>For Four-Wheel Drive, Add</i>	197.75	
01 22 23 00-0076	MO	33' Engine Powered, Scissor Platform Lift.....	2,165.80	
		<i>For Four-Wheel Drive, Add</i>	433.16	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-86.63	
01 22 23 00-0077	DAY	40' Engine Powered, Scissor Platform Lift.....	480.24	
		<i>For Four-Wheel Drive, Add</i>	96.05	
01 22 23 00-0078	WK	40' Engine Powered, Scissor Platform Lift.....	1,101.73	
		<i>For Four-Wheel Drive, Add</i>	220.35	
01 22 23 00-0079	MO	40' Engine Powered, Scissor Platform Lift.....	2,448.29	
		<i>For Four-Wheel Drive, Add</i>	489.66	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-97.93	
01 22 23 00-0080	DAY	43' Engine Powered, Scissor Platform Lift.....	508.49	
		<i>For Four-Wheel Drive, Add</i>	101.70	
01 22 23 00-0081	WK	43' Engine Powered, Scissor Platform Lift.....	1,186.48	
		<i>For Four-Wheel Drive, Add</i>	237.30	
01 22 23 00-0082	MO	43' Engine Powered, Scissor Platform Lift.....	2,919.12	
		<i>For Four-Wheel Drive, Add</i>	583.82	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-116.76	
01 22 23 00-0083	DAY	50' Engine Powered, Scissor Platform Lift.....	951.07	
		<i>For Four-Wheel Drive, Add</i>	190.21	
01 22 23 00-0084	WK	50' Engine Powered, Scissor Platform Lift.....	2,090.46	
		<i>For Four-Wheel Drive, Add</i>	418.09	
01 22 23 00-0085	MO	50' Engine Powered, Scissor Platform Lift.....	5,141.41	
		<i>For Four-Wheel Drive, Add</i>	1,028.28	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-205.66	

01 22 23 00-0086 Personnel Lifts (01 22 23 00-0001)

Note: Includes delivery to job site and pick-up when complete. Excludes operator. For use on paved surfaces.

01 22 23 00-0087	DAY	24', Push-Type, Electric Single Man Personnel Lift.....	135.33	
01 22 23 00-0088	WK	24', Push-Type, Electric Single Man Personnel Lift.....	383.44	
01 22 23 00-0089	MO	24', Push-Type, Electric Single Man Personnel Lift.....	774.41	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-30.98	
01 22 23 00-0090	DAY	30', Push-Type, Electric Single Man Personnel Lift.....	187.96	
01 22 23 00-0091	WK	30', Push-Type, Electric Single Man Personnel Lift.....	398.48	
01 22 23 00-0092	MO	30', Push-Type, Electric Single Man Personnel Lift.....	1,353.33	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-54.13	
01 22 23 00-0093	DAY	36', Push-Type, Electric Single Man Personnel Lift.....	315.78	
01 22 23 00-0094	WK	36', Push-Type, Electric Single Man Personnel Lift.....	766.89	
01 22 23 00-0095	MO	36', Push-Type, Electric Single Man Personnel Lift.....	2,240.51	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-89.62	
01 22 23 00-0096	DAY	40', Push-Type, Electric Single Man Personnel Lift.....	338.33	
01 22 23 00-0097	WK	40', Push-Type, Electric Single Man Personnel Lift.....	842.07	
01 22 23 00-0098	MO	40', Push-Type, Electric Single Man Personnel Lift.....	2,533.73	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-101.35	
01 22 23 00-0099	DAY	15', Self-Propelled, Electric Single Man Personnel Lift.....	180.44	
01 22 23 00-0100	WK	15', Self-Propelled, Electric Single Man Personnel Lift.....	360.89	
01 22 23 00-0101	MO	15', Self-Propelled, Electric Single Man Personnel Lift.....	721.78	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-28.87	
01 22 23 00-0102	DAY	20', Self-Propelled, Electric Single Man Personnel Lift.....	180.44	
01 22 23 00-0103	WK	20', Self-Propelled, Electric Single Man Personnel Lift.....	360.89	
01 22 23 00-0104	MO	20', Self-Propelled, Electric Single Man Personnel Lift.....	750.35	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-30.01	

01 22 23 00-0105 Bucket Trucks (01 22 23 00-0001)

Note: Includes full-time operator, delivery, and removal.

01 22 23 00-0106	DAY	29' To 33' Bucket Truck With Full-Time Operator.....	1,452.47	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0107 WK 29' To 33' Bucket Truck With Full-Time Operator	5,864.46	
For Equipment Without Operator, Deduct	-3,767.64	
01 22 23 00-0108 MO 29' To 33' Bucket Truck With Full-Time Operator	21,663.82	
For Equipment Without Operator, Deduct	-16,326.46	
For >6 Months (>26 Weeks) , Deduct	-213.49	
01 22 23 00-0109 DAY 38' To 41' Bucket Truck With Full-Time Operator	1,541.43	
For Equipment Without Operator, Deduct	-753.53	
01 22 23 00-0110 WK 38' To 41' Bucket Truck With Full-Time Operator	6,150.39	
For Equipment Without Operator, Deduct	-3,767.64	
01 22 23 00-0111 MO 38' To 41' Bucket Truck With Full-Time Operator	22,426.30	
For Equipment Without Operator, Deduct	-16,326.46	
For >6 Months (>26 Weeks) , Deduct	-243.99	
01 22 23 00-0112 DAY 45' To 48' Bucket Truck With Full-Time Operator	1,770.17	
For Equipment Without Operator, Deduct	-753.53	
01 22 23 00-0113 WK 45' To 48' Bucket Truck With Full-Time Operator	6,563.40	
For Equipment Without Operator, Deduct	-3,767.64	
01 22 23 00-0114 MO 45' To 48' Bucket Truck With Full-Time Operator	23,315.86	
For Equipment Without Operator, Deduct	-16,326.46	
For >6 Months (>26 Weeks) , Deduct	-279.58	
01 22 23 00-0115 DAY 62' Bucket Truck With Full-Time Operator	2,278.49	
For Equipment Without Operator, Deduct	-753.53	
01 22 23 00-0116 WK 62' Bucket Truck With Full-Time Operator	8,215.44	
For Equipment Without Operator, Deduct	-3,767.64	
01 22 23 00-0117 MO 62' Bucket Truck With Full-Time Operator	27,763.66	
For Equipment Without Operator, Deduct	-16,326.46	
For >6 Months (>26 Weeks) , Deduct	-457.49	
01 22 23 00-0118 DAY 85' Bucket Truck With Full-Time Operator	2,532.65	
For Equipment Without Operator, Deduct	-753.53	
01 22 23 00-0119 WK 85' Bucket Truck With Full-Time Operator	9,105.00	
For Equipment Without Operator, Deduct	-3,767.64	
01 22 23 00-0120 MO 85' Bucket Truck With Full-Time Operator	30,940.66	
For Equipment Without Operator, Deduct	-16,326.46	
For >6 Months (>26 Weeks) , Deduct	-584.57	
01 22 23 00-0121 Day 105' Bucket Truck With Full-Time Operator	2,659.73	
For Equipment Without Operator, Deduct	-753.53	
01 22 23 00-0122 WK 105' Bucket Truck With Full-Time Operator	9,486.24	
For Equipment Without Operator, Deduct	-3,767.64	
01 22 23 00-0123 MO 105' Bucket Truck With Full-Time Operator	31,245.65	
For Equipment Without Operator, Deduct	-16,326.46	
For >6 Months (>26 Weeks) , Deduct	-596.77	
01 22 23 00-0124 Air Equipment (01 22 23)		
01 22 23 00-0125 Air Compressors (01 22 23 00-0124)		
Note: Includes delivery, set-up, and removal. Excludes operator.		
01 22 23 00-0126 DAY 100 CFM Diesel Powered Portable Air Compressor	179.54	
01 22 23 00-0127 WK 100 CFM Diesel Powered Portable Air Compressor	538.60	
01 22 23 00-0128 MO 100 CFM Diesel Powered Portable Air Compressor	1,496.12	
For >6 Months (>26 Weeks) , Deduct	-59.84	
01 22 23 00-0129 DAY 130 CFM Diesel Powered Portable Air Compressor	215.44	
01 22 23 00-0130 WK 130 CFM Diesel Powered Portable Air Compressor	634.36	
01 22 23 00-0131 MO 130 CFM Diesel Powered Portable Air Compressor	1,795.35	
For >6 Months (>26 Weeks) , Deduct	-71.81	
01 22 23 00-0132 DAY 185 CFM Diesel Powered Portable Air Compressor	287.26	
01 22 23 00-0133 WK 185 CFM Diesel Powered Portable Air Compressor	646.33	
01 22 23 00-0134 MO 185 CFM Diesel Powered Portable Air Compressor	1,424.31	
For >6 Months (>26 Weeks) , Deduct	-56.97	
01 22 23 00-0135 DAY 375 CFM Diesel Powered Portable Air Compressor	406.95	
01 22 23 00-0136 WK 375 CFM Diesel Powered Portable Air Compressor	1,029.33	
01 22 23 00-0137 MO 375 CFM Diesel Powered Portable Air Compressor	2,453.64	
For >6 Months (>26 Weeks) , Deduct	-98.15	
01 22 23 00-0138 DAY 600 CFM Diesel Powered Portable Air Compressor	904.86	
01 22 23 00-0139 WK 600 CFM Diesel Powered Portable Air Compressor	2,178.36	
01 22 23 00-0140 MO 600 CFM Diesel Powered Portable Air Compressor	5,429.14	
For >6 Months (>26 Weeks) , Deduct	-217.17	
01 22 23 00-0141 DAY 750 CFM Diesel Powered Portable Air Compressor	1,089.18	
01 22 23 00-0142 WK 750 CFM Diesel Powered Portable Air Compressor	2,681.06	
01 22 23 00-0143 MO 750 CFM Diesel Powered Portable Air Compressor	6,582.95	
For >6 Months (>26 Weeks) , Deduct	-263.32	
01 22 23 00-0144 DAY 825 CFM Diesel Powered Portable Air Compressor	1,089.18	
01 22 23 00-0145 WK 825 CFM Diesel Powered Portable Air Compressor	2,681.06	
01 22 23 00-0146 MO 825 CFM Diesel Powered Portable Air Compressor	6,582.95	
For >6 Months (>26 Weeks) , Deduct	-263.32	
01 22 23 00-0147 DAY 1,300 CFM Diesel Powered Portable Air Compressor	1,268.71	
01 22 23 00-0148 WK 1,300 CFM Diesel Powered Portable Air Compressor	2,843.83	
01 22 23 00-0149 MO 1,300 CFM Diesel Powered Portable Air Compressor	7,583.56	
For >6 Months (>26 Weeks) , Deduct	-303.34	
01 22 23 00-0150 DAY 1,600 CFM Diesel Powered Portable Air Compressor	1,579.91	
01 22 23 00-0151 WK 1,600 CFM Diesel Powered Portable Air Compressor	3,554.79	
01 22 23 00-0152 MO 1,600 CFM Diesel Powered Portable Air Compressor	9,479.45	
For >6 Months (>26 Weeks) , Deduct	-379.18	

01	01	General Requirements
	01 20	Price and Payment Procedures
	01 22	Unit Prices



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-0153 Portable Negative Air Machines (01 22 23 00-0124)
 Note: A Negative Air Machine is used in a sealed containment area to filter air and exhaust the filtered air through ducting to a location outside the sealed containment area. Includes delivery to job site and pick-up when complete. Excludes all filters and duct.

01 22 23 00-0154	DAY	Up To 2,000 CFM, Portable Negative Air Machine	136.57	
01 22 23 00-0155	WK	Up To 2,000 CFM, Portable Negative Air Machine	560.92	
01 22 23 00-0156	MO	Up To 2,000 CFM, Portable Negative Air Machine	1,694.97	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-67.80	
01 22 23 00-0157	EA	First Stage Pre-Filter For Portable Negative Air Machines	14.54	
01 22 23 00-0158	EA	Second Stage Pre-Filter For Portable Negative Air Machines	29.82	
01 22 23 00-0159	EA	High Efficiency Particulate Air (HEPA) Filter, 99.99% Efficient At 0.3 Micron For Portable Negative Air Machines.....	142.40	
01 22 23 00-0160	LF	Flexible Exhaust Duct For Portable Negative Air Machines.....	2.60	

01 22 23 00-0161 Portable Air Scrubbers (01 22 23 00-0124)
 Note: A Portable Air Scrubber filters and recirculates the filtered air into the same space and does not use ducting to exhaust the filtered air to a different location. Includes delivery to job site and pick-up when complete. Excludes all filters.

01 22 23 00-0162	DAY	Up To 1,000 CFM, Portable Air Scrubber	66.74	
01 22 23 00-0163	WK	Up To 1,000 CFM, Portable Air Scrubber	277.41	
01 22 23 00-0164	MO	Up To 1,000 CFM, Portable Air Scrubber	767.92	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-30.72	
01 22 23 00-0165	DAY	>1,000 to 2,000 CFM, Portable Air Scrubber.....	84.43	
01 22 23 00-0166	WK	>1,000 to 2,000 CFM, Portable Air Scrubber.....	349.78	
01 22 23 00-0167	MO	>1,000 to 2,000 CFM, Portable Air Scrubber.....	1,025.23	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-41.01	
01 22 23 00-0168	DAY	>2,000 To 5,000 CFM, Portable Air Scrubber.....	108.55	
01 22 23 00-0169	WK	>2,000 To 5,000 CFM, Portable Air Scrubber.....	462.36	
01 22 23 00-0170	MO	>2,000 To 5,000 CFM, Portable Air Scrubber.....	1,294.60	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-51.78	
01 22 23 00-0171	EA	First Stage Pre-Filter For Portable Air Scrubbers	19.37	
01 22 23 00-0172	EA	Second Stage Pre-Filter For Portable Air Scrubbers	25.80	
01 22 23 00-0173	EA	High Efficiency Particulate Air (HEPA) Filter, 99.99% Efficient At 0.3 Micron For Portable Air Scrubbers.....	238.89	

01 22 23 00-0174 Compaction And Paving Equipment (01 22 23)

01 22 23 00-0175 Steel Roadway Plates (01 22 23 00-0174)
 Note: 3 day minimum. Excludes delivery to job site and pick-up when complete. See CSI section 01 22 23 00-0176 for placement (set-up) from truck and removal from ground (load on truck), 01 71 13 00-0001 for material delivery on truck.

01 22 23 00-0176	EA	Placement And Removal Of Steel Roadway Plates.....	59.92	
01 22 23 00-0177	DAY	1" x 4' x 8' Steel Plate	44.12	
01 22 23 00-0178	WK	1" x 4' x 8' Steel Plate	104.18	
01 22 23 00-0179	MO	1" x 4' x 8' Steel Plate	137.10	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.48	
01 22 23 00-0180	DAY	1" x 4' x 10' Steel Plate	58.83	
01 22 23 00-0181	WK	1" x 4' x 10' Steel Plate	132.36	
01 22 23 00-0182	MO	1" x 4' x 10' Steel Plate	161.78	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-6.47	
01 22 23 00-0183	DAY	1" x 5' x 10' Steel Plate	61.28	
01 22 23 00-0184	WK	1" x 5' x 10' Steel Plate	138.49	
01 22 23 00-0185	MO	1" x 5' x 10' Steel Plate	367.68	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-14.71	
01 22 23 00-0186	DAY	1" x 6' x 8' Steel Plate	39.22	
01 22 23 00-0187	WK	1" x 6' x 8' Steel Plate	88.24	
01 22 23 00-0188	MO	1" x 6' x 8' Steel Plate	235.32	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-9.41	
01 22 23 00-0189	DAY	1" x 6' x 10' Steel Plate	73.54	
01 22 23 00-0190	WK	1" x 6' x 10' Steel Plate	96.82	
01 22 23 00-0191	MO	1" x 6' x 10' Steel Plate	258.60	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-10.34	
01 22 23 00-0192	DAY	1" x 6' x 12' Steel Plate	102.95	
01 22 23 00-0193	WK	1" x 6' x 12' Steel Plate	131.75	
01 22 23 00-0194	MO	1" x 6' x 12' Steel Plate	356.65	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-14.27	
01 22 23 00-0195	DAY	1" x 8' x 10' Steel Plate	64.96	
01 22 23 00-0196	WK	1" x 8' x 10' Steel Plate	145.85	
01 22 23 00-0197	MO	1" x 8' x 10' Steel Plate	388.52	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-15.54	
01 22 23 00-0198	DAY	1" x 8' x 12' Steel Plate	117.66	
01 22 23 00-0199	WK	1" x 8' x 12' Steel Plate	145.85	
01 22 23 00-0200	MO	1" x 8' x 12' Steel Plate	705.95	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-28.24	
01 22 23 00-0201	DAY	1" x 8' x 16' Steel Plate	156.88	
01 22 23 00-0202	WK	1" x 8' x 16' Steel Plate	352.97	
01 22 23 00-0203	MO	1" x 8' x 16' Steel Plate	941.26	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-37.65	
01 22 23 00-0204	LF	Cold Mix For Temporary Ramp Base, 6" At Edge Of Trench Plate.....	2.65	1.20
01 22 23 00-0205	EA	Removal And Resetting Of Steel Roadway Plate	33.29	



General Requirements		01
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0206 Street Sweepers <small>(01 22 23 00-0174)</small>		
Note: Includes full-time operator. Excludes delivery, set-up, and removal.		
01 22 23 00-0207 DAY 8' Road Broom, Self Propelled Street Sweeper With Full-Time Operator	1,179.70	
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0208 WK 8' Road Broom, Self Propelled Street Sweeper With Full-Time Operator	5,678.08	
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0209 MO 8' Road Broom, Self Propelled Street Sweeper With Full-Time Operator	23,956.20	
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-120.00	
01 22 23 00-0210 DAY Self-Propelled Street Sweeper With Hopper And Full-Time Operator	2,197.51	
Note: Truck with main and gutter brooms, elevator, debris hopper and water tank.		
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0211 WK Self-Propelled Street Sweeper With Hopper And Full-Time Operator	9,764.06	
Note: Truck with main and gutter brooms, elevator, debris hopper and water tank.		
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0212 MO Self-Propelled Street Sweeper With Hopper And Full-Time Operator	38,543.11	
Note: Truck with main and gutter brooms, elevator, debris hopper and water tank.		
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-703.48	
01 22 23 00-0213 Earthmoving Equipment <small>(01 22 23)</small>		
01 22 23 00-0214 Skid-Steer Loaders <small>(01 22 23 00-0213)</small>		
Note: Includes full-time operator and combination bucket and dozer blade attachments. Add extra attachments where necessary. Excludes delivery, set-up, and removal.		
01 22 23 00-0215 DAY 700 LB Capacity, 36" Wide, Skid-Steer Loader With Full-Time Operator	1,298.63	
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0216 WK 700 LB Capacity, 36" Wide, Skid-Steer Loader With Full-Time Operator	5,705.51	
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0217 MO 700 LB Capacity, 36" Wide, Skid-Steer Loader With Full-Time Operator	23,050.15	
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-83.76	
01 22 23 00-0218 DAY 1,500 To 1,700 LB Capacity, 60" Wide, Skid-Steer Loader With Full-Time Operator	1,385.99	
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0219 WK 1,500 To 1,700 LB Capacity, 60" Wide, Skid-Steer Loader With Full-Time Operator	5,863.59	
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0220 MO 1,500 To 1,700 LB Capacity, 60" Wide, Skid-Steer Loader With Full-Time Operator	23,396.82	
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-97.62	
01 22 23 00-0221 DAY 2,000 To 2,400 LB Capacity, 72" Wide, Skid-Steer Loader With Full-Time Operator	1,410.95	
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0222 WK 2,000 To 2,400 LB Capacity, 72" Wide, Skid-Steer Loader With Full-Time Operator	6,091.01	
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0223 MO 2,000 To 2,400 LB Capacity, 72" Wide, Skid-Steer Loader With Full-Time Operator	24,000.04	
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-121.75	
01 22 23 00-0224 DAY 2,500 To 2,700 LB Capacity, 78" Wide, Tracked Skid-Steer Loader With Full-Time Operator	1,508.02	
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0225 WK 2,500 To 2,700 LB Capacity, 78" Wide, Tracked Skid-Steer Loader With Full-Time Operator	6,409.95	
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0226 MO 2,500 To 2,700 LB Capacity, 78" Wide, Tracked Skid-Steer Loader With Full-Time Operator	25,053.93	
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-163.91	
01 22 23 00-0227 DAY 3,200 To 3,500 LB Capacity, 78" Wide, Tracked Skid-Steer Loader With Full-Time Operator	1,674.43	
For Equipment Without Operator, Deduct	-967.21	
01 22 23 00-0228 WK 3,200 To 3,500 LB Capacity, 78" Wide, Tracked Skid-Steer Loader With Full-Time Operator	7,040.90	
For Equipment Without Operator, Deduct	-4,836.05	
01 22 23 00-0229 MO 3,200 To 3,500 LB Capacity, 78" Wide, Tracked Skid-Steer Loader With Full-Time Operator	26,607.03	
For Equipment Without Operator, Deduct	-20,956.23	
For >6 Months (>26 Weeks), Deduct	-226.03	
01 22 23 00-0230 DAY Hydraulic Hammer Attachment For Skid-Steer Loaders	277.34	
01 22 23 00-0231 WK Hydraulic Hammer Attachment For Skid-Steer Loaders	922.16	
01 22 23 00-0232 MO Hydraulic Hammer Attachment For Skid-Steer Loaders	2,454.46	
For >6 Months (>26 Weeks), Deduct	-98.18	
01 22 23 00-0233 DAY Forklift Attachment For Skid-Steer Loaders	59.63	
01 22 23 00-0234 WK Forklift Attachment For Skid-Steer Loaders	159.47	
01 22 23 00-0235 MO Forklift Attachment For Skid-Steer Loaders	450.68	
For >6 Months (>26 Weeks), Deduct	-18.03	
01 22 23 00-0236 DAY Backhoe Attachment For Skid-Steer Loaders	131.74	
01 22 23 00-0237 WK Backhoe Attachment For Skid-Steer Loaders	316.17	
01 22 23 00-0238 MO Backhoe Attachment For Skid-Steer Loaders	786.26	
For >6 Months (>26 Weeks), Deduct	-31.45	
01 22 23 00-0239 DAY Broom Attachment For Skid-Steer Loaders	130.35	
01 22 23 00-0240 WK Broom Attachment For Skid-Steer Loaders	353.61	
01 22 23 00-0241 MO Broom Attachment For Skid-Steer Loaders	936.02	
For >6 Months (>26 Weeks), Deduct	-37.44	
01 22 23 00-0242 DAY Auger Attachment (Excludes Bits And Extensions) For Skid-Steer Loaders	113.71	
01 22 23 00-0243 WK Auger Attachment (Excludes Bits And Extensions) For Skid-Steer Loaders	313.39	
01 22 23 00-0244 MO Auger Attachment (Excludes Bits And Extensions) For Skid-Steer Loaders	855.59	
For >6 Months (>26 Weeks), Deduct	-34.22	
01 22 23 00-0245 DAY Up To 18" Diameter, 4' Length, Auger Bit For Skid-Steer Mounted Augers (Excludes Auger)	31.34	
01 22 23 00-0246 WK Up To 18" Diameter, 4' Length, Auger Bit For Skid-Steer Mounted Augers (Excludes Auger)	82.00	

01	01	General Requirements
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-0247	MO		Up To 18" Diameter, 4' Length, Auger Bit For Skid-Steer Mounted Augers (Excludes Auger)241.16 <i>For >6 Months (>26 Weeks) , Deduct</i> -9.65		
01 22 23 00-0248	DAY		>18" To 48" Diameter, 4' Length, Auger Bit For Skid-Steer Mounted Augers (Excludes Auger).....42.20		
01 22 23 00-0249	WK		>18" To 48" Diameter, 4' Length, Auger Bit For Skid-Steer Mounted Augers (Excludes Auger).....104.90		
01 22 23 00-0250	MO		>18" To 48" Diameter, 4' Length, Auger Bit For Skid-Steer Mounted Augers (Excludes Auger).....313.52 <i>For >6 Months (>26 Weeks) , Deduct</i> -12.54		
01 22 23 00-0251	DAY		Up To 24" Diameter, 4' Length, Rock Tip Auger Bit For Skid-Steer Mounted Augers (Excludes Auger) .....61.49		
01 22 23 00-0252	WK		Up To 24" Diameter, 4' Length, Rock Tip Auger Bit For Skid-Steer Mounted Augers (Excludes Auger) .....186.91		
01 22 23 00-0253	MO		Up To 24" Diameter, 4' Length, Rock Tip Auger Bit For Skid-Steer Mounted Augers (Excludes Auger) .....554.68 <i>For >6 Months (>26 Weeks) , Deduct</i> -22.19		
01 22 23 00-0254	DAY		2' Length, Auger Bit Extension For Skid-Steer Mounted Augers (Excludes Auger).....12.48		
01 22 23 00-0255	WK		2' Length, Auger Bit Extension For Skid-Steer Mounted Augers (Excludes Auger) .....29.12		
01 22 23 00-0256	MO		2' Length, Auger Bit Extension For Skid-Steer Mounted Augers (Excludes Auger) .....77.66 <i>For >6 Months (>26 Weeks) , Deduct</i> -3.11		

01 22 23 00-0257 Bulldozers (01 22 23 00-0213)

Note: Includes full-time operator. Excludes delivery, set-up, and removal.

01 22 23 00-0258	DAY		70 HP, D3 Bulldozer With Full-Time Operator .....1,419.79 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0259	WK		70 HP, D3 Bulldozer With Full-Time Operator .....6,624.75 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0260	MO		70 HP, D3 Bulldozer With Full-Time Operator .....26,288.34 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -209.99		
01 22 23 00-0261	DAY		90 To 105 HP, D4 Or D5 Bulldozer With Full-Time Operator.....1,631.47 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0262	WK		90 To 105 HP, D4 Or D5 Bulldozer With Full-Time Operator.....7,479.96 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0263	MO		90 To 105 HP, D4 Or D5 Bulldozer With Full-Time Operator.....28,913.27 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -314.99		
01 22 23 00-0264	DAY		140 HP, D6 Bulldozer With Full-Time Operator .....2,232.67 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0265	WK		140 HP, D6 Bulldozer With Full-Time Operator .....9,884.74 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0266	MO		140 HP, D6 Bulldozer With Full-Time Operator .....36,110.64 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -602.89		
01 22 23 00-0267	DAY		200 HP, D7 Bulldozer With Full-Time Operator .....2,766.12 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0268	WK		200 HP, D7 Bulldozer With Full-Time Operator .....12,027.01 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0269	MO		200 HP, D7 Bulldozer With Full-Time Operator .....42,545.94 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -860.30		
01 22 23 00-0270	DAY		335 HP, D8 Bulldozer With Full-Time Operator .....3,401.18 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0271	WK		335 HP, D8 Bulldozer With Full-Time Operator .....14,567.26 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0272	MO		335 HP, D8 Bulldozer With Full-Time Operator .....50,166.69 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -1,165.13		
01 22 23 00-0273	DAY		460 HP, D9 Bulldozer With Full-Time Operator .....3,756.82 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0274	WK		460 HP, D9 Bulldozer With Full-Time Operator .....15,981.34 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0275	MO		460 HP, D9 Bulldozer With Full-Time Operator .....54,400.44 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -1,334.48		

01 22 23 00-0276 Motor Scraper (01 22 23 00-0213)

Note: Includes full-time operator. Excludes delivery, set-up, and removal.

01 22 23 00-0277	DAY		11 CY Motor Scraper-Hauler With Full-Time Operator .....2,287.64 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0278	WK		11 CY Motor Scraper-Hauler With Full-Time Operator .....10,121.55 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0279	MO		11 CY Motor Scraper-Hauler With Full-Time Operator .....36,819.99 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -631.26		
01 22 23 00-0280	DAY		18 CY Motor Scraper-Hauler With Full-Time Operator .....2,819.70 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0281	WK		18 CY Motor Scraper-Hauler With Full-Time Operator .....12,249.80 <i>For Equipment Without Operator, Deduct</i> -4,855.04		
01 22 23 00-0282	MO		18 CY Motor Scraper-Hauler With Full-Time Operator .....43,222.77 <i>For Equipment Without Operator, Deduct</i> -21,038.49 <i>For >6 Months (>26 Weeks) , Deduct</i> -887.37		
01 22 23 00-0283	DAY		24 CY Motor Scraper-Hauler With Full-Time Operator .....3,333.73 <i>For Equipment Without Operator, Deduct</i> -971.01		
01 22 23 00-0284	WK		24 CY Motor Scraper-Hauler With Full-Time Operator14,296.89 <i>For Equipment Without Operator, Deduct</i> -4,855.04		



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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0285 MO 24 CY Motor Scraper-Hauler With Full-Time Operator	49,355.01	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-1,132.66	
01 22 23 00-0286 Hydraulic Excavators (01 22 23 00-0213)		
Note: Includes full-time operator. Excludes delivery, set-up, and removal.		
01 22 23 00-0287 DAY 3/8 CY Hydraulic Excavator With Full-Time Operator	1,340.86	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0288 WK 3/8 CY Hydraulic Excavator With Full-Time Operator	6,163.20	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0289 MO 3/8 CY Hydraulic Excavator With Full-Time Operator	25,421.85	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-175.33	
01 22 23 00-0290 DAY 1/2 CY Hydraulic Excavator With Full-Time Operator	1,444.96	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0291 WK 1/2 CY Hydraulic Excavator With Full-Time Operator	6,622.08	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0292 MO 1/2 CY Hydraulic Excavator With Full-Time Operator	27,257.38	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-248.76	
01 22 23 00-0293 DAY 5/8 CY Hydraulic Excavator With Full-Time Operator	1,477.84	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0294 WK 5/8 CY Hydraulic Excavator With Full-Time Operator	6,793.31	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0295 MO 5/8 CY Hydraulic Excavator With Full-Time Operator	27,558.74	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-260.81	
01 22 23 00-0296 DAY 3/4 CY Hydraulic Excavator With Full-Time Operator	1,512.08	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0297 WK 3/4 CY Hydraulic Excavator With Full-Time Operator	6,950.83	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0298 MO 3/4 CY Hydraulic Excavator With Full-Time Operator	27,860.09	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-272.86	
01 22 23 00-0299 DAY 7/8 To 1 CY Hydraulic Excavator With Full-Time Operator	1,539.48	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0300 WK 7/8 To 1 CY Hydraulic Excavator With Full-Time Operator	7,115.21	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0301 MO 7/8 To 1 CY Hydraulic Excavator With Full-Time Operator	28,161.45	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-284.92	
01 22 23 00-0302 DAY 1-1/8 To 1-1/4 CY Hydraulic Excavator With Full-Time Operator	1,909.32	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0303 WK 1-1/8 To 1-1/4 CY Hydraulic Excavator With Full-Time Operator	8,587.74	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0304 MO 1-1/8 To 1-1/4 CY Hydraulic Excavator With Full-Time Operator	32,236.61	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-447.92	
01 22 23 00-0305 DAY 1-3/8 To 1-1/2 CY Hydraulic Excavator With Full-Time Operator	1,964.11	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0306 WK 1-3/8 To 1-1/2 CY Hydraulic Excavator With Full-Time Operator	8,827.46	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0307 MO 1-3/8 To 1-1/2 CY Hydraulic Excavator With Full-Time Operator	32,955.75	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-476.69	
01 22 23 00-0308 DAY 1-5/8 To 1-7/8 CY Hydraulic Excavator With Full-Time Operator	2,066.85	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0309 WK 1-5/8 To 1-7/8 CY Hydraulic Excavator With Full-Time Operator	9,238.40	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0310 MO 1-5/8 To 1-7/8 CY Hydraulic Excavator With Full-Time Operator	34,188.57	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-526.00	
01 22 23 00-0311 DAY 2 To 2-3/8 CY Hydraulic Excavator With Full-Time Operator	2,183.28	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0312 WK 2 To 2-3/8 CY Hydraulic Excavator With Full-Time Operator	9,697.28	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0313 MO 2 To 2-3/8 CY Hydraulic Excavator With Full-Time Operator	35,558.37	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-580.80	
01 22 23 00-0314 DAY 2-1/2 To 2-7/8 CY Hydraulic Excavator With Full-Time Operator	2,217.53	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0315 WK 2-1/2 To 2-7/8 CY Hydraulic Excavator With Full-Time Operator	9,834.26	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0316 MO 2-1/2 To 2-7/8 CY Hydraulic Excavator With Full-Time Operator	35,969.31	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-597.23	
01 22 23 00-0317 DAY 3 To 3-3/4 CY Hydraulic Excavator With Full-Time Operator	2,546.28	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0318 WK 3 To 3-3/4 CY Hydraulic Excavator With Full-Time Operator	11,156.12	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0319 MO 3 To 3-3/4 CY Hydraulic Excavator With Full-Time Operator	39,941.73	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-756.13	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 22 23 00-0320	DAY 4 To 5-3/4 CY Hydraulic Excavator With Full-Time Operator.....	3,018.86	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0321	WK 4 To 5-3/4 CY Hydraulic Excavator With Full-Time Operator.....	13,032.75	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0322	MO 4 To 5-3/4 CY Hydraulic Excavator With Full-Time Operator.....	45,557.91	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-980.78	
01 22 23 00-0323	DAY Thumbs Or Grapple Attachment For Hydraulic Excavators	95.89	
01 22 23 00-0324	WK Thumbs Or Grapple Attachment For Hydraulic Excavators	369.85	
01 22 23 00-0325	MO Thumbs Or Grapple Attachment For Hydraulic Excavators	1,095.84	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-43.83	
01 22 23 00-0326	DAY 1,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	424.64	
01 22 23 00-0327	WK 1,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	1,123.24	
01 22 23 00-0328	MO 1,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	3,143.69	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-125.75	
01 22 23 00-0329	DAY 1,500 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	657.50	
01 22 23 00-0330	WK 1,500 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	1,678.00	
01 22 23 00-0331	MO 1,500 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	4,362.81	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-174.51	
01 22 23 00-0332	DAY 3,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	917.77	
01 22 23 00-0333	WK 3,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	2,472.49	
01 22 23 00-0334	MO 3,000 Ft-Lb Hydraulic Hammer Attachment For Hydraulic Excavators	6,931.19	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-277.25	
01 22 23 00-0335	DAY 24" Compaction Wheel Attachment For Hydraulic Excavators	191.77	
01 22 23 00-0336	WK 24" Compaction Wheel Attachment For Hydraulic Excavators	767.09	
01 22 23 00-0337	MO 24" Compaction Wheel Attachment For Hydraulic Excavators	2,301.26	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-92.05	
01 22 23 00-0338	DAY 36" Compaction Wheel Attachment For Hydraulic Excavators	273.96	
01 22 23 00-0339	WK 36" Compaction Wheel Attachment For Hydraulic Excavators	1,095.84	
01 22 23 00-0340	MO 36" Compaction Wheel Attachment For Hydraulic Excavators	3,287.52	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-131.50	
01 22 23 00-0341	DAY 48" Compaction Wheel Attachment For Hydraulic Excavators	301.36	
01 22 23 00-0342	WK 48" Compaction Wheel Attachment For Hydraulic Excavators	1,191.73	
01 22 23 00-0343	MO 48" Compaction Wheel Attachment For Hydraulic Excavators	3,561.48	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-142.46	

01 22 23 00-0344 Mini-Excavators (01 22 23 00-0213)

Note: Includes full-time operator. Excludes delivery, set-up, and removal.

01 22 23 00-0345	DAY 2,000 LB Mini-Excavator With Full-Time Operator.....	1,258.67	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0346	WK 2,000 LB Mini-Excavator With Full-Time Operator.....	5,670.07	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0347	MO 2,000 LB Mini-Excavator With Full-Time Operator.....	22,832.93	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-71.78	
01 22 23 00-0348	DAY 3,500 LB Mini-Excavator With Full-Time Operator.....	1,265.52	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0349	WK 3,500 LB Mini-Excavator With Full-Time Operator.....	5,690.62	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0350	MO 3,500 LB Mini-Excavator With Full-Time Operator.....	23,264.41	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-89.04	
01 22 23 00-0351	DAY 6,000 LB Mini-Excavator With Full-Time Operator.....	1,299.76	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0352	WK 6,000 LB Mini-Excavator With Full-Time Operator.....	5,786.50	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0353	MO 6,000 LB Mini-Excavator With Full-Time Operator.....	23,326.06	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-91.50	
01 22 23 00-0354	DAY 7,500 LB Mini-Excavator With Full-Time Operator.....	1,313.46	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0355	WK 7,500 LB Mini-Excavator With Full-Time Operator.....	5,834.45	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0356	MO 7,500 LB Mini-Excavator With Full-Time Operator.....	23,353.45	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-92.60	
01 22 23 00-0357	DAY 9,500 LB Mini-Excavator With Full-Time Operator.....	1,395.65	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0358	WK 9,500 LB Mini-Excavator With Full-Time Operator.....	5,902.94	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0359	MO 9,500 LB Mini-Excavator With Full-Time Operator.....	24,147.94	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-124.38	
01 22 23 00-0360	DAY 11,000 LB Mini-Excavator With Full-Time Operator.....	1,402.50	
	<i>For Equipment Without Operator, Deduct</i>	-971.01	
01 22 23 00-0361	WK 11,000 LB Mini-Excavator With Full-Time Operator.....	6,245.39	
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04	
01 22 23 00-0362	MO 11,000 LB Mini-Excavator With Full-Time Operator.....	24,182.18	
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49	
	<i>For >6 Months (>26 Weeks), Deduct</i>	-125.75	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-0363	Road Graders <small>(01 22 23 00-0213)</small>	
	Note: Includes full-time operator. Excludes delivery, set-up, and removal.	
01 22 23 00-0364	DAY 50 To 60 HP Road Grader With Full-Time Operator	2,323.71
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0365	WK 50 To 60 HP Road Grader With Full-Time Operator	8,372.06
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0366	MO 50 To 60 HP Road Grader With Full-Time Operator	30,507.39
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-378.76
01 22 23 00-0367	DAY 80 To 100 HP Road Grader With Full-Time Operator	2,991.04
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0368	WK 80 To 100 HP Road Grader With Full-Time Operator	9,851.01
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0369	MO 80 To 100 HP Road Grader With Full-Time Operator	35,016.39
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-559.12
01 22 23 00-0370	DAY 130 To 140 HP Road Grader With Full-Time Operator	3,488.53
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0371	WK 130 To 140 HP Road Grader With Full-Time Operator	11,324.55
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0372	MO 130 To 140 HP Road Grader With Full-Time Operator	40,449.73
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-776.45
01 22 23 00-0373	DAY 170 To 185 HP Road Grader With Full-Time Operator	4,244.54
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0374	WK 170 To 185 HP Road Grader With Full-Time Operator	17,949.18
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0375	MO 170 To 185 HP Road Grader With Full-Time Operator	66,867.94
	<i>For Equipment Without Operator, Deduct</i>	-21,038.46
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,833.18

01 22 23 00-0376	Loader-Backhoes With Standard Bucket <small>(01 22 23 00-0213)</small>	
	Note: Includes full-time operator. Excludes delivery, set-up, and removal.	
01 22 23 00-0377	DAY 1/2 To 5/8 CY, 65 HP, Loader-Backhoe With Standard Bucket And Full-Time Operator	1,404.17
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0378	WK 1/2 To 5/8 CY, 65 HP, Loader-Backhoe With Standard Bucket And Full-Time Operator	5,883.80
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0379	MO 1/2 To 5/8 CY, 65 HP, Loader-Backhoe With Standard Bucket And Full-Time Operator	23,459.55
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-96.84
01 22 23 00-0380	DAY 1 CY, 24" Bucket, 14'-4" Deep, 75 HP, Loader-Backhoe With Full-Time Operator	1,450.58
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0381	WK 1 CY, 24" Bucket, 14'-4" Deep, 75 HP, Loader-Backhoe With Full-Time Operator	6,046.23
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0382	MO 1 CY, 24" Bucket, 14'-4" Deep, 75 HP, Loader-Backhoe With Full-Time Operator	24,449.63
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-136.45
01 22 23 00-0383	DAY 1-1/2 CY, 24" Bucket, 16'-6" Deep, 90 HP, Loader-Backhoe With Full-Time Operator	1,522.13
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0384	WK 1-1/2 CY, 24" Bucket, 16'-6" Deep, 90 HP, Loader-Backhoe With Full-Time Operator	6,224.14
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0385	MO 1-1/2 CY, 24" Bucket, 16'-6" Deep, 90 HP, Loader-Backhoe With Full-Time Operator	24,960.13
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-156.87
01 22 23 00-0386	DAY 1-3/4 CY, 30" Bucket, 18'-0" Deep, 112 HP, Loader-Backhoe With Full-Time Operator	1,841.20
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0387	WK 1-3/4 CY, 30" Bucket, 18'-0" Deep, 112 HP, Loader-Backhoe With Full-Time Operator	7,175.54
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0388	MO 1-3/4 CY, 30" Bucket, 18'-0" Deep, 112 HP, Loader-Backhoe With Full-Time Operator	27,682.85
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-265.77

01 22 23 00-0389	Heavy Duty Construction Loaders <small>(01 22 23 00-0213)</small>	
	Note: Includes full-time operator. Excludes delivery, set-up, and removal.	
01 22 23 00-0390	DAY 2-1/2 CY, 119 HP, Heavy Duty Construction Loader With Full-Time Operator	1,480.58
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0391	WK 2-1/2 CY, 119 HP, Heavy Duty Construction Loader With Full-Time Operator	6,869.79
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0392	MO 2-1/2 CY, 119 HP, Heavy Duty Construction Loader With Full-Time Operator	27,074.91
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-241.46
01 22 23 00-0393	DAY 3 CY, 135 HP, Heavy Duty Construction Loader With Full-Time Operator	1,903.91
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0394	WK 3 CY, 135 HP, Heavy Duty Construction Loader With Full-Time Operator	7,332.32
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04
01 22 23 00-0395	MO 3 CY, 135 HP, Heavy Duty Construction Loader With Full-Time Operator	27,310.09
	<i>For Equipment Without Operator, Deduct</i>	-21,038.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-250.86
01 22 23 00-0396	DAY 3-1/2 CY, 198 HP, Heavy Duty Construction Loader With Full-Time Operator	1,997.98
	<i>For Equipment Without Operator, Deduct</i>	-971.01
01 22 23 00-0397	WK 3-1/2 CY, 198 HP, Heavy Duty Construction Loader With Full-Time Operator	7,583.19
	<i>For Equipment Without Operator, Deduct</i>	-4,855.04

01	01	General Requirements
	01 20	Price and Payment Procedures
	01 22	Unit Prices



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0398 MO 3-1/2 CY, 198 HP, Heavy Duty Construction Loader With Full-Time Operator	27,937.25	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-275.95	
01 22 23 00-0399 DAY 4-1/2 CY, 215 HP, Heavy Duty Construction Loader With Full-Time Operator	2,256.69	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0400 WK 4-1/2 CY, 215 HP, Heavy Duty Construction Loader With Full-Time Operator	8,265.22	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0401 MO 4-1/2 CY, 215 HP, Heavy Duty Construction Loader With Full-Time Operator	29,661.94	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-344.94	
01 22 23 00-0402 DAY 7-1/3 CY, 330 HP, Heavy Duty Construction Loader With Full-Time Operator	2,923.05	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0403 WK 7-1/3 CY, 330 HP, Heavy Duty Construction Loader With Full-Time Operator	12,647.50	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0404 MO 7-1/3 CY, 330 HP, Heavy Duty Construction Loader With Full-Time Operator	44,400.20	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-934.47	
01 22 23 00-0405 DAY 13-1/2 CY, 690 HP, Heavy Duty Construction Loader With Full-Time Operator	7,313.09	
For Equipment Without Operator, Deduct	-971.01	
01 22 23 00-0406 WK 13-1/2 CY, 690 HP, Heavy Duty Construction Loader With Full-Time Operator	25,449.19	
For Equipment Without Operator, Deduct	-4,855.04	
01 22 23 00-0407 MO 13-1/2 CY, 690 HP, Heavy Duty Construction Loader With Full-Time Operator	77,163.12	
For Equipment Without Operator, Deduct	-21,038.49	
For >6 Months (>26 Weeks) , Deduct	-2,244.99	
01 22 23 00-0408 Tractors <small>(01 22 23 00-0213)</small>		
Note: Excludes operator, delivery, set-up, and removal.		
01 22 23 00-0409 DAY 20 To 29 HP Tractor	572.58	
01 22 23 00-0410 WK 20 To 29 HP Tractor	1,378.43	
01 22 23 00-0411 MO 20 To 29 HP Tractor	3,721.77	
For >6 Months (>26 Weeks) , Deduct	-148.87	
01 22 23 00-0412 DAY 30 To 35 HP Tractor	593.28	
01 22 23 00-0413 WK 30 To 35 HP Tractor	1,527.38	
01 22 23 00-0414 MO 30 To 35 HP Tractor	4,228.70	
For >6 Months (>26 Weeks) , Deduct	-169.15	
01 22 23 00-0415 DAY 40 To 45 HP Tractor	605.90	
01 22 23 00-0416 WK 40 To 45 HP Tractor	1,628.37	
01 22 23 00-0417 MO 40 To 45 HP Tractor	4,468.54	
For >6 Months (>26 Weeks) , Deduct	-178.74	
01 22 23 00-0418 DAY 80 To 89 HP Tractor	780.10	
01 22 23 00-0419 WK 80 To 89 HP Tractor	2,212.31	
01 22 23 00-0420 MO 80 To 89 HP Tractor	6,334.47	
For >6 Months (>26 Weeks) , Deduct	-253.38	
01 22 23 00-0421 DAY 60" Rotary Mower Attachment For Tractors	244.89	
01 22 23 00-0422 WK 60" Rotary Mower Attachment For Tractors	757.38	
01 22 23 00-0423 DAY 84" Rotary Mower Attachment For Tractors	267.61	
01 22 23 00-0424 WK 84" Rotary Mower Attachment For Tractors	820.50	
01 22 23 00-0425 DAY Under Deck Rotary Mower Attachment For Tractors	40.18	
01 22 23 00-0426 WK Under Deck Rotary Mower Attachment For Tractors	160.73	
01 22 23 00-0427 Shoring <small>(01 22 23 00-0213)</small>		
Note: Includes delivery to job site and pick-up when complete.		
01 22 23 00-0428 Aluminum Hydraulic Shoring <small>(01 22 23 00-0427)</small>		
Note: Includes delivery to job site and pick-up when complete. Excludes sheeting.		
01 22 23 00-0429 WK 2' Rails, 1 Cylinder, Aluminum Hydraulic Shoring	120.17	
Note: Up to 88" spread width.		
01 22 23 00-0430 MO 2' Rails, 1 Cylinder, Aluminum Hydraulic Shoring	354.46	
Note: Up to 88" spread width.		
For >6 Months (>26 Weeks) , Deduct	-14.18	
01 22 23 00-0431 WK Up To 12' Rails, 2 Cylinders, Aluminum Hydraulic Shoring	161.21	
Note: Up to 88" spread width.		
01 22 23 00-0432 MO Up To 12' Rails, 2 Cylinders, Aluminum Hydraulic Shoring	475.49	
Note: Up to 88" spread width.		
For >6 Months (>26 Weeks) , Deduct	-19.02	
01 22 23 00-0433 WK Up To 16' Rails, 3 Cylinders, Aluminum Hydraulic Shoring	298.93	
Note: Up to 88" spread width.		
01 22 23 00-0434 MO Up To 16' Rails, 3 Cylinders, Aluminum Hydraulic Shoring	881.83	
Note: Up to 88" spread width.		
For >6 Months (>26 Weeks) , Deduct	-35.27	
01 22 23 00-0435 EA Set-up And Removal Of 1 Cylinder Aluminum Hydraulic Shores	30.38	
01 22 23 00-0436 EA Set-up And Removal Of 2 Cylinders Aluminum Hydraulic Shores	48.61	
01 22 23 00-0437 EA Set-up And Removal Of 3 Cylinders Aluminum Hydraulic Shores	81.01	
01 22 23 00-0438 Trench Boxes/Trench Shields <small>(01 22 23 00-0213)</small>		
Note: Trenching tasks include moving the trench box in excavation as trenching proceeds. Includes delivery to job site and pick-up when complete. For stackable units, combine multiple units for depth required.		
01 22 23 00-0439 WK 4' x 6' Trench Box With Up To 48" Spreaders	256.08	
01 22 23 00-0440 MO 4' x 6' Trench Box With Up To 48" Spreaders	768.23	
For >6 Months (>26 Weeks) , Deduct	-30.73	
01 22 23 00-0441 WK 6' x 6' Trench Box With Up To 48" Spreaders	289.12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0442 MO 6' x 6' Trench Box With Up To 48" Spreaders.....	867.35	
For >6 Months (>26 Weeks) , Deduct	-34.69	
01 22 23 00-0443 WK 8' x 6' Trench Box With Up To 48" Spreaders.....	305.64	
01 22 23 00-0444 MO 8' x 6' Trench Box With Up To 48" Spreaders.....	916.92	
For >6 Months (>26 Weeks) , Deduct	-36.68	
01 22 23 00-0445 WK 4' x 8' Trench Box With Up To 48" Spreaders.....	280.86	
01 22 23 00-0446 MO 4' x 8' Trench Box With Up To 48" Spreaders.....	842.57	
For >6 Months (>26 Weeks) , Deduct	-33.70	
01 22 23 00-0447 WK 6' x 8' Trench Box With Up To 48" Spreaders.....	330.42	
01 22 23 00-0448 MO 6' x 8' Trench Box With Up To 48" Spreaders.....	991.26	
For >6 Months (>26 Weeks) , Deduct	-39.65	
01 22 23 00-0449 WK 8' x 8' Trench Box With Up To 48" Spreaders.....	371.72	
01 22 23 00-0450 MO 8' x 8' Trench Box With Up To 48" Spreaders.....	1,115.17	
For >6 Months (>26 Weeks) , Deduct	-44.61	
01 22 23 00-0451 WK 4' x 10' Trench Box With Up To 48" Spreaders.....	313.90	
01 22 23 00-0452 MO 4' x 10' Trench Box With Up To 48" Spreaders.....	941.70	
For >6 Months (>26 Weeks) , Deduct	-37.67	
01 22 23 00-0453 WK 6' x 10' Trench Box With Up To 48" Spreaders.....	371.72	
01 22 23 00-0454 MO 6' x 10' Trench Box With Up To 48" Spreaders.....	1,115.17	
For >6 Months (>26 Weeks) , Deduct	-44.61	
01 22 23 00-0455 WK 8' x 10' Trench Box With Up To 48" Spreaders.....	454.33	
01 22 23 00-0456 MO 8' x 10' Trench Box With Up To 48" Spreaders.....	1,354.72	
For >6 Months (>26 Weeks) , Deduct	-54.19	
01 22 23 00-0457 WK 4' x 12' Trench Box With Up To 48" Spreaders.....	371.72	
01 22 23 00-0458 MO 4' x 12' Trench Box With Up To 48" Spreaders.....	1,115.17	
For >6 Months (>26 Weeks) , Deduct	-44.61	
01 22 23 00-0459 WK 6' x 12' Trench Box With Up To 48" Spreaders.....	454.33	
01 22 23 00-0460 MO 6' x 12' Trench Box With Up To 48" Spreaders.....	1,362.98	
For >6 Months (>26 Weeks) , Deduct	-54.52	
01 22 23 00-0461 WK 8' x 12' Trench Box With Up To 48" Spreaders.....	578.24	
01 22 23 00-0462 MO 8' x 12' Trench Box With Up To 48" Spreaders.....	1,734.70	
For >6 Months (>26 Weeks) , Deduct	-69.39	
01 22 23 00-0463 WK 4' x 14' Trench Box With Up To 48" Spreaders.....	413.02	
01 22 23 00-0464 MO 4' x 14' Trench Box With Up To 48" Spreaders.....	1,239.08	
For >6 Months (>26 Weeks) , Deduct	-49.56	
01 22 23 00-0465 WK 6' x 14' Trench Box With Up To 48" Spreaders.....	536.93	
01 22 23 00-0466 MO 6' x 14' Trench Box With Up To 48" Spreaders.....	1,610.80	
For >6 Months (>26 Weeks) , Deduct	-64.43	
01 22 23 00-0467 WK 8' x 14' Trench Box With Up To 48" Spreaders.....	660.84	
01 22 23 00-0468 MO 8' x 14' Trench Box With Up To 48" Spreaders.....	1,982.52	
For >6 Months (>26 Weeks) , Deduct	-79.30	
01 22 23 00-0469 WK 4' x 16' Trench Box With Up To 48" Spreaders.....	454.33	
01 22 23 00-0470 MO 4' x 16' Trench Box With Up To 48" Spreaders.....	1,362.98	
For >6 Months (>26 Weeks) , Deduct	-54.52	
01 22 23 00-0471 WK 6' x 16' Trench Box With Up To 48" Spreaders.....	619.54	
01 22 23 00-0472 MO 6' x 16' Trench Box With Up To 48" Spreaders.....	1,858.61	
For >6 Months (>26 Weeks) , Deduct	-74.34	
01 22 23 00-0473 WK 8' x 16' Trench Box With Up To 48" Spreaders.....	743.44	
01 22 23 00-0474 MO 8' x 16' Trench Box With Up To 48" Spreaders.....	2,230.34	
For >6 Months (>26 Weeks) , Deduct	-89.21	
01 22 23 00-0475 WK 4' x 20' Trench Box With Up To 48" Spreaders.....	536.93	
01 22 23 00-0476 MO 4' x 20' Trench Box With Up To 48" Spreaders.....	1,610.80	
For >6 Months (>26 Weeks) , Deduct	-64.43	
01 22 23 00-0477 WK 6' x 20' Trench Box With Up To 48" Spreaders.....	743.44	
01 22 23 00-0478 MO 6' x 20' Trench Box With Up To 48" Spreaders.....	2,230.34	
For >6 Months (>26 Weeks) , Deduct	-89.21	
01 22 23 00-0479 WK 8' x 20' Trench Box With Up To 48" Spreaders.....	867.35	
01 22 23 00-0480 MO 8' x 20' Trench Box With Up To 48" Spreaders.....	2,602.06	
For >6 Months (>26 Weeks) , Deduct	-104.08	
01 22 23 00-0481 WK 4' x 24' Trench Box With Up To 48" Spreaders.....	743.44	
01 22 23 00-0482 MO 4' x 24' Trench Box With Up To 48" Spreaders.....	2,230.34	
For >6 Months (>26 Weeks) , Deduct	-89.21	
01 22 23 00-0483 WK 6' x 24' Trench Box With Up To 48" Spreaders.....	908.66	
01 22 23 00-0484 MO 6' x 24' Trench Box With Up To 48" Spreaders.....	2,725.96	
For >6 Months (>26 Weeks) , Deduct	-109.04	
01 22 23 00-0485 WK 8' x 24' Trench Box With Up To 48" Spreaders.....	991.26	
01 22 23 00-0486 MO 8' x 24' Trench Box With Up To 48" Spreaders.....	2,973.78	
For >6 Months (>26 Weeks) , Deduct	-118.95	
01 22 23 00-0487 WK For Spreaders >48" To 84", Add.....	24.78	
01 22 23 00-0488 MO For Spreaders >48" To 84", Add.....	74.34	
For >6 Months (>26 Weeks) , Deduct	-2.97	
01 22 23 00-0489 WK For Spreaders >84" To 120", Add.....	148.69	
01 22 23 00-0490 MO For Spreaders >84" To 120", Add.....	446.07	
For >6 Months (>26 Weeks) , Deduct	-17.84	
01 22 23 00-0491 WK For Spreaders >120", Add.....	313.90	
01 22 23 00-0492 MO For Spreaders >120", Add.....	941.70	
For >6 Months (>26 Weeks) , Deduct	-37.67	
01 22 23 00-0493 WK 8' x 4' Manhole Box.....	390.31	
01 22 23 00-0494 MO 8' x 4' Manhole Box.....	1,170.93	
For >6 Months (>26 Weeks) , Deduct	-46.84	
01 22 23 00-0495 WK 8' x 8' Manhole Box.....	557.58	
01 22 23 00-0496 MO 8' x 8' Manhole Box.....	1,672.75	
For >6 Months (>26 Weeks) , Deduct	-66.91	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 22 23 00-0497

Trenchers (01 22 23 00-0213)

Note: Includes full-time operator. Excludes delivery, set-up, and removal.

01 22 23 00-0498	DAY 4' Maximum Trench Depth, Ride-On Trencher With Full-Time Operator	1,371.15
	<i>For Equipment Without Operator, Deduct</i>	-967.21
01 22 23 00-0499	WK 4' Maximum Trench Depth, Ride-On Trencher With Full-Time Operator	6,211.96
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
01 22 23 00-0500	MO 4' Maximum Trench Depth, Ride-On Trencher With Full-Time Operator	24,743.13
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For >6 Months (>26 Weeks), Deduct</i>	-151.48
01 22 23 00-0501	DAY 5' Maximum Trench Depth, Ride-On Trencher With Full-Time Operator	2,052.79
	<i>For Equipment Without Operator, Deduct</i>	-967.21
01 22 23 00-0502	WK 5' Maximum Trench Depth, Ride-On Trencher With Full-Time Operator	8,509.34
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
01 22 23 00-0503	MO 5' Maximum Trench Depth, Ride-On Trencher With Full-Time Operator	31,054.63
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For >6 Months (>26 Weeks), Deduct</i>	-403.94

01 22 23 00-0504

Heavy Equipment (Ground Protection) Mats (01 22 23 00-0213)

Note: Rental price per mat. Excludes placement, moving, mobilization and demobilization. See CSI section 01 22 23 00-0213 for equipment for offloading/reloading from delivery vehicle, placing, and moving mats, 01 71 13 00-0001 for equipment delivery, pickup, mobilization and demobilization.

01 22 23 00-0505	DAY 14' Width x 8' Length, 6" Thick, 3-Ply Laminated Heavy Equipment Mat	22.51
01 22 23 00-0506	WK 14' Width x 8' Length, 6" Thick, 3-Ply Laminated Heavy Equipment Mat	53.60
01 22 23 00-0507	MO 14' Width x 8' Length, 6" Thick, 3-Ply Laminated Heavy Equipment Mat	112.55
	<i>For >6 Months (>26 Weeks), Deduct</i>	-4.50
01 22 23 00-0508	DAY 16' Width x 8' Length, 6" Thick, 3-Ply Laminated Heavy Equipment Mat	23.64
01 22 23 00-0509	WK 16' Width x 8' Length, 6" Thick, 3-Ply Laminated Heavy Equipment Mat	56.28
01 22 23 00-0510	MO 16' Width x 8' Length, 6" Thick, 3-Ply Laminated Heavy Equipment Mat	118.18
	<i>For >6 Months (>26 Weeks), Deduct</i>	-4.73
01 22 23 00-0511	Day 16' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	19.13
01 22 23 00-0512	WK 16' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	45.02
01 22 23 00-0513	MO 16' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	95.67
	<i>For >6 Months (>26 Weeks), Deduct</i>	-3.83
01 22 23 00-0514	Day 18' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	21.38
01 22 23 00-0515	WK 18' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	50.65
01 22 23 00-0516	MO 18' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	106.92
	<i>For >6 Months (>26 Weeks), Deduct</i>	-4.28
01 22 23 00-0517	Day 20' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	23.64
01 22 23 00-0518	WK 20' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	56.28
01 22 23 00-0519	MO 20' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	118.18
	<i>For >6 Months (>26 Weeks), Deduct</i>	-4.73
01 22 23 00-0520	Day 24' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	25.89
01 22 23 00-0521	WK 24' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	61.63
01 22 23 00-0522	MO 24' Width x 4' Length, 8" Thick Hardwood Timbers, Dragline/Excavator Mat	129.43
	<i>For >6 Months (>26 Weeks), Deduct</i>	-5.18
01 22 23 00-0523	Day 12' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	20.26
01 22 23 00-0524	WK 12' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	56.28
01 22 23 00-0525	MO 12' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	101.30
	<i>For >6 Months (>26 Weeks), Deduct</i>	-4.05
01 22 23 00-0526	Day 16' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	23.64
01 22 23 00-0527	WK 16' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	56.28
01 22 23 00-0528	MO 16' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	118.18
	<i>For >6 Months (>26 Weeks), Deduct</i>	-4.73
01 22 23 00-0529	Day 20' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	28.14
01 22 23 00-0530	WK 20' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	61.90
01 22 23 00-0531	MO 20' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	140.69
	<i>For >6 Months (>26 Weeks), Deduct</i>	-5.63
01 22 23 00-0532	Day 24' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	30.39
01 22 23 00-0533	WK 24' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	72.35
01 22 23 00-0534	MO 24' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	151.94
	<i>For >6 Months (>26 Weeks), Deduct</i>	-6.08
01 22 23 00-0535	Day 28' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	32.64
01 22 23 00-0536	WK 28' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	77.71
01 22 23 00-0537	MO 28' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	163.20
	<i>For >6 Months (>26 Weeks), Deduct</i>	-6.53
01 22 23 00-0538	Day 30' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	33.76
01 22 23 00-0539	WK 30' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	80.39
01 22 23 00-0540	MO 30' Width x 4' Length, 12" Thick Hardwood Timbers, Crane Mat	168.82
	<i>For >6 Months (>26 Weeks), Deduct</i>	-6.75
01 22 23 00-0541	Day 14' Width x 8' Length, 2-3/4" Thick, Laminated Heavy Equipment Mat (Emtek™)	10.83
01 22 23 00-0542	WK 14' Width x 8' Length, 2-3/4" Thick, Laminated Heavy Equipment Mat (Emtek™)	27.07
01 22 23 00-0543	MO 14' Width x 8' Length, 2-3/4" Thick, Laminated Heavy Equipment Mat (Emtek™)	81.20
	<i>For >6 Months (>26 Weeks), Deduct</i>	-3.25
01 22 23 00-0544	Day 14' Width x 8' Length, 3-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™)	12.94
01 22 23 00-0545	WK 14' Width x 8' Length, 3-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™)	32.36
01 22 23 00-0546	MO 14' Width x 8' Length, 3-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™)	97.07
	<i>For >6 Months (>26 Weeks), Deduct</i>	-3.88
01 22 23 00-0547	Day 16' Width x 8' Length, 3-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™)	14.78
01 22 23 00-0548	WK 16' Width x 8' Length, 3-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™)	36.95



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0549 MO 16' Width x 8' Length, 3-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	110.86	
For >6 Months (>26 Weeks) , Deduct	-4.43	
01 22 23 00-0550 Day 14' Width x 8' Length, 4-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	15.76	
01 22 23 00-0551 WK 14' Width x 8' Length, 4-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	39.39	
01 22 23 00-0552 MO 14' Width x 8' Length, 4-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	118.18	
For >6 Months (>26 Weeks) , Deduct	-4.73	
01 22 23 00-0553 Day 16' Width x 8' Length, 4-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	18.01	
01 22 23 00-0554 WK 16' Width x 8' Length, 4-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	45.02	
01 22 23 00-0555 MO 16' Width x 8' Length, 4-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	135.06	
For >6 Months (>26 Weeks) , Deduct	-5.40	
01 22 23 00-0556 Day 16' Width x 8' Length, 5-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	20.69	
01 22 23 00-0557 WK 16' Width x 8' Length, 5-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	51.74	
01 22 23 00-0558 MO 16' Width x 8' Length, 5-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	155.21	
For >6 Months (>26 Weeks) , Deduct	-6.21	
01 22 23 00-0559 Day 24' Width x 4' Length, 6" Thick, Laminated Heavy Equipment Mat (Emtek™).....	15.92	
01 22 23 00-0560 WK 24' Width x 4' Length, 6" Thick, Laminated Heavy Equipment Mat (Emtek™).....	39.81	
01 22 23 00-0561 MO 24' Width x 4' Length, 6" Thick, Laminated Heavy Equipment Mat (Emtek™).....	119.42	
For >6 Months (>26 Weeks) , Deduct	-4.78	
01 22 23 00-0562 Day 30' Width x 4' Length, 6-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	21.56	
01 22 23 00-0563 WK 30' Width x 4' Length, 6-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	53.89	
01 22 23 00-0564 MO 30' Width x 4' Length, 6-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	161.68	
For >6 Months (>26 Weeks) , Deduct	-6.47	
01 22 23 00-0565 Day 24' Width x 4' Length, 7-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	18.64	
01 22 23 00-0566 WK 24' Width x 4' Length, 7-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	46.60	
01 22 23 00-0567 MO 24' Width x 4' Length, 7-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	139.79	
For >6 Months (>26 Weeks) , Deduct	-5.59	
01 22 23 00-0568 Day 40' Width x 4' Length, 7-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	31.08	
01 22 23 00-0569 WK 40' Width x 4' Length, 7-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	77.71	
01 22 23 00-0570 MO 40' Width x 4' Length, 7-1/2" Thick, Laminated Heavy Equipment Mat (Emtek™).....	233.14	
For >6 Months (>26 Weeks) , Deduct	-9.33	
01 22 23 00-0571 Day 40' Width x 4' Length, 8" Thick, Laminated Heavy Equipment Mat (Emtek™).....	33.13	
01 22 23 00-0572 WK 40' Width x 4' Length, 8" Thick, Laminated Heavy Equipment Mat (Emtek™).....	82.84	
01 22 23 00-0573 MO 40' Width x 4' Length, 8" Thick, Laminated Heavy Equipment Mat (Emtek™).....	248.51	
For >6 Months (>26 Weeks) , Deduct	-9.94	
01 22 23 00-0574 Electrical Equipment (01 22 23)		
01 22 23 00-0575 Tripod Mounted Floodlights (01 22 23 00-0574)		
Note: Includes delivery to job site and pick-up when complete.		
01 22 23 00-0576 DAY 500 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	74.10	
01 22 23 00-0577 WK 500 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	175.30	
01 22 23 00-0578 MO 500 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	370.48	
For >6 Months (>26 Weeks) , Deduct	-14.82	
01 22 23 00-0579 DAY 1,000 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	74.10	
01 22 23 00-0580 WK 1,000 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	216.86	
01 22 23 00-0581 MO 1,000 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	641.56	
For >6 Months (>26 Weeks) , Deduct	-25.66	
01 22 23 00-0582 DAY 2,000 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	83.13	
01 22 23 00-0583 WK 2,000 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	225.90	
01 22 23 00-0584 MO 2,000 Watt, 115 Volt, 2 Lamp, Portable Light Stand With Tripod.....	551.20	
For >6 Months (>26 Weeks) , Deduct	-22.05	
01 22 23 00-0585 Trailer Mounted Floodlights (01 22 23 00-0574)		
Note: Includes delivery to job site and pick-up when complete. Excludes operator.		
01 22 23 00-0586 DAY 4 x 1,000 Watt Floodlights, 30' Telescoping Tower, Diesel Power Trailer Mounted Light Tower.....	207.83	
01 22 23 00-0587 WK 4 x 1,000 Watt Floodlights, 30' Telescoping Tower, Diesel Power Trailer Mounted Light Tower.....	460.84	
01 22 23 00-0588 MO 4 x 1,000 Watt Floodlights, 30' Telescoping Tower, Diesel Power Trailer Mounted Light Tower.....	993.96	
For >6 Months (>26 Weeks) , Deduct	-39.76	
01 22 23 00-0589 Generator Sets (01 22 23 00-0574)		
01 22 23 00-0590 Portable, Gas Powered Generator Sets (01 22 23 00-0589)		
Note: With 24 hour day-tank. Includes delivery to job site and pick-up when complete. Excludes cables, operator and fuel costs. See CSI section 01 22 23 00-0707 for reimbursable fuel fees.		
01 22 23 00-0591 DAY 3.6 KW, 8 HP Gas Powered Generator Set.....	57.28	
Note: Fuel consumption: 100% load - 0.54 gallons per hour		
For LP Or NG Gas, Add	7.16	
For >160 To 320 Hours Usage Per Month, Add	28.64	
01 22 23 00-0592 WK 3.6 KW, 8 HP Gas Powered Generator Set.....	206.46	
Note: Fuel consumption: 100% load - 0.54 gallons per hour		
For LP Or NG Gas, Add	25.81	
01 22 23 00-0593 MO 3.6 KW, 8 HP Gas Powered Generator Set.....	572.76	
Note: Fuel consumption: 100% load - 0.54 gallons per hour		
For LP Or NG Gas, Add	71.60	
For >6 Months (>26 Weeks) , Deduct	-22.91	
01 22 23 00-0594 DAY 5 KW, 11 HP Gas Powered Generator Set.....	81.25	
Note: Fuel consumption: 100% load - 0.75 gallons per hour		
For LP Or NG Gas, Add	10.16	
01 22 23 00-0595 WK 5 KW, 11 HP Gas Powered Generator Set.....	259.74	
Note: Fuel consumption: 100% load - 0.75 gallons per hour		
For LP Or NG Gas, Add	32.47	

01	01	General Requirements
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MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
01 22 23 00-0596	MO	5 KW, 11 HP Gas Powered Generator Set.....	592.74		
		Note: Fuel consumption: 100% load – 0.75 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	74.09		
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-23.71		
01 22 23 00-0597	DAY	6.5 KW, 13 HP Gas Powered Generator Set.....	103.90		
		Note: Fuel consumption: 100% load – 0.975 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	12.99		
01 22 23 00-0598	WK	6.5 KW, 13 HP Gas Powered Generator Set.....	279.72		
		Note: Fuel consumption: 100% load – 0.975 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	34.97		
01 22 23 00-0599	MO	6.5 KW, 13 HP Gas Powered Generator Set.....	772.56		
		Note: Fuel consumption: 100% load – 0.975 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	96.57		
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-30.90		
01 22 23 00-0600	DAY	10 KW, 18 HP Gas Powered Generator Set.....	115.88		
		Note: Fuel consumption: 100% load – 1.5 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	14.49		
01 22 23 00-0601	WK	10 KW, 18 HP Gas Powered Generator Set.....	313.02		
		Note: Fuel consumption: 100% load – 1.5 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	39.13		
01 22 23 00-0602	MO	10 KW, 18 HP Gas Powered Generator Set.....	899.10		
		Note: Fuel consumption: 100% load – 1.5 gallons per hour			
		<i>For LP Or NG Gas, Add</i>	112.39		
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-35.96		
01 22 23 00-0603		Towable, Diesel Powered Generator Sets <small>(01 22 23 00-0599)</small>			
		Note: Includes 24 hour day-tank on sizes up to 180KW, 40 hour day-tank for sizes greater than 180KW To 300 KW and 1000 gallon for sizes greater than 300KW. Multi-voltage transformer unless stated otherwise, trailer mounted including sound attenuation and control panel. Excludes cables, operator and fuel costs. See CSI section 01 22 23 00-0707 for reimbursable fuel fees.			
01 22 23 00-0604	DAY	20 KW, 60 Hertz Towable Diesel Powered Generator Set.....	238.43		
		Note: Fuel consumption: 100% load – 1.6 gallons per hour, 75% load - 1.3 gallons per hour, 50% load - 0.9 gallons per hour.			
		<i>For >8 To 16 Hours Usage Per Day, Add</i>	119.22		
		<i>For >16 To 24 Hours Usage Per Day, Add</i>	238.43		
01 22 23 00-0605	WK	20 KW, 60 Hertz Towable Diesel Powered Generator Set.....	623.38		
		Note: Fuel consumption: 100% load – 1.6 gallons per hour, 75% load - 1.3 gallons per hour, 50% load - 0.9 gallons per hour.			
		<i>For >40 To 80 Hours Usage Per Week, Add</i>	311.69		
		<i>For >80 Hours Usage Per Week, Add</i>	623.38		
01 22 23 00-0606	MO	20 KW, 60 Hertz Towable Diesel Powered Generator Set.....	1,698.30		
		Note: Fuel consumption: 100% load – 1.6 gallons per hour, 75% load - 1.3 gallons per hour, 50% load - 0.9 gallons per hour.			
		<i>For >160 To 320 Hours Usage Per Month, Add</i>	849.15		
		<i>For >320 Hours Usage Per Month, Add</i>	1,698.30		
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-67.93		
01 22 23 00-0607	DAY	30 KW, 60 Hertz Towable Diesel Powered Generator Set.....	366.48		
		Note: Fuel consumption: 100% load – 2.9 gallons per hour, 75% load - 2.4 gallons per hour, 50% load - 1.8 gallons per hour.			
		<i>For >8 To 16 Hours Usage Per Day, Add</i>	183.24		
		<i>For >16 To 24 Hours Usage Per Day, Add</i>	366.48		
01 22 23 00-0608	WK	30 KW, 60 Hertz Towable Diesel Powered Generator Set.....	1,087.62		
		Note: Fuel consumption: 100% load – 2.9 gallons per hour, 75% load - 2.4 gallons per hour, 50% load - 1.8 gallons per hour.			
		<i>For >40 To 80 Hours Usage Per Week, Add</i>	543.81		
		<i>For >80 Hours Usage Per Week, Add</i>	1,087.62		
01 22 23 00-0609	MO	30 KW, 60 Hertz Towable Diesel Powered Generator Set.....	2,246.18		
		Note: Fuel consumption: 100% load – 2.9 gallons per hour, 75% load - 2.4 gallons per hour, 50% load - 1.8 gallons per hour.			
		<i>For >160 To 320 Hours Usage Per Month, Add</i>	1,123.09		
		<i>For >320 Hours Usage Per Month, Add</i>	2,246.18		
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-89.85		
01 22 23 00-0610	DAY	40.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	401.95		
		Note: Fuel consumption: 100% load – 4.0 gallons per hour, 75% load - 3.2 gallons per hour, 50% load - 2.3 gallons per hour.			
		<i>For >8 To 16 Hours Usage Per Day, Add</i>	200.98		
		<i>For >16 To 24 Hours Usage Per Day, Add</i>	401.95		
01 22 23 00-0611	WK	40.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	1,123.09		
		Note: Fuel consumption: 100% load - 4.0 gallons per hour, 75% load - 3.2 gallons per hour, 50% load - 2.3 gallons per hour.			
		<i>For >40 To 80 Hours Usage Per Week, Add</i>	561.55		
		<i>For >80 Hours Usage Per Week, Add</i>	1,123.09		
01 22 23 00-0612	MO	40.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	2,482.62		
		Note: Fuel consumption: 100% load - 4.0 gallons per hour, 75% load - 3.2 gallons per hour, 50% load - 2.3 gallons per hour.			
		<i>For >160 To 320 Hours Usage Per Month, Add</i>	1,241.31		
		<i>For >320 Hours Usage Per Month, Add</i>	2,482.62		
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-99.30		
01 22 23 00-0613	DAY	55.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	431.50		
		Note: Fuel consumption: 100% load – 4.8 gallons per hour, 75% load - 3.8 gallons per hour, 50% load - 2.9 gallons per hour.			
		<i>For >8 To 16 Hours Usage Per Day, Add</i>	215.75		
		<i>For >16 To 24 Hours Usage Per Day, Add</i>	431.50		



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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23	00-0614	WK	55.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 4.8 gallons per hour, 75% load - 3.8 gallons per hour, 50% load - 2.9 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> <i>For >80 Hours Usage Per Week, Add</i>	1,182.20 591.10 1,182.20	
01 22 23	00-0615	MO	55.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 4.8 gallons per hour, 75% load - 3.8 gallons per hour, 50% load - 2.9 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> <i>For >320 Hours Usage Per Month, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	2,837.28 1,418.64 2,837.28 -113.49	
01 22 23	00-0616	DAY	70.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 5.7 gallons per hour, 75% load - 4.3 gallons per hour, 50% load - 3.2 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> <i>For >16 To 24 Hours Usage Per Day, Add</i>	472.88 236.44 472.88	
01 22 23	00-0617	WK	70.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 5.7 gallons per hour, 75% load - 4.3 gallons per hour, 50% load - 3.2 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> <i>For >80 Hours Usage Per Week, Add</i>	1,341.80 670.90 1,341.80	
01 22 23	00-0618	MO	70.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 5.7 gallons per hour, 75% load - 4.3 gallons per hour, 50% load - 3.2 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> <i>For >320 Hours Usage Per Month, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	3,191.94 1,595.97 3,191.94 -127.68	
01 22 23	00-0619	DAY	80.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 6.5 gallons per hour, 75% load - 4.9 gallons per hour, 50% load - 3.6 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> <i>For >16 To 24 Hours Usage Per Day, Add</i>	531.99 266.00 531.99	
01 22 23	00-0620	WK	80.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 6.5 gallons per hour, 75% load - 4.9 gallons per hour, 50% load - 3.6 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> <i>For >80 Hours Usage Per Week, Add</i>	1,418.64 709.32 1,418.64	
01 22 23	00-0621	MO	80.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load – 6.5 gallons per hour, 75% load - 4.9 gallons per hour, 50% load - 3.6 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> <i>For >320 Hours Usage Per Month, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	3,546.60 1,773.30 3,546.60 -141.86	
01 22 23	00-0622	DAY	100.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 7.4 gallons per hour, 75% load - 5.8 gallons per hour, 50% load - 4.1 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> <i>For >16 To 24 Hours Usage Per Day, Add</i>	549.72 274.86 549.72	
01 22 23	00-0623	WK	100.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 7.4 gallons per hour, 75% load - 5.8 gallons per hour, 50% load - 4.1 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> <i>For >80 Hours Usage Per Week, Add</i>	1,477.75 738.88 1,477.75	
01 22 23	00-0624	MO	100.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 7.4 gallons per hour, 75% load - 5.8 gallons per hour, 50% load - 4.1 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> <i>For >320 Hours Usage Per Month, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	4,019.48 2,009.74 4,019.48 -160.78	
01 22 23	00-0625	DAY	120.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 8.7 gallons per hour, 75% load - 6.8 gallons per hour, 50% load - 4.8 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> <i>For >16 To 24 Hours Usage Per Day, Add</i>	620.66 310.33 620.66	
01 22 23	00-0626	WK	120.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 8.7 gallons per hour, 75% load - 6.8 gallons per hour, 50% load - 4.8 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> <i>For >80 Hours Usage Per Week, Add</i>	1,714.19 857.10 1,714.19	
01 22 23	00-0627	MO	120.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 8.7 gallons per hour, 75% load - 6.8 gallons per hour, 50% load - 4.8 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> <i>For >320 Hours Usage Per Month, Add</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	4,610.58 2,305.29 4,610.58 -184.42	
01 22 23	00-0628	DAY	140.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 10.2 gallons per hour, 75% load - 7.9 gallons per hour, 50% load - 5.6 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> <i>For >16 To 24 Hours Usage Per Day, Add</i>	650.21 325.11 650.21	
01 22 23	00-0629	WK	140.0 KW, 60 Hertz Towable Diesel Powered Generator Set Note: Fuel consumption: 100% load - 10.2 gallons per hour, 75% load - 7.9 gallons per hour, 50% load - 5.6 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> <i>For >80 Hours Usage Per Week, Add</i>	1,802.86 901.43 1,802.86	

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MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
01 22 23 00-0630 MO 140.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	5,083.46	
Note: Fuel consumption: 100% load - 10.2 gallons per hour, 75% load - 7.9 gallons per hour, 50% load - 5.6 gallons per hour.		
For >160 To 320 Hours Usage Per Month, Add	2,541.73	
For >320 Hours Usage Per Month, Add	5,083.46	
For >6 Months (>26 Weeks) , Deduct	-203.34	
01 22 23 00-0631 DAY 150.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	679.76	
Note: Fuel consumption: 100% load - 10.9 gallons per hour, 75% load - 8.4 gallons per hour, 50% load - 5.9 gallons per hour.		
For >8 To 16 Hours Usage Per Day, Add	339.88	
For >16 To 24 Hours Usage Per Day, Add	679.76	
01 22 23 00-0632 WK 150.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	1,950.63	
Note: Fuel consumption: 100% load - 10.9 gallons per hour, 75% load - 8.4 gallons per hour, 50% load - 5.9 gallons per hour.		
For >40 To 80 Hours Usage Per Week, Add	975.32	
For >80 Hours Usage Per Week, Add	1,950.63	
01 22 23 00-0633 MO 150.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	5,319.90	
Note: Fuel consumption: 100% load - 10.9 gallons per hour, 75% load - 8.4 gallons per hour, 50% load - 5.9 gallons per hour.		
For >160 To 320 Hours Usage Per Month, Add	2,659.95	
For >320 Hours Usage Per Month, Add	5,319.90	
For >6 Months (>26 Weeks) , Deduct	-212.80	
01 22 23 00-0634 DAY 160.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	709.32	
Note: Fuel consumption: 100% load - 11.6 gallons per hour, 75% load - 8.9 gallons per hour, 50% load - 6.2 gallons per hour.		
For >8 To 16 Hours Usage Per Day, Add	354.66	
For >16 To 24 Hours Usage Per Day, Add	709.32	
01 22 23 00-0635 WK 160.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	2,068.85	
Note: Fuel consumption: 100% load - 11.6 gallons per hour, 75% load - 8.9 gallons per hour, 50% load - 6.2 gallons per hour.		
For >40 To 80 Hours Usage Per Week, Add	1,034.43	
For >80 Hours Usage Per Week, Add	2,068.85	
01 22 23 00-0636 MO 160.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	5,556.34	
Note: Fuel consumption: 100% load - 11.6 gallons per hour, 75% load - 8.9 gallons per hour, 50% load - 6.2 gallons per hour.		
For >160 To 320 Hours Usage Per Month, Add	2,778.17	
For >320 Hours Usage Per Month, Add	5,556.34	
For >6 Months (>26 Weeks) , Deduct	-222.25	
01 22 23 00-0637 DAY 175.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	709.32	
Note: Fuel consumption: 100% load - 12.7 gallons per hour, 75% load - 9.7 gallons per hour, 50% load - 6.8 gallons per hour.		
For >8 To 16 Hours Usage Per Day, Add	354.66	
For >16 To 24 Hours Usage Per Day, Add	709.32	
01 22 23 00-0638 WK 175.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	2,068.85	
Note: Fuel consumption: 100% load - 12.7 gallons per hour, 75% load - 9.7 gallons per hour, 50% load - 6.8 gallons per hour.		
For >40 To 80 Hours Usage Per Week, Add	1,034.43	
For >80 Hours Usage Per Week, Add	2,068.85	
01 22 23 00-0639 MO 175.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	5,556.34	
Note: Fuel consumption: 100% load - 12.7 gallons per hour, 75% load - 9.7 gallons per hour, 50% load - 6.8 gallons per hour.		
For >160 To 320 Hours Usage Per Month, Add	2,778.17	
For >320 Hours Usage Per Month, Add	5,556.34	
For >6 Months (>26 Weeks) , Deduct	-222.25	
01 22 23 00-0640 DAY 200.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	975.32	
Note: Fuel consumption: 100% load - 14.4 gallons per hour, 75% load - 11.0 gallons per hour, 50% load - 7.7 gallons per hour.		
For >8 To 16 Hours Usage Per Day, Add	487.66	
For >16 To 24 Hours Usage Per Day, Add	975.32	
01 22 23 00-0641 WK 200.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	2,423.51	
Note: Fuel consumption: 100% load - 14.4 gallons per hour, 75% load - 11.0 gallons per hour, 50% load - 7.7 gallons per hour.		
For >40 To 80 Hours Usage Per Week, Add	1,211.76	
For >80 Hours Usage Per Week, Add	2,423.51	
01 22 23 00-0642 MO 200.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	7,093.20	
Note: Fuel consumption: 100% load - 14.4 gallons per hour, 75% load - 11.0 gallons per hour, 50% load - 7.7 gallons per hour.		
For >160 To 320 Hours Usage Per Month, Add	3,546.60	
For >320 Hours Usage Per Month, Add	7,093.20	
For >6 Months (>26 Weeks) , Deduct	-283.73	
01 22 23 00-0643 DAY 250.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	1,034.42	
Note: Fuel consumption: 100% load - 19.8 gallons per hour, 75% load - 12.3 gallons per hour, 50% load - 8.6 gallons per hour.		
For >8 To 16 Hours Usage Per Day, Add	517.21	
For >16 To 24 Hours Usage Per Day, Add	1,034.42	
01 22 23 00-0644 WK 250.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	2,482.62	
Note: Fuel consumption: 100% load - 19.8 gallons per hour, 75% load - 12.3 gallons per hour, 50% load - 8.6 gallons per hour.		
For >40 To 80 Hours Usage Per Week, Add	1,241.31	
For >80 Hours Usage Per Week, Add	2,482.62	
01 22 23 00-0645 MO 250.0 KW, 60 Hertz Towable Diesel Powered Generator Set.....	7,329.64	
Note: Fuel consumption: 100% load - 19.8 gallons per hour, 75% load - 12.3 gallons per hour, 50% load - 8.6 gallons per hour.		
For >160 To 320 Hours Usage Per Month, Add	3,664.82	
For >320 Hours Usage Per Month, Add	7,329.64	
For >6 Months (>26 Weeks) , Deduct	-293.19	



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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23	00-0646	DAY	275.0 KW, 60 Hertz Towable Diesel Powered Generator Set 1,093.54 Note: Fuel consumption: 100% load - 18.0 gallons per hour, 75% load - 13.6 gallons per hour, 50% load - 9.5 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> 546.77 <i>For >16 To 24 Hours Usage Per Day, Add</i> 1,093.54		
01 22 23	00-0647	WK	275.0 KW, 60 Hertz Towable Diesel Powered Generator Set 2,541.73 Note: Fuel consumption: 100% load - 18.0 gallons per hour, 75% load - 13.6 gallons per hour, 50% load - 9.5 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> 1,270.87 <i>For >80 Hours Usage Per Week, Add</i> 2,541.73		
01 22 23	00-0648	MO	275.0 KW, 60 Hertz Towable Diesel Powered Generator Set 7,566.08 Note: Fuel consumption: 100% load - 18.0 gallons per hour, 75% load - 13.6 gallons per hour, 50% load - 9.5 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> 3,783.04 <i>For >320 Hours Usage Per Month, Add</i> 7,566.08 <i>For >6 Months (>26 Weeks) , Deduct</i> -302.64		
01 22 23	00-0649	DAY	300.0 KW, 60 Hertz Towable Diesel Powered Generator Set 1,129.00 Note: Fuel consumption: 100% load - 21.5 gallons per hour, 75% load - 16.1 gallons per hour, 50% load - 11.3 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> 564.50 <i>For >16 To 24 Hours Usage Per Day, Add</i> 1,129.00		
01 22 23	00-0650	WK	300.0 KW, 60 Hertz Towable Diesel Powered Generator Set 2,719.06 Note: Fuel consumption: 100% load - 21.5 gallons per hour, 75% load - 16.1 gallons per hour, 50% load - 11.3 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> 1,359.53 <i>For >80 Hours Usage Per Week, Add</i> 2,719.06		
01 22 23	00-0651	MO	300.0 KW, 60 Hertz Towable Diesel Powered Generator Set 8,038.96 Note: Fuel consumption: 100% load - 21.5 gallons per hour, 75% load - 16.1 gallons per hour, 50% load - 11.3 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> 4,019.48 <i>For >320 Hours Usage Per Month, Add</i> 8,038.96 <i>For >6 Months (>26 Weeks) , Deduct</i> -321.56		
01 22 23	00-0652	DAY	350.0 KW, 60 Hertz Towable Diesel Powered Generator Set 1,182.20 Note: Fuel consumption: 100% load - 25.1 gallons per hour, 75% load - 18.7 gallons per hour, 50% load - 13.1 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> 591.10 <i>For >16 To 24 Hours Usage Per Day, Add</i> 1,182.20		
01 22 23	00-0653	WK	350.0 KW, 60 Hertz Towable Diesel Powered Generator Set 3,073.72 Note: Fuel consumption: 100% load - 25.1 gallons per hour, 75% load - 18.7 gallons per hour, 50% load - 13.1 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> 1,536.86 <i>For >80 Hours Usage Per Week, Add</i> 3,073.72		
01 22 23	00-0654	MO	350.0 KW, 60 Hertz Towable Diesel Powered Generator Set 8,866.50 Note: Fuel consumption: 100% load - 25.1 gallons per hour, 75% load - 18.7 gallons per hour, 50% load - 13.1 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> 4,433.25 <i>For >320 Hours Usage Per Month, Add</i> 8,866.50 <i>For >6 Months (>26 Weeks) , Deduct</i> -354.66		
01 22 23	00-0655	DAY	400.0 KW, 60 Hertz Towable Diesel Powered Generator Set 2,188.13 Note: Fuel consumption: 100% load - 28.6 gallons per hour, 75% load - 21.3 gallons per hour, 50% load - 14.9 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> 1,094.07 <i>For >16 To 24 Hours Usage Per Day, Add</i> 2,188.13		
01 22 23	00-0656	WK	400.0 KW, 60 Hertz Towable Diesel Powered Generator Set 5,657.36 Note: Fuel consumption: 100% load - 28.6 gallons per hour, 75% load - 21.3 gallons per hour, 50% load - 14.9 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> 2,828.68 <i>For >80 Hours Usage Per Week, Add</i> 5,657.36		
01 22 23	00-0657	MO	400.0 KW, 60 Hertz Towable Diesel Powered Generator Set 14,961.60 Note: Fuel consumption: 100% load - 28.6 gallons per hour, 75% load - 21.3 gallons per hour, 50% load - 14.9 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> 7,480.80 <i>For >320 Hours Usage Per Month, Add</i> 14,961.60 <i>For >6 Months (>26 Weeks) , Deduct</i> -598.46		
01 22 23	00-0658	DAY	500.0 KW, 60 Hertz Container Diesel Powered Generator Set 2,805.30 Note: Fuel consumption: 100% load - 35.7 gallons per hour, 75% load - 26.4 gallons per hour, 50% load - 18.5 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> 1,402.65 <i>For >16 To 24 Hours Usage Per Day, Add</i> 2,805.30		
01 22 23	00-0659	WK	500.0 KW, 60 Hertz Container Diesel Powered Generator Set 7,293.78 Note: Fuel consumption: 100% load - 35.7 gallons per hour, 75% load - 26.4 gallons per hour, 50% load - 18.5 gallons per hour. <i>For >40 To 80 Hours Usage Per Week, Add</i> 3,646.89 <i>For >80 Hours Usage Per Week, Add</i> 7,293.78		
01 22 23	00-0660	MO	500.0 KW, 60 Hertz Container Diesel Powered Generator Set 16,831.80 Note: Fuel consumption: 100% load - 35.7 gallons per hour, 75% load - 26.4 gallons per hour, 50% load - 18.5 gallons per hour. <i>For >160 To 320 Hours Usage Per Month, Add</i> 8,415.90 <i>For >320 Hours Usage Per Month, Add</i> 16,831.80 <i>For >6 Months (>26 Weeks) , Deduct</i> -673.27		
01 22 23	00-0661	DAY	640.0 KW, 60 Hertz Container Diesel Powered Generator Set 3,469.22 Note: Fuel consumption: 100% load - 45.6 gallons per hour, 75% load - 33.5 gallons per hour, 50% load - 20.8 gallons per hour. <i>For >8 To 16 Hours Usage Per Day, Add</i> 1,734.61 <i>For >16 To 24 Hours Usage Per Day, Add</i> 3,469.22		

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MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST
01 22 23 00-0662	WK	640.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	9,163.98
		Note: Fuel consumption: 100% load - 45.6 gallons per hour, 75% load - 33.5 gallons per hour, 50% load - 20.8 gallons per hour.	
		<i>For >40 To 80 Hours Usage Per Week, Add</i>	4,581.99
		<i>For >80 Hours Usage Per Week, Add</i>	9,163.98
01 22 23 00-0663	MO	640.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	22,442.40
		Note: Fuel consumption: 100% load - 45.6 gallons per hour, 75% load - 33.5 gallons per hour, 50% load - 20.8 gallons per hour.	
		<i>For >160 To 320 Hours Usage Per Month, Add</i>	11,221.20
		<i>For >320 Hours Usage Per Month, Add</i>	22,442.40
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-897.70
01 22 23 00-0664	DAY	750.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	3,749.75
		Note: Fuel consumption: 100% load - 53.4 gallons per hour, 75% load - 39.3 gallons per hour, 50% load - 24.4 gallons per hour.	
		<i>For >8 To 16 Hours Usage Per Day, Add</i>	1,874.88
		<i>For >16 To 24 Hours Usage Per Day, Add</i>	3,749.75
01 22 23 00-0665	WK	750.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	8,640.32
		Note: Fuel consumption: 100% load - 53.4 gallons per hour, 75% load - 39.3 gallons per hour, 50% load - 24.4 gallons per hour.	
		<i>For >40 To 80 Hours Usage Per Week, Add</i>	4,320.16
		<i>For >80 Hours Usage Per Week, Add</i>	8,640.32
01 22 23 00-0666	MO	750.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	25,920.97
		Note: Fuel consumption: 100% load - 53.4 gallons per hour, 75% load - 39.3 gallons per hour, 50% load - 24.4 gallons per hour.	
		<i>For >160 To 320 Hours Usage Per Month, Add</i>	12,960.49
		<i>For >320 Hours Usage Per Month, Add</i>	25,920.97
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,036.84
01 22 23 00-0667	DAY	1,000.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	4,254.70
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 71.1 gallons per hour, 75% load - 52.1 gallons per hour, 50% load - 36.4 gallons per hour.	
01 22 23 00-0668	WK	1,000.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	11,118.34
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 71.1 gallons per hour, 75% load - 52.1 gallons per hour, 50% load - 36.4 gallons per hour.	
01 22 23 00-0669	MO	1,000.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	30,456.21
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 71.1 gallons per hour, 75% load - 52.1 gallons per hour, 50% load - 36.4 gallons per hour.	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,218.25
01 22 23 00-0670	DAY	1,500.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	5,610.60
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 106.5 gallons per hour, 75% load - 77.8 gallons per hour, 50% load - 54.3 gallons per hour.	
01 22 23 00-0671	WK	1,500.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	16,831.80
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 106.5 gallons per hour, 75% load - 77.8 gallons per hour, 50% load - 54.3 gallons per hour.	
01 22 23 00-0672	MO	1,500.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	48,260.51
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 106.5 gallons per hour, 75% load - 77.8 gallons per hour, 50% load - 54.3 gallons per hour.	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,930.42
01 22 23 00-0673	DAY	2,000.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	7,396.64
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 141.9 gallons per hour, 75% load - 103.5 gallons per hour, 50% load - 72.2 gallons per hour.	
01 22 23 00-0674	WK	2,000.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	18,496.28
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 141.9 gallons per hour, 75% load - 103.5 gallons per hour, 50% load - 72.2 gallons per hour.	
01 22 23 00-0675	MO	2,000.0 KW, 60 Hertz Container Diesel Powered Generator Set.....	50,495.40
		Note: Includes 1,000 Gallon fuel tank. Fuel consumption: 100% load - 141.9 gallons per hour, 75% load - 103.5 gallons per hour, 50% load - 72.2 gallons per hour.	
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-2,019.82
01 22 23 00-0676	EA	Up To 300 KW Generator Set Delivery, Set-Up, Testing And Pick-up.....	966.78
01 22 23 00-0677	EA	350 To 750 KW Generator Set Delivery, Set-Up, Testing And Pick-up.....	1,578.90
01 22 23 00-0678	EA	1,000 To 2,000 KW Generator Set Delivery, Set-Up, Testing And Pick-up.....	2,684.93
01 22 23 00-0679		Cabling For Generator Sets <small>(01 22 23 00-0589)</small>	
		Note: Includes delivery to job site and pick-up when complete.	
01 22 23 00-0680	DAY	#1 Banded Cable, 50' With Camlock Ends For Generator Set.....	26.01
01 22 23 00-0681	WK	#1 Banded Cable, 50' With Camlock Ends For Generator Set.....	45.51
01 22 23 00-0682	MO	#1 Banded Cable, 50' With Camlock Ends For Generator Set.....	136.54
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.46
01 22 23 00-0683	DAY	50', 4/0 Cable With Camlock Ends For Generator Set.....	13.00
01 22 23 00-0684	WK	50', 4/0 Cable With Camlock Ends For Generator Set.....	37.83
01 22 23 00-0685	MO	50', 4/0 Cable With Camlock Ends For Generator Set.....	105.22
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-4.21
01 22 23 00-0686		Resistive Load Banks For Generator Sets <small>(01 22 23 00-0589)</small>	
		Note: Includes delivery to job site and pick-up when complete. See CSI section 01 22 23 00-0707 for reimbursable fuel fees.	
01 22 23 00-0687	DAY	100 KW A/C Resistive Load Bank	360.70
01 22 23 00-0688	WK	100 KW A/C Resistive Load Bank	686.03
01 22 23 00-0689	MO	100 KW A/C Resistive Load Bank	1,874.20
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-74.97
01 22 23 00-0690	DAY	650 KW A/C Resistive Load Bank	787.22
01 22 23 00-0691	WK	650 KW A/C Resistive Load Bank	2,105.21
01 22 23 00-0692	MO	650 KW A/C Resistive Load Bank	5,367.38
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-214.70



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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-0693	Sub-Distribution Panels (Spider Box) For Generator Sets (01 22 23 00-0589) Note: Includes delivery to job site and pick-up when complete.	
01 22 23 00-0694	DAY 50 Amperes, 240 Volt, Single Phase, Sub-Distribution Panel (Spider Box).....	63.84
01 22 23 00-0695	WK 50 Amperes, 240 Volt, Single Phase, Sub-Distribution Panel (Spider Box).....	165.51
01 22 23 00-0696	MO 50 Amperes, 240 Volt, Single Phase, Sub-Distribution Panel (Spider Box).....	466.97
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-18.68

01 22 23 00-0697	Portable Distribution Panels For Generator Sets (01 22 23 00-0589) Note: Includes delivery to job site and pick-up when complete.	
01 22 23 00-0698	DAY 200 Amperes, 208 Volt, 3 Phase, Portable Spider Box Feeder Panel.....	141.86
01 22 23 00-0699	WK 200 Amperes, 208 Volt, 3 Phase, Portable Spider Box Feeder Panel.....	384.22
01 22 23 00-0700	MO 200 Amperes, 208 Volt, 3 Phase, Portable Spider Box Feeder Panel.....	1,075.80
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-43.03
01 22 23 00-0701	DAY 100 Amperes, 208 Volt, 3 Phase, Portable Quad Box Panel.....	115.86
01 22 23 00-0702	WK 100 Amperes, 208 Volt, 3 Phase, Portable Quad Box Panel.....	301.46
01 22 23 00-0703	MO 100 Amperes, 208 Volt, 3 Phase, Portable Quad Box Panel.....	857.10
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-34.28
01 22 23 00-0704	DAY 200 Amperes, 208 Volt, 3 Phase, Portable Quad Box Panel.....	147.78
01 22 23 00-0705	WK 200 Amperes, 208 Volt, 3 Phase, Portable Quad Box Panel.....	372.39
01 22 23 00-0706	MO 200 Amperes, 208 Volt, 3 Phase, Portable Quad Box Panel.....	1,010.78
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-40.43

01 22 23 00-0707	Fuel Reimbursement For Generators (01 22 23 00-0589)	
01 22 23 00-0708	EA Fuel Reimbursement For Generators	1.00
	Note: Purchases made by the contractor for fuel will be reimbursed to the Contractor at the actual cost of the purchase, without mark-up, for which a receipt or bill is received. The Adjustment Factor applied to Reimbursable Fees will be 1.0000. The base cost of the purchase is \$1.00, quantity will adjust cost to actual purchase cost; i.e., quantity of 125 = \$125.00 purchase. If there are multiple purchases, each one shall be listed separately with a comment in the "note" block to identify the purchase.	

01 22 23 00-0709 **General Equipment** (01 22 23)

01 22 23 00-0710 **Jacks And Bracing** (01 22 23 00-0709)
Note: Includes delivery to job site and pick-up when complete.

01 22 23 00-0711	Manual Hydraulic Jacks (01 22 23 00-0710)	
01 22 23 00-0712	DAY 12 Ton Manual Hydraulic Bottle Jack	1.83
01 22 23 00-0713	WK 12 Ton Manual Hydraulic Bottle Jack	8.72
01 22 23 00-0714	MO 12 Ton Manual Hydraulic Bottle Jack	31.36
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.25
01 22 23 00-0715	DAY 20 Ton Manual Hydraulic Bottle Jack	3.21
01 22 23 00-0716	WK 20 Ton Manual Hydraulic Bottle Jack	10.10
01 22 23 00-0717	MO 20 Ton Manual Hydraulic Bottle Jack	38.25
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.53
01 22 23 00-0718	DAY 50 Ton Manual Hydraulic Bottle Jack	11.48
01 22 23 00-0719	WK 50 Ton Manual Hydraulic Bottle Jack	44.56
01 22 23 00-0720	MO 50 Ton Manual Hydraulic Bottle Jack	160.32
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-6.41
01 22 23 00-0721	DAY 100 Ton Manual Hydraulic Bottle Jack	16.08
01 22 23 00-0722	WK 100 Ton Manual Hydraulic Bottle Jack	64.31
01 22 23 00-0723	MO 100 Ton Manual Hydraulic Bottle Jack	231.64
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-9.27

01 22 23 00-0724	Manual Screw Jacks (01 22 23 00-0710)	
01 22 23 00-0725	DAY 10 To 20 Ton Manual Screw Jack	17.75
01 22 23 00-0726	WK 10 To 20 Ton Manual Screw Jack	46.99
01 22 23 00-0727	MO 10 To 20 Ton Manual Screw Jack	140.97
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.64

01 22 23 00-0728	Pressure Washers (01 22 23 00-0709) Note: Includes delivery to job site, pick-up when complete and full time operator.	
01 22 23 00-0729	DAY 2,000 PSI Pressure Washer With Full-Time Operator	906.79
	<i>For Equipment Without Operator, Deduct</i>	-772.81
01 22 23 00-0730	WK 2,000 PSI Pressure Washer With Full-Time Operator	4,204.14
	<i>For Equipment Without Operator, Deduct</i>	-3,864.03
01 22 23 00-0731	MO 2,000 PSI Pressure Washer With Full-Time Operator	17,609.89
	<i>For Equipment Without Operator, Deduct</i>	-16,744.14
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-34.63
01 22 23 00-0732	DAY 2,500 PSI Pressure Washer With Full-Time Operator	906.79
	<i>For Equipment Without Operator, Deduct</i>	-772.81
01 22 23 00-0733	WK 2,500 PSI Pressure Washer With Full-Time Operator	4,204.14
	<i>For Equipment Without Operator, Deduct</i>	-3,864.03
01 22 23 00-0734	MO 2,500 PSI Pressure Washer With Full-Time Operator	17,609.89
	<i>For Equipment Without Operator, Deduct</i>	-16,744.14
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-34.63

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CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
01 22 23 00-0735	DAY 3,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	906.79 -772.81	
01 22 23 00-0736	WK 3,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	4,204.14 -3,864.03	
01 22 23 00-0737	MO 3,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	17,609.89 -16,744.14 -34.63	
01 22 23 00-0738	DAY 3,500 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	917.10 -772.81	
01 22 23 00-0739	WK 3,500 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	4,235.06 -3,864.03	
01 22 23 00-0740	MO 3,500 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	17,692.34 -16,744.14 -37.93	
01 22 23 00-0741	DAY 4,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	958.33 -772.81	
01 22 23 00-0742	WK 4,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	4,369.05 -3,864.03	
01 22 23 00-0743	MO 4,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	18,156.13 -16,744.14 -56.48	
01 22 23 00-0744	DAY 5,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	978.94 -772.81	
01 22 23 00-0745	WK 5,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i>	4,420.58 -3,864.03	
01 22 23 00-0746	MO 5,000 PSI Pressure Washer With Full-Time Operator <i>For Equipment Without Operator, Deduct</i> <i>For >6 Months (>26 Weeks) , Deduct</i>	18,310.73 -16,744.14 -62.66	
01 22 23 00-0747	Confined Space Entry Equipment (01 22 23 00-0709) Note: Includes delivery to job site, set-up, and pick-up when complete.		
01 22 23 00-0748	DAY Ventilation Equipment For Confined Space Note: Includes electric or gas blower and ventilation duct up to 25'.	51.10	
01 22 23 00-0749	WK Ventilation Equipment For Confined Space Note: Includes electric or gas blower and ventilation duct up to 25'.	153.30	
01 22 23 00-0750	MO Ventilation Equipment For Confined Space Note: Includes electric or gas blower and ventilation duct up to 25'.	457.48 -18.30	
01 22 23 00-0751	DAY Confined Space Air Monitor, Tripod, Harness, Cables, SCBAs And Complete Assembly.....	64.20	
01 22 23 00-0752	WK Confined Space Air Monitor, Tripod, Harness, Cables, SCBAs And Complete Assembly.....	192.60	
01 22 23 00-0753	MO Confined Space Air Monitor, Tripod, Harness, Cables, SCBAs And Complete Assembly..... <i>For >6 Months (>26 Weeks) , Deduct</i>	577.80 -23.11	
01 22 23 00-0754	DAY Confined Space Air Monitor Personnel..... Note: Per person day.	967.21	
01 22 23 00-0755	Direct Fired Space Heaters (01 22 23 00-0709) Note: Includes delivery to job site, set-up, and pick-up when complete. Excludes operator.		
01 22 23 00-0756	DAY 150,000 BTU/Hour Space Heater.....	76.30	
01 22 23 00-0757	WK 150,000 BTU/Hour Space Heater.....	219.37	
01 22 23 00-0758	MO 150,000 BTU/Hour Space Heater..... <i>For >6 Months (>26 Weeks) , Deduct</i>	619.97 -24.80	
01 22 23 00-0759	DAY 500,000 BTU/Hour Space Heater.....	162.15	
01 22 23 00-0760	WK 500,000 BTU/Hour Space Heater.....	400.60	
01 22 23 00-0761	MO 500,000 BTU/Hour Space Heater..... <i>For >6 Months (>26 Weeks) , Deduct</i>	1,012.94 -40.52	
01 22 23 00-0762	Trailer Mounted Brush Chipper (01 22 23 00-0709) Note: Includes delivery to job site and pick-up when complete.		
01 22 23 00-0763	DAY 4" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	238.26	
01 22 23 00-0764	WK 4" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	569.74	
01 22 23 00-0765	MO 4" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up..... <i>For >6 Months (>26 Weeks) , Deduct</i>	1,750.67 -70.03	
01 22 23 00-0766	DAY 6" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	310.77	
01 22 23 00-0767	WK 6" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	700.27	
01 22 23 00-0768	MO 6" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up..... <i>For >6 Months (>26 Weeks) , Deduct</i>	1,864.62 -74.58	
01 22 23 00-0769	DAY 9" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	580.10	
01 22 23 00-0770	WK 9" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	1,305.23	
01 22 23 00-0771	MO 9" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up..... <i>For >6 Months (>26 Weeks) , Deduct</i>	3,480.62 -139.22	
01 22 23 00-0772	DAY 12" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	564.44	
01 22 23 00-0773	WK 12" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up.....	1,270.00	
01 22 23 00-0774	MO 12" Capacity, Trailer Mounted Brush Chipper For Emergency Clean-up..... <i>For >6 Months (>26 Weeks) , Deduct</i>	3,386.66 -135.47	
01 22 23 00-0775	Material Handling Equipment (01 22 23)		
01 22 23 00-0776	Truck Mounted Hydraulic Cranes (01 22 23 00-0775) Note: Includes full-time operator, delivery, set-up, rigging, all necessary counter weights and removal time in rental period. Excludes lattice boom extension.		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0777 DAY 6 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	1,482.70	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0778 WK 6 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	6,438.29	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0779 MO 6 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	25,914.78	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-180.49	
01 22 23 00-0780 DAY 8 To 9 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	1,613.71	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0781 WK 8 To 9 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	6,827.66	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0782 MO 8 To 9 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	27,079.26	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-227.07	
01 22 23 00-0783 DAY 14 To 15 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	1,744.71	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0784 WK 14 To 15 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	7,217.03	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0785 MO 14 To 15 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	28,243.74	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-273.65	
01 22 23 00-0786 DAY 20 To 25 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	1,919.38	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0787 WK 20 To 25 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	7,741.05	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0788 MO 20 To 25 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	29,808.51	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-336.24	
01 22 23 00-0789 DAY 30 To 35 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	2,079.50	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0790 WK 30 To 35 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	8,825.47	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0791 MO 30 To 35 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	33,058.86	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-466.26	
01 22 23 00-0792 DAY 40 To 45 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	2,457.96	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0793 WK 40 To 45 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	10,179.18	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0794 MO 40 To 45 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	37,122.90	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-628.82	
01 22 23 00-0795 DAY 50 To 55 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	2,698.13	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0796 WK 50 To 55 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	11,023.43	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0797 MO 50 To 55 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	39,661.47	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-730.36	
01 22 23 00-0798 DAY 60 To 65 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	2,887.36	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0799 WK 60 To 65 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	11,707.56	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0800 MO 60 To 65 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	41,710.95	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-812.34	
01 22 23 00-0801 DAY 70 To 75 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	3,076.59	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0802 WK 70 To 75 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	12,391.69	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0803 MO 70 To 75 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	43,760.44	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-894.32	
01 22 23 00-0804 DAY 85 To 90 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	3,200.31	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0805 WK 85 To 90 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	12,813.82	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0806 MO 85 To 90 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	45,041.36	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-945.56	
01 22 23 00-0807 DAY 100 To 110 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	3,367.71	
For Equipment Without Operator, Deduct	-987.80	
01 22 23 00-0808 WK 100 To 110 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	13,439.72	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0809 MO 100 To 110 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	46,904.53	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-1,020.08	
01 22 23 00-0810 DAY 120 To 125 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	3,906.28	
For Equipment Without Operator, Deduct	-987.80	
For Half Day Usage, Deduct	-1,167.39	
01 22 23 00-0811 WK 120 To 125 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	15,153.69	
For Equipment Without Operator, Deduct	-4,939.02	
01 22 23 00-0812 MO 120 To 125 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	52,046.44	
For Equipment Without Operator, Deduct	-21,402.42	
For >6 Months (>26 Weeks) , Deduct	-1,225.76	

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01 22 23 00-0813	DAY		140 To 150 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	4,277.46	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
			<i>For Half Day Usage, Deduct</i>	-1,315.86	
01 22 23 00-0814	WK		140 To 150 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	16,452.82	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0815	MO		140 To 150 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	55,943.81	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,381.66	
01 22 23 00-0816	DAY		175 To 185 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	4,947.03	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
			<i>For Half Day Usage, Deduct</i>	-1,583.69	
01 22 23 00-0817	WK		175 To 185 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	18,796.33	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0818	MO		175 To 185 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	62,974.36	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,662.88	
01 22 23 00-0819	DAY		200 To 210 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	5,412.82	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
			<i>For Half Day Usage, Deduct</i>	-1,770.01	
01 22 23 00-0820	WK		200 To 210 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	20,426.60	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0821	MO		200 To 210 Ton Lift, Truck Mounted Hydraulic Crane With Full-Time Operator	67,865.17	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,858.51	
01 22 23 00-0822			Cable Controlled Lattice Boom, Mechanical Cranes <small>(01 22 23 00-0775)</small>		
			Note: Includes full-time operator and counterweights. Excludes delivery, set-up, and removal. See CSI section 01		
			71 13 00-0004 for lattice crane delivery.		
01 22 23 00-0823	DAY		75 To 80 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Mechanical Crane With Full-Time Operator.....	2,734.52	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0824	WK		75 To 80 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Mechanical Crane With Full-Time Operator.....	11,168.99	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0825	MO		75 To 80 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Mechanical Crane With Full-Time Operator.....	40,092.32	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-747.60	
01 22 23 00-0826	DAY		100 To 110 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Mechanical Crane With Full-Time Operator.....	4,080.95	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0827	WK		100 To 110 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Mechanical Crane With Full-Time Operator.....	13,410.61	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0828	MO		100 To 110 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Mechanical Crane With Full-Time Operator.....	46,817.20	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,016.59	
01 22 23 00-0829	DAY		125 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Or Crawler Mechanical Crane With Full-Time Operator	4,299.29	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0830	WK		125 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Or Crawler Mechanical Crane With Full-Time Operator	15,004.49	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0831	MO		125 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Or Crawler Mechanical Crane With Full-Time Operator	51,597.39	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,207.80	
01 22 23 00-0832	DAY		150 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Or Crawler Mechanical Crane With Full-Time Operator	4,735.97	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0833	WK		150 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Or Crawler Mechanical Crane With Full-Time Operator	16,598.38	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0834	MO		150 Ton Lift, Cable Controlled Lattice Boom, Truck Mounted Or Crawler Mechanical Crane With Full-Time Operator	56,371.75	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,398.77	
01 22 23 00-0835	DAY		200 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	4,943.39	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0836	WK		200 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	18,192.26	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0837	MO		200 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	61,157.77	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,590.21	
01 22 23 00-0838	DAY		250 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	5,150.82	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0839	WK		250 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	19,786.14	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0840	MO		250 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	65,943.78	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-1,781.65	
01 22 23 00-0841	DAY		300 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	5,834.95	
			<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0842	WK		300 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	22,238.83	
			<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0843	MO		300 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	73,291.65	
			<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-2,075.57	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0844 DAY 500 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	10,041.63	
<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0845 WK 500 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	37,231.51	
<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0846 MO 500 Ton Lift, Cable Controlled Lattice Boom, Crawler Mechanical Crane With Full-Time Operator	118,287.16	
<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-3,875.39	
01 22 23 00-0847 Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklifts (01 22 23 00-0775)		
<i>Note: Includes full-time operator. Excludes delivery, set-up, and removal.</i>		
01 22 23 00-0848 DAY 5,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	1,549.71	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
01 22 23 00-0849 WK 5,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	6,261.65	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
01 22 23 00-0850 MO 5,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	24,022.03	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-122.63	
01 22 23 00-0851 DAY 6,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	1,611.03	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
01 22 23 00-0852 WK 6,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	6,399.61	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
01 22 23 00-0853 MO 6,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	24,328.61	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-134.90	
01 22 23 00-0854 DAY 8,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	1,595.70	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
01 22 23 00-0855 WK 8,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	6,468.59	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
01 22 23 00-0856 MO 8,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	24,788.48	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-153.29	
01 22 23 00-0857 DAY 10,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	1,771.98	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
01 22 23 00-0858 WK 10,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	6,928.46	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
01 22 23 00-0859 MO 10,000 LB Telescopic Boom, Hi-Reach, Rough Terrain Construction Forklift With Full-Time Operator	25,861.51	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-196.21	
01 22 23 00-0860 Straight Mast, Rough Terrain Construction Forklifts (01 22 23 00-0775)		
<i>Note: Includes full-time operator. Excludes delivery, set-up, and removal.</i>		
01 22 23 00-0861 DAY 5,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	1,345.84	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	75.73	
01 22 23 00-0862 WK 5,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	5,869.99	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	206.79	
01 22 23 00-0863 MO 5,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	23,322.64	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	473.28	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-94.66	
01 22 23 00-0864 DAY 6,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	1,365.76	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	79.71	
01 22 23 00-0865 WK 6,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	5,924.41	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	217.67	
01 22 23 00-0866 MO 6,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	23,447.19	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	498.19	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-99.64	
01 22 23 00-0867 DAY 8,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	1,473.07	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	101.17	
01 22 23 00-0868 WK 8,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	6,223.32	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	277.45	
01 22 23 00-0869 MO 8,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	24,137.00	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	636.15	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-127.23	
01 22 23 00-0870 DAY 10,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	1,532.16	
<i>For Equipment Without Operator, Deduct</i>	-967.21	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	112.99	
01 22 23 00-0871 WK 10,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	6,197.73	
<i>For Equipment Without Operator, Deduct</i>	-4,836.05	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	272.34	
01 22 23 00-0872 MO 10,000 LB Straight Mast, Rough Terrain Construction Forklift With Full-Time Operator.....	24,345.93	
<i>For Equipment Without Operator, Deduct</i>	-20,956.23	
<i>For Propane Instead Of Gas Or Diesel, Add</i>	677.94	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-135.59	

01	01	General Requirements
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MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 22 23 00-0873	Straight Mast, Industrial Warehouse Forklifts <small>(01 22 23 00-0775)</small>	
	Note: Includes full-time operator. Excludes delivery, set-up, and removal.	
01 22 23 00-0874	DAY 5,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	1,289.12
	<i>For Equipment Without Operator, Deduct</i>	-967.21
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	64.38
01 22 23 00-0875	WK 5,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	5,571.84
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	147.16
01 22 23 00-0876	MO 5,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	22,719.07
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	352.57
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-70.51
01 22 23 00-0877	DAY 6,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	1,296.78
	<i>For Equipment Without Operator, Deduct</i>	-967.21
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	65.91
01 22 23 00-0878	WK 6,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	5,594.84
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	151.76
01 22 23 00-0879	MO 6,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	22,772.72
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	363.30
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-72.66
01 22 23 00-0880	DAY 8,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	1,457.74
	<i>For Equipment Without Operator, Deduct</i>	-967.21
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	98.11
01 22 23 00-0881	WK 8,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	5,947.40
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	222.27
01 22 23 00-0882	MO 8,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	23,638.81
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	536.52
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-107.30
01 22 23 00-0883	DAY 12,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	1,473.07
	<i>For Equipment Without Operator, Deduct</i>	-967.21
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	101.17
01 22 23 00-0884	WK 12,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	6,077.70
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	248.33
01 22 23 00-0885	MO 12,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	24,098.67
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	628.49
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-125.70
01 22 23 00-0886	DAY 15,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	1,611.03
	<i>For Equipment Without Operator, Deduct</i>	-967.21
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	128.76
01 22 23 00-0887	WK 15,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	6,299.97
	<i>For Equipment Without Operator, Deduct</i>	-4,836.05
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	292.78
01 22 23 00-0888	MO 15,000 LB Straight Mast, Industrial Warehouse Forklift With Full-Time Operator	24,481.90
	<i>For Equipment Without Operator, Deduct</i>	-20,956.23
	<i>For Propane Instead Of Gas Or Diesel, Add</i>	705.13
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-141.03

01 22 23 00-0889	Chain Hoists <small>(01 22 23 00-0775)</small>	
	Note: Includes delivery to job site and pick-up when complete.	
01 22 23 00-0890	DAY 1 Ton, 20' Lift, Manual Chain Hoist	13.78
01 22 23 00-0891	WK 1 Ton, 20' Lift, Manual Chain Hoist	35.83
01 22 23 00-0892	MO 1 Ton, 20' Lift, Manual Chain Hoist	106.11
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-4.24
01 22 23 00-0893	DAY 3 Ton, 20' Lift, Manual Chain Hoist	38.58
01 22 23 00-0894	WK 3 Ton, 20' Lift, Manual Chain Hoist	90.95
01 22 23 00-0895	MO 3 Ton, 20' Lift, Manual Chain Hoist	254.93
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-10.20
01 22 23 00-0896	DAY 5 Ton, 20' Lift, Manual Chain Hoist	49.61
01 22 23 00-0897	WK 5 Ton, 20' Lift, Manual Chain Hoist	133.67
01 22 23 00-0898	MO 5 Ton, 20' Lift, Manual Chain Hoist	372.06
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-14.88
01 22 23 00-0899	DAY 2 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	97.84
01 22 23 00-0900	WK 2 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	254.93
01 22 23 00-0901	MO 2 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	689.00
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-27.56
01 22 23 00-0902	DAY 3 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	99.22
01 22 23 00-0903	WK 3 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	265.26
01 22 23 00-0904	MO 3 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	723.45
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-28.94
01 22 23 00-0905	DAY 5 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	101.97
01 22 23 00-0906	WK 5 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	285.94
01 22 23 00-0907	MO 5 Ton, 20' Lift, 2-Speed, 230/460 Volt, 60 Cycle, Electric Chain Hoist	792.35
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-31.69

01 22 23 00-0908	Roof Swing Hoist <small>(01 22 23 00-0775)</small>	
	Note: Includes delivery to job site and pick-up when complete.	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-0909 DAY Up To 400 Lbs, Manual Swing Roof Hoist	100.36	
01 22 23 00-0910 WK Up To 400 Lbs, Manual Swing Roof Hoist	351.26	
01 22 23 00-0911 MO Up To 400 Lbs, Manual Swing Roof Hoist	1,204.32	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-48.17	
01 22 23 00-0912 Truck Mounted Digger Derrick (01 22 23 00-0775)		
Note: Includes full-time operator, delivery, set-up, and removal time in rental period. Lifting capacity is reduced.		
01 22 23 00-0913 DAY Up To 47' Sheave Height, 34' Horizontal Reach, 12 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	1,676.85	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0914 WK Up To 47' Sheave Height, 34' Horizontal Reach, 12 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	7,006.17	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0915 MO Up To 47' Sheave Height, 34' Horizontal Reach, 12 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	26,914.83	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-220.50	
01 22 23 00-0916 DAY Up To 48' Sheave Height, 38' Horizontal Reach, 15 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	1,818.48	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0917 WK Up To 48' Sheave Height, 38' Horizontal Reach, 15 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	7,431.06	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0918 MO Up To 48' Sheave Height, 38' Horizontal Reach, 15 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	28,047.86	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-265.82	
01 22 23 00-0919 DAY Up To 65' Sheave Height, 55' Horizontal Reach, 21 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	2,693.66	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-987.80	
01 22 23 00-0920 WK Up To 65' Sheave Height, 55' Horizontal Reach, 21 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	10,056.61	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-4,939.02	
01 22 23 00-0921 MO Up To 65' Sheave Height, 55' Horizontal Reach, 21 Ton Capacity, Truck Mounted Hydraulic Digger Derrick With Full-Time Operator	35,049.32	
Note: Includes lifting boom, grapple arm and auger drill.		
<i>For Equipment Without Operator, Deduct</i>	-21,402.42	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-545.88	
01 22 23 00-0922 Pumping Equipment (01 22 23)		
01 22 23 00-0923 Gas Powered Portable Centrifugal Pumps (01 22 23 00-0922)		
Note: Includes delivery, set-up, and removal. Excludes operator. See CSI section 01 22 23 00-0947 for larger diameter pumps.		
01 22 23 00-0924 DAY 8,500 GPH, 2" Discharge, 108' Maximum Head, Gas Powered Portable Centrifugal Pump	75.67	
01 22 23 00-0925 WK 8,500 GPH, 2" Discharge, 108' Maximum Head, Gas Powered Portable Centrifugal Pump	170.25	
01 22 23 00-0926 MO 8,500 GPH, 2" Discharge, 108' Maximum Head, Gas Powered Portable Centrifugal Pump	454.01	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-18.16	
01 22 23 00-0927 DAY 16,500 GPH, 3" Discharge, 85' Maximum Head, Gas Powered Portable Centrifugal Pump	90.80	
01 22 23 00-0928 WK 16,500 GPH, 3" Discharge, 85' Maximum Head, Gas Powered Portable Centrifugal Pump	204.30	
01 22 23 00-0929 MO 16,500 GPH, 3" Discharge, 85' Maximum Head, Gas Powered Portable Centrifugal Pump	544.81	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-21.79	
01 22 23 00-0930 Gas Powered Portable Diaphragm Pumps (01 22 23 00-0922)		
Note: Includes delivery, set-up, and removal. Excludes operator.		
01 22 23 00-0931 DAY 3,000 GPH, 2" Discharge, 25' Maximum Head, Gas Powered Portable Diaphragm Pump	87.02	
01 22 23 00-0932 WK 3,000 GPH, 2" Discharge, 25' Maximum Head, Gas Powered Portable Diaphragm Pump	245.92	
01 22 23 00-0933 MO 3,000 GPH, 2" Discharge, 25' Maximum Head, Gas Powered Portable Diaphragm Pump	624.26	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-24.97	
01 22 23 00-0934 DAY 5,200 GPH, 3" Discharge, 25' Maximum Head, Gas Powered Portable Diaphragm Pump	105.94	
01 22 23 00-0935 WK 5,200 GPH, 3" Discharge, 25' Maximum Head, Gas Powered Portable Diaphragm Pump	283.76	
01 22 23 00-0936 MO 5,200 GPH, 3" Discharge, 25' Maximum Head, Gas Powered Portable Diaphragm Pump	803.97	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-32.16	
01 22 23 00-0937 Gas Powered Portable Trash Pumps (01 22 23 00-0922)		
Note: Includes delivery, set-up, and removal. Excludes operator.		
01 22 23 00-0938 DAY 12,000 GPH, 2" Discharge, 100' Maximum Head, Gas Powered Portable Trash Pump	109.72	
01 22 23 00-0939 WK 12,000 GPH, 2" Discharge, 100' Maximum Head, Gas Powered Portable Trash Pump	227.00	
01 22 23 00-0940 MO 12,000 GPH, 2" Discharge, 100' Maximum Head, Gas Powered Portable Trash Pump	681.01	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-27.24	
01 22 23 00-0941 DAY 25,000 GPH, 3" Discharge, 90' Maximum Head, Gas Powered Portable Trash Pump	109.72	
01 22 23 00-0942 WK 25,000 GPH, 3" Discharge, 90' Maximum Head, Gas Powered Portable Trash Pump	293.21	

01	01	General Requirements
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-0943	MO	25,000 GPH, 3" Discharge, 90' Maximum Head, Gas Powered Portable Trash Pump.....	803.97
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-32.16
01 22 23 00-0944	DAY	35,000 GPH, 4" Discharge, 106' Maximum Head, Gas Powered Portable Trash Pump.....	174.04
01 22 23 00-0945	WK	35,000 GPH, 4" Discharge, 106' Maximum Head, Gas Powered Portable Trash Pump.....	491.84
01 22 23 00-0946	MO	35,000 GPH, 4" Discharge, 106' Maximum Head, Gas Powered Portable Trash Pump.....	1,428.23
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-57.13

01 22 23 00-0947 Diesel Powered Portable Trash Pumps (01 22 23 00-0922)

Note: Includes delivery, set-up, and removal. Excludes operator.

01 22 23 00-0948	DAY	63,000 GPH, 4" Discharge, 153' Maximum Head, Diesel Powered Portable Trash Pump	340.51
01 22 23 00-0949	WK	63,000 GPH, 4" Discharge, 153' Maximum Head, Diesel Powered Portable Trash Pump	926.93
01 22 23 00-0950	MO	63,000 GPH, 4" Discharge, 153' Maximum Head, Diesel Powered Portable Trash Pump	4,038.78
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-161.55
01 22 23 00-0951	DAY	156,000 GPH, 6" Discharge, 160' Maximum Head, Diesel Powered Portable Trash Pump	520.22
01 22 23 00-0952	WK	156,000 GPH, 6" Discharge, 160' Maximum Head, Diesel Powered Portable Trash Pump	1,362.02
01 22 23 00-0953	MO	156,000 GPH, 6" Discharge, 160' Maximum Head, Diesel Powered Portable Trash Pump	3,622.61
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-144.90
01 22 23 00-0954	DAY	246,000 GPH, 10" Discharge, 160' Maximum Head, Diesel Powered Portable Trash Pump	707.50
01 22 23 00-0955	WK	246,000 GPH, 10" Discharge, 160' Maximum Head, Diesel Powered Portable Trash Pump	1,893.59
01 22 23 00-0956	MO	246,000 GPH, 10" Discharge, 160' Maximum Head, Diesel Powered Portable Trash Pump	5,065.97
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-202.64
01 22 23 00-0957	DAY	379,000 GPH, 12" Discharge, 104' Maximum Head, Diesel Powered Portable Trash Pump	915.58
01 22 23 00-0958	WK	379,000 GPH, 12" Discharge, 104' Maximum Head, Diesel Powered Portable Trash Pump	2,338.14
01 22 23 00-0959	MO	379,000 GPH, 12" Discharge, 104' Maximum Head, Diesel Powered Portable Trash Pump	6,866.87
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-274.67

01 22 23 00-0960 Diesel Powered Portable High Head Trash Pumps (01 22 23 00-0922)

Note: Includes delivery, set-up, and removal. Excludes operator.

01 22 23 00-0961	DAY	27,000 GPH, 3" Suction, 3" Discharge, 300' Maximum Head, Diesel Powered Portable High Head Trash Pump	454.01
01 22 23 00-0962	WK	27,000 GPH, 3" Suction, 3" Discharge, 300' Maximum Head, Diesel Powered Portable High Head Trash Pump	1,021.52
01 22 23 00-0963	MO	27,000 GPH, 3" Suction, 3" Discharge, 300' Maximum Head, Diesel Powered Portable High Head Trash Pump	2,724.05
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-108.96
01 22 23 00-0964	DAY	90,000 GPH, 6" Suction, 4" Discharge, 330' Maximum Head, Diesel Powered Portable High Head Trash Pump	681.01
01 22 23 00-0965	WK	90,000 GPH, 6" Suction, 4" Discharge, 330' Maximum Head, Diesel Powered Portable High Head Trash Pump	1,821.71
01 22 23 00-0966	MO	90,000 GPH, 6" Suction, 4" Discharge, 330' Maximum Head, Diesel Powered Portable High Head Trash Pump	5,107.59
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-204.30
01 22 23 00-0967	DAY	135,000 GPH, 8" Suction, 6" Discharge, 320' Maximum Head, Diesel Powered Portable High Head Trash Pump	832.35
01 22 23 00-0968	WK	135,000 GPH, 8" Suction, 6" Discharge, 320' Maximum Head, Diesel Powered Portable High Head Trash Pump	1,872.78
01 22 23 00-0969	MO	135,000 GPH, 8" Suction, 6" Discharge, 320' Maximum Head, Diesel Powered Portable High Head Trash Pump	4,994.09
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-199.76

01 22 23 00-0970 Diesel Powered Portable Silenced Environmental Trash Pumps (01 22 23 00-0922)

Note: Includes delivery, set-up, and removal. Excludes operator.

01 22 23 00-0971	DAY	90,000 GPH, 4" Discharge, 330' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump.....	486.17
01 22 23 00-0972	WK	90,000 GPH, 4" Discharge, 330' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump.....	1,106.64
01 22 23 00-0973	MO	90,000 GPH, 4" Discharge, 330' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump.....	3,450.46
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-138.02
01 22 23 00-0974	DAY	136,800 GPH, 6" Discharge, 158' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump.....	595.89
01 22 23 00-0975	WK	136,800 GPH, 6" Discharge, 158' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump.....	1,484.98
01 22 23 00-0976	MO	136,800 GPH, 6" Discharge, 158' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump.....	4,038.78
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-161.55
01 22 23 00-0977	DAY	246,000 GPH, 10" Discharge, 158' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump	718.85
01 22 23 00-0978	WK	246,000 GPH, 10" Discharge, 158' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump	2,126.27
01 22 23 00-0979	MO	246,000 GPH, 10" Discharge, 158' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump	5,930.48
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-237.22
01 22 23 00-0980	DAY	510,000 GPH, 12" Discharge, 200' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump	1,082.05
01 22 23 00-0981	WK	510,000 GPH, 12" Discharge, 200' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump	2,763.77
01 22 23 00-0982	MO	510,000 GPH, 12" Discharge, 200' Maximum Head, Diesel Powered Portable Silenced Environmental Trash Pump	8,115.39
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-324.62

01 22 23 00-0983 3 Phase Electric Submersible Pumps (01 22 23 00-0922)

Note: Includes delivery, set-up, and removal. Excludes operator.

01 22 23 00-0984	DAY	24,000 GPH, 3" Discharge, 78' Maximum Head, 3 Phase Electric Submersible Pump	189.17
01 22 23 00-0985	WK	24,000 GPH, 3" Discharge, 78' Maximum Head, 3 Phase Electric Submersible Pump	472.92
01 22 23 00-0986	MO	24,000 GPH, 3" Discharge, 78' Maximum Head, 3 Phase Electric Submersible Pump	1,418.78
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-56.75
01 22 23 00-0987	DAY	49,800 GPH, 4" Discharge, 98' Maximum Head, 3 Phase Electric Submersible Pump	249.70
01 22 23 00-0988	WK	49,800 GPH, 4" Discharge, 98' Maximum Head, 3 Phase Electric Submersible Pump	624.26
01 22 23 00-0989	MO	49,800 GPH, 4" Discharge, 98' Maximum Head, 3 Phase Electric Submersible Pump	1,872.78
		<i>For >6 Months (>26 Weeks) , Deduct</i>	-74.91



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-0990	Suction Hose With Couplings (01 22 23 00-0922)		
Note: Includes delivery, set-up, and removal.			
01 22 23 00-0991	DAY Up To 2" Inside Diameter, 20' Length, Suction Hose With Couplings.....	5.76	
01 22 23 00-0992	WK Up To 2" Inside Diameter, 20' Length, Suction Hose With Couplings.....	14.40	
01 22 23 00-0993	MO Up To 2" Inside Diameter, 20' Length, Suction Hose With Couplings.....	44.16	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.77	
01 22 23 00-0994	DAY 3" Inside Diameter, 20' Length, Suction Hose With Couplings.....	15.36	
01 22 23 00-0995	WK 3" Inside Diameter, 20' Length, Suction Hose With Couplings.....	39.36	
01 22 23 00-0996	MO 3" Inside Diameter, 20' Length, Suction Hose With Couplings.....	120.00	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-4.80	
01 22 23 00-0997	DAY 4" Inside Diameter, 20' Length, Suction Hose With Couplings.....	23.04	
01 22 23 00-0998	WK 4" Inside Diameter, 20' Length, Suction Hose With Couplings.....	58.56	
01 22 23 00-0999	MO 4" Inside Diameter, 20' Length, Suction Hose With Couplings.....	177.60	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-7.10	
01 22 23 00-1000	DAY 6" Inside Diameter, 20' Length, Suction Hose With Couplings.....	28.80	
01 22 23 00-1001	WK 6" Inside Diameter, 20' Length, Suction Hose With Couplings.....	72.00	
01 22 23 00-1002	MO 6" Inside Diameter, 20' Length, Suction Hose With Couplings.....	211.20	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-8.45	
01 22 23 00-1003	DAY 10" Inside Diameter, 20' Length, Suction Hose With Couplings.....	67.20	
01 22 23 00-1004	WK 10" Inside Diameter, 20' Length, Suction Hose With Couplings.....	172.80	
01 22 23 00-1005	MO 10" Inside Diameter, 20' Length, Suction Hose With Couplings.....	508.80	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-20.35	
01 22 23 00-1006	DAY 12" Inside Diameter, 20' Length, Suction Hose With Couplings.....	90.24	
01 22 23 00-1007	WK 12" Inside Diameter, 20' Length, Suction Hose With Couplings.....	196.80	
01 22 23 00-1008	MO 12" Inside Diameter, 20' Length, Suction Hose With Couplings.....	590.40	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-23.62	

01 22 23 00-1009	Discharge Hose With Couplings (01 22 23 00-0922)		
Note: Includes delivery, set-up, and removal.			
01 22 23 00-1010	DAY 1-1/2" Inside Diameter, 50' Length, Discharge Hose With Couplings	5.76	
01 22 23 00-1011	WK 1-1/2" Inside Diameter, 50' Length, Discharge Hose With Couplings	14.40	
01 22 23 00-1012	MO 1-1/2" Inside Diameter, 50' Length, Discharge Hose With Couplings	44.16	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.77	
01 22 23 00-1013	DAY 2" Inside Diameter, 50' Length, Discharge Hose With Couplings	6.72	
01 22 23 00-1014	WK 2" Inside Diameter, 50' Length, Discharge Hose With Couplings	16.32	
01 22 23 00-1015	MO 2" Inside Diameter, 50' Length, Discharge Hose With Couplings	50.88	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-2.04	
01 22 23 00-1016	DAY 3" Inside Diameter, 50' Length, Discharge Hose With Couplings	7.68	
01 22 23 00-1017	WK 3" Inside Diameter, 50' Length, Discharge Hose With Couplings	19.20	
01 22 23 00-1018	MO 3" Inside Diameter, 50' Length, Discharge Hose With Couplings	58.56	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-2.34	
01 22 23 00-1019	DAY 4" Inside Diameter, 50' Length, Discharge Hose With Couplings	20.16	
01 22 23 00-1020	WK 4" Inside Diameter, 50' Length, Discharge Hose With Couplings	51.84	
01 22 23 00-1021	MO 4" Inside Diameter, 50' Length, Discharge Hose With Couplings	148.80	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.95	
01 22 23 00-1022	DAY 6" Inside Diameter, 50' Length, Discharge Hose With Couplings	24.96	
01 22 23 00-1023	WK 6" Inside Diameter, 50' Length, Discharge Hose With Couplings	68.16	
01 22 23 00-1024	MO 6" Inside Diameter, 50' Length, Discharge Hose With Couplings	187.20	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-7.49	
01 22 23 00-1025	DAY 10" Inside Diameter, 10' Length, Discharge Hose With Couplings	19.20	
01 22 23 00-1026	WK 10" Inside Diameter, 10' Length, Discharge Hose With Couplings	48.00	
01 22 23 00-1027	MO 10" Inside Diameter, 10' Length, Discharge Hose With Couplings	144.00	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.76	
01 22 23 00-1028	DAY 12" Inside Diameter, 10' Length, Discharge Hose With Couplings	48.96	
01 22 23 00-1029	WK 12" Inside Diameter, 10' Length, Discharge Hose With Couplings	124.80	
01 22 23 00-1030	MO 12" Inside Diameter, 10' Length, Discharge Hose With Couplings	369.60	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-14.78	

01 22 23 00-1031	Hydraulic Submersible Pumps (01 22 23 00-0922)		
Note: Includes delivery, set-up, and removal. Excludes operator.			
01 22 23 00-1032	Hydraulic Submersible Pumps (01 22 23 00-1031)		
Note: Includes delivery, set-up, and removal. Excludes operator.			
01 22 23 00-1033	DAY 60,000 GPH, 4" Discharge, 115' Maximum Head, Hydraulic Submersible Pump.....	124.85	
01 22 23 00-1034	WK 60,000 GPH, 4" Discharge, 115' Maximum Head, Hydraulic Submersible Pump.....	334.83	
01 22 23 00-1035	MO 60,000 GPH, 4" Discharge, 115' Maximum Head, Hydraulic Submersible Pump.....	936.39	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-37.46	
01 22 23 00-1036	DAY 132,000 GPH, 6" Discharge, 90' Maximum Head, Hydraulic Submersible Pump.....	158.90	
01 22 23 00-1037	WK 132,000 GPH, 6" Discharge, 90' Maximum Head, Hydraulic Submersible Pump.....	408.61	
01 22 23 00-1038	MO 132,000 GPH, 6" Discharge, 90' Maximum Head, Hydraulic Submersible Pump.....	1,248.52	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-49.94	

01 22 23 00-1039	Hydraulic Submersible Pump Diesel Power Packs (01 22 23 00-1031)		
Note: Includes delivery, set-up, and removal. Excludes operator.			
01 22 23 00-1040	DAY 100 HP, Hydraulic Submersible Pump Diesel Power Pack.....	288.48	
01 22 23 00-1041	WK 100 HP, Hydraulic Submersible Pump Diesel Power Pack.....	860.72	
01 22 23 00-1042	MO 100 HP, Hydraulic Submersible Pump Diesel Power Pack.....	2,270.04	
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-90.80	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 22 23 00-1043	HDPE Pipe With Couplings <small>(01 22 23 00-0922)</small>	
Note: Includes delivery, set-up, and removal.		
01 22 23 00-1044	DAY 4" x 50' HDPE Pipe With Couplings	12.10
01 22 23 00-1045	WK 4" x 50' HDPE Pipe With Couplings	29.03
01 22 23 00-1046	MO 4" x 50' HDPE Pipe With Couplings	89.52
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-3.58
01 22 23 00-1047	DAY 6" x 50' HDPE Pipe With Couplings	19.36
01 22 23 00-1048	WK 6" x 50' HDPE Pipe With Couplings	48.39
01 22 23 00-1049	MO 6" x 50' HDPE Pipe With Couplings	147.58
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.90
01 22 23 00-1050	DAY 8" x 50' HDPE Pipe With Couplings	31.45
01 22 23 00-1051	WK 8" x 50' HDPE Pipe With Couplings	82.26
01 22 23 00-1052	MO 8" x 50' HDPE Pipe With Couplings	244.36
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-9.77
01 22 23 00-1053	DAY 10" x 50' HDPE Pipe With Couplings	38.71
01 22 23 00-1054	WK 10" x 50' HDPE Pipe With Couplings	99.20
01 22 23 00-1055	MO 10" x 50' HDPE Pipe With Couplings	302.42
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-12.10
01 22 23 00-1056	DAY 12" x 20' HDPE Pipe With Couplings	29.03
01 22 23 00-1057	WK 12" x 20' HDPE Pipe With Couplings	79.84
01 22 23 00-1058	MO 12" x 20' HDPE Pipe With Couplings	241.94
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-9.68
01 22 23 00-1059	DAY 4" Elbow For HDPE Pipe, Quick Connect	29.03
01 22 23 00-1060	WK 4" Elbow For HDPE Pipe, Quick Connect	75.00
01 22 23 00-1061	MO 4" Elbow For HDPE Pipe, Quick Connect	222.58
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-8.90
01 22 23 00-1062	DAY 6" Elbow For HDPE Pipe, Quick Connect	33.87
01 22 23 00-1063	WK 6" Elbow For HDPE Pipe, Quick Connect	87.10
01 22 23 00-1064	MO 6" Elbow For HDPE Pipe, Quick Connect	266.13
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-10.65
01 22 23 00-1065	DAY 8" Elbow For HDPE Pipe, Quick Connect	38.71
01 22 23 00-1066	WK 8" Elbow For HDPE Pipe, Quick Connect	99.20
01 22 23 00-1067	MO 8" Elbow For HDPE Pipe, Quick Connect	302.42
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-12.10
01 22 23 00-1068	DAY 10" Elbow For HDPE Pipe, Quick Connect	48.39
01 22 23 00-1069	WK 10" Elbow For HDPE Pipe, Quick Connect	123.39
01 22 23 00-1070	MO 10" Elbow For HDPE Pipe, Quick Connect	375.01
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-15.00
01 22 23 00-1071	DAY 12" Elbow For HDPE Pipe, Quick Connect	48.39
01 22 23 00-1072	WK 12" Elbow For HDPE Pipe, Quick Connect	123.39
01 22 23 00-1073	MO 12" Elbow For HDPE Pipe, Quick Connect	375.01
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-15.00
01 22 23 00-1074	DAY 4" Tee For HDPE Pipe, Quick Connect	29.03
01 22 23 00-1075	WK 4" Tee For HDPE Pipe, Quick Connect	75.00
01 22 23 00-1076	MO 4" Tee For HDPE Pipe, Quick Connect	222.58
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-8.90
01 22 23 00-1077	DAY 6" Tee For HDPE Pipe, Quick Connect	38.71
01 22 23 00-1078	WK 6" Tee For HDPE Pipe, Quick Connect	99.20
01 22 23 00-1079	MO 6" Tee For HDPE Pipe, Quick Connect	302.42
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-12.10
01 22 23 00-1080	DAY 8" Tee For HDPE Pipe, Quick Connect	48.39
01 22 23 00-1081	WK 8" Tee For HDPE Pipe, Quick Connect	123.39
01 22 23 00-1082	MO 8" Tee For HDPE Pipe, Quick Connect	375.01
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-15.00
01 22 23 00-1083	DAY 10" Tee For HDPE Pipe, Quick Connect	58.07
01 22 23 00-1084	WK 10" Tee For HDPE Pipe, Quick Connect	147.58
01 22 23 00-1085	MO 10" Tee For HDPE Pipe, Quick Connect	447.59
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-17.90
01 22 23 00-1086	DAY 12" Tee For HDPE Pipe, Quick Connect	58.07
01 22 23 00-1087	WK 12" Tee For HDPE Pipe, Quick Connect	147.58
01 22 23 00-1088	MO 12" Tee For HDPE Pipe, Quick Connect	447.59
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-17.90
01 22 23 00-1089	DAY 4" Cap For HDPE Pipe, Quick Connect	4.84
01 22 23 00-1090	WK 4" Cap For HDPE Pipe, Quick Connect	14.52
01 22 23 00-1091	MO 4" Cap For HDPE Pipe, Quick Connect	43.55
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.74
01 22 23 00-1092	DAY 6" Cap For HDPE Pipe, Quick Connect	4.84
01 22 23 00-1093	WK 6" Cap For HDPE Pipe, Quick Connect	14.52
01 22 23 00-1094	MO 6" Cap For HDPE Pipe, Quick Connect	43.55
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.74
01 22 23 00-1095	DAY 8" Cap For HDPE Pipe, Quick Connect	4.84
01 22 23 00-1096	WK 8" Cap For HDPE Pipe, Quick Connect	14.52
01 22 23 00-1097	MO 8" Cap For HDPE Pipe, Quick Connect	43.55
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.74
01 22 23 00-1098	DAY 10" Cap For HDPE Pipe, Quick Connect	4.84
01 22 23 00-1099	WK 10" Cap For HDPE Pipe, Quick Connect	14.52
01 22 23 00-1100	MO 10" Cap For HDPE Pipe, Quick Connect	43.55
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.74
01 22 23 00-1101	DAY 12" Cap For HDPE Pipe, Quick Connect	4.84
01 22 23 00-1102	WK 12" Cap For HDPE Pipe, Quick Connect	14.52
01 22 23 00-1103	MO 12" Cap For HDPE Pipe, Quick Connect	43.55
	<i>For >6 Months (>26 Weeks) , Deduct</i>	-1.74



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-1104 DAY 4" Wye For HDPE Pipe, Quick Connect	14.52	
01 22 23 00-1105 WK 4" Wye For HDPE Pipe, Quick Connect	36.29	
01 22 23 00-1106 MO 4" Wye For HDPE Pipe, Quick Connect	111.29	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-4.45	
01 22 23 00-1107 DAY 6" Wye For HDPE Pipe, Quick Connect	16.94	
01 22 23 00-1108 WK 6" Wye For HDPE Pipe, Quick Connect	43.55	
01 22 23 00-1109 MO 6" Wye For HDPE Pipe, Quick Connect	133.07	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-5.32	
01 22 23 00-1110 DAY 8" Wye For HDPE Pipe, Quick Connect	29.03	
01 22 23 00-1111 WK 8" Wye For HDPE Pipe, Quick Connect	75.00	
01 22 23 00-1112 MO 8" Wye For HDPE Pipe, Quick Connect	222.58	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-8.90	
01 22 23 00-1113 DAY 10" Wye For HDPE Pipe, Quick Connect	43.55	
01 22 23 00-1114 WK 10" Wye For HDPE Pipe, Quick Connect	111.29	
01 22 23 00-1115 MO 10" Wye For HDPE Pipe, Quick Connect	338.72	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-13.55	
01 22 23 00-1116 DAY 12" Wye For HDPE Pipe, Quick Connect	43.55	
01 22 23 00-1117 WK 12" Wye For HDPE Pipe, Quick Connect	111.29	
01 22 23 00-1118 MO 12" Wye For HDPE Pipe, Quick Connect	338.72	
<i>For >6 Months (>26 Weeks) , Deduct</i>	-13.55	
01 22 23 00-1119 Temporary Building Services (01 22 23)		
01 22 23 00-1120 Boilers (01 22 23 00-1119)		
Note: Excludes operator, delivery, set-up, and removal.		
01 22 23 00-1121 Electric Boilers (01 22 23 00-1120)		
01 22 23 00-1122 MO 40 MBH, 12 KW Electric Boiler Rental	2,596.99	
01 22 23 00-1123 MO 60 MBH, 20 KW Electric Boiler Rental	2,833.12	
01 22 23 00-1124 MO 95 MBH, 30 KW Electric Boiler Rental	2,951.18	
01 22 23 00-1125 MO 135 MBH, 40 KW Electric Boiler Rental	3,305.26	
01 22 23 00-1126 MO 165 MBH, 50 KW Electric Boiler Rental	4,603.76	
01 22 23 00-1127 MO 215 MBH, 60 KW Electric Boiler Rental	5,312.05	
01 22 23 00-1128 MO 365 MBH, 100 KW Electric Boiler Rental	6,964.74	
01 22 23 00-1129 MO 510 MBH, 150 KW Electric Boiler Rental	8,499.35	
01 22 23 00-1130 Oil/Gas Fired Boilers (01 22 23 00-1120)		
01 22 23 00-1131 MO Up To 100 HP, Gas/Oil Dual Fuel Boiler Rental	2,479.00	
01 22 23 00-1132 MO >100 HP To 250 HP, Gas/Oil Dual Fuel Boiler Rental	3,222.70	
01 22 23 00-1133 MO >250 HP To 500 HP, Gas/Oil Dual Fuel Boiler Rental	5,205.90	
01 22 23 00-1134 MO >500 HP To 800 HP, Gas/Oil Dual Fuel Boiler Rental	7,189.10	
01 22 23 00-1135 Oil Fired Boilers (01 22 23 00-1120)		
01 22 23 00-1136 MO 250 HP Oil Fired Boiler Rental	7,293.67	
01 22 23 00-1137 MO 350 HP Oil Fired Boiler Rental	9,724.90	
01 22 23 00-1138 MO 500 HP Oil Fired Boiler Rental	12,156.12	
01 22 23 00-1139 MO 600 HP Oil Fired Boiler Rental	13,371.73	
01 22 23 00-1140 Boilers Setup (01 22 23 00-1120)		
01 22 23 00-1141 EA Setup Rental Boiler	7,774.26	
Note: Includes delivery, setup, installation, startup, commissioning, decommissioning, and pickup. Excludes piping and electrical hookup. Excludes crane.		
01 22 23 00-1142 Chillers (01 22 23 00-1119)		
Note: Excludes operator, delivery, set-up, and removal.		
01 22 23 00-1143 Air Cooled Chillers (01 22 23 00-1142)		
01 22 23 00-1144 MO 25 Ton Air Cooled Chiller Rental	2,494.67	
<i>For >3 To 6 Month Rental, Deduct</i>	-374.20	
<i>For >6 Month Rental, Deduct</i>	-623.67	
01 22 23 00-1145 MO 40 Ton Air Cooled Chiller Rental	3,991.48	
<i>For >3 To 6 Month Rental, Deduct</i>	-598.72	
<i>For >6 Month Rental, Deduct</i>	-997.87	
01 22 23 00-1146 MO 60 Ton Air Cooled Chiller Rental	4,882.03	
<i>For >3 To 6 Month Rental, Deduct</i>	-732.30	
<i>For >6 Month Rental, Deduct</i>	-1,220.51	
01 22 23 00-1147 MO 80 Ton Air Cooled Chiller Rental	5,772.58	
<i>For >3 To 6 Month Rental, Deduct</i>	-865.89	
<i>For >6 Month Rental, Deduct</i>	-1,443.15	
01 22 23 00-1148 MO 100 Ton Air Cooled Chiller Rental	6,663.13	
<i>For >3 To 6 Month Rental, Deduct</i>	-999.47	
<i>For >6 Month Rental, Deduct</i>	-1,665.78	
01 22 23 00-1149 MO 125 Ton Air Cooled Chiller Rental	7,719.37	
<i>For >3 To 6 Month Rental, Deduct</i>	-1,157.91	
<i>For >6 Month Rental, Deduct</i>	-1,929.84	
01 22 23 00-1150 MO 155 Ton Air Cooled Chiller Rental	9,338.54	
<i>For >3 To 6 Month Rental, Deduct</i>	-1,400.78	
<i>For >6 Month Rental, Deduct</i>	-2,334.64	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 22 23 00-1151	MO		170 Ton Air Cooled Chiller Rental	9,986.22	
			<i>For >3 To 6 Month Rental, Deduct</i>	-1,497.93	
			<i>For >6 Month Rental, Deduct</i>	-2,496.56	
01 22 23 00-1152	MO		200 Ton Air Cooled Chiller Rental	11,471.73	
			<i>For >3 To 6 Month Rental, Deduct</i>	-1,720.76	
			<i>For >6 Month Rental, Deduct</i>	-2,867.93	
01 22 23 00-1153	MO		250 Ton Air Cooled Chiller Rental	13,650.10	
			<i>For >3 To 6 Month Rental, Deduct</i>	-2,047.52	
			<i>For >6 Month Rental, Deduct</i>	-3,412.53	
01 22 23 00-1154	MO		300 Ton Air Cooled Chiller Rental	15,928.25	
			Note: Includes trailer.		
			<i>For >3 To 6 Month Rental, Deduct</i>	-2,389.24	
			<i>For >6 Month Rental, Deduct</i>	-3,982.06	
01 22 23 00-1155	MO		400 Ton Air Cooled Chiller Rental	21,011.74	
			Note: Includes trailer, pump and 200' of 6" hose.		
			<i>For >3 To 6 Month Rental, Deduct</i>	-3,151.76	
			<i>For >6 Month Rental, Deduct</i>	-5,252.94	
01 22 23 00-1156	MO		500 Ton Air Cooled Chiller Rental	26,008.61	
			Note: Includes trailer, pump and 200' of 6" hose.		
			<i>For >3 To 6 Month Rental, Deduct</i>	-3,901.29	
			<i>For >6 Month Rental, Deduct</i>	-6,502.15	
01 22 23 00-1157	EA		Setup Air Cooled Chiller Rental Unit	5,404.06	
			Note: Includes delivery, setup, installation, refrigerant charge, startup, commissioning, decommissioning, recovery of refrigerant and pickup. Excludes piping and electrical hookup. Excludes crane if off-loaded.		

01 22 23 00-1158 Chiller Rental Accessories (01 22 23 00-1142)

01 22 23 00-1159	MO		4" x 25' Flexible Water Hose For Chiller Rental	44.45	
01 22 23 00-1160	MO		6" x 25' Flexible Water Hose For Chiller Rental	55.56	

01 22 23 00-1161 Emergency Cooler/Freezer (01 22 23 00-1119)

Note: Excludes utility connection, delivery, set-up, and removal. Cooler 115 Volt or 230 Volt, freezer 208/230 Volt, combo 115 Volt or 230 Volt.

01 22 23 00-1162	DAY		8 x 6 x 7 Emergency Cooler Rental	142.47	
01 22 23 00-1163	WK		8 x 6 x 7 Emergency Cooler Rental	759.84	
01 22 23 00-1164	DAY		10 x 7 x 7 Emergency Cooler Rental	284.94	
01 22 23 00-1165	WK		10 x 7 x 7 Emergency Cooler Rental	1,139.76	
01 22 23 00-1166	MO		10 x 7 x 7 Emergency Cooler Rental	2,849.40	
01 22 23 00-1167	DAY		10 x 7 x 7 Emergency Freezer Rental	332.43	
01 22 23 00-1168	WK		10 x 7 x 7 Emergency Freezer Rental	1,329.72	
01 22 23 00-1169	MO		10 x 7 x 7 Emergency Freezer Rental	3,419.28	
01 22 23 00-1170	DAY		6 x 8 x 7 Or 6 x 6 x 7, Emergency Combo Cooler/Freezer Rental	379.92	
01 22 23 00-1171	WK		6 x 8 x 7 Or 6 x 6 x 7, Emergency Combo Cooler/Freezer Rental	1,519.68	
01 22 23 00-1172	MO		6 x 8 x 7 Or 6 x 6 x 7, Emergency Combo Cooler/Freezer Rental	3,799.20	

01 22 23 00-1173 Portable Spot Cooling Units (01 22 23 00-1119)

Note: Includes up to 20' duct. Excludes operator, delivery, set-up, and removal.

01 22 23 00-1174	DAY		1 Ton Portable Spot Cooling Unit	213.27	
01 22 23 00-1175	WK		1 Ton Portable Spot Cooling Unit	462.08	
01 22 23 00-1176	MO		1 Ton Portable Spot Cooling Unit	1,092.31	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-43.69	
01 22 23 00-1177	DAY		1.5 Ton Portable Spot Cooling Unit	278.89	
01 22 23 00-1178	WK		1.5 Ton Portable Spot Cooling Unit	572.81	
01 22 23 00-1179	MO		1.5 Ton Portable Spot Cooling Unit	1,343.86	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-53.75	
01 22 23 00-1180	DAY		2 Ton Portable Spot Cooling Unit	375.95	
01 22 23 00-1181	WK		2 Ton Portable Spot Cooling Unit	786.08	
01 22 23 00-1182	MO		2 Ton Portable Spot Cooling Unit	1,455.96	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-58.24	
01 22 23 00-1183	DAY		3 Ton Portable Spot Cooling Unit	393.72	
01 22 23 00-1184	WK		3 Ton Portable Spot Cooling Unit	833.93	
01 22 23 00-1185	MO		3 Ton Portable Spot Cooling Unit	1,842.85	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-73.71	
01 22 23 00-1186	DAY		5 Ton Portable Spot Cooling Unit	615.20	
01 22 23 00-1187	WK		5 Ton Portable Spot Cooling Unit	1,244.06	
01 22 23 00-1188	MO		5 Ton Portable Spot Cooling Unit	2,585.19	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-103.41	
01 22 23 00-1189	DAY		10 To 12 Ton Portable Spot Cooling Unit	803.85	
01 22 23 00-1190	WK		10 To 12 Ton Portable Spot Cooling Unit	1,811.41	
01 22 23 00-1191	MO		10 To 12 Ton Portable Spot Cooling Unit	4,371.99	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-174.88	
01 22 23 00-1192	DAY		20 Ton Portable Spot Cooling Unit	922.79	
01 22 23 00-1193	WK		20 Ton Portable Spot Cooling Unit	2,119.00	
01 22 23 00-1194	MO		20 Ton Portable Spot Cooling Unit	5,905.87	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-236.23	
01 22 23 00-1195	DAY		25 Ton Portable Spot Cooling Unit	1,312.42	
01 22 23 00-1196	WK		25 Ton Portable Spot Cooling Unit	2,659.01	
01 22 23 00-1197	MO		25 Ton Portable Spot Cooling Unit	6,186.13	
			<i>For >6 Months (>26 Weeks), Deduct</i>	-247.45	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23 00-1198 EA Setup Rental Of Up To 5 Ton Portable Spot Cooler 273.44 Note: Includes delivery, setup, connection to power outlet and connection to duct and removal. Excludes electrical wiring.	273.44	
01 22 23 00-1199 EA Setup Rental Of 10 To 15 Ton Portable Spot Cooler..... 625.90 Note: Includes delivery, setup, connection to power outlet and connection to duct and removal. Excludes electrical wiring.	625.90	
01 22 23 00-1200 EA Setup Rental Of 20 To 25 Ton Portable Spot Cooler..... 909.25 Note: Includes delivery, setup, connection to power outlet and connection to duct and removal. Excludes electrical wiring.	909.25	
01 22 23 00-1201 Fuel Oil Tank <small>(01 22 23 00-1119)</small> Note: Excludes delivery to job site and pick-up when complete. Excludes Off-road fuel costs. See CSI section 01 22 23 00-0707 for reimbursable fuel fees.		
01 22 23 00-1202 MO 100 Gallon Portable Double Wall Fuel Oil Tank Rental 433.92 <i>For >6 Months (>26 Weeks) , Deduct</i> -17.36	433.92	
01 22 23 00-1203 MO 275 Gallon Portable Double Wall Fuel Oil Tank Rental 674.98 <i>For >6 Months (>26 Weeks) , Deduct</i> -27.00	674.98	
01 22 23 00-1204 MO 500 Gallon Portable Double Wall Fuel Oil Tank Rental 1,687.46 <i>For >6 Months (>26 Weeks) , Deduct</i> -67.50	1,687.46	
01 22 23 00-1205 MO 1,000 Gallon Portable Double Wall Fuel Oil Tank Rental 2,812.42 <i>For >6 Months (>26 Weeks) , Deduct</i> -112.50	2,812.42	
01 22 23 00-1206 MO 2,300 Gallon Portable Double Wall Fuel Oil Tank Rental 3,712.40 <i>For >6 Months (>26 Weeks) , Deduct</i> -148.50	3,712.40	
01 22 23 00-1207 MO 5,000 Gallon Portable Double Wall Fuel Oil Tank Rental 6,631.97 <i>For >6 Months (>26 Weeks) , Deduct</i> -265.28	6,631.97	
01 22 23 00-1208 Truck And Trailer Equipment <small>(01 22 23)</small>		
01 22 23 00-1209 Trucks <small>(01 22 23 00-1208)</small> Note: Includes driver, delivery, and removal.		
01 22 23 00-1210 Flat Bed Trucks <small>(01 22 23 00-1209)</small> Note: Includes hydraulic tilt bed.		
01 22 23 00-1211 DAY 1-1/2 Ton Capacity, 8' To 10' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 1,047.66 <i>For Equipment Without Operator, Deduct</i> -753.53	1,047.66	
01 22 23 00-1212 WK 1-1/2 Ton Capacity, 8' To 10' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 4,538.74 <i>For Equipment Without Operator, Deduct</i> -3,767.64	4,538.74	
01 22 23 00-1213 MO 1-1/2 Ton Capacity, 8' To 10' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 18,274.09 <i>For Equipment Without Operator, Deduct</i> -16,326.46 <i>For >6 Months (>26 Weeks) , Deduct</i> -77.91	18,274.09	
01 22 23 00-1214 DAY 3 Ton Capacity, 12' To 16' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 1,174.85 <i>For Equipment Without Operator, Deduct</i> -753.53	1,174.85	
01 22 23 00-1215 WK 3 Ton Capacity, 12' To 16' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 4,864.67 <i>For Equipment Without Operator, Deduct</i> -3,767.64	4,864.67	
01 22 23 00-1216 MO 3 Ton Capacity, 12' To 16' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 19,108.78 <i>For Equipment Without Operator, Deduct</i> -16,326.46 <i>For >6 Months (>26 Weeks) , Deduct</i> -111.29	19,108.78	
01 22 23 00-1217 DAY 6-1/2 Ton Capacity, 16' To 22' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 1,286.11 <i>For Equipment Without Operator, Deduct</i> -753.53	1,286.11	
01 22 23 00-1218 WK 6-1/2 Ton Capacity, 16' To 22' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 5,213.50 <i>For Equipment Without Operator, Deduct</i> -3,767.64	5,213.50	
01 22 23 00-1219 MO 6-1/2 Ton Capacity, 16' To 22' Bed, 4 x 2 Flat Bed Truck With Full-Time Truck Driver 20,436.35 <i>For Equipment Without Operator, Deduct</i> -16,326.46 <i>For >6 Months (>26 Weeks) , Deduct</i> -164.40	20,436.35	
01 22 23 00-1220 Light Off-Road Utility Passenger Vehicles <small>(01 22 23 00-1209)</small>		
01 22 23 00-1221 DAY 4 Wheel, 2 Person, Light Off Road Utility Passenger Vehicle..... 300.82	300.82	
01 22 23 00-1222 WK 4 Wheel, 2 Person, Light Off Road Utility Passenger Vehicle..... 695.64	695.64	
01 22 23 00-1223 MO 4 Wheel, 2 Person, Light Off Road Utility Passenger Vehicle..... 1,504.08 <i>For >6 Months (>26 Weeks) , Deduct</i> -60.16	1,504.08	
01 22 23 00-1224 DAY 4 Wheel, 4 Person, Light Off Road Utility Passenger Vehicle..... 310.22	310.22	
01 22 23 00-1225 WK 4 Wheel, 4 Person, Light Off Road Utility Passenger Vehicle..... 723.84	723.84	
01 22 23 00-1226 MO 4 Wheel, 4 Person, Light Off Road Utility Passenger Vehicle..... 1,598.08 <i>For >6 Months (>26 Weeks) , Deduct</i> -63.92	1,598.08	
01 22 23 00-1227 Light Duty Trucks <small>(01 22 23 00-1209)</small>		
01 22 23 00-1228 DAY 1/2 To 3/4 Ton, 4 x 2 Light Duty Conventional Pickup Truck With Full-Time Truck Driver 1,048.29 <i>For Equipment Without Operator, Deduct</i> -749.04	1,048.29	
01 22 23 00-1229 WK 1/2 To 3/4 Ton, 4 x 2 Light Duty Conventional Pickup Truck With Full-Time Truck Driver..... 4,727.10 <i>For Equipment Without Operator, Deduct</i> -3,745.19	4,727.10	
01 22 23 00-1230 MO 1/2 To 3/4 Ton, 4 x 2 Light Duty Conventional Pickup Truck With Full-Time Truck Driver..... 18,286.48 <i>For Equipment Without Operator, Deduct</i> -16,229.15 <i>For >6 Months (>26 Weeks) , Deduct</i> -82.29	18,286.48	
01 22 23 00-1231 DAY 3/4 Ton, 4 x 4 Crew Cab Pickup Truck With Full-Time Truck Driver..... 1,104.40 <i>For Equipment Without Operator, Deduct</i> -749.04	1,104.40	
01 22 23 00-1232 WK 3/4 Ton, 4 x 4 Crew Cab Pickup Truck With Full-Time Truck Driver..... 4,895.42 <i>For Equipment Without Operator, Deduct</i> -3,745.19	4,895.42	
01 22 23 00-1233 MO 3/4 Ton, 4 x 4 Crew Cab Pickup Truck With Full-Time Truck Driver..... 18,660.54 <i>For Equipment Without Operator, Deduct</i> -16,229.15 <i>For >6 Months (>26 Weeks) , Deduct</i> -97.26	18,660.54	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 22 23 00-1234		Rear Dump Trucks <small>(01 22 23 00-1209)</small>		
01 22 23 00-1235	DAY	2.5 CY Rear Dump Truck With Full-Time Truck Driver	1,144.11	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23 00-1236	WK	2.5 CY Rear Dump Truck With Full-Time Truck Driver	4,799.27	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23 00-1237	MO	2.5 CY Rear Dump Truck With Full-Time Truck Driver	19,485.04	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-16,326.46	
			-126.34	
01 22 23 00-1238	DAY	4 CY Rear Dump Truck With Full-Time Truck Driver	1,273.59	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23 00-1239	WK	4 CY Rear Dump Truck With Full-Time Truck Driver	5,200.46	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23 00-1240	MO	4 CY Rear Dump Truck With Full-Time Truck Driver	20,041.18	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-148.59	
01 22 23 00-1241	DAY	6 CY Rear Dump Truck With Full-Time Truck Driver	1,340.89	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23 00-1242	WK	6 CY Rear Dump Truck With Full-Time Truck Driver	5,359.66	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23 00-1243	MO	6 CY Rear Dump Truck With Full-Time Truck Driver	20,147.32	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-152.83	
01 22 23 00-1244	DAY	13 CY Rear Dump Truck With Full-Time Truck Driver	2,228.81	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23 00-1245	WK	13 CY Rear Dump Truck With Full-Time Truck Driver	7,174.57	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23 00-1246	MO	13 CY Rear Dump Truck With Full-Time Truck Driver	25,241.80	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-356.61	
01 22 23 00-1247	DAY	18 CY Rear Dump Truck With Full-Time Truck Driver	2,376.33	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23 00-1248	WK	18 CY Rear Dump Truck With Full-Time Truck Driver	7,515.27	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23 00-1249	MO	18 CY Rear Dump Truck With Full-Time Truck Driver	26,133.33	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-392.27	
01 22 23 00-1250		Vacuum Trucks <small>(01 22 23 00-1209)</small>		
01 22 23 00-1251	DAY	5,000 Gallon Vacuum Truck With Full-Time Truck Driver	2,218.19	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23 00-1252	WK	5,000 Gallon Vacuum Truck With Full-Time Truck Driver	8,178.61	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23 00-1253	MO	5,000 Gallon Vacuum Truck With Full-Time Truck Driver	29,342.86	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-520.66	
01 22 23 00-1254		Water Trucks <small>(01 22 23 00-1209)</small>		
		Note: Includes pump and 1-1/2" Diameter x 50' water hose. See CSI section 01 22 23 00-1009 for additional discharge hose, 01 22 23 00-1275 for water trailer.		
01 22 23 00-1255	DAY	2,000 Gallon Water Truck With Full-Time Driver	1,399.28	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
		<i>For Each 1,000 Gallon Of Purchased Water, Add</i>	14.51	
01 22 23 00-1256	WK	2,000 Gallon Water Truck With Full-Time Driver	5,468.12	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
		<i>For Each 1,000 Gallon Of Purchased Water, Add</i>	14.51	
01 22 23 00-1257	MO	2,000 Gallon Water Truck With Full-Time Driver	20,344.46	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For Each 1,000 Gallon Of Purchased Water, Add</i>	14.51	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-160.72	
01 22 23 00-1258	DAY	3,700 To 4,000 Gallon Water Truck With Full-Time Driver	1,714.98	
		<i>For Equipment Without Operator, Deduct</i>	-753.53	
		<i>For Each 1,000 Gallon Of Purchased Water, Add</i>	14.51	
01 22 23 00-1259	WK	3,700 To 4,000 Gallon Water Truck With Full-Time Driver	6,415.22	
		<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
		<i>For Each 1,000 Gallon Of Purchased Water, Add</i>	14.51	
01 22 23 00-1260	MO	3,700 To 4,000 Gallon Water Truck With Full-Time Driver	22,783.96	
		<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
		<i>For Each 1,000 Gallon Of Purchased Water, Add</i>	14.51	
		<i>For >6 Months (>26 Weeks), Deduct</i>	-258.30	
01 22 23 00-1261		Traffic Control Truck With Mounted Impact Attenuators/Crash Cushions And Arrow Board <small>(01 22 23 00-1209)</small>		
01 22 23 00-1262	DAY	Traffic Control Truck With Mounted Impact Attenuator/Crash Cushion And Arrow Board With Full-Time Truck Driver	2,053.55	
		<i>For Equipment Without Operator, Deduct</i>	-749.04	
01 22 23 00-1263	WK	Traffic Control Truck With Mounted Impact Attenuator/Crash Cushion And Arrow Board With Full-Time Truck Driver	7,595.15	
		<i>For Equipment Without Operator, Deduct</i>	-3,745.19	



General Requirements		01
Price and Payment Procedures		01 20
Unit Prices		01 22

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 22 23	00-1264	MO	Traffic Control Truck With Mounted Impact Attenuator/Crash Cushion And Arrow Board With Full-Time Truck Driver.....	25,578.63	
			<i>For Equipment Without Operator, Deduct</i>	-16,229.15	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-373.98	
01 22 23	00-1265		Straight/Box Trucks (01 22 23 00-1209)		
01 22 23	00-1266	DAY	18,000 LB Capacity, 24' Straight/Box Truck With Full-Time Truck Driver	879.13	
			Note: Includes 2,500 LB lift gate.		
			<i>For Equipment Without Operator, Deduct</i>	-753.53	
01 22 23	00-1267	WK	18,000 LB Capacity, 24' Straight/Box Truck With Full-Time Truck Driver	4,395.65	
			Note: Includes 2,500 LB lift gate.		
			<i>For Equipment Without Operator, Deduct</i>	-3,767.64	
01 22 23	00-1268	MO	18,000 LB Capacity, 24' Straight/Box Truck With Full-Time Truck Driver	18,180.28	
			Note: Includes 2,500 LB lift gate.		
			<i>For Equipment Without Operator, Deduct</i>	-16,326.46	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-74.15	
01 22 23	00-1269		Truck Mounted Accessories (01 22 23 00-1208)		
			Note: Includes delivery to job site and pick-up when complete.		
01 22 23	00-1270		Truck Mounted Arrow Boards (01 22 23 00-1269)		
01 22 23	00-1271	DAY	Truck Mounted Arrow Board	55.92	
01 22 23	00-1272	WK	Truck Mounted Arrow Board	222.39	
01 22 23	00-1273	MO	Truck Mounted Arrow Board	792.98	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-31.72	
01 22 23	00-1274		Trailers (01 22 23 00-1208)		
			Note: Includes delivery to job site and pick-up when complete.		
01 22 23	00-1275		Water Trailers With Pump (01 22 23 00-1274)		
01 22 23	00-1276	DAY	500 To 600 Gallon Water Trailer With Pump	165.02	
01 22 23	00-1277	WK	500 To 600 Gallon Water Trailer With Pump	423.32	
01 22 23	00-1278	MO	500 To 600 Gallon Water Trailer With Pump	1,133.65	
			<i>For >6 Months (>26 Weeks) , Deduct</i>	-45.35	
01 22 23	00-1279		Refrigerated Trailers (01 22 23 00-1274)		
			Note: Excludes electrical supply and connection		
01 22 23	00-1280	MO	8' x 40' Refrigerated Container Trailer	2,097.36	
			Note: Requires 460 volt, 3 phase electrical power connection. See CSI section 10 56 13 00-0000 for metal storage shelving, 26 05 00 00-0000 for electrical wiring.		

01 30 Administrative Requirements (01)

01 35 Special Procedures (01 30)

01 35 29 Health, Safety, and Emergency Response Procedures (01 35)

See CSI section 02 90 00 00-0000 for disaster recovery task.

01 35 29 00-0001 Emergency Response (01 35 29)

See CSI section 01 22 20 00-0001 for labor services to load and unload shipping container, 01 22 20 00-0062 for security guards, 01 22 23 00-0000 for portable equipment usage (air compressors, generators, lighting, etc.), 01 52 13 00-0029 for container usage.

01 35 29 00-0002	MI	Trucking Delivery Of 20' Shipping Container	2.62
01 35 29 00-0003	MI	Trucking Delivery Of 40' Shipping Container	5.24

01 35 33 Infection Control Procedures (01 35)

See CSI section 02 87 19 00-0000 for Bio-Hazard And Infectious Disease Control Remediation.

01 35 33 00-0001 COVID-19 RSIP Work Plan for Unit Disinfection and Safe Work Practices (01 35 33)

01 35 33 00-0002	DAY	COVID-19 RSIP Work Plan for Unit Disinfection and Safe Work Practices	241.50
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Note: The LACDA will establish the number of days required for the implementation of the scope included in this task item, to be determined by the phase, duration, and intensity of construction activity requiring the extent of such practices in any given unit. In addition to the requirements contained in this task, the Contractor and their Subcontractors are to perform all work , throughout the entire project duration, with strict adherence to all local, state, and federal COVID-19 safety guidelines including those set-forth by, but not limited to the Los Angeles County Department of Health and Public Works, California Department of Public Health, Cal/OSHA, and the Centers for Disease Control and Prevention (CDC) at no additional cost to the Owner/LACDA. These non-compensable items include: • Provide all necessary Personal Protective Equipment (PPE) items for all workers, including, but not limited to face masks, gloves, goggles, and hand sanitizer. All items must meet the standards/recommendations set-forth by the CDC. • Daily, manual wipe-down to disinfect hard surfaces touched in the course of work. Compensable items under this task to include: 1) Disinfect all surfaces touched in the course of work at the end of each work day (e.g. windows, doors, hardware, frames, etc.).

01 40 Quality Requirements (01)

01 41 Regulatory Requirements (01 40)

01	01	General Requirements
	01 40	Quality Requirements
	01 41	Regulatory Requirements



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 41 26 Permit Requirements (01 41)
See CSI section 01 22 16 00-0001 for reimbursable fees.

01 42 References (01 40)

01 42 13 Abbreviations and Acronyms (01 42)
Note: For specification publishing. Review specifications for requirements.
01 42 13 00-0001 NTE Abbreviations And Acronyms0.00
Note: For specification publishing. Review specifications for requirements.

01 42 16 Definitions (01 42)
Note: For specification publishing. Review specifications for requirements.
01 42 16 00-0001 NTE Definitions0.00
Note: For specification publishing. Review specifications for requirements.

01 42 19 Reference Standards (01 42)
Note: For specification publishing. Review specifications for requirements.
01 42 19 00-0001 NTE Reference Standards0.00
Note: For specification publishing. Review specifications for requirements.

01 42 21 Construction Suppliers or Venor List (01 42)
Note: For specification publishing. Review specifications for requirements.
01 42 21 00-0001 NTE Construction Suppliers or Venor List0.00
Note: For specification publishing. Review specifications for requirements.

01 45 Quality Control (01 40)

Note: Refer to section specifications for testing included with other sections.

01 45 23 Testing and Inspecting Services (01 45)
Note: For application to existing materials/site conditions or additional testing over specifications stated tests. Includes acquisition and maintenance of sample (for laboratory tests) to include shipping as required, applicable equipment for field tests, and appropriate test reports.

01 45 23 00-0001 **Soils/Aggregate Testing** (01 45 23)
01 45 23 00-0002 **Field Soils Tests** (01 45 23 00-0001)
01 45 23 00-0003 EA Plasticity Index Soils Test, ASTM D-4318, Field Soils Test343.56
01 45 23 00-0004 EA 4" Compaction Curves Soils Test, ASTM D-1557, Field Soils Test487.63
01 45 23 00-0005 EA 6" Compaction Curves Soils Test, ASTM D-1557, Field Soils Test554.12
01 45 23 00-0006 EA Resistance (R) Value Soils Test, CA 301, Field Soils Test443.30
01 45 23 00-0007 SET Cement Treated Base Laboratory Design, Soil Cement, Field Soils Test1,329.47
01 45 23 00-0008 EA Moisture Content, Field Soils Test49.86
01 45 23 00-0009 EA UBC Or Swell Test, Field Soils Test132.99
01 45 23 00-0010 EA Proctor Compaction 4" Standard Mold ASTM D698, Field Soils Test332.37
01 45 23 00-0011 EA Proctor Compaction 6" Standard Mold, Field Soils Test415.46
01 45 23 00-0012 EA Density And Classification Test, Field Soils Test101.23
01 45 23 00-0013 EA Percolation Test, Field Soils Test253.08
01 45 23 00-0014 EA Infiltration Test, Field Soils Test506.16

01 45 23 00-0015 **Aggregate Testing** (01 45 23 00-0001)
01 45 23 00-0016 EA Coarse Aggregate Sieve Analysis Test, ASTM C-136, CA 202110.82
01 45 23 00-0017 EA Fine Aggregate Sieve Analysis Test, ASTM C-136, CA 202199.48
01 45 23 00-0018 EA Sieve Analysis, Pit Run, ASTM C136164.50
Note: Includes wash.
01 45 23 00-0019 EA Specific Special Gravity, Course, ASTM C127176.08
Note: Includes absorption test.
01 45 23 00-0020 EA Special Gravity, Fine, ASTM C127157.87
Note: Includes absorption test.
01 45 23 00-0021 EA Aggregate Cleanness Value, ASTM C-128, CA 227221.65
01 45 23 00-0022 EA Sand Equivalent, Average of 3 Tests, ASTM D2419, CA 217166.24
01 45 23 00-0023 EA Fine Aggregate Durability Index, CA 229177.32
01 45 23 00-0024 EA Sodium And Magnesium Soundness, ASTM C88465.31
01 45 23 00-0025 EA Los Angeles Rattler, ASTM C-131, CA 211354.64
01 45 23 00-0026 EA Unit Weight Of Aggregates, ASTM C2999.74
01 45 23 00-0027 EA Organic Impurities In Sand, ASTM C4099.71
01 45 23 00-0028 EA Crushed Particle, ASTM California Test Method99.71
01 45 23 00-0029 EA Clay Lump And Friable Particles, ASTM C142199.42

01 45 23 00-0030 **Permeability Tests** (01 45 23 00-0001)
01 45 23 00-0031 **In-Place Tests** (01 45 23 00-0030)
01 45 23 00-0032 EA Double Ring Infiltrometer Test, ASTM D33851,760.85
01 45 23 00-0033 EA Unconfined Compressive Strength (Pocket Penetrometer) Test83.09

01 45 23 00-0034 **Lab Tests** (01 45 23 00-0030)



General Requirements	01	10
Quality Requirements	01 40	
Quality Control	01 45	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 45 23 00-0035 EA Falling Head Rigid Wall Consolidometer Technique CAE	821.73	
01 45 23 00-0036 EA Falling Head Permeability Test EPA-9100	821.73	
01 45 23 00-0037 EA Constant Head Permeability Test For Granular Soils, ASTM D2432	469.56	
01 45 23 00-0038 Concrete/Cement/Asphalt Testing (01 45 23)		
01 45 23 00-0039 Concrete Testing (01 45 23 00-0038)		
01 45 23 00-0040 EA Prepare 6 x 12 Concrete Cylinder And Deliver To Lab	24.92	
01 45 23 00-0041 EA 6 x 12 Cylinder Concrete Compression Test, ASTM C-39 Or ASTM D1633	70.43	
01 45 23 00-0042 EA Concrete Cores Compression Test, ASTM C-42	144.07	
01 45 23 00-0043 EA 6 x 6 x 18 Concrete Flexural Test, ASTM C-78	210.57	
01 45 23 00-0044 EA Unit Weight Of Concrete Cylinder, ASTM C-567	77.58	
01 45 23 00-0045 EA Concrete Mix Design Review	421.14	
01 45 23 00-0046 EA Trial Concrete Batch Prepared In Laboratory	997.42	
01 45 23 00-0047 EA Concrete Shrinkage, ASTM C-157 Modified	775.78	
01 45 23 00-0048 EA 6 x 12 Concrete Cylinder Splitting Tensile Test, ASTM C-496	119.69	
01 45 23 00-0049 EA Concrete Slump Test, ASTM C143	55.41	
01 45 23 00-0050 EA Concrete Air Content Test, ASTM C138, ASTM C173, Or ASTM C231	55.41	
01 45 23 00-0051 Cement Testing (01 45 23 00-0038)		
01 45 23 00-0052 EA Cement Grab Sample (CCR Title 24)	55.41	
Note: Includes sealing and storing 1 year.		
01 45 23 00-0053 EA 2" x 2" x 2" Cube Compression Test, All Type Materials	88.66	
01 45 23 00-0054 Asphaltic Concrete Testing (01 45 23 00-0038)		
01 45 23 00-0055 EA Hveem Asphaltic Concrete Stability Test, CA 366	110.82	
01 45 23 00-0056 EA Marshall Asphaltic Concrete Stability Test (3 Specimens), ASTM D-6926/6927	288.14	
01 45 23 00-0057 EA Stability Tests, Premixed, ASTM D1559	110.82	
01 45 23 00-0058 EA Stability Tests, Lab. Mixed, ASTM D1559	288.14	
01 45 23 00-0059 EA Swell Test, CA 305	132.99	
Note: Includes compaction.		
01 45 23 00-0060 EA % Asphalt Extraction Test, ASTM D-2172 B	332.48	
01 45 23 00-0061 EA Maximum Theoretical Unit Weight, ASTM C2041	211.30	
01 45 23 00-0062 EA Unit Weight Sample Requiring Compaction, California Test Method 308	44.33	
01 45 23 00-0063 EA Asphalt Unit Weight On Core Test, CA 308C	44.33	
01 45 23 00-0064 HR Nuclear Field Density Testing, 4 Hour Minimum	228.30	
01 45 23 00-0065 EA Asphalt Film Stripping Test, CTM 302/AASHTO T182/ASTM D1664	113.89	
01 45 23 00-0066 EA Penetration, ASTM D5	160.10	
01 45 23 00-0067 Masonry/Concrete Block/Tile Testing (01 45 23)		
01 45 23 00-0068 Masonry Testing (01 45 23 00-0067)		
01 45 23 00-0069 EA 2" x 4" Cylinder Mortar Compression Test	73.14	
01 45 23 00-0070 EA 4" x 4" x 8" Grout Prisms Compression Test	73.14	
01 45 23 00-0071 EA Masonry Cores Compression Test	144.07	
01 45 23 00-0072 EA Composite Grouted Prism Compression Test	277.06	
01 45 23 00-0073 Concrete Block Testing (ASTM C140 Or CMA Per Specimen) (01 45 23 00-0067)		
01 45 23 00-0074 EA Up To 8" x 8" x 16" Concrete Block Compression Test, ASTM C-140	177.32	
01 45 23 00-0075 EA Absorption Test, Moisture Content And Unit Weight	121.91	
01 45 23 00-0076 EA First Unit, Moisture Condition By Relative Humidity, ASTM C427	465.31	
01 45 23 00-0077 EA Moisture Condition By Relative Humidity, ASTM C427, Additional Unit	232.66	
01 45 23 00-0078 Acoustical Testing (01 45 23)		

01	01	General Requirements
	01 40	Quality Requirements
	01 45	Quality Control



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 45 23 00-0079 EA Pre-Construction Acoustical Testing (30% Artificial Noise Eligility Testing)..... 1,671.67
 Note: Pursuant to LACDA providing a list of residential structures that have been categorically selected pursuant to the qualification requirements established by 1) FAA Order 5100.38D and 2) Acoustical Testing Plan for LAX (ATP 2019). The JOC contractor commissioned acoustical engineer shall: Conduct acoustical engineering to sound test 1 single and or multifamily dwelling per the ATP 2019, ASTM Standard E966 and FAA Order 5100.38D, to include but not limited to: Provide engineering professionals, labor, equipment, and material to utilize artificial noise to accurately measure outdoor to indoor noise level reduction (NLR) of all habitable rooms to determine eligibility of the residential structure. 1. Provide artificial noise source test kit per ATP 2019 (Measurement Procedure, 2nd paragraph page 7). 2. Place equipment and noise source at façade in compliance with ASTM E966 per ATP 2019 (Placement of the Loudspeaker, 3rd paragraph page 7). 3. Generate artificial sound (pink sound) per ATP 2019 (Creating the One-Third Octave Band Measurement, 3rd paragraph page 8). 4. Calculate exterior vs interior noise reduction per ATP 2019 (Section D. Calculating Interior Noise Levels, page 8). 5. Calculate noise based on 737-800 to determine NLR per ATP 2019 (Aircraft Noise Spectra for use in NLR Calculation paragraph 6, page 9) 6. Provide pre-construction sound test data in a report format with methodology narrative, test results, NLR per unit and habitable room. Report may include property batching per initial work order or may be limited to one pre-construction test. 1. Categorical Testing Report content requirement detail: Owner Name, Address, Zoning, CNEL, Single or Multifamily description, No of tests per batch (to meet 30% representative sampling requirement) and confirmation on which property was tested from categorical list. 2. Audit Summary Report content detail: Group Designation (to be provided by LACDA), Owner Name, Address, List of habitable room with Exterior and Interior Noise Levels recorded, and cumulative average Noise Level of all rooms. All Test result figures exceeding an interior CNEL greater than 45dB to be indicated in bold red font color. The following notes should be included at the bottom of the Audit Summary Report: Notes: "Rooms with Interior CNEL of 45 dB and greater are in bold red font" 1) Testing conducted per ATP standards/procedures 2) Exterior CNEL data from 2020 Noise Exposure Map – and have been rounded to the next 4 dB CNEL Contour 3) Interior CNEL equals exterior CNEL minus measured room NLR 4) The ASTM E966 test method states "It is estimated that the repeatability standard deviation of these test procedures are of the order of 2 to 3 dB, depending on frequency". 5) Test results between 44.1 and 44.9 have been reported as 45.0 dB due to ASTM E966 test method 7. Confirm the residential parcel is located within the 65CNEL though 74 CNEL to include FAA Approved Block Rounding (60 CNEL) as delineated by the 2020 LAX Noise Exposure Map (NEM) link LAWA.ORG 8. Schedule testing with resident(s) providing an arrival and departure time within e hours 8AM and 5PM, Monday through Friday (explanation of procedures, noise impact, resident expectations and supply each occupant with a pair of disposable ear plugs min rating 32dB) 9. Pre-Construction Acoustical Test Report must be completed and submitted to LACDA in final form not later than 20 working days from field noise test survey.
 For > 3 Tests, Per Test, Deduct -385.82
 For Ancillary Sound Test Equipment, Add 771.54
 Note: Supply and set-up mechanical lift to elevate loudspeaker on second story and/or elevated facade broadcast applications to meet ATP 19 testing protocols.

01 45 23 00-0080 EA Post-Construction Acoustical Audit/Testing (10% Artificial Noise Post Acoustical Improvement Audit/Testing)..... 1,671.67
 Note: Pursuant to LACDA providing a list of residential structures that have been sound mitigated pursuant to the requirements established by 1) FAA Order 5100.38D and 2) Acoustical Testing Plan for LAX (ATP 2019). The JOC contractor commissioned acoustical engineer shall: Conduct acoustical engineering to sound test 1 single and or multifamily dwelling per the ATP 2019, ASTM Standard E966 and FAA Order 5100.38D, to include but not limited to: Provide engineering professionals, labor, equipment, and material to utilize artificial noise to accurately measure outdoor to indoor noise level reduction (NLR) of all habitable rooms to include cumulative room average of the dwelling to determine post treatment interior noise reduction/improvement. Goal: The goal of the Airport Improvement Program (AIP) and State of California is to achieve, post-construction, an interior noise of more than 45dB CNEL and a noise reduction goal (not a requirement) of 5 dB compared to pre-construction conditions. 1. Provide post-construction acoustic testing per ATP 2019 (Section G. Post-Construction Acoustic Testing, Page 15). 2. Provide artificial noise source test kit per ATP 2019 (Measurement Procedure, 2nd paragraph page 7). 3. Place equipment and noise source at façade in compliance with ASTM E966 per ATP 2019 (Placement of the Loudspeaker, 3rd paragraph page 7). 4. Generate artificial sound (pink sound) per ATP 2019 (Creating the One-Third Octave Band Measurement, 3rd paragraph page 8). 5. Calculate exterior vs interior noise reduction per ATP 2019 (Section D. Calculating Interior Noise Levels, page 8). 6. Calculate noise based on 737-800 to determine NLR per ATP 2019 (Aircraft Noise Spectra for use in NLR Calculation paragraph 6, page 9) 7. Provide post-construction sound test data in a comprehensive report format with methodology narrative, Pre (To be provided by LACDA, if not already provided by this consultant) and Post Test results, measured noise reduction per unit and habitable room. Report may include property batching per initial work order or may be limited to one post-construction test. 1. Noise Audit Summary Report content requirement detail: Owner Name, Address, Zoning, CNEL, Single or Multifamily description, No of tests per batch (to meet 10% representative sampling requirement) and confirmation on which property was tested from categorical list. 2. Audit Summary Report content detail: Group Designation (to be provided by LACDA), Owner Name, Address, List of habitable room with Exterior and Interior Noise Levels recorded, and cumulative average Noise Level of all rooms. All Test result figures with sound exceeding an interior CNEL greater than 45dB to be indicated in bold red font color. The following notes should be included at the bottom of the Audit Summary Report: Notes: "Rooms with Interior Noise Reduction of 45 dB and greater are to be reported in bold red font" 1) Testing conducted per ATP standards/procedures 2) Exterior CNEL data from 2020 Noise Exposure Map – and have been rounded to the next 4 dB CNEL Contour 3) Interior CNEL equals exterior CNEL minus measured room NLR 4) The ASTM E966 test method states "It is estimated that the repeatability standard deviation of these test procedures are of the order of 2 to 3 dB, depending on frequency". 8. Confirm the residential parcel is located within the 65CNEL though 74 CNEL to include FAA Approved Block Rounding (60 CNEL) as delineated by the 2020 LAX Noise Exposure Map (NEM) link LAWA.ORG 9. Schedule testing with resident(s) providing an arrival and departure time within e hours 8AM and 5PM, Monday through Friday (explanation of procedures, noise impact, resident expectations and supp
 For > 3 Tests, Per Test, Deduct -385.82
 For Ancillary Sound Test Equipment, Add 771.54
 Note: Supply and set-up mechanical lift to elevate loudspeaker on second story and/or elevated facade broadcast applications to meet ATP 19 testing protocols.

01 45 29 Testing Laboratory Services (01 45)

Note: For application to existing materials/site conditions or additional testing over specifications stated tests.

01 45 29 00-0001 Soil Borings Laboratory Tests (01 45 29)

01 45 29 00-0002 EA Atterberg Limits - Liquid Limits (LL) And Plastic Limits (PL), T89, T90, ASTM D4318, Soil Borings Laboratory Test..... 152.61



General Requirements	01	10
Quality Requirements	01 40	
Quality Control	01 45	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 45 29 00-0003 EA Shrinkage Limit, Soil Borings Laboratory Test.....	48.69	
01 45 29 00-0004 EA Unconfined Compressive Strength of Cohesive Soils, Soil Borings Laboratory Test	117.39	
01 45 29 00-0005 EA Consolidation, Soil Borings Laboratory Test.....	821.73	
01 45 29 00-0006 EA Swell Test, Soil Borings Laboratory Test.....	128.83	
01 45 29 00-0007 EA In Place Density, Soil Borings Laboratory Test.....	35.22	
01 45 29 00-0008 EA Moisture Content, ASTM D2216, Soil Borings Laboratory Test.....	21.88	
01 45 29 00-0009 EA Hydrometer Analysis, Soil Borings Laboratory Test.....	282.46	
01 45 29 00-0010 EA Specific Gravity, ASTM D854, Soil Borings Laboratory Test	98.48	
01 45 29 00-0011 EA Partial Sieve Analysis, Soil Borings Laboratory Test.....	19.48	
01 45 29 00-0012 EA Laboratory Permeability, Soil Borings Laboratory Test.....	973.77	
01 45 29 00-0013 EA Sieve Analysis, ASTM D422, Soil Borings Laboratory Test.....	196.96	
01 45 29 00-0014 EA Sulfate Soundness, Soil Borings Laboratory Test.....	243.44	
01 45 29 00-0015 EA Los Angeles Abrasion, Soil Borings Laboratory Test.....	450.63	
01 45 29 00-0016 EA Soil Bearing Ratio, ASTM D1883.....	498.71	
01 45 29 00-0017 EA Compaction Test Subgrade, Soil Borings Laboratory Test	146.07	
01 45 29 00-0018 EA Compaction Test Base Course, Soil Borings Laboratory Test.....	162.29	
01 45 29 00-0019 EA In Place Density And Water Content Test By Nuclear Methods, ASTM D6938, Soil Borings Laboratory Test.....	348.32	
01 45 29 00-0020 EA Field Density Sand Cone, AASHTO T-191, ASTM D1556, Soil Borings Laboratory Test.....	74.66	

01 50 Temporary Facilities and Controls ^(01 50)

Note: Tasks in this section shall be used as directed by owner.

01 51 Temporary Utilities ^(01 50)

01 51 26 Temporary Lighting ^(01 51)

01 51 26 00-0001 Temporary Lighting Devices ^(01 51 26)

Note: Includes removal after use.

01 51 26 00-0002 EA Temporary Exit Light.....	295.52
01 51 26 00-0003 EA Temporary 10 Light String With Cages.....	107.30
01 51 26 00-0004 EA Temporary High Bay Light	404.08

01 52 Construction Facilities ^(01 50)

Note: Tasks in this section shall be used as directed by owner for owner's use.

01 52 13 Field Offices and Sheds ^(01 52)

01 52 13 00-0001 Field Offices and Office Trailers ^(01 52 13)

Note: Excludes furniture, utility connections and service. Minimum 6 months rental. See CSI section 01 52 13 00-0015 for furniture, skirting, and steps.

01 52 13 00-0002 MO 8' x 24' Mobile Office, With Toilet.....	188.83
For Each Delivery And Removal, Two Round Trips, Add	1,249.64
For Each Set-Up (Block And Level), Add	440.31
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
For Office Trailer Without Toilet, Deduct	-37.77
01 52 13 00-0003 MO 8' x 32' Mobile Office, With Toilet.....	214.01
For Each Delivery And Removal, Two Round Trips, Add	1,249.64
For Each Set-Up (Block And Level), Add	440.31
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
For Office Trailer Without Toilet, Deduct	-42.80
01 52 13 00-0004 MO 10' x 36' Mobile Office, With Toilet.....	289.54
For Each Delivery And Removal, Two Round Trips, Add	1,874.47
For Each Set-Up (Block And Level), Add	718.39
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
For Office Trailer Without Toilet, Deduct	-57.91
01 52 13 00-0005 MO 10' x 40' Mobile Office, With Toilet.....	308.43
For Each Delivery And Removal, Two Round Trips, Add	1,874.47
For Each Set-Up (Block And Level), Add	718.39
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
For Office Trailer Without Toilet, Deduct	-61.69
01 52 13 00-0006 MO 10' x 44' Mobile Office, With Toilet.....	339.90
For Each Delivery And Removal, Two Round Trips, Add	1,874.47
For Each Set-Up (Block And Level), Add	718.39
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
01 52 13 00-0007 MO 10' x 50' Mobile Office, With Toilet.....	358.78
For Each Delivery And Removal, Two Round Trips, Add	1,874.47
For Each Set-Up (Block And Level), Add	718.39
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
01 52 13 00-0008 MO 12' x 32' Mobile Office, With Toilet.....	277.58
For Each Anchoring Into Dirt, Add	134.27
For Each Anchoring Into Asphalt Or Concrete, Add	201.40
For Each Delivery And Removal, Two Round Trips, Add	753.01
For Each Set-Up (Block And Level), Add	579.35

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 52	Construction Facilities



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 52 13 00-0009	MO 12' x 44' Mobile Office, With Toilet.....	371.12	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	1,874.47	
	<i>For Each Set-Up (Block And Level), Add</i>	718.39	
	<i>For Each Anchoring Into Dirt, Add</i>	134.27	
	<i>For Each Anchoring Into Asphalt Or Concrete, Add</i>	201.40	
01 52 13 00-0010	MO 12' x 50' Mobile Office, With Toilet.....	421.72	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	1,874.47	
	<i>For Each Set-Up (Block And Level), Add</i>	718.39	
	<i>For Each Anchoring Into Dirt, Add</i>	134.27	
	<i>For Each Anchoring Into Asphalt Or Concrete, Add</i>	201.40	
01 52 13 00-0011	MO 12' x 60' Mobile Office, With Toilet.....	459.49	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	1,874.47	
	<i>For Each Set-Up (Block And Level), Add</i>	718.39	
	<i>For Each Anchoring Into Dirt, Add</i>	134.27	
	<i>For Each Anchoring Into Asphalt Or Concrete, Add</i>	201.40	
01 52 13 00-0012	MO 24' x 60' Modular Office, With Toilet.....	1,007.10	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	3,748.93	
	<i>For Each Set-Up (Block And Level), Add</i>	1,158.70	
	<i>For Each Anchoring Into Dirt, Add</i>	134.27	
	<i>For Each Anchoring Into Asphalt Or Concrete, Add</i>	201.40	
01 52 13 00-0013	MO 24' x 72' Modular Office, With Toilet.....	1,208.52	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	3,748.93	
	<i>For Each Set-Up (Block And Level), Add</i>	1,158.70	
	<i>For Each Anchoring Into Dirt, Add</i>	134.27	
	<i>For Each Anchoring Into Asphalt Or Concrete, Add</i>	201.40	
01 52 13 00-0014	MO 30' x 30' Modular Office, With Toilet.....	574.36	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	3,748.93	
	<i>For Each Set-Up (Block And Level), Add</i>	1,158.70	
	<i>For Each Anchoring Into Dirt, Add</i>	134.27	
	<i>For Each Anchoring Into Asphalt Or Concrete, Add</i>	201.40	

01 52 13 00-0015 Accessories For Field Office Trailers (01 52 13)

Note: Costs includes installation or placement in trailer.

01 52 13 00-0016	MO Desk For Field Office Trailer.....	57.18	
01 52 13 00-0017	MO Rolling Desk Chair For Field Office Trailer.....	35.74	
01 52 13 00-0018	MO File Cabinet For Field Office Trailer.....	42.88	
01 52 13 00-0019	MO Table For Field Office Trailer.....	28.59	
01 52 13 00-0020	MO Folding Chair For Field Office Trailer.....	13.54	
01 52 13 00-0021	EA Phone Hook-Up For Field Office Trailer.....	157.24	
01 52 13 00-0022	MO Local Phone Service Per Phone Line For Field Office Trailer.....	100.06	
01 52 13 00-0023	MO Security System With Monitoring For Field Office Trailer.....	180.17	
01 52 13 00-0024	LF Perimeter Trailer Vinyl Skirting For Field Office Trailer.....	16.12	
01 52 13 00-0025	LF Insulated Perimeter Trailer Vinyl Skirting For Field Office Trailer.....	38.17	
01 52 13 00-0026	MO Steps For Field Office Trailer.....	47.00	
01 52 13 00-0027	MO Fax Machine For Field Office Trailer.....	71.47	
01 52 13 00-0028	MO Copier For Field Office Trailer.....	114.36	

01 52 13 00-0029 Storage Containers (01 52 13)

01 52 13 00-0030	MO 8' x 8' x 10' Storage Container.....	175.49	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	130.18	
	<i>For >12 Months, Deduct</i>	-52.65	
01 52 13 00-0031	MO 8' x 8' x 20' Storage Container.....	183.47	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	143.20	
	<i>For >12 Months, Deduct</i>	-55.04	
01 52 13 00-0032	MO 8' x 8' x 40' Storage Container.....	216.97	
	<i>For Each Delivery And Removal, Two Round Trips, Add</i>	288.40	
	<i>For >12 Months, Deduct</i>	-65.09	

01 52 19 Sanitary Facilities (01 52)

01 52 19 00-0001 Portable Toilets (01 52 19)

Note: Includes set-up, servicing once per week (unless task states otherwise) and removal.

01 52 19 00-0002	WK Portable Chemical Toilet.....	79.14	
	<i>For Each Additional Servicing Per Unit Per Week, Add</i>	25.00	
	<i>For Each Delivery And Set-up, Add</i>	47.49	
01 52 19 00-0003	MO Portable Chemical Toilet.....	237.44	
	<i>For Each Additional Servicing Per Unit Per Week, Add</i>	25.00	
	<i>For Each Delivery And Set-up, Add</i>	47.49	
01 52 19 00-0004	WK Americans With Disabilities Act Compliant Portable Chemical Toilet.....	94.40	
	<i>For Each Additional Servicing Per Unit Per Week, Add</i>	25.00	
	<i>For Each Delivery And Set-up, Add</i>	47.49	
01 52 19 00-0005	MO Americans With Disabilities Act Compliant Portable Chemical Toilet.....	277.01	
	<i>For Each Additional Servicing Per Unit Per Week, Add</i>	25.00	
	<i>For Each Delivery And Set-up, Add</i>	47.49	
01 52 19 00-0006	WK Two Station Portable Handwash.....	54.79	
	<i>For Each Delivery And Set-up, Add</i>	47.49	
01 52 19 00-0007	MO Two Station Portable Handwash.....	166.19	
	<i>For Each Delivery And Set-up, Add</i>	47.49	
01 52 19 00-0008	MO 6 Station, Portable Toilets, Multi Trailer.....	4,685.40	
	<i>Note: Includes women's room (3 toilets, 2 sinks) and men's room (1 toilet, 1 urinal and 1 sink). Excludes servicing.</i>		
	<i>For Each Delivery, Set-up And Removal, Two Round Trips, Add</i>	1,199.81	



General Requirements	01	10
Temporary Facilities and Controls	01 50	
Construction Facilities	01 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 52 19 00-0009	WK Service 6 Station Trailer Restrooms, 3 Times Per Week.....	2,044.02	
	<i>For One Additional Service Per Week, Add</i>	681.34	
	<i>Note: For one less service per week, UOM to be negative one (-1)</i>		

01 53 Temporary Construction (01 50)

01 53 16 Temporary Decking (01 53)

01 53 16 00-0001	Temporary Walkways And Railings <small>(01 53 16)</small>		
	<i>Note: Includes removal after use.</i>		
01 53 16 00-0002	SF Temporary Wood Walkway, 3/4" Plywood On 2 x 6 Stringers	7.73	
01 53 16 00-0003	LF Temporary Wooden Guardrail, 42" High, Posts, Handrail, And Intermediate Rail	31.10	
01 53 16 00-0004	LF Temporary Wood Guardrail Base, 12" x 12" Timber Beam	14.90	
01 53 16 00-0005	RSR Temporary Wood Stairs, Tread And Riser On 2" x 12" Stringers.....	25.42	

01 53 23 Temporary Ramps (01 53)

01 53 23 00-0001	Temporary Plywood For Wheel Barrow Access <small>(01 53 23)</small>		
	<i>Note: Includes removal after use.</i>		
01 53 23 00-0002	SF Temporary Plywood For Wheel Barrow Access.....	1.49	0.47

01 54 Construction Aids (01 50)

01 54 09 Personnel Protection Equipment (01 54)

01 54 09 00-0001	Personnel Protection Equipment <small>(01 54 09)</small>		
	<i>Note: Personnel Protection Equipment (PPE) for workers safety is considered as part of the Contractor's and Workers responsibility. Includes, but are not limited to; protective work gloves, hearing protection, protective clothing, reflective vests, safety glasses or face shields, dust masks, hard hats, appropriate foot protection (slip resistant, puncture-resistant soles, safety-toed), safety harnesses with lifeline, etc. Review JOC Note and specifications for requirements.</i>		
01 54 09 00-0002	NTE Personnel Protection Equipment	0.00	
	<i>Note: For specification publishing. Review specifications for requirements.</i>		

01 54 23 Temporary Scaffolding and Platforms (01 54)

01 54 23 00-0001	Scaffolding <small>(01 54 23)</small>		
	<i>Note: Additional scaffolding rental for work above the normal working height.</i>		
01 54 23 00-0002	Scaffolding Rental - Rental Only <small>(01 54 23 00-0001)</small>		
	<i>Note: Monthly rental of actual scaffolding volume rented. Scaffolding is complete with bracing, 2" thick x 12" wide scaffolding planks, scaffolding stairs (where necessary in lieu of planks), standard accessories, base leveling devices, mud sills, climbing ladders and landings, brackets, clamps and building ties, etc. See CSI section 01 54 23 00-0006 for scaffolding erection and dismantling.</i>		
01 54 23 00-0003	CCF Scaffolding With Bracing Accessories - Area Based On 5' Wide Sections (CCF / Month).....	31.45	
	<i>For Up To 25, Add</i>	12.58	
	<i>For >25 To 50, Add</i>	7.86	
	<i>For >50 To 150, Add</i>	3.15	
01 54 23 00-0004	CCF Scaffolding With Bracing Accessories - Area Based On 4' Wide Sections (CCF / Month).....	35.37	
	<i>For Up To 25, Add</i>	14.15	
	<i>For >25 To 50, Add</i>	8.84	
	<i>For >50 To 150, Add</i>	3.54	
01 54 23 00-0005	CCF Scaffolding With Bracing Accessories - Area Based On 3' Wide Sections (CCF / Month).....	47.18	
	<i>For Up To 25, Add</i>	18.87	
	<i>For >25 To 50, Add</i>	11.80	
	<i>For >50 To 150, Add</i>	4.72	
01 54 23 00-0006	Scaffolding Erection And Dismantling - Labor Only <small>(01 54 23 00-0001)</small>		
	<i>Note: Includes both initial erection and final dismantling Excludes lifting equipment. The unit of measure is the volume of scaffolding erected. See CSI section 01 54 23 00-0002 for scaffolding rental.</i>		
01 54 23 00-0007	CCF Up To 20' Height Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories	45.05	
01 54 23 00-0008	CCF >20' To 40' Height Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories	59.07	
01 54 23 00-0009	CCF >40' To 60' Height Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories	78.83	
01 54 23 00-0010	CCF >60' To 80' Height Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories	86.72	
01 54 23 00-0011	CCF >80' Height Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories	99.86	
01 54 23 00-0012	CCF Up To 20' Height Scaffolding Initial Erection And Final Dismantling Set Up On Stairs, Per CCF Of Scaffolding And Accessories	63.07	
01 54 23 00-0013	Heavy Duty Masonry Scaffolding Rental - Rental Only <small>(01 54 23 00-0001)</small>		
	<i>Note: Monthly rental of actual scaffolding volume rented. For projects over 2 stories. Scaffolding is complete with bracing, 2" thick x 12" wide scaffolding planks, scaffolding stairs (where necessary in lieu of planks), standard accessories, base leveling devices, mud sills, climbing ladders and landings, brackets, clamps, flat plate, connectors and building ties, etc. See CSI section 01 54 23 00-0019 for erection.</i>		
01 54 23 00-0014	CCF Heavy Duty Masonry Scaffolding With Bracing Accessories - Area Based On 4' Wide Sections (CCF / Month).....	68.38	
01 54 23 00-0015	CCF Heavy Duty Masonry Scaffolding With Bracing Accessories - Area Based On 2' Wide Sections (CCF / Month).....	125.37	
01 54 23 00-0016	LF Aluminum Joists (LF / Month)	11.12	
01 54 23 00-0017	LF Aluminum Stringers (LF / Month)	15.94	
01 54 23 00-0018	EA Screw Jack With U-Plate For Stringers (EA / Month).....	20.09	

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 54	Construction Aids



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 54 23 00-0019 Heavy Duty Masonry Scaffolding Erection And Dismantling - Labor Only (01 54 23 00-0001)
 Note: Includes both initial erection and final dismantling. Excludes lifting equipment. The unit of measure is the volume of scaffolding erected. See CSI section 01 54 23 00-0013 for scaffolding rental.

01 54 23 00-0020	CCF	Up To 20' Height Heavy Duty Masonry Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories.....	84.09
01 54 23 00-0021	CCF	>20' To 40' Height Heavy Duty Masonry Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories.....	105.11
01 54 23 00-0022	CCF	>40' To 60' Height Heavy Duty Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories.....	126.14
01 54 23 00-0023	CCF	>60' To 80' Height Heavy Duty Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories.....	136.65
01 54 23 00-0024	CCF	>80' Height Heavy Duty Scaffolding Initial Erection And Final Dismantling, Per CCF Of Scaffolding And Accessories.....	152.42

01 54 23 00-0025 Scaffolding Accessories (01 54 23 00-0001)
 See CSI section 01 54 23 00-0019 for erection.

01 54 23 00-0026	CSF	Netting for Exterior Building Scaffolding.....	40.25
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Note: Includes removal after use.

01 54 23 00-0027 Rolling Scaffolding (01 54 23)
 Note: Includes moving and relocating scaffolding on site. Excludes initial erection and final dismantling of scaffold.

01 54 23 00-0028	DAY	>14' To 20', Rolling Scaffolding, Complete With Wheels, Railings, Etc., (5' Wide X 7' Long Section).....	11.65
01 54 23 00-0029	WK	>14' To 20', Rolling Scaffolding, Complete With Wheels, Railings, Etc., (5' Wide X 7' Long Section).....	46.69
01 54 23 00-0030	MO	>14' To 20', Rolling Scaffolding, Complete With Wheels, Railings, Etc., (5' Wide X 7' Long Section).....	186.74
01 54 23 00-0031	DAY	>20' To 40', Rolling Scaffolding, Complete With Wheels, Railings, Etc., (5' Wide X 7' Long Section).....	19.50
01 54 23 00-0032	WK	>20' To 40', Rolling Scaffolding, Complete With Wheels, Railings, Etc., (5' Wide X 7' Long Section).....	78.12
01 54 23 00-0033	MO	>20' To 40', Rolling Scaffolding, Complete With Wheels, Railings, Etc., (5' Wide X 7' Long Section).....	312.52
01 54 23 00-0034	EA	>14' To 20', Rolling Scaffolding Initial Erection And Final Dismantling For Each Scaffold.....	121.44
01 54 23 00-0035	EA	>20' To 40', Rolling Scaffolding Initial Erection And Final Dismantling For Each Scaffold.....	151.79

01 54 23 00-0036 Shoring Posts (01 54 23)

01 54 23 00-0037	DAY	6'-6" To 11' Extension, 5,000 LB Capacity, Steel Shoring Post.....	2.09
01 54 23 00-0038	WK	6'-6" To 11' Extension, 5,000 LB Capacity, Steel Shoring Post.....	8.35
01 54 23 00-0039	MO	6'-6" To 11' Extension, 5,000 LB Capacity, Steel Shoring Post.....	25.06
01 54 23 00-0040	EA	Initial Erection And Final Dismantling For Each Shoring Post.....	9.72

For >20 To 50, Deduct -1.46
For >50 To 100, Deduct -3.40
For >100, Deduct -5.35

01 54 23 00-0041 Temporary Lumber, Single Use (01 54 23)
 Note: Includes removal after use.

01 54 23 00-0042	SF	5/16" CD Grade Plywood, Temporary Lumber.....	2.41
01 54 23 00-0043	SF	1/2" CD Grade Plywood, Temporary Lumber.....	2.76
01 54 23 00-0044	SF	5/8" CD Grade Plywood, Temporary Lumber.....	3.08
01 54 23 00-0045	SF	3/4" CD Grade Plywood, Temporary Lumber.....	3.42
01 54 23 00-0046	SF	1" CD Grade Plywood, Temporary Lumber.....	5.12
01 54 23 00-0047	LF	2" x 4" Temporary Lumber.....	3.08
01 54 23 00-0048	LF	2" x 6" Temporary Lumber.....	3.93
01 54 23 00-0049	LF	2" x 8" Temporary Lumber.....	4.77
01 54 23 00-0050	LF	2" x 10" Temporary Lumber.....	5.63
01 54 23 00-0051	LF	2" x 12" Temporary Lumber.....	6.48
01 54 23 00-0052	LF	3" x 8" Temporary Lumber.....	6.48
01 54 23 00-0053	LF	3" x 10" Temporary Lumber.....	7.76
01 54 23 00-0054	LF	3" x 12" Temporary Lumber.....	9.04
01 54 23 00-0055	LF	4" x 4" Temporary Lumber.....	4.24
01 54 23 00-0056	LF	4" x 6" Temporary Lumber.....	6.13
01 54 23 00-0057	LF	6" x 6" Temporary Lumber.....	8.01
01 54 23 00-0058	LF	6" x 8" Temporary Lumber.....	10.42
01 54 23 00-0059	LF	12" x 12" Temporary Lumber.....	25.90

01 54 23 00-0060 Temporary Precast Concrete Blocks (01 54 23)
 Note: Includes removal after use.

01 54 23 00-0061	EA	2' x 2' x 2' Temporary Precast Concrete (Ecology) Block.....	128.78
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Note: Includes removal after use.

01 54 23 00-0062	EA	2' x 2' x 4' Temporary Precast Concrete (Ecology) Block.....	160.98
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Note: Includes removal after use.

01 54 23 00-0063	EA	2' x 2' x 8' Temporary Precast Concrete (Ecology) Block.....	211.42
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Note: Includes removal after use.

01 54 26 Temporary Swing Staging (01 54)
 Note: Up to one month rental. Includes connection to existing electrical outlet on roof, all necessary safety equipment for personnel and anchoring to existing roof anchors. Excludes installing roof anchors.



General Requirements	01	
Temporary Facilities and Controls	01 50	5
Construction Aids	01 54	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 54 26 00-0001	Swing Stage <small>(01 54 26)</small>		
	Note: Up to one month rental. Includes connection to existing electrical outlet on roof, and all necessary safety equipment for personnel. Excludes installing roof anchors.		
01 54 26 00-0002	MO 7' Swing Stage, Electric Operated	3,005.64	
01 54 26 00-0003	MO 10' Swing Stage, Electric Operated	3,155.92	
01 54 26 00-0004	MO 14' Swing Stage, Electric Operated	3,306.20	
01 54 26 00-0005	MO 20' Swing Stage, Electric Operated	3,456.49	
01 54 26 00-0006	MO 24' Swing Stage, Electric Operated	3,606.77	
01 54 26 00-0007	MO 30' Swing Stage, Electric Operated	3,757.05	
01 54 26 00-0008	MO 42' Swing Stage, Electric Operated	3,907.33	
01 54 26 00-0009	MO 12' Swing Stage, Manually Operated	866.71	
01 54 26 00-0010	MO 24' Swing Stage, Manually Operated	1,083.38	
01 54 26 00-0011	EA Swing Stage Platform From Hooks, Erection And Dismantling	5,176.72	
	Note: Includes both initial erection and final dismantling of platform. Excludes anchors or temporary roof mounted outrigger system.		
01 54 26 00-0012	EA Swing Stage Platform And Temporary Roof Mounted Outrigger System Erection And Dismantling	7,193.93	
	Note: Includes both initial erection and final dismantling of temporary roof mounted outrigger system.		
01 54 26 00-0013	EA Move Swing Stage Platform From Hooks To Different Location At Same Roof	2,722.03	
01 54 26 00-0014	EA Move Swing Stage Platform and Temporary Roof Mounted Outrigger System To Different Location At Same Roof	3,791.40	

01 55 Vehicular Access and Parking (01 50)

01 55 23 Temporary Roads (01 55)

01 55 23 00-0001	Temporary Stabilized Construction Entrance <small>(01 55 23)</small>		
	Note: As per Caltrans detail.		
01 55 23 00-0002	SF 3" To 4" Rock Temporary Stabilized Construction Entrance Assembly	3.26	
	Note: Includes up to 12" excavation of pit, hauling and disposal of soil, filter fabric at base and sides, filled with rock, and compaction.		
01 55 23 00-0003	SF >4" To 6" Rock Temporary Stabilized Construction Entrance Assembly	4.26	
	Note: Includes up to 12" excavation of pit, hauling and disposal of soil, filter fabric at base and sides, filled with rock, and compaction.		

01 55 23 00-0004 Rumble Trench Plate (01 55 23)

01 55 23 00-0005	MO 8' x 10' Steel Rumble Trench Plate Rental	401.44	
01 55 23 00-0006	EA Placement And Removal Of Rumble Plate	103.21	
	Note: If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for rentals tasks, 01 71 13 00-0000 for mobilization tasks.		
01 55 23 00-0007	EA Relocate And Adjust Location Of Rumble Plate	25.80	
	Note: If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for rentals tasks, 01 71 13 00-0000 for mobilization tasks.		

01 55 23 00-0008 Temporary Road Ramps (Godwin) (01 55 23)

	Note: Excludes asphalt and gravel.		
01 55 23 00-0009	EA 4" Pipeline, 12' Passable Vehicle Width, Temporary Road Ramp (Godwin)	4,947.45	230.77
01 55 23 00-0010	EA 6" Pipeline, 12' Passable Vehicle Width, Temporary Road Ramp (Godwin)	6,738.54	346.15
01 55 23 00-0011	EA 8" Pipeline, 12' Passable Vehicle Width, Temporary Road Ramp (Godwin)	9,309.78	461.53
01 55 23 00-0012	EA 12" Pipeline, 12' Passable Vehicle Width, Temporary Road Ramp (Godwin)	19,292.54	576.92
01 55 23 00-0013	EA 24" Pipeline, 15' Passable Vehicle Width, Temporary Road Ramp (Godwin)	28,300.11	692.30

01 55 26 Traffic Control (01 55)

01 55 26 00-0001	Temporary Removable Preformed Traffic Black Line Mask <small>(01 55 26)</small>		
	Note: Includes installation and removal after use.		
01 55 26 00-0002	LF 6" Removable Traffic Black Line Mask	5.39	
01 55 26 00-0003	LF 8" Removable Traffic Black Line Mask	6.48	

01 55 26 00-0004 Temporary Preformed Traffic Line Tape (01 55 26)

	Note: Includes installation and removal after use.		
01 55 26 00-0005	LF 4" Reflective Removable Traffic Line Tape	5.45	
01 55 26 00-0006	LF 6" Reflective Removable Traffic Line Tape	7.38	
01 55 26 00-0007	LF 8" Reflective Removable Traffic Line Tape	9.23	

01 55 26 00-0008 Temporary Painted Traffic Lines (01 55 26)

	Note: Includes installation and removal after use.		
01 55 26 00-0009	LF 4" Temporary Painted Traffic Lines	2.42	
	<i>For Not Removed, Deduct</i>		
	-1.72		
01 55 26 00-0010	LF 6" Temporary Painted Traffic Lines	3.19	
	<i>For Not Removed, Deduct</i>		
	-2.31		
01 55 26 00-0011	LF 8" Temporary Painted Traffic Lines	4.00	
	<i>For Not Removed, Deduct</i>		
	-2.94		

01 55 26 00-0012 Temporary Pedestrian Traffic Control (01 55 26)

01 55 26 00-0013	CLF 1", 4 Mil Polyethylene Printed Barricade Tape, Fluorescent Orange	10.65	
01 55 26 00-0014	CLF 2", 4 Mil Polyethylene Printed Barricade Tape, Fluorescent Orange	13.72	

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 55	Vehicular Access and Parking



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 55 26 00-0015	CLF	3/4", 4 Mil Polyethylene Printed Barricade Tape, Fluorescent Yellow.....	8.65
01 55 26 00-0016	CLF	2", 4 Mil Polyethylene Printed Barricade Tape, Fluorescent Yellow.....	10.51
01 55 26 00-0017	CLF	3", 4 Mil Polyethylene Printed Barricade Tape, Non-Fluorescent.....	11.29
01 55 26 00-0018	CLF	6", 4 Mil Polyethylene Printed Barricade Tape, Non-Fluorescent.....	15.14
01 55 26 00-0019	CLF	1" Exterior Vinyl Tape (Warning Tape).....	12.37
01 55 26 00-0020	CLF	2" Exterior Vinyl Tape (Warning Tape).....	16.99
01 55 26 00-0021	CLF	3" Exterior Vinyl Tape (Warning Tape).....	20.91
01 55 26 00-0022	CLF	4" Exterior Vinyl Tape (Warning Tape).....	24.43

01 55 26 00-0023 Linear Delineation System, Temporary Or Permanent (01 55 26)

Note: High visibility reflective sheeting strips. Scotchlite as manufactured by 3M.

01 55 26 00-0024	LF	4" Linear Delineation System.....	11.51
01 55 26 00-0025	LF	6" Linear Delineation System.....	15.52

01 55 26 00-0026 Temporary Traffic Protection (01 55 26)

01 55 26 00-0027 Temporary Portable Traffic Control Device Usage (01 55 26 00-0026)

Note: Excludes placing and removing devices. See CSI section 01 55 26 00-0126 for delivery, placing and removal.

01 55 26 00-0028	DAY	28" Cone With Reflective Collar.....	0.86
01 55 26 00-0029	WK	28" Cone With Reflective Collar.....	2.59
01 55 26 00-0030	MO	28" Cone With Reflective Collar.....	7.76
01 55 26 00-0031	DAY	Vertical Panel.....	2.60
01 55 26 00-0032	WK	Vertical Panel.....	7.81
01 55 26 00-0033	MO	Vertical Panel.....	23.43
01 55 26 00-0034	DAY	Channelizer Drum.....	2.83
01 55 26 00-0035	WK	Channelizer Drum.....	8.48
01 55 26 00-0036	MO	Channelizer Drum.....	25.44
01 55 26 00-0037	DAY	Stackable Channelizer Panel.....	1.34
01 55 26 00-0038	WK	Stackable Channelizer Panel.....	4.01
01 55 26 00-0039	MO	Stackable Channelizer Panel.....	12.03
01 55 26 00-0040	DAY	Type I Barricade, Up To 3' Wide With Reflective Rail Each Side.....	1.85
01 55 26 00-0041	WK	Type I Barricade, Up To 3' Wide With Reflective Rail Each Side.....	5.55
01 55 26 00-0042	MO	Type I Barricade, Up To 3' Wide With Reflective Rail Each Side.....	16.66
01 55 26 00-0043	DAY	Type II Barricade, Up To 3' Wide With Two Reflective Rails Each Side.....	4.10
01 55 26 00-0044	WK	Type II Barricade, Up To 3' Wide With Two Reflective Rails Each Side.....	12.31
01 55 26 00-0045	MO	Type II Barricade, Up To 3' Wide With Two Reflective Rails Each Side.....	36.92
01 55 26 00-0046	DAY	Type III Barricade, Up To 5' Wide With Three Reflective Rails.....	4.68
01 55 26 00-0047	WK	Type III Barricade, Up To 5' Wide With Three Reflective Rails.....	14.03
01 55 26 00-0048	MO	Type III Barricade, Up To 5' Wide With Three Reflective Rails.....	42.08
01 55 26 00-0049	DAY	Type III Barricade, >5' To 10' Wide With Three Reflective Rails.....	8.55
01 55 26 00-0050	WK	Type III Barricade, >5' To 10' Wide With Three Reflective Rails.....	25.66
01 55 26 00-0051	MO	Type III Barricade, >5' To 10' Wide With Three Reflective Rails.....	76.97
01 55 26 00-0052	DAY	Up To 10' Wide A Frame Barricade.....	4.69
01 55 26 00-0053	WK	Up To 10' Wide A Frame Barricade.....	14.07
01 55 26 00-0054	MO	Up To 10' Wide A Frame Barricade.....	42.21
01 55 26 00-0055	DAY	Type A Or C Flasher.....	0.96
01 55 26 00-0056	WK	Type A Or C Flasher.....	2.87
01 55 26 00-0057	MO	Type A Or C Flasher.....	8.60
01 55 26 00-0058	DAY	Type B Flasher (High Intensity).....	5.19
01 55 26 00-0059	WK	Type B Flasher (High Intensity).....	15.56
01 55 26 00-0060	MO	Type B Flasher (High Intensity).....	46.67

01 55 26 00-0061 Temporary Traffic Barriers Usage (01 55 26 00-0026)

Note: Excludes placing and removing devices. See CSI section 01 55 26 00-0126 for delivery, placing and removal.

01 55 26 00-0062	DAY	6' Long Portable Parking Curbs.....	2.23
01 55 26 00-0063	WK	6' Long Portable Parking Curbs.....	6.70
01 55 26 00-0064	MO	6' Long Portable Parking Curbs.....	20.10
01 55 26 00-0065	DAY	6' Long Portable Speed Bumps.....	6.61
01 55 26 00-0066	WK	6' Long Portable Speed Bumps.....	19.83
01 55 26 00-0067	MO	6' Long Portable Speed Bumps.....	59.49
01 55 26 00-0068	DAY	Up To 12.5' Concrete Traffic Barrier.....	15.88
01 55 26 00-0069	WK	Up To 12.5' Concrete Traffic Barrier.....	47.64
01 55 26 00-0070	MO	Up To 12.5' Concrete Traffic Barrier.....	142.92
01 55 26 00-0071	DAY	>12.5' To 20' Concrete Traffic Barrier.....	31.76
01 55 26 00-0072	WK	>12.5' To 20' Concrete Traffic Barrier.....	95.28
01 55 26 00-0073	MO	>12.5' To 20' Concrete Traffic Barrier.....	285.85
01 55 26 00-0074	DAY	6' x 32" Tall Plastic Water Barrier.....	18.96
01 55 26 00-0075	WK	6' x 32" Tall Plastic Water Barrier.....	56.89
01 55 26 00-0076	MO	6' x 32" Tall Plastic Water Barrier.....	170.68
01 55 26 00-0077	DAY	6' x 46" Tall Plastic Water Barrier.....	27.08
01 55 26 00-0078	WK	6' x 46" Tall Plastic Water Barrier.....	81.24
01 55 26 00-0079	MO	6' x 46" Tall Plastic Water Barrier.....	243.71
01 55 26 00-0080	DAY	Sand Filled Crash Attenuator Barrels.....	10.60
01 55 26 00-0081	WK	Sand Filled Crash Attenuator Barrels.....	31.80
01 55 26 00-0082	MO	Sand Filled Crash Attenuator Barrels.....	95.39



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 55 26 00-0083

Temporary Portable Signs And Message Displays Usage (01 55 26 00-0026)

Note: Excludes placing and removing devices. See CSI section 01 55 26 00-0126 for delivery, placing and removal.

01 55 26 00-0084	DAY	Mesh Or Vinyl Roll-up Sign With Stand	8.32	
01 55 26 00-0085	WK	Mesh Or Vinyl Roll-up Sign With Stand	24.96	
01 55 26 00-0086	MO	Mesh Or Vinyl Roll-up Sign With Stand	74.89	
01 55 26 00-0087	DAY	18" x 18" Aluminum Construction Sign, With Portable Stand	4.24	
01 55 26 00-0088	WK	18" x 18" Aluminum Construction Sign, With Portable Stand	12.73	
01 55 26 00-0089	MO	18" x 18" Aluminum Construction Sign, With Portable Stand	38.19	
01 55 26 00-0090	DAY	30" x 24" Aluminum Construction Sign, With Portable Stand	5.16	
01 55 26 00-0091	WK	30" x 24" Aluminum Construction Sign, With Portable Stand	15.47	
01 55 26 00-0092	MO	30" x 24" Aluminum Construction Sign, With Portable Stand	46.40	
01 55 26 00-0093	DAY	30" x 30" Aluminum Construction Sign, With Portable Stand	4.78	
01 55 26 00-0094	WK	30" x 30" Aluminum Construction Sign, With Portable Stand	14.35	
01 55 26 00-0095	MO	30" x 30" Aluminum Construction Sign, With Portable Stand	43.04	
01 55 26 00-0096	DAY	48" x 18" Aluminum Construction Sign, With Portable Stand	5.46	
01 55 26 00-0097	WK	48" x 18" Aluminum Construction Sign, With Portable Stand	16.39	
01 55 26 00-0098	MO	48" x 18" Aluminum Construction Sign, With Portable Stand	49.16	
01 55 26 00-0099	DAY	48" x 24" Aluminum Construction Sign, With Portable Stand	6.07	
01 55 26 00-0100	WK	48" x 24" Aluminum Construction Sign, With Portable Stand	18.22	
01 55 26 00-0101	MO	48" x 24" Aluminum Construction Sign, With Portable Stand	54.67	
01 55 26 00-0102	DAY	48" x 30" Aluminum Construction Sign, With Portable Stand	6.69	
01 55 26 00-0103	WK	48" x 30" Aluminum Construction Sign, With Portable Stand	20.06	
01 55 26 00-0104	MO	48" x 30" Aluminum Construction Sign, With Portable Stand	60.18	
01 55 26 00-0105	DAY	60" x 24" Aluminum Construction Sign, With Portable Stand	10.31	
01 55 26 00-0106	WK	60" x 24" Aluminum Construction Sign, With Portable Stand	30.94	
01 55 26 00-0107	MO	60" x 24" Aluminum Construction Sign, With Portable Stand	92.81	
01 55 26 00-0108	DAY	60" x 30" Aluminum Construction Sign, With Portable Stand	11.08	
01 55 26 00-0109	WK	60" x 30" Aluminum Construction Sign, With Portable Stand	33.23	
01 55 26 00-0110	MO	60" x 30" Aluminum Construction Sign, With Portable Stand	99.70	
01 55 26 00-0111	DAY	60" x 36" Aluminum Construction Sign, With Portable Stand	11.84	
01 55 26 00-0112	WK	60" x 36" Aluminum Construction Sign, With Portable Stand	35.53	
01 55 26 00-0113	MO	60" x 36" Aluminum Construction Sign, With Portable Stand	106.59	
01 55 26 00-0114	DAY	Aluminum Sign And Post	4.14	
01 55 26 00-0115	WK	Aluminum Sign And Post	12.41	
01 55 26 00-0116	MO	Aluminum Sign And Post	37.22	
01 55 26 00-0117	DAY	Trailer Mounted Flashing Arrow Board	205.33	
01 55 26 00-0118	WK	Trailer Mounted Flashing Arrow Board	568.32	
01 55 26 00-0119	MO	Trailer Mounted Flashing Arrow Board	1,503.31	
01 55 26 00-0120	DAY	Trailer Mounted Portable Variable Message Sign (PVMS)	277.32	
01 55 26 00-0121	WK	Trailer Mounted Portable Variable Message Sign (PVMS)	739.52	
01 55 26 00-0122	MO	Trailer Mounted Portable Variable Message Sign (PVMS)	1,479.04	
01 55 26 00-0123	DAY	Two Head, Trailer Mounted Traffic Signal System (Set Of Two)	1,415.54	
		Note: Consists of a set of two communicating trailers. Each with two LED traffic light head, solar panels and a battery bank, mounted on a heavy-duty towable trailer.		
01 55 26 00-0124	WK	Two Head, Trailer Mounted Traffic Signal System (Set Of Two)	4,246.62	
		Note: Consists of a set of two communicating trailers. Each with two LED traffic light head, solar panels and a battery bank, mounted on a heavy-duty towable trailer.		
01 55 26 00-0125	MO	Two Head, Trailer Mounted Traffic Signal System (Set Of Two)	12,739.86	
		Note: Consists of a set of two communicating trailers. Each with two LED traffic light head, solar panels and a battery bank, mounted on a heavy-duty towable trailer.		

01 55 26 00-0126

Place And Remove Temporary Traffic Protection Using Truck (01 55 26 00-0026)

Note: Includes delivery and return up to 15 miles. See CSI section 01 74 19 00-0040 for delivery >15 miles.

01 55 26 00-0127	EA	Placement And Removal Of Up To 250 Cones Using Truck	4.06	
01 55 26 00-0128	EA	Placement And Removal Of >250 Cones Using Truck	3.55	
01 55 26 00-0129	EA	Placement And Removal Of Up To 250 Panels/Channelizers Using Truck	6.70	
01 55 26 00-0130	EA	Placement And Removal Of >250 Panels/Channelizers Using Truck	5.59	
01 55 26 00-0131	EA	Placement And Removal Of Up To 250 Barricades Using Truck	10.16	
01 55 26 00-0132	EA	Placement And Removal Of >250 Barricades Using Truck	8.13	
01 55 26 00-0133	EA	Placement And Removal Of Curbs/Speed Bumps Using Truck	10.16	
01 55 26 00-0134	EA	Placement And Removal Of Portable Sign And Stand Using Truck	6.10	
01 55 26 00-0135	EA	Placement And Removal Of Aluminum Sign And Post Using Truck	25.41	
01 55 26 00-0136	EA	Placement And Removal Of Trailer Mounted Boards And Signals Using Truck	76.21	
01 55 26 00-0137	EA	Placement And Removal Of Up To 12.5' Concrete Traffic Barrier	103.21	
		Note: If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for rentals tasks, 01 71 13 00-0000 for mobilization tasks.		
		For 1 Barrier, Add	258.03	
		For 2 Barriers, Add	92.89	
		For 3 Barriers, Add	30.96	
01 55 26 00-0138	EA	Placement And Removal Of >12.5' Concrete Traffic Barrier	154.82	
		Note: If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for rentals tasks, 01 71 13 00-0000 for mobilization tasks.		
		For 1 Barrier, Add	387.05	
		For 2 Barriers, Add	139.34	
		For 3 Barriers, Add	46.45	

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 55	Vehicular Access and Parking



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
01 55 26 00-0139	EA	Placement And Removal Of Plastic Water Barrier..... Note: Includes water. If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for Equipment Usage, 01 71 13 00-0000 for mobilization tasks.	58.86	
		<i>For 1 Barrier, Add</i>	129.03	
		<i>For 2 Barriers, Add</i>	46.45	
		<i>For 3 Barriers, Add</i>	15.48	
01 55 26 00-0140	EA	Placement And Removal Of Crash Attenuator Barrels..... Note: If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for rentals tasks, 01 71 13 00-0000 for mobilization tasks.	77.41	
		<i>For 1 Barrier, Add</i>	193.53	
		<i>For 2 Barriers, Add</i>	69.67	
		<i>For 3 Barriers, Add</i>	23.22	
01 55 26 00-0141		Place And Remove Temporary Traffic Protection From Roadside (Daily) <small>(01 55 26 00-0026)</small>		
01 55 26 00-0142	EA	Placement And Removal Of Up To 250 Cones By Hand From Roadside.....	2.54	
01 55 26 00-0143	EA	Placement And Removal Of >250 Cones By Hand From Roadside.....	2.03	
01 55 26 00-0144	EA	Placement And Removal Of Up To 250 Panels/Channelizers By Hand From Roadside.....	3.38	
01 55 26 00-0145	EA	Placement And Removal Of >250 Panels/Channelizers By Hand From Roadside.....	2.70	
01 55 26 00-0146	EA	Placement And Removal Of Up To 250 Barricades By Hand From Roadside.....	5.09	
01 55 26 00-0147	EA	Placement And Removal Of >250 Barricades By Hand From Roadside.....	4.06	
01 55 26 00-0148	EA	Placement And Removal Of Portable Sign And Stand From Roadside.....	3.11	
01 55 26 00-0149	EA	Placement And Removal Of Trailer Mounted Boards And Signals From Roadside.....	38.11	
01 55 26 00-0150	EA	Roadside Relocation Of Concrete Traffic Barrier..... Note: Excludes flatbed truck. If lifting equipment is not available on site, See CSI section 01 22 23 00-0000 for rental tasks, 01 71 13 00-0000 for mobilization.	51.61	
01 55 26 00-0151		Place And Remove Temporary Signs For Detours <small>(01 55 26 00-0026)</small>		
01 55 26 00-0152		Temporary ReflectORIZED Signs For Detours <small>(01 55 26 00-0151)</small> Note: Excludes posts.		
01 55 26 00-0153		Temporary Aluminum Engineer Grade Stop Signs For Detours <small>(01 55 26 00-0152)</small>		
01 55 26 00-0154	EA	Temporary 18" x 18" Aluminum Engineer Grade Stop Sign For Detours..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	88.79 6.95 13.21	
01 55 26 00-0155	EA	Temporary 18" x 24" Aluminum Engineer Grade Stop Sign For Detours..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	99.56 9.09 17.27	
01 55 26 00-0156	EA	Temporary 24" x 24" Aluminum Engineer Grade Stop Sign For Detours..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	106.79 13.89 22.02	
01 55 26 00-0157	EA	Temporary 30" x 30" Aluminum Engineer Grade Stop Sign For Detours..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	119.94 5.21 28.20	
01 55 26 00-0158	EA	Temporary 36" x 36" Aluminum Engineer Grade Stop Sign For Detours..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	149.72 15.29 47.97	
01 55 26 00-0159		Other Temporary ReflectORIZED Traffic Signs For Detours <small>(01 55 26 00-0152)</small> Note: Other traffic signs includes reserve, handicap, visitor, no parking, property, speed limit, tow away, ADA, parking time limit, parking exclusive area, school, traffic/caution, etc. Excludes posts.		
01 55 26 00-0160		Temporary Aluminum Engineer Grade Traffic Signs For Detours <small>(01 55 26 00-0159)</small>		
01 55 26 00-0161	EA	Temporary 6" x 12" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	64.07 1.72	
01 55 26 00-0162	EA	Temporary 6" x 18" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	66.94 2.58	
01 55 26 00-0163	EA	Temporary 9" x 12" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	66.94 2.58	
01 55 26 00-0164	EA	Temporary 9" x 15" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	69.09 3.23	
01 55 26 00-0165	EA	Temporary 9" x 18" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	71.25 3.88	
01 55 26 00-0166	EA	Temporary 9" x 24" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	79.19 5.17	
01 55 26 00-0167	EA	Temporary 9" x 48" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	96.41 10.33	
01 55 26 00-0168	EA	Temporary 12" x 12" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	69.81 3.44	
01 55 26 00-0169	EA	Temporary 12" x 18" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	79.19 5.17	
01 55 26 00-0170	EA	Temporary 12" x 24" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	84.93 6.89	
01 55 26 00-0171	EA	Temporary 12" x 30" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	90.67 8.61	
01 55 26 00-0172	EA	Temporary 12" x 36" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	96.41 10.33	
01 55 26 00-0173	EA	Temporary 18" x 18" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	87.80 7.75	
01 55 26 00-0174	EA	Temporary 18" x 24" Aluminum Engineer Grade Traffic Sign For Detours..... <i>For Hi-Intensity Grade, Add</i>	96.41 10.33	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 55 26 00-0175 EA Temporary 18" x 30" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	108.68 12.92	
01 55 26 00-0176 EA Temporary 18" x 36" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	117.29 15.50	
01 55 26 00-0177 EA Temporary 18" x 54" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	157.70 23.25	
01 55 26 00-0178 EA Temporary 24" x 24" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	111.55 13.78	
01 55 26 00-0179 EA Temporary 24" x 30" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	123.03 17.22	
01 55 26 00-0180 EA Temporary 24" x 36" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	134.51 20.67	
01 55 26 00-0181 EA Temporary 24" x 42" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	160.57 24.11	
01 55 26 00-0182 EA Temporary 24" x 48" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	172.05 27.56	
01 55 26 00-0183 EA Temporary 24" x 54" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	183.53 31.00	
01 55 26 00-0184 EA Temporary 30" x 30" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	137.38 21.53	
01 55 26 00-0185 EA Temporary 30" x 36" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	166.31 25.83	
01 55 26 00-0186 EA Temporary 30" x 42" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	180.66 30.14	
01 55 26 00-0187 EA Temporary 30" x 48" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	209.61 34.45	
01 55 26 00-0188 EA Temporary 30" x 60" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	252.88 43.06	
01 55 26 00-0189 EA Temporary 36" x 36" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	183.53 31.00	
01 55 26 00-0190 EA Temporary 36" x 42" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	215.35 36.17	
01 55 26 00-0191 EA Temporary 36" x 48" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	247.14 41.33	
01 55 26 00-0192 EA Temporary 36" x 54" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	264.36 46.50	
01 55 26 00-0193 EA Temporary 36" x 60" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	296.17 51.67	
01 55 26 00-0194 EA Temporary 36" x 73" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	348.07 62.86	
01 55 26 00-0195 EA Temporary 36" x 78" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	362.42 67.17	
01 55 26 00-0196 EA Temporary 36" x 108" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	470.41 93.00	
01 55 26 00-0197 EA Temporary 42" x 42" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	250.01 42.20	
01 55 26 00-0198 EA Temporary 48" x 48" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	307.66 55.11	
01 55 26 00-0199 EA Temporary 48" x 54" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	345.20 62.00	
01 55 26 00-0200 EA Temporary 48" x 60" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	368.16 68.89	
01 55 26 00-0201 EA Temporary 48" x 66" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	413.01 75.78	
01 55 26 00-0202 EA Temporary 48" x 72" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	435.97 82.67	
01 55 26 00-0203 EA Temporary 48" x 84" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	496.48 96.45	
01 55 26 00-0204 EA Temporary 48" x 96" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	542.40 110.22	
01 55 26 00-0205 EA Temporary 48" x 102" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	565.37 117.11	
01 55 26 00-0206 EA Temporary 48" x 108" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	595.62 124.00	
01 55 26 00-0207 EA Temporary 60" x 72" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	519.44 103.34	
01 55 26 00-0208 EA Temporary 78" x 96" Aluminum Engineer Grade Traffic Sign For Detours <i>For Hi-Intensity Grade, Add</i>	779.33 179.12	
01 55 26 00-0209 Temporary Overhead Sign Structures For Detours (01 55 26 00-0151) Note: Including horizontal Z-bars.		
01 55 26 00-0210 SF From 30 To 360 SF Signs For Temporary Overhead Sign Structures For Detours <i>For Over 10' High, Add</i>	22.50 13.00	
01 55 26 00-0211 Temporary Sign Posts For Detours (01 55 26 00-0151) Note: Excludes sign.		
01 55 26 00-0212 Temporary U-Channel Sign Posts For Detours (01 55 26 00-0211) Note: Excludes digging and concrete.		
01 55 26 00-0213 Temporary Baked Enamel U-Channel Sign Posts For Detours (01 55 26 00-0212)		
01 55 26 00-0214 EA Temporary 3' To 4' Baked Enamel U-Channel Sign Post Base For Detours	79.34	
01 55 26 00-0215 EA Temporary 6' Baked Enamel U-Channel Sign Post For Detours	102.28	

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 55	Vehicular Access and Parking



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
01 55 26 00-0216	EA	Temporary 7' Baked Enamel U-Channel Sign Post For Detours		122.34	
01 55 26 00-0217	EA	Temporary 8' Baked Enamel U-Channel Sign Post For Detours		143.06	
01 55 26 00-0218	EA	Temporary 10' Baked Enamel U-Channel Sign Post For Detours		173.02	
01 55 26 00-0219	EA	Temporary 12' Baked Enamel U-Channel Sign Post For Detours		183.65	
01 55 26 00-0220		Temporary Galvanized Steel U-Channel Sign Posts For Detours (01 55 26 00-0212)			
01 55 26 00-0221	EA	Temporary 3' To 4' Galvanized Steel U-Channel Sign Post Base For Detours.....		83.43	
01 55 26 00-0222	EA	Temporary 6' Galvanized Steel U-Channel Sign Post For Detours.....		108.77	
01 55 26 00-0223	EA	Temporary 7' Galvanized Steel U-Channel Sign Post For Detours.....		137.00	
01 55 26 00-0224	EA	Temporary 8' Galvanized Steel U-Channel Sign Post For Detours.....		159.27	
01 55 26 00-0225	EA	Temporary 10' Galvanized Steel U-Channel Sign Post For Detours.....		184.82	
01 55 26 00-0226	EA	Temporary 12' Galvanized Steel U-Channel Sign Post For Detours.....		193.91	
01 55 26 00-0227		Temporary Fiberglass Or Composite Plastic U-Channel Sign Posts For Detours (01 55 26 00-0212)			
01 55 26 00-0228	EA	Temporary 3' To 4' Fiberglass Or Composite Plastic U-Channel Sign Post Base For Detours.....		78.38	
01 55 26 00-0229	EA	Temporary 6' Fiberglass Or Composite Plastic U-Channel Sign Post For Detours.....		100.19	
01 55 26 00-0230	EA	Temporary 7' Fiberglass Or Composite Plastic U-Channel Sign Post For Detours.....		119.81	
01 55 26 00-0231	EA	Temporary 8' Fiberglass Or Composite Plastic U-Channel Sign Post For Detours.....		140.05	
01 55 26 00-0232	EA	Temporary 10' Fiberglass Or Composite Plastic U-Channel Sign Post For Detours.....		167.55	
01 55 26 00-0233	EA	Temporary 12' Fiberglass Or Composite Plastic U-Channel Sign Post For Detours.....		180.41	
01 55 26 00-0234		Temporary Tubular Sign Posts For Detours (01 55 26 00-0211)			
		Note: Excludes digging and concrete.			
01 55 26 00-0235		Temporary 2-3/8" Diameter, Galvanized Steel Tubular Sign Post For Detours (01 55 26 00-0234)			
01 55 26 00-0236	EA	Temporary 6', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post For Detours.....		109.44	
01 55 26 00-0237	EA	Temporary 7', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post For Detours.....		130.34	
01 55 26 00-0238	EA	Temporary 8', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post For Detours.....		153.33	
01 55 26 00-0239	EA	Temporary 10', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post For Detours.....		193.69	
01 55 26 00-0240	EA	Temporary 12', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post For Detours.....		207.30	
01 55 26 00-0241		Temporary Square Sign Posts For Detours (01 55 26 00-0211)			
		Note: Excludes digging and concrete.			
01 55 26 00-0242		Temporary Galvanized Steel Square Sign Posts For Detours (01 55 26 00-0241)			
01 55 26 00-0243	EA	Temporary 3' To 4' Galvanized Steel Square Sign Post Base For Detours		84.34	
01 55 26 00-0244	EA	Temporary 6' Galvanized Steel Square Sign Post For Detours		124.12	
01 55 26 00-0245	EA	Temporary 7' Galvanized Steel Square Sign Post For Detours		146.55	
01 55 26 00-0246	EA	Temporary 8' Galvanized Steel Square Sign Post For Detours		170.96	
01 55 26 00-0247	EA	Temporary 10' Galvanized Steel Square Sign Post For Detours		208.40	
01 55 26 00-0248	EA	Temporary 12' Galvanized Steel Square Sign Post For Detours		223.62	
01 55 26 00-0249		Temporary Breakaway Sign Posts And Bases For Detours (01 55 26 00-0151)			
		Note: For breakaway post systems, base posts are driven in, sign posts bolted to base post using lap splice hardware kit. Excludes sign.			
01 55 26 00-0250		Temporary 2.5 LB/LF Breakaway Sign Posts And Base Posts For Detours (01 55 26 00-0249)			
01 55 26 00-0251		Temporary Base Posts, 2.5 LB/LF, For Breakaway Sign Posts For Detours (01 55 26 00-0250)			
01 55 26 00-0252	EA	Temporary Base Post for 2.5 LB/LF, Breakaway Sign Post For Detours.....		108.17	
01 55 26 00-0253	EA	Temporary Lap Splice Hardware For 2.5 LB/LF, Breakaway Sign Post For Detours.....		66.86	
01 55 26 00-0254		Temporary Breakaway Sign Posts, 2.5 LB/LF For Detours (01 55 26 00-0250)			
01 55 26 00-0255	LF	Temporary Breakaway Sign Post, 2.5 LB/LF For Detours		12.36	
01 55 26 00-0256		Temporary 4 LB/LF Breakaway Sign Posts And Base Posts For Detours (01 55 26 00-0249)			
01 55 26 00-0257		Temporary Base Posts, 4 LB/LF, For Breakaway Sign Posts For Detours (01 55 26 00-0256)			
01 55 26 00-0258	EA	Temporary Base Post for 4 LB/LF, Breakaway Sign Post For Detours.....		111.55	
01 55 26 00-0259	EA	Temporary Lap Splice Hardware for 4 LB/LF, Breakaway Sign Post For Detours.....		66.86	
01 55 26 00-0260		Temporary Breakaway Sign Posts, 4 LB/LF For Detours (01 55 26 00-0256)			
01 55 26 00-0261	LF	Temporary Breakaway Sign Post, 4 LB/LF For Detours		14.45	
01 55 26 00-0262		Temporary Driven Sign Posts For Detours (01 55 26 00-0249)			
01 55 26 00-0263		Temporary Driven Posts, 2.5 LB/LF For Detours (01 55 26 00-0262)			
01 55 26 00-0264	LF	Temporary Driven Post, 2.5 LB/LF For Detours.....		14.30	
		For Each Soil Plate, Add		3.00	



General Requirements	01	10
Temporary Facilities and Controls	01 50	
Vehicular Access and Parking	01 55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 55 26 00-0265	Temporary Driven Posts, 4 LB/LF For Detours <small>(01 55 26 00-0262)</small>	
01 55 26 00-0266	LF Temporary Driven Post, 4 LB/LF For Detours..... <i>For Each Soil Plate, Add</i>	17.37 3.00

01 55 26 00-0267 Temporary Omni-Directional Breakaway System For Sign Posts And Light Poles For Detours (01 55 26 00-0249)

01 55 26 00-0268	Temporary Omni-Directional Breakaway Systems For Signs For Detours <small>(01 55 26 00-0267)</small>	
	Note: Break-Safe as manufactured by Transpo Industries. Organized by post type and size. Includes hinges, anchors, all associated parts and drilling.	
01 55 26 00-0269	EA Temporary Omni-Directional Breakaway System For 6" To 8" Wide Flange (Transpo B525)	1,167.83
01 55 26 00-0270	EA Temporary Omni-Directional Breakaway System For 10" To 21" Wide Flange (Transpo B650)	1,244.53
01 55 26 00-0271	EA Temporary Omni-Directional Breakaway System For Standard I Beam Or W6x9 Flange (Transpo A14 And A16)	853.19
01 55 26 00-0272	EA Temporary Omni-Directional Breakaway System For 3" To 4.5" Outside Diameter Pipe (Transpo A3 And A4.5).....	747.27
01 55 26 00-0273	EA Temporary Omni-Directional Breakaway System For Square Tube (Transpo AS3 And AS4).....	847.31
01 55 26 00-0274	EA Temporary Omni-Directional Breakaway System For U-Channels (Transpo AU4 To AU6)	806.11
01 55 26 00-0275	EA Temporary Omni-Directional Breakaway System For U-Channels Embedded (Transpo AUX4 To AUX6)	751.02

01 55 26 00-0276 Temporary Omni-Directional Breakaway Systems For Poles For Detours (01 55 26 00-0267)

	Note: Pole-Safe As Manufactured By Transpo Industries. Organized by bolt size. Includes four couplings, all associated parts, drilling and can be for new or for retro-fitting existing poles.	
01 55 26 00-0277	EA Temporary Omni-Directional Breakaway System For Poles With 5/8" Couplings.....	421.72
01 55 26 00-0278	EA Temporary Omni-Directional Breakaway System For Poles With 3/4" Couplings.....	442.19
01 55 26 00-0279	EA Temporary Omni-Directional Breakaway System For Poles With 1" Couplings.....	459.17
01 55 26 00-0280	EA Temporary Omni-Directional Breakaway System For Poles With 1 1/4" Couplings.....	697.20
01 55 26 00-0281	EA Temporary Skirt For Omni-Directional Breakaway System For Poles With Bolt Circle Diameter Of 10" To Less Than 15"	61.22
01 55 26 00-0282	EA Temporary Skirt For Omni-Directional Breakaway System For Poles With Bolt Circle Diameter Of 15" To 20"	81.63

01 55 26 00-0283 Temporary Rumble Strips (01 55 26)

	Note: Includes removal after use.	
01 55 26 00-0284	LF 1/4" High, 4" Wide, Polymer Tape Temporary Rumble Strip.....	13.71
01 55 26 00-0285	LF 1/2" High, 3-1/2" Wide, Polycarbonate Temporary Rumble Strip.....	9.90

01 56 Temporary Barriers and Enclosures (01 50)

Note: Includes removal after use.

01 56 16 Temporary Dust Barriers (01 56)

01 56 16 00-0001	Temporary Sheeting For Protection <small>(01 56 16)</small>	
	Note: Includes removal after use.	
01 56 16 00-0002	SF 6 Mil, Plastic Sheeting, Applied To Floors	0.41
	Note: Includes removal after use.	
01 56 16 00-0003	SF 6 Mil, Plastic Sheeting, Applied To Walls.....	0.53
	Note: Includes removal after use.	
01 56 16 00-0004	SF 6 Mil, Plastic Sheeting, Applied To Ceilings.....	0.70
	Note: Includes removal after use.	
01 56 16 00-0005	SF 6 Mil, Plastic Sheeting, Applied To Scaffolding.....	0.69
	Note: Includes removal after use.	
01 56 16 00-0006	SF 6 Mil, Fire Retardant, Plastic Sheeting, Applied To Floors.....	0.49
	Note: Includes removal after use.	
01 56 16 00-0007	SF 6 Mil, Fire Retardant, Plastic Sheeting, Applied To Walls.....	0.61
	Note: Includes removal after use.	
01 56 16 00-0008	SF 6 Mil, Fire Retardant, Plastic Sheeting, Applied To Ceilings.....	0.78
	Note: Includes removal after use.	
01 56 16 00-0009	SF 6 Mil, Fire Retardant, Plastic Sheeting, Applied To Scaffolding.....	0.73
	Note: Includes removal after use.	
01 56 16 00-0010	SF 10 Mil, Fire Retardant, Reinforced, Plastic Sheeting, Applied To Scaffolding.....	0.93
	Note: Includes removal after use.	
01 56 16 00-0011	SF 6 Mil, Fire Retardant, Anti-static, Plastic Sheeting, Applied To Floors.....	0.51
	Note: Includes removal after use.	
01 56 16 00-0012	SF 6 Mil, Fire Retardant, Anti-static, Plastic Sheeting, Applied To Walls	0.63
	Note: Includes removal after use.	
01 56 16 00-0013	SF 6 Mil, Fire Retardant, Anti-static, Plastic Sheeting, Applied To Ceilings	0.80
	Note: Includes removal after use.	
01 56 16 00-0014	SF 6 Mil, Fire Retardant, Anti-static, Plastic Sheeting, Applied To Scaffolding	0.75
	Note: Includes removal after use.	
01 56 16 00-0015	SF 6 Mil, Reinforced, Plastic Sheeting, Applied To Floors	0.51
	Note: Includes removal after use.	
01 56 16 00-0016	SF 6 Mil, Reinforced, Plastic Sheeting, Applied To Walls	0.63
	Note: Includes removal after use.	
01 56 16 00-0017	SF 6 Mil, Reinforced, Plastic Sheeting, Applied To Ceilings	0.80
	Note: Includes removal after use.	
01 56 16 00-0018	SF 6 Mil, Reinforced, Plastic Sheeting, Applied To Scaffolding	0.75
	Note: Includes removal after use.	

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 56	Temporary Barriers and Enclosures



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
01 56 16 00-0019	SF	6 Mil, Fire Retardant, Reinforced, Plastic Sheeting, Applied To Floors Note: Includes removal after use.		0.57	
01 56 16 00-0020	SF	6 Mil, Fire Retardant, Reinforced, Plastic Sheeting, Applied To Walls..... Note: Includes removal after use.		0.69	
01 56 16 00-0021	SF	6 Mil, Fire Retardant, Reinforced, Plastic Sheeting, Applied To Ceilings..... Note: Includes removal after use.		0.86	
01 56 16 00-0022	SF	6 Mil, Fire Retardant, Reinforced, Plastic Sheeting, Applied To Scaffolding..... Note: Includes removal after use.		0.81	
01 56 16 00-0023		Temporary Stud Wall <small>(01 56 16)</small> Note: Includes removal after use.			
01 56 16 00-0024		Temporary Stud Wall With Drywall <small>(01 56 16 00-0023)</small> Note: Includes 2 x 4 wood studs installed 16" on center, single bottom and top plate, appropriate fastening devices, drywall taped and finished and removal after use. Excludes paint.			
01 56 16 00-0025		Temporary Stud Wall With Drywall <small>(01 56 16 00-0024)</small>			
01 56 16 00-0026	SF	3/8" Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		5.98	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0027	SF	1/2" Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		5.98	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0028	SF	5/8" Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		6.11	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0029	SF	3/8" Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		8.40	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0030	SF	1/2" Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		8.40	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0031	SF	5/8" Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		8.67	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0032		Temporary Stud Wall With Fire Rated Drywall <small>(01 56 16 00-0024)</small>			
01 56 16 00-0033	SF	1/2" Type C Fire Rated Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		6.13	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0034	SF	5/8" Type C Fire Rated Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		6.18	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0035	SF	5/8" Type X Fire Rated Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use.		6.10	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0036	SF	3/4" Fire Rated (Sheetrock® Ultracode®) Gypsum Board On One Side, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		7.15	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0037	SF	1/2" Type C Fire Rated Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		8.71	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0038	SF	5/8" Type C Fire Rated Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		8.80	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0039	SF	5/8" Type X Fire Rated Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		8.64	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0040	SF	3/4" Fire Rated (Sheetrock® Ultracode®) Gypsum Board On Both Sides, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		10.74	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	
01 56 16 00-0041		Temporary Stud Wall With Oriented Strand Board (OSB) <small>(01 56 16 00-0023)</small> Note: Includes 2 x 4 wood studs installed 16" on center, single bottom and top plate, appropriate fastening devices, oriented strand board (OSB) wall sheathing, and removal after use. Excludes paint.			
01 56 16 00-0042	SF	7/16" Oriented Strand Board (OSB) Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		5.78	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0043	SF	1/2" Oriented Strand Board (OSB) Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		5.83	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0044	SF	5/8" Oriented Strand Board (OSB) Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		5.98	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0045	SF	3/4" Oriented Strand Board (OSB) Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		6.07	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.81	
01 56 16 00-0046	SF	7/16" Oriented Strand Board (OSB) Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center..... Note: Includes removal after use.		8.00	
		<i>For Metal Studs 24" On Center, Add/Deduct</i>		0.90	



General Requirements		01
Temporary Facilities and Controls		01 50
Temporary Barriers and Enclosures		01 56

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 56 16 00-0047	SF		1/2" Oriented Strand Board (OSB) Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	8.11 0.90	
01 56 16 00-0048	SF		5/8" Oriented Strand Board (OSB) Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	8.41 0.90	
01 56 16 00-0049	SF		3/4" Oriented Strand Board (OSB) Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	8.57 0.90	
01 56 16 00-0050			Temporary Stud Wall With BC Plywood <small>(01 56 16 00-0023)</small> Note: Includes 2 x 4 wood studs installed 16" on center, single bottom and top plate, appropriate fastening devices, interior/exterior BC plywood wall sheathing, and removal after use. Excludes paint.		
01 56 16 00-0051	SF		3/8" BC Plywood Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	6.14 0.81	
01 56 16 00-0052	SF		1/2" BC Plywood Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	6.34 0.81	
01 56 16 00-0053	SF		5/8" BC Plywood Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	6.59 0.81	
01 56 16 00-0054	SF		3/4" BC Plywood Wall Sheathing On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	6.76 0.81	
01 56 16 00-0055	SF		3/8" BC Plywood Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	8.72 0.90	
01 56 16 00-0056	SF		1/2" BC Plywood Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	9.12 0.90	
01 56 16 00-0057	SF		5/8" BC Plywood Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	9.62 0.90	
01 56 16 00-0058	SF		3/4" BC Plywood Wall Sheathing On Both Sides, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	9.96 0.90	
01 56 16 00-0059			Temporary Stud Wall With Plastic Sheeting <small>(01 56 16 00-0023)</small> Note: Includes 2 x 4 wood studs installed 16" on center, single bottom and top plate, appropriate fastening devices, 6 Mil plastic sheeting, and removal after use.		
01 56 16 00-0060	SF		6 Mil, Plastic Sheeting On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	3.32 0.71	
01 56 16 00-0061	SF		6 Mil, Fire Retardant, Plastic Sheeting On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	3.40 0.71	
01 56 16 00-0062	SF		6 Mil, Fire Retardant, Anti-static, Plastic Sheeting On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	3.43 0.71	
01 56 16 00-0063	SF		6 Mil, Reinforced, Plastic Sheeting On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	3.42 0.71	
01 56 16 00-0064	SF		6 Mil, Fire Retardant, Reinforced, Plastic Sheeting On One Side, Temporary Wood Stud Wall, 16" On Center Note: Includes removal after use. <i>For Metal Studs 24" On Center, Add/Deduct</i>	3.49 0.71	
01 56 16 00-0065			Temporary Doors <small>(01 56 16 00-0023)</small> Note: For temporary stud walls. Includes removal after use.		
01 56 16 00-0066	EA		Temporary Metal Door And Frame Note: Painted with panic hardware, lockset, threshold and smoke seals. Remove after use.	564.68	
01 56 16 00-0067			Temporary Floor Protection <small>(01 56 16)</small> Note: Includes removal after use.		
01 56 16 00-0068	SF		1/8" Thick, Masonite For Temporary Floor Protection..... Note: Includes removal after use.	1.66	
01 56 16 00-0069	SF		1/2" Thick, Plywood For Temporary Floor Protection..... Note: Includes removal after use.	1.69	
01 56 16 00-0070	SF		3/4" Thick, Plywood For Temporary Floor Protection..... Note: Includes removal after use.	2.00	
01 56 16 00-0071	LF		38" Wide, 46 Mil Fiberboard, Ram Board® For Temporary Floor Protection..... Note: Includes removal after use.	1.07	
01 56 16 00-0072	LF		36" Wide, 9 Mil, Regular Weight Red Rosin Paper, For Temporary Floor Protection Note: Includes removal after use.	0.36	
01 56 16 00-0073	CSF		3 Mil, Temporary Self-adhesive Carpet Protection Film..... Note: Includes removal after use.	27.80	
01 56 16 00-0074			Sticky Mats <small>(01 56 16)</small> Note: Includes removal after use.		

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 56	Temporary Barriers and Enclosures



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 56 16 00-0075	EA		18" x 36", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	37.98	24.84
01 56 16 00-0076	EA		18" x 46", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	43.50	28.98
01 56 16 00-0077	EA		24" x 36", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	43.50	28.98
01 56 16 00-0078	EA		25" x 45", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	57.30	39.33
01 56 16 00-0079	EA		36" x 36", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	62.82	43.47
01 56 16 00-0080	EA		36" x 46", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	68.34	47.61
01 56 16 00-0081	EA		36" x 60", 30 Layer Sticky Mat Note: Includes removal after use. <i>For 60 Layers Instead Of 30, Add</i>	137.34	99.36
01 56 16 00-0082	EA		36" x 72", 30 Layer Sticky Mat Note: Includes removal after use.	163.83	

01 56 26 Temporary Fencing (01 56)

01 56 26 00-0001			Temporary Fencing (01 56 26) Note: Per ASTM A392-06 Standards		
01 56 26 00-0002			Temporary Chain Link Fence (01 56 26 00-0001) Note: Includes delivery, set-up (driving posts) and removal. Excludes auguring/drilling for posts. See CSI section 02 41 19 13-0080 for core drilling in asphalt or concrete, 32 31 13 13-0001 for augering and backfill of posts.		
01 56 26 00-0003			Temporary Chain Link Fence, Up To 6 Months (01 56 26 00-0002)		
01 56 26 00-0004	LF		Temporary 4' High Chain Link Fence And Posts, Up To 6 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	7.27	-0.17 -0.34 -0.51 1.60
01 56 26 00-0005	LF		Temporary 6' High Chain Link Fence And Posts, Up To 6 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	8.09	-0.19 -0.38 -0.57 2.55
01 56 26 00-0006	LF		Temporary 8' High Chain Link Fence And Posts, Up To 6 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	11.12	-0.32 -0.65 -0.97 3.60
01 56 26 00-0007	LF		Temporary 10' High Chain Link Fence And Posts, Up To 6 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	24.32	-0.96 -1.92 -2.87 4.75
01 56 26 00-0008			Temporary Chain Link Fence, >6 To 12 Months (01 56 26 00-0002)		
01 56 26 00-0009	LF		Temporary 4' High Chain Link Fence And Posts, >6 To 12 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	7.62	-0.19 -0.37 -0.56 1.60
01 56 26 00-0010	LF		Temporary 6' High Chain Link Fence And Posts, >6 To 12 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	8.46	-0.21 -0.42 -0.63 2.55
01 56 26 00-0011	LF		Temporary 8' High Chain Link Fence And Posts, >6 To 12 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	11.75	-0.35 -0.71 -1.06 3.60
01 56 26 00-0012	LF		Temporary 10' High Chain Link Fence And Posts, >6 To 12 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	26.23	-1.05 -2.11 -3.16 4.75
01 56 26 00-0013			Temporary Chain Link Fence, >12 To 18 Months (01 56 26 00-0002)		
01 56 26 00-0014	LF		Temporary 4' High Chain Link Fence And Posts, >12 To 18 Months <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i> <i>For Each LF Shade Cloth, Add</i>	7.99	-0.21 -0.41 -0.62 1.60



General Requirements		01
Temporary Facilities and Controls		01 50
Temporary Barriers and Enclosures		01 56

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 56 26 00-0015	LF		Temporary 6' High Chain Link Fence And Posts, >12 To 18 Months	8.89	
			<i>For >100 To 250, Deduct</i>	-0.23	
			<i>For >250 To 500, Deduct</i>	-0.46	
			<i>For >500, Deduct</i>	-0.69	
			<i>For Each LF Shade Cloth, Add</i>	2.55	
01 56 26 00-0016	LF		Temporary 8' High Chain Link Fence And Posts, >12 To 18 Months	12.47	
			<i>For >100 To 250, Deduct</i>	-0.39	
			<i>For >250 To 500, Deduct</i>	-0.78	
			<i>For >500, Deduct</i>	-1.17	
			<i>For Each LF Shade Cloth, Add</i>	3.60	
01 56 26 00-0017	LF		Temporary 10' High Chain Link Fence And Posts, >12 To 18 Months	28.34	
			<i>For >100 To 250, Deduct</i>	-1.16	
			<i>For >250 To 500, Deduct</i>	-2.32	
			<i>For >500, Deduct</i>	-3.48	
			<i>For Each LF Shade Cloth, Add</i>	4.75	
01 56 26 00-0018			Temporary Chain Link Fence, >18 Months (01 56 26 00-0002)		
01 56 26 00-0019	LF		Temporary 4' High Chain Link Fence And Posts, >18 Months	8.40	
			<i>For >100 To 250, Deduct</i>	-0.23	
			<i>For >250 To 500, Deduct</i>	-0.45	
			<i>For >500, Deduct</i>	-0.68	
			<i>For Each LF Shade Cloth, Add</i>	1.60	
01 56 26 00-0020	LF		Temporary 6' High Chain Link Fence And Posts, >18 Months	9.33	
			<i>For >100 To 250, Deduct</i>	-0.25	
			<i>For >250 To 500, Deduct</i>	-0.51	
			<i>For >500, Deduct</i>	-0.76	
			<i>For Each LF Shade Cloth, Add</i>	2.55	
01 56 26 00-0021	LF		Temporary 8' High Chain Link Fence And Posts, >18 Months	13.24	
			<i>For >100 To 250, Deduct</i>	-0.43	
			<i>For >250 To 500, Deduct</i>	-0.86	
			<i>For >500, Deduct</i>	-1.29	
			<i>For Each LF Shade Cloth, Add</i>	3.60	
01 56 26 00-0022	LF		Temporary 10' High Chain Link Fence And Posts, >18 Months.....	30.65	
			<i>For >100 To 250, Deduct</i>	-1.27	
			<i>For >250 To 500, Deduct</i>	-2.55	
			<i>For >500, Deduct</i>	-3.82	
			<i>For Each LF Shade Cloth, Add</i>	4.75	
01 56 26 00-0023			Temporary Chain Link Fence Gates (01 56 26 00-0001)		
			Note: Includes delivery, set-up (driving posts) and removal. Excludes auguring/drilling for posts. See CSI section 02 41 19 13-0080 for core drilling in asphalt or concrete, 32 31 13 13-0001 for augering and backfill of posts.		
01 56 26 00-0024			Temporary Chain Link Fence Gates, Up To 6 Months (01 56 26 00-0023)		
01 56 26 00-0025			4' High, Temporary Chain Link Fence Gates, Up To 6 Months (01 56 26 00-0024)		
01 56 26 00-0026	EA		4' Wide, 4' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	288.34	
			<i>For Each LF Shade Cloth, Add</i>	16.09	
01 56 26 00-0027	EA		10' Wide, 4' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	490.65	
			<i>For Each LF Shade Cloth, Add</i>	40.21	
01 56 26 00-0028	EA		12' Wide, 4' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	549.22	
			<i>For Each LF Shade Cloth, Add</i>	48.26	
01 56 26 00-0029	EA		15' Wide, 4' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	625.28	
			<i>For Each LF Shade Cloth, Add</i>	60.32	
01 56 26 00-0030	EA		20' Wide, 4' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	748.72	
			<i>For Each LF Shade Cloth, Add</i>	80.43	
01 56 26 00-0031	EA		24' Wide, 4' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	833.66	
			<i>For Each LF Shade Cloth, Add</i>	96.51	
01 56 26 00-0032			6' High, Temporary Chain Link Fence Gates, Up To 6 Months (01 56 26 00-0024)		
01 56 26 00-0033	EA		4' Wide, 6' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	308.82	
			<i>For Each LF Shade Cloth, Add</i>	25.64	
01 56 26 00-0034	EA		10' Wide, 6' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	530.18	
			<i>For Each LF Shade Cloth, Add</i>	64.09	
01 56 26 00-0035	EA		12' Wide, 6' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	594.80	
			<i>For Each LF Shade Cloth, Add</i>	76.91	
01 56 26 00-0036	EA		15' Wide, 6' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	689.60	
			<i>For Each LF Shade Cloth, Add</i>	96.13	
01 56 26 00-0037	EA		20' Wide, 6' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	833.43	
			<i>For Each LF Shade Cloth, Add</i>	128.18	
01 56 26 00-0038	EA		24' Wide, 6' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	946.28	
			<i>For Each LF Shade Cloth, Add</i>	153.81	
01 56 26 00-0039			8' High, Temporary Chain Link Fence Gates, Up To 6 Months (01 56 26 00-0024)		
01 56 26 00-0040	EA		4' Wide, 8' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	344.95	
			<i>For Each LF Shade Cloth, Add</i>	36.19	
01 56 26 00-0041	EA		10' Wide, 8' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	607.99	
			<i>For Shade Cloth, Add</i>	90.48	
01 56 26 00-0042	EA		12' Wide, 8' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	679.77	
			<i>For Shade Cloth, Add</i>	108.57	
01 56 26 00-0043	EA		15' Wide, 8' High, Temporary Chain Link Fence Gate, Up To 6 Months.....	778.38	
			<i>For Shade Cloth, Add</i>	135.72	

01	General Requirements
01 50	Temporary Facilities and Controls
01 56	Temporary Barriers and Enclosures



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 56 26 00-0044	EA 20' Wide, 8' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Shade Cloth, Add</i>	951.29 180.96
01 56 26 00-0045	EA 24' Wide, 8' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Shade Cloth, Add</i>	1,105.01 217.15
01 56 26 00-0046	10' High, Temporary Chain Link Fence Gates, Up To 6 Months <small>(01 56 26 00-0024)</small>	
01 56 26 00-0047	EA 4' Wide, 10' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Each LF Shade Cloth, Add</i>	417.68 47.75
01 56 26 00-0048	EA 10' Wide, 10' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Each LF Shade Cloth, Add</i>	728.65 119.38
01 56 26 00-0049	EA 12' Wide, 10' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Each LF Shade Cloth, Add</i>	816.32 143.26
01 56 26 00-0050	EA 15' Wide, 10' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Each LF Shade Cloth, Add</i>	933.36 179.07
01 56 26 00-0051	EA 20' Wide, 10' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Each LF Shade Cloth, Add</i>	1,140.98 238.76
01 56 26 00-0052	EA 24' Wide, 10' High, Temporary Chain Link Fence Gate, Up To 6 Months <i>For Each LF Shade Cloth, Add</i>	1,319.27 286.52
01 56 26 00-0053	Temporary Chain Link Fence Gates, >6 To 12 Months <small>(01 56 26 00-0023)</small>	
01 56 26 00-0054	4' High, Temporary Chain Link Fence Gates, >6 To 12 Months <small>(01 56 26 00-0053)</small>	
01 56 26 00-0055	EA 4' Wide, 4' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	299.11 16.09
01 56 26 00-0056	EA 10' Wide, 4' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	507.40 40.21
01 56 26 00-0057	EA 12' Wide, 4' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	568.37 48.26
01 56 26 00-0058	EA 15' Wide, 4' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	646.82 60.32
01 56 26 00-0059	EA 20' Wide, 4' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	775.05 80.43
01 56 26 00-0060	EA 24' Wide, 4' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	862.38 96.51
01 56 26 00-0061	6' High, Temporary Chain Link Fence Gates, >6 To 12 Months <small>(01 56 26 00-0053)</small>	
01 56 26 00-0062	EA 4' Wide, 6' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	320.08 25.64
01 56 26 00-0063	EA 10' Wide, 6' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	547.70 64.09
01 56 26 00-0064	EA 12' Wide, 6' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	614.82 76.91
01 56 26 00-0065	EA 15' Wide, 6' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	712.12 96.13
01 56 26 00-0066	EA 20' Wide, 6' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	860.96 128.18
01 56 26 00-0067	EA 24' Wide, 6' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	976.30 153.81
01 56 26 00-0068	8' High, Temporary Chain Link Fence Gates, >6 To 12 Months <small>(01 56 26 00-0053)</small>	
01 56 26 00-0069	EA 4' Wide, 8' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	357.34 36.19
01 56 26 00-0070	EA 10' Wide, 8' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Shade Cloth, Add</i>	627.26 90.48
01 56 26 00-0071	EA 12' Wide, 8' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Shade Cloth, Add</i>	701.79 108.57
01 56 26 00-0072	EA 15' Wide, 8' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Shade Cloth, Add</i>	803.15 135.72
01 56 26 00-0073	EA 20' Wide, 8' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Shade Cloth, Add</i>	981.56 180.96
01 56 26 00-0074	EA 24' Wide, 8' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Shade Cloth, Add</i>	1,138.04 217.15
01 56 26 00-0075	10' High, Temporary Chain Link Fence Gates, >6 To 12 Months <small>(01 56 26 00-0053)</small>	
01 56 26 00-0076	EA 4' Wide, 10' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	433.17 47.75
01 56 26 00-0077	EA 10' Wide, 10' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	752.73 119.38
01 56 26 00-0078	EA 12' Wide, 10' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	843.85 143.26
01 56 26 00-0079	EA 15' Wide, 10' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	964.33 179.07
01 56 26 00-0080	EA 20' Wide, 10' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	1,178.83 238.76
01 56 26 00-0081	EA 24' Wide, 10' High, Temporary Chain Link Fence Gate, >6 To 12 Months <i>For Each LF Shade Cloth, Add</i>	1,360.56 286.52



General Requirements	01	10
Temporary Facilities and Controls	01 50	
Temporary Barriers and Enclosures	01 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 56 26 00-0082 Temporary Chain Link Fence Gates, >12 To 18 Months <small>(01 56 26 00-0023)</small>		
01 56 26 00-0083 4' High, Temporary Chain Link Fence Gates, >12 To 18 Months <small>(01 56 26 00-0082)</small>		
01 56 26 00-0084 EA 4' Wide, 4' High, Temporary Chain Link Fence Gate, >12 To 18 Months	310.42	
For Each LF Shade Cloth, Add	16.09	
01 56 26 00-0085 EA 10' Wide, 4' High, Temporary Chain Link Fence Gate, >12 To 18 Months	525.00	
For Each LF Shade Cloth, Add	40.21	
01 56 26 00-0086 EA 12' Wide, 4' High, Temporary Chain Link Fence Gate, >12 To 18 Months	588.47	
For Each LF Shade Cloth, Add	48.26	
01 56 26 00-0087 EA 15' Wide, 4' High, Temporary Chain Link Fence Gate, >12 To 18 Months	669.44	
For Each LF Shade Cloth, Add	60.32	
01 56 26 00-0088 EA 20' Wide, 4' High, Temporary Chain Link Fence Gate, >12 To 18 Months	802.70	
For Each LF Shade Cloth, Add	80.43	
01 56 26 00-0089 EA 24' Wide, 4' High, Temporary Chain Link Fence Gate, >12 To 18 Months	892.54	
For Each LF Shade Cloth, Add	96.51	
01 56 26 00-0090 6' High, Temporary Chain Link Fence Gates, >12 To 18 Months <small>(01 56 26 00-0082)</small>		
01 56 26 00-0091 EA 4' Wide, 6' High, Temporary Chain Link Fence Gate, >12 To 18 Months	331.91	
For Each LF Shade Cloth, Add	25.64	
01 56 26 00-0092 EA 10' Wide, 6' High, Temporary Chain Link Fence Gate, >12 To 18 Months	566.09	
For Each LF Shade Cloth, Add	64.09	
01 56 26 00-0093 EA 12' Wide, 6' High, Temporary Chain Link Fence Gate, >12 To 18 Months	635.84	
For Each LF Shade Cloth, Add	76.91	
01 56 26 00-0094 EA 15' Wide, 6' High, Temporary Chain Link Fence Gate, >12 To 18 Months	735.77	
For Each LF Shade Cloth, Add	96.13	
01 56 26 00-0095 EA 20' Wide, 6' High, Temporary Chain Link Fence Gate, >12 To 18 Months	889.86	
For Each LF Shade Cloth, Add	128.18	
01 56 26 00-0096 EA 24' Wide, 6' High, Temporary Chain Link Fence Gate, >12 To 18 Months	1,007.83	
For Each LF Shade Cloth, Add	153.81	
01 56 26 00-0097 8' High, Temporary Chain Link Fence Gates, >12 To 18 Months <small>(01 56 26 00-0082)</small>		
01 56 26 00-0098 EA 4' Wide, 8' High, Temporary Chain Link Fence Gate, >12 To 18 Months	370.34	
For Each LF Shade Cloth, Add	36.19	
01 56 26 00-0099 EA 10' Wide, 8' High, Temporary Chain Link Fence Gate, >12 To 18 Months	647.49	
For Shade Cloth, Add	90.48	
01 56 26 00-0100 EA 12' Wide, 8' High, Temporary Chain Link Fence Gate, >12 To 18 Months	724.91	
For Shade Cloth, Add	108.57	
01 56 26 00-0101 EA 15' Wide, 8' High, Temporary Chain Link Fence Gate, >12 To 18 Months	829.17	
For Shade Cloth, Add	135.72	
01 56 26 00-0102 EA 20' Wide, 8' High, Temporary Chain Link Fence Gate, >12 To 18 Months	1,013.36	
For Shade Cloth, Add	180.96	
01 56 26 00-0103 EA 24' Wide, 8' High, Temporary Chain Link Fence Gate, >12 To 18 Months	1,172.72	
For Shade Cloth, Add	217.15	
01 56 26 00-0104 10' High, Temporary Chain Link Fence Gates, >12 To 18 Months <small>(01 56 26 00-0082)</small>		
01 56 26 00-0105 EA 4' Wide, 10' High, Temporary Chain Link Fence Gate, >12 To 18 Months	449.43	
For Each LF Shade Cloth, Add	47.75	
01 56 26 00-0106 EA 10' Wide, 10' High, Temporary Chain Link Fence Gate, >12 To 18 Months	778.02	
For Each LF Shade Cloth, Add	119.38	
01 56 26 00-0107 EA 12' Wide, 10' High, Temporary Chain Link Fence Gate, >12 To 18 Months	872.75	
For Each LF Shade Cloth, Add	143.26	
01 56 26 00-0108 EA 15' Wide, 10' High, Temporary Chain Link Fence Gate, >12 To 18 Months	996.84	
For Each LF Shade Cloth, Add	179.07	
01 56 26 00-0109 EA 20' Wide, 10' High, Temporary Chain Link Fence Gate, >12 To 18 Months	1,218.57	
For Each LF Shade Cloth, Add	238.76	
01 56 26 00-0110 EA 24' Wide, 10' High, Temporary Chain Link Fence Gate, >12 To 18 Months	1,403.91	
For Each LF Shade Cloth, Add	286.52	
01 56 26 00-0111 Temporary Chain Link Fence Gates, >18 Months <small>(01 56 26 00-0023)</small>		
01 56 26 00-0112 4' High, Temporary Chain Link Fence Gates, >18 Months <small>(01 56 26 00-0111)</small>		
01 56 26 00-0113 EA 4' Wide, 4' High, Temporary Chain Link Fence Gate, >18 Months	321.73	
For Each LF Shade Cloth, Add	16.09	
01 56 26 00-0114 EA 10' Wide, 4' High, Temporary Chain Link Fence Gate, >18 Months	542.59	
For Each LF Shade Cloth, Add	40.21	
01 56 26 00-0115 EA 12' Wide, 4' High, Temporary Chain Link Fence Gate, >18 Months	608.58	
For Each LF Shade Cloth, Add	48.26	
01 56 26 00-0116 EA 15' Wide, 4' High, Temporary Chain Link Fence Gate, >18 Months	692.06	
For Each LF Shade Cloth, Add	60.32	
01 56 26 00-0117 EA 20' Wide, 4' High, Temporary Chain Link Fence Gate, >18 Months	830.34	
For Each LF Shade Cloth, Add	80.43	
01 56 26 00-0118 EA 24' Wide, 4' High, Temporary Chain Link Fence Gate, >18 Months	922.70	
For Each LF Shade Cloth, Add	96.51	
01 56 26 00-0119 6' High, Temporary Chain Link Fence Gates, >18 Months <small>(01 56 26 00-0111)</small>		
01 56 26 00-0120 EA 4' Wide, 6' High, Temporary Chain Link Fence Gate, >18 Months	343.73	
For Each LF Shade Cloth, Add	25.64	

01	General Requirements
01 50	Temporary Facilities and Controls
01 56	Temporary Barriers and Enclosures



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 56 26 00-0121	EA		10' Wide, 6' High, Temporary Chain Link Fence Gate, >18 Months	584.48	
			<i>For Each LF Shade Cloth, Add</i>	64.09	
01 56 26 00-0122	EA		12' Wide, 6' High, Temporary Chain Link Fence Gate, >18 Months	656.86	
			<i>For Each LF Shade Cloth, Add</i>	76.91	
01 56 26 00-0123	EA		15' Wide, 6' High, Temporary Chain Link Fence Gate, >18 Months	759.41	
			<i>For Each LF Shade Cloth, Add</i>	96.13	
01 56 26 00-0124	EA		20' Wide, 6' High, Temporary Chain Link Fence Gate, >18 Months	918.76	
			<i>For Each LF Shade Cloth, Add</i>	128.18	
01 56 26 00-0125	EA		24' Wide, 6' High, Temporary Chain Link Fence Gate, >18 Months	1,039.36	
			<i>For Each LF Shade Cloth, Add</i>	153.81	
01 56 26 00-0126			8' High, Temporary Chain Link Fence Gates, >18 Months <small>(01 56 26 00-0111)</small>		
01 56 26 00-0127	EA		4' Wide, 8' High, Temporary Chain Link Fence Gate, >18 Months	383.35	
			<i>For Each LF Shade Cloth, Add</i>	36.19	
01 56 26 00-0128	EA		10' Wide, 8' High, Temporary Chain Link Fence Gate, >18 Months	667.73	
			<i>For Shade Cloth, Add</i>	90.48	
01 56 26 00-0129	EA		12' Wide, 8' High, Temporary Chain Link Fence Gate, >18 Months	748.03	
			<i>For Shade Cloth, Add</i>	108.57	
01 56 26 00-0130	EA		15' Wide, 8' High, Temporary Chain Link Fence Gate, >18 Months	855.18	
			<i>For Shade Cloth, Add</i>	135.72	
01 56 26 00-0131	EA		20' Wide, 8' High, Temporary Chain Link Fence Gate, >18 Months	1,045.15	
			<i>For Shade Cloth, Add</i>	180.96	
01 56 26 00-0132	EA		24' Wide, 8' High, Temporary Chain Link Fence Gate, >18 Months	1,207.41	
			<i>For Shade Cloth, Add</i>	217.15	
01 56 26 00-0133			10' High, Temporary Chain Link Fence Gates, >18 Months <small>(01 56 26 00-0111)</small>		
01 56 26 00-0134	EA		4' Wide, 10' High, Temporary Chain Link Fence Gate, >18 Months	465.68	
			<i>For Each LF Shade Cloth, Add</i>	47.75	
01 56 26 00-0135	EA		10' Wide, 10' High, Temporary Chain Link Fence Gate, >18 Months	803.31	
			<i>For Each LF Shade Cloth, Add</i>	119.38	
01 56 26 00-0136	EA		12' Wide, 10' High, Temporary Chain Link Fence Gate, >18 Months	901.65	
			<i>For Each LF Shade Cloth, Add</i>	143.26	
01 56 26 00-0137	EA		15' Wide, 10' High, Temporary Chain Link Fence Gate, >18 Months	1,029.36	
			<i>For Each LF Shade Cloth, Add</i>	179.07	
01 56 26 00-0138	EA		20' Wide, 10' High, Temporary Chain Link Fence Gate, >18 Months	1,258.31	
			<i>For Each LF Shade Cloth, Add</i>	238.76	
01 56 26 00-0139	EA		24' Wide, 10' High, Temporary Chain Link Fence Gate, >18 Months	1,447.27	
			<i>For Each LF Shade Cloth, Add</i>	286.52	
01 56 26 00-0140			Temporary Chain Link Fence Panels (Portable) <small>(01 56 26 00-0001)</small>		
			Note: Includes delivery, set-up and removal. Excludes sandbags.		
01 56 26 00-0141			Temporary Chain Link Fence Panels (Portable), Up To 6 Months <small>(01 56 26 00-0140)</small>		
01 56 26 00-0142	LF		Temporary 4' High Chain Link Fence Panels (Portable), Up To 6 Months	7.94	
			<i>For >100 To 250, Deduct</i>	-0.20	
			<i>For >250 To 500, Deduct</i>	-0.41	
			<i>For >500, Deduct</i>	-0.61	
			<i>For Each LF Shade Cloth, Add</i>	1.60	
01 56 26 00-0143	LF		Temporary 6' High Chain Link Fence Panels (Portable), Up To 6 Months	8.81	
			<i>For >100 To 250, Deduct</i>	-0.23	
			<i>For >250 To 500, Deduct</i>	-0.45	
			<i>For >500, Deduct</i>	-0.68	
			<i>For Each LF Shade Cloth, Add</i>	2.55	
01 56 26 00-0144	LF		Temporary 8' High Chain Link Fence Panels (Portable), Up To 6 Months	11.98	
			<i>For >100 To 250, Deduct</i>	-0.37	
			<i>For >250 To 500, Deduct</i>	-0.73	
			<i>For >500, Deduct</i>	-1.10	
			<i>For Each LF Shade Cloth, Add</i>	3.60	
01 56 26 00-0145			Temporary Chain Link Fence Panels (Portable), >6 To 12 Months <small>(01 56 26 00-0140)</small>		
01 56 26 00-0146	LF		Temporary 4' High Chain Link Fence Panels (Portable), >6 To 12 Months	8.28	
			<i>For >100 To 250, Deduct</i>	-0.22	
			<i>For >250 To 500, Deduct</i>	-0.44	
			<i>For >500, Deduct</i>	-0.66	
			<i>For Each LF Shade Cloth, Add</i>	1.60	
01 56 26 00-0147	LF		Temporary 6' High Chain Link Fence Panels (Portable), >6 To 12 Months	9.18	
			<i>For >100 To 250, Deduct</i>	-0.25	
			<i>For >250 To 500, Deduct</i>	-0.49	
			<i>For >500, Deduct</i>	-0.74	
			<i>For Each LF Shade Cloth, Add</i>	2.55	
01 56 26 00-0148	LF		Temporary 8' High Chain Link Fence Panels (Portable), >6 To 12 Months	12.62	
			<i>For >100 To 250, Deduct</i>	-0.40	
			<i>For >250 To 500, Deduct</i>	-0.80	
			<i>For >500, Deduct</i>	-1.19	
			<i>For Each LF Shade Cloth, Add</i>	3.60	
01 56 26 00-0149			Temporary Chain Link Fence Panels (Portable), >12 To 18 Months <small>(01 56 26 00-0140)</small>		



General Requirements	01	
Temporary Facilities and Controls	01 50	10
Temporary Barriers and Enclosures	01 56	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 56 26 00-0150	LF		Temporary 4' High Chain Link Fence Panels (Portable), >12 To 18 Months	8.63	
			<i>For >100 To 250, Deduct</i>	-0.24	
			<i>For >250 To 500, Deduct</i>	-0.47	
			<i>For >500, Deduct</i>	-0.71	
			<i>For Each LF Shade Cloth, Add</i>	1.60	
01 56 26 00-0151	LF		Temporary 6' High Chain Link Fence Panels (Portable), >12 To 18 Months	9.62	
			<i>For >100 To 250, Deduct</i>	-0.27	
			<i>For >250 To 500, Deduct</i>	-0.54	
			<i>For >500, Deduct</i>	-0.80	
			<i>For Each LF Shade Cloth, Add</i>	2.55	
01 56 26 00-0152	LF		Temporary 8' High Chain Link Fence Panels (Portable), >12 To 18 Months	13.34	
			<i>For >100 To 250, Deduct</i>	-0.43	
			<i>For >250 To 500, Deduct</i>	-0.87	
			<i>For >500, Deduct</i>	-1.30	
			<i>For Each LF Shade Cloth, Add</i>	3.60	
01 56 26 00-0153			Temporary Chain Link Fence Panels (Portable), >18 Months (01 56 26 00-0140)		
01 56 26 00-0154	LF		Temporary 4' High Chain Link Fence Panels (Portable), >18 Months	9.06	
			<i>For >100 To 250, Deduct</i>	-0.26	
			<i>For >250 To 500, Deduct</i>	-0.52	
			<i>For >500, Deduct</i>	-0.78	
			<i>For Each LF Shade Cloth, Add</i>	1.60	
01 56 26 00-0155	LF		Temporary 6' High Chain Link Fence Panels (Portable), >18 Months	10.05	
			<i>For >100 To 250, Deduct</i>	-0.29	
			<i>For >250 To 500, Deduct</i>	-0.58	
			<i>For >500, Deduct</i>	-0.87	
			<i>For Each LF Shade Cloth, Add</i>	2.55	
01 56 26 00-0156	LF		Temporary 8' High Chain Link Fence Panels (Portable), >18 Months	14.09	
			<i>For >100 To 250, Deduct</i>	-0.47	
			<i>For >250 To 500, Deduct</i>	-0.94	
			<i>For >500, Deduct</i>	-1.41	
			<i>For Each LF Shade Cloth, Add</i>	3.60	
01 56 26 00-0157			Temporary Chain Link Fence Panels (Portable) Sandbags (01 56 26 00-0140)		
01 56 26 00-0158	BAG		Temporary Chain Link Fence Panels (Portable) Sandbag	7.35	
			Note: Includes placement and removal.		
01 56 26 00-0159			Relocate Chain Link Fence, Gates And Panels (01 56 26 00-0001)		
			Note: Excludes auguring/drilling for posts.		
01 56 26 00-0160			Relocate Temporary Chain Link Fence On Site (01 56 26 00-0159)		
01 56 26 00-0161	LF		Relocate Temporary 4' High Chain Link Fence And Posts	3.48	
01 56 26 00-0162	LF		Relocate Temporary 6' High Chain Link Fence And Posts	5.21	
01 56 26 00-0163	LF		Relocate Temporary 8' High Chain Link Fence And Posts	7.53	
01 56 26 00-0164	LF		Relocate Temporary 10' High Chain Link Fence And Posts	9.27	
01 56 26 00-0165			Relocate Temporary Chain Link Fence Panels On Site (01 56 26 00-0159)		
01 56 26 00-0166	LF		Relocate Temporary 4' High Chain Link Fence Panel, Self Standing	0.97	
01 56 26 00-0167	LF		Relocate Temporary 6' High Chain Link Fence Panel, Self Standing	1.16	
01 56 26 00-0168	LF		Relocate Temporary 8' High Chain Link Fence Panel, Self Standing	1.31	
01 56 26 00-0169			Relocate Temporary Chain Link Gates On Site (01 56 26 00-0159)		
01 56 26 00-0170	EA		Relocate Temporary 4' High Chain Link Vehicle Gate And Posts	126.36	
01 56 26 00-0171	EA		Relocate Temporary 6' High Chain Link Vehicle Gate And Posts	145.80	
01 56 26 00-0172	EA		Relocate Temporary 8' High Chain Link Vehicle Gate And Posts	179.83	
01 56 26 00-0173	EA		Relocate Temporary 10' High Chain Link Vehicle Gate And Posts	194.41	
01 56 26 00-0174			Temporary Rail And Timber Structure (01 56 26)		
01 56 26 00-0175	LF		4' High Temporary Rail And Timber Structure	232.63	
			Note: Includes steel posts, rails and plates, excavation, concrete, forming, finish, backfill and creosoted planking with 2" gaps		
01 56 26 00-0176	LF		6' High Temporary Rail And Timber Structure	331.70	
			Note: Includes steel posts, rails and plates, excavation, concrete, forming, finish, backfill and creosoted planking with 2" gaps		
01 56 26 00-0177	LF		8' High Temporary Rail And Timber Structure	430.78	
			Note: Includes steel posts, rails and plates, excavation, concrete, forming, finish, backfill and creosoted planking with 2" gaps		
01 56 26 00-0178	LF		10' High Temporary Rail And Timber Structure	550.23	
			Note: Includes steel posts, rails and plates, excavation, concrete, forming, finish, backfill and creosoted planking with 2" gaps		
01 56 26 00-0179	LF		12' High Temporary Rail And Timber Structure	639.57	
			Note: Includes steel posts, rails and plates, excavation, concrete, forming, finish, backfill and creosoted planking with 2" gaps		
01 56 26 00-0180	LF		15' High Temporary Rail And Timber Structure	733.79	
			Note: Includes steel posts, rails and plates, excavation, concrete, forming, finish, backfill and creosoted planking with 2" gaps		

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 56	Temporary Barriers and Enclosures



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 56 26 00-0181	Temporary Safety Fence <small>(01 56 26)</small>		
	Note: Includes removal after use.		
01 56 26 00-0182	LF 48" High With Posts At 8' On Center, Plastic Mesh Temporary Safety Fence		3.63

01 56 29 Temporary Protective Walkways (01 56)

01 56 29 00-0001	Temporary Sidewalk Bridge Protection <small>(01 56 29)</small>		
01 56 29 00-0002	Installation of Sidewalk Bridge <small>(01 56 29 00-0001)</small>		
01 56 29 00-0003	LF Installation of Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		168.19
	Note: Includes spanning openings, planking and parapet, lighting, up to 8' wide, up to 8' high, 2 post system.		
	<i>For 3 Post System, Add</i>		6.00
	<i>For Each Additional Foot Over 8' Wide, Add</i>		3.00
	<i>For Each Additional Foot Over 8' High, Add</i>		2.00
01 56 29 00-0004	LF Installation of Netting for Sidewalk Bridge.....		4.28

01 56 29 00-0005 Monthly Rental of Sidewalk Bridge (01 56 29 00-0001)

01 56 29 00-0006	LF Monthly Rental Of Up To 8' Wide And 8' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		15.04
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		2.26
01 56 29 00-0007	LF Monthly Rental Of Up To 8' Wide, 8' - 12' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		16.94
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		2.54
01 56 29 00-0008	LF Monthly Rental Of Up To 8' Wide, Over 12' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		18.82
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		2.82
01 56 29 00-0009	LF Monthly Rental Of 8' - 12' Wide And 8' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		18.82
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		2.82
01 56 29 00-0010	LF Monthly Rental Of 8' - 12' Wide, 8' - 12' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		20.68
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		3.10
01 56 29 00-0011	LF Monthly Rental Of 8' - 12' Wide, Over 12' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		24.48
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		3.67
01 56 29 00-0012	LF Monthly Rental Of Over 12' Wide And 8' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		22.60
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		3.39
01 56 29 00-0013	LF Monthly Rental Of Over 12' Wide, 8' - 12' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		26.36
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		3.95
01 56 29 00-0014	LF Monthly Rental Of Over 12' Wide, Over 12' High, 2 Post System, Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		28.20
	Note: Includes spanning openings, planking and parapet, lighting and maintenance.		
	<i>For 3 Post System, Add</i>		4.23
01 56 29 00-0015	LF Monthly Rental of Netting for Sidewalk Bridge.....		2.82

01 56 29 00-0016 Removal of Sidewalk Bridge (01 56 29 00-0001)

01 56 29 00-0017	LF Removal Of Heavy Duty Steel Post And Beam Sidewalk Bridge Assembly		35.01
	Note: Includes spanning openings, planking and parapet, lighting, up to 8' wide, up to 8' high, 2 post system.		
	<i>For 3 Post System, Add</i>		2.50
	<i>For Each Additional Foot Over 8' Wide, Add</i>		1.25
	<i>For Each Additional Foot Over 8' High, Add</i>		0.75
01 56 29 00-0018	LF Removal Of Netting For Sidewalk Bridge.....		2.14

01 56 29 00-0019 Temporary Safety Nets (01 56 29)

01 56 29 00-0020	SF Small Mesh Debris Netting		2.31
	Note: Includes 3" molded plastic base plates, plastic cable ties, and 1/4", 7x9 aircraft cable tied off to structure, not including anchors.		

01 56 33 Temporary Security Barriers (01 56)

01 56 33 00-0001	Board-up Opening With Plywood <small>(01 56 33)</small>		
	Note: For use where directed by owner for boarding up door and window openings.		
01 56 33 00-0002	OPNG Removal Of Protective Barrier To Allow Work In Building, Reseal At End Of Day, Per Opening Per Day.....		14.59
01 56 33 00-0003	SF 5/8" Thick Plywood, 2" x 4" Wood Stud Framing And Fasteners, For Board-Up Opening		8.06
01 56 33 00-0004	SF 3/4" Thick Plywood, 2" x 4" Wood Stud Framing And Fasteners, For Board-Up Opening		9.33



General Requirements	01	10
Temporary Facilities and Controls	01 50	
Temporary Barriers and Enclosures	01 56	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
01 56 33 00-0005		Temporary Pedestrian Barricade (01 56 33)			
		Note: Portable, interlocking galvanized steel fence with pivoting legs.			
01 56 33 00-0006	DAY	3-1/2' x 7-1/2' Galvanized Steel Pedestrian Barricade, Rental.....	14.05		
01 56 33 00-0007	WK	3-1/2' x 7-1/2' Galvanized Steel Pedestrian Barricade, Rental.....	34.12		
01 56 33 00-0008	MO	3-1/2' x 7-1/2' Galvanized Steel Pedestrian Barricade, Rental.....	102.37		
01 56 33 00-0009		Vacant Property Security (01 56 33)			
01 56 33 00-0010	SF	14 Gauge Perforated Steel Security Window Panel With Back Bar Frame	70.22		7.53
		Note: Includes fasteners for securing frame to structure and security fasteners for securing screen to frame.			
01 56 39		Temporary Tree and Plant Protection (01 56)			
01 56 39 00-0001		Temporary Tree Guards (01 56 39)			
		Note: Includes digging holes and removal after use.			
01 56 39 00-0002	EA	Up To 4' x 4' Temporary Tree Guard, 2" x 4" Wood Stud Framing Construction, 4 Uprights Set In Earth 2' Deep, With Double Rail.....	209.00		
01 56 39 00-0003	EA	4' x 4' Temporary Tree Guard, 2" x 4" Wood Stud Framing Construction, 4 Uprights Set In Earth 2' Deep, With Double Rail	247.09		
01 56 39 00-0004	EA	6' x 6' Temporary Tree Guard, 2" x 4" Wood Stud Framing Construction, 4 Uprights Set In Earth 2' Deep, With Double Rail	268.39		
01 57		Temporary Controls (01 50)			
01 57 13		Temporary Erosion and Sediment Control (01 57)			
		See CSI section 31 25 00 00-0000 for temporary erosion and sediment control.			
01 57 23		Temporary Storm Water Pollution Control (01 57)			
		See CSI section 31 25 00 00-0000 for temporary storm water pollution control.			
01 57 23 00-0001		Temporary Drain Guard (01 57 23)			
		Note: Includes removal after use.			
01 57 23 00-0002	EA	36" x 48" x 18" Non-Woven Polypropylene Trash and Debris Drain Guard (Ultra-Drain Guard® 9227).....	111.93		
01 57 23 00-0003	EA	36" x 48" x 18" Non-Woven Polypropylene Oil and Sediment Drain Guard (Ultra-Drain Guard® 9217).....	109.86		
		Note: Up to 0.87 gallons oil, up to 40 lbs sediment.			
01 57 23 00-0004	EA	36" x 48" x 18" Non-Woven Polypropylene Oil and Sediment Drain Guard (Ultra-Drain Guard® 9219).....	138.95		
		Note: Up to 1.38 gallons oil, up to 40 lbs sediment.			
01 57 23 00-0005	EA	60" x 60" x 18" Non-Woven Polypropylene Oil and Sediment Drain Guard (Ultra-Drain Guard® 9356).....	136.86		
		Note: Up to 1.55 gallons oil, up to 40 lbs sediment.			
01 57 23 00-0006	EA	60" x 60" x 18" Non-Woven Polypropylene Oil and Sediment Drain Guard (Ultra-Drain Guard® 9358).....	168.03		
		Note: Up to 2.06 gallons oil, up to 40 lbs sediment.			
01 58		Project Identification (01 50)			
		Note: Includes removal after use.			
01 58 13		Temporary Project Signage (01 58)			
01 58 13 00-0001		Project Sign (01 58 13)			
01 58 13 00-0002		MDO Plywood Signs (01 58 13 00-0001)			
		Note: Excludes posts.			
01 58 13 00-0003		Reflectorized, MDO Plywood Signs (01 58 13 00-0002)			
01 58 13 00-0004		Engineer Grade, Reflectorized, MDO Plywood Signs (01 58 13 00-0003)			
01 58 13 00-0005	EA	Up To 8 SF, One Or Two Color Design, Engineer Grade, Reflectorized, MDO Plywood Sign	177.88		26.74
		For High-Intensity Grade, Add	43.54		
		For Diamond Grade, Add	83.98		
01 58 13 00-0006	EA	>8 To 16 SF, One Or Two Color Design, Engineer Grade, Reflectorized, MDO Plywood Sign.....	304.73		27.95
		For High-Intensity Grade, Add	87.09		
		For Diamond Grade, Add	167.96		
01 58 13 00-0007	EA	>16 To 24 SF, One Or Two Color Design, Engineer Grade, Reflectorized, MDO Plywood Sign.....	431.57		29.16
		For High-Intensity Grade, Add	130.63		
		For Diamond Grade, Add	251.94		
01 58 13 00-0008	EA	>24 To 32 SF, One Or Two Color Design, Engineer Grade, Reflectorized, MDO Plywood Sign.....	558.42		30.38
		For High-Intensity Grade, Add	174.18		
		For Diamond Grade, Add	335.92		
01 58 13 00-0009	SF	>32 SF, One Or Two Color Design, Engineer Grade, Reflectorized, MDO Plywood Sign	17.50		0.97
		For High-Intensity Grade, Add	5.44		
		For Diamond Grade, Add	10.50		
01 58 13 00-0010		Non-Reflectorized, MDO Plywood Signs (01 58 13 00-0002)			
01 58 13 00-0011		One Or Two Color Design, Non-Reflectorized, MDO Plywood Signs (01 58 13 00-0010)			
01 58 13 00-0012	EA	Up To 8 SF, One Or Two Color Design, Non-Reflectorized, MDO Plywood Sign.....	222.27		26.74
01 58 13 00-0013	EA	>8 To 16 SF, One Or Two Color Design, Non-Reflectorized, MDO Plywood Sign	264.99		27.95
01 58 13 00-0014	EA	>16 To 24 SF, One Or Two Color Design, Non-Reflectorized, MDO Plywood Sign	331.67		29.16
01 58 13 00-0015	EA	>24 To 32 SF, One Or Two Color Design, Non-Reflectorized, MDO Plywood Sign	394.64		30.38
01 58 13 00-0016	SF	>32 SF, One Or Two Color Design, Non-Reflectorized, MDO Plywood Sign	12.38		0.97

01	01	General Requirements
	01 50	Temporary Facilities and Controls
	01 58	Project Identification



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 58 13 00-0017	Full Color Design, Non-Reflectorized, MDO Plywood Signs <small>(01 58 13 00-0010)</small>		
01 58 13 00-0018	EA Up To 8 SF, Full Color Design, Non-Reflectorized, MDO Plywood Sign.....	227.02	26.74
01 58 13 00-0019	EA >8 To 16 SF, Full Color Design, Non-Reflectorized, MDO Plywood Sign.....	290.60	27.95
01 58 13 00-0020	EA >16 To 24 SF, Full Color Design, Non-Reflectorized, MDO Plywood Sign.....	357.70	29.16
01 58 13 00-0021	EA >24 To 32 SF, Full Color Design, Non-Reflectorized, MDO Plywood Sign.....	416.95	30.38
01 58 13 00-0022	SF >32 SF, Full Color Design, Non-Reflectorized, MDO Plywood Sign.....	13.08	0.97
01 58 13 00-0023	Fabricate And Install New Posts <small>(01 58 13 00-0001)</small>		
	Note: Includes excavation, backfill and compaction. Excludes core drilling.		
01 58 13 00-0024	LF Galvanized Metal Channel Sign Posts.....	15.42	
01 58 13 00-0025	LF 4" x 4" Pressure Treated Wood Sign Posts.....	12.33	
01 58 13 00-0026	LF 4" x 6" Pressure Treated Wood Sign Posts.....	15.24	
01 58 13 00-0027	Owner Supplied Signs <small>(01 58 13 00-0001)</small>		
01 58 13 00-0028	EA Installation And Removal Of Owner Supplied Project Sign.....	97.21	

01 60 Product Requirements (01)

01 65 Product Delivery Requirements (01 60)

01 65 00 00-0001	Helicopter Lift <small>(01 65)</small>		
	Note: Includes Helicopter, Crew, Permits, Fuel And Clearances		
01 65 00 00-0002	DAY Helicopter Lift <3,500Lbs.....	35,872.31	
	Note: Maximum of (3) Operations, Helicopter Crew, Helicopter, Rigging. Includes Day Permit for FAA Permit, Street Closure fees and Right of way. Signage, Safety Rigging Landing Plan. Clearing, Cleaning and Delineation of Landing Zone, Drop Zone, and Alternate landing Area. Delineation and closure of Ingress Egress routes.		
	<i>For Weekend Day Usage, Add</i>	3,500.00	

01 66 Product Storage and Handling Requirements (01 60)

01 66 19 Product Handling Requirements (01 66)

Note: Not for use in conjunction with other tasks when the distance is less than 2 stories or less than 125'.

01 66 19 00-0001	Transfer Delivered Materials Between Floors <small>(01 66 19)</small>		
	Note: For moving delivered, owner supplied or existing materials in a building.		
01 66 19 00-0002	CY Transfer Delivered Material Between Floors Via Stairs, Per Floor.....	18.69	
	Note: Quantity equals volume of materials multiplied by number of floors traveled.		
01 66 19 00-0003	CY Transfer Delivered Material Between Floors Via Elevator, Per Trip.....	12.15	
	Note: Quantity is not multiplied by number of floors traveled. Includes transfer of materials between elevators, if more than one bank of elevators is required.		
01 66 19 00-0004	Transfer Delivered Materials Distances Greater Than 125' <small>(01 66 19)</small>		
	Note: For moving delivered, owner supplied or existing materials in a building.		
01 66 19 00-0005	CY Transfer Delivered Materials Distances Greater Than 125', Per CY Of Material Per 125'.....	7.59	
01 66 19 00-0006	Transfer Demolition Debris Between Floors <small>(01 66 19)</small>		
	Note: Only for use with demolition tasks.		
01 66 19 00-0007	CY Transfer Demolition Debris Between Floors Via Stairs, Per Floor.....	18.69	
	Note: Quantity equals material volume times bulk factor times number of floors traveled.		
01 66 19 00-0008	CY Transfer Demolition Debris Between Floors Via Elevator, Per Trip.....	12.15	
	Note: Quantity is not multiplied by number of floors traveled. Includes transfer of materials between elevators, if more than one bank of elevators is required.		
01 66 19 00-0009	Transfer Demolition Debris Distances Greater Than 125' <small>(01 66 19)</small>		
	Note: Only for use with demolition tasks.		
01 66 19 00-0010	CY Transfer Demolition Debris Distances Greater Than 125', Per CY Of Material Per 125'.....	7.59	
01 66 19 00-0011	Moving Furniture And Furnishings <small>(01 66 19)</small>		
	Note: To be used when contractor is required to move furniture and furnishings occupying 55% or more of the total floor space.		
01 66 19 00-0012	SF Removal, Transportation, Return And Reinstallation Of Office Furniture And Furnishings.....	1.21	
	Note: Includes desks, tables, file cabinets, chairs, storage boxes, bookshelves, office equipment, computers, and other furniture and furnishings. Quantity equals total floor space.		

01 70 Execution and Closeout Requirements (01)

01 71 Examination and Preparation (01 70)

01 71 13 Mobilization (01 71)

01 71 13 00-0001	Equipment Delivery, Pickup, Mobilization And Demobilization <small>(01 71 13)</small>		
	Note: Excludes flagman for traffic control where necessary. Per each mobilization delivery.		



General Requirements	01	5
Execution and Closeout Requirements	01 70	
Examination and Preparation	01 71	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 71 13 00-0002 EA Equipment Delivery, Pickup, Mobilization And Demobilization Using A Rollback Flatbed Truck 474.47 Note: Includes loading, tie-down of equipment, delivery of equipment, off loading on site, rigging, dismantling, loading for return and transporting away. For equipment such as trenchers, skid-steer loaders (bobcats), industrial warehouse forklifts, sweepers, scissor platform lifts, telescoping and articulating boom man lifts with up to 40' boom lengths, etc.	474.47	
01 71 13 00-0003 EA Equipment Delivery, Pickup, Mobilization And Demobilization Using A Tractor Trailer With Up To 53' Bed..... 1,516.34 Note: Includes loading, tie-down of equipment, delivery of equipment, off loading on site, rigging, dismantling, loading for return and transporting away. For equipment such as bulldozers, motor scrapers, hydraulic excavators, gradalls, road graders, loader-backhoes, heavy duty construction loaders, tractors, pavers, rollers, bridge finishers, straight mast construction forklifts, telescoping boom rough terrain construction forklifts, telescoping and articulating boom man lifts with >40' boom lengths, etc.	1,516.34	
01 71 13 00-0004 Crane Delivery, Pickup, Mobilization And Demobilization (01 71 13) Note: Includes delivery of equipment, off loading on site and rigging. Pick-up (return) includes dismantling, loading and transporting away. Excludes flagman for traffic control where necessary.		
01 71 13 00-0005 EA Up To 20 Ton Lift Move On/Off Cost, Hydraulic Crane 506.10 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 126.53 <i>For >60 To 100 Miles Radius, Add</i> 202.44	506.10	
01 71 13 00-0006 EA >20 To 40 Ton Lift Move On/Off Cost, Hydraulic Crane 822.41 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 205.60 <i>For >60 To 100 Miles Radius, Add</i> 328.96	822.41	
01 71 13 00-0007 EA >40 To 70 Ton Lift Move On/Off Cost, Hydraulic Crane 1,138.73 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 284.68 <i>For >60 To 100 Miles Radius, Add</i> 455.49	1,138.73	
01 71 13 00-0008 EA >70 To 110 Ton Lift Move On/Off Cost, Hydraulic Crane 1,834.62 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 458.66 <i>For >60 To 100 Miles Radius, Add</i> 733.85	1,834.62	
01 71 13 00-0009 EA >110 To 125 Ton Lift Move On/Off Cost, Hydraulic Crane 2,302.77 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 575.69 <i>For >60 To 100 Miles Radius, Add</i> 921.11	2,302.77	
01 71 13 00-0010 EA >125 To 150 Ton Lift Move On/Off Cost, Hydraulic Crane 2,865.80 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 716.45 <i>For >60 To 100 Miles Radius, Add</i> 1,146.32	2,865.80	
01 71 13 00-0011 EA >150 To 185 Ton Lift Move On/Off Cost, Hydraulic Crane 3,302.31 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 825.58 <i>For >60 To 100 Miles Radius, Add</i> 1,320.92	3,302.31	
01 71 13 00-0012 EA >185 To 210 Ton Lift Move On/Off Cost, Hydraulic Crane 3,694.55 Note: Includes delivery and pickup. <i>For >30 To 60 Miles Radius, Add</i> 923.64 <i>For >60 To 100 Miles Radius, Add</i> 1,477.82	3,694.55	
01 71 13 00-0013 EA 75 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 1,961.15 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 490.29 <i>For >60 To 100 Miles Radius, Add</i> 784.46	1,961.15	
01 71 13 00-0014 EA 100 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 3,099.88 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 774.97 <i>For >60 To 100 Miles Radius, Add</i> 1,239.95	3,099.88	
01 71 13 00-0015 EA 125 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 3,922.29 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 980.57 <i>For >60 To 100 Miles Radius, Add</i> 1,568.92	3,922.29	
01 71 13 00-0016 EA 150 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 4,871.23 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 1,217.81 <i>For >60 To 100 Miles Radius, Add</i> 1,948.49	4,871.23	
01 71 13 00-0017 EA 200 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 6,073.23 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 1,518.31 <i>For >60 To 100 Miles Radius, Add</i> 2,429.29	6,073.23	
01 71 13 00-0018 EA 250 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 7,085.43 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 1,771.36 <i>For >60 To 100 Miles Radius, Add</i> 2,834.17	7,085.43	
01 71 13 00-0019 EA 300 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 10,122.05 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 2,530.51 <i>For >60 To 100 Miles Radius, Add</i> 4,048.82	10,122.05	
01 71 13 00-0020 EA 500 Ton Lift Move On/Off Cost, Cable Controlled Lattice Boom Mechanical Crane 13,879.86 Note: Includes delivery, rigging and pickup. <i>For >30 To 60 Miles Radius, Add</i> 3,469.97 <i>For >60 To 100 Miles Radius, Add</i> 5,551.94	13,879.86	

01 71 23 Field Engineering (01 71)
01 71 23 16 Construction Surveying (01 71 23)

01	01	General Requirements
	01 70	Execution and Closeout Requirements
	01 71	Examination and Preparation



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 71 23 16-0001	Conventional Topographic Survey <small>(01 71 23 16)</small> Note: The professional services include AutoCAD drafting and certification. The survey includes location of structures, walks, drives, parking, significant vegetation, utilities, etc. The area within building footprint is not to be considered as part of the acreage.	
01 71 23 16-0002	ACR Conventional Topographic Survey Of Clear Area With Few To No Obstacles.....	1,333.22
01 71 23 16-0003	ACR Conventional Topographic Survey Of Clear Area With Medium Height Vegetation, Few Trees (<5% Buildings).....	3,759.88
01 71 23 16-0004	ACR Conventional Topographic Survey Of Clear Area With Few Structures, And/or Wooded (5-25% Buildings).....	5,398.66
01 71 23 16-0005	ACR Conventional Topographic Survey Of Developed Areas With Several Structures (25-65% Buildings).....	8,123.62
01 71 23 16-0006	ACR Conventional Topographic Survey Of Highly Developed Areas, Sidewalks, Etcetera (>65% Buildings).....	10,172.58

01 71 23 16-0007	Property Lines Survey <small>(01 71 23 16)</small> Note: Not to be added to tasks in the "Conventional Topographic Survey" section.	
01 71 23 16-0008	LF Survey Property Lines On Cleared Land	3.00
01 71 23 16-0009	LF Survey Property Lines On Slightly Wooded Land	3.48
01 71 23 16-0010	LF Survey Property Lines On Wooded Land.....	4.07

01 71 23 16-0011	Survey Monument <small>(01 71 23 16)</small>	
01 71 23 16-0012	EA 3' Precast Survey Monument.....	206.58
	<i>For Owner Furnished Monument, Deduct</i>	<i>-84.70</i>
01 71 23 16-0013	EA Precast Survey Monument Box With Cast Iron Frame And Cover.....	308.54
01 71 23 16-0014	EA Riser Ring For Survey Monument.....	158.46
01 71 23 16-0015	EA Adjust Survey Monument Cover To Grade.....	254.09

01 71 23 16-0016	Facade Surveying <small>(01 71 23 16)</small>	
01 71 23 16-0017	LF Facade Survey And Reports (LF Of Facade x Number Of Floors).....	8.28

01 71 36 Non-Destructive Concrete Examination (01 71)

01 71 36 00-0001	Electromagnetic Survey <small>(01 71 36)</small> Note: To locate voids, prior to moving heavy machinery to an area of concern, to locate reinforcing bars, conduits, pipes, etc., prior to core drilling or cutting existing concrete, masonry or asphalt, to locate underground utilities, underground storage tanks, etc. Electromagnetic survey includes Subsurface Interface Radar (SIR) and/or Ground Penetrating Radar (GPR).	
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01 71 36 00-0002	Electromagnetic (SIR/GPR) Survey <small>(01 71 36 00-0001)</small>	
01 71 36 00-0003	EA Up To 1 Hour On Site, Electromagnetic (SIR/GPR) Survey, Earth, Concrete, Masonry Or Asphalt.....	1,128.06
01 71 36 00-0004	EA >1 To 4 Hours On Site, Electromagnetic (SIR/GPR) Survey, Earth, Concrete, Masonry Or Asphalt.....	1,692.09
01 71 36 00-0005	EA >4 To 8 Hours On Site, Electromagnetic (SIR/GPR) Survey, Earth, Concrete, Masonry Or Asphalt.....	3,384.18

01 71 36 00-0006	Reports And Mapping For Electromagnetic (SIR/GPR) Surveys <small>(01 71 36 00-0001)</small>	
01 71 36 00-0007	EA Standard Report For Electromagnetic (SIR/GPR) Survey, Earth, Concrete, Masonry Or Asphalt..... Note: Includes a detailed description of the scope of work, inspection methods, and equipment used. Also includes visuals such as site locations, images of data, and site photos.	376.02
01 71 36 00-0008	EA GPS Mapping Of Located Utilities/Items For Electromagnetic (SIR/GPR) Survey, Earth, Concrete, Masonry Or Asphalt.....	752.04
01 71 36 00-0009	EA CAD Mapping Of Located Utilities/Items For Electromagnetic (SIR/GPR) Survey, Earth, Concrete, Masonry Or Asphalt..... Note: Includes additions to the owner provided CAD drawing.	1,692.09

01 74 Cleaning and Waste Management (01 70)

01 74 13	Progress Cleaning <small>(01 74)</small> Note: For use on existing areas other than where actual work is to be performed where ordered by the owner. Daily cleanup and final cleanup is included in the contractor's adjustment factor.	
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01 74 13 00-0001	General <small>(01 74 13)</small>	
01 74 13 00-0002	CSF Clean Miscellaneous Surfaces, Wipe Down With Mild Detergent.....	24.33
01 74 13 00-0003	CY Collect Existing Debris And Load Into Truck Or Dumpster	28.48
	Note: Per CY of debris removed.	

01 74 16 Site Maintenance (01 74)

01 74 16 00-0001	Parking Lot, Roads And Pathway Maintenance <small>(01 74 16)</small> Note: These tasks shall be used for maintenance of existing roads and walks only as requested by the owner. Tasks not to be used in conjunction with related installation/demolition tasks in the Construction Task Catalog®.	
01 74 16 00-0002	Parking Lot, Road, And Street Sweeping <small>(01 74 16 00-0001)</small>	
01 74 16 00-0003	MSF Sweep Parking Lot, With Street Sweeper.....	24.31
01 74 16 00-0004	MSF Sweeper/Vacuum/Sprayer For Parking Lots, Streets And Roads.....	29.18

01 74 16 00-0005	Runway Sweeping <small>(01 74 16 00-0001)</small>	
01 74 16 00-0006	MSF Sweep Runway, With Street Sweep	36.48



General Requirements	01	5
Execution and Closeout Requirements	01 70	
Cleaning and Waste Management	01 74	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 74 19 Construction Waste Management and Disposal (01 74)

Note: Tasks in this section shall be used as directed by owner.

01 74 19 00-0001	LF	Debris Chutes (01 74 19) Note: Includes hopper sections and entry sections. Used as required for buildings of all heights.	
01 74 19 00-0002		Steel Temporary Debris Chutes (01 74 19 00-0001)	
01 74 19 00-0003	LF	18" Diameter, Steel Temporary Debris Chute.....	38.86
01 74 19 00-0004	LF	30" Diameter, Steel Temporary Debris Chute.....	59.52
01 74 19 00-0005		Plastic Temporary Debris Chutes (01 74 19 00-0001)	
01 74 19 00-0006	LF	24" Diameter, Plastic Temporary Debris Chute	15.40
		For Steel Liner, Add	3.09
01 74 19 00-0007	LF	30" Diameter, Plastic Temporary Debris Chute	17.66
		For Steel Liner, Add	3.55
01 74 19 00-0008	LF	36" Diameter, Plastic Temporary Debris Chute	19.91
		For Steel Liner, Add	4.00
01 74 19 00-0009		Wood Temporary Debris Chutes (01 74 19 00-0001)	
01 74 19 00-0010	LF	4' x 4', Wood Temporary Debris Chute	31.14
		Note: Includes fabrication and installation.	
01 74 19 00-0011		Construction Dumpsters Rental (01 74 19) Note: Includes service to delivery and pick-up of dumpster, hauling of debris, rental of dumpster and all applicable non-hazardous disposal fees. Cost of "each" is based on each pick-up. Use modifier for excess tons up to legal state limit. Unacceptable materials include: aerosol cans, all liquids, animals, antifreeze, appliances, asbestos, barrels, batteries, chemical products, computers, contaminated oils (mixed with solvents, gasoline, etc.), dirt, fluorescent tubes, hazardous waste, herbicides and pesticides, industrial waste, lubricating/hydraulic oil, mattresses, medical waste, microwaves, monitors, motor oil, oil filters, other flammable liquids, paint (except completely dried latex paint cans, no liquids), petroleum-contaminated soil/lead paint chips, propane tanks, radioactive material, railroad ties, solvents, televisions, tires, and transmission oil.	
01 74 19 00-0012	EA	10 CY Dumpster "Construction Debris"	475.49
		Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	
01 74 19 00-0013	EA	15 CY Dumpster "Construction Debris"	537.58
		Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	
01 74 19 00-0014	EA	20 CY Dumpster "Construction Debris"	599.68
		Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	
01 74 19 00-0015	EA	30 CY Dumpster "Construction Debris"	753.58
		Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	
01 74 19 00-0016	EA	40 CY Dumpster "Construction Debris"	824.60
		Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	
01 74 19 00-0017	EA	10 CY Low-Boy Dumpster "Concrete Or Asphalt Only"	723.29
		Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Concrete or asphalt only.	
01 74 19 00-0018		Construction Washout Container (01 74 19)	
01 74 19 00-0019	EA	30" x 30" x 14" High, Corrugated Cardboard With 6mm Liner, 50 Gallon, Construction Washout Bin	54.95
		Note: Up to 10 uses, requires additional 6mm plastic for multiple uses See CSI section 01 56 16 00-0002 for 6mm plastic for additional loads.	
01 74 19 00-0020	EA	48" x 48" x 14" High, Corrugated Cardboard With 6mm Liner, 140 Gallon, Construction Washout Bin.....	78.95
		Note: Up to 10 uses, requires additional 6mm plastic for multiple uses See CSI section 01 56 16 00-0002 for 6mm plastic for additional loads.	
01 74 19 00-0021	EA	72" x 72" x 12" High, Corrugated Cardboard With 6mm Liner, 260 Gallon, Construction Washout Bin.....	135.95
		Note: Up to 10 uses, requires additional 6mm plastic for multiple uses See CSI section 01 56 16 00-0002 for 6mm plastic for additional loads.	
01 74 19 00-0022		Concrete Washout Service (01 74 19)	
01 74 19 00-0023	MO	Rampless Concrete Washout Bin	516.07
		Note: Includes delivery.	
01 74 19 00-0024	MO	Ramped Concrete Washout Bin	619.29
		Note: Includes delivery.	
01 74 19 00-0025	EA	Interim Vacuum Service, Concrete Washout Bin	621.54
		Note: Includes vacuum and recycle excess clear liquid from the unfilled bin to allow additional space for washout material.	
01 74 19 00-0026	EA	Vacuum, Pickup, Swap And Dump, Concrete Washout Bin	1,346.67
		Note: Includes vacuum the liquid from the full bin and pick up the bin, and recycle all material. An empty bin will be left at the site if the project is not completed.	
01 74 19 00-0027		Debris Processing Fee (01 74 19)	
01 74 19 00-0028		Material Recycling Fees (01 74 19 00-0027) Note: Not to be used with Dumpster Tasks which includes the Landfill Dump Fee. Excludes hauling.	
01 74 19 00-0029	CY	Drop-Off Asphalt At Recycling Center	18.60
01 74 19 00-0030	CY	Drop-Off Non-Reinforced Concrete At Recycling Center	24.92
01 74 19 00-0031	CY	Drop-Off Reinforced Concrete At Recycling Center.....	37.38
01 74 19 00-0032	CY	Drop-Off Brick Or Block At Recycling Center	32.40
01 74 19 00-0033	CY	Drop-Off Dirt At Recycling Center.....	36.13
01 74 19 00-0034	CY	Drop-Off Dimensional Lumber At Recycling Center.....	34.89

01	01	General Requirements
	01 70	Execution and Closeout Requirements
	01 74	Cleaning and Waste Management



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 74 19 00-0035 Landfill Dump Fees (01 74 19 00-0027)
 Note: Does not apply when material is transferred to owner's site or facility, or with use of dumpsters. Excludes hauling.

01 74 19 00-0036	CY	Traditional Building Construction Materials Landfill Dump Fee.....	16.58
01 74 19 00-0037	TON	Traditional Building Construction Materials, Landfill Dump Fee.....	72.27
01 74 19 00-0038	CY	Trees, Stumps And Brush, Landfill Dump Fee.....	19.96
01 74 19 00-0039	CY	Hazardous Materials And Rubbish Landfill Dump Fee.....	47.60

Note: Includes regulated waste such as paint cans, refrigerators/freezers, air conditioners, smoke detectors, batteries, etc.

01 74 19 00-0040 Hauling (01 74 19)
 Note: Includes driver and equipment, ten (10) to fifteen (15) minutes load time, time for travel, dump time and return (roundtrip). The task quantity is the number of miles to the disposal site/transfer station (one way mileage) times the number of cubic yards being transported. For example, to haul 8 CY to a site 14 miles away, the quantity is calculated as follows: 14 miles x 8 CY = 112 CYM. Use both hauling tasks for distances greater than 15 miles. To haul 28 CY to a site 32 miles away, the quantity for the task to haul the first 15 miles is calculated: 15 miles x 28 CY = 420 CYM. The quantity for the additional hauling task over the first 15 miles is calculated: 32 total miles less 15 initial miles equals 17 miles x 28 CY = 476 CYM.

01 74 19 00-0041	CYM	Hauling Up To 15 Miles.....	1.32
01 74 19 00-0042	CYM	Hauling, Miles Over Initial 15 Miles.....	1.00

01 74 23 Final Cleaning (01 74)

01 74 23 00-0001 Cleaning Of Glass (01 74 23)

01 74 23 00-0002	CSF	Cleaning Of Existing Glass Surfaces.....	32.91
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01 95 Residential Construction (01)

01 95 01 Residential - General Conditions (01 95)

01 95 01 00-0001 Pre-Clean Interior Of Residential Unit (01 95 01)
 Note: Remove all discarded debris from unit prior to commencement of work. Excludes disposal of waste.

01 95 01 00-0002	EA	Pre-Clean Residential Unit - Efficiency Unit.....	680.32
01 95 01 00-0003	EA	Pre-Clean Residential Unit - One Bedroom Unit.....	874.13
01 95 01 00-0004	EA	Pre-Clean Residential Unit - Two Bedroom Unit.....	1,306.50
01 95 01 00-0005	EA	Pre-Clean Residential Unit - Three Bedroom Unit.....	1,760.94
01 95 01 00-0006	EA	Pre-Clean Residential Unit - Four Bedroom Unit.....	2,237.65
01 95 01 00-0007	EA	Pre-Clean Residential Unit - Five Bedroom Unit.....	2,700.10
01 95 01 00-0008	EA	Pre-Clean Residential Unit - Six Bedroom Unit.....	3,155.96
01 95 01 00-0009	EA	Pre-Clean Residential Basement.....	1,944.08

01 95 01 00-0010 Final Clean Interior Of Residential Unit (01 95 01)
 Note: Final cleaning to make unit ready for tenant move-in. This is over and above the daily and final construction cleaning which is part of the Contractor's Adjustment Factor.

01 95 01 00-0011	EA	Final Clean Residential Unit - Efficiency Unit.....	826.57
01 95 01 00-0012	EA	Final Clean Residential Unit - One Bedroom Unit.....	1,065.83
01 95 01 00-0013	EA	Final Clean Residential Unit - Two Bedroom Unit.....	1,557.75
01 95 01 00-0014	EA	Final Clean Residential Unit - Three Bedroom Unit.....	2,025.08
01 95 01 00-0015	EA	Final Clean Residential Unit - Four Bedroom Unit.....	2,641.40
01 95 01 00-0016	EA	Final Clean Residential Unit - Five Bedroom Unit.....	3,115.50
01 95 01 00-0017	EA	Final Clean Residential Unit - Six Bedroom Unit.....	3,594.81
01 95 01 00-0018	EA	Final Clean Residential Unit - Basement.....	2,139.17

01 95 01 00-0019 Clean Residential HVAC (01 95 01)

01 95 01 00-0020	EA	Clean And Service Residential Furnace.....	586.59
01 95 01 00-0021	EA	Clean Residential Ductwork In Efficiency Unit.....	631.85
01 95 01 00-0022	EA	Clean Residential Ductwork In One Bedroom Unit.....	755.15
01 95 01 00-0023	EA	Clean Residential Ductwork In Two Bedroom Unit.....	878.56
01 95 01 00-0024	EA	Clean Residential Ductwork In Three Bedroom Unit.....	1,003.34
01 95 01 00-0025	EA	Clean Residential Ductwork In Four Bedroom Unit.....	1,126.09
01 95 01 00-0026	EA	Clean Residential Ductwork In Five Bedroom Unit.....	1,266.99
01 95 01 00-0027	EA	Clean Residential Ductwork In Six Bedroom Unit.....	1,411.21

01 95 01 00-0028 Residential Relocation Costs (01 95 01)
 Note: Includes packing all furniture in unit and relocating furniture to new location. Excludes moving truck.

01 95 01 00-0029	EA	Move Furniture In Residential Efficiency Bedroom, Same Floor.....	780.90
01 95 01 00-0030	EA	Move Furniture In Residential One Bedroom, Same Floor.....	1,049.37
01 95 01 00-0031	EA	Move Furniture In Residential Two Bedroom, Same Floor.....	1,657.77
01 95 01 00-0032	EA	Move Furniture In Residential Three Bedroom, Same Floor.....	2,168.00
01 95 01 00-0033	EA	Move Furniture In Residential Four Bedroom, Same Floor.....	2,677.39
01 95 01 00-0034	EA	Move Furniture In Residential Five Bedroom, Same Floor.....	3,098.68
01 95 01 00-0035	EA	Move Furniture In Residential Six Bedroom, Same Floor.....	3,612.05
01 95 01 00-0036	EA	Move Furniture In Residential Efficiency Bedroom, Different Floor.....	927.40
01 95 01 00-0037	EA	Move Furniture In Residential One Bedroom, Different Floor.....	1,243.32



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 01 00-0038 EA Move Furniture In Residential Two Bedroom, Different Floor.....	2,050.14	
01 95 01 00-0039 EA Move Furniture In Residential Three Bedroom, Different Floor.....	2,653.09	
01 95 01 00-0040 EA Move Furniture In Residential Four Bedroom, Different Floor.....	3,281.26	
01 95 01 00-0041 EA Move Furniture In Residential Five Bedroom, Different Floor.....	3,782.84	
01 95 01 00-0042 EA Move Furniture In Residential Six Bedroom, Different Floor.....	4,297.22	
01 95 01 00-0043 EA Move Furniture In Residential Efficiency Bedroom, Different Building.....	1,464.36	
01 95 01 00-0044 EA Move Furniture In Residential One Bedroom, Different Building.....	1,825.54	
01 95 01 00-0045 EA Move Furniture In Residential Two Bedroom, Different Building.....	2,628.79	
01 95 01 00-0046 EA Move Furniture In Residential Three Bedroom, Different Building.....	3,439.60	
01 95 01 00-0047 EA Move Furniture In Residential Four Bedroom, Different Building.....	4,074.13	
01 95 01 00-0048 EA Move Furniture In Residential Five Bedroom, Different Building.....	4,562.96	
01 95 01 00-0049 EA Move Furniture In Residential Six Bedroom, Different Building.....	5,076.75	
01 95 01 00-0050 Residential Testing (01 95 01)		
01 95 01 00-0051 EA Carbon Dioxide (CO2) Test For Residential Sewer Vents.....	495.09	
01 95 01 00-0052 EA Carbon Monoxide (CO) Test On Residential Furnace.....	742.57	
01 95 06 Residential - Wood and Plastics (01 95)		
01 95 06 00-0001 Residential Wood Hand Rails (01 95 06)		
01 95 06 00-0002 EA Brackets For Residential Hand Rails.....	43.03	13.34
01 95 06 00-0003 LF 2-1/4" x 2-3/8" Residential Oak Colonial Handrail.....	22.17	7.59
01 95 06 00-0004 LF 2-1/4" x 2-3/8" Residential Hemlock Colonial Handrail.....	19.66	7.59
01 95 06 00-0005 LF 2-1/4" x 2-3/8" Residential Poplar Colonial Handrail.....	21.99	7.59
01 95 06 00-0006 LF 1-5/8" x 1-1/16" Residential Pine Oval Handrail.....	16.20	7.59
01 95 06 00-0007 LF 1-1/4" x 2-1/4" Residential Pine Oval Handrail.....	16.29	7.59
01 95 06 00-0008 LF 2-1/4" x 1-5/16" Residential Poplar Oval Handrail.....	17.11	7.59
01 95 06 00-0009 LF 1-3/4" x 1-5/8" Residential Oak Oval Handrail.....	18.50	7.59
01 95 06 00-0010 LF 2-1/4" x 1-1/2" Residential Oak Oval Handrail.....	18.75	7.59
01 95 06 00-0011 Residential Cabinets (01 95 06)		
Note: Cabinets meet Los Angeles County Housing Authority Specifications and include installation, all moldings, fasteners, caulking, and hardware (hinges, drawer guides, door pulls, etc). While all items associated with this task may not be listed this task is for complete and in place construction.		
01 95 06 00-0012 Residential Base Cabinets (01 95 06 00-0011)		
Note: Excludes tops.		
01 95 06 00-0013 Residential Base Cabinets, Single Drawer And Single Door (01 95 06 00-0012)		
Note: Use these cabinets for Universal Access (32-1/2" high with 8-1/2" kick) applications.		
01 95 06 00-0014 EA Up To 15" Wide, 34-1/2" High x 24" Deep, Single Drawer And Single Door, Residential Base Cabinet.....	339.67	61.85
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		100.60
For 4 Drawer Unit, Add		125.75
01 95 06 00-0015 EA >15" To 18" Wide, 34-1/2" High x 24" Deep, Single Drawer And Single Door, Residential Base Cabinet.....	370.50	75.95
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		104.94
For 4 Drawer Unit, Add		131.17
01 95 06 00-0016 EA >18" To 21" Wide, 34-1/2" High x 24" Deep, Single Drawer And Single Door, Residential Base Cabinet.....	406.46	86.81
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		113.10
For 4 Drawer Unit, Add		141.38
01 95 06 00-0017 EA >21" To 24" Wide, 34-1/2" High x 24" Deep, Single Drawer And Single Door, Residential Base Cabinet.....	436.72	100.91
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		117.19
For 4 Drawer Unit, Add		146.49
01 95 06 00-0018 Residential Base Cabinets, Double Drawer And Double Door (01 95 06 00-0012)		
Note: Use these cabinets for Universal Access (32-1/2" high with 8-1/2" kick) applications.		
01 95 06 00-0019 EA 24" To 27" Wide, 34-1/2" High x 24" Deep, Double Drawer And Double Door, Residential Base Cabinet.....	534.30	83.01
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		36.83
For Sink Base With Sink Front (No Drawer), Deduct		-55.24
01 95 06 00-0020 EA >27" To 30" Wide, 34-1/2" High x 24" Deep, Double Drawer And Double Door, Residential Base Cabinet.....	558.36	88.97
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		38.04
For Sink Base With Sink Front (No Drawer), Deduct		-57.06
01 95 06 00-0021 EA >30" To 33" Wide, 34-1/2" High x 24" Deep, Double Drawer And Double Door, Residential Base Cabinet.....	578.02	91.15
Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
For 3 Drawer Unit, Add		39.57
For Sink Base With Sink Front (No Drawer), Deduct		-59.36

01 General Requirements**01 95 Residential Construction****01 95 06 Residential - Wood and Plastics**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 06 00-0022	EA		>33" To 36" Wide, 34-1/2" High x 24" Deep, Double Drawer And Double Door, Residential Base Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	595.76	93.31
			<i>For 3 Drawer Unit, Add</i>	40.91	
			<i>For Sink Base With Sink Front (No Drawer), Deduct</i>	-61.37	
01 95 06 00-0023	EA		>36" To 42" Wide, 34-1/2" High x 24" Deep, Double Drawer And Double Door, Residential Base Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	653.08	100.91
			<i>For 3 Drawer Unit, Add</i>	45.13	
			<i>For Sink Base With Sink Front (No Drawer), Deduct</i>	-67.69	
01 95 06 00-0024	EA		>42" To 48" Wide, 34-1/2" High x 24" Deep, 2 Drawer And 2 Door, Residential Base Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	710.42	113.93
			<i>For 3 Drawer Unit, Add</i>	48.26	
			<i>For Sink Base With Sink Front (No Drawer), Deduct</i>	-72.38	
01 95 06 00-0025			Residential Vanity Bases (01 95 06 00-0012)		
01 95 06 00-0026	EA		18" Wide, 32-1/2" High x 21" Deep, Single Door, Residential Vanity Base..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	413.48	80.72
01 95 06 00-0027	EA		21" Wide, 32-1/2" High x 21" Deep, Single Door, Residential Vanity Base..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	446.59	89.84
01 95 06 00-0028	EA		24" Wide, 32-1/2" High x 21" Deep, Double Door, Residential Vanity Base..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	472.40	93.53
01 95 06 00-0029	EA		30" Wide, 32-1/2" High x 21" Deep, Double Door, Residential Vanity Base..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	555.19	113.93
01 95 06 00-0030	EA		36" Wide, 32-1/2" High x 21" Deep, Double Door, Residential Vanity Base..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	583.92	113.93
01 95 06 00-0031	EA		42" Wide, 32-1/2" High x 21" Deep, Double Door, Residential Vanity Base..... Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.	613.92	113.93
01 95 06 00-0032			Residential Wall Cabinets (01 95 06 00-0011)		
01 95 06 00-0033			36" High x 13" Deep, Residential Wall Cabinets (01 95 06 00-0032)		
01 95 06 00-0034			Single Door Type Units (01 95 06 00-0033)		
01 95 06 00-0035	EA		Up To 15" Wide, 36" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	369.54	78.12
01 95 06 00-0036	EA		>15" To 18" Wide, 36" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	390.16	79.75
01 95 06 00-0037	EA		>18" To 24" Wide, 36" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	412.20	82.46
01 95 06 00-0038			Double Door Type Units (01 95 06 00-0033)		
01 95 06 00-0039	EA		Up To 27" Wide, 36" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	498.17	91.15
01 95 06 00-0040	EA		>27" To 30" Wide, 36" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	538.46	99.83
01 95 06 00-0041	EA		>30" To 36" Wide, 36" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	581.79	101.99
01 95 06 00-0042	EA		>36" To 42" Wide, 36" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	636.74	105.79
01 95 06 00-0043	EA		>42" To 48" Wide, 36" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	664.43	110.67
01 95 06 00-0044			30" High x 13" Deep, Residential Wall Cabinets (01 95 06 00-0032)		
01 95 06 00-0045			Single Door Type Units (01 95 06 00-0044)		
01 95 06 00-0046	EA		Up To 12" Wide, 30" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	265.72	61.71
01 95 06 00-0047	EA		>12" To 15" Wide, 30" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	271.58	64.37
01 95 06 00-0048	EA		>15" To 18" Wide, 30" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	291.21	65.74
01 95 06 00-0049	EA		>18" To 24" Wide, 30" High x 13" Deep, Single Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	316.48	68.06
01 95 06 00-0050			Double Door Type Units (01 95 06 00-0044)		
01 95 06 00-0051	EA		Up To 27" Wide, 30" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	352.77	69.50
01 95 06 00-0052	EA		>27" To 30" Wide, 30" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	373.46	71.23
01 95 06 00-0053	EA		>30" To 36" Wide, 30" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	405.63	72.95



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 06 00-0054 EA >36" To 42" Wide, 30" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	439.71	74.65
01 95 06 00-0055 EA >42" To 48" Wide, 30" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	458.67	75.52
01 95 06 00-0056 24" High x 13" Deep, Residential Wall Cabinets (01 95 06 00-0032)		
01 95 06 00-0057 Double Door Type Units (01 95 06 00-0056)		
01 95 06 00-0058 EA Up To 27" Wide, 24" High x 13" Deep, Double Door, Residential Wall Cabinet Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	320.27	56.42
01 95 06 00-0059 EA >27" To 30" Wide, 24" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	338.48	59.13
01 95 06 00-0060 EA >30" To 36" Wide, 24" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	368.02	60.87
01 95 06 00-0061 EA >36" To 42" Wide, 24" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	399.82	61.85
01 95 06 00-0062 15" High x 13" Deep, Residential Wall Cabinets (01 95 06 00-0032)		
01 95 06 00-0063 Double Door Type Units (01 95 06 00-0062)		
01 95 06 00-0064 EA Up To 30" Wide, 15" High x 13" Deep, Double Door, Residential Wall Cabinet Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	279.19	53.17
01 95 06 00-0065 EA >30" To 36" Wide, 15" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	307.38	60.87
01 95 06 00-0066 EA >36" To 39" Wide, 15" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	323.40	60.87
01 95 06 00-0067 12" High x 13" Deep, Residential Wall Cabinets (01 95 06 00-0032)		
01 95 06 00-0068 EA Up To 30" Wide, 12" High x 13" Deep, Double Door, Residential Wall Cabinet Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	279.67	33.42
01 95 06 00-0069 EA >30" To 39" Wide, 12" High x 13" Deep, Double Door, Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	323.84	25.07
01 95 06 00-0070 Full Height Wall Cabinets (01 95 06 00-0032)		
01 95 06 00-0071 LF Up To 8' Tall x 13" Deep, Full Height Wall Cabinet..... <i>For 2x4 Blocking, Add</i> Note: Includes blocking top and bottom of cabinet, materials, fasteners and cutting and patching drywall to match.	534.27 22.10	21.96
01 95 06 00-0072 LF Up To 8' Tall x 24" Deep, Full Height Wall Cabinet..... <i>For 2x4 Blocking, Add</i> Note: Includes blocking top and bottom of cabinet, materials, fasteners and cutting and patching drywall to match.	586.68 22.10	25.25
01 95 06 00-0073 Residential Cabinet Accessories (01 95 06 00-0011)		
01 95 06 00-0074 EA Residential, Single Door Wall Corner Cabinet With Shelving Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	714.11	122.01
01 95 06 00-0075 EA Residential, Single Door Wall Lazy Susan With Cabinet Enclosure Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	821.35	122.01
01 95 06 00-0076 EA Residential, Base Corner Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels. Excludes countertop.	702.07	48.80
01 95 06 00-0077 EA Residential, Broom/Utility Cabinet Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	909.40	69.73
01 95 06 00-0078 EA Residential, Base Range Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	828.14	40.67
01 95 06 00-0079 EA Residential, Microwave Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	340.17	32.54
01 95 06 00-0080 Residential Cabinet Repairs (01 95 06 00-0011)		
01 95 06 00-0081 EA Removal And Replacement Of Residential Cabinet Door..... Note: Includes all hardware.	99.26	
01 95 06 00-0082 EA Removal And Replacement Of Residential Cabinet Drawer Note: Includes all hardware.	119.17	
01 95 06 00-0083 PR Removal And Replacement Of Residential Drawer Guides.....	50.79	
01 95 06 00-0084 EA Removal And Replacement Of Residential Knob/Pull	30.69	
01 95 06 00-0085 PR Removal And Replacement Of Residential Hinges.....	24.46	
01 95 06 00-0086 Residential Stair Parts (01 95 06)		
01 95 06 00-0087 LF Removal And Replacement Of Residential Pine Stair Treads	28.19	
01 95 06 00-0088 LF Removal And Replacement Of Residential Oak Stair Treads.....	44.34	
01 95 06 00-0089 LF Removal And Replacement Of Residential Pine Stair Risers	25.96	
01 95 06 00-0090 LF Removal And Replacement Of Residential Oak Stair Risers.....	35.18	
01 95 06 00-0091 EA Re-Anchor Residential Stairs Bracket.....	85.29	

01 General Requirements**01 95 Residential Construction****01 95 06 Residential - Wood and Plastics**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 95 06 00-0092	Residential Finish Carpentry And Wood Casings <small>(01 95 06)</small>		
01 95 06 00-0093	LF 5/8" x 3-1/4" Residential Primed Finger Joint Casing.....	6.84	1.93
01 95 06 00-0094	LF 11/16" x 2-1/4" Residential Primed Finger Joint Casing.....	5.52	1.93
01 95 06 00-0095	LF 11/16" x 3-1/4" Residential Pine Casing	5.75	1.93

01 95 07 Residential - Thermal and Moisture Protection (01 95)

01 95 07 00-0001	Residential Siding <small>(01 95 07)</small>		
	See CSI section 06 65 00 00-0048 for PVC Trim, 07 46 33 00-0001 for vinyl siding.		
01 95 07 00-0002	Residential Roofing <small>(01 95 07)</small>		
01 95 07 00-0003	Aluminum Drip Edge <small>(01 95 07 00-0002)</small>		
	See CSI section 07 62 19 00-0002 for drip edge.		
01 95 07 00-0004	LF 0.031" Thick, Residential Vented Aluminum Drip Edge, 6-1/2" Shingle Underlay, Painted Finish.....	8.28	1.10
01 95 07 00-0005	Flashing <small>(01 95 07 00-0002)</small>		
01 95 07 00-0006	SF Residential Aluminum Valley Flashing.....	37.03	3.06
01 95 07 00-0007	SF Residential Aluminum Step Flashing	39.34	3.78
01 95 07 00-0008	SF Residential Copper Step Flashing	29.93	5.37
01 95 07 00-0009	Roofing <small>(01 95 07 00-0002)</small>		
01 95 07 00-0010	SQ Solar Reflective Shingles, CertainTeed Landmark Colaris	623.30	199.05
01 95 07 00-0011	Hip And Ridge Vent <small>(01 95 07 00-0002)</small>		
	See CSI section 07 31 13 13-0020 for hip and ridge vent.		
01 95 07 00-0012	Temporary Roof Cover <small>(01 95 07 00-0002)</small>		
	Note: Includes tarp, sand bags, ropes, tape, deck screws and wood slats as necessary. Includes removal after use. See CSI section 07 31 13 13-0020 for hip and ridge vent.		
01 95 07 00-0013	SF Temporary Plastic Sheeting, Applied To Roofing	1.10	

01 95 08 Residential - Doors and Windows (01 95)

See CSI section 08 36 13 00-0101 for residential overhead doors, 08 53 00 00-0000 for vinyl windows.

01 95 08 00-0001	Residential Exterior Doors <small>(01 95 08)</small>		
01 95 08 00-0002	Steel Exterior Residential Door Slab <small>(01 95 08 00-0001)</small>		
	Note: Primed galvanized steel skin with polystyrene core door.		
01 95 08 00-0003	EA 24 Gauge Flush Steel Exterior Residential Door Slab	332.84	56.96
	For 12" x 12" Vision Light, Add	74.12	
	For 20 Minute Fire Rating, Add	2.19	
	For 90 Minute Fire Rating, Add	19.70	
01 95 08 00-0004	EA 24 Gauge Six Panel Steel Exterior Residential Door Slab	350.67	56.96
	For Fan Or Nine Lite, Add	60.36	
	For 20 Minute Fire Rating, Add	2.37	
	For 90 Minute Fire Rating, Add	21.31	
01 95 08 00-0005	EA 22 Gauge Flush Steel Exterior Residential Door Slab	502.50	59.67
	For 12" x 12" Vision Light, Add	74.12	
	For 20 Minute Fire Rating, Add	3.83	
	For 90 Minute Fire Rating, Add	532.56	
01 95 08 00-0006	EA 22 Gauge Six Panel Steel Exterior Residential Door Slab	514.13	59.67
	For Fan Or Nine Lite, Add	60.36	
	For 20 Minute Fire Rating, Add	3.95	
	For 90 Minute Fire Rating, Add	548.73	
01 95 08 00-0007	Pre-Hung Steel Exterior Residential Doors <small>(01 95 08 00-0001)</small>		
	Note: Primed galvanized steel skin with polystyrene core door. Primed galvanized steel skin and wood frame.		
01 95 08 00-0008	EA 25 Gauge Flush Pre-Hung (Or Slab Only) Steel Exterior Residential Doors.....	416.32	75.95
	For 12" x 12" Vision Light, Add	74.12	
	For 20 Minute Fire Rating, Add	150.71	
	For 90 Minute Fire Rating, Add	349.02	
01 95 08 00-0009	EA 25 Gauge Six Panel Pre-Hung (Or Slab Only) Steel Exterior Residential Doors	441.39	75.95
	For Fan Or Nine Lite, Add	60.36	
	For 20 Minute Fire Rating, Add	165.00	
	For 90 Minute Fire Rating, Add	382.11	
01 95 08 00-0010	EA 24 Gauge Flush Pre-Hung Steel Exterior Residential Doors	623.74	81.38
	For 12" x 12" Vision Light, Add	74.12	
	For 20 Minute Fire Rating, Add	18.44	
	For 90 Minute Fire Rating, Add	271.98	
01 95 08 00-0011	EA 24 Gauge Six Panel Pre-Hung Steel Exterior Residential Doors.....	640.51	81.38
	For Fan Or Nine Lite, Add	60.36	
	For 20 Minute Fire Rating, Add	19.11	
	For 90 Minute Fire Rating, Add	281.88	
01 95 08 00-0012	EA 22 Gauge Flush Pre-Hung Steel Exterior Residential Doors	752.00	86.81
	For 12" x 12" Vision Light, Add	74.12	
	For 20 Minute Fire Rating, Add	23.14	
	For 90 Minute Fire Rating, Add	566.83	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 08 00-0013 EA 22 Gauge Six Panel Pre-Hung Steel Exterior Residential Doors..... <i>For Fan Or Nine Lite, Add</i> <i>For 20 Minute Fire Rating, Add</i> <i>For 90 Minute Fire Rating, Add</i>	775.82 60.36 24.09 590.18	86.81
01 95 08 00-0014 Fiberglass Exterior Residential Door Slab (01 95 08 00-0001)		
01 95 08 00-0015 EA Flush Fiberglass Exterior Residential Doors..... <i>For 12" x 12" Vision Light, Add</i> <i>For 20 Minute Fire Rating, Add</i>	414.77 74.12 3.01	56.96
01 95 08 00-0016 EA Six Panel Fiberglass Exterior Residential Doors..... <i>For Fan Or Nine Lite, Add</i> <i>For 20 Minute Fire Rating, Add</i>	414.92 60.36 129.43	56.96
01 95 08 00-0017 Pre-Hung Fiberglass Exterior Residential Doors (01 95 08 00-0001)		
01 95 08 00-0018 EA Flush Pre-Hung Fiberglass Exterior Residential Doors..... <i>For Fan Or Nine Lite, Add</i> <i>For 20 Minute Fire Rating, Add</i>	700.83 60.36 91.47	81.38
01 95 08 00-0019 EA Six Panel Pre-Hung Fiberglass Exterior Residential Doors <i>For Fan Or Nine Lite, Add</i> <i>For 20 Minute Fire Rating, Add</i>	700.98 60.36 139.94	81.38
01 95 08 00-0020 Residential Interior Doors (01 95 08)		
01 95 08 00-0021 Birch Faced Hollow Core Flush Door Slab (01 95 08 00-0020) Note: Includes preparing door for lockset and hinges.		
01 95 08 00-0022 EA 2'-4", 1-3/8" Unfinished, Birch Faced, Hollow Core, Residential Flush Door Slab	169.40	49.37
01 95 08 00-0023 EA 2'-6", 1-3/8" Unfinished, Birch Faced, Hollow Core, Residential Flush Door Slab	170.49	49.91
01 95 08 00-0024 EA 2'-8", 1-3/8" Unfinished, Birch Faced, Hollow Core, Residential Flush Door Slab	173.85	50.46
01 95 08 00-0025 EA 3'-0", 1-3/8" Unfinished, Birch Faced, Hollow Core, Residential Flush Door Slab	179.49	50.99
01 95 08 00-0026 Lauan Faced Hollow Core Flush Door Slab (01 95 08 00-0020) Note: Includes preparing door for lockset and hinges.		
01 95 08 00-0027 EA 1'-6", 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door Slab	134.68	43.40
01 95 08 00-0028 EA 2'-0", 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door Slab	145.52	48.83
01 95 08 00-0029 EA 2'-4", 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door Slab	153.45	49.37
01 95 08 00-0030 EA 2'-6", 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door Slab	156.81	49.91
01 95 08 00-0031 EA 2'-8", 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door Slab	160.17	50.46
01 95 08 00-0032 EA 3'-0", 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door Slab	163.53	50.99
01 95 08 00-0033 Lauan Faced Solid Core Flush Door Slab (01 95 08 00-0020) Note: Includes preparing door for lockset and hinges.		
01 95 08 00-0034 EA 2'-8", 1-3/8" Unfinished, Lauan Faced, Solid Core, Residential Flush Door Slab	210.32	50.46
01 95 08 00-0035 EA 3'-0", 1-3/8" Unfinished, Lauan Faced, Solid Core, Residential Flush Door Slab	215.96	50.99
01 95 08 00-0036 High Density Fiberboard Hollow Core Six Panel Door Slab (01 95 08 00-0020) Note: Includes preparing door for lockset and hinges.		
01 95 08 00-0037 EA 2'-0", 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door Slab	170.59	48.83
01 95 08 00-0038 EA 2'-4", 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door Slab	178.52	49.37
01 95 08 00-0039 EA 2'-6", 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door Slab	179.61	49.91
01 95 08 00-0040 EA 2'-8", 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door Slab	185.25	50.46
01 95 08 00-0041 EA 3'-0", 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door Slab	190.89	50.99
01 95 08 00-0042 Pre-Hung Lauan Faced Hollow Core Flush Door Slab And Frame (01 95 08 00-0020) Note: Includes hinges.		
01 95 08 00-0043 EA 2'-0", Pre-Hung 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door And Frame.....	245.04	67.81
01 95 08 00-0044 EA 2'-4", Pre-Hung 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door And Frame.....	250.03	69.17
01 95 08 00-0045 EA 2'-6", Pre-Hung 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door And Frame.....	257.30	70.53
01 95 08 00-0046 EA 2'-8", Pre-Hung 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door And Frame.....	264.58	71.88
01 95 08 00-0047 EA 3'-0", Pre-Hung 1-3/8" Unfinished, Lauan Faced, Hollow Core, Residential Flush Door And Frame.....	271.85	73.24
01 95 08 00-0048 Pre-Hung High Density Fiberboard Hollow Core Six Panel Door And Frame (01 95 08 00-0020) Note: Includes hinges.		
01 95 08 00-0049 EA 1'-6", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	269.24	65.10
01 95 08 00-0050 EA 2'-0", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	279.23	67.81
01 95 08 00-0051 EA 2'-4", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	295.62	69.17
01 95 08 00-0052 EA 2'-6", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	300.61	70.53
01 95 08 00-0053 EA 2'-8", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	307.89	71.88
01 95 08 00-0054 EA 3'-0", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	315.16	73.24

01	01 General Requirements
	01 95 Residential Construction
	01 95 08 Residential - Doors and Windows



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 08 00-0055 Residential Bi-Fold And Bi-Pass Doors (01 95 08)
See CSI section 08 13 76 00-0001 for bi-fold metal doors, 08 14 76 00-0001 for bi-fold wood doors.

01 95 08 00-0056 Residential Security Screens (01 95 08)

01 95 08 00-0057	EA Heavy Duty Aluminum Residential Security Screen Door, 0.028" Stainless Mesh, Hardware (Tapco Or Equal)	857.15	166.70
	<i>For Powder Coated Color, Add</i>	19.71	
01 95 08 00-0058	EA Heavy Duty Steel Residential Security Screen Door, 0.028" Stainless Steel Mesh, Powder Coated Color And Hardware (Summitt Or Rusco Or Equal)	891.30	166.70

01 95 08 00-0059 Residential Door Hardware (01 95 08)
See CSI section 08 71 11 00-2369 for residential locks and latches, 08 71 11 00-2380 for deadbolts.

01 95 08 00-0060	PR Exterior Residential Grade Door Hinges	66.42	10.93
01 95 08 00-0061	PR Interior Residential Grade Door Hinges	53.70	10.93
01 95 08 00-0062	EA 4" Modern Bright Brass Surface Bolt, Residential	47.19	12.03
01 95 08 00-0063	EA 6" Modern Bright Brass Surface Bolt, Residential	51.04	12.03
01 95 08 00-0064	EA 4" Modern Satin Chrome Surface Bolt, Residential	50.77	12.03
01 95 08 00-0065	EA 6" Modern Satin Chrome Surface Bolt, Residential	55.14	12.03
01 95 08 00-0066	EA Mortise Entry Lockset With Lever Handle, Schlage L9000-06A	756.18	27.33
01 95 08 00-0067	EA Interior Lockset With Knobs, Schlage Rhode Design "D" Series	529.27	50.73
01 95 08 00-0068	EA Interior Lockset With Knobs, Schlage Levon Design "A" Series	374.34	50.73

01 95 08 00-0069 Residential Door Accessories (01 95 08)

01 95 08 00-0070	EA Residential Chain Door Guard	52.43	10.84
01 95 08 00-0071	EA Residential Wall Mounted Door Bumper	26.86	5.43
01 95 08 00-0072	OPNG Residential Weatherstripping	86.90	9.49
01 95 08 00-0073	EA Residential Aluminum Threshold	58.22	9.49
01 95 08 00-0074	EA Residential Wood Threshold	62.74	9.49

01 95 08 00-0075 Residential Window Repair (01 95 08)
Note: Includes self adhering butyl rubber tape flashing at perimeter.

01 95 08 00-0076	EA Removal And Replacement Of Residential Window Sash Locks	17.05	
01 95 08 00-0077	EA Removal And Replacement Of Residential Window Lifts/Handles	16.38	
01 95 08 00-0078	EA Removal And Replacement Of Residential Window Balance, Complete (Per Balance)	20.32	
	<i>Note: Includes bracket, guides and support hardware.</i>		
01 95 08 00-0079	EA Removal And Replacement Of Residential Casement Window Fasteners	16.75	
01 95 08 00-0080	EA Removal And Replacement Of Residential Window Hooks	13.78	
01 95 08 00-0081	SF Removal And Replacement Of Residential Fiberglass Window Insect Screens	5.04	
01 95 08 00-0082	SF Removal And Replacement Of Residential Aluminum Window Insect Screens	5.07	

01 95 08 00-0083 Residential Window Barrier (01 95 08)

01 95 08 00-0084	SF Inoperable/Fixed, 12 Mesh (0.028") Stainless Steel Wire Cloth Infill, Level 5, Steel Narrowline Residential Security Screen (Kane SNR5Z)	27.50	0.70
01 95 08 00-0085	SF Operable, 12 Mesh (0.028") Stainless Steel Wire Cloth Infill, Level 5, Steel Narrowline Residential Security Screen (Kane SNR50)	41.55	0.70

01 95 09 Residential - Finishes (01 95)

01 95 09 00-0001 Residential Painting (01 95 09)

Note: Based on overall floor area square foot or Gross Square Foot (GSF). Includes all materials, surface preparation (wipe down and light clean, patching holes up to 3/8"), caulking and sealing, all finishes, surface protection, and masking tape.

01 95 09 00-0002	GSF One Coat Paint - Efficiency Unit	2.74	
01 95 09 00-0003	GSF One Coat Paint - One Bedroom Unit	2.70	
01 95 09 00-0004	GSF One Coat Paint - Two Bedroom Unit	2.66	
01 95 09 00-0005	GSF One Coat Paint - Three Bedroom Unit	2.61	
01 95 09 00-0006	GSF One Coat Paint - Four Bedroom Unit	2.58	
01 95 09 00-0007	GSF One Coat Paint - Five Bedroom Unit	2.54	
01 95 09 00-0008	GSF One Coat Paint - Six Bedroom Unit	2.49	
01 95 09 00-0009	GSF Two Coats Paint - Efficiency Unit	3.72	
01 95 09 00-0010	GSF Two Coats Paint - One Bedroom Unit	3.63	
01 95 09 00-0011	GSF Two Coats Paint - Two Bedroom Unit	3.59	
01 95 09 00-0012	GSF Two Coats Paint - Three Bedroom Unit	3.55	
01 95 09 00-0013	GSF Two Coats Paint - Four Bedroom Unit	3.50	
01 95 09 00-0014	GSF Two Coats Paint - Five Bedroom Unit	3.47	
01 95 09 00-0015	GSF Two Coats Paint - Six Bedroom Unit	3.42	
01 95 09 00-0016	GSF Paint Entire Residential Unit Complete	6.23	
	<i>Note: Includes doors, walls, moldings, kitchen, ceilings, etc. Includes preparation. Per SF of floor area. Combination semi-gloss and eggshell. Two coats paint or one coat primer and one coat paint.</i>		
	<i>For Each Additional Coat, Add</i>	2.26	
01 95 09 00-0017	GSF Paint Entire Residential Unit Complete Excluding Doors	5.72	
	<i>Note: Includes walls, moldings, kitchen, ceilings, etc. Includes preparation. Per SF of floor area. Combination semi-gloss and eggshell. Two coats paint or one coat primer and one coat paint.</i>		
	<i>For Each Additional Coat, Add</i>	2.07	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 09 00-0018 SF Paint Exterior Stucco Walls, 1 Coat Primer, Brush Roller Work.....	1.14	
<i>For Work >20' Above Floor, Add</i>	0.20	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Up To 100, Add</i>	0.66	
<i>For >100 To 250, Add</i>	0.32	
<i>For >250 To 500, Add</i>	0.14	
<i>For >2,500 To 5,000, Deduct</i>	-0.06	
<i>For >5,000 To 10,000, Deduct</i>	-0.11	
<i>For >10,000 To 20,000, Deduct</i>	-0.17	
<i>For >20,000, Deduct</i>	-0.23	
01 95 09 00-0019 SF Paint Exterior Stucco Walls, 2 Coats Paint, Brush Roller Work	2.41	
<i>For Work >20' Above Floor, Add</i>	0.41	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.41	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Up To 100, Add</i>	1.35	
<i>For >100 To 250, Add</i>	0.65	
<i>For >250 To 500, Add</i>	0.28	
<i>For >2,500 To 5,000, Deduct</i>	-0.12	
<i>For >5,000 To 10,000, Deduct</i>	-0.24	
<i>For >10,000 To 20,000, Deduct</i>	-0.36	
<i>For >20,000, Deduct</i>	-0.48	
01 95 09 00-0020 SF Paint Interior Plaster/Drywall Walls, 1 Coat Primer, Brush Roller Work.....	0.81	
<i>For Up To 100, Add</i>	0.45	
<i>For >100 To 250, Add</i>	0.22	
<i>For >250 To 500, Add</i>	0.09	
<i>For >2,500 To 5,000, Deduct</i>	-0.04	
<i>For >5,000 To 10,000, Deduct</i>	-0.08	
<i>For >10,000 To 20,000, Deduct</i>	-0.12	
<i>For >20,000, Deduct</i>	-0.16	
01 95 09 00-0021 SF Paint Interior Plaster/Drywall Walls, 2 Coats Paint, Brush Roller Work	1.61	
<i>For Up To 100, Add</i>	0.91	
<i>For >100 To 250, Add</i>	0.44	
<i>For >250 To 500, Add</i>	0.19	
<i>For >2,500 To 5,000, Deduct</i>	-0.08	
<i>For >5,000 To 10,000, Deduct</i>	-0.16	
<i>For >10,000 To 20,000, Deduct</i>	-0.24	
<i>For >20,000, Deduct</i>	-0.32	
01 95 09 00-0022 SF Paint Interior Drywall/Plaster Ceiling, 1 Coat Primer, Brush Roller Work.....	0.93	
<i>For Up To 100, Add</i>	0.54	
<i>For >100 To 250, Add</i>	0.26	
<i>For >250 To 500, Add</i>	0.11	
<i>For >2,500 To 5,000, Deduct</i>	-0.05	
<i>For >5,000 To 10,000, Deduct</i>	-0.09	
<i>For >10,000 To 20,000, Deduct</i>	-0.14	
<i>For >20,000, Deduct</i>	-0.19	
01 95 09 00-0023 SF Paint Interior Drywall/Plaster Ceiling, 2 Coats Paint, Brush Roller Work	1.69	
<i>For Up To 100, Add</i>	1.00	
<i>For >100 To 250, Add</i>	0.48	
<i>For >250 To 500, Add</i>	0.21	
<i>For >2,500 To 5,000, Deduct</i>	-0.08	
<i>For >5,000 To 10,000, Deduct</i>	-0.17	
<i>For >10,000 To 20,000, Deduct</i>	-0.25	
<i>For >20,000, Deduct</i>	-0.34	
01 95 09 00-0024 EA Paint Door, Each Face, 1 Coat Primer, Brush Roller Work.....	58.77	
<i>For >5 To 10, Deduct</i>	-2.94	
<i>For >10 To 25, Deduct</i>	-5.88	
<i>For >25, Deduct</i>	-8.82	
01 95 09 00-0025 EA Paint Door, Each Face, 2 Coats Paint, Brush Roller Work	107.01	
<i>For >5 To 10, Deduct</i>	-5.35	
<i>For >10 To 25, Deduct</i>	-10.70	
<i>For >25, Deduct</i>	-16.05	
01 95 09 00-0026 LF Paint Door Frame And Trim, 1 Coat Primer, Brush Roller Work	1.18	
01 95 09 00-0027 LF Paint Door Frame And Trim, 2 Coats Paint, Brush Roller Work	2.53	
01 95 09 00-0028 Residential Flooring <small>(01 95 09)</small>		
01 95 09 00-0029 Luxury Vinyl Tile (LVT) (Mohawk) <small>(01 95 09 00-0028)</small>		
01 95 09 00-0030 SF 2.5mm, Resilient Flooring, Glue Down Luxury Vinyl Tile (LVT) (Centrato C0104).....	5.64	1.33
<i>For Up To 20, Add</i>	1.75	
<i>For >20 To 40, Add</i>	1.02	
<i>For >40 To 80, Add</i>	0.40	
<i>For >1,000 To 3,000, Deduct</i>	-0.12	
<i>For >3,000 To 6,000, Deduct</i>	-0.30	
<i>For >6,000, Deduct</i>	-0.54	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	
01 95 09 00-0031 SF 2.5mm, Resilient Flooring, Glue Down Luxury Vinyl Tile (LVT) (Living Local C2039).....	6.29	1.33
<i>For Up To 20, Add</i>	1.85	
<i>For >20 To 40, Add</i>	1.08	
<i>For >40 To 80, Add</i>	0.43	
<i>For >1,000 To 3,000, Deduct</i>	-0.14	
<i>For >3,000 To 6,000, Deduct</i>	-0.33	
<i>For >6,000, Deduct</i>	-0.58	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	

01	01	General Requirements
	01 95	Residential Construction
	01 95 09	Residential - Finishes



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 09 00-0032 SF 2.5mm, Resilient Flooring, Glue Down Luxury Vinyl Tile (LVT) (Morikato Stone C0016).....	13.49	1.33
For Up To 20, Add	2.93	
For >20 To 40, Add	1.80	
For >40 To 80, Add	0.79	
For >1,000 To 3,000, Deduct	-0.28	
For >3,000 To 6,000, Deduct	-0.62	
For >6,000, Deduct	-1.01	
For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add	0.72	
01 95 09 00-0033 Carpet Tiles (Mohawk) (01 95 09 00-0028)		
Note: EcoFlex ICTbacked		
01 95 09 00-0034 SY 15 Ounce, Tufted, Nylon Carpet Tile (CEO II QB382)	32.82	5.33
For >200 To 400, Deduct	-0.40	
For >400 To 600, Deduct	-0.59	
For >600 To 900, Deduct	-1.18	
For >900 To 1,500, Deduct	-1.77	
For >1,500 To 2,200, Deduct	-2.63	
For >2,200 To 3,500, Deduct	-3.45	
For >3,500, Deduct	-4.27	
01 95 09 00-0035 SY 15 Ounce, Tufted, Nylon Carpet Tile (Artist II QB380).....	32.82	5.33
For >200 To 400, Deduct	-0.40	
For >400 To 600, Deduct	-0.59	
For >600 To 900, Deduct	-1.18	
For >900 To 1,500, Deduct	-1.77	
For >1,500 To 2,200, Deduct	-2.63	
For >2,200 To 3,500, Deduct	-3.45	
For >3,500, Deduct	-4.27	
01 95 09 00-0036 SY 19 Ounce, Tufted, Nylon Carpet Tile (Doctor II QB381).....	32.82	5.33
For >200 To 400, Deduct	-0.40	
For >400 To 600, Deduct	-0.59	
For >600 To 900, Deduct	-1.18	
For >900 To 1,500, Deduct	-1.77	
For >1,500 To 2,200, Deduct	-2.63	
For >2,200 To 3,500, Deduct	-3.45	
For >3,500, Deduct	-4.27	
01 95 09 00-0037 SY 18 Ounce, Tufted, Nylon Carpet Tile (New Basics III BT400).....	31.72	5.33
For >200 To 400, Deduct	-0.37	
For >400 To 600, Deduct	-0.56	
For >600 To 900, Deduct	-1.13	
For >900 To 1,500, Deduct	-1.70	
For >1,500 To 2,200, Deduct	-2.52	
For >2,200 To 3,500, Deduct	-3.31	
For >3,500, Deduct	-4.10	
01 95 09 00-0038 Broadloom Carpet (Mohawk) (01 95 09 00-0028)		
01 95 09 00-0039 SY 15 Ounce, Tufted Broadloom Carpet (CEO II BQ382).....	34.06	21.89
For Installation On Stairs, Each Riser, Add	6.00	
For Up To 15, Add	2.92	
For >15 To 33, Add	1.46	
For >200 To 400, Deduct	-0.39	
For >400 To 600, Deduct	-0.58	
For >600 To 900, Deduct	-1.19	
For >900, Deduct	-1.80	
01 95 09 00-0040 SY 17 Ounce, Tufted Broadloom Carpet (Artist II BQ380)	34.06	21.89
For Installation On Stairs, Each Riser, Add	6.00	
For Up To 15, Add	2.92	
For >15 To 33, Add	1.46	
For >200 To 400, Deduct	-0.39	
For >400 To 600, Deduct	-0.58	
For >600 To 900, Deduct	-1.19	
For >900, Deduct	-1.80	
01 95 09 00-0041 SY 19 Ounce, Tufted Broadloom Carpet (Doctor II BQ381)	34.06	21.89
For Installation On Stairs, Each Riser, Add	6.00	
For Up To 15, Add	2.92	
For >15 To 33, Add	1.46	
For >200 To 400, Deduct	-0.39	
For >400 To 600, Deduct	-0.58	
For >600 To 900, Deduct	-1.19	
For >900, Deduct	-1.80	
01 95 09 00-0042 Resilient Sheet Flooring (Mohawk) (01 95 09 00-0028)		
01 95 09 00-0043 SF 0.080", 20 mil Wear Layer, Resilient Sheet Flooring (Mohawk Juniperous C2043).....	5.69	0.66
01 95 09 00-0044 SF 0.080", 20 mil Wear Layer, Resilient Sheet Flooring (Mohawk Klei Firma C2047)	5.69	0.66

01 95 10 Residential - Specialties (01 95)

01 95 10 00-0001 Residential Toilet Accessories (01 95 10)
See CSI section 10 28 16 13-0001 for residential toilet accessories.

01 95 11 Residential - Equipment (01 95)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 11 00-0001 Residential Kitchen Equipment <small>(01 95 11)</small> See CSI section 11 30 13 00-0000 for residential appliances.		
01 95 11 00-0002 Refrigerators <small>(01 95 11 00-0001)</small> See CSI section 11 30 13 00-0042 for residential refrigerators.		
01 95 11 00-0003 Ranges <small>(01 95 11 00-0001)</small> See CSI section 11 30 13 13-0001 for ranges.		
01 95 22 Residential - Plumbing <small>(01 95)</small>		
01 95 22 00-0001 Residential Plumbing <small>(01 95 22)</small>		
01 95 22 00-0002 Residential Lavatory Faucets <small>(01 95 22 00-0001)</small> See CSI section 22 41 39 00-0010 for residential kitchen faucets, 22 42 39 00-0024 for additional lavatory faucets.		
01 95 22 00-0003 EA Lavatory Faucet, Single Handle, Polished Chrome, Moen CAL4621.....	254.37	41.34
01 95 22 00-0004 Residential Bathroom Tub/Shower Faucets And Trim <small>(01 95 22 00-0001)</small>		
01 95 22 00-0005 EA Posi-Temp Single Handle Tub/Shower Chrome Shower Valve, Moen Chateau L2353.....	258.74	49.83
01 95 22 00-0006 Residential Preassembled Vanities With Tops <small>(01 95 22 00-0001)</small>		
01 95 22 00-0007 EA 19" Preassembled Residential Vanity With Top (Glacier Bay GB18P2COM-WH).....	351.47	93.53
01 95 22 00-0008 EA 24-1/2" Preassembled Residential Vanity With Top (Glacier Bay GB24P2COM-WH).....	434.39	113.93
01 95 22 00-0009 EA 30-1/2" Preassembled Residential Vanity With Top (Glacier Bay GB30P2COM-WH).....	529.54	119.36
01 95 22 00-0010 Residential Kitchen Faucets And Trim <small>(01 95 22 00-0001)</small> See CSI section 22 41 39 00-0001 for residential kitchen faucets.		
01 95 22 00-0011 EA Kitchen Faucet, Single-Handle, Polished Chrome, Moen CA8710	257.98	57.41
01 95 22 00-0012 EA Kitchen Faucet, Single-Handle, Polished Chrome, Moen #7300	267.57	57.41
01 95 22 00-0013 Residential Water Heaters Parts And Accessories <small>(01 95 22 00-0001)</small>		
01 95 22 00-0014 EA Removal And Replacement Of Residential Pressure And Temperature Valve.....	170.46	
01 95 22 00-0015 EA Removal And Replacement Of Residential 9", 120 Volt, 1,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	129.40	
01 95 22 00-0016 EA Removal And Replacement Of Residential 9", 208 Volt, 2,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	142.25	
01 95 22 00-0017 EA Removal And Replacement Of Residential 16-1/2", 208 Volt, 3,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	194.33	
01 95 22 00-0018 EA Removal And Replacement Of Residential 16-1/2", 208 Volt, 4,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	194.33	
01 95 22 00-0019 EA Removal And Replacement Of Residential 16-1/2", 208 Volt, 4,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	195.14	
01 95 22 00-0020 EA Removal And Replacement Of Residential 16-1/2", 208 Volt, 5,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	200.76	
01 95 22 00-0021 EA Removal And Replacement Of Residential 16-1/2", 208 Volt, 6,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	196.48	
01 95 22 00-0022 EA Removal And Replacement Of Residential 9-1/4", 240 Volt, 1,000 Watt Screw-In Water Heater Element	122.70	
01 95 22 00-0023 EA Removal And Replacement Of Residential 9", 240 Volt, 1,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	134.49	
01 95 22 00-0024 EA Removal And Replacement Of Residential 11-1/2", 240 Volt, 2,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	136.82	
01 95 22 00-0025 EA Removal And Replacement Of Residential 11", 240 Volt, 2,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	136.55	
01 95 22 00-0026 EA Removal And Replacement Of Residential 13-1/2", 240 Volt, 3,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	150.08	
01 95 22 00-0027 EA Removal And Replacement Of Residential 13-3/4", 240 Volt, 3,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	150.88	
01 95 22 00-0028 EA Removal And Replacement Of Residential 16", 240 Volt, 4,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	183.35	
01 95 22 00-0029 EA Removal And Replacement Of Residential 13-3/4", 240 Volt, 4,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	156.24	
01 95 22 00-0030 EA Removal And Replacement Of Residential 16", 240 Volt, 5,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	188.44	
01 95 22 00-0031 EA Removal And Replacement Of Residential 13-1/2", 240 Volt, 5,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	163.74	
01 95 22 00-0032 EA Removal And Replacement Of Residential 16-1/2", 240 Volt, 6,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	185.49	
01 95 22 00-0033 EA Removal And Replacement Of Residential 16-1/2", 277 Volt, 3,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	199.16	
01 95 22 00-0034 EA Removal And Replacement Of Residential 16-1/2", 277 Volt, 4,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	207.46	
01 95 22 00-0035 EA Removal And Replacement Of Residential 16", 480 Volt, 2,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	170.22	
01 95 22 00-0036 EA Removal And Replacement Of Residential 16-1/2", 480 Volt, 3,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	198.62	
01 95 22 00-0037 EA Removal And Replacement Of Residential 16-1/2", 480 Volt, 4,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	207.73	

01	01 General Requirements
	01 95 Residential Construction
	01 95 22 Residential - Plumbing



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	01 95 22 00-0038	EA	Removal And Replacement Of Residential 16-1/2", 480 Volt, 4,500 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	208.53	
	01 95 22 00-0039	EA	Removal And Replacement Of Residential 16-1/2", 480 Volt, 5,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	208.53	
	01 95 22 00-0040	EA	Removal And Replacement Of Residential 16-1/2", 480 Volt, 6,000 Watt Screw-In Water Heater Element..... Note: Incoloy Nickel-base sheath elements.	203.98	
	01 95 22 00-0041		Residential Domestic Water Heater (01 95 22 00-0001)		
	01 95 22 00-0042	EA	40 Gallon, Gas Domestic Water Heater; Bradford White M-I-5036FBN	1,373.68	226.76
	01 95 22 00-0043	EA	38 Gallon, Gas Domestic Water Heater; Rheem #563688	1,439.71	226.76
	01 95 23 Residential - HVAC (01 95)				
	01 95 23 00-0001		Residential HVAC (01 95 23)		
	01 95 23 00-0002		Residential Furnaces (01 95 23 00-0001) Note: All units based on output.		
	01 95 23 00-0003	EA	35 MBH Top Vent Natural Gas Furnace; Williams Monterey #3509622	1,609.37	98.47
			Note: Blower cooling capacity up to 3 tons.		
	01 95 23 00-0004		Residential Furnace Repair Parts And Accessories (01 95 23 00-0001)		
	01 95 23 00-0005	EA	Removal And Replacement Of Residential Motor Blower Assembly	246.15	
	01 95 23 00-0006	EA	Removal And Replacement Of Residential Blower Assembly	840.95	
	01 95 23 00-0007	EA	Removal And Replacement Of Residential Heater/Furnace Door	67.29	
	01 95 23 00-0008	EA	Up To 4" Diameter Residential Roof Jack With Bird Screen And Back Draft Damper	124.54	43.91
	01 95 23 00-0009	EA	6" Diameter Residential Roof Jack With Bird Screen And Back Draft Damper	150.89	43.91
	01 95 23 00-0010		Residential Air Distribution (01 95 23 00-0001)		
	01 95 23 00-0011	EA	Removal And Replacement Of Residential Exhaust Fan.....	250.32	
	01 95 23 00-0012	EA	Removal And Replacement Of Residential Return Air Grills.....	68.90	
	01 95 23 00-0013	EA	Removal And Replacement Of Residential Air Registers	42.72	
	01 95 23 00-0014		Residential Thermostat (01 95 23 00-0001)		
	01 95 23 00-0015	EA	24 Volt AC, Heat Only, Residential Thermostat (Lightstat)	396.88	39.72
			Note: With automatic setback.		
	01 95 23 00-0016		Thru Wall Air Conditioner (01 95 23 00-0001)		
	01 95 23 00-0017	EA	14,800 BTU Packaged Terminal Air Conditioner with 14,000 Heat Pump BTU, R-410A Refrigerant, Electronic Touch Controls, LED Display and 4.5 Dehumidification Rate; GE #AZ61H15DAB	3,217.33	321.14
	01 95 26 Residential - Electrical (01 95)				
	01 95 26 00-0001		Residential Wire (01 95 26)		
	01 95 26 00-0002	LF	2 Conductors, 12 AWG, Residential Non-Metallic Sheathed, Solid Copper Cable	5.33	1.96
	01 95 26 00-0003	LF	2 Conductors, 10 AWG, Residential Non-Metallic Sheathed, Solid Copper Cable	6.04	1.96
	01 95 26 00-0004		Residential Lighting Fixtures (01 95 26) Note: Includes lamps.		
	01 95 26 00-0005		Residential Bedroom Fixtures (01 95 26 00-0004)		
	01 95 26 00-0006	EA	11" Round, Close To Ceiling, Incandescent Residential Fixture (Progress 3520-30).....	142.29	40.72
	01 95 26 00-0007	EA	12" Round, 2 - 13 Watt Lamps, Close To Ceiling, Compact Fluorescent Residential Fixture (Sea Gull 5902-15).....	194.94	40.72
	01 95 26 00-0008	EA	Globe, Close To Ceiling, Incandescent Residential Fixture (Progress 3605-30)	88.17	40.72
	01 95 26 00-0009	EA	Globe, Close To Ceiling, Incandescent Residential Fixture, With Pull Chain (Progress 3605-30SW)	103.76	40.72
	01 95 26 00-0010	EA	14" Round, Close To Ceiling, Compact Fluorescent Residential Fixture (Progress 7378-30)	227.38	40.72
	01 95 26 00-0011	EA	12" Square, Incandescent Residential Canopy (Progress 4962).....	88.49	40.72
	01 95 26 00-0012	EA	12" Square, Incandescent Residential Canopy (Progress 4961).....	87.35	40.72
	01 95 26 00-0013	EA	Square Ceiling Fixture, Two Light Incandescent, Westinghouse #66201	88.57	40.72
	01 95 26 00-0014	EA	6" Opal Ball Ceiling Mount Fixture, One Light; Sunset #F2203-30	65.95	24.45
	01 95 26 00-0015	EA	Slim line - 11" Diameter- 3" Low Profile Steel Fixture With Acrylic Lens (White) 13 Watt	111.33	30.17
	01 95 26 00-0016		Residential Bathroom Fixtures (01 95 26 00-0004)		
	01 95 26 00-0017	EA	Incandescent Residential Wall Fixture (Sea Gull 4450).....	102.94	40.72
	01 95 26 00-0018	EA	Incandescent Residential Wall Fixture (Westinghouse 66401)	79.06	40.72
	01 95 26 00-0019	EA	2 Lamps, Incandescent Residential Wall Fixture (Westinghouse 66403)	85.60	40.72
	01 95 26 00-0020	EA	70 CFM Bathroom Fan With Light; Nutone 668RP	270.83	61.24
	01 95 26 00-0021	EA	1250W/120V Ceiling Bath Heater; Broan #154.....	192.08	40.72
	01 95 26 00-0022		Residential Kitchen And Hallway Fixtures (01 95 26 00-0004) See CSI section 26 51 16 00-0209 for ceiling light fixtures.		
	01 95 26 00-0023	EA	5" x 26", 1 - 17 Watt, Vandal Resistant Fluorescent Fixture.....	593.40	40.72



General Requirements		01
Residential Construction		01 95
Residential - Electrical		01 95 26

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 26 00-0024	EA		9" x 26", 2 - 17 Watt, Vandal Resistant, Fluorescent Fixture	672.63	40.72
01 95 26 00-0025			Residential Exterior Fixtures (01 95 26 00-0004)		
01 95 26 00-0026	EA		Glass Globe, Incandescent Residential Wall Lantern (Progress Lighting P5602-31)	80.79	40.72
01 95 26 00-0027	EA		Glass Lens, Incandescent Residential Wall Lantern (Lumapro 3RB20)	118.22	40.72
01 95 26 00-0028	EA		Polycarbonate Lens, HPS Residential Wall Lantern (Lumapro 5MM60)	283.81	40.72
01 95 26 00-0029	EA		Motion Sensor, Zenith SL-5105	133.21	30.57
01 95 26 00-0030	EA		Exterior Porch Light, Incandescent, Rabb VAN1F-13	194.50	40.72
01 95 26 00-0031			Residential Alarms (01 95 26)		
01 95 26 00-0032	EA		Battery Operated, Residential Smoke Alarm (Kidde 0916E)	55.62	15.28
01 95 26 00-0033	EA		AC Powered, Residential Smoke Alarm (Kidde i12020)	81.63	30.57
01 95 26 00-0034	EA		Battery Operated, Residential Carbon Monoxide and Smoke Alarm (Kidde 900-0102)	146.02	15.28
01 95 26 00-0035	EA		AC Powered Wire-in Smoke Alarm, BRK 9120B	157.28	61.14
01 95 26 00-0036			Residential Breakers (01 95 26) See CSI section 26 28 16 13-0002 for circuit breakers.		
01 95 99 92			Los Angeles County Lead Remediation Program (01 95)		
01 95 99 92-0001			Construction Dumpsters Rental (01 95 99 92) Note: Includes service to delivery and pick-up of dumpster, hauling of debris, rental of dumpster and all applicable non-hazardous disposal fees. Cost of "each" is based on each pick-up. Unacceptable materials include: aerosol cans, all liquids, animals, antifreeze, appliances, asbestos, barrels, batteries, chemical products, computers, contaminated oils (mixed with solvents, gasoline, etc.), dirt, fluorescent tubes, hazardous waste, herbicides & pesticides, industrial waste, lubricating/hydraulic oil, mattresses, medical waste, microwaves, monitors, motor oil, oil filters, other flammable liquids, paint (except completely dried latex paint cans, no liquids), petroleum-contaminated soil/lead paint chips, propane tanks, radioactive material, railroad ties, solvents, televisions, tires, and transmission oil.		
01 95 99 92-0002	EA		10 CY Dumpster "Construction Debris" Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	475.49	
01 95 99 92-0003	EA		20 CY Dumpster "Construction Debris" Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	599.68	
01 95 99 92-0004	EA		40 CY Dumpster "Construction Debris" Note: Includes delivery of dumpster, rental cost, pick-up cost, hauling, and disposal fee. Non-hazardous material.	824.60	
01 95 99 92-0005			Asbestos Abatement And Disposal (01 95 99 92) Note: Tasks include materials, equipment, mobilization, preparation, critical barriers (e.g. electrical outlets, registers, windows, etc.), signage, removal, lockdown encapsulant applied to surfaces, clean-up, vacuuming, transportation for up to 25 miles, disposal of waste at transfer facility or final destination, personnel health monitoring, negative air, documentation and other associated costs necessary for the complete abatement and disposal of the ACM in accordance with EPA, OSHA, and local regulations. Where types of ACM are listed by quantity, the quantity of the entire project, not a particular work area, is to be used in determining which task applies. For certain types of work, there is a task with a unit of measure of SET for a quantity of less than 10 LF or SF (10 LF to 20 LF for ACM pipe insulation), followed by a series of tasks for other quantities. For those tasks the contractor will be paid the first task with a unit of measure of EA, plus an additional task to arrive at the appropriate quantity for the project. This does not apply to glove bag projects.		
01 95 99 92-0006			Minimum Charge For Asbestos Remediation (01 95 99 92-0005)		
01 95 99 92-0007	EA		Asbestos Remediation Minimum Show Up Charge Note: For projects where the total asbestos remediation charge is less than the minimum charge, use task "Minimum Charge For Asbestos Remediation" exclusively. Task "Minimum Charge For Asbestos Remediation" should not be used in conjunction with any other tasks in this section. Includes air sample and personal air monitoring.	1,343.83	
01 95 99 92-0008			Surfacing Material, Asbestos Abatement And Disposal (01 95 99 92-0005)		
01 95 99 92-0009			Gypsum Wall Board, Asbestos Abatement And Disposal (01 95 99 92-0008)		
01 95 99 92-0010	SET		Up To 50 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	877.01 237.14	
01 95 99 92-0011	SF		>50 To 500 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	17.26 4.67	
01 95 99 92-0012	SF		>500 To 2,500 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	12.68 3.41	
01 95 99 92-0013	SF		>2,500 To 10,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	9.99 2.67	
01 95 99 92-0014	SF		>10,000 To 50,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	7.84 2.08	
01 95 99 92-0015	SF		>50,000 To 100,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	6.22 1.63	
01 95 99 92-0016	SF		>100,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal For Additional Layer, Add	5.03 1.30	
01 95 99 92-0017			Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal (01 95 99 92-0008)		
01 95 99 92-0018	SET		Up To 25 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal	869.67	

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 92 Los Angeles County Lead Remediation Program	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0019 SF >25 To 500 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal.....	32.52	
01 95 99 92-0020 SF >500 To 2,500 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal	23.90	
01 95 99 92-0021 SF >2,500 To 10,000 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal.....	18.72	
01 95 99 92-0022 SF >10,000 To 50,000 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal	14.63	
01 95 99 92-0023 SF >50,000 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal.....	10.53	
01 95 99 92-0024 Spray On Acoustical Ceiling, Asbestos Abatement And Disposal (01 95 99 92-0008)		
01 95 99 92-0025 SET Up To 50 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal	877.01	
01 95 99 92-0026 SF >50 To 500 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	14.66	
01 95 99 92-0027 SF >500 To 2,500 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	11.37	
01 95 99 92-0028 SF >2,500 To 10,000 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	8.38	
01 95 99 92-0029 SF >10,000 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	6.34	
01 95 99 92-0030 Roofing, Asbestos Abatement And Disposal (01 95 99 92-0005)		
01 95 99 92-0031 Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal (01 95 99 92-0030)		
Note: Includes roofing, flashing, sheet metal, insulation, pitch pockets, board etc.		
01 95 99 92-0032 Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal (01 95 99 92-0031)		
01 95 99 92-0033 SET Up To 125 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	1,114.63	
01 95 99 92-0034 SF >125 To 1,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	8.56	
01 95 99 92-0035 SF >1,000 To 5,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	6.91	
01 95 99 92-0036 SF >5,000 To 10,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	5.58	
01 95 99 92-0037 SF >10,000 To 20,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	4.25	
01 95 99 92-0038 SF >20,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	3.27	
01 95 99 92-0039 Shingles And Felt Roofing, Asbestos Abatement And Disposal (01 95 99 92-0030)		
01 95 99 92-0040 SET Up To 125 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal	1,087.07	
Note: Single or first of multiple layers.		
01 95 99 92-0041 SF >125 To 1,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal.....	8.34	
Note: Single or first of multiple layers.		
01 95 99 92-0042 SF >1,000 To 5,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal.....	6.69	
Note: Single or first of multiple layers.		
For Each Additional Layer, Add		
	1.67	
01 95 99 92-0043 SF >5,000 To 10,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal.....	5.36	
Note: Single or first of multiple layers.		
For Each Additional Layer, Add		
	1.07	
01 95 99 92-0044 SF >10,000 To 20,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal.....	4.03	
Note: Single or first of multiple layers.		
For Each Additional Layer, Add		
	0.81	
01 95 99 92-0045 SF >20,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal.....	3.05	
Note: Single or first of multiple layers.		
For Each Additional Layer, Add		
	0.61	
01 95 99 92-0046 Roof Penetration Mastic, Asbestos Abatement And Disposal (01 95 99 92-0030)		
01 95 99 92-0047 SET Up To 10 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal	270.21	
01 95 99 92-0048 SF >10 To 50 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	3.30	
01 95 99 92-0049 SF >50 To 100 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	2.72	
01 95 99 92-0050 SF >100 To 250 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	2.21	
01 95 99 92-0051 SF >250 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	1.62	
01 95 99 92-0052 Lead Remediation (01 95 99 92)		
Note: Tasks include materials, equipment, mobilization, preparation, critical barriers (e.g. electrical outlets, registers, windows, etc.), signage, removal, clean-up, vacuuming, transportation for up to 25 miles, disposal, personnel health monitoring, negative air, documentation and other associated costs necessary for the complete removal and disposal of lead contaminated materials in accordance with EPA and local regulations. Where types of Lead are listed by quantity, the quantity of the entire project, not a particular work area, is to be used in determining which task applies.		
01 95 99 92-0053 Minimum Charge For Lead-Based Paint Remediation (01 95 99 92-0052)		
01 95 99 92-0054 EA Lead-Based Paint Remediation Minimum Show Up Charge.....	1,288.03	
Note: For projects where the total lead-based paint remediation charge is less than the minimum charge, use task "Minimum Charge For Lead-Based Paint Remediation" exclusively. Task "Minimum Charge For Lead-Based Paint Remediation" should not be used in conjunction with any other tasks in this section. Includes air sample and personal air monitoring.		

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 99 92-0055
Chemical Stripping Of Lead Contaminated Material (01 95 99 92-0052)

Note: Per 0.02" (20 mils) application. Manufacture recommended operating temperatures not to be below 50 degrees. Includes heat gun (where required) for follow up, waste handling, packing and all personnel blood work, lab test fees and monitoring. Industrial coatings often contain other hazardous ingredients in addition to or in place of lead. These might include, but are not be limited to, chromium, cadmium and mercury.

01 95 99 92-0056	SF	Balustrades, Chemical Stripping Of Lead Contaminated Material	37.41
01 95 99 92-0057	SF	Balustrades, Ornate, Chemical Stripping Of Lead Contaminated Material	55.49
01 95 99 92-0058	LF	Up To 6" Wide, Wood Trim, Chemical Stripping Of Lead Contaminated Material	16.07
01 95 99 92-0059	LF	>6" To 12" Wide, Wood Trim, Chemical Stripping Of Lead Contaminated Material	32.81
01 95 99 92-0060	SF	Cornice, Chemical Stripping Of Lead Contaminated Material	17.46
01 95 99 92-0061	SF	Cornice, Ornate, Chemical Stripping Of Lead Contaminated Material	49.46
01 95 99 92-0062	SF	Brick, Concrete Block, Concrete, Chemical Stripping Of Lead Contaminated Material	10.77
01 95 99 92-0063	SF	Cabinets, Chemical Stripping Of Lead Contaminated Material	31.27
01 95 99 92-0064	SF	Cabinets, Ornate, Chemical Stripping Of Lead Contaminated Material	39.86
01 95 99 92-0065	SF	Plaster, Stucco and Drywall Surfaces, Chemical Stripping Of Lead Contaminated Material	14.85
01 95 99 92-0066	SF	Columns, Chemical Stripping Of Lead Contaminated Material	14.27
01 95 99 92-0067	SF	Flush Doors, One Side, Chemical Stripping Of Lead Contaminated Material	12.57
01 95 99 92-0068	SF	Raised Panel Doors and Decorative Doors, Chemical Stripping Of Lead Contaminated Material	13.11
01 95 99 92-0069	SF	Sectional Panel Or Roll-Up Doors, Chemical Stripping Of Lead Contaminated	22.77
01 95 99 92-0070	EA	Electrical Devices, Chemical Stripping Of Lead Contaminated Material	65.08
01 95 99 92-0071	LF	Door Frames, Chemical Stripping Of Lead Contaminated Material	16.14
01 95 99 92-0072	SF	Wood Floors, Chemical Stripping Of Lead Contaminated Material	8.87
01 95 99 92-0073	SF	HVAC Grilles, Chemical Stripping Of Lead Contaminated Material	33.42
01 95 99 92-0074	SF	HVAC Grilles, Ornate, Chemical Stripping Of Lead Contaminated Material	39.86
01 95 99 92-0075	EA	Hinges, Chemical Stripping Of Lead Contaminated Material	20.93
01 95 99 92-0076	EA	Up To 6" Diameter Hangers, Chemical Stripping Of Lead Contaminated Material	25.79
01 95 99 92-0077	LF	Up To 2" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material	7.19
01 95 99 92-0078	LF	>2" To 4" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material	11.56
01 95 99 92-0079	LF	>4" To 8" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material	20.68
01 95 99 92-0080	LF	>8" To 12" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material	28.34
01 95 99 92-0081	LF	>12" To 16" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material	50.82
01 95 99 92-0082	SF	>16" Diameter Pipes, Chemical Stripping Of Lead Contaminated Material, SF Of Surface Area	15.18
01 95 99 92-0083	EA	Up To 12 SF Radiators, Chemical Stripping Of Lead Contaminated Material	301.96
01 95 99 92-0084	SF	Flat And Raised Panel Wood Shutters, Chemical Stripping Of Lead Contaminated Material	21.13
01 95 99 92-0085	SF	Louvered Wood Shutters, Chemical Stripping Of Lead Contaminated Material	23.13
01 95 99 92-0086	SF	Siding, Chemical Stripping Of Lead Contaminated Material	12.06
01 95 99 92-0087	SF	Soffit, Chemical Stripping Of Lead Contaminated Material	25.29
01 95 99 92-0088	SF	Flat Steel Surfaces, Chemical Stripping Of Lead Contaminated Material	11.63
01 95 99 92-0089	SF	Corrugated Steel, Chemical Stripping Of Lead Contaminated Material	13.20
01 95 99 92-0090	SF	Steel Beams and Columns, Chemical Stripping Of Lead Contaminated Material	13.17
01 95 99 92-0091	SF	Trusses, Chemical Stripping Of Lead Contaminated Material	18.67
01 95 99 92-0092	SF	Wood Surfaces, Chemical Stripping Of Lead Contaminated Material	13.17
01 95 99 92-0093	SF	Windows, One Side, 1/1 Light, Chemical Stripping Of Lead Contaminated Material	30.35
01 95 99 92-0094	SF	Windows, One Side, 2/2 Light, Chemical Stripping Of Lead Contaminated Material	33.22
01 95 99 92-0095	SF	Windows, One Side, 4/4 Light, Chemical Stripping Of Lead Contaminated Material	35.16
01 95 99 92-0096	SF	Windows, One Side, 6/6 Light, Chemical Stripping Of Lead Contaminated Material	37.11
01 95 99 92-0097	SF	Windows, One Side, 8/8 Light Chemical Stripping Of Lead Contaminated Material	39.05
01 95 99 92-0098	SF	Windows, One Side, 10/10 Light, Chemical Stripping Of Lead Contaminated Material	41.06
01 95 99 92-0099	SF	Windows, One Side, 12/12 light Chemical Stripping Of Lead Contaminated Material	42.95
01 95 99 92-0100	SF	Windows, One Side, 14/14 Light, Chemical Stripping Of Lead Contaminated Material	43.93
01 95 99 92-0101	SF	Windows, One Side, 16/16 Light Chemical Stripping Of Lead Contaminated Material	44.91
01 95 99 92-0102	SF	Windows, One Side, 20/20 Light, Chemical Stripping Of Lead Contaminated Material	45.86
01 95 99 92-0103	SF	Metal Stairs, Chemical Stripping Of Lead Contaminated Material	60.59
01 95 99 92-0104	LF	Metal Single Hand Rail, Chemical Stripping Of Lead Contaminated Material	10.52
01 95 99 92-0105	SF	Metal Railing And Posts, Chemical Stripping Of Lead Contaminated Material	30.79
		Note: The unit of measure "SF" is measured for "Length x Height". Work includes both sides of railing.	
01 95 99 92-0106	SF	Metal Picket Fence, Chemical Stripping Of Lead Contaminated Material	33.67
01 95 99 92-0107	LF	Window Sill Wood Trim, Chemical Stripping Of Lead Contaminated Material	8.41
		For 0.025" (25 mil) Application, Add	0.57
		For 0.03" (30 mil) Application, Add	0.95
		For 0.125" (125 mil) Application, Add	6.60
01 95 99 92-0108	LF	Window Jamb Wood Trim, Chemical Stripping Of Lead Contaminated Material	14.90
		For 0.025" (25 mil) Application, Add	0.90
		For 0.03" (30 mil) Application, Add	1.44
		For 0.125" (125 mil) Application, Add	8.23
01 95 99 92-0109	LF	Window Sash Wood Trim, Chemical Stripping Of Lead Contaminated Material	12.22
		For 0.025" (25 mil) Application, Add	0.76
		For 0.03" (30 mil) Application, Add	1.24
		For 0.125" (125 mil) Application, Add	7.56
01 95 99 92-0110	LF	Door Threshold, Wood Trim, Chemical Stripping Of Lead Contaminated Material	16.14
		For 0.025" (25 mil) Application, Add	1.01
		For 0.03" (30 mil) Application, Add	1.64

01 95 99 92-0111
Demolish Lead Contaminated Material (01 95 99 92-0052)

Note: Includes waste handling, packing, all personnel blood work, lab test fees and monitoring. Industrial coatings often contain other hazardous ingredients in addition to or in place of lead. These might include, but are not be limited to, chromium, cadmium and mercury.

01 95 99 92-0112	SF	Demolish Ceiling Suspension System, Lead Contaminated Material	2.66
01 95 99 92-0113	SF	Demolish Plaster Or Stucco, And Lath, Lead Contaminated Material	3.87
01 95 99 92-0114	SF	Demolish Walls, Gypsum Board, Lead Contaminated Material	1.25
01 95 99 92-0115	SF	Demolish Suspended Ceiling System And Tile, Lead Contaminated Material	1.55

01 General Requirements**01 95 Residential Construction****01 95 99 92 Los Angeles County Lead Remediation Program**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 95 99 92-0116	SF	Demolish Acoustical Ceiling Tile, Lead Contaminated Material	0.99
01 95 99 92-0117	SF	Demolish Metal Pan Grid System, Lead Contaminated Material	1.54
01 95 99 92-0118	EA	Demolish Ceiling And Recessed Light Fixtures, Lead Contaminated Material	74.34
01 95 99 92-0119	EA	Demolish >2' x 4' Light Fixtures, Lead Contaminated Material	98.61
01 95 99 92-0120	SF	Demolish Non Load Bearing Partitions Of Plaster Or Stucco, Lath And Studs, Lead Contaminated Material	11.02
01 95 99 92-0121	SF	Demolish Non Load Bearing Partitions Of Gypsum Board And Studs, Lead Contaminated Material	6.17
01 95 99 92-0122	SF	Demolish Brick, Lead Contaminated Material	4.64
01 95 99 92-0123	SF	Demolish Concrete Block, Lead Contaminated Material	5.98
01 95 99 92-0124	SF	Demolish Tile, Lead Contaminated Material	4.50
01 95 99 92-0125	SF	Removal Of Lead Paint On Brick Or Concrete Block, Lead Contaminated Material	6.77
01 95 99 92-0126	IN	Drilling, Up To 1/2" Diameter In Lead Paint/Asbestos Material Per Inch Of Depth	5.26
01 95 99 92-0127	IN	Drilling, >1/2" To 1" Diameter In Lead Paint/Asbestos Material Per Inch Of Depth	7.01
01 95 99 92-0128	LF	Demolish Wood Balustrades And Railings, Lead Contaminated Material	7.71
01 95 99 92-0129	LF	Demolish Up To 6" Wide Baseboard, Lead Contaminated Material	2.00
01 95 99 92-0130	LF	Demolish >6" To 12" Wide Baseboard, Lead Contaminated Material	2.51
01 95 99 92-0131	LF	Demolish Base Shoe Molding, Lead Contaminated Material	1.64
01 95 99 92-0132	SF	Demolish Concrete, Lead Contaminated Material	15.34
01 95 99 92-0133	LF	Demolish Cabinets, Lead Contaminated Material	35.72
01 95 99 92-0134	SF	Demolish Ceilings, Gypsum Board, Lead Contaminated Material	2.02
01 95 99 92-0135	SF	Demolish Up To 12" Diameter Columns, Lead Contaminated Material	19.79
01 95 99 92-0136	SF	Demolish Cornice, Lead Contaminated Material	2.63
01 95 99 92-0137	EA	Demolish Doors, Lead Contaminated Material	77.47
01 95 99 92-0138	LF	Demolish Door And Window Trim Or Frames, Lead Contaminated Material	2.36
01 95 99 92-0139	EA	Demolish Electrical Devices, Lead Contaminated Material	23.77
01 95 99 92-0140	LF	Demolish Up To 1" Diameter Electrical Conduit, Lead Contaminated Material	3.05
01 95 99 92-0141	LF	Demolish >1" To 2" Diameter Electrical Conduit, Lead Contaminated Material	5.08
01 95 99 92-0142	SF	Demolish Wood Floors, Lead Contaminated Material	3.66
01 95 99 92-0143	SF	Demolish Grilles, Lead Contaminated Material	4.30
01 95 99 92-0144	EA	Demolish Hinges, Lead Contaminated Material	8.64
01 95 99 92-0145	EA	Demolish Up To 6" Diameter Hangers, Lead Contaminated Material	18.57
01 95 99 92-0146	LF	Demolish Up To 2" Diameter Pipes, Lead Contaminated Material	7.62
01 95 99 92-0147	LF	Demolish >2" To 4" Diameter Pipes, Lead Contaminated Material	11.11
01 95 99 92-0148	LF	Demolish >4" To 8" Diameter Pipes, Lead Contaminated Material	16.79
01 95 99 92-0149	LF	Demolish >8" To 12" Diameter Pipes, Lead Contaminated Material	30.96
01 95 99 92-0150	EA	Demolish Radiators, Lead Contaminated Material	133.73
01 95 99 92-0151	EA	Demolish Shutters, Lead Contaminated Material	52.11
01 95 99 92-0152	SF	Demolish Siding, Lead Contaminated Material	2.07
01 95 99 92-0153	SF	Demolish Soffit, Lead Contaminated Material	1.76
01 95 99 92-0154	SF	Demolish Flat Steel Surfaces, Lead Contaminated Material	4.82
01 95 99 92-0155	SF	Demolish Steel Beams, Lead Contaminated Material	5.68
01 95 99 92-0156	SF	Demolish Trusses, Lead Contaminated Material	7.44
01 95 99 92-0157	SF	Demolish Walls, Wood, Lead Contaminated Material	5.51
01 95 99 92-0158	SF	Demolish Windows, Lead Contaminated Material	18.51
01 95 99 92-0159	SF	Demolish Metal Stair, Lead Contaminated Material	8.85
01 95 99 92-0160	LF	Demolish Single Metal Hand Rail, Lead Contaminated Material	6.50
01 95 99 92-0161	LF	Demolish Metal Railing And Posts, Lead Contaminated Material	10.63
01 95 99 92-0162	SF	Demolish Metal Picket Fence, Lead Contaminated Material	2.93
01 95 99 92-0163	SF	Demolish Plywood, Lead Contaminated Material	7.99
01 95 99 92-0164	SF	Demolish Planks (Various Sizes), Lead Contaminated Material	3.90
01 95 99 92-0165	EA	Demolish Metal Brackets Or Other Small Metal Shapes, Lead Contaminated Material	24.40
01 95 99 92-0166	SF	Demolish Ceramic Tile Block, Lead Contaminated Material	5.33
01 95 99 92-0167	LF	Demolish Metal Guard Rails, Lead Contaminated Material	14.64
01 95 99 92-0168	LF	Demolish Roof Metal Trim, Lead Contaminated Material	3.13
01 95 99 92-0169	LF	Demolish Rain Gutters, Lead Contaminated Material	5.37
01 95 99 92-0170	LF	Demolish Downspouts, Lead Contaminated Material	4.40
01 95 99 92-0171	LF	Demolish Roof Metal Flashing, Lead Contaminated Material	3.13
01 95 99 92-0172	LF	Demolish Fascia Board Up To 12", Lead Contaminated Material	7.81
01 95 99 92-0173	SF	Demolish And Replace Foundation Crawlspace Vent Cover/Frame (Wood) With New Material, Including 1/4" Galvanized Wire Mesh Screen	25.47
01 95 99 92-0174	SF	Demolish And Replace Foundation Vent / Exterior Attic Vent Cover/Frame (Wood) With New Material, Including 1/4" Galvanized Wire Mesh Screen	34.25

01 95 99 92-0175 Wet Sanding Of Lead Contaminated Material (01 95 99 92-0052)

01 95 99 92-0176	SF	Wet Sand/Scrape Of Lead Contaminated Material For Prep Before New Paint	3.71
01 95 99 92-0177	SF	Fascia Boards, Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	3.71
01 95 99 92-0178	SF	Eaves, Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	3.71
01 95 99 92-0179	SF	Rafter Tails, Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	3.71
01 95 99 92-0180	LF	Up To 6" Wide, Baseboard/Crown Molding (Simple), Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	1.86
01 95 99 92-0181	LF	Up To 6" Wide, Baseboard/Crown Molding (Ornate), Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	2.15
01 95 99 92-0182	LF	>6" To 12" Wide, Baseboard/Crown Molding (Ornate), Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	4.29
01 95 99 92-0183	SF	Foundation Crawlspace Vent Cover/Frame (Wood), Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	3.71
01 95 99 92-0184	SF	Foundation Vent / Exterior Attic Vent Cover/Frame (Wood), Wet Scrape/Remove Loose, Flaking Lead-Based Paint (LBP) To Prepare For Painting	4.09



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 99 92-0185

Lead Abatement Encapsulation (01 95 99 92-0052)

Note: Can also be used for asbestos contaminated encapsulation. Spray applied application unless task described otherwise. Encapsulation does not include paint.

01 95 99 92-0186	SF	Balustrades, Lead Abatement Encapsulation	6.72	
01 95 99 92-0187	LF	Up To 6" Wide, Baseboard, Lead Abatement Encapsulation	7.76	
01 95 99 92-0188	LF	>6" To 12" Wide, Baseboard, Lead Abatement Encapsulation	10.47	
01 95 99 92-0189	SF	Brick, Concrete Block, Concrete, Lead Abatement Encapsulation	4.32	
01 95 99 92-0190	SF	Ornate Cabinets, Lead Abatement Encapsulation	9.74	
01 95 99 92-0191	SF	Simple Design Cabinets, Lead Abatement Encapsulation	7.93	
01 95 99 92-0192	SF	Drywall Ceilings, Lead Abatement Encapsulation	2.70	
01 95 99 92-0193	SF	Wood Ceilings, Lead Abatement Encapsulation	3.28	
01 95 99 92-0194	SF	Acoustical And Popcorn Ceilings, Lead Abatement Encapsulation	3.04	
01 95 99 92-0195	SF	Columns, Lead Abatement Encapsulation	5.22	
01 95 99 92-0196	SF	Doors, Lead Abatement Encapsulation	11.44	
01 95 99 92-0197	LF	Up To 2" Electrical Conduit, Lead Abatement Encapsulation	4.40	
01 95 99 92-0198	SF	Picket Fence (Brush), Lead Abatement Encapsulation	3.11	
01 95 99 92-0199	SF	Wood Floors (Roller), Lead Abatement Encapsulation	2.60	
01 95 99 92-0200	SF	Grilles, Vents, Lead Abatement Encapsulation	7.26	
01 95 99 92-0201	LF	Gutters And Downspouts, Lead Abatement Encapsulation	6.72	
01 95 99 92-0202	EA	Hangers, Lead Abatement Encapsulation	57.40	
01 95 99 92-0203	LF	Up To 4" Diameter Pipe (Brush), Lead Abatement Encapsulation	4.08	
01 95 99 92-0204	LF	>4" To 8" Diameter Pipe (Brush), Lead Abatement Encapsulation	5.88	
01 95 99 92-0205	LF	>8" To 12" Diameter Pipe (Brush), Lead Abatement Encapsulation	9.09	
01 95 99 92-0206	LF	>12" To 16" Diameter Pipe (Brush), Lead Abatement Encapsulation	13.42	
01 95 99 92-0207	EA	Radiators, Lead Abatement Encapsulation	245.33	
01 95 99 92-0208	EA	Up To 6' Shutters, Lead Abatement Encapsulation	211.97	
01 95 99 92-0209	SF	Siding, Lead Abatement Encapsulation	3.71	
01 95 99 92-0210	SF	Up To 12" Soffit, Lead Abatement Encapsulation	5.22	
01 95 99 92-0211	SF	Steel, Flat Surfaces And Tanks Up To 12", Lead Abatement Encapsulation	4.32	
01 95 99 92-0212	SF	Steel Beams And Metal Decks, Lead Abatement Encapsulation	5.65	
01 95 99 92-0213	SF	Trusses, Lead Abatement Encapsulation	5.65	
01 95 99 92-0214	SF	Drywall Walls, Lead Abatement Encapsulation	2.40	
01 95 99 92-0215	SF	Wood Walls, Lead Abatement Encapsulation	2.96	
01 95 99 92-0216	EA	Window Without Grille, Lead Abatement Encapsulation	212.32	
01 95 99 92-0217	EA	Window With Grille, Lead Abatement Encapsulation	249.52	
01 95 99 92-0218	LF	Frames And Trim, Lead Abatement Encapsulation	3.85	
01 95 99 92-0219	LF	Steel Lintels, Lead Abatement Encapsulation	4.42	
01 95 99 92-0220	LF	Wood Fascia Boards, Lead Abatement Encapsulation	11.74	
01 95 99 92-0221	SF	Wood Eaves, Lead Abatement Encapsulation	11.74	
01 95 99 92-0222	LF	Wood Window Sill, Lead Abatement Encapsulation	3.52	
01 95 99 92-0223	LF	Wood Window Sash, Lead Abatement Encapsulation	4.52	
01 95 99 92-0224	LF	Wood Window Jamb And Trim, Lead Abatement Encapsulation	6.34	
01 95 99 92-0225	LF	Wood Doorway Threshold, Lead Abatement Encapsulation	4.24	
01 95 99 92-0226	LF	Up To 6" Wide, Crown Molding (Simple), Lead Abatement Encapsulation	6.67	
01 95 99 92-0227	LF	>6" To 12" Wide, Crown Molding (Simple), Lead Abatement Encapsulation	9.05	
01 95 99 92-0228	LF	Up To 6" Wide, Crown Molding (Ornate), Lead Abatement Encapsulation	8.29	
01 95 99 92-0229	LF	>6" To 12" Wide, Crown Molding (Ornate), Lead Abatement Encapsulation	11.20	
01 95 99 92-0230	SF	Foundation Crawlspace Vent Cover/Frame (Wood) - Lead Abatement Encapsulation	9.74	
01 95 99 92-0231	SF	Foundation Vent / Exterior Attic Vent Cover/Frame (Wood) - Lead Abatement Encapsulation	11.10	

01 95 99 92-0232

Removal By Heat Gun Of Lead Contaminated Material (01 95 99 92-0052)

Note: Remove of multi-layers of paint down to substrate

01 95 99 92-0233	SF	Scrape And Removal Of Multi-layers Of Paint With Heat Gun	7.23	
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01 95 99 92-0234

Barriers And Protection (01 95 99 92)

Note: Includes removal and disposal after use.

01 95 99 92-0235

Hazmat Containment Construction (01 95 99 92-0234)

01 95 99 92-0236	SF	6 Mil Plastic Sheeting, Applied To Floors, Hazmat Containment Construction	0.52	
01 95 99 92-0237	SF	6 Mil Plastic Sheeting, Applied To Walls, Hazmat Containment Construction	0.68	
01 95 99 92-0238	SF	6 Mil Plastic Sheeting, Applied To Ceilings, Hazmat Containment Construction	0.91	

01 95 99 92-0239

Decontamination Chambers (01 95 99 92)

Note: Includes removal after use.

01 95 99 92-0240	EA	Portable Personnel Decontamination Wash Facility (3 Stage)	978.43	
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Note: Includes connection to negative air system.

01 95 99 92-0241

Residential Wood Hand Rails (01 95 99 92)

01 95 99 92-0242	EA	Brackets For Residential Hand Rails	43.03	13.34
01 95 99 92-0243	LF	2-1/4" x 2-3/8" Oak Colonial Residential Handrail	22.17	7.59
01 95 99 92-0244	LF	2-1/4" x 2-3/8" Hemlock Colonial Residential Handrail	19.66	7.59
01 95 99 92-0245	LF	2-1/4" x 2-3/8" Poplar Colonial Residential Handrail	21.99	7.59
01 95 99 92-0246	LF	1-5/8" x 1-1/16" Pine Oval Residential Handrail	16.20	7.59
01 95 99 92-0247	LF	1-1/4" x 2-1/4" Pine Oval Residential Handrail	16.29	7.59
01 95 99 92-0248	LF	2-1/4" x 1-5/16" Poplar Oval Residential Handrail	17.11	7.59
01 95 99 92-0249	LF	1-3/4" x 1-5/8" Oak Oval Residential Handrail	18.50	7.59
01 95 99 92-0250	LF	2-1/4" x 1-1/2" Oak Oval Residential Handrail	18.75	7.59

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 92	Los Angeles County Lead Remediation Program



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 99 92-0251	Residential Wood Shelving <small>(01 95 99 92)</small>		
	Note: Wood shelving is clear or finger jointed pine, poplar, laminated particle board or medium-density fiberboard (MDF) shelving. Includes brackets.		
01 95 99 92-0252	LF 12" Wide Wood Shelving For Residential Closets	31.11	6.95
01 95 99 92-0253	LF 16" Wide Wood Shelving For Residential Closets	46.67	10.52
01 95 99 92-0254	LF 20" Wide Wood Shelving For Residential Closets	62.46	14.00

01 95 99 92-0255	Residential Cabinets <small>(01 95 99 92)</small>		
	Note: Cabinets meet Los Angeles County Housing Authority Specifications and include installation, all moldings, fasteners, caulking, and hardware (hinges, drawer guides, door pulls, etc). While all items associated with this task may not be listed this task is for complete and in place construction.		

01 95 99 92-0256	Residential Base Cabinets <small>(01 95 99 92-0255)</small>		
	Note: Excludes tops.		

01 95 99 92-0257	Base Cabinets, Single Drawer And Single Door <small>(01 95 99 92-0256)</small>		
	Note: Use these cabinets for Universal Access (32-1/2" high with 8-1/2" kick) applications.		
01 95 99 92-0258	EA Up To 15" Width, 34-1/2" High x 24" Deep Base 1 Drawer And 1 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0259	EA >15"-18" Width, 34-1/2" High x 24" Deep Base 1 Drawer And 1 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0260	EA >18"-21" Width, 34-1/2" High x 24" Deep Base 1 Drawer And 1 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0261	EA >21"-24" Width, 34-1/2" High x 24" Deep Base 1 Drawer And 1 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		

01 95 99 92-0262	Base Cabinets, Double Drawer And Double Door <small>(01 95 99 92-0256)</small>		
	Note: Use these cabinets for Universal Access (32-1/2" high with 8-1/2" kick) applications.		
01 95 99 92-0263	EA 24"-27" Wide, 34-1/2" High x 24" Deep 2 Drawer And 2 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0264	EA >27"-30" Wide, 34-1/2" High x 24" Deep 2 Drawer And 2 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0265	EA >30"-33" Wide, 34-1/2" High x 24" Deep 2 Drawer And 2 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0266	EA >33"-36" Wide, 34-1/2" High x 24" Deep 2 Drawer And 2 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0267	EA >36"-42" Wide, 34-1/2" High x 24" Deep 2 Drawer And 2 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0268	EA >42"-48" Wide, 34-1/2" High x 24" Deep 2 Drawer And 2 Door Residential Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		

01 95 99 92-0269	Vanity Bases <small>(01 95 99 92-0256)</small>		
01 95 99 92-0270	EA 32-1/2" High x 21" Deep x 18" Wide Residential Vanity Bases, 1 Door.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0271	EA 32-1/2" High x 21" Deep x 21" Wide Residential Vanity Bases, 1 Door.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0272	EA 32-1/2" High x 21" Deep x 24" Wide Residential Vanity Bases, 2 Door.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0273	EA 32-1/2" High x 21" Deep x 30" Wide Residential Vanity Bases, 2 Door.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0274	EA 32-1/2" High x 21" Deep x 36" Wide Residential Vanity Bases, 2 Door.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		
01 95 99 92-0275	EA 32-1/2" High x 21" Deep x 42" Wide Residential Vanity Bases, 2 Door.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames and drawer fronts. Solid hardwood door panels. Excludes countertop.		

01 95 99 92-0276	Residential Wall Cabinets <small>(01 95 99 92-0255)</small>		
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01 95 99 92-0277	Wall Cabinets 36" High x 13" Deep <small>(01 95 99 92-0276)</small>		
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01 95 99 92-0278	Single Door Type Units <small>(01 95 99 92-0277)</small>		
01 95 99 92-0279	EA Up To 15" Wide, 36" High x 13" Deep Single Door Residential Wall Cabinet.....	0.00	
	Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0280 EA >15"-18" Wide, 36" High x 13" Deep Single Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0281 EA >18"-24" Wide, 36" High x 13" Deep Single Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0282 Double Door Type Units (01 95 99 92-0277)		
01 95 99 92-0283 EA Up To 27" Wide, 36" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0284 EA >27"-30" Wide, 36" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0285 EA >30"-36" Wide, 36" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0286 EA >36"-42" Wide, 36" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0287 EA >42"-48" Wide, 36" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0288 Wall Cabinets 30" High x 13" Deep (01 95 99 92-0276)		
01 95 99 92-0289 Single Door Type Units (01 95 99 92-0288)		
01 95 99 92-0290 EA Up To 12" Wide, 30" High x 13" Deep Single Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0291 EA >12"-15" Wide, 30" High x 13" Deep Single Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0292 EA >15"-18" Wide, 30" High x 13" Deep Single Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0293 EA >18"-24" Wide, 30" High x 13" Deep Single Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0294 Double Door Type Units (01 95 99 92-0288)		
01 95 99 92-0295 EA Up To 27" Wide, 30" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0296 EA >27"-30" Wide, 30" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0297 EA >30"-36" Wide, 30" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0298 EA >36"-42" Wide, 30" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0299 EA >42"-48" Wide, 30" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0300 Wall Cabinets 24" High x 13" Deep (01 95 99 92-0276)		
01 95 99 92-0301 Double Door Type Units (01 95 99 92-0300)		
01 95 99 92-0302 EA Up To 27" Wide, 24" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0303 EA >27"-30" Wide, 24" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0304 EA >30"-36" Wide, 24" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0305 EA >36"-42" Wide, 24" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0306 Wall Cabinets 15" High x 13" Deep (01 95 99 92-0276)		
01 95 99 92-0307 Double Door Type Units (01 95 99 92-0306)		
01 95 99 92-0308 EA Up To 30" Wide, 15" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0309 EA >30"-36" Wide, 15" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0310 EA >36"-39" Wide, 15" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0311 Wall Cabinets 12" High x 13" Deep (01 95 99 92-0276)		
01 95 99 92-0312 EA Up To 30" Wide, 12" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0313 EA >30"-39" Wide, 12" High x 13" Deep Double Door Residential Wall Cabinet..... Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0314 Full Height Wall Cabinets (01 95 99 92-0276)		
01 95 99 92-0315 LF Up To 8' Tall x 13" Deep, Full Height Wall Cabinet.....	0.00	
01 95 99 92-0316 LF Up To 8' Tall x 24" Deep, Full Height Wall Cabinet.....	0.00	
01 95 99 92-0317 Residential Cabinet Accessories (01 95 99 92-0255)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0318 EA Residential, Single Door Wall Corner Cabinet With Shelving .....0.00 Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0319 EA Residential, Single Door Wall Lazy Susan With Cabinet Enclosure .....0.00 Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0320 EA Residential, Base Corner Cabinet.....0.00 Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels. Excludes countertop.	0.00	
01 95 99 92-0321 EA Residential, Broom/Utility Cabinet .....0.00 Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0322 EA Residential, Base Range Cabinet.....0.00 Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0323 EA Residential, Microwave Cabinet.....0.00 Note: Prefinished with solid hardwood face frames, hardwood door frames. Solid hardwood door panels.	0.00	
01 95 99 92-0324 Residential Cabinet Repairs (01 95 99 92-0255)		
01 95 99 92-0325 EA Replace Residential Cabinet Door.....0.00 Note: Includes all hardware.	0.00	
01 95 99 92-0326 EA Replace Residential Cabinet Drawer .....0.00 Note: Includes all hardware.	0.00	
01 95 99 92-0327 PR Replace Residential Drawer Guides .....0.00	0.00	
01 95 99 92-0328 EA Replace Residential Knob/Pull.....0.00	0.00	
01 95 99 92-0329 Roof Decking (01 95 99 92)		
01 95 99 92-0330 SF 1/2" Thick CDX Plywood Roof Decking .....2.23 Note: Applied to wood rafters.	2.23	0.66
<i>For Shear Wall Construction, Add</i>	0.28	
<i>For Exterior CC Grade Plywood, Add</i>	0.12	
<i>For Application To Metal Studs, Joists, Or Rafters, Add</i>	0.28	
<i>For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add</i>	2.10	
<i>For Fire Retardant Treatment, Add</i>	0.66	
<i>For >1,696 To 3,200, Deduct</i>	-0.05	
<i>For >3,200 To 6,400, Deduct</i>	-0.07	
<i>For >6,400 To 12,800, Deduct</i>	-0.13	
<i>For >12,800, Deduct</i>	-0.17	
01 95 99 92-0331 Fascia Board (01 95 99 92)		
01 95 99 92-0332 LF 2" x 6" Pine Fascia Board .....4.96	4.96	2.16
01 95 99 92-0333 Mobilization Of Crew For Small Quantity Of Roof Work (01 95 99 92)		
01 95 99 92-0334 EA Up To 1 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....1,495.23 Note: For use with all roofing tasks where the total quantity of roof work is 4 squares or less.	1,495.23	
01 95 99 92-0335 EA >1 To 2 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....1,118.73	1,118.73	
01 95 99 92-0336 EA >2 To 3 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....747.62	747.62	
01 95 99 92-0337 EA >3 To 4 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....372.91	372.91	
01 95 99 92-0338 Residential Roofing (01 95 99 92)		
01 95 99 92-0339 Aluminum Drip Edge (01 95 99 92-0338)		
01 95 99 92-0340 LF 0.031" Thick Residential Vented Aluminum Drip Edge, 6-1/2" Shingle Underlay, Painted Finish .....8.28	8.28	1.10
01 95 99 92-0341 Flashing (01 95 99 92-0338)		
01 95 99 92-0342 SF Residential Aluminum Valley Flashing .....37.03	37.03	3.06
01 95 99 92-0343 SF Residential Aluminum Step Flashing .....39.34	39.34	3.78
01 95 99 92-0344 SF Residential Copper Step Flashing .....29.93	29.93	5.37
01 95 99 92-0345 Roofing (01 95 99 92-0338)		
01 95 99 92-0346 SQ Solar Reflective Shingles, CertainTeed Landmark Colaris .....623.30	623.30	199.05
01 95 99 92-0347 Architectural Fiberglass Reinforced, Asphalt Composition Shingle (01 95 99 92-0338)		
01 95 99 92-0348 SQ 245 LB/SQ, 5" Exposure, Two Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Landmark).....382.67	382.67	275.24
<i>For >35 To 75, Deduct</i>	-13.25	
<i>For >75 To 100, Deduct</i>	-22.15	
<i>For >100 To 200, Deduct</i>	-33.71	
<i>For >200, Deduct</i>	-51.52	
<i>For Steep Roof, Over 7 To 12, Add</i>	80.06	
01 95 99 92-0349 Asphalt Shingle Accessories (01 95 99 92-0338)		
01 95 99 92-0350 LF Architectural Hip And Ridge Shingles .....5.23	5.23	3.57
01 95 99 92-0351 SQ Demolish Additional Layers Of Shingles.....117.62	117.62	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0352 Corrugated Tiles And Shakes Nailed To Wood <small>(01 95 99 92-0338)</small> Note: Includes 30 lb felt underlayment.		
01 95 99 92-0353 SQ 13" x 16-1/2" Concrete Roof Tile, 90/SQ, 950 LB/SQ, Earthtone Colors, Corrugated	1,183.65	444.24
For >50 To 75, Deduct	-11.80	
For >75 To 100, Deduct	-42.87	
For >100 To 200, Deduct	-76.89	
For >200, Deduct	-107.95	
For Steep Roof, Over 7 To 12, Add	284.35	
01 95 99 92-0354 SQ 13" x 16-1/2" Concrete Roof Tile, 90/SQ, 950 LB/SQ, Colors, Shakes.....	1,163.70	397.47
For >50 To 75, Deduct	-14.75	
For >75 To 100, Deduct	-45.68	
For >100 To 200, Deduct	-80.30	
For >200, Deduct	-111.24	
For Steep Roof, Over 7 To 12, Add	254.42	
01 95 99 92-0355 Accessories <small>(01 95 99 92-0338)</small>		
01 95 99 92-0356 EA Ridge And Hip, 10" X 16-1/2", 8 LB Each For Concrete Tile Roof	4.97	
01 95 99 92-0357 EA Rake, 6-1/2" X 16-3/4", 9 LB Each For Concrete Tile Roof.....	3.27	
01 95 99 92-0358 Mechanically Fastened, Roofing Underlayment <small>(01 95 99 92-0338)</small> Note: Standard slope.		
01 95 99 92-0359 SQ 30 LB, Asphalt Saturated Organic Felt Roofing Underlayment, Mechanically Fastened	62.18	12.32
For Steep Roof, Over 7 To 12, Add	7.88	
For >50 To 75, Deduct	-1.50	
For >75 To 100, Deduct	-3.24	
For >100 To 200, Deduct	-5.36	
For >200, Deduct	-7.72	
01 95 99 92-0360 SQ 30 LB, Asphalt Saturated Organic Felt Shake Underlayment, Mechanically Fastened.....	69.25	12.32
For Steep Roof, Over 7 To 12, Add	7.88	
For >50 To 75, Deduct	-1.78	
For >75 To 100, Deduct	-3.74	
For >100 To 200, Deduct	-6.14	
For >200, Deduct	-8.71	
01 95 99 92-0361 Prepared Roll Roofing <small>(01 95 99 92-0338)</small> Note: Fastened with roofing nails and roofing cement. Includes fasteners and adhesive. Excludes warranty.		
01 95 99 92-0362 SQ Granule Surfaced, 90 LB, Asphalt Saturated Organic Felt Roll Roofing.....	260.31	37.32
01 95 99 92-0363 Built-Up Asphalt Roofing Components <small>(01 95 99 92-0338)</small>		
01 95 99 92-0364 Built-Up Asphalt Membrane Roofing <small>(01 95 99 92-0363)</small> Note: Includes all standard manufacturers' colors including white for granule and smooth surfaced cap sheets and flashing.		
01 95 99 92-0365 Cold Adhesive Applied, Built-Up Asphalt Membrane Roofing <small>(01 95 99 92-0364)</small> Note: Includes applying cold adhesive and embedding the membrane.		
01 95 99 92-0366 Cold Adhesive Applied, Built-Up Asphalt Roofing Base, Ply And Cap Sheets <small>(01 95 99 92-0365)</small>		
01 95 99 92-0367 SQ Type IV, Asphalt Coated Fiberglass Ply Sheet, Cold Adhesive Applied	117.95	
For Up To 10, Add	31.43	
For >10 To 20, Add	17.68	
For >10 To 20, Add	17.68	
01 95 99 92-0368 SQ Asphalt Coated Polyester And Fiberglass Scrim, Base Or Ply Sheet, Cold Adhesive Applied	323.19	
For Up To 10, Add	72.48	
For >10 To 20, Add	38.20	
For >10 To 20, Add	38.20	
01 95 99 92-0369 Cold Adhesive Applied, Built-Up Asphalt Roofing Flashing <small>(01 95 99 92-0365)</small>		
01 95 99 92-0370 SF Asphalt Coated Polyester And Fiberglass Scrim, Flashing, Cold Adhesive Applied.....	7.80	
01 95 99 92-0371 Asphalt Saturated Organic Felt <small>(01 95 99 92-0363)</small>		
01 95 99 92-0372 Cold Adhesive Applied, Asphalt Saturated Organic Felt <small>(01 95 99 92-0371)</small> Note: Includes applying cold adhesive and embedding the felt.		
01 95 99 92-0373 SQ 15 LB, Asphalt Saturated Organic Base Or Ply Sheet, Cold Adhesive Applied	114.29	
For Up To 10, Add	30.70	
For >10 To 20, Add	17.31	
For >10 To 20, Add	17.31	
01 95 99 92-0374 SQ 30 LB, Asphalt Saturated Organic Base Or Ply Sheet, Cold Adhesive Applied	129.38	
For Up To 10, Add	33.72	
For >10 To 20, Add	18.82	
For >10 To 20, Add	18.82	

01	01	General Requirements
	01 95	Residential Construction
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 99 92-0375	Demolish Built-Up Roofing <small>(01 95 99 92-0363)</small>	
	Note: For removing any asphalt, coal tar or modified bitumen roofing system, including surfacing material down to the insulation or recovery board. Includes removal of any basic roof accessories and any sheet metals; except special existing conditions (mechanical equipment piping, electrical, ducts, etc.).	
01 95 99 92-0376	SQ Demolish Cap Sheet Surfaced, Built Up Roofing System	317.59
	Note: Includes protective surfacing.	
	For Up To 10, Add	78.82
	For >10 To 25, Add	47.29

01 95 99 92-0377 **Residential Windows** (01 95 99 92)

01 95 99 92-0378	Residential Vinyl Windows <small>(01 95 99 92-0377)</small>	
	Note: All labor, material and equipment to remove existing windows and Security bars install new windows (Milgard, Quiet Line Series). Includes white solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Chip clean and repair any stucco as needed and repair drywall as needed (allow 2 SF each of stucco and drywall chip, cut and repair), stucco key replacement, caulking and sealants. This list may not cover all individual items involved in the new window removal and installation, however it is intended to represent the complete in-place window replacement.	

01 95 99 92-0379 **Double Hung Vinyl Windows** (01 95 99 92-0378)

01 95 99 92-0380 **Double Hung Flanged Vinyl Windows (Milgard Quiet Line™ Series)** (01 95 99 92-0379)

01 95 99 92-0381	EA Up To 73" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series).....	855.01
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63
	For New Security Bar Installation (includes foot quick release), Add	562.35
01 95 99 92-0382	EA >73" To 83" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	942.78
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08
	For New Security Bar Installation (includes foot quick release), Add	562.35
01 95 99 92-0383	EA >83" To 93" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,025.20
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52
	For New Security Bar Installation (includes foot quick release), Add	562.35
01 95 99 92-0384	EA >93" To 101" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,085.12
	For Re-Installation Of Existing Security Bars, Add	37.96
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96
	For New Security Bar Installation (includes foot quick release), Add	751.62
01 95 99 92-0385	EA >101" To 110" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,149.06
	For Re-Installation Of Existing Security Bars, Add	37.96
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	35.40
	For New Security Bar Installation (includes foot quick release), Add	751.62
01 95 99 92-0386	EA >110" To 120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,139.84
	For Re-Installation Of Existing Security Bars, Add	37.96
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	21.57
	For New Security Bar Installation (includes foot quick release), Add	751.62
01 95 99 92-0387	UI >120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series).....	10.43
	For Re-Installation Of Existing Security Bars, Add	0.32
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32
	For New Security Bar Installation (includes foot quick release), Add	6.27

01 95 99 92-0388 **Casement Vinyl Windows** (01 95 99 92-0378)

01 95 99 92-0389 **Casement Flanged Vinyl Windows (Milgard Quiet Line™ Series)** (01 95 99 92-0388)

01 95 99 92-0390 **One Operating Sash, Casement Vinyl Windows (Milgard Quiet Line™ Series)** (01 95 99 92-0389)

01 95 99 92-0391	EA Up To 53" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	819.52
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	20.75
	For New Security Bar Installation (includes foot quick release), Add	562.35
01 95 99 92-0392	EA >53 To 63" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	930.59
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	23.19
	For New Security Bar Installation (includes foot quick release), Add	562.35
01 95 99 92-0393	EA >63 To 73" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,030.93
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63
	For New Security Bar Installation (includes foot quick release), Add	562.35
01 95 99 92-0394	EA >73" To 83" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,120.58
	For Re-Installation Of Existing Security Bars, Add	27.11
	For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08
	For New Security Bar Installation (includes foot quick release), Add	562.35



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0395 EA >83" To 93" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,199.51	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0396 EA >93" To 101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,247.38	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 92-0397 UI >101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	12.29	
<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
01 95 99 92-0398 Two Operating Sashes, Casement Vinyl Windows (Milgard Quiet Line™ Series) <small>(01 95 99 92-0389)</small>		
01 95 99 92-0399 EA Up To 73" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,363.23	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0400 EA >73" To 83" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,498.38	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0401 EA >83" To 93" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,622.84	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0402 EA >93" To 101" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,707.13	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 92-0403 EA >101" To 110" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,797.03	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	35.40	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 92-0404 EA >110" To 120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,890.96	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	37.84	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 92-0405 UI >120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	15.77	
<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
01 95 99 92-0406 Horizontal Sliding Vinyl Windows <small>(01 95 99 92-0378)</small>		
01 95 99 92-0407 Horizontal Flanged Sliding Vinyl Windows (Milgard Quiet Line™ Series) <small>(01 95 99 92-0406)</small>		
01 95 99 92-0408 EA Up To 73" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	776.84	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0409 EA >73" To 83" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	853.90	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0410 EA >83" To 93" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	925.58	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 92-0411 EA >93" To 101" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	976.94	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 92-0412 EA >101" To 110" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	1,031.24	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	35.40	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	

01	01	General Requirements
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0413 EA >110" To 120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)	1,119.81	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	37.84	
For New Security Bar Installation (includes foot quick release), Add	751.62	
01 95 99 92-0414 UI >120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	9.35	
For Re-Installation Of Existing Security Bars, Add	0.32	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
For New Security Bar Installation (includes foot quick release), Add	6.27	
01 95 99 92-0415 Fixed Picture Vinyl Windows (01 95 99 92-0378)		
01 95 99 92-0416 Fixed Picture Flanged Vinyl Windows (Milgard Style Line™ Series) (01 95 99 92-0415)		
01 95 99 92-0417 EA Up To 53" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	577.32	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	20.75	
For New Security Bar Installation (includes foot quick release), Add	562.35	
01 95 99 92-0418 EA >53 To 63" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	654.70	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	23.19	
For New Security Bar Installation (includes foot quick release), Add	562.35	
01 95 99 92-0419 EA >63 To 73" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	725.15	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
For New Security Bar Installation (includes foot quick release), Add	562.35	
01 95 99 92-0420 EA >73" To 83" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	788.71	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
For New Security Bar Installation (includes foot quick release), Add	562.35	
01 95 99 92-0421 EA >83" To 93" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	845.35	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
For New Security Bar Installation (includes foot quick release), Add	562.35	
01 95 99 92-0422 EA >93" To 101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	881.99	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
For New Security Bar Installation (includes foot quick release), Add	751.62	
01 95 99 92-0423 UI >101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	8.68	
For Re-Installation Of Existing Security Bars, Add	0.32	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
For New Security Bar Installation (includes foot quick release), Add	6.27	
01 95 99 92-0424 Accessories For Vinyl Windows (01 95 99 92-0378)		
01 95 99 92-0425 Factory Installed Grilles For Vinyl Windows (01 95 99 92-0424)		
01 95 99 92-0426 Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows (01 95 99 92-0425)		
01 95 99 92-0427 EA Up To 9 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows.....	48.94	
01 95 99 92-0428 EA >9 To 18 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	62.93	
01 95 99 92-0429 EA >18 To 24 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	81.04	
01 95 99 92-0430 EA >24 To 36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	95.66	
01 95 99 92-0431 EA >36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	117.59	
01 95 99 92-0432 Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows (01 95 99 92-0425)		
01 95 99 92-0433 EA Up To 9 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	111.23	
01 95 99 92-0434 EA >9 To 18 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	133.48	
01 95 99 92-0435 EA >18 To 24 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	168.44	
01 95 99 92-0436 EA >24 To 36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	209.75	
01 95 99 92-0437 EA >36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	251.07	
01 95 99 92-0438 Meeting Egress Code For Windows (01 95 99 92-0378)		
01 95 99 92-0439 EA Drop Sill Up To 47"	344.33	
Note: Includes king stud, trimmers, cripples, exterior flashing, stucco molding, stucco patch with fog coat, drywall texture to match existing 90%, insulation if applicable (R-15), lath and paper overlap, backer rod, caulking, paint touch-up to match existing minimum 90% (hand applied only)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0440 EA Enlarge Sideways Up To 49" Wide.....	444.53	
Note: Includes header, king stud, trimmers, cripples, exterior flashing, stucco molding, stucco path with fog coat, drywall texture to match existing 90%, insulation if applicable (R-15), lath and paper overlap, backer rod, caulking, paint touch-up to match existing minimum 90% (hand applied only)		
01 95 99 92-0441 Remove And Reinstall Residential Window Security Bars (01 95 99 92-0377)		
Note: Includes reusing existing bolts and fasteners.		
01 95 99 92-0442 EA Remove and Reinstall Residential Window Security Bars.....	54.23	
Note: Includes four connecting bolts.		
01 95 99 92-0443 Residential Doors (01 95 99 92)		
01 95 99 92-0444 Residential Exterior Doors (01 95 99 92-0443)		
01 95 99 92-0445 Pre-Hung Steel Exterior Residential Doors (01 95 99 92-0444)		
Note: Primed galvanized steel skin with polystyrene core door. Primed galvanized steel skin and wood frame.		
01 95 99 92-0446 EA 25 Gauge Flush Pre-Hung (Or Slab Only) Steel Exterior Residential Doors.....	416.32	75.95
For 12" x 12" Vision Light, Add		
For 20 Minute Fire Rating, Add		
For 90 Minute Fire Rating, Add		
01 95 99 92-0447 EA 25 Gauge Six Panel Pre-Hung (Or Slab Only) Steel Exterior Residential Doors.....	441.39	75.95
For Fan Or Nine Lite, Add		
For 20 Minute Fire Rating, Add		
For 90 Minute Fire Rating, Add		
01 95 99 92-0448 EA 24 Gauge Flush Pre-Hung Steel Exterior Residential Doors.....	623.74	81.38
For 12" x 12" Vision Light, Add		
For 20 Minute Fire Rating, Add		
For 90 Minute Fire Rating, Add		
01 95 99 92-0449 EA 24 Gauge Six Panel Pre-Hung Steel Exterior Residential Doors.....	640.51	81.38
For Fan Or Nine Lite, Add		
For 20 Minute Fire Rating, Add		
For 90 Minute Fire Rating, Add		
01 95 99 92-0450 EA 22 Gauge Flush Pre-Hung Steel Exterior Residential Doors.....	752.00	86.81
For 12" x 12" Vision Light, Add		
For 20 Minute Fire Rating, Add		
For 90 Minute Fire Rating, Add		
01 95 99 92-0451 EA 22 Gauge Six Panel Pre-Hung Steel Exterior Residential Doors.....	775.82	86.81
For Fan Or Nine Lite, Add		
For 20 Minute Fire Rating, Add		
For 90 Minute Fire Rating, Add		
01 95 99 92-0452 Pre-Hung Fiberglass Exterior Residential Doors (01 95 99 92-0444)		
01 95 99 92-0453 EA Flush Pre-Hung Fiberglass Exterior Residential Doors.....	700.83	81.38
For Fan Or Nine Lite, Add		
For 20 Minute Fire Rating, Add		
01 95 99 92-0454 EA Six Panel Pre-Hung Fiberglass Exterior Residential Doors.....	700.98	81.38
For Fan Or Nine Lite, Add		
For 20 Minute Fire Rating, Add		
01 95 99 92-0455 Residential Interior Doors (01 95 99 92-0443)		
01 95 99 92-0456 Pre-Hung High Density Fiberboard Hollow Core Six Panel Door And Frame (01 95 99 92-0455)		
Note: Includes hinges.		
01 95 99 92-0457 EA 1'-6", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	269.24	65.10
01 95 99 92-0458 EA 2'-0", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	279.23	67.81
01 95 99 92-0459 EA 2'-4", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	295.62	69.17
01 95 99 92-0460 EA 2'-6", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	300.61	70.53
01 95 99 92-0461 EA 2'-8", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	307.89	71.88
01 95 99 92-0462 EA 3'-0", Pre-Hung 1-3/8" Primed, High Density Fiberboard Hardboard, Hollow Core, Six Panel Residential Door And Frame.....	315.16	73.24
01 95 99 92-0463 Residential Security Screens (01 95 99 92-0443)		
01 95 99 92-0464 EA Heavy Duty Aluminum Residential Security Screen Door, 0.028" Stainless Mesh, Hardware (Tapco Or Equal).....	857.15	166.70
For Powder Coated Color, Add		
01 95 99 92-0465 EA Heavy Duty Steel Residential Security Screen Door, 0.028" Stainless Steel Mesh, Powder Coated Color And Hardware (Summitt Or Rusco Or Equal).....	891.30	166.70
01 95 99 92-0466 Residential Door Hardware (01 95 99 92-0443)		
01 95 99 92-0467 PR Exterior Residential Grade Door Hinges.....	66.42	10.93
01 95 99 92-0468 PR Interior Residential Grade Door Hinges.....	53.70	10.93
01 95 99 92-0469 EA 4" Modern Bright Brass Surface Bolt, Residential.....	47.19	12.03
01 95 99 92-0470 EA 6" Modern Bright Brass Surface Bolt, Residential.....	51.04	12.03



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
01 95 99 92-0471	EA	4" Modern Satin Chrome Surface Bolt, Residential		50.77	12.03
01 95 99 92-0472	EA	6" Modern Satin Chrome Surface Bolt, Residential		55.14	12.03
01 95 99 92-0473	EA	Interior Lockset With Knobs, Schlage Rhode Design "D" Series		529.27	50.73
01 95 99 92-0474	EA	Interior Lockset With Knobs, Schlage Levon Design "A" Series		374.34	50.73
01 95 99 92-0475		Residential Door Accessories (01 95 99 92-0443)			
01 95 99 92-0476	EA	Residential Chain Door Guard		52.43	10.84
01 95 99 92-0477	EA	Residential Wall Mounted Door Bumper		26.86	5.43
01 95 99 92-0478		Residential Sliding Doors (01 95 99 92-0443)			
01 95 99 92-0479		Premium Vinyl Sliding Glass Doors (Milgard Style Line™ Series) (01 95 99 92-0478)			
Note: Includes white solid vinyl interior and exterior, standard hardware and clear high-performance Low-E insulating glass. Excludes grilles and insect screens.					
01 95 99 92-0480	EA	61-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series)		4,589.09	85.72
01 95 99 92-0481	EA	73-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series)		5,041.80	86.81
01 95 99 92-0482	EA	97-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series)		6,742.17	104.16
01 95 99 92-0483		Wood Moldings (01 95 99 92)			
01 95 99 92-0484	LF	1-1/8" Wide Soft Wood Door And Window Molding		5.24	1.73
For Clear Birch, Add				0.44	
For Clear Mahogany, Oak, Maple Or Walnut, Add				1.00	
For Stain Grade Material (No Finger Joints), Add				0.24	
For Clear Poplar, Add				0.27	
01 95 99 92-0485	LF	2-1/2" Wide Soft Wood Door And Window Molding		6.75	1.73
For Clear Birch, Add				0.92	
For Clear Mahogany, Oak, Maple Or Walnut, Add				1.68	
For Stain Grade Material (No Finger Joints), Add				0.52	
For Clear Poplar, Add				0.57	
01 95 99 92-0486	LF	3-1/2" Soft Wood Base Molding, All Dimensions Are Nominal.....		7.01	1.30
For Clear Birch, Add				0.85	
For Clear Mahogany, Oak, Maple Or Walnut, Add				1.64	
For Stain Grade Material (No Finger Joints), Add				0.48	
For Clear Poplar, Add				0.53	
01 95 99 92-0487		Drywall, Plaster and Stucco (01 95 99 92)			
01 95 99 92-0488		Plaster (01 95 99 92-0487)			
01 95 99 92-0489	SF	Up To 10 SF, Cut And Patch Hole In Plaster To Match Existing.....		19.69	
01 95 99 92-0490	SF	>10 To 50 SF, Cut And Patch Hole In Plaster To Match Existing		17.44	
01 95 99 92-0491		Stucco (01 95 99 92-0487)			
01 95 99 92-0492	SF	Up To 10 SF, Chip, Clean And Repair Plaster/Stucco		37.07	
01 95 99 92-0493	SF	>10 To 50 SF, Chip, Clean And Repair Plaster/Stucco		26.93	
01 95 99 92-0494		Lath (01 95 99 92-0487)			
01 95 99 92-0495	SF	2.5 LB/SY, Installed On Studs Or Furred Walls, Flat Diamond, Expanded Metal Lath		2.62	0.62
For Stainless Steel, Add				0.80	
01 95 99 92-0496	LF	Stucco Key Replacement.....		5.50	0.62
Note: Includes removal of existing.					
01 95 99 92-0497	LF	Galvanized Weep Screed		3.99	0.62
01 95 99 92-0498	CSF	Two Layer Kraft Paper Laminated With Asphalt, Grade "B" Building Paper (Aquabar B)		30.21	
01 95 99 92-0499		Drywall (01 95 99 92-0487)			
01 95 99 92-0500	SF	Up To 2 SF, Cut And Patch Hole In Drywall To Match Existing		21.20	
Note: Per location.					
01 95 99 92-0501	SF	>2 To 4 SF, Cut And Patch Hole In Drywall To Match Existing		17.15	
Note: Per location.					
01 95 99 92-0502	SF	>4 To 8 SF, Cut And Patch Hole In Drywall To Match Existing		15.40	
Note: Per location.					
01 95 99 92-0503	SF	>8 To 16 SF, Cut And Patch Hole In Drywall To Match Existing		13.59	
Note: Per location.					
01 95 99 92-0504	SF	>16 To 32 SF, Cut And Patch Hole In Drywall To Match Existing.....		12.18	
Note: Per location.					
01 95 99 92-0505	SF	1/2" Gypsum Board.....		1.69	0.56
For Curved Surfaces With A 2'-0" Maximum Radius, Add				0.27	
For Adhesive Applied Sheets, Add				0.12	
Note: Includes bracing until adhesive is bonded					
For Foil Back Board, Add				0.10	
For Horizontal Installation Up To 10' High, Add				0.38	
For Horizontal Installation >10' High, Add				0.57	
For Walls >10' High, Add				0.09	
For Up To 128, Add				0.56	
For >128 To 320, Add				0.34	
For >1,536, Deduct				-0.14	



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0506	SF		5/8" Gypsum Board..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Foil Back Board, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i>	1.98 0.30 0.12 0.10 0.44 0.65 0.10 0.65 0.39 -0.17	0.64
01 95 99 92-0507 Residential Painting <small>(01 95 99 92)</small>					
<i>Note: Includes all materials, surface preparation (wipe down and light clean, patching holes up to 3/8"), caulking and sealing, all finishes, surface protection, and masking tape.</i>					
01 95 99 92-0508	SF		Paint Exterior Stucco Walls, 1 Coat Primer, Brush Roller Work..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000 To 10,000, Deduct</i> <i>For >10,000 To 20,000, Deduct</i>	1.14 0.20 0.66 0.32 0.14 -0.06 -0.11 -0.17	
01 95 99 92-0509	SF		Paint Exterior Stucco Walls, 2 Coats Paint, Brush Roller Work..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000 To 10,000, Deduct</i> <i>For >10,000 To 20,000, Deduct</i>	2.41 0.41 1.35 0.65 0.28 -0.12 -0.24 -0.36	
01 95 99 92-0510	SF		Paint Interior Plaster/Drywall Walls, 1 Coat Primer, Brush Roller Work..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000 To 10,000, Deduct</i> <i>For >10,000 To 20,000, Deduct</i>	0.81 0.14 0.45 0.22 0.09 -0.04 -0.08 -0.12	
01 95 99 92-0511	SF		Paint Interior Plaster/Drywall Walls, 2 Coats Paint, Brush Roller Work..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000 To 10,000, Deduct</i> <i>For >10,000 To 20,000, Deduct</i>	1.61 0.28 0.91 0.44 0.19 -0.08 -0.16 -0.24	
01 95 99 92-0512	SF		Paint Interior Drywall/Plaster Ceiling, 1 Coat Primer, Brush Roller Work..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000 To 10,000, Deduct</i> <i>For >10,000 To 20,000, Deduct</i>	0.93 0.17 0.54 0.26 0.11 -0.05 -0.09 -0.14	
01 95 99 92-0513	SF		Paint Interior Drywall/Plaster Ceiling, 2 Coats Paint, Brush Roller Work..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000 To 10,000, Deduct</i> <i>For >10,000 To 20,000, Deduct</i>	1.69 0.31 1.00 0.48 0.21 -0.08 -0.17 -0.25	
01 95 99 92-0514	EA		Paint Door, Each Face, 1 Coat Primer, Brush Roller Work..... <i>For >5 To 10, Deduct</i> <i>For >10 To 25, Deduct</i> <i>For >25, Deduct</i>	58.77 -2.94 -5.88 -8.82	
01 95 99 92-0515	EA		Paint Door, Each Face, 2 Coats Paint, Brush Roller Work..... <i>For >5 To 10, Deduct</i> <i>For >10 To 25, Deduct</i> <i>For >25, Deduct</i>	107.01 -5.35 -10.70 -16.05	
01 95 99 92-0516	LF		Paint Door Frame And Trim, 1 Coat Primer, Brush Roller Work.....	1.18	
01 95 99 92-0517	LF		Paint Door Frame And Trim, 2 Coats Paint, Brush Roller Work.....	2.53	
01 95 99 92-0518	LF		1 Coat Primer, Brush/Roller Work, Paint Baseboard/Crown Molding (Simple) To 6" Wide..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i>	0.79 0.17	
01 95 99 92-0519	LF		2 Coats Paint, Brush/Roller Work, Paint Baseboard/Crown Molding (Simple) To 6" Wide..... <i>For Work >20' Above Floor, Add</i> <i>Note: Applied only to work area above 20'.</i>	1.81 0.41	

01 General Requirements

01 95 Residential Construction

01 95 99 92 Los Angeles County Lead Remediation Program



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

01 95 99 92-0520	LF	1 Coat Primer, Brush/Roller Work, Paint Baseboard/Crown Molding (Ornate) To 6" Wide.....	0.84	
		<i>For Work >20' Above Floor, Add</i>	0.18	
		<i>Note: Applied only to work area above 20'.</i>		
01 95 99 92-0521	LF	2 Coats Paint, Brush/Roller Work, Paint Baseboard/Crown Molding (Ornate) to 6" Wide	1.97	
		<i>For Work >20' Above Floor, Add</i>	0.45	
		<i>Note: Applied only to work area above 20'.</i>		
01 95 99 92-0522	SF	1 Coat Primer, Brush/Roller Work, Paint Baseboard/Crown Molding (Ornate) >6" Wide.....	2.10	
		<i>For Work >20' Above Floor, Add</i>	0.40	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	1.28	
		<i>For >100 To 250, Add</i>	0.61	
		<i>For >250 To 500, Add</i>	0.27	
		<i>For >2,500 To 5,000, Deduct</i>	-0.11	
		<i>For >5,000 To 10,000, Deduct</i>	-0.21	
		<i>For >10,000 To 20,000, Deduct</i>	-0.32	
01 95 99 92-0523	SF	2 Coats Paint, Brush/Roller Work, Paint Baseboard/Crown Molding (Ornate) > 6" Wide	4.27	
		<i>For Work >20' Above Floor, Add</i>	0.80	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	2.55	
		<i>For >100 To 250, Add</i>	1.22	
		<i>For >250 To 500, Add</i>	0.53	
		<i>For >2,500 To 5,000, Deduct</i>	-0.21	
		<i>For >5,000 To 10,000, Deduct</i>	-0.43	
		<i>For >10,000 To 20,000, Deduct</i>	-0.64	
01 95 99 92-0524	LF	1 Coat Primer, Brush/Roller Work, Paint Wood Doorway Threshold	1.18	
01 95 99 92-0525	LF	2 Coats Paint, Brush/Roller Work, Paint Wood Doorway Threshold	2.53	
01 95 99 92-0526	SF	1 Coat Primer, Brush/Roller Work, Paint Eaves.....	1.40	
		<i>For Work >20' Above Floor, Add</i>	0.23	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	0.76	
		<i>For >100 To 250, Add</i>	0.37	
		<i>For >250 To 500, Add</i>	0.16	
		<i>For >2,500 To 5,000, Deduct</i>	-0.07	
		<i>For >5,000 To 10,000, Deduct</i>	-0.14	
		<i>For >10,000 To 20,000, Deduct</i>	-0.21	
01 95 99 92-0527	SF	2 Coats Paint, Brush/Roller Work, Paint Eaves	2.93	
		<i>For Work >20' Above Floor, Add</i>	0.46	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	1.54	
		<i>For >100 To 250, Add</i>	0.75	
		<i>For >250 To 500, Add</i>	0.33	
		<i>For >2,500 To 5,000, Deduct</i>	-0.15	
		<i>For >5,000 To 10,000, Deduct</i>	-0.29	
		<i>For >10,000 To 20,000, Deduct</i>	-0.44	
01 95 99 92-0528	SF	1 Coat Primer, Sprayed, Paint Eaves	1.25	
		<i>For Work >20' Above Floor, Add</i>	0.16	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	0.58	
		<i>For >100 To 250, Add</i>	0.29	
		<i>For >250 To 500, Add</i>	0.13	
		<i>For >2,500 To 5,000, Deduct</i>	-0.06	
		<i>For >5,000 To 10,000, Deduct</i>	-0.13	
		<i>For >10,000 To 20,000, Deduct</i>	-0.19	
01 95 99 92-0529	SF	2 Coats Paint, Sprayed, Paint Eaves	2.63	
		<i>For Work >20' Above Floor, Add</i>	0.36	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	1.25	
		<i>For >100 To 250, Add</i>	0.62	
		<i>For >250 To 500, Add</i>	0.27	
		<i>For >2,500 To 5,000, Deduct</i>	-0.13	
		<i>For >5,000 To 10,000, Deduct</i>	-0.26	
		<i>For >10,000 To 20,000, Deduct</i>	-0.39	
01 95 99 92-0530	SF	1 Coat Primer, Brush/Roller Work, Paint Rafter Tails	1.40	
		<i>For Work >20' Above Floor, Add</i>	0.23	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	0.76	
		<i>For >100 To 250, Add</i>	0.37	
		<i>For >250 To 500, Add</i>	0.16	
		<i>For >2,500 To 5,000, Deduct</i>	-0.07	
		<i>For >5,000 To 10,000, Deduct</i>	-0.14	
		<i>For >10,000 To 20,000, Deduct</i>	-0.21	
01 95 99 92-0531	SF	2 Coats Paint, Brush/Roller Work, Paint Rafter Tails	2.93	
		<i>For Work >20' Above Floor, Add</i>	0.46	
		<i>Note: Applied only to work area above 20'.</i>		
		<i>For Up To 100, Add</i>	1.54	
		<i>For >100 To 250, Add</i>	0.75	
		<i>For >250 To 500, Add</i>	0.33	
		<i>For >2,500 To 5,000, Deduct</i>	-0.15	
		<i>For >5,000 To 10,000, Deduct</i>	-0.29	
		<i>For >10,000 To 20,000, Deduct</i>	-0.44	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0532 SF 1 Coat Primer, Sprayed, Paint Rafter Tails.....	1.25	
<i>For Work >20' Above Floor, Add</i>	0.16	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Up To 100, Add</i>	0.58	
<i>For >100 To 250, Add</i>	0.29	
<i>For >250 To 500, Add</i>	0.13	
<i>For >2,500 To 5,000, Deduct</i>	-0.06	
<i>For >5,000 To 10,000, Deduct</i>	-0.13	
<i>For >10,000 To 20,000, Deduct</i>	-0.19	
01 95 99 92-0533 SF 2 Coats Paint, Sprayed, Paint Rafter Tails	2.63	
<i>For Work >20' Above Floor, Add</i>	0.36	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Up To 100, Add</i>	1.25	
<i>For >100 To 250, Add</i>	0.62	
<i>For >250 To 500, Add</i>	0.27	
<i>For >2,500 To 5,000, Deduct</i>	-0.13	
<i>For >5,000 To 10,000, Deduct</i>	-0.26	
<i>For >10,000 To 20,000, Deduct</i>	-0.39	
01 95 99 92-0534 SF 1 Coat Primer, Brush/Roller Work, Paint Wood Foundation Crawspace Vent Cover/Frame	1.40	
<i>For Up To 100, Add</i>	0.76	
<i>For >100 To 250, Add</i>	0.37	
<i>For >250 To 500, Add</i>	0.16	
<i>For >2,500 To 5,000, Deduct</i>	-0.07	
<i>For >5,000 To 10,000, Deduct</i>	-0.14	
<i>For >10,000 To 20,000, Deduct</i>	-0.21	
01 95 99 92-0535 SF 2 Coats Paint, Brush/Roller Work, Paint Wood Foundation Crawspace Vent Cover/Frame	2.93	
<i>For Up To 100, Add</i>	1.54	
<i>For >100 To 250, Add</i>	0.75	
<i>For >250 To 500, Add</i>	0.33	
<i>For >2,500 To 5,000, Deduct</i>	-0.15	
<i>For >5,000 To 10,000, Deduct</i>	-0.29	
<i>For >10,000 To 20,000, Deduct</i>	-0.44	
01 95 99 92-0536 SF 1 Coat Primer, Brush/Roller Work, Paint Wood Foundation Vent / Exterior Attic Vent Cover/Frame.....	1.40	
<i>For Work >20' Above Floor, Add</i>	0.23	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Up To 100, Add</i>	0.76	
<i>For >100 To 250, Add</i>	0.37	
<i>For >250 To 500, Add</i>	0.16	
<i>For >2,500 To 5,000, Deduct</i>	-0.07	
<i>For >5,000 To 10,000, Deduct</i>	-0.14	
<i>For >10,000 To 20,000, Deduct</i>	-0.21	
01 95 99 92-0537 SF 2 Coats Paint, Brush/Roller Work, Paint Wood Foundation Vent / Exterior Attic Vent Cover/Frame.....	2.93	
<i>For Work >20' Above Floor, Add</i>	0.46	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Up To 100, Add</i>	1.54	
<i>For >100 To 250, Add</i>	0.75	
<i>For >250 To 500, Add</i>	0.33	
<i>For >2,500 To 5,000, Deduct</i>	-0.15	
<i>For >5,000 To 10,000, Deduct</i>	-0.29	
<i>For >10,000 To 20,000, Deduct</i>	-0.44	
01 95 99 92-0538 Painting, Touch Up <small>(01 95 99 92)</small>		
<i>Note: Includes all materials, surface preparation (wipe down and light clean, patching holes up to 3/8"), caulking and sealing, all finishes, surface protection, and masking tape.</i>		
01 95 99 92-0539 SF Paint Touch Up Interior Plaster/Drywall Walls, 1 Coat Primer, Brush Roller Work	0.81	
<i>For Up To 100, Add</i>	0.45	
<i>For >100 To 250, Add</i>	0.22	
<i>For >250 To 500, Add</i>	0.09	
<i>For >2,500 To 5,000, Deduct</i>	-0.04	
<i>For >5,000 To 10,000, Deduct</i>	-0.08	
<i>For >10,000 To 20,000, Deduct</i>	-0.12	
<i>For >20,000, Deduct</i>	-0.16	
01 95 99 92-0540 SF Paint Touch Up Interior Plaster/Drywall Walls, 2 Coats Paint, Brush Roller Work.....	1.61	
<i>For Up To 100, Add</i>	0.91	
<i>For >100 To 250, Add</i>	0.44	
<i>For >250 To 500, Add</i>	0.19	
<i>For >2,500 To 5,000, Deduct</i>	-0.08	
<i>For >5,000 To 10,000, Deduct</i>	-0.16	
<i>For >10,000 To 20,000, Deduct</i>	-0.24	
<i>For >20,000, Deduct</i>	-0.32	
01 95 99 92-0541 SF Paint Touch Up Interior Plaster/Drywall Walls, 1 Coat Primer, Sprayed.....	0.73	
<i>For Up To 100, Add</i>	0.35	
<i>For >100 To 250, Add</i>	0.17	
<i>For >250 To 500, Add</i>	0.08	
<i>For >2,500 To 5,000, Deduct</i>	-0.04	
<i>For >5,000 To 10,000, Deduct</i>	-0.07	
<i>For >10,000 To 20,000, Deduct</i>	-0.11	
<i>For >20,000, Deduct</i>	-0.15	
01 95 99 92-0542 SF Paint Touch Up Interior Plaster/Drywall Walls, 2 Coats Paint, Sprayed.....	1.33	
<i>For Up To 100, Add</i>	0.67	
<i>For >100 To 250, Add</i>	0.33	
<i>For >250 To 500, Add</i>	0.14	
<i>For >2,500 To 5,000, Deduct</i>	-0.07	
<i>For >5,000 To 10,000, Deduct</i>	-0.13	
<i>For >10,000 To 20,000, Deduct</i>	-0.20	
<i>For >20,000, Deduct</i>	-0.27	

01	01 General Requirements
	01 95 Residential Construction
	01 95 99 92 Los Angeles County Lead Remediation Program



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 92-0543	SF		Paint Touch Up Interior Acoustical Ceiling, 1 Coat Primer, Brush/Roller Work.....	0.93	
			<i>For Up To 100, Add</i>	0.54	
			<i>For >100 To 250, Add</i>	0.26	
			<i>For >250 To 500, Add</i>	0.11	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.19	
01 95 99 92-0544	SF		Paint Touch Up Interior Acoustical Ceiling, 2 Coats Paint, Brush/Roller Work	1.69	
			<i>For Up To 100, Add</i>	1.00	
			<i>For >100 To 250, Add</i>	0.48	
			<i>For >250 To 500, Add</i>	0.21	
			<i>For >2,500 To 5,000, Deduct</i>	-0.08	
			<i>For >5,000 To 10,000, Deduct</i>	-0.17	
			<i>For >10,000 To 20,000, Deduct</i>	-0.25	
			<i>For >20,000, Deduct</i>	-0.34	
01 95 99 92-0545	SF		Paint Touch Up Interior Acoustical Ceiling, 1 Coat Primer, Sprayed	0.90	
			<i>For Up To 100, Add</i>	0.48	
			<i>For >100 To 250, Add</i>	0.23	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	
01 95 99 92-0546	SF		Paint Touch Up Interior Acoustical Ceiling, 2 Coats Paint, Sprayed	1.42	
			<i>For Up To 100, Add</i>	0.74	
			<i>For >100 To 250, Add</i>	0.36	
			<i>For >250 To 500, Add</i>	0.16	
			<i>For >2,500 To 5,000, Deduct</i>	-0.07	
			<i>For >5,000 To 10,000, Deduct</i>	-0.14	
			<i>For >10,000 To 20,000, Deduct</i>	-0.21	
			<i>For >20,000, Deduct</i>	-0.28	

01 95 99 92-0547 Plumbing (01 95 99 92)

01 95 99 92-0548 Piping (01 95 99 92-0547)

01 95 99 92-0549	LF		1/2" Inside Diameter Copper Pipe/Tubing Type L Assembly	24.12	3.21
			Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies.		
01 95 99 92-0550	LF		3/4" Inside Diameter Copper Pipe/Tubing Type L Assembly	27.79	4.13
			Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies.		
01 95 99 92-0551	LF		1" Inside Diameter Copper Pipe/Tubing Type L Assembly	30.87	4.93
			Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available.		
01 95 99 92-0552	LF		1-1/4" Inside Diameter Copper Pipe/Tubing Type L Assembly	35.41	5.74
			Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available.		
01 95 99 92-0553	LF		1-1/2" Inside Diameter Copper Pipe/Tubing Type L Assembly	39.59	6.55
			Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available.		

01 95 99 99 Los Angeles Community Development Commission RSIP

Tasks (01 95)

01 95 99 99-0001 Residential Windows (01 95 99 99)

01 95 99 99-0002 Residential Vinyl Windows (01 95 99 99-0001)

Note: All labor, material and equipment to remove existing windows and Security bars install new windows. Includes white solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Minimum STC rating of 44. Chip clean and repair any stucco as needed and repair drywall as needed (allow 2 SF each of stucco and drywall chip, cut and repair), stucco key replacement, caulking and sealants. This list may not cover all individual items involved in the new window removal and installation, however it is intended to represent the complete in-place window replacement.

01 95 99 99-0003 Double Hung Vinyl Windows (01 95 99 99-0002)

01 95 99 99-0004 Double Hung Flanged Vinyl Windows (Milgard Quiet Line™ Series) (01 95 99 99-0003)

01 95 99 99-0005	EA		Up To 73" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	855.01	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0006	EA		>73" To 83" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	942.78	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0007	EA		>83" To 93" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,025.20	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0008 EA >93" To 101" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series).....	1,085.12	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 99-0009 EA >101" To 110" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series).....	1,149.06	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	35.40	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 99-0010 EA >110" To 120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series).....	1,139.84	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	21.57	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 99-0011 UI >120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series).....	10.43	
<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
01 95 99 99-0012 Casement Vinyl Windows (01 95 99 99-0002)		
01 95 99 99-0013 Casement Flanged Vinyl Windows (Milgard Quiet Line™ Series) (01 95 99 99-0012)		
01 95 99 99-0014 One Operating Sash, Casement Vinyl Windows (Milgard Quiet Line™ Series) (01 95 99 99-0013)		
01 95 99 99-0015 EA Up To 53" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	819.52	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	20.75	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0016 EA >53 To 63" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	930.59	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	23.19	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0017 EA >63 To 73" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,030.93	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0018 EA >73" To 83" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,120.58	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0019 EA >83" To 93" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,199.51	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0020 EA >93" To 101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,247.38	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 99-0021 UI >101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	12.29	
<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
01 95 99 99-0022 Two Operating Sashes, Casement Vinyl Windows (Milgard Quiet Line™ Series) (01 95 99 99-0013)		
01 95 99 99-0023 EA Up To 73" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,363.23	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0024 EA >73" To 83" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,498.38	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0025 EA >83" To 93" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,622.84	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0026	EA		>93" To 101" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,707.13 37.96 32.96 751.62	
01 95 99 99-0027	EA		>101" To 110" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,797.03 37.96 35.40 751.62	
01 95 99 99-0028	EA		>110" To 120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,890.96 37.96 37.84 751.62	
01 95 99 99-0029	UI		>120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	15.77 0.32 0.32 6.27	
01 95 99 99-0030 Horizontal Sliding Vinyl Windows (01 95 99 99-0002)					
01 95 99 99-0031 Horizontal Flanged Sliding Vinyl Windows (Milgard Quiet Line™ Series) (01 95 99 99-0030)					
01 95 99 99-0032	EA		Up To 73" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	776.84 27.11 25.63 562.35	
01 95 99 99-0033	EA		>73" To 83" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	853.90 27.11 28.08 562.35	
01 95 99 99-0034	EA		>83" To 93" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	925.58 27.11 30.52 562.35	
01 95 99 99-0035	EA		>93" To 101" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	976.94 37.96 32.96 751.62	
01 95 99 99-0036	EA		>101" To 110" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,031.24 37.96 35.40 751.62	
01 95 99 99-0037	EA		>110" To 120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,119.81 37.96 37.84 751.62	
01 95 99 99-0038	UI		>120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	9.35 0.32 0.32 6.27	
01 95 99 99-0039 Fixed Picture Vinyl Windows (01 95 99 99-0002)					
01 95 99 99-0040 Fixed Picture Flanged Vinyl Windows (Milgard Style Line™ Series) (01 95 99 99-0039)					
01 95 99 99-0041	EA		Up To 53" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	577.32 27.11 20.75 562.35	
01 95 99 99-0042	EA		>53 To 63" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	654.70 27.11 23.19 562.35	
01 95 99 99-0043	EA		>63 To 73" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	725.15 27.11 25.63 562.35	
01 95 99 99-0044	EA		>73" To 83" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	788.71 27.11 28.08 562.35	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0045 EA >83" To 93" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	845.35	
<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
01 95 99 99-0046 EA >93" To 101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	881.99	
<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
01 95 99 99-0047 UI >101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	8.68	
<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
01 95 99 99-0048 Accessories For Vinyl Windows (01 95 99 99-0002)		
01 95 99 99-0049 Factory Installed Grilles For Vinyl Windows (01 95 99 99-0048)		
01 95 99 99-0050 Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows (01 95 99 99-0049)		
01 95 99 99-0051 EA Up To 9 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	48.94	
01 95 99 99-0052 EA >9 To 18 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	62.93	
01 95 99 99-0053 EA >18 To 24 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	81.04	
01 95 99 99-0054 EA >24 To 36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	95.66	
01 95 99 99-0055 EA >36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	117.59	
01 95 99 99-0056 Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows (01 95 99 99-0049)		
01 95 99 99-0057 EA Up To 9 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	111.23	
01 95 99 99-0058 EA >9 To 18 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	133.48	
01 95 99 99-0059 EA >18 To 24 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	168.44	
01 95 99 99-0060 EA >24 To 36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	209.75	
01 95 99 99-0061 EA >36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	251.07	
01 95 99 99-0062 Meeting Egress Code For Windows (01 95 99 99-0002)		
01 95 99 99-0063 EA Drop Sill Up To 47"	344.33	
Note: Includes king stud, trimmers, cripples, exterior flashing, stucco molding, stucco patch with fog coat, drywall texture to match existing 90%, insulation if applicable (R-15), lath and paper overlap, backer rod, caulking, paint touch-up to match existing minimum 90% (hand applied only)		
01 95 99 99-0064 EA Enlarge Sideways Up To 49" Wide	444.53	
Note: Includes header, king stud, trimmers, cripples, exterior flashing, stucco molding, stucco path with fog coat, drywall texture to match existing 90%, insulation if applicable (R-15), lath and paper overlap, backer rod, caulking, paint touch-up to match existing minimum 90% (hand applied only)		
01 95 99 99-0065 Residential Window Glazing (01 95 99 99-0001)		
01 95 99 99-0066 Laminated Glass With PVB Interlayer, Residential Window Glazing (01 95 99 99-0065)		
Note: Type I, Class I, Quality Q3.		
01 95 99 99-0067 SF 1/4" Thick, Laminated Glass With PVB Interlayer, Residential Window Glazing	27.97	
<i>For Reflective Coated Glass, Add</i>	12.59	
<i>For Low-E Coated Glass, Add</i>	6.99	
01 95 99 99-0068 SF 3/8" Thick, Laminated Glass With PVB Interlayer, Residential Window Glazing	34.91	
<i>For Reflective Coated Glass, Add</i>	15.71	
<i>For Low-E Coated Glass, Add</i>	8.73	
01 95 99 99-0069 SF 1/2" Thick, Laminated Glass With PVB Interlayer, Factory Installed Glass.....	40.34	
<i>For Reflective Coated Glass, Add</i>	18.15	
<i>For Low-E Coated Glass, Add</i>	10.09	
01 95 99 99-0070 Remove And Reinstall Residential Window Security Bars (01 95 99 99-0001)		
Note: Includes reusing existing bolts and fasteners. See CSI section 05 05 23 00-0000 for additional fasteners.		
01 95 99 99-0071 EA Remove and Reinstall Residential Window Security Bars	54.23	
Note: Includes four connecting bolts.		
01 95 99 99-0072 Residential Vinyl Windows (Prime Windows) (01 95 99 99-0001)		
Note: All labor, material and equipment to remove existing windows and Security bars install new windows. Includes any color solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Minimum STC rating of 44, Chip clean and repair any stucco as needed and repair drywall as needed (allow 2 SF each of stucco and drywall chip, cut and repair), stucco key replacement, caulking and sealants. This list may not cover all individual items involved in the new window removal and installation; however it is intended to represent the complete in-place window replacement for block frame, retrofit and nail on. See CSI section 01 95 99 99-0048 for window accessories.		

01 General Requirements**01 95 Residential Construction**

01 95 99 99 Los Angeles Community Development Commission RSIP Tasks

MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0073			Single Hung Vinyl Windows (Prime Windows Series 7100) <small>(01 95 99 99-0072)</small>		
01 95 99 99-0074	EA		Up To 73" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	1,613.67	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	403.98	
			<i>For Obscure Glass, Add</i>	72.14	
			<i>For Grilles, Add</i>	57.71	
01 95 99 99-0075	EA		>73" To 83" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	1,774.23	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	444.38	
			<i>For Obscure Glass, Add</i>	79.35	
			<i>For Grilles, Add</i>	63.48	
01 95 99 99-0076	EA		>83" To 93" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	1,847.08	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	460.22	
			<i>For Obscure Glass, Add</i>	82.18	
			<i>For Grilles, Add</i>	65.75	
01 95 99 99-0077	EA		>93" To 101" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	2,018.95	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
			<i>For Tempered Glass, Add</i>	503.78	
			<i>For Obscure Glass, Add</i>	89.96	
			<i>For Grilles, Add</i>	71.97	
01 95 99 99-0078	EA		>101" To 110" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	2,094.63	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	35.40	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
			<i>For Tempered Glass, Add</i>	520.42	
			<i>For Obscure Glass, Add</i>	92.93	
			<i>For Grilles, Add</i>	74.35	
01 95 99 99-0079	EA		>110" To 120" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	2,277.82	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	37.84	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
			<i>For Tempered Glass, Add</i>	769.71	
			<i>For Obscure Glass, Add</i>	141.79	
			<i>For Grilles, Add</i>	101.28	
01 95 99 99-0080	UI		>120" UI, Single Hung Vinyl Window (Prime Windows Series 7100).....	18.60	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
			<i>For Tempered Glass, Add</i>	6.26	
			<i>For Obscure Glass, Add</i>	1.15	
			<i>For Grilles, Add</i>	0.82	
01 95 99 99-0081			Casement Vinyl Windows (Prime Windows Series 7500) <small>(01 95 99 99-0072)</small>		
01 95 99 99-0082			One Operating Sash, Casement Vinyl Windows (Prime Windows Series 7500) <small>(01 95 99 99-0081)</small>		
01 95 99 99-0083	EA		Up To 53" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	1,773.49	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	20.75	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	228.92	
			<i>For Obscure Glass, Add</i>	32.70	
			<i>For Grilles, Add</i>	49.05	
01 95 99 99-0084	EA		>53 To 63" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	2,001.94	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	23.19	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	258.62	
			<i>For Obscure Glass, Add</i>	36.95	
			<i>For Grilles, Add</i>	55.42	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0085 EA >63 To 73" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	2,088.94	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	268.53	
For Obscure Glass, Add	38.36	
For Grilles, Add	57.54	
01 95 99 99-0086 EA >73" To 83" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	2,342.85	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	301.80	
For Obscure Glass, Add	43.11	
For Grilles, Add	64.67	
01 95 99 99-0087 EA >83" To 93" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	2,443.99	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	313.68	
For Obscure Glass, Add	44.81	
For Grilles, Add	67.22	
01 95 99 99-0088 EA >93" To 101" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	2,774.29	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
For New Security Bar Installation (includes foot quick release), Add	751.62	
For Tempered Glass, Add	357.64	
For Obscure Glass, Add	51.09	
For Grilles, Add	76.64	
01 95 99 99-0089 UI >101" UI, One Operating Sash, Casement Vinyl Window (Prime Windows Series 7500).....	26.69	
For Re-Installation Of Existing Security Bars, Add	0.32	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
For New Security Bar Installation (includes foot quick release), Add	6.27	
For Tempered Glass, Add	3.44	
For Obscure Glass, Add	0.49	
For Grilles, Add	0.74	
01 95 99 99-0090 Two Operating Sashes, Casement Vinyl Windows (Prime Windows Series 7500) <small>(01 95 99 99-0081)</small>		
01 95 99 99-0091 EA Up To 73" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	3,848.56	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	514.87	
For Obscure Glass, Add	73.55	
For Grilles, Add	110.33	
01 95 99 99-0092 EA >73" To 83" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	4,054.39	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	541.41	
For Obscure Glass, Add	77.34	
For Grilles, Add	116.02	
01 95 99 99-0093 EA >83" To 93" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	4,214.93	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	561.61	
For Obscure Glass, Add	80.23	
For Grilles, Add	120.34	
01 95 99 99-0094 EA >93" To 101" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	4,573.52	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
For Tempered Glass, Add	609.53	
For Obscure Glass, Add	87.08	
For Grilles, Add	130.61	
01 95 99 99-0095 EA >101" To 110" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	4,867.03	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	35.40	
For Tempered Glass, Add	648.35	
For Obscure Glass, Add	92.62	
For Grilles, Add	138.93	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0096 EA >110" To 120" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	5,157.72	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	37.84	
For New Security Bar Installation (includes foot quick release), Add	751.62	
For Tempered Glass, Add	686.76	
For Obscure Glass, Add	98.11	
For Grilles, Add	147.16	
01 95 99 99-0097 UI >120" UI, Two Operating Sashes, Casement Vinyl Window (Prime Windows Series 7500).....	39.76	
For Re-Installation Of Existing Security Bars, Add	0.32	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
For New Security Bar Installation (includes foot quick release), Add	6.27	
For Tempered Glass, Add	5.27	
For Obscure Glass, Add	0.75	
For Grilles, Add	1.13	
01 95 99 99-0098 Horizontal Rolling Vinyl Windows (Prime Windows Series 7000) (01 95 99 99-0072)		
01 95 99 99-0099 EA Up To 73" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	1,627.81	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	407.94	
For Obscure Glass, Add	72.85	
For Grilles, Add	72.85	
01 95 99 99-0100 EA >73" To 83" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	1,748.77	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	437.25	
For Obscure Glass, Add	78.08	
For Grilles, Add	78.08	
01 95 99 99-0101 EA >83" To 93" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	1,931.95	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	483.98	
For Obscure Glass, Add	86.43	
For Grilles, Add	86.43	
01 95 99 99-0102 EA >93" To 101" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	2,146.26	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
For New Security Bar Installation (includes foot quick release), Add	751.62	
For Tempered Glass, Add	539.43	
For Obscure Glass, Add	96.33	
For Grilles, Add	96.33	
01 95 99 99-0103 EA >101" To 110" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	2,281.34	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	35.40	
For New Security Bar Installation (includes foot quick release), Add	751.62	
For Tempered Glass, Add	572.70	
For Obscure Glass, Add	102.27	
For Grilles, Add	102.27	
01 95 99 99-0104 EA >110" To 120" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	2,515.45	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	37.84	
For New Security Bar Installation (includes foot quick release), Add	751.62	
For Tempered Glass, Add	860.01	
For Obscure Glass, Add	158.42	
For Grilles, Add	158.42	
01 95 99 99-0105 UI >120" UI, Horizontal Rolling Vinyl Window (Prime Windows Series 7000).....	20.02	
For Re-Installation Of Existing Security Bars, Add	0.32	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
For New Security Bar Installation (includes foot quick release), Add	6.27	
For Tempered Glass, Add	6.80	
For Obscure Glass, Add	1.25	
For Grilles, Add	1.25	
01 95 99 99-0106 Fixed Picture Vinyl Windows (Prime Windows Series 7200) (01 95 99 99-0072)		
01 95 99 99-0107 EA Up To 53" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	786.18	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	20.75	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	356.31	
For Obscure Glass, Add	58.31	
For Grilles, Add	58.31	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0108 EA >53 To 63" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	904.30	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	23.19	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	412.32	
For Obscure Glass, Add	67.47	
For Grilles, Add	67.47	
01 95 99 99-0109 EA >63 To 73" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	971.49	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	440.33	
For Obscure Glass, Add	72.05	
For Grilles, Add	72.05	
01 95 99 99-0110 EA >73" To 83" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	1,038.69	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	468.34	
For Obscure Glass, Add	76.64	
For Grilles, Add	76.64	
01 95 99 99-0111 EA >83" To 93" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	1,170.95	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	532.13	
For Obscure Glass, Add	87.08	
For Grilles, Add	87.08	
01 95 99 99-0112 EA >93" To 101" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	1,311.71	
For Re-Installation Of Existing Security Bars, Add	37.96	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
For New Security Bar Installation (includes foot quick release), Add	751.62	
For Tempered Glass, Add	600.59	
For Obscure Glass, Add	98.28	
For Grilles, Add	98.28	
01 95 99 99-0113 UI >101" UI, Fixed Picture Vinyl Window (Prime Windows Series 7200).....	14.18	
For Re-Installation Of Existing Security Bars, Add	0.32	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
For New Security Bar Installation (includes foot quick release), Add	6.27	
For Tempered Glass, Add	6.63	
For Obscure Glass, Add	1.09	
For Grilles, Add	1.09	
01 95 99 99-0114 Awning Vinyl Windows (Prime Windows Series 7600) (01 95 99 99-0072)		
01 95 99 99-0115 EA Up To 43" UI, Awning Vinyl Window (Prime Windows Series 7600).....	924.99	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	20.75	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	110.13	
For Obscure Glass, Add	15.73	
For Grilles, Add	23.60	
01 95 99 99-0116 EA >43" To 53" UI, Awning Vinyl Window (Prime Windows Series 7600).....	1,276.08	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	23.19	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	157.00	
For Obscure Glass, Add	22.43	
For Grilles, Add	33.64	
01 95 99 99-0117 EA >53" To 63" UI, Awning Vinyl Window (Prime Windows Series 7600).....	1,357.15	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	24.41	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	167.22	
For Obscure Glass, Add	23.89	
For Grilles, Add	35.83	
01 95 99 99-0118 EA >63 To 73" UI, Awning Vinyl Window (Prime Windows Series 7600).....	1,438.17	
For Re-Installation Of Existing Security Bars, Add	27.11	
For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
For New Security Bar Installation (includes foot quick release), Add	562.35	
For Tempered Glass, Add	177.42	
For Obscure Glass, Add	25.35	
For Grilles, Add	38.02	

01 General Requirements**01 95 Residential Construction****01 95 99 99 Los Angeles Community Development Commission RSIP Tasks**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0119	EA		>73" To 83" UI, Awning Vinyl Window (Prime Windows Series 7600).....	1,594.43	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	197.02	
			<i>For Obscure Glass, Add</i>	28.15	
			<i>For Grilles, Add</i>	42.22	
01 95 99 99-0120	EA		>83" To 93" UI, Awning Vinyl Window (Prime Windows Series 7600).....	1,744.89	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
			<i>For Tempered Glass, Add</i>	215.80	
			<i>For Obscure Glass, Add</i>	30.83	
			<i>For Grilles, Add</i>	46.24	
01 95 99 99-0121	EA		>93" To 101" UI, Awning Vinyl Window (Prime Windows Series 7600).....	1,833.34	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
			<i>For Tempered Glass, Add</i>	225.91	
			<i>For Obscure Glass, Add</i>	32.27	
			<i>For Grilles, Add</i>	48.41	
01 95 99 99-0122	UI		>101" UI, Awning Vinyl Window (Prime Windows Series 7600).....	18.03	
			<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
			<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
			<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	
			<i>For Tempered Glass, Add</i>	2.23	
			<i>For Obscure Glass, Add</i>	0.32	
			<i>For Grilles, Add</i>	0.48	
01 95 99 99-0123			Vinyl Window Accesories (Prime Windows) (01 95 99 99-0072)		
01 95 99 99-0124	EA		Window Opening Control Device For Single Hung Vinyl Windows (Prime Windows).....	22.63	
01 95 99 99-0125	EA		Window Opening Control Device For One Operating Sash, Casement Vinyl Windows (Prime Windows).....	33.95	
01 95 99 99-0126	EA		Window Opening Control Device For Two Operating Sashes, Casement Vinyl Windows (Prime Windows).....	67.90	
01 95 99 99-0127			Residential Doors (01 95 99 99)		
01 95 99 99-0128			Door Assemblies (01 95 99 99-0127)		
			Note: All labor, material and equipment to remove and replace existing doors. Includes STC 40 Paint grade sc. door, frame, hinges, caulking, seals, ridged weather stripping, entry lockset, deadbolt, threshold and paint per manufacturer specifications. Per L.A. County Residential Sound Improvement Program Specification (RSIP) 08100 Rated Door. This list may not cover all individual items involved in the new door removal and installation, however it is intended to represent the complete in-place installation of doors.		
01 95 99 99-0129	EA		2'-4" Thru 2'-8" x 7' x 1-3/4" Thick, STC 40, Composite With Wood Veneer Cladding, Acoustical Door System (Unrated).....	4,525.92	
			<i>For Stain Grade Assembly, Add</i>	1,024.14	
			<i>Note: Includes stain and varnish per manufacturer's specifications</i>		
			<i>For Raised Panel, Add</i>	484.36	
			<i>For Wagon Wheel, Add</i>	678.11	
			<i>For Half Lite, Add</i>	891.23	
			<i>For Hollywood/French Door, Add</i>	968.73	
			<i>For Side Lite Assembly, Up To 12", Add</i>	896.67	
			<i>For Transom Lite, Add</i>	389.34	
			<i>For Enlarging Door Opening To 36" Minimum Width, Add</i>	748.65	
			<i>For 20 Minute Fire Door Assembly, Add</i>	464.99	
01 95 99 99-0130	EA		2'-10" Thru 3' x 7' x 1-3/4" Thick, STC 40, Composite With Wood Veneer Cladding, Acoustical Door System (Unrated).....	4,926.64	
			<i>For Stain Grade Assembly, Add</i>	1,141.17	
			<i>Note: Includes stain and varnish per manufacturer's specifications</i>		
			<i>For Raised Panel, Add</i>	532.42	
			<i>For Wagon Wheel, Add</i>	745.39	
			<i>For Half Lite, Add</i>	979.65	
			<i>For Hollywood/French Door, Add</i>	1,064.84	
			<i>For Side Lite Assembly, Up To 12", Add</i>	896.67	
			<i>For Transom Lite, Add</i>	467.22	
			<i>For Enlarging Door Opening To 36" Minimum Width, Add</i>	748.65	
			<i>For 20 Minute Fire Door Assembly, Add</i>	511.12	
01 95 99 99-0131	EA		3'-2" Thru 3'-6" x 7' x 1-3/4" Thick, STC 40, Composite With Wood Veneer Cladding, Acoustical Door System (Unrated).....	5,523.80	
			<i>For Stain Grade Assembly, Add</i>	1,302.89	
			<i>Note: Includes stain and varnish per manufacturer's specifications</i>		
			<i>For Raised Panel, Add</i>	605.37	
			<i>For Wagon Wheel, Add</i>	847.52	
			<i>For Half Lite, Add</i>	1,113.88	
			<i>For Hollywood/French Door, Add</i>	1,210.74	
			<i>For Side Lite Assembly, Up To 12", Add</i>	896.67	
			<i>For Transom Lite, Add</i>	545.08	
			<i>For 20 Minute Fire Door Assembly, Add</i>	581.15	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0132	EA			4' x 7' x 1-3/4" Thick, STC 40, Double Assembly, Composite With Wood Veneer Cladding, Acoustical Door System (Unrated) 6,889.85		
				<i>For Stain Grade Assembly, Add</i> 1,637.42		
				<i>Note: Includes stain and varnish per manufacturer's specifications</i>		
				<i>For Raised Panel, Add</i> 774.43		
				<i>For Wagon Wheel, Add</i> 1,084.20		
				<i>For Half Lite, Add</i> 1,424.95		
				<i>For Hollywood/French Door, Add</i> 1,548.86		
				<i>For Side Lite Assembly, Up To 12", Add</i> 896.67		
				<i>For Transom Lite, Add</i> 622.95		
				<i>For 20 Minute Fire Door Assembly, Add</i> 743.45		
01 95 99 99-0133	EA			5' x 7' x 1-3/4" Thick, STC 40, Double Assembly, Composite With Wood Veneer Cladding, Acoustical Door System (Unrated) 8,089.60		
				<i>For Stain Grade Assembly, Add</i> 1,961.28		
				<i>Note: Includes stain and varnish per manufacturer's specifications</i>		
				<i>For Raised Panel, Add</i> 920.33		
				<i>For Wagon Wheel, Add</i> 1,288.46		
				<i>For Half Lite, Add</i> 1,693.40		
				<i>For Hollywood/French Door, Add</i> 1,840.66		
				<i>For Side Lite Assembly, Up To 12", Add</i> 896.67		
				<i>For Transom Lite, Add</i> 778.69		
				<i>For 20 Minute Fire Door Assembly, Add</i> 883.52		
01 95 99 99-0134	EA			6' x 7' x 1-3/4" Thick, STC 40, Double Assembly, Composite With Wood Veneer Cladding, Acoustical Door System (Unrated) 8,904.92		
				<i>For Stain Grade Assembly, Add</i> 2,198.37		
				<i>Note: Includes stain and varnish per manufacturer's specifications</i>		
				<i>For Raised Panel, Add</i> 1,018.18		
				<i>For Wagon Wheel, Add</i> 1,425.45		
				<i>For Half Lite, Add</i> 1,873.44		
				<i>For Hollywood/French Door, Add</i> 2,036.35		
				<i>For Side Lite Assembly, Up To 12", Add</i> 896.67		
				<i>For Transom Lite, Add</i> 934.42		
				<i>For 20 Minute Fire Door Assembly, Add</i> 977.45		
01 95 99 99-0135				Residential Sliding Doors (01 95 99 99-0127)		
01 95 99 99-0136				Premium Vinyl Sliding Glass Doors (Milgard Style Line™ Series) (01 95 99 99-0135)		
				Note: Includes white solid vinyl interior and exterior, standard hardware and clear high-performance Low-E insulating glass. Excludes grilles and insect screens. Minimum STC rating of 32 included in price.		
01 95 99 99-0137	EA			61-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series) 4,589.09		85.72
				<i>For STC 35 Rating, Add</i> 1,811.24		
				<i>For STC 44 Rating, Add</i> 5,080.31		
01 95 99 99-0138	EA			73-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series) 5,041.80		86.81
				<i>For STC 35 Rating, Add</i> 1,995.96		
				<i>For STC 44 Rating, Add</i> 5,598.43		
01 95 99 99-0139	EA			97-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series) 6,742.17		104.16
				<i>For STC 35 Rating, Add</i> 2,678.87		
				<i>For STC 44 Rating, Add</i> 7,513.92		
01 95 99 99-0140				Premium Vinyl Sliding Glass Doors (Prime Windows Series 8400) (01 95 99 99-0135)		
				Note: Includes any color solid vinyl interior and exterior, standard hardware and clear high-performance Low-E insulating glass. Excludes grilles and insect screens. Minimum STC 35 rating.		
01 95 99 99-0141	EA			61-3/4" x 81-3/4" Frame Opening, Vinyl Sliding Glass Door (Prime Windows Series 8400) 7,313.32		85.72
				<i>For Grilles, Add</i> 285.68		
				<i>For STC 37, Add</i> 5,999.19		
01 95 99 99-0142	EA			73-3/4" x 81-3/4" Frame Opening, Vinyl Sliding Glass Door (Prime Windows Series 8400) 8,400.79		86.81
				<i>For Grilles, Add</i> 329.09		
				<i>For STC 37, Add</i> 6,910.84		
01 95 99 99-0143	EA			95-1/2" x 81-3/4" Frame Opening, Vinyl Sliding Glass Door (Prime Windows Series 8400) 9,994.03		104.16
				<i>For Grilles, Add</i> 391.43		
				<i>For STC 37, Add</i> 8,219.99		
01 95 99 99-0144	EA			61-3/4" x 95-1/2" Frame Opening, Vinyl Sliding Glass Door (Prime Windows Series 8400) 7,929.70		94.29
				<i>For Grilles, Add</i> 309.64		
				<i>For STC 37, Add</i> 6,502.54		
01 95 99 99-0145	EA			73-3/4" x 95-1/2" Frame Opening, Vinyl Sliding Glass Door (Prime Windows Series 8400) 9,259.13		95.49
				<i>For Grilles, Add</i> 362.73		
				<i>For STC 37, Add</i> 7,617.26		
01 95 99 99-0146	EA			95-1/2" x 95-1/2" Frame Opening, Vinyl Sliding Glass Door (Prime Windows Series 8400) 11,089.86		114.58
				<i>For Grilles, Add</i> 434.43		
				<i>For STC 37, Add</i> 9,123.00		
01 95 99 99-0147				Residential Storm Doors (01 95 99 99-0127)		
01 95 99 99-0148	EA			Aluminum Residential Storm Door, Tempered Glass, STC 30 With Frame, Trim, Hardware 708.84		86.81
01 95 99 99-0149				Residential Security Screen (01 95 99 99-0127)		
01 95 99 99-0150	EA			Prehung Steel Security Screen Door, Residential, With Frame, Trim, Hardware 706.04		149.19
01 95 99 99-0151				Residential Pre-Hung Fire Rated Doors (01 95 99 99-0127)		
				Note: Assembly to include self-closing hinges, seals, threshold, caulking, dead bolt and entry lockset per RSIP specifications.		

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
01 95 99 99-0152	EA	3' x 7' x 1-3/4" Prehung Solid Core, Fire Rated, Veneer Faced Wood Door.....		1,230.13	151.91
01 95 99 99-0153	EA	3'-6" x 7' x 1-3/4" Prehung Solid Core, Fire Rated, Veneer Faced Wood Door.....		1,357.83	159.50
01 95 99 99-0154		Remove And Reinstall Residential Security Screen Doors <small>(01 95 99 99-0127)</small>			
		Note: Includes reusing existing bolts and fasteners. See CSI section 05 05 23 00-0000 for additional fasteners.			
01 95 99 99-0155	EA	Remove and Reinstall Residential Security Screen Doors		70.50	
		Note: Includes 6 lag bolts.			
01 95 99 99-0156		Door Assembly <small>(01 95 99 99-0127)</small>			
		Note: All labor, material and equipment to remove and replace existing door slab. Includes STC 40 Paint grade sc. door, hinges, ridged weather stripping, paint and primer per manufacturer specifications. Includes drilling for lockset and deadbolt with up to a 5 1/2" offset, drill for peep hole /doorbell combo, mail slot, and mortise hinges. Reuse of existing Lockset, deadbolt, mail slot, and peephole/doorbell. Per L.A. County Residential Sound Improvement Program Specification (RSIP) 08100 Rated Door. This list may not cover all individual items involved in the new door removal and installation; however it is intended to represent the complete in-place installation of doors.			
01 95 99 99-0157	EA	2'-10" Thru 3' x 7' x 1-3/4" Thick, STC 40, Wood Clad Fiberglass Acoustical Door (Unrated)		3,057.63	
		Note: Includes STC 40 Paint grade sc. door, hinges, weather stripping, paint and primer both sides per manufacturer specifications. Includes drilling for lockset and deadbolt with up to a 5 1/2" offset, drill for peep hole /doorbell combo, mail slot, and mortise hinges. Reuse of existing lockset, deadbolt, mail slot, and peephole/doorbell.			
		<i>For Stain Grade Assembly, Add</i>		745.06	
		Note: Includes stain and varnish per manufacturer's specifications			
		<i>For Side Lite Assembly, Up To 12", Add</i>		896.67	
		<i>For Transom Lite, Add</i>		467.22	
		<i>For Enlarging Door Opening To 36" Minimum Width, Add</i>		748.65	
01 95 99 99-0158		Residential Hardware <small>(01 95 99 99)</small>			
01 95 99 99-0159	EA	1-5/16" Overall Height, Satin Aluminum Finish, Aluminum Floor Stop (Ives FS430)		30.90	13.57
01 95 99 99-0160	EA	3-3/4" Projection, Residential Rigid Type, Satin Aluminum Finish, Aluminum Wall Stop (Ives 60)		16.03	5.43
01 95 99 99-0161	EA	Satin Brass Finish, Brass Residential Hinge Pin Door Stop (Ives 72).....		25.54	10.85
01 95 99 99-0162		Wood Moldings <small>(01 95 99 99)</small>			
01 95 99 99-0163	LF	1-1/8" Wide Soft Wood Door And Window Molding		5.24	1.73
		<i>For Clear Birch, Add</i>		0.44	
		<i>For Clear Mahogany, Oak, Maple Or Walnut, Add</i>		1.00	
		<i>For Stain Grade Material (No Finger Joints), Add</i>		0.24	
		<i>For Clear Poplar, Add</i>		0.27	
01 95 99 99-0164	LF	2-1/2" Wide Soft Wood Door And Window Molding		6.75	1.73
		<i>For Clear Birch, Add</i>		0.92	
		<i>For Clear Mahogany, Oak, Maple Or Walnut, Add</i>		1.68	
		<i>For Stain Grade Material (No Finger Joints), Add</i>		0.52	
		<i>For Clear Poplar, Add</i>		0.57	
01 95 99 99-0165	LF	3-1/2" Soft Wood Base Molding, All Dimensions Are Nominal.....		7.01	1.30
		<i>For Clear Birch, Add</i>		0.85	
		<i>For Clear Mahogany, Oak, Maple Or Walnut, Add</i>		1.64	
		<i>For Stain Grade Material (No Finger Joints), Add</i>		0.48	
		<i>For Clear Poplar, Add</i>		0.53	
01 95 99 99-0166		Wood Repair and Carpentry <small>(01 95 99 99)</small>			
01 95 99 99-0167		Framing <small>(01 95 99 99-0166)</small>			
01 95 99 99-0168	LF	2" x 4" Pressure Treated Wood Sill.....		3.16	1.64
01 95 99 99-0169	LF	2" x 6" Pressure Treated Wood Sill.....		3.89	1.86
01 95 99 99-0170	LF	2" x 4" Wood Stud Framing, For Partition Walls		1.69	0.87
01 95 99 99-0171	LF	2" x 6" Wood Stud Framing, For Partition Walls		2.03	0.93
01 95 99 99-0172		Headers and Posts <small>(01 95 99 99-0166)</small>			
01 95 99 99-0173		Timber Beams <small>(01 95 99 99-0172)</small>			
01 95 99 99-0174	LF	4" x 4", Douglas Fir, Heavy Timber Beam.....		6.34	1.94
01 95 99 99-0175	LF	4" x 6", Douglas Fir, Heavy Timber Beam.....		7.74	2.02
01 95 99 99-0176	LF	4" x 8", Douglas Fir, Heavy Timber Beam.....		9.14	2.10
01 95 99 99-0177	LF	4" x 10", Douglas Fir, Heavy Timber Beam.....		11.95	2.24
01 95 99 99-0178	LF	4" x 12", Douglas Fir, Heavy Timber Beam.....		14.24	2.38
01 95 99 99-0179	LF	6" x 6", Douglas Fir, Heavy Timber Beam.....		9.86	2.19
01 95 99 99-0180	LF	6" x 8", Douglas Fir, Heavy Timber Beam.....		11.89	2.30
01 95 99 99-0181	LF	6" x 10", Douglas Fir, Heavy Timber Beam.....		16.11	2.46
01 95 99 99-0182	LF	6" x 12", Douglas Fir, Heavy Timber Beam.....		19.27	2.51
01 95 99 99-0183	LF	8" x 8", Douglas Fir, Heavy Timber Beam.....		14.59	2.38
01 95 99 99-0184	LF	8" x 10", Douglas Fir, Heavy Timber Beam.....		19.85	2.46
01 95 99 99-0185	LF	8" x 12", Douglas Fir, Heavy Timber Beam.....		24.09	2.51
01 95 99 99-0186		Timber Columns <small>(01 95 99 99-0172)</small>			
01 95 99 99-0187	LF	4" x 4", Pressure Treated, Heavy Timber Column		4.63	1.02
01 95 99 99-0188	LF	4" x 6", Pressure Treated, Heavy Timber Column		6.28	1.08



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0189 LF 4" x 8", Pressure Treated, Heavy Timber Column	7.65	1.11
01 95 99 99-0190 LF 4" x 10", Pressure Treated, Heavy Timber Column	10.59	1.18
01 95 99 99-0191 LF 4" x 12", Pressure Treated, Heavy Timber Column	12.95	1.25
01 95 99 99-0192 LF 6" x 6", Pressure Treated, Heavy Timber Column	9.22	1.14
01 95 99 99-0193 LF 6" x 8", Pressure Treated, Heavy Timber Column	11.67	1.19
01 95 99 99-0194 LF 6" x 10", Pressure Treated, Heavy Timber Column	14.23	1.29
01 95 99 99-0195 LF 6" x 12", Pressure Treated, Heavy Timber Column	17.92	1.32
01 95 99 99-0196 LF 8" x 8", Pressure Treated, Heavy Timber Column	18.25	1.25
01 95 99 99-0197 LF 8" x 10", Pressure Treated, Heavy Timber Column	21.50	1.29
01 95 99 99-0198 LF 8" x 12", Pressure Treated, Heavy Timber Column	25.62	1.35
01 95 99 99-0199 LF 10" x 10", Pressure Treated, Heavy Timber Column	25.74	1.35
01 95 99 99-0200 LF 10" x 12", Pressure Treated, Heavy Timber Column	34.70	1.43
01 95 99 99-0201 LF 12" x 12", Pressure Treated, Heavy Timber Column	41.35	1.59
01 95 99 99-0202 Plywood Catwalks (01 95 99 99-0166)		
01 95 99 99-0203 SF 5/8" AC Fir Plywood Floor Decking	2.93	0.66
Note: Applied to floor or joists.		
01 95 99 99-0204 Soffit Framing (01 95 99 99-0166)		
01 95 99 99-0205 LF 2" x 4" Wood Suspended Ceiling Framing	3.32	1.86
01 95 99 99-0206 Insulation (01 95 99 99)		
01 95 99 99-0207 SF 9-1/2" Thick, Kraft Faced, R-30 Fiberglass Flexible Insulation	2.56	0.53
01 95 99 99-0208 SF 9-1/2" Thick, Unfaced, R-30 Fiberglass Flexible Insulation	2.42	0.53
01 95 99 99-0209 SF 8-1/2" Thick, R-30 Attic, Cellulose Blown In Insulation	2.15	1.50
01 95 99 99-0210 CF Expansive Foam Sprayed Insulation	21.00	1.50
01 95 99 99-0211 Drywall, Plaster and Stucco (01 95 99 99)		
01 95 99 99-0212 Plaster (01 95 99 99-0211)		
01 95 99 99-0213 SF Up To 10 SF, Cut And Patch Hole In Plaster To Match Existing	19.69	
01 95 99 99-0214 SF >10 To 50 SF, Cut And Patch Hole In Plaster To Match Existing	17.44	
01 95 99 99-0215 Stucco (01 95 99 99-0211)		
01 95 99 99-0216 SF Up To 10 SF, Chip, Clean And Repair Plaster/Stucco	37.07	
01 95 99 99-0217 SF >10 To 50 SF, Chip, Clean And Repair Plaster/Stucco	26.93	
01 95 99 99-0218 Lath (01 95 99 99-0211)		
01 95 99 99-0219 SF 2.5 LB/SY, Installed On Studs Or Furred Walls, Flat Diamond, Expanded Metal Lath	2.62	0.62
For Stainless Steel, Add		0.80
01 95 99 99-0220 LF Stucco Key Replacement	5.50	0.62
Note: Includes removal of existing.		
01 95 99 99-0221 LF Galvanized Weep Screed	3.99	0.62
01 95 99 99-0222 CSF Two Layer Kraft Paper Laminated With Asphalt, Grade "B" Building Paper (Aquabar B)	30.21	
01 95 99 99-0223 Drywall (01 95 99 99-0211)		
01 95 99 99-0224 SF Up To 2 SF, Cut And Patch Hole In Drywall To Match Existing	21.20	
Note: Per location.		
01 95 99 99-0225 SF >2 To 4 SF, Cut And Patch Hole In Drywall To Match Existing	17.15	
Note: Per location.		
01 95 99 99-0226 SF >4 To 8 SF, Cut And Patch Hole In Drywall To Match Existing	15.40	
Note: Per location.		
01 95 99 99-0227 SF >8 To 16 SF, Cut And Patch Hole In Drywall To Match Existing	13.59	
Note: Per location.		
01 95 99 99-0228 SF >16 To 32 SF, Cut And Patch Hole In Drywall To Match Existing	12.18	
Note: Per location. See CSI section 09 29 10 00-0001 for "Gypsum Board" repairs > 32 SF.		
01 95 99 99-0229 SF 1/2" Gypsum Board	1.69	0.56
For Curved Surfaces With A 2'-0" Maximum Radius, Add		0.27
For Adhesive Applied Sheets, Add		0.12
Note: Includes bracing until adhesive is bonded		
For Foil Back Board, Add		0.10
For Horizontal Installation Up To 10' High, Add		0.38
For Horizontal Installation >10' High, Add		0.57
For Walls >10' High, Add		0.09
For Up To 128, Add		0.56
For >128 To 320, Add		0.34
For >1,536, Deduct		-0.14

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0230 SF 5/8" Gypsum Board.....	1.98	0.64
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.30	
For Adhesive Applied Sheets, Add	0.12	
Note: Includes bracing until adhesive is bonded		
For Foil Back Board, Add	0.10	
For Horizontal Installation Up To 10' High, Add	0.44	
For Horizontal Installation >10' High, Add	0.65	
For Walls >10' High, Add	0.10	
For Up To 128, Add	0.65	
For >128 To 320, Add	0.39	
For >1,536, Deduct	-0.17	
01 95 99 99-0231 Painting, Touch Up (01 95 99 99)		
Note: Includes all materials, surface preparation (wipe down and light clean, patching holes up to 3/8"), caulking and sealing, all finishes, surface protection, and masking tape.		
01 95 99 99-0232 SF Paint Touch Up Interior Plaster/Drywall Walls, 1 Coat Primer, Brush Roller Work	0.81	
For Up To 100, Add	0.45	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
01 95 99 99-0233 SF Paint Touch Up Interior Plaster/Drywall Walls, 2 Coats Paint, Brush Roller Work	1.61	
For Up To 100, Add	0.91	
For >100 To 250, Add	0.44	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.32	
01 95 99 99-0234 SF Paint Touch Up Interior Plaster/Drywall Walls, 1 Coat Primer, Sprayed	0.73	
For Up To 100, Add	0.35	
For >100 To 250, Add	0.17	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.15	
01 95 99 99-0235 SF Paint Touch Up Interior Plaster/Drywall Walls, 2 Coats Paint, Sprayed.....	1.33	
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
01 95 99 99-0236 SF Paint Touch Up Interior Acoustical Ceiling, 1 Coat Primer, Brush/Roller Work.....	0.93	
For Up To 100, Add	0.54	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.19	
01 95 99 99-0237 SF Paint Touch Up Interior Acoustical Ceiling, 2 Coats Paint, Brush/Roller Work	1.69	
For Up To 100, Add	1.00	
For >100 To 250, Add	0.48	
For >250 To 500, Add	0.21	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000 To 20,000, Deduct	-0.25	
For >20,000, Deduct	-0.34	
01 95 99 99-0238 SF Paint Touch Up Interior Acoustical Ceiling, 1 Coat Primer, Sprayed	0.90	
For Up To 100, Add	0.48	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.18	
01 95 99 99-0239 SF Paint Touch Up Interior Acoustical Ceiling, 2 Coats Paint, Sprayed	1.42	
For Up To 100, Add	0.74	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.28	
01 95 99 99-0240 Flooring (01 95 99 99)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0241 SF 1/2" Thick, Red Oak, Prefinished Engineered Wood Flooring	16.95	1.09
<i>For Up To 20, Add</i>	4.46	
<i>For >20 To 50, Add</i>	2.55	
<i>For >20 To 50, Add</i>	2.55	
<i>For >100 To 300, Add</i>	0.64	
01 95 99 99-0242 SF 0.08" Inlaid Sheet Vinyl Floor, Mannington Fine Fields #10146.....	9.03	0.66
<i>For >40 To 100, Add</i>	1.79	
<i>For >1,000, Deduct</i>	-0.77	
01 95 99 99-0243 SY 7/16" Thick, Rebonded, 6 LB/CF	9.26	2.77
01 95 99 99-0244 SY 22 Ounce, Medium Traffic, Non Patterned, Nylon Broadloom Carpet	48.45	21.89
<i>For Up To 15, Add</i>	2.92	
<i>For >15 To 33, Add</i>	1.46	
<i>For >200 To 400, Deduct</i>	-0.68	
<i>For >400 To 600, Deduct</i>	-1.02	
<i>For >600 To 900, Deduct</i>	-1.91	
<i>For >900, Deduct</i>	-2.81	
<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
01 95 99 99-0245 SF Mounted Floor Tile, Residential Grade, Thin-Set Mortar	11.06	2.89
Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles. Tiles mounted from back, side or front in 12" x 12", 12" x 24", or similar sized sheets.		
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	8.19	
<i>For >50 To 250, Add</i>	1.45	
01 95 99 99-0246 SF 1/8" Thick, Vinyl Composition Tile (VCT) (Armstrong® Standard Excelon Imperial Texture®).....	3.79	1.33
<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
<i>For Up To 100, Add</i>	0.27	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	
01 95 99 99-0247 SF 1/8" Thick, Vinyl Composition Tile (VCT) (Armstrong® Standard Excelon® Imperial® Texture with Diamond 10® Technology Coating)	4.91	1.33
<i>For Up To 100, Add</i>	0.33	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	
01 95 99 99-0248 SF 1/8" Thick, Vinyl Composition Tile (VCT) (Armstrong® Standard Excelon® MultiColor™ with Diamond 10® Technology Coating)	4.91	1.33
<i>For Up To 100, Add</i>	0.33	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	
01 95 99 99-0249 SF 1/8" Thick, Vinyl Composition Tile (VCT) (Armstrong® Premium Excelon® Raffia® Stream™ with Diamond 10® Technology Coating)	6.44	1.33
<i>For Up To 100, Add</i>	0.40	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	
01 95 99 99-0250 SF 1/8" Thick, Vinyl Composition Tile (VCT) (Armstrong® Striations BBT™ with Diamond 10® Technology Coating).....	8.36	1.33
<i>For Up To 100, Add</i>	0.50	
<i>For Modified Urethane Adhesive (Armstrong S-1000) Instead Of Water-Based/Latex-Resin, Add</i>	0.72	
01 95 99 99-0251 HVAC <small>(01 95 99 99)</small>		
01 95 99 99-0252 Residential Split System Heat Pump HVAC Assembly <small>(01 95 99 99-0251)</small>		
Note: All labor, material, Energy calculations, testing (HERS, AIR BALANCING & TITLE 24) and Drawings (Engineered Design, shop drawings & Final As-Built) and represents a complete, in place and fully functioning title 24 compliant system. Units comply with PCC and are 15 SEER minimum. Includes 7 day programmable thermostat with up to 50 LF of wire (model), all duct work (supply, return, fresh air), dampers, Plenums, all supply registers, interior air return register, exterior fresh air intake grilles, refrigerants, air filters, penetrations, seismic bracing, cat walks, vibration isolation, all hangers, all straps, fasteners, caulking, sealants, Refrigerant line sets (up to 30 LF), UV protected condensate drains (Up to 50 LF), 26 Ga painted sheet metal line set covers (up to 10 LF) & 4" thick 2' x 2' concrete condenser pads. This list may not cover all individual items involved in the new system, however it is intended to represent the installation of the complete operational and in place system in its entirety.		
01 95 99 99-0253 EA 1.5 – 2.5 Ton Residential Split System Condenser/Heat Pump, Air Handler With Coils, And Refrigerant Dryer (Up To 1,250SF).....	9,466.19	
Note: Includes R 6.0 Insulated Duct; Up to 10 LF of 14"; Up to 20 LF of 12", Up to 20 LF of 10", Up to 30 LF of 8", Up to 20 LF of 6". Up to 15 LF and up to 8" fresh air intake duct with backdraft & volume damper with 1/4" wire mesh, supply registers with damper up to 3- 6"x6", up to 3- 8"x8", up to 3- 10"x 10", up to 2- 12"x12", Up to 24"x30" return air grille with filter rack, up to 8" fresh air grille.		
<i>For Additional LF Of 12" R6.0 Insulated Duct Above Allowance, Add Per LF</i>	26.44	
<i>For Additional LF Of 10" R6.0 Insulated Duct Above Allowance, Add Per LF</i>	19.85	
<i>For Additional LF Of 8" R6.0 Insulated Duct Above Allowance, Add Per LF</i>	15.30	
<i>For Additional LF Of 6" R6.0 Insulated Duct Above Allowance, Add Per LF</i>	11.40	
<i>For Additional LF Of Up To 8" Fresh Air Duct Above Allowance, Add Per LF</i>	13.05	
<i>For Additional 6" x 6" Supply Register With Damper, Add Per EA</i>	127.20	
<i>For Additional 8" x 8" Supply Register With Damper, Add Per EA</i>	141.53	
<i>For Additional 10" x 10" Supply Register With Damper, Add Per EA</i>	170.02	
<i>For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF</i>	15.04	
<i>For Additional LF Of Condensate Drain, Add Per LF</i>	7.46	

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 99 99-0254	EA	3.0 – 4.0 Ton Residential Split System Condenser/Heat Pump, Air Handler With Coils, And Refrigerant Dryer (Up To 2,000SF).....	10,976.23
		Note: Includes R 6.0 Insulated Duct; Up to 10 LF of 14"; Up to 20 LF of 12", Up to 20 LF of 10", Up to 30 LF of 8", Up to 20 LF of 6". Up to 15 LF and up to 8" fresh air intake duct with backdraft & volume damper with 1/4" wire mesh, supply registers with damper up to 3- 6"x6", up to 3- 8"x8", up to 3- 10"x 10", up to 2- 12"x12", Up to 24"x30" return air grille with filter rack, up to 8" fresh air grille. For Additional LF Of 12" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 10" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 8" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 6" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of Up To 8" Fresh Air Duct Above Allowance, Add Per LF For Additional 6" x 6" Supply Register With Damper, Add Per EA For Additional 8" x 8" Supply Register With Damper, Add Per EA For Additional 10" x 10" Supply Register With Damper, Add Per EA For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF For Additional LF Of Condensate Drain, Add Per LF	26.44 19.85 15.30 11.40 13.05 127.20 141.53 170.02 15.04 7.46
01 95 99 99-0255	EA	5.0 Ton Residential Split System Condenser/Heat Pump, Air Handler With Coils, And Refrigerant Dryer (Up To 3,000SF).....	13,667.56
		Note: Includes R 6.0 Insulated Duct; Up to 10 LF of 14"; Up to 20 LF of 12", Up to 20 LF of 10", Up to 30 LF of 8", Up to 20 LF of 6". Up to 15 LF and up to 8" fresh air intake duct with backdraft & volume damper with 1/4" wire mesh, supply registers with damper up to 3- 6"x6", up to 3- 8"x8", up to 3- 10"x 10", up to 2- 12"x12", Up to 24"x30" return air grille with filter rack, up to 8" fresh air grille. For Additional LF Of 12" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 10" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 8" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 6" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of Up To 8" Fresh Air Duct Above Allowance, Add Per LF For Additional 6" x 6" Supply Register With Damper, Add Per EA For Additional 8" x 8" Supply Register With Damper, Add Per EA For Additional 10" x 10" Supply Register With Damper, Add Per EA For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF For Additional LF Of Condensate Drain, Add Per LF	26.44 19.85 15.30 11.40 13.05 127.20 141.53 170.02 15.04 7.46

01 95 99 99-0256 Residential Split System Gas Fired HVAC Assembly (01 95 99 99-0251)

Note: All labor, material, Energy calculations, testing (HERS, AIR BALANCING & TITLE 24) and Drawings (Engineered Design, shop drawings & Final As-Built) and represents a complete, in place and fully functioning title 24 compliant system. Units comply with PCC and are 15 SEER minimum. Includes 7 day programmable thermostat with up to 50 LF of wire (model), all duct work (supply, return, fresh air), dampers, Plenums, all supply registers, interior air return register, exterior fresh air intake grilles, refrigerants, air filters, penetrations, seismic bracing, cat walks, vibration isolation, all hangers, all straps, fasteners, caulking, sealants, Refrigerant line sets (up to 30 LF), UV protected condensate drains (Up to 50 LF), 26 Ga painted sheet metal line set covers (up to 10 LF) & 4" thick 2' x 2' concrete condenser pads. This list may not cover all individual items involved in the new system, however it is intended to represent the installation of the complete operational and in place system in its entirety.

01 95 99 99-0257	EA	1.5 – 2.5 Ton Residential Split System Condenser, Gas Fired Air Handler With Coils, And Refrigerant Dryer (Up To 1,250SF).....	9,935.82
		Note: Includes R 6.0 Insulated Duct; Up to 10 LF of 14"; Up to 20 LF of 12", Up to 20 LF of 10", Up to 30 LF of 8", Up to 20 LF of 6". Up to 15 LF and up to 8" fresh air intake duct with backdraft & volume damper with 1/4" wire mesh, supply registers with damper up to 3- 6"x6", up to 3- 8"x8", up to 3- 10"x 10", up to 2- 12"x12", Up to 24"x30" return air grille with filter rack, up to 8" fresh air grille. For Additional LF Of 12" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 10" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 8" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 6" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of Up To 8" Fresh Air Duct Above Allowance, Add Per LF For Additional 6" x 6" Supply Register With Damper, Add Per EA For Additional 8" x 8" Supply Register With Damper, Add Per EA For Additional 10" x 10" Supply Register With Damper, Add Per EA For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF For Additional LF Of Condensate Drain, Add Per LF	26.44 19.85 15.30 11.40 13.05 127.20 141.53 170.02 15.04 7.46
01 95 99 99-0258	EA	3.0 – 4.0 Ton Residential Split System Condenser, Gas Fired Air Handler With Coils, And Refrigerant Dryer (Up To 2,000SF).....	11,864.74
		Note: Includes R 6.0 Insulated Duct; Up to 10 LF of 14"; Up to 20 LF of 12", Up to 20 LF of 10", Up to 30 LF of 8", Up to 20 LF of 6". Up to 15 LF and up to 8" fresh air intake duct with backdraft & volume damper with 1/4" wire mesh, supply registers with damper up to 3- 6"x6", up to 3- 8"x8", up to 3- 10"x 10", up to 2- 12"x12", Up to 24"x30" return air grille with filter rack, up to 8" fresh air grille. For Additional LF Of 12" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 10" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 8" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of 6" R6.0 Insulated Duct Above Allowance, Add Per LF For Additional LF Of Up To 8" Fresh Air Duct Above Allowance, Add Per LF For Additional 6" x 6" Supply Register With Damper, Add Per EA For Additional 8" x 8" Supply Register With Damper, Add Per EA For Additional 10" x 10" Supply Register With Damper, Add Per EA For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF For Additional LF Of Condensate Drain, Add Per LF	26.44 19.85 15.30 11.40 13.05 127.20 141.53 170.02 15.04 7.46



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0259 EA 5.0 Ton Residential Split System Condenser, Gas Fired Air Handler With Coils, And Refrigerant Dryer (Up To 3,000SF).....	14,184.53	
Note: Includes R 6.0 Insulated Duct; Up to 10 LF of 14"; Up to 20 LF of 12"; Up to 20 LF of 10"; Up to 30 LF of 8"; Up to 20 LF of 6". Up to 15 LF and up to 8" fresh air intake duct with backdraft & volume damper with 1/4" wire mesh, supply registers with damper up to 3- 6"x6", up to 3- 8"x8", up to 3- 10"x 10", up to 2- 2- 12"x12", Up to 24"x30" return air grille with filter rack, up to 8" fresh air grille.		
For Additional LF Of 12" R6.0 Insulated Duct Above Allowance, Add Per LF	26.44	
For Additional LF Of 10" R6.0 Insulated Duct Above Allowance, Add Per LF	19.85	
For Additional LF Of 8" R6.0 Insulated Duct Above Allowance, Add Per LF	15.30	
For Additional LF Of 6" R6.0 Insulated Duct Above Allowance, Add Per LF	11.40	
For Additional LF Of Up To 8" Fresh Air Duct Above Allowance, Add Per LF	13.05	
For Additional 6" x 6" Supply Register With Damper, Add Per EA	127.20	
For Additional 8" x 8" Supply Register With Damper, Add Per EA	141.53	
For Additional 10" x 10" Supply Register With Damper, Add Per EA	170.02	
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
For Additional LF Of Condensate Drain, Add Per LF	7.46	
01 95 99 99-0260 Indoor Units (01 95 99 99-0251)		
01 95 99 99-0261 EA 7,500 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	946.60	180.08
Note: Includes indoor unit and wireless thermostat.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0262 EA 9,000 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,000.78	191.33
Note: Includes indoor unit and wireless thermostat.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0263 EA 11,900 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,055.84	202.59
Note: Includes indoor unit and wireless thermostat.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0264 EA 17,500 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,192.62	213.84
Note: Includes indoor unit and wireless thermostat.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0265 EA 24,200 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,275.51	225.09
Note: Includes indoor unit and wireless thermostat.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0266 Outdoor Units (01 95 99 99-0251)		
01 95 99 99-0267 EA 19,700 BTU, 16.5 SEER, Outdoor Unit, Wall Mounted Ductless Split System Air Conditioners.....	2,601.78	270.11
Note: Includes outdoor unit and refrigerant charge.		
01 95 99 99-0268 EA 25,400 BTU, 16.2 SEER, Outdoor Unit, Wall Mounted Ductless Split System Air Conditioners.....	2,878.01	292.62
Note: Includes outdoor unit and refrigerant charge.		
01 95 99 99-0269 EA 30,600 BTU, 17.6 SEER, Outdoor Unit, Wall Mounted Ductless Split System Air Conditioners.....	4,536.73	315.13
Note: Includes outdoor unit and refrigerant charge.		
01 95 99 99-0270 Heat Pumps (01 95 99 99-0251)		
01 95 99 99-0271 EA 9,000 BTU Cooling, 12,200 BTU Heating, 16 SEER, Wall Mounted Ductless Split System Heat Pumps	2,372.02	371.40
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0272 EA 11,900 BTU Cooling, 13,300 BTU Heating, 17 SEER, Wall Mounted Ductless Split System Heat Pumps	2,620.70	405.16
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0273 EA 17,500 BTU Cooling, 20,400 BTU Heating, 20 SEER, Wall Mounted Ductless Split System Heat Pumps	3,193.79	450.19
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0274 EA 24,200 BTU Cooling, 29,000 BTU Heating, 17 SEER, Wall Mounted Ductless Split System Heat Pumps	3,674.41	495.20
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0275 EA 25,200 BTU Cooling, 29,200 BTU Heating, 14.9 SEER, Wall Mounted Ductless Split System Heat Pumps	5,193.70	540.22
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0276 EA 29,800 BTU Cooling, 34,800 BTU Heating, 15 SEER, Wall Mounted Ductless Split System Heat Pumps	6,010.35	562.73
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0277 EA 31,400 BTU Cooling, 36,400 BTU Heating, 15.9 SEER, Wall Mounted Ductless Split System Heat Pumps	6,591.21	599.86
Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
For Additional LF Of Insulated Line Set And Refrigerant Charge, Add Per LF	15.04	
01 95 99 99-0278 Blended Filtered Ventilation System (01 95 99 99-0251)		
Note: Complete assembly. Includes, installation, installation, registers, duct work, wall penetrations for fresh air, cutting in ceiling and wall registers on interior. Hooking up control wires and electrical. Does not include electrical runs		
01 95 99 99-0279 EA Blended Filtered Ventilation System (Aldes BV150).....	780.67	54.88
For Duct, Add Per LF	9.28	
For Control Run, Add Per LF	0.66	
For Return Register, Add Per Each	163.69	
For Supply Register, Add Per Each	209.03	
01 95 99 99-0280 EA Blended Filtered Ventilation System (Aldes BV300).....	1,182.58	67.09
For Duct, Add Per LF	11.40	
For Control Run, Add Per LF	0.66	
For Return Register, Add Per Each	163.69	
For Supply Register, Add Per Each	209.03	
01 95 99 99-0281 EA 4" Exhaust Port, Multiport Exhaust Fans (Aldes MPVS200).....	498.94	60.98
For Duct, Add Per LF	9.28	
For Control Run, Add Per LF	0.66	

01	01	General Requirements
	01 95	Residential Construction
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0282 EA 6" Exhaust Port, Multiport Exhaust Fans (Aldes MPVS200).....	522.53	60.98
For Duct, Add Per LF	11.40	
For Control Run, Add Per LF	0.66	
01 95 99 99-0283 Automatic Condensate Pump With Tank (01 95 99 99-0251)		
01 95 99 99-0284 EA 1/20 HP Automatic Condensate Pump With Tank (Hartell KT-15-1UL).....	118.11	26.45
01 95 99 99-0285 EA 1/30 HP Automatic Condensate Pump With Tank (Little Giant VCMX-20).....	125.98	26.45
01 95 99 99-0286 EA 1/50 HP, 200 GPH (Max) Automatic Condensate Removal Pump With Safety Switch (Little Giant VCL-14ULS).....	209.99	34.38
01 95 99 99-0287 Chase Cover (01 95 99 99-0251)		
01 95 99 99-0288 SF Metal Track And Cover Chase.....	33.74	3.28
Note: Up to 24'-6"		
01 95 99 99-0289 Remove Wall Heater (01 95 99 99-0251)		
01 95 99 99-0290 EA Removal Of Wall Heater And Cap Gas.....	325.77	
01 95 99 99-0291 Schedule 40 Polyvinyl Chloride (PVC) Non-Pressure Pipe Assemblies (01 95 99 99-0251)		
Note: Includes pipe and all fittings (straps, couplings, elbows, tees, threaded adapter and reducer fittings). For HVAC condensate drain lines.		
01 95 99 99-0292 LF 1/2" Schedule 40 Polyvinyl Chloride (PVC) Non-Pressure Pipe And Fittings Assembly.....	10.78	3.02
For Work In Restricted Working Space, Add	2.87	
01 95 99 99-0293 LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Non-Pressure Pipe And Fittings Assembly.....	14.34	3.78
For Work In Restricted Working Space, Add	3.57	
01 95 99 99-0294 LF 1" Schedule 40 Polyvinyl Chloride (PVC) Non-Pressure Pipe And Fittings Assembly.....	15.77	4.03
For Work In Restricted Working Space, Add	4.11	
01 95 99 99-0295 Plumbing (01 95 99 99)		
01 95 99 99-0296 Piping (01 95 99 99-0295)		
01 95 99 99-0297 LF 1/2" Inside Diameter Copper Pipe/Tubing Type L Assembly.....	24.12	3.21
Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies.		
01 95 99 99-0298 LF 3/4" Inside Diameter Copper Pipe/Tubing Type L Assembly.....	27.79	4.13
Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies.		
01 95 99 99-0299 LF 1" Inside Diameter Copper Pipe/Tubing Type L Assembly.....	30.87	4.93
Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available.		
01 95 99 99-0300 LF 1-1/4" Inside Diameter Copper Pipe/Tubing Type L Assembly.....	35.41	5.74
Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available.		
01 95 99 99-0301 LF 1-1/2" Inside Diameter Copper Pipe/Tubing Type L Assembly.....	39.59	6.55
Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available.		
01 95 99 99-0302 Water Heaters (01 95 99 99-0295)		
01 95 99 99-0303 EA 40 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith GCV-40).....	1,562.67	226.76
01 95 99 99-0304 EA Minimum 9 GPM, 150,000 BTU, Tankless, Domestic Water Heater.....	1,963.05	172.23
Note: Includes up to 15' of 3/4" gas line upgrade.		
01 95 99 99-0305 EA Removal And Reinstallation Of Water Heater Gas Fired, Up To 86 Gallon.....	521.90	
01 95 99 99-0306 EA Earthquake Straps For Up To 80 Gallon Water Heater.....	60.93	11.48
01 95 99 99-0307 EA Minimum 9 GPM, Tankless, Electric Domestic Water Heater (Rheem ECOH180DVLN-1).....	2,903.92	172.23
01 95 99 99-0308 EA 1/2" x 1/2" Temperature And Pressure Relief Valve, Bronze Body, Threaded, Residential.....	73.13	29.28
01 95 99 99-0309 EA 3/4" x 3/4" Temperature And Pressure Relief Valve, Bronze Body, Threaded, Residential.....	86.90	35.13
01 95 99 99-0310 EA 21" x 21" x 18" High, 18 Gauge, Water Heater Stand.....	128.07	17.22
01 95 99 99-0311 EA 24" x 24" x 18" High, 16 Gauge, Water Heater Stand.....	229.47	17.22
01 95 99 99-0312 EA 22" Diameter, Plastic Water Heater Pan With PVC Drain Connection.....	36.43	8.61
01 95 99 99-0313 EA 24" Diameter, Plastic Water Heater Pan With PVC Drain Connection.....	39.55	8.61
01 95 99 99-0314 EA 26" Diameter, Plastic Water Heater Pan With PVC Drain Connection.....	43.94	8.61
01 95 99 99-0315 EA 20" Diameter, Aluminum Water Heater Pan With PVC Drain Connection.....	65.78	8.61
01 95 99 99-0316 EA 22" Diameter, Aluminum Water Heater Pan With PVC Drain Connection.....	71.64	8.61
01 95 99 99-0317 EA 24" Diameter, Aluminum Water Heater Pan With PVC Drain Connection.....	75.54	8.61
01 95 99 99-0318 EA 26" Diameter, Aluminum Water Heater Pan With PVC Drain Connection.....	82.78	8.61
01 95 99 99-0319 EA 24" x 26.5" x 76.5" Galvanized Steel Water Heater Enclosure (Holdrite QS-E24-H).....	373.67	71.77
01 95 99 99-0320 EA 30" x 30" x 74" Galvanized Steel Water Heater Enclosure (Holdrite QS-E30).....	406.14	57.41
01 95 99 99-0321 Vent Piping (01 95 99 99-0295)		
01 95 99 99-0322 LF 4" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	34.40	10.58
01 95 99 99-0323 LF 5" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	38.02	11.25
01 95 99 99-0324 EA 4" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	90.64	21.16
01 95 99 99-0325 EA 5" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	101.24	22.51
01 95 99 99-0326 EA 4" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	74.80	21.16
01 95 99 99-0327 EA 5" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	81.92	22.51
01 95 99 99-0328 EA 4" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	58.90	16.43
01 95 99 99-0329 EA 5" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	76.16	18.01
01 95 99 99-0330 EA 4" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe.....	69.28	21.16



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0331 EA 5" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	87.27	23.97
01 95 99 99-0332 EA 4" Round Galvanized Storm Collar, Double Wall	31.20	10.81
01 95 99 99-0333 EA 5" Round Galvanized Storm Collar, Double Wall	36.73	12.61
01 95 99 99-0334 Electrical <small>(01 95 99 99)</small>		
01 95 99 99-0335 Electrical Panel Assembly <small>(01 95 99 99-0334)</small>		
<p>Note: All labor, material and equipment to remove and replace existing panel with new electrical panel. New panel shall include removal and reinstallation, including drilling and anchors. Installation of new panel shall include lockout/tagout, all fittings and connectors, breakers, torque and terminations, and testing. New panel shall include any/all circuit tracing, all required grounding including 2 ground rods and 1 cold water ground and gas ground. Installation of new panel shall also include any/all patch paint of surrounding plaster or drywall surfaces, patch/paint repair shall match existing to 90%.</p>		
01 95 99 99-0336 EA Single Family Electrical Panel: 100 Amp Main Breaker, Indoor, 12 – 20 Amp Breakers, 120/240V, 1 Phase Assembled Panel Board, 1 Pole Breakers, 20 Circuit Capacity	3,231.95	
<p>Note: Remove and replace existing panels including any/all patch of surrounding surfaces, up to 2 sf and paint to match to 90%, paint to be feathered in. Includes installation of 2 grounding rod and 1 cold water grounding and gas grounding. Includes lock out and tag out. Includes drilling and mounting anchors. Includes connection of main service. Includes conduit connectors for flex or emt. Includes terminations and torque. Any/all circuit tracing is included. Symmetrical raceway (expected quality). Wire label and Panel Scheduling Included for all circuits. Includes Vertical riser and weather head. NEC/Code Compliant.</p>		
<i>For Additional Breaker, Add Per Each</i>		58.11
<i>For NEMA 3R Panel With Waterproof Hubs, Add</i>		628.94
01 95 99 99-0337 EA Single Family Electrical Panel: 225 Amp Main Breaker, Indoor, 20 – 20 Amp Breakers, 120/240V, 1 Phase Assembled Panel Board, 1 Pole Breakers, 20 Circuit Capacity	4,061.75	
<p>Note: Remove and replace existing panels including any/all patch of surrounding surfaces, up to 2 sf and paint to match to 90%, paint to be feathered in. Includes installation of 2 grounding rod and 1 cold water grounding and gas grounding. Includes lock out and tag out. Includes drilling and mounting anchors. Includes connection of main service. Includes conduit connectors for flex or emt. Includes terminations and torque. Any/all circuit tracing is included. Symmetrical raceway (expected quality). Wire label and Panel Scheduling Included for all circuits. Includes Vertical riser and weather head. NEC/Code Compliant.</p>		
<i>For Additional Breaker, Add Per Each</i>		58.11
<i>For NEMA 3R Panel With Waterproof Hubs, Add</i>		827.84
01 95 99 99-0338 EA Multi-Family Electrical Panel: 400 Amp Rating, 36- 20 Amp breakers, 120/208V, 4 Wire, 1 Phase Assembled Panelboard, >225 To 400 Amp Main Breaker, 1 Pole Breakers, 54 Circuit Capacity	6,561.00	
<p>Note: Remove and replace existing panels including any/all patch of surrounding surfaces, up to 2 sf and paint to match to 90%, paint to be feathered in. Includes installation of 2 grounding rod and 1 cold water grounding and gas grounding. Includes lock out and tag out. Includes drilling and mounting anchors. Includes connection of main service. Includes conduit connectors for flex or emt. Includes terminations and torque. Any/all circuit tracing is included. Symmetrical raceway (expected quality). Wire label and Panel Scheduling Included for all circuits. Includes Vertical riser and weather head. NEC/Code Compliant.</p>		
<i>For Additional Breaker, Add Per Each</i>		58.11
<i>For NEMA 3R Panel With Waterproof Hubs, Add</i>		781.89
<i>For Door in Door (Hinged) Trim Front, Add</i>		596.50
01 95 99 99-0339 Demolition and Isolation <small>(01 95 99 99-0334)</small>		
01 95 99 99-0340 LF Remove Overhead Electrical Lines From Buildings	1.24	
01 95 99 99-0341 EA Knob And Tube Disconnection And Isolation	30.57	
01 95 99 99-0342 Main Panels and Subpanels <small>(01 95 99 99-0334)</small>		
01 95 99 99-0343 EA 100 Amp Main Breaker, Indoor, 18 Circuit, 3 Wire, 20 Amp, 120/240 Volt, 1 Phase, With 1 Pole Plug-In Breakers	1,642.68	611.40
01 95 99 99-0344 EA 200 Amp Main Breaker, Indoor, 24 Circuit, 3 Wire, 20 Amp, 120/240 Volt, 1 Phase, With 1 Pole Plug-In Breakers	2,179.79	753.00
01 95 99 99-0345 EA 1 Pole, 120/240 Volt, 15-30 Amp, Branch Circuit Breaker, 10,000 Amp Interrupting Capacity	58.11	22.01
01 95 99 99-0346 EA 2 Pole, 120/240 Volt, 15-30 Amp, Branch Circuit Breaker, 10,000 Amp Interrupting Capacity	94.59	33.01
01 95 99 99-0347 EA 2 Pole, 120/240 Volt, 35-60 Amp, Branch Circuit Breaker, 10,000 Amp Interrupting Capacity	94.59	33.01
01 95 99 99-0348 EA 30 Amp, AC Disconnect	127.83	51.96
01 95 99 99-0349 EA 60 Amp, AC Disconnect	147.83	58.09
01 95 99 99-0350 EA 40 Amp, Outdoor Assembled Sub Panel	204.81	73.37
01 95 99 99-0351 EA 60 Amp, Outdoor Assembled Sub Panel	223.38	85.60
01 95 99 99-0352 Grounding And Bonding For Electrical Systems <small>(01 95 99 99-0334)</small>		
01 95 99 99-0353 EA 1/2" Diameter x 8' Long Copper-Clad Ground Rods	105.04	91.71
01 95 99 99-0354 EA 1/2" Bronze Ground Rod Clamp	24.81	13.82
01 95 99 99-0355 EA 1/2" To 1" Bronze Pipe Ground Clamps	32.74	22.99
01 95 99 99-0356 EA Up To #6 AWG Cadweld Connection For Splice, Lug, Ground Rod, Rebar Or Structural Steel	142.15	
<p>Note: Includes molds, materials and all necessary tools to make connections.</p>		
01 95 99 99-0357 EA 14-8 AWG Copper Ground Kit For Circuit Breaker Panels	80.79	30.57
01 95 99 99-0358 Conduit, Raceways, And Wire <small>(01 95 99 99-0334)</small>		
01 95 99 99-0359 Electrical Metallic Tubing (EMT) Conduit Assemblies <small>(01 95 99 99-0358)</small>		
<p>Note: Includes conduit, field bends, set screw connectors, set screw couplings, straps, and wire as indicated. Per CLF.</p>		
01 95 99 99-0360 CLF 1/2" Electrical Metallic Tubing (EMT) With 3 #12 THHN/THWN Assembly	941.95	273.04
<p>Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.</p>		
01 95 99 99-0361 CLF 1/2" Electrical Metallic Tubing (EMT) With 4 #12 THHN/THWN Assembly	1,025.83	296.50
<p>Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.</p>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0362 CLF 1/2" Electrical Metallic Tubing (EMT) With 3 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,000.87	284.77
01 95 99 99-0363 CLF 1/2" Electrical Metallic Tubing (EMT) With 4 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,104.40	312.14
01 95 99 99-0364 CLF 3/4" Electrical Metallic Tubing (EMT) With 3 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,062.41	294.37
01 95 99 99-0365 CLF 3/4" Electrical Metallic Tubing (EMT) With 4 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,146.30	317.83
01 95 99 99-0366 CLF 3/4" Electrical Metallic Tubing (EMT) With 5 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,230.18	341.29
01 95 99 99-0367 CLF 3/4" Electrical Metallic Tubing (EMT) With 6 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,314.06	364.76
01 95 99 99-0368 CLF 3/4" Electrical Metallic Tubing (EMT) With 3 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,121.32	306.10
01 95 99 99-0369 CLF 3/4" Electrical Metallic Tubing (EMT) With 4 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,224.85	333.47
01 95 99 99-0370 CLF 3/4" Electrical Metallic Tubing (EMT) With 5 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,328.38	360.85
01 95 99 99-0371 CLF 3/4" Electrical Metallic Tubing (EMT) With 6 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,431.90	388.22
01 95 99 99-0372 CLF 1" Electrical Metallic Tubing (EMT) With 3 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,238.48	316.83
01 95 99 99-0373 CLF 1" Electrical Metallic Tubing (EMT) With 4 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,322.37	340.29
01 95 99 99-0374 CLF 1" Electrical Metallic Tubing (EMT) With 5 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,406.25	363.75
01 95 99 99-0375 CLF 1" Electrical Metallic Tubing (EMT) With 6 #12 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,490.14	387.20
01 95 99 99-0376 CLF 1" Electrical Metallic Tubing (EMT) With 3 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,297.40	328.56
01 95 99 99-0377 CLF 1" Electrical Metallic Tubing (EMT) With 4 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,400.93	355.93
01 95 99 99-0378 CLF 1" Electrical Metallic Tubing (EMT) With 5 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,504.45	383.29
01 95 99 99-0379 CLF 1" Electrical Metallic Tubing (EMT) With 6 #10 THHN/THWN Assembly Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.	1,607.97	410.67
01 95 99 99-0380 Electrical Metallic Tubing (EMT) Conduit (01 95 99 99-0358)		
01 95 99 99-0381 LF 1/2" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	6.04 0.75 1.26	2.02
01 95 99 99-0382 LF 3/4" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	7.18 0.84 1.40	2.24
01 95 99 99-0383 LF 1" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	8.81 0.92 1.54	2.46
01 95 99 99-0384 LF 1-1/4" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	11.12 1.04 1.73	2.77
01 95 99 99-0385 LF 1-1/2" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	13.04 1.17 1.96	3.13
01 95 99 99-0386 LF 2" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	15.12 1.34 2.23	3.58
01 95 99 99-0387 LF 2-1/2" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	19.79 1.59 2.66	4.24
01 95 99 99-0388 LF 3" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	23.77 1.84 3.07	4.91
01 95 99 99-0389 LF 3-1/2" Electrical Metallic Tubing (EMT) Conduit For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Installation In Wood Stud Wall (Includes Drilling), Add	29.87 2.18 3.63	5.80



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0390 LF 4" Electrical Metallic Tubing (EMT) Conduit..... <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	39.27 3.30 5.50	8.80
01 95 99 99-0391 Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings (01 95 99 99-0398)		
01 95 99 99-0392 LF 1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	5.39	1.75
01 95 99 99-0393 LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	6.15	1.92
01 95 99 99-0394 LF 1" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	7.61	2.24
01 95 99 99-0395 LF 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	9.09	2.56
01 95 99 99-0396 LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	10.68	2.98
01 95 99 99-0397 LF 2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	12.75	3.42
01 95 99 99-0398 LF 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	16.90	4.06
01 95 99 99-0399 LF 3" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	19.80	4.70
01 95 99 99-0400 LF 3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	24.18	5.55
01 95 99 99-0401 LF 4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	28.40	6.83
01 95 99 99-0402 LF 5" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	40.42	9.61
01 95 99 99-0403 LF 6" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings.....	53.70	12.81
01 95 99 99-0404 Single Stranded Copper (01 95 99 99-0358)		
01 95 99 99-0405 MLF #18 AWG Cable - Type TFFN 600 Volt Copper, Single Stranded, Placed In Conduit.....	527.52	223.43
01 95 99 99-0406 MLF #16 AWG Cable - Type TFFN 600 Volt Copper, Single Stranded, Placed In Conduit.....	657.86	245.78
01 95 99 99-0407 MLF #14 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	676.40	179.19
01 95 99 99-0408 MLF #12 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	838.86	213.60
01 95 99 99-0409 MLF #10 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	1,035.25	268.68
01 95 99 99-0410 MLF #8 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	1,446.20	354.14
01 95 99 99-0411 MLF #6 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	1,957.62	427.65
01 95 99 99-0412 MLF #4 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	2,575.43	505.40
01 95 99 99-0413 MLF #3 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	3,073.86	572.10
01 95 99 99-0414 MLF #2 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	3,666.64	640.69
01 95 99 99-0415 MLF #1 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	4,357.79	723.03
01 95 99 99-0416 MLF #1/0 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	5,068.85	791.73
01 95 99 99-0417 MLF #2/0 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	5,745.29	874.96
01 95 99 99-0418 MLF #3/0 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	6,797.05	925.46
01 95 99 99-0419 MLF #4/0 AWG Cable - Type THHN-THWN 600 Volt Copper, Single Stranded, Placed In Conduit.....	8,083.66	1,041.20
01 95 99 99-0420 Wireway With Screw Cover (01 95 99 99-0358)		
01 95 99 99-0421 2-1/2" x 2-1/2", Wireway With Screw Cover (01 95 99 99-0420)		
01 95 99 99-0422 LF 2-1/2" x 2-1/2", NEMA 1, Surface Mounted Wireway With Screw Cover.....	27.28	5.58
01 95 99 99-0423 EA 2-1/2" x 2-1/2", End Plate For Surface Mounted Wireway With Screw Cover.....	22.60	8.38
01 95 99 99-0424 EA 2-1/2" x 2-1/2", Coupling For Surface Mounted Wireway With Screw Cover.....	26.73	10.45
01 95 99 99-0425 EA 2-1/2" x 2-1/2", Panel Adapter For Surface Mounted Wireway With Screw Cover.....	56.22	19.55
01 95 99 99-0426 EA 2-1/2" x 2-1/2", Elbow For Surface Mounted Wireway With Screw Cover.....	90.33	19.55
01 95 99 99-0427 EA 2-1/2" x 2-1/2", Tee For Surface Mounted Wireway With Screw Cover.....	133.78	27.82
01 95 99 99-0428 EA 2-1/2" x 2-1/2", Cross For Surface Mounted Wireway With Screw Cover.....	150.17	30.72
01 95 99 99-0429 4" x 4", Wireway With Screw Cover (01 95 99 99-0420)		
01 95 99 99-0430 LF 4" x 4", NEMA 1, Surface Mounted Wireway With Screw Cover.....	33.41	7.04
01 95 99 99-0431 LF 4" x 4", NEMA 3R, Surface Mounted Wireway With Screw Cover.....	59.87	7.04
01 95 99 99-0432 EA 4" x 4", End Plate For Surface Mounted Wireway With Screw Cover.....	18.38	6.15
01 95 99 99-0433 EA 4" x 4", Coupling For Surface Mounted Wireway With Screw Cover.....	29.55	11.73
01 95 99 99-0434 EA 4" x 4", Panel Adapter For Surface Mounted Wireway With Screw Cover.....	66.42	23.91
01 95 99 99-0435 EA 4" x 4", Elbow For Surface Mounted Wireway With Screw Cover.....	103.92	23.91
01 95 99 99-0436 EA 4" x 4", Tee For Surface Mounted Wireway With Screw Cover.....	147.10	31.06
01 95 99 99-0437 EA 4" x 4", Cross For Surface Mounted Wireway With Screw Cover.....	169.94	36.31
01 95 99 99-0438 Plugs, Switches And Boxes (01 95 99 99-0334)		
01 95 99 99-0439 EA 1 Gang, 15 Amp, NEMA 5-15, Duplex Receptacle Assembly.....	98.93	43.41
01 95 99 99-0440 EA 1 Gang, 20 Amp, NEMA 5-20, Duplex Receptacle Assembly.....	106.09	46.46
01 95 99 99-0441 EA 2 Gang, 15 Amp, NEMA 5-15, Duplex Receptacle Assembly.....	127.63	55.64
01 95 99 99-0442 EA 2 Gang, 20 Amp, NEMA 5-20, Duplex Receptacle Assembly.....	141.95	61.76
01 95 99 99-0443 EA 1 Gang, 15 Amp, GFI, Duplex Receptacle Assembly.....	113.07	43.41
01 95 99 99-0444 EA 1 Gang, 20 Amp, GFI, Duplex Receptacle Assembly.....	120.97	46.46
01 95 99 99-0445 EA 15 Amp Ground Fault Circuit Interrupter (GFCI), Duplex Receptacle.....	38.57	15.28
01 95 99 99-0446 EA 20 Amp Ground Fault Circuit Interrupter (GFCI), Duplex Receptacle.....	55.64	18.34
01 95 99 99-0447 EA 1 Gang, 15 Amp, 120/277 Volt, SPST, Switch Assembly.....	102.26	42.79
01 95 99 99-0448 EA 2 Gang, 15 Amp, 120/277 Volt, SPST, Switch Assembly.....	137.34	55.94
01 95 99 99-0449 EA 15 Amp Ground Fault Circuit Interrupter (GFCI), Weather Tamper (WT) Resistant, Duplex Receptacle.....	75.65	18.34
01 95 99 99-0450 EA 20 Amp Ground Fault Circuit Interrupter (GFCI), Weather Tamper (WT) Resistant, Duplex Receptacle.....	81.50	18.34
01 95 99 99-0451 Breakers (01 95 99 99-0334)		
01 95 99 99-0452 EA 1 Pole GFI, 120/240 Volt, 15-30 Amp, Branch Circuit Breaker, 10,000 Amp Interrupting Capacity.....	116.40	26.90
01 95 99 99-0453 EA 1 Pole GFI, 120/240 Volt, 15-20 Amp, "Arc Fault" Circuit Breaker, 10,000 Amp Interrupting Capacity.....	93.42	26.90

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0454 Service Light <small>(01 95 99 99-0334)</small>		
01 95 99 99-0455 EA 13 Watt Porch Light, Glass Globe, Cooper FE13PCW	103.67	30.57
01 95 99 99-0456 Smoke And Carbon Monoxide Detectors <small>(01 95 99 99-0334)</small>		
01 95 99 99-0457 EA Photo Electric Residential Smoke Detector 110-120 Volt, Wired (BRK 7010)	131.47	45.92
01 95 99 99-0458 EA AC Powered, Residential Carbon Monoxide Alarm (Kidde 900-0107)	164.28	30.57
01 95 99 99-0459 EA AC Powered, Residential Carbon Monoxide and Fire Alarm (Kidde 900-0114)	183.32	30.57
01 95 99 99-0460 Bathroom Exhaust Fan <small>(01 95 99 99-0334)</small>		
01 95 99 99-0461 EA 110 CFM, Single Speed, Ceiling Bathroom Exhaust Fan Without Light (NuTone InVent Series AEN110)	278.94	48.99
For Up To 2 SF Cutting And Patching 5/8" Fire Rated Gypsum Board Ceiling, Add	48.70	
For Painting Up To 50 SF Ceiling, 1 Coat Primer and 2 Coats Paint, Add	237.19	
For New 2-Gang Plastic Box With 15 Amp Switch Assembly, Up To 15' Of 14 Gauge 3 Conductor Romex From Fan To Switch, Add	257.14	
For New 2-Gang Plastic Box With Humidity Sensing Fan Switch Assembly (Load Rating: 600W Incandescent, 150W LED/CFL, 400VA inductive /ballast), Up To 15' Of 14 Gauge 3 Conductor Romex From Fan To Switch, Add	298.83	
For Up To 50' Wiring To New 15 Amp, Single Pole Breaker, Add	304.76	
For Up To 50' Wiring To New 15 Amp, AFCI/GFCI (Dual Function Breaker, Arc Fault And Ground Fault Protection) Protected Branch Circuit UL listed Class 5mA With Self-Test Feature, 15 AMP- Plug-In Or Bolt-on As Required), Add	420.56	
For Up To 15' Of 4" Exhaust Duct And Tie Into Exhaust System, Add	190.98	
For Roof Vent, Cutting Hole And Patch, Add	523.86	
01 95 99 99-0462 EA 110 CFM, Single Speed, Ceiling Bathroom Exhaust Fan With LED Light (NuTone InVent Series AEN110L)	392.70	48.99
For Up To 2 SF Cutting And Patching 5/8" Fire Rated Gypsum Board Ceiling, Add	48.70	
For Painting Up To 50 SF Ceiling, 1 Coat Primer and 2 Coats Paint, Add	237.19	
For New 2-Gang Plastic Box With 15 Amp Switch Assembly, Up To 15' Of 14 Gauge 3 Conductor Romex From Fan To Switch, Add	257.14	
For New 2-Gang Plastic Box With Humidity Sensing Fan Switch Assembly (Load Rating: 600W Incandescent, 150W LED/CFL, 400VA inductive /ballast), Up To 15' Of 14 Gauge 3 Conductor Romex From Fan To Switch, Add	298.83	
For Up To 50' Wiring To New 15 Amp, Single Pole Breaker, Add	304.76	
For Up To 50' Wiring To New 15 Amp, AFCI/GFCI (Dual Function Breaker, Arc Fault And Ground Fault Protection) Protected Branch Circuit UL listed Class 5mA With Self-Test Feature, 15 AMP- Plug-In Or Bolt-on As Required), Add	420.56	
For Up To 15' Of 4" Exhaust Duct And Tie Into Exhaust System, Add	190.98	
For Roof Vent, Cutting Hole And Patch, Add	523.86	
01 95 99 99-0463 Rigid Galvanized Steel (RGS) Conduit With Snap-On Water Tight Connection <small>(01 95 99 99-0334)</small>		
01 95 99 99-0464 LF 1/2" Rigid Galvanized Steel (RGS) Conduit Assembly With Snap-On Water Tight Connection	11.38	2.46
01 95 99 99-0465 LF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With Snap-On Water Tight Connection	12.86	2.68
01 95 99 99-0466 LF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With Snap-On Water Tight Connection	22.06	3.13
01 95 99 99-0467 Trenching, Backfill, And Compaction <small>(01 95 99 99)</small>		
01 95 99 99-0468 CY 12" Wide or Less, Excavation for Trenching by Machine in Soil	11.97	
For Up To 20, Add	11.97	
For >20 To 50, Add	8.98	
For >50 To 250, Add	4.79	
01 95 99 99-0469 CY Excavation For Trenching By Hand In Soil	145.81	
Note: Includes stockpiling excess materials and trimming sides and bottom of trench.		
01 95 99 99-0470 CY Backfilling or Placing Subbase for Trenches with Imported or Stockpiled Materials by Machine	4.32	
For Up To 20, Add	4.32	
For >20 To 50, Add	3.24	
For >50 To 250, Add	1.73	
01 95 99 99-0471 CY Backfilling or Placing Subbase for Trenches with Imported or Stockpiled Materials by Hand	40.51	
01 95 99 99-0472 CY Compaction of Fill or Subbase for Trenches by Vibratory Plate, Air Tamper, Etcetera	8.45	
For Up To 20, Add	8.45	
For >20 To 50, Add	6.34	
For >50 To 250, Add	3.38	
01 95 99 99-0473 CY Compaction of Fill or Subbase for Trenches by Hand	45.69	
01 95 99 99-0474 French Drains <small>(01 95 99 99)</small>		
01 95 99 99-0475 Core Drill And Auger <small>(01 95 99 99-0474)</small>		
01 95 99 99-0476 EA Drill 8" Diameter Core In Up To 4" Concrete	192.99	
01 95 99 99-0477 EA Core Drill Minimum Charge	926.53	
Note: For projects where the total core drilling charge is less than the minimum charge, use task "Minimum Charge For Core Drilling" exclusively. Task "Minimum Charge For Core Drilling" should not be used in conjunction with any other tasks in this section. Does not apply to sections "Drilling In Concrete Per Inch Of Depth" or "Drilling In Brick Or Block Per Inch Of Depth".		
01 95 99 99-0478 VLF 8" Diameter Hole, Auger By Machine	19.05	
01 95 99 99-0479 BAG 50 LB Capacity Gravel Bag With Gravel	12.04	3.07
01 95 99 99-0480 EA 8" Diameter Round Drain Grate	50.77	
01 95 99 99-0481 Equipment Pads <small>(01 95 99 99)</small>		
01 95 99 99-0482 SF 4" Equipment Pad With Rebar	23.85	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
01 95 99 99-0483 Chimney/Fireplace <small>(01 95 99 99)</small>		
01 95 99 99-0484 Damper <small>(01 95 99 99-0483)</small>		
01 95 99 99-0485 EA 6" Round Flue Shutter Draft Control Damper	1,291.31	60.01
01 95 99 99-0486 EA 8" Round Flue Shutter Draft Control Damper	1,497.86	69.21
01 95 99 99-0487 Flue Pipe <small>(01 95 99 99-0483)</small>		
01 95 99 99-0488 LF 6" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe	41.48	12.05
01 95 99 99-0489 LF 8" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe	54.31	13.84
01 95 99 99-0490 Spark Arrestor <small>(01 95 99 99-0483)</small>		
01 95 99 99-0491 EA 15" x 24", Black, Adjustable Flue Guard Chimney Cap Spark Arrestor	264.03	54.03
01 95 99 99-0492 Fire Rated Fireplace Door <small>(01 95 99 99-0483)</small>		
01 95 99 99-0493 EA 29" To 32" Wide Glass Fireplace Door, 25" To 32" Height	1,240.70	72.91
<i>Note: Includes 1/4" tempered glass.</i>		
<i>For Wire Mesh Screen, Add</i>		
	96.00	
<i>For Wire Mesh Door, Add</i>		
	152.00	
01 95 99 99-0494 EA 32" To 35" Wide Glass Fireplace Door, 25" To 32" Height	1,354.67	72.91
<i>Note: Includes 1/4" tempered glass.</i>		
<i>For Wire Mesh Screen, Add</i>		
	96.00	
<i>For Wire Mesh Door, Add</i>		
	152.00	
01 95 99 99-0495 EA 35" To 38" Wide Glass Fireplace Door, 25" To 32" Height	1,445.84	72.91
<i>Note: Includes 1/4" tempered glass.</i>		
<i>For Wire Mesh Screen, Add</i>		
	96.00	
<i>For Wire Mesh Door, Add</i>		
	152.00	
01 95 99 99-0496 EA 38" To 43" Wide Glass Fireplace Door, 25" To 32" Height	1,555.25	72.91
<i>Note: Includes 1/4" tempered glass.</i>		
<i>For Wire Mesh Screen, Add</i>		
	96.00	
<i>For Wire Mesh Door, Add</i>		
	152.00	
01 95 99 99-0497 Hand Rails <small>(01 95 99 99)</small>		
01 95 99 99-0498 LF 1-1/2" Diameter, Wood Handrail With Brackets	25.07	5.43
01 95 99 99-0499 LF 1-1/2" Diameter, Schedule 40, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	39.80	6.51
<i>For Galvanized Finish, Add</i>		
	7.06	
01 95 99 99-0500 LF 1-1/2" Diameter, Schedule 40, One Rail, Up To 42" High, Welded Steel Pipe Railing	52.75	10.85
<i>For Schedule 80 Handrail, Add</i>		
	14.22	
<i>For 11 Gauge A513 Steel Tubing, Deduct</i>		
	-6.83	
<i>For 12 Gauge A513 Steel Tubing, Deduct</i>		
	-7.76	
<i>For 14 Gauge A513 Steel Tubing, Deduct</i>		
	-10.25	
<i>For 16 Gauge A513 Steel Tubing, Deduct</i>		
	-12.11	
<i>For Aluminum, Satin Finish, Add</i>		
	13.04	
<i>For Aluminum, Clear Anodized Finish, Add</i>		
	20.18	
<i>For Aluminum, Dark Anodized Finish, Add</i>		
	23.29	
<i>For Galvanizing, Add</i>		
	12.42	
<i>For Wrought Iron, Add</i>		
	5.28	
<i>For Solid Steel Rails, Add</i>		
	10.55	
<i>For 304 Stainless Steel, Add</i>		
	99.36	
<i>For 316 Stainless Steel, Add</i>		
	111.78	
<i>For 2" Wheel Guard, Add</i>		
	2.95	
<i>For 4" High Kick Plate, Add</i>		
	3.88	
<i>For 6" High Kick Plate, Add</i>		
	6.21	
<i>For Curved Rail, Add</i>		
	25.14	
<i>For Mounting On Stairs, Add</i>		
	15.83	
<i>For Mounting On Slopes, Add</i>		
	5.28	
<i>For Post Base Flange With Screws, Add Per Post</i>		
	19.67	
<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>		
	29.76	
<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>		
	20.95	
<i>For Nylon Coating, Add</i>		
	4.66	

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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01 95 99 99-0501	LF 1-1/2" Diameter, Schedule 40, Two Rail, Up To 42" High, Welded Steel Pipe Railing	60.52	10.85
	<i>For Schedule 80 Handrail, Add</i>	14.22	
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-8.54	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-9.71	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-12.81	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-15.14	
	<i>For Aluminum, Satin Finish, Add</i>	16.30	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	25.23	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	29.12	
	<i>For Galvanizing, Add</i>	15.53	
	<i>For Wrought Iron, Add</i>	6.05	
	<i>For Solid Steel Rails, Add</i>	12.10	
	<i>For 304 Stainless Steel, Add</i>	124.22	
	<i>For 316 Stainless Steel, Add</i>	139.75	
	<i>For 2" Wheel Guard, Add</i>	3.69	
	<i>For 4" High Kick Plate, Add</i>	4.85	
	<i>For 6" High Kick Plate, Add</i>	7.76	
	<i>For Curved Rail, Add</i>	29.80	
	<i>For Mounting On Stairs, Add</i>	18.16	
	<i>For Mounting On Slopes, Add</i>	6.05	
	<i>For Post Base Flange With Screws, Add Per Post</i>	19.67	
	<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	29.76	
	<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	24.84	
	<i>For Nylon Coating, Add</i>	5.82	

01 95 99 99-0502 Security Bars (01 95 99 99)

01 95 99 99-0503	EA Window Bar Quick Release Kit (Grisham WBQR)	250.81	65.10
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01 95 99 99-0504 Residential Sound Improvement Program Assemblies (01 95 99 99)

Note: Assemblies are inclusive of all Labor, Equipment, and Materials to Sound insulate residential units as per the LA County RSIP program specifications, scopes of work, and details. Required Incidental engineering, load calculations, and permitting to complete these tasks are also inclusive of these assemblies. The County reserves the right to add or delete individual tasks from these assemblies as deemed necessary based on site specific conditions.

01 95 99 99-0505	EA RSIP Single Family Residence up to 1,000 SF	37,998.00	
	Note: (Up to 12 windows Included)		
01 95 99 99-0506	EA RSIP Single Family Residence up to 1,500 SF	42,220.00	
	Note: (Up to 15 windows Included)		
01 95 99 99-0507	EA RSIP Single Family Residence up to 2,000 SF	46,442.00	
	Note: (Up to 20 windows Included)		
01 95 99 99-0508	EA RSIP Single Family Residence up to 2,500 SF	50,664.00	
	Note: (Up to 22 windows Included)		
01 95 99 99-0509	EA RSIP Single Family Residence over 2,500 SF	54,886.00	
	Note: (Up to 25 windows Included)		
01 95 99 99-0510	EA RSIP Multi- Family Residence up to 2 Units	51,719.50	
	Note: (Up to 20 windows Included)		
01 95 99 99-0511	EA RSIP Multi-Family Residence up to 3 Units	54,886.00	
	Note: (Up to 22 windows Included)		
01 95 99 99-0512	EA RSIP Multi-Family Residence up to 4 Units	62,802.25	
	Note: (Up to 25 windows Included)		
01 95 99 99-0513	EA RSIP Apartment studio/1 bedroom	33,776.00	
	Note: (Up to 5 windows Included)		
01 95 99 99-0514	EA RSIP Apartment 2 bedroom	37,998.00	
	Note: (Up to 8 windows Included)		
01 95 99 99-0515	EA RSIP Apartment 3+ bedroom	42,220.00	
	Note: (Up to 12 windows Included)		

01 95 99 99-0516 Tenant Temporary In-place And Or Off-site Dwelling Accommodations/Procedures (01 95 99 99)

Note: Assemblies are inclusive of all Labor, Equipment, and Materials of tenant displacement and relocation procedures as per the LA County RSIP program specifications, scopes of work, and details. Required Incidental engineering, load calculations, and permitting to complete these tasks are also inclusive of these assemblies. The County reserves the right to add or delete individual tasks from these assemblies as deemed necessary based on site specific conditions.

01 95 99 99-0517	DAY Tenant Temporary In-place And Or Off-site Dwelling Accommodations/Procedures, Tier 1 (Low)	3,332.13	
	Note: Includes PPE, modular hand washing station, 32 gallon trash container, hand sanitizer dispenser, Owner provided signage & hotline, disinfectant fogging, terry cloth wipes, phone line, COVID-19 monitor, virtual inspection support, daily infrared temperature readings and logs		
	<i>For Virtual Inspection Support > 5 Units, Add Per Each Additional Unit</i>	312.50	
01 95 99 99-0518	DAY Tenant Temporary In-place And Or Off-site Dwelling Accommodations/Procedures, Tier 2 (Moderate)	4,245.50	
	Note: Includes PPE, modular hand washing station, 32 gallon trash containers, hand sanitizer dispenser, Owner provided signage & hotline, air scrubber, plastic barriers, disinfectant fogging, terry cloth wipes, phone line, COVID-19 monitor, virtual inspection support, daily infrared temperature readings and logs		
	<i>For Virtual Inspection Support > 5 Units, Add Per Each Additional Unit</i>	312.50	
01 95 99 99-0519	DAY Tenant Temporary In-place And Or Off-site Dwelling Accommodations/Procedures, Tier 3 (High)	6,690.42	
	Note: Includes PPE with Type B hazmat suits, modular hand washing station, 32 gallon trash containers, hand sanitizer dispenser, Owner provided signage & hotline, disinfectant fogging, air scrubber, plastic barriers, phone line, tent & set-up, tables, folding chairs, Wifi hotspot provision, 8' x 8' x 20' storage container, COVID-19 monitor, virtual inspection support, daily infrared temperature readings and logs		
	<i>For Virtual Inspection Support > 5 Units, Add Per Each Additional Unit</i>	312.50	



General Requirements	01	01
Residential Construction	01 95	
Los Angeles Community Development Commission RSIP Tasks 01 95 99 99		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

END OF SECTION 01

01	01	General Requirements
	01 95	Residential Construction
	01 95 99 99 Los Angeles Community Development Commission RSIP Tasks	



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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Existing Conditions	02	02
Assessment	02 20	
Existing Material Assessment	02 25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 Existing Conditions

02 20 Assessment ⁽⁰²⁾

02 25 Existing Material Assessment ^(02 20)

02 25 16 Existing Concrete, Masonry or Asphalt Assessment ^(02 25)

See CSI section 01 71 36 00-0000 for non-destructive concrete examination.

02 25 16 13 Concrete Assessment Drilling ^(02 25 16)

See CSI section 01 71 36 00-0000 for non-destructive concrete examination.

02 40 Demolition and Structure Moving ⁽⁰²⁾

02 41 Demolition ^(02 40)

02 41 13 Selective Site Demolition ^(02 41)

02 41 13 13 Paving Removal ^(02 41 13)

02 41 13 13-0001 By Machine, Break-up And Leave In Place Bituminous And Concrete Paving ^(02 41 13 13)

Note: Includes slabs, pavements, sidewalks and base courses. Includes work around obstacles. These tasks are not to be used in conjunction with any other loading activities or other break-up tasks. Excludes saw cutting (where required) and disposal. See CSI section 02 41 13 13-0018 for breaking-up, removal and loading as a combined operation, 02 41 19 13-0057 for saw cutting.

02 41 13 13-0002	SY	Up To 3" By Machine, Break-up And Leave In Place Bituminous Paving	7.62
		<i>For >500 To 1,000, Deduct</i>	-0.76
		<i>For >1,000 To 2,500, Deduct</i>	-1.37
		<i>For >2,500 To 5,000, Deduct</i>	-1.98
		<i>For >5,000 To 10,000, Deduct</i>	-2.59
		<i>For >10,000, Deduct</i>	-3.20
02 41 13 13-0003	SY	>3" To 6" By Machine, Break-up And Leave In Place Bituminous Paving	11.42
		<i>For >500 To 1,000, Deduct</i>	-1.14
		<i>For >1,000 To 2,500, Deduct</i>	-2.06
		<i>For >2,500 To 5,000, Deduct</i>	-2.97
		<i>For >5,000 To 10,000, Deduct</i>	-3.88
		<i>For >10,000, Deduct</i>	-4.80
02 41 13 13-0004	SY	>6" To 9" By Machine, Break-up And Leave In Place Bituminous Paving	15.23
		<i>For >500 To 1,000, Deduct</i>	-1.52
		<i>For >1,000 To 2,500, Deduct</i>	-2.74
		<i>For >2,500 To 5,000, Deduct</i>	-3.96
		<i>For >5,000 To 10,000, Deduct</i>	-5.18
		<i>For >10,000, Deduct</i>	-6.40
02 41 13 13-0005	SY	Up To 3" By Machine, Break-up And Leave In Place Concrete Paving	14.76
		<i>For >500 To 1,000, Deduct</i>	-1.48
		<i>For >1,000 To 2,500, Deduct</i>	-2.66
		<i>For >2,500 To 5,000, Deduct</i>	-3.84
		<i>For >5,000 To 10,000, Deduct</i>	-5.02
		<i>For >10,000, Deduct</i>	-6.20
02 41 13 13-0006	SY	>3" To 6" By Machine, Break-up And Leave In Place Concrete Paving	20.84
		<i>For >500 To 1,000, Deduct</i>	-2.08
		<i>For >1,000 To 2,500, Deduct</i>	-3.75
		<i>For >2,500 To 5,000, Deduct</i>	-5.42
		<i>For >5,000 To 10,000, Deduct</i>	-7.09
		<i>For >10,000, Deduct</i>	-8.75
02 41 13 13-0007	SY	>6" To 9" By Machine, Break-up And Leave In Place Concrete Paving	29.52
		<i>For >500 To 1,000, Deduct</i>	-2.95
		<i>For >1,000 To 2,500, Deduct</i>	-5.31
		<i>For >2,500 To 5,000, Deduct</i>	-7.68
		<i>For >5,000 To 10,000, Deduct</i>	-10.04
		<i>For >10,000, Deduct</i>	-12.40
02 41 13 13-0008	SY	>9" To 14" By Machine, Break-up And Leave In Place Concrete Paving	41.68
		<i>For >500 To 1,000, Deduct</i>	-4.17
		<i>For >1,000 To 2,500, Deduct</i>	-7.50
		<i>For >2,500 To 5,000, Deduct</i>	-10.84
		<i>For >5,000 To 10,000, Deduct</i>	-14.17
		<i>For >10,000, Deduct</i>	-17.51
02 41 13 13-0009	SY	>14" To 19" By Machine, Break-up And Leave In Place Concrete Paving	54.50
		<i>For >500 To 1,000, Deduct</i>	-5.45
		<i>For >1,000 To 2,500, Deduct</i>	-9.81
		<i>For >2,500 To 5,000, Deduct</i>	-14.17
		<i>For >5,000 To 10,000, Deduct</i>	-18.53
		<i>For >10,000, Deduct</i>	-22.89
02 41 13 13-0010	SY	>19" To 24" By Machine, Break-up And Leave In Place Concrete Paving	70.86
		<i>For >500 To 1,000, Deduct</i>	-7.09
		<i>For >1,000 To 2,500, Deduct</i>	-12.75
		<i>For >2,500 To 5,000, Deduct</i>	-18.42
		<i>For >5,000 To 10,000, Deduct</i>	-24.09
		<i>For >10,000, Deduct</i>	-29.76

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 41 13 13-0011	By Hand, Break-up And Leave In Place Bituminous And Concrete Paving ^(02 41 13 13) Note: Includes slabs, pavements, sidewalks and base courses. Includes work around obstacles with jackhammer and hand tools. For individual work areas where conventional equipment access is limited or prohibited. Task is only to be used when requested by owner. These tasks are not to be used in conjunction with any other loading activities or other break-up tasks. Excludes saw cutting (where required) and disposal. See CSI section 02 41 13 13-0037 for breaking-up, removal and loading as a combined operation, 02 41 19 13-0057 for saw cutting.	
02 41 13 13-0012	SF Up To 3" By Hand, Break-up And Leave In Place Bituminous Paving	1.94
02 41 13 13-0013	SF >3" To 6" By Hand, Break-up And Leave In Place Bituminous Paving	2.47
02 41 13 13-0014	SF >6" To 9" By Hand, Break-up And Leave In Place Bituminous Paving	3.27
02 41 13 13-0015	SF Up To 3" By Hand, Break-up And Leave In Place Concrete Paving	2.43
02 41 13 13-0016	SF >3" To 6" By Hand, Break-up And Leave In Place Concrete Paving	3.10
02 41 13 13-0017	SF >6" To 9" By Hand, Break-up And Leave In Place Concrete Paving	4.09
02 41 13 13-0018	By Machine, Break-up And Remove Bituminous And Concrete Paving ^(02 41 13) Note: Includes slabs, pavements, sidewalks and base courses. Includes work around obstacles, breaking into manageable sizes by machine and loading into truck, dumpster or moving material to stockpile. Removal depth to include base aggregate. Excludes saw cutting (where required) and disposal. See CSI section 02 41 19 13-0057 for saw cutting.	
02 41 13 13-0019	SY Up To 3" By Machine, Break-up And Remove Bituminous Paving	16.48
	For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	4.94
	Note: (Around Existing Structures And Obstructions), Add	
	For Elevated Slab, Add	8.24
	For >500 To 1,000, Deduct	-1.65
	For >1,000 To 2,500, Deduct	-2.97
	For >2,500 To 5,000, Deduct	-4.28
	For >5,000 To 10,000, Deduct	-5.60
	For >10,000, Deduct	-6.92
02 41 13 13-0020	SY >3" To 6" By Machine, Break-up And Remove Bituminous Paving.....	22.49
	For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	6.75
	Note: (Around Existing Structures And Obstructions), Add	
	For Elevated Slab, Add	11.25
	For >500 To 1,000, Deduct	-2.25
	For >1,000 To 2,500, Deduct	-4.05
	For >2,500 To 5,000, Deduct	-5.85
	For >5,000 To 10,000, Deduct	-7.65
	For >10,000, Deduct	-9.45
02 41 13 13-0021	SY >6" To 9" By Machine, Break-up And Remove Bituminous Paving.....	31.21
	For Elevated Slab, Add	15.61
	For >500 To 1,000, Deduct	-3.12
	For >1,000 To 2,500, Deduct	-5.62
	For >2,500 To 5,000, Deduct	-8.11
	For >5,000 To 10,000, Deduct	-10.61
	For >10,000, Deduct	-13.11
02 41 13 13-0022	SY >9" To 12" By Machine, Break-up And Remove Bituminous Paving.....	40.73
	For Elevated Slab, Add	20.37
	For >500 To 1,000, Deduct	-4.07
	For >1,000 To 2,500, Deduct	-7.33
	For >2,500 To 5,000, Deduct	-10.59
	For >5,000 To 10,000, Deduct	-13.85
	For >10,000, Deduct	-17.11
02 41 13 13-0023	SY >12" To 15" By Machine, Break-up And Remove Bituminous Paving.....	56.69
	For Elevated Slab, Add	28.35
	For >500 To 1,000, Deduct	-5.67
	For >1,000 To 2,500, Deduct	-10.20
	For >2,500 To 5,000, Deduct	-14.74
	For >5,000 To 10,000, Deduct	-19.27
	For >10,000, Deduct	-23.81
02 41 13 13-0024	SY Up To 3" By Machine, Break-up And Remove Non-Reinforced Concrete Paving	18.95
	For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	5.69
	Note: (Around Existing Structures And Obstructions), Add	
	For Elevated Slab, Add	9.48
	For >500 To 1,000, Deduct	-1.90
	For >1,000 To 2,500, Deduct	-3.41
	For >2,500 To 5,000, Deduct	-4.93
	For >5,000 To 10,000, Deduct	-6.44
	For >10,000, Deduct	-7.96
02 41 13 13-0025	SY >3" To 6" By Machine, Break-up And Remove Non-Reinforced Concrete Paving.....	24.80
	For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	7.44
	Note: (Around Existing Structures And Obstructions), Add	
	For Elevated Slab, Add	12.40
	For >500 To 1,000, Deduct	-2.48
	For >1,000 To 2,500, Deduct	-4.46
	For >2,500 To 5,000, Deduct	-6.45
	For >5,000 To 10,000, Deduct	-8.43
	For >10,000, Deduct	-10.42
02 41 13 13-0026	SY >6" To 9" By Machine, Break-up And Remove Non-Reinforced Concrete Paving.....	44.29
	For Elevated Slab, Add	22.15
	For >500 To 1,000, Deduct	-4.43
	For >1,000 To 2,500, Deduct	-7.97
	For >2,500 To 5,000, Deduct	-11.52
	For >5,000 To 10,000, Deduct	-15.06
	For >10,000, Deduct	-18.60



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 13 13-0027 SY >9" To 14" By Machine, Break-up And Remove Non-Reinforced Concrete Paving.....	57.86	
For Elevated Slab, Add	28.93	
For >500 To 1,000, Deduct	-5.79	
For >1,000 To 2,500, Deduct	-10.41	
For >2,500 To 5,000, Deduct	-15.04	
For >5,000 To 10,000, Deduct	-19.67	
For >10,000, Deduct	-24.30	
02 41 13 13-0028 SY Up To 3" By Machine, Break-up And Remove Welded Wire Reinforced Concrete Paving.....	25.16	
For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	7.55	
Note: (Around Existing Structures And Obstructions), Add		
For Elevated Slab, Add	12.58	
For >500 To 1,000, Deduct	-2.52	
For >1,000 To 2,500, Deduct	-4.53	
For >2,500 To 5,000, Deduct	-6.54	
For >5,000 To 10,000, Deduct	-8.55	
For >10,000, Deduct	-10.57	
02 41 13 13-0029 SY >3" To 6" By Machine, Break-up And Remove Welded Wire Reinforced Concrete Paving.....	32.59	
For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	9.78	
Note: (Around Existing Structures And Obstructions), Add		
For Elevated Slab, Add	16.30	
For >500 To 1,000, Deduct	-3.26	
For >1,000 To 2,500, Deduct	-5.87	
For >2,500 To 5,000, Deduct	-8.47	
For >5,000 To 10,000, Deduct	-11.08	
For >10,000, Deduct	-13.69	
02 41 13 13-0030 SY >6" To 9" By Machine, Break-up And Remove Welded Wire Reinforced Concrete Paving.....	54.03	
For Additional Cost Of Hand Held Equipment Usage (Around Existing Structures And Obstructions), Add	16.21	
Note: (Around Existing Structures And Obstructions), Add		
For Elevated Slab, Add	27.02	
For >500 To 1,000, Deduct	-5.40	
For >1,000 To 2,500, Deduct	-9.73	
For >2,500 To 5,000, Deduct	-14.05	
For >5,000 To 10,000, Deduct	-18.37	
For >10,000, Deduct	-22.69	
02 41 13 13-0031 SY Up To 3" By Machine, Break-up And Remove Rod Reinforced Concrete Paving.....	27.28	
For Elevated Slab, Add	13.64	
For >500 To 1,000, Deduct	-2.73	
For >1,000 To 2,500, Deduct	-4.91	
For >2,500 To 5,000, Deduct	-7.09	
For >5,000 To 10,000, Deduct	-9.28	
For >10,000, Deduct	-11.46	
02 41 13 13-0032 SY >3" To 6" By Machine, Break-up And Remove Rod Reinforced Concrete Paving.....	35.07	
For Elevated Slab, Add	17.54	
For >500 To 1,000, Deduct	-3.51	
For >1,000 To 2,500, Deduct	-6.31	
For >2,500 To 5,000, Deduct	-9.12	
For >5,000 To 10,000, Deduct	-11.92	
For >10,000, Deduct	-14.73	
02 41 13 13-0033 SY >6" To 9" By Machine, Break-up And Remove Rod Reinforced Concrete Paving.....	62.71	
For Elevated Slab, Add	31.36	
For >500 To 1,000, Deduct	-6.27	
For >1,000 To 2,500, Deduct	-11.29	
For >2,500 To 5,000, Deduct	-16.30	
For >5,000 To 10,000, Deduct	-21.32	
For >10,000, Deduct	-26.34	
02 41 13 13-0034 SY >9" To 14" By Machine, Break-up And Remove Rod Reinforced Concrete Paving.....	81.84	
For Elevated Slab, Add	40.92	
For >500 To 1,000, Deduct	-8.18	
For >1,000 To 2,500, Deduct	-14.73	
For >2,500 To 5,000, Deduct	-21.28	
For >5,000 To 10,000, Deduct	-27.83	
For >10,000, Deduct	-34.37	
02 41 13 13-0035 SY >14" To 19" By Machine, Break-up And Remove Rod Reinforced Concrete Paving.....	106.99	
For Elevated Slab, Add	53.50	
For >500 To 1,000, Deduct	-10.70	
For >1,000 To 2,500, Deduct	-19.26	
For >2,500 To 5,000, Deduct	-27.82	
For >5,000 To 10,000, Deduct	-36.38	
For >10,000, Deduct	-44.94	
02 41 13 13-0036 SY >19" To 24" By Machine, Break-up And Remove Rod Reinforced Concrete Paving.....	129.85	
For Elevated Slab, Add	64.93	
For >500 To 1,000, Deduct	-12.99	
For >1,000 To 2,500, Deduct	-23.37	
For >2,500 To 5,000, Deduct	-33.76	
For >5,000 To 10,000, Deduct	-44.15	
For >10,000, Deduct	-54.54	
02 41 13 13-0037 By Hand, Break-up And Remove Bituminous And Concrete Paving <small>(02 41 13 13)</small>		
Note: Includes slabs, pavements, sidewalks and base courses. Includes work around obstacles. Work includes breaking into manageable size with jackhammer and hand tools, removal and loading onto a truck or dumpster. For individual work areas where conventional equipment access is limited or prohibited. Task is only to be used when requested by owner. Removal depth to include base aggregate. Excludes saw cutting (where required) and disposal. See CSI section 02 41 19 13-0057 for saw cutting.		
02 41 13 13-0038 SF Up To 3" By Hand, Break-up And Remove Bituminous Paving	4.34	
02 41 13 13-0039 SF >3" To 6" By Hand, Break-up And Remove Bituminous Paving	5.72	
02 41 13 13-0040 SF >6" To 9" By Hand, Break-up And Remove Bituminous Paving	7.42	

02 Existing Conditions**02 40 Demolition and Structure Moving****02 41 Demolition**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 41 13 13-0041	SF	Up To 3" By Hand, Break-up And Remove Concrete Paving	5.43
02 41 13 13-0042	SF	>3" To 6" By Hand, Break-up And Remove Concrete Paving.....	7.50
02 41 13 13-0043	SF	>6" To 9" By Hand, Break-up And Remove Concrete Paving.....	9.60
02 41 13 13-0044	SF	Up To 3" By Hand, Break-up And Remove Welded Wire Reinforced Concrete Paving.....	7.60
02 41 13 13-0045	SF	>3" To 6" By Hand, Break-up And Remove Welded Wire Reinforced Concrete Paving.....	10.49
02 41 13 13-0046	SF	>6" To 9" By Hand, Break-up And Remove Welded Wire Reinforced Concrete Paving.....	13.44

02 41 13 13-0047 Grind Concrete (02 41 13 13)

02 41 13 13-0048	EA	Grind Existing Sidewalks, Up To 1/2" Depth, To Remove Ridges (Tripping Hazard).....	214.76
		Note: For each location up to 5' wide, feather up to 12" each direction.	
		<i>For >1/2" To 1" Depth Of Grinding, Add</i>	32.21
		<i>For >1" To 1-1/2" Depth Of Grinding, Add</i>	53.69
		<i>For Up To 5, Add</i>	42.95
		<i>For >5 To 10, Add</i>	21.48
		<i>For >25 To 50, Deduct</i>	-21.48
		<i>For >50 To 250, Deduct</i>	-32.21
		<i>For >250, Deduct</i>	-42.95
		<i>For Sidewalks >5', Add</i>	21.48
		<i>For Up To 12" Additional Feathering Per Side, Add</i>	21.48

02 41 13 15 Hydro Demolition (02 41 13)**02 41 13 15-0001 Hydro Demolition Of Concrete Pavement** (02 41 13 15)

Note: Includes removal but excludes disposal of concrete.

02 41 13 15-0002	SF	Up To 2" Depth, Hydro Demolition, Using 40,000 PSI Water Jet.....	8.29
02 41 13 15-0003	SF	>2" To 4" Depth, Hydro Demolition, Using 40,000 PSI Water Jet.....	10.37
02 41 13 15-0004	SF	>4" To 6" Depth, Hydro Demolition, Using 40,000 PSI Water Jet.....	13.87
02 41 13 15-0005	SF	>6" To 8" Depth, Hydro Demolition, Using 40,000 PSI Water Jet.....	27.61

02 41 16 Structure Demolition (02 41)**02 41 16 13 Building Demolition** (02 41 16)**02 41 16 13-0001 Building Interior Demolition** (02 41 16 13)

Note: Guttled and placed in truck or dumpsters. Based on overall floor area square foot or Gross Square Foot (GSF) including flooring under interior demolished walls. Includes all soft stripping of materials (doors and frames, non-load bearing walls, carpet, moldings, drywall, tile, ceiling, ductwork, piping, light fixtures, etc.), accessible mechanical, electrical, plumbing, overhead sprinkler, fire protection and similar systems. Excludes lead, asbestos or other contaminants or load bearing walls, mechanical, plumbing or electrical equipment such as furnaces, water heaters, plumbing fixtures, sump pumps, switchgear or panel boards. Excludes hauling, dump fees, recycling charges, and/or salvage value.

02 41 16 13-0002	GSF	Residential Building Interior Demolition, Gutting And Placing Into Dumpster Or Truck	8.42
02 41 16 13-0003	GSF	Up To 2,000 SF Commercial Building Interior Demolition, Gutting And Placing Into Dumpster Or Truck.....	12.73
02 41 16 13-0004	GSF	>2,000 To 10,000 SF Commercial Building Interior Demolition, Gutting And Placing Into Dumpster Or Truck	10.42
02 41 16 13-0005	GSF	>10,000 SF Commercial Building Interior Demolition, Gutting And Placing Into Dumpster Or Truck.....	9.26

02 41 16 13-0006 Commercial And Residential Structures Demolition (02 41 16 13)

Note: Complete demolition of structures. Includes site and building safety preparation, signage, dust control, scattered debris and other site clean-up, demolition equipment, and repair of any damaged adjacent property. Excludes (if required) utility disconnects and capping, underground or above ground storage tank removal, adjacent property protection, adjacent property cleanup, adjacent property work, site paving (asphalt or concrete), recycling fees, gutting/soft stripping (selective removal of materials for reuse) of building, site security, hazardous material abatement (including lead, asbestos, and PCBs), surveys, clearing and grubbing of site, cranes, traffic control, elevator removal, major mechanical equipment such as boilers, chillers, cooling towers, Etc., excavation or backfill, foundations, basement floor, slab-on grade, temporary fencing (installation and removal), hauling, disposal and dump fees for all debris (site and building), earthwork and erosion control. Pricing is by Hundred Cubic Foot (CCF) of complete building volume being demolished. For computing building volume, height is computed at actual floor-to-floor dimensions with attic and basement each computed at half-height, width and length are actual dimensions. Excludes salvage value.

02 41 16 13-0007 Wood Frame Construction Building Demolition (02 41 16 13-0006)

02 41 16 13-0008	CCF	By Pneumatic Tools/Hand, Wood Frame Construction Building Demolition	59.71
		<i>For Floor-To-Floor (Or Floor-To-Structure) Heights >12' To 15', Deduct</i>	-4.48
		<i>For Floor-To-Floor (Or Floor-To-Structure) Heights >15' To 18', Deduct</i>	-8.96
		<i>For Floor-To-Floor (Or Floor-To-Structure) Heights >18' To 21', Deduct</i>	-13.43
		<i>For Up To 500, Add</i>	17.91
		<i>For >500 To 1,000, Add</i>	11.94
		<i>For >1,000 To 2,000, Add</i>	5.97
		<i>For Volume Of Area Within 15' To An Adjacent Building, Add</i>	19.70
		<i>For No Interior Partitions, Deduct</i>	-14.93
02 41 16 13-0009	CCF	By Machine, Wood Frame Construction Building Demolition.....	37.40
		<i>For Floor-To-Floor (Or Floor-To-Structure) Heights >12' To 15', Deduct</i>	-2.81
		<i>For Floor-To-Floor (Or Floor-To-Structure) Heights >15' To 18', Deduct</i>	-5.61
		<i>For Floor-To-Floor (Or Floor-To-Structure) Heights >18' To 21', Deduct</i>	-8.42
		<i>For Up To 500, Add</i>	11.22
		<i>For >500 To 1,000, Add</i>	7.48
		<i>For >1,000 To 2,000, Add</i>	3.74
		<i>For Work >3 Stories To 6 Stories (Exclude Volume Below), Add</i>	5.61
		<i>For Volume Of Area Within 15' To An Adjacent Building, Add</i>	12.34
		<i>For No Interior Partitions, Deduct</i>	-9.35



Existing Conditions		02
Demolition and Structure Moving		02 40
Demolition		02 41

02

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 16 13-0010 Foundation Demolition <small>(02 41 16 13)</small> Note: Excludes earthwork.		
02 41 16 13-0011 Concrete Foundation Demolition <small>(02 41 16 13-0010)</small>		
02 41 16 13-0012 CF Non-Reinforced Concrete Foundation Demolition	16.16	
For >135 To 405, Deduct	-1.41	
For >405 To 810, Deduct	-2.83	
For >810 To 2025, Deduct	-4.04	
For >2025, Deduct	-6.46	
02 41 16 13-0013 CF Reinforced Concrete Foundation Demolition	19.39	
For >135 To 405, Deduct	-1.70	
For >405 To 810, Deduct	-3.39	
For >810 To 2025, Deduct	-4.85	
For >2025, Deduct	-7.76	
 02 41 16 13-0014 Concrete Foundation Wall Demolition <small>(02 41 16 13-0010)</small>		
02 41 16 13-0015 SF 4" Thick Non-Reinforced Concrete Foundation Wall Demolition.....	6.92	
For >500 To 2,000, Deduct	-0.52	
For >2,000 To 6,000, Deduct	-1.38	
For >6,000 To 8,000, Deduct	-2.42	
For >8,000, Deduct	-3.81	
02 41 16 13-0016 SF 6" Thick Non-Reinforced Concrete Foundation Wall Demolition.....	9.23	
For >500 To 2,000, Deduct	-0.69	
For >2,000 To 6,000, Deduct	-1.85	
For >6,000 To 8,000, Deduct	-3.23	
For >8,000, Deduct	-5.08	
02 41 16 13-0017 SF 8" Thick Non-Reinforced Concrete Foundation Wall Demolition.....	11.53	
For >500 To 2,000, Deduct	-0.86	
For >2,000 To 6,000, Deduct	-2.31	
For >6,000 To 8,000, Deduct	-4.04	
For >8,000, Deduct	-6.34	
02 41 16 13-0018 SF 10" Thick Non-Reinforced Concrete Foundation Wall Demolition.....	13.85	
For >500 To 2,000, Deduct	-1.04	
For >2,000 To 6,000, Deduct	-2.77	
For >6,000 To 8,000, Deduct	-4.85	
For >8,000, Deduct	-7.62	
02 41 16 13-0019 SF 12" Thick Non-Reinforced Concrete Foundation Wall Demolition.....	16.16	
For >500 To 2,000, Deduct	-1.21	
For >2,000 To 6,000, Deduct	-3.23	
For >6,000 To 8,000, Deduct	-5.66	
For >8,000, Deduct	-8.89	
02 41 16 13-0020 SF 16" Thick Non-Reinforced Concrete Foundation Wall Demolition.....	18.46	
For >500 To 2,000, Deduct	-1.38	
For >2,000 To 6,000, Deduct	-3.69	
For >6,000 To 8,000, Deduct	-6.46	
For >8,000, Deduct	-10.15	
02 41 16 13-0021 SF 4" Thick Reinforced Concrete Foundation Wall Demolition	8.31	
For >500 To 2,000, Deduct	-0.62	
For >2,000 To 6,000, Deduct	-1.66	
For >6,000 To 8,000, Deduct	-2.91	
For >8,000, Deduct	-4.57	
02 41 16 13-0022 SF 6" Thick Reinforced Concrete Foundation Wall Demolition	11.08	
For >500 To 2,000, Deduct	-0.83	
For >2,000 To 6,000, Deduct	-2.22	
For >6,000 To 8,000, Deduct	-3.88	
For >8,000, Deduct	-6.09	
02 41 16 13-0023 SF 8" Thick Reinforced Concrete Foundation Wall Demolition	13.85	
For >500 To 2,000, Deduct	-1.04	
For >2,000 To 6,000, Deduct	-2.77	
For >6,000 To 8,000, Deduct	-4.85	
For >8,000, Deduct	-7.62	
02 41 16 13-0024 SF 10" Thick Reinforced Concrete Foundation Wall Demolition	16.39	
For >500 To 2,000, Deduct	-1.23	
For >2,000 To 6,000, Deduct	-3.28	
For >6,000 To 8,000, Deduct	-5.74	
For >8,000, Deduct	-9.01	
02 41 16 13-0025 SF 12" Thick Reinforced Concrete Foundation Wall Demolition	19.39	
For >500 To 2,000, Deduct	-1.45	
For >2,000 To 6,000, Deduct	-3.88	
For >6,000 To 8,000, Deduct	-6.79	
For >8,000, Deduct	-10.66	
02 41 16 13-0026 SF 16" Thick Reinforced Concrete Foundation Wall Demolition	22.15	
For >500 To 2,000, Deduct	-1.66	
For >2,000 To 6,000, Deduct	-4.43	
For >6,000 To 8,000, Deduct	-7.75	
For >8,000, Deduct	-12.18	
 02 41 16 13-0027 Concrete Block Foundation Wall Demolition <small>(02 41 16 13-0010)</small>		
02 41 16 13-0028 SF 4" Thick Non-Reinforced Concrete Block Foundation Wall Demolition.....	5.08	
For >500 To 2,000, Deduct	-0.38	
For >2,000 To 6,000, Deduct	-1.02	
For >6,000 To 8,000, Deduct	-1.78	
For >8,000, Deduct	-2.79	

02 Existing Conditions**02 40 Demolition and Structure Moving****02 41 Demolition**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 41 16 13-0029	SF 6" Thick Non-Reinforced Concrete Block Foundation Wall Demolition	5.42
	<i>For >500 To 2,000, Deduct</i>	-0.41
	<i>For >2,000 To 6,000, Deduct</i>	-1.08
	<i>For >6,000 To 8,000, Deduct</i>	-1.90
	<i>For >8,000, Deduct</i>	-2.98
02 41 16 13-0030	SF 8" Thick Non-Reinforced Concrete Block Foundation Wall Demolition	6.12
	<i>For >500 To 2,000, Deduct</i>	-0.46
	<i>For >2,000 To 6,000, Deduct</i>	-1.22
	<i>For >6,000 To 8,000, Deduct</i>	-2.14
	<i>For >8,000, Deduct</i>	-3.37
02 41 16 13-0031	SF 10" Thick Non-Reinforced Concrete Block Foundation Wall Demolition	7.03
	<i>For >500 To 2,000, Deduct</i>	-0.53
	<i>For >2,000 To 6,000, Deduct</i>	-1.41
	<i>For >6,000 To 8,000, Deduct</i>	-2.46
	<i>For >8,000, Deduct</i>	-3.87
02 41 16 13-0032	SF 12" Thick Non-Reinforced Concrete Block Foundation Wall Demolition	7.85
	<i>For >500 To 2,000, Deduct</i>	-0.59
	<i>For >2,000 To 6,000, Deduct</i>	-1.57
	<i>For >6,000 To 8,000, Deduct</i>	-2.75
	<i>For >8,000, Deduct</i>	-4.32
02 41 16 13-0033	SF 16" Thick Non-Reinforced Concrete Block Foundation Wall Demolition	9.81
	<i>For >500 To 2,000, Deduct</i>	-0.74
	<i>For >2,000 To 6,000, Deduct</i>	-1.96
	<i>For >6,000 To 8,000, Deduct</i>	-3.43
	<i>For >8,000, Deduct</i>	-5.40
02 41 16 13-0034	SF 4" Thick Reinforced Concrete Block Foundation Wall Demolition	6.09
	<i>For >500 To 2,000, Deduct</i>	-0.46
	<i>For >2,000 To 6,000, Deduct</i>	-1.22
	<i>For >6,000 To 8,000, Deduct</i>	-2.13
	<i>For >8,000, Deduct</i>	-3.35
02 41 16 13-0035	SF 6" Thick Reinforced Concrete Block Foundation Wall Demolition	6.50
	<i>For >500 To 2,000, Deduct</i>	-0.49
	<i>For >2,000 To 6,000, Deduct</i>	-1.30
	<i>For >6,000 To 8,000, Deduct</i>	-2.28
	<i>For >8,000, Deduct</i>	-3.58
02 41 16 13-0036	SF 8" Thick Reinforced Concrete Block Foundation Wall Demolition	7.34
	<i>For >500 To 2,000, Deduct</i>	-0.55
	<i>For >2,000 To 6,000, Deduct</i>	-1.47
	<i>For >6,000 To 8,000, Deduct</i>	-2.57
	<i>For >8,000, Deduct</i>	-4.04
02 41 16 13-0037	SF 10" Thick Reinforced Concrete Block Foundation Wall Demolition	8.45
	<i>For >500 To 2,000, Deduct</i>	-0.63
	<i>For >2,000 To 6,000, Deduct</i>	-1.69
	<i>For >6,000 To 8,000, Deduct</i>	-2.96
	<i>For >8,000, Deduct</i>	-4.65
02 41 16 13-0038	SF 12" Thick Reinforced Concrete Block Foundation Wall Demolition	9.41
	<i>For >500 To 2,000, Deduct</i>	-0.71
	<i>For >2,000 To 6,000, Deduct</i>	-1.88
	<i>For >6,000 To 8,000, Deduct</i>	-3.29
	<i>For >8,000, Deduct</i>	-5.18
02 41 16 13-0039	SF 16" Thick Reinforced Concrete Block Foundation Wall Demolition	11.77
	<i>For >500 To 2,000, Deduct</i>	-0.88
	<i>For >2,000 To 6,000, Deduct</i>	-2.35
	<i>For >6,000 To 8,000, Deduct</i>	-4.12
	<i>For >8,000, Deduct</i>	-6.47

02 41 16 13-0040 Brick Foundation Wall Demolition (02 41 16 13-0010)

02 41 16 13-0041	SF 4" Thick Brick Foundation Wall Demolition	5.08
	<i>For >500 To 2,000, Deduct</i>	-0.38
	<i>For >2,000 To 6,000, Deduct</i>	-1.02
	<i>For >6,000 To 8,000, Deduct</i>	-1.78
	<i>For >8,000, Deduct</i>	-2.79
02 41 16 13-0042	SF 6" Thick Brick Foundation Wall Demolition	5.42
	<i>For >500 To 2,000, Deduct</i>	-0.41
	<i>For >2,000 To 6,000, Deduct</i>	-1.08
	<i>For >6,000 To 8,000, Deduct</i>	-1.90
	<i>For >8,000, Deduct</i>	-2.98
02 41 16 13-0043	SF 8" Thick Brick Foundation Wall Demolition	6.12
	<i>For >500 To 2,000, Deduct</i>	-0.46
	<i>For >2,000 To 6,000, Deduct</i>	-1.22
	<i>For >6,000 To 8,000, Deduct</i>	-2.14
	<i>For >8,000, Deduct</i>	-3.37
02 41 16 13-0044	SF 10" Thick Brick Foundation Wall Demolition	7.03
	<i>For >500 To 2,000, Deduct</i>	-0.53
	<i>For >2,000 To 6,000, Deduct</i>	-1.41
	<i>For >6,000 To 8,000, Deduct</i>	-2.46
	<i>For >8,000, Deduct</i>	-3.87
02 41 16 13-0045	SF 12" Thick Brick Foundation Wall Demolition	7.85
	<i>For >500 To 2,000, Deduct</i>	-0.59
	<i>For >2,000 To 6,000, Deduct</i>	-1.57
	<i>For >6,000 To 8,000, Deduct</i>	-2.75
	<i>For >8,000, Deduct</i>	-4.32



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 16 13-0046 SF 16" Thick Brick Foundation Wall Demolition	9.81	
<i>For >500 To 2,000, Deduct</i>	-0.74	
<i>For >2,000 To 6,000, Deduct</i>	-1.96	
<i>For >6,000 To 8,000, Deduct</i>	-3.43	
<i>For >8,000, Deduct</i>	-5.40	
02 41 16 13-0047 Stone Foundation Demolition (02 41 16 13-0010)		
02 41 16 13-0048 CF Stone Footing Or Foundation Wall Demolition	16.16	
<i>For >135 To 405, Deduct</i>	-1.41	
<i>For >405 To 810, Deduct</i>	-2.83	
<i>For >810 To 2025, Deduct</i>	-4.04	
<i>For >2025, Deduct</i>	-6.46	
02 41 16 13-0049 Other Foundation Demolition (02 41 16 13-0010)		
02 41 16 13-0050 CF Concrete Footing For Fence, Gate Or Playground Equipment Post, Etc. Demolition	16.70	
Note: Includes excavation.		
<i>For >135 To 405, Deduct</i>	-1.46	
<i>For >405 To 810, Deduct</i>	-2.92	
<i>For >810 To 2025, Deduct</i>	-4.18	
<i>For >2025, Deduct</i>	-6.68	
02 41 19 Selective Demolition (02 41)		
02 41 19 13 Selective Building Demolition (02 41 19)		
02 41 19 13-0001 Exterior Masonry Removal (02 41 19 13)		
02 41 19 13-0002 Masonry Columns Removal (Interior And Exterior) (02 41 19 13-0001)		
02 41 19 13-0003 VLF 8" x 8" Masonry Column Removal	16.29	
02 41 19 13-0004 VLF 10" x 10" Masonry Column Removal	25.45	
02 41 19 13-0005 VLF 12" x 12" Masonry Column Removal	32.61	
02 41 19 13-0006 VLF 14" x 14" Masonry Column Removal	40.82	
02 41 19 13-0007 VLF 16" x 16" Masonry Column Removal	50.15	
02 41 19 13-0008 CF Masonry Column Removal, Per CF Of Masonry Removed; For Other Sizes Over 16" Square	28.16	
02 41 19 13-0009 Masonry Chimney Removal (02 41 19 13-0001)		
02 41 19 13-0010 CF Up To 3 CF/VLF Chimney Removal, Per CF Of Masonry Removed	33.04	
02 41 19 13-0011 CF >3 To 10 CF/VLF Chimney Removal, Per CF Of Masonry Removed	24.81	
02 41 19 13-0012 CF >10 To 20 CF/VLF Chimney Removal, Per CF Of Masonry Removed	18.98	
02 41 19 13-0013 CF >20 CF/VLF Chimney Removal, Per CF Of Masonry Removed	13.15	
02 41 19 13-0014 Remove And Reset Precast, Stone Or Masonry Coping (02 41 19 13-0001)		
Note: Includes removing, cleaning, and resetting coping with new ties and mortar. Excludes finished edge saw cutting at the intersection between demolition and undisturbed areas. See CSI section 02 41 19 13-0057 for saw cutting.		
02 41 19 13-0015 LF Up To 8" Wide, Remove And Reset Precast, Stone Or Masonry Coping	20.33	
02 41 19 13-0016 LF >8" To 12" Wide, Remove And Reset Precast, Stone Or Masonry Coping	30.34	
02 41 19 13-0017 LF >12" To 24" Wide, Remove And Reset Precast, Stone Or Masonry Coping	57.86	
02 41 19 13-0018 Facade Removal (02 41 19 13-0001)		
Note: Includes any saw cutting that may be required for size reduction into manageable pieces for handling and disposal. Excludes finished edge saw cutting at the intersection between demolition and undisturbed areas. See CSI section 02 41 19 13-0057 for saw cutting.		
02 41 19 13-0019 SF Stone Or Brick Veneer Facade Removal	6.20	
<i>For Cleaning and Storage For Reuse, Add</i>	9.30	
02 41 19 13-0020 Exterior Masonry Removal (02 41 19 13-0001)		
Note: Includes any saw cutting that may be required for size reduction into manageable pieces for handling and disposal. Salvage modifier includes removing mortar, scraping, cleaning, placement on pallets and storage on site. Excludes finished edge saw cutting at the intersection between demolition and undisturbed areas. See CSI section 02 41 19 13-0057 for saw cutting.		
02 41 19 13-0021 SF Demolish 4" Thick Non-Reinforced Concrete Block Exterior Wall	5.46	
02 41 19 13-0022 SF Demolish 6" Thick Non-Reinforced Concrete Block Exterior Wall	6.15	
02 41 19 13-0023 SF Demolish 8" Thick Non-Reinforced Concrete Block Exterior Wall	7.44	
02 41 19 13-0024 SF Demolish 10" Thick Non-Reinforced Concrete Block Exterior Wall	8.14	
02 41 19 13-0025 SF Demolish 12" Thick Non-Reinforced Concrete Block Exterior Wall	8.93	
02 41 19 13-0026 SF Demolish 16" Thick Non-Reinforced Concrete Block Exterior Wall	11.17	
02 41 19 13-0027 SF Demolish 4" Thick Reinforced Concrete Block Exterior Wall	6.45	
02 41 19 13-0028 SF Demolish 6" Thick Reinforced Concrete Block Exterior Wall	7.38	
02 41 19 13-0029 SF Demolish 8" Thick Reinforced Concrete Block Exterior Wall	8.93	
02 41 19 13-0030 SF Demolish 10" Thick Reinforced Concrete Block Exterior Wall	9.77	
02 41 19 13-0031 SF Demolish 12" Thick Reinforced Concrete Block Exterior Wall	10.72	
02 41 19 13-0032 SF Demolish 16" Thick Reinforced Concrete Block Exterior Wall	13.40	
02 41 19 13-0033 SF Demolish 4" Thick Brick Exterior Wall	5.46	
<i>For Cleaning and Storage For Reuse, Add</i>	8.19	

02 Existing Conditions**02 40 Demolition and Structure Moving****02 41 Demolition**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 41 19 13-0034	SF	Demolish 6" Thick Brick Exterior Wall	6.15
		<i>For Cleaning and Storage For Reuse, Add</i>	9.23
02 41 19 13-0035	SF	Demolish 8" Thick Brick Exterior Wall	7.44
		<i>For Cleaning and Storage For Reuse, Add</i>	11.16
02 41 19 13-0036	SF	Demolish 10" Thick Brick Exterior Wall	8.14
		<i>For Cleaning and Storage For Reuse, Add</i>	12.21
02 41 19 13-0037	SF	Demolish 12" Thick Brick Exterior Wall	8.93
		<i>For Cleaning and Storage For Reuse, Add</i>	13.40
02 41 19 13-0038	SF	Demolish 16" Thick Brick Exterior Wall	11.17
		<i>For Cleaning and Storage For Reuse, Add</i>	16.76
02 41 19 13-0039	CF	Exterior Brick, Concrete Block Or Composite Removal	15.87
		<i>For Cleaning and Storage For Reuse, Add</i>	23.81

02 41 19 13-0040**Lintel Removal** (02 41 19 13-0001)

Note: Includes any saw cutting that may be required for size reduction into manageable pieces for handling and disposal. Excludes finished edge saw cutting at the intersection between demolition and undisturbed areas. See CSI section 02 41 19 13-0057 for saw cutting.

02 41 19 13-0041	LF	Demolish Steel Lintel	12.56
02 41 19 13-0042	LF	Demolish Concrete Or Stone Lintel	16.75
02 41 19 13-0043	LF	Demolish Steel Shelf Angle	13.26

02 41 19 13-0044**Reinstall Lintel** (02 41 19 13-0001)

Note: Excludes finished edge saw cutting at the intersection between demolition and undisturbed areas. See CSI section 02 41 19 13-0057 for saw cutting.

02 41 19 13-0045	LF	Clean, Prime And Paint Steel Shelf Angle Or Lintel	7.34
02 41 19 13-0046	LF	Reinstall Existing Concrete Or Stone Lintel	16.75
02 41 19 13-0047	LF	Reinstall Existing Steel Shelf Angle	48.48
		Note: Includes fasteners.	
02 41 19 13-0048	LF	Reinstall Existing Steel Lintel	18.62
02 41 19 13-0049	LF	Removal And Replacement Of Steel Shelf Angle Over Window Openings At Cavity Walls	82.29
02 41 19 13-0050	LF	Removal And Replacement Of Steel Lintel Over Window Openings	157.59

02 41 19 13-0051**Exterior Concrete Wall Removal** (02 41 19 13)

02 41 19 13-0052	SF	Demolish 4" Thick Reinforced Concrete Exterior Wall	7.19
02 41 19 13-0053	SF	Demolish 6" Thick Reinforced Concrete Exterior Wall	13.04
02 41 19 13-0054	SF	Demolish 8" Thick Reinforced Concrete Exterior Wall	16.39
02 41 19 13-0055	SF	Demolish 10" Thick Reinforced Concrete Exterior Wall	19.33
02 41 19 13-0056	SF	Demolish 12" Thick Reinforced Concrete Exterior Wall	22.85

02 41 19 13-0057**Saw Cutting** (02 41 19 13)

Note: Includes blade wear, water, taping off area, layout, clean-up and mist spray with wet vacuuming for dust control where necessary. For projects where the total saw cutting charge is less than the minimum charge, use task "Saw Cut Minimum Charge" exclusively. Task "Saw Cut Minimum Charge" should not be used in conjunction with any other tasks in this section.

02 41 19 13-0058	LF	Bituminous Paving Up To 4" Depth, Saw Cut	2.45
		<i>For Each Additional Pass (Depth To 3"), Add</i>	0.95
		<i>For >250, Deduct</i>	-0.24
02 41 19 13-0059	LF	Brick Masonry Up To 4" Depth, Saw Cut	9.31
		<i>For Each Additional Pass (Depth To 3"), Add</i>	3.69
		<i>For >250, Deduct</i>	-0.92
02 41 19 13-0060	LF	Concrete Block Up To 4" Depth, Saw Cut	8.41
		<i>For Each Additional Pass (Depth To 3"), Add</i>	3.33
		<i>For >250, Deduct</i>	-0.83
02 41 19 13-0061	LF	Non-Reinforced Concrete Slab Or Paving Up To 4" Depth, Saw Cut	2.80
		<i>For Each Additional Pass (Depth To 3"), Add</i>	1.08
		<i>For >250, Deduct</i>	-0.27
02 41 19 13-0062	LF	Welded Wire Reinforced Concrete Slab Up To 4" Depth, Saw Cut	3.70
		<i>For Each Additional Pass (Depth To 3"), Add</i>	1.44
		<i>For >250, Deduct</i>	-0.36
02 41 19 13-0063	LF	Rod Reinforced Concrete Slab Up To 4" Depth, Saw Cut	6.17
		<i>For Each Additional Pass (Depth To 3"), Add</i>	2.42
		<i>For >250, Deduct</i>	-0.60
02 41 19 13-0064	LF	Plain Concrete Walls Up To 4" Depth, Saw Cut	11.92
		<i>For Each Additional Pass (Depth To 3"), Add</i>	4.73
		<i>For >250, Deduct</i>	-1.18
02 41 19 13-0065	LF	Saw Cut Rod Reinforced Concrete Walls Up To 4" Depth	16.01
		<i>For Each Additional Pass (Depth To 3"), Add</i>	6.36
		<i>For >250, Deduct</i>	-1.59
02 41 19 13-0066	LF	Concrete And Asphalt Up To 4" Depth, Saw Cut In Streets	3.23
		<i>For Each Additional Pass (Depth To 3"), Add</i>	1.17
		<i>For >250, Deduct</i>	-0.28
02 41 19 13-0067	LF	Igneous Stone Pavements Up To 4" Depth, Saw Cut	8.43
		<i>For Each Additional Pass (Depth To 3"), Add</i>	3.34
		<i>For >250, Deduct</i>	-0.83
02 41 19 13-0068	LF	Sedimentary Stone Pavements Up To 4" Depth, Saw Cut	8.43
		<i>For Each Additional Pass (Depth To 3"), Add</i>	3.34
		<i>For >250, Deduct</i>	-0.83
02 41 19 13-0069	LF	Metamorphic Stone Pavements Up To 4" Depth, Saw Cut	8.43
		<i>For Each Additional Pass (Depth To 3"), Add</i>	3.34
		<i>For >250, Deduct</i>	-0.83

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 13-0070 LF Terrazzo Stone Pavements Up To 4" Depth, Saw Cut	8.43	
For Each Additional Pass (Depth To 3"), Add	3.34	
For >250, Deduct	-0.83	
02 41 19 13-0071 EA Saw Cut Minimum Charge	1,150.28	
Note: For projects where the total saw cutting charge is less than the minimum charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.		
02 41 19 13-0072 Torch Cutting <small>(02 41 19 13)</small>		
Note: Includes grinding edge		
02 41 19 13-0073 LF Up To 1/2", Torch Cut Steel Plate	3.10	
02 41 19 13-0074 LF >1/2" To 1" Thick, Torch Cut Steel Plate	6.20	
02 41 19 13-0075 LF >1" To 1-1/2" Thick, Torch Cut Steel Plate	9.30	
02 41 19 13-0076 LF >1-1/2" To 2" Thick, Torch Cut Steel Plate	12.41	
02 41 19 13-0077 LF >2" To 2-1/2" Thick, Torch Cut Steel Plate	15.51	
02 41 19 13-0078 LF >2-1/2" To 3" Thick, Torch Cut Steel Plate	18.59	
02 41 19 13-0079 EA Torch Cutting Minimum Charge	1,016.61	
Note: For projects where the total torch cutting charge is less than the minimum charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.		
02 41 19 13-0080 Drilling In Existing Materials <small>(02 41 19 13)</small>		
Note: Includes drill bit wear, water, layout, set-up and clean-up.		
02 41 19 13-0081 Concrete Core Drilling <small>(02 41 19 13-0080)</small>		
02 41 19 13-0082 Up To 4" Thick Concrete Core Drilling <small>(02 41 19 13-0081)</small>		
02 41 19 13-0083 EA Drill 1" Diameter Core In Up To 4" Concrete	45.73	
For Horizontal Cores, Add	9.05	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	18.10	
02 41 19 13-0084 EA Drill 1-1/2" Diameter Core In Up To 4" Concrete	50.73	
For Horizontal Cores, Add	10.05	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	20.10	
02 41 19 13-0085 EA Drill 2" Diameter Core In Up To 4" Concrete	56.33	
For Horizontal Cores, Add	11.17	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	22.34	
02 41 19 13-0086 EA Drill 3" Diameter Core In Up To 4" Concrete	80.44	
For Horizontal Cores, Add	15.96	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	31.91	
02 41 19 13-0087 EA Drill 4" Diameter Core In Up To 4" Concrete	107.77	
For Horizontal Cores, Add	21.38	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	42.76	
02 41 19 13-0088 EA Drill 6" Diameter Core In Up To 4" Concrete	120.77	
For Horizontal Cores, Add	23.93	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	47.86	
02 41 19 13-0089 EA Drill 8" Diameter Core In Up To 4" Concrete	192.99	
For Horizontal Cores, Add	38.29	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	76.59	
02 41 19 13-0090 EA Drill 10" Diameter Core In Up To 4" Concrete	241.41	
For Horizontal Cores, Add	47.87	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	95.73	
02 41 19 13-0091 EA Drill 12" Diameter Core In Up To 4" Concrete	281.72	
For Horizontal Cores, Add	55.85	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	111.69	
02 41 19 13-0092 EA Drill 14" Diameter Core In Up To 4" Concrete	322.04	
For Horizontal Cores, Add	63.81	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	127.63	
02 41 19 13-0093 EA Drill 18" Diameter Core In Up To 4" Concrete	362.76	
For Horizontal Cores, Add	71.79	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	143.58	
02 41 19 13-0094 >4" To 6" Thick Concrete Core Drilling <small>(02 41 19 13-0081)</small>		
02 41 19 13-0095 EA Drill 1" Diameter Core In >4" To 6" Concrete	65.36	
For Horizontal Cores, Add	12.92	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	25.84	
02 41 19 13-0096 EA Drill 1-1/2" Diameter Core In >4" To 6" Concrete	72.53	
For Horizontal Cores, Add	14.36	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	28.71	
02 41 19 13-0097 EA Drill 2" Diameter Core In >4" To 6" Concrete	80.51	
For Horizontal Cores, Add	15.95	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	31.90	
02 41 19 13-0098 EA Drill 3" Diameter Core In >4" To 6" Concrete	96.76	
For Horizontal Cores, Add	19.15	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	38.29	
02 41 19 13-0099 EA Drill 4" Diameter Core In >4" To 6" Concrete	121.02	
For Horizontal Cores, Add	23.93	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	47.86	
02 41 19 13-0100 EA Drill 6" Diameter Core In >4" To 6" Concrete	161.24	
For Horizontal Cores, Add	31.91	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	63.82	
02 41 19 13-0101 EA Drill 8" Diameter Core In >4" To 6" Concrete	241.64	
For Horizontal Cores, Add	47.87	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	95.73	

02 Existing Conditions**02 40 Demolition and Structure Moving****02 41 Demolition**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 41 19 13-0102	EA	Drill 10" Diameter Core In >4" To 6" Concrete	282.34
		<i>For Horizontal Cores, Add</i>	55.85
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	111.69
02 41 19 13-0103	EA	Drill 12" Diameter Core In >4" To 6" Concrete	322.80
		<i>For Horizontal Cores, Add</i>	63.81
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	127.63
02 41 19 13-0104	EA	Drill 14" Diameter Core In >4" To 6" Concrete	363.48
		<i>For Horizontal Cores, Add</i>	71.79
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	143.58
02 41 19 13-0105	EA	Drill 18" Diameter Core In >4" To 6" Concrete	404.73
		<i>For Horizontal Cores, Add</i>	79.77
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	159.54
02 41 19 13-0106		>6" To 8" Thick Concrete Core Drilling (02 41 19 13-0081)	
02 41 19 13-0107	EA	Drill 1" Diameter Core In >6" To 8" Concrete	72.10
		<i>For Horizontal Cores, Add</i>	14.22
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	28.43
02 41 19 13-0108	EA	Drill 1-1/2" Diameter Core In >6" To 8" Concrete	79.99
		<i>For Horizontal Cores, Add</i>	15.79
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	31.59
02 41 19 13-0109	EA	Drill 2" Diameter Core In >6" To 8" Concrete	88.78
		<i>For Horizontal Cores, Add</i>	17.55
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	35.10
02 41 19 13-0110	EA	Drill 3" Diameter Core In >6" To 8" Concrete	105.11
		<i>For Horizontal Cores, Add</i>	20.74
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	41.48
02 41 19 13-0111	EA	Drill 4" Diameter Core In >6" To 8" Concrete	137.44
		<i>For Horizontal Cores, Add</i>	27.12
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	54.24
02 41 19 13-0112	EA	Drill 6" Diameter Core In >6" To 8" Concrete	193.74
		<i>For Horizontal Cores, Add</i>	38.29
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	76.59
02 41 19 13-0113	EA	Drill 8" Diameter Core In >6" To 8" Concrete	322.16
		<i>For Horizontal Cores, Add</i>	63.81
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	127.63
02 41 19 13-0114	EA	Drill 10" Diameter Core In >6" To 8" Concrete	363.09
		<i>For Horizontal Cores, Add</i>	71.79
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	143.58
02 41 19 13-0115	EA	Drill 12" Diameter Core In >6" To 8" Concrete	403.82
		<i>For Horizontal Cores, Add</i>	79.77
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	159.54
02 41 19 13-0116	EA	Drill 14" Diameter Core In >6" To 8" Concrete	444.76
		<i>For Horizontal Cores, Add</i>	87.73
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	175.46
02 41 19 13-0117	EA	Drill 18" Diameter Core In >6" To 8" Concrete	486.58
		<i>For Horizontal Cores, Add</i>	95.73
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	191.46
02 41 19 13-0118		>8" To 10" Thick Concrete Core Drilling (02 41 19 13-0081)	
02 41 19 13-0119	EA	Drill 1" Diameter Core In >8" To 10" Concrete	85.28
		<i>For Horizontal Cores, Add</i>	16.80
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	33.60
02 41 19 13-0120	EA	Drill 1-1/2" Diameter Core In >8" To 10" Concrete	94.62
		<i>For Horizontal Cores, Add</i>	18.67
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	37.34
02 41 19 13-0121	EA	Drill 2" Diameter Core In >8" To 10" Concrete	104.98
		<i>For Horizontal Cores, Add</i>	20.74
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	41.48
02 41 19 13-0122	EA	Drill 3" Diameter Core In >8" To 10" Concrete	121.43
		<i>For Horizontal Cores, Add</i>	23.93
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	47.86
02 41 19 13-0123	EA	Drill 4" Diameter Core In >8" To 10" Concrete	137.92
		<i>For Horizontal Cores, Add</i>	27.12
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	54.24
02 41 19 13-0124	EA	Drill 6" Diameter Core In >8" To 10" Concrete	194.31
		<i>For Horizontal Cores, Add</i>	38.29
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	76.59
02 41 19 13-0125	EA	Drill 8" Diameter Core In >8" To 10" Concrete	322.94
		<i>For Horizontal Cores, Add</i>	63.81
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	127.63
02 41 19 13-0126	EA	Drill 10" Diameter Core In >8" To 10" Concrete	364.12
		<i>For Horizontal Cores, Add</i>	71.79
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	143.58
02 41 19 13-0127	EA	Drill 12" Diameter Core In >8" To 10" Concrete	404.98
		<i>For Horizontal Cores, Add</i>	79.76
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	159.51
02 41 19 13-0128	EA	Drill 14" Diameter Core In >8" To 10" Concrete	446.32
		<i>For Horizontal Cores, Add</i>	87.73
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	175.46
02 41 19 13-0129	EA	Drill 18" Diameter Core In >8" To 10" Concrete	488.52
		<i>For Horizontal Cores, Add</i>	95.71
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	191.41



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 13-0130 >10" To 12" Thick Concrete Core Drilling (02 41 19 13-0081)		
02 41 19 13-0131 EA Drill 1" Diameter Core In >10" To 12" Concrete.....	92.02	
For Horizontal Cores, Add	18.09	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	36.19	
02 41 19 13-0132 EA Drill 1-1/2" Diameter Core In >10" To 12" Concrete.....	102.07	
For Horizontal Cores, Add	20.10	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	40.21	
02 41 19 13-0133 EA Drill 2" Diameter Core In >10" To 12" Concrete.....	113.24	
For Horizontal Cores, Add	22.34	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	44.68	
02 41 19 13-0134 EA Drill 3" Diameter Core In >10" To 12" Concrete.....	121.80	
For Horizontal Cores, Add	23.93	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	47.86	
02 41 19 13-0135 EA Drill 4" Diameter Core In >10" To 12" Concrete.....	162.33	
For Horizontal Cores, Add	31.91	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	63.82	
02 41 19 13-0136 EA Drill 6" Diameter Core In >10" To 12" Concrete.....	210.85	
For Horizontal Cores, Add	41.49	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	82.97	
02 41 19 13-0137 EA Drill 8" Diameter Core In >10" To 12" Concrete.....	339.71	
For Horizontal Cores, Add	67.01	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	134.02	
02 41 19 13-0138 EA Drill 10" Diameter Core In >10" To 12" Concrete.....	365.15	
For Horizontal Cores, Add	71.79	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	143.58	
02 41 19 13-0139 EA Drill 12" Diameter Core In >10" To 12" Concrete.....	422.29	
For Horizontal Cores, Add	82.97	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	165.94	
02 41 19 13-0140 >12" Thick Concrete Core Drilling (02 41 19 13-0081)		
02 41 19 13-0141 IN Drill 1" Diameter Core In >12" Concrete.....	11.19	
For Horizontal Cores, Add	2.21	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	4.42	
02 41 19 13-0142 IN Drill 1-1/2" Diameter Core In >12" Concrete.....	12.42	
For Horizontal Cores, Add	2.46	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	4.92	
02 41 19 13-0143 IN Drill 2" Diameter Core In >12" Concrete.....	13.78	
For Horizontal Cores, Add	2.73	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	5.46	
02 41 19 13-0144 IN Drill 3" Diameter Core In >12" Concrete.....	15.13	
For Horizontal Cores, Add	2.99	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	5.98	
02 41 19 13-0145 IN Drill 4" Diameter Core In >12" Concrete.....	20.16	
For Horizontal Cores, Add	3.99	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	7.97	
02 41 19 13-0146 IN Drill 6" Diameter Core In >12" Concrete.....	26.23	
For Horizontal Cores, Add	5.19	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	10.38	
02 41 19 13-0147 IN Drill 8" Diameter Core In >12" Concrete.....	42.30	
For Horizontal Cores, Add	8.38	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	16.76	
02 41 19 13-0148 IN Drill 10" Diameter Core In >12" Concrete.....	45.58	
For Horizontal Cores, Add	9.01	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	18.02	
02 41 19 13-0149 IN Drill 12" Diameter Core In >12" Concrete.....	52.50	
For Horizontal Cores, Add	10.38	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	20.75	
02 41 19 13-0150 Brick/Concrete Block Core Drilling (02 41 19 13-0080)		
02 41 19 13-0151 Up To 4" Thick Brick/Concrete Block Core Drilling (02 41 19 13-0150)		
02 41 19 13-0152 EA Drill 1" Diameter Core In Up To 4" Brick/Concrete Block.....	36.68	
For Horizontal Cores, Add	7.24	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	14.48	
02 41 19 13-0153 EA Drill 1-1/2" Diameter Core In Up To 4" Brick/Concrete Block.....	40.69	
For Horizontal Cores, Add	8.04	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	16.08	
02 41 19 13-0154 EA Drill 2" Diameter Core In Up To 4" Brick/Concrete Block.....	45.16	
For Horizontal Cores, Add	8.93	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	17.87	
02 41 19 13-0155 EA Drill 3" Diameter Core In Up To 4" Brick/Concrete Block.....	64.48	
For Horizontal Cores, Add	12.76	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	25.53	
02 41 19 13-0156 EA Drill 4" Diameter Core In Up To 4" Brick/Concrete Block.....	86.40	
For Horizontal Cores, Add	17.10	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	34.21	
02 41 19 13-0157 EA Drill 6" Diameter Core In Up To 4" Brick/Concrete Block.....	96.84	
For Horizontal Cores, Add	19.15	
For Overhead Ceiling Cores (Where Not Accessible From Above), Add	38.29	

02 Existing Conditions**02 40 Demolition and Structure Moving****02 41 Demolition**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 13-0158	EA		Drill 8" Diameter Core In Up To 4" Brick/Concrete Block.....	154.69	
			<i>For Horizontal Cores, Add</i>	30.63	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	61.27	
02 41 19 13-0159	EA		Drill 10" Diameter Core In Up To 4" Brick/Concrete Block.....	193.54	
			<i>For Horizontal Cores, Add</i>	38.29	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	76.58	
02 41 19 13-0160	EA		Drill 12" Diameter Core In Up To 4" Brick/Concrete Block.....	225.87	
			<i>For Horizontal Cores, Add</i>	44.68	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	89.35	
02 41 19 13-0161	EA		Drill 14" Diameter Core In Up To 4" Brick/Concrete Block.....	258.23	
			<i>For Horizontal Cores, Add</i>	51.05	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	102.10	
02 41 19 13-0162	EA		Drill 18" Diameter Core In Up To 4" Brick/Concrete Block.....	290.97	
			<i>For Horizontal Cores, Add</i>	57.43	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	114.86	
02 41 19 13-0163			>4" To 6" Thick Brick/Concrete Block Core Drilling (02 41 19 13-0150)		
02 41 19 13-0164	EA		Drill 1" Diameter Core In >4" To 6" Brick/Concrete Block.....	52.44	
			<i>For Horizontal Cores, Add</i>	10.34	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	20.68	
02 41 19 13-0165	EA		Drill 1-1/2" Diameter Core In >4" To 6" Brick/Concrete Block.....	58.17	
			<i>For Horizontal Cores, Add</i>	11.48	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	22.97	
02 41 19 13-0166	EA		Drill 2" Diameter Core In >4" To 6" Brick/Concrete Block.....	64.56	
			<i>For Horizontal Cores, Add</i>	12.76	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	25.52	
02 41 19 13-0167	EA		Drill 3" Diameter Core In >4" To 6" Brick/Concrete Block.....	77.62	
			<i>For Horizontal Cores, Add</i>	15.32	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	30.64	
02 41 19 13-0168	EA		Drill 4" Diameter Core In >4" To 6" Brick/Concrete Block.....	97.09	
			<i>For Horizontal Cores, Add</i>	19.15	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	38.29	
02 41 19 13-0169	EA		Drill 6" Diameter Core In >4" To 6" Brick/Concrete Block.....	129.33	
			<i>For Horizontal Cores, Add</i>	25.53	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	51.06	
02 41 19 13-0170	EA		Drill 8" Diameter Core In >4" To 6" Brick/Concrete Block.....	193.77	
			<i>For Horizontal Cores, Add</i>	38.29	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	76.58	
02 41 19 13-0171	EA		Drill 10" Diameter Core In >4" To 6" Brick/Concrete Block.....	226.49	
			<i>For Horizontal Cores, Add</i>	44.68	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	89.35	
02 41 19 13-0172	EA		Drill 12" Diameter Core In >4" To 6" Brick/Concrete Block.....	258.99	
			<i>For Horizontal Cores, Add</i>	51.05	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	102.10	
02 41 19 13-0173	EA		Drill 14" Diameter Core In >4" To 6" Brick/Concrete Block.....	291.69	
			<i>For Horizontal Cores, Add</i>	57.43	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	114.86	
02 41 19 13-0174	EA		Drill 18" Diameter Core In >4" To 6" Brick/Concrete Block.....	324.95	
			<i>For Horizontal Cores, Add</i>	63.82	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	127.63	
02 41 19 13-0175			>6" To 8" Thick Brick/Concrete Block Core Drilling (02 41 19 13-0150)		
02 41 19 13-0176	EA		Drill 1" Diameter Core In >6" To 8" Brick/Concrete Block.....	57.88	
			<i>For Horizontal Cores, Add</i>	11.37	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	22.74	
02 41 19 13-0177	EA		Drill 1-1/2" Diameter Core In >6" To 8" Brick/Concrete Block.....	64.20	
			<i>For Horizontal Cores, Add</i>	12.64	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	25.27	
02 41 19 13-0178	EA		Drill 2" Diameter Core In >6" To 8" Brick/Concrete Block.....	71.22	
			<i>For Horizontal Cores, Add</i>	14.04	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	28.08	
02 41 19 13-0179	EA		Drill 3" Diameter Core In >6" To 8" Brick/Concrete Block.....	84.36	
			<i>For Horizontal Cores, Add</i>	16.59	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	33.18	
02 41 19 13-0180	EA		Drill 4" Diameter Core In >6" To 8" Brick/Concrete Block.....	110.32	
			<i>For Horizontal Cores, Add</i>	21.70	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	43.40	
02 41 19 13-0181	EA		Drill 6" Diameter Core In >6" To 8" Brick/Concrete Block.....	155.44	
			<i>For Horizontal Cores, Add</i>	30.63	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	61.27	
02 41 19 13-0182	EA		Drill 8" Diameter Core In >6" To 8" Brick/Concrete Block.....	258.35	
			<i>For Horizontal Cores, Add</i>	51.05	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	102.10	
02 41 19 13-0183	EA		Drill 10" Diameter Core In >6" To 8" Brick/Concrete Block.....	291.30	
			<i>For Horizontal Cores, Add</i>	57.43	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	114.86	
02 41 19 13-0184	EA		Drill 12" Diameter Core In >6" To 8" Brick/Concrete Block.....	324.04	
			<i>For Horizontal Cores, Add</i>	63.82	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	127.63	
02 41 19 13-0185	EA		Drill 14" Diameter Core In >6" To 8" Brick/Concrete Block.....	357.03	
			<i>For Horizontal Cores, Add</i>	70.19	
			<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	140.37	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 13-0186 EA Drill 18" Diameter Core In >6" To 8" Brick/Concrete Block	390.85	
<i>For Horizontal Cores, Add</i>	76.58	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	153.17	
02 41 19 13-0187 >8" To 10" Thick Brick/Concrete Block Core Drilling (02 41 19 13-0150)		
02 41 19 13-0188 EA Drill 1" Diameter Core In >8" To 10" Brick/Concrete Block	68.48	
<i>For Horizontal Cores, Add</i>	13.44	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	26.88	
02 41 19 13-0189 EA Drill 1-1/2" Diameter Core In >8" To 10" Brick/Concrete Block	75.95	
<i>For Horizontal Cores, Add</i>	14.93	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	29.87	
02 41 19 13-0190 EA Drill 2" Diameter Core In >8" To 10" Brick/Concrete Block	84.24	
<i>For Horizontal Cores, Add</i>	16.59	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	33.18	
02 41 19 13-0191 EA Drill 3" Diameter Core In >8" To 10" Brick/Concrete Block	97.50	
<i>For Horizontal Cores, Add</i>	19.15	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	38.29	
02 41 19 13-0192 EA Drill 4" Diameter Core In >8" To 10" Brick/Concrete Block	110.80	
<i>For Horizontal Cores, Add</i>	21.70	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	43.40	
02 41 19 13-0193 EA Drill 6" Diameter Core In >8" To 10" Brick/Concrete Block	156.01	
<i>For Horizontal Cores, Add</i>	30.63	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	61.27	
02 41 19 13-0194 EA Drill 8" Diameter Core In >8" To 10" Brick/Concrete Block	259.13	
<i>For Horizontal Cores, Add</i>	51.05	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	102.10	
02 41 19 13-0195 EA Drill 10" Diameter Core In >8" To 10" Brick/Concrete Block	292.33	
<i>For Horizontal Cores, Add</i>	57.43	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	114.86	
02 41 19 13-0196 EA Drill 12" Diameter Core In >8" To 10" Brick/Concrete Block	325.22	
<i>For Horizontal Cores, Add</i>	63.80	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	127.61	
02 41 19 13-0197 EA Drill 14" Diameter Core In >8" To 10" Brick/Concrete Block	358.59	
<i>For Horizontal Cores, Add</i>	70.19	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	140.37	
02 41 19 13-0198 EA Drill 18" Diameter Core In >8" To 10" Brick/Concrete Block	392.82	
<i>For Horizontal Cores, Add</i>	76.57	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	153.13	
02 41 19 13-0199 >10" To 12" Thick Brick/Concrete Block Core Drilling (02 41 19 13-0150)		
02 41 19 13-0200 EA Drill 1" Diameter Core In >10" To 12" Brick/Concrete Block	73.92	
<i>For Horizontal Cores, Add</i>	14.47	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	28.95	
02 41 19 13-0201 EA Drill 1-1/2" Diameter Core In >10" To 12" Brick/Concrete Block	81.97	
<i>For Horizontal Cores, Add</i>	16.08	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	32.17	
02 41 19 13-0202 EA Drill 2" Diameter Core In >10" To 12" Brick/Concrete Block	90.90	
<i>For Horizontal Cores, Add</i>	17.87	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	35.74	
02 41 19 13-0203 EA Drill 3" Diameter Core In >10" To 12" Brick/Concrete Block	97.87	
<i>For Horizontal Cores, Add</i>	19.15	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	38.29	
02 41 19 13-0204 EA Drill 4" Diameter Core In >10" To 12" Brick/Concrete Block	130.42	
<i>For Horizontal Cores, Add</i>	25.53	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	51.06	
02 41 19 13-0205 EA Drill 6" Diameter Core In >10" To 12" Brick/Concrete Block	169.36	
<i>For Horizontal Cores, Add</i>	33.19	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	66.38	
02 41 19 13-0206 EA Drill 8" Diameter Core In >10" To 12" Brick/Concrete Block	272.69	
<i>For Horizontal Cores, Add</i>	53.61	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	107.21	
02 41 19 13-0207 EA Drill 10" Diameter Core In >10" To 12" Brick/Concrete Block	293.36	
<i>For Horizontal Cores, Add</i>	57.43	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	114.86	
02 41 19 13-0208 EA Drill 12" Diameter Core In >10" To 12" Brick/Concrete Block	339.32	
<i>For Horizontal Cores, Add</i>	66.38	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	132.75	
02 41 19 13-0209 >12" Thick Brick/Concrete Block Core Drilling (02 41 19 13-0150)		
02 41 19 13-0210 IN Drill 1" Diameter Core In >12" Brick/Concrete Block	8.98	
<i>For Horizontal Cores, Add</i>	1.77	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	3.54	
02 41 19 13-0211 IN Drill 1-1/2" Diameter Core In >12" Brick/Concrete Block	9.96	
<i>For Horizontal Cores, Add</i>	1.97	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	3.93	
02 41 19 13-0212 IN Drill 2" Diameter Core In >12" Brick/Concrete Block	11.05	
<i>For Horizontal Cores, Add</i>	2.18	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	4.37	
02 41 19 13-0213 IN Drill 3" Diameter Core In >12" Brick/Concrete Block	12.15	
<i>For Horizontal Cores, Add</i>	2.39	
<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	4.79	

02 Existing Conditions**02 40 Demolition and Structure Moving****02 41 Demolition**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 41 19 13-0214	IN	Drill 4" Diameter Core In >12" Brick/Concrete Block.....	16.17
		<i>For Horizontal Cores, Add</i>	3.19
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	6.38
02 41 19 13-0215	IN	Drill 6" Diameter Core In >12" Brick/Concrete Block.....	21.03
		<i>For Horizontal Cores, Add</i>	4.15
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	8.30
02 41 19 13-0216	IN	Drill 8" Diameter Core In >12" Brick/Concrete Block.....	33.93
		<i>For Horizontal Cores, Add</i>	6.71
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	13.42
02 41 19 13-0217	IN	Drill 10" Diameter Core In >12" Brick/Concrete Block.....	36.57
		<i>For Horizontal Cores, Add</i>	7.21
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	14.42
02 41 19 13-0218	IN	Drill 12" Diameter Core In >12" Brick/Concrete Block.....	42.13
		<i>For Horizontal Cores, Add</i>	8.30
		<i>For Overhead Ceiling Cores (Where Not Accessible From Above), Add</i>	16.60

02 41 19 13-0219 Asphalt Core Drilling (02 41 19 13-0080)**02 41 19 13-0220 Up To 2" Thick Asphalt Core Drilling** (02 41 19 13-0219)

02 41 19 13-0221	EA	Drill 2" Diameter Core In Up To 2" Asphalt	34.29
02 41 19 13-0222	EA	Drill 3" Diameter Core In Up To 2" Asphalt	42.53
02 41 19 13-0223	EA	Drill 4" Diameter Core In Up To 2" Asphalt	53.52
02 41 19 13-0224	EA	Drill 6" Diameter Core In Up To 2" Asphalt	67.25
02 41 19 13-0225	EA	Drill 8" Diameter Core In Up To 2" Asphalt	83.75
02 41 19 13-0226	EA	Drill 10" Diameter Core In Up To 2" Asphalt	104.30
02 41 19 13-0227	EA	Drill 12" Diameter Core In Up To 2" Asphalt	130.36

02 41 19 13-0228 >2" To 3" Thick Asphalt Core Drilling (02 41 19 13-0219)

02 41 19 13-0229	EA	Drill 2" Diameter Core In >2" To 3" Asphalt	43.88
02 41 19 13-0230	EA	Drill 3" Diameter Core In >2" To 3" Asphalt	54.86
02 41 19 13-0231	EA	Drill 4" Diameter Core In >2" To 3" Asphalt	68.58
02 41 19 13-0232	EA	Drill 6" Diameter Core In >2" To 3" Asphalt	86.41
02 41 19 13-0233	EA	Drill 8" Diameter Core In >2" To 3" Asphalt	107.04
02 41 19 13-0234	EA	Drill 10" Diameter Core In >2" To 3" Asphalt	134.44
02 41 19 13-0235	EA	Drill 12" Diameter Core In >2" To 3" Asphalt	167.33

02 41 19 13-0236 >3" To 4" Thick Asphalt Core Drilling (02 41 19 13-0219)

02 41 19 13-0237	EA	Drill 2" Diameter Core In >3" To 4" Asphalt	56.23
02 41 19 13-0238	EA	Drill 3" Diameter Core In >3" To 4" Asphalt	69.96
02 41 19 13-0239	EA	Drill 4" Diameter Core In >3" To 4" Asphalt	87.82
02 41 19 13-0240	EA	Drill 6" Diameter Core In >3" To 4" Asphalt	109.79
02 41 19 13-0241	EA	Drill 8" Diameter Core In >3" To 4" Asphalt	137.30
02 41 19 13-0242	EA	Drill 10" Diameter Core In >3" To 4" Asphalt	171.56
02 41 19 13-0243	EA	Drill 12" Diameter Core In >3" To 4" Asphalt	214.07

02 41 19 13-0244 >4" To 6" Thick Asphalt Core Drilling (02 41 19 13-0219)

02 41 19 13-0245	EA	Drill 2" Diameter Core In >4" To 6" Asphalt	71.38
02 41 19 13-0246	EA	Drill 3" Diameter Core In >4" To 6" Asphalt	90.64
02 41 19 13-0247	EA	Drill 4" Diameter Core In >4" To 6" Asphalt	112.65
02 41 19 13-0248	EA	Drill 6" Diameter Core In >4" To 6" Asphalt	140.12
02 41 19 13-0249	EA	Drill 8" Diameter Core In >4" To 6" Asphalt	175.93
02 41 19 13-0250	EA	Drill 10" Diameter Core In >4" To 6" Asphalt	219.80
02 41 19 13-0251	EA	Drill 12" Diameter Core In >4" To 6" Asphalt	274.68

02 41 19 13-0252 Manhole Core Drilling (02 41 19 13-0080)

02 41 19 13-0253	EA	Drill 4" Diameter Core In 6" Brick Manhole	240.25
02 41 19 13-0254	EA	Drill 5" Diameter Core In 6" Brick Manhole	274.56
02 41 19 13-0255	EA	Drill 6" Diameter Core In 6" Brick Manhole	320.20
02 41 19 13-0256	EA	Drill 8" Diameter Core In 6" Brick Manhole	480.20
02 41 19 13-0257	EA	Drill 2" Diameter Core In 8" Concrete Manhole.....	321.90
02 41 19 13-0258	EA	Drill 3" Diameter Core In 8" Concrete Manhole.....	342.75
02 41 19 13-0259	EA	Drill 4" Diameter Core In 8" Concrete Manhole.....	377.32
02 41 19 13-0260	EA	Drill 5" Diameter Core In 8" Concrete Manhole.....	404.85
02 41 19 13-0261	EA	Drill 6" Diameter Core In 8" Concrete Manhole.....	480.16
02 41 19 13-0262	EA	Drill 8" Diameter Core In 8" Concrete Manhole.....	685.80
02 41 19 13-0263	EA	Drill 2" Diameter Core In Fiberglass Manhole	31.93
02 41 19 13-0264	EA	Drill 3" Diameter Core In Fiberglass Manhole	36.86
02 41 19 13-0265	EA	Drill 4" Diameter Core In Fiberglass Manhole	39.94
02 41 19 13-0266	EA	Drill 5" Diameter Core In Fiberglass Manhole.....	43.57
02 41 19 13-0267	EA	Drill 6" Diameter Core In Fiberglass Manhole.....	47.93
02 41 19 13-0268	EA	Drill 8" Diameter Core In Fiberglass Manhole.....	53.25

02 41 19 13-0269 Drilling In Concrete Per Inch Of Depth (02 41 19 13-0080)

Note: Includes layout.

02 41 19 13-0270	IN	1/4" Diameter Drilling In Concrete Per Inch Of Depth.....	2.34
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	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 13-0271	IN	5/16" Diameter Drilling In Concrete Per Inch Of Depth.....	2.48	
02 41 19 13-0272	IN	3/8" Diameter Drilling In Concrete Per Inch Of Depth.....	2.62	
02 41 19 13-0273	IN	1/2" Diameter Drilling In Concrete Per Inch Of Depth.....	2.81	
02 41 19 13-0274	IN	5/8" Diameter Drilling In Concrete Per Inch Of Depth.....	2.99	
02 41 19 13-0275	IN	3/4" Diameter Drilling In Concrete Per Inch Of Depth.....	3.29	
02 41 19 13-0276	IN	7/8" Diameter Drilling In Concrete Per Inch Of Depth.....	3.55	
02 41 19 13-0277	IN	1" Diameter Drilling In Concrete Per Inch Of Depth.....	3.73	
02 41 19 13-0278	IN	1-1/8" Diameter Drilling In Concrete Per Inch Of Depth.....	4.40	
02 41 19 13-0279	IN	1-1/4" Diameter Drilling In Concrete Per Inch Of Depth.....	4.13	
02 41 19 13-0280	IN	1-3/8" Diameter Drilling In Concrete Per Inch Of Depth.....	4.40	
02 41 19 13-0281	IN	1-1/2" Diameter Drilling In Concrete Per Inch Of Depth.....	4.67	
02 41 19 13-0282	IN	1-3/4" Diameter Drilling In Concrete Per Inch Of Depth.....	5.18	
02 41 19 13-0283	IN	2" Diameter Drilling In Concrete Per Inch Of Depth.....	6.02	
02 41 19 13-0284		Drilling In Brick/Concrete Block Per Inch Of Depth (02 41 19 13-0080)		
		Note: Includes layout.		
02 41 19 13-0285	IN	1/4" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	1.96	
02 41 19 13-0286	IN	5/16" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	2.07	
02 41 19 13-0287	IN	3/8" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	2.18	
02 41 19 13-0288	IN	1/2" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	2.34	
02 41 19 13-0289	IN	5/8" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	2.49	
02 41 19 13-0290	IN	3/4" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	2.73	
02 41 19 13-0291	IN	7/8" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	2.96	
02 41 19 13-0292	IN	1" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	3.11	
02 41 19 13-0293	IN	1-1/8" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	3.28	
02 41 19 13-0294	IN	1-1/4" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	3.44	
02 41 19 13-0295	IN	1-3/8" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	3.67	
02 41 19 13-0296	IN	1-1/2" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	3.90	
02 41 19 13-0297	IN	1-3/4" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	4.34	
02 41 19 13-0298	IN	2" Diameter Drilling In Brick/Concrete Block Per Inch Of Depth.....	5.02	
02 41 19 13-0299		Drilling In Wood Or Plastic Per Inch Of Depth (02 41 19 13-0080)		
		Note: Includes layout.		
02 41 19 13-0300	IN	1/4" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	0.97	
02 41 19 13-0301	IN	5/16" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.03	
02 41 19 13-0302	IN	3/8" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.09	
02 41 19 13-0303	IN	1/2" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.17	
02 41 19 13-0304	IN	5/8" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.24	
02 41 19 13-0305	IN	3/4" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.36	
02 41 19 13-0306	IN	7/8" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.47	
02 41 19 13-0307	IN	1" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.56	
02 41 19 13-0308	IN	1-1/8" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.63	
02 41 19 13-0309	IN	1-1/4" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.71	
02 41 19 13-0310	IN	1-3/8" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.82	
02 41 19 13-0311	IN	1-1/2" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	1.94	
02 41 19 13-0312	IN	1-3/4" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	2.16	
02 41 19 13-0313	IN	2" Diameter Drilling In Wood Or Plastic Per Inch Of Depth.....	2.50	
02 41 19 13-0314		Limestone Core Drilling (02 41 19 13-0080)		
02 41 19 13-0315		10" To 14" Thick Limestone Core Drilling (02 41 19 13-0314)		
02 41 19 13-0316	EA	Drill 1" Diameter Core In 10" To 14" Limestone.....	68.91	
02 41 19 13-0317	EA	Drill 1-1/2" Diameter Core In 10" To 14" Limestone.....	82.75	
02 41 19 13-0318	EA	Drill 2" Diameter Core In 10" To 14" Limestone.....	89.77	
02 41 19 13-0319	EA	Drill 3" Diameter Core In 10" To 14" Limestone.....	103.82	
02 41 19 13-0320	EA	Drill 4" Diameter Core In 10" To 14" Limestone.....	117.88	
02 41 19 13-0321	EA	Drill 6" Diameter Core In 10" To 14" Limestone.....	166.12	
02 41 19 13-0322	EA	Drill 8" Diameter Core In 10" To 14" Limestone.....	276.18	
02 41 19 13-0323		15" To 18" Thick Limestone Core Drilling (02 41 19 13-0314)		
02 41 19 13-0324	EA	Drill 1" Diameter Core In 15" To 18" Limestone.....	75.87	
02 41 19 13-0325	EA	Drill 1-1/2" Diameter Core In 15" To 18" Limestone.....	89.75	
02 41 19 13-0326	EA	Drill 2" Diameter Core In 15" To 18" Limestone.....	96.82	
02 41 19 13-0327	EA	Drill 3" Diameter Core In 15" To 18" Limestone.....	104.12	
02 41 19 13-0328	EA	Drill 4" Diameter Core In 15" To 18" Limestone.....	138.76	
02 41 19 13-0329	EA	Drill 6" Diameter Core In 15" To 18" Limestone.....	180.22	
02 41 19 13-0330	EA	Drill 8" Diameter Core In 15" To 18" Limestone.....	290.58	
02 41 19 13-0331		19" To 24" Thick Limestone Core Drilling (02 41 19 13-0314)		
02 41 19 13-0332	EA	Drill 1" Diameter Core In 19" To 24" Limestone.....	82.81	
02 41 19 13-0333	EA	Drill 1-1/2" Diameter Core In 19" To 24" Limestone.....	96.74	
02 41 19 13-0334	EA	Drill 2" Diameter Core In 19" To 24" Limestone.....	103.84	
02 41 19 13-0335	EA	Drill 3" Diameter Core In 19" To 24" Limestone.....	118.01	
02 41 19 13-0336	EA	Drill 4" Diameter Core In 19" To 24" Limestone.....	166.41	
02 41 19 13-0337	EA	Drill 6" Diameter Core In 19" To 24" Limestone.....	207.96	
02 41 19 13-0338	EA	Drill 8" Diameter Core In 19" To 24" Limestone.....	311.80	

02	02 Existing Conditions
	02 40 Demolition and Structure Moving
	02 41 Demolition



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 41 19 13-0339	Minimum Charge For Core Drilling (02 41 19 13-0080)	
02 41 19 13-0340	EA Core Drill Minimum Charge.....	926.53
	Note: For projects where the total core drilling charge is less than the minimum charge, use task "Minimum Charge For Core Drilling" exclusively. Task "Minimum Charge For Core Drilling" should not be used in conjunction with any other tasks in this section. Does not apply to sections "Drilling In Concrete Per Inch Of Depth" or "Drilling In Brick Or Block Per Inch Of Depth" or "Drilling In Wood Or Plastic Per Inch Of Depth".	
02 41 19 13-0341	Cutouts (02 41 19 13)	
	Note: Includes saw cutting and removal of material. Not to be used for openings greater than 24 SF.	
02 41 19 13-0342	Reinforced Concrete Slab On Grade Cutouts (02 41 19 13-0341)	
02 41 19 13-0343	SF 4" Thick Reinforced Concrete Slab On Grade Cutouts, <24 SF	55.02
02 41 19 13-0344	SF 6" Thick Reinforced Concrete Slab On Grade Cutouts, <24 SF	58.35
02 41 19 13-0345	SF 8" Thick Reinforced Concrete Slab On Grade Cutouts, <24 SF	61.69
02 41 19 13-0346	SF 10" Thick Reinforced Concrete Slab On Grade Cutouts, <24 SF	65.03
02 41 19 13-0347	SF 12" Thick Reinforced Concrete Slab On Grade Cutouts, <24 SF	66.69
02 41 19 13-0348	Reinforced Concrete Elevated Slab Cutouts (02 41 19 13-0341)	
	Note: Includes cutting and removing steel decking.	
02 41 19 13-0349	SF 4" Thick Reinforced Concrete Elevated Slab Cutouts, <24 SF	67.06
02 41 19 13-0350	SF 6" Thick Reinforced Concrete Elevated Slab Cutouts, <24 SF	71.11
02 41 19 13-0351	SF 8" Thick Reinforced Concrete Elevated Slab Cutouts, <24 SF	75.18
02 41 19 13-0352	SF 10" Thick Reinforced Concrete Elevated Slab Cutouts, <24 SF	79.24
02 41 19 13-0353	SF 12" Thick Reinforced Concrete Elevated Slab Cutouts, <24 SF	81.28
02 41 19 13-0354	Reinforced Concrete Wall Cutouts (02 41 19 13-0341)	
02 41 19 13-0355	SF 4" Thick Reinforced Concrete Wall Cutouts, <24 SF	68.77
02 41 19 13-0356	SF 6" Thick Reinforced Concrete Wall Cutouts, <24 SF	72.94
02 41 19 13-0357	SF 8" Thick Reinforced Concrete Wall Cutouts, <24 SF	77.11
02 41 19 13-0358	SF 10" Thick Reinforced Concrete Wall Cutouts, <24 SF	81.28
02 41 19 13-0359	SF 12" Thick Reinforced Concrete Wall Cutouts, <24 SF	83.36
02 41 19 13-0360	Brick Wall Cutouts (02 41 19 13-0341)	
	Note: Excludes toothing.	
02 41 19 13-0361	SF 4" Thick Brick Wall Cutouts, <24 SF	20.84
02 41 19 13-0362	SF 6" Thick Brick Wall Cutouts, <24 SF	34.39
02 41 19 13-0363	SF 8" Thick Brick Wall Cutouts, <24 SF	47.89
02 41 19 13-0364	SF 10" Thick Brick Wall Cutouts, <24 SF	58.35
02 41 19 13-0365	SF 12" Thick Brick Wall Cutouts, <24 SF	69.81
02 41 19 13-0366	SF 16" Thick Brick Wall Cutouts, <24 SF	82.32
02 41 19 13-0367	Concrete Block Wall Cutouts (02 41 19 13-0341)	
	Note: Excludes toothing.	
02 41 19 13-0368	SF 4" Thick Concrete Block Wall Cutouts, <24 SF	34.48
02 41 19 13-0369	SF 6" Thick Concrete Block Wall Cutouts, <24 SF	36.51
02 41 19 13-0370	SF 8" Thick Concrete Block Wall Cutouts, <24 SF	38.55
02 41 19 13-0371	SF 10" Thick Concrete Block Wall Cutouts, <24 SF	40.64
02 41 19 13-0372	SF 12" Thick Concrete Block Wall Cutouts, <24 SF	41.68
02 41 19 13-0373	SF 16" Thick Concrete Block Wall Cutouts, <24 SF	43.77
02 41 19 13-0374	Limestone Cutouts (02 41 19 13-0341)	
02 41 19 13-0375	SF 2" Thick Limestone Cutouts, <24 SF	58.35
02 41 19 13-0376	SF 4" Thick Limestone Cutouts, <24 SF	70.86
02 41 19 13-0377	SF 6" Thick Limestone Cutouts, <24 SF	75.03
02 41 19 13-0378	SF 8" Thick Limestone Cutouts, <24 SF	79.19
02 41 19 13-0379	SF 10" Thick Limestone Cutouts, <24 SF	83.36
02 41 19 13-0380	SF 12" Thick Limestone Cutouts, <24 SF	87.53
02 41 19 13-0381	Toothing Masonry Cutouts (02 41 19 13-0341)	
	Note: For use where existing masonry must be removed in a toothing pattern along horizontal and vertical mortar joints. VLF measurement includes all horizontal cutting.	
02 41 19 13-0382	VLF Brick, Soft Old Mortar, Toothing Masonry Cutouts	20.84
02 41 19 13-0383	VLF Brick, Hard Mortar, Toothing Masonry Cutouts	28.13
02 41 19 13-0384	VLF Concrete Block, Soft Old Mortar, Toothing Masonry Cutouts	12.51
02 41 19 13-0385	VLF Concrete Block, Hard Mortar, Toothing Masonry Cutouts	16.67
02 41 19 13-0386	Minimum Charge For Cutouts (02 41 19 13-0341)	
	Note: For projects where the total cutouts charge is less than the minimum charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.	
02 41 19 13-0387	EA Cutouts Minimum Charge	416.81



Existing Conditions		02
Demolition and Structure Moving		02 40
Demolition		02 41

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 13-0388 Elevated Concrete Removal <small>(02 41 19 13)</small>		
02 41 19 13-0389 CF Elevated Concrete Beam/Slab/Steps Removal, Reinforced	13.96	
02 41 19 16 Selective Interior Demolition <small>(02 41 19)</small>		
Note: Includes break-up of material, loading into truck or dumpster and clean-up.		
02 41 19 16-0001 Floor Removal <small>(02 41 19 16)</small>		
02 41 19 16-0002 Scarify Concrete <small>(02 41 19 16-0001)</small>		
Note: Up to 1/4" removal per pass.		
02 41 19 16-0003 SF Scarify Concrete Floor	0.29	
02 41 19 16-0004 SF Scarify Concrete Tread And Riser	2.42	
02 41 19 16-0005 SF Scarify Concrete Wall	2.19	
02 41 19 16-0006 Fireproofing Removal <small>(02 41 19 16)</small>		
02 41 19 16-0007 SF Removal Of Fireproofing From Concrete Or Steel.....	1.38	
02 41 19 16-0008 Demolish Ceiling <small>(02 41 19 16)</small>		
02 41 19 16-0009 SF Demolish Drywall Ceiling	1.07	
02 41 19 16-0010 SF Demolish Furred Plastered Ceiling	2.49	
02 41 19 16-0011 SF Demolish Suspended Plastered Ceiling And Suspension System.....	1.91	
02 41 19 16-0012 Demolish Concrete Stair <small>(02 41 19 16)</small>		
02 41 19 16-0013 CF Demolish Interior Reinforced Concrete Stairs.....	8.93	
02 41 19 16-0014 CF Demolish Exterior Reinforced Concrete Stairs	7.50	
02 41 19 16-0015 Demolish Interior Partition/Wall <small>(02 41 19 16)</small>		
Note: Price includes knock down, loading, clean-up.		
02 41 19 16-0016 Demolish Masonry And Concrete Interior Partition/Walls <small>(02 41 19 16-0015)</small>		
Note: Includes saw cutting, knock down, loading and clean-up.		
02 41 19 16-0017 Demolish Concrete Block Interior Partition/Walls <small>(02 41 19 16-0016)</small>		
02 41 19 16-0018 SF Demolish 4" Thick Non-Reinforced Concrete Block Interior Partition/Wall.....	5.79	
02 41 19 16-0019 SF Demolish 6" Thick Non-Reinforced Concrete Block Interior Partition/Wall.....	6.17	
02 41 19 16-0020 SF Demolish 8" Thick Non-Reinforced Concrete Block Interior Partition/Wall.....	6.96	
02 41 19 16-0021 SF Demolish 12" Thick Non-Reinforced Concrete Block Interior Partition/Wall.....	8.94	
02 41 19 16-0022 SF Demolish 16" Thick Non-Reinforced Concrete Block Interior Partition/Wall.....	11.17	
02 41 19 16-0023 SF Demolish 4" Thick Reinforced Concrete Block Interior Partition/Wall	6.94	
02 41 19 16-0024 SF Demolish 6" Thick Reinforced Concrete Block Interior Partition/Wall	7.41	
02 41 19 16-0025 SF Demolish 8" Thick Reinforced Concrete Block Interior Partition/Wall	8.37	
02 41 19 16-0026 SF Demolish 12" Thick Reinforced Concrete Block Interior Partition/Wall	10.73	
02 41 19 16-0027 SF Demolish 16" Thick Reinforced Concrete Block Interior Partition/Wall	13.41	
02 41 19 16-0028 Demolish Brick Interior Partition/Walls <small>(02 41 19 16-0016)</small>		
02 41 19 16-0029 SF Demolish 4" Thick Brick Interior Partition/Wall.....	5.79	
02 41 19 16-0030 SF Demolish 8" Thick Brick Interior Partition/Wall.....	6.96	
02 41 19 16-0031 SF Demolish 12" Thick Brick Interior Partition/Wall.....	8.93	
02 41 19 16-0032 SF Demolish 16" Thick Brick Interior Partition/Wall	11.17	
02 41 19 16-0033 Demolish Glass Block Interior Partition/Walls <small>(02 41 19 16-0016)</small>		
02 41 19 16-0034 SF Demolish Glass Block Interior Partition/Walls	4.96	
02 41 19 16-0035 Demolish Concrete Interior Partition/Walls <small>(02 41 19 16-0016)</small>		
See CSI section 02 41 16 13-0010 for concrete foundation demolition.		
02 41 19 16-0036 SF Demolish 6" Thick Non-Reinforced Concrete Interior Partition/Wall	10.52	
02 41 19 16-0037 SF Demolish 8" Thick Non-Reinforced Concrete Interior Partition/Wall	13.15	
02 41 19 16-0038 SF Demolish 12" Thick Non-Reinforced Concrete Interior Partition/Wall	18.41	
02 41 19 16-0039 SF Demolish 6" Thick Reinforced Concrete Interior Partition/Wall	12.62	
02 41 19 16-0040 SF Demolish 8" Thick Reinforced Concrete Interior Partition/Wall	15.87	
02 41 19 16-0041 SF Demolish 12" Thick Reinforced Concrete Interior Partition/Wall	22.09	
02 41 19 16-0042 Demolish Terra-Cotta Block Interior Partition/Walls <small>(02 41 19 16-0016)</small>		
02 41 19 16-0043 SF Demolish Up To 6" Thick Terra-Cotta Block Interior Partition/Wall Finished With Plaster	1.99	
02 41 19 16-0044 Demolish Stud Framed Interior Partition/Walls <small>(02 41 19 16-0015)</small>		
Note: Includes knock down, loading and clean-up. Includes demo of insulation if required.		
02 41 19 16-0045 SF Demolish Wood Or Metal Framed Interior Partition/Wall With Drywall 1 Side	3.52	
For Heights >14' To 20', Add		0.53
For Heights >20', Add		0.70

02	02 Existing Conditions
	02 40 Demolition and Structure Moving
	02 41 Demolition



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 41 19 16-0046 SF Demolish Wood Or Metal Framed Interior Partition/Wall With Drywall 2 Sides.....	4.10	
For Heights >14' To 20', Add	0.62	
For Heights >20', Add	0.82	
02 41 19 16-0047 SF Demolish Wood Or Metal Framed Interior Partition/Wall With Plaster And Lath 1 Side.....	4.49	
For Heights >14' To 20', Add	0.67	
For Heights >20', Add	0.90	
02 41 19 16-0048 SF Demolish Wood Or Metal Framed Interior Partition/Wall With Plaster And Lath 2 Sides.....	6.25	
For Heights >14' To 20', Add	0.94	
For Heights >20', Add	1.25	
02 41 19 16-0049 SF Demolish Plaster And Lath From 1 Side Of An Interior Partition/Wall.....	1.85	
For Heights >14' To 20', Add	0.28	
For Heights >20', Add	0.37	
02 41 19 16-0050 SF Demolish Plaster And Lath From 2 Sides Of An Interior Partition/Wall.....	2.21	
For Heights >14' To 20', Add	0.33	
For Heights >20', Add	0.44	

02 42 Removal and Salvage of Construction Materials (02 40)

02 42 21 Salvage of Construction Materials (02 42)

Note: Includes placement on pallets and storage on site.

02 42 21 35 Roofing Salvage (02 42 21)

02 42 21 35-0001 Clay Tile Roofing Remove And Salvage For Re-use (02 42 21 35)

Note: Includes removing mortar, scraping, cleaning, placement on pallets and storage on site.

02 42 21 35-0002 SQ Removal Of Clay Roof Tile, Salvage For Re-use.....	323.73
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02 42 21 47 Flooring Salvage (02 42 21)

02 42 21 47-0001 Flooring Remove And Salvage For Re-Use (02 42 21 47)

Note: Includes removing mortar, scraping, cleaning, placement on pallets and storage on site.

02 42 21 47-0002 SF Removal Of Brick Flooring And Salvage.....	2.95
02 42 21 47-0003 SF Removal Of Ceramic/Quarry Tile Floor And Salvage	2.95
02 42 21 47-0004 SF Removal Of Terrazzo Flooring And Salvage.....	4.07
02 42 21 47-0005 SF Removal Of Wood Strip Flooring And Salvage.....	2.38
02 42 21 47-0006 SF Removal Of Wood Parquet Flooring And Salvage.....	1.26
02 42 21 47-0007 SF Removal Of Resilient/Linoleum Flooring And Salvage	0.90

02 50 Site Remediation (02)

02 58 Snow Control (02 50)

02 58 13 Snow Fencing (02 58)

02 58 13 00-0001 Snow/Sand Fence On Steel Posts (02 58 13)

02 58 13 00-0002 LF Steel Fence Post, 10' On Center With 4' Wood Snow/Sand Fence	8.23	2.34
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02 60 Contaminated Site Material Removal (02)

02 61 Removal and Disposal of Contaminated Soils (02 60)

02 61 13 Excavation and Handling of Contaminated Material (02 61)

See CSI section 31 23 16 00-0000 for excavation.

02 61 13 00-0001 Excavate Petroleum Contaminated Soil (02 61 13)

02 61 13 00-0002 CY Excavate Petroleum Contaminated Soil.....	14.47
Note: Includes excavation, making a determination if the soil is reusable or contaminated, and stockpiling as per determination.	
02 61 13 00-0003 CY Load Excavated Petroleum Contaminated Soil.....	8.32
02 61 13 00-0004 CY Disposal Fees Of Petroleum Contaminated Soil.....	76.26

02 61 13 00-0005 Accessories For Contaminated Soil Stockpile (02 61 13)

See CSI section 31 25 14 23-0001 for sand bags.

02 61 13 00-0006 SF 30 Mil Liner For Contaminated Soil Storage	1.59
Note: 9.93 SF of liner per 1 ton of petroleum contaminated soil.	
02 61 13 00-0007 SF 10 Mil Liner For Contaminated Soil Storage	0.95
Note: 9.93 SF of liner per 1 ton of petroleum contaminated soil.	

02 61 26 Removal and Disposal of Asbestos Contaminated Soils (02 61)

Note: Includes materials, equipment, mobilization, preparation, signage, removal, transportation for up to 25 miles, disposal of waste at transfer facility or final destination, personnel health monitoring, negative air, documentation and other associated costs necessary for the complete abatement and disposal of the ACM in accordance with EPA, OSHA, and local regulations. Where types of ACM are listed by quantity, the quantity of the entire project, not a particular work area, is to be used in determining which task applies. For certain types of work, there is a task with a unit of measure of CF for a quantity of less than 10 CF, followed by a series of tasks for other quantities. For those tasks the contractor will be paid the first task with a unit of measure of EA, plus an additional task to arrive at the appropriate quantity for the project.

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 61 26 00-0001

Removal and Disposal of Asbestos Contaminated Soils (02 61 26)

Note: Includes materials, equipment, mobilization, preparation, signage, removal, transportation for up to 25 miles, disposal of waste at transfer facility or final destination, personnel health monitoring, negative air, documentation and other associated costs necessary for the complete abatement and disposal of the ACM in accordance with EPA, OSHA, and local regulations. Where types of ACM are listed by quantity, the quantity of the entire project, not a particular work area, is to be used in determining which task applies. For certain types of work, there is a task with a unit of measure of CF for a quantity of less than 10 CF, followed by a series of tasks for other quantities. For those tasks the contractor will be paid the first task with a unit of measure of EA, plus an additional task to arrive at the appropriate quantity for the project.

02 61 26 00-0002	EA Up To 10 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	1,293.48	
	<i>For Work In Restricted Working Space, Add</i>	<i>388.04</i>	
02 61 26 00-0003	CF >10 To 100 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	85.74	
	<i>For Work In Restricted Working Space, Add</i>	<i>25.72</i>	
02 61 26 00-0004	CF >100 To 250 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	57.16	
	<i>For Work In Restricted Working Space, Add</i>	<i>17.15</i>	
02 61 26 00-0005	CF >250 To 500 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	42.94	
	<i>For Work In Restricted Working Space, Add</i>	<i>12.88</i>	
02 61 26 00-0006	CF >500 To 2,500 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	34.30	
	<i>For Work In Restricted Working Space, Add</i>	<i>10.29</i>	
02 61 26 00-0007	CF >2,500 To 10,000 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	29.15	
	<i>For Work In Restricted Working Space, Add</i>	<i>8.75</i>	
02 61 26 00-0008	CF >10,000 CF, Asbestos Contaminated Soil, Asbestos Abatement And Disposal.....	26.23	
	<i>For Work In Restricted Working Space, Add</i>	<i>7.87</i>	

02 65 Underground Storage Tank Removal (02 65)

Note: Petroleum gasoline is classified as a hazardous material; fuel oil is considered a non-hazardous material. See CSI section 01 74 19 00-0040 for hauling, 31 20 00 00-0000 for non-contaminated soil excavation, 31 23 16 00-0000 for excavation, 31 41 00 00-0000 for shoring.

02 65 00 00-0001

Monitoring, Sampling, Testing And Analysis (02 65)

02 65 00 00-0002

Field Samples For Testing Underground Storage Tank (02 65 00 00-0001)

02 65 00 00-0003	EA Collection Of Sludge Sample For Underground Storage Tank.....	26.07	
02 65 00 00-0004	EA Collection Of Pumpable Liquids Sample For Underground Storage Tank.....	26.07	
02 65 00 00-0005	EA Collection Of Contaminated Soil Sample.....	26.07	

02 65 00 00-0006

Lab Tests For Underground Storage Tank Removal (02 65 00 00-0001)

Note: Includes lab test fees, reports, shipping, handling, chain of custody documents and disposal of sample.

02 65 00 00-0007	EA Benzene, Toluene, Ethylbenzene, Xylene 8020, Lab Test.....	202.69	
	Note: The cost is for the in-lab test for Benzene, Toluene, Ethylbenzene, And Xylene using procedure 8020 as detailed in EPA SW-846.		
02 65 00 00-0008	EA Flashpoint, Lab Test.....	78.82	
	Note: The cost is for the in-lab test for the flashpoint using procedure 40CFR 261.21 as detailed in EPA SW-846.		
02 65 00 00-0009	EA TOX 9020, Lab Test.....	189.62	
	Note: The cost is for the in-lab test for total organic halides using procedure 9020 as detailed in EPA SW-846.		
02 65 00 00-0010	EA TPH 8015 Modified, Lab Test.....	202.69	
	Note: The cost is for the in-lab test for total petroleum hydrocarbons by gas chromatography using procedure 8015 Mod. as detailed in EPA SW-846.		
02 65 00 00-0011	EA TRPH 418.1, Lab Test.....	157.65	
	Note: The cost is for the in-lab test for total recoverable petroleum hydrocarbons using procedure 418.1 as detailed in EPA SW-846.		
02 65 00 00-0012	EA VOC, Lab Test.....	427.90	
	Note: The cost is for the in-lab test for volatile organics using procedure 8240 as detailed in EPA SW-846.		
02 65 00 00-0013	EA Semi-Volatile Organic, Lab Test.....	788.24	
	Note: The cost is for the in-lab test for semi-volatile organics using procedure 8270 as detailed in EPA SW-846.		
02 65 00 00-0014	EA Oil And Grease 413.1, Lab Test.....	94.81	
	Note: The cost is for the in-lab test for oil and grease using procedure 413.1 as detailed in EPA SW-846.		
02 65 00 00-0015	EA TCLP (Extraction) - Metals, Lab Test.....	168.91	
	Note: The cost is for the in-lab test for toxicity characteristics leaching procedures using procedure 1311 as detailed in EPA SW-846.		
02 65 00 00-0016	EA TCLP (Extraction) - Semi-Volatile Organic, Lab Test.....	225.21	
	Note: The cost is for the in-lab test for toxicity characteristics leaching procedures using procedure 1311 as detailed in EPA SW-846.		
02 65 00 00-0017	EA Metals 6010 RCRA, Lab Test.....	252.24	
	Note: The cost is for the in-lab test for metals using procedure 6010 RCRA as detailed in EPA SW-846.		
02 65 00 00-0018	EA Metals (Arsenic) 7060, Lab Test.....	33.78	
	Note: The cost is for the in-lab test for the metal arsenic using procedure 7060 as detailed in EPA SW-846.		
02 65 00 00-0019	EA Metals (Selenium) 7740, Lab Test.....	33.78	
	Note: The cost is for the in-lab test for the metal selenium (SE) using procedure 7740 as detailed in EPA SW-846.		
02 65 00 00-0020	EA Metals (Lead) 7421, Lab Test.....	33.78	
	Note: The cost is for the in-lab test for the metal lead using procedure 7421 as detailed in EPA SW-846.		
02 65 00 00-0021	EA Metals (Mercury) 7470, Lab Test.....	63.06	
	Note: The cost is for the in-lab test for the metal mercury using procedure 7470 as detailed in EPA SW-846.		
02 65 00 00-0022	EA PNA/PAH 8100, Lab Test.....	360.34	
	Note: The cost is for the in-lab test for polynuclear aromatic hydrocarbons using procedure 8100 as detailed in EPA SW-846.		
02 65 00 00-0023	EA Fuel Id ASTM D3328-78, Lab Test.....	130.36	
	Note: The cost is for the in-lab test to determine the constituents of fuel using the procedure as detailed in ASTM D3328-78.		
02 65 00 00-0024	EA pH, Lab Test.....	27.03	
02 65 00 00-0025	EA Lab Test - Polychlorinated Biphenyl (PCB) In Wastewater.....	337.82	

02	02 Existing Conditions
	02 60 Contaminated Site Material Removal
	02 65 Underground Storage Tank Removal



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
02 65 00 00-0026	EA	Methyl Tertiary Butyl Ether (MTBE), Lab Test			202.69
02 65 00 00-0027		Tests, Surveys And Maintenance For Underground Storage Tank (02 65 00 00-0001)			
02 65 00 00-0028	EA	Site Survey For AST/UST Location By Certified Tank Installer..... Note: Includes testing Pump output both tank and dispenser, Calibrate pump dispenser if needed, Check all sumps both tank and dispenser, check all fitting connections for leaks and check wiring connection for possible malfunction or safety hazard, check seals on caps for fill tube, check overflow performance for safety shutdown, check all hoses and pump handle, check break-away couplings, complete written report on all data found.			1,185.47
02 65 00 00-0029	EA	Check Cathodic Protection - Impressed Current Systems And Sacrificial Anode Systems			204.62
02 65 00 00-0030	EA	Check And Report On Monitor Probes..... Note: By Certified Technician			47.39
02 65 00 00-0031	EA	Tank Monitoring System: Check System Per Manufacturer's Specification By Certified Technician With Written Report..... Note: Including pass / fail; paper feed operational paper installed etc.; and status of inspection repairs needed etc.			333.89
02 65 00 00-0032	EA	Removal And Replacement Of Anode On Impressed System.....			177.21
02 65 00 00-0033	EA	Removal And Replacement Of Power Converter On Impressed System On Underground Storage Tank			254.21
02 65 00 00-0034	EA	Removal And Replacement Of Monitor Probes On Underground Storage Tank			352.32
02 65 00 00-0035	EA	Ultrasonic Test On Underground Storage Tank.....			208.04
02 65 00 00-0036		Tests And Sampling Labor Hours (02 65 00 00-0001)			
02 65 00 00-0037	HR	Certified Tank Installer For Underground Storage Tank			113.43
02 65 00 00-0038	HR	Certified Geologist/Environmentalist			129.38
02 65 00 00-0039	HR	Hourly Office Work For Reports Required For EPA On Underground Storage Tank..... Note: Includes title searches, well survey data, site drawings, submitting preliminary work, etc. Hours not to be used in association with other tasks performed.			138.41
02 65 00 00-0040		Remove Tank Contents (02 65)			
02 65 00 00-0041		Transfer Liquid (02 65 00 00-0040)			
02 65 00 00-0042	GAL	Transfer Reusable Liquid To Different Tank			0.62
		Note: Per gallon of material transferred.			
02 65 00 00-0043		Remove And Dispose Of Liquid From Tank (02 65 00 00-0040)			
02 65 00 00-0044	GAL	Removal and Disposal Of Hazardous Liquids From Tank			1.87
02 65 00 00-0045	GAL	Removal and Disposal Of Non-Hazardous Liquid From Tank			0.83
02 65 00 00-0046		Remove And Dispose Of Solids Or Sludge (02 65 00 00-0040)			
		Note: Includes scraping and solidifying agent.			
02 65 00 00-0047	GAL	Removal and Disposal Of Hazardous Solids Or Sludge From Tank			7.01
02 65 00 00-0048	GAL	Removal and Disposal Of Non-Hazardous Solids Or Sludge From Tank.....			1.58
02 65 00 00-0049		Purge Vapors, Open And Clean Tank (02 65)			
02 65 00 00-0050		Purge Vapors (02 65 00 00-0049)			
02 65 00 00-0051	LB	Purge Tank Using Dry Ice..... Note: Approximately 1.5 To 3.0 LBS of dry ice per 100 Gals of tank volume.			5.16
02 65 00 00-0052		High Pressure Water Wash And Rinse Of Tank Interior (02 65 00 00-0049)			
		Note: Includes removal and disposal of rinse water.			
02 65 00 00-0053	EA	Up To 275 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior			347.15
02 65 00 00-0054	EA	>275 To 550 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			455.58
02 65 00 00-0055	EA	>550 To 1,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			591.36
02 65 00 00-0056	EA	>1,000 To 2,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			800.77
02 65 00 00-0057	EA	>2,000 To 5,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			1,553.14
02 65 00 00-0058	EA	>5,000 To 6,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			1,867.58
02 65 00 00-0059	EA	>6,000 To 8,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			2,143.18
02 65 00 00-0060	EA	>8,000 To 10,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			2,590.65
02 65 00 00-0061	EA	>10,000 To 15,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			3,341.72
02 65 00 00-0062	EA	>15,000 To 20,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			4,017.69
02 65 00 00-0063	EA	>20,000 To 30,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			5,092.75
02 65 00 00-0064	EA	>30,000 To 40,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			6,272.23
02 65 00 00-0065	EA	>40,000 To 50,000 Gallon Tank, High Pressure Water Wash And Rinse Of Tank Interior.....			7,674.53
02 65 00 00-0066		Scrape Clean Tank Exterior (02 65 00 00-0049)			
02 65 00 00-0067	EA	Up To 275 Gallon Tank, Scrape Clean Tank Exterior			256.38
02 65 00 00-0068	EA	>275 To 550 Gallon Tank, Scrape Clean Tank Exterior			341.40
02 65 00 00-0069	EA	>550 To 1,000 Gallon Tank, Scrape Clean Tank Exterior			447.34
02 65 00 00-0070	EA	>1,000 To 2,000 Gallon Tank, Scrape Clean Tank Exterior			619.48
02 65 00 00-0071	EA	>2,000 To 5,000 Gallon Tank, Scrape Clean Tank Exterior			1,371.87
02 65 00 00-0072	EA	>5,000 To 6,000 Gallon Tank, Scrape Clean Tank Exterior			1,737.06
02 65 00 00-0073	EA	>6,000 To 8,000 Gallon Tank, Scrape Clean Tank Exterior			2,032.69



Existing Conditions		02
Contaminated Site Material Removal		02 60
Underground Storage Tank Removal		02 65

02

MINOR		TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION		UNIT COST	UNIT COST
02 65 00 00-0074	EA >8,000 To 10,000 Gallon Tank, Scrape Clean Tank Exterior	2,555.37	
02 65 00 00-0075	EA >10,000 To 15,000 Gallon Tank, Scrape Clean Tank Exterior	3,321.36	
02 65 00 00-0076	EA >15,000 To 20,000 Gallon Tank, Scrape Clean Tank Exterior	4,168.96	
02 65 00 00-0077	EA >20,000 To 30,000 Gallon Tank, Scrape Clean Tank Exterior	5,428.34	
02 65 00 00-0078	EA >30,000 To 40,000 Gallon Tank, Scrape Clean Tank Exterior	6,514.00	
02 65 00 00-0079	EA >40,000 To 50,000 Gallon Tank, Scrape Clean Tank Exterior	8,142.50	
02 65 00 00-0080	Tank And Piping Removal <small>(02 65)</small>		
	Note: Excludes excavation.		
02 65 00 00-0081	Removal And Disposal Of Piping <small>(02 65 00 00-0080)</small>		
	Note: Includes removal, inspection, loading, transporting pipe to disposal facility or transfer station within 15 miles and disposal fees.		
02 65 00 00-0082	LF Up To 4", Removal And Disposal Of Piping.....	20.29	
02 65 00 00-0083	LF >4" To 8", Removal And Disposal Of Piping.....	27.05	
02 65 00 00-0084	Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement <small>(02 65 00 00-0080)</small>		
	Note: Excludes excavation or backfill.		
02 65 00 00-0085	EA Up To 275 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement	735.06	
02 65 00 00-0086	EA >275 To 550 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	892.57	
02 65 00 00-0087	EA >550 To 1,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	1,050.09	
02 65 00 00-0088	EA >1,000 To 2,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	1,312.61	
02 65 00 00-0089	EA >2,000 To 5,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	1,837.64	
02 65 00 00-0090	EA >5,000 To 6,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	2,310.18	
02 65 00 00-0091	EA >6,000 To 8,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	2,625.21	
02 65 00 00-0092	EA >8,000 To 10,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	3,150.25	
02 65 00 00-0093	EA >10,000 To 15,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	4,200.33	
02 65 00 00-0094	EA >15,000 To 20,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	5,035.28	
02 65 00 00-0095	EA >20,000 To 30,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	5,900.31	
02 65 00 00-0096	EA >30,000 To 40,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	6,902.85	
02 65 00 00-0097	EA >40,000 To 50,000 Gallon Tank, Cut Straps, Extract Tank From The Diggings And Block To Prevent Movement.....	8,628.56	
02 65 00 00-0098	Cut Tank Into Sections That Can Easily Be Transported And Disposed Of When Necessary <small>(02 65 00 00-0080)</small>		
	Note: Includes 1 lengthwise at every 4' on-center height wise.		
02 65 00 00-0099	EA >1,000 To 2,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	866.45	
02 65 00 00-0100	EA >2,000 To 5,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	1,615.81	
02 65 00 00-0101	EA >5,000 To 6,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	1,943.66	
02 65 00 00-0102	EA >6,000 To 8,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	2,166.12	
02 65 00 00-0103	EA >8,000 To 10,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	2,599.35	
02 65 00 00-0104	EA >10,000 To 15,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	3,231.62	
02 65 00 00-0105	EA >15,000 To 20,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	3,887.31	
02 65 00 00-0106	EA >20,000 To 30,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	4,859.14	
02 65 00 00-0107	EA >30,000 To 40,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	6,073.94	
02 65 00 00-0108	EA >40,000 To 50,000 Gallon Tank, Cut Tank Into Sections That Can Easily Be Transported And Disposed Of	7,592.40	
02 65 00 00-0109	Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station <small>(02 65 00 00-0080)</small>		
	Note: Includes disposal fee.		
02 65 00 00-0110	EA Up To 275 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station	319.28	
	For Each Additional Mile >15 Miles, Add	4.91	
02 65 00 00-0111	EA >275 To 550 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	432.39	
	For Each Additional Mile >15 Miles, Add	6.20	
02 65 00 00-0112	EA >550 To 1,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	679.29	
	For Each Additional Mile >15 Miles, Add	9.30	
02 65 00 00-0113	EA >1,000 To 2,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	1,048.41	
	For Each Additional Mile >15 Miles, Add	10.86	
02 65 00 00-0114	EA >2,000 To 5,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	1,850.14	
	For Each Additional Mile >15 Miles, Add	19.13	
02 65 00 00-0115	EA >5,000 To 6,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	1,912.17	
	For Each Additional Mile >15 Miles, Add	20.68	
02 65 00 00-0116	EA >6,000 To 8,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	2,015.56	
	For Each Additional Mile >15 Miles, Add	23.26	
02 65 00 00-0117	EA >8,000 To 10,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	2,919.45	
	For Each Additional Mile >15 Miles, Add	31.02	
02 65 00 00-0118	EA >10,000 To 15,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	4,010.64	
	For Each Additional Mile >15 Miles, Add	46.52	
02 65 00 00-0119	EA >15,000 To 20,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	4,688.30	
	For Each Additional Mile >15 Miles, Add	51.69	
02 65 00 00-0120	EA >20,000 To 30,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	5,797.93	
	For Each Additional Mile >15 Miles, Add	62.03	
02 65 00 00-0121	EA >30,000 To 40,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	8,095.82	
	For Each Additional Mile >15 Miles, Add	74.44	
02 65 00 00-0122	EA >40,000 To 50,000 Gallon Tank, Load, Transport, And Dispose Of Tank At Disposal Facility Or Transfer Station.....	9,770.83	
	For Each Additional Mile >15 Miles, Add	85.61	

02	02 Existing Conditions
	02 60 Contaminated Site Material Removal
	02 65 Underground Storage Tank Removal



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 65 00 00-0123	Other Storage Tank Removals <small>(02 65 00 00-0080)</small>	
02 65 00 00-0124	GAL Removal Of Cement Lining.....	0.64
02 65 00 00-0125	GAL Sandblast Tank In Prep For Lining Or Welding; Remove Sand, Vacuum Walls And Seams.....	0.23
02 65 00 00-0126	GAL Install Epoxy For Interior Corrosion Protection.....	1.50

02 65 00 00-0127	Tank Closure Report <small>(02 65 00 00-0080)</small>	
	Note: Excludes soils tests. See CSI section 02 65 00 00-0006 for soil tests.	
02 65 00 00-0128	EA Prepare Tank Closure Report.....	3,468.86

02 65 00 00-0129	Temporary Tanks <small>(02 65)</small>	
02 65 00 00-0130	Temporary Holding Tanks <small>(02 65 00 00-0129)</small>	
02 65 00 00-0131	Above Ground Temporary Holding Tanks, Monthly Rental <small>(02 65 00 00-0130)</small>	
02 65 00 00-0132	MO 550 Gallon, Stainless Steel, DOT Approved, Above Ground Temporary Holding Tanks, Monthly Rental.....	937.13
02 65 00 00-0133	MO 630 Gallon, Polyethylene, DOT Approved, Above Ground Temporary Holding Tanks, Monthly Rental.....	937.13
02 65 00 00-0134	MO 630 Gallon, Polyethylene, Stackable, Above Ground Temporary Holding Tanks, Monthly Rental.....	1,874.25
02 65 00 00-0135	MO 4,000 Gallon, Polyethylene, Stackable, Above Ground Temporary Holding Tanks, Monthly Rental.....	1,405.69
02 65 00 00-0136	MO 4,000 Gallon, Polyethylene, Trailer Mounted, Above Ground Temporary Holding Tanks, Monthly Rental.....	3,279.95
02 65 00 00-0137	MO 6,000 Gallon, Polyethylene, Total Drain, Above Ground Temporary Holding Tanks, Monthly Rental.....	2,342.82
02 65 00 00-0138	MO 21,000 Gallon (500 BBL), Steel, Open, Stationary, Above Ground Temporary Holding Tanks, Monthly Rental.....	6,068.30
02 65 00 00-0139	MO 21,000 Gallon (500 BBL), Steel, Closed, Stationary, Above Ground Temporary Holding Tanks, Monthly Rental.....	7,272.33
02 65 00 00-0140	MO 21,000 Gallon (500 BBL), Steel, Vapor Proof, Above Ground Temporary Holding Tanks, Monthly Rental.....	12,281.09

02 65 00 00-0141	Secondary Containment Berm <small>(02 65 00 00-0129)</small>	
02 65 00 00-0142	MO Secondary Containment Berm Monthly Rental.....	2,030.44

02 80 Facility Remediation (02)

02 81 Transportation and Disposal of Hazardous Materials (02 80)

02 81 00 00-0001	Equipment Oil Drain And Disposal <small>(02 81)</small>	
02 81 00 00-0002	TRIP Drain Oil Filled Equipment, Place In Approved Container And Transport To Disposal Site.....	658.04
	Note: Excludes Disposal Cost.	
02 81 00 00-0003	DRM Disposal Of Non-Polychlorinated Biphenyl (PCB) Oil In Normal Landfill, Per Partial Or Full 55-Gallon Drum.....	103.41
	Note: Excludes draining, placing in approved container, and transporting to disposal site.	
02 81 00 00-0004	DRM Disposal Of Non-Toxic Polychlorinated Biphenyl (PCB) Oil Into A Lined Landfill, Per Partial Or Full 55-Gallon Drum.....	470.02
	Note: Excludes draining, placing in approved container, and transporting to disposal site.	
02 81 00 00-0005	DRM Disposal Of Toxic Polychlorinated Biphenyl (PCB) Oil By Incineration, Per Partial Or Full 55-Gallon Drum.....	846.04
	Note: Excludes draining, placing in approved container, and transporting to disposal site.	
02 81 00 00-0006	CF Hazardous Polychlorinated Biphenyl (PCB) Oil Filled Equipment Disposal At Approved Site.....	112.85
	Note: Includes handling of equipment and disposal at approved site. Excludes draining of PCB contaminated oil prior to disposal.	

02 82 Asbestos Remediation (02 80)

See CSI section 01 56 16 00-0023 for temporary stud walls, 01 74 19 00-0040 for hauling in excess of 25 miles to transfer or disposal site, 02 89 00 00-0008 for plastic sheeting for containment construction, 02 89 00 00-0020 for decontamination chambers.

02 82 13 Asbestos Abatement (02 82)

02 82 13 00-0001	Air Monitoring And Bulk Sampling, Asbestos Testing <small>(02 82 13)</small>	
	Note: Includes packaging of sample for shipping, shipping to testing lab, chain of custody documentation, analysis of sample, lab report, and sample disposal. Polarizing Light Microscope (PLM), Phase Contrast Microscope (PCM), and Transmission Electron Microscope (TEM). Excludes sampling time.	
02 82 13 00-0002	HR Certified Asbestos Air Sampling Technician For Bulk Sampling Or Air Monitoring.....	104.60
02 82 13 00-0003	EA 48 Hours Or Longer Turnaround, (Bulk Point Counting) PLM Test, Asbestos Testing.....	61.22
02 82 13 00-0004	EA Next Day Turnaround, (Bulk Point Counting) PLM Test, Asbestos Testing.....	71.77
02 82 13 00-0005	EA Same Day Turnaround, (Bulk Point Counting) PLM Test, Asbestos Testing.....	113.99
02 82 13 00-0006	EA 48 Hours Or Longer Turnaround, (Bulk) TEM Test, Asbestos Testing.....	196.32
02 82 13 00-0007	EA Next Day Turnaround, (Bulk) TEM Test, Asbestos Testing.....	238.54
02 82 13 00-0008	EA 48 Hours Or Longer Turnaround, (Air) PCM Test, Asbestos Testing.....	48.55
02 82 13 00-0009	EA Next Day Turnaround, (Air) PCM Test, Asbestos Testing.....	59.11
02 82 13 00-0010	EA Same Day Turnaround, (Air) PCM Test, Asbestos Testing.....	80.22
02 82 13 00-0011	EA 48 Hours Or Longer Turnaround, (Air Point Counting) PLM Test.....	61.22
02 82 13 00-0012	EA Next Day Turnaround, (Air Point Counting) PLM Test.....	71.77
02 82 13 00-0013	EA Same Day Turnaround, (Air Point Counting) PLM Test.....	113.99
02 82 13 00-0014	EA 48 Hours Or Longer Turnaround, (Air) TEM Test, Asbestos Testing.....	196.32
02 82 13 00-0015	EA Next Day Turnaround, (Air) TEM Test, Asbestos Testing.....	225.88
02 82 13 00-0016	EA Same Day Turnaround, (Air) TEM Test, Asbestos Testing.....	314.54

02 82 16 Engineering Control of Asbestos Containing Materials (02 82)

02 82 16 00-0001	Asbestos Encapsulation (Lock-Down) <small>(02 82 16)</small>	
02 82 16 00-0002	SF Asbestos Encapsulant Spray Adhesive (Lock-Down), Per Coat.....	1.74

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 82 16 00-0003 SF Asbestos Binding Compound Encapsulant/Sealant, Per Coat Required (Fiberlock® ABC® Asbestos Binding Compound).....	2.37	
02 82 16 00-0004 SF Asbestos Fiberspray Encapsulation (Fiberlock® ABC Fiberspray®)	2.54	
02 82 16 00-0005 SF Asbestos Acrylic Encasement/Encapsulation (Fiberlock® Lag-Kote®)	2.79	
02 82 16 00-0006 SF Water Activated Repair Cloth Encapsulant (Fiberlock® Lag-Kwik®).....	8.50	
02 82 16 00-0007 SF Water Activated Repair Cloth Encapsulant (Fiberlock® Lag-Kloth®)	9.61	
02 82 33 Removal and Disposal of Asbestos Containing Materials (02 82)		
Note: Includes materials, equipment, mobilization, preparation, critical barriers (e.g. electrical outlets, registers, windows, etc.), signage, removal, lockdown encapsulant applied to surfaces, bagging, clean-up, vacuuming, transportation for up to 25 miles, disposal of waste at transfer facility or final destination, personnel health monitoring, negative air, documentation and other associated costs necessary for the complete abatement and disposal of the ACM in accordance with EPA, OSHA, and local regulations. Where types of ACM are listed by quantity, the quantity of the entire project, not a particular work area, is to be used in determining which task applies. For certain types of work, there is a task with a unit of measure of SET for a quantity of less than 10 LF or SF (10 LF to 20 LF for ACM pipe insulation), followed by a series of tasks for other quantities. For those tasks the contractor will be paid the first task with a unit of measure of EA, plus an additional task to arrive at the appropriate quantity for the project.		
02 82 33 00-0001 Pipe And Pipe Fittings Insulation, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0002 Pipe Insulation, Asbestos Abatement And Disposal (02 82 33 00-0001)		
Note: Diameter is outer size of insulation. Treat fittings as additional linear feet of insulation.		
02 82 33 00-0003 Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal (02 82 33 00-0002)		
See CSI section 02 82 33 00-0031 for projects with less than 10 LF.		
02 82 33 00-0004 SET Up To 20 LF, Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	1,311.11	
For Work In Restricted Working Space, Add	388.04	
02 82 33 00-0005 LF >20 To 250 LF, Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal	44.98	
For Work In Restricted Working Space, Add	13.23	
02 82 33 00-0006 LF >250 To 500 LF, Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal	33.96	
For Work In Restricted Working Space, Add	9.92	
02 82 33 00-0007 LF >500 To 2,500 LF, Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal	25.69	
For Work In Restricted Working Space, Add	7.44	
02 82 33 00-0008 LF >2,500 To 10,000 LF, Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal	19.48	
For Work In Restricted Working Space, Add	5.58	
02 82 33 00-0009 LF >10,000 LF, Up To 6" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	17.06	
For Work In Restricted Working Space, Add	4.85	
02 82 33 00-0010 >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal (02 82 33 00-0002)		
See CSI section 02 82 33 00-0031 for projects with less than 10 LF.		
02 82 33 00-0011 SET Up To 20 LF, >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	1,328.74	
For Work In Restricted Working Space, Add	388.04	
02 82 33 00-0012 LF >20 To 250 LF, >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	52.48	
For Work In Restricted Working Space, Add	15.22	
02 82 33 00-0013 LF >250 To 500 LF, >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	39.79	
For Work In Restricted Working Space, Add	11.41	
02 82 33 00-0014 LF >500 To 2,500 LF, >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	30.28	
For Work In Restricted Working Space, Add	8.56	
02 82 33 00-0015 LF >2,500 To 10,000 LF, >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	23.15	
For Work In Restricted Working Space, Add	6.42	
02 82 33 00-0016 LF >10,000 LF, >6" To 12" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	20.36	
For Work In Restricted Working Space, Add	5.58	
02 82 33 00-0017 >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal (02 82 33 00-0002)		
See CSI section 02 82 33 00-0031 for projects with less than 10 LF.		
02 82 33 00-0018 SET Up To 20 LF, >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal	1,346.37	
For Work In Restricted Working Space, Add	388.04	
02 82 33 00-0019 LF >20 To 250 LF, >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	69.97	
For Work In Restricted Working Space, Add	20.29	
02 82 33 00-0020 LF >250 To 500 LF, >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	53.05	
For Work In Restricted Working Space, Add	15.21	
02 82 33 00-0021 LF >500 To 2,500 LF, >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	40.38	
For Work In Restricted Working Space, Add	11.41	
02 82 33 00-0022 LF >2,500 To 10,000 LF, >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	30.86	
For Work In Restricted Working Space, Add	8.55	
02 82 33 00-0023 LF >10,000 LF, >12" To 18" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	27.16	
For Work In Restricted Working Space, Add	7.44	
02 82 33 00-0024 >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal (02 82 33 00-0002)		
See CSI section 02 82 33 00-0031 for projects with less than 10 LF.		
02 82 33 00-0025 SET Up To 20 LF, >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal	1,364.00	
For Work In Restricted Working Space, Add	388.04	
02 82 33 00-0026 LF >20 To 250 LF, >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	96.21	
For Work In Restricted Working Space, Add	27.89	
02 82 33 00-0027 LF >250 To 500 LF, >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	72.94	
For Work In Restricted Working Space, Add	20.91	
02 82 33 00-0028 LF >500 To 2,500 LF, >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal.....	55.52	
For Work In Restricted Working Space, Add	15.69	

02 Existing Conditions**02 80 Facility Remediation****02 82 Asbestos Remediation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 82 33 00-0029	LF	>2,500 To 10,000 LF, >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal	42.43	
		<i>For Work In Restricted Working Space, Add</i>	11.76	
02 82 33 00-0030	LF	>10,000 LF, >18" To 24" Diameter Pipe Insulation, Asbestos Abatement And Disposal	37.34	
		<i>For Work In Restricted Working Space, Add</i>	10.23	
02 82 33 00-0031		Glove Bag Method, Pipe Insulation, Asbestos Abatement And Disposal (02 82 33 00-0031)		
		Note: Solid isolation barriers and plastic sheeting for containment construction (except on floor) are not required for glove bag projects unless required by local codes.		
02 82 33 00-0032	SET	Glove Bag For First 3 LF Pipe Insulation, Asbestos Abatement And Disposal	842.07	
		<i>For Work In Restricted Working Space, Add</i>	251.03	
02 82 33 00-0033	LF	>3 To 20 LF Additional Glove Bag Work for Pipe Insulation	141.22	
		<i>For Work In Restricted Working Space, Add</i>	41.84	
02 82 33 00-0034	LF	>20 To 250 LF Additional Glove Bag Work for Pipe Insulation	55.90	
		<i>For Work In Restricted Working Space, Add</i>	16.24	
02 82 33 00-0035	LF	>250 To 500 LF Additional Glove Bag Work for Pipe Insulation	42.36	
		<i>For Work In Restricted Working Space, Add</i>	12.18	
02 82 33 00-0036	LF	>500 LF Additional Glove Bag Work for Pipe Insulation	32.21	
		<i>For Work In Restricted Working Space, Add</i>	9.14	
02 82 33 00-0037		Thermal Insulation, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0038		Other Thermal Insulation, Up To 3" Thickness, Asbestos Abatement And Disposal (02 82 33 00-0037)		
		Note: e.g., duct, boiler, tank, etc.		
02 82 33 00-0039	SET	Up To 25 SF, Up To 3" Thickness Thermal Insulation, Asbestos Abatement And Disposal	1,304.50	
02 82 33 00-0040	SF	>25 To 500 SF, Up To 3" Thickness Thermal Insulation, Asbestos Abatement And Disposal	44.54	
02 82 33 00-0041	SF	>500 To 2,500 SF, Up To 3" Thickness Thermal Insulation, Asbestos Abatement And Disposal	35.17	
02 82 33 00-0042	SF	>2,500 To 10,000 SF, Up To 3" Thickness Thermal Insulation, Asbestos Abatement And Disposal	26.48	
02 82 33 00-0043	SF	>10,000 SF, Up To 3" Thickness Thermal Insulation, Asbestos Abatement And Disposal	19.98	
02 82 33 00-0044		Surfacing Material, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0045		Fireproofing For Small Areas, Asbestos Abatement And Disposal (02 82 33 00-0044)		
		Note: For asbestos abatement for up to 1 SF sections to expose area for attachments. See CSI section 02 82 33 00-0047 for areas > 1 SF see CSI section.		
02 82 33 00-0046	EA	Up To 1 SF, Fireproofing For Small Areas, Asbestos Abatement And Disposal	216.02	
		Note: For asbestos abatement for up to 1 SF sections to expose steel area for welding attachments.		
02 82 33 00-0047		Fireproofing, Asbestos Abatement And Disposal (02 82 33 00-0044)		
		Note: Exposed surface area, includes associated overspray.		
02 82 33 00-0048	SET	Up To 25 SF, Fireproofing, Asbestos Abatement And Disposal	1,304.50	
02 82 33 00-0049	SF	>25 To 500 SF, Fireproofing, Asbestos Abatement And Disposal	53.34	
02 82 33 00-0050	SF	>500 To 2,500 SF, Fireproofing, Asbestos Abatement And Disposal	40.11	
02 82 33 00-0051	SF	>2,500 To 10,000 SF, Fireproofing, Asbestos Abatement And Disposal	30.19	
02 82 33 00-0052	SF	>10,000 SF, Fireproofing, Asbestos Abatement And Disposal	22.75	
02 82 33 00-0053		Acoustical Plaster, Asbestos Abatement And Disposal (02 82 33 00-0044)		
		Note: Remove surface coat from brown coat or remove entire assembly, including lathe and finish materials.		
02 82 33 00-0054	SET	Up To 25 SF, Acoustical Plaster, Asbestos Abatement And Disposal	1,300.83	
02 82 33 00-0055	SF	>25 To 500 SF, Acoustical Plaster, Asbestos Abatement And Disposal	22.39	
02 82 33 00-0056	SF	>500 To 2,500 SF, Acoustical Plaster, Asbestos Abatement And Disposal	17.00	
02 82 33 00-0057	SF	>2,500 To 10,000 SF, Acoustical Plaster, Asbestos Abatement And Disposal	12.68	
02 82 33 00-0058	SF	>10,000 SF, Acoustical Plaster, Asbestos Abatement And Disposal	9.45	
02 82 33 00-0059		Gypsum Wall Board, Asbestos Abatement And Disposal (02 82 33 00-0044)		
02 82 33 00-0060	SET	Up To 50 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	1,308.17	
		<i>For Additional Layer, Add</i>	355.71	
02 82 33 00-0061	SF	>50 To 500 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	17.26	
		<i>For Additional Layer, Add</i>	4.67	
02 82 33 00-0062	SF	>500 To 2,500 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	12.68	
		<i>For Additional Layer, Add</i>	3.41	
02 82 33 00-0063	SF	>2,500 To 10,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	9.99	
		<i>For Additional Layer, Add</i>	2.67	
02 82 33 00-0064	SF	>10,000 To 50,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	7.84	
		<i>For Additional Layer, Add</i>	2.08	
02 82 33 00-0065	SF	>50,000 To 100,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	6.22	
		<i>For Additional Layer, Add</i>	1.63	
02 82 33 00-0066	SF	>100,000 SF, Single Layer Gypsum Wall Board, Asbestos Abatement And Disposal	5.03	
		<i>For Additional Layer, Add</i>	1.30	
02 82 33 00-0067		Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal (02 82 33 00-0044)		
02 82 33 00-0068	SET	Up To 25 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal	1,300.83	



Existing Conditions	02	02
Facility Remediation	02 80	
Asbestos Remediation	02 82	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 82 33 00-0069 SF >25 To 500 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal.....	32.52	
02 82 33 00-0070 SF >500 To 2,500 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal	23.90	
02 82 33 00-0071 SF >2,500 To 10,000 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal.....	18.72	
02 82 33 00-0072 SF >10,000 To 50,000 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal	14.63	
02 82 33 00-0073 SF >50,000 SF, Gypsum Wall Board (Or Backer Board) With Ceramic Tile And Mastic, Asbestos Abatement And Disposal.....	10.53	
02 82 33 00-0074 Stucco, Asbestos Abatement And Disposal (02 82 33 00-0044)		
02 82 33 00-0075 SET Up To 50 SF, Stucco, Asbestos Abatement And Disposal	1,308.17	
02 82 33 00-0076 SF >50 To 500 SF, Stucco, Asbestos Abatement And Disposal	28.41	
02 82 33 00-0077 SF >500 To 2,500 SF, Stucco, Asbestos Abatement And Disposal	21.36	
02 82 33 00-0078 SF >2,500 To 10,000 SF, Stucco, Asbestos Abatement And Disposal.....	16.12	
02 82 33 00-0079 SF >10,000 SF, Stucco, Asbestos Abatement And Disposal	12.15	
02 82 33 00-0080 Spray On Acoustical Ceiling, Asbestos Abatement And Disposal (02 82 33 00-0044)		
02 82 33 00-0081 SET Up To 50 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal	1,308.17	
02 82 33 00-0082 SF >50 To 500 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	14.66	
02 82 33 00-0083 SF >500 To 2,500 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	11.37	
02 82 33 00-0084 SF >2,500 To 10,000 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	8.38	
02 82 33 00-0085 SF >10,000 SF, Spray On Acoustical Ceiling, Asbestos Abatement And Disposal.....	6.34	
02 82 33 00-0086 Plywood, Asbestos Abatement And Disposal (02 82 33 00-0044)		
02 82 33 00-0087 SET Up To 40 SF, Plywood, Asbestos Abatement And Disposal.....	1,305.24	
02 82 33 00-0088 SF >50 To 500 SF, Plywood, Asbestos Abatement And Disposal	18.61	
02 82 33 00-0089 SF >500 To 2,500 SF, Plywood, Asbestos Abatement And Disposal	9.11	
02 82 33 00-0090 SF >2,500 To 10,000 SF, Plywood, Asbestos Abatement And Disposal	6.24	
02 82 33 00-0091 SF >10,000 SF, Plywood, Asbestos Abatement And Disposal.....	5.36	
02 82 33 00-0092 Flooring Material, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0093 Floor Tile, Linoleum, Carpet Or Base, Asbestos Abatement And Disposal (02 82 33 00-0092)		
02 82 33 00-0094 Floor Tile, Asbestos Abatement And Disposal (02 82 33 00-0093)		
Note: Single layer or first of multiple layers. Excludes mastic.		
02 82 33 00-0095 SET Up To 100 SF, Single Layer Or First Of Multiple Layers, Floor Tile, Asbestos Abatement And Disposal.....	1,296.42	
For Each Additional Layer, Add	194.46	
02 82 33 00-0096 SF >100 To 500 SF, Single Layer Or First Of Multiple Layers, Floor Tile, Asbestos Abatement And Disposal.....	9.11	
For Each Additional Layer, Add	1.37	
02 82 33 00-0097 SF >500 To 2,500 SF, Single Layer Or First Of Multiple Layers, Floor Tile, Asbestos Abatement And Disposal.....	7.45	
For Each Additional Layer, Add	1.12	
02 82 33 00-0098 SF >2,500 To 10,000 SF, Single Layer Or First Of Multiple Layers, Floor Tile, Asbestos Abatement And Disposal.....	5.94	
For Each Additional Layer, Add	0.89	
02 82 33 00-0099 SF >10,000 SF, Single Layer Or First Of Multiple Layers, Floor Tile, Asbestos Abatement And Disposal.....	4.12	
For Each Additional Layer, Add	0.62	
02 82 33 00-0100 Linoleum Or Vinyl Sheet, Asbestos Abatement And Disposal (02 82 33 00-0093)		
Note: Single layer or first of multiple layers. Excludes mastic.		
02 82 33 00-0101 SET Up To 100 SF, Single Layer Or Multiple Layers, Linoleum Or Vinyl Sheet, Asbestos Abatement And Disposal.....	1,296.42	
For Each Additional Layer, Add	194.46	
02 82 33 00-0102 SF >100 To 500 SF, Single Layer Or Multiple Layers, Linoleum Or Vinyl Sheet, Asbestos Abatement And Disposal.....	9.11	
For Each Additional Layer, Add	1.37	
02 82 33 00-0103 SF >500 To 2,500 SF, Single Layer Or Multiple Layers, Linoleum Or Vinyl Sheet, Asbestos Abatement And Disposal.....	7.49	
For Each Additional Layer, Add	1.12	
02 82 33 00-0104 SF >2,500 To 10,000 SF, Single Layer Or Multiple Layers, Linoleum Or Vinyl Sheet, Asbestos Abatement And Disposal.....	6.79	
For Each Additional Layer, Add	1.02	
02 82 33 00-0105 SF >10,000 SF, Single Layer Or Multiple Layers, Linoleum Or Vinyl Sheet, Asbestos Abatement And Disposal.....	5.49	
For Each Additional Layer, Add	0.82	
02 82 33 00-0106 Carpet, Asbestos Abatement And Disposal (02 82 33 00-0093)		
02 82 33 00-0107 SET Up To 100 SF, Carpet With Non-Friable Asbestos Mastic, Asbestos Abatement And Disposal.....	1,296.42	
02 82 33 00-0108 SF >100 To 500 SF, Carpet With Non-Friable Asbestos Mastic, Asbestos Abatement And Disposal	7.15	
02 82 33 00-0109 SF >500 To 2,500 SF, Carpet With Non-Friable Asbestos Mastic, Asbestos Abatement And Disposal	5.79	
02 82 33 00-0110 SF >2,500 To 10,000 SF, Carpet With Non-Friable Asbestos Mastic, Asbestos Abatement And Disposal	4.24	
02 82 33 00-0111 SF >10,000 SF, Carpet With Non-Friable Asbestos Mastic, Asbestos Abatement And Disposal.....	3.22	
02 82 33 00-0112 Wall Or Cove Base, Asbestos Abatement And Disposal (02 82 33 00-0093)		
Note: Up to 12".		
02 82 33 00-0113 SET Up To 25 LF, Wall Base And Mastic, Asbestos Abatement And Disposal	434.83	
02 82 33 00-0114 LF >25 To 100 LF, Wall Base And Mastic, Asbestos Abatement And Disposal.....	5.90	
02 82 33 00-0115 LF >100 To 500 LF, Wall Base And Mastic, Asbestos Abatement And Disposal.....	3.60	

02 Existing Conditions**02 80 Facility Remediation****02 82 Asbestos Remediation**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
02 82 33 00-0116	LF	>500 To 2,500 LF, Wall Base And Mastic, Asbestos Abatement And Disposal.....	2.31	
02 82 33 00-0117	LF	>2,500 LF, Wall Base And Mastic, Asbestos Abatement And Disposal.....	1.66	
02 82 33 00-0118		Mastic, Asbestos Abatement And Disposal (02 82 33 00-0092) Note: Applies to single layer or bottom layer only of multiple layers. Non-hydrocarbon with pine, citrus or no odor.		
02 82 33 00-0119	SET	Up To 100 SF, Mastic, Asbestos Abatement And Disposal 1,300.83 Note: Applies to bottom layer only if multiple layers.	1,300.83	
02 82 33 00-0120	SF	>100 To 500 SF, Mastic, Asbestos Abatement And Disposal..... 3.29 Note: Applies to bottom layer only if multiple layers.	3.29	
02 82 33 00-0121	SF	>500 To 2,500 SF, Mastic, Asbestos Abatement And Disposal..... 2.43 Note: Applies to bottom layer only if multiple layers.	2.43	
02 82 33 00-0122	SF	>2,500 To 10,000 SF, Mastic, Asbestos Abatement And Disposal..... 1.89 Note: Applies to bottom layer only if multiple layers.	1.89	
02 82 33 00-0123	SF	>10,000 SF, Mastic, Asbestos Abatement And Disposal..... 1.53 Note: Applies to bottom layer only if multiple layers.	1.53	
02 82 33 00-0124		Hardwood Flooring System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal (02 82 33 00-0092) Note: Includes finish wood, asbestos barrier paper, cleanup of sub-wood floor, fasteners, wood fillers and protection of clean crawl space from contamination.		
02 82 33 00-0125	SET	Up To 100 SF, Hardwood Flooring System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 1,322.87	1,322.87	
02 82 33 00-0126	SF	>100 To 500 SF, Hardwood Flooring System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 10.47	10.47	
02 82 33 00-0127	SF	>500 To 2,500 SF, Hardwood Flooring System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 7.73	7.73	
02 82 33 00-0128	SF	>2,500 To 10,000 SF, Hardwood Flooring System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 6.11	6.11	
02 82 33 00-0129	SF	>10,000 SF, Hardwood Flooring System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 4.82	4.82	
02 82 33 00-0130		Cementitious Underlayment For Flooring, Asbestos Abatement And Disposal (02 82 33 00-0092)		
02 82 33 00-0131	SET	Up To 100 SF, Cementitious Underlayment For Flooring, Asbestos Abatement And Disposal 1,308.17	1,308.17	
02 82 33 00-0132	SF	>100 To 500 SF, Cementitious Underlayment For Flooring, Asbestos Abatement And Disposal..... 11.68	11.68	
02 82 33 00-0133	SF	>500 To 2,500 SF, Cementitious Underlayment For Flooring, Asbestos Abatement And Disposal..... 7.70 Note: Includes detachment of mounted objects before removal.	7.70	
02 82 33 00-0134	SF	>2,500 To 10,000 SF, Cementitious Underlayment For Flooring, Asbestos Abatement And Disposal..... 6.08	6.08	
02 82 33 00-0135	SF	>10,000 SF, Cementitious Underlayment For Flooring, Asbestos Abatement And Disposal..... 5.00	5.00	
02 82 33 00-0136		Roofing, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0137		Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal (02 82 33 00-0136) Note: Includes roofing, flashing, sheet metal, insulation, pitch pockets, board etc.		
02 82 33 00-0138		Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal (02 82 33 00-0137)		
02 82 33 00-0139	SET	Up To 125 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 1,330.22	1,330.22	
02 82 33 00-0140	SF	>125 To 1,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 8.56	8.56	
02 82 33 00-0141	SF	>1,000 To 5,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 6.91	6.91	
02 82 33 00-0142	SF	>5,000 To 10,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 5.58	5.58	
02 82 33 00-0143	SF	>10,000 To 20,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 4.25	4.25	
02 82 33 00-0144	SF	>20,000 SF, Up To 2" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal 3.27	3.27	
02 82 33 00-0145		>2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal (02 82 33 00-0137)		
02 82 33 00-0146	SET	Up To 110 SF, >2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 1,358.12	1,358.12	
02 82 33 00-0147	SF	>110 To 1,000 SF, >2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 10.01	10.01	
02 82 33 00-0148	SF	>1,000 To 5,000 SF, >2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 8.09	8.09	
02 82 33 00-0149	SF	>5,000 To 10,000 SF, >2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 6.64	6.64	
02 82 33 00-0150	SF	>10,000 To 20,000 SF, >2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 5.12	5.12	
02 82 33 00-0151	SF	>20,000 SF, >2" To 5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal 3.97	3.97	
02 82 33 00-0152		>5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal (02 82 33 00-0137)		
02 82 33 00-0153	SET	Up To 110 SF, >5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 1,390.44	1,390.44	
02 82 33 00-0154	SF	>110 To 1,000 SF, >5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal..... 11.34	11.34	



Existing Conditions	02	02
Facility Remediation	02 80	
Asbestos Remediation	02 82	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 82 33 00-0155 SF >1,000 To 5,000 SF, >5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	9.21	
02 82 33 00-0156 SF >5,000 To 10,000 SF, >5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	7.60	
02 82 33 00-0157 SF >10,000 To 20,000 SF, >5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	5.92	
02 82 33 00-0158 SF >20,000 SF, >5" Average Thickness, Built-Up Tar And Felt Roofing, Asbestos Abatement And Disposal.....	4.64	
02 82 33 00-0159 Shingles And Felt Roofing, Asbestos Abatement And Disposal (02 82 33 00-0136)		
02 82 33 00-0160 Shingles And Felt Roofing, Asbestos Abatement And Disposal (02 82 33 00-0159)		
02 82 33 00-0161 SET Up To 125 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal..... Note: Single or first of multiple layers.	1,302.66	
02 82 33 00-0162 SF >125 To 1,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal..... Note: Single or first of multiple layers.	8.34	
For Each Additional Layer, Add	1.67	
02 82 33 00-0163 SF >1,000 To 5,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal..... Note: Single or first of multiple layers.	6.69	
For Each Additional Layer, Add	1.34	
02 82 33 00-0164 SF >5,000 To 10,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal..... Note: Single or first of multiple layers.	5.36	
For Each Additional Layer, Add	1.07	
02 82 33 00-0165 SF >10,000 To 20,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal..... Note: Single or first of multiple layers.	4.03	
For Each Additional Layer, Add	0.81	
02 82 33 00-0166 SF >20,000 SF, Shingles And Felt Roofing, Asbestos Abatement And Disposal..... Note: Single or first of multiple layers.	3.05	
For Each Additional Layer, Add	0.61	
02 82 33 00-0167 Roof Penetration Mastic, Asbestos Abatement And Disposal (02 82 33 00-0136)		
02 82 33 00-0168 SET Up To 10 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	431.90	
02 82 33 00-0169 SF >10 To 50 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	3.30	
02 82 33 00-0170 SF >50 To 100 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	2.72	
02 82 33 00-0171 SF >100 To 250 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	2.21	
02 82 33 00-0172 SF >250 SF, Roof Penetration Mastic, Asbestos Abatement And Disposal.....	1.62	
02 82 33 00-0173 Roof Curb Mastic, Asbestos Abatement And Disposal (02 82 33 00-0136)		
02 82 33 00-0174 SET Up To 10 LF, Roof Curb Mastic, Asbestos Abatement And Disposal.....	431.90	
02 82 33 00-0175 LF >10 To 20 LF, Roof Curb Mastic, Asbestos Abatement And Disposal.....	9.77	
02 82 33 00-0176 LF >20 To 50 LF, Roof Curb Mastic, Asbestos Abatement And Disposal.....	7.83	
02 82 33 00-0177 LF >50 To 150 LF, Roof Curb Mastic, Asbestos Abatement And Disposal.....	6.53	
02 82 33 00-0178 LF >150 LF, Roof Curb Mastic, Asbestos Abatement And Disposal.....	4.73	
02 82 33 00-0179 Asbestos-Cement Products, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0180 Interior Asbestos-Cement Board, Asbestos Abatement And Disposal (02 82 33 00-0179)		
Note: Includes detachment of mounted objects before removal.		
02 82 33 00-0181 SET Up To 100 SF, Interior Asbestos-Cement Board, Asbestos Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	1,308.17	
02 82 33 00-0182 SF >100 To 500 SF, Interior Asbestos-Cement Board, Asbestos Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	8.97	
02 82 33 00-0183 SF >500 To 2,500 SF, Interior Asbestos-Cement Board, Asbestos Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	4.56	
02 82 33 00-0184 SF >2,500 To 10,000 SF, Interior Asbestos-Cement Board, Asbestos Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	3.68	
02 82 33 00-0185 SF >10,000 SF, Interior Asbestos-Cement Board, Asbestos Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	3.21	
02 82 33 00-0186 Exterior Asbestos-Cement Board, Asbestos Abatement And Disposal (02 82 33 00-0179)		
02 82 33 00-0187 SET Up To 100 SF, Exterior Asbestos-Cement Board, Asbestos Abatement And Disposal.....	1,308.17	
02 82 33 00-0188 SF >100 To 500 SF, Exterior Asbestos-Cement Board, Asbestos Abatement And Disposal.....	7.80	
02 82 33 00-0189 SF >500 To 2,500 SF, Exterior Asbestos-Cement Board, Asbestos Abatement And Disposal.....	4.07	
02 82 33 00-0190 SF >2,500 To 10,000 SF, Exterior Asbestos-Cement Board, Asbestos Abatement And Disposal.....	3.29	
02 82 33 00-0191 SF >10,000 SF, Exterior Asbestos-Cement Board, Asbestos Abatement And Disposal.....	2.87	
02 82 33 00-0192 Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal (02 82 33 00-0179)		
02 82 33 00-0193 SET Up To 10 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	1,095.52	
02 82 33 00-0194 LF >10 To 100 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	45.86	
02 82 33 00-0195 LF >100 To 250 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	34.84	
02 82 33 00-0196 LF >250 To 500 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	26.57	
02 82 33 00-0197 LF >500 To 2,500 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	20.36	
02 82 33 00-0198 LF >2,500 To 10,000 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	15.72	
02 82 33 00-0199 LF >10,000 LF, Up To 12" Diameter Asbestos-Cement Pipe, Asbestos Abatement And Disposal.....	15.39	
02 82 33 00-0200 Exterior Transite Siding, Asbestos Abatement And Disposal (02 82 33 00-0179)		

02 Existing Conditions**02 80 Facility Remediation****02 82 Asbestos Remediation**

Los Angeles County Development Authority

MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 82 33 00-0201	SET	Up To 125 SF, Exterior Transite Siding, Asbestos Abatement And Disposal	1,318.38	
		Note: Single or first of multiple layers.		
02 82 33 00-0202	SF	>125 To 1,000 SF, Exterior Transite Siding, Asbestos Abatement And Disposal	7.04	
		Note: Single or first of multiple layers.		
02 82 33 00-0203	SF	>1,000 To 5,000 SF, Exterior Transite Siding, Asbestos Abatement And Disposal	5.67	
		Note: Single or first of multiple layers.		
02 82 33 00-0204	SF	>5,000 To 10,000 SF, Exterior Transite Siding, Asbestos Abatement And Disposal	4.56	
		Note: Single or first of multiple layers.		
02 82 33 00-0205	SF	>10,000 To 20,000 SF, Exterior Transite Siding, Asbestos Abatement And Disposal	3.46	
		Note: Single or first of multiple layers.		
02 82 33 00-0206	SF	>20,000 SF, Exterior Transite Siding, Asbestos Abatement And Disposal	2.64	
		Note: Single or first of multiple layers.		
02 82 33 00-0207		Asbestos Contaminated Debris, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0208		Asbestos Contaminated Debris, Asbestos Abatement And Disposal (02 82 33 00-0207)		
02 82 33 00-0209	SET	Up To 10 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	879.95	
		<i>For Work In Restricted Working Space, Add</i>	258.70	
02 82 33 00-0210	CF	>10 To 100 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	87.50	
		<i>For Work In Restricted Working Space, Add</i>	25.72	
02 82 33 00-0211	CF	>100 To 250 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	58.92	
		<i>For Work In Restricted Working Space, Add</i>	17.15	
02 82 33 00-0212	CF	>250 To 500 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	44.70	
		<i>For Work In Restricted Working Space, Add</i>	12.88	
02 82 33 00-0213	CF	>500 To 2,500 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	36.06	
		<i>For Work In Restricted Working Space, Add</i>	10.29	
02 82 33 00-0214	CF	>2,500 To 10,000 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	30.91	
		<i>For Work In Restricted Working Space, Add</i>	8.75	
02 82 33 00-0215	CF	>10,000 CF, Asbestos Contaminated Debris, Asbestos Abatement And Disposal	27.99	
		<i>For Work In Restricted Working Space, Add</i>	7.87	
02 82 33 00-0216		Other Asbestos Containing Materials, Asbestos Abatement And Disposal (02 82 33)		
02 82 33 00-0217		30" To 36" Fire Door, Asbestos Abatement And Disposal (02 82 33 00-0216)		
02 82 33 00-0218	SET	Up To 1 EA, 30" To 36" Fire Door, Asbestos Abatement And Disposal	439.09	
02 82 33 00-0219	EA	>1 To 20 EA, 30" To 36" Fire Door, Asbestos Abatement And Disposal	163.15	
02 82 33 00-0220	EA	>20 EA, 30" To 36" Fire Door, Asbestos Abatement And Disposal	147.62	
02 82 33 00-0221		HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal (02 82 33 00-0216)		
02 82 33 00-0222	SET	Up To 10 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	431.53	
02 82 33 00-0223	LF	>10 To 50 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	8.86	
02 82 33 00-0224	LF	>50 To 100 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	6.65	
02 82 33 00-0225	LF	>100 To 250 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	5.73	
02 82 33 00-0226	LF	>250 To 1,000 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	4.94	
02 82 33 00-0227	LF	>1,000 To 2,500 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	4.23	
02 82 33 00-0228	LF	>2,500 LF, HVAC Duct Flexible Connector (Web Cloth), Asbestos Abatement And Disposal	3.65	
02 82 33 00-0229		Grout, Asbestos Abatement And Disposal (02 82 33 00-0216)		
		Note: e.g. flue grout.		
02 82 33 00-0230	SET	Up To 10 LF, Grout, Asbestos Abatement And Disposal	431.40	
02 82 33 00-0231	LF	>10 To 50 LF, Grout, Asbestos Abatement And Disposal	16.99	
02 82 33 00-0232	LF	>50 To 100 LF, Grout, Asbestos Abatement And Disposal	11.70	
02 82 33 00-0233	LF	>100 To 250 LF, Grout, Asbestos Abatement And Disposal	10.03	
02 82 33 00-0234	LF	>250 To 1,000 LF, Grout, Asbestos Abatement And Disposal	8.62	
02 82 33 00-0235	LF	>1,000 To 2,500 LF, Grout, Asbestos Abatement And Disposal	7.43	
02 82 33 00-0236	LF	>2,500 LF, Grout, Asbestos Abatement And Disposal	6.37	
02 82 33 00-0237		Gaskets, Asbestos Abatement And Disposal (02 82 33 00-0216)		
		Note: e.g. rope, web cloth, flat.		
02 82 33 00-0238	SET	Up To 10 LF, Gaskets, Asbestos Abatement And Disposal	431.53	
02 82 33 00-0239	LF	>10 To 50 LF, Gaskets, Asbestos Abatement And Disposal	22.90	
02 82 33 00-0240	LF	>50 To 250 LF, Gaskets, Asbestos Abatement And Disposal	17.18	
02 82 33 00-0241	LF	>250 To 500 LF, Gaskets, Asbestos Abatement And Disposal	14.64	
02 82 33 00-0242	LF	>500 To 1,500 LF, Gaskets, Asbestos Abatement And Disposal	13.19	
02 82 33 00-0243	LF	>1,500 To 2,500 LF, Gaskets, Asbestos Abatement And Disposal	11.85	
02 82 33 00-0244	LF	>2,500 LF, Gaskets, Asbestos Abatement And Disposal	11.28	
02 82 33 00-0245		Ceiling Tile Including Glue Removal, Asbestos Abatement And Disposal (02 82 33 00-0216)		
		Note: e.g. grid, spline, or glued on.		
02 82 33 00-0246	SET	Up To 50 SF, Ceiling Tile, Asbestos Abatement And Disposal	869.66	
		Note: Including Glue Removal		
02 82 33 00-0247	SF	>50 To 1,000 SF, Ceiling Tile, Asbestos Abatement And Disposal	18.47	
		Note: Including Glue Removal		



Existing Conditions	02	02
Facility Remediation	02 80	
Asbestos Remediation	02 82	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 82 33 00-0248	SF	>1,000 To 2,500 SF, Ceiling Tile, Asbestos Abatement And Disposal 8.97	8.97
		Note: Including Glue Removal	
02 82 33 00-0249	SF	>2,500 To 10,000 SF, Ceiling Tile, Asbestos Abatement And Disposal 6.10	6.10
		Note: Including Glue Removal	
02 82 33 00-0250	SF	>10,000 SF, Ceiling Tile, Asbestos Abatement And Disposal 5.22	5.22
		Note: Including Glue Removal	

02 82 33 00-0251 Nailed-On Ceiling Tile System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal (02 82 33 00-0216)

Note: Includes ceiling tile, asbestos barrier paper, and furring strips.

02 82 33 00-0252	SET	Up To 50 SF, Nailed-On Ceiling Tile System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 866.29	866.29
02 82 33 00-0253	SF	>50 To 1,000 SF, Nailed-On Ceiling Tile System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 18.47	18.47
02 82 33 00-0254	SF	>1,000 To 2,500 SF, Nailed-On Ceiling Tile System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal 8.97	8.97
02 82 33 00-0255	SF	>2,500 To 10,000 SF, Nailed-On Ceiling Tile System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal 6.10	6.10
02 82 33 00-0256	SF	>10,000 SF, Nailed-On Ceiling Tile System With Asbestos Barrier Paper Backing, Asbestos Abatement And Disposal..... 5.22	5.22

02 82 33 00-0257 Caulking, Asbestos Abatement And Disposal (02 82 33 00-0216)

02 82 33 00-0258 Non-Friable Caulking, Asbestos Abatement And Disposal (02 82 33 00-0257)

02 82 33 00-0259	SET	Up To 10 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal 431.40	431.40
02 82 33 00-0260	LF	>10 To 50 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal..... 12.74	12.74
02 82 33 00-0261	LF	>50 To 100 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal..... 8.99	8.99
02 82 33 00-0262	LF	>100 To 250 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal..... 6.69	6.69
02 82 33 00-0263	LF	>250 To 1,000 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal..... 5.04	5.04
02 82 33 00-0264	LF	>1,000 To 2,500 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal 3.98	3.98
02 82 33 00-0265	LF	>2,500 LF, Non-Friable Asbestos Contaminated Caulking, Asbestos Abatement And Disposal 3.46	3.46

02 82 33 00-0266 Window Putty, Asbestos Abatement And Disposal (02 82 33 00-0216)

02 82 33 00-0267	SET	Up To 10 LF, Window Putty, Asbestos Abatement And Disposal 431.40	431.40
02 82 33 00-0268	LF	>10 To 50 LF, Window Putty, Asbestos Abatement And Disposal 16.99	16.99
02 82 33 00-0269	LF	>50 To 100 LF, Window Putty, Asbestos Abatement And Disposal 11.70	11.70
02 82 33 00-0270	LF	>100 To 250 LF, Window Putty, Asbestos Abatement And Disposal 10.03	10.03
02 82 33 00-0271	LF	>250 To 1,000 LF, Window Putty, Asbestos Abatement And Disposal 8.62	8.62
02 82 33 00-0272	LF	>1,000 LF, Window Putty, Asbestos Abatement And Disposal..... 7.43	7.43

02 82 33 00-0273 Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal (02 82 33 00-0216)

02 82 33 00-0274	SET	Up To 4 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal..... 896.17	896.17
02 82 33 00-0275	EA	>4 To 40 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal 85.62	85.62
02 82 33 00-0276	EA	>40 To 60 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal 59.90	59.90
02 82 33 00-0277	EA	>60 To 125 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal 47.11	47.11
02 82 33 00-0278	EA	>125 To 625 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal 39.33	39.33
02 82 33 00-0279	EA	>625 To 1,500 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal 34.69	34.69
02 82 33 00-0280	EA	>1,500 EA, Asbestos Contaminated Light Fixture, Asbestos Abatement And Disposal 32.07	32.07

02 83 Lead Remediation (02 80)

See CSI section 01 56 16 00-0023 for temporary stud walls, 01 74 19 00-0040 for hauling in excess of 25 miles to transfer or disposal site, 02 89 00 00-0008 for plastic sheeting for containment construction, 02 89 00 00-0020 for decontamination chambers.

02 83 19 Lead-Based Paint Remediation (02 83)

02 83 19 13 Lead-Based Paint Abatement (02 83 19)

Note: Includes materials, equipment, mobilization, preparation, critical barriers (e.g. electrical outlets, registers, windows, etc.), signage, removal, bagging, clean-up, vacuuming, transportation for up to 25 miles, disposal, personnel health monitoring, negative air, documentation and other associated costs necessary for the complete removal and disposal of lead contaminated materials in accordance with EPA and local regulations. Where types of Lead are listed by quantity, the quantity of the entire project, not a particular work area, is to be used in determining which task applies. See CSI section 01 56 16 00-0023 for temporary stud walls, 01 74 19 00-0040 for hauling in excess of 25 miles to transfer or disposal site, 02 89 00 00-0008 for plastic sheeting.

02 83 19 13-0001 Minimum Charge For Lead-Based Paint Remediation (02 83 19 13)

02 83 19 13-0002	EA	Lead-Based Paint Remediation Minimum Show Up Charge 1,288.03	1,288.03
		Note: For projects where the total lead-based paint remediation charge is less than the minimum charge, use task "Minimum Charge For Lead-Based Paint Remediation" exclusively. Task "Minimum Charge For Lead-Based Paint Remediation" should not be used in conjunction with any other tasks in this section. Includes air sample and personal air monitoring.	

02 83 19 13-0003 Lead Sampling And Testing (02 83 19 13)

Note: Includes packaging of sample for shipping, shipping to testing lab, chain of custody documentation, analysis of sample, lab report, and sample disposal. Excludes sampling time.

02 83 19 13-0004	HR	Certified Lead Sampling Technician For Bulk Sampling Or Air Monitoring..... 97.63	97.63
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02 Existing Conditions**02 80 Facility Remediation****02 83 Lead Remediation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 83 19 13-0005	EA	X-Ray Fluorescence (XRF) Lead Testing	72.77
		Note: Including Technician, 3 Readings Per Surface And Lab Fee	
02 83 19 13-0006	EA	5 Day Turnaround Toxicity Characteristic Leaching Procedure (TCLP) Lead Test And Lab Fee	69.66
02 83 19 13-0007	EA	48 Hour Turnaround Toxicity Characteristic Leaching Procedure (TCLP) Lead Test And Lab Fee	105.55
02 83 19 13-0008	EA	24 Hour Turnaround Toxicity Characteristic Leaching Procedure (TCLP) Lead Test And Lab Fee	147.77
02 83 19 13-0009	EA	5 Day Turnaround Total Threshold Leaching Concentration (TTLC) Lead Test And Lab Fee	27.44
02 83 19 13-0010	EA	24 Hour Turnaround Total Threshold Leaching Concentration (TTLC) Lead Test And Lab Fee	42.22
02 83 19 13-0011	EA	8 Hour Turnaround Total Threshold Leaching Concentration (TTLC) Lead Test And Lab Fee	52.78
02 83 19 13-0012	EA	5 Day Turnaround Soluble Threshold Limit Concentration (STLC) Lead Test And Lab Fee	69.66
02 83 19 13-0013	EA	3 Day Turnaround Soluble Threshold Limit Concentration (STLC) Lead Test And Lab Fee	105.55
02 83 19 13-0014	EA	5 Day Turnaround Lead Wipe Samples And Lab Fee	11.61
02 83 19 13-0015	EA	24 Hour Turnaround Lead Wipe Samples And Lab Fee	15.83
02 83 19 13-0016	EA	8 Hour Turnaround Lead Wipe Samples And Lab Fee	23.22
02 83 19 13-0017	EA	5 Day Turnaround Lead Air Samples And Lab Fee	11.61
02 83 19 13-0018	EA	24 Hour Turnaround Lead Air Samples And Lab Fee	15.83
02 83 19 13-0019	EA	8 Hour Turnaround Lead Air Samples And Lab Fee	23.22
02 83 19 13-0020	EA	5 Day Turnaround Lead Bulk Samples And Lab Fee	11.61
02 83 19 13-0021	EA	24 Hour Turnaround Lead Bulk Samples And Lab Fee	15.83
02 83 19 13-0022	EA	8 Hour Turnaround Lead Bulk Samples And Lab Fee	23.22
02 83 19 13-0023	EA	5 Day Turnaround Lead Water Test and Lab Fee	42.22
02 83 19 13-0024	EA	24 Hour Turnaround Lead Water Test and Lab Fee	63.33
02 83 19 13-0025	EA	8 Hour Turnaround Lead Water Test and Lab Fee	84.44
02 83 19 13-0026	EA	5 Day Turnaround Lead Paint Chip Test and Lab Fee	43.66
02 83 19 13-0027	EA	5 Day Turnaround Lead Soil Test and Lab Fee	87.33

02 83 19 13-0028 Chemical Stripping Of Lead Contaminated Material (02 83 19 13)

Note: Per 0.02" (20 mils) application. Manufacture recommended operating temperatures not to be below 50 degrees. Includes heat gun (where required) for follow up, waste handling, packing and all personnel blood work, lab test fees and monitoring. Industrial coatings often contain other hazardous ingredients in addition to or in place of lead. These might include, but are not limited to, chromium, cadmium and mercury.

02 83 19 13-0029	SF	Balustrades, Chemical Stripping Of Lead Contaminated Material	37.41
		For 0.025" (25 mil) Application, Add	2.12
		For 0.03" (30 mil) Application, Add	3.34
02 83 19 13-0030	SF	Balustrades, Ornate, Chemical Stripping Of Lead Contaminated Material	55.49
		For 0.025" (25 mil) Application, Add	3.02
		For 0.03" (30 mil) Application, Add	4.69
02 83 19 13-0031	LF	Up To 6" Wide, Wood Trim, Chemical Stripping Of Lead Contaminated Material	16.07
		For 0.025" (25 mil) Application, Add	0.95
		For 0.03" (30 mil) Application, Add	1.52
		For 0.125" (125 mil) Application, Add	8.52
02 83 19 13-0032	LF	>6" To 12" Wide, Wood Trim, Chemical Stripping Of Lead Contaminated Material	32.81
		For 0.025" (25 mil) Application, Add	1.79
		For 0.03" (30 mil) Application, Add	2.78
		For 0.125" (125 mil) Application, Add	12.70
02 83 19 13-0033	SF	Cornice, Chemical Stripping Of Lead Contaminated Material	17.46
		For 0.025" (25 mil) Application, Add	1.12
		For 0.03" (30 mil) Application, Add	1.84
02 83 19 13-0034	SF	Cornice, Ornate, Chemical Stripping Of Lead Contaminated Material	49.46
		For 0.025" (25 mil) Application, Add	2.72
		For 0.03" (30 mil) Application, Add	4.24
02 83 19 13-0035	SF	Brick, Concrete Block, Concrete, Chemical Stripping Of Lead Contaminated Material	10.77
		For 0.025" (25 mil) Application, Add	0.74
		For 0.03" (30 mil) Application, Add	1.23
		For 0.125" (125 mil) Application, Add	8.69
02 83 19 13-0036	SF	Cabinets, Chemical Stripping Of Lead Contaminated Material	31.27
		For 0.025" (25 mil) Application, Add	1.76
		For 0.03" (30 mil) Application, Add	2.77
02 83 19 13-0037	SF	Cabinets, Ornate, Chemical Stripping Of Lead Contaminated Material	39.86
		For 0.025" (25 mil) Application, Add	2.19
		For 0.03" (30 mil) Application, Add	3.41
02 83 19 13-0038	SF	Plaster, Stucco and Drywall Surfaces, Chemical Stripping Of Lead Contaminated Material	14.85
		For 0.025" (25 mil) Application, Add	0.94
		For 0.03" (30 mil) Application, Add	1.54
02 83 19 13-0039	SF	Columns, Chemical Stripping Of Lead Contaminated Material	14.27
		For 0.025" (25 mil) Application, Add	0.96
		For 0.03" (30 mil) Application, Add	1.60
		For 0.125" (125 mil) Application, Add	11.07
02 83 19 13-0040	SF	Flush Doors, One Side, Chemical Stripping Of Lead Contaminated Material	12.57
		For 0.025" (25 mil) Application, Add	0.83
		For 0.03" (30 mil) Application, Add	1.37
02 83 19 13-0041	SF	Raised Panel Doors and Decorative Doors, Chemical Stripping Of Lead Contaminated Material	15.45
		For 0.025" (25 mil) Application, Add	0.97
		For 0.03" (30 mil) Application, Add	1.58
02 83 19 13-0042	SF	Sectional Panel Or Roll-Up Doors, Chemical Stripping Of Lead Contaminated	22.77
		For 0.025" (25 mil) Application, Add	1.39
		For 0.03" (30 mil) Application, Add	2.24
02 83 19 13-0043	EA	Electrical Devices, Chemical Stripping Of Lead Contaminated Material	65.08
		For 0.025" (25 mil) Application, Add	3.65
		For 0.03" (30 mil) Application, Add	5.73
02 83 19 13-0044	LF	Door Frames, Chemical Stripping Of Lead Contaminated Material	16.14
		For 0.025" (25 mil) Application, Add	1.01
		For 0.03" (30 mil) Application, Add	1.64

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 83 19 13-0045 SF Wood Floors, Chemical Stripping Of Lead Contaminated Material.....	8.87	
For 0.025" (25 mil) Application, Add	0.64	
For 0.03" (30 mil) Application, Add	1.09	
02 83 19 13-0046 SF HVAC Grilles, Chemical Stripping Of Lead Contaminated Material.....	33.42	
For 0.025" (25 mil) Application, Add	1.87	
For 0.03" (30 mil) Application, Add	2.93	
02 83 19 13-0047 SF HVAC Grilles, Ornate, Chemical Stripping Of Lead Contaminated Material.....	39.86	
For 0.025" (25 mil) Application, Add	2.19	
For 0.03" (30 mil) Application, Add	3.41	
02 83 19 13-0048 EA Hinges, Chemical Stripping Of Lead Contaminated Material.....	20.93	
For 0.025" (25 mil) Application, Add	1.35	
For 0.03" (30 mil) Application, Add	2.21	
02 83 19 13-0049 EA Up To 6" Diameter Hangers, Chemical Stripping Of Lead Contaminated Material.....	25.79	
For 0.025" (25 mil) Application, Add	1.59	
For 0.03" (30 mil) Application, Add	2.57	
For 0.125" (125 mil) Application, Add	15.45	
02 83 19 13-0050 LF Up To 2" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material.....	7.19	
For 0.025" (25 mil) Application, Add	0.51	
For 0.03" (30 mil) Application, Add	0.86	
For 0.125" (125 mil) Application, Add	6.30	
02 83 19 13-0051 LF >2" To 4" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material.....	11.56	
For 0.025" (25 mil) Application, Add	0.73	
For 0.03" (30 mil) Application, Add	1.19	
For 0.125" (125 mil) Application, Add	7.39	
02 83 19 13-0052 LF >4" To 8" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material.....	20.68	
For 0.025" (25 mil) Application, Add	1.28	
For 0.03" (30 mil) Application, Add	2.08	
For 0.125" (125 mil) Application, Add	12.67	
02 83 19 13-0053 LF >8" To 12" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material.....	28.34	
For 0.025" (25 mil) Application, Add	1.72	
For 0.03" (30 mil) Application, Add	2.76	
For 0.125" (125 mil) Application, Add	16.09	
02 83 19 13-0054 LF >12" To 16" Diameter Pipes and Conduit, Chemical Stripping Of Lead Contaminated Material.....	50.82	
For 0.025" (25 mil) Application, Add	2.99	
For 0.03" (30 mil) Application, Add	4.77	
For 0.125" (125 mil) Application, Add	26.21	
02 83 19 13-0055 SF >16" Diameter Pipes, Chemical Stripping Of Lead Contaminated Material, SF Of Surface Area.....	15.18	
For 0.025" (25 mil) Application, Add	0.87	
For 0.03" (30 mil) Application, Add	1.37	
For 0.125" (125 mil) Application, Add	7.04	
02 83 19 13-0056 EA Up To 12 SF Radiators, Chemical Stripping Of Lead Contaminated Material.....	301.96	
For 0.025" (25 mil) Application, Add	16.55	
For 0.03" (30 mil) Application, Add	25.73	
02 83 19 13-0057 SF Flat And Raised Panel Wood Shutters, Chemical Stripping Of Lead Contaminated Material.....	21.13	
For 0.025" (25 mil) Application, Add	1.62	
For 0.03" (30 mil) Application, Add	2.78	
02 83 19 13-0058 SF Louvered Wood Shutters, Chemical Stripping Of Lead Contaminated Material.....	23.13	
For 0.025" (25 mil) Application, Add	1.72	
For 0.03" (30 mil) Application, Add	2.93	
02 83 19 13-0059 SF Siding, Chemical Stripping Of Lead Contaminated Material.....	12.06	
For 0.025" (25 mil) Application, Add	0.85	
For 0.03" (30 mil) Application, Add	1.44	
For 0.125" (125 mil) Application, Add	10.52	
02 83 19 13-0060 SF Soffit, Chemical Stripping Of Lead Contaminated Material.....	25.29	
For 0.025" (25 mil) Application, Add	1.46	
For 0.03" (30 mil) Application, Add	2.32	
For 0.125" (125 mil) Application, Add	12.32	
02 83 19 13-0061 SF Flat Steel Surfaces, Chemical Stripping Of Lead Contaminated Material.....	11.63	
For 0.025" (25 mil) Application, Add	0.78	
For 0.03" (30 mil) Application, Add	1.30	
For 0.125" (125 mil) Application, Add	8.91	
02 83 19 13-0062 SF Corrugated Steel, Chemical Stripping Of Lead Contaminated Material.....	13.20	
For 0.025" (25 mil) Application, Add	0.86	
For 0.03" (30 mil) Application, Add	1.42	
For 0.125" (125 mil) Application, Add	9.30	
02 83 19 13-0063 SF Steel Beams and Columns, Chemical Stripping Of Lead Contaminated Material.....	13.17	
For 0.025" (25 mil) Application, Add	0.86	
For 0.03" (30 mil) Application, Add	1.41	
For 0.125" (125 mil) Application, Add	9.29	
02 83 19 13-0064 SF Steel Trusses, Chemical Stripping Of Lead Contaminated Material.....	18.67	
For 0.025" (25 mil) Application, Add	1.13	
For 0.03" (30 mil) Application, Add	1.83	
For 0.125" (125 mil) Application, Add	10.67	
02 83 19 13-0065 SF Wood Surfaces, Chemical Stripping Of Lead Contaminated Material.....	13.17	
For 0.025" (25 mil) Application, Add	0.86	
For 0.03" (30 mil) Application, Add	1.41	
For 0.125" (125 mil) Application, Add	9.29	
02 83 19 13-0066 SF Windows (Sash, Sill, Jambs, Casing Trim), One Side, 1/1 Light, Chemical Stripping Of Lead Contaminated Material.....	30.35	
For 0.025" (25 mil) Application, Add	1.72	
For 0.03" (30 mil) Application, Add	2.70	
02 83 19 13-0067 SF Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 2/2 Light, Chemical Stripping Of Lead Contaminated Material.....	33.22	
For 0.025" (25 mil) Application, Add	1.86	
For 0.03" (30 mil) Application, Add	2.92	

02 Existing Conditions**02 80 Facility Remediation****02 83 Lead Remediation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 83 19 13-0068	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 4/4 Light, Chemical Stripping Of Lead Contaminated Material.....	35.16
		<i>For 0.025" (25 mil) Application, Add</i>	1.96
		<i>For 0.03" (30 mil) Application, Add</i>	3.06
02 83 19 13-0069	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 6/6 Light, Chemical Stripping Of Lead Contaminated Material.....	37.11
		<i>For 0.025" (25 mil) Application, Add</i>	2.06
		<i>For 0.03" (30 mil) Application, Add</i>	3.21
02 83 19 13-0070	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 8/8 Light Chemical Stripping Of Lead Contaminated Material.....	39.05
		<i>For 0.025" (25 mil) Application, Add</i>	2.15
		<i>For 0.03" (30 mil) Application, Add</i>	3.35
02 83 19 13-0071	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 10/10 Light, Chemical Stripping Of Lead Contaminated Material.....	41.06
		<i>For 0.025" (25 mil) Application, Add</i>	2.25
		<i>For 0.03" (30 mil) Application, Add</i>	3.50
02 83 19 13-0072	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 12/12 light Chemical Stripping Of Lead Contaminated Material.....	42.95
		<i>For 0.025" (25 mil) Application, Add</i>	2.35
		<i>For 0.03" (30 mil) Application, Add</i>	3.65
02 83 19 13-0073	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 14/14 Light, Chemical Stripping Of Lead Contaminated Material.....	43.93
		<i>For 0.025" (25 mil) Application, Add</i>	2.40
		<i>For 0.03" (30 mil) Application, Add</i>	3.72
02 83 19 13-0074	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 16/16 Light Chemical Stripping Of Lead Contaminated Material.....	44.91
		<i>For 0.025" (25 mil) Application, Add</i>	2.45
		<i>For 0.03" (30 mil) Application, Add</i>	3.79
02 83 19 13-0075	SF	Windows (Sash, Sill, Jambs, Muntins, Casing Trim), One Side, 20/20 Light, Chemical Stripping Of Lead Contaminated Material.....	45.86
		<i>For 0.025" (25 mil) Application, Add</i>	2.49
		<i>For 0.03" (30 mil) Application, Add</i>	3.86
02 83 19 13-0076	SF	Metal Stairs, Chemical Stripping Of Lead Contaminated Material	60.59
		<i>For 0.025" (25 mil) Application, Add</i>	3.43
		<i>For 0.03" (30 mil) Application, Add</i>	5.39
		<i>For 0.125" (125 mil) Application, Add</i>	27.15
02 83 19 13-0077	LF	Metal Single Hand Rail, Chemical Stripping Of Lead Contaminated Material.....	10.52
		<i>For 0.025" (25 mil) Application, Add</i>	0.68
		<i>For 0.03" (30 mil) Application, Add</i>	1.11
		<i>For 0.125" (125 mil) Application, Add</i>	7.13
02 83 19 13-0078	SF	Metal Railing And Posts, Chemical Stripping Of Lead Contaminated Material	30.79
		Note: The unit of measure "SF" is measured for 'Length x Height'. Work includes both sides of railing.	
		<i>For 0.025" (25 mil) Application, Add</i>	1.84
		<i>For 0.03" (30 mil) Application, Add</i>	2.95
		<i>For 0.125" (125 mil) Application, Add</i>	16.70
02 83 19 13-0079	SF	Metal Picket Fence, Chemical Stripping Of Lead Contaminated Material.....	33.67
		<i>For 0.025" (25 mil) Application, Add</i>	1.93
		<i>For 0.03" (30 mil) Application, Add</i>	3.06
		<i>For 0.125" (125 mil) Application, Add</i>	15.92
02 83 19 13-0080	LF	2" Wide Paint From Concrete Or Asphalt Pavement, Chemical Stripping Of Lead Contaminated Material.....	3.10
		<i>For 0.025" (25 mil) Application, Add</i>	0.19
		<i>For 0.03" (30 mil) Application, Add</i>	0.30
02 83 19 13-0081	LF	3" Wide Paint From Concrete Or Asphalt Pavement, Chemical Stripping Of Lead Contaminated Material.....	4.65
		<i>For 0.025" (25 mil) Application, Add</i>	0.28
		<i>For 0.03" (30 mil) Application, Add</i>	0.46
02 83 19 13-0082	LF	4" Wide Paint From Concrete Or Asphalt Pavement, Chemical Stripping Of Lead Contaminated Material.....	5.38
		<i>For 0.025" (25 mil) Application, Add</i>	0.32
		<i>For 0.03" (30 mil) Application, Add</i>	0.51
02 83 19 13-0083	LF	6" Wide Paint From Concrete Or Asphalt Pavement, Chemical Stripping Of Lead Contaminated Material.....	6.18
		<i>For 0.025" (25 mil) Application, Add</i>	0.38
		<i>For 0.03" (30 mil) Application, Add</i>	0.60
02 83 19 13-0084	SF	Paint From Concrete Or Asphalt Pavement, Chemical Stripping Of Lead Contaminated Material	10.77
		<i>For 0.025" (25 mil) Application, Add</i>	0.74
		<i>For 0.03" (30 mil) Application, Add</i>	1.23

02 83 19 13-0085 Demolish Lead Contaminated Material (02 83 19 13)

Note: Includes waste handling, packing, all personnel blood work, lab test fees and monitoring. Industrial coatings often contain other hazardous ingredients in addition to or in place of lead. These might include, but are not be limited to, chromium, cadmium and mercury.

02 83 19 13-0086	SF	Demolish Ceiling Suspension System, Lead Contaminated Material	2.66
02 83 19 13-0087	SF	Demolish Plaster Or Stucco, And Lath, Lead Contaminated Material.....	3.87
02 83 19 13-0088	SF	Demolish Walls, Gypsum Board, Lead Contaminated Material	1.25
02 83 19 13-0089	SF	Demolish Suspended Ceiling System And Tile, Lead Contaminated Material.....	1.55
02 83 19 13-0090	SF	Demolish Acoustical Ceiling Tile, Lead Contaminated Material	0.99
02 83 19 13-0091	SF	Demolish Metal Pan Grid System, Lead Contaminated Material	1.54
02 83 19 13-0092	EA	Demolish Ceiling And Recessed Light Fixtures, Lead Contaminated Material	74.34
02 83 19 13-0093	EA	Demolish >2' x 4' Light Fixtures, Lead Contaminated Material	98.61
02 83 19 13-0094	SF	Demolish Non-Load Bearing Partitions Of Plaster Or Stucco, Lath And Studs, Lead Contaminated Material.....	11.02
02 83 19 13-0095	SF	Demolish Non-Load Bearing Partitions Of Gypsum Board And Studs, Lead Contaminated Material	6.17
02 83 19 13-0096	SF	Demolish Brick, Lead Contaminated Material	4.64
02 83 19 13-0097	SF	Demolish Concrete Block, Lead Contaminated Material.....	5.98
02 83 19 13-0098	SF	Demolish Tile, Lead Contaminated Material	4.50
02 83 19 13-0099	SF	Demolish Up To 6" Concrete, Lead Contaminated Material	6.77
02 83 19 13-0100	IN	Drilling, Up To 1/2" Diameter In Lead Paint/Asbestos Material Per Inch Of Depth	5.26

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 83 19 13-0101 IN Drilling, >1/2" To 1" Diameter In Lead Paint/Asbestos Material Per Inch Of Depth	7.01	
02 83 19 13-0102 LF Demolish Wood Balustrades And Railings, Lead Contaminated Material	7.71	
02 83 19 13-0103 LF Demolish Up To 6" Wide Baseboard, Lead Contaminated Material	2.00	
02 83 19 13-0104 LF Demolish >6" To 12" Wide Baseboard, Lead Contaminated Material	2.51	
02 83 19 13-0105 LF Demolish Base Shoe Molding, Lead Contaminated Material	1.64	
02 83 19 13-0106 SF Demolish Concrete, Lead Contaminated Material	15.34	
02 83 19 13-0107 LF Demolish Cabinets, Lead Contaminated Material	35.72	
02 83 19 13-0108 SF Demolish Ceilings, Gypsum Board, Lead Contaminated Material	2.02	
02 83 19 13-0109 SF Demolish Up To 12" Diameter Columns, Lead Contaminated Material	19.79	
02 83 19 13-0110 SF Demolish Cornice, Lead Contaminated Material	2.63	
02 83 19 13-0111 EA Demolish Doors, Lead Contaminated Material	77.47	
02 83 19 13-0112 LF Demolish Door And Window Trim Or Frames, Lead Contaminated Material	2.36	
02 83 19 13-0113 EA Demolish Electrical Devices, Lead Contaminated Material	23.77	
02 83 19 13-0114 LF Demolish Up To 1" Diameter Electrical Conduit, Lead Contaminated Material	3.05	
02 83 19 13-0115 LF Demolish >1" To 2" Diameter Electrical Conduit, Lead Contaminated Material	5.08	
02 83 19 13-0116 SF Demolish Wood Floors, Lead Contaminated Material	3.66	
02 83 19 13-0117 SF Demolish Grilles, Lead Contaminated Material	4.30	
02 83 19 13-0118 EA Demolish Hinges, Lead Contaminated Material	8.64	
02 83 19 13-0119 EA Demolish Up To 6" Diameter Hangers, Lead Contaminated Material	18.57	
02 83 19 13-0120 LF Demolish Up To 2" Diameter Pipes, Lead Contaminated Material	7.62	
02 83 19 13-0121 LF Demolish >2" To 4" Diameter Pipes, Lead Contaminated Material	11.11	
02 83 19 13-0122 LF Demolish >4" To 8" Diameter Pipes, Lead Contaminated Material	16.79	
02 83 19 13-0123 LF Demolish >8" To 12" Diameter Pipes, Lead Contaminated Material	30.96	
02 83 19 13-0124 EA Demolish Radiators, Lead Contaminated Material	133.73	
02 83 19 13-0125 EA Demolish Shutters, Lead Contaminated Material	52.11	
02 83 19 13-0126 SF Demolish Siding, Lead Contaminated Material	2.07	
02 83 19 13-0127 SF Demolish Soffit, Lead Contaminated Material	1.76	
02 83 19 13-0128 SF Demolish Flat Steel Surfaces, Lead Contaminated Material	4.82	
02 83 19 13-0129 SF Demolish Steel Beams, Lead Contaminated Material	5.68	
02 83 19 13-0130 SF Demolish Trusses, Lead Contaminated Material	7.44	
02 83 19 13-0131 SF Demolish Walls, Wood, Lead Contaminated Material	5.51	
02 83 19 13-0132 SF Demolish Windows, Lead Contaminated Material	18.51	
02 83 19 13-0133 SF Demolish Metal Stair, Lead Contaminated Material	8.85	
02 83 19 13-0134 LF Demolish Single Metal Hand Rail, Lead Contaminated Material	6.50	
02 83 19 13-0135 LF Demolish Metal Railing And Posts, Lead Contaminated Material	10.63	
02 83 19 13-0136 SF Demolish Metal Picket Fence, Lead Contaminated Material	2.93	
02 83 19 13-0137 SF Demolish Plywood, Lead Contaminated Material	7.99	
02 83 19 13-0138 SF Demolish Planks (Various Sizes), Lead Contaminated Material	3.90	
02 83 19 13-0139 EA Demolish Metal Brackets Or Other Small Metal Shapes, Lead Contaminated Material	24.40	
02 83 19 13-0140 SF Demolish Ceramic Tile Block, Lead Contaminated Material	5.33	
02 83 19 13-0141 LF Demolish Metal Guard Rails, Lead Contaminated Material	14.64	
02 83 19 13-0142 LF Demolish Roof Metal Trim, Lead Contaminated Material	3.13	
02 83 19 13-0143 LF Demolish Rain Gutters, Lead Contaminated Material	5.37	
02 83 19 13-0144 LF Demolish Downspouts, Lead Contaminated Material	4.40	
02 83 19 13-0145 SF Demolish Corrugated Metal Roofing, Lead Contaminated Material	5.41	
02 83 19 13-0146 LF Demolish Roof Metal Flashing, Lead Contaminated Material	3.13	
02 83 19 13-0147 LF Demolish Fascia Board Up To 12", Lead Contaminated Material	7.81	
02 83 19 13-0148 Wet Sanding/Light Scraping Of Lead Contaminated Material (02 83 19 13)		
Note: Remove loose, flaking lead-based paint to prepare for painting.		
02 83 19 13-0149 SF Wet Sand/Scrape Of Lead Contaminated Material To Prepare For Painting	3.71	
02 83 19 13-0150 Mechanical Stripping Of Lead Contaminated Material (02 83 19 13)		
Note: Includes heat gun (where required) for follow up, waste handling, packing and all personnel blood work, lab test fees and monitoring.		
02 83 19 13-0151 SF Grind Flat Steel Surfaces, Mechanical Stripping Of Lead Contaminated Material	20.52	
02 83 19 13-0152 Lead Abatement Encapsulation (02 83 19 13)		
Note: Can also be used for asbestos contaminated encapsulation. Spray applied application unless task described otherwise.		
02 83 19 13-0153 SF Balustrades, Lead Abatement Encapsulation	6.72	
02 83 19 13-0154 LF Up To 6" Wide, Baseboard, Lead Abatement Encapsulation	6.67	
02 83 19 13-0155 LF >6" To 12" Wide, Baseboard, Lead Abatement Encapsulation	9.05	
02 83 19 13-0156 SF Brick, Concrete Block, Concrete, Lead Abatement Encapsulation	4.32	
02 83 19 13-0157 SF Ornate Cabinets, Lead Abatement Encapsulation	9.74	
02 83 19 13-0158 SF Simple Design Cabinets, Lead Abatement Encapsulation	7.93	
02 83 19 13-0159 SF Drywall Ceilings, Lead Abatement Encapsulation	2.70	
02 83 19 13-0160 SF Wood Ceilings, Lead Abatement Encapsulation	3.28	
02 83 19 13-0161 SF Acoustical And Popcorn Ceilings, Lead Abatement Encapsulation	3.04	
02 83 19 13-0162 SF Columns, Lead Abatement Encapsulation	5.22	
02 83 19 13-0163 SF Doors, Lead Abatement Encapsulation	9.97	
02 83 19 13-0164 LF Up To 2" Electrical Conduit, Lead Abatement Encapsulation	4.40	
02 83 19 13-0165 SF Picket Fence (Brush), Lead Abatement Encapsulation	3.11	
02 83 19 13-0166 SF Wood Floors (Roller), Lead Abatement Encapsulation	2.60	
02 83 19 13-0167 SF Grilles, Vents, Lead Abatement Encapsulation	7.26	
02 83 19 13-0168 LF Gutters And Downspouts, Lead Abatement Encapsulation	6.72	
02 83 19 13-0169 EA Hangers, Lead Abatement Encapsulation	57.40	
02 83 19 13-0170 LF Up To 4" Diameter Pipe (Brush), Lead Abatement Encapsulation	4.08	

02 Existing Conditions**02 80 Facility Remediation****02 83 Lead Remediation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 83 19 13-0171	LF	>4" To 8" Diameter Pipe (Brush), Lead Abatement Encapsulation	5.88
02 83 19 13-0172	LF	>8" To 12" Diameter Pipe (Brush), Lead Abatement Encapsulation	9.09
02 83 19 13-0173	LF	>12" To 16" Diameter Pipe (Brush), Lead Abatement Encapsulation	13.42
02 83 19 13-0174	EA	Radiators, Lead Abatement Encapsulation.....	147.82
02 83 19 13-0175	EA	Up To 6' Shutters, Lead Abatement Encapsulation	211.97
02 83 19 13-0176	SF	Siding, Lead Abatement Encapsulation	3.71
02 83 19 13-0177	SF	Up To 12" Soffit, Lead Abatement Encapsulation	5.22
02 83 19 13-0178	SF	Steel, Flat Surfaces And Tanks Up To 12', Lead Abatement Encapsulation	4.32
02 83 19 13-0179	SF	Steel Beams And Metal Decks, Lead Abatement Encapsulation.....	5.65
02 83 19 13-0180	SF	Trusses, Lead Abatement Encapsulation	5.65
02 83 19 13-0181	SF	Drywall Walls, Lead Abatement Encapsulation.....	2.40
02 83 19 13-0182	SF	Wood Walls, Lead Abatement Encapsulation	2.96
02 83 19 13-0183	EA	Window Without Grille, Lead Abatement Encapsulation	125.08
02 83 19 13-0184	EA	Window With Grille, Lead Abatement Encapsulation	160.89
02 83 19 13-0185	LF	Wood Door Frames And Trim, Lead Abatement Encapsulation	3.85
02 83 19 13-0186	LF	Steel Lintels, Lead Abatement Encapsulation.....	4.42
02 83 19 13-0187	LF	Wood Fascia Boards, Lead Abatement Encapsulation.....	11.74
02 83 19 13-0188	SF	Wood Eaves, Lead Abatement Encapsulation	11.74
02 83 19 13-0189	LF	Wood Window Sill, Lead Abatement Encapsulation	3.52
02 83 19 13-0190	LF	Wood Window Sash, Lead Abatement Encapsulation	4.52
02 83 19 13-0191	LF	Wood Window Jamb And Trim, Lead Abatement Encapsulation	6.34
02 83 19 13-0192	LF	Wood Doorway Threshold, Lead Abatement Encapsulation.....	4.24
02 83 19 13-0193	LF	Up To 6" Wide, Crown Molding (Simple), Lead Abatement Encapsulation	6.67
02 83 19 13-0194	LF	>6" To 12" Wide, Crown Molding (Simple), Lead Abatement Encapsulation	9.05
02 83 19 13-0195	LF	Up To 6" Wide, Crown Molding (Ornate), Lead Abatement Encapsulation	8.29
02 83 19 13-0196	LF	>6" To 12" Wide, Crown Molding (Ornate), Lead Abatement Encapsulation	11.20

02 83 19 13-0197 Removal By Heat Gun Of Lead Contaminated Material (02 83 19 13)

Note: Remove of multi-layers of paint down to substrate

02 83 19 13-0198	SF	Scrape And Removal Per Layer Of Multi-layers Of Paint With Heat Gun	7.23
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02 83 33 Removal and Disposal of Material Containing Lead (02 83)**02 83 33 13 Lead-Based Paint Removal and Disposal (02 83 33)****02 83 33 13-0001 Remove Loose Dirt And Debris Containing Lead (02 83 33 13)**

02 83 33 13-0002	SF	High Efficiency Particulate Air (HEPA) Vacuum And Wet Cleaning Of Lead Contaminated Area With Mild Detergent.....	0.31
02 83 33 13-0003	SF	High Efficiency Particulate Air (HEPA) Vacuum And Wet Cleaning Of Lead Contaminated Area With Tri-Sodium Phosphate	0.30
02 83 33 13-0004	SF	High Efficiency Particulate Air (HEPA) Vacuum And Shampoo Cleaning Of Lead Contaminated Carpeting	1.54

02 84 Polychlorinated Biphenyl Remediation (02 80)**02 84 16 Handling of Lighting Ballasts and Lamps Containing PBCs and Mercury (02 84)****02 84 16 00-0001 Removal Of TSCA-Exempt PCB And Non-PCB Ballasts From Demolished Fixtures (02 84 16)**

Note: Includes removal of TSCA-exempt PCB and Non-PCB ballast from demolished lighting fixture and placing ballast in an approved container for recycling.

02 84 16 00-0002	EA	Removal Of TSCA-Exempt Polychlorinated Biphenyl (PCB) And Non-PCB Ballast From A Demolished Fixture For Recycling.....	9.80
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02 84 16 00-0003 Recycle TSCA-Exempt PCB And Non-PCB Ballasts (02 84 16)

Note: Non-leaking ballasts. Includes containers, shipping costs and recycling fees. Excludes ballast removal.

02 84 16 00-0004	EA	Recycle Non-Polychlorinated Biphenyl (PCB) Ballast Removed From Up To 4' Length Fixtures	3.21
02 84 16 00-0005	EA	Recycle Non-Polychlorinated Biphenyl (PCB) Ballast Removed From >4' To 8' Length Fixtures.....	4.09
02 84 16 00-0006	EA	Recycle TSCA-Exempt Polychlorinated Biphenyl (PCB) Ballast Removed From Up To 4' Length Fixtures	9.67
02 84 16 00-0007	EA	Recycle TSCA-Exempt Polychlorinated Biphenyl (PCB) Ballast Removed From >4' To 8' Length Fixtures.....	20.23

02 84 16 00-0008 Disposal Of Leaking PCB And Non-PCB Ballasts (02 84 16)

Note: Disposal at an EPA approved facility. Includes containers, shipping costs and disposal fees. Excludes ballast removal.

02 84 16 00-0009	EA	Dispose Of Leaking Non-Polychlorinated Biphenyl (PCB) Ballast Removed From Up To 4' Length Fixtures.....	5.85
02 84 16 00-0010	EA	Dispose Of Leaking Non-Polychlorinated Biphenyl (PCB) Ballast Removed From >4' To 8' Length Fixtures	8.05
02 84 16 00-0011	EA	Dispose Of Leaking Polychlorinated Biphenyl (PCB) Ballast Removed From Up To 4' Length Fixtures	24.85
02 84 16 00-0012	EA	Dispose Of Leaking Polychlorinated Biphenyl (PCB) Ballast Removed From >4' To 8' Length Fixtures.....	48.25

02 86 Hazardous Waste Drum Handling (02 80)**02 86 00 00-0001 Hazardous Waste Packaging (02 86)****02 86 00 00-0002 Overpacks (02 86 00 00-0001)****02 86 00 00-0003 Steel Salvage Drums, 16 Gauge (02 86 00 00-0002)**

02 86 00 00-0004	EA	110 Gallon, 30" Diameter X 41" High.....	594.79
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 86 00 00-0005 EA 85 Gallon, 26" Diameter X 38" High.....	338.57	
02 86 00 00-0006 EA 83 Gallon, 26" Diameter X 36" High.....	326.77	
02 86 00 00-0007 EA 55 Gallon, DOT 17C, 18" Diameter X 34" High.....	204.44	
02 86 00 00-0008 EA 30 Gallon, DOT 17C, 18" Diameter X 28" High.....	161.05	
02 86 00 00-0009 EA 22 Gallon, 16" Diameter X 25" High.....	108.51	
02 86 00 00-0010 EA 15 Gallon, DOT 17C, 14" Diameter X 24" High.....	98.10	
02 86 00 00-0011 EA 10 Gallon, 13.8" Diameter X 15" High.....	86.45	
02 86 00 00-0012 Polyethylene Overpacks (02 86 00 00-0002)		
02 86 00 00-0013 EA 95 Gallon, DOT E9618, Twist On Lid 31" Diameter X 41" High.....	671.85	
02 86 00 00-0014 EA 20 Gallon, Labpack, Twist On Lid 21" Diameter X 7.5" High.....	124.16	
02 86 00 00-0015 EA 85 Gallon, DOT E9775, Clamp Ring Lid, 27" Diameter X 41" High.....	607.94	
02 86 00 00-0016 Composite Overpacks (02 86 00 00-0002)		
02 86 00 00-0017 EA 55 Gal, DOT 17C, Steel Drum Nested With 2-20 Gallon Fiber Drums.....	329.90	
02 86 00 00-0018 EA 55 Gal, DOT 17C, Steel Drum Nested With 4-10 Gallon Fiber Drums.....	452.71	
02 86 00 00-0019 EA 85 Gal, 16 Gauge Salvage Drum Nested With 3-20 Gallon Fiber Drums.....	614.05	
02 86 00 00-0020 DOT E-9168 Exempt Packaging (02 86 00 00-0002)		
02 86 00 00-0021 EA 32 Oz Bottle, Carton, Insert, Can, Poly Bag And Tape -E9168.....	63.58	
02 86 00 00-0022 EA 950 cc Bottle, Carton, Insert, Can, Poly Bag And Tape -E9168.....	67.08	
02 86 00 00-0023 EA 500 cc Bottle, Carton, Insert, Can, Poly Bag And Tape -E9168.....	65.58	
02 86 00 00-0024 EA 250 cc Bottle, Carton, Insert, Can, Poly Bag And Tape -E9168.....	32.47	
02 86 00 00-0025 EA Can, Carton, Insert, Tape - Corrosive And Flammable - UPS.....	17.68	
02 86 00 00-0026 EA 16 Oz Bottle, Carton, Insert And Tape, Sludge/Viscous, UPS.....	14.65	
02 86 00 00-0027 EA 32 Oz Bottle, Carton, Insert And Tape, Sludge/Viscous, UPS.....	19.06	
02 86 00 00-0028 Steel Drums (02 86 00 00-0001)		
02 86 00 00-0029 UN Rated Steel Drums (02 86 00 00-0028)		
02 86 00 00-0030 EA 8 Gallon, 17C, Open, Steel Drum.....	110.77	
02 86 00 00-0031 EA 55 Gallon Stainless Steel DOT 5C Seamless Oh Drum 16-Gauge (25-49).....	1,380.00	
02 86 00 00-0032 EA UN 1A2/X 320/S 55 Gallon, Open, 16 Gauge, Steel Drum.....	245.27	
02 86 00 00-0033 EA 55 Gallon Stainless Steel DOT 17E Ch 18-Gauge Drum (10-24).....	1,113.58	
02 86 00 00-0034 EA 55 Gallon Reconditioned Steel 17h Drum (50+).....	108.36	
02 86 00 00-0035 EA 55 Gallon Stainless Steel DOT 17E Ch 18-Gauge Drum (25-49).....	1,092.62	
02 86 00 00-0036 EA UN 1A2/X 320/S 55 Gallon, Closed, 16 Gauge, Steel Drum.....	231.82	
02 86 00 00-0037 EA 55 Gallon Stainless Steel DOT 5C Seamless Oh Drum 16-Gauge (50+).....	1,308.15	
02 86 00 00-0038 EA 55 Gallon Stainless Steel DOT 5C Ch Seamless Drum 16-Gauge (10-24).....	1,598.52	
02 86 00 00-0039 EA 55 Gallon Stainless Steel DOT 5C Ch Seamless Drum 16-Gauge (25-49).....	1,568.59	
02 86 00 00-0040 EA 55 Gallon Stainless Steel DOT 5C Oh 16-Gauge Drum (1-9).....	1,445.85	
02 86 00 00-0041 EA UN 1A2/Y 1.4/100 55 Gallon, Open, 16 Gauge, Steel Drum.....	187.97	
02 86 00 00-0042 EA 55 Gallon Stainless Steel DOT 17E Ch 18-Gauge Drum (50+).....	984.86	
02 86 00 00-0043 EA 55 Gallon Stainless Steel DOT 5C Oh 16-Gauge Drum (10-24).....	1,418.91	
02 86 00 00-0044 EA UN 1A2/Y 1.4/100 55 Gallon, Closed, 16 Gauge, Steel Drum.....	148.14	
02 86 00 00-0045 EA 30 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum.....	927.98	
02 86 00 00-0046 EA 55 Gallon Stainless Steel DOT 5C Ch Seamless Drum 16-Gauge (50+).....	1,412.93	
02 86 00 00-0047 EA UN 1A2/X 160/S 30 Gallon, Open, 18 Gauge, Steel Drum.....	171.72	
02 86 00 00-0048 EA 55 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (1-9).....	1,508.72	
02 86 00 00-0049 EA 30 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (10-24).....	892.06	
02 86 00 00-0050 EA 55 Gallon Stainless Steel DOT 5C Oh 16-Gauge Drum (25-49).....	1,278.22	
02 86 00 00-0051 EA 30 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (25-49).....	853.14	
02 86 00 00-0052 EA 55 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (10-24).....	1,472.80	
02 86 00 00-0053 EA UN 1A2/Y 1.4/100 30 Gallon, Open, 18 Gauge, Steel Drum.....	145.96	
02 86 00 00-0054 EA 55 Gallon Stainless Steel DOT 5C Oh 16-Gauge Drum (50+).....	1,212.36	
02 86 00 00-0055 EA 55 Gallon Reconditioned Steel 17h Drum (1-9).....	158.93	
02 86 00 00-0056 EA 30 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (50+).....	823.21	
02 86 00 00-0057 EA 55 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (25-49).....	1,445.85	
02 86 00 00-0058 EA 30 Gallon, 17E, Open, Steel Drum.....	105.89	
02 86 00 00-0059 EA 55 Gallon Reconditioned Steel 17h Drum (10-24).....	140.87	
02 86 00 00-0060 EA 20 Gallon, 17C, Open, Steel Drum.....	148.82	
02 86 00 00-0061 EA 55 Gallon Stainless Steel DOT 5C Ch 16-Gauge Drum (50+).....	1,302.17	
02 86 00 00-0062 EA 55 Gallon Stainless Steel DOT 5C Seamless Oh Drum 16-Gauge (1-9).....	1,559.61	
02 86 00 00-0063 EA 55 Gallon Stainless Steel DOT 17E Ch 18-Gauge Drum (1-9).....	1,140.52	
02 86 00 00-0064 EA 55 Gallon Reconditioned Steel 17h Drum (25-49).....	122.81	
02 86 00 00-0065 EA 55 Gallon Stainless Steel DOT 5C Seamless Oh Drum 16-Gauge (10-24).....	1,529.67	
02 86 00 00-0066 EA 20 Gallon, 17E, Open, Steel Drum.....	100.17	
02 86 00 00-0067 Plastic Drums (02 86 00 00-0001)		
02 86 00 00-0068 Polyethylene Closed Head Drums (02 86 00 00-0067)		
Note: Closed head drums have standard NPS (National Pipe Standard) plug and drain vents. Primarily for liquids.		
02 86 00 00-0069 EA 55 Gallon Polyethylene Closed Head Drums.....	153.97	
02 86 00 00-0070 EA 35 Gallon Polyethylene Closed Head Drums.....	118.20	
02 86 00 00-0071 EA 30 Gallon Polyethylene Closed Head Drums.....	107.32	
02 86 00 00-0072 EA 20 Gallon Polyethylene Closed Head Drums.....	74.98	

02	02 Existing Conditions
	02 80 Facility Remediation
	02 86 Hazardous Waste Drum Handling



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 86 00 00-0073 EA 15 Gallon Polyethylene Closed Head Drums.....73.55

02 86 00 00-0074 Polyethylene Open Head Drums (02 86 00 00-0067)
 Note: Open head drums are primarily used for solids and sludge.

02 86 00 00-0075 EA 55 Gallon Polyethylene Open Head Drums194.61
 02 86 00 00-0076 EA 35 Gallon Polyethylene Open Head Drums143.10
 02 86 00 00-0077 EA 30 Gallon Polyethylene Open Head Drums135.94
 02 86 00 00-0078 EA 20 Gallon Polyethylene Open Head Drums100.17
 02 86 00 00-0079 EA 15 Gallon Polyethylene Open Head Drums85.86

02 86 00 00-0080 Fiber Drums (02 86 00 00-0001)

02 86 00 00-0081 Steel Top/Fiber Bottom Drums, Hazardous (02 86 00 00-0080)
 Note: Waste fiber drums have tubular rubber gaskets and caulked bottom seams.

02 86 00 00-0082 EA 30 Gallon Fiber Drum DOT-21C (1-9).....117.91
 02 86 00 00-0083 EA 30 Gallon Fiber Drum DOT-21C (10-24).....110.47
 02 86 00 00-0084 EA 30 Gallon Fiber Drum DOT-21C (25-49).....100.74
 02 86 00 00-0085 EA 30 Gallon Fiber Drum DOT-21C (50+).....99.60
 02 86 00 00-0086 EA 55 Gallon Fiber Drum DOT-21C (1-9).....121.35
 02 86 00 00-0087 EA 55 Gallon Fiber Drum DOT-21C (10-24).....114.48
 02 86 00 00-0088 EA 55 Gallon Fiber Drum DOT-21C (25-49).....105.89
 02 86 00 00-0089 EA 55 Gallon Fiber Drum DOT-21C (50-99).....102.46
 02 86 00 00-0090 EA 55 Gallon Fiber Drum DOT-21C (100+).....88.72
 02 86 00 00-0091 EA 10 Gallon, 20" Diameter, DOT 21C-250 Polyethylene/Polyester Lined75.56
 02 86 00 00-0092 EA 20 Gallon, 20" Diameter, DOT 21C-250 Polyethylene/Polyester Lined82.42
 02 86 00 00-0093 EA 20 Gallon, 23" Diameter, DOT 21C-250 Polyethylene/Polyester Lined96.16

02 86 00 00-0094 Loading Hazardous Waste For Shipment (02 86 00 00-0001)

02 86 00 00-0095 EA Load Drums On Disposal Truck.....11.92
 02 86 00 00-0096 EA Load Liquid Or Sludge Into 5,000 Gallon Bulk Tank Truck1,266.51

02 86 00 00-0097 Transport Drums To Landfill (02 86 00 00-0001)
 Note: Includes transportation for up to 25 miles.

02 86 00 00-0098 EA Transport Drum To Landfill99.31
 Note: Includes transportation for up to 25 miles.

02 87 Bio-Hazard Material Remediation (02 80)

02 87 13 Mold Remediation (02 87)
 Note: All unit pricing in this section includes: materials, equipment, mobilization, preparation, removal, clean-up, vacuuming, transportation for up to 25 miles, disposal, monitoring (personnel and air), sampling/testing, fees, documentation and other associated costs necessary for the complete removal and disposal of mold in accordance with EPA, OSHA, IICRC standards and local regulations. Where types of Mold are listed by quantity, the quantity of the entire project, not a particular work area of building, is to be used in determining which tasks apply. For certain types of work, there is a task with a unit of measure of SET for a quantity of less than 100 LF or SF (Up to 25 LF for Mold Abatement pipe insulation), followed by a series of tasks for other quantities. For those tasks the contractor will be paid the first task with a unit of measure of EA, plus an additional task to arrive at the appropriate quantity for the project. See CSI section 01 56 16 00-0023 for temporary stud walls, 01 74 19 00-0040 for hauling in excess of 25 miles to transfer or disposal site, 02 89 00 00-0008 for plastic sheeting for containment construction, 02 89 00 00-0020 for decontamination chambers.

02 87 13 33 Removal and Disposal of Materials with Mold (02 87 13)

02 87 13 33-0001 Pipe And Pipe Fittings Insulation, Mold Abatement And Disposal (02 87 13 33)
 Note: Treat fittings as additional lf of insulation.

02 87 13 33-0002 Pipe Insulation, Mold Abatement And Disposal (02 87 13 33-0001)
 Note: Diameter is outer size of insulation.

02 87 13 33-0003 Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal (02 87 13 33-0002)
 Note: Excludes encased fittings.

02 87 13 33-0004 SET Up To 20 LF, Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal871.13
 02 87 13 33-0005 LF >20 To 250 LF, Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal33.78
 02 87 13 33-0006 LF >250 To 500 LF, Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal25.45
 02 87 13 33-0007 LF >500 To 2,500 LF, Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal.....19.20
 02 87 13 33-0008 LF >2,500 To 10,000 LF, Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal.....14.50
 02 87 13 33-0009 LF >10,000 LF, Up To 6" Diameter Pipe Insulation, Mold Abatement And Disposal.....12.67

02 87 13 33-0010 >6" Diameter Pipe Insulation, Mold Abatement And Disposal (02 87 13 33-0002)

02 87 13 33-0011 SET Up To 20 LF, >6" Diameter Pipe Insulation, Mold Abatement And Disposal.....897.58
 02 87 13 33-0012 LF >20 To 250 LF, >6" Diameter Pipe Insulation, Mold Abatement And Disposal40.11
 02 87 13 33-0013 LF >250 To 500 LF, >6" Diameter Pipe Insulation, Mold Abatement And Disposal30.52
 02 87 13 33-0014 LF >500 To 2,500 LF, >6" Diameter Pipe Insulation, Mold Abatement And Disposal23.33
 02 87 13 33-0015 LF >2,500 To 10,000 LF, >6" Diameter Pipe Insulation, Mold Abatement And Disposal17.94
 02 87 13 33-0016 LF >10,000 LF, >6" Diameter Pipe Insulation, Mold Abatement And Disposal15.83

02 87 13 33-0017 Thermal Insulation, Mold Abatement And Disposal (02 87 13 33)



Existing Conditions	02	02
Facility Remediation	02 80	
Bio-Hazard Material Remediation	02 87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 87 13 33-0018 Other Thermal Insulation, Up To 3" Thick, Mold Abatement And Disposal <small>(02 87 13 33-0017)</small>		
02 87 13 33-0019 SET Up To 50 SF, Up To 3" Thick Thermal Insulation, Mold Abatement And Disposal	884.36	
02 87 13 33-0020 SF >50 To 500 SF, Up To 3" Thick Thermal Insulation, Mold Abatement And Disposal	19.60	
02 87 13 33-0021 SF >500 To 2,500 SF, Up To 3" Thick Thermal Insulation, Mold Abatement And Disposal	14.81	
02 87 13 33-0022 SF >2,500 To 10,000 SF, Up To 3" Thick Other Thermal Insulation, Mold Abatement And Disposal	11.22	
02 87 13 33-0023 SF >10,000 SF, Up To 3" Thick Thermal Insulation, Mold Abatement And Disposal	8.70	
02 87 13 33-0024 Surfacing Material, Mold Abatement And Disposal <small>(02 87 13 33)</small> Note: e.g. fireproofing, acoustical plaster, etc.		
02 87 13 33-0025 Stucco, Mold Abatement And Disposal <small>(02 87 13 33-0024)</small> Note: Remove surface coat from brown coat or remove entire assembly, including lath.		
02 87 13 33-0026 SET Up To 50 SF, Stucco, Mold Abatement And Disposal	877.01	
02 87 13 33-0027 SF >50 To 500 SF, Stucco, Mold Abatement And Disposal	19.45	
02 87 13 33-0028 SF >500 To 2,500 SF, Stucco, Mold Abatement And Disposal	14.66	
02 87 13 33-0029 SF >2,500 To 10,000 SF, Stucco, Mold Abatement And Disposal	11.07	
02 87 13 33-0030 SF >10,000 SF, Stucco, Mold Abatement And Disposal	8.40	
02 87 13 33-0031 Acoustical Plaster, Mold Abatement And Disposal <small>(02 87 13 33-0024)</small> Note: Remove surface coat from brown coat or remove entire assembly, including lath.		
02 87 13 33-0032 SET Up To 50 SF, Acoustical Plaster, Mold Abatement And Disposal	877.01	
02 87 13 33-0033 SF >50 To 500 SF, Acoustical Plaster, Mold Abatement And Disposal	19.45	
02 87 13 33-0034 SF >500 To 2,500 SF, Acoustical Plaster, Mold Abatement And Disposal	14.66	
02 87 13 33-0035 SF >2,500 To 10,000 SF, Acoustical Plaster, Mold Abatement And Disposal	11.07	
02 87 13 33-0036 SF >10,000 SF, Acoustical Plaster, Mold Abatement And Disposal	8.40	
02 87 13 33-0037 Gypsum Board, Mold Abatement And Disposal <small>(02 87 13 33-0024)</small>		
02 87 13 33-0038 SET Up To 100 SF, Gypsum Board, Mold Abatement And Disposal	891.71	
02 87 13 33-0039 SF >100 To 500 SF, Gypsum Board, Mold Abatement And Disposal	6.49	
02 87 13 33-0040 SF >500 To 2,500 SF, Gypsum Board, Mold Abatement And Disposal	5.14	
02 87 13 33-0041 SF >2,500 To 10,000 SF, Gypsum Board, Mold Abatement And Disposal	4.06	
02 87 13 33-0042 SF >10,000 SF, Gypsum Board, Mold Abatement And Disposal	2.99	
02 87 13 33-0043 Fireproofing, Mold Abatement And Disposal <small>(02 87 13 33-0024)</small> Note: Exposed surface area, includes associated overspray.		
02 87 13 33-0044 SET Up To 50 SF, Fireproofing, Mold Abatement And Disposal	884.36	
02 87 13 33-0045 SF >50 To 500 SF, Fireproofing, Mold Abatement And Disposal	26.85	
02 87 13 33-0046 SF >500 To 2,500 SF, Fireproofing, Mold Abatement And Disposal	20.27	
02 87 13 33-0047 SF >2,500 To 10,000 SF, Fireproofing, Mold Abatement And Disposal	15.32	
02 87 13 33-0048 SF >10,000 SF, Fireproofing, Mold Abatement And Disposal	11.60	
02 87 13 33-0049 Flooring, Mold Abatement And Disposal <small>(02 87 13 33)</small> Note: Includes cove base.		
02 87 13 33-0050 Floor Tile Or Linoleum, Mold Abatement And Disposal <small>(02 87 13 33-0049)</small>		
02 87 13 33-0051 Floor Tile Or Linoleum, Mold Abatement And Disposal <small>(02 87 13 33-0050)</small> Note: Single layer or first of multiple layers.		
02 87 13 33-0052 SET Up To 100 SF, Single Layer Or First Of Multiple Layers, Floor Tile Or Linoleum, Mold Abatement And Disposal	891.71	
02 87 13 33-0053 SF >100 To 500 SF, Single Layer Or First Of Multiple Layers, Floor Tile Or Linoleum, Mold Abatement And Disposal	6.45	
For Each Additional Layer, Add	1.61	
02 87 13 33-0054 SF >500 To 2,500 SF, Single Layer Or First Of Multiple Layers, Floor Tile Or Linoleum, Mold Abatement And Disposal	3.61	
For Each Additional Layer, Add	0.90	
02 87 13 33-0055 SF >2,500 To 10,000 SF, Single Layer Or First Of Multiple Layers, Floor Tile Or Linoleum, Mold Abatement And Disposal	2.09	
For Each Additional Layer, Add	0.52	
02 87 13 33-0056 SF >10,000 SF, Single Layer Or First Of Multiple Layers, Floor Tile Or Linoleum, Mold Abatement And Disposal	1.62	
For Each Additional Layer, Add	0.41	
02 87 13 33-0057 Carpet, Mold Abatement And Disposal <small>(02 87 13 33-0049)</small>		
02 87 13 33-0058 Carpet, Glue Down, Mold Abatement And Disposal <small>(02 87 13 33-0057)</small>		
02 87 13 33-0059 SET Up To 100 SF, Carpet, Glue Down, Mold Abatement And Disposal	891.71	
02 87 13 33-0060 SF >100 To 500 SF, Carpet, Glue Down, Mold Abatement And Disposal	5.36	
02 87 13 33-0061 SF >500 To 2,500 SF, Carpet, Glue Down, Mold Abatement And Disposal	3.37	
02 87 13 33-0062 SF >2,500 To 10,000 SF, Carpet, Glue Down, Mold Abatement And Disposal	2.25	
02 87 13 33-0063 SF >10,000 SF, Carpet, Glue Down, Mold Abatement And Disposal	1.72	
02 87 13 33-0064 Carpet, Padded With Tack Strips, Mold Abatement And Disposal <small>(02 87 13 33-0057)</small>		
02 87 13 33-0065 SET Up To 100 SF, Carpet And Pad, Mold Abatement And Disposal	891.71	
Note: Includes tack strips.		
02 87 13 33-0066 SF >100 To 500 SF, Carpet And Pad, Mold Abatement And Disposal	6.04	
Note: Includes tack strips.		

02 Existing Conditions**02 80 Facility Remediation****02 87 Bio-Hazard Material Remediation**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
02 87 13 33-0067	SF	>500 To 2,500 SF, Carpet And Pad, Mold Abatement And Disposal..... Note: Includes tack strips.	4.39	
02 87 13 33-0068	SF	>2,500 To 10,000 SF, Carpet And Pad, Mold Abatement And Disposal..... Note: Includes tack strips.	3.48	
02 87 13 33-0069	SF	>10,000 SF, Carpet And Pad, Mold Abatement And Disposal..... Note: Includes tack strips.	2.68	
02 87 13 33-0070		Subflooring, Mold Abatement And Disposal (02 87 13 33-0049)		
02 87 13 33-0071	SET	Up To 75 SF, Subflooring, Mold Abatement And Disposal	884.36	
02 87 13 33-0072	SF	>75 To 500 SF, Subflooring, Mold Abatement And Disposal	7.42	
02 87 13 33-0073	SF	>500 To 2,500 SF, Subflooring, Mold Abatement And Disposal.....	4.74	
02 87 13 33-0074	SF	>2,500 To 10,000 SF, Subflooring, Mold Abatement And Disposal.....	2.86	
02 87 13 33-0075	SF	>10,000 SF, Subflooring, Mold Abatement And Disposal.....	1.83	
02 87 13 33-0076		Siding, Mold Abatement And Disposal (02 87 13 33)		
02 87 13 33-0077		Interior Paneling, Mold Abatement And Disposal (02 87 13 33-0076) Note: Includes detachment of mounted objects before removal.		
02 87 13 33-0078	SET	Up To 100 SF, Interior Paneling, Mold Abatement And Disposal	891.71	
02 87 13 33-0079	SF	>100 To 500 SF, Interior Paneling, Mold Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	6.42	
02 87 13 33-0080	SF	>500 To 2,500 SF, Interior Paneling, Mold Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	4.52	
02 87 13 33-0081	SF	>2,500 To 10,000 SF, Interior Paneling, Mold Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	2.63	
02 87 13 33-0082	SF	>10,000 SF, Interior Paneling, Mold Abatement And Disposal..... Note: Includes detachment of mounted objects before removal.	2.01	
02 87 13 33-0083		Exterior Siding, Mold Abatement And Disposal (02 87 13 33-0076)		
02 87 13 33-0084	SET	Up To 100 SF, Exterior Siding Board, Mold Abatement And Disposal.....	891.71	
02 87 13 33-0085	SF	>100 To 500 SF, Exterior Siding Board, Mold Abatement And Disposal.....	7.99	
02 87 13 33-0086	SF	>500 To 2,500 SF, Exterior Siding Board, Mold Abatement And Disposal.....	5.55	
02 87 13 33-0087	SF	>2,500 To 10,000 SF, Exterior Siding Board, Mold Abatement And Disposal.....	3.74	
02 87 13 33-0088	SF	>10,000 SF, Exterior Siding Board, Mold Abatement And Disposal.....	3.37	
02 87 13 33-0089		Contaminated Debris, Mold Abatement And Disposal (02 87 13 33)		
02 87 13 33-0090		Contaminated Debris, Mold Abatement And Disposal (02 87 13 33-0089)		
02 87 13 33-0091	SET	Up To 20 CF, Contaminated Debris, Mold Abatement And Disposal.....	897.58	
02 87 13 33-0092	CF	>20 To 100 CF, Contaminated Debris, Mold Abatement And Disposal.....	31.58	
02 87 13 33-0093	CF	>100 To 250 CF, Contaminated Debris, Mold Abatement And Disposal.....	21.65	
02 87 13 33-0094	CF	>250 To 500 CF, Contaminated Debris, Mold Abatement And Disposal.....	16.67	
02 87 13 33-0095	CF	>500 To 2,500 CF, Contaminated Debris, Mold Abatement And Disposal.....	13.69	
02 87 13 33-0096	CF	>2,500 To 10,000 CF, Contaminated Debris, Mold Abatement And Disposal.....	8.28	
02 87 13 33-0097	CF	>10,000 CF, Contaminated Debris, Mold Abatement And Disposal.....	7.62	
02 87 13 33-0098		Other Mold Containing Materials, Mold Abatement And Disposal (02 87 13 33)		
02 87 13 33-0099		Wood Studs, Mold Abatement And Disposal (02 87 13 33-0098) Note: 2" x 4" or 2" x 6" exposed studs in walls. Excludes surfacing material.		
02 87 13 33-0100	SET	Up To 100 LF, Wood Studs, Mold Abatement And Disposal	445.85	
02 87 13 33-0101	LF	>100 To 500 LF, Wood Studs, Mold Abatement And Disposal.....	3.63	
02 87 13 33-0102	LF	>500 To 2,500 LF, Wood Studs, Mold Abatement And Disposal.....	2.70	
02 87 13 33-0103	LF	>2,500 To 10,000 LF, Wood Studs, Mold Abatement And Disposal.....	2.11	
02 87 13 33-0104	LF	>10,000 LF, Wood Studs, Mold Abatement And Disposal.....	1.60	
02 87 13 33-0105		Ceiling Tile, Mold Abatement And Disposal (02 87 13 33-0098) Note: e.g. grid, spline, or glued on; 12" x 12" to 2' x 4'.		
02 87 13 33-0106	SET	Up To 100 SF, Ceiling Tile, Mold Abatement And Disposal.....	891.71	
02 87 13 33-0107	SF	>100 To 1,000 SF, Ceiling Tile, Mold Abatement And Disposal.....	11.07	
02 87 13 33-0108	SF	>1,000 To 2,500 SF, Ceiling Tile, Mold Abatement And Disposal.....	5.20	
02 87 13 33-0109	SF	>2,500 To 10,000 SF, Ceiling Tile, Mold Abatement And Disposal.....	3.74	
02 87 13 33-0110	SF	>10,000 To 25,000 SF, Ceiling Tile, Mold Abatement And Disposal.....	3.68	
02 87 13 33-0111	SF	>25,000 To 50,000 SF, Ceiling Tile, Mold Abatement And Disposal.....	3.61	
02 87 13 33-0112	SF	>50,000 To 100,000 SF, Ceiling Tile, Mold Abatement And Disposal.....	3.16	
02 87 13 33-0113	SF	>100,000 SF, Ceiling Tile, Mold Abatement And Disposal.....	2.76	
02 87 13 33-0114		Caulking, Mold Abatement And Disposal (02 87 13 33-0098)		
02 87 13 33-0115	SET	Up To 20 LF, Caulking, Mold Abatement And Disposal.....	216.07	
02 87 13 33-0116	LF	>20 To 50 LF, Caulking, Mold Abatement And Disposal.....	4.34	
02 87 13 33-0117	LF	>50 To 100 LF, Caulking, Mold Abatement And Disposal.....	3.10	
02 87 13 33-0118	LF	>100 To 250 LF, Caulking, Mold Abatement And Disposal.....	2.35	
02 87 13 33-0119	LF	>250 To 1,000 LF, Caulking, Mold Abatement And Disposal.....	1.74	
02 87 13 33-0120	LF	>1,000 To 2,500 LF, Caulking, Mold Abatement And Disposal.....	1.41	



Existing Conditions	02	02
Facility Remediation	02 80	
Bio-Hazard Material Remediation	02 87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 87 13 33-0121 LF >2,500 LF, Caulking, Mold Abatement And Disposal	1.22	
02 87 13 33-0122 Wipe Down Walls, Ceilings And Floors (02 87 13 33-0098)		
02 87 13 33-0123 CSF Wipe Down Floors With Mild Bleach Solution	23.98	
For >25 To 50, Deduct	-2.40	
For >50 To 200, Deduct	-5.99	
For >200, Deduct	-9.58	
02 87 13 33-0124 CSF Wipe Down Walls With Mild Bleach Solution	28.20	
For >25 To 50, Deduct	-2.82	
For >50 To 200, Deduct	-7.05	
For >200, Deduct	-11.27	
02 87 13 33-0125 CSF Wipe Down Ceilings With Mild Bleach Solution	32.08	
For >25 To 50, Deduct	-3.21	
For >50 To 200, Deduct	-8.02	
For >200, Deduct	-12.82	
02 87 13 33-0126 CSF Wipe Down Countertops With Mild Bleach Solution	26.16	
For >25 To 50, Deduct	-2.61	
02 87 13 33-0127 CSF Wipe Down Other Surfaces With Mild Bleach Solution	33.18	
For >25 To 50, Deduct	-3.32	
For >50 To 200, Deduct	-8.29	
For >200, Deduct	-13.26	
02 87 13 33-0128 Cabinets (02 87 13 33-0098)		
02 87 13 33-0129 SET Up To 10 LF, Base Cabinet, Mold Abatement And Disposal	942.56	
02 87 13 33-0130 LF >10 To 20 LF, Base Cabinet, Mold Abatement And Disposal	99.49	
02 87 13 33-0131 LF >20 LF, Base Cabinet, Mold Abatement And Disposal	73.33	
02 87 13 33-0132 SET Up To 10 LF, Wall Cabinet, Mold Abatement And Disposal	889.67	
02 87 13 33-0133 LF >10 To 20 LF, Wall Cabinet, Mold Abatement And Disposal	83.73	
02 87 13 33-0134 LF >20 LF, Wall Cabinet, Mold Abatement And Disposal	57.59	
02 87 16 Excrement Removal (02 87)		
Note: Includes materials, equipment, mobilization, preparation, critical barriers (e.g. electrical outlets, registers, windows, etc.), signage, removal, clean-up, vacuuming, disposal, personnel health monitoring, documentation and other associated costs necessary for the complete removal and disposal of the contaminated material in accordance with EPA and local regulations. The quantity of the entire project, not a particular work area, is to be used in determining which tasks apply. There is a task with a unit of measure of EA for a quantity of less than 10 SF, followed by a series of tasks for additional quantities. For those tasks, the contractor will be paid the first task with a unit of measure of EA, plus each additional task in sequence to arrive at the total quantity for the entire project, not a particular work area.		
02 87 16 13 Bird Excrement Removal (02 87 16)		
02 87 16 13-0001 Bird Waste Removal (02 87 16 13)		
Note: In addition to items listed the Bio-Hazard Material Remediation note above, includes wetting agents and disinfection of contaminated surfaces.		
02 87 16 13-0002 EA Up To 10 SF Bird Waste Removal, Up To 3" Thickness	862.32	
For Work In Restricted Working Space, Add	258.70	
02 87 16 13-0003 SF >10 To 500 SF Bird Waste Removal, Up To 3" Thickness	14.37	
For Work In Restricted Working Space, Add	4.31	
02 87 16 13-0004 SF >500 To 2,500 SF Bird Waste Removal, Up To 3" Thickness	13.06	
For Work In Restricted Working Space, Add	3.92	
02 87 16 13-0005 SF >2,500 To 10,000 SF Bird Waste Removal, Up To 3" Thickness	11.88	
For Work In Restricted Working Space, Add	3.56	
02 87 16 13-0006 SF >10,000 SF Bird Waste Removal, Up To 3" Thickness	10.80	
For Work In Restricted Working Space, Add	3.24	
02 87 19 Bio-Hazard and Infectious Disease Control Remediation (02 87)		
02 87 19 00-0001 Barriers For Bio-Hazard And Infectious Disease Control (02 87 19)		
02 87 19 00-0002 Adjustable Barrier Panel System For Bio-Hazard And Infectious Disease Control (02 87 19 00-0001)		
Note: Panels are opal or transparent. Includes self-leveling floor channel, 1/4" foam gasket to conform to ceiling, edge gaskets, grid clips, and cam locks.		
02 87 19 00-0003 EA 4' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4000)	689.97	
02 87 19 00-0004 EA 3' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4001)	655.30	
02 87 19 00-0005 EA 2' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4002)	516.64	
02 87 19 00-0006 EA 2' Wide x 7'-8" To 10' High With High Efficiency Particulate Air (HEPA) Filtered Air Discharge Port, Fire Rated Containment Panel Assembly (Edge Guard 4002.1)	597.53	
02 87 19 00-0007 EA 4' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly With 44" Door (Edge Guard 4003)	1,169.50	
Note: Includes a hydraulic closer and a lever style lockset standard.		
02 87 19 00-0008 EA 7'-8" To 10' High, Hinged Corner Assembly (Edge Guard 4004)	236.00	
02 87 19 00-0009 EA 6" Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4005)	316.11	
02 87 19 00-0010 EA 12" Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4006)	339.22	
02 87 19 00-0011 EA 7'-8" To 10' High, Outside Corner Post (Edge Guard 4007)	195.55	
02 87 19 00-0012 EA 4'-4" Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly With 48" Door (Edge Guard 4008)	1,400.60	
Note: Includes a hydraulic closer and a lever style lockset standard.		
02 87 19 00-0013 EA 7'-8" To 10' High, "T" Post Corner Assembly (Edge Guard 4009)	195.55	
02 87 19 00-0014 EA 3' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly With 32" Door (Edge Guard 4010)	1,053.95	
Note: Includes a hydraulic closer and a lever style lockset standard.		

02 Existing Conditions**02 80 Facility Remediation****02 87 Bio-Hazard Material Remediation**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
02 87 19 00-0015	EA	Closure Strips (Edge Guard 3003).....		14.13	
		Note: To seal panels to existing walls			
02 87 19 00-0016	EA	Digital Differential Pressure Gauge Kit (Edge Guard 3005).....		323.31	
02 87 19 00-0017		Temporary Sheeting For Bio-Hazard And Infectious Disease Control (02 87 19 00-0001)			
		Note: Includes removal and disposal in approved landfill after use.			
02 87 19 00-0018	SF	6 Mil Plastic Sheeting, Applied To Floors, For Bio-Hazard And Infectious Disease Control		0.55	
02 87 19 00-0019	SF	6 Mil Plastic Sheeting, Applied To Walls, For Bio-Hazard And Infectious Disease Control.....		0.72	
02 87 19 00-0020	SF	6 Mil Plastic Sheeting, Applied To Ceilings, For Bio-Hazard And Infectious Disease Control.....		0.97	
02 87 19 00-0021	SF	6 Mil Plastic Fire Retardant, Anti-static Sheeting, Applied To Floors, For Bio-Hazard And Infectious Disease Control		0.65	
02 87 19 00-0022	SF	6 Mil Plastic Fire Retardant, Anti-static Retardant Sheeting, Applied To Walls, For Bio-Hazard And Infectious Disease Control		0.82	
02 87 19 00-0023	SF	6 Mil Plastic Fire Retardant, Anti-static Retardant Sheeting, Applied To Ceilings, For Bio-Hazard And Infectious Disease Control		1.07	
02 87 19 00-0024		Temporary Floor Protection For Bio-Hazard And Infectious Disease Control (02 87 19 00-0001)			
		Note: Includes removal after use.			
02 87 19 00-0025	SF	1/8" Thick, Masonite Temporary Floor Protection For Bio-Hazard And Infectious Disease Control.....		1.78	
02 87 19 00-0026	SF	1/2" Thick, Plywood Temporary Floor Protection For Bio-Hazard And Infectious Disease Control.....		1.81	
02 87 19 00-0027	SF	3/4" Thick, Plywood Temporary Floor Protection For Bio-Hazard And Infectious Disease Control.....		2.14	
02 87 19 00-0028		Temporary Stud Wall For Bio-Hazard And Infectious Disease Control (02 87 19 00-0001)			
		Note: Includes removal after use.			
02 87 19 00-0029	SF	1/2" Gypsum Board On One Side, Temporary Wood Stud Wall For Bio-Hazard And Infectious Disease Control.....		6.11	
02 87 19 00-0030	SF	1/2" Gypsum Board On Both Sides, Temporary Wood Stud Wall For Bio-Hazard And Infectious Disease Control		8.57	
02 87 19 00-0031	SF	5/8" Type Fire Rated Gypsum Board On One Side, Temporary Wood Stud Wall For Bio-Hazard And Infectious Disease Control		6.31	
02 87 19 00-0032	SF	5/8" Type Fire Rated Gypsum Board On Both Sides, Temporary Wood Stud Wall For Bio-Hazard And Infectious Disease Control		8.97	
02 87 19 00-0033	SF	6 Mil, Fire Retardant, Plastic Sheeting On One Side, Temporary Wood Stud Wall For Bio-Hazard And Infectious Disease Control		3.45	
02 87 19 00-0034		Isolation Barriers For Bio-Hazard And Infectious Disease Control (02 87 19 00-0001)			
02 87 19 00-0035	GSF	Tent Construction Utilizing Two Layers Of 6 Mil Fire Rated Plastic Sheeting For Bio-Hazard And Infectious Disease Control		22.97	
		Note: Includes support frame of 2x4s or PVC piping (ground SF) up to 6' to construct stand-alone tents (floor, walls and ceiling) with airlock.			
02 87 19 00-0036	GSF	Relocate Tent Construction To Different Area		2.78	
02 87 19 00-0037		Plexiglass Barriers For Bio-Hazard And Infectious Disease Control (02 87 19 00-0001)			
02 87 19 00-0038	SF	3/8" Thick, Clear Acrylic Glazing (Plexiglas) For Bio-Hazard And Infectious Disease Control		21.13	
02 87 19 00-0039	SF	1/2" Thick, Clear Acrylic Glazing (Plexiglas) For Bio-Hazard And Infectious Disease Control		25.02	
02 87 19 00-0040	SF	3/4" Thick, Clear Acrylic Glazing (Plexiglas) For Bio-Hazard And Infectious Disease Control		35.32	
02 87 19 00-0041	PR	Install Pair Of 8" Diameter Glove Iris Port In Barrier For Bio-Hazard And Infectious Disease Control.....		1,471.29	
		Note: Excludes gloves.			
02 87 19 00-0042	PR	Pair Of 8" Diameter Economy Sleeved Gloves With Clamping Ring For Bio-Hazard And Infectious Disease Control		527.66	
		Note: For installation in glove iris port.			
02 87 19 00-0043	PR	Pair Of 8" Diameter Bellows Type Gloves With Clamping Ring For Bio-Hazard And Infectious Disease Control.....		843.62	
		Note: For installation in glove iris port.			
02 87 19 00-0044	EA	5-5/16" Diameter, Satin Anodized Aluminum, No-Draft Speak-Thru In Barrier For Bio-Hazard And Infectious Disease.....		149.67	
		Note: Includes gaskets and mounting screws for installation on glass from 1/4" (6 mm) to 1/2" (12 mm) thick. Require a minimum hole diameter of 2-1/4" (57 mm), and will cover holes up to 4-1/4" (108 mm). Recommended hole diameter is 3-1/2" (89 mm).			
02 87 19 00-0045		Temporary Portable And Mobile Trailers (02 87 19)			
02 87 19 00-0046		Trailer Delivery (02 87 19 00-0045)			
02 87 19 00-0047	EA	Deliver Trailer Within 25 Miles		1,257.14	
02 87 19 00-0048		Portable And Mobile Trailers, Purchase (02 87 19 00-0045)			
		Note: Includes cost to set-up, underpin, tie-downs, HVAC unit, lights, outlets, & phone jacks. Trailers shall have a 12' x 12' office area and 6' x 8' bathroom with sink, mirror, and water closet. Minimum of two pedestrian doors and a tinted/insulated 3' x 4' single hung window per 20 SF of wall area. Excludes connection of utilities.			
02 87 19 00-0049	EA	8' x 24' Mobile Trailer With Toilet, Purchase		13,013.18	
		For Tie-Downs, Add		129.42	
02 87 19 00-0050	EA	8' x 32' Mobile Trailer With Toilet, Purchase		18,384.07	
		For Tie-Downs, Add		129.42	
02 87 19 00-0051	EA	10' x 36' Mobile Trailer With Toilet, Purchase		26,231.69	
		For Tie-Downs, Add		129.42	
02 87 19 00-0052	EA	10' x 44' Mobile Trailer With Toilet, Purchase		32,779.78	
		For Tie-Downs, Add		129.42	



Existing Conditions	02	02
Facility Remediation	02 80	
Bio-Hazard Material Remediation	02 87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 87 19 00-0053 EA 10' x 50' Mobile Trailer With Toilet, Purchase <i>For Tie-Downs, Add</i>	37,267.69 129.42	
02 87 19 00-0054 EA 12' x 50' Mobile Trailer With Toilet, Purchase <i>For Tie-Downs, Add</i>	39,178.30 129.42	
02 87 19 00-0055 EA 12' x 60' Mobile Trailer With Toilet, Purchase <i>For Tie-Downs, Add</i>	43,593.64 129.42	
02 87 19 00-0056 Accessories For Portable And Mobile Trailers <small>(02 87 19 00-0045)</small>		
02 87 19 00-0057 Skirting <small>(02 87 19 00-0056)</small> Note: Includes 2" x 4" wood framing 16" on center.		
02 87 19 00-0058 SF 1'-8" High Vinyl Covered Skirt	5.19	1.86
02 87 19 00-0059 SF 3' High Vinyl Covered Skirt	7.56	3.06
02 87 19 00-0060 Aluminum Modular Access Ramp <small>(02 87 19 00-0056)</small> Note: Includes picketed guardrails, inside grabrails, legs and hardware.		
02 87 19 00-0061 EA Up To 35" High, Aluminum Modular Access Ramp	3,795.41	35.52
02 87 19 00-0062 Aluminum Modular Stairs <small>(02 87 19 00-0056)</small> Note: Excludes earthwork		
02 87 19 00-0063 EA Aluminum Steps For Mobile Trailers	1,047.84	
02 87 19 00-0064 Decontamination Chambers For Bio-Hazard And Infectious Disease Control <small>(02 87 19)</small> Note: Includes removal after use.		
02 87 19 00-0065 EA Portable Personnel Decontamination Wash Facility (3 Stage) For Bio-Hazard And Infectious Disease Control Note: Includes connection to negative air system.	986.80	
02 87 19 00-0066 EA Portable Personnel Decontamination Wash Facility (5 Stage) For Bio-Hazard And Infectious Disease Control Note: Includes connection to negative air system.	1,162.50	
02 87 19 00-0067 EA Portable Waste Decontamination Unit For Bio-Hazard And Infectious Disease Control Note: Includes connection to negative air system.	597.59	
02 87 19 00-0068 Bio-Hazard And Infectious Disease Control Cleaning, Level 2 <small>(02 87 19)</small> Note: Includes worker personal protection equipment suites, gloves and masks. Level 1 Biohazard - Minor bacteria and viruses as well as non-infectious bacteria. Microbes are not known to cause disease in healthy hosts and pose minimal risk to workers and the environment. Level 2 Biohazard - Bacteria and viruses that cause mild disease or are difficult to contract. Microbes are typically indigenous and are associated with diseases of varying severity. They pose moderate risk to workers and the environment. Level 3 Biohazard - Microbes are indigenous or exotic and cause serious or potential lethal diseases through respiratory transmission. Disposal of materials used to wipe down surfaces in approved landfill after use. See CSI section 02 87 19 00-0138 for disposal of material into approved landfill.		
02 87 19 00-0069 Bio-Hazard And Infectious Disease Control Cleaning Mobilization <small>(02 87 19 00-0068)</small>		
02 87 19 00-0070 EA Bio-Hazard And Infectious Disease Control Mobilization And Set-Up Note: Mobilization and set-up minimum for each site location.	364.25	
02 87 19 00-0071 Bio-Hazard And Infectious Disease Control Cleaning Of Surfaces <small>(02 87 19 00-0068)</small> Note: Includes electrostatic spraying of surfaces with mild bleach, wet mop/wipe, disinfect and high efficiency particulate air (HEPA) vacuum surfaces		
02 87 19 00-0072 CSF Cleaning Of Floors For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution <i>For >25 To 50, Deduct</i> <i>For >50 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Cleaning Surfaces With Goldshield® GS5, Add</i> <i>For Level 1 Biohazard Cleaning, Deduct</i> <i>For Level 3 Biohazard Cleaning, Add</i>	27.01 -2.70 -5.40 -8.09 14.56 -5.40 8.90	
02 87 19 00-0073 CSF Cleaning Of Walls For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution <i>For >25 To 50, Deduct</i> <i>For >50 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Cleaning Surfaces With Goldshield® GS5, Add</i> <i>For Level 1 Biohazard Cleaning, Deduct</i> <i>For Level 3 Biohazard Cleaning, Add</i>	31.77 -3.17 -6.35 -9.52 14.56 -6.35 10.47	
02 87 19 00-0074 CSF Cleaning Of Ceilings For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution <i>For >25 To 50, Deduct</i> <i>For >50 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Cleaning Surfaces With Goldshield® GS5, Add</i> <i>For Level 1 Biohazard Cleaning, Deduct</i> <i>For Level 3 Biohazard Cleaning, Add</i>	36.14 -3.61 -7.22 -10.83 14.56 -7.22 11.92	
02 87 19 00-0075 CSF Cleaning Of Countertops For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution <i>For Cleaning Surfaces With Goldshield® GS5, Add</i> <i>For >5 To 10, Deduct</i> <i>For >10 To 50, Deduct</i> <i>For >50, Deduct</i> <i>For Level 1 Biohazard Cleaning, Deduct</i> <i>For Level 3 Biohazard Cleaning, Add</i>	29.46 14.56 -1.47 -2.94 -5.89 -5.89 9.71	

02 Existing Conditions**02 80 Facility Remediation****02 87 Bio-Hazard Material Remediation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 87 19 00-0076	CSF	Cleaning Of Other Surfaces For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution	37.39
		<i>For >25 To 50, Deduct</i>	-3.74
		<i>For >50 To 200, Deduct</i>	-7.47
		<i>For >200, Deduct</i>	-11.21
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	14.56
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-7.47
		<i>For Level 3 Biohazard Cleaning, Add</i>	12.33

02 87 19 00-0077 Bio-Hazard And Infectious Disease Control Cleaning Of Equipment And**Materials** (02 87 19 00-0068)

Note: Includes spraying of surfaces with mild bleach, wet mop/wipe and disinfect

02 87 19 00-0078	EA	Cleaning Of Plumbing Fixture For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution	69.80
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-13.95
		<i>For Level 3 Biohazard Cleaning, Add</i>	23.02
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	7.28
02 87 19 00-0079	EA	Cleaning Of Restroom Accessory For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution	32.04
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-6.40
		<i>For Level 3 Biohazard Cleaning, Add</i>	10.56
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	4.85
02 87 19 00-0080	EA	Cleaning Of Kitchen Appliance For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution	112.44
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-22.48
		<i>For Level 3 Biohazard Cleaning, Add</i>	37.10
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	7.28
02 87 19 00-0081	EA	Cleaning Of Electrical Switch/Receptacle For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution	6.94
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-1.38
		<i>For Level 3 Biohazard Cleaning, Add</i>	2.28
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	1.46
02 87 19 00-0082	EA	Cleaning Of WorkStation, Exterior Wipe For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution Clean-up	103.65
		Note: Includes desk, chair, computer, monitor(s), keyboard, mouse, lamp, drawers	
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-20.72
		<i>For Level 3 Biohazard Cleaning, Add</i>	34.19
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	7.28
02 87 19 00-0083	EA	Cleaning Of Knobs, Latches, And Locks For Bio-Hazard And Infectious Disease Control With Mild Bleach Solution Clean-up	11.08
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-2.21
		<i>For Level 3 Biohazard Cleaning, Add</i>	3.65
		<i>For Cleaning Surfaces With Goldshield® GS5, Add</i>	1.46

02 87 19 00-0084 Bio-Hazard And Infectious Disease Control Cleaning Of Ductwork (02 87 19 00-0068)

02 87 19 00-0085	LF	Up To 2 SF Cross Section, Clean Supply/Return Ductwork For Bio-Hazard And Infectious Disease Control Cleaning	4.08
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-0.81
		<i>For Level 3 Biohazard Cleaning, Add</i>	1.34
02 87 19 00-0086	LF	>2 SF To 4 SF Cross Section, Clean Supply/Return Ductwork For Bio-Hazard And Infectious Disease Control Cleaning	5.12
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-1.01
		<i>For Level 3 Biohazard Cleaning, Add</i>	1.67
02 87 19 00-0087	LF	>4 SF To 8 SF Cross Section, Clean Supply/Return Ductwork For Bio-Hazard And Infectious Disease Control Cleaning	6.86
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-1.35
		<i>For Level 3 Biohazard Cleaning, Add</i>	2.22
02 87 19 00-0088	LF	>8 SF Cross Section, Clean Supply/Return Ductwork For Bio-Hazard And Infectious Disease Control Cleaning	9.72
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-1.90
		<i>For Level 3 Biohazard Cleaning, Add</i>	3.13
02 87 19 00-0089	EA	Clean Duct Coil For Bio-Hazard And Infectious Disease Control Cleaning	182.16
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-36.43
		<i>For Level 3 Biohazard Cleaning, Add</i>	60.10
02 87 19 00-0090	SF	Clean Duct Dampers And Vane Sets For Bio-Hazard And Infectious Disease Control Cleaning	12.68
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-2.53
		<i>For Level 3 Biohazard Cleaning, Add</i>	4.17
02 87 19 00-0091	EA	Clean Fan Coil Unit (FCU) Or Variable Air Volume (VAV) Unit For Bio-Hazard And Infectious Disease Control Cleaning	121.45
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-24.28
		<i>For Level 3 Biohazard Cleaning, Add</i>	40.07
02 87 19 00-0092	EA	Clean Air Handling Unit Fan And Coil For Bio-Hazard And Infectious Disease Control Cleaning	364.28
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-72.85
		<i>For Level 3 Biohazard Cleaning, Add</i>	120.20
02 87 19 00-0093	EA	Clean Grille/Diffuser/Register For Bio-Hazard And Infectious Disease Control Cleaning	30.38
		Note: Includes removal and reinstallation.	
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-6.07
		<i>For Level 3 Biohazard Cleaning, Add</i>	10.02
02 87 19 00-0094	SF	Apply Sporidicin Disinfectant To Ductwork And Surfaces After Cleaning For Bio-Hazard And Infectious Disease Control Cleaning	0.55
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-0.10
		<i>For Level 3 Biohazard Cleaning, Add</i>	0.16
02 87 19 00-0095	SF	Apply Goldshield® GS5 Anti-microbial Agent To Ductwork And Surfaces After Cleaning For Bio-Hazard And Infectious Disease Control Cleaning	0.64
		<i>For Level 1 Biohazard Cleaning, Deduct</i>	-0.10
		<i>For Level 3 Biohazard Cleaning, Add</i>	0.16



Existing Conditions	02	02
Facility Remediation	02 80	
Bio-Hazard Material Remediation	02 87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 87 19 00-0096 Bio-Hazard And Infectious Disease Control Equipment Rental <small>(02 87 19)</small>		
<i>Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Bio-Hazard And Infectious Control Clean Up sections.</i>		
02 87 19 00-0097 DAY Up To 5,000 CFM Portable Air Scrubber For Bio-Hazard And Infectious Disease Control Clean-up	108.55	
02 87 19 00-0098 WK Up To 5,000 CFM Portable Air Scrubber For Bio-Hazard And Infectious Disease Control Clean-up	462.36	
02 87 19 00-0099 MO Up To 5,000 CFM Portable Air Scrubber For Bio-Hazard And Infectious Disease Control Clean-up	1,294.60	
02 87 19 00-0100 DAY Industrial High Efficiency Particulate Air (HEPA) Vacuum For Bio-Hazard And Infectious Disease Control Clean-up	155.99	
02 87 19 00-0101 WK Industrial High Efficiency Particulate Air (HEPA) Vacuum For Bio-Hazard And Infectious Disease Control Clean-up	428.98	
02 87 19 00-0102 MO Industrial High Efficiency Particulate Air (HEPA) Vacuum For Bio-Hazard And Infectious Disease Control Clean-up	1,169.93	
02 87 19 00-0103 DAY Zip Wall Poles (Per 2 Poles) For Bio-Hazard And Infectious Disease Control Clean-up	45.88	
02 87 19 00-0104 WK Zip Wall Poles (Per 2 Poles) For Bio-Hazard And Infectious Disease Control Clean-up	126.17	
02 87 19 00-0105 MO Zip Wall Poles (Per 2 Poles) For Bio-Hazard And Infectious Disease Control Clean-up	344.10	
02 87 19 00-0106 DAY Up To 2,000 CFM Portable Negative Air Machine With Pre-Filter And High Efficiency Particulate Air (HEPA) Filter For Bio-Hazard And Infectious Disease Control Clean-up	136.57	
02 87 19 00-0107 WK Up To 2,000 CFM Portable Negative Air Machine With Pre-Filter And High Efficiency Particulate Air (HEPA) Filter For Bio-Hazard And Infectious Disease Control Clean-up	560.92	
02 87 19 00-0108 MO Up To 2,000 CFM Portable Negative Air Machine With Pre-Filter And High Efficiency Particulate Air (HEPA) Filter For Bio-Hazard And Infectious Disease Control Clean-up	1,694.97	
02 87 19 00-0109 EA High Efficiency Particulate Air (HEPA) Filter, 99.99% Efficient At 0.3 Micron For Negative Air Machine For Bio-Hazard And Infectious Disease Control Clean-up	132.68	
<i>Note: Required if over 800 hours operation.</i>		
02 87 19 00-0110 DAY 20' x 20' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	435.08	
02 87 19 00-0111 WK 20' x 20' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	870.16	
02 87 19 00-0112 MO 20' x 20' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	1,740.31	
02 87 19 00-0113 DAY 20' x 40' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	580.10	
02 87 19 00-0114 WK 20' x 40' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	1,160.21	
02 87 19 00-0115 MO 20' x 40' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	2,320.42	
02 87 19 00-0116 DAY 20' x 60' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	979.47	
02 87 19 00-0117 WK 20' x 60' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	1,958.93	
02 87 19 00-0118 MO 20' x 60' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	3,917.87	
02 87 19 00-0119 DAY 20' x 80' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	1,305.96	
02 87 19 00-0120 WK 20' x 80' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	2,611.91	
02 87 19 00-0121 MO 20' x 80' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	5,223.82	
02 87 19 00-0122 DAY 20' x 100' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	1,632.45	
02 87 19 00-0123 WK 20' x 100' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	3,264.89	
02 87 19 00-0124 MO 20' x 100' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	6,529.78	
02 87 19 00-0125 EA Set-Up 20' x 20' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	111.14	
<i>Note: Includes staking down tent.</i>		
02 87 19 00-0126 EA Set-Up 20' x 40' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	222.27	
<i>Note: Includes staking down tent.</i>		
02 87 19 00-0127 EA Set-Up 20' x 60' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	666.81	
<i>Note: Includes staking down tent.</i>		
02 87 19 00-0128 EA Set-Up 20' x 80' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	1,333.62	
<i>Note: Includes staking down tent.</i>		
02 87 19 00-0129 EA Set-Up 20' x 100' High Peak Frame Tent For Bio-Hazard And Infectious Disease Control Clean-up	2,222.71	
<i>Note: Includes staking down tent.</i>		
02 87 19 00-0130 DAY Portable Dual Sink Wash Station For Bio-Hazard And Infectious Disease Control Clean-up	95.14	
02 87 19 00-0131 WK Portable Dual Sink Wash Station For Bio-Hazard And Infectious Disease Control Clean-up	261.63	
02 87 19 00-0132 MO Portable Dual Sink Wash Station For Bio-Hazard And Infectious Disease Control Clean-up	713.53	
02 87 19 00-0133 Bio-Hazard And Infectious Disease Control Hauling By Truck <small>(02 87 19)</small>		
<i>Note: Includes driver and equipment, ten (10) to fifteen (15) minutes load time, time for travel, dump time and return (roundtrip). The task quantity is the number of miles to the disposal site/transfer station (one-way mileage) using an appropriately sized truck.</i>		
02 87 19 00-0134 EA Hauling With 2-3 CY Pick-up Truck, Van Or Trailer, Up To 15 Miles For Bio-Hazard And Infectious Disease Control Clean Up	109.42	
<i>Note: Each first 15 miles per trip</i>		
<i>For Each Additional Mile Over First 15 Miles, Add Per Mile</i>		1.37
02 87 19 00-0135 EA Hauling With 6 To 8 CY Dump Truck, Up To 15 Miles For Bio-Hazard And Infectious Disease Control Clean Up	164.71	
<i>Note: Each first 15 miles per trip</i>		
<i>For Each Additional Mile Over First 15 Miles, Add Per Mile</i>		2.06
02 87 19 00-0136 EA Hauling With 10 To 12 CY Dump Truck, Up To 15 Miles For Bio-Hazard And Infectious Disease Control Clean Up	170.30	
<i>Note: Each first 15 miles per trip</i>		
<i>For Each Additional Mile Over First 15 Miles, Add Per Mile</i>		2.13
02 87 19 00-0137 EA Hauling With 16' To 20', Box Or Flat Bed Truck, Up To 15 Miles For Bio-Hazard And Infectious Disease Control Clean Up	177.58	
<i>Note: Each first 15 miles per trip</i>		
<i>For Each Additional Mile Over First 15 Miles, Add Per Mile</i>		2.22
02 87 19 00-0138 Bio-Hazard And Infectious Disease Control Disposal <small>(02 87 19)</small>		
<i>Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Bio-Hazard And Infectious Control Clean Up sections.</i>		
02 87 19 00-0139 CY Bio-Hazard And Infectious Disease Control Landfill Dump Fee	47.60	
02 87 19 00-0140 BLU-MED Response Systems® (BLU-MED) Deployable Medical Facilities™ and Emergency Shelters <small>(02 87 19)</small>		
<i>Note: Includes delivery and set-up of facility, electrical, lighting and HVAC. Excludes medical equipment.</i>		

02 Existing Conditions**02 80 Facility Remediation****02 87 Bio-Hazard Material Remediation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 87 19 00-0141	EA	20' x 32.5' Medical Shelter with 1-phase electrical, 60 Hertz (BLU-MED BM-2032.5-MS/1P)	45,047.15
02 87 19 00-0142	EA	7' x 8' Entry Vestibule (BLU-MED BM-MS-VEST).....	4,330.54
02 87 19 00-0143	EA	Vestibule End Panel with Bump Thru Door (BLU-MED BM-7x8-VEP04).....	7,165.29
02 87 19 00-0144	SF	Sub Flooring For Medical Shelter (AKS-AB846)	6.66
02 87 19 00-0145	EA	Upgrade To Large Roto-Mold Container, Blue (AK-ULC-5).....	1,966.72
02 87 19 00-0146	EA	Environmental Control Unit-5 Ton, 60 Hertz, Blue (AK-ECU-5T-5).....	32,212.44
02 87 19 00-0147	EA	3' ECU to Generator Pigtail, 60 Hertz (AKS-AC915).....	1,122.79
02 87 19 00-0148	EA	Negative Pressure Isolation (NPI) System (AK-NPIS-5).....	50,701.85
		Note: Including: (1) Germicidal/high efficiency particulate air (HEPA) Filter Unit; (1) Monitor/Alarm with Motorized Damper; (1) Isolation Partition for 20'-Wide Shelter; (1) NPI Accessories Case	
02 87 19 00-0149	EA	6' Step Ladder (AKS-AC595).....	304.30
02 87 19 00-0150	EA	10 Lbs Sledgehammer (AKS-AA268)	93.16

02 87 19 00-0151 Bio-Hazard And Infectious Disease Time And Material Tasks (02 87 19)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Bio-Hazard And Infectious Control Clean Up sections.

02 87 19 00-0152 Bio-Hazard And Infectious Disease Control Labor (02 87 19 00-0151)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Bio-Hazard And Infectious Control Clean Up sections.

02 87 19 00-0153	HR	General Laborer For Bio-Hazard And Infectious Disease Control Clean Up.....	115.92
02 87 19 00-0154	HR	Skilled Tradesman For Bio-Hazard And Infectious Disease Control Clean Up	128.68
02 87 19 00-0155	HR	Biohazard Technician For Bio-Hazard And Infectious Disease Control Clean Up	102.85
02 87 19 00-0156	HR	Biohazard Supervisor For Bio-Hazard And Infectious Disease Control Clean Up	123.67
02 87 19 00-0157	HR	Project Manager For Bio-Hazard And Infectious Disease Control Clean Up	136.00

02 87 19 00-0158 Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment (02 87 19 00-0151)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Bio-Hazard And Infectious Control Clean Up sections.

02 87 19 00-0159	EA	Tyvek Coveralls For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment.....	15.19
02 87 19 00-0160	EA	Tyvek Coveralls With Hood, Boots, Elastic Wrists And Ankles For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	23.65
02 87 19 00-0161	PR	Polycarbonate Lens Safety Goggles For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	15.33
02 87 19 00-0162	EA	Dual Cartridge Half-Mask Respirator For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	125.72
02 87 19 00-0163	EA	Cartridge - Respirator For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	53.06
02 87 19 00-0164	EA	Full Face Respirator For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	383.55
		Note: Respirator Connection Type: Bayonet, 4 pt. Full Face Suspension	
02 87 19 00-0165	EA	14-1/2" Width x 9" Height Polycarbonate Visor Faceshield For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	52.43
		Note: Includes basic impact ratchet headgear and faceshield safety system. ANSI Z87.1-2010	
02 87 19 00-0166	EA	19" Width x 11" Height Polycarbonate Visor Attachment To Hardhat For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment.....	95.26
		Note: Includes clear polycarbonate crown and chin guard system for hardhat. The chin guard extends below the chin, the shield extends passed the ear, and the crown extends over the forehead to the front of the hardhat. ANSI Z87.1-2015. Excludes hardhat.	
02 87 19 00-0167	BOX	Box of 100, 5 Mil, Disposable Latex Gloves For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	27.53
02 87 19 00-0168	EA	Gloves - Rubber (Heavy Duty) For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment	23.51
02 87 19 00-0169	EA	Belt-Mounted, Universal Mask, Powered Air Purifying Respirator (PAPR) System Kit For Bio-Hazard And Infectious Control Clean Up Personal Protection Equipment.....	2,563.76
		Note: Kit includes NIOSH Approved with Draeger DHR 7000, C420 Blower, Single-Speed Toggle, Battery - LiSO2 (BA5800/U), C420 Breathing Tube Assembly with 75 Degrees Swivel, Decon Belt Assembly 70" x 2", C420 Airflow Indicator (Afi), Micronel Safety M95 Cartridge (2), Molded Case, Black, CBRN Breathing Tube Assembly	

02 87 19 00-0170 Bio-Hazard And Infectious Disease Control Expendables (02 87 19 00-0151)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Bio-Hazard And Infectious Control Clean Up sections. See CSI section 01 56 16 00-0001 for temporary sheeting, 01 56 16 00-0023 for temporary walls.

02 87 19 00-0171	GAL	Bleach For Bio-Hazard And Infectious Disease Control Clean-up	11.84
02 87 19 00-0172	EA	N95 Masks For Bio-Hazard And Infectious Disease Control Clean-up	4.22
02 87 19 00-0173	GAL	Disinfectant/Anti-microbial For Bio-Hazard And Infectious Disease Control Clean Up	116.03
02 87 19 00-0174	GAL	Goldshield® GS5 Anti-microbial Concentrate For Bio-Hazard And Infectious Disease Control Clean-up	349.34
		Note: Mix 1 gallon in 5 gallons of water to produce 6 gallons of ready-to-use product. Use on any surface for bacterial inhibition up to 30 days	
02 87 19 00-0175	QT	Hand Sanitizer For Bio-Hazard And Infectious Disease Control Clean-up.....	11.70
02 87 19 00-0176	EA	Sponges - Dry For Bio-Hazard And Infectious Disease Control Clean-up	6.02
02 87 19 00-0177	ROL	Tape - Duct, 2" x 50 YD For Bio-Hazard And Infectious Disease Control Clean-up	15.10
02 87 19 00-0178	EA	UV Mini Light, Handheld For Bio-Hazard And Infectious Disease Control Clean-up	76.33
02 87 19 00-0179	ROL	Visqueen 1 Mil, 12' x 400', For Bio-Hazard And Infectious Disease Control Clean-up	60.87
02 87 19 00-0180	LB	Wipes, Terry Cloth 14" x 17" For Bio-Hazard And Infectious Disease Control Clean-up	8.54
02 87 19 00-0181	EA	Wyp-Alls, Case, 160 Wipes For Bio-Hazard And Infectious Disease Control Clean-up.....	18.80
02 87 19 00-0182	ROL	6 Mil, 55 Gallon Trash Bags, 50/Roll For Bio-Hazard And Infectious Disease Control Clean Up	187.36

02 89 Hazmat Ancillary Tasks and Support (02 80)



Existing Conditions	02	02
Facility Remediation	02 80	
Hazmat Ancillary Tasks and Support	02 89	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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02 89 00 00-0001	Barriers And Protection <small>(02 89)</small> Note: Includes removal and disposal after use.		
02 89 00 00-0002	Isolation Barriers <small>(02 89 00 00-0001)</small> See CSI section 01 56 16 00-0023 for temporary stud walls.		
02 89 00 00-0003	Cleaning Surfaces <small>(02 89 00 00-0001)</small> Note: Other surfaces outside contamination area but not contaminated by, or part of removal.		
02 89 00 00-0004	SF Up To 100 SF, Clean Non-Asbestos Surface	2.12	
02 89 00 00-0005	SF >100 To 500 SF, Clean Non-Asbestos Surface.....	1.49	
02 89 00 00-0006	SF >500 To 1,000 SF, Clean Non-Asbestos Surface.....	0.97	
02 89 00 00-0007	SF >1,000 SF, Clean Non-Asbestos Surface.....	0.76	
02 89 00 00-0008	Hazmat Containment Construction Plastic Sheeting <small>(02 89 00 00-0001)</small>		
02 89 00 00-0009	SF 6 Mil Plastic Sheeting, Applied To Floors, Hazmat Containment Construction.....	0.52	
02 89 00 00-0010	SF 6 Mil Plastic Sheeting, Applied To Walls, Hazmat Containment Construction.....	0.68	
02 89 00 00-0011	SF 6 Mil Plastic Sheeting, Applied To Ceilings, Hazmat Containment Construction.....	0.91	
02 89 00 00-0012	SF 6 Mil Plastic Fire Retardant, Anti-static Sheeting, Applied To Floors, Hazmat Containment Construction.....	0.64	
02 89 00 00-0013	SF 6 Mil Plastic Fire Retardant, Anti-static Retardant Sheeting, Applied To Walls, Hazmat Containment Construction.....	0.81	
02 89 00 00-0014	SF 6 Mil Plastic Fire Retardant, Anti-static Retardant Sheeting, Applied To Ceilings, Hazmat Containment Construction.....	1.05	
02 89 00 00-0015	EA Up To 36 Square Inches, Seal Wall Penetrations With Foam Firestop, Hazmat Containment Construction.....	142.38	
02 89 00 00-0016	EA >36 To 72 Square Inches, Seal Wall Penetrations With Foam Firestop, Hazmat Containment Construction.....	276.97	
02 89 00 00-0017	EA >72 To 144 Square Inches, Seal Wall Penetrations With Foam Firestop, Hazmat Containment Construction.....	543.12	
02 89 00 00-0018	LF Caulk Seams With Latex, Hazmat Containment Construction.....	4.76	
02 89 00 00-0019	SF 2 Layers 6 Mil Poly, Protect Carpeted Area, Hazmat Containment Construction.....	2.02	
02 89 00 00-0020	Decontamination Chambers <small>(02 89)</small> Note: Includes removal after use.		
02 89 00 00-0021	EA 3 Stage Portable Personnel Decontamination Wash Facility..... Note: Includes connection to negative air system.	978.43	
02 89 00 00-0022	EA 5 Stage Portable Personnel Decontamination Wash Facility..... Note: Includes connection to negative air system.	1,152.44	
02 89 00 00-0023	EA Portable Waste Decontamination Unit..... Note: Includes connection to negative air system. <i>For Dismantling And Relocation To A Different Area, Add</i>	590.89 367.07	

02 90 Disaster Recovery (02)

Note: The tasks in this division are only to be used when specifically requested by the Owner and are not to be combined with tasks from other divisions of this or other Construction Task Catalogs® unless specifically requested by the Owner.

02 90 50 Cleaning and Disaster Clean-up (02 90)

02 90 50 00-0001	Non-Mold Contaminated Wet Material Removal <small>(02 90 50)</small> Note: For materials not requiring mold abatement.		
02 90 50 00-0002	SY Wet Broadloom Carpet Removal For Disaster Clean-up.....	28.59	
02 90 50 00-0003	SY Wet Carpet Tile Removal For Disaster Clean-up.....	6.96	
02 90 50 00-0004	SF Wet Batt Insulation Removal For Disaster Clean-up.....	0.58	
02 90 50 00-0005	SF Wet Ceiling Tile Removal For Disaster Clean-up.....	0.70	
02 90 50 00-0006	SF Single Layer, Wet Gypsum Board Removal For Disaster Clean-up.....	0.68	
02 90 50 00-0007	SF Double Layer, Wet Gypsum Board Removal For Disaster Clean-up.....	1.06	
02 90 50 00-0008	Cleaning <small>(02 90 50)</small> Note: Use "Light Clean" when soot or dust is barely evident. Use "Medium Clean" when paint color can be seen through the soot or dust. Use "Heavy Clean" when paint color cannot be seen. Includes all man power, equipment and expendables required		
02 90 50 00-0009	Clean Furnishings <small>(02 90 50 00-0008)</small>		
02 90 50 00-0010	EA Office Equipment, Exterior Wipe For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	28.20 11.84 36.66	
02 90 50 00-0011	SF Bookcase (Per SF Of Face Area), Light Clean For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	1.57 0.66 2.04	
02 90 50 00-0012	LF Shelving, Light Clean For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	2.82 1.18 3.67	
02 90 50 00-0013	EA Plastic Or Metal Chair, Light Clean For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	8.14 3.42 10.58	
02 90 50 00-0014	EA Upholstered Chair, Light Clean For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	26.32 11.05 34.22	
02 90 50 00-0015	EA Upholstered Sofa, Light Clean For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	162.31 68.17 211.00	
02 90 50 00-0016	EA Desk, Light Clean For Disaster Clean-up..... <i>For Medium Clean, Add</i> <i>For Heavy Clean, Add</i>	33.21 13.95 43.17	

02 Existing Conditions**02 90 Disaster Recovery****02 90 50 Cleaning and Disaster Clean-up**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 50 00-0017	EA		Table, Light Clean For Disaster Clean-up.....	31.33	
			<i>For Medium Clean, Add</i>	13.16	
			<i>For Heavy Clean, Add</i>	40.73	
02 90 50 00-0018	EA		Two Drawer File Cabinet, Light Clean For Disaster Clean-up	6.87	
			<i>For Medium Clean, Add</i>	2.89	
			<i>For Heavy Clean, Add</i>	8.93	
02 90 50 00-0019	EA		Four Drawer File Cabinet, Light Clean For Disaster Clean-up.....	8.79	
			<i>For Medium Clean, Add</i>	3.69	
			<i>For Heavy Clean, Add</i>	11.43	
02 90 50 00-0020	LF		Base Cabinet, Exterior Wipe, Light Clean For Disaster Clean-up.....	7.21	
			<i>For Medium Clean, Add</i>	3.03	
			<i>For Heavy Clean, Add</i>	9.37	
02 90 50 00-0021	LF		Base Cabinet, Exterior And Interior Wipe, Light Clean For Disaster Clean-up	14.10	
			<i>For Medium Clean, Add</i>	5.92	
			<i>For Heavy Clean, Add</i>	18.33	
02 90 50 00-0022	LF		Wall Cabinet, Exterior Wipe, Light Clean For Disaster Clean-up.....	7.21	
			<i>For Medium Clean, Add</i>	3.03	
			<i>For Heavy Clean, Add</i>	9.37	
02 90 50 00-0023	LF		Wall Cabinet, Exterior And Interior Wipe, Light Clean For Disaster Clean-up.....	12.53	
			<i>For Medium Clean, Add</i>	5.26	
			<i>For Heavy Clean, Add</i>	16.29	
02 90 50 00-0024	EA		Picture Frame, Glass And Back, Light Clean For Disaster Clean-up.....	3.01	
			<i>For Medium Clean, Add</i>	1.26	
			<i>For Heavy Clean, Add</i>	3.91	
02 90 50 00-0025			Clean Hard Surfaces (02 90 50 00-0008)		
02 90 50 00-0026	LF		Wood, Vinyl Or Rubber Baseboard, Light Clean For Disaster Clean-up.....	0.41	
			<i>For Medium Clean, Add</i>	0.17	
			<i>For Heavy Clean, Add</i>	0.53	
02 90 50 00-0027	EA		Door And Hardware (Per Side), Light Clean For Disaster Clean-up	5.33	
			<i>For Medium Clean, Add</i>	2.24	
			<i>For Heavy Clean, Add</i>	6.93	
02 90 50 00-0028	EA		Detailed Door And Hardware (Per Side), Light Clean For Disaster Clean-up.....	6.04	
			<i>For Medium Clean, Add</i>	2.54	
			<i>For Heavy Clean, Add</i>	7.85	
02 90 50 00-0029	SF		Overhead Door, Light Clean For Disaster Clean-up	0.42	
			<i>For Medium Clean, Add</i>	0.18	
			<i>For Heavy Clean, Add</i>	0.55	
02 90 50 00-0030	SF		Mirror, Light Clean For Disaster Clean-up	0.32	
			<i>For Medium Clean, Add</i>	0.13	
			<i>For Heavy Clean, Add</i>	0.42	
02 90 50 00-0031	SF		Window, Light Clean For Disaster Clean-up	0.92	
			<i>For Medium Clean, Add</i>	0.39	
			<i>For Heavy Clean, Add</i>	1.20	
02 90 50 00-0032	LF		Handrail, Light Clean For Disaster Clean-up	0.82	
			<i>For Medium Clean, Add</i>	0.34	
			<i>For Heavy Clean, Add</i>	1.07	
02 90 50 00-0033	LF		Bumper Rail, Light Clean For Disaster Clean-up	0.44	
			<i>For Medium Clean, Add</i>	0.18	
			<i>For Heavy Clean, Add</i>	0.57	
02 90 50 00-0034	SF		Hard Floor, Light Clean For Disaster Clean-up.....	0.36	
			<i>For Medium Clean, Add</i>	0.15	
			<i>For Heavy Clean, Add</i>	0.47	
02 90 50 00-0035	SF		Carpet, Light Clean For Disaster Clean-up.....	0.38	
			<i>For Medium Clean, Add</i>	0.16	
			<i>For Heavy Clean, Add</i>	0.49	
02 90 50 00-0036	SF		Hard Ceiling, Light Clean For Disaster Clean-up.....	0.29	
			<i>For Medium Clean, Add</i>	0.12	
			<i>For Heavy Clean, Add</i>	0.38	
02 90 50 00-0037	SF		Suspended Ceiling, Tile And Grid, Light Clean For Disaster Clean-up.....	0.32	
			<i>For Medium Clean, Add</i>	0.13	
			<i>For Heavy Clean, Add</i>	0.42	
02 90 50 00-0038	SF		Ceramic Tile Wall, Light Clean For Disaster Clean-up.....	0.26	
			<i>For Medium Clean, Add</i>	0.11	
			<i>For Heavy Clean, Add</i>	0.34	
02 90 50 00-0039	SF		Wall, Light Clean For Disaster Clean-up.....	0.19	
			<i>For Medium Clean, Add</i>	0.08	
			<i>For Heavy Clean, Add</i>	0.25	
02 90 50 00-0040	SF		Masonry Wall, Light Clean For Disaster Clean-up.....	0.26	
			<i>For Medium Clean, Add</i>	0.11	
			<i>For Heavy Clean, Add</i>	0.34	
02 90 50 00-0041	EA		Up To 24 SF Area Rug, Off-Site Cleaning, Light Clean For Disaster Clean-up	66.09	
			Note: Includes removal from site, cleaning, and return.		
			<i>For Medium Clean, Add</i>	27.76	
			<i>For Heavy Clean, Add</i>	85.92	
02 90 50 00-0042	EA		>24 To 96 SF Area Rug, Off-Site Cleaning, Light Clean For Disaster Clean-up.....	82.61	
			Note: Includes removal from site, cleaning, and return.		
			<i>For Medium Clean, Add</i>	34.70	
			<i>For Heavy Clean, Add</i>	107.39	
02 90 50 00-0043	EA		>96 To 140 SF Area Rug, Off-Site Cleaning, Light Clean For Disaster Clean-up.....	99.13	
			Note: Includes removal from site, cleaning, and return.		
			<i>For Medium Clean, Add</i>	41.63	
			<i>For Heavy Clean, Add</i>	128.87	



Existing Conditions	02
Disaster Recovery	02 90
Cleaning and Disaster Clean-up	02 90 50

02

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 50 00-0044 EA >140 To 216 SF Area Rug, Off-Site Cleaning, Light Clean For Disaster Clean-up.....	115.66	
<i>For Medium Clean, Add</i>	48.58	
<i>For Heavy Clean, Add</i>	150.36	
02 90 50 00-0045 Clean Window Treatments (02 90 50 00-0008)		
02 90 50 00-0046 SF Window Blind, Light Clean For Disaster Clean-up.....	0.72	
<i>For Medium Clean, Add</i>	0.30	
<i>For Heavy Clean, Add</i>	0.94	
02 90 50 00-0047 EA Up To 6' Long Drapery (Per Pleat), Light Clean For Disaster Clean-up.....	1.47	
<i>For Medium Clean, Add</i>	0.62	
<i>For Heavy Clean, Add</i>	1.91	
02 90 50 00-0048 EA Up To 6' Long Lined Drapery (Per Pleat), Light Clean For Disaster Clean-up.....	1.69	
<i>For Medium Clean, Add</i>	0.71	
<i>For Heavy Clean, Add</i>	2.20	
02 90 50 00-0049 EA >6' To 8' Drapery (Per Pleat), Light Clean For Disaster Clean-up.....	1.54	
<i>For Medium Clean, Add</i>	0.65	
<i>For Heavy Clean, Add</i>	2.00	
02 90 50 00-0050 EA >6' To 8' Lined Drapery (Per Pleat), Light Clean For Disaster Clean-up.....	1.77	
<i>For Medium Clean, Add</i>	0.74	
<i>For Heavy Clean, Add</i>	2.30	
02 90 50 00-0051 EA >8' To 10' Drapery (Per Pleat), Light Clean For Disaster Clean-up.....	1.89	
<i>For Medium Clean, Add</i>	0.79	
<i>For Heavy Clean, Add</i>	2.46	
02 90 50 00-0052 EA >8' To 10' Lined Drapery (Per Pleat), Light Clean For Disaster Clean-up.....	2.17	
<i>For Medium Clean, Add</i>	0.91	
<i>For Heavy Clean, Add</i>	2.82	
02 90 50 00-0053 Clean Appliances (02 90 50 00-0008)		
02 90 50 00-0054 EA Microwave Oven, Outside, Light Clean For Disaster Clean-up.....	12.98	
<i>For Medium Clean, Add</i>	5.45	
<i>For Heavy Clean, Add</i>	16.87	
02 90 50 00-0055 EA Refrigerator, Outside, Light Clean For Disaster Clean-up.....	30.59	
<i>For Medium Clean, Add</i>	12.85	
<i>For Heavy Clean, Add</i>	39.77	
02 90 50 00-0056 EA Range, Outside, Light Clean For Disaster Clean-up.....	26.44	
<i>For Medium Clean, Add</i>	11.10	
<i>For Heavy Clean, Add</i>	34.37	
02 90 50 00-0057 Clean Plumbing (02 90 50 00-0008)		
02 90 50 00-0058 EA Water Heater, Light Clean For Disaster Clean-up.....	18.80	
<i>For Medium Clean, Add</i>	7.90	
<i>For Heavy Clean, Add</i>	24.44	
02 90 50 00-0059 EA Plumbing Fixture, Light Clean For Disaster Clean-up.....	18.99	
<i>For Medium Clean, Add</i>	7.98	
<i>For Heavy Clean, Add</i>	24.69	
02 90 50 00-0060 EA Restroom Accessory, Light Clean For Disaster Clean-up.....	8.71	
<i>For Medium Clean, Add</i>	3.66	
<i>For Heavy Clean, Add</i>	11.32	
02 90 50 00-0061 Clean HVAC (02 90 50 00-0008)		
02 90 50 00-0062 LF Baseboard Heater, Light Clean For Disaster Clean-up.....	5.62	
<i>For Medium Clean, Add</i>	2.36	
<i>For Heavy Clean, Add</i>	7.31	
02 90 50 00-0063 LF Ductwork, Exterior Wipe, Light Clean For Disaster Clean-up.....	15.67	
<i>For Medium Clean, Add</i>	6.58	
<i>For Heavy Clean, Add</i>	20.37	
02 90 50 00-0064 EA Ductwork, Interior (Per Grille/Register), Light Clean For Disaster Clean-up.....	60.16	
<i>For Medium Clean, Add</i>	25.27	
<i>For Heavy Clean, Add</i>	78.21	
02 90 50 00-0065 EA Grille/Register, Light Clean For Disaster Clean-up.....	5.64	
<i>For Medium Clean, Add</i>	2.37	
<i>For Heavy Clean, Add</i>	7.33	
02 90 50 00-0066 EA Air Handling Unit, Exterior Wipe, Light Clean For Disaster Clean-up.....	39.06	
<i>For Medium Clean, Add</i>	16.41	
<i>For Heavy Clean, Add</i>	50.78	
02 90 50 00-0067 EA Furnace, Exterior Wipe, Light Clean For Disaster Clean-up.....	34.78	
<i>For Medium Clean, Add</i>	14.61	
<i>For Heavy Clean, Add</i>	45.21	
02 90 50 00-0068 Clean Electrical (02 90 50 00-0008)		
02 90 50 00-0069 EA Electric Fan, Light Clean For Disaster Clean-up.....	23.19	
<i>For Medium Clean, Add</i>	9.74	
<i>For Heavy Clean, Add</i>	30.15	
02 90 50 00-0070 EA Ceiling Fan, Light Clean For Disaster Clean-up.....	25.07	
<i>For Medium Clean, Add</i>	10.53	
<i>For Heavy Clean, Add</i>	32.59	
02 90 50 00-0071 EA Ceiling Fan And Light, Light Clean For Disaster Clean-up.....	32.59	
<i>For Medium Clean, Add</i>	13.69	
<i>For Heavy Clean, Add</i>	42.37	

02 Existing Conditions**02 90 Disaster Recovery****02 90 50 Cleaning and Disaster Clean-up**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 50 00-0072	EA		Ceiling Exhaust Fan, Light Clean For Disaster Clean-up.....	22.87	
			<i>For Medium Clean, Add</i>	9.61	
			<i>For Heavy Clean, Add</i>	29.73	
02 90 50 00-0073	EA		2' x 4' Light Fixture, Light Clean For Disaster Clean-up.....	15.05	
			<i>For Medium Clean, Add</i>	6.32	
			<i>For Heavy Clean, Add</i>	19.57	
02 90 50 00-0074	EA		Light Fixture, Light Clean For Disaster Clean-up.....	6.89	
			<i>For Medium Clean, Add</i>	2.89	
			<i>For Heavy Clean, Add</i>	8.96	
02 90 50 00-0075	EA		Smoke Detector, Light Clean For Disaster Clean-up.....	5.33	
			<i>For Medium Clean, Add</i>	2.24	
			<i>For Heavy Clean, Add</i>	6.93	
02 90 50 00-0076	EA		Thermostat, Light Clean For Disaster Clean-up.....	1.88	
			<i>For Medium Clean, Add</i>	0.79	
			<i>For Heavy Clean, Add</i>	2.44	
02 90 50 00-0077			Thermal Fog (02 90 50 00-0008)		
02 90 50 00-0078	CF		Clean And Deodorize Building With Thermal Fog For Disaster Clean-up.....	0.02	
02 90 50 00-0079			Contents Manipulation (02 90 50)		
02 90 50 00-0080	SF		Cover Contents With 6 Mil Plastic Sheeting For Disaster Clean-up.....	0.24	
02 90 50 00-0081	SF		Floor Protection, Adhesive Film For Disaster Clean-up.....	0.29	
02 90 50 00-0082	SF		Move Contents Out And Later Reset For Disaster Clean-up.....	0.50	
02 90 50 00-0083	MO		20' Long Job Site Storage Trailer For Disaster Clean-up.....	193.09	
02 90 50 00-0084	MO		40' Long Job Site Storage Trailer For Disaster Clean-up.....	256.07	
02 90 50 00-0085	EA		Delivery Or Pickup Job Site Storage Trailer For Disaster Clean-up.....	145.76	
02 90 50 00-0086			Water Disaster Clean-up (02 90 50)		
02 90 50 00-0087	LF		Detach Baseboard For Disaster Clean-up.....	0.67	
02 90 50 00-0088	LF		Detach And Later Reset Baseboard For Disaster Clean-up.....	1.20	
02 90 50 00-0089	EA		Block And Pad Furniture (Per Piece Of Furniture) For Disaster Clean-up.....	4.45	
02 90 50 00-0090	SF		Water Extraction From Floor For Disaster Clean-up.....	0.46	
02 90 50 00-0091	SF		Gray Water Extraction From Floor For Disaster Clean-up.....	0.75	
02 90 50 00-0092	SF		Black Water Extraction From Floor For Disaster Clean-up.....	1.18	
02 90 50 00-0093	SF		Tear Out Wet Non-Salvageable Carpet For Disaster Clean-up.....	0.37	
02 90 50 00-0094	SF		Tear Out Wet Non-Salvageable Carpet, Black Water For Disaster Clean-up.....	0.44	
02 90 50 00-0095	SF		Tear Out Wet Non-Salvageable Glue Down Carpet For Disaster Clean-up.....	0.66	
02 90 50 00-0096	SF		Tear Out Wet Non-Salvageable Glue Down Carpet, Black Water For Disaster Clean-up.....	0.96	
02 90 50 00-0097	SF		Tear Out Vinyl Flooring For Disaster Clean-up.....	0.91	
02 90 50 00-0098	SF		Tear Out Vinyl Flooring, Black Water For Disaster Clean-up.....	1.33	
02 90 50 00-0099	SF		Tear Out Wood Flooring, Black Water For Disaster Clean-up.....	3.45	
02 90 50 00-0100	SF		Tear Out Laminated Wood Flooring For Disaster Clean-up.....	1.69	
02 90 50 00-0101	SF		Tear Out Laminated Wood Flooring, Black Water For Disaster Clean-up.....	2.48	
02 90 50 00-0102	SF		Tear Out Wet Ceiling Tile For Disaster Clean-up.....	0.28	
02 90 50 00-0103	SF		Tear Out Batt Insulation For Disaster Clean-up.....	0.28	
02 90 50 00-0104	SF		Tear Out Wet Gypsum Board For Disaster Clean-up.....	0.48	
02 90 50 00-0105	SF		Apply Anti-microbial Agent For Disaster Clean-up.....	0.28	
02 90 50 00-0106	SF		High Efficiency Particulate Air (HEPA) Vacuuming For Disaster Clean-up.....	0.36	
02 90 50 00-0107			Board Up And Tarp Up (02 90 50)		
02 90 50 00-0108	SF		Polyethylene Tarp On Roof For Disaster Clean-up.....	0.28	
02 90 50 00-0109	SF		1/2" Temporary Plywood On Roof For Disaster Clean-up.....	1.59	
02 90 50 00-0110	SF		5/8" Temporary Plywood On Roof For Disaster Clean-up.....	1.83	
02 90 50 00-0111	SF		3/4" Temporary Plywood On Roof For Disaster Clean-up.....	2.00	
02 90 50 00-0112	SF		1/2" Temporary Plywood On Wall Or Windows For Disaster Clean-up.....	1.96	
02 90 50 00-0113	SF		5/8" Temporary Plywood On Wall Or Windows For Disaster Clean-up.....	2.20	
02 90 50 00-0114	SF		3/4" Temporary Plywood On Wall Or Windows For Disaster Clean-up.....	2.37	
02 90 50 00-0115			Minimum Charges (02 90 50)		
02 90 50 00-0116	EA		Disaster Cleaning Minimum Charge.....	1,405.43	
02 90 50 00-0117	EA		Disaster Water Extraction Minimum Charge.....	291.42	
02 90 50 00-0118	EA		Disaster Carpet Cleaning Minimum Charge.....	248.62	
02 90 50 00-0119			Document Restoration (02 90 50)		
02 90 50 00-0120	EA		Book Rebinding, Each For Document Restoration.....	128.39	
02 90 50 00-0121	EA		Book Recasing, Each For Document Restoration.....	64.18	
02 90 50 00-0122	EA		Boxes-MCS, 1.2 CF For Document Restoration.....	9.14	
02 90 50 00-0123	EA		Boxes-MCS, 2.0 CF For Document Restoration.....	10.08	
02 90 50 00-0124	EA		Boxes Bankers For Document Restoration.....	20.51	
02 90 50 00-0125	EA		Boxes Standard Packout For Document Restoration.....	5.85	
02 90 50 00-0126	EA		Boxes X Ray For Document Restoration.....	12.85	
02 90 50 00-0127	EA		CD Scanning and Diagnostics, Each For Document Restoration.....	12.85	
02 90 50 00-0128	EA		Cleaning Antique Books, Each For Document Restoration.....	385.15	
02 90 50 00-0129	EA		Cleaning Catheter Roll, Per Roll For Document Restoration.....	51.34	
02 90 50 00-0130	EA		Cleaning CD And DVD, Per Disc For Document Restoration.....	5.16	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 50 00-0131 EA Cleaning Level 1 - Blue Prints, Each For Document Restoration.....	4.08	
02 90 50 00-0132 CF Cleaning Level 1 - Document Per CF For Document Restoration	126.57	
02 90 50 00-0133 EA Cleaning Level 1 - Linen, Each For Document Restoration	4.08	
02 90 50 00-0134 EA Cleaning Level 1 - Mylar, Each For Document Restoration	4.08	
02 90 50 00-0135 EA Cleaning Level 2 - Blue Print, Each For Document Restoration	5.08	
02 90 50 00-0136 CF Cleaning Level 2 - Document Per CF For Document Restoration	189.68	
02 90 50 00-0137 EA Cleaning Level 2 - Linen, Each For Document Restoration	5.08	
02 90 50 00-0138 EA Cleaning Level 2 - Mylar, Each For Document Restoration	5.08	
02 90 50 00-0139 EA Cleaning Level 3 - Blue Prints, Each For Document Restoration.....	7.20	
02 90 50 00-0140 CF Cleaning Level 3 - Document Per CF For Document Restoration	253.10	
02 90 50 00-0141 EA Cleaning Level 3 - Linen, Each For Document Restoration	7.20	
02 90 50 00-0142 EA Cleaning Level 3 - Mylar, Each For Document Restoration	7.20	
02 90 50 00-0143 EA Cleaning Level 4 - All Fire-Blue Print, Each For Document Restoration	10.09	
02 90 50 00-0144 EA Cleaning Level 4 - All Fire-Linen, Each For Document Restoration.....	10.09	
02 90 50 00-0145 EA Cleaning Level 4 - All Fire-Mylar, Each For Document Restoration.....	10.09	
02 90 50 00-0146 CF Cleaning Level 4 - Light Fire-Document Per CF For Document Restoration	316.31	
02 90 50 00-0147 EA Cleaning Level 5 - Severe Fire-Blue Print, Each For Document Restoration.....	11.18	
02 90 50 00-0148 CF Cleaning Level 5 - Severe Fire-Document Per CF For Document Restoration.....	474.61	
02 90 50 00-0149 EA Cleaning Level 5 - Severe Fire-Linen, Each For Document Restoration	11.18	
02 90 50 00-0150 EA Cleaning Level 5 - Severe Fire-Mylar, Each For Document Restoration	11.18	
02 90 50 00-0151 EA Cleaning Microfiche Sheets, Each For Document Restoration	3.97	
02 90 50 00-0152 EA Cleaning Microfiche Strips, Each For Document Restoration	0.92	
02 90 50 00-0153 EA Cleaning Microfilm Rolls (In House), Per Roll For Document Restoration	128.39	
02 90 50 00-0154 EA Cleaning Microfilm Rolls (Outside), Per Roll For Document Restoration	179.75	
02 90 50 00-0155 EA Cleaning Photographs Negatives, Per Negative For Document Restoration.....	3.97	
02 90 50 00-0156 EA Cleaning Photographs, Each For Document Restoration	0.92	
02 90 50 00-0157 EA Cleaning Record Albums, Each For Document Restoration	5.16	
02 90 50 00-0158 EA Cleaning VHS And Beta Tapes-In House, Each For Document Restoration.....	12.85	
02 90 50 00-0159 EA Cleaning VHS And Beta Tapes-Outside, Each For Document Restoration	51.34	
02 90 50 00-0160 EA Cleaning X Ray 1-1000, Per Film For Document Restoration	5.41	
02 90 50 00-0161 EA Cleaning X Ray 1K-5K, Per Film For Document Restoration	4.62	
02 90 50 00-0162 EA Cleaning X Ray 5K-Up, Per Film For Document Restoration	3.63	
02 90 50 00-0163 EA Copying Clean Water, Per Page For Document Restoration	0.53	
02 90 50 00-0164 EA Copying Greywater Fire, Per Page For Document Restoration	1.39	
02 90 50 00-0165 CF Deodorization, Vapor Tech For Document Restoration	9.28	
02 90 50 00-0166 CF Disinfectant-Fogging For Document Restoration	18.00	
02 90 50 00-0167 EA Document Disposal In House No Shredding For Document Restoration.....	72.11	
02 90 50 00-0168 EA Document Disposal In House With Shredding For Document Restoration.....	19.68	
02 90 50 00-0169 CF Up To 150 CF, Drying-MCS Center For Document Restoration	231.09	
02 90 50 00-0170 CF >150 To 500 CF, Drying-MCS Center For Document Restoration	179.75	
02 90 50 00-0171 CF >500 CF, Drying-MCS Center For Document Restoration	154.06	
02 90 50 00-0172 CF >50 To 150 CF, Drying-MCS Center For Document Restoration.....	205.42	
02 90 50 00-0173 CF Up To 500 CF, Drying-Onsite For Document Restoration	385.15	
02 90 50 00-0174 CF >500 CF, Drying-Onsite For Document Restoration	236.27	
02 90 50 00-0175 EA Drying Antique Books, Each For Document Restoration	51.34	
02 90 50 00-0176 EA Drying Blue Prints, Each For Document Restoration.....	6.42	
02 90 50 00-0177 EA DVD Scanning And Diagnostics, Each For Document Restoration	12.85	
02 90 50 00-0178 EA Freeze Drying (In House) For Document Restoration.....	131.61	
02 90 50 00-0179 EA Freeze Drying (Outside) For Document Restoration.....	112.81	
02 90 50 00-0180 EA Up To 48 CF, Irradiation - Gamma (Minimum Charge) For Document Restoration	3,102.16	
02 90 50 00-0181 CF >48 CF, Irradiation - Gamma (Per CF Charge) For Document Restoration	28.20	
02 90 50 00-0182 EA Minimal Drying Jobs For Document Restoration.....	1,306.67	
02 90 50 00-0183 EA Monthly Storage For Document Restoration	235.01	
02 90 50 00-0184 EA Mylar Prints For Document Restoration.....	12.85	
02 90 50 00-0185 CF Ozoning For Document Restoration	8.34	
02 90 50 00-0186 CF Stabilization Freezer Storage, Per Cubic Foot Per Month For Document Restoration	11.36	
02 90 50 00-0187 MO Stabilization Freezer Storage, Per Page-Per Month For Document Restoration	0.12	
02 90 50 00-0188 EA Wood Pallets, Each For Document Restoration.....	31.57	

02 90 55 Emergency Clean-up (02 90)

02 90 55 00-0001 Emergency Clean-up (02 90 55)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Cleaning, Contents Manipulation, and Water Emergency Clean-up sections.

02 90 55 00-0002 Emergency Clean-up Labor (02 90 55 00-0001)

Note: Used in the performance of time and material projects. Labor costs are based on workers familiar with and skilled in the performance of the task following restoration requirements. Not to be used in conjunction with tasks in the Cleaning, Contents Manipulation, and Water Emergency Clean-up sections.

02 90 55 00-0003 HR Skilled Tradesman For Emergency Clean Up.....	61.68
02 90 55 00-0004 HR Restoration / Document Laborer For Emergency Clean Up	43.18
02 90 55 00-0005 HR Restoration / Document Supervisor For Emergency Clean Up.....	59.37
02 90 55 00-0006 HR Restoration / Document Project Manager For Emergency Clean Up.....	97.15
02 90 55 00-0007 HR Assistant Project Manager For Emergency Clean Up.....	80.96
02 90 55 00-0008 HR Senior Project Manager For Emergency Clean Up.....	113.34
02 90 55 00-0009 HR Project Director / Document Consultant / Account Manager For Emergency Clean Up	161.91
02 90 55 00-0010 HR Equipment Technician For Emergency Clean Up	118.73
02 90 55 00-0011 HR Mold Remediation Laborer For Emergency Clean Up	59.11
02 90 55 00-0012 HR Mold Remediation Supervisor For Emergency Clean Up	80.96
02 90 55 00-0013 HR Administrative Personnel For Emergency Clean Up.....	37.78
02 90 55 00-0014 HR Project Accountant For Emergency Clean Up	61.68

02 Existing Conditions**02 90 Disaster Recovery****02 90 55 Emergency Clean-up**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 90 55 00-0015	HR	Biohazard Technician For Emergency Clean Up	85.71
02 90 55 00-0016	HR	Biohazard Supervisor For Emergency Clean Up	103.06
02 90 55 00-0017	HR	Health And Safety Officer For Emergency Clean Up	92.52
02 90 55 00-0018	HR	Resource And Logistics Coordinator For Emergency Clean Up	66.82
02 90 55 00-0019	HR	Loss Control Specialist For Emergency Clean Up	64.76
02 90 55 00-0020	HR	Moisture Control Specialist For Emergency Clean Up	53.46
02 90 55 00-0021	HR	Mobilization Support For Emergency Clean Up	32.90

02 90 55 00-0022**Emergency Clean-up Equipment (02 90 55 00-0001)**

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Cleaning, Contents Manipulation, and Water Emergency Clean-up sections.

02 90 55 00-0023**General Emergency Clean-up Equipment (02 90 55 00-0022)**

02 90 55 00-0024	DAY	265 CFM Portable Ozone Machine, 12,000 MG/HR For Emergency Clean-up	108.55
02 90 55 00-0025	WK	265 CFM Portable Ozone Machine, 12,000 MG/HR For Emergency Clean-up	414.11
02 90 55 00-0026	MO	265 CFM Portable Ozone Machine, 12,000 MG/HR For Emergency Clean-up	1,133.78
02 90 55 00-0027	DAY	13" Floor Buffer Rental For Emergency Clean-up	55.06
02 90 55 00-0028	WK	13" Floor Buffer Rental For Emergency Clean-up	147.10
02 90 55 00-0029	MO	13" Floor Buffer Rental For Emergency Clean-up	406.07
02 90 55 00-0030	DAY	17" Floor Buffer Rental For Emergency Clean-up	101.52
02 90 55 00-0031	WK	17" Floor Buffer Rental For Emergency Clean-up	258.98
02 90 55 00-0032	MO	17" Floor Buffer Rental For Emergency Clean-up	611.18
02 90 55 00-0033	DAY	Walk Behind Floor Scrubber Rental For Emergency Clean-up	559.39
02 90 55 00-0034	WK	Walk Behind Floor Scrubber Rental For Emergency Clean-up	1,502.06
02 90 55 00-0035	MO	Walk Behind Floor Scrubber Rental For Emergency Clean-up	4,185.04
02 90 55 00-0036	DAY	Ride-On Floor Scrubber Rental For Emergency Clean-up	1,263.80
02 90 55 00-0037	WK	Ride-On Floor Scrubber Rental For Emergency Clean-up	3,335.60
02 90 55 00-0038	MO	Ride-On Floor Scrubber Rental For Emergency Clean-up	8,991.61
02 90 55 00-0039	DAY	4 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	91.16
02 90 55 00-0040	WK	4 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	258.98
02 90 55 00-0041	MO	4 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	890.87
02 90 55 00-0042	DAY	8 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	84.94
02 90 55 00-0043	WK	8 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	227.90
02 90 55 00-0044	MO	8 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	590.46
02 90 55 00-0045	DAY	17 to 30 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	135.91
02 90 55 00-0046	WK	17 to 30 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	387.84
02 90 55 00-0047	MO	17 to 30 Gallon, Commercial Carpet Extractor Rental For Emergency Clean-up	1,083.97
02 90 55 00-0048	DAY	Truck Mounted Extractor Rental For Emergency Clean-up	965.45
02 90 55 00-0049	WK	Truck Mounted Extractor Rental For Emergency Clean-up	2,896.34
02 90 55 00-0050	MO	Truck Mounted Extractor Rental For Emergency Clean-up	8,689.03
02 90 55 00-0051	DAY	16" Chain Saw Rental For Emergency Clean-up	99.45
02 90 55 00-0052	WK	16" Chain Saw Rental For Emergency Clean-up	223.75
02 90 55 00-0053	MO	16" Chain Saw Rental For Emergency Clean-up	596.68
02 90 55 00-0054	DAY	20" Chain Saw Rental For Emergency Clean-up	124.31
02 90 55 00-0055	WK	20" Chain Saw Rental For Emergency Clean-up	279.69
02 90 55 00-0056	MO	20" Chain Saw Rental For Emergency Clean-up	745.85
02 90 55 00-0057	EA	Cleaning Kit With Mop, Broom And Bucket For Emergency Clean-up	93.23
02 90 55 00-0058	DAY	14" To 16" Electric Cut Off Saw Rental For Emergency Clean-up	132.60
02 90 55 00-0059	WK	14" To 16" Electric Cut Off Saw Rental For Emergency Clean-up	362.56
02 90 55 00-0060	MO	14" To 16" Electric Cut Off Saw Rental For Emergency Clean-up	1,015.18
02 90 55 00-0061	DAY	12" To 14" Gasoline Cut Off Saw Rental For Emergency Clean-up	161.60
02 90 55 00-0062	WK	12" To 14" Gasoline Cut Off Saw Rental For Emergency Clean-up	549.03
02 90 55 00-0063	MO	12" To 14" Gasoline Cut Off Saw Rental For Emergency Clean-up	1,046.26
02 90 55 00-0064	DAY	Wet Or Dry Portable Cleaning Unit For Emergency Clean-up	155.99
02 90 55 00-0065	WK	Wet Or Dry Portable Cleaning Unit For Emergency Clean-up	428.98
02 90 55 00-0066	MO	Wet Or Dry Portable Cleaning Unit For Emergency Clean-up	1,169.93
02 90 55 00-0067	DAY	Extension Cords - 220 Volt For Emergency Clean-up	51.80
02 90 55 00-0068	DAY	Extension Cords - 220 Volt Converter Box For Emergency Clean-up	31.08
02 90 55 00-0069	DAY	Demolition Cart, 1 Yard For Emergency Clean-up	82.87
02 90 55 00-0070	WK	Demolition Cart, 1 Yard For Emergency Clean-up	227.90
02 90 55 00-0071	MO	Demolition Cart, 1 Yard For Emergency Clean-up	621.54
02 90 55 00-0072	DAY	Demolition Cart, 1-1/2 Yard For Emergency Clean-up	103.59
02 90 55 00-0073	WK	Demolition Cart, 1-1/2 Yard For Emergency Clean-up	284.87
02 90 55 00-0074	MO	Demolition Cart, 1-1/2 Yard For Emergency Clean-up	776.92
02 90 55 00-0075	EA	Demolition Kit With Wheel Barrow, Shovel And Broom For Emergency Clean-up	155.38
02 90 55 00-0076	DAY	Dry-Ice Blasting System For Emergency Clean-up	1,830.28
02 90 55 00-0077	DAY	Fogger - Mist For Emergency Clean-up	45.88
02 90 55 00-0078	WK	Fogger - Mist For Emergency Clean-up	126.17
02 90 55 00-0079	MO	Fogger - Mist For Emergency Clean-up	344.10
02 90 55 00-0080	DAY	Fogger - Electric Thermal For Emergency Clean-up	66.07
02 90 55 00-0081	WK	Fogger - Electric Thermal For Emergency Clean-up	181.68
02 90 55 00-0082	MO	Fogger - Electric Thermal For Emergency Clean-up	495.50
02 90 55 00-0083	DAY	Fogger - Gas Power Thermal For Emergency Clean-up	191.10
02 90 55 00-0084	WK	Fogger - Gas Power Thermal For Emergency Clean-up	525.52
02 90 55 00-0085	MO	Fogger - Gas Power Thermal For Emergency Clean-up	1,433.23
02 90 55 00-0086	EA	Gang Box, Demo/Framing (One Time Per Job) For Emergency Clean-up	218.48
02 90 55 00-0087	WK	Gang Box, Demo/Framing (One Time Per Job) For Emergency Clean-up	600.81
02 90 55 00-0088	MO	Gang Box, Demo/Framing (One Time Per Job) For Emergency Clean-up	1,638.56
02 90 55 00-0089	DAY	Hand Trucks/Dollies For Emergency Clean-up	24.86
02 90 55 00-0090	WK	Hand Trucks/Dollies For Emergency Clean-up	68.37
02 90 55 00-0091	MO	Hand Trucks/Dollies For Emergency Clean-up	186.46

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 55 00-0092 DAY Heat Gun - Shrink Wrap For Emergency Clean-up.....	141.01	
02 90 55 00-0093 WK Heat Gun - Shrinkwrap For Emergency Clean-up	387.77	
02 90 55 00-0094 MO Heat Gun - Shrinkwrap For Emergency Clean-up	1,057.56	
02 90 55 00-0095 DAY High Efficiency Particulate Air (HEPA) Negative Air Machine For Emergency Clean-up.....	192.26	
Note: Includes all filters.		
02 90 55 00-0096 DAY Ladder For Emergency Clean-up.....	35.22	
02 90 55 00-0097 DAY Lights - Demo, Drop, Stand, String For Emergency Clean-up	33.03	
02 90 55 00-0098 DAY Lights - Wobble For Emergency Clean-up.....	40.37	
02 90 55 00-0099 DAY Moisture Meter For Emergency Clean-up.....	55.06	
02 90 55 00-0100 WK Moisture Meter For Emergency Clean-up.....	151.40	
02 90 55 00-0101 MO Moisture Meter For Emergency Clean-up.....	412.92	
02 90 55 00-0102 DAY Nail Gun For Emergency Clean-up.....	93.23	
02 90 55 00-0103 WK Nail Gun For Emergency Clean-up.....	256.39	
02 90 55 00-0104 MO Nail Gun For Emergency Clean-up.....	699.23	
02 90 55 00-0105 DAY Ozone Generator For Emergency Clean-up.....	229.40	
02 90 55 00-0106 DAY PPE (Personal Protective Equipment) Mold Remediation Related For Emergency Clean-up	124.31	
02 90 55 00-0107 DAY Portable Generator, Up To 7,500 Watt For Emergency Clean-up	183.52	
02 90 55 00-0108 DAY Pressure Washer, Hot For Emergency Clean-up.....	275.28	
02 90 55 00-0109 DAY Pressure Washer, Cold For Emergency Clean-up.....	183.52	
02 90 55 00-0110 DAY Scaffolding - Per Section For Emergency Clean-up	134.67	
02 90 55 00-0111 DAY Small Tools - Tool Box For Emergency Clean-up.....	51.80	
02 90 55 00-0112 DAY Soda Blasting Equipment For Emergency Clean-up.....	1,816.18	
02 90 55 00-0113 DAY Sprayer - Hudson For Emergency Clean-up.....	16.57	
02 90 55 00-0114 WK Sprayer - Hudson For Emergency Clean-up.....	45.58	
02 90 55 00-0115 MO Sprayer - Hudson For Emergency Clean-up.....	124.31	
02 90 55 00-0116 DAY 0.47 GPM, Airless Paint Sprayer For Emergency Clean-up	111.96	
02 90 55 00-0117 WK 0.47 GPM, Airless Paint Sprayer For Emergency Clean-up	329.42	
02 90 55 00-0118 MO 0.47 GPM, Airless Paint Sprayer For Emergency Clean-up	1,127.52	
02 90 55 00-0119 DAY 0.60 GPM, Airless Paint Sprayer For Emergency Clean-up	220.77	
02 90 55 00-0120 WK 0.60 GPM, Airless Paint Sprayer For Emergency Clean-up	520.39	
02 90 55 00-0121 MO 0.60 GPM, Airless Paint Sprayer For Emergency Clean-up	1,450.80	
02 90 55 00-0122 DAY 0.80 GPM, Airless Paint Sprayer For Emergency Clean-up	236.54	
02 90 55 00-0123 WK 0.80 GPM, Airless Paint Sprayer For Emergency Clean-up	591.35	
02 90 55 00-0124 MO 0.80 GPM, Airless Paint Sprayer For Emergency Clean-up	1,592.72	
02 90 55 00-0125 DAY Storage Space (Per SF Per Day) For Emergency Clean-up.....	4.55	
02 90 55 00-0126 DAY Submersible Pump For Emergency Clean-up	45.88	
02 90 55 00-0127 DAY Trash Pump - 2" Gas Powered For Emergency Clean-up	261.33	
02 90 55 00-0128 DAY Vehicle, Pick-up, SUV, Car For Emergency Clean-up.....	129.73	
02 90 55 00-0129 DAY Vehicle, Van For Emergency Clean-up.....	211.51	
02 90 55 00-0130 DAY 16' Or 24' Box Truck Vehicle For Emergency Clean-up.....	265.41	
Note: Includes Mileage		
02 90 55 00-0131 DAY Trailer - Refrigerated 40' Storage For Emergency Clean-up.....	281.08	
02 90 55 00-0132 DAY Utility Trailer For Emergency Clean-up.....	234.07	
Note: Includes Mileage		
02 90 55 00-0133 DAY Truck Mount, Per Wand Extraction For Emergency Clean-up.....	1,055.68	
02 90 55 00-0134 DAY High Efficiency Particulate Air (HEPA) Backpack Vacuum For Emergency Clean-up.....	45.88	
02 90 55 00-0135 WK High Efficiency Particulate Air (HEPA) Backpack Vacuum For Emergency Clean-up	126.17	
02 90 55 00-0136 MO High Efficiency Particulate Air (HEPA) Backpack Vacuum For Emergency Clean-up.....	344.10	
02 90 55 00-0137 DAY 12 Gallon, Industrial High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up	155.99	
02 90 55 00-0138 WK 12 Gallon, Industrial High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up.....	428.98	
02 90 55 00-0139 MO 12 Gallon, Industrial High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up.....	1,169.93	
02 90 55 00-0140 DAY Vacuum - Upright For Emergency Clean-up.....	31.02	
02 90 55 00-0141 WK Vacuum - Upright For Emergency Clean-up.....	85.31	
02 90 55 00-0142 MO Vacuum - Upright For Emergency Clean-up.....	232.66	
02 90 55 00-0143 DAY 12 To 23 Gallon, Wet/Dry Shop Vacuum For Emergency Clean-up	64.23	
02 90 55 00-0144 WK 12 To 23 Gallon, Wet/Dry Shop Vacuum For Emergency Clean-up	159.53	
02 90 55 00-0145 MO 12 To 23 Gallon, Wet/Dry Shop Vacuum For Emergency Clean-up	383.28	
02 90 55 00-0146 DAY 55 Gallon Wet/Dry Drum Top Vacuum For Emergency Clean-up.....	64.23	
02 90 55 00-0147 WK 55 Gallon Wet/Dry Drum Top Vacuum For Emergency Clean-up.....	159.53	
02 90 55 00-0148 MO 55 Gallon Wet/Dry Drum Top Vacuum For Emergency Clean-up.....	404.00	
02 90 55 00-0149 DAY 17 Gallon Wet Vacuum With Pump Discharge For Emergency Clean-up	147.10	
02 90 55 00-0150 WK 17 Gallon Wet Vacuum With Pump Discharge For Emergency Clean-up	393.64	
02 90 55 00-0151 MO 17 Gallon Wet Vacuum With Pump Discharge For Emergency Clean-up	1,098.05	
02 90 55 00-0152 DAY Zip Wall Poles (Per 2 Poles) For Emergency Clean-up.....	45.88	
02 90 55 00-0153 WK Zip Wall Poles (Per 2 Poles) For Emergency Clean-up.....	126.17	
02 90 55 00-0154 MO Zip Wall Poles (Per 2 Poles) For Emergency Clean-up.....	344.10	
02 90 55 00-0155 DAY 10' x 10' Canopy For Emergency Clean-up.....	130.52	
02 90 55 00-0156 WK 10' x 10' Canopy For Emergency Clean-up.....	261.05	
02 90 55 00-0157 MO 10' x 10' Canopy For Emergency Clean-up.....	522.09	
02 90 55 00-0158 DAY 10' x 20' Canopy For Emergency Clean-up.....	261.05	
02 90 55 00-0159 WK 10' x 20' Canopy For Emergency Clean-up.....	522.09	
02 90 55 00-0160 MO 10' x 20' Canopy For Emergency Clean-up.....	1,044.19	
02 90 55 00-0161 DAY 16' x 16' Canopy For Emergency Clean-up.....	327.34	
02 90 55 00-0162 WK 16' x 16' Canopy For Emergency Clean-up.....	654.69	
02 90 55 00-0163 MO 16' x 16' Canopy For Emergency Clean-up.....	1,309.38	
02 90 55 00-0164 DAY 20' x 20' Canopy For Emergency Clean-up.....	435.08	
02 90 55 00-0165 WK 20' x 20' Canopy For Emergency Clean-up.....	870.16	
02 90 55 00-0166 MO 20' x 20' Canopy For Emergency Clean-up.....	1,740.31	
02 90 55 00-0167 DAY 20' x 30' Canopy For Emergency Clean-up.....	497.23	
02 90 55 00-0168 WK 20' x 30' Canopy For Emergency Clean-up.....	994.46	
02 90 55 00-0169 MO 20' x 30' Canopy For Emergency Clean-up.....	1,988.93	

02 Existing Conditions**02 90 Disaster Recovery****02 90 55 Emergency Clean-up**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 90 55 00-0170	DAY	20' x 40' Canopy For Emergency Clean-up	580.10
02 90 55 00-0171	WK	20' x 40' Canopy For Emergency Clean-up	1,160.21
02 90 55 00-0172	MO	20' x 40' Canopy For Emergency Clean-up	2,320.42
02 90 55 00-0173	DAY	First Aid Station For Emergency Clean-up	313.26
02 90 55 00-0174	WK	First Aid Station For Emergency Clean-up	861.45
02 90 55 00-0175	MO	First Aid Station For Emergency Clean-up	2,349.42
02 90 55 00-0176	DAY	Portable Eyewash Station For Emergency Clean-up	95.14
02 90 55 00-0177	WK	Portable Eyewash Station For Emergency Clean-up	261.63
02 90 55 00-0178	MO	Portable Eyewash Station For Emergency Clean-up	713.53
02 90 55 00-0179	DAY	2 Way Radio For Emergency Clean-up	39.48

02 90 55 00-0180 Technical/Electronics Restoration Equipment (02 90 55 00-0022)

02 90 55 00-0181	DAY	Computer - Diagnostic For Emergency Clean-up	51.80
02 90 55 00-0182	WK	Computer - Diagnostic For Emergency Clean-up	142.44
02 90 55 00-0183	MO	Computer - Diagnostic For Emergency Clean-up	388.46
02 90 55 00-0184	DAY	Convection Oven - Large For Emergency Clean-up	820.66
02 90 55 00-0185	WK	Convection Oven - Large For Emergency Clean-up	2,256.82
02 90 55 00-0186	MO	Convection Oven - Large For Emergency Clean-up	6,154.98
02 90 55 00-0187	DAY	Convection Oven - Small For Emergency Clean-up	186.46
02 90 55 00-0188	WK	Convection Oven - Small For Emergency Clean-up	512.77
02 90 55 00-0189	MO	Convection Oven - Small For Emergency Clean-up	1,398.46
02 90 55 00-0190	DAY	Convection Oven - Vacuum For Emergency Clean-up	1,171.30
02 90 55 00-0191	WK	Convection Oven - Vacuum For Emergency Clean-up	3,221.08
02 90 55 00-0192	MO	Convection Oven - Vacuum For Emergency Clean-up	8,784.77
02 90 55 00-0193	DAY	Decontamination Booth For Emergency Clean-up	968.25
02 90 55 00-0194	WK	Decontamination Booth For Emergency Clean-up	2,662.69
02 90 55 00-0195	MO	Decontamination Booth For Emergency Clean-up	7,261.89
02 90 55 00-0196	DAY	DI Water System For Emergency Clean-up	75.20
02 90 55 00-0197	WK	DI Water System For Emergency Clean-up	206.81
02 90 55 00-0198	MO	DI Water System For Emergency Clean-up	564.03
02 90 55 00-0199	DAY	ESD Bench Workstation For Emergency Clean-up	46.06
02 90 55 00-0200	WK	ESD Bench Workstation For Emergency Clean-up	126.67
02 90 55 00-0201	MO	ESD Bench Workstation For Emergency Clean-up	345.47
02 90 55 00-0202	DAY	Heater/Enclosure Control System For Emergency Clean-up	31.08
02 90 55 00-0203	WK	Heater/Enclosure Control System For Emergency Clean-up	85.46
02 90 55 00-0204	MO	Heater/Enclosure Control System For Emergency Clean-up	233.08
02 90 55 00-0205	DAY	Hi-Tech Mobile Cart/Workstation For Emergency Clean-up	118.45
02 90 55 00-0206	WK	Hi-Tech Mobile Cart/Workstation For Emergency Clean-up	325.73
02 90 55 00-0207	MO	Hi-Tech Mobile Cart/Workstation For Emergency Clean-up	888.35
02 90 55 00-0208	DAY	Micro-Blaster/Dust Collector For Emergency Clean-up	466.16
02 90 55 00-0209	WK	Micro-Blaster/Dust Collector For Emergency Clean-up	1,281.93
02 90 55 00-0210	MO	Micro-Blaster/Dust Collector For Emergency Clean-up	3,496.16
02 90 55 00-0211	DAY	Mobile Laboratory For Emergency Clean-up	1,294.88
02 90 55 00-0212	WK	Mobile Laboratory For Emergency Clean-up	3,560.91
02 90 55 00-0213	MO	Mobile Laboratory For Emergency Clean-up	9,711.56
02 90 55 00-0214	DAY	Nitrogen Enclosure Cabinet For Emergency Clean-up	24.86
02 90 55 00-0215	WK	Nitrogen Enclosure Cabinet For Emergency Clean-up	68.37
02 90 55 00-0216	MO	Nitrogen Enclosure Cabinet For Emergency Clean-up	186.46
02 90 55 00-0217	DAY	Odell Cleaning Station For Emergency Clean-up	725.13
02 90 55 00-0218	WK	Odell Cleaning Station For Emergency Clean-up	1,994.11
02 90 55 00-0219	MO	Odell Cleaning Station For Emergency Clean-up	5,438.48
02 90 55 00-0220	DAY	Parts Washer For Emergency Clean-up	51.80
02 90 55 00-0221	WK	Parts Washer For Emergency Clean-up	142.44
02 90 55 00-0222	MO	Parts Washer For Emergency Clean-up	388.46
02 90 55 00-0223	DAY	Ultrasonic Cleaning System For Emergency Clean-up	352.52
02 90 55 00-0224	WK	Ultrasonic Cleaning System For Emergency Clean-up	969.43
02 90 55 00-0225	MO	Ultrasonic Cleaning System For Emergency Clean-up	2,643.89
02 90 55 00-0226	DAY	Technical High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up	155.99
02 90 55 00-0227	WK	Technical High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up	428.98
02 90 55 00-0228	MO	Technical High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up	1,169.93

02 90 55 00-0229 Drying/Dehumidification Equipment (02 90 55 00-0022)

02 90 55 00-0230	DAY	202 CFM Water Extraction Unit With Dual 3-Stage Vacuums For Emergency Clean-up Note: Includes 25' high Pressure solution hose and 25' Vacuum hose.	229.40
02 90 55 00-0231	WK	202 CFM Water Extraction Unit With Dual 3-Stage Vacuums For Emergency Clean-up Note: Includes 25' high Pressure solution hose and 25' Vacuum hose.	630.85
02 90 55 00-0232	MO	202 CFM Water Extraction Unit With Dual 3-Stage Vacuums For Emergency Clean-up Note: Includes 25' high Pressure solution hose and 25' Vacuum hose.	1,720.49
02 90 55 00-0233	DAY	2,200 CFM Centrifugal Air Mover For Emergency Clean-up	57.63
02 90 55 00-0234	WK	2,200 CFM Centrifugal Air Mover For Emergency Clean-up	158.49
02 90 55 00-0235	MO	2,200 CFM Centrifugal Air Mover For Emergency Clean-up	432.25
02 90 55 00-0236	DAY	3,000 CFM Axial Air Mover For Emergency Clean-up	96.05
02 90 55 00-0237	WK	3,000 CFM Axial Air Mover For Emergency Clean-up	264.15
02 90 55 00-0238	MO	3,000 CFM Axial Air Mover For Emergency Clean-up	720.41
02 90 55 00-0239	DAY	Injectidry System For Emergency Clean-up	284.45
02 90 55 00-0240	WK	Injectidry System For Emergency Clean-up	782.25
02 90 55 00-0241	MO	Injectidry System For Emergency Clean-up	2,133.41
02 90 55 00-0242	DAY	Up To 100 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	183.52
02 90 55 00-0243	WK	Up To 100 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	504.68

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 55 00-0244 MO Up To 100 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	1,376.39	
02 90 55 00-0245 DAY >100 To 175 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	258.98	
02 90 55 00-0246 WK >100 To 175 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	712.18	
02 90 55 00-0247 MO >100 To 175 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	1,942.31	
02 90 55 00-0248 DAY >175 To 250 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	253.43	
02 90 55 00-0249 WK >175 To 250 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	696.94	
02 90 55 00-0250 MO >175 To 250 Pints Water Removal Per Day, Refrigerant Dehumidifier For Emergency Clean-up	1,900.73	
02 90 55 00-0251 DAY Phoenix 200 Refrigerant Dehumidifier For Emergency Clean-up	270.91	
02 90 55 00-0252 WK Phoenix 200 Refrigerant Dehumidifier For Emergency Clean-up	745.00	
02 90 55 00-0253 MO Phoenix 200 Refrigerant Dehumidifier For Emergency Clean-up	2,031.82	
02 90 55 00-0254 DAY Phoenix 300 Refrigerant Dehumidifier For Emergency Clean-up	270.91	
02 90 55 00-0255 WK Phoenix 300 Refrigerant Dehumidifier For Emergency Clean-up	745.00	
02 90 55 00-0256 MO Phoenix 300 Refrigerant Dehumidifier For Emergency Clean-up	2,031.82	
02 90 55 00-0257 DAY D-500 Desiccant Dehumidifier For Emergency Clean-up	305.86	
02 90 55 00-0258 WK D-500 Desiccant Dehumidifier For Emergency Clean-up	841.13	
02 90 55 00-0259 MO D-500 Desiccant Dehumidifier For Emergency Clean-up	2,293.99	
02 90 55 00-0260 DAY D-750 Desiccant Dehumidifier For Emergency Clean-up	642.32	
02 90 55 00-0261 WK D-750 Desiccant Dehumidifier For Emergency Clean-up	1,766.37	
02 90 55 00-0262 MO D-750 Desiccant Dehumidifier For Emergency Clean-up	4,817.37	
02 90 55 00-0263 DAY D-1000 Desiccant Dehumidifier For Emergency Clean-up	1,101.11	
02 90 55 00-0264 WK D-1000 Desiccant Dehumidifier For Emergency Clean-up	3,028.06	
02 90 55 00-0265 MO D-1000 Desiccant Dehumidifier For Emergency Clean-up	8,258.36	
02 90 55 00-0266 DAY D-1500 Desiccant Dehumidifier For Emergency Clean-up	1,695.37	
02 90 55 00-0267 WK D-1500 Desiccant Dehumidifier For Emergency Clean-up	4,662.26	
02 90 55 00-0268 MO D-1500 Desiccant Dehumidifier For Emergency Clean-up	12,715.24	
02 90 55 00-0269 DAY D-2000 Desiccant Dehumidifier For Emergency Clean-up	1,695.37	
02 90 55 00-0270 WK D-2000 Desiccant Dehumidifier For Emergency Clean-up	4,662.26	
02 90 55 00-0271 MO D-2000 Desiccant Dehumidifier For Emergency Clean-up	12,715.24	
02 90 55 00-0272 DAY D-2250 Desiccant Dehumidifier For Emergency Clean-up	1,770.52	
02 90 55 00-0273 WK D-2250 Desiccant Dehumidifier For Emergency Clean-up	4,868.93	
02 90 55 00-0274 MO D-2250 Desiccant Dehumidifier For Emergency Clean-up	13,278.91	
02 90 55 00-0275 DAY D-3000 Desiccant Dehumidifier For Emergency Clean-up	2,202.23	
02 90 55 00-0276 WK D-3000 Desiccant Dehumidifier For Emergency Clean-up	6,056.13	
02 90 55 00-0277 MO D-3000 Desiccant Dehumidifier For Emergency Clean-up	16,516.71	
02 90 55 00-0278 DAY D-4500 Desiccant Dehumidifier For Emergency Clean-up	2,477.51	
02 90 55 00-0279 WK D-4500 Desiccant Dehumidifier For Emergency Clean-up	6,813.14	
02 90 55 00-0280 MO D-4500 Desiccant Dehumidifier For Emergency Clean-up	18,581.30	
02 90 55 00-0281 DAY D-5000 Desiccant Dehumidifier For Emergency Clean-up	2,661.03	
02 90 55 00-0282 WK D-5000 Desiccant Dehumidifier For Emergency Clean-up	7,317.82	
02 90 55 00-0283 MO D-5000 Desiccant Dehumidifier For Emergency Clean-up	19,957.69	
02 90 55 00-0284 DAY D-9000 Desiccant Dehumidifier For Emergency Clean-up	3,495.60	
02 90 55 00-0285 WK D-9000 Desiccant Dehumidifier For Emergency Clean-up	9,612.90	
02 90 55 00-0286 MO D-9000 Desiccant Dehumidifier For Emergency Clean-up	26,217.00	
02 90 55 00-0287 DAY D-10500 Desiccant Dehumidifier For Emergency Clean-up	3,670.38	
02 90 55 00-0288 WK D-10500 Desiccant Dehumidifier For Emergency Clean-up	10,093.54	
02 90 55 00-0289 MO D-10500 Desiccant Dehumidifier For Emergency Clean-up	27,527.85	
02 90 55 00-0290 DAY 3.5 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	641.58	
02 90 55 00-0291 WK 3.5 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	1,764.36	
02 90 55 00-0292 MO 3.5 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	4,811.88	
02 90 55 00-0293 DAY 5 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	888.35	
02 90 55 00-0294 WK 5 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	2,442.95	
02 90 55 00-0295 MO 5 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	6,662.60	
02 90 55 00-0296 DAY 10 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	1,101.11	
02 90 55 00-0297 WK 10 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	3,028.06	
02 90 55 00-0298 MO 10 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	8,258.36	
02 90 55 00-0299 DAY 25 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	1,468.15	
02 90 55 00-0300 WK 25 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	4,037.42	
02 90 55 00-0301 MO 25 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	11,011.14	
02 90 55 00-0302 DAY 50 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	2,477.51	
02 90 55 00-0303 WK 50 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	6,813.14	
02 90 55 00-0304 MO 50 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	18,581.30	
02 90 55 00-0305 DAY 80 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	2,752.78	
02 90 55 00-0306 WK 80 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	7,570.16	
02 90 55 00-0307 MO 80 Ton DX Unit - Heating / Air Conditioning For Emergency Clean-up	20,645.89	
02 90 55 00-0308 DAY 25' Flex Duct For Emergency Clean-up	36.70	
02 90 55 00-0309 WK 25' Flex Duct For Emergency Clean-up	100.94	
02 90 55 00-0310 MO 25' Flex Duct For Emergency Clean-up	275.28	
02 90 55 00-0311 DAY Hygrothermograph For Emergency Clean-up	51.80	
02 90 55 00-0312 WK Hygrothermograph For Emergency Clean-up	142.44	
02 90 55 00-0313 MO Hygrothermograph For Emergency Clean-up	388.46	
02 90 55 00-0314 DAY Dehumidification Trailer With 1,500 CFM Desiccant Unit For Emergency Clean-up	9,289.48	
Note: Includes 400 KW generator, 1500 CFM desiccant DH, 25 Ton DX unit, 1000 gallon fuel tank, and limited electrical distribution.		
02 90 55 00-0315 WK Dehumidification Trailer With 1,500 CFM Desiccant Unit For Emergency Clean-up	25,546.07	
Note: Includes 400 KW generator, 1500 CFM desiccant DH, 25 Ton DX unit, 1000 gallon fuel tank, and limited electrical distribution.		
02 90 55 00-0316 MO Dehumidification Trailer With 1,500 CFM Desiccant Unit For Emergency Clean-up	69,671.11	
Note: Includes 400 KW generator, 1500 CFM desiccant DH, 25 Ton DX unit, 1000 gallon fuel tank, and limited electrical distribution.		

02 90 55 00-0317 Power Equipment (02 90 55 00-0022)

02 Existing Conditions**02 90 Disaster Recovery****02 90 55 Emergency Clean-up**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 90 55 00-0318	WK	Up to 65 KVA Generator For Emergency Clean-up	1,222.06
02 90 55 00-0319	WK	>65 to 125 KVA Generator For Emergency Clean-up	2,068.11
02 90 55 00-0320	WK	>125 to 250 KVA Generator For Emergency Clean-up	2,017.14
02 90 55 00-0321	WK	>250 to 375 KVA Generator For Emergency Clean-up	3,478.18
02 90 55 00-0322	WK	>375 Up to 440 KVA Generator For Emergency Clean-up	4,700.25
02 90 55 00-0323	WK	>440 to 625 KVA Generator For Emergency Clean-up	7,077.70
02 90 55 00-0324	WK	>625 to 800 KVA Generator For Emergency Clean-up	7,238.38
02 90 55 00-0325	WK	>800 to 1,000 KVA Generator For Emergency Clean-up	9,682.52
02 90 55 00-0326	WK	>1,000 to 1,500 KVA Generator For Emergency Clean-up	14,570.78
02 90 55 00-0327	EA	Generator Cable/Pigtails (Per Section) For Emergency Clean-up	31.59
02 90 55 00-0328	EA	Sub-Distribution Panel (Spider Box) For Emergency Clean-up	151.35
02 90 55 00-0329	EA	Electrical Distribution Panel For Emergency Clean-up	352.52
02 90 55 00-0330	EA	Quad Box Strings (25' Sections) For Emergency Clean-up	56.87
02 90 55 00-0331	EA	50' Power Cord For Spider Box For Emergency Clean-up	52.64
02 90 55 00-0332	EA	Pig Tails (Per Each) For Emergency Clean-up	5.18

02 90 55 00-0333 Freight Charges (02 90 55 00-0022)

02 90 55 00-0334	MI	Freight Up To 1 Ton Pick Up Truck For Emergency Clean-up Equipment	2.59
02 90 55 00-0335	MI	Freight >1 Ton Pick Up Truck For Emergency Clean-up Equipment	4.66
02 90 55 00-0336	MI	Freight 16' Or 24' Box Truck For Emergency Clean-up Equipment	4.66
02 90 55 00-0337	MI	Freight Tractor Trailer For Emergency Clean-up Equipment	6.73

02 90 55 00-0338 Emergency Clean-up Personal Protection Equipment (02 90 55 00-0001)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Cleaning, Contents Manipulation, and Water Emergency Clean-up sections.

02 90 55 00-0339	EA	Tyvek Coveralls For Emergency Clean-up Personal Protection Equipment	15.19
02 90 55 00-0340	EA	Tyvek Coveralls With Elastic Wrists And Ankles For Emergency Clean-up Personal Protection Equipment	17.90
02 90 55 00-0341	EA	Tyvek Coveralls With Hood, Elastic Wrists And Ankles For Emergency Clean-up Personal Protection Equipment	18.76
02 90 55 00-0342	EA	Tyvek Coveralls With Hood, Boots, Elastic Wrists And Ankles For Emergency Clean-up Personal Protection Equipment	23.65
02 90 55 00-0343	EA	Disposable Dual Cartridge Half-Mask Respirator For Emergency Clean-up Personal Protection Equipment	125.72
02 90 55 00-0344	EA	N95 Respirator For Emergency Clean-up Personal Protection Equipment	5.26
02 90 55 00-0345	EA	N95 Respirator With Valve For Emergency Clean-up Personal Protection Equipment	7.49
02 90 55 00-0346	PR	3M Respirator Cartridges For Emergency Clean-up Personal Protection Equipment	50.25
02 90 55 00-0347	EA	Respirator Cleaning Wipes, Per Box 100 For Emergency Clean-up Personal Protection Equipment	40.21
02 90 55 00-0348	PR	P100 Respirator Cartridges For Emergency Clean-up Personal Protection Equipment	50.25
02 90 55 00-0349	EA	Respirator Cartridge For Emergency Clean-up Personal Protection Equipment	53.06
02 90 55 00-0350	BOX	Dust Mask, Box of 50, For Emergency Clean-up Personal Protection Equipment	59.16
02 90 55 00-0351	PR	Cotton Canvas Gloves For Emergency Clean-up Personal Protection Equipment	4.23
02 90 55 00-0352	BOX	5 Mil, Disposable Latex Gloves, Box of 100, For Emergency Clean-up Personal Protection Equipment	27.53
02 90 55 00-0353	PR	4 Mil, Disposable Nitrile Gloves For Emergency Clean-up Personal Protection Equipment	0.56
02 90 55 00-0354	PR	5 Mil, Disposable Vinyl Gloves For Emergency Clean-up Personal Protection Equipment	0.48
02 90 55 00-0355	PR	17 Mil, Latex Gloves For Emergency Clean-up Personal Protection Equipment	2.24
02 90 55 00-0356	PR	15 Mil, Nitrile Gloves For Emergency Clean-up Personal Protection Equipment	5.32
02 90 55 00-0357	PR	Vinyl Coated Gloves With Knit Lining For Emergency Clean-up Personal Protection Equipment	7.29
02 90 55 00-0358	PR	30 Mil, Polyvinyl Chloride (PVC) And Polyvinyl Chloride (PVC) Blend Gloves For Emergency Clean-up Personal Protection Equipment	8.17
02 90 55 00-0359	PR	Leather Gloves For Emergency Clean-up Personal Protection Equipment	13.77
02 90 55 00-0360	EA	Heavy Duty, Rubber Gloves For Emergency Clean-up Personal Protection Equipment	23.51
02 90 55 00-0361	PR	Polycarbonate Lens Safety Goggles For Emergency Clean-up Personal Protection Equipment	15.33
02 90 55 00-0362	PR	Chemical Splash/Impact Resistant, Polycarbonate Lens Safety Goggles For Emergency Clean-up Personal Protection Equipment	25.28
02 90 55 00-0363	PR	Plastic Safety Glasses For Emergency Clean-up Personal Protection Equipment	6.71
02 90 55 00-0364	EA	Safety Harness (Per Person/Day) For Emergency Clean-up Personal Protection Equipment	9.18

02 90 55 00-0365 Emergency Clean-up Expendables (02 90 55 00-0001)

Note: Used in the performance of time and material projects. Not used in conjunction with tasks in the Cleaning, Contents Manipulation, and Water Emergency Clean-up sections.

02 90 55 00-0366 General Materials (02 90 55 00-0365)

02 90 55 00-0367	GAL	Adhesive Remover For Emergency Clean-up	110.11
02 90 55 00-0368	GAL	Bioside-HS Cleaning Solution For Emergency Clean-up	35.32
02 90 55 00-0369	GAL	Biocide Mold Cleaning Solution For Emergency Clean-up	45.07
02 90 55 00-0370	EA	10" x 12" x 15" Cardboard Storage Box For Emergency Clean-up	5.80
02 90 55 00-0371	EA	10" x 12" x 24" Cardboard Storage Box For Emergency Clean-up	8.81
02 90 55 00-0372	EA	10" x 15" x 24" Cardboard Storage Box For Emergency Clean-up	8.81
02 90 55 00-0373	GAL	Bleach For Emergency Clean-up	11.84
02 90 55 00-0374	EA	Small Stainless Brush For Emergency Clean-up	7.52
02 90 55 00-0375	EA	2-1/2 Gallon Buckets For Emergency Clean-up	8.75
02 90 55 00-0376	EA	5 Gallon Bucket For Emergency Clean-up	13.26
02 90 55 00-0377	GAL	Carpet Defoamer For Emergency Clean-up	34.11
02 90 55 00-0378	GAL	Carpet Pre-treat For Emergency Clean-up	27.83
02 90 55 00-0379	GAL	Carpet Spotter For Emergency Clean-up	46.63
02 90 55 00-0380	GAL	Carpet/Upholstery Cleaner For Emergency Clean-up	37.60
02 90 55 00-0381	ROL	Carpet Masking/Shield For Emergency Clean-up	108.23
02 90 55 00-0382	EA	Chemical Sponge For Emergency Clean-up	4.33
02 90 55 00-0383	GAL	Clear Seal For Emergency Clean-up	148.05
02 90 55 00-0384	GAL	Coil Cleaner For Emergency Clean-up	74.51
02 90 55 00-0385	EA	Decontamination Chamber For Emergency Clean-up	323.75

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
02 90 55 00-0386 GAL All Purpose Degreaser For Emergency Clean-up.....	48.45	
02 90 55 00-0387 GAL De-Foamer Liquid For Emergency Clean-up.....	63.68	
02 90 55 00-0388 EA Deodorization Membrane For Emergency Clean-up.....	118.77	
02 90 55 00-0389 GAL 9-D-9 Smoke Deodorizer For Emergency Clean-up.....	190.34	
02 90 55 00-0390 LB Deodorizing Gel For Emergency Clean-up.....	44.72	
02 90 55 00-0391 GAL Deodorizing Liquid For Emergency Clean-up.....	62.98	
02 90 55 00-0392 PAIL Deodorizing Block For Emergency Clean-up.....	11.24	
02 90 55 00-0393 GAL Disinfectant/Anti-microbial For Emergency Clean-up.....	116.03	
02 90 55 00-0394 GAL BruClean Disinfectant For Emergency Clean-up.....	37.90	
02 90 55 00-0395 GAL Dryclean For Emergency Clean-up.....	49.49	
02 90 55 00-0396 GAL Duct Sealant Spray For Emergency Clean-up.....	74.58	
02 90 55 00-0397 GAL Antifungal Duct Sealant For Emergency Clean-up.....	107.73	
02 90 55 00-0398 GAL Microbial Encapsulant (Fosters 20 - 40) For Emergency Clean-up.....	171.65	
02 90 55 00-0399 PR Ear Plugs For Emergency Clean-up Personal Protection Equipment.....	0.67	
02 90 55 00-0400 GAL Encapsulant For Emergency Clean-up.....	123.33	
02 90 55 00-0401 GAL Aftershock Fiberlocke For Emergency Clean-up.....	108.29	
02 90 55 00-0402 GAL IAQ 2500 Fiberlocke For Emergency Clean-up.....	127.92	
02 90 55 00-0403 GAL IAS 6000 Fiberlocke For Emergency Clean-up.....	131.57	
02 90 55 00-0404 ROL Filter Material For Emergency Clean-up.....	290.36	
02 90 55 00-0405 EA Blue Paper Collection Bag Filter For Emergency Clean-up.....	7.82	
02 90 55 00-0406 EA CVAC Filter For High Efficiency Particulate Air (HEPA) Vacuum For Emergency Clean-up.....	621.03	
02 90 55 00-0407 EA Pre-Filter For Negative Air Machine For Emergency Clean-up.....	2.98	
02 90 55 00-0408 EA Pleated Filter For Negative Air Machine For Emergency Clean-up.....	13.27	
02 90 55 00-0409 EA Charcoal Filter For Negative Air Machine For Emergency Clean-up.....	47.23	
02 90 55 00-0410 EA High Efficiency Particulate Air (HEPA) Filter For Negative Air Machine For Emergency Clean-up.....	449.18	
02 90 55 00-0411 EA Pleated Dehumidifier Filter For Emergency Clean-up.....	11.85	
02 90 55 00-0412 GAL Floor Stripper For Emergency Clean-up.....	23.20	
02 90 55 00-0413 GAL Floor Wax For Emergency Clean-up.....	33.15	
02 90 55 00-0414 GAL Fogger (Thermal) For Emergency Clean-up.....	201.88	
02 90 55 00-0415 BOX Furniture Blocks For Emergency Clean-up.....	162.60	
02 90 55 00-0416 EA Furniture Polish, Per 10 Oz Can For Emergency Clean-up.....	21.91	
02 90 55 00-0417 GAL Glass Cleaner For Emergency Clean-up.....	14.61	
02 90 55 00-0418 EA Goof Off Spray, 12 Oz For Emergency Clean-up.....	18.80	
02 90 55 00-0419 EA Halogen Light Bulbs For Emergency Clean-up.....	23.67	
02 90 55 00-0420 QT Hand Sanitizer For Emergency Clean-up.....	11.70	
02 90 55 00-0421 EA Hard Hats For Emergency Clean-up Personal Protection Equipment.....	9.63	
02 90 55 00-0422 BOX Hog Rings, Box Of 2,500 For Emergency Clean-up.....	22.91	
02 90 55 00-0423 GAL HVAC Coal Cleaner For Emergency Clean-up.....	71.82	
02 90 55 00-0424 BOX Inventory Tag, Box Of 1,000 For Emergency Clean-up.....	161.13	
02 90 55 00-0425 EA Utility Knives For Emergency Clean-up.....	18.23	
02 90 55 00-0426 ROL 13" Lay Flat Tubing (250' Roll) For Emergency Clean-up.....	138.22	
02 90 55 00-0427 ROL 20" Lay Flat Tubing (250' Roll) For Emergency Clean-up.....	145.93	
02 90 55 00-0428 ROL 29" Lay Flat Tubing (250' Roll) For Emergency Clean-up.....	290.54	
02 90 55 00-0429 ROL 39" Lay Flat Tubing (250' Roll) For Emergency Clean-up.....	419.95	
02 90 55 00-0430 GAL Lemon Oil For Emergency Clean-up.....	58.73	
02 90 55 00-0431 GAL LPS 1/Mecca Lube For Emergency Clean-up.....	60.23	
02 90 55 00-0432 GAL LPS 2 For Emergency Clean-up.....	63.75	
02 90 55 00-0433 GAL LPS Contact Cleaner For Emergency Clean-up.....	63.45	
02 90 55 00-0434 GAL Light Lubricant Preserve For Emergency Clean-up.....	168.20	
02 90 55 00-0435 GAL Heavy Lubricant Preserver For Emergency Clean-up.....	33.15	
02 90 55 00-0436 GAL Machinery Cleaning Solvent For Emergency Clean-up.....	281.16	
02 90 55 00-0437 GAL Metal Polishing Paste For Emergency Clean-up.....	31.13	
02 90 55 00-0438 GAL MediClean® Disinfectant For Emergency Clean-up.....	66.99	
02 90 55 00-0439 GAL Dri-Eaz Milgo Plus Sanitizer For Emergency Clean-up.....	82.23	
02 90 55 00-0440 EA Mop Heads For Emergency Clean-up.....	10.43	
02 90 55 00-0441 EA Nylon Scouring Pads For Emergency Clean-up.....	1.82	
02 90 55 00-0442 GAL Odor Neutralizer For Emergency Clean-up.....	46.63	
02 90 55 00-0443 EA Packing Paper, 25 LB Bundle For Emergency Clean-up.....	83.79	
02 90 55 00-0444 EA Paint Brushes For Emergency Clean-up.....	8.29	
02 90 55 00-0445 ROL Corrugated/Craft Paper, 48" x 250' For Emergency Clean-up.....	195.41	
02 90 55 00-0446 EA Putty Knives For Emergency Clean-up.....	7.51	
02 90 55 00-0447 ROL Red Resin Paper, 200' Roll For Emergency Clean-up.....	42.64	
02 90 55 00-0448 GAL Reodorant For Emergency Clean-up.....	140.88	
02 90 55 00-0449 GAL Restoracide For Emergency Clean-up.....	66.08	
02 90 55 00-0450 GAL Rust Remover For Emergency Clean-up.....	102.77	
02 90 55 00-0451 EA Saltesmo Test Samples For Emergency Clean-up.....	9.55	
02 90 55 00-0452 EA Sand Bag For Emergency Clean-up.....	2.50	
Note: Excludes sand material		
02 90 55 00-0453 EA Scotch-Brite 7447, Per Box 50 For Emergency Clean-up.....	33.56	
02 90 55 00-0454 EA Small Scrub Brushes For Emergency Clean-up.....	17.30	
02 90 55 00-0455 GAL Clear Soot Sealant For Emergency Clean-up.....	119.19	
02 90 55 00-0456 GAL Pigmented Soot Sealant For Emergency Clean-up.....	321.43	
02 90 55 00-0457 ROL Shrinkwrap Plastic For Emergency Clean-up.....	73.99	
02 90 55 00-0458 EA Dry Sponges For Emergency Clean-up.....	6.02	
02 90 55 00-0459 EA Spray Adhesive, Per Can For Emergency Clean-up.....	7.72	
02 90 55 00-0460 EA Spray Bot./Trigger For Emergency Clean-up.....	6.40	
02 90 55 00-0461 GAL Stain Remover For Emergency Clean-up.....	42.11	
02 90 55 00-0462 GAL Stainless Steel Cleaner For Emergency Clean-up.....	14.54	
02 90 55 00-0463 EA Stainless Steel Polish, Per Can For Emergency Clean-up.....	19.09	
02 90 55 00-0464 LB Sweeping Compound For Emergency Clean-up.....	0.69	
02 90 55 00-0465 ROL Duct Tape, 2" x 50 YD For Emergency Clean-up.....	15.10	

02 Existing Conditions**02 90 Disaster Recovery****02 90 55 Emergency Clean-up**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

02 90 55 00-0466	ROL	Environmental (Teal) Tape, 3/4" x 1,440' For Emergency Clean-up	14.21
02 90 55 00-0467	ROL	HVAC (Aluminum) Tape, 2" x 75' For Emergency Clean-up	36.46
02 90 55 00-0468	ROL	Blue Masking (Painters) Tape, 1-1/2" x 198' For Emergency Clean-up	20.22
02 90 55 00-0469	ROL	Poly Box Tape, 2" x 110 YD For Emergency Clean-up	6.24
02 90 55 00-0470	LB	Terry Towels For Emergency Clean-up	8.54
02 90 55 00-0471	GAL	Thermal Fog For Emergency Clean-up	94.76
02 90 55 00-0472	ROL	1.7 Mil, 55 Gallon Trash Bags, 50/Roll For Emergency Clean-up	46.98
02 90 55 00-0473	ROL	3 Mil, 55 Gallon Trash Bags, 50/Roll For Emergency Clean-up	109.81
02 90 55 00-0474	ROL	4 Mil, 55 Gallon Trash Bags, 50/Roll For Emergency Clean-up	140.88
02 90 55 00-0475	ROL	6 Mil, 55 Gallon Trash Bags, 50/Roll For Emergency Clean-up	187.36
02 90 55 00-0476	EA	Trisodium Phosphate, 20 LB Pail For Emergency Clean-up	60.48
02 90 55 00-0477	EA	Backpack Vacuum Bags For Emergency Clean-up	2.04
02 90 55 00-0478	EA	Upright Vacuum Bags For Emergency Clean-up	2.72
02 90 55 00-0479	GAL	Vinyl And Leather Cleaner For Emergency Clean-up	37.60
02 90 55 00-0480	ROL	1 Mil Visqueen, 12' x 400', For Emergency Clean-up	60.87
02 90 55 00-0481	ROL	4 Mil Visqueen, 32' x 100', For Emergency Clean-up	165.27
02 90 55 00-0482	ROL	6 Mil Visqueen, 32' x 400', For Emergency Clean-up	225.51
02 90 55 00-0483	LB	Wipes, Cotton Cloth For Emergency Clean-up	6.39
02 90 55 00-0484	ROL	12" x 750', Wrap, Bubble/Anti-static For Emergency Clean-up	185.62
02 90 55 00-0485	EA	Wyp-Alls, Case Of 160 Wipes For Emergency Clean-up	18.80
02 90 55 00-0486	EA	Zip Wall Zippers For Emergency Clean-up	28.17
02 90 55 00-0487	EA	Absorbent Matt Roll For Oil And Other Liquids - 15" Wide x 50' Roll Note: 3.3 gallon volume absorption capacity per roll	33.76
02 90 55 00-0488	EA	Oil Only Sorbent Pads - 15" x 19", Light, Package Of 100 Note: 26 OZ volume absorption capacity per pad	50.65
02 90 55 00-0489	EA	Oil Only Sorbent Pads - 15" x 19", Medium, Package Of 100 Note: 33 OZ volume absorption capacity per pad	53.36
02 90 55 00-0490	EA	Oil Only Sorbent Pads - 15" x 19", Heavy, Package Of 100 Note: 45 OZ volume absorption capacity per pad	87.12

02 90 55 00-0491 Technical/Electronics Restoration Materials (02 90 55 00-0365)

02 90 55 00-0492	EA	Brush - Brass For Emergency Clean-up	6.22
02 90 55 00-0493	EA	1" Brush, Natural Bristle For Emergency Clean-up	1.99
02 90 55 00-0494	EA	1/2" Brush, Natural Bristle For Emergency Clean-up	1.66
02 90 55 00-0495	EA	1/4" Brush, Natural Bristle For Emergency Clean-up	1.41
02 90 55 00-0496	EA	Brush - Parts For Emergency Clean-up	8.62
02 90 55 00-0497	EA	Brush - Plastic For Emergency Clean-up	4.48
02 90 55 00-0498	EA	Brush - Wire Grout For Emergency Clean-up	9.87
02 90 55 00-0499	EA	Brushing Tool For Emergency Clean-up	19.04
02 90 55 00-0500	EA	Cleaning Swabs, Cotton For Emergency Clean-up	0.41
02 90 55 00-0501	EA	Cleaning Swabs, Foam Tip For Emergency Clean-up	0.50
02 90 55 00-0502	EA	Contact Restorer, Per Can For Emergency Clean-up	37.68
02 90 55 00-0503	EA	Contact Spray, Per Can For Emergency Clean-up	25.64
02 90 55 00-0504	UNT	Corrosion Inhibitor Emitter - 1 CF For Emergency Clean-up	3.98
02 90 55 00-0505	UNT	Corrosion Inhibitor Emitter - 5 CF For Emergency Clean-up	11.39
02 90 55 00-0506	UNT	Corrosion Inhibitor Emitter - 10 CF For Emergency Clean-up	14.76
02 90 55 00-0507	LB	Cotton Cleaning Cloths For Emergency Clean-up	23.31
02 90 55 00-0508	EA	12" x 17" Dust Cloths For Emergency Clean-up	0.37
02 90 55 00-0509	EA	24" x 24" Dust Cloths For Emergency Clean-up	1.02
02 90 55 00-0510	EA	Deoxidizing Agent, Per Can For Emergency Clean-up	18.26
02 90 55 00-0511	GAL	Electronic Grade Detergent For Emergency Clean-up	42.30
02 90 55 00-0512	SHT	Inventory Labels For Emergency Clean-up	0.23
02 90 55 00-0513	GAL	Isopropyl Alcohol For Emergency Clean-up	112.10
02 90 55 00-0514	GAL	Lubrication/Penetrating Oil, Per Can For Emergency Clean-up	169.61
02 90 55 00-0515	GAL	PC Board Detergent For Emergency Clean-up	106.44
02 90 55 00-0516	GAL	Rust Inhibitor, Regular Duty For Emergency Clean-up	181.68
02 90 55 00-0517	GAL	Rust Inhibitor, Moderate Duty For Emergency Clean-up	183.05
02 90 55 00-0518	GAL	Rust Inhibitor, Severe Duty For Emergency Clean-up	195.66
02 90 55 00-0519	LB	Wipes, Lint Free Cloths For Emergency Clean-up	7.39
02 90 55 00-0520	EA	Wire Marker Card For Emergency Clean-up	2.90
02 90 55 00-0521	EA	Steel Wool, 16 Pad Sleeve For Emergency Clean-up	1.59

END OF SECTION 02



Concrete	03	03
Maintenance of Concrete	03 01	
Maintenance of Cast-In-Place Concrete	03 01 30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 Concrete

03 01 Maintenance of Concrete (03)

03 01 30 Maintenance of Cast-In-Place Concrete (03 01)

03 01 30 51 Cleaning of Cast-In-Place Concrete (03 01 30)

03 01 30 51-0001	Abrasive Blasting <small>(03 01 30 51)</small>	
	Note: Includes containment and clean-up of all material. Includes steel ball media.	
03 01 30 51-0002	SF Concrete Floors, Abrasive Shot (Bead) Blasting.....	3.91
	For Up To 100, Add	3.24
	For >100 To 250, Add	0.81
	For >250 To 500, Add	0.41
	For >5,000 To 10,000, Deduct	-0.08
	For >10,000, Deduct	-0.16
03 01 30 51-0003	SF Concrete Walls, Abrasive Shot (Bead) Blasting.....	5.53
	For Up To 100, Add	6.48
	For >100 To 250, Add	1.62
	For >250 To 500, Add	0.81
	For >5,000 To 10,000, Deduct	-0.16
	For >10,000, Deduct	-0.32

03 01 30 71 Rehabilitation of Cast-In-Place Concrete (03 01 30)

03 01 30 71-0001	Concrete Resurfacing/Repair <small>(03 01 30 71)</small>	
	See CSI section 09 01 90 52-0002 for surface preparation as required.	
03 01 30 71-0002	Concrete Repair <small>(03 01 30 71-0001)</small>	
03 01 30 71-0003	Decks Or Floors <small>(03 01 30 71-0002)</small>	
	Note: Includes bonding agent and sealant. Excludes saw cutting, sand blasting and forming.	
03 01 30 71-0004	SF Patch Decks Or Floors With 1/8" To 1/4" Thick Cementitious Mortar.....	6.78
03 01 30 71-0005	SF Patch Decks Or Floors With 1/8" To 1/4" Thick Epoxy Cementitious Mortar.....	22.05
03 01 30 71-0006	SF Patch Decks Or Floors With White Aluminum Oxide Grit (Non-Slip Aggregate).....	0.61
03 01 30 71-0007	Verticals Or Overheads <small>(03 01 30 71-0002)</small>	
	Note: Includes bonding agent and sealant. Excludes saw cutting, sand blasting and forming.	
03 01 30 71-0008	SF Patch Verticals Or Overheads With 1/8" To 1/4" Thick Cementitious Mortar.....	10.11
03 01 30 71-0009	SF Patch Verticals Or Overheads With 1/8" To 1/4" Thick Epoxy Cementitious Mortar.....	29.76
03 01 30 71-0010	SF Patch Verticals Or Overheads With 1/8" To 1/4" Thick Latex Cementitious Mortar.....	33.63
03 01 30 71-0011	SF Patch Verticals Or Overheads With 1/8" To 1/4" Thick Elastomeric Compound.....	9.00
03 01 30 71-0012	SF Patch Verticals Or Overheads With 1/8" To 1/4" Thick Copolymer Cementitious Compound.....	15.94
	Note: Rapid Set - WunderFixx	
03 01 30 71-0013	Circular Piers <small>(03 01 30 71-0002)</small>	
03 01 30 71-0014	SF Patch Circular Piers With 1/8" To 1/4" Elastomeric Patching Compound.....	12.47
03 01 30 71-0015	SF Patch Circular Piers With 1/8" To 1/4" Copolymer Cementitious Compound.....	21.51
	Note: Rapid Set - WunderFixx	
03 01 30 71-0016	Bridge Deck Treatment <small>(03 01 30 71-0002)</small>	
03 01 30 71-0017	SF Sweep Bridge Deck.....	0.02
03 01 30 71-0018	SF Clean Bridge Deck.....	0.02
03 01 30 71-0019	SF Treat Bridge Deck With Methacrylate Resin Sealant.....	2.24
03 01 30 71-0020	Concrete Finishes <small>(03 01 30 71-0001)</small>	
03 01 30 71-0021	Concrete Patching <small>(03 01 30 71-0020)</small>	
03 01 30 71-0022	Walls <small>(03 01 30 71-0021)</small>	
03 01 30 71-0023	BAG Sika Top 111 Plus.....	174.17
	Note: SikaTop 111 PLUS is a two-component, polymer-modified, portland-cement, fast-setting, screed mortar.	
	Yield: Approximately 0.5 cu. ft./unit. Approximately 0.75 cu. ft./unit (SikaTop 111 + 42 lbs. of 3/8" pea gravel).	
	For Up To 10, Add	63.89
	For >10 To 25, Add	38.33
	For >25 To 50, Add	25.56
	For >50 To 75, Add	12.78
03 01 30 71-0024	BAG Sika Grout 212, 50 LB Bag.....	119.56
	Note: SikaGrout 212 is a non-shrink, cementitious grout with a unique 2-stage shrinkage compensating mechanism. It is non-metallic and contains no chloride. Coverage: Approximately 0.44 cu. ft./bag at high flow.	
	For Up To 10, Add	40.45
	For >10 To 25, Add	24.27
	For >25 To 50, Add	16.18
	For >50 To 75, Add	8.09

03 Concrete**03 01 Maintenance of Concrete****03 01 30 Maintenance of Cast-In-Place Concrete**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
03 01 30 71-0025	EA	Sika Flex 1A, 10.3 Ounce Tube.....			40.37
		Note: Sikaflex-1a is a premium-grade, high-performance, moisture-cured, 1-component, polyurethane-based, non-sag elastomeric sealant. Coverage: 10.3 fl. oz. cartridge seals 12.4 lineal ft. of 1/2 x 1/4 in. joint. 20 fl. oz. uni-pac sausage seals 24 lineal ft. of 1/2 x 1/4 in. joint.			
03 01 30 71-0026	BAG	Pea Gravel.....			30.66
03 01 30 71-0027		Crack Repair For Concrete (03 01 30 71-0001)			
03 01 30 71-0028		Non-Structural Crack Repair For Concrete (03 01 30 71-0027)			
03 01 30 71-0029		Surface Applied, Non-Structural Crack Repair For Concrete (03 01 30 71-0028)			
		Note: Includes removing all debris and contaminants accessible within the crack using hand tools, water blasting, compressed air or vacuuming. Includes installing sealer with caulk gun, cartridge gun, squeeze bottle, etc. Excludes backer rod and sanding.			
03 01 30 71-0030	LF	Up To 1/4" Wide, Latex Emulsion, Gravity Fed Non-Structural Crack Repair For Concrete, Surface Applied With Squeeze Tube (Quikrete® Concrete Crack Seal).....			7.00
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60
03 01 30 71-0031	LF	>1/4" To 1/2" Wide, Latex Emulsion, Gravity Fed Non-Structural Crack Repair For Concrete, Surface Applied With Squeeze Tube (Quikrete® Concrete Crack Seal).....			9.16
		For Walls Instead Of Floors, Add			0.88
		For V-Grooving Crack With Grinder, Add			5.47
03 01 30 71-0032	LF	Up To 1/4" Wide, Sanded Acrylic Latex, Gravity Fed Non-Structural Crack Repair For Concrete, Surface Applied With Caulk Gun (Quikrete® Concrete Repair).....			7.14
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60
03 01 30 71-0033	LF	>1/4" To 1/2" Wide, Sanded Acrylic Latex, Gravity Fed Non-Structural Crack Repair For Concrete, Surface Applied With Caulk Gun (Quikrete® Concrete Repair).....			9.44
		For Walls Instead Of Floors, Add			0.88
		For V-Grooving Crack With Grinder, Add			5.47
03 01 30 71-0034	LF	Up To 1/4" Wide, Self Leveling Polyurethane Sealant, Gravity Fed Non-Structural Crack Repair For Concrete, Surface Applied With Cartridge Tool (Sikaflex® Self-Leveling Sealant).....			7.65
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60
03 01 30 71-0035	LF	>1/4" To 1/2" Wide, Self Leveling Polyurethane Sealant, Gravity Fed Non-Structural Crack Repair For Concrete, Surface Applied With Cartridge Tool (Sikaflex® Self-Leveling Sealant).....			10.45
		For Walls Instead Of Floors, Add			0.88
		For V-Grooving Crack With Grinder, Add			5.47
03 01 30 71-0036	LF	Up To 1/4" Wide, Non-Sag Elastomeric Polyurethane Sealant, Gravity Fed Non Structural Crack Repair For Concrete, Surface Applied With Cartridge Tool (Sikaflex® Concrete Fix).....			8.02
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60
03 01 30 71-0037	LF	>1/4" To 1/2" Wide, Non-Sag Elastomeric Polyurethane Sealant, Gravity Fed Non Structural Crack Repair For Concrete, Surface Applied With Cartridge Tool (Sikaflex® Concrete Fix).....			11.19
		For Walls Instead Of Floors, Add			0.88
		For V-Grooving Crack With Grinder, Add			5.47
03 01 30 71-0038		Pressure Injected, Non-Structural Crack Repair For Concrete (03 01 30 71-0028)			
		Note: Includes removing all debris and contaminants accessible within the crack using hand tools, water blasting, compressed air or vacuuming. Includes installing injection ports, sealing the crack opening (one side only), injecting the crack with polyurethane and restoring the sealed surface to flush conditions. Excludes disposal.			
03 01 30 71-0039	LF	Up To 1/4" Wide, Water Activated Polyurethane Foam Grout, Non-Structural Crack Repair For Concrete, Installed With Automated Injection Equipment (SealBoss 1570).....			31.06
		For Walls Instead Of Floors, Add			2.21
		For Cracks Accessible From Both Sides, Add			6.32
03 01 30 71-0040		Structural Crack Repair For Concrete (03 01 30 71-0027)			
03 01 30 71-0041		Surface Applied, Structural Crack Repair For Concrete (03 01 30 71-0040)			
		Note: Includes removing all debris and contaminants accessible within the crack using hand tools, water blasting, compressed air or vacuuming. Excludes disposal.			
03 01 30 71-0042	LF	Up To 1/4" Wide, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Concrete, Surface Applied With Trowel (Sikadur® 35).....			8.11
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60
03 01 30 71-0043	LF	>1/4" To 1/2" Wide, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Concrete, Surface Applied With Trowel (Sikadur® 35).....			11.38
		For Walls Instead Of Floors, Add			0.88
		For V-Grooving Crack With Grinder, Add			5.47
03 01 30 71-0044	LF	Up To 1/4" Wide, Moisture Tolerant, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Concrete, Surface Applied Trowel (Sikadur® 52).....			7.92
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60
03 01 30 71-0045	LF	>1/4" To 1/2" Wide, Moisture Tolerant, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Concrete, Surface Applied With Trowel (Sikadur® 52).....			10.98
		For Walls Instead Of Floors, Add			0.88
		For V-Grooving Crack With Grinder, Add			5.47
03 01 30 71-0046	LF	Up To 1/4" Wide, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Concrete, Surface Applied With Caulk Gun (Sikadur® Crack Fix).....			9.56
		For Walls Instead Of Floors, Add			0.68
		For V-Grooving Crack With Grinder, Add			5.60



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 01 30 71-0047	LF	>1/4" To 1/2" Wide, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Concrete, Surface Applied With Caulk Gun (Sikadur® Crack Fix).....	14.29	
		<i>For Walls Instead Of Floors, Add</i>	0.88	
		<i>For V-Grooving Crack With Grinder, Add</i>	5.47	
03 01 30 71-0048		Pressure Injected, Structural Crack Repair For Concrete (03 01 30 71-0040) Note: Includes removing all debris and contaminants accessible within the crack using hand tools, water blasting, compressed air or vacuuming. Includes installing injection ports, sealing the crack opening (one side only), injecting the crack with epoxy and restoring the sealed surface to flush conditions. Excludes disposal.		
03 01 30 71-0049	LF	Up To 1/4" Wide, Low Viscosity, High Strength Epoxy Resin, Structural Crack Repair For Concrete, Installed With Automated Injection Equipment (Sikadur® 35).....	27.10	
		<i>For Walls Instead Of Floors, Add</i>	2.21	
		<i>For Cracks Accessible From Both Sides, Add</i>	6.32	
03 01 30 71-0050	LF	Up To 1/4" Wide, Moisture Tolerant, Low Viscosity, High Strength Epoxy Resin, Structural Crack Repair For Concrete, Installed With Automated Injection Equipment (Sikadur® 52).....	26.90	
		<i>For Walls Instead Of Floors, Add</i>	2.21	
		<i>For Cracks Accessible From Both Sides, Add</i>	6.32	
03 01 30 71-0051		Carbon Fiber Strengthening System (03 01 30 71-0001) Note: Includes preparing surface, dust and debris removal by hand, clean and protect adjacent area, fill voids, primer, fabric substrate layers, final coat of epoxy and finish. Excludes disposal.		
03 01 30 71-0052	SF	Carbon Fiber Strengthening System For Concrete Beams, Per Layer	79.61	
		Note: Includes carbon fabric epoxy saturant, primer, filler for voids, anchors, finish.		
03 01 30 71-0053	SF	Carbon Fiber Strengthening System For Concrete Columns, Per Layer	70.86	
		Note: Includes carbon fabric epoxy saturant, primer, filler for voids, anchors, finish.		
03 01 30 71-0054	SF	Carbon Fiber Strengthening System For Concrete Ceiling Slabs, Per Layer	65.94	
		Note: Includes carbon fabric epoxy saturant, primer, filler for voids, anchors, finish.		
03 01 30 71-0055	SF	Carbon Fiber Strengthening System For Concrete Walls, Per Layer.....	63.21	
		Note: Includes carbon fabric epoxy saturant, primer, filler for voids, anchors, finish.		
03 01 30 71-0056	SF	Carbon Fiber Strengthening System For Concrete Slab, Per Layer	59.39	
		Note: Includes carbon fabric epoxy saturant, primer, filler for voids, anchors, finish.		
03 01 30 71-0057		Concrete Rehabilitation (03 01 30 71)		
03 01 30 71-0058		Corrosive Inhibitor (03 01 30 71-0057)		
03 01 30 71-0059	SF	Corrosive Inhibitor.....	6.02	
03 01 30 72		Strengthening Of Cast-in-Place Concrete (03 01 30)		
03 01 30 72-0001		Concrete Surface Repairs (03 01 30 72)		
03 01 30 72-0002	SF	Sound The Concrete Surface To Locate Delaminated Areas	0.38	

03 05 Common Work Results For Concrete (03)

03 05 13 Concrete Admixtures (03 05)

03 05 13 00-0001 Concrete Admixtures (03 05 13)				
03 05 13 00-0002	CY	Low Range Water Reducing (LRWR), Type A Concrete Admixture	8.08	
03 05 13 00-0003	CY	Set Retarding, Type B Concrete Admixture	5.60	
03 05 13 00-0004	CY	1% Calcium Chloride Accelerating, Type C Concrete Admixture.....	8.71	
03 05 13 00-0005	CY	2% Calcium Chloride Accelerating, Type C Concrete Admixture.....	17.41	
03 05 13 00-0006	CY	1% Non-Chloride Accelerating, Type C Concrete Admixture.....	15.55	
03 05 13 00-0007	CY	2% Non-Chloride Accelerating, Type C Concrete Admixture.....	31.09	
03 05 13 00-0008	CY	1% Water Reducing and Retarding (Hydration Stabilizer), Type D Concrete Admixture	6.72	
03 05 13 00-0009	CY	2% Water Reducing and Retarding (Hydration Stabilizer), Type D Concrete Admixture	13.10	
03 05 13 00-0010	CY	1% Water Reducing and Accelerating (High Early Strength), Type E Concrete Admixture	9.33	
03 05 13 00-0011	CY	2% Water Reducing and Accelerating (High Early Strength), Type E Concrete Admixture	18.65	
03 05 13 00-0012	CY	Mid Range Water Reducing (MRWR) Superplasticizer, Type A Or E Concrete Admixture	6.22	
03 05 13 00-0013	CY	High Range Water Reducing (HRWR) Superplasticizer, Type F Concrete Admixture.....	14.92	
03 05 13 00-0014	CY	1 LB/CY Polyethylene, Polypropylene, Nylon, Synthetic Plastic Fibers, Concrete Admixture	13.27	
03 05 13 00-0015	CY	1-1/2 LB/CY Polyethylene, Polypropylene, Nylon, Synthetic Plastic Fibers, Concrete Admixture	19.90	
03 05 13 00-0016	CY	25 LB/CY Steel Fibers, Concrete Admixture.....	46.40	
03 05 13 00-0017	CY	10% Microsilica (Silica Fume), Concrete Admixture	99.49	
03 05 13 00-0018	CY	Corrosion Inhibiting Concrete Admixture	37.31	
03 05 13 00-0019	CY	Winter Service Or Heat, Concrete Add.....	19.90	
03 05 13 00-0020	CY	Chilled Water, Concrete Add	19.90	
03 05 13 00-0021	CY	Subtle Color (See Davis Colors Color Card), Concrete Admixture	37.77	
03 05 13 00-0022	CY	Standard Color (See Davis Colors Color Card), Concrete Admixture.....	62.95	
03 05 13 00-0023	CY	Premium Color (See Davis Colors Color Card), Concrete Admixture	120.86	
03 05 13 00-0024	CY	Ultra Premium Color (See Davis Colors Color Card), Concrete Admixture	167.86	

03 10 Concrete Forming and Accessories (03)

03 11 Concrete Forming (03 10)

03 11 13 Structural Cast-In-Place Concrete Forming (03 11)

03 Concrete**03 10 Concrete Forming and Accessories****03 11 Concrete Forming**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

Note: Per square foot of formwork.

03 11 13 00-0001	Wood Formwork (03 11 13)		
	Note: For job built wood and/or plywood form systems where metal framed formwork cannot be used. Includes erecting, stripping, stacking, plywood, framing lumber, oiling, studs/walers, strongbacks, deadmen, supporting braces, turnbuckles, ties, and clips.		
03 11 13 00-0002	Foundation Wood Formwork (03 11 13 00-0001)		
	Note: For foundation work below or at grade.		
03 11 13 00-0003	SF Continuous Footings Foundation Wood Formwork.....	8.00	
	For <1,000, Add	1.50	
	For Foundations >8' Below Grade, Add	1.45	
	For Curved Formwork, Add	2.91	
03 11 13 00-0004	SF Pile Cap, Pier Or Spread Footings Foundation Wood Formwork.....	9.54	
	For <1,000, Add	1.81	
	For Foundations >8' Below Grade, Add	1.76	
	For Curved Formwork, Add	3.51	
03 11 13 00-0005	SF Mat Foundation Wood Formwork.....	11.14	
	For <1,000, Add	2.12	
	For Foundations >8' Below Grade, Add	2.07	
	For Curved Formwork, Add	4.14	
03 11 13 00-0006	SF Grade Beams Or Duct Bank Foundation Wood Formwork	9.25	
	For <1,000, Add	1.75	
	For Foundations >8' Below Grade, Add	1.69	
	For Curved Formwork, Add	3.39	
03 11 13 00-0007	SF Below Grade Walls Foundation Wood Formwork	13.07	
	Note: Excludes footing		
	For <1,000, Add	2.47	
	For Foundations >8' Below Grade, Add	2.39	
	For Curved Formwork, Add	4.78	
03 11 13 00-0008	Slab Edge And Block-Out Wood Formwork (03 11 13 00-0001)		
03 11 13 00-0009	LF Up To 6" High Slab Edge and Block-Out Wood Formwork	6.19	
	For Foundations >8' Below Grade, Add	1.16	
	For Curved Formwork, Add	2.32	
	For Up To 250, Add	1.19	
03 11 13 00-0010	LF >6" To 12" High Slab Edge and Block-Out Wood Formwork	8.85	
	For Foundations >8' Below Grade, Add	1.62	
	For Curved Formwork, Add	3.23	
	For Up To 250, Add	1.67	
03 11 13 00-0011	SF >12" High Slab Edge and Block-Out Wood Formwork.....	11.48	
	For Foundations >8' Below Grade, Add	2.10	
	For Curved Formwork, Add	4.20	
	For <1,000, Add	2.17	
03 11 13 00-0012	Column Wood Formwork (03 11 13 00-0001)		
03 11 13 00-0013	LF Up To 8" Square Column Wood Formwork.....	47.75	
03 11 13 00-0014	LF >8" To 12" Square Column Wood Formwork.....	69.84	
03 11 13 00-0015	LF >12" To 18" Square Column Wood Formwork	87.97	
03 11 13 00-0016	LF >18" To 24" Square Column Wood Formwork	126.29	
03 11 13 00-0017	LF >24" To 36" Square Column Wood Formwork	181.35	
03 11 13 00-0018	LF >36" To 48" Square Column Wood Formwork.....	239.79	
03 11 13 00-0019	Above Grade Wall Wood Formwork (03 11 13 00-0001)		
03 11 13 00-0020	SF Up To 8' High Above Grade Wall Wood Formwork.....	14.61	
	For Curved Formwork, Add	5.40	
	For <1,000, Add	2.77	
03 11 13 00-0021	SF >8' High Above Grade Wall Wood Formwork	17.29	
	For Curved Formwork, Add	6.41	
	For <1,000, Add	3.29	
03 11 13 00-0022	Elevated Beam Wood Formwork (03 11 13 00-0001)		
	Note: Includes adjustable shores and column supports and bracing lumber up to 14' for bottom of elevated beam.		
03 11 13 00-0023	SF Bottom of Elevated Beam Wood Formwork	19.28	
	For Curved Formwork, Add	7.06	
	For <1,000, Add	3.64	
03 11 13 00-0024	SF Vertical Sides of Elevated Beam Wood Formwork	12.14	
	For Curved Formwork, Add	4.50	
	For <1,000, Add	2.31	
03 11 13 00-0025	Elevated Slab Wood Formwork (03 11 13 00-0001)		
	Note: Includes adjustable shores and column supports and bracing lumber up to 14' for bottom of elevated slab.		
03 11 13 00-0026	SF Elevated Slab Wood Formwork	11.44	
	For <1,000, Add	2.09	
03 11 13 00-0027	Metal Framed Formwork (03 11 13)		
	Note: For all metal framed and metal form systems. Includes erecting, stripping, stacking, oiling, studs/walers, strongbacks, deadmen, supporting braces, turnbuckles, ties, and clips.		



Concrete	03	CS	
Concrete Forming and Accessories			03 10
Concrete Forming			03 11

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 11 13 00-0028 Foundation Metal Framed Formwork (03 11 13 00-0027)		
Note: For foundation work below or at grade.		
03 11 13 00-0029 SF Continuous Footings Foundation Metal Framed Formwork	7.58	
For <1,000, Add	1.38	
For Foundations >8' Below Grade, Add	1.31	
For Curved Formwork, Add	2.62	
03 11 13 00-0030 SF Pile Cap, Pier Or Spread Footings Foundation Metal Framed Formwork	8.39	
For <1,000, Add	1.54	
For Foundations >8' Below Grade, Add	1.47	
For Curved Formwork, Add	2.94	
03 11 13 00-0031 SF Mat Foundation Metal Framed Formwork	9.41	
For <1,000, Add	1.71	
For Foundations >8' Below Grade, Add	1.62	
For Curved Formwork, Add	3.25	
03 11 13 00-0032 SF Grade Beams Or Duct Bank Foundation Metal Framed Formwork	7.95	
For <1,000, Add	1.44	
For Foundations >8' Below Grade, Add	1.37	
For Curved Formwork, Add	2.73	
03 11 13 00-0033 SF Below Grade Walls Foundation Metal Framed Formwork	12.06	
Note: Excludes footing.		
For <1,000, Add	2.23	
For Foundations >8' Below Grade, Add	2.13	
For Curved Formwork, Add	4.27	
03 11 13 00-0034 Slab Edge And Block-Out Metal Framed Formwork (03 11 13 00-0027)		
03 11 13 00-0035 LF Up To 6" High Slab Edge and Block-Out Metal Framed Formwork	5.43	
For Foundations >8' Below Grade, Add	1.06	
For Curved Formwork, Add	2.11	
For <250, Add	1.07	
03 11 13 00-0036 LF >6" To 12" High Slab Edge and Block-Out Metal Framed Formwork	6.80	
For Foundations >8' Below Grade, Add	1.31	
For Curved Formwork, Add	2.62	
For <250, Add	1.33	
03 11 13 00-0037 SF >12" High Slab Edge and Block-Out Metal Framed Formwork	7.54	
For Foundations >8' Below Grade, Add	1.45	
For Curved Formwork, Add	2.90	
For <1,000, Add	1.47	
03 11 13 00-0038 Column Metal Framed Formwork (03 11 13 00-0027)		
03 11 13 00-0039 Square Columns (03 11 13 00-0038)		
03 11 13 00-0040 LF Up To 12" Square Column Metal Framed Formwork	47.19	
03 11 13 00-0041 LF >12" To 16" Square Column Metal Framed Formwork	57.08	
03 11 13 00-0042 LF >16" To 20" Square Column Metal Framed Formwork	67.00	
03 11 13 00-0043 LF >20" To 24" Square Column Metal Framed Formwork	80.02	
03 11 13 00-0044 LF >24" To 30" Square Column Metal Framed Formwork	96.44	
03 11 13 00-0045 LF >30" To 36" Square Column Metal Framed Formwork	115.85	
03 11 13 00-0046 LF >36" To 48" Square Column Metal Framed Formwork	148.68	
03 11 13 00-0047 LF >48" To 60" Square Column Metal Framed Formwork	183.46	
03 11 13 00-0048 Round Columns (03 11 13 00-0038)		
03 11 13 00-0049 LF Up To 12" Diameter Column Metal Formwork	47.94	
03 11 13 00-0050 LF >12" To 16" Diameter Column Metal Formwork	53.19	
03 11 13 00-0051 LF >16" To 20" Diameter Column Metal Formwork	60.93	
03 11 13 00-0052 LF >20" To 24" Diameter Column Metal Formwork	70.79	
03 11 13 00-0053 LF >24" To 30" Diameter Column Metal Formwork	83.43	
03 11 13 00-0054 LF >30" To 36" Diameter Column Metal Formwork	95.43	
03 11 13 00-0055 LF >36" To 48" Diameter Column Metal Formwork	124.30	
03 11 13 00-0056 LF >48" To 60" Diameter Column Metal Formwork	163.65	
03 11 13 00-0057 Above Grade Wall Metal Framed Formwork (03 11 13 00-0027)		
03 11 13 00-0058 SF Up to 8' High Above Grade Wall Metal Framed Formwork	7.50	
For Curved Formwork, Add	2.45	
For <1,000, Add	1.32	
03 11 13 00-0059 SF >8' High Above Grade Wall Metal Framed Formwork	9.17	
For Curved Formwork, Add	2.95	
For <1,000, Add	1.59	
03 11 13 00-0060 Elevated Beam Metal Framed Formwork (03 11 13 00-0027)		
Note: Includes adjustable shores and column supports and bracing lumber up to 14' for bottom of elevated beam.		
03 11 13 00-0061 SF Bottom of Elevated Beam Metal Framed Formwork	7.56	
For Curved Formwork, Add	2.30	
For <1,000, Add	1.27	
03 11 13 00-0062 SF Vertical Sides of Elevated Beam Metal Framed Formwork	5.60	
For Curved Formwork, Add	1.79	
For <1,000, Add	0.97	

03	03 Concrete
	03 10 Concrete Forming and Accessories
	03 11 Concrete Forming



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 11 13 00-0063	Elevated Slab Metal Framed Formwork <small>(03 11 13 00-0027)</small> Note: Includes adjustable shores and column supports and bracing lumber up to 14' for bottom of elevated slab.	
03 11 13 00-0064	SF Elevated Slab Metal Framed Formwork.....	10.53
	<i>For <1,000, Add</i>	1.57
03 11 13 00-0065	Fiber Tube Formwork <small>(03 11 13)</small> Note: Includes all supporting braces, erecting, aligning, stripping, turnbuckles, ties and clips.	
03 11 13 00-0066	Round Column Fiber Tube Formwork <small>(03 11 13 00-0065)</small>	
03 11 13 00-0067	LF 6" Diameter Round Fiber Tube Formwork	19.49
	<i>For Plastic Lined, Add</i>	0.83
	<i>For Columns >12' In Length, Add</i>	1.95
03 11 13 00-0068	LF 8" Diameter Round Fiber Tube Formwork	20.64
	<i>For Plastic Lined, Add</i>	0.98
	<i>For Columns >12' In Length, Add</i>	2.06
03 11 13 00-0069	LF 10" Diameter Round Fiber Tube Formwork	22.98
	<i>For Plastic Lined, Add</i>	1.18
	<i>For Columns >12' In Length, Add</i>	2.30
03 11 13 00-0070	LF 12" Diameter Round Fiber Tube Formwork	28.64
	<i>For Plastic Lined, Add</i>	2.10
	<i>For Columns >12' In Length, Add</i>	2.86
03 11 13 00-0071	LF 14" Diameter Round Fiber Tube Formwork	32.28
	<i>For Plastic Lined, Add</i>	2.66
	<i>For Columns >12' In Length, Add</i>	3.23
03 11 13 00-0072	LF 16" Diameter Round Fiber Tube Formwork	35.31
	<i>For Plastic Lined, Add</i>	3.32
	<i>For Columns >12' In Length, Add</i>	3.53
03 11 13 00-0073	LF 18" Diameter Round Fiber Tube Formwork	38.12
	<i>For Plastic Lined, Add</i>	3.88
	<i>For Columns >12' In Length, Add</i>	3.81
03 11 13 00-0074	LF 20" Diameter Round Fiber Tube Formwork	43.70
	<i>For Plastic Lined, Add</i>	5.27
	<i>For Columns >12' In Length, Add</i>	4.37
03 11 13 00-0075	LF 22" Diameter Round Fiber Tube Formwork	45.72
	<i>For Plastic Lined, Add</i>	5.48
	<i>For Columns >12' In Length, Add</i>	4.57
03 11 13 00-0076	LF 24" Diameter Round Fiber Tube Formwork	48.04
	<i>For Plastic Lined, Add</i>	5.78
	<i>For Columns >12' In Length, Add</i>	4.80
03 11 13 00-0077	LF 26" Diameter Round Fiber Tube Formwork	50.08
	<i>For Plastic Lined, Add</i>	6.24
	<i>For Columns >12' In Length, Add</i>	5.01
03 11 13 00-0078	LF 28" Diameter Round Fiber Tube Formwork	52.12
	<i>For Plastic Lined, Add</i>	6.70
	<i>For Columns >12' In Length, Add</i>	5.21
03 11 13 00-0079	LF 30" Diameter Round Fiber Tube Formwork	54.17
	<i>For Plastic Lined, Add</i>	7.16
	<i>For Columns >12' In Length, Add</i>	5.42
03 11 13 00-0080	LF 36" Diameter Round Fiber Tube Formwork	62.90
	<i>For Plastic Lined, Add</i>	9.21
	<i>For Columns >12' In Length, Add</i>	6.29
03 11 13 00-0081	LF 42" Diameter Round Fiber Tube Formwork	100.83
	<i>For Plastic Lined, Add</i>	20.18
	<i>For Columns >12' In Length, Add</i>	10.08
03 11 13 00-0082	LF 48" Diameter Round Fiber Tube Formwork	123.45
	<i>For Plastic Lined, Add</i>	26.56
	<i>For Columns >12' In Length, Add</i>	12.35
03 11 13 00-0083	LF 54" Diameter Round Fiber Tube Formwork	225.30
	<i>For Plastic Lined, Add</i>	56.45
	<i>For Columns >12' In Length, Add</i>	22.53
03 11 13 00-0084	LF 60" Diameter Round Fiber Tube Formwork	251.17
	<i>For Plastic Lined, Add</i>	63.71
	<i>For Columns >12' In Length, Add</i>	25.12
03 11 13 00-0085	Accessories For Formwork <small>(03 11 13)</small>	
03 11 13 00-0086	Keyway Forms, All Materials <small>(03 11 13 00-0085)</small>	
03 11 13 00-0087	LF 2" x 4" To 2" x 6" Keyway Forms for Concrete Formwork, All Materials	2.16
03 11 13 00-0088	Chamfer Strips, All Materials <small>(03 11 13 00-0085)</small>	
03 11 13 00-0089	LF 1/2" Wide Chamfer Strips for Concrete Formwork, All Materials.....	2.28
03 11 13 00-0090	LF 3/4" Wide Chamfer Strips for Concrete Formwork, All Materials.....	2.64
03 11 13 00-0091	LF 1" Wide Chamfer Strips for Concrete Formwork, All Materials.....	3.06
03 11 13 00-0092	Sleeves And Chases, Plastic Or Sheet Metal <small>(03 11 13 00-0085)</small>	
03 11 13 00-0093	EA 2" Diameter Sleeves Or Chases for Concrete Formwork, Plastic or Sheet Metal	15.55
03 11 13 00-0094	EA 4" Diameter Sleeves Or Chases for Concrete Formwork, Plastic or Sheet Metal	20.04
03 11 13 00-0095	EA 6" Diameter Sleeves Or Chases for Concrete Formwork, Plastic or Sheet Metal	24.36
03 11 13 00-0096	EA 8" Diameter Sleeves Or Chases for Concrete Formwork, Plastic or Sheet Metal	29.90
03 11 13 00-0097	EA 12" Diameter Sleeves Or Chases for Concrete Formwork, Plastic or Sheet Metal	39.18



Concrete	03	CS	
Concrete Forming and Accessories			03 10
Concrete Forming			03 11

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 11 13 00-0098 EA 18" Diameter Sleeves Or Chases for Concrete Formwork, Plastic or Sheet Metal.....	103.82	
03 11 16 Architectural Cast-In-Place Concrete Forming (03 11)		
03 11 16 13 Concrete Form Liners (03 11 16)		
03 11 16 13-0001 Concrete Form Liners (03 11 16 13)		
03 11 16 13-0002 SF Various Patterns And Textures, 1 Use, Concrete Form Liner, Add To Formwork	5.70	
03 11 16 13-0003 SF Beveled Edge, Rusticated Concrete Finish, 1 Use, Concrete Form Liner, Add To Formwork	7.40	
03 11 16 13-0004 SF Square Edge, Rusticated Concrete Finish, 1 Use, Concrete Form Liner, Add To Formwork	9.72	
03 11 23 Permanent Stair Forming (03 11)		
03 11 23 00-0001 Stairway Wood Formwork (03 11 23)		
03 11 23 00-0002 SF Cast On Grade Stairway Wood Formwork.....	18.58	
<i>For Curved Formwork, Add</i>	7.18	
<i>For <1,000, Add</i>	3.63	
03 11 23 00-0003 SF Elevated Stairway Wood Formwork.....	36.95	
Note: Includes adjustable column supports and bracing lumber up to 14' for bottom of elevated stair.		
<i>For Curved Formwork, Add</i>	13.96	
<i>For <1,000, Add</i>	7.12	
03 11 23 00-0004 Stairway Metal Framed Formwork (03 11 23)		
03 11 23 00-0005 SF Cast On Grade Stairway Metal Framed Formwork.....	15.62	
<i>For Curved Formwork, Add</i>	5.87	
<i>For <1,000, Add</i>	3.00	
03 11 23 00-0006 SF Elevated Stairway Metal Framed Formwork	28.94	
Note: Includes adjustable column supports and bracing lumber up to 14' for bottom of elevated stair.		
<i>For Curved Formwork, Add</i>	10.89	
<i>For <1,000, Add</i>	5.56	
03 15 Concrete Accessories (03 15)		
03 15 13 Waterstops (03 15)		
03 15 13 13 Non-Expanding Waterstops (03 15 13)		
03 15 13 13-0001 Polyvinyl Chloride (PVC) Waterstops (03 15 13 13)		
03 15 13 13-0002 LF 3/16" Thick x 4" Wide Ribbed Polyvinyl Chloride (PVC) Waterstop	10.07	
03 15 13 13-0003 LF 3/16" Thick x 6" Wide Ribbed Polyvinyl Chloride (PVC) Waterstop	11.70	
03 15 13 13-0004 LF 3/16" Thick x 9" Wide Ribbed Polyvinyl Chloride (PVC) Waterstop With Center Bulb	15.01	
03 15 13 13-0005 LF 3/8" Thick x 9" Wide Ribbed Polyvinyl Chloride (PVC) Waterstop With Center Bulb	16.94	
03 15 13 13-0006 LF 1/2" Thick x 9" Wide Ribbed Polyvinyl Chloride (PVC) Waterstop	29.44	
03 15 13 13-0007 LF 3/16" Thick x 6" Wide Dumbbell Polyvinyl Chloride (PVC) Waterstop	13.25	
03 15 13 13-0008 LF 3/8" Thick x 6" Wide Dumbbell Polyvinyl Chloride (PVC) Waterstop	15.92	
03 15 13 13-0009 LF 3/8" Thick x 9" Wide Plain Polyvinyl Chloride (PVC) Waterstop	32.89	
03 15 13 13-0010 LF 3/8" Thick x 9" Wide Plain Polyvinyl Chloride (PVC) Waterstop With Center Bulb	24.30	
03 15 13 13-0011 Rubber Waterstops (03 15 13 13)		
03 15 13 13-0012 LF 3/8" Thick x 6" Wide Rubber Dumbbell Waterstop.....	9.31	
03 15 13 13-0013 LF 3/8" Thick x 9" Wide Rubber Dumbbell Waterstop.....	10.61	
03 15 13 13-0014 LF 1/4" Thick x 6" Wide Rubber Waterstop, With Center Bulb.....	9.55	
03 15 13 13-0015 LF 1/4" Thick x 9" Wide Rubber Waterstop, With Center Bulb.....	12.87	
03 15 13 13-0016 LF 3/8" Thick x 6" Wide Rubber Waterstop, With Center Bulb.....	10.90	
03 15 13 13-0017 LF 3/8" Thick x 9" Wide Rubber Waterstop, With Center Bulb.....	13.75	
03 15 13 16 Expanding Waterstops (03 15 13)		
03 15 13 16-0001 Bentonite Waterstops (03 15 13 16)		
03 15 13 16-0002 LF 3/4" x 3/8" Bentonite Waterstop	9.68	
03 15 13 16-0003 LF 1-1/4" x 1/2" Bentonite Waterstop.....	16.04	
03 15 13 16-0004 LF 1" x 3/4" Bentonite Waterstop	18.33	
03 15 13 16-0005 LF 1" x 1" Bentonite Waterstop	21.40	
03 15 16 Concrete Construction Joints (03 15)		
03 15 16 00-0001 Poured Expansion Joint (03 15 16)		
03 15 16 00-0002 LF 1/2" x 1" Plain Asphalt Expansion Joint, Poured.....	3.43	0.97
<i>For Installation In Walls, Add</i>	1.62	
03 15 16 00-0003 LF 1" x 2" Plain Asphalt Expansion Joint, Poured.....	7.56	0.97
<i>For Installation In Walls, Add</i>	1.82	
03 15 16 00-0004 LF 1/2" x 1" Liquid Neoprene Expansion Joint, Poured, Cold Applied	3.28	0.97
<i>For Installation In Walls, Add</i>	1.62	
03 15 16 00-0005 LF 1" x 2" Liquid Neoprene Expansion Joint, Poured, Cold Applied	6.94	0.97
<i>For Installation In Walls, Add</i>	1.82	

03 Concrete**03 10 Concrete Forming and Accessories****03 15 Concrete Accessories**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
03 15 16 00-0006	LF 1/2" x 1" Polyurethane Expansion Joint, Poured, 2 Parts <i>For Installation In Walls, Add</i>	4.51 1.82	0.97
03 15 16 00-0007	LF 1" x 2" Polyurethane Expansion Joint, Poured, 2 Parts <i>For Installation In Walls, Add</i>	8.09 2.96	0.97
03 15 16 00-0008	LF 1/2" x 1" Rubberized Asphalt Expansion Joint, Poured, Hot Or Cold Applied <i>For Installation In Walls, Add</i>	3.80 1.62	0.97
03 15 16 00-0009	LF 1/2" x 1" Rubberized Asphalt Expansion Joint, Poured, Hot Applied Fuel Resistant <i>For Installation In Walls, Add</i>	4.65 1.62	0.97
03 15 16 00-0010	LF 1" x 2" Rubberized Asphalt Expansion Joint, Poured, Hot Applied Fuel Resistant <i>For Installation In Walls, Add</i>	11.96 1.82	0.97
03 15 16 00-0011	Premolded Expansion Joints (03 15 16)		
03 15 16 00-0012	Asphalt Saturated Fiber, Premolded Expansion Joints (03 15 16 00-0011)		
03 15 16 00-0013	LF 1/4" x 3" Asphalt Saturated Fiber, Premolded Expansion Joint	2.38	1.09
03 15 16 00-0014	LF 1/4" x 4" Asphalt Saturated Fiber, Premolded Expansion Joint	2.78	1.14
03 15 16 00-0015	LF 1/4" x 5" Asphalt Saturated Fiber, Premolded Expansion Joint	3.02	1.20
03 15 16 00-0016	LF 1/4" x 6" Asphalt Saturated Fiber, Premolded Expansion Joint	3.27	1.25
03 15 16 00-0017	LF 3/8" x 3" Asphalt Saturated Fiber, Premolded Expansion Joint	2.64	1.09
03 15 16 00-0018	LF 3/8" x 4" Asphalt Saturated Fiber, Premolded Expansion Joint	2.99	1.14
03 15 16 00-0019	LF 3/8" x 5" Asphalt Saturated Fiber, Premolded Expansion Joint	3.40	1.20
03 15 16 00-0020	LF 3/8" x 6" Asphalt Saturated Fiber, Premolded Expansion Joint	3.99	1.25
03 15 16 00-0021	LF 1/2" x 2" Asphalt Saturated Fiber, Premolded Expansion Joint	2.38	1.03
03 15 16 00-0022	LF 1/2" x 3" Asphalt Saturated Fiber, Premolded Expansion Joint	2.60	1.09
03 15 16 00-0023	LF 1/2" x 4" Asphalt Saturated Fiber, Premolded Expansion Joint	2.88	1.14
03 15 16 00-0024	LF 1/2" x 5" Asphalt Saturated Fiber, Premolded Expansion Joint	3.12	1.20
03 15 16 00-0025	LF 1/2" x 6" Asphalt Saturated Fiber, Premolded Expansion Joint	3.41	1.25
03 15 16 00-0026	LF 1/2" x 8" Asphalt Saturated Fiber, Premolded Expansion Joint	3.82	1.30
03 15 16 00-0027	LF 1/2" x 10" Asphalt Saturated Fiber, Premolded Expansion Joint	4.12	1.36
03 15 16 00-0028	LF 1/2" x 12" Asphalt Saturated Fiber, Premolded Expansion Joint	4.68	1.41
03 15 16 00-0029	LF 3/4" x 4" Asphalt Saturated Fiber, Premolded Expansion Joint	2.91	1.14
03 15 16 00-0030	LF 3/4" x 5" Asphalt Saturated Fiber, Premolded Expansion Joint	3.38	1.20
03 15 16 00-0031	LF 3/4" x 8" Asphalt Saturated Fiber, Premolded Expansion Joint	4.21	1.30
03 15 16 00-0032	SF 1" Asphalt Saturated Fiber, Premolded Expansion Joint	7.48	1.79
03 15 16 00-0033	Cork, Premolded Expansion Joints (03 15 16 00-0011)		
03 15 16 00-0034	LF 1/2" x 4" Cork, Premolded Expansion Joint	4.38	1.14
03 15 16 00-0035	LF 1/2" x 6" Cork, Premolded Expansion Joint	4.94	1.25
03 15 16 00-0036	LF 1/2" x 8" Cork, Premolded Expansion Joint	5.39	1.30
03 15 16 00-0037	LF 1/2" x 10" Cork, Premolded Expansion Joint	7.75	1.36
03 15 16 00-0038	LF 1/2" x 12" Cork, Premolded Expansion Joint	8.26	1.41
03 15 16 00-0039	SF 1/2" Cork, Premolded Expansion Joint	9.03	1.79
03 15 16 00-0040	SF 3/4" Cork, Premolded Expansion Joint	10.59	1.79
03 15 16 00-0041	SF 1" Cork, Premolded Expansion Joint	11.31	1.79
03 15 16 00-0042	Flexible Polyethylene Foam, Premolded Expansion Joints (03 15 16 00-0011)		
03 15 16 00-0043	LF 1/4" x 4" Flexible Polyethylene Foam, Premolded Expansion Joint	2.61	1.14
03 15 16 00-0044	LF 1/4" x 5" Flexible Polyethylene Foam, Premolded Expansion Joint	2.72	1.20
03 15 16 00-0045	LF 1/4" x 6" Flexible Polyethylene Foam, Premolded Expansion Joint	2.88	1.25
03 15 16 00-0046	LF 1/4" x 8" Flexible Polyethylene Foam, Premolded Expansion Joint	3.41	1.30
03 15 16 00-0047	LF 1/2" x 4" Flexible Polyethylene Foam, Premolded Expansion Joint	2.70	1.14
03 15 16 00-0048	LF 1/2" x 5" Flexible Polyethylene Foam, Premolded Expansion Joint	2.82	1.20
03 15 16 00-0049	LF 1/2" x 6" Flexible Polyethylene Foam, Premolded Expansion Joint	2.94	1.25
03 15 16 00-0050	LF 1/2" x 8" Flexible Polyethylene Foam, Premolded Expansion Joint	3.26	1.30
03 15 16 00-0051	Zip Strip, Premolded Expansion Joints (03 15 16 00-0011)		
03 15 16 00-0052	LF 1" Zip Strip, Premolded Expansion Joint.....	2.64	1.14
03 15 16 00-0053	LF 1-1/2" Zip Strip, Premolded Expansion Joint	2.91	1.20
03 15 16 00-0054	LF 2" Zip Strip, Premolded Expansion Joint.....	3.25	1.30
03 15 16 00-0055	Sponge Rubber, Premolded Expansion Joints (03 15 16 00-0011)		
03 15 16 00-0056	LF 1/2" x 4" Sponge Rubber, Premolded Expansion Joint.....	4.17	1.09
03 15 16 00-0057	LF 1/2" x 6" Sponge Rubber, Premolded Expansion Joint.....	5.00	1.09
03 15 16 00-0058	Asphalt Felt Control Joints Or Bond Breaker (03 15 16)		
03 15 16 00-0059	SF Asphalt Felt Control Joint, 30 LB Felt Bond Breaker..... >1,250, Deduct	1.25 -0.06	0.82
03 15 16 00-0060	SF Asphalt Felt Control Joint, 15 LB Felt Bond Breaker..... >1,250, Deduct	1.17 -0.06	0.82
03 15 16 00-0061	Keyed Cold Expansion And Control Joints (03 15 16)		
03 15 16 00-0062	24 Gauge Galvanized Steel With Stakes (03 15 16 00-0061)		
03 15 16 00-0063	LF 24 Gauge Galvanized Steel Keyed Joint, 3-1/2" Cold Expansion Or Control Joint	6.25	



Concrete	03	03
Concrete Forming and Accessories	03 10	
Concrete Accessories	03 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 15 16 00-0064 LF 24 Gauge Galvanized Steel Keyed Joint, 4-1/2" Cold Expansion Or Control Joint.....	6.37	
03 15 16 00-0065 LF 24 Gauge Galvanized Steel Keyed Joint, 5-1/2" Cold Expansion Or Control Joint.....	6.60	
03 15 16 00-0066 LF 24 Gauge Galvanized Steel Keyed Joint, 7-1/2" Cold Expansion Or Control Joint.....	7.02	
03 15 16 00-0067 LF 24 Gauge Galvanized Steel Keyed Joint, 9-1/2" Cold Expansion Or Control Joint.....	8.84	
03 15 19 Cast-In Concrete Anchors (03 15)		
03 15 19 00-0001 Cast In Place Anchors (03 15 19)		
Note: For cast in place installations. Includes nut and washer.		
03 15 19 00-0002 J-Type Anchor Bolts (03 15 19 00-0001)		
See CSI section 03 11 13 00-0002 for template.		
03 15 19 00-0003 1/2" And 5/8" Diameter (03 15 19 00-0002)		
03 15 19 00-0004 EA 1/2" Diameter x 6" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	13.10	
For Galvanized, Add	3.47	
For Stainless Steel, Add	24.29	
For >10 To 50, Deduct	-0.31	
For >50 To 100, Deduct	-0.79	
For >100, Deduct	-1.58	
03 15 19 00-0005 EA 1/2" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	15.48	
For Galvanized, Add	4.42	
For Stainless Steel, Add	30.94	
For >10 To 50, Deduct	-0.33	
For >50 To 100, Deduct	-0.89	
For >100, Deduct	-1.77	
03 15 19 00-0006 EA 1/2" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	19.37	
For Galvanized, Add	6.09	
For Stainless Steel, Add	42.63	
For >10 To 50, Deduct	-0.36	
For >50 To 100, Deduct	-1.02	
For >100, Deduct	-2.05	
03 15 19 00-0007 EA 5/8" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	23.10	
For Galvanized, Add	7.96	
For Stainless Steel, Add	55.69	
For >10 To 50, Deduct	-0.36	
For >50 To 100, Deduct	-1.12	
For >100, Deduct	-2.23	
03 15 19 00-0008 EA 5/8" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	29.09	
For Galvanized, Add	10.62	
For Stainless Steel, Add	74.34	
For >10 To 50, Deduct	-0.39	
For >50 To 100, Deduct	-1.32	
For >100, Deduct	-2.63	
03 15 19 00-0009 EA 5/8" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	32.90	
For Galvanized, Add	12.14	
For Stainless Steel, Add	84.95	
For >10 To 50, Deduct	-0.43	
For >50 To 100, Deduct	-1.47	
For >100, Deduct	-2.94	
03 15 19 00-0010 3/4" And 7/8" Diameter (03 15 19 00-0002)		
03 15 19 00-0011 EA 3/4" Diameter x 8" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	32.73	
For Galvanized, Add	12.05	
For Stainless Steel, Add	84.35	
For >10 To 50, Deduct	-0.43	
For >50 To 100, Deduct	-1.47	
For >100, Deduct	-2.93	
03 15 19 00-0012 EA 3/4" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	37.68	
For Galvanized, Add	14.05	
For Stainless Steel, Add	98.32	
For >10 To 50, Deduct	-0.48	
For >50 To 100, Deduct	-1.66	
For >100, Deduct	-3.32	
03 15 19 00-0013 EA 3/4" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	46.77	
For Galvanized, Add	17.99	
For Stainless Steel, Add	125.93	
For >10 To 50, Deduct	-0.54	
For >50 To 100, Deduct	-1.98	
For >100, Deduct	-3.96	
03 15 19 00-0014 EA 3/4" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	57.43	
For Galvanized, Add	22.67	
For Stainless Steel, Add	158.69	
For >10 To 50, Deduct	-0.60	
For >50 To 100, Deduct	-2.34	
For >100, Deduct	-4.69	
03 15 19 00-0015 EA 7/8" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt.....	43.73	
For Galvanized, Add	16.47	
For Stainless Steel, Add	115.29	
For >10 To 50, Deduct	-0.54	
For >50 To 100, Deduct	-1.90	
For >100, Deduct	-3.81	

03 Concrete**03 10 Concrete Forming and Accessories****03 15 Concrete Accessories**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 15 19 00-0016	EA	7/8" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	51.77
		<i>For Galvanized, Add</i>	19.72
		<i>For Stainless Steel, Add</i>	138.04
		<i>For >10 To 50, Deduct</i>	-0.62
		<i>For >50 To 100, Deduct</i>	-2.22
		<i>For >100, Deduct</i>	-4.44
03 15 19 00-0017	EA	7/8" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	66.96
		<i>For Galvanized, Add</i>	26.29
		<i>For Stainless Steel, Add</i>	184.03
		<i>For >10 To 50, Deduct</i>	-0.72
		<i>For >50 To 100, Deduct</i>	-2.75
		<i>For >100, Deduct</i>	-5.51
03 15 19 00-0018		1" And 1-1/8" Diameter <small>(03 15 19 00-0002)</small>	
03 15 19 00-0019	EA	1" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	54.94
		<i>For Galvanized, Add</i>	21.31
		<i>For Stainless Steel, Add</i>	149.14
		<i>For >10 To 50, Deduct</i>	-0.62
		<i>For >50 To 100, Deduct</i>	-2.30
		<i>For >100, Deduct</i>	-4.60
03 15 19 00-0020	EA	1" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	65.66
		<i>For Galvanized, Add</i>	25.64
		<i>For Stainless Steel, Add</i>	179.48
		<i>For >10 To 50, Deduct</i>	-0.72
		<i>For >50 To 100, Deduct</i>	-2.72
		<i>For >100, Deduct</i>	-5.44
03 15 19 00-0021	EA	1" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	81.54
		<i>For Galvanized, Add</i>	32.14
		<i>For Stainless Steel, Add</i>	224.98
		<i>For >10 To 50, Deduct</i>	-0.86
		<i>For >50 To 100, Deduct</i>	-3.33
		<i>For >100, Deduct</i>	-6.67
03 15 19 00-0022	EA	1" Diameter x 36" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	100.12
		<i>For Galvanized, Add</i>	39.27
		<i>For Stainless Steel, Add</i>	274.89
		<i>For >10 To 50, Deduct</i>	-1.08
		<i>For >50 To 100, Deduct</i>	-4.12
		<i>For >100, Deduct</i>	-8.24
03 15 19 00-0023	EA	1-1/8" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	66.81
		<i>For Galvanized, Add</i>	26.64
		<i>For Stainless Steel, Add</i>	186.45
		<i>For >10 To 50, Deduct</i>	-0.68
		<i>For >50 To 100, Deduct</i>	-2.69
		<i>For >100, Deduct</i>	-5.37
03 15 19 00-0024	EA	1-1/8" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	79.90
		<i>For Galvanized, Add</i>	32.06
		<i>For Stainless Steel, Add</i>	224.39
		<i>For >10 To 50, Deduct</i>	-0.79
		<i>For >50 To 100, Deduct</i>	-3.18
		<i>For >100, Deduct</i>	-6.36
03 15 19 00-0025	EA	1-1/8" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	99.31
		<i>For Galvanized, Add</i>	40.18
		<i>For Stainless Steel, Add</i>	281.26
		<i>For >10 To 50, Deduct</i>	-0.95
		<i>For >50 To 100, Deduct</i>	-3.90
		<i>For >100, Deduct</i>	-7.81
03 15 19 00-0026	EA	1-1/8" Diameter x 36" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	121.87
		<i>For Galvanized, Add</i>	49.09
		<i>For Stainless Steel, Add</i>	343.63
		<i>For >10 To 50, Deduct</i>	-1.18
		<i>For >50 To 100, Deduct</i>	-4.82
		<i>For >100, Deduct</i>	-9.65
03 15 19 00-0027		1-1/4" And 1-1/2" Diameter <small>(03 15 19 00-0002)</small>	
03 15 19 00-0028	EA	1-1/4" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	81.58
		<i>For Galvanized, Add</i>	33.29
		<i>For Stainless Steel, Add</i>	233.03
		<i>For >10 To 50, Deduct</i>	-0.75
		<i>For >50 To 100, Deduct</i>	-3.16
		<i>For >100, Deduct</i>	-6.33
03 15 19 00-0029	EA	1-1/4" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	97.64
		<i>For Galvanized, Add</i>	40.08
		<i>For Stainless Steel, Add</i>	280.53
		<i>For >10 To 50, Deduct</i>	-0.87
		<i>For >50 To 100, Deduct</i>	-3.75
		<i>For >100, Deduct</i>	-7.51
03 15 19 00-0030	EA	1-1/4" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	121.48
		<i>For Galvanized, Add</i>	50.24
		<i>For Stainless Steel, Add</i>	351.68
		<i>For >10 To 50, Deduct</i>	-1.05
		<i>For >50 To 100, Deduct</i>	-4.61
		<i>For >100, Deduct</i>	-9.22



Concrete	03	CS	
Concrete Forming and Accessories			03 10
Concrete Accessories			03 15

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 15 19 00-0031 EA 1-1/4" Diameter x 36" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	148.95	
For Galvanized, Add	61.36	
For Stainless Steel, Add	429.49	
For >10 To 50, Deduct	-1.31	
For >50 To 100, Deduct	-5.69	
For >100, Deduct	-11.38	
03 15 19 00-0032 EA 1-1/2" Diameter x 12" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	100.04	
For Galvanized, Add	41.61	
For Stainless Steel, Add	291.27	
For >10 To 50, Deduct	-0.84	
For >50 To 100, Deduct	-3.76	
For >100, Deduct	-7.53	
03 15 19 00-0033 EA 1-1/2" Diameter x 18" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	119.79	
For Galvanized, Add	50.09	
For Stainless Steel, Add	350.60	
For >10 To 50, Deduct	-0.98	
For >50 To 100, Deduct	-4.47	
For >100, Deduct	-8.93	
03 15 19 00-0034 EA 1-1/2" Diameter x 24" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	149.17	
For Galvanized, Add	62.81	
For Stainless Steel, Add	439.67	
For >10 To 50, Deduct	-1.18	
For >50 To 100, Deduct	-5.50	
For >100, Deduct	-10.99	
03 15 19 00-0035 EA 1-1/2" Diameter x 36" Length, Plain Steel, J-Type Cast In Place Anchor Bolt	182.82	
For Galvanized, Add	76.70	
For Stainless Steel, Add	536.90	
For >10 To 50, Deduct	-1.47	
For >50 To 100, Deduct	-6.78	
For >100, Deduct	-13.55	
03 15 19 00-0036 L-Type Anchor Bolts <small>(03 15 19 00-0001)</small>		
See CSI section 03 11 13 00-0002 for template.		
03 15 19 00-0037 3/4" And 7/8" Diameter <small>(03 15 19 00-0036)</small>		
03 15 19 00-0038 EA 3/4" Diameter x 12" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	28.01	
For Galvanized, Add	9.21	
For Stainless Steel, Add	64.47	
For >10 To 50, Deduct	-0.48	
For >50 To 100, Deduct	-1.42	
For >100, Deduct	-2.84	
03 15 19 00-0039 EA 3/4" Diameter x 18" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	33.55	
For Galvanized, Add	11.38	
For Stainless Steel, Add	79.66	
For >10 To 50, Deduct	-0.54	
For >50 To 100, Deduct	-1.65	
For >100, Deduct	-3.30	
03 15 19 00-0040 EA 3/4" Diameter x 24" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	38.42	
For Galvanized, Add	13.05	
For Stainless Steel, Add	91.32	
For >10 To 50, Deduct	-0.62	
For >50 To 100, Deduct	-1.89	
For >100, Deduct	-3.77	
03 15 19 00-0041 EA 3/4" Diameter x 30" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	41.47	
For Galvanized, Add	13.55	
For Stainless Steel, Add	94.82	
For >10 To 50, Deduct	-0.72	
For >50 To 100, Deduct	-2.12	
For >100, Deduct	-4.23	
03 15 19 00-0042 EA 3/4" Diameter x 36" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	45.70	
For Galvanized, Add	14.22	
For Stainless Steel, Add	99.54	
For >10 To 50, Deduct	-0.86	
For >50 To 100, Deduct	-2.44	
For >100, Deduct	-4.87	
03 15 19 00-0043 EA 7/8" Diameter x 12" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	33.63	
For Galvanized, Add	11.42	
For Stainless Steel, Add	79.94	
For >10 To 50, Deduct	-0.54	
For >50 To 100, Deduct	-1.65	
For >100, Deduct	-3.30	
03 15 19 00-0044 EA 7/8" Diameter x 18" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	38.94	
For Galvanized, Add	13.31	
For Stainless Steel, Add	93.14	
For >10 To 50, Deduct	-0.62	
For >50 To 100, Deduct	-1.90	
For >100, Deduct	-3.80	
03 15 19 00-0045 EA 7/8" Diameter x 24" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	44.90	
For Galvanized, Add	15.26	
For Stainless Steel, Add	106.82	
For >10 To 50, Deduct	-0.72	
For >50 To 100, Deduct	-2.20	
For >100, Deduct	-4.40	

03 Concrete**03 10 Concrete Forming and Accessories****03 15 Concrete Accessories**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 15 19 00-0046	EA 7/8" Diameter x 30" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	48.95
	For Galvanized, Add	15.85
	For Stainless Steel, Add	110.92
	For >10 To 50, Deduct	-0.86
	For >50 To 100, Deduct	-2.52
	For >100, Deduct	-5.04
03 15 19 00-0047	EA 7/8" Diameter x 36" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	54.87
	For Galvanized, Add	16.65
	For Stainless Steel, Add	116.52
	For >10 To 50, Deduct	-1.08
	For >50 To 100, Deduct	-2.99
	For >100, Deduct	-5.98
03 15 19 00-0048	1" And 1-1/8" Diameter <small>(03 15 19 00-0036)</small>	
03 15 19 00-0049	EA 1" Diameter x 12" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	41.63
	For Galvanized, Add	14.65
	For Stainless Steel, Add	102.55
	For >10 To 50, Deduct	-0.62
	For >50 To 100, Deduct	-1.97
	For >100, Deduct	-3.93
03 15 19 00-0050	EA 1" Diameter x 18" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	47.32
	For Galvanized, Add	16.47
	For Stainless Steel, Add	115.29
	For >10 To 50, Deduct	-0.72
	For >50 To 100, Deduct	-2.26
	For >100, Deduct	-4.52
03 15 19 00-0051	EA 1" Diameter x 24" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	54.10
	For Galvanized, Add	18.42
	For Stainless Steel, Add	128.94
	For >10 To 50, Deduct	-0.86
	For >50 To 100, Deduct	-2.65
	For >100, Deduct	-5.29
03 15 19 00-0052	EA 1" Diameter x 30" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	57.34
	For Galvanized, Add	19.29
	For Stainless Steel, Add	135.03
	For >10 To 50, Deduct	-0.94
	For >50 To 100, Deduct	-2.84
	For >100, Deduct	-5.68
03 15 19 00-0053	EA 1" Diameter x 36" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	61.98
	For Galvanized, Add	20.20
	For Stainless Steel, Add	141.40
	For >10 To 50, Deduct	-1.08
	For >50 To 100, Deduct	-3.17
	For >100, Deduct	-6.34
03 15 19 00-0054	EA 1" Diameter x 42" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	70.79
	For Galvanized, Add	23.41
	For Stainless Steel, Add	163.84
	For >10 To 50, Deduct	-1.20
	For >50 To 100, Deduct	-3.57
	For >100, Deduct	-7.14
03 15 19 00-0055	EA 1" Diameter x 48" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	83.56
	For Galvanized, Add	27.40
	For Stainless Steel, Add	191.77
	For >10 To 50, Deduct	-1.44
	For >50 To 100, Deduct	-4.25
	For >100, Deduct	-8.49
03 15 19 00-0056	EA 1-1/8" Diameter x 18" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	52.91
	For Galvanized, Add	19.27
	For Stainless Steel, Add	134.86
	For >10 To 50, Deduct	-0.72
	For >50 To 100, Deduct	-2.40
	For >100, Deduct	-4.80
03 15 19 00-0057	EA 1-1/8" Diameter x 24" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	60.39
	For Galvanized, Add	21.57
	For Stainless Steel, Add	150.96
	For >10 To 50, Deduct	-0.86
	For >50 To 100, Deduct	-2.80
	For >100, Deduct	-5.61
03 15 19 00-0058	EA 1-1/8" Diameter x 30" Length, Plain Steel, L-Type Cast In Place Anchor Bolt	63.88
	For Galvanized, Add	22.56
	For Stainless Steel, Add	157.92
	For >10 To 50, Deduct	-0.94
	For >50 To 100, Deduct	-3.00
	For >100, Deduct	-6.01

03 20 Concrete Reinforcing (03)

Note: Includes cutting or torching to size, bending where necessary and tie wires.

03 21 Reinforcement Bars (03 20)

Note: Includes cutting, bending, tie wire, tying, bar chairs and all non-mechanical splicing. The weights of reinforcing steel shall be used as follows: #2 - 0.167 Lbs./LF, #3 - 0.376 Lbs./LF, #4 - 0.668 Lbs./LF, #5 - 1.043 Lbs./LF, #6 - 1.502 Lbs./LF, #7 - 2.044 Lbs./LF, #8 - 2.670 Lbs./LF, #9 - 3.400 Lbs./LF, #10 - 4.303 Lbs./LF, #11 - 5.313 Lbs./LF, #14 - 7.650 Lbs./LF, #18 - 13.600 Lbs./LF.

03 21 11 Plain Steel Reinforcement Bars (03 21)



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0001 Beams And Girders, Steel Reinforcement Bar <small>(03 21 11)</small>		
Note: ASTM A-615 Plain Steel and A-706 Low Alloy Steel.		
03 21 11 00-0002 LF #3, Grade 40, Beams And Girders, Steel Reinforcement Bar.....	0.71	
For Up To 100, Add	0.46	
For >100 To 200, Add	0.25	
For >200 To 500, Add	0.10	
03 21 11 00-0003 LF #4, Grade 40, Beams And Girders, Steel Reinforcement Bar.....	1.20	
For Up To 100, Add	0.79	
For >100 To 200, Add	0.43	
For >200 To 500, Add	0.17	
03 21 11 00-0004 LF #5, Grade 40, Beams And Girders, Steel Reinforcement Bar.....	1.79	
For Up To 100, Add	1.20	
For >100 To 200, Add	0.65	
For >200 To 500, Add	0.26	
03 21 11 00-0005 LF #6, Grade 40, Beams And Girders, Steel Reinforcement Bar.....	2.47	
For Up To 100, Add	1.69	
For >100 To 200, Add	0.91	
For >200 To 500, Add	0.36	
03 21 11 00-0006 LF #3, Grade 50, Beams And Girders, Steel Reinforcement Bar.....	0.73	
For Up To 100, Add	0.48	
For >100 To 200, Add	0.26	
For >200 To 500, Add	0.10	
03 21 11 00-0007 LF #4, Grade 50, Beams And Girders, Steel Reinforcement Bar.....	1.22	
For Up To 100, Add	0.81	
For >100 To 200, Add	0.44	
For >200 To 500, Add	0.18	
03 21 11 00-0008 LF #5, Grade 50, Beams And Girders, Steel Reinforcement Bar.....	1.83	
For Up To 100, Add	1.24	
For >100 To 200, Add	0.67	
For >200 To 500, Add	0.27	
03 21 11 00-0009 LF #6, Grade 50, Beams And Girders, Steel Reinforcement Bar.....	2.52	
For Up To 100, Add	1.74	
For >100 To 200, Add	0.94	
For >200 To 500, Add	0.37	
03 21 11 00-0010 LF #3, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	0.75	
For Up To 100, Add	0.50	
For >100 To 200, Add	0.27	
For >200 To 500, Add	0.11	
03 21 11 00-0011 LF #4, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	1.26	
For Up To 100, Add	0.85	
For >100 To 200, Add	0.46	
For >200 To 500, Add	0.18	
03 21 11 00-0012 LF #5, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	1.89	
For Up To 100, Add	1.30	
For >100 To 200, Add	0.70	
For >200 To 500, Add	0.28	
03 21 11 00-0013 LF #6, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	2.61	
For Up To 100, Add	1.83	
For >100 To 200, Add	0.98	
For >200 To 500, Add	0.39	
03 21 11 00-0014 LF #7, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	3.38	
For Up To 100, Add	1.90	
For >100 To 200, Add	1.11	
For >200 To 400, Add	0.52	
03 21 11 00-0015 LF #8, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	4.21	
For Up To 100, Add	2.41	
For >100 To 200, Add	1.40	
For >200 To 400, Add	0.65	
03 21 11 00-0016 LF #9, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	5.17	
For Up To 100, Add	3.00	
For >100 To 200, Add	1.74	
For >200 To 400, Add	0.81	
03 21 11 00-0017 LF #10, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	6.32	
For Up To 100, Add	3.02	
For >100 To 200, Add	1.64	
For >200 To 300, Add	0.82	
03 21 11 00-0018 LF #11, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	7.51	
For Up To 100, Add	3.65	
For >100 To 200, Add	1.97	
For >200 To 300, Add	0.98	
03 21 11 00-0019 LF #14, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	10.40	
For Up To 100, Add	5.12	
For >100 To 200, Add	2.75	
For >200 To 300, Add	1.37	
03 21 11 00-0020 LF #18, Grade 60, Beams And Girders, Steel Reinforcement Bar.....	17.76	
For Up To 100, Add	8.89	
For >100 To 200, Add	4.74	
For >200 To 300, Add	2.37	
03 21 11 00-0021 LF #6, Grade 75, Beams And Girders, Steel Reinforcement Bar.....	2.70	
For Up To 100, Add	1.92	
For >100 To 200, Add	1.03	
For >200 To 500, Add	0.41	
03 21 11 00-0022 LF #7, Grade 75, Beams And Girders, Steel Reinforcement Bar.....	3.50	
For Up To 100, Add	1.99	
For >100 To 200, Add	1.16	
For >200 To 400, Add	0.54	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 21 11 00-0023	LF	#8, Grade 75, Beams And Girders, Steel Reinforcement Bar	4.37	
		<i>For Up To 100, Add</i>	2.53	
		<i>For >100 To 200, Add</i>	1.47	
		<i>For >200 To 400, Add</i>	0.69	
03 21 11 00-0024	LF	#9, Grade 75, Beams And Girders, Steel Reinforcement Bar	5.37	
		<i>For Up To 100, Add</i>	3.15	
		<i>For >100 To 200, Add</i>	1.82	
		<i>For >200 To 400, Add</i>	0.85	
03 21 11 00-0025	LF	#10, Grade 75, Beams And Girders, Steel Reinforcement Bar	6.57	
		<i>For Up To 100, Add</i>	3.17	
		<i>For >100 To 200, Add</i>	1.72	
		<i>For >200 To 300, Add</i>	0.86	
03 21 11 00-0026	LF	#11, Grade 75, Beams And Girders, Steel Reinforcement Bar	7.82	
		<i>For Up To 100, Add</i>	3.83	
		<i>For >100 To 200, Add</i>	2.06	
		<i>For >200 To 300, Add</i>	1.03	
03 21 11 00-0027	LF	#14, Grade 75, Beams And Girders, Steel Reinforcement Bar	10.84	
		<i>For Up To 100, Add</i>	5.39	
		<i>For >100 To 200, Add</i>	2.88	
		<i>For >200 To 300, Add</i>	1.44	
03 21 11 00-0028	LF	#18, Grade 75, Beams And Girders, Steel Reinforcement Bar	18.55	
		<i>For Up To 100, Add</i>	9.37	
		<i>For >100 To 200, Add</i>	4.98	
		<i>For >200 To 300, Add</i>	2.49	
03 21 11 00-0029	LF	#3, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	0.76	
		<i>For Up To 100, Add</i>	0.51	
		<i>For >100 To 200, Add</i>	0.28	
		<i>For >200 To 500, Add</i>	0.11	
03 21 11 00-0030	LF	#4, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	1.29	
		<i>For Up To 100, Add</i>	0.88	
		<i>For >100 To 200, Add</i>	0.48	
		<i>For >200 To 500, Add</i>	0.19	
03 21 11 00-0031	LF	#5, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	1.94	
		<i>For Up To 100, Add</i>	1.35	
		<i>For >100 To 200, Add</i>	0.73	
		<i>For >200 To 500, Add</i>	0.29	
03 21 11 00-0032	LF	#6, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	2.68	
		<i>For Up To 100, Add</i>	1.90	
		<i>For >100 To 200, Add</i>	1.02	
		<i>For >200 To 500, Add</i>	0.41	
03 21 11 00-0033	LF	#7, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	3.47	
		<i>For Up To 100, Add</i>	1.96	
		<i>For >100 To 200, Add</i>	1.15	
		<i>For >200 To 400, Add</i>	0.53	
03 21 11 00-0034	LF	#8, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	4.33	
		<i>For Up To 100, Add</i>	2.50	
		<i>For >100 To 200, Add</i>	1.45	
		<i>For >200 To 400, Add</i>	0.68	
03 21 11 00-0035	LF	#9, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	5.32	
		<i>For Up To 100, Add</i>	3.11	
		<i>For >100 To 200, Add</i>	1.80	
		<i>For >200 To 400, Add</i>	0.84	
03 21 11 00-0036	LF	#10, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	6.50	
		<i>For Up To 100, Add</i>	3.13	
		<i>For >100 To 200, Add</i>	1.69	
		<i>For >200 To 300, Add</i>	0.85	
03 21 11 00-0037	LF	#11, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	7.74	
		<i>For Up To 100, Add</i>	3.78	
		<i>For >100 To 200, Add</i>	2.04	
		<i>For >200 To 300, Add</i>	1.02	
03 21 11 00-0038	LF	#14, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	10.73	
		<i>For Up To 100, Add</i>	5.32	
		<i>For >100 To 200, Add</i>	2.85	
		<i>For >200 To 300, Add</i>	1.42	
03 21 11 00-0039	LF	#18, Grade 60, Beams And Girders, Low Alloy Steel Reinforcement Bar	18.35	
		<i>For Up To 100, Add</i>	9.25	
		<i>For >100 To 200, Add</i>	4.92	
		<i>For >200 To 300, Add</i>	2.46	

03 21 11 00-0040 Columns, Steel Reinforcement Bar (03 21 11)

Note: ASTM A-615 Plain Steel and A-706 Low Alloy Steel.

03 21 11 00-0041	LF	#3, Grade 40, Columns, Steel Reinforcement Bar	0.74	
		<i>For Up To 100, Add</i>	0.47	
		<i>For >100 To 200, Add</i>	0.26	
		<i>For >200 To 500, Add</i>	0.10	
03 21 11 00-0042	LF	#4, Grade 40, Columns, Steel Reinforcement Bar	1.27	
		<i>For Up To 100, Add</i>	0.82	
		<i>For >100 To 200, Add</i>	0.45	
		<i>For >200 To 500, Add</i>	0.18	
03 21 11 00-0043	LF	#5, Grade 40, Columns, Steel Reinforcement Bar	1.89	
		<i>For Up To 100, Add</i>	1.24	
		<i>For >100 To 200, Add</i>	0.68	
		<i>For >200 To 500, Add</i>	0.27	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0044 LF #6, Grade 40, Columns, Steel Reinforcement Bar.....	2.60	
For Up To 100, Add	1.74	
For >100 To 200, Add	0.94	
For >200 To 500, Add	0.38	
03 21 11 00-0045 LF #3, Grade 50, Columns, Steel Reinforcement Bar.....	0.76	
For Up To 100, Add	0.49	
For >100 To 200, Add	0.27	
For >200 To 500, Add	0.11	
03 21 11 00-0046 LF #4, Grade 50, Columns, Steel Reinforcement Bar.....	1.29	
For Up To 100, Add	0.84	
For >100 To 200, Add	0.46	
For >200 To 500, Add	0.18	
03 21 11 00-0047 LF #5, Grade 50, Columns, Steel Reinforcement Bar.....	1.93	
For Up To 100, Add	1.28	
For >100 To 200, Add	0.70	
For >200 To 500, Add	0.28	
03 21 11 00-0048 LF #6, Grade 50, Columns, Steel Reinforcement Bar.....	2.65	
For Up To 100, Add	1.79	
For >100 To 200, Add	0.97	
For >200 To 500, Add	0.39	
03 21 11 00-0049 LF #3, Grade 60, Columns, Steel Reinforcement Bar.....	0.78	
For Up To 100, Add	0.51	
For >100 To 200, Add	0.28	
For >200 To 500, Add	0.11	
03 21 11 00-0050 LF #4, Grade 60, Columns, Steel Reinforcement Bar.....	1.33	
For Up To 100, Add	0.88	
For >100 To 200, Add	0.48	
For >200 To 500, Add	0.19	
03 21 11 00-0051 LF #5, Grade 60, Columns, Steel Reinforcement Bar.....	1.99	
For Up To 100, Add	1.34	
For >100 To 200, Add	0.73	
For >200 To 500, Add	0.29	
03 21 11 00-0052 LF #6, Grade 60, Columns, Steel Reinforcement Bar.....	2.74	
For Up To 100, Add	1.88	
For >100 To 200, Add	1.01	
For >200 To 500, Add	0.41	
03 21 11 00-0053 LF #7, Grade 60, Columns, Steel Reinforcement Bar.....	3.54	
For Up To 100, Add	1.95	
For >100 To 200, Add	1.15	
For >200 To 400, Add	0.53	
03 21 11 00-0054 LF #8, Grade 60, Columns, Steel Reinforcement Bar.....	4.39	
For Up To 100, Add	2.47	
For >100 To 200, Add	1.45	
For >200 To 400, Add	0.67	
03 21 11 00-0055 LF #9, Grade 60, Columns, Steel Reinforcement Bar.....	5.39	
For Up To 100, Add	3.07	
For >100 To 200, Add	1.79	
For >200 To 400, Add	0.84	
03 21 11 00-0056 LF #10, Grade 60, Columns, Steel Reinforcement Bar.....	6.57	
For Up To 100, Add	3.10	
For >100 To 200, Add	1.69	
For >200 To 300, Add	0.85	
03 21 11 00-0057 LF #11, Grade 60, Columns, Steel Reinforcement Bar.....	7.79	
For Up To 100, Add	3.73	
For >100 To 200, Add	2.02	
For >200 To 300, Add	1.01	
03 21 11 00-0058 LF #14, Grade 60, Columns, Steel Reinforcement Bar.....	10.78	
For Up To 100, Add	5.24	
For >100 To 200, Add	2.82	
For >200 To 300, Add	1.41	
03 21 11 00-0059 LF #18, Grade 60, Columns, Steel Reinforcement Bar.....	18.34	
For Up To 100, Add	9.07	
For >100 To 200, Add	4.86	
For >200 To 300, Add	2.43	
03 21 11 00-0060 LF #6, Grade 75, Columns, Steel Reinforcement Bar.....	2.83	
For Up To 100, Add	1.97	
For >100 To 200, Add	1.06	
For >200 To 500, Add	0.42	
03 21 11 00-0061 LF #7, Grade 75, Columns, Steel Reinforcement Bar.....	3.66	
For Up To 100, Add	2.04	
For >100 To 200, Add	1.20	
For >200 To 400, Add	0.56	
03 21 11 00-0062 LF #8, Grade 75, Columns, Steel Reinforcement Bar.....	4.55	
For Up To 100, Add	2.59	
For >100 To 200, Add	1.51	
For >200 To 400, Add	0.70	
03 21 11 00-0063 LF #9, Grade 75, Columns, Steel Reinforcement Bar.....	5.59	
For Up To 100, Add	3.22	
For >100 To 200, Add	1.87	
For >200 To 400, Add	0.88	
03 21 11 00-0064 LF #10, Grade 75, Columns, Steel Reinforcement Bar.....	6.82	
For Up To 100, Add	3.25	
For >100 To 200, Add	1.77	
For >200 To 300, Add	0.88	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 11 00-0065	LF #11, Grade 75, Columns, Steel Reinforcement Bar	8.10
	For Up To 100, Add	3.92
	For >100 To 200, Add	2.12
	For >200 To 300, Add	1.06
03 21 11 00-0066	LF #14, Grade 75, Columns, Steel Reinforcement Bar	11.22
	For Up To 100, Add	5.50
	For >100 To 200, Add	2.96
	For >200 To 300, Add	1.48
03 21 11 00-0067	LF #18, Grade 75, Columns, Steel Reinforcement Bar	19.13
	For Up To 100, Add	9.54
	For >100 To 200, Add	5.09
	For >200 To 300, Add	2.55
03 21 11 00-0068	LF #3, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	0.79
	For Up To 100, Add	0.52
	For >100 To 200, Add	0.28
	For >200 To 500, Add	0.11
03 21 11 00-0069	LF #4, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	1.36
	For Up To 100, Add	0.91
	For >100 To 200, Add	0.49
	For >200 To 500, Add	0.20
03 21 11 00-0070	LF #5, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	2.04
	For Up To 100, Add	1.39
	For >100 To 200, Add	0.75
	For >200 To 500, Add	0.30
03 21 11 00-0071	LF #6, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	2.81
	For Up To 100, Add	1.95
	For >100 To 200, Add	1.05
	For >200 To 500, Add	0.42
03 21 11 00-0072	LF #7, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	3.63
	For Up To 100, Add	2.02
	For >100 To 200, Add	1.19
	For >200 To 400, Add	0.55
03 21 11 00-0073	LF #8, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	4.51
	For Up To 100, Add	2.56
	For >100 To 200, Add	1.50
	For >200 To 400, Add	0.70
03 21 11 00-0074	LF #9, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	5.54
	For Up To 100, Add	3.19
	For >100 To 200, Add	1.85
	For >200 To 400, Add	0.87
03 21 11 00-0075	LF #10, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	6.75
	For Up To 100, Add	3.21
	For >100 To 200, Add	1.74
	For >200 To 300, Add	0.87
03 21 11 00-0076	LF #11, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	8.02
	For Up To 100, Add	3.87
	For >100 To 200, Add	2.09
	For >200 To 300, Add	1.05
03 21 11 00-0077	LF #14, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	11.11
	For Up To 100, Add	5.44
	For >100 To 200, Add	2.92
	For >200 To 300, Add	1.46
03 21 11 00-0078	LF #18, Grade 60, Columns, Low Alloy Steel Reinforcement Bar	18.93
	For Up To 100, Add	9.42
	For >100 To 200, Add	5.03
	For >200 To 300, Add	2.52

03 21 11 00-0079 Footings, Steel Reinforcement Bar (03 21 11)

Note: ASTM A-615 Plain Steel and A-706 Low Alloy Steel.

03 21 11 00-0080	LF #3, Grade 40, Footings, Steel Reinforcement Bar	0.65
	For Up To 100, Add	0.43
	For >100 To 200, Add	0.24
	For >200 To 500, Add	0.09
03 21 11 00-0081	LF #4, Grade 40, Footings, Steel Reinforcement Bar	1.10
	For Up To 100, Add	0.75
	For >100 To 200, Add	0.41
	For >200 To 500, Add	0.16
03 21 11 00-0082	LF #5, Grade 40, Footings, Steel Reinforcement Bar	1.65
	For Up To 100, Add	1.15
	For >100 To 200, Add	0.62
	For >200 To 500, Add	0.25
03 21 11 00-0083	LF #6, Grade 40, Footings, Steel Reinforcement Bar	2.28
	For Up To 100, Add	1.61
	For >100 To 200, Add	0.86
	For >200 To 500, Add	0.35
03 21 11 00-0084	LF #3, Grade 50, Footings, Steel Reinforcement Bar	0.67
	For Up To 100, Add	0.45
	For >100 To 200, Add	0.25
	For >200 To 500, Add	0.10
03 21 11 00-0085	LF #4, Grade 50, Footings, Steel Reinforcement Bar	1.12
	For Up To 100, Add	0.77
	For >100 To 200, Add	0.42
	For >200 To 500, Add	0.17



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0086 LF #5, Grade 50, Footings, Steel Reinforcement Bar	1.69	
For Up To 100, Add	1.19	
For >100 To 200, Add	0.64	
For >200 To 500, Add	0.25	
03 21 11 00-0087 LF #6, Grade 50, Footings, Steel Reinforcement Bar	2.33	
For Up To 100, Add	1.66	
For >100 To 200, Add	0.89	
For >200 To 500, Add	0.36	
03 21 11 00-0088 LF #3, Grade 60, Footings, Steel Reinforcement Bar	0.69	
For Up To 100, Add	0.47	
For >100 To 200, Add	0.26	
For >200 To 500, Add	0.10	
03 21 11 00-0089 LF #4, Grade 60, Footings, Steel Reinforcement Bar	1.16	
For Up To 100, Add	0.81	
For >100 To 200, Add	0.44	
For >200 To 500, Add	0.17	
03 21 11 00-0090 LF #5, Grade 60, Footings, Steel Reinforcement Bar	1.75	
For Up To 100, Add	1.25	
For >100 To 200, Add	0.67	
For >200 To 500, Add	0.27	
03 21 11 00-0091 LF #6, Grade 60, Footings, Steel Reinforcement Bar	2.42	
For Up To 100, Add	1.75	
For >100 To 200, Add	0.93	
For >200 To 500, Add	0.37	
03 21 11 00-0092 LF #7, Grade 60, Footings, Steel Reinforcement Bar	3.15	
For Up To 100, Add	1.81	
For >100 To 200, Add	1.05	
For >200 To 400, Add	0.49	
03 21 11 00-0093 LF #8, Grade 60, Footings, Steel Reinforcement Bar	3.93	
For Up To 100, Add	2.31	
For >100 To 200, Add	1.33	
For >200 To 400, Add	0.63	
03 21 11 00-0094 LF #9, Grade 60, Footings, Steel Reinforcement Bar	4.84	
For Up To 100, Add	2.88	
For >100 To 200, Add	1.66	
For >200 To 400, Add	0.78	
03 21 11 00-0095 LF #10, Grade 60, Footings, Steel Reinforcement Bar	5.93	
For Up To 100, Add	3.58	
For >100 To 200, Add	2.05	
For >200 To 400, Add	0.97	
For Up To 100, Add	2.91	
For >100 To 200, Add	1.56	
For >200 To 300, Add	0.78	
03 21 11 00-0096 LF #11, Grade 60, Footings, Steel Reinforcement Bar	7.08	
For Up To 100, Add	4.33	
For >100 To 200, Add	2.47	
For >200 To 400, Add	1.17	
For Up To 100, Add	3.52	
For >100 To 200, Add	1.88	
For >200 To 300, Add	0.94	
03 21 11 00-0097 LF #14, Grade 60, Footings, Steel Reinforcement Bar	9.84	
For Up To 100, Add	6.12	
For >100 To 200, Add	3.46	
For >200 To 400, Add	1.65	
For Up To 100, Add	4.96	
For >100 To 200, Add	2.64	
For >200 To 300, Add	1.32	
03 21 11 00-0098 LF #18, Grade 60, Footings, Steel Reinforcement Bar	16.87	
For Up To 100, Add	10.66	
For >100 To 200, Add	6.00	
For >200 To 400, Add	2.88	
For Up To 100, Add	8.63	
For >100 To 200, Add	4.56	
For >200 To 300, Add	2.28	
03 21 11 00-0099 LF #6, Grade 75, Footings, Steel Reinforcement Bar	2.51	
For Up To 100, Add	1.84	
For >100 To 200, Add	0.98	
For >200 To 500, Add	0.39	
For Up To 100, Add	1.44	
For >100 To 200, Add	0.84	
For >200 To 400, Add	0.39	
03 21 11 00-0100 LF #7, Grade 75, Footings, Steel Reinforcement Bar	3.27	
For Up To 100, Add	1.90	
For >100 To 200, Add	1.10	
For >200 To 400, Add	0.52	
03 21 11 00-0101 LF #8, Grade 75, Footings, Steel Reinforcement Bar	4.09	
For Up To 100, Add	2.43	
For >100 To 200, Add	1.40	
For >200 To 400, Add	0.66	
03 21 11 00-0102 LF #9, Grade 75, Footings, Steel Reinforcement Bar	5.04	
For Up To 100, Add	3.03	
For >100 To 200, Add	1.74	
For >200 To 400, Add	0.82	
03 21 11 00-0103 LF #10, Grade 75, Footings, Steel Reinforcement Bar	6.18	
For Up To 100, Add	3.06	
For >100 To 200, Add	1.64	
For >200 To 300, Add	0.82	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 11 00-0104	LF #11, Grade 75, Footings, Steel Reinforcement Bar	7.39
	For Up To 100, Add	3.70
	For >100 To 200, Add	1.97
	For >200 To 300, Add	0.99
03 21 11 00-0105	LF #14, Grade 75, Footings, Steel Reinforcement Bar	10.28
	For Up To 100, Add	5.22
	For >100 To 200, Add	2.77
	For >200 To 300, Add	1.38
03 21 11 00-0106	LF #18, Grade 75, Footings, Steel Reinforcement Bar	17.66
	For Up To 100, Add	9.10
	For >100 To 200, Add	4.80
	For >200 To 300, Add	2.40
03 21 11 00-0107	LF #3, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	0.70
	For Up To 100, Add	0.48
	For >100 To 200, Add	0.26
	For >200 To 500, Add	0.10
03 21 11 00-0108	LF #4, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	1.19
	For Up To 100, Add	0.84
	For >100 To 200, Add	0.45
	For >200 To 500, Add	0.18
03 21 11 00-0109	LF #5, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	1.80
	For Up To 100, Add	1.30
	For >100 To 200, Add	0.69
	For >200 To 500, Add	0.28
03 21 11 00-0110	LF #6, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	2.49
	For Up To 100, Add	1.82
	For >100 To 200, Add	0.97
	For >200 To 500, Add	0.39
03 21 11 00-0111	LF #7, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	3.24
	For Up To 100, Add	1.88
	For >100 To 200, Add	1.09
	For >200 To 400, Add	0.51
03 21 11 00-0112	LF #8, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	4.05
	For Up To 100, Add	2.40
	For >100 To 200, Add	1.38
	For >200 To 400, Add	0.65
03 21 11 00-0113	LF #9, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	4.99
	For Up To 100, Add	2.99
	For >100 To 200, Add	1.72
	For >200 To 400, Add	0.81
03 21 11 00-0114	LF #10, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	6.11
	For Up To 100, Add	3.02
	For >100 To 200, Add	1.62
	For >200 To 300, Add	0.81
03 21 11 00-0115	LF #11, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	7.31
	For Up To 100, Add	3.65
	For >100 To 200, Add	1.95
	For >200 To 300, Add	0.97
03 21 11 00-0116	LF #14, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	10.17
	For Up To 100, Add	5.15
	For >100 To 200, Add	2.74
	For >200 To 300, Add	1.37
03 21 11 00-0117	LF #18, Grade 60, Footings, Low Alloy Steel Reinforcement Bar	17.46
	For Up To 100, Add	8.98
	For >100 To 200, Add	4.74
	For >200 To 300, Add	2.37

03 21 11 00-0118 Slab On Grade, Steel Reinforcement Bar (03 21 11)

Note: ASTM A-615 Plain Steel and A-706 Low Alloy Steel.

03 21 11 00-0119	LF #3, Grade 40, Slab On Grade, Steel Reinforcement Bar	0.62
	For Up To 100, Add	0.42
	For >100 To 200, Add	0.23
	For >200 To 500, Add	0.09
03 21 11 00-0120	LF #4, Grade 40, Slab On Grade, Steel Reinforcement Bar	1.07
	For Up To 100, Add	0.74
	For >100 To 200, Add	0.40
	For >200 To 500, Add	0.16
03 21 11 00-0121	LF #5, Grade 40, Slab On Grade, Steel Reinforcement Bar	1.60
	For Up To 100, Add	1.13
	For >100 To 200, Add	0.60
	For >200 To 500, Add	0.24
03 21 11 00-0122	LF #6, Grade 40, Slab On Grade, Steel Reinforcement Bar	2.20
	For Up To 100, Add	1.58
	For >100 To 200, Add	0.84
	For >200 To 500, Add	0.34
03 21 11 00-0123	LF #3, Grade 50, Slab On Grade, Steel Reinforcement Bar	0.64
	For Up To 100, Add	0.44
	For >100 To 200, Add	0.24
	For >200 To 500, Add	0.10
03 21 11 00-0124	LF #4, Grade 50, Slab On Grade, Steel Reinforcement Bar	1.09
	For Up To 100, Add	0.76
	For >100 To 200, Add	0.41
	For >200 To 500, Add	0.16



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0125 LF #5, Grade 50, Slab On Grade, Steel Reinforcement Bar	1.64	
For Up To 100, Add	1.17	
For >100 To 200, Add	0.62	
For >200 To 500, Add	0.25	
03 21 11 00-0126 LF #6, Grade 50, Slab On Grade, Steel Reinforcement Bar	2.25	
For Up To 100, Add	1.63	
For >100 To 200, Add	0.87	
For >200 To 500, Add	0.35	
03 21 11 00-0127 LF #3, Grade 60, Slab On Grade, Steel Reinforcement Bar	0.66	
For Up To 100, Add	0.46	
For >100 To 200, Add	0.25	
For >200 To 500, Add	0.10	
03 21 11 00-0128 LF #4, Grade 60, Slab On Grade, Steel Reinforcement Bar	1.13	
For Up To 100, Add	0.80	
For >100 To 200, Add	0.43	
For >200 To 500, Add	0.17	
03 21 11 00-0129 LF #5, Grade 60, Slab On Grade, Steel Reinforcement Bar	1.70	
For Up To 100, Add	1.23	
For >100 To 200, Add	0.65	
For >200 To 500, Add	0.26	
03 21 11 00-0130 LF #6, Grade 60, Slab On Grade, Steel Reinforcement Bar	2.34	
For Up To 100, Add	1.72	
For >100 To 200, Add	0.91	
For >200 To 500, Add	0.37	
03 21 11 00-0131 LF #7, Grade 60, Slab On Grade, Steel Reinforcement Bar	3.07	
For Up To 100, Add	1.79	
For >100 To 200, Add	1.03	
For >200 To 400, Add	0.49	
03 21 11 00-0132 LF #8, Grade 60, Slab On Grade, Steel Reinforcement Bar	3.84	
For Up To 100, Add	2.28	
For >100 To 200, Add	1.31	
For >200 To 400, Add	0.62	
03 21 11 00-0133 LF #9, Grade 60, Slab On Grade, Steel Reinforcement Bar	4.73	
For Up To 100, Add	2.84	
For >100 To 200, Add	1.63	
For >200 To 400, Add	0.77	
03 21 11 00-0134 LF #10, Grade 60, Slab On Grade, Steel Reinforcement Bar	5.80	
For Up To 100, Add	2.87	
For >100 To 200, Add	1.54	
For >200 To 300, Add	0.77	
03 21 11 00-0135 LF #11, Grade 60, Slab On Grade, Steel Reinforcement Bar	6.94	
For Up To 100, Add	3.47	
For >100 To 200, Add	1.85	
For >200 To 300, Add	0.93	
03 21 11 00-0136 LF #14, Grade 60, Slab On Grade, Steel Reinforcement Bar	9.65	
For Up To 100, Add	4.90	
For >100 To 200, Add	2.60	
For >200 To 300, Add	1.30	
03 21 11 00-0137 LF #18, Grade 60, Slab On Grade, Steel Reinforcement Bar	16.58	
For Up To 100, Add	8.54	
For >100 To 200, Add	4.50	
For >200 To 300, Add	2.25	
03 21 11 00-0138 LF #6, Grade 75, Slab On Grade, Steel Reinforcement Bar	2.43	
For Up To 100, Add	1.81	
For >100 To 200, Add	0.96	
For >200 To 500, Add	0.38	
03 21 11 00-0139 LF #7, Grade 75, Slab On Grade, Steel Reinforcement Bar	3.19	
For Up To 100, Add	1.88	
For >100 To 200, Add	1.08	
For >200 To 400, Add	0.51	
03 21 11 00-0140 LF #8, Grade 75, Slab On Grade, Steel Reinforcement Bar	4.00	
For Up To 100, Add	2.40	
For >100 To 200, Add	1.37	
For >200 To 400, Add	0.65	
03 21 11 00-0141 LF #9, Grade 75, Slab On Grade, Steel Reinforcement Bar	4.93	
For Up To 100, Add	2.99	
For >100 To 200, Add	1.71	
For >200 To 400, Add	0.81	
03 21 11 00-0142 LF #10, Grade 75, Slab On Grade, Steel Reinforcement Bar	6.05	
For Up To 100, Add	3.02	
For >100 To 200, Add	1.61	
For >200 To 300, Add	0.81	
03 21 11 00-0143 LF #11, Grade 75, Slab On Grade, Steel Reinforcement Bar	7.25	
For Up To 100, Add	3.66	
For >100 To 200, Add	1.95	
For >200 To 300, Add	0.97	
03 21 11 00-0144 LF #14, Grade 75, Slab On Grade, Steel Reinforcement Bar	10.09	
For Up To 100, Add	5.16	
For >100 To 200, Add	2.73	
For >200 To 300, Add	1.37	
03 21 11 00-0145 LF #18, Grade 75, Slab On Grade, Steel Reinforcement Bar	17.37	
For Up To 100, Add	9.01	
For >100 To 200, Add	4.74	
For >200 To 300, Add	2.37	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 21 11 00-0146	LF	#3, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	0.67	
		<i>For Up To 100, Add</i>	0.47	
		<i>For >100 To 200, Add</i>	0.25	
		<i>For >200 To 500, Add</i>	0.10	
03 21 11 00-0147	LF	#4, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	1.16	
		<i>For Up To 100, Add</i>	0.83	
		<i>For >100 To 200, Add</i>	0.44	
		<i>For >200 To 500, Add</i>	0.18	
03 21 11 00-0148	LF	#5, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	1.75	
		<i>For Up To 100, Add</i>	1.28	
		<i>For >100 To 200, Add</i>	0.68	
		<i>For >200 To 500, Add</i>	0.27	
03 21 11 00-0149	LF	#6, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	2.41	
		<i>For Up To 100, Add</i>	1.79	
		<i>For >100 To 200, Add</i>	0.95	
		<i>For >200 To 500, Add</i>	0.38	
03 21 11 00-0150	LF	#7, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	3.16	
		<i>For Up To 100, Add</i>	1.85	
		<i>For >100 To 200, Add</i>	1.07	
		<i>For >200 To 400, Add</i>	0.50	
03 21 11 00-0151	LF	#8, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	3.96	
		<i>For Up To 100, Add</i>	2.37	
		<i>For >100 To 200, Add</i>	1.36	
		<i>For >200 To 400, Add</i>	0.64	
03 21 11 00-0152	LF	#9, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	4.88	
		<i>For Up To 100, Add</i>	2.96	
		<i>For >100 To 200, Add</i>	1.69	
		<i>For >200 To 400, Add</i>	0.80	
03 21 11 00-0153	LF	#10, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	5.98	
		<i>For Up To 100, Add</i>	2.98	
		<i>For >100 To 200, Add</i>	1.59	
		<i>For >200 To 300, Add</i>	0.80	
03 21 11 00-0154	LF	#11, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	7.17	
		<i>For Up To 100, Add</i>	3.61	
		<i>For >100 To 200, Add</i>	1.92	
		<i>For >200 To 300, Add</i>	0.96	
03 21 11 00-0155	LF	#14, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	9.98	
		<i>For Up To 100, Add</i>	5.10	
		<i>For >100 To 200, Add</i>	2.70	
		<i>For >200 To 300, Add</i>	1.35	
03 21 11 00-0156	LF	#18, Grade 60, Slab On Grade, Low Alloy Steel Reinforcement Bar	17.17	
		<i>For Up To 100, Add</i>	8.89	
		<i>For >100 To 200, Add</i>	4.68	
		<i>For >200 To 300, Add</i>	2.34	

03 21 11 00-0157 Elevated Slabs, Steel Reinforcement Bar (03 21 11)

Note: ASTM A-615 Plain Steel and A-706 Low Alloy Steel.

03 21 11 00-0158	LF	#3, Grade 40, Elevated Slabs, Steel Reinforcement Bar	0.58	
		<i>For Up To 100, Add</i>	0.41	
		<i>For >100 To 200, Add</i>	0.22	
		<i>For >200 To 500, Add</i>	0.09	
03 21 11 00-0159	LF	#4, Grade 40, Elevated Slabs, Steel Reinforcement Bar	0.99	
		<i>For Up To 100, Add</i>	0.71	
		<i>For >100 To 200, Add</i>	0.38	
		<i>For >200 To 500, Add</i>	0.15	
03 21 11 00-0160	LF	#5, Grade 40, Elevated Slabs, Steel Reinforcement Bar	1.50	
		<i>For Up To 100, Add</i>	1.09	
		<i>For >100 To 200, Add</i>	0.58	
		<i>For >200 To 500, Add</i>	0.23	
03 21 11 00-0161	LF	#6, Grade 40, Elevated Slabs, Steel Reinforcement Bar	2.07	
		<i>For Up To 100, Add</i>	1.53	
		<i>For >100 To 200, Add</i>	0.81	
		<i>For >200 To 500, Add</i>	0.32	
03 21 11 00-0162	LF	#3, Grade 50, Elevated Slabs, Steel Reinforcement Bar	0.60	
		<i>For Up To 100, Add</i>	0.43	
		<i>For >100 To 200, Add</i>	0.23	
		<i>For >200 To 500, Add</i>	0.09	
03 21 11 00-0163	LF	#4, Grade 50, Elevated Slabs, Steel Reinforcement Bar	1.01	
		<i>For Up To 100, Add</i>	0.73	
		<i>For >100 To 200, Add</i>	0.39	
		<i>For >200 To 500, Add</i>	0.16	
03 21 11 00-0164	LF	#5, Grade 50, Elevated Slabs, Steel Reinforcement Bar	1.54	
		<i>For Up To 100, Add</i>	1.13	
		<i>For >100 To 200, Add</i>	0.60	
		<i>For >200 To 500, Add</i>	0.24	
03 21 11 00-0165	LF	#6, Grade 50, Elevated Slabs, Steel Reinforcement Bar	2.12	
		<i>For Up To 100, Add</i>	1.58	
		<i>For >100 To 200, Add</i>	0.84	
		<i>For >200 To 500, Add</i>	0.33	
03 21 11 00-0166	LF	#3, Grade 60, Elevated Slabs, Steel Reinforcement Bar	0.62	
		<i>For Up To 100, Add</i>	0.45	
		<i>For >100 To 200, Add</i>	0.24	
		<i>For >200 To 500, Add</i>	0.10	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0167 LF #4, Grade 60, Elevated Slabs, Steel Reinforcement Bar	1.05	
<i>For Up To 100, Add</i>	0.77	
<i>For >100 To 200, Add</i>	0.41	
<i>For >200 To 500, Add</i>	0.16	
03 21 11 00-0168 LF #5, Grade 60, Elevated Slabs, Steel Reinforcement Bar	1.60	
<i>For Up To 100, Add</i>	1.19	
<i>For >100 To 200, Add</i>	0.63	
<i>For >200 To 500, Add</i>	0.25	
03 21 11 00-0169 LF #6, Grade 60, Elevated Slabs, Steel Reinforcement Bar	2.21	
<i>For Up To 100, Add</i>	1.67	
<i>For >100 To 200, Add</i>	0.88	
<i>For >200 To 500, Add</i>	0.35	
03 21 11 00-0170 LF #7, Grade 60, Elevated Slabs, Steel Reinforcement Bar	2.91	
<i>For Up To 100, Add</i>	1.73	
<i>For >100 To 200, Add</i>	0.99	
<i>For >200 To 400, Add</i>	0.47	
03 21 11 00-0171 LF #8, Grade 60, Elevated Slabs, Steel Reinforcement Bar	3.64	
<i>For Up To 100, Add</i>	2.21	
<i>For >100 To 200, Add</i>	1.26	
<i>For >200 To 400, Add</i>	0.60	
03 21 11 00-0172 LF #9, Grade 60, Elevated Slabs, Steel Reinforcement Bar	4.52	
<i>For Up To 100, Add</i>	2.77	
<i>For >100 To 200, Add</i>	1.58	
<i>For >200 To 400, Add</i>	0.75	
03 21 11 00-0173 LF #10, Grade 60, Elevated Slabs, Steel Reinforcement Bar	5.56	
<i>For Up To 100, Add</i>	2.80	
<i>For >100 To 200, Add</i>	1.49	
<i>For >200 To 300, Add</i>	0.74	
03 21 11 00-0174 LF #11, Grade 60, Elevated Slabs, Steel Reinforcement Bar	6.65	
<i>For Up To 100, Add</i>	3.39	
<i>For >100 To 200, Add</i>	1.79	
<i>For >200 To 300, Add</i>	0.90	
03 21 11 00-0175 LF #14, Grade 60, Elevated Slabs, Steel Reinforcement Bar	9.28	
<i>For Up To 100, Add</i>	4.79	
<i>For >100 To 200, Add</i>	2.52	
<i>For >200 To 300, Add</i>	1.26	
03 21 11 00-0176 LF #18, Grade 60, Elevated Slabs, Steel Reinforcement Bar	16.00	
<i>For Up To 100, Add</i>	8.36	
<i>For >100 To 200, Add</i>	4.39	
<i>For >200 To 300, Add</i>	2.19	
03 21 11 00-0177 LF #6, Grade 75, Elevated Slabs, Steel Reinforcement Bar	2.30	
<i>For Up To 100, Add</i>	1.76	
<i>For >100 To 200, Add</i>	0.93	
<i>For >200 To 500, Add</i>	0.37	
03 21 11 00-0178 LF #7, Grade 75, Elevated Slabs, Steel Reinforcement Bar	3.03	
<i>For Up To 100, Add</i>	1.82	
<i>For >100 To 200, Add</i>	1.04	
<i>For >200 To 400, Add</i>	0.49	
03 21 11 00-0179 LF #8, Grade 75, Elevated Slabs, Steel Reinforcement Bar	3.80	
<i>For Up To 100, Add</i>	2.33	
<i>For >100 To 200, Add</i>	1.32	
<i>For >200 To 400, Add</i>	0.63	
03 21 11 00-0180 LF #9, Grade 75, Elevated Slabs, Steel Reinforcement Bar	4.72	
<i>For Up To 100, Add</i>	2.92	
<i>For >100 To 200, Add</i>	1.66	
<i>For >200 To 400, Add</i>	0.79	
03 21 11 00-0181 LF #10, Grade 75, Elevated Slabs, Steel Reinforcement Bar	5.81	
<i>For Up To 100, Add</i>	2.95	
<i>For >100 To 200, Add</i>	1.56	
<i>For >200 To 300, Add</i>	0.78	
03 21 11 00-0182 LF #11, Grade 75, Elevated Slabs, Steel Reinforcement Bar	6.96	
<i>For Up To 100, Add</i>	3.57	
<i>For >100 To 200, Add</i>	1.89	
<i>For >200 To 300, Add</i>	0.94	
03 21 11 00-0183 LF #14, Grade 75, Elevated Slabs, Steel Reinforcement Bar	9.72	
<i>For Up To 100, Add</i>	5.05	
<i>For >100 To 200, Add</i>	2.66	
<i>For >200 To 300, Add</i>	1.33	
03 21 11 00-0184 LF #18, Grade 75, Elevated Slabs, Steel Reinforcement Bar	16.79	
<i>For Up To 100, Add</i>	8.84	
<i>For >100 To 200, Add</i>	4.63	
<i>For >200 To 300, Add</i>	2.31	
03 21 11 00-0185 LF #3, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	0.63	
<i>For Up To 100, Add</i>	0.46	
<i>For >100 To 200, Add</i>	0.24	
<i>For >200 To 500, Add</i>	0.10	
03 21 11 00-0186 LF #4, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	1.08	
<i>For Up To 100, Add</i>	0.80	
<i>For >100 To 200, Add</i>	0.42	
<i>For >200 To 500, Add</i>	0.17	
03 21 11 00-0187 LF #5, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	1.65	
<i>For Up To 100, Add</i>	1.24	
<i>For >100 To 200, Add</i>	0.65	
<i>For >200 To 500, Add</i>	0.26	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 11 00-0188	LF #6, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	2.28
	For Up To 100, Add	1.74
	For >100 To 200, Add	0.92
	For >200 To 500, Add	0.37
03 21 11 00-0189	LF #7, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	3.00
	For Up To 100, Add	1.80
	For >100 To 200, Add	1.03
	For >200 To 400, Add	0.49
03 21 11 00-0190	LF #8, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	3.76
	For Up To 100, Add	2.30
	For >100 To 200, Add	1.31
	For >200 To 400, Add	0.62
03 21 11 00-0191	LF #9, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	4.67
	For Up To 100, Add	2.88
	For >100 To 200, Add	1.64
	For >200 To 400, Add	0.78
03 21 11 00-0192	LF #10, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	5.74
	For Up To 100, Add	2.90
	For >100 To 200, Add	1.54
	For >200 To 300, Add	0.77
03 21 11 00-0193	LF #11, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	6.88
	For Up To 100, Add	3.53
	For >100 To 200, Add	1.86
	For >200 To 300, Add	0.93
03 21 11 00-0194	LF #14, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	9.61
	For Up To 100, Add	4.99
	For >100 To 200, Add	2.62
	For >200 To 300, Add	1.31
03 21 11 00-0195	LF #18, Grade 60, Elevated Slabs, Low Alloy Steel Reinforcement Bar	16.59
	For Up To 100, Add	8.72
	For >100 To 200, Add	4.57
	For >200 To 300, Add	2.28

03 21 11 00-0196 Walls, Steel Reinforcement Bar (03 21 11)

Note: ASTM A-615 Plain Steel and A-706 Low Alloy Steel.

03 21 11 00-0197	LF #3, Grade 40, Walls, Steel Reinforcement Bar	0.56
	For Up To 100, Add	0.40
	For >100 To 200, Add	0.21
	For >200 To 500, Add	0.09
03 21 11 00-0198	LF #4, Grade 40, Walls, Steel Reinforcement Bar	0.96
	For Up To 100, Add	0.70
	For >100 To 200, Add	0.37
	For >200 To 500, Add	0.15
03 21 11 00-0199	LF #5, Grade 40, Walls, Steel Reinforcement Bar	1.44
	For Up To 100, Add	1.06
	For >100 To 200, Add	0.56
	For >200 To 500, Add	0.23
03 21 11 00-0200	LF #6, Grade 40, Walls, Steel Reinforcement Bar	2.01
	For Up To 100, Add	1.51
	For >100 To 200, Add	0.80
	For >200 To 500, Add	0.32
03 21 11 00-0201	LF #3, Grade 50, Walls, Steel Reinforcement Bar	0.58
	For Up To 100, Add	0.42
	For >100 To 200, Add	0.22
	For >200 To 500, Add	0.09
03 21 11 00-0202	LF #4, Grade 50, Walls, Steel Reinforcement Bar	0.98
	For Up To 100, Add	0.72
	For >100 To 200, Add	0.38
	For >200 To 500, Add	0.15
03 21 11 00-0203	LF #5, Grade 50, Walls, Steel Reinforcement Bar	1.48
	For Up To 100, Add	1.10
	For >100 To 200, Add	0.58
	For >200 To 500, Add	0.23
03 21 11 00-0204	LF #6, Grade 50, Walls, Steel Reinforcement Bar	2.06
	For Up To 100, Add	1.56
	For >100 To 200, Add	0.82
	For >200 To 500, Add	0.33
03 21 11 00-0205	LF #3, Grade 60, Walls, Steel Reinforcement Bar	0.60
	For Up To 100, Add	0.44
	For >100 To 200, Add	0.23
	For >200 To 500, Add	0.09
03 21 11 00-0206	LF #4, Grade 60, Walls, Steel Reinforcement Bar	1.02
	For Up To 100, Add	0.76
	For >100 To 200, Add	0.40
	For >200 To 500, Add	0.16
03 21 11 00-0207	LF #5, Grade 60, Walls, Steel Reinforcement Bar	1.54
	For Up To 100, Add	1.16
	For >100 To 200, Add	0.61
	For >200 To 500, Add	0.25
03 21 11 00-0208	LF #6, Grade 60, Walls, Steel Reinforcement Bar	2.15
	For Up To 100, Add	1.65
	For >100 To 200, Add	0.87
	For >200 To 500, Add	0.35



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0209 LF #7, Grade 60, Walls, Steel Reinforcement Bar	2.81	
For Up To 100, Add	1.70	
For >100 To 200, Add	0.97	
For >200 To 400, Add	0.46	
03 21 11 00-0210 LF #8, Grade 60, Walls, Steel Reinforcement Bar	3.56	
For Up To 100, Add	2.18	
For >100 To 200, Add	1.24	
For >200 To 400, Add	0.59	
03 21 11 00-0211 LF #9, Grade 60, Walls, Steel Reinforcement Bar	4.41	
For Up To 100, Add	2.73	
For >100 To 200, Add	1.55	
For >200 To 400, Add	0.74	
03 21 11 00-0212 LF #10, Grade 60, Walls, Steel Reinforcement Bar	5.43	
For Up To 100, Add	2.76	
For >100 To 200, Add	1.46	
For >200 To 300, Add	0.73	
03 21 11 00-0213 LF #11, Grade 60, Walls, Steel Reinforcement Bar	6.51	
For Up To 100, Add	3.35	
For >100 To 200, Add	1.77	
For >200 To 300, Add	0.88	
03 21 11 00-0214 LF #14, Grade 60, Walls, Steel Reinforcement Bar	9.10	
For Up To 100, Add	4.73	
For >100 To 200, Add	2.49	
For >200 To 300, Add	1.24	
03 21 11 00-0215 LF #18, Grade 60, Walls, Steel Reinforcement Bar	15.71	
For Up To 100, Add	8.28	
For >100 To 200, Add	4.33	
For >200 To 300, Add	2.17	
03 21 11 00-0216 LF #6, Grade 75, Walls, Steel Reinforcement Bar	2.24	
For Up To 100, Add	1.74	
For >100 To 200, Add	0.91	
For >200 To 500, Add	0.36	
03 21 11 00-0217 LF #7, Grade 75, Walls, Steel Reinforcement Bar	2.93	
For Up To 100, Add	1.79	
For >100 To 200, Add	1.02	
For >200 To 400, Add	0.48	
03 21 11 00-0218 LF #8, Grade 75, Walls, Steel Reinforcement Bar	3.72	
For Up To 100, Add	2.30	
For >100 To 200, Add	1.30	
For >200 To 400, Add	0.62	
03 21 11 00-0219 LF #9, Grade 75, Walls, Steel Reinforcement Bar	4.61	
For Up To 100, Add	2.88	
For >100 To 200, Add	1.63	
For >200 To 400, Add	0.78	
03 21 11 00-0220 LF #10, Grade 75, Walls, Steel Reinforcement Bar	5.68	
For Up To 100, Add	2.91	
For >100 To 200, Add	1.54	
For >200 To 300, Add	0.77	
03 21 11 00-0221 LF #11, Grade 75, Walls, Steel Reinforcement Bar	6.82	
For Up To 100, Add	3.53	
For >100 To 200, Add	1.86	
For >200 To 300, Add	0.93	
03 21 11 00-0222 LF #14, Grade 75, Walls, Steel Reinforcement Bar	9.54	
For Up To 100, Add	5.00	
For >100 To 200, Add	2.62	
For >200 To 300, Add	1.31	
03 21 11 00-0223 LF #18, Grade 75, Walls, Steel Reinforcement Bar	16.50	
For Up To 100, Add	8.75	
For >100 To 200, Add	4.57	
For >200 To 300, Add	2.28	
03 21 11 00-0224 LF #3, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	0.61	
For Up To 100, Add	0.45	
For >100 To 200, Add	0.24	
For >200 To 500, Add	0.10	
03 21 11 00-0225 LF #4, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	1.05	
For Up To 100, Add	0.79	
For >100 To 200, Add	0.42	
For >200 To 500, Add	0.17	
03 21 11 00-0226 LF #5, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	1.59	
For Up To 100, Add	1.21	
For >100 To 200, Add	0.64	
For >200 To 500, Add	0.26	
03 21 11 00-0227 LF #6, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	2.22	
For Up To 100, Add	1.72	
For >100 To 200, Add	0.90	
For >200 To 500, Add	0.36	
03 21 11 00-0228 LF #7, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	2.90	
For Up To 100, Add	1.76	
For >100 To 200, Add	1.01	
For >200 To 400, Add	0.48	
03 21 11 00-0229 LF #8, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	3.68	
For Up To 100, Add	2.27	
For >100 To 200, Add	1.29	
For >200 To 400, Add	0.61	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 11 00-0230	LF #9, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	4.56	
	<i>For Up To 100, Add</i>	2.84	
	<i>For >100 To 200, Add</i>	1.61	
	<i>For >200 To 400, Add</i>	0.77	
03 21 11 00-0231	LF #10, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	5.61	
	<i>For Up To 100, Add</i>	2.87	
	<i>For >100 To 200, Add</i>	1.52	
	<i>For >200 To 300, Add</i>	0.76	
03 21 11 00-0232	LF #11, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	6.74	
	<i>For Up To 100, Add</i>	3.48	
	<i>For >100 To 200, Add</i>	1.84	
	<i>For >200 To 300, Add</i>	0.92	
03 21 11 00-0233	LF #14, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	9.43	
	<i>For Up To 100, Add</i>	4.93	
	<i>For >100 To 200, Add</i>	2.59	
	<i>For >200 To 300, Add</i>	1.29	
03 21 11 00-0234	LF #18, Grade 60, Walls, Low Alloy Steel Reinforcement Bar	16.30	
	<i>For Up To 100, Add</i>	8.63	
	<i>For >100 To 200, Add</i>	4.51	
	<i>For >200 To 300, Add</i>	2.25	
03 21 11 00-0235	Deformed Straight Dowels <small>(03 21 11)</small>		
	Note: Excludes drilling. See CSI section 02 41 19 13-0269 for drilling in concrete.		
03 21 11 00-0236	EA 3/8" Diameter x 24" Long, Deformed Straight Dowel	2.80	
	<i>For Up To 12" Length, Deduct</i>	-0.36	
	<i>For >12" To <24" Length, Deduct</i>	-0.18	
03 21 11 00-0237	EA 1/2" Diameter x 24" Long, Deformed Straight Dowel	3.36	
	<i>For Up To 12" Length, Deduct</i>	-0.48	
	<i>For >12" To <24" Length, Deduct</i>	-0.24	
03 21 11 00-0238	EA 5/8" Diameter x 24" Long, Deformed Straight Dowel	4.17	
	<i>For Up To 12" Length, Deduct</i>	-0.75	
	<i>For >12" To <24" Length, Deduct</i>	-0.38	
03 21 11 00-0239	EA 3/4" Diameter x 24" Long, Deformed Straight Dowel	5.12	
	<i>For Up To 12" Length, Deduct</i>	-1.08	
	<i>For >12" To <24" Length, Deduct</i>	-0.54	
03 21 11 00-0240	EA 7/8" Diameter x 24" Long, Deformed Straight Dowel	6.12	
	<i>For Up To 12" Length, Deduct</i>	-1.51	
	<i>For >12" To <24" Length, Deduct</i>	-0.75	
03 21 11 00-0241	EA 1" Diameter x 24" Long, Deformed Straight Dowel	7.72	
	<i>For Up To 12" Length, Deduct</i>	-1.93	
	<i>For >12" To <24" Length, Deduct</i>	-0.97	
03 21 11 00-0242	EA 1-1/8" Diameter x 24" Long, Deformed Straight Dowel	9.14	
	<i>For Up To 12" Length, Deduct</i>	-2.38	
	<i>For >12" To <24" Length, Deduct</i>	-1.19	
03 21 11 00-0243	EA 1-1/4" Diameter x 24" Long, Deformed Straight Dowel	11.26	
	<i>For Up To 12" Length, Deduct</i>	-3.12	
	<i>For >12" To <24" Length, Deduct</i>	-1.56	
03 21 11 00-0244	EA 1-3/8" Diameter x 24" Long, Deformed Straight Dowel	13.42	
	<i>For Up To 12" Length, Deduct</i>	-3.85	
	<i>For >12" To <24" Length, Deduct</i>	-1.92	
03 21 11 00-0245	Spirals, Reinforcing Steel <small>(03 21 11)</small>		
03 21 11 00-0246	TON Up To 15" Diameter, Grade 60, Spirals, Reinforcing Steel	3,664.94	
	<i>For Grade 75, Add</i>	142.00	
03 21 11 00-0247	TON >15" To 24" Diameter, Grade 60, Spirals, Reinforcing Steel	3,622.42	
	<i>For Grade 75, Add</i>	142.00	
03 21 11 00-0248	TON >24" To 36" Diameter, Grade 60, Spirals, Reinforcing Steel	3,589.99	
	<i>For Grade 75, Add</i>	142.00	
03 21 11 00-0249	TON >36" To 48" Diameter, Grade 60, Spirals, Reinforcing Steel	3,536.95	
	<i>For Grade 75, Add</i>	142.00	
03 21 11 00-0250	TON >48" To 64" Diameter, Grade 60, Spirals, Reinforcing Steel	3,465.23	
	<i>For Grade 75, Add</i>	142.00	
03 21 11 00-0251	TON >64" To 84" Diameter, Grade 60, Spirals, Reinforcing Steel	3,440.86	
	<i>For Grade 75, Add</i>	145.49	
03 21 11 00-0252	TON >84" To 96" Diameter, Grade 60, Spirals, Reinforcing Steel	3,380.82	
	<i>For Grade 75, Add</i>	145.49	
03 21 11 00-0253	Dowel Or Hairpin, Drilled And Epoxy Into Concrete <small>(03 21 11)</small>		
03 21 11 00-0254	EA Dowels Or Hairpin, 1/2" x 30" Length, Drilled And Epoxy In Concrete, 6" Embedment	26.41	
03 21 11 00-0255	EA Dowels Or Hairpin, 1/2" x 36" Length, Drilled And Epoxy In Concrete, >6" To 12" Embedment	27.65	
03 21 11 00-0256	Accessories For Reinforcing Steel <small>(03 21 11)</small>		
03 21 11 00-0257	Reinforcing Steel Lap-Weld Splice <small>(03 21 11 00-0256)</small>		
03 21 11 00-0258	EA Up To #6 Reinforcing Steel Lap-Weld Splice	62.55	
03 21 11 00-0259	EA >#6 Reinforcing Steel Lap-Weld Splice	99.56	
03 21 11 00-0260	Reinforcing Steel Sleeve And Wedge Splice Joint <small>(03 21 11 00-0256)</small>		
03 21 11 00-0261	EA Up To #4 Reinforcing Steel, Sleeve And Wedge Splice Joint	34.01	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 11 00-0262 EA #5 Reinforcing Steel, Sleeve And Wedge Splice Joint.....	51.67	
03 21 11 00-0263 EA #6 Reinforcing Steel, Sleeve And Wedge Splice Joint.....	76.78	
 03 21 13 Galvanized Reinforcement Steel Bars (03 21)		
03 21 13 00-0001 Beams And Girders, Galvanized Steel Reinforcement Bar (03 21 13)		
Note: ASTM A-767 Hot Dipped Galvanized Steel.		
03 21 13 00-0002 LF #3, Grade 40, Beams And Girders, Galvanized Steel Reinforcement Bar.....	0.86	
For Up To 100, Add	0.61	
For >100 To 200, Add	0.33	
For >200 To 500, Add	0.13	
03 21 13 00-0003 LF #4, Grade 40, Beams And Girders, Galvanized Steel Reinforcement Bar.....	1.46	
For Up To 100, Add	1.05	
For >100 To 200, Add	0.56	
For >200 To 500, Add	0.22	
03 21 13 00-0004 LF #5, Grade 40, Beams And Girders, Galvanized Steel Reinforcement Bar.....	2.20	
For Up To 100, Add	1.61	
For >100 To 200, Add	0.86	
For >200 To 500, Add	0.34	
03 21 13 00-0005 LF #6, Grade 40, Beams And Girders, Galvanized Steel Reinforcement Bar.....	3.06	
For Up To 100, Add	2.28	
For >100 To 200, Add	1.21	
For >200 To 500, Add	0.48	
03 21 13 00-0006 LF #3, Grade 50, Beams And Girders, Galvanized Steel Reinforcement Bar.....	0.88	
For Up To 100, Add	0.63	
For >100 To 200, Add	0.34	
For >200 To 500, Add	0.13	
03 21 13 00-0007 LF #4, Grade 50, Beams And Girders, Galvanized Steel Reinforcement Bar.....	1.49	
For Up To 100, Add	1.08	
For >100 To 200, Add	0.58	
For >200 To 500, Add	0.23	
03 21 13 00-0008 LF #5, Grade 50, Beams And Girders, Galvanized Steel Reinforcement Bar.....	2.24	
For Up To 100, Add	1.65	
For >100 To 200, Add	0.88	
For >200 To 500, Add	0.35	
03 21 13 00-0009 LF #6, Grade 50, Beams And Girders, Galvanized Steel Reinforcement Bar.....	3.12	
For Up To 100, Add	2.34	
For >100 To 200, Add	1.24	
For >200 To 500, Add	0.49	
03 21 13 00-0010 LF #3, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	0.90	
For Up To 100, Add	0.65	
For >100 To 200, Add	0.35	
For >200 To 500, Add	0.14	
03 21 13 00-0011 LF #4, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	1.53	
For Up To 100, Add	1.12	
For >100 To 200, Add	0.60	
For >200 To 500, Add	0.24	
03 21 13 00-0012 LF #5, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	2.31	
For Up To 100, Add	1.72	
For >100 To 200, Add	0.91	
For >200 To 500, Add	0.36	
03 21 13 00-0013 LF #6, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	3.21	
For Up To 100, Add	2.43	
For >100 To 200, Add	1.28	
For >200 To 500, Add	0.51	
03 21 13 00-0014 LF #7, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	4.20	
For Up To 100, Add	2.51	
For >100 To 200, Add	1.44	
For >200 To 400, Add	0.68	
03 21 13 00-0015 LF #8, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	5.27	
For Up To 100, Add	3.20	
For >100 To 200, Add	1.83	
For >200 To 400, Add	0.87	
03 21 13 00-0016 LF #9, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	6.52	
For Up To 100, Add	4.01	
For >100 To 200, Add	2.28	
For >200 To 400, Add	1.08	
03 21 13 00-0017 LF #10, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	8.03	
For Up To 100, Add	4.05	
For >100 To 200, Add	2.15	
For >200 To 300, Add	1.08	
03 21 13 00-0018 LF #11, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	9.62	
For Up To 100, Add	4.91	
For >100 To 200, Add	2.60	
For >200 To 300, Add	1.30	
03 21 13 00-0019 LF #14, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	13.44	
For Up To 100, Add	6.95	
For >100 To 200, Add	3.66	
For >200 To 300, Add	1.83	
03 21 13 00-0020 LF #18, Grade 60, Beams And Girders, Galvanized Steel Reinforcement Bar.....	23.16	
For Up To 100, Add	12.13	
For >100 To 200, Add	6.36	
For >200 To 300, Add	3.18	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 13 00-0021	LF #6, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	3.30
	For Up To 100, Add	2.52
	For >100 To 200, Add	1.33
	For >200 To 500, Add	0.53
03 21 13 00-0022	LF #7, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	4.32
	For Up To 100, Add	2.60
	For >100 To 200, Add	1.49
	For >200 To 400, Add	0.70
03 21 13 00-0023	LF #8, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	5.43
	For Up To 100, Add	3.32
	For >100 To 200, Add	1.89
	For >200 To 400, Add	0.90
03 21 13 00-0024	LF #9, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	6.72
	For Up To 100, Add	4.16
	For >100 To 200, Add	2.36
	For >200 To 400, Add	1.12
03 21 13 00-0025	LF #10, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	8.28
	For Up To 100, Add	4.20
	For >100 To 200, Add	2.23
	For >200 To 300, Add	1.11
03 21 13 00-0026	LF #11, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	9.93
	For Up To 100, Add	5.10
	For >100 To 200, Add	2.69
	For >200 To 300, Add	1.35
03 21 13 00-0027	LF #14, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	13.88
	For Up To 100, Add	7.21
	For >100 To 200, Add	3.79
	For >200 To 300, Add	1.90
03 21 13 00-0028	LF #18, Grade 75, Beams And Girders, Galvanized Steel Reinforcement Bar	23.95
	For Up To 100, Add	12.61
	For >100 To 200, Add	6.60
	For >200 To 300, Add	3.30

03 21 13 00-0029 Columns, Galvanized Steel Reinforcement Bar (03 21 13)

Note: ASTM A-767 Hot Dipped Galvanized Steel.

03 21 13 00-0030	LF #3, Grade 40, Columns, Galvanized Steel Reinforcement Bar	0.89
	For Up To 100, Add	0.62
	For >100 To 200, Add	0.33
	For >200 To 500, Add	0.13
03 21 13 00-0031	LF #4, Grade 40, Columns, Galvanized Steel Reinforcement Bar	1.53
	For Up To 100, Add	1.08
	For >100 To 200, Add	0.58
	For >200 To 500, Add	0.23
03 21 13 00-0032	LF #5, Grade 40, Columns, Galvanized Steel Reinforcement Bar	2.30
	For Up To 100, Add	1.65
	For >100 To 200, Add	0.88
	For >200 To 500, Add	0.35
03 21 13 00-0033	LF #6, Grade 40, Columns, Galvanized Steel Reinforcement Bar	3.19
	For Up To 100, Add	2.33
	For >100 To 200, Add	1.24
	For >200 To 500, Add	0.50
03 21 13 00-0034	LF #3, Grade 50, Columns, Galvanized Steel Reinforcement Bar	0.91
	For Up To 100, Add	0.64
	For >100 To 200, Add	0.34
	For >200 To 500, Add	0.14
03 21 13 00-0035	LF #4, Grade 50, Columns, Galvanized Steel Reinforcement Bar	1.56
	For Up To 100, Add	1.11
	For >100 To 200, Add	0.59
	For >200 To 500, Add	0.24
03 21 13 00-0036	LF #5, Grade 50, Columns, Galvanized Steel Reinforcement Bar	2.34
	For Up To 100, Add	1.69
	For >100 To 200, Add	0.90
	For >200 To 500, Add	0.36
03 21 13 00-0037	LF #6, Grade 50, Columns, Galvanized Steel Reinforcement Bar	3.25
	For Up To 100, Add	2.39
	For >100 To 200, Add	1.27
	For >200 To 500, Add	0.51
03 21 13 00-0038	LF #3, Grade 60, Columns, Galvanized Steel Reinforcement Bar	0.93
	For Up To 100, Add	0.66
	For >100 To 200, Add	0.35
	For >200 To 500, Add	0.14
03 21 13 00-0039	LF #4, Grade 60, Columns, Galvanized Steel Reinforcement Bar	1.60
	For Up To 100, Add	1.15
	For >100 To 200, Add	0.61
	For >200 To 500, Add	0.25
03 21 13 00-0040	LF #5, Grade 60, Columns, Galvanized Steel Reinforcement Bar	2.41
	For Up To 100, Add	1.76
	For >100 To 200, Add	0.94
	For >200 To 500, Add	0.37
03 21 13 00-0041	LF #6, Grade 60, Columns, Galvanized Steel Reinforcement Bar	3.34
	For Up To 100, Add	2.48
	For >100 To 200, Add	1.31
	For >200 To 500, Add	0.53



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 13 00-0042 LF #7, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	4.36	
For Up To 100, Add	2.57	
For >100 To 200, Add	1.48	
For >200 To 400, Add	0.70	
03 21 13 00-0043 LF #8, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	5.45	
For Up To 100, Add	3.26	
For >100 To 200, Add	1.87	
For >200 To 400, Add	0.88	
03 21 13 00-0044 LF #9, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	6.74	
For Up To 100, Add	4.09	
For >100 To 200, Add	2.33	
For >200 To 400, Add	1.11	
03 21 13 00-0045 LF #10, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	8.28	
For Up To 100, Add	4.13	
For >100 To 200, Add	2.20	
For >200 To 300, Add	1.10	
03 21 13 00-0046 LF #11, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	9.90	
For Up To 100, Add	5.00	
For >100 To 200, Add	2.66	
For >200 To 300, Add	1.33	
03 21 13 00-0047 LF #14, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	13.82	
For Up To 100, Add	7.06	
For >100 To 200, Add	3.74	
For >200 To 300, Add	1.87	
03 21 13 00-0048 LF #18, Grade 60, Columns, Galvanized Steel Reinforcement Bar.....	23.74	
For Up To 100, Add	12.31	
For >100 To 200, Add	6.48	
For >200 To 300, Add	3.24	
03 21 13 00-0049 LF #6, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	3.43	
For Up To 100, Add	2.57	
For >100 To 200, Add	1.36	
For >200 To 500, Add	0.54	
03 21 13 00-0050 LF #7, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	4.48	
For Up To 100, Add	2.66	
For >100 To 200, Add	1.53	
For >200 To 400, Add	0.72	
03 21 13 00-0051 LF #8, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	5.61	
For Up To 100, Add	3.38	
For >100 To 200, Add	1.94	
For >200 To 400, Add	0.92	
03 21 13 00-0052 LF #9, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	6.94	
For Up To 100, Add	4.24	
For >100 To 200, Add	2.41	
For >200 To 400, Add	1.15	
03 21 13 00-0053 LF #10, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	8.53	
For Up To 100, Add	4.28	
For >100 To 200, Add	2.28	
For >200 To 300, Add	1.14	
03 21 13 00-0054 LF #11, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	10.21	
For Up To 100, Add	5.18	
For >100 To 200, Add	2.75	
For >200 To 300, Add	1.37	
03 21 13 00-0055 LF #14, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	14.26	
For Up To 100, Add	7.33	
For >100 To 200, Add	3.87	
For >200 To 300, Add	1.93	
03 21 13 00-0056 LF #18, Grade 75, Columns, Galvanized Steel Reinforcement Bar.....	24.53	
For Up To 100, Add	12.78	
For >100 To 200, Add	6.71	
For >200 To 300, Add	3.36	
03 21 13 00-0057 Footings, Galvanized Steel Reinforcement Bar <small>(03 21 13)</small>		
Note: ASTM A-767 Hot Dipped Galvanized Steel.		
03 21 13 00-0058 LF #3, Grade 40, Footings, Galvanized Steel Reinforcement Bar.....	0.80	
For Up To 100, Add	0.58	
For >100 To 200, Add	0.31	
For >200 To 500, Add	0.12	
03 21 13 00-0059 LF #4, Grade 40, Footings, Galvanized Steel Reinforcement Bar.....	1.36	
For Up To 100, Add	1.01	
For >100 To 200, Add	0.54	
For >200 To 500, Add	0.21	
03 21 13 00-0060 LF #5, Grade 40, Footings, Galvanized Steel Reinforcement Bar.....	2.06	
For Up To 100, Add	1.56	
For >100 To 200, Add	0.82	
For >200 To 500, Add	0.33	
03 21 13 00-0061 LF #6, Grade 40, Footings, Galvanized Steel Reinforcement Bar.....	2.87	
For Up To 100, Add	2.20	
For >100 To 200, Add	1.16	
For >200 To 500, Add	0.46	
03 21 13 00-0062 LF #3, Grade 50, Footings, Galvanized Steel Reinforcement Bar.....	0.82	
For Up To 100, Add	0.60	
For >100 To 200, Add	0.32	
For >200 To 500, Add	0.13	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 13 00-0063	LF #4, Grade 50, Footings, Galvanized Steel Reinforcement Bar	1.39	
	For Up To 100, Add	1.04	
	For >100 To 200, Add	0.55	
	For >200 To 500, Add	0.22	
03 21 13 00-0064	LF #5, Grade 50, Footings, Galvanized Steel Reinforcement Bar	2.10	
	For Up To 100, Add	1.60	
	For >100 To 200, Add	0.84	
	For >200 To 500, Add	0.34	
03 21 13 00-0065	LF #6, Grade 50, Footings, Galvanized Steel Reinforcement Bar	2.93	
	For Up To 100, Add	2.26	
	For >100 To 200, Add	1.19	
	For >200 To 500, Add	0.48	
03 21 13 00-0066	LF #3, Grade 60, Footings, Galvanized Steel Reinforcement Bar	0.84	
	For Up To 100, Add	0.62	
	For >100 To 200, Add	0.33	
	For >200 To 500, Add	0.13	
03 21 13 00-0067	LF #4, Grade 60, Footings, Galvanized Steel Reinforcement Bar	1.43	
	For Up To 100, Add	1.08	
	For >100 To 200, Add	0.57	
	For >200 To 500, Add	0.23	
03 21 13 00-0068	LF #5, Grade 60, Footings, Galvanized Steel Reinforcement Bar	2.17	
	For Up To 100, Add	1.67	
	For >100 To 200, Add	0.88	
	For >200 To 500, Add	0.35	
03 21 13 00-0069	LF #6, Grade 60, Footings, Galvanized Steel Reinforcement Bar	3.02	
	For Up To 100, Add	2.35	
	For >100 To 200, Add	1.23	
	For >200 To 500, Add	0.49	
03 21 13 00-0070	LF #7, Grade 60, Footings, Galvanized Steel Reinforcement Bar	3.97	
	For Up To 100, Add	2.43	
	For >100 To 200, Add	1.38	
	For >200 To 400, Add	0.66	
03 21 13 00-0071	LF #8, Grade 60, Footings, Galvanized Steel Reinforcement Bar	4.99	
	For Up To 100, Add	3.10	
	For >100 To 200, Add	1.76	
	For >200 To 400, Add	0.84	
03 21 13 00-0072	LF #9, Grade 60, Footings, Galvanized Steel Reinforcement Bar	6.19	
	For Up To 100, Add	3.89	
	For >100 To 200, Add	2.20	
	For >200 To 400, Add	1.05	
03 21 13 00-0073	LF #10, Grade 60, Footings, Galvanized Steel Reinforcement Bar	7.64	
	For Up To 100, Add	3.93	
	For >100 To 200, Add	2.08	
	For >200 To 300, Add	1.04	
03 21 13 00-0074	LF #11, Grade 60, Footings, Galvanized Steel Reinforcement Bar	9.19	
	For Up To 100, Add	4.78	
	For >100 To 200, Add	2.51	
	For >200 To 300, Add	1.26	
03 21 13 00-0075	LF #14, Grade 60, Footings, Galvanized Steel Reinforcement Bar	12.88	
	For Up To 100, Add	6.78	
	For >100 To 200, Add	3.55	
	For >200 To 300, Add	1.77	
03 21 13 00-0076	LF #18, Grade 60, Footings, Galvanized Steel Reinforcement Bar	22.27	
	For Up To 100, Add	11.87	
	For >100 To 200, Add	6.18	
	For >200 To 300, Add	3.09	
03 21 13 00-0077	LF #6, Grade 75, Footings, Galvanized Steel Reinforcement Bar	3.11	
	For Up To 100, Add	2.44	
	For >100 To 200, Add	1.28	
	For >200 To 500, Add	0.51	
03 21 13 00-0078	LF #7, Grade 75, Footings, Galvanized Steel Reinforcement Bar	4.09	
	For Up To 100, Add	2.52	
	For >100 To 200, Add	1.43	
	For >200 To 400, Add	0.68	
03 21 13 00-0079	LF #8, Grade 75, Footings, Galvanized Steel Reinforcement Bar	5.15	
	For Up To 100, Add	3.22	
	For >100 To 200, Add	1.82	
	For >200 To 400, Add	0.87	
03 21 13 00-0080	LF #9, Grade 75, Footings, Galvanized Steel Reinforcement Bar	6.39	
	For Up To 100, Add	4.04	
	For >100 To 200, Add	2.28	
	For >200 To 400, Add	1.09	
03 21 13 00-0081	LF #10, Grade 75, Footings, Galvanized Steel Reinforcement Bar	7.89	
	For Up To 100, Add	4.08	
	For >100 To 200, Add	2.15	
	For >200 To 300, Add	1.08	
03 21 13 00-0082	LF #11, Grade 75, Footings, Galvanized Steel Reinforcement Bar	9.50	
	For Up To 100, Add	4.97	
	For >100 To 200, Add	2.61	
	For >200 To 300, Add	1.30	
03 21 13 00-0083	LF #14, Grade 75, Footings, Galvanized Steel Reinforcement Bar	13.32	
	For Up To 100, Add	7.04	
	For >100 To 200, Add	3.68	
	For >200 To 300, Add	1.84	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 13 00-0084 LF #18, Grade 75, Footings, Galvanized Steel Reinforcement Bar	23.06	
<i>For Up To 100, Add</i>	12.34	
<i>For >100 To 200, Add</i>	6.42	
<i>For >200 To 300, Add</i>	3.21	
03 21 13 00-0085 Slab On Grade, Galvanized Steel Reinforcement Bar <small>(03 21 13)</small>		
Note: ASTM A-767 Hot Dipped Galvanized Steel.		
03 21 13 00-0086 LF #3, Grade 40, Slab On Grade, Galvanized Steel Reinforcement Bar	0.77	
<i>For Up To 100, Add</i>	0.57	
<i>For >100 To 200, Add</i>	0.30	
<i>For >200 To 500, Add</i>	0.12	
03 21 13 00-0087 LF #4, Grade 40, Slab On Grade, Galvanized Steel Reinforcement Bar	1.33	
<i>For Up To 100, Add</i>	1.00	
<i>For >100 To 200, Add</i>	0.53	
<i>For >200 To 500, Add</i>	0.21	
03 21 13 00-0088 LF #5, Grade 40, Slab On Grade, Galvanized Steel Reinforcement Bar	2.01	
<i>For Up To 100, Add</i>	1.54	
<i>For >100 To 200, Add</i>	0.81	
<i>For >200 To 500, Add</i>	0.32	
03 21 13 00-0089 LF #6, Grade 40, Slab On Grade, Galvanized Steel Reinforcement Bar	2.79	
<i>For Up To 100, Add</i>	2.17	
<i>For >100 To 200, Add</i>	1.14	
<i>For >200 To 500, Add</i>	0.46	
03 21 13 00-0090 LF #3, Grade 50, Slab On Grade, Galvanized Steel Reinforcement Bar	0.79	
<i>For Up To 100, Add</i>	0.59	
<i>For >100 To 200, Add</i>	0.31	
<i>For >200 To 500, Add</i>	0.13	
03 21 13 00-0091 LF #4, Grade 50, Slab On Grade, Galvanized Steel Reinforcement Bar	1.36	
<i>For Up To 100, Add</i>	1.03	
<i>For >100 To 200, Add</i>	0.54	
<i>For >200 To 500, Add</i>	0.22	
03 21 13 00-0092 LF #5, Grade 50, Slab On Grade, Galvanized Steel Reinforcement Bar	2.05	
<i>For Up To 100, Add</i>	1.58	
<i>For >100 To 200, Add</i>	0.83	
<i>For >200 To 500, Add</i>	0.33	
03 21 13 00-0093 LF #6, Grade 50, Slab On Grade, Galvanized Steel Reinforcement Bar	2.85	
<i>For Up To 100, Add</i>	2.23	
<i>For >100 To 200, Add</i>	1.17	
<i>For >200 To 500, Add</i>	0.47	
03 21 13 00-0094 LF #3, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	0.81	
<i>For Up To 100, Add</i>	0.61	
<i>For >100 To 200, Add</i>	0.32	
<i>For >200 To 500, Add</i>	0.13	
03 21 13 00-0095 LF #4, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	1.40	
<i>For Up To 100, Add</i>	1.07	
<i>For >100 To 200, Add</i>	0.56	
<i>For >200 To 500, Add</i>	0.23	
03 21 13 00-0096 LF #5, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	2.12	
<i>For Up To 100, Add</i>	1.65	
<i>For >100 To 200, Add</i>	0.86	
<i>For >200 To 500, Add</i>	0.35	
03 21 13 00-0097 LF #6, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	2.94	
<i>For Up To 100, Add</i>	2.32	
<i>For >100 To 200, Add</i>	1.21	
<i>For >200 To 500, Add</i>	0.49	
03 21 13 00-0098 LF #7, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	3.89	
<i>For Up To 100, Add</i>	2.40	
<i>For >100 To 200, Add</i>	1.36	
<i>For >200 To 400, Add</i>	0.65	
03 21 13 00-0099 LF #8, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	4.90	
<i>For Up To 100, Add</i>	3.07	
<i>For >100 To 200, Add</i>	1.73	
<i>For >200 To 400, Add</i>	0.83	
03 21 13 00-0100 LF #9, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	6.08	
<i>For Up To 100, Add</i>	3.86	
<i>For >100 To 200, Add</i>	2.17	
<i>For >200 To 400, Add</i>	1.04	
03 21 13 00-0101 LF #10, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	7.51	
<i>For Up To 100, Add</i>	3.89	
<i>For >100 To 200, Add</i>	2.05	
<i>For >200 To 300, Add</i>	1.02	
03 21 13 00-0102 LF #11, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	9.05	
<i>For Up To 100, Add</i>	4.74	
<i>For >100 To 200, Add</i>	2.49	
<i>For >200 To 300, Add</i>	1.24	
03 21 13 00-0103 LF #14, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	12.69	
<i>For Up To 100, Add</i>	6.72	
<i>For >100 To 200, Add</i>	3.51	
<i>For >200 To 300, Add</i>	1.76	
03 21 13 00-0104 LF #18, Grade 60, Slab On Grade, Galvanized Steel Reinforcement Bar	21.98	
<i>For Up To 100, Add</i>	11.78	
<i>For >100 To 200, Add</i>	6.12	
<i>For >200 To 300, Add</i>	3.06	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 21	13 00-0105	LF	#6, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	3.03	
			For Up To 100, Add	2.41	
			For >100 To 200, Add	1.26	
			For >200 To 500, Add	0.50	
03 21	13 00-0106	LF	#7, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	4.01	
			For Up To 100, Add	2.49	
			For >100 To 200, Add	1.41	
			For >200 To 400, Add	0.67	
03 21	13 00-0107	LF	#8, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	5.06	
			For Up To 100, Add	3.19	
			For >100 To 200, Add	1.80	
			For >200 To 400, Add	0.86	
03 21	13 00-0108	LF	#9, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	6.28	
			For Up To 100, Add	4.01	
			For >100 To 200, Add	2.25	
			For >200 To 400, Add	1.08	
03 21	13 00-0109	LF	#10, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	7.76	
			For Up To 100, Add	4.04	
			For >100 To 200, Add	2.12	
			For >200 To 300, Add	1.06	
03 21	13 00-0110	LF	#11, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	9.36	
			For Up To 100, Add	4.93	
			For >100 To 200, Add	2.58	
			For >200 To 300, Add	1.29	
03 21	13 00-0111	LF	#14, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	13.13	
			For Up To 100, Add	6.99	
			For >100 To 200, Add	3.64	
			For >200 To 300, Add	1.82	
03 21	13 00-0112	LF	#18, Grade 75, Slab On Grade, Galvanized Steel Reinforcement Bar	22.77	
			For Up To 100, Add	12.25	
			For >100 To 200, Add	6.36	
			For >200 To 300, Add	3.18	

03 21 13 00-0113 Elevated Slabs, Galvanized Steel Reinforcement Bar (03 21 13)

Note: ASTM A-767 Hot Dipped Galvanized Steel.

03 21	13 00-0114	LF	#3, Grade 40, Elevated Slabs, Galvanized Steel Reinforcement Bar	0.73	
			For Up To 100, Add	0.56	
			For >100 To 200, Add	0.29	
			For >200 To 500, Add	0.12	
03 21	13 00-0115	LF	#4, Grade 40, Elevated Slabs, Galvanized Steel Reinforcement Bar	1.25	
			For Up To 100, Add	0.97	
			For >100 To 200, Add	0.51	
			For >200 To 500, Add	0.20	
03 21	13 00-0116	LF	#5, Grade 40, Elevated Slabs, Galvanized Steel Reinforcement Bar	1.91	
			For Up To 100, Add	1.50	
			For >100 To 200, Add	0.78	
			For >200 To 500, Add	0.31	
03 21	13 00-0117	LF	#6, Grade 40, Elevated Slabs, Galvanized Steel Reinforcement Bar	2.66	
			For Up To 100, Add	2.12	
			For >100 To 200, Add	1.11	
			For >200 To 500, Add	0.44	
03 21	13 00-0118	LF	#3, Grade 50, Elevated Slabs, Galvanized Steel Reinforcement Bar	0.75	
			For Up To 100, Add	0.58	
			For >100 To 200, Add	0.30	
			For >200 To 500, Add	0.12	
03 21	13 00-0119	LF	#4, Grade 50, Elevated Slabs, Galvanized Steel Reinforcement Bar	1.28	
			For Up To 100, Add	1.00	
			For >100 To 200, Add	0.52	
			For >200 To 500, Add	0.21	
03 21	13 00-0120	LF	#5, Grade 50, Elevated Slabs, Galvanized Steel Reinforcement Bar	1.95	
			For Up To 100, Add	1.54	
			For >100 To 200, Add	0.80	
			For >200 To 500, Add	0.32	
03 21	13 00-0121	LF	#6, Grade 50, Elevated Slabs, Galvanized Steel Reinforcement Bar	2.72	
			For Up To 100, Add	2.18	
			For >100 To 200, Add	1.14	
			For >200 To 500, Add	0.45	
03 21	13 00-0122	LF	#3, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	0.77	
			For Up To 100, Add	0.60	
			For >100 To 200, Add	0.31	
			For >200 To 500, Add	0.13	
03 21	13 00-0123	LF	#4, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	1.32	
			For Up To 100, Add	1.04	
			For >100 To 200, Add	0.54	
			For >200 To 500, Add	0.22	
03 21	13 00-0124	LF	#5, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	2.02	
			For Up To 100, Add	1.61	
			For >100 To 200, Add	0.84	
			For >200 To 500, Add	0.34	
03 21	13 00-0125	LF	#6, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	2.81	
			For Up To 100, Add	2.27	
			For >100 To 200, Add	1.18	
			For >200 To 500, Add	0.47	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 13 00-0126 LF #7, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	3.73	
For Up To 100, Add	2.35	
For >100 To 200, Add	1.32	
For >200 To 400, Add	0.63	
03 21 13 00-0127 LF #8, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	4.70	
For Up To 100, Add	3.00	
For >100 To 200, Add	1.68	
For >200 To 400, Add	0.81	
03 21 13 00-0128 LF #9, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	5.87	
For Up To 100, Add	3.78	
For >100 To 200, Add	2.12	
For >200 To 400, Add	1.02	
03 21 13 00-0129 LF #10, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	7.27	
For Up To 100, Add	3.82	
For >100 To 200, Add	2.00	
For >200 To 300, Add	1.00	
03 21 13 00-0130 LF #11, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	8.76	
For Up To 100, Add	4.65	
For >100 To 200, Add	2.43	
For >200 To 300, Add	1.21	
03 21 13 00-0131 LF #14, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	12.32	
For Up To 100, Add	6.61	
For >100 To 200, Add	3.44	
For >200 To 300, Add	1.72	
03 21 13 00-0132 LF #18, Grade 60, Elevated Slabs, Galvanized Steel Reinforcement Bar	21.40	
For Up To 100, Add	11.60	
For >100 To 200, Add	6.01	
For >200 To 300, Add	3.00	
03 21 13 00-0133 LF #6, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	2.90	
For Up To 100, Add	2.36	
For >100 To 200, Add	1.23	
For >200 To 500, Add	0.49	
03 21 13 00-0134 LF #7, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	3.85	
For Up To 100, Add	2.44	
For >100 To 200, Add	1.37	
For >200 To 400, Add	0.66	
03 21 13 00-0135 LF #8, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	4.86	
For Up To 100, Add	3.12	
For >100 To 200, Add	1.75	
For >200 To 400, Add	0.84	
03 21 13 00-0136 LF #9, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	6.07	
For Up To 100, Add	3.93	
For >100 To 200, Add	2.20	
For >200 To 400, Add	1.06	
03 21 13 00-0137 LF #10, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	7.52	
For Up To 100, Add	3.97	
For >100 To 200, Add	2.08	
For >200 To 300, Add	1.04	
03 21 13 00-0138 LF #11, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	9.07	
For Up To 100, Add	4.84	
For >100 To 200, Add	2.52	
For >200 To 300, Add	1.26	
03 21 13 00-0139 LF #14, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	12.76	
For Up To 100, Add	6.88	
For >100 To 200, Add	3.57	
For >200 To 300, Add	1.78	
03 21 13 00-0140 LF #18, Grade 75, Elevated Slabs, Galvanized Steel Reinforcement Bar	22.19	
For Up To 100, Add	12.08	
For >100 To 200, Add	6.25	
For >200 To 300, Add	3.12	
03 21 13 00-0141 Walls, Galvanized Steel Reinforcement Bar <small>(03 21 13)</small>		
Note: ASTM A-767 Hot Dipped Galvanized Steel.		
03 21 13 00-0142 LF #3, Grade 40, Walls, Galvanized Steel Reinforcement Bar	0.71	
For Up To 100, Add	0.55	
For >100 To 200, Add	0.29	
For >200 To 500, Add	0.12	
03 21 13 00-0143 LF #4, Grade 40, Walls, Galvanized Steel Reinforcement Bar	1.22	
For Up To 100, Add	0.96	
For >100 To 200, Add	0.50	
For >200 To 500, Add	0.20	
03 21 13 00-0144 LF #5, Grade 40, Walls, Galvanized Steel Reinforcement Bar	1.85	
For Up To 100, Add	1.47	
For >100 To 200, Add	0.77	
For >200 To 500, Add	0.31	
03 21 13 00-0145 LF #6, Grade 40, Walls, Galvanized Steel Reinforcement Bar	2.60	
For Up To 100, Add	2.10	
For >100 To 200, Add	1.09	
For >200 To 500, Add	0.44	
03 21 13 00-0146 LF #3, Grade 50, Walls, Galvanized Steel Reinforcement Bar	0.73	
For Up To 100, Add	0.57	
For >100 To 200, Add	0.30	
For >200 To 500, Add	0.12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21	13 00-0147	LF	#4, Grade 50, Walls, Galvanized Steel Reinforcement Bar	1.25	
			For Up To 100, Add	0.99	
			For >100 To 200, Add	0.52	
			For >200 To 500, Add	0.21	
03 21	13 00-0148	LF	#5, Grade 50, Walls, Galvanized Steel Reinforcement Bar	1.89	
			For Up To 100, Add	1.51	
			For >100 To 200, Add	0.79	
			For >200 To 500, Add	0.32	
03 21	13 00-0149	LF	#6, Grade 50, Walls, Galvanized Steel Reinforcement Bar	2.66	
			For Up To 100, Add	2.16	
			For >100 To 200, Add	1.12	
			For >200 To 500, Add	0.45	
03 21	13 00-0150	LF	#3, Grade 60, Walls, Galvanized Steel Reinforcement Bar	0.75	
			For Up To 100, Add	0.59	
			For >100 To 200, Add	0.31	
			For >200 To 500, Add	0.12	
03 21	13 00-0151	LF	#4, Grade 60, Walls, Galvanized Steel Reinforcement Bar	1.29	
			For Up To 100, Add	1.03	
			For >100 To 200, Add	0.54	
			For >200 To 500, Add	0.21	
03 21	13 00-0152	LF	#5, Grade 60, Walls, Galvanized Steel Reinforcement Bar	1.96	
			For Up To 100, Add	1.58	
			For >100 To 200, Add	0.82	
			For >200 To 500, Add	0.33	
03 21	13 00-0153	LF	#6, Grade 60, Walls, Galvanized Steel Reinforcement Bar	2.75	
			For Up To 100, Add	2.25	
			For >100 To 200, Add	1.17	
			For >200 To 500, Add	0.47	
03 21	13 00-0154	LF	#7, Grade 60, Walls, Galvanized Steel Reinforcement Bar	3.63	
			For Up To 100, Add	2.31	
			For >100 To 200, Add	1.30	
			For >200 To 400, Add	0.62	
03 21	13 00-0155	LF	#8, Grade 60, Walls, Galvanized Steel Reinforcement Bar	4.62	
			For Up To 100, Add	2.97	
			For >100 To 200, Add	1.66	
			For >200 To 400, Add	0.80	
03 21	13 00-0156	LF	#9, Grade 60, Walls, Galvanized Steel Reinforcement Bar	5.76	
			For Up To 100, Add	3.74	
			For >100 To 200, Add	2.09	
			For >200 To 400, Add	1.01	
03 21	13 00-0157	LF	#10, Grade 60, Walls, Galvanized Steel Reinforcement Bar	7.14	
			For Up To 100, Add	3.78	
			For >100 To 200, Add	1.98	
			For >200 To 300, Add	0.99	
03 21	13 00-0158	LF	#11, Grade 60, Walls, Galvanized Steel Reinforcement Bar	8.62	
			For Up To 100, Add	4.61	
			For >100 To 200, Add	2.40	
			For >200 To 300, Add	1.20	
03 21	13 00-0159	LF	#14, Grade 60, Walls, Galvanized Steel Reinforcement Bar	12.14	
			For Up To 100, Add	6.56	
			For >100 To 200, Add	3.40	
			For >200 To 300, Add	1.70	
03 21	13 00-0160	LF	#18, Grade 60, Walls, Galvanized Steel Reinforcement Bar	21.11	
			For Up To 100, Add	11.52	
			For >100 To 200, Add	5.95	
			For >200 To 300, Add	2.98	
03 21	13 00-0161	LF	#6, Grade 75, Walls, Galvanized Steel Reinforcement Bar	2.84	
			For Up To 100, Add	2.34	
			For >100 To 200, Add	1.21	
			For >200 To 500, Add	0.48	
03 21	13 00-0162	LF	#7, Grade 75, Walls, Galvanized Steel Reinforcement Bar	3.75	
			For Up To 100, Add	2.40	
			For >100 To 200, Add	1.35	
			For >200 To 400, Add	0.65	
03 21	13 00-0163	LF	#8, Grade 75, Walls, Galvanized Steel Reinforcement Bar	4.78	
			For Up To 100, Add	3.09	
			For >100 To 200, Add	1.73	
			For >200 To 400, Add	0.83	
03 21	13 00-0164	LF	#9, Grade 75, Walls, Galvanized Steel Reinforcement Bar	5.96	
			For Up To 100, Add	3.89	
			For >100 To 200, Add	2.17	
			For >200 To 400, Add	1.05	
03 21	13 00-0165	LF	#10, Grade 75, Walls, Galvanized Steel Reinforcement Bar	7.39	
			For Up To 100, Add	3.93	
			For >100 To 200, Add	2.05	
			For >200 To 300, Add	1.03	
03 21	13 00-0166	LF	#11, Grade 75, Walls, Galvanized Steel Reinforcement Bar	8.93	
			For Up To 100, Add	4.80	
			For >100 To 200, Add	2.49	
			For >200 To 300, Add	1.25	
03 21	13 00-0167	LF	#14, Grade 75, Walls, Galvanized Steel Reinforcement Bar	12.58	
			For Up To 100, Add	6.82	
			For >100 To 200, Add	3.53	
			For >200 To 300, Add	1.77	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 13 00-0168 LF #18, Grade 75, Walls, Galvanized Steel Reinforcement Bar	21.90	
For Up To 100, Add	11.99	
For >100 To 200, Add	6.19	
For >200 To 300, Add	3.09	
03 21 16 Epoxy-Coated Reinforcement Steel Bars (03 21)		
03 21 16 00-0001 Beams And Girders, Epoxy Coated Steel Reinforcement Bar (03 21 16)		
Note: ASTM A-775 Epoxy Coated Steel.		
03 21 16 00-0002 LF #3, Grade 40, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	0.84	
For Up To 100, Add	0.59	
For >100 To 200, Add	0.32	
For >200 To 500, Add	0.13	
03 21 16 00-0003 LF #4, Grade 40, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	1.43	
For Up To 100, Add	1.02	
For >100 To 200, Add	0.55	
For >200 To 500, Add	0.22	
03 21 16 00-0004 LF #5, Grade 40, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	2.16	
For Up To 100, Add	1.57	
For >100 To 200, Add	0.84	
For >200 To 500, Add	0.33	
03 21 16 00-0005 LF #6, Grade 40, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	3.00	
For Up To 100, Add	2.22	
For >100 To 200, Add	1.18	
For >200 To 500, Add	0.47	
03 21 16 00-0006 LF #3, Grade 50, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	0.86	
For Up To 100, Add	0.61	
For >100 To 200, Add	0.33	
For >200 To 500, Add	0.13	
03 21 16 00-0007 LF #4, Grade 50, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	1.46	
For Up To 100, Add	1.05	
For >100 To 200, Add	0.56	
For >200 To 500, Add	0.22	
03 21 16 00-0008 LF #5, Grade 50, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	2.20	
For Up To 100, Add	1.61	
For >100 To 200, Add	0.86	
For >200 To 500, Add	0.34	
03 21 16 00-0009 LF #6, Grade 50, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	3.06	
For Up To 100, Add	2.28	
For >100 To 200, Add	1.21	
For >200 To 500, Add	0.48	
03 21 16 00-0010 LF #3, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	0.88	
For Up To 100, Add	0.63	
For >100 To 200, Add	0.34	
For >200 To 500, Add	0.13	
03 21 16 00-0011 LF #4, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	1.50	
For Up To 100, Add	1.09	
For >100 To 200, Add	0.58	
For >200 To 500, Add	0.23	
03 21 16 00-0012 LF #5, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	2.26	
For Up To 100, Add	1.67	
For >100 To 200, Add	0.89	
For >200 To 500, Add	0.35	
03 21 16 00-0013 LF #6, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	3.14	
For Up To 100, Add	2.36	
For >100 To 200, Add	1.25	
For >200 To 500, Add	0.50	
03 21 16 00-0014 LF #7, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	4.11	
For Up To 100, Add	2.44	
For >100 To 200, Add	1.40	
For >200 To 400, Add	0.66	
03 21 16 00-0015 LF #8, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	5.16	
For Up To 100, Add	3.12	
For >100 To 200, Add	1.78	
For >200 To 400, Add	0.84	
03 21 16 00-0016 LF #9, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	6.37	
For Up To 100, Add	3.90	
For >100 To 200, Add	2.22	
For >200 To 400, Add	1.05	
03 21 16 00-0017 LF #10, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	7.84	
For Up To 100, Add	3.94	
For >100 To 200, Add	2.10	
For >200 To 300, Add	1.05	
03 21 16 00-0018 LF #11, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	9.39	
For Up To 100, Add	4.77	
For >100 To 200, Add	2.53	
For >200 To 300, Add	1.27	
03 21 16 00-0019 LF #14, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	13.11	
For Up To 100, Add	6.75	
For >100 To 200, Add	3.56	
For >200 To 300, Add	1.78	
03 21 16 00-0020 LF #18, Grade 60, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	22.57	
For Up To 100, Add	11.78	
For >100 To 200, Add	6.18	
For >200 To 300, Add	3.09	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 16 00-0021	LF #6, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	3.23	
	For Up To 100, Add	2.45	
	For >100 To 200, Add	1.29	
	For >200 To 500, Add	0.52	
03 21 16 00-0022	LF #7, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	4.23	
	For Up To 100, Add	2.53	
	For >100 To 200, Add	1.45	
	For >200 To 400, Add	0.69	
03 21 16 00-0023	LF #8, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	5.31	
	For Up To 100, Add	3.23	
	For >100 To 200, Add	1.84	
	For >200 To 400, Add	0.87	
03 21 16 00-0024	LF #9, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	6.57	
	For Up To 100, Add	4.05	
	For >100 To 200, Add	2.30	
	For >200 To 400, Add	1.09	
03 21 16 00-0025	LF #10, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	8.09	
	For Up To 100, Add	4.09	
	For >100 To 200, Add	2.17	
	For >200 To 300, Add	1.09	
03 21 16 00-0026	LF #11, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	9.70	
	For Up To 100, Add	4.96	
	For >100 To 200, Add	2.62	
	For >200 To 300, Add	1.31	
03 21 16 00-0027	LF #14, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	13.55	
	For Up To 100, Add	7.01	
	For >100 To 200, Add	3.69	
	For >200 To 300, Add	1.85	
03 21 16 00-0028	LF #18, Grade 75, Beams And Girders, Epoxy Coated Steel Reinforcement Bar	23.36	
	For Up To 100, Add	12.25	
	For >100 To 200, Add	6.42	
	For >200 To 300, Add	3.21	
03 21 16 00-0029	Columns, Epoxy Coated Steel Reinforcement Bar <small>(03 21 16)</small>		
	Note: ASTM A-775 Epoxy Coated Steel.		
03 21 16 00-0030	LF #3, Grade 40, Columns, Epoxy Coated Steel Reinforcement Bar	0.87	
	For Up To 100, Add	0.60	
	For >100 To 200, Add	0.32	
	For >200 To 500, Add	0.13	
03 21 16 00-0031	LF #4, Grade 40, Columns, Epoxy Coated Steel Reinforcement Bar	1.50	
	For Up To 100, Add	1.05	
	For >100 To 200, Add	0.56	
	For >200 To 500, Add	0.23	
03 21 16 00-0032	LF #5, Grade 40, Columns, Epoxy Coated Steel Reinforcement Bar	2.26	
	For Up To 100, Add	1.61	
	For >100 To 200, Add	0.86	
	For >200 To 500, Add	0.34	
03 21 16 00-0033	LF #6, Grade 40, Columns, Epoxy Coated Steel Reinforcement Bar	3.13	
	For Up To 100, Add	2.27	
	For >100 To 200, Add	1.21	
	For >200 To 500, Add	0.48	
03 21 16 00-0034	LF #3, Grade 50, Columns, Epoxy Coated Steel Reinforcement Bar	0.89	
	For Up To 100, Add	0.62	
	For >100 To 200, Add	0.33	
	For >200 To 500, Add	0.13	
03 21 16 00-0035	LF #4, Grade 50, Columns, Epoxy Coated Steel Reinforcement Bar	1.53	
	For Up To 100, Add	1.08	
	For >100 To 200, Add	0.58	
	For >200 To 500, Add	0.23	
03 21 16 00-0036	LF #5, Grade 50, Columns, Epoxy Coated Steel Reinforcement Bar	2.30	
	For Up To 100, Add	1.65	
	For >100 To 200, Add	0.88	
	For >200 To 500, Add	0.35	
03 21 16 00-0037	LF #6, Grade 50, Columns, Epoxy Coated Steel Reinforcement Bar	3.19	
	For Up To 100, Add	2.33	
	For >100 To 200, Add	1.24	
	For >200 To 500, Add	0.50	
03 21 16 00-0038	LF #3, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar	0.91	
	For Up To 100, Add	0.64	
	For >100 To 200, Add	0.34	
	For >200 To 500, Add	0.14	
03 21 16 00-0039	LF #4, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar	1.57	
	For Up To 100, Add	1.12	
	For >100 To 200, Add	0.60	
	For >200 To 500, Add	0.24	
03 21 16 00-0040	LF #5, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar	2.36	
	For Up To 100, Add	1.71	
	For >100 To 200, Add	0.91	
	For >200 To 500, Add	0.36	
03 21 16 00-0041	LF #6, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar	3.27	
	For Up To 100, Add	2.41	
	For >100 To 200, Add	1.28	
	For >200 To 500, Add	0.51	



Concrete	03	03
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 16 00-0042 LF #7, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 400, Add</i>	4.27 2.50 1.44 0.68	
03 21 16 00-0043 LF #8, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 400, Add</i>	5.34 3.18 1.83 0.86	
03 21 16 00-0044 LF #9, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 400, Add</i>	6.59 3.97 2.27 1.08	
03 21 16 00-0045 LF #10, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	8.09 4.01 2.15 1.07	
03 21 16 00-0046 LF #11, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	9.67 4.86 2.59 1.29	
03 21 16 00-0047 LF #14, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	13.49 6.86 3.64 1.82	
03 21 16 00-0048 LF #18, Grade 60, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	23.15 11.95 6.30 3.15	
03 21 16 00-0049 LF #6, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 500, Add</i>	3.36 2.50 1.32 0.53	
03 21 16 00-0050 LF #7, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 400, Add</i>	4.39 2.59 1.49 0.70	
03 21 16 00-0051 LF #8, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 400, Add</i>	5.49 3.29 1.89 0.89	
03 21 16 00-0052 LF #9, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 400, Add</i>	6.79 4.12 2.35 1.12	
03 21 16 00-0053 LF #10, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	8.34 4.16 2.22 1.11	
03 21 16 00-0054 LF #11, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	9.98 5.04 2.68 1.34	
03 21 16 00-0055 LF #14, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	13.93 7.13 3.77 1.88	
03 21 16 00-0056 LF #18, Grade 75, Columns, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 300, Add</i>	23.94 12.43 6.54 3.27	
03 21 16 00-0057 Footings, Epoxy Coated Steel Reinforcement Bar <small>(03 21 16)</small> Note: ASTM A-775 Epoxy Coated Steel.		
03 21 16 00-0058 LF #3, Grade 40, Footings, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 500, Add</i>	0.78 0.56 0.30 0.12	
03 21 16 00-0059 LF #4, Grade 40, Footings, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 500, Add</i>	1.33 0.98 0.52 0.21	
03 21 16 00-0060 LF #5, Grade 40, Footings, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 500, Add</i>	2.02 1.52 0.80 0.32	
03 21 16 00-0061 LF #6, Grade 40, Footings, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 500, Add</i>	2.81 2.14 1.13 0.45	
03 21 16 00-0062 LF #3, Grade 50, Footings, Epoxy Coated Steel Reinforcement Bar <i>For Up To 100, Add</i> <i>For >100 To 200, Add</i> <i>For >200 To 500, Add</i>	0.80 0.58 0.31 0.12	
03 21 16 00-0063 LF #4, Grade 50, Footings, Epoxy Coated Steel Reinforcement Bar	1.36	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 16 00-0064	LF #5, Grade 50, Footings, Epoxy Coated Steel Reinforcement Bar.....	2.06	
	For Up To 100, Add	1.56	
	For >100 To 200, Add	0.82	
	For >200 To 500, Add	0.33	
03 21 16 00-0065	LF #6, Grade 50, Footings, Epoxy Coated Steel Reinforcement Bar.....	2.87	
	For Up To 100, Add	2.20	
	For >100 To 200, Add	1.16	
	For >200 To 500, Add	0.46	
03 21 16 00-0066	LF #3, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	0.82	
	For Up To 100, Add	0.60	
	For >100 To 200, Add	0.32	
	For >200 To 500, Add	0.13	
03 21 16 00-0067	LF #4, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	1.40	
	For Up To 100, Add	1.05	
	For >100 To 200, Add	0.56	
	For >200 To 500, Add	0.22	
03 21 16 00-0068	LF #5, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	2.12	
	For Up To 100, Add	1.62	
	For >100 To 200, Add	0.85	
	For >200 To 500, Add	0.34	
03 21 16 00-0069	LF #6, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	2.95	
	For Up To 100, Add	2.28	
	For >100 To 200, Add	1.20	
	For >200 To 500, Add	0.48	
03 21 16 00-0070	LF #7, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	3.88	
	For Up To 100, Add	2.36	
	For >100 To 200, Add	1.35	
	For >200 To 400, Add	0.64	
03 21 16 00-0071	LF #8, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	4.88	
	For Up To 100, Add	3.02	
	For >100 To 200, Add	1.71	
	For >200 To 400, Add	0.82	
03 21 16 00-0072	LF #9, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	6.04	
	For Up To 100, Add	3.78	
	For >100 To 200, Add	2.14	
	For >200 To 400, Add	1.02	
03 21 16 00-0073	LF #10, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	7.45	
	For Up To 100, Add	3.82	
	For >100 To 200, Add	2.02	
	For >200 To 300, Add	1.01	
03 21 16 00-0074	LF #11, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	8.96	
	For Up To 100, Add	4.64	
	For >100 To 200, Add	2.44	
	For >200 To 300, Add	1.22	
03 21 16 00-0075	LF #14, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	12.55	
	For Up To 100, Add	6.58	
	For >100 To 200, Add	3.45	
	For >200 To 300, Add	1.72	
03 21 16 00-0076	LF #18, Grade 60, Footings, Epoxy Coated Steel Reinforcement Bar.....	21.68	
	For Up To 100, Add	11.51	
	For >100 To 200, Add	6.01	
	For >200 To 300, Add	3.00	
03 21 16 00-0077	LF #6, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	3.04	
	For Up To 100, Add	2.37	
	For >100 To 200, Add	1.24	
	For >200 To 500, Add	0.50	
03 21 16 00-0078	LF #7, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	4.00	
	For Up To 100, Add	2.45	
	For >100 To 200, Add	1.39	
	For >200 To 400, Add	0.66	
03 21 16 00-0079	LF #8, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	5.03	
	For Up To 100, Add	3.13	
	For >100 To 200, Add	1.77	
	For >200 To 400, Add	0.85	
03 21 16 00-0080	LF #9, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	6.24	
	For Up To 100, Add	3.93	
	For >100 To 200, Add	2.22	
	For >200 To 400, Add	1.06	
03 21 16 00-0081	LF #10, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	7.70	
	For Up To 100, Add	3.97	
	For >100 To 200, Add	2.09	
	For >200 To 300, Add	1.05	
03 21 16 00-0082	LF #11, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	9.27	
	For Up To 100, Add	4.83	
	For >100 To 200, Add	2.54	
	For >200 To 300, Add	1.27	
03 21 16 00-0083	LF #14, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	12.99	
	For Up To 100, Add	6.85	
	For >100 To 200, Add	3.58	
	For >200 To 300, Add	1.79	
03 21 16 00-0084	LF #18, Grade 75, Footings, Epoxy Coated Steel Reinforcement Bar.....	22.47	
	For Up To 100, Add	11.99	
	For >100 To 200, Add	6.24	
	For >200 To 300, Add	3.12	

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 16 00-0085		Slab On Grade, Epoxy Coated Steel Reinforcement Bar <small>(03 21 16)</small>		
		Note: ASTM A-775 Epoxy Coated Steel.		
03 21 16 00-0086	LF	#3, Grade 40, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	0.75	
		For Up To 100, Add	0.55	
		For >100 To 200, Add	0.29	
		For >200 To 500, Add	0.12	
03 21 16 00-0087	LF	#4, Grade 40, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	1.30	
		For Up To 100, Add	0.97	
		For >100 To 200, Add	0.51	
		For >200 To 500, Add	0.21	
03 21 16 00-0088	LF	#5, Grade 40, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	1.97	
		For Up To 100, Add	1.50	
		For >100 To 200, Add	0.79	
		For >200 To 500, Add	0.32	
03 21 16 00-0089	LF	#6, Grade 40, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	2.73	
		For Up To 100, Add	2.11	
		For >100 To 200, Add	1.11	
		For >200 To 500, Add	0.44	
03 21 16 00-0090	LF	#3, Grade 50, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	0.77	
		For Up To 100, Add	0.57	
		For >100 To 200, Add	0.30	
		For >200 To 500, Add	0.12	
03 21 16 00-0091	LF	#4, Grade 50, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	1.33	
		For Up To 100, Add	1.00	
		For >100 To 200, Add	0.53	
		For >200 To 500, Add	0.21	
03 21 16 00-0092	LF	#5, Grade 50, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	2.01	
		For Up To 100, Add	1.54	
		For >100 To 200, Add	0.81	
		For >200 To 500, Add	0.32	
03 21 16 00-0093	LF	#6, Grade 50, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	2.79	
		For Up To 100, Add	2.17	
		For >100 To 200, Add	1.14	
		For >200 To 500, Add	0.46	
03 21 16 00-0094	LF	#3, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	0.79	
		For Up To 100, Add	0.59	
		For >100 To 200, Add	0.31	
		For >200 To 500, Add	0.13	
03 21 16 00-0095	LF	#4, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	1.37	
		For Up To 100, Add	1.04	
		For >100 To 200, Add	0.55	
		For >200 To 500, Add	0.22	
03 21 16 00-0096	LF	#5, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	2.07	
		For Up To 100, Add	1.60	
		For >100 To 200, Add	0.84	
		For >200 To 500, Add	0.34	
03 21 16 00-0097	LF	#6, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	2.87	
		For Up To 100, Add	2.25	
		For >100 To 200, Add	1.18	
		For >200 To 500, Add	0.47	
03 21 16 00-0098	LF	#7, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	3.80	
		For Up To 100, Add	2.33	
		For >100 To 200, Add	1.33	
		For >200 To 400, Add	0.63	
03 21 16 00-0099	LF	#8, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	4.79	
		For Up To 100, Add	2.99	
		For >100 To 200, Add	1.69	
		For >200 To 400, Add	0.81	
03 21 16 00-0100	LF	#9, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	5.93	
		For Up To 100, Add	3.74	
		For >100 To 200, Add	2.11	
		For >200 To 400, Add	1.01	
03 21 16 00-0101	LF	#10, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	7.32	
		For Up To 100, Add	3.78	
		For >100 To 200, Add	1.99	
		For >200 To 300, Add	1.00	
03 21 16 00-0102	LF	#11, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	8.82	
		For Up To 100, Add	4.60	
		For >100 To 200, Add	2.42	
		For >200 To 300, Add	1.21	
03 21 16 00-0103	LF	#14, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	12.36	
		For Up To 100, Add	6.53	
		For >100 To 200, Add	3.41	
		For >200 To 300, Add	1.71	
03 21 16 00-0104	LF	#18, Grade 60, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	21.39	
		For Up To 100, Add	11.42	
		For >100 To 200, Add	5.95	
		For >200 To 300, Add	2.97	
03 21 16 00-0105	LF	#6, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	2.96	
		For Up To 100, Add	2.34	
		For >100 To 200, Add	1.22	
		For >200 To 500, Add	0.49	
03 21 16 00-0106	LF	#7, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	3.92	
		For Up To 100, Add	2.42	
		For >100 To 200, Add	1.37	
		For >200 To 400, Add	0.66	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 21 16 00-0107	LF #8, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	4.94	
	For Up To 100, Add	3.10	
	For >100 To 200, Add	1.75	
	For >200 To 400, Add	0.84	
03 21 16 00-0108	LF #9, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	6.13	
	For Up To 100, Add	3.89	
	For >100 To 200, Add	2.19	
	For >200 To 400, Add	1.05	
03 21 16 00-0109	LF #10, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	7.57	
	For Up To 100, Add	3.93	
	For >100 To 200, Add	2.07	
	For >200 To 300, Add	1.03	
03 21 16 00-0110	LF #11, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	9.13	
	For Up To 100, Add	4.79	
	For >100 To 200, Add	2.51	
	For >200 To 300, Add	1.25	
03 21 16 00-0111	LF #14, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	12.80	
	For Up To 100, Add	6.79	
	For >100 To 200, Add	3.54	
	For >200 To 300, Add	1.77	
03 21 16 00-0112	LF #18, Grade 75, Slab On Grade, Epoxy Coated Steel Reinforcement Bar.....	22.18	
	For Up To 100, Add	11.90	
	For >100 To 200, Add	6.18	
	For >200 To 300, Add	3.09	
03 21 16 00-0113	Elevated Slabs, Epoxy Coated Steel Reinforcement Bar <small>(03 21 16)</small>		
	Note: ASTM A-775 Epoxy Coated Steel.		
03 21 16 00-0114	LF #3, Grade 40, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	0.71	
	For Up To 100, Add	0.54	
	For >100 To 200, Add	0.28	
	For >200 To 500, Add	0.11	
03 21 16 00-0115	LF #4, Grade 40, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	1.22	
	For Up To 100, Add	0.94	
	For >100 To 200, Add	0.49	
	For >200 To 500, Add	0.20	
03 21 16 00-0116	LF #5, Grade 40, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	1.87	
	For Up To 100, Add	1.46	
	For >100 To 200, Add	0.76	
	For >200 To 500, Add	0.31	
03 21 16 00-0117	LF #6, Grade 40, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	2.60	
	For Up To 100, Add	2.06	
	For >100 To 200, Add	1.08	
	For >200 To 500, Add	0.43	
03 21 16 00-0118	LF #3, Grade 50, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	0.73	
	For Up To 100, Add	0.56	
	For >100 To 200, Add	0.29	
	For >200 To 500, Add	0.12	
03 21 16 00-0119	LF #4, Grade 50, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	1.25	
	For Up To 100, Add	0.97	
	For >100 To 200, Add	0.51	
	For >200 To 500, Add	0.20	
03 21 16 00-0120	LF #5, Grade 50, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	1.91	
	For Up To 100, Add	1.50	
	For >100 To 200, Add	0.78	
	For >200 To 500, Add	0.31	
03 21 16 00-0121	LF #6, Grade 50, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	2.66	
	For Up To 100, Add	2.12	
	For >100 To 200, Add	1.11	
	For >200 To 500, Add	0.44	
03 21 16 00-0122	LF #3, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	0.75	
	For Up To 100, Add	0.58	
	For >100 To 200, Add	0.30	
	For >200 To 500, Add	0.12	
03 21 16 00-0123	LF #4, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	1.29	
	For Up To 100, Add	1.01	
	For >100 To 200, Add	0.53	
	For >200 To 500, Add	0.21	
03 21 16 00-0124	LF #5, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	1.97	
	For Up To 100, Add	1.56	
	For >100 To 200, Add	0.81	
	For >200 To 500, Add	0.33	
03 21 16 00-0125	LF #6, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	2.74	
	For Up To 100, Add	2.20	
	For >100 To 200, Add	1.15	
	For >200 To 500, Add	0.46	
03 21 16 00-0126	LF #7, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	3.64	
	For Up To 100, Add	2.28	
	For >100 To 200, Add	1.29	
	For >200 To 400, Add	0.62	
03 21 16 00-0127	LF #8, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	4.59	
	For Up To 100, Add	2.92	
	For >100 To 200, Add	1.64	
	For >200 To 400, Add	0.79	



Concrete	03	CS
Concrete Reinforcing	03 20	
Reinforcement Bars	03 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 16 00-0128 LF #9, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	5.72	
For Up To 100, Add	3.67	
For >100 To 200, Add	2.06	
For >200 To 400, Add	0.99	
03 21 16 00-0129 LF #10, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	7.08	
For Up To 100, Add	3.71	
For >100 To 200, Add	1.94	
For >200 To 300, Add	0.97	
03 21 16 00-0130 LF #11, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	8.53	
For Up To 100, Add	4.52	
For >100 To 200, Add	2.36	
For >200 To 300, Add	1.18	
03 21 16 00-0131 LF #14, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	11.99	
For Up To 100, Add	6.41	
For >100 To 200, Add	3.34	
For >200 To 300, Add	1.67	
03 21 16 00-0132 LF #18, Grade 60, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	20.81	
For Up To 100, Add	11.25	
For >100 To 200, Add	5.83	
For >200 To 300, Add	2.92	
03 21 16 00-0133 LF #6, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	2.83	
For Up To 100, Add	2.29	
For >100 To 200, Add	1.19	
For >200 To 500, Add	0.48	
03 21 16 00-0134 LF #7, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	3.76	
For Up To 100, Add	2.37	
For >100 To 200, Add	1.33	
For >200 To 400, Add	0.64	
03 21 16 00-0135 LF #8, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	4.74	
For Up To 100, Add	3.03	
For >100 To 200, Add	1.70	
For >200 To 400, Add	0.82	
03 21 16 00-0136 LF #9, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	5.92	
For Up To 100, Add	3.82	
For >100 To 200, Add	2.14	
For >200 To 400, Add	1.03	
03 21 16 00-0137 LF #10, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	7.33	
For Up To 100, Add	3.86	
For >100 To 200, Add	2.02	
For >200 To 300, Add	1.01	
03 21 16 00-0138 LF #11, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	8.84	
For Up To 100, Add	4.70	
For >100 To 200, Add	2.45	
For >200 To 300, Add	1.23	
03 21 16 00-0139 LF #14, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	12.43	
For Up To 100, Add	6.68	
For >100 To 200, Add	3.47	
For >200 To 300, Add	1.73	
03 21 16 00-0140 LF #18, Grade 75, Elevated Slabs, Epoxy Coated Steel Reinforcement Bar.....	21.60	
For Up To 100, Add	11.72	
For >100 To 200, Add	6.07	
For >200 To 300, Add	3.03	
03 21 16 00-0141 Walls, Epoxy Coated Steel Reinforcement Bar (03 21 16)		
Note: ASTM A-775 Epoxy Coated Steel.		
03 21 16 00-0142 LF #3, Grade 40, Walls, Epoxy Coated Steel Reinforcement Bar.....	0.69	
For Up To 100, Add	0.53	
For >100 To 200, Add	0.28	
For >200 To 500, Add	0.11	
03 21 16 00-0143 LF #4, Grade 40, Walls, Epoxy Coated Steel Reinforcement Bar.....	1.19	
For Up To 100, Add	0.93	
For >100 To 200, Add	0.49	
For >200 To 500, Add	0.19	
03 21 16 00-0144 LF #5, Grade 40, Walls, Epoxy Coated Steel Reinforcement Bar.....	1.81	
For Up To 100, Add	1.43	
For >100 To 200, Add	0.75	
For >200 To 500, Add	0.30	
03 21 16 00-0145 LF #6, Grade 40, Walls, Epoxy Coated Steel Reinforcement Bar.....	2.54	
For Up To 100, Add	2.04	
For >100 To 200, Add	1.06	
For >200 To 500, Add	0.42	
03 21 16 00-0146 LF #3, Grade 50, Walls, Epoxy Coated Steel Reinforcement Bar.....	0.71	
For Up To 100, Add	0.55	
For >100 To 200, Add	0.29	
For >200 To 500, Add	0.12	
03 21 16 00-0147 LF #4, Grade 50, Walls, Epoxy Coated Steel Reinforcement Bar.....	1.22	
For Up To 100, Add	0.96	
For >100 To 200, Add	0.50	
For >200 To 500, Add	0.20	
03 21 16 00-0148 LF #5, Grade 50, Walls, Epoxy Coated Steel Reinforcement Bar.....	1.85	
For Up To 100, Add	1.47	
For >100 To 200, Add	0.77	
For >200 To 500, Add	0.31	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 21 16 00-0149	LF	#6, Grade 50, Walls, Epoxy Coated Steel Reinforcement Bar	2.60	
		<i>For Up To 100, Add</i>	2.10	
		<i>For >100 To 200, Add</i>	1.09	
		<i>For >200 To 500, Add</i>	0.44	
03 21 16 00-0150	LF	#3, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	0.73	
		<i>For Up To 100, Add</i>	0.57	
		<i>For >100 To 200, Add</i>	0.30	
		<i>For >200 To 500, Add</i>	0.12	
03 21 16 00-0151	LF	#4, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	1.26	
		<i>For Up To 100, Add</i>	1.00	
		<i>For >100 To 200, Add</i>	0.52	
		<i>For >200 To 500, Add</i>	0.21	
03 21 16 00-0152	LF	#5, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	1.91	
		<i>For Up To 100, Add</i>	1.53	
		<i>For >100 To 200, Add</i>	0.80	
		<i>For >200 To 500, Add</i>	0.32	
03 21 16 00-0153	LF	#6, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	2.68	
		<i>For Up To 100, Add</i>	2.18	
		<i>For >100 To 200, Add</i>	1.13	
		<i>For >200 To 500, Add</i>	0.45	
03 21 16 00-0154	LF	#7, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	3.54	
		<i>For Up To 100, Add</i>	2.24	
		<i>For >100 To 200, Add</i>	1.26	
		<i>For >200 To 400, Add</i>	0.61	
03 21 16 00-0155	LF	#8, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	4.51	
		<i>For Up To 100, Add</i>	2.89	
		<i>For >100 To 200, Add</i>	1.62	
		<i>For >200 To 400, Add</i>	0.78	
03 21 16 00-0156	LF	#9, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	5.61	
		<i>For Up To 100, Add</i>	3.63	
		<i>For >100 To 200, Add</i>	2.03	
		<i>For >200 To 400, Add</i>	0.98	
03 21 16 00-0157	LF	#10, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	6.95	
		<i>For Up To 100, Add</i>	3.67	
		<i>For >100 To 200, Add</i>	1.92	
		<i>For >200 To 300, Add</i>	0.96	
03 21 16 00-0158	LF	#11, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	8.39	
		<i>For Up To 100, Add</i>	4.47	
		<i>For >100 To 200, Add</i>	2.33	
		<i>For >200 To 300, Add</i>	1.17	
03 21 16 00-0159	LF	#14, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	11.81	
		<i>For Up To 100, Add</i>	6.36	
		<i>For >100 To 200, Add</i>	3.30	
		<i>For >200 To 300, Add</i>	1.65	
03 21 16 00-0160	LF	#18, Grade 60, Walls, Epoxy Coated Steel Reinforcement Bar	20.52	
		<i>For Up To 100, Add</i>	11.16	
		<i>For >100 To 200, Add</i>	5.77	
		<i>For >200 To 300, Add</i>	2.89	
03 21 16 00-0161	LF	#6, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	2.77	
		<i>For Up To 100, Add</i>	2.27	
		<i>For >100 To 200, Add</i>	1.18	
		<i>For >200 To 500, Add</i>	0.47	
03 21 16 00-0162	LF	#7, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	3.66	
		<i>For Up To 100, Add</i>	2.33	
		<i>For >100 To 200, Add</i>	1.31	
		<i>For >200 To 400, Add</i>	0.63	
03 21 16 00-0163	LF	#8, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	4.66	
		<i>For Up To 100, Add</i>	3.00	
		<i>For >100 To 200, Add</i>	1.68	
		<i>For >200 To 400, Add</i>	0.81	
03 21 16 00-0164	LF	#9, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	5.81	
		<i>For Up To 100, Add</i>	3.78	
		<i>For >100 To 200, Add</i>	2.11	
		<i>For >200 To 400, Add</i>	1.02	
03 21 16 00-0165	LF	#10, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	7.20	
		<i>For Up To 100, Add</i>	3.82	
		<i>For >100 To 200, Add</i>	1.99	
		<i>For >200 To 300, Add</i>	1.00	
03 21 16 00-0166	LF	#11, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	8.70	
		<i>For Up To 100, Add</i>	4.66	
		<i>For >100 To 200, Add</i>	2.42	
		<i>For >200 To 300, Add</i>	1.21	
03 21 16 00-0167	LF	#14, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	12.25	
		<i>For Up To 100, Add</i>	6.62	
		<i>For >100 To 200, Add</i>	3.43	
		<i>For >200 To 300, Add</i>	1.72	
03 21 16 00-0168	LF	#18, Grade 75, Walls, Epoxy Coated Steel Reinforcement Bar	21.31	
		<i>For Up To 100, Add</i>	11.64	
		<i>For >100 To 200, Add</i>	6.01	
		<i>For >200 To 300, Add</i>	3.01	

03 21 16 00-0169 Epoxy Coated Deformed Straight Dowels ^(03 21 16)

Note: Excludes drilling. See CSI section 02 41 19 13-0269 for drilling in concrete.

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 21 16 00-0170	EA			3/8" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel.....	4.62	
				<i>For Up To 12" Length, Deduct</i>	-0.50	
				<i>For >12" To <24" Length, Deduct</i>	-0.25	
03 21 16 00-0171	EA			1/2" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel.....	5.50	
				<i>For Up To 12" Length, Deduct</i>	-0.76	
				<i>For >12" To <24" Length, Deduct</i>	-0.38	
03 21 16 00-0172	EA			5/8" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel.....	6.87	
				<i>For Up To 12" Length, Deduct</i>	-1.14	
				<i>For >12" To <24" Length, Deduct</i>	-0.57	
03 21 16 00-0173	EA			3/4" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel.....	8.56	
				<i>For Up To 12" Length, Deduct</i>	-1.52	
				<i>For >12" To <24" Length, Deduct</i>	-0.76	
03 21 16 00-0174	EA			7/8" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel.....	10.37	
				<i>For Up To 12" Length, Deduct</i>	-2.06	
				<i>For >12" To <24" Length, Deduct</i>	-1.03	
03 21 16 00-0175	EA			1" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel.....	12.10	
				<i>For Up To 12" Length, Deduct</i>	-2.54	
				<i>For >12" To <24" Length, Deduct</i>	-1.27	
03 21 16 00-0176	EA			1-1/8" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel	14.30	
				<i>For Up To 12" Length, Deduct</i>	-3.07	
				<i>For >12" To <24" Length, Deduct</i>	-1.54	
03 21 16 00-0177	EA			1-1/4" Diameter x 24" Long, Epoxy Coated Deformed Straight Dowel	17.23	
				<i>For Up To 12" Length, Deduct</i>	-3.72	
				<i>For >12" To <24" Length, Deduct</i>	-1.86	

03 30 Cast-In-Place Concrete ⁽⁰³⁾

See CSI section 01 74 19 00-0040 for hauling over 15 miles.

03 30 53 Miscellaneous Cast-in-Place Concrete ^(03 30)

03 30 53 00-0001 Place Concrete Duct Bank ^(03 30 53)

03 30 53 00-0002	CY	Direct Chute, Place 3,000 PSI Concrete Duct Bank	215.88
		<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
		<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
		<i>For 3,500 PSI Concrete, Add</i>	8.95
		<i>For 3,750 PSI Concrete, Add</i>	12.18
		<i>For 4,000 PSI Concrete, Add</i>	15.40
		<i>For 4,500 PSI Concrete, Add</i>	17.91
		<i>For 5,000 PSI Concrete, Add</i>	20.42
		<i>For 6,000 PSI Concrete, Add</i>	48.35
		<i>For White Cement Concrete, Add</i>	21.49
		<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
		<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
		<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
		<i>For Up To 20, Add</i>	14.72
		<i>For >20 To 50, Add</i>	5.52
		<i>For >100 To 200, Deduct</i>	-4.32
		<i>For >200 To 400, Deduct</i>	-8.64
		<i>For >400, Deduct</i>	-12.95

03 30 53 00-0003 Place Concrete Thrust Blocks And Backfill ^(03 30 53)

03 30 53 00-0004	CY	Direct Chute, Place 3,000 PSI Concrete Thrust Blocks.....	262.17
		<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
		<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
		<i>For 3,500 PSI Concrete, Add</i>	8.95
		<i>For 3,750 PSI Concrete, Add</i>	12.18
		<i>For 4,000 PSI Concrete, Add</i>	15.40
		<i>For 4,500 PSI Concrete, Add</i>	17.91
		<i>For 5,000 PSI Concrete, Add</i>	20.42
		<i>For 6,000 PSI Concrete, Add</i>	48.35
		<i>For White Cement Concrete, Add</i>	21.49
		<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
		<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
		<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
		<i>For Up To 20, Add</i>	33.23
		<i>For >20 To 50, Add</i>	12.46
		<i>For >100 To 200, Deduct</i>	-5.24
		<i>For >200 To 400, Deduct</i>	-10.49
		<i>For >400, Deduct</i>	-15.73

03 30 53 00-0005 Place Concrete Slurry ^(03 30 53)

03 30 53 00-0006	CY	Direct Chute, Place Two Sack Cement, Concrete Slurry.....	200.69
		Note: Two 94# sack cement per CY.	
03 30 53 00-0007	CY	Concrete Pump, Place Two Sack Cement, Concrete Slurry.....	193.35
		Note: Two 94# sack cement per CY. Excludes pumping equipment.	

03 30 53 00-0008 Hand Mix And Place Concrete ^(03 30 53)

03	03 Concrete
	03 30 Cast-In-Place Concrete
	03 30 53 Miscellaneous Cast-in-Place Concrete



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 30 53 00-0009 CF Hand Mix And Place 3,000 PSI Concrete	20.23	
Note: For use where conventional equipment access is limited or when directed by the owner. Includes local aggregate, sand, bagged cement (Type I) and water.		
For Up To 25 CF, Add	2.41	
For 2,000 PSI Concrete, Deduct	-0.41	
For 2,500 PSI Concrete, Deduct	-0.21	
For 3,500 PSI Concrete, Add	0.38	
For 3,750 PSI Concrete, Add	0.52	
For 4,000 PSI Concrete, Add	0.66	
For 4,500 PSI Concrete, Add	0.77	
For 5,000 PSI Concrete, Add	0.87	
For 6,000 PSI Concrete, Add	2.07	
For White Cement Concrete, Add	0.92	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	0.99	
For High Early Strength, Type 3 ASTM C150, Add	0.77	
For Lightweight Aggregate, ASTM C330, Add	2.68	

03 31 Structural Concrete (03 30)

03 31 13 Heavyweight Structural Concrete (03 31)

Note: Includes delivery, fuel charge and placement of material. See CSI section 02 41 00 00-0000 for demolition, 03 05 13 00-0001 for admixtures, 03 11 00 00-0000 for forming, 03 20 00 00-0000 for reinforcing, 03 31 13 00-0086 for small concrete purchases (short load), 03 35 00 00-0000 for finishing, 03 39 00 00-0000 for curing.

03 31 13 00-0001 Concrete Slab Assemblies (03 31 13)

03 31 13 00-0002 3,000 PSI Slab On Grade Concrete Slabs Assemblies (03 31 13 00-0001)

Note: Includes forms, welded wire reinforcement (where necessary), #3 to #6 reinforcing rods at 12" on center each way with chairs (where necessary), vapor barrier, concrete, curing, latex or hot asphalt expansion joints, control joints, screed, float, and finish for pedestrian slabs. Excludes excavation, base, earthwork, and expansion joints along existing slab. See CSI section 03 05 13 00-0001 for color additive alternative, 03 37 16 00-0001 for concrete pumping equipment.

03 31 13 00-0003 SF 4" 3,000 PSI Slab On Grade Concrete Slab Assembly	8.55	
For 2,000 PSI Concrete, Deduct	-0.23	
For 2,500 PSI Concrete, Deduct	-0.12	
For 3,500 PSI Concrete, Add	0.08	
For 4,000 PSI Concrete, Add	0.27	
For 4,500 PSI Concrete, Add	0.34	
For 5,000 PSI Concrete, Add	0.40	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	3.39	
For >500 To 1,000, Add	2.33	
For >1,000 To 2,000, Add	1.28	
For >2,000 To 5,000, Add	0.64	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000 To 35,000, Deduct	-0.43	
For >35,000 To 50,000, Deduct	-0.65	
For >50,000 To 70,000, Deduct	-0.86	
For >70,000, Deduct	-1.07	
03 31 13 00-0004 SF 5" 3,000 PSI Slab On Grade Concrete Slab Assembly	9.33	
For 2,000 PSI Concrete, Deduct	-0.27	
For 2,500 PSI Concrete, Deduct	-0.13	
For 3,500 PSI Concrete, Add	0.09	
For 4,000 PSI Concrete, Add	0.31	
For 4,500 PSI Concrete, Add	0.39	
For 5,000 PSI Concrete, Add	0.45	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	3.62	
For >500 To 1,000, Add	2.50	
For >1,000 To 2,000, Add	1.37	
For >2,000 To 5,000, Add	0.69	
For >10,000 To 20,000, Deduct	-0.25	
For >20,000 To 35,000, Deduct	-0.48	
For >35,000 To 50,000, Deduct	-0.71	
For >50,000 To 70,000, Deduct	-0.95	
For >70,000, Deduct	-1.18	
03 31 13 00-0005 SF 6" 3,000 PSI Slab On Grade Concrete Slab Assembly	10.46	
For 2,000 PSI Concrete, Deduct	-0.31	
For 2,500 PSI Concrete, Deduct	-0.16	
For 3,500 PSI Concrete, Add	0.11	
For 4,000 PSI Concrete, Add	0.36	
For 4,500 PSI Concrete, Add	0.46	
For 5,000 PSI Concrete, Add	0.53	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	3.97	
For >500 To 1,000, Add	2.74	
For >1,000 To 2,000, Add	1.52	
For >2,000 To 5,000, Add	0.76	
For >10,000 To 20,000, Deduct	-0.29	
For >20,000 To 35,000, Deduct	-0.55	
For >35,000 To 50,000, Deduct	-0.81	
For >50,000 To 70,000, Deduct	-1.07	
For >70,000, Deduct	-1.33	



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0006 SF 7" 3,000 PSI Slab On Grade Concrete Slab Assembly.....	11.53	
For 2,000 PSI Concrete, Deduct	-0.36	
For 2,500 PSI Concrete, Deduct	-0.18	
For 3,500 PSI Concrete, Add	0.13	
For 4,000 PSI Concrete, Add	0.42	
For 4,500 PSI Concrete, Add	0.52	
For 5,000 PSI Concrete, Add	0.60	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	4.26	
For >500 To 1,000, Add	2.95	
For >1,000 To 2,000, Add	1.64	
For >2,000 To 5,000, Add	0.82	
For >10,000 To 20,000, Deduct	-0.33	
For >20,000 To 35,000, Deduct	-0.62	
For >35,000 To 50,000, Deduct	-0.91	
For >50,000 To 70,000, Deduct	-1.20	
For >70,000, Deduct	-1.49	
03 31 13 00-0007 SF 8" 3,000 PSI Slab On Grade Concrete Slab Assembly.....	12.43	
For 2,000 PSI Concrete, Deduct	-0.40	
For 2,500 PSI Concrete, Deduct	-0.20	
For 3,500 PSI Concrete, Add	0.14	
For 4,000 PSI Concrete, Add	0.46	
For 4,500 PSI Concrete, Add	0.58	
For 5,000 PSI Concrete, Add	0.67	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	4.52	
For >500 To 1,000, Add	3.13	
For >1,000 To 2,000, Add	1.75	
For >2,000 To 5,000, Add	0.88	
For >10,000 To 20,000, Deduct	-0.37	
For >20,000 To 35,000, Deduct	-0.68	
For >35,000 To 50,000, Deduct	-0.99	
For >50,000 To 70,000, Deduct	-1.30	
For >70,000, Deduct	-1.61	
03 31 13 00-0008 SF 10" 3,000 PSI Slab On Grade Concrete Slab Assembly.....	14.76	
For 2,000 PSI Concrete, Deduct	-0.50	
For 2,500 PSI Concrete, Deduct	-0.25	
For 3,500 PSI Concrete, Add	0.18	
For 4,000 PSI Concrete, Add	0.59	
For 4,500 PSI Concrete, Add	0.73	
For 5,000 PSI Concrete, Add	0.85	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	5.14	
For >500 To 1,000, Add	3.58	
For >1,000 To 2,000, Add	2.02	
For >2,000 To 5,000, Add	1.01	
For >10,000 To 20,000, Deduct	-0.46	
For >20,000 To 35,000, Deduct	-0.83	
For >35,000 To 50,000, Deduct	-1.20	
For >50,000 To 70,000, Deduct	-1.57	
For >70,000, Deduct	-1.94	
03 31 13 00-0009 SF 12" 3,000 PSI Slab On Grade Concrete Slab Assembly.....	16.57	
For 2,000 PSI Concrete, Deduct	-0.58	
For 2,500 PSI Concrete, Deduct	-0.29	
For 3,500 PSI Concrete, Add	0.20	
For 4,000 PSI Concrete, Add	0.67	
For 4,500 PSI Concrete, Add	0.85	
For 5,000 PSI Concrete, Add	0.97	
For Reinforcing Rods Are At 18" On Center, Deduct	-0.45	
For Reinforcing Rods Are At 24" On Center, Deduct	-0.66	
For Up To 500, Add	5.66	
For >500 To 1,000, Add	3.95	
For >1,000 To 2,000, Add	2.24	
For >2,000 To 5,000, Add	1.12	
For >10,000 To 20,000, Deduct	-0.54	
For >20,000 To 35,000, Deduct	-0.95	
For >35,000 To 50,000, Deduct	-1.36	
For >50,000 To 70,000, Deduct	-1.78	
For >70,000, Deduct	-2.19	
 03 31 13 00-0010 Concrete Delivery And Placement <small>(03 31 13)</small>		
Note: Includes cleaning out equipment and standard concrete placement tests.		
 03 31 13 00-0011 Place Concrete By Method Indicated <small>(03 31 13 00-0010)</small>		
Note: Tasks for concrete placement "By Concrete Pump" exclude the pumping equipment. See CSI section 03 37 16 00-0001 for concrete pumping equipment.		
 03 31 13 00-0012 Place Concrete Pile Caps <small>(03 31 13 00-0011)</small>		

03 Concrete**03 30 Cast-In-Place Concrete****03 31 Structural Concrete**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 31 13 00-0013	CY Crane And Bucket, Place 3,000 PSI Concrete Pile Caps	315.40
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	54.52
	For >20 To 50, Add	20.45
	For >100 To 200, Deduct	-6.31
	For >200 To 400, Deduct	-12.62
	For >400, Deduct	-18.92
03 31 13 00-0014	CY Direct Chute, Place 3,000 PSI Concrete Pile Caps	240.17
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	24.44
	For >20 To 50, Add	9.16
	For >100 To 200, Deduct	-4.80
	For >200 To 400, Deduct	-9.61
	For >400, Deduct	-14.41
03 31 13 00-0015	CY Concrete Pump, Place 3,000 PSI Concrete Pile Caps.....	252.18
	Note: Excludes pumping equipment.	
	For 2,000 PSI Concrete, Deduct	-10.48
	For 2,500 PSI Concrete, Deduct	-5.24
	For 3,500 PSI Concrete, Add	9.70
	For 3,750 PSI Concrete, Add	13.19
	For 4,000 PSI Concrete, Add	16.68
	For 4,500 PSI Concrete, Add	19.40
	For 5,000 PSI Concrete, Add	22.12
	For 6,000 PSI Concrete, Add	52.38
	For White Cement Concrete, Add	23.28
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22
	For High Early Strength, Type 3 ASTM C150, Add	19.40
	For Lightweight Aggregate, ASTM C330, Add	67.90
	For Up To 20, Add	23.27
	For >20 To 50, Add	8.73
	For >100 To 200, Deduct	-5.04
	For >200 To 400, Deduct	-10.09
	For >400, Deduct	-15.13
03 31 13 00-0016	Place Concrete Continuous Footings (03 31 13 00-0011)	
03 31 13 00-0017	CY Crane And Bucket, Place 3,000 PSI Concrete Continuous Footings.....	300.24
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	48.46
	For >20 To 50, Add	18.17
	For >100 To 200, Deduct	-6.00
	For >200 To 400, Deduct	-12.01
	For >400, Deduct	-18.01



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0018 CY Direct Chute, Place 3,000 PSI Concrete Continuous Footings.....	233.38	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	21.72	
For >20 To 50, Add	8.15	
For >100 To 200, Deduct	-4.67	
For >200 To 400, Deduct	-9.34	
For >400, Deduct	-14.00	
03 31 13 00-0019 CY Concrete Pump, Place 3,000 PSI Concrete Continuous Footings.....	245.72	
Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	20.68	
For >20 To 50, Add	7.76	
For >100 To 200, Deduct	-4.91	
For >200 To 400, Deduct	-9.83	
For >400, Deduct	-14.74	
03 31 13 00-0020 Place Concrete Spread Footings (03 31 13 00-0011)		
03 31 13 00-0021 CY Crane And Bucket, Place 3,000 PSI Concrete Spread Footings.....	383.54	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	81.78	
For >20 To 50, Add	30.67	
For >100 To 200, Deduct	-7.67	
For >200 To 400, Deduct	-15.34	
For >400, Deduct	-23.01	
03 31 13 00-0022 CY Direct Chute, Place 3,000 PSI Concrete Spread Footings.....	270.71	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	36.65	
For >20 To 50, Add	13.74	
For >100 To 200, Deduct	-5.41	
For >200 To 400, Deduct	-10.83	
For >400, Deduct	-16.24	

03	03 Concrete
	03 30 Cast-In-Place Concrete
	03 31 Structural Concrete



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 31 13 00-0023	CY	Concrete Pump, Place 3,000 PSI Concrete Spread Footings.....	281.28
		Note: Excludes pumping equipment.	
		For 2,000 PSI Concrete, Deduct	-10.48
		For 2,500 PSI Concrete, Deduct	-5.24
		For 3,500 PSI Concrete, Add	9.70
		For 3,750 PSI Concrete, Add	13.19
		For 4,000 PSI Concrete, Add	16.68
		For 4,500 PSI Concrete, Add	19.40
		For 5,000 PSI Concrete, Add	22.12
		For 6,000 PSI Concrete, Add	52.38
		For White Cement Concrete, Add	23.28
		For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22
		For High Early Strength, Type 3 ASTM C150, Add	19.40
		For Lightweight Aggregate, ASTM C330, Add	67.90
		For Up To 20, Add	34.91
		For >20 To 50, Add	13.09
		For >100 To 200, Deduct	-5.63
		For >200 To 400, Deduct	-11.25
		For >400, Deduct	-16.88

03 31 13 00-0024 Place Concrete Mat Foundation (03 31 13 00-0011)

03 31 13 00-0025	CY	Crane And Bucket, Place 3,000 PSI Concrete Mat Foundation.....	215.43
		For 2,000 PSI Concrete, Deduct	-9.67
		For 2,500 PSI Concrete, Deduct	-4.84
		For 3,500 PSI Concrete, Add	8.95
		For 3,750 PSI Concrete, Add	12.18
		For 4,000 PSI Concrete, Add	15.40
		For 4,500 PSI Concrete, Add	17.91
		For 5,000 PSI Concrete, Add	20.42
		For 6,000 PSI Concrete, Add	48.35
		For White Cement Concrete, Add	21.49
		For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
		For High Early Strength, Type 3 ASTM C150, Add	17.91
		For Lightweight Aggregate, ASTM C330, Add	62.68
		For Up To 20, Add	14.54
		For >20 To 50, Add	5.45
		For >100 To 200, Deduct	-4.31
		For >200 To 400, Deduct	-8.62
		For >400, Deduct	-12.93

03 31 13 00-0026	CY	Direct Chute, Place 3,000 PSI Concrete Mat Foundation.....	195.37
		For 2,000 PSI Concrete, Deduct	-9.67
		For 2,500 PSI Concrete, Deduct	-4.84
		For 3,500 PSI Concrete, Add	8.95
		For 3,750 PSI Concrete, Add	12.18
		For 4,000 PSI Concrete, Add	15.40
		For 4,500 PSI Concrete, Add	17.91
		For 5,000 PSI Concrete, Add	20.42
		For 6,000 PSI Concrete, Add	48.35
		For White Cement Concrete, Add	21.49
		For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
		For High Early Strength, Type 3 ASTM C150, Add	17.91
		For Lightweight Aggregate, ASTM C330, Add	62.68
		For Up To 20, Add	6.52
		For >20 To 50, Add	2.44
		For >100 To 200, Deduct	-3.91
		For >200 To 400, Deduct	-7.81
		For >400, Deduct	-11.72

03 31 13 00-0027	CY	Concrete Pump, Place 3,000 PSI Concrete Mat Foundation.....	207.59
		Note: Excludes pumping equipment.	
		For 2,000 PSI Concrete, Deduct	-10.48
		For 2,500 PSI Concrete, Deduct	-5.24
		For 3,500 PSI Concrete, Add	9.70
		For 3,750 PSI Concrete, Add	13.19
		For 4,000 PSI Concrete, Add	16.68
		For 4,500 PSI Concrete, Add	19.40
		For 5,000 PSI Concrete, Add	22.12
		For 6,000 PSI Concrete, Add	52.38
		For White Cement Concrete, Add	23.28
		For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22
		For High Early Strength, Type 3 ASTM C150, Add	19.40
		For Lightweight Aggregate, ASTM C330, Add	67.90
		For Up To 20, Add	5.43
		For >20 To 50, Add	2.04
		For >100 To 200, Deduct	-4.15
		For >200 To 400, Deduct	-8.30
		For >400, Deduct	-12.46

03 31 13 00-0028 Place Concrete Grade Beams (03 31 13 00-0011)



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
03 31 13 00-0029	CY Crane And Bucket, Place 3,000 PSI Concrete Grade Beams	276.01
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	38.77
	For >20 To 50, Add	14.54
	For >100 To 200, Deduct	-5.52
	For >200 To 400, Deduct	-11.04
	For >400, Deduct	-16.56
03 31 13 00-0030	CY Direct Chute, Place 3,000 PSI Concrete Grade Beams	222.51
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	17.37
	For >20 To 50, Add	6.51
	For >100 To 200, Deduct	-4.45
	For >200 To 400, Deduct	-8.90
	For >400, Deduct	-13.35
03 31 13 00-0031	CY Concrete Pump, Place 3,000 PSI Concrete Grade Beams	235.39
	Note: Excludes pumping equipment.	
	For 2,000 PSI Concrete, Deduct	-10.48
	For 2,500 PSI Concrete, Deduct	-5.24
	For 3,500 PSI Concrete, Add	9.70
	For 3,750 PSI Concrete, Add	13.19
	For 4,000 PSI Concrete, Add	16.68
	For 4,500 PSI Concrete, Add	19.40
	For 5,000 PSI Concrete, Add	22.12
	For 6,000 PSI Concrete, Add	52.38
	For White Cement Concrete, Add	23.28
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22
	For High Early Strength, Type 3 ASTM C150, Add	19.40
	For Lightweight Aggregate, ASTM C330, Add	67.90
	For Up To 20, Add	16.55
	For >20 To 50, Add	6.21
	For >100 To 200, Deduct	-4.71
	For >200 To 400, Deduct	-9.42
	For >400, Deduct	-14.12
03 31 13 00-0032	Place Concrete Slab On Grade <small>(03 31 13 00-0011)</small>	
03 31 13 00-0033	CY Up To 6", By Crane And Bucket, Place 3,000 PSI Concrete Slab On Grade	278.29
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	39.68
	For >20 To 50, Add	14.88
	For >100 To 200, Deduct	-5.57
	For >200 To 400, Deduct	-11.13
	For >400, Deduct	-16.70

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 31 13 00-0034	CY >6", By Crane And Bucket, Place 3,000 PSI Concrete Slab On Grade	254.35	
	For 2,000 PSI Concrete, Deduct	-9.67	
	For 2,500 PSI Concrete, Deduct	-4.84	
	For 3,500 PSI Concrete, Add	8.95	
	For 3,750 PSI Concrete, Add	12.18	
	For 4,000 PSI Concrete, Add	15.40	
	For 4,500 PSI Concrete, Add	17.91	
	For 5,000 PSI Concrete, Add	20.42	
	For 6,000 PSI Concrete, Add	48.35	
	For White Cement Concrete, Add	21.49	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
	For High Early Strength, Type 3 ASTM C150, Add	17.91	
	For Lightweight Aggregate, ASTM C330, Add	62.68	
	For Up To 20, Add	30.11	
	For >20 To 50, Add	11.29	
	For >100 To 200, Deduct	-5.09	
	For >200 To 400, Deduct	-10.17	
	For >400, Deduct	-15.26	
03 31 13 00-0035	CY Up To 6", By Direct Chute, Place 3,000 PSI Concrete Slab On Grade	223.54	
	For 2,000 PSI Concrete, Deduct	-9.67	
	For 2,500 PSI Concrete, Deduct	-4.84	
	For 3,500 PSI Concrete, Add	8.95	
	For 3,750 PSI Concrete, Add	12.18	
	For 4,000 PSI Concrete, Add	15.40	
	For 4,500 PSI Concrete, Add	17.91	
	For 5,000 PSI Concrete, Add	20.42	
	For 6,000 PSI Concrete, Add	48.35	
	For White Cement Concrete, Add	21.49	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
	For High Early Strength, Type 3 ASTM C150, Add	17.91	
	For Lightweight Aggregate, ASTM C330, Add	62.68	
	For Up To 20, Add	17.78	
	For >20 To 50, Add	6.67	
	For >100 To 200, Deduct	-4.47	
	For >200 To 400, Deduct	-8.94	
	For >400, Deduct	-13.41	
03 31 13 00-0036	CY >6", By Direct Chute, Place 3,000 PSI Concrete Slab On Grade	212.81	
	For 2,000 PSI Concrete, Deduct	-9.67	
	For 2,500 PSI Concrete, Deduct	-4.84	
	For 3,500 PSI Concrete, Add	8.95	
	For 3,750 PSI Concrete, Add	12.18	
	For 4,000 PSI Concrete, Add	15.40	
	For 4,500 PSI Concrete, Add	17.91	
	For 5,000 PSI Concrete, Add	20.42	
	For 6,000 PSI Concrete, Add	48.35	
	For White Cement Concrete, Add	21.49	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
	For High Early Strength, Type 3 ASTM C150, Add	17.91	
	For Lightweight Aggregate, ASTM C330, Add	62.68	
	For Up To 20, Add	13.49	
	For >20 To 50, Add	5.06	
	For >100 To 200, Deduct	-4.26	
	For >200 To 400, Deduct	-8.51	
	For >400, Deduct	-12.77	
03 31 13 00-0037	CY Up To 6", By Concrete Pump, Place 3,000 PSI Concrete Slab On Grade	231.06	
	Note: Excludes pumping equipment.		
	For 2,000 PSI Concrete, Deduct	-10.48	
	For 2,500 PSI Concrete, Deduct	-5.24	
	For 3,500 PSI Concrete, Add	9.70	
	For 3,750 PSI Concrete, Add	13.19	
	For 4,000 PSI Concrete, Add	16.68	
	For 4,500 PSI Concrete, Add	19.40	
	For 5,000 PSI Concrete, Add	22.12	
	For 6,000 PSI Concrete, Add	52.38	
	For White Cement Concrete, Add	23.28	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
	For High Early Strength, Type 3 ASTM C150, Add	19.40	
	For Lightweight Aggregate, ASTM C330, Add	67.90	
	For Up To 20, Add	14.82	
	For >20 To 50, Add	5.56	
	For >100 To 200, Deduct	-4.62	
	For >200 To 400, Deduct	-9.24	
	For >400, Deduct	-13.86	



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0038	CY >6", By Concrete Pump, Place 3,000 PSI Concrete Slab On Grade Note: Excludes pumping equipment.	222.12	
	For 2,000 PSI Concrete, Deduct	-10.48	
	For 2,500 PSI Concrete, Deduct	-5.24	
	For 3,500 PSI Concrete, Add	9.70	
	For 3,750 PSI Concrete, Add	13.19	
	For 4,000 PSI Concrete, Add	16.68	
	For 4,500 PSI Concrete, Add	19.40	
	For 5,000 PSI Concrete, Add	22.12	
	For 6,000 PSI Concrete, Add	52.38	
	For White Cement Concrete, Add	23.28	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
	For High Early Strength, Type 3 ASTM C150, Add	19.40	
	For Lightweight Aggregate, ASTM C330, Add	67.90	
	For Up To 20, Add	11.24	
	For >20 To 50, Add	4.22	
	For >100 To 200, Deduct	-4.44	
	For >200 To 400, Deduct	-8.88	
	For >400, Deduct	-13.33	
03 31 13 00-0039	Place Concrete Stairs (03 31 13 00-0011)		
03 31 13 00-0040	CY Crane And Bucket, Place 3,000 PSI On Grade Concrete Stairs.....	625.43	
	For 2,000 PSI Concrete, Deduct	-9.67	
	For 2,500 PSI Concrete, Deduct	-4.84	
	For 3,500 PSI Concrete, Add	8.95	
	For 3,750 PSI Concrete, Add	12.18	
	For 4,000 PSI Concrete, Add	15.40	
	For 4,500 PSI Concrete, Add	17.91	
	For 5,000 PSI Concrete, Add	20.42	
	For 6,000 PSI Concrete, Add	48.35	
	For White Cement Concrete, Add	21.49	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
	For High Early Strength, Type 3 ASTM C150, Add	17.91	
	For Lightweight Aggregate, ASTM C330, Add	62.68	
	For Up To 20, Add	178.54	
	For >20 To 50, Add	66.95	
	For >100 To 200, Deduct	-12.51	
	For >200 To 400, Deduct	-25.02	
	For >400, Deduct	-37.53	
03 31 13 00-0041	CY Direct Chute, Place 3,000 PSI On Grade Concrete Stairs.....	379.16	
	For 2,000 PSI Concrete, Deduct	-9.67	
	For 2,500 PSI Concrete, Deduct	-4.84	
	For 3,500 PSI Concrete, Add	8.95	
	For 3,750 PSI Concrete, Add	12.18	
	For 4,000 PSI Concrete, Add	15.40	
	For 4,500 PSI Concrete, Add	17.91	
	For 5,000 PSI Concrete, Add	20.42	
	For 6,000 PSI Concrete, Add	48.35	
	For White Cement Concrete, Add	21.49	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
	For High Early Strength, Type 3 ASTM C150, Add	17.91	
	For Lightweight Aggregate, ASTM C330, Add	62.68	
	For Up To 20, Add	80.03	
	For >20 To 50, Add	30.01	
	For >100 To 200, Deduct	-7.58	
	For >200 To 400, Deduct	-15.17	
	For >400, Deduct	-22.75	
03 31 13 00-0042	CY Concrete Pump, Place 3,000 PSI On Grade Concrete Stairs.....	360.75	
	Note: Excludes pumping equipment.		
	For 2,000 PSI Concrete, Deduct	-10.48	
	For 2,500 PSI Concrete, Deduct	-5.24	
	For 3,500 PSI Concrete, Add	9.70	
	For 3,750 PSI Concrete, Add	13.19	
	For 4,000 PSI Concrete, Add	16.68	
	For 4,500 PSI Concrete, Add	19.40	
	For 5,000 PSI Concrete, Add	22.12	
	For 6,000 PSI Concrete, Add	52.38	
	For White Cement Concrete, Add	23.28	
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
	For High Early Strength, Type 3 ASTM C150, Add	19.40	
	For Lightweight Aggregate, ASTM C330, Add	67.90	
	For Up To 20, Add	66.70	
	For >20 To 50, Add	25.01	
	For >100 To 200, Deduct	-7.22	
	For >200 To 400, Deduct	-14.43	
	For >400, Deduct	-21.65	
03 31 13 00-0043	Place Concrete Superstructure By Method Indicated (03 31 13 00-0010)		
	See CSI section 03 37 16 00-0001 for concrete pump truck.		
03 31 13 00-0044	Place Elevated Concrete Beams (03 31 13 00-0043)		

03 Concrete**03 30 Cast-In-Place Concrete****03 31 Structural Concrete**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 31 13 00-0045	CY Crane And Bucket, Place 3,000 PSI Elevated Concrete Beams.....	421.40	
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67	
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84	
	<i>For 3,500 PSI Concrete, Add</i>	8.95	
	<i>For 3,750 PSI Concrete, Add</i>	12.18	
	<i>For 4,000 PSI Concrete, Add</i>	15.40	
	<i>For 4,500 PSI Concrete, Add</i>	17.91	
	<i>For 5,000 PSI Concrete, Add</i>	20.42	
	<i>For 6,000 PSI Concrete, Add</i>	48.35	
	<i>For White Cement Concrete, Add</i>	21.49	
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28	
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91	
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68	
	<i>For Up To 20, Add</i>	96.93	
	<i>For >20 To 50, Add</i>	36.35	
	<i>For >100 To 200, Deduct</i>	-8.43	
	<i>For >200 To 400, Deduct</i>	-16.86	
	<i>For >400, Deduct</i>	-25.28	
03 31 13 00-0046	CY Concrete Pump, Place 3,000 PSI Elevated Concrete Beams.....	297.44	
	Note: Excludes pumping equipment.		
	<i>For 2,000 PSI Concrete, Deduct</i>	-10.48	
	<i>For 2,500 PSI Concrete, Deduct</i>	-5.24	
	<i>For 3,500 PSI Concrete, Add</i>	9.70	
	<i>For 3,750 PSI Concrete, Add</i>	13.19	
	<i>For 4,000 PSI Concrete, Add</i>	16.68	
	<i>For 4,500 PSI Concrete, Add</i>	19.40	
	<i>For 5,000 PSI Concrete, Add</i>	22.12	
	<i>For 6,000 PSI Concrete, Add</i>	52.38	
	<i>For White Cement Concrete, Add</i>	23.28	
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	25.22	
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	19.40	
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	67.90	
	<i>For Up To 20, Add</i>	41.37	
	<i>For >20 To 50, Add</i>	15.51	
	<i>For >100 To 200, Deduct</i>	-5.95	
	<i>For >200 To 400, Deduct</i>	-11.90	
	<i>For >400, Deduct</i>	-17.85	
03 31 13 00-0047	Place Elevated Concrete Slab <small>(03 31 13 00-0043)</small>	293.17	
03 31 13 00-0048	CY Up To 6", By Crane And Bucket, Place 3,000 PSI Elevated Concrete Slab		
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67	
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84	
	<i>For 3,500 PSI Concrete, Add</i>	8.95	
	<i>For 3,750 PSI Concrete, Add</i>	12.18	
	<i>For 4,000 PSI Concrete, Add</i>	15.40	
	<i>For 4,500 PSI Concrete, Add</i>	17.91	
	<i>For 5,000 PSI Concrete, Add</i>	20.42	
	<i>For 6,000 PSI Concrete, Add</i>	48.35	
	<i>For White Cement Concrete, Add</i>	21.49	
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28	
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91	
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68	
	<i>For Up To 20, Add</i>	45.64	
	<i>For >20 To 50, Add</i>	17.11	
	<i>For >100 To 200, Deduct</i>	-5.86	
	<i>For >200 To 400, Deduct</i>	-11.73	
	<i>For >400, Deduct</i>	-17.59	
03 31 13 00-0049	CY >6", By Crane And Bucket, Place 3,000 PSI Elevated Concrete Slab	265.64	
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67	
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84	
	<i>For 3,500 PSI Concrete, Add</i>	8.95	
	<i>For 3,750 PSI Concrete, Add</i>	12.18	
	<i>For 4,000 PSI Concrete, Add</i>	15.40	
	<i>For 4,500 PSI Concrete, Add</i>	17.91	
	<i>For 5,000 PSI Concrete, Add</i>	20.42	
	<i>For 6,000 PSI Concrete, Add</i>	48.35	
	<i>For White Cement Concrete, Add</i>	21.49	
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28	
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91	
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68	
	<i>For Up To 20, Add</i>	34.62	
	<i>For >20 To 50, Add</i>	12.98	
	<i>For >100 To 200, Deduct</i>	-5.31	
	<i>For >200 To 400, Deduct</i>	-10.63	
	<i>For >400, Deduct</i>	-15.94	



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0050 CY Up To 6", By Concrete Pump, Place 3,000 PSI Elevated Concrete Slab.....	242.71	
Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	19.48	
For >20 To 50, Add	7.31	
For >100 To 200, Deduct	-4.85	
For >200 To 400, Deduct	-9.71	
For >400, Deduct	-14.56	
03 31 13 00-0051 CY >6", By Concrete Pump, Place 3,000 PSI Elevated Concrete Slab	230.95	
Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	14.78	
For >20 To 50, Add	5.54	
For >100 To 200, Deduct	-4.62	
For >200 To 400, Deduct	-9.24	
For >400, Deduct	-13.86	
03 31 13 00-0052 Place Concrete Columns <small>(03 31 13 00-0043)</small>		
03 31 13 00-0053 CY 12" Square Or Round, By Crane And Bucket, Place 3,000 PSI Concrete Columns	440.79	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	104.68	
For >20 To 50, Add	39.26	
For >100 To 200, Deduct	-8.82	
For >200 To 400, Deduct	-17.63	
For >400, Deduct	-26.45	
03 31 13 00-0054 CY 18" Square Or Round, By Crane And Bucket, Place 3,000 PSI Concrete Columns	369.31	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	76.09	
For >20 To 50, Add	28.53	
For >100 To 200, Deduct	-7.39	
For >200 To 400, Deduct	-14.77	
For >400, Deduct	-22.16	

03 Concrete**03 30 Cast-In-Place Concrete****03 31 Structural Concrete**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 31 13 00-0055	CY 24" Square Or Round, By Crane And Bucket, Place 3,000 PSI Concrete Columns	318.17
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	55.64
	For >20 To 50, Add	20.86
	For >100 To 200, Deduct	-6.36
	For >200 To 400, Deduct	-12.73
	For >400, Deduct	-19.09
03 31 13 00-0056	CY 36" Square Or Round, By Crane And Bucket, Place 3,000 PSI Concrete Columns	295.40
	For 2,000 PSI Concrete, Deduct	-9.67
	For 2,500 PSI Concrete, Deduct	-4.84
	For 3,500 PSI Concrete, Add	8.95
	For 3,750 PSI Concrete, Add	12.18
	For 4,000 PSI Concrete, Add	15.40
	For 4,500 PSI Concrete, Add	17.91
	For 5,000 PSI Concrete, Add	20.42
	For 6,000 PSI Concrete, Add	48.35
	For White Cement Concrete, Add	21.49
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28
	For High Early Strength, Type 3 ASTM C150, Add	17.91
	For Lightweight Aggregate, ASTM C330, Add	62.68
	For Up To 20, Add	46.53
	For >20 To 50, Add	17.45
	For >100 To 200, Deduct	-5.91
	For >200 To 400, Deduct	-11.82
	For >400, Deduct	-17.72
03 31 13 00-0057	CY 12" Square Or Round, By Concrete Pump, Place 3,000 PSI Concrete Columns	305.72
	Note: Excludes pumping equipment.	
	For 2,000 PSI Concrete, Deduct	-10.48
	For 2,500 PSI Concrete, Deduct	-5.24
	For 3,500 PSI Concrete, Add	9.70
	For 3,750 PSI Concrete, Add	13.19
	For 4,000 PSI Concrete, Add	16.68
	For 4,500 PSI Concrete, Add	19.40
	For 5,000 PSI Concrete, Add	22.12
	For 6,000 PSI Concrete, Add	52.38
	For White Cement Concrete, Add	23.28
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22
	For High Early Strength, Type 3 ASTM C150, Add	19.40
	For Lightweight Aggregate, ASTM C330, Add	67.90
	For Up To 20, Add	44.68
	For >20 To 50, Add	16.76
	For >100 To 200, Deduct	-6.11
	For >200 To 400, Deduct	-12.23
	For >400, Deduct	-18.34
03 31 13 00-0058	CY 18" Square Or Round, By Concrete Pump, Place 3,000 PSI Concrete Columns	275.21
	Note: Excludes pumping equipment.	
	For 2,000 PSI Concrete, Deduct	-10.48
	For 2,500 PSI Concrete, Deduct	-5.24
	For 3,500 PSI Concrete, Add	9.70
	For 3,750 PSI Concrete, Add	13.19
	For 4,000 PSI Concrete, Add	16.68
	For 4,500 PSI Concrete, Add	19.40
	For 5,000 PSI Concrete, Add	22.12
	For 6,000 PSI Concrete, Add	52.38
	For White Cement Concrete, Add	23.28
	For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22
	For High Early Strength, Type 3 ASTM C150, Add	19.40
	For Lightweight Aggregate, ASTM C330, Add	67.90
	For Up To 20, Add	32.48
	For >20 To 50, Add	12.18
	For >100 To 200, Deduct	-5.50
	For >200 To 400, Deduct	-11.01
	For >400, Deduct	-16.51



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0059 CY 24" Square Or Round, By Concrete Pump, Place 3,000 PSI Concrete Columns	253.38	
Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	23.75	
For >20 To 50, Add	8.91	
For >100 To 200, Deduct	-5.07	
For >200 To 400, Deduct	-10.14	
For >400, Deduct	-15.20	
03 31 13 00-0060 CY 36" Square Or Round, By Concrete Pump, Place 3,000 PSI Concrete Columns	243.65	
Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	19.86	
For >20 To 50, Add	7.45	
For >100 To 200, Deduct	-4.87	
For >200 To 400, Deduct	-9.75	
For >400, Deduct	-14.62	
03 31 13 00-0061 Place Concrete Walls (03 31 13 00-0043)		
03 31 13 00-0062 CY Up To 8" Thick, By Crane And Bucket, Place 3,000 PSI Concrete Walls	424.43	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	98.14	
For >20 To 50, Add	36.80	
For >100 To 200, Deduct	-8.49	
For >200 To 400, Deduct	-16.98	
For >400, Deduct	-25.47	
03 31 13 00-0063 CY 12" Thick, By Crane And Bucket, Place 3,000 PSI Concrete Walls	404.08	
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	90.00	
For >20 To 50, Add	33.75	
For >100 To 200, Deduct	-8.08	
For >200 To 400, Deduct	-16.16	
For >400, Deduct	-24.24	

03 Concrete**03 30 Cast-In-Place Concrete****03 31 Structural Concrete**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 31 13 00-0064	CY 15" Thick, By Crane And Bucket, Place 3,000 PSI Concrete Walls	350.83
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	68.70
	<i>For >20 To 50, Add</i>	25.76
	<i>For >100 To 200, Deduct</i>	-7.02
	<i>For >200 To 400, Deduct</i>	-14.03
	<i>For >400, Deduct</i>	-21.05
03 31 13 00-0065	CY Up To 8" Thick, By Direct Chute, Place 3,000 PSI Concrete Walls	289.03
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	43.98
	<i>For >20 To 50, Add</i>	16.49
	<i>For >100 To 200, Deduct</i>	-5.78
	<i>For >200 To 400, Deduct</i>	-11.56
	<i>For >400, Deduct</i>	-17.34
03 31 13 00-0066	CY 12" Thick, By Direct Chute, Place 3,000 PSI Concrete Walls	267.05
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	35.19
	<i>For >20 To 50, Add</i>	13.20
	<i>For >100 To 200, Deduct</i>	-5.34
	<i>For >200 To 400, Deduct</i>	-10.68
	<i>For >400, Deduct</i>	-16.02
03 31 13 00-0067	CY 15" Thick, By Direct Chute, Place 3,000 PSI Concrete Walls	256.06
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	30.79
	<i>For >20 To 50, Add</i>	11.55
	<i>For >100 To 200, Deduct</i>	-5.12
	<i>For >200 To 400, Deduct</i>	-10.24
	<i>For >400, Deduct</i>	-15.36



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0068 CY Up To 8" Thick, By Concrete Pump, Place 3,000 PSI Concrete Walls .....298.73 Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	41.89	
For >20 To 50, Add	15.71	
For >100 To 200, Deduct	-5.97	
For >200 To 400, Deduct	-11.95	
For >400, Deduct	-17.92	
03 31 13 00-0069 CY 12" Thick, By Concrete Pump, Place 3,000 PSI Concrete Walls .....277.79 Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	33.51	
For >20 To 50, Add	12.57	
For >100 To 200, Deduct	-5.56	
For >200 To 400, Deduct	-11.11	
For >400, Deduct	-16.67	
03 31 13 00-0070 CY 15" Thick, By Concrete Pump, Place 3,000 PSI Concrete Walls .....267.32 Note: Excludes pumping equipment.		
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	29.32	
For >20 To 50, Add	11.00	
For >100 To 200, Deduct	-5.35	
For >200 To 400, Deduct	-10.69	
For >400, Deduct	-16.04	
03 31 13 00-0071 Place Elevated Concrete Stairs (03 31 13 00-0043)		
03 31 13 00-0072 CY Crane And Bucket, Place 3,000 PSI Elevated Concrete Stairs .....675.09		
For 2,000 PSI Concrete, Deduct	-9.67	
For 2,500 PSI Concrete, Deduct	-4.84	
For 3,500 PSI Concrete, Add	8.95	
For 3,750 PSI Concrete, Add	12.18	
For 4,000 PSI Concrete, Add	15.40	
For 4,500 PSI Concrete, Add	17.91	
For 5,000 PSI Concrete, Add	20.42	
For 6,000 PSI Concrete, Add	48.35	
For White Cement Concrete, Add	21.49	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	23.28	
For High Early Strength, Type 3 ASTM C150, Add	17.91	
For Lightweight Aggregate, ASTM C330, Add	62.68	
For Up To 20, Add	198.40	
For >20 To 50, Add	74.40	
For >100 To 200, Deduct	-13.50	
For >200 To 400, Deduct	-27.00	
For >400, Deduct	-40.51	

03 Concrete**03 30 Cast-In-Place Concrete****03 31 Structural Concrete**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 31 13 00-0073	CY Direct Chute, Place 3,000 PSI Elevated Concrete Stairs.....	401.37
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	88.92
	<i>For >20 To 50, Add</i>	33.34
	<i>For >100 To 200, Deduct</i>	-8.03
	<i>For >200 To 400, Deduct</i>	-16.05
	<i>For >400, Deduct</i>	-24.08
03 31 13 00-0074	CY Concrete Pump, Place 3,000 PSI Elevated Concrete Stairs.....	379.26
	Note: Excludes pumping equipment.	
	<i>For 2,000 PSI Concrete, Deduct</i>	-10.48
	<i>For 2,500 PSI Concrete, Deduct</i>	-5.24
	<i>For 3,500 PSI Concrete, Add</i>	9.70
	<i>For 3,750 PSI Concrete, Add</i>	13.19
	<i>For 4,000 PSI Concrete, Add</i>	16.68
	<i>For 4,500 PSI Concrete, Add</i>	19.40
	<i>For 5,000 PSI Concrete, Add</i>	22.12
	<i>For 6,000 PSI Concrete, Add</i>	52.38
	<i>For White Cement Concrete, Add</i>	23.28
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	25.22
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	19.40
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	67.90
	<i>For Up To 20, Add</i>	74.10
	<i>For >20 To 50, Add</i>	27.79
	<i>For >100 To 200, Deduct</i>	-7.59
	<i>For >200 To 400, Deduct</i>	-15.17
	<i>For >400, Deduct</i>	-22.76
03 31 13 00-0075	Place Concrete Coping <small>(03 31 13 00-0043)</small>	692.23
03 31 13 00-0076	CY Crane And Bucket, Place 3,000 PSI Concrete Coping.....	692.23
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	205.26
	<i>For >20 To 50, Add</i>	76.97
	<i>For >100 To 200, Deduct</i>	-13.84
	<i>For >200 To 400, Deduct</i>	-27.69
	<i>For >400, Deduct</i>	-41.53
03 31 13 00-0077	CY Direct Chute, Place 3,000 PSI Concrete Coping.....	399.88
	<i>For 2,000 PSI Concrete, Deduct</i>	-9.67
	<i>For 2,500 PSI Concrete, Deduct</i>	-4.84
	<i>For 3,500 PSI Concrete, Add</i>	8.95
	<i>For 3,750 PSI Concrete, Add</i>	12.18
	<i>For 4,000 PSI Concrete, Add</i>	15.40
	<i>For 4,500 PSI Concrete, Add</i>	17.91
	<i>For 5,000 PSI Concrete, Add</i>	20.42
	<i>For 6,000 PSI Concrete, Add</i>	48.35
	<i>For White Cement Concrete, Add</i>	21.49
	<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	23.28
	<i>For High Early Strength, Type 3 ASTM C150, Add</i>	17.91
	<i>For Lightweight Aggregate, ASTM C330, Add</i>	62.68
	<i>For Up To 20, Add</i>	88.32
	<i>For >20 To 50, Add</i>	33.12
	<i>For >100 To 200, Deduct</i>	-8.00
	<i>For >200 To 400, Deduct</i>	-16.00
	<i>For >400, Deduct</i>	-23.99



Concrete	03	03
Cast-In-Place Concrete	03 30	
Structural Concrete	03 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 31 13 00-0078 CY Concrete Pump, Place 3,000 PSI Concrete Coping Note: Excludes pumping equipment.	528.45	
For 2,000 PSI Concrete, Deduct	-10.48	
For 2,500 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Add	9.70	
For 3,750 PSI Concrete, Add	13.19	
For 4,000 PSI Concrete, Add	16.68	
For 4,500 PSI Concrete, Add	19.40	
For 5,000 PSI Concrete, Add	22.12	
For 6,000 PSI Concrete, Add	52.38	
For White Cement Concrete, Add	23.28	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	25.22	
For High Early Strength, Type 3 ASTM C150, Add	19.40	
For Lightweight Aggregate, ASTM C330, Add	67.90	
For Up To 20, Add	133.78	
For >20 To 50, Add	50.17	
For >100 To 200, Deduct	-10.57	
For >200 To 400, Deduct	-21.14	
For >400, Deduct	-31.71	
03 31 13 00-0079 Concrete Carts (03 31 13 00-0010) Note: Used to place concrete were necessary.		
03 31 13 00-0080 CY 50' Haul, Non-Motorized, Concrete Buggy.....	27.22	
03 31 13 00-0081 CY 150' Haul, Non-Motorized, Concrete Buggy.....	36.45	
03 31 13 00-0082 CY 250' Haul, Non-Motorized, Concrete Buggy.....	48.61	
03 31 13 00-0083 CY 50' Haul, Motorized, Concrete Buggy.....	12.18	
03 31 13 00-0084 CY 150' Haul, Motorized, Concrete Buggy.....	16.33	
03 31 13 00-0085 CY 250' Haul, Motorized, Concrete Buggy.....	21.77	
03 31 13 00-0086 Delivery Fee For Small Concrete Purchases (Short Load) (03 31 13)		
03 31 13 00-0087 CY Delivery Fee For Small Concrete Purchases (Short Load) Per CY For Each CY Less Than 9 CY..... Note: The task quantity is 9 minus the number of CY's delivered. For example, the delivery fee for 2CY's is: (9-2) = 7.	26.22	
03 31 13 00-0088 Equipment Pads (03 31 13)		
03 31 13 00-0089 Small Concrete Equipment Housekeeping Pad Assemblies (03 31 13 00-0088) Note: Includes forms, hand mix concrete, finish, curing and reinforcing. For up to 50 SF per pad and up to 5 pads per project. See CSI section 03 31 13 00-0002 for >50 SF concrete pads.		
03 31 13 00-0090 SF 4" Equipment Pad With Welded Wire Reinforcement Assembly..... For >5 To 20 Pads, Deduct For >20 To 50 Pads, Deduct For >50 Pads, Deduct	19.10 -2.35 -4.31 -6.26	
03 31 13 00-0091 SF 4" Equipment Pad With Rebar Assembly..... For >5 To 20 Pads, Deduct For >20 To 50 Pads, Deduct For >50 Pads, Deduct	23.85 -2.71 -4.97 -7.23	
03 31 13 00-0092 SF 6" Equipment Pad With Rebar Assembly..... For >5 To 20 Pads, Deduct For >20 To 50 Pads, Deduct For >50 Pads, Deduct	29.99 -3.41 -6.25 -9.09	
03 31 13 00-0093 SF 8" Equipment Pad With Rebar Assembly..... For >5 To 20 Pads, Deduct For >20 To 50 Pads, Deduct For >50 Pads, Deduct	37.62 -4.33 -7.94 -11.54	
03 31 16 Lightweight Structural Concrete (03 31)		
03 31 16 00-0001 Low Density Cellular / Foam Concrete Fill (03 31 16)		
03 31 16 00-0002 CY Lightweight Low Density Pervious Cellular/Foam Concrete, 100 To 120 PCF Density Range.....	310.82	
03 35 Concrete Finishing (03 30)		
03 35 13 High-Tolerance Concrete Floor Finishing (03 35)		
03 35 13 00-0001 Floor Finishes (03 35 13) Note: Task is for final finish type and includes all required prior finishes.		
03 35 13 00-0002 SF Screed, Concrete Floor Finish..... For Up To 100, Add For >100 To 250, Add For >250 To 500, Add For >5,000 To 10,000, Deduct For >10,000, Deduct	1.03 2.06 0.52 0.26 -0.05 -0.10	
03 35 13 00-0003 SF Darby, Concrete Floor Finish..... For Up To 100, Add For >100 To 250, Add For >250 To 500, Add For >5,000 To 10,000, Deduct For >10,000, Deduct	1.23 2.46 0.62 0.31 -0.06 -0.12	

03	03 Concrete
	03 30 Cast-In-Place Concrete
	03 35 Concrete Finishing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 35 13 00-0004	SF Broom, Concrete Floor Finish.....	1.36	
	<i>For Up To 100, Add</i>	2.72	
	<i>For >100 To 250, Add</i>	0.68	
	<i>For >250 To 500, Add</i>	0.34	
	<i>For >5,000 To 10,000, Deduct</i>	-0.07	
	<i>For >10,000, Deduct</i>	-0.14	
03 35 13 00-0005	SF Final Float, Concrete Floor Finish.....	1.59	
	<i>For Up To 100, Add</i>	3.18	
	<i>For >100 To 250, Add</i>	0.80	
	<i>For >250 To 500, Add</i>	0.40	
	<i>For >5,000 To 10,000, Deduct</i>	-0.08	
	<i>For >10,000, Deduct</i>	-0.16	
03 35 13 00-0006	SF Steel Trowel, Concrete Floor Finish.....	1.79	
	<i>For Up To 100, Add</i>	3.58	
	<i>For >100 To 250, Add</i>	0.90	
	<i>For >250 To 500, Add</i>	0.45	
	<i>For >5,000 To 10,000, Deduct</i>	-0.09	
	<i>For >10,000, Deduct</i>	-0.18	
03 35 13 00-0007	SF Concrete Floor Finishes, Machine.....	1.59	
	<i>For Up To 100, Add</i>	3.18	
	<i>For >100 To 250, Add</i>	0.80	
	<i>For >250 To 500, Add</i>	0.40	
	<i>For >5,000 To 10,000, Deduct</i>	-0.08	
	<i>For >10,000, Deduct</i>	-0.16	

03 35 16 Heavy-Duty Concrete Floor Finishing (03 35)

03 35 16 00-0001	Shake On Floor Hardeners (03 35 16)		
03 35 16 00-0002	SF 0.3 LB/SF, Metallic, Shake On Floor Hardener.....	1.29	
03 35 16 00-0003	SF 0.65 LB/SF, Metallic, Shake On Floor Hardener.....	1.99	
03 35 16 00-0004	SF 0.3 LB/SF, Non-Metallic, Shake On Floor Hardener.....	1.22	
03 35 16 00-0005	SF 0.65 LB/SF, Non-Metallic, Shake On Floor Hardener.....	1.48	

03 35 19 Colored Concrete Finishing (03 35)

03 35 19 00-0001	Concrete Surface Treatments (03 35 19)		
03 35 19 00-0002	SF Acrylic Latex Bonding Agent.....	0.58	
03 35 19 00-0003	SF Epoxy Resin Bonding Agent.....	3.39	
03 35 19 00-0004	SF Clear Acrylic Sealer, Hardener And Dustproof.....	0.40	
03 35 19 00-0005	SF Colored Acrylic Sealer, Hardener And Dustproof.....	0.42	

03 35 23 Exposed Aggregate Concrete Finishing (03 35)

03 35 23 00-0001	Exposed Aggregate, Concrete Finish (03 35 23)		
03 35 23 00-0002	SF Exposed Aggregate, Concrete Floor Finish.....	3.89	

03 35 26 Grooved Concrete Surface Finishing (03 35)

03 35 26 00-0001	Ramp, Grooved Concrete Surface Finishing (03 35 26)		
03 35 26 00-0002	SF Ramp, Grooved Concrete Surface Finishing.....	4.71	

03 35 29 Tooled Concrete Finishing (03 35)

03 35 29 00-0001	Solid Board Concrete Finish (03 35 29)		
03 35 29 00-0002	SF Solid Board Concrete, Non-Uniform Finish, 1 Use, Add To Formwork.....	16.15	

03 35 33 Stamped Concrete Finishing (03 35)

03 35 33 00-0001	Stamped Concrete Finishes (03 35 33)		
03 35 33 00-0002	SF Up To 2,500 SF Stamped Concrete Finish.....	4.13	
03 35 33 00-0003	SF >2,500 To 10,000 SF Stamped Concrete Finish.....	3.75	
03 35 33 00-0004	SF >10,000 SF Stamped Concrete Finish.....	3.58	

03 35 43 Polished Concrete Finishing (03 35)

03 35 43 00-0001	Concrete Floor Polishing System (03 35 43)		
	Note: The floor polishing system below may consist of one or multiple applications of each task/step below depending on existing conditions and desired results.		
03 35 43 00-0002	SF Mechanically Grind Concrete Floor With 40 Grit Metal Bonded Diamond Wheels.....	1.95	
	<i>For Up To 500, Add</i>	3.71	
	<i>For >500 To 1,000, Add</i>	3.44	
	<i>For >1,000 To 2,500, Add</i>	2.27	
	<i>For >2,500 To 4,000, Add</i>	1.18	
	<i>For >8,000 To 15,000, Deduct</i>	-0.46	
	<i>For >15,000 To 25,000, Deduct</i>	-0.58	
	<i>For >25,000, Deduct</i>	-0.82	



Concrete	03	03
Cast-In-Place Concrete	03 30	
Concrete Finishing	03 35	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 35 43 00-0003 SF Mechanically Grind Concrete Floor With 80 Grit Metal Bonded Diamond Wheels.....	1.56	
For Up To 500, Add	2.95	
For >500 To 1,000, Add	2.74	
For >1,000 To 2,500, Add	1.81	
For >2,500 To 4,000, Add	0.94	
For >8,000 To 15,000, Deduct	-0.36	
For >15,000 To 25,000, Deduct	-0.46	
For >25,000, Deduct	-0.65	
03 35 43 00-0004 SF Mechanically Grind Concrete Floor With 100 Grit Resin Bonded Diamond Wheels	1.31	
For Up To 500, Add	2.46	
For >500 To 1,000, Add	2.29	
For >1,000 To 2,500, Add	1.51	
For >2,500 To 4,000, Add	0.79	
For >8,000 To 15,000, Deduct	-0.30	
For >15,000 To 25,000, Deduct	-0.39	
For >25,000, Deduct	-0.55	
03 35 43 00-0005 SF Mechanically Grind Concrete Floor With 150 Grit Metal Bonded Diamond Wheels.....	1.21	
For Up To 500, Add	2.27	
For >500 To 1,000, Add	2.11	
For >1,000 To 2,500, Add	1.39	
For >2,500 To 4,000, Add	0.73	
For >8,000 To 15,000, Deduct	-0.28	
For >15,000 To 25,000, Deduct	-0.36	
For >25,000, Deduct	-0.50	
03 35 43 00-0006 SF Mechanically Grind Concrete Floor With 200 Grit Resin Bonded Diamond Wheels	1.12	
For Up To 500, Add	2.10	
For >500 To 1,000, Add	1.94	
For >1,000 To 2,500, Add	1.29	
For >2,500 To 4,000, Add	0.67	
For >8,000 To 15,000, Deduct	-0.26	
For >15,000 To 25,000, Deduct	-0.33	
For >25,000, Deduct	-0.46	
03 35 43 00-0007 SF Mechanically Grind Concrete Floor With 400 Grit Resin Bonded Diamond Wheels	1.12	
For Up To 500, Add	2.10	
For >500 To 1,000, Add	1.94	
For >1,000 To 2,500, Add	1.29	
For >2,500 To 4,000, Add	0.67	
For >8,000 To 15,000, Deduct	-0.26	
For >15,000 To 25,000, Deduct	-0.33	
For >25,000, Deduct	-0.46	
03 35 43 00-0008 SF Mechanically Grind Concrete Floor With 800 Grit Resin Bonded Diamond Wheels	1.12	
For Up To 500, Add	2.10	
For >500 To 1,000, Add	1.94	
For >1,000 To 2,500, Add	1.29	
For >2,500 To 4,000, Add	0.67	
For >8,000 To 15,000, Deduct	-0.26	
For >15,000 To 25,000, Deduct	-0.33	
For >25,000, Deduct	-0.46	
03 35 43 00-0009 SF Mechanically Grind Concrete Floor With 1,500 Grit Resin Bonded Diamond Wheels	1.12	
For Up To 500, Add	2.10	
For >500 To 1,000, Add	1.94	
For >1,000 To 2,500, Add	1.29	
For >2,500 To 4,000, Add	0.67	
For >8,000 To 15,000, Deduct	-0.26	
For >15,000 To 25,000, Deduct	-0.33	
For >25,000, Deduct	-0.46	
03 35 43 00-0010 SF High Speed Burnish Concrete Floor With Diamond Pads.....	0.28	
For Up To 500, Add	0.47	
For >500 To 1,000, Add	0.43	
For >1,000 To 2,500, Add	0.29	
For >2,500 To 4,000, Add	0.15	
For >8,000 To 15,000, Deduct	-0.06	
For >15,000 To 25,000, Deduct	-0.07	
For >25,000, Deduct	-0.10	
03 35 43 00-0011 SF Apply 1 Coat Of Concrete Densifier For Concrete Floor Polishing	0.58	
For Up To 500, Add	0.56	
For >500 To 1,000, Add	0.52	
For >1,000 To 2,500, Add	0.35	
For >2,500 To 4,000, Add	0.18	
For >8,000 To 15,000, Deduct	-0.07	
For >15,000 To 25,000, Deduct	-0.09	
For >25,000, Deduct	-0.12	
03 35 43 00-0012 SF Apply 2 Coats Of Concrete Densifier With Stain Protector For Concrete Floor Polishing.....	1.02	
For Up To 500, Add	0.83	
For >500 To 1,000, Add	0.77	
For >1,000 To 2,500, Add	0.51	
For >2,500 To 4,000, Add	0.27	
For >8,000 To 15,000, Deduct	-0.10	
For >15,000 To 25,000, Deduct	-0.13	
For >25,000, Deduct	-0.18	

03	03 Concrete
	03 30 Cast-In-Place Concrete
	03 35 Concrete Finishing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 35 43 00-0013 SF Concrete Floor Polishing Final Clean Up	0.15	
For Up To 500, Add	0.29	
For >500 To 1,000, Add	0.27	
For >1,000 To 2,500, Add	0.18	
For >2,500 To 4,000, Add	0.09	
For >8,000 To 15,000, Deduct	-0.04	
For >15,000 To 25,000, Deduct	-0.05	
For >25,000, Deduct	-0.06	
03 35 63 Slip-Resistant Floor Finishing (03 35)		
03 35 63 00-0001 Slip-Resistant Floor Finishing (03 35 63)		
03 35 63 00-0002 SF Aluminum Oxide Abrasive Floor Finish, 0.25 LB/SF	1.66	
For Up To 100, Add	1.98	
For >100 To 250, Add	0.50	
For >250 To 500, Add	0.25	
For >5,000 To 10,000, Deduct	-0.05	
For >10,000, Deduct	-0.10	
03 35 63 00-0003 SF Silicone Carbide Abrasive Floor Finish 0.25 LB/SF	1.34	
For Up To 100, Add	1.98	
For >100 To 250, Add	0.50	
For >250 To 500, Add	0.25	
For >5,000 To 10,000, Deduct	-0.05	
For >10,000, Deduct	-0.10	
03 35 66 Acid Etch Floor Finishing (03 35)		
03 35 66 00-0001 Acid Etch Floor (03 35 66)		
03 35 66 00-0002 SF Concrete Floor Finishes, Etch With Acid And Rinse	1.04	
For Up To 100, Add	0.94	
For >100 To 250, Add	0.24	
For >250 To 500, Add	0.12	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000, Deduct	-0.05	
03 35 83 Concrete Wall Finishing (03 35)		
03 35 83 00-0001 Wall Finishes (03 35 83)		
03 35 83 00-0002 SF Burlap Rub With Grout, New Concrete Wall Finishes	1.82	
For Up To 100, Add	3.44	
For >100 To 250, Add	0.86	
For >250 To 500, Add	0.43	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000, Deduct	-0.17	
03 35 83 00-0003 SF 1/16" Float Finish, New Concrete Wall Finishes	2.74	
For Up To 100, Add	5.16	
For >100 To 250, Add	1.29	
For >250 To 500, Add	0.65	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000, Deduct	-0.26	
03 35 83 00-0004 SF Etch With Acid And Rinse, New Concrete Wall Finishes	1.14	
For Up To 100, Add	1.14	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.14	
For >5,000 To 10,000, Deduct	-0.03	
For >10,000, Deduct	-0.06	
03 35 83 00-0005 SF Bush Hammer Green Concrete, New Concrete Wall Finishes	5.51	
For Up To 100, Add	10.92	
For >100 To 250, Add	2.73	
For >250 To 500, Add	1.37	
For >5,000 To 10,000, Deduct	-0.27	
For >10,000, Deduct	-0.55	
03 35 83 00-0006 SF Bush Hammer Cured Concrete, New Concrete Wall Finishes	8.54	
For Up To 100, Add	16.88	
For >100 To 250, Add	4.22	
For >250 To 500, Add	2.11	
For >5,000 To 10,000, Deduct	-0.42	
For >10,000, Deduct	-0.84	
03 35 83 00-0007 SF Break Ties And Patch, New Concrete Wall Finishes	1.05	
For Up To 100, Add	1.84	
For >100 To 250, Add	0.46	
For >250 To 500, Add	0.23	
For >5,000 To 10,000, Deduct	-0.05	
For >10,000, Deduct	-0.09	
03 35 83 00-0008 SF Carborundum Dry Rub, New Concrete Wall Finishes	3.57	
For Up To 100, Add	6.88	
For >100 To 250, Add	1.72	
For >250 To 500, Add	0.86	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000, Deduct	-0.34	



Concrete	03	03
Cast-In-Place Concrete	03 30	
Concrete Finishing	03 35	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 35 83 00-0009 SF Carborundum Wet Rub, New Concrete Wall Finishes	5.44	
<i>For Up To 100, Add</i>	10.62	
<i>For >100 To 250, Add</i>	2.66	
<i>For >250 To 500, Add</i>	1.33	
<i>For >5,000 To 10,000, Deduct</i>	-0.27	
<i>For >10,000, Deduct</i>	-0.53	
03 35 83 00-0010 SF Up To 1/4" Penetration Abrasive Media Blasting, New Concrete Wall Finishes	5.74	
Note: 4.5 Lbs of sand or abrasive media material per SF		
<i>For Up To 100, Add</i>	9.18	
<i>For >100 To 250, Add</i>	2.30	
<i>For >250 To 500, Add</i>	1.15	
<i>For >5,000 To 10,000, Deduct</i>	-0.23	
<i>For >10,000, Deduct</i>	-0.46	
03 35 83 00-0011 SF >1/4" To 1/2" Penetration Abrasive Media Blasting, New Concrete Wall Finishes	11.46	
Note: 9 Lbs of sand abrasive media material per SF		
<i>For Up To 100, Add</i>	18.34	
<i>For >100 To 250, Add</i>	4.59	
<i>For >250 To 500, Add</i>	2.29	
<i>For >5,000 To 10,000, Deduct</i>	-0.46	
<i>For >10,000, Deduct</i>	-0.92	

03 37 Specialty Placed Concrete (03 30)

Note: Includes gun finish. Not to be used for pumping concrete tasks. See CSI section 03 35 00 00-0000 for finishing.

03 37 13 Shotcrete (03 37)

03 37 13 00-0001 Shotcrete, Fiber Reinforced, Structural Repair (03 37 13)

03 37 13 00-0002 SF 1" Thick Shotcrete, Fiber Reinforced	3.70
<i>For Up To 25, Add</i>	0.70
<i>For >25 To 50, Add</i>	0.41
<i>For >50 To 150, Add</i>	0.17
03 37 13 00-0003 SF 2" Thick Shotcrete, Fiber Reinforced	6.95
<i>For Up To 25, Add</i>	1.29
<i>For >25 To 50, Add</i>	0.74
<i>For >50 To 150, Add</i>	0.30
03 37 13 00-0004 SF 3" Thick Shotcrete, Fiber Reinforced	9.83
<i>For Up To 25, Add</i>	1.78
<i>For >25 To 50, Add</i>	1.03
<i>For >50 To 150, Add</i>	0.40
03 37 13 00-0005 SF 4" Thick Shotcrete, Fiber Reinforced	12.39
<i>For Up To 25, Add</i>	2.20
<i>For >25 To 50, Add</i>	1.26
<i>For >50 To 150, Add</i>	0.48
03 37 13 00-0006 SF 6" Thick Shotcrete, Fiber Reinforced	16.77
<i>For Up To 25, Add</i>	2.85
<i>For >25 To 50, Add</i>	1.62
<i>For >50 To 150, Add</i>	0.58

03 37 13 00-0007 Gunite (Dry Mix Shotcrete), Sprayed (03 37 13)

03 37 13 00-0008 SF 1" Thick Gunite (Dry Mix Shotcrete), Sprayed	4.05
<i>For Radius Or Irregular Surface, Add</i>	1.21
<i>For Up To 25, Add</i>	0.86
<i>For >25 To 50, Add</i>	0.51
<i>For >50 To 150, Add</i>	0.23
03 37 13 00-0009 SF 2" Thick Gunite (Dry Mix Shotcrete), Sprayed	7.49
<i>For Radius Or Irregular Surface, Add</i>	2.18
<i>For Up To 25, Add</i>	1.57
<i>For >25 To 50, Add</i>	0.92
<i>For >50 To 150, Add</i>	0.41
03 37 13 00-0010 SF 3" Thick Gunite (Dry Mix Shotcrete), Sprayed	10.39
<i>For Radius Or Irregular Surface, Add</i>	2.94
<i>For Up To 25, Add</i>	2.14
<i>For >25 To 50, Add</i>	1.25
<i>For >50 To 150, Add</i>	0.55
03 37 13 00-0011 SF 4" Thick Gunite (Dry Mix Shotcrete), Sprayed	12.88
<i>For Radius Or Irregular Surface, Add</i>	3.52
<i>For Up To 25, Add</i>	2.61
<i>For >25 To 50, Add</i>	1.53
<i>For >50 To 150, Add</i>	0.66
03 37 13 00-0012 SF 5" Thick Gunite (Dry Mix Shotcrete), Sprayed	15.00
<i>For Radius Or Irregular Surface, Add</i>	3.96
<i>For Up To 25, Add</i>	2.99
<i>For >25 To 50, Add</i>	1.74
<i>For >50 To 150, Add</i>	0.74
03 37 13 00-0013 SF 6" Thick Gunite (Dry Mix Shotcrete), Sprayed	16.82
<i>For Radius Or Irregular Surface, Add</i>	4.28
<i>For Up To 25, Add</i>	3.29
<i>For >25 To 50, Add</i>	1.91
<i>For >50 To 150, Add</i>	0.80
03 37 13 00-0014 SF 8" Thick Gunite (Dry Mix Shotcrete), Sprayed	21.01
<i>For Radius Or Irregular Surface, Add</i>	5.14
<i>For Up To 25, Add</i>	4.03
<i>For >25 To 50, Add</i>	2.34
<i>For >50 To 150, Add</i>	0.96

03	03 Concrete
	03 30 Cast-In-Place Concrete
	03 37 Specialty Placed Concrete



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 37 13 00-0015	SF	10" Thick Gunitite (Dry Mix Shotcrete), Sprayed	24.63	
		<i>For Radius Or Irregular Surface, Add</i>	5.78	
		<i>For Up To 25, Add</i>	4.63	
		<i>For >25 To 50, Add</i>	2.68	
		<i>For >50 To 150, Add</i>	1.08	
03 37 13 00-0016	SF	12" Thick Gunitite (Dry Mix Shotcrete), Sprayed	27.83	
		<i>For Radius Or Irregular Surface, Add</i>	6.24	
		<i>For Up To 25, Add</i>	5.12	
		<i>For >25 To 50, Add</i>	2.95	
		<i>For >50 To 150, Add</i>	1.17	

03 37 16 Pumped Concrete (03 37)

03 37 16 00-0001 Concrete Pumping With Boom Truck (03 37 16)
 Note: Includes truck rental, operator, and local travel delivery. For delivery/set-up of equipment add one hour, for clean-up of equipment add one hour. Use four hours as the minimum cost including set-up and clean-up. Excludes concrete, use "Concrete Pump" concrete tasks from appropriate section to place into pump hopper and place concrete. Sizes are measured at a 30 degree vertical reach. See CSI section 03 31 13 00-0010 for concrete placement.

03 37 16 00-0002	HR	55' To 60' Boom Truck For Concrete Placement (95 CY Per Hour Rating)	209.90	
03 37 16 00-0003	HR	70' To 80' Boom Truck For Concrete Placement (117 CY Per Hour Rating)	224.21	
03 37 16 00-0004	HR	90' To 100' Boom Truck For Concrete Placement (117 CY Per Hour Rating)	275.89	
03 37 16 00-0005	HR	105' To 115' Boom Truck For Concrete Placement (117 CY Per Hour Rating)	308.06	
03 37 16 00-0006	HR	120' To 130' Boom Truck For Concrete Placement (170 CY Per Hour Rating)	341.26	
03 37 16 00-0007	HR	135' To 140' Boom Truck For Concrete Placement (170 CY Per Hour Rating)	411.58	
03 37 16 00-0008	HR	148' To 155' Boom Truck For Concrete Placement (170 CY Per Hour Rating)	453.53	
03 37 16 00-0009	HR	170' To 175' Boom Truck For Concrete Placement (182 CY Per Hour Rating)	555.14	
03 37 16 00-0010	HR	35 CY/HR, 66 HP Trailer Mounted Concrete Pump	152.11	

Note: Includes hoses

03 39 Concrete Curing (03 39)

03 39 13 Water Concrete Curing (03 39)

03 39 13 00-0001 Water Concrete Curing (03 39 13)

03 39 13 00-0002	SF	Water Based Curing, Sealing, Hardening And Dustproofing Compound	0.37	
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Note: Coverage rates: rough finish = 300 SF/GAL, broom finish = 300 to 400 SF/GAL, steel troweled = 500 to 600 SF/GAL, and vertical surface = 400 - 500 SF/GAL.

03 39 23 Membrane Concrete Curing (03 39)

03 39 23 23 Sheet Membrane Concrete Curing (03 39 23)

03 39 23 23-0001 Warm Weather Concrete Curing Blankets (03 39 23 23)

03 39 23 23-0002	CSF	Warm Weather Concrete Curing Blankets	36.18	
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03 39 23 23-0003 Cold Weather Concrete Curing Blankets (03 39 23 23)

03 39 23 23-0004	CSF	Electric, Cold Weather Concrete Curing Blanket	309.96	
03 39 23 23-0005	CSF	Non-Electric, Cold Weather Concrete Curing Blanket	39.92	

03 40 Precast Concrete (03)

Note: Precast concrete material prices are based on a precast operation producing large quantities of precast products. Includes the concrete panel, delivery to construction site and overhead/mobilization charges for the precast plant.

03 41 Precast Structural Concrete (03 41)

03 41 33 Precast Structural Pretensioned Concrete (03 41)

03 41 33 00-0001 Slabs, Roof And Floor Members (03 41 33)

03 41 33 00-0002	SF	4" Thick Precast Prestressed Slab, 12-16' Span Roof/Floor	17.96	2.40
03 41 33 00-0003	SF	6" Thick Precast Prestressed Slab, 16-25' Span Roof/Floor	22.37	2.40
03 41 33 00-0004	SF	8" Thick Precast Prestressed Slab, 25-32' Span Roof/Floor	26.79	2.52
03 41 33 00-0005	SF	10" Thick Precast Prestressed Slab, 32-40' Span Roof/Floor	31.22	2.64

03 41 33 00-0006 Tee Members (03 41 33)

03 41 33 00-0007 Multiple Tee, Roof And Floor (03 41 33 00-0006)

03 41 33 00-0008	SF	Prestressed Multiple Tee, Roof And Floor Members	40.28	3.12
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03 41 33 00-0009 Double Tee Wall Member (03 41 33 00-0006)

03 41 33 00-0010	SF	Prestressed Double Tee Wall Members Precast Concrete, <40' Span	57.16	8.52
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03 41 33 00-0011 Single Tee, Short Span, Roof Members (03 41 33 00-0006)

03 41 33 00-0012	SF	Prestressed Single Tee, Short Span Roof Precast Concrete Members, <40' Span	47.41	5.16
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Concrete	03	03
Precast Concrete	03 40	
Precast Structural Concrete	03 41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 41 33 00-0013 Single Tee, Long Span, Roof Members <small>(03 41 33 00-0006)</small>		
03 41 33 00-0014 SF Prestressed Single Tee, Long Span Roof Precast Concrete Members, <40' Span	56.82	4.44
03 41 33 00-0015 Prestressed Concrete Items <small>(03 41 33)</small>		
03 41 33 00-0016 Prestressed Quad Tee <small>(03 41 33 00-0015)</small>		
03 41 33 00-0017 SF Tees, Prestressed Quad Tee, Short Spans, Roof	29.11	0.96
03 41 33 00-0018 SF Tees, Prestressed Quad Tee, Short Spans, Floor	30.38	0.96
03 41 33 00-0019 Prestressed Double Tee <small>(03 41 33 00-0015)</small>		
03 41 33 00-0020 SF Tees, Double Tee, Floor Members , 60' Span	48.38	0.84
03 41 33 00-0021 SF Tees, Double Tee, Floor Members , 80' Span	66.60	0.84
03 41 33 00-0022 SF Tees, Double Tee, Roof Members, 30' Span	33.05	1.44
03 41 33 00-0023 SF Tees, Double Tee, Roof Members, 50' Span	51.14	0.96
03 41 33 00-0024 SF Tees, Double Tee, Wall Members, Up To 55' High	35.83	1.91
03 41 33 00-0025 Prestressed Single Tee <small>(03 41 33 00-0015)</small>		
03 41 33 00-0026 SF Tees, Single Tee Roof Members, 40' Span	57.29	2.16
03 41 33 00-0027 SF Tees, Single Tee Roof Members, 80' Span	66.32	1.32
03 41 33 00-0028 SF Tees, Single Tee Roof Members, 100' Span	87.72	1.20
03 41 33 00-0029 SF Tees, Single Tee Roof Members, 120' Span	92.37	1.20
03 41 33 00-0030 Prestressed Double Tee Floor Members <small>(03 41 33 00-0015)</small>		
03 41 33 00-0031 EA Tees, Double Tees, Floor Members, Lightweight, 20" X 8' Wide, 45'	14,804.99	345.40
03 41 33 00-0032 EA Tees, Double Tees, Floor Members, Lightweight, 24" X 8' Wide, 50'	16,121.15	383.77
03 41 33 00-0033 EA Tees, Double Tees, Floor Members, Lightweight, 32" X 10' Wide, 60'	26,960.94	431.74
03 41 33 00-0034 EA Tees, Double Tees, Floor Members, Standard Weight, 12" X 8' Wide, 25'	5,803.66	314.10
03 41 33 00-0035 EA Tees, Double Tees, Floor Members, Standard Weight, 16" X 8' Wide, 25'	7,618.39	345.40
03 41 33 00-0036 EA Tees, Double Tees, Floor Members, Standard Weight, 18" X 8' Wide, 35'	9,732.10	345.40
03 41 33 00-0037 EA Tees, Double Tees, Floor Members, Standard Weight, 20" X 8' Wide, 45'	10,836.88	383.77
03 41 33 00-0038 EA Tees, Double Tees, Floor Members, Standard Weight, 24" X 8' Wide, 50'	13,855.96	431.74
03 41 33 00-0039 EA Tees, Double Tees, Floor Members, Standard Weight, 32" X 10' Wide, 60'	24,924.63	493.63
03 41 33 00-0040 Prestressed Double Tee Roof Members <small>(03 41 33 00-0015)</small>		
03 41 33 00-0041 EA Tees, Double Tees, Roof Members, Lightweight, 20" X 8' Wide, 45'	11,634.43	345.40
03 41 33 00-0042 EA Tees, Double Tees, Roof Members, Lightweight, 24" X 8' Wide, 50'	15,275.66	383.77
03 41 33 00-0043 EA Tees, Double Tees, Roof Members, Lightweight, 32" X 10' Wide, 60'	25,058.60	431.74
03 41 33 00-0044 EA Tees, Double Tees, Roof Members, Standard Weight, 12" X 8' Wide, 30'	7,790.54	314.10
03 41 33 00-0045 EA Tees, Double Tees, Roof Members, Standard Weight, 16" X 8' Wide, 30'	8,210.23	345.40
03 41 33 00-0046 EA Tees, Double Tees, Roof Members, Standard Weight, 18" X 8' Wide, 30'	9,097.99	345.40
03 41 33 00-0047 EA Tees, Double Tees, Roof Members, Standard Weight, 20" X 8' Wide, 40'	9,357.29	383.77
03 41 33 00-0048 EA Tees, Double Tees, Roof Members, Standard Weight, 24" X 8' Wide, 50'	12,376.36	431.74
03 41 33 00-0049 EA Tees, Double Tees, Roof Members, Standard Weight, 32" X 10' Wide, 60'	21,331.33	493.63
03 41 33 00-0050 Plant Produced Pretensioned Prestressed Concrete Hollow Core Slab <small>(03 41 33)</small>		
03 41 33 00-0051 SF Hollow Core Slab, 4" Slab, 12' - 16' Spans, Plant Produced Pretensioned Prestressed Concrete	30.76	
03 41 33 00-0052 SF Hollow Core Slab, 6" Slab, 16' - 25' Spans, Plant Produced Pretensioned Prestressed Concrete	32.02	
03 41 33 00-0053 SF Hollow Core Slab, 8" Slab, 25' - 30' Spans, Plant Produced Pretensioned Prestressed Concrete	33.52	
03 41 33 00-0054 SF Hollow Core Slab, 10" Slab, 30' - 35' Spans, Plant Produced Pretensioned Prestressed Concrete	34.63	
03 41 33 00-0055 SF Hollow Core Slab, 12" Slab, 35' - 40' Spans, Plant Produced Pretensioned Prestressed Concrete	37.02	
03 41 33 00-0056 Double And Single Tees <small>(03 41 33)</small>		
03 41 33 00-0057 Double And Single Tees With 16" Roof And Floor Loading <small>(03 41 33 00-0056)</small>		
03 41 33 00-0058 SF Double Tee With 16" Roof Loading, 30' Span, Pretensioned Prestressed Concrete	37.18	
03 41 33 00-0059 SF Double Tee With 16" Roof Loading, 40' Span, Pretensioned Prestressed Concrete	36.29	
03 41 33 00-0060 SF Double Tee With 16" Roof Loading, 45' Span, Pretensioned Prestressed Concrete	34.28	
03 41 33 00-0061 SF Double Tee With 16" Floor Loading, 30' Span, Pretensioned Prestressed Concrete	37.18	
03 41 33 00-0062 SF Double Tee With 16" Floor Loading, 40' Span, Pretensioned Prestressed Concrete	37.05	
03 41 33 00-0063 SF Single Tee With 16" Roof Loading, 30' Span, Pretensioned Prestressed Concrete	56.97	
03 41 33 00-0064 SF Single Tee With 16" Roof Loading, 40' Span, Pretensioned Prestressed Concrete	55.70	
03 41 33 00-0065 SF Single Tee With 16" Roof Loading, 45' Span, Pretensioned Prestressed Concrete	52.16	
03 41 33 00-0066 SF Single Tee With 16" Floor Loading, 30' Span, Pretensioned Prestressed Concrete	56.97	
03 41 33 00-0067 SF Single Tee With 16" Floor Loading, 40' Span, Pretensioned Prestressed Concrete	53.41	
03 41 33 00-0068 Double And Single Tees With 24" Roof And Floor Loading <small>(03 41 33 00-0056)</small>		
03 41 33 00-0069 SF Double Tee With 24" Roof Loading, 30' Span, Pretensioned Prestressed Concrete	38.32	
03 41 33 00-0070 SF Double Tee With 24" Roof Loading, 40' Span, Pretensioned Prestressed Concrete	37.43	
03 41 33 00-0071 SF Double Tee With 24" Roof Loading, 45' Span, Pretensioned Prestressed Concrete	36.18	
03 41 33 00-0072 SF Double Tee With 24" Floor Loading, 30' Span, Pretensioned Prestressed Concrete	38.32	

MINOR
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TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 41 33 00-0073	SF	Double Tee With 24" Floor Loading, 40' Span, Pretensioned Prestressed Concrete	37.05	
03 41 33 00-0074	SF	Single Tee With 24" Roof Loading, 30' Span, Pretensioned Prestressed Concrete	58.49	
03 41 33 00-0075	SF	Single Tee With 24" Roof Loading, 40' Span, Pretensioned Prestressed Concrete	57.22	
03 41 33 00-0076	SF	Single Tee With 24" Roof Loading, 45' Span, Pretensioned Prestressed Concrete	55.21	
03 41 33 00-0077	SF	Single Tee With 24" Floor Loading, 30' Span, Pretensioned Prestressed Concrete	58.49	
03 41 33 00-0078	SF	Single Tee With 24" Floor Loading, 40' Span, Pretensioned Prestressed Concrete	56.84	

03 41 33 00-0079 Double And Single Tees With 32" Roof And Floor Loading (03 41 33 00-0056)

03 41 33 00-0080	SF	Double Tee With 32" Roof Load, 50' Span, Pretensioned Prestressed Concrete	40.41	
03 41 33 00-0081	SF	Double Tee With 32" Roof Load, 60' Span, Pretensioned Prestressed Concrete	39.14	
03 41 33 00-0082	SF	Double Tee With 32" Roof Load, 70' Span, Pretensioned Prestressed Concrete	37.86	
03 41 33 00-0083	SF	Single Tee With 32" Roof Load, 50' Span, Pretensioned Prestressed Concrete	62.09	
03 41 33 00-0084	SF	Single Tee With 32" Roof Load, 60' Span, Pretensioned Prestressed Concrete	60.06	
03 41 33 00-0085	SF	Single Tee With 32" Roof Load, 70' Span, Pretensioned Prestressed Concrete	57.65	

03 48 Precast Concrete Specialties (03 40)

03 48 16 Precast Concrete Splash Blocks (03 48)

03 48 16 00-0001 Precast Concrete Splash Blocks (03 48 16)

03 48 16 00-0002	EA	Precast Concrete Splash Blocks, 20" x 12" x 3"	40.39	4.37
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03 48 24 Precast Minaret Segments (03 48)

03 48 24 00-0001 Installation Costs Using A 50 Ton Hydraulic Crane (03 48 24)

Note: Includes handling, hoisting into place, alignment, bracing and permanent connections.

03 48 24 00-0002 L - Shaped Segments (03 48 24 00-0001)

03 48 24 00-0003	EA	Install Minaret, L-Shape Segment, 0-1 Ton/Each 100' Maximum Radius With 50 Ton Crane	374.41	299.53
03 48 24 00-0004	EA	Install Minaret, L-Shape Segment, 1-3 Ton/Each 65' Maximum Radius With 50 Ton Crane	419.57	335.67
03 48 24 00-0005	EA	Install Minaret, L-Shape Segment, 3-5 Ton/Each 50' Maximum Radius With 50 Ton Crane	474.40	379.51
03 48 24 00-0006	EA	Install Minaret, L-Shape Segment, 5-7 Ton/Each 40' Maximum Radius With 50 Ton Crane	506.02	404.81

03 48 24 00-0007 O - Shaped Segments (03 48 24 00-0001)

03 48 24 00-0008	EA	Install Minaret, O-Shape Segment, 0-1 Ton/Each 100' Maximum Radius With 50 Ton Crane	395.70	316.62
03 48 24 00-0009	EA	Install Minaret, O-Shape Segment, 1-3 Ton/Each 65' Maximum Radius With 50 Ton Crane	444.11	355.23
03 48 24 00-0010	EA	Install Minaret, O-Shape Segment, 3-5 Ton/Each 50' Maximum Radius With 50 Ton Crane	502.97	402.34
03 48 24 00-0011	EA	Install Minaret, O-Shape Segment, 5-7 Ton/Each 40' Maximum Radius With 50 Ton Crane	538.66	430.90

03 48 24 00-0012 Platform Segment (03 48 24 00-0001)

03 48 24 00-0013	EA	Install Minaret, Platform Segments, 0-1 Ton/Each 100' Maximum Radius With 50 Ton Crane	759.02	607.28
03 48 24 00-0014	EA	Install Minaret, Platform Segments, 1-3 Ton/Each 65' Maximum Radius With 50 Ton Crane	917.50	733.95
03 48 24 00-0015	EA	Install Minaret, Platform Segments, 3-5 Ton/Each 50' Maximum Radius With 50 Ton Crane	1,018.21	814.58
03 48 24 00-0016	EA	Install Minaret, Platform Segments, 5-7 Ton/Each 40' Maximum Radius With 50 Ton Crane	1,143.74	915.03

03 48 24 00-0017 Cap Segment (03 48 24 00-0001)

03 48 24 00-0018	EA	Install Minaret, Cap Segments, 0-1 Ton/Each 100' Maximum Radius With 50 Ton Crane	415.39	332.28
03 48 24 00-0019	EA	Install Minaret, Cap Segments, 1-3 Ton/Each 65' Maximum Radius With 50 Ton Crane	463.85	371.02
03 48 24 00-0020	EA	Install Minaret, Cap Segments, 3-5 Ton/Each 50' Maximum Radius With 50 Ton Crane	528.44	422.68
03 48 24 00-0021	EA	Install Minaret, Cap Segments, 5-7 Ton/Each 40' Maximum Radius With 50 Ton Crane	564.14	451.25

03 48 24 00-0022 Installation Costs Using A 90 Ton Crawler Crane (03 48 24)

Note: Includes handling, hoisting into place, alignment, bracing and permanent connections. Excludes grouting and caulking of joints.

03 48 24 00-0023 L - Shaped Segments (03 48 24 00-0022)

03 48 24 00-0024	EA	Install Minaret, L-Shaped Segments, 0-1 Ton/Each 180' Maximum Radius With 90 Ton Crane	378.95	303.16
03 48 24 00-0025	EA	Install Minaret, L-Shaped Segments, 1-3 Ton/Each 135' Maximum Radius With 90 Ton Crane	424.65	339.74
03 48 24 00-0026	EA	Install Minaret, L-Shaped Segments, 3-5 Ton/Each 100' Maximum Radius With 90 Ton Crane	480.14	384.10
03 48 24 00-0027	EA	Install Minaret, L-Shaped Segments, 5-7 Ton/Each 79' Maximum Radius With 90 Ton Crane	512.15	409.72

03 48 24 00-0028 O - Shaped Segment (03 48 24 00-0022)

03 48 24 00-0029	EA	Install Minaret, O-Shaped Segments, 0-1 Ton/Each 180' Maximum Radius With 90 Ton Crane	400.50	320.46
03 48 24 00-0030	EA	Install Minaret, O-Shaped Segments, 1-3 Ton/Each 135' Maximum Radius With 90 Ton Crane	449.49	359.54
03 48 24 00-0031	EA	Install Minaret, O-Shaped Segments, 3-5 Ton/Each 100' Maximum Radius With 90 Ton Crane	509.06	407.21
03 48 24 00-0032	EA	Install Minaret, O-Shaped Segments, 5-7 Ton/Each 79' Maximum Radius With 90 Ton Crane	545.19	436.13

03 48 24 00-0033 Platform Segment (03 48 24 00-0022)

03 48 24 00-0034	EA	Install Minaret, Platform Segment, 0-1 Ton/Each 180' Maximum Radius With 90 Ton Crane	612.35	489.87
03 48 24 00-0035	EA	Install Minaret, Platform Segment, 1-3 Ton/Each 135' Maximum Radius With 90 Ton Crane	741.27	592.99
03 48 24 00-0036	EA	Install Minaret, Platform Segment, 3-5 Ton/Each 100' Maximum Radius With 90 Ton Crane	820.44	656.36
03 48 24 00-0037	EA	Install Minaret, Platform Segment, 5-7 Ton/Each 79' Maximum Radius With 90 Ton Crane	928.62	742.84



Concrete	03	03
Precast Concrete	03 40	
Precast Concrete Specialties	03 48	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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03 48 24 00-0038	Cap Segment <small>(03 48 24 00-0022)</small>		
03 48 24 00-0039	EA Install Minaret, Cap Segment, 0-1 Ton/Each 180' Maximum Radius With 90 Ton Crane	420.42	336.30
03 48 24 00-0040	EA Install Minaret, Cap Segment, 1-3 Ton/Each 135' Maximum Radius With 90 Ton Crane	469.47	375.51
03 48 24 00-0041	EA Install Minaret, Cap Segment, 3-5 Ton/Each 100' Maximum Radius With 90 Ton Crane	534.84	427.81
03 48 24 00-0042	EA Install Minaret, Cap Segment, 5-7 Ton/Each 79' Maximum Radius With 90 Ton Crane	570.97	456.72

03 48 24 00-0043	Material Costs <small>(03 48 24)</small>		
	Note: Includes 3000 PSI concrete, imbedded items, formwork and precast concrete operations.		
03 48 24 00-0044	CY Precast Concrete Minaret, L-Shaped Segments, 3,000 PSI Concrete	10,145.56	
	Note: Including Post Tension Cost		
03 48 24 00-0045	CY Precast Concrete Minaret, O-Shaped Segments, 3,000 PSI Concrete	10,145.56	
	Note: Including Post Tension Cost		
03 48 24 00-0046	CY Precast Concrete Minaret, Platform Segments, 3,000 PSI Concrete	10,145.56	
	Note: Including Post Tension Cost		
03 48 24 00-0047	CY Precast Concrete Minaret, Cap Segments, 3,000 PSI Concrete	10,145.56	
	Note: Including Post Tension Cost		

03 48 29	Precast Accessories <small>(03 48)</small>		
	Note: Includes installation labor, material and equipment.		
03 48 29 00-0001	Bearing Pads For Precast Members <small>(03 48 29)</small>		
03 48 29 00-0002	Continuous 2" Wide Strips <small>(03 48 29 00-0001)</small>		
03 48 29 00-0003	LF Bearing Pads, Continuous 2" Wide x 1/8" Thick Strips	1.50	
	Note: For precast members		
03 48 29 00-0004	LF Bearing Pads, Continuous 2" Wide x 1/4" Thick Strips	2.11	
	Note: For precast members.		
03 48 29 00-0005	LF Bearing Pads, Continuous 2" Wide x 1/2" Thick Strips	3.44	
	Note: For precast members		
03 48 29 00-0006	LF Bearing Pads, Continuous 2" Wide x 3/4" Thick Strips	4.81	
	Note: For precast members		
03 48 29 00-0007	LF Bearing Pads, Continuous 2" Wide x 1" Thick Strips	6.24	
	Note: For precast members		
03 48 29 00-0008	LF Bearing Pads, Continuous 2" Wide x 1-1/2" Thick Strips	8.94	
	Note: For precast members		

03 48 29 00-0009	Bearing Pad Pipe Supports <small>(03 48 29)</small>		
03 48 29 00-0010	LF 8" Diameter Precast Balustrade, Decorative Shapes	99.21	
03 48 29 00-0011	LF Precast Rail Cap, <1 SF Cross Section	63.60	
03 48 29 00-0012	LF 4" x 4" Precast Pipe Support	10.24	

03 48 49	Precast Landings <small>(03 48)</small>		
03 48 49 00-0001	SF 3" Thick Precast Landing	106.61	
03 48 49 00-0002	SF 4" Thick Precast Landing	124.28	
03 48 49 00-0003	SF 5" Thick Precast Landing	141.24	
03 48 49 00-0004	SF 6" Thick Precast Landing	162.84	

03 48 54	Precast Concrete Blocks <small>(03 48)</small>		
03 48 54 00-0001	Precast Interlocking Concrete Blocks <small>(03 48 54)</small>		
	Note: Includes lifting loop		
03 48 54 00-0002	EA 2' x 2' x 2' Precast Interlocking Concrete (Ecology) Block	161.36	46.16
03 48 54 00-0003	EA 2' x 2' x 3' Precast Interlocking Concrete (Ecology) Block	192.35	51.92
03 48 54 00-0004	EA 2' x 2' x 4' Precast Interlocking Concrete (Ecology) Block	223.33	57.69
03 48 54 00-0005	EA 2' x 2' x 6' Precast Interlocking Concrete (Ecology) Block	301.87	63.46
03 48 54 00-0006	EA 2' x 2' x 8' Precast Interlocking Concrete (Ecology) Block	363.10	69.23

03 50 Cast Decks and Underlayment (03)

03 51 Cast Roof Decks (03 50)

03 51 13	Cementitious Wood Fiber Decks <small>(03 51)</small>		
03 51 13 00-0001	Cement Fiber Tongue And Groove Planks <small>(03 51 13)</small>		
03 51 13 00-0002	SF 1" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	3.80	
03 51 13 00-0003	SF 1-1/2" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	3.96	
03 51 13 00-0004	SF 2" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	4.15	
03 51 13 00-0005	SF 2-1/2" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	4.72	
03 51 13 00-0006	SF 3" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	5.35	
03 51 13 00-0007	SF 3-1/2" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	6.07	
03 51 13 00-0008	SF 4" Thick Cementitious Fiber Tongue And Groove Planks, Cement Wood Fiber System	6.95	

03 51 16 Gypsum Concrete Roof Decks (03 51)

03 Concrete**03 50 Cast Decks and Underlayment****03 51 Cast Roof Decks**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

03 51 16 00-0001	Class A Gypsum Fill Concrete Deck <small>(03 51 16)</small>		
03 51 16 00-0002	SF 2" Thick Precast Gypsum Fill Concrete Deck, Class A.....	11.73	0.60
03 51 16 00-0003	SF 2-1/2" Thick Precast Gypsum Fill Concrete Deck, Class A.....	14.53	0.71
03 51 16 00-0004	SF 3" Thick Precast Gypsum Fill Concrete Deck, Class A.....	17.35	0.81
03 51 16 00-0005	SF 3-1/2" Thick Precast Gypsum Fill Concrete Deck, Class A.....	20.20	0.91
03 51 16 00-0006	SF 4" Thick Precast Gypsum Fill Concrete Deck, Class A.....	23.07	1.00

03 51 16 00-0007	Form Board For Lightweight Deck <small>(03 51 16)</small>		
03 51 16 00-0008	SF Gypsum Deck Form Board, 1/2" Drywall For Lightweight Deck.....	2.59	
03 51 16 00-0009	SF Gypsum Deck Form Board, 1" Mineral Fiber Board For Lightweight Deck.....	3.54	
03 51 16 00-0010	SF Gypsum Deck Form Board, 1-1/2" Mineral Fiber Board For Lightweight Deck.....	7.62	
03 51 16 00-0011	SF Gypsum Deck Form Board, 1" Cementitious Fiber Board For Lightweight Deck.....	2.89	0.61
03 51 16 00-0012	SF Gypsum Deck Form Board, 1-1/2" Cementitious Fiber Board For Lightweight Deck.....	3.55	0.61
03 51 16 00-0013	SF Gypsum Deck Form Board, 1" Glass Fiber Board For Lightweight Deck.....	4.00	0.61
03 51 16 00-0014	SF Gypsum Deck Form Board, 1-1/2" Glass Fiber Board For Lightweight Deck.....	5.00	0.61

03 51 16 00-0015	Gypsum Plank <small>(03 51 16)</small>		
03 51 16 00-0016	SF 2" Thick, Insulating Concrete Gypsum Plank, Roof Deck.....	4.15	
03 51 16 00-0017	SF 3" Thick, Insulating Concrete Gypsum Plank, Roof Deck.....	5.49	

03 53 Concrete Topping (03 53)

Note: Installed over new or existing concrete.

03 53 14 Granolithic Concrete Topping (03 53)

03 53 14 00-0001	Granolithic Topping Laid After <small>(03 53 14)</small>		
	Note: Using 1:1:1-1/2 mix.		
03 53 14 00-0002	SF 1/2" Thick Concrete Topping, Granolithic Laid After Finish, 1:1:1-1/2 Mix.....	4.53	
03 53 14 00-0003	SF 1" Thick Concrete Topping, Granolithic Laid After Finish, 1:1:1-1/2 Mix.....	4.89	
03 53 14 00-0004	SF 2" Thick Concrete Topping, Granolithic Laid After Finish, 1:1:1-1/2 Mix.....	6.16	

03 53 19 Concrete Overlayment (03 53)

03 53 19 00-0001	Integral Topping Including Hard Trowel Finish <small>(03 53 19)</small>		
	Note: Using 1:1:2 mix.		
03 53 19 00-0002	SF 3/16" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	2.68	
03 53 19 00-0003	SF 1/2" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	3.01	
03 53 19 00-0004	SF 3/4" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	3.53	
03 53 19 00-0005	SF 1" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	4.19	
03 53 19 00-0006	SF 2" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	5.96	
03 53 19 00-0007	SF 2-1/2" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	5.11	
03 53 19 00-0008	SF 3" Thick Hard Trowel Integral Concrete Topping, 1:1:2 Mix.....	5.71	

03 54 Cast Underlayment (03 50)

Note: Includes primer. Excludes sandblasting existing smooth finished concrete surface (where necessary).

03 54 16 Hydraulic Cement Underlayment (03 54)

03 54 16 00-0001	Self Leveling Cementitious Underlayment For Floors <small>(03 54 16)</small>		
	Note: Includes primer.		
03 54 16 00-0002	SF 1/8" Thick Self Leveling Cementitious Underlayment For Floors.....	1.78	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.15	
	For >100 To 250 SF, Add	0.07	
03 54 16 00-0003	SF 1/4" Thick Self Leveling Cementitious Underlayment For Floors.....	3.05	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.15	
	For >100 To 250 SF, Add	0.07	
03 54 16 00-0004	SF 3/8" Thick Self Leveling Cementitious Underlayment For Floors.....	3.90	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.15	
	For >100 To 250 SF, Add	0.07	
03 54 16 00-0005	SF 1/2" Thick Self Leveling Cementitious Underlayment For Floors.....	5.59	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.15	
	For >100 To 250 SF, Add	0.07	
03 54 16 00-0006	SF 5/8" Thick Self Leveling Cementitious Underlayment For Floors.....	6.61	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.15	
	For >100 To 250 SF, Add	0.07	
03 54 16 00-0007	SF 3/4" Thick Self Leveling Cementitious Underlayment For Floors.....	8.17	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.17	
	For >100 To 250 SF, Add	0.08	
03 54 16 00-0008	SF 1" Thick Self Leveling Cementitious Underlayment For Floors.....	10.71	
	Note: Including Surface Preparation		
	For Up To 100 SF, Add	0.17	
	For >100 To 250 SF, Add	0.08	



Concrete	03	03
Cast Decks and Underlayment	03 50	
Cast Underlayment	03 54	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 54 16 00-0009	SF		1-1/4" Thick Self Leveling Cementitious Underlayment For Floors Note: Including Surface Preparation For Up To 100 SF, Add For >100 To 250 SF, Add	14.14 0.19 0.10	
03 54 16 00-0010	SF		1-1/2" Thick Self Leveling Cementitious Underlayment For Floors Note: Including Surface Preparation For Up To 100 SF, Add For >100 To 250 SF, Add	15.84 0.19 0.10	
03 54 16 00-0011	SF		1-3/4" Thick Self Leveling Cementitious Underlayment For Floors Note: Including Surface Preparation For Up To 100 SF, Add For >100 To 250 SF, Add	21.02 0.24 0.12	
03 60 Grouting ⁽⁰³⁾					
03 61 Cementitious Grouting ^(03 60)					
Note: 1 part cement to 3 parts sand by volume.					
03 61 16 Cementitious Flowable Grout ^(03 61)					
03 61 16 00-0001			Cementitious Flowable Grout ^(03 61 16)		
03 61 16 00-0002	CY		Cementitious Flowable Grout	472.77	
03 62 Non-Shrink Grouting ^(03 60)					
03 62 13 Non-Metallic Non-Shrink Grouting ^(03 62)					
03 62 13 00-0001			Fluid Type, Non-Metallic Non-Shrink Grouting For Bases ^(03 62 13)		
03 62 13 00-0002	SF		1" Deep, Fluid Type, Non-Metallic Non-Shrink Grout For Bases	27.02	
03 62 13 00-0003	SF		2" Deep, Fluid Type, Non-Metallic Non-Shrink Grout For Bases	40.11	
03 62 13 00-0004			Non-Metallic Non-Shrink Grouting For Bases ^(03 62 13)		
03 62 13 00-0005	SF		1" Deep, Non-Metallic Non-Shrink Grout For Bases	41.43	
03 62 13 00-0006	SF		2" Deep, Non-Metallic Non-Shrink Grout For Bases	66.56	
03 62 13 00-0007			Non-Metallic Non-Shrink Grouting For Joints ^(03 62 13)		
03 62 13 00-0008			1/2" Joint Thickness, Non-Metallic Non-Shrink Grout For Joints ^(03 62 13 00-0007)		
03 62 13 00-0009	LF		4" Deep x 1/2" Thick, Non-Metallic Non-Shrink Grout For Joints	2.27	
03 62 13 00-0010	LF		6" Deep x 1/2" Thick, Non-Metallic Non-Shrink Grout For Joints	2.96	
03 62 13 00-0011	LF		8" Deep x 1/2" Thick, Non-Metallic Non-Shrink Grout For Joints	3.92	
03 62 13 00-0012			1" Joint Thickness, Non-Metallic Non-Shrink Grout For Joints ^(03 62 13 00-0007)		
03 62 13 00-0013	LF		4" Deep x 1" Thick, Non-Metallic Non-Shrink Grout For Joints	3.33	
03 62 13 00-0014	LF		6" Deep x 1" Thick, Non-Metallic Non-Shrink Grout For Joints	4.43	
03 62 13 00-0015	LF		8" Deep x 1" Thick, Non-Metallic Non-Shrink Grout For Joints	5.89	
03 62 16 Metallic Non-Shrink Grouting ^(03 62)					
03 62 16 00-0001			Metallic Non-Shrink Grouting For Bases ^(03 62 16)		
03 62 16 00-0002	SF		1" Deep, Metallic Non-Shrink Grout For Bases	34.97	
03 62 16 00-0003	SF		2" Deep, Metallic Non-Shrink Grout For Bases	54.02	
03 62 16 00-0004			Metallic Non-Shrink Grouting For Joints ^(03 62 16)		
03 62 16 00-0005			1/2" Joint Thickness, Metallic Non-Shrink Grout For Joints ^(03 62 16 00-0004)		
03 62 16 00-0006	LF		4" Deep x 1/2" Thick, Metallic Non-Shrink Grout For Joints	1.86	
03 62 16 00-0007	LF		6" Deep x 1/2" Thick, Metallic Non-Shrink Grout For Joints	2.36	
03 62 16 00-0008	LF		8" Deep x 1/2" Thick, Metallic Non-Shrink Grout For Joints	3.14	
03 62 16 00-0009			1" Joint Thickness, Metallic Non-Shrink Grout For Joints ^(03 62 16 00-0004)		
03 62 16 00-0010	LF		4" Deep x 1" Thick, Metallic Non-Shrink Grout For Joints	2.55	
03 62 16 00-0011	LF		6" Deep x 1" Thick, Metallic Non-Shrink Grout For Joints	3.21	
03 62 16 00-0012	LF		8" Deep x 1" Thick, Metallic Non-Shrink Grout For Joints	4.29	
03 63 Epoxy Grouting ^(03 60)					
03 63 00 00-0001			Spray On Concrete Epoxy Grout ^(03 63) Note: (Sika 224) per thickness per coat.		
03 63 00 00-0002	SF		1/4" Thick Coat Spray On Concrete Epoxy Grout	4.24	
			For Color, Add	1.10	
03 63 00 00-0003	SF		3/8" Thick Coat Spray On Concrete Epoxy Grout	5.87	
			For Color, Add	1.65	

03	03 Concrete
	03 60 Grouting
	03 63 Epoxy Grouting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
03 63 00 00-0004 SF 1/2" Thick Coat Spray On Concrete Epoxy Grout..... <i>For Color, Add</i>	7.51 2.20	
03 63 00 00-0005 SF 5/8" Thick Coat Spray On Concrete Epoxy Grout..... <i>For Color, Add</i>	8.98 2.76	
03 63 00 00-0006 SF 3/4" Thick Coat Spray On Concrete Epoxy Grout..... <i>For Color, Add</i>	10.48 3.31	
03 63 00 00-0007 SF 1" Thick Coat Spray On Concrete Epoxy Grout..... <i>For Color, Add</i>	13.55 4.42	

03 64 Injection Grouting (03 60)

Note: By volume of void filled. Includes injection ports.

03 64 23 Epoxy Injection Grouting (03 64)

03 64 23 00-0001 Pressure Injected Epoxy Grout (03 64 23)

03 64 23 00-0002 CF Pressure Injected Epoxy Grout..... <i>For >4, Deduct</i>	1,339.57 -141.43
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03 64 26 Cementitious Injection Grouting (03 64)

03 64 26 00-0001 Pressure Injected Cementitious Grout (03 64 26)

03 64 26 00-0002 CF Pressure Injected Cementitious Grout..... <i>For >4, Deduct</i>	236.55 -60.68
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03 80 Concrete Cutting and Boring (03)

03 81 Concrete Cutting (03 80)

03 81 13 Flat Concrete Sawing (03 81)

See CSI section 02 41 19 13-0057 for saw cutting.

03 81 16 Track Mounted Concrete Wall Sawing (03 81)

See CSI section 02 41 19 13-0057 for saw cutting.

03 82 Concrete Boring (03 80)

03 82 13 Concrete Core Drilling (03 82)

See CSI section 02 41 19 13-0080 for core drilling.

END OF SECTION 03



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 Masonry

04 01 Maintenance of Masonry ⁽⁰⁴⁾

04 01 20 Maintenance of Unit Masonry ^(04 01)

Note: For use on existing brick. Includes clean-up of debris. Excludes disposal.

04 01 20 41 Unit Masonry Stabilization ^(04 01 20)

04 01 20 41-0001	EA	Masonry Repair (Helifix®) ^(04 01 20 41)		
04 01 20 41-0002	EA	Grouted Ties For Stabilizing Solid Masonry (Helifix® CemTie) ^(04 01 20 41-0001)		
Note: Austenitic stainless steel. For stabilizing solid masonry. Includes drilling, cementitious grout and patching surface.				
04 01 20 41-0003	EA	304 Stainless Steel Helical Pin, Grouted Ties For Stabilizing Solid Masonry (Helifix® CemTie) ^(04 01 20 41-0002)		
04 01 20 41-0004	EA	8mm Diameter, 350mm Length, 304 Stainless Steel Helical Pin, Grouted Tie For Stabilizing Solid Masonry (Helifix® CemTie)	21.17	
		For Up To 10, Add	9.55	
		For >10 To 50, Add	4.78	
04 01 20 41-0005	EA	8mm Diameter, 600mm Length, 304 Stainless Steel Helical Pin, Grouted Tie For Stabilizing Solid Masonry (Helifix® CemTie)	30.30	
		For Up To 10, Add	9.55	
		For >10 To 50, Add	4.78	
04 01 20 41-0006	EA	8mm Diameter, 900mm Length, 304 Stainless Steel Helical Pin, Grouted Tie For Stabilizing Solid Masonry (Helifix® CemTie)	40.21	
		For Up To 10, Add	9.55	
		For >10 To 50, Add	4.78	
04 01 20 41-0007	EA	316 Stainless Steel Helical Pin, Grouted Ties For Stabilizing Solid Masonry (Helifix® CemTie) ^(04 01 20 41-0002)		
04 01 20 41-0008	EA	8mm Diameter, 350mm Length, 316 Stainless Steel Helical Pin, Grouted Tie For Stabilizing Solid Masonry (Helifix® CemTie)	23.15	
		For Up To 10, Add	9.55	
		For >10 To 50, Add	4.78	
04 01 20 41-0009	EA	8mm Diameter, 600mm Length, 316 Stainless Steel Helical Pin, Grouted Tie For Stabilizing Solid Masonry (Helifix® CemTie)	33.81	
		For Up To 10, Add	9.55	
		For >10 To 50, Add	4.78	
04 01 20 41-0010	EA	8mm Diameter, 900mm Length, 316 Stainless Steel Helical Pin, Grouted Tie For Stabilizing Solid Masonry (Helifix® CemTie)	45.48	
		For Up To 10, Add	9.55	
		For >10 To 50, Add	4.78	
04 01 20 41-0011	EA	Ties For Stitching Masonry Cracks (Helifix® Helibar) ^(04 01 20 41-0001)		
Note: Austenitic stainless steel. For stabilizing cracked masonry. Includes removing horizontal mortar and re-pointing mortar bed. Includes cementitious grout. Excludes repairing vertical crack.				
04 01 20 41-0012	EA	304 Stainless Steel Helical Pin, Ties For Stitching Masonry Cracks (Helifix® Helibar) ^(04 01 20 41-0011)		
04 01 20 41-0013	EA	4.5mm Diameter, 1m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	57.29	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0014	EA	4.5mm Diameter, 1.2m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	62.48	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0015	EA	4.5mm Diameter, 7m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	182.78	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0016	EA	6mm Diameter, 1m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	57.29	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0017	EA	6mm Diameter, 1.2m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	62.48	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0018	EA	6mm Diameter, 1.5m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	68.38	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0019	EA	6mm Diameter, 2m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	79.46	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	
04 01 20 41-0020	EA	6mm Diameter, 7m Length, 304 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	182.78	
		For Up To 10, Add	38.20	
		For >10 To 50, Add	19.10	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 01 20 41-0021	316 Stainless Steel Helical Pin, Ties For Stitching Masonry Cracks (Helifix® Helibar) <small>(04 01 20 41-0011)</small>		
04 01 20 41-0022	EA 4.5mm Diameter, 1m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	60.12	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0023	EA 4.5mm Diameter, 1.2m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	66.24	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0024	EA 4.5mm Diameter, 7m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	206.30	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0025	EA 6mm Diameter, 1m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	60.12	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0026	EA 6mm Diameter, 1.2m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	66.24	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0027	EA 6mm Diameter, 1.5m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	73.08	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0028	EA 6mm Diameter, 2m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	86.05	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0029	EA 6mm Diameter, 7m Length, 316 Stainless Steel Helical Pin, Tie For Stitching Masonry Cracks (Helifix® Helibar)	206.30	
	For Up To 10, Add	38.20	
	For >10 To 50, Add	19.10	
04 01 20 41-0030	Mechanical Repair Anchors (Helifix® TorkFix) <small>(04 01 20 41-0001)</small> Note: Austenitic stainless steel. For stabilizing masonry veneer walls to inner wythes of brick, concrete block, wood studs or steel studs. Includes drilling and patching surface.		
04 01 20 41-0031	304 Stainless Steel, Mechanical Repair Anchors (Helifix® TorkFix) <small>(04 01 20 41-0030)</small>		
04 01 20 41-0032	EA 4-1/2" Length, Brick To Brick/Concrete Block, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	10.74	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0033	EA 5-1/2" Length, Brick To Brick/Concrete Block, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	11.67	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0034	EA 6-1/2" Length, Brick To Brick/Concrete Block, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	12.60	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0035	EA 7-1/2" Length, Brick To Brick/Concrete Block, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	13.53	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0036	EA 8-1/2" Length, Brick To Brick/Concrete Block, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	14.46	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0037	EA 9-1/2" Length, Brick To Brick/Concrete Block, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	15.38	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0038	EA 4-1/2" Length, Brick To Wood Frame/Steel Stud, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	10.74	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0039	EA 5-1/2" Length, Brick To Wood Frame/Steel Stud, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	11.67	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0040	EA 6-1/2" Length, Brick To Wood Frame/Steel Stud, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	12.60	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0041	EA 7-1/2" Length, Brick To Wood Frame/Steel Stud, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	13.53	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0042	EA 8-1/2" Length, Brick To Wood Frame/Steel Stud, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	14.46	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0043	EA 10-1/2" Length, Brick To Wood Frame/Steel Stud, 304 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	16.31	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0044	EA 4-1/2" Length, 304 Stainless Steel, Veneer Panel Anchor (Helifix® TorkFix)	10.74	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0045	EA 6-1/2" Length, 304 Stainless Steel, Veneer Panel Anchor (Helifix® TorkFix)	12.60	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	
04 01 20 41-0046	EA 8" Length, 304 Stainless Steel, Veneer Panel Anchor (Helifix® TorkFix)	13.99	
	For Up To 10, Add	5.73	
	For >10 To 50, Add	2.87	



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 01 20 41-0047		316 Stainless Steel, Mechanical Repair Anchors (Helifix® TorkFix) <small>(04 01 20 41-0030)</small>		
	EA	4-1/2" Length, Brick To Brick/Concrete Block, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	10.74	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	5-1/2" Length, Brick To Brick/Concrete Block, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	11.67	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	6-1/2" Length, Brick To Brick/Concrete Block, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	12.60	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	7-1/2" Length, Brick To Brick/Concrete Block, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	13.53	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	8-1/2" Length, Brick To Brick/Concrete Block, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	14.46	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	9-1/2" Length, Brick To Brick/Concrete Block, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	15.38	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	4-1/2" Length, Brick To Wood Frame/Steel Stud, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	10.74	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	5-1/2" Length, Brick To Wood Frame/Steel Stud, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	11.67	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	6-1/2" Length, Brick To Wood Frame/Steel Stud, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	12.60	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	7-1/2" Length, Brick To Wood Frame/Steel Stud, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	13.53	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	8-1/2" Length, Brick To Wood Frame/Steel Stud, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	14.46	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	10-1/2" Length, Brick To Wood Frame/Steel Stud, 316 Stainless Steel, Mechanical Repair Anchor (Helifix® TorkFix)	16.31	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	4-1/2" Length, 316 Stainless Steel, Veneer Panel Anchor (Helifix® TorkFix)	10.74	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	6-1/2" Length, 316 Stainless Steel, Veneer Panel Anchor (Helifix® TorkFix)	12.60	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
	EA	8" Length, 316 Stainless Steel, Veneer Panel Anchor (Helifix® TorkFix)	13.99	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	

04 01 20 41-0063 Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®) (04 01 20 41-0001)
 Note: Austenitic stainless steel. For pinning stucco, terracotta, granite, marble, etc., to concrete block, brick or solid concrete. Includes drilling and patching surface.

04 01 20 41-0064		304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®) <small>(04 01 20 41-0063)</small>		
	EA	8mm Diameter, 115mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	8.55	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
		<i>For Metal Stud Clip, Add</i>	2.37	
	EA	8mm Diameter, 155mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	8.89	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
		<i>For Metal Stud Clip, Add</i>	2.37	
	EA	8mm Diameter, 170mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	8.95	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
		<i>For Metal Stud Clip, Add</i>	2.37	
	EA	8mm Diameter, 195mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	9.09	
		<i>For Up To 10, Add</i>	5.73	
		<i>For >10 To 50, Add</i>	2.87	
		<i>For Metal Stud Clip, Add</i>	2.37	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 01 20 41-0069	EA		8mm Diameter, 220mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.33	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0070	EA		8mm Diameter, 245mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.54	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0071	EA		8mm Diameter, 270mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.64	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0072	EA		8mm Diameter, 295mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.77	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0073	EA		8mm Diameter, 325mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.36	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0074	EA		8mm Diameter, 350mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.45	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0075	EA		8mm Diameter, 400mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.16	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0076	EA		8mm Diameter, 450mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.77	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0077	EA		8mm Diameter, 500mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	12.29	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0078	EA		8mm Diameter, 550mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	14.11	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0079	EA		8mm Diameter, 600mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	15.73	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0080	EA		8mm Diameter, 700mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	17.89	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0081	EA		10mm Diameter, 125mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	8.67	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0082	EA		10mm Diameter, 155mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.03	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0083	EA		10mm Diameter, 170mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.35	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0084	EA		10mm Diameter, 195mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.64	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0085	EA		10mm Diameter, 220mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.83	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
04 01 20 41-0086 EA 10mm Diameter, 245mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.96	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0087 EA 10mm Diameter, 270mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.17	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0088 EA 10mm Diameter, 300mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.26	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0089 EA 10mm Diameter, 350mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.68	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0090 EA 10mm Diameter, 400mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.28	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0091 EA 10mm Diameter, 450mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.78	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0092 EA 10mm Diameter, 500mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	12.42	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0093 EA 10mm Diameter, 550mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	15.84	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0094 EA 10mm Diameter, 600mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	17.75	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0095 EA 10mm Diameter, 700mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	20.72	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0096 EA 8mm Tapered To 6.5mm Diameter, 155mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	9.45	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0097 EA 8mm Tapered To 6.5mm Diameter, 170mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	9.66	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0098 EA 8mm Tapered To 6.5mm Diameter, 185mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	9.80	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0099 EA 8mm Tapered To 6.5mm Diameter, 195mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	9.90	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0100 EA 8mm Tapered To 6.5mm Diameter, 220mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.20	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0101 EA 8mm Tapered To 6.5mm Diameter, 245mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.67	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0102 EA 8mm Tapered To 6.5mm Diameter, 270mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.85	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	

04 Masonry**04 01 Maintenance of Masonry****04 01 20 Maintenance of Unit Masonry**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 01 20 41-0103	EA	8mm Tapered To 6.5mm Diameter, 295mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	11.32
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0104	EA	10mm Tapered To 8mm Diameter, 155mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	10.00
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0105	EA	10mm Tapered To 8mm Diameter, 170mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	10.41
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0106	EA	10mm Tapered To 8mm Diameter, 195mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	10.70
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0107	EA	10mm Tapered To 8mm Diameter, 220mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	10.88
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0108	EA	10mm Tapered To 8mm Diameter, 245mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	11.01
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0109	EA	10mm Tapered To 8mm Diameter, 300mm Length, 304 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	11.32
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0110	EA	304 Stainless Steel, Seismic Connector (Helifix® DryFix®)	4.54
		Note: For installation over the DryFix® helical pin. Excludes removal of grout from the horizontal mortar joint and installation of Helibar or 9 gauge continuous wire.	
		<i>For Up To 10, Add</i>	2.86
		<i>For >10 To 50, Add</i>	1.43

04 01 20 41-0111 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®) (04 01 20 41-0063)

04 01 20 41-0112	EA	8mm Diameter, 115mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	9.08
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0113	EA	8mm Diameter, 155mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	9.50
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0114	EA	8mm Diameter, 170mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	9.58
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0115	EA	8mm Diameter, 195mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	9.75
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0116	EA	8mm Diameter, 220mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	10.06
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0117	EA	8mm Diameter, 245mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	10.31
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0118	EA	8mm Diameter, 270mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	10.44
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37
04 01 20 41-0119	EA	8mm Diameter, 295mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®)	10.61
		<i>For Up To 10, Add</i>	5.73
		<i>For >10 To 50, Add</i>	2.87
		<i>For Metal Stud Clip, Add</i>	2.37

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
04 01 20 41-0120 EA 8mm Diameter, 325mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.22	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0121 EA 8mm Diameter, 350mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.33	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0122 EA 8mm Diameter, 400mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	12.22	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0123 EA 8mm Diameter, 450mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	12.97	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0124 EA 8mm Diameter, 500mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	13.63	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0125 EA 8mm Diameter, 550mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	15.90	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0126 EA 8mm Diameter, 600mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	17.75	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0127 EA 8mm Diameter, 700mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	20.44	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0128 EA 10mm Diameter, 125mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.30	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0129 EA 10mm Diameter, 155mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	9.71	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0130 EA 10mm Diameter, 170mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.11	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0131 EA 10mm Diameter, 195mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.48	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0132 EA 10mm Diameter, 220mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.71	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0133 EA 10mm Diameter, 245mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	10.87	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0134 EA 10mm Diameter, 270mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.14	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0135 EA 10mm Diameter, 300mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.25	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0136 EA 10mm Diameter, 350mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	11.74	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 01 20 41-0137	EA		10mm Diameter, 400mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	12.42	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0138	EA		10mm Diameter, 450mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	13.04	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0139	EA		10mm Diameter, 500mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	13.83	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0140	EA		10mm Diameter, 550mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	18.10	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0141	EA		10mm Diameter, 600mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	20.15	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0142	EA		10mm Diameter, 700mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix®).....	23.87	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0143	EA		8mm Tapered To 6.5mm Diameter, 155mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.29	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0144	EA		8mm Tapered To 6.5mm Diameter, 170mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.53	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0145	EA		8mm Tapered To 6.5mm Diameter, 185mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.69	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0146	EA		8mm Tapered To 6.5mm Diameter, 195mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.82	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0147	EA		8mm Tapered To 6.5mm Diameter, 220mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	11.19	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0148	EA		8mm Tapered To 6.5mm Diameter, 245mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	11.79	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0149	EA		8mm Tapered To 6.5mm Diameter, 270mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	11.98	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0150	EA		8mm Tapered To 6.5mm Diameter, 295mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	12.57	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0151	EA		10mm Tapered To 8mm Diameter, 155mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	10.89	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0152	EA		10mm Tapered To 8mm Diameter, 170mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	11.40	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0153	EA		10mm Tapered To 8mm Diameter, 195mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric).....	11.77	
			<i>For Up To 10, Add</i>	5.73	
			<i>For >10 To 50, Add</i>	2.87	
			<i>For Metal Stud Clip, Add</i>	2.37	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 01 20 41-0154 EA 10mm Tapered To 8mm Diameter, 220mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	12.00	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0155 EA 10mm Tapered To 8mm Diameter, 245mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	12.16	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0156 EA 10mm Tapered To 8mm Diameter, 300mm Length, 316 Stainless Steel Helical Pin, Dry Mechanical Pinning And Remedial Tying System (Helifix® DryFix® Asymmetric)	12.54	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
<i>For Metal Stud Clip, Add</i>	2.37	
04 01 20 41-0157 EA 316 Stainless Steel, Seismic Connector (Helifix® DryFix®)	4.95	
Note: For installation over the DryFix® helical pin. Excludes removal of grout from the horizontal mortar joint and installation of Helibar or 9 gauge continuous wire.		
<i>For Up To 10, Add</i>	2.86	
<i>For >10 To 50, Add</i>	1.43	
04 01 20 41-0158 Concrete Patching Pins (Helifix® PatchPin) (04 01 20 41-0001)		
Note: Austenitic stainless steel. For patching reinforced concrete. Includes drilling. Excludes patching mortar.		
04 01 20 41-0159 304 Stainless Steel Helical Pin, Concrete Patching Pins (Helifix® PatchPin)		
(04 01 20 41-0158)		
04 01 20 41-0160 EA 8mm Diameter, 70mm Length, 304 Stainless Steel Helical Pin, Concrete Patching Pin (Helifix® PatchPin)	7.26	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
04 01 20 41-0161 EA 8mm Diameter, 102mm Length, 304 Stainless Steel Helical Pin, Concrete Patching Pin (Helifix® PatchPin)	7.30	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
04 01 20 41-0162 316 Stainless Steel Helical Pin, Concrete Patching Pins (Helifix® PatchPin)		
(04 01 20 41-0158)		
04 01 20 41-0163 EA 8mm Diameter, 70mm Length, 316 Stainless Steel Helical Pin, Concrete Patching Pin (Helifix® PatchPin)	7.54	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
04 01 20 41-0164 EA 8mm Diameter, 102mm Length, 316 Stainless Steel Helical Pin, Concrete Patching Pin (Helifix® PatchPin)	7.61	
<i>For Up To 10, Add</i>	5.73	
<i>For >10 To 50, Add</i>	2.87	
04 01 20 41-0165 Movement Joint Ties (Helifix® Movement Joint Tie) (04 01 20 41-0001)		
Note: Austenitic stainless steel. For creating movement joints in existing walls. Includes removing horizontal mortar and re-pointing mortar bed. Includes cementitious grout.		
04 01 20 41-0166 304 Stainless Steel Helical Pin, Movement Joint Ties (Helifix® Movement Joint Tie) (04 01 20 41-0165)		
04 01 20 41-0167 EA 6mm Diameter, 400mm Length, 304 Stainless Steel Helical Pin, Movement Joint Tie With De-Bond Sleeve (Helifix® Movement Joint Tie)	46.94	
<i>For Up To 10, Add</i>	38.20	
<i>For >10 To 50, Add</i>	19.10	
04 01 20 41-0168 316 Stainless Steel Helical Pin, Movement Joint Ties (Helifix® Movement Joint Tie) (04 01 20 41-0165)		
04 01 20 41-0169 EA 6mm Diameter, 400mm Length, 316 Stainless Steel Helical Pin, Movement Joint Tie With De-Bond Sleeve (Helifix® Movement Joint Tie)	48.24	
<i>For Up To 10, Add</i>	38.20	
<i>For >10 To 50, Add</i>	19.10	
04 01 20 41-0170 Unit Masonry Stabilization (04 01 20 41)		
04 01 20 41-0171 Repair Bulging Or Loose Masonry (04 01 20 41-0170)		
04 01 20 41-0172 SF Repair Bulging Or Loose Masonry Using Existing Masonry	84.78	
Note: Includes saw cutting, toothing, removing loose masonry, installing anchor and reinstalling brick and mortar.		
04 01 20 41-0173 SF Repair Bulging Or Loose Masonry Using New Masonry	90.56	
Note: Includes saw cutting, toothing, removing loose masonry, installing anchor and installing new brick and mortar.		
04 01 20 51 Unit Masonry Maintenance (04 01 20)		
04 01 20 51-0001 Grind Unit Masonry (04 01 20 51)		
04 01 20 51-0002 SF Grind Smooth Masonry Wall	3.99	
04 01 20 91 Unit Masonry Restoration (04 01 20)		
See CSI section 03 01 30 71-0057 for crack repair.		

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 01 20 91-0001	Cut And Repoint Masonry <small>(04 01 20 91)</small>	
	Note: Remove existing mortar to 3/4" depth. Repoint with pointing mortar. Includes pointing mortar, cutting, rinsing and cleaning joint.	
04 01 20 91-0002	SF Cut And Repoint, Hard Mortar, Running Bond, Brick.....	9.57
	<i>For Common Bond, Add</i>	0.36
	<i>For Flemish Bond, Add</i>	1.25
	<i>For English Bond, Add</i>	2.06
	<i>For Oversized Or Larger Than Standard, Deduct</i>	-1.44
	<i>For >250 To 1,000, Deduct</i>	-0.45
	<i>For >1,000, Deduct</i>	-0.93
04 01 20 91-0003	SF Cut And Repoint, Soft, Loose Or Crumbling Mortar, Running Bond, Brick.....	6.69
	<i>For Common Bond, Add</i>	0.24
	<i>For Flemish Bond, Add</i>	0.85
	<i>For English Bond, Add</i>	1.40
	<i>For Oversized Or Larger Than Standard, Deduct</i>	-1.00
	<i>For >250 To 1,000, Deduct</i>	-0.30
	<i>For >1,000, Deduct</i>	-0.64
04 01 20 91-0004	SF Cut And Repoint, Hard Mortar, Running Bond, Concrete Block.....	5.16
	<i>For Common Bond, Add</i>	0.18
	<i>For Oversized Or Larger Than Standard, Deduct</i>	-0.77
	<i>For >250 To 1,000, Deduct</i>	-0.23
	<i>For >1,000, Deduct</i>	-0.49
04 01 20 91-0005	SF Cut And Repoint, Soft, Loose Or Crumbling Mortar, Running Bond, Concrete Block.....	3.72
	<i>For Common Bond, Add</i>	0.12
	<i>For Oversized Or Larger Than Standard, Deduct</i>	-0.56
	<i>For >250 To 1,000, Deduct</i>	-0.16
	<i>For >1,000, Deduct</i>	-0.34
04 01 20 91-0006	LF Cut And Repoint Brick/Block, Irregular Shapes And Other Than Complete SF Area.....	3.03
04 01 20 91-0007	Repair Masonry <small>(04 01 20 91)</small>	
	Note: Includes mortar for repair.	
04 01 20 91-0008	SF Patch And Repair Terra Cotta Walls Or Coping.....	20.40
	Note: Including Replacement Of Damaged Material	
04 01 20 91-0009	SF Patch And Repair Terra Cotta Floors.....	19.00
	Note: Including Replacement Of Damaged Material	
04 01 20 91-0010	LF Chip And Repair With Masonry Patch, Cracks Up To 1/4".....	4.40
04 01 20 91-0011	SF Patching Over Masonry Surface With Elastomeric Paint Using A Trowel 6" Blade.....	7.94
04 01 20 91-0012	LF Pressure Grout Block/Brick Using LA City RGA Rule Of General Application 1-91 (Portland Cement Base).....	427.19
04 01 20 91-0013	LF Pressure Grout Block/Brick Master Builders RHEOCHEM 900 (Portland Cement Base).....	121.88
04 01 20 91-0014	LF Up To 1/4" Wide, Water Activated Polyurethane Foam Grout, Non-Structural Crack Repair For Masonry, Installed With Automated Injection Equipment (SealBoss 1570).....	36.57
	<i>For Cracks Accessible From Both Sides, Add</i>	7.42
04 01 20 91-0015	LF Up To 1/4" Wide, Moisture Tolerant, Low Viscosity, High Strength Epoxy Resin, Structural Crack Repair For Masonry, Installed With Automated Injection Equipment (Sikadur® 52).....	32.41
	<i>For Cracks Accessible From Both Sides, Add</i>	7.42
04 01 20 91-0016	LF Up To 1/4" Wide, Moisture Tolerant, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Masonry, Surface Applied Trowel (Sikadur® 52).....	8.89
	<i>For V-Grooving Crack With Grinder, Add</i>	6.40
04 01 20 91-0017	LF >1/4" To 1/2" Wide, Moisture Tolerant, Low Viscosity, High Strength Epoxy Resin, Gravity Fed Structural Crack Repair For Masonry, Surface Applied With Trowel (Sikadur® 52).....	11.95
	<i>For V-Grooving Crack With Grinder, Add</i>	6.08

04 01 50 Maintenance of Refractory Masonry (04 01)

04 01 50 52 Refractory Masonry Cleaning (04 01 50)

04 01 50 52-0001 Chimney Cleaning (04 01 50 52)

04 01 50 52-0002	LF Up To 2 SF Cross Section Chimney Cleaning.....	7.78
04 01 50 52-0003	LF >2 To 4 SF Cross Section Chimney Cleaning.....	15.55
04 01 50 52-0004	LF >4 SF Cross Section Chimney Cleaning.....	23.34

04 05 Common Work Results for Masonry (04)

04 05 13 Masonry Mortaring (04 05)

04 05 13 26 Engineered Masonry Mortaring (04 05 13)

Note: Mortar, sand and standard supplements are included in the cost of brick, block, stone, simulated or synthetic masonry units.

04 05 13 26-0001 Masonry Cement Mortar (04 05 13 26)

Note: Ratio is bag material to sand.

04 05 13 26-0002	CF Type M Masonry Cement 1:1:6 Mix.....	7.43
04 05 13 26-0003	CF Type N Masonry Cement 1:3 Mix.....	6.86
04 05 13 26-0004	CF Type O Masonry Cement 1:3 Mix.....	7.04
04 05 13 26-0005	CF Type PM Masonry Cement 1:1:6 Mix, 2,500 PSI.....	7.70
04 05 13 26-0006	CF Type S Masonry Cement 1/2:1:4 Mix.....	8.12

04 05 13 26-0007 Mortar Admixture (04 05 13 26)

04 05 13 26-0008	CF Water - Repellent Stearate - Cost Based On CF Of Mortar.....	0.44
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 05 13 26-0009	CF	Pozzolanic Plasticizers - Cost Based On CF Of Mortar	0.08
04 05 13 26-0010		Color Admixtures For Mortar <small>(04 05 13 26)</small> Note: Costs are based on CF of mortar.	
04 05 13 26-0011	CF	Buff Colored Admixture	2.79
04 05 13 26-0012	CF	Brown Colored Admixture	3.17
04 05 13 26-0013	CF	Black Colored Admixture	3.92
04 05 13 26-0014	CF	Red Colored Admixture	8.58
04 05 13 26-0015		Portland Cement <small>(04 05 13 26)</small>	
04 05 13 26-0016	CF	Normal Portland Cement (Type I)	14.87
04 05 13 26-0017	CF	Modified Portland Cement (Type II)	7.42
04 05 13 26-0018	CF	High Early Strength Portland Cement (Type III)	7.87
04 05 13 26-0019	CF	White Non-Staining Portland Cement (Type I)	16.48

04 05 16 Masonry Grouting (04 05)

04 05 16 26 Engineered Masonry Grouting (04 05 16)

Note: Excludes reinforcement.

04 05 16 26-0001		Grout Bond Beams And Lintels, Grout Fill <small>(04 05 16 26)</small> Note: Excludes block.	
04 05 16 26-0002	LF	Grout Bond Beams And Lintels - 6" Block, Grout Fill Only, 0.1125 CF/LF, 8" Deep	4.45
04 05 16 26-0003	LF	Grout Bond Beams And Lintels - 8" Block, Grout Fill Only, 0.20 CF/LF, 8" Deep	4.86
04 05 16 26-0004	LF	Grout Bond Beams And Lintels - 10" Block, Grout Fill Only, 0.25 CF/LF, 8" Deep	5.45
04 05 16 26-0005	LF	Grout Bond Beams And Lintels, 12" Block, Grout Fill Only, 0.30 CF/LF, 8" Deep	6.10
04 05 16 26-0006		Grout Concrete Block Cores, Grout Fill <small>(04 05 16 26)</small> Note: Per SF of face area filled.	
04 05 16 26-0007	SF	Grout Concrete Block Cores- 4" Block, Grout Fill Block Solid (0.067 CF/SF)	3.44
04 05 16 26-0008	SF	Grout Concrete Block Cores- 6" Block, Grout Fill Block Solid (0.175 CF/SF)	5.04
04 05 16 26-0009	SF	Grout Concrete Block Cores- 8" Block, Grout Fill Block Solid (0.258 CF/SF)	7.20
04 05 16 26-0010	SF	Grout Concrete Block Cores- 10" Block, Grout Fill Block Solid (0.34 CF/SF)	8.85
04 05 16 26-0011	SF	Grout Concrete Block Cores- 12" Block, Grout Fill Block Solid (0.422 CF/SF)	10.48
04 05 16 26-0012		Grout Cavity Walls, Grout Fill <small>(04 05 16 26)</small> Note: Per SF of face area filled.	
04 05 16 26-0013	SF	Grout Cavity Walls - 2" Space, Grout Fill (0.167 CF/SF)	4.09
04 05 16 26-0014	SF	Grout Cavity Walls - 3" Space, Grout Fill (0.250 CF/SF)	5.78
04 05 16 26-0015	SF	Grout Cavity Walls - 4" Space, Grout Fill (0.333 CF/SF)	7.27
04 05 16 26-0016	SF	Grout Cavity Walls - 6" Space, Grout Fill (0.500 CF/SF)	9.88
04 05 16 26-0017		Grout Frames, Grout Fill <small>(04 05 16 26)</small>	
04 05 16 26-0018	LF	Grout Door Frames - Grout Fill	6.54
04 05 16 26-0019	LF	Grout Window Frames - Grout Fill	5.61
04 05 16 26-0020		Sand Filled Walls <small>(04 05 16 26)</small>	
04 05 16 26-0021		Sand Fill Cavity Walls, Sand Fill <small>(04 05 16 26-0020)</small> Note: Per SF of face area filled.	
04 05 16 26-0022	SF	Sand Fill Cavity Walls - 2" Space, Sand Fill (0.167 CF/SF)	3.32
04 05 16 26-0023	SF	Sand Fill Cavity Walls - 3" Space, Sand Fill (0.250 CF/SF)	4.58
04 05 16 26-0024	SF	Sand Fill Cavity Walls - 4" Space, Sand Fill (0.333 CF/SF)	5.63
04 05 16 26-0025	SF	Sand Fill Cavity Walls - 6" Space, Sand Fill (0.500 CF/SF)	7.50

04 05 19 Masonry Anchorage and Reinforcing (04 05)

04 05 19 13 Continuous Joint Reinforcing (04 05 19)

Note: Includes cutting and bending.

04 05 19 13-0001		Continuous Joint Reinforcing <small>(04 05 19 13)</small>	
04 05 19 13-0002		Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0001)</small>	
04 05 19 13-0003		Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0002)</small>	
04 05 19 13-0004		Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>	
04 05 19 13-0005	CLF	#4 (For 4" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	56.43
		<i>For Hot-Dipped Galvanized, Add</i>	9.51
		<i>For Stainless Steel, Add</i>	38.02

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
04 05 19 13-0006	CLF #6 (For 6" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	59.95	
	<i>For Hot-Dipped Galvanized, Add</i>	9.99	
	<i>For Stainless Steel, Add</i>	39.94	
04 05 19 13-0007	CLF #8 (For 8" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	64.67	
	<i>For Hot-Dipped Galvanized, Add</i>	10.53	
	<i>For Stainless Steel, Add</i>	42.10	
04 05 19 13-0008	CLF #10 (For 10" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	70.25	
	<i>For Hot-Dipped Galvanized, Add</i>	11.14	
	<i>For Stainless Steel, Add</i>	44.54	
04 05 19 13-0009	CLF #12 (For 12" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	76.79	
	<i>For Hot-Dipped Galvanized, Add</i>	11.74	
	<i>For Stainless Steel, Add</i>	46.94	
04 05 19 13-0010	CLF #13 (For 13" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	81.63	
	<i>For Hot-Dipped Galvanized, Add</i>	12.03	
	<i>For Stainless Steel, Add</i>	48.10	
04 05 19 13-0011	CLF #14 (For 14" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	85.17	
	<i>For Hot-Dipped Galvanized, Add</i>	12.36	
	<i>For Stainless Steel, Add</i>	49.44	
04 05 19 13-0012	CLF #16 (For 16" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	98.27	
	<i>For Hot-Dipped Galvanized, Add</i>	16.99	
	<i>For Stainless Steel, Add</i>	67.96	
04 05 19 13-0013	CLF #18 (For 18" Walls), Mill Galvanized, Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	120.66	
	<i>For Hot-Dipped Galvanized, Add</i>	26.27	
	<i>For Stainless Steel, Add</i>	105.06	
04 05 19 13-0014	Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>		
04 05 19 13-0015	CLF #4 (For 4" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	66.98	
	<i>For Hot-Dipped Galvanized, Add</i>	14.78	
	<i>For Stainless Steel, Add</i>	59.10	
04 05 19 13-0016	CLF #6 (For 6" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	70.61	
	<i>For Hot-Dipped Galvanized, Add</i>	15.32	
	<i>For Stainless Steel, Add</i>	61.26	
04 05 19 13-0017	CLF #8 (For 8" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	75.44	
	<i>For Hot-Dipped Galvanized, Add</i>	15.91	
	<i>For Stainless Steel, Add</i>	63.64	
04 05 19 13-0018	CLF #10 (For 10" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	80.91	
	<i>For Hot-Dipped Galvanized, Add</i>	16.47	
	<i>For Stainless Steel, Add</i>	65.86	
04 05 19 13-0019	CLF #12 (For 12" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	87.42	
	<i>For Hot-Dipped Galvanized, Add</i>	17.05	
	<i>For Stainless Steel, Add</i>	68.20	
04 05 19 13-0020	CLF #13 (For 13" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	92.30	
	<i>For Hot-Dipped Galvanized, Add</i>	17.37	
	<i>For Stainless Steel, Add</i>	69.48	
04 05 19 13-0021	CLF #14 (For 14" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	95.78	
	<i>For Hot-Dipped Galvanized, Add</i>	17.66	
	<i>For Stainless Steel, Add</i>	70.64	
04 05 19 13-0022	CLF #16 (For 16" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	112.28	
	<i>For Hot-Dipped Galvanized, Add</i>	24.00	
	<i>For Stainless Steel, Add</i>	96.00	
04 05 19 13-0023	CLF #18 (For 18" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	144.70	
	<i>For Hot-Dipped Galvanized, Add</i>	38.29	
	<i>For Stainless Steel, Add</i>	153.16	
04 05 19 13-0024	Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>		
04 05 19 13-0025	CLF #4 (For 4" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	77.19	
	<i>For Hot-Dipped Galvanized, Add</i>	19.89	
	<i>For Stainless Steel, Add</i>	79.54	
04 05 19 13-0026	CLF #6 (For 6" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	82.27	
	<i>For Hot-Dipped Galvanized, Add</i>	20.98	
	<i>For Stainless Steel, Add</i>	83.92	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0027 CLF #8 (For 8" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	87.32	
<i>For Hot-Dipped Galvanized, Add</i>	22.07	
<i>For Stainless Steel, Add</i>	88.28	
04 05 19 13-0028 CLF #10 (For 10" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	94.74	
<i>For Hot-Dipped Galvanized, Add</i>	23.38	
<i>For Stainless Steel, Add</i>	93.52	
04 05 19 13-0029 CLF #12 (For 12" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	102.13	
<i>For Hot-Dipped Galvanized, Add</i>	24.68	
<i>For Stainless Steel, Add</i>	98.70	
04 05 19 13-0030 CLF #13 (For 13" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	108.33	
<i>For Hot-Dipped Galvanized, Add</i>	25.38	
<i>For Stainless Steel, Add</i>	101.50	
04 05 19 13-0031 CLF #14 (For 14" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	111.92	
<i>For Hot-Dipped Galvanized, Add</i>	25.97	
<i>For Stainless Steel, Add</i>	103.88	
04 05 19 13-0032 CLF #16 (For 16" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	118.62	
<i>For Hot-Dipped Galvanized, Add</i>	27.17	
<i>For Stainless Steel, Add</i>	108.66	
04 05 19 13-0033 CLF #18 (For 18" Walls), Mill Galvanized, Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	158.39	
<i>For Hot-Dipped Galvanized, Add</i>	45.13	
<i>For Stainless Steel, Add</i>	180.52	
04 05 19 13-0034 Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>		
04 05 19 13-0035 CLF #4 (For 4" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	80.71	
<i>For Hot-Dipped Galvanized, Add</i>	21.65	
<i>For Stainless Steel, Add</i>	86.58	
04 05 19 13-0036 CLF #6 (For 6" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	84.21	
<i>For Hot-Dipped Galvanized, Add</i>	22.12	
<i>For Stainless Steel, Add</i>	88.46	
04 05 19 13-0037 CLF #8 (For 8" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	88.92	
<i>For Hot-Dipped Galvanized, Add</i>	22.66	
<i>For Stainless Steel, Add</i>	90.62	
04 05 19 13-0038 CLF #10 (For 10" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	94.51	
<i>For Hot-Dipped Galvanized, Add</i>	23.27	
<i>For Stainless Steel, Add</i>	93.06	
04 05 19 13-0039 CLF #12 (For 12" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	101.04	
<i>For Hot-Dipped Galvanized, Add</i>	23.86	
<i>For Stainless Steel, Add</i>	95.44	
04 05 19 13-0040 CLF #13 (For 13" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	105.89	
<i>For Hot-Dipped Galvanized, Add</i>	24.16	
<i>For Stainless Steel, Add</i>	96.62	
04 05 19 13-0041 CLF #14 (For 14" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	109.42	
<i>For Hot-Dipped Galvanized, Add</i>	24.49	
<i>For Stainless Steel, Add</i>	97.94	
04 05 19 13-0042 CLF #16 (For 16" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	122.52	
<i>For Hot-Dipped Galvanized, Add</i>	29.12	
<i>For Stainless Steel, Add</i>	116.46	
04 05 19 13-0043 Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>		
04 05 19 13-0044 CLF #4 (For 4" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	91.24	
<i>For Hot-Dipped Galvanized, Add</i>	26.91	
<i>For Stainless Steel, Add</i>	107.64	
04 05 19 13-0045 CLF #6 (For 6" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	94.89	
<i>For Hot-Dipped Galvanized, Add</i>	27.46	
<i>For Stainless Steel, Add</i>	109.82	
04 05 19 13-0046 CLF #8 (For 8" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	99.71	
<i>For Hot-Dipped Galvanized, Add</i>	28.05	
<i>For Stainless Steel, Add</i>	112.20	
04 05 19 13-0047 CLF #10 (For 10" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	105.19	
<i>For Hot-Dipped Galvanized, Add</i>	28.61	
<i>For Stainless Steel, Add</i>	114.42	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0048	CLF	#12 (For 12" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	111.69		
		<i>For Hot-Dipped Galvanized, Add</i>	29.19		
		<i>For Stainless Steel, Add</i>	116.74		
04 05 19 13-0049	CLF	#13 (For 13" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	116.57		
		<i>For Hot-Dipped Galvanized, Add</i>	29.51		
		<i>For Stainless Steel, Add</i>	118.02		
04 05 19 13-0050	CLF	#14 (For 14" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	120.04		
		<i>For Hot-Dipped Galvanized, Add</i>	29.80		
		<i>For Stainless Steel, Add</i>	119.18		
04 05 19 13-0051	CLF	#16 (For 16" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	136.55		
		<i>For Hot-Dipped Galvanized, Add</i>	36.13		
		<i>For Stainless Steel, Add</i>	144.52		
04 05 19 13-0052	CLF	#18 (For 18" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	168.97		
		<i>For Hot-Dipped Galvanized, Add</i>	50.43		
		<i>For Stainless Steel, Add</i>	201.70		
04 05 19 13-0053		Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>			
04 05 19 13-0054	CLF	#4 (For 4" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	101.45		
		<i>For Hot-Dipped Galvanized, Add</i>	32.02		
		<i>For Stainless Steel, Add</i>	128.06		
04 05 19 13-0055	CLF	#6 (For 6" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	106.53		
		<i>For Hot-Dipped Galvanized, Add</i>	33.11		
		<i>For Stainless Steel, Add</i>	132.44		
04 05 19 13-0056	CLF	#8 (For 8" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	111.59		
		<i>For Hot-Dipped Galvanized, Add</i>	34.21		
		<i>For Stainless Steel, Add</i>	136.82		
04 05 19 13-0057	CLF	#10 (For 10" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	119.00		
		<i>For Hot-Dipped Galvanized, Add</i>	35.51		
		<i>For Stainless Steel, Add</i>	142.04		
04 05 19 13-0058	CLF	#12 (For 12" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	126.40		
		<i>For Hot-Dipped Galvanized, Add</i>	36.81		
		<i>For Stainless Steel, Add</i>	147.24		
04 05 19 13-0059	CLF	#13 (For 13" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	132.59		
		<i>For Hot-Dipped Galvanized, Add</i>	37.51		
		<i>For Stainless Steel, Add</i>	150.02		
04 05 19 13-0060	CLF	#14 (For 14" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	136.18		
		<i>For Hot-Dipped Galvanized, Add</i>	38.10		
		<i>For Stainless Steel, Add</i>	152.40		
04 05 19 13-0061	CLF	#16 (For 16" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	142.88		
		<i>For Hot-Dipped Galvanized, Add</i>	39.30		
		<i>For Stainless Steel, Add</i>	157.18		
04 05 19 13-0062	CLF	#18 (For 18" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	182.65		
		<i>For Hot-Dipped Galvanized, Add</i>	57.26		
		<i>For Stainless Steel, Add</i>	229.04		
04 05 19 13-0063		Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>			
04 05 19 13-0064	CLF	#4 (For 4" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	104.97		
		<i>For Hot-Dipped Galvanized, Add</i>	33.78		
		<i>For Stainless Steel, Add</i>	135.10		
04 05 19 13-0065	CLF	#6 (For 6" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	108.47		
		<i>For Hot-Dipped Galvanized, Add</i>	34.25		
		<i>For Stainless Steel, Add</i>	136.98		
04 05 19 13-0066	CLF	#8 (For 8" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	113.18		
		<i>For Hot-Dipped Galvanized, Add</i>	34.79		
		<i>For Stainless Steel, Add</i>	139.14		
04 05 19 13-0067	CLF	#10 (For 10" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	118.77		
		<i>For Hot-Dipped Galvanized, Add</i>	35.40		
		<i>For Stainless Steel, Add</i>	141.58		
04 05 19 13-0068	CLF	#12 (For 12" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement	125.31		
		<i>For Hot-Dipped Galvanized, Add</i>	36.00		
		<i>For Stainless Steel, Add</i>	143.98		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0069 CLF #13 (For 13" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	130.15	
<i>For Hot-Dipped Galvanized, Add</i>	36.29	
<i>For Stainless Steel, Add</i>	145.14	
04 05 19 13-0070 CLF #14 (For 14" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	133.68	
<i>For Hot-Dipped Galvanized, Add</i>	36.62	
<i>For Stainless Steel, Add</i>	146.46	
04 05 19 13-0071 CLF #16 (For 16" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	146.79	
<i>For Hot-Dipped Galvanized, Add</i>	41.25	
<i>For Stainless Steel, Add</i>	165.00	
04 05 19 13-0072 CLF #18 (For 18" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	169.18	
<i>For Hot-Dipped Galvanized, Add</i>	50.53	
<i>For Stainless Steel, Add</i>	202.10	
04 05 19 13-0073 Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>		
04 05 19 13-0074 CLF #4 (For 4" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	115.51	
<i>For Hot-Dipped Galvanized, Add</i>	39.05	
<i>For Stainless Steel, Add</i>	156.18	
04 05 19 13-0075 CLF #6 (For 6" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	119.15	
<i>For Hot-Dipped Galvanized, Add</i>	39.59	
<i>For Stainless Steel, Add</i>	158.34	
04 05 19 13-0076 CLF #8 (For 8" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	123.97	
<i>For Hot-Dipped Galvanized, Add</i>	40.18	
<i>For Stainless Steel, Add</i>	160.72	
04 05 19 13-0077 CLF #10 (For 10" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, Four-Wire, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	129.45	
<i>For Hot-Dipped Galvanized, Add</i>	40.74	
<i>For Stainless Steel, Add</i>	162.94	
04 05 19 13-0078 CLF #12 (For 12" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	135.96	
<i>For Hot-Dipped Galvanized, Add</i>	41.32	
<i>For Stainless Steel, Add</i>	165.28	
04 05 19 13-0079 CLF #13 (For 13" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	140.83	
<i>For Hot-Dipped Galvanized, Add</i>	41.64	
<i>For Stainless Steel, Add</i>	166.54	
04 05 19 13-0080 CLF #14 (For 14" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	144.31	
<i>For Hot-Dipped Galvanized, Add</i>	41.93	
<i>For Stainless Steel, Add</i>	167.72	
04 05 19 13-0081 CLF #16 (For 16" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	160.82	
<i>For Hot-Dipped Galvanized, Add</i>	48.27	
<i>For Stainless Steel, Add</i>	193.06	
04 05 19 13-0082 CLF #18 (For 18" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	193.24	
<i>For Hot-Dipped Galvanized, Add</i>	62.56	
<i>For Stainless Steel, Add</i>	250.24	
04 05 19 13-0083 Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0003)</small>		
04 05 19 13-0084 CLF #4 (For 4" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	125.71	
<i>For Hot-Dipped Galvanized, Add</i>	44.15	
<i>For Stainless Steel, Add</i>	176.58	
04 05 19 13-0085 CLF #6 (For 6" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	130.79	
<i>For Hot-Dipped Galvanized, Add</i>	45.24	
<i>For Stainless Steel, Add</i>	180.96	
04 05 19 13-0086 CLF #8 (For 8" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	135.85	
<i>For Hot-Dipped Galvanized, Add</i>	46.34	
<i>For Stainless Steel, Add</i>	185.34	
04 05 19 13-0087 CLF #10 (For 10" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	143.26	
<i>For Hot-Dipped Galvanized, Add</i>	47.64	
<i>For Stainless Steel, Add</i>	190.56	
04 05 19 13-0088 CLF #12 (For 12" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	150.67	
<i>For Hot-Dipped Galvanized, Add</i>	48.95	
<i>For Stainless Steel, Add</i>	195.78	
04 05 19 13-0089 CLF #13 (For 13" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement.....	156.85	
<i>For Hot-Dipped Galvanized, Add</i>	49.64	
<i>For Stainless Steel, Add</i>	198.54	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 13-0090	CLF #14 (For 14" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	160.45	
	<i>For Hot-Dipped Galvanized, Add</i>	50.24	
	<i>For Stainless Steel, Add</i>	200.94	
04 05 19 13-0091	CLF #16 (For 16" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	167.14	
	<i>For Hot-Dipped Galvanized, Add</i>	51.43	
	<i>For Stainless Steel, Add</i>	205.70	
04 05 19 13-0092	CLF #18 (For 18" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type, Masonry Wall Reinforcement	206.92	
	<i>For Hot-Dipped Galvanized, Add</i>	69.40	
	<i>For Stainless Steel, Add</i>	277.58	
04 05 19 13-0093	Ladder-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0002)</small>		
04 05 19 13-0094	9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0093)</small>		
04 05 19 13-0095	CLF #8 (For 8" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	80.91	
	<i>For Hot-Dipped Galvanized, Add</i>	16.16	
	<i>For Stainless Steel, Add</i>	64.64	
04 05 19 13-0096	CLF #10 (For 10" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	89.27	
	<i>For Hot-Dipped Galvanized, Add</i>	17.65	
	<i>For Stainless Steel, Add</i>	70.58	
04 05 19 13-0097	CLF #12 (For 12" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	97.29	
	<i>For Hot-Dipped Galvanized, Add</i>	18.96	
	<i>For Stainless Steel, Add</i>	75.82	
04 05 19 13-0098	CLF #13 (For 13" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	104.19	
	<i>For Hot-Dipped Galvanized, Add</i>	19.71	
	<i>For Stainless Steel, Add</i>	78.84	
04 05 19 13-0099	CLF #14 (For 14" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	108.30	
	<i>For Hot-Dipped Galvanized, Add</i>	20.41	
	<i>For Stainless Steel, Add</i>	81.64	
04 05 19 13-0100	CLF #16 (For 16" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	116.27	
	<i>For Hot-Dipped Galvanized, Add</i>	21.97	
	<i>For Stainless Steel, Add</i>	87.88	
04 05 19 13-0101	CLF #18 (For 18" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	123.15	
	<i>For Hot-Dipped Galvanized, Add</i>	23.25	
	<i>For Stainless Steel, Add</i>	93.00	
04 05 19 13-0102	3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0093)</small>		
04 05 19 13-0103	CLF #8 (For 8" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	94.04	
	<i>For Hot-Dipped Galvanized, Add</i>	22.73	
	<i>For Stainless Steel, Add</i>	90.90	
04 05 19 13-0104	CLF #10 (For 10" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	102.43	
	<i>For Hot-Dipped Galvanized, Add</i>	24.23	
	<i>For Stainless Steel, Add</i>	96.90	
04 05 19 13-0105	CLF #12 (For 12" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	110.30	
	<i>For Hot-Dipped Galvanized, Add</i>	25.46	
	<i>For Stainless Steel, Add</i>	101.84	
04 05 19 13-0106	CLF #13 (For 13" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	117.35	
	<i>For Hot-Dipped Galvanized, Add</i>	26.29	
	<i>For Stainless Steel, Add</i>	105.16	
04 05 19 13-0107	CLF #14 (For 14" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	121.43	
	<i>For Hot-Dipped Galvanized, Add</i>	26.98	
	<i>For Stainless Steel, Add</i>	107.90	
04 05 19 13-0108	CLF #16 (For 16" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	129.40	
	<i>For Hot-Dipped Galvanized, Add</i>	28.54	
	<i>For Stainless Steel, Add</i>	114.14	
04 05 19 13-0109	CLF #18 (For 18" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	136.46	
	<i>For Hot-Dipped Galvanized, Add</i>	29.91	
	<i>For Stainless Steel, Add</i>	119.62	
04 05 19 13-0110	3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0093)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0111 CLF #8 (For 8" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	100.42	
<i>For Hot-Dipped Galvanized, Add</i>	25.92	
<i>For Stainless Steel, Add</i>	103.66	
04 05 19 13-0112 CLF #10 (For 10" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	110.32	
<i>For Hot-Dipped Galvanized, Add</i>	28.17	
<i>For Stainless Steel, Add</i>	112.68	
04 05 19 13-0113 CLF #12 (For 12" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	120.15	
<i>For Hot-Dipped Galvanized, Add</i>	30.39	
<i>For Stainless Steel, Add</i>	121.54	
04 05 19 13-0114 CLF #13 (For 13" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	127.89	
<i>For Hot-Dipped Galvanized, Add</i>	31.56	
<i>For Stainless Steel, Add</i>	126.24	
04 05 19 13-0115 CLF #14 (For 14" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	132.76	
<i>For Hot-Dipped Galvanized, Add</i>	32.64	
<i>For Stainless Steel, Add</i>	130.56	
04 05 19 13-0116 CLF #16 (For 16" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	142.21	
<i>For Hot-Dipped Galvanized, Add</i>	34.94	
<i>For Stainless Steel, Add</i>	139.76	
04 05 19 13-0117 CLF #18 (For 18" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Tabs, Masonry Wall Reinforcement	151.04	
<i>For Hot-Dipped Galvanized, Add</i>	37.20	
<i>For Stainless Steel, Add</i>	148.78	
04 05 19 13-0118 Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0002)</small>		
04 05 19 13-0119 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0118)</small>		
04 05 19 13-0120 CLF #8 (For 4" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	116.26	
<i>For Hot-Dipped Galvanized, Add</i>	33.84	
<i>For Stainless Steel, Add</i>	135.34	
04 05 19 13-0121 CLF #10 (For 6" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	123.71	
<i>For Hot-Dipped Galvanized, Add</i>	34.87	
<i>For Stainless Steel, Add</i>	139.46	
04 05 19 13-0122 CLF #12 (For 8" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	131.21	
<i>For Hot-Dipped Galvanized, Add</i>	35.92	
<i>For Stainless Steel, Add</i>	143.66	
04 05 19 13-0123 CLF #14 (For 10" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	141.64	
<i>For Hot-Dipped Galvanized, Add</i>	37.08	
<i>For Stainless Steel, Add</i>	148.32	
04 05 19 13-0124 CLF #16 (For 12" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	148.82	
<i>For Hot-Dipped Galvanized, Add</i>	38.25	
<i>For Stainless Steel, Add</i>	152.98	
04 05 19 13-0125 CLF #18 (For 14" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	156.69	
<i>For Hot-Dipped Galvanized, Add</i>	40.02	
<i>For Stainless Steel, Add</i>	160.08	
04 05 19 13-0126 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0118)</small>		
04 05 19 13-0127 CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	136.84	
<i>For Hot-Dipped Galvanized, Add</i>	44.13	
<i>For Stainless Steel, Add</i>	176.50	
04 05 19 13-0128 CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	144.33	
<i>For Hot-Dipped Galvanized, Add</i>	45.18	
<i>For Stainless Steel, Add</i>	180.70	
04 05 19 13-0129 CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	152.09	
<i>For Hot-Dipped Galvanized, Add</i>	46.36	
<i>For Stainless Steel, Add</i>	185.42	
04 05 19 13-0130 CLF #14 (For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	162.25	
<i>For Hot-Dipped Galvanized, Add</i>	47.39	
<i>For Stainless Steel, Add</i>	189.54	
04 05 19 13-0131 CLF #16 (For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	169.46	
<i>For Hot-Dipped Galvanized, Add</i>	48.57	
<i>For Stainless Steel, Add</i>	194.26	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 13-0132	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	176.14
	<i>For Hot-Dipped Galvanized, Add</i>	49.75
	<i>For Stainless Steel, Add</i>	198.98
04 05 19 13-0133	3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0118)</small>	
04 05 19 13-0134	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	138.36
	<i>For Hot-Dipped Galvanized, Add</i>	44.89
	<i>For Stainless Steel, Add</i>	179.54
04 05 19 13-0135	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	146.98
	<i>For Hot-Dipped Galvanized, Add</i>	46.50
	<i>For Stainless Steel, Add</i>	186.00
04 05 19 13-0136	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	155.58
	<i>For Hot-Dipped Galvanized, Add</i>	48.10
	<i>For Stainless Steel, Add</i>	192.40
04 05 19 13-0137	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	167.55
	<i>For Hot-Dipped Galvanized, Add</i>	50.04
	<i>For Stainless Steel, Add</i>	200.14
04 05 19 13-0138	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	176.25
	<i>For Hot-Dipped Galvanized, Add</i>	51.96
	<i>For Stainless Steel, Add</i>	207.84
04 05 19 13-0139	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement	184.38
	<i>For Hot-Dipped Galvanized, Add</i>	53.87
	<i>For Stainless Steel, Add</i>	215.46
04 05 19 13-0140	Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0002)</small>	
04 05 19 13-0141	9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0140)</small>	
04 05 19 13-0142	CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	125.49
	<i>For Hot-Dipped Galvanized, Add</i>	35.76
	<i>For Stainless Steel, Add</i>	143.02
04 05 19 13-0143	CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	132.93
	<i>For Hot-Dipped Galvanized, Add</i>	36.78
	<i>For Stainless Steel, Add</i>	147.10
04 05 19 13-0144	CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	143.07
	<i>For Hot-Dipped Galvanized, Add</i>	37.80
	<i>For Stainless Steel, Add</i>	151.18
04 05 19 13-0145	CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	150.33
	<i>For Hot-Dipped Galvanized, Add</i>	39.00
	<i>For Stainless Steel, Add</i>	156.00
04 05 19 13-0146	CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	156.98
	<i>For Hot-Dipped Galvanized, Add</i>	40.17
	<i>For Stainless Steel, Add</i>	160.66
04 05 19 13-0147	CLF #20 (For 14" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	164.67
	<i>For Hot-Dipped Galvanized, Add</i>	42.51
	<i>For Stainless Steel, Add</i>	170.04
04 05 19 13-0148	3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0140)</small>	
04 05 19 13-0149	CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	146.10
	<i>For Hot-Dipped Galvanized, Add</i>	46.06
	<i>For Stainless Steel, Add</i>	184.24
04 05 19 13-0150	CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	153.57
	<i>For Hot-Dipped Galvanized, Add</i>	47.10
	<i>For Stainless Steel, Add</i>	188.38
04 05 19 13-0151	CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	164.00
	<i>For Hot-Dipped Galvanized, Add</i>	48.26
	<i>For Stainless Steel, Add</i>	193.04
04 05 19 13-0152	CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement	170.92
	<i>For Hot-Dipped Galvanized, Add</i>	49.30
	<i>For Stainless Steel, Add</i>	197.18



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
04 05 19 13-0153	CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	177.60
	<i>For Hot-Dipped Galvanized, Add</i>	50.48
	<i>For Stainless Steel, Add</i>	201.90
04 05 19 13-0154	CLF #20 (For 14" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	185.55
	<i>For Hot-Dipped Galvanized, Add</i>	52.95
	<i>For Stainless Steel, Add</i>	211.80
04 05 19 13-0155	3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0140)</small>	
04 05 19 13-0156	CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	147.56
	<i>For Hot-Dipped Galvanized, Add</i>	46.79
	<i>For Stainless Steel, Add</i>	187.16
04 05 19 13-0157	CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	156.19
	<i>For Hot-Dipped Galvanized, Add</i>	48.41
	<i>For Stainless Steel, Add</i>	193.62
04 05 19 13-0158	CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	167.55
	<i>For Hot-Dipped Galvanized, Add</i>	50.04
	<i>For Stainless Steel, Add</i>	200.14
04 05 19 13-0159	CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	176.25
	<i>For Hot-Dipped Galvanized, Add</i>	51.96
	<i>For Stainless Steel, Add</i>	207.84
04 05 19 13-0160	CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	184.38
	<i>For Hot-Dipped Galvanized, Add</i>	53.87
	<i>For Stainless Steel, Add</i>	215.46
04 05 19 13-0161	CLF #20 (For 14" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	192.85
	<i>For Hot-Dipped Galvanized, Add</i>	56.60
	<i>For Stainless Steel, Add</i>	226.40
04 05 19 13-0162	Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0002)</small>	
04 05 19 13-0163	9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0162)</small>	
04 05 19 13-0164	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	118.71
	<i>For Hot-Dipped Galvanized, Add</i>	32.37
	<i>For Stainless Steel, Add</i>	129.46
	<i>For Seismic Hook And Eye, Add</i>	13.92
04 05 19 13-0165	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	125.79
	<i>For Hot-Dipped Galvanized, Add</i>	33.21
	<i>For Stainless Steel, Add</i>	132.82
	<i>For Seismic Hook And Eye, Add</i>	14.28
04 05 19 13-0166	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	135.70
	<i>For Hot-Dipped Galvanized, Add</i>	34.11
	<i>For Stainless Steel, Add</i>	136.44
	<i>For Seismic Hook And Eye, Add</i>	14.67
04 05 19 13-0167	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	142.47
	<i>For Hot-Dipped Galvanized, Add</i>	35.07
	<i>For Stainless Steel, Add</i>	140.28
	<i>For Seismic Hook And Eye, Add</i>	15.08
04 05 19 13-0168	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	148.80
	<i>For Hot-Dipped Galvanized, Add</i>	36.08
	<i>For Stainless Steel, Add</i>	144.30
	<i>For Seismic Hook And Eye, Add</i>	15.51
04 05 19 13-0169	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	153.61
	<i>For Hot-Dipped Galvanized, Add</i>	36.98
	<i>For Stainless Steel, Add</i>	147.92
	<i>For Seismic Hook And Eye, Add</i>	15.90
04 05 19 13-0170	3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0162)</small>	
04 05 19 13-0171	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	138.04
	<i>For Hot-Dipped Galvanized, Add</i>	42.03
	<i>For Stainless Steel, Add</i>	168.12
	<i>For Seismic Hook And Eye, Add</i>	18.07

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 13-0172	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	144.75
	<i>For Hot-Dipped Galvanized, Add</i>	42.69
	<i>For Stainless Steel, Add</i>	170.74
	<i>For Seismic Hook And Eye, Add</i>	18.35
04 05 19 13-0173	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	154.71
	<i>For Hot-Dipped Galvanized, Add</i>	43.62
	<i>For Stainless Steel, Add</i>	174.46
	<i>For Seismic Hook And Eye, Add</i>	18.75
04 05 19 13-0174	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	161.37
	<i>For Hot-Dipped Galvanized, Add</i>	44.52
	<i>For Stainless Steel, Add</i>	178.08
	<i>For Seismic Hook And Eye, Add</i>	19.14
04 05 19 13-0175	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	167.49
	<i>For Hot-Dipped Galvanized, Add</i>	45.42
	<i>For Stainless Steel, Add</i>	181.68
	<i>For Seismic Hook And Eye, Add</i>	19.53
04 05 19 13-0176	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	174.40
	<i>For Hot-Dipped Galvanized, Add</i>	47.38
	<i>For Stainless Steel, Add</i>	189.50
	<i>For Seismic Hook And Eye, Add</i>	20.37
04 05 19 13-0177	3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0162)</small>	
04 05 19 13-0178	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement	139.47
	<i>For Hot-Dipped Galvanized, Add</i>	42.75
	<i>For Stainless Steel, Add</i>	170.98
	<i>For Seismic Hook And Eye, Add</i>	18.38
04 05 19 13-0179	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	147.95
	<i>For Hot-Dipped Galvanized, Add</i>	44.29
	<i>For Stainless Steel, Add</i>	177.14
	<i>For Seismic Hook And Eye, Add</i>	19.04
04 05 19 13-0180	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	159.11
	<i>For Hot-Dipped Galvanized, Add</i>	45.82
	<i>For Stainless Steel, Add</i>	183.26
	<i>For Seismic Hook And Eye, Add</i>	19.70
04 05 19 13-0181	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	167.63
	<i>For Hot-Dipped Galvanized, Add</i>	47.65
	<i>For Stainless Steel, Add</i>	190.60
	<i>For Seismic Hook And Eye, Add</i>	20.49
04 05 19 13-0182	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	175.62
	<i>For Hot-Dipped Galvanized, Add</i>	49.49
	<i>For Stainless Steel, Add</i>	197.94
	<i>For Seismic Hook And Eye, Add</i>	21.28
04 05 19 13-0183	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	182.26
	<i>For Hot-Dipped Galvanized, Add</i>	51.31
	<i>For Stainless Steel, Add</i>	205.22
	<i>For Seismic Hook And Eye, Add</i>	22.06
04 05 19 13-0184	Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0002)</small>	
04 05 19 13-0185	9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0184)</small>	
04 05 19 13-0186	CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	127.95
	<i>For Hot-Dipped Galvanized, Add</i>	34.29
	<i>For Stainless Steel, Add</i>	137.14
	<i>For Seismic Hook And Eye, Add</i>	14.74
04 05 19 13-0187	CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	137.71
	<i>For Hot-Dipped Galvanized, Add</i>	35.12
	<i>For Stainless Steel, Add</i>	140.46
	<i>For Seismic Hook And Eye, Add</i>	15.10
04 05 19 13-0188	CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	144.22
	<i>For Hot-Dipped Galvanized, Add</i>	35.95
	<i>For Stainless Steel, Add</i>	143.78
	<i>For Seismic Hook And Eye, Add</i>	15.46

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0189 CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	150.66	
<i>For Hot-Dipped Galvanized, Add</i>	37.01	
<i>For Stainless Steel, Add</i>	148.02	
<i>For Seismic Hook And Eye, Add</i>	15.91	
04 05 19 13-0190 CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	155.59	
<i>For Hot-Dipped Galvanized, Add</i>	37.97	
<i>For Stainless Steel, Add</i>	151.88	
<i>For Seismic Hook And Eye, Add</i>	16.33	
04 05 19 13-0191 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0184)</small>		
04 05 19 13-0192 CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	146.58	
<i>For Hot-Dipped Galvanized, Add</i>	43.60	
<i>For Stainless Steel, Add</i>	174.40	
<i>For Seismic Hook And Eye, Add</i>	18.75	
04 05 19 13-0193 CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	156.49	
<i>For Hot-Dipped Galvanized, Add</i>	44.51	
<i>For Stainless Steel, Add</i>	178.02	
<i>For Seismic Hook And Eye, Add</i>	19.14	
04 05 19 13-0194 CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	163.26	
<i>For Hot-Dipped Galvanized, Add</i>	45.47	
<i>For Stainless Steel, Add</i>	181.86	
<i>For Seismic Hook And Eye, Add</i>	19.55	
04 05 19 13-0195 CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	169.12	
<i>For Hot-Dipped Galvanized, Add</i>	46.24	
<i>For Stainless Steel, Add</i>	184.94	
<i>For Seismic Hook And Eye, Add</i>	19.88	
04 05 19 13-0196 CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	174.22	
<i>For Hot-Dipped Galvanized, Add</i>	47.29	
<i>For Stainless Steel, Add</i>	189.14	
<i>For Seismic Hook And Eye, Add</i>	20.33	
04 05 19 13-0197 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0184)</small>		
04 05 19 13-0198 CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	148.51	
<i>For Hot-Dipped Galvanized, Add</i>	44.57	
<i>For Stainless Steel, Add</i>	178.26	
<i>For Seismic Hook And Eye, Add</i>	19.16	
04 05 19 13-0199 CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	159.69	
<i>For Hot-Dipped Galvanized, Add</i>	46.11	
<i>For Stainless Steel, Add</i>	184.42	
<i>For Seismic Hook And Eye, Add</i>	19.83	
04 05 19 13-0200 CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	167.63	
<i>For Hot-Dipped Galvanized, Add</i>	47.65	
<i>For Stainless Steel, Add</i>	190.60	
<i>For Seismic Hook And Eye, Add</i>	20.49	
04 05 19 13-0201 CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	175.62	
<i>For Hot-Dipped Galvanized, Add</i>	49.49	
<i>For Stainless Steel, Add</i>	197.94	
<i>For Seismic Hook And Eye, Add</i>	21.28	
04 05 19 13-0202 CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Ladder-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	182.26	
<i>For Hot-Dipped Galvanized, Add</i>	51.31	
<i>For Stainless Steel, Add</i>	205.22	
<i>For Seismic Hook And Eye, Add</i>	22.06	
04 05 19 13-0203 Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0001)</small>		
04 05 19 13-0204 Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0203)</small>		
04 05 19 13-0205 Two-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0206 CLF #4 (For 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	64.38	
<i>For Hot-Dipped Galvanized, Add</i>	13.48	
<i>For Stainless Steel, Add</i>	53.92	
04 05 19 13-0207 CLF #6 (For 6" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement.....	67.23	
<i>For Hot-Dipped Galvanized, Add</i>	13.63	
<i>For Stainless Steel, Add</i>	54.50	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0208	CLF		#8 (For 8" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	71.95	
			<i>For Hot-Dipped Galvanized, Add</i>	14.17	
			<i>For Stainless Steel, Add</i>	56.66	
04 05 19 13-0209	CLF		#10 (For 10" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	77.71	
			<i>For Hot-Dipped Galvanized, Add</i>	14.87	
			<i>For Stainless Steel, Add</i>	59.46	
04 05 19 13-0210	CLF		#12 (For 12" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	84.62	
			<i>For Hot-Dipped Galvanized, Add</i>	15.65	
			<i>For Stainless Steel, Add</i>	62.60	
04 05 19 13-0211	CLF		#13 (For 13" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	89.72	
			<i>For Hot-Dipped Galvanized, Add</i>	16.07	
			<i>For Stainless Steel, Add</i>	64.28	
04 05 19 13-0212	CLF		#14 (For 14" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	93.35	
			<i>For Hot-Dipped Galvanized, Add</i>	16.69	
			<i>For Stainless Steel, Add</i>	66.74	
04 05 19 13-0213	CLF		#16 (For 16" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	111.16	
			<i>For Hot-Dipped Galvanized, Add</i>	23.44	
			<i>For Stainless Steel, Add</i>	93.76	
04 05 19 13-0214	CLF		#18 (For 18" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	117.68	
			<i>For Hot-Dipped Galvanized, Add</i>	24.78	
			<i>For Stainless Steel, Add</i>	99.12	
04 05 19 13-0215	CLF		#20 (For 20" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	158.65	
			<i>For Hot-Dipped Galvanized, Add</i>	42.86	
			<i>For Stainless Steel, Add</i>	171.44	
04 05 19 13-0216			Two-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0217	CLF		#4 (For 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	74.82	
			<i>For Hot-Dipped Galvanized, Add</i>	18.70	
			<i>For Stainless Steel, Add</i>	74.78	
04 05 19 13-0218	CLF		#6 (For 6" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	77.89	
			<i>For Hot-Dipped Galvanized, Add</i>	18.96	
			<i>For Stainless Steel, Add</i>	75.82	
04 05 19 13-0219	CLF		#8 (For 8" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	82.61	
			<i>For Hot-Dipped Galvanized, Add</i>	19.50	
			<i>For Stainless Steel, Add</i>	77.98	
04 05 19 13-0220	CLF		#10 (For 10" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	88.34	
			<i>For Hot-Dipped Galvanized, Add</i>	20.18	
			<i>For Stainless Steel, Add</i>	80.72	
04 05 19 13-0221	CLF		#12 (For 12" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	95.10	
			<i>For Hot-Dipped Galvanized, Add</i>	20.89	
			<i>For Stainless Steel, Add</i>	83.56	
04 05 19 13-0222	CLF		#13 (For 13" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	100.33	
			<i>For Hot-Dipped Galvanized, Add</i>	21.39	
			<i>For Stainless Steel, Add</i>	85.54	
04 05 19 13-0223	CLF		#14 (For 14" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	103.80	
			<i>For Hot-Dipped Galvanized, Add</i>	21.91	
			<i>For Stainless Steel, Add</i>	87.64	
04 05 19 13-0224	CLF		#16 (For 16" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	125.19	
			<i>For Hot-Dipped Galvanized, Add</i>	30.46	
			<i>For Stainless Steel, Add</i>	121.82	
04 05 19 13-0225	CLF		#18 (For 18" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	131.71	
			<i>For Hot-Dipped Galvanized, Add</i>	31.80	
			<i>For Stainless Steel, Add</i>	127.18	
04 05 19 13-0226	CLF		#20 (For 20" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	188.25	
			<i>For Hot-Dipped Galvanized, Add</i>	60.07	
			<i>For Stainless Steel, Add</i>	240.26	
04 05 19 13-0227			Two-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0228	CLF		#4 (For 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	90.76	
			<i>For Hot-Dipped Galvanized, Add</i>	26.67	
			<i>For Stainless Steel, Add</i>	106.68	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
04 05 19 13-0229 CLF #6 (For 6" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	94.32	
<i>For Hot-Dipped Galvanized, Add</i>	27.01	
<i>For Stainless Steel, Add</i>	108.02	
04 05 19 13-0230 CLF #8 (For 8" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	99.17	
<i>For Hot-Dipped Galvanized, Add</i>	28.00	
<i>For Stainless Steel, Add</i>	111.98	
04 05 19 13-0231 CLF #10 (For 10" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	106.68	
<i>For Hot-Dipped Galvanized, Add</i>	29.35	
<i>For Stainless Steel, Add</i>	117.40	
04 05 19 13-0232 CLF #12 (For 12" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	114.86	
<i>For Hot-Dipped Galvanized, Add</i>	31.04	
<i>For Stainless Steel, Add</i>	124.16	
04 05 19 13-0233 CLF #13 (For 13" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	121.20	
<i>For Hot-Dipped Galvanized, Add</i>	31.81	
<i>For Stainless Steel, Add</i>	127.24	
04 05 19 13-0234 CLF #14 (For 14" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	125.90	
<i>For Hot-Dipped Galvanized, Add</i>	32.96	
<i>For Stainless Steel, Add</i>	131.84	
04 05 19 13-0235 CLF #16 (For 16" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	156.82	
<i>For Hot-Dipped Galvanized, Add</i>	46.27	
<i>For Stainless Steel, Add</i>	185.06	
04 05 19 13-0236 CLF #18 (For 18" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	165.90	
<i>For Hot-Dipped Galvanized, Add</i>	48.89	
<i>For Stainless Steel, Add</i>	195.54	
04 05 19 13-0237 CLF #20 (For 20" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	241.98	
<i>For Hot-Dipped Galvanized, Add</i>	84.53	
<i>For Stainless Steel, Add</i>	338.10	
04 05 19 13-0238 Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0239 CLF #4 (For 4" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	80.71	
<i>For Hot-Dipped Galvanized, Add</i>	21.65	
<i>For Stainless Steel, Add</i>	86.58	
04 05 19 13-0240 CLF #6 (For 6" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	84.21	
<i>For Hot-Dipped Galvanized, Add</i>	22.12	
<i>For Stainless Steel, Add</i>	88.46	
04 05 19 13-0241 CLF #8 (For 8" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	88.92	
<i>For Hot-Dipped Galvanized, Add</i>	22.66	
<i>For Stainless Steel, Add</i>	90.62	
04 05 19 13-0242 CLF #10 (For 10" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	94.51	
<i>For Hot-Dipped Galvanized, Add</i>	23.27	
<i>For Stainless Steel, Add</i>	93.06	
04 05 19 13-0243 CLF #12 (For 12" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	101.04	
<i>For Hot-Dipped Galvanized, Add</i>	23.86	
<i>For Stainless Steel, Add</i>	95.44	
04 05 19 13-0244 CLF #13 (For 13" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	105.89	
<i>For Hot-Dipped Galvanized, Add</i>	24.16	
<i>For Stainless Steel, Add</i>	96.62	
04 05 19 13-0245 CLF #14 (For 14" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	109.42	
<i>For Hot-Dipped Galvanized, Add</i>	24.49	
<i>For Stainless Steel, Add</i>	97.94	
04 05 19 13-0246 CLF #16 (For 16" Walls), Mill Galvanized, Three-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	122.52	
<i>For Hot-Dipped Galvanized, Add</i>	29.12	
<i>For Stainless Steel, Add</i>	116.46	
04 05 19 13-0247 Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0248 CLF #4 (For 4" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	91.24	
<i>For Hot-Dipped Galvanized, Add</i>	26.91	
<i>For Stainless Steel, Add</i>	107.64	
04 05 19 13-0249 CLF #6 (For 6" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	94.89	
<i>For Hot-Dipped Galvanized, Add</i>	27.46	
<i>For Stainless Steel, Add</i>	109.82	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 13-0250	CLF #8 (For 8" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	99.71
	<i>For Hot-Dipped Galvanized, Add</i>	28.05
	<i>For Stainless Steel, Add</i>	112.20
04 05 19 13-0251	CLF #10 (For 10" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	105.19
	<i>For Hot-Dipped Galvanized, Add</i>	28.61
	<i>For Stainless Steel, Add</i>	114.42
04 05 19 13-0252	CLF #12 (For 12" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	111.69
	<i>For Hot-Dipped Galvanized, Add</i>	29.19
	<i>For Stainless Steel, Add</i>	116.74
04 05 19 13-0253	CLF #13 (For 13" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	116.57
	<i>For Hot-Dipped Galvanized, Add</i>	29.51
	<i>For Stainless Steel, Add</i>	118.02
04 05 19 13-0254	CLF #14 (For 14" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	120.04
	<i>For Hot-Dipped Galvanized, Add</i>	29.80
	<i>For Stainless Steel, Add</i>	119.18
04 05 19 13-0255	CLF #16 (For 16" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	136.55
	<i>For Hot-Dipped Galvanized, Add</i>	36.13
	<i>For Stainless Steel, Add</i>	144.52
04 05 19 13-0256	CLF #18 (For 18" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	168.97
	<i>For Hot-Dipped Galvanized, Add</i>	50.43
	<i>For Stainless Steel, Add</i>	201.70

04 05 19 13-0257 Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement (04 05 19 13-0204)

04 05 19 13-0258	CLF #4 (For 4" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	101.45
	<i>For Hot-Dipped Galvanized, Add</i>	32.02
	<i>For Stainless Steel, Add</i>	128.06
04 05 19 13-0259	CLF #6 (For 6" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	106.53
	<i>For Hot-Dipped Galvanized, Add</i>	33.11
	<i>For Stainless Steel, Add</i>	132.44
04 05 19 13-0260	CLF #8 (For 8" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	111.59
	<i>For Hot-Dipped Galvanized, Add</i>	34.21
	<i>For Stainless Steel, Add</i>	136.82
04 05 19 13-0261	CLF #10 (For 10" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	119.00
	<i>For Hot-Dipped Galvanized, Add</i>	35.51
	<i>For Stainless Steel, Add</i>	142.04
04 05 19 13-0262	CLF #12 (For 12" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	126.40
	<i>For Hot-Dipped Galvanized, Add</i>	36.81
	<i>For Stainless Steel, Add</i>	147.24
04 05 19 13-0263	CLF #13 (For 13" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	132.59
	<i>For Hot-Dipped Galvanized, Add</i>	37.51
	<i>For Stainless Steel, Add</i>	150.02
04 05 19 13-0264	CLF #14 (For 14" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	136.18
	<i>For Hot-Dipped Galvanized, Add</i>	38.10
	<i>For Stainless Steel, Add</i>	152.40
04 05 19 13-0265	CLF #16 (For 16" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	142.88
	<i>For Hot-Dipped Galvanized, Add</i>	39.30
	<i>For Stainless Steel, Add</i>	157.18
04 05 19 13-0266	CLF #18 (For 18" Walls), Mill Galvanized, Three-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	182.65
	<i>For Hot-Dipped Galvanized, Add</i>	57.26
	<i>For Stainless Steel, Add</i>	229.04

04 05 19 13-0267 Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement (04 05 19 13-0204)

04 05 19 13-0268	CLF #4 (For 4" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	104.97
	<i>For Hot-Dipped Galvanized, Add</i>	33.78
	<i>For Stainless Steel, Add</i>	135.10
04 05 19 13-0269	CLF #6 (For 6" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	108.47
	<i>For Hot-Dipped Galvanized, Add</i>	34.25
	<i>For Stainless Steel, Add</i>	136.98
04 05 19 13-0270	CLF #8 (For 8" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	113.18
	<i>For Hot-Dipped Galvanized, Add</i>	34.79
	<i>For Stainless Steel, Add</i>	139.14

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0271 CLF #10 (For 10" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	118.77	
<i>For Hot-Dipped Galvanized, Add</i>	35.40	
<i>For Stainless Steel, Add</i>	141.58	
04 05 19 13-0272 CLF #12 (For 12" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	125.31	
<i>For Hot-Dipped Galvanized, Add</i>	36.00	
<i>For Stainless Steel, Add</i>	143.98	
04 05 19 13-0273 CLF #13 (For 13" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	130.15	
<i>For Hot-Dipped Galvanized, Add</i>	36.29	
<i>For Stainless Steel, Add</i>	145.14	
04 05 19 13-0274 CLF #14 (For 14" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	133.68	
<i>For Hot-Dipped Galvanized, Add</i>	36.62	
<i>For Stainless Steel, Add</i>	146.46	
04 05 19 13-0275 CLF #16 (For 16" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	146.79	
<i>For Hot-Dipped Galvanized, Add</i>	41.25	
<i>For Stainless Steel, Add</i>	165.00	
04 05 19 13-0276 CLF #18 (For 18" Walls), Mill Galvanized, Four-Wire, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	169.18	
<i>For Hot-Dipped Galvanized, Add</i>	50.53	
<i>For Stainless Steel, Add</i>	202.10	
04 05 19 13-0277 Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0278 CLF #4 (For 4" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	115.51	
<i>For Hot-Dipped Galvanized, Add</i>	39.05	
<i>For Stainless Steel, Add</i>	156.18	
04 05 19 13-0279 CLF #6 (For 6" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	119.15	
<i>For Hot-Dipped Galvanized, Add</i>	39.59	
<i>For Stainless Steel, Add</i>	158.34	
04 05 19 13-0280 CLF #8 (For 8" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	123.97	
<i>For Hot-Dipped Galvanized, Add</i>	40.18	
<i>For Stainless Steel, Add</i>	160.72	
04 05 19 13-0281 CLF #10 (For 10" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	129.45	
<i>For Hot-Dipped Galvanized, Add</i>	40.74	
<i>For Stainless Steel, Add</i>	162.94	
04 05 19 13-0282 CLF #12 (For 12" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	135.96	
<i>For Hot-Dipped Galvanized, Add</i>	41.32	
<i>For Stainless Steel, Add</i>	165.28	
04 05 19 13-0283 CLF #13 (For 13" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	140.83	
<i>For Hot-Dipped Galvanized, Add</i>	41.64	
<i>For Stainless Steel, Add</i>	166.54	
04 05 19 13-0284 CLF #14 (For 14" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	144.31	
<i>For Hot-Dipped Galvanized, Add</i>	41.93	
<i>For Stainless Steel, Add</i>	167.72	
04 05 19 13-0285 CLF #16 (For 16" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	160.82	
<i>For Hot-Dipped Galvanized, Add</i>	48.27	
<i>For Stainless Steel, Add</i>	193.06	
04 05 19 13-0286 CLF #18 (For 18" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type, Masonry Wall Reinforcement	193.24	
<i>For Hot-Dipped Galvanized, Add</i>	62.56	
<i>For Stainless Steel, Add</i>	250.24	
04 05 19 13-0287 Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement <small>(04 05 19 13-0204)</small>		
04 05 19 13-0288 CLF #4 (For 4" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	125.71	
<i>For Hot-Dipped Galvanized, Add</i>	44.15	
<i>For Stainless Steel, Add</i>	176.58	
04 05 19 13-0289 CLF #6 (For 6" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	130.79	
<i>For Hot-Dipped Galvanized, Add</i>	45.24	
<i>For Stainless Steel, Add</i>	180.96	
04 05 19 13-0290 CLF #8 (For 8" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	135.85	
<i>For Hot-Dipped Galvanized, Add</i>	46.34	
<i>For Stainless Steel, Add</i>	185.34	
04 05 19 13-0291 CLF #10 (For 10" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	143.26	
<i>For Hot-Dipped Galvanized, Add</i>	47.64	
<i>For Stainless Steel, Add</i>	190.56	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 13-0292	CLF #12 (For 12" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	150.67	
	<i>For Hot-Dipped Galvanized, Add</i>	48.95	
	<i>For Stainless Steel, Add</i>	195.78	
04 05 19 13-0293	CLF #13 (For 13" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	156.85	
	<i>For Hot-Dipped Galvanized, Add</i>	49.64	
	<i>For Stainless Steel, Add</i>	198.54	
04 05 19 13-0294	CLF #14 (For 14" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	160.45	
	<i>For Hot-Dipped Galvanized, Add</i>	50.24	
	<i>For Stainless Steel, Add</i>	200.94	
04 05 19 13-0295	CLF #16 (For 16" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	167.14	
	<i>For Hot-Dipped Galvanized, Add</i>	51.43	
	<i>For Stainless Steel, Add</i>	205.70	
04 05 19 13-0296	CLF #18 (For 18" Walls), Mill Galvanized, Four-Wire, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type, Masonry Wall Reinforcement	206.92	
	<i>For Hot-Dipped Galvanized, Add</i>	69.40	
	<i>For Stainless Steel, Add</i>	277.58	
04 05 19 13-0297	Truss-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0203)</small>		
04 05 19 13-0298	9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0297)</small>		
04 05 19 13-0299	CLF #8 (For 8" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	90.84	
	<i>For Hot-Dipped Galvanized, Add</i>	21.13	
	<i>For Stainless Steel, Add</i>	84.50	
04 05 19 13-0300	CLF #10 (For 10" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	98.27	
	<i>For Hot-Dipped Galvanized, Add</i>	22.15	
	<i>For Stainless Steel, Add</i>	88.58	
04 05 19 13-0301	CLF #12 (For 12" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	106.26	
	<i>For Hot-Dipped Galvanized, Add</i>	23.44	
	<i>For Stainless Steel, Add</i>	93.76	
04 05 19 13-0302	CLF #13 (For 13" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	113.42	
	<i>For Hot-Dipped Galvanized, Add</i>	24.33	
	<i>For Stainless Steel, Add</i>	97.30	
04 05 19 13-0303	CLF #14 (For 14" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	117.62	
	<i>For Hot-Dipped Galvanized, Add</i>	25.07	
	<i>For Stainless Steel, Add</i>	100.28	
04 05 19 13-0304	CLF #16 (For 16" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	126.05	
	<i>For Hot-Dipped Galvanized, Add</i>	26.86	
	<i>For Stainless Steel, Add</i>	107.44	
04 05 19 13-0305	CLF #18 (For 18" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	133.95	
	<i>For Hot-Dipped Galvanized, Add</i>	28.65	
	<i>For Stainless Steel, Add</i>	114.60	
04 05 19 13-0306	3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0297)</small>		
04 05 19 13-0307	CLF #8 (For 8" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	104.00	
	<i>For Hot-Dipped Galvanized, Add</i>	27.71	
	<i>For Stainless Steel, Add</i>	110.82	
04 05 19 13-0308	CLF #10 (For 10" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	111.46	
	<i>For Hot-Dipped Galvanized, Add</i>	28.74	
	<i>For Stainless Steel, Add</i>	114.96	
04 05 19 13-0309	CLF #12 (For 12" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	119.39	
	<i>For Hot-Dipped Galvanized, Add</i>	30.01	
	<i>For Stainless Steel, Add</i>	120.02	
04 05 19 13-0310	CLF #13 (For 13" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	126.58	
	<i>For Hot-Dipped Galvanized, Add</i>	30.91	
	<i>For Stainless Steel, Add</i>	123.62	
04 05 19 13-0311	CLF #14 (For 14" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	130.69	
	<i>For Hot-Dipped Galvanized, Add</i>	31.61	
	<i>For Stainless Steel, Add</i>	126.42	
04 05 19 13-0312	CLF #16 (For 16" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement	139.15	
	<i>For Hot-Dipped Galvanized, Add</i>	33.41	
	<i>For Stainless Steel, Add</i>	133.64	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0313 CLF #18 (For 18" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	147.11 35.23 140.92	
04 05 19 13-0314 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <small>(04 05 19 13-0297)</small>		
04 05 19 13-0315 CLF #8 (For 8" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	116.20 33.81 135.22	
04 05 19 13-0316 CLF #10 (For 10" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	124.79 35.41 141.62	
04 05 19 13-0317 CLF #12 (For 12" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	134.59 37.61 150.42	
04 05 19 13-0318 CLF #13 (For 13" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	142.37 38.80 155.20	
04 05 19 13-0319 CLF #14 (For 14" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	147.46 39.99 159.96	
04 05 19 13-0320 CLF #16 (For 16" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	157.70 42.69 170.74	
04 05 19 13-0321 CLF #18 (For 18" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Tabs, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	166.47 44.91 179.64	
04 05 19 13-0322 Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0203)</small>		
04 05 19 13-0323 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0322)</small>		
04 05 19 13-0324 CLF #8 (For 4" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	131.86 41.64 166.54	
04 05 19 13-0325 CLF #10 (For 6" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	137.84 41.93 167.72	
04 05 19 13-0326 CLF #12 (For 8" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	145.27 42.95 171.78	
04 05 19 13-0327 CLF #14 (For 10" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	156.08 44.30 177.20	
04 05 19 13-0328 CLF #16 (For 12" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	164.13 45.90 183.60	
04 05 19 13-0329 CLF #18 (For 14" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	172.36 47.86 191.42	
04 05 19 13-0330 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0322)</small>		
04 05 19 13-0331 CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	152.22 51.82 207.26	
04 05 19 13-0332 CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	158.48 52.25 209.00	
04 05 19 13-0333 CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <i>For Hot-Dipped Galvanized, Add</i> <i>For Stainless Steel, Add</i>	165.92 53.27 213.08	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0334	CLF	#14	(For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	176.67	
			<i>For Hot-Dipped Galvanized, Add</i>	54.60	
			<i>For Stainless Steel, Add</i>	218.38	
04 05 19 13-0335	CLF	#16	(For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	184.46	
			<i>For Hot-Dipped Galvanized, Add</i>	56.07	
			<i>For Stainless Steel, Add</i>	224.26	
04 05 19 13-0336	CLF	#18	(For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	191.75	
			<i>For Hot-Dipped Galvanized, Add</i>	57.55	
			<i>For Stainless Steel, Add</i>	230.20	
04 05 19 13-0337			3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0322)</small>		
04 05 19 13-0338	CLF	#8	(For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	163.37	
			<i>For Hot-Dipped Galvanized, Add</i>	57.39	
			<i>For Stainless Steel, Add</i>	229.56	
04 05 19 13-0339	CLF	#10	(For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	169.63	
			<i>For Hot-Dipped Galvanized, Add</i>	57.83	
			<i>For Stainless Steel, Add</i>	231.30	
04 05 19 13-0340	CLF	#12	(For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	178.23	
			<i>For Hot-Dipped Galvanized, Add</i>	59.43	
			<i>For Stainless Steel, Add</i>	237.70	
04 05 19 13-0341	CLF	#14	(For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	190.53	
			<i>For Hot-Dipped Galvanized, Add</i>	61.53	
			<i>For Stainless Steel, Add</i>	246.10	
04 05 19 13-0342	CLF	#16	(For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	200.68	
			<i>For Hot-Dipped Galvanized, Add</i>	64.18	
			<i>For Stainless Steel, Add</i>	256.70	
04 05 19 13-0343	CLF	#18	(For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Composite Walls, Masonry Wall Reinforcement.....	210.88	
			<i>For Hot-Dipped Galvanized, Add</i>	67.12	
			<i>For Stainless Steel, Add</i>	268.46	
04 05 19 13-0344			Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0203)</small>		
04 05 19 13-0345			9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0344)</small>		
04 05 19 13-0346	CLF	#10	(For 4" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	141.13	
			<i>For Hot-Dipped Galvanized, Add</i>	43.58	
			<i>For Stainless Steel, Add</i>	174.30	
04 05 19 13-0347	CLF	#12	(For 6" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	147.14	
			<i>For Hot-Dipped Galvanized, Add</i>	43.88	
			<i>For Stainless Steel, Add</i>	175.52	
04 05 19 13-0348	CLF	#14	(For 8" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	157.22	
			<i>For Hot-Dipped Galvanized, Add</i>	44.87	
			<i>For Stainless Steel, Add</i>	179.48	
04 05 19 13-0349	CLF	#16	(For 10" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	164.75	
			<i>For Hot-Dipped Galvanized, Add</i>	46.21	
			<i>For Stainless Steel, Add</i>	184.84	
04 05 19 13-0350	CLF	#18	(For 12" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	172.33	
			<i>For Hot-Dipped Galvanized, Add</i>	47.84	
			<i>For Stainless Steel, Add</i>	191.36	
04 05 19 13-0351	CLF	#20	(For 14" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	178.65	
			<i>For Hot-Dipped Galvanized, Add</i>	49.50	
			<i>For Stainless Steel, Add</i>	198.00	
04 05 19 13-0352			3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0344)</small>		
04 05 19 13-0353	CLF	#10	(For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	161.42	
			<i>For Hot-Dipped Galvanized, Add</i>	53.72	
			<i>For Stainless Steel, Add</i>	214.88	
04 05 19 13-0354	CLF	#12	(For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	167.69	
			<i>For Hot-Dipped Galvanized, Add</i>	54.16	
			<i>For Stainless Steel, Add</i>	216.62	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
04 05 19 13-0355	CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	177.83
	<i>For Hot-Dipped Galvanized, Add</i>	55.18
	<i>For Stainless Steel, Add</i>	220.70
04 05 19 13-0356	CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	185.36
	<i>For Hot-Dipped Galvanized, Add</i>	56.52
	<i>For Stainless Steel, Add</i>	226.06
04 05 19 13-0357	CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	192.62
	<i>For Hot-Dipped Galvanized, Add</i>	57.99
	<i>For Stainless Steel, Add</i>	231.94
04 05 19 13-0358	CLF #20 (For 14" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	199.11
	<i>For Hot-Dipped Galvanized, Add</i>	59.73
	<i>For Stainless Steel, Add</i>	238.92
04 05 19 13-0359	3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0344)</small>	
04 05 19 13-0360	CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	172.60
	<i>For Hot-Dipped Galvanized, Add</i>	59.31
	<i>For Stainless Steel, Add</i>	237.24
04 05 19 13-0361	CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	178.84
	<i>For Hot-Dipped Galvanized, Add</i>	59.73
	<i>For Stainless Steel, Add</i>	238.92
04 05 19 13-0362	CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	190.21
	<i>For Hot-Dipped Galvanized, Add</i>	61.37
	<i>For Stainless Steel, Add</i>	245.46
04 05 19 13-0363	CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	199.22
	<i>For Hot-Dipped Galvanized, Add</i>	63.45
	<i>For Stainless Steel, Add</i>	253.78
04 05 19 13-0364	CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	208.81
	<i>For Hot-Dipped Galvanized, Add</i>	66.08
	<i>For Stainless Steel, Add</i>	264.32
04 05 19 13-0365	CLF #20 (For 14" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Adjustable Tabs For Cavity Walls, Masonry Wall Reinforcement.....	215.83
	<i>For Hot-Dipped Galvanized, Add</i>	68.09
	<i>For Stainless Steel, Add</i>	272.36
04 05 19 13-0366	Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0203)</small>	
04 05 19 13-0367	9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0366)</small>	
04 05 19 13-0368	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	133.29
	<i>For Hot-Dipped Galvanized, Add</i>	39.66
	<i>For Stainless Steel, Add</i>	158.62
	<i>For Seismic Hook And Eye, Add</i>	17.05
04 05 19 13-0369	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	139.25
	<i>For Hot-Dipped Galvanized, Add</i>	39.94
	<i>For Stainless Steel, Add</i>	159.74
	<i>For Seismic Hook And Eye, Add</i>	17.17
04 05 19 13-0370	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	149.06
	<i>For Hot-Dipped Galvanized, Add</i>	40.79
	<i>For Stainless Steel, Add</i>	163.16
	<i>For Seismic Hook And Eye, Add</i>	17.54
04 05 19 13-0371	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	156.39
	<i>For Hot-Dipped Galvanized, Add</i>	42.03
	<i>For Stainless Steel, Add</i>	168.12
	<i>For Seismic Hook And Eye, Add</i>	18.07
04 05 19 13-0372	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	163.27
	<i>For Hot-Dipped Galvanized, Add</i>	43.31
	<i>For Stainless Steel, Add</i>	173.24
	<i>For Seismic Hook And Eye, Add</i>	18.62
04 05 19 13-0373	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	169.42
	<i>For Hot-Dipped Galvanized, Add</i>	44.89
	<i>For Stainless Steel, Add</i>	179.54
	<i>For Seismic Hook And Eye, Add</i>	19.30

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 13-0374	3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0366)</small>		
04 05 19 13-0375	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	151.99	
	For Hot-Dipped Galvanized, Add	49.01	
	For Stainless Steel, Add	196.02	
	For Seismic Hook And Eye, Add	21.07	
04 05 19 13-0376	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	158.14	
	For Hot-Dipped Galvanized, Add	49.38	
	For Stainless Steel, Add	197.52	
	For Seismic Hook And Eye, Add	21.23	
04 05 19 13-0377	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	167.82	
	For Hot-Dipped Galvanized, Add	50.17	
	For Stainless Steel, Add	200.68	
	For Seismic Hook And Eye, Add	21.57	
04 05 19 13-0378	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	175.02	
	For Hot-Dipped Galvanized, Add	51.35	
	For Stainless Steel, Add	205.38	
	For Seismic Hook And Eye, Add	22.08	
04 05 19 13-0379	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	181.88	
	For Hot-Dipped Galvanized, Add	52.62	
	For Stainless Steel, Add	210.46	
	For Seismic Hook And Eye, Add	22.62	
04 05 19 13-0380	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	187.67	
	For Hot-Dipped Galvanized, Add	54.01	
	For Stainless Steel, Add	216.04	
	For Seismic Hook And Eye, Add	23.22	
04 05 19 13-0381	3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0366)</small>		
04 05 19 13-0382	CLF #8 (For 4" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement	163.28	
	For Hot-Dipped Galvanized, Add	54.65	
	For Stainless Steel, Add	218.60	
	For Seismic Hook And Eye, Add	23.50	
04 05 19 13-0383	CLF #10 (For 6" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement	169.53	
	For Hot-Dipped Galvanized, Add	55.08	
	For Stainless Steel, Add	220.30	
	For Seismic Hook And Eye, Add	23.68	
04 05 19 13-0384	CLF #12 (For 8" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement	180.68	
	For Hot-Dipped Galvanized, Add	56.60	
	For Stainless Steel, Add	226.40	
	For Seismic Hook And Eye, Add	24.34	
04 05 19 13-0385	CLF #14 (For 10" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	189.52	
	For Hot-Dipped Galvanized, Add	58.60	
	For Stainless Steel, Add	234.38	
	For Seismic Hook And Eye, Add	25.20	
04 05 19 13-0386	CLF #16 (For 12" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	198.88	
	For Hot-Dipped Galvanized, Add	61.12	
	For Stainless Steel, Add	244.46	
	For Seismic Hook And Eye, Add	26.28	
04 05 19 13-0387	CLF #18 (For 14" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Composite Walls, Masonry Wall Reinforcement.....	207.47	
	For Hot-Dipped Galvanized, Add	63.91	
	For Stainless Steel, Add	255.64	
	For Seismic Hook And Eye, Add	27.48	
04 05 19 13-0388	Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0203)</small>		
04 05 19 13-0389	9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall <small>(04 05 19 13-0388)</small>		
04 05 19 13-0390	CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	142.42	
	For Hot-Dipped Galvanized, Add	41.52	
	For Stainless Steel, Add	166.08	
	For Seismic Hook And Eye, Add	17.85	
04 05 19 13-0391	CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	151.10	
	For Hot-Dipped Galvanized, Add	41.81	
	For Stainless Steel, Add	167.24	
	For Seismic Hook And Eye, Add	17.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 13-0392 CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	157.79	
<i>For Hot-Dipped Galvanized, Add</i>	42.73	
<i>For Stainless Steel, Add</i>	170.92	
<i>For Seismic Hook And Eye, Add</i>	18.37	
04 05 19 13-0393 CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	164.73	
<i>For Hot-Dipped Galvanized, Add</i>	44.04	
<i>For Stainless Steel, Add</i>	176.16	
<i>For Seismic Hook And Eye, Add</i>	18.94	
04 05 19 13-0394 CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 9 Gauge Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement	170.76	
<i>For Hot-Dipped Galvanized, Add</i>	45.56	
<i>For Stainless Steel, Add</i>	182.22	
<i>For Seismic Hook And Eye, Add</i>	19.59	
04 05 19 13-0395 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0388)</small>		
04 05 19 13-0396 CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	162.57	
<i>For Hot-Dipped Galvanized, Add</i>	51.60	
<i>For Stainless Steel, Add</i>	206.38	
<i>For Seismic Hook And Eye, Add</i>	22.19	
04 05 19 13-0397 CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	171.31	
<i>For Hot-Dipped Galvanized, Add</i>	51.92	
<i>For Stainless Steel, Add</i>	207.66	
<i>For Seismic Hook And Eye, Add</i>	22.32	
04 05 19 13-0398 CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	177.94	
<i>For Hot-Dipped Galvanized, Add</i>	52.81	
<i>For Stainless Steel, Add</i>	211.22	
<i>For Seismic Hook And Eye, Add</i>	22.71	
04 05 19 13-0399 CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	184.64	
<i>For Hot-Dipped Galvanized, Add</i>	54.00	
<i>For Stainless Steel, Add</i>	215.98	
<i>For Seismic Hook And Eye, Add</i>	23.22	
04 05 19 13-0400 CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 9 Gauge Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	190.09	
<i>For Hot-Dipped Galvanized, Add</i>	55.22	
<i>For Stainless Steel, Add</i>	220.88	
<i>For Seismic Hook And Eye, Add</i>	23.74	
04 05 19 13-0401 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement <small>(04 05 19 13-0388)</small>		
04 05 19 13-0402 CLF #10 (For 4" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	172.35	
<i>For Hot-Dipped Galvanized, Add</i>	56.49	
<i>For Stainless Steel, Add</i>	225.94	
<i>For Seismic Hook And Eye, Add</i>	24.29	
04 05 19 13-0403 CLF #12 (For 6" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	181.27	
<i>For Hot-Dipped Galvanized, Add</i>	56.90	
<i>For Stainless Steel, Add</i>	227.58	
<i>For Seismic Hook And Eye, Add</i>	24.46	
04 05 19 13-0404 CLF #14 (For 8" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	189.20	
<i>For Hot-Dipped Galvanized, Add</i>	58.44	
<i>For Stainless Steel, Add</i>	233.74	
<i>For Seismic Hook And Eye, Add</i>	25.13	
04 05 19 13-0405 CLF #16 (For 10" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	197.48	
<i>For Hot-Dipped Galvanized, Add</i>	60.42	
<i>For Stainless Steel, Add</i>	241.66	
<i>For Seismic Hook And Eye, Add</i>	25.98	
04 05 19 13-0406 CLF #18 (For 12" + 2" + 4" Walls), Mill Galvanized, 3/16" Side Rods, 3/16" Cross Rods, Truss-Type With Hook And Eye Ties For Cavity Walls, Masonry Wall Reinforcement.....	205.52	
<i>For Hot-Dipped Galvanized, Add</i>	62.94	
<i>For Stainless Steel, Add</i>	251.74	
<i>For Seismic Hook And Eye, Add</i>	27.06	
04 05 19 16 Masonry Anchors <small>(04 05 19)</small>		
04 05 19 16-0001 Rectangular, Wire Masonry Wall Ties <small>(04 05 19 16)</small>		
04 05 19 16-0002 Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Ties <small>(04 05 19 16-0001)</small>		
04 05 19 16-0003 EA 2" Width x 4" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.40	
04 05 19 16-0004 EA 2" Width x 6" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.51	
04 05 19 16-0005 EA 2" Width x 8" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.62	
04 05 19 16-0006 EA 2" Width x 10" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.75	
04 05 19 16-0007 EA 2" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.88	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 16-0008	EA	4" Width x 6" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.62
04 05 19 16-0009	EA	4" Width x 8" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.75
04 05 19 16-0010	EA	4" Width x 10" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	1.88
04 05 19 16-0011	EA	4" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Rectangular, Wire Masonry Wall Tie.....	2.01

04 05 19 16-0012 Mill Galvanized, Rectangular, Wire Masonry Wall Ties (04 05 19 16-0001)

04 05 19 16-0013	EA	2" Width x 4" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.21
04 05 19 16-0014	EA	2" Width x 6" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.25
04 05 19 16-0015	EA	2" Width x 8" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.30
04 05 19 16-0016	EA	2" Width x 10" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.37
04 05 19 16-0017	EA	2" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.44
04 05 19 16-0018	EA	4" Width x 6" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.30
04 05 19 16-0019	EA	4" Width x 8" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.37
04 05 19 16-0020	EA	4" Width x 10" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.44
04 05 19 16-0021	EA	4" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Rectangular, Wire Masonry Wall Tie	1.52

04 05 19 16-0022 Z-Type, Wire Masonry Wall Ties (04 05 19 16)**04 05 19 16-0023 Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Ties** (04 05 19 16-0022)

04 05 19 16-0024	EA	6" Length, 2" Bends, 3/16" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.21
04 05 19 16-0025	EA	8" Length, 2" Bends, 3/16" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.28
04 05 19 16-0026	EA	10" Length, 2" Bends, 3/16" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.47
04 05 19 16-0027	EA	12" Length, 2" Bends, 3/16" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.56
04 05 19 16-0028	EA	6" Length, 2" Bends, 1/4" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.58
04 05 19 16-0029	EA	8" Length, 2" Bends, 1/4" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.70
04 05 19 16-0030	EA	10" Length, 2" Bends, 1/4" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.85
04 05 19 16-0031	EA	12" Length, 2" Bends, 1/4" Diameter, Hot-Dipped Galvanized, Z-Type, Wire Masonry Wall Tie	1.94

04 05 19 16-0032 Mill Galvanized, Z-Type, Wire Masonry Wall Ties (04 05 19 16-0022)

04 05 19 16-0033	EA	6" Length, 2" Bends, 3/16" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.07
04 05 19 16-0034	EA	8" Length, 2" Bends, 3/16" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.09
04 05 19 16-0035	EA	10" Length, 2" Bends, 3/16" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.24
04 05 19 16-0036	EA	12" Length, 2" Bends, 3/16" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.28
04 05 19 16-0037	EA	6" Length, 2" Bends, 1/4" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.29
04 05 19 16-0038	EA	8" Length, 2" Bends, 1/4" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.37
04 05 19 16-0039	EA	10" Length, 2" Bends, 1/4" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.44
04 05 19 16-0040	EA	12" Length, 2" Bends, 1/4" Diameter, Mill Galvanized, Z-Type, Wire Masonry Wall Tie	1.54

04 05 19 16-0041 Wire Beam Ties (04 05 19 16)**04 05 19 16-0042 Hot-Dipped Galvanized, Wire Beam Ties** (04 05 19 16-0041)

04 05 19 16-0043	EA	2" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Beam Tie	1.74
04 05 19 16-0044	EA	4" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Beam Tie	1.79
04 05 19 16-0045	EA	6" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Beam Tie	1.83
04 05 19 16-0046	EA	8" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Beam Tie	1.88
04 05 19 16-0047	EA	10" Width x 12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Beam Tie	1.97

04 05 19 16-0048 Mill Galvanized, Wire Beam Ties (04 05 19 16-0041)

04 05 19 16-0049	EA	2" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Wire Beam Tie.....	2.13
04 05 19 16-0050	EA	4" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Wire Beam Tie	2.24
04 05 19 16-0051	EA	6" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Wire Beam Tie.....	2.36
04 05 19 16-0052	EA	8" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Wire Beam Tie	2.41
04 05 19 16-0053	EA	10" Width x 12" Length, 3/16" Diameter, Mill Galvanized, Wire Beam Tie.....	2.50

04 05 19 16-0054 Adjustable Double Pintle, Wire Masonry Wall Ties (04 05 19 16)**04 05 19 16-0055 Hot-Dipped Galvanized, Adjustable Double Pintle, Wire Masonry Wall Ties**

04 05 19 16-0056	EA	6" Total Length, 3/16" Diameter, Hot-Dipped Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	1.97
04 05 19 16-0057	EA	7" Total Length, 3/16" Diameter, Hot-Dipped Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	2.07
04 05 19 16-0058	EA	8" Total Length, 3/16" Diameter, Hot-Dipped Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	2.10
04 05 19 16-0059	EA	9" Total Length, 3/16" Diameter, Hot-Dipped Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	2.19
04 05 19 16-0060	EA	10" Total Length, 3/16" Diameter, Hot-Dipped Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	2.22

04 05 19 16-0061 Mill Galvanized, Adjustable Double Pintle, Wire Masonry Wall Ties (04 05 19 16-0054)

04 05 19 16-0062	EA	6" Total Length, 3/16" Diameter, Mill Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie.....	1.62
04 05 19 16-0063	EA	7" Total Length, 3/16" Diameter, Mill Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	1.68
04 05 19 16-0064	EA	8" Total Length, 3/16" Diameter, Mill Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	1.71
04 05 19 16-0065	EA	9" Total Length, 3/16" Diameter, Mill Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie	1.76
04 05 19 16-0066	EA	10" Total Length, 3/16" Diameter, Mill Galvanized, Adjustable Double Pintle, Wire Masonry Wall Tie.....	1.78

04 05 19 16-0067 Corrugated Buck (Brick) Anchors (04 05 19 16)

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 16-0068		Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchors <small>(04 05 19 16-0067)</small>		
04 05 19 16-0069	EA	3-1/2" Length, 1-1/4" Width, 16 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.46	
04 05 19 16-0070	EA	4-1/2" Length, 1-1/4" Width, 16 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.57	
04 05 19 16-0071	EA	5-1/2" Length, 1-1/4" Width, 16 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.67	
04 05 19 16-0072	EA	6-1/2" Length, 1-1/4" Width, 16 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.78	
04 05 19 16-0073	EA	7-1/2" Length, 1-1/4" Width, 16 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.89	
04 05 19 16-0074	EA	3-1/2" Length, 1-1/4" Width, 14 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.55	
04 05 19 16-0075	EA	4-1/2" Length, 1-1/4" Width, 14 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.67	
04 05 19 16-0076	EA	5-1/2" Length, 1-1/4" Width, 14 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.78	
04 05 19 16-0077	EA	6-1/2" Length, 1-1/4" Width, 14 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	2.90	
04 05 19 16-0078	EA	7-1/2" Length, 1-1/4" Width, 14 Gauge, Hot-Dipped Galvanized, Corrugated Buck (Brick) Anchor.....	3.02	
04 05 19 16-0079		Mill Galvanized, Corrugated Buck (Brick) Anchors <small>(04 05 19 16-0067)</small>		
04 05 19 16-0080	EA	3-1/2" Length, 1-1/4" Width, 16 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.08	
04 05 19 16-0081	EA	4-1/2" Length, 1-1/4" Width, 16 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.16	
04 05 19 16-0082	EA	5-1/2" Length, 1-1/4" Width, 16 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.23	
04 05 19 16-0083	EA	6-1/2" Length, 1-1/4" Width, 16 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.31	
04 05 19 16-0084	EA	7-1/2" Length, 1-1/4" Width, 16 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.39	
04 05 19 16-0085	EA	3-1/2" Length, 1-1/4" Width, 14 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.15	
04 05 19 16-0086	EA	4-1/2" Length, 1-1/4" Width, 14 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.23	
04 05 19 16-0087	EA	5-1/2" Length, 1-1/4" Width, 14 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.32	
04 05 19 16-0088	EA	6-1/2" Length, 1-1/4" Width, 14 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.40	
04 05 19 16-0089	EA	7-1/2" Length, 1-1/4" Width, 14 Gauge, Mill Galvanized, Corrugated Buck (Brick) Anchor.....	2.49	
04 05 19 16-0090		Corrugated Wall Ties <small>(04 05 19 16)</small>		
04 05 19 16-0091		Hot-Dipped Galvanized, Corrugated Wall Ties <small>(04 05 19 16-0090)</small>		
04 05 19 16-0092	EA	7/8" Width, 7" Length, 28 Gauge, Hot-Dipped Galvanized, Corrugated Wall Tie.....	1.06	
04 05 19 16-0093	EA	7/8" Width, 7" Length, 26 Gauge, Hot-Dipped Galvanized, Corrugated Wall Tie.....	1.15	
04 05 19 16-0094	EA	7/8" Width, 7" Length, 24 Gauge, Hot-Dipped Galvanized, Corrugated Wall Tie.....	1.19	
04 05 19 16-0095	EA	7/8" Width, 7" Length, 22 Gauge, Hot-Dipped Galvanized, Corrugated Wall Tie.....	1.22	
04 05 19 16-0096	EA	7/8" Width, 7" Length, 16 Gauge, Hot-Dipped Galvanized, Corrugated Wall Tie.....	1.52	
04 05 19 16-0097		Mill Galvanized, Corrugated Wall Ties <small>(04 05 19 16-0090)</small>		
04 05 19 16-0098	EA	7/8" Width, 7" Length, 26 Gauge, Mill Galvanized, Corrugated Wall Tie.....	1.10	
04 05 19 16-0099	EA	7/8" Width, 7" Length, 24 Gauge, Mill Galvanized, Corrugated Wall Tie.....	1.12	
04 05 19 16-0100	EA	7/8" Width, 7" Length, 22 Gauge, Mill Galvanized, Corrugated Wall Tie.....	1.15	
04 05 19 16-0101	EA	7/8" Width, 7" Length, 16 Gauge, Mill Galvanized, Corrugated Wall Tie.....	1.38	
04 05 19 16-0102		Stainless Steel, Corrugated Wall Ties <small>(04 05 19 16-0090)</small>		
04 05 19 16-0103	EA	7/8" Width, 7" Length, 28 Gauge, Stainless Steel, Corrugated Wall Tie.....	1.37	
04 05 19 16-0104	EA	7/8" Width, 7" Length, 26 Gauge, Stainless Steel, Corrugated Wall Tie.....	1.43	
04 05 19 16-0105	EA	7/8" Width, 7" Length, 24 Gauge, Stainless Steel, Corrugated Wall Tie.....	1.50	
04 05 19 16-0106	EA	7/8" Width, 7" Length, 22 Gauge, Stainless Steel, Corrugated Wall Tie.....	1.56	
04 05 19 16-0107	EA	7/8" Width, 7" Length, 16 Gauge, Stainless Steel, Corrugated Wall Tie.....	1.89	
04 05 19 16-0108		Wire Mesh Wall Ties <small>(04 05 19 16)</small>		
		Note: 1/2" square mesh.		
04 05 19 16-0109	EA	3" Width, 8" Length, 16 Gauge, Hot-Dipped Galvanized, Wire Mesh Wall Tie.....	2.32	
04 05 19 16-0110	EA	3" Width, 12" Length, 16 Gauge, Hot-Dipped Galvanized, Wire Mesh Wall Tie.....	2.90	
04 05 19 16-0111	EA	6" Width, 8" Length, 16 Gauge, Hot-Dipped Galvanized, Wire Mesh Wall Tie.....	3.49	
04 05 19 16-0112	EA	6" Width, 12" Length, 16 Gauge, Hot-Dipped Galvanized, Wire Mesh Wall Tie.....	4.59	
04 05 19 16-0113	EA	10" Width, 8" Length, 16 Gauge, Hot-Dipped Galvanized, Wire Mesh Wall Tie.....	4.20	
04 05 19 16-0114	EA	10" Width, 12" Length, 16 Gauge, Hot-Dipped Galvanized, Wire Mesh Wall Tie.....	5.34	
04 05 19 16-0115		Triangle Brick Ties <small>(04 05 19 16)</small>		
04 05 19 16-0116		Hot-Dipped Galvanized, Triangle Brick Ties <small>(04 05 19 16-0115)</small>		
04 05 19 16-0117	EA	3" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.03	
04 05 19 16-0118	EA	3-1/2" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.08	
04 05 19 16-0119	EA	4" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.13	
04 05 19 16-0120	EA	4-1/2" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.22	
04 05 19 16-0121	EA	5" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.27	
04 05 19 16-0122	EA	6" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.40	
04 05 19 16-0123	EA	7" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.50	
04 05 19 16-0124	EA	9" Length, 3/16" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.73	
04 05 19 16-0125	EA	3" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.52	
04 05 19 16-0126	EA	3-1/2" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.55	
04 05 19 16-0127	EA	4" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.59	
04 05 19 16-0128	EA	4-1/2" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.67	
04 05 19 16-0129	EA	5" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.71	
04 05 19 16-0130	EA	6" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.83	
04 05 19 16-0131	EA	7" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	2.91	
04 05 19 16-0132	EA	9" Length, 1/4" Diameter, Hot-Dipped Galvanized, Triangle Brick Tie.....	3.15	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 16-0133		Mill Galvanized, Triangle Brick Ties <small>(04 05 19 16-0115)</small>	
04 05 19 16-0134	EA	3" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	1.80
04 05 19 16-0135	EA	3-1/2" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	1.81
04 05 19 16-0136	EA	4" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	1.83
04 05 19 16-0137	EA	4-1/2" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	1.90
04 05 19 16-0138	EA	5" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	1.91
04 05 19 16-0139	EA	6" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	1.99
04 05 19 16-0140	EA	7" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.02
04 05 19 16-0141	EA	9" Length, 3/16" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.10
04 05 19 16-0142	EA	3" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.08
04 05 19 16-0143	EA	3-1/2" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.11
04 05 19 16-0144	EA	4" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.14
04 05 19 16-0145	EA	4-1/2" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.22
04 05 19 16-0146	EA	5" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.24
04 05 19 16-0147	EA	6" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.33
04 05 19 16-0148	EA	7" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.38
04 05 19 16-0149	EA	9" Length, 1/4" Diameter, Mill Galvanized, Triangle Brick Tie.....	2.52
04 05 19 16-0150		Seismic Veneer Anchors <small>(04 05 19 16)</small>	
04 05 19 16-0151	EA	3-1/2" Length, 1-1/4" Width, Stainless Steel, Seismic Notch Veneer Anchor..... Note: For horizontal wire attachment. Excludes wire.	6.12
04 05 19 16-0152		Slip-Set, Joint Stabilization Anchors <small>(04 05 19 16)</small>	
		Note: For restraining lateral movement at control joints. Field bendable.	
04 05 19 16-0153	EA	9-5/8" Length, 1-5/8" Width, Mill Galvanized, Slip-Set, Joint Stabilization Anchor.....	7.97
04 05 19 16-0154	EA	9-5/8" Length, 1-5/8" Width, Hot-Dipped Galvanized, Slip-Set, Joint Stabilization Anchor.....	8.67
04 05 19 16-0155	EA	9-5/8" Length, 1-5/8" Width, Stainless Steel, Slip-Set, Joint Stabilization Anchor.....	6.12
04 05 19 16-0156		Strap Partition Top Anchors <small>(04 05 19 16)</small>	
04 05 19 16-0157	EA	12 Gauge Strap, 3/8" Rod, Hot-Dipped Galvanized, Partition Top Anchor.....	4.44
04 05 19 16-0158	EA	12 Gauge Strap, 3/8" Rod, Stainless Steel, Partition Top Anchor.....	6.44
04 05 19 16-0159		Rigid Partition Anchors <small>(04 05 19 16)</small>	
04 05 19 16-0160		Hot-Dipped Galvanized, Rigid Partition Anchors <small>(04 05 19 16-0159)</small>	
04 05 19 16-0161	EA	1" Width, 8" Length, 1/8" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.09
04 05 19 16-0162	EA	1-1/4" Width, 8" Length, 1/8" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.39
04 05 19 16-0163	EA	1-1/2" Width, 8" Length, 1/8" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.76
04 05 19 16-0164	EA	1-3/4" Width, 8" Length, 1/8" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	4.10
04 05 19 16-0165	EA	2" Width, 8" Length, 1/8" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	4.43
04 05 19 16-0166	EA	2-1/4" Width, 8" Length, 1/8" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	4.77
04 05 19 16-0167	EA	1" Width, 8" Length, 1/4" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	4.44
04 05 19 16-0168	EA	1-1/4" Width, 8" Length, 1/4" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	5.51
04 05 19 16-0169	EA	1-1/2" Width, 8" Length, 1/4" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	6.59
04 05 19 16-0170	EA	1-3/4" Width, 8" Length, 1/4" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	7.67
04 05 19 16-0171	EA	2" Width, 8" Length, 1/4" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	8.74
04 05 19 16-0172	EA	2-1/4" Width, 8" Length, 1/4" Thick, Hot-Dipped Galvanized, U Or Z Style, Rigid Partition Anchor.....	9.82
04 05 19 16-0173		Mill Galvanized, Rigid Partition Anchors <small>(04 05 19 16-0159)</small>	
04 05 19 16-0174	EA	1" Width, 8" Length, 1/8" Thick, Mill Galvanized, U Or Z Style, Rigid Partition Anchor.....	2.79
04 05 19 16-0175	EA	1-1/4" Width, 8" Length, 1/8" Thick, Mill Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.05
04 05 19 16-0176	EA	1-1/2" Width, 8" Length, 1/8" Thick, Mill Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.32
04 05 19 16-0177	EA	1-3/4" Width, 8" Length, 1/8" Thick, Mill Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.58
04 05 19 16-0178	EA	2" Width, 8" Length, 1/8" Thick, Mill Galvanized, U Or Z Style, Rigid Partition Anchor.....	3.84
04 05 19 16-0179	EA	2-1/4" Width, 8" Length, 1/8" Thick, Mill Galvanized, U Or Z Style, Rigid Partition Anchor.....	4.10
04 05 19 16-0180		Screw-On Masonry Veneer Anchor Plates <small>(04 05 19 16)</small>	
04 05 19 16-0181	EA	12 Gauge, Hot-Dipped Galvanized, Screw-On Masonry Veneer Anchor Plate.....	1.97
04 05 19 16-0182	EA	14 Gauge, Hot-Dipped Galvanized, Screw-On Masonry Veneer Anchor Plate.....	2.09
04 05 19 16-0183		Wire Column Ties <small>(04 05 19 16)</small>	
04 05 19 16-0184		Hot-Dipped Galvanized, Wire Column Ties <small>(04 05 19 16-0183)</small>	
04 05 19 16-0185	EA	3" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.44
04 05 19 16-0186	EA	5" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.62
04 05 19 16-0187	EA	7" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.75
04 05 19 16-0188	EA	9" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.93
04 05 19 16-0189	EA	10" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.59
04 05 19 16-0190	EA	12" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.75
04 05 19 16-0191	EA	14" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.86
04 05 19 16-0192	EA	16" Length, 3/16" Diameter, Hot-Dipped Galvanized, Wire Column Tie.....	2.98

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 16-0193 EA 3" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	3.38	
04 05 19 16-0194 EA 5" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	3.69	
04 05 19 16-0195 EA 7" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	3.90	
04 05 19 16-0196 EA 9" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	4.19	
04 05 19 16-0197 EA 10" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	3.69	
04 05 19 16-0198 EA 12" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	3.90	
04 05 19 16-0199 EA 14" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	4.08	
04 05 19 16-0200 EA 16" Length, 1/4" Diameter, Hot-Dipped Galvanized, Wire Column Tie	4.28	
04 05 19 16-0201 Mill Galvanized, Wire Column Ties (04 05 19 16-0183)		
04 05 19 16-0202 EA 3" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.12	
04 05 19 16-0203 EA 5" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.23	
04 05 19 16-0204 EA 7" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.30	
04 05 19 16-0205 EA 9" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.41	
04 05 19 16-0206 EA 10" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.17	
04 05 19 16-0207 EA 12" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.28	
04 05 19 16-0208 EA 14" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.35	
04 05 19 16-0209 EA 16" Length, 3/16" Diameter, Mill Galvanized, Wire Column Tie	2.44	
04 05 19 16-0210 EA 3" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	2.82	
04 05 19 16-0211 EA 5" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	3.02	
04 05 19 16-0212 EA 7" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	3.11	
04 05 19 16-0213 EA 9" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	3.31	
04 05 19 16-0214 EA 10" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	2.73	
04 05 19 16-0215 EA 12" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	3.07	
04 05 19 16-0216 EA 14" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	3.20	
04 05 19 16-0217 EA 16" Length, 1/4" Diameter, Mill Galvanized, Wire Column Tie	3.31	
04 05 19 16-0218 Dovetail Anchors, Slots And Ties (04 05 19 16)		
04 05 19 16-0219 Dovetail Anchor Slots (04 05 19 16-0218)		
04 05 19 16-0220 Hot-Dipped Galvanized, Dovetail Anchor Slot (04 05 19 16-0219)		
04 05 19 16-0221 LF 24 Gauge, Hot-Dipped Galvanized, Dovetail Anchor Slot	4.47	
04 05 19 16-0222 LF 22 Gauge, Hot-Dipped Galvanized, Dovetail Anchor Slot	5.00	
04 05 19 16-0223 LF 20 Gauge, Hot-Dipped Galvanized, Dovetail Anchor Slot	5.31	
04 05 19 16-0224 LF 18 Gauge, Hot-Dipped Galvanized, Dovetail Anchor Slot	5.46	
04 05 19 16-0225 LF 16 Gauge, Hot-Dipped Galvanized, Dovetail Anchor Slot	5.82	
04 05 19 16-0226 Mill Galvanized, Dovetail Anchor Slot (04 05 19 16-0219)		
04 05 19 16-0227 LF 24 Gauge, Mill Galvanized, Dovetail Anchor Slot	3.42	
04 05 19 16-0228 LF 22 Gauge, Mill Galvanized, Dovetail Anchor Slot	4.09	
04 05 19 16-0229 LF 20 Gauge, Mill Galvanized, Dovetail Anchor Slot	4.24	
04 05 19 16-0230 LF 18 Gauge, Mill Galvanized, Dovetail Anchor Slot	4.47	
04 05 19 16-0231 LF 16 Gauge, Mill Galvanized, Dovetail Anchor Slot	4.62	
04 05 19 16-0232 304 Stainless Steel, Dovetail Anchor Slot (04 05 19 16-0219)		
04 05 19 16-0233 LF 24 Gauge, 304 Stainless Steel, Dovetail Anchor Slot	3.98	
04 05 19 16-0234 LF 22 Gauge, 304 Stainless Steel, Dovetail Anchor Slot	4.42	
04 05 19 16-0235 LF 20 Gauge, 304 Stainless Steel, Dovetail Anchor Slot	4.57	
04 05 19 16-0236 LF 18 Gauge, 304 Stainless Steel, Dovetail Anchor Slot	5.07	
04 05 19 16-0237 LF 16 Gauge, 304 Stainless Steel, Dovetail Anchor Slot	5.55	
04 05 19 16-0238 316 Stainless Steel, Dovetail Anchor Slot (04 05 19 16-0219)		
04 05 19 16-0239 LF 24 Gauge, 316 Stainless Steel, Dovetail Anchor Slot	4.32	
04 05 19 16-0240 LF 22 Gauge, 316 Stainless Steel, Dovetail Anchor Slot	4.66	
04 05 19 16-0241 LF 20 Gauge, 316 Stainless Steel, Dovetail Anchor Slot	4.99	
04 05 19 16-0242 LF 18 Gauge, 316 Stainless Steel, Dovetail Anchor Slot	5.42	
04 05 19 16-0243 LF 16 Gauge, 316 Stainless Steel, Dovetail Anchor Slot	5.67	
04 05 19 16-0244 Dovetail Corrugated Brick Ties (04 05 19 16-0218)		
04 05 19 16-0245 Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie (04 05 19 16-0244)		
04 05 19 16-0246 EA 3-1/2" Length, 1" Width, 16 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.43	
04 05 19 16-0247 EA 5-1/2" Length, 1" Width, 16 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.60	
04 05 19 16-0248 EA 7-1/2" Length, 1" Width, 16 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.77	
04 05 19 16-0249 EA 3-1/2" Length, 1" Width, 14 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.47	
04 05 19 16-0250 EA 5-1/2" Length, 1" Width, 14 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.79	
04 05 19 16-0251 EA 7-1/2" Length, 1" Width, 14 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	2.03	
04 05 19 16-0252 EA 3-1/2" Length, 1" Width, 12 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.56	
04 05 19 16-0253 EA 5-1/2" Length, 1" Width, 12 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	1.78	
04 05 19 16-0254 EA 7-1/2" Length, 1" Width, 12 Gauge, Hot-Dipped Galvanized, Dovetail Corrugated Brick Tie	2.00	
04 05 19 16-0255 Mill Galvanized, Dovetail Corrugated Brick Tie (04 05 19 16-0244)		
04 05 19 16-0256 EA 3-1/2" Length, 1" Width, 16 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie	1.28	

04 Masonry**04 05 Common Work Results for Masonry****04 05 19 Masonry Anchorage and Reinforcing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 19 16-0257	EA	5-1/2" Length, 1" Width, 16 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.38
04 05 19 16-0258	EA	7-1/2" Length, 1" Width, 16 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.49
04 05 19 16-0259	EA	3-1/2" Length, 1" Width, 14 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.36
04 05 19 16-0260	EA	5-1/2" Length, 1" Width, 14 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.57
04 05 19 16-0261	EA	7-1/2" Length, 1" Width, 14 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.74
04 05 19 16-0262	EA	3-1/2" Length, 1" Width, 12 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.40
04 05 19 16-0263	EA	5-1/2" Length, 1" Width, 12 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.65
04 05 19 16-0264	EA	7-1/2" Length, 1" Width, 12 Gauge, Mill Galvanized, Dovetail Corrugated Brick Tie.....	1.82

04 05 19 16-0265 Dovetail Stone Anchors (04 05 19 16-0218)**04 05 19 16-0266 Hot-Dipped Galvanized, Dovetail Stone Anchors** (04 05 19 16-0265)

04 05 19 16-0267	EA	3-1/2" Length, 1" Width, 16 Gauge, Hot-Dipped Galvanized, Dovetail Stone Anchor.....	1.79
04 05 19 16-0268	EA	5-1/2" Length, 1" Width, 16 Gauge, Hot-Dipped Galvanized, Dovetail Stone Anchor.....	1.96
04 05 19 16-0269	EA	7-1/2" Length, 1" Width, 16 Gauge, Hot-Dipped Galvanized, Dovetail Stone Anchor.....	2.14

04 05 19 16-0270 Dovetail Partition Top Anchors (04 05 19 16-0218)

04 05 19 16-0271	EA	3/8" Rod, Hot-Dipped Galvanized, Dovetail Partition Top Anchor.....	4.60
04 05 19 16-0272	EA	3/8" Rod, Stainless Steel, Dovetail Partition Top Anchor.....	6.93

04 05 19 16-0273 Dovetail Flexible Triangle Brick Ties (04 05 19 16-0218)**04 05 19 16-0274 Hot-Dipped Galvanized, Dovetail Flexible Triangle Brick Ties** (04 05 19 16-0273)

04 05 19 16-0275	EA	3" Length, 3/16" Diameter, Hot-Dipped Galvanized, Dovetail Flexible Triangle Brick Tie.....	2.74
04 05 19 16-0276	EA	5" Length, 3/16" Diameter, Hot-Dipped Galvanized, Dovetail Flexible Triangle Brick Tie.....	2.96
04 05 19 16-0277	EA	7" Length, 3/16" Diameter, Hot-Dipped Galvanized, Dovetail Flexible Triangle Brick Tie.....	3.11
04 05 19 16-0278	EA	9" Length, 3/16" Diameter, Hot-Dipped Galvanized, Dovetail Flexible Triangle Brick Tie.....	3.27

04 05 19 16-0279 Mill Galvanized, Dovetail Flexible Triangle Brick Ties (04 05 19 16-0273)

04 05 19 16-0280	EA	3" Length, 3/16" Diameter, Mill Galvanized, Dovetail Flexible Triangle Brick Tie.....	2.42
04 05 19 16-0281	EA	5" Length, 3/16" Diameter, Mill Galvanized, Dovetail Flexible Triangle Brick Tie.....	2.44
04 05 19 16-0282	EA	7" Length, 3/16" Diameter, Mill Galvanized, Dovetail Flexible Triangle Brick Tie.....	2.54
04 05 19 16-0283	EA	9" Length, 3/16" Diameter, Mill Galvanized, Dovetail Flexible Triangle Brick Tie.....	2.79

04 05 19 26 Masonry Reinforcing Bars (04 05 19)

Note: Includes cutting and bending.

04 05 19 26-0001 Plain Steel Masonry Reinforcement Bar (04 05 19 26)

04 05 19 26-0002	LF	#3, Grade 40, Horizontal Placed, Steel Masonry Reinforcement Bar.....	1.01
04 05 19 26-0003	LF	#4, Grade 40, Horizontal Placed, Steel Masonry Reinforcement Bar.....	1.66
04 05 19 26-0004	LF	#5, Grade 40, Horizontal Placed, Steel Masonry Reinforcement Bar.....	2.34
04 05 19 26-0005	LF	#6, Grade 40, Horizontal Placed, Steel Masonry Reinforcement Bar.....	3.05
04 05 19 26-0006	LF	#3, Grade 50, Horizontal Placed, Steel Masonry Reinforcement Bar.....	1.03
04 05 19 26-0007	LF	#4, Grade 50, Horizontal Placed, Steel Masonry Reinforcement Bar.....	1.68
04 05 19 26-0008	LF	#5, Grade 50, Horizontal Placed, Steel Masonry Reinforcement Bar.....	2.38
04 05 19 26-0009	LF	#6, Grade 50, Horizontal Placed, Steel Masonry Reinforcement Bar.....	3.10
04 05 19 26-0010	LF	#3, Grade 60, Horizontal Placed, Steel Masonry Reinforcement Bar.....	1.05
04 05 19 26-0011	LF	#4, Grade 60, Horizontal Placed, Steel Masonry Reinforcement Bar.....	1.72
04 05 19 26-0012	LF	#5, Grade 60, Horizontal Placed, Steel Masonry Reinforcement Bar.....	2.44
04 05 19 26-0013	LF	#6, Grade 60, Horizontal Placed, Steel Masonry Reinforcement Bar.....	3.19
04 05 19 26-0014	LF	#3, Grade 40, Vertical Placed, Steel Masonry Reinforcement Bar.....	1.19
04 05 19 26-0015	LF	#4, Grade 40, Vertical Placed, Steel Masonry Reinforcement Bar.....	1.94
04 05 19 26-0016	LF	#5, Grade 40, Vertical Placed, Steel Masonry Reinforcement Bar.....	2.72
04 05 19 26-0017	LF	#6, Grade 40, Vertical Placed, Steel Masonry Reinforcement Bar.....	3.53
04 05 19 26-0018	LF	#3, Grade 50, Vertical Placed, Steel Masonry Reinforcement Bar.....	1.21
04 05 19 26-0019	LF	#4, Grade 50, Vertical Placed, Steel Masonry Reinforcement Bar.....	1.96
04 05 19 26-0020	LF	#5, Grade 50, Vertical Placed, Steel Masonry Reinforcement Bar.....	2.76
04 05 19 26-0021	LF	#6, Grade 50, Vertical Placed, Steel Masonry Reinforcement Bar.....	3.58
04 05 19 26-0022	LF	#3, Grade 60, Vertical Placed, Steel Masonry Reinforcement Bar.....	1.23
04 05 19 26-0023	LF	#4, Grade 60, Vertical Placed, Steel Masonry Reinforcement Bar.....	2.00
04 05 19 26-0024	LF	#5, Grade 60, Vertical Placed, Steel Masonry Reinforcement Bar.....	2.82
04 05 19 26-0025	LF	#6, Grade 60, Vertical Placed, Steel Masonry Reinforcement Bar.....	3.67

04 05 19 26-0026 Galvanized Steel Masonry Reinforcement Bar (04 05 19 26)

04 05 19 26-0027	LF	#3, Grade 40, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	1.16
04 05 19 26-0028	LF	#4, Grade 40, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	1.92
04 05 19 26-0029	LF	#5, Grade 40, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	2.75
04 05 19 26-0030	LF	#6, Grade 40, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	3.64
04 05 19 26-0031	LF	#3, Grade 50, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	1.18
04 05 19 26-0032	LF	#4, Grade 50, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	1.95
04 05 19 26-0033	LF	#5, Grade 50, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	2.79
04 05 19 26-0034	LF	#6, Grade 50, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	3.70
04 05 19 26-0035	LF	#3, Grade 60, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	1.20
04 05 19 26-0036	LF	#4, Grade 60, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	1.99
04 05 19 26-0037	LF	#5, Grade 60, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar.....	2.86

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 05 19 26-0038 LF #6, Grade 60, Horizontal Placed, Galvanized Steel Masonry Reinforcement Bar	3.79	
04 05 19 26-0039 LF #3, Grade 40, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	1.34	
04 05 19 26-0040 LF #4, Grade 40, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	2.20	
04 05 19 26-0041 LF #5, Grade 40, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	3.13	
04 05 19 26-0042 LF #6, Grade 40, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	4.12	
04 05 19 26-0043 LF #3, Grade 50, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	1.36	
04 05 19 26-0044 LF #4, Grade 50, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	2.23	
04 05 19 26-0045 LF #5, Grade 50, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	3.17	
04 05 19 26-0046 LF #6, Grade 50, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	4.18	
04 05 19 26-0047 LF #3, Grade 60, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	1.38	
04 05 19 26-0048 LF #4, Grade 60, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	2.27	
04 05 19 26-0049 LF #5, Grade 60, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	3.24	
04 05 19 26-0050 LF #6, Grade 60, Vertical Placed, Galvanized Steel Masonry Reinforcement Bar	4.27	
04 05 19 26-0051 Epoxy-Coated Masonry Reinforcement Bar (04 05 19 26)		
04 05 19 26-0052 LF #3, Grade 40, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	1.14	
04 05 19 26-0053 LF #4, Grade 40, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	1.89	
04 05 19 26-0054 LF #5, Grade 40, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	2.71	
04 05 19 26-0055 LF #6, Grade 40, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	3.58	
04 05 19 26-0056 LF #3, Grade 50, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	1.16	
04 05 19 26-0057 LF #4, Grade 50, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	1.92	
04 05 19 26-0058 LF #5, Grade 50, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	2.75	
04 05 19 26-0059 LF #6, Grade 50, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	3.64	
04 05 19 26-0060 LF #3, Grade 60, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	1.18	
04 05 19 26-0061 LF #4, Grade 60, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	1.96	
04 05 19 26-0062 LF #5, Grade 60, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	2.81	
04 05 19 26-0063 LF #6, Grade 60, Horizontal Placed, Epoxy-Coated Masonry Reinforcement Bar	3.72	
04 05 19 26-0064 LF #3, Grade 40, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	1.32	
04 05 19 26-0065 LF #4, Grade 40, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	2.17	
04 05 19 26-0066 LF #5, Grade 40, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	3.09	
04 05 19 26-0067 LF #6, Grade 40, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	4.06	
04 05 19 26-0068 LF #3, Grade 50, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	1.34	
04 05 19 26-0069 LF #4, Grade 50, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	2.20	
04 05 19 26-0070 LF #5, Grade 50, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	3.13	
04 05 19 26-0071 LF #6, Grade 50, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	4.12	
04 05 19 26-0072 LF #3, Grade 60, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	1.36	
04 05 19 26-0073 LF #4, Grade 60, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	2.24	
04 05 19 26-0074 LF #5, Grade 60, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	3.19	
04 05 19 26-0075 LF #6, Grade 60, Vertical Placed, Epoxy-Coated Masonry Reinforcement Bar	4.20	
04 05 23 Masonry Accessories (04 05)		
04 05 23 13 Masonry Control and Expansion Joints (04 05 23)		
04 05 23 13-0001 Masonry Control Joints (04 05 23 13)		
04 05 23 13-0002 Rubber, Masonry Control Joints (04 05 23 13-0001)		
04 05 23 13-0003 LF 1-5/8" Width, T-Style, Rubber, Masonry Control Joint	7.12	0.96
04 05 23 13-0004 LF 2-5/8" Width, Rubber, Masonry Control Joint	6.90	0.96
04 05 23 13-0005 LF 6-7/8" Width, Rubber, Masonry Control Joint	15.08	0.96
04 05 23 13-0006 Polyvinyl Chloride (PVC), Masonry Control Joints (04 05 23 13-0001)		
04 05 23 13-0007 LF 1-5/8" Width, T-Style, Polyvinyl Chloride (PVC), Masonry Control Joint	4.05	0.96
04 05 23 13-0008 LF 2-5/8" Width, Polyvinyl Chloride (PVC), Masonry Control Joint	4.23	0.96
04 05 23 13-0009 LF 4-7/8" Width, Polyvinyl Chloride (PVC), Masonry Control Joint	5.35	0.96
04 05 23 13-0010 LF 6-7/8" Width, Polyvinyl Chloride (PVC), Masonry Control Joint	5.90	0.96
04 05 23 13-0011 LF 11-1/8" Width, Polyvinyl Chloride (PVC), Masonry Control Joint	5.51	0.96
04 05 23 16 Masonry Embedded Flashing (04 05 23)		
04 05 23 16-0001 Lead Coated Copper Through Wall Flashing (04 05 23 16)		
04 05 23 16-0002 Mastic Backed 2 Sides, Lead Coated Copper Through Wall Flashing (04 05 23 16-0001)		
04 05 23 16-0003 SF 2 Ounce, Mastic Backed 2 Sides, Lead Coated Copper Through Wall Flashing	9.60	1.83
04 05 23 16-0004 SF 3 Ounce, Mastic Backed 2 Sides, Lead Coated Copper Through Wall Flashing	10.65	1.83
04 05 23 16-0005 SF 5 Ounce, Mastic Backed 2 Sides, Lead Coated Copper Through Wall Flashing	13.57	1.83
04 05 23 16-0006 SF 7 Ounce, Mastic Backed 2 Sides, Lead Coated Copper Through Wall Flashing	16.15	1.83
04 05 23 16-0007 Fabric Backed 2 Sides, Lead Coated Copper Through Wall Flashing (04 05 23 16-0001)		
04 05 23 16-0008 SF 2 Ounce, Fabric Backed 2 Sides, Lead Coated Copper Through Wall Flashing	10.62	1.83
04 05 23 16-0009 SF 3 Ounce, Fabric Backed 2 Sides, Lead Coated Copper Through Wall Flashing	11.57	1.83
04 05 23 16-0010 SF 5 Ounce, Fabric Backed 2 Sides, Lead Coated Copper Through Wall Flashing	14.94	1.83
04 05 23 16-0011 SF 7 Ounce, Fabric Backed 2 Sides, Lead Coated Copper Through Wall Flashing	18.04	1.83

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 05 23 16-0012		Paper Backed 2 Sides, Lead Coated Copper Through Wall Flashing (04 05 23 16-0001)		
04 05 23 16-0013	SF	2 Ounce, Paper Backed 2 Sides, Lead Coated Copper Through Wall Flashing	9.83	1.83
04 05 23 16-0014	SF	3 Ounce, Paper Backed 2 Sides, Lead Coated Copper Through Wall Flashing	11.15	1.83
04 05 23 16-0015	SF	5 Ounce, Paper Backed 2 Sides, Lead Coated Copper Through Wall Flashing	13.04	1.83
04 05 23 16-0016	SF	7 Ounce, Paper Backed 2 Sides, Lead Coated Copper Through Wall Flashing	16.99	1.83
04 05 23 16-0017		Stainless Steel Through Wall Flashing (04 05 23 16)		
04 05 23 16-0018		Paper Backed 2 Sides, Stainless Steel Through Wall Flashing (04 05 23 16-0017)		
04 05 23 16-0019	SF	0.005" Thick Paper Backed 2 Sides, Stainless Steel Through Wall Flashing	6.84	1.71
04 05 23 16-0020		Polyvinyl Chloride (PVC) Through Wall Flashing (04 05 23 16)		
04 05 23 16-0021	SF	0.010" Thick Black Polyvinyl Chloride (PVC) Through Wall Flashing	4.91	1.99
04 05 23 16-0022	SF	0.020" Thick Black Polyvinyl Chloride (PVC) Through Wall Flashing	5.27	1.99
04 05 23 16-0023	SF	0.030" Thick Black Polyvinyl Chloride (PVC) Through Wall Flashing	5.69	1.99
04 05 23 16-0024	SF	0.056" Thick Black Polyvinyl Chloride (PVC) Through Wall Flashing	7.07	1.99
04 05 23 16-0025		Copper Through Wall Flashing (04 05 23 16)		
04 05 23 16-0026		2 Sides Coated With Asphalt, Thru-Wall Copper Flashing (04 05 23 16-0025)		
04 05 23 16-0027	SF	2 Ounce, 2 Sides Coated With Asphalt, Thru-Wall Copper Flashing	8.01	1.71
04 05 23 16-0028	SF	3 Ounce, 2 Sides Coated With Asphalt, Thru-Wall Copper Flashing	8.79	1.71
04 05 23 16-0029	SF	5 Ounce, 2 Sides Coated With Asphalt, Thru-Wall Copper Flashing	10.93	1.71
04 05 23 16-0030	SF	7 Ounce, 2 Sides Coated With Asphalt, Thru-Wall Copper Flashing	12.82	1.71
04 05 23 16-0031	SF	10 Ounce, 2 Sides Coated With Asphalt, Thru-Wall Copper Flashing	13.62	1.71
04 05 23 16-0032		2 Sides Glass Fabric And Asphalt, Thru-Wall Copper Flashing (04 05 23 16-0025)		
04 05 23 16-0033	SF	2 Ounce, 2 Sides Glass Fabric And Asphalt, Thru-Wall Copper Flashing	8.78	1.71
04 05 23 16-0034	SF	3 Ounce, 2 Sides Glass Fabric And Asphalt, Thru-Wall Copper Flashing	9.46	1.71
04 05 23 16-0035	SF	5 Ounce, 2 Sides Glass Fabric And Asphalt, Thru-Wall Copper Flashing	11.94	1.71
04 05 23 16-0036	SF	7 Ounce, 2 Sides Glass Fabric And Asphalt, Thru-Wall Copper Flashing	14.20	1.71
04 05 23 16-0037	SF	10 Ounce, 2 Sides Glass Fabric And Asphalt, Thru-Wall Copper Flashing	15.54	1.71
04 05 23 16-0038		1 Side Kraft Paper And Asphalt, Thru-Wall Copper Flashing (04 05 23 16-0025)		
04 05 23 16-0039	SF	2 Ounce, 1 Side Kraft Paper And Asphalt, Thru-Wall Copper Flashing	8.10	1.71
04 05 23 16-0040	SF	3 Ounce, 1 Side Kraft Paper And Asphalt, Thru-Wall Copper Flashing	8.88	1.71
04 05 23 16-0041	SF	5 Ounce, 1 Side Kraft Paper And Asphalt, Thru-Wall Copper Flashing	11.01	1.71
04 05 23 16-0042	SF	7 Ounce, 1 Side Kraft Paper And Asphalt, Thru-Wall Copper Flashing	12.90	1.71
04 05 23 16-0043	SF	10 Ounce, 1 Side Kraft Paper And Asphalt, Thru-Wall Copper Flashing	13.70	1.71
04 05 23 16-0044		2 Sides Kraft Paper And Asphalt, Thru-Wall Copper Flashing (04 05 23 16-0025)		
04 05 23 16-0045	SF	2 Ounce, 2 Sides Kraft Paper And Asphalt, Thru-Wall Copper Flashing	8.20	1.71
04 05 23 16-0046	SF	3 Ounce, 2 Sides Kraft Paper And Asphalt, Thru-Wall Copper Flashing	9.15	1.71
04 05 23 16-0047	SF	5 Ounce, 2 Sides Kraft Paper And Asphalt, Thru-Wall Copper Flashing	10.54	1.71
04 05 23 16-0048	SF	7 Ounce, 2 Sides Kraft Paper And Asphalt, Thru-Wall Copper Flashing	13.44	1.71
04 05 23 16-0049	SF	10 Ounce, 2 Sides Kraft Paper And Asphalt, Thru-Wall Copper Flashing	9.59	1.71
04 05 23 16-0050		2 Sides Kraft Paper Reinforced With Glass Fabric And Asphalt, Thru-Wall Copper Flashing (04 05 23 16-0025)		
04 05 23 16-0051	SF	3 Ounce, 2 Sides Kraft Paper Reinforced With Glass Fabric And Asphalt, Thru-Wall Copper Flashing	11.37	1.71
04 05 23 16-0052	SF	5 Ounce, 2 Sides Kraft Paper Reinforced With Glass Fabric And Asphalt, Thru-Wall Copper Flashing	14.23	1.71
04 05 23 16-0053		2 Sides Glass Fabric, Thru-Wall Copper Flashing (04 05 23 16-0025)		
		Note: Glass fabric is bonded to both sides with a non-asphaltic adhesive.		
04 05 23 16-0054	SF	3 Ounce, 2 Sides Glass Fabric, Thru-Wall Copper Flashing	9.72	1.71
04 05 23 16-0055	SF	5 Ounce, 2 Sides Glass Fabric, Thru-Wall Copper Flashing	12.27	1.71
04 05 23 19		Masonry Cavity Drainage, Weepholes, and Vents (04 05 23)		
04 05 23 19-0001		Brick Vents, 4" Deep, With Insect Screen (04 05 23 19)		
		Note: 0.100" nominal wall thickness, three mortar ribs on top and bottom of frame.		
04 05 23 19-0002	EA	8-1/8" x 2-3/8" Aluminum Brick Vent	78.45	
04 05 23 19-0003	EA	8-1/8" x 4-3/4" Aluminum Brick Vent	97.62	
04 05 23 19-0004	EA	8-1/8" x 7-3/4" Aluminum Brick Vent	123.81	
04 05 23 19-0005	EA	12" x 2-3/8" Aluminum Brick Vent	97.30	
04 05 23 19-0006	EA	12" x 4-3/4" Aluminum Brick Vent	120.64	
04 05 23 19-0007	EA	12" x 7-3/4" Aluminum Brick Vent	153.40	
04 05 23 19-0008	EA	16-1/2" x 2-3/8" Aluminum Brick Vent	115.89	
04 05 23 19-0009	EA	16-1/2" x 4-3/4" Aluminum Brick Vent	158.19	
04 05 23 19-0010	EA	16-1/2" x 7-3/4" Aluminum Brick Vent	194.52	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
04 05 23 19-0011 EA 24" x 2-3/8" Aluminum Brick Vent.....	159.84	
04 05 23 19-0012 EA 24" x 4-3/4" Aluminum Brick Vent.....	208.61	
04 05 23 19-0013 EA 24" x 7-3/4" Aluminum Brick Vent.....	257.98	

04 20 Unit Masonry ⁽⁰⁴⁾

Note: Includes finishing joints (pointing) and cleaning of new brick and mortar. Cutting of new bricks/blocks to size. Weep holes and wicking material.

04 21 Clay Unit Masonry ^(04 20)

04 21 13 Brick Masonry ^(04 21)

Note: Includes brick and mortar. See CSI section 04 05 19 13-0000 for reinforcing, 04 05 19 16-0000 for masonry anchors.

04 21 13 00-0001 Brick Masonry ^(04 21 13)

04 21 13 00-0002 SF Standard Size Red Brick, Running Bond.....	24.96
Note: Standard size brick, 3-5/8" x 2-1/4" x 8". (6.55 Bricks/SF)	
For Buff Or Gray, Add	0.96
For Common Or American Bond, Add	0.77
For English Bond, Add	1.53
For Flemish Bond, Add	3.17
For Stacked Bond, Add	2.21
For <10, Small Area Replacements (Individual Areas), Add	29.06
For Curved Wall, Add	3.84
For Corbels, Add	14.39
For Severe Weather (SW) Brick, Add	0.87
For Glazed Brick, Add	20.23
04 21 13 00-0003 SF Engineer Standard Size Red Brick, Running Bond.....	25.91
Note: Engineer standard size brick, 3-5/8" x 2-3/4" x 8". (5.39 Bricks/SF)	
For Buff Or Gray, Add	1.19
For Common Or American Bond, Add	0.75
For English Bond, Add	1.50
For Flemish Bond, Add	3.17
For Stacked Bond, Add	2.23
For <10, Small Area Replacements (Individual Areas), Add	28.48
For Curved Wall, Add	3.75
For Corbels, Add	14.06
For Severe Weather (SW) Brick, Add	1.07
For Glazed Brick, Add	25.06
04 21 13 00-0004 SF Modular Size Red Brick, Running Bond.....	24.96
Note: Modular size brick, 3-5/8" x 2-1/4" x 7-5/8". (6.75 Bricks/SF)	
For Buff Or Gray, Add	0.96
For Common Or American Bond, Add	0.77
For English Bond, Add	1.53
For Flemish Bond, Add	3.17
For Stacked Bond, Add	2.21
For <10, Small Area Replacements (Individual Areas), Add	29.06
For Curved Wall, Add	3.84
For Corbels, Add	14.39
For Severe Weather (SW) Brick, Add	0.87
For Glazed Brick, Add	20.23
04 21 13 00-0005 SF Engineer Modular Size Red Brick, Running Bond.....	25.91
Note: Engineer modular size brick, 3-5/8" x 2-3/4" x 7-5/8". (5.63 Bricks/SF)	
For Buff Or Gray, Add	1.19
For Common Or American Bond, Add	0.75
For English Bond, Add	1.50
For Flemish Bond, Add	3.17
For Stacked Bond, Add	2.23
For <10, Small Area Replacements (Individual Areas), Add	28.48
For Curved Wall, Add	3.75
For Corbels, Add	14.06
For Severe Weather (SW) Brick, Add	1.07
For Glazed Brick, Add	25.06
04 21 13 00-0006 SF Economy Size Red Brick, Running Bond.....	25.72
Note: Economy size brick, 3-5/8" x 3-5/8" x 7-5/8". (4.5 Bricks/SF)	
For Buff Or Gray, Add	1.16
For Common Or American Bond, Add	0.75
For English Bond, Add	1.50
For Flemish Bond, Add	3.16
For Stacked Bond, Add	2.22
For <10, Small Area Replacements (Individual Areas), Add	28.47
For Curved Wall, Add	3.75
For Corbels, Add	14.06
For Severe Weather (SW) Brick, Add	1.05
For Glazed Brick, Add	24.40
04 21 13 00-0007 SF Utility Size Red Brick, Running Bond.....	19.06
Note: Utility size brick, 3-5/8" x 3-5/8" x 11-5/8". (3.0 Bricks/SF)	
For Buff Or Gray, Add	1.00
For Common Or American Bond, Add	0.52
For English Bond, Add	1.05
For Flemish Bond, Add	2.26
For Stacked Bond, Add	1.61
For <10, Small Area Replacements (Individual Areas), Add	19.93
For Curved Wall, Add	2.62
For Corbels, Add	9.82
For Severe Weather (SW) Brick, Add	0.90
For Glazed Brick, Add	20.90

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

04 21 13 00-0008	SF	Double Utility Size Red Brick, Running Bond.....	17.27
		Note: Double utility size brick, 3-5/8" x 7-5/8" x 11-5/8". (1.5 Bricks/SF)	
		For Buff Or Gray, Add	0.70
		For Common Or American Bond, Add	0.52
		For English Bond, Add	1.05
		For Flemish Bond, Add	2.17
		For Stacked Bond, Add	1.52
		For <10, Small Area Replacements (Individual Areas), Add	19.84
		For Curved Wall, Add	2.62
		For Corbels, Add	9.82
		For Severe Weather (SW) Brick, Add	0.63
		For Glazed Brick, Add	14.63
04 21 13 00-0009	SF	Norman Size Red Brick, Running Bond.....	26.27
		Note: Norman size brick, 3-5/8" x 2-1/4" x 11-5/8". (4.5 Bricks/SF)	
		For Buff Or Gray, Add	1.25
		For Common Or American Bond, Add	0.75
		For English Bond, Add	1.50
		For Flemish Bond, Add	3.19
		For Stacked Bond, Add	2.25
		For <10, Small Area Replacements (Individual Areas), Add	28.50
		For Curved Wall, Add	3.75
		For Corbels, Add	14.06
		For Severe Weather (SW) Brick, Add	1.13
		For Glazed Brick, Add	26.32
04 21 13 00-0010	SF	Roman Size Red Brick, Running Bond.....	27.85
		Note: Roman size brick, 3-5/8" x 1-5/8" x 11-5/8". (6.0 Bricks/SF)	
		For Buff Or Gray, Add	1.52
		For Common Or American Bond, Add	0.75
		For English Bond, Add	1.50
		For Flemish Bond, Add	3.27
		For Stacked Bond, Add	2.33
		For <10, Small Area Replacements (Individual Areas), Add	28.58
		For Curved Wall, Add	3.75
		For Corbels, Add	14.06
		For Severe Weather (SW) Brick, Add	1.37
		For Glazed Brick, Add	31.85

04 21 13 00-0011 Fire Brick (04 21 13)

04 21 13 00-0012	SF	Running Bond, Red Fire Brick	29.44
		For Buff Or Gray, Add	1.78
		For Common Or American Bond, Add	0.75
		For English Bond, Add	1.50
		For Flemish Bond, Add	3.35
		For Stacked Bond, Add	2.41
		For <10, Small Area Replacements (Individual Areas), Add	28.66

04 21 13 00-0013 Window Sill (04 21 13)

04 21 13 00-0014	LF	Standard Size Red Brick, Window Sill	22.32
		Note: Standard size brick, 3-5/8" x 2-1/4" x 8", placed on edge.	
		For Buff Or Gray, Add	0.28
04 21 13 00-0015	LF	Engineer Standard Size Red Brick, Window Sill.....	22.52
		Note: Engineer standard size brick, 3-5/8" x 2-3/4" x 8", placed on edge.	
		For Buff Or Gray, Add	0.31
04 21 13 00-0016	LF	Modular Size Red Brick, Window Sill	22.32
		Note: Modular size brick, 3-5/8" x 2-1/4" x 7-5/8", placed on edge.	
		For Buff Or Gray, Add	0.28
04 21 13 00-0017	LF	Engineer Modular Size Red Brick, Window Sill.....	22.65
		Note: Engineer modular size brick, 3-5/8" x 2-3/4" x 7-5/8", placed on edge.	
		For Buff Or Gray, Add	0.33
04 21 13 00-0018	LF	Economy Size Red Brick, Window Sill.....	23.52
		Note: Economy size brick, 3-5/8" x 3-5/8" x 7-5/8", placed on edge.	
		For Buff Or Gray, Add	0.48
04 21 13 00-0019	LF	Utility Size Red Brick, Window Sill	23.70
		Note: Utility size brick, 3-5/8" x 3-5/8" x 11-5/8", placed on edge.	
		For Buff Or Gray, Add	0.51
04 21 13 00-0020	LF	Double Utility Size Red Brick, Window Sill.....	23.70
		Note: Double utility size brick, 3-5/8" x 7-5/8" x 11-5/8", placed on edge.	
		For Buff Or Gray, Add	0.51
04 21 13 00-0021	LF	Norman Size Red Brick, Window Sill	22.76
		Note: Norman size brick, 3-5/8" x 2-1/4" x 11-5/8", placed on edge.	
		For Buff Or Gray, Add	0.35
04 21 13 00-0022	LF	Roman Size Red Brick, Window Sill	22.85
		Note: Roman size brick, 3-5/8" x 1-5/8" x 11-5/8", placed on edge.	
		For Buff Or Gray, Add	0.37

04 21 19 Clay Tile Masonry (04 21)

04 21 19 00-0001 Scored Face, Hollow, Clay Backing Tile (04 21 19)

04 21 19 00-0002 Load Bearing, Scored Face, Hollow, Clay Backing Tile (04 21 19 00-0001)

04 21 19 00-0003	SF	4" Thick Load Bearing, Scored Face, Hollow, Clay Backing Tile.....	23.20
		For Smooth Face, One Side, Add	1.46
		For Smooth Face, Two Sides, Add	2.47



Masonry	04	04
Unit Masonry	04 20	
Clay Unit Masonry	04 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 21 19 00-0004 SF 6" Thick Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	25.23 1.62 2.74	
04 21 19 00-0005 SF 8" Thick Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	28.34 1.88 3.20	
04 21 19 00-0006 SF 10" Thick Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	39.11 2.91 5.03	
04 21 19 00-0007 SF 12" Thick Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	51.54 4.05 7.07	
04 21 19 00-0008 Non-Load Bearing, Scored Face, Hollow, Clay Backing Tile (04 21 19 00-0001)		
04 21 19 00-0009 SF 3" Thick Non-Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	19.41 1.18 1.97	
04 21 19 00-0010 SF 4" Thick Non-Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	23.30 1.53 2.60	
04 21 19 00-0011 SF 6" Thick Non-Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	23.90 1.56 2.63	
04 21 19 00-0012 SF 8" Thick Non-Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	36.71 2.77 4.81	
04 21 19 00-0013 SF 12" Thick Non-Load Bearing, Scored Face, Hollow, Clay Backing Tile <i>For Smooth Face, One Side, Add</i> <i>For Smooth Face, Two Sides, Add</i>	50.15 4.01 7.02	
04 21 26 Glazed Structural Clay Tile Masonry (04 21)		
Note: Includes tile and mortar in all colors.		
04 21 26 00-0001 6T Series Structural Glazed Clay Tile (04 21 26)		
04 21 26 00-0002 Glazed On One Side 6T Series Structural Glazed Clay Tile (04 21 26 00-0001)		
04 21 26 00-0003 SF 2" Thick 1 Sided 6T Series Structural Glazed Clay Tile, 5-1/3" x 12" <i>For Stacked Bond, Add</i>	32.01 2.05	
04 21 26 00-0004 SF 4" Thick 1 Sided 6T Series Structural Glazed Clay Tile, 5-1/3" x 12" <i>For Stacked Bond, Add</i>	36.02 2.05	
04 21 26 00-0005 SF 6" Thick 1 Sided 6T Series Structural Glazed Clay Tile, 5-1/3" x 12" <i>For Stacked Bond, Add</i>	44.21 2.14	
04 21 26 00-0006 Special Shapes 6T Series Structural Glazed Clay Tile (04 21 26 00-0001)		
04 21 26 00-0007 LF Bullnose, Jamb Or Sill Shapes 6T Series Structural Glazed Clay Tile <i>For Stacked Bond, Add</i>	33.34 2.42	
04 21 26 00-0008 LF 2" Or 4" Cove Base 6T Series Structural Glazed Clay Tile <i>For Stacked Bond, Add</i>	40.02 2.42	
04 21 26 00-0009 8W Series Structural Glazed Clay Tile (04 21 26)		
04 21 26 00-0010 Glazed On One Side 8W Series Structural Glazed Clay Tile (04 21 26 00-0009)		
04 21 26 00-0011 SF 2" Thick 1 Sided 8W Series Structural Glazed Clay Tile, 8" x 16" <i>For Stacked Bond, Add</i>	25.31 1.30	
04 21 26 00-0012 SF 4" Thick 1 Sided 8W Series Structural Glazed Clay Tile, 8" x 16" <i>For Stacked Bond, Add</i>	31.63 1.40	
04 21 26 00-0013 SF 6" Thick 1 Sided 8W Series Structural Glazed Clay Tile, 8" x 16" <i>For Stacked Bond, Add</i>	43.97 1.49	
04 21 26 00-0014 Special Shapes 8W Series Structural Glazed Clay Tile (04 21 26 00-0009)		
04 21 26 00-0015 LF Bullnose, Jamb Or Sill Shapes 8W Series Structural Glazed Clay Tile <i>For Stacked Bond, Add</i>	34.69 1.68	
04 21 26 00-0016 LF 2" Or 4" Cove Base 8W Series Structural Glazed Clay Tile <i>For Stacked Bond, Add</i>	34.63 1.68	
04 21 26 00-0017 4W Series Structural Glazed Clay Tile (04 21 26)		
04 21 26 00-0018 Glazed On One Side 4W Series Structural Glazed Clay Tile (04 21 26 00-0017)		
04 21 26 00-0019 SF 2" Thick 1 Sided 4W Series Structural Glazed Tile, 8" x 8" <i>For Stacked Bond, Add</i>	33.52 2.05	
04 21 26 00-0020 SF 4" Thick 1 Sided 4W Series Structural Glazed Tile, 8" x 8" <i>For Stacked Bond, Add</i>	35.52 2.05	
04 21 26 00-0021 SF 6" Thick 1 Sided 4W Series Structural Glazed Tile, 8" x 8" <i>For Stacked Bond, Add</i>	44.47 2.14	
04 21 26 00-0022 Special Shapes 4W Series Structural Glazed Clay Tile (04 21 26 00-0017)		

04	04	Masonry
	04 20	Unit Masonry
	04 21	Clay Unit Masonry



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 21 26 00-0023	LF	Bullnose, Jamb Or Sill Shapes 4W Series Structural Glazed Clay Tile	34.56	
		<i>For Stacked Bond, Add</i>	2.42	
04 21 26 00-0024	LF	2" Or 4" Cove Base 4W Series Structural Glazed Clay Tile.....	39.91	
		<i>For Stacked Bond, Add</i>	2.42	
04 21 26 00-0025		6T Series Sound Absorbing Structural Glazed Tile (04 21 26)		
04 21 26 00-0026	SF	4" Thick, 6T Sound Absorbing Structural Glazed Tile	34.63	
04 21 26 00-0027	SF	6" Thick, 6T Sound Absorbing Structural Glazed Tile	37.44	
04 21 26 00-0028	SF	8" Thick, 6T Sound Absorbing Structural Glazed Tile	43.69	
04 21 26 00-0029		8T Series Sound Absorbing Structural Glazed Tile (04 21 26)		
04 21 26 00-0030	SF	4" Thick, 8T Sound Absorbing Structural Glazed Tile	39.01	
04 21 26 00-0031	SF	6" Thick, 8T Sound Absorbing Structural Glazed Tile	44.13	
04 21 26 00-0032	SF	8" Thick, 8T Acoustical Glazed Tile	52.31	
04 21 29		Terra Cotta Masonry (04 21)		
04 21 29 00-0001		Coping (04 21 29)		
		Note: Includes caulk and ties. Excludes drilling into existing materials or other anchoring bolts.		
04 21 29 00-0002	SF	Terra Cotta Coping	106.89	39.45
		<i>For Smooth Tile Instead Of Scored, Add</i>	3.68	
		<i>For Reinforcing With Steel Rods, Add</i>	7.39	
04 21 29 00-0003		Partition Or Back Up (Scored) (04 21 29)		
04 21 29 00-0004		Non-load Bearing, 12" x 12" (04 21 29 00-0003)		
04 21 29 00-0005	SF	3" Thick Terra Cotta, Non-Load Bearing 12" x 12" Scored Face, Back-Up Partitions.....	28.26	
		<i>For Smooth Tile Instead Of Scored, Add</i>	3.81	
		<i>For Reinforcing With Steel Rods, Add</i>	3.53	
04 21 29 00-0006	SF	4" Thick Terra Cotta, Non-Load Bearing 12" x 12" Scored Face, Back-Up Partitions.....	29.95	
		<i>For Smooth Tile Instead Of Scored, Add</i>	3.98	
		<i>For Reinforcing With Steel Rods, Add</i>	3.71	
04 21 29 00-0007	SF	6" Thick Terra Cotta, Non-Load Bearing 12" x 12" Scored Face, Back-Up Partitions.....	38.92	
		<i>For Smooth Tile Instead Of Scored, Add</i>	5.44	
		<i>For Reinforcing With Steel Rods, Add</i>	4.97	
04 21 29 00-0008	SF	8" Thick Terra Cotta, Non-Load Bearing 12" x 12" Scored Face, Back-Up Partitions.....	47.78	
		<i>For Smooth Tile Instead Of Scored, Add</i>	6.84	
		<i>For Reinforcing With Steel Rods, Add</i>	6.19	
04 21 29 00-0009		Load Bearing, 12" x 12" (04 21 29 00-0003)		
04 21 29 00-0010		In Walls (04 21 29 00-0009)		
04 21 29 00-0011	SF	4" Thick Terra Cotta, Walls 12" x 12" Load Bearing Scored Face	31.90	
		<i>For Smooth Tile Instead Of Scored, Add</i>	4.33	
		<i>For Reinforcing With Steel Rods, Add</i>	4.00	
04 21 29 00-0012	SF	6" Thick Terra Cotta, Walls 12" x 12" Load Bearing Scored Face	43.35	
		<i>For Smooth Tile Instead Of Scored, Add</i>	6.24	
		<i>For Reinforcing With Steel Rods, Add</i>	5.63	
04 21 29 00-0013	SF	8" Thick Terra Cotta, Walls 12" x 12" Load Bearing Scored Face	52.10	
		<i>For Smooth Tile Instead Of Scored, Add</i>	7.62	
		<i>For Reinforcing With Steel Rods, Add</i>	6.84	
04 21 29 00-0014	SF	10" Thick Terra Cotta, Walls 12" x 12" Load Bearing Scored Face	54.47	
		<i>For Smooth Tile Instead Of Scored, Add</i>	7.79	
		<i>For Reinforcing With Steel Rods, Add</i>	7.05	
04 21 29 00-0015	SF	12" Thick Terra Cotta, Walls 12" x 12" Load Bearing Scored Face	65.50	
		<i>For Smooth Tile Instead Of Scored, Add</i>	9.44	
		<i>For Reinforcing With Steel Rods, Add</i>	8.52	
04 21 29 00-0016		In Floors (04 21 29 00-0009)		
04 21 29 00-0017	SF	4" Thick Terra Cotta, Floors 12" x 12" Load Bearing Scored Face	29.30	
		<i>For Smooth Tile Instead Of Scored, Add</i>	4.33	
		<i>For Reinforcing With Steel Rods, Add</i>	3.87	
04 21 29 00-0018	SF	6" Thick Terra Cotta, Floors 12" x 12" Load Bearing Scored Face	40.45	
		<i>For Smooth Tile Instead Of Scored, Add</i>	6.24	
		<i>For Reinforcing With Steel Rods, Add</i>	5.49	
04 21 29 00-0019	SF	8" Thick Terra Cotta, Floors 12" x 12" Load Bearing Scored Face	49.12	
		<i>For Smooth Tile Instead Of Scored, Add</i>	7.62	
		<i>For Reinforcing With Steel Rods, Add</i>	6.69	
04 21 29 00-0020	SF	10" Thick Terra Cotta, Floors 12" x 12" Load Bearing Scored Face	51.12	
		<i>For Smooth Tile Instead Of Scored, Add</i>	7.79	
		<i>For Reinforcing With Steel Rods, Add</i>	6.89	
04 21 29 00-0021	SF	12" Thick Terra Cotta, Floors 12" x 12" Load Bearing Scored Face	61.16	
		<i>For Smooth Tile Instead Of Scored, Add</i>	9.44	
		<i>For Reinforcing With Steel Rods, Add</i>	8.31	

04 22 Concrete Unit Masonry (04 20)



Masonry	04	04
Unit Masonry	04 20	
Concrete Unit Masonry	04 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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Note: Includes block and mortar. Excludes horizontal and vertical reinforcing. See CSI section 04 05 19 13-0000 for joint reinforcing.

04 22 23	Architectural Concrete Unit Masonry (04 22)	
04 22 23 13	Exposed Aggregate Concrete Unit Masonry (04 22 23)	
04 22 23 13-0001	Concrete Blocks (04 22 23 13)	
04 22 23 13-0002	Lightweight Concrete Blocks (04 22 23 13-0001)	
04 22 23 13-0003	Cored, Lightweight, Concrete Blocks (04 22 23 13-0002)	
04 22 23 13-0004	SF 4" x 8" x 16", Cored, Lightweight, Concrete Block	11.93
	For Stacked Bond, Add	2.57
	For Scored Block, Add	0.41
	For Curved Wall Application, Add	1.98
	For <10, Small Area Replacements (Individual Areas), Add	15.00
04 22 23 13-0005	SF 6" x 8" x 16", Cored, Lightweight, Concrete Block	13.29
	For Stacked Bond, Add	2.78
	For Scored Block, Add	0.52
	For Curved Wall Application, Add	2.14
	For <10, Small Area Replacements (Individual Areas), Add	16.26
04 22 23 13-0006	SF 8" x 8" x 16", Cored, Lightweight, Concrete Block	14.41
	For Stacked Bond, Add	2.99
	For Scored Block, Add	0.58
	For Curved Wall Application, Add	2.30
	For <10, Small Area Replacements (Individual Areas), Add	17.47
04 22 23 13-0007	SF 10" x 8" x 16", Cored, Lightweight, Concrete Block	15.90
	For Stacked Bond, Add	3.13
	For Scored Block, Add	0.77
	For Curved Wall Application, Add	2.41
	For <10, Small Area Replacements (Individual Areas), Add	18.34
04 22 23 13-0008	SF 12" x 8" x 16", Cored, Lightweight, Concrete Block	19.00
	For Stacked Bond, Add	3.86
	For Scored Block, Add	0.83
	For Curved Wall Application, Add	2.97
	For <10, Small Area Replacements (Individual Areas), Add	22.57
04 22 23 13-0009	Solid, Lightweight, Concrete Blocks (04 22 23 13-0002)	
04 22 23 13-0010	SF 4" x 8" x 16", Solid, Lightweight, Concrete Block	12.86
	For Stacked Bond, Add	2.64
	For Scored Block, Add	0.54
	For Curved Wall Application, Add	2.03
	For <10, Small Area Replacements (Individual Areas), Add	15.43
04 22 23 13-0011	SF 6" x 8" x 16", Solid, Lightweight, Concrete Block	14.11
	For Stacked Bond, Add	2.90
	For Scored Block, Add	0.59
	For Curved Wall Application, Add	2.23
	For <10, Small Area Replacements (Individual Areas), Add	16.98
04 22 23 13-0012	SF 8" x 8" x 16", Solid, Lightweight, Concrete Block	14.89
	For Stacked Bond, Add	3.08
	For Scored Block, Add	0.61
	For Curved Wall Application, Add	2.37
	For <10, Small Area Replacements (Individual Areas), Add	18.00
04 22 23 13-0013	SF 10" x 8" x 16", Solid, Lightweight, Concrete Block	16.61
	For Stacked Bond, Add	3.23
	For Scored Block, Add	0.84
	For Curved Wall Application, Add	2.48
	For <10, Small Area Replacements (Individual Areas), Add	18.93
04 22 23 13-0014	SF 12" x 8" x 16", Solid, Lightweight, Concrete Block	19.82
	For Stacked Bond, Add	3.99
	For Scored Block, Add	0.90
	For Curved Wall Application, Add	3.07
	For <10, Small Area Replacements (Individual Areas), Add	23.33
04 22 23 13-0015	Normal Weight Concrete Blocks (04 22 23 13-0001)	
04 22 23 13-0016	Cored, Normal Weight, Concrete Blocks (04 22 23 13-0015)	
04 22 23 13-0017	SF 4" x 8" x 16", Cored, Normal Weight, Concrete Block	12.18
	For Stacked Bond, Add	2.64
	For Scored Block, Add	0.41
	For Curved Wall Application, Add	2.03
	For <10, Small Area Replacements (Individual Areas), Add	15.38
	For 3,500 PSI, Add	0.43
	For 5,000 PSI, Add	0.73
04 22 23 13-0018	SF 6" x 8" x 16", Cored, Normal Weight, Concrete Block	13.49
	For Stacked Bond, Add	2.90
	For Scored Block, Add	0.46
	For Curved Wall Application, Add	2.23
	For <10, Small Area Replacements (Individual Areas), Add	16.93
	For 3,500 PSI, Add	0.49
	For 5,000 PSI, Add	0.84

04	04	Masonry
	04 20	Unit Masonry
	04 22	Concrete Unit Masonry



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 22 23 13-0019 SF 8" x 8" x 16", Cored, Normal Weight, Concrete Block.....	14.53	
For Stacked Bond, Add	3.08	
For Scored Block, Add	0.54	
For Curved Wall Application, Add	2.37	
For <10, Small Area Replacements (Individual Areas), Add	17.98	
For 3,500 PSI, Add	0.56	
For 5,000 PSI, Add	0.96	
04 22 23 13-0020 SF 10" x 8" x 16", Cored, Normal Weight, Concrete Block.....	17.58	
For Stacked Bond, Add	3.23	
For Scored Block, Add	1.03	
For Curved Wall Application, Add	2.48	
For <10, Small Area Replacements (Individual Areas), Add	19.00	
For 3,500 PSI, Add	1.09	
For 5,000 PSI, Add	1.86	
04 22 23 13-0021 SF 12" x 8" x 16", Cored, Normal Weight, Concrete Block.....	20.66	
For Stacked Bond, Add	3.99	
For Scored Block, Add	1.07	
For Curved Wall Application, Add	3.07	
For <10, Small Area Replacements (Individual Areas), Add	23.39	
For 3,500 PSI, Add	1.12	
For 5,000 PSI, Add	1.92	
04 22 23 13-0022 Solid, Normal Weight, Concrete Blocks (04 22 23 13-0015)		
04 22 23 13-0023 SF 4" x 8" x 16", Solid, Normal Weight, Concrete Block.....	13.00	
For Stacked Bond, Add	2.71	
For Scored Block, Add	0.52	
For Curved Wall Application, Add	2.08	
For <10, Small Area Replacements (Individual Areas), Add	15.82	
For 3,500 PSI, Add	0.54	
For 5,000 PSI, Add	0.93	
04 22 23 13-0024 SF 6" x 8" x 16", Solid, Normal Weight, Concrete Block.....	13.89	
For Stacked Bond, Add	2.99	
For Scored Block, Add	0.48	
For Curved Wall Application, Add	2.30	
For <10, Small Area Replacements (Individual Areas), Add	17.43	
For 3,500 PSI, Add	0.50	
For 5,000 PSI, Add	0.86	
04 22 23 13-0025 SF 8" x 8" x 16", Solid, Normal Weight, Concrete Block.....	15.00	
For Stacked Bond, Add	3.18	
For Scored Block, Add	0.56	
For Curved Wall Application, Add	2.44	
For <10, Small Area Replacements (Individual Areas), Add	18.54	
For 3,500 PSI, Add	0.58	
For 5,000 PSI, Add	1.00	
04 22 23 13-0026 SF 10" x 8" x 16", Solid, Normal Weight, Concrete Block.....	16.53	
For Stacked Bond, Add	3.33	
For Scored Block, Add	0.74	
For Curved Wall Application, Add	2.56	
For <10, Small Area Replacements (Individual Areas), Add	19.51	
For 3,500 PSI, Add	0.78	
For 5,000 PSI, Add	1.34	
04 22 23 13-0027 SF 12" x 8" x 16", Solid, Normal Weight, Concrete Block.....	19.74	
For Stacked Bond, Add	4.13	
For Scored Block, Add	0.77	
For Curved Wall Application, Add	3.17	
For <10, Small Area Replacements (Individual Areas), Add	24.10	
For 3,500 PSI, Add	0.81	
For 5,000 PSI, Add	1.39	
04 22 23 13-0028 Bond Beam Or Lintel Concrete Blocks (04 22 23 13)		
04 22 23 13-0029 Lightweight, Bond Beam Or Lintel Concrete Blocks (04 22 23 13-0028)		
Note: Excludes concrete fill and reinforcing.		
04 22 23 13-0030 LF 6" x 8" x 16", Lightweight, Bond Beam Or Lintel Concrete Block.....	13.89	
For Stacked Bond, Add	2.78	
For Grout And Fill With 2 #5 Rebar, Add	8.54	
For Scored Block, Add	0.64	
For Curved Wall Application, Add	2.14	
04 22 23 13-0031 LF 8" x 8" x 16", Lightweight, Bond Beam Or Lintel Concrete Block.....	15.35	
For Stacked Bond, Add	2.99	
For Grout And Fill With 2 #5 Rebar, Add	9.60	
For Scored Block, Add	0.77	
For Curved Wall Application, Add	2.30	
04 22 23 13-0032 LF 12" x 8" x 16", Lightweight, Bond Beam Or Lintel Concrete Block.....	18.93	
For Stacked Bond, Add	3.86	
For Grout And Fill With 2 #5 Rebar, Add	11.51	
For Scored Block, Add	0.82	
For Curved Wall Application, Add	2.97	
04 22 23 13-0033 Normal Weight, Bond Beam Or Lintel Concrete Blocks (04 22 23 13-0028)		
Note: Excludes concrete fill and reinforcing.		



Masonry	04	04
Unit Masonry	04 20	
Concrete Unit Masonry	04 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 22 23 13-0034 LF 6" x 8" x 16", Normal Weight, Bond Beam Or Lintel Concrete Block	13.90	
For Stacked Bond, Add	2.90	
For Grout And Fill With 2 #5 Rebar, Add	8.32	
For Scored Block, Add	0.55	
For Curved Wall Application, Add	2.23	
For 3,500 PSI, Add	0.57	
For 5,000 PSI, Add	0.98	
04 22 23 13-0035 LF 8" x 8" x 16", Normal Weight, Bond Beam Or Lintel Concrete Block	15.24	
For Stacked Bond, Add	3.08	
For Grout And Fill With 2 #5 Rebar, Add	9.32	
For Scored Block, Add	0.68	
For Curved Wall Application, Add	2.37	
For 3,500 PSI, Add	0.71	
For 5,000 PSI, Add	1.22	
04 22 23 13-0036 LF 12" x 8" x 16", Normal Weight, Bond Beam Or Lintel Concrete Block	18.97	
For Stacked Bond, Add	3.99	
For Grout And Fill With 2 #5 Rebar, Add	11.31	
For Scored Block, Add	0.73	
For Curved Wall Application, Add	3.07	
For 3,500 PSI, Add	0.76	
For 5,000 PSI, Add	1.31	
04 22 23 23 Prefaced Concrete Unit Masonry (04 22 23)		
04 22 23 23-0001 Ground Face Concrete Blocks (04 22 23 23)		
04 22 23 23-0002 SF 4" x 8" x 16", Ground Face, Concrete Block	15.67	
For Stacked Bond, Add	3.23	
For Scored Block, Add	0.65	
For Curved Wall Application, Add	2.48	
For <10, Small Area Replacements (Individual Areas), Add	18.86	
04 22 23 23-0003 SF 6" x 8" x 16", Ground Face, Concrete Block	17.67	
For Stacked Bond, Add	3.63	
For Scored Block, Add	0.74	
For Curved Wall Application, Add	2.79	
For <10, Small Area Replacements (Individual Areas), Add	21.22	
04 22 23 23-0004 SF 8" x 8" x 16", Ground Face, Concrete Block	19.14	
For Stacked Bond, Add	3.84	
For Scored Block, Add	0.88	
For Curved Wall Application, Add	2.95	
For <10, Small Area Replacements (Individual Areas), Add	22.45	
04 22 23 23-0005 SF 10" x 8" x 16", Ground Face, Concrete Block	20.48	
For Stacked Bond, Add	4.07	
For Scored Block, Add	0.97	
For Curved Wall Application, Add	3.13	
For <10, Small Area Replacements (Individual Areas), Add	23.82	
04 22 23 23-0006 SF 12" x 8" x 16", Ground Face, Concrete Block	24.47	
For Stacked Bond, Add	4.98	
For Scored Block, Add	1.06	
For Curved Wall Application, Add	3.83	
For <10, Small Area Replacements (Individual Areas), Add	29.15	
04 22 23 26 Sound-Absorbing Concrete Unit Masonry (04 22 23)		
04 22 23 26-0001 Slotted, Acoustical Concrete Block (04 22 23 26)		
04 22 23 26-0002 SF 4" x 8" x 16", .45 - .55 NRC, Slotted, Acoustical Concrete Block	21.42	
For Stacked Bond, Add	3.23	
For Curved Wall Application, Add	2.48	
For <10, Small Area Replacements (Individual Areas), Add	19.29	
04 22 23 26-0003 SF 6" x 8" x 16", .45 - .55 NRC, Slotted, Acoustical Concrete Block	24.04	
For Stacked Bond, Add	3.50	
For Curved Wall Application, Add	2.70	
For <10, Small Area Replacements (Individual Areas), Add	21.01	
04 22 23 26-0004 SF 8" x 8" x 16", .45 - .55 NRC, Slotted, Acoustical Concrete Block	27.76	
For Stacked Bond, Add	3.84	
For Curved Wall Application, Add	2.95	
For <10, Small Area Replacements (Individual Areas), Add	23.10	
04 22 23 29 Split-Face Concrete Unit Masonry (04 22 23)		
04 22 23 29-0001 Split Face, Concrete Blocks (04 22 23 29)		
04 22 23 29-0002 Plain Or Scored, Split Face, Concrete Blocks (04 22 23 29-0001)		
04 22 23 29-0003 SF 4" x 8" x 16", Plain Or Scored, Split Face, Concrete Block	16.06	
For Stacked Bond, Add	3.23	
For Curved Wall Application, Add	2.48	
For <10, Small Area Replacements (Individual Areas), Add	18.89	
04 22 23 29-0004 SF 6" x 8" x 16", Plain Or Scored, Split Face, Concrete Block	18.13	
For Stacked Bond, Add	3.63	
For Curved Wall Application, Add	2.79	
For <10, Small Area Replacements (Individual Areas), Add	21.25	

04	04	Masonry
	04 20	Unit Masonry
	04 22	Concrete Unit Masonry



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
04 22 23 29-0005 SF 8" x 8" x 16", Plain Or Scored, Split Face, Concrete Block	19.66	
For Stacked Bond, Add	3.84	
For Curved Wall Application, Add	2.95	
For <10, Small Area Replacements (Individual Areas), Add	22.49	
04 22 23 29-0006 SF 10" x 8" x 16", Plain Or Scored, Split Face, Concrete Block	21.10	
For Stacked Bond, Add	4.07	
For Curved Wall Application, Add	3.13	
For <10, Small Area Replacements (Individual Areas), Add	23.87	
04 22 23 29-0007 SF 12" x 8" x 16", Plain Or Scored, Split Face, Concrete Block	24.83	
For Stacked Bond, Add	4.98	
For Curved Wall Application, Add	3.83	
For <10, Small Area Replacements (Individual Areas), Add	29.18	
04 22 23 29-0008 Plain Or Scored, Split Face, Bond Beam Or Lintel Concrete Blocks (04 22 23 29-0001)		
04 22 23 29-0009 SF 4" x 8" x 16", Plain Or Scored, Split Face, Bond Beam Or Lintel Concrete Block	16.97	
For Stacked Bond, Add	3.23	
For Grout And Fill With 2 #5 Rebar, Add	10.77	
For Curved Wall Application, Add	2.48	
For <10, Small Area Replacements (Individual Areas), Add	18.96	
04 22 23 29-0010 SF 6" x 8" x 16", Plain Or Scored, Split Face, Bond Beam Or Lintel Concrete Block	19.17	
For Stacked Bond, Add	3.63	
For Grout And Fill With 2 #5 Rebar, Add	12.19	
For Curved Wall Application, Add	2.79	
For <10, Small Area Replacements (Individual Areas), Add	21.33	
04 22 23 29-0011 SF 8" x 8" x 16", Plain Or Scored, Split Face, Bond Beam Or Lintel Concrete Block	20.89	
For Stacked Bond, Add	3.84	
For Grout And Fill With 2 #5 Rebar, Add	13.52	
For Curved Wall Application, Add	2.95	
For <10, Small Area Replacements (Individual Areas), Add	22.59	
04 22 23 29-0012 SF 10" x 8" x 16", Plain Or Scored, Split Face, Bond Beam Or Lintel Concrete Block	22.46	
For Stacked Bond, Add	4.07	
For Grout And Fill With 2 #5 Rebar, Add	14.64	
For Curved Wall Application, Add	3.13	
For <10, Small Area Replacements (Individual Areas), Add	23.97	
04 22 23 29-0013 SF 12" x 8" x 16", Plain Or Scored, Split Face, Bond Beam Or Lintel Concrete Block	26.24	
For Stacked Bond, Add	4.98	
For Grout And Fill With 2 #5 Rebar, Add	16.66	
For Curved Wall Application, Add	3.83	
For <10, Small Area Replacements (Individual Areas), Add	29.29	
04 22 23 29-0014 Split Rib, Concrete Block (04 22 23 29)		
04 22 23 29-0015 Split Rib, Concrete Block (04 22 23 29-0014)		
04 22 23 29-0016 SF 4" x 8" x 16", Split Rib, Concrete Block	15.77	
For Stacked Bond, Add	3.23	
For Curved Wall Application, Add	2.48	
For <10, Small Area Replacements (Individual Areas), Add	18.87	
04 22 23 29-0017 SF 6" x 8" x 16", Split Rib, Concrete Block	18.80	
For Stacked Bond, Add	3.63	
For Curved Wall Application, Add	2.79	
For <10, Small Area Replacements (Individual Areas), Add	21.30	
04 22 23 29-0018 SF 8" x 8" x 16", Split Rib, Concrete Block	20.01	
For Stacked Bond, Add	3.84	
For Curved Wall Application, Add	2.95	
For <10, Small Area Replacements (Individual Areas), Add	22.52	
04 22 23 29-0019 SF 10" x 8" x 16", Split Rib, Concrete Block	21.39	
For Stacked Bond, Add	4.07	
For Curved Wall Application, Add	3.13	
For <10, Small Area Replacements (Individual Areas), Add	23.89	
04 22 23 29-0020 SF 12" x 8" x 16", Split Rib, Concrete Block	25.47	
For Stacked Bond, Add	4.98	
For Curved Wall Application, Add	3.83	
For <10, Small Area Replacements (Individual Areas), Add	29.23	
04 22 23 31 Glazed Concrete Masonry Unit (04 22 23)		
04 22 23 31-0001 One Glazed Face, Concrete Blocks (04 22 23 31)		
04 22 23 31-0002 One Glazed Face, Concrete Blocks (04 22 23 31-0001)		
04 22 23 31-0003 SF 4" x 8" x 16", One Glazed Face, Concrete Block	28.17	
For Stacked Bond, Add	3.13	
For Curved Wall Application, Add	2.41	
For <10, Small Area Replacements (Individual Areas), Add	19.26	
04 22 23 31-0004 SF 6" x 8" x 16", One Glazed Face, Concrete Block	30.15	
For Stacked Bond, Add	3.45	
For Curved Wall Application, Add	2.65	
For <10, Small Area Replacements (Individual Areas), Add	21.14	
04 22 23 31-0005 SF 8" x 8" x 16", One Glazed Face, Concrete Block	31.93	
For Stacked Bond, Add	3.63	
For Curved Wall Application, Add	2.79	
For <10, Small Area Replacements (Individual Areas), Add	22.29	



Masonry	04	04
Unit Masonry	04 20	
Concrete Unit Masonry	04 22	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

04 22 23 31-0006	SF 10" x 8" x 16", One Glazed Face, Concrete Block	33.82	
	For Stacked Bond, Add	3.84	
	For Curved Wall Application, Add	2.95	
	For <10, Small Area Replacements (Individual Areas), Add	23.56	
04 22 23 31-0007	SF 12" x 8" x 16", One Glazed Face, Concrete Block	38.05	
	For Stacked Bond, Add	4.69	
	For Curved Wall Application, Add	3.61	
	For <10, Small Area Replacements (Individual Areas), Add	28.58	
04 22 23 31-0008	Two Glazed Faces, Concrete Blocks (04 22 23 31)		
04 22 23 31-0009	Two Glazed Faces, Concrete Blocks (04 22 23 31-0008)		
04 22 23 31-0010	SF 4" x 8" x 16", Two Glazed Faces, Concrete Block	37.69	
	For Stacked Bond, Add	3.57	
	For Curved Wall Application, Add	2.74	
	For <10, Small Area Replacements (Individual Areas), Add	22.38	
04 22 23 31-0011	SF 6" x 8" x 16", Two Glazed Faces, Concrete Block	39.51	
	For Stacked Bond, Add	3.84	
	For Curved Wall Application, Add	2.95	
	For <10, Small Area Replacements (Individual Areas), Add	23.98	
04 22 23 31-0012	SF 8" x 8" x 16", Two Glazed Faces, Concrete Block	42.12	
	For Stacked Bond, Add	4.24	
	For Curved Wall Application, Add	3.26	
	For <10, Small Area Replacements (Individual Areas), Add	26.37	

04 23 Glass Unit Masonry (04 20)

04 23 13 Vertical Glass Unit Masonry (04 23)

Note: Includes 1/4" mortar joints and caulking. Excludes joint reinforcement and anchors.

04 23 13 00-0001 Glass Block Unit Masonry (04 23 13)

04 23 13 00-0002	SF 6" x 6" x 4" Plain Glass Block	77.06	
	For Solar Reflective (Suntrol) Blocks, Add	15.90	
	For Essex (Horizontal Striated) Blocks, Add	9.08	
	For Sculptured Or Patterned Blocks, Add	15.90	
	For Colored Glass, Add	45.42	
	For Thinline Block, Deduct	-11.36	
	For >1,000 To 5,000, Deduct	-5.42	
	For >5,000, Deduct	-9.27	
04 23 13 00-0003	SF 8" x 8" x 4" Plain Glass Block	55.42	
	For Solar Reflective (Suntrol) Blocks, Add	11.25	
	For Essex (Horizontal Striated) Blocks, Add	6.43	
	For Sculptured Or Patterned Blocks, Add	11.25	
	For Colored Glass, Add	32.15	
	For Thinline Block, Deduct	-8.04	
	For >1,000 To 5,000, Deduct	-3.92	
	For >5,000, Deduct	-6.69	
04 23 13 00-0004	SF 12" x 12" x 4" Plain Glass Block	62.48	
	For Solar Reflective (Suntrol) Blocks, Add	14.38	
	For Essex (Horizontal Striated) Blocks, Add	8.22	
	For Sculptured Or Patterned Blocks, Add	14.38	
	For Colored Glass, Add	41.08	
	For Thinline Block, Deduct	-10.27	
	For >1,000 To 5,000, Deduct	-4.18	
	For >5,000, Deduct	-7.30	

04 23 13 00-0005 Solid Glass Block (Vistabrik®) (04 23 13)

04 23 13 00-0006	SF 3" x 8" x 3" Solid Glass Block (Vistabrik®).....	757.01	
04 23 13 00-0007	SF 4" x 8" x 3" Solid Glass Block (Vistabrik®).....	573.30	
04 23 13 00-0008	SF 6" x 8" x 3" Solid Glass Block (Vistabrik®).....	391.77	
04 23 13 00-0009	SF 8" x 8" x 3" Solid Glass Block (Vistabrik®).....	274.18	

04 40 Stone Assemblies (04)

Note: Includes pointing and cleaning of new stone and mortar. All stone prices include material and mortar.

04 41 Dry-Placed Stone (04 40)

04 41 00 00-0001 Ashlar Veneer, Random Size, Square Cut Rough Stone (04 41)

04 41 00 00-0002	SF 4" Thick Ashlar Veneer, Random Size, Square Cut Rough Stone.....	25.46	7.38
04 41 00 00-0003	SF 6" Thick Ashlar Veneer, Random Size, Square Cut Rough Stone.....	25.92	7.38

04 42 Exterior Stone Cladding (04 40)

04 42 43 Stone Panels for Curtain Walls (04 42)

04 42 43 00-0001 Marble Facing Panels (04 42 43)

Note: 3' x 1.5'

04 42 43 00-0002	SF 3/4" Thick Marble Facing Panels	71.74	16.97
04 42 43 00-0003	SF 7/8" Thick Marble Facing Panels	75.82	17.18

04	04	Masonry
	04 40	Stone Assemblies
	04 42	Exterior Stone Cladding



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
04 42 43 00-0004	SF	1-1/2" Thick Marble Facing Panels		87.68	17.52
04 42 43 00-0005	SF	2" Thick Marble Facing Panels		96.41	18.06
04 42 43 00-0006	SF	2-1/4" Thick Marble Facing Panels		102.75	19.15
04 42 43 00-0007	CF	Marble Face Panel.....		434.10	62.40
04 42 43 00-0008		Smooth Limestone Panels (04 42 43)			
		Note: Up to 12' x 5' panels.			
04 42 43 00-0009	SF	1-1/2" Thick Smooth Limestone Panels		58.56	34.05
04 42 43 00-0010	SF	2" Thick Smooth Limestone Panels		62.07	35.69
04 42 43 00-0011	SF	3" Thick Smooth Limestone Panels		65.77	37.32
04 42 43 00-0012	SF	4" Thick Smooth Limestone Panels		76.09	41.05
04 42 43 00-0013		Sandstone Panels (04 42 43)			
04 42 43 00-0014	SF	2-1/2" Thick Sandstone Panels.....		66.95	35.69
04 42 43 00-0015	SF	4" Thick Sandstone Panels.....		73.61	41.05
04 42 43 00-0016	SF	Split Face Sandstone Panels, Random Sizes.....		67.82	41.05
04 43		Stone Masonry (04 40)			
04 43 16		Stone Fabrications (04 43)			
04 43 16 00-0001		Marble (04 43 16)			
04 43 16 00-0002		Marble Base (04 43 16 00-0001)			
		Note: 1" thick.			
04 43 16 00-0003	LF	4" High Marble Base		107.08	67.71
04 43 16 00-0004	LF	6" High Marble Base		121.55	73.76
04 43 16 00-0005		Marble Columns (04 43 16 00-0001)			
04 43 16 00-0006	CF	Plain Faced Solid Marble Columns.....		298.41	62.40
04 43 16 00-0007	CF	Fluted, Carved Solid Marble Columns		497.78	62.40
04 43 16 00-0008		Marble Flooring (04 43 16 00-0001)			
04 43 16 00-0009	SF	3/8" Uniform Color Marble Flooring.....		30.12	15.50
04 43 16 00-0010	SF	1/2" Uniform Color Marble Flooring.....		32.33	15.50
04 43 16 00-0011	SF	1/2" Travertine Marble Flooring.....		38.78	17.70
04 43 16 00-0012		Marble Items (04 43 16 00-0001)			
04 43 16 00-0013	LF	12" Wide Marble Stair Treads		80.29	24.39
04 43 16 00-0014	LF	6" Wide Marble Stair Risers		61.12	19.55
04 43 16 00-0015	LF	6" Wide x 2" Thick Marble Window Sills.....		36.57	14.50
04 43 16 00-0016	LF	5" Wide x 7/8" Thick Marble Window Stool, Polished		71.33	17.80
04 43 16 00-0017	SF	7/8" Thick, Non-Skid, Marble Patio Blocks.....		40.17	22.47
04 43 16 00-0018		Limestone (04 43 16)			
04 43 16 00-0019		Ashlar Veneer Limestone (04 43 16 00-0018)			
04 43 16 00-0020	SF	4" Ashlar Veneer Limestone, Random Sizes		58.55	24.39
04 43 16 00-0021	SF	6" To 8" Thick, Pitched Face Ashlar Veneer Limestone, Random Sizes		88.77	33.51
04 43 16 00-0022		Limestone Coping (04 43 16 00-0018)			
		Note: Measured from the highest point. Includes drilling into existing materials, caulk and ties.			
04 43 16 00-0023	SF	2-1/2" Thick Limestone Coping		28.69	8.76
04 43 16 00-0024	SF	3" Thick Limestone Coping		32.01	9.30
04 43 16 00-0025	SF	3-1/2" Thick Limestone Coping		35.34	9.85
04 43 16 00-0026	SF	4" Thick Limestone Coping		37.57	10.18
04 43 16 00-0027	SF	5" Thick Limestone Coping		43.14	10.40
04 43 16 00-0028	SF	6" Thick Limestone Coping		61.85	10.94
04 43 16 00-0029	CF	>6" Thick Limestone Coping		101.38	22.02
04 43 16 00-0030		Limestone Stair Treads (04 43 16 00-0018)			
04 43 16 00-0031	SF	2" Thick Limestone Treads		34.73	8.21
04 43 16 00-0032	SF	2-1/2" Thick Limestone Treads		36.88	8.76
04 43 16 00-0033	SF	3" Thick Limestone Treads		41.19	9.30
04 43 16 00-0034	SF	3-1/2" Thick Limestone Treads		44.41	9.85
04 43 16 00-0035	SF	4" Thick Limestone Treads		47.63	9.85
04 43 16 00-0036	SF	5" Thick Limestone Treads		51.87	10.40
04 43 16 00-0037	SF	6" Thick Limestone Tread, Smooth Finish		70.79	10.94
04 43 16 00-0038		Limestone Items (04 43 16 00-0018)			
04 43 16 00-0039	CF	Sawn Edge Limestone Block, Sill, Lintel, Jamb And Other Trim.....		179.21	82.57



Masonry	04	04
Stone Assemblies	04 40	
Stone Masonry	04 43	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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04 43 16 00-0040	Granite <small>(04 43 16)</small>		
04 43 16 00-0041	Polished Granite Veneer Facing Panels <small>(04 43 16 00-0040)</small> Note: Excludes structural support steel.		
04 43 16 00-0042	SF 7/8" Thick Black Polished Granite Veneer Facing Panels.....	105.23	34.26
04 43 16 00-0043	SF 7/8" Thick Gray Polished Granite Veneer Facing Panels.....	95.81	34.26
04 43 16 00-0044	Granite Stair Treads <small>(04 43 16 00-0040)</small>		
04 43 16 00-0045	SF 2" Thick Granite Stair Tread	61.57	8.21
04 43 16 00-0046	Slate <small>(04 43 16)</small>		
04 43 16 00-0047	Slate Panels Or Sills <small>(04 43 16 00-0046)</small>		
04 43 16 00-0048	SF 1" Thick Slate Panels.....	60.35	34.26
04 43 16 00-0049	SF 2" Thick Slate Panels.....	69.87	34.26
04 43 16 00-0050	Slate Sills Or Stools <small>(04 43 16 00-0046)</small>		
04 43 16 00-0051	LF 6" Wide, 1" Thick Slate Sills Or Stools With Sand Finish.....	27.24	14.59
04 43 16 00-0052	LF 10" Wide, 1" Thick Slate Sills Or Stools With Sand Finish.....	33.29	14.59
04 43 16 00-0053	LF 6" Wide, 2" Thick Slate Sills Or Stools With Sand Finish.....	32.44	14.59
04 43 16 00-0054	LF 10" Wide, 2" Thick Slate Sills Or Stools With Sand Finish.....	45.42	14.59
04 43 16 00-0055	Slate Stair Treads <small>(04 43 16 00-0046)</small>		
04 43 16 00-0056	SF 2" Thick Slate Stair Tread	40.62	8.21

04 70 Manufactured Masonry (04)

04 72 Cast Stone Masonry (04 70)

04 72 00 00-0001	Precast Concrete Lintels <small>(04 72)</small>		
04 72 00 00-0002	Solid Precast Concrete Lintels <small>(04 72 00 00-0001)</small>		
04 72 00 00-0003	LF 4" x 8", Solid Precast Concrete Lintel	17.33	
04 72 00 00-0004	LF 6" x 8", Solid Precast Concrete Lintel	22.28	
04 72 00 00-0005	LF 8" x 8", Solid Precast Concrete Lintel	27.64	
04 72 00 00-0006	U Shaped Precast Concrete Lintels <small>(04 72 00 00-0001)</small> Note: Excludes concrete fill and field added reinforcing. See CSI section 04 05 16 26-0001 for concrete fill.		
04 72 00 00-0007	LF 6" x 8", U Shaped Precast Concrete Lintel	18.60	
04 72 00 00-0008	LF 8" x 8", U Shaped Precast Concrete Lintel	22.65	
04 72 00 00-0009	LF 12" x 8", U Shaped Precast Concrete Lintel	37.74	
04 72 00 00-0010	Precast Concrete Coping <small>(04 72)</small> Note: Includes caulk and ties. Excludes drilling into existing materials or other anchoring bolts.		
04 72 00 00-0011	Precast Concrete Coping <small>(04 72 00 00-0010)</small> Note: Measured at highest point.		
04 72 00 00-0012	SF 2" Thick Precast Concrete Coping.....	51.56	11.93
04 72 00 00-0013	SF 2-1/2" Thick Precast Concrete Coping.....	58.05	12.84
04 72 00 00-0014	SF 3" Thick Precast Concrete Coping.....	66.99	13.76
04 72 00 00-0015	SF 3-1/2" Thick Precast Concrete Coping.....	72.03	14.68
04 72 00 00-0016	SF 4" Thick Precast Concrete Coping.....	77.11	15.59
04 72 00 00-0017	SF 5" Thick Precast Concrete Coping.....	91.61	16.52
04 72 00 00-0018	SF 6" Thick Precast Concrete Coping.....	104.42	17.43
04 72 00 00-0019	Precast Concrete Window Sills <small>(04 72)</small> Note: Includes caulk and ties.		
04 72 00 00-0020	Precast Concrete Window Sills <small>(04 72 00 00-0019)</small>		
04 72 00 00-0021	LF 6" Wide Precast Concrete Window Sill	37.73	9.17
04 72 00 00-0022	LF 10" Wide Precast Concrete Window Sill	56.39	9.17
04 72 00 00-0023	LF 14" Wide Precast Concrete Window Sill	66.51	9.17

END OF SECTION 04

04	04	Masonry
	04 70	Manufactured Masonry
	04 72	Cast Stone Masonry



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 Metals

05 05 Common Work Results for Metals (05)

05 05 19 Post-Installed Concrete Anchors (05 05)

See CSI section 03 15 19 00-0000 for cast-in concrete anchors.

05 05 19 00-0001	Concrete And Masonry Anchors <small>(05 05 19)</small>	
05 05 19 00-0002	Expansion Anchors <small>(05 05 19 00-0001)</small>	
	Note: Includes drilling.	
05 05 19 00-0003	Wedge Expansion Bolt Anchors <small>(05 05 19 00-0002)</small>	
05 05 19 00-0004	Zinc Plated Steel, Wedge Anchor Expansion Bolt <small>(05 05 19 00-0003)</small>	
	Note: Includes nut and washer.	
05 05 19 00-0005	EA 1/4" Diameter x 1-3/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	11.96
	For >10 To 50, Deduct	-0.54
	For >50 To 100, Deduct	-1.10
	For >100, Deduct	-2.20
05 05 19 00-0006	EA 1/4" Diameter x 2-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	12.15
	For >10 To 50, Deduct	-0.54
	For >50 To 100, Deduct	-1.11
	For >100, Deduct	-2.21
05 05 19 00-0007	EA 1/4" Diameter x 3-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	12.56
	For >10 To 50, Deduct	-0.55
	For >50 To 100, Deduct	-1.14
	For >100, Deduct	-2.28
05 05 19 00-0008	EA 3/8" Diameter x 2-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	14.79
	For >10 To 50, Deduct	-0.65
	For >50 To 100, Deduct	-1.35
	For >100, Deduct	-2.69
05 05 19 00-0009	EA 3/8" Diameter x 2-3/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	14.94
	For >10 To 50, Deduct	-0.65
	For >50 To 100, Deduct	-1.35
	For >100, Deduct	-2.70
05 05 19 00-0010	EA 3/8" Diameter x 3" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	15.00
	For >10 To 50, Deduct	-0.65
	For >50 To 100, Deduct	-1.35
	For >100, Deduct	-2.70
05 05 19 00-0011	EA 3/8" Diameter x 5" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	15.56
	For >10 To 50, Deduct	-0.65
	For >50 To 100, Deduct	-1.37
	For >100, Deduct	-2.73
05 05 19 00-0012	EA 1/2" Diameter x 2-3/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	21.71
	For >10 To 50, Deduct	-0.93
	For >50 To 100, Deduct	-1.93
	For >100, Deduct	-3.86
05 05 19 00-0013	EA 1/2" Diameter x 3-3/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	21.83
	For >10 To 50, Deduct	-0.93
	For >50 To 100, Deduct	-1.93
	For >100, Deduct	-3.87
05 05 19 00-0014	EA 1/2" Diameter x 4-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	22.06
	For >10 To 50, Deduct	-0.93
	For >50 To 100, Deduct	-1.94
	For >100, Deduct	-3.88
05 05 19 00-0015	EA 1/2" Diameter x 5-1/2" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	22.69
	For >10 To 50, Deduct	-0.93
	For >50 To 100, Deduct	-1.96
	For >100, Deduct	-3.91
05 05 19 00-0016	EA 1/2" Diameter x 7" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	23.56
	For >10 To 50, Deduct	-0.93
	For >50 To 100, Deduct	-1.98
	For >100, Deduct	-3.96
05 05 19 00-0017	EA 5/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	29.28
	For >10 To 50, Deduct	-1.14
	For >50 To 100, Deduct	-2.45
	For >100, Deduct	-4.89
05 05 19 00-0018	EA 5/8" Diameter x 4-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	29.47
	For >10 To 50, Deduct	-1.14
	For >50 To 100, Deduct	-2.45
	For >100, Deduct	-4.90
05 05 19 00-0019	EA 5/8" Diameter x 5" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	29.87
	For >10 To 50, Deduct	-1.14
	For >50 To 100, Deduct	-2.46
	For >100, Deduct	-4.92
05 05 19 00-0020	EA 5/8" Diameter x 6" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	30.64
	For >10 To 50, Deduct	-1.14
	For >50 To 100, Deduct	-2.48
	For >100, Deduct	-4.96
05 05 19 00-0021	EA 5/8" Diameter x 7" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	31.42
	For >10 To 50, Deduct	-1.14
	For >50 To 100, Deduct	-2.50
	For >100, Deduct	-5.00

05 Metals**05 05 Common Work Results for Metals****05 05 19 Post-Installed Concrete Anchors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 19 00-0022	EA	5/8" Diameter x 8-1/2" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	37.53
		<i>For >10 To 50, Deduct</i>	-1.14
		<i>For >50 To 100, Deduct</i>	-2.65
		<i>For >100, Deduct</i>	-5.31
05 05 19 00-0023	EA	5/8" Diameter x 10" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	42.78
		<i>For >10 To 50, Deduct</i>	-1.14
		<i>For >50 To 100, Deduct</i>	-2.78
		<i>For >100, Deduct</i>	-5.57
05 05 19 00-0024	EA	3/4" Diameter x 4-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	35.70
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-2.93
		<i>For >100, Deduct</i>	-5.87
05 05 19 00-0025	EA	3/4" Diameter x 4-3/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	35.86
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-2.94
		<i>For >100, Deduct</i>	-5.87
05 05 19 00-0026	EA	3/4" Diameter x 5-1/2" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	36.80
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-2.96
		<i>For >100, Deduct</i>	-5.92
05 05 19 00-0027	EA	3/4" Diameter x 6-1/4" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	37.92
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-2.99
		<i>For >100, Deduct</i>	-5.98
05 05 19 00-0028	EA	3/4" Diameter x 7" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	39.21
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-3.02
		<i>For >100, Deduct</i>	-6.04
05 05 19 00-0029	EA	3/4" Diameter x 8-1/2" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	44.11
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-3.14
		<i>For >100, Deduct</i>	-6.29
05 05 19 00-0030	EA	3/4" Diameter x 10" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	50.63
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-3.31
		<i>For >100, Deduct</i>	-6.61
05 05 19 00-0031	EA	3/4" Diameter x 12" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	57.99
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-3.49
		<i>For >100, Deduct</i>	-6.98
05 05 19 00-0032	EA	7/8" Diameter x 6" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	53.79
		<i>For >10 To 50, Deduct</i>	-1.48
		<i>For >50 To 100, Deduct</i>	-3.56
		<i>For >100, Deduct</i>	-7.12
05 05 19 00-0033	EA	7/8" Diameter x 8" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	57.65
		<i>For >10 To 50, Deduct</i>	-1.48
		<i>For >50 To 100, Deduct</i>	-3.66
		<i>For >100, Deduct</i>	-7.31
05 05 19 00-0034	EA	7/8" Diameter x 10" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	62.78
		<i>For >10 To 50, Deduct</i>	-1.48
		<i>For >50 To 100, Deduct</i>	-3.78
		<i>For >100, Deduct</i>	-7.57
05 05 19 00-0035	EA	1" Diameter x 6" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	65.18
		<i>For >10 To 50, Deduct</i>	-1.91
		<i>For >50 To 100, Deduct</i>	-4.49
		<i>For >100, Deduct</i>	-8.99
05 05 19 00-0036	EA	1" Diameter x 9" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	72.47
		<i>For >10 To 50, Deduct</i>	-1.91
		<i>For >50 To 100, Deduct</i>	-4.68
		<i>For >100, Deduct</i>	-9.35
05 05 19 00-0037	EA	1" Diameter x 12" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt.....	79.69
		<i>For >10 To 50, Deduct</i>	-1.91
		<i>For >50 To 100, Deduct</i>	-4.86
		<i>For >100, Deduct</i>	-9.71
05 05 19 00-0038	EA	1-1/4" Diameter x 9" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	85.64
		<i>For >10 To 50, Deduct</i>	-2.45
		<i>For >50 To 100, Deduct</i>	-5.81
		<i>For >100, Deduct</i>	-11.62
05 05 19 00-0039	EA	1-1/4" Diameter x 12" Length, Zinc Plated Steel, Wedge Anchor Expansion Bolt	90.85
		<i>For >10 To 50, Deduct</i>	-2.45
		<i>For >50 To 100, Deduct</i>	-5.94
		<i>For >100, Deduct</i>	-11.88
05 05 19 00-0040		304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt <small>(05 05 19 00-0003)</small>	
		Note: Includes nut and washer.	
05 05 19 00-0041	EA	1/4" Diameter x 1-3/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	13.15
		<i>For >10 To 50, Deduct</i>	-0.54
		<i>For >50 To 100, Deduct</i>	-1.13
		<i>For >100, Deduct</i>	-2.26
05 05 19 00-0042	EA	1/4" Diameter x 2-1/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	13.72
		<i>For >10 To 50, Deduct</i>	-0.54
		<i>For >50 To 100, Deduct</i>	-1.15
		<i>For >100, Deduct</i>	-2.29



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 19 00-0043	EA			1/4" Diameter x 3-1/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	14.35	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.18	
				<i>For >100, Deduct</i>	-2.37	
05 05 19 00-0044	EA			3/8" Diameter x 2-1/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	17.13	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.41	
				<i>For >100, Deduct</i>	-2.81	
05 05 19 00-0045	EA			3/8" Diameter x 2-3/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	17.62	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.42	
				<i>For >100, Deduct</i>	-2.84	
05 05 19 00-0046	EA			3/8" Diameter x 3" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	17.97	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.43	
				<i>For >100, Deduct</i>	-2.85	
05 05 19 00-0047	EA			3/8" Diameter x 5" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	20.63	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.49	
				<i>For >100, Deduct</i>	-2.99	
05 05 19 00-0048	EA			1/2" Diameter x 2-3/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	27.11	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.07	
				<i>For >100, Deduct</i>	-4.13	
05 05 19 00-0049	EA			1/2" Diameter x 3-3/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	28.03	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.09	
				<i>For >100, Deduct</i>	-4.18	
05 05 19 00-0050	EA			1/2" Diameter x 4-1/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	28.56	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.10	
				<i>For >100, Deduct</i>	-4.21	
05 05 19 00-0051	EA			1/2" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	30.98	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.16	
				<i>For >100, Deduct</i>	-4.33	
05 05 19 00-0052	EA			1/2" Diameter x 7" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	34.62	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.25	
				<i>For >100, Deduct</i>	-4.51	
05 05 19 00-0053	EA			5/8" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	40.28	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.72	
				<i>For >100, Deduct</i>	-5.44	
05 05 19 00-0054	EA			5/8" Diameter x 5" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	42.65	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.78	
				<i>For >100, Deduct</i>	-5.56	
05 05 19 00-0055	EA			5/8" Diameter x 6" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	45.21	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.84	
				<i>For >100, Deduct</i>	-5.69	
05 05 19 00-0056	EA			5/8" Diameter x 7" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	48.60	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.93	
				<i>For >100, Deduct</i>	-5.86	
05 05 19 00-0057	EA			5/8" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	63.53	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-3.30	
				<i>For >100, Deduct</i>	-6.61	
05 05 19 00-0058	EA			3/4" Diameter x 4-1/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	48.13	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.24	
				<i>For >100, Deduct</i>	-6.49	
05 05 19 00-0059	EA			3/4" Diameter x 4-3/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	52.93	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.36	
				<i>For >100, Deduct</i>	-6.73	
05 05 19 00-0060	EA			3/4" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	57.04	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.47	
				<i>For >100, Deduct</i>	-6.93	
05 05 19 00-0061	EA			3/4" Diameter x 6-1/4" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	57.54	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.48	
				<i>For >100, Deduct</i>	-6.96	
05 05 19 00-0062	EA			3/4" Diameter x 7" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	61.39	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.58	
				<i>For >100, Deduct</i>	-7.15	
05 05 19 00-0063	EA			3/4" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	71.39	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.83	
				<i>For >100, Deduct</i>	-7.65	

05 Metals**05 05 Common Work Results for Metals****05 05 19 Post-Installed Concrete Anchors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 19 00-0064	EA 3/4" Diameter x 10" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	85.50	
	<i>For >10 To 50, Deduct</i>	-1.36	
	<i>For >50 To 100, Deduct</i>	-4.18	
	<i>For >100, Deduct</i>	-8.36	
05 05 19 00-0065	EA 7/8" Diameter x 8" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	85.19	
	<i>For >10 To 50, Deduct</i>	-1.48	
	<i>For >50 To 100, Deduct</i>	-4.34	
	<i>For >100, Deduct</i>	-8.69	
05 05 19 00-0066	EA 1" Diameter x 6" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	125.51	
	<i>For >10 To 50, Deduct</i>	-1.91	
	<i>For >50 To 100, Deduct</i>	-6.00	
	<i>For >100, Deduct</i>	-12.01	
05 05 19 00-0067	EA 1" Diameter x 9" Length, 304/18-8 Stainless Steel, Wedge Anchor Expansion Bolt.....	146.37	
	<i>For >10 To 50, Deduct</i>	-1.91	
	<i>For >50 To 100, Deduct</i>	-6.52	
	<i>For >100, Deduct</i>	-13.05	
05 05 19 00-0068	316 Stainless Steel, Wedge Anchor Expansion Bolt <small>(05 05 19 00-0003)</small>		
	Note: Includes nut and washer.		
05 05 19 00-0069	EA 1/4" Diameter x 2-1/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	13.64	
	<i>For >10 To 50, Deduct</i>	-0.54	
	<i>For >50 To 100, Deduct</i>	-1.14	
	<i>For >100, Deduct</i>	-2.29	
05 05 19 00-0070	EA 1/4" Diameter x 3-1/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	14.56	
	<i>For >10 To 50, Deduct</i>	-0.55	
	<i>For >50 To 100, Deduct</i>	-1.19	
	<i>For >100, Deduct</i>	-2.38	
05 05 19 00-0071	EA 3/8" Diameter x 2-1/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	18.71	
	<i>For >10 To 50, Deduct</i>	-0.65	
	<i>For >50 To 100, Deduct</i>	-1.45	
	<i>For >100, Deduct</i>	-2.89	
05 05 19 00-0072	EA 3/8" Diameter x 2-3/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	19.55	
	<i>For >10 To 50, Deduct</i>	-0.65	
	<i>For >50 To 100, Deduct</i>	-1.47	
	<i>For >100, Deduct</i>	-2.93	
05 05 19 00-0073	EA 3/8" Diameter x 3" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	19.77	
	<i>For >10 To 50, Deduct</i>	-0.65	
	<i>For >50 To 100, Deduct</i>	-1.47	
	<i>For >100, Deduct</i>	-2.94	
05 05 19 00-0074	EA 3/8" Diameter x 5" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	23.77	
	<i>For >10 To 50, Deduct</i>	-0.65	
	<i>For >50 To 100, Deduct</i>	-1.57	
	<i>For >100, Deduct</i>	-3.14	
05 05 19 00-0075	EA 1/2" Diameter x 2-3/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	30.94	
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.16	
	<i>For >100, Deduct</i>	-4.33	
05 05 19 00-0076	EA 1/2" Diameter x 3-3/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	33.27	
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.22	
	<i>For >100, Deduct</i>	-4.44	
05 05 19 00-0077	EA 1/2" Diameter x 4-1/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	37.49	
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.33	
	<i>For >100, Deduct</i>	-4.65	
05 05 19 00-0078	EA 1/2" Diameter x 5-1/2" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	38.54	
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.35	
	<i>For >100, Deduct</i>	-4.71	
05 05 19 00-0079	EA 5/8" Diameter x 5" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	53.21	
	<i>For >10 To 50, Deduct</i>	-1.14	
	<i>For >50 To 100, Deduct</i>	-3.04	
	<i>For >100, Deduct</i>	-6.09	
05 05 19 00-0080	EA 5/8" Diameter x 7" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	54.48	
	<i>For >10 To 50, Deduct</i>	-1.14	
	<i>For >50 To 100, Deduct</i>	-3.08	
	<i>For >100, Deduct</i>	-6.15	
05 05 19 00-0081	EA 3/4" Diameter x 4-3/4" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	66.22	
	<i>For >10 To 50, Deduct</i>	-1.36	
	<i>For >50 To 100, Deduct</i>	-3.70	
	<i>For >100, Deduct</i>	-7.39	
05 05 19 00-0082	EA 3/4" Diameter x 5-1/2" Length, 316 Stainless Steel, Wedge Anchor Expansion Bolt.....	71.49	
	<i>For >10 To 50, Deduct</i>	-1.36	
	<i>For >50 To 100, Deduct</i>	-3.83	
	<i>For >100, Deduct</i>	-7.66	
05 05 19 00-0083	Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt <small>(05 05 19 00-0003)</small>		
	Note: Includes nut and washer.		
05 05 19 00-0084	EA 1/2" Diameter x 2-3/4" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt.....	24.31	
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.00	
	<i>For >100, Deduct</i>	-3.99	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 19 00-0085	EA			1/2" Diameter x 4-1/4" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt	25.83	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.03	
				<i>For >100, Deduct</i>	-4.07	
05 05 19 00-0086	EA			1/2" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt	27.36	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.07	
				<i>For >100, Deduct</i>	-4.15	
05 05 19 00-0087	EA			1/2" Diameter x 7" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt.....	28.12	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.09	
				<i>For >100, Deduct</i>	-4.18	
05 05 19 00-0088	EA			5/8" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt	33.84	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.56	
				<i>For >100, Deduct</i>	-5.12	
05 05 19 00-0089	EA			5/8" Diameter x 6" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt.....	32.00	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.51	
				<i>For >100, Deduct</i>	-5.03	
05 05 19 00-0090	EA			3/4" Diameter x 4-3/4" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt	44.29	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.15	
				<i>For >100, Deduct</i>	-6.30	
05 05 19 00-0091	EA			3/4" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt	45.97	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.19	
				<i>For >100, Deduct</i>	-6.38	
05 05 19 00-0092	EA			3/4" Diameter x 8-1/2" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt	54.21	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.40	
				<i>For >100, Deduct</i>	-6.79	
05 05 19 00-0093	EA			1" Diameter x 6" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt.....	55.77	
				<i>For >10 To 50, Deduct</i>	-1.91	
				<i>For >50 To 100, Deduct</i>	-4.26	
				<i>For >100, Deduct</i>	-8.52	
05 05 19 00-0094	EA			1" Diameter x 9" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt.....	60.52	
				<i>For >10 To 50, Deduct</i>	-1.91	
				<i>For >50 To 100, Deduct</i>	-4.38	
				<i>For >100, Deduct</i>	-8.76	
05 05 19 00-0095	EA			1" Diameter x 12" Length, Hot Dipped Galvanized Steel, Wedge Anchor Expansion Bolt.....	65.22	
				<i>For >10 To 50, Deduct</i>	-1.91	
				<i>For >50 To 100, Deduct</i>	-4.50	
				<i>For >100, Deduct</i>	-8.99	
05 05 19 00-0096				Concrete Sleeve Anchors <small>(05 05 19 00-0002)</small>		
05 05 19 00-0097				Zinc Plated Steel, Concrete Sleeve Anchors <small>(05 05 19 00-0096)</small>		
				Note: Includes nut and washer.		
05 05 19 00-0098	EA			1/4" Diameter x 5/8" Length, Zinc Plated Steel, Concrete Sleeve Anchor	11.85	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.12	
				<i>For >100, Deduct</i>	-2.23	
05 05 19 00-0099	EA			1/4" Diameter x 1-3/8" Length, Zinc Plated Steel, Concrete Sleeve Anchor	12.13	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.12	
				<i>For >100, Deduct</i>	-2.25	
05 05 19 00-0100	EA			1/4" Diameter x 2-1/4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	12.47	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.13	
				<i>For >100, Deduct</i>	-2.26	
05 05 19 00-0101	EA			5/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Concrete Sleeve Anchor	12.53	
				<i>For >10 To 50, Deduct</i>	-0.57	
				<i>For >50 To 100, Deduct</i>	-1.18	
				<i>For >100, Deduct</i>	-2.35	
05 05 19 00-0102	EA			5/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Concrete Sleeve Anchor	12.79	
				<i>For >10 To 50, Deduct</i>	-0.57	
				<i>For >50 To 100, Deduct</i>	-1.18	
				<i>For >100, Deduct</i>	-2.36	
05 05 19 00-0103	EA			3/8" Diameter x 1-7/8" Length, Zinc Plated Steel, Concrete Sleeve Anchor	14.21	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.33	
				<i>For >100, Deduct</i>	-2.66	
05 05 19 00-0104	EA			3/8" Diameter x 3" Length, Zinc Plated Steel, Concrete Sleeve Anchor	14.68	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.34	
				<i>For >100, Deduct</i>	-2.69	
05 05 19 00-0105	EA			3/8" Diameter x 4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	15.13	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.35	
				<i>For >100, Deduct</i>	-2.71	
05 05 19 00-0106	EA			1/2" Diameter x 2-1/4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	20.68	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-1.90	
				<i>For >100, Deduct</i>	-3.81	

05 Metals**05 05 Common Work Results for Metals****05 05 19 Post-Installed Concrete Anchors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 19 00-0107	EA 1/2" Diameter x 3" Length, Zinc Plated Steel, Concrete Sleeve Anchor	21.27
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-1.92
	<i>For >100, Deduct</i>	-3.84
05 05 19 00-0108	EA 1/2" Diameter x 4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	21.78
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-1.93
	<i>For >100, Deduct</i>	-3.86
05 05 19 00-0109	EA 1/2" Diameter x 6" Length, Zinc Plated Steel, Concrete Sleeve Anchor	22.39
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-1.95
	<i>For >100, Deduct</i>	-3.89
05 05 19 00-0110	EA 5/8" Diameter x 2-1/4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	26.23
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.37
	<i>For >100, Deduct</i>	-4.74
05 05 19 00-0111	EA 5/8" Diameter x 3" Length, Zinc Plated Steel, Concrete Sleeve Anchor	27.12
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.39
	<i>For >100, Deduct</i>	-4.78
05 05 19 00-0112	EA 5/8" Diameter x 4-1/4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	27.80
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.41
	<i>For >100, Deduct</i>	-4.82
05 05 19 00-0113	EA 5/8" Diameter x 6" Length, Zinc Plated Steel, Concrete Sleeve Anchor	29.72
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.46
	<i>For >100, Deduct</i>	-4.91
05 05 19 00-0114	EA 3/4" Diameter x 2-1/2" Length, Zinc Plated Steel, Concrete Sleeve Anchor	32.83
	<i>For >10 To 50, Deduct</i>	-1.36
	<i>For >50 To 100, Deduct</i>	-2.86
	<i>For >100, Deduct</i>	-5.72
05 05 19 00-0115	EA 3/4" Diameter x 4-1/4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	34.49
	<i>For >10 To 50, Deduct</i>	-1.36
	<i>For >50 To 100, Deduct</i>	-2.90
	<i>For >100, Deduct</i>	-5.80
05 05 19 00-0116	EA 3/4" Diameter x 5-1/2" Length, Zinc Plated Steel, Concrete Sleeve Anchor	35.99
	<i>For >10 To 50, Deduct</i>	-1.36
	<i>For >50 To 100, Deduct</i>	-2.94
	<i>For >100, Deduct</i>	-5.88
05 05 19 00-0117	EA 3/4" Diameter x 6-1/4" Length, Zinc Plated Steel, Concrete Sleeve Anchor	38.38
	<i>For >10 To 50, Deduct</i>	-1.36
	<i>For >50 To 100, Deduct</i>	-3.00
	<i>For >100, Deduct</i>	-6.00
05 05 19 00-0118	304/18-8 Stainless Steel, Concrete Sleeve Anchors <small>(05 05 19 00-0096)</small>	
	Note: Includes nut and washer.	
05 05 19 00-0119	EA 1/4" Diameter x 1-3/8" Length, 304/18-8 Stainless Steel, Concrete Sleeve Anchor	13.97
	<i>For >10 To 50, Deduct</i>	-0.55
	<i>For >50 To 100, Deduct</i>	-1.17
	<i>For >100, Deduct</i>	-2.34
05 05 19 00-0120	EA 3/8" Diameter x 1-7/8" Length, 304/18-8 Stainless Steel, Concrete Sleeve Anchor	18.68
	<i>For >10 To 50, Deduct</i>	-0.65
	<i>For >50 To 100, Deduct</i>	-1.44
	<i>For >100, Deduct</i>	-2.89
05 05 19 00-0121	EA 3/8" Diameter x 3" Length, 304/18-8 Stainless Steel, Concrete Sleeve Anchor	20.93
	<i>For >10 To 50, Deduct</i>	-0.65
	<i>For >50 To 100, Deduct</i>	-1.50
	<i>For >100, Deduct</i>	-3.00
05 05 19 00-0122	EA 1/2" Diameter x 2-1/4" Length, 304/18-8 Stainless Steel, Concrete Sleeve Anchor	28.11
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-2.09
	<i>For >100, Deduct</i>	-4.18
05 05 19 00-0123	EA 1/2" Diameter x 4" Length, 304/18-8 Stainless Steel, Concrete Sleeve Anchor	32.15
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-2.19
	<i>For >100, Deduct</i>	-4.38
05 05 19 00-0124	EA 5/8" Diameter x 4-1/4" Length, 304/18-8 Stainless Steel, Concrete Sleeve Anchor	44.82
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.83
	<i>For >100, Deduct</i>	-5.67
05 05 19 00-0125	Concrete Strike Anchors <small>(05 05 19 00-0002)</small>	
	Note: Includes nut and washer.	
05 05 19 00-0126	EA 1/4" Diameter x 1-3/4" Length, Zinc Plated Steel, Concrete Strike Anchor	13.21
	<i>For >10 To 50, Deduct</i>	-0.55
	<i>For >50 To 100, Deduct</i>	-1.15
	<i>For >100, Deduct</i>	-2.30
05 05 19 00-0127	EA 1/4" Diameter x 2-3/8" Length, Zinc Plated Steel, Concrete Strike Anchor	13.68
	<i>For >10 To 50, Deduct</i>	-0.55
	<i>For >50 To 100, Deduct</i>	-1.16
	<i>For >100, Deduct</i>	-2.33



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 19 00-0128	EA			5/16" Diameter x 2-3/4" Length, Zinc Plated Steel, Concrete Strike Anchor.....	14.21	
				<i>For >10 To 50, Deduct</i>	-0.57	
				<i>For >50 To 100, Deduct</i>	-1.22	
				<i>For >100, Deduct</i>	-2.43	
05 05 19 00-0129	EA			5/16" Diameter x 4" Length, Zinc Plated Steel, Concrete Strike Anchor.....	16.15	
				<i>For >10 To 50, Deduct</i>	-0.57	
				<i>For >50 To 100, Deduct</i>	-1.27	
				<i>For >100, Deduct</i>	-2.53	
05 05 19 00-0130	EA			3/8" Diameter x 2-3/8" Length, Zinc Plated Steel, Concrete Strike Anchor.....	16.33	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.38	
				<i>For >100, Deduct</i>	-2.77	
05 05 19 00-0131	EA			3/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Concrete Strike Anchor.....	17.78	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.42	
				<i>For >100, Deduct</i>	-2.84	
05 05 19 00-0132	EA			3/8" Diameter x 5" Length, Zinc Plated Steel, Concrete Strike Anchor.....	18.90	
				<i>For >10 To 50, Deduct</i>	-0.65	
				<i>For >50 To 100, Deduct</i>	-1.45	
				<i>For >100, Deduct</i>	-2.90	
05 05 19 00-0133	EA			1/2" Diameter x 2-3/4" Length, Zinc Plated Steel, Concrete Strike Anchor.....	24.29	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-1.99	
				<i>For >100, Deduct</i>	-3.99	
05 05 19 00-0134	EA			1/2" Diameter x 3-1/2" Length, Zinc Plated Steel, Concrete Strike Anchor.....	25.16	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.02	
				<i>For >100, Deduct</i>	-4.03	
05 05 19 00-0135	EA			1/2" Diameter x 4-3/4" Length, Zinc Plated Steel, Concrete Strike Anchor.....	27.71	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.08	
				<i>For >100, Deduct</i>	-4.16	
05 05 19 00-0136	EA			1/2" Diameter x 6" Length, Zinc Plated Steel, Concrete Strike Anchor.....	31.02	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.16	
				<i>For >100, Deduct</i>	-4.33	
05 05 19 00-0137	EA			5/8" Diameter x 4" Length, Zinc Plated Steel, Concrete Strike Anchor.....	33.89	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.56	
				<i>For >100, Deduct</i>	-5.12	
05 05 19 00-0138	EA			5/8" Diameter x 4-3/4" Length, Zinc Plated Steel, Concrete Strike Anchor.....	36.94	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.64	
				<i>For >100, Deduct</i>	-5.27	
05 05 19 00-0139	EA			5/8" Diameter x 6" Length, Zinc Plated Steel, Concrete Strike Anchor.....	39.63	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.70	
				<i>For >100, Deduct</i>	-5.41	
05 05 19 00-0140	EA			3/4" Diameter x 5" Length, Zinc Plated Steel, Concrete Strike Anchor.....	45.55	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.18	
				<i>For >100, Deduct</i>	-6.36	
05 05 19 00-0141	EA			3/4" Diameter x 6" Length, Zinc Plated Steel, Concrete Strike Anchor.....	48.41	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.25	
				<i>For >100, Deduct</i>	-6.50	
05 05 19 00-0142				Multi-Set Drop-In Anchors <small>(05 05 19 00-0002)</small>		
05 05 19 00-0143				Zinc Plated Steel, Multi-Set Drop-In Anchors <small>(05 05 19 00-0142)</small>		
				Note: Excludes bolt, nut and washer.		
05 05 19 00-0144	EA			1/4" Bolt Diameter, Zinc Plated Steel, Multi-Set Drop-In Anchor.....	16.46	
				<i>For >10 To 50, Deduct</i>	-0.76	
				<i>For >50 To 100, Deduct</i>	-1.55	
				<i>For >100, Deduct</i>	-3.11	
05 05 19 00-0145	EA			3/8" Bolt Diameter, Zinc Plated Steel, Multi-Set Drop-In Anchor.....	20.17	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-1.90	
				<i>For >100, Deduct</i>	-3.80	
05 05 19 00-0146	EA			1/2" Bolt Diameter, Zinc Plated Steel, Multi-Set Drop-In Anchor.....	25.30	
				<i>For >10 To 50, Deduct</i>	-1.10	
				<i>For >50 To 100, Deduct</i>	-2.28	
				<i>For >100, Deduct</i>	-4.55	
05 05 19 00-0147	EA			5/8" Bolt Diameter, Zinc Plated Steel, Multi-Set Drop-In Anchor.....	29.43	
				<i>For >10 To 50, Deduct</i>	-1.20	
				<i>For >50 To 100, Deduct</i>	-2.54	
				<i>For >100, Deduct</i>	-5.08	
05 05 19 00-0148	EA			3/4" Bolt Diameter, Zinc Plated Steel, Multi-Set Drop-In Anchor.....	36.58	
				<i>For >10 To 50, Deduct</i>	-1.37	
				<i>For >50 To 100, Deduct</i>	-2.97	
				<i>For >100, Deduct</i>	-5.93	
05 05 19 00-0149				304/18-8 Stainless Steel, Multi-Set Drop-In Anchors <small>(05 05 19 00-0142)</small>		
				Note: Excludes bolt, nut and washer.		

05 Metals**05 05 Common Work Results for Metals****05 05 19 Post-Installed Concrete Anchors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 19 00-0150	EA 1/4" Bolt Diameter, 304/18-8 Stainless Steel, Multi-Set Drop-In Anchor.....	20.92
	<i>For >10 To 50, Deduct</i>	-0.76
	<i>For >50 To 100, Deduct</i>	-1.67
	<i>For >100, Deduct</i>	-3.33
05 05 19 00-0151	EA 3/8" Bolt Diameter, 304/18-8 Stainless Steel, Multi-Set Drop-In Anchor.....	28.76
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-2.11
	<i>For >100, Deduct</i>	-4.23
05 05 19 00-0152	EA 1/2" Bolt Diameter, 304/18-8 Stainless Steel, Multi-Set Drop-In Anchor.....	36.35
	<i>For >10 To 50, Deduct</i>	-1.10
	<i>For >50 To 100, Deduct</i>	-2.55
	<i>For >100, Deduct</i>	-5.10
05 05 19 00-0153	EA 5/8" Bolt Diameter, 304/18-8 Stainless Steel, Multi-Set Drop-In Anchor.....	47.25
	<i>For >10 To 50, Deduct</i>	-1.20
	<i>For >50 To 100, Deduct</i>	-2.99
	<i>For >100, Deduct</i>	-5.97
05 05 19 00-0154	EA 3/4" Bolt Diameter, 304/18-8 Stainless Steel, Multi-Set Drop-In Anchor.....	67.22
	<i>For >10 To 50, Deduct</i>	-1.37
	<i>For >50 To 100, Deduct</i>	-3.73
	<i>For >100, Deduct</i>	-7.47

05 05 19 00-0155 Single Bolt Expansion Anchors (05 05 19 00-0002)

Note: Excludes bolt, nut and washer.

05 05 19 00-0156	EA 1/4" Bolt Diameter, Zinc Plated Steel, Single Bolt Expansion Anchor.....	12.26
	<i>For >10 To 50, Deduct</i>	-0.55
	<i>For >50 To 100, Deduct</i>	-1.13
	<i>For >100, Deduct</i>	-2.25
05 05 19 00-0157	EA 5/16" Bolt Diameter, Zinc Plated Steel, Single Bolt Expansion Anchor.....	13.30
	<i>For >10 To 50, Deduct</i>	-0.57
	<i>For >50 To 100, Deduct</i>	-1.19
	<i>For >100, Deduct</i>	-2.39
05 05 19 00-0158	EA 3/8" Bolt Diameter, Zinc Plated Steel, Single Bolt Expansion Anchor.....	15.03
	<i>For >10 To 50, Deduct</i>	-0.65
	<i>For >50 To 100, Deduct</i>	-1.35
	<i>For >100, Deduct</i>	-2.70
05 05 19 00-0159	EA 1/2" Bolt Diameter, Zinc Plated Steel, Single Bolt Expansion Anchor.....	22.39
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-1.95
	<i>For >100, Deduct</i>	-3.89
05 05 19 00-0160	EA 5/8" Bolt Diameter, Zinc Plated Steel, Single Bolt Expansion Anchor.....	33.52
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.55
	<i>For >100, Deduct</i>	-5.10
05 05 19 00-0161	EA 3/4" Bolt Diameter, Zinc Plated Steel, Single Bolt Expansion Anchor.....	40.77
	<i>For >10 To 50, Deduct</i>	-1.36
	<i>For >50 To 100, Deduct</i>	-3.06
	<i>For >100, Deduct</i>	-6.12

05 05 19 00-0162 Concrete Lag Shield Anchors (05 05 19 00-0002)

Note: Excludes lag bolt and washer.

05 05 19 00-0163	EA 1/4" Bolt Diameter, Zinc Plated Steel, Concrete Lag Shield Anchor.....	11.97
	<i>For >10 To 50, Deduct</i>	-0.55
	<i>For >50 To 100, Deduct</i>	-1.12
	<i>For >100, Deduct</i>	-2.24
05 05 19 00-0164	EA 5/16" Bolt Diameter, Zinc Plated Steel, Concrete Lag Shield Anchor.....	14.25
	<i>For >10 To 50, Deduct</i>	-0.65
	<i>For >50 To 100, Deduct</i>	-1.33
	<i>For >100, Deduct</i>	-2.67
05 05 19 00-0165	EA 3/8" Bolt Diameter, Zinc Plated Steel, Concrete Lag Shield Anchor.....	15.08
	<i>For >10 To 50, Deduct</i>	-0.65
	<i>For >50 To 100, Deduct</i>	-1.35
	<i>For >100, Deduct</i>	-2.71
05 05 19 00-0166	EA 1/2" Bolt Diameter, Zinc Plated Steel, Concrete Lag Shield Anchor.....	21.20
	<i>For >10 To 50, Deduct</i>	-0.93
	<i>For >50 To 100, Deduct</i>	-1.92
	<i>For >100, Deduct</i>	-3.84
05 05 19 00-0167	EA 5/8" Bolt Diameter, Zinc Plated Steel, Concrete Lag Shield Anchor.....	31.69
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.51
	<i>For >100, Deduct</i>	-5.01
05 05 19 00-0168	EA 3/4" Bolt Diameter, Zinc Plated Steel, Concrete Lag Shield Anchor.....	34.19
	<i>For >10 To 50, Deduct</i>	-1.36
	<i>For >50 To 100, Deduct</i>	-2.89
	<i>For >100, Deduct</i>	-5.79

05 05 19 00-0169 Chemical And Adhesive Anchors (05 05 19 00-0001)**05 05 19 00-0170 Chemically Adhered Anchor Rods (05 05 19 00-0169)**

Note: Includes drilling hole, injected adhesive or pre-placed adhesive cartridge, nut and washer. Zinc coated carbon steel.



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	05 05 19 00-0171	EA		1/4" x 1-9/16" Long Chemically Adhered Anchor Rod	17.44	
				<i>For >10 To 50, Deduct</i>	-0.60	
				<i>For >50 To 100, Deduct</i>	-1.34	
				<i>For >100, Deduct</i>	-2.68	
	05 05 19 00-0172	EA		5/16" x 2-3/8" Long Chemically Adhered Anchor Rod	21.01	
				<i>For >10 To 50, Deduct</i>	-0.66	
				<i>For >50 To 100, Deduct</i>	-1.51	
				<i>For >100, Deduct</i>	-3.02	
	05 05 19 00-0173	EA		3/8" x 2-3/4" Long Chemically Adhered Anchor Rod	25.97	
				<i>For >10 To 50, Deduct</i>	-0.82	
				<i>For >50 To 100, Deduct</i>	-1.88	
				<i>For >100, Deduct</i>	-3.76	
	05 05 19 00-0174	EA		1/2" x 3-11/16" Long Chemically Adhered Anchor Rod	31.11	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.17	
				<i>For >100, Deduct</i>	-4.33	
	05 05 19 00-0175	EA		1/2" x 5-1/2" Long Chemically Adhered Anchor Rod	33.98	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-2.24	
				<i>For >100, Deduct</i>	-4.47	
	05 05 19 00-0176	EA		5/8" x 7" Long Chemically Adhered Anchor Rod.....	42.08	
				<i>For >10 To 50, Deduct</i>	-1.14	
				<i>For >50 To 100, Deduct</i>	-2.77	
				<i>For >100, Deduct</i>	-5.53	
	05 05 19 00-0177	EA		3/4" x 9-1/2" Long Chemically Adhered Anchor Rod	56.98	
				<i>For >10 To 50, Deduct</i>	-1.36	
				<i>For >50 To 100, Deduct</i>	-3.46	
				<i>For >100, Deduct</i>	-6.93	
	05 05 19 00-0178	EA		7/8" x 10" Long Chemically Adhered Anchor Rod.....	70.14	
				<i>For >10 To 50, Deduct</i>	-1.47	
				<i>For >50 To 100, Deduct</i>	-3.96	
				<i>For >100, Deduct</i>	-7.92	
	05 05 19 00-0179	EA		1" x 11-3/4" Long Chemically Adhered Anchor Rod	97.76	
				<i>For >10 To 50, Deduct</i>	-1.91	
				<i>For >50 To 100, Deduct</i>	-5.31	
				<i>For >100, Deduct</i>	-10.62	
	05 05 19 00-0180	EA		1-1/4" x 14" Long Chemically Adhered Anchor Rod	146.56	
				<i>For >10 To 50, Deduct</i>	-2.41	
				<i>For >50 To 100, Deduct</i>	-7.28	
				<i>For >100, Deduct</i>	-14.55	
05 05 19 00-0181				Chemical Adhesives For Bolts, Dowels Or Threaded Rod <small>(05 05 19 00-0169)</small>		
				Note: Injected or drop in cartridge. Sizes listed are for the diameter of the bolt, dowel or rod to be anchored. Includes drilling. Drill a hole 1/16" to 1/4" larger than the diameter of the thread and a depth a minimum of 4-1/2 times the diameter of the bolt. Excludes bolt, dowel or rod.		
	05 05 19 00-0182	EA		1/4" Chemical Adhesive For Bolt Or Threaded Rod	12.71	
				<i>For >10 To 50, Deduct</i>	-0.60	
				<i>For >50 To 100, Deduct</i>	-1.22	
				<i>For >100, Deduct</i>	-2.44	
	05 05 19 00-0183	EA		5/16" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	13.98	
				<i>For >10 To 50, Deduct</i>	-0.66	
				<i>For >50 To 100, Deduct</i>	-1.34	
				<i>For >100, Deduct</i>	-2.67	
	05 05 19 00-0184	EA		3/8" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	16.43	
				<i>For >10 To 50, Deduct</i>	-0.77	
				<i>For >50 To 100, Deduct</i>	-1.56	
				<i>For >100, Deduct</i>	-3.12	
	05 05 19 00-0185	EA		1/2" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	20.07	
				<i>For >10 To 50, Deduct</i>	-0.93	
				<i>For >50 To 100, Deduct</i>	-1.89	
				<i>For >100, Deduct</i>	-3.78	
	05 05 19 00-0186	EA		5/8" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	23.63	
				<i>For >10 To 50, Deduct</i>	-0.99	
				<i>For >50 To 100, Deduct</i>	-2.08	
				<i>For >100, Deduct</i>	-4.15	
	05 05 19 00-0187	EA		3/4" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	30.98	
				<i>For >10 To 50, Deduct</i>	-1.22	
				<i>For >50 To 100, Deduct</i>	-2.60	
				<i>For >100, Deduct</i>	-5.19	
	05 05 19 00-0188	EA		7/8" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	34.96	
				<i>For >10 To 50, Deduct</i>	-1.30	
				<i>For >50 To 100, Deduct</i>	-2.83	
				<i>For >100, Deduct</i>	-5.66	
	05 05 19 00-0189	EA		1" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	44.79	
				<i>For >10 To 50, Deduct</i>	-1.57	
				<i>For >50 To 100, Deduct</i>	-3.48	
				<i>For >100, Deduct</i>	-6.95	
	05 05 19 00-0190	EA		1-1/8" Chemical Adhesive For Bolt, Dowel Or Threaded Rod	50.50	
				<i>For >10 To 50, Deduct</i>	-1.70	
				<i>For >50 To 100, Deduct</i>	-3.82	
				<i>For >100, Deduct</i>	-7.63	
	05 05 19 00-0191	EA		1-1/4" Chemical Adhesive For Bolt, Dowel Or Threaded Rod	59.92	
				<i>For >10 To 50, Deduct</i>	-1.93	
				<i>For >50 To 100, Deduct</i>	-4.39	
				<i>For >100, Deduct</i>	-8.78	

05 Metals**05 05 Common Work Results for Metals****05 05 19 Post-Installed Concrete Anchors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 19 00-0192	EA	1-3/8" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	68.77	
		<i>For >10 To 50, Deduct</i>	-2.10	
		<i>For >50 To 100, Deduct</i>	-4.87	
		<i>For >100, Deduct</i>	-9.74	
05 05 19 00-0193	EA	1-1/2" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	81.40	
		<i>For >10 To 50, Deduct</i>	-2.29	
		<i>For >50 To 100, Deduct</i>	-5.47	
		<i>For >100, Deduct</i>	-10.93	
05 05 19 00-0194	EA	1-3/4" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	107.23	
		<i>For >10 To 50, Deduct</i>	-2.69	
		<i>For >50 To 100, Deduct</i>	-6.71	
		<i>For >100, Deduct</i>	-13.42	
05 05 19 00-0195	EA	2" Chemical Adhesive For Bolt, Dowel Or Threaded Rod.....	171.86	
		<i>For >10 To 50, Deduct</i>	-3.25	
		<i>For >50 To 100, Deduct</i>	-9.16	
		<i>For >100, Deduct</i>	-18.33	
05 05 19 00-0196		Grout Concrete Anchor Bolt Or Threaded Rod (05 05 19 00-0169)		
05 05 19 00-0197	EA	Grout Concrete Anchor Bolt or Threaded Rod.....	4.80	
		<i>For >10 To 50, Deduct</i>	-0.23	
		<i>For >50 To 100, Deduct</i>	-0.47	
		<i>For >100, Deduct</i>	-0.94	
05 05 19 00-0198		Other Concrete And Masonry Anchors (05 05 19 00-0001)		
05 05 19 00-0199		Tapcon Masonry Screws (05 05 19 00-0198)		
		Note: Includes drilling. Countersunk or hex head.		
05 05 19 00-0200	EA	3/16" x 1-1/4" Tapcon Masonry Screw.....	11.47	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.11	
		<i>For >100, Deduct</i>	-2.21	
05 05 19 00-0201	EA	3/16" x 2-1/4" Tapcon Masonry Screw.....	11.62	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.11	
		<i>For >100, Deduct</i>	-2.22	
05 05 19 00-0202	EA	3/16" x 3-1/4" Tapcon Masonry Screw.....	11.92	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.12	
		<i>For >100, Deduct</i>	-2.24	
05 05 19 00-0203	EA	1/4" x 1-1/4" Tapcon Masonry Screw.....	11.64	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.11	
		<i>For >100, Deduct</i>	-2.22	
05 05 19 00-0204	EA	1/4" x 2-1/4" Tapcon Masonry Screw.....	11.81	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.12	
		<i>For >100, Deduct</i>	-2.23	
05 05 19 00-0205	EA	1/4" x 3-1/4" Tapcon Masonry Screw.....	12.18	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.13	
		<i>For >100, Deduct</i>	-2.25	
05 05 19 00-0206		Large Diameter, Self-Threading Concrete Fasteners (05 05 19 00-0199)		
		Note: Includes drilling. Zinc plated.		
05 05 19 00-0207	EA	3/8" x 1-3/4", Large Diameter, Self-Threading Concrete Fastener.....	12.28	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.13	
		<i>For >100, Deduct</i>	-2.26	
05 05 19 00-0208	EA	3/8" x 2-1/2", Large Diameter, Self-Threading Concrete Fastener.....	12.77	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.14	
		<i>For >100, Deduct</i>	-2.28	
05 05 19 00-0209	EA	3/8" x 3", Large Diameter, Self-Threading Concrete Fastener.....	12.90	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.14	
		<i>For >100, Deduct</i>	-2.29	
05 05 19 00-0210	EA	3/8" x 4", Large Diameter, Self-Threading Concrete Fastener.....	13.13	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.15	
		<i>For >100, Deduct</i>	-2.30	
05 05 19 00-0211	EA	3/8" x 5", Large Diameter, Self-Threading Concrete Fastener.....	13.33	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.15	
		<i>For >100, Deduct</i>	-2.31	
05 05 19 00-0212	EA	1/2" x 3", Large Diameter, Self-Threading Concrete Fastener.....	13.75	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.16	
		<i>For >100, Deduct</i>	-2.33	
05 05 19 00-0213	EA	1/2" x 4", Large Diameter, Self-Threading Concrete Fastener.....	14.27	
		<i>For >10 To 50, Deduct</i>	-0.55	
		<i>For >50 To 100, Deduct</i>	-1.18	
		<i>For >100, Deduct</i>	-2.35	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 19 00-0214	EA			1/2" x 5", Large Diameter, Self-Threading Concrete Fastener.....	14.75	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.19	
				<i>For >100, Deduct</i>	-2.38	
05 05 19 00-0215	EA			1/2" x 6", Large Diameter, Self-Threading Concrete Fastener.....	16.09	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.22	
				<i>For >100, Deduct</i>	-2.45	
05 05 19 00-0216	EA			5/8" x 3", Large Diameter, Self-Threading Concrete Fastener.....	16.25	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.23	
				<i>For >100, Deduct</i>	-2.45	
05 05 19 00-0217	EA			5/8" x 4", Large Diameter, Self-Threading Concrete Fastener.....	17.06	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.25	
				<i>For >100, Deduct</i>	-2.49	
05 05 19 00-0218	EA			5/8" x 5", Large Diameter, Self-Threading Concrete Fastener.....	17.90	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.27	
				<i>For >100, Deduct</i>	-2.54	
05 05 19 00-0219	EA			5/8" x 6", Large Diameter, Self-Threading Concrete Fastener.....	18.44	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.28	
				<i>For >100, Deduct</i>	-2.56	
05 05 19 00-0220	EA			3/4" x 4-1/2", Large Diameter, Self-Threading Concrete Fastener.....	18.20	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.28	
				<i>For >100, Deduct</i>	-2.55	
05 05 19 00-0221	EA			3/4" x 5-1/2", Large Diameter, Self-Threading Concrete Fastener.....	18.98	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.30	
				<i>For >100, Deduct</i>	-2.59	
05 05 19 00-0222	EA			3/4" x 6-1/4", Large Diameter, Self-Threading Concrete Fastener.....	20.79	
				<i>For >10 To 50, Deduct</i>	-0.55	
				<i>For >50 To 100, Deduct</i>	-1.34	
				<i>For >100, Deduct</i>	-2.68	
05 05 19 00-0223				Pin Bolt Drives (05 05 19 00-0198)		
				Note: Includes drilling. Zinc plated.		
05 05 19 00-0224	EA			1/4" x 1" Pin Bolt Drive.....	7.38	
				<i>For >10 To 50, Deduct</i>	-0.33	
				<i>For >50 To 100, Deduct</i>	-0.68	
				<i>For >100, Deduct</i>	-1.35	
05 05 19 00-0225	EA			1/4" x 1-1/4" Pin Bolt Drive.....	7.38	
				<i>For >10 To 50, Deduct</i>	-0.33	
				<i>For >50 To 100, Deduct</i>	-0.68	
				<i>For >100, Deduct</i>	-1.35	
05 05 19 00-0226	EA			1/4" x 1-1/2" Pin Bolt Drive.....	7.49	
				<i>For >10 To 50, Deduct</i>	-0.33	
				<i>For >50 To 100, Deduct</i>	-0.68	
				<i>For >100, Deduct</i>	-1.36	
05 05 19 00-0227	EA			1/4" x 2" Pin Bolt Drive.....	7.52	
				<i>For >10 To 50, Deduct</i>	-0.33	
				<i>For >50 To 100, Deduct</i>	-0.68	
				<i>For >100, Deduct</i>	-1.36	
05 05 19 00-0228				Powder Actuated, Shot-In Place Anchors (05 05 19 00-0198)		
05 05 19 00-0229	EA			0.15" Diameter x 1/2" Length, Stud Powder Actuated Anchor.....	1.98	
				<i>For >10 To 50, Deduct</i>	-0.07	
				<i>For >50 To 100, Deduct</i>	-0.16	
				<i>For >100, Deduct</i>	-0.32	
05 05 19 00-0230	EA			0.15" Diameter x 3/4" Length, Stud Powder Actuated Anchor.....	2.12	
				<i>For >10 To 50, Deduct</i>	-0.08	
				<i>For >50 To 100, Deduct</i>	-0.17	
				<i>For >100, Deduct</i>	-0.34	
05 05 19 00-0231	EA			0.15"/0.18" Diameter x 1" Length, Stud Powder Actuated Anchor.....	2.32	
				<i>For >10 To 50, Deduct</i>	-0.08	
				<i>For >50 To 100, Deduct</i>	-0.18	
				<i>For >100, Deduct</i>	-0.36	
05 05 19 00-0232	EA			0.15"/0.18" Diameter x 1-1/4" Length, Stud Powder Actuated Anchor.....	2.62	
				<i>For >10 To 50, Deduct</i>	-0.09	
				<i>For >50 To 100, Deduct</i>	-0.20	
				<i>For >100, Deduct</i>	-0.39	
05 05 19 00-0233	EA			0.15"/0.18" Diameter x 1-7/8" Length, Stud Powder Actuated Anchor.....	2.84	
				<i>For >10 To 50, Deduct</i>	-0.09	
				<i>For >50 To 100, Deduct</i>	-0.20	
				<i>For >100, Deduct</i>	-0.40	
05 05 19 00-0234				Powder Actuated, Shot-In Place Anchors With Exposed Thread (05 05 19 00-0198)		

05 Metals**05 05 Common Work Results for Metals****05 05 19 Post-Installed Concrete Anchors**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 05 19 00-0235	EA		0.145" Diameter x 1" Long Shank, 3/4" Thread Length, 1/4" - 20 Treaded Stud Powder Actuated Anchor.....	2.54	
			<i>For >10 To 50, Deduct</i>	-0.08	
			<i>For >50 To 100, Deduct</i>	-0.18	
			<i>For >100, Deduct</i>	-0.36	
05 05 19 00-0236	EA		0.205" Diameter x 1-1/6" Long Shank, 1" Thread Length, 3/8" - 16 Treaded Stud Powder Actuated Anchor.....	3.63	
			<i>For >10 To 50, Deduct</i>	-0.09	
			<i>For >50 To 100, Deduct</i>	-0.23	
			<i>For >100, Deduct</i>	-0.46	

05 05 21 Fastening Methods for Metal (05 05)

05 05 21 00-0001			Welding <small>(05 05 21)</small>		
05 05 21 00-0002			Minimum Charge For Welding <small>(05 05 21 00-0001)</small>		
05 05 21 00-0003	EA		Welding Minimum Charge.....	500.39	
			Note: For projects where the total welding charge is less than the minimum charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.		
05 05 21 00-0004			Spot Welding <small>(05 05 21 00-0001)</small>		
05 05 21 00-0005	EA		Up To 15 Spot Weldings, Welds Up To 1" Length Each.....	12.57	
			<i>For Aluminum Welding, Add</i>	1.99	
			<i>For Stainless Steel Welding, Add</i>	3.27	
05 05 21 00-0006	EA		>15 Spot Weldings, Welds Up To 1" Length Each.....	9.81	
			<i>For Aluminum Welding, Add</i>	1.57	
			<i>For Stainless Steel Welding, Add</i>	2.58	
05 05 21 00-0007			Field Welding (Seam And Stitch Welding) <small>(05 05 21 00-0001)</small>		
05 05 21 00-0008			Vertical Fillet Welds <small>(05 05 21 00-0007)</small>		
			Note: For existing steel and moment connections. Includes tack welds for proper alignment until the final welds are made.		
05 05 21 00-0009	LF		1/8" Vertical Fillet Weld.....	8.14	
			<i>For Aluminum Welding, Add</i>	1.72	
			<i>For Stainless Steel Welding, Add</i>	2.66	
			<i>For Up To 25, Add</i>	2.64	
			<i>For >25 To 50, Add</i>	1.87	
05 05 21 00-0010	LF		3/16" Vertical Fillet Weld.....	15.65	
			<i>For Aluminum Welding, Add</i>	2.96	
			<i>For Stainless Steel Welding, Add</i>	4.68	
			<i>For Up To 25, Add</i>	5.22	
			<i>For >25 To 50, Add</i>	3.71	
05 05 21 00-0011	LF		1/4" Vertical Fillet Weld.....	23.50	
			<i>For Aluminum Welding, Add</i>	4.46	
			<i>For Stainless Steel Welding, Add</i>	7.05	
			<i>For Up To 25, Add</i>	7.84	
			<i>For >25 To 50, Add</i>	5.56	
05 05 21 00-0012	LF		5/16" Vertical Fillet Weld.....	31.01	
			<i>For Aluminum Welding, Add</i>	5.91	
			<i>For Stainless Steel Welding, Add</i>	9.33	
			<i>For Up To 25, Add</i>	10.33	
			<i>For >25 To 50, Add</i>	7.33	
05 05 21 00-0013	LF		3/8" Vertical Fillet Weld.....	39.15	
			<i>For Aluminum Welding, Add</i>	7.43	
			<i>For Stainless Steel Welding, Add</i>	11.73	
			<i>For Up To 25, Add</i>	13.06	
			<i>For >25 To 50, Add</i>	9.27	
05 05 21 00-0014	LF		7/16" Vertical Fillet Weld.....	45.36	
			<i>For Aluminum Welding, Add</i>	8.03	
			<i>For Stainless Steel Welding, Add</i>	12.88	
			<i>For Up To 25, Add</i>	15.36	
			<i>For >25 To 50, Add</i>	10.93	
05 05 21 00-0015	LF		1/2" Vertical Fillet Weld.....	53.54	
			<i>For Aluminum Welding, Add</i>	10.20	
			<i>For Stainless Steel Welding, Add</i>	16.09	
			<i>For Up To 25, Add</i>	17.84	
			<i>For >25 To 50, Add</i>	12.66	
05 05 21 00-0016	LF		9/16" Vertical Fillet Weld.....	62.42	
			<i>For Aluminum Welding, Add</i>	11.30	
			<i>For Stainless Steel Welding, Add</i>	18.03	
			<i>For Up To 25, Add</i>	21.04	
			<i>For >25 To 50, Add</i>	14.96	
05 05 21 00-0017	LF		5/8" Vertical Fillet Weld.....	72.39	
			<i>For Aluminum Welding, Add</i>	13.16	
			<i>For Stainless Steel Welding, Add</i>	20.97	
			<i>For Up To 25, Add</i>	24.38	
			<i>For >25 To 50, Add</i>	17.33	
05 05 21 00-0018	LF		3/4" Vertical Fillet Weld.....	97.99	
			<i>For Aluminum Welding, Add</i>	18.65	
			<i>For Stainless Steel Welding, Add</i>	29.43	
			<i>For Up To 25, Add</i>	32.65	
			<i>For >25 To 50, Add</i>	23.18	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 05 21 00-0019

Horizontal Or Flat Fillet Welds (05 05 21 00-0007)

Note: For existing steel and moment connections. Includes tack welds for proper alignment until the final welds are made.

05 05 21 00-0020	LF 1/8" Horizontal Or Flat Fillet Weld.....	6.89	
	For Aluminum Welding, Add	1.53	
	For Stainless Steel Welding, Add	2.35	
	For Up To 25, Add	2.20	
	For >25 To 50, Add	1.56	
05 05 21 00-0021	LF 3/16" Horizontal Or Flat Fillet Weld.....	13.30	
	For Aluminum Welding, Add	2.64	
	For Stainless Steel Welding, Add	4.14	
	For Up To 25, Add	4.39	
	For >25 To 50, Add	3.11	
05 05 21 00-0022	LF 1/4" Horizontal Or Flat Fillet Weld.....	19.90	
	For Aluminum Welding, Add	3.96	
	For Stainless Steel Welding, Add	6.19	
	For Up To 25, Add	6.56	
	For >25 To 50, Add	4.65	
05 05 21 00-0023	LF 5/16" Horizontal Or Flat Fillet Weld.....	26.32	
	For Aluminum Welding, Add	5.27	
	For Stainless Steel Welding, Add	8.24	
	For Up To 25, Add	8.66	
	For >25 To 50, Add	6.14	
05 05 21 00-0024	LF 3/8" Horizontal Or Flat Fillet Weld.....	33.19	
	For Aluminum Welding, Add	6.59	
	For Stainless Steel Welding, Add	10.32	
	For Up To 25, Add	10.94	
	For >25 To 50, Add	7.76	
05 05 21 00-0025	LF 7/16" Horizontal Or Flat Fillet Weld.....	38.27	
	For Aluminum Welding, Add	7.04	
	For Stainless Steel Welding, Add	11.19	
	For Up To 25, Add	12.85	
	For >25 To 50, Add	9.14	
05 05 21 00-0026	LF 1/2" Horizontal Or Flat Fillet Weld.....	45.36	
	For Aluminum Welding, Add	9.07	
	For Stainless Steel Welding, Add	14.17	
	For Up To 25, Add	14.93	
	For >25 To 50, Add	10.59	
05 05 21 00-0027	LF 9/16" Horizontal Or Flat Fillet Weld.....	52.81	
	For Aluminum Welding, Add	9.99	
	For Stainless Steel Welding, Add	15.79	
	For Up To 25, Add	17.62	
	For >25 To 50, Add	12.51	
05 05 21 00-0028	LF 5/8" Horizontal Or Flat Fillet Weld.....	61.60	
	For Aluminum Welding, Add	11.92	
	For Stainless Steel Welding, Add	18.75	
	For Up To 25, Add	20.44	
	For >25 To 50, Add	14.51	
05 05 21 00-0029	LF 3/4" Horizontal Or Flat Fillet Weld.....	83.11	
	For Aluminum Welding, Add	16.61	
	For Stainless Steel Welding, Add	25.95	
	For Up To 25, Add	27.36	
	For >25 To 50, Add	19.40	
05 05 21 00-0030	LF 7/8" Horizontal Or Flat Fillet Weld.....	121.11	
	For Aluminum Welding, Add	22.28	
	For Stainless Steel Welding, Add	35.42	
	For Up To 25, Add	40.68	
	For >25 To 50, Add	28.91	
05 05 21 00-0031	LF 1" Horizontal Or Flat Fillet Weld.....	164.85	
	For Aluminum Welding, Add	32.46	
	For Stainless Steel Welding, Add	50.87	
	For Up To 25, Add	54.48	
	For >25 To 50, Add	38.64	

05 05 23 Metal Fastenings (05 05)

05 05 23 00-0001

Hex Bolts (05 05 23)

Note: For owner furnished materials or where requested by the owner. Excludes drilling through wood, steel, concrete, brick or block. See CSI section 02 41 19 13-0269 for drilling into concrete, 02 41 19 13-0284 for drilling into brick or block, 02 41 19 13-0299 for drilling into wood or plastic, 05 05 23 00-1567 for drilling through steel.

05 05 23 00-0002

A307B Heavy Hex Bolts (05 05 23 00-0001)

Note: Includes A307B heavy hex nut and two structural washers.

05 05 23 00-0003

Plain Finish A307B Heavy Hex Bolts (05 05 23 00-0002)

05 05 23 00-0004	EA 1/2" Diameter x 1-1/2" Long, Plain Finish A307B Heavy Hex Bolt.....	14.57	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.24	
	For >100, Deduct	-2.48	
05 05 23 00-0005	EA 1/2" Diameter x 3" Long, Plain Finish A307B Heavy Hex Bolt.....	16.23	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.28	
	For >100, Deduct	-2.57	

05 Metals

05 05 Common Work Results for Metals

05 05 23 Metal Fastenings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0006	EA 5/8" Diameter x 2" Long, Plain Finish A307B Heavy Hex Bolt	16.27	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.28	
	For >100, Deduct	-2.57	
05 05 23 00-0007	EA 5/8" Diameter x 4" Long, Plain Finish A307B Heavy Hex Bolt	19.46	1.60
	For >10 To 50, Deduct	-0.67	
	For >50 To 100, Deduct	-1.49	
	For >100, Deduct	-2.98	
05 05 23 00-0008	EA 3/4" Diameter x 2" Long, Plain Finish A307B Heavy Hex Bolt	19.06	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.35	
	For >100, Deduct	-2.71	
05 05 23 00-0009	EA 3/4" Diameter x 4" Long, Plain Finish A307B Heavy Hex Bolt	22.93	1.60
	For >10 To 50, Deduct	-0.67	
	For >50 To 100, Deduct	-1.57	
	For >100, Deduct	-3.15	
05 05 23 00-0010	EA 3/4" Diameter x 6" Long, Plain Finish A307B Heavy Hex Bolt	29.38	1.67
	For >10 To 50, Deduct	-0.70	
	For >50 To 100, Deduct	-1.78	
	For >100, Deduct	-3.56	
05 05 23 00-0011	EA 3/4" Diameter x 8" Long, Plain Finish A307B Heavy Hex Bolt	31.60	1.76
	For >10 To 50, Deduct	-0.73	
	For >50 To 100, Deduct	-1.89	
	For >100, Deduct	-3.78	
05 05 23 00-0012	EA 7/8" Diameter x 2" Long, Plain Finish A307B Heavy Hex Bolt	23.01	1.52
	For >10 To 50, Deduct	-0.63	
	For >50 To 100, Deduct	-1.53	
	For >100, Deduct	-3.05	
05 05 23 00-0013	EA 7/8" Diameter x 4" Long, Plain Finish A307B Heavy Hex Bolt	27.92	1.67
	For >10 To 50, Deduct	-0.70	
	For >50 To 100, Deduct	-1.74	
	For >100, Deduct	-3.48	
05 05 23 00-0014	EA 1" Diameter x 4" Long, Plain Finish A307B Heavy Hex Bolt	33.09	1.76
	For >10 To 50, Deduct	-0.73	
	For >50 To 100, Deduct	-1.93	
	For >100, Deduct	-3.86	
05 05 23 00-0015	EA 1" Diameter x 6" Long, Plain Finish A307B Heavy Hex Bolt	47.96	1.84
	For >10 To 50, Deduct	-0.77	
	For >50 To 100, Deduct	-2.35	
	For >100, Deduct	-4.71	
05 05 23 00-0016	EA 1-1/4" Diameter x 4" Long, Plain Finish A307B Heavy Hex Bolt	56.25	2.09
	For >10 To 50, Deduct	-0.87	
	For >50 To 100, Deduct	-2.71	
	For >100, Deduct	-5.42	
05 05 23 00-0017	EA 1-1/4" Diameter x 6" Long, Plain Finish A307B Heavy Hex Bolt	63.42	2.24
	For >10 To 50, Deduct	-0.93	
	For >50 To 100, Deduct	-2.98	
	For >100, Deduct	-5.97	
05 05 23 00-0018	Galvanized A307B Heavy Hex Bolts (05 05 23 00-0002)	15.38	1.40
	EA 1/2" Diameter x 1-1/2" Long, Galvanized A307B Heavy Hex Bolt	15.38	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.26	
	For >100, Deduct	-2.52	
05 05 23 00-0020	EA 1/2" Diameter x 3" Long, Galvanized A307B Heavy Hex Bolt	16.77	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.30	
	For >100, Deduct	-2.59	
05 05 23 00-0021	EA 5/8" Diameter x 2" Long, Galvanized A307B Heavy Hex Bolt	18.28	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.33	
	For >100, Deduct	-2.67	
05 05 23 00-0022	EA 5/8" Diameter x 4" Long, Galvanized A307B Heavy Hex Bolt	21.47	1.60
	For >10 To 50, Deduct	-0.67	
	For >50 To 100, Deduct	-1.54	
	For >100, Deduct	-3.08	
05 05 23 00-0023	EA 3/4" Diameter x 2" Long, Galvanized A307B Heavy Hex Bolt	21.35	1.40
	For >10 To 50, Deduct	-0.58	
	For >50 To 100, Deduct	-1.41	
	For >100, Deduct	-2.82	
05 05 23 00-0024	EA 3/4" Diameter x 4" Long, Galvanized A307B Heavy Hex Bolt	27.15	1.60
	For >10 To 50, Deduct	-0.67	
	For >50 To 100, Deduct	-1.68	
	For >100, Deduct	-3.36	
05 05 23 00-0025	EA 3/4" Diameter x 6" Long, Galvanized A307B Heavy Hex Bolt	36.66	1.67
	For >10 To 50, Deduct	-0.70	
	For >50 To 100, Deduct	-1.96	
	For >100, Deduct	-3.93	
05 05 23 00-0026	EA 3/4" Diameter x 8" Long, Galvanized A307B Heavy Hex Bolt	43.38	1.76
	For >10 To 50, Deduct	-0.73	
	For >50 To 100, Deduct	-2.18	
	For >100, Deduct	-4.37	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0027 EA 7/8" Diameter x 2" Long, Galvanized A307B Heavy Hex Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	28.99 -0.63 -1.68 -3.35	1.52
05 05 23 00-0028 EA 7/8" Diameter x 4" Long, Galvanized A307B Heavy Hex Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	34.66 -0.70 -1.91 -3.82	1.67
05 05 23 00-0029 EA 1" Diameter x 4" Long, Galvanized A307B Heavy Hex Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	41.79 -0.73 -2.15 -4.29	1.76
05 05 23 00-0030 EA 1" Diameter x 6" Long, Galvanized A307B Heavy Hex Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	63.73 -0.77 -2.75 -5.50	1.84
05 05 23 00-0031 EA 1-1/4" Diameter x 4" Long, Galvanized A307B Heavy Hex Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	63.30 -0.87 -2.89 -5.78	2.09
05 05 23 00-0032 EA 1-1/4" Diameter x 6" Long, Galvanized A307B Heavy Hex Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	79.76 -0.93 -3.39 -6.79	2.24
05 05 23 00-0033 A325 High Strength Structural Bolts <small>(05 05 23 00-0001)</small>		
05 05 23 00-0034 Plain Finish A325 High Strength Structural Bolts <small>(05 05 23 00-0033)</small> Note: Includes A325 heavy hex nut and structural washer.		
05 05 23 00-0035 EA 1/2" Diameter x 1-1/2" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	14.18 -0.58 -1.23 -2.46	1.40
05 05 23 00-0036 EA 1/2" Diameter x 3" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	14.55 -0.58 -1.24 -2.48	1.40
05 05 23 00-0037 EA 5/8" Diameter x 2" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	15.73 -0.58 -1.27 -2.54	1.40
05 05 23 00-0038 EA 5/8" Diameter x 4" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	19.49 -0.67 -1.49 -2.98	1.60
05 05 23 00-0039 EA 5/8" Diameter x 6" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	22.89 -0.70 -1.62 -3.24	1.67
05 05 23 00-0040 EA 3/4" Diameter x 2" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	17.35 -0.58 -1.31 -2.62	1.40
05 05 23 00-0041 EA 3/4" Diameter x 4" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	21.23 -0.67 -1.53 -3.06	1.60
05 05 23 00-0042 EA 3/4" Diameter x 6" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	24.42 -0.70 -1.66 -3.31	1.67
05 05 23 00-0043 EA 3/4" Diameter x 8" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	30.56 -0.73 -1.86 -3.73	1.76
05 05 23 00-0044 EA 7/8" Diameter x 2" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	20.33 -0.63 -1.46 -2.92	1.52
05 05 23 00-0045 EA 7/8" Diameter x 4" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	25.07 -0.70 -1.67 -3.34	1.67
05 05 23 00-0046 EA 7/8" Diameter x 6" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	28.87 -0.73 -1.82 -3.64	1.76
05 05 23 00-0047 EA 7/8" Diameter x 8" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	31.38 -0.77 -1.94 -3.88	1.84
05 05 23 00-0048 EA 1" Diameter x 2" Long, Plain Finish A325 High Strength Structural Bolt..... <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	22.64 -0.66 -1.55 -3.11	1.58

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0049	EA 1" Diameter x 4" Long, Plain Finish A325 High Strength Structural Bolt.....	27.49	1.76
	<i>For >10 To 50, Deduct</i>	-0.73	
	<i>For >50 To 100, Deduct</i>	-1.79	
	<i>For >100, Deduct</i>	-3.58	
05 05 23 00-0050	EA 1" Diameter x 6" Long, Plain Finish A325 High Strength Structural Bolt.....	32.16	1.84
	<i>For >10 To 50, Deduct</i>	-0.77	
	<i>For >50 To 100, Deduct</i>	-1.96	
	<i>For >100, Deduct</i>	-3.92	
05 05 23 00-0051	EA 1" Diameter x 8" Long, Plain Finish A325 High Strength Structural Bolt.....	41.90	1.96
	<i>For >10 To 50, Deduct</i>	-0.82	
	<i>For >50 To 100, Deduct</i>	-2.28	
	<i>For >100, Deduct</i>	-4.56	
05 05 23 00-0052	EA 1-1/4" Diameter x 3" Long, Plain Finish A325 High Strength Structural Bolt.....	39.84	1.96
	<i>For >10 To 50, Deduct</i>	-0.82	
	<i>For >50 To 100, Deduct</i>	-2.23	
	<i>For >100, Deduct</i>	-4.45	
05 05 23 00-0053	EA 1-1/4" Diameter x 4" Long, Plain Finish A325 High Strength Structural Bolt.....	45.41	2.09
	<i>For >10 To 50, Deduct</i>	-0.87	
	<i>For >50 To 100, Deduct</i>	-2.44	
	<i>For >100, Deduct</i>	-4.88	
05 05 23 00-0054	EA 1-1/4" Diameter x 6" Long, Plain Finish A325 High Strength Structural Bolt.....	53.67	2.24
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.74	
	<i>For >100, Deduct</i>	-5.48	
05 05 23 00-0055	EA 1-1/4" Diameter x 8" Long, Plain Finish A325 High Strength Structural Bolt.....	63.44	2.39
	<i>For >10 To 50, Deduct</i>	-1.00	
	<i>For >50 To 100, Deduct</i>	-3.08	
	<i>For >100, Deduct</i>	-6.16	
05 05 23 00-0056	Galvanized A325 High Strength Structural Bolts <small>(05 05 23 00-0053)</small>		
	Note: Includes A325 heavy hex nut and structural washer.		
05 05 23 00-0057	EA 1/2" Diameter x 1-1/2" Long, Galvanized A325 High Strength Structural Bolt.....	14.92	1.40
	<i>For >10 To 50, Deduct</i>	-0.58	
	<i>For >50 To 100, Deduct</i>	-1.25	
	<i>For >100, Deduct</i>	-2.50	
05 05 23 00-0058	EA 1/2" Diameter x 3" Long, Galvanized A325 High Strength Structural Bolt.....	15.18	1.40
	<i>For >10 To 50, Deduct</i>	-0.58	
	<i>For >50 To 100, Deduct</i>	-1.26	
	<i>For >100, Deduct</i>	-2.51	
05 05 23 00-0059	EA 5/8" Diameter x 2" Long, Galvanized A325 High Strength Structural Bolt.....	17.27	1.40
	<i>For >10 To 50, Deduct</i>	-0.58	
	<i>For >50 To 100, Deduct</i>	-1.31	
	<i>For >100, Deduct</i>	-2.62	
05 05 23 00-0060	EA 5/8" Diameter x 4" Long, Galvanized A325 High Strength Structural Bolt.....	20.59	1.60
	<i>For >10 To 50, Deduct</i>	-0.67	
	<i>For >50 To 100, Deduct</i>	-1.52	
	<i>For >100, Deduct</i>	-3.03	
05 05 23 00-0061	EA 5/8" Diameter x 6" Long, Galvanized A325 High Strength Structural Bolt.....	21.83	1.67
	<i>For >10 To 50, Deduct</i>	-0.70	
	<i>For >50 To 100, Deduct</i>	-1.59	
	<i>For >100, Deduct</i>	-3.18	
05 05 23 00-0062	EA 3/4" Diameter x 2" Long, Galvanized A325 High Strength Structural Bolt.....	18.07	1.40
	<i>For >10 To 50, Deduct</i>	-0.58	
	<i>For >50 To 100, Deduct</i>	-1.33	
	<i>For >100, Deduct</i>	-2.66	
05 05 23 00-0063	EA 3/4" Diameter x 4" Long, Galvanized A325 High Strength Structural Bolt.....	22.13	1.60
	<i>For >10 To 50, Deduct</i>	-0.67	
	<i>For >50 To 100, Deduct</i>	-1.55	
	<i>For >100, Deduct</i>	-3.11	
05 05 23 00-0064	EA 3/4" Diameter x 6" Long, Galvanized A325 High Strength Structural Bolt.....	25.82	1.67
	<i>For >10 To 50, Deduct</i>	-0.70	
	<i>For >50 To 100, Deduct</i>	-1.69	
	<i>For >100, Deduct</i>	-3.38	
05 05 23 00-0065	EA 3/4" Diameter x 8" Long, Galvanized A325 High Strength Structural Bolt.....	33.87	1.76
	<i>For >10 To 50, Deduct</i>	-0.73	
	<i>For >50 To 100, Deduct</i>	-1.95	
	<i>For >100, Deduct</i>	-3.89	
05 05 23 00-0066	EA 7/8" Diameter x 2" Long, Galvanized A325 High Strength Structural Bolt.....	24.60	1.52
	<i>For >10 To 50, Deduct</i>	-0.63	
	<i>For >50 To 100, Deduct</i>	-1.57	
	<i>For >100, Deduct</i>	-3.13	
05 05 23 00-0067	EA 7/8" Diameter x 4" Long, Galvanized A325 High Strength Structural Bolt.....	27.59	1.67
	<i>For >10 To 50, Deduct</i>	-0.70	
	<i>For >50 To 100, Deduct</i>	-1.73	
	<i>For >100, Deduct</i>	-3.47	
05 05 23 00-0068	EA 7/8" Diameter x 6" Long, Galvanized A325 High Strength Structural Bolt.....	31.93	1.76
	<i>For >10 To 50, Deduct</i>	-0.73	
	<i>For >50 To 100, Deduct</i>	-1.90	
	<i>For >100, Deduct</i>	-3.80	
05 05 23 00-0069	EA 7/8" Diameter x 8" Long, Galvanized A325 High Strength Structural Bolt.....	40.56	1.84
	<i>For >10 To 50, Deduct</i>	-0.77	
	<i>For >50 To 100, Deduct</i>	-2.17	
	<i>For >100, Deduct</i>	-4.34	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0070	EA			1" Diameter x 2" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	25.96 -0.66 -1.64 -3.28	1.58
05 05 23 00-0071	EA			1" Diameter x 4" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	35.10 -0.73 -1.98 -3.96	1.76
05 05 23 00-0072	EA			1" Diameter x 6" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	38.54 -0.77 -2.12 -4.24	1.84
05 05 23 00-0073	EA			1" Diameter x 8" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	49.75 -0.82 -2.47 -4.95	1.96
05 05 23 00-0074	EA			1-1/4" Diameter x 3" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	49.43 -0.82 -2.47 -4.93	1.96
05 05 23 00-0075	EA			1-1/4" Diameter x 4" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	52.73 -0.87 -2.62 -5.25	2.09
05 05 23 00-0076	EA			1-1/4" Diameter x 6" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	62.07 -0.93 -2.95 -5.90	2.24
05 05 23 00-0077	EA			1-1/4" Diameter x 8" Long, Galvanized A325 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	72.20 -1.00 -3.30 -6.60	2.39
05 05 23 00-0078				A490 High Strength Structural Bolts <small>(05 05 23 00-0001)</small> Note: Includes A490 heavy hex nut and two structural washers.		
05 05 23 00-0079				Plain Finish A490 High Strength Structural Bolts <small>(05 05 23 00-0078)</small>		
05 05 23 00-0080	EA			5/8" Diameter x 2" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	16.31 -0.58 -1.28 -2.57	1.40
05 05 23 00-0081	EA			5/8" Diameter x 4" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	23.48 -0.67 -1.59 -3.18	1.60
05 05 23 00-0082	EA			5/8" Diameter x 6" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	25.18 -0.70 -1.68 -3.35	1.67
05 05 23 00-0083	EA			3/4" Diameter x 2" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	18.56 -0.58 -1.34 -2.68	1.40
05 05 23 00-0084	EA			3/4" Diameter x 4" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	22.61 -0.67 -1.57 -3.13	1.60
05 05 23 00-0085	EA			3/4" Diameter x 6" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	26.64 -0.70 -1.71 -3.42	1.67
05 05 23 00-0086	EA			3/4" Diameter x 8" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	34.87 -0.73 -1.97 -3.94	1.76
05 05 23 00-0087	EA			7/8" Diameter x 2" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	21.72 -0.63 -1.49 -2.99	1.52
05 05 23 00-0088	EA			7/8" Diameter x 4" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	25.51 -0.70 -1.68 -3.36	1.67
05 05 23 00-0089	EA			7/8" Diameter x 6" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	37.86 -0.73 -2.05 -4.09	1.76
05 05 23 00-0090	EA			1" Diameter x 2" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	25.89 -0.66 -1.64 -3.27	1.58
05 05 23 00-0091	EA			1" Diameter x 4" Long, Plain Finish A490 High Strength Structural Bolt <i>For >10 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	31.13 -0.73 -1.88 -3.76	1.76

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0092	EA 1" Diameter x 6" Long, Plain Finish A490 High Strength Structural Bolt.....	36.09	1.84
	<i>For >10 To 50, Deduct</i>	-0.77	
	<i>For >50 To 100, Deduct</i>	-2.06	
	<i>For >100, Deduct</i>	-4.12	
05 05 23 00-0093	EA 1-1/4" Diameter x 3" Long, Plain Finish A490 High Strength Structural Bolt.....	45.64	1.96
	<i>For >10 To 50, Deduct</i>	-0.82	
	<i>For >50 To 100, Deduct</i>	-2.37	
	<i>For >100, Deduct</i>	-4.74	
05 05 23 00-0094	EA 1-1/4" Diameter x 4" Long, Plain Finish A490 High Strength Structural Bolt.....	59.25	2.09
	<i>For >10 To 50, Deduct</i>	-0.87	
	<i>For >50 To 100, Deduct</i>	-2.79	
	<i>For >100, Deduct</i>	-5.57	
05 05 23 00-0095	EA 1-1/4" Diameter x 6" Long, Plain Finish A490 High Strength Structural Bolt.....	62.29	2.24
	<i>For >10 To 50, Deduct</i>	-0.93	
	<i>For >50 To 100, Deduct</i>	-2.96	
	<i>For >100, Deduct</i>	-5.91	
05 05 23 00-0096	EA 1-1/4" Diameter x 8" Long, Plain Finish A490 High Strength Structural Bolt.....	64.92	2.39
	<i>For >10 To 50, Deduct</i>	-1.00	
	<i>For >50 To 100, Deduct</i>	-3.12	
	<i>For >100, Deduct</i>	-6.23	
05 05 23 00-0097	Hex Head Bolts <small>(05 05 23 00-0001)</small>		
05 05 23 00-0098	Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0097)</small>		
05 05 23 00-0099	1/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0098)</small>		
05 05 23 00-0100	EA 1/4" Diameter x 1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	6.97	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0101	EA 1/4" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.00	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0102	EA 1/4" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.09	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0103	EA 1/4" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.14	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0104	EA 1/4" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.39	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0105	EA 1/4" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.43	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0106	EA 1/4" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.57	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0107	EA 1/4" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.78	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0108	EA 1/4" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.83	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0109	EA 1/4" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.05	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0110	EA 1/4" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.40	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0111	EA 1/4" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.56	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0112	EA 1/4" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.79	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0113	EA 1/4" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.47	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0114 EA 1/4" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.82	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0115 EA 1/4" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.92	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0116 5/16" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0098)</small>		
05 05 23 00-0117 EA 5/16" Diameter x 1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.05	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0118 EA 5/16" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.08	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0119 EA 5/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.16	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0120 EA 5/16" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.22	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0121 EA 5/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.49	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0122 EA 5/16" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.64	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0123 EA 5/16" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.69	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0124 EA 5/16" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.04	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0125 EA 5/16" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.25	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0126 EA 5/16" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.33	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0127 EA 5/16" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.59	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0128 EA 5/16" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.67	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0129 EA 5/16" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.47	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0130 EA 5/16" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.05	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0131 EA 5/16" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.40	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0132 EA 5/16" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.72	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0133 3/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0098)</small>		
05 05 23 00-0134 EA 3/8" Diameter x 1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.15	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0135	EA 3/8" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.18	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0136	EA 3/8" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.29	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0137	EA 3/8" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.39	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0138	EA 3/8" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.67	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0139	EA 3/8" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.86	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0140	EA 3/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.04	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0141	EA 3/8" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.43	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0142	EA 3/8" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.67	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0143	EA 3/8" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.80	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0144	EA 3/8" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.24	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0145	EA 3/8" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.37	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0146	EA 3/8" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.47	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0147	EA 3/8" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.72	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0148	EA 3/8" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.87	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0149	EA 3/8" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.08	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0150	7/16" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0096)</small>		
05 05 23 00-0151	EA 7/16" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.57	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0152	EA 7/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.72	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0153	EA 7/16" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.74	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0154	EA 7/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.13	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0155	EA 7/16" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.36	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0156	EA			7/16" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.54	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0157	EA			7/16" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.22	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0158	EA			7/16" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.36	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0159	EA			7/16" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.63	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0160	EA			7/16" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.29	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0161	EA			7/16" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.42	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0162	EA			7/16" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.76	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0163	EA			7/16" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.10	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0164	EA			7/16" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.41	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0165	EA			7/16" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.02	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0166				1/2" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0098)</small>		
05 05 23 00-0167	EA			1/2" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.44	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0168	EA			1/2" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.62	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0169	EA			1/2" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.80	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0170	EA			1/2" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.20	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0171	EA			1/2" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.38	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0172	EA			1/2" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.57	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0173	EA			1/2" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.01	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0174	EA			1/2" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.22	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0175	EA			1/2" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.60	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0176	EA			1/2" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.86	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0177	EA 1/2" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.90
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0178	EA 1/2" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.22
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0179	EA 1/2" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.70
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0180	EA 1/2" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.90
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0181	EA 1/2" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.45
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0182	EA 1/2" Diameter x 8-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.93
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0183	EA 1/2" Diameter x 9" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.13
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0184	EA 1/2" Diameter x 9-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.90
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0185	EA 1/2" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.12
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64

05 05 23 00-0186 9/16" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts (05 05

05 05 23 00-0187	EA 9/16" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.63
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0188	EA 9/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.88
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0189	EA 9/16" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.94
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0190	EA 9/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.94
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0191	EA 9/16" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.26
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0192	EA 9/16" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.37
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0193	EA 9/16" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.60
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0194	EA 9/16" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.68
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0195	EA 9/16" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.95
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0196	EA 9/16" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.22
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0197	EA 9/16" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.30
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0198	EA			9/16" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.54	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0199	EA			9/16" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.99	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0200	EA			9/16" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.28	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0201	EA			9/16" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.57	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0202	EA			9/16" Diameter x 8-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.03	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0203	EA			9/16" Diameter x 9" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.37	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0204	EA			9/16" Diameter x 9-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.60	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0205	EA			9/16" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.95	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0206				5/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0098)</small>		
05 05 23 00-0207	EA			5/8" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.15	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0208	EA			5/8" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.32	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0209	EA			5/8" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.53	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0210	EA			5/8" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.01	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0211	EA			5/8" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.33	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0212	EA			5/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.73	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0213	EA			5/8" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.42	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0214	EA			5/8" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.03	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0215	EA			5/8" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.51	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0216	EA			5/8" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.90	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0217	EA			5/8" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.96	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0218	EA			5/8" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.77	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0219	EA 5/8" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	15.42
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0220	EA 5/8" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.06
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0221	EA 5/8" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.81
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0222	EA 5/8" Diameter x 8-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	17.82
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0223	EA 5/8" Diameter x 9" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	18.55
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0224	EA 5/8" Diameter x 9-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.30
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0225	EA 5/8" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.88
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93

05 05 23 00-0226 3/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts (05 05

05 05 23 00-0227	EA 3/4" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.70
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0228	EA 3/4" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.03
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0229	EA 3/4" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.34
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0230	EA 3/4" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.91
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0231	EA 3/4" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.38
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0232	EA 3/4" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.80
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0233	EA 3/4" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.44
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0234	EA 3/4" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.02
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0235	EA 3/4" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.48
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0236	EA 3/4" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	15.63
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0237	EA 3/4" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.01
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0238	EA 3/4" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.73
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0239	EA 3/4" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.96
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0240	EA			3/4" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	18.64	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0241	EA			3/4" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.42	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0242	EA			3/4" Diameter x 8-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	20.64	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0243	EA			3/4" Diameter x 9" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	21.42	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0244	EA			3/4" Diameter x 9-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	22.46	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0245	EA			3/4" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	23.47	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0246				7/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0098)</small>		
05 05 23 00-0247	EA			7/8" Diameter x 1" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.42	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0248	EA			7/8" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.70	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0249	EA			7/8" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.84	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0250	EA			7/8" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.42	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0251	EA			7/8" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	15.18	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0252	EA			7/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.07	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0253	EA			7/8" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	17.00	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0254	EA			7/8" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	18.30	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0255	EA			7/8" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.02	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0256	EA			7/8" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.78	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0257	EA			7/8" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	20.21	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0258	EA			7/8" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	21.23	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0259	EA			7/8" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	22.45	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0260	EA			7/8" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	23.49	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0261	EA 7/8" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	24.51
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0262	EA 7/8" Diameter x 8-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	25.67
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0263	EA 7/8" Diameter x 9" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	26.75
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0264	EA 7/8" Diameter x 9-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	27.75
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0265	EA 7/8" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	28.81
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22

05 05 23 00-0266 1" Diameter, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolts (05 05 23 00-0098)

05 05 23 00-0267	EA 1" Diameter x 1-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.68
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0268	EA 1" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.55
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0269	EA 1" Diameter x 2-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	17.93
	<i>For >100 To 250, Deduct</i>	-1.99
	<i>For >250 To 500, Deduct</i>	-2.49
	<i>For >500, Deduct</i>	-2.99
05 05 23 00-0270	EA 1" Diameter x 3" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.41
	<i>For >100 To 250, Deduct</i>	-1.99
	<i>For >250 To 500, Deduct</i>	-2.49
	<i>For >500, Deduct</i>	-2.99
05 05 23 00-0271	EA 1" Diameter x 3-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	20.75
	<i>For >100 To 250, Deduct</i>	-1.99
	<i>For >250 To 500, Deduct</i>	-2.49
	<i>For >500, Deduct</i>	-2.99
05 05 23 00-0272	EA 1" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	22.33
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0273	EA 1" Diameter x 4-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	23.63
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0274	EA 1" Diameter x 5" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	24.97
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0275	EA 1" Diameter x 5-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	25.84
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0276	EA 1" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	26.49
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0277	EA 1" Diameter x 6-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	27.62
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0278	EA 1" Diameter x 7" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	28.93
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0279	EA 1" Diameter x 7-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	30.05
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0280	EA 1" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	31.21
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0281	EA 1" Diameter x 8-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	32.34
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0282 EA 1" Diameter x 9" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	33.65	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0283 EA 1" Diameter x 9-1/2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	34.81	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0284 EA 1" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Hex Head Bolt.....	35.99	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0285 Zinc Plated Steel, Grade 5, Hex Head Bolts <small>(05 05 23 00-0097)</small>		
05 05 23 00-0286 1/4" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts <small>(05 05 23 00-0285)</small>		
05 05 23 00-0287 EA 1/4" Diameter x 1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.03	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0288 EA 1/4" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.09	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0289 EA 1/4" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.14	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0290 EA 1/4" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.24	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0291 EA 1/4" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.53	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0292 EA 1/4" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.71	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0293 EA 1/4" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.90	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0294 EA 1/4" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.25	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0295 EA 1/4" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.49	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0296 EA 1/4" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.65	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0297 EA 1/4" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.01	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0298 EA 1/4" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.16	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0299 EA 1/4" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.31	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0300 EA 1/4" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.70	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0301 EA 1/4" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.92	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0302 EA 1/4" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.13	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0303 5/16" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts <small>(05 05 23 00-0285)</small>		

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0304	EA 5/16" Diameter x 1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.15
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0305	EA 5/16" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.19
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0306	EA 5/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.26
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0307	EA 5/16" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.40
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0308	EA 5/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.69
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0309	EA 5/16" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.86
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0310	EA 5/16" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.15
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0311	EA 5/16" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.50
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0312	EA 5/16" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.74
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0313	EA 5/16" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.95
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0314	EA 5/16" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	9.57
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0315	EA 5/16" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	9.65
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0316	EA 5/16" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	9.94
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0317	EA 5/16" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.51
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0318	EA 5/16" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.91
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0319	EA 5/16" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	11.29
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28

05 05 23 00-0320 3/8" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts (05 05 23 00-0285)

05 05 23 00-0321	EA 3/8" Diameter x 1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.21
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0322	EA 3/8" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.25
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0323	EA 3/8" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.38
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0324	EA 3/8" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	7.52
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0325	EA			3/8" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	7.87	
				<i>For >100 To 250, Deduct</i>	-1.41	
				<i>For >250 To 500, Deduct</i>	-1.76	
				<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0326	EA			3/8" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.03	
				<i>For >100 To 250, Deduct</i>	-1.41	
				<i>For >250 To 500, Deduct</i>	-1.76	
				<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0327	EA			3/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.29	
				<i>For >100 To 250, Deduct</i>	-1.41	
				<i>For >250 To 500, Deduct</i>	-1.76	
				<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0328	EA			3/8" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.77	
				<i>For >100 To 250, Deduct</i>	-1.45	
				<i>For >250 To 500, Deduct</i>	-1.81	
				<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0329	EA			3/8" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.38	
				<i>For >100 To 250, Deduct</i>	-1.45	
				<i>For >250 To 500, Deduct</i>	-1.81	
				<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0330	EA			3/8" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.66	
				<i>For >100 To 250, Deduct</i>	-1.45	
				<i>For >250 To 500, Deduct</i>	-1.81	
				<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0331	EA			3/8" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.21	
				<i>For >100 To 250, Deduct</i>	-1.48	
				<i>For >250 To 500, Deduct</i>	-1.86	
				<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0332	EA			3/8" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.47	
				<i>For >100 To 250, Deduct</i>	-1.48	
				<i>For >250 To 500, Deduct</i>	-1.86	
				<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0333	EA			3/8" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.93	
				<i>For >100 To 250, Deduct</i>	-1.48	
				<i>For >250 To 500, Deduct</i>	-1.86	
				<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0334	EA			3/8" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.46	
				<i>For >100 To 250, Deduct</i>	-1.52	
				<i>For >250 To 500, Deduct</i>	-1.90	
				<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0335	EA			3/8" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	12.07	
				<i>For >100 To 250, Deduct</i>	-1.52	
				<i>For >250 To 500, Deduct</i>	-1.90	
				<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0336	EA			3/8" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	12.56	
				<i>For >100 To 250, Deduct</i>	-1.52	
				<i>For >250 To 500, Deduct</i>	-1.90	
				<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0337				7/16" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts (05 05 23 00-0285)		
05 05 23 00-0338	EA			7/16" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.46	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0339	EA			7/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.58	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0340	EA			7/16" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	8.90	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0341	EA			7/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.33	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0342	EA			7/16" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.56	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0343	EA			7/16" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.77	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0344	EA			7/16" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.24	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0345	EA			7/16" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.44	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0346	EA 7/16" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	11.98
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0347	EA 7/16" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.35
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0348	EA 7/16" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.60
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0349	EA 7/16" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.86
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0350	EA 7/16" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	13.40
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0351	EA 7/16" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	13.75
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0352	EA 7/16" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	14.10
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58

05 05 23 00-0353 1/2" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts (05 05 23 00-0285)

05 05 23 00-0354	EA 1/2" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.62
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0355	EA 1/2" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.79
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0356	EA 1/2" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	8.97
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0357	EA 1/2" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	9.45
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0358	EA 1/2" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	9.72
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0359	EA 1/2" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.02
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0360	EA 1/2" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.46
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0361	EA 1/2" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	11.41
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0362	EA 1/2" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	11.47
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0363	EA 1/2" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.32
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0364	EA 1/2" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.69
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0365	EA 1/2" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	13.64
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0366	EA 1/2" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	14.68
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0367 EA 1/2" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	15.22	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0368 EA 1/2" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	15.41	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0369 EA 1/2" Diameter x 8-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	16.59	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0370 EA 1/2" Diameter x 9" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	17.52	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0371 EA 1/2" Diameter x 9-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	18.83	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0372 EA 1/2" Diameter x 10" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	19.34	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0373 9/16" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts (05 05 23 00-0285)		
05 05 23 00-0374 EA 9/16" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.14	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-1.95	
<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0375 EA 9/16" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.44	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-1.95	
<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0376 EA 9/16" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	9.72	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-1.95	
<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0377 EA 9/16" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.21	
<i>For >100 To 250, Deduct</i>	-1.60	
<i>For >250 To 500, Deduct</i>	-2.00	
<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0378 EA 9/16" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	10.60	
<i>For >100 To 250, Deduct</i>	-1.60	
<i>For >250 To 500, Deduct</i>	-2.00	
<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0379 EA 9/16" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.02	
<i>For >100 To 250, Deduct</i>	-1.60	
<i>For >250 To 500, Deduct</i>	-2.00	
<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0380 EA 9/16" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.70	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0381 EA 9/16" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	13.35	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0382 EA 9/16" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	13.78	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0383 EA 9/16" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	14.46	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0384 EA 9/16" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	14.92	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0385 EA 9/16" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	16.44	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0386 EA 9/16" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	18.51	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0387 EA 9/16" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	19.14	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0388	EA 9/16" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	20.19
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0389	EA 9/16" Diameter x 8-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	21.38
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0390	EA 9/16" Diameter x 9" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	21.77
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0391	EA 9/16" Diameter x 9-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	22.15
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0392	EA 9/16" Diameter x 10" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	23.09
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64

05 05 23 00-0393 5/8" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts (05 05 23 00-0285)

05 05 23 00-0394	EA 5/8" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.44
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0395	EA 5/8" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.55
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0396	EA 5/8" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	10.64
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0397	EA 5/8" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	11.12
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0398	EA 5/8" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	11.62
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0399	EA 5/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.08
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0400	EA 5/8" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	12.74
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0401	EA 5/8" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	13.63
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0402	EA 5/8" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	14.10
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0403	EA 5/8" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	14.55
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0404	EA 5/8" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	15.31
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0405	EA 5/8" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	16.51
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0406	EA 5/8" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	17.80
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0407	EA 5/8" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	18.80
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0408	EA 5/8" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	18.95
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0409	EA			5/8" Diameter x 8-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	20.95	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0410	EA			5/8" Diameter x 9" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	22.29	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0411	EA			5/8" Diameter x 9-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	24.26	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0412	EA			5/8" Diameter x 10" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	24.95	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0413				3/4" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts (05 05 23 00-0285)		
05 05 23 00-0414	EA			3/4" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.57	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0415	EA			3/4" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.77	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0416	EA			3/4" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	11.87	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0417	EA			3/4" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	12.49	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0418	EA			3/4" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	12.99	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0419	EA			3/4" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	13.76	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0420	EA			3/4" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	14.47	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0421	EA			3/4" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	14.96	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0422	EA			3/4" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	15.99	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0423	EA			3/4" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	16.67	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0424	EA			3/4" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	17.52	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0425	EA			3/4" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	18.56	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0426	EA			3/4" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	20.23	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0427	EA			3/4" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	21.31	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0428	EA			3/4" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	21.93	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0429	EA			3/4" Diameter x 8-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	23.74	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0430	EA 3/4" Diameter x 9" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	24.29	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0431	EA 3/4" Diameter x 9-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	26.08	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0432	EA 3/4" Diameter x 10" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	26.52	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0433	7/8" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts <small>(05 05 23 00-0285)</small>		
05 05 23 00-0434	EA 7/8" Diameter x 1" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	13.96	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0435	EA 7/8" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	14.20	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0436	EA 7/8" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	14.54	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0437	EA 7/8" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	15.07	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0438	EA 7/8" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	16.08	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0439	EA 7/8" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	16.75	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0440	EA 7/8" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	17.45	
	<i>For >100 To 250, Deduct</i>	-2.03	
	<i>For >250 To 500, Deduct</i>	-2.54	
	<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0441	EA 7/8" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	18.64	
	<i>For >100 To 250, Deduct</i>	-2.03	
	<i>For >250 To 500, Deduct</i>	-2.54	
	<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0442	EA 7/8" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	19.54	
	<i>For >100 To 250, Deduct</i>	-2.03	
	<i>For >250 To 500, Deduct</i>	-2.54	
	<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0443	EA 7/8" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	20.17	
	<i>For >100 To 250, Deduct</i>	-2.07	
	<i>For >250 To 500, Deduct</i>	-2.59	
	<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0444	EA 7/8" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	20.91	
	<i>For >100 To 250, Deduct</i>	-2.07	
	<i>For >250 To 500, Deduct</i>	-2.59	
	<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0445	EA 7/8" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	24.12	
	<i>For >100 To 250, Deduct</i>	-2.07	
	<i>For >250 To 500, Deduct</i>	-2.59	
	<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0446	EA 7/8" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	25.45	
	<i>For >100 To 250, Deduct</i>	-2.11	
	<i>For >250 To 500, Deduct</i>	-2.64	
	<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0447	EA 7/8" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	26.86	
	<i>For >100 To 250, Deduct</i>	-2.11	
	<i>For >250 To 500, Deduct</i>	-2.64	
	<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0448	EA 7/8" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	26.95	
	<i>For >100 To 250, Deduct</i>	-2.11	
	<i>For >250 To 500, Deduct</i>	-2.64	
	<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0449	EA 7/8" Diameter x 8-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	29.18	
	<i>For >100 To 250, Deduct</i>	-2.15	
	<i>For >250 To 500, Deduct</i>	-2.69	
	<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0450	EA 7/8" Diameter x 9" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt	30.55	
	<i>For >100 To 250, Deduct</i>	-2.15	
	<i>For >250 To 500, Deduct</i>	-2.69	
	<i>For >500, Deduct</i>	-3.22	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	05 05 23	00-0451	EA	7/8" Diameter x 9-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	31.73	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
	05 05 23	00-0452	EA	7/8" Diameter x 10" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	32.91	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23	00-0453			1" Diameter, Zinc Plated Steel, Grade 5, Hex Head Bolts <small>(05 05 23 00-0285)</small>		
	05 05 23	00-0454	EA	1" Diameter x 1-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	16.20	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
	05 05 23	00-0455	EA	1" Diameter x 2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	16.28	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
	05 05 23	00-0456	EA	1" Diameter x 2-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	17.23	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
	05 05 23	00-0457	EA	1" Diameter x 3" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	18.20	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
	05 05 23	00-0458	EA	1" Diameter x 3-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	18.92	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
	05 05 23	00-0459	EA	1" Diameter x 4" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	20.03	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
	05 05 23	00-0460	EA	1" Diameter x 4-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	21.17	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
	05 05 23	00-0461	EA	1" Diameter x 5" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	22.84	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
	05 05 23	00-0462	EA	1" Diameter x 5-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	24.23	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
	05 05 23	00-0463	EA	1" Diameter x 6" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	24.58	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
	05 05 23	00-0464	EA	1" Diameter x 6-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	26.90	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
	05 05 23	00-0465	EA	1" Diameter x 7" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	28.58	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
	05 05 23	00-0466	EA	1" Diameter x 7-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	31.06	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
	05 05 23	00-0467	EA	1" Diameter x 8" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	31.76	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
	05 05 23	00-0468	EA	1" Diameter x 8-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	39.88	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
	05 05 23	00-0469	EA	1" Diameter x 9" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	40.51	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
	05 05 23	00-0470	EA	1" Diameter x 9-1/2" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	42.20	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
	05 05 23	00-0471	EA	1" Diameter x 10" Length, Zinc Plated Steel, Grade 5, Hex Head Bolt.....	43.36	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0472	Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0097)		
05 05 23 00-0473	1/4" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)		
05 05 23 00-0474	EA 1/4" Diameter x 1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.06	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	
05 05 23 00-0475	EA 1/4" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.18	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	
05 05 23 00-0476	EA 1/4" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.24	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	
05 05 23 00-0477	EA 1/4" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.37	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	
05 05 23 00-0478	EA 1/4" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.64	
	For >100 To 250, Deduct	-1.41	
	For >250 To 500, Deduct	-1.76	
	For >500, Deduct	-2.11	
05 05 23 00-0479	EA 1/4" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.78	
	For >100 To 250, Deduct	-1.41	
	For >250 To 500, Deduct	-1.76	
	For >500, Deduct	-2.11	
05 05 23 00-0480	EA 1/4" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.91	
	For >100 To 250, Deduct	-1.41	
	For >250 To 500, Deduct	-1.76	
	For >500, Deduct	-2.11	
05 05 23 00-0481	EA 1/4" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.12	
	For >100 To 250, Deduct	-1.45	
	For >250 To 500, Deduct	-1.81	
	For >500, Deduct	-2.17	
05 05 23 00-0482	EA 1/4" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.50	
	For >100 To 250, Deduct	-1.45	
	For >250 To 500, Deduct	-1.81	
	For >500, Deduct	-2.17	
05 05 23 00-0483	EA 1/4" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.86	
	For >100 To 250, Deduct	-1.45	
	For >250 To 500, Deduct	-1.81	
	For >500, Deduct	-2.17	
05 05 23 00-0484	EA 1/4" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.24	
	For >100 To 250, Deduct	-1.48	
	For >250 To 500, Deduct	-1.86	
	For >500, Deduct	-2.23	
05 05 23 00-0485	EA 1/4" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.44	
	For >100 To 250, Deduct	-1.48	
	For >250 To 500, Deduct	-1.86	
	For >500, Deduct	-2.23	
05 05 23 00-0486	EA 1/4" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.68	
	For >100 To 250, Deduct	-1.48	
	For >250 To 500, Deduct	-1.86	
	For >500, Deduct	-2.23	
05 05 23 00-0487	EA 1/4" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.04	
	For >100 To 250, Deduct	-1.52	
	For >250 To 500, Deduct	-1.90	
	For >500, Deduct	-2.28	
05 05 23 00-0488	EA 1/4" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.51	
	For >100 To 250, Deduct	-1.52	
	For >250 To 500, Deduct	-1.90	
	For >500, Deduct	-2.28	
05 05 23 00-0489	EA 1/4" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.72	
	For >100 To 250, Deduct	-1.52	
	For >250 To 500, Deduct	-1.90	
	For >500, Deduct	-2.28	
05 05 23 00-0490	5/16" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)		
05 05 23 00-0491	EA 5/16" Diameter x 1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.17	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	
05 05 23 00-0492	EA 5/16" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.24	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	
05 05 23 00-0493	EA 5/16" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.47	
	For >100 To 250, Deduct	-1.37	
	For >250 To 500, Deduct	-1.71	
	For >500, Deduct	-2.05	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0494 EA 5/16" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.51	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0495 EA 5/16" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	7.83	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0496 EA 5/16" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.17	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0497 EA 5/16" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	8.27	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0498 EA 5/16" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.67	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0499 EA 5/16" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	8.88	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0500 EA 5/16" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.37	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0501 EA 5/16" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	9.85	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0502 EA 5/16" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.03	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0503 EA 5/16" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	10.32	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0504 EA 5/16" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.71	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0505 EA 5/16" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	10.92	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0506 EA 5/16" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	11.33	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0507 3/8" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)		
05 05 23 00-0508 EA 3/8" Diameter x 1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.41	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0509 EA 3/8" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.44	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0510 EA 3/8" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	7.45	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0511 EA 3/8" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	7.72	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0512 EA 3/8" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	8.06	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0513 EA 3/8" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.33	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0514 EA 3/8" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	8.57	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0515	EA 3/8" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.54
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0516	EA 3/8" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	9.84
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0517	EA 3/8" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.90
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0518	EA 3/8" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	10.21
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0519	EA 3/8" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.55
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0520	EA 3/8" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	12.05
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0521	EA 3/8" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	12.59
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0522	EA 3/8" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	13.26
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0523	EA 3/8" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	14.83
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28

05 05 23 00-0524 7/16" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)

05 05 23 00-0525	EA 7/16" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.64
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0526	EA 7/16" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	8.68
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0527	EA 7/16" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.10
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0528	EA 7/16" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	9.33
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0529	EA 7/16" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.80
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0530	EA 7/16" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	10.06
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0531	EA 7/16" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.30
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0532	EA 7/16" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	11.35
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0533	EA 7/16" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	12.17
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0534	EA 7/16" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	12.93
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0535	EA 7/16" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	13.22
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0536	EA			7/16" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	13.65	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0537	EA			7/16" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	14.48	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0538	EA			7/16" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	15.87	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0539	EA			7/16" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	15.98	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0540				1/2" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)		
05 05 23 00-0541	EA			1/2" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	8.91	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0542	EA			1/2" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	9.22	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0543	EA			1/2" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.41	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0544	EA			1/2" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	9.80	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0545	EA			1/2" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.14	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0546	EA			1/2" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	10.90	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0547	EA			1/2" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	11.62	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0548	EA			1/2" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	12.07	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0549	EA			1/2" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	12.39	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0550	EA			1/2" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	13.15	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0551	EA			1/2" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	14.11	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0552	EA			1/2" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	14.99	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0553	EA			1/2" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	15.95	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0554	EA			1/2" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	16.34	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0555	EA			1/2" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	17.44	
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0556	EA			1/2" Diameter x 8-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	19.48	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0557	EA 1/2" Diameter x 9" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	20.27	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0558	EA 1/2" Diameter x 9-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	20.68	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0559	EA 1/2" Diameter x 10" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	22.65	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0560	9/16" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)		
05 05 23 00-0561	EA 9/16" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.20	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0562	EA 9/16" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	9.38	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0563	EA 9/16" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	9.81	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0564	EA 9/16" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	10.63	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0565	EA 9/16" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.78	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0566	EA 9/16" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	11.40	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0567	EA 9/16" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	12.01	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0568	EA 9/16" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	14.05	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0569	EA 9/16" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	14.45	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0570	EA 9/16" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	14.98	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0571	EA 9/16" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	15.86	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0572	EA 9/16" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	19.21	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0573	EA 9/16" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	23.32	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0574	EA 9/16" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	28.16	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0575	EA 9/16" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	33.43	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0576	5/8" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)		
05 05 23 00-0577	EA 5/8" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	10.84	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0578	EA			5/8" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	11.02	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0579	EA			5/8" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	11.49	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0580	EA			5/8" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	12.37	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0581	EA			5/8" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	12.93	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0582	EA			5/8" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	13.24	
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0583	EA			5/8" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	13.64	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0584	EA			5/8" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	14.65	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0585	EA			5/8" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	15.09	
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0586	EA			5/8" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	15.77	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0587	EA			5/8" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	16.24	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0588	EA			5/8" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	17.23	
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0589	EA			5/8" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	19.77	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0590	EA			5/8" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	20.90	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0591	EA			5/8" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	21.38	
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0592	EA			5/8" Diameter x 8-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	23.58	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0593	EA			5/8" Diameter x 9" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	25.79	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0594	EA			5/8" Diameter x 9-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	25.96	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0595	EA			5/8" Diameter x 10" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	28.02	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0596				3/4" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts <small>(05 05 23 00-0472)</small>	11.89	
	EA			3/4" Diameter x 1" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	11.89	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0598	EA			3/4" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	12.09	
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0599	EA 3/4" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	12.22
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0600	EA 3/4" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	12.70
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0601	EA 3/4" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	13.12
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0602	EA 3/4" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	14.32
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0603	EA 3/4" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	15.02
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0604	EA 3/4" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	15.12
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0605	EA 3/4" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	16.76
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75
05 05 23 00-0606	EA 3/4" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	17.55
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0607	EA 3/4" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	18.41
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0608	EA 3/4" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	20.01
	<i>For >100 To 250, Deduct</i>	-1.87
	<i>For >250 To 500, Deduct</i>	-2.34
	<i>For >500, Deduct</i>	-2.81
05 05 23 00-0609	EA 3/4" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	22.15
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0610	EA 3/4" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	23.01
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0611	EA 3/4" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	23.45
	<i>For >100 To 250, Deduct</i>	-1.91
	<i>For >250 To 500, Deduct</i>	-2.39
	<i>For >500, Deduct</i>	-2.87
05 05 23 00-0612	EA 3/4" Diameter x 8-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	25.76
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0613	EA 3/4" Diameter x 9" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	27.32
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0614	EA 3/4" Diameter x 9-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	28.43
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0615	EA 3/4" Diameter x 10" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	28.84
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93

05 05 23 00-0616 7/8" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts (05 05 23 00-0472)

05 05 23 00-0617	EA 7/8" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	15.76
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0618	EA 7/8" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	16.29
	<i>For >100 To 250, Deduct</i>	-1.95
	<i>For >250 To 500, Deduct</i>	-2.44
	<i>For >500, Deduct</i>	-2.93
05 05 23 00-0619	EA 7/8" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	17.27
	<i>For >100 To 250, Deduct</i>	-1.99
	<i>For >250 To 500, Deduct</i>	-2.49
	<i>For >500, Deduct</i>	-2.99



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0620	EA			7/8" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	18.86	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0621	EA			7/8" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	19.04	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0622	EA			7/8" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	19.57	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0623	EA			7/8" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	23.40	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0624	EA			7/8" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	24.38	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0625	EA			7/8" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	26.85	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0626	EA			7/8" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	28.29	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0627	EA			7/8" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	32.00	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0628	EA			7/8" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	33.42	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0629	EA			7/8" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	37.24	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0630	EA			7/8" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	38.78	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0631	EA			7/8" Diameter x 8-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	40.22	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0632	EA			7/8" Diameter x 9" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	40.66	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0633	EA			7/8" Diameter x 9-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	41.04	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0634	EA			7/8" Diameter x 10" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	41.96	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0635				1" Diameter, Zinc Plated Steel, Grade 8, Hex Head Bolts <small>(05 05 23 00-0472)</small>	17.27	
05 05 23 00-0636	EA			1" Diameter x 1-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	17.27	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0637	EA			1" Diameter x 2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	18.60	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0638	EA			1" Diameter x 2-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	19.38	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0639	EA			1" Diameter x 3" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	20.37	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0640	EA			1" Diameter x 3-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt	22.23	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0641	EA 1" Diameter x 4" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	22.91
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0642	EA 1" Diameter x 4-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	24.51
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0643	EA 1" Diameter x 5" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	26.65
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0644	EA 1" Diameter x 5-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	27.86
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0645	EA 1" Diameter x 6" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	28.76
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0646	EA 1" Diameter x 6-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	33.23
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0647	EA 1" Diameter x 7" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	34.11
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0648	EA 1" Diameter x 7-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	39.16
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0649	EA 1" Diameter x 8" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	40.03
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0650	EA 1" Diameter x 8-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	42.92
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0651	EA 1" Diameter x 9" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	44.39
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0652	EA 1" Diameter x 9-1/2" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	48.23
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0653	EA 1" Diameter x 10" Length, Yellow Zinc Plated Steel, Grade 8, Hex Head Bolt.....	50.58
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22

05 05 23 00-0654 Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts (05 05 23 00-0654)05 05 23 00-0655 1/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts (05 05 23 00-0654)

05 05 23 00-0656	EA 1/4" Diameter x 1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.22
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0657	EA 1/4" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.24
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0658	EA 1/4" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.26
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0659	EA 1/4" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.54
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0660	EA 1/4" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.86
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0661	EA 1/4" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.02
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0662 EA 1/4" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.09	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0663 EA 1/4" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.31	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0664 EA 1/4" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.50	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0665 EA 1/4" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.55	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0666 EA 1/4" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.87	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0667 EA 1/4" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.04	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0668 EA 1/4" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.10	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0669 EA 1/4" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.44	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0670 EA 1/4" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.90	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0671 EA 1/4" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.48	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0672 5/16" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0654)</small>		
05 05 23 00-0673 EA 5/16" Diameter x 1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.10	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0674 EA 5/16" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.62	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0675 EA 5/16" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.67	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0676 EA 5/16" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.69	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0677 EA 5/16" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.12	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0678 EA 5/16" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.62	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0679 EA 5/16" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.71	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0680 EA 5/16" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.05	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0681 EA 5/16" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.09	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0682 EA 5/16" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.49	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0683	EA 5/16" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.79
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0684	EA 5/16" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.94
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0685	EA 5/16" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.32
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0686	EA 5/16" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.27
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0687	EA 5/16" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.88
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0688	EA 5/16" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.45
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28

05 05 23 00-0689 3/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts (05 05 23 00-0684)

05 05 23 00-0690	EA 3/8" Diameter x 1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.26
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0691	EA 3/8" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.38
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0692	EA 3/8" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.51
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0693	EA 3/8" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	7.83
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0694	EA 3/8" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.16
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0695	EA 3/8" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.43
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0696	EA 3/8" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.62
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0697	EA 3/8" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.08
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0698	EA 3/8" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.21
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0699	EA 3/8" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.54
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0700	EA 3/8" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.86
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0701	EA 3/8" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.31
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0702	EA 3/8" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.38
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0703	EA 3/8" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.60
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	05 05 23	00-0704	EA	3/8" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.65	
				<i>For >100 To 250, Deduct</i>	-1.52	
				<i>For >250 To 500, Deduct</i>	-1.90	
				<i>For >500, Deduct</i>	-2.28	
	05 05 23	00-0705	EA	3/8" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.17	
				<i>For >100 To 250, Deduct</i>	-1.52	
				<i>For >250 To 500, Deduct</i>	-1.90	
				<i>For >500, Deduct</i>	-2.28	
05 05 23	00-0706			7/16" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0654)</small>		
	05 05 23	00-0707	EA	7/16" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.02	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
	05 05 23	00-0708	EA	7/16" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.60	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
	05 05 23	00-0709	EA	7/16" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.04	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
	05 05 23	00-0710	EA	7/16" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.98	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
	05 05 23	00-0711	EA	7/16" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.01	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
	05 05 23	00-0712	EA	7/16" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.05	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
	05 05 23	00-0713	EA	7/16" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.61	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
	05 05 23	00-0714	EA	7/16" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.02	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
	05 05 23	00-0715	EA	7/16" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.39	
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
	05 05 23	00-0716	EA	7/16" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.01	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
	05 05 23	00-0717	EA	7/16" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.44	
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23	00-0718			1/2" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0654)</small>		
	05 05 23	00-0719	EA	1/2" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.77	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
	05 05 23	00-0720	EA	1/2" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	8.96	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
	05 05 23	00-0721	EA	1/2" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.33	
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
	05 05 23	00-0722	EA	1/2" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	9.95	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
	05 05 23	00-0723	EA	1/2" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.24	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
	05 05 23	00-0724	EA	1/2" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	10.78	
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0725	EA 1/2" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	11.06
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0726	EA 1/2" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	11.26
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0727	EA 1/2" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	11.69
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46
05 05 23 00-0728	EA 1/2" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	12.09
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0729	EA 1/2" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	12.57
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0730	EA 1/2" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	12.61
	<i>For >100 To 250, Deduct</i>	-1.68
	<i>For >250 To 500, Deduct</i>	-2.10
	<i>For >500, Deduct</i>	-2.52
05 05 23 00-0731	EA 1/2" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	12.89
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0732	EA 1/2" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	13.02
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0733	EA 1/2" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	13.38
	<i>For >100 To 250, Deduct</i>	-1.72
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.58
05 05 23 00-0734	EA 1/2" Diameter x 8-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	15.29
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0735	EA 1/2" Diameter x 9" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	15.58
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0736	EA 1/2" Diameter x 9-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	15.64
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0737	EA 1/2" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	15.81
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64

05 05 23 00-0738 5/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts
(05 05 23 00-0654)

05 05 23 00-0739	EA 5/8" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	10.42
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0740	EA 5/8" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	10.71
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0741	EA 5/8" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	10.91
	<i>For >100 To 250, Deduct</i>	-1.76
	<i>For >250 To 500, Deduct</i>	-2.20
	<i>For >500, Deduct</i>	-2.64
05 05 23 00-0742	EA 5/8" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	11.42
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0743	EA 5/8" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	11.85
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0744	EA 5/8" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	12.80
	<i>For >100 To 250, Deduct</i>	-1.80
	<i>For >250 To 500, Deduct</i>	-2.25
	<i>For >500, Deduct</i>	-2.69
05 05 23 00-0745	EA 5/8" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	13.14
	<i>For >100 To 250, Deduct</i>	-1.83
	<i>For >250 To 500, Deduct</i>	-2.29
	<i>For >500, Deduct</i>	-2.75

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0746 EA 5/8" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.31	
<i>For >100 To 250, Deduct</i>	-1.83	
<i>For >250 To 500, Deduct</i>	-2.29	
<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0747 EA 5/8" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.60	
<i>For >100 To 250, Deduct</i>	-1.83	
<i>For >250 To 500, Deduct</i>	-2.29	
<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0748 EA 5/8" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.18	
<i>For >100 To 250, Deduct</i>	-1.87	
<i>For >250 To 500, Deduct</i>	-2.34	
<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0749 EA 5/8" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.51	
<i>For >100 To 250, Deduct</i>	-1.87	
<i>For >250 To 500, Deduct</i>	-2.34	
<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0750 EA 5/8" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	15.49	
<i>For >100 To 250, Deduct</i>	-1.87	
<i>For >250 To 500, Deduct</i>	-2.34	
<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0751 EA 5/8" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	15.74	
<i>For >100 To 250, Deduct</i>	-1.91	
<i>For >250 To 500, Deduct</i>	-2.39	
<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0752 EA 5/8" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	17.45	
<i>For >100 To 250, Deduct</i>	-1.91	
<i>For >250 To 500, Deduct</i>	-2.39	
<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0753 EA 5/8" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	17.96	
<i>For >100 To 250, Deduct</i>	-1.91	
<i>For >250 To 500, Deduct</i>	-2.39	
<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0754 EA 5/8" Diameter x 8-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	18.87	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0755 EA 5/8" Diameter x 9" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.68	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0756 EA 5/8" Diameter x 9-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	21.53	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0757 EA 5/8" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	21.67	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0758 3/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0654)</small>		
05 05 23 00-0759 EA 3/4" Diameter x 1" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.81	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0760 EA 3/4" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	11.87	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0761 EA 3/4" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	12.22	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >250 To 500, Deduct</i>	-2.20	
<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0762 EA 3/4" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	13.21	
<i>For >100 To 250, Deduct</i>	-1.80	
<i>For >250 To 500, Deduct</i>	-2.25	
<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0763 EA 3/4" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	14.54	
<i>For >100 To 250, Deduct</i>	-1.80	
<i>For >250 To 500, Deduct</i>	-2.25	
<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0764 EA 3/4" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	15.39	
<i>For >100 To 250, Deduct</i>	-1.80	
<i>For >250 To 500, Deduct</i>	-2.25	
<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0765 EA 3/4" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.04	
<i>For >100 To 250, Deduct</i>	-1.83	
<i>For >250 To 500, Deduct</i>	-2.29	
<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0766 EA 3/4" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	16.12	
<i>For >100 To 250, Deduct</i>	-1.83	
<i>For >250 To 500, Deduct</i>	-2.29	
<i>For >500, Deduct</i>	-2.75	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0767	EA 3/4" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	16.30	
	<i>For >100 To 250, Deduct</i>	-1.83	
	<i>For >250 To 500, Deduct</i>	-2.29	
	<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0768	EA 3/4" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	16.62	
	<i>For >100 To 250, Deduct</i>	-1.87	
	<i>For >250 To 500, Deduct</i>	-2.34	
	<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0769	EA 3/4" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	17.75	
	<i>For >100 To 250, Deduct</i>	-1.87	
	<i>For >250 To 500, Deduct</i>	-2.34	
	<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0770	EA 3/4" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	18.22	
	<i>For >100 To 250, Deduct</i>	-1.87	
	<i>For >250 To 500, Deduct</i>	-2.34	
	<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0771	EA 3/4" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	19.33	
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0772	EA 3/4" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	19.48	
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0773	EA 3/4" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	19.94	
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0774	EA 3/4" Diameter x 8-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	20.83	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0775	EA 3/4" Diameter x 9" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	21.32	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0776	EA 3/4" Diameter x 9-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	21.59	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0777	EA 3/4" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	21.73	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0778	7/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0654)</small>		
05 05 23 00-0779	EA 7/8" Diameter x 1-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	15.55	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0780	EA 7/8" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	16.10	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0781	EA 7/8" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	16.60	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0782	EA 7/8" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	19.46	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0783	EA 7/8" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	19.88	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0784	EA 7/8" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	20.62	
	<i>For >100 To 250, Deduct</i>	-2.03	
	<i>For >250 To 500, Deduct</i>	-2.54	
	<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0785	EA 7/8" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	21.22	
	<i>For >100 To 250, Deduct</i>	-2.03	
	<i>For >250 To 500, Deduct</i>	-2.54	
	<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0786	EA 7/8" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	21.98	
	<i>For >100 To 250, Deduct</i>	-2.03	
	<i>For >250 To 500, Deduct</i>	-2.54	
	<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0787	EA 7/8" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt	22.72	
	<i>For >100 To 250, Deduct</i>	-2.07	
	<i>For >250 To 500, Deduct</i>	-2.59	
	<i>For >500, Deduct</i>	-3.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0788 EA 7/8" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	23.31	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0789 EA 7/8" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	28.03	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0790 EA 7/8" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	28.87	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0791 EA 7/8" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	29.97	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0792 EA 7/8" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	30.23	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0793 EA 7/8" Diameter x 8-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	30.74	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0794 EA 7/8" Diameter x 9" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	31.35	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0795 EA 7/8" Diameter x 9-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	32.11	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0796 EA 7/8" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	32.83	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0797 1" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolts <small>(05 05 23 00-0654)</small>		
05 05 23 00-0798 EA 1" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.38	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0799 EA 1" Diameter x 2-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	19.75	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0800 EA 1" Diameter x 3" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	20.77	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0801 EA 1" Diameter x 3-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	21.58	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0802 EA 1" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	23.61	
<i>For >100 To 250, Deduct</i>	-2.03	
<i>For >250 To 500, Deduct</i>	-2.54	
<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0803 EA 1" Diameter x 4-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	24.03	
<i>For >100 To 250, Deduct</i>	-2.03	
<i>For >250 To 500, Deduct</i>	-2.54	
<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0804 EA 1" Diameter x 5" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	25.22	
<i>For >100 To 250, Deduct</i>	-2.03	
<i>For >250 To 500, Deduct</i>	-2.54	
<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0805 EA 1" Diameter x 5-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	25.54	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0806 EA 1" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	25.98	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0807 EA 1" Diameter x 6-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	30.03	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0808 EA 1" Diameter x 7" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	30.98	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 05 23 00-0809	EA		1" Diameter x 7-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	32.68	
			<i>For >100 To 250, Deduct</i>	-2.11	
			<i>For >250 To 500, Deduct</i>	-2.64	
			<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0810	EA		1" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	34.35	
			<i>For >100 To 250, Deduct</i>	-2.11	
			<i>For >250 To 500, Deduct</i>	-2.64	
			<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0811	EA		1" Diameter x 8-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	35.06	
			<i>For >100 To 250, Deduct</i>	-2.15	
			<i>For >250 To 500, Deduct</i>	-2.69	
			<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0812	EA		1" Diameter x 9" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	36.42	
			<i>For >100 To 250, Deduct</i>	-2.15	
			<i>For >250 To 500, Deduct</i>	-2.69	
			<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0813	EA		1" Diameter x 9-1/2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	37.45	
			<i>For >100 To 250, Deduct</i>	-2.15	
			<i>For >250 To 500, Deduct</i>	-2.69	
			<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0814	EA		1" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Hex Head Bolt.....	38.98	
			<i>For >100 To 250, Deduct</i>	-2.15	
			<i>For >250 To 500, Deduct</i>	-2.69	
			<i>For >500, Deduct</i>	-3.22	

05 05 23 00-0815 304/18-8 Stainless Steel, Hex Head Bolts (05 05 23 00-0097)

05 05 23 00-0816 1/4" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts (05 05 23 00-0815)

05 05 23 00-0817	EA		1/4" Diameter x 1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	7.20	
			<i>For >100 To 250, Deduct</i>	-1.37	
			<i>For >250 To 500, Deduct</i>	-1.71	
			<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0818	EA		1/4" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	7.34	
			<i>For >100 To 250, Deduct</i>	-1.37	
			<i>For >250 To 500, Deduct</i>	-1.71	
			<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0819	EA		1/4" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	7.52	
			<i>For >100 To 250, Deduct</i>	-1.37	
			<i>For >250 To 500, Deduct</i>	-1.71	
			<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0820	EA		1/4" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	7.71	
			<i>For >100 To 250, Deduct</i>	-1.37	
			<i>For >250 To 500, Deduct</i>	-1.71	
			<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0821	EA		1/4" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	8.09	
			<i>For >100 To 250, Deduct</i>	-1.41	
			<i>For >250 To 500, Deduct</i>	-1.76	
			<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0822	EA		1/4" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	8.37	
			<i>For >100 To 250, Deduct</i>	-1.41	
			<i>For >250 To 500, Deduct</i>	-1.76	
			<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0823	EA		1/4" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	8.71	
			<i>For >100 To 250, Deduct</i>	-1.41	
			<i>For >250 To 500, Deduct</i>	-1.76	
			<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0824	EA		1/4" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	9.16	
			<i>For >100 To 250, Deduct</i>	-1.45	
			<i>For >250 To 500, Deduct</i>	-1.81	
			<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0825	EA		1/4" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	9.57	
			<i>For >100 To 250, Deduct</i>	-1.45	
			<i>For >250 To 500, Deduct</i>	-1.81	
			<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0826	EA		1/4" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	9.95	
			<i>For >100 To 250, Deduct</i>	-1.45	
			<i>For >250 To 500, Deduct</i>	-1.81	
			<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0827	EA		1/4" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	10.45	
			<i>For >100 To 250, Deduct</i>	-1.48	
			<i>For >250 To 500, Deduct</i>	-1.86	
			<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0828	EA		1/4" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	11.07	
			<i>For >100 To 250, Deduct</i>	-1.48	
			<i>For >250 To 500, Deduct</i>	-1.86	
			<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0829	EA		1/4" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	18.55	
			<i>For >100 To 250, Deduct</i>	-1.48	
			<i>For >250 To 500, Deduct</i>	-1.86	
			<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0830	EA		1/4" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt.....	22.40	
			<i>For >100 To 250, Deduct</i>	-1.52	
			<i>For >250 To 500, Deduct</i>	-1.90	
			<i>For >500, Deduct</i>	-2.28	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0831 EA 1/4" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	22.75	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0832 EA 1/4" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt	23.59	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0833 5/16" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>		
05 05 23 00-0834 EA 5/16" Diameter x 1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	7.46	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0835 EA 5/16" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt	7.59	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0836 EA 5/16" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	7.86	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0837 EA 5/16" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	8.07	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0838 EA 5/16" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	8.66	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0839 EA 5/16" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	8.79	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0840 EA 5/16" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	9.49	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-0841 EA 5/16" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.18	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0842 EA 5/16" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.96	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0843 EA 5/16" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	11.35	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-0844 EA 5/16" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	12.73	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0845 EA 5/16" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	14.69	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0846 EA 5/16" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	19.14	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-0847 EA 5/16" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	26.54	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-0848 3/8" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>		
05 05 23 00-0849 EA 3/8" Diameter x 1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	7.79	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0850 EA 3/8" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt	7.96	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-0851 EA 3/8" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	8.38	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0852	EA 3/8" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	8.91
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0853	EA 3/8" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	9.37
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0854	EA 3/8" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	9.80
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0855	EA 3/8" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.37
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0856	EA 3/8" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	11.08
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0857	EA 3/8" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	11.74
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0858	EA 3/8" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	13.21
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0859	EA 3/8" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	13.57
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0860	EA 3/8" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	14.78
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0861	EA 3/8" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	17.36
	<i>For >100 To 250, Deduct</i>	-1.48
	<i>For >250 To 500, Deduct</i>	-1.86
	<i>For >500, Deduct</i>	-2.23
05 05 23 00-0862	EA 3/8" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	18.16
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0863	EA 3/8" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	18.53
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28
05 05 23 00-0864	EA 3/8" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt	21.11
	<i>For >100 To 250, Deduct</i>	-1.52
	<i>For >250 To 500, Deduct</i>	-1.90
	<i>For >500, Deduct</i>	-2.28

05 05 23 00-0865 7/16" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts (05 05 23 00-0815)

05 05 23 00-0866	EA 7/16" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.13
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0867	EA 7/16" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.31
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0868	EA 7/16" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.99
	<i>For >100 To 250, Deduct</i>	-1.56
	<i>For >250 To 500, Deduct</i>	-1.95
	<i>For >500, Deduct</i>	-2.34
05 05 23 00-0869	EA 7/16" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	11.59
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0870	EA 7/16" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	12.41
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0871	EA 7/16" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	13.78
	<i>For >100 To 250, Deduct</i>	-1.60
	<i>For >250 To 500, Deduct</i>	-2.00
	<i>For >500, Deduct</i>	-2.40
05 05 23 00-0872	EA 7/16" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	14.60
	<i>For >100 To 250, Deduct</i>	-1.64
	<i>For >250 To 500, Deduct</i>	-2.05
	<i>For >500, Deduct</i>	-2.46

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0873 EA 7/16" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	16.20	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0874 EA 7/16" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	16.90	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0875 EA 7/16" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	19.30	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0876 EA 7/16" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	21.74	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0877 EA 7/16" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	22.07	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0878 EA 7/16" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	22.56	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0879 1/2" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>		
05 05 23 00-0880 EA 1/2" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.11	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-1.95	
<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0881 EA 1/2" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	10.31	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-1.95	
<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0882 EA 1/2" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	11.38	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-1.95	
<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0883 EA 1/2" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	12.00	
<i>For >100 To 250, Deduct</i>	-1.60	
<i>For >250 To 500, Deduct</i>	-2.00	
<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0884 EA 1/2" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	12.98	
<i>For >100 To 250, Deduct</i>	-1.60	
<i>For >250 To 500, Deduct</i>	-2.00	
<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0885 EA 1/2" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	13.51	
<i>For >100 To 250, Deduct</i>	-1.60	
<i>For >250 To 500, Deduct</i>	-2.00	
<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0886 EA 1/2" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	14.34	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0887 EA 1/2" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	14.81	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0888 EA 1/2" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	17.37	
<i>For >100 To 250, Deduct</i>	-1.64	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0889 EA 1/2" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	18.28	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0890 EA 1/2" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	19.44	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0891 EA 1/2" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	20.74	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.10	
<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0892 EA 1/2" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	22.87	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0893 EA 1/2" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	23.65	
<i>For >100 To 250, Deduct</i>	-1.72	
<i>For >250 To 500, Deduct</i>	-2.15	
<i>For >500, Deduct</i>	-2.58	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0894	EA 1/2" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt	24.88	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-0895	EA 1/2" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	31.10	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0896	EA 1/2" Diameter x 9" Length, 304/18-8 Stainless Steel, Hex Head Bolt	31.59	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0897	EA 1/2" Diameter x 9-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	34.98	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0898	EA 1/2" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Head Bolt	38.36	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0899	9/16" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>		
05 05 23 00-0900	EA 9/16" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt	15.74	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0901	EA 9/16" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	17.97	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0902	EA 9/16" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	21.87	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-0903	EA 9/16" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	22.85	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0904	EA 9/16" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	24.23	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0905	EA 9/16" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	26.65	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-0906	EA 9/16" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	30.40	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0907	EA 9/16" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	30.95	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0908	EA 9/16" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	36.06	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-0909	EA 9/16" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	38.68	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0910	EA 9/16" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	41.41	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-0911	5/8" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>		
05 05 23 00-0912	EA 5/8" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt	12.99	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0913	EA 5/8" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	13.50	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0914	EA 5/8" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	15.63	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0915	EA			5/8" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....16.17		
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0916	EA			5/8" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....17.18		
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0917	EA			5/8" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....18.63		
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0918	EA			5/8" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....20.64		
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0919	EA			5/8" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....20.66		
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0920	EA			5/8" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....22.28		
				<i>For >100 To 250, Deduct</i>	-1.83	
				<i>For >250 To 500, Deduct</i>	-2.29	
				<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0921	EA			5/8" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....23.39		
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0922	EA			5/8" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....24.86		
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0923	EA			5/8" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....30.21		
				<i>For >100 To 250, Deduct</i>	-1.87	
				<i>For >250 To 500, Deduct</i>	-2.34	
				<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0924	EA			5/8" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....33.33		
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0925	EA			5/8" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....35.75		
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0926	EA			5/8" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....36.85		
				<i>For >100 To 250, Deduct</i>	-1.91	
				<i>For >250 To 500, Deduct</i>	-2.39	
				<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0927	EA			5/8" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....41.52		
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0928	EA			5/8" Diameter x 9" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....42.95		
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0929	EA			5/8" Diameter x 9-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....49.31		
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0930	EA			5/8" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....51.93		
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0931				3/4" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>		
05 05 23 00-0932	EA			3/4" Diameter x 1" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....15.31		
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0933	EA			3/4" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....16.31		
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0934	EA			3/4" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....17.62		
				<i>For >100 To 250, Deduct</i>	-1.76	
				<i>For >250 To 500, Deduct</i>	-2.20	
				<i>For >500, Deduct</i>	-2.64	
05 05 23 00-0935	EA			3/4" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt .....19.23		
				<i>For >100 To 250, Deduct</i>	-1.80	
				<i>For >250 To 500, Deduct</i>	-2.25	
				<i>For >500, Deduct</i>	-2.69	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-0936	EA 3/4" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	20.68	
	<i>For >100 To 250, Deduct</i>	-1.80	
	<i>For >250 To 500, Deduct</i>	-2.25	
	<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0937	EA 3/4" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	23.12	
	<i>For >100 To 250, Deduct</i>	-1.80	
	<i>For >250 To 500, Deduct</i>	-2.25	
	<i>For >500, Deduct</i>	-2.69	
05 05 23 00-0938	EA 3/4" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	24.76	
	<i>For >100 To 250, Deduct</i>	-1.83	
	<i>For >250 To 500, Deduct</i>	-2.29	
	<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0939	EA 3/4" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	27.02	
	<i>For >100 To 250, Deduct</i>	-1.83	
	<i>For >250 To 500, Deduct</i>	-2.29	
	<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0940	EA 3/4" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	28.84	
	<i>For >100 To 250, Deduct</i>	-1.83	
	<i>For >250 To 500, Deduct</i>	-2.29	
	<i>For >500, Deduct</i>	-2.75	
05 05 23 00-0941	EA 3/4" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	30.91	
	<i>For >100 To 250, Deduct</i>	-1.87	
	<i>For >250 To 500, Deduct</i>	-2.34	
	<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0942	EA 3/4" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	33.02	
	<i>For >100 To 250, Deduct</i>	-1.87	
	<i>For >250 To 500, Deduct</i>	-2.34	
	<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0943	EA 3/4" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	36.99	
	<i>For >100 To 250, Deduct</i>	-1.87	
	<i>For >250 To 500, Deduct</i>	-2.34	
	<i>For >500, Deduct</i>	-2.81	
05 05 23 00-0944	EA 3/4" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	47.71	
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0945	EA 3/4" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	51.07	
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0946	EA 3/4" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt	58.26	
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-2.87	
05 05 23 00-0947	EA 3/4" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	58.79	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0948	EA 3/4" Diameter x 9" Length, 304/18-8 Stainless Steel, Hex Head Bolt	59.92	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0949	EA 3/4" Diameter x 9-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	62.99	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0950	EA 3/4" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Head Bolt	65.35	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0951	7/8" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0815)</small>	22.53	
05 05 23 00-0952	EA 7/8" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt		
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0953	EA 7/8" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	25.02	
	<i>For >100 To 250, Deduct</i>	-1.95	
	<i>For >250 To 500, Deduct</i>	-2.44	
	<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0954	EA 7/8" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	27.11	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0955	EA 7/8" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	29.63	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0956	EA 7/8" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	30.45	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-2.99	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-0957	EA			7/8" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	32.71	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0958	EA			7/8" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	33.51	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0959	EA			7/8" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	39.00	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0960	EA			7/8" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	40.02	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0961	EA			7/8" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	42.13	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0962	EA			7/8" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	53.75	
				<i>For >100 To 250, Deduct</i>	-2.07	
				<i>For >250 To 500, Deduct</i>	-2.59	
				<i>For >500, Deduct</i>	-3.11	
05 05 23 00-0963	EA			7/8" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	58.40	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0964	EA			7/8" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	63.61	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0965	EA			7/8" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt	67.81	
				<i>For >100 To 250, Deduct</i>	-2.11	
				<i>For >250 To 500, Deduct</i>	-2.64	
				<i>For >500, Deduct</i>	-3.16	
05 05 23 00-0966	EA			7/8" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	80.77	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0967	EA			7/8" Diameter x 9" Length, 304/18-8 Stainless Steel, Hex Head Bolt	90.98	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0968	EA			7/8" Diameter x 9-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	95.71	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0969	EA			7/8" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Head Bolt	100.42	
				<i>For >100 To 250, Deduct</i>	-2.15	
				<i>For >250 To 500, Deduct</i>	-2.69	
				<i>For >500, Deduct</i>	-3.22	
05 05 23 00-0970				1" Diameter, 304/18-8 Stainless Steel, Hex Head Bolts (05 05 23 00-0815)		
05 05 23 00-0971	EA			1" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	28.55	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0972	EA			1" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	30.37	
				<i>For >100 To 250, Deduct</i>	-1.95	
				<i>For >250 To 500, Deduct</i>	-2.44	
				<i>For >500, Deduct</i>	-2.93	
05 05 23 00-0973	EA			1" Diameter x 2-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	33.26	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0974	EA			1" Diameter x 3" Length, 304/18-8 Stainless Steel, Hex Head Bolt	35.55	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0975	EA			1" Diameter x 3-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	39.30	
				<i>For >100 To 250, Deduct</i>	-1.99	
				<i>For >250 To 500, Deduct</i>	-2.49	
				<i>For >500, Deduct</i>	-2.99	
05 05 23 00-0976	EA			1" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Head Bolt	43.71	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	
05 05 23 00-0977	EA			1" Diameter x 4-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	46.33	
				<i>For >100 To 250, Deduct</i>	-2.03	
				<i>For >250 To 500, Deduct</i>	-2.54	
				<i>For >500, Deduct</i>	-3.05	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-0978	EA 1" Diameter x 5" Length, 304/18-8 Stainless Steel, Hex Head Bolt	50.19
	<i>For >100 To 250, Deduct</i>	-2.03
	<i>For >250 To 500, Deduct</i>	-2.54
	<i>For >500, Deduct</i>	-3.05
05 05 23 00-0979	EA 1" Diameter x 5-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	54.03
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0980	EA 1" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Head Bolt	54.24
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0981	EA 1" Diameter x 6-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	64.61
	<i>For >100 To 250, Deduct</i>	-2.07
	<i>For >250 To 500, Deduct</i>	-2.59
	<i>For >500, Deduct</i>	-3.11
05 05 23 00-0982	EA 1" Diameter x 7" Length, 304/18-8 Stainless Steel, Hex Head Bolt	77.93
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0983	EA 1" Diameter x 7-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	79.88
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0984	EA 1" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Head Bolt	81.84
	<i>For >100 To 250, Deduct</i>	-2.11
	<i>For >250 To 500, Deduct</i>	-2.64
	<i>For >500, Deduct</i>	-3.16
05 05 23 00-0985	EA 1" Diameter x 8-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	85.94
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0986	EA 1" Diameter x 9" Length, 304/18-8 Stainless Steel, Hex Head Bolt	91.94
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0987	EA 1" Diameter x 9-1/2" Length, 304/18-8 Stainless Steel, Hex Head Bolt	119.15
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22
05 05 23 00-0988	EA 1" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Head Bolt	150.85
	<i>For >100 To 250, Deduct</i>	-2.15
	<i>For >250 To 500, Deduct</i>	-2.69
	<i>For >500, Deduct</i>	-3.22

05 05 23 00-0989 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0997)

05 05 23 00-0990 1/4" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)

05 05 23 00-0991	EA 1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	7.47
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0992	EA 1" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	7.76
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0993	EA 1-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	7.97
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0994	EA 2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	8.11
	<i>For >100 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-1.71
	<i>For >500, Deduct</i>	-2.05
05 05 23 00-0995	EA 2-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	8.71
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0996	EA 3" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	9.08
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0997	EA 3-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	9.45
	<i>For >100 To 250, Deduct</i>	-1.41
	<i>For >250 To 500, Deduct</i>	-1.76
	<i>For >500, Deduct</i>	-2.11
05 05 23 00-0998	EA 4" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	9.95
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17
05 05 23 00-0999	EA 4-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	10.26
	<i>For >100 To 250, Deduct</i>	-1.45
	<i>For >250 To 500, Deduct</i>	-1.81
	<i>For >500, Deduct</i>	-2.17



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1000 EA 5" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	10.39	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1001 EA 5-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	11.54	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1002 EA 6" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	11.80	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1003 EA 6-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	21.33	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1004 EA 7" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	33.06	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1005 EA 7-1/2" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	58.49	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1006 EA 8" Length x 1/4" Diameter, 316 Stainless Steel, Hex Head Bolt	64.29	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-1.90	
<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1007 5/16" Diameter, 316 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0989)</small>		
05 05 23 00-1008 EA 5/16" Diameter x 1/2" Length, 316 Stainless Steel, Hex Head Bolt	7.86	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1009 EA 5/16" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt	8.19	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1010 EA 5/16" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt	8.73	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1011 EA 5/16" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt	9.14	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-1.71	
<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1012 EA 5/16" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt	9.51	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-1013 EA 5/16" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt	10.35	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-1014 EA 5/16" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt	10.94	
<i>For >100 To 250, Deduct</i>	-1.41	
<i>For >250 To 500, Deduct</i>	-1.76	
<i>For >500, Deduct</i>	-2.11	
05 05 23 00-1015 EA 5/16" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt	11.39	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1016 EA 5/16" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt	12.64	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1017 EA 5/16" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt	12.89	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-1.81	
<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1018 EA 5/16" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt	13.96	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1019 EA 5/16" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt	14.94	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1020 EA 5/16" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt	23.05	
<i>For >100 To 250, Deduct</i>	-1.48	
<i>For >250 To 500, Deduct</i>	-1.86	
<i>For >500, Deduct</i>	-2.23	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1021	EA 5/16" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt	34.76	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1022	3/8" Diameter, 316 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0989)</small>		
05 05 23 00-1023	EA 3/8" Diameter x 1/2" Length, 316 Stainless Steel, Hex Head Bolt	8.72	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1024	EA 3/8" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt	8.85	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1025	EA 3/8" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt	9.36	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1026	EA 3/8" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt	10.57	
	<i>For >100 To 250, Deduct</i>	-1.37	
	<i>For >250 To 500, Deduct</i>	-1.71	
	<i>For >500, Deduct</i>	-2.05	
05 05 23 00-1027	EA 3/8" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt	11.19	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-1028	EA 3/8" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt	11.41	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-1029	EA 3/8" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt	12.46	
	<i>For >100 To 250, Deduct</i>	-1.41	
	<i>For >250 To 500, Deduct</i>	-1.76	
	<i>For >500, Deduct</i>	-2.11	
05 05 23 00-1030	EA 3/8" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt	12.82	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1031	EA 3/8" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt	13.48	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1032	EA 3/8" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt	13.93	
	<i>For >100 To 250, Deduct</i>	-1.45	
	<i>For >250 To 500, Deduct</i>	-1.81	
	<i>For >500, Deduct</i>	-2.17	
05 05 23 00-1033	EA 3/8" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt	15.58	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1034	EA 3/8" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt	17.36	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1035	EA 3/8" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt	17.44	
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-1.86	
	<i>For >500, Deduct</i>	-2.23	
05 05 23 00-1036	EA 3/8" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt	22.14	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1037	EA 3/8" Diameter x 7-1/2" Length, 316 Stainless Steel, Hex Head Bolt	29.49	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1038	EA 3/8" Diameter x 8" Length, 316 Stainless Steel, Hex Head Bolt	37.42	
	<i>For >100 To 250, Deduct</i>	-1.52	
	<i>For >250 To 500, Deduct</i>	-1.90	
	<i>For >500, Deduct</i>	-2.28	
05 05 23 00-1039	7/16" Diameter, 316 Stainless Steel, Hex Head Bolts <small>(05 05 23 00-0989)</small>		
05 05 23 00-1040	EA 7/16" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt	11.72	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1041	EA 7/16" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt	12.48	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1042	EA			7/16" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt .....13.90		
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1043	EA			7/16" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....15.32		
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1044	EA			7/16" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt .....16.69		
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1045	EA			7/16" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....18.94		
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1046	EA			7/16" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt .....21.28		
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1047	EA			7/16" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....21.67		
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1048	EA			7/16" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt .....22.49		
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1049	EA			7/16" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....23.25		
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-1050	EA			7/16" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt .....23.83		
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-1051	EA			7/16" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....24.42		
				<i>For >100 To 250, Deduct</i>	-1.68	
				<i>For >250 To 500, Deduct</i>	-2.10	
				<i>For >500, Deduct</i>	-2.52	
05 05 23 00-1052	EA			7/16" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt .....25.08		
				<i>For >100 To 250, Deduct</i>	-1.72	
				<i>For >250 To 500, Deduct</i>	-2.15	
				<i>For >500, Deduct</i>	-2.58	
05 05 23 00-1053				1/2" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)		
05 05 23 00-1054	EA			1/2" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt .....11.68		
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1055	EA			1/2" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....12.50		
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1056	EA			1/2" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt .....13.65		
				<i>For >100 To 250, Deduct</i>	-1.56	
				<i>For >250 To 500, Deduct</i>	-1.95	
				<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1057	EA			1/2" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....15.21		
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1058	EA			1/2" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt .....16.48		
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1059	EA			1/2" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....16.79		
				<i>For >100 To 250, Deduct</i>	-1.60	
				<i>For >250 To 500, Deduct</i>	-2.00	
				<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1060	EA			1/2" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt .....17.51		
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1061	EA			1/2" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt .....19.95		
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1062	EA			1/2" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt .....24.91		
				<i>For >100 To 250, Deduct</i>	-1.64	
				<i>For >250 To 500, Deduct</i>	-2.05	
				<i>For >500, Deduct</i>	-2.46	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 05 23 00-1063	EA 1/2" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt	25.49	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-1064	EA 1/2" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt	26.27	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-1065	EA 1/2" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt	32.41	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	
05 05 23 00-1066	EA 1/2" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt	36.70	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-1067	EA 1/2" Diameter x 7-1/2" Length, 316 Stainless Steel, Hex Head Bolt	39.35	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-1068	EA 1/2" Diameter x 8" Length, 316 Stainless Steel, Hex Head Bolt	43.75	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.15	
	<i>For >500, Deduct</i>	-2.58	
05 05 23 00-1069	EA 1/2" Diameter x 8-1/2" Length, 316 Stainless Steel, Hex Head Bolt	55.57	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-1070	EA 1/2" Diameter x 9" Length, 316 Stainless Steel, Hex Head Bolt	63.07	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-1071	EA 1/2" Diameter x 9-1/2" Length, 316 Stainless Steel, Hex Head Bolt	64.30	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-1072	EA 1/2" Diameter x 10" Length, 316 Stainless Steel, Hex Head Bolt	66.22	
	<i>For >100 To 250, Deduct</i>	-1.76	
	<i>For >250 To 500, Deduct</i>	-2.20	
	<i>For >500, Deduct</i>	-2.64	
05 05 23 00-1073	9/16" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)		
05 05 23 00-1074	EA 9/16" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt	32.23	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1075	EA 9/16" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt	34.92	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1076	EA 9/16" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt	43.95	
	<i>For >100 To 250, Deduct</i>	-1.56	
	<i>For >250 To 500, Deduct</i>	-1.95	
	<i>For >500, Deduct</i>	-2.34	
05 05 23 00-1077	EA 9/16" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt	49.20	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1078	EA 9/16" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt	54.53	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1079	EA 9/16" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt	59.86	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.00	
	<i>For >500, Deduct</i>	-2.40	
05 05 23 00-1080	EA 9/16" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt	63.37	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1081	EA 9/16" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt	67.77	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1082	EA 9/16" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt	71.67	
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-2.05	
	<i>For >500, Deduct</i>	-2.46	
05 05 23 00-1083	EA 9/16" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt	73.05	
	<i>For >100 To 250, Deduct</i>	-1.68	
	<i>For >250 To 500, Deduct</i>	-2.10	
	<i>For >500, Deduct</i>	-2.52	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	05 05 23 00-1084	EA		9/16" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	76.49 -1.68 -2.10 -2.52	
	05 05 23 00-1085 5/8" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)					
	05 05 23 00-1086	EA		5/8" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	16.84 -1.76 -2.20 -2.64	
	05 05 23 00-1087	EA		5/8" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	17.07 -1.76 -2.20 -2.64	
	05 05 23 00-1088	EA		5/8" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	17.15 -1.76 -2.20 -2.64	
	05 05 23 00-1089	EA		5/8" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	18.88 -1.80 -2.25 -2.69	
	05 05 23 00-1090	EA		5/8" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	20.47 -1.80 -2.25 -2.69	
	05 05 23 00-1091	EA		5/8" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	25.49 -1.80 -2.25 -2.69	
	05 05 23 00-1092	EA		5/8" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	26.73 -1.83 -2.29 -2.75	
	05 05 23 00-1093	EA		5/8" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	31.13 -1.83 -2.29 -2.75	
	05 05 23 00-1094	EA		5/8" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	32.65 -1.83 -2.29 -2.75	
	05 05 23 00-1095	EA		5/8" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	35.74 -1.87 -2.34 -2.81	
	05 05 23 00-1096	EA		5/8" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	36.99 -1.87 -2.34 -2.81	
	05 05 23 00-1097	EA		5/8" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	44.69 -1.87 -2.34 -2.81	
	05 05 23 00-1098	EA		5/8" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	47.65 -1.91 -2.39 -2.87	
	05 05 23 00-1099	EA		5/8" Diameter x 7-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	48.63 -1.91 -2.39 -2.87	
	05 05 23 00-1100	EA		5/8" Diameter x 8" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	52.22 -1.91 -2.39 -2.87	
	05 05 23 00-1101	EA		5/8" Diameter x 8-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	55.66 -1.95 -2.44 -2.93	
	05 05 23 00-1102	EA		5/8" Diameter x 9" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	58.71 -1.95 -2.44 -2.93	
	05 05 23 00-1103	EA		5/8" Diameter x 9-1/2" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	73.24 -1.95 -2.44 -2.93	
	05 05 23 00-1104	EA		5/8" Diameter x 10" Length, 316 Stainless Steel, Hex Head Bolt <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	88.77 -1.95 -2.44 -2.93	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1105	3/4" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)		
05 05 23 00-1106	EA 3/4" Diameter x 1" Length, 316 Stainless Steel, Hex Head Bolt 22.95 <i>For >100 To 250, Deduct</i> -1.76 <i>For >250 To 500, Deduct</i> -2.20 <i>For >500, Deduct</i> -2.64		
05 05 23 00-1107	EA 3/4" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt 23.50 <i>For >100 To 250, Deduct</i> -1.76 <i>For >250 To 500, Deduct</i> -2.20 <i>For >500, Deduct</i> -2.64		
05 05 23 00-1108	EA 3/4" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt 25.59 <i>For >100 To 250, Deduct</i> -1.76 <i>For >250 To 500, Deduct</i> -2.20 <i>For >500, Deduct</i> -2.64		
05 05 23 00-1109	EA 3/4" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt 27.61 <i>For >100 To 250, Deduct</i> -1.80 <i>For >250 To 500, Deduct</i> -2.25 <i>For >500, Deduct</i> -2.69		
05 05 23 00-1110	EA 3/4" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt 31.52 <i>For >100 To 250, Deduct</i> -1.80 <i>For >250 To 500, Deduct</i> -2.25 <i>For >500, Deduct</i> -2.69		
05 05 23 00-1111	EA 3/4" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt 33.79 <i>For >100 To 250, Deduct</i> -1.80 <i>For >250 To 500, Deduct</i> -2.25 <i>For >500, Deduct</i> -2.69		
05 05 23 00-1112	EA 3/4" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt 38.80 <i>For >100 To 250, Deduct</i> -1.83 <i>For >250 To 500, Deduct</i> -2.29 <i>For >500, Deduct</i> -2.75		
05 05 23 00-1113	EA 3/4" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt 40.79 <i>For >100 To 250, Deduct</i> -1.83 <i>For >250 To 500, Deduct</i> -2.29 <i>For >500, Deduct</i> -2.75		
05 05 23 00-1114	EA 3/4" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt 41.89 <i>For >100 To 250, Deduct</i> -1.83 <i>For >250 To 500, Deduct</i> -2.29 <i>For >500, Deduct</i> -2.75		
05 05 23 00-1115	EA 3/4" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt 43.55 <i>For >100 To 250, Deduct</i> -1.87 <i>For >250 To 500, Deduct</i> -2.34 <i>For >500, Deduct</i> -2.81		
05 05 23 00-1116	EA 3/4" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt 46.05 <i>For >100 To 250, Deduct</i> -1.87 <i>For >250 To 500, Deduct</i> -2.34 <i>For >500, Deduct</i> -2.81		
05 05 23 00-1117	EA 3/4" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt 53.75 <i>For >100 To 250, Deduct</i> -1.87 <i>For >250 To 500, Deduct</i> -2.34 <i>For >500, Deduct</i> -2.81		
05 05 23 00-1118	EA 3/4" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt 65.07 <i>For >100 To 250, Deduct</i> -1.91 <i>For >250 To 500, Deduct</i> -2.39 <i>For >500, Deduct</i> -2.87		
05 05 23 00-1119	EA 3/4" Diameter x 7-1/2" Length, 316 Stainless Steel, Hex Head Bolt 73.75 <i>For >100 To 250, Deduct</i> -1.91 <i>For >250 To 500, Deduct</i> -2.39 <i>For >500, Deduct</i> -2.87		
05 05 23 00-1120	EA 3/4" Diameter x 8" Length, 316 Stainless Steel, Hex Head Bolt 75.05 <i>For >100 To 250, Deduct</i> -1.91 <i>For >250 To 500, Deduct</i> -2.39 <i>For >500, Deduct</i> -2.87		
05 05 23 00-1121	EA 3/4" Diameter x 8-1/2" Length, 316 Stainless Steel, Hex Head Bolt 80.47 <i>For >100 To 250, Deduct</i> -1.95 <i>For >250 To 500, Deduct</i> -2.44 <i>For >500, Deduct</i> -2.93		
05 05 23 00-1122	EA 3/4" Diameter x 9" Length, 316 Stainless Steel, Hex Head Bolt 93.62 <i>For >100 To 250, Deduct</i> -1.95 <i>For >250 To 500, Deduct</i> -2.44 <i>For >500, Deduct</i> -2.93		
05 05 23 00-1123	EA 3/4" Diameter x 9-1/2" Length, 316 Stainless Steel, Hex Head Bolt 94.73 <i>For >100 To 250, Deduct</i> -1.95 <i>For >250 To 500, Deduct</i> -2.44 <i>For >500, Deduct</i> -2.93		
05 05 23 00-1124	EA 3/4" Diameter x 10" Length, 316 Stainless Steel, Hex Head Bolt 97.50 <i>For >100 To 250, Deduct</i> -1.95 <i>For >250 To 500, Deduct</i> -2.44 <i>For >500, Deduct</i> -2.93		
05 05 23 00-1125	7/8" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)		
05 05 23 00-1126	EA 7/8" Diameter x 1-1/2" Length, 316 Stainless Steel, Hex Head Bolt 25.91 <i>For >100 To 250, Deduct</i> -1.95 <i>For >250 To 500, Deduct</i> -2.44 <i>For >500, Deduct</i> -2.93		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1127 EA 7/8" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt	29.53	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-1128 EA 7/8" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt	31.70	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-1129 EA 7/8" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt	36.76	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-1130 EA 7/8" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt	39.03	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-1131 EA 7/8" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt	41.21	
<i>For >100 To 250, Deduct</i>	-2.03	
<i>For >250 To 500, Deduct</i>	-2.54	
<i>For >500, Deduct</i>	-3.05	
05 05 23 00-1132 EA 7/8" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt	44.27	
<i>For >100 To 250, Deduct</i>	-2.03	
<i>For >250 To 500, Deduct</i>	-2.54	
<i>For >500, Deduct</i>	-3.05	
05 05 23 00-1133 EA 7/8" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt	51.17	
<i>For >100 To 250, Deduct</i>	-2.03	
<i>For >250 To 500, Deduct</i>	-2.54	
<i>For >500, Deduct</i>	-3.05	
05 05 23 00-1134 EA 7/8" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt	51.55	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-1135 EA 7/8" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt	53.83	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-1136 EA 7/8" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt	73.13	
<i>For >100 To 250, Deduct</i>	-2.07	
<i>For >250 To 500, Deduct</i>	-2.59	
<i>For >500, Deduct</i>	-3.11	
05 05 23 00-1137 EA 7/8" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt	81.84	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	
05 05 23 00-1138 EA 7/8" Diameter x 7-1/2" Length, 316 Stainless Steel, Hex Head Bolt	91.00	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	
05 05 23 00-1139 EA 7/8" Diameter x 8" Length, 316 Stainless Steel, Hex Head Bolt	95.51	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.16	
05 05 23 00-1140 EA 7/8" Diameter x 8-1/2" Length, 316 Stainless Steel, Hex Head Bolt	101.57	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1141 EA 7/8" Diameter x 9" Length, 316 Stainless Steel, Hex Head Bolt	105.49	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1142 EA 7/8" Diameter x 9-1/2" Length, 316 Stainless Steel, Hex Head Bolt	109.38	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1143 EA 7/8" Diameter x 10" Length, 316 Stainless Steel, Hex Head Bolt	113.76	
<i>For >100 To 250, Deduct</i>	-2.15	
<i>For >250 To 500, Deduct</i>	-2.69	
<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1144 1" Diameter, 316 Stainless Steel, Hex Head Bolts (05 05 23 00-0989)		
05 05 23 00-1145 EA 1" Diameter x 2" Length, 316 Stainless Steel, Hex Head Bolt	33.86	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-2.44	
<i>For >500, Deduct</i>	-2.93	
05 05 23 00-1146 EA 1" Diameter x 2-1/2" Length, 316 Stainless Steel, Hex Head Bolt	39.63	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	
05 05 23 00-1147 EA 1" Diameter x 3" Length, 316 Stainless Steel, Hex Head Bolt	43.36	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-2.49	
<i>For >500, Deduct</i>	-2.99	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1148	EA	1" Diameter x 3-1/2" Length, 316 Stainless Steel, Hex Head Bolt	49.32	
		<i>For >100 To 250, Deduct</i>	-1.99	
		<i>For >250 To 500, Deduct</i>	-2.49	
		<i>For >500, Deduct</i>	-2.99	
05 05 23 00-1149	EA	1" Diameter x 4" Length, 316 Stainless Steel, Hex Head Bolt	51.64	
		<i>For >100 To 250, Deduct</i>	-2.03	
		<i>For >250 To 500, Deduct</i>	-2.54	
		<i>For >500, Deduct</i>	-3.05	
05 05 23 00-1150	EA	1" Diameter x 4-1/2" Length, 316 Stainless Steel, Hex Head Bolt	55.68	
		<i>For >100 To 250, Deduct</i>	-2.03	
		<i>For >250 To 500, Deduct</i>	-2.54	
		<i>For >500, Deduct</i>	-3.05	
05 05 23 00-1151	EA	1" Diameter x 5" Length, 316 Stainless Steel, Hex Head Bolt	59.76	
		<i>For >100 To 250, Deduct</i>	-2.03	
		<i>For >250 To 500, Deduct</i>	-2.54	
		<i>For >500, Deduct</i>	-3.05	
05 05 23 00-1152	EA	1" Diameter x 5-1/2" Length, 316 Stainless Steel, Hex Head Bolt	64.07	
		<i>For >100 To 250, Deduct</i>	-2.07	
		<i>For >250 To 500, Deduct</i>	-2.59	
		<i>For >500, Deduct</i>	-3.11	
05 05 23 00-1153	EA	1" Diameter x 6" Length, 316 Stainless Steel, Hex Head Bolt	74.61	
		<i>For >100 To 250, Deduct</i>	-2.07	
		<i>For >250 To 500, Deduct</i>	-2.59	
		<i>For >500, Deduct</i>	-3.11	
05 05 23 00-1154	EA	1" Diameter x 6-1/2" Length, 316 Stainless Steel, Hex Head Bolt	85.01	
		<i>For >100 To 250, Deduct</i>	-2.07	
		<i>For >250 To 500, Deduct</i>	-2.59	
		<i>For >500, Deduct</i>	-3.11	
05 05 23 00-1155	EA	1" Diameter x 7" Length, 316 Stainless Steel, Hex Head Bolt	99.42	
		<i>For >100 To 250, Deduct</i>	-2.11	
		<i>For >250 To 500, Deduct</i>	-2.64	
		<i>For >500, Deduct</i>	-3.16	
05 05 23 00-1156	EA	1" Diameter x 7-1/2" Length, 316 Stainless Steel, Hex Head Bolt	111.37	
		<i>For >100 To 250, Deduct</i>	-2.11	
		<i>For >250 To 500, Deduct</i>	-2.64	
		<i>For >500, Deduct</i>	-3.16	
05 05 23 00-1157	EA	1" Diameter x 8" Length, 316 Stainless Steel, Hex Head Bolt	113.09	
		<i>For >100 To 250, Deduct</i>	-2.11	
		<i>For >250 To 500, Deduct</i>	-2.64	
		<i>For >500, Deduct</i>	-3.16	
05 05 23 00-1158	EA	1" Diameter x 8-1/2" Length, 316 Stainless Steel, Hex Head Bolt	117.19	
		<i>For >100 To 250, Deduct</i>	-2.15	
		<i>For >250 To 500, Deduct</i>	-2.69	
		<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1159	EA	1" Diameter x 9" Length, 316 Stainless Steel, Hex Head Bolt	118.84	
		<i>For >100 To 250, Deduct</i>	-2.15	
		<i>For >250 To 500, Deduct</i>	-2.69	
		<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1160	EA	1" Diameter x 9-1/2" Length, 316 Stainless Steel, Hex Head Bolt	138.68	
		<i>For >100 To 250, Deduct</i>	-2.15	
		<i>For >250 To 500, Deduct</i>	-2.69	
		<i>For >500, Deduct</i>	-3.22	
05 05 23 00-1161	EA	1" Diameter x 10" Length, 316 Stainless Steel, Hex Head Bolt	157.84	
		<i>For >100 To 250, Deduct</i>	-2.15	
		<i>For >250 To 500, Deduct</i>	-2.69	
		<i>For >500, Deduct</i>	-3.22	

05 05 23 00-1162 Screws (05 05 23)05 05 23 00-1163 Teks® 5 Self Drilling Screws (05 05 23 00-1162)

Note: Includes Climaseal® finish, self-drill point and tapping threads.

05 05 23 00-1164	EA	12-24 x 1-1/4", Hex Washer Head, Teks® 5 Self Drilling Screw	3.77	
		<i>For >10 To 50, Deduct</i>	-0.16	
		<i>For >50 To 100, Deduct</i>	-0.34	
		<i>For >100, Deduct</i>	-0.68	
05 05 23 00-1165	EA	12-24 x 1-1/2", Hex Washer Head, Teks® 5 Self Drilling Screw	3.96	
		<i>For >10 To 50, Deduct</i>	-0.16	
		<i>For >50 To 100, Deduct</i>	-0.34	
		<i>For >100, Deduct</i>	-0.69	
05 05 23 00-1166	EA	12-24 x 2", Hex Washer Head, Teks® 5 Self Drilling Screw	4.45	
		<i>For >10 To 50, Deduct</i>	-0.17	
		<i>For >50 To 100, Deduct</i>	-0.37	
		<i>For >100, Deduct</i>	-0.74	
05 05 23 00-1167	EA	1/4" x 3", 28 TPI, Hex Washer Head, Teks® 5 Self Drilling Screw	6.20	
		<i>For >10 To 50, Deduct</i>	-0.22	
		<i>For >50 To 100, Deduct</i>	-0.48	
		<i>For >100, Deduct</i>	-0.96	
05 05 23 00-1168	EA	1/4" x 4", 28 TPI, Hex Washer Head, Teks® 5 Self Drilling Screw	6.63	
		<i>For >10 To 50, Deduct</i>	-0.23	
		<i>For >50 To 100, Deduct</i>	-0.51	
		<i>For >100, Deduct</i>	-1.01	
05 05 23 00-1169	EA	1/4" x 6", 28 TPI, Hex Washer Head, Teks® 5 Self Drilling Screw	8.35	
		<i>For >10 To 50, Deduct</i>	-0.24	
		<i>For >50 To 100, Deduct</i>	-0.57	
		<i>For >100, Deduct</i>	-1.13	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1170 EA 1/4" x 8", 28 TPI, Hex Washer Head, Teks® 5 Self Drilling Screw	9.40	
<i>For >10 To 50, Deduct</i>	-0.25	
<i>For >50 To 100, Deduct</i>	-0.61	
<i>For >100, Deduct</i>	-1.22	
05 05 23 00-1171 Security Screws <small>(05 05 23 00-1162)</small>		
05 05 23 00-1172 304/18-8 Stainless Steel, Security Screws <small>(05 05 23 00-1171)</small>		
Note: Includes "security" style drive in machine or sheet metal screw threads.		
05 05 23 00-1173 EA #4 Diameter x 1/2" Length, 304/18-8 Stainless Steel, Security Screws	2.94	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.28	
<i>For >100, Deduct</i>	-0.56	
05 05 23 00-1174 EA #6 Diameter x 1/2" Length, 304/18-8 Stainless Steel, Security Screw	3.50	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.29	
<i>For >100, Deduct</i>	-0.58	
05 05 23 00-1175 EA #6 Diameter x 1" Length, 304/18-8 Stainless Steel, Security Screw	3.98	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100, Deduct</i>	-0.61	
05 05 23 00-1176 EA #6 Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Security Screw	4.15	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.31	
<i>For >100, Deduct</i>	-0.62	
05 05 23 00-1177 EA #6 Diameter x 2" Length, 304/18-8 Stainless Steel, Security Screw	4.46	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.32	
<i>For >100, Deduct</i>	-0.63	
05 05 23 00-1178 EA #8 Diameter x 1/2" Length, 304/18-8 Stainless Steel, Security Screw	3.63	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100, Deduct</i>	-0.59	
05 05 23 00-1179 EA #8 Diameter x 1" Length, 304/18-8 Stainless Steel, Security Screw	3.86	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100, Deduct</i>	-0.60	
05 05 23 00-1180 EA #8 Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Security Screw	4.33	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.31	
<i>For >100, Deduct</i>	-0.63	
05 05 23 00-1181 EA #8 Diameter x 2" Length, 304/18-8 Stainless Steel, Security Screw	4.48	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.32	
<i>For >100, Deduct</i>	-0.63	
05 05 23 00-1182 EA #10 Diameter x 1/2" Length, 304/18-8 Stainless Steel, Security Screw	3.77	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100, Deduct</i>	-0.60	
05 05 23 00-1183 EA #10 Diameter x 1" Length, 304/18-8 Stainless Steel, Security Screw	3.83	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100, Deduct</i>	-0.60	
05 05 23 00-1184 EA #10 Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Security Screw	4.04	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.31	
<i>For >100, Deduct</i>	-0.61	
05 05 23 00-1185 EA #10 Diameter x 2" Length, 304/18-8 Stainless Steel, Security Screw	4.69	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.32	
<i>For >100, Deduct</i>	-0.64	
05 05 23 00-1186 EA 1/4" Diameter x 1/2" Length, 304/18-8 Stainless Steel, Security Screw	4.15	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.31	
<i>For >100, Deduct</i>	-0.62	
05 05 23 00-1187 EA 1/4" Diameter x 1" Length, 304/18-8 Stainless Steel, Security Screw	4.29	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.31	
<i>For >100, Deduct</i>	-0.62	
05 05 23 00-1188 EA 1/4" Diameter x 1-1/2" Length, 304/18-8 Stainless Steel, Security Screw	4.92	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.33	
<i>For >100, Deduct</i>	-0.66	
05 05 23 00-1189 EA 1/4" Diameter x 2" Length, 304/18-8 Stainless Steel, Security Screw	5.90	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-0.35	
<i>For >100, Deduct</i>	-0.70	
05 05 23 00-1190 Threaded Rod <small>(05 05 23)</small>		
Note: Fully threaded. See CSI section 05 05 19 00-0169 for anchoring adhesive, 05 05 23 00-1283 for nuts and washers.		
05 05 23 00-1191 Plain Finish Steel, Low Carbon Threaded Rod <small>(05 05 23 00-1190)</small>		

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1192	LF 1/4" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	3.20	0.55
	<i>For Left Hand Threaded Rod, Add</i>	0.21	
05 05 23 00-1193	LF 5/16" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	4.38	0.61
	<i>For Left Hand Threaded Rod, Add</i>	0.32	
05 05 23 00-1194	LF 3/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	5.10	0.71
	<i>For Left Hand Threaded Rod, Add</i>	0.37	
05 05 23 00-1195	LF 7/16" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	7.20	0.72
	<i>For Left Hand Threaded Rod, Add</i>	0.58	
05 05 23 00-1196	LF 1/2" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	7.38	0.75
	<i>For Left Hand Threaded Rod, Add</i>	0.59	
05 05 23 00-1197	LF 9/16" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	9.37	0.76
	<i>For Left Hand Threaded Rod, Add</i>	0.79	
05 05 23 00-1198	LF 5/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	10.68	0.77
	<i>For Left Hand Threaded Rod, Add</i>	0.91	
05 05 23 00-1199	LF 3/4" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	18.18	0.80
	<i>For Left Hand Threaded Rod, Add</i>	1.66	
05 05 23 00-1200	LF 7/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	19.88	0.82
	<i>For Left Hand Threaded Rod, Add</i>	1.82	
05 05 23 00-1201	LF 1" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	27.47	0.93
	<i>For Left Hand Threaded Rod, Add</i>	2.56	
05 05 23 00-1202	LF 1-1/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	34.37	1.03
	<i>For Left Hand Threaded Rod, Add</i>	3.23	
05 05 23 00-1203	LF 1-1/4" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	45.90	1.12
	<i>For Left Hand Threaded Rod, Add</i>	4.36	
05 05 23 00-1204	LF 1-3/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	57.44	1.21
	<i>For Left Hand Threaded Rod, Add</i>	5.50	
05 05 23 00-1205	LF 1-1/2" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	68.97	1.27
	<i>For Left Hand Threaded Rod, Add</i>	6.64	
05 05 23 00-1206	LF 1-3/4" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	84.91	1.33
	<i>For Left Hand Threaded Rod, Add</i>	8.23	
05 05 23 00-1207	LF 2" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	108.89	1.39
	<i>For Left Hand Threaded Rod, Add</i>	10.61	
05 05 23 00-1208	Zinc Plated Steel, Low Carbon Threaded Rod <small>(05 05 23 00-1190)</small>		
05 05 23 00-1209	LF 1/4" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	3.23	0.55
	<i>For Left Hand Threaded Rod, Add</i>	0.21	
05 05 23 00-1210	LF 5/16" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	5.07	0.61
	<i>For Left Hand Threaded Rod, Add</i>	0.38	
05 05 23 00-1211	LF 3/8" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	5.62	0.71
	<i>For Left Hand Threaded Rod, Add</i>	0.42	
05 05 23 00-1212	LF 7/16" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	8.51	0.72
	<i>For Left Hand Threaded Rod, Add</i>	0.71	
05 05 23 00-1213	LF 1/2" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	9.20	0.75
	<i>For Left Hand Threaded Rod, Add</i>	0.77	
05 05 23 00-1214	LF 9/16" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	12.36	0.76
	<i>For Left Hand Threaded Rod, Add</i>	1.09	
05 05 23 00-1215	LF 5/8" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	13.17	0.77
	<i>For Left Hand Threaded Rod, Add</i>	1.16	
05 05 23 00-1216	LF 3/4" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	20.32	0.80
	<i>For Left Hand Threaded Rod, Add</i>	1.87	
05 05 23 00-1217	LF 7/8" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	26.62	0.82
	<i>For Left Hand Threaded Rod, Add</i>	2.50	
05 05 23 00-1218	LF 1" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	35.97	0.93
	<i>For Left Hand Threaded Rod, Add</i>	3.41	
05 05 23 00-1219	LF 1-1/8" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	46.66	1.03
	<i>For Left Hand Threaded Rod, Add</i>	4.46	
05 05 23 00-1220	LF 1-1/4" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	55.78	1.12
	<i>For Left Hand Threaded Rod, Add</i>	5.35	
05 05 23 00-1221	LF 1-3/8" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	63.57	1.21
	<i>For Left Hand Threaded Rod, Add</i>	6.11	
05 05 23 00-1222	LF 1-1/2" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	80.41	1.27
	<i>For Left Hand Threaded Rod, Add</i>	7.79	
05 05 23 00-1223	LF 1-3/4" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	99.98	1.33
	<i>For Left Hand Threaded Rod, Add</i>	9.73	
05 05 23 00-1224	LF 2" Diameter, Zinc Plated Steel, Low Carbon Threaded Rod	146.66	1.39
	<i>For Left Hand Threaded Rod, Add</i>	14.39	
05 05 23 00-1225	Hot Dipped Galvanized Steel, Low Carbon Threaded Rod <small>(05 05 23 00-1190)</small>		
05 05 23 00-1226	LF 3/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	9.90	0.71
	<i>For Left Hand Threaded Rod, Add</i>	0.85	
05 05 23 00-1227	LF 1/2" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	14.19	0.75
	<i>For Left Hand Threaded Rod, Add</i>	1.27	
05 05 23 00-1228	LF 5/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	19.50	0.77
	<i>For Left Hand Threaded Rod, Add</i>	1.80	
05 05 23 00-1229	LF 3/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	27.13	0.80
	<i>For Left Hand Threaded Rod, Add</i>	2.56	
05 05 23 00-1230	LF 7/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	37.96	0.82
	<i>For Left Hand Threaded Rod, Add</i>	3.63	
05 05 23 00-1231	LF 1" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	49.17	0.93
	<i>For Left Hand Threaded Rod, Add</i>	4.73	
05 05 23 00-1232	LF 1-1/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod	64.95	1.03
	<i>For Left Hand Threaded Rod, Add</i>	6.29	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1233 LF 1-1/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	85.70 8.34	1.12
05 05 23 00-1234 LF 1-3/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	95.90 9.35	1.21
05 05 23 00-1235 LF 1-1/2" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	114.41 11.19	1.27
05 05 23 00-1236 LF 1-3/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	139.30 13.66	1.33
05 05 23 00-1237 LF 2" Diameter, Hot Dipped Galvanized Steel, Low Carbon Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	244.46 24.17	1.39
05 05 23 00-1238 304/18-8 Stainless Steel Threaded Rod <small>(05 05 23 00-1190)</small>		
05 05 23 00-1239 LF 1/4" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	4.07 0.30	0.55
05 05 23 00-1240 LF 5/16" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	6.27 0.50	0.61
05 05 23 00-1241 LF 3/8" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	8.12 0.67	0.71
05 05 23 00-1242 LF 7/16" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	11.45 1.00	0.72
05 05 23 00-1243 LF 1/2" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	13.81 1.23	0.75
05 05 23 00-1244 LF 9/16" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	20.07 1.86	0.76
05 05 23 00-1245 LF 5/8" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	20.97 1.94	0.77
05 05 23 00-1246 LF 3/4" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	29.55 2.80	0.80
05 05 23 00-1247 LF 7/8" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	40.83 3.92	0.82
05 05 23 00-1248 LF 1" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	52.46 5.06	0.93
05 05 23 00-1249 LF 1-1/4" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	111.58 10.93	1.12
05 05 23 00-1250 LF 1-1/2" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	170.23 16.77	1.27
05 05 23 00-1251 LF 1-3/4" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	175.09 17.24	1.33
05 05 23 00-1252 LF 2" Diameter, 304/18-8 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	242.56 23.98	1.39
05 05 23 00-1253 316 Stainless Steel Threaded Rod <small>(05 05 23 00-1190)</small>		
05 05 23 00-1254 LF 1/4" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	6.06 0.49	0.55
05 05 23 00-1255 LF 5/16" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	9.95 0.87	0.61
05 05 23 00-1256 LF 3/8" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	13.27 1.19	0.71
05 05 23 00-1257 LF 7/16" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	20.97 1.95	0.72
05 05 23 00-1258 LF 1/2" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	22.25 2.08	0.75
05 05 23 00-1259 LF 9/16" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	29.34 2.78	0.76
05 05 23 00-1260 LF 5/8" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	31.61 3.01	0.77
05 05 23 00-1261 LF 3/4" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	46.30 4.47	0.80
05 05 23 00-1262 LF 7/8" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	63.57 6.19	0.82
05 05 23 00-1263 LF 1" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	80.52 7.87	0.93
05 05 23 00-1264 LF 1-1/4" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	170.52 16.82	1.12
05 05 23 00-1265 LF 1-1/2" Diameter, 316 Stainless Steel Threaded Rod..... <i>For Left Hand Threaded Rod, Add</i>	223.68 22.11	1.27
05 05 23 00-1266 Plain Finish Steel, B-7 Alloy Threaded Rod <small>(05 05 23 00-1190)</small>		
05 05 23 00-1267 LF 1/4" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod..... <i>For Zinc Plating, Add</i>	6.14 2.51	0.55
05 05 23 00-1268 LF 5/16" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod..... <i>For Zinc Plating, Add</i>	9.83 4.30	0.61
05 05 23 00-1269 LF 3/8" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod..... <i>For Zinc Plating, Add</i>	10.20 4.41	0.71
05 05 23 00-1270 LF 7/16" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod..... <i>For Zinc Plating, Add</i>	11.21 4.89	0.72
05 05 23 00-1271 LF 1/2" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod..... <i>For Zinc Plating, Add</i>	12.42 5.47	0.75
05 05 23 00-1272 LF 9/16" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod..... <i>For Zinc Plating, Add</i>	15.77 7.13	0.76

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1273	LF	5/8" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	16.30	0.77
		<i>For Zinc Plating, Add</i>	7.38	
05 05 23 00-1274	LF	3/4" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	21.98	0.80
		<i>For Zinc Plating, Add</i>	10.20	
05 05 23 00-1275	LF	7/8" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	26.55	0.82
		<i>For Zinc Plating, Add</i>	12.46	
05 05 23 00-1276	LF	1" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	34.65	0.93
		<i>For Zinc Plating, Add</i>	16.40	
05 05 23 00-1277	LF	1-1/8" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	45.35	1.03
		<i>For Zinc Plating, Add</i>	21.64	
05 05 23 00-1278	LF	1-1/4" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	50.46	1.12
		<i>For Zinc Plating, Add</i>	24.07	
05 05 23 00-1279	LF	1-3/8" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	58.43	1.21
		<i>For Zinc Plating, Add</i>	28.00	
05 05 23 00-1280	LF	1-1/2" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	71.38	1.27
		<i>For Zinc Plating, Add</i>	34.42	
05 05 23 00-1281	LF	1-3/4" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	73.76	1.33
		<i>For Zinc Plating, Add</i>	35.55	
05 05 23 00-1282	LF	2" Diameter, Plain Finish Steel, B-7 Alloy Threaded Rod	99.60	1.39
		<i>For Zinc Plating, Add</i>	48.41	

05 05 23 00-1283 Nuts And Washers (05 05 23)

05 05 23 00-1284 Hex Nuts (05 05 23 00-1283)

05 05 23 00-1285 Zinc Plated Steel, Low Carbon/Grade 2 Hex Nuts (05 05 23 00-1284)

05 05 23 00-1286	EA	1/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.62	0.27
05 05 23 00-1287	EA	5/16" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.70	0.27
05 05 23 00-1288	EA	3/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.74	0.27
05 05 23 00-1289	EA	7/16" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.88	0.27
05 05 23 00-1290	EA	1/2" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.96	0.27
05 05 23 00-1291	EA	9/16" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.32	0.27
05 05 23 00-1292	EA	5/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.37	0.27
05 05 23 00-1293	EA	3/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.64	0.54
05 05 23 00-1294	EA	7/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	2.48	0.54
05 05 23 00-1295	EA	1" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	3.18	0.54
05 05 23 00-1296	EA	1-1/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	5.31	0.54
05 05 23 00-1297	EA	1-1/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	6.52	0.54
05 05 23 00-1298	EA	1-3/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	9.71	0.54
05 05 23 00-1299	EA	1-1/2" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	11.27	0.82
05 05 23 00-1300	EA	1-3/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	16.68	0.82
05 05 23 00-1301	EA	2" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	24.23	0.82

05 05 23 00-1302 Zinc Plated Steel, Grade 5 Hex Nuts (05 05 23 00-1284)

05 05 23 00-1303	EA	1/4" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	0.64	0.27
05 05 23 00-1304	EA	5/16" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	0.71	0.27
05 05 23 00-1305	EA	3/8" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	0.77	0.27
05 05 23 00-1306	EA	7/16" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	0.92	0.27
05 05 23 00-1307	EA	1/2" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	1.10	0.27
05 05 23 00-1308	EA	9/16" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	1.36	0.27
05 05 23 00-1309	EA	5/8" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	1.40	0.27
05 05 23 00-1310	EA	3/4" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	1.88	0.54
05 05 23 00-1311	EA	7/8" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	2.72	0.54
05 05 23 00-1312	EA	1" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	3.90	0.54
05 05 23 00-1313	EA	1-1/8" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	6.03	0.54
05 05 23 00-1314	EA	1-1/4" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	8.59	0.54
05 05 23 00-1315	EA	1-3/8" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	12.74	0.54
05 05 23 00-1316	EA	1-1/2" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	14.08	0.82
05 05 23 00-1317	EA	1-3/4" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	25.64	0.82
05 05 23 00-1318	EA	2" Diameter, Zinc Plated Steel, Grade 5 Hex Nut	36.88	0.82

05 05 23 00-1319 Zinc Plated Steel, Grade 8 Hex Nuts (05 05 23 00-1284)

05 05 23 00-1320	EA	1/4" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	0.66	0.27
05 05 23 00-1321	EA	5/16" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	0.77	0.27
05 05 23 00-1322	EA	3/8" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	0.83	0.27
05 05 23 00-1323	EA	7/16" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	1.08	0.27
05 05 23 00-1324	EA	1/2" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	1.31	0.27
05 05 23 00-1325	EA	9/16" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	1.60	0.27
05 05 23 00-1326	EA	5/8" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	1.84	0.27
05 05 23 00-1327	EA	3/4" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	2.32	0.54
05 05 23 00-1328	EA	7/8" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	3.56	0.54
05 05 23 00-1329	EA	1" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	4.79	0.54
05 05 23 00-1330	EA	1-1/8" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	7.59	0.54
05 05 23 00-1331	EA	1-1/4" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	9.50	0.54
05 05 23 00-1332	EA	1-3/8" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	15.80	0.54
05 05 23 00-1333	EA	1-1/2" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	16.77	0.82
05 05 23 00-1334	EA	1-3/4" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	25.71	0.82
05 05 23 00-1335	EA	2" Diameter, Zinc Plated Steel, Grade 8 Hex Nut	36.47	0.82



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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		CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1336		Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nuts <small>(05 05 23 00-1284)</small>		
05 05 23 00-1337	EA	1/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	0.66	0.27
05 05 23 00-1338	EA	5/16" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	0.75	0.27
05 05 23 00-1339	EA	3/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	0.81	0.27
05 05 23 00-1340	EA	7/16" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	1.05	0.27
05 05 23 00-1341	EA	1/2" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	1.22	0.27
05 05 23 00-1342	EA	9/16" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	1.38	0.27
05 05 23 00-1343	EA	5/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	1.54	0.27
05 05 23 00-1344	EA	3/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	2.10	0.54
05 05 23 00-1345	EA	7/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	3.12	0.54
05 05 23 00-1346	EA	1" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	4.36	0.54
05 05 23 00-1347	EA	1-1/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	7.33	0.54
05 05 23 00-1348	EA	1-1/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	9.43	0.54
05 05 23 00-1349	EA	1-3/8" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	14.13	0.54
05 05 23 00-1350	EA	1-1/2" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	16.51	0.82
05 05 23 00-1351	EA	1-3/4" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	29.00	0.82
05 05 23 00-1352	EA	2" Diameter, Hot Dipped Galvanized Steel, Low Carbon/Grade 2 Hex Nut.....	50.38	0.82

05 05 23 00-1353		304 Stainless Steel Hex Nuts <small>(05 05 23 00-1284)</small>		
05 05 23 00-1354	EA	1/4" Diameter, 304 Stainless Steel Hex Nut.....	0.78	0.27
05 05 23 00-1355	EA	5/16" Diameter, 304 Stainless Steel Hex Nut.....	0.95	0.27
05 05 23 00-1356	EA	3/8" Diameter, 304 Stainless Steel Hex Nut.....	1.07	0.27
05 05 23 00-1357	EA	7/16" Diameter, 304 Stainless Steel Hex Nut.....	1.72	0.27
05 05 23 00-1358	EA	1/2" Diameter, 304 Stainless Steel Hex Nut.....	1.86	0.27
05 05 23 00-1359	EA	9/16" Diameter, 304 Stainless Steel Hex Nut.....	2.98	0.27
05 05 23 00-1360	EA	5/8" Diameter, 304 Stainless Steel Hex Nut.....	3.35	0.27
05 05 23 00-1361	EA	3/4" Diameter, 304 Stainless Steel Hex Nut.....	3.88	0.54
05 05 23 00-1362	EA	7/8" Diameter, 304 Stainless Steel Hex Nut.....	6.55	0.54
05 05 23 00-1363	EA	1" Diameter, 304 Stainless Steel Hex Nut.....	10.15	0.54
05 05 23 00-1364	EA	1-1/4" Diameter, 304 Stainless Steel Hex Nut.....	24.80	0.54
05 05 23 00-1365	EA	1-1/2" Diameter, 304 Stainless Steel Hex Nut.....	48.05	0.82
05 05 23 00-1366	EA	1-3/4" Diameter, 304 Stainless Steel Hex Nut.....	84.87	0.82
05 05 23 00-1367	EA	2" Diameter, 304 Stainless Steel Hex Nut.....	121.18	0.82

05 05 23 00-1368		316 Stainless Steel Hex Nuts <small>(05 05 23 00-1284)</small>		
05 05 23 00-1369	EA	1/4" Diameter, 316 Stainless Steel Hex Nut.....	0.95	0.27
05 05 23 00-1370	EA	5/16" Diameter, 316 Stainless Steel Hex Nut.....	1.09	0.27
05 05 23 00-1371	EA	3/8" Diameter, 316 Stainless Steel Hex Nut.....	1.33	0.27
05 05 23 00-1372	EA	7/16" Diameter, 316 Stainless Steel Hex Nut.....	2.34	0.27
05 05 23 00-1373	EA	1/2" Diameter, 316 Stainless Steel Hex Nut.....	2.51	0.27
05 05 23 00-1374	EA	9/16" Diameter, 316 Stainless Steel Hex Nut.....	3.52	0.27
05 05 23 00-1375	EA	5/8" Diameter, 316 Stainless Steel Hex Nut.....	4.01	0.27
05 05 23 00-1376	EA	3/4" Diameter, 316 Stainless Steel Hex Nut.....	5.69	0.54
05 05 23 00-1377	EA	7/8" Diameter, 316 Stainless Steel Hex Nut.....	8.04	0.54
05 05 23 00-1378	EA	1" Diameter, 316 Stainless Steel Hex Nut.....	12.51	0.54
05 05 23 00-1379	EA	1-1/4" Diameter, 316 Stainless Steel Hex Nut.....	38.73	0.54
05 05 23 00-1380	EA	1-1/2" Diameter, 316 Stainless Steel Hex Nut.....	62.90	0.82
05 05 23 00-1381	EA	1-3/4" Diameter, 316 Stainless Steel Hex Nut.....	106.49	0.82
05 05 23 00-1382	EA	2" Diameter, 316 Stainless Steel Hex Nut.....	198.43	0.82

05 05 23 00-1383		Flat Washers <small>(05 05 23 00-1283)</small>		
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05 05 23 00-1384		Zinc Plated Steel, Low Carbon Flat Washers <small>(05 05 23 00-1383)</small>		
05 05 23 00-1385	EA	1/4" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.05	
05 05 23 00-1386	EA	5/16" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.09	
05 05 23 00-1387	EA	3/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.16	
05 05 23 00-1388	EA	7/16" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.24	
05 05 23 00-1389	EA	1/2" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.34	
05 05 23 00-1390	EA	9/16" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.39	
05 05 23 00-1391	EA	5/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.66	
05 05 23 00-1392	EA	3/4" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	0.95	
05 05 23 00-1393	EA	7/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	1.13	
05 05 23 00-1394	EA	1" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	1.39	
05 05 23 00-1395	EA	1-1/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	1.57	
05 05 23 00-1396	EA	1-1/4" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	1.88	
05 05 23 00-1397	EA	1-3/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	2.95	
05 05 23 00-1398	EA	1-1/2" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	3.02	
05 05 23 00-1399	EA	1-3/4" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	4.47	
05 05 23 00-1400	EA	2" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer.....	5.56	

05 05 23 00-1401		Zinc Plated Steel, Hardened Flat Washers <small>(05 05 23 00-1383)</small>		
05 05 23 00-1402	EA	1/4" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	0.20	
05 05 23 00-1403	EA	5/16" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	0.28	
05 05 23 00-1404	EA	3/8" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	0.32	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1405	EA	7/16" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	0.44
05 05 23 00-1406	EA	1/2" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	0.59
05 05 23 00-1407	EA	9/16" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	0.95
05 05 23 00-1408	EA	5/8" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	1.36
05 05 23 00-1409	EA	3/4" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	1.92
05 05 23 00-1410	EA	7/8" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	3.21
05 05 23 00-1411	EA	1" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	3.56
05 05 23 00-1412	EA	1-1/8" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	5.18
05 05 23 00-1413	EA	1-1/4" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	5.65
05 05 23 00-1414	EA	1-3/8" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	7.45
05 05 23 00-1415	EA	1-1/2" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	8.52
05 05 23 00-1416	EA	1-3/4" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	11.45
05 05 23 00-1417	EA	2" Inside Diameter, Zinc Plated Steel, Hardened Flat Washer.....	13.74

05 05 23 00-1418 Hot Dipped Galvanized Steel Flat Washers (05 05 23 00-1383)

05 05 23 00-1419	EA	1/4" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.13
05 05 23 00-1420	EA	5/16" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.19
05 05 23 00-1421	EA	3/8" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.21
05 05 23 00-1422	EA	7/16" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.40
05 05 23 00-1423	EA	1/2" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.51
05 05 23 00-1424	EA	9/16" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.84
05 05 23 00-1425	EA	5/8" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	0.94
05 05 23 00-1426	EA	3/4" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	1.42
05 05 23 00-1427	EA	7/8" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	2.00
05 05 23 00-1428	EA	1" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	2.20
05 05 23 00-1429	EA	1-1/8" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	3.36
05 05 23 00-1430	EA	1-1/4" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	3.74
05 05 23 00-1431	EA	1-3/8" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	5.34
05 05 23 00-1432	EA	1-1/2" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	5.79
05 05 23 00-1433	EA	1-3/4" Inside Diameter, Hot Dipped Galvanized Steel Flat Washer.....	8.40

05 05 23 00-1434 304/18-8 Stainless Steel Flat Washers (05 05 23 00-1383)

05 05 23 00-1435	EA	1/4" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	0.18
05 05 23 00-1436	EA	5/16" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	0.25
05 05 23 00-1437	EA	3/8" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	0.35
05 05 23 00-1438	EA	7/16" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	0.64
05 05 23 00-1439	EA	1/2" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	1.17
05 05 23 00-1440	EA	9/16" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	1.46
05 05 23 00-1441	EA	5/8" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	2.15
05 05 23 00-1442	EA	3/4" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	2.19
05 05 23 00-1443	EA	7/8" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	4.61
05 05 23 00-1444	EA	1" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	5.84
05 05 23 00-1445	EA	1-1/8" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	6.80
05 05 23 00-1446	EA	1-1/4" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	7.32
05 05 23 00-1447	EA	1-3/8" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	7.74
05 05 23 00-1448	EA	1-1/2" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	9.43
05 05 23 00-1449	EA	1-3/4" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	11.72
05 05 23 00-1450	EA	2" Inside Diameter, 304/18-8 Stainless Steel Flat Washer.....	23.03

05 05 23 00-1451 316 Stainless Steel Flat Washers (05 05 23 00-1383)

05 05 23 00-1452	EA	1/4" Inside Diameter, 316 Stainless Steel Flat Washer.....	0.36
05 05 23 00-1453	EA	5/16" Inside Diameter, 316 Stainless Steel Flat Washer.....	0.39
05 05 23 00-1454	EA	3/8" Inside Diameter, 316 Stainless Steel Flat Washer.....	0.70
05 05 23 00-1455	EA	7/16" Inside Diameter, 316 Stainless Steel Flat Washer.....	0.82
05 05 23 00-1456	EA	1/2" Inside Diameter, 316 Stainless Steel Flat Washer.....	1.52
05 05 23 00-1457	EA	9/16" Inside Diameter, 316 Stainless Steel Flat Washer.....	2.73
05 05 23 00-1458	EA	5/8" Inside Diameter, 316 Stainless Steel Flat Washer.....	3.22
05 05 23 00-1459	EA	3/4" Inside Diameter, 316 Stainless Steel Flat Washer.....	4.06
05 05 23 00-1460	EA	7/8" Inside Diameter, 316 Stainless Steel Flat Washer.....	6.29
05 05 23 00-1461	EA	1" Inside Diameter, 316 Stainless Steel Flat Washer.....	7.03
05 05 23 00-1462	EA	1-1/8" Inside Diameter, 316 Stainless Steel Flat Washer.....	8.01
05 05 23 00-1463	EA	1-1/4" Inside Diameter, 316 Stainless Steel Flat Washer.....	9.86
05 05 23 00-1464	EA	1-3/8" Inside Diameter, 316 Stainless Steel Flat Washer.....	10.43
05 05 23 00-1465	EA	1-1/2" Inside Diameter, 316 Stainless Steel Flat Washer.....	10.66
05 05 23 00-1466	EA	1-3/4" Inside Diameter, 316 Stainless Steel Flat Washer.....	15.63

05 05 23 00-1467 Lock Washers (05 05 23 00-1283)

05 05 23 00-1468 Zinc Plated Steel, Low Carbon Lock Washers (05 05 23 00-1467)

05 05 23 00-1469	EA	1/4" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.02
05 05 23 00-1470	EA	5/16" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.04
05 05 23 00-1471	EA	3/8" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.06
05 05 23 00-1472	EA	7/16" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.10
05 05 23 00-1473	EA	1/2" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.13
05 05 23 00-1474	EA	9/16" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.22
05 05 23 00-1475	EA	5/8" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.25
05 05 23 00-1476	EA	3/4" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer.....	0.38

		DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
MINOR CSI UOM DESCRIPTION				
05 05 23 00-1477	EA	7/8" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	0.63	
05 05 23 00-1478	EA	1" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	1.14	
05 05 23 00-1479	EA	1-1/8" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	1.66	
05 05 23 00-1480	EA	1-1/4" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	2.55	
05 05 23 00-1481	EA	1-3/8" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	4.03	
05 05 23 00-1482	EA	1-1/2" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	4.75	
05 05 23 00-1483	EA	1-3/4" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	8.47	
05 05 23 00-1484	EA	2" Inside Diameter, Zinc Plated Steel, Low Carbon Lock Washer	9.54	
05 05 23 00-1485		Hot Dipped Galvanized Steel Lock Washers (05 05 23 00-1487)		
05 05 23 00-1486	EA	1/4" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.10	
05 05 23 00-1487	EA	5/16" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.12	
05 05 23 00-1488	EA	3/8" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.16	
05 05 23 00-1489	EA	7/16" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.18	
05 05 23 00-1490	EA	1/2" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.28	
05 05 23 00-1491	EA	9/16" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.37	
05 05 23 00-1492	EA	5/8" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.44	
05 05 23 00-1493	EA	3/4" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	0.73	
05 05 23 00-1494	EA	7/8" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	1.05	
05 05 23 00-1495	EA	1" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	1.66	
05 05 23 00-1496	EA	1-1/8" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	3.01	
05 05 23 00-1497	EA	1-1/4" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	3.59	
05 05 23 00-1498	EA	1-3/8" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	5.18	
05 05 23 00-1499	EA	1-1/2" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	5.92	
05 05 23 00-1500	EA	1-3/4" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	8.01	
05 05 23 00-1501	EA	2" Inside Diameter, Hot Dipped Galvanized Steel Lock Washer	10.91	
05 05 23 00-1502		304/18-8 Stainless Steel Lock Washers (05 05 23 00-1487)		
05 05 23 00-1503	EA	1/4" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	0.15	
05 05 23 00-1504	EA	5/16" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	0.21	
05 05 23 00-1505	EA	3/8" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	0.30	
05 05 23 00-1506	EA	7/16" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	0.56	
05 05 23 00-1507	EA	1/2" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	0.62	
05 05 23 00-1508	EA	9/16" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	1.51	
05 05 23 00-1509	EA	5/8" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	1.78	
05 05 23 00-1510	EA	3/4" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	2.07	
05 05 23 00-1511	EA	7/8" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	3.75	
05 05 23 00-1512	EA	1" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	5.29	
05 05 23 00-1513	EA	1-1/8" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	9.24	
05 05 23 00-1514	EA	1-1/4" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	12.29	
05 05 23 00-1515	EA	1-3/8" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	15.63	
05 05 23 00-1516	EA	1-1/2" Inside Diameter, 304/18-8 Stainless Steel Lock Washer	18.75	
05 05 23 00-1517		316 Stainless Steel Lock Washers (05 05 23 00-1467)		
05 05 23 00-1518	EA	1/4" Inside Diameter, 316 Stainless Steel Lock Washer	0.19	
05 05 23 00-1519	EA	5/16" Inside Diameter, 316 Stainless Steel Lock Washer	0.41	
05 05 23 00-1520	EA	3/8" Inside Diameter, 316 Stainless Steel Lock Washer	0.47	
05 05 23 00-1521	EA	7/16" Inside Diameter, 316 Stainless Steel Lock Washer	0.81	
05 05 23 00-1522	EA	1/2" Inside Diameter, 316 Stainless Steel Lock Washer	0.90	
05 05 23 00-1523	EA	9/16" Inside Diameter, 316 Stainless Steel Lock Washer	1.61	
05 05 23 00-1524	EA	5/8" Inside Diameter, 316 Stainless Steel Lock Washer	1.76	
05 05 23 00-1525	EA	3/4" Inside Diameter, 316 Stainless Steel Lock Washer	3.05	
05 05 23 00-1526	EA	7/8" Inside Diameter, 316 Stainless Steel Lock Washer	5.04	
05 05 23 00-1527	EA	1" Inside Diameter, 316 Stainless Steel Lock Washer	6.86	
05 05 23 00-1528	EA	1-1/8" Inside Diameter, 316 Stainless Steel Lock Washer	9.57	
05 05 23 00-1529	EA	1-1/4" Inside Diameter, 316 Stainless Steel Lock Washer	14.73	
05 05 23 00-1530	EA	1-3/8" Inside Diameter, 316 Stainless Steel Lock Washer	26.37	
05 05 23 00-1531	EA	1-1/2" Inside Diameter, 316 Stainless Steel Lock Washer	29.28	
05 05 23 00-1532		Load Indicating Washers (05 05 23 00-1283)		
05 05 23 00-1533		A325, Direct Tension Indicator, Load Indicating Washers (ASTM F959) (05 05 23 00-1532)		
05 05 23 00-1534		Plain Finish, A325, Direct Tension Indicator, Load Indicating Washers (ASTM F959) (05 05 23 00-1533)		
05 05 23 00-1535	EA	1/2", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	2.76	
05 05 23 00-1536	EA	5/8", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	3.13	
05 05 23 00-1537	EA	3/4", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	3.37	
05 05 23 00-1538	EA	7/8", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	3.83	
05 05 23 00-1539	EA	1", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	4.63	
05 05 23 00-1540	EA	1-1/8", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	7.69	
05 05 23 00-1541	EA	1-1/4", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	9.94	
05 05 23 00-1542	EA	1-3/8", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	12.69	
05 05 23 00-1543	EA	1-1/2", Plain Finish, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959)	13.95	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1544	Galvanized, A325, Direct Tension Indicator, Load Indicating Washers (ASTM F959) <small>(05 05 23 00-1533)</small>		
05 05 23 00-1545	EA 1/2", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	3.50	
05 05 23 00-1546	EA 5/8", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	3.89	
05 05 23 00-1547	EA 3/4", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	3.79	
05 05 23 00-1548	EA 7/8", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	4.63	
05 05 23 00-1549	EA 1", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	5.48	
05 05 23 00-1550	EA 1-1/8", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	8.26	
05 05 23 00-1551	EA 1-1/4", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	10.40	
05 05 23 00-1552	EA 1-3/8", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	14.79	
05 05 23 00-1553	EA 1-1/2", Galvanized, A325, Direct Tension Indicator, Load Indicating Washer (ASTM F959).....	16.27	
05 05 23 00-1554	Beveled Washers <small>(05 05 23 00-1283)</small>		
05 05 23 00-1555	Plain Finish, Square Beveled Structural Washers (ASTM F436) <small>(05 05 23 00-1554)</small>		
05 05 23 00-1556	EA 1/2", Plain Finish, Square Beveled Structural Washer (ASTM F436).....	4.56	
05 05 23 00-1557	EA 5/8", Plain Finish, Square Beveled Structural Washer (ASTM F436).....	4.66	
05 05 23 00-1558	EA 3/4", Plain Finish, Square Beveled Structural Washer (ASTM F436).....	4.76	
05 05 23 00-1559	EA 7/8", Plain Finish, Square Beveled Structural Washer (ASTM F436).....	5.79	
05 05 23 00-1560	EA 1", Plain Finish, Square Beveled Structural Washer (ASTM F436).....	6.09	
05 05 23 00-1561	Galvanized, Square Beveled Structural Washers (ASTM F436) <small>(05 05 23 00-1554)</small>		
05 05 23 00-1562	EA 1/2", Galvanized, Square Beveled Structural Washer (ASTM F436).....	6.56	
05 05 23 00-1563	EA 5/8", Galvanized, Square Beveled Structural Washer (ASTM F436).....	6.85	
05 05 23 00-1564	EA 3/4", Galvanized, Square Beveled Structural Washer (ASTM F436).....	6.85	
05 05 23 00-1565	EA 7/8", Galvanized, Square Beveled Structural Washer (ASTM F436).....	7.25	
05 05 23 00-1566	EA 1", Galvanized, Square Beveled Structural Washer (ASTM F436).....	7.71	
05 05 23 00-1567	Drilling In Existing Steel Plates <small>(05 05 23)</small>		
05 05 23 00-1568	EA Up To 1/2" Diameter Drill Through Up To 1/4" Steel Plate.....	23.21	
	For Aluminum, Deduct	-2.32	
	For Stainless Steel, Add	2.90	
	For >5 To 10, Deduct	-2.32	
	For >10 To 25, Deduct	-5.80	
	For >25 To 50, Deduct	-8.12	
	For >50, Deduct	-11.61	
05 05 23 00-1569	EA >1/2" To 7/8" Diameter Drill Through Up To 1/4" Steel Plate.....	27.31	
	For Aluminum, Deduct	-2.73	
	For Stainless Steel, Add	3.41	
	For >5 To 10, Deduct	-2.73	
	For >10 To 25, Deduct	-6.83	
	For >25 To 50, Deduct	-9.56	
	For >50, Deduct	-13.66	
05 05 23 00-1570	EA >7/8" To 1-1/2" Diameter Drill Through Up To 1/4" Steel Plate.....	32.77	
	For Aluminum, Deduct	-3.28	
	For Stainless Steel, Add	4.10	
	For >5 To 10, Deduct	-3.28	
	For >10 To 25, Deduct	-8.19	
	For >25 To 50, Deduct	-11.47	
	For >50, Deduct	-16.39	
05 05 23 00-1571	EA >1-1/2" To 4" Diameter Drill Through Up To 1/4" Steel Plate.....	38.23	
	For Aluminum, Deduct	-3.82	
	For Stainless Steel, Add	4.78	
	For >5 To 10, Deduct	-3.82	
	For >10 To 25, Deduct	-9.56	
	For >25 To 50, Deduct	-13.38	
	For >50, Deduct	-19.12	
05 05 23 00-1572	EA >4" To 10" Diameter Drill Through Up To 1/4" Steel Plate.....	51.21	
	For Aluminum, Deduct	-5.12	
	For Stainless Steel, Add	6.40	
	For >5 To 10, Deduct	-5.12	
	For >10 To 25, Deduct	-12.80	
	For >25 To 50, Deduct	-17.92	
	For >50, Deduct	-25.61	
05 05 23 00-1573	EA Up To 1/2" Diameter Drill Through >1/4" To 1/2" Steel Plate.....	27.31	
	For Aluminum, Deduct	-2.73	
	For Stainless Steel, Add	3.41	
	For >5 To 10, Deduct	-2.73	
	For >10 To 25, Deduct	-6.83	
	For >25 To 50, Deduct	-9.56	
	For >50, Deduct	-13.66	
05 05 23 00-1574	EA >1/2" To 7/8" Diameter Drill Through >1/4" To 1/2" Steel Plate.....	34.14	
	For Aluminum, Deduct	-3.41	
	For Stainless Steel, Add	4.27	
	For >5 To 10, Deduct	-3.41	
	For >10 To 25, Deduct	-8.54	
	For >25 To 50, Deduct	-11.95	
	For >50, Deduct	-17.07	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 05 23 00-1575 EA >7/8" To 1-1/2" Diameter Drill Through >1/4" To 1/2" Steel Plate.....	40.96	
For Aluminum, Deduct	-4.10	
For Stainless Steel, Add	5.12	
For >5 To 10, Deduct	-4.10	
For >10 To 25, Deduct	-10.24	
For >25 To 50, Deduct	-14.34	
For >50, Deduct	-20.48	
05 05 23 00-1576 EA >1-1/2" To 4" Diameter Drill Through >1/4" To 1/2" Steel Plate.....	51.21	
For Aluminum, Deduct	-5.12	
For Stainless Steel, Add	6.40	
For >5 To 10, Deduct	-5.12	
For >10 To 25, Deduct	-12.80	
For >25 To 50, Deduct	-17.92	
For >50, Deduct	-25.61	
05 05 23 00-1577 EA Up To 1/2" Diameter Drill Through >1/2" To 1" Steel Plate.....	34.14	
For Aluminum, Deduct	-3.41	
For Stainless Steel, Add	4.27	
For >5 To 10, Deduct	-3.41	
For >10 To 25, Deduct	-8.54	
For >25 To 50, Deduct	-11.95	
For >50, Deduct	-17.07	
05 05 23 00-1578 EA >1/2" To 7/8" Diameter Drill Through >1/2" To 1" Steel Plate.....	45.06	
For Aluminum, Deduct	-4.51	
For Stainless Steel, Add	5.63	
For >5 To 10, Deduct	-4.51	
For >10 To 25, Deduct	-11.27	
For >25 To 50, Deduct	-15.77	
For >50, Deduct	-22.53	
05 05 23 00-1579 EA >7/8" To 1-1/2" Diameter Drill Through >1/2" To 1" Steel Plate.....	54.62	
For Aluminum, Deduct	-5.46	
For Stainless Steel, Add	6.83	
For >5 To 10, Deduct	-5.46	
For >10 To 25, Deduct	-13.66	
For >25 To 50, Deduct	-19.12	
For >50, Deduct	-27.31	
05 05 23 00-1580 Welded Stud Anchors (05 05 23)		
05 05 23 00-1581 EA 1-1/8" Long x 1/4" Diameter, Welded Stud Concrete Anchors.....	4.74	
05 05 23 00-1582 EA 2-11/16" Long x 1/4" Diameter, Welded Stud Concrete Anchors.....	4.85	
05 05 23 00-1583 EA 3-1/8" Long x 1/4" Diameter, Welded Stud Concrete Anchors.....	4.90	
05 05 23 00-1584 EA 4-1/8" Long x 1/4" Diameter, Welded Stud Concrete Anchors.....	4.94	
05 05 23 00-1585 EA 1-3/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	4.61	
05 05 23 00-1586 EA 1-5/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	4.88	
05 05 23 00-1587 EA 2-1/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	5.15	
05 05 23 00-1588 EA 2-5/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	5.29	
05 05 23 00-1589 EA 3-1/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	5.43	
05 05 23 00-1590 EA 4-1/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	5.99	
05 05 23 00-1591 EA 5-1/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	6.45	
05 05 23 00-1592 EA 6-1/8" Long x 3/8" Diameter, Welded Stud Concrete Anchors.....	6.82	
05 05 23 00-1593 EA 1-1/2" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	5.70	
05 05 23 00-1594 EA 1-5/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	5.74	
05 05 23 00-1595 EA 2-1/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	6.16	
05 05 23 00-1596 EA 2-5/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	6.56	
05 05 23 00-1597 EA 3-1/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	7.05	
05 05 23 00-1598 EA 4-1/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	7.81	
05 05 23 00-1599 EA 5-5/16" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	8.30	
05 05 23 00-1600 EA 6-1/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	9.64	
05 05 23 00-1601 EA 8-1/8" Long x 1/2" Diameter, Welded Stud Concrete Anchors.....	12.17	
05 05 23 00-1602 EA 2-11/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	8.26	
05 05 23 00-1603 EA 3-3/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	8.90	
05 05 23 00-1604 EA 3-11/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	9.42	
05 05 23 00-1605 EA 4-3/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	9.94	
05 05 23 00-1606 EA 4-11/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	10.37	
05 05 23 00-1607 EA 5-3/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	10.76	
05 05 23 00-1608 EA 6-3/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	11.28	
05 05 23 00-1609 EA 6-9/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	13.45	
05 05 23 00-1610 EA 8-3/16" Long x 5/8" Diameter, Welded Stud Concrete Anchors.....	16.44	
05 05 23 00-1611 Welded Shear Stud Connector (05 05 23)		
05 05 23 00-1612 3/4" Diameter Welded Shear Stud Connector (05 05 23 00-1611)		
05 05 23 00-1613 EA 3/4" Diameter x 3-3/16" Long, Welded Shear Stud Connector.....	10.65	
05 05 23 00-1614 EA 3/4" Diameter x 3-3/8" Long, Welded Shear Stud Connector.....	11.11	
05 05 23 00-1615 EA 3/4" Diameter x 3-7/8" Long, Welded Shear Stud Connector.....	11.23	
05 05 23 00-1616 EA 3/4" Diameter x 4-3/16" Long, Welded Shear Stud Connector.....	11.29	
05 05 23 00-1617 EA 3/4" Diameter x 4-3/8" Long, Welded Shear Stud Connector.....	11.81	
05 05 23 00-1618 EA 3/4" Diameter x 4-11/16" Long, Welded Shear Stud Connector.....	12.76	
05 05 23 00-1619 EA 3/4" Diameter x 4-7/8" Long, Welded Shear Stud Connector.....	21.95	
05 05 23 00-1620 EA 3/4" Diameter x 5-3/16" Long, Welded Shear Stud Connector.....	13.86	
05 05 23 00-1621 EA 3/4" Diameter x 5-3/8" Long, Welded Shear Stud Connector.....	15.54	
05 05 23 00-1622 EA 3/4" Diameter x 6-3/16" Long, Welded Shear Stud Connector.....	20.02	

05 Metals**05 05 Common Work Results for Metals****05 05 23 Metal Fastenings**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 05 23 00-1623	EA	3/4" Diameter x 7-3/16" Long, Welded Shear Stud Connector	20.54	
05 05 23 00-1624	EA	3/4" Diameter x 8-3/16" Long, Welded Shear Stud Connector	22.37	
05 05 23 00-1625	EA	3/4" Diameter x 10-3/16" Long, Welded Shear Stud Connector	30.06	

05 05 23 00-1626 7/8" Diameter Welded Shear Stud Connector (05 05 23 00-1611)

05 05 23 00-1627	EA	7/8" Diameter x 3-3/16" Long, Welded Shear Stud Connector	12.94	
05 05 23 00-1628	EA	7/8" Diameter x 3-11/16" Long, Welded Shear Stud Connector	13.68	
05 05 23 00-1629	EA	7/8" Diameter x 4-3/16" Long, Welded Shear Stud Connector	14.41	
05 05 23 00-1630	EA	7/8" Diameter x 5-3/16" Long, Welded Shear Stud Connector	16.52	
05 05 23 00-1631	EA	7/8" Diameter x 6-3/16" Long, Welded Shear Stud Connector	21.15	
05 05 23 00-1632	EA	7/8" Diameter x 7-3/16" Long, Welded Shear Stud Connector	23.38	
05 05 23 00-1633	EA	7/8" Diameter x 8-3/16" Long, Welded Shear Stud Connector	25.57	
05 05 23 00-1634	EA	7/8" Diameter x 10-3/16" Long, Welded Shear Stud Connector	31.74	

05 05 23 00-1635 1" Diameter Welded Shear Stud Connector (05 05 23 00-1611)

05 05 23 00-1636	EA	1" Diameter x 3-1/4" Long, Welded Shear Stud Connector	17.74	
05 05 23 00-1637	EA	1" Diameter x 4-1/4" Long, Welded Shear Stud Connector	20.00	
05 05 23 00-1638	EA	1" Diameter x 5-1/4" Long, Welded Shear Stud Connector	23.32	
05 05 23 00-1639	EA	1" Diameter x 6-1/4" Long, Welded Shear Stud Connector	29.48	
05 05 23 00-1640	EA	1" Diameter x 7-1/4" Long, Welded Shear Stud Connector	32.96	
05 05 23 00-1641	EA	1" Diameter x 8-1/4" Long, Welded Shear Stud Connector	36.44	

05 10 Structural Metal Framing (05)**05 12 Structural Steel Framing (05 10)****05 12 23 Structural Steel for Buildings (05 12)**

See CSI section 05 05 21 00-0007 for moment connection welding, 05 12 23 00-0089 for field fabrication of additional structural metal connections.

05 12 23 00-0001 Rolled Steel Members (05 12 23)

Note: Prices by Ton (or LB) are based on ASTM A992/A36 steel with bolted standard beam connections and shop primed with red primer paint. Stock cross-sections only. Includes shop fabrication into sub-assemblies and delivery to site, all connecting bolts, connecting welds, and crane for erection (or demolition). Excludes moment connection welding. See CSI section 05 05 21 00-0007 for moment connection welding, 05 12 23 00-0089 for field fabrication of additional structural metal connections.

05 12 23 00-0002 Beams, Girders And Columns (05 12 23 00-0001)

Note: For one and two story I beams and W shapes and HP shapes.

05 12 23 00-0003	TON	Up To 30 LB/LF Beams, Girders And Columns	12,055.85	1,331.36
		<i>For ASTM A242 Type 2 High Strength Steel, Add</i>	744.12	
		<i>For Hot Dip Galvanizing, Add</i>	2,604.43	
		<i>For >10 To 25 Tons, Deduct</i>	-790.63	
		<i>For >25 To 50 Tons, Deduct</i>	-1,627.77	
		<i>For >50 Tons, Deduct</i>	-2,325.39	
05 12 23 00-0004	TON	>30-65 LB/LF Beams, Girders And Columns	8,551.96	860.63
		<i>For ASTM A242 Type 2 High Strength Steel, Add</i>	610.71	
		<i>For Hot Dip Galvanizing, Add</i>	2,137.48	
		<i>For >10 To 25 Tons, Deduct</i>	-648.88	
		<i>For >25 To 50 Tons, Deduct</i>	-1,335.93	
		<i>For >50 Tons, Deduct</i>	-1,908.47	

05 12 23 00-0005 Shapes (05 12 23 00-0001)**05 12 23 00-0006 Rolled C, MC Steel Channels (05 12 23 00-0005)**

05 12 23 00-0007	TON	Up To 10 LB/LF Rolled C, MC Steel Channels	18,905.07	3,389.09
		<i>For ASTM A242 Type 2 High Strength Steel, Add</i>	1,058.40	
		<i>For Hot Dip Galvanizing, Add</i>	3,704.39	
		<i>For >10 To 25 Tons, Deduct</i>	-1,124.55	
		<i>For >25 To 50 Tons, Deduct</i>	-2,315.25	
		<i>For >50 Tons, Deduct</i>	-3,307.50	
05 12 23 00-0008	TON	>10 To 20 Rolled C, MC Steel Channels	15,426.70	2,582.17
		<i>For ASTM A242 Type 2 High Strength Steel, Add</i>	1,013.79	
		<i>For Hot Dip Galvanizing, Add</i>	3,548.27	
		<i>For >10 To 25 Tons, Deduct</i>	-1,077.15	
		<i>For >25 To 50 Tons, Deduct</i>	-2,217.67	
		<i>For >50 Tons, Deduct</i>	-3,168.10	

05 12 23 00-0009 Double L Shape Steel Angles (05 12 23 00-0005)

05 12 23 00-0010	TON	Up To 20 LB/LF Double L Shape Steel Angles	16,363.35	1,963.74
		<i>For ASTM A242 Type 2 High Strength Steel, Add</i>	1,034.07	
		<i>For Hot Dip Galvanizing, Add</i>	3,619.24	
		<i>For >10 To 25 Tons, Deduct</i>	-1,098.70	
		<i>For >25 To 50 Tons, Deduct</i>	-2,262.02	
		<i>For >50 Tons, Deduct</i>	-3,231.46	

05 12 23 00-0011 Combination Section Shapes (05 12 23 00-0001)



	Metals	05
	Structural Metal Framing	05 10
	Structural Steel Framing	05 12

05

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0012 Combination Section, W Shapes And Angles <small>(05 12 23 00-0011)</small>		
05 12 23 00-0013 TON Up To 30 LB/LF Combination Section - W Shapes And Angles	14,134.11	1,452.46
For ASTM A242 Type 2 High Strength Steel, Add	910.38	
For Hot Dip Galvanizing, Add	3,186.35	
For >10 To 25 Tons, Deduct	-967.28	
For >25 To 50 Tons, Deduct	-1,991.47	
For >50 Tons, Deduct	-2,844.95	
05 12 23 00-0014 TON >30-65 LB/LF Combination Section - W Shapes And Angles	10,295.69	860.63
For ASTM A242 Type 2 High Strength Steel, Add	750.21	
For Hot Dip Galvanizing, Add	2,625.73	
For >10 To 25 Tons, Deduct	-797.10	
For >25 To 50 Tons, Deduct	-1,641.08	
For >50 Tons, Deduct	-2,344.40	
05 12 23 00-0015 TON >100-300 LB/LF Combination Section - W Shapes And Angles	6,509.82	257.70
For ASTM A242 Type 2 High Strength Steel, Add	498.79	
For Hot Dip Galvanizing, Add	1,745.75	
For >10 To 25 Tons, Deduct	-529.96	
For >25 To 50 Tons, Deduct	-1,091.09	
For >50 Tons, Deduct	-1,558.71	
05 12 23 00-0016 Combination Section, Channels And Angles <small>(05 12 23 00-0011)</small>		
05 12 23 00-0017 TON Up To 30 LB/LF Combination Section - Channels And Angles	14,919.80	1,452.46
For ASTM A242 Type 2 High Strength Steel, Add	973.24	
For Hot Dip Galvanizing, Add	3,406.34	
For >10 To 25 Tons, Deduct	-1,034.07	
For >25 To 50 Tons, Deduct	-2,128.96	
For >50 Tons, Deduct	-3,041.38	
05 12 23 00-0018 Standard Weight Pipe <small>(05 12 23 00-0001)</small>		
05 12 23 00-0019 TON 1/2" To 5" Diameter Standard Weight Pipe	8,733.86	774.64
For ASTM A242 Type 2 High Strength Steel, Add	632.61	
For Hot Dip Galvanizing, Add	2,214.12	
For >10 To 25 Tons, Deduct	-672.14	
For >25 To 50 Tons, Deduct	-1,383.82	
For >50 Tons, Deduct	-1,976.89	
05 12 23 00-0020 TON >5" To 12" Diameter Standard Weight Pipe	9,295.27	968.31
For ASTM A242 Type 2 High Strength Steel, Add	660.99	
For Hot Dip Galvanizing, Add	2,313.47	
For >10 To 25 Tons, Deduct	-702.30	
For >25 To 50 Tons, Deduct	-1,445.92	
For >50 Tons, Deduct	-2,065.60	
05 12 23 00-0021 Temporary Steel Support For Structures <small>(05 12 23 00-0001)</small>		
Note: Includes removal after use.		
05 12 23 00-0022 TON Up To 30 LB/LF Temporary Steel Support For Structures	12,055.85	
Note: For all stock sections.		
05 12 23 00-0023 TON >30 LB/LF Temporary Steel Support For Structures	8,551.96	
Note: For all stock sections.		
05 12 23 00-0024 Structural Steel Shapes <small>(05 12 23)</small>		
Note: Prices by Ton (or LB) are based on ASTM A992/A36 steel with bolted standard beam connections and shop primed with red primer paint. Stock cross-sections only. Includes shop fabrication into sub-assemblies and delivery to site, all connecting bolts, connecting welds, and crane for erection (or demolition). Excludes moment connection welding. See CSI section 05 05 21 00-0007 for moment connection welding, 05 12 23 00-0089 for field fabrication of additional structural metal connections.		
05 12 23 00-0025 Steel Rods <small>(05 12 23 00-0024)</small>		
05 12 23 00-0026 TON 1/2" To 5" Diameter Extra Strong Steel, Solid	9,465.52	605.26
For ASTM A242 Type 2 High Strength Steel, Add	705.60	
For Hot Dip Galvanizing, Add	2,469.59	
For >10 To 25 Tons, Deduct	-749.70	
For >25 To 50 Tons, Deduct	-1,543.50	
For >50 Tons, Deduct	-2,205.00	
05 12 23 00-0027 Column Base Plates <small>(05 12 23 00-0024)</small>		
05 12 23 00-0028 LB Column Base Plates, Up To 150 LB / Each, A36 Miscellaneous Steel Items	4.63	0.79
For ASTM A242 Type 2 High Strength Steel, Add	0.30	
For Hot Dip Galvanizing, Add	1.06	
05 12 23 00-0029 Double Extra Strong Pipes <small>(05 12 23 00-0024)</small>		
05 12 23 00-0030 TON 2" To 5" Diameter Double Extra Strong Pipe	11,267.65	1,106.58
For ASTM A242 Type 2 High Strength Steel, Add	806.98	
For Hot Dip Galvanizing, Add	2,824.42	
For >10 To 25 Tons, Deduct	-857.41	
For >25 To 50 Tons, Deduct	-1,765.27	
For >50 Tons, Deduct	-2,521.81	

05 Metals**05 10 Structural Metal Framing****05 12 Structural Steel Framing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0031	TON >5" To 8" Diameter Double Extra Strong Pipe <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	10,722.84 806.98 2,824.42 -857.41 -1,765.27 -2,521.81	595.84
05 12 23 00-0032	Structural Pipes <small>(05 12 23 00-0024)</small>		
05 12 23 00-0033	TON 3" To 5" Outside Diameter Structural Pipe, Extra Heavy A36 Miscellaneous Steel Items..... <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	7,883.18 567.72 1,987.03 -603.21 -1,241.89 -1,774.14	511.27
05 12 23 00-0034	TON >5" To 12" Outside Diameter Structural Pipe, Extra Heavy A36 Miscellaneous Steel Items <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	8,397.37 567.72 1,987.03 -603.21 -1,241.89 -1,774.14	589.63
05 12 23 00-0035	Structural Tubing <small>(05 12 23 00-0024)</small>		
05 12 23 00-0036	Rectangle Structural Tubing <small>(05 12 23 00-0035)</small>		
05 12 23 00-0037	TON 3" x 2" Weight Range 5-7 LB/LF Structural Tubing - Rectangle..... <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	13,223.26 1,013.79 3,548.27 -1,077.15 -2,217.67 -3,168.10	516.43
05 12 23 00-0038	TON 4" x 3", 2" Weight Range 6-13 LB/LF Structural Tubing - Rectangle <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	13,308.01 1,013.79 3,548.27 -1,077.15 -2,217.67 -3,168.10	595.84
05 12 23 00-0039	TON 5" x 4", 3", 2" Weight Range 8-20 LB/LF Structural Tubing - Rectangle <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	11,586.84 871.86 3,051.51 -926.35 -1,907.20 -2,724.57	645.54
05 12 23 00-0040	TON 6" x 4", 3", 2" Weight Range 9-29 LB/LF Structural Tubing - Rectangle <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	10,964.21 811.03 2,838.62 -861.72 -1,774.14 -2,534.48	774.64
05 12 23 00-0041	Square Structural Tubing <small>(05 12 23 00-0035)</small>		
05 12 23 00-0042	TON 2" x 2" Weight Range 4-6 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	13,188.83 1,013.79 3,548.27 -1,077.15 -2,217.67 -3,168.10	484.15
05 12 23 00-0043	TON 2.5" x 2.5" Weight Range 5-8 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	13,223.26 1,013.79 3,548.27 -1,077.15 -2,217.67 -3,168.10	516.43
05 12 23 00-0044	TON 3" x 3" Weight Range 6-11 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	11,840.29 892.14 3,122.48 -947.90 -1,951.55 -2,787.93	645.54
05 12 23 00-0045	TON 3.5" x 3.5" Weight Range 8-13 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	11,724.55 871.86 3,051.51 -926.35 -1,907.20 -2,724.57	774.64
05 12 23 00-0046	TON 4" x 4" Weight Range 10-22 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	9,345.96 665.05 2,327.67 -706.61 -1,454.79 -2,078.27	968.31



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0047	TON		5" x 5" Weight Range 12-30 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	9,493.51 665.05 2,327.67 -706.61 -1,454.79 -2,078.27	1,106.58
05 12 23 00-0048	TON		6" x 6" Weight Range 15-35 LB/LF Structural Tubing - Square <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	9,965.67 665.05 2,327.67 -706.61 -1,454.79 -2,078.27	1,549.30
05 12 23 00-0049			Galvanized Steel Pipe Tubing (05 12 23 00-0035) Note: ASTM A53 Grade B		
05 12 23 00-0050	LF	2"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	48.14	5.70
05 12 23 00-0051	LF	2-1/2"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	52.84	6.78
05 12 23 00-0052	LF	3"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	58.56	9.00
05 12 23 00-0053	LF	3-1/2"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	63.16	10.03
05 12 23 00-0054	LF	4"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	66.05	10.85
05 12 23 00-0055	LF	5"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	74.02	13.56
05 12 23 00-0056	LF	6"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	81.97	16.27
05 12 23 00-0057	LF	8"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	89.75	19.53
05 12 23 00-0058	LF	10"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	100.96	23.87
05 12 23 00-0059	LF	12"	Diameter Galvanized Steel Pipe Tubing, Standard Weight	118.69	30.38
05 12 23 00-0060			Structural Shapes (05 12 23 00-0024)		
05 12 23 00-0061	TON		Structural Shapes, Steel Angle A36 Structural Steel, Purlins And Girts (Up To 20 LB/LF) <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >20 To 50 LB/LF, Deduct</i> <i>For >50 To 75 LB/LF, Deduct</i> <i>For >75 To 100 LB/LF, Deduct</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	8,637.32 336.80 1,178.79 -1,085.10 -1,738.33 -2,391.57 -357.85 -736.75 -1,052.50	2,789.22
05 12 23 00-0062	TON		Structural Shapes, Steel Plate A36 Structural Steel Note: Up to 21.5 LB per SF <i>For ASTM A242 Type 2 High Strength Steel, Add</i> <i>For Hot Dip Galvanizing, Add</i> <i>For >21.5 To 50 LB/LF, Deduct</i> <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	9,594.14 648.84 2,270.94 -1,033.60 -689.39 -1,419.34 -2,027.63	1,115.69
05 12 23 00-0063	LB		Structural Shapes, Primed Pipe Supports (Up To 20 LB/LF)	5.62	0.25
05 12 23 00-0064	LB		Structural Shapes, Galvanized Pipe Supports	6.88	0.25
05 12 23 00-0065			Built-Up Trusses (05 12 23 00-0024)		
05 12 23 00-0066	TON		Up To 50 LF Span Average Weight 100 LB/LF Trusses, Built-up <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	10,728.48 -876.80 -1,805.18 -2,578.83	387.33
05 12 23 00-0067	TON		>50-100 LF Span Average Weight 120 LB/LF Trusses, Built-up <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	10,646.24 -885.42 -1,822.92 -2,604.18	215.10
05 12 23 00-0068	TON		>100-200 LF Span Average Weight 150 LB/LF Trusses, Built-up <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	9,499.08 -797.09 -1,641.07 -2,344.39	113.88
05 12 23 00-0069	TON		>200 LF Span Average Weight 180 LB/LF Trusses, Built-up <i>For >10 To 25 Tons, Deduct</i> <i>For >25 To 50 Tons, Deduct</i> <i>For >50 Tons, Deduct</i>	9,238.89 -775.55 -1,596.72 -2,281.03	107.67
05 12 23 00-0070			Masonry Plates, Filler Plates, Sole Plates And Anchor Straps (05 12 23 00-0024) Note: Includes shop fabrication, welds, drilling and shop primer.		
05 12 23 00-0071	SF	1/4"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	34.28	8.04
05 12 23 00-0072	SF	3/8"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	51.41	12.02
05 12 23 00-0073	SF	1/2"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	68.56	16.02
05 12 23 00-0074	SF	5/8"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	85.69	20.02
05 12 23 00-0075	SF	3/4"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	102.84	23.91
05 12 23 00-0076	SF	7/8"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	119.97	28.03
05 12 23 00-0077	SF	1"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	137.11	32.03
05 12 23 00-0078	SF	1-1/8"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	154.25	36.04
05 12 23 00-0079	SF	1-1/4"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	171.39	40.04
05 12 23 00-0080	SF	1-3/8"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	188.53	44.05
05 12 23 00-0081	SF	1-1/2"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	205.67	48.05
05 12 23 00-0082	SF	1-5/8"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	222.81	52.06
05 12 23 00-0083	SF	1-3/4"	Masonry Plates, Filler Plates, Sole Plates And Anchor Straps	239.96	56.05

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
05 12 23 00-0084	SF	1-7/8" Masonry Plates, Filler Plates, Sole Plates And Anchor Straps.....		257.09	60.06
05 12 23 00-0085	SF	2" Masonry Plates, Filler Plates, Sole Plates And Anchor Straps.....		274.24	64.06
05 12 23 00-0086		Accessories For Steel (05 12 23)			
05 12 23 00-0087		Field Painting For Touch-Up Of Shop Prime Coat (05 12 23 00-0086)			
05 12 23 00-0088	SF	Touch Up Paint - Type 1 Red Oxide Field Painting Prime Coat.....		1.50	
05 12 23 00-0089		Connection And Stiffener Plates (05 12 23 00-0086)			
		Note: For field fabrication of additional structural metal connections.			
05 12 23 00-0090	TON	1/8" Plate Weight 6.16 LB/SF Connection And Stiffener Plates.....		23,414.23	
		For >10 To 25 Tons, Deduct		-1,990.21	
		For >25 To 50 Tons, Deduct		-4,097.49	
		For >50 Tons, Deduct		-5,853.56	
05 12 23 00-0091	TON	3/16" Plate Weight 8.71 LB/SF Connection And Stiffener Plates.....		19,976.92	
		For >10 To 25 Tons, Deduct		-1,698.04	
		For >25 To 50 Tons, Deduct		-3,495.96	
		For >50 Tons, Deduct		-4,994.23	
05 12 23 00-0092	TON	1/4" Plate Weight 11.26 LB/SF Connection And Stiffener Plates.....		15,448.56	
		For >10 To 25 Tons, Deduct		-1,313.13	
		For >25 To 50 Tons, Deduct		-2,703.50	
		For >50 Tons, Deduct		-3,862.14	
05 12 23 00-0093	TON	5/16" Plate Weight 13.81 LB/SF Connection And Stiffener Plates.....		15,448.56	
		For >10 To 25 Tons, Deduct		-1,313.13	
		For >25 To 50 Tons, Deduct		-2,703.50	
		For >50 Tons, Deduct		-3,862.14	
05 12 23 00-0094	TON	3/8" Plate Weight 16.37 LB/SF Connection And Stiffener Plates.....		15,448.56	
		For >10 To 25 Tons, Deduct		-1,313.13	
		For >25 To 50 Tons, Deduct		-2,703.50	
		For >50 Tons, Deduct		-3,862.14	
05 12 23 00-0095	TON	1/2" Plate Weight 21.47 LB/SF Connection And Stiffener Plates.....		15,448.56	
		For >10 To 25 Tons, Deduct		-1,313.13	
		For >25 To 50 Tons, Deduct		-2,703.50	
		For >50 Tons, Deduct		-3,862.14	
05 12 23 00-0096	TON	9/16" Plate Weight 24.02 LB/SF Connection And Stiffener Plates.....		15,448.56	
		For >10 To 25 Tons, Deduct		-1,313.13	
		For >25 To 50 Tons, Deduct		-2,703.50	
		For >50 Tons, Deduct		-3,862.14	
05 12 23 00-0097	TON	5/8" Plate Weight 26.58 LB/SF Connection And Stiffener Plates.....		15,448.56	
		For >10 To 25 Tons, Deduct		-1,313.13	
		For >25 To 50 Tons, Deduct		-2,703.50	
		For >50 Tons, Deduct		-3,862.14	
05 12 23 00-0098	TON	3/4" Plate Weight 31.68 LB/SF Connection And Stiffener Plates.....		14,483.03	
		For >10 To 25 Tons, Deduct		-1,231.06	
		For >25 To 50 Tons, Deduct		-2,534.53	
		For >50 Tons, Deduct		-3,620.76	
05 12 23 00-0099	TON	7/8" Plate Weight 36.78 LB/SF Connection And Stiffener Plates.....		14,483.03	
		For >10 To 25 Tons, Deduct		-1,231.06	
		For >25 To 50 Tons, Deduct		-2,534.53	
		For >50 Tons, Deduct		-3,620.76	
05 12 23 00-0100	TON	1" Plate Weight 41.89 LB/SF Connection And Stiffener Plates.....		14,483.03	
		For >10 To 25 Tons, Deduct		-1,231.06	
		For >25 To 50 Tons, Deduct		-2,534.53	
		For >50 Tons, Deduct		-3,620.76	
05 12 23 00-0101		Field Applied Cold Galvanizing (05 12 23 00-0086)			
05 12 23 00-0102	SF	Brush Applied Cold Galvanizing		1.78	
05 12 23 00-0103		Metal Grinding (05 12 23 00-0086)			
		Note: For use to prepare existing metal for welding by removing of rust or scale and smoothing surface after torch cutting.			
05 12 23 00-0104	SI	Metal Grinding Up To 1/32" Thickness To Be Removed.....		1.07	
		Note: Includes rust or scale removal on metal and smoothing surface.			
05 12 23 00-0105		Lightweight Framing Steel Shapes (05 12 23)			
		Note: Includes cutting to length. Excludes fasteners or welds. When used with structural steel shapes by TON, connecting bolts or welds are considered included with structural steel tasks by TON.			
05 12 23 00-0106		Angle Iron - L (05 12 23 00-0105)			
05 12 23 00-0107		1/8" Thick (05 12 23 00-0106)			
05 12 23 00-0108	LF	1/2" x 1/2" x 1/8" Thick, Plain Steel Angle Iron.....		2.91	1.75
		For >100 To 250, Deduct		-0.18	
		For >250 To 500, Deduct		-0.25	
		For >500 To 1,000, Deduct		-0.38	
		For >1,000, Deduct		-0.51	
		For Galvanized Steel, Add		0.35	
		For 304 Stainless Steel, Add		1.60	
		For High Strength Steel (HSS), Add		0.58	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0109 LF 3/4" x 1/2" x 1/8" Thick, Plain Steel Angle Iron	3.37	1.99
For >100 To 250, Deduct	-0.20	
For >250 To 500, Deduct	-0.28	
For >500 To 1,000, Deduct	-0.43	
For >1,000, Deduct	-0.59	
For Galvanized Steel, Add	0.44	
For 304 Stainless Steel, Add	2.02	
For High Strength Steel (HSS), Add	0.67	
05 12 23 00-0110 LF 3/4" x 3/4" x 1/8" Thick, Plain Steel Angle Iron	3.81	2.20
For >100 To 250, Deduct	-0.22	
For >250 To 500, Deduct	-0.32	
For >500 To 1,000, Deduct	-0.48	
For >1,000, Deduct	-0.65	
For Galvanized Steel, Add	0.55	
For 304 Stainless Steel, Add	2.51	
For High Strength Steel (HSS), Add	0.76	
05 12 23 00-0111 LF 1" x 3/4" x 1/8" Thick, Plain Steel Angle Iron	4.27	2.44
For >100 To 250, Deduct	-0.24	
For >250 To 500, Deduct	-0.35	
For >500 To 1,000, Deduct	-0.54	
For >1,000, Deduct	-0.73	
For Galvanized Steel, Add	0.63	
For 304 Stainless Steel, Add	2.91	
For High Strength Steel (HSS), Add	0.85	
05 12 23 00-0112 LF 1" x 1" x 1/8" Thick, Plain Steel Angle Iron	4.71	2.64
For >100 To 250, Deduct	-0.26	
For >250 To 500, Deduct	-0.38	
For >500 To 1,000, Deduct	-0.59	
For >1,000, Deduct	-0.79	
For Galvanized Steel, Add	0.74	
For 304 Stainless Steel, Add	3.39	
For High Strength Steel (HSS), Add	0.94	
05 12 23 00-0113 LF 1-1/4" x 1-1/4" x 1/8" Thick, Plain Steel Angle Iron	5.64	3.10
For >100 To 250, Deduct	-0.31	
For >250 To 500, Deduct	-0.45	
For >500 To 1,000, Deduct	-0.70	
For >1,000, Deduct	-0.94	
For Galvanized Steel, Add	0.93	
For 304 Stainless Steel, Add	4.28	
For High Strength Steel (HSS), Add	1.13	
05 12 23 00-0114 LF 1-1/2" x 1" x 1/8" Thick, Plain Steel Angle Iron	5.64	3.10
For >100 To 250, Deduct	-0.31	
For >250 To 500, Deduct	-0.45	
For >500 To 1,000, Deduct	-0.70	
For >1,000, Deduct	-0.94	
For Galvanized Steel, Add	0.93	
For 304 Stainless Steel, Add	4.28	
For High Strength Steel (HSS), Add	1.13	
05 12 23 00-0115 LF 1-1/2" x 1-1/2" x 1/8" Thick, Plain Steel Angle Iron	6.25	3.33
For >100 To 250, Deduct	-0.33	
For >250 To 500, Deduct	-0.49	
For >500 To 1,000, Deduct	-0.76	
For >1,000, Deduct	-1.02	
For Galvanized Steel, Add	1.12	
For 304 Stainless Steel, Add	5.16	
For High Strength Steel (HSS), Add	1.25	
05 12 23 00-0116 LF 1-3/4" x 1-3/4" x 1/8" Thick, Plain Steel Angle Iron	6.73	3.44
For >100 To 250, Deduct	-0.34	
For >250 To 500, Deduct	-0.51	
For >500 To 1,000, Deduct	-0.80	
For >1,000, Deduct	-1.08	
For 316 Stainless Steel, Add	6.85	
For Aluminum, Add	0.39	
For Galvanized Steel, Add	1.33	
For 304 Stainless Steel, Add	6.10	
For High Strength Steel (HSS), Add	1.35	
05 12 23 00-0117 LF 2" x 1-1/2" x 1/8" Thick, Plain Steel Angle Iron	6.73	3.44
For >100 To 250, Deduct	-0.34	
For >250 To 500, Deduct	-0.51	
For >500 To 1,000, Deduct	-0.80	
For >1,000, Deduct	-1.08	
For 316 Stainless Steel, Add	6.85	
For Aluminum, Add	0.39	
For Galvanized Steel, Add	1.33	
For 304 Stainless Steel, Add	6.10	
For High Strength Steel (HSS), Add	1.35	
05 12 23 00-0118 LF 2" x 2" x 1/8" Thick, Plain Steel Angle Iron	7.21	3.56
For >100 To 250, Deduct	-0.36	
For >250 To 500, Deduct	-0.54	
For >500 To 1,000, Deduct	-0.84	
For >1,000, Deduct	-1.13	
For Galvanized Steel, Add	1.53	
For 304 Stainless Steel, Add	7.01	
For High Strength Steel (HSS), Add	1.44	
05 12 23 00-0119 3/16" Thick <small>(05 12 23 00-0106)</small>		

05 Metals

05 10 Structural Metal Framing

05 12 Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0120	LF 1" x 1" x 3/16" Thick, Plain Steel Angle Iron.....	5.44	2.79
	For >100 To 250, Deduct	-0.28	
	For >250 To 500, Deduct	-0.42	
	For >500 To 1,000, Deduct	-0.64	
	For >1,000, Deduct	-0.87	
	For 316 Stainless Steel, Add	5.50	
	For Aluminum, Add	0.31	
	For Galvanized Steel, Add	1.07	
	For 304 Stainless Steel, Add	4.90	
	For High Strength Steel (HSS), Add	1.09	
05 12 23 00-0121	LF 1-1/4" x 1-1/4" x 3/16" Thick, Plain Steel Angle Iron.....	6.57	3.28
	For >100 To 250, Deduct	-0.33	
	For >250 To 500, Deduct	-0.49	
	For >500 To 1,000, Deduct	-0.77	
	For >1,000, Deduct	-1.04	
	For Galvanized Steel, Add	1.36	
	For 304 Stainless Steel, Add	6.27	
	For High Strength Steel (HSS), Add	1.31	
05 12 23 00-0122	LF 1-1/2" x 1" x 3/16" Thick, Plain Steel Angle Iron.....	6.57	3.28
	For >100 To 250, Deduct	-0.33	
	For >250 To 500, Deduct	-0.49	
	For >500 To 1,000, Deduct	-0.77	
	For >1,000, Deduct	-1.04	
	For Galvanized Steel, Add	1.36	
	For 304 Stainless Steel, Add	6.27	
	For High Strength Steel (HSS), Add	1.31	
05 12 23 00-0123	LF 1-1/2" x 1-1/2" x 3/16" Thick, Plain Steel Angle Iron.....	7.35	3.52
	For >100 To 250, Deduct	-0.35	
	For >250 To 500, Deduct	-0.53	
	For >500 To 1,000, Deduct	-0.84	
	For >1,000, Deduct	-1.14	
	For Galvanized Steel, Add	1.66	
	For 304 Stainless Steel, Add	7.61	
	For High Strength Steel (HSS), Add	1.47	
05 12 23 00-0124	LF 1-3/4" x 1-3/4" x 3/16" Thick, Plain Steel Angle Iron.....	8.02	3.64
	For >100 To 250, Deduct	-0.36	
	For >250 To 500, Deduct	-0.57	
	For >500 To 1,000, Deduct	-0.89	
	For >1,000, Deduct	-1.21	
	For 316 Stainless Steel, Add	10.11	
	For Aluminum, Add	0.57	
	For Galvanized Steel, Add	1.96	
	For 304 Stainless Steel, Add	9.01	
	For High Strength Steel (HSS), Add	1.60	
05 12 23 00-0125	LF 2" x 1-1/2" x 3/16" Thick, Plain Steel Angle Iron.....	8.02	3.64
	For >100 To 250, Deduct	-0.36	
	For >250 To 500, Deduct	-0.57	
	For >500 To 1,000, Deduct	-0.89	
	For >1,000, Deduct	-1.21	
	For 316 Stainless Steel, Add	10.11	
	For Aluminum, Add	0.57	
	For Galvanized Steel, Add	1.96	
	For 304 Stainless Steel, Add	9.01	
	For High Strength Steel (HSS), Add	1.60	
05 12 23 00-0126	LF 2" x 2" x 3/16" Thick, Plain Steel Angle Iron.....	8.66	3.77
	For >100 To 250, Deduct	-0.38	
	For >250 To 500, Deduct	-0.59	
	For >500 To 1,000, Deduct	-0.94	
	For >1,000, Deduct	-1.28	
	For Galvanized Steel, Add	2.25	
	For 304 Stainless Steel, Add	10.35	
	For High Strength Steel (HSS), Add	1.73	
05 12 23 00-0127	LF 2-1/2" x 2" x 3/16" Thick, Plain Steel Angle Iron.....	9.47	4.04
	For >100 To 250, Deduct	-0.40	
	For >250 To 500, Deduct	-0.64	
	For >500 To 1,000, Deduct	-1.01	
	For >1,000, Deduct	-1.38	
	For Galvanized Steel, Add	2.54	
	For 304 Stainless Steel, Add	11.66	
	For High Strength Steel (HSS), Add	1.89	
05 12 23 00-0128	LF 2-1/2" x 2-1/2" x 3/16" Thick, Plain Steel Angle Iron.....	10.34	4.32
	For >100 To 250, Deduct	-0.43	
	For >250 To 500, Deduct	-0.69	
	For >500 To 1,000, Deduct	-1.09	
	For >1,000, Deduct	-1.50	
	For Galvanized Steel, Add	2.84	
	For 304 Stainless Steel, Add	13.05	
	For High Strength Steel (HSS), Add	2.07	
05 12 23 00-0129	LF 3" x 2" x 3/16" Thick, Plain Steel Angle Iron.....	10.33	4.32
	For >100 To 250, Deduct	-0.43	
	For >250 To 500, Deduct	-0.69	
	For >500 To 1,000, Deduct	-1.09	
	For >1,000, Deduct	-1.49	
	For Galvanized Steel, Add	2.83	
	For 304 Stainless Steel, Add	13.02	
	For High Strength Steel (HSS), Add	2.07	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0130 LF 3" x 2-1/2" x 3/16" Thick, Plain Steel Angle Iron	11.42	4.77
For >100 To 250, Deduct	-0.48	
For >250 To 500, Deduct	-0.76	
For >500 To 1,000, Deduct	-1.21	
For >1,000, Deduct	-1.65	
For Galvanized Steel, Add	3.13	
For 304 Stainless Steel, Add	14.39	
For High Strength Steel (HSS), Add	2.28	
05 12 23 00-0131 LF 3" x 3" x 3/16" Thick, Plain Steel Angle Iron	12.49	5.23
For >100 To 250, Deduct	-0.52	
For >250 To 500, Deduct	-0.84	
For >500 To 1,000, Deduct	-1.32	
For >1,000, Deduct	-1.81	
For Galvanized Steel, Add	3.42	
For 304 Stainless Steel, Add	15.73	
For High Strength Steel (HSS), Add	2.50	
05 12 23 00-0132 1/4" Thick (05 12 23 00-0106)		
05 12 23 00-0133 LF 1" x 1" x 1/4" Thick, Plain Steel Angle Iron	6.49	3.22
For >100 To 250, Deduct	-0.32	
For >250 To 500, Deduct	-0.48	
For >500 To 1,000, Deduct	-0.75	
For >1,000, Deduct	-1.02	
For 316 Stainless Steel, Add	7.01	
For Aluminum, Add	0.39	
For Galvanized Steel, Add	1.36	
For 304 Stainless Steel, Add	6.24	
For High Strength Steel (HSS), Add	1.30	
05 12 23 00-0134 LF 1-1/4" x 1-1/4" x 1/4" Thick, Plain Steel Angle Iron	7.45	3.46
For >100 To 250, Deduct	-0.35	
For >250 To 500, Deduct	-0.53	
For >500 To 1,000, Deduct	-0.83	
For >1,000, Deduct	-1.14	
For 316 Stainless Steel, Add	9.06	
For Aluminum, Add	0.51	
For Galvanized Steel, Add	1.75	
For 304 Stainless Steel, Add	8.07	
For High Strength Steel (HSS), Add	1.49	
05 12 23 00-0135 LF 1-1/2" x 1" x 1/4" Thick, Plain Steel Angle Iron	7.44	3.46
For >100 To 250, Deduct	-0.35	
For >250 To 500, Deduct	-0.53	
For >500 To 1,000, Deduct	-0.83	
For >1,000, Deduct	-1.14	
For Galvanized Steel, Add	1.75	
For 304 Stainless Steel, Add	8.04	
For High Strength Steel (HSS), Add	1.49	
05 12 23 00-0136 LF 1-1/2" x 1-1/2" x 1/4" Thick, Plain Steel Angle Iron	8.40	3.71
For >100 To 250, Deduct	-0.37	
For >250 To 500, Deduct	-0.58	
For >500 To 1,000, Deduct	-0.92	
For >1,000, Deduct	-1.25	
For Galvanized Steel, Add	2.14	
For 304 Stainless Steel, Add	9.83	
For High Strength Steel (HSS), Add	1.68	
05 12 23 00-0137 LF 1-3/4" x 1-3/4" x 1/4" Thick, Plain Steel Angle Iron	9.24	3.83
For >100 To 250, Deduct	-0.38	
For >250 To 500, Deduct	-0.61	
For >500 To 1,000, Deduct	-0.97	
For >1,000, Deduct	-1.33	
For 316 Stainless Steel, Add	13.22	
For Aluminum, Add	0.74	
For Galvanized Steel, Add	2.56	
For 304 Stainless Steel, Add	11.77	
For High Strength Steel (HSS), Add	1.85	
05 12 23 00-0138 LF 2" x 1" x 1/4" Thick, Plain Steel Angle Iron	8.18	3.59
For >100 To 250, Deduct	-0.35	
For >250 To 500, Deduct	-0.56	
For >500 To 1,000, Deduct	-0.88	
For >1,000, Deduct	-1.20	
For 316 Stainless Steel, Add	11.14	
For Aluminum, Add	0.63	
For Galvanized Steel, Add	2.16	
For 304 Stainless Steel, Add	9.92	
For High Strength Steel (HSS), Add	1.64	
05 12 23 00-0139 LF 2" x 1-1/2" x 1/4" Thick, Plain Steel Angle Iron	9.22	3.83
For >100 To 250, Deduct	-0.38	
For >250 To 500, Deduct	-0.61	
For >500 To 1,000, Deduct	-0.97	
For >1,000, Deduct	-1.33	
For 316 Stainless Steel, Add	13.15	
For Aluminum, Add	0.74	
For Galvanized Steel, Add	2.55	
For 304 Stainless Steel, Add	11.71	
For High Strength Steel (HSS), Add	1.84	

05	05 Metals
	05 10 Structural Metal Framing
	05 12 Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0140	LF 2" x 2" x 1/4" Thick, Plain Steel Angle Iron.....	10.01	3.96
	<i>For >100 To 250, Deduct</i>	-0.40	
	<i>For >250 To 500, Deduct</i>	-0.65	
	<i>For >500 To 1,000, Deduct</i>	-1.03	
	<i>For >1,000, Deduct</i>	-1.41	
	<i>For Galvanized Steel, Add</i>	2.94	
	<i>For 304 Stainless Steel, Add</i>	13.51	
	<i>For High Strength Steel (HSS), Add</i>	2.00	
05 12 23 00-0141	LF 2-1/2" x 2" x 1/4" Thick, Plain Steel Angle Iron	11.23	4.38
	<i>For >100 To 250, Deduct</i>	-0.44	
	<i>For >250 To 500, Deduct</i>	-0.72	
	<i>For >500 To 1,000, Deduct</i>	-1.15	
	<i>For >1,000, Deduct</i>	-1.57	
	<i>For Galvanized Steel, Add</i>	3.34	
	<i>For 304 Stainless Steel, Add</i>	15.36	
	<i>For High Strength Steel (HSS), Add</i>	2.25	
05 12 23 00-0142	LF 2-1/2" x 2-1/2" x 1/4" Thick, Plain Steel Angle Iron	12.50	4.80
	<i>For >100 To 250, Deduct</i>	-0.48	
	<i>For >250 To 500, Deduct</i>	-0.79	
	<i>For >500 To 1,000, Deduct</i>	-1.27	
	<i>For >1,000, Deduct</i>	-1.74	
	<i>For Galvanized Steel, Add</i>	3.78	
	<i>For 304 Stainless Steel, Add</i>	17.36	
	<i>For High Strength Steel (HSS), Add</i>	2.50	
05 12 23 00-0143	LF 3" x 2" x 1/4" Thick, Plain Steel Angle Iron.....	12.50	4.80
	<i>For >100 To 250, Deduct</i>	-0.48	
	<i>For >250 To 500, Deduct</i>	-0.79	
	<i>For >500 To 1,000, Deduct</i>	-1.27	
	<i>For >1,000, Deduct</i>	-1.74	
	<i>For Galvanized Steel, Add</i>	3.78	
	<i>For 304 Stainless Steel, Add</i>	17.36	
	<i>For High Strength Steel (HSS), Add</i>	2.50	
05 12 23 00-0144	LF 3" x 2-1/2" x 1/4" Thick, Plain Steel Angle Iron	13.81	5.33
	<i>For >100 To 250, Deduct</i>	-0.53	
	<i>For >250 To 500, Deduct</i>	-0.88	
	<i>For >500 To 1,000, Deduct</i>	-1.40	
	<i>For >1,000, Deduct</i>	-1.92	
	<i>For Galvanized Steel, Add</i>	4.15	
	<i>For 304 Stainless Steel, Add</i>	19.10	
	<i>For High Strength Steel (HSS), Add</i>	2.76	
05 12 23 00-0145	LF 3" x 3" x 1/4" Thick, Plain Steel Angle Iron.....	15.09	5.86
	<i>For >100 To 250, Deduct</i>	-0.59	
	<i>For >250 To 500, Deduct</i>	-0.96	
	<i>For >500 To 1,000, Deduct</i>	-1.54	
	<i>For >1,000, Deduct</i>	-2.11	
	<i>For Galvanized Steel, Add</i>	4.51	
	<i>For 304 Stainless Steel, Add</i>	20.75	
	<i>For High Strength Steel (HSS), Add</i>	3.02	
05 12 23 00-0146	LF 3-1/2" x 3" x 1/4" Thick, Plain Steel Angle Iron	16.42	6.30
	<i>For >100 To 250, Deduct</i>	-0.63	
	<i>For >250 To 500, Deduct</i>	-1.04	
	<i>For >500 To 1,000, Deduct</i>	-1.66	
	<i>For >1,000, Deduct</i>	-2.28	
	<i>For Galvanized Steel, Add</i>	4.97	
	<i>For 304 Stainless Steel, Add</i>	22.86	
	<i>For High Strength Steel (HSS), Add</i>	3.28	
05 12 23 00-0147	LF 3-1/2" x 3-1/2" x 1/4" Thick, Plain Steel Angle Iron	17.40	0.65
	<i>For >100 To 250, Deduct</i>	-0.66	
	<i>For >250 To 500, Deduct</i>	-1.09	
	<i>For >500 To 1,000, Deduct</i>	-1.75	
	<i>For >1,000, Deduct</i>	-2.40	
	<i>For Galvanized Steel, Add</i>	5.35	
	<i>For 304 Stainless Steel, Add</i>	24.60	
	<i>For High Strength Steel (HSS), Add</i>	3.48	
05 12 23 00-0148	LF 4" x 3" x 1/4" Thick, Plain Steel Angle Iron.....	17.40	6.58
	<i>For >100 To 250, Deduct</i>	-0.66	
	<i>For >250 To 500, Deduct</i>	-1.09	
	<i>For >500 To 1,000, Deduct</i>	-1.75	
	<i>For >1,000, Deduct</i>	-2.40	
	<i>For Galvanized Steel, Add</i>	5.35	
	<i>For 304 Stainless Steel, Add</i>	24.60	
	<i>For High Strength Steel (HSS), Add</i>	3.48	
05 12 23 00-0149	LF 4" x 3-1/2" x 1/4" Thick, Plain Steel Angle Iron	18.35	6.85
	<i>For >100 To 250, Deduct</i>	-0.69	
	<i>For >250 To 500, Deduct</i>	-1.14	
	<i>For >500 To 1,000, Deduct</i>	-1.83	
	<i>For >1,000, Deduct</i>	-2.52	
	<i>For Galvanized Steel, Add</i>	5.71	
	<i>For 304 Stainless Steel, Add</i>	26.25	
	<i>For High Strength Steel (HSS), Add</i>	3.67	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0150 LF 4" x 4" x 1/4" Thick, Plain Steel Angle Iron	19.36	7.14
For >100 To 250, Deduct	-0.71	
For >250 To 500, Deduct	-1.20	
For >500 To 1,000, Deduct	-1.92	
For >1,000, Deduct	-2.64	
For Galvanized Steel, Add	6.09	
For 304 Stainless Steel, Add	28.02	
For High Strength Steel (HSS), Add	3.87	
05 12 23 00-0151 LF 5" x 3" x 1/4" Thick, Plain Steel Angle Iron	19.36	7.14
For >100 To 250, Deduct	-0.71	
For >250 To 500, Deduct	-1.20	
For >500 To 1,000, Deduct	-1.92	
For >1,000, Deduct	-2.64	
For Galvanized Steel, Add	6.09	
For 304 Stainless Steel, Add	28.02	
For High Strength Steel (HSS), Add	3.87	
05 12 23 00-0152 LF 5" x 3-1/2" x 1/4" Thick, Plain Steel Angle Iron	20.43	7.53
For >100 To 250, Deduct	-0.75	
For >250 To 500, Deduct	-1.26	
For >500 To 1,000, Deduct	-2.03	
For >1,000, Deduct	-2.79	
For Galvanized Steel, Add	6.44	
For 304 Stainless Steel, Add	29.61	
For High Strength Steel (HSS), Add	4.09	
05 12 23 00-0153 5/16" Thick <small>(05 12 23 00-0106)</small>		
05 12 23 00-0154 LF 2-1/2" x 2" x 5/16" Thick, Plain Steel Angle Iron	13.49	5.09
For >100 To 250, Deduct	-0.51	
For >250 To 500, Deduct	-0.85	
For >500 To 1,000, Deduct	-1.35	
For >1,000, Deduct	-1.86	
For Galvanized Steel, Add	4.15	
For 304 Stainless Steel, Add	19.10	
For High Strength Steel (HSS), Add	2.70	
05 12 23 00-0155 LF 2-1/2" x 2-1/2" x 5/16" Thick, Plain Steel Angle Iron	14.63	5.40
For >100 To 250, Deduct	-0.54	
For >250 To 500, Deduct	-0.91	
For >500 To 1,000, Deduct	-1.45	
For >1,000, Deduct	-2.00	
For Galvanized Steel, Add	4.61	
For 304 Stainless Steel, Add	21.20	
For High Strength Steel (HSS), Add	2.93	
05 12 23 00-0156 LF 3" x 2" x 5/16" Thick, Plain Steel Angle Iron	14.63	5.40
For >100 To 250, Deduct	-0.54	
For >250 To 500, Deduct	-0.91	
For >500 To 1,000, Deduct	-1.45	
For >1,000, Deduct	-2.00	
For Galvanized Steel, Add	4.61	
For 304 Stainless Steel, Add	21.20	
For High Strength Steel (HSS), Add	2.93	
05 12 23 00-0157 LF 3" x 2-1/2" x 5/16" Thick, Plain Steel Angle Iron	16.23	5.92
For >100 To 250, Deduct	-0.59	
For >250 To 500, Deduct	-1.00	
For >500 To 1,000, Deduct	-1.60	
For >1,000, Deduct	-2.20	
For Galvanized Steel, Add	5.17	
For 304 Stainless Steel, Add	23.77	
For High Strength Steel (HSS), Add	3.25	
05 12 23 00-0158 LF 3" x 3" x 5/16" Thick, Plain Steel Angle Iron	17.66	6.44
For >100 To 250, Deduct	-0.64	
For >250 To 500, Deduct	-1.09	
For >500 To 1,000, Deduct	-1.74	
For >1,000, Deduct	-2.40	
For Galvanized Steel, Add	5.63	
For 304 Stainless Steel, Add	25.88	
For High Strength Steel (HSS), Add	3.53	
05 12 23 00-0159 LF 3-1/2" x 3" x 5/16" Thick, Plain Steel Angle Iron	18.84	6.76
For >100 To 250, Deduct	-0.68	
For >250 To 500, Deduct	-1.15	
For >500 To 1,000, Deduct	-1.84	
For >1,000, Deduct	-2.54	
For Galvanized Steel, Add	6.09	
For 304 Stainless Steel, Add	28.02	
For High Strength Steel (HSS), Add	3.77	
05 12 23 00-0160 LF 3-1/2" x 3-1/2" x 5/16" Thick, Plain Steel Angle Iron	20.15	7.09
For >100 To 250, Deduct	-0.71	
For >250 To 500, Deduct	-1.21	
For >500 To 1,000, Deduct	-1.95	
For >1,000, Deduct	-2.69	
For Galvanized Steel, Add	6.63	
For 304 Stainless Steel, Add	30.47	
For High Strength Steel (HSS), Add	4.03	

05 Metals**05 10 Structural Metal Framing****05 12 Structural Steel Framing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0161	LF 4" x 3" x 5/16" Thick, Plain Steel Angle Iron.....	20.15	7.09
	<i>For >100 To 250, Deduct</i>	-0.71	
	<i>For >250 To 500, Deduct</i>	-1.21	
	<i>For >500 To 1,000, Deduct</i>	-1.95	
	<i>For >1,000, Deduct</i>	-2.69	
	<i>For Galvanized Steel, Add</i>	6.63	
	<i>For 304 Stainless Steel, Add</i>	30.47	
	<i>For High Strength Steel (HSS), Add</i>	4.03	
05 12 23 00-0162	LF 4" x 3-1/2" x 5/16" Thick, Plain Steel Angle Iron	21.43	7.50
	<i>For >100 To 250, Deduct</i>	-0.75	
	<i>For >250 To 500, Deduct</i>	-1.29	
	<i>For >500 To 1,000, Deduct</i>	-2.07	
	<i>For >1,000, Deduct</i>	-2.86	
	<i>For Galvanized Steel, Add</i>	7.09	
	<i>For 304 Stainless Steel, Add</i>	32.58	
	<i>For High Strength Steel (HSS), Add</i>	4.29	
05 12 23 00-0163	LF 4" x 4" x 5/16" Thick, Plain Steel Angle Iron.....	22.66	7.84
	<i>For >100 To 250, Deduct</i>	-0.78	
	<i>For >250 To 500, Deduct</i>	-1.35	
	<i>For >500 To 1,000, Deduct</i>	-2.18	
	<i>For >1,000, Deduct</i>	-3.01	
	<i>For Galvanized Steel, Add</i>	7.57	
	<i>For 304 Stainless Steel, Add</i>	34.80	
	<i>For High Strength Steel (HSS), Add</i>	4.53	
05 12 23 00-0164	LF 5" x 3" x 5/16" Thick, Plain Steel Angle Iron.....	22.66	7.84
	<i>For >100 To 250, Deduct</i>	-0.78	
	<i>For >250 To 500, Deduct</i>	-1.35	
	<i>For >500 To 1,000, Deduct</i>	-2.18	
	<i>For >1,000, Deduct</i>	-3.01	
	<i>For Galvanized Steel, Add</i>	7.57	
	<i>For 304 Stainless Steel, Add</i>	34.80	
	<i>For High Strength Steel (HSS), Add</i>	4.53	
05 12 23 00-0165	LF 5" x 3-1/2" x 5/16" Thick, Plain Steel Angle Iron	23.80	8.16
	<i>For >100 To 250, Deduct</i>	-0.82	
	<i>For >250 To 500, Deduct</i>	-1.41	
	<i>For >500 To 1,000, Deduct</i>	-2.28	
	<i>For >1,000, Deduct</i>	-3.15	
	<i>For Galvanized Steel, Add</i>	8.01	
	<i>For 304 Stainless Steel, Add</i>	36.82	
	<i>For High Strength Steel (HSS), Add</i>	4.76	
05 12 23 00-0166	LF 5" x 5" x 5/16" Thick, Plain Steel Angle Iron.....	26.67	8.50
	<i>For >100 To 250, Deduct</i>	-0.85	
	<i>For >250 To 500, Deduct</i>	-1.52	
	<i>For >500 To 1,000, Deduct</i>	-2.47	
	<i>For >1,000, Deduct</i>	-3.42	
	<i>For Galvanized Steel, Add</i>	9.50	
	<i>For 304 Stainless Steel, Add</i>	43.69	
	<i>For High Strength Steel (HSS), Add</i>	5.33	
05 12 23 00-0167	LF 6" x 3-1/2" x 5/16" Thick, Plain Steel Angle Iron	26.37	8.86
	<i>For >100 To 250, Deduct</i>	-0.89	
	<i>For >250 To 500, Deduct</i>	-1.55	
	<i>For >500 To 1,000, Deduct</i>	-2.50	
	<i>For >1,000, Deduct</i>	-3.46	
	<i>For Galvanized Steel, Add</i>	9.02	
	<i>For 304 Stainless Steel, Add</i>	41.47	
	<i>For High Strength Steel (HSS), Add</i>	5.27	
05 12 23 00-0168	3/8" Thick <small>(05 12 23 00-0106)</small>		
05 12 23 00-0169	LF 3" x 2" x 3/8" Thick, Plain Steel Angle Iron.....	16.29	5.65
	<i>For >100 To 250, Deduct</i>	-0.56	
	<i>For >250 To 500, Deduct</i>	-0.97	
	<i>For >500 To 1,000, Deduct</i>	-1.57	
	<i>For >1,000, Deduct</i>	-2.16	
	<i>For Galvanized Steel, Add</i>	5.43	
	<i>For 304 Stainless Steel, Add</i>	24.97	
	<i>For High Strength Steel (HSS), Add</i>	3.26	
05 12 23 00-0170	LF 3" x 2-1/2" x 3/8" Thick, Plain Steel Angle Iron	17.99	6.11
	<i>For >100 To 250, Deduct</i>	-0.61	
	<i>For >250 To 500, Deduct</i>	-1.06	
	<i>For >500 To 1,000, Deduct</i>	-1.72	
	<i>For >1,000, Deduct</i>	-2.37	
	<i>For Galvanized Steel, Add</i>	6.09	
	<i>For 304 Stainless Steel, Add</i>	28.02	
	<i>For High Strength Steel (HSS), Add</i>	3.60	
05 12 23 00-0171	LF 3" x 3" x 3/8" Thick, Plain Steel Angle Iron.....	19.47	6.59
	<i>For >100 To 250, Deduct</i>	-0.66	
	<i>For >250 To 500, Deduct</i>	-1.15	
	<i>For >500 To 1,000, Deduct</i>	-1.85	
	<i>For >1,000, Deduct</i>	-2.56	
	<i>For Galvanized Steel, Add</i>	6.63	
	<i>For 304 Stainless Steel, Add</i>	30.47	
	<i>For High Strength Steel (HSS), Add</i>	3.89	



	Metals 05	
	Structural Metal Framing 05 10	05
	Structural Steel Framing 05 12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0172	LF		3-1/2" x 3" x 3/8" Thick, Plain Steel Angle Iron	20.78	6.77
			<i>For >100 To 250, Deduct</i>	-0.68	
			<i>For >250 To 500, Deduct</i>	-1.20	
			<i>For >500 To 1,000, Deduct</i>	-1.94	
			<i>For >1,000, Deduct</i>	-2.69	
			<i>For Galvanized Steel, Add</i>	7.29	
			<i>For 304 Stainless Steel, Add</i>	33.52	
			<i>For High Strength Steel (HSS), Add</i>	4.16	
05 12 23 00-0173	LF		3-1/2" x 3-1/2" x 3/8" Thick, Plain Steel Angle Iron	22.14	7.14
			<i>For >100 To 250, Deduct</i>	-0.71	
			<i>For >250 To 500, Deduct</i>	-1.27	
			<i>For >500 To 1,000, Deduct</i>	-2.06	
			<i>For >1,000, Deduct</i>	-2.85	
			<i>For Galvanized Steel, Add</i>	7.82	
			<i>For 304 Stainless Steel, Add</i>	35.97	
			<i>For High Strength Steel (HSS), Add</i>	4.43	
05 12 23 00-0174	LF		4" x 3" x 3/8" Thick, Plain Steel Angle Iron	22.14	7.14
			<i>For >100 To 250, Deduct</i>	-0.71	
			<i>For >250 To 500, Deduct</i>	-1.27	
			<i>For >500 To 1,000, Deduct</i>	-2.06	
			<i>For >1,000, Deduct</i>	-2.85	
			<i>For Galvanized Steel, Add</i>	7.82	
			<i>For 304 Stainless Steel, Add</i>	35.97	
			<i>For High Strength Steel (HSS), Add</i>	4.43	
05 12 23 00-0175	LF		4" x 3-1/2" x 3/8" Thick, Plain Steel Angle Iron	23.88	7.79
			<i>For >100 To 250, Deduct</i>	-0.78	
			<i>For >250 To 500, Deduct</i>	-1.37	
			<i>For >500 To 1,000, Deduct</i>	-2.23	
			<i>For >1,000, Deduct</i>	-3.09	
			<i>For Galvanized Steel, Add</i>	8.38	
			<i>For 304 Stainless Steel, Add</i>	38.50	
			<i>For High Strength Steel (HSS), Add</i>	4.78	
05 12 23 00-0176	LF		4" x 4" x 3/8" Thick, Plain Steel Angle Iron	25.23	8.01
			<i>For >100 To 250, Deduct</i>	-0.80	
			<i>For >250 To 500, Deduct</i>	-1.43	
			<i>For >500 To 1,000, Deduct</i>	-2.33	
			<i>For >1,000, Deduct</i>	-3.23	
			<i>For Galvanized Steel, Add</i>	9.02	
			<i>For 304 Stainless Steel, Add</i>	41.47	
			<i>For High Strength Steel (HSS), Add</i>	5.05	
05 12 23 00-0177	LF		5" x 3" x 3/8" Thick, Plain Steel Angle Iron	25.65	8.33
			<i>For >100 To 250, Deduct</i>	-0.83	
			<i>For >250 To 500, Deduct</i>	-1.47	
			<i>For >500 To 1,000, Deduct</i>	-2.39	
			<i>For >1,000, Deduct</i>	-3.31	
			<i>For Galvanized Steel, Add</i>	9.02	
			<i>For 304 Stainless Steel, Add</i>	41.47	
			<i>For High Strength Steel (HSS), Add</i>	5.13	
05 12 23 00-0178	LF		5" x 3-1/2" x 3/8" Thick, Plain Steel Angle Iron	27.41	8.97
			<i>For >100 To 250, Deduct</i>	-0.90	
			<i>For >250 To 500, Deduct</i>	-1.58	
			<i>For >500 To 1,000, Deduct</i>	-2.57	
			<i>For >1,000, Deduct</i>	-3.55	
			<i>For Galvanized Steel, Add</i>	9.57	
			<i>For 304 Stainless Steel, Add</i>	44.00	
			<i>For High Strength Steel (HSS), Add</i>	5.48	
05 12 23 00-0179	LF		5" x 5" x 3/8" Thick, Plain Steel Angle Iron	32.25	10.46
			<i>For >100 To 250, Deduct</i>	-1.05	
			<i>For >250 To 500, Deduct</i>	-1.85	
			<i>For >500 To 1,000, Deduct</i>	-3.01	
			<i>For >1,000, Deduct</i>	-4.16	
			<i>For Galvanized Steel, Add</i>	11.35	
			<i>For 304 Stainless Steel, Add</i>	52.18	
			<i>For High Strength Steel (HSS), Add</i>	6.45	
05 12 23 00-0180	LF		6" x 3-1/2" x 3/8" Thick, Plain Steel Angle Iron	30.33	9.72
			<i>For >100 To 250, Deduct</i>	-0.97	
			<i>For >250 To 500, Deduct</i>	-1.73	
			<i>For >500 To 1,000, Deduct</i>	-2.81	
			<i>For >1,000, Deduct</i>	-3.89	
			<i>For Galvanized Steel, Add</i>	10.77	
			<i>For 304 Stainless Steel, Add</i>	49.50	
			<i>For High Strength Steel (HSS), Add</i>	6.07	
05 12 23 00-0181	LF		6" x 4" x 3/8" Thick, Plain Steel Angle Iron	32.25	10.46
			<i>For >100 To 250, Deduct</i>	-1.05	
			<i>For >250 To 500, Deduct</i>	-1.85	
			<i>For >500 To 1,000, Deduct</i>	-3.01	
			<i>For >1,000, Deduct</i>	-4.16	
			<i>For Galvanized Steel, Add</i>	11.35	
			<i>For 304 Stainless Steel, Add</i>	52.18	
			<i>For High Strength Steel (HSS), Add</i>	6.45	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0182	LF		6" x 6" x 3/8" Thick, Plain Steel Angle Iron.....	38.90	12.55
			<i>For >100 To 250, Deduct</i>	-1.25	
			<i>For >250 To 500, Deduct</i>	-2.23	
			<i>For >500 To 1,000, Deduct</i>	-3.62	
			<i>For >1,000, Deduct</i>	-5.01	
			<i>For Galvanized Steel, Add</i>	13.75	
			<i>For 304 Stainless Steel, Add</i>	63.21	
			<i>For High Strength Steel (HSS), Add</i>	7.78	
05 12 23 00-0183	LF		7" x 4" x 3/8" Thick, Plain Steel Angle Iron.....	35.58	11.50
			<i>For >100 To 250, Deduct</i>	-1.15	
			<i>For >250 To 500, Deduct</i>	-2.04	
			<i>For >500 To 1,000, Deduct</i>	-3.31	
			<i>For >1,000, Deduct</i>	-4.59	
			<i>For Galvanized Steel, Add</i>	12.55	
			<i>For 304 Stainless Steel, Add</i>	57.68	
			<i>For High Strength Steel (HSS), Add</i>	7.12	
05 12 23 00-0184			1/2" Thick <small>(05 12 23 00-0106)</small>		
05 12 23 00-0185	LF		3" x 3" x 1/2" Thick, Plain Steel Angle Iron.....	22.96	6.73
			<i>For >100 To 250, Deduct</i>	-0.67	
			<i>For >250 To 500, Deduct</i>	-1.25	
			<i>For >500 To 1,000, Deduct</i>	-2.05	
			<i>For >1,000, Deduct</i>	-2.84	
			<i>For Galvanized Steel, Add</i>	8.67	
			<i>For 304 Stainless Steel, Add</i>	39.87	
			<i>For High Strength Steel (HSS), Add</i>	4.59	
05 12 23 00-0186	LF		4" x 3" x 1/2" Thick, Plain Steel Angle Iron.....	27.14	7.95
			<i>For >100 To 250, Deduct</i>	-0.80	
			<i>For >250 To 500, Deduct</i>	-1.47	
			<i>For >500 To 1,000, Deduct</i>	-2.42	
			<i>For >1,000, Deduct</i>	-3.36	
			<i>For Galvanized Steel, Add</i>	10.25	
			<i>For 304 Stainless Steel, Add</i>	47.11	
			<i>For High Strength Steel (HSS), Add</i>	5.43	
05 12 23 00-0187	LF		4" x 3-1/2" x 1/2" Thick, Plain Steel Angle Iron	29.08	8.52
			<i>For >100 To 250, Deduct</i>	-0.85	
			<i>For >250 To 500, Deduct</i>	-1.58	
			<i>For >500 To 1,000, Deduct</i>	-2.59	
			<i>For >1,000, Deduct</i>	-3.60	
			<i>For Galvanized Steel, Add</i>	10.99	
			<i>For 304 Stainless Steel, Add</i>	50.50	
			<i>For High Strength Steel (HSS), Add</i>	5.82	
05 12 23 00-0188	LF		4" x 4" x 1/2" Thick, Plain Steel Angle Iron.....	31.29	9.17
			<i>For >100 To 250, Deduct</i>	-0.92	
			<i>For >250 To 500, Deduct</i>	-1.70	
			<i>For >500 To 1,000, Deduct</i>	-2.79	
			<i>For >1,000, Deduct</i>	-3.88	
			<i>For Galvanized Steel, Add</i>	11.82	
			<i>For 304 Stainless Steel, Add</i>	54.32	
			<i>For High Strength Steel (HSS), Add</i>	6.26	
05 12 23 00-0189	LF		5" x 3" x 1/2" Thick, Plain Steel Angle Iron.....	31.29	9.17
			<i>For >100 To 250, Deduct</i>	-0.92	
			<i>For >250 To 500, Deduct</i>	-1.70	
			<i>For >500 To 1,000, Deduct</i>	-2.79	
			<i>For >1,000, Deduct</i>	-3.88	
			<i>For Galvanized Steel, Add</i>	11.82	
			<i>For 304 Stainless Steel, Add</i>	54.32	
			<i>For High Strength Steel (HSS), Add</i>	6.26	
05 12 23 00-0190	LF		5" x 3-1/2" x 1/2" Thick, Plain Steel Angle Iron	33.23	9.74
			<i>For >100 To 250, Deduct</i>	-0.97	
			<i>For >250 To 500, Deduct</i>	-1.80	
			<i>For >500 To 1,000, Deduct</i>	-2.96	
			<i>For >1,000, Deduct</i>	-4.11	
			<i>For Galvanized Steel, Add</i>	12.56	
			<i>For 304 Stainless Steel, Add</i>	57.71	
			<i>For High Strength Steel (HSS), Add</i>	6.65	
05 12 23 00-0191	LF		5" x 5" x 1/2" Thick, Plain Steel Angle Iron.....	39.59	11.60
			<i>For >100 To 250, Deduct</i>	-1.16	
			<i>For >250 To 500, Deduct</i>	-2.15	
			<i>For >500 To 1,000, Deduct</i>	-3.53	
			<i>For >1,000, Deduct</i>	-4.90	
			<i>For Galvanized Steel, Add</i>	14.95	
			<i>For 304 Stainless Steel, Add</i>	68.74	
			<i>For High Strength Steel (HSS), Add</i>	7.92	
05 12 23 00-0192	LF		6" x 4" x 1/2" Thick, Plain Steel Angle Iron.....	39.59	11.60
			<i>For >100 To 250, Deduct</i>	-1.16	
			<i>For >250 To 500, Deduct</i>	-2.15	
			<i>For >500 To 1,000, Deduct</i>	-3.53	
			<i>For >1,000, Deduct</i>	-4.90	
			<i>For Galvanized Steel, Add</i>	14.95	
			<i>For 304 Stainless Steel, Add</i>	68.74	
			<i>For High Strength Steel (HSS), Add</i>	7.92	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0193 LF 6" x 6" x 1/2" Thick, Plain Steel Angle Iron	47.89	14.03
For >100 To 250, Deduct	-1.40	
For >250 To 500, Deduct	-2.60	
For >500 To 1,000, Deduct	-4.27	
For >1,000, Deduct	-5.93	
For Galvanized Steel, Add	18.09	
For 304 Stainless Steel, Add	83.13	
For High Strength Steel (HSS), Add	9.58	
05 12 23 00-0194 LF 7" x 4" x 1/2" Thick, Plain Steel Angle Iron	43.73	12.82
For >100 To 250, Deduct	-1.28	
For >250 To 500, Deduct	-2.38	
For >500 To 1,000, Deduct	-3.90	
For >1,000, Deduct	-5.42	
For Galvanized Steel, Add	16.52	
For 304 Stainless Steel, Add	75.92	
For High Strength Steel (HSS), Add	8.75	
05 12 23 00-0195 LF 8" x 4" x 1/2" Thick, Plain Steel Angle Iron	47.89	14.03
For >100 To 250, Deduct	-1.40	
For >250 To 500, Deduct	-2.60	
For >500 To 1,000, Deduct	-4.27	
For >1,000, Deduct	-5.93	
For Galvanized Steel, Add	18.09	
For 304 Stainless Steel, Add	83.13	
For High Strength Steel (HSS), Add	9.58	
05 12 23 00-0196 LF 8" x 6" x 1/2" Thick, Plain Steel Angle Iron	56.22	16.48
For >100 To 250, Deduct	-1.65	
For >250 To 500, Deduct	-3.05	
For >500 To 1,000, Deduct	-5.01	
For >1,000, Deduct	-6.96	
For Galvanized Steel, Add	21.24	
For 304 Stainless Steel, Add	97.61	
For High Strength Steel (HSS), Add	11.24	
05 12 23 00-0197 LF 8" x 8" x 1/2" Thick, Plain Steel Angle Iron	64.51	18.91
For >100 To 250, Deduct	-1.89	
For >250 To 500, Deduct	-3.50	
For >500 To 1,000, Deduct	-5.75	
For >1,000, Deduct	-7.99	
For Galvanized Steel, Add	24.37	
For 304 Stainless Steel, Add	112.01	
For High Strength Steel (HSS), Add	12.90	
05 12 23 00-0198 5/8" Thick (05 12 23 00-0106)		
05 12 23 00-0199 LF 4" x 4" x 5/8" Thick, Plain Steel Angle Iron	37.38	10.51
For >100 To 250, Deduct	-1.05	
For >250 To 500, Deduct	-1.99	
For >500 To 1,000, Deduct	-3.27	
For >1,000, Deduct	-4.55	
For Galvanized Steel, Add	14.49	
For High Strength Steel (HSS), Add	7.48	
05 12 23 00-0200 LF 5" x 3-1/2" x 5/8" Thick, Plain Steel Angle Iron	40.02	11.25
For >100 To 250, Deduct	-1.13	
For >250 To 500, Deduct	-2.13	
For >500 To 1,000, Deduct	-3.50	
For >1,000, Deduct	-4.88	
For Galvanized Steel, Add	15.51	
For High Strength Steel (HSS), Add	8.00	
05 12 23 00-0201 LF 5" x 5" x 5/8" Thick, Plain Steel Angle Iron	47.62	13.39
For >100 To 250, Deduct	-1.34	
For >250 To 500, Deduct	-2.53	
For >500 To 1,000, Deduct	-4.17	
For >1,000, Deduct	-5.80	
For Galvanized Steel, Add	18.46	
For High Strength Steel (HSS), Add	9.52	
05 12 23 00-0202 LF 6" x 4" x 5/8" Thick, Plain Steel Angle Iron	47.62	13.39
For >100 To 250, Deduct	-1.34	
For >250 To 500, Deduct	-2.53	
For >500 To 1,000, Deduct	-4.17	
For >1,000, Deduct	-5.80	
For Galvanized Steel, Add	18.46	
For High Strength Steel (HSS), Add	9.52	
05 12 23 00-0203 LF 6" x 6" x 5/8" Thick, Plain Steel Angle Iron	57.63	16.20
For >100 To 250, Deduct	-1.62	
For >250 To 500, Deduct	-3.06	
For >500 To 1,000, Deduct	-5.04	
For >1,000, Deduct	-7.02	
For Galvanized Steel, Add	22.34	
For High Strength Steel (HSS), Add	11.53	
05 12 23 00-0204 LF 7" x 4" x 5/8" Thick, Plain Steel Angle Iron	52.62	14.80
For >100 To 250, Deduct	-1.48	
For >250 To 500, Deduct	-2.79	
For >500 To 1,000, Deduct	-4.60	
For >1,000, Deduct	-6.41	
For Galvanized Steel, Add	20.40	
For High Strength Steel (HSS), Add	10.52	

05	05 Metals
	05 10 Structural Metal Framing
	05 12 Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0205	LF 8" x 6" x 5/8" Thick, Plain Steel Angle Iron.....	67.85	19.08
	<i>For >100 To 250, Deduct</i>	-1.91	
	<i>For >250 To 500, Deduct</i>	-3.60	
	<i>For >500 To 1,000, Deduct</i>	-5.94	
	<i>For >1,000, Deduct</i>	-8.27	
	<i>For Galvanized Steel, Add</i>	26.30	
	<i>For High Strength Steel (HSS), Add</i>	13.57	
05 12 23 00-0206	LF 8" x 8" x 5/8" Thick, Plain Steel Angle Iron.....	77.87	21.89
	<i>For >100 To 250, Deduct</i>	-2.19	
	<i>For >250 To 500, Deduct</i>	-4.14	
	<i>For >500 To 1,000, Deduct</i>	-6.81	
	<i>For >1,000, Deduct</i>	-9.49	
	<i>For Galvanized Steel, Add</i>	30.18	
	<i>For High Strength Steel (HSS), Add</i>	15.57	
05 12 23 00-0207	3/4" Thick (05 12 23 00-0106)		
05 12 23 00-0208	LF 4" x 4" x 3/4" Thick, Plain Steel Angle Iron.....	43.03	11.61
	<i>For >100 To 250, Deduct</i>	-1.16	
	<i>For >250 To 500, Deduct</i>	-2.24	
	<i>For >500 To 1,000, Deduct</i>	-3.70	
	<i>For >1,000, Deduct</i>	-5.16	
	<i>For Galvanized Steel, Add</i>	17.08	
	<i>For High Strength Steel (HSS), Add</i>	8.61	
05 12 23 00-0209	LF 5" x 3-1/2" x 3/4" Thick, Plain Steel Angle Iron	46.04	12.43
	<i>For >100 To 250, Deduct</i>	-1.24	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500 To 1,000, Deduct</i>	-3.96	
	<i>For >1,000, Deduct</i>	-5.52	
	<i>For Galvanized Steel, Add</i>	18.27	
	<i>For High Strength Steel (HSS), Add</i>	9.21	
05 12 23 00-0210	LF 5" x 5" x 3/4" Thick, Plain Steel Angle Iron.....	54.89	14.82
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-2.85	
	<i>For >500 To 1,000, Deduct</i>	-4.72	
	<i>For >1,000, Deduct</i>	-6.59	
	<i>For Galvanized Steel, Add</i>	21.79	
	<i>For High Strength Steel (HSS), Add</i>	10.98	
05 12 23 00-0211	LF 6" x 4" x 3/4" Thick, Plain Steel Angle Iron.....	54.89	14.82
	<i>For >100 To 250, Deduct</i>	-1.48	
	<i>For >250 To 500, Deduct</i>	-2.85	
	<i>For >500 To 1,000, Deduct</i>	-4.72	
	<i>For >1,000, Deduct</i>	-6.59	
	<i>For Galvanized Steel, Add</i>	21.79	
	<i>For High Strength Steel (HSS), Add</i>	10.98	
05 12 23 00-0212	LF 6" x 6" x 3/4" Thick, Plain Steel Angle Iron.....	66.74	18.01
	<i>For >100 To 250, Deduct</i>	-1.80	
	<i>For >250 To 500, Deduct</i>	-3.47	
	<i>For >500 To 1,000, Deduct</i>	-5.74	
	<i>For >1,000, Deduct</i>	-8.01	
	<i>For Galvanized Steel, Add</i>	26.49	
	<i>For High Strength Steel (HSS), Add</i>	13.35	
05 12 23 00-0213	LF 7" x 4" x 3/4" Thick, Plain Steel Angle Iron.....	60.93	16.45
	<i>For >100 To 250, Deduct</i>	-1.64	
	<i>For >250 To 500, Deduct</i>	-3.17	
	<i>For >500 To 1,000, Deduct</i>	-5.24	
	<i>For >1,000, Deduct</i>	-7.31	
	<i>For Galvanized Steel, Add</i>	24.18	
	<i>For High Strength Steel (HSS), Add</i>	12.19	
05 12 23 00-0214	LF 8" x 4" x 3/4" Thick, Plain Steel Angle Iron.....	66.74	18.01
	<i>For >100 To 250, Deduct</i>	-1.80	
	<i>For >250 To 500, Deduct</i>	-3.47	
	<i>For >500 To 1,000, Deduct</i>	-5.74	
	<i>For >1,000, Deduct</i>	-8.01	
	<i>For Galvanized Steel, Add</i>	26.49	
	<i>For High Strength Steel (HSS), Add</i>	13.35	
05 12 23 00-0215	LF 8" x 6" x 3/4" Thick, Plain Steel Angle Iron.....	78.61	21.21
	<i>For >100 To 250, Deduct</i>	-2.12	
	<i>For >250 To 500, Deduct</i>	-4.09	
	<i>For >500 To 1,000, Deduct</i>	-6.76	
	<i>For >1,000, Deduct</i>	-9.43	
	<i>For Galvanized Steel, Add</i>	31.20	
	<i>For High Strength Steel (HSS), Add</i>	15.72	
05 12 23 00-0216	LF 8" x 8" x 3/4" Thick, Plain Steel Angle Iron.....	90.46	24.42
	<i>For >100 To 250, Deduct</i>	-2.44	
	<i>For >250 To 500, Deduct</i>	-4.70	
	<i>For >500 To 1,000, Deduct</i>	-7.78	
	<i>For >1,000, Deduct</i>	-10.85	
	<i>For Galvanized Steel, Add</i>	35.90	
	<i>For High Strength Steel (HSS), Add</i>	18.09	
05 12 23 00-0217	7/8" Thick (05 12 23 00-0106)		



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0218 LF 5" x 5" x 7/8" Thick, Plain Steel Angle Iron	61.72	15.93
For >100 To 250, Deduct	-1.59	
For >250 To 500, Deduct	-3.14	
For >500 To 1,000, Deduct	-5.21	
For >1,000, Deduct	-7.28	
For Galvanized Steel, Add	25.10	
For High Strength Steel (HSS), Add	12.34	
05 12 23 00-0219 LF 6" x 4" x 7/8" Thick, Plain Steel Angle Iron	61.72	15.93
For >100 To 250, Deduct	-1.59	
For >250 To 500, Deduct	-3.14	
For >500 To 1,000, Deduct	-5.21	
For >1,000, Deduct	-7.28	
For Galvanized Steel, Add	25.10	
For High Strength Steel (HSS), Add	12.34	
05 12 23 00-0220 LF 6" x 6" x 7/8" Thick, Plain Steel Angle Iron	75.13	19.39
For >100 To 250, Deduct	-1.94	
For >250 To 500, Deduct	-3.82	
For >500 To 1,000, Deduct	-6.34	
For >1,000, Deduct	-8.87	
For Galvanized Steel, Add	30.55	
For High Strength Steel (HSS), Add	15.03	
05 12 23 00-0221 LF 8" x 6" x 7/8" Thick, Plain Steel Angle Iron	88.75	22.90
For >100 To 250, Deduct	-2.29	
For >250 To 500, Deduct	-4.51	
For >500 To 1,000, Deduct	-7.49	
For >1,000, Deduct	-10.47	
For Galvanized Steel, Add	36.09	
For High Strength Steel (HSS), Add	17.75	
05 12 23 00-0222 LF 8" x 8" x 7/8" Thick, Plain Steel Angle Iron	102.12	26.36
For >100 To 250, Deduct	-2.64	
For >250 To 500, Deduct	-5.19	
For >500 To 1,000, Deduct	-8.62	
For >1,000, Deduct	-12.05	
For Galvanized Steel, Add	41.53	
For High Strength Steel (HSS), Add	20.42	
05 12 23 00-0223 Bar Channel (05 12 23 00-0105)		
05 12 23 00-0224 LF 1" x 1/2" x 1/8" Thick Bar Channel.....	5.14	
For 316 Stainless Steel, Add	5.18	
For Aluminum, Add	0.29	
For Galvanized Steel, Add	1.00	
For 304 Stainless Steel, Add	4.62	
For High Strength Steel (HSS), Add	1.03	
05 12 23 00-0225 LF 1-1/4" x 1/2" x 1/8" Thick Bar Channel.....	5.77	
For 316 Stainless Steel, Add	6.21	
For Aluminum, Add	0.35	
For Galvanized Steel, Add	1.20	
For 304 Stainless Steel, Add	5.53	
For High Strength Steel (HSS), Add	1.15	
05 12 23 00-0226 LF 1-1/2" x 1/2" x 1/8" Thick Bar Channel.....	6.29	
For 316 Stainless Steel, Add	6.88	
For Aluminum, Add	0.39	
For Galvanized Steel, Add	1.33	
For 304 Stainless Steel, Add	6.13	
For High Strength Steel (HSS), Add	1.26	
05 12 23 00-0227 LF 1-1/2" x 3/4" x 1/8" Thick Bar Channel.....	7.20	
For 316 Stainless Steel, Add	7.17	
For Aluminum, Add	0.40	
For Galvanized Steel, Add	1.39	
For 304 Stainless Steel, Add	6.38	
For High Strength Steel (HSS), Add	1.44	
05 12 23 00-0228 LF 2" x 1/2" x 1/8" Thick Bar Channel.....	7.70	
For 316 Stainless Steel, Add	8.77	
For Aluminum, Add	0.49	
For Galvanized Steel, Add	1.70	
For 304 Stainless Steel, Add	7.81	
05 12 23 00-0229 LF 2" x 1" x 1/8" Thick Bar Channel.....	10.13	
For 316 Stainless Steel, Add	9.79	
For Aluminum, Add	0.55	
For Galvanized Steel, Add	1.90	
For 304 Stainless Steel, Add	8.72	
05 12 23 00-0230 Channels - C (05 12 23 00-0105)		
05 12 23 00-0231 LF C2 x 1.78 - 2" Wide Channel	8.42	4.36
For >100 To 250, Deduct	-0.44	
For >250 To 500, Deduct	-0.65	
For >500 To 1,000, Deduct	-1.00	
For >1,000, Deduct	-1.36	
For 316 Stainless Steel, Add	8.32	
For Aluminum, Add	0.47	
For Galvanized Steel, Add	1.61	
For 304 Stainless Steel, Add	7.41	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0232 LF C3 x 4.1 - 3" Wide Channel.....	14.47	6.27
For >100 To 250, Deduct	-0.63	
For >250 To 500, Deduct	-0.99	
For >500 To 1,000, Deduct	-1.56	
For >1,000, Deduct	-2.13	
For 316 Stainless Steel, Add	19.52	
For Aluminum, Add	1.10	
For Galvanized Steel, Add	3.78	
For 304 Stainless Steel, Add	17.39	
05 12 23 00-0233 LF C3 x 5 - 3" Wide Channel.....	17.65	7.66
For >100 To 250, Deduct	-0.77	
For >250 To 500, Deduct	-1.21	
For >500 To 1,000, Deduct	-1.90	
For >1,000, Deduct	-2.60	
For 316 Stainless Steel, Add	23.81	
For Aluminum, Add	1.34	
For Galvanized Steel, Add	4.61	
For 304 Stainless Steel, Add	21.20	
05 12 23 00-0234 LF C3 x 6 - 3" Wide Channel.....	21.18	9.19
For >100 To 250, Deduct	-0.92	
For >250 To 500, Deduct	-1.45	
For >500 To 1,000, Deduct	-2.28	
For >1,000, Deduct	-3.12	
For 316 Stainless Steel, Add	28.58	
For Aluminum, Add	1.61	
For Galvanized Steel, Add	5.54	
For 304 Stainless Steel, Add	25.45	
05 12 23 00-0235 LF C4 x 5.4 - 4" Wide Channel.....	18.08	7.53
For >100 To 250, Deduct	-0.75	
For >250 To 500, Deduct	-1.21	
For >500 To 1,000, Deduct	-1.91	
For >1,000, Deduct	-2.61	
For 316 Stainless Steel, Add	25.73	
For Aluminum, Add	1.45	
For Galvanized Steel, Add	4.98	
For 304 Stainless Steel, Add	22.91	
05 12 23 00-0236 LF C4 x 7.25 - 4" Wide Channel.....	24.27	10.11
For >100 To 250, Deduct	-1.01	
For >250 To 500, Deduct	-1.62	
For >500 To 1,000, Deduct	-2.56	
For >1,000, Deduct	-3.51	
For 316 Stainless Steel, Add	34.53	
For Aluminum, Add	1.94	
For Galvanized Steel, Add	6.69	
For 304 Stainless Steel, Add	30.75	
05 12 23 00-0237 LF C5 x 6.7 - 5" Wide Channel.....	21.68	8.78
For >100 To 250, Deduct	-0.88	
For >250 To 500, Deduct	-1.42	
For >500 To 1,000, Deduct	-2.26	
For >1,000, Deduct	-3.09	
For 316 Stainless Steel, Add	31.90	
For Aluminum, Add	1.79	
For Galvanized Steel, Add	6.18	
For 304 Stainless Steel, Add	28.41	
05 12 23 00-0238 LF C5 x 9 - 5" Wide Channel.....	29.13	11.80
For >100 To 250, Deduct	-1.18	
For >250 To 500, Deduct	-1.91	
For >500 To 1,000, Deduct	-3.03	
For >1,000, Deduct	-4.15	
For 316 Stainless Steel, Add	42.88	
For Aluminum, Add	2.41	
For Galvanized Steel, Add	8.31	
For 304 Stainless Steel, Add	38.19	
05 12 23 00-0239 LF C6 x 8.2 - 6" Wide Channel.....	26.27	10.55
For >100 To 250, Deduct	-1.05	
For >250 To 500, Deduct	-1.71	
For >500 To 1,000, Deduct	-2.72	
For >1,000, Deduct	-3.73	
For 316 Stainless Steel, Add	39.07	
For Aluminum, Add	2.20	
For Galvanized Steel, Add	7.57	
For 304 Stainless Steel, Add	34.80	
05 12 23 00-0240 LF C6 x 10.5 - 6" Wide Channel.....	33.63	13.50
For >100 To 250, Deduct	-1.35	
For >250 To 500, Deduct	-2.19	
For >500 To 1,000, Deduct	-3.48	
For >1,000, Deduct	-4.77	
For 316 Stainless Steel, Add	50.02	
For Aluminum, Add	2.81	
For Galvanized Steel, Add	9.69	
For 304 Stainless Steel, Add	44.55	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0241 LF C6 x 13 - 6" Wide Channel	41.64	16.71
For >100 To 250, Deduct	-1.67	
For >250 To 500, Deduct	-2.71	
For >500 To 1,000, Deduct	-4.31	
For >1,000, Deduct	-5.91	
For 316 Stainless Steel, Add	61.92	
For Aluminum, Add	3.48	
For Galvanized Steel, Add	12.00	
For 304 Stainless Steel, Add	55.15	
05 12 23 00-0242 LF C7 x 9.8 - 7" Wide Channel	31.33	12.55
For >100 To 250, Deduct	-1.26	
For >250 To 500, Deduct	-2.04	
For >500 To 1,000, Deduct	-3.24	
For >1,000, Deduct	-4.44	
For 316 Stainless Steel, Add	46.69	
For Aluminum, Add	2.63	
For Galvanized Steel, Add	9.05	
For 304 Stainless Steel, Add	41.58	
05 12 23 00-0243 LF C7 x 12.25 - 7" Wide Channel	39.15	15.68
For >100 To 250, Deduct	-1.57	
For >250 To 500, Deduct	-2.55	
For >500 To 1,000, Deduct	-4.05	
For >1,000, Deduct	-5.55	
For 316 Stainless Steel, Add	58.34	
For Aluminum, Add	3.28	
For Galvanized Steel, Add	11.30	
For 304 Stainless Steel, Add	51.96	
05 12 23 00-0244 LF C7 x 14.75 - 7" Wide Channel	47.14	18.89
For >100 To 250, Deduct	-1.89	
For >250 To 500, Deduct	-3.07	
For >500 To 1,000, Deduct	-4.88	
For >1,000, Deduct	-6.68	
For 316 Stainless Steel, Add	70.24	
For Aluminum, Add	3.95	
For Galvanized Steel, Add	13.61	
For 304 Stainless Steel, Add	62.56	
05 12 23 00-0245 LF C8 x 11.5 - 8" Wide Channel	35.53	13.81
For >100 To 250, Deduct	-1.38	
For >250 To 500, Deduct	-2.27	
For >500 To 1,000, Deduct	-3.62	
For >1,000, Deduct	-4.97	
For 316 Stainless Steel, Add	54.78	
For Aluminum, Add	3.08	
For Galvanized Steel, Add	10.61	
For 304 Stainless Steel, Add	48.79	
05 12 23 00-0246 LF C8 x 13.75 - 8" Wide Channel	42.48	16.51
For >100 To 250, Deduct	-1.65	
For >250 To 500, Deduct	-2.71	
For >500 To 1,000, Deduct	-4.33	
For >1,000, Deduct	-5.94	
For 316 Stainless Steel, Add	65.50	
For Aluminum, Add	3.68	
For Galvanized Steel, Add	12.69	
For 304 Stainless Steel, Add	58.34	
05 12 23 00-0247 LF C8 x 18.75 - 8" Wide Channel	57.93	22.51
For >100 To 250, Deduct	-2.25	
For >250 To 500, Deduct	-3.70	
For >500 To 1,000, Deduct	-5.90	
For >1,000, Deduct	-8.10	
For 316 Stainless Steel, Add	89.31	
For Aluminum, Add	5.02	
For Galvanized Steel, Add	17.30	
For 304 Stainless Steel, Add	79.54	
05 12 23 00-0248 LF C9 x 13.4 - 9" Wide Channel	41.40	16.09
For >100 To 250, Deduct	-1.61	
For >250 To 500, Deduct	-2.64	
For >500 To 1,000, Deduct	-4.22	
For >1,000, Deduct	-5.79	
For 316 Stainless Steel, Add	63.84	
For Aluminum, Add	3.59	
For Galvanized Steel, Add	12.37	
For 304 Stainless Steel, Add	56.86	
05 12 23 00-0249 LF C9 x 15 - 9" Wide Channel	46.34	18.01
For >100 To 250, Deduct	-1.80	
For >250 To 500, Deduct	-2.96	
For >500 To 1,000, Deduct	-4.72	
For >1,000, Deduct	-6.48	
For 316 Stainless Steel, Add	71.46	
For Aluminum, Add	4.02	
For Galvanized Steel, Add	13.84	
For 304 Stainless Steel, Add	63.64	

05 Metals

05 10 Structural Metal Framing

05 12 Structural Steel Framing



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 12 23 00-0250	LF	C9 x 20 - 9" Wide Channel.....	61.79	24.01
		<i>For >100 To 250, Deduct</i>	-2.40	
		<i>For >250 To 500, Deduct</i>	-3.95	
		<i>For >500 To 1,000, Deduct</i>	-6.29	
		<i>For >1,000, Deduct</i>	-8.64	
		<i>For 316 Stainless Steel, Add</i>	95.26	
		<i>For Aluminum, Add</i>	5.36	
		<i>For Galvanized Steel, Add</i>	18.46	
		<i>For 304 Stainless Steel, Add</i>	84.84	
05 12 23 00-0251	LF	C10 x 15.3 - 10" Wide Channel.....	47.26	18.36
		<i>For >100 To 250, Deduct</i>	-1.84	
		<i>For >250 To 500, Deduct</i>	-3.02	
		<i>For >500 To 1,000, Deduct</i>	-4.81	
		<i>For >1,000, Deduct</i>	-6.61	
		<i>For 316 Stainless Steel, Add</i>	72.86	
		<i>For Aluminum, Add</i>	4.10	
		<i>For Galvanized Steel, Add</i>	14.12	
		<i>For 304 Stainless Steel, Add</i>	64.89	
05 12 23 00-0252	LF	C10 x 20 - 10" Wide Channel.....	61.79	24.01
		<i>For >100 To 250, Deduct</i>	-2.40	
		<i>For >250 To 500, Deduct</i>	-3.95	
		<i>For >500 To 1,000, Deduct</i>	-6.29	
		<i>For >1,000, Deduct</i>	-8.64	
		<i>For 316 Stainless Steel, Add</i>	95.26	
		<i>For Aluminum, Add</i>	5.36	
		<i>For Galvanized Steel, Add</i>	18.46	
		<i>For 304 Stainless Steel, Add</i>	84.84	
05 12 23 00-0253	LF	C10 x 25 - 10" Wide Channel.....	77.23	30.02
		<i>For >100 To 250, Deduct</i>	-3.00	
		<i>For >250 To 500, Deduct</i>	-4.93	
		<i>For >500 To 1,000, Deduct</i>	-7.86	
		<i>For >1,000, Deduct</i>	-10.79	
		<i>For 316 Stainless Steel, Add</i>	119.07	
		<i>For Aluminum, Add</i>	6.70	
		<i>For Galvanized Steel, Add</i>	23.07	
		<i>For 304 Stainless Steel, Add</i>	106.05	
05 12 23 00-0254	LF	C10 x 30 - 10" Wide Channel.....	92.67	36.01
		<i>For >100 To 250, Deduct</i>	-3.60	
		<i>For >250 To 500, Deduct</i>	-5.92	
		<i>For >500 To 1,000, Deduct</i>	-9.44	
		<i>For >1,000, Deduct</i>	-12.95	
		<i>For 316 Stainless Steel, Add</i>	142.88	
		<i>For Aluminum, Add</i>	8.04	
		<i>For Galvanized Steel, Add</i>	27.68	
		<i>For 304 Stainless Steel, Add</i>	127.25	
05 12 23 00-0255	LF	C12 x 20.7 - 12" Wide Channel.....	63.95	24.86
		<i>For >100 To 250, Deduct</i>	-2.49	
		<i>For >250 To 500, Deduct</i>	-4.08	
		<i>For >500 To 1,000, Deduct</i>	-6.51	
		<i>For >1,000, Deduct</i>	-8.94	
		<i>For 316 Stainless Steel, Add</i>	98.59	
		<i>For Aluminum, Add</i>	5.55	
		<i>For Galvanized Steel, Add</i>	19.10	
		<i>For 304 Stainless Steel, Add</i>	87.81	
05 12 23 00-0256	LF	C12 x 25 - 12" Wide Channel.....	77.23	30.02
		<i>For >100 To 250, Deduct</i>	-3.00	
		<i>For >250 To 500, Deduct</i>	-4.93	
		<i>For >500 To 1,000, Deduct</i>	-7.86	
		<i>For >1,000, Deduct</i>	-10.79	
		<i>For 316 Stainless Steel, Add</i>	119.07	
		<i>For Aluminum, Add</i>	6.70	
		<i>For Galvanized Steel, Add</i>	23.07	
		<i>For 304 Stainless Steel, Add</i>	106.05	
05 12 23 00-0257	LF	C12 x 30 - 12" Wide Channel.....	92.67	36.01
		<i>For >100 To 250, Deduct</i>	-3.60	
		<i>For >250 To 500, Deduct</i>	-5.92	
		<i>For >500 To 1,000, Deduct</i>	-9.44	
		<i>For >1,000, Deduct</i>	-12.95	
		<i>For 316 Stainless Steel, Add</i>	142.88	
		<i>For Aluminum, Add</i>	8.04	
		<i>For Galvanized Steel, Add</i>	27.68	
		<i>For 304 Stainless Steel, Add</i>	127.25	
05 12 23 00-0258	LF	C15 x 33.9 - 15" Wide Channel.....	104.73	40.70
		<i>For >100 To 250, Deduct</i>	-4.07	
		<i>For >250 To 500, Deduct</i>	-6.69	
		<i>For >500 To 1,000, Deduct</i>	-10.66	
		<i>For >1,000, Deduct</i>	-14.64	
		<i>For 316 Stainless Steel, Add</i>	161.47	
		<i>For Aluminum, Add</i>	9.08	
		<i>For Galvanized Steel, Add</i>	31.29	
		<i>For 304 Stainless Steel, Add</i>	143.81	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0259 LF C15 x 40 - 15" Wide Channel	123.57	48.02
For >100 To 250, Deduct	-4.80	
For >250 To 500, Deduct	-7.89	
For >500 To 1,000, Deduct	-12.58	
For >1,000, Deduct	-17.27	
For 316 Stainless Steel, Add	190.53	
For Aluminum, Add	10.72	
For Galvanized Steel, Add	36.91	
For 304 Stainless Steel, Add	169.69	
05 12 23 00-0260 LF C15 x 50 - 15" Wide Channel	154.46	60.02
For >100 To 250, Deduct	-6.00	
For >250 To 500, Deduct	-9.86	
For >500 To 1,000, Deduct	-15.73	
For >1,000, Deduct	-21.59	
For 316 Stainless Steel, Add	238.14	
For Aluminum, Add	13.40	
For Galvanized Steel, Add	46.14	
For 304 Stainless Steel, Add	212.10	
05 12 23 00-0261 Miscellaneous Channels - MC <small>(05 12 23 00-0105)</small>		
05 12 23 00-0262 LF MC6 x 12 - 6" Wide Channel	38.44	15.43
For >100 To 250, Deduct	-1.54	
For >250 To 500, Deduct	-2.50	
For >500 To 1,000, Deduct	-3.98	
For >1,000, Deduct	-5.46	
For 316 Stainless Steel, Add	57.15	
For Aluminum, Add	3.21	
For Galvanized Steel, Add	11.07	
For 304 Stainless Steel, Add	50.90	
05 12 23 00-0263 LF MC6 x 15.1 - 6" Wide Channel	48.37	19.41
For >100 To 250, Deduct	-1.94	
For >250 To 500, Deduct	-3.15	
For >500 To 1,000, Deduct	-5.01	
For >1,000, Deduct	-6.86	
For 316 Stainless Steel, Add	71.94	
For Aluminum, Add	4.05	
For Galvanized Steel, Add	13.94	
For 304 Stainless Steel, Add	64.07	
05 12 23 00-0264 LF MC6 x 15.3 - 6" Wide Channel	49.00	19.67
For >100 To 250, Deduct	-1.97	
For >250 To 500, Deduct	-3.19	
For >500 To 1,000, Deduct	-5.07	
For >1,000, Deduct	-6.95	
For 316 Stainless Steel, Add	72.86	
For Aluminum, Add	4.10	
For Galvanized Steel, Add	14.12	
For 304 Stainless Steel, Add	64.89	
05 12 23 00-0265 LF MC6 x 16.3 - 6" Wide Channel	52.21	20.95
For >100 To 250, Deduct	-2.10	
For >250 To 500, Deduct	-3.40	
For >500 To 1,000, Deduct	-5.41	
For >1,000, Deduct	-7.41	
For 316 Stainless Steel, Add	77.63	
For Aluminum, Add	4.37	
For Galvanized Steel, Add	15.04	
For 304 Stainless Steel, Add	69.14	
05 12 23 00-0266 LF MC6 x 18 - 6" Wide Channel	57.65	23.14
For >100 To 250, Deduct	-2.31	
For >250 To 500, Deduct	-3.76	
For >500 To 1,000, Deduct	-5.97	
For >1,000, Deduct	-8.18	
For 316 Stainless Steel, Add	85.73	
For Aluminum, Add	4.82	
For Galvanized Steel, Add	16.61	
For 304 Stainless Steel, Add	76.35	
05 12 23 00-0267 LF MC7 x 17.6 - 7" Wide Channel	56.26	22.55
For >100 To 250, Deduct	-2.25	
For >250 To 500, Deduct	-3.66	
For >500 To 1,000, Deduct	-5.82	
For >1,000, Deduct	-7.98	
For 316 Stainless Steel, Add	83.84	
For Aluminum, Add	4.72	
For Galvanized Steel, Add	16.24	
For 304 Stainless Steel, Add	74.67	
05 12 23 00-0268 LF MC7 x 19.1 - 7" Wide Channel	61.06	24.47
For >100 To 250, Deduct	-2.45	
For >250 To 500, Deduct	-3.97	
For >500 To 1,000, Deduct	-6.32	
For >1,000, Deduct	-8.66	
For 316 Stainless Steel, Add	90.98	
For Aluminum, Add	5.12	
For Galvanized Steel, Add	17.63	
For 304 Stainless Steel, Add	81.03	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0269 LF MC7 x 22.7 - 7" Wide Channel.....	72.56	29.08
For >100 To 250, Deduct	-2.91	
For >250 To 500, Deduct	-4.72	
For >500 To 1,000, Deduct	-7.51	
For >1,000, Deduct	-10.29	
For 316 Stainless Steel, Add	108.13	
For Aluminum, Add	6.08	
For Galvanized Steel, Add	20.95	
For 304 Stainless Steel, Add	96.30	
05 12 23 00-0270 LF MC8 x 8.5 - 8" Wide Channel.....	26.26	10.21
For >100 To 250, Deduct	-1.02	
For >250 To 500, Deduct	-1.68	
For >500 To 1,000, Deduct	-2.67	
For >1,000, Deduct	-3.67	
For 316 Stainless Steel, Add	40.48	
For Aluminum, Add	2.28	
For Galvanized Steel, Add	7.84	
For 304 Stainless Steel, Add	36.05	
05 12 23 00-0271 LF MC8 x 18.7 - 8" Wide Channel.....	57.77	22.45
For >100 To 250, Deduct	-2.25	
For >250 To 500, Deduct	-3.69	
For >500 To 1,000, Deduct	-5.88	
For >1,000, Deduct	-8.08	
For 316 Stainless Steel, Add	89.06	
For Aluminum, Add	5.01	
For Galvanized Steel, Add	17.25	
For 304 Stainless Steel, Add	79.32	
05 12 23 00-0272 LF MC8 x 20 - 8" Wide Channel.....	61.79	24.01
For >100 To 250, Deduct	-2.40	
For >250 To 500, Deduct	-3.95	
For >500 To 1,000, Deduct	-6.29	
For >1,000, Deduct	-8.64	
For 316 Stainless Steel, Add	95.26	
For Aluminum, Add	5.36	
For Galvanized Steel, Add	18.46	
For 304 Stainless Steel, Add	84.84	
05 12 23 00-0273 LF MC8 x 21.4 - 8" Wide Channel.....	66.12	25.70
For >100 To 250, Deduct	-2.57	
For >250 To 500, Deduct	-4.22	
For >500 To 1,000, Deduct	-6.73	
For >1,000, Deduct	-9.24	
For 316 Stainless Steel, Add	101.92	
For Aluminum, Add	5.73	
For Galvanized Steel, Add	19.75	
For 304 Stainless Steel, Add	90.77	
05 12 23 00-0274 LF MC8 x 22.8 - 8" Wide Channel.....	70.43	27.38
For >100 To 250, Deduct	-2.74	
For >250 To 500, Deduct	-4.50	
For >500 To 1,000, Deduct	-7.17	
For >1,000, Deduct	-9.84	
For 316 Stainless Steel, Add	108.61	
For Aluminum, Add	6.11	
For Galvanized Steel, Add	21.04	
For 304 Stainless Steel, Add	96.73	
05 12 23 00-0275 LF MC9 x 23.9 - 9" Wide Channel.....	73.83	28.70
For >100 To 250, Deduct	-2.87	
For >250 To 500, Deduct	-4.72	
For >500 To 1,000, Deduct	-7.52	
For >1,000, Deduct	-10.32	
For 316 Stainless Steel, Add	113.82	
For Aluminum, Add	6.40	
For Galvanized Steel, Add	22.05	
For 304 Stainless Steel, Add	101.37	
05 12 23 00-0276 LF MC9 x 25.4 - 9" Wide Channel.....	78.46	30.49
For >100 To 250, Deduct	-3.05	
For >250 To 500, Deduct	-5.01	
For >500 To 1,000, Deduct	-7.99	
For >1,000, Deduct	-10.97	
For 316 Stainless Steel, Add	120.99	
For Aluminum, Add	6.81	
For Galvanized Steel, Add	23.44	
For 304 Stainless Steel, Add	107.76	
05 12 23 00-0277 LF MC10 x 6.5 - 10" Wide Channel.....	20.08	7.80
For >100 To 250, Deduct	-0.78	
For >250 To 500, Deduct	-1.28	
For >500 To 1,000, Deduct	-2.05	
For >1,000, Deduct	-2.81	
For 316 Stainless Steel, Add	30.94	
For Aluminum, Add	1.74	
For Galvanized Steel, Add	6.00	
For 304 Stainless Steel, Add	27.56	



	Metals	05
	Structural Metal Framing	05 10
	Structural Steel Framing	05 12

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0278	LF		MC10 x 8.4 - 10" Wide Channel	25.95	10.08
			<i>For >100 To 250, Deduct</i>	-1.01	
			<i>For >250 To 500, Deduct</i>	-1.66	
			<i>For >500 To 1,000, Deduct</i>	-2.64	
			<i>For >1,000, Deduct</i>	-3.63	
			<i>For 316 Stainless Steel, Add</i>	40.00	
			<i>For Aluminum, Add</i>	2.25	
			<i>For Galvanized Steel, Add</i>	7.75	
			<i>For 304 Stainless Steel, Add</i>	35.63	
05 12 23 00-0279	LF		MC10 x 21.9 - 10" Wide Channel	67.65	26.30
			<i>For >100 To 250, Deduct</i>	-2.63	
			<i>For >250 To 500, Deduct</i>	-4.32	
			<i>For >500 To 1,000, Deduct</i>	-6.89	
			<i>For >1,000, Deduct</i>	-9.46	
			<i>For 316 Stainless Steel, Add</i>	104.32	
			<i>For Aluminum, Add</i>	5.87	
			<i>For Galvanized Steel, Add</i>	20.21	
			<i>For 304 Stainless Steel, Add</i>	92.91	
05 12 23 00-0280	LF		MC10 x 24.9 - 10" Wide Channel	76.93	29.90
			<i>For >100 To 250, Deduct</i>	-2.99	
			<i>For >250 To 500, Deduct</i>	-4.91	
			<i>For >500 To 1,000, Deduct</i>	-7.83	
			<i>For >1,000, Deduct</i>	-10.75	
			<i>For 316 Stainless Steel, Add</i>	118.59	
			<i>For Aluminum, Add</i>	6.67	
			<i>For Galvanized Steel, Add</i>	22.98	
			<i>For 304 Stainless Steel, Add</i>	105.62	
05 12 23 00-0281	LF		MC10 x 25.3 - 10" Wide Channel	78.16	30.38
			<i>For >100 To 250, Deduct</i>	-3.04	
			<i>For >250 To 500, Deduct</i>	-4.99	
			<i>For >500 To 1,000, Deduct</i>	-7.96	
			<i>For >1,000, Deduct</i>	-10.92	
			<i>For 316 Stainless Steel, Add</i>	120.51	
			<i>For Aluminum, Add</i>	6.78	
			<i>For Galvanized Steel, Add</i>	23.35	
			<i>For 304 Stainless Steel, Add</i>	107.33	
05 12 23 00-0282	LF		MC10 x 28.3 - 10" Wide Channel	87.43	33.97
			<i>For >100 To 250, Deduct</i>	-3.40	
			<i>For >250 To 500, Deduct</i>	-5.58	
			<i>For >500 To 1,000, Deduct</i>	-8.90	
			<i>For >1,000, Deduct</i>	-12.22	
			<i>For 316 Stainless Steel, Add</i>	134.78	
			<i>For Aluminum, Add</i>	7.58	
			<i>For Galvanized Steel, Add</i>	26.11	
			<i>For 304 Stainless Steel, Add</i>	120.04	
05 12 23 00-0283	LF		MC10 x 28.5 - 10" Wide Channel	88.04	34.22
			<i>For >100 To 250, Deduct</i>	-3.42	
			<i>For >250 To 500, Deduct</i>	-5.62	
			<i>For >500 To 1,000, Deduct</i>	-8.96	
			<i>For >1,000, Deduct</i>	-12.31	
			<i>For 316 Stainless Steel, Add</i>	135.74	
			<i>For Aluminum, Add</i>	7.64	
			<i>For Galvanized Steel, Add</i>	26.30	
			<i>For 304 Stainless Steel, Add</i>	120.90	
05 12 23 00-0284	LF		MC10 x 33.6 - 10" Wide Channel	103.80	40.34
			<i>For >100 To 250, Deduct</i>	-4.03	
			<i>For >250 To 500, Deduct</i>	-6.63	
			<i>For >500 To 1,000, Deduct</i>	-10.57	
			<i>For >1,000, Deduct</i>	-14.51	
			<i>For 316 Stainless Steel, Add</i>	160.03	
			<i>For Aluminum, Add</i>	9.00	
			<i>For Galvanized Steel, Add</i>	31.01	
			<i>For 304 Stainless Steel, Add</i>	142.53	
05 12 23 00-0285	LF		MC10 x 41.1 - 10" Wide Channel	126.97	49.35
			<i>For >100 To 250, Deduct</i>	-4.93	
			<i>For >250 To 500, Deduct</i>	-8.11	
			<i>For >500 To 1,000, Deduct</i>	-12.93	
			<i>For >1,000, Deduct</i>	-17.75	
			<i>For 316 Stainless Steel, Add</i>	195.78	
			<i>For Aluminum, Add</i>	11.01	
			<i>For Galvanized Steel, Add</i>	37.93	
			<i>For 304 Stainless Steel, Add</i>	174.36	
05 12 23 00-0286	LF		MC12 x 30.9 - 12" Wide Channel	95.46	37.10
			<i>For >100 To 250, Deduct</i>	-3.71	
			<i>For >250 To 500, Deduct</i>	-6.10	
			<i>For >500 To 1,000, Deduct</i>	-9.72	
			<i>For >1,000, Deduct</i>	-13.34	
			<i>For 316 Stainless Steel, Add</i>	147.17	
			<i>For Aluminum, Add</i>	8.28	
			<i>For Galvanized Steel, Add</i>	28.51	
			<i>For 304 Stainless Steel, Add</i>	131.07	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0287 LF MC12 x 32.9 - 12" Wide Channel.....	101.64	39.49
For >100 To 250, Deduct	-3.95	
For >250 To 500, Deduct	-6.49	
For >500 To 1,000, Deduct	-10.35	
For >1,000, Deduct	-14.21	
For 316 Stainless Steel, Add	156.70	
For Aluminum, Add	8.81	
For Galvanized Steel, Add	30.36	
For 304 Stainless Steel, Add	139.56	
05 12 23 00-0288 LF MC12 x 35 - 12" Wide Channel.....	108.13	42.01
For >100 To 250, Deduct	-4.20	
For >250 To 500, Deduct	-6.91	
For >500 To 1,000, Deduct	-11.01	
For >1,000, Deduct	-15.11	
For 316 Stainless Steel, Add	166.72	
For Aluminum, Add	9.38	
For Galvanized Steel, Add	32.30	
For 304 Stainless Steel, Add	148.49	
05 12 23 00-0289 LF MC12 x 37 - 12" Wide Channel.....	114.31	44.43
For >100 To 250, Deduct	-4.44	
For >250 To 500, Deduct	-7.30	
For >500 To 1,000, Deduct	-11.64	
For >1,000, Deduct	-15.98	
For 316 Stainless Steel, Add	176.22	
For Aluminum, Add	9.91	
For Galvanized Steel, Add	34.14	
For 304 Stainless Steel, Add	156.95	
05 12 23 00-0290 LF MC12 x 40 - 12" Wide Channel.....	123.57	48.02
For >100 To 250, Deduct	-4.80	
For >250 To 500, Deduct	-7.89	
For >500 To 1,000, Deduct	-12.58	
For >1,000, Deduct	-17.27	
For 316 Stainless Steel, Add	190.53	
For Aluminum, Add	10.72	
For Galvanized Steel, Add	36.91	
For 304 Stainless Steel, Add	169.69	
05 12 23 00-0291 LF MC12 x 45 - 12" Wide Channel.....	139.02	54.03
For >100 To 250, Deduct	-5.40	
For >250 To 500, Deduct	-8.88	
For >500 To 1,000, Deduct	-14.16	
For >1,000, Deduct	-19.43	
For 316 Stainless Steel, Add	214.34	
For Aluminum, Add	12.06	
For Galvanized Steel, Add	41.53	
For 304 Stainless Steel, Add	190.89	
05 12 23 00-0292 LF MC12 x 50 - 12" Wide Channel.....	154.46	60.03
For >100 To 250, Deduct	-6.00	
For >250 To 500, Deduct	-9.86	
For >500 To 1,000, Deduct	-15.73	
For >1,000, Deduct	-21.59	
For 316 Stainless Steel, Add	238.14	
For Aluminum, Add	13.40	
For Galvanized Steel, Add	46.14	
For 304 Stainless Steel, Add	212.10	
05 12 23 00-0293 LF MC13 x 31.8 - 13" Wide Channel.....	98.24	38.18
For >100 To 250, Deduct	-3.82	
For >250 To 500, Deduct	-6.27	
For >500 To 1,000, Deduct	-10.00	
For >1,000, Deduct	-13.73	
For 316 Stainless Steel, Add	151.46	
For Aluminum, Add	8.52	
For Galvanized Steel, Add	29.34	
For 304 Stainless Steel, Add	134.89	
05 12 23 00-0294 LF MC13 x 35 - 13" Wide Channel.....	108.13	42.01
For >100 To 250, Deduct	-4.20	
For >250 To 500, Deduct	-6.91	
For >500 To 1,000, Deduct	-11.01	
For >1,000, Deduct	-15.11	
For 316 Stainless Steel, Add	166.72	
For Aluminum, Add	9.38	
For Galvanized Steel, Add	32.30	
For 304 Stainless Steel, Add	148.49	
05 12 23 00-0295 LF MC13 x 40 - 13" Wide Channel.....	123.57	48.02
For >100 To 250, Deduct	-4.80	
For >250 To 500, Deduct	-7.89	
For >500 To 1,000, Deduct	-12.58	
For >1,000, Deduct	-17.27	
For 316 Stainless Steel, Add	190.53	
For Aluminum, Add	10.72	
For Galvanized Steel, Add	36.91	
For 304 Stainless Steel, Add	169.69	



	Metals	05
	Structural Metal Framing	05 10
	Structural Steel Framing	05 12

05

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0296 LF MC13 x 50 - 13" Wide Channel	154.46	60.03
For >100 To 250, Deduct	-6.00	
For >250 To 500, Deduct	-9.86	
For >500 To 1,000, Deduct	-15.73	
For >1,000, Deduct	-21.59	
For 316 Stainless Steel, Add	238.14	
For Aluminum, Add	13.40	
For Galvanized Steel, Add	46.14	
For 304 Stainless Steel, Add	212.10	
05 12 23 00-0297 LF MC18 x 42.7 - 18" Wide Channel	131.92	51.27
For >100 To 250, Deduct	-5.13	
For >250 To 500, Deduct	-8.43	
For >500 To 1,000, Deduct	-13.43	
For >1,000, Deduct	-18.44	
For 316 Stainless Steel, Add	203.39	
For Aluminum, Add	11.44	
For Galvanized Steel, Add	39.41	
For 304 Stainless Steel, Add	181.15	
05 12 23 00-0298 LF MC18 x 45.8 - 18" Wide Channel	141.48	55.00
For >100 To 250, Deduct	-5.50	
For >250 To 500, Deduct	-9.04	
For >500 To 1,000, Deduct	-14.41	
For >1,000, Deduct	-19.77	
For 316 Stainless Steel, Add	218.14	
For Aluminum, Add	12.27	
For Galvanized Steel, Add	42.27	
For 304 Stainless Steel, Add	194.28	
05 12 23 00-0299 LF MC18 x 51.9 - 18" Wide Channel	160.34	62.31
For >100 To 250, Deduct	-6.23	
For >250 To 500, Deduct	-10.24	
For >500 To 1,000, Deduct	-16.33	
For >1,000, Deduct	-22.41	
For 316 Stainless Steel, Add	247.20	
For Aluminum, Add	13.91	
For Galvanized Steel, Add	47.90	
For 304 Stainless Steel, Add	220.16	
05 12 23 00-0300 LF MC18 x 58 - 18" Wide Channel	179.18	69.63
For >100 To 250, Deduct	-6.96	
For >250 To 500, Deduct	-11.44	
For >500 To 1,000, Deduct	-18.24	
For >1,000, Deduct	-25.04	
For 316 Stainless Steel, Add	276.26	
For Aluminum, Add	15.54	
For Galvanized Steel, Add	53.52	
For 304 Stainless Steel, Add	246.04	
05 12 23 00-0301 Structural Bar Tees (05 12 23 00-0105)		
05 12 23 00-0302 LF 3/4" x 3/4" x 1/8" Structural Bar Tee	5.46	3.19
For >100 To 250, Deduct	-0.32	
For >250 To 500, Deduct	-0.46	
For >500 To 1,000, Deduct	-0.70	
For >1,000, Deduct	-0.94	
For 316 Stainless Steel, Add	3.84	
For Aluminum, Add	0.22	
For Galvanized Steel, Add	0.74	
For 304 Stainless Steel, Add	3.42	
05 12 23 00-0303 LF 1" x 1" x 1/8" Structural Bar Tee	6.67	3.77
For >100 To 250, Deduct	-0.38	
For >250 To 500, Deduct	-0.54	
For >500 To 1,000, Deduct	-0.84	
For >1,000, Deduct	-1.13	
For 316 Stainless Steel, Add	5.28	
For Aluminum, Add	0.30	
For Galvanized Steel, Add	1.02	
For 304 Stainless Steel, Add	4.70	
05 12 23 00-0304 LF 1-1/2" x 1-1/2" x 1/4" Structural Bar Tee	10.52	4.35
For >100 To 250, Deduct	-0.44	
For >250 To 500, Deduct	-0.70	
For >500 To 1,000, Deduct	-1.11	
For >1,000, Deduct	-1.51	
For 316 Stainless Steel, Add	15.10	
For Aluminum, Add	0.85	
For Galvanized Steel, Add	2.93	
For 304 Stainless Steel, Add	13.45	
05 12 23 00-0305 LF 2" x 2" x 1/4" Structural Bar Tee	14.61	5.69
For >100 To 250, Deduct	-0.57	
For >250 To 500, Deduct	-0.93	
For >500 To 1,000, Deduct	-1.49	
For >1,000, Deduct	-2.04	
For 316 Stainless Steel, Add	22.50	
For Aluminum, Add	1.27	
For Galvanized Steel, Add	4.36	
For 304 Stainless Steel, Add	20.04	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0306	LF 2-1/2" x 2-1/2" x 3/8" Structural Bar Tee	21.77	6.86
	For >100 To 250, Deduct	-0.69	
	For >250 To 500, Deduct	-1.23	
	For >500 To 1,000, Deduct	-2.00	
	For >1,000, Deduct	-2.78	
	For 316 Stainless Steel, Add	40.38	
	For Aluminum, Add	2.27	
	For Galvanized Steel, Add	7.82	
	For 304 Stainless Steel, Add	35.97	
05 12 23 00-0307	LF 3" x 3" x 3/8" Structural Bar Tee	26.86	8.78
	For >100 To 250, Deduct	-0.88	
	For >250 To 500, Deduct	-1.55	
	For >500 To 1,000, Deduct	-2.51	
	For >1,000, Deduct	-3.48	
	For 316 Stainless Steel, Add	48.48	
	For Aluminum, Add	2.73	
	For Galvanized Steel, Add	9.39	
	For 304 Stainless Steel, Add	43.18	
05 12 23 00-0308	Structural Zees <small>(05 12 23 00-0105)</small>		
05 12 23 00-0309	LF 1-1/4" x 1-3/4" x 1-3/4" x 3/16" Structural Zee.....	12.84	4.35
	For >100 To 250, Deduct	-0.44	
	For >250 To 500, Deduct	-0.76	
	For >500 To 1,000, Deduct	-1.22	
	For >1,000, Deduct	-1.69	
	For 316 Stainless Steel, Add	22.53	
	For Aluminum, Add	1.27	
	For Galvanized Steel, Add	4.36	
	For 304 Stainless Steel, Add	20.06	
05 12 23 00-0310	LF 2-11/16" x 3" x 2-11/16" x 1/4" Structural Zee.....	23.76	5.19
	For >100 To 250, Deduct	-0.52	
	For >250 To 500, Deduct	-1.11	
	For >500 To 1,000, Deduct	-1.88	
	For >1,000, Deduct	-2.65	
	For 316 Stainless Steel, Add	53.89	
	For Aluminum, Add	3.03	
	For Galvanized Steel, Add	10.44	
	For 304 Stainless Steel, Add	47.99	
05 12 23 00-0311	LF 3-1/16" x 4" x 3-1/16" x 1/4" Structural Zee.....	28.42	5.86
	For >100 To 250, Deduct	-0.59	
	For >250 To 500, Deduct	-1.30	
	For >500 To 1,000, Deduct	-2.20	
	For >1,000, Deduct	-3.11	
	For 316 Stainless Steel, Add	65.95	
	For Aluminum, Add	3.71	
	For Galvanized Steel, Add	12.78	
	For 304 Stainless Steel, Add	58.74	
05 12 23 00-0312	LF 3-1/4" x 5" x 3-1/4" x 5/16" Structural Zee.....	38.07	6.69
	For >100 To 250, Deduct	-0.67	
	For >250 To 500, Deduct	-1.62	
	For >500 To 1,000, Deduct	-2.80	
	For >1,000, Deduct	-3.97	
	For 316 Stainless Steel, Add	93.28	
	For Aluminum, Add	5.25	
	For Galvanized Steel, Add	18.07	
	For 304 Stainless Steel, Add	83.08	
05 12 23 00-0313	LF 3-1/2" x 6" x 3-1/2" x 3/8" Structural Zee.....	49.17	7.28
	For >100 To 250, Deduct	-0.73	
	For >250 To 500, Deduct	-1.96	
	For >500 To 1,000, Deduct	-3.43	
	For >1,000, Deduct	-4.90	
	For 316 Stainless Steel, Add	126.27	
	For Aluminum, Add	7.10	
	For Galvanized Steel, Add	24.47	
	For 304 Stainless Steel, Add	112.46	
05 12 23 00-0314	Junior I-Beams <small>(05 12 23 00-0105)</small>		
05 12 23 00-0315	LF 3" Junior I-Beam, 2.9 LB/LF	17.65	6.28
	For >100 To 250, Deduct	-0.63	
	For >250 To 500, Deduct	-1.07	
	For >500 To 1,000, Deduct	-1.72	
	For >1,000, Deduct	-2.37	
	For 316 Stainless Steel, Add	29.70	
	For Aluminum, Add	1.67	
	For Galvanized Steel, Add	5.75	
	For 304 Stainless Steel, Add	26.45	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0316 LF 4" Junior I-Beam, 3.2 LB/LF.....	19.40	6.86
For >100 To 250, Deduct	-0.69	
For >250 To 500, Deduct	-1.17	
For >500 To 1,000, Deduct	-1.89	
For >1,000, Deduct	-2.60	
For 316 Stainless Steel, Add	32.77	
For Aluminum, Add	1.84	
For Galvanized Steel, Add	6.35	
For 304 Stainless Steel, Add	29.18	
05 12 23 00-0317 LF 5" Junior I-Beam, 3.8 LB/LF.....	22.19	7.53
For >100 To 250, Deduct	-0.75	
For >250 To 500, Deduct	-1.31	
For >500 To 1,000, Deduct	-2.11	
For >1,000, Deduct	-2.92	
For 316 Stainless Steel, Add	38.88	
For Aluminum, Add	2.19	
For Galvanized Steel, Add	7.53	
For 304 Stainless Steel, Add	34.63	
05 12 23 00-0318 LF 6" Junior I-Beam, 4.4 LB/LF.....	25.01	8.20
For >100 To 250, Deduct	-0.82	
For >250 To 500, Deduct	-1.45	
For >500 To 1,000, Deduct	-2.34	
For >1,000, Deduct	-3.24	
For 316 Stainless Steel, Add	45.02	
For Aluminum, Add	2.53	
For Galvanized Steel, Add	8.72	
For 304 Stainless Steel, Add	40.10	
05 12 23 00-0319 LF 7" Junior I-Beam, 5.5 LB/LF.....	29.30	8.78
For >100 To 250, Deduct	-0.88	
For >250 To 500, Deduct	-1.61	
For >500 To 1,000, Deduct	-2.64	
For >1,000, Deduct	-3.66	
For 316 Stainless Steel, Add	56.29	
For Aluminum, Add	3.17	
For Galvanized Steel, Add	10.91	
For 304 Stainless Steel, Add	50.13	
05 12 23 00-0320 LF 8" Junior I-Beam, 6.5 LB/LF.....	33.28	9.37
For >100 To 250, Deduct	-0.94	
For >250 To 500, Deduct	-1.77	
For >500 To 1,000, Deduct	-2.91	
For >1,000, Deduct	-4.06	
For 316 Stainless Steel, Add	66.53	
For Aluminum, Add	3.74	
For Galvanized Steel, Add	12.89	
For 304 Stainless Steel, Add	59.25	
05 12 23 00-0321 LF 10" Junior I-Beam, 9 LB/LF.....	43.07	10.71
For >100 To 250, Deduct	-1.07	
For >250 To 500, Deduct	-2.15	
For >500 To 1,000, Deduct	-3.58	
For >1,000, Deduct	-5.02	
For 316 Stainless Steel, Add	92.13	
For Aluminum, Add	5.18	
For Galvanized Steel, Add	17.85	
For 304 Stainless Steel, Add	82.05	
05 12 23 00-0322 LF 12" Junior I-Beam, 11.8 LB/LF.....	54.70	12.72
For >100 To 250, Deduct	-1.27	
For >250 To 500, Deduct	-2.64	
For >500 To 1,000, Deduct	-4.43	
For >1,000, Deduct	-6.22	
For 316 Stainless Steel, Add	120.77	
For Aluminum, Add	6.79	
For Galvanized Steel, Add	23.40	
For 304 Stainless Steel, Add	107.56	
05 12 23 00-0323 Round Stock (05 12 23 00-0105)		
05 12 23 00-0324 LF 1/4" Carbon Steel Rounds, ASTM A108.....	2.65	
For 316 Stainless Steel, Add	4.90	
For Aluminum, Add	0.28	
For Galvanized Steel, Add	0.95	
For 304 Stainless Steel, Add	4.36	
05 12 23 00-0325 LF 3/8" Carbon Steel Rounds, ASTM A108.....	4.29	
For 316 Stainless Steel, Add	9.66	
For Aluminum, Add	0.54	
For Galvanized Steel, Add	1.87	
For 304 Stainless Steel, Add	8.61	
05 12 23 00-0326 LF 1/2" Carbon Steel Rounds, ASTM A108.....	5.98	
For 316 Stainless Steel, Add	14.69	
For Aluminum, Add	0.83	
For Galvanized Steel, Add	2.85	
For 304 Stainless Steel, Add	13.08	
05 12 23 00-0327 LF 5/8" Carbon Steel Rounds, ASTM A108.....	9.21	
For 316 Stainless Steel, Add	24.51	
For Aluminum, Add	1.38	
For Galvanized Steel, Add	4.75	
For 304 Stainless Steel, Add	21.83	

05 Metals

05 10 Structural Metal Framing

05 12 Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0328	LF 3/4" Carbon Steel Rounds, ASTM A108	10.95	
	For 316 Stainless Steel, Add	29.09	
	For Aluminum, Add	1.64	
	For Galvanized Steel, Add	5.64	
	For 304 Stainless Steel, Add	25.91	
05 12 23 00-0329	LF 7/8" Carbon Steel Rounds, ASTM A108	12.78	
	For 316 Stainless Steel, Add	34.02	
	For Aluminum, Add	1.91	
	For Galvanized Steel, Add	6.59	
	For 304 Stainless Steel, Add	30.30	
05 12 23 00-0330	LF 1" Carbon Steel Rounds, ASTM A108	18.73	
	For 316 Stainless Steel, Add	51.81	
	For Aluminum, Add	2.91	
	For Galvanized Steel, Add	10.04	
	For 304 Stainless Steel, Add	46.14	
05 12 23 00-0331	LF 1-1/8" Carbon Steel Rounds, ASTM A108	22.77	
	For 316 Stainless Steel, Add	62.94	
	For Aluminum, Add	3.54	
	For Galvanized Steel, Add	12.20	
	For 304 Stainless Steel, Add	56.06	
05 12 23 00-0332	LF 1-1/4" Carbon Steel Rounds, ASTM A108	27.14	
	For 316 Stainless Steel, Add	74.08	
	For Aluminum, Add	4.17	
	For Galvanized Steel, Add	14.35	
	For 304 Stainless Steel, Add	65.98	
05 12 23 00-0333	LF 1-3/8" Carbon Steel Rounds, ASTM A108	32.91	
	For 316 Stainless Steel, Add	90.43	
	For Aluminum, Add	5.09	
	For Galvanized Steel, Add	17.52	
	For 304 Stainless Steel, Add	80.54	
05 12 23 00-0334	LF 1-1/2" Carbon Steel Rounds, ASTM A108	36.57	
	For 316 Stainless Steel, Add	99.17	
	For Aluminum, Add	5.58	
	For Galvanized Steel, Add	19.21	
	For 304 Stainless Steel, Add	88.32	
05 12 23 00-0335	LF 1-5/8" Carbon Steel Rounds, ASTM A108	42.09	
	For 316 Stainless Steel, Add	112.38	
	For Aluminum, Add	6.32	
	For Galvanized Steel, Add	21.77	
	For 304 Stainless Steel, Add	100.09	
05 12 23 00-0336	LF 1-3/4" Carbon Steel Rounds, ASTM A108	50.18	
	For 316 Stainless Steel, Add	130.82	
	For Aluminum, Add	7.36	
	For Galvanized Steel, Add	25.35	
	For 304 Stainless Steel, Add	116.51	
05 12 23 00-0337	LF 1-7/8" Carbon Steel Rounds, ASTM A108	60.15	
	For 316 Stainless Steel, Add	153.22	
	For Aluminum, Add	8.62	
	For Galvanized Steel, Add	29.69	
	For 304 Stainless Steel, Add	136.46	
05 12 23 00-0338	LF 2" Carbon Steel Rounds, ASTM A108	68.45	
	For 316 Stainless Steel, Add	170.43	
	For Aluminum, Add	9.59	
	For Galvanized Steel, Add	33.02	
	For 304 Stainless Steel, Add	151.79	
05 12 23 00-0339	LF 2-1/8" Carbon Steel Rounds, ASTM A108	79.70	
	For 316 Stainless Steel, Add	194.66	
	For Aluminum, Add	10.95	
	For Galvanized Steel, Add	37.71	
	For 304 Stainless Steel, Add	173.37	
05 12 23 00-0340	LF 2-1/4" Carbon Steel Rounds, ASTM A108	90.09	
	For 316 Stainless Steel, Add	218.85	
	For Aluminum, Add	12.31	
	For Galvanized Steel, Add	42.40	
	For 304 Stainless Steel, Add	194.91	
05 12 23 00-0341	LF 2-3/8" Carbon Steel Rounds, ASTM A108	103.18	
	For 316 Stainless Steel, Add	250.34	
	For Aluminum, Add	14.08	
	For Galvanized Steel, Add	48.50	
	For 304 Stainless Steel, Add	222.96	
05 12 23 00-0342	LF 2-1/2" Carbon Steel Rounds, ASTM A108	113.60	
	For 316 Stainless Steel, Add	269.79	
	For Aluminum, Add	15.18	
	For Galvanized Steel, Add	52.27	
	For 304 Stainless Steel, Add	240.28	
05 12 23 00-0343	LF 2-5/8" Carbon Steel Rounds, ASTM A108	139.64	
	For 316 Stainless Steel, Add	342.69	
	For Aluminum, Add	19.28	
	For Galvanized Steel, Add	66.40	
	For 304 Stainless Steel, Add	305.21	
05 12 23 00-0344	LF 2-3/4" Carbon Steel Rounds, ASTM A108	159.01	
	For 316 Stainless Steel, Add	390.78	
	For Aluminum, Add	21.98	
	For Galvanized Steel, Add	75.71	
	For 304 Stainless Steel, Add	348.04	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0345 LF 2-7/8 Carbon Steel Rounds, ASTM A108	177.32	
For 316 Stainless Steel, Add	435.49	
For Aluminum, Add	24.50	
For Galvanized Steel, Add	84.38	
For 304 Stainless Steel, Add	387.86	
05 12 23 00-0346 LF 3" Carbon Steel Rounds, ASTM A108	185.75	
For 316 Stainless Steel, Add	448.54	
For Aluminum, Add	25.23	
For Galvanized Steel, Add	86.91	
For 304 Stainless Steel, Add	399.48	
05 12 23 00-0347 LF 3-1/8" Carbon Steel Rounds, ASTM A108	193.19	
For 316 Stainless Steel, Add	458.50	
For Aluminum, Add	25.79	
For Galvanized Steel, Add	88.83	
For 304 Stainless Steel, Add	408.35	
05 12 23 00-0348 LF 3-1/4" Carbon Steel Rounds, ASTM A108	203.37	
For 316 Stainless Steel, Add	477.18	
For Aluminum, Add	26.84	
For Galvanized Steel, Add	92.45	
For 304 Stainless Steel, Add	424.99	
05 12 23 00-0349 LF 3-1/2" Carbon Steel Rounds, ASTM A108	248.89	
For 316 Stainless Steel, Add	605.47	
For Aluminum, Add	34.06	
For Galvanized Steel, Add	117.31	
For 304 Stainless Steel, Add	539.25	
05 12 23 00-0350 LF 3-5/8" Carbon Steel Rounds, ASTM A108	276.77	
For 316 Stainless Steel, Add	677.34	
For Aluminum, Add	38.10	
For Galvanized Steel, Add	131.24	
For 304 Stainless Steel, Add	603.26	
05 12 23 00-0351 LF 3-3/4" Carbon Steel Rounds, ASTM A108	296.94	
For 316 Stainless Steel, Add	724.54	
For Aluminum, Add	40.76	
For Galvanized Steel, Add	140.38	
For 304 Stainless Steel, Add	645.30	
05 12 23 00-0352 LF 4" Carbon Steel Rounds, ASTM A108	333.74	
For 316 Stainless Steel, Add	824.93	
For Aluminum, Add	46.40	
For Galvanized Steel, Add	159.83	
For 304 Stainless Steel, Add	734.70	
05 12 23 00-0353 Square Stock (05 12 23 00-0105)		
05 12 23 00-0354 LF 3/8" Square Bar Stock	1.98	
For 316 Stainless Steel, Add	2.27	
For Aluminum, Add	0.13	
For Galvanized Steel, Add	0.44	
For 304 Stainless Steel, Add	2.02	
05 12 23 00-0355 LF 1/2" Square Bar Stock	2.65	
For 316 Stainless Steel, Add	4.03	
For Aluminum, Add	0.23	
For Galvanized Steel, Add	0.78	
For 304 Stainless Steel, Add	3.59	
05 12 23 00-0356 LF 5/8" Square Bar Stock	3.51	
For 316 Stainless Steel, Add	6.27	
For Aluminum, Add	0.35	
For Galvanized Steel, Add	1.22	
For 304 Stainless Steel, Add	5.59	
05 12 23 00-0357 LF 3/4" Square Bar Stock	4.69	
For 316 Stainless Steel, Add	9.06	
For Aluminum, Add	0.51	
For Galvanized Steel, Add	1.75	
For 304 Stainless Steel, Add	8.07	
05 12 23 00-0358 LF 7/8" Square Bar Stock	6.10	
For 316 Stainless Steel, Add	12.64	
For Aluminum, Add	0.71	
For Galvanized Steel, Add	2.45	
For 304 Stainless Steel, Add	11.26	
05 12 23 00-0359 LF 1" Square Bar Stock	7.59	
For 316 Stainless Steel, Add	16.16	
For Aluminum, Add	0.91	
For Galvanized Steel, Add	3.13	
For 304 Stainless Steel, Add	14.39	
05 12 23 00-0360 LF 1-1/4" Square Bar Stock	11.87	
For 316 Stainless Steel, Add	25.22	
For Aluminum, Add	1.42	
For Galvanized Steel, Add	4.69	
For 304 Stainless Steel, Add	22.46	
05 12 23 00-0361 LF 1-1/2" Square Bar Stock	16.93	
For 316 Stainless Steel, Add	36.32	
For Aluminum, Add	2.04	
For Galvanized Steel, Add	7.04	
For 304 Stainless Steel, Add	32.35	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0362	LF 1-3/4" Square Bar Stock <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	25.09 50.53 2.84 9.79 45.00	
05 12 23 00-0363	LF 2" Square Bar Stock <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	35.82 64.64 3.64 12.52 57.57	
05 12 23 00-0364	Steel Tubing <small>(05 12 23 00-0105)</small> Note: General purpose low-carbon steel.		
05 12 23 00-0365	Square Steel Tubing <small>(05 12 23 00-0364)</small>		
05 12 23 00-0366	0.06" Wall Thickness <small>(05 12 23 00-0365)</small>		
05 12 23 00-0367	LF 1/2" x 1/2" x 0.06" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	2.67 -0.06 -0.13 -0.21 -0.30 1.15	0.60
05 12 23 00-0368	LF 3/4" x 3/4" x 0.06" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	4.09 -0.09 -0.20 -0.33 -0.46 1.75	0.95
05 12 23 00-0369	LF 1" x 1" x 0.06" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	5.49 -0.13 -0.27 -0.45 -0.63 2.34	1.71
05 12 23 00-0370	LF 1-1/4" x 1-1/4" x 0.06" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	7.26 -0.16 -0.34 -0.58 -0.82 3.16	1.63
05 12 23 00-0371	LF 1-1/2" x 1-1/2" x 0.06" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	8.61 -0.20 -0.41 -0.69 -0.97 3.71	1.96
05 12 23 00-0372	0.083" Wall Thickness <small>(05 12 23 00-0365)</small>		
05 12 23 00-0373	LF 3/4" x 3/4" x 0.083" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	4.75 -0.11 -0.23 -0.38 -0.54 2.03	1.11
05 12 23 00-0374	LF 1" x 1" x 0.083" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	6.92 -0.15 -0.32 -0.55 -0.77 3.04	1.52
05 12 23 00-0375	LF 1-1/4" x 1-1/4" x 0.083" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	8.36 -0.19 -0.40 -0.68 -0.95 3.59	1.93
05 12 23 00-0376	LF 1-1/2" x 1-1/2" x 0.083" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	10.11 -0.23 -0.49 -0.82 -1.15 4.33	2.35
05 12 23 00-0377	LF 2" x 2" x 0.083" Square Steel Tubing <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i> <i>For Galvanized Steel, Add</i>	12.96 -0.31 -0.64 -1.07 -1.49 5.45	3.12
05 12 23 00-0378	0.12" Wall Thickness <small>(05 12 23 00-0365)</small>		



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0379 LF 1" x 1" x 0.12" Square Steel Tubing.....	7.64	1.80
For >100 To 250, Deduct	-0.18	
For >250 To 500, Deduct	-0.37	
For >500 To 1,000, Deduct	-0.62	
For >1,000, Deduct	-0.87	
For Galvanized Steel, Add	3.24	
05 12 23 00-0380 LF 1-1/4" x 1-1/4" x 0.12" Square Steel Tubing	9.84	2.32
For >100 To 250, Deduct	-0.23	
For >250 To 500, Deduct	-0.48	
For >500 To 1,000, Deduct	-0.80	
For >1,000, Deduct	-1.12	
For Galvanized Steel, Add	4.19	
05 12 23 00-0381 LF 1-1/2" x 1-1/2" x 0.12" Square Steel Tubing	12.07	2.83
For >100 To 250, Deduct	-0.28	
For >250 To 500, Deduct	-0.58	
For >500 To 1,000, Deduct	-0.98	
For >1,000, Deduct	-1.38	
For Galvanized Steel, Add	5.15	
05 12 23 00-0382 LF 2" x 2" x 0.12" Square Steel Tubing.....	16.34	3.86
For >100 To 250, Deduct	-0.39	
For >250 To 500, Deduct	-0.79	
For >500 To 1,000, Deduct	-1.33	
For >1,000, Deduct	-1.87	
For Galvanized Steel, Add	6.94	
05 12 23 00-0383 1/8" Wall Thickness (05 12 23 00-0365)		
05 12 23 00-0384 LF 2" x 2" x 1/8" Square Steel Tubing.....	14.68	4.01
For >100 To 250, Deduct	-0.40	
For >250 To 500, Deduct	-0.77	
For >500 To 1,000, Deduct	-1.27	
For >1,000, Deduct	-1.77	
For Galvanized Steel, Add	5.79	
05 12 23 00-0385 LF 2-1/2" x 2-1/2" x 1/8" Square Steel Tubing	19.37	5.08
For >100 To 250, Deduct	-0.51	
For >250 To 500, Deduct	-0.99	
For >500 To 1,000, Deduct	-1.64	
For >1,000, Deduct	-2.30	
For Galvanized Steel, Add	7.82	
05 12 23 00-0386 LF 3" x 3" x 1/8" Square Steel Tubing.....	22.69	6.14
For >100 To 250, Deduct	-0.61	
For >250 To 500, Deduct	-1.18	
For >500 To 1,000, Deduct	-1.95	
For >1,000, Deduct	-2.73	
For Galvanized Steel, Add	8.99	
05 12 23 00-0387 LF 3-1/2" x 3-1/2" x 1/8" Square Steel Tubing	26.28	7.21
For >100 To 250, Deduct	-0.72	
For >250 To 500, Deduct	-1.38	
For >500 To 1,000, Deduct	-2.28	
For >1,000, Deduct	-3.17	
For Galvanized Steel, Add	10.34	
05 12 23 00-0388 LF 4" x 4" x 1/8" Square Steel Tubing.....	28.94	8.28
For >100 To 250, Deduct	-0.83	
For >250 To 500, Deduct	-1.55	
For >500 To 1,000, Deduct	-2.55	
For >1,000, Deduct	-3.55	
For Galvanized Steel, Add	11.10	
05 12 23 00-0389 3/16" Wall Thickness (05 12 23 00-0365)		
05 12 23 00-0390 LF 2" x 2" x 3/16" Square Steel Tubing.....	16.64	4.52
For >100 To 250, Deduct	-0.45	
For >250 To 500, Deduct	-0.87	
For >500 To 1,000, Deduct	-1.43	
For >1,000, Deduct	-2.00	
For Galvanized Steel, Add	6.58	
05 12 23 00-0391 LF 2-1/2" x 2-1/2" x 3/16" Square Steel Tubing	21.55	5.84
For >100 To 250, Deduct	-0.59	
For >250 To 500, Deduct	-1.12	
For >500 To 1,000, Deduct	-1.86	
For >1,000, Deduct	-2.59	
For Galvanized Steel, Add	8.53	
05 12 23 00-0392 LF 3" x 3" x 3/16" Square Steel Tubing.....	26.48	7.18
For >100 To 250, Deduct	-0.72	
For >250 To 500, Deduct	-1.38	
For >500 To 1,000, Deduct	-2.28	
For >1,000, Deduct	-3.18	
For Galvanized Steel, Add	10.48	
05 12 23 00-0393 LF 3-1/2" x 3-1/2" x 3/16" Square Steel Tubing	31.40	8.52
For >100 To 250, Deduct	-0.85	
For >250 To 500, Deduct	-1.64	
For >500 To 1,000, Deduct	-2.71	
For >1,000, Deduct	-3.78	
For Galvanized Steel, Add	12.42	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0394	LF 4" x 4" x 3/16" Square Steel Tubing.....	36.30	9.85
	For >100 To 250, Deduct	-0.98	
	For >250 To 500, Deduct	-1.89	
	For >500 To 1,000, Deduct	-3.13	
	For >1,000, Deduct	-4.36	
	For Galvanized Steel, Add	14.37	
05 12 23 00-0395	LF 4-1/2" x 4-1/2" x 3/16" Square Steel Tubing.....	41.23	11.19
	For >100 To 250, Deduct	-1.12	
	For >250 To 500, Deduct	-2.15	
	For >500 To 1,000, Deduct	-3.55	
	For >1,000, Deduct	-4.96	
	For Galvanized Steel, Add	16.31	
05 12 23 00-0396	LF 5" x 5" x 3/16" Square Steel Tubing.....	46.13	12.52
	For >100 To 250, Deduct	-1.25	
	For >250 To 500, Deduct	-2.41	
	For >500 To 1,000, Deduct	-3.98	
	For >1,000, Deduct	-5.55	
	For Galvanized Steel, Add	18.25	
05 12 23 00-0397	LF 6" x 6" x 3/16" Square Steel Tubing.....	56.00	15.20
	For >100 To 250, Deduct	-1.52	
	For >250 To 500, Deduct	-2.92	
	For >500 To 1,000, Deduct	-4.83	
	For >1,000, Deduct	-6.73	
	For Galvanized Steel, Add	22.15	
05 12 23 00-0398	1/4" Wall Thickness (05 12 23 00-0365)		
05 12 23 00-0399	LF 2" x 2" x 1/4" Square Steel Tubing.....	17.77	4.52
	For >100 To 250, Deduct	-0.45	
	For >250 To 500, Deduct	-0.90	
	For >500 To 1,000, Deduct	-1.49	
	For >1,000, Deduct	-2.09	
	For Galvanized Steel, Add	7.28	
05 12 23 00-0400	LF 2-1/2" x 2-1/2" x 1/4" Square Steel Tubing.....	23.37	5.95
	For >100 To 250, Deduct	-0.60	
	For >250 To 500, Deduct	-1.18	
	For >500 To 1,000, Deduct	-1.96	
	For >1,000, Deduct	-2.75	
	For Galvanized Steel, Add	9.57	
05 12 23 00-0401	LF 3" x 3" x 1/4" Square Steel Tubing.....	28.95	7.37
	For >100 To 250, Deduct	-0.74	
	For >250 To 500, Deduct	-1.46	
	For >500 To 1,000, Deduct	-2.43	
	For >1,000, Deduct	-3.40	
	For Galvanized Steel, Add	11.85	
05 12 23 00-0402	LF 3-1/2" x 3-1/2" x 1/4" Square Steel Tubing.....	34.53	8.79
	For >100 To 250, Deduct	-0.88	
	For >250 To 500, Deduct	-1.74	
	For >500 To 1,000, Deduct	-2.90	
	For >1,000, Deduct	-4.05	
	For Galvanized Steel, Add	14.14	
05 12 23 00-0403	LF 4" x 4" x 1/4" Square Steel Tubing.....	40.12	10.21
	For >100 To 250, Deduct	-1.02	
	For >250 To 500, Deduct	-2.02	
	For >500 To 1,000, Deduct	-3.37	
	For >1,000, Deduct	-4.71	
	For Galvanized Steel, Add	16.43	
05 12 23 00-0404	LF 4-1/2" x 4-1/2" x 1/4" Square Steel Tubing.....	45.71	11.64
	For >100 To 250, Deduct	-1.16	
	For >250 To 500, Deduct	-2.31	
	For >500 To 1,000, Deduct	-3.84	
	For >1,000, Deduct	-5.37	
	For Galvanized Steel, Add	18.72	
05 12 23 00-0405	LF 5" x 5" x 1/4" Square Steel Tubing.....	51.33	13.07
	For >100 To 250, Deduct	-1.31	
	For >250 To 500, Deduct	-2.59	
	For >500 To 1,000, Deduct	-4.31	
	For >1,000, Deduct	-6.03	
	For Galvanized Steel, Add	21.02	
05 12 23 00-0406	LF 6" x 6" x 1/4" Square Steel Tubing.....	62.50	15.91
	For >100 To 250, Deduct	-1.59	
	For >250 To 500, Deduct	-3.15	
	For >500 To 1,000, Deduct	-5.25	
	For >1,000, Deduct	-7.34	
	For Galvanized Steel, Add	25.59	
05 12 23 00-0407	Rectangular Steel Tubing (05 12 23 00-0364)		
05 12 23 00-0408	3/16" Wall Thickness (05 12 23 00-0407)		
05 12 23 00-0409	LF 3" x 2" x 3/16" Square Steel Tubing.....	21.55	5.84
	For >100 To 250, Deduct	-0.59	
	For >250 To 500, Deduct	-1.12	
	For >500 To 1,000, Deduct	-1.86	
	For >1,000, Deduct	-2.59	
	For Galvanized Steel, Add	8.53	



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0410 LF 4" x 2" x 3/16" Square Steel Tubing.....	26.48	7.18
For >100 To 250, Deduct	-0.72	
For >250 To 500, Deduct	-1.38	
For >500 To 1,000, Deduct	-2.28	
For >1,000, Deduct	-3.18	
For Galvanized Steel, Add	10.48	
05 12 23 00-0411 LF 4" x 3" x 3/16" Square Steel Tubing.....	31.40	8.52
For >100 To 250, Deduct	-0.85	
For >250 To 500, Deduct	-1.64	
For >500 To 1,000, Deduct	-2.71	
For >1,000, Deduct	-3.78	
For Galvanized Steel, Add	12.42	
05 12 23 00-0412 LF 5" x 2" x 3/16" Square Steel Tubing.....	31.40	8.52
For >100 To 250, Deduct	-0.85	
For >250 To 500, Deduct	-1.64	
For >500 To 1,000, Deduct	-2.71	
For >1,000, Deduct	-3.78	
For Galvanized Steel, Add	12.42	
05 12 23 00-0413 LF 5" x 3" x 3/16" Square Steel Tubing.....	36.30	9.85
For >100 To 250, Deduct	-0.98	
For >250 To 500, Deduct	-1.89	
For >500 To 1,000, Deduct	-3.13	
For >1,000, Deduct	-4.36	
For Galvanized Steel, Add	14.37	
05 12 23 00-0414 LF 5" x 4" x 3/16" Square Steel Tubing.....	41.23	11.19
For >100 To 250, Deduct	-1.12	
For >250 To 500, Deduct	-2.15	
For >500 To 1,000, Deduct	-3.55	
For >1,000, Deduct	-4.96	
For Galvanized Steel, Add	16.31	
05 12 23 00-0415 LF 6" x 2" x 3/16" Square Steel Tubing.....	36.30	9.85
For >100 To 250, Deduct	-0.98	
For >250 To 500, Deduct	-1.89	
For >500 To 1,000, Deduct	-3.13	
For >1,000, Deduct	-4.36	
For Galvanized Steel, Add	14.37	
05 12 23 00-0416 LF 6" x 3" x 3/16" Square Steel Tubing.....	41.23	11.19
For >100 To 250, Deduct	-1.12	
For >250 To 500, Deduct	-2.15	
For >500 To 1,000, Deduct	-3.55	
For >1,000, Deduct	-4.96	
For Galvanized Steel, Add	16.31	
05 12 23 00-0417 LF 6" x 4" x 3/16" Square Steel Tubing.....	46.13	12.52
For >100 To 250, Deduct	-1.25	
For >250 To 500, Deduct	-2.41	
For >500 To 1,000, Deduct	-3.98	
For >1,000, Deduct	-5.55	
For Galvanized Steel, Add	18.25	
05 12 23 00-0418 1/4" Wall Thickness (05 12 23 00-0407)		
05 12 23 00-0419 LF 3" x 2" x 1/4" Square Steel Tubing.....	23.37	5.95
For >100 To 250, Deduct	-0.60	
For >250 To 500, Deduct	-1.18	
For >500 To 1,000, Deduct	-1.96	
For >1,000, Deduct	-2.75	
For Galvanized Steel, Add	9.57	
05 12 23 00-0420 LF 4" x 2" x 1/4" Square Steel Tubing.....	28.95	7.37
For >100 To 250, Deduct	-0.74	
For >250 To 500, Deduct	-1.46	
For >500 To 1,000, Deduct	-2.43	
For >1,000, Deduct	-3.40	
For Galvanized Steel, Add	11.85	
05 12 23 00-0421 LF 4" x 3" x 1/4" Square Steel Tubing.....	34.53	8.79
For >100 To 250, Deduct	-0.88	
For >250 To 500, Deduct	-1.74	
For >500 To 1,000, Deduct	-2.90	
For >1,000, Deduct	-4.05	
For Galvanized Steel, Add	14.14	
05 12 23 00-0422 LF 5" x 2" x 1/4" Square Steel Tubing.....	34.53	8.79
For >100 To 250, Deduct	-0.88	
For >250 To 500, Deduct	-1.74	
For >500 To 1,000, Deduct	-2.90	
For >1,000, Deduct	-4.05	
For Galvanized Steel, Add	14.14	
05 12 23 00-0423 LF 5" x 3" x 1/4" Square Steel Tubing.....	40.12	10.21
For >100 To 250, Deduct	-1.02	
For >250 To 500, Deduct	-2.02	
For >500 To 1,000, Deduct	-3.37	
For >1,000, Deduct	-4.71	
For Galvanized Steel, Add	16.43	

05	05 Metals
	05 10 Structural Metal Framing
	05 12 Structural Steel Framing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0424	LF 5" x 4" x 1/4" Square Steel Tubing.....	45.71	11.64
	For >100 To 250, Deduct	-1.16	
	For >250 To 500, Deduct	-2.31	
	For >500 To 1,000, Deduct	-3.84	
	For >1,000, Deduct	-5.37	
	For Galvanized Steel, Add	18.72	
05 12 23 00-0425	LF 6" x 2" x 1/4" Square Steel Tubing.....	40.12	10.21
	For >100 To 250, Deduct	-1.02	
	For >250 To 500, Deduct	-2.02	
	For >500 To 1,000, Deduct	-3.37	
	For >1,000, Deduct	-4.71	
	For Galvanized Steel, Add	16.43	
05 12 23 00-0426	LF 6" x 3" x 1/4" Square Steel Tubing.....	45.71	11.64
	For >100 To 250, Deduct	-1.16	
	For >250 To 500, Deduct	-2.31	
	For >500 To 1,000, Deduct	-3.84	
	For >1,000, Deduct	-5.37	
	For Galvanized Steel, Add	18.72	
05 12 23 00-0427	LF 6" x 4" x 1/4" Square Steel Tubing.....	51.33	13.07
	For >100 To 250, Deduct	-1.31	
	For >250 To 500, Deduct	-2.59	
	For >500 To 1,000, Deduct	-4.31	
	For >1,000, Deduct	-6.03	
	For Galvanized Steel, Add	21.02	
05 12 23 00-0428	Round Steel Tubing (05 12 23 00-0364)		
05 12 23 00-0429	0.065" Wall Thickness (05 12 23 00-0428)		
05 12 23 00-0430	LF 1" Diameter x 0.065" Round Steel Tubing	4.75	1.09
	For >100 To 250, Deduct	-0.11	
	For >250 To 500, Deduct	-0.23	
	For >500 To 1,000, Deduct	-0.38	
	For >1,000, Deduct	-0.54	
	For Galvanized Steel, Add	2.05	
05 12 23 00-0431	LF 1-1/4" Diameter x 0.065" Round Steel Tubing	6.01	1.38
	For >100 To 250, Deduct	-0.14	
	For >250 To 500, Deduct	-0.29	
	For >500 To 1,000, Deduct	-0.48	
	For >1,000, Deduct	-0.68	
	For Galvanized Steel, Add	2.59	
05 12 23 00-0432	LF 1-1/2" Diameter x 0.065" Round Steel Tubing	7.29	1.66
	For >100 To 250, Deduct	-0.17	
	For >250 To 500, Deduct	-0.35	
	For >500 To 1,000, Deduct	-0.59	
	For >1,000, Deduct	-0.83	
	For Galvanized Steel, Add	3.14	
05 12 23 00-0433	LF 2" Diameter x 0.065" Round Steel Tubing	9.83	2.25
	For >100 To 250, Deduct	-0.23	
	For >250 To 500, Deduct	-0.47	
	For >500 To 1,000, Deduct	-0.79	
	For >1,000, Deduct	-1.11	
	For Galvanized Steel, Add	4.23	
05 12 23 00-0434	LF 2-1/2" Diameter x 0.065" Round Steel Tubing	12.36	2.83
	For >100 To 250, Deduct	-0.28	
	For >250 To 500, Deduct	-0.59	
	For >500 To 1,000, Deduct	-1.00	
	For >1,000, Deduct	-1.40	
	For Galvanized Steel, Add	5.33	
05 12 23 00-0435	LF 3" Diameter x 0.065" Round Steel Tubing	14.90	3.40
	For >100 To 250, Deduct	-0.34	
	For >250 To 500, Deduct	-0.71	
	For >500 To 1,000, Deduct	-1.20	
	For >1,000, Deduct	-1.69	
	For Galvanized Steel, Add	6.42	
05 12 23 00-0436	LF 3-1/2" Diameter x 0.065" Round Steel Tubing	17.45	3.99
	For >100 To 250, Deduct	-0.40	
	For >250 To 500, Deduct	-0.84	
	For >500 To 1,000, Deduct	-1.40	
	For >1,000, Deduct	-1.97	
	For Galvanized Steel, Add	7.52	
05 12 23 00-0437	LF 4" Diameter x 0.065" Round Steel Tubing	19.98	4.57
	For >100 To 250, Deduct	-0.46	
	For >250 To 500, Deduct	-0.96	
	For >500 To 1,000, Deduct	-1.61	
	For >1,000, Deduct	-2.26	
	For Galvanized Steel, Add	8.61	
05 12 23 00-0438	0.083" Wall Thickness (05 12 23 00-0428)		
05 12 23 00-0439	LF 1" Diameter x 0.083" Round Steel Tubing	5.16	1.19
	For >100 To 250, Deduct	-0.12	
	For >250 To 500, Deduct	-0.25	
	For >500 To 1,000, Deduct	-0.42	
	For >1,000, Deduct	-0.59	
	For Galvanized Steel, Add	2.21	



	Metals	05
	Structural Metal Framing	05 10
	Structural Steel Framing	05 12

05

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0440	LF 1-1/4" Diameter x 0.083" Round Steel Tubing	6.56	1.51
	For >100 To 250, Deduct	-0.15	
	For >250 To 500, Deduct	-0.32	
	For >500 To 1,000, Deduct	-0.53	
	For >1,000, Deduct	-0.74	
	For Galvanized Steel, Add	2.81	
05 12 23 00-0441	LF 1-1/2" Diameter x 0.083" Round Steel Tubing	7.97	1.84
	For >100 To 250, Deduct	-0.18	
	For >250 To 500, Deduct	-0.38	
	For >500 To 1,000, Deduct	-0.64	
	For >1,000, Deduct	-0.90	
	For Galvanized Steel, Add	3.42	
05 12 23 00-0442	LF 2" Diameter x 0.083" Round Steel Tubing	10.77	2.49
	For >100 To 250, Deduct	-0.25	
	For >250 To 500, Deduct	-0.52	
	For >500 To 1,000, Deduct	-0.87	
	For >1,000, Deduct	-1.22	
	For Galvanized Steel, Add	4.63	
05 12 23 00-0443	LF 2-1/2" Diameter x 0.083" Round Steel Tubing	13.59	3.14
	For >100 To 250, Deduct	-0.31	
	For >250 To 500, Deduct	-0.65	
	For >500 To 1,000, Deduct	-1.10	
	For >1,000, Deduct	-1.54	
	For Galvanized Steel, Add	5.83	
05 12 23 00-0444	LF 3" Diameter x 0.083" Round Steel Tubing	16.41	3.79
	For >100 To 250, Deduct	-0.38	
	For >250 To 500, Deduct	-0.79	
	For >500 To 1,000, Deduct	-1.33	
	For >1,000, Deduct	-1.86	
	For Galvanized Steel, Add	7.04	
05 12 23 00-0445	LF 3-1/2" Diameter x 0.083" Round Steel Tubing	19.21	4.43
	For >100 To 250, Deduct	-0.44	
	For >250 To 500, Deduct	-0.92	
	For >500 To 1,000, Deduct	-1.55	
	For >1,000, Deduct	-2.18	
	For Galvanized Steel, Add	8.25	
05 12 23 00-0446	LF 4" Diameter x 0.083" Round Steel Tubing	22.03	5.09
	For >100 To 250, Deduct	-0.51	
	For >250 To 500, Deduct	-1.06	
	For >500 To 1,000, Deduct	-1.78	
	For >1,000, Deduct	-2.50	
	For Galvanized Steel, Add	9.46	
05 12 23 00-0447	0.125" Wall Thickness (05 12 23 00-0428)		
05 12 23 00-0448	LF 2" Diameter x 0.125" Round Steel Tubing	11.51	3.14
	For >100 To 250, Deduct	-0.31	
	For >250 To 500, Deduct	-0.60	
	For >500 To 1,000, Deduct	-0.99	
	For >1,000, Deduct	-1.39	
	For Galvanized Steel, Add	4.54	
05 12 23 00-0449	LF 2-1/2" Diameter x 0.125" Round Steel Tubing	14.59	3.98
	For >100 To 250, Deduct	-0.40	
	For >250 To 500, Deduct	-0.76	
	For >500 To 1,000, Deduct	-1.26	
	For >1,000, Deduct	-1.76	
	For Galvanized Steel, Add	5.75	
05 12 23 00-0450	LF 3" Diameter x 0.125" Round Steel Tubing	17.66	4.81
	For >100 To 250, Deduct	-0.48	
	For >250 To 500, Deduct	-0.92	
	For >500 To 1,000, Deduct	-1.53	
	For >1,000, Deduct	-2.13	
	For Galvanized Steel, Add	6.96	
05 12 23 00-0451	LF 3-1/2" Diameter x 0.125" Round Steel Tubing	20.72	5.66
	For >100 To 250, Deduct	-0.57	
	For >250 To 500, Deduct	-1.08	
	For >500 To 1,000, Deduct	-1.79	
	For >1,000, Deduct	-2.50	
	For Galvanized Steel, Add	8.17	
05 12 23 00-0452	LF 4" Diameter x 0.125" Round Steel Tubing	23.79	6.50
	For >100 To 250, Deduct	-0.65	
	For >250 To 500, Deduct	-1.24	
	For >500 To 1,000, Deduct	-2.05	
	For >1,000, Deduct	-2.87	
	For Galvanized Steel, Add	9.39	
05 12 23 00-0453	Flat Steel Bar (05 12 23 00-0105)		
05 12 23 00-0454	1/8" Thick (05 12 23 00-0453)		
05 12 23 00-0455	LF 1/8" Thick x 1" Wide Flat Steel Bar	3.44	1.56
	For Galvanized Steel, Add	0.68	
05 12 23 00-0456	LF 1/8" Thick x 2" Wide Flat Steel Bar	5.33	2.35
	For Galvanized Steel, Add	1.12	
05 12 23 00-0457	LF 1/8" Thick x 4" Wide Flat Steel Bar	8.25	3.30
	For Galvanized Steel, Add	2.04	

05	05	Metals
	05 10	Structural Metal Framing
	05 12	Structural Steel Framing



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
05 12 23 00-0458	LF	1/8" Thick x 6" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	11.18 2.76	4.48
05 12 23 00-0459		3/16" Thick <small>(05 12 23 00-0453)</small>		
05 12 23 00-0460	LF	3/16" Thick x 1" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	4.57 1.03	1.94
05 12 23 00-0461	LF	3/16" Thick x 2" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	7.23 1.77	2.91
05 12 23 00-0462	LF	3/16" Thick x 4" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	9.85 2.99	3.34
05 12 23 00-0463	LF	3/16" Thick x 6" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	13.63 4.14	4.64
05 12 23 00-0464		1/4" Thick <small>(05 12 23 00-0453)</small>		
05 12 23 00-0465	LF	1/4" Thick x 1" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	4.72 1.02	2.05
05 12 23 00-0466	LF	1/4" Thick x 2" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	7.93 2.05	3.08
05 12 23 00-0467	LF	1/4" Thick x 4" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	11.69 3.97	3.52
05 12 23 00-0468	LF	1/4" Thick x 6" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	16.90 5.64	5.20
05 12 23 00-0469		3/8" Thick <small>(05 12 23 00-0453)</small>		
05 12 23 00-0470	LF	3/8" Thick x 1" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	6.03 1.59	2.31
05 12 23 00-0471	LF	3/8" Thick x 2" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	9.94 2.94	3.45
05 12 23 00-0472	LF	3/8" Thick x 4" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	15.41 5.88	3.95
05 12 23 00-0473	LF	3/8" Thick x 6" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	22.13 8.27	5.84
05 12 23 00-0474		1/2" Thick <small>(05 12 23 00-0453)</small>		
05 12 23 00-0475	LF	1/2" Thick x 1" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	7.11 2.04	2.53
05 12 23 00-0476	LF	1/2" Thick x 2" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	11.77 3.75	3.82
05 12 23 00-0477	LF	1/2" Thick x 4" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	16.84 6.39	4.34
05 12 23 00-0478	LF	1/2" Thick x 6" Wide Flat Steel Bar <i>For Galvanized Steel, Add</i>	30.23 12.75	6.44
05 12 23 00-0479		Flat Steel Plate <small>(05 12 23 00-0105)</small>		
05 12 23 00-0480	SF	1/8" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	17.85 24.83 1.40 4.81 22.12	6.73
05 12 23 00-0481	SF	3/16" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	20.17 31.07 1.75 6.02 27.67	6.96
05 12 23 00-0482	SF	1/4" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	24.09 39.62 2.23 7.68 35.28	7.80
05 12 23 00-0483	SF	3/8" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	32.60 62.18 3.50 12.05 55.38	8.78
05 12 23 00-0484	SF	1/2" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	38.70 77.47 4.36 15.01 69.00	9.65
05 12 23 00-0485	SF	3/4" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	63.52 145.28 8.17 28.15 129.39	11.96
05 12 23 00-0486	SF	1" Thick Flat Steel Plate <i>For 316 Stainless Steel, Add</i> <i>For Aluminum, Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i>	84.80 198.91 11.19 38.54 177.16	14.95



Metals	05	05
Structural Metal Framing	05 10	
Structural Steel Framing	05 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 12 23 00-0487 Metal Runner/Track <small>(05 12 23 00-0105)</small>		
05 12 23 00-0488 LF 4" Wide x 1-1/4" Leg, 18 Gauge, Slotted Metal Runner.....	8.38	3.74
For >100 To 250, Deduct	-0.38	
For >250 To 500, Deduct	-0.59	
For >500 To 1,000, Deduct	-0.92	
For >1,000, Deduct	-1.26	
05 12 23 00-0489 LF 6" Wide x 1-1/4" Leg, 18 Gauge, Slotted Metal Runner.....	10.10	4.18
For >100 To 250, Deduct	-0.42	
For >250 To 500, Deduct	-0.67	
For >500 To 1,000, Deduct	-1.06	
For >1,000, Deduct	-1.46	
05 12 23 00-0490 LF 8" Wide x 1-1/4" Leg, 18 Gauge, Slotted Metal Runner.....	12.11	4.80
For >100 To 250, Deduct	-0.48	
For >250 To 500, Deduct	-0.78	
For >500 To 1,000, Deduct	-1.25	
For >1,000, Deduct	-1.71	
05 12 23 00-0491 LF 10" Wide x 1-1/4" Leg, 18 Gauge, Slotted Metal Runner.....	14.08	5.23
For >100 To 250, Deduct	-0.52	
For >250 To 500, Deduct	-0.87	
For >500 To 1,000, Deduct	-1.40	
For >1,000, Deduct	-1.93	
05 12 23 00-0492 LF 4" Wide x 1-1/4" Leg, 16 Gauge, Slotted Metal Runner.....	9.11	3.74
For >100 To 250, Deduct	-0.38	
For >250 To 500, Deduct	-0.60	
For >500 To 1,000, Deduct	-0.96	
For >1,000, Deduct	-1.31	
05 12 23 00-0493 LF 6" Wide x 1-1/4" Leg, 16 Gauge, Slotted Metal Runner.....	11.15	4.18
For >100 To 250, Deduct	-0.42	
For >250 To 500, Deduct	-0.70	
For >500 To 1,000, Deduct	-1.12	
For >1,000, Deduct	-1.53	
05 12 23 00-0494 LF 8" Wide x 1-1/4" Leg, 16 Gauge, Slotted Metal Runner.....	13.15	4.80
For >100 To 250, Deduct	-0.48	
For >250 To 500, Deduct	-0.81	
For >500 To 1,000, Deduct	-1.30	
For >1,000, Deduct	-1.79	
05 12 23 00-0495 LF 10" Wide x 1-1/4" Leg, 16 Gauge, Slotted Metal Runner.....	15.38	5.23
For >100 To 250, Deduct	-0.52	
For >250 To 500, Deduct	-0.91	
For >500 To 1,000, Deduct	-1.47	
For >1,000, Deduct	-2.02	
05 12 23 00-0496 LF 4" Wide x 1-1/4" Leg, 14 Gauge, Slotted Metal Runner.....	10.20	4.14
For >100 To 250, Deduct	-0.41	
For >250 To 500, Deduct	-0.67	
For >500 To 1,000, Deduct	-1.06	
For >1,000, Deduct	-1.46	
05 12 23 00-0497 LF 6" Wide x 1-1/4" Leg, 14 Gauge, Slotted Metal Runner.....	12.48	4.60
For >100 To 250, Deduct	-0.46	
For >250 To 500, Deduct	-0.77	
For >500 To 1,000, Deduct	-1.24	
For >1,000, Deduct	-1.70	
05 12 23 00-0498 LF 8" Wide x 1-1/4" Leg, 14 Gauge, Slotted Metal Runner.....	14.29	5.29
For >100 To 250, Deduct	-0.53	
For >250 To 500, Deduct	-0.89	
For >500 To 1,000, Deduct	-1.42	
For >1,000, Deduct	-1.95	
05 12 23 00-0499 LF 10" Wide x 1-1/4" Leg, 14 Gauge, Slotted Metal Runner.....	16.71	5.74
For >100 To 250, Deduct	-0.58	
For >250 To 500, Deduct	-0.99	
For >500 To 1,000, Deduct	-1.60	
For >1,000, Deduct	-2.21	

05 13 Structural Stainless-Steel Framing (05 10)

05 13 00 00-0001 Stainless Steel Tube <small>(05 13)</small>		
05 13 00 00-0002 LF 1" x 1" Stainless Steel Tube.....	37.11	
05 13 00 00-0003 LF 1-1/2" x 1-1/2" Stainless Steel Tube.....	48.16	
05 13 00 00-0004 LF 2" x 2" Stainless Steel Tube.....	65.71	

05 14 Structural Aluminum Framing (05 10)

05 14 13 Architecturally-Exposed Structural Aluminum Framing (05 14)

05 14 13 00-0001 Rolled Or Plate Shapes <small>(05 14 13)</small>		
Note: 1" through 10" member.		
05 14 13 00-0002 LB Structural Aluminum, Up To 2,000 LB / Order 1" To 10" Rolled / Plate Structural Members.....	9.48	0.90
05 14 13 00-0003 LB Structural Aluminum, >2,000 - 9,999 LB / Order 1" To 10" Rolled / Plate Structural Members.....	8.35	0.84

05 14 13 00-0004 Aluminum Extrusions (05 14 13)

05 Metals**05 10 Structural Metal Framing****05 14 Structural Aluminum Framing**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
05 14 13 00-0005	LB	Aluminum Extrusions, Stock Shapes 1" To 10" Rolled / Plate Structural Members		15.42	3.74
05 14 13 00-0006	LB	Aluminum Extrusions, Custom Shapes 1" To 10" Rolled / Plate Structural Members		16.34	3.74
05 14 13 00-0007		Aluminum Tubing <small>(05 14 13)</small>			
05 14 13 00-0008	LB	Aluminum Extrusions, Tubular Shapes 1" To 10" Rolled / Plate Structural Members		13.80	3.80
05 14 13 00-0009	LF	1" x 1" Aluminum Tubing, 1/8" Wall Thickness		12.30	6.13
05 14 13 00-0010	LF	1-1/4" x 1-1/4" Aluminum Tubing, 1/8" Wall Thickness		14.90	6.70
05 14 13 00-0011	LF	1-1/2" x 1-1/2" Aluminum Tubing, 1/8" Wall Thickness		17.11	7.81
05 14 13 00-0012	LF	2" x 2" Aluminum Tubing, 1/8" Wall Thickness		20.37	8.37
05 14 13 00-0013	LF	4" x 4" Aluminum Tubing, 1/4" Wall Thickness		59.86	10.60
05 14 13 00-0014	LF	2" x 5" Aluminum Tubing, 1/4" Wall Thickness		49.00	9.49
05 15		Wire Rope Assemblies <small>(05 15)</small>			
05 15 16		Steel Wire Rope Assemblies <small>(05 15)</small>			
05 15 16 00-0001		6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope <small>(05 15 16)</small>			
05 15 16 00-0002	LF	1/4" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		1.68	0.11
		<i>For >500, Deduct</i>		-0.30	
05 15 16 00-0003	LF	5/16" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		2.25	0.11
		<i>For >500, Deduct</i>		-0.39	
05 15 16 00-0004	LF	3/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		2.67	0.22
		<i>For >500, Deduct</i>		-0.45	
05 15 16 00-0005	LF	7/16" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		3.21	0.22
		<i>For >500, Deduct</i>		-0.52	
05 15 16 00-0006	LF	1/2" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		3.71	0.33
		<i>For >500, Deduct</i>		-0.59	
05 15 16 00-0007	LF	9/16" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		4.54	0.44
		<i>For >500, Deduct</i>		-0.71	
05 15 16 00-0008	LF	5/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		5.42	0.44
		<i>For >500, Deduct</i>		-0.84	
05 15 16 00-0009	LF	3/4" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		7.51	0.79
		<i>For >500, Deduct</i>		-1.15	
05 15 16 00-0010	LF	7/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		10.09	0.90
		<i>For >500, Deduct</i>		-1.54	
05 15 16 00-0011	LF	1" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		12.56	1.23
		<i>For >500, Deduct</i>		-1.88	
05 15 16 00-0012	LF	1-1/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		15.53	1.56
		<i>For >500, Deduct</i>		-2.32	
05 15 16 00-0013	LF	1-1/4" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		18.93	1.89
		<i>For >500, Deduct</i>		-2.83	
05 15 16 00-0014		6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope <small>(05 15 16)</small>			
05 15 16 00-0015	LF	1/4" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		1.97	0.11
		<i>For >500, Deduct</i>		-0.36	
05 15 16 00-0016	LF	5/16" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		2.55	0.11
		<i>For >500, Deduct</i>		-0.45	
05 15 16 00-0017	LF	3/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		3.16	0.22
		<i>For >500, Deduct</i>		-0.55	
05 15 16 00-0018	LF	7/16" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		3.59	0.22
		<i>For >500, Deduct</i>		-0.60	
05 15 16 00-0019	LF	1/2" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		4.26	0.33
		<i>For >500, Deduct</i>		-0.70	
05 15 16 00-0020	LF	9/16" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		4.90	0.44
		<i>For >500, Deduct</i>		-0.78	
05 15 16 00-0021	LF	5/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope		5.72	0.44
		<i>For >500, Deduct</i>		-0.90	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 15 16 00-0022	LF			3/4" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	8.40	0.79
				<i>For >500, Deduct</i>	-1.33	
05 15 16 00-0023	LF			7/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	10.74	0.90
				<i>For >500, Deduct</i>	-1.67	
05 15 16 00-0024	LF			1" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	13.21	1.23
				<i>For >500, Deduct</i>	-2.02	
05 15 16 00-0025	LF			1-1/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	16.91	1.56
				<i>For >500, Deduct</i>	-2.59	
05 15 16 00-0026	LF			1-1/4" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	20.58	1.89
				<i>For >500, Deduct</i>	-3.16	
05 15 16 00-0027				6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope <small>(05 15 16)</small>		
05 15 16 00-0028	LF			1/4" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	1.56	0.11
				<i>For >500, Deduct</i>	-0.27	
05 15 16 00-0029	LF			5/16" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	2.11	0.11
				<i>For >500, Deduct</i>	-0.36	
05 15 16 00-0030	LF			3/8" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	2.51	0.22
				<i>For >500, Deduct</i>	-0.42	
05 15 16 00-0031	LF			7/16" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	2.94	0.22
				<i>For >500, Deduct</i>	-0.47	
05 15 16 00-0032	LF			1/2" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	3.53	0.33
				<i>For >500, Deduct</i>	-0.55	
05 15 16 00-0033	LF			9/16" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	4.46	0.44
				<i>For >500, Deduct</i>	-0.70	
05 15 16 00-0034	LF			5/8" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	5.20	0.44
				<i>For >500, Deduct</i>	-0.80	
05 15 16 00-0035	LF			3/4" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	7.31	0.79
				<i>For >500, Deduct</i>	-1.11	
05 15 16 00-0036	LF			7/8" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	8.93	0.90
				<i>For >500, Deduct</i>	-1.31	
05 15 16 00-0037	LF			1" Diameter, 6x19, Fiber Core (FC), Improved Plow Steel (IPS), Bright Finish, Wire Rope.....	11.34	1.23
				<i>For >500, Deduct</i>	-1.64	
05 15 16 00-0038				6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope <small>(05 15 16)</small>		
05 15 16 00-0039	LF			1/4" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	1.54	0.11
				<i>For >500, Deduct</i>	-0.27	
05 15 16 00-0040	LF			5/16" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	2.03	0.11
				<i>For >500, Deduct</i>	-0.35	
05 15 16 00-0041	LF			3/8" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	2.51	0.22
				<i>For >500, Deduct</i>	-0.42	
05 15 16 00-0042	LF			7/16" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	2.94	0.22
				<i>For >500, Deduct</i>	-0.47	
05 15 16 00-0043	LF			1/2" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	3.69	0.33
				<i>For >500, Deduct</i>	-0.58	
05 15 16 00-0044	LF			9/16" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	4.39	0.44
				<i>For >500, Deduct</i>	-0.68	
05 15 16 00-0045	LF			5/8" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	5.50	0.44
				<i>For >500, Deduct</i>	-0.86	
05 15 16 00-0046	LF			3/4" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	7.67	0.79
				<i>For >500, Deduct</i>	-1.18	
05 15 16 00-0047	LF			7/8" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	10.02	0.90
				<i>For >500, Deduct</i>	-1.53	
05 15 16 00-0048	LF			1" Diameter, 6x37, Fiber Core (FC), Extra Improved Plow Steel (EIPS), Bright Finish, Wire Rope.....	12.34	1.23
				<i>For >500, Deduct</i>	-1.85	
05 15 16 00-0049				6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope <small>(05 15 16)</small>		
05 15 16 00-0050	LF			3/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope.....	2.85	0.22
				<i>For >500, Deduct</i>	-0.48	
05 15 16 00-0051	LF			7/16" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope.....	3.33	0.22
				<i>For >500, Deduct</i>	-0.55	
05 15 16 00-0052	LF			1/2" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope.....	3.89	0.33
				<i>For >500, Deduct</i>	-0.62	
05 15 16 00-0053	LF			9/16" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope.....	5.23	0.44
				<i>For >500, Deduct</i>	-0.85	
05 15 16 00-0054	LF			5/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope.....	5.76	0.44
				<i>For >500, Deduct</i>	-0.91	

05 Metals**05 10 Structural Metal Framing****05 15 Wire Rope Assemblies**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
05 15 16 00-0055	LF	3/4" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	7.85		0.79
		<i>For >500, Deduct</i>	-1.22		
05 15 16 00-0056	LF	7/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	10.05		0.90
		<i>For >500, Deduct</i>	-1.53		
05 15 16 00-0057	LF	1" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	13.25		1.23
		<i>For >500, Deduct</i>	-2.02		
05 15 16 00-0058	LF	1-1/8" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	16.04		1.56
		<i>For >500, Deduct</i>	-2.42		
05 15 16 00-0059	LF	1-1/4" Diameter, 6x19, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	19.36		1.89
		<i>For >500, Deduct</i>	-2.92		
05 15 16 00-0060		6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope ^(05 15 16)			
05 15 16 00-0061	LF	3/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	2.92		0.22
		<i>For >500, Deduct</i>	-0.50		
05 15 16 00-0062	LF	7/16" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	3.53		0.22
		<i>For >500, Deduct</i>	-0.59		
05 15 16 00-0063	LF	1/2" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	4.16		0.33
		<i>For >500, Deduct</i>	-0.68		
05 15 16 00-0064	LF	9/16" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	5.82		0.44
		<i>For >500, Deduct</i>	-0.97		
05 15 16 00-0065	LF	5/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	5.86		0.44
		<i>For >500, Deduct</i>	-0.93		
05 15 16 00-0066	LF	3/4" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	8.04		0.79
		<i>For >500, Deduct</i>	-1.26		
05 15 16 00-0067	LF	7/8" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	10.65		0.90
		<i>For >500, Deduct</i>	-1.65		
05 15 16 00-0068	LF	1" Diameter, 6x37, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Galvanized Finish, Wire Rope	13.45		1.23
		<i>For >500, Deduct</i>	-2.06		
05 15 16 00-0069		19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope ^(05 15 16)			
05 15 16 00-0070	LF	1/4" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	3.04		0.11
		<i>For >500, Deduct</i>	-0.57		
05 15 16 00-0071	LF	5/16" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	3.27		0.11
		<i>For >500, Deduct</i>	-0.60		
05 15 16 00-0072	LF	3/8" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	3.84		0.22
		<i>For >500, Deduct</i>	-0.69		
05 15 16 00-0073	LF	7/16" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	5.16		0.22
		<i>For >500, Deduct</i>	-0.91		
05 15 16 00-0074	LF	1/2" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	5.89		0.22
		<i>For >500, Deduct</i>	-1.06		
05 15 16 00-0075	LF	9/16" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	6.78		0.44
		<i>For >500, Deduct</i>	-1.16		
05 15 16 00-0076	LF	5/8" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	8.05		0.44
		<i>For >500, Deduct</i>	-1.37		
05 15 16 00-0077	LF	3/4" Diameter, 19x7, Independent Wire Rope Core (IWRC), Extra Improved Plow Steel (EIPS), Bright Finish, Rotation Resistant Wire Rope	11.08		0.66
		<i>For >500, Deduct</i>	-1.87		
05 15 16 00-0078		7x7, Galvanized Finish, Aircraft Cable ^(05 15 16)			
05 15 16 00-0079	LF	1/16" Diameter, 7x7, Galvanized Finish, Aircraft Cable	0.34		0.08
		<i>For >500, Deduct</i>	-0.04		
05 15 16 00-0080	LF	3/32" Diameter, 7x7, Galvanized Finish, Aircraft Cable	0.38		0.09
		<i>For >500, Deduct</i>	-0.05		
05 15 16 00-0081	LF	1/8" Diameter, 7x7, Galvanized Finish, Aircraft Cable	0.43		0.10
		<i>For >500, Deduct</i>	-0.05		
05 15 16 00-0082	LF	5/32" Diameter, 7x7, Galvanized Finish, Aircraft Cable	0.50		0.11
		<i>For >500, Deduct</i>	-0.06		
05 15 16 00-0083	LF	3/16" Diameter, 7x7, Galvanized Finish, Aircraft Cable	0.61		0.11
		<i>For >500, Deduct</i>	-0.08		



		MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 15 16 00-0084 7x19, Galvanized Finish, Aircraft Cable (05 15 16)				
05 15 16 00-0085	LF	1/8" Diameter, 7x19, Galvanized Finish, Aircraft Cable <i>For >500, Deduct</i>	0.60 -0.09	0.10
05 15 16 00-0086	LF	5/32" Diameter, 7x19, Galvanized Finish, Aircraft Cable <i>For >500, Deduct</i>	0.65 -0.09	0.11
05 15 16 00-0087	LF	3/16" Diameter, 7x19, Galvanized Finish, Aircraft Cable <i>For >500, Deduct</i>	0.75 -0.11	0.11
05 15 16 00-0088	LF	1/4" Diameter, 7x19, Galvanized Finish, Aircraft Cable <i>For >500, Deduct</i>	0.89 -0.14	0.11
05 15 16 00-0089	LF	5/16" Diameter, 7x19, Galvanized Finish, Aircraft Cable <i>For >500, Deduct</i>	1.35 -0.21	0.11
05 15 16 00-0090	LF	3/8" Diameter, 7x19, Galvanized Finish, Aircraft Cable <i>For >500, Deduct</i>	1.80 -0.27	0.11
05 15 16 00-0091 Heavy Duty, Galvanized Steel, Wire Rope Thimbles (05 15 16)				
05 15 16 00-0092	EA	1/4" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	14.56	3.34
05 15 16 00-0093	EA	5/16" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	16.65	3.34
05 15 16 00-0094	EA	3/8" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	18.98	3.34
05 15 16 00-0095	EA	7/16" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	25.38	3.34
05 15 16 00-0096	EA	1/2" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	25.41	3.34
05 15 16 00-0097	EA	9/16" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	25.41	3.34
05 15 16 00-0098	EA	5/8" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	27.57	3.34
05 15 16 00-0099	EA	3/4" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	50.68	5.14
05 15 16 00-1000	EA	7/8" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	59.73	6.24
05 15 16 00-1001	EA	1" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	106.64	10.26
05 15 16 00-1002	EA	1-1/8" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	153.35	13.95
05 15 16 00-1003	EA	1-1/4" Diameter, Heavy Duty, Galvanized Steel, Wire Rope Thimble.....	153.35	13.95
05 15 16 00-0104 Galvanized Steel, Wire Rope Clips (05 15 16)				
05 15 16 00-0105	EA	1/8" Diameter, Galvanized Steel, Wire Rope Clip.....	16.96	3.34
05 15 16 00-0106	EA	3/16" Diameter, Galvanized Steel, Wire Rope Clip.....	17.32	3.34
05 15 16 00-0107	EA	1/4" Diameter, Galvanized Steel, Wire Rope Clip.....	19.77	3.34
05 15 16 00-0108	EA	5/16" Diameter, Galvanized Steel, Wire Rope Clip.....	20.16	3.34
05 15 16 00-0109	EA	3/8" Diameter, Galvanized Steel, Wire Rope Clip.....	20.71	3.34
05 15 16 00-0110	EA	7/16" Diameter, Galvanized Steel, Wire Rope Clip.....	25.98	3.34
05 15 16 00-0111	EA	1/2" Diameter, Galvanized Steel, Wire Rope Clip.....	26.38	3.34
05 15 16 00-0112	EA	9/16" Diameter, Galvanized Steel, Wire Rope Clip.....	30.20	3.34
05 15 16 00-0113	EA	5/8" Diameter, Galvanized Steel, Wire Rope Clip.....	30.75	3.34
05 15 16 00-0114	EA	3/4" Diameter, Galvanized Steel, Wire Rope Clip.....	42.14	4.46
05 15 16 00-0115	EA	7/8" Diameter, Galvanized Steel, Wire Rope Clip.....	63.06	6.70
05 15 16 00-0116	EA	1" Diameter, Galvanized Steel, Wire Rope Clip.....	69.32	6.70
05 15 16 00-0117	EA	1-1/8" Diameter, Galvanized Steel, Wire Rope Clip.....	81.48	8.92
05 15 16 00-0118	EA	1-1/4" Diameter, Galvanized Steel, Wire Rope Clip.....	118.35	13.39
05 15 16 00-0119 Steel, Open Swage Sockets (05 15 16)				
05 15 16 00-0120	EA	1/4" Diameter, Steel, Open Swage Socket.....	103.64	3.34
05 15 16 00-0121	EA	5/16" Diameter, Steel, Open Swage Socket.....	165.99	3.34
05 15 16 00-0122	EA	3/8" Diameter, Steel, Open Swage Socket.....	170.40	4.46
05 15 16 00-0123	EA	7/16" Diameter, Steel, Open Swage Socket.....	202.20	5.58
05 15 16 00-0124	EA	1/2" Diameter, Steel, Open Swage Socket.....	202.20	5.58
05 15 16 00-0125	EA	9/16" Diameter, Steel, Open Swage Socket.....	293.58	12.27
05 15 16 00-0126	EA	5/8" Diameter, Steel, Open Swage Socket.....	293.58	12.27
05 15 16 00-0127	EA	3/4" Diameter, Steel, Open Swage Socket.....	371.25	23.43
05 15 16 00-0128	EA	7/8" Diameter, Steel, Open Swage Socket.....	498.90	33.47
05 15 16 00-0129	EA	1" Diameter, Steel, Open Swage Socket.....	699.83	51.32
05 15 16 00-0130	EA	1-1/8" Diameter, Steel, Open Swage Socket.....	911.82	80.33
05 15 16 00-0131	EA	1-1/4" Diameter, Steel, Open Swage Socket.....	1,061.53	92.61
05 15 16 00-0132 Steel, Closed Swage Sockets (05 15 16)				
05 15 16 00-0133	EA	1/4" Diameter, Steel, Closed Swage Socket.....	83.07	3.34
05 15 16 00-0134	EA	5/16" Diameter, Steel, Closed Swage Socket.....	113.00	3.34
05 15 16 00-0135	EA	3/8" Diameter, Steel, Closed Swage Socket.....	113.00	3.34
05 15 16 00-0136	EA	7/16" Diameter, Steel, Closed Swage Socket.....	140.57	4.46
05 15 16 00-0137	EA	1/2" Diameter, Steel, Closed Swage Socket.....	141.80	4.46
05 15 16 00-0138	EA	9/16" Diameter, Steel, Closed Swage Socket.....	193.41	7.81
05 15 16 00-0139	EA	5/8" Diameter, Steel, Closed Swage Socket.....	198.72	8.92
05 15 16 00-0140	EA	3/4" Diameter, Steel, Closed Swage Socket.....	244.41	14.50
05 15 16 00-0141	EA	7/8" Diameter, Steel, Closed Swage Socket.....	314.49	21.20
05 15 16 00-0142	EA	1" Diameter, Steel, Closed Swage Socket.....	449.92	29.01
05 15 16 00-0143	EA	1-1/8" Diameter, Steel, Closed Swage Socket.....	555.73	40.17
05 15 16 00-0144	EA	1-1/4" Diameter, Steel, Closed Swage Socket.....	748.93	62.48
05 15 16 00-0145 Galvanized Steel, Open Spelter Sockets (05 15 16)				

05 Metals**05 10 Structural Metal Framing****05 15 Wire Rope Assemblies**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 15 16 00-0146	EA	1/4" Galvanized Steel, Open Spelter Socket	174.59	3.34
05 15 16 00-0147	EA	5/16" Galvanized Steel, Open Spelter Socket.....	178.64	3.34
05 15 16 00-0148	EA	3/8" Galvanized Steel, Open Spelter Socket	178.64	3.34
05 15 16 00-0149	EA	7/16" Galvanized Steel, Open Spelter Socket.....	198.23	6.70
05 15 16 00-0150	EA	1/2" Galvanized Steel, Open Spelter Socket	198.23	6.70
05 15 16 00-0151	EA	9/16" Galvanized Steel, Open Spelter Socket.....	258.49	11.16
05 15 16 00-0152	EA	5/8" Galvanized Steel, Open Spelter Socket	258.49	11.16
05 15 16 00-0153	EA	3/4" Galvanized Steel, Open Spelter Socket	325.76	16.73
05 15 16 00-0154	EA	7/8" Galvanized Steel, Open Spelter Socket	485.89	27.89
05 15 16 00-0155	EA	1" Galvanized Steel, Open Spelter Socket	888.12	43.51
05 15 16 00-0156	EA	1-1/8" Galvanized Steel, Open Spelter Socket	1,032.97	70.29
05 15 16 00-0157	EA	1-1/4" Galvanized Steel, Open Spelter Socket	1,396.98	92.61

05 15 16 00-0158 Galvanized Steel, Closed Spelter Sockets (05 15 16)

05 15 16 00-0159	EA	1/4" Galvanized Steel, Closed Spelter Socket.....	146.12	3.34
05 15 16 00-0160	EA	5/16" Galvanized Steel, Closed Spelter Socket	146.67	3.34
05 15 16 00-0161	EA	3/8" Galvanized Steel, Closed Spelter Socket	146.67	3.34
05 15 16 00-0162	EA	7/16" Galvanized Steel, Closed Spelter Socket.....	163.31	5.58
05 15 16 00-0163	EA	1/2" Galvanized Steel, Closed Spelter Socket	163.31	5.58
05 15 16 00-0164	EA	9/16" Galvanized Steel, Closed Spelter Socket	227.10	10.04
05 15 16 00-0165	EA	5/8" Galvanized Steel, Closed Spelter Socket	227.10	10.04
05 15 16 00-0166	EA	3/4" Galvanized Steel, Closed Spelter Socket	276.88	14.50
05 15 16 00-0167	EA	7/8" Galvanized Steel, Closed Spelter Socket	403.75	22.31
05 15 16 00-0168	EA	1" Galvanized Steel, Closed Spelter Socket	609.07	34.59
05 15 16 00-0169	EA	1-1/8" Galvanized Steel, Closed Spelter Socket.....	796.85	46.86
05 15 16 00-0170	EA	1-1/4" Galvanized Steel, Closed Spelter Socket.....	1,001.98	62.48

05 15 16 00-0171 Forged Steel, Jaw And Jaw Turnbuckles (05 15 16)

05 15 16 00-0172	EA	1/4" x 4", Forged Steel, Jaw And Jaw Turnbuckle	99.98	3.34
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-13.32	
05 15 16 00-0173	EA	5/16" x 4-1/2", Forged Steel, Jaw And Jaw Turnbuckle	107.37	3.34
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-14.43	
05 15 16 00-0174	EA	3/8" x 6", Forged Steel, Jaw And Jaw Turnbuckle	121.06	3.34
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-16.49	
05 15 16 00-0175	EA	1/2" x 6", Forged Steel, Jaw And Jaw Turnbuckle	133.08	4.46
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-17.15	
05 15 16 00-0176	EA	1/2" x 9", Forged Steel, Jaw And Jaw Turnbuckle	175.39	5.58
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-22.82	
05 15 16 00-0177	EA	1/2" x 12", Forged Steel, Jaw And Jaw Turnbuckle	199.16	6.70
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-25.84	
05 15 16 00-0178	EA	5/8" x 6", Forged Steel, Jaw And Jaw Turnbuckle	201.52	8.92
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-25.08	
05 15 16 00-0179	EA	5/8" x 9", Forged Steel, Jaw And Jaw Turnbuckle	250.26	8.92
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-31.96	
05 15 16 00-0180	EA	5/8" x 12", Forged Steel, Jaw And Jaw Turnbuckle	284.58	10.04
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-36.71	
05 15 16 00-0181	EA	3/4" x 6", Forged Steel, Jaw And Jaw Turnbuckle	271.52	12.27
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-33.61	
05 15 16 00-0182	EA	3/4" x 9", Forged Steel, Jaw And Jaw Turnbuckle	308.27	14.50
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-37.43	
05 15 16 00-0183	EA	3/4" x 12", Forged Steel, Jaw And Jaw Turnbuckle	382.28	15.62
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-47.78	
05 15 16 00-0184	EA	3/4" x 18", Forged Steel, Jaw And Jaw Turnbuckle	459.86	18.97
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-57.44	
05 15 16 00-0185	EA	7/8" x 12", Forged Steel, Jaw And Jaw Turnbuckle	520.04	26.77
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-62.07	
05 15 16 00-0186	EA	7/8" x 18", Forged Steel, Jaw And Jaw Turnbuckle	631.66	31.24
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-76.16	
05 15 16 00-0187	EA	1" x 6", Forged Steel, Jaw And Jaw Turnbuckle	540.98	26.77
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-65.21	
05 15 16 00-0188	EA	1" x 12", Forged Steel, Jaw And Jaw Turnbuckle	615.76	34.59
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-71.45	
05 15 16 00-0189	EA	1" x 18", Forged Steel, Jaw And Jaw Turnbuckle	847.87	43.51
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-101.43	
05 15 16 00-0190	EA	1" x 24", Forged Steel, Jaw And Jaw Turnbuckle	946.15	51.32
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-111.50	
05 15 16 00-0191	EA	1-1/4" x 12", Forged Steel, Jaw And Jaw Turnbuckle	1,050.29	62.48
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-120.35	
05 15 16 00-0192	EA	1-1/4" x 18", Forged Steel, Jaw And Jaw Turnbuckle	1,271.81	70.29
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-148.93	
05 15 16 00-0193	EA	1-1/4" x 24", Forged Steel, Jaw And Jaw Turnbuckle	1,655.12	80.33
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-200.45	
05 15 16 00-0194	EA	1-1/2" x 12", Forged Steel, Jaw And Jaw Turnbuckle	1,631.34	85.91
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-193.21	
05 15 16 00-0195	EA	1-1/2" x 18", Forged Steel, Jaw And Jaw Turnbuckle	1,782.63	111.56
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-200.45	
05 15 16 00-0196	EA	1-1/2" x 24", Forged Steel, Jaw And Jaw Turnbuckle	3,254.72	145.03
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-404.53	
05 15 16 00-0197	EA	2" x 24", Forged Steel, Jaw And Jaw Turnbuckle	5,301.86	278.92
		For "Eye And Eye" Or "Hook and Hook" Turnbuckle, Deduct	-627.93	



	Metals	05
	Structural Metal Framing	05 10
	Wire Rope Assemblies	05 15

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 15 16 00-0198	Galvanized Steel, Drop Forged, Shoulder Eye Bolts <small>(05 15 16)</small>
05 15 16 00-0199	EA 1/4" Diameter Thread, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....19.50
05 15 16 00-0200	EA 5/16" Diameter Thread, 7/8" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....19.60
05 15 16 00-0201	EA 3/8" Diameter Thread, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....22.38
05 15 16 00-0202	EA 7/16" Diameter Thread, 1-3/32" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....26.85
05 15 16 00-0203	EA 1/2" Diameter Thread, 1-3/16" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....26.72
05 15 16 00-0204	EA 5/8" Diameter Thread, 1-3/8" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....37.17
05 15 16 00-0205	EA 3/4" Diameter Thread, 1-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....45.24
05 15 16 00-0206	EA 7/8" Diameter Thread, 1-11/16" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....61.85
05 15 16 00-0207	EA 1" Diameter Thread, 1-13/16" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....84.11
05 15 16 00-0208	EA 1-1/8" Diameter Thread, 2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....123.54
05 15 16 00-0209	EA 1-1/4" Diameter Thread, 2-3/16" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....147.32
05 15 16 00-0210	EA 1-1/2" Diameter Thread, 2-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....270.76
05 15 16 00-0211	EA 1-3/4" Diameter Thread, 2-7/8" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....310.83
05 15 16 00-0212	EA 2" Diameter Thread, 3-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Shoulder Eye Bolt.....385.18

05 15 16 00-0213	Galvanized Steel, Drop Forged, Eye Bolts <small>(05 15 16)</small>
05 15 16 00-0214	EA 1/4" Diameter Thread, 3" Shank Length, 1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....26.30
05 15 16 00-0215	EA 1/4" Diameter Thread, 4" Shank Length, 1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....23.44
05 15 16 00-0216	EA 5/16" Diameter Thread, 2-1/4" Shank Length, 5/8" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....32.73
05 15 16 00-0217	EA 5/16" Diameter Thread, 4-1/4" Shank Length, 5/8" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....21.12
05 15 16 00-0218	EA 3/8" Diameter Thread, 2-1/2" Shank Length, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....29.44
05 15 16 00-0219	EA 3/8" Diameter Thread, 3" Shank Length, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....45.59
05 15 16 00-0220	EA 3/8" Diameter Thread, 4" Shank Length, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....44.07
05 15 16 00-0221	EA 3/8" Diameter Thread, 4-1/2" Shank Length, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....41.75
05 15 16 00-0222	EA 3/8" Diameter Thread, 5" Shank Length, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....37.17
05 15 16 00-0223	EA 3/8" Diameter Thread, 6" Shank Length, 3/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....38.39
05 15 16 00-0224	EA 1/2" Diameter Thread, 2" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....33.51
05 15 16 00-0225	EA 1/2" Diameter Thread, 3" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....26.11
05 15 16 00-0226	EA 1/2" Diameter Thread, 3-1/4" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....34.83
05 15 16 00-0227	EA 1/2" Diameter Thread, 4" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....48.50
05 15 16 00-0228	EA 1/2" Diameter Thread, 4-1/2" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....36.15
05 15 16 00-0229	EA 1/2" Diameter Thread, 6" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....59.82
05 15 16 00-0230	EA 1/2" Diameter Thread, 8" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....52.25
05 15 16 00-0231	EA 1/2" Diameter Thread, 10" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....47.35
05 15 16 00-0232	EA 1/2" Diameter Thread, 12" Shank Length, 1" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....56.23
05 15 16 00-0233	EA 5/8" Diameter Thread, 4" Shank Length, 1-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....56.97
05 15 16 00-0234	EA 5/8" Diameter Thread, 4-1/2" Shank Length, 1-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....50.38
05 15 16 00-0235	EA 5/8" Diameter Thread, 6" Shank Length, 1-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....64.14
05 15 16 00-0236	EA 5/8" Diameter Thread, 8" Shank Length, 1-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....73.92
05 15 16 00-0237	EA 5/8" Diameter Thread, 10" Shank Length, 1-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....85.70
05 15 16 00-0238	EA 5/8" Diameter Thread, 12" Shank Length, 1-1/4" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....70.21
05 15 16 00-0239	EA 3/4" Diameter Thread, 4-1/2" Shank Length, 1-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....70.37
05 15 16 00-0240	EA 3/4" Diameter Thread, 6" Shank Length, 1-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....71.78
05 15 16 00-0241	EA 3/4" Diameter Thread, 8" Shank Length, 1-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....79.61
05 15 16 00-0242	EA 3/4" Diameter Thread, 10" Shank Length, 1-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....86.06
05 15 16 00-0243	EA 3/4" Diameter Thread, 12" Shank Length, 1-1/2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....101.14
05 15 16 00-0244	EA 1" Diameter Thread, 8" Shank Length, 2" Inside Eye Diameter, Galvanized Steel, Drop Forged, Eye Bolt.....134.74

05 15 19 Stainless Steel Wire Rope Assemblies (05 15)

05 15 19 00-0001	7x7, 304 Stainless Steel, Aircraft Cable <small>(05 15 19)</small>
05 15 19 00-0002	LF 1/16" Diameter, 7x7, 304 Stainless Steel, Aircraft Cable.....0.27
	<i>For >500, Deduct</i>.....-0.03
05 15 19 00-0003	LF 3/32" Diameter, 7x7, 304 Stainless Steel, Aircraft Cable.....0.34
	<i>For >500, Deduct</i>.....-0.04
05 15 19 00-0004	LF 1/8" Diameter, 7x7, 304 Stainless Steel, Aircraft Cable.....0.44
	<i>For >500, Deduct</i>.....-0.06
05 15 19 00-0005	LF 5/32" Diameter, 7x7, 304 Stainless Steel, Aircraft Cable.....0.57
	<i>For >500, Deduct</i>.....-0.08
05 15 19 00-0006	LF 3/16" Diameter, 7x7, 304 Stainless Steel, Aircraft Cable.....0.72
	<i>For >500, Deduct</i>.....-0.10

05 15 19 00-0007	7x19, 304 Stainless Steel, Aircraft Cable <small>(05 15 19)</small>
05 15 19 00-0008	LF 1/8" Diameter, 7x19, 304 Stainless Steel, Aircraft Cable.....0.50
	<i>For >500, Deduct</i>.....-0.07
05 15 19 00-0009	LF 5/32" Diameter, 7x19, 304 Stainless Steel, Aircraft Cable.....0.58
	<i>For >500, Deduct</i>.....-0.08
05 15 19 00-0010	LF 3/16" Diameter, 7x19, 304 Stainless Steel, Aircraft Cable.....0.68
	<i>For >500, Deduct</i>.....-0.09
05 15 19 00-0011	LF 1/4" Diameter, 7x19, 304 Stainless Steel, Aircraft Cable.....0.85
	<i>For >500, Deduct</i>.....-0.13
05 15 19 00-0012	LF 5/16" Diameter, 7x19, 304 Stainless Steel, Aircraft Cable.....1.29
	<i>For >500, Deduct</i>.....-0.20
05 15 19 00-0013	LF 3/8" Diameter, 7x19, 304 Stainless Steel, Aircraft Cable.....1.93
	<i>For >500, Deduct</i>.....-0.30

05	05 Metals
	05 10 Structural Metal Framing
	05 15 Wire Rope Assemblies



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 15 19 00-0014	7x7, 316 Stainless Steel, Aircraft Cable <small>(05 15 19)</small>		
05 15 19 00-0015	LF 1/16" Diameter, 7x7, 316 Stainless Steel, Aircraft Cable	0.27	0.08
	<i>For >500, Deduct</i>	-0.03	
05 15 19 00-0016	LF 3/32" Diameter, 7x7, 316 Stainless Steel, Aircraft Cable	0.34	0.09
	<i>For >500, Deduct</i>	-0.04	
05 15 19 00-0017	LF 1/8" Diameter, 7x7, 316 Stainless Steel, Aircraft Cable	0.44	0.10
	<i>For >500, Deduct</i>	-0.06	
05 15 19 00-0018	LF 5/32" Diameter, 7x7, 316 Stainless Steel, Aircraft Cable	0.57	0.11
	<i>For >500, Deduct</i>	-0.08	
05 15 19 00-0019	LF 3/16" Diameter, 7x7, 316 Stainless Steel, Aircraft Cable	0.72	0.11
	<i>For >500, Deduct</i>	-0.10	

05 15 19 00-0020	7x19, 316 Stainless Steel, Aircraft Cable <small>(05 15 19)</small>		
05 15 19 00-0021	LF 1/8" Diameter, 7x19, 316 Stainless Steel, Aircraft Cable	0.50	0.10
	<i>For >500, Deduct</i>	-0.07	
05 15 19 00-0022	LF 5/32" Diameter, 7x19, 316 Stainless Steel, Aircraft Cable	0.58	0.11
	<i>For >500, Deduct</i>	-0.08	
05 15 19 00-0023	LF 3/16" Diameter, 7x19, 316 Stainless Steel, Aircraft Cable	0.68	0.11
	<i>For >500, Deduct</i>	-0.09	
05 15 19 00-0024	LF 1/4" Diameter, 7x19, 316 Stainless Steel, Aircraft Cable	0.85	0.11
	<i>For >500, Deduct</i>	-0.13	
05 15 19 00-0025	LF 5/16" Diameter, 7x19, 316 Stainless Steel, Aircraft Cable	1.29	0.11
	<i>For >500, Deduct</i>	-0.20	
05 15 19 00-0026	LF 3/8" Diameter, 7x19, 316 Stainless Steel, Aircraft Cable	1.93	0.11
	<i>For >500, Deduct</i>	-0.30	

05 40 Cold-Formed Metal Framing (05)

Note: Includes all connecting bolts and welds.

05 41 Structural Metal Stud Framing (05 40)

Note: Includes studs, bridging, fasteners, and metal stiffener at half height. Do not deduct for openings of less than 25 SF.

05 41 00 00-0001	18 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners <small>(05 41)</small>		
05 41 00 00-0002	SF 2-1/2" Width, 16" On Center, 18 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners	5.06	0.91
	<i>For Walls >10' High, Add</i>	1.01	
	<i>For Curved Wall, Add</i>	0.63	
	<i>For Up To 200, Add</i>	1.43	
	<i>For >200 To 500, Add</i>	0.72	
	<i>For 12" On Center, Add</i>	0.91	
	<i>For 24" On Center, Deduct</i>	-0.91	
05 41 00 00-0003	SF 3-5/8" Width, 16" On Center, 18 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners	5.67	0.91
	<i>For Walls >10' High, Add</i>	1.13	
	<i>For Curved Wall, Add</i>	0.67	
	<i>For Up To 200, Add</i>	1.58	
	<i>For >200 To 500, Add</i>	0.79	
	<i>For 12" On Center, Add</i>	1.02	
	<i>For 24" On Center, Deduct</i>	-1.02	
05 41 00 00-0004	SF 4" Width, 16" On Center, 18 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners.....	5.91	0.91
	<i>For Walls >10' High, Add</i>	1.18	
	<i>For Curved Wall, Add</i>	0.69	
	<i>For Up To 200, Add</i>	1.64	
	<i>For >200 To 500, Add</i>	0.82	
	<i>For 12" On Center, Add</i>	1.07	
	<i>For 24" On Center, Deduct</i>	-1.07	
05 41 00 00-0005	SF 6" Width, 16" On Center, 18 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners.....	7.61	1.01
	<i>For Walls >10' High, Add</i>	1.52	
	<i>For Curved Wall, Add</i>	0.72	
	<i>For Up To 200, Add</i>	2.00	
	<i>For >200 To 500, Add</i>	1.00	
	<i>For 12" On Center, Add</i>	1.40	
	<i>For 24" On Center, Deduct</i>	-1.40	
05 41 00 00-0006	SF 8" Width, 16" On Center, 18 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners.....	8.52	1.11
	<i>For Walls >10' High, Add</i>	1.70	
	<i>For Curved Wall, Add</i>	0.75	
	<i>For Up To 200, Add</i>	2.21	
	<i>For >200 To 500, Add</i>	1.10	
	<i>For 12" On Center, Add</i>	1.58	
	<i>For 24" On Center, Deduct</i>	-1.58	

05 41 00 00-0007	16 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners <small>(05 41)</small>		
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Metals	05	05
Cold-Formed Metal Framing	05 40	
Structural Metal Stud Framing	05 41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 41 00 00-0008 SF 2-1/2" Width, 16" On Center, 16 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....5.44	5.44	0.91
<i>For Walls >10' High, Add</i>	1.09	
<i>For Curved Wall, Add</i>	0.67	
<i>For Up To 200, Add</i>	1.53	
<i>For >200 To 500, Add</i>	0.77	
<i>For 12" On Center, Add</i>	0.98	
<i>For 24" On Center, Deduct</i>	-0.98	
05 41 00 00-0009 SF 3-5/8" Width, 16" On Center, 16 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....6.33	6.33	0.92
<i>For Walls >10' High, Add</i>	1.27	
<i>For Curved Wall, Add</i>	0.70	
<i>For Up To 200, Add</i>	1.73	
<i>For >200 To 500, Add</i>	0.87	
<i>For 12" On Center, Add</i>	1.15	
<i>For 24" On Center, Deduct</i>	-1.15	
05 41 00 00-0010 SF 4" Width, 16" On Center, 16 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....6.68	6.68	0.92
<i>For Walls >10' High, Add</i>	1.34	
<i>For Curved Wall, Add</i>	0.73	
<i>For Up To 200, Add</i>	1.82	
<i>For >200 To 500, Add</i>	0.91	
<i>For 12" On Center, Add</i>	1.22	
<i>For 24" On Center, Deduct</i>	-1.22	
05 41 00 00-0011 SF 6" Width, 16" On Center, 16 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....8.54	8.54	1.11
<i>For Walls >10' High, Add</i>	1.71	
<i>For Curved Wall, Add</i>	0.76	
<i>For Up To 200, Add</i>	2.22	
<i>For >200 To 500, Add</i>	1.11	
<i>For 12" On Center, Add</i>	1.58	
<i>For 24" On Center, Deduct</i>	-1.58	
05 41 00 00-0012 SF 8" Width, 16" On Center, 16 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....9.44	9.44	1.21
<i>For Walls >10' High, Add</i>	1.89	
<i>For Curved Wall, Add</i>	0.80	
<i>For Up To 200, Add</i>	2.42	
<i>For >200 To 500, Add</i>	1.21	
<i>For 12" On Center, Add</i>	1.75	
<i>For 24" On Center, Deduct</i>	-1.75	
05 41 00 00-0013 14 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners ^(05 41)		
05 41 00 00-0014 SF 3-5/8" Width, 16" On Center, 14 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....7.52	7.52	1.26
<i>For Walls >10' High, Add</i>	1.50	
<i>For Curved Wall, Add</i>	0.84	
<i>For Up To 200, Add</i>	2.06	
<i>For >200 To 500, Add</i>	1.03	
<i>For 12" On Center, Add</i>	1.36	
<i>For 24" On Center, Deduct</i>	-1.36	
05 41 00 00-0015 SF 4" Width, 16" On Center, 14 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....7.74	7.74	1.28
<i>For Walls >10' High, Add</i>	1.55	
<i>For Curved Wall, Add</i>	0.86	
<i>For Up To 200, Add</i>	2.12	
<i>For >200 To 500, Add</i>	1.06	
<i>For 12" On Center, Add</i>	1.41	
<i>For 24" On Center, Deduct</i>	-1.41	
05 41 00 00-0016 SF 6" Width, 16" On Center, 14 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....9.80	9.80	1.35
<i>For Walls >10' High, Add</i>	1.96	
<i>For Curved Wall, Add</i>	0.90	
<i>For Up To 200, Add</i>	2.56	
<i>For >200 To 500, Add</i>	1.28	
<i>For 12" On Center, Add</i>	1.81	
<i>For 24" On Center, Deduct</i>	-1.81	
05 41 00 00-0017 SF 8" Width, 16" On Center, 14 Gauge, Load Bearing, Structural Metal Stud Framing With Tracks And Runners .....10.78	10.78	1.41
<i>For Walls >10' High, Add</i>	2.16	
<i>For Curved Wall, Add</i>	0.94	
<i>For Up To 200, Add</i>	2.78	
<i>For >200 To 500, Add</i>	1.39	
<i>For 12" On Center, Add</i>	2.00	
<i>For 24" On Center, Deduct</i>	-2.00	
05 43 Slotted Channel Framing ^(05 40)		
05 43 00 00-0001 Unistrut Channel ^(05 43)		
Note: Excludes fasteners and accessories.		
05 43 00 00-0002 Steel Unistrut Channel ^(05 43 00 00-0001)		
05 43 00 00-0003 LF 1-5/8" Wide x 1-5/8" High, 12 Gauge, Steel Unistrut Channel .....11.78	11.78	2.52
<i>For Powder Coating, Add</i>	1.01	
<i>For Galvanizing, Add</i>	1.15	
05 43 00 00-0004 LF 1-5/8" Wide x 1-3/8" High, 12 Gauge, Steel Unistrut Channel .....12.11	12.11	2.52
<i>For Powder Coating, Add</i>	1.06	
<i>For Galvanizing, Add</i>	1.20	
05 43 00 00-0005 LF 1-5/8" Wide x 13/16" High, 12 Gauge, Steel Unistrut Channel .....12.61	12.61	2.52
<i>For Powder Coating, Add</i>	1.14	
<i>For Galvanizing, Add</i>	1.29	

05 Metals**05 40 Cold-Formed Metal Framing****05 43 Slotted Channel Framing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 43 00 00-0006	LF		1-5/8" Wide x 1-5/8" High, 14 Gauge, Steel Unistrut Channel <i>For Powder Coating, Add</i>	11.13 0.91	2.52
			<i>For Galvanizing, Add</i>	1.04	
05 43 00 00-0007	LF		1-5/8" Wide x 13/16" High, 14 Gauge, Steel Unistrut Channel <i>For Powder Coating, Add</i>	9.70 0.70	2.52
			<i>For Galvanizing, Add</i>	0.79	
05 43 00 00-0008			Stainless Steel Unistrut Channel (05 43 00 00-0001)		
05 43 00 00-0009			304 Stainless Steel Unistrut Channel (05 43 00 00-0008)		
05 43 00 00-0010	LF		1-5/8" Wide x 13/16" High, 14 Gauge, 304 Stainless Steel Unistrut Channel	33.97	2.52
05 43 00 00-0011	LF		1-5/8" Wide x 13/16" High, 12 Gauge, 304 Stainless Steel Unistrut Channel	41.04	2.52
05 43 00 00-0012	LF		1-5/8" Wide x 1-5/8" High, 14 Gauge, 304 Stainless Steel Unistrut Channel	39.28	2.52
05 43 00 00-0013	LF		1-5/8" Wide x 1-5/8" High, 12 Gauge, 304 Stainless Steel Unistrut Channel	50.20	2.52
05 43 00 00-0014			316 Stainless Steel Unistrut Channel (05 43 00 00-0008)		
05 43 00 00-0015	LF		1-5/8" Wide x 13/16" High, 14 Gauge, 316 Stainless Steel Unistrut Channel	56.90	2.52
05 43 00 00-0016			Unistrut Closure Strips (05 43)		
05 43 00 00-0017	LF		Steel Raceway Closure Strip For Unistrut Channel	6.18	0.55
05 43 00 00-0018			Lock Nuts With Spring For Unistrut Channel (05 43) Note: Includes hex bolt.		
05 43 00 00-0019			Steel Lock Nuts With Spring For Unistrut Channel (05 43 00 00-0018) Note: Includes hex bolt.		
05 43 00 00-0020	EA		1/4-20, Steel Lock Nut With Spring For Unistrut Channel	7.54	
05 43 00 00-0021	EA		3/8-16, Steel Lock Nut With Spring For Unistrut Channel	8.24	
05 43 00 00-0022	EA		1/2-13, Steel Lock Nut With Spring For Unistrut Channel	8.76	
05 43 00 00-0023	EA		5/8-11, Steel Lock Nut With Spring For Unistrut Channel	11.58	
05 43 00 00-0024			Stainless Steel Lock Nuts With Spring For Unistrut Channel (05 43 00 00-0018) Note: Includes hex bolt.		
05 43 00 00-0025	EA		1/4-20, 316 Stainless Steel Lock Nut With Spring For Unistrut Channel	18.86	
05 43 00 00-0026	EA		3/8-16, 316 Stainless Steel Lock Nut With Spring For Unistrut Channel	20.16	
05 43 00 00-0027	EA		1/2-13, 316 Stainless Steel Lock Nut With Spring For Unistrut Channel	29.05	
05 43 00 00-0028	EA		5/8-11, 316 Stainless Steel Lock Nut With Spring For Unistrut Channel	50.58	
05 43 00 00-0029			Lock Nuts Without Spring For Unistrut Channel (05 43) Note: Includes hex bolt.		
05 43 00 00-0030			Steel Lock Nuts Without Spring For Unistrut Channel (05 43 00 00-0029) Note: Includes hex bolt.		
05 43 00 00-0031	EA		1/4-20, Steel Lock Nut Without Spring For Unistrut Channel	7.56	
05 43 00 00-0032	EA		3/8-16, Steel Lock Nut Without Spring For Unistrut Channel	8.34	
05 43 00 00-0033	EA		1/2-13, Steel Lock Nut Without Spring For Unistrut Channel	8.80	
05 43 00 00-0034	EA		5/8-11, Steel Lock Nut Without Spring For Unistrut Channel	12.39	
05 43 00 00-0035			Stainless Steel Lock Nuts Without Spring For Unistrut Channel (05 43 00 00-0029) Note: Includes hex bolt.		
05 43 00 00-0036	EA		1/4-20, 316 Stainless Steel Lock Nut Without Spring For Unistrut Channel	13.16	
05 43 00 00-0037	EA		3/8-16, 316 Stainless Steel Lock Nut Without Spring For Unistrut Channel	16.13	
05 43 00 00-0038	EA		1/2-13, 316 Stainless Steel Lock Nut Without Spring For Unistrut Channel	17.69	
05 43 00 00-0039	EA		5/8-11, 316 Stainless Steel Lock Nut Without Spring For Unistrut Channel	49.24	
05 43 00 00-0040			Beam Clamp For Unistrut Channel (05 43)		
05 43 00 00-0041	EA		1-5/8" Channel, P2675 Unistrut Beam Clamp	24.74	8.37
05 43 00 00-0042	EA		1-5/8" Channel, P2676 Unistrut Beam Clamp	32.19	8.37
05 43 00 00-0043	EA		Add For Unistrut Swivel Nut, P2676	4.06	
05 43 00 00-0044			Beam Clamp Clevis Hangers For Unistrut Channel (05 43)		
05 43 00 00-0045	EA		Up To 3/8" Rod, Beam Clamp Clevis Hanger (Unistrut P2674)	27.32	8.37
05 43 00 00-0046	EA		Up To 1/2" Rod, Beam Clamp Clevis Hanger (Unistrut P2677)	33.26	8.37
05 43 00 00-0047	EA		Add For Unistrut Swivel Nut	4.06	
05 43 00 00-0048	EA		6-Hole ElectroGalvanized Steel Shelf Bracket For Unistrut	180.19	11.16
05 43 00 00-0049			Accessories For Unistrut Channel (05 43)		
05 43 00 00-0050	EA		Trolley Truck Hanger, 1-5/8" Channel P1834	59.23	8.37
05 43 00 00-0051	EA		Flat Plate Fitting, One Hole, 1-5/8" Channel P1064	14.71	5.58
05 43 00 00-0052	EA		60 Degree Angle, 1-5/8" Channel P2097	15.41	5.58



Metals	05	05
Cold-Formed Metal Framing	05 40	
Slotted Channel Framing	05 43	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 43 00 00-0053	Bases For Unistrut Channel <small>(05 43)</small>	
05 43 00 00-0054	Steel Bases For Unistrut Channel <small>(05 43 00 00-0053)</small>	
	Note: Includes straight or angled post mounting and fasteners.	
05 43 00 00-0055	EA 6" x 6", 1-5/8" Height, Single Post, Steel Base For Unistrut Channel	119.64 27.89
05 43 00 00-0056	EA 6" x 6", 3-1/2" Height, Single Post, Steel Base For Unistrut Channel	121.19 27.89
05 43 00 00-0057	EA 6" x 6", 1-5/8" Height, Double Post, Steel Base For Unistrut Channel	171.52 27.89
05 43 00 00-0058	EA 6" x 6", 3-1/2" Height, Double Post, Steel Base For Unistrut Channel	142.22 27.89

05 43 00 00-0059	Stainless Steel Bases For Unistrut Channel <small>(05 43 00 00-0053)</small>	
	Note: Includes straight or angled post mounting and fasteners.	
05 43 00 00-0060	EA 6" x 6", 1-5/8" Height, Single Post, 304 Stainless Steel Base For Unistrut Channel.....	230.10 27.89
05 43 00 00-0061	EA 6" x 6", 3-1/2" Height, Single Post, 304 Stainless Steel Base For Unistrut Channel.....	418.27 27.89
05 43 00 00-0062	EA 6" x 6", 3-1/2" Height, Double Post, 304 Stainless Steel Base For Unistrut Channel.....	318.53 27.89
05 43 00 00-0063	EA 6" x 6", 1-5/8" Height, Single Post, 316 Stainless Steel Base For Unistrut Channel.....	470.74 27.89
05 43 00 00-0064	EA 6" x 6", 3-1/2" Height, Double Post, 316 Stainless Steel Base For Unistrut Channel.....	413.87 27.89

05 45 Metal Support Assemblies (05 40)

- 05 45 13 Mechanical Metal Supports** (05 45)
See CSI section 23 05 29 00-0000 for metal supports.
- 05 45 16 Electrical Metal Supports** (05 45)
See CSI section 26 05 29 00-0000 for metal supports.

05 50 Metal Fabrications (05)

05 51 Metal Stairs (05 50)

- 05 51 13 Metal Pan Stairs** (05 51)
Note: Open concrete filled metal pan stair and landing including steel stringer, safety nosing and concrete. Excludes handrail.
See CSI section 05 52 13 00-0000 for handrails.

05 51 13 00-0001	Open Concrete Filled Metal Pan Stair And Landing <small>(05 51 13)</small>	
	Note: Includes steel stringer, safety nosing and concrete. Excludes handrail.	
05 51 13 00-0002	RSR 3'-6" Wide Open Concrete Filled Metal Pan Tread Stair	1,156.87 32.55
	<i>For Closed Riser, Add</i>	134.36
05 51 13 00-0003	RSR 4'-0" Wide Open Concrete Filled Metal Pan Tread Stair	1,314.00 37.98
	<i>For Closed Riser, Add</i>	152.47
05 51 13 00-0004	RSR 5'-0" Wide Open Concrete Filled Metal Pan Tread Stair	1,462.43 44.48
	<i>For Closed Riser, Add</i>	169.39
05 51 13 00-0005	SF Concrete Filled Steel Pan Landing	84.74 5.43
	Note: Conventional shape.	

- 05 51 19 Metal Grating Stairs** (05 51)
Note: Open steel grating tread metal stair and landing including steel stringers, safety nosing and 2 pipe handrail.

05 51 19 00-0001	Open Steel Grating Tread Metal Stair And Landing <small>(05 51 19)</small>	
	Note: Includes steel stringers, safety nosing and 2 pipe handrail.	
05 51 19 00-0002	RSR 3'-6" Wide Open Steel Grating Tread Metal Stair	554.65 43.40
	<i>For Closed Riser, Add</i>	67.33
	<i>For Galvanized Steel, Add</i>	116.96
05 51 19 00-0003	RSR 4'-0" Wide Open Steel Grating Tread Metal Stair	589.95 49.91
	<i>For Closed Riser, Add</i>	71.20
	<i>For Galvanized Steel, Add</i>	122.53
05 51 19 00-0004	RSR 5'-0" Wide Open Steel Grating Tread Metal Stair	651.85 58.60
	<i>For Closed Riser, Add</i>	78.30
	<i>For Galvanized Steel, Add</i>	133.67
05 51 19 00-0005	SF Steel Grating Landing With Framing And 2 Pipe Handrail	101.90 5.43
	Note: Conventional shape.	
	<i>For Galvanized Steel, Add</i>	20.05

- 05 51 33 Metal Ladders** (05 51)
Note: Includes factory prime.

05 51 33 13 Vertical Metal Ladders (05 51 33)

05 51 33 13-0001	Vertical Ladders <small>(05 51 33 13)</small>	
	Note: Climbing rungs are 3/4" corrugated steel round rungs on 12" centers. Stand-off brackets are 7"	
05 51 33 13-0002	VLF 20" Wide Fixed Vertical Steel Ladder Primed	106.07 13.02
	<i>For Galvanized Steel, Add</i>	16.31
	<i>For Aluminum, Add</i>	32.61
05 51 33 13-0003	VLF 24" Wide Fixed Vertical Steel Ladder Primed	122.60 13.02
	<i>For Galvanized Steel, Add</i>	20.44
	<i>For Aluminum, Add</i>	40.88
05 51 33 13-0004	VLF 20" Wide Fixed Vertical Steel Caged Ladder Primed	258.62 21.70
	<i>For Galvanized Steel, Add</i>	47.37
	<i>For Aluminum, Add</i>	94.73
05 51 33 13-0005	VLF 24" Wide Fixed Vertical Steel Caged Ladder Primed	291.67 21.70
	<i>For Galvanized Steel, Add</i>	55.63
	<i>For Aluminum, Add</i>	111.26

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 51 33 13-0006		Vertical Ladders Options (05 51 33 13)		
05 51 33 13-0007	EA	20" Wide Vertical Steel Ladder Walk-Thru Handrails, Primed	442.59	40.68
		Note: Extends 42" above landing surface. Includes mounting bracket.		
		For Galvanized Steel, Add	90.30	
		For Aluminum, Add	180.61	
05 51 33 13-0008	EA	24" Wide Vertical Steel Ladder Walk-Thru Handrails, Primed	485.21	43.40
		Note: Extends 42" above landing surface. Includes mounting bracket.		
		For Galvanized Steel, Add	99.60	
		For Aluminum, Add	199.20	
05 51 33 13-0009	EA	Security Cage Entry Gate With Lockable Hasp	543.57	13.56
05 51 33 13-0010	EA	6' Powder Coated, Security Ladder Guard	1,445.60	81.38
05 51 33 13-0011	EA	8' Powder Coated, Security Ladder Guard	1,730.36	94.94
05 51 33 13-0012	EA	Safety Chain Attachment	266.05	

05 51 33 13-0013		Welded Steel Ladder Cages (05 51 33 13)		
Note: For existing fixed ladders up to 20" wide. Excludes the ladder.				
05 51 33 13-0014		Powder Coated, Welded Steel Ladder Cages (05 51 33 13-0013)		
05 51 33 13-0015	EA	7-1/2' Length, Powder Coated, Welded Steel Ladder Cage	2,447.35	162.76
05 51 33 13-0016	EA	8-1/2' Length, Powder Coated, Welded Steel Ladder Cage	2,661.83	168.18
05 51 33 13-0017	EA	9-1/2' Length, Powder Coated, Welded Steel Ladder Cage	2,832.04	173.60
05 51 33 13-0018	EA	10-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,014.05	179.03
05 51 33 13-0019	EA	11-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,119.35	184.46
05 51 33 13-0020	EA	12-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,292.50	189.89
05 51 33 13-0021	EA	13-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,445.01	195.30
05 51 33 13-0022	EA	14-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,644.72	200.73
05 51 33 13-0023	EA	15-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,838.55	206.16
05 51 33 13-0024	EA	16-1/2' Length, Powder Coated, Welded Steel Ladder Cage	3,996.95	211.59
05 51 33 13-0025	EA	17-1/2' Length, Powder Coated, Welded Steel Ladder Cage	4,190.77	217.01
05 51 33 13-0026	EA	18-1/2' Length, Powder Coated, Welded Steel Ladder Cage	4,378.69	222.43
05 51 33 13-0027	EA	19-1/2' Length, Powder Coated, Welded Steel Ladder Cage	4,563.65	227.86
05 51 33 13-0028	EA	20-1/2' Length, Powder Coated, Welded Steel Ladder Cage	4,902.07	233.29
05 51 33 13-0029	EA	21-1/2' Length, Powder Coated, Welded Steel Ladder Cage	5,001.46	238.71
05 51 33 13-0030	EA	22-1/2' Length, Powder Coated, Welded Steel Ladder Cage	5,174.62	244.14
05 51 33 13-0031	EA	23-1/2' Length, Powder Coated, Welded Steel Ladder Cage	5,333.03	249.56
05 51 33 13-0032	EA	24-1/2' Length, Powder Coated, Welded Steel Ladder Cage	5,479.62	254.98
05 51 33 13-0033	EA	25-1/2' Length, Powder Coated, Welded Steel Ladder Cage	5,809.19	260.41
05 51 33 13-0034	EA	26-1/2' Length, Powder Coated, Welded Steel Ladder Cage	5,985.30	265.84
05 51 33 13-0035	EA	27-1/2' Length, Powder Coated, Welded Steel Ladder Cage	6,149.61	271.26

05 51 33 13-0036		Welded Stainless Steel Ladder Cages (05 51 33 13-0013)		
05 51 33 13-0037	EA	7-1/2' Length, Welded Stainless Steel Ladder Cage	6,204.10	162.76
05 51 33 13-0038	EA	8-1/2' Length, Welded Stainless Steel Ladder Cage	6,631.06	168.18
05 51 33 13-0039	EA	9-1/2' Length, Welded Stainless Steel Ladder Cage	7,344.27	173.60
05 51 33 13-0040	EA	10-1/2' Length, Welded Stainless Steel Ladder Cage	7,694.49	179.03
05 51 33 13-0041	EA	11-1/2' Length, Welded Stainless Steel Ladder Cage	7,988.66	184.46
05 51 33 13-0042	EA	12-1/2' Length, Welded Stainless Steel Ladder Cage	8,380.19	189.89
05 51 33 13-0043	EA	13-1/2' Length, Welded Stainless Steel Ladder Cage	9,087.51	195.30
05 51 33 13-0044	EA	14-1/2' Length, Welded Stainless Steel Ladder Cage	9,443.63	200.73
05 51 33 13-0045	EA	15-1/2' Length, Welded Stainless Steel Ladder Cage	9,811.57	206.16
05 51 33 13-0046	EA	16-1/2' Length, Welded Stainless Steel Ladder Cage	10,214.92	211.59
05 51 33 13-0047	EA	17-1/2' Length, Welded Stainless Steel Ladder Cage	10,936.98	217.01
05 51 33 13-0048	EA	18-1/2' Length, Welded Stainless Steel Ladder Cage	11,296.06	222.43
05 51 33 13-0049	EA	19-1/2' Length, Welded Stainless Steel Ladder Cage	11,637.44	227.86
05 51 33 13-0050	EA	20-1/2' Length, Welded Stainless Steel Ladder Cage	12,206.05	233.29
05 51 33 13-0051	EA	21-1/2' Length, Welded Stainless Steel Ladder Cage	12,845.48	238.71
05 51 33 13-0052	EA	22-1/2' Length, Welded Stainless Steel Ladder Cage	13,198.66	244.14
05 51 33 13-0053	EA	23-1/2' Length, Welded Stainless Steel Ladder Cage	13,560.70	249.56
05 51 33 13-0054	EA	24-1/2' Length, Welded Stainless Steel Ladder Cage	13,899.11	254.98
05 51 33 13-0055	EA	25-1/2' Length, Welded Stainless Steel Ladder Cage	14,774.63	260.41
05 51 33 13-0056	EA	26-1/2' Length, Welded Stainless Steel Ladder Cage	15,113.06	265.84
05 51 33 13-0057	EA	27-1/2' Length, Welded Stainless Steel Ladder Cage	15,460.33	271.26

05 51 33 16		Inclined Metal Ladders (05 51 33)		
05 51 33 16-0001		Industrial Ship Ladder, Incline Stairs (05 51 33 16)		
Note: Includes factory prime.				
05 51 33 16-0002	RSR	3' Wide Industrial Steel Ship Ladder With 2 Rails Each Side	388.52	54.25
		For Aluminum, Add	140.01	

05 51 33 23		Alternating Tread Ladders (05 51 33)		
05 51 33 23-0001		Vertical Ladders With Alternating Tread (05 51 33 23)		
05 51 33 23-0002	EA	4' Vertical Height Aluminum Alternating Tread Ladder	2,739.68	162.76
		For Stainless Steel, Add	263.66	
		For Primed Steel, Deduct	-219.72	



	Metals	05	
	Metal Fabrications	05 50	05
	Metal Stairs	05 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 51 33 23-0003	EA		5' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	3,148.80 321.26 -250.59	172.52
05 51 33 23-0004	EA		6' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	3,512.51 381.40 -278.71	172.52
05 51 33 23-0005	EA		7' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	3,993.58 441.48 -302.50	216.79
05 51 33 23-0006	EA		8' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	4,397.45 510.88 -328.42	224.47
05 51 33 23-0007	EA		9' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	4,718.82 575.72 -347.42	224.47
05 51 33 23-0008	EA		10' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	5,178.64 651.60 -369.24	250.40
05 51 33 23-0009	EA		11' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	5,538.71 729.13 -388.08	250.40
05 51 33 23-0010	EA		12' Vertical Height Aluminum Alternating Tread Ladder <i>For Stainless Steel, Add</i> <i>For Primed Steel, Deduct</i>	5,818.86 797.47 -398.74	250.40

05 52 Metal Railings (05 50)

05 52 13 Pipe and Tube Railings (05 52)

Note: Includes embedded steel sleeves, grouting, connection bolts (where necessary) and drilling of bolt (where necessary).

05 52 13 00-0001 **Welded Steel Pipe Railing** (05 52 13)

Note: Includes field welds and touch-up of welds.

05 52 13 00-0002 **One Rail, Up To 42" High, Welded Steel Pipe Railings** (05 52 13 00-0001)

Note: Includes factory primed posts and one rail.

05 52 13 00-0003	LF		1" Diameter, Schedule 40, One Rail, Up To 42" High, Welded Steel Pipe Railing..... <i>For 11 Gauge A513 Steel Tubing, Deduct</i> <i>For 12 Gauge A513 Steel Tubing, Deduct</i> <i>For 14 Gauge A513 Steel Tubing, Deduct</i> <i>For 16 Gauge A513 Steel Tubing, Deduct</i> <i>For Aluminum, Satin Finish, Add</i> <i>For Aluminum, Clear Anodized Finish, Add</i> <i>For Aluminum, Dark Anodized Finish, Add</i> <i>For Galvanizing, Add</i> <i>For Wrought Iron, Add</i> <i>For Solid Steel Rails, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 316 Stainless Steel, Add</i> <i>For 2" Wheel Guard, Add</i> <i>For 4" High Kick Plate, Add</i> <i>For 6" High Kick Plate, Add</i> <i>For Curved Rail, Add</i> <i>For Mounting On Stairs, Add</i> <i>For Mounting On Slopes, Add</i> <i>For Post Base Flange With Screws, Add Per Post</i> <i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i> <i>For Custom Design Or Shapes (Square Tops, etc), Add</i> <i>For Nylon Coating, Add</i> <i>For Schedule 80 Handrail, Add</i> <i>For Additional Off Set Handrail, ADA Attachment, Add</i>	38.20 -3.63 -4.13 -5.45 -6.44 6.93 10.73 12.38 6.60 3.82 7.64 52.80 59.40 1.57 2.06 3.30 16.41 11.46 3.82 19.67 29.76 13.68 2.48 8.22 14.24	10.85
05 52 13 00-0004	LF		1-1/4" Diameter, Schedule 40, One Rail, Up To 42" High, Welded Steel Pipe Railing <i>For Schedule 80 Handrail, Add</i> <i>For 11 Gauge A513 Steel Tubing, Deduct</i> <i>For 12 Gauge A513 Steel Tubing, Deduct</i> <i>For 14 Gauge A513 Steel Tubing, Deduct</i> <i>For 16 Gauge A513 Steel Tubing, Deduct</i> <i>For Aluminum, Satin Finish, Add</i> <i>For Aluminum, Clear Anodized Finish, Add</i> <i>For Aluminum, Dark Anodized Finish, Add</i> <i>For Galvanizing, Add</i> <i>For Wrought Iron, Add</i> <i>For Solid Steel Rails, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 316 Stainless Steel, Add</i> <i>For 2" Wheel Guard, Add</i> <i>For 4" High Kick Plate, Add</i> <i>For 6" High Kick Plate, Add</i> <i>For Curved Rail, Add</i> <i>For Mounting On Stairs, Add</i> <i>For Mounting On Slopes, Add</i> <i>For Post Base Flange With Screws, Add Per Post</i> <i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i> <i>For Custom Design Or Shapes (Square Tops, etc), Add</i> <i>For Nylon Coating, Add</i> <i>For Additional Off Set Handrail, ADA Attachment, Add</i>	41.04 14.22 -4.25 -4.84 -6.38 -7.54 8.12 12.57 14.51 7.74 4.10 8.21 61.89 69.62 1.84 2.42 3.87 18.11 12.31 4.10 19.67 29.76 15.10 2.90 15.95	10.85

05	05	Metals
	05 50	Metal Fabrications
	05 52	Metal Railings



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 52 13 00-0005 LF 1-1/2" Diameter, Schedule 40, One Rail, Up To 42" High, Welded Steel Pipe Railing	43.89	10.85
For Schedule 80 Handrail, Add	14.22	
For 11 Gauge A513 Steel Tubing, Deduct	-4.88	
For 12 Gauge A513 Steel Tubing, Deduct	-5.55	
For 14 Gauge A513 Steel Tubing, Deduct	-7.32	
For 16 Gauge A513 Steel Tubing, Deduct	-8.65	
For Aluminum, Satin Finish, Add	9.32	
For Aluminum, Clear Anodized Finish, Add	14.42	
For Aluminum, Dark Anodized Finish, Add	16.64	
For Galvanizing, Add	8.88	
For Wrought Iron, Add	4.39	
For Solid Steel Rails, Add	8.78	
For 304 Stainless Steel, Add	71.01	
For 316 Stainless Steel, Add	79.88	
For 2" Wheel Guard, Add	2.11	
For 4" High Kick Plate, Add	2.77	
For 6" High Kick Plate, Add	4.44	
For Curved Rail, Add	19.82	
For Mounting On Stairs, Add	13.17	
For Mounting On Slopes, Add	4.39	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	16.52	
For Nylon Coating, Add	3.33	
For Additional Off Set Handrail, ADA Attachment, Add	17.65	
05 52 13 00-0006 LF 2" Diameter, Schedule 40, One Rail, Up To 42" High, Welded Steel Pipe Railing	48.82	10.85
For 11 Gauge A513 Steel Tubing, Deduct	-5.97	
For 12 Gauge A513 Steel Tubing, Deduct	-6.78	
For 14 Gauge A513 Steel Tubing, Deduct	-8.95	
For 16 Gauge A513 Steel Tubing, Deduct	-10.58	
For Aluminum, Satin Finish, Add	11.39	
For Aluminum, Clear Anodized Finish, Add	17.63	
For Aluminum, Dark Anodized Finish, Add	20.34	
For Galvanizing, Add	10.85	
For Wrought Iron, Add	4.88	
For Solid Steel Rails, Add	9.76	
For 304 Stainless Steel, Add	86.78	
For 316 Stainless Steel, Add	97.63	
For 2" Wheel Guard, Add	2.58	
For 4" High Kick Plate, Add	3.39	
For 6" High Kick Plate, Add	5.42	
For Curved Rail, Add	22.78	
For Mounting On Stairs, Add	14.65	
For Mounting On Slopes, Add	4.88	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	18.99	
For Nylon Coating, Add	4.07	
For Schedule 80 Handrail, Add	16.64	
For Additional Off Set Handrail, ADA Attachment, Add	20.61	
05 52 13 00-0007 LF 2-1/2" Diameter, Schedule 40, One Rail, Up To 42" High, Welded Steel Pipe Railing	54.73	10.85
For 11 Gauge A513 Steel Tubing, Deduct	-7.27	
For 12 Gauge A513 Steel Tubing, Deduct	-8.26	
For 14 Gauge A513 Steel Tubing, Deduct	-10.90	
For 16 Gauge A513 Steel Tubing, Deduct	-12.88	
For Aluminum, Satin Finish, Add	13.87	
For Aluminum, Clear Anodized Finish, Add	21.47	
For Aluminum, Dark Anodized Finish, Add	24.77	
For Galvanizing, Add	13.21	
For Wrought Iron, Add	5.47	
For Solid Steel Rails, Add	10.95	
For 304 Stainless Steel, Add	105.70	
For 316 Stainless Steel, Add	118.91	
For 2" Wheel Guard, Add	3.14	
For 4" High Kick Plate, Add	4.13	
For 6" High Kick Plate, Add	6.61	
For Curved Rail, Add	26.33	
For Mounting On Stairs, Add	16.42	
For Mounting On Slopes, Add	5.47	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	21.94	
For Nylon Coating, Add	4.95	
For Schedule 80 Handrail, Add	19.09	
For Additional Off Set Handrail, ADA Attachment, Add	24.16	

05 52 13 00-0008 Two Rail, Up To 42" High, Welded Steel Pipe Railings (05 52 13 00-0001)
Note: Includes factory primed posts and two rails.



Metals	05	05
Metal Fabrications	05 50	
Metal Railings	05 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 52 13 00-0009 LF 1" Diameter, Schedule 40, Two Rail, Up To 42" High, Welded Steel Pipe Railing.....	50.57	10.85
For 11 Gauge A513 Steel Tubing, Deduct	-6.35	
For 12 Gauge A513 Steel Tubing, Deduct	-7.22	
For 14 Gauge A513 Steel Tubing, Deduct	-9.53	
For 16 Gauge A513 Steel Tubing, Deduct	-11.26	
For Aluminum, Satin Finish, Add	12.13	
For Aluminum, Clear Anodized Finish, Add	18.77	
For Aluminum, Dark Anodized Finish, Add	21.65	
For Galvanizing, Add	11.55	
For Wrought Iron, Add	5.06	
For Solid Steel Rails, Add	10.11	
For 304 Stainless Steel, Add	92.38	
For 316 Stainless Steel, Add	103.93	
For 2" Wheel Guard, Add	2.74	
For 4" High Kick Plate, Add	3.61	
For 6" High Kick Plate, Add	5.77	
For Curved Rail, Add	23.83	
For Mounting On Stairs, Add	15.17	
For Mounting On Slopes, Add	5.06	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	19.86	
For Nylon Coating, Add	4.33	
For Schedule 80 Handrail, Add	8.22	
For Additional Off Set Handrail, ADA Attachment, Add	14.24	
05 52 13 00-0010 LF 1-1/4" Diameter, Schedule 40, Two Rail, Up To 42" High, Welded Steel Pipe Railing	55.55	10.85
For Schedule 80 Handrail, Add	14.22	
For 11 Gauge A513 Steel Tubing, Deduct	-7.45	
For 12 Gauge A513 Steel Tubing, Deduct	-8.46	
For 14 Gauge A513 Steel Tubing, Deduct	-11.17	
For 16 Gauge A513 Steel Tubing, Deduct	-13.20	
For Aluminum, Satin Finish, Add	14.22	
For Aluminum, Clear Anodized Finish, Add	22.00	
For Aluminum, Dark Anodized Finish, Add	25.39	
For Galvanizing, Add	13.54	
For Wrought Iron, Add	5.56	
For Solid Steel Rails, Add	11.11	
For 304 Stainless Steel, Add	108.32	
For 316 Stainless Steel, Add	121.86	
For 2" Wheel Guard, Add	3.22	
For 4" High Kick Plate, Add	4.23	
For 6" High Kick Plate, Add	6.77	
For Curved Rail, Add	26.82	
For Mounting On Stairs, Add	16.67	
For Mounting On Slopes, Add	5.56	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	22.35	
For Nylon Coating, Add	5.08	
For Additional Off Set Handrail, ADA Attachment, Add	15.95	
05 52 13 00-0011 LF 1-1/2" Diameter, Schedule 40, Two Rail, Up To 42" High, Welded Steel Pipe Railing	60.52	10.85
For Schedule 80 Handrail, Add	14.22	
For 11 Gauge A513 Steel Tubing, Deduct	-8.54	
For 12 Gauge A513 Steel Tubing, Deduct	-9.71	
For 14 Gauge A513 Steel Tubing, Deduct	-12.81	
For 16 Gauge A513 Steel Tubing, Deduct	-15.14	
For Aluminum, Satin Finish, Add	16.30	
For Aluminum, Clear Anodized Finish, Add	25.23	
For Aluminum, Dark Anodized Finish, Add	29.12	
For Galvanizing, Add	15.53	
For Wrought Iron, Add	6.05	
For Solid Steel Rails, Add	12.10	
For 304 Stainless Steel, Add	124.22	
For 316 Stainless Steel, Add	139.75	
For 2" Wheel Guard, Add	3.69	
For 4" High Kick Plate, Add	4.85	
For 6" High Kick Plate, Add	7.76	
For Curved Rail, Add	29.80	
For Mounting On Stairs, Add	18.16	
For Mounting On Slopes, Add	6.05	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	24.84	
For Nylon Coating, Add	5.82	
For Additional Off Set Handrail, ADA Attachment, Add	17.65	

05	05 Metals
	05 50 Metal Fabrications
	05 52 Metal Railings



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 52 13 00-0012 LF 2" Diameter, Schedule 40, Two Rail, Up To 42" High, Welded Steel Pipe Railing.....	69.14	10.85
For 11 Gauge A513 Steel Tubing, Deduct	-10.44	
For 12 Gauge A513 Steel Tubing, Deduct	-11.86	
For 14 Gauge A513 Steel Tubing, Deduct	-15.66	
For 16 Gauge A513 Steel Tubing, Deduct	-18.50	
For Aluminum, Satin Finish, Add	19.92	
For Aluminum, Clear Anodized Finish, Add	30.84	
For Aluminum, Dark Anodized Finish, Add	35.58	
For Galvanizing, Add	18.98	
For Wrought Iron, Add	6.91	
For Solid Steel Rails, Add	13.83	
For 304 Stainless Steel, Add	151.81	
For 316 Stainless Steel, Add	170.78	
For 2" Wheel Guard, Add	4.51	
For 4" High Kick Plate, Add	5.93	
For 6" High Kick Plate, Add	9.49	
For Curved Rail, Add	34.97	
For Mounting On Stairs, Add	20.74	
For Mounting On Slopes, Add	6.91	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	29.15	
For Nylon Coating, Add	7.12	
For Schedule 80 Handrail, Add	16.64	
For Additional Off Set Handrail, ADA Attachment, Add	20.61	
05 52 13 00-0013 LF 2-1/2" Diameter, Schedule 40, Two Rail, Up To 42" High, Welded Steel Pipe Railing	79.48	10.85
For 11 Gauge A513 Steel Tubing, Deduct	-12.71	
For 12 Gauge A513 Steel Tubing, Deduct	-14.45	
For 14 Gauge A513 Steel Tubing, Deduct	-19.07	
For 16 Gauge A513 Steel Tubing, Deduct	-22.53	
For Aluminum, Satin Finish, Add	24.27	
For Aluminum, Clear Anodized Finish, Add	37.56	
For Aluminum, Dark Anodized Finish, Add	43.34	
For Galvanizing, Add	23.11	
For Wrought Iron, Add	7.95	
For Solid Steel Rails, Add	15.90	
For 304 Stainless Steel, Add	184.90	
For 316 Stainless Steel, Add	208.01	
For 2" Wheel Guard, Add	5.49	
For 4" High Kick Plate, Add	7.22	
For 6" High Kick Plate, Add	11.56	
For Curved Rail, Add	41.18	
For Mounting On Stairs, Add	23.84	
For Mounting On Slopes, Add	7.95	
For Post Base Flange With Screws, Add Per Post	19.67	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	29.76	
For Custom Design Or Shapes (Square Tops, etc), Add	34.32	
For Nylon Coating, Add	8.67	
For Schedule 80 Handrail, Add	19.09	
For Additional Off Set Handrail, ADA Attachment, Add	24.16	
05 52 13 00-0014 Three Rail, Up To 42" High, Welded Steel Pipe Railings (05 52 13 00-0001)		
Note: Includes factory primed posts and three rails.		
05 52 13 00-0015 LF 1" Diameter, Schedule 40, Three Rail, Up To 42" High, Welded Steel Pipe Railing	79.09	13.02
For 11 Gauge A513 Steel Tubing, Deduct	-11.67	
For 12 Gauge A513 Steel Tubing, Deduct	-13.26	
For 14 Gauge A513 Steel Tubing, Deduct	-17.51	
For 16 Gauge A513 Steel Tubing, Deduct	-20.69	
For Aluminum, Satin Finish, Add	22.28	
For Aluminum, Clear Anodized Finish, Add	34.48	
For Aluminum, Dark Anodized Finish, Add	39.79	
For Galvanizing, Add	21.22	
For Wrought Iron, Add	7.91	
For Solid Steel Rails, Add	15.82	
For 304 Stainless Steel, Add	169.76	
For 316 Stainless Steel, Add	190.98	
For 2" Wheel Guard, Add	5.04	
For 4" High Kick Plate, Add	6.63	
For 6" High Kick Plate, Add	10.61	
For Curved Rail, Add	39.64	
For Mounting On Stairs, Add	23.73	
For Mounting On Slopes, Add	7.91	
For Post Base Flange With Screws, Add Per Post	20.10	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	30.41	
For Custom Design Or Shapes (Square Tops, etc), Add	33.04	
For Nylon Coating, Add	7.96	
For Schedule 80 Handrail, Add	11.52	
For Additional Off Set Handrail, ADA Attachment, Add	15.11	



	Metals	05	
	Metal Fabrications	05 50	05
	Metal Railings	05 52	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 52	13 00-0016	LF	1-1/4" Diameter, Schedule 40, Three Rail, Up To 42" High, Welded Steel Pipe Railing.....	88.22	13.02
			<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-13.68	
			<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-15.55	
			<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-20.52	
			<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-24.25	
			<i>For Aluminum, Satin Finish, Add</i>	26.12	
			<i>For Aluminum, Clear Anodized Finish, Add</i>	40.42	
			<i>For Aluminum, Dark Anodized Finish, Add</i>	46.64	
			<i>For Galvanizing, Add</i>	24.87	
			<i>For Wrought Iron, Add</i>	8.82	
			<i>For Solid Steel Rails, Add</i>	17.64	
			<i>For 304 Stainless Steel, Add</i>	198.98	
			<i>For 316 Stainless Steel, Add</i>	223.85	
			<i>For 2" Wheel Guard, Add</i>	5.91	
			<i>For 4" High Kick Plate, Add</i>	7.77	
			<i>For 6" High Kick Plate, Add</i>	12.44	
			<i>For Curved Rail, Add</i>	45.12	
			<i>For Mounting On Stairs, Add</i>	26.47	
			<i>For Mounting On Slopes, Add</i>	8.82	
			<i>For Post Base Flange With Screws, Add Per Post</i>	20.10	
			<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	30.41	
			<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	37.60	
			<i>For Nylon Coating, Add</i>	9.33	
			<i>For Schedule 80 Handrail, Add</i>	19.52	
			<i>For Additional Off Set Handrail, ADA Attachment, Add</i>	16.82	
05 52	13 00-0017	LF	1-1/2" Diameter, Schedule 40, Three Rail, Up To 42" High, Welded Steel Pipe Railing.....	97.35	13.02
			<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-15.69	
			<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-17.83	
			<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-23.53	
			<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-27.81	
			<i>For Aluminum, Satin Finish, Add</i>	29.95	
			<i>For Aluminum, Clear Anodized Finish, Add</i>	46.35	
			<i>For Aluminum, Dark Anodized Finish, Add</i>	53.48	
			<i>For Galvanizing, Add</i>	28.52	
			<i>For Wrought Iron, Add</i>	9.74	
			<i>For Solid Steel Rails, Add</i>	19.47	
			<i>For 304 Stainless Steel, Add</i>	228.19	
			<i>For 316 Stainless Steel, Add</i>	256.72	
			<i>For 2" Wheel Guard, Add</i>	6.77	
			<i>For 4" High Kick Plate, Add</i>	8.91	
			<i>For 6" High Kick Plate, Add</i>	14.26	
			<i>For Curved Rail, Add</i>	50.60	
			<i>For Mounting On Stairs, Add</i>	29.21	
			<i>For Mounting On Slopes, Add</i>	9.74	
			<i>For Post Base Flange With Screws, Add Per Post</i>	20.10	
			<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	30.41	
			<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	42.17	
			<i>For Nylon Coating, Add</i>	10.70	
			<i>For Schedule 80 Handrail, Add</i>	19.52	
			<i>For Additional Off Set Handrail, ADA Attachment, Add</i>	18.52	
05 52	13 00-0018	LF	2" Diameter, Schedule 40, Three Rail, Up To 42" High, Welded Steel Pipe Railing.....	113.23	13.02
			<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-19.18	
			<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-21.80	
			<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-28.77	
			<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-34.00	
			<i>For Aluminum, Satin Finish, Add</i>	36.62	
			<i>For Aluminum, Clear Anodized Finish, Add</i>	56.67	
			<i>For Aluminum, Dark Anodized Finish, Add</i>	65.39	
			<i>For Galvanizing, Add</i>	34.88	
			<i>For Wrought Iron, Add</i>	11.32	
			<i>For Solid Steel Rails, Add</i>	22.65	
			<i>For 304 Stainless Steel, Add</i>	279.01	
			<i>For 316 Stainless Steel, Add</i>	313.88	
			<i>For 2" Wheel Guard, Add</i>	8.28	
			<i>For 4" High Kick Plate, Add</i>	10.90	
			<i>For 6" High Kick Plate, Add</i>	17.44	
			<i>For Curved Rail, Add</i>	60.13	
			<i>For Mounting On Stairs, Add</i>	33.97	
			<i>For Mounting On Slopes, Add</i>	11.32	
			<i>For Post Base Flange With Screws, Add Per Post</i>	20.10	
			<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	30.41	
			<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	50.11	
			<i>For Nylon Coating, Add</i>	13.08	
			<i>For Schedule 80 Handrail, Add</i>	22.75	
			<i>For Additional Off Set Handrail, ADA Attachment, Add</i>	21.48	

05	05 Metals
	05 50 Metal Fabrications
	05 52 Metal Railings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 52 13 00-0019	LF 2-1/2" Diameter, Schedule 40, Three Rail, Up To 42" High, Welded Steel Pipe Railing.....	132.13	13.02
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-23.34	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-26.52	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-35.01	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-41.38	
	<i>For Aluminum, Satin Finish, Add</i>	44.56	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	68.96	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	79.57	
	<i>For Galvanizing, Add</i>	42.44	
	<i>For Wrought Iron, Add</i>	13.21	
	<i>For Solid Steel Rails, Add</i>	26.43	
	<i>For 304 Stainless Steel, Add</i>	339.49	
	<i>For 316 Stainless Steel, Add</i>	381.92	
	<i>For 2" Wheel Guard, Add</i>	10.08	
	<i>For 4" High Kick Plate, Add</i>	13.26	
	<i>For 6" High Kick Plate, Add</i>	21.22	
	<i>For Curved Rail, Add</i>	71.47	
	<i>For Mounting On Stairs, Add</i>	39.64	
	<i>For Mounting On Slopes, Add</i>	13.21	
	<i>For Post Base Flange With Screws, Add Per Post</i>	20.10	
	<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	30.41	
	<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	59.56	
	<i>For Nylon Coating, Add</i>	15.91	
	<i>For Schedule 80 Handrail, Add</i>	26.02	
	<i>For Additional Off Set Handrail, ADA Attachment, Add</i>	25.03	
05 52 13 00-0020	Four Rail, Up To 42" High, Welded Steel Pipe Railings (05 52 13 00-0001)		
	Note: Includes factory primed posts and four rails.		
05 52 13 00-0021	LF 1" Diameter, Schedule 40, Four Rail, Up To 42" High, Welded Steel Pipe Railing.....	95.48	15.19
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-14.32	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-16.28	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-21.48	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-25.39	
	<i>For Aluminum, Satin Finish, Add</i>	27.34	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	42.32	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	48.83	
	<i>For Galvanizing, Add</i>	26.04	
	<i>For Wrought Iron, Add</i>	9.55	
	<i>For Solid Steel Rails, Add</i>	19.10	
	<i>For 304 Stainless Steel, Add</i>	208.32	
	<i>For 316 Stainless Steel, Add</i>	234.36	
	<i>For 2" Wheel Guard, Add</i>	6.18	
	<i>For 4" High Kick Plate, Add</i>	8.14	
	<i>For 6" High Kick Plate, Add</i>	13.02	
	<i>For Curved Rail, Add</i>	48.17	
	<i>For Mounting On Stairs, Add</i>	28.64	
	<i>For Mounting On Slopes, Add</i>	9.55	
	<i>For Post Base Flange With Screws, Add Per Post</i>	20.54	
	<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	31.06	
	<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	40.15	
	<i>For Nylon Coating, Add</i>	9.77	
	<i>For Schedule 80 Handrail, Add</i>	15.10	
	<i>For Additional Off Set Handrail, ADA Attachment, Add</i>	15.98	
05 52 13 00-0022	LF 1-1/4" Diameter, Schedule 40, Four Rail, Up To 42" High, Welded Steel Pipe Railing.....	103.59	15.19
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-16.11	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-18.30	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-24.16	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-28.55	
	<i>For Aluminum, Satin Finish, Add</i>	30.75	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	47.59	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	54.91	
	<i>For Galvanizing, Add</i>	29.28	
	<i>For Wrought Iron, Add</i>	10.36	
	<i>For Solid Steel Rails, Add</i>	20.72	
	<i>For 304 Stainless Steel, Add</i>	234.27	
	<i>For 316 Stainless Steel, Add</i>	263.56	
	<i>For 2" Wheel Guard, Add</i>	6.95	
	<i>For 4" High Kick Plate, Add</i>	9.15	
	<i>For 6" High Kick Plate, Add</i>	14.64	
	<i>For Curved Rail, Add</i>	53.04	
	<i>For Mounting On Stairs, Add</i>	31.08	
	<i>For Mounting On Slopes, Add</i>	10.36	
	<i>For Post Base Flange With Screws, Add Per Post</i>	20.54	
	<i>For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post</i>	31.06	
	<i>For Custom Design Or Shapes (Square Tops, etc), Add</i>	44.20	
	<i>For Nylon Coating, Add</i>	10.98	
	<i>For Schedule 80 Handrail, Add</i>	25.09	
	<i>For Additional Off Set Handrail, ADA Attachment, Add</i>	17.69	



Metals	05	05
Metal Fabrications	05 50	
Metal Railings	05 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 52 13 00-0023 LF 1-1/2" Diameter, Schedule 40, Four Rail, Up To 42" High, Welded Steel Pipe Railing.....	111.70	15.19
For 11 Gauge A513 Steel Tubing, Deduct	-17.89	
For 12 Gauge A513 Steel Tubing, Deduct	-20.33	
For 14 Gauge A513 Steel Tubing, Deduct	-26.84	
For 16 Gauge A513 Steel Tubing, Deduct	-31.71	
For Aluminum, Satin Finish, Add	34.15	
For Aluminum, Clear Anodized Finish, Add	52.86	
For Aluminum, Dark Anodized Finish, Add	60.99	
For Galvanizing, Add	32.53	
For Wrought Iron, Add	11.17	
For Solid Steel Rails, Add	22.34	
For 304 Stainless Steel, Add	260.22	
For 316 Stainless Steel, Add	292.75	
For 2" Wheel Guard, Add	7.73	
For 4" High Kick Plate, Add	10.17	
For 6" High Kick Plate, Add	16.26	
For Curved Rail, Add	57.91	
For Mounting On Stairs, Add	33.51	
For Mounting On Slopes, Add	11.17	
For Post Base Flange With Screws, Add Per Post	20.54	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	31.06	
For Custom Design Or Shapes (Square Tops, etc), Add	48.26	
For Nylon Coating, Add	12.20	
For Schedule 80 Handrail, Add	25.09	
For Additional Off Set Handrail, ADA Attachment, Add	19.39	
05 52 13 00-0024 LF 2" Diameter, Schedule 40, Four Rail, Up To 42" High, Welded Steel Pipe Railing	129.77	15.19
For 11 Gauge A513 Steel Tubing, Deduct	-21.87	
For 12 Gauge A513 Steel Tubing, Deduct	-24.85	
For 14 Gauge A513 Steel Tubing, Deduct	-32.80	
For 16 Gauge A513 Steel Tubing, Deduct	-38.76	
For Aluminum, Satin Finish, Add	41.74	
For Aluminum, Clear Anodized Finish, Add	64.60	
For Aluminum, Dark Anodized Finish, Add	74.54	
For Galvanizing, Add	39.76	
For Wrought Iron, Add	12.98	
For Solid Steel Rails, Add	25.95	
For 304 Stainless Steel, Add	318.05	
For 316 Stainless Steel, Add	357.80	
For 2" Wheel Guard, Add	9.44	
For 4" High Kick Plate, Add	12.42	
For 6" High Kick Plate, Add	19.88	
For Curved Rail, Add	68.75	
For Mounting On Stairs, Add	38.93	
For Mounting On Slopes, Add	12.98	
For Post Base Flange With Screws, Add Per Post	20.54	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	31.06	
For Custom Design Or Shapes (Square Tops, etc), Add	57.29	
For Nylon Coating, Add	14.91	
For Schedule 80 Handrail, Add	29.13	
For Additional Off Set Handrail, ADA Attachment, Add	22.35	
05 52 13 00-0025 LF 2-1/2" Diameter, Schedule 40, Four Rail, Up To 42" High, Welded Steel Pipe Railing.....	150.94	15.19
For 11 Gauge A513 Steel Tubing, Deduct	-26.52	
For 12 Gauge A513 Steel Tubing, Deduct	-30.14	
For 14 Gauge A513 Steel Tubing, Deduct	-39.78	
For 16 Gauge A513 Steel Tubing, Deduct	-47.02	
For Aluminum, Satin Finish, Add	50.64	
For Aluminum, Clear Anodized Finish, Add	78.36	
For Aluminum, Dark Anodized Finish, Add	90.42	
For Galvanizing, Add	48.22	
For Wrought Iron, Add	15.09	
For Solid Steel Rails, Add	30.19	
For 304 Stainless Steel, Add	385.79	
For 316 Stainless Steel, Add	434.02	
For 2" Wheel Guard, Add	11.45	
For 4" High Kick Plate, Add	15.07	
For 6" High Kick Plate, Add	24.11	
For Curved Rail, Add	81.45	
For Mounting On Stairs, Add	45.28	
For Mounting On Slopes, Add	15.09	
For Post Base Flange With Screws, Add Per Post	20.54	
For Embedded Stainless Steel Post Sleeves (Excludes Core Drilling), Add Per Post	31.06	
For Custom Design Or Shapes (Square Tops, etc), Add	67.88	
For Nylon Coating, Add	18.08	
For Schedule 80 Handrail, Add	33.22	
For Additional Off Set Handrail, ADA Attachment, Add	25.90	
05 52 13 00-0026 Railing Infill Panels ^(05 52 13)		
Note: Includes field welds and touch-up of welds.		
05 52 13 00-0027 Wire Mesh Or Welded Wire Mesh, Railing Infill Panels ^(05 52 13 00-0026)		
Note: Square weave or square welded wire mesh.		
05 52 13 00-0028 SF Powder Coated Steel, Wire Mesh Or Welded Wire Mesh, Railing Infill Panel	14.97	
05 52 13 00-0029 SF Galvanized Steel, Wire Mesh Or Welded Wire Mesh, Railing Infill Panel	15.90	
05 52 13 00-0030 SF Aluminum, Wire Mesh Or Welded Wire Mesh, Railing Infill Panel	16.71	
05 52 13 00-0031 SF Stainless Steel, Wire Mesh Or Welded Wire Mesh, Railing Infill Panel	28.26	

05	05 Metals
	05 50 Metal Fabrications
	05 52 Metal Railings



MINOR		TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION		UNIT COST	UNIT COST

05 52 13 00-0032	Perforated Metal, Railing Infill Panels <small>(05 52 13 00-0026)</small>		
05 52 13 00-0033	SF Powder Coated Steel, Perforated Metal, Railing Infill Panel		14.88
05 52 13 00-0034	SF Galvanized Steel, Perforated Metal, Railing Infill Panel		15.18
05 52 13 00-0035	SF Aluminum, Perforated Metal, Railing Infill Panel		16.25
05 52 13 00-0036	SF Stainless Steel, Perforated Metal, Railing Infill Panel		32.61

05 52 13 00-0037	Expanded Metal, Railing Infill Panels <small>(05 52 13 00-0026)</small>		
05 52 13 00-0038	SF Powder Coated Steel, Expanded Metal, Railing Infill Panel		6.62
05 52 13 00-0039	SF Galvanized Steel, Expanded Metal, Railing Infill Panel		13.53
05 52 13 00-0040	SF Aluminum, Expanded Metal, Railing Infill Panel		17.77
05 52 13 00-0041	SF Stainless Steel, Expanded Metal, Railing Infill Panel		26.50

05 52 13 00-0042	Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railings <small>(05 52 13)</small>		
	<small>Note: Includes factory primed, fasteners and field touch-up of welds.</small>		
05 52 13 00-0043	LF 1" Diameter, Schedule 40, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	38.37	6.51
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-4.86	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-5.53	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-7.29	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-8.62	
	<i>For Galvanized Finish, Add</i>	6.63	
	<i>For Schedule 80 Handrail, Add</i>	3.74	
	<i>For Stainless Steel, Add</i>	44.20	
	<i>For Aluminum, Satin Finish, Add</i>	9.28	
	<i>For Curved Rail, Add</i>	11.51	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	14.37	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	16.58	
05 52 13 00-0044	LF 1-1/4" Diameter, Schedule 40, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	39.08	6.51
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-5.02	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-5.70	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-7.53	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-8.90	
	<i>For Galvanized Finish, Add</i>	6.84	
	<i>For Schedule 80 Handrail, Add</i>	4.72	
	<i>For Stainless Steel, Add</i>	45.62	
	<i>For Aluminum, Satin Finish, Add</i>	9.58	
	<i>For Curved Rail, Add</i>	11.72	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	14.83	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	17.11	
05 52 13 00-0045	LF 1-1/2" Diameter, Schedule 40, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	39.80	6.51
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-5.18	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-5.88	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-7.76	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-9.18	
	<i>For Galvanized Finish, Add</i>	7.06	
	<i>For Schedule 80 Handrail, Add</i>	18.06	
	<i>For Stainless Steel, Add</i>	47.06	
	<i>For Aluminum, Satin Finish, Add</i>	9.88	
	<i>For Curved Rail, Add</i>	11.94	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	15.29	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	17.65	
05 52 13 00-0046	LF 2" Diameter, Schedule 40, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	47.99	6.51
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-6.98	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-7.93	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-10.47	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-12.37	
	<i>For Galvanized Finish, Add</i>	9.52	
	<i>For Schedule 80 Handrail, Add</i>	6.54	
	<i>For Stainless Steel, Add</i>	63.44	
	<i>For Aluminum, Satin Finish, Add</i>	13.32	
	<i>For Curved Rail, Add</i>	14.40	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	20.62	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	23.79	
05 52 13 00-0047	LF 2-1/2" Diameter, Schedule 40, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	54.77	6.51
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-8.47	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-9.63	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-12.71	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-15.02	
	<i>For Galvanized Finish, Add</i>	11.55	
	<i>For Schedule 80 Handrail, Add</i>	7.36	
	<i>For Stainless Steel, Add</i>	77.00	
	<i>For Aluminum, Satin Finish, Add</i>	16.17	
	<i>For Curved Rail, Add</i>	16.43	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	25.03	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	28.88	

05 52 13 00-0048	Custom Shapes, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railings <small>(05 52 13)</small>		
	<small>Note: Includes factory primed, fasteners and field touch-up of welds.</small>		



	Metals	05	
	Metal Fabrications	05 50	05
	Metal Railings	05 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 52 13 00-0049	LF 1" Diameter, Custom Shapes, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	46.75	6.84
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-6.71	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-7.62	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-10.06	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-11.89	
	<i>For Galvanized Finish, Add</i>	9.14	
	<i>For Schedule 80 Handrail, Add</i>	3.74	
	<i>For Stainless Steel, Add</i>	60.96	
	<i>For Aluminum, Satin Finish, Add</i>	12.80	
	<i>For Curved Rail, Add</i>	14.03	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	19.81	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	22.86	
05 52 13 00-0050	LF 1-1/4" Diameter, Custom Shapes, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	47.75	6.84
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-6.93	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-7.87	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-10.39	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-12.28	
	<i>For Galvanized Finish, Add</i>	9.44	
	<i>For Schedule 80 Handrail, Add</i>	4.72	
	<i>For Stainless Steel, Add</i>	62.96	
	<i>For Aluminum, Satin Finish, Add</i>	13.22	
	<i>For Curved Rail, Add</i>	14.33	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	20.46	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	23.61	
05 52 13 00-0051	LF 1-1/2" Diameter, Custom Shapes, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	48.49	6.84
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-7.09	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-8.06	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-10.63	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-12.57	
	<i>For Galvanized Finish, Add</i>	9.67	
	<i>For Schedule 80 Handrail, Add</i>	18.06	
	<i>For Stainless Steel, Add</i>	64.44	
	<i>For Aluminum, Satin Finish, Add</i>	13.53	
	<i>For Curved Rail, Add</i>	14.55	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	20.94	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	24.17	
05 52 13 00-0052	LF 2" Diameter, Custom Shapes, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	59.94	6.84
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-9.61	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-10.92	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-14.41	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-17.03	
	<i>For Galvanized Finish, Add</i>	13.10	
	<i>For Schedule 80 Handrail, Add</i>	6.54	
	<i>For Stainless Steel, Add</i>	87.34	
	<i>For Aluminum, Satin Finish, Add</i>	18.34	
	<i>For Curved Rail, Add</i>	17.98	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	28.39	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	32.75	
05 52 13 00-0053	LF 2-1/2" Diameter, Custom Shapes, Wall Bracket Mounted, Up To 42" High, Welded Steel Pipe Railing	67.42	6.84
	<i>For 11 Gauge A513 Steel Tubing, Deduct</i>	-11.25	
	<i>For 12 Gauge A513 Steel Tubing, Deduct</i>	-12.79	
	<i>For 14 Gauge A513 Steel Tubing, Deduct</i>	-16.88	
	<i>For 16 Gauge A513 Steel Tubing, Deduct</i>	-19.95	
	<i>For Galvanized Finish, Add</i>	15.35	
	<i>For Schedule 80 Handrail, Add</i>	7.36	
	<i>For Stainless Steel, Add</i>	102.30	
	<i>For Aluminum, Satin Finish, Add</i>	21.48	
	<i>For Curved Rail, Add</i>	20.23	
	<i>For Aluminum, Clear Anodized Finish, Add</i>	33.25	
	<i>For Aluminum, Dark Anodized Finish, Add</i>	38.36	
05 52 13 00-0054	Remove And Reinstall Pipe Railing <small>(05 52 13)</small>		
05 52 13 00-0055	LF Removal And Reinstallation Of Wall Bracket Mounted Pipe Railing	24.41	
05 52 13 00-0056	LF Removal And Reinstallation Of Floor Mounted Pipe Railing	32.91	
05 52 13 00-0057	EA Install New Galvanized Steel Pipe Railing Bracket	65.46	
	<i>For Stainless Steel, Add</i>	65.82	

05 53 Metal Gratings (05 50)

05 53 13 Bar Gratings (05 53)

05 53 13 00-0001 Welded Grating (05 53 13)

Note: Sizes are for height and width of bearing bars. Welded grating is open grid grating which has bearing bars and cross bars locked in place by resistance welding, or conventional hand welding. Resistance welded grating is produced on precise automated production equipment by combining hydraulic pressure with a powerful electric current to fuse - electroforge - the cross bar and bearing bar into a single rigid panel.

05 53 13 00-0002 Steel, Welded Grating (05 53 13 00-0001)

Note: Bearing bars at 1-3/16" on-center, crossbars at 4" on-center, bolted or tack welded, unpainted steel, and in all sizes.

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 53 13 00-0003	SF 3/4" x 1/8" Steel, Welded Grating	14.19	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	2.01	
	For 304 Stainless Steel, Add	37.88	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	3.45	
	For Crossbars At 2" On-Center, Add	1.27	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-1.90	
05 53 13 00-0004	SF 3/4" x 3/16" Steel, Welded Grating	19.07	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	2.84	
	For 304 Stainless Steel, Add	53.54	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	4.87	
	For Crossbars At 2" On-Center, Add	1.80	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.02	
05 53 13 00-0005	SF 1" x 1/8" Steel, Welded Grating	17.33	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	2.54	
	For 304 Stainless Steel, Add	47.96	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	4.36	
	For Crossbars At 2" On-Center, Add	1.61	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-1.97	
05 53 13 00-0006	SF 1" x 3/16" Steel, Welded Grating.....	23.96	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	3.67	
	For 304 Stainless Steel, Add	69.24	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	6.30	
	For Crossbars At 2" On-Center, Add	2.33	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.14	
05 53 13 00-0007	SF 1" x 1/4" Steel, Welded Grating	30.59	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	4.79	
	For 304 Stainless Steel, Add	90.52	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	8.23	
	For Crossbars At 2" On-Center, Add	3.05	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.31	
05 53 13 00-0008	SF 1-1/4" x 1/8" Steel, Welded Grating	20.50	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	3.08	
	For 304 Stainless Steel, Add	58.13	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	5.29	
	For Crossbars At 2" On-Center, Add	1.96	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.05	
05 53 13 00-0009	SF 1-1/4" x 3/16" Steel, Welded Grating	28.57	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	4.45	
	For 304 Stainless Steel, Add	84.04	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	7.64	
	For Crossbars At 2" On-Center, Add	2.83	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.26	
05 53 13 00-0010	SF 1-1/2" x 1/8" Steel, Welded Grating	23.68	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	3.62	
	For 304 Stainless Steel, Add	68.34	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	6.22	
	For Crossbars At 2" On-Center, Add	2.30	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.13	
05 53 13 00-0011	SF 1-1/2" x 3/16" Steel, Welded Grating	33.96	1.46
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	5.28	
	For 304 Stainless Steel, Add	99.61	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	9.06	
	For Crossbars At 2" On-Center, Add	3.35	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.74	



	Metals 05	
	Metal Fabrications 05 50	05
	Metal Gratings 05 53	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 53 13 00-0012	SF 1-1/2" x 1/4" Steel, Welded Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Serrated Wear Surface, Add For Set In Place Without Bolting Or Tack Welding, Deduct	44.05 0.22 6.99 132.00 12.01 4.44 0.16 -2.99	1.46
05 53 13 00-0013	SF 1-3/4" x 3/16" Steel, Welded Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Serrated Wear Surface, Add For Set In Place Without Bolting Or Tack Welding, Deduct	38.88 0.22 6.11 115.40 10.50 3.88 0.16 -2.86	1.46
05 53 13 00-0014	SF 2" x 3/16" Steel, Welded Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Serrated Wear Surface, Add For Set In Place Without Bolting Or Tack Welding, Deduct	43.49 0.22 6.90 130.20 11.84 4.38 0.16 -2.98	1.46
05 53 13 00-0015	SF 2-1/4" x 3/16" Steel, Welded Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Serrated Wear Surface, Add For Set In Place Without Bolting Or Tack Welding, Deduct	48.37 0.22 7.72 145.86 13.27 4.91 0.16 -3.10	1.46
05 53 13 00-0016	SF 2-1/2" x 3/16" Steel, Welded Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Serrated Wear Surface, Add For Set In Place Without Bolting Or Tack Welding, Deduct	52.98 0.22 8.51 160.66 14.61 5.41 0.16 -3.21	1.46
05 53 13 00-0017	Pressure Locked Grating ^(05 53 13) Note: Sizes are for height and width of bearing bars. Pressure locked grating is an open grid grating which is an assembly of tight-fitting, slotted bearing bars and cross bars, interlocked together. The permanent locking of the bars is accomplished by slotting the bearing bars with a wider 'dovetail' shape at the bottom of the slot. The bearing bar slot is usually 1/2 the depth of the cross bar. The cross bars are slotted to a depth slightly less than half its depth. When the bars are pressed together under hydraulic pressure, the cross bar material is forced into the 'dovetail' shape of the bearing bar notch, forming a strong, rigid unit.		
05 53 13 00-0018	Steel, Pressure Locked Grating ^(05 53 13 00-0017) Note: Bearing bars at 1-3/16" on-center, crossbars at 4" on-center, bolted or tack welded, unpainted steel, and in all sizes.		
05 53 13 00-0019	SF 3/4" x 1/8" Steel, Pressure Locked Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Set In Place Without Bolting Or Tack Welding, Deduct	27.00 0.22 4.04 46.05 7.19 2.66 -2.22	1.19
05 53 13 00-0020	SF 3/4" x 3/16" Steel, Pressure Locked Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Set In Place Without Bolting Or Tack Welding, Deduct	33.28 0.22 5.07 57.80 9.02 3.34 -2.37	1.19
05 53 13 00-0021	SF 1" x 1/8" Steel, Pressure Locked Grating For One Coat Of Shop Applied Paint (Red Or Black), Add For Galvanized Steel, Add For 304 Stainless Steel, Add Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center For Bearing Bars At 15/16" On-Center, Add For Crossbars At 2" On-Center, Add For Serrated Wear Surface, Add For Set In Place Without Bolting Or Tack Welding, Deduct	29.68 0.22 4.48 51.06 7.97 2.95 0.16 -2.28	1.19

05	05	Metals
	05 50	Metal Fabrications
	05 53	Metal Gratings



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 53 13 00-0022	SF 1" x 3/16" Steel, Pressure Locked Grating.....	40.47	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	6.25	
	For 304 Stainless Steel, Add	71.25	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 7/16" On-Center, Add	55.22	
	For Bearing Bars At 15/16" On-Center, Add	11.12	
	For Crossbars At 2" On-Center, Add	4.11	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.55	
05 53 13 00-0023	SF 1-1/4" x 1/8" Steel, Pressure Locked Grating.....	33.28	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	5.07	
	For 304 Stainless Steel, Add	57.80	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	9.02	
	For Crossbars At 2" On-Center, Add	3.34	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.37	
05 53 13 00-0024	SF 1-1/4" x 3/16" Steel, Pressure Locked Grating.....	45.46	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	7.06	
	For 304 Stainless Steel, Add	80.58	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	12.58	
	For Crossbars At 2" On-Center, Add	4.65	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.68	
05 53 13 00-0025	SF 1-1/2" x 1/8" Steel, Pressure Locked Grating.....	37.05	1.19
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	5.68	
	For 304 Stainless Steel, Add	64.85	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	10.12	
	For Crossbars At 2" On-Center, Add	3.74	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-2.47	
05 53 13 00-0026	SF 1-1/2" x 3/16" Steel, Pressure Locked Grating.....	51.24	1.46
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	7.92	
	For 304 Stainless Steel, Add	90.39	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 7/16" On-Center, Add	70.05	
	For Bearing Bars At 15/16" On-Center, Add	14.11	
	For Crossbars At 2" On-Center, Add	5.22	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-3.17	
05 53 13 00-0027	SF 1-3/4" x 3/16" Steel, Pressure Locked Grating.....	56.51	1.46
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	8.79	
	For 304 Stainless Steel, Add	100.25	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	15.65	
	For Crossbars At 2" On-Center, Add	5.79	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-3.30	
05 53 13 00-0028	SF 2" x 3/16" Steel, Pressure Locked Grating.....	60.80	1.46
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	9.49	
	For 304 Stainless Steel, Add	108.27	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	16.90	
	For Crossbars At 2" On-Center, Add	6.25	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-3.41	
05 53 13 00-0029	SF 2-1/4" x 3/16" Steel, Pressure Locked Grating.....	64.92	1.46
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	10.17	
	For 304 Stainless Steel, Add	115.98	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	18.10	
	For Crossbars At 2" On-Center, Add	6.69	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-3.51	
05 53 13 00-0030	SF 2-1/2" x 3/16" Steel, Pressure Locked Grating.....	68.48	1.46
	For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
	For Galvanized Steel, Add	10.75	
	For 304 Stainless Steel, Add	122.64	
	Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
	For Bearing Bars At 15/16" On-Center, Add	19.14	
	For Crossbars At 2" On-Center, Add	7.08	
	For Serrated Wear Surface, Add	0.16	
	For Set In Place Without Bolting Or Tack Welding, Deduct	-3.60	

05 53 13 00-0031 Aluminum, Type 6063, Pressure Locked Grating (05 53 13 00-0017)
 Note: Bearing bars at 1-3/16" on-center, crossbars at 4" on-center, bolted in place, and in all sizes.



	Metals	05	
	Metal Fabrications	05 50	05
	Metal Gratings	05 53	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 53 13 00-0032	SF		3/4" x 1/8" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	17.09 4.29 1.59 -1.97 2.21	1.19
05 53 13 00-0033	SF		3/4" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	23.12 6.05 2.24 -2.12 3.11	1.19
05 53 13 00-0034	SF		1" x 1/8" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	21.82 5.67 2.10 0.16 -2.09 2.91	1.19
05 53 13 00-0035	SF		1" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 7/16" On-Center, Add</i> <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	29.61 39.47 7.95 2.94 0.16 -2.28 4.08	1.19
05 53 13 00-0036	SF		1-1/4" x 1/8" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	25.25 6.68 2.47 0.16 -2.17 3.43	1.19
05 53 13 00-0037	SF		1-1/4" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	33.74 9.15 3.39 0.16 -2.39 4.70	1.19
05 53 13 00-0038	SF		1-1/2" x 1/8" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	28.47 7.62 2.82 0.16 -2.25 3.91	1.19
05 53 13 00-0039	SF		1-1/2" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 7/16" On-Center, Add</i> <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	38.00 51.63 10.40 3.85 0.16 -2.49 5.34	1.19
05 53 13 00-0040	SF		1-3/4" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	42.08 11.59 4.29 0.16 -2.59 5.95	1.19
05 53 13 00-0041	SF		2" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	46.91 13.00 4.81 0.16 -2.71 6.68	1.19
05 53 13 00-0042	SF		2-1/4" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	50.70 14.11 5.22 0.16 -2.81 7.25	1.19
05 53 13 00-0043	SF		2-1/2" x 3/16" Aluminum, Pressure Locked Grating <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	55.22 15.43 5.71 0.16 -2.92 7.92	1.19
05 53 13 00-0044			Swage Locked Grating <small>(05 53 13)</small> Note: Sizes are for height and width of bearing bars. Swage locked grating is an open grid grating where bearing bars are pre-punched to receive a cross bar without penetrating or cutting the top surface of the bearing bar. The cross bar is then inserted through the pre-punched hole and deformed by swaging or squeezing under hydraulic pressure to permanently lock the bars in place.		
05 53 13 00-0045			Steel, Swage Locked Grating <small>(05 53 13 00-0044)</small> Note: Bearing bars at 1-3/16" on-center, crossbars at 4" on-center, bolted or tack welded, unpainted steel, and in all sizes.		

05	05	Metals
	05 50	Metal Fabrications
	05 53	Metal Gratings



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
05 53 13 00-0046	SF	1" x 3/16" Steel, Swaged Grating.....	44.31	1.19
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	3.86	
		For 304 Stainless Steel, Add	69.50	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	26.83	
		For Crossbars At 2" On-Center, Add	3.35	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-2.65	
05 53 13 00-0047	SF	1-1/4" x 3/16" Steel, Swaged Grating.....	49.47	1.19
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	4.33	
		For 304 Stainless Steel, Add	78.06	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	30.13	
		For Crossbars At 2" On-Center, Add	3.77	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-2.78	
05 53 13 00-0048	SF	1-1/2" x 3/16" Steel, Swaged Grating.....	54.06	1.46
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	4.70	
		For 304 Stainless Steel, Add	84.77	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	32.72	
		For Crossbars At 2" On-Center, Add	4.09	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-3.24	
05 53 13 00-0049	SF	1-3/4" x 3/16" Steel, Swaged Grating.....	61.99	1.46
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	5.43	
		For 304 Stainless Steel, Add	97.92	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	37.80	
		For Crossbars At 2" On-Center, Add	4.72	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-3.44	
05 53 13 00-0050	SF	2" x 3/16" Steel, Swaged Grating.....	69.94	1.46
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	6.16	
		For 304 Stainless Steel, Add	111.10	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	42.89	
		For Crossbars At 2" On-Center, Add	5.36	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-3.64	
05 53 13 00-0051	SF	2-1/4" x 3/16" Steel, Swaged Grating.....	77.87	1.46
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	6.89	
		For 304 Stainless Steel, Add	124.25	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	47.96	
		For Crossbars At 2" On-Center, Add	6.00	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-3.84	
05 53 13 00-0052	SF	2-1/2" x 3/16" Steel, Swaged Grating.....	85.83	1.46
		For One Coat Of Shop Applied Paint (Red Or Black), Add	0.22	
		For Galvanized Steel, Add	7.63	
		For 304 Stainless Steel, Add	137.45	
		Note: Bearing bars at 1-3/16" on-center and crossbars at 4" on-center		
		For Bearing Bars At 15/16" On-Center, Add	53.06	
		For Crossbars At 2" On-Center, Add	6.63	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting Or Tack Welding, Deduct	-4.04	
05 53 13 00-0053		Aluminum Grating, Type 6063, Swage Locked (05 53 13 00-0044)		
		Note: Bearing bars at 1-3/16" on-center, crossbars at 4" on-center, bolted in place, and in all sizes.		
05 53 13 00-0054	SF	1" x 1/8" Aluminum, Swaged Grating.....	20.16	1.19
		For Bearing Bars At 15/16" On-Center, Add	11.37	
		For Crossbars At 2" On-Center, Add	1.42	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting, Deduct	-2.05	
		For Powder Coating, Add	2.67	
05 53 13 00-0055	SF	1" x 3/16" Aluminum, Swaged Grating.....	26.11	1.19
		For Bearing Bars At 15/16" On-Center, Add	15.18	
		For Crossbars At 2" On-Center, Add	1.90	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting, Deduct	-2.19	
		For Powder Coating, Add	3.56	
05 53 13 00-0056	SF	1-1/4" x 1/8" Aluminum, Swaged Grating.....	22.83	1.19
		For Bearing Bars At 15/16" On-Center, Add	13.08	
		For Crossbars At 2" On-Center, Add	1.64	
		For Serrated Wear Surface, Add	0.16	
		For Set In Place Without Bolting, Deduct	-2.11	
		For Powder Coating, Add	3.07	



	Metals	05
	Metal Fabrications	05 50
	Metal Gratings	05 53

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 53 13 00-0057	SF		1-1/4" x 3/16" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	30.11 17.74 2.22 0.16 -2.29 4.16	1.19
05 53 13 00-0058	SF		1-1/2" x 1/8" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	26.00 15.11 1.89 0.16 -2.19 3.54	1.19
05 53 13 00-0059	SF		1-1/2" x 3/16" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	34.39 20.48 2.56 0.16 -2.40 4.80	1.19
05 53 13 00-0060	SF		1-3/4" x 3/16" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	39.33 23.64 2.96 0.16 -2.52 5.54	1.19
05 53 13 00-0061	SF		2" x 3/16" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	44.24 26.78 3.35 0.16 -2.65 6.28	1.19
05 53 13 00-0062	SF		2-1/4" x 3/16" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	49.17 29.94 3.74 0.16 -2.77 7.02	1.19
05 53 13 00-0063	SF		2-1/2" x 3/16" Aluminum, Swaged Grating..... <i>For Bearing Bars At 15/16" On-Center, Add</i> <i>For Crossbars At 2" On-Center, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting, Deduct</i> <i>For Powder Coating, Add</i>	54.08 33.08 4.14 0.16 -2.89 7.75	1.19
05 53 13 00-0064			Riveted Grating <small>(05 53 13)</small> Note: Riveted grating is an open grid grating where bearing bars are pre-punched to receive a solid round rivet. Crimp/lacing bars are pre-punched as well and then formed into a reticulated shape. Bearing bars and crimp bars are then assembled and clamped in place by rivets which are cold driven under hydraulic pressure to permanently lock the assembly together.		
05 53 13 00-0065			Steel, Riveted Grating <small>(05 53 13 00-0064)</small> Note: 1" clear opening, bolted or tack welded in place, unpainted steel, all sizes.		
05 53 13 00-0066	SF		3/4" x 1/8", 7.0 LB/SF, Steel, Riveted Grating..... <i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 5/8" Clear Opening, Add</i> <i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>	84.38 0.22 3.94 70.43 28.29 -3.65	1.19
05 53 13 00-0067	SF		3/4" x 3/16", 8.5 LB/SF, Steel, Riveted Grating..... <i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 5/8" Clear Opening, Add</i> <i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>	99.39 0.22 4.66 83.32 33.47 -4.03	1.19
05 53 13 00-0068	SF		1" x 1/8", 8.0 LB/SF, Steel, Riveted Grating..... <i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 5/8" Clear Opening, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>	91.29 0.22 4.27 76.37 30.67 0.16 -3.82	1.19
05 53 13 00-0069	SF		1" x 3/16", 9.5 LB/SF, Steel, Riveted Grating..... <i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 5/8" Clear Opening, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>	105.11 0.22 4.93 88.24 35.44 0.16 -4.17	1.19
05 53 13 00-0070	SF		1-1/4" x 1/8", 9.0 LB/SF, Steel, Riveted Grating..... <i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i> <i>For Galvanized Steel, Add</i> <i>For 304 Stainless Steel, Add</i> <i>For 5/8" Clear Opening, Add</i> <i>For Serrated Wear Surface, Add</i> <i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>	97.01 0.22 4.54 81.28 32.64 0.16 -3.97	1.19

05 Metals

05 50 Metal Fabrications

05 53 Metal Gratings

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 53 13 00-0071	SF	1-1/4" x 3/16", 11.1 LB/SF, Steel, Riveted Grating	.....	115.76	1.19
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		5.44	
		<i>For 304 Stainless Steel, Add</i>		97.38	
		<i>For 5/8" Clear Opening, Add</i>		39.11	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-4.44	
05 53 13 00-0072	SF	1-1/2" x 1/8", 10.1 LB/SF, Steel, Riveted Grating	.....	103.07	1.46
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		4.81	
		<i>For 304 Stainless Steel, Add</i>		86.02	
		<i>For 5/8" Clear Opening, Add</i>		34.55	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-4.47	
05 53 13 00-0073	SF	1-1/2" x 3/16", 12.5 LB/SF, Steel, Riveted Grating	.....	123.10	1.46
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		5.77	
		<i>For 304 Stainless Steel, Add</i>		103.23	
		<i>For 5/8" Clear Opening, Add</i>		41.46	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-4.97	
05 53 13 00-0074	SF	1-3/4" x 3/16", 14.0 LB/SF, Steel, Riveted Grating	.....	133.33	1.46
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		6.26	
		<i>For 304 Stainless Steel, Add</i>		112.01	
		<i>For 5/8" Clear Opening, Add</i>		44.99	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-5.22	
05 53 13 00-0075	SF	2" x 3/16", 17.0 LB/SF, Steel, Riveted Grating	.....	156.16	1.46
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		7.36	
		<i>For 304 Stainless Steel, Add</i>		131.62	
		<i>For 5/8" Clear Opening, Add</i>		52.86	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-5.79	
05 53 13 00-0076	SF	2-1/4" x 3/16", 18.5 LB/SF, Steel, Riveted Grating	.....	164.11	1.46
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		7.74	
		<i>For 304 Stainless Steel, Add</i>		138.45	
		<i>For 5/8" Clear Opening, Add</i>		55.61	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-5.99	
05 53 13 00-0077	SF	2-1/2" x 3/16", 20.0 LB/SF, Steel, Riveted Grating	.....	171.20	1.46
		<i>For One Coat Of Shop Applied Paint (Red Or Black), Add</i>		0.22	
		<i>For Galvanized Steel, Add</i>		8.08	
		<i>For 304 Stainless Steel, Add</i>		144.54	
		<i>For 5/8" Clear Opening, Add</i>		58.05	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting Or Tack Welding, Deduct</i>		-6.17	
05 53 13 00-0078		Aluminum, Riveted Grating <small>(05 53 13 00-0064)</small>			
		Note: 1" clear opening, bolted in place and in all sizes.			
05 53 13 00-0079	SF	3/4" x 1/8", 2.4 LB/SF, Aluminum, Riveted Grating	.....	42.96	1.19
		<i>For 5/8" Clear Opening, Add</i>		14.00	
		<i>For Set In Place Without Bolting, Deduct</i>		-2.62	
		<i>For Powder Coating, Add</i>		6.09	
05 53 13 00-0080	SF	3/4" x 3/16", 2.9 LB/SF, Aluminum, Riveted Grating	.....	50.99	1.19
		<i>For 5/8" Clear Opening, Add</i>		16.77	
		<i>For Set In Place Without Bolting, Deduct</i>		-2.82	
		<i>For Powder Coating, Add</i>		7.29	
05 53 13 00-0081	SF	1" x 1/8", 2.7 LB/SF, Aluminum, Riveted Grating	.....	47.25	1.19
		<i>For 5/8" Clear Opening, Add</i>		15.48	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting, Deduct</i>		-2.72	
		<i>For Powder Coating, Add</i>		6.73	
05 53 13 00-0082	SF	1" x 3/16", 3.2 LB/SF, Aluminum, Riveted Grating	.....	55.09	1.19
		<i>For 5/8" Clear Opening, Add</i>		18.18	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting, Deduct</i>		-2.92	
		<i>For Powder Coating, Add</i>		7.91	
05 53 13 00-0083	SF	1-1/4" x 1/8", 3.1 LB/SF, Aluminum, Riveted Grating	.....	52.99	1.19
		<i>For 5/8" Clear Opening, Add</i>		17.46	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting, Deduct</i>		-2.87	
		<i>For Powder Coating, Add</i>		7.59	
05 53 13 00-0084	SF	1-1/4" x 3/16", 3.8 LB/SF, Aluminum, Riveted Grating	.....	63.87	1.19
		<i>For 5/8" Clear Opening, Add</i>		21.21	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting, Deduct</i>		-3.14	
		<i>For Powder Coating, Add</i>		9.22	
05 53 13 00-0085	SF	1-1/2" x 1/8", 3.4 LB/SF, Aluminum, Riveted Grating	.....	56.91	1.19
		<i>For 5/8" Clear Opening, Add</i>		18.81	
		<i>For Serrated Wear Surface, Add</i>		0.16	
		<i>For Set In Place Without Bolting, Deduct</i>		-2.96	
		<i>For Powder Coating, Add</i>		8.18	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 53 13 00-0086 SF 1-1/2" x 3/16", 4.3 LB/SF, Aluminum, Riveted Grating.....	70.73	1.19
For 5/8" Clear Opening, Add	23.58	
For Serrated Wear Surface, Add	0.16	
For Set In Place Without Bolting, Deduct	-3.31	
For Powder Coating, Add	10.25	
05 53 13 00-0087 SF 1-3/4" x 3/16", 4.8 LB/SF, Aluminum, Riveted Grating.....	77.98	1.19
For 5/8" Clear Opening, Add	26.08	
For Serrated Wear Surface, Add	0.16	
For Set In Place Without Bolting, Deduct	-3.49	
For Powder Coating, Add	11.34	
05 53 13 00-0088 SF 2" x 3/16", 5.8 LB/SF, Aluminum, Riveted Grating.....	92.86	1.19
For 5/8" Clear Opening, Add	31.21	
For Serrated Wear Surface, Add	0.16	
For Set In Place Without Bolting, Deduct	-3.86	
For Powder Coating, Add	13.57	
05 53 13 00-0089 SF 2-1/4" x 3/16", 6.4 LB/SF, Aluminum, Riveted Grating.....	101.31	1.19
For 5/8" Clear Opening, Add	34.13	
For Serrated Wear Surface, Add	0.16	
For Set In Place Without Bolting, Deduct	-4.07	
For Powder Coating, Add	14.84	
05 53 13 00-0090 SF 2-1/2" x 3/16", 7.2 LB/SF, Aluminum, Riveted Grating.....	112.63	1.19
For 5/8" Clear Opening, Add	38.03	
For Serrated Wear Surface, Add	0.16	
For Set In Place Without Bolting, Deduct	-4.36	
For Powder Coating, Add	16.54	

05 54 Metal Floor Plates (05 50)

05 54 00 00-0001 Steel Floor Plates <small>(05 54)</small>		
05 54 00 00-0002 SF 16 Gauge Steel Raised Or Diamond Pattern Floor Plates.....	22.52	1.41
05 54 00 00-0003 SF 14 Gauge Steel Raised Or Diamond Pattern Floor Plates.....	25.86	1.41
05 54 00 00-0004 SF 12 Gauge Steel Raised Or Diamond Pattern Floor Plates.....	32.59	1.41
05 54 00 00-0005 SF 1/8" Steel Raised Or Diamond Pattern Floor Plates.....	43.71	1.51
05 54 00 00-0006 SF 1/4" Steel Raised Or Diamond Pattern Floor Plates.....	55.77	1.63
05 54 00 00-0007 Aluminum Alloy Floor Plates <small>(05 54)</small>		
05 54 00 00-0008 SF 0.125" Aluminum Alloy Raised Or Diamond Pattern Floor Plate.....	30.16	1.19
For Powder Coating, Add	4.17	
05 54 00 00-0009 SF 0.188" Aluminum Alloy Raised Or Diamond Pattern Floor Plate.....	34.60	1.41
For Powder Coating, Add	4.78	
05 54 00 00-0010 SF 0.25" Aluminum Alloy Raised Or Diamond Pattern Floor Plate.....	39.07	1.51
For Powder Coating, Add	5.40	
05 54 00 00-0011 Type 304 Stainless Steel Floor Plates <small>(05 54)</small>		
05 54 00 00-0012 SF 1/8" Type 304 Stainless Steel Raised Or Diamond Pattern Floor Plate.....	39.18	1.63
05 54 00 00-0013 SF 3/16" Type 304 Stainless Steel Raised Or Diamond Pattern Floor Plate.....	46.84	1.84
05 54 00 00-0014 SF 1/4" Type 304 Stainless Raised Or Diamond Pattern Steel Floor Plate.....	60.71	2.17
05 54 00 00-0015 Perforated Plates (SlipNOT) <small>(05 54)</small>		
05 54 00 00-0016 SF 1/4" Steel Perforated Plates Plates, Welded, 3/8" Diameter On 9/16" Staggered Centers.....	131.60	5.97

05 55 Metal Stair Treads and Nosings (05 50)

05 55 13 Metal Stair Treads <small>(05 55)</small>		
05 55 13 00-0001 Abrasive Cast Aluminum Stair Treads <small>(05 55 13)</small>		
Note: Includes abrasive diamond pattern surface and anchors. Excludes stringers.		
05 55 13 00-0002 LF 8" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Stair Tread.....	70.89	5.97
For 3/8" Thick, Add	15.34	
05 55 13 00-0003 LF 9" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Stair Tread.....	78.27	5.97
For 3/8" Thick, Add	17.18	
05 55 13 00-0004 LF 10" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Stair Tread.....	85.63	5.97
For 3/8" Thick, Add	19.02	
05 55 13 00-0005 LF 11" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Stair Tread.....	93.04	5.97
For 3/8" Thick, Add	20.87	
05 55 13 00-0006 LF 12" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Stair Tread.....	100.38	5.97
For 3/8" Thick, Add	22.71	
05 55 13 00-0007 Abrasive Cast Iron Stair Treads <small>(05 55 13)</small>		
Note: Includes abrasive diamond pattern surface and anchors. Excludes stringers.		
05 55 13 00-0008 LF 8" Depth, 3/8" Thick, 1/4" Lip, Abrasive Cast Iron Stair Tread.....	99.52	5.97
05 55 13 00-0009 LF 9" Depth, 3/8" Thick, 1/4" Lip, Abrasive Cast Iron Stair Tread.....	110.46	5.97
05 55 13 00-0010 LF 10" Depth, 3/8" Thick, 1/4" Lip, Abrasive Cast Iron Stair Tread.....	121.42	5.97
05 55 13 00-0011 LF 11" Depth, 3/8" Thick, 1/4" Lip, Abrasive Cast Iron Stair Tread.....	132.35	5.97
05 55 13 00-0012 LF 12" Depth, 3/8" Thick, 1/4" Lip, Abrasive Cast Iron Stair Tread.....	143.31	5.97

05	05 Metals
	05 50 Metal Fabrications
	05 55 Metal Stair Treads and Nosings



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 55 13 00-0013 Aluminum/Ceramic Grit Coating, Extruded Aluminum Safety Stair Treads <small>(05 55 13)</small>		
<small>Note: Includes extruded aluminum base with diamond hard aluminum oxide abrasive filler/surface. Includes anchors. Excludes stringers.</small>		
05 55 13 00-0014 LF 6-1/2" Depth, 5/32" Thick, 1-1/16" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Safety Stair Tread.....	36.36	5.97
05 55 13 00-0015 LF 9" Depth, 5/32" Thick, 1-1/16" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Safety Stair Tread.....	43.05	5.97
05 55 13 00-0016 LF 11" Depth, 5/32" Thick, 1-1/16" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Safety Stair Tread.....	46.00	5.97
05 55 13 00-0017 Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Treads <small>(05 55 13)</small>		
<small>Note: Includes extruded aluminum base with diamond hard aluminum oxide abrasive filler/surface. Includes anchors. Excludes stringers.</small>		
05 55 13 00-0018 LF 8" Depth, 9/32" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Tread.....	54.82	5.97
<small>For Epoxy Sealed For Corrosive Environment, Add 4.64</small>		
<small>For Two Color Tread, Add 3.48</small>		
05 55 13 00-0019 LF 9" Depth, 9/32" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Tread.....	55.38	5.97
<small>For Epoxy Sealed For Corrosive Environment, Add 4.64</small>		
<small>For Two Color Tread, Add 3.48</small>		
05 55 13 00-0020 LF 11" Depth, 9/32" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Tread.....	67.41	5.97
<small>For Epoxy Sealed For Corrosive Environment, Add 4.64</small>		
<small>For Two Color Tread, Add 3.48</small>		
05 55 13 00-0021 LF 12" Depth, 9/32" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Tread.....	77.95	5.97
<small>For Epoxy Sealed For Corrosive Environment, Add 4.64</small>		
<small>For Two Color Tread, Add 3.48</small>		
05 55 13 00-0022 LF 15" Depth, 9/32" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Tread.....	91.69	5.97
<small>For Epoxy Sealed For Corrosive Environment, Add 4.64</small>		
<small>For Two Color Tread, Add 3.48</small>		
05 55 13 00-0023 Stair Landing Treads <small>(05 55 13)</small>		
05 55 13 00-0024 Abrasive Cast Aluminum Stair Landing Treads <small>(05 55 13 00-0023)</small>		
<small>Note: Includes abrasive diamond pattern surface and anchors.</small>		
05 55 13 00-0025 SF 5/16" Thick, Abrasive Cast Aluminum Landing Treads.....	100.38	5.97
<small>For 3/8" Thick, Add 22.71</small>		
05 55 13 00-0026 Abrasive Cast Iron Stair Landing Treads <small>(05 55 13 00-0023)</small>		
<small>Note: Includes abrasive diamond pattern surface and anchors.</small>		
05 55 13 00-0027 SF 3/8" Thick, Abrasive Cast Iron Landing Treads.....	143.31	5.97
05 55 13 00-0028 Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Landing Treads <small>(05 55 13 00-0023)</small>		
<small>Note: Includes extruded aluminum base with diamond hard aluminum oxide abrasive filler/surface. Includes anchors.</small>		
05 55 13 00-0029 SF 9/32" Thick, Aluminum/Ceramic Grit Coating, Extruded Aluminum Renovation Stair Landing Treads.....	92.90	5.97
<small>For Epoxy Sealed For Corrosive Environment, Add 4.64</small>		
05 55 13 00-0030 Open Cast Iron Stair Tread <small>(05 55 13)</small>		
<small>Note: Includes steel stringers, safety nosing and 2 pipe handrail. Excludes landings.</small>		
05 55 13 00-0031 RSR 3'-6" Wide, Open Cast Iron Stair Tread.....	791.36	43.40
<small>For Closed Riser, Add 67.92</small>		
05 55 13 00-0032 RSR 4'-0" Wide, Open Cast Iron Stair Tread.....	885.45	49.91
<small>For Closed Riser, Add 75.84</small>		
05 55 13 00-0033 RSR 5'-0" Wide, Open Cast Iron Stair Tread.....	974.22	58.60
<small>For Closed Riser, Add 83.35</small>		
05 55 13 00-0034 Perforated Stair Tread (SlipNOT) <small>(05 55 13)</small>		
05 55 13 00-0035 LF 1/4" x 12 5/8" Steel Perforated Plates Treads, Welded, With 6-1/2" Riser And 2" Nosing.....	240.39	5.97
05 55 16 Metal Stair Nosings <small>(05 55)</small>		
05 55 16 00-0001 Abrasive Cast Aluminum Nosings <small>(05 55 16)</small>		
<small>Note: Includes abrasive diamond pattern surface and anchors.</small>		
05 55 16 00-0002 LF 3" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Nosing.....	29.35	4.07
<small>For 3/8" Thick, Add 5.71</small>		
05 55 16 00-0003 LF 4" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Nosing.....	36.48	4.07
<small>For 3/8" Thick, Add 7.49</small>		
05 55 16 00-0004 LF 6" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Aluminum Nosing.....	52.37	4.07
<small>For 3/8" Thick, Add 11.47</small>		
05 55 16 00-0005 Abrasive Cast Iron Nosings <small>(05 55 16)</small>		
<small>Note: Includes abrasive diamond pattern surface and anchors.</small>		
05 55 16 00-0006 LF 3" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Iron Nosing.....	34.56	4.07
<small>For 3/8" Thick, Add 7.01</small>		
05 55 16 00-0007 LF 4" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Iron Nosing.....	43.33	4.07
<small>For 3/8" Thick, Add 9.21</small>		



Metals	05	05
Metal Fabrications	05 50	
Metal Stair Treads and Nosings	05 55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 55 16 00-0008 LF 6" Depth, 5/16" Thick, 1/4" Lip, Abrasive Cast Iron Nosing..... <i>For 3/8" Thick, Add</i>	60.68 13.54	4.07
05 55 16 00-0009 Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosings <small>(05 55 16)</small> Note: Includes extruded aluminum base with diamond hard aluminum oxide abrasive filler/surface. Includes anchors.		
05 55 16 00-0010 LF 1-7/8" Depth, 1/4" Thick, 1/4" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing	24.52	4.07
05 55 16 00-0011 LF 3" Depth, 1/4" Thick, 1/4" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing.....	27.96	4.07
05 55 16 00-0012 LF 4" Depth, 1/4" Thick, 1/4" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing.....	30.58	4.07
05 55 16 00-0013 LF 6" Depth, 1/4" Thick, 1/4" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing.....	38.74	4.07
05 55 16 00-0014 LF 1-7/8" Depth, 1/4" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing	25.45	4.07
05 55 16 00-0015 LF 3" Depth, 1/4" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing	28.38	4.07
05 55 16 00-0016 LF 4" Depth, 1/4" Thick, 1-1/8" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing	31.28	4.07
05 55 16 00-0017 LF 3" Depth, 1/4" Thick, 1-3/4" Lip, Aluminum/Ceramic Grit Coating, Extruded Aluminum Nosing	29.52	4.07
05 55 16 00-0018 Perforated Stair Nosing (SlipNOT) <small>(05 55 16)</small>		
05 55 16 00-0019 LF 1/4" x 2" Steel Nosings With 2" Bend, Welded, Nosings/Risers To Have (2) 1/2" Diameter	51.65	4.07
05 55 16 00-0020 LF 1/4" x 6" Steel Plates With 6-1/2" Bend, Welded, Nosings/Risers To Have (2) 1/2" Diameter	98.96	5.97
05 56 Metal Castings <small>(05 50)</small>		
05 56 00 00-0001 Castings <small>(05 56)</small>		
05 56 00 00-0002 LB Up To 150 LB, Miscellaneous Castings, Light Section	6.15	0.55
05 56 00 00-0003 LB >150 LB, Miscellaneous Castings, Heavy Section.....	10.71	0.43
05 58 Formed Metal Fabrications <small>(05 50)</small>		
05 58 16 Formed Metal Enclosures <small>(05 58)</small>		
05 58 16 00-0001 Drip Pan <small>(05 58 16)</small>		
05 58 16 00-0002 SF Stainless Steel Drip Pan	112.60	6.11
05 58 16 00-0003 SF Galvanized Steel Drip Pan.....	111.21	6.11
05 58 16 00-0004 SF Aluminum Drip Pan	77.91	4.89
05 58 16 00-0005 SF Plastic Drip Pan	19.46	4.28
05 58 23 Formed Metal Guards <small>(05 58)</small>		
05 58 23 00-0001 Protective Guard Rails <small>(05 58 23)</small> Note: Includes painted finish.		
05 58 23 00-0002 2-Rib, 11 Gauge Steel, Protective Guard Rails <small>(05 58 23 00-0001)</small> Note: Steel King Armor Guard.		
05 58 23 00-0003 Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rails <small>(05 58 23 00-0002)</small> Note: Excludes posts. Includes fasteners.		
05 58 23 00-0004 EA 1' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	204.67	19.53
05 58 23 00-0005 EA 2' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	241.59	19.53
05 58 23 00-0006 EA 3' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	276.42	19.53
05 58 23 00-0007 EA 4' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	313.34	19.53
05 58 23 00-0008 EA 5' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	348.36	19.53
05 58 23 00-0009 EA 6' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	393.76	19.53
05 58 23 00-0010 EA 7' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	424.69	19.53
05 58 23 00-0011 EA 8' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	472.59	19.53
05 58 23 00-0012 EA 9' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	504.02	19.53
05 58 23 00-0013 EA 10' Length, 10-1/2" Height, Bolt-On, 2-Rib, 11 Gauge Steel, Protective Guard Rail	526.47	19.53
05 58 23 00-0014 Posts For 2-Rib Guard Rails <small>(05 58 23 00-0002)</small> Note: Includes drilling, surface mounting plate and anchors.		
05 58 23 00-0015 EA 12" Height, Single Rail Post For 2-Rib Guard Rails	408.66	40.69
05 58 23 00-0016 EA 42" Height, Triple Rail Post For 2-Rib Guard Rails	536.88	40.69
05 58 23 00-0017 3-Rib, 11 Gauge Steel, Protective Guard Rails <small>(05 58 23 00-0001)</small> Note: Steel King Steel Guard.		
05 58 23 00-0018 Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rails <small>(05 58 23 00-0017)</small> Note: Excludes posts. Includes fasteners.		
05 58 23 00-0019 EA 1' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	226.92	19.53
05 58 23 00-0020 EA 2' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	251.47	19.53
05 58 23 00-0021 EA 3' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	282.10	19.53
05 58 23 00-0022 EA 4' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	310.74	19.53
05 58 23 00-0023 EA 5' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	343.87	19.53
05 58 23 00-0024 EA 6' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	359.83	19.53
05 58 23 00-0025 EA 7' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	398.25	19.53
05 58 23 00-0026 EA 8' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	430.68	19.53
05 58 23 00-0027 EA 9' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	465.10	19.53
05 58 23 00-0028 EA 10' Length, 15" Height, Bolt-On, 3-Rib, 11 Gauge Steel, Protective Guard Rail	500.03	19.53

05 Metals**05 50 Metal Fabrications****05 58 Formed Metal Fabrications**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 58 23 00-0029		Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rails (05 58 23 00-0017)		
Note: Excludes posts. Includes fasteners and lift-out mounting plate.				
05 58 23 00-0030	EA	1' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	337.38	19.53
05 58 23 00-0031	EA	2' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	364.32	19.53
05 58 23 00-0032	EA	3' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	392.26	19.53
05 58 23 00-0033	EA	4' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	424.69	19.53
05 58 23 00-0034	EA	5' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	457.12	19.53
05 58 23 00-0035	EA	6' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	483.56	19.53
05 58 23 00-0036	EA	7' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	514.00	19.53
05 58 23 00-0037	EA	8' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	548.42	19.53
05 58 23 00-0038	EA	9' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	585.34	19.53
05 58 23 00-0039	EA	10' Length, 15" Height, Lift-Out, 3-Rib, 11 Gauge Steel, Protective Guard Rail.....	617.77	19.53
05 58 23 00-0040		Posts For 3-Rib Guard Rails (05 58 23 00-0017)		
Note: Includes drilling, surface mounting plate and anchors.				
05 58 23 00-0041	EA	18" Height, Single Rail Post For 3-Rib Guard Rails.....	357.58	40.69
05 58 23 00-0042	EA	42" Height, Double Rail Post For 3-Rib Guard Rails.....	461.55	40.69
05 58 23 00-0043		All-Welded, Protective Guards (05 58 23)		
Note: Surface mounted inverted-U style protective barriers. Includes painted finish, drilling, surface mounting plate and anchors.				
05 58 23 00-0044		All-Welded, Protective Guards (05 58 23 00-0043)		
05 58 23 00-0045	EA	36" Length, 9" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	466.22	54.25
05 58 23 00-0046	EA	48" Length, 9" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	491.16	54.25
05 58 23 00-0047	EA	36" Length, 16" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	505.63	54.25
05 58 23 00-0048	EA	48" Length, 16" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	527.08	54.25
05 58 23 00-0049	EA	36" Length, 24" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	522.09	54.25
05 58 23 00-0050	EA	48" Length, 24" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	548.54	54.25
05 58 23 00-0051	EA	36" Length, 36" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	556.02	54.25
05 58 23 00-0052	EA	48" Length, 36" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	564.50	54.25
05 58 23 00-0053	EA	48" Length, 42" Height, 4-1/2" Diameter Steel Pipe, All-Welded, Protective Guard.....	604.91	54.25
05 58 23 00-0054		Corner Style, All-Welded, Protective Guards (05 58 23 00-0043)		
05 58 23 00-0055	EA	24" Length, 24" Height, 4-1/2" Diameter Steel Pipe, Corner Style, All-Welded, Protective Guard.....	620.88	54.25
05 58 23 00-0056	EA	30" Length, 24" Height, 4-1/2" Diameter Steel Pipe, Corner Style, All-Welded, Protective Guard.....	650.81	54.25
05 58 23 00-0057	EA	24" Length, 36" Height, 4-1/2" Diameter Steel Pipe, Corner Style, All-Welded, Protective Guard.....	663.29	54.25
05 58 23 00-0058	EA	30" Length, 36" Height, 4-1/2" Diameter Steel Pipe, Corner Style, All-Welded, Protective Guard.....	724.65	54.25
05 58 23 00-0059		Warehouse Safety Bollards (05 58 23)		
Note: Includes painted finish, drilling, surface mounting plate and anchors.				
05 58 23 00-0060	EA	24" Height, 4-1/2" Diameter Steel Pipe, Bolt Down, Warehouse Safety Bollard.....	301.57	40.69
05 58 23 00-0061	EA	36" Height, 4-1/2" Diameter Steel Pipe, Bolt Down, Warehouse Safety Bollard.....	350.86	40.69
05 58 23 00-0062	EA	42" Height, 4-1/2" Diameter Steel Pipe, Bolt Down, Warehouse Safety Bollard.....	403.05	40.69
05 58 23 00-0063	EA	36" Height, 5-1/2" Diameter Steel Pipe, Bolt Down, Warehouse Safety Bollard.....	417.32	40.69
05 58 23 00-0064	EA	42" Height, 5-1/2" Diameter Steel Pipe, Bolt Down, Warehouse Safety Bollard.....	450.25	40.69
05 59 Metal Specialties (05 50)				
05 59 65 Metal Chain (05 59)				
05 59 65 00-0001		Alloy Steel Chain, Self Colored, Cut Length (05 59 65)		
Note: Includes all connecting links, double clevis mid-Links, slip or grab hooks, or shackles as required.				
05 59 65 00-0002	LF	3/16" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	7.06	1.05
		<i>For Plastic Dipped, Add</i>	0.74	
05 59 65 00-0003	LF	1/4" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	8.35	1.39
		<i>For Plastic Dipped, Add</i>	0.83	
05 59 65 00-0004	LF	3/8" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	13.07	2.79
		<i>For Plastic Dipped, Add</i>	1.12	
05 59 65 00-0005	LF	1/2" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	20.93	4.70
		<i>For Plastic Dipped, Add</i>	1.73	
05 59 65 00-0006	LF	5/8" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	35.32	7.95
		<i>For Plastic Dipped, Add</i>	2.91	
05 59 65 00-0007	LF	3/4" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	49.57	11.16
		<i>For Plastic Dipped, Add</i>	4.09	
05 59 65 00-0008	LF	7/8" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	67.86	13.95
		<i>For Plastic Dipped, Add</i>	6.00	
05 59 65 00-0009	LF	1" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	98.48	18.59
		<i>For Plastic Dipped, Add</i>	9.19	
05 59 65 00-0010	LF	1-1/4" Diameter Alloy Steel Chain, Cut Length, Self Colored.....	160.66	27.89
		<i>For Plastic Dipped, Add</i>	15.73	
05 59 65 00-0011		316L Stainless Steel Chain, Cut Length (05 59 65)		
05 59 65 00-0012	CLF	1/8" Diameter 316L Stainless Steel Chain, Cut Length.....	2,685.17	92.94



Metals	05	05
Metal Fabrications	05 50	
Metal Specialties	05 59	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 59 65 00-0013	CLF		3/16" Diameter 316L Stainless Steel Chain, Cut Length.....	3,304.44	111.56
05 59 65 00-0014	CLF		9/32" Diameter 316L Stainless Steel Chain, Cut Length.....	4,142.23	139.46
05 59 65 00-0015	CLF		5/16" Diameter 316L Stainless Steel Chain, Cut Length.....	5,596.08	185.99
05 59 65 00-0016	CLF		3/8" Diameter 316L Stainless Steel Chain, Cut Length.....	6,362.48	278.92
05 59 65 00-0017	CLF		1/2" Diameter 316L Stainless Steel Chain, Cut Length.....	9,599.61	464.91
05 59 69 Metal Panels <small>(05 59)</small>					
05 59 69 00-0001			Woven And Welded Wire Cloth <small>(05 59 69)</small>		
Note: Excludes frame and fastening to frame. See CSI section 05 05 21 00-0004 for spot welding.					
05 59 69 00-0002			Plain Steel Woven And Welded Wire Cloth Panels <small>(05 59 69 00-0001)</small>		
05 59 69 00-0003			2" Square Wire Spacing <small>(05 59 69 00-0002)</small>		
05 59 69 00-0004	SF		0.12" Thick Wire, 2" Spacing, 0.44 LB/SF Woven And Welded Wire Cloth Panels	9.89	2.98
			For Up To 2, Add	2.77	
			For >2 To 6, Add	1.58	
			For >15 To 40, Deduct	-0.30	
			For >40, Deduct	-0.89	
			For Galvanized, Add	2.60	
			For Aluminum, Add	3.55	
			For 304 Stainless Steel, Add	14.21	
			For 316 Stainless Steel, Add	16.28	
05 59 69 00-0005	SF		0.135" Thick Wire, 2" Spacing, 0.55 LB/SF Woven And Welded Wire Cloth Panels	10.64	3.10
			For Up To 2, Add	2.96	
			For >2 To 6, Add	1.69	
			For >15 To 40, Deduct	-0.33	
			For >40, Deduct	-0.98	
			For Galvanized, Add	2.86	
			For Aluminum, Add	3.90	
			For 304 Stainless Steel, Add	15.60	
			For 316 Stainless Steel, Add	17.88	
05 59 69 00-0006	SF		0.148" Thick Wire, 2" Spacing, 0.65 LB/SF Woven And Welded Wire Cloth Panels	11.31	3.44
			For Up To 2, Add	3.18	
			For >2 To 6, Add	1.82	
			For >15 To 40, Deduct	-0.34	
			For >40, Deduct	-1.01	
			For Galvanized, Add	2.96	
			For Aluminum, Add	4.04	
			For 304 Stainless Steel, Add	16.15	
			For 316 Stainless Steel, Add	18.51	
05 59 69 00-0007	SF		0.162" Thick Wire, 2" Spacing, 0.78 LB/SF Woven And Welded Wire Cloth Panels	11.92	3.59
			For Up To 2, Add	3.34	
			For >2 To 6, Add	1.91	
			For >15 To 40, Deduct	-0.36	
			For >40, Deduct	-1.07	
			For Galvanized, Add	3.15	
			For Aluminum, Add	4.29	
			For 304 Stainless Steel, Add	17.16	
			For 316 Stainless Steel, Add	19.66	
05 59 69 00-0008	SF		0.177" Thick Wire, 2" Spacing, 0.92 LB/SF Woven And Welded Wire Cloth Panels	13.04	4.02
			For Up To 2, Add	3.68	
			For >2 To 6, Add	2.11	
			For >15 To 40, Deduct	-0.38	
			For >40, Deduct	-1.15	
			For Galvanized, Add	3.38	
			For Aluminum, Add	4.61	
			For 304 Stainless Steel, Add	18.43	
			For 316 Stainless Steel, Add	21.12	
05 59 69 00-0009	SF		0.192" Thick Wire, 2" Spacing, 1.08 LB/SF Woven And Welded Wire Cloth Panels	14.99	4.47
			For Up To 2, Add	4.19	
			For >2 To 6, Add	2.39	
			For >15 To 40, Deduct	-0.45	
			For >40, Deduct	-1.35	
			For Galvanized, Add	3.97	
			For Aluminum, Add	5.41	
			For 304 Stainless Steel, Add	21.65	
			For 316 Stainless Steel, Add	24.81	
05 59 69 00-0010	SF		0.207" Thick Wire, 2" Spacing, 1.25 LB/SF Woven And Welded Wire Cloth Panels	17.00	4.92
			For Up To 2, Add	4.71	
			For >2 To 6, Add	2.68	
			For >15 To 40, Deduct	-0.52	
			For >40, Deduct	-1.57	
			For Galvanized, Add	4.59	
			For Aluminum, Add	6.26	
			For 304 Stainless Steel, Add	25.06	
			For 316 Stainless Steel, Add	28.71	
05 59 69 00-0011	SF		0.225" Thick Wire, 2" Spacing, 1.46 LB/SF Woven And Welded Wire Cloth Panels	19.47	5.47
			For Up To 2, Add	5.35	
			For >2 To 6, Add	3.04	
			For >15 To 40, Deduct	-0.61	
			For >40, Deduct	-1.83	
			For Galvanized, Add	5.36	
			For Aluminum, Add	7.31	
			For 304 Stainless Steel, Add	29.26	
			For 316 Stainless Steel, Add	33.52	

05	05 Metals
	05 50 Metal Fabrications
	05 59 Metal Specialties



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 59 69 00-0012	1-3/4" Square Wire Spacing <small>(05 59 69 00-0002)</small>		
05 59 69 00-0013	SF 0.12" Thick Wire, 1-3/4" Spacing, 0.49 LB/SF Woven And Welded Wire Cloth Panels	10.38	3.15
	For Up To 2, Add	2.92	
	For >2 To 6, Add	1.67	
	For >15 To 40, Deduct	-0.31	
	For >40, Deduct	-0.93	
	For Galvanized, Add	2.71	
	For Aluminum, Add	3.70	
	For 304 Stainless Steel, Add	14.81	
	For 316 Stainless Steel, Add	16.97	
05 59 69 00-0014	SF 0.135" Thick Wire, 1-3/4" Spacing, 0.62 LB/SF Woven And Welded Wire Cloth Panels	11.42	3.32
	For Up To 2, Add	3.17	
	For >2 To 6, Add	1.81	
	For >15 To 40, Deduct	-0.35	
	For >40, Deduct	-1.05	
	For Galvanized, Add	3.07	
	For Aluminum, Add	4.19	
	For 304 Stainless Steel, Add	16.75	
	For 316 Stainless Steel, Add	19.20	
05 59 69 00-0015	SF 0.148" Thick Wire, 1-3/4" Spacing, 0.74 LB/SF Woven And Welded Wire Cloth Panels	12.27	3.73
	For Up To 2, Add	3.45	
	For >2 To 6, Add	1.97	
	For >15 To 40, Deduct	-0.36	
	For >40, Deduct	-1.09	
	For Galvanized, Add	3.21	
	For Aluminum, Add	4.37	
	For 304 Stainless Steel, Add	17.50	
	For 316 Stainless Steel, Add	20.05	
05 59 69 00-0016	SF 0.162" Thick Wire, 1-3/4" Spacing, 0.88 LB/SF Woven And Welded Wire Cloth Panels	12.83	3.85
	For Up To 2, Add	3.59	
	For >2 To 6, Add	2.05	
	For >15 To 40, Deduct	-0.38	
	For >40, Deduct	-1.15	
	For Galvanized, Add	3.38	
	For Aluminum, Add	4.61	
	For 304 Stainless Steel, Add	18.46	
	For 316 Stainless Steel, Add	21.15	
05 59 69 00-0017	SF 0.177" Thick Wire, 1-3/4" Spacing, 1.04 LB/SF Woven And Welded Wire Cloth Panels	14.03	4.32
	For Up To 2, Add	3.96	
	For >2 To 6, Add	2.27	
	For >15 To 40, Deduct	-0.41	
	For >40, Deduct	-1.24	
	For Galvanized, Add	3.64	
	For Aluminum, Add	4.96	
	For 304 Stainless Steel, Add	19.85	
	For 316 Stainless Steel, Add	22.74	
05 59 69 00-0018	SF 0.192" Thick Wire, 1-3/4" Spacing, 1.22 LB/SF Woven And Welded Wire Cloth Panels	16.13	4.82
	For Up To 2, Add	4.51	
	For >2 To 6, Add	2.58	
	For >15 To 40, Deduct	-0.49	
	For >40, Deduct	-1.46	
	For Galvanized, Add	4.27	
	For Aluminum, Add	5.82	
	For 304 Stainless Steel, Add	23.28	
	For 316 Stainless Steel, Add	26.68	
05 59 69 00-0019	SF 0.207" Thick Wire, 1-3/4" Spacing, 1.41 LB/SF Woven And Welded Wire Cloth Panels	18.27	5.29
	For Up To 2, Add	5.06	
	For >2 To 6, Add	2.88	
	For >15 To 40, Deduct	-0.56	
	For >40, Deduct	-1.68	
	For Galvanized, Add	4.94	
	For Aluminum, Add	6.73	
	For 304 Stainless Steel, Add	26.93	
	For 316 Stainless Steel, Add	30.86	
05 59 69 00-0020	SF 0.225" Thick Wire, 1-3/4" Spacing, 1.65 LB/SF Woven And Welded Wire Cloth Panels	20.97	5.88
	For Up To 2, Add	5.76	
	For >2 To 6, Add	3.27	
	For >15 To 40, Deduct	-0.66	
	For >40, Deduct	-1.97	
	For Galvanized, Add	5.77	
	For Aluminum, Add	7.87	
	For 304 Stainless Steel, Add	31.49	
	For 316 Stainless Steel, Add	36.08	

05 59 69 00-0021 1-1/2" Square Wire Spacing (05 59 69 00-0002)



Metals	05	05
Metal Fabrications	05 50	
Metal Specialties	05 59	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 59 69 00-0022 SF 0.12" Thick Wire, 1-1/2" Spacing, 0.57 LB/SF Woven And Welded Wire Cloth Panels	11.49	3.51
For Up To 2, Add	3.23	
For >2 To 6, Add	1.85	
For >15 To 40, Deduct	-0.34	
For >40, Deduct	-1.02	
For Galvanized, Add	3.01	
For Aluminum, Add	4.10	
For 304 Stainless Steel, Add	16.39	
For 316 Stainless Steel, Add	18.78	
05 59 69 00-0023 SF 0.135" Thick Wire, 1-1/2" Spacing, 0.72 LB/SF Woven And Welded Wire Cloth Panels	12.63	3.69
For Up To 2, Add	3.51	
For >2 To 6, Add	2.00	
For >15 To 40, Deduct	-0.39	
For >40, Deduct	-1.16	
For Galvanized, Add	3.40	
For Aluminum, Add	4.63	
For 304 Stainless Steel, Add	18.53	
For 316 Stainless Steel, Add	21.23	
05 59 69 00-0024 SF 0.148" Thick Wire, 1-1/2" Spacing, 0.85 LB/SF Woven And Welded Wire Cloth Panels	13.43	4.08
For Up To 2, Add	3.78	
For >2 To 6, Add	2.16	
For >15 To 40, Deduct	-0.40	
For >40, Deduct	-1.20	
For Galvanized, Add	3.51	
For Aluminum, Add	4.79	
For 304 Stainless Steel, Add	19.15	
For 316 Stainless Steel, Add	21.95	
05 59 69 00-0025 SF 0.162" Thick Wire, 1-1/2" Spacing, 1.02 LB/SF Woven And Welded Wire Cloth Panels	14.16	4.25
For Up To 2, Add	3.97	
For >2 To 6, Add	2.27	
For >15 To 40, Deduct	-0.42	
For >40, Deduct	-1.27	
For Galvanized, Add	3.74	
For Aluminum, Add	5.09	
For 304 Stainless Steel, Add	20.38	
For 316 Stainless Steel, Add	23.35	
05 59 69 00-0026 SF 0.177" Thick Wire, 1-1/2" Spacing, 1.2 LB/SF Woven And Welded Wire Cloth Panels	15.43	4.75
For Up To 2, Add	4.35	
For >2 To 6, Add	2.49	
For >15 To 40, Deduct	-0.45	
For >40, Deduct	-1.36	
For Galvanized, Add	4.00	
For Aluminum, Add	5.45	
For 304 Stainless Steel, Add	21.82	
For 316 Stainless Steel, Add	25.00	
05 59 69 00-0027 SF 0.192" Thick Wire, 1-1/2" Spacing, 1.4 LB/SF Woven And Welded Wire Cloth Panels	17.63	5.27
For Up To 2, Add	4.93	
For >2 To 6, Add	2.82	
For >15 To 40, Deduct	-0.53	
For >40, Deduct	-1.59	
For Galvanized, Add	4.67	
For Aluminum, Add	6.37	
For 304 Stainless Steel, Add	25.46	
For 316 Stainless Steel, Add	29.18	
05 59 69 00-0028 SF 0.207" Thick Wire, 1-1/2" Spacing, 1.62 LB/SF Woven And Welded Wire Cloth Panels	19.98	5.79
For Up To 2, Add	5.54	
For >2 To 6, Add	3.15	
For >15 To 40, Deduct	-0.61	
For >40, Deduct	-1.84	
For Galvanized, Add	5.40	
For Aluminum, Add	7.36	
For 304 Stainless Steel, Add	29.45	
For 316 Stainless Steel, Add	33.74	
05 59 69 00-0029 SF 0.225" Thick Wire, 1-1/2" Spacing, 1.89 LB/SF Woven And Welded Wire Cloth Panels	22.86	6.42
For Up To 2, Add	6.28	
For >2 To 6, Add	3.57	
For >15 To 40, Deduct	-0.72	
For >40, Deduct	-2.15	
For Galvanized, Add	6.30	
For Aluminum, Add	8.59	
For 304 Stainless Steel, Add	34.37	
For 316 Stainless Steel, Add	39.38	
05 59 69 00-0030 1-1/4" Square Wire Spacing (05 59 69 00-0002)		
05 59 69 00-0031 SF 0.105" Thick Wire, 1-1/4" Spacing, 0.52 LB/SF Woven And Welded Wire Cloth Panels	11.75	3.78
For Up To 2, Add	3.36	
For >2 To 6, Add	1.93	
For >15 To 40, Deduct	-0.33	
For >40, Deduct	-1.00	
For Galvanized, Add	2.94	
For Aluminum, Add	4.01	
For 304 Stainless Steel, Add	16.06	
For 316 Stainless Steel, Add	18.40	

05	05	Metals
	05 50	Metal Fabrications
	05 59	Metal Specialties



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
05 59 69 00-0032 SF 0.12" Thick Wire, 1-1/4" Spacing, 0.68 LB/SF Woven And Welded Wire Cloth Panels	12.71	3.97
For Up To 2, Add	3.60	
For >2 To 6, Add	2.07	
For >15 To 40, Deduct	-0.37	
For >40, Deduct	-1.11	
For Galvanized, Add	3.26	
For Aluminum, Add	4.45	
For 304 Stainless Steel, Add	17.78	
For 316 Stainless Steel, Add	20.38	
05 59 69 00-0033 SF 0.135" Thick Wire, 1-1/4" Spacing, 0.85 LB/SF Woven And Welded Wire Cloth Panels	13.81	4.14
For Up To 2, Add	3.87	
For >2 To 6, Add	2.21	
For >15 To 40, Deduct	-0.41	
For >40, Deduct	-1.24	
For Galvanized, Add	3.65	
For Aluminum, Add	4.97	
For 304 Stainless Steel, Add	19.90	
For 316 Stainless Steel, Add	22.80	
05 59 69 00-0034 SF 0.148" Thick Wire, 1-1/4" Spacing, 1.01 LB/SF Woven And Welded Wire Cloth Panels	14.24	4.22
For Up To 2, Add	3.97	
For >2 To 6, Add	2.27	
For >15 To 40, Deduct	-0.43	
For >40, Deduct	-1.29	
For Galvanized, Add	3.79	
For Aluminum, Add	5.17	
For 304 Stainless Steel, Add	20.69	
For 316 Stainless Steel, Add	23.71	
05 59 69 00-0035 SF 0.162" Thick Wire, 1-1/4" Spacing, 1.2 LB/SF Woven And Welded Wire Cloth Panels	15.43	4.76
For Up To 2, Add	4.36	
For >2 To 6, Add	2.50	
For >15 To 40, Deduct	-0.45	
For >40, Deduct	-1.36	
For Galvanized, Add	4.00	
For Aluminum, Add	5.45	
For 304 Stainless Steel, Add	21.79	
For 316 Stainless Steel, Add	24.97	
05 59 69 00-0036 SF 0.177" Thick Wire, 1-1/4" Spacing, 1.42 LB/SF Woven And Welded Wire Cloth Panels	17.38	5.36
For Up To 2, Add	4.90	
For >2 To 6, Add	2.81	
For >15 To 40, Deduct	-0.51	
For >40, Deduct	-1.54	
For Galvanized, Add	4.51	
For Aluminum, Add	6.14	
For 304 Stainless Steel, Add	24.58	
For 316 Stainless Steel, Add	28.16	
05 59 69 00-0037 SF 0.192" Thick Wire, 1-1/4" Spacing, 1.65 LB/SF Woven And Welded Wire Cloth Panels	19.78	5.91
For Up To 2, Add	5.53	
For >2 To 6, Add	3.16	
For >15 To 40, Deduct	-0.60	
For >40, Deduct	-1.79	
For Galvanized, Add	5.24	
For Aluminum, Add	7.14	
For 304 Stainless Steel, Add	28.56	
For 316 Stainless Steel, Add	32.73	
05 59 69 00-0038 SF 0.207" Thick Wire, 1-1/4" Spacing, 1.9 LB/SF Woven And Welded Wire Cloth Panels	22.32	6.46
For Up To 2, Add	6.19	
For >2 To 6, Add	3.52	
For >15 To 40, Deduct	-0.69	
For >40, Deduct	-2.06	
For Galvanized, Add	6.03	
For Aluminum, Add	8.23	
For 304 Stainless Steel, Add	32.90	
For 316 Stainless Steel, Add	37.70	
05 59 69 00-0039 SF 0.225" Thick Wire, 1-1/4" Spacing, 2.22 LB/SF Woven And Welded Wire Cloth Panels	25.58	7.17
For Up To 2, Add	7.03	
For >2 To 6, Add	3.99	
For >15 To 40, Deduct	-0.80	
For >40, Deduct	-2.40	
For Galvanized, Add	7.05	
For Aluminum, Add	9.61	
For 304 Stainless Steel, Add	38.45	
For 316 Stainless Steel, Add	44.06	
05 59 69 00-0040 1" Square Wire Spacing <small>(05 59 69 00-0002)</small>		
05 59 69 00-0041 SF 0.105" Thick Wire, 1" Spacing, 0.64 LB/SF Woven And Welded Wire Cloth Panels	13.40	4.44
For Up To 2, Add	3.86	
For >2 To 6, Add	2.23	
For >15 To 40, Deduct	-0.37	
For >40, Deduct	-1.12	
For Galvanized, Add	3.30	
For Aluminum, Add	4.49	
For 304 Stainless Steel, Add	17.98	
For 316 Stainless Steel, Add	20.60	



Metals	05	05
Metal Fabrications	05 50	
Metal Specialties	05 59	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 59 69 00-0042	SF		0.12" Thick Wire, 1" Spacing, 0.83 LB/SF Woven And Welded Wire Cloth Panels	14.37	4.62
			For Up To 2, Add	4.10	
			For >2 To 6, Add	2.36	
			For >15 To 40, Deduct	-0.41	
			For >40, Deduct	-1.23	
			For Galvanized, Add	3.62	
			For Aluminum, Add	4.93	
			For 304 Stainless Steel, Add	19.73	
			For 316 Stainless Steel, Add	22.61	
05 59 69 00-0043	SF		0.135" Thick Wire, 1" Spacing, 1.04 LB/SF Woven And Welded Wire Cloth Panels	14.98	4.82
			For Up To 2, Add	4.28	
			For >2 To 6, Add	2.46	
			For >15 To 40, Deduct	-0.43	
			For >40, Deduct	-1.28	
			For Galvanized, Add	3.76	
			For Aluminum, Add	5.12	
			For 304 Stainless Steel, Add	20.50	
			For 316 Stainless Steel, Add	23.49	
05 59 69 00-0044	SF		0.148" Thick Wire, 1" Spacing, 1.23 LB/SF Woven And Welded Wire Cloth Panels	16.07	4.89
			For Up To 2, Add	4.52	
			For >2 To 6, Add	2.59	
			For >15 To 40, Deduct	-0.48	
			For >40, Deduct	-1.43	
			For Galvanized, Add	4.20	
			For Aluminum, Add	5.72	
			For 304 Stainless Steel, Add	22.90	
			For 316 Stainless Steel, Add	26.24	
05 59 69 00-0045	SF		0.162" Thick Wire, 1" Spacing, 1.46 LB/SF Woven And Welded Wire Cloth Panels	17.87	5.51
			For Up To 2, Add	5.04	
			For >2 To 6, Add	2.89	
			For >15 To 40, Deduct	-0.53	
			For >40, Deduct	-1.58	
			For Galvanized, Add	4.63	
			For Aluminum, Add	6.31	
			For 304 Stainless Steel, Add	25.25	
			For 316 Stainless Steel, Add	28.93	
05 59 69 00-0046	SF		0.177" Thick Wire, 1" Spacing, 1.72 LB/SF Woven And Welded Wire Cloth Panels	20.05	6.18
			For Up To 2, Add	5.66	
			For >2 To 6, Add	3.24	
			For >15 To 40, Deduct	-0.59	
			For >40, Deduct	-1.77	
			For Galvanized, Add	5.20	
			For Aluminum, Add	7.09	
			For 304 Stainless Steel, Add	28.37	
			For 316 Stainless Steel, Add	32.51	
05 59 69 00-0047	SF		0.192" Thick Wire, 1" Spacing, 2.01 LB/SF Woven And Welded Wire Cloth Panels	22.95	6.85
			For Up To 2, Add	6.42	
			For >2 To 6, Add	3.67	
			For >15 To 40, Deduct	-0.69	
			For >40, Deduct	-2.07	
			For Galvanized, Add	6.08	
			For Aluminum, Add	8.29	
			For 304 Stainless Steel, Add	33.14	
			For 316 Stainless Steel, Add	37.98	
05 59 69 00-0048	SF		0.207" Thick Wire, 1" Spacing, 2.31 LB/SF Woven And Welded Wire Cloth Panels	25.84	7.48
			For Up To 2, Add	7.16	
			For >2 To 6, Add	4.08	
			For >15 To 40, Deduct	-0.79	
			For >40, Deduct	-2.38	
			For Galvanized, Add	6.98	
			For Aluminum, Add	9.52	
			For 304 Stainless Steel, Add	38.09	
			For 316 Stainless Steel, Add	43.64	
05 59 69 00-0049	SF		0.225" Thick Wire, 1" Spacing, 2.69 LB/SF Woven And Welded Wire Cloth Panels	29.51	8.28
			For Up To 2, Add	8.11	
			For >2 To 6, Add	4.61	
			For >15 To 40, Deduct	-0.92	
			For >40, Deduct	-2.77	
			For Galvanized, Add	8.13	
			For Aluminum, Add	11.09	
			For 304 Stainless Steel, Add	44.35	
			For 316 Stainless Steel, Add	50.82	
05 59 69 00-0050			3/4" Square Wire Spacing (05 59 69 00-0002)		
05 59 69 00-0051	SF		0.105" Thick Wire, 3/4" Spacing, 0.83 LB/SF Woven And Welded Wire Cloth Panels	13.57	4.43
			For Up To 2, Add	3.89	
			For >2 To 6, Add	2.24	
			For >15 To 40, Deduct	-0.38	
			For >40, Deduct	-1.15	
			For Galvanized, Add	3.37	
			For Aluminum, Add	4.60	
			For 304 Stainless Steel, Add	18.41	
			For 316 Stainless Steel, Add	21.09	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
05 59 69 00-0052	SF 0.12" Thick Wire, 3/4" Spacing, 1.07 LB/SF Woven And Welded Wire Cloth Panels	15.16	4.97
	For Up To 2, Add	4.36	
	For >2 To 6, Add	2.51	
	For >15 To 40, Deduct	-0.43	
	For >40, Deduct	-1.28	
	For Galvanized, Add	3.76	
	For Aluminum, Add	5.12	
	For 304 Stainless Steel, Add	20.50	
	For 316 Stainless Steel, Add	23.49	
05 59 69 00-0053	SF 0.135" Thick Wire, 3/4" Spacing, 1.33 LB/SF Woven And Welded Wire Cloth Panels	16.76	5.61
	For Up To 2, Add	4.85	
	For >2 To 6, Add	2.80	
	For >15 To 40, Deduct	-0.46	
	For >40, Deduct	-1.39	
	For Galvanized, Add	4.09	
	For Aluminum, Add	5.57	
	For 304 Stainless Steel, Add	22.30	
	For 316 Stainless Steel, Add	25.55	
05 59 69 00-0054	SF 0.148" Thick Wire, 3/4" Spacing, 1.58 LB/SF Woven And Welded Wire Cloth Panels	18.14	5.98
	For Up To 2, Add	5.22	
	For >2 To 6, Add	3.01	
	For >15 To 40, Deduct	-0.51	
	For >40, Deduct	-1.52	
	For Galvanized, Add	4.47	
	For Aluminum, Add	6.10	
	For 304 Stainless Steel, Add	24.38	
	For 316 Stainless Steel, Add	27.94	
05 59 69 00-0055	SF 0.162" Thick Wire, 3/4" Spacing, 1.87 LB/SF Woven And Welded Wire Cloth Panels	21.00	6.73
	For Up To 2, Add	6.00	
	For >2 To 6, Add	3.45	
	For >15 To 40, Deduct	-0.60	
	For >40, Deduct	-1.80	
	For Galvanized, Add	5.29	
	For Aluminum, Add	7.21	
	For 304 Stainless Steel, Add	28.85	
	For 316 Stainless Steel, Add	33.06	
05 59 69 00-0056	SF 0.177" Thick Wire, 3/4" Spacing, 2.2 LB/SF Woven And Welded Wire Cloth Panels	24.17	7.53
	For Up To 2, Add	6.84	
	For >2 To 6, Add	3.92	
	For >15 To 40, Deduct	-0.71	
	For >40, Deduct	-2.12	
	For Galvanized, Add	6.22	
	For Aluminum, Add	8.48	
	For 304 Stainless Steel, Add	33.94	
	For 316 Stainless Steel, Add	38.89	
05 59 69 00-0057	SF 0.192" Thick Wire, 3/4" Spacing, 2.56 LB/SF Woven And Welded Wire Cloth Panels	27.54	8.31
	For Up To 2, Add	7.73	
	For >2 To 6, Add	4.42	
	For >15 To 40, Deduct	-0.82	
	For >40, Deduct	-2.47	
	For Galvanized, Add	7.24	
	For Aluminum, Add	9.87	
	For 304 Stainless Steel, Add	39.48	
	For 316 Stainless Steel, Add	45.24	
05 59 69 00-0058	SF 0.207" Thick Wire, 3/4" Spacing, 2.93 LB/SF Woven And Welded Wire Cloth Panels	30.88	9.04
	For Up To 2, Add	8.59	
	For >2 To 6, Add	4.90	
	For >15 To 40, Deduct	-0.94	
	For >40, Deduct	-2.82	
	For Galvanized, Add	8.29	
	For Aluminum, Add	11.30	
	For 304 Stainless Steel, Add	45.19	
	For 316 Stainless Steel, Add	51.78	
05 59 69 00-0059	SF 0.225" Thick Wire, 3/4" Spacing, 3.41 LB/SF Woven And Welded Wire Cloth Panels	35.25	9.99
	For Up To 2, Add	9.72	
	For >2 To 6, Add	5.52	
	For >15 To 40, Deduct	-1.10	
	For >40, Deduct	-3.29	
	For Galvanized, Add	9.64	
	For Aluminum, Add	13.15	
	For 304 Stainless Steel, Add	52.61	
	For 316 Stainless Steel, Add	60.28	
05 59 69 00-0060	1/2" Square Wire Spacing (05 59 69 00-0002)		
05 59 69 00-0061	SF 0.105" Thick Wire, 1/2" Spacing, 1.18 LB/SF Woven And Welded Wire Cloth Panels	14.17	4.74
	For Up To 2, Add	4.10	
	For >2 To 6, Add	2.37	
	For >15 To 40, Deduct	-0.39	
	For >40, Deduct	-1.18	
	For Galvanized, Add	3.45	
	For Aluminum, Add	4.71	
	For 304 Stainless Steel, Add	18.84	
	For 316 Stainless Steel, Add	21.59	



Metals	05	05
Metal Fabrications	05 50	
Metal Specialties	05 59	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 59 69 00-0062 SF 0.12" Thick Wire, 1/2" Spacing, 1.51 LB/SF Woven And Welded Wire Cloth Panels	16.56	5.76
For Up To 2, Add	4.85	
For >2 To 6, Add	2.81	
For >15 To 40, Deduct	-0.44	
For >40, Deduct	-1.33	
For Galvanized, Add	3.90	
For Aluminum, Add	5.32	
For 304 Stainless Steel, Add	21.29	
For 316 Stainless Steel, Add	24.39	
05 59 69 00-0063 SF 0.135" Thick Wire, 1/2" Spacing, 1.88 LB/SF Woven And Welded Wire Cloth Panels	20.03	6.82
For Up To 2, Add	5.82	
For >2 To 6, Add	3.37	
For >15 To 40, Deduct	-0.55	
For >40, Deduct	-1.64	
For Galvanized, Add	4.81	
For Aluminum, Add	6.56	
For 304 Stainless Steel, Add	26.26	
For 316 Stainless Steel, Add	30.09	
05 59 69 00-0064 SF 0.148" Thick Wire, 1/2" Spacing, 2.22 LB/SF Woven And Welded Wire Cloth Panels	23.11	7.65
For Up To 2, Add	6.66	
For >2 To 6, Add	3.84	
For >15 To 40, Deduct	-0.65	
For >40, Deduct	-1.94	
For Galvanized, Add	5.68	
For Aluminum, Add	7.75	
For 304 Stainless Steel, Add	31.01	
For 316 Stainless Steel, Add	35.53	
05 59 69 00-0065 SF 0.162" Thick Wire, 1/2" Spacing, 2.61 LB/SF Woven And Welded Wire Cloth Panels	26.57	8.53
For Up To 2, Add	7.59	
For >2 To 6, Add	4.36	
For >15 To 40, Deduct	-0.76	
For >40, Deduct	-2.28	
For Galvanized, Add	6.68	
For Aluminum, Add	9.11	
For 304 Stainless Steel, Add	36.46	
For 316 Stainless Steel, Add	41.77	
05 59 69 00-0066 SF 0.177" Thick Wire, 1/2" Spacing, 3.06 LB/SF Woven And Welded Wire Cloth Panels	30.48	9.51
For Up To 2, Add	8.63	
For >2 To 6, Add	4.95	
For >15 To 40, Deduct	-0.89	
For >40, Deduct	-2.67	
For Galvanized, Add	7.83	
For Aluminum, Add	10.68	
For 304 Stainless Steel, Add	42.72	
For 316 Stainless Steel, Add	48.95	
05 59 69 00-0067 SF 0.192" Thick Wire, 1/2" Spacing, 3.54 LB/SF Woven And Welded Wire Cloth Panels	34.53	10.46
For Up To 2, Add	9.69	
For >2 To 6, Add	5.54	
For >15 To 40, Deduct	-1.03	
For >40, Deduct	-3.09	
For Galvanized, Add	9.06	
For Aluminum, Add	12.36	
For 304 Stainless Steel, Add	49.44	
For 316 Stainless Steel, Add	56.65	
05 59 69 00-0068 SF 0.207" Thick Wire, 1/2" Spacing, 4.04 LB/SF Woven And Welded Wire Cloth Panels	38.61	11.33
For Up To 2, Add	10.74	
For >2 To 6, Add	6.13	
For >15 To 40, Deduct	-1.18	
For >40, Deduct	-3.53	
For Galvanized, Add	10.34	
For Aluminum, Add	14.10	
For 304 Stainless Steel, Add	56.40	
For 316 Stainless Steel, Add	64.63	
05 59 69 00-0069 SF 0.225" Thick Wire, 1/2" Spacing, 4.68 LB/SF Woven And Welded Wire Cloth Panels	40.12	12.47
For Up To 2, Add	11.35	
For >2 To 6, Add	6.51	
For >15 To 40, Deduct	-1.18	
For >40, Deduct	-3.53	
For Galvanized, Add	10.34	
For Aluminum, Add	14.10	
For 304 Stainless Steel, Add	56.40	
For 316 Stainless Steel, Add	64.63	
05 59 69 00-0070 Expanded Metal Panels <small>(05 59 69)</small>		
Note: Excludes frame and fastening to frame. See CSI section 05 05 21 00-0004 for spot welding.		
05 59 69 00-0071 Plain Flattened Expanded Metal Diamond Shape Panels <small>(05 59 69 00-0070)</small>		
Note: Excludes frame and fastening to frame. See CSI section 05 05 21 00-0004 for spot welding.		
05 59 69 00-0072 SF 1/4" #20-F Plain Expanded Metal Panel, 0.82 LB/SF	11.18	4.08
For Galvanized, Add	2.52	
For Aluminum, Add	3.44	
For 304 Stainless Steel, Add	13.75	
For 316 Stainless Steel, Add	15.76	

05	05 Metals
	05 50 Metal Fabrications
	05 59 Metal Specialties



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 59 69 00-0073 SF 1/4" #18-F Plain Expanded Metal Panel, 1.08 LB/SF	14.07	4.47
For Galvanized, Add	3.56	
For Aluminum, Add	4.86	
For 304 Stainless Steel, Add	19.44	
For 316 Stainless Steel, Add	22.28	
05 59 69 00-0074 SF 1/2" #20-F Plain Expanded Metal Panel, 0.40 LB/SF	8.06	3.15
For Galvanized, Add	1.69	
For Aluminum, Add	2.31	
For 304 Stainless Steel, Add	9.24	
For 316 Stainless Steel, Add	10.59	
05 59 69 00-0075 SF 1/2" #18-F Plain Expanded Metal Panel, 0.66 LB/SF	8.79	3.44
For Galvanized, Add	1.85	
For Aluminum, Add	2.53	
For 304 Stainless Steel, Add	10.10	
For 316 Stainless Steel, Add	11.58	
05 59 69 00-0076 SF 1/2" #16-F Plain Expanded Metal Panel, 0.82 LB/SF	9.95	4.08
For Galvanized, Add	1.98	
For Aluminum, Add	2.70	
For 304 Stainless Steel, Add	10.80	
For 316 Stainless Steel, Add	12.38	
05 59 69 00-0077 SF 1/2" #13-F Plain Expanded Metal Panel, 1.4 LB/SF	12.73	5.27
For Galvanized, Add	2.51	
For Aluminum, Add	3.43	
For 304 Stainless Steel, Add	13.70	
For 316 Stainless Steel, Add	15.70	
05 59 69 00-0078 SF 3/4" #16-F Plain Expanded Metal Panel, 0.51 LB/SF	7.01	3.10
For Galvanized, Add	1.26	
For Aluminum, Add	1.72	
For 304 Stainless Steel, Add	6.89	
For 316 Stainless Steel, Add	7.89	
05 59 69 00-0079 SF 3/4" #14-F Plain Expanded Metal Panel, 0.63 LB/SF	7.86	3.32
For Galvanized, Add	1.50	
For Aluminum, Add	2.05	
For 304 Stainless Steel, Add	8.21	
For 316 Stainless Steel, Add	9.41	
05 59 69 00-0080 SF 3/4" #13-F Plain Expanded Metal Panel, 0.75 LB/SF	8.98	3.73
For Galvanized, Add	1.76	
For Aluminum, Add	2.40	
For 304 Stainless Steel, Add	9.60	
For 316 Stainless Steel, Add	11.00	
05 59 69 00-0081 SF 3/4" #9-F Plain Expanded Metal Panel, 1.50 LB/SF	14.14	6.18
For Galvanized, Add	2.60	
For Aluminum, Add	3.55	
For 304 Stainless Steel, Add	14.18	
For 316 Stainless Steel, Add	16.25	
05 59 69 00-0082 SF 1" #16-F Plain Expanded Metal Panel, 0.41 LB/SF	7.84	3.78
For Galvanized, Add	1.22	
For Aluminum, Add	1.67	
For 304 Stainless Steel, Add	6.67	
For 316 Stainless Steel, Add	7.65	
05 59 69 00-0083 SF 1-1/2" #16-F Plain Expanded Metal Panel, 0.38 LB/SF	6.77	2.98
For Galvanized, Add	1.23	
For Aluminum, Add	1.68	
For 304 Stainless Steel, Add	6.72	
For 316 Stainless Steel, Add	7.70	
05 59 69 00-0084 SF 1-1/2" #13-F Plain Expanded Metal Panel, 0.57 LB/SF	7.81	3.51
For Galvanized, Add	1.39	
For Aluminum, Add	1.89	
For 304 Stainless Steel, Add	7.56	
For 316 Stainless Steel, Add	8.66	
05 59 69 00-0085 SF 1-1/2" #9-F Plain Expanded Metal Panel, 1.14 LB/SF	12.13	4.74
For Galvanized, Add	2.56	
For Aluminum, Add	3.49	
For 304 Stainless Steel, Add	13.94	
For 316 Stainless Steel, Add	15.98	

05 70 Decorative Metal ⁽⁰⁵⁾

Note: Includes anchors and related accessories.

05 71 Decorative Metal Stairs ^(05 70)

05 71 13 Fabricated Metal Spiral Stairs ^(05 71)

Note: Includes factory prime.

05 71 13 00-0001 Spiral Stairs, Stock Units ^(05 71 13)

Note: Includes factory prime.

05 71 13 00-0002 Steel Tread ^(05 71 13 00-0001)

05 71 13 00-0003 VLF 3'-6" Diameter, Spiral Steel Stair With Rails	507.53	54.25
For Galvanized, Add	279.31	
05 71 13 00-0004 VLF 4' Diameter, Spiral Steel Stair With Rails	578.69	59.68
For Galvanized, Add	321.54	
05 71 13 00-0005 VLF 4'-6" Diameter, Spiral Steel Stair With Rails	640.59	65.10
For Galvanized, Add	357.27	



Metals	05	05
Decorative Metal	05 70	
Decorative Metal Stairs	05 71	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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05 71 13 00-0006	VLF 5' Diameter, Spiral Steel Stair With Rails <i>For Galvanized, Add</i>	686.24 381.63	70.53
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05 73 Decorative Metal Railings (05 70)

Note: Factory primed. Includes brackets.

05 73 23 Decorative Metal Railings (05 73)

05 73 23 00-0001 Railings; Vertical Square Bars At 6" (05 73 23)

Note: Centers with shaped top rails (round, square, rectangular, diamond, triangular or other shape).

05 73 23 00-0002	LF Steel Ornamental Handrail Vertical Square Bars At 6", Shaped Top Rail, Up To 42" High <i>For Rake Or Angle Railings, Add</i> <i>For Curved Railings, Add</i> <i>For 4" On Center Standards, Add</i> <i>For 4-1/2" On Center Standards, Add</i> <i>For 5" On Center Standards, Add</i> <i>For 5-1/2" On Center Standards, Add</i> <i>For Each Field Bending Of Rails, Add</i> <i>For Galvanized, Add</i>	69.53 10.07 17.29 1.61 1.29 0.86 0.43 14.52 3.00	11.94
05 73 23 00-0003	LF Aluminum Ornamental Handrail Vertical Square Bars At 6", Shaped Top Rail, Up To 42" High <i>For Rake Or Angle Railings, Add</i> <i>For Curved Railings, Add</i> <i>For 4" On Center Standards, Add</i> <i>For 4-1/2" On Center Standards, Add</i> <i>For 5" On Center Standards, Add</i> <i>For 5-1/2" On Center Standards, Add</i> <i>For Each Field Bending Of Rails, Add</i>	181.94 19.55 64.35 8.69 6.95 4.63 2.32 19.03	16.27
05 73 23 00-0004	LF Bronze Ornamental Handrail Vertical Square Bars At 6", Shaped Top Rail, Up To 42" High <i>For Rake Or Angle Railings, Add</i> <i>For Curved Railings, Add</i> <i>For 4" On Center Standards, Add</i> <i>For 4-1/2" On Center Standards, Add</i> <i>For 5" On Center Standards, Add</i> <i>For 5-1/2" On Center Standards, Add</i> <i>For Each Field Bending Of Rails, Add</i>	209.84 24.74 68.07 8.58 6.86 4.57 2.29 26.37	27.13
05 73 23 00-0005	LF Stainless Steel Ornamental Handrail Vertical Square Bars At 6", Shaped Top Rail, Up To 42" High <i>For Rake Or Angle Railings, Add</i> <i>For Curved Railings, Add</i> <i>For 4" On Center Standards, Add</i> <i>For 4-1/2" On Center Standards, Add</i> <i>For 5" On Center Standards, Add</i> <i>For 5-1/2" On Center Standards, Add</i> <i>For Each Field Bending Of Rails, Add</i>	294.19 29.46 110.07 15.46 12.36 8.24 4.12 24.53	21.70
05 73 23 00-0006	LF Black Wrought Iron Ornamental Handrail Vertical Square Bars At 6", Shaped Top Rail, Up To 42" High <i>For Rake Or Angle Railings, Add</i> <i>For Curved Railings, Add</i> <i>For 4" On Center Standards, Add</i> <i>For 4-1/2" On Center Standards, Add</i> <i>For 5" On Center Standards, Add</i> <i>For 5-1/2" On Center Standards, Add</i> <i>For Each Field Bending Of Rails, Add</i>	328.40 29.22 133.17 19.67 15.73 10.49 5.24 19.05	33.09

05 73 23 00-0007 Laminated Metal Or Wood Handrails With Metal Supports (05 73 23)

05 73 23 00-0008	LF 2-1/2" Laminated Metal Or Wood Handrail Round/Oval Shape With Metal Supports <i>For Rake Or Angle Railings, Add</i> <i>For Curved Railings, Add</i> <i>For 4" On Center Standards, Add</i> <i>For 4-1/2" On Center Standards, Add</i> <i>For 5" On Center Standards, Add</i> <i>For 5-1/2" On Center Standards, Add</i> <i>For Each Field Bending Of Rails, Add</i>	172.92 13.61 75.10 11.52 9.22 6.15 3.07 7.32	5.43
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05 73 23 00-0009 Plain Handrails (05 73 23)

05 73 23 00-0010	LF 2" Brass Handrail	58.92	11.87
05 73 23 00-0011	EA 90 Degree Angle For 2" Brass Handrail	120.51	42.85
05 73 23 00-0012	EA End Cap For 2" Brass Handrail	54.23	21.48
05 73 23 00-0013	EA Brass Bracket And Joint For 2" Brass Handrail	90.83	42.85
05 73 23 00-0014	LF 2" Stainless Steel Handrail	71.91	14.84

05 73 23 00-0015 Restoration Of Existing Metal Handrail And Railing (05 73 23)

Note: Task includes rust removal by grinding, cleaning, surface prep and one coat of protective primer. See CSI section 09 91 13 00-0382 for painting.

05 73 23 00-0016	LF Refinish Metal Handrail	10.79	
05 73 23 00-0017	LF Refinish Wrought Iron Balustrade	10.75	

05 73 23 00-0018 Remove And Reinstall Ornamental Railing (05 73 23)

05 73 23 00-0019	LF Removal And Reinstallation Of Ornamental Handrail And Pickets	99.83	
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05	05 Metals
	05 70 Decorative Metal
	05 75 Decorative Formed Metal



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

05 75 Decorative Formed Metal (05 70)

05 75 00 00-0001	Metal Sheets, Installed On Walls <small>(05 75)</small> Note: Includes field fabrication (bending) where noted.		
05 75 00 00-0002	Copper Sheets, Installed On Walls <small>(05 75 00 00-0001)</small> Note: Includes field fabrication.		
05 75 00 00-0003	SF 0.0162" (12 Ounce) Thick Copper Sheet, Installed On Walls	27.67	2.12
	For >16 To 200, Deduct	-1.54	
	For >200 To 500, Deduct	-3.09	
	For >500, Deduct	-4.47	
05 75 00 00-0004	SF 0.0215" (16 Ounce) Thick Copper Sheet, Installed On Walls	34.69	2.37
	For >16 To 200, Deduct	-1.91	
	For >200 To 500, Deduct	-3.82	
	For >500, Deduct	-5.56	
05 75 00 00-0005	SF 0.0242" (18 Ounce) Thick Copper Sheet, Installed On Walls	37.99	2.55
	For >16 To 200, Deduct	-2.09	
	For >200 To 500, Deduct	-4.18	
	For >500, Deduct	-6.08	
05 75 00 00-0006	SF 0.027" (20 Ounce) Thick Copper Sheet, Installed On Walls	41.07	2.68
	For >16 To 200, Deduct	-2.25	
	For >200 To 500, Deduct	-4.51	
	For >500, Deduct	-6.56	
05 75 00 00-0007	SF 0.0323" (24 Ounce) Thick Copper Sheet, Installed On Walls	46.96	2.80
	For >16 To 200, Deduct	-2.56	
	For >200 To 500, Deduct	-5.12	
	For >500, Deduct	-7.47	
05 75 00 00-0008	SF 0.0431" (32 Ounce) Thick Copper Sheet, Installed On Walls	59.79	2.94
	For >16 To 200, Deduct	-3.21	
	For >200 To 500, Deduct	-6.42	
	For >500, Deduct	-9.41	
05 75 00 00-0009	SF 0.052" (40 Ounce) Thick Copper Sheet, Installed On Walls	70.24	3.07
	For >16 To 200, Deduct	-3.74	
	For >200 To 500, Deduct	-7.48	
	For >500, Deduct	-11.00	
05 75 00 00-0010	SF 0.0646" (48 Ounce) Thick Copper Sheet, Installed On Walls	85.24	3.31
	For >16 To 200, Deduct	-4.51	
	For >200 To 500, Deduct	-9.02	
	For >500, Deduct	-13.28	
05 75 00 00-0011	SF 0.08" Thick Copper Sheet, Installed On Walls	104.96	3.57
	For >16 To 200, Deduct	-5.52	
	For >200 To 500, Deduct	-11.03	
	For >500, Deduct	-16.28	
05 75 00 00-0012	SF 0.125" Thick Copper Sheet, Installed On Walls	154.82	3.83
	For >16 To 200, Deduct	-8.03	
	For >200 To 500, Deduct	-16.06	
	For >500, Deduct	-23.80	
05 75 00 00-0013	Stainless Steel Sheets, Installed On Walls <small>(05 75 00 00-0001)</small> Note: Includes field fabrication.		
05 75 00 00-0014	SF 0.026" Thick (24 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	13.31	2.41
	For >16 To 200, Deduct	-0.85	
	For >200 To 500, Deduct	-1.69	
	For >500, Deduct	-2.36	
05 75 00 00-0015	SF 0.0312" Thick (22 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	14.97	2.60
	For >16 To 200, Deduct	-0.94	
	For >200 To 500, Deduct	-1.89	
	For >500, Deduct	-2.64	
05 75 00 00-0016	SF 0.0375" Thick (20 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	16.23	2.73
	For >16 To 200, Deduct	-1.02	
	For >200 To 500, Deduct	-2.03	
	For >500, Deduct	-2.84	
05 75 00 00-0017	SF 0.050" Thick (18 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	18.79	2.86
	For >16 To 200, Deduct	-1.15	
	For >200 To 500, Deduct	-2.31	
	For >500, Deduct	-3.25	
05 75 00 00-0018	SF 0.0625" Thick (16 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	21.28	2.99
	For >16 To 200, Deduct	-1.29	
	For >200 To 500, Deduct	-2.58	
	For >500, Deduct	-3.64	
05 75 00 00-0019	SF 0.078" Thick (14 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	24.39	3.12
	For >16 To 200, Deduct	-1.45	
	For >200 To 500, Deduct	-2.91	
	For >500, Deduct	-4.13	
05 75 00 00-0020	SF 0.125" Thick (11 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	34.53	3.64
	For >16 To 200, Deduct	-2.00	
	For >200 To 500, Deduct	-4.00	
	For >500, Deduct	-5.73	
05 75 00 00-0021	SF 3/16" Thick (7 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls	45.99	3.86
	For >16 To 200, Deduct	-2.59	
	For >200 To 500, Deduct	-5.18	
	For >500, Deduct	-7.48	



Metals	05	05
Decorative Metal	05 70	
Decorative Formed Metal	05 75	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
05 75 00 00-0022 SF 1/4" Thick (3 Gauge) 304 Brushed Stainless Steel Sheet, Installed On Walls.....	62.56	4.68
<i>For >16 To 200, Deduct</i>	-3.48	
<i>For >200 To 500, Deduct</i>	-6.96	
<i>For >500, Deduct</i>	-10.09	
05 75 00 00-0023 SF 3/8" Thick 304 Brushed Stainless Steel Sheet, Installed On Walls.....	102.70	5.02
<i>For >16 To 200, Deduct</i>	-5.51	
<i>For >200 To 500, Deduct</i>	-11.02	
<i>For >500, Deduct</i>	-16.16	
05 75 00 00-0024 SF 1/2" Thick 304 Brushed Stainless Steel Sheet, Installed On Walls.....	131.04	5.84
<i>For >16 To 200, Deduct</i>	-6.99	
<i>For >200 To 500, Deduct</i>	-13.98	
<i>For >500, Deduct</i>	-20.54	
05 75 00 00-0025 Aluminum Sheets, Installed On Walls (05 75 00 00-0001)		
Note: Includes field fabrication.		
05 75 00 00-0026 SF 0.016" Thick (26 Gauge) Aluminum Sheet, Installed On Walls.....	10.50	2.12
<i>For >16 To 200, Deduct</i>	-0.68	
<i>For >200 To 500, Deduct</i>	-1.37	
<i>For >500, Deduct</i>	-1.89	
05 75 00 00-0027 SF 0.020" Thick (24 Gauge) Aluminum Sheet, Installed On Walls.....	11.94	2.37
<i>For >16 To 200, Deduct</i>	-0.77	
<i>For >200 To 500, Deduct</i>	-1.55	
<i>For >500, Deduct</i>	-2.15	
05 75 00 00-0028 SF 0.025" Thick (22 Gauge) Aluminum Sheet, Installed On Walls.....	13.36	2.55
<i>For >16 To 200, Deduct</i>	-0.86	
<i>For >200 To 500, Deduct</i>	-1.72	
<i>For >500, Deduct</i>	-2.39	
05 75 00 00-0029 SF 0.032" Thick (20 Gauge) Aluminum Sheet, Installed On Walls.....	14.87	2.68
<i>For >16 To 200, Deduct</i>	-0.94	
<i>For >200 To 500, Deduct</i>	-1.89	
<i>For >500, Deduct</i>	-2.63	
05 75 00 00-0030 SF 0.040" Thick (18 Gauge) Aluminum Sheet, Installed On Walls.....	16.36	2.80
<i>For >16 To 200, Deduct</i>	-1.03	
<i>For >200 To 500, Deduct</i>	-2.06	
<i>For >500, Deduct</i>	-2.88	
05 75 00 00-0031 SF 0.050" Thick (16 Gauge) Aluminum Sheet, Installed On Walls.....	18.00	2.94
<i>For >16 To 200, Deduct</i>	-1.12	
<i>For >200 To 500, Deduct</i>	-2.24	
<i>For >500, Deduct</i>	-3.14	
05 75 00 00-0032 SF 0.064" Thick (14 Gauge) Aluminum Sheet, Installed On Walls.....	20.04	3.07
<i>For >16 To 200, Deduct</i>	-1.23	
<i>For >200 To 500, Deduct</i>	-2.46	
<i>For >500, Deduct</i>	-3.47	
05 75 00 00-0033 SF 0.090" Thick (11 Gauge) Aluminum Sheet, Installed On Walls.....	23.87	3.57
<i>For >16 To 200, Deduct</i>	-1.46	
<i>For >200 To 500, Deduct</i>	-2.92	
<i>For >500, Deduct</i>	-4.12	
05 75 00 00-0034 Galvanized Steel Sheets, Installed On Walls (05 75 00 00-0001)		
Note: Includes field fabrication.		
05 75 00 00-0035 SF 0.0217" (26 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	9.01	2.12
<i>For >16 To 200, Deduct</i>	-0.61	
<i>For >200 To 500, Deduct</i>	-1.22	
<i>For >500, Deduct</i>	-1.67	
05 75 00 00-0036 SF 0.0276" (24 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	9.99	2.37
<i>For >16 To 200, Deduct</i>	-0.68	
<i>For >200 To 500, Deduct</i>	-1.35	
<i>For >500, Deduct</i>	-1.85	
05 75 00 00-0037 SF 0.0336" (22 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	10.63	2.55
<i>For >16 To 200, Deduct</i>	-0.72	
<i>For >200 To 500, Deduct</i>	-1.45	
<i>For >500, Deduct</i>	-1.98	
05 75 00 00-0038 SF 0.0396" (20 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	11.29	2.68
<i>For >16 To 200, Deduct</i>	-0.77	
<i>For >200 To 500, Deduct</i>	-1.53	
<i>For >500, Deduct</i>	-2.10	
05 75 00 00-0039 SF 0.0516" (18 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	12.14	2.80
<i>For >16 To 200, Deduct</i>	-0.82	
<i>For >200 To 500, Deduct</i>	-1.64	
<i>For >500, Deduct</i>	-2.24	
05 75 00 00-0040 SF 0.0635" (16 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	13.06	2.94
<i>For >16 To 200, Deduct</i>	-0.87	
<i>For >200 To 500, Deduct</i>	-1.75	
<i>For >500, Deduct</i>	-2.40	
05 75 00 00-0041 SF 0.0785" (14 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	14.53	3.07
<i>For >16 To 200, Deduct</i>	-0.96	
<i>For >200 To 500, Deduct</i>	-1.91	
<i>For >500, Deduct</i>	-2.64	
05 75 00 00-0042 SF 0.1084" (12 Gauge) Thick Galvanized Steel Sheet, Installed On Walls.....	16.65	3.31
<i>For >16 To 200, Deduct</i>	-1.08	
<i>For >200 To 500, Deduct</i>	-2.16	
<i>For >500, Deduct</i>	-3.00	

05	05	Metals
	05 70	Decorative Metal
	05 75	Decorative Formed Metal



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	05 75 00 00-0043	SF	0.1382" (10 Gauge) Thick Galvanized Steel Sheet, Installed On Walls	19.19	3.83
			<i>For >16 To 200, Deduct</i>	-1.25	
			<i>For >200 To 500, Deduct</i>	-2.49	
			<i>For >500, Deduct</i>	-3.45	
05 75 00 00-0044			Galvanized Zinc-Plated Steel Sheets, Installed On Walls <small>(05 75 00 00-0001)</small>		
			Note: Includes field fabrication.		
	05 75 00 00-0045	SF	0.013" Thick Galvanized Zinc Plated Steel Sheet, Installed On Walls	12.41	2.01
			<i>For >16 To 200, Deduct</i>	-0.82	
			<i>For >200 To 500, Deduct</i>	-1.64	
			<i>For >500, Deduct</i>	-2.26	
	05 75 00 00-0046	SF	0.016" Thick Galvanized Zinc Plated Steel Sheet, Installed On Walls	14.36	2.28
			<i>For >16 To 200, Deduct</i>	-0.95	
			<i>For >200 To 500, Deduct</i>	-1.89	
			<i>For >500, Deduct</i>	-2.61	
	05 75 00 00-0047	SF	0.019" Thick Galvanized Zinc Plated Steel Sheet, Installed On Walls	16.31	2.53
			<i>For >16 To 200, Deduct</i>	-1.07	
			<i>For >200 To 500, Deduct</i>	-2.14	
			<i>For >500, Deduct</i>	-2.95	
	05 75 00 00-0048	SF	0.024" Thick Galvanized Zinc Plated Steel Sheet, Installed On Walls	18.04	2.73
			<i>For >16 To 200, Deduct</i>	-1.18	
			<i>For >200 To 500, Deduct</i>	-2.35	
			<i>For >500, Deduct</i>	-3.25	

END OF SECTION 05



Wood, Plastics, and Composites	06	06
Maintenance of Wood, Plastics, and Composites	06 01	
Maintenance of Rough Carpentry	06 01 10	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 Wood, Plastics, and Composites

06 01 Maintenance of Wood, Plastics, and Composites ⁽⁰⁶⁾

06 01 10 Maintenance of Rough Carpentry ^(06 01)

06 01 10 91 Rough Carpentry Restoration ^(06 01 10)

06 01 10 91-0001		Roof Beam Restoration ^(06 01 10 91)	
06 01 10 91-0002	EA	Up To 5, Roof Beam Restoration And Fill.....	74.38
		Note: Includes cutting out damaged/rotten wood, filling with wood fiber restore material, and then with two-part epoxy, or polyester bondo, and sanding.	
06 01 10 91-0003	EA	>5 To 25, Roof Beam Restoration And Fill.....	64.02
		Note: Includes cutting out damaged/rotten wood, filling with wood fiber restore material, and then with two-part epoxy, or polyester bondo, and sanding.	
06 01 10 91-0004	EA	>25, Roof Beam Restoration And Fill.....	53.65
		Note: Includes cutting out damaged/rotten wood, filling with wood fiber restore material, and then with two-part epoxy, or polyester bondo, and sanding.	

06 01 10 91-0005		Roof Beam Replacement ^(06 01 10 91)	
		Note: Includes cutting back the rafter beam back 18" and in a zig-zag Z splice cut for purpose of splicing on new end piece. Attached with glue and screwed on with lag screws counter sunk.	
06 01 10 91-0006	EA	Up To 5, Roof Beam Replacement, 6" x 12" Beams.....	166.31
		Note: Includes cutting off damaged/rotten wood, new beams with screws.	
06 01 10 91-0007	EA	>5 To 25, Roof Beam Replacement, 6" x 12" Beams.....	155.94
		Note: Includes cutting off damaged/rotten wood, new beams with screws.	
06 01 10 91-0008	EA	>25, Roof Beam Replacement, 6" x 12" Beams.....	145.58
		Note: Includes cutting off damaged/rotten wood, new beams with screws.	
06 01 10 91-0009	EA	Up To 5, Roof Beam Replacement, 4" x 8" Beams.....	145.83
		Note: Includes cutting off damaged/rotten wood, new beams with screws.	
06 01 10 91-0010	EA	>5 To 25, Roof Beam Replacement, 4" x 8" Beams.....	135.46
		Note: Includes cutting off damaged/rotten wood, new beams with screws.	
06 01 10 91-0011	EA	>25, Roof Beam Replacement, 4" x 8" Beams.....	125.09
		Note: Includes cutting off damaged/rotten wood, new beams with screws.	

06 01 10 91-0012		Roof Beam Caps ^(06 01 10 91)	
06 01 10 91-0013	EA	4" x 4" Stainless Steel Beam End Cap.....	31.66
		For Galvanized Steel, Deduct	-2.59
06 01 10 91-0014	EA	4" x 6" Stainless Steel Beam End Cap.....	47.33
		For Galvanized Steel, Deduct	-4.55
06 01 10 91-0015	EA	4" x 8" Stainless Steel Beam End Cap.....	61.00
		For Galvanized Steel, Deduct	-5.92
06 01 10 91-0016	EA	6" x 6" Stainless Steel Beam End Cap.....	55.30
		For Galvanized Steel, Deduct	-5.21
06 01 10 91-0017	EA	6" x 12" Stainless Steel Beam End Cap.....	69.44
		For Galvanized Steel, Deduct	-6.63

06 01 10 91-0018		Field Formed Beam Top/End Caps ^(06 01 10 91)	
06 01 10 91-0019	SF	24 Gauge, Stainless Steel Field Formed Beam Top/End Cap.....	14.45
		Note: Includes forming and bending at edges and around end of exposed beam	
06 01 10 91-0020	SF	24 Gauge, Galvanized Steel Field Formed Beam Top/End Cap.....	11.11
		Note: Includes forming and bending at edges and around end of exposed beam	

06 01 40 Maintenance of Architectural Woodwork ^(06 01)

06 01 40 91 Architectural Woodwork Restoration ^(06 01 40)

06 01 40 91-0001		Cabinet Hardware Replacement ^(06 01 40 91)	
06 01 40 91-0002	EA	Removal And Replacement Of Concealed, Full Or Half Overlay, Self Closing, Steel Cabinet Hinges.....	42.00
06 01 40 91-0003	EA	Removal And Replacement Of Semi Concealed, Brass Cabinet Hinges.....	40.63

06 05 Common Work Results for Wood, Plastics, and Composites ⁽⁰⁶⁾

06 05 23 Wood, Plastic, and Composite Fastenings ^(06 05)

Note: For additional fasteners above normal conditions, for replacing existing fasteners, for relocating existing materials or fixtures, or for different fasteners required due to load limits on standard fasteners.

06 05 23 00-0001		Threaded Anchor Bolts ^(06 05 23)	
		Note: Threaded on two ends with two nuts and flat washers.	
06 05 23 00-0002	EA	1/2" Diameter x 4" Long, Threaded Anchor Bolt.....	16.99
		For >10 To 50, Deduct	-0.39
		For >50 To 100, Deduct	-1.01
		For >100 To 250, Deduct	-2.01
		For >250 To 500, Deduct	-3.41
		For >500, Deduct	-4.80

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
06 05 23 00-0003	EA 1/2" Diameter x 7-1/2" Long, Threaded Anchor Bolt	24.68	
	<i>For >10 To 50, Deduct</i>	-0.42	
	<i>For >50 To 100, Deduct</i>	-1.24	
	<i>For >100 To 250, Deduct</i>	-2.49	
	<i>For >250 To 500, Deduct</i>	-4.15	
	<i>For >500, Deduct</i>	-5.81	
06 05 23 00-0004	EA 3/4" Diameter x 7-1/2" Long, Threaded Anchor Bolt	27.71	
	<i>For >10 To 50, Deduct</i>	-0.42	
	<i>For >50 To 100, Deduct</i>	-1.32	
	<i>For >100 To 250, Deduct</i>	-2.64	
	<i>For >250 To 500, Deduct</i>	-4.37	
	<i>For >500, Deduct</i>	-6.11	
06 05 23 00-0005	EA 3/4" Diameter x 12" Long, Threaded Anchor Bolt	60.50	
	<i>For >10 To 50, Deduct</i>	-0.57	
	<i>For >50 To 100, Deduct</i>	-2.37	
	<i>For >100 To 250, Deduct</i>	-4.74	
	<i>For >250 To 500, Deduct</i>	-7.68	
	<i>For >500, Deduct</i>	-10.62	
06 05 23 00-0006	Framing Anchors <small>(06 05 23)</small>		
	Note: Including nails.		
06 05 23 00-0007	EA 1-7/16" x 2-1/2", 18 Gauge, Galvanized Framing Angle Anchor (Simpson Strong Tie® A34)	6.90	3.25
	<i>For >10 To 50, Deduct</i>	-0.31	
	<i>For >50 To 100, Deduct</i>	-0.64	
	<i>For >100 To 250, Deduct</i>	-1.28	
	<i>For >250 To 500, Deduct</i>	-2.22	
	<i>For >500, Deduct</i>	-3.17	
06 05 23 00-0008	EA 1-7/16" x 4-1/2", 18 Gauge, Galvanized Framing Angle Anchor (Simpson Strong Tie® A35)	7.70	3.58
	<i>For >10 To 50, Deduct</i>	-0.35	
	<i>For >50 To 100, Deduct</i>	-0.72	
	<i>For >100 To 250, Deduct</i>	-1.43	
	<i>For >250 To 500, Deduct</i>	-2.49	
	<i>For >500, Deduct</i>	-3.56	
06 05 23 00-0009	Angle Anchors <small>(06 05 23)</small>		
	Note: Including nails.		
06 05 23 00-0010	EA 2" x 1-1/2" x 1-3/8" Wide, 18 Gauge Galvanized Angle Anchor (Simpson Strong Tie® A21)	6.99	3.25
	<i>For >10 To 50, Deduct</i>	-0.31	
	<i>For >50 To 100, Deduct</i>	-0.64	
	<i>For >100 To 250, Deduct</i>	-1.28	
	<i>For >250 To 500, Deduct</i>	-2.23	
	<i>For >500, Deduct</i>	-3.18	
06 05 23 00-0011	EA 2" x 1-1/2" x 2-3/4" Wide, 18 Gauge Galvanized Angle Anchor (Simpson Strong Tie® A23)	7.67	3.47
	<i>For >10 To 50, Deduct</i>	-0.33	
	<i>For >50 To 100, Deduct</i>	-0.69	
	<i>For >100 To 250, Deduct</i>	-1.38	
	<i>For >250 To 500, Deduct</i>	-2.39	
	<i>For >500, Deduct</i>	-3.41	
06 05 23 00-0012	EA 3-7/8" x 2" x 2-1/2" Wide, 12 Gauge Galvanized Angle Anchor (Simpson Strong Tie® A24)	13.39	3.58
	<i>For >10 To 50, Deduct</i>	-0.35	
	<i>For >50 To 100, Deduct</i>	-0.86	
	<i>For >100 To 250, Deduct</i>	-1.72	
	<i>For >250 To 500, Deduct</i>	-2.92	
	<i>For >500, Deduct</i>	-4.13	
06 05 23 00-0013	EA 3" x 3" x 1-1/2" Wide, 18 Gauge Galvanized Angle Anchor (Simpson Strong Tie® A33)	12.04	3.58
	<i>For >10 To 50, Deduct</i>	-0.35	
	<i>For >50 To 100, Deduct</i>	-0.82	
	<i>For >100 To 250, Deduct</i>	-1.65	
	<i>For >250 To 500, Deduct</i>	-2.82	
	<i>For >500, Deduct</i>	-3.99	
06 05 23 00-0014	EA 4-9/16" x 4-9/16" x 1-1/2" Wide, 18 Gauge Galvanized Angle Anchor (Simpson Strong Tie® A44)	13.16	4.02
	<i>For >10 To 50, Deduct</i>	-0.38	
	<i>For >50 To 100, Deduct</i>	-0.91	
	<i>For >100 To 250, Deduct</i>	-1.81	
	<i>For >250 To 500, Deduct</i>	-3.10	
	<i>For >500, Deduct</i>	-4.39	
06 05 23 00-0015	EA 5-7/8" x 5-7/8" x 1-1/2" Wide, 18 Gauge Galvanized Angle Anchor (Simpson Strong Tie® A66)	14.93	4.23
	<i>For >10 To 50, Deduct</i>	-0.41	
	<i>For >50 To 100, Deduct</i>	-0.99	
	<i>For >100 To 250, Deduct</i>	-1.99	
	<i>For >250 To 500, Deduct</i>	-3.39	
	<i>For >500, Deduct</i>	-4.80	
06 05 23 00-0016	Reinforcing Angle Wood Construction Connectors <small>(06 05 23)</small>		
	Note: Including nails.		
06 05 23 00-0017	EA 3" x 3-3/4", 16 Gauge, Galvanized Reinforcing Angle Wood Construction Connectors (Simpson Strong Tie® L30)	7.71	3.04
	<i>For >10 To 50, Deduct</i>	-0.31	
	<i>For >50 To 100, Deduct</i>	-0.66	
	<i>For >100 To 250, Deduct</i>	-1.32	
	<i>For >250 To 500, Deduct</i>	-2.28	
	<i>For >500, Deduct</i>	-3.25	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0018 EA 5" x 3-3/4", 16 Gauge, Galvanized Reinforcing Angle Wood Construction Connectors (Simpson Strong Tie® L50)	9.56	3.25
<i>For >10 To 50, Deduct</i>	-0.33	
<i>For >50 To 100, Deduct</i>	-0.73	
<i>For >100 To 250, Deduct</i>	-1.46	
<i>For >250 To 500, Deduct</i>	-2.52	
<i>For >500, Deduct</i>	-3.58	
06 05 23 00-0019 EA 7" x 3-3/4", 16 Gauge, Galvanized Reinforcing Angle Wood Construction Connectors (Simpson Strong Tie® L70)	10.90	3.36
<i>For >10 To 50, Deduct</i>	-0.34	
<i>For >50 To 100, Deduct</i>	-0.78	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-2.68	
<i>For >500, Deduct</i>	-3.80	
06 05 23 00-0020 EA 9" x 3-3/4", 16 Gauge, Galvanized Reinforcing Angle Wood Construction Connectors (Simpson Strong Tie® L90)	12.13	3.47
<i>For >10 To 50, Deduct</i>	-0.36	
<i>For >50 To 100, Deduct</i>	-0.84	
<i>For >100 To 250, Deduct</i>	-1.67	
<i>For >250 To 500, Deduct</i>	-2.87	
<i>For >500, Deduct</i>	-4.06	
06 05 23 00-0021 EA 3-3/8" x 3-3/4", 18 Gauge, Galvanized Reinforcing Skewable Angle Wood Construction Connectors (Simpson Strong Tie® LS30).....	8.44	3.04
<i>For >10 To 50, Deduct</i>	-0.31	
<i>For >50 To 100, Deduct</i>	-0.68	
<i>For >100 To 250, Deduct</i>	-1.35	
<i>For >250 To 500, Deduct</i>	-2.34	
<i>For >500, Deduct</i>	-3.32	
06 05 23 00-0022 EA 4-7/8" x 3-3/4", 18 Gauge, Galvanized Reinforcing Skewable Angle Wood Construction Connectors (Simpson Strong Tie® LS50).....	9.31	3.25
<i>For >10 To 50, Deduct</i>	-0.33	
<i>For >50 To 100, Deduct</i>	-0.73	
<i>For >100 To 250, Deduct</i>	-1.45	
<i>For >250 To 500, Deduct</i>	-2.51	
<i>For >500, Deduct</i>	-3.56	
06 05 23 00-0023 EA 6-3/8" x 3-3/4", 18 Gauge, Galvanized Reinforcing Skewable Angle Wood Construction Connectors (Simpson Strong Tie® LS70).....	10.84	3.36
<i>For >10 To 50, Deduct</i>	-0.34	
<i>For >50 To 100, Deduct</i>	-0.78	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-2.68	
<i>For >500, Deduct</i>	-3.80	
06 05 23 00-0024 EA 7-7/8" x 3-3/4", 18 Gauge, Galvanized Reinforcing Skewable Angle Wood Construction Connectors (Simpson Strong Tie® LS90).....	12.90	3.47
<i>For >10 To 50, Deduct</i>	-0.36	
<i>For >50 To 100, Deduct</i>	-0.86	
<i>For >100 To 250, Deduct</i>	-1.71	
<i>For >250 To 500, Deduct</i>	-2.93	
<i>For >500, Deduct</i>	-4.14	
06 05 23 00-0025 Hold Down Anchors <small>(06 05 23)</small>		
Note: Including nails.		
06 05 23 00-0026 EA 8-5/8" High x 2-1/2" Wide x 2-1/4" Deep, 12 Gauge, Galvanized Hold Downs (Simpson Strong Tie® HD3B)	56.12	
<i>For >10 To 50, Deduct</i>	-1.68	
<i>For >50 To 100, Deduct</i>	-3.92	
<i>For >100 To 250, Deduct</i>	-7.85	
<i>For >250 To 500, Deduct</i>	-13.45	
<i>For >500, Deduct</i>	-19.06	
06 05 23 00-0027 EA 9-3/8" High x 2-1/2" Wide x 2-1/2" Deep, 10 Gauge, Galvanized Hold Downs (Simpson Strong Tie® HD5B)	78.93	
<i>For >10 To 50, Deduct</i>	-1.74	
<i>For >50 To 100, Deduct</i>	-4.58	
<i>For >100 To 250, Deduct</i>	-9.15	
<i>For >250 To 500, Deduct</i>	-15.46	
<i>For >500, Deduct</i>	-21.77	
06 05 23 00-0028 EA 12-3/8" High x 2-1/2" Wide x 2-1/2" Deep, 10 Gauge, Galvanized Hold Downs (Simpson Strong Tie® HD7B)	97.52	
<i>For >10 To 50, Deduct</i>	-1.84	
<i>For >50 To 100, Deduct</i>	-5.20	
<i>For >100 To 250, Deduct</i>	-10.41	
<i>For >250 To 500, Deduct</i>	-17.46	
<i>For >500, Deduct</i>	-24.50	
06 05 23 00-0029 EA 14" High x 2-1/2" Wide x 2-1/2" Deep, 7 Gauge, Galvanized Hold Downs (Simpson Strong Tie® HD9B)	115.16	
<i>For >10 To 50, Deduct</i>	-2.06	
<i>For >50 To 100, Deduct</i>	-5.97	
<i>For >100 To 250, Deduct</i>	-11.94	
<i>For >250 To 500, Deduct</i>	-19.97	
<i>For >500, Deduct</i>	-28.00	
06 05 23 00-0030 EA 20-5/16" High x 3-1/2" Wide x 4-1/2" Deep, 3 Gauge, Galvanized Hold Downs (Simpson Strong Tie® HD12)	186.95	
<i>For >10 To 50, Deduct</i>	-2.60	
<i>For >50 To 100, Deduct</i>	-8.58	
<i>For >100 To 250, Deduct</i>	-17.16	
<i>For >250 To 500, Deduct</i>	-28.34	
<i>For >500, Deduct</i>	-39.52	
06 05 23 00-0031 EA 24-1/2" High x 3-1/2" Wide x 4-1/2" Deep, 3 Gauge, Galvanized Hold Downs (Simpson Strong Tie® HD19)	252.22	
<i>For >10 To 50, Deduct</i>	-2.71	
<i>For >50 To 100, Deduct</i>	-10.37	
<i>For >100 To 250, Deduct</i>	-20.75	
<i>For >250 To 500, Deduct</i>	-33.83	
<i>For >500, Deduct</i>	-46.91	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0032	EA	8-11/16" Height x 3" Wide x 3-1/4" Deep, 14 Gauge, Galvanized Predeflected Holdown With Screws (Simpson Strong Tie® HDU2-SDS2.5).....	66.23	
		<i>For >10 To 50, Deduct</i>	-1.68	
		<i>For >50 To 100, Deduct</i>	-4.18	
		<i>For >100 To 250, Deduct</i>	-8.35	
		<i>For >250 To 500, Deduct</i>	-14.21	
		<i>For >500, Deduct</i>	-20.07	
06 05 23 00-0033	EA	10-15/16" Height x 3" Wide x 3-1/4" Deep, 14 Gauge, Galvanized Predeflected Holdown With Screws (Simpson Strong Tie® HDU4-SDS2.5).....	73.35	
		<i>For >10 To 50, Deduct</i>	-1.74	
		<i>For >50 To 100, Deduct</i>	-4.44	
		<i>For >100 To 250, Deduct</i>	-8.87	
		<i>For >250 To 500, Deduct</i>	-15.04	
		<i>For >500, Deduct</i>	-21.22	
06 05 23 00-0034	EA	13-3/16" Height x 3" Wide x 3-1/4" Deep, 14 Gauge, Galvanized Predeflected Holdown With Screws (Simpson Strong Tie® HDU5-SDS2.5).....	82.22	
		<i>For >10 To 50, Deduct</i>	-1.84	
		<i>For >50 To 100, Deduct</i>	-4.82	
		<i>For >100 To 250, Deduct</i>	-9.64	
		<i>For >250 To 500, Deduct</i>	-16.31	
		<i>For >500, Deduct</i>	-22.97	
06 05 23 00-0035	EA	16-5/8" Height x 3" Wide x 3-1/2" Deep, 10 Gauge, Galvanized Predeflected Holdown With Screws (Simpson Strong Tie® HDU8-SDS2.5).....	101.62	
		<i>For >10 To 50, Deduct</i>	-2.06	
		<i>For >50 To 100, Deduct</i>	-5.63	
		<i>For >100 To 250, Deduct</i>	-11.26	
		<i>For >250 To 500, Deduct</i>	-18.95	
		<i>For >500, Deduct</i>	-26.65	
06 05 23 00-0036	EA	22-1/4" Height x 3" Wide x 3-1/2" Deep, 10 Gauge, Galvanized Predeflected Holdown With Screws (Simpson Strong Tie® HDU11-SDS2.5).....	130.90	
		<i>For >10 To 50, Deduct</i>	-2.60	
		<i>For >50 To 100, Deduct</i>	-7.18	
		<i>For >100 To 250, Deduct</i>	-14.35	
		<i>For >250 To 500, Deduct</i>	-24.13	
		<i>For >500, Deduct</i>	-33.91	
06 05 23 00-0037	EA	25-11/16" Height x 3" Wide x 3-1/2" Deep, 7 Gauge, Galvanized Predeflected Holdown With Screws (Simpson Strong Tie® HDU14-SDS2.5).....	146.34	
		<i>For >10 To 50, Deduct</i>	-2.71	
		<i>For >50 To 100, Deduct</i>	-7.73	
		<i>For >100 To 250, Deduct</i>	-15.45	
		<i>For >250 To 500, Deduct</i>	-25.89	
		<i>For >500, Deduct</i>	-36.33	

06 05 23 00-0038 Joist And Beam Hangers (06 05 23)

Note: Including nails.

06 05 23 00-0039	EA	18 Gauge, Galvanized Joist Hanger, For 2" x 4" Joist Also Acceptable For Beam Hangers (Simpson Strong Tie® LU24).....	7.36	3.04
		<i>For >10 To 50, Deduct</i>	-0.31	
		<i>For >50 To 100, Deduct</i>	-0.65	
		<i>For >100 To 250, Deduct</i>	-1.30	
		<i>For >250 To 500, Deduct</i>	-2.26	
		<i>For >500, Deduct</i>	-3.22	
06 05 23 00-0040	EA	18 Gauge, Galvanized Joist Hanger, For 2" x 6" To 2" x 10" Joist, Also Acceptable For Beam Hangers (Simpson Strong Tie® LU28).....	8.20	3.25
		<i>For >10 To 50, Deduct</i>	-0.33	
		<i>For >50 To 100, Deduct</i>	-0.70	
		<i>For >100 To 250, Deduct</i>	-1.40	
		<i>For >250 To 500, Deduct</i>	-2.42	
		<i>For >500, Deduct</i>	-3.45	
06 05 23 00-0041	EA	16 Gauge, Galvanized Joist Hanger, For 3" x 6" To 3" x 9" Joist, Also Acceptable For Beam Hangers (Simpson Strong Tie® LUS36).....	11.57	3.36
		<i>For >10 To 50, Deduct</i>	-0.34	
		<i>For >50 To 100, Deduct</i>	-0.80	
		<i>For >100 To 250, Deduct</i>	-1.60	
		<i>For >250 To 500, Deduct</i>	-2.73	
		<i>For >500, Deduct</i>	-3.87	
06 05 23 00-0042	EA	16 Gauge, Galvanized Joist Hanger, For 3" x 10" To 3" x 14" Joist, Also Acceptable For Beam Hangers (Simpson Strong Tie® LUS310).....	12.60	3.47
		<i>For >10 To 50, Deduct</i>	-0.36	
		<i>For >50 To 100, Deduct</i>	-0.85	
		<i>For >100 To 250, Deduct</i>	-1.70	
		<i>For >250 To 500, Deduct</i>	-2.90	
		<i>For >500, Deduct</i>	-4.11	
06 05 23 00-0043	EA	14 Gauge, Galvanized Joist Hanger, For 4" x 6" To 4" x 8" Joist, Also Acceptable For Beam Hangers (Simpson Strong Tie® HUS46).....	19.37	3.68
		<i>For >10 To 50, Deduct</i>	-0.37	
		<i>For >50 To 100, Deduct</i>	-1.03	
		<i>For >100 To 250, Deduct</i>	-2.07	
		<i>For >250 To 500, Deduct</i>	-3.47	
		<i>For >500, Deduct</i>	-4.87	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0044 EA 14 Gauge, Galvanized Joist Hanger, For 4" x 10" To 4" x 14" Joist, Also Acceptable For Beam Hangers (Simpson Strong Tie® HUS412).....	23.12	3.80
<i>For >10 To 50, Deduct</i>	-0.38	
<i>For >50 To 100, Deduct</i>	-1.14	
<i>For >100 To 250, Deduct</i>	-2.28	
<i>For >250 To 500, Deduct</i>	-3.80	
<i>For >500, Deduct</i>	-5.32	
06 05 23 00-0045 Anchor And Ties <small>(06 05 23)</small>		
Note: Including nails.		
06 05 23 00-0046 EA 12-3/8" Long, 11 Gauge, Galvanized Heavy Tension Tie (Simpson Strong Tie® HTT4).....	35.44	
Note: Includes nails. Excludes anchor bolt.		
06 05 23 00-0047 EA 16" Long, 11 Gauge, Galvanized Heavy Tension Tie (Simpson Strong Tie® HTT5).....	43.90	
Note: Includes nails. Excludes anchor bolt.		
06 05 23 00-0048 EA 16 Gauge, Zinc Galvanized Finish Mudsill Anchor (Simpson Strong Tie® MASAZ).....	4.65	
06 05 23 00-0049 EA 16 Gauge, Zinc Galvanized Finish Mudsill Anchor (Simpson Strong Tie® MASBZ).....	5.24	
06 05 23 00-0050 Hurricane Ties <small>(06 05 23)</small>		
06 05 23 00-0051 EA 6" x 1-3/8" Wide, 18 Gauge, Galvanized Finish Hurricane Ties (Simpson Strong Tie® H2.5A)	8.03	3.36
<i>For >10 To 50, Deduct</i>	-0.37	
<i>For >50 To 100, Deduct</i>	-0.76	
<i>For >100 To 250, Deduct</i>	-1.52	
<i>For >250 To 500, Deduct</i>	-2.66	
<i>For >500, Deduct</i>	-3.80	
06 05 23 00-0052 EA 6" x 1-3/8" Wide, 18 Gauge, Zinc Galvanized Finish Hurricane Ties (Simpson Strong Tie® H2.5AZ)	2.93	
06 05 23 00-0053 EA 6" x 1-3/8" Wide, 18 Gauge, Stainless Steel Hurricane Ties (Simpson Strong Tie® H2.5ASS)	8.05	
06 05 23 00-0054 EA 10-7/16" x 1-1/2" Wide, 18 Gauge, Galvanized Finish Hurricane Ties (Simpson Strong Tie® H2A)	9.93	3.36
<i>For >10 To 50, Deduct</i>	-0.37	
<i>For >50 To 100, Deduct</i>	-0.81	
<i>For >100 To 250, Deduct</i>	-1.62	
<i>For >250 To 500, Deduct</i>	-2.80	
<i>For >500, Deduct</i>	-3.99	
06 05 23 00-0055 EA 19-3/16" x 2-1/4" Wide, 18 Gauge, Galvanized Finish Hurricane Ties (Simpson Strong Tie® H6).....	16.82	
06 05 23 00-0056 Post Column Bases <small>(06 05 23)</small>		
Note: Including nails.		
06 05 23 00-0057 EA Adjustable And Standoff 4" x 4" Post Base, With Bolts (Simpson Strong Tie® ABA44)	33.05	
06 05 23 00-0058 EA Adjustable And Standoff 4" x 6" Post Base, With Bolts (Simpson Strong Tie® ABA46)	50.30	
06 05 23 00-0059 EA Adjustable And Standoff 6" x 6" Post Base, With Bolts (Simpson Strong Tie® ABA66)	51.78	
06 05 23 00-0060 Post Column Caps <small>(06 05 23)</small>		
Note: Including nails.		
06 05 23 00-0061 EA 4" Beam, 4" Post Flange, 18 Gauge, Galvanized Post Cap (Simpson Strong Tie® BC4)	17.17	3.80
<i>For >10 To 50, Deduct</i>	-0.42	
<i>For >50 To 100, Deduct</i>	-1.06	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >250 To 500, Deduct</i>	-3.58	
<i>For >500, Deduct</i>	-5.06	
06 05 23 00-0062 EA 6" Beam, 6" Post Flange, 18 Gauge, Galvanized Post Cap (Simpson Strong Tie® BC6)	38.01	3.80
<i>For >10 To 50, Deduct</i>	-0.44	
<i>For >50 To 100, Deduct</i>	-1.61	
<i>For >100 To 250, Deduct</i>	-3.22	
<i>For >250 To 500, Deduct</i>	-5.27	
<i>For >500, Deduct</i>	-7.33	
06 05 23 00-0063 EA 3-1/8" Beam, 4" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC3 1/4-4)	189.97	
Note: Excludes field welding		
<i>For >10 To 50, Deduct</i>	-1.08	
<i>For >50 To 100, Deduct</i>	-6.38	
<i>For >100 To 250, Deduct</i>	-12.75	
<i>For >250 To 500, Deduct</i>	-20.21	
<i>For >500, Deduct</i>	-27.67	
<i>For Hot Dipped Galvanized, Add</i>	75.73	
06 05 23 00-0064 EA 3-1/8" Beam, 6" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC3 1/4-6)	198.63	
<i>For >10 To 50, Deduct</i>	-1.22	
<i>For >50 To 100, Deduct</i>	-6.80	
<i>For >100 To 250, Deduct</i>	-13.59	
<i>For >250 To 500, Deduct</i>	-21.61	
<i>For >500, Deduct</i>	-29.62	
<i>For Hot Dipped Galvanized, Add</i>	78.40	
06 05 23 00-0065 EA 4" Beam, 4" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC44).....	122.55	
Note: Excludes field welding		
<i>For >10 To 50, Deduct</i>	-1.08	
<i>For >50 To 100, Deduct</i>	-4.69	
<i>For >100 To 250, Deduct</i>	-9.38	
<i>For >250 To 500, Deduct</i>	-15.16	
<i>For >500, Deduct</i>	-20.93	
<i>For Hot Dipped Galvanized, Add</i>	45.39	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 05 23 00-0066	EA		4" Beam, 6" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC46).....	194.53	
			<i>For >10 To 50, Deduct</i>	-1.22	
			<i>For >50 To 100, Deduct</i>	-6.69	
			<i>For >100 To 250, Deduct</i>	-13.39	
			<i>For >250 To 500, Deduct</i>	-21.30	
			<i>For >500, Deduct</i>	-29.21	
			<i>For Hot Dipped Galvanized, Add</i>	76.56	
06 05 23 00-0067	EA		4" Beam, 8" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC48).....	203.38	
			Note: Excludes field welding		
			<i>For >10 To 50, Deduct</i>	-1.22	
			<i>For >50 To 100, Deduct</i>	-6.91	
			<i>For >100 To 250, Deduct</i>	-13.83	
			<i>For >250 To 500, Deduct</i>	-21.96	
			<i>For >500, Deduct</i>	-30.10	
			<i>For Hot Dipped Galvanized, Add</i>	80.54	
06 05 23 00-0068	EA		6" Beam, 4" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC64).....	207.84	
			<i>For >10 To 50, Deduct</i>	-1.17	
			<i>For >50 To 100, Deduct</i>	-6.95	
			<i>For >100 To 250, Deduct</i>	-13.89	
			<i>For >250 To 500, Deduct</i>	-22.00	
			<i>For >500, Deduct</i>	-30.11	
			<i>For Hot Dipped Galvanized, Add</i>	83.03	
06 05 23 00-0069	EA		6" Beam, 6" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC66).....	210.01	
			<i>For >10 To 50, Deduct</i>	-1.27	
			<i>For >50 To 100, Deduct</i>	-7.16	
			<i>For >100 To 250, Deduct</i>	-14.32	
			<i>For >250 To 500, Deduct</i>	-22.76	
			<i>For >500, Deduct</i>	-31.20	
			<i>For Hot Dipped Galvanized, Add</i>	83.03	
06 05 23 00-0070	EA		6" Beam, 8" Post, 7 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC68).....	210.01	
			<i>For >10 To 50, Deduct</i>	-1.27	
			<i>For >50 To 100, Deduct</i>	-7.16	
			<i>For >100 To 250, Deduct</i>	-14.32	
			<i>For >250 To 500, Deduct</i>	-22.76	
			<i>For >500, Deduct</i>	-31.20	
			<i>For Hot Dipped Galvanized, Add</i>	83.03	
06 05 23 00-0071	EA		5-1/8" Beam, 4" Post, 3 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC5 1/4-4)	242.57	
			<i>For >10 To 50, Deduct</i>	-1.17	
			<i>For >50 To 100, Deduct</i>	-7.81	
			<i>For >100 To 250, Deduct</i>	-15.63	
			<i>For >250 To 500, Deduct</i>	-24.61	
			<i>For >500, Deduct</i>	-33.59	
			<i>For Hot Dipped Galvanized, Add</i>	98.66	
06 05 23 00-0072	EA		5-1/8" Beam, 6" Post, 3 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC5 1/4-6)	244.74	
			<i>For >10 To 50, Deduct</i>	-1.27	
			<i>For >50 To 100, Deduct</i>	-8.03	
			<i>For >100 To 250, Deduct</i>	-16.06	
			<i>For >250 To 500, Deduct</i>	-25.37	
			<i>For >500, Deduct</i>	-34.67	
			<i>For Hot Dipped Galvanized, Add</i>	98.66	
06 05 23 00-0073	EA		5-1/8" Beam, 8" Post, 3 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC5 1/4-8)	244.74	
			<i>For >10 To 50, Deduct</i>	-1.27	
			<i>For >50 To 100, Deduct</i>	-8.03	
			<i>For >100 To 250, Deduct</i>	-16.06	
			<i>For >250 To 500, Deduct</i>	-25.37	
			<i>For >500, Deduct</i>	-34.67	
			<i>For Hot Dipped Galvanized, Add</i>	98.66	
06 05 23 00-0074	EA		8" Beam, 4" Post, 3 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC84).....	296.36	
			<i>For >10 To 50, Deduct</i>	-1.17	
			<i>For >50 To 100, Deduct</i>	-9.16	
			<i>For >100 To 250, Deduct</i>	-18.32	
			<i>For >250 To 500, Deduct</i>	-28.64	
			<i>For >500, Deduct</i>	-38.96	
			<i>For Hot Dipped Galvanized, Add</i>	122.87	
06 05 23 00-0075	EA		8" Beam, 6" Post, 3 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC86).....	298.53	
			<i>For >10 To 50, Deduct</i>	-1.27	
			<i>For >50 To 100, Deduct</i>	-9.38	
			<i>For >100 To 250, Deduct</i>	-18.75	
			<i>For >250 To 500, Deduct</i>	-29.40	
			<i>For >500, Deduct</i>	-40.05	
			<i>For Hot Dipped Galvanized, Add</i>	122.87	
06 05 23 00-0076	EA		8" Beam, 8" Post, 3 Gauge, Gray Paint Column Cap With Bolts (Simpson Strong Tie® CC88).....	298.53	
			<i>For >10 To 50, Deduct</i>	-1.27	
			<i>For >50 To 100, Deduct</i>	-9.38	
			<i>For >100 To 250, Deduct</i>	-18.75	
			<i>For >250 To 500, Deduct</i>	-29.40	
			<i>For >500, Deduct</i>	-40.05	
			<i>For Hot Dipped Galvanized, Add</i>	122.87	
06 05 23 00-0077	EA		3-1/8" Beam, 4" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC3 1/4-4).....	189.97	
			Note: Excludes field welding		
			<i>For >10 To 50, Deduct</i>	-1.08	
			<i>For >50 To 100, Deduct</i>	-6.38	
			<i>For >100 To 250, Deduct</i>	-12.75	
			<i>For >250 To 500, Deduct</i>	-20.21	
			<i>For >500, Deduct</i>	-27.67	
			<i>For Hot Dipped Galvanized, Add</i>	75.73	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0078 EA 3-1/8" Beam, 6" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC3 1/4-6).....	198.63	
<i>For >10 To 50, Deduct</i>	-1.22	
<i>For >50 To 100, Deduct</i>	-6.80	
<i>For >100 To 250, Deduct</i>	-13.59	
<i>For >250 To 500, Deduct</i>	-21.61	
<i>For >500, Deduct</i>	-29.62	
<i>For Hot Dipped Galvanized, Add</i>	78.40	
06 05 23 00-0079 EA 4" Beam, 4" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC44).....	122.55	
Note: Excludes field welding		
<i>For >10 To 50, Deduct</i>	-1.08	
<i>For >50 To 100, Deduct</i>	-4.69	
<i>For >100 To 250, Deduct</i>	-9.38	
<i>For >250 To 500, Deduct</i>	-15.16	
<i>For >500, Deduct</i>	-20.93	
<i>For Hot Dipped Galvanized, Add</i>	45.39	
06 05 23 00-0080 EA 4" Beam, 6" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC46).....	194.53	
<i>For >10 To 50, Deduct</i>	-1.22	
<i>For >50 To 100, Deduct</i>	-6.69	
<i>For >100 To 250, Deduct</i>	-13.39	
<i>For >250 To 500, Deduct</i>	-21.30	
<i>For >500, Deduct</i>	-29.21	
<i>For Hot Dipped Galvanized, Add</i>	76.56	
06 05 23 00-0081 EA 4" Beam, 8" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC48).....	203.38	
Note: Excludes field welding		
<i>For >10 To 50, Deduct</i>	-1.22	
<i>For >50 To 100, Deduct</i>	-6.91	
<i>For >100 To 250, Deduct</i>	-13.83	
<i>For >250 To 500, Deduct</i>	-21.96	
<i>For >500, Deduct</i>	-30.10	
<i>For Hot Dipped Galvanized, Add</i>	80.54	
06 05 23 00-0082 EA 6" Beam, 4" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC64).....	207.84	
<i>For >10 To 50, Deduct</i>	-1.17	
<i>For >50 To 100, Deduct</i>	-6.95	
<i>For >100 To 250, Deduct</i>	-13.89	
<i>For >250 To 500, Deduct</i>	-22.00	
<i>For >500, Deduct</i>	-30.11	
<i>For Hot Dipped Galvanized, Add</i>	83.03	
06 05 23 00-0083 EA 6" Beam, 6" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC66).....	210.01	
<i>For >10 To 50, Deduct</i>	-1.27	
<i>For >50 To 100, Deduct</i>	-7.16	
<i>For >100 To 250, Deduct</i>	-14.32	
<i>For >250 To 500, Deduct</i>	-22.76	
<i>For >500, Deduct</i>	-31.20	
<i>For Hot Dipped Galvanized, Add</i>	83.03	
06 05 23 00-0084 EA 6" Beam, 8" Post, 7 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC68).....	210.01	
<i>For >10 To 50, Deduct</i>	-1.27	
<i>For >50 To 100, Deduct</i>	-7.16	
<i>For >100 To 250, Deduct</i>	-14.32	
<i>For >250 To 500, Deduct</i>	-22.76	
<i>For >500, Deduct</i>	-31.20	
<i>For Hot Dipped Galvanized, Add</i>	83.03	
06 05 23 00-0085 EA 5-1/8" Beam, 4" Post, 3 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC5 1/4-4).....	242.57	
<i>For >10 To 50, Deduct</i>	-1.17	
<i>For >50 To 100, Deduct</i>	-7.81	
<i>For >100 To 250, Deduct</i>	-15.63	
<i>For >250 To 500, Deduct</i>	-24.61	
<i>For >500, Deduct</i>	-33.59	
<i>For Hot Dipped Galvanized, Add</i>	98.66	
06 05 23 00-0086 EA 5-1/8" Beam, 6" Post, 3 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC5 1/4-6).....	244.74	
<i>For >10 To 50, Deduct</i>	-1.27	
<i>For >50 To 100, Deduct</i>	-8.03	
<i>For >100 To 250, Deduct</i>	-16.06	
<i>For >250 To 500, Deduct</i>	-25.37	
<i>For >500, Deduct</i>	-34.67	
<i>For Hot Dipped Galvanized, Add</i>	98.66	
06 05 23 00-0087 EA 5-1/8" Beam, 8" Post, 3 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC5 1/4-8).....	244.74	
<i>For >10 To 50, Deduct</i>	-1.27	
<i>For >50 To 100, Deduct</i>	-8.03	
<i>For >100 To 250, Deduct</i>	-16.06	
<i>For >250 To 500, Deduct</i>	-25.37	
<i>For >500, Deduct</i>	-34.67	
<i>For Hot Dipped Galvanized, Add</i>	98.66	
06 05 23 00-0088 EA 8" Beam, 4" Post, 3 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC84).....	296.36	
<i>For >10 To 50, Deduct</i>	-1.17	
<i>For >50 To 100, Deduct</i>	-9.16	
<i>For >100 To 250, Deduct</i>	-18.32	
<i>For >250 To 500, Deduct</i>	-28.64	
<i>For >500, Deduct</i>	-38.96	
<i>For Hot Dipped Galvanized, Add</i>	122.87	
06 05 23 00-0089 EA 8" Beam, 6" Post, 3 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC86).....	298.53	
<i>For >10 To 50, Deduct</i>	-1.27	
<i>For >50 To 100, Deduct</i>	-9.38	
<i>For >100 To 250, Deduct</i>	-18.75	
<i>For >250 To 500, Deduct</i>	-29.40	
<i>For >500, Deduct</i>	-40.05	
<i>For Hot Dipped Galvanized, Add</i>	122.87	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0090	EA 8" Beam, 8" Post, 3 Gauge, Gray Paint End Column Cap With Bolts (Simpson Strong Tie® ECC88)	298.53	
	<i>For >10 To 50, Deduct</i>	-1.27	
	<i>For >50 To 100, Deduct</i>	-9.38	
	<i>For >100 To 250, Deduct</i>	-18.75	
	<i>For >250 To 500, Deduct</i>	-29.40	
	<i>For >500, Deduct</i>	-40.05	
	<i>For Hot Dipped Galvanized, Add</i>	122.87	
06 05 23 00-0091	Rafter Connectors <small>(06 05 23)</small>		
06 05 23 00-0092	EA Galvanized Rigid Rafter Connector, For 2" x 6" (Simpson Strong Tie® RR)	9.64	3.36
	<i>For >10 To 50, Deduct</i>	-0.37	
	<i>For >50 To 100, Deduct</i>	-0.80	
	<i>For >100 To 250, Deduct</i>	-1.60	
	<i>For >250 To 500, Deduct</i>	-2.78	
	<i>For >500, Deduct</i>	-3.96	
06 05 23 00-0093	Bolts And Fasteners <small>(06 05 23)</small>		
06 05 23 00-0094	Carriage Bolts <small>(06 05 23 00-0093)</small>		
	Note: Includes drilling of holes in any material. Includes nut and washer.		
06 05 23 00-0095	Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolts <small>(06 05 23 00-0094)</small>		
06 05 23 00-0096	EA 1/4" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	14.54	
	<i>For >10 To 50, Deduct</i>	-0.71	
	<i>For >50 To 100, Deduct</i>	-1.42	
	<i>For >100 To 250, Deduct</i>	-2.84	
	<i>For >250 To 500, Deduct</i>	-4.97	
	<i>For >500, Deduct</i>	-7.09	
06 05 23 00-0097	EA 1/4" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	14.74	
	<i>For >10 To 50, Deduct</i>	-0.71	
	<i>For >50 To 100, Deduct</i>	-1.43	
	<i>For >100 To 250, Deduct</i>	-2.85	
	<i>For >250 To 500, Deduct</i>	-4.98	
	<i>For >500, Deduct</i>	-7.11	
06 05 23 00-0098	EA 1/4" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	14.86	
	<i>For >10 To 50, Deduct</i>	-0.71	
	<i>For >50 To 100, Deduct</i>	-1.43	
	<i>For >100 To 250, Deduct</i>	-2.86	
	<i>For >250 To 500, Deduct</i>	-4.99	
	<i>For >500, Deduct</i>	-7.13	
06 05 23 00-0099	EA 1/4" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	17.38	
	<i>For >10 To 50, Deduct</i>	-0.81	
	<i>For >50 To 100, Deduct</i>	-1.65	
	<i>For >100 To 250, Deduct</i>	-3.31	
	<i>For >250 To 500, Deduct</i>	-5.78	
	<i>For >500, Deduct</i>	-8.25	
06 05 23 00-0100	EA 3/8" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	16.14	
	<i>For >10 To 50, Deduct</i>	-0.76	
	<i>For >50 To 100, Deduct</i>	-1.54	
	<i>For >100 To 250, Deduct</i>	-3.08	
	<i>For >250 To 500, Deduct</i>	-5.39	
	<i>For >500, Deduct</i>	-7.69	
06 05 23 00-0101	EA 3/8" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	17.55	
	<i>For >10 To 50, Deduct</i>	-0.81	
	<i>For >50 To 100, Deduct</i>	-1.66	
	<i>For >100 To 250, Deduct</i>	-3.32	
	<i>For >250 To 500, Deduct</i>	-5.79	
	<i>For >500, Deduct</i>	-8.26	
06 05 23 00-0102	EA 3/8" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	17.86	
	<i>For >10 To 50, Deduct</i>	-0.81	
	<i>For >50 To 100, Deduct</i>	-1.67	
	<i>For >100 To 250, Deduct</i>	-3.33	
	<i>For >250 To 500, Deduct</i>	-5.81	
	<i>For >500, Deduct</i>	-8.29	
06 05 23 00-0103	EA 3/8" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	21.34	
	<i>For >10 To 50, Deduct</i>	-0.98	
	<i>For >50 To 100, Deduct</i>	-2.00	
	<i>For >100 To 250, Deduct</i>	-4.00	
	<i>For >250 To 500, Deduct</i>	-6.97	
	<i>For >500, Deduct</i>	-9.94	
06 05 23 00-0104	EA 3/8" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	23.36	
	<i>For >10 To 50, Deduct</i>	-1.03	
	<i>For >50 To 100, Deduct</i>	-2.13	
	<i>For >100 To 250, Deduct</i>	-4.26	
	<i>For >250 To 500, Deduct</i>	-7.42	
	<i>For >500, Deduct</i>	-10.58	
06 05 23 00-0105	EA 3/8" Diameter x 12" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	26.46	
	<i>For >10 To 50, Deduct</i>	-1.14	
	<i>For >50 To 100, Deduct</i>	-2.37	
	<i>For >100 To 250, Deduct</i>	-4.74	
	<i>For >250 To 500, Deduct</i>	-8.25	
	<i>For >500, Deduct</i>	-11.75	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0106 EA 1/2" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	18.21	
<i>For >10 To 50, Deduct</i>	-0.81	
<i>For >50 To 100, Deduct</i>	-1.68	
<i>For >100 To 250, Deduct</i>	-3.35	
<i>For >250 To 500, Deduct</i>	-5.84	
<i>For >500, Deduct</i>	-8.33	
06 05 23 00-0107 EA 1/2" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	20.11	
<i>For >10 To 50, Deduct</i>	-0.87	
<i>For >50 To 100, Deduct</i>	-1.80	
<i>For >100 To 250, Deduct</i>	-3.61	
<i>For >250 To 500, Deduct</i>	-6.28	
<i>For >500, Deduct</i>	-8.96	
06 05 23 00-0108 EA 1/2" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	21.44	
<i>For >10 To 50, Deduct</i>	-0.92	
<i>For >50 To 100, Deduct</i>	-1.92	
<i>For >100 To 250, Deduct</i>	-3.84	
<i>For >250 To 500, Deduct</i>	-6.68	
<i>For >500, Deduct</i>	-9.52	
06 05 23 00-0109 EA 1/2" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	24.06	
<i>For >10 To 50, Deduct</i>	-1.03	
<i>For >50 To 100, Deduct</i>	-2.15	
<i>For >100 To 250, Deduct</i>	-4.29	
<i>For >250 To 500, Deduct</i>	-7.47	
<i>For >500, Deduct</i>	-10.65	
06 05 23 00-0110 EA 1/2" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	28.40	
<i>For >10 To 50, Deduct</i>	-1.19	
<i>For >50 To 100, Deduct</i>	-2.50	
<i>For >100 To 250, Deduct</i>	-5.00	
<i>For >250 To 500, Deduct</i>	-8.69	
<i>For >500, Deduct</i>	-12.38	
06 05 23 00-0111 EA 1/2" Diameter x 12" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	32.03	
<i>For >10 To 50, Deduct</i>	-1.30	
<i>For >50 To 100, Deduct</i>	-2.75	
<i>For >100 To 250, Deduct</i>	-5.51	
<i>For >250 To 500, Deduct</i>	-9.56	
<i>For >500, Deduct</i>	-13.62	
06 05 23 00-0112 EA 3/4" Diameter x 2" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	25.71	
<i>For >10 To 50, Deduct</i>	-0.98	
<i>For >50 To 100, Deduct</i>	-2.11	
<i>For >100 To 250, Deduct</i>	-4.21	
<i>For >250 To 500, Deduct</i>	-7.30	
<i>For >500, Deduct</i>	-10.38	
06 05 23 00-0113 EA 3/4" Diameter x 4" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	28.05	
<i>For >10 To 50, Deduct</i>	-1.03	
<i>For >50 To 100, Deduct</i>	-2.25	
<i>For >100 To 250, Deduct</i>	-4.49	
<i>For >250 To 500, Deduct</i>	-7.77	
<i>For >500, Deduct</i>	-11.05	
06 05 23 00-0114 EA 3/4" Diameter x 6" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	33.87	
<i>For >10 To 50, Deduct</i>	-1.19	
<i>For >50 To 100, Deduct</i>	-2.64	
<i>For >100 To 250, Deduct</i>	-5.27	
<i>For >250 To 500, Deduct</i>	-9.10	
<i>For >500, Deduct</i>	-12.93	
06 05 23 00-0115 EA 3/4" Diameter x 8" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	38.65	
<i>For >10 To 50, Deduct</i>	-1.25	
<i>For >50 To 100, Deduct</i>	-2.84	
<i>For >100 To 250, Deduct</i>	-5.68	
<i>For >250 To 500, Deduct</i>	-9.76	
<i>For >500, Deduct</i>	-13.85	
06 05 23 00-0116 EA 3/4" Diameter x 10" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	41.95	
<i>For >10 To 50, Deduct</i>	-1.36	
<i>For >50 To 100, Deduct</i>	-3.08	
<i>For >100 To 250, Deduct</i>	-6.16	
<i>For >250 To 500, Deduct</i>	-10.60	
<i>For >500, Deduct</i>	-15.04	
06 05 23 00-0117 EA 3/4" Diameter x 12" Length, Zinc Plated Steel, Low Carbon/Grade 2, Carriage Bolt	42.62	
<i>For >10 To 50, Deduct</i>	-1.41	
<i>For >50 To 100, Deduct</i>	-3.18	
<i>For >100 To 250, Deduct</i>	-6.36	
<i>For >250 To 500, Deduct</i>	-10.95	
<i>For >500, Deduct</i>	-15.54	
06 05 23 00-0118 Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolts <small>(06 05 23 00-0094)</small>		
06 05 23 00-0119 EA 1/4" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	14.89	
<i>For >10 To 50, Deduct</i>	-0.71	
<i>For >50 To 100, Deduct</i>	-1.43	
<i>For >100 To 250, Deduct</i>	-2.86	
<i>For >250 To 500, Deduct</i>	-4.99	
<i>For >500, Deduct</i>	-7.13	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0120	EA 1/4" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	15.25
	<i>For >10 To 50, Deduct</i>	-0.71
	<i>For >50 To 100, Deduct</i>	-1.44
	<i>For >100 To 250, Deduct</i>	-2.88
	<i>For >250 To 500, Deduct</i>	-5.02
	<i>For >500, Deduct</i>	-7.17
06 05 23 00-0121	EA 1/4" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	15.66
	<i>For >10 To 50, Deduct</i>	-0.71
	<i>For >50 To 100, Deduct</i>	-1.45
	<i>For >100 To 250, Deduct</i>	-2.90
	<i>For >250 To 500, Deduct</i>	-5.05
	<i>For >500, Deduct</i>	-7.21
06 05 23 00-0122	EA 1/4" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	18.73
	<i>For >10 To 50, Deduct</i>	-0.81
	<i>For >50 To 100, Deduct</i>	-1.69
	<i>For >100 To 250, Deduct</i>	-3.38
	<i>For >250 To 500, Deduct</i>	-5.88
	<i>For >500, Deduct</i>	-8.38
06 05 23 00-0123	EA 3/8" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	16.63
	<i>For >10 To 50, Deduct</i>	-0.76
	<i>For >50 To 100, Deduct</i>	-1.55
	<i>For >100 To 250, Deduct</i>	-3.11
	<i>For >250 To 500, Deduct</i>	-5.42
	<i>For >500, Deduct</i>	-7.74
06 05 23 00-0124	EA 3/8" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	18.31
	<i>For >10 To 50, Deduct</i>	-0.81
	<i>For >50 To 100, Deduct</i>	-1.68
	<i>For >100 To 250, Deduct</i>	-3.36
	<i>For >250 To 500, Deduct</i>	-5.85
	<i>For >500, Deduct</i>	-8.34
06 05 23 00-0125	EA 3/8" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	18.76
	<i>For >10 To 50, Deduct</i>	-0.81
	<i>For >50 To 100, Deduct</i>	-1.69
	<i>For >100 To 250, Deduct</i>	-3.38
	<i>For >250 To 500, Deduct</i>	-5.88
	<i>For >500, Deduct</i>	-8.38
06 05 23 00-0126	EA 3/8" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	22.70
	<i>For >10 To 50, Deduct</i>	-0.98
	<i>For >50 To 100, Deduct</i>	-2.03
	<i>For >100 To 250, Deduct</i>	-4.06
	<i>For >250 To 500, Deduct</i>	-7.07
	<i>For >500, Deduct</i>	-10.08
06 05 23 00-0127	EA 3/8" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	24.89
	<i>For >10 To 50, Deduct</i>	-1.03
	<i>For >50 To 100, Deduct</i>	-2.17
	<i>For >100 To 250, Deduct</i>	-4.34
	<i>For >250 To 500, Deduct</i>	-7.53
	<i>For >500, Deduct</i>	-10.73
06 05 23 00-0128	EA 3/8" Diameter x 12" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	27.87
	<i>For >10 To 50, Deduct</i>	-1.14
	<i>For >50 To 100, Deduct</i>	-2.40
	<i>For >100 To 250, Deduct</i>	-4.81
	<i>For >250 To 500, Deduct</i>	-8.35
	<i>For >500, Deduct</i>	-11.90
06 05 23 00-0129	EA 1/2" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	19.35
	<i>For >10 To 50, Deduct</i>	-0.81
	<i>For >50 To 100, Deduct</i>	-1.70
	<i>For >100 To 250, Deduct</i>	-3.41
	<i>For >250 To 500, Deduct</i>	-5.93
	<i>For >500, Deduct</i>	-8.44
06 05 23 00-0130	EA 1/2" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	21.01
	<i>For >10 To 50, Deduct</i>	-0.87
	<i>For >50 To 100, Deduct</i>	-1.83
	<i>For >100 To 250, Deduct</i>	-3.65
	<i>For >250 To 500, Deduct</i>	-6.35
	<i>For >500, Deduct</i>	-9.05
06 05 23 00-0131	EA 1/2" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	22.51
	<i>For >10 To 50, Deduct</i>	-0.92
	<i>For >50 To 100, Deduct</i>	-1.95
	<i>For >100 To 250, Deduct</i>	-3.89
	<i>For >250 To 500, Deduct</i>	-6.76
	<i>For >500, Deduct</i>	-9.62
06 05 23 00-0132	EA 1/2" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	25.60
	<i>For >10 To 50, Deduct</i>	-1.03
	<i>For >50 To 100, Deduct</i>	-2.19
	<i>For >100 To 250, Deduct</i>	-4.37
	<i>For >250 To 500, Deduct</i>	-7.59
	<i>For >500, Deduct</i>	-10.80
06 05 23 00-0133	EA 1/2" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	29.90
	<i>For >10 To 50, Deduct</i>	-1.19
	<i>For >50 To 100, Deduct</i>	-2.54
	<i>For >100 To 250, Deduct</i>	-5.07
	<i>For >250 To 500, Deduct</i>	-8.80
	<i>For >500, Deduct</i>	-12.53



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0134 EA 1/2" Diameter x 12" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	33.19	
<i>For >10 To 50, Deduct</i>	-1.30	
<i>For >50 To 100, Deduct</i>	-2.78	
<i>For >100 To 250, Deduct</i>	-5.56	
<i>For >250 To 500, Deduct</i>	-9.65	
<i>For >500, Deduct</i>	-13.73	
06 05 23 00-0135 EA 3/4" Diameter x 2" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	29.13	
<i>For >10 To 50, Deduct</i>	-0.98	
<i>For >50 To 100, Deduct</i>	-2.19	
<i>For >100 To 250, Deduct</i>	-4.38	
<i>For >250 To 500, Deduct</i>	-7.55	
<i>For >500, Deduct</i>	-10.72	
06 05 23 00-0136 EA 3/4" Diameter x 4" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	30.44	
<i>For >10 To 50, Deduct</i>	-1.03	
<i>For >50 To 100, Deduct</i>	-2.31	
<i>For >100 To 250, Deduct</i>	-4.61	
<i>For >250 To 500, Deduct</i>	-7.95	
<i>For >500, Deduct</i>	-11.29	
06 05 23 00-0137 EA 3/4" Diameter x 6" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	35.56	
<i>For >10 To 50, Deduct</i>	-1.19	
<i>For >50 To 100, Deduct</i>	-2.68	
<i>For >100 To 250, Deduct</i>	-5.36	
<i>For >250 To 500, Deduct</i>	-9.23	
<i>For >500, Deduct</i>	-13.10	
06 05 23 00-0138 EA 3/4" Diameter x 8" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	38.52	
<i>For >10 To 50, Deduct</i>	-1.25	
<i>For >50 To 100, Deduct</i>	-2.83	
<i>For >100 To 250, Deduct</i>	-5.67	
<i>For >250 To 500, Deduct</i>	-9.75	
<i>For >500, Deduct</i>	-13.83	
06 05 23 00-0139 EA 3/4" Diameter x 10" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	44.16	
<i>For >10 To 50, Deduct</i>	-1.36	
<i>For >50 To 100, Deduct</i>	-3.14	
<i>For >100 To 250, Deduct</i>	-6.27	
<i>For >250 To 500, Deduct</i>	-10.77	
<i>For >500, Deduct</i>	-15.26	
06 05 23 00-0140 EA 3/4" Diameter x 12" Length, Hot Dipped Galvanized Steel, Low Carbon/Grade 2, Carriage Bolt	47.22	
<i>For >10 To 50, Deduct</i>	-1.41	
<i>For >50 To 100, Deduct</i>	-3.30	
<i>For >100 To 250, Deduct</i>	-6.59	
<i>For >250 To 500, Deduct</i>	-11.30	
<i>For >500, Deduct</i>	-16.00	
06 05 23 00-0141 304/18-8 Stainless Steel, Carriage Bolts <small>(06 05 23 00-0094)</small>		
06 05 23 00-0142 EA 1/4" Diameter x 2" Length, 304/18-8 Stainless Steel, Carriage Bolt	16.03	
<i>For >10 To 50, Deduct</i>	-0.71	
<i>For >50 To 100, Deduct</i>	-1.46	
<i>For >100 To 250, Deduct</i>	-2.92	
<i>For >250 To 500, Deduct</i>	-5.08	
<i>For >500, Deduct</i>	-7.24	
06 05 23 00-0143 EA 1/4" Diameter x 4" Length, 304/18-8 Stainless Steel, Carriage Bolt	18.15	
<i>For >10 To 50, Deduct</i>	-0.71	
<i>For >50 To 100, Deduct</i>	-1.51	
<i>For >100 To 250, Deduct</i>	-3.02	
<i>For >250 To 500, Deduct</i>	-5.24	
<i>For >500, Deduct</i>	-7.46	
06 05 23 00-0144 EA 1/4" Diameter x 6" Length, 304/18-8 Stainless Steel, Carriage Bolt	19.53	
<i>For >10 To 50, Deduct</i>	-0.71	
<i>For >50 To 100, Deduct</i>	-1.55	
<i>For >100 To 250, Deduct</i>	-3.09	
<i>For >250 To 500, Deduct</i>	-5.34	
<i>For >500, Deduct</i>	-7.59	
06 05 23 00-0145 EA 1/4" Diameter x 8" Length, 304/18-8 Stainless Steel, Carriage Bolt	36.61	
<i>For >10 To 50, Deduct</i>	-0.81	
<i>For >50 To 100, Deduct</i>	-2.14	
<i>For >100 To 250, Deduct</i>	-4.27	
<i>For >250 To 500, Deduct</i>	-7.22	
<i>For >500, Deduct</i>	-10.17	
06 05 23 00-0146 EA 3/8" Diameter x 2" Length, 304/18-8 Stainless Steel, Carriage Bolt	19.07	
<i>For >10 To 50, Deduct</i>	-0.76	
<i>For >50 To 100, Deduct</i>	-1.62	
<i>For >100 To 250, Deduct</i>	-3.23	
<i>For >250 To 500, Deduct</i>	-5.60	
<i>For >500, Deduct</i>	-7.98	
06 05 23 00-0147 EA 3/8" Diameter x 4" Length, 304/18-8 Stainless Steel, Carriage Bolt	23.23	
<i>For >10 To 50, Deduct</i>	-0.81	
<i>For >50 To 100, Deduct</i>	-1.80	
<i>For >100 To 250, Deduct</i>	-3.60	
<i>For >250 To 500, Deduct</i>	-6.22	
<i>For >500, Deduct</i>	-8.83	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0148	EA	3/8" Diameter x 6" Length, 304/18-8 Stainless Steel, Carriage Bolt	23.89
		<i>For >10 To 50, Deduct</i>	-0.81
		<i>For >50 To 100, Deduct</i>	-1.82
		<i>For >100 To 250, Deduct</i>	-3.64
		<i>For >250 To 500, Deduct</i>	-6.27
		<i>For >500, Deduct</i>	-8.90
06 05 23 00-0149	EA	3/8" Diameter x 8" Length, 304/18-8 Stainless Steel, Carriage Bolt	49.22
		<i>For >10 To 50, Deduct</i>	-0.98
		<i>For >50 To 100, Deduct</i>	-2.69
		<i>For >100 To 250, Deduct</i>	-5.39
		<i>For >250 To 500, Deduct</i>	-9.06
		<i>For >500, Deduct</i>	-12.73
06 05 23 00-0150	EA	3/8" Diameter x 10" Length, 304/18-8 Stainless Steel, Carriage Bolt	61.32
		<i>For >10 To 50, Deduct</i>	-1.03
		<i>For >50 To 100, Deduct</i>	-3.08
		<i>For >100 To 250, Deduct</i>	-6.16
		<i>For >250 To 500, Deduct</i>	-10.27
		<i>For >500, Deduct</i>	-14.38
06 05 23 00-0151	EA	3/8" Diameter x 12" Length, 304/18-8 Stainless Steel, Carriage Bolt	68.84
		<i>For >10 To 50, Deduct</i>	-1.14
		<i>For >50 To 100, Deduct</i>	-3.43
		<i>For >100 To 250, Deduct</i>	-6.86
		<i>For >250 To 500, Deduct</i>	-11.42
		<i>For >500, Deduct</i>	-15.99
06 05 23 00-0152	EA	1/2" Diameter x 2" Length, 304/18-8 Stainless Steel, Carriage Bolt	25.70
		<i>For >10 To 50, Deduct</i>	-0.81
		<i>For >50 To 100, Deduct</i>	-1.86
		<i>For >100 To 250, Deduct</i>	-3.73
		<i>For >250 To 500, Deduct</i>	-6.40
		<i>For >500, Deduct</i>	-9.08
06 05 23 00-0153	EA	1/2" Diameter x 4" Length, 304/18-8 Stainless Steel, Carriage Bolt	29.74
		<i>For >10 To 50, Deduct</i>	-0.87
		<i>For >50 To 100, Deduct</i>	-2.05
		<i>For >100 To 250, Deduct</i>	-4.09
		<i>For >250 To 500, Deduct</i>	-7.00
		<i>For >500, Deduct</i>	-9.92
06 05 23 00-0154	EA	1/2" Diameter x 6" Length, 304/18-8 Stainless Steel, Carriage Bolt	37.24
		<i>For >10 To 50, Deduct</i>	-0.92
		<i>For >50 To 100, Deduct</i>	-2.31
		<i>For >100 To 250, Deduct</i>	-4.63
		<i>For >250 To 500, Deduct</i>	-7.86
		<i>For >500, Deduct</i>	-11.10
06 05 23 00-0155	EA	1/2" Diameter x 8" Length, 304/18-8 Stainless Steel, Carriage Bolt	63.27
		<i>For >10 To 50, Deduct</i>	-1.03
		<i>For >50 To 100, Deduct</i>	-3.13
		<i>For >100 To 250, Deduct</i>	-6.26
		<i>For >250 To 500, Deduct</i>	-10.41
		<i>For >500, Deduct</i>	-14.57
06 05 23 00-0156	EA	1/2" Diameter x 10" Length, 304/18-8 Stainless Steel, Carriage Bolt	71.19
		<i>For >10 To 50, Deduct</i>	-1.19
		<i>For >50 To 100, Deduct</i>	-3.57
		<i>For >100 To 250, Deduct</i>	-7.14
		<i>For >250 To 500, Deduct</i>	-11.90
		<i>For >500, Deduct</i>	-16.66
06 05 23 00-0157	EA	1/2" Diameter x 12" Length, 304/18-8 Stainless Steel, Carriage Bolt	117.09
		<i>For >10 To 50, Deduct</i>	-1.30
		<i>For >50 To 100, Deduct</i>	-4.88
		<i>For >100 To 250, Deduct</i>	-9.76
		<i>For >250 To 500, Deduct</i>	-15.94
		<i>For >500, Deduct</i>	-22.12
06 05 23 00-0158	EA	3/4" Diameter x 4" Length, 304/18-8 Stainless Steel, Carriage Bolt	90.75
		<i>For >10 To 50, Deduct</i>	-1.03
		<i>For >50 To 100, Deduct</i>	-3.81
		<i>For >100 To 250, Deduct</i>	-7.63
		<i>For >250 To 500, Deduct</i>	-12.47
		<i>For >500, Deduct</i>	-17.32
06 05 23 00-0159	EA	3/4" Diameter x 6" Length, 304/18-8 Stainless Steel, Carriage Bolt	130.98
		<i>For >10 To 50, Deduct</i>	-1.19
		<i>For >50 To 100, Deduct</i>	-5.06
		<i>For >100 To 250, Deduct</i>	-10.13
		<i>For >250 To 500, Deduct</i>	-16.39
		<i>For >500, Deduct</i>	-22.64
06 05 23 00-0160	EA	3/4" Diameter x 8" Length, 304/18-8 Stainless Steel, Carriage Bolt	145.84
		<i>For >10 To 50, Deduct</i>	-1.25
		<i>For >50 To 100, Deduct</i>	-5.52
		<i>For >100 To 250, Deduct</i>	-11.03
		<i>For >250 To 500, Deduct</i>	-17.80
		<i>For >500, Deduct</i>	-24.56
06 05 23 00-0161	EA	3/4" Diameter x 10" Length, 304/18-8 Stainless Steel, Carriage Bolt	219.78
		<i>For >10 To 50, Deduct</i>	-1.36
		<i>For >50 To 100, Deduct</i>	-7.53
		<i>For >100 To 250, Deduct</i>	-15.06
		<i>For >250 To 500, Deduct</i>	-23.94
		<i>For >500, Deduct</i>	-32.82



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0162 EA 3/4" Diameter x 12" Length, 304/18-8 Stainless Steel, Carriage Bolt	231.34	
<i>For >10 To 50, Deduct</i>	-1.41	
<i>For >50 To 100, Deduct</i>	-7.90	
<i>For >100 To 250, Deduct</i>	-15.80	
<i>For >250 To 500, Deduct</i>	-25.11	
<i>For >500, Deduct</i>	-34.41	
06 05 23 00-0163 316 Stainless Steel, Carriage Bolts <small>(06 05 23 00-0094)</small>		
06 05 23 00-0164 EA 1/4" Diameter x 2" Length, 316 Stainless Steel, Carriage Bolt.....	25.81	
<i>For >10 To 50, Deduct</i>	-0.71	
<i>For >50 To 100, Deduct</i>	-1.70	
<i>For >100 To 250, Deduct</i>	-3.41	
<i>For >250 To 500, Deduct</i>	-5.81	
<i>For >500, Deduct</i>	-8.22	
06 05 23 00-0165 EA 1/4" Diameter x 4" Length, 316 Stainless Steel, Carriage Bolt.....	29.52	
<i>For >10 To 50, Deduct</i>	-0.71	
<i>For >50 To 100, Deduct</i>	-1.80	
<i>For >100 To 250, Deduct</i>	-3.59	
<i>For >250 To 500, Deduct</i>	-6.09	
<i>For >500, Deduct</i>	-8.59	
06 05 23 00-0166 EA 3/8" Diameter x 2" Length, 316 Stainless Steel, Carriage Bolt.....	31.86	
<i>For >10 To 50, Deduct</i>	-0.76	
<i>For >50 To 100, Deduct</i>	-1.94	
<i>For >100 To 250, Deduct</i>	-3.87	
<i>For >250 To 500, Deduct</i>	-6.56	
<i>For >500, Deduct</i>	-9.26	
06 05 23 00-0167 EA 3/8" Diameter x 4" Length, 316 Stainless Steel, Carriage Bolt.....	38.11	
<i>For >10 To 50, Deduct</i>	-0.81	
<i>For >50 To 100, Deduct</i>	-2.17	
<i>For >100 To 250, Deduct</i>	-4.35	
<i>For >250 To 500, Deduct</i>	-7.33	
<i>For >500, Deduct</i>	-10.32	
06 05 23 00-0168 EA 1/2" Diameter x 2" Length, 316 Stainless Steel, Carriage Bolt.....	54.63	
<i>For >10 To 50, Deduct</i>	-0.81	
<i>For >50 To 100, Deduct</i>	-2.59	
<i>For >100 To 250, Deduct</i>	-5.17	
<i>For >250 To 500, Deduct</i>	-8.57	
<i>For >500, Deduct</i>	-11.97	
06 05 23 00-0169 EA 1/2" Diameter x 4" Length, 316 Stainless Steel, Carriage Bolt.....	59.73	
<i>For >10 To 50, Deduct</i>	-0.87	
<i>For >50 To 100, Deduct</i>	-2.80	
<i>For >100 To 250, Deduct</i>	-5.59	
<i>For >250 To 500, Deduct</i>	-9.25	
<i>For >500, Deduct</i>	-12.92	
06 05 23 00-0170 EA 1/2" Diameter x 6" Length, 316 Stainless Steel, Carriage Bolt.....	64.49	
<i>For >10 To 50, Deduct</i>	-0.92	
<i>For >50 To 100, Deduct</i>	-2.99	
<i>For >100 To 250, Deduct</i>	-5.99	
<i>For >250 To 500, Deduct</i>	-9.91	
<i>For >500, Deduct</i>	-13.82	
06 05 23 00-0171 Hex Lag Bolts <small>(06 05 23 00-0093)</small>		
Note: Includes drilling of holes in any material.		
06 05 23 00-0172 Zinc Plated Steel, Hex Lag Bolts <small>(06 05 23 00-0171)</small>		
06 05 23 00-0173 EA 1/4" Diameter x 2" Length, Zinc Plated Steel, Hex Lag Bolt	13.83	
<i>For >10 To 50, Deduct</i>	-0.68	
<i>For >50 To 100, Deduct</i>	-1.36	
<i>For >100 To 250, Deduct</i>	-2.73	
<i>For >250 To 500, Deduct</i>	-4.77	
<i>For >500, Deduct</i>	-6.81	
06 05 23 00-0174 EA 1/4" Diameter x 4" Length, Zinc Plated Steel, Hex Lag Bolt	14.00	
<i>For >10 To 50, Deduct</i>	-0.68	
<i>For >50 To 100, Deduct</i>	-1.37	
<i>For >100 To 250, Deduct</i>	-2.73	
<i>For >250 To 500, Deduct</i>	-4.78	
<i>For >500, Deduct</i>	-6.82	
06 05 23 00-0175 EA 1/4" Diameter x 6" Length, Zinc Plated Steel, Hex Lag Bolt	14.34	
<i>For >10 To 50, Deduct</i>	-0.68	
<i>For >50 To 100, Deduct</i>	-1.38	
<i>For >100 To 250, Deduct</i>	-2.75	
<i>For >250 To 500, Deduct</i>	-4.80	
<i>For >500, Deduct</i>	-6.86	
06 05 23 00-0176 EA 3/8" Diameter x 2" Length, Zinc Plated Steel, Hex Lag Bolt	15.29	
<i>For >10 To 50, Deduct</i>	-0.74	
<i>For >50 To 100, Deduct</i>	-1.49	
<i>For >100 To 250, Deduct</i>	-2.98	
<i>For >250 To 500, Deduct</i>	-5.21	
<i>For >500, Deduct</i>	-7.44	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0177	EA	3/8" Diameter x 4" Length, Zinc Plated Steel, Hex Lag Bolt.....	16.67
		<i>For >10 To 50, Deduct</i>	-0.79
		<i>For >50 To 100, Deduct</i>	-1.60
		<i>For >100 To 250, Deduct</i>	-3.21
		<i>For >250 To 500, Deduct</i>	-5.60
		<i>For >500, Deduct</i>	-8.00
06 05 23 00-0178	EA	3/8" Diameter x 6" Length, Zinc Plated Steel, Hex Lag Bolt.....	17.05
		<i>For >10 To 50, Deduct</i>	-0.79
		<i>For >50 To 100, Deduct</i>	-1.61
		<i>For >100 To 250, Deduct</i>	-3.23
		<i>For >250 To 500, Deduct</i>	-5.63
		<i>For >500, Deduct</i>	-8.04
06 05 23 00-0179	EA	3/8" Diameter x 8" Length, Zinc Plated Steel, Hex Lag Bolt.....	20.99
		<i>For >10 To 50, Deduct</i>	-0.95
		<i>For >50 To 100, Deduct</i>	-1.95
		<i>For >100 To 250, Deduct</i>	-3.90
		<i>For >250 To 500, Deduct</i>	-6.80
		<i>For >500, Deduct</i>	-9.70
06 05 23 00-0180	EA	3/8" Diameter x 10" Length, Zinc Plated Steel, Hex Lag Bolt.....	22.26
		<i>For >10 To 50, Deduct</i>	-1.00
		<i>For >50 To 100, Deduct</i>	-2.06
		<i>For >100 To 250, Deduct</i>	-4.12
		<i>For >250 To 500, Deduct</i>	-7.18
		<i>For >500, Deduct</i>	-10.25
06 05 23 00-0181	EA	1/2" Diameter x 2" Length, Zinc Plated Steel, Hex Lag Bolt.....	17.04
		<i>For >10 To 50, Deduct</i>	-0.80
		<i>For >50 To 100, Deduct</i>	-1.62
		<i>For >100 To 250, Deduct</i>	-3.24
		<i>For >250 To 500, Deduct</i>	-5.66
		<i>For >500, Deduct</i>	-8.08
06 05 23 00-0182	EA	1/2" Diameter x 4" Length, Zinc Plated Steel, Hex Lag Bolt.....	18.64
		<i>For >10 To 50, Deduct</i>	-0.85
		<i>For >50 To 100, Deduct</i>	-1.74
		<i>For >100 To 250, Deduct</i>	-3.48
		<i>For >250 To 500, Deduct</i>	-6.08
		<i>For >500, Deduct</i>	-8.67
06 05 23 00-0183	EA	1/2" Diameter x 6" Length, Zinc Plated Steel, Hex Lag Bolt.....	20.41
		<i>For >10 To 50, Deduct</i>	-0.90
		<i>For >50 To 100, Deduct</i>	-1.87
		<i>For >100 To 250, Deduct</i>	-3.73
		<i>For >250 To 500, Deduct</i>	-6.50
		<i>For >500, Deduct</i>	-9.27
06 05 23 00-0184	EA	1/2" Diameter x 8" Length, Zinc Plated Steel, Hex Lag Bolt.....	23.34
		<i>For >10 To 50, Deduct</i>	-1.01
		<i>For >50 To 100, Deduct</i>	-2.10
		<i>For >100 To 250, Deduct</i>	-4.20
		<i>For >250 To 500, Deduct</i>	-7.31
		<i>For >500, Deduct</i>	-10.41
06 05 23 00-0185	EA	1/2" Diameter x 10" Length, Zinc Plated Steel, Hex Lag Bolt.....	27.63
		<i>For >10 To 50, Deduct</i>	-1.17
		<i>For >50 To 100, Deduct</i>	-2.45
		<i>For >100 To 250, Deduct</i>	-4.89
		<i>For >250 To 500, Deduct</i>	-8.51
		<i>For >500, Deduct</i>	-12.12
06 05 23 00-0186	EA	1/2" Diameter x 12" Length, Zinc Plated Steel, Hex Lag Bolt.....	30.15
		<i>For >10 To 50, Deduct</i>	-1.28
		<i>For >50 To 100, Deduct</i>	-2.67
		<i>For >100 To 250, Deduct</i>	-5.34
		<i>For >250 To 500, Deduct</i>	-9.28
		<i>For >500, Deduct</i>	-13.22
06 05 23 00-0187	EA	3/4" Diameter x 4" Length, Zinc Plated Steel, Hex Lag Bolt.....	25.63
		<i>For >10 To 50, Deduct</i>	-1.01
		<i>For >50 To 100, Deduct</i>	-2.16
		<i>For >100 To 250, Deduct</i>	-4.31
		<i>For >250 To 500, Deduct</i>	-7.48
		<i>For >500, Deduct</i>	-10.64
06 05 23 00-0188	EA	3/4" Diameter x 6" Length, Zinc Plated Steel, Hex Lag Bolt.....	30.80
		<i>For >10 To 50, Deduct</i>	-1.17
		<i>For >50 To 100, Deduct</i>	-2.53
		<i>For >100 To 250, Deduct</i>	-5.05
		<i>For >250 To 500, Deduct</i>	-8.75
		<i>For >500, Deduct</i>	-12.44
06 05 23 00-0189	EA	3/4" Diameter x 8" Length, Zinc Plated Steel, Hex Lag Bolt.....	34.46
		<i>For >10 To 50, Deduct</i>	-1.22
		<i>For >50 To 100, Deduct</i>	-2.70
		<i>For >100 To 250, Deduct</i>	-5.39
		<i>For >250 To 500, Deduct</i>	-9.31
		<i>For >500, Deduct</i>	-13.23
06 05 23 00-0190	EA	3/4" Diameter x 10" Length, Zinc Plated Steel, Hex Lag Bolt.....	38.98
		<i>For >10 To 50, Deduct</i>	-1.33
		<i>For >50 To 100, Deduct</i>	-2.97
		<i>For >100 To 250, Deduct</i>	-5.94
		<i>For >250 To 500, Deduct</i>	-10.23
		<i>For >500, Deduct</i>	-14.53



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
06 05 23 00-0191 EA 3/4" Diameter x 12" Length, Zinc Plated Steel, Hex Lag Bolt.....	44.23	
<i>For >10 To 50, Deduct</i>	-1.38	
<i>For >50 To 100, Deduct</i>	-3.18	
<i>For >100 To 250, Deduct</i>	-6.36	
<i>For >250 To 500, Deduct</i>	-10.92	
<i>For >500, Deduct</i>	-15.48	
06 05 23 00-0192 Hot Dipped Galvanized Steel, Hex Lag Bolts <small>(06 05 23 00-0171)</small>		
06 05 23 00-0193 EA 1/4" Diameter x 2" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	13.91	
<i>For >10 To 50, Deduct</i>	-0.68	
<i>For >50 To 100, Deduct</i>	-1.36	
<i>For >100 To 250, Deduct</i>	-2.73	
<i>For >250 To 500, Deduct</i>	-4.77	
<i>For >500, Deduct</i>	-6.82	
06 05 23 00-0194 EA 1/4" Diameter x 4" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	14.17	
<i>For >10 To 50, Deduct</i>	-0.68	
<i>For >50 To 100, Deduct</i>	-1.37	
<i>For >100 To 250, Deduct</i>	-2.74	
<i>For >250 To 500, Deduct</i>	-4.79	
<i>For >500, Deduct</i>	-6.84	
06 05 23 00-0195 EA 1/4" Diameter x 6" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	14.44	
<i>For >10 To 50, Deduct</i>	-0.68	
<i>For >50 To 100, Deduct</i>	-1.38	
<i>For >100 To 250, Deduct</i>	-2.76	
<i>For >250 To 500, Deduct</i>	-4.81	
<i>For >500, Deduct</i>	-6.87	
06 05 23 00-0196 EA 3/8" Diameter x 2" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	15.44	
<i>For >10 To 50, Deduct</i>	-0.74	
<i>For >50 To 100, Deduct</i>	-1.49	
<i>For >100 To 250, Deduct</i>	-2.99	
<i>For >250 To 500, Deduct</i>	-5.22	
<i>For >500, Deduct</i>	-7.46	
06 05 23 00-0197 EA 3/8" Diameter x 4" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	16.90	
<i>For >10 To 50, Deduct</i>	-0.79	
<i>For >50 To 100, Deduct</i>	-1.61	
<i>For >100 To 250, Deduct</i>	-3.22	
<i>For >250 To 500, Deduct</i>	-5.62	
<i>For >500, Deduct</i>	-8.02	
06 05 23 00-0198 EA 3/8" Diameter x 6" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	17.32	
<i>For >10 To 50, Deduct</i>	-0.79	
<i>For >50 To 100, Deduct</i>	-1.62	
<i>For >100 To 250, Deduct</i>	-3.24	
<i>For >250 To 500, Deduct</i>	-5.65	
<i>For >500, Deduct</i>	-8.06	
06 05 23 00-0199 EA 3/8" Diameter x 8" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	21.50	
<i>For >10 To 50, Deduct</i>	-0.95	
<i>For >50 To 100, Deduct</i>	-1.96	
<i>For >100 To 250, Deduct</i>	-3.93	
<i>For >250 To 500, Deduct</i>	-6.84	
<i>For >500, Deduct</i>	-9.75	
06 05 23 00-0200 EA 3/8" Diameter x 10" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	23.12	
<i>For >10 To 50, Deduct</i>	-1.00	
<i>For >50 To 100, Deduct</i>	-2.08	
<i>For >100 To 250, Deduct</i>	-4.16	
<i>For >250 To 500, Deduct</i>	-7.25	
<i>For >500, Deduct</i>	-10.33	
06 05 23 00-0201 EA 1/2" Diameter x 2" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	17.42	
<i>For >10 To 50, Deduct</i>	-0.80	
<i>For >50 To 100, Deduct</i>	-1.63	
<i>For >100 To 250, Deduct</i>	-3.26	
<i>For >250 To 500, Deduct</i>	-5.69	
<i>For >500, Deduct</i>	-8.12	
06 05 23 00-0202 EA 1/2" Diameter x 4" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	18.86	
<i>For >10 To 50, Deduct</i>	-0.85	
<i>For >50 To 100, Deduct</i>	-1.75	
<i>For >100 To 250, Deduct</i>	-3.49	
<i>For >250 To 500, Deduct</i>	-6.09	
<i>For >500, Deduct</i>	-8.69	
06 05 23 00-0203 EA 1/2" Diameter x 6" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	20.79	
<i>For >10 To 50, Deduct</i>	-0.90	
<i>For >50 To 100, Deduct</i>	-1.88	
<i>For >100 To 250, Deduct</i>	-3.75	
<i>For >250 To 500, Deduct</i>	-6.53	
<i>For >500, Deduct</i>	-9.31	
06 05 23 00-0204 EA 1/2" Diameter x 8" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	24.50	
<i>For >10 To 50, Deduct</i>	-1.01	
<i>For >50 To 100, Deduct</i>	-2.13	
<i>For >100 To 250, Deduct</i>	-4.26	
<i>For >250 To 500, Deduct</i>	-7.39	
<i>For >500, Deduct</i>	-10.53	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0205	EA	1/2" Diameter x 10" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	28.19
		<i>For >10 To 50, Deduct</i>	-1.17
		<i>For >50 To 100, Deduct</i>	-2.46
		<i>For >100 To 250, Deduct</i>	-4.92
		<i>For >250 To 500, Deduct</i>	-8.55
		<i>For >500, Deduct</i>	-12.18
06 05 23 00-0206	EA	1/2" Diameter x 12" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	31.53
		<i>For >10 To 50, Deduct</i>	-1.28
		<i>For >50 To 100, Deduct</i>	-2.70
		<i>For >100 To 250, Deduct</i>	-5.40
		<i>For >250 To 500, Deduct</i>	-9.38
		<i>For >500, Deduct</i>	-13.36
06 05 23 00-0207	EA	3/4" Diameter x 4" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	26.49
		<i>For >10 To 50, Deduct</i>	-1.01
		<i>For >50 To 100, Deduct</i>	-2.18
		<i>For >100 To 250, Deduct</i>	-4.35
		<i>For >250 To 500, Deduct</i>	-7.54
		<i>For >500, Deduct</i>	-10.73
06 05 23 00-0208	EA	3/4" Diameter x 6" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	31.58
		<i>For >10 To 50, Deduct</i>	-1.17
		<i>For >50 To 100, Deduct</i>	-2.54
		<i>For >100 To 250, Deduct</i>	-5.09
		<i>For >250 To 500, Deduct</i>	-8.80
		<i>For >500, Deduct</i>	-12.52
06 05 23 00-0209	EA	3/4" Diameter x 8" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	35.76
		<i>For >10 To 50, Deduct</i>	-1.22
		<i>For >50 To 100, Deduct</i>	-2.73
		<i>For >100 To 250, Deduct</i>	-5.46
		<i>For >250 To 500, Deduct</i>	-9.41
		<i>For >500, Deduct</i>	-13.36
06 05 23 00-0210	EA	3/4" Diameter x 10" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	42.04
		<i>For >10 To 50, Deduct</i>	-1.33
		<i>For >50 To 100, Deduct</i>	-3.04
		<i>For >100 To 250, Deduct</i>	-6.09
		<i>For >250 To 500, Deduct</i>	-10.46
		<i>For >500, Deduct</i>	-14.84
06 05 23 00-0211	EA	3/4" Diameter x 12" Length, Hot Dipped Galvanized Steel, Hex Lag Bolt.....	47.52
		<i>For >10 To 50, Deduct</i>	-1.38
		<i>For >50 To 100, Deduct</i>	-3.26
		<i>For >100 To 250, Deduct</i>	-6.52
		<i>For >250 To 500, Deduct</i>	-11.17
		<i>For >500, Deduct</i>	-15.81

06 05 23 00-0212 304/18-8 Stainless Steel, Hex Lag Bolts (06 05 23 00-0171)

06 05 23 00-0213	EA	1/4" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	14.89
		<i>For >10 To 50, Deduct</i>	-0.68
		<i>For >50 To 100, Deduct</i>	-1.39
		<i>For >100 To 250, Deduct</i>	-2.78
		<i>For >250 To 500, Deduct</i>	-4.85
		<i>For >500, Deduct</i>	-6.91
06 05 23 00-0214	EA	1/4" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	15.88
		<i>For >10 To 50, Deduct</i>	-0.68
		<i>For >50 To 100, Deduct</i>	-1.41
		<i>For >100 To 250, Deduct</i>	-2.83
		<i>For >250 To 500, Deduct</i>	-4.92
		<i>For >500, Deduct</i>	-7.01
06 05 23 00-0215	EA	1/4" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	18.58
		<i>For >10 To 50, Deduct</i>	-0.68
		<i>For >50 To 100, Deduct</i>	-1.48
		<i>For >100 To 250, Deduct</i>	-2.96
		<i>For >250 To 500, Deduct</i>	-5.12
		<i>For >500, Deduct</i>	-7.28
06 05 23 00-0216	EA	3/8" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	18.18
		<i>For >10 To 50, Deduct</i>	-0.74
		<i>For >50 To 100, Deduct</i>	-1.56
		<i>For >100 To 250, Deduct</i>	-3.13
		<i>For >250 To 500, Deduct</i>	-5.43
		<i>For >500, Deduct</i>	-7.73
06 05 23 00-0217	EA	3/8" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	20.73
		<i>For >10 To 50, Deduct</i>	-0.79
		<i>For >50 To 100, Deduct</i>	-1.71
		<i>For >100 To 250, Deduct</i>	-3.41
		<i>For >250 To 500, Deduct</i>	-5.91
		<i>For >500, Deduct</i>	-8.41
06 05 23 00-0218	EA	3/8" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	22.45
		<i>For >10 To 50, Deduct</i>	-0.79
		<i>For >50 To 100, Deduct</i>	-1.75
		<i>For >100 To 250, Deduct</i>	-3.50
		<i>For >250 To 500, Deduct</i>	-6.04
		<i>For >500, Deduct</i>	-8.58



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0219	EA			3/8" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	49.61	
				<i>For >10 To 50, Deduct</i>	-0.95	
				<i>For >50 To 100, Deduct</i>	-2.67	
				<i>For >100 To 250, Deduct</i>	-5.33	
				<i>For >250 To 500, Deduct</i>	-8.95	
				<i>For >500, Deduct</i>	-12.56	
06 05 23 00-0220	EA			3/8" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	71.66	
				<i>For >10 To 50, Deduct</i>	-1.00	
				<i>For >50 To 100, Deduct</i>	-3.30	
				<i>For >100 To 250, Deduct</i>	-6.59	
				<i>For >250 To 500, Deduct</i>	-10.89	
				<i>For >500, Deduct</i>	-15.19	
06 05 23 00-0221	EA			1/2" Diameter x 2" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	22.63	
				<i>For >10 To 50, Deduct</i>	-0.80	
				<i>For >50 To 100, Deduct</i>	-1.76	
				<i>For >100 To 250, Deduct</i>	-3.52	
				<i>For >250 To 500, Deduct</i>	-6.08	
				<i>For >500, Deduct</i>	-8.64	
06 05 23 00-0222	EA			1/2" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	27.28	
				<i>For >10 To 50, Deduct</i>	-0.85	
				<i>For >50 To 100, Deduct</i>	-1.96	
				<i>For >100 To 250, Deduct</i>	-3.92	
				<i>For >250 To 500, Deduct</i>	-6.72	
				<i>For >500, Deduct</i>	-9.53	
06 05 23 00-0223	EA			1/2" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	34.56	
				<i>For >10 To 50, Deduct</i>	-0.90	
				<i>For >50 To 100, Deduct</i>	-2.22	
				<i>For >100 To 250, Deduct</i>	-4.44	
				<i>For >250 To 500, Deduct</i>	-7.56	
				<i>For >500, Deduct</i>	-10.68	
06 05 23 00-0224	EA			1/2" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	76.67	
				<i>For >10 To 50, Deduct</i>	-1.01	
				<i>For >50 To 100, Deduct</i>	-3.43	
				<i>For >100 To 250, Deduct</i>	-6.86	
				<i>For >250 To 500, Deduct</i>	-11.31	
				<i>For >500, Deduct</i>	-15.75	
06 05 23 00-0225	EA			1/2" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	105.58	
				<i>For >10 To 50, Deduct</i>	-1.17	
				<i>For >50 To 100, Deduct</i>	-4.39	
				<i>For >100 To 250, Deduct</i>	-8.79	
				<i>For >250 To 500, Deduct</i>	-14.35	
				<i>For >500, Deduct</i>	-19.92	
06 05 23 00-0226	EA			1/2" Diameter x 12" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	123.85	
				<i>For >10 To 50, Deduct</i>	-1.28	
				<i>For >50 To 100, Deduct</i>	-5.01	
				<i>For >100 To 250, Deduct</i>	-10.02	
				<i>For >250 To 500, Deduct</i>	-16.31	
				<i>For >500, Deduct</i>	-22.59	
06 05 23 00-0227	EA			3/4" Diameter x 4" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	115.91	
				<i>For >10 To 50, Deduct</i>	-1.01	
				<i>For >50 To 100, Deduct</i>	-4.41	
				<i>For >100 To 250, Deduct</i>	-8.83	
				<i>For >250 To 500, Deduct</i>	-14.25	
				<i>For >500, Deduct</i>	-19.67	
06 05 23 00-0228	EA			3/4" Diameter x 6" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	132.41	
				<i>For >10 To 50, Deduct</i>	-1.17	
				<i>For >50 To 100, Deduct</i>	-5.07	
				<i>For >100 To 250, Deduct</i>	-10.13	
				<i>For >250 To 500, Deduct</i>	-16.37	
				<i>For >500, Deduct</i>	-22.60	
06 05 23 00-0229	EA			3/4" Diameter x 8" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	137.74	
				<i>For >10 To 50, Deduct</i>	-1.22	
				<i>For >50 To 100, Deduct</i>	-5.28	
				<i>For >100 To 250, Deduct</i>	-10.55	
				<i>For >250 To 500, Deduct</i>	-17.05	
				<i>For >500, Deduct</i>	-23.55	
06 05 23 00-0230	EA			3/4" Diameter x 10" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	193.00	
				<i>For >10 To 50, Deduct</i>	-1.33	
				<i>For >50 To 100, Deduct</i>	-6.82	
				<i>For >100 To 250, Deduct</i>	-13.64	
				<i>For >250 To 500, Deduct</i>	-21.78	
				<i>For >500, Deduct</i>	-29.93	
06 05 23 00-0231	EA			3/4" Diameter x 12" Length, 304/18-8 Stainless Steel, Hex Lag Bolt.....	211.00	
				<i>For >10 To 50, Deduct</i>	-1.38	
				<i>For >50 To 100, Deduct</i>	-7.35	
				<i>For >100 To 250, Deduct</i>	-14.70	
				<i>For >250 To 500, Deduct</i>	-23.43	
				<i>For >500, Deduct</i>	-32.16	
06 05 23 00-0232 Stainless Steel Screws <small>(06 05 23 00-0093)</small>						
06 05 23 00-0233	EA			#8 x 1-1/2" Stainless Steel Screw.....	2.15	
06 05 23 00-0234	EA			#9 x 1-1/2" Stainless Steel Screw.....	2.19	
06 05 23 00-0235	EA			#10 x 1-1/2" Stainless Steel Screw.....	2.25	
06 05 23 00-0236	EA			#12 x 1-1/2" Stainless Steel Screw.....	2.43	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0237		Galvanized Steel Screws (06 05 23 00-0093)	
06 05 23 00-0238	EA	#8 x 1-1/2" Galvanized Steel Screw.....	1.98
06 05 23 00-0239	EA	#9 x 1-1/2" Galvanized Steel Screw.....	2.03
06 05 23 00-0240	EA	#10 x 1-1/2" Galvanized Steel Screw.....	2.07
06 05 23 00-0241	EA	#12 x 1-1/2" Galvanized Steel Screw.....	2.22
06 05 23 00-0242	EA	#8 x 2-1/2" Galvanized Steel Screw.....	2.02
06 05 23 00-0243	EA	#9 x 2-1/2" Galvanized Steel Screw.....	2.06
06 05 23 00-0244	EA	#10 x 2-1/2" Galvanized Steel Screw.....	2.11
06 05 23 00-0245	EA	#12 x 2-1/2" Galvanized Steel Screw.....	2.30
06 05 23 00-0246		Timber Bolts (06 05 23 00-0093)	
Note: Includes drilling of holes in any material.			
06 05 23 00-0247	EA	5/8" - 11 x 4" Threaded x 8" OAL A153 Galvanized Timber Bolt (Fastenal #11103914)	37.84
		For >10 To 50, Deduct	-1.12
		For >50 To 100, Deduct	-2.63
		For >100 To 250, Deduct	-5.27
		For >250 To 500, Deduct	-9.02
		For >500, Deduct	-12.78
06 05 23 00-0248	EA	5/8" - 11 x 4" Threaded x 10" OAL A153 Galvanized Timber Bolt (Fastenal #11103915)	42.84
		For >10 To 50, Deduct	-1.26
		For >50 To 100, Deduct	-2.96
		For >100 To 250, Deduct	-5.92
		For >250 To 500, Deduct	-10.14
		For >500, Deduct	-14.36
06 05 23 00-0249	EA	5/8" - 11 x 6" Threaded x 12" OAL A153 Galvanized Timber Bolt (Fastenal #11103916)	46.38
		For >10 To 50, Deduct	-1.34
		For >50 To 100, Deduct	-3.17
		For >100 To 250, Deduct	-6.34
		For >250 To 500, Deduct	-10.85
		For >500, Deduct	-15.36
06 05 23 00-0250	EA	5/8" - 11 x 6" Threaded x 14" OAL A153 Galvanized Timber Bolt (Fastenal #11103917)	52.16
		For >10 To 50, Deduct	-1.42
		For >50 To 100, Deduct	-3.43
		For >100 To 250, Deduct	-6.86
		For >250 To 500, Deduct	-11.71
		For >500, Deduct	-16.56
06 05 23 00-0251	EA	5/8" - 11 x 6" Threaded x 16" OAL A153 Galvanized Timber Bolt (Fastenal #11103918)	55.60
		For >10 To 50, Deduct	-1.49
		For >50 To 100, Deduct	-3.63
		For >100 To 250, Deduct	-7.26
		For >250 To 500, Deduct	-12.39
		For >500, Deduct	-17.51
06 05 23 00-0252	EA	5/8" - 11 x 6" Threaded x 18" OAL A153 Galvanized Timber Bolt (Fastenal #11103919)	57.68
		For >10 To 50, Deduct	-1.56
		For >50 To 100, Deduct	-3.78
		For >100 To 250, Deduct	-7.56
		For >250 To 500, Deduct	-12.90
		For >500, Deduct	-18.24
06 05 23 00-0253	EA	3/4" - 11 x 4" Threaded x 10" OAL A153 Galvanized Timber Bolt (Fastenal #11103920)	52.09
		For >10 To 50, Deduct	-1.34
		For >50 To 100, Deduct	-3.31
		For >100 To 250, Deduct	-6.63
		For >250 To 500, Deduct	-11.28
		For >500, Deduct	-15.93
06 05 23 00-0254	EA	3/4" - 11 x 6" Threaded x 12" OAL A153 Galvanized Timber Bolt (Fastenal #11103921)	54.54
		For >10 To 50, Deduct	-1.40
		For >50 To 100, Deduct	-3.46
		For >100 To 250, Deduct	-6.91
		For >250 To 500, Deduct	-11.77
		For >500, Deduct	-16.62
06 05 23 00-0255	EA	3/4" - 11 x 6" Threaded x 14" OAL A153 Galvanized Timber Bolt (Fastenal #11103922)	60.83
		For >10 To 50, Deduct	-1.48
		For >50 To 100, Deduct	-3.74
		For >100 To 250, Deduct	-7.48
		For >250 To 500, Deduct	-12.69
		For >500, Deduct	-17.91
06 05 23 00-0256	EA	3/4" - 11 x 6" Threaded x 16" OAL A153 Galvanized Timber Bolt (Fastenal #11103923)	65.50
		For >10 To 50, Deduct	-1.55
		For >50 To 100, Deduct	-3.97
		For >100 To 250, Deduct	-7.94
		For >250 To 500, Deduct	-13.46
		For >500, Deduct	-18.99
06 05 23 00-0257	EA	3/4" - 11 x 6" Threaded x 18" OAL A153 Galvanized Timber Bolt (Fastenal #11103924)	70.61
		For >10 To 50, Deduct	-1.63
		For >50 To 100, Deduct	-4.21
		For >100 To 250, Deduct	-8.42
		For >250 To 500, Deduct	-14.26
		For >500, Deduct	-20.11
06 05 23 00-0258		Supports (06 05 23)	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0259 Shear Plates <small>(06 05 23 00-0258)</small>		
06 05 23 00-0260 EA 2-5/8" Diameter, Shear Plate	16.15	4.02
<i>For >10 To 50, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-1.08	
<i>For >100 To 250, Deduct</i>	-2.16	
<i>For >250 To 500, Deduct</i>	-3.70	
<i>For >500, Deduct</i>	-5.23	
06 05 23 00-0261 EA 4" Diameter, Shear Plate	15.39	4.23
<i>For >10 To 50, Deduct</i>	-0.47	
<i>For >50 To 100, Deduct</i>	-1.09	
<i>For >100 To 250, Deduct</i>	-2.18	
<i>For >250 To 500, Deduct</i>	-3.75	
<i>For >500, Deduct</i>	-5.31	
06 05 23 00-0262 Sill Anchors <small>(06 05 23 00-0258)</small>		
06 05 23 00-0263 EA Sill Anchor Embedded In Concrete	13.46	4.23
<i>For >10 To 50, Deduct</i>	-0.47	
<i>For >50 To 100, Deduct</i>	-1.04	
<i>For >100 To 250, Deduct</i>	-2.09	
<i>For >250 To 500, Deduct</i>	-3.60	
<i>For >500, Deduct</i>	-5.12	
06 05 23 00-0264 Spike Grids <small>(06 05 23 00-0258)</small>		
06 05 23 00-0265 EA 3" x 6" Flat Or Curved Spike Grid	11.87	4.02
<i>For >10 To 50, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-0.97	
<i>For >100 To 250, Deduct</i>	-1.95	
<i>For >250 To 500, Deduct</i>	-3.38	
<i>For >500, Deduct</i>	-4.80	
06 05 23 00-0266 Split Rings <small>(06 05 23 00-0258)</small>		
06 05 23 00-0267 EA 2-1/2" Diameter Split Ring	16.39	4.02
<i>For >10 To 50, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-1.09	
<i>For >100 To 250, Deduct</i>	-2.18	
<i>For >250 To 500, Deduct</i>	-3.72	
<i>For >500, Deduct</i>	-5.26	
06 05 23 00-0268 EA 4" Diameter Split Ring.....	17.60	4.45
<i>For >10 To 50, Deduct</i>	-0.49	
<i>For >50 To 100, Deduct</i>	-1.18	
<i>For >100 To 250, Deduct</i>	-2.36	
<i>For >250 To 500, Deduct</i>	-4.03	
<i>For >500, Deduct</i>	-5.70	
06 05 23 00-0269 Toothed Rings <small>(06 05 23 00-0258)</small>		
06 05 23 00-0270 EA 2-5/8" Or 4" Toothed Ring.....	12.72	4.02
<i>For >10 To 50, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-1.00	
<i>For >100 To 250, Deduct</i>	-1.99	
<i>For >250 To 500, Deduct</i>	-3.44	
<i>For >500, Deduct</i>	-4.89	
06 05 23 00-0271 Straps And Shields <small>(06 05 23)</small>		
06 05 23 00-0272 Shield Plate <small>(06 05 23 00-0271)</small>		
06 05 23 00-0273 EA 5" Wide x 8" Long, 16 Gauge, Galvanized Shield Plate (Simpson Strong Tie® PSPN58Z)	8.60	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.28	
<i>For >100 To 250, Deduct</i>	-0.57	
<i>For >250 To 500, Deduct</i>	-0.98	
<i>For >500, Deduct</i>	-1.48	
06 05 23 00-0274 EA 5" Wide x 16" Long, 16 Gauge, Galvanized Shield Plate (Simpson Strong Tie® PSPN516Z)	13.75	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.43	
<i>For >100 To 250, Deduct</i>	-0.85	
<i>For >250 To 500, Deduct</i>	-1.44	
<i>For >500, Deduct</i>	-2.12	
06 05 23 00-0275 Strap Ties <small>(06 05 23 00-0271)</small>		
06 05 23 00-0276 EA 1-1/4" Wide x 9" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA9).....	3.24	
<i>For >10 To 50, Deduct</i>	-0.05	
<i>For >50 To 100, Deduct</i>	-0.14	
<i>For >100 To 250, Deduct</i>	-0.27	
<i>For >250 To 500, Deduct</i>	-0.51	
<i>For >500, Deduct</i>	-0.82	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0277	EA	1-1/4" Wide x 12" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA12).....	3.33
		<i>For >10 To 50, Deduct</i>	-0.05
		<i>For >50 To 100, Deduct</i>	-0.14
		<i>For >100 To 250, Deduct</i>	-0.27
		<i>For >250 To 500, Deduct</i>	-0.52
		<i>For >500, Deduct</i>	-0.83
06 05 23 00-0278	EA	1-1/4" Wide x 15" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA15).....	4.26
		<i>For >10 To 50, Deduct</i>	-0.07
		<i>For >50 To 100, Deduct</i>	-0.17
		<i>For >100 To 250, Deduct</i>	-0.35
		<i>For >250 To 500, Deduct</i>	-0.66
		<i>For >500, Deduct</i>	-1.05
06 05 23 00-0279	EA	1-1/4" Wide x 18" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA18).....	4.43
		<i>For >10 To 50, Deduct</i>	-0.07
		<i>For >50 To 100, Deduct</i>	-0.18
		<i>For >100 To 250, Deduct</i>	-0.36
		<i>For >250 To 500, Deduct</i>	-0.67
		<i>For >500, Deduct</i>	-1.07
06 05 23 00-0280	EA	1-1/4" Wide x 21" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA21).....	4.61
		<i>For >10 To 50, Deduct</i>	-0.07
		<i>For >50 To 100, Deduct</i>	-0.18
		<i>For >100 To 250, Deduct</i>	-0.37
		<i>For >250 To 500, Deduct</i>	-0.68
		<i>For >500, Deduct</i>	-1.08
06 05 23 00-0281	EA	1-1/4" Wide x 24" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA24).....	5.29
		<i>For >10 To 50, Deduct</i>	-0.08
		<i>For >50 To 100, Deduct</i>	-0.21
		<i>For >100 To 250, Deduct</i>	-0.43
		<i>For >250 To 500, Deduct</i>	-0.80
		<i>For >500, Deduct</i>	-1.28
06 05 23 00-0282	EA	1-1/4" Wide x 30" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA30).....	6.92
		<i>For >10 To 50, Deduct</i>	-0.08
		<i>For >50 To 100, Deduct</i>	-0.25
		<i>For >100 To 250, Deduct</i>	-0.51
		<i>For >250 To 500, Deduct</i>	-0.93
		<i>For >500, Deduct</i>	-1.44
06 05 23 00-0283	EA	1-1/4" Wide x 36" Long, 20 Gauge, Galvanized Strap Tie (Simpson Strong Tie® LSTA36).....	8.03
		<i>For >10 To 50, Deduct</i>	-0.10
		<i>For >50 To 100, Deduct</i>	-0.30
		<i>For >100 To 250, Deduct</i>	-0.59
		<i>For >250 To 500, Deduct</i>	-1.08
		<i>For >500, Deduct</i>	-1.68
06 05 23 00-0284	EA	1-1/4" Wide x 9" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA9).....	3.61
		<i>For >10 To 50, Deduct</i>	-0.05
		<i>For >50 To 100, Deduct</i>	-0.14
		<i>For >100 To 250, Deduct</i>	-0.29
		<i>For >250 To 500, Deduct</i>	-0.54
		<i>For >500, Deduct</i>	-0.86
06 05 23 00-0285	EA	1-1/4" Wide x 12" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA12).....	3.74
		<i>For >10 To 50, Deduct</i>	-0.05
		<i>For >50 To 100, Deduct</i>	-0.15
		<i>For >100 To 250, Deduct</i>	-0.30
		<i>For >250 To 500, Deduct</i>	-0.55
		<i>For >500, Deduct</i>	-0.87
06 05 23 00-0286	EA	1-1/4" Wide x 15" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA15).....	4.77
		<i>For >10 To 50, Deduct</i>	-0.07
		<i>For >50 To 100, Deduct</i>	-0.19
		<i>For >100 To 250, Deduct</i>	-0.37
		<i>For >250 To 500, Deduct</i>	-0.70
		<i>For >500, Deduct</i>	-1.10
06 05 23 00-0287	EA	1-1/4" Wide x 18" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA18).....	4.99
		<i>For >10 To 50, Deduct</i>	-0.07
		<i>For >50 To 100, Deduct</i>	-0.19
		<i>For >100 To 250, Deduct</i>	-0.39
		<i>For >250 To 500, Deduct</i>	-0.71
		<i>For >500, Deduct</i>	-1.12
06 05 23 00-0288	EA	1-1/4" Wide x 21" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA21).....	5.09
		<i>For >10 To 50, Deduct</i>	-0.07
		<i>For >50 To 100, Deduct</i>	-0.20
		<i>For >100 To 250, Deduct</i>	-0.39
		<i>For >250 To 500, Deduct</i>	-0.72
		<i>For >500, Deduct</i>	-1.13
06 05 23 00-0289	EA	1-1/4" Wide x 24" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA24).....	5.80
		<i>For >10 To 50, Deduct</i>	-0.08
		<i>For >50 To 100, Deduct</i>	-0.23
		<i>For >100 To 250, Deduct</i>	-0.45
		<i>For >250 To 500, Deduct</i>	-0.84
		<i>For >500, Deduct</i>	-1.33
06 05 23 00-0290	EA	1-1/4" Wide x 30" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA30).....	7.26
		<i>For >10 To 50, Deduct</i>	-0.08
		<i>For >50 To 100, Deduct</i>	-0.26
		<i>For >100 To 250, Deduct</i>	-0.53
		<i>For >250 To 500, Deduct</i>	-0.95
		<i>For >500, Deduct</i>	-1.47



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0291 EA 1-1/4" Wide x 36" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA36).....	8.04	
<i>For >10 To 50, Deduct</i>	-0.10	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100 To 250, Deduct</i>	-0.59	
<i>For >250 To 500, Deduct</i>	-1.08	
<i>For >500, Deduct</i>	-1.68	
06 05 23 00-0292 EA 1-1/4" Wide x 36" Long, 18 Gauge, Galvanized Strap Tie (Simpson Strong Tie® MSTA49).....	12.79	
<i>For >10 To 50, Deduct</i>	-0.11	
<i>For >50 To 100, Deduct</i>	-0.43	
<i>For >100 To 250, Deduct</i>	-0.86	
<i>For >250 To 500, Deduct</i>	-1.50	
<i>For >500, Deduct</i>	-2.28	
06 05 23 00-0293 EA 1-1/4" Wide x 9" Long, 16 Gauge, Galvanized Strap Tie (Simpson Strong Tie® ST9).....	4.29	
<i>For >10 To 50, Deduct</i>	-0.05	
<i>For >50 To 100, Deduct</i>	-0.16	
<i>For >100 To 250, Deduct</i>	-0.32	
<i>For >250 To 500, Deduct</i>	-0.59	
<i>For >500, Deduct</i>	-0.93	
06 05 23 00-0294 EA 1-1/4" Wide x 12" Long, 16 Gauge, Galvanized Strap Tie (Simpson Strong Tie® ST12).....	4.30	
<i>For >10 To 50, Deduct</i>	-0.05	
<i>For >50 To 100, Deduct</i>	-0.16	
<i>For >100 To 250, Deduct</i>	-0.32	
<i>For >250 To 500, Deduct</i>	-0.59	
<i>For >500, Deduct</i>	-0.93	
06 05 23 00-0295 EA 1-1/4" Wide x 18" Long, 16 Gauge, Galvanized Strap Tie (Simpson Strong Tie® ST18).....	5.23	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.20	
<i>For >100 To 250, Deduct</i>	-0.40	
<i>For >250 To 500, Deduct</i>	-0.73	
<i>For >500, Deduct</i>	-1.15	
06 05 23 00-0296 EA 1-1/4" Wide x 22" Long, 16 Gauge, Galvanized Strap Tie (Simpson Strong Tie® ST22).....	7.26	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.26	
<i>For >100 To 250, Deduct</i>	-0.53	
<i>For >250 To 500, Deduct</i>	-0.95	
<i>For >500, Deduct</i>	-1.47	
06 05 23 00-0297 EA 1-3/8" Wide x 6" Long, 12 Gauge, Galvanized Strap Tie (Simpson Strong Tie® HRS6).....	6.23	
<i>For >10 To 50, Deduct</i>	-0.05	
<i>For >50 To 100, Deduct</i>	-0.21	
<i>For >100 To 250, Deduct</i>	-0.42	
<i>For >250 To 500, Deduct</i>	-0.74	
<i>For >500, Deduct</i>	-1.12	
06 05 23 00-0298 EA 1-3/8" Wide x 8" Long, 12 Gauge, Galvanized Strap Tie (Simpson Strong Tie® HRS8).....	6.89	
<i>For >10 To 50, Deduct</i>	-0.05	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >100 To 250, Deduct</i>	-0.45	
<i>For >250 To 500, Deduct</i>	-0.79	
<i>For >500, Deduct</i>	-1.19	
06 05 23 00-0299 EA 1-3/8" Wide x 12" Long, 12 Gauge, Galvanized Strap Tie (Simpson Strong Tie® HRS12).....	9.05	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.29	
<i>For >100 To 250, Deduct</i>	-0.59	
<i>For >250 To 500, Deduct</i>	-1.02	
<i>For >500, Deduct</i>	-1.53	
06 05 23 00-0300 EA 2-1/16" Wide x 27" Long, 12 Gauge, Galvanized Medium Strap Tie (Simpson Strong Tie® MST27).....	13.51	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.42	
<i>For >100 To 250, Deduct</i>	-0.84	
<i>For >250 To 500, Deduct</i>	-1.42	
<i>For >500, Deduct</i>	-2.10	
06 05 23 00-0301 EA 2-1/16" Wide x 37" Long, 12 Gauge, Galvanized Medium Strap Tie (Simpson Strong Tie® MST37).....	16.85	
<i>For >10 To 50, Deduct</i>	-0.10	
<i>For >50 To 100, Deduct</i>	-0.52	
<i>For >100 To 250, Deduct</i>	-1.03	
<i>For >250 To 500, Deduct</i>	-1.74	
<i>For >500, Deduct</i>	-2.56	
06 05 23 00-0302 EA 2-1/16" Wide x 48" Long, 12 Gauge, Galvanized Medium Strap Tie (Simpson Strong Tie® MST48).....	25.01	
<i>For >10 To 50, Deduct</i>	-0.11	
<i>For >50 To 100, Deduct</i>	-0.73	
<i>For >100 To 250, Deduct</i>	-1.47	
<i>For >250 To 500, Deduct</i>	-2.42	
<i>For >500, Deduct</i>	-3.50	
06 05 23 00-0303 EA 2-1/16" Wide x 60" Long, 12 Gauge, Galvanized Medium Strap Tie (Simpson Strong Tie® MST60).....	43.71	
<i>For >10 To 50, Deduct</i>	-0.12	
<i>For >50 To 100, Deduct</i>	-1.21	
<i>For >100 To 250, Deduct</i>	-2.43	
<i>For >250 To 500, Deduct</i>	-3.89	
<i>For >500, Deduct</i>	-5.49	
06 05 23 00-0304 EA 2-1/16" Wide x 72" Long, 12 Gauge, Galvanized Medium Strap Tie (Simpson Strong Tie® MST72).....	56.40	
<i>For >10 To 50, Deduct</i>	-0.14	
<i>For >50 To 100, Deduct</i>	-1.55	
<i>For >100 To 250, Deduct</i>	-3.09	
<i>For >250 To 500, Deduct</i>	-4.91	
<i>For >500, Deduct</i>	-6.89	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 05 23 00-0305	EA	3" Wide x 28-1/4" Long, 16 Gauge, Galvanized Strap Ties (Simpson Strong Tie® MSTC28)	16.15	
		<i>For >10 To 50, Deduct</i>	-0.08	
		<i>For >50 To 100, Deduct</i>	-0.49	
		<i>For >100 To 250, Deduct</i>	-0.97	
		<i>For >250 To 500, Deduct</i>	-1.62	
		<i>For >500, Deduct</i>	-2.36	
06 05 23 00-0306	EA	3" Wide x 40-1/4" Long, 16 Gauge, Galvanized Strap Ties (Simpson Strong Tie® MSTC40)	20.88	
		<i>For >10 To 50, Deduct</i>	-0.10	
		<i>For >50 To 100, Deduct</i>	-0.62	
		<i>For >100 To 250, Deduct</i>	-1.23	
		<i>For >250 To 500, Deduct</i>	-2.04	
		<i>For >500, Deduct</i>	-2.96	
06 05 23 00-0307	EA	3" Wide x 52-1/4" Long, 16 Gauge, Galvanized Strap Ties (Simpson Strong Tie® MSTC52)	24.39	
		<i>For >10 To 50, Deduct</i>	-0.11	
		<i>For >50 To 100, Deduct</i>	-0.72	
		<i>For >100 To 250, Deduct</i>	-1.44	
		<i>For >250 To 500, Deduct</i>	-2.37	
		<i>For >500, Deduct</i>	-3.44	
06 05 23 00-0308	EA	3" Wide x 66-1/4" Long, 16 Gauge, Galvanized Strap Ties (Simpson Strong Tie® MSTC66)	37.23	
		<i>For >10 To 50, Deduct</i>	-0.12	
		<i>For >50 To 100, Deduct</i>	-1.05	
		<i>For >100 To 250, Deduct</i>	-2.11	
		<i>For >250 To 500, Deduct</i>	-3.40	
		<i>For >500, Deduct</i>	-4.85	

06 05 23 00-0309 Twist Strap Ties (06 05 23 00-0271)

06 05 23 00-0310	EA	1-1/4" Wide x 12" Long, 18 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® LTS12)	3.82	
		<i>For >10 To 50, Deduct</i>	-0.05	
		<i>For >50 To 100, Deduct</i>	-0.15	
		<i>For >100 To 250, Deduct</i>	-0.30	
		<i>For >250 To 500, Deduct</i>	-0.56	
		<i>For >500, Deduct</i>	-0.88	
06 05 23 00-0311	EA	1-1/4" Wide x 16" Long, 18 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® LTS16)	4.82	
		<i>For >10 To 50, Deduct</i>	-0.06	
		<i>For >50 To 100, Deduct</i>	-0.18	
		<i>For >100 To 250, Deduct</i>	-0.36	
		<i>For >250 To 500, Deduct</i>	-0.67	
		<i>For >500, Deduct</i>	-1.04	
06 05 23 00-0312	EA	1-1/4" Wide x 18" Long, 18 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® LTS18)	5.56	
		<i>For >10 To 50, Deduct</i>	-0.07	
		<i>For >50 To 100, Deduct</i>	-0.21	
		<i>For >100 To 250, Deduct</i>	-0.41	
		<i>For >250 To 500, Deduct</i>	-0.76	
		<i>For >500, Deduct</i>	-1.18	
06 05 23 00-0313	EA	1-1/4" Wide x 20" Long, 18 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® LTS20)	6.02	
		<i>For >10 To 50, Deduct</i>	-0.07	
		<i>For >50 To 100, Deduct</i>	-0.23	
		<i>For >100 To 250, Deduct</i>	-0.45	
		<i>For >250 To 500, Deduct</i>	-0.82	
		<i>For >500, Deduct</i>	-1.29	
06 05 23 00-0314	EA	1-1/4" Wide x 12" Long, 16 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® MTS12)	3.77	
		<i>For >10 To 50, Deduct</i>	-0.05	
		<i>For >50 To 100, Deduct</i>	-0.15	
		<i>For >100 To 250, Deduct</i>	-0.30	
		<i>For >250 To 500, Deduct</i>	-0.55	
		<i>For >500, Deduct</i>	-0.87	
06 05 23 00-0315	EA	1-1/4" Wide x 16" Long, 16 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® MTS16)	4.90	
		<i>For >10 To 50, Deduct</i>	-0.06	
		<i>For >50 To 100, Deduct</i>	-0.18	
		<i>For >100 To 250, Deduct</i>	-0.37	
		<i>For >250 To 500, Deduct</i>	-0.67	
		<i>For >500, Deduct</i>	-1.05	
06 05 23 00-0316	EA	1-1/4" Wide x 18" Long, 16 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® MTS18)	5.70	
		<i>For >10 To 50, Deduct</i>	-0.07	
		<i>For >50 To 100, Deduct</i>	-0.21	
		<i>For >100 To 250, Deduct</i>	-0.42	
		<i>For >250 To 500, Deduct</i>	-0.77	
		<i>For >500, Deduct</i>	-1.19	
06 05 23 00-0317	EA	1-1/4" Wide x 20" Long, 16 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® MTS20)	6.07	
		<i>For >10 To 50, Deduct</i>	-0.07	
		<i>For >50 To 100, Deduct</i>	-0.23	
		<i>For >100 To 250, Deduct</i>	-0.45	
		<i>For >250 To 500, Deduct</i>	-0.83	
		<i>For >500, Deduct</i>	-1.29	
06 05 23 00-0318	EA	1-1/4" Wide x 24" Long, 16 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® MTS24)	8.36	
		<i>For >10 To 50, Deduct</i>	-0.08	
		<i>For >50 To 100, Deduct</i>	-0.29	
		<i>For >100 To 250, Deduct</i>	-0.58	
		<i>For >250 To 500, Deduct</i>	-1.03	
		<i>For >500, Deduct</i>	-1.58	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 05 23 00-0319 EA 1-1/4" Wide x 16" Long, 14 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® HTS16)	6.39	
<i>For >10 To 50, Deduct</i>	-0.06	
<i>For >50 To 100, Deduct</i>	-0.22	
<i>For >100 To 250, Deduct</i>	-0.44	
<i>For >250 To 500, Deduct</i>	-0.78	
<i>For >500, Deduct</i>	-1.20	
06 05 23 00-0320 EA 1-1/4" Wide x 20" Long, 14 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® HTS20)	7.65	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.27	
<i>For >100 To 250, Deduct</i>	-0.53	
<i>For >250 To 500, Deduct</i>	-0.95	
<i>For >500, Deduct</i>	-1.45	
06 05 23 00-0321 EA 1-1/4" Wide x 24" Long, 14 Gauge, Galvanized Twist Strap Tie (Simpson Strong Tie® HTS24)	8.90	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >100 To 250, Deduct</i>	-0.61	
<i>For >250 To 500, Deduct</i>	-1.07	
<i>For >500, Deduct</i>	-1.64	
06 05 23 00-0322 Retrofit Plate Strap <small>(06 05 23 00-0271)</small>		
06 05 23 00-0323 EA 1-3/8" Wide x 18-5/16" Long, 16 Gauge, Galvanized Retrofit Plate Strap (Simpson Strong Tie® RPS18)	6.38	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >100 To 250, Deduct</i>	-0.45	
<i>For >250 To 500, Deduct</i>	-0.82	
<i>For >500, Deduct</i>	-1.26	
06 05 23 00-0324 EA 1-3/8" Wide x 22-5/16" Long, 16 Gauge, Galvanized Retrofit Plate Strap (Simpson Strong Tie® RPS22)	7.33	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.25	
<i>For >100 To 250, Deduct</i>	-0.50	
<i>For >250 To 500, Deduct</i>	-0.89	
<i>For >500, Deduct</i>	-1.36	
06 05 23 00-0325 EA 1-3/8" Wide x 28-5/16" Long, 16 Gauge, Galvanized Retrofit Plate Strap (Simpson Strong Tie® RPS28)	8.82	
<i>For >10 To 50, Deduct</i>	-0.07	
<i>For >50 To 100, Deduct</i>	-0.29	
<i>For >100 To 250, Deduct</i>	-0.58	
<i>For >250 To 500, Deduct</i>	-1.00	
<i>For >500, Deduct</i>	-1.51	
06 05 23 00-0326 Stud Shoe <small>(06 05 23 00-0271)</small>		
06 05 23 00-0327 EA 6" High With 3-1/4" Wide Tabs For 2X Stud, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® SS1.5).....	11.00	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.36	
<i>For >100 To 250, Deduct</i>	-0.71	
<i>For >250 To 500, Deduct</i>	-1.23	
<i>For >500, Deduct</i>	-1.85	
06 05 23 00-0328 EA 6" High With 3-1/4" Wide Tabs For 3X Stud, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® SS2.5).....	22.01	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.63	
<i>For >100 To 250, Deduct</i>	-1.26	
<i>For >250 To 500, Deduct</i>	-2.06	
<i>For >500, Deduct</i>	-2.95	
06 05 23 00-0329 EA 6" High With 3-1/4" Wide Tabs For 2-2X Studs, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® SS3).....	22.11	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.63	
<i>For >100 To 250, Deduct</i>	-1.27	
<i>For >250 To 500, Deduct</i>	-2.06	
<i>For >500, Deduct</i>	-2.96	
06 05 23 00-0330 EA 6" High With 3-1/4" Wide Tabs For 3-2X Studs, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® SS4.5).....	29.77	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.83	
<i>For >100 To 250, Deduct</i>	-1.65	
<i>For >250 To 500, Deduct</i>	-2.64	
<i>For >500, Deduct</i>	-3.72	
06 05 23 00-0331 EA 7-1/8" High With 3-1/4" Wide Tabs For 2X Studs, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® HSS2-SDS1.5).....	27.95	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.78	
<i>For >100 To 250, Deduct</i>	-1.56	
<i>For >250 To 500, Deduct</i>	-2.50	
<i>For >500, Deduct</i>	-3.54	
06 05 23 00-0332 EA 7-1/8" High With 3-1/4" Wide Tabs For 2-2X Studs, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie HSS2-2-SDS3).....	30.31	
<i>For >10 To 50, Deduct</i>	-0.08	
<i>For >50 To 100, Deduct</i>	-0.84	
<i>For >100 To 250, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-2.68	
<i>For >500, Deduct</i>	-3.78	

06 Wood, Plastics, and Composites**06 05 Common Work Results for Wood, Plastics, and Composites****06 05 23 Wood, Plastic, and Composite Fastenings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 05 23 00-0333	EA	7-1/8" High With 3-1/4" Wide Tabs For 3-2X Studs, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® HSS2-3-SDS3)	32.11	
		<i>For >10 To 50, Deduct</i>	-0.08	
		<i>For >50 To 100, Deduct</i>	-0.88	
		<i>For >100 To 250, Deduct</i>	-1.77	
		<i>For >250 To 500, Deduct</i>	-2.81	
		<i>For >500, Deduct</i>	-3.96	
06 05 23 00-0334	EA	7-1/8" High With 3-1/4" Wide Tabs For 4X Studs, 16 Gauge, Galvanized Stud Shoe (Simpson Strong Tie® HSS4-SDS3)	48.72	
		<i>For >10 To 50, Deduct</i>	-0.08	
		<i>For >50 To 100, Deduct</i>	-1.30	
		<i>For >100 To 250, Deduct</i>	-2.60	
		<i>For >250 To 500, Deduct</i>	-4.06	
		<i>For >500, Deduct</i>	-5.62	
06 05 23 00-0335		Nail Stops <small>(06 05 23 00-0271)</small>		
06 05 23 00-0336	EA	1-1/2" Wide x 3" Long, 16 Gauge, Galvanized Nail Stops (Simpson Strong Tie® NS1)	2.96	
		<i>For >10 To 50, Deduct</i>	-0.05	
		<i>For >50 To 100, Deduct</i>	-0.13	
		<i>For >100 To 250, Deduct</i>	-0.26	
		<i>For >250 To 500, Deduct</i>	-0.49	
		<i>For >500, Deduct</i>	-0.79	
06 05 23 00-0337	EA	1-1/2" Wide x 6" Long, 16 Gauge, Galvanized Nail Stops (Simpson Strong Tie® NS2)	3.12	
		<i>For >10 To 50, Deduct</i>	-0.05	
		<i>For >50 To 100, Deduct</i>	-0.13	
		<i>For >100 To 250, Deduct</i>	-0.26	
		<i>For >250 To 500, Deduct</i>	-0.50	
		<i>For >500, Deduct</i>	-0.81	
06 10		Rough Carpentry <small>(06)</small>		
06 11		Wood Framing <small>(06 10)</small>		
Note: All framing lumber is grade #2 or better unless otherwise listed. Dimensions are nominal. See CSI section 06 05 23 00-0000 for anchors and supports.				
06 11 13		Engineered Wood Products <small>(06 11)</small>		
Note: All framing lumber is grade #2 or better unless otherwise listed. Dimensions are nominal.				
06 11 13 00-0001		Built-Up Members <small>(06 11 13)</small>		
Note: A structural framing member made from fastening separate pieces of lumber together.				
06 11 13 00-0002		Built-Up Beams Or Joists <small>(06 11 13 00-0001)</small>		
06 11 13 00-0003	LF	Two 2" x 6" Built-up Wood Beam Or Joist	4.29	1.86
		<i>For Each Additional 2" x_" In The Built Up Member, Add</i>	0.72	
06 11 13 00-0004	LF	Two 2" x 8" Built-up Wood Beam Or Joist	5.31	2.19
		<i>For Each Additional 2" x_" In The Built Up Member, Add</i>	1.02	
06 11 13 00-0005	LF	Two 2" x 10" Built-up Wood Beam Or Joist	6.76	2.62
		<i>For Each Additional 2" x_" In The Built Up Member, Add</i>	1.42	
06 11 16		Mechanically Graded Lumber <small>(06 11)</small>		
06 11 16 00-0001		Rafters And Joists <small>(06 11 16)</small>		
06 11 16 00-0002		Rafters <small>(06 11 16 00-0001)</small>		
Note: An inclined roof framing member to which a roof covering is attached.				
06 11 16 00-0003	LF	2" x 6" Wood Rafter	2.47	1.31
06 11 16 00-0004	LF	2" x 8" Wood Rafter	2.88	1.42
06 11 16 00-0005	LF	2" x 10" Wood Rafter	4.15	2.07
06 11 16 00-0006	LF	2" x 12" Wood Rafter	4.77	2.30
06 11 16 00-0007	LF	2" x 14" Wood Rafter	5.18	2.51
06 11 16 00-0008	LF	2" x 6" Pressure Treated Wood Rafter	2.91	1.31
06 11 16 00-0009	LF	2" x 8" Pressure Treated Wood Rafter	3.49	1.42
06 11 16 00-0010	LF	2" x 10" Pressure Treated Wood Rafter	4.75	2.07
06 11 16 00-0011	LF	2" x 12" Pressure Treated Wood Rafter	5.69	2.30
06 11 16 00-0012		Joists <small>(06 11 16 00-0001)</small>		
Note: A series of parallel beams to support floors or ceilings.				
06 11 16 00-0013	LF	2" x 6" Pressure Treated Wood Floor Joist	2.58	1.10
06 11 16 00-0014	LF	2" x 8" Pressure Treated Wood Floor Joist	3.27	1.20
06 11 16 00-0015	LF	2" x 10" Pressure Treated Wood Floor Joist	3.99	1.54
06 11 16 00-0016	LF	2" x 12" Pressure Treated Wood Floor Joist	4.93	1.75
06 11 16 00-0017		Purlins <small>(06 11 16 00-0001)</small>		
Note: A horizontal structural member in a roof, supporting the loads from the roof deck or sheathing.				
06 11 16 00-0018	LF	2" x 4" Wood Purlin	1.74	0.66
06 11 16 00-0019	LF	2" x 6" Wood Purlin	2.16	0.72
06 11 16 00-0020	LF	2" x 8" Wood Purlin	2.61	0.79
06 11 16 00-0021	LF	2" x 10" Wood Purlin	3.17	0.87
06 11 16 00-0022	LF	2" x 4" Pressure Treated Wood Purlin	2.01	0.66



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 11 16 00-0023 LF 2" x 6" Pressure Treated Wood Purlin	2.60	0.72
06 11 16 00-0024 LF 2" x 8" Pressure Treated Wood Purlin	3.22	0.79
06 11 16 00-0025 LF 2" x 10" Pressure Treated Wood Purlin	3.77	0.87
06 11 16 00-0026 Framing (06 11 16)		
06 11 16 00-0027 Partition Framing (06 11 16 00-0026)		
06 11 16 00-0028 LF 2" x 4" Wood Stud Framing, For Partition Walls	1.69	0.87
06 11 16 00-0029 LF 2" x 6" Wood Stud Framing, For Partition Walls	2.03	0.93
06 11 16 00-0030 LF 2" x 8" Wood Stud Framing, For Partition Walls	2.38	0.99
06 11 16 00-0031 LF 2" x 4" Pressure Treated Wood Stud Framing, For Partition Walls.....	1.96	0.87
06 11 16 00-0032 LF 2" x 6" Pressure Treated Wood Stud Framing, For Partition Walls.....	2.47	0.93
06 11 16 00-0033 LF 2" x 8" Pressure Treated Wood Stud Framing, For Partition Walls.....	2.99	0.99
06 11 16 00-0034 Sills And Plates (06 11 16)		
06 11 16 00-0035 Sills (06 11 16 00-0034)		
Note: A horizontal member which rests on and is attached to the foundation.		
06 11 16 00-0036 LF 2" x 4" Wood Sill	2.89	1.64
For "Green" Materials (FSC and SCS certified), Add		
	0.06	
06 11 16 00-0037 LF 2" x 6" Wood Sill	3.45	1.86
For "Green" Materials (FSC and SCS certified), Add		
	0.11	
06 11 16 00-0038 LF 2" x 8" Wood Sill	4.10	2.07
For "Green" Materials (FSC and SCS certified), Add		
	0.15	
06 11 16 00-0039 LF 2" x 4" Pressure Treated Wood Sill.....	3.16	1.64
06 11 16 00-0040 LF 2" x 6" Pressure Treated Wood Sill.....	3.89	1.86
06 11 16 00-0041 LF 2" x 8" Pressure Treated Wood Sill.....	4.71	2.07
06 11 16 00-0042 Plates (06 11 16 00-0034)		
Note: A horizontal member connecting and terminating studs, posts, joists, rafters, etc. such as the top and bottom plate on a stud framed partition wall.		
06 11 16 00-0043 LF 2" x 4" Wood Plate.....	2.89	1.64
For "Green" Materials (FSC and SCS certified), Add		
	0.06	
06 11 16 00-0044 LF 2" x 6" Wood Plate.....	3.45	1.86
For "Green" Materials (FSC and SCS certified), Add		
	0.11	
06 11 16 00-0045 LF 2" x 8" Wood Plate.....	4.08	2.07
For "Green" Materials (FSC and SCS certified), Add		
	0.15	
06 11 16 00-0046 LF 2" x 4" Pressure Treated Wood Plate	3.16	1.64
06 11 16 00-0047 LF 2" x 6" Pressure Treated Wood Plate	3.89	1.86
06 11 16 00-0048 LF 2" x 8" Pressure Treated Wood Plate	4.69	2.07
06 11 16 00-0049 Sills And Plates From Redwood (06 11 16 00-0034)		
06 11 16 00-0050 Construction Grade/Rough (06 11 16 00-0049)		
06 11 16 00-0051 LF 2" x 6" Redwood, Construction Grade/Rough.....	5.98	1.86
06 11 16 00-0052 LF 2" x 8" Redwood, Construction Grade/Rough.....	8.05	2.07
06 11 16 00-0053 LF 2" x 10" Redwood, Construction Grade/Rough.....	9.79	2.30
06 11 16 00-0054 LF 2" x 12" Redwood, Construction Grade/Rough.....	11.82	2.51
06 11 16 00-0055 Con Heart/Smooth (06 11 16 00-0049)		
06 11 16 00-0056 LF 2" x 6" Redwood, Con Heart/Smooth.....	7.36	1.86
06 11 16 00-0057 LF 2" x 8" Redwood, Con Heart/Smooth.....	10.12	2.07
06 11 16 00-0058 LF 2" x 10" Redwood, Con Heart/Smooth.....	13.31	2.30
06 11 16 00-0059 LF 2" x 12" Redwood, Con Heart/Smooth.....	16.01	2.51
06 11 16 00-0060 Suspended Ceiling Framing (06 11 16)		
06 11 16 00-0061 LF 1" x 2" Wood Suspended Ceiling Framing.....	2.38	1.42
06 11 16 00-0062 LF 1" x 3" Wood Suspended Ceiling Framing.....	2.59	1.54
06 11 16 00-0063 LF 1" x 4" Wood Suspended Ceiling Framing.....	2.73	1.64
06 11 16 00-0064 LF 2" x 2" Wood Suspended Ceiling Framing.....	2.80	1.64
06 11 16 00-0065 LF 2" x 4" Wood Suspended Ceiling Framing.....	3.32	1.86
06 11 16 00-0066 LF 1" x 2" Pressure Treated Wood Suspended Ceiling Framing	2.57	1.42
06 11 16 00-0067 LF 1" x 3" Pressure Treated Wood Suspended Ceiling Framing	2.61	1.54
06 11 16 00-0068 LF 1" x 4" Pressure Treated Wood Suspended Ceiling Framing	2.88	1.64
06 11 16 00-0069 LF 2" x 2" Pressure Treated Wood Suspended Ceiling Framing	3.04	1.64
06 11 16 00-0070 LF 2" x 4" Pressure Treated Wood Suspended Ceiling Framing	3.55	1.86
06 11 16 00-0071 Posts And Girts (06 11 16)		
06 11 16 00-0072 Posts (06 11 16 00-0071)		
Note: A vertical, upright framing member.		
06 11 16 00-0073 LF 4" x 4" Wood Post.....	4.18	2.07
06 11 16 00-0074 LF 4" x 5" Wood Post.....	4.77	2.41
06 11 16 00-0075 LF 4" x 6" Wood Post.....	5.25	2.62
06 11 16 00-0076 LF 6" x 6" Wood Post.....	5.84	2.85

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 11 Wood Framing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 11 16 00-0077	LF	8" x 8" Wood Post.....	6.42	2.95
06 11 16 00-0078	LF	10" x 10" Wood Post.....	7.01	3.39
06 11 16 00-0079	LF	4" x 4" Pressure Treated Wood Post.....	5.73	2.07
06 11 16 00-0080	LF	3" x 6" Pressure Treated Wood Post.....	6.59	2.62
06 11 16 00-0081	LF	4" x 6" Pressure Treated Wood Post.....	8.05	2.62
06 11 16 00-0082	LF	6" x 6" Pressure Treated Wood Post.....	11.27	2.85
06 11 16 00-0083 Girts (06 11 16 00-0071)				
Note: A horizontal member at intermediate level between columns, studs, or posts.				
06 11 16 00-0084	LF	2" x 4" Wood Girt.....	2.01	0.78
06 11 16 00-0085	LF	2" x 6" Wood Girt.....	2.45	0.86
06 11 16 00-0086	LF	2" x 8" Wood Girt.....	2.92	0.96
06 11 16 00-0087	LF	2" x 10" Wood Girt.....	3.51	1.05
06 11 16 00-0088	LF	4" x 4" Wood Girt.....	4.06	1.58
06 11 16 00-0089	LF	4" x 5" Wood Girt.....	4.65	1.77
06 11 16 00-0090	LF	4" x 6" Wood Girt.....	5.23	1.97
06 11 16 00-0091	LF	6" x 6" Wood Girt.....	5.82	2.17
06 11 16 00-0092	LF	8" x 8" Wood Girt.....	6.41	2.36
06 11 16 00-0093	LF	10" x 10" Wood Girt.....	7.00	2.57
06 11 16 00-0094	LF	2" x 4" Pressure Treated Wood Girt.....	2.28	0.78
06 11 16 00-0095	LF	2" x 6" Pressure Treated Wood Girt.....	2.89	0.86
06 11 16 00-0096	LF	2" x 8" Pressure Treated Wood Girt.....	3.53	0.96
06 11 16 00-0097	LF	2" x 10" Pressure Treated Wood Girt.....	4.11	1.05
06 11 16 00-0098	LF	4" x 4" Pressure Treated Wood Girt.....	5.73	1.58
06 11 16 00-0099	LF	3" x 6" Pressure Treated Wood Girt.....	6.59	1.97
06 11 16 00-0100	LF	4" x 6" Pressure Treated Wood Girt.....	8.05	1.97
06 11 16 00-0101	LF	6" x 6" Pressure Treated Wood Girt.....	11.27	2.17
06 11 16 00-0102 Construction Grade/Rough Redwood Posts (06 11 16 00-0071)				
06 11 16 00-0103	LF	4" x 4" Redwood, Construction Grade/Rough Post.....	9.42	2.07
		For Smooth "Clear", Add	1.26	
06 11 16 00-0104	LF	4" x 5" Redwood, Construction Grade/Rough Post.....	11.38	2.41
		For Smooth "Clear", Add	1.57	
06 11 16 00-0105	LF	4" x 6" Redwood, Construction Grade/Rough Post.....	13.36	2.62
		For Smooth "Clear", Add	1.89	
06 11 16 00-0106	LF	4" x 8" Redwood, Construction Grade/Rough Post.....	16.68	2.70
		For Smooth "Clear", Add	2.52	
06 11 16 00-0107	LF	4" x 10" Redwood, Construction Grade/Rough Post.....	20.07	2.88
		For Smooth "Clear", Add	3.14	
06 11 16 00-0108	LF	6" x 6" Redwood, Construction Grade/Rough Post.....	18.48	2.85
		For Smooth "Clear", Add	2.83	
06 11 16 00-0109	LF	6" x 8" Redwood, Construction Grade/Rough Post.....	23.35	2.95
		For Smooth "Clear", Add	3.77	
06 11 16 00-0110	LF	6" x 10" Redwood, Construction Grade/Rough Post.....	28.20	2.77
		For Smooth "Clear", Add	4.72	
06 11 16 00-0111	LF	8" x 8" Redwood, Construction Grade/Rough Post.....	29.88	2.95
		For Smooth "Clear", Add	5.03	
06 11 16 00-0112 Stair Stringers (06 11 16)				
06 11 16 00-0113	LF	2" x 10" Wood Stair Stringer.....	7.95	4.37
		For "Green" Materials (FSC and SCS certified), Add	0.21	
06 11 16 00-0114	LF	2" x 12" Wood Stair Stringer.....	9.39	5.13
		For "Green" Materials (FSC and SCS certified), Add	0.26	
06 11 16 00-0115	LF	2" x 10" Pressure Treated Wood Stair Stringer.....	8.58	4.37
06 11 16 00-0116	LF	2" x 12" Pressure Treated Wood Stair Stringer.....	10.29	5.13
06 11 16 00-0117 Blocking And Sleepers (06 11 16)				
06 11 16 00-0118 Pressure Treated Lattice (06 11 16 00-0117)				
06 11 16 00-0119	SF	3/4" Thick Pressure Treated Wood Lattice.....	6.27	2.30
06 11 16 00-0120 Sleepers (06 11 16 00-0117)				
06 11 16 00-0121 Sleepers To Wood (06 11 16 00-0120)				
06 11 16 00-0122	LF	1" x 2" Pressure Treated Wood Sleeper On Wood.....	1.14	0.39
06 11 16 00-0123	LF	1" x 3" Pressure Treated Wood Sleeper On Wood.....	1.18	0.44
06 11 16 00-0124	LF	1" x 4" Pressure Treated Wood Sleeper On Wood.....	1.40	0.49
06 11 16 00-0125	LF	2" x 4" Pressure Treated Wood Sleeper On Wood.....	2.21	0.60
06 11 16 00-0126	LF	2" x 6" Pressure Treated Wood Sleeper On Wood.....	2.99	0.66
06 11 16 00-0127 Sleepers To Concrete (06 11 16 00-0120)				
06 11 16 00-0128	LF	1" x 2" Pressure Treated Wood Sleeper On Concrete.....	1.18	0.39
06 11 16 00-0129	LF	1" x 3" Pressure Treated Wood Sleeper On Concrete.....	1.21	0.44
06 11 16 00-0130	LF	1" x 4" Pressure Treated Wood Sleeper On Concrete.....	1.44	0.49
06 11 16 00-0131	LF	2" x 4" Pressure Treated Wood Sleeper On Concrete.....	2.32	0.60
06 11 16 00-0132	LF	2" x 6" Pressure Treated Wood Sleeper On Concrete.....	3.15	0.66



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 11 16 00-0133		Roofing Nailers <small>(06 11 16)</small>		
06 11 16 00-0134	LF	2" x 4" Pressure Treated Lumber, For Roofing Nailers	3.21	0.87
06 11 16 00-0135	LF	2" x 6" Pressure Treated Lumber, For Roofing Nailers	3.78	0.93
06 11 16 00-0136	LF	2" x 8" Pressure Treated Lumber, For Roofing Nailers	4.36	0.99

06 11 16 00-0137		Roofing Sleepers <small>(06 11 16)</small>		
06 11 16 00-0138	LF	2" x 4" Pressure Treated Lumber, For Roofing Sleepers	1.52	
06 11 16 00-0139	LF	4" x 4" Pressure Treated Lumber, For Roofing Sleepers	4.18	
06 11 16 00-0140	LF	4" x 6" Pressure Treated Lumber, For Roofing Sleepers	6.09	
06 11 16 00-0141	LF	6" x 6" Pressure Treated Lumber, For Roofing Sleepers	9.13	

06 11 16 00-0142 Canopy Framing, Bridging, And Furring (06 11 16)

06 11 16 00-0143 Wood And Steel Bridging (06 11 16 00-0142)

06 11 16 00-0144 Wood Bridging (06 11 16 00-0143)

06 11 16 00-0145	EA	1 Pair Wood Bridging, 1" x 3" Cross Type	8.79	3.83
		Note: For joists spaced at 16" on center.		
06 11 16 00-0146	EA	1 Pair Wood Bridging, 2" x 3" Cross Type	9.03	3.83
		Note: For joists spaced at 16" on center.		

06 11 16 00-0147 Steel Bridging (06 11 16 00-0143)

06 11 16 00-0148	EA	1 Pair Steel Bridging, Wood Joists At 16" On Center	11.38	3.83
06 11 16 00-0149	EA	1 Pair Steel Bridging, Wood Joists At 24" On Center	11.34	3.83

06 11 16 00-0150 Light Framing, Trim And Furring (06 11 16 00-0142)

06 11 16 00-0151 Redwood Light Framing, Trim And Furring (06 11 16 00-0150)

Note: S4S board, select grade 1

06 11 16 00-0152	LF	1" x 1" Redwood Light Framing, Trim And Furring	1.91	0.89
06 11 16 00-0153	LF	1" x 2" Redwood Light Framing, Trim And Furring	2.21	0.99
06 11 16 00-0154	LF	1" x 4" Redwood Light Framing, Trim And Furring	2.67	1.08
06 11 16 00-0155	LF	1" x 6" Redwood Light Framing, Trim And Furring	3.17	1.19
06 11 16 00-0156	LF	1" x 8" Redwood Light Framing, Trim And Furring	3.73	1.31
06 11 16 00-0157	LF	1" x 10" Redwood Light Framing, Trim And Furring	4.35	1.44
06 11 16 00-0158	LF	2" x 2" Redwood Light Framing, Trim And Furring	3.19	1.19
06 11 16 00-0159	LF	2" x 4" Redwood Light Framing, Trim And Furring	3.75	1.31

06 11 16 00-0160 Poplar Light Framing, Trim And Furring (06 11 16 00-0150)

Note: S4S board, select grade 1

06 11 16 00-0161	LF	1" x 1" Poplar Light Framing, Trim And Furring	2.18	0.89
06 11 16 00-0162	LF	1" x 2" Poplar Light Framing, Trim And Furring	2.65	0.99
06 11 16 00-0163	LF	1" x 4" Poplar Light Framing, Trim And Furring	3.29	1.08
06 11 16 00-0164	LF	1" x 6" Poplar Light Framing, Trim And Furring	4.12	1.19
06 11 16 00-0165	LF	1" x 8" Poplar Light Framing, Trim And Furring	4.77	1.31
06 11 16 00-0166	LF	1" x 10" Poplar Light Framing, Trim And Furring	6.22	1.44
06 11 16 00-0167	LF	1" x 12" Poplar Light Framing, Trim And Furring	6.69	1.44
06 11 16 00-0168	LF	2" x 2" Poplar Light Framing, Trim And Furring	5.31	1.19
06 11 16 00-0169	LF	2" x 4" Poplar Light Framing, Trim And Furring	5.94	1.31
06 11 16 00-0170	LF	2" x 6" Poplar Light Framing, Trim And Furring	7.87	1.44

06 11 16 00-0171 Maple Light Framing, Trim And Furring (06 11 16 00-0150)

Note: S4S board, select grade 1

06 11 16 00-0172	LF	1" x 4" Maple Light Framing, Trim And Furring	4.03	1.08
06 11 16 00-0173	LF	1" x 6" Maple Light Framing, Trim And Furring	5.27	1.19
06 11 16 00-0174	LF	1" x 8" Maple Light Framing, Trim And Furring	6.56	1.31

06 13 Heavy Timber Construction (06 10)

06 13 23 Heavy Timber Framing (06 13)

06 13 23 00-0001 Heavy Timber Framing (06 13 23)
 Note: Excludes fasteners. See CSI section 06 05 23 00-0093 for bolts and fasteners.

06 13 23 00-0002 Heavy Timber Beams (06 13 23 00-0001)

06 13 23 00-0003 Pine, Heavy Timber Beams (06 13 23 00-0002)

06 13 23 00-0004	LF	4" x 4", Pine, Heavy Timber Beam	6.12	1.94
06 13 23 00-0005	LF	4" x 6", Pine, Heavy Timber Beam	7.40	2.02
06 13 23 00-0006	LF	4" x 8", Pine, Heavy Timber Beam	8.68	2.10
06 13 23 00-0007	LF	4" x 10", Pine, Heavy Timber Beam	11.27	2.24
06 13 23 00-0008	LF	4" x 12", Pine, Heavy Timber Beam	13.39	2.38
06 13 23 00-0009	LF	6" x 6", Pine, Heavy Timber Beam	9.36	2.19

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 13 Heavy Timber Construction**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
06 13 23 00-0010	LF	6" x 8", Pine, Heavy Timber Beam.....		11.23	2.30
06 13 23 00-0011	LF	6" x 10", Pine, Heavy Timber Beam.....		15.10	2.46
06 13 23 00-0012	LF	6" x 12", Pine, Heavy Timber Beam.....		17.97	2.51
06 13 23 00-0013	LF	8" x 8", Pine, Heavy Timber Beam.....		13.70	2.38
06 13 23 00-0014	LF	8" x 10", Pine, Heavy Timber Beam.....		18.50	2.46
06 13 23 00-0015	LF	8" x 12", Pine, Heavy Timber Beam.....		22.36	2.51
06 13 23 00-0016	LF	10" x 10", Pine, Heavy Timber Beam.....		22.09	2.51
06 13 23 00-0017	LF	10" x 12", Pine, Heavy Timber Beam.....		27.04	2.73
06 13 23 00-0018	LF	12" x 12", Pine, Heavy Timber Beam.....		31.88	3.01
06 13 23 00-0019 Douglas Fir, Heavy Timber Beams (06 13 23 00-0002)					
06 13 23 00-0020	LF	4" x 4", Douglas Fir, Heavy Timber Beam.....		6.34	1.94
06 13 23 00-0021	LF	4" x 6", Douglas Fir, Heavy Timber Beam.....		7.74	2.02
06 13 23 00-0022	LF	4" x 8", Douglas Fir, Heavy Timber Beam.....		9.14	2.10
06 13 23 00-0023	LF	4" x 10", Douglas Fir, Heavy Timber Beam.....		11.95	2.24
06 13 23 00-0024	LF	4" x 12", Douglas Fir, Heavy Timber Beam.....		14.24	2.38
06 13 23 00-0025	LF	6" x 6", Douglas Fir, Heavy Timber Beam.....		9.86	2.19
06 13 23 00-0026	LF	6" x 8", Douglas Fir, Heavy Timber Beam.....		11.89	2.30
06 13 23 00-0027	LF	6" x 10", Douglas Fir, Heavy Timber Beam.....		16.11	2.46
06 13 23 00-0028	LF	6" x 12", Douglas Fir, Heavy Timber Beam.....		19.27	2.51
06 13 23 00-0029	LF	8" x 8", Douglas Fir, Heavy Timber Beam.....		14.59	2.38
06 13 23 00-0030	LF	8" x 10", Douglas Fir, Heavy Timber Beam.....		19.85	2.46
06 13 23 00-0031	LF	8" x 12", Douglas Fir, Heavy Timber Beam.....		24.09	2.51
06 13 23 00-0032	LF	10" x 10", Douglas Fir, Heavy Timber Beam.....		23.78	2.51
06 13 23 00-0033	LF	10" x 12", Douglas Fir, Heavy Timber Beam.....		29.17	2.73
06 13 23 00-0034	LF	12" x 12", Douglas Fir, Heavy Timber Beam.....		34.46	3.01
06 13 23 00-0035 Pressure Treated, Heavy Timber Beams (06 13 23 00-0002)					
06 13 23 00-0036	LF	4" x 4", Pressure Treated, Heavy Timber Beam.....		6.47	1.94
06 13 23 00-0037	LF	4" x 6", Pressure Treated, Heavy Timber Beam.....		8.17	2.02
06 13 23 00-0038	LF	4" x 8", Pressure Treated, Heavy Timber Beam.....		9.64	2.10
06 13 23 00-0039	LF	4" x 10", Pressure Treated, Heavy Timber Beam.....		12.71	2.24
06 13 23 00-0040	LF	4" x 12", Pressure Treated, Heavy Timber Beam.....		15.21	2.38
06 13 23 00-0041	LF	6" x 6", Pressure Treated, Heavy Timber Beam.....		11.27	2.19
06 13 23 00-0042	LF	6" x 8", Pressure Treated, Heavy Timber Beam.....		13.81	2.30
06 13 23 00-0043	LF	6" x 10", Pressure Treated, Heavy Timber Beam.....		16.56	2.46
06 13 23 00-0044	LF	6" x 12", Pressure Treated, Heavy Timber Beam.....		20.31	2.51
06 13 23 00-0045	LF	8" x 8", Pressure Treated, Heavy Timber Beam.....		20.51	2.38
06 13 23 00-0046	LF	8" x 10", Pressure Treated, Heavy Timber Beam.....		23.83	2.46
06 13 23 00-0047	LF	8" x 12", Pressure Treated, Heavy Timber Beam.....		28.05	2.51
06 13 23 00-0048	LF	10" x 10", Pressure Treated, Heavy Timber Beam.....		28.16	2.51
06 13 23 00-0049	LF	10" x 12", Pressure Treated, Heavy Timber Beam.....		37.29	2.73
06 13 23 00-0050	LF	12" x 12", Pressure Treated, Heavy Timber Beam.....		44.20	3.01
06 13 23 00-0051 Heavy Timber Columns (06 13 23 00-0001)					
06 13 23 00-0052 Pine, Heavy Timber Columns (06 13 23 00-0051)					
06 13 23 00-0053	LF	4" x 4", Pine, Heavy Timber Column.....		4.28	1.02
06 13 23 00-0054	LF	4" x 6", Pine, Heavy Timber Column.....		5.51	1.08
06 13 23 00-0055	LF	4" x 8", Pine, Heavy Timber Column.....		6.69	1.11
06 13 23 00-0056	LF	4" x 10", Pine, Heavy Timber Column.....		9.15	1.18
06 13 23 00-0057	LF	4" x 12", Pine, Heavy Timber Column.....		11.13	1.25
06 13 23 00-0058	LF	6" x 6", Pine, Heavy Timber Column.....		7.31	1.14
06 13 23 00-0059	LF	6" x 8", Pine, Heavy Timber Column.....		9.09	1.19
06 13 23 00-0060	LF	6" x 10", Pine, Heavy Timber Column.....		12.77	1.29
06 13 23 00-0061	LF	6" x 12", Pine, Heavy Timber Column.....		15.58	1.32
06 13 23 00-0062	LF	8" x 8", Pine, Heavy Timber Column.....		11.44	1.25
06 13 23 00-0063	LF	8" x 10", Pine, Heavy Timber Column.....		16.17	1.29
06 13 23 00-0064	LF	8" x 12", Pine, Heavy Timber Column.....		19.93	1.35
06 13 23 00-0065	LF	10" x 10", Pine, Heavy Timber Column.....		19.67	1.35
06 13 23 00-0066	LF	10" x 12", Pine, Heavy Timber Column.....		24.45	1.43
06 13 23 00-0067	LF	12" x 12", Pine, Heavy Timber Column.....		29.03	1.59
06 13 23 00-0068 Douglas Fir, Heavy Timber Columns (06 13 23 00-0051)					
06 13 23 00-0069	LF	4" x 4", Douglas Fir, Heavy Timber Column.....		4.50	1.02
06 13 23 00-0070	LF	4" x 6", Douglas Fir, Heavy Timber Column.....		5.85	1.08
06 13 23 00-0071	LF	4" x 8", Douglas Fir, Heavy Timber Column.....		7.15	1.11
06 13 23 00-0072	LF	4" x 10", Douglas Fir, Heavy Timber Column.....		9.83	1.18
06 13 23 00-0073	LF	4" x 12", Douglas Fir, Heavy Timber Column.....		11.98	1.25
06 13 23 00-0074	LF	6" x 6", Douglas Fir, Heavy Timber Column.....		7.81	1.14
06 13 23 00-0075	LF	6" x 8", Douglas Fir, Heavy Timber Column.....		9.75	1.19
06 13 23 00-0076	LF	6" x 10", Douglas Fir, Heavy Timber Column.....		13.78	1.29
06 13 23 00-0077	LF	6" x 12", Douglas Fir, Heavy Timber Column.....		16.88	1.32
06 13 23 00-0078	LF	8" x 8", Douglas Fir, Heavy Timber Column.....		12.33	1.25
06 13 23 00-0079	LF	8" x 10", Douglas Fir, Heavy Timber Column.....		17.52	1.29
06 13 23 00-0080	LF	8" x 12", Douglas Fir, Heavy Timber Column.....		21.66	1.35
06 13 23 00-0081	LF	10" x 10", Douglas Fir, Heavy Timber Column.....		21.36	1.35

06	06 Wood, Plastics, and Composites
	06 10 Rough Carpentry
	06 15 Wood Decking



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 15 13 00-0034	Wood Ramp Systems <small>(06 15 13)</small> Note: Includes the decking, joists, girders, railing posts at corners and along ramp, pickets and railing. Excludes ground posts.		
06 15 13 00-0035	Pressure Treated Wood Ramp System <small>(06 15 13 00-0034)</small>		
06 15 13 00-0036	2" x 6" Joists, Pressure Treated Wood Ramp System <small>(06 15 13 00-0035)</small>		
06 15 13 00-0037	SF 5/4" x 4" Pressure Treated Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	43.62	7.51
06 15 13 00-0038	SF 5/4" x 6" Pressure Treated Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	42.11	7.13
06 15 13 00-0039	SF 2" x 4" Pressure Treated Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	45.17	7.70
06 15 13 00-0040	SF 2" x 6" Pressure Treated Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	43.67	7.33
06 15 13 00-0041	2" x 8" Joists, Pressure Treated Wood Ramp System <small>(06 15 13 00-0035)</small>		
06 15 13 00-0042	SF 5/4" x 4" Pressure Treated Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	45.01	7.70
06 15 13 00-0043	SF 5/4" x 6" Pressure Treated Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	43.48	7.33
06 15 13 00-0044	SF 2" x 4" Pressure Treated Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	46.64	7.90
06 15 13 00-0045	SF 2" x 6" Pressure Treated Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	45.10	7.51
06 15 13 00-0046	2" x 10" Joists, Pressure Treated Wood Ramp System <small>(06 15 13 00-0035)</small>		
06 15 13 00-0047	SF 5/4" x 4" Pressure Treated Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	46.46	7.89
06 15 13 00-0048	SF 5/4" x 6" Pressure Treated Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	44.90	7.50
06 15 13 00-0049	SF 2" x 4" Pressure Treated Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	48.13	8.10
06 15 13 00-0050	SF 2" x 6" Pressure Treated Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	46.57	7.69
06 15 13 00-0051	Redwood With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0034)</small>		
06 15 13 00-0052	2" x 6" Joists, Redwood With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0051)</small>		
06 15 13 00-0053	SF 5/4" x 4" Redwood Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	46.13	7.51
06 15 13 00-0054	SF 5/4" x 6" Redwood Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	44.75	7.13
06 15 13 00-0055	SF 2" x 4" Redwood Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	48.33	7.70
06 15 13 00-0056	SF 2" x 6" Redwood Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	46.64	7.33
06 15 13 00-0057	2" x 8" Joists, Redwood With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0051)</small>		
06 15 13 00-0058	SF 5/4" x 4" Redwood Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	47.69	7.70
06 15 13 00-0059	SF 5/4" x 6" Redwood Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	46.28	7.33
06 15 13 00-0060	SF 2" x 4" Redwood Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	50.00	7.90
06 15 13 00-0061	SF 2" x 6" Redwood Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	48.27	7.51
06 15 13 00-0062	2" x 10" Joists, Redwood With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0051)</small>		
06 15 13 00-0063	SF 5/4" x 4" Redwood Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	50.68	7.89
06 15 13 00-0064	SF 5/4" x 6" Redwood Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	49.23	7.50
06 15 13 00-0065	SF 2" x 4" Redwood Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	53.16	8.10
06 15 13 00-0066	SF 2" x 6" Redwood Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	51.98	7.69
06 15 13 00-0067	Cedar With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0034)</small>		
06 15 13 00-0068	2" x 6" Joists, Cedar With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0067)</small>		
06 15 13 00-0069	SF 5/4" x 4" Cedar Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	44.51	7.51
06 15 13 00-0070	SF 5/4" x 6" Cedar Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	43.04	7.13
06 15 13 00-0071	SF 2" x 4" Cedar Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	46.14	7.70
06 15 13 00-0072	SF 2" x 6" Cedar Decking, 2" x 6" Pressure Treated Joists, Wood Ramp System	44.68	7.33
06 15 13 00-0073	2" x 8" Joists, Cedar With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0067)</small>		
06 15 13 00-0074	SF 5/4" x 4" Cedar Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	45.96	7.70
06 15 13 00-0075	SF 5/4" x 6" Cedar Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	44.46	7.33
06 15 13 00-0076	SF 2" x 4" Cedar Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	47.67	7.90
06 15 13 00-0077	SF 2" x 6" Cedar Decking, 2" x 8" Pressure Treated Joists, Wood Ramp System	46.18	7.51
06 15 13 00-0078	2" x 10" Joists, Cedar With Pressure Treated Joists, Wood Ramp System <small>(06 15 13 00-0067)</small>		
06 15 13 00-0079	SF 5/4" x 4" Cedar Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	47.50	7.89
06 15 13 00-0080	SF 5/4" x 6" Cedar Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	45.96	7.50
06 15 13 00-0081	SF 2" x 4" Cedar Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	49.22	8.10
06 15 13 00-0082	SF 2" x 6" Cedar Decking, 2" x 10" Pressure Treated Joists, Wood Ramp System	47.71	7.69
06 15 13 00-0083	Wood Stair Systems <small>(06 15 13)</small> Note: Includes the decking, joists, girders, railing posts at corners and along stairs, pickets and railing. Excludes ground posts.		



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 15 13 00-0084	Pressure Treated Wood Stair System <small>(06 15 13 00-0083)</small>		
06 15 13 00-0085	2" x 10" Joists, Pressure Treated Wood Stair System <small>(06 15 13 00-0084)</small>		
06 15 13 00-0086	RSR 3' Wide, 5/4" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	119.19	18.49
06 15 13 00-0087	RSR 3' Wide, 5/4" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	116.44	17.56
06 15 13 00-0088	RSR 3' Wide, 2" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	122.90	18.96
06 15 13 00-0089	RSR 3' Wide, 2" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	119.54	18.01
06 15 13 00-0090	RSR 3'-6" Wide, 5/4" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	125.14	19.41
06 15 13 00-0091	RSR 3'-6" Wide, 5/4" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	122.27	18.45
06 15 13 00-0092	RSR 3'-6" Wide, 2" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	129.04	19.91
06 15 13 00-0093	RSR 3'-6" Wide, 2" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	125.52	18.92
06 15 13 00-0094	RSR 4' Wide, 5/4" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	131.25	20.39
06 15 13 00-0095	RSR 4' Wide, 5/4" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	128.21	19.36
06 15 13 00-0096	RSR 4' Wide, 2" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	135.35	20.91
06 15 13 00-0097	RSR 4' Wide, 2" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	131.63	19.85
06 15 13 00-0098	RSR 5' Wide, 5/4" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	139.44	21.40
06 15 13 00-0099	RSR 5' Wide, 5/4" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	136.36	20.34
06 15 13 00-0100	RSR 5' Wide, 2" x 4" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	143.82	21.96
06 15 13 00-0101	RSR 5' Wide, 2" x 6" Pressure Treated Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	139.98	20.86
06 15 13 00-0102	2" x 12" Joists, Pressure Treated Wood Stair System <small>(06 15 13 00-0084)</small>		
06 15 13 00-0103	RSR 3' Wide, 5/4" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	121.71	18.95
06 15 13 00-0104	RSR 3' Wide, 5/4" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	118.39	18.00
06 15 13 00-0105	RSR 3' Wide, 2" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	125.65	19.44
06 15 13 00-0106	RSR 3' Wide, 2" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	122.27	18.47
06 15 13 00-0107	RSR 3'-6" Wide, 5/4" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	127.80	19.90
06 15 13 00-0108	RSR 3'-6" Wide, 5/4" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	124.31	18.91
06 15 13 00-0109	RSR 3'-6" Wide, 2" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	131.93	20.41
06 15 13 00-0110	RSR 3'-6" Wide, 2" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	128.38	19.38
06 15 13 00-0111	RSR 4' Wide, 5/4" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	134.04	20.89
06 15 13 00-0112	RSR 4' Wide, 5/4" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	130.37	19.84
06 15 13 00-0113	RSR 4' Wide, 2" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	138.36	21.42
06 15 13 00-0114	RSR 4' Wide, 2" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	134.63	20.37
06 15 13 00-0115	RSR 5' Wide, 5/4" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	142.39	21.95
06 15 13 00-0116	RSR 5' Wide, 5/4" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	138.60	20.85
06 15 13 00-0117	RSR 5' Wide, 2" x 4" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	147.01	22.50
06 15 13 00-0118	RSR 5' Wide, 2" x 6" Pressure Treated Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	143.16	21.37
06 15 13 00-0119	Redwood With Pressure Treated Joists, Wood Stair System <small>(06 15 13 00-0083)</small>		
06 15 13 00-0120	2" x 10" Joists, Redwood With Pressure Treated Joists, Wood Stair System <small>(06 15 13 00-0119)</small>		
06 15 13 00-0121	RSR 3' Wide, 5/4" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	134.08	18.49
06 15 13 00-0122	RSR 3' Wide, 5/4" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	131.19	17.56
06 15 13 00-0123	RSR 3' Wide, 2" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	138.71	18.96
06 15 13 00-0124	RSR 3' Wide, 2" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	135.82	18.01
06 15 13 00-0125	RSR 3'-6" Wide, 5/4" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	140.77	19.41
06 15 13 00-0126	RSR 3'-6" Wide, 5/4" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	137.75	18.45
06 15 13 00-0127	RSR 3'-6" Wide, 2" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	145.65	19.91
06 15 13 00-0128	RSR 3'-6" Wide, 2" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	142.61	18.92
06 15 13 00-0129	RSR 4' Wide, 5/4" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	147.59	20.39
06 15 13 00-0130	RSR 4' Wide, 5/4" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	144.40	19.36
06 15 13 00-0131	RSR 4' Wide, 2" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	152.70	20.91
06 15 13 00-0132	RSR 4' Wide, 2" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	149.49	19.85
06 15 13 00-0133	RSR 5' Wide, 5/4" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	157.41	21.40
06 15 13 00-0134	RSR 5' Wide, 5/4" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	154.16	20.34
06 15 13 00-0135	RSR 5' Wide, 2" x 4" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	162.90	21.96
06 15 13 00-0136	RSR 5' Wide, 2" x 6" Redwood Decking With 2" x 10" Pressure Treated Joists, Wood Stair System	159.63	20.86
06 15 13 00-0137	2" x 12" Joists, Redwood With Pressure Treated Joists, Wood Stair System <small>(06 15 13 00-0119)</small>		
06 15 13 00-0138	RSR 3' Wide, 5/4" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	132.20	18.95
06 15 13 00-0139	RSR 3' Wide, 5/4" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	129.26	18.00
06 15 13 00-0140	RSR 3' Wide, 2" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	136.58	19.44
06 15 13 00-0141	RSR 3' Wide, 2" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	133.71	18.47
06 15 13 00-0142	RSR 3'-6" Wide, 5/4" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	138.82	19.90
06 15 13 00-0143	RSR 3'-6" Wide, 5/4" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	135.73	18.91
06 15 13 00-0144	RSR 3'-6" Wide, 2" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	143.40	20.41
06 15 13 00-0145	RSR 3'-6" Wide, 2" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	140.39	19.38
06 15 13 00-0146	RSR 4' Wide, 5/4" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	145.55	20.89
06 15 13 00-0147	RSR 4' Wide, 5/4" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	142.30	19.84
06 15 13 00-0148	RSR 4' Wide, 2" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	150.35	21.42
06 15 13 00-0149	RSR 4' Wide, 2" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	147.18	20.37
06 15 13 00-0150	RSR 5' Wide, 5/4" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	155.06	21.95
06 15 13 00-0151	RSR 5' Wide, 5/4" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	151.72	20.85
06 15 13 00-0152	RSR 5' Wide, 2" x 4" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	160.20	22.50
06 15 13 00-0153	RSR 5' Wide, 2" x 6" Redwood Decking With 2" x 12" Pressure Treated Joists, Wood Stair System	156.97	21.37

06	06	Wood, Plastics, and Composites
	06 10	Rough Carpentry
	06 15	Wood Decking



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 15 13 00-0154	Wood Deck And Ramp Systems Repairs <small>(06 15 13)</small> Note: Includes removal of material and screws. Excludes anchors and bolts.		
06 15 13 00-0155	Deck Joist Or Girt <small>(06 15 13 00-0154)</small> See CSI section 06 11 16 00-0012 for treated wood joist replacement.		
06 15 13 00-0156	Deck Boards <small>(06 15 13 00-0154)</small>		
06 15 13 00-0157	LF 5/4" x 4" Round Edge Pressure Treated Deck Boards.....	2.01	0.84
06 15 13 00-0158	LF 5/4" x 6" Round Edge Pressure Treated Deck Boards.....	2.23	1.00
06 15 13 00-0159	LF 2" x 4" Round Edge Pressure Treated Deck Boards.....	2.19	1.00
06 15 13 00-0160	LF 2" x 6" Round Edge Pressure Treated Deck Boards.....	2.88	1.15
06 15 13 00-0161	LF 2" x 8" Round Edge Pressure Treated Deck Boards.....	3.68	1.37
06 15 13 00-0162	LF 2" x 10" Round Edge Pressure Treated Deck Boards.....	4.51	1.69
06 15 13 00-0163	LF 2" x 12" Round Edge Pressure Treated Deck Boards.....	5.56	1.99
06 15 13 00-0164	LF 2" x 4" Round Edge Cedar Deck Boards.....	2.41	1.00
06 15 13 00-0165	LF 2" x 6" Round Edge Cedar Deck Boards.....	3.09	1.15
06 15 13 00-0166	LF 2" x 4" Round Edge Redwood Deck Boards.....	2.63	1.00
06 15 13 00-0167	LF 2" x 6" Round Edge Redwood Deck Boards.....	3.41	1.15
06 15 13 00-0168	Deck Railing And Pickets <small>(06 15 13 00-0154)</small>		
06 15 13 00-0169	LF 2" x 4" Pressure Treated Deck Railing.....	2.19	1.00
06 15 13 00-0170	LF 2" x 2" Pressure Treated Deck Railing Picket.....	1.53	0.76
06 15 13 00-0171	LF 2" x 4" Cedar Deck Railing.....	2.41	1.00
06 15 13 00-0172	LF 2" x 2" Cedar Deck Railing Picket.....	1.82	0.76
06 15 13 00-0173	LF 2" x 4" Redwood Deck Railing.....	2.63	1.00
06 15 13 00-0174	LF 2" x 2" Redwood Deck Railing Picket.....	1.99	0.76
06 15 13 00-0175	Deck Posts <small>(06 15 13 00-0154)</small> See CSI section 06 11 16 00-0071 for treated wood post replacement, 06 51 13 00-0024 for plastic/composite lumber column replacement.		

06 16 Sheathing (06 10)

06 16 23 Subflooring (06 16)

06 16 23 00-0001	Board Type Subflooring <small>(06 16 23)</small>		
06 16 23 00-0002	SF 1" x 8" Regular Surface Board Type Subfloor..... Note: 4 Sides Laid In A Regular Pattern. <i>For Water Resistant Coating Or Treatment, Add</i> <i>For Foil Backing, Add</i> <i>For Tongue And Groove, Add</i>	3.29 0.08 0.13 0.09	0.87
06 16 23 00-0003	SF 1" x 8" Diagonal Surface Board Type Subfloor..... Note: 4 Sides Laid In A Diagonal Pattern. <i>For Water Resistant Coating Or Treatment, Add</i> <i>For Foil Backing, Add</i> <i>For Tongue And Groove, Add</i>	3.65 0.08 0.13 0.09	1.10
06 16 23 00-0004	SF 1" x 10" Regular Surface Board Type Subfloor..... Note: 4 sides laid in a regular pattern. <i>For Water Resistant Coating Or Treatment, Add</i> <i>For Foil Backing, Add</i> <i>For Tongue And Groove, Add</i>	3.16 0.08 0.14 0.10	0.76
06 16 23 00-0005	SF 1" x 10" Diagonal Surface Board Type Subfloor..... Note: 4 sides laid in a diagonal pattern. <i>For Water Resistant Coating Or Treatment, Add</i> <i>For Foil Backing, Add</i> <i>For Tongue And Groove, Add</i>	3.42 0.08 0.14 0.10	0.87

06 16 33 Wood Board Sheathing (06 16)

06 16 33 00-0001	Plywood <small>(06 16 33)</small>		
06 16 33 00-0002	Roof Decking <small>(06 16 33 00-0001)</small>		
06 16 33 00-0003	SF 3/8" Thick CDX Plywood Roof Decking..... Note: Applied to wood rafters. <i>For ACQ Preservative Treatment, Add</i> <i>For Shear Wall Construction, Add</i> <i>For Exterior CC Grade Plywood, Add</i> <i>For Application To Metal Studs, Joists, Or Rafters, Add</i> <i>For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add</i> <i>For Fire Retardant Treatment, Add</i> <i>For >1,696 To 3,200, Deduct</i> <i>For >3,200 To 6,400, Deduct</i> <i>For >6,400 To 12,800, Deduct</i> <i>For >12,800, Deduct</i>	1.97 0.33 0.26 0.10 0.26 1.94 0.54 -0.04 -0.06 -0.11 -0.15	0.55



Wood, Plastics, and Composites	06	06
Rough Carpentry	06 10	
Sheathing	06 16	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 16 33 00-0004 SF 1/2" Thick CDX Plywood Roof Decking	2.23	0.66
Note: Applied to wood rafters.		
For ACQ Preservative Treatment, Add	0.40	
For Shear Wall Construction, Add	0.28	
For Exterior CC Grade Plywood, Add	0.12	
For Application To Metal Studs, Joists, Or Rafters, Add	0.28	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.10	
For Fire Retardant Treatment, Add	0.66	
For >1,696 To 3,200, Deduct	-0.05	
For >3,200 To 6,400, Deduct	-0.07	
For >6,400 To 12,800, Deduct	-0.13	
For >12,800, Deduct	-0.17	
06 16 33 00-0005 SF 5/8" Thick CDX Plywood Roof Decking	2.58	0.66
Note: Applied to wood rafters.		
For ACQ Preservative Treatment, Add	0.51	
For Tongue And Groove, Add	0.07	
For Shear Wall Construction, Add	0.30	
For Exterior CC Grade Plywood, Add	0.16	
For Application To Metal Studs, Joists, Or Rafters, Add	0.30	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.27	
For Fire Retardant Treatment, Add	0.85	
For >1,696 To 3,200, Deduct	-0.06	
For >3,200 To 6,400, Deduct	-0.10	
For >6,400 To 12,800, Deduct	-0.16	
For >12,800, Deduct	-0.20	
06 16 33 00-0006 SF 3/4" Thick CDX Plywood Roof Decking	2.87	0.76
Note: Applied to wood rafters.		
For ACQ Preservative Treatment, Add	0.60	
For Tongue And Groove, Add	0.09	
For Shear Wall Construction, Add	0.33	
For Exterior CC Grade Plywood, Add	0.19	
For Application To Metal Studs, Joists, Or Rafters, Add	0.33	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.45	
For Fire Retardant Treatment, Add	0.98	
For >1,696 To 3,200, Deduct	-0.07	
For >3,200 To 6,400, Deduct	-0.11	
For >6,400 To 12,800, Deduct	-0.18	
For >12,800, Deduct	-0.23	
06 16 33 00-0007 SF 1" Thick CDX Plywood Roof Decking	3.45	0.87
Note: Applied to wood rafters.		
For ACQ Preservative Treatment, Add	0.80	
For Tongue And Groove, Add	0.12	
For Shear Wall Construction, Add	0.36	
For Exterior CC Grade Plywood, Add	0.25	
For Application To Metal Studs, Joists, Or Rafters, Add	0.36	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.67	
For Fire Retardant Treatment, Add	1.32	
For >1,696 To 3,200, Deduct	-0.10	
For >3,200 To 6,400, Deduct	-0.15	
For >6,400 To 12,800, Deduct	-0.23	
For >12,800, Deduct	-0.29	
06 16 33 00-0008 Wall Sheathing (06 16 33 00-0001)		
06 16 33 00-0009 SF 1/4" Interior BC Plywood Wall Sheathing	2.30	0.76
Note: Applied to wall studs.		
For Ceiling Installation, Add	0.16	
For Shear Wall Construction, Add	0.33	
For Exterior CC Grade Plywood, Add	0.10	
For Application To Metal Studs, Joists, Or Rafters, Add	0.33	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.45	
For Fire Retardant Treatment, Add	0.53	
For >1,696 To 3,200, Deduct	-0.04	
For >3,200 To 6,400, Deduct	-0.06	
For >6,400 To 12,800, Deduct	-0.11	
For >12,800, Deduct	-0.16	
06 16 33 00-0010 SF 5/16" Interior BC Plywood Wall Sheathing	2.34	0.76
Note: Applied to wall studs.		
For Ceiling Installation, Add	0.16	
For Shear Wall Construction, Add	0.33	
For Exterior CC Grade Plywood, Add	0.11	
For Application To Metal Studs, Joists, Or Rafters, Add	0.33	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.45	
For Fire Retardant Treatment, Add	0.56	
For >1,696 To 3,200, Deduct	-0.04	
For >3,200 To 6,400, Deduct	-0.06	
For >6,400 To 12,800, Deduct	-0.12	
For >12,800, Deduct	-0.17	

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 16 Sheathing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 16 33 00-0011	SF	3/8" Interior BC Plywood Wall Sheathing.....	2.40	0.87
		Note: Applied to wall studs.		
		For Ceiling Installation, Add	0.16	
		For Shear Wall Construction, Add	0.33	
		For Exterior CC Grade Plywood, Add	0.12	
		For Application To Metal Studs, Joists, Or Rafters, Add	0.33	
		For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.45	
		For Fire Retardant Treatment, Add	0.61	
		For >1,696 To 3,200, Deduct	-0.05	
		For >3,200 To 6,400, Deduct	-0.07	
		For >6,400 To 12,800, Deduct	-0.13	
		For >12,800, Deduct	-0.17	
06 16 33 00-0012	SF	1/2" Interior BC Plywood Wall Sheathing.....	2.71	0.87
		Note: Applied to wall studs.		
		For Ceiling Installation, Add	0.17	
		For Shear Wall Construction, Add	0.35	
		For Exterior CC Grade Plywood, Add	0.15	
		For Application To Metal Studs, Joists, Or Rafters, Add	0.35	
		For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.61	
		For Fire Retardant Treatment, Add	0.77	
		For >1,696 To 3,200, Deduct	-0.06	
		For >3,200 To 6,400, Deduct	-0.09	
		For >6,400 To 12,800, Deduct	-0.15	
		For >12,800, Deduct	-0.20	
06 16 33 00-0013	SF	5/8" Interior BC Plywood Wall Sheathing.....	3.09	0.99
		Note: Applied to wall studs.		
		For Ceiling Installation, Add	0.19	
		For Shear Wall Construction, Add	0.37	
		For Exterior CC Grade Plywood, Add	0.18	
		For Application To Metal Studs, Joists, Or Rafters, Add	0.37	
		For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.81	
		For Fire Retardant Treatment, Add	0.96	
		For >1,696 To 3,200, Deduct	-0.07	
		For >3,200 To 6,400, Deduct	-0.11	
		For >6,400 To 12,800, Deduct	-0.18	
		For >12,800, Deduct	-0.24	
06 16 33 00-0014	SF	3/4" Interior BC Plywood Wall Sheathing.....	3.40	1.10
		Note: Applied to wall studs.		
		For Ceiling Installation, Add	0.20	
		For Shear Wall Construction, Add	0.40	
		For Exterior CC Grade Plywood, Add	0.21	
		For Application To Metal Studs, Joists, Or Rafters, Add	0.40	
		For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	3.02	
		For Fire Retardant Treatment, Add	1.10	
		For >1,696 To 3,200, Deduct	-0.08	
		For >3,200 To 6,400, Deduct	-0.13	
		For >6,400 To 12,800, Deduct	-0.20	
		For >12,800, Deduct	-0.27	
06 16 33 00-0015		Floor Decking <small>(06 16 33 00-0001)</small>		
		Note: Includes patching of seams and all fastener holes where necessary.		
06 16 33 00-0016	SF	1/2" AC Fir Plywood Floor Decking.....	2.54	0.66
		Note: Applied to floor or joists.		
		For ACQ Preservative Treatment, Add	0.57	
		For Exterior Glue, Add	0.11	
		For Marine Grade, Add	0.92	
		For Tongue And Groove, Add	0.08	
		For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.04	
		For Fire Retardant Treatment, Add	0.93	
		For >1,696 To 3,200, Deduct	-0.07	
		For >3,200 To 6,400, Deduct	-0.11	
		For >6,400 To 12,800, Deduct	-0.16	
		For >12,800, Deduct	-0.21	
06 16 33 00-0017	SF	5/8" AC Fir Plywood Floor Decking.....	2.93	0.66
		Note: Applied to floor or joists.		
		For ACQ Preservative Treatment, Add	0.69	
		For Exterior Glue, Add	0.13	
		For Marine Grade, Add	1.13	
		For Tongue And Groove, Add	0.10	
		For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.24	
		For Fire Retardant Treatment, Add	1.14	
		For >1,696 To 3,200, Deduct	-0.09	
		For >3,200 To 6,400, Deduct	-0.13	
		For >6,400 To 12,800, Deduct	-0.20	
		For >12,800, Deduct	-0.25	



Wood, Plastics, and Composites	06	06
Rough Carpentry	06 10	
Sheathing	06 16	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 16 33 00-0018 SF 3/4" AC Fir Plywood Floor Decking.....	3.15	0.66
Note: Applied to floor or joists.		
For ACQ Preservative Treatment, Add	0.75	
For Exterior Glue, Add	0.15	
For Marine Grade, Add	1.23	
For Tongue And Groove, Add	0.11	
For Selective Replacement <400 (Includes Removal Of Damaged Plywood And Fitting New Plywood To Size), Add	2.37	
For Fire Retardant Treatment, Add	1.24	
For >1,696 To 3,200, Deduct	-0.09	
For >3,200 To 6,400, Deduct	-0.14	
For >6,400 To 12,800, Deduct	-0.21	
For >12,800, Deduct	-0.27	
06 16 33 00-0019 Underlayment Grade (06 16 33 00-0001)		
Note: Includes patching of seams and all fastener holes where necessary.		
06 16 33 00-0020 SF 1/4" Thick Plywood Underlayment BC Grade	1.89	0.66
For Fire Retardant Treatment, Add	0.50	
For >1,696 To 3,200, Deduct	-0.04	
For >3,200 To 6,400, Deduct	-0.06	
For >6,400 To 12,800, Deduct	-0.09	
For >12,800, Deduct	-0.14	
06 16 33 00-0021 SF 3/8" Thick Plywood Underlayment BC Grade	2.02	0.66
For Fire Retardant Treatment, Add	0.55	
For >1,696 To 3,200, Deduct	-0.04	
For >3,200 To 6,400, Deduct	-0.06	
For >6,400 To 12,800, Deduct	-0.10	
For >12,800, Deduct	-0.15	
06 16 33 00-0022 SF 1/2" Thick Plywood Underlayment BC Grade	2.10	0.76
For Fire Retardant Treatment, Add	0.59	
For >1,696 To 3,200, Deduct	-0.05	
For >3,200 To 6,400, Deduct	-0.07	
For >6,400 To 12,800, Deduct	-0.10	
For >12,800, Deduct	-0.16	
06 16 33 00-0023 SF 5/8" Thick Plywood Underlayment BC Grade	2.40	0.76
For Fire Retardant Treatment, Add	0.70	
For >1,696 To 3,200, Deduct	-0.05	
For >3,200 To 6,400, Deduct	-0.08	
For >6,400 To 12,800, Deduct	-0.12	
For >12,800, Deduct	-0.18	
For Tongue And Groove, Add	0.06	
06 16 33 00-0024 SF 3/4" Thick Plywood Underlayment BC Grade	2.58	0.76
For Fire Retardant Treatment, Add	0.85	
For >1,696 To 3,200, Deduct	-0.06	
For >3,200 To 6,400, Deduct	-0.10	
For >6,400 To 12,800, Deduct	-0.13	
For >12,800, Deduct	-0.20	
For Tongue And Groove, Add	0.07	
06 16 33 00-0025 SF 1-1/8" Thick Plywood Underlayment BC Grade	3.32	0.87
For Fire Retardant Treatment, Add	1.29	
For >1,696 To 3,200, Deduct	-0.10	
For >3,200 To 6,400, Deduct	-0.15	
For >6,400 To 12,800, Deduct	-0.19	
For >12,800, Deduct	-0.28	
For Tongue And Groove, Add	0.11	
06 16 33 00-0026 SF 3/8" Thick CDX Plywood Underlayment Grade	2.17	0.66
For Fire Retardant Treatment, Add	0.66	
For >1,696 To 3,200, Deduct	-0.05	
For >3,200 To 6,400, Deduct	-0.08	
For >6,400 To 12,800, Deduct	-0.11	
For >12,800, Deduct	-0.17	
06 16 33 00-0027 SF 5/8" Thick CDX Plywood Underlayment Grade.....	2.76	0.76
For Fire Retardant Treatment, Add	1.00	
For >1,696 To 3,200, Deduct	-0.08	
For >3,200 To 6,400, Deduct	-0.11	
For >6,400 To 12,800, Deduct	-0.15	
For >12,800, Deduct	-0.23	
06 16 33 00-0028 Oriented Strand Board (06 16 33)		
06 16 33 00-0029 On Roof (06 16 33 00-0028)		
06 16 33 00-0030 SF 3/8" Thick Structural Oriented Strand Board (OSB) On Roof.....	1.71	0.66
For >1,408 To 3,200, Deduct	-0.03	
For >3,200 To 6,400, Deduct	-0.04	
For >6,400 To 12,800, Deduct	-0.08	
For >12,800, Deduct	-0.11	
For Fire Retardant Treatment, Add	0.33	
For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add	1.94	
06 16 33 00-0031 SF 1/2" Thick Structural Oriented Strand Board (OSB) On Roof.....	1.89	0.66
For >1,408 To 3,200, Deduct	-0.03	
For >3,200 To 6,400, Deduct	-0.04	
For >6,400 To 12,800, Deduct	-0.09	
For >12,800, Deduct	-0.13	
For Fire Retardant Treatment, Add	0.39	
For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add	2.10	

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 16 Sheathing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
06 16 33 00-0032	SF 5/8" Thick Structural Oriented Strand Board (OSB) On Roof.....	2.22	0.76
	<i>For >1,408 To 3,200, Deduct</i>	-0.04	
	<i>For >3,200 To 6,400, Deduct</i>	-0.06	
	<i>For >6,400 To 12,800, Deduct</i>	-0.12	
	<i>For >12,800, Deduct</i>	-0.16	
	<i>For Fire Retardant Treatment, Add</i>	0.56	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.27	
06 16 33 00-0033	SF 3/4" Thick Structural Oriented Strand Board (OSB) On Roof.....	2.57	0.76
	<i>For >1,408 To 3,200, Deduct</i>	-0.06	
	<i>For >3,200 To 6,400, Deduct</i>	-0.08	
	<i>For >6,400 To 12,800, Deduct</i>	-0.14	
	<i>For >12,800, Deduct</i>	-0.19	
	<i>For Fire Retardant Treatment, Add</i>	0.74	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.45	
06 16 33 00-0034	On Walls <small>(06 16 33 00-0028)</small>		
06 16 33 00-0035	SF 3/8" Thick Structural Oriented Strand Board (OSB) On Walls.....	2.05	0.76
	<i>For >1,408 To 3,200, Deduct</i>	-0.03	
	<i>For >3,200 To 6,400, Deduct</i>	-0.04	
	<i>For >6,400 To 12,800, Deduct</i>	-0.09	
	<i>For >12,800, Deduct</i>	-0.13	
	<i>For Fire Retardant Treatment, Add</i>	0.33	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.45	
06 16 33 00-0036	SF 1/2" Thick Structural Oriented Strand Board (OSB) On Walls.....	2.23	0.87
	<i>For >1,408 To 3,200, Deduct</i>	-0.03	
	<i>For >3,200 To 6,400, Deduct</i>	-0.04	
	<i>For >6,400 To 12,800, Deduct</i>	-0.10	
	<i>For >12,800, Deduct</i>	-0.15	
	<i>For Fire Retardant Treatment, Add</i>	0.39	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.61	
06 16 33 00-0037	SF 5/8" Thick Structural Oriented Strand Board (OSB) On Walls.....	2.58	0.99
	<i>For >1,408 To 3,200, Deduct</i>	-0.04	
	<i>For >3,200 To 6,400, Deduct</i>	-0.06	
	<i>For >6,400 To 12,800, Deduct</i>	-0.12	
	<i>For >12,800, Deduct</i>	-0.18	
	<i>For Fire Retardant Treatment, Add</i>	0.56	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.81	
06 16 33 00-0038	SF 3/4" Thick Structural Oriented Strand Board (OSB) On Walls.....	2.95	0.99
	<i>For >1,408 To 3,200, Deduct</i>	-0.06	
	<i>For >3,200 To 6,400, Deduct</i>	-0.08	
	<i>For >6,400 To 12,800, Deduct</i>	-0.15	
	<i>For >12,800, Deduct</i>	-0.21	
	<i>For Fire Retardant Treatment, Add</i>	0.74	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	3.02	
06 16 33 00-0039	On Floors <small>(06 16 33 00-0028)</small>		
	Note: Includes patching of seams and all fastener holes where necessary.		
06 16 33 00-0040	SF 3/8" Thick Structural Oriented Strand Board (OSB) On Floors.....	1.73	0.66
	<i>For >1,408 To 3,200, Deduct</i>	-0.03	
	<i>For >3,200 To 6,400, Deduct</i>	-0.04	
	<i>For >6,400 To 12,800, Deduct</i>	-0.08	
	<i>For >12,800, Deduct</i>	-0.12	
	<i>For Fire Retardant Treatment, Add</i>	0.33	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	1.97	
06 16 33 00-0041	SF 1/2" Thick Structural Oriented Strand Board (OSB) On Floors.....	2.07	0.76
	<i>For >1,408 To 3,200, Deduct</i>	-0.03	
	<i>For >3,200 To 6,400, Deduct</i>	-0.04	
	<i>For >6,400 To 12,800, Deduct</i>	-0.09	
	<i>For >12,800, Deduct</i>	-0.14	
	<i>For Fire Retardant Treatment, Add</i>	0.39	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.37	
06 16 33 00-0042	SF 5/8" Thick Structural Oriented Strand Board (OSB) On Floors.....	2.43	0.87
	<i>For >1,408 To 3,200, Deduct</i>	-0.04	
	<i>For >3,200 To 6,400, Deduct</i>	-0.06	
	<i>For >6,400 To 12,800, Deduct</i>	-0.12	
	<i>For >12,800, Deduct</i>	-0.17	
	<i>For Fire Retardant Treatment, Add</i>	0.56	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.58	
06 16 33 00-0043	SF 3/4" Thick Structural Oriented Strand Board (OSB) On Floors.....	2.81	0.99
	<i>For >1,408 To 3,200, Deduct</i>	-0.06	
	<i>For >3,200 To 6,400, Deduct</i>	-0.08	
	<i>For >6,400 To 12,800, Deduct</i>	-0.15	
	<i>For >12,800, Deduct</i>	-0.21	
	<i>For Fire Retardant Treatment, Add</i>	0.74	
	<i>For Selective Replacement <400 (Includes Removal Of Damaged OSB And Fitting New OSB To Size), Add</i>	2.81	
06 16 33 00-0044	Particle Board <small>(06 16 33)</small>		
06 16 33 00-0045	Particle Board Floor Decking <small>(06 16 33 00-0044)</small>		
	Note: Includes patching of seams and all fastener holes where necessary.		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 16 33 00-0046 SF 3/8" Particle Board Floor Decking.....	1.93	0.55
Note: Applied to plywood subfloor.		
For Fire Retardant Treatment Add	0.51	
For >1,536 To 3,200, Deduct	-0.04	
For >3,200 To 6,400, Deduct	-0.06	
For >6,400 To 12,800, Deduct	-0.10	
For >12,800, Deduct	-0.14	
For Tongue And Groove, Add	0.04	
06 16 33 00-0047 SF 1/2" Particle Board Floor Decking.....	2.23	0.55
Note: Applied to plywood subfloor.		
For Fire Retardant Treatment Add	0.69	
For >1,536 To 3,200, Deduct	-0.05	
For >3,200 To 6,400, Deduct	-0.08	
For >6,400 To 12,800, Deduct	-0.13	
For >12,800, Deduct	-0.17	
For Tongue And Groove, Add	0.06	
06 16 33 00-0048 SF 5/8" Particle Board Floor Decking.....	2.52	0.66
Note: Applied to plywood subfloor.		
For Fire Retardant Treatment Add	0.86	
For >1,536 To 3,200, Deduct	-0.07	
For >3,200 To 6,400, Deduct	-0.10	
For >6,400 To 12,800, Deduct	-0.16	
For >12,800, Deduct	-0.20	
For Tongue And Groove, Add	0.08	
06 16 33 00-0049 SF 3/4" Particle Board Floor Decking.....	2.81	0.66
Note: Applied to plywood subfloor.		
For Fire Retardant Treatment Add	1.01	
For >1,536 To 3,200, Deduct	-0.08	
For >3,200 To 6,400, Deduct	-0.12	
For >6,400 To 12,800, Deduct	-0.18	
For >12,800, Deduct	-0.23	
For Tongue And Groove, Add	0.09	

06 16 43 Gypsum Sheathing (06 16)

06 16 43 00-0001 Exterior Gypsum Sheathing <small>(06 16 43)</small>		
Note: Includes moisture resistant core and fiberglass mats on both sides and long edges.		
06 16 43 00-0002 SF 1/2" Exterior Gypsum Sheathing (GP Dens-Glass Gold).....	3.27	0.87
For Selective Replacement <400 (Includes Removal Of Damaged Gypsum And Fitting New Gypsum To Size), Add	2.61	
For Ceiling Installation, Add	0.17	
For Application To Metal Studs, Joists, Or Rafters, Add	0.35	
For >1,696 To 3,200, Deduct	-0.09	
For >3,200 To 6,400, Deduct	-0.14	
For >6,400 To 12,800, Deduct	-0.21	
For >12,800, Deduct	-0.27	
06 16 43 00-0003 SF 5/8" Exterior Gypsum Sheathing (GP Dens-Glass Gold).....	3.54	1.10
For Selective Replacement <400 (Includes Removal Of Damaged Gypsum And Fitting New Gypsum To Size), Add	2.81	
For Ceiling Installation, Add	0.19	
For Application To Metal Studs, Joists, Or Rafters, Add	0.37	
For >1,696 To 3,200, Deduct	-0.10	
For >3,200 To 6,400, Deduct	-0.15	
For >6,400 To 12,800, Deduct	-0.23	
For >12,800, Deduct	-0.29	

06 17 Shop-Fabricated Structural Wood (06 10)

06 17 13 Laminated Veneer Lumber (06 17)

06 17 13 00-0001 Laminated Veneer Lumber (LVL) <small>(06 17 13)</small>		
06 17 13 00-0002 LF 1-3/4" Wide x 5-1/2" Deep Laminated Veneer Lumber (LVL)	6.90	1.89
06 17 13 00-0003 LF 1-3/4" Wide x 7-1/4" Deep Laminated Veneer Lumber (LVL)	7.52	1.92
06 17 13 00-0004 LF 1-3/4" Wide x 9-1/2" Deep Laminated Veneer Lumber (LVL)	8.23	1.95
06 17 13 00-0005 LF 1-3/4" Wide x 11-7/8" Deep Laminated Veneer Lumber (LVL)	9.13	1.98
06 17 13 00-0006 LF 1-3/4" Wide x 14" Deep Laminated Veneer Lumber (LVL)	9.82	2.01
06 17 13 00-0007 LF 1-3/4" Wide x 16" Deep Laminated Veneer Lumber (LVL)	10.77	2.08
06 17 13 00-0008 LF 1-3/4" Wide x 18" Deep Laminated Veneer Lumber (LVL)	12.11	2.12
06 17 13 00-0009 LF 1-3/4" Wide x 24" Deep Laminated Veneer Lumber (LVL)	16.42	2.41

06 17 23 Parallel Strand Lumber (06 17)

06 17 23 00-0001 Laminated Strand Lumber (LSL) <small>(06 17 23)</small>		
06 17 23 00-0002 LF 2" x 4" Laminated Strand Lumber (LSL)	2.38	0.87
06 17 23 00-0003 LF 2" x 6" Laminated Strand Lumber (LSL)	3.14	0.93

06 17 33 Wood I-Joists (06 17)

06 17 33 00-0001 Prefabricated Wood I-Joists <small>(06 17 33)</small>		
06 17 33 00-0002 LF 9-1/2" Deep, 3/8" Web With 1-1/2" x 1-3/4" Flanges Prefabricated Wood I-Joist, Up To 30' Length	4.40	1.29
For I-Joists 30' To 40' In Length, Add	0.56	
For I-Joists >40' In Length, Add	1.38	

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 17 Shop-Fabricated Structural Wood**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 17 33 00-0003	LF	11-7/8" Deep, 3/8" Web With 1-1/2" x 1-3/4" Flanges Prefabricated Wood I-Joist, Up To 30' Length	4.76	1.43
		<i>For I-Joists 30' To 40' In Length, Add</i>	0.63	
		<i>For I-Joists >40' In Length, Add</i>	1.54	
06 17 33 00-0004	LF	14" Deep, 3/8" Web With 1-1/2" x 1-3/4" Flanges Prefabricated Wood I-Joist, Up To 30' Length.....	5.55	1.60
		<i>For I-Joists 30' To 40' In Length, Add</i>	0.71	
		<i>For I-Joists >40' In Length, Add</i>	1.73	
06 17 33 00-0005	LF	16" Deep, 3/8" Web With 1-1/2" x 1-3/4" Flanges Prefabricated Wood I-Joist, Up To 30' Length.....	6.24	1.78
		<i>For I-Joists 30' To 40' In Length, Add</i>	0.79	
		<i>For I-Joists >40' In Length, Add</i>	1.93	
06 17 43 Rim Boards (06 17)				
06 17 43 00-0001		Oriented Strand Board (OSB) Rim Board (06 17 43)		
06 17 43 00-0002	LF	1-1/8" Wide x 9-1/2" Deep, Oriented Strand Board (OSB) Rim Board	5.75	1.95
06 17 43 00-0003	LF	1-1/8" Wide x 11-7/8" Deep, Oriented Strand Board (OSB) Rim Board	6.24	1.98
06 17 43 00-0004	LF	1-1/8" Wide x 14" Deep, Oriented Strand Board (OSB) Rim Board	6.82	2.01
06 17 53 Shop-Fabricated Wood Trusses (06 17)				
Note: Includes temporary and permanent bracing, and fastening with truss tie-downs.				
06 17 53 00-0001		Pre-Assembled Wood Roof Trusses (06 17 53)		
Note: For King Post, Queen Post, Fink or Howe types. Includes 2" x 4" top and bottom chords up to 42' and with 2" x 6" top and bottom chords >42'.				
06 17 53 00-0002	EA	10' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	183.81	74.94
		<i>For Up To 15, Add</i>	2.54	
		<i>For >35, Deduct</i>	-1.70	
		<i>For 3 In 12 Slope, Add</i>	1.02	
		<i>For 5 In 12 Slope, Add</i>	2.71	
		<i>For 6 In 12 Slope, Add</i>	5.09	
		<i>For 7 In 12 Slope, Add</i>	6.79	
		<i>For 8 In 12 Slope, Add</i>	8.14	
06 17 53 00-0003	EA	12' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	203.78	82.08
		<i>For Up To 15, Add</i>	2.97	
		<i>For >35, Deduct</i>	-1.98	
		<i>For 3 In 12 Slope, Add</i>	1.19	
		<i>For 5 In 12 Slope, Add</i>	3.17	
		<i>For 6 In 12 Slope, Add</i>	5.94	
		<i>For 7 In 12 Slope, Add</i>	7.93	
		<i>For 8 In 12 Slope, Add</i>	9.51	
06 17 53 00-0004	EA	14' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	226.12	89.21
		<i>For Up To 15, Add</i>	3.58	
		<i>For >35, Deduct</i>	-2.38	
		<i>For 3 In 12 Slope, Add</i>	1.43	
		<i>For 5 In 12 Slope, Add</i>	3.82	
		<i>For 6 In 12 Slope, Add</i>	7.15	
		<i>For 7 In 12 Slope, Add</i>	9.54	
		<i>For 8 In 12 Slope, Add</i>	11.45	
06 17 53 00-0005	EA	16' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	254.67	96.35
		<i>For Up To 15, Add</i>	4.65	
		<i>For >35, Deduct</i>	-3.10	
		<i>For 3 In 12 Slope, Add</i>	1.86	
		<i>For 5 In 12 Slope, Add</i>	4.96	
		<i>For 6 In 12 Slope, Add</i>	9.30	
		<i>For 7 In 12 Slope, Add</i>	12.39	
		<i>For 8 In 12 Slope, Add</i>	14.87	
06 17 53 00-0006	EA	18' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	279.65	103.49
		<i>For Up To 15, Add</i>	5.45	
		<i>For >35, Deduct</i>	-3.63	
		<i>For 3 In 12 Slope, Add</i>	2.18	
		<i>For 5 In 12 Slope, Add</i>	5.81	
		<i>For 6 In 12 Slope, Add</i>	10.90	
		<i>For 7 In 12 Slope, Add</i>	14.53	
		<i>For 8 In 12 Slope, Add</i>	17.44	
06 17 53 00-0007	EA	20' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	296.25	114.19
		<i>For Up To 15, Add</i>	5.09	
		<i>For >35, Deduct</i>	-3.39	
		<i>For 3 In 12 Slope, Add</i>	2.04	
		<i>For 5 In 12 Slope, Add</i>	5.43	
		<i>For 6 In 12 Slope, Add</i>	10.18	
		<i>For 7 In 12 Slope, Add</i>	13.57	
		<i>For 8 In 12 Slope, Add</i>	16.29	
06 17 53 00-0008	EA	22' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	312.51	182.00
		<i>For Up To 15, Add</i>	5.24	
		<i>For >35, Deduct</i>	-3.49	
		<i>For 3 In 12 Slope, Add</i>	2.10	
		<i>For 5 In 12 Slope, Add</i>	5.59	
		<i>For 6 In 12 Slope, Add</i>	10.48	
		<i>For 7 In 12 Slope, Add</i>	13.97	
		<i>For 8 In 12 Slope, Add</i>	16.76	



Wood, Plastics, and Composites	06	06
Rough Carpentry	06 10	
Shop-Fabricated Structural Wood	06 17	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 17 53 00-0009	EA		24' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	332.70	128.47
			For Up To 15, Add	5.68	
			For >35, Deduct	-3.79	
			For 3 In 12 Slope, Add	2.27	
			For 5 In 12 Slope, Add	6.06	
			For 6 In 12 Slope, Add	11.36	
			For 7 In 12 Slope, Add	15.15	
			For 8 In 12 Slope, Add	18.18	
06 17 53 00-0010	EA		26' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	353.54	203.41
			For Up To 15, Add	6.17	
			For >35, Deduct	-4.12	
			For 3 In 12 Slope, Add	2.47	
			For 5 In 12 Slope, Add	6.59	
			For 6 In 12 Slope, Add	12.35	
			For 7 In 12 Slope, Add	16.46	
			For 8 In 12 Slope, Add	19.76	
06 17 53 00-0011	EA		28' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	375.23	142.74
			For Up To 15, Add	6.73	
			For >35, Deduct	-4.49	
			For 3 In 12 Slope, Add	2.69	
			For 5 In 12 Slope, Add	7.18	
			For 6 In 12 Slope, Add	13.46	
			For 7 In 12 Slope, Add	17.95	
			For 8 In 12 Slope, Add	21.54	
06 17 53 00-0012	EA		30' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	392.34	224.82
			For Up To 15, Add	6.94	
			For >35, Deduct	-4.63	
			For 3 In 12 Slope, Add	2.78	
			For 5 In 12 Slope, Add	7.41	
			For 6 In 12 Slope, Add	13.89	
			For 7 In 12 Slope, Add	18.52	
			For 8 In 12 Slope, Add	22.22	
06 17 53 00-0013	EA		32' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	408.74	153.45
			For Up To 15, Add	7.64	
			For >35, Deduct	-5.09	
			For 3 In 12 Slope, Add	3.06	
			For 5 In 12 Slope, Add	8.15	
			For 6 In 12 Slope, Add	15.28	
			For 7 In 12 Slope, Add	20.37	
			For 8 In 12 Slope, Add	24.44	
06 17 53 00-0014	EA		34' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	443.29	240.95
			For Up To 15, Add	9.16	
			For >35, Deduct	-6.11	
			For 3 In 12 Slope, Add	3.66	
			For 5 In 12 Slope, Add	9.77	
			For 6 In 12 Slope, Add	18.32	
			For 7 In 12 Slope, Add	24.42	
			For 8 In 12 Slope, Add	29.31	
06 17 53 00-0015	EA		36' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	460.03	164.15
			For Up To 15, Add	9.88	
			For >35, Deduct	-6.59	
			For 3 In 12 Slope, Add	3.95	
			For 5 In 12 Slope, Add	10.54	
			For 6 In 12 Slope, Add	19.76	
			For 7 In 12 Slope, Add	26.34	
			For 8 In 12 Slope, Add	31.61	
06 17 53 00-0016	EA		38' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	483.30	256.94
			For Up To 15, Add	10.55	
			For >35, Deduct	-7.04	
			For 3 In 12 Slope, Add	4.22	
			For 5 In 12 Slope, Add	11.26	
			For 6 In 12 Slope, Add	21.11	
			For 7 In 12 Slope, Add	28.14	
			For 8 In 12 Slope, Add	33.77	
06 17 53 00-0017	EA		40' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	500.59	178.43
			For Up To 15, Add	10.78	
			For >35, Deduct	-7.19	
			For 3 In 12 Slope, Add	4.31	
			For 5 In 12 Slope, Add	11.50	
			For 6 In 12 Slope, Add	21.56	
			For 7 In 12 Slope, Add	28.75	
			For 8 In 12 Slope, Add	34.50	
06 17 53 00-0018	EA		42' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	545.25	278.35
			For Up To 15, Add	13.06	
			For >35, Deduct	-8.71	
			For 3 In 12 Slope, Add	5.22	
			For 5 In 12 Slope, Add	13.93	
			For 6 In 12 Slope, Add	26.12	
			For 7 In 12 Slope, Add	34.82	
			For 8 In 12 Slope, Add	41.79	

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 17 Shop-Fabricated Structural Wood**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 17 53 00-0019	EA	44' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	589.09	192.70
		<i>For Up To 15, Add</i>	15.28	
		<i>For >35, Deduct</i>	-10.18	
		<i>For 3 In 12 Slope, Add</i>	6.11	
		<i>For 5 In 12 Slope, Add</i>	16.29	
		<i>For 6 In 12 Slope, Add</i>	30.55	
		<i>For 7 In 12 Slope, Add</i>	40.74	
		<i>For 8 In 12 Slope, Add</i>	48.88	
06 17 53 00-0020	EA	46' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	609.92	199.84
		<i>For Up To 15, Add</i>	15.77	
		<i>For >35, Deduct</i>	-10.51	
		<i>For 3 In 12 Slope, Add</i>	6.31	
		<i>For 5 In 12 Slope, Add</i>	16.82	
		<i>For 6 In 12 Slope, Add</i>	31.54	
		<i>For 7 In 12 Slope, Add</i>	42.05	
		<i>For 8 In 12 Slope, Add</i>	50.46	
06 17 53 00-0021	EA	48' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	638.70	206.98
		<i>For Up To 15, Add</i>	16.86	
		<i>For >35, Deduct</i>	-11.24	
		<i>For 3 In 12 Slope, Add</i>	6.74	
		<i>For 5 In 12 Slope, Add</i>	17.98	
		<i>For 6 In 12 Slope, Add</i>	33.71	
		<i>For 7 In 12 Slope, Add</i>	44.95	
		<i>For 8 In 12 Slope, Add</i>	53.94	
06 17 53 00-0022	EA	50' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	715.91	214.11
		<i>For Up To 15, Add</i>	21.58	
		<i>For >35, Deduct</i>	-14.38	
		<i>For 3 In 12 Slope, Add</i>	8.63	
		<i>For 5 In 12 Slope, Add</i>	23.01	
		<i>For 6 In 12 Slope, Add</i>	43.15	
		<i>For 7 In 12 Slope, Add</i>	57.54	
		<i>For 8 In 12 Slope, Add</i>	69.04	
06 17 53 00-0023	EA	52' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	685.53	192.56
		<i>For Up To 15, Add</i>	19.30	
		<i>For >35, Deduct</i>	-12.87	
		<i>For 3 In 12 Slope, Add</i>	7.72	
		<i>For 5 In 12 Slope, Add</i>	20.58	
		<i>For 6 In 12 Slope, Add</i>	38.60	
		<i>For 7 In 12 Slope, Add</i>	51.46	
		<i>For 8 In 12 Slope, Add</i>	61.75	
06 17 53 00-0024	EA	54' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	719.37	224.82
		<i>For Up To 15, Add</i>	20.23	
		<i>For >35, Deduct</i>	-13.49	
		<i>For 3 In 12 Slope, Add</i>	8.09	
		<i>For 5 In 12 Slope, Add</i>	21.58	
		<i>For 6 In 12 Slope, Add</i>	40.46	
		<i>For 7 In 12 Slope, Add</i>	53.95	
		<i>For 8 In 12 Slope, Add</i>	64.74	
06 17 53 00-0025	EA	56' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	746.90	208.40
		<i>For Up To 15, Add</i>	21.22	
		<i>For >35, Deduct</i>	-14.15	
		<i>For 3 In 12 Slope, Add</i>	8.49	
		<i>For 5 In 12 Slope, Add</i>	22.64	
		<i>For 6 In 12 Slope, Add</i>	42.45	
		<i>For 7 In 12 Slope, Add</i>	56.60	
		<i>For 8 In 12 Slope, Add</i>	67.92	
06 17 53 00-0026	EA	58' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	769.76	235.53
		<i>For Up To 15, Add</i>	22.40	
		<i>For >35, Deduct</i>	-14.94	
		<i>For 3 In 12 Slope, Add</i>	8.96	
		<i>For 5 In 12 Slope, Add</i>	23.90	
		<i>For 6 In 12 Slope, Add</i>	44.81	
		<i>For 7 In 12 Slope, Add</i>	59.74	
		<i>For 8 In 12 Slope, Add</i>	71.69	
06 17 53 00-0027	EA	60' Pre-Assembled Wood Roof Truss, 4 In 12 Slope.....	784.98	239.09
		<i>For Up To 15, Add</i>	23.01	
		<i>For >35, Deduct</i>	-15.34	
		<i>For 3 In 12 Slope, Add</i>	9.20	
		<i>For 5 In 12 Slope, Add</i>	24.54	
		<i>For 6 In 12 Slope, Add</i>	46.02	
		<i>For 7 In 12 Slope, Add</i>	61.36	
		<i>For 8 In 12 Slope, Add</i>	73.63	

06 17 53 00-0028 Pre-Assembled Wood Gable End Roof Trusses (06 17 53)

Note: 24" on center gable studs. Includes 2" x 4" top and bottom chords up to 42' and with 2" x 6" top and bottom chords >42'.

06 17 53 00-0029	EA	10' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	188.12	74.94
		<i>For 3 In 12 Slope, Add</i>	1.15	
		<i>For 5 In 12 Slope, Add</i>	3.06	
		<i>For 6 In 12 Slope, Add</i>	5.74	
		<i>For 7 In 12 Slope, Add</i>	7.65	
		<i>For 8 In 12 Slope, Add</i>	9.18	
		<i>For 16" On Center Gable Studs, Add</i>	7.65	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
06 17 53 00-0030 EA 12' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	208.82	82.08
<i>For 3 In 12 Slope, Add</i>	1.34	
<i>For 5 In 12 Slope, Add</i>	3.57	
<i>For 6 In 12 Slope, Add</i>	6.70	
<i>For 7 In 12 Slope, Add</i>	8.93	
<i>For 8 In 12 Slope, Add</i>	10.72	
<i>For 16" On Center Gable Studs, Add</i>	8.93	
06 17 53 00-0031 EA 14' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	232.18	89.21
<i>For 3 In 12 Slope, Add</i>	1.61	
<i>For 5 In 12 Slope, Add</i>	4.30	
<i>For 6 In 12 Slope, Add</i>	8.06	
<i>For 7 In 12 Slope, Add</i>	10.75	
<i>For 8 In 12 Slope, Add</i>	12.90	
<i>For 16" On Center Gable Studs, Add</i>	10.75	
06 17 53 00-0032 EA 16' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	262.55	96.35
<i>For 3 In 12 Slope, Add</i>	2.10	
<i>For 5 In 12 Slope, Add</i>	5.59	
<i>For 6 In 12 Slope, Add</i>	10.48	
<i>For 7 In 12 Slope, Add</i>	13.97	
<i>For 8 In 12 Slope, Add</i>	16.76	
<i>For 16" On Center Gable Studs, Add</i>	13.97	
06 17 53 00-0033 EA 18' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	288.89	103.49
<i>For 3 In 12 Slope, Add</i>	2.46	
<i>For 5 In 12 Slope, Add</i>	6.55	
<i>For 6 In 12 Slope, Add</i>	12.29	
<i>For 7 In 12 Slope, Add</i>	16.38	
<i>For 8 In 12 Slope, Add</i>	19.66	
<i>For 16" On Center Gable Studs, Add</i>	16.38	
06 17 53 00-0034 EA 20' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	314.58	114.19
<i>For 3 In 12 Slope, Add</i>	2.59	
<i>For 5 In 12 Slope, Add</i>	6.90	
<i>For 6 In 12 Slope, Add</i>	12.93	
<i>For 7 In 12 Slope, Add</i>	17.24	
<i>For 8 In 12 Slope, Add</i>	20.69	
<i>For 16" On Center Gable Studs, Add</i>	17.24	
06 17 53 00-0035 EA 22' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	331.37	121.34
<i>For 3 In 12 Slope, Add</i>	2.66	
<i>For 5 In 12 Slope, Add</i>	7.10	
<i>For 6 In 12 Slope, Add</i>	13.31	
<i>For 7 In 12 Slope, Add</i>	17.74	
<i>For 8 In 12 Slope, Add</i>	21.29	
<i>For 16" On Center Gable Studs, Add</i>	17.74	
06 17 53 00-0036 EA 24' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	353.16	128.47
<i>For 3 In 12 Slope, Add</i>	2.89	
<i>For 5 In 12 Slope, Add</i>	7.70	
<i>For 6 In 12 Slope, Add</i>	14.43	
<i>For 7 In 12 Slope, Add</i>	19.24	
<i>For 8 In 12 Slope, Add</i>	23.09	
<i>For 16" On Center Gable Studs, Add</i>	19.24	
06 17 53 00-0037 EA 26' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	375.77	135.61
<i>For 3 In 12 Slope, Add</i>	3.14	
<i>For 5 In 12 Slope, Add</i>	8.36	
<i>For 6 In 12 Slope, Add</i>	15.68	
<i>For 7 In 12 Slope, Add</i>	20.91	
<i>For 8 In 12 Slope, Add</i>	25.09	
<i>For 16" On Center Gable Studs, Add</i>	20.91	
06 17 53 00-0038 EA 28' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	399.47	142.74
<i>For 3 In 12 Slope, Add</i>	3.42	
<i>For 5 In 12 Slope, Add</i>	9.12	
<i>For 6 In 12 Slope, Add</i>	17.10	
<i>For 7 In 12 Slope, Add</i>	22.80	
<i>For 8 In 12 Slope, Add</i>	27.36	
<i>For 16" On Center Gable Studs, Add</i>	22.80	
06 17 53 00-0039 EA 30' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	418.35	149.88
<i>For 3 In 12 Slope, Add</i>	3.56	
<i>For 5 In 12 Slope, Add</i>	9.49	
<i>For 6 In 12 Slope, Add</i>	17.79	
<i>For 7 In 12 Slope, Add</i>	23.72	
<i>For 8 In 12 Slope, Add</i>	28.46	
<i>For 16" On Center Gable Studs, Add</i>	23.72	
06 17 53 00-0040 EA 32' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	437.36	153.45
<i>For 3 In 12 Slope, Add</i>	3.91	
<i>For 5 In 12 Slope, Add</i>	10.44	
<i>For 6 In 12 Slope, Add</i>	19.57	
<i>For 7 In 12 Slope, Add</i>	26.09	
<i>For 8 In 12 Slope, Add</i>	31.31	
<i>For 16" On Center Gable Studs, Add</i>	26.09	
06 17 53 00-0041 EA 34' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	477.59	160.59
<i>For 3 In 12 Slope, Add</i>	4.69	
<i>For 5 In 12 Slope, Add</i>	12.51	
<i>For 6 In 12 Slope, Add</i>	23.46	
<i>For 7 In 12 Slope, Add</i>	31.28	
<i>For 8 In 12 Slope, Add</i>	37.54	
<i>For 16" On Center Gable Studs, Add</i>	31.28	

06 Wood, Plastics, and Composites**06 10 Rough Carpentry****06 17 Shop-Fabricated Structural Wood**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 17 53 00-0042	EA		36' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	497.05	164.15
			<i>For 3 In 12 Slope, Add</i>	5.06	
			<i>For 5 In 12 Slope, Add</i>	13.50	
			<i>For 6 In 12 Slope, Add</i>	25.31	
			<i>For 7 In 12 Slope, Add</i>	33.75	
			<i>For 8 In 12 Slope, Add</i>	40.50	
			<i>For 16" On Center Gable Studs, Add</i>	33.75	
06 17 53 00-0043	EA		38' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	522.84	171.30
			<i>For 3 In 12 Slope, Add</i>	5.41	
			<i>For 5 In 12 Slope, Add</i>	14.42	
			<i>For 6 In 12 Slope, Add</i>	27.04	
			<i>For 7 In 12 Slope, Add</i>	36.05	
			<i>For 8 In 12 Slope, Add</i>	43.26	
			<i>For 16" On Center Gable Studs, Add</i>	36.05	
06 17 53 00-0044	EA		40' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	552.57	178.43
			<i>For 3 In 12 Slope, Add</i>	5.87	
			<i>For 5 In 12 Slope, Add</i>	15.66	
			<i>For 6 In 12 Slope, Add</i>	29.36	
			<i>For 7 In 12 Slope, Add</i>	39.14	
			<i>For 8 In 12 Slope, Add</i>	46.97	
			<i>For 16" On Center Gable Studs, Add</i>	39.14	
06 17 53 00-0045	EA		42' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	608.24	185.57
			<i>For 3 In 12 Slope, Add</i>	7.11	
			<i>For 5 In 12 Slope, Add</i>	18.97	
			<i>For 6 In 12 Slope, Add</i>	35.57	
			<i>For 7 In 12 Slope, Add</i>	47.42	
			<i>For 8 In 12 Slope, Add</i>	56.90	
			<i>For 16" On Center Gable Studs, Add</i>	47.42	
06 17 53 00-0046	EA		44' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	662.77	192.70
			<i>For 3 In 12 Slope, Add</i>	8.32	
			<i>For 5 In 12 Slope, Add</i>	22.19	
			<i>For 6 In 12 Slope, Add</i>	41.60	
			<i>For 7 In 12 Slope, Add</i>	55.47	
			<i>For 8 In 12 Slope, Add</i>	66.57	
			<i>For 16" On Center Gable Studs, Add</i>	55.47	
06 17 53 00-0047	EA		46' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	685.97	199.84
			<i>For 3 In 12 Slope, Add</i>	8.59	
			<i>For 5 In 12 Slope, Add</i>	22.90	
			<i>For 6 In 12 Slope, Add</i>	42.94	
			<i>For 7 In 12 Slope, Add</i>	57.26	
			<i>For 8 In 12 Slope, Add</i>	68.71	
			<i>For 16" On Center Gable Studs, Add</i>	57.26	
06 17 53 00-0048	EA		48' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	719.98	206.98
			<i>For 3 In 12 Slope, Add</i>	9.18	
			<i>For 5 In 12 Slope, Add</i>	24.48	
			<i>For 6 In 12 Slope, Add</i>	45.90	
			<i>For 7 In 12 Slope, Add</i>	61.20	
			<i>For 8 In 12 Slope, Add</i>	73.44	
			<i>For 16" On Center Gable Studs, Add</i>	61.20	
06 17 53 00-0049	EA		50' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	779.39	214.11
			<i>For 3 In 12 Slope, Add</i>	10.53	
			<i>For 5 In 12 Slope, Add</i>	28.09	
			<i>For 6 In 12 Slope, Add</i>	52.67	
			<i>For 7 In 12 Slope, Add</i>	70.23	
			<i>For 8 In 12 Slope, Add</i>	84.28	
			<i>For 16" On Center Gable Studs, Add</i>	70.23	
06 17 53 00-0050	EA		52' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	798.35	221.26
			<i>For 3 In 12 Slope, Add</i>	10.68	
			<i>For 5 In 12 Slope, Add</i>	28.47	
			<i>For 6 In 12 Slope, Add</i>	53.38	
			<i>For 7 In 12 Slope, Add</i>	71.17	
			<i>For 8 In 12 Slope, Add</i>	85.40	
			<i>For 16" On Center Gable Studs, Add</i>	71.17	
06 17 53 00-0051	EA		54' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	822.68	224.82
			<i>For 3 In 12 Slope, Add</i>	11.19	
			<i>For 5 In 12 Slope, Add</i>	29.84	
			<i>For 6 In 12 Slope, Add</i>	55.96	
			<i>For 7 In 12 Slope, Add</i>	74.61	
			<i>For 8 In 12 Slope, Add</i>	89.53	
			<i>For 16" On Center Gable Studs, Add</i>	74.61	
06 17 53 00-0052	EA		56' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	855.28	231.96
			<i>For 3 In 12 Slope, Add</i>	11.74	
			<i>For 5 In 12 Slope, Add</i>	31.31	
			<i>For 6 In 12 Slope, Add</i>	58.70	
			<i>For 7 In 12 Slope, Add</i>	78.27	
			<i>For 8 In 12 Slope, Add</i>	93.93	
			<i>For 16" On Center Gable Studs, Add</i>	78.27	
06 17 53 00-0053	EA		58' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	884.14	235.53
			<i>For 3 In 12 Slope, Add</i>	12.39	
			<i>For 5 In 12 Slope, Add</i>	33.05	
			<i>For 6 In 12 Slope, Add</i>	61.96	
			<i>For 7 In 12 Slope, Add</i>	82.62	
			<i>For 8 In 12 Slope, Add</i>	99.14	
			<i>For 16" On Center Gable Studs, Add</i>	82.62	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 17 53 00-0054 EA 60' Pre-Assembled Wood Gable End Roof Truss, 4 In 12 Slope.....	902.47	239.09
<i>For 3 In 12 Slope, Add</i>	12.73	
<i>For 5 In 12 Slope, Add</i>	33.94	
<i>For 6 In 12 Slope, Add</i>	63.64	
<i>For 7 In 12 Slope, Add</i>	84.86	
<i>For 8 In 12 Slope, Add</i>	101.83	
<i>For 16" On Center Gable Studs, Add</i>	84.86	

06 18 Glued-Laminated Construction (06 10)

06 18 13 Glued-Laminated Beams (06 18)

06 18 13 00-0001 Glue Laminated Straight Beams (06 18 13)

Note: Based on southern yellow pine or hemlock lumber with waterproof glue and factor applied sealer.

06 18 13 00-0002 LF 3-1/2" x 6" Glue Laminated Straight Beam	8.91	3.04
06 18 13 00-0003 LF 3-1/2" x 7-1/2" Glue Laminated Straight Beam	11.13	3.79
06 18 13 00-0004 LF 3-1/2" x 9" Glue Laminated Straight Beam	13.37	4.55
06 18 13 00-0005 LF 3-1/2" x 9-1/2" Glue Laminated Straight Beam	14.11	4.81
06 18 13 00-0006 LF 3-1/2" x 10-1/2" Glue Laminated Straight Beam	15.59	5.31
06 18 13 00-0007 LF 3-1/2" x 12" Glue Laminated Straight Beam	17.82	6.06
06 18 13 00-0008 LF 3-1/2" x 13-1/2" Glue Laminated Straight Beam	20.05	6.82
06 18 13 00-0009 LF 3-1/2" x 14" Glue Laminated Straight Beam	20.79	7.08
06 18 13 00-0010 LF 3-1/2" x 15" Glue Laminated Straight Beam	22.28	7.58
06 18 13 00-0011 LF 3-1/2" x 16" Glue Laminated Straight Beam	23.75	8.10
06 18 13 00-0012 LF 3-1/2" x 16-1/2" Glue Laminated Straight Beam	24.50	8.35
06 18 13 00-0013 LF 3-1/2" x 18" Glue Laminated Straight Beam	26.72	9.11
06 18 13 00-0014 LF 3-1/2" x 19-1/2" Glue Laminated Straight Beam	28.96	9.87
06 18 13 00-0015 LF 3-1/2" x 21" Glue Laminated Straight Beam	31.17	10.63
06 18 13 00-0016 LF 3-1/2" x 22.5" Glue Laminated Straight Beam	33.41	11.38
06 18 13 00-0017 LF 5-1/2" x 6" Glue Laminated Straight Beam	14.00	4.76
06 18 13 00-0018 LF 5-1/2" x 7-1/2" Glue Laminated Straight Beam	17.50	5.97
06 18 13 00-0019 LF 5-1/2" x 9" Glue Laminated Straight Beam	20.99	7.16
06 18 13 00-0020 LF 5-1/2" x 9-1/2" Glue Laminated Straight Beam	22.17	7.56
06 18 13 00-0021 LF 5-1/2" x 10-1/2" Glue Laminated Straight Beam	24.50	8.35
06 18 13 00-0022 LF 5-1/2" x 12" Glue Laminated Straight Beam	28.00	9.54
06 18 13 00-0023 LF 5-1/2" x 13-1/2" Glue Laminated Straight Beam	31.50	10.74
06 18 13 00-0024 LF 5-1/2" x 14" Glue Laminated Straight Beam	32.66	11.13
06 18 13 00-0025 LF 5-1/2" x 15" Glue Laminated Straight Beam	35.00	11.92
06 18 13 00-0026 LF 5-1/2" x 16" Glue Laminated Straight Beam	37.32	12.72
06 18 13 00-0027 LF 5-1/2" x 16-1/2" Glue Laminated Straight Beam	38.50	13.12
06 18 13 00-0028 LF 5-1/2" x 18" Glue Laminated Straight Beam	42.00	14.30
06 18 13 00-0029 LF 5-1/2" x 19-1/2" Glue Laminated Straight Beam	45.49	15.51
06 18 13 00-0030 LF 5-1/2" x 21" Glue Laminated Straight Beam	49.00	16.70
06 18 13 00-0031 LF 5-1/2" x 22.5" Glue Laminated Straight Beam	52.50	17.89
06 18 13 00-0032 LF 5-1/2" x 24" Glue Laminated Straight Beam	56.00	19.08
06 18 13 00-0033 LF 6-3/4" x 9" Glue Laminated Straight Beam	25.78	8.78
06 18 13 00-0034 LF 6-3/4" x 9-1/2" Glue Laminated Straight Beam	27.20	9.27
06 18 13 00-0035 LF 6-3/4" x 10-1/2" Glue Laminated Straight Beam	30.07	10.25
06 18 13 00-0036 LF 6-3/4" x 12" Glue Laminated Straight Beam	34.36	11.70
06 18 13 00-0037 LF 6-3/4" x 13-1/2" Glue Laminated Straight Beam	38.66	13.17
06 18 13 00-0038 LF 6-3/4" x 14" Glue Laminated Straight Beam	40.09	13.66
06 18 13 00-0039 LF 6-3/4" x 15" Glue Laminated Straight Beam	42.95	14.64
06 18 13 00-0040 LF 6-3/4" x 16" Glue Laminated Straight Beam	45.82	15.60
06 18 13 00-0041 LF 6-3/4" x 16-1/2" Glue Laminated Straight Beam	47.25	16.10
06 18 13 00-0042 LF 6-3/4" x 18" Glue Laminated Straight Beam	51.54	17.56
06 18 13 00-0043 LF 6-3/4" x 19-1/2" Glue Laminated Straight Beam	55.83	19.03
06 18 13 00-0044 LF 6-3/4" x 21" Glue Laminated Straight Beam	60.14	20.48
06 18 13 00-0045 LF 6-3/4" x 22.5" Glue Laminated Straight Beam	64.42	21.96
06 18 13 00-0046 LF 6-3/4" x 24" Glue Laminated Straight Beam	68.73	23.42
06 18 13 00-0047 LF 8-3/4" x 9" Glue Laminated Straight Beam	33.41	11.38
06 18 13 00-0048 LF 8-3/4" x 9-1/2" Glue Laminated Straight Beam	35.26	12.01
06 18 13 00-0049 LF 8-3/4" x 10-1/2" Glue Laminated Straight Beam	38.97	13.28
06 18 13 00-0050 LF 8-3/4" x 12" Glue Laminated Straight Beam	44.54	15.18
06 18 13 00-0051 LF 8-3/4" x 13-1/2" Glue Laminated Straight Beam	50.12	17.08
06 18 13 00-0052 LF 8-3/4" x 14" Glue Laminated Straight Beam	51.97	17.71
06 18 13 00-0053 LF 8-3/4" x 15" Glue Laminated Straight Beam	55.67	18.96
06 18 13 00-0054 LF 8-3/4" x 16" Glue Laminated Straight Beam	59.39	20.24
06 18 13 00-0055 LF 8-3/4" x 16-1/2" Glue Laminated Straight Beam	61.25	20.86
06 18 13 00-0056 LF 8-3/4" x 18" Glue Laminated Straight Beam	66.83	22.76
06 18 13 00-0057 LF 8-3/4" x 19-1/2" Glue Laminated Straight Beam	72.39	24.65
06 18 13 00-0058 LF 8-3/4" x 21" Glue Laminated Straight Beam	77.96	26.56
06 18 13 00-0059 LF 8-3/4" x 22.5" Glue Laminated Straight Beam	83.52	28.46
06 18 13 00-0060 LF 8-3/4" x 24" Glue Laminated Straight Beam	89.10	30.36

06 18 13 00-0061 Glue Laminated Decking (06 18 13)

06 18 13 00-0062 LF 2" - 4" Thick x 4" Wide Glue Laminated Decking	4.51	1.87
06 18 13 00-0063 LF 2" - 4" Thick x 6" Wide Glue Laminated Decking	4.66	1.87
06 18 13 00-0064 LF 2" - 4" Thick x 8" Wide Glue Laminated Decking	4.80	1.76

06	06 Wood, Plastics, and Composites
	06 10 Rough Carpentry
	06 18 Glued-Laminated Construction



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 18 16 Glued-Laminated Columns (06 18)

06 18 16 00-0001	Glue Laminated Structural Units <small>(06 18 16)</small>		
	Note: Based on southern yellow pine or hemlock lumber in 2" laminations with waterproof glue and factor applied sealer.		
06 18 16 00-0002	LF 3-1/4" x 7-1/2" Glue Laminated Purlin Or Column.....	13.01	3.82
06 18 16 00-0003	LF 3-1/4" x 9-1/4" Glue Laminated Purlin Or Column.....	14.66	4.25
06 18 16 00-0004	LF 5-1/4" x 9-1/4" Glue Laminated Purlin Or Column.....	27.75	9.07
06 18 16 00-0005	LF 5-1/4" x 13" Glue Laminated Purlin Or Column.....	30.41	9.51

06 20 Finish Carpentry (06)

06 20 23 Interior Finish Carpentry (06 20)

06 20 23 00-0001	Residential Wood Shelving <small>(06 20 23)</small>		
	Note: Wood shelving is clear or finger jointed pine, poplar, laminated particle board or medium-density fiberboard (MDF) shelving. Includes brackets.		
06 20 23 00-0002	LF 12" Wide Wood Shelving For Residential Closets	31.11	6.95
06 20 23 00-0003	LF 16" Wide Wood Shelving For Residential Closets	46.67	10.52
06 20 23 00-0004	LF 20" Wide Wood Shelving For Residential Closets	62.46	14.00

06 22 Millwork (06 20)

06 22 13 Standard Pattern Wood Trim (06 22)

06 22 13 00-0001	Pine Moldings (All Dimensions Are Nominal) <small>(06 22 13)</small>		
06 22 13 00-0002	LF 1/4" x 1-1/4" Wood Lattice Strip	3.20	1.09
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.40	
06 22 13 00-0003	LF 1/4" x 1-5/8" Wood Lattice Strip	3.37	0.87
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.40	
06 22 13 00-0004	LF 1/4" x 2-1/2" Wood Lattice Strip	4.31	0.87
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.40	
06 22 13 00-0005	LF 1/4" x 3-1/2" Wood Lattice Strip	4.86	0.87
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.40	

06 22 13 00-0006 Ceilings (All Dimensions Are Nominal) (06 22 13)

06 22 13 00-0007	White Pine <small>(06 22 13 00-0006)</small>		
06 22 13 00-0008	LF 9/16" x 3-5/8" White Pine Crown Or Bed Molding	15.29	3.80
	<i>For Birch, Add</i>	3.55	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	4.98	
	<i>For Poplar, Add</i>	1.97	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.25	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	1.28	
06 22 13 00-0009	LF 11/16" x 4-5/8" White Pine Crown Or Bed Molding	20.57	4.55
	<i>For Birch, Add</i>	5.07	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	6.98	
	<i>For Poplar, Add</i>	2.81	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.50	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	1.83	
06 22 13 00-0010	LF 3/4" x 3/4" White Pine Crown Or Bed Molding	7.28	2.61
	<i>For Birch, Add</i>	1.06	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	1.76	
	<i>For Poplar, Add</i>	0.59	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.00	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	0.38	
06 22 13 00-0011	LF 9/16" x 1-5/8" White Pine Crown Or Bed Molding	8.34	2.61
	<i>For Birch, Add</i>	1.44	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	2.23	
	<i>For Poplar, Add</i>	0.80	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.00	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	0.52	
06 22 13 00-0012	LF 9/16" x 2-1/4" White Pine Crown Or Bed Molding	10.98	3.25
	<i>For Birch, Add</i>	2.00	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	3.04	
	<i>For Poplar, Add</i>	1.11	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.25	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	0.72	
06 22 13 00-0013	LF 3/4" x 3-1/2" White Pine Crown Or Bed Molding	12.74	3.25
	<i>For Birch, Add</i>	2.63	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	3.83	
	<i>For Poplar, Add</i>	1.46	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.25	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	0.95	
06 22 13 00-0014	LF 5/8" x 4-1/4" White Pine Crown Or Bed Molding	15.84	3.91
	<i>For Birch, Add</i>	3.36	
	<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	4.85	
	<i>For Poplar, Add</i>	1.87	
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.50	
	<i>For Stain Grade Material (No Finger Joints), Add</i>	1.21	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 22 13 00-0015 LF 1" x 2" White Pine Dentil Molding	7.55	3.04
For Birch, Add	1.16	
For Mahogany, Oak, Maple Or Walnut, Add	1.88	
For Poplar, Add	0.64	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.00	
For Stain Grade Material (No Finger Joints), Add	0.42	
06 22 13 00-0016 LF 9/16" x 1-3/4" White Pine Cove Molding	6.41	2.28
For Birch, Add	1.14	
For Mahogany, Oak, Maple Or Walnut, Add	1.75	
For Poplar, Add	0.63	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.75	
For Stain Grade Material (No Finger Joints), Add	0.41	
06 22 13 00-0017 LF 1 1/16" x 2-3/4" White Pine Cove Molding	9.79	2.28
For Birch, Add	2.35	
For Mahogany, Oak, Maple Or Walnut, Add	3.27	
For Poplar, Add	1.31	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.75	
For Stain Grade Material (No Finger Joints), Add	0.85	
06 22 13 00-0018 LF 3/8" x 3/8" White Pine Cove Molding	3.75	1.30
For Birch, Add	0.54	
For Mahogany, Oak, Maple Or Walnut, Add	0.90	
For Poplar, Add	0.30	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.52	
For Stain Grade Material (No Finger Joints), Add	0.19	
06 22 13 00-0019 LF 1/2" x 1/2" White Pine Cove Molding	4.13	1.30
For Birch, Add	0.67	
For Mahogany, Oak, Maple Or Walnut, Add	1.07	
For Poplar, Add	0.37	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.52	
For Stain Grade Material (No Finger Joints), Add	0.24	
06 22 13 00-0020 LF 5/8" x 5/8" White Pine Cove Molding	5.54	1.63
For Birch, Add	1.02	
For Mahogany, Oak, Maple Or Walnut, Add	1.54	
For Poplar, Add	0.57	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.62	
For Stain Grade Material (No Finger Joints), Add	0.37	
06 22 13 00-0021 LF 3/4" x 3/4" White Pine Cove Molding	5.54	1.63
For Birch, Add	1.02	
For Mahogany, Oak, Maple Or Walnut, Add	1.54	
For Poplar, Add	0.57	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.62	
For Stain Grade Material (No Finger Joints), Add	0.37	
06 22 13 00-0022 LF 15/16" x 15/16" White Pine Cove Molding	7.25	1.63
For Birch, Add	1.63	
For Mahogany, Oak, Maple Or Walnut, Add	2.31	
For Poplar, Add	0.91	
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.62	
For Stain Grade Material (No Finger Joints), Add	0.59	
06 22 13 00-0023 LF 7-1/2" Wide White Pine Mullion Covers	48.41	1.95
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.89	
06 22 13 00-0024 LF Three Piece White Pine Mullion Trim, 2 Cove Moldings	61.38	1.95
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.89	
06 22 13 00-0025 Cedar Trim <small>(06 22 13 00-0006)</small>		
06 22 13 00-0026 LF 2" x 4" Cedar Ceiling Trim	12.69	5.47
For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.81	
06 22 13 00-0027 Oak Trim <small>(06 22 13 00-0006)</small>		
06 22 13 00-0028 LF 1" x 8" Clear Oak Ceiling Trim	13.28	5.04
For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.68	
06 22 13 00-0029 Closet Poles <small>(06 22 13)</small>		
06 22 13 00-0030 LF 1-1/8" Diameter Pine Closet Poles	11.15	2.82
06 22 13 00-0031 LF 1-5/8" Diameter Pine Closet Poles	13.68	2.82
06 22 13 00-0032 LF 2" Diameter Pine Closet Poles	18.89	3.14

06 25 Prefinished Paneling (06 20)

06 25 16 Prefinished Plywood Paneling (06 25)

06 25 16 00-0001 Hardboard Panels (06 25 16)
 Note: Excludes furring and trim.

06 25 16 00-0002 Tempered Hardboard Panels (06 25 16 00-0001)

06	06 Wood, Plastics, and Composites
	06 20 Finish Carpentry
	06 25 Prefinished Paneling



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 25 16 00-0003 SF 1/4" Tempered Hardboard Panels	5.62	1.97
For Waterproof Glue, Add	0.08	
For Ceiling Installation, Add	1.34	
For Glue Laminated Installation, Add	0.28	
For 1/8" Thick Paneling, Deduct	-0.50	
For 1/2" Thick Paneling, Add	1.16	
For 5/8" Thick Paneling, Add	1.40	
For 3/4" Thick Paneling, Add	1.71	
For Fire Retardant Treatment (Class I), Add	0.91	

06 40 Architectural Woodwork (06)

06 41 Architectural Wood Casework (06 40)

06 41 13 Wood-Veneer-Faced Architectural Cabinets (06 41)

06 41 13 00-0001 Removal And Reinstallation Of Cabinet Or Counters (06 41 13)

Note: Includes storage, cleaning and supply materials. Any height or width.

06 41 13 00-0002 LF Removal And Reinstallation Of Wood Base Cabinets	83.01	
06 41 13 00-0003 LF Removal And Reinstallation Of Wall Cabinets	72.18	
06 41 13 00-0004 LF Removal And Reinstallation Of Plastic Laminated Countertops	17.21	

06 41 13 00-0005 Wood-Veneer Faced Wall And Base Cabinets (06 41 13)

Note: Kitchen cabinets are constructed of 3/8" and 1/2" thick laminated particleboard with corner braces. Shelves are 3/4" laminated particleboard. The face frame is 3/4" x 1-1/2" solid wood. Hinges are 6 way adjustable, fully concealed steel. Drawers are 1/2" thick laminated particleboard boxes with 3/8" laminated particleboard bottoms. Drawer guides are side mounted, epoxy coated double rails. Excludes door or drawer pull hardware.

06 41 13 00-0006 Solid Maple Face Frame And Door, Wall And Base Cabinets (06 41 13 00-0005)

06 41 13 00-0007 Base Cabinets, 35" High, 23-3/4" Deep (06 41 13 00-0006)

06 41 13 00-0008 EA 12" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	424.74	21.70
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0009 EA 15" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	452.33	27.12
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0010 EA 18" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	473.17	32.55
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0011 EA 21" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	498.20	37.98
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0012 EA 24" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	568.76	43.40
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0013 EA 27" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	595.08	48.83
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0014 EA 30" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	644.52	54.25
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0015 EA 33" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	679.41	59.67
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0016 EA 36" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	700.54	65.10
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	129.59	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0017 EA 48" Wide, 35" High x 23-3/4" Deep, Double Drawer and Double Door, Solid Maple Face Frame, Door and Drawer Front, Base Cabinet	800.22	86.81
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	259.18	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0018 EA 30" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Maple Face Frame and Drawer Fronts, Base Cabinet	890.52	54.25
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	259.18	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0019 EA 36" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Maple Face Frame and Drawer Fronts, Base Cabinet	989.38	65.10
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	259.18	
For All Plywood Box Construction, Add	135.08	
06 41 13 00-0020 EA 30" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Maple Face Frame and Drawer Fronts, Base Cabinet	935.55	54.25
For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add	388.78	
For All Plywood Box Construction, Add	135.08	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0021 EA 36" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	1,045.39 388.78 135.08	65.10
06 41 13 00-0022 EA 12" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	431.33 388.78 135.08	21.70
06 41 13 00-0023 EA 15" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	441.35 388.78 135.08	27.12
06 41 13 00-0024 EA 18" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	483.06 388.78 135.08	32.55
06 41 13 00-0025 EA 21" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	514.68 388.78 135.08	37.98
06 41 13 00-0026 EA 24" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	536.91 388.78 135.08	43.40
06 41 13 00-0027 EA 27" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	564.33 388.78 135.08	48.83
06 41 13 00-0028 EA 30" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	933.35 388.78 135.08	54.25
06 41 13 00-0029 EA 33" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	984.73 388.78 135.08	59.67
06 41 13 00-0030 EA 36" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	1,035.51 388.78 135.08	65.10
06 41 13 00-0031 EA 12" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	532.37 518.37 135.08	21.70
06 41 13 00-0032 EA 15" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	543.48 518.37 135.08	27.12
06 41 13 00-0033 EA 18" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	590.68 518.37 135.08	32.55
06 41 13 00-0034 EA 21" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	628.89 518.37 135.08	37.98
06 41 13 00-0035 EA 24" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	662.11 518.37 135.08	43.40
06 41 13 00-0036 EA 27" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	696.12 518.37 135.08	48.83
06 41 13 00-0037 EA 30" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	979.48 518.37 135.08	54.25
06 41 13 00-0038 EA 33" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	1,036.34 518.37 135.08	59.67
06 41 13 00-0039 EA 36" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Maple Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	1,094.81 518.37 135.08	65.10
06 41 13 00-0040 Wall Cabinet, 12" High, 12" Deep (06 41 13 00-0006)		
06 41 13 00-0041 EA 30" Wide, 12" High x 12" Deep, Double Door, Solid Maple Face Frame and Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	379.71 72.48	54.25
06 41 13 00-0042 EA 33" Wide, 12" High x 12" Deep, Double Door, Solid Maple Face Frame and Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	405.82 72.48	59.67
06 41 13 00-0043 EA 36" Wide, 12" High x 12" Deep, Double Door, Solid Maple Face Frame and Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	447.69 72.48	65.10

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 41 13 00-0044	EA	39" Wide, 12" High x 12" Deep, Double Door, Solid Maple Face Frame and Doors, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	478.44 72.48	70.53
06 41 13 00-0045		Wall Cabinets, 14" High, 12" Deep (06 41 13 00-0006)		
06 41 13 00-0046	EA	12" Wide, 14" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	321.77 72.48	21.70
06 41 13 00-0047	EA	15" Wide, 14" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	329.43 72.48	27.12
06 41 13 00-0048	EA	18" Wide, 14" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	345.88 72.48	32.55
06 41 13 00-0049	EA	21" Wide, 14" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	354.64 72.48	37.98
06 41 13 00-0050	EA	24" Wide, 14" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	364.50 72.48	43.40
06 41 13 00-0051	EA	30" Wide, 14" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	382.04 72.48	54.25
06 41 13 00-0052	EA	33" Wide, 14" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	409.47 72.48	59.67
06 41 13 00-0053	EA	36" Wide, 14" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	447.69 72.48	65.10
06 41 13 00-0054	EA	39" Wide, 14" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	478.44 72.48	70.53
06 41 13 00-0055		Wall Cabinets, 18" High, 12" Deep (06 41 13 00-0006)		
06 41 13 00-0056	EA	12" Wide, 18" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	334.95 72.48	21.70
06 41 13 00-0057	EA	15" Wide, 18" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	352.50 72.48	27.12
06 41 13 00-0058	EA	18" Wide, 18" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	365.65 72.48	32.55
06 41 13 00-0059	EA	21" Wide, 18" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	379.90 72.48	37.98
06 41 13 00-0060	EA	24" Wide, 18" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	399.64 72.48	43.40
06 41 13 00-0061	EA	27" Wide, 18" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	422.69 72.48	48.85
06 41 13 00-0062	EA	30" Wide, 18" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	443.55 72.48	54.25
06 41 13 00-0063	EA	33" Wide, 18" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	459.99 72.48	59.67
06 41 13 00-0064	EA	36" Wide, 18" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	469.65 72.48	65.10
06 41 13 00-0065		Wall Cabinets, 30" High, 12" Deep (06 41 13 00-0006)		
06 41 13 00-0066	EA	12" Wide, 30" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	362.26 72.48	21.70
06 41 13 00-0067	EA	15" Wide, 30" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	395.22 72.48	27.12
06 41 13 00-0068	EA	18" Wide, 30" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	422.43 72.48	32.55
06 41 13 00-0069	EA	21" Wide, 30" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	455.49 72.48	37.98
06 41 13 00-0070	EA	24" Wide, 30" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	487.49 72.48	43.40
06 41 13 00-0071	EA	27" Wide, 30" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	535.77 72.48	48.85
06 41 13 00-0072	EA	30" Wide, 30" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	548.94 72.48	54.25
06 41 13 00-0073	EA	33" Wide, 30" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	599.60 72.48	59.67
06 41 13 00-0074	EA	36" Wide, 30" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	617.30 72.48	65.10
06 41 13 00-0075		Wall Cabinets, 36" High, 12" Deep (06 41 13 00-0006)		
06 41 13 00-0076	EA	12" Wide, 36" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	409.48 72.48	21.70
06 41 13 00-0077	EA	15" Wide, 36" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	444.64 72.48	27.12
06 41 13 00-0078	EA	18" Wide, 36" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	475.14 72.48	32.55
06 41 13 00-0079	EA	21" Wide, 36" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	510.40 72.48	37.98
06 41 13 00-0080	EA	24" Wide, 36" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	600.60 72.48	43.40
06 41 13 00-0081	EA	27" Wide, 36" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	603.86 72.48	48.85
06 41 13 00-0082	EA	30" Wide, 36" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	625.82 72.48	54.25



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0083 EA 33" Wide, 36" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	685.27 72.48	59.67
06 41 13 00-0084 EA 36" Wide, 36" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	702.96 72.48	65.10
06 41 13 00-0085 Wall Cabinets, 42" High, 12" Deep (06 41 13 00-0006)		
06 41 13 00-0086 EA 12" Wide, 42" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	458.90 72.48	21.70
06 41 13 00-0087 EA 15" Wide, 42" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	501.75 72.48	27.12
06 41 13 00-0088 EA 18" Wide, 42" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	534.45 72.48	32.55
06 41 13 00-0089 EA 21" Wide, 42" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	568.60 72.48	37.98
06 41 13 00-0090 EA 24" Wide, 42" High x 12" Deep, Single Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	620.37 72.48	43.40
06 41 13 00-0091 EA 27" Wide, 42" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	663.17 72.48	48.85
06 41 13 00-0092 EA 30" Wide, 42" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	698.30 72.48	54.25
06 41 13 00-0093 EA 33" Wide, 42" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	765.44 72.48	59.67
06 41 13 00-0094 EA 36" Wide, 42" High x 12" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	788.62 72.48	65.10
06 41 13 00-0095 Wall Cabinets, 12" High, 23-3/4" Deep (06 41 13 00-0006)		
06 41 13 00-0096 EA 30" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	434.75 72.48	54.25
06 41 13 00-0097 EA 33" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	467.45 72.48	59.67
06 41 13 00-0098 EA 36" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	502.86 72.48	65.10
06 41 13 00-0099 EA 39" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Maple Face Frame and Door, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	544.51 72.48	70.53
06 41 13 00-0100 EA 48" Wide, 12" High x 23-3/4" Deep, Triple Door, Solid Maple Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	645.54 72.48	86.81
06 41 13 00-0101 Utility Cabinets, 84" High (06 41 13 00-0006)		
06 41 13 00-0102 EA 15" Wide, 84" High x 12" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	828.15 267.97	48.22
06 41 13 00-0103 EA 18" Wide, 84" High x 12" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	938.16 267.97	57.87
06 41 13 00-0104 EA 21" Wide, 84" High x 12" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,055.87 267.97	453.30
06 41 13 00-0105 EA 24" Wide, 84" High x 12" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,108.78 267.97	77.16
06 41 13 00-0106 EA 30" Wide, 84" High x 12" Deep, Four Door, Solid Maple Face Frame and Door, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,347.28 267.97	96.44
06 41 13 00-0107 EA 36" Wide, 84" High x 12" Deep, Four Door, Solid Maple Face Frame and Door, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,557.23 267.97	115.74
06 41 13 00-0108 EA 15" Wide, 84" High x 24" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	940.17 267.97	48.22
06 41 13 00-0109 EA 18" Wide, 84" High x 24" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,040.29 267.97	57.87
06 41 13 00-0110 EA 21" Wide, 84" High x 24" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,189.86 267.97	67.52
06 41 13 00-0111 EA 24" Wide, 84" High x 24" Deep, Two Door, Solid Maple Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,263.63 267.97	77.16
06 41 13 00-0112 EA 30" Wide, 84" High x 24" Deep, Four Door, Solid Maple Face Frame and Door, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,574.62 267.97	96.44
06 41 13 00-0113 EA 36" Wide, 84" High x 24" Deep, Four Door, Solid Maple Face Frame and Door, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,803.23 267.97	115.74
06 41 13 00-0114 Solid Oak Face Frame And Door, Wall And Base Cabinets (06 41 13 00-0005)		
06 41 13 00-0115 Base Cabinets, 35" High, 23-3/4" Deep (06 41 13 00-0114)		
06 41 13 00-0116 EA 12" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet..... <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	381.91 129.59 135.08	21.70
06 41 13 00-0117 EA 15" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet..... <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	406.20 129.59 135.08	27.12
06 41 13 00-0118 EA 18" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet..... <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	424.85 129.59 135.08	32.55

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41	13 00-0119	EA	21" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	447.69	37.98
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	129.59	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0120	EA	24" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	509.46	43.40
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	129.59	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0121	EA	27" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	533.58	48.83
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	129.59	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0122	EA	30" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	576.43	54.25
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	129.59	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0123	EA	33" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	608.03	59.67
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	129.59	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0124	EA	36" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	626.96	65.10
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	129.59	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0125	EA	48" Wide, 35" High x 23-3/4" Deep, Double Drawer and Double Door, Solid Oak Face Frame, Door and Drawer Front, Base Cabinet.....	715.66	86.81
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	259.18	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0126	EA	30" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	793.88	54.25
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	259.18	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0127	EA	36" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	880.66	65.10
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	259.18	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0128	EA	30" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	833.41	54.25
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0129	EA	36" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	930.08	65.10
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0130	EA	12" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	388.50	21.70
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0131	EA	15" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	397.42	27.12
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0132	EA	18" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	433.63	32.55
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0133	EA	21" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	461.96	37.98
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0134	EA	24" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	482.00	43.40
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0135	EA	27" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	506.13	48.83
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0136	EA	30" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	831.22	54.25
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0137	EA	33" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	876.00	59.67
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0138	EA	36" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	921.29	65.10
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0139	EA	12" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	476.36	21.70
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0140	EA	15" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	487.47	27.12
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0141	EA	18" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	529.18	32.55
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0142	EA	21" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	563.00	37.98
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41	13 00-0143	EA	24" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet.....	591.83	43.40
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0144 EA 27" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	622.54 518.37 135.08	48.83
06 41 13 00-0145 EA 30" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	871.85 518.37 135.08	54.25
06 41 13 00-0146 EA 33" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	922.13 518.37 135.08	59.67
06 41 13 00-0147 EA 36" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Oak Face Frame and Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	974.01 518.37 135.08	65.10
06 41 13 00-0148 Wall Cabinets, 12" High, 12" Deep (06 41 13 00-0114)		
06 41 13 00-0149 EA 30" Wide, 12" High x 12" Deep, Double Door, Solid Oak Face Frame and Doors, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	342.37 72.48	54.25
06 41 13 00-0150 EA 33" Wide, 12" High x 12" Deep, Double Door, Solid Oak Face Frame and Doors, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	365.19 72.48	59.67
06 41 13 00-0151 EA 36" Wide, 12" High x 12" Deep, Double Door, Solid Oak Face Frame and Doors, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	402.66 72.48	65.10
06 41 13 00-0152 EA 39" Wide, 12" High x 12" Deep, Double Door, Solid Oak Face Frame and Doors, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	430.11 72.48	70.53
06 41 13 00-0153 Wall Cabinets, 14" High, 12" Deep (06 41 13 00-0114)		
06 41 13 00-0154 EA 12" Wide, 14" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	291.02 72.48	21.70
06 41 13 00-0155 EA 15" Wide, 14" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	297.59 72.48	27.12
06 41 13 00-0156 EA 18" Wide, 14" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	311.84 72.48	32.55
06 41 13 00-0157 EA 21" Wide, 14" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	320.60 72.48	37.98
06 41 13 00-0158 EA 24" Wide, 14" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	329.35 72.48	43.40
06 41 13 00-0159 EA 30" Wide, 14" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	344.70 72.48	54.25
06 41 13 00-0160 EA 33" Wide, 14" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	368.84 72.48	59.67
06 41 13 00-0161 EA 36" Wide, 14" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	402.66 72.48	65.10
06 41 13 00-0162 EA 39" Wide, 14" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	430.11 72.48	70.53
06 41 13 00-0163 Wall Cabinets, 18" High, 12" Deep (06 41 13 00-0114)		
06 41 13 00-0164 EA 12" Wide, 18" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	302.00 72.48	21.70
06 41 13 00-0165 EA 15" Wide, 18" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	317.35 72.48	27.12
06 41 13 00-0166 EA 18" Wide, 18" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	329.41 72.48	32.55
06 41 13 00-0167 EA 21" Wide, 18" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	342.56 72.48	37.98
06 41 13 00-0168 EA 24" Wide, 18" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	360.11 72.48	43.40
06 41 13 00-0169 EA 27" Wide, 18" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	380.95 72.48	48.85
06 41 13 00-0170 EA 30" Wide, 18" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	398.52 72.48	54.25
06 41 13 00-0171 EA 33" Wide, 18" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	413.87 72.48	59.67
06 41 13 00-0172 EA 36" Wide, 18" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	422.43 72.48	65.10
06 41 13 00-0173 Wall Cabinets, 30" High, 12" Deep (06 41 13 00-0114)		
06 41 13 00-0174 EA 12" Wide, 30" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	328.21 72.48	21.70
06 41 13 00-0175 EA 15" Wide, 30" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	357.88 72.48	27.12
06 41 13 00-0176 EA 18" Wide, 30" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	381.79 72.48	32.55
06 41 13 00-0177 EA 21" Wide, 30" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	410.46 72.48	37.98
06 41 13 00-0178 EA 24" Wide, 30" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	439.16 72.48	43.40
06 41 13 00-0179 EA 27" Wide, 30" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	481.96 72.48	48.85
06 41 13 00-0180 EA 30" Wide, 30" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	494.03 72.48	54.25

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 41 13 00-0181	EA	33" Wide, 30" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	538.10	59.67
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0182	EA	36" Wide, 30" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	554.70	65.10
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0183		Wall Cabinets, 36" High, 12" Deep (06 41 13 00-0114)		
06 41 13 00-0184	EA	12" Wide, 36" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	369.94	21.70
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0185	EA	15" Wide, 36" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	400.71	27.12
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0186	EA	18" Wide, 36" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	427.92	32.55
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0187	EA	21" Wide, 36" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	458.78	37.98
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0188	EA	24" Wide, 36" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	539.10	43.40
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0189	EA	27" Wide, 36" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	541.26	48.85
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0190	EA	30" Wide, 36" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	561.02	54.25
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0191	EA	33" Wide, 36" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	613.88	59.67
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0192	EA	36" Wide, 36" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	629.38	65.10
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0193		Wall Cabinets, 42" High, 12" Deep (06 41 13 00-0114)		
06 41 13 00-0194	EA	12" Wide, 42" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	412.77	21.70
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0195	EA	15" Wide, 42" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	451.23	27.12
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0196	EA	18" Wide, 42" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	480.63	32.55
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0197	EA	21" Wide, 42" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	510.40	37.98
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0198	EA	24" Wide, 42" High x 12" Deep, Single Door, Solid Oak Face Frame and Door, Wall Cabinet.....	556.67	43.40
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0199	EA	27" Wide, 42" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	593.98	48.85
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0200	EA	30" Wide, 42" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	624.72	54.25
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0201	EA	33" Wide, 42" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	684.17	59.67
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0202	EA	36" Wide, 42" High x 12" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet.....	705.16	65.10
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0203		Wall Cabinets, 12" High, 23-3/4" Deep (06 41 13 00-0114)		
06 41 13 00-0204	EA	30" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet	391.92	54.25
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0205	EA	33" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet	421.33	59.67
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0206	EA	36" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet	452.34	65.10
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0207	EA	39" Wide, 12" High x 23-3/4" Deep, Double Door, Solid Oak Face Frame and Door, Wall Cabinet	489.60	70.53
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0208	EA	48" Wide, 12" High x 23-3/4" Deep, Triple Door, Solid Oak Face Frame and Door, Wall Cabinet.....	578.55	86.81
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0209		Utility Cabinets, 84" High (06 41 13 00-0114)		
06 41 13 00-0210	EA	15" Wide, 84" High x 12" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	749.08	48.22
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0211	EA	18" Wide, 84" High x 12" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	848.10	57.87
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0212	EA	21" Wide, 84" High x 12" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	953.74	453.30
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0213	EA	24" Wide, 84" High x 12" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	1,002.25	77.16
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0214	EA	30" Wide, 84" High x 12" Deep, Four Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	1,213.30	96.44
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0215	EA	36" Wide, 84" High x 12" Deep, Four Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	1,400.18	115.74
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0216	EA	15" Wide, 84" High x 24" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	847.92	48.22
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0217	EA	18" Wide, 84" High x 24" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	938.16	57.87
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0218	EA	21" Wide, 84" High x 24" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	1,071.25	67.52
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0219	EA	24" Wide, 84" High x 24" Deep, Two Door, Solid Oak Face Frame and Door, Pantry Cabinet.....	1,138.43	77.16
		<i>For All Plywood Box Construction, Add</i>	267.97	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0220 EA 30" Wide, 84" High x 24" Deep, Four Door, Solid Oak Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,413.18 267.97	96.44
06 41 13 00-0221 EA 36" Wide, 84" High x 24" Deep, Four Door, Solid Oak Face Frame and Door, Pantry Cabinet <i>For All Plywood Box Construction, Add</i>	1,616.53 267.97	115.74
06 41 13 00-0222 Solid Wood Face Frame And Thermofoil Door, Wall And Base Cabinets <small>(06 41 13 00-0009)</small>		
06 41 13 00-0223 Base Cabinets, 35" High, 23-3/4" Deep <small>(06 41 13 00-0002)</small>		
06 41 13 00-0224 EA 12" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	381.91 129.59 135.08	21.70
06 41 13 00-0225 EA 15" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	406.20 129.59 135.08	27.12
06 41 13 00-0226 EA 18" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	424.85 129.59 135.08	32.55
06 41 13 00-0227 EA 21" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	447.69 129.59 135.08	37.98
06 41 13 00-0228 EA 24" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	509.46 129.59 135.08	43.40
06 41 13 00-0229 EA 27" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	533.58 129.59 135.08	48.83
06 41 13 00-0230 EA 30" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	576.43 129.59 135.08	54.25
06 41 13 00-0231 EA 33" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	608.03 129.59 135.08	59.67
06 41 13 00-0232 EA 36" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	626.96 129.59 135.08	65.10
06 41 13 00-0233 EA 48" Wide, 35" High x 23-3/4" Deep, Double Drawer and Double Door, Solid Wood Face Frame, Thermofoil Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	715.66 259.18 135.08	86.81
06 41 13 00-0234 EA 30" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	793.88 259.18 135.08	54.25
06 41 13 00-0235 EA 36" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	880.66 259.18 135.08	65.10
06 41 13 00-0236 EA 30" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	833.41 388.78 135.08	54.25
06 41 13 00-0237 EA 36" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	930.08 388.78 135.08	65.10
06 41 13 00-0238 EA 12" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	388.50 388.78 135.08	21.70
06 41 13 00-0239 EA 15" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	397.42 388.78 135.08	27.12
06 41 13 00-0240 EA 18" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	433.63 388.78 135.08	32.55
06 41 13 00-0241 EA 21" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	461.96 388.78 135.08	37.98
06 41 13 00-0242 EA 24" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	482.00 388.78 135.08	43.40

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0243	EA		27" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	506.13	48.83
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0244	EA		30" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	831.22	54.25
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0245	EA		33" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	876.00	59.67
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0246	EA		36" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	921.29	65.10
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0247	EA		12" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	476.36	21.70
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0248	EA		15" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	487.47	27.12
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0249	EA		18" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	529.18	32.55
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0250	EA		21" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	563.00	37.98
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0251	EA		24" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	591.83	43.40
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0252	EA		27" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	622.54	48.83
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0253	EA		30" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	871.85	54.25
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0254	EA		33" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	922.13	59.67
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0255	EA		36" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Thermofoil Drawer Fronts, Base Cabinet.....	974.01	65.10
			<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
			<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0256			Wall Cabinets, 12" High, 12" Deep (06 41 13 00-0222)		
06 41 13 00-0257	EA		30" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	342.37	54.25
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0258	EA		33" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	365.19	59.67
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0259	EA		36" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	402.66	65.10
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0260	EA		39" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	430.11	70.53
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0261			Wall Cabinets, 14" High, 12" Deep (06 41 13 00-0222)		
06 41 13 00-0262	EA		12" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet.....	291.02	21.70
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0263	EA		15" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet.....	297.59	27.12
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0264	EA		18" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet.....	311.84	32.55
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0265	EA		21" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet.....	320.60	37.98
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0266	EA		24" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet.....	329.35	43.40
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0267	EA		30" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	344.70	54.25
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0268	EA		33" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	368.84	59.67
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0269	EA		36" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	402.66	65.10
			<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0270	EA		39" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet.....	430.11	70.53
			<i>For All Plywood Box Construction, Add</i>	72.48	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0271 Wall Cabinets, 18" High, 12" Deep (06 41 13 00-0222)		
06 41 13 00-0272 EA 12" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	302.00	21.70
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0273 EA 15" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	317.35	27.12
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0274 EA 18" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	329.41	32.55
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0275 EA 21" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	342.56	37.98
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0276 EA 24" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	360.11	43.40
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0277 EA 27" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	380.95	48.85
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0278 EA 30" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	398.52	54.25
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0279 EA 33" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	413.87	59.67
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0280 EA 36" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	422.43	65.10
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0281 Wall Cabinets, 30" High, 12" Deep (06 41 13 00-0222)		
06 41 13 00-0282 EA 12" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	328.21	21.70
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0283 EA 15" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	357.88	27.12
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0284 EA 18" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	381.79	32.55
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0285 EA 21" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	410.46	37.98
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0286 EA 24" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	439.16	43.40
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0287 EA 27" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	481.96	48.85
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0288 EA 30" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	494.03	54.25
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0289 EA 33" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	538.10	59.67
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0290 EA 36" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	554.70	65.10
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0291 Wall Cabinets, 36" High, 12" Deep (06 41 13 00-0222)		
06 41 13 00-0292 EA 12" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	369.94	21.70
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0293 EA 15" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	400.71	27.12
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0294 EA 18" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	427.92	32.55
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0295 EA 21" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	458.78	37.98
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0296 EA 24" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	539.10	43.40
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0297 EA 27" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	541.26	48.85
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0298 EA 30" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	561.02	54.25
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0299 EA 33" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	613.88	59.67
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0300 EA 36" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	629.38	65.10
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0301 Wall Cabinets, 42" High, 12" Deep (06 41 13 00-0222)		
06 41 13 00-0302 EA 12" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	412.77	21.70
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0303 EA 15" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	451.23	27.12
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0304 EA 18" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	480.63	32.55
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0305 EA 21" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	510.40	37.98
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0306 EA 24" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Thermofoil Door, Wall Cabinet	556.67	43.40
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0307 EA 27" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	593.98	48.85
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0308 EA 30" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	624.72	54.25
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	
06 41 13 00-0309 EA 33" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet	684.17	59.67
<i>For All Plywood Box Construction, Add</i>		
	<i>72.48</i>	

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
06 41 13 00-0310	EA	36" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	705.16 72.48		65.10
06 41 13 00-0311		Wall Cabinets, 12" High, 23-3/4" Deep (06 41 13 00-0222)			
06 41 13 00-0312	EA	30" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	391.92 72.48		54.25
06 41 13 00-0313	EA	33" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	421.33 72.48		59.67
06 41 13 00-0314	EA	36" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	452.34 72.48		65.10
06 41 13 00-0315	EA	39" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet <i>For All Plywood Box Construction, Add</i>	489.60 72.48		70.53
06 41 13 00-0316	EA	48" Wide, 12" High x 23-3/4" Deep, Triple Doors, Solid Wood Face Frame and Thermofoil Doors, Wall Cabinet..... <i>For All Plywood Box Construction, Add</i>	578.55 72.48		86.81
06 41 13 00-0317		Utility Cabinets, 84" High (06 41 13 00-0222)			
06 41 13 00-0318	EA	15" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	749.08 267.97		48.22
06 41 13 00-0319	EA	18" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	848.10 267.97		57.87
06 41 13 00-0320	EA	21" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	953.74 267.97		453.30
06 41 13 00-0321	EA	24" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,002.25 267.97		77.16
06 41 13 00-0322	EA	30" Wide, 84" High x 12" Deep, Four Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,213.30 267.97		96.44
06 41 13 00-0323	EA	36" Wide, 84" High x 12" Deep, Four Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,400.18 267.97		115.74
06 41 13 00-0324	EA	15" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	847.92 267.97		48.22
06 41 13 00-0325	EA	18" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	938.16 267.97		57.87
06 41 13 00-0326	EA	21" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,071.25 267.97		67.52
06 41 13 00-0327	EA	24" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,138.43 267.97		77.16
06 41 13 00-0328	EA	30" Wide, 84" High x 24" Deep, Four Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,413.18 267.97		96.44
06 41 13 00-0329	EA	36" Wide, 84" High x 24" Deep, Four Doors, Solid Wood Face Frame and Thermofoil Doors, Pantry Cabinet..... <i>For All Plywood Box Construction, Add</i>	1,616.53 267.97		115.74
06 41 13 00-0330		Solid Wood Face Frame And Decorative Laminate Veneer Door, Wall And Base Cabinets (06 41 13 00-0005)			
06 41 13 00-0331		Base Cabinets, 35" High, 23-3/4" Deep (06 41 13 00-0330)			
06 41 13 00-0332	EA	12" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	381.91 129.59 135.08		21.70
06 41 13 00-0333	EA	15" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	406.20 129.59 135.08		27.12
06 41 13 00-0334	EA	18" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	424.85 129.59 135.08		32.55
06 41 13 00-0335	EA	21" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	447.69 129.59 135.08		37.98
06 41 13 00-0336	EA	24" Wide, 35" High x 23-3/4" Deep, Single Drawer and Single Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	509.46 129.59 135.08		43.40
06 41 13 00-0337	EA	27" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	533.58 129.59 135.08		48.83
06 41 13 00-0338	EA	30" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	576.43 129.59 135.08		54.25
06 41 13 00-0339	EA	33" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	608.03 129.59 135.08		59.67
06 41 13 00-0340	EA	36" Wide, 35" High x 23-3/4" Deep, Single Drawer and Double Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet <i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i> <i>For All Plywood Box Construction, Add</i>	626.96 129.59 135.08		65.10

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0341 EA 48" Wide, 35" High x 23-3/4" Deep, Double Drawer and Double Door, Solid Wood Face Frame, Decorative Laminate Veneer Door and Drawer Front, Base Cabinet.....	715.66	86.81
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	259.18	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0342 EA 30" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	793.88	54.25
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	259.18	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0343 EA 36" Wide, 35" High x 23-3/4" Deep, Double Drawer with False Panel Drawer Front, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	880.66	65.10
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	259.18	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0344 EA 30" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	833.41	54.25
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0345 EA 36" Wide, 35" High x 23-3/4" Deep, Triple Drawer with False Panel Drawer Front, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	930.08	65.10
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0346 EA 12" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	388.50	21.70
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0347 EA 15" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	397.42	27.12
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0348 EA 18" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	433.63	32.55
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0349 EA 21" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	461.96	37.98
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0350 EA 24" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	482.00	43.40
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0351 EA 27" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	506.13	48.83
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0352 EA 30" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	831.22	54.25
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0353 EA 33" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	876.00	59.67
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0354 EA 36" Wide, 35" High x 23-3/4" Deep, Three Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	921.29	65.10
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	388.78	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0355 EA 12" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	476.36	21.70
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0356 EA 15" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	487.47	27.12
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0357 EA 18" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	529.18	32.55
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0358 EA 21" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	563.00	37.98
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0359 EA 24" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	591.83	43.40
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0360 EA 27" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	622.54	48.83
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	
06 41 13 00-0361 EA 30" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet.....	871.85	54.25
<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37	
<i>For All Plywood Box Construction, Add</i>	135.08	

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
06 41 13 00-0362	EA	33" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet	922.13		59.67
		<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37		
		<i>For All Plywood Box Construction, Add</i>	135.08		
06 41 13 00-0363	EA	36" Wide, 35" High x 23-3/4" Deep, Four Drawer Base, Solid Wood Face Frame and Decorative Laminate Veneer Drawer Fronts, Base Cabinet	974.01		65.10
		<i>For Solid Wood Drawers, Dovetail Joints And Full Extension Drawer Guides, Add</i>	518.37		
		<i>For All Plywood Box Construction, Add</i>	135.08		
06 41 13 00-0364		Wall Cabinets, 12" High, 12" Deep (06 41 13 00-0330)			
06 41 13 00-0365	EA	30" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	342.37		54.25
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0366	EA	33" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	365.19		59.67
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0367	EA	36" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	402.66		65.10
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0368	EA	39" Wide, 12" High x 12" Deep, Double Door, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	430.11		70.53
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0369		Wall Cabinets, 14" High, 12" Deep (06 41 13 00-0330)			
06 41 13 00-0370	EA	12" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	291.02		21.70
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0371	EA	15" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	297.59		27.12
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0372	EA	18" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	311.84		32.55
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0373	EA	21" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	320.60		37.98
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0374	EA	24" Wide, 14" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	329.35		43.40
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0375	EA	30" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	344.70		54.25
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0376	EA	33" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	368.84		59.67
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0377	EA	36" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	402.66		65.10
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0378	EA	39" Wide, 14" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	430.11		70.53
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0379		Wall Cabinets, 18" High, 12" Deep (06 41 13 00-0330)			
06 41 13 00-0380	EA	12" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	302.00		21.70
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0381	EA	15" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	317.35		27.12
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0382	EA	18" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	329.41		32.55
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0383	EA	21" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	342.56		37.98
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0384	EA	24" Wide, 18" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet	360.11		43.40
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0385	EA	27" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	380.95		48.85
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0386	EA	30" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	398.52		54.25
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0387	EA	33" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	413.87		59.67
		<i>For All Plywood Box Construction, Add</i>	72.48		
06 41 13 00-0388	EA	36" Wide, 18" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet	422.43		65.10
		<i>For All Plywood Box Construction, Add</i>	72.48		

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 41 13 00-0389				Wall Cabinets, 30" High, 12" Deep <small>(06 41 13 00-0330)</small>		
06 41 13 00-0390	EA			12" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	328.21	21.70
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0391	EA			15" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	357.88	27.12
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0392	EA			18" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	381.79	32.55
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0393	EA			21" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	410.46	37.98
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0394	EA			24" Wide, 30" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	439.16	43.40
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0395	EA			27" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	481.96	48.85
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0396	EA			30" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	494.03	54.25
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0397	EA			33" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	538.10	59.67
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0398	EA			36" Wide, 30" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	554.70	65.10
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0399				Wall Cabinets, 36" High, 12" Deep <small>(06 41 13 00-0330)</small>		
06 41 13 00-0400	EA			12" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	369.94	21.70
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0401	EA			15" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	400.71	27.12
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0402	EA			18" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	427.92	32.55
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0403	EA			21" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	458.78	37.98
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0404	EA			24" Wide, 36" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	539.10	43.40
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0405	EA			27" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	541.26	48.85
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0406	EA			30" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	561.02	54.25
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0407	EA			33" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	613.88	59.67
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0408	EA			36" Wide, 36" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	629.38	65.10
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0409				Wall Cabinets, 42" High, 12" Deep <small>(06 41 13 00-0330)</small>		
06 41 13 00-0410	EA			12" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	412.77	21.70
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0411	EA			15" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	451.23	27.12
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0412	EA			18" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	480.63	32.55
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0413	EA			21" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	510.40	37.98
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0414	EA			24" Wide, 42" High x 12" Deep, Single Door, Solid Wood Face Frame and Decorative Laminate Veneer Door, Wall Cabinet.....	556.67	43.40
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0415	EA			27" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	593.98	48.85
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	
06 41 13 00-0416	EA			30" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	624.72	54.25
				<i>For All Plywood Box Construction, Add</i>	<i>72.48</i>	

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 41 Architectural Wood Casework**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 41 13 00-0417	EA	33" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	684.17	59.67
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0418	EA	36" Wide, 42" High x 12" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	705.16	65.10
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0419		Wall Cabinets, 12" High, 23-3/4" Deep (06 41 13 00-0330)		
06 41 13 00-0420	EA	30" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	391.92	54.25
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0421	EA	33" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	421.33	59.67
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0422	EA	36" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	452.34	65.10
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0423	EA	39" Wide, 12" High x 23-3/4" Deep, Double Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	489.60	70.53
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0424	EA	48" Wide, 12" High x 23-3/4" Deep, Triple Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Wall Cabinet.....	578.55	86.81
		<i>For All Plywood Box Construction, Add</i>	72.48	
06 41 13 00-0425		Utility Cabinets, 84" High (06 41 13 00-0330)		
06 41 13 00-0426	EA	15" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	749.08	48.22
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0427	EA	18" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	848.10	57.87
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0428	EA	21" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	953.74	453.30
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0429	EA	24" Wide, 84" High x 12" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,002.25	77.16
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0430	EA	30" Wide, 84" High x 12" Deep, Four Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,213.30	96.44
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0431	EA	36" Wide, 84" High x 12" Deep, Four Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,400.18	115.74
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0432	EA	15" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	847.92	48.22
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0433	EA	18" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	938.16	57.87
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0434	EA	21" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,071.25	67.52
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0435	EA	24" Wide, 84" High x 24" Deep, Two Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,138.43	77.16
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0436	EA	30" Wide, 84" High x 24" Deep, Four Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,413.18	96.44
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 13 00-0437	EA	36" Wide, 84" High x 24" Deep, Four Doors, Solid Wood Face Frame and Decorative Laminate Veneer Doors, Pantry Cabinet.....	1,616.53	115.74
		<i>For All Plywood Box Construction, Add</i>	267.97	
06 41 93		Cabinet and Drawer Hardware (06 41)		
06 41 93 00-0001		Cabinet Hardware (06 41 93)		
		Note: Includes all finishes, and mounting screws.		
06 41 93 00-0002	EA	4" To 6" Long, 1/2" Diameter, Cabinet Bar Pull.....	26.36	9.23
06 41 93 00-0003	EA	7" To 9" Long, 1/2" Diameter, Cabinet Bar Pull.....	27.22	9.23
06 41 93 00-0004	EA	10" To 12" Long, 1/2" Diameter, Cabinet Bar Pull.....	28.74	9.23
06 41 93 00-0005	EA	3" To 4-1/2", Flat Cabinet Pull Handle.....	30.42	9.23
06 41 93 00-0006	EA	5" To 6-1/2", Flat Cabinet Pull Handle.....	31.29	9.23
06 41 93 00-0007	EA	7" To 8-1/2", Flat Cabinet Pull Handle.....	40.60	9.23
06 41 93 00-0008	EA	12" To 12-1/2", Flat Cabinet Pull Handle.....	79.15	9.23
06 41 93 00-0009	EA	1-7/16" Diameter, Mushroom Cabinet Pull Knobs.....	20.56	7.05
06 41 93 00-0010	EA	3-7/16" x 1-5/8" x 1" Projection, Cabinet Cup Pull.....	20.41	7.05
06 41 93 00-0011	EA	1-1/4" Long, Finger Cabinet Pull.....	27.82	8.14
06 41 93 00-0012	EA	3" Long, Finger Cabinet Pull.....	31.88	8.14
06 41 93 00-0013	EA	4" Long, Finger Cabinet Pull.....	34.65	8.14
06 41 93 00-0014	EA	6" Long, Finger Cabinet Pull.....	38.44	8.14
06 41 93 00-0015	EA	12" Long, Finger Cabinet Pull.....	56.03	8.14
06 41 93 00-0016	EA	Cabinet Spring Loaded Adjustable Barrel Ball Catch.....	40.48	10.85



Wood, Plastics, and Composites	06	06
Architectural Woodwork	06 40	
Architectural Wood Casework	06 41	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	06 41 93 00-0017	EA	Cabinet Surface Mounted Square or Matchbook Latch	59.55	10.85
	06 41 93 00-0018	EA	Cabinet Door or Drawer Mortised Lock With 2 Keys.....	155.95	16.28
	06 41 93 00-0019	EA	Cabinet Door or Drawer Bored Lock with 2 Keys.....	53.40	9.23
	06 41 93 00-0020	EA	Cabinet Surface Mounted Slide or Barrel Bolt Latch.....	35.98	9.23
	06 41 93 00-0021	EA	4" Wire Pull Handles, Aluminum Satin Finihs (Stanley 4484)	25.02	9.23
	06 41 93 00-0022	EA	180 Degree Overlay Clip Top Hinges, Concealed (Stanley BB8180 S826-149).....	50.54	10.85
	06 41 93 00-0023	EA	1-1/4" Diameter Pull Knobs, Solid Brass (Stanley 4482)	36.40	7.05
	06 41 93 00-0024	EA	14" To 22" Full Extension Drawer Slide (KV 8400).....	62.81	9.23

06 42 Wood Paneling (06 40)

Note: Includes glue for installation.

06 42 13 Wood Board Paneling (06 42)

	06 42 13 00-0001		Solid Wood Paneling <small>(06 42 13)</small>		
	06 42 13 00-0002		7/16" Solid Wood Paneling, Tongue And Groove, 3" To 5" Wide <small>(06 42 13 00-0001)</small>		
	06 42 13 00-0003	SF	Homestead Cedar Paneling Tongue And Groove, 7/16"	9.92	2.28
	06 42 13 00-0004	SF	Homestead Juniper Paneling Tongue And Groove, 7/16"	10.44	2.28
	06 42 13 00-0005		7/16" Solid Wood Paneling, Tongue And Groove, 6" To 10" Wide <small>(06 42 13 00-0001)</small>		
	06 42 13 00-0006	SF	8" Random Plank Tongue And Groove, 7/16".....	12.96	2.16
	06 42 13 00-0007	SF	8" Solid Plank Tongue And Groove, 7/16"	12.00	2.16
	06 42 13 00-0008		1/2" Solid Wood Paneling, Tongue And Groove, 4" To 6" Wide <small>(06 42 13 00-0001)</small>		
	06 42 13 00-0009	SF	Alder Wood Tongue And Groove Paneling, 1/2".....	11.48	2.28
	06 42 13 00-0010		1" Solid Wood Paneling, Shiplap, 6" To 8" Wide <small>(06 42 13 00-0001)</small>		
	06 42 13 00-0011	SF	1" Teredo (Driftwood) Wood Shiplap	7.41	1.95

06 42 16 Flush Wood Paneling (06 42)

	06 42 16 00-0001		Veneer Hardboard Panels <small>(06 42 16)</small>		
	06 42 16 00-0002	SF	1/4" Maple Veneer Paneling	6.29	1.97
			For Waterproof Glue, Add	0.13	
			For Ceiling Installation, Add	1.34	
	06 42 16 00-0003		Plywood Unfinished With Trim 1/4" Thick <small>(06 42 16)</small>		
	06 42 16 00-0004		Birch <small>(06 42 16 00-0003)</small>		
	06 42 16 00-0005	SF	1/4" Unfinished Birch Plywood, Natural Faced With Trim	5.36	1.75
			For Waterproof Glue, Add	0.10	
			For Ceiling Installation, Add	1.18	
			For Installation On Metal Studs Or Furring, Add	0.43	
			For Glue Laminated Installation, Add	0.27	
			For Lumber Core, Add	0.16	
			For 1/8" Thick Paneling, Deduct	-0.51	
			For 1/2" Thick Paneling, Add	1.24	
			For 5/8" Thick Paneling, Add	1.54	
			For 3/4" Thick Paneling, Add	1.93	
			For Fire Retardant Treatment (Class I), Add	1.13	
	06 42 16 00-0006		Top Grade Plywood Prefinished With Trim 1/4" Thick <small>(06 42 16)</small>		
	06 42 16 00-0007	SF	1/4" Top Grade Plywood, Birch Veneer Prefinished With Trim.....	5.97	1.97
			For Flitch Matched Veneer, Add	0.80	
			For Second Grade Veneer, Deduct	-0.16	
			For Third Grade Veneer, Deduct	-0.24	
			For Waterproof Glue, Add	0.11	
			For Ceiling Installation, Add	1.31	
			For Installation On Metal Studs Or Furring, Add	0.48	
			For Glue Laminated Installation, Add	0.30	
			For Lumber Core, Add	0.18	
			For 1/8" Thick Paneling, Deduct	-0.57	
			For 1/2" Thick Paneling, Add	1.39	
			For 5/8" Thick Paneling, Add	1.72	
			For 3/4" Thick Paneling, Add	2.16	
			For Fire Retardant Treatment (Class I), Add	1.26	

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 42 Wood Paneling**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 42 16 00-0008	SF	1/4" Top Grade Plywood, Cherry Veneer Prefinished With Trim.....	6.69	1.97
		<i>For Flitch Matched Veneer, Add</i>	1.16	
		<i>For Second Grade Veneer, Deduct</i>	-0.23	
		<i>For Third Grade Veneer, Deduct</i>	-0.35	
		<i>For Waterproof Glue, Add</i>	0.16	
		<i>For Ceiling Installation, Add</i>	1.31	
		<i>For Installation On Metal Studs Or Furring, Add</i>	0.48	
		<i>For Glue Laminated Installation, Add</i>	0.33	
		<i>For Lumber Core, Add</i>	0.26	
		<i>For 1/8" Thick Paneling, Deduct</i>	-0.69	
		<i>For 1/2" Thick Paneling, Add</i>	1.78	
		<i>For 5/8" Thick Paneling, Add</i>	2.26	
		<i>For 3/4" Thick Paneling, Add</i>	2.89	
		<i>For Fire Retardant Treatment (Class I), Add</i>	1.83	
06 42 16 00-0009	SF	1/4" Top Grade Plywood, Mahogany Veneer Prefinished With Trim.....	8.93	1.97
		<i>For Flitch Matched Veneer, Add</i>	2.01	
		<i>For Second Grade Veneer, Deduct</i>	-0.40	
		<i>For Third Grade Veneer, Deduct</i>	-0.60	
		<i>For Waterproof Glue, Add</i>	0.28	
		<i>For Ceiling Installation, Add</i>	1.48	
		<i>For Installation On Metal Studs Or Furring, Add</i>	0.54	
		<i>For Glue Laminated Installation, Add</i>	0.45	
		<i>For Lumber Core, Add</i>	0.44	
		<i>For 1/8" Thick Paneling, Deduct</i>	-1.01	
		<i>For 1/2" Thick Paneling, Add</i>	2.76	
		<i>For 5/8" Thick Paneling, Add</i>	3.60	
		<i>For 3/4" Thick Paneling, Add</i>	4.68	
		<i>For Fire Retardant Treatment (Class I), Add</i>	3.17	
06 42 16 00-0010	SF	1/4" Top Grade Plywood, Red Oak Veneer Prefinished With Trim.....	6.14	1.97
		<i>For Flitch Matched Veneer, Add</i>	0.89	
		<i>For Second Grade Veneer, Deduct</i>	-0.18	
		<i>For Third Grade Veneer, Deduct</i>	-0.27	
		<i>For Waterproof Glue, Add</i>	0.12	
		<i>For Ceiling Installation, Add</i>	1.31	
		<i>For Installation On Metal Studs Or Furring, Add</i>	0.48	
		<i>For Glue Laminated Installation, Add</i>	0.31	
		<i>For Lumber Core, Add</i>	0.19	
		<i>For 1/8" Thick Paneling, Deduct</i>	-0.60	
		<i>For 1/2" Thick Paneling, Add</i>	1.48	
		<i>For 5/8" Thick Paneling, Add</i>	1.85	
		<i>For 3/4" Thick Paneling, Add</i>	2.33	
		<i>For Fire Retardant Treatment (Class I), Add</i>	1.40	
06 42 16 00-0011	SF	1/4" Top Grade Plywood, Walnut Veneer Prefinished With Trim.....	7.77	1.97
		<i>For Flitch Matched Veneer, Add</i>	1.70	
		<i>For Second Grade Veneer, Deduct</i>	-0.34	
		<i>For Third Grade Veneer, Deduct</i>	-0.51	
		<i>For Waterproof Glue, Add</i>	0.24	
		<i>For Ceiling Installation, Add</i>	1.31	
		<i>For Installation On Metal Studs Or Furring, Add</i>	0.48	
		<i>For Glue Laminated Installation, Add</i>	0.39	
		<i>For Lumber Core, Add</i>	0.37	
		<i>For 1/8" Thick Paneling, Deduct</i>	-0.87	
		<i>For 1/2" Thick Paneling, Add</i>	2.36	
		<i>For 5/8" Thick Paneling, Add</i>	3.07	
		<i>For 3/4" Thick Paneling, Add</i>	3.99	
		<i>For Fire Retardant Treatment (Class I), Add</i>	2.69	
06 42 16 00-0012	SF	1/4" Top Grade Plywood, Maple Veneer Prefinished With Trim.....	6.18	1.97
		<i>For Flitch Matched Veneer, Add</i>	0.91	
		<i>For Second Grade Veneer, Deduct</i>	-0.18	
		<i>For Third Grade Veneer, Deduct</i>	-0.27	
		<i>For Waterproof Glue, Add</i>	0.13	
		<i>For Ceiling Installation, Add</i>	1.31	
		<i>For Installation On Metal Studs Or Furring, Add</i>	0.48	
		<i>For Glue Laminated Installation, Add</i>	0.31	
		<i>For Lumber Core, Add</i>	0.20	
		<i>For 1/8" Thick Paneling, Deduct</i>	-0.61	
		<i>For 1/2" Thick Paneling, Add</i>	1.50	
		<i>For 5/8" Thick Paneling, Add</i>	1.88	
		<i>For 3/4" Thick Paneling, Add</i>	2.37	
		<i>For Fire Retardant Treatment (Class I), Add</i>	1.43	

06 42 16 00-0013 Accessories (06 42 16)

06 42 16 00-0014	EA	Aluminum Panel Retainer "J" With Bolt.....	41.05	
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06 42 19 Plastic-Laminate-Faced Wood Paneling (06 42)**06 42 19 00-0001 Plastic Laminate (06 42 19)**

Note: Standard colors and patterns.

06 42 19 00-0002	SF	1/16" Plastic Laminate Faced Panel.....	10.86	3.80
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Note: Includes cutting to fit.

06 43 Wood Stairs and Railings (06 40)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 43 16 Wood Railings (06 43)

06 43 16 00-0001 Handrails (06 43 16)

06 43 16 00-0002 Wood Handrail With Brackets (06 43 16 00-0001)

Note: Includes pine, fir or red oak interior grade or pressure treated exterior grade handrail with brackets.

06 43 16 00-0003	LF	1-1/2" x 1-11/16", Wood Handrail With Brackets	18.43	
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	2.49	
06 43 16 00-0004	LF	1-7/8" x 2-5/8", Wood Handrail With Brackets	19.96	5.43
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	2.49	
06 43 16 00-0005	LF	1-1/2" Diameter, Wood Handrail With Brackets	25.07	5.43
06 43 16 00-0006	LF	1-3/4" Diameter, Wood Handrail With Brackets	26.35	5.43
06 43 16 00-0007	LF	2" Diameter, Wood Handrail With Brackets	30.94	5.43
06 43 16 00-0008	LF	2-1/2" Diameter, Wood Handrail With Brackets	45.12	5.43

06 44 Ornamental Woodwork (06 40)

06 44 39 Wood Posts and Columns (06 44)

06 44 39 00-0001 Columns (06 44 39)

06 44 39 00-0002 Pine Colonial Columns, Round Tapered With Cap And Base (06 44 39 00-0001)

Note: Paint grade/finger jointed pine.

06 44 39 00-0003	LF	6" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	76.63	
06 44 39 00-0004	LF	8" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	95.74	10.31
06 44 39 00-0005	LF	10" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	117.57	11.94
06 44 39 00-0006	LF	12" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	140.97	12.47
06 44 39 00-0007	LF	14" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	176.57	14.11
06 44 39 00-0008	LF	16" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	216.94	15.19
06 44 39 00-0009	LF	18" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	262.18	16.27
06 44 39 00-0010	LF	20" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	313.41	17.37
06 44 39 00-0011	LF	6" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	88.38	7.06
06 44 39 00-0012	LF	8" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	105.16	10.31
06 44 39 00-0013	LF	10" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	130.57	11.94
06 44 39 00-0014	LF	12" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	154.87	12.47
06 44 39 00-0015	LF	14" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	194.81	14.11
06 44 39 00-0016	LF	16" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	249.25	15.19
06 44 39 00-0017	LF	18" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	309.94	16.27
06 44 39 00-0018	LF	20" Diameter Fluted Column, Pine Colonial Columns, Round Tapered With Cap And Base	377.75	17.37

06 44 39 00-0019 Pine Colonial Columns, Round Non-Tapered With Cap And Base (06 44 39 00-0001)

Note: Paint grade/finger jointed pine.

06 44 39 00-0020	LF	6" Diameter Plain Column, Pine Colonial Columns, Round Tapered With Cap And Base	92.41	
06 44 39 00-0021	LF	8" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	113.68	10.31
06 44 39 00-0022	LF	10" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	140.88	11.94
06 44 39 00-0023	LF	12" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	170.11	12.47
06 44 39 00-0024	LF	14" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	216.68	14.11
06 44 39 00-0025	LF	16" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	271.56	15.19
06 44 39 00-0026	LF	18" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	334.32	16.27
06 44 39 00-0027	LF	20" Diameter Plain Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	405.84	17.37
06 44 39 00-0028	LF	6" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	107.12	7.06
06 44 39 00-0029	LF	8" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	126.54	10.31
06 44 39 00-0030	LF	10" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	157.74	11.94
06 44 39 00-0031	LF	12" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	197.96	12.47
06 44 39 00-0032	LF	14" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	252.05	14.11
06 44 39 00-0033	LF	16" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	311.56	15.19
06 44 39 00-0034	LF	18" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	376.99	16.27
06 44 39 00-0035	LF	20" Diameter Fluted Column, Pine Colonial Columns, Round Non-Tapered With Cap And Base	448.45	17.37

06 44 39 00-0036 Pine Classical Columns, Round Tapered With Cap And Base (06 44 39 00-0001)

Note: Paint grade/finger jointed pine.

06 44 39 00-0037	LF	6" Diameter Plain Column, Pine Classical Columns, Round Tapered With Cap And Base	82.21	
06 44 39 00-0038	LF	8" Diameter Plain Column, Pine Classical Columns, Round Tapered With Cap And Base	102.46	10.31
06 44 39 00-0039	LF	10" Diameter Plain Column, Pine Classical Columns, Round Tapered With Cap And Base	126.02	11.94
06 44 39 00-0040	LF	12" Diameter Plain Column, Pine Classical Columns, Round Tapered With Cap And Base	151.43	12.47
06 44 39 00-0041	LF	6" Diameter Fluted Column, Pine Classical Columns, Round Tapered With Cap And Base	95.01	7.06
06 44 39 00-0042	LF	8" Diameter Fluted Column, Pine Classical Columns, Round Tapered With Cap And Base	112.72	10.31
06 44 39 00-0043	LF	10" Diameter Fluted Column, Pine Classical Columns, Round Tapered With Cap And Base	140.18	11.94
06 44 39 00-0044	LF	12" Diameter Fluted Column, Pine Classical Columns, Round Tapered With Cap And Base	176.57	12.47

06 44 39 00-0045 Redwood Colonial Columns, Round Tapered With Cap And Base (06 44 39 00-0001)

Note: Paint grade/finger jointed redwood.

06 44 39 00-0046	LF	6" Diameter Plain Column, Redwood Colonial Columns, Round Tapered With Cap And Base	129.17	
06 44 39 00-0047	LF	8" Diameter Plain Column, Redwood Colonial Columns, Round Tapered With Cap And Base	154.92	10.31
06 44 39 00-0048	LF	10" Diameter Plain Column, Redwood Colonial Columns, Round Tapered With Cap And Base	193.33	11.94
06 44 39 00-0049	LF	12" Diameter Plain Column, Redwood Colonial Columns, Round Tapered With Cap And Base	236.91	12.47
06 44 39 00-0050	LF	6" Diameter Fluted Column, Redwood Colonial Columns, Round Tapered With Cap And Base	148.90	7.06
06 44 39 00-0051	LF	8" Diameter Fluted Column, Redwood Colonial Columns, Round Tapered With Cap And Base	175.99	10.31

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 44 Ornamental Woodwork**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 44 39 00-0052	LF	10" Diameter Fluted Column, Redwood Colonial Columns, Round Tapered With Cap And Base	217.99	11.94
06 44 39 00-0053	LF	12" Diameter Fluted Column, Redwood Colonial Columns, Round Tapered With Cap And Base	269.19	12.47

06 44 39 00-0054 Ornamental Or Decorative Cap And Bases, Resin (06 44 39 00-0001)

Note: For tapered wood columns.

06 44 39 00-0055	EA	6" Resin Corinthian Capital And Base	405.85	14.65
06 44 39 00-0056	EA	8" Resin Corinthian Capital And Base	615.32	16.27
06 44 39 00-0057	EA	10" Resin Corinthian Capital And Base	858.35	18.99
06 44 39 00-0058	EA	12" Resin Corinthian Capital And Base	1,096.88	21.70
06 44 39 00-0059	EA	6" Resin Greek Erectheum Cap And Base	361.02	14.65
06 44 39 00-0060	EA	8" Resin Greek Erectheum Cap And Base	503.25	16.27
06 44 39 00-0061	EA	10" Resin Greek Erectheum Cap And Base	625.24	18.99
06 44 39 00-0062	EA	12" Resin Greek Erectheum Cap And Base	818.94	21.70
06 44 39 00-0063	EA	6" Resin Roman Ionic Capital And Base	380.04	15.19
06 44 39 00-0064	EA	8" Resin Roman Ionic Capital And Base	503.25	16.27
06 44 39 00-0065	EA	10" Resin Roman Ionic Capital And Base	625.24	18.99
06 44 39 00-0066	EA	12" Resin Roman Ionic Capital And Base	796.52	21.70
06 44 39 00-0067	EA	6" Resin Scamozzi Capital And Base	384.53	15.19
06 44 39 00-0068	EA	8" Resin Scamozzi Capital And Base	548.08	16.27
06 44 39 00-0069	EA	10" Resin Scamozzi Capital And Base	647.65	18.99
06 44 39 00-0070	EA	12" Resin Scamozzi Capital And Base	890.66	21.70
06 44 39 00-0071	EA	6" Resin Temple Of Winds Cap And Base	384.53	15.19
06 44 39 00-0072	EA	8" Resin Temple Of Winds Cap And Base	597.39	16.27
06 44 39 00-0073	EA	10" Resin Temple Of Winds Cap And Base	791.10	18.99
06 44 39 00-0074	EA	12" Resin Temple Of Winds Cap And Base	980.32	21.70

06 44 39 00-0075 Ornamental Or Decorative Cap And Bases, Plaster (06 44 39 00-0001)

Note: For tapered wood columns.

06 44 39 00-0076	EA	6" Plaster Corinthian Capital And Base	822.76	14.65
06 44 39 00-0077	EA	8" Plaster Corinthian Capital And Base	924.64	16.27
06 44 39 00-0078	EA	10" Plaster Corinthian Capital And Base	1,176.63	18.99
06 44 39 00-0079	EA	12" Plaster Corinthian Capital And Base	1,294.12	21.70
06 44 39 00-0080	EA	6" Plaster Greek Erectheum Cap And Base	544.82	14.65
06 44 39 00-0081	EA	8" Plaster Greek Erectheum Cap And Base	633.26	16.27
06 44 39 00-0082	EA	10" Plaster Greek Erectheum Cap And Base	782.14	18.99
06 44 39 00-0083	EA	12" Plaster Greek Erectheum Cap And Base	984.80	21.70
06 44 39 00-0084	EA	6" Plaster Roman Ionic Capital And Base	523.50	15.19
06 44 39 00-0085	EA	8" Plaster Roman Ionic Capital And Base	687.05	16.27
06 44 39 00-0086	EA	10" Plaster Roman Ionic Capital And Base	831.45	18.99
06 44 39 00-0087	EA	12" Plaster Roman Ionic Capital And Base	984.80	21.70
06 44 39 00-0088	EA	6" Plaster Scamozzi Capital And Base	622.12	15.19
06 44 39 00-0089	EA	8" Plaster Scamozzi Capital And Base	826.02	16.27
06 44 39 00-0090	EA	10" Plaster Scamozzi Capital And Base	930.07	18.99
06 44 39 00-0091	EA	12" Plaster Scamozzi Capital And Base	1,182.05	21.70
06 44 39 00-0092	EA	6" Plaster Temple Of Winds Cap And Base	523.50	15.19
06 44 39 00-0093	EA	8" Plaster Temple Of Winds Cap And Base	678.08	16.27
06 44 39 00-0094	EA	10" Plaster Temple Of Winds Cap And Base	885.24	18.99
06 44 39 00-0095	EA	12" Plaster Temple Of Winds Cap And Base	1,132.74	21.70
06 44 39 00-0096	EA	6" Plaster Empire Capital And Base	590.74	15.19
06 44 39 00-0097	EA	8" Plaster Empire Capital And Base	722.92	16.27
06 44 39 00-0098	EA	10" Plaster Empire Capital And Base	880.76	18.99
06 44 39 00-0099	EA	12" Plaster Empire Capital And Base	984.80	21.70

06 46 Wood Trim (06 40)**06 46 13 Wood Door and Window Casings (06 46)****06 46 13 00-0001 Door and Window Casings (06 46 13)**

06 46 13 00-0002	LF	1-1/8" Wide Plain Pine Door And Window Molding	5.24	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.89	
06 46 13 00-0003	LF	1-1/8" Wide Detailed Pine Door And Window Molding	5.29	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.89	
06 46 13 00-0004	LF	2-1/2" Wide Pine Complete Door And Window Trim	6.75	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.89	

06 46 19 Wood Base and Shoe Moldings (06 46)**06 46 19 00-0001 Base And Shoe Molding (06 46 19)**

06 46 19 00-0002	LF	1/2" x 1/2" Pine Quarter Round Trim	5.35	2.06
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 19 00-0003	LF	3/4" x 3/4" Pine Quarter Round Trim	5.77	2.06
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 19 00-0004	LF	3-1/2" High White Pine Base Molding, All Dimensions Are Nominal	7.01	1.30
		<i>For Clear Birch, Add</i>	0.85	
		<i>For Clear Mahogany, Oak, Maple Or Walnut, Add</i>	1.64	
		<i>For Stain Grade Material (No Finger Joints), Add</i>	0.48	
		<i>For Clear Poplar, Add</i>	0.53	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 19 00-0005 LF 4-1/2" High White Pine Base Molding, All Dimensions Are Nominal.....	8.50	1.63
<i>For Clear Birch, Add</i>	0.98	
<i>For Clear Mahogany, Oak, Maple Or Walnut, Add</i>	1.92	
<i>For Stain Grade Material (No Finger Joints), Add</i>	0.55	
<i>For Clear Poplar, Add</i>	0.61	
06 46 19 00-0006 LF 5-1/2" High White Pine Base Molding, All Dimensions Are Nominal.....	10.72	1.84
<i>For Clear Birch, Add</i>	1.52	
<i>For Clear Mahogany, Oak, Maple Or Walnut, Add</i>	2.73	
<i>For Stain Grade Material (No Finger Joints), Add</i>	0.86	
<i>For Clear Poplar, Add</i>	0.95	
06 46 19 00-0007 LF 3/4" x 1" Oak Base Shoe	6.85	2.06
06 46 19 00-0008 LF 3/4" x 1" White Pine Base Shoe, Stain Grade.....	6.61	2.06
06 46 19 00-0009 LF 3/4" x 1" White Pine Base Shoe, Paint Grade.....	6.07	2.06
06 46 23 Wood Chair Rails (06 46)		
06 46 23 00-0001 Chair Rails (06 46 23)		
06 46 23 00-0002 LF 5/8" x 2-1/2" White Pine Shaped Chair Rail.....	8.72	1.95
<i>For Birch, Add</i>	1.40	
<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	2.41	
<i>For Poplar, Add</i>	0.88	
06 46 23 00-0003 LF 5/8" x 3-1/2" White Pine Shaped Chair Rail.....	10.93	1.95
<i>For Birch, Add</i>	2.11	
<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	3.40	
<i>For Poplar, Add</i>	1.32	
06 46 23 00-0004 LF 1/2" x 1-5/8" White Pine Shaped Chair Rail.....	6.45	1.95
<i>For Birch, Add</i>	1.02	
<i>For Mahogany, Oak, Maple Or Walnut, Add</i>	1.77	
<i>For Poplar, Add</i>	0.64	
06 46 26 Wood Cornices (06 46)		
06 46 26 00-0001 Wood Cornices (06 46 26)		
06 46 26 00-0002 LF 1" x 2" White Pine Cornices, All Dimensions Are Nominal.....	6.33	1.95
<i>For Birch, Add</i>	0.72	
<i>For Mahogany, Oak, Maple, Or Walnut, Add</i>	1.33	
<i>For Poplar, Add</i>	0.90	
06 46 26 00-0003 LF 1" x 4" White Pine Cornices, All Dimensions Are Nominal.....	8.12	2.06
<i>For Birch, Add</i>	1.30	
<i>For Mahogany, Oak, Maple, Or Walnut, Add</i>	2.07	
<i>For Poplar, Add</i>	1.62	
06 46 26 00-0004 LF 1" x 6" White Pine Cornices, All Dimensions Are Nominal.....	11.58	2.16
<i>For Birch, Add</i>	2.47	
<i>For Mahogany, Oak, Maple, Or Walnut, Add</i>	3.56	
<i>For Poplar, Add</i>	3.09	
06 46 26 00-0005 LF 1" x 8" White Pine Cornices, All Dimensions Are Nominal.....	13.46	2.16
<i>For Birch, Add</i>	3.07	
<i>For Mahogany, Oak, Maple, Or Walnut, Add</i>	4.33	
<i>For Poplar, Add</i>	3.84	
06 46 26 00-0006 LF 1" x 10" White Pine Cornices, All Dimensions Are Nominal.....	15.63	2.28
<i>For Birch, Add</i>	3.77	
<i>For Mahogany, Oak, Maple, Or Walnut, Add</i>	5.23	
<i>For Poplar, Add</i>	4.71	
06 46 26 00-0007 LF 1" x 12" White Pine Cornices, All Dimensions Are Nominal.....	20.33	2.50
<i>For Birch, Add</i>	5.36	
<i>For Mahogany, Oak, Maple, Or Walnut, Add</i>	7.25	
<i>For Poplar, Add</i>	6.71	
06 46 29 Wood Fasciae and Soffits (06 46)		
06 46 29 00-0001 Fascia Board (06 46 29)		
06 46 29 00-0002 Pine Fascia Board (06 46 29 00-0001)		
06 46 29 00-0003 LF 1" x 6" Pine Fascia Board	5.01	2.16
06 46 29 00-0004 LF 1" x 8" Pine Fascia Board	5.71	2.41
06 46 29 00-0005 LF 1" x 10" Pine Fascia Board	6.16	2.53
06 46 29 00-0006 LF 1" x 12" Pine Fascia Board	7.21	2.83
06 46 29 00-0007 LF 2" x 6" Pine Fascia Board	4.96	2.16
06 46 29 00-0008 LF 2" x 8" Pine Fascia Board	5.64	2.41
06 46 29 00-0009 LF 2" x 10" Pine Fascia Board	6.26	2.53
06 46 29 00-0010 LF 2" x 12" Pine Fascia Board	7.52	2.83
06 46 29 00-0011 LF 2" x 6" Trim, Exterior, Pine, Resawn Fascia	6.90	2.16
06 46 29 00-0012 LF 2" x 8" Trim, Exterior, Pine, Resawn Fascia	8.19	2.41
06 46 29 00-0013 LF 2" x 10" Trim, Exterior, Pine, Resawn Fascia	9.34	2.53
06 46 29 00-0014 LF 2" x 12" Trim, Exterior, Pine, Resawn Fascia	12.13	2.83
06 46 29 00-0015 Cedar Fascia Board (06 46 29 00-0001)		
06 46 29 00-0016 LF 1" x 6" Cedar Fascia Board.....	5.33	2.16
06 46 29 00-0017 LF 1" x 8" Cedar Fascia Board.....	6.21	2.41
06 46 29 00-0018 LF 1" x 10" Cedar Fascia Board.....	7.12	2.53

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 29 00-0019	LF		1" x 12" Cedar Fascia Board.....	8.56	2.83
06 46 29 00-0020			Engineered Wood Fascia Board (06 46 29 00-0001)		
06 46 29 00-0021	LF		1" x 6" Engineered Wood Fascia Board.....	4.82	2.16
06 46 29 00-0022	LF		1" x 8" Engineered Wood Fascia Board.....	5.47	2.41
06 46 29 00-0023	LF		1" x 12" Engineered Wood Fascia Board.....	6.63	2.83
06 46 29 00-0024			Soffit (06 46 29)		
06 46 29 00-0025			Sanded Plywood Soffit (06 46 29 00-0024)		
06 46 29 00-0026	SF		3/8" Thick, Sanded Plywood Soffit.....	4.46	1.64
06 46 29 00-0027	SF		1/2" Thick, Sanded Plywood Soffit.....	4.91	1.73
06 46 29 00-0028	SF		5/8" Thick, Sanded Plywood Soffit.....	5.15	1.80
06 46 29 00-0029	SF		3/4" Thick, Sanded Plywood Soffit.....	5.71	1.90
06 46 29 00-0030			MDO Plywood Soffit (06 46 29 00-0024)		
06 46 29 00-0031	SF		3/8" Thick, MDO Plywood Soffit.....	5.00	1.64
06 46 29 00-0032	SF		1/2" Thick, MDO Plywood Soffit.....	5.60	1.73
06 46 29 00-0033	SF		3/4" Thick, MDO Plywood Soffit.....	7.05	1.90
06 46 29 00-0034			Exterior Ceiling Gypsum Board Soffit (06 46 29 00-0024)		
06 46 29 00-0035	SF		1/2" Thick, Exterior Ceiling Gypsum Board Soffit.....	3.65	1.43
06 46 29 00-0036	SF		5/8" Thick, Fire Rated, Exterior Ceiling Gypsum Board Soffit.....	3.96	1.50
06 46 36			Custom Wood Molding (06 46)		
			Note: Includes set-up, knife charge, gluing (Where necessary for widths over 7-1/2"). All dimensions are nominal.		
06 46 36 00-0001			Ash (06 46 36)		
06 46 36 00-0002	LF		3/4" x 1-1/2" Custom Shaped Ash.....	8.30	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.88	
06 46 36 00-0003	LF		3/4" x 2-1/2" Custom Shaped Ash.....	10.66	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.91	
06 46 36 00-0004	LF		3/4" x 3-1/2" Custom Shaped Ash.....	13.04	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.94	
06 46 36 00-0005	LF		3/4" x 4-1/2" Custom Shaped Ash.....	15.40	1.30
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.96	
06 46 36 00-0006	LF		3/4" x 5-1/2" Custom Shaped Ash.....	17.88	1.30
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.02	
06 46 36 00-0007	LF		3/4" x 6-1/2" Custom Shaped Ash.....	20.36	1.41
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.07	
06 46 36 00-0008	LF		3/4" x 7-1/2" Custom Shaped Ash.....	22.71	1.41
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.10	
06 46 36 00-0009	LF		3/4" x 8-1/2" Custom Shaped Ash.....	25.10	1.41
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.13	
06 46 36 00-0010	LF		3/4" x 9-1/2" Custom Shaped Ash.....	27.40	1.52
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.15	
06 46 36 00-0011	LF		3/4" x 10-1/2" Custom Shaped Ash.....	29.92	1.52
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.21	
06 46 36 00-0012	LF		3/4" x 11-1/2" Custom Shaped Ash.....	32.33	1.63
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.25	
06 46 36 00-0013	LF		1" x 1-1/2" Custom Shaped Ash.....	9.96	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.90	
06 46 36 00-0014	LF		1" x 2-1/2" Custom Shaped Ash.....	13.07	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.93	
06 46 36 00-0015	LF		1" x 3-1/2" Custom Shaped Ash.....	16.18	1.30
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.96	
06 46 36 00-0016	LF		1" x 4-1/2" Custom Shaped Ash.....	19.30	1.30
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.99	
06 46 36 00-0017	LF		1" x 5-1/2" Custom Shaped Ash.....	22.58	1.41
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.04	
06 46 36 00-0018	LF		1" x 6-1/2" Custom Shaped Ash.....	25.81	1.41
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.10	
06 46 36 00-0019	LF		1" x 7-1/2" Custom Shaped Ash.....	28.91	1.41
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.12	
06 46 36 00-0020	LF		1" x 8-1/2" Custom Shaped Ash.....	32.03	1.52
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.16	
06 46 36 00-0021	LF		1" x 9-1/2" Custom Shaped Ash.....	35.15	1.52
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.17	
06 46 36 00-0022	LF		1" x 10-1/2" Custom Shaped Ash.....	38.40	1.63
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.24	
06 46 36 00-0023	LF		1" x 11-1/2" Custom Shaped Ash.....	41.56	1.63
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	1.27	
06 46 36 00-0024	LF		1-1/4" x 1-1/2" Custom Shaped Ash.....	12.05	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.93	
06 46 36 00-0025	LF		1-1/4" x 2-1/2" Custom Shaped Ash.....	16.17	1.20
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.96	
06 46 36 00-0026	LF		1-1/4" x 3-1/2" Custom Shaped Ash.....	20.29	1.30
			For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0027 LF 1-1/4" x 4-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	24.41 1.01	1.30
06 46 36 00-0028 LF 1-1/4" x 5-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	28.67 1.07	1.41
06 46 36 00-0029 LF 1-1/4" x 6-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	32.91 1.12	1.41
06 46 36 00-0030 LF 1-1/4" x 7-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	37.02 1.15	1.52
06 46 36 00-0031 LF 1-1/4" x 8-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	41.16 1.18	1.52
06 46 36 00-0032 LF 1-1/4" x 9-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	45.24 1.20	1.52
06 46 36 00-0033 LF 1-1/4" x 10-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	49.51 1.26	1.63
06 46 36 00-0034 LF 1-1/4" x 11-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	53.68 1.30	1.73
06 46 36 00-0035 LF 1-1/2" x 1-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.04 0.95	1.20
06 46 36 00-0036 LF 1-1/2" x 2-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	20.60 0.98	1.30
06 46 36 00-0037 LF 1-1/2" x 3-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	26.16 1.01	1.30
06 46 36 00-0038 LF 1-1/2" x 4-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.73 1.04	1.41
06 46 36 00-0039 LF 1-1/2" x 5-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	37.31 1.07	1.41
06 46 36 00-0040 LF 1-1/2" x 6-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	43.10 1.15	1.52
06 46 36 00-0041 LF 1-1/2" x 7-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	48.75 1.17	1.52
06 46 36 00-0042 LF 1-1/2" x 8-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	54.25 1.21	1.52
06 46 36 00-0043 LF 1-1/2" x 9-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	59.76 1.22	1.63
06 46 36 00-0044 LF 1-1/2" x 10-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	66.00 1.29	1.63
06 46 36 00-0045 LF 1-1/2" x 11-1/2" Custom Shaped Ash <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	71.08 1.32	1.73
06 46 36 00-0046 Basswood <small>(06 46 36)</small>		
06 46 36 00-0047 LF 3/4" x 1-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	6.81 0.88	1.20
06 46 36 00-0048 LF 3/4" x 2-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	8.42 0.91	1.20
06 46 36 00-0049 LF 3/4" x 3-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	10.05 0.94	1.20
06 46 36 00-0050 LF 3/4" x 4-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.66 0.96	1.30
06 46 36 00-0051 LF 3/4" x 5-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	13.40 1.02	1.30
06 46 36 00-0052 LF 3/4" x 6-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.13 1.07	1.41
06 46 36 00-0053 LF 3/4" x 7-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	16.73 1.10	1.41
06 46 36 00-0054 LF 3/4" x 8-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	18.38 1.13	1.52
06 46 36 00-0055 LF 3/4" x 9-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	19.93 1.15	1.52
06 46 36 00-0056 LF 3/4" x 10-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	21.70 1.21	1.63
06 46 36 00-0057 LF 3/4" x 11-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	23.36 1.25	1.63
06 46 36 00-0058 LF 1" x 1-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	7.83 0.90	1.20
06 46 36 00-0059 LF 1" x 2-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	9.87 0.93	1.20
06 46 36 00-0060 LF 1" x 3-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.91 0.96	1.30
06 46 36 00-0061 LF 1" x 4-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	13.96 0.99	1.30
06 46 36 00-0062 LF 1" x 5-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	16.17 1.04	1.41
06 46 36 00-0063 LF 1" x 6-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	18.34 1.10	1.41
06 46 36 00-0064 LF 1" x 7-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	20.37 1.12	1.52
06 46 36 00-0065 LF 1" x 8-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.43 1.16	1.52
06 46 36 00-0066 LF 1" x 9-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	24.47 1.17	1.52
06 46 36 00-0067 LF 1" x 10-1/2" Custom Shaped Basswood <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	26.66 1.24	1.63

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 46 36 00-0068	LF	1" x 11-1/2" Custom Shaped Basswood.....	28.75	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.27	
06 46 36 00-0069	LF	1-1/2" x 1-1/2" Custom Shaped Basswood.....	10.87	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.93	
06 46 36 00-0070	LF	1-1/2" x 2-1/2" Custom Shaped Basswood.....	14.41	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0071	LF	1-1/2" x 3-1/2" Custom Shaped Basswood.....	17.94	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.98	
06 46 36 00-0072	LF	1-1/2" x 4-1/2" Custom Shaped Basswood.....	21.48	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.01	
06 46 36 00-0073	LF	1-1/2" x 5-1/2" Custom Shaped Basswood.....	25.14	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0074	LF	1-1/2" x 6-1/2" Custom Shaped Basswood.....	28.80	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	
06 46 36 00-0075	LF	1-1/2" x 7-1/2" Custom Shaped Basswood.....	32.32	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0076	LF	1-1/2" x 8-1/2" Custom Shaped Basswood.....	35.88	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.18	
06 46 36 00-0077	LF	1-1/2" x 9-1/2" Custom Shaped Basswood.....	39.37	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.20	
06 46 36 00-0078	LF	1-1/2" x 10-1/2" Custom Shaped Basswood.....	43.05	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.26	
06 46 36 00-0079	LF	1-1/2" x 11-1/2" Custom Shaped Basswood.....	46.64	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.30	
06 46 36 00-0080	LF	3-1/2" x 3-1/2" Custom Shaped Basswood.....	43.95	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0081	LF	3-1/2" x 4-1/2" Custom Shaped Basswood.....	53.97	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	
06 46 36 00-0082	LF	3-1/2" x 5-1/2" Custom Shaped Basswood.....	63.91	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0083	LF	3-1/2" x 6-1/2" Custom Shaped Basswood.....	74.06	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.22	
06 46 36 00-0084	LF	3-1/2" x 7-1/2" Custom Shaped Basswood.....	83.99	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.25	
06 46 36 00-0085	LF	3-1/2" x 8-1/2" Custom Shaped Basswood.....	94.12	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.30	
06 46 36 00-0086	LF	3-1/2" x 9-1/2" Custom Shaped Basswood.....	103.94	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.32	
06 46 36 00-0087	LF	3-1/2" x 10-1/2" Custom Shaped Basswood.....	113.88	1.73
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.35	
06 46 36 00-0088	LF	3-1/2" x 11-1/2" Custom Shaped Basswood.....	124.03	1.84
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.42	
06 46 36 00-0089		Birch <small>(06 46 36)</small>		
06 46 36 00-0090	LF	3/4" x 1-1/2" Custom Shaped Birch.....	7.34	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.88	
06 46 36 00-0091	LF	3/4" x 2-1/2" Custom Shaped Birch.....	9.22	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.91	
06 46 36 00-0092	LF	3/4" x 3-1/2" Custom Shaped Birch.....	11.11	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.94	
06 46 36 00-0093	LF	3/4" x 4-1/2" Custom Shaped Birch.....	13.00	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0094	LF	3/4" x 5-1/2" Custom Shaped Birch.....	15.00	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.02	
06 46 36 00-0095	LF	3/4" x 6-1/2" Custom Shaped Birch.....	17.00	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0096	LF	3/4" x 7-1/2" Custom Shaped Birch.....	18.87	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.10	
06 46 36 00-0097	LF	3/4" x 8-1/2" Custom Shaped Birch.....	20.78	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.13	
06 46 36 00-0098	LF	3/4" x 9-1/2" Custom Shaped Birch.....	22.60	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0099	LF	3/4" x 10-1/2" Custom Shaped Birch.....	24.63	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.21	
06 46 36 00-0100	LF	3/4" x 11-1/2" Custom Shaped Birch.....	26.56	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.25	
06 46 36 00-0101	LF	1" x 1-1/2" Custom Shaped Birch.....	8.63	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.90	
06 46 36 00-0102	LF	1" x 2-1/2" Custom Shaped Birch.....	11.04	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.93	
06 46 36 00-0103	LF	1" x 3-1/2" Custom Shaped Birch.....	13.51	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0104	LF	1" x 4-1/2" Custom Shaped Birch.....	15.99	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.99	
06 46 36 00-0105	LF	1" x 5-1/2" Custom Shaped Birch.....	18.58	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 36 00-0106	LF	1" x 6-1/2" Custom Shaped Birch.....	21.11	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.10	
06 46 36 00-0107	LF	1" x 7-1/2" Custom Shaped Birch.....	23.57	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	
06 46 36 00-0108	LF	1" x 8-1/2" Custom Shaped Birch.....	26.06	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.16	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0109 LF 1" x 9-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	28.48 1.17	1.52
06 46 36 00-0110 LF 1" x 10-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.04 1.24	1.63
06 46 36 00-0111 LF 1" x 11-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	33.56 1.27	1.63
06 46 36 00-0112 LF 1-1/4" x 1-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	10.12 0.93	1.20
06 46 36 00-0113 LF 1-1/4" x 2-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	13.29 0.96	1.20
06 46 36 00-0114 LF 1-1/4" x 3-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	16.45 0.98	1.30
06 46 36 00-0115 LF 1-1/4" x 4-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	19.61 1.01	1.30
06 46 36 00-0116 LF 1-1/4" x 5-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.90 1.07	1.41
06 46 36 00-0117 LF 1-1/4" x 6-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	26.18 1.12	1.41
06 46 36 00-0118 LF 1-1/4" x 7-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	29.34 1.15	1.52
06 46 36 00-0119 LF 1-1/4" x 8-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	32.52 1.18	1.52
06 46 36 00-0120 LF 1-1/4" x 9-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	35.63 1.20	1.52
06 46 36 00-0121 LF 1-1/4" x 10-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	38.94 1.26	1.63
06 46 36 00-0122 LF 1-1/4" x 11-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	42.15 1.30	1.73
06 46 36 00-0123 LF 1-1/2" x 1-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	12.48 0.95	1.20
06 46 36 00-0124 LF 1-1/2" x 2-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	16.76 0.98	1.30
06 46 36 00-0125 LF 1-1/2" x 3-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	21.04 1.01	1.30
06 46 36 00-0126 LF 1-1/2" x 4-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	25.32 1.04	1.41
06 46 36 00-0127 LF 1-1/2" x 5-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	29.63 1.07	1.41
06 46 36 00-0128 LF 1-1/2" x 6-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	34.14 1.15	1.52
06 46 36 00-0129 LF 1-1/2" x 7-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	38.40 1.17	1.52
06 46 36 00-0130 LF 1-1/2" x 8-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	42.72 1.21	1.52
06 46 36 00-0131 LF 1-1/2" x 9-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	46.95 1.22	1.63
06 46 36 00-0132 LF 1-1/2" x 10-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	51.91 1.29	1.63
06 46 36 00-0133 LF 1-1/2" x 11-1/2" Custom Shaped Birch <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	55.71 1.32	1.73
06 46 36 00-0134 Clear Western Cedar <small>(06 46 36)</small>		
06 46 36 00-0135 LF 3/4" x 1-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	7.34 0.88	1.20
06 46 36 00-0136 LF 3/4" x 2-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	9.22 0.91	1.20
06 46 36 00-0137 LF 3/4" x 3-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.11 0.94	1.20
06 46 36 00-0138 LF 3/4" x 4-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	13.00 0.96	1.30
06 46 36 00-0139 LF 3/4" x 5-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.00 1.02	1.30
06 46 36 00-0140 LF 3/4" x 6-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	17.00 1.07	1.41
06 46 36 00-0141 LF 1" x 1-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	8.73 0.90	1.20
06 46 36 00-0142 LF 1" x 2-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.25 0.93	1.20
06 46 36 00-0143 LF 1" x 3-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	13.78 0.96	1.30
06 46 36 00-0144 LF 1" x 4-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	16.31 0.99	1.30
06 46 36 00-0145 LF 1" x 5-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	18.95 1.04	1.41
06 46 36 00-0146 LF 1" x 6-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	21.59 1.10	1.41
06 46 36 00-0147 LF 1-1/4" x 1-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.51 0.93	1.20
06 46 36 00-0148 LF 1-1/4" x 2-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.37 0.96	1.20
06 46 36 00-0149 LF 1-1/4" x 3-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	19.22 0.98	1.30

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 46 36 00-0150	LF	1-1/4" x 4-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	23.08 1.07	1.30
06 46 36 00-0151	LF	1-1/4" x 5-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	27.06 1.07	1.41
06 46 36 00-0152	LF	1-1/4" x 6-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.04 1.12	1.41
06 46 36 00-0153	LF	1-1/2" x 1-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.83 0.95	1.20
06 46 36 00-0154	LF	1-1/2" x 2-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.80 0.98	1.30
06 46 36 00-0155	LF	1-1/2" x 3-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	19.76 1.01	1.30
06 46 36 00-0156	LF	1-1/2" x 4-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	23.72 1.04	1.41
06 46 36 00-0157	LF	1-1/2" x 5-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	27.70 1.07	1.41
06 46 36 00-0158	LF	1-1/2" x 6-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.90 1.15	1.52
06 46 36 00-0159	LF	3-1/2" x 3-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	38.83 1.07	1.41
06 46 36 00-0160	LF	3-1/2" x 4-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	47.56 1.12	1.41
06 46 36 00-0161	LF	3-1/2" x 5-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	56.22 1.15	1.52
06 46 36 00-0162	LF	3-1/2" x 6-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	65.09 1.22	1.63
06 46 36 00-0163	LF	3-1/2" x 7-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	73.74 1.25	1.63
06 46 36 00-0164	LF	3-1/2" x 8-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	82.49 1.30	1.73
06 46 36 00-0165	LF	3-1/2" x 9-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	91.13 1.32	1.73
06 46 36 00-0166	LF	3-1/2" x 10-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	99.79 1.35	1.73
06 46 36 00-0167	LF	3-1/2" x 11-1/2" Custom Shaped Clear West Cedar <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	108.66 1.42	1.84

06 46 36 00-0168 Cherry (06 46 36)

06 46 36 00-0169	LF	3/4" x 1-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	9.05 0.88	1.20
06 46 36 00-0170	LF	3/4" x 2-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.78 0.91	1.20
06 46 36 00-0171	LF	3/4" x 3-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	14.53 0.94	1.20
06 46 36 00-0172	LF	3/4" x 4-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	17.27 0.96	1.30
06 46 36 00-0173	LF	3/4" x 5-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	20.12 1.02	1.30
06 46 36 00-0174	LF	3/4" x 6-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.98 1.07	1.41
06 46 36 00-0175	LF	3/4" x 7-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	25.70 1.10	1.41
06 46 36 00-0176	LF	3/4" x 8-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	28.47 1.13	1.41
06 46 36 00-0177	LF	3/4" x 9-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.14 1.15	1.52
06 46 36 00-0178	LF	3/4" x 10-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	34.03 1.21	1.52
06 46 36 00-0179	LF	3/4" x 11-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	36.81 1.25	1.63
06 46 36 00-0180	LF	1" x 1-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	10.87 0.90	1.20
06 46 36 00-0181	LF	1" x 2-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	14.46 0.93	1.20
06 46 36 00-0182	LF	1" x 3-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	18.05 0.96	1.30
06 46 36 00-0183	LF	1" x 4-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	21.64 0.99	1.30
06 46 36 00-0184	LF	1" x 5-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	25.35 1.04	1.41
06 46 36 00-0185	LF	1" x 6-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	29.06 1.10	1.41
06 46 36 00-0186	LF	1" x 7-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	32.64 1.12	1.41
06 46 36 00-0187	LF	1" x 8-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	36.30 1.16	1.52
06 46 36 00-0188	LF	1" x 9-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	39.79 1.17	1.52
06 46 36 00-0189	LF	1" x 10-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	43.53 1.24	1.63
06 46 36 00-0190	LF	1" x 11-1/2" Custom Shaped Cherry <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	47.17 1.27	1.63

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0191 LF 1-1/4" x 1-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	12.85 0.93	1.20
06 46 36 00-0192 LF 1-1/4" x 2-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	17.40 0.96	1.20
06 46 36 00-0193 LF 1-1/4" x 3-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	21.89 0.98	1.30
06 46 36 00-0194 LF 1-1/4" x 4-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	26.44 1.01	1.30
06 46 36 00-0195 LF 1-1/4" x 5-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.07 1.07	1.41
06 46 36 00-0196 LF 1-1/4" x 6-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	35.74 1.12	1.41
06 46 36 00-0197 LF 1-1/4" x 7-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	40.22 1.15	1.52
06 46 36 00-0198 LF 1-1/4" x 8-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	44.79 1.18	1.52
06 46 36 00-0199 LF 1-1/4" x 9-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	49.24 1.20	1.52
06 46 36 00-0200 LF 1-1/4" x 10-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	53.94 1.26	1.63
06 46 36 00-0201 LF 1-1/4" x 11-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	58.48 1.30	1.73
06 46 36 00-0202 LF 1-1/2" x 1-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	16.53 0.95	1.20
06 46 36 00-0203 LF 1-1/2" x 2-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.84 0.98	1.30
06 46 36 00-0204 LF 1-1/2" x 3-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	29.15 1.01	1.30
06 46 36 00-0205 LF 1-1/2" x 4-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	35.46 1.04	1.41
06 46 36 00-0206 LF 1-1/2" x 5-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	41.79 1.07	1.41
06 46 36 00-0207 LF 1-1/2" x 6-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	48.33 1.15	1.52
06 46 36 00-0208 LF 1-1/2" x 7-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	54.63 1.17	1.52
06 46 36 00-0209 LF 1-1/2" x 8-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	60.98 1.21	1.52
06 46 36 00-0210 LF 1-1/2" x 9-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	67.23 1.22	1.63
06 46 36 00-0211 LF 1-1/2" x 10-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	73.79 1.29	1.63
06 46 36 00-0212 LF 1-1/2" x 11-1/2" Custom Shaped Cherry..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	80.05 1.32	1.73
06 46 36 00-0213 Cypress <small>(06 46 36)</small>		
06 46 36 00-0214 LF 3/4" x 1-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	6.81 0.88	1.20
06 46 36 00-0215 LF 3/4" x 2-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	8.42 0.91	1.20
06 46 36 00-0216 LF 3/4" x 3-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	10.05 0.94	1.20
06 46 36 00-0217 LF 3/4" x 4-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.66 0.96	1.30
06 46 36 00-0218 LF 3/4" x 5-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	13.40 1.02	1.30
06 46 36 00-0219 LF 3/4" x 6-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.13 1.07	1.41
06 46 36 00-0220 LF 3/4" x 7-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	17.16 1.10	1.41
06 46 36 00-0221 LF 3/4" x 8-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	18.86 1.13	1.41
06 46 36 00-0222 LF 3/4" x 9-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.07 1.15	1.52
06 46 36 00-0223 LF 3/4" x 10-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	24.05 1.21	1.52
06 46 36 00-0224 LF 1" x 1-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	9.16 0.90	1.20
06 46 36 00-0225 LF 1" x 2-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.84 0.93	1.20
06 46 36 00-0226 LF 1" x 3-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	14.58 0.96	1.30
06 46 36 00-0227 LF 1" x 4-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	17.32 0.99	1.30
06 46 36 00-0228 LF 1" x 5-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	20.18 1.04	1.41
06 46 36 00-0229 LF 1" x 6-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.98 1.10	1.41
06 46 36 00-0230 LF 1" x 7-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	25.70 1.12	1.41
06 46 36 00-0231 LF 1" x 8-1/2" Custom Shaped Cypress..... <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	28.46 1.16	1.52

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 46 36 00-0232	LF	1" x 9-1/2" Custom Shaped Cypress	31.14	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.17	
06 46 36 00-0233	LF	1" x 10-1/2" Custom Shaped Cypress	34.08	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.24	
06 46 36 00-0234	LF	1" x 11-1/2" Custom Shaped Cypress	36.76	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.27	
06 46 36 00-0235	LF	1-1/2" x 1-1/2" Custom Shaped Cypress	10.77	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.95	
06 46 36 00-0236	LF	1-1/2" x 2-1/2" Custom Shaped Cypress	14.20	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.98	
06 46 36 00-0237	LF	1-1/2" x 3-1/2" Custom Shaped Cypress	17.63	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.01	
06 46 36 00-0238	LF	1-1/2" x 4-1/2" Custom Shaped Cypress	21.05	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 36 00-0239	LF	1-1/2" x 5-1/2" Custom Shaped Cypress	24.50	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0240	LF	1-1/2" x 6-1/2" Custom Shaped Cypress	28.16	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0241	LF	1-1/2" x 7-1/2" Custom Shaped Cypress	31.57	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.17	
06 46 36 00-0242	LF	1-1/2" x 8-1/2" Custom Shaped Cypress	35.04	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.21	
06 46 36 00-0243	LF	1-1/2" x 9-1/2" Custom Shaped Cypress	41.61	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.22	
06 46 36 00-0244	LF	1-1/2" x 10-1/2" Custom Shaped Cypress	45.40	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.29	
06 46 36 00-0245	Fir	<small>(06 46 36)</small>		
06 46 36 00-0246	LF	3/4" x 1-1/2" Custom Shaped Fir	7.66	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.88	
06 46 36 00-0247	LF	3/4" x 2-1/2" Custom Shaped Fir	9.70	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.91	
06 46 36 00-0248	LF	3/4" x 3-1/2" Custom Shaped Fir	11.75	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.94	
06 46 36 00-0249	LF	3/4" x 4-1/2" Custom Shaped Fir	13.80	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0250	LF	3/4" x 5-1/2" Custom Shaped Fir	15.96	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.02	
06 46 36 00-0251	LF	3/4" x 6-1/2" Custom Shaped Fir	18.12	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0252	LF	3/4" x 7-1/2" Custom Shaped Fir	20.15	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.10	
06 46 36 00-0253	LF	3/4" x 8-1/2" Custom Shaped Fir	22.22	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.13	
06 46 36 00-0254	LF	3/4" x 9-1/2" Custom Shaped Fir	24.20	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0255	LF	3/4" x 10-1/2" Custom Shaped Fir	26.39	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.21	
06 46 36 00-0256	LF	1" x 1-1/2" Custom Shaped Fir	9.16	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.90	
06 46 36 00-0257	LF	1" x 2-1/2" Custom Shaped Fir	11.84	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.93	
06 46 36 00-0258	LF	1" x 3-1/2" Custom Shaped Fir	14.58	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0259	LF	1" x 4-1/2" Custom Shaped Fir	17.32	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.99	
06 46 36 00-0260	LF	1" x 5-1/2" Custom Shaped Fir	20.18	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 36 00-0261	LF	1" x 6-1/2" Custom Shaped Fir	22.98	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.10	
06 46 36 00-0262	LF	1" x 7-1/2" Custom Shaped Fir	25.70	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	
06 46 36 00-0263	LF	1" x 8-1/2" Custom Shaped Fir	28.46	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.16	
06 46 36 00-0264	LF	1" x 9-1/2" Custom Shaped Fir	31.14	1.52
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.17	
06 46 36 00-0265	LF	1" x 10-1/2" Custom Shaped Fir	34.08	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.24	
06 46 36 00-0266	LF	1" x 11-1/2" Custom Shaped Fir	36.76	1.63
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.27	
06 46 36 00-0267	LF	1-1/4" x 1-1/2" Custom Shaped Fir	10.28	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.93	
06 46 36 00-0268	LF	1-1/4" x 2-1/2" Custom Shaped Fir	13.55	1.20
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0269	LF	1-1/4" x 3-1/2" Custom Shaped Fir	16.77	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.98	
06 46 36 00-0270	LF	1-1/4" x 4-1/2" Custom Shaped Fir	20.04	1.30
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.01	
06 46 36 00-0271	LF	1-1/4" x 5-1/2" Custom Shaped Fir	23.38	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0272	LF	1-1/4" x 6-1/2" Custom Shaped Fir	26.77	1.41
		<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0273 LF 1-1/4" x 7-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	29.98 1.15	1.52
06 46 36 00-0274 LF 1-1/4" x 8-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	33.26 1.18	1.52
06 46 36 00-0275 LF 1-1/4" x 9-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	36.43 1.20	1.52
06 46 36 00-0276 LF 1-1/4" x 10-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	39.85 1.26	1.63
06 46 36 00-0277 LF 1-1/4" x 11-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	43.11 1.30	1.73
06 46 36 00-0278 LF 1-1/2" x 1-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	11.83 0.95	1.20
06 46 36 00-0279 LF 1-1/2" x 2-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.80 0.98	1.30
06 46 36 00-0280 LF 1-1/2" x 3-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	19.76 1.01	1.30
06 46 36 00-0281 LF 1-1/2" x 4-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	23.72 1.04	1.41
06 46 36 00-0282 LF 1-1/2" x 5-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	27.70 1.07	1.41
06 46 36 00-0283 LF 1-1/2" x 6-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	31.90 1.15	1.52
06 46 36 00-0284 LF 1-1/2" x 7-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	35.84 1.17	1.52
06 46 36 00-0285 LF 1-1/2" x 8-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	39.84 1.21	1.63
06 46 36 00-0286 LF 1-1/2" x 9-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	43.74 1.22	1.63
06 46 36 00-0287 LF 1-1/2" x 10-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	47.86 1.29	1.73
06 46 36 00-0288 LF 1-1/2" x 11-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	51.87 1.32	1.73
06 46 36 00-0289 LF 2-1/2" x 1-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	19.71 1.00	1.30
06 46 36 00-0290 LF 2-1/2" x 2-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	27.50 1.02	1.30
06 46 36 00-0291 LF 2-1/2" x 3-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	35.30 1.05	1.41
06 46 36 00-0292 LF 2-1/2" x 4-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	43.19 1.10	1.41
06 46 36 00-0293 LF 2-1/2" x 5-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	50.99 1.12	1.41
06 46 36 00-0294 LF 2-1/2" x 6-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	58.99 1.20	1.52
06 46 36 00-0295 LF 2-1/2" x 7-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	66.80 1.22	1.63
06 46 36 00-0296 LF 2-1/2" x 8-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	74.80 1.27	1.63
06 46 36 00-0297 LF 2-1/2" x 9-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	82.49 1.30	1.73
06 46 36 00-0298 LF 2-1/2" x 10-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	90.28 1.32	1.73
06 46 36 00-0299 LF 3-1/2" x 3-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	44.06 1.07	1.41
06 46 36 00-0300 LF 3-1/2" x 4-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	53.97 1.12	1.41
06 46 36 00-0301 LF 3-1/2" x 5-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	63.91 1.15	1.52
06 46 36 00-0302 LF 3-1/2" x 6-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	74.06 1.22	1.63
06 46 36 00-0303 LF 3-1/2" x 7-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	83.99 1.25	1.63
06 46 36 00-0304 LF 3-1/2" x 8-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	94.02 1.30	1.73
06 46 36 00-0305 LF 3-1/2" x 9-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	103.94 1.32	1.73
06 46 36 00-0306 LF 3-1/2" x 10-1/2" Custom Shaped Fir <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	113.88 1.35	1.73
06 46 36 00-0307 Honduran Mahogany (06 46 36)		
06 46 36 00-0308 LF 3/4" x 1-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	9.69 0.88	1.20
06 46 36 00-0309 LF 3/4" x 2-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	12.75 0.91	1.20
06 46 36 00-0310 LF 3/4" x 3-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	15.81 0.94	1.20
06 46 36 00-0311 LF 3/4" x 4-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	18.87 0.96	1.30
06 46 36 00-0312 LF 3/4" x 5-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	22.04 1.02	1.30
06 46 36 00-0313 LF 3/4" x 6-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	25.22 1.07	1.41

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 46 36 00-0314	LF 3/4" x 7-1/2" Custom Shaped Honduras Mahogany.....	28.26	1.41
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.10	
06 46 36 00-0315	LF 3/4" x 8-1/2" Custom Shaped Honduras Mahogany.....	31.35	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.13	
06 46 36 00-0316	LF 3/4" x 9-1/2" Custom Shaped Honduras Mahogany.....	34.34	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0317	LF 3/4" x 10-1/2" Custom Shaped Honduras Mahogany.....	37.55	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.21	
06 46 36 00-0318	LF 3/4" x 11-1/2" Custom Shaped Honduras Mahogany.....	40.65	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.25	
06 46 36 00-0319	LF 1" x 1-1/2" Custom Shaped Honduras Mahogany.....	11.83	1.20
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.90	
06 46 36 00-0320	LF 1" x 2-1/2" Custom Shaped Honduras Mahogany.....	15.84	1.20
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.93	
06 46 36 00-0321	LF 1" x 3-1/2" Custom Shaped Honduras Mahogany.....	19.91	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0322	LF 1" x 4-1/2" Custom Shaped Honduras Mahogany.....	23.99	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.99	
06 46 36 00-0323	LF 1" x 5-1/2" Custom Shaped Honduras Mahogany.....	28.18	1.41
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 36 00-0324	LF 1" x 6-1/2" Custom Shaped Honduras Mahogany.....	32.32	1.41
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.10	
06 46 36 00-0325	LF 1" x 7-1/2" Custom Shaped Honduras Mahogany.....	36.38	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	
06 46 36 00-0326	LF 1" x 8-1/2" Custom Shaped Honduras Mahogany.....	40.47	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.16	
06 46 36 00-0327	LF 1" x 9-1/2" Custom Shaped Honduras Mahogany.....	44.49	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.17	
06 46 36 00-0328	LF 1" x 10-1/2" Custom Shaped Honduras Mahogany.....	48.65	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.24	
06 46 36 00-0329	LF 1" x 11-1/2" Custom Shaped Honduras Mahogany.....	53.30	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.27	
06 46 36 00-0330	LF 1-1/4" x 1-1/2" Custom Shaped Honduras Mahogany.....	13.49	1.20
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.93	
06 46 36 00-0331	LF 1-1/4" x 2-1/2" Custom Shaped Honduras Mahogany.....	18.36	1.20
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.96	
06 46 36 00-0332	LF 1-1/4" x 3-1/2" Custom Shaped Honduras Mahogany.....	23.17	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.98	
06 46 36 00-0333	LF 1-1/4" x 4-1/2" Custom Shaped Honduras Mahogany.....	28.04	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.01	
06 46 36 00-0334	LF 1-1/4" x 5-1/2" Custom Shaped Honduras Mahogany.....	32.99	1.41
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0335	LF 1-1/4" x 6-1/2" Custom Shaped Honduras Mahogany.....	37.98	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.12	
06 46 36 00-0336	LF 1-1/4" x 7-1/2" Custom Shaped Honduras Mahogany.....	42.78	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0337	LF 1-1/4" x 8-1/2" Custom Shaped Honduras Mahogany.....	47.67	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.18	
06 46 36 00-0338	LF 1-1/4" x 9-1/2" Custom Shaped Honduras Mahogany.....	51.37	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.20	
06 46 36 00-0339	LF 1-1/4" x 10-1/2" Custom Shaped Honduras Mahogany.....	57.46	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.26	
06 46 36 00-0340	LF 1-1/4" x 11-1/2" Custom Shaped Honduras Mahogany.....	62.33	1.73
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.30	
06 46 36 00-0341	LF 1-1/2" x 1-1/2" Custom Shaped Honduras Mahogany.....	16.74	1.20
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.95	
06 46 36 00-0342	LF 1-1/2" x 2-1/2" Custom Shaped Honduras Mahogany.....	23.16	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.98	
06 46 36 00-0343	LF 1-1/2" x 3-1/2" Custom Shaped Honduras Mahogany.....	29.58	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.01	
06 46 36 00-0344	LF 1-1/2" x 4-1/2" Custom Shaped Honduras Mahogany.....	36.00	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.04	
06 46 36 00-0345	LF 1-1/2" x 5-1/2" Custom Shaped Honduras Mahogany.....	42.43	1.41
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	
06 46 36 00-0346	LF 1-1/2" x 6-1/2" Custom Shaped Honduras Mahogany.....	49.08	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.15	
06 46 36 00-0347	LF 1-1/2" x 7-1/2" Custom Shaped Honduras Mahogany.....	55.48	1.52
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.17	
06 46 36 00-0348	LF 1-1/2" x 8-1/2" Custom Shaped Honduras Mahogany.....	61.94	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.21	
06 46 36 00-0349	LF 1-1/2" x 9-1/2" Custom Shaped Honduras Mahogany.....	68.29	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.22	
06 46 36 00-0350	LF 1-1/2" x 10-1/2" Custom Shaped Honduras Mahogany.....	74.86	1.63
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.29	
06 46 36 00-0351	LF 1-1/2" x 11-1/2" Custom Shaped Honduras Mahogany.....	81.44	1.73
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.32	
06 46 36 00-0352	LF 2" x 1-1/2" Custom Shaped Honduras Mahogany.....	19.97	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.97	
06 46 36 00-0353	LF 2" x 2-1/2" Custom Shaped Honduras Mahogany.....	27.98	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.00	
06 46 36 00-0354	LF 2" x 3-1/2" Custom Shaped Honduras Mahogany.....	35.94	1.30
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.02	
06 46 36 00-0355	LF 2" x 4-1/2" Custom Shaped Honduras Mahogany.....	44.05	1.41
	<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	1.07	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0356 LF 2" x 5-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	52.00 1.10	1.41
06 46 36 00-0357 LF 2" x 6-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	60.22 1.17	1.52
06 46 36 00-0358 LF 2" x 7-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	68.17 1.20	1.52
06 46 36 00-0359 LF 2" x 8-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	76.29 1.25	1.63
06 46 36 00-0360 LF 2" x 9-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	84.25 1.27	1.63
06 46 36 00-0361 LF 2" x 10-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	92.26 1.30	1.73
06 46 36 00-0362 LF 2" x 11-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	100.43 1.37	1.84
06 46 36 00-0363 LF 2-1/2" x 1-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	24.62 1.00	1.30
06 46 36 00-0364 LF 2-1/2" x 2-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	33.27 1.02	1.30
06 46 36 00-0365 LF 2-1/2" x 3-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	42.98 1.05	1.41
06 46 36 00-0366 LF 2-1/2" x 4-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	52.80 1.10	1.41
06 46 36 00-0367 LF 2-1/2" x 5-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	62.52 1.12	1.41
06 46 36 00-0368 LF 2-1/2" x 6-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	72.44 1.20	1.52
06 46 36 00-0369 LF 2-1/2" x 7-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	82.17 1.22	1.63
06 46 36 00-0370 LF 2-1/2" x 8-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	91.99 1.27	1.63
06 46 36 00-0371 LF 2-1/2" x 9-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	101.70 1.30	1.73
06 46 36 00-0372 LF 2-1/2" x 10-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	111.42 1.32	1.73
06 46 36 00-0373 LF 2-1/2" x 11-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	121.35 1.40	1.84
06 46 36 00-0374 LF 3-1/2" x 3-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	58.46 1.07	1.41
06 46 36 00-0375 LF 3-1/2" x 4-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	72.11 1.12	1.41
06 46 36 00-0376 LF 3-1/2" x 5-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	85.68 1.15	1.52
06 46 36 00-0377 LF 3-1/2" x 6-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	99.46 1.22	1.63
06 46 36 00-0378 LF 3-1/2" x 7-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	113.02 1.25	1.63
06 46 36 00-0379 LF 3-1/2" x 8-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	126.68 1.30	1.73
06 46 36 00-0380 LF 3-1/2" x 9-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	140.23 1.32	1.73
06 46 36 00-0381 LF 3-1/2" x 10-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	153.80 1.35	1.73
06 46 36 00-0382 LF 3-1/2" x 11-1/2" Custom Shaped Honduras Mahogany <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	167.57 1.42	1.84
06 46 36 00-0383 Maple <small>(06 46 36)</small>		
06 46 36 00-0384 LF 3/4" x 1-1/2" Custom Shaped Maple.....	7.24	1.20
06 46 36 00-0385 LF 3/4" x 2-1/2" Custom Shaped Maple.....	9.06	1.20
06 46 36 00-0386 LF 3/4" x 3-1/2" Custom Shaped Maple.....	10.90	1.20
06 46 36 00-0387 LF 3/4" x 4-1/2" Custom Shaped Maple.....	12.73	1.30
06 46 36 00-0388 LF 3/4" x 5-1/2" Custom Shaped Maple.....	14.68	1.30
06 46 36 00-0389 LF 3/4" x 6-1/2" Custom Shaped Maple.....	16.62	1.41
06 46 36 00-0390 LF 3/4" x 7-1/2" Custom Shaped Maple.....	18.44	1.41
06 46 36 00-0391 LF 3/4" x 8-1/2" Custom Shaped Maple.....	20.30	1.41
06 46 36 00-0392 LF 3/4" x 9-1/2" Custom Shaped Maple.....	22.07	1.52
06 46 36 00-0393 LF 3/4" x 10-1/2" Custom Shaped Maple.....	24.05	1.63
06 46 36 00-0394 LF 3/4" x 11-1/2" Custom Shaped Maple.....	25.92	1.63
06 46 36 00-0395 LF 1" x 1-1/2" Custom Shaped Maple.....	8.63	1.20
06 46 36 00-0396 LF 1" x 2-1/2" Custom Shaped Maple.....	11.04	1.20
06 46 36 00-0397 LF 1" x 3-1/2" Custom Shaped Maple.....	13.51	1.30
06 46 36 00-0398 LF 1" x 4-1/2" Custom Shaped Maple.....	15.99	1.30
06 46 36 00-0399 LF 1" x 5-1/2" Custom Shaped Maple.....	18.58	1.41
06 46 36 00-0400 LF 1" x 6-1/2" Custom Shaped Maple.....	21.11	1.41
06 46 36 00-0401 LF 1" x 7-1/2" Custom Shaped Maple.....	23.57	1.41
06 46 36 00-0402 LF 1" x 8-1/2" Custom Shaped Maple.....	26.06	1.52
06 46 36 00-0403 LF 1" x 9-1/2" Custom Shaped Maple.....	28.48	1.52
06 46 36 00-0404 LF 1" x 10-1/2" Custom Shaped Maple.....	29.97	1.63
06 46 36 00-0405 LF 1" x 11-1/2" Custom Shaped Maple.....	33.56	1.63
06 46 36 00-0406 LF 1-1/4" x 1-1/2" Custom Shaped Maple.....	9.80	1.20
06 46 36 00-0407 LF 1-1/4" x 2-1/2" Custom Shaped Maple.....	12.81	1.20
06 46 36 00-0408 LF 1-1/4" x 3-1/2" Custom Shaped Maple.....	15.81	1.30
06 46 36 00-0409 LF 1-1/4" x 4-1/2" Custom Shaped Maple.....	18.81	1.30

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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06 46 36 00-0410	LF	1-1/4" x 5-1/2" Custom Shaped Maple.....	21.94	1.41
06 46 36 00-0411	LF	1-1/4" x 6-1/2" Custom Shaped Maple.....	25.06	1.41
06 46 36 00-0412	LF	1-1/4" x 7-1/2" Custom Shaped Maple.....	28.05	1.52
06 46 36 00-0413	LF	1-1/4" x 8-1/2" Custom Shaped Maple.....	31.08	1.52
06 46 36 00-0414	LF	1-1/4" x 9-1/2" Custom Shaped Maple.....	34.03	1.52
06 46 36 00-0415	LF	1-1/4" x 10-1/2" Custom Shaped Maple.....	37.18	1.63
06 46 36 00-0416	LF	1-1/4" x 11-1/2" Custom Shaped Maple.....	40.23	1.73
06 46 36 00-0417	LF	1-1/2" x 1-1/2" Custom Shaped Maple.....	12.26	1.20
06 46 36 00-0418	LF	1-1/2" x 2-1/2" Custom Shaped Maple.....	16.44	1.30
06 46 36 00-0419	LF	1-1/2" x 3-1/2" Custom Shaped Maple.....	20.61	1.30
06 46 36 00-0420	LF	1-1/2" x 4-1/2" Custom Shaped Maple.....	24.79	1.41
06 46 36 00-0421	LF	1-1/2" x 5-1/2" Custom Shaped Maple.....	28.99	1.41
06 46 36 00-0422	LF	1-1/2" x 6-1/2" Custom Shaped Maple.....	33.39	1.52
06 46 36 00-0423	LF	1-1/2" x 7-1/2" Custom Shaped Maple.....	37.55	1.52
06 46 36 00-0424	LF	1-1/2" x 8-1/2" Custom Shaped Maple.....	42.30	1.63
06 46 36 00-0425	LF	1-1/2" x 9-1/2" Custom Shaped Maple.....	45.88	1.63
06 46 36 00-0426	LF	1-1/2" x 10-1/2" Custom Shaped Maple.....	50.31	1.73
06 46 36 00-0427	LF	1-1/2" x 11-1/2" Custom Shaped Maple.....	54.43	1.73
06 46 36 00-0428	LF	2" x 1-1/2" Custom Shaped Maple.....	16.24	1.30
06 46 36 00-0429	LF	2" x 2-1/2" Custom Shaped Maple.....	22.38	1.30
06 46 36 00-0430	LF	2" x 3-1/2" Custom Shaped Maple.....	28.47	1.30
06 46 36 00-0431	LF	2" x 4-1/2" Custom Shaped Maple.....	34.71	1.41
06 46 36 00-0432	LF	2" x 5-1/2" Custom Shaped Maple.....	40.79	1.41
06 46 36 00-0433	LF	2" x 6-1/2" Custom Shaped Maple.....	47.14	1.52
06 46 36 00-0434	LF	2" x 7-1/2" Custom Shaped Maple.....	53.23	1.52
06 46 36 00-0435	LF	2" x 8-1/2" Custom Shaped Maple.....	59.48	1.63
06 46 36 00-0436	LF	2" x 9-1/2" Custom Shaped Maple.....	65.57	1.63
06 46 36 00-0437	LF	2" x 10-1/2" Custom Shaped Maple.....	71.71	1.73
06 46 36 00-0438	LF	2" x 11-1/2" Custom Shaped Maple.....	78.55	1.84
06 46 36 00-0439	LF	3-1/2" x 3-1/2" Custom Shaped Maple.....	62.73	1.41
06 46 36 00-0440	LF	3-1/2" x 4-1/2" Custom Shaped Maple.....	77.45	1.41
06 46 36 00-0441	LF	3-1/2" x 5-1/2" Custom Shaped Maple.....	92.09	1.52
06 46 36 00-0442	LF	3-1/2" x 6-1/2" Custom Shaped Maple.....	106.93	1.63
06 46 36 00-0443	LF	3-1/2" x 7-1/2" Custom Shaped Maple.....	121.56	1.63
06 46 36 00-0444	LF	3-1/2" x 8-1/2" Custom Shaped Maple.....	136.28	1.73
06 46 36 00-0445	LF	3-1/2" x 9-1/2" Custom Shaped Maple.....	150.90	1.73
06 46 36 00-0446	LF	3-1/2" x 10-1/2" Custom Shaped Maple.....	165.54	1.73
06 46 36 00-0447	LF	3-1/2" x 11-1/2" Custom Shaped Maple.....	180.38	1.84

06 46 36 00-0448 Appl Soft Maple (06 46 36)

06 46 36 00-0449	LF	3/4" x 1-1/2" Custom Shaped Appl Soft Maple.....	7.34	1.20
06 46 36 00-0450	LF	3/4" x 2-1/2" Custom Shaped Appl Soft Maple.....	9.22	1.20
06 46 36 00-0451	LF	3/4" x 3-1/2" Custom Shaped Appl Soft Maple.....	11.11	1.20
06 46 36 00-0452	LF	3/4" x 4-1/2" Custom Shaped Appl Soft Maple.....	13.00	1.30
06 46 36 00-0453	LF	3/4" x 5-1/2" Custom Shaped Appl Soft Maple.....	15.00	1.30
06 46 36 00-0454	LF	3/4" x 6-1/2" Custom Shaped Appl Soft Maple.....	17.00	1.41
06 46 36 00-0455	LF	3/4" x 7-1/2" Custom Shaped Appl Soft Maple.....	18.87	1.41
06 46 36 00-0456	LF	3/4" x 8-1/2" Custom Shaped Appl Soft Maple.....	20.78	1.41
06 46 36 00-0457	LF	3/4" x 9-1/2" Custom Shaped Appl Soft Maple.....	22.60	1.52
06 46 36 00-0458	LF	3/4" x 10-1/2" Custom Shaped Appl Soft Maple.....	24.63	1.63
06 46 36 00-0459	LF	3/4" x 11-1/2" Custom Shaped Appl Soft Maple.....	26.56	1.63
06 46 36 00-0460	LF	1" x 1-1/2" Custom Shaped Appl Soft Maple.....	8.36	1.20
06 46 36 00-0461	LF	1" x 2-1/2" Custom Shaped Appl Soft Maple.....	10.67	1.20
06 46 36 00-0462	LF	1" x 3-1/2" Custom Shaped Appl Soft Maple.....	12.98	1.30
06 46 36 00-0463	LF	1" x 4-1/2" Custom Shaped Appl Soft Maple.....	15.24	1.30
06 46 36 00-0464	LF	1" x 5-1/2" Custom Shaped Appl Soft Maple.....	17.78	1.41
06 46 36 00-0465	LF	1" x 6-1/2" Custom Shaped Appl Soft Maple.....	20.20	1.41
06 46 36 00-0466	LF	1" x 7-1/2" Custom Shaped Appl Soft Maple.....	22.50	1.41
06 46 36 00-0467	LF	1" x 8-1/2" Custom Shaped Appl Soft Maple.....	24.83	1.52
06 46 36 00-0468	LF	1" x 9-1/2" Custom Shaped Appl Soft Maple.....	27.14	1.52
06 46 36 00-0469	LF	1" x 10-1/2" Custom Shaped Appl Soft Maple.....	29.60	1.63
06 46 36 00-0470	LF	1" x 11-1/2" Custom Shaped Appl Soft Maple.....	31.96	1.63
06 46 36 00-0471	LF	1-1/4" x 1-1/2" Custom Shaped Appl Soft Maple.....	9.32	1.20
06 46 36 00-0472	LF	1-1/4" x 2-1/2" Custom Shaped Appl Soft Maple.....	12.11	1.20
06 46 36 00-0473	LF	1-1/4" x 3-1/2" Custom Shaped Appl Soft Maple.....	14.85	1.30
06 46 36 00-0474	LF	1-1/4" x 4-1/2" Custom Shaped Appl Soft Maple.....	17.64	1.30
06 46 36 00-0475	LF	1-1/4" x 5-1/2" Custom Shaped Appl Soft Maple.....	20.50	1.41
06 46 36 00-0476	LF	1-1/4" x 6-1/2" Custom Shaped Appl Soft Maple.....	23.41	1.41
06 46 36 00-0477	LF	1-1/4" x 7-1/2" Custom Shaped Appl Soft Maple.....	26.13	1.52
06 46 36 00-0478	LF	1-1/4" x 8-1/2" Custom Shaped Appl Soft Maple.....	28.94	1.52
06 46 36 00-0479	LF	1-1/4" x 9-1/2" Custom Shaped Appl Soft Maple.....	31.63	1.52
06 46 36 00-0480	LF	1-1/4" x 10-1/2" Custom Shaped Appl Soft Maple.....	34.57	1.63
06 46 36 00-0481	LF	1-1/4" x 11-1/2" Custom Shaped Appl Soft Maple.....	37.35	1.73
06 46 36 00-0482	LF	1-1/2" x 1-1/2" Custom Shaped Appl Soft Maple.....	11.19	1.20
06 46 36 00-0483	LF	1-1/2" x 2-1/2" Custom Shaped Appl Soft Maple.....	14.84	1.30
06 46 36 00-0484	LF	1-1/2" x 3-1/2" Custom Shaped Appl Soft Maple.....	18.48	1.30
06 46 36 00-0485	LF	1-1/2" x 4-1/2" Custom Shaped Appl Soft Maple.....	22.12	1.41
06 46 36 00-0486	LF	1-1/2" x 5-1/2" Custom Shaped Appl Soft Maple.....	25.78	1.41
06 46 36 00-0487	LF	1-1/2" x 6-1/2" Custom Shaped Appl Soft Maple.....	29.66	1.52
06 46 36 00-0488	LF	1-1/2" x 7-1/2" Custom Shaped Appl Soft Maple.....	33.28	1.52



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0489 LF 1-1/2" x 8-1/2" Custom Shaped Appl Soft Maple	36.96	1.63
06 46 36 00-0490 LF 1-1/2" x 9-1/2" Custom Shaped Appl Soft Maple	40.54	1.63
06 46 36 00-0491 LF 1-1/2" x 10-1/2" Custom Shaped Appl Soft Maple	44.33	1.73
06 46 36 00-0492 LF 1-1/2" x 11-1/2" Custom Shaped Appl Soft Maple	48.03	1.73
06 46 36 00-0493 Red Oak <small>(06 46 36)</small>		
06 46 36 00-0494 LF 3/4" x 1-1/2" Custom Shaped Red Oak	7.88	1.20
06 46 36 00-0495 LF 3/4" x 2-1/2" Custom Shaped Red Oak	10.02	1.20
06 46 36 00-0496 LF 3/4" x 3-1/2" Custom Shaped Red Oak	12.18	1.20
06 46 36 00-0497 LF 3/4" x 4-1/2" Custom Shaped Red Oak	14.33	1.30
06 46 36 00-0498 LF 3/4" x 5-1/2" Custom Shaped Red Oak	16.60	1.30
06 46 36 00-0499 LF 3/4" x 6-1/2" Custom Shaped Red Oak	18.87	1.41
06 46 36 00-0500 LF 3/4" x 7-1/2" Custom Shaped Red Oak	21.00	1.41
06 46 36 00-0501 LF 3/4" x 8-1/2" Custom Shaped Red Oak	23.18	1.41
06 46 36 00-0502 LF 3/4" x 9-1/2" Custom Shaped Red Oak	25.27	1.52
06 46 36 00-0503 LF 3/4" x 10-1/2" Custom Shaped Red Oak	27.57	1.63
06 46 36 00-0504 LF 3/4" x 11-1/2" Custom Shaped Red Oak	29.77	1.63
06 46 36 00-0505 LF 1" x 1-1/2" Custom Shaped Red Oak	9.53	1.20
06 46 36 00-0506 LF 1" x 2-1/2" Custom Shaped Red Oak	12.48	1.20
06 46 36 00-0507 LF 1" x 3-1/2" Custom Shaped Red Oak	15.38	1.30
06 46 36 00-0508 LF 1" x 4-1/2" Custom Shaped Red Oak	19.40	1.30
06 46 36 00-0509 LF 1" x 5-1/2" Custom Shaped Red Oak	21.35	1.41
06 46 36 00-0510 LF 1" x 6-1/2" Custom Shaped Red Oak	24.42	1.41
06 46 36 00-0511 LF 1" x 7-1/2" Custom Shaped Red Oak	27.30	1.41
06 46 36 00-0512 LF 1" x 8-1/2" Custom Shaped Red Oak	30.22	1.52
06 46 36 00-0513 LF 1" x 9-1/2" Custom Shaped Red Oak	33.12	1.52
06 46 36 00-0514 LF 1" x 10-1/2" Custom Shaped Red Oak	36.22	1.63
06 46 36 00-0515 LF 1" x 11-1/2" Custom Shaped Red Oak	39.16	1.63
06 46 36 00-0516 LF 1-1/4" x 1-1/2" Custom Shaped Red Oak	11.88	1.20
06 46 36 00-0517 LF 1-1/4" x 2-1/2" Custom Shaped Red Oak	15.95	1.20
06 46 36 00-0518 LF 1-1/4" x 3-1/2" Custom Shaped Red Oak	19.97	1.30
06 46 36 00-0519 LF 1-1/4" x 4-1/2" Custom Shaped Red Oak	24.04	1.30
06 46 36 00-0520 LF 1-1/4" x 5-1/2" Custom Shaped Red Oak	28.19	1.41
06 46 36 00-0521 LF 1-1/4" x 6-1/2" Custom Shaped Red Oak	32.37	1.41
06 46 36 00-0522 LF 1-1/4" x 7-1/2" Custom Shaped Red Oak	36.38	1.52
06 46 36 00-0523 LF 1-1/4" x 8-1/2" Custom Shaped Red Oak	40.47	1.52
06 46 36 00-0524 LF 1-1/4" x 9-1/2" Custom Shaped Red Oak	44.44	1.62
06 46 36 00-0525 LF 1-1/4" x 10-1/2" Custom Shaped Red Oak	48.65	1.53
06 46 36 00-0526 LF 1-1/4" x 11-1/2" Custom Shaped Red Oak	52.72	1.73
06 46 36 00-0527 LF 1-1/2" x 1-1/2" Custom Shaped Red Oak	16.74	1.20
06 46 36 00-0528 LF 1-1/2" x 2-1/2" Custom Shaped Red Oak	23.16	1.30
06 46 36 00-0529 LF 1-1/2" x 3-1/2" Custom Shaped Red Oak	29.58	1.30
06 46 36 00-0530 LF 1-1/2" x 4-1/2" Custom Shaped Red Oak	36.00	1.30
06 46 36 00-0531 LF 1-1/2" x 5-1/2" Custom Shaped Red Oak	42.43	1.41
06 46 36 00-0532 LF 1-1/2" x 6-1/2" Custom Shaped Red Oak	49.19	1.52
06 46 36 00-0533 LF 1-1/2" x 7-1/2" Custom Shaped Red Oak	55.48	1.52
06 46 36 00-0534 LF 1-1/2" x 8-1/2" Custom Shaped Red Oak	63.00	1.63
06 46 36 00-0535 LF 1-1/2" x 9-1/2" Custom Shaped Red Oak	68.29	1.63
06 46 36 00-0536 LF 1-1/2" x 10-1/2" Custom Shaped Red Oak	74.86	1.63
06 46 36 00-0537 LF 1-1/2" x 11-1/2" Custom Shaped Red Oak	81.33	1.73
06 46 36 00-0538 LF 2" x 1-1/2" Custom Shaped Red Oak	25.84	1.30
06 46 36 00-0539 LF 2" x 2-1/2" Custom Shaped Red Oak	36.79	1.30
06 46 36 00-0540 LF 2" x 3-1/2" Custom Shaped Red Oak	47.68	1.30
06 46 36 00-0541 LF 2" x 4-1/2" Custom Shaped Red Oak	58.72	1.41
06 46 36 00-0542 LF 2" x 5-1/2" Custom Shaped Red Oak	69.61	1.41
06 46 36 00-0543 LF 2" x 6-1/2" Custom Shaped Red Oak	80.77	1.52
06 46 36 00-0544 LF 2" x 7-1/2" Custom Shaped Red Oak	91.66	1.52
06 46 36 00-0545 LF 2" x 8-1/2" Custom Shaped Red Oak	102.71	1.63
06 46 36 00-0546 LF 2" x 9-1/2" Custom Shaped Red Oak	113.60	1.63
06 46 36 00-0547 LF 2" x 10-1/2" Custom Shaped Red Oak	124.54	1.73
06 46 36 00-0548 LF 2" x 11-1/2" Custom Shaped Red Oak	135.65	1.84
06 46 36 00-0549 White Oak <small>(06 46 36)</small>		
06 46 36 00-0550 LF 3/4" x 1-1/2" Custom Shaped White Oak	7.98	1.20
06 46 36 00-0551 LF 3/4" x 2-1/2" Custom Shaped White Oak	10.18	1.20
06 46 36 00-0552 LF 3/4" x 3-1/2" Custom Shaped White Oak	12.40	1.20
06 46 36 00-0553 LF 3/4" x 4-1/2" Custom Shaped White Oak	14.60	1.30
06 46 36 00-0554 LF 3/4" x 5-1/2" Custom Shaped White Oak	16.92	1.30
06 46 36 00-0555 LF 3/4" x 6-1/2" Custom Shaped White Oak	19.24	1.41
06 46 36 00-0556 LF 3/4" x 7-1/2" Custom Shaped White Oak	21.43	1.41
06 46 36 00-0557 LF 3/4" x 8-1/2" Custom Shaped White Oak	23.66	1.41
06 46 36 00-0558 LF 3/4" x 9-1/2" Custom Shaped White Oak	25.80	1.52
06 46 36 00-0559 LF 3/4" x 10-1/2" Custom Shaped White Oak	28.15	1.63
06 46 36 00-0560 LF 3/4" x 11-1/2" Custom Shaped White Oak	30.41	1.63
06 46 36 00-0561 LF 1" x 1-1/2" Custom Shaped White Oak	9.53	1.20
06 46 36 00-0562 LF 1" x 2-1/2" Custom Shaped White Oak	12.48	1.20
06 46 36 00-0563 LF 1" x 3-1/2" Custom Shaped White Oak	15.38	1.30
06 46 36 00-0564 LF 1" x 4-1/2" Custom Shaped White Oak	19.40	1.30
06 46 36 00-0565 LF 1" x 5-1/2" Custom Shaped White Oak	21.35	1.41

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 46 36 00-0566	LF	1" x 6-1/2" Custom Shaped White Oak	24.42	1.41
06 46 36 00-0567	LF	1" x 7-1/2" Custom Shaped White Oak	27.30	1.41
06 46 36 00-0568	LF	1" x 8-1/2" Custom Shaped White Oak	30.22	1.52
06 46 36 00-0569	LF	1" x 9-1/2" Custom Shaped White Oak	33.12	1.52
06 46 36 00-0570	LF	1" x 10-1/2" Custom Shaped White Oak	36.22	1.63
06 46 36 00-0571	LF	1" x 11-1/2" Custom Shaped White Oak	39.16	1.63
06 46 36 00-0572	LF	1-1/4" x 1-1/2" Custom Shaped White Oak	12.05	1.20
06 46 36 00-0573	LF	1-1/4" x 2-1/2" Custom Shaped White Oak	16.17	1.20
06 46 36 00-0574	LF	1-1/4" x 3-1/2" Custom Shaped White Oak	20.29	1.30
06 46 36 00-0575	LF	1-1/4" x 4-1/2" Custom Shaped White Oak	24.41	1.30
06 46 36 00-0576	LF	1-1/4" x 5-1/2" Custom Shaped White Oak	28.67	1.41
06 46 36 00-0577	LF	1-1/4" x 6-1/2" Custom Shaped White Oak	32.91	1.41
06 46 36 00-0578	LF	1-1/4" x 7-1/2" Custom Shaped White Oak	37.02	1.52
06 46 36 00-0579	LF	1-1/4" x 8-1/2" Custom Shaped White Oak	41.16	1.52
06 46 36 00-0580	LF	1-1/4" x 9-1/2" Custom Shaped White Oak	45.24	1.52
06 46 36 00-0581	LF	1-1/4" x 10-1/2" Custom Shaped White Oak	49.51	1.63
06 46 36 00-0582	LF	1-1/4" x 11-1/2" Custom Shaped White Oak	53.68	1.73
06 46 36 00-0583	LF	1-1/2" x 1-1/2" Custom Shaped White Oak	19.95	1.20
06 46 36 00-0584	LF	1-1/2" x 2-1/2" Custom Shaped White Oak	27.97	1.30
06 46 36 00-0585	LF	1-1/2" x 3-1/2" Custom Shaped White Oak	35.98	1.30
06 46 36 00-0586	LF	1-1/2" x 4-1/2" Custom Shaped White Oak	44.00	1.41
06 46 36 00-0587	LF	1-1/2" x 5-1/2" Custom Shaped White Oak	52.04	1.41
06 46 36 00-0588	LF	1-1/2" x 6-1/2" Custom Shaped White Oak	60.29	1.52
06 46 36 00-0589	LF	1-1/2" x 7-1/2" Custom Shaped White Oak	68.29	1.52
06 46 36 00-0590	LF	1-1/2" x 8-1/2" Custom Shaped White Oak	76.35	1.63
06 46 36 00-0591	LF	1-1/2" x 9-1/2" Custom Shaped White Oak	83.24	1.63
06 46 36 00-0592	LF	1-1/2" x 10-1/2" Custom Shaped White Oak	92.47	1.73
06 46 36 00-0593	LF	1-1/2" x 11-1/2" Custom Shaped White Oak	100.54	1.73

06 46 36 00-0594 White Pine (06 46 36)

06 46 36 00-0595	LF	3/4" x 1-1/2" Custom Shaped White Pine	8.94	1.20
06 46 36 00-0596	LF	3/4" x 2-1/2" Custom Shaped White Pine	11.62	1.20
06 46 36 00-0597	LF	3/4" x 3-1/2" Custom Shaped White Pine	14.32	1.20
06 46 36 00-0598	LF	3/4" x 4-1/2" Custom Shaped White Pine	17.00	1.30
06 46 36 00-0599	LF	3/4" x 5-1/2" Custom Shaped White Pine	19.80	1.30
06 46 36 00-0600	LF	3/4" x 6-1/2" Custom Shaped White Pine	22.60	1.41
06 46 36 00-0601	LF	3/4" x 7-1/2" Custom Shaped White Pine	25.27	1.41
06 46 36 00-0602	LF	3/4" x 8-1/2" Custom Shaped White Pine	27.98	1.41
06 46 36 00-0603	LF	3/4" x 9-1/2" Custom Shaped White Pine	32.21	1.52
06 46 36 00-0604	LF	3/4" x 10-1/2" Custom Shaped White Pine	35.20	1.63
06 46 36 00-0605	LF	1" x 1-1/2" Custom Shaped White Pine	10.07	1.20
06 46 36 00-0606	LF	1" x 2-1/2" Custom Shaped White Pine	13.28	1.20
06 46 36 00-0607	LF	1" x 3-1/2" Custom Shaped White Pine	16.44	1.30
06 46 36 00-0608	LF	1" x 4-1/2" Custom Shaped White Pine	19.67	1.30
06 46 36 00-0609	LF	1" x 5-1/2" Custom Shaped White Pine	22.95	1.41
06 46 36 00-0610	LF	1" x 6-1/2" Custom Shaped White Pine	26.29	1.41
06 46 36 00-0611	LF	1" x 7-1/2" Custom Shaped White Pine	29.44	1.41
06 46 36 00-0612	LF	1" x 8-1/2" Custom Shaped White Pine	32.67	1.52
06 46 36 00-0613	LF	1" x 9-1/2" Custom Shaped White Pine	35.79	1.52
06 46 36 00-0614	LF	1" x 10-1/2" Custom Shaped White Pine	39.15	1.63
06 46 36 00-0615	LF	1" x 11-1/2" Custom Shaped White Pine	42.36	1.63
06 46 36 00-0616	LF	1-1/4" x 1-1/2" Custom Shaped White Pine	11.40	1.20
06 46 36 00-0617	LF	1-1/4" x 2-1/2" Custom Shaped White Pine	15.21	1.20
06 46 36 00-0618	LF	1-1/4" x 3-1/2" Custom Shaped White Pine	19.12	1.30
06 46 36 00-0619	LF	1-1/4" x 4-1/2" Custom Shaped White Pine	22.81	1.30
06 46 36 00-0620	LF	1-1/4" x 5-1/2" Custom Shaped White Pine	26.74	1.41
06 46 36 00-0621	LF	1-1/4" x 6-1/2" Custom Shaped White Pine	30.67	1.41
06 46 36 00-0622	LF	1-1/4" x 7-1/2" Custom Shaped White Pine	34.46	1.52
06 46 36 00-0623	LF	1-1/4" x 8-1/2" Custom Shaped White Pine	38.28	1.52
06 46 36 00-0624	LF	1-1/4" x 9-1/2" Custom Shaped White Pine	42.03	1.52
06 46 36 00-0625	LF	1-1/4" x 10-1/2" Custom Shaped White Pine	45.99	1.63
06 46 36 00-0626	LF	1-1/4" x 11-1/2" Custom Shaped White Pine	49.84	1.73
06 46 36 00-0627	LF	1-1/2" x 1-1/2" Custom Shaped White Pine	14.40	1.20
06 46 36 00-0628	LF	1-1/2" x 2-1/2" Custom Shaped White Pine	19.64	1.30
06 46 36 00-0629	LF	1-1/2" x 3-1/2" Custom Shaped White Pine	24.88	1.30
06 46 36 00-0630	LF	1-1/2" x 4-1/2" Custom Shaped White Pine	30.13	1.41
06 46 36 00-0631	LF	1-1/2" x 5-1/2" Custom Shaped White Pine	35.39	1.41
06 46 36 00-0632	LF	1-1/2" x 6-1/2" Custom Shaped White Pine	40.86	1.52
06 46 36 00-0633	LF	1-1/2" x 7-1/2" Custom Shaped White Pine	46.09	1.52
06 46 36 00-0634	LF	1-1/2" x 8-1/2" Custom Shaped White Pine	51.37	1.63
06 46 36 00-0635	LF	1-1/2" x 9-1/2" Custom Shaped White Pine	57.62	1.63
06 46 36 00-0636	LF	1-1/2" x 10-1/2" Custom Shaped White Pine	61.95	1.73
06 46 36 00-0637	LF	1-1/2" x 11-1/2" Custom Shaped White Pine	67.24	1.73
06 46 36 00-0638	LF	2" x 1-1/2" Custom Shaped White Pine	22.37	1.30
06 46 36 00-0639	LF	2" x 2-1/2" Custom Shaped White Pine	31.56	1.30
06 46 36 00-0640	LF	2" x 3-1/2" Custom Shaped White Pine	40.74	1.30
06 46 36 00-0641	LF	2" x 4-1/2" Custom Shaped White Pine	50.02	1.41
06 46 36 00-0642	LF	2" x 5-1/2" Custom Shaped White Pine	59.21	1.41
06 46 36 00-0643	LF	2" x 6-1/2" Custom Shaped White Pine	68.60	1.52
06 46 36 00-0644	LF	2" x 7-1/2" Custom Shaped White Pine	77.78	1.52

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 46 36 00-0645	LF			2" x 8-1/2" Custom Shaped White Pine	87.07	1.63
06 46 36 00-0646	LF			2" x 9-1/2" Custom Shaped White Pine	96.25	1.63
06 46 36 00-0647	LF			2" x 10-1/2" Custom Shaped White Pine	105.44	1.73
06 46 36 00-0648	LF			2" x 11-1/2" Custom Shaped White Pine	114.84	1.84
06 46 36 00-0649	LF			2-1/2" x 1-1/2" Custom Shaped White Pine	26.75	1.30
06 46 36 00-0650	LF			2-1/2" x 2-1/2" Custom Shaped White Pine	38.07	1.30
06 46 36 00-0651	LF			2-1/2" x 3-1/2" Custom Shaped White Pine	49.39	1.41
06 46 36 00-0652	LF			2-1/2" x 4-1/2" Custom Shaped White Pine	60.81	1.41
06 46 36 00-0653	LF			2-1/2" x 5-1/2" Custom Shaped White Pine	72.12	1.41
06 46 36 00-0654	LF			2-1/2" x 6-1/2" Custom Shaped White Pine	83.65	1.52
06 46 36 00-0655	LF			2-1/2" x 7-1/2" Custom Shaped White Pine	94.98	1.63
06 46 36 00-0656	LF			2-1/2" x 8-1/2" Custom Shaped White Pine	106.39	1.63
06 46 36 00-0657	LF			2-1/2" x 9-1/2" Custom Shaped White Pine	117.71	1.73
06 46 36 00-0658	LF			2-1/2" x 10-1/2" Custom Shaped White Pine	129.03	1.73
06 46 36 00-0659	LF			2-1/2" x 11-1/2" Custom Shaped White Pine	140.57	1.84
06 46 36 00-0660	LF			3-1/2" x 3-1/2" Custom Shaped White Pine	68.71	1.41
06 46 36 00-0661	LF			3-1/2" x 4-1/2" Custom Shaped White Pine	84.92	1.41
06 46 36 00-0662	LF			3-1/2" x 5-1/2" Custom Shaped White Pine	101.05	1.52
06 46 36 00-0663	LF			3-1/2" x 6-1/2" Custom Shaped White Pine	117.39	1.63
06 46 36 00-0664	LF			3-1/2" x 7-1/2" Custom Shaped White Pine	133.51	1.63
06 46 36 00-0665	LF			3-1/2" x 8-1/2" Custom Shaped White Pine	149.73	1.73
06 46 36 00-0666	LF			3-1/2" x 9-1/2" Custom Shaped White Pine	165.84	1.73
06 46 36 00-0667	LF			3-1/2" x 10-1/2" Custom Shaped White Pine	181.97	1.73
06 46 36 00-0668	LF			3-1/2" x 11-1/2" Custom Shaped White Pine	198.31	1.84
06 46 36 00-0669				Clear Yellow Pine <small>(06 46 36)</small>		
06 46 36 00-0670	LF			3/4" x 1-1/2" Custom Shaped "C" Y Pine	5.95	1.20
06 46 36 00-0671	LF			3/4" x 2-1/2" Custom Shaped "C" Y Pine	7.14	1.20
06 46 36 00-0672	LF			3/4" x 3-1/2" Custom Shaped "C" Y Pine	8.34	1.20
06 46 36 00-0673	LF			3/4" x 4-1/2" Custom Shaped "C" Y Pine	9.53	1.30
06 46 36 00-0674	LF			3/4" x 5-1/2" Custom Shaped "C" Y Pine	10.83	1.30
06 46 36 00-0675	LF			3/4" x 6-1/2" Custom Shaped "C" Y Pine	12.14	1.41
06 46 36 00-0676	LF			3/4" x 7-1/2" Custom Shaped "C" Y Pine	13.32	1.41
06 46 36 00-0677	LF			3/4" x 8-1/2" Custom Shaped "C" Y Pine	14.54	1.41
06 46 36 00-0678	LF			1" x 1-1/2" Custom Shaped "C" Y Pine	6.87	1.20
06 46 36 00-0679	LF			1" x 2-1/2" Custom Shaped "C" Y Pine	8.48	1.20
06 46 36 00-0680	LF			1" x 3-1/2" Custom Shaped "C" Y Pine	10.04	1.30
06 46 36 00-0681	LF			1" x 4-1/2" Custom Shaped "C" Y Pine	11.66	1.30
06 46 36 00-0682	LF			1" x 5-1/2" Custom Shaped "C" Y Pine	13.35	1.41
06 46 36 00-0683	LF			1" x 6-1/2" Custom Shaped "C" Y Pine	15.08	1.41
06 46 36 00-0684	LF			1" x 7-1/2" Custom Shaped "C" Y Pine	17.16	1.41
06 46 36 00-0685	LF			1" x 8-1/2" Custom Shaped "C" Y Pine	18.85	1.52
06 46 36 00-0686	LF			1-1/2" x 1-1/2" Custom Shaped "C" Y Pine	7.99	1.20
06 46 36 00-0687	LF			1-1/2" x 2-1/2" Custom Shaped "C" Y Pine	10.03	1.30
06 46 36 00-0688	LF			1-1/2" x 3-1/2" Custom Shaped "C" Y Pine	12.07	1.30
06 46 36 00-0689	LF			1-1/2" x 4-1/2" Custom Shaped "C" Y Pine	14.12	1.41
06 46 36 00-0690	LF			1-1/2" x 5-1/2" Custom Shaped "C" Y Pine	16.18	1.41
06 46 36 00-0691	LF			1-1/2" x 6-1/2" Custom Shaped "C" Y Pine	18.45	1.52
06 46 36 00-0692	LF			1-1/2" x 7-1/2" Custom Shaped "C" Y Pine	20.47	1.52
06 46 36 00-0693	LF			1-1/2" x 8-1/2" Custom Shaped "C" Y Pine	22.55	1.63
06 46 36 00-0694	LF			1-1/2" x 9-1/2" Custom Shaped "C" Y Pine	26.13	1.63
06 46 36 00-0695	LF			1-1/2" x 10-1/2" Custom Shaped "C" Y Pine	26.94	1.73
06 46 36 00-0696				Poplar <small>(06 46 36)</small>		
06 46 36 00-0697	LF			3/4" x 1-1/2" Custom Shaped Poplar	6.27	1.20
06 46 36 00-0698	LF			3/4" x 2-1/2" Custom Shaped Poplar	7.62	1.20
06 46 36 00-0699	LF			3/4" x 3-1/2" Custom Shaped Poplar	8.98	1.20
06 46 36 00-0700	LF			3/4" x 4-1/2" Custom Shaped Poplar	10.33	1.30
06 46 36 00-0701	LF			3/4" x 5-1/2" Custom Shaped Poplar	11.79	1.30
06 46 36 00-0702	LF			3/4" x 6-1/2" Custom Shaped Poplar	13.26	1.41
06 46 36 00-0703	LF			3/4" x 7-1/2" Custom Shaped Poplar	14.60	1.41
06 46 36 00-0704	LF			3/4" x 8-1/2" Custom Shaped Poplar	15.98	1.41
06 46 36 00-0705	LF			3/4" x 9-1/2" Custom Shaped Poplar	17.26	1.52
06 46 36 00-0706	LF			3/4" x 10-1/2" Custom Shaped Poplar	18.76	1.63
06 46 36 00-0707	LF			3/4" x 11-1/2" Custom Shaped Poplar	20.27	1.63
06 46 36 00-0708	LF			1" x 1-1/2" Custom Shaped Poplar	7.29	1.20
06 46 36 00-0709	LF			1" x 2-1/2" Custom Shaped Poplar	9.07	1.20
06 46 36 00-0710	LF			1" x 3-1/2" Custom Shaped Poplar	10.84	1.30
06 46 36 00-0711	LF			1" x 4-1/2" Custom Shaped Poplar	12.63	1.30
06 46 36 00-0712	LF			1" x 5-1/2" Custom Shaped Poplar	14.57	1.41
06 46 36 00-0713	LF			1" x 6-1/2" Custom Shaped Poplar	16.47	1.41
06 46 36 00-0714	LF			1" x 7-1/2" Custom Shaped Poplar	18.23	1.41
06 46 36 00-0715	LF			1" x 8-1/2" Custom Shaped Poplar	20.03	1.52
06 46 36 00-0716	LF			1" x 9-1/2" Custom Shaped Poplar	21.80	1.52
06 46 36 00-0717	LF			1" x 10-1/2" Custom Shaped Poplar	23.73	1.63
06 46 36 00-0718	LF			1" x 11-1/2" Custom Shaped Poplar	25.55	1.63
06 46 36 00-0719	LF			1-1/4" x 1-1/2" Custom Shaped Poplar	8.20	1.20
06 46 36 00-0720	LF			1-1/4" x 2-1/2" Custom Shaped Poplar	10.40	1.20
06 46 36 00-0721	LF			1-1/4" x 3-1/2" Custom Shaped Poplar	12.61	1.30

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 46 36 00-0722	LF	1-1/4" x 4-1/2" Custom Shaped Poplar	14.81	1.30
06 46 36 00-0723	LF	1-1/4" x 5-1/2" Custom Shaped Poplar	17.14	1.41
06 46 36 00-0724	LF	1-1/4" x 6-1/2" Custom Shaped Poplar	19.46	1.41
06 46 36 00-0725	LF	1-1/4" x 7-1/2" Custom Shaped Poplar	21.65	1.52
06 46 36 00-0726	LF	1-1/4" x 8-1/2" Custom Shaped Poplar	23.87	1.52
06 46 36 00-0727	LF	1-1/4" x 9-1/2" Custom Shaped Poplar	26.02	1.52
06 46 36 00-0728	LF	1-1/4" x 10-1/2" Custom Shaped Poplar	28.37	1.63
06 46 36 00-0729	LF	1-1/4" x 11-1/2" Custom Shaped Poplar	30.63	1.73
06 46 36 00-0730	LF	1-1/2" x 1-1/2" Custom Shaped Poplar	10.34	1.20
06 46 36 00-0731	LF	1-1/2" x 2-1/2" Custom Shaped Poplar	13.56	1.30
06 46 36 00-0732	LF	1-1/2" x 3-1/2" Custom Shaped Poplar	16.77	1.30
06 46 36 00-0733	LF	1-1/2" x 4-1/2" Custom Shaped Poplar	19.99	1.41
06 46 36 00-0734	LF	1-1/2" x 5-1/2" Custom Shaped Poplar	23.22	1.41
06 46 36 00-0735	LF	1-1/2" x 6-1/2" Custom Shaped Poplar	26.67	1.52
06 46 36 00-0736	LF	1-1/2" x 7-1/2" Custom Shaped Poplar	29.86	1.52
06 46 36 00-0737	LF	1-1/2" x 8-1/2" Custom Shaped Poplar	33.12	1.63
06 46 36 00-0738	LF	1-1/2" x 9-1/2" Custom Shaped Poplar	36.27	1.63
06 46 36 00-0739	LF	1-1/2" x 10-1/2" Custom Shaped Poplar	39.64	1.73
06 46 36 00-0740	LF	1-1/2" x 11-1/2" Custom Shaped Poplar	42.90	1.73
06 46 36 00-0741	LF	2" x 1-1/2" Custom Shaped Poplar	13.57	1.30
06 46 36 00-0742	LF	2" x 2-1/2" Custom Shaped Poplar	18.38	1.30
06 46 36 00-0743	LF	2" x 3-1/2" Custom Shaped Poplar	23.13	1.30
06 46 36 00-0744	LF	2" x 4-1/2" Custom Shaped Poplar	28.04	1.41
06 46 36 00-0745	LF	2" x 5-1/2" Custom Shaped Poplar	32.79	1.41
06 46 36 00-0746	LF	2" x 6-1/2" Custom Shaped Poplar	37.80	1.52
06 46 36 00-0747	LF	2" x 7-1/2" Custom Shaped Poplar	42.56	1.52
06 46 36 00-0748	LF	2" x 8-1/2" Custom Shaped Poplar	47.47	1.63
06 46 36 00-0749	LF	2" x 9-1/2" Custom Shaped Poplar	52.23	1.63
06 46 36 00-0750	LF	2" x 10-1/2" Custom Shaped Poplar	57.03	1.73
06 46 36 00-0751	LF	2" x 11-1/2" Custom Shaped Poplar	62.01	1.84
06 46 36 00-0752	LF	2-1/2" x 1-1/2" Custom Shaped Poplar	16.83	1.30
06 46 36 00-0753	LF	2-1/2" x 2-1/2" Custom Shaped Poplar	23.18	1.30
06 46 36 00-0754	LF	2-1/2" x 3-1/2" Custom Shaped Poplar	29.54	1.41
06 46 36 00-0755	LF	2-1/2" x 4-1/2" Custom Shaped Poplar	35.99	1.41
06 46 36 00-0756	LF	2-1/2" x 5-1/2" Custom Shaped Poplar	42.34	1.41
06 46 36 00-0757	LF	2-1/2" x 6-1/2" Custom Shaped Poplar	48.91	1.52
06 46 36 00-0758	LF	2-1/2" x 7-1/2" Custom Shaped Poplar	55.27	1.63
06 46 36 00-0759	LF	2-1/2" x 8-1/2" Custom Shaped Poplar	61.73	1.63
06 46 36 00-0760	LF	2-1/2" x 9-1/2" Custom Shaped Poplar	68.08	1.73
06 46 36 00-0761	LF	2-1/2" x 10-1/2" Custom Shaped Poplar	74.43	1.73
06 46 36 00-0762	LF	2-1/2" x 11-1/2" Custom Shaped Poplar	81.01	1.84
06 46 36 00-0763	LF	3-1/2" x 3-1/2" Custom Shaped Poplar	40.53	1.41
06 46 36 00-0764	LF	3-1/2" x 4-1/2" Custom Shaped Poplar	49.70	1.41
06 46 36 00-0765	LF	3-1/2" x 5-1/2" Custom Shaped Poplar	58.78	1.52
06 46 36 00-0766	LF	3-1/2" x 6-1/2" Custom Shaped Poplar	68.19	1.63
06 46 36 00-0767	LF	3-1/2" x 7-1/2" Custom Shaped Poplar	77.16	1.63
06 46 36 00-0768	LF	3-1/2" x 8-1/2" Custom Shaped Poplar	86.33	1.73
06 46 36 00-0769	LF	3-1/2" x 9-1/2" Custom Shaped Poplar	95.40	1.73
06 46 36 00-0770	LF	3-1/2" x 10-1/2" Custom Shaped Poplar	104.48	1.73
06 46 36 00-0771	LF	3-1/2" x 11-1/2" Custom Shaped Poplar	113.78	1.84

06 46 36 00-0772 Clear Heart Redwood (06 46 36)

06 46 36 00-0773	LF	3/4" x 1-1/2" Custom Shaped Clear Heart Redwood	7.77	1.20
06 46 36 00-0774	LF	3/4" x 2-1/2" Custom Shaped Clear Heart Redwood	9.86	1.20
06 46 36 00-0775	LF	3/4" x 3-1/2" Custom Shaped Clear Heart Redwood	11.97	1.20
06 46 36 00-0776	LF	3/4" x 4-1/2" Custom Shaped Clear Heart Redwood	14.06	1.30
06 46 36 00-0777	LF	3/4" x 5-1/2" Custom Shaped Clear Heart Redwood	16.28	1.30
06 46 36 00-0778	LF	3/4" x 6-1/2" Custom Shaped Clear Heart Redwood	18.49	1.41
06 46 36 00-0779	LF	3/4" x 7-1/2" Custom Shaped Clear Heart Redwood	22.71	1.41
06 46 36 00-0780	LF	3/4" x 8-1/2" Custom Shaped Clear Heart Redwood	25.10	1.41
06 46 36 00-0781	LF	3/4" x 9-1/2" Custom Shaped Clear Heart Redwood	25.22	1.52
06 46 36 00-0782	LF	3/4" x 10-1/2" Custom Shaped Clear Heart Redwood	26.98	1.63
06 46 36 00-0783	LF	1" x 1-1/2" Custom Shaped Clear Heart Redwood	9.43	1.20
06 46 36 00-0784	LF	1" x 2-1/2" Custom Shaped Clear Heart Redwood	12.27	1.20
06 46 36 00-0785	LF	1" x 3-1/2" Custom Shaped Clear Heart Redwood	15.11	1.30
06 46 36 00-0786	LF	1" x 4-1/2" Custom Shaped Clear Heart Redwood	17.96	1.30
06 46 36 00-0787	LF	1" x 5-1/2" Custom Shaped Clear Heart Redwood	20.98	1.41
06 46 36 00-0788	LF	1" x 6-1/2" Custom Shaped Clear Heart Redwood	23.94	1.41
06 46 36 00-0789	LF	1" x 7-1/2" Custom Shaped Clear Heart Redwood	30.51	1.41
06 46 36 00-0790	LF	1" x 8-1/2" Custom Shaped Clear Heart Redwood	33.85	1.52
06 46 36 00-0791	LF	1" x 9-1/2" Custom Shaped Clear Heart Redwood	37.12	1.52
06 46 36 00-0792	LF	1" x 10-1/2" Custom Shaped Clear Heart Redwood	40.59	1.63
06 46 36 00-0793	LF	1-1/2" x 1-1/2" Custom Shaped Clear Heart Redwood	12.48	1.20
06 46 36 00-0794	LF	1-1/2" x 2-1/2" Custom Shaped Clear Heart Redwood	16.76	1.30
06 46 36 00-0795	LF	1-1/2" x 3-1/2" Custom Shaped Clear Heart Redwood	21.04	1.30
06 46 36 00-0796	LF	1-1/2" x 4-1/2" Custom Shaped Clear Heart Redwood	25.32	1.41
06 46 36 00-0797	LF	1-1/2" x 5-1/2" Custom Shaped Clear Heart Redwood	29.63	1.41
06 46 36 00-0798	LF	1-1/2" x 6-1/2" Custom Shaped Clear Heart Redwood	34.25	1.52
06 46 36 00-0799	LF	1-1/2" x 7-1/2" Custom Shaped Clear Heart Redwood	46.09	1.52
06 46 36 00-0800	LF	1-1/2" x 8-1/2" Custom Shaped Clear Heart Redwood	51.37	1.63



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
06 46 36 00-0801 LF 1-1/2" x 9-1/2" Custom Shaped Clear Heart Redwood.....	60.82	1.63
06 46 36 00-0802 LF 1-1/2" x 10-1/2" Custom Shaped Clear Heart Redwood.....	66.64	1.73
06 46 36 00-0803 LF 3-1/2" x 3-1/2" Custom Shaped Clear Heart Redwood.....	64.44	1.41
06 46 36 00-0804 LF 3-1/2" x 4-1/2" Custom Shaped Clear Heart Redwood.....	79.58	1.41
06 46 36 00-0805 LF 3-1/2" x 5-1/2" Custom Shaped Clear Heart Redwood.....	94.65	1.52
06 46 36 00-0806 LF 3-1/2" x 6-1/2" Custom Shaped Clear Heart Redwood.....	109.92	1.63
06 46 36 00-0807 LF 3-1/2" x 7-1/2" Custom Shaped Clear Heart Redwood.....	124.97	1.63
06 46 36 00-0808 LF 3-1/2" x 8-1/2" Custom Shaped Clear Heart Redwood.....	140.13	1.73
06 46 36 00-0809 LF 3-1/2" x 9-1/2" Custom Shaped Clear Heart Redwood.....	155.17	1.73
06 46 36 00-0810 LF 3-1/2" x 10-1/2" Custom Shaped Clear Heart Redwood.....	170.23	1.73
06 46 36 00-0811 LF 3-1/2" x 11-1/2" Custom Shaped Clear Heart Redwood.....	185.51	1.84
06 46 36 00-0812 Teak <small>(06 46 36)</small>		
06 46 36 00-0813 LF 3/4" x 1-1/2" Custom Shaped Teak.....	22.07	1.20
06 46 36 00-0814 LF 3/4" x 2-1/2" Custom Shaped Teak.....	31.32	1.20
06 46 36 00-0815 LF 3/4" x 3-1/2" Custom Shaped Teak.....	40.57	1.20
06 46 36 00-0816 LF 3/4" x 4-1/2" Custom Shaped Teak.....	49.82	1.30
06 46 36 00-0817 LF 3/4" x 5-1/2" Custom Shaped Teak.....	59.19	1.30
06 46 36 00-0818 LF 3/4" x 6-1/2" Custom Shaped Teak.....	68.55	1.41
06 46 36 00-0819 LF 3/4" x 7-1/2" Custom Shaped Teak.....	77.79	1.41
06 46 36 00-0820 LF 3/4" x 8-1/2" Custom Shaped Teak.....	87.06	1.41
06 46 36 00-0821 LF 3/4" x 9-1/2" Custom Shaped Teak.....	96.25	1.52
06 46 36 00-0822 LF 3/4" x 10-1/2" Custom Shaped Teak.....	105.64	1.63
06 46 36 00-0823 LF 3/4" x 11-1/2" Custom Shaped Teak.....	114.94	1.63
06 46 36 00-0824 LF 1-1/2" x 1-1/2" Custom Shaped Teak.....	51.33	1.20
06 46 36 00-0825 LF 1-1/2" x 2-1/2" Custom Shaped Teak.....	59.03	1.30
06 46 36 00-0826 LF 1-1/2" x 3-1/2" Custom Shaped Teak.....	77.40	1.30
06 46 36 00-0827 LF 1-1/2" x 4-1/2" Custom Shaped Teak.....	95.77	1.41
06 46 36 00-0828 LF 1-1/2" x 5-1/2" Custom Shaped Teak.....	114.16	1.41
06 46 36 00-0829 LF 1-1/2" x 6-1/2" Custom Shaped Teak.....	132.23	1.52
06 46 36 00-0830 LF 1-1/2" x 7-1/2" Custom Shaped Teak.....	151.11	1.52
06 46 36 00-0831 LF 1-1/2" x 8-1/2" Custom Shaped Teak.....	169.53	1.63
06 46 36 00-0832 LF 1-1/2" x 9-1/2" Custom Shaped Teak.....	187.84	1.63
06 46 36 00-0833 LF 1-1/2" x 10-1/2" Custom Shaped Teak.....	206.36	1.73
06 46 36 00-0834 LF 1-1/2" x 11-1/2" Custom Shaped Teak.....	224.78	1.73
06 46 36 00-0835 Walnut <small>(06 46 36)</small>		
06 46 36 00-0836 LF 3/4" x 1-1/2" Custom Shaped Walnut.....	11.93	1.20
06 46 36 00-0837 LF 3/4" x 2-1/2" Custom Shaped Walnut.....	16.11	1.20
06 46 36 00-0838 LF 3/4" x 3-1/2" Custom Shaped Walnut.....	20.29	1.20
06 46 36 00-0839 LF 3/4" x 4-1/2" Custom Shaped Walnut.....	24.47	1.30
06 46 36 00-0840 LF 3/4" x 5-1/2" Custom Shaped Walnut.....	28.77	1.30
06 46 36 00-0841 LF 3/4" x 6-1/2" Custom Shaped Walnut.....	33.06	1.41
06 46 36 00-0842 LF 3/4" x 7-1/2" Custom Shaped Walnut.....	37.23	1.41
06 46 36 00-0843 LF 3/4" x 8-1/2" Custom Shaped Walnut.....	41.43	1.41
06 46 36 00-0844 LF 3/4" x 9-1/2" Custom Shaped Walnut.....	45.55	1.52
06 46 36 00-0845 LF 3/4" x 10-1/2" Custom Shaped Walnut.....	49.88	1.63
06 46 36 00-0846 LF 3/4" x 11-1/2" Custom Shaped Walnut.....	54.10	1.63
06 46 36 00-0847 LF 1" x 1-1/2" Custom Shaped Walnut.....	14.34	1.20
06 46 36 00-0848 LF 1" x 2-1/2" Custom Shaped Walnut.....	19.69	1.20
06 46 36 00-0849 LF 1" x 3-1/2" Custom Shaped Walnut.....	24.98	1.30
06 46 36 00-0850 LF 1" x 4-1/2" Custom Shaped Walnut.....	30.34	1.30
06 46 36 00-0851 LF 1" x 5-1/2" Custom Shaped Walnut.....	35.76	1.41
06 46 36 00-0852 LF 1" x 6-1/2" Custom Shaped Walnut.....	41.23	1.41
06 46 36 00-0853 LF 1" x 7-1/2" Custom Shaped Walnut.....	46.52	1.41
06 46 36 00-0854 LF 1" x 8-1/2" Custom Shaped Walnut.....	51.89	1.52
06 46 36 00-0855 LF 1" x 9-1/2" Custom Shaped Walnut.....	57.13	1.52
06 46 36 00-0856 LF 1" x 10-1/2" Custom Shaped Walnut.....	62.63	1.63
06 46 36 00-0857 LF 1" x 11-1/2" Custom Shaped Walnut.....	67.98	1.63
06 46 36 00-0858 LF 1-1/4" x 1-1/2" Custom Shaped Walnut.....	17.65	1.20
06 46 36 00-0859 LF 1-1/4" x 2-1/2" Custom Shaped Walnut.....	24.60	1.20
06 46 36 00-0860 LF 1-1/4" x 3-1/2" Custom Shaped Walnut.....	31.50	1.30
06 46 36 00-0861 LF 1-1/4" x 4-1/2" Custom Shaped Walnut.....	38.45	1.30
06 46 36 00-0862 LF 1-1/4" x 5-1/2" Custom Shaped Walnut.....	45.48	1.41
06 46 36 00-0863 LF 1-1/4" x 6-1/2" Custom Shaped Walnut.....	52.55	1.41
06 46 36 00-0864 LF 1-1/4" x 7-1/2" Custom Shaped Walnut.....	59.44	1.52
06 46 36 00-0865 LF 1-1/4" x 8-1/2" Custom Shaped Walnut.....	66.41	1.52
06 46 36 00-0866 LF 1-1/4" x 9-1/2" Custom Shaped Walnut.....	73.25	1.52
06 46 36 00-0867 LF 1-1/4" x 10-1/2" Custom Shaped Walnut.....	80.35	1.63
06 46 36 00-0868 LF 1-1/4" x 11-1/2" Custom Shaped Walnut.....	87.30	1.73
06 46 36 00-0869 LF 1-1/2" x 1-1/2" Custom Shaped Walnut.....	24.00	1.20
06 46 36 00-0870 LF 1-1/2" x 2-1/2" Custom Shaped Walnut.....	34.05	1.30
06 46 36 00-0871 LF 1-1/2" x 3-1/2" Custom Shaped Walnut.....	44.10	1.30
06 46 36 00-0872 LF 1-1/2" x 4-1/2" Custom Shaped Walnut.....	54.14	1.41
06 46 36 00-0873 LF 1-1/2" x 5-1/2" Custom Shaped Walnut.....	64.21	1.41
06 46 36 00-0874 LF 1-1/2" x 6-1/2" Custom Shaped Walnut.....	74.48	1.52
06 46 36 00-0875 LF 1-1/2" x 7-1/2" Custom Shaped Walnut.....	84.51	1.52
06 46 36 00-0876 LF 1-1/2" x 8-1/2" Custom Shaped Walnut.....	94.60	1.63
06 46 36 00-0877 LF 1-1/2" x 9-1/2" Custom Shaped Walnut.....	105.65	1.63

06 Wood, Plastics, and Composites**06 40 Architectural Woodwork****06 46 Wood Trim**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 46 36 00-0878	LF	1-1/2" x 10-1/2" Custom Shaped Walnut	114.78	1.73
06 46 36 00-0879	LF	1-1/2" x 11-1/2" Custom Shaped Walnut	124.88	1.73
06 46 36 00-0880	LF	2" x 1-1/2" Custom Shaped Walnut.....	40.52	1.30
06 46 36 00-0881	LF	2" x 2-1/2" Custom Shaped Walnut.....	58.78	1.30
06 46 36 00-0882	LF	2" x 3-1/2" Custom Shaped Walnut.....	77.03	1.30
06 46 36 00-0883	LF	2" x 4-1/2" Custom Shaped Walnut.....	95.38	1.41
06 46 36 00-0884	LF	2" x 5-1/2" Custom Shaped Walnut.....	113.64	1.41
06 46 36 00-0885	LF	2" x 6-1/2" Custom Shaped Walnut.....	132.10	1.52
06 46 36 00-0886	LF	2" x 7-1/2" Custom Shaped Walnut.....	150.36	1.52
06 46 36 00-0887	LF	2" x 8-1/2" Custom Shaped Walnut.....	168.72	1.63
06 46 36 00-0888	LF	2" x 9-1/2" Custom Shaped Walnut.....	186.98	1.63
06 46 36 00-0889	LF	2" x 10-1/2" Custom Shaped Walnut.....	205.23	1.73
06 46 36 00-0890	LF	2" x 11-1/2" Custom Shaped Walnut.....	223.71	1.84
06 46 36 00-0891	LF	2-1/2" x 1-1/2" Custom Shaped Walnut	50.77	1.30
06 46 36 00-0892	LF	2-1/2" x 2-1/2" Custom Shaped Walnut	74.09	1.30
06 46 36 00-0893	LF	2-1/2" x 3-1/2" Custom Shaped Walnut	97.42	1.41
06 46 36 00-0894	LF	2-1/2" x 4-1/2" Custom Shaped Walnut	120.84	1.41
06 46 36 00-0895	LF	2-1/2" x 5-1/2" Custom Shaped Walnut	144.17	1.41
06 46 36 00-0896	LF	2-1/2" x 6-1/2" Custom Shaped Walnut	167.70	1.52
06 46 36 00-0897	LF	2-1/2" x 7-1/2" Custom Shaped Walnut	191.04	1.63
06 46 36 00-0898	LF	2-1/2" x 8-1/2" Custom Shaped Walnut	214.46	1.63
06 46 36 00-0899	LF	2-1/2" x 9-1/2" Custom Shaped Walnut	237.79	1.73
06 46 36 00-0900	LF	2-1/2" x 10-1/2" Custom Shaped Walnut	261.11	1.73
06 46 36 00-0901	LF	2-1/2" x 11-1/2" Custom Shaped Walnut	284.66	1.84

06 48 Wood Frames (06 40)

Note: Includes perimeter caulk, sealant (as required), anchors and silencers.

06 48 13 Exterior Wood Door Frames (06 48)**06 48 13 00-0001 Exterior Door Frames** (06 48 13)

Note: 6'-8" and 7'-2" frames are the same price as 7' frames. Custom made with threshold, includes all trim molding, up to 8" depth.

06 48 13 00-0002	EA	3' x 7' Pine Exterior Door Frame Custom Made With Threshold And Trim	281.96	61.54
		<i>For Birch, Add</i>	55.65	
		<i>For Mahogany, Add</i>	135.14	
06 48 13 00-0003	EA	3'-6" x 7' Pine Exterior Door Frame Custom Made With Threshold And Trim	296.40	64.49
		<i>For Birch, Add</i>	58.80	
		<i>For Mahogany, Add</i>	142.79	
06 48 13 00-0004	EA	4' x 7' Pine Exterior Door Frame Custom Made With Threshold And Trim	310.85	67.00
		<i>For Birch, Add</i>	61.94	
		<i>For Mahogany, Add</i>	150.42	
06 48 13 00-0005	EA	5' x 7' Pine Exterior Door Frame Custom Made With Threshold And Trim	338.42	71.71
		<i>For Birch, Add</i>	68.23	
		<i>For Mahogany, Add</i>	165.69	
06 48 13 00-0006	EA	6' x 7' Pine Exterior Door Frame Custom Made With Threshold And Trim	366.64	76.85
		<i>For Birch, Add</i>	74.52	
		<i>For Mahogany, Add</i>	180.98	
06 48 13 00-0007	EA	3' x 7' Walnut Exterior Door Frame Custom Made With Threshold And Trim	415.56	61.76
06 48 13 00-0008	EA	3'-6" x 7' Walnut Exterior Door Frame Custom Made With Threshold And Trim	423.43	64.49
06 48 13 00-0009	EA	4' x 7' Walnut Exterior Door Frame Custom Made With Threshold And Trim	431.27	67.23
06 48 13 00-0010	EA	5' x 7' Walnut Exterior Door Frame Custom Made With Threshold And Trim	444.88	71.60
06 48 13 00-0011	EA	6' x 7' Walnut Exterior Door Frame Custom Made With Threshold And Trim	460.76	77.07
06 48 13 00-0012	EA	3' x 7' Oak Exterior Door Frame Custom Made With Threshold And Trim	328.09	61.76
06 48 13 00-0013	EA	3'-6" x 7' Oak Exterior Door Frame Custom Made With Threshold And Trim	343.86	64.49
06 48 13 00-0014	EA	4' x 7' Oak Exterior Door Frame Custom Made With Threshold And Trim	359.72	67.23
06 48 13 00-0015	EA	5' x 7' Oak Exterior Door Frame Custom Made With Threshold And Trim	389.11	71.60
06 48 13 00-0016	EA	6' x 7' Oak Exterior Door Frame Custom Made With Threshold And Trim	420.66	77.07

06 48 16 Interior Wood Door Frames (06 48)**06 48 16 00-0001 Interior Door Frames** (06 48 16)

Note: 6'-8" and 7'-2" frames are the same price as 7' frames. Custom made, includes all trim molding.

06 48 16 00-0002	EA	2'-0" Or 2'-4" x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	140.85	29.29
		<i>For Oak Or Maple, Add</i>	25.51	
		<i>For Birch, Add</i>	28.80	
		<i>For Mahogany, Add</i>	69.95	
		<i>For Walnut Frame, Add</i>	37.03	
06 48 16 00-0003	EA	2'-6" x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	141.82	29.40
		<i>For Oak Or Maple, Add</i>	25.72	
		<i>For Birch, Add</i>	29.04	
		<i>For Mahogany, Add</i>	70.53	
		<i>For Walnut Frame, Add</i>	37.34	
06 48 16 00-0004	EA	2'-8" x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	143.60	29.95
		<i>For Oak Or Maple, Add</i>	25.92	
		<i>For Birch, Add</i>	29.26	
		<i>For Mahogany, Add</i>	71.07	
		<i>For Walnut Frame, Add</i>	37.62	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 48 16 00-0005 EA 3' x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	145.92	30.72
For Oak Or Maple, Add	26.17	
For Birch, Add	29.55	
For Mahogany, Add	71.77	
For Walnut Frame, Add	37.99	
06 48 16 00-0006 EA 3'-4" x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	149.29	31.48
For Oak Or Maple, Add	26.73	
For Birch, Add	30.18	
For Mahogany, Add	73.29	
For Walnut Frame, Add	38.80	
06 48 16 00-0007 EA 4' x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	157.73	33.45
For Oak Or Maple, Add	28.14	
For Birch, Add	31.77	
For Mahogany, Add	77.16	
For Walnut Frame, Add	40.85	
06 48 16 00-0008 EA 5' x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	167.78	36.19
For Oak Or Maple, Add	29.56	
For Birch, Add	33.38	
For Mahogany, Add	81.06	
For Walnut Frame, Add	42.91	
06 48 16 00-0009 EA 6' x 7' Pine Interior Door Frame Custom Made With Threshold And Trim	176.77	38.47
For Oak Or Maple, Add	30.97	
For Birch, Add	34.97	
For Mahogany, Add	84.92	
For Walnut Frame, Add	44.96	
06 48 16 00-0010 LF 4-9/16", Pine Interior Door Frame	6.76	2.62
For Oak Or Maple, Add	0.47	
For Birch, Add	0.53	
For Mahogany, Add	1.28	
For Walnut Frame, Add	0.68	

06 50 Structural Plastics ⁽⁰⁶⁾

06 51 Structural Plastic Shapes and Plates ^(06 50)

06 51 13 Plastic Lumber ^(06 51)

06 51 13 00-0001 Beams And Girders, Recycled Plastic Lumber ^(06 51 13)

06 51 13 00-0002 LF 2" x 6", Beam Or Girder, Recycled Plastic Lumber	11.67	1.76
For Reinforced Structural Plastic Lumber, Add	3.39	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	0.82	
For White Color, Add	3.89	
For All Other Colors (Except Black, Brown Or White), Add	3.30	
06 51 13 00-0003 LF 2" x 8", Beam Or Girder, Recycled Plastic Lumber	14.92	1.91
For Reinforced Structural Plastic Lumber, Add	4.51	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.10	
For White Color, Add	5.18	
For All Other Colors (Except Black, Brown Or White), Add	4.38	
06 51 13 00-0004 LF 2" x 10", Beam Or Girder, Recycled Plastic Lumber	17.86	2.06
For Reinforced Structural Plastic Lumber, Add	5.52	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.34	
For White Color, Add	6.34	
For All Other Colors (Except Black, Brown Or White), Add	5.37	
06 51 13 00-0005 LF 3" x 10", Beam Or Girder, Recycled Plastic Lumber	26.11	2.45
For Reinforced Structural Plastic Lumber, Add	8.37	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	2.03	
For White Color, Add	9.61	
For All Other Colors (Except Black, Brown Or White), Add	8.14	
06 51 13 00-0006 LF 3" x 12", Beam Or Girder, Recycled Plastic Lumber	31.26	2.76
For Reinforced Structural Plastic Lumber, Add	10.11	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	2.46	
For White Color, Add	11.61	
For All Other Colors (Except Black, Brown Or White), Add	9.84	
06 51 13 00-0007 LF 4" x 4", Beam Or Girder, Recycled Plastic Lumber	16.84	2.37
For Reinforced Structural Plastic Lumber, Add	4.98	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.21	
For White Color, Add	5.72	
For All Other Colors (Except Black, Brown Or White), Add	4.84	
06 51 13 00-0008 LF 4" x 6", Beam Or Girder, Recycled Plastic Lumber	22.71	2.52
For Reinforced Structural Plastic Lumber, Add	7.07	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.72	
For White Color, Add	8.12	
For All Other Colors (Except Black, Brown Or White), Add	6.88	

06 Wood, Plastics, and Composites**06 50 Structural Plastics****06 51 Structural Plastic Shapes and Plates**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 51 13 00-0009	LF	5" x 5", Beam Or Girder, Recycled Plastic Lumber	23.64	2.60
		<i>For Reinforced Structural Plastic Lumber, Add</i>	7.37	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.79	
		<i>For White Color, Add</i>	8.47	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	7.17	
06 51 13 00-0010	LF	6" x 6", Beam Or Girder, Recycled Plastic Lumber	32.64	2.83
		<i>For Reinforced Structural Plastic Lumber, Add</i>	10.58	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	2.57	
		<i>For White Color, Add</i>	12.15	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	10.29	
06 51 13 00-0011	LF	6" x 8", Beam Or Girder, Recycled Plastic Lumber	44.55	2.99
		<i>For Reinforced Structural Plastic Lumber, Add</i>	14.90	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	3.63	
		<i>For White Color, Add</i>	17.12	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	14.50	
06 51 13 00-0012		Joists, Recycled Plastic Lumber <small>(06 51 13)</small>		
06 51 13 00-0013	LF	2" x 4", Joist, Recycled Plastic Lumber	7.60	0.99
		<i>For Reinforced Structural Plastic Lumber, Add</i>	2.29	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.56	
		<i>For White Color, Add</i>	2.63	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	2.22	
06 51 13 00-0014	LF	2" x 6", Joist, Recycled Plastic Lumber	10.58	1.04
		<i>For Reinforced Structural Plastic Lumber, Add</i>	3.39	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.82	
		<i>For White Color, Add</i>	3.89	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	3.30	
06 51 13 00-0015	LF	2" x 8", Joist, Recycled Plastic Lumber	13.82	1.15
		<i>For Reinforced Structural Plastic Lumber, Add</i>	4.51	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.10	
		<i>For White Color, Add</i>	5.18	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	4.38	
06 51 13 00-0016	LF	2" x 10", Joist, Recycled Plastic Lumber	16.87	1.37
		<i>For Reinforced Structural Plastic Lumber, Add</i>	5.52	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.34	
		<i>For White Color, Add</i>	6.34	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	5.37	
06 51 13 00-0017	LF	3" x 10", Joist, Recycled Plastic Lumber	24.91	1.61
		<i>For Reinforced Structural Plastic Lumber, Add</i>	8.37	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	2.03	
		<i>For White Color, Add</i>	9.61	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	8.14	
06 51 13 00-0018	LF	3" x 12", Joist, Recycled Plastic Lumber	30.28	2.06
		<i>For Reinforced Structural Plastic Lumber, Add</i>	10.11	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	2.46	
		<i>For White Color, Add</i>	11.61	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	9.84	
06 51 13 00-0019	LF	4" x 4", Joist, Recycled Plastic Lumber	15.52	1.45
		<i>For Reinforced Structural Plastic Lumber, Add</i>	4.98	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.21	
		<i>For White Color, Add</i>	5.72	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	4.84	
06 51 13 00-0020	LF	4" x 6", Joist, Recycled Plastic Lumber	21.29	1.54
		<i>For Reinforced Structural Plastic Lumber, Add</i>	7.07	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.72	
		<i>For White Color, Add</i>	8.12	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	6.88	
06 51 13 00-0021	LF	5" x 5", Joist, Recycled Plastic Lumber	22.32	1.69
		<i>For Reinforced Structural Plastic Lumber, Add</i>	7.37	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.79	
		<i>For White Color, Add</i>	8.47	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	7.17	
06 51 13 00-0022	LF	6" x 6", Joist, Recycled Plastic Lumber	31.31	1.91
		<i>For Reinforced Structural Plastic Lumber, Add</i>	10.58	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	2.57	
		<i>For White Color, Add</i>	12.15	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	10.29	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 51 13 00-0023 LF 6" x 8", Joist, Recycled Plastic Lumber.....	43.24	2.06
For Reinforced Structural Plastic Lumber, Add	14.90	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	3.63	
For White Color, Add	17.12	
For All Other Colors (Except Black, Brown Or White), Add	14.50	
06 51 13 00-0024 Columns, Recycled Plastic Lumber (06 51 13)		
06 51 13 00-0025 LF 4" x 4", Column, Recycled Plastic Lumber.....	17.93	3.14
For Reinforced Structural Plastic Lumber, Add	4.98	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.21	
For White Color, Add	5.72	
For All Other Colors (Except Black, Brown Or White), Add	4.84	
06 51 13 00-0026 LF 4" x 6", Column, Recycled Plastic Lumber.....	25.44	4.43
For Reinforced Structural Plastic Lumber, Add	7.07	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.72	
For White Color, Add	8.12	
For All Other Colors (Except Black, Brown Or White), Add	6.88	
06 51 13 00-0027 LF 5" x 5", Column, Recycled Plastic Lumber.....	27.03	4.97
For Reinforced Structural Plastic Lumber, Add	7.37	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.79	
For White Color, Add	8.47	
For All Other Colors (Except Black, Brown Or White), Add	7.17	
06 51 13 00-0028 LF 6" x 6", Column, Recycled Plastic Lumber.....	36.67	5.66
For Reinforced Structural Plastic Lumber, Add	10.58	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	2.57	
For White Color, Add	12.15	
For All Other Colors (Except Black, Brown Or White), Add	10.29	
06 51 13 00-0029 LF 6" x 8", Column, Recycled Plastic Lumber.....	50.22	6.96
For Reinforced Structural Plastic Lumber, Add	14.90	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	3.63	
For White Color, Add	17.12	
For All Other Colors (Except Black, Brown Or White), Add	14.50	
06 51 13 00-0030 Walls, Recycled Plastic Lumber (06 51 13)		
06 51 13 00-0031 LF 2" x 3", Walls, Recycled Plastic Lumber.....	6.82	0.99
For Reinforced Structural Plastic Lumber, Add	2.00	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	0.49	
For White Color, Add	2.30	
For All Other Colors (Except Black, Brown Or White), Add	1.94	
06 51 13 00-0032 LF 2" x 4", Walls, Recycled Plastic Lumber.....	7.83	1.15
For Reinforced Structural Plastic Lumber, Add	2.29	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	0.56	
For White Color, Add	2.63	
For All Other Colors (Except Black, Brown Or White), Add	2.22	
06 51 13 00-0033 LF 2" x 6", Walls, Recycled Plastic Lumber.....	10.91	1.22
For Reinforced Structural Plastic Lumber, Add	3.39	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	0.82	
For White Color, Add	3.89	
For All Other Colors (Except Black, Brown Or White), Add	3.30	
06 51 13 00-0034 LF 2" x 8", Walls, Recycled Plastic Lumber.....	14.03	1.30
For Reinforced Structural Plastic Lumber, Add	4.51	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	1.10	
For White Color, Add	5.18	
For All Other Colors (Except Black, Brown Or White), Add	4.38	
06 51 13 00-0035 Other Shapes, Recycled Plastic Lumber (06 51 13)		
06 51 13 00-0036 LF 5/4" x 4", Other Shapes, Recycled Plastic Lumber.....	6.65	0.87
For Reinforced Structural Plastic Lumber, Add	1.97	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	0.48	
For White Color, Add	2.26	
For All Other Colors (Except Black, Brown Or White), Add	1.92	
06 51 13 00-0037 LF 5/4" x 6", Other Shapes, Recycled Plastic Lumber.....	8.47	0.99
For Reinforced Structural Plastic Lumber, Add	2.61	
Note: High density polyethylene combined with fiberglass.		
For Brown Color, Add	0.63	
For White Color, Add	3.00	
For All Other Colors (Except Black, Brown Or White), Add	2.54	

06 Wood, Plastics, and Composites**06 50 Structural Plastics****06 51 Structural Plastic Shapes and Plates**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
06 51 13 00-0038	LF	5/4" x 8", Recycled Plastic Lumber	11.11	0.99
		<i>For Reinforced Structural Plastic Lumber, Add</i>	3.59	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.87	
		<i>For White Color, Add</i>	4.12	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	3.49	
06 51 13 00-0039	LF	1" x 4", Other Shapes, Recycled Plastic Lumber	6.69	0.87
		<i>For Reinforced Structural Plastic Lumber, Add</i>	1.98	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.48	
		<i>For White Color, Add</i>	2.28	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	1.93	
06 51 13 00-0040	LF	1" x 6", Other Shapes, Recycled Plastic Lumber	7.40	0.99
		<i>For Reinforced Structural Plastic Lumber, Add</i>	2.21	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.54	
		<i>For White Color, Add</i>	2.54	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	2.15	
06 51 13 00-0041	LF	1" x 6", Tongue And Grooved, Other Shapes, Recycled Plastic Lumber	7.54	0.99
		<i>For Reinforced Structural Plastic Lumber, Add</i>	2.26	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.55	
		<i>For White Color, Add</i>	2.60	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	2.20	
06 51 13 00-0042	LF	2" x 2", Other Shapes, Recycled Plastic Lumber	4.62	0.84
		<i>For Reinforced Structural Plastic Lumber, Add</i>	1.26	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.31	
		<i>For White Color, Add</i>	1.45	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	1.23	
06 51 13 00-0043	LF	2" x 3", Other Shapes, Recycled Plastic Lumber	6.82	0.99
		<i>For Reinforced Structural Plastic Lumber, Add</i>	2.00	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.49	
		<i>For White Color, Add</i>	2.30	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	1.94	
06 51 13 00-0044	LF	2" x 4", Other Shapes, Recycled Plastic Lumber	7.83	1.15
		<i>For Reinforced Structural Plastic Lumber, Add</i>	2.29	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.56	
		<i>For White Color, Add</i>	2.63	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	2.22	
06 51 13 00-0045	LF	2" x 6", Other Shapes, Recycled Plastic Lumber	10.91	1.22
		<i>For Reinforced Structural Plastic Lumber, Add</i>	3.39	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.82	
		<i>For White Color, Add</i>	3.89	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	3.30	
06 51 13 00-0046	LF	2" x 8", Other Shapes, Recycled Plastic Lumber	14.03	1.30
		<i>For Reinforced Structural Plastic Lumber, Add</i>	4.51	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.10	
		<i>For White Color, Add</i>	5.18	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	4.38	
06 51 13 00-0047	LF	2" x 10", Other Shapes, Recycled Plastic Lumber	16.87	1.37
		<i>For Reinforced Structural Plastic Lumber, Add</i>	5.52	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.34	
		<i>For White Color, Add</i>	6.34	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	5.37	
06 51 13 00-0048	LF	2" x 12", Other Shapes, Recycled Plastic Lumber	20.40	1.45
		<i>For Reinforced Structural Plastic Lumber, Add</i>	6.79	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.65	
		<i>For White Color, Add</i>	7.79	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	6.60	
06 51 13 00-0049	LF	3" x 4", Other Shapes, Recycled Plastic Lumber	11.22	1.34
		<i>For Reinforced Structural Plastic Lumber, Add</i>	3.44	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	0.84	
		<i>For White Color, Add</i>	3.95	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	3.35	
06 51 13 00-0050	LF	3" x 6", Other Shapes, Recycled Plastic Lumber	16.46	1.43
		<i>For Reinforced Structural Plastic Lumber, Add</i>	5.34	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.30	
		<i>For White Color, Add</i>	6.13	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	5.19	
06 51 13 00-0051	LF	3" x 8", Other Shapes, Recycled Plastic Lumber	21.46	1.54
		<i>For Reinforced Structural Plastic Lumber, Add</i>	7.14	
		<i>Note: High density polyethylene combined with fiberglass.</i>		
		<i>For Brown Color, Add</i>	1.74	
		<i>For White Color, Add</i>	8.20	
		<i>For All Other Colors (Except Black, Brown Or White), Add</i>	6.94	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 51 13 00-0052 LF 3" x 10", Other Shapes, Recycled Plastic Lumber	24.91	1.61
<i>For Reinforced Structural Plastic Lumber, Add</i>	8.37	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	2.03	
<i>For White Color, Add</i>	9.61	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	8.14	
06 51 13 00-0053 LF 3" x 12", Other Shapes, Recycled Plastic Lumber	30.28	2.06
<i>For Reinforced Structural Plastic Lumber, Add</i>	10.11	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	2.46	
<i>For White Color, Add</i>	11.61	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	9.84	
06 51 13 00-0054 LF 4" x 4", Other Shapes, Recycled Plastic Lumber	15.52	1.45
<i>For Reinforced Structural Plastic Lumber, Add</i>	4.98	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	1.21	
<i>For White Color, Add</i>	5.72	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	4.84	
06 51 13 00-0055 LF 4" x 6", Other Shapes, Recycled Plastic Lumber	21.29	1.54
<i>For Reinforced Structural Plastic Lumber, Add</i>	7.07	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	1.72	
<i>For White Color, Add</i>	8.12	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	6.88	
06 51 13 00-0056 LF 4" x 8", Other Shapes, Recycled Plastic Lumber	28.64	1.66
<i>For Reinforced Structural Plastic Lumber, Add</i>	9.72	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	2.36	
<i>For White Color, Add</i>	11.16	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	9.46	
06 51 13 00-0057 LF 5" x 5", Other Shapes, Recycled Plastic Lumber	22.32	1.69
<i>For Reinforced Structural Plastic Lumber, Add</i>	7.37	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	1.79	
<i>For White Color, Add</i>	8.47	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	7.17	
06 51 13 00-0058 LF 6" x 6", Other Shapes, Recycled Plastic Lumber	31.31	1.91
<i>For Reinforced Structural Plastic Lumber, Add</i>	10.58	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	2.57	
<i>For White Color, Add</i>	12.15	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	10.29	
06 51 13 00-0059 LF 6" x 8", Other Shapes, Recycled Plastic Lumber	43.24	2.06
<i>For Reinforced Structural Plastic Lumber, Add</i>	14.90	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	3.63	
<i>For White Color, Add</i>	17.12	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	14.50	
06 51 13 00-0060 LF 6" x 12", Other Shapes, Recycled Plastic Lumber	61.08	2.30
<i>For Reinforced Structural Plastic Lumber, Add</i>	21.39	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	5.20	
<i>For White Color, Add</i>	24.57	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	20.81	
06 51 13 00-0061 LF 8" x 8", Other Shapes, Recycled Plastic Lumber	54.31	2.21
<i>For Reinforced Structural Plastic Lumber, Add</i>	18.93	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	4.60	
<i>For White Color, Add</i>	21.74	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	18.42	
06 51 13 00-0062 LF 8" x 10", Other Shapes, Recycled Plastic Lumber	92.84	2.30
<i>For Reinforced Structural Plastic Lumber, Add</i>	33.14	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	8.06	
<i>For White Color, Add</i>	38.06	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	32.24	
06 51 13 00-0063 LF 10" x 10", Other Shapes, Recycled Plastic Lumber	128.84	2.41
<i>For Reinforced Structural Plastic Lumber, Add</i>	46.41	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	11.29	
<i>For White Color, Add</i>	53.30	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	45.15	
06 51 13 00-0064 LF 2" Diameter, Other Shapes, Recycled Plastic Lumber	4.96	0.76
<i>For Reinforced Structural Plastic Lumber, Add</i>	1.43	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	0.35	
<i>For White Color, Add</i>	1.64	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	1.39	
06 51 13 00-0065 LF 3-1/2" Diameter, Other Shapes, Recycled Plastic Lumber	14.28	0.99
<i>For Reinforced Structural Plastic Lumber, Add</i>	4.76	
<i>Note: High density polyethylene combined with fiberglass.</i>		
<i>For Brown Color, Add</i>	1.16	
<i>For White Color, Add</i>	5.47	
<i>For All Other Colors (Except Black, Brown Or White), Add</i>	4.63	

06 Wood, Plastics, and Composites**06 50 Structural Plastics****06 51 Structural Plastic Shapes and Plates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 51 13 00-0066	LF		4" Diameter, Other Shapes, Recycled Plastic Lumber.....	15.75	1.15
			<i>For Reinforced Structural Plastic Lumber, Add</i>	5.22	
			<i>Note: High density polyethylene combined with fiberglass.</i>		
			<i>For Brown Color, Add</i>	1.27	
			<i>For White Color, Add</i>	6.00	
			<i>For All Other Colors (Except Black, Brown Or White), Add</i>	5.08	
06 51 13 00-0067	LF		5" Diameter, Other Shapes, Recycled Plastic Lumber.....	19.50	1.37
			<i>For Reinforced Structural Plastic Lumber, Add</i>	6.49	
			<i>Note: High density polyethylene combined with fiberglass.</i>		
			<i>For Brown Color, Add</i>	1.58	
			<i>For White Color, Add</i>	7.45	
			<i>For All Other Colors (Except Black, Brown Or White), Add</i>	6.31	
06 51 13 00-0068	LF		6" Diameter, Other Shapes, Recycled Plastic Lumber.....	43.22	1.61
			<i>For Reinforced Structural Plastic Lumber, Add</i>	15.14	
			<i>Note: High density polyethylene combined with fiberglass.</i>		
			<i>For Brown Color, Add</i>	3.68	
			<i>For White Color, Add</i>	17.39	
			<i>For All Other Colors (Except Black, Brown Or White), Add</i>	14.73	
06 51 13 00-0069	SF		1/8" Thick, Other Shapes, Recycled Plastic Sheeting.....	4.00	0.84
06 51 13 00-0070	SF		1/4" Thick, Other Shapes, Recycled Plastic Sheeting.....	5.86	0.87
06 51 13 00-0071	SF		3/8" Thick, Other Shapes, Recycled Plastic Sheeting.....	8.49	0.93
06 51 13 00-0072	SF		1/2" Thick, Other Shapes, Recycled Plastic Sheeting.....	10.81	0.97

06 51 23 Plastic Channel and Shapes (06 51)

06 51 23 00-0001	Channel (06 51 23)				
06 51 23 00-0002	LF	1-5/8" x 1-5/8" Plastic Polyester Channel (B-Line BFP22).....	20.80	2.43	
06 51 23 00-0003	LF	1-5/8" x 1-5/8" Plastic Polyester Channel (B-Line BFP22H1-7/8).....	38.39	2.43	
06 51 23 00-0004	LF	1-5/8" x 1-5/8" Plastic Polyester Channel (B-Line BFP22SH).....	38.39	2.43	
06 51 23 00-0005	LF	1-5/8" x 1-5/8" Plastic Polyester Channel (B-Line BFP22A).....	50.11	2.43	
06 51 23 00-0006	LF	1-5/8" x 1-5/8" Vinyl Ester Resin Channel (B-Line BFV22).....	25.96	2.43	
06 51 23 00-0007	LF	1-5/8" x 1-5/8" Vinyl Ester Resin Channel (B-Line BFV22H1-7/8).....	43.78	2.43	
06 51 23 00-0008	LF	1-5/8" x 1-5/8" Vinyl Ester Resin Channel (B-Line BFV22SH).....	43.78	2.43	
06 51 23 00-0009	LF	1-5/8" x 1-5/8" Vinyl Ester Resin Channel (B-Line BFV22A).....	55.03	2.43	
06 51 23 00-0010	LF	1-5/8" x 1" Plastic Polyester Channel (B-Line BFP42).....	21.04	2.43	
06 51 23 00-0011	LF	1-5/8" x 1" Plastic Polyester Channel (B-Line BFP42H1-7/8).....	33.46	2.43	
06 51 23 00-0012	LF	1-5/8" x 1" Plastic Polyester Channel (B-Line BFP42SH).....	33.46	2.43	
06 51 23 00-0013	LF	1-5/8" x 1" Plastic Polyester Channel (B-Line BFP42A).....	45.19	2.43	
06 51 23 00-0014	LF	1-5/8" x 1" Vinyl Ester Resin Channel (B-Line BFV42).....	25.49	2.43	
06 51 23 00-0015	LF	1-5/8" x 1" Vinyl Ester Resin Channel (B-Line BFV42H1-7/8).....	38.39	2.43	
06 51 23 00-0016	LF	1-5/8" x 1" Vinyl Ester Resin Channel (B-Line BFV42SH).....	38.39	2.43	
06 51 23 00-0017	LF	1-5/8" x 1" Vinyl Ester Resin Channel (B-Line BFV42A).....	47.30	2.43	

06 51 33 Carbon Fiber Plates (06 51)

06 51 33 00-0001	Carbon Fiber Plates (06 51 33)				
			<i>Note: Outer Material: 2x2 Twill Carbon Fiber Prepreg, Inner Material: 0/90 (Balanced) Unidirectional Carbon Fiber Prepreg, Exterior Finish: Matte/Matte</i>		
06 51 33 00-0002	EA	6" x 6", 0.039" Thickness, Carbon Fiber Plates.....	19.00		
06 51 33 00-0003	EA	6" x 12", 0.039" Thickness, Carbon Fiber Plates.....	29.99		
06 51 33 00-0004	EA	6" x 24", 0.039" Thickness, Carbon Fiber Plates.....	51.85		
06 51 33 00-0005	EA	12" x 12", 0.039" Thickness, Carbon Fiber Plates.....	51.85		
06 51 33 00-0006	EA	12" x 24", 0.039" Thickness, Carbon Fiber Plates.....	92.54		
06 51 33 00-0007	EA	12" x 48", 0.039" Thickness, Carbon Fiber Plates.....	171.79		
06 51 33 00-0008	EA	24" x 24", 0.039" Thickness, Carbon Fiber Plates.....	172.34		
06 51 33 00-0009	EA	24" x 48", 0.039" Thickness, Carbon Fiber Plates.....	328.43		
06 51 33 00-0010	EA	38" x 48", 0.039" Thickness, Carbon Fiber Plates.....	493.08		
06 51 33 00-0011	EA	38" x 96", 0.039" Thickness, Carbon Fiber Plates.....	982.54		
06 51 33 00-0012	EA	6" x 6", 1/16" Thickness, Carbon Fiber Plates.....	23.83		
06 51 33 00-0013	EA	6" x 12", 1/16" Thickness, Carbon Fiber Plates.....	42.08		
06 51 33 00-0014	EA	6" x 24", 1/16" Thickness, Carbon Fiber Plates.....	72.40		
06 51 33 00-0015	EA	12" x 12", 1/16" Thickness, Carbon Fiber Plates.....	72.40		
06 51 33 00-0016	EA	12" x 24", 1/16" Thickness, Carbon Fiber Plates.....	128.79		
06 51 33 00-0017	EA	12" x 48", 1/16" Thickness, Carbon Fiber Plates.....	243.08		
06 51 33 00-0018	EA	24" x 24", 1/16" Thickness, Carbon Fiber Plates.....	243.63		
06 51 33 00-0019	EA	24" x 48", 1/16" Thickness, Carbon Fiber Plates.....	461.35		
06 51 33 00-0020	EA	38" x 48", 1/16" Thickness, Carbon Fiber Plates.....	698.51		
06 51 33 00-0021	EA	38" x 96", 1/16" Thickness, Carbon Fiber Plates.....	1,393.39		
06 51 33 00-0022	EA	6" x 6", 0.079" Thickness, Carbon Fiber Plates.....	28.66		
06 51 33 00-0023	EA	6" x 12", 0.079" Thickness, Carbon Fiber Plates.....	46.91		
06 51 33 00-0024	EA	6" x 24", 0.079" Thickness, Carbon Fiber Plates.....	83.27		
06 51 33 00-0025	EA	12" x 12", 0.079" Thickness, Carbon Fiber Plates.....	83.27		
06 51 33 00-0026	EA	12" x 24", 0.079" Thickness, Carbon Fiber Plates.....	166.25		
06 51 33 00-0027	EA	12" x 48", 0.079" Thickness, Carbon Fiber Plates.....	318.00		
06 51 33 00-0028	EA	24" x 24", 0.079" Thickness, Carbon Fiber Plates.....	318.55		
06 51 33 00-0029	EA	24" x 48", 0.079" Thickness, Carbon Fiber Plates.....	527.81		
06 51 33 00-0030	EA	38" x 48", 0.079" Thickness, Carbon Fiber Plates.....	802.43		
06 51 33 00-0031	EA	38" x 96", 0.079" Thickness, Carbon Fiber Plates.....	1,590.36		
06 51 33 00-0032	EA	6" x 6", 3/32" Thickness, Carbon Fiber Plates.....	32.29		
06 51 33 00-0033	EA	6" x 12", 3/32" Thickness, Carbon Fiber Plates.....	55.37		
06 51 33 00-0034	EA	6" x 24", 3/32" Thickness, Carbon Fiber Plates.....	91.73		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 51 33 00-0035 EA 12" x 12", 3/32" Thickness, Carbon Fiber Plates	91.73	
06 51 33 00-0036 EA 12" x 24", 3/32" Thickness, Carbon Fiber Plates	168.67	
06 51 33 00-0037 EA 12" x 48", 3/32" Thickness, Carbon Fiber Plates	316.80	
06 51 33 00-0038 EA 24" x 24", 3/32" Thickness, Carbon Fiber Plates	317.35	
06 51 33 00-0039 EA 24" x 48", 3/32" Thickness, Carbon Fiber Plates	606.36	
06 51 33 00-0040 EA 38" x 48", 3/32" Thickness, Carbon Fiber Plates	917.23	
06 51 33 00-0041 EA 38" x 96", 3/32" Thickness, Carbon Fiber Plates	1,828.42	
06 51 33 00-0042 EA 6" x 6", 0.119" Thickness, Carbon Fiber Plates	37.12	
06 51 33 00-0043 EA 6" x 12", 0.119" Thickness, Carbon Fiber Plates	67.45	
06 51 33 00-0044 EA 6" x 24", 0.119" Thickness, Carbon Fiber Plates	108.65	
06 51 33 00-0045 EA 12" x 12", 0.119" Thickness, Carbon Fiber Plates	108.65	
06 51 33 00-0046 EA 12" x 24", 0.119" Thickness, Carbon Fiber Plates	195.25	
06 51 33 00-0047 EA 12" x 48", 0.119" Thickness, Carbon Fiber Plates	372.38	
06 51 33 00-0048 EA 24" x 24", 0.119" Thickness, Carbon Fiber Plates	372.93	
06 51 33 00-0049 EA 24" x 48", 0.119" Thickness, Carbon Fiber Plates	707.86	
06 51 33 00-0050 EA 38" x 48", 0.119" Thickness, Carbon Fiber Plates	1,073.11	
06 51 33 00-0051 EA 38" x 96", 0.119" Thickness, Carbon Fiber Plates	2,136.56	
06 51 33 00-0052 EA 6" x 6", 1/8" Thickness, Carbon Fiber Plates	35.91	
06 51 33 00-0053 EA 6" x 12", 1/8" Thickness, Carbon Fiber Plates	63.83	
06 51 33 00-0054 EA 6" x 24", 1/8" Thickness, Carbon Fiber Plates	108.65	
06 51 33 00-0055 EA 12" x 12", 1/8" Thickness, Carbon Fiber Plates	108.65	
06 51 33 00-0056 EA 12" x 24", 1/8" Thickness, Carbon Fiber Plates	181.96	
06 51 33 00-0057 EA 12" x 48", 1/8" Thickness, Carbon Fiber Plates	353.05	
06 51 33 00-0058 EA 24" x 24", 1/8" Thickness, Carbon Fiber Plates	353.60	
06 51 33 00-0059 EA 24" x 48", 1/8" Thickness, Carbon Fiber Plates	671.61	
06 51 33 00-0060 EA 38" x 48", 1/8" Thickness, Carbon Fiber Plates	1,061.03	
06 51 33 00-0061 EA 38" x 96", 1/8" Thickness, Carbon Fiber Plates	2,074.93	
06 51 33 00-0062 EA 6" x 6", 0.157" Thickness, Carbon Fiber Plates	44.37	
06 51 33 00-0063 EA 6" x 12", 0.157" Thickness, Carbon Fiber Plates	87.99	
06 51 33 00-0064 EA 6" x 24", 0.157" Thickness, Carbon Fiber Plates	132.82	
06 51 33 00-0065 EA 12" x 12", 0.157" Thickness, Carbon Fiber Plates	132.82	
06 51 33 00-0066 EA 12" x 24", 0.157" Thickness, Carbon Fiber Plates	230.30	
06 51 33 00-0067 EA 12" x 48", 0.157" Thickness, Carbon Fiber Plates	438.84	
06 51 33 00-0068 EA 24" x 24", 0.157" Thickness, Carbon Fiber Plates	439.39	
06 51 33 00-0069 EA 24" x 48", 0.157" Thickness, Carbon Fiber Plates	840.79	
06 51 33 00-0070 EA 38" x 48", 0.157" Thickness, Carbon Fiber Plates	1,273.71	
06 51 33 00-0071 EA 38" x 96", 0.157" Thickness, Carbon Fiber Plates	2,541.37	
06 51 33 00-0072 EA 6" x 6", 3/16" Thickness, Carbon Fiber Plates	50.41	
06 51 33 00-0073 EA 6" x 12", 3/16" Thickness, Carbon Fiber Plates	90.41	
06 51 33 00-0074 EA 6" x 24", 3/16" Thickness, Carbon Fiber Plates	152.15	
06 51 33 00-0075 EA 12" x 12", 3/16" Thickness, Carbon Fiber Plates	152.15	
06 51 33 00-0076 EA 12" x 24", 3/16" Thickness, Carbon Fiber Plates	261.72	
06 51 33 00-0077 EA 12" x 48", 3/16" Thickness, Carbon Fiber Plates	505.31	
06 51 33 00-0078 EA 24" x 24", 3/16" Thickness, Carbon Fiber Plates	505.86	
06 51 33 00-0079 EA 24" x 48", 3/16" Thickness, Carbon Fiber Plates	961.63	
06 51 33 00-0080 EA 38" x 48", 3/16" Thickness, Carbon Fiber Plates	1,454.97	
06 51 33 00-0081 EA 38" x 96", 3/16" Thickness, Carbon Fiber Plates	2,891.81	
06 51 33 00-0082 EA 6" x 6", 0.197" Thickness, Carbon Fiber Plates	51.62	
06 51 33 00-0083 EA 6" x 12", 0.197" Thickness, Carbon Fiber Plates	96.45	
06 51 33 00-0084 EA 6" x 24", 0.197" Thickness, Carbon Fiber Plates	165.44	
06 51 33 00-0085 EA 12" x 12", 0.197" Thickness, Carbon Fiber Plates	144.90	
06 51 33 00-0086 EA 12" x 24", 0.197" Thickness, Carbon Fiber Plates	290.72	
06 51 33 00-0087 EA 12" x 48", 0.197" Thickness, Carbon Fiber Plates	510.14	
06 51 33 00-0088 EA 24" x 24", 0.197" Thickness, Carbon Fiber Plates	510.69	
06 51 33 00-0089 EA 24" x 48", 0.197" Thickness, Carbon Fiber Plates	968.88	
06 51 33 00-0090 EA 38" x 48", 0.197" Thickness, Carbon Fiber Plates	1,471.89	
06 51 33 00-0091 EA 38" x 96", 0.197" Thickness, Carbon Fiber Plates	2,922.02	
06 51 33 00-0092 EA 6" x 6", 1/4" Thickness, Carbon Fiber Plates	60.08	
06 51 33 00-0093 EA 6" x 12", 1/4" Thickness, Carbon Fiber Plates	108.54	
06 51 33 00-0094 EA 6" x 24", 1/4" Thickness, Carbon Fiber Plates	181.15	
06 51 33 00-0095 EA 12" x 12", 1/4" Thickness, Carbon Fiber Plates	181.15	
06 51 33 00-0096 EA 12" x 24", 1/4" Thickness, Carbon Fiber Plates	326.97	
06 51 33 00-0097 EA 12" x 48", 1/4" Thickness, Carbon Fiber Plates	624.94	
06 51 33 00-0098 EA 24" x 24", 1/4" Thickness, Carbon Fiber Plates	625.49	
06 51 33 00-0099 EA 24" x 48", 1/4" Thickness, Carbon Fiber Plates	1,191.22	
06 51 33 00-0100 EA 38" x 48", 1/4" Thickness, Carbon Fiber Plates	1,810.24	
06 51 33 00-0101 EA 38" x 96", 1/4" Thickness, Carbon Fiber Plates	3,597.52	

06 52 Plastic Structural Assemblies (06 50)

06 52 13 Plastic Columns (06 52)

06 52 13 00-0001 Round Fiberglass Columns (06 52 13)

06 52 13 00-0002 LF 6" Diameter, Round Fiberglass Column	19.30	7.16
06 52 13 00-0003 LF 8" Diameter, Round Fiberglass Column	27.39	10.41
06 52 13 00-0004 LF 10" Diameter, Round Fiberglass Column	31.65	11.72
06 52 13 00-0005 LF 12" Diameter, Round Fiberglass Column	38.22	12.26
06 52 13 00-0006 LF 15" Diameter, Round Fiberglass Column	46.32	14.16
06 52 13 00-0007 EA 6" Diameter, Base And Cap For Round Fiberglass Columns	37.09	13.56
06 52 13 00-0008 EA 8" Diameter, Base And Cap For Round Fiberglass Columns	40.93	14.65

06 Wood, Plastics, and Composites**06 50 Structural Plastics****06 52 Plastic Structural Assemblies**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
06 52 13 00-0009	EA	10" Diameter, Base And Cap For Round Fiberglass Columns		47.85	16.27
06 52 13 00-0010	EA	12" Diameter, Base And Cap For Round Fiberglass Columns		64.11	17.37
06 52 13 00-0011	EA	15" Diameter, Base And Cap For Round Fiberglass Columns		85.07	18.99
06 52 13 00-0012		Fluted Fiberglass Columns (06 52 13)			
06 52 13 00-0013	LF	6" Diameter, Fluted Fiberglass Column		20.28	7.16
06 52 13 00-0014	LF	8" Diameter, Fluted Fiberglass Column		28.69	10.41
06 52 13 00-0015	LF	10" Diameter, Fluted Fiberglass Column		33.29	11.72
06 52 13 00-0016	LF	12" Diameter, Fluted Fiberglass Column		40.98	12.26
06 52 13 00-0017	LF	15" Diameter, Fluted Fiberglass Column		49.92	14.21
06 52 13 00-0018	EA	6" Diameter, Base And Cap For Fluted Fiberglass Columns		39.08	13.56
06 52 13 00-0019	EA	8" Diameter, Base And Cap For Fluted Fiberglass Columns		43.26	14.65
06 52 13 00-0020	EA	10" Diameter, Base And Cap For Fluted Fiberglass Columns		50.91	16.27
06 52 13 00-0021	EA	12" Diameter, Base And Cap For Fluted Fiberglass Columns		69.99	17.37
06 52 13 00-0022	EA	15" Diameter, Base And Cap For Fluted Fiberglass Columns		94.49	18.99
06 52 13 00-0023		Ornamental Or Decorative Cap And Base For Fiberglass Columns (06 52 13)			
06 52 13 00-0024	EA	8" Roman Ionic Cap And Base For Fiberglass Columns		137.86	16.27
06 52 13 00-0025	EA	10" Roman Ionic Cap And Base For Fiberglass Columns		182.62	18.99
06 52 13 00-0026	EA	12" Roman Ionic Cap And Base For Fiberglass Columns		232.70	21.70
06 52 13 00-0027	EA	8" Scamozzi Cap And Base For Fiberglass Columns		162.53	16.27
06 52 13 00-0028	EA	10" Scamozzi Cap And Base For Fiberglass Columns		195.28	18.99
06 52 13 00-0029	EA	12" Scamozzi Cap And Base For Fiberglass Columns		282.02	21.70
06 52 13 00-0030	EA	8" Corinthian Cap And Base For Fiberglass Columns		202.52	16.27
06 52 13 00-0031	EA	10" Corinthian Cap And Base For Fiberglass Columns		245.27	18.99
06 52 13 00-0032	EA	12" Corinthian Cap And Base For Fiberglass Columns		323.35	21.70
06 52 13 00-0033	EA	8" Temple Of Winds Cap And Base For Fiberglass Columns		139.86	16.27
06 52 13 00-0034	EA	10" Temple Of Winds Cap And Base For Fiberglass Columns		186.62	18.99
06 52 13 00-0035	EA	12" Temple Of Winds Cap And Base For Fiberglass Columns		236.70	21.70
06 52 13 00-0036	EA	8" Greek Erectheum Cap And Base For Fiberglass Columns		139.86	16.27
06 52 13 00-0037	EA	10" Greek Erectheum Cap And Base For Fiberglass Columns		167.96	18.99
06 52 13 00-0038	EA	12" Greek Erectheum Cap And Base For Fiberglass Columns		220.03	21.70
06 53 Plastic Decking (06 50)					
06 53 16 Plastic Stair Treads (06 53)					
06 53 16 00-0001		Fiberglass Reinforced Plastic Stair Treads (06 53 16)			
		Note: Includes standard colors and anchors. Excludes stringers.			
06 53 16 00-0002	LF	1" Thick, 12" Wide, Fiberglass Reinforced Plastic Stair Tread With Safety Nosing, Excluding Stringer		47.05	2.79
06 53 16 00-0003	LF	1-1/2" Thick, 12" Wide, Fiberglass Reinforced Plastic Stair Tread With Safety Nosing, Excluding Stringer		63.84	3.34
06 53 16 00-0004	LF	2" Thick, 12" Wide, Fiberglass Reinforced Plastic Stair Tread With Safety Nosing, Excluding Stringer		88.20	3.69
06 60 Plastic Fabrications (06)					
06 65 Plastic Trim (06 60)					
06 65 00 00-0001		Plastic Moldings (06 65)			
		Note: All dimensions are nominal.			
06 65 00 00-0002		Base, Plastic Moldings (06 65 00 00-0001)			
06 65 00 00-0003	LF	3-1/2" High, Base, Plastic Molding		6.13	2.16
06 65 00 00-0004	LF	4-1/2" High, Base, Plastic Molding		7.49	2.71
06 65 00 00-0005	LF	3/4" x 1", Base Shoe, Plastic Molding		5.74	2.28
06 65 00 00-0006		Cornice, Plastic Moldings (06 65 00 00-0001)			
06 65 00 00-0007	LF	1" x 2" Cornice, Plastic Molding		5.67	2.16
06 65 00 00-0008	LF	1" x 4" Cornice, Plastic Molding		6.93	2.28
06 65 00 00-0009	LF	1" x 6" Cornice, Plastic Molding		9.31	2.39
06 65 00 00-0010	LF	1" x 8" Cornice, Plastic Molding		10.64	2.50
06 65 00 00-0011	LF	1" x 10" Cornice, Plastic Molding		12.16	2.61
06 65 00 00-0012	LF	1" x 12" Cornice, Plastic Molding		15.40	2.71
06 65 00 00-0013		Crown Or Bed, Plastic Moldings (06 65 00 00-0001)			
06 65 00 00-0014	LF	9/16" x 1-5/8" Crown Or Bed, Plastic Molding		9.69	2.16
06 65 00 00-0015	LF	9/16" x 2-1/4" Crown Or Bed, Plastic Molding		12.93	2.71
06 65 00 00-0016	LF	9/16" x 3-1/2" Crown Or Bed, Plastic Molding		13.44	2.71
06 65 00 00-0017	LF	9/16" x 3-5/8" Crown Or Bed, Plastic Molding		13.96	2.71
06 65 00 00-0018	LF	5/8" x 4-1/4" Crown Or Bed, Plastic Molding		18.11	3.25
06 65 00 00-0019	LF	11/16" x 4-5/8" Crown Or Bed, Plastic Molding		21.31	3.25
06 65 00 00-0020		Dentil, Plastic Moldings (06 65 00 00-0001)			
06 65 00 00-0021	LF	11/16" x 1-3/8" Dentil, Plastic Molding		8.33	2.16

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 65 00 00-0022 LF 5/8" x 2-1/2" Dentil, Plastic Molding	9.30	2.16
06 65 00 00-0023 LF 1-3/8" x 3-3/8" Dentil, Plastic Molding	11.50	2.16
06 65 00 00-0024 LF 1-1/2" x 4-1/2" Dentil, Plastic Molding	15.30	2.16
06 65 00 00-0025 Cove, Plastic Moldings (06 65 00 00-0001)		
06 65 00 00-0026 LF 3/8" x 3/8" Cove, Plastic Molding	3.26	1.20
06 65 00 00-0027 LF 1/2" x 1/2" Cove, Plastic Molding	3.52	1.20
06 65 00 00-0028 LF 5/8" x 5/8" Cove, Plastic Molding	4.60	1.41
06 65 00 00-0029 LF 3/4" x 3/4" Cove, Plastic Molding	4.60	1.41
06 65 00 00-0030 LF 15/16" x 15/16" Cove, Plastic Molding	5.74	1.41
06 65 00 00-0031 LF 9/16" x 1-3/4" Cove, Plastic Molding	7.47	1.63
06 65 00 00-0032 LF 11/16" x 2-3/4" Cove, Plastic Molding	9.88	1.63
06 65 00 00-0033 Chair Rail, Plastic Moldings (06 65 00 00-0001)		
06 65 00 00-0034 LF 1/2" x 1-5/8" Chair Rail, Plastic Molding	5.39	1.63
06 65 00 00-0035 LF 5/8" x 2-1/2" Chair Rail, Plastic Molding	7.27	2.16
06 65 00 00-0036 LF 5/8" x 3-1/2" Chair Rail, Plastic Molding	8.75	2.16
06 65 00 00-0037 Door, Plastic Moldings (06 65 00 00-0001)		
06 65 00 00-0038 LF 1-1/8" Wide, Door, Plastic Molding	4.79	1.95
06 65 00 00-0039 LF 1-1/8" Wide, Detailed Door, Plastic Molding	4.82	1.95
06 65 00 00-0040 Trim, Plastic Moldings (06 65 00 00-0001)		
06 65 00 00-0041 LF 1/2" x 1/2" Quarter Round Trim, Plastic Molding	5.08	2.28
06 65 00 00-0042 LF 3/4" x 3/4" Quarter Round Trim, Plastic Molding	7.43	2.28
06 65 00 00-0043 LF 1-1/4" x 2" Brick Mould, Plastic Molding	6.53	2.16
06 65 00 00-0044 LF 1-17/32" x 1-1/2" x 1-3/8" Sill Nose, Plastic Molding	7.56	2.16
06 65 00 00-0045 LF 11/16" x 1-5/8" Drip Cap, Plastic Molding	5.54	2.16
06 65 00 00-0046 LF 2-3/4" x 2" Water Table, Plastic Molding	8.31	2.16
06 65 00 00-0047 LF 3/8" x 2" Garage Door Stop, Plastic Molding	6.10	2.16
06 65 00 00-0048 Extruded Polyvinyl Chloride (PVC) Trimboard (06 65)		
Note: As manufactured by Azek or Kleer. All dimensions are nominal.		
06 65 00 00-0049 LF 1" x 4" Extruded Polyvinyl Chloride (PVC) Trimboard	4.04	0.87
06 65 00 00-0050 LF 1" x 6" Extruded Polyvinyl Chloride (PVC) Trimboard	5.80	0.98
06 65 00 00-0051 LF 1" x 8" Extruded Polyvinyl Chloride (PVC) Trimboard	7.60	1.09
06 65 00 00-0052 LF 1" x 10" Extruded Polyvinyl Chloride (PVC) Trimboard	9.16	1.11
06 65 00 00-0053 LF 1" x 12" Extruded Polyvinyl Chloride (PVC) Trimboard	10.87	1.14
06 65 00 00-0054 LF 5/4" x 4" Extruded Polyvinyl Chloride (PVC) Trimboard	4.96	0.87
06 65 00 00-0055 LF 5/4" x 6" Extruded Polyvinyl Chloride (PVC) Trimboard	7.22	0.98
06 65 00 00-0056 LF 5/4" x 8" Extruded Polyvinyl Chloride (PVC) Trimboard	9.18	1.09
06 65 00 00-0057 LF 5/4" x 10" Extruded Polyvinyl Chloride (PVC) Trimboard	11.32	1.11
06 65 00 00-0058 LF 5/4" x 12" Extruded Polyvinyl Chloride (PVC) Trimboard	13.28	1.14
06 65 00 00-0059 LF 3-1/2" x 3-1/2" Extruded Polyvinyl Chloride (PVC) Corner Board	10.82	1.11
06 65 00 00-0060 LF 5-1/2" x 5-1/2" Extruded Polyvinyl Chloride (PVC) Corner Board	14.36	1.14
06 65 00 00-0061 SF 1/2" Smooth/Wood Grain Reversible Extruded Polyvinyl Chloride (PVC) Sheets	7.58	0.98
06 65 00 00-0062 SF 3/4" Smooth/Wood Grain Reversible Extruded Polyvinyl Chloride (PVC) Sheets	10.92	1.09
06 70 Structural Composites (06)		
06 74 Composite Gratings (06 70)		
06 74 13 Fiberglass Reinforced Gratings (06 74)		
06 74 13 00-0001 Molded Fiberglass Gratings And Coverings (06 74 13)		
06 74 13 00-0002 Vi-Corr Resin System (06 74 13 00-0001)		
Note: Orange or dark gray.		
06 74 13 00-0003 SF 1" Molded Fiberglass Grate, 1" x 4" Mesh, Vi-Corr Resin, Meniscus Top	46.61	2.00
06 74 13 00-0004 SF 1" Molded Fiberglass Grate, 1-1/2" Square Mesh, Vi-Corr Resin, Meniscus Top	45.26	2.00
06 74 13 00-0005 SF 1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, Vi-Corr Resin, Meniscus Top	59.17	2.00
06 74 13 00-0006 SF 2" Molded Fiberglass Grate, 2" x 2" Mesh, Vi-Corr Resin, Meniscus Top	64.02	2.57
06 74 13 00-0007 SF 1" Molded Fiberglass Grating, 1" x 4" Mesh, Vi-Corr Resin, Applied Grit Top	48.93	2.00
06 74 13 00-0008 SF 1" Molded Fiberglass Grate, 1-1/2" Square Mesh, Vi-Corr Resin, Applied Grit Top	47.53	2.00
06 74 13 00-0009 SF 1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, Vi-Corr Resin, Applied Grit Top	62.52	2.00
06 74 13 00-0010 SF 2" Molded Fiberglass Grating, 2" x 2" Mesh, Vi-Corr Resin, Applied Grit Top	67.18	2.57
06 74 13 00-0011 SF 1/4" Vi-Corr Resin Polyester Resin, Fiberplate Covering	44.20	1.61
06 74 13 00-0012 SF 1/2" Vi-Corr Resin Polyester Resin, Fiberplate Covering	71.76	1.76
06 74 13 00-0013 SF 3/4" Vi-Corr Resin Polyester Resin, Fiberplate Covering	98.41	1.94
06 74 13 00-0014 IFR Fire Retardant Isophthalic Resin (06 74 13 00-0001)		
06 74 13 00-0015 SF 1" Molded Fiberglass Grate, 1" x 4" Mesh, IFR Fire Retardant Isophthalic Resin, Meniscus Top	42.84	2.00
06 74 13 00-0016 SF 1" Molded Fiberglass Grate, 1-1/2" Square Mesh, IFR Fire Retardant Isophthalic Resin, Meniscus Top	40.10	2.00

06 Wood, Plastics, and Composites**06 70 Structural Composites****06 74 Composite Gratings**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 74 13 00-0017	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, IFR Fire Retardant Isophthalic Resin, Meniscus Top.....	51.70	2.00
06 74 13 00-0018	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, IFR Fire Retardant Isophthalic Resin, Meniscus Top.....	55.73	2.57
06 74 13 00-0019	SF	1" Molded Fiberglass Grating, 1" x 4" Mesh, IFR Fire Retardant Isophthalic Resin, Applied Grit Top.....	44.74	2.00
06 74 13 00-0020	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, IFR Fire Retardant Isophthalic Resin, Applied Grit Top.....	41.18	2.00
06 74 13 00-0021	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, IFR Fire Retardant Isophthalic Resin, Applied Grit Top.....	56.14	2.57
06 74 13 00-0022	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, IFR Fire Retardant Isophthalic Resin, Applied Grit Top.....	58.86	2.57
06 74 13 00-0023	SF	1/4" IFR Fire Retardant Isophthalic Resin Polyester Resin, Fiberplate Covering.....	38.93	1.61
06 74 13 00-0024	SF	1/2" IFR Fire Retardant Isophthalic Resin Polyester Resin, Fiberplate Covering.....	55.22	1.76
06 74 13 00-0025	SF	3/4" IFR Fire Retardant Isophthalic Resin Polyester Resin, Fiberplate Covering.....	75.92	1.94
06 74 13 00-0026 Corvex Polyester Resin (06 74 13 00-0001)				
Note: Dark gray.				
06 74 13 00-0027	SF	1" Molded Fiberglass Grate, 1" x 4" Mesh, Corvex Polyester Resin, Meniscus Top.....	36.30	2.00
06 74 13 00-0028	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, Corvex Polyester Resin, Meniscus Top.....	34.85	2.00
06 74 13 00-0029	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, Corvex Polyester Resin, Meniscus Top.....	42.32	2.00
06 74 13 00-0030	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, Corvex Polyester Resin, Meniscus Top.....	48.62	2.57
06 74 13 00-0031	SF	1" Molded Fiberglass Grating, 1" x 4" Mesh, Corvex Polyester Resin, Applied Grit Top.....	38.70	2.00
06 74 13 00-0032	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, Corvex Polyester Resin, Applied Grit Top.....	37.24	2.00
06 74 13 00-0033	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, Corvex Polyester Resin, Applied Grit Top.....	45.11	2.00
06 74 13 00-0034	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, Corvex Polyester Resin, Applied Grit Top.....	51.01	2.57
06 74 13 00-0035	SF	1/4" Corvex Polyester Resin, Fiberplate Covering.....	34.34	1.61
06 74 13 00-0036	SF	1/2" Corvex Polyester Resin, Fiberplate Covering.....	54.97	1.76
06 74 13 00-0037	SF	3/4" Corvex Polyester Resin, Fiberplate Covering.....	76.32	1.94
06 74 13 00-0038 XFR Extra Fire Retardant (06 74 13 00-0001)				
06 74 13 00-0039	SF	1" Molded Fiberglass Grate, 1" x 4" Mesh, XFR Extra Fire Retardant, Meniscus Top.....	53.57	2.00
06 74 13 00-0040	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, XFR Extra Fire Retardant, Meniscus Top.....	52.00	2.00
06 74 13 00-0041	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, XFR Extra Fire Retardant, Meniscus Top.....	71.31	2.00
06 74 13 00-0042	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, XFR Extra Fire Retardant, Meniscus Top.....	76.13	2.57
06 74 13 00-0043	SF	1" Molded Fiberglass Grating, 1" x 4" Mesh XFR Extra Fire Retardant, Applied Grit Top.....	55.92	2.00
06 74 13 00-0044	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, XFR Extra Fire Retardant, Applied Grit Top.....	54.39	2.00
06 74 13 00-0045	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, XFR Extra Fire Retardant, Applied Grit Top.....	74.10	2.00
06 74 13 00-0046	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, XFR Extra Fire Retardant, Applied Grit Top.....	79.51	2.57
06 74 13 00-0047	SF	1/4" XFR Extra Fire Retardant Resin, Fiberplate Covering.....	50.67	1.61
06 74 13 00-0048	SF	1/2" XFR Extra Fire Retardant Resin, Fiberplate Covering.....	82.12	1.76
06 74 13 00-0049 ELS Extremely Low Smoke Resin (06 74 13 00-0001)				
06 74 13 00-0050	SF	1" Molded Fiberglass Grate, 1" x 4" Mesh, ELS Extremity Low Smoke Resin, Meniscus Top.....	54.95	2.00
06 74 13 00-0051	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, ELS Extremity Low Smoke Resin, Meniscus Top.....	53.27	2.00
06 74 13 00-0052	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, ELS Extremity Low Smoke Resin, Meniscus Top.....	69.39	2.00
06 74 13 00-0053	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, ELS Extremity Low Smoke Resin, Meniscus Top.....	74.31	2.57
06 74 13 00-0054	SF	1" Molded Fiberglass Grating, 1" x 4" Mesh, ELS Extremity Low Smoke Resin, Applied Grit Top.....	57.13	2.00
06 74 13 00-0055	SF	1" Molded Fiberglass Grate, 1-1/2" Square Mesh, ELS Extremity Low Smoke Resin, Applied Grit Top.....	55.75	2.00
06 74 13 00-0056	SF	1-1/2" Molded Fiberglass Grate, 1-1/2" Square Mesh, ELS Extremity Low Smoke Resin, Applied Grit Top.....	72.08	2.00
06 74 13 00-0057	SF	2" Molded Fiberglass Grating, 2" x 2" Mesh, ELS Extremity Low Smoke Resin, Applied Grit Top.....	77.03	2.57
06 74 13 00-0058	SF	1/4" ELS Extremity Low Smoke Resin, Fiberplate Covering.....	56.67	1.61
06 74 13 00-0059	SF	1/2" ELS Extremity Low Smoke Resin, Fiberplate Covering.....	102.40	1.76
06 74 13 00-0060 Pultruded Fiberglass Grating (06 74 13)				
06 74 13 00-0061 ISOFR Isophthalic Polyester Resin System (06 74 13 00-0060)				
Note: For moderately corrosive environments, green.				
06 74 13 00-0062 1" ISOFR Isophthalic Polyester Resin System (06 74 13 00-0061)				
06 74 13 00-0063	SF	1" Pultruded Fiberglass Grate, 6" Bar Space, 50% Open, ISOFR Isophthalic Polyester Resin.....	38.97	2.57
06 74 13 00-0064	SF	1" Pultruded Fiberglass Grate, 12" Bar Space, 50% Open, ISOFR Isophthalic Polyester Resin.....	34.54	2.00
06 74 13 00-0065	SF	1" Pultruded Fiberglass Grate, 6" Bar Space, 40% Open, ISOFR Isophthalic Polyester Resin.....	44.11	2.57
06 74 13 00-0066	SF	1" Pultruded Fiberglass Grate, 12" Bar Space, 40% Open, ISOFR Isophthalic Polyester Resin.....	40.76	2.00
06 74 13 00-0067	SF	1" Pultruded Fiberglass Grate, 6" Bar Space, 38% Open, ISOFR Isophthalic Polyester Resin.....	30.31	2.57
06 74 13 00-0068	SF	1" Pultruded Fiberglass Grate, 12" Bar Space, 38% Open, ISOFR Isophthalic Polyester Resin.....	26.81	2.00
06 74 13 00-0069	SF	1" Pultruded Fiberglass Grate, 6" Bar Space, 25% Open, ISOFR Isophthalic Polyester Resin.....	34.78	2.57
06 74 13 00-0070	SF	1" Pultruded Fiberglass Grate, 12" Bar Space, 25% Open, ISOFR Isophthalic Polyester Resin.....	31.36	2.00
06 74 13 00-0071 1-1/2" ISOFR Isophthalic Polyester Resin System (06 74 13 00-0061)				
06 74 13 00-0072	SF	1-1/2" Pultruded Fiberglass Grate, 6" Bar Space, 50% Open, ISOFR Isophthalic Polyester Resin.....	44.06	2.57
06 74 13 00-0073	SF	1-1/2" Pultruded Fiberglass Grate, 12" Bar Space, 50% Open, ISOFR Isophthalic Polyester Resin.....	39.75	2.00
06 74 13 00-0074	SF	1-1/2" Pultruded Fiberglass Grate, 6" Bar Space, 40% Open, ISOFR Isophthalic Polyester Resin.....	49.57	2.57
06 74 13 00-0075	SF	1-1/2" Pultruded Fiberglass Grate, 12" Bar Space, 40% Open, ISOFR Isophthalic Polyester Resin.....	46.48	2.00
06 74 13 00-0076	SF	1-1/2" Pultruded Fiberglass Grate, 6" Bar Space, 25% Open, ISOFR Isophthalic Polyester Resin.....	38.69	2.57
06 74 13 00-0077	SF	1-1/2" Pultruded Fiberglass Grate, 12" Bar Space, 25% Open, ISOFR Isophthalic Polyester Resin.....	35.27	2.00
06 74 13 00-0078 2" ISOFR Isophthalic Polyester Resin System (06 74 13 00-0061)				
06 74 13 00-0079	SF	2" Pultruded Fiberglass Grate, 6" Bar Space, 50% Open, ISOFR Isophthalic Polyester Resin.....	38.10	2.57
06 74 13 00-0080	SF	2" Pultruded Fiberglass Grate, 12" Bar Space, 50% Open, ISOFR Isophthalic Polyester Resin.....	42.21	2.57
06 74 13 00-0081	SF	2" Pultruded Fiberglass Grate, 6" Bar Space, 33% Open, ISOFR Isophthalic Polyester Resin.....	51.13	2.57



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 74 13 00-0082 SF 2" Pultruded Fiberglass Grate, 12" Bar Space, 33% Open, ISOFR Isophthalic Polyester Resin	48.22	2.57
06 74 13 00-0083 VEF Vinyl Ester Resin System (06 74 13 00-0060)		
06 74 13 00-0084 1" VEF Vinyl Ester Resin System (06 74 13 00-0083)		
06 74 13 00-0085 SF 1" Pultruded Fiberglass Grate, 6" Bar Space, 50% Open, VEF Vinyl Ester Resin	41.29	2.00
06 74 13 00-0086 SF 1" Pultruded Fiberglass Grate, 12" Bar Space, 50% Open, VEF Vinyl Ester Resin	36.87	2.00
06 74 13 00-0087 SF 1" Pultruded Fiberglass Grate, 6" Bar Space, 40% Open, VEF Vinyl Ester Resin	46.48	2.00
06 74 13 00-0088 SF 1" Pultruded Fiberglass Grate, 12" Bar Space, 40% Open, VEF Vinyl Ester Resin	53.43	2.00
06 74 13 00-0089 SF 1" Pultruded Fiberglass Grate, 6" Bar Space, 38% Open, VEF Vinyl Ester Resin	31.59	2.00
06 74 13 00-0090 SF 1" Pultruded Fiberglass Grate, 12" Bar Space, 38% Open, VEF Vinyl Ester Resin	28.19	2.00
06 74 13 00-0091 SF 1" Pultruded Fiberglass Grate, 6" Bar Space, 25% Open, VEF Vinyl Ester Resin	36.33	2.00
06 74 13 00-0092 SF 1" Pultruded Fiberglass Grate, 12" Bar Space, 25% Open, VEF Vinyl Ester Resin	33.30	2.00
06 74 13 00-0093 1-1/2" VEF Vinyl Ester Resin System (06 74 13 00-0083)		
06 74 13 00-0094 SF 1-1/2" Pultruded Fiberglass Grate, 6" Bar Space, 50% Open, VEF Vinyl Ester Resin	45.37	2.00
06 74 13 00-0095 SF 1-1/2" Pultruded Fiberglass Grate, 12" Bar Space, 50% Open, VEF Vinyl Ester Resin	41.01	2.00
06 74 13 00-0096 SF 1-1/2" Pultruded Fiberglass Grate, 6" Bar Space, 40% Open, VEF Vinyl Ester Resin	51.93	2.00
06 74 13 00-0097 SF 1-1/2" Pultruded Fiberglass Grate, 12" Bar Space, 40% Open, VEF Vinyl Ester Resin	48.46	2.00
06 74 13 00-0098 SF 1-1/2" Pultruded Fiberglass Grate, 6" Bar Space, 25% Open, VEF Vinyl Ester Resin	40.73	2.00
06 74 13 00-0099 SF 1-1/2" Pultruded Fiberglass Grate, 12" Bar Space, 25% Open, VEF Vinyl Ester Resin	37.48	2.00
06 74 13 00-0100 2" VEF Vinyl Ester Resin System (06 74 13 00-0083)		
06 74 13 00-0101 SF 2" Pultruded Fiberglass Grate, 6" Bar Space, 50% Open, VEF Vinyl Ester Resin	40.05	2.57
06 74 13 00-0102 SF 2" Pultruded Fiberglass Grate, 12" Bar Space, 50% Open, VEF Vinyl Ester Resin	36.89	2.57
06 74 13 00-0103 SF 2" Pultruded Fiberglass Grate, 6" Bar Space, 33% Open, VEF Vinyl Ester Resin	53.87	2.57
06 74 13 00-0104 SF 2" Pultruded Fiberglass Grate, 12" Bar Space, 33% Open, VEF Vinyl Ester Resin	52.30	2.57
06 74 13 00-0105 Moltruded Fiberglass Rigidex Grating (06 74 13 00-0060)		
06 74 13 00-0106 SF Rigidex I, 1-1/2" Deep Fiberglass Grating, 1-1/2" x 4" Bar Space, Metallic Grey Color, Moltruded, Corvex Resin	21.98	2.24
06 74 13 00-0107 SF Rigidex I, 2" Deep Fiberglass Grating, 1-1/2" x 4" Bar Space, Metallic Grey Color, Moltruded, Corvex Resin	26.44	2.79
06 74 13 00-0108 SF Rigidex II, 1-1/2" Deep Fiberglass Grating, 1" x 4" Bar Space, Yellow Color, Moltruded, SOFR Resin	29.49	2.24
06 74 13 00-0109 SF Rigidex II, 2" Deep Fiberglass Grating, 1" x 4" Bar Space, Yellow Color, Moltruded, ISOFR Resin	33.95	2.79
06 80 Composite Fabrications (06)		
06 81 Composite Railings (06 80)		
06 81 13 Glass-Fiber-Reinforced Plastic Railings (06 81)		
06 81 13 00-0001 Fiberglass Handrail Assemblies (06 81 13)		
Note: Assembly includes posts, rails, kick plates, fasteners and accessories. Not to be used in conjunction with handrail components.		
06 81 13 00-0002 LF Fiberglass Side Mount Handrail, 2-1/8" Square Tube Posts Up To 42" High, Set 5' On Center, Two Horizontal 1-3/4" Square Tube Rails, 4" Kick Plate, Stainless Steel Fasteners And Accessories Assembly	78.91	22.31
<i>For Each LF Of Anchoring Posts Into Masonry Or Concrete, Add</i>		
	3.00	
<i>For Sloped Floor Installation, Add</i>		
	6.18	
<i>For Stair Installation (Without Kick Plates), Add</i>		
	11.50	
06 81 13 00-0003 LF Fiberglass Top Mount Handrail, 2-1/8" Square Tube Posts Up To 42" High, Set 5' On Center, Two Horizontal 1-3/4" Square Tube Rails, 4" Kick Plate, Stainless Steel Fasteners And Accessories Assembly	89.57	20.92
06 81 13 00-0004 LF Fiberglass Handrail For Stairs, 2-1/8" Square Tube Posts Up To 42" High, Set 5' On Center, Two Horizontal 1-3/4" Square Tube Rails, Stainless Steel Fasteners And Accessories Assembly	84.56	27.89
06 81 13 00-0005 Fiberglass Handrail Components (06 81 13)		
Note: This section is only to be used when entire handrail assembly is not required.		
06 81 13 00-0006 LF Fiberglass Kick Plate (12' Sections) With Splice Kit	18.57	5.58
06 81 13 00-0007 LF Fiberglass Kick Plate (24' sections) With Splice Kit	16.52	5.58
06 81 13 00-0008 EA Fiberglass Side Mount Post For Handrail	179.70	33.47
06 81 13 00-0009 EA Fiberglass Top Mount Post For Handrail With Stainless Steel Base	208.54	22.31
06 81 13 00-0010 LF Fiberglass Square Tube For Horizontal Handrail, ISOFR 1-3/4" x 1/8" (12' sections)	20.18	6.70
06 81 13 00-0011 LF Fiberglass Square Tube For Horizontal Handrail, ISOFR 1-3/4" x 1/8" (24' sections)	19.11	6.70
06 81 13 00-0012 LF Fiberglass Square Tube For Horizontal Handrail, ISOFR 2-1/8" x 3/16" (21' sections)	20.70	6.70
06 82 Composite Trim (06 80)		
06 82 00 00-0001 Fiberglass Castings (06 82)		
06 82 00 00-0002 Fiberglass Angle, Equal Legs (06 82 00 00-0001)		
06 82 00 00-0003 LF 1" x 1" x 1/8" Thick Fiberglass Angle, ISOFR Isophthalic Polyester Resin	9.68	3.34
06 82 00 00-0004 LF 1" x 1" x 1/8" Thick Fiberglass Angle, VEF Vinyl Ester Resin	10.17	3.34
06 82 00 00-0005 LF 3" x 3" x 1/4" Thick Fiberglass Angle, ISOFR Isophthalic Polyester Resin	18.39	4.02
06 82 00 00-0006 LF 3" x 3" x 1/4" Thick Fiberglass Angle, VEF Vinyl Ester Resin	20.36	4.02
06 82 00 00-0007 LF 4" x 4" x 1/4" Thick Fiberglass Angle, ISOFR Isophthalic Polyester Resin	20.49	4.02
06 82 00 00-0008 LF 4" x 4" x 1/4" Thick Fiberglass Angle, VEF Vinyl Ester Resin	21.92	4.02

06 Wood, Plastics, and Composites**06 80 Composite Fabrications****06 82 Composite Trim**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

06 82 00 00-0009	LF	4" x 4" x 3/8" Thick Fiberglass Angle, ISOFR Isophthalic Polyester Resin	23.84	4.02
06 82 00 00-0010	LF	4" x 4" x 3/8" Thick Fiberglass Angle, VERF Vinyl Ester Resin	26.89	4.02
06 82 00 00-0011	LF	6" x 6" x 1/2" Thick Fiberglass Angle, ISOFR Isophthalic Polyester Resin	64.98	5.02
06 82 00 00-0012	LF	6" x 6" x 1/2" Thick Fiberglass Angle, VERF Vinyl Ester Resin	74.83	5.02

06 82 00 00-0013 Fiberglass Channels (06 82 00 00-0001)

06 82 00 00-0014	LF	3" x 1" x 1/4" Fiberglass Channel, ISOFR Isophthalic Polyester Resin	11.17	5.02
06 82 00 00-0015	LF	3" x 1" x 1/4" Fiberglass Channel, VERF Vinyl Ester Resin	11.66	5.02
06 82 00 00-0016	LF	4" x 1 1/8" x 1/4" Fiberglass Channel, ISOFR Isophthalic Polyester Resin	23.82	5.69
06 82 00 00-0017	LF	4" x 1 1/8" x 1/4" Fiberglass Channel, VERF Vinyl Ester Resin	23.82	5.69
06 82 00 00-0018	LF	6" x 1 11/16" x 3/8" Fiberglass Channel, ISOFR Isophthalic Polyester Resin	37.66	5.69
06 82 00 00-0019	LF	6" x 1 11/16" x 3/8" Fiberglass Channel, VERF Vinyl Ester Resin	43.88	5.69
06 82 00 00-0020	LF	8" x 2 3/16" x 3/8" Fiberglass Channel, ISOFR Isophthalic Polyester Resin	35.34	5.69
06 82 00 00-0021	LF	8" x 2 3/16" x 3/8" Fiberglass Channel, VERF Vinyl Ester Resin	42.71	5.69
06 82 00 00-0022	LF	10" x 2-3/4" x 1/2" Fiberglass Channel, ISOFR Isophthalic Polyester Resin	53.82	7.81
06 82 00 00-0023	LF	10" x 2-3/4" x 1/2" Fiberglass Channel, VERF Vinyl Ester Resin	61.85	7.81

06 82 00 00-0024 Fiberglass Wide Flange Beams (06 82 00 00-0001)

06 82 00 00-0025	LF	4" x 4" x 1/4" Fiberglass Wide Flange Beam, ISOFR Isophthalic Polyester Resin	32.52	6.70
06 82 00 00-0026	LF	4" x 4" x 1/4" Fiberglass Wide Flange Beam, VERF Vinyl Ester Resin	35.62	6.70
06 82 00 00-0027	LF	6" x 6" x 1/4" Fiberglass Wide Flange Beam, ISOFR Isophthalic Polyester Resin	41.66	8.04
06 82 00 00-0028	LF	6" x 6" x 1/4" Fiberglass Wide Flange Beam, VERF Vinyl Ester Resin	43.15	8.04
06 82 00 00-0029	LF	8" x 8" x 3/8" Fiberglass Wide Flange Beam, ISOFR Isophthalic Polyester Resin	67.54	10.04
06 82 00 00-0030	LF	8" x 8" x 3/8" Fiberglass Wide Flange Beam, VERF Vinyl Ester Resin	85.06	10.04
06 82 00 00-0031	LF	10" x 10" x 1/2" Fiberglass Wide Flange Beam, ISOFR Isophthalic Polyester Resin	151.24	12.27
06 82 00 00-0032	LF	10" x 10" x 1/2" Fiberglass Wide Flange Beam, VERF Vinyl Ester Resin	170.39	12.27

06 82 00 00-0033 Fiberglass Flat Sheet (06 82 00 00-0001)

Note: Not to be used for bathroom board.

06 82 00 00-0034	SF	1/8" Thick Fiberglass Flat Sheet, ISOFR Isophthalic Polyester Resin	26.85	5.69
06 82 00 00-0035	SF	1/8" Thick Fiberglass Flat Sheet, VERF Vinyl Ester Resin	28.07	5.69
06 82 00 00-0036	SF	1/4" Thick Fiberglass Flat Sheet, ISOFR Isophthalic Polyester Resin	42.46	6.70
06 82 00 00-0037	SF	1/4" Thick Fiberglass Flat Sheet, VERF Vinyl Ester Resin	48.97	6.70
06 82 00 00-0038	SF	3/8" Thick Fiberglass Flat Sheet, ISOFR Isophthalic Polyester Resin	57.73	8.04
06 82 00 00-0039	SF	3/8" Thick Fiberglass Flat Sheet, VERF Vinyl Ester Resin	67.50	8.04
06 82 00 00-0040	SF	1/2" Thick Fiberglass Flat Sheet, ISOFR Isophthalic Polyester Resin	77.94	10.04
06 82 00 00-0041	SF	1/2" Thick Fiberglass Flat Sheet, VERF Vinyl Ester Resin	92.89	10.04

06 82 00 00-0042 Fiberglass Bars (06 82 00 00-0001)**06 82 00 00-0043 Square Bars** (06 82 00 00-0042)

06 82 00 00-0044	LF	1" Square Fiberglass Solid Square Bar, ISO Isophthalic Polyester Resin	15.90	4.02
06 82 00 00-0045	LF	1-1/4" Square Fiberglass Solid Square Bar, ISO Isophthalic Polyester Resin	22.95	5.91
06 82 00 00-0046	LF	1-1/2" Square Fiberglass Solid Square Bar, ISOFR Isophthalic Polyester Resin	26.95	7.81

06 82 00 00-0047 Round Bars (06 82 00 00-0042)

06 82 00 00-0048	LF	1/4" Diameter Fiberglass Solid Round Bar, ISOFR Isophthalic Polyester Resin	10.12	3.34
06 82 00 00-0049	LF	1" Diameter Fiberglass Solid Round Bar, ISOFR Isophthalic Polyester Resin	21.98	5.02
06 82 00 00-0050	LF	1" Diameter Fiberglass Solid Round Bar, VERF Vinyl Ester Resin	24.94	5.02
06 82 00 00-0051	LF	1-1/4" Diameter Fiberglass Solid Round Bar, ISOFR Isophthalic Polyester Resin	33.25	5.02
06 82 00 00-0052	LF	1-1/2" Diameter Fiberglass Solid Round Bar, ISOFR Isophthalic Polyester Resin	39.75	5.69

06 82 00 00-0053 Fiberglass Tubes (06 82 00 00-0001)**06 82 00 00-0054 Square Tube** (06 82 00 00-0053)

06 82 00 00-0055	LF	1" x 1" x 1/8" Thick Fiberglass Square Tube, ISOFR Isophthalic Polyester Resin	11.46	3.34
06 82 00 00-0056	LF	1" x 1" x 1/8" Thick Fiberglass Square Tube, VERF Vinyl Ester Resin	12.42	3.34
06 82 00 00-0057	LF	2" x 2" x 1/8" Thick Fiberglass Square Tube, ISOFR Isophthalic Polyester Resin	17.07	4.02
06 82 00 00-0058	LF	2" x 2" x 1/8" Thick Fiberglass Square Tube, VERF Vinyl Ester Resin	18.76	4.02
06 82 00 00-0059	LF	3" x 3" x 1/4" Thick Fiberglass Square Tube, ISOFR Isophthalic Polyester Resin	32.88	5.02
06 82 00 00-0060	LF	3" x 3" x 1/4" Thick Fiberglass Square Tube, VERF Vinyl Ester Resin	36.79	5.02
06 82 00 00-0061	LF	4" x 4" x 1/4" Thick Fiberglass Square Tube, ISOFR Isophthalic Polyester Resin	38.67	6.02
06 82 00 00-0062	LF	4" x 4" x 1/4" Thick Fiberglass Square Tube, VERF Vinyl Ester Resin	49.55	6.02

06 82 00 00-0063 Round Tube (06 82 00 00-0053)

06 82 00 00-0064	LF	1" Diameter x 1/8" Thick Fiberglass Round Tube, ISOFR Isophthalic Polyester Resin	10.95	3.34
06 82 00 00-0065	LF	1" Diameter x 1/8" Thick Fiberglass Round Tube, VERF Vinyl Ester Resin	11.39	3.34
06 82 00 00-0066	LF	2" Diameter x 1/4" Thick Fiberglass Round Tube, ISOFR Isophthalic Polyester Resin	20.83	4.02
06 82 00 00-0067	LF	2" Diameter x 1/4" Thick Fiberglass Round Tube, VERF Vinyl Ester Resin	22.27	4.02

06 82 00 00-0068 Fiberglass Threaded Rods (06 82 00 00-0001)

06 82 00 00-0069	LF	3/8" Diameter Fiberglass Threaded Rod, VERF Vinyl Ester Resin	15.05	2.57
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
06 82 00 00-0070 LF 1/2" Diameter Fiberglass Threaded Rod, VERF Vinyl Ester Resin.....	16.05	2.57
06 82 00 00-0071 LF 5/8" Diameter Fiberglass Threaded Rod, VERF Vinyl Ester Resin.....	18.42	2.90
06 82 00 00-0072 LF 3/4" Diameter Fiberglass Threaded Rod, VERF Vinyl Ester Resin.....	20.34	2.90
06 82 00 00-0073 LF 1" Diameter Fiberglass Threaded Rod, VERF Vinyl Ester Resin.....	22.52	2.90
06 82 00 00-0074 Grating Support Legs, VEFR Resin (06 82 00 00-0001)		
06 82 00 00-0075 EA Grating Support Legs, Fixed Height With Base Miscellaneous Fiberglass Castings.....	14.90	
06 82 00 00-0076 EA Grate Support Legs Fixed Height Without Base Miscellaneous Fiberglass Castings.....	6.38	
06 82 00 00-0077 EA Grating Support Legs, Adjustable To 60" Miscellaneous Fiberglass Castings.....	24.00	
06 82 00 00-0078 Fiberglass Netting (06 82 00 00-0001)		
06 82 00 00-0079 SF 1/2" x 1/2" Mesh, Clear Flexible Fiberglass Netting.....	0.81	0.39
06 82 00 00-0080 SF 1/2" x 2" Mesh, Clear Flexible Fiberglass Netting.....	0.81	0.39
06 82 00 00-0081 SF 3/4" x 5/8" Mesh, Clear Flexible Fiberglass Netting.....	0.81	0.39
06 82 00 00-0082 SF 7/8" x 7/8" Mesh, Clear Flexible Fiberglass Netting.....	0.81	0.39
06 82 00 00-0083 SF 1" x 1" Mesh, Clear Flexible Fiberglass Netting.....	0.81	0.39
06 82 00 00-0084 SF 1/2" x 1/2" Mesh, Green Flexible Fiberglass Netting.....	0.80	0.39
06 82 00 00-0085 SF 1/2" x 2" Mesh, Green Flexible Fiberglass Netting.....	0.80	0.39
06 82 00 00-0086 SF 3/4" x 5/8" Mesh, Green Flexible Fiberglass Netting.....	0.80	0.39
06 82 00 00-0087 SF 7/8" x 7/8" Mesh, Green Flexible Fiberglass Netting.....	0.80	0.39
06 82 00 00-0088 SF 1" x 1" Mesh, Green Flexible Fiberglass Netting.....	0.80	0.39
06 82 00 00-0089 Fiberglass Stair Treads (06 82)		
06 82 00 00-0090 Fiberglass Stair Treads (06 82 00 00-0089)		
06 82 00 00-0091 10-1/2" Deep Isophthalic Resin System (06 82 00 00-0090)		
06 82 00 00-0092 EA 1" Fiberglass Stair Tread, 10-1/2" Deep x 24" Wide Isophthalic Resin System.....	109.46	17.52
06 82 00 00-0093 EA 1" Fiberglass Stair Tread, 10-1/2" Deep x 30" Wide Isophthalic Resin System.....	128.10	17.52
06 82 00 00-0094 EA 1" Fiberglass Stair Tread, 10-1/2" Deep x 36" Wide Isophthalic Resin System.....	146.76	17.52
06 82 00 00-0095 EA 1" Fiberglass Stair Tread, 10-1/2" Deep x 42" Wide Isophthalic Resin System.....	165.40	17.52
06 82 00 00-0096 EA 1-1/2" Fiberglass Stair Tread, 10-1/2" Deep x 24" Wide Isophthalic Resin System.....	120.65	17.52
06 82 00 00-0097 EA 1-1/2" Fiberglass Stair Tread, 10-1/2" Deep x 30" Wide Isophthalic Resin System.....	142.09	17.52
06 82 00 00-0098 EA 1-1/2" Fiberglass Stair Tread, 10-1/2" Deep x 36" Wide Isophthalic Resin System.....	163.54	17.52
06 82 00 00-0099 EA 1-1/2" Fiberglass Stair Tread, 10-1/2" Deep x 42" Wide Isophthalic Resin System.....	184.98	17.52
06 82 00 00-0100 EA 2" Fiberglass Stair Tread, 10-1/2" Deep x 24" Wide Isophthalic Resin System.....	137.80	17.52
06 82 00 00-0101 EA 2" Fiberglass Stair Tread, 10-1/2" Deep x 30" Wide Isophthalic Resin System.....	163.54	17.52
06 82 00 00-0102 EA 2" Fiberglass Stair Tread, 10-1/2" Deep x 36" Wide Isophthalic Resin System.....	189.27	17.52
06 82 00 00-0103 EA 2" Fiberglass Stair Tread, 10-1/2" Deep x 42" Wide Isophthalic Resin System.....	215.01	17.52
06 82 00 00-0104 12" Deep Isophthalic Resin System (06 82 00 00-0090)		
06 82 00 00-0105 EA 1" Fiberglass Stair Tread, 12" Deep x 24" Wide Isophthalic Resin System.....	120.12	17.52
06 82 00 00-0106 EA 1" Fiberglass Stair Tread, 12" Deep x 30" Wide Isophthalic Resin System.....	141.43	17.52
06 82 00 00-0107 EA 1" Fiberglass Stair Tread, 12" Deep x 36" Wide Isophthalic Resin System.....	162.75	17.52
06 82 00 00-0108 EA 1" Fiberglass Stair Tread, 12" Deep x 42" Wide Isophthalic Resin System.....	184.06	17.52
06 82 00 00-0109 EA 1-1/2" Fiberglass Stair Tread, 12" Deep x 24" Wide Isophthalic Resin System.....	132.91	17.52
06 82 00 00-0110 EA 1-1/2" Fiberglass Stair Tread, 12" Deep x 30" Wide Isophthalic Resin System.....	157.41	17.52
06 82 00 00-0111 EA 1-1/2" Fiberglass Stair Tread, 12" Deep x 36" Wide Isophthalic Resin System.....	181.93	17.52
06 82 00 00-0112 EA 1-1/2" Fiberglass Stair Tread, 12" Deep x 42" Wide Isophthalic Resin System.....	206.44	17.52
06 82 00 00-0113 EA 2" Fiberglass Stair Tread, 12" Deep x 24" Wide Isophthalic Resin System.....	152.51	17.52
06 82 00 00-0114 EA 2" Fiberglass Stair Tread, 12" Deep x 30" Wide Isophthalic Resin System.....	181.92	17.52
06 82 00 00-0115 EA 2" Fiberglass Stair Tread, 12" Deep x 36" Wide Isophthalic Resin System.....	211.34	17.52
06 82 00 00-0116 EA 2" Fiberglass Stair Tread, 12" Deep x 42" Wide Isophthalic Resin System.....	240.75	17.52
06 82 00 00-0117 Other Fiberglass (06 82)		
06 82 00 00-0118 Fiberglass Splash Blocks (06 82 00 00-0117)		
06 82 00 00-0119 EA Standard Size Fiberglass Splash Block.....	19.12	3.89

END OF SECTION 06

06	06	Wood, Plastics, and Composites
	06 80	Composite Fabrications
	06 82	Composite Trim



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 Thermal And Moisture Protection

07 01 Operation and Maintenance of Thermal and Moisture Protection ⁽⁰⁷⁾

07 01 50 Maintenance of Membrane Roofing ^(07 01)

07 01 50 19 Preparation for Re-Roofing ^(07 01 50)

07 01 50 19-0001 Preparation For Re-Roofing ^(07 01 50 19)

07 01 50 19-0002	SQ	Removal Of Pea Gravel Ballast From Roof, Vacuum And Disposal	82.14
07 01 50 19-0003	SQ	Removal Of Gravel Ballast From Roof, Vacuum And Disposal	143.71

07 01 50 81 Roof Replacement ^(07 01 50)

07 01 50 81-0001 Roof Repair ^(07 01 50 81)

Note: Less than 100 SF areas. Excludes mobilization of crew for small quantity of roof work. See CSI section 07 05 13 00-0001 for mobilization of crew for small quantity of roof work.

07 01 50 81-0002	LF	Heat Weld Roofing Seams For Repair.....	7.78
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07 01 50 81-0003 Emergency Roof Patch ^(07 01 50 81)

Note: 4 Hour response time.

07 01 50 81-0004	EA	Mobilize For Emergency Roof Patching.....	746.42
07 01 50 81-0005	EA	Granule Emergency Roof Patch Cover 16 SF	95.17

07 01 50 81-0006 Adhesives ^(07 01 50 81)

Note: For repair of seams.

07 01 50 81-0007 Mastic Sealer ^(07 01 50 81-0006)

07 01 50 81-0008 Applied At Joints Only ^(07 01 50 81-0007)

07 01 50 81-0009	LF	Mastic Sealer, 1/4" Bead At Joint	4.90	2.12
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07 01 50 91 Roofing Restoration ^(07 01 50)

07 01 50 91-0001 Pressure Wash Membrane Roofing ^(07 01 50 91)

07 01 50 91-0002	SF	Up To 2,500 PSI, Pressure Wash Membrane Roofing	0.17
		<i>For Up To 100, Add</i>	<i>0.13</i>
		<i>For >100 To 250, Add</i>	<i>0.06</i>
		<i>For >250 To 500, Add</i>	<i>0.03</i>
		<i>For >5,000 To 10,000, Deduct</i>	<i>-0.01</i>
		<i>For >10,000 To 15,000, Deduct</i>	<i>-0.02</i>
		<i>For >15,000 To 30,000, Deduct</i>	<i>-0.03</i>
		<i>For >30,000, Deduct</i>	<i>-0.03</i>

07 05 Common Work Results for Thermal and Moisture Protection ⁽⁰⁷⁾

07 05 13 Mobilization Of Crew For Small Quantity Of Roof Work ^(07 05)

07 05 13 00-0001 Mobilization Of Crew For Small Quantity Of Roof Work ^(07 05 13)

Note: For use with all roofing tasks where the total quantity of roof work is 4 squares or less.

07 05 13 00-0002	EA	Up To 1 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....	1,495.23
07 05 13 00-0003	EA	>1 To 2 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....	1,118.73
07 05 13 00-0004	EA	>2 To 3 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....	747.62
07 05 13 00-0005	EA	>3 To 4 SQ, Mobilization Of Crew For Small Quantity Of Roof Work.....	372.91

07 10 Dampproofing and Waterproofing ⁽⁰⁷⁾

Note: The following tasks are for application to vertical (walls and foundations) surfaces. For horizontal (flat) surfaces apply the appropriate modifier to reduce the labor cost (where listed). Waterproofing is the treatment of a surface or structure to PREVENT the passage of water under hydrostatic pressure. Dampproofing is the treatment of a surface or structure to RESIST the passage of water in the absence of hydrostatic pressure.

07 11 Dampproofing ^(07 10)

07 11 13 Bituminous Dampproofing ^(07 11)

07 11 13 00-0001 Fibrous Asphalt Dampproofing, Brush, Roller Or Spray ^(07 11 13)

07 11 13 00-0002	CSF	1 Coat, Fibrous Asphalt Dampproofing, Brush, Roller Or Spray	187.84
07 11 13 00-0003	CSF	2 Coats, Brush, Roller Or Spray, Fibrous Asphalt Dampproofing	287.36

07 11 13 00-0004 Fibrous Asphalt Dampproofing, Troweled On ^(07 11 13)

07 Thermal And Moisture Protection**07 10 Dampproofing and Waterproofing****07 11 Dampproofing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 11 13 00-0005	CSF	Primer And 1 Coat, Fibrous Asphalt Dampproofing, Troweled On.....	324.34	
07 11 13 00-0006	CSF	Primer And 2 Coats, Troweled On, Fibrous Asphalt Dampproofing.....	505.33	

07 11 13 00-0007 Asphaltic Paint Dampproofing (07 11 13)

07 11 13 00-0008	CSF	1 Coat, Asphaltic Paint Dampproofing, Brushed On.....	150.32	
07 11 13 00-0009	CSF	2 Coats, Brushed On, Asphaltic Paint Dampproofing.....	278.23	

07 11 19 Sheet Dampproofing (07 11)**07 11 19 00-0001 Neoprene (07 11 19)**

07 11 19 00-0002	SF	1/16" Patch Neoprene Roof (5 To 20 SF).....	39.21	
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07 13 Sheet Waterproofing (07 10)**07 13 13 Bituminous Sheet Waterproofing (07 13)****07 13 13 00-0001 15 LB Asphalt Saturated Organic Felt Sheet Waterproofing, Hot-Mopped (07 13)**

07 13 13 00-0002	CSF	1 Ply, 15 LB Asphalt Saturated Organic Felt Sheet Waterproofing, Hot-Mopped.....	341.70	119.56
		<i>For 30 LB Felt, Add</i>	76.93	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-35.87	
07 13 13 00-0003	CSF	2 Ply, 15 LB Asphalt Saturated Organic Felt Sheet Waterproofing, Hot-Mopped.....	430.41	134.51
		<i>For 30 LB Felt, Add</i>	121.05	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-40.35	
07 13 13 00-0004	CSF	3 Ply, 15 LB Asphalt Saturated Organic Felt Sheet Waterproofing, Hot-Mopped.....	519.14	149.45
		<i>For 30 LB Felt, Add</i>	165.18	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-44.84	
07 13 13 00-0005	CSF	4 Ply, 15 LB Asphalt Saturated Organic Felt Sheet Waterproofing, Hot-Mopped.....	607.86	164.39
		<i>For 30 LB Felt, Add</i>	209.30	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-49.32	
07 13 13 00-0006	CSF	5 Ply, 15 LB Asphalt Saturated Organic Felt Sheet Waterproofing, Hot-Mopped.....	696.58	179.34
		<i>For 30 LB Felt, Add</i>	253.43	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-53.80	

07 13 13 00-0007 Asphalt Coated Protective Board (07 13 13)

07 13 13 00-0008	CSF	1/8" Asphalt Coated Protective Board.....	293.25	119.80
		<i>For Application To Horizontal Surfaces, Deduct</i>	-39.96	
07 13 13 00-0009	CSF	1/4" Asphalt Coated Protective Board.....	378.14	124.41
		<i>For Application To Horizontal Surfaces, Deduct</i>	-41.47	
07 13 13 00-0010	CSF	3/8" Asphalt Coated Protective Board.....	480.33	129.63
		<i>For Application To Horizontal Surfaces, Deduct</i>	-43.20	
07 13 13 00-0011	CSF	1/2" Asphalt Coated Protective Board.....	533.31	134.86
		<i>For Application To Horizontal Surfaces, Deduct</i>	-44.96	

07 13 53 Elastomeric Sheet Waterproofing (07 13)**07 13 53 00-0001 Rubberized Membrane Sheet (07 13 53)**

07 13 53 00-0002	SF	215 Mil Rubberized Asphalt Membrane Sheet, Vertical Surface.....	7.89	1.24
		<i>For Floor Surfaces, Deduct</i>	-1.21	

07 13 53 00-0003 Ethylene Propylene Diene Monomer (EPDM) (07 13 53)

07 13 53 00-0004	CSF	45 Mil Ethylene Propylene Diene Monomer (EPDM) Membrane.....	507.83	174.16
		<i>For Application To Horizontal Surfaces, Deduct</i>	-52.24	
07 13 53 00-0005	CSF	60 Mil Ethylene Propylene Diene Monomer (EPDM) Membrane.....	581.47	174.16
		<i>For Application To Horizontal Surfaces, Deduct</i>	-52.24	

07 13 53 00-0006 Butyl Sheet Waterproofing (07 13 53)

07 13 53 00-0007	CSF	1/32" Butyl Sheet Waterproofing.....	103.41	43.54
		<i>For Joint Taping, Add</i>	15.21	
		<i>For Each Additional Ply, Add</i>	76.75	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	
07 13 53 00-0008	CSF	1/16" Butyl Sheet Waterproofing.....	122.43	43.54
		<i>For Joint Taping, Add</i>	16.16	
		<i>For Each Additional Ply, Add</i>	90.06	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	

07 13 53 00-0009 Butyl With Nylon (07 13 53)

07 13 53 00-0010	CSF	1/32" Butyl Elastomeric Waterproofing With Nylon.....	114.29	43.54
		<i>For Joint Taping, Add</i>	15.75	
		<i>For Each Additional Ply, Add</i>	84.37	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	
07 13 53 00-0011	CSF	1/16" Butyl Elastomeric Waterproofing With Nylon.....	126.52	43.54
		<i>For Joint Taping, Add</i>	16.36	
		<i>For Each Additional Ply, Add</i>	92.93	
		<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 13 53 00-0012 Neoprene Sheet Waterproofing (07 13 53)		
07 13 53 00-0013 CSF 1/32" Neoprene Sheet Waterproofing	176.85	43.54
<i>For Joint Taping, Add</i>	18.88	
<i>For Each Additional Ply, Add</i>	128.16	
<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	
07 13 53 00-0014 CSF 1/16" Neoprene Sheet Waterproofing	257.82	43.54
<i>For Joint Taping, Add</i>	22.93	
<i>For Each Additional Ply, Add</i>	184.84	
<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	
07 13 53 00-0015 Neoprene With Nylon (07 13 53)		
07 13 53 00-0016 CSF 1/32" Neoprene Elastomeric Waterproofing With Nylon	185.30	43.54
<i>For Joint Taping, Add</i>	19.30	
<i>For Each Additional Ply, Add</i>	134.07	
<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	
07 13 53 00-0017 CSF 1/16" Neoprene Elastomeric Waterproofing With Nylon	271.32	43.54
<i>For Joint Taping, Add</i>	23.60	
<i>For Each Additional Ply, Add</i>	194.29	
<i>For Application To Horizontal Surfaces, Deduct</i>	-6.54	
07 13 53 00-0018 Plastic Vapor Barrier (Polyethylene) (07 13 53)		
07 13 53 00-0019 CSF 4 Mil Polyethylene Vapor Barrier	36.59	13.23
<i>For Joint Taping, Add</i>	8.57	
<i>For Each Additional Ply, Add</i>	28.54	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.39	
07 13 53 00-0020 CSF 6 Mil Polyethylene Vapor Barrier	37.46	13.23
<i>For Joint Taping, Add</i>	8.61	
<i>For Each Additional Ply, Add</i>	29.15	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.39	
07 13 53 00-0021 CSF 10 Mil Polyethylene Vapor Barrier	64.44	13.23
<i>For Joint Taping, Add</i>	9.96	
<i>For Each Additional Ply, Add</i>	48.04	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.39	
07 13 53 00-0022 CSF 60 Mil Polyethylene Vapor Barrier With Bentonite	98.81	13.23
Note: Includes seam tape, liquid mastic, anchors and termination bar.		
<i>For Each Additional Ply, Add</i>	72.42	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.88	
07 13 53 00-0023 Plastic Vapor Barrier (PVC) (07 13 53)		
07 13 53 00-0024 CSF 10 Mil Polyvinyl Chloride (PVC) Vapor Barrier	43.30	14.64
<i>For Joint Taping, Add</i>	8.90	
<i>For Each Additional Ply, Add</i>	33.24	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.39	
07 13 53 00-0025 CSF 20 Mil Polyvinyl Chloride (PVC) Vapor Barrier	54.59	15.18
<i>For Joint Taping, Add</i>	9.72	
<i>For Each Additional Ply, Add</i>	41.25	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.56	
07 13 53 00-0026 CSF 30 Mil Polyvinyl Chloride (PVC) Vapor Barrier	69.67	15.72
<i>For Joint Taping, Add</i>	10.72	
<i>For Each Additional Ply, Add</i>	51.92	
<i>For Application To Horizontal Surfaces, Deduct</i>	-4.72	
07 13 53 00-0027 Vinyl Plastic Vapor Barrier (07 13 53)		
07 13 53 00-0028 CSF 4 Mil Vinyl Plastic Vapor Barrier With Fiberglass Insulation At Joints (Tu-Tuf #4)	44.34	13.56
07 14 Fluid-Applied Waterproofing (07 10)		
07 14 13 Hot Fluid-Applied Rubberized Asphalt Waterproofing (07 14)		
07 14 13 00-0001 Hot Applied Rubberized Asphalt Waterproofing Coating (07 14 13)		
07 14 13 00-0002 SF 90 Mil Hot Applied Rubberized Asphalt Waterproofing Coating, Vertical Surface	2.55	1.24
Note: Includes primer.		
<i>For Floor Surfaces, Deduct</i>	-0.35	
<i>For Reinforcing Fabric, Add</i>	0.57	
07 14 13 00-0003 SF 125 Mil Hot Applied Rubberized Asphalt Waterproofing Coating, Vertical Surface	2.99	
Note: Includes primer.		
<i>For Floor Surfaces, Deduct</i>	-0.38	
<i>For Application To Horizontal Surfaces, Deduct</i>	-0.24	
<i>For Reinforcing Fabric, Add</i>	0.57	
07 14 13 00-0004 Acrylic Deck Waterproofing Coating (07 14 13)		
07 14 13 00-0005 SF Pedestrian Walking Deck Waterproofing Coating System (Dex-O-Tex Weatherwear)	19.70	
Note: Includes primer.		
<i>For Floor Surfaces, Deduct</i>	-2.08	
<i>For Reinforcing Fabric, Add</i>	0.57	

07	07 Thermal And Moisture Protection
	07 10 Dampproofing and Waterproofing
	07 14 Fluid-Applied Waterproofing



MINOR		TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION		UNIT COST	UNIT COST

07 16 Cementitious and Reactive Waterproofing (07 10)

07 16 13 Polymer Modified Cement Waterproofing (07 16)

07 16 13 00-0001	SF	Polymer Modified Cementitious Waterproofing Assembly, 2 Coats	4.84
<small>Note: As manufactured by Thoro Consumer Products. Includes Thoroseal, Acryl 60, acrylic waterproof coating and white pigmented acrylic copolymer primer.</small>			

07 16 16 Crystalline Waterproofing (07 16)

07 16 16 00-0001	SF	Crystalline Cementitious Waterproofing, 2 Coats (Xypex Concentrate)	6.41
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07 16 19 Metal Oxide Waterproofing (07 16)

07 16 19 00-0001 Metallic Oxide Waterproofing (07 16 19)

Note: Includes one broom applied bond coat and three brush applied waterproof coats. Excludes concrete repairs to subbase and final protective concrete surface coat. See CSI section 03 54 16 00-0001 for self leveling underlayment for concrete floors.

07 16 19 00-0002	CSF	Catalyzed Metallic Waterproofing Treatment, Metal Oxide Waterproofing (Euclid Iron Waterpeller)	501.13
<small>For Application To Horizontal Surfaces, Deduct</small>			-62.64

07 17 Bentonite Waterproofing (07 10)

07 17 13 Bentonite Panel Waterproofing (07 17)

07 17 13 00-0001	CSF	3/16" Bentonite Waterproofing Panels	465.91	142.94
<small>For Application To Horizontal Surfaces, Deduct</small>			-42.89	
07 17 13 00-0002	CSF	1/4" Bentonite Waterproofing Panels	435.22	151.03
<small>For Application To Horizontal Surfaces, Deduct</small>			-46.42	
07 17 13 00-0003	CSF	5/8" Bentonite Waterproofing Panels	577.72	157.49
<small>For Application To Horizontal Surfaces, Deduct</small>			-47.24	
07 17 13 00-0004	CSF	3/8" Granular Bentonite, Troweled	467.54	131.00
<small>For Application To Horizontal Surfaces, Deduct</small>			-39.28	

07 18 Traffic Coatings (07 10)

07 18 13 Pedestrian Traffic Coatings (07 18)

07 18 13 00-0001 Elastomeric Plaza Deck System (Garland Dura-Walk®) (07 18 13)

Note: For pedestrian and vehicular traffic. Includes 10 year warranty. Excludes surface preparaion, deck crack repair, joint sealants or markings.

07 18 13 00-0002	SQ	Porous Concrete Primer (Garland Dura-Walk® FC Primer Kit)	172.82
07 18 13 00-0003	SQ	32 mils, Base Coat, One-Component, Polyurethane, Elastomeric Plaza Deck System (Garland Dura-Walk®)	494.00
07 18 13 00-0004	SQ	16 mils, Wear Coat, One-Component, Polyurethane, Elastomeric Plaza Deck System (Garland Dura-Walk®)	284.75
07 18 13 00-0005	SQ	16 mils, Top Coat, One-Component, Polyurethane, Elastomeric Plaza Deck System (Garland Dura-Walk®)	340.64
07 18 13 00-0006	LF	6" Wide, Poly Joint Tape (Garland Dura-Walk®)	1.71

07 18 16 Vehicular Traffic Coatings (07 18)

07 18 16 00-0001 Preparation For Vehicular Traffic Coating (07 18 16)

See CSI section 03 01 30 71-0027 for crack repairs, 32 17 23 00-0000 for pavement markings.

07 18 16 00-0002	SF	Grinding Of Existing Concrete Floor Prior To Installation Of Deck Coating	1.07
07 18 16 00-0003	SF	Shot Blasting Concrete Surface For Vehicular Traffic Coating	2.65

07 18 16 00-0004 Vehicular Traffic Coating (Sika) (07 18 16)

Note: Excludes surface preparaion, deck crack repair, joint sealants or pavement markings. See CSI section 03 01 30 71-0027 for crack repairs, 07 18 16 00-0001 for surface preparaion, 32 17 23 00-0000 for pavement markings.

07 18 16 00-0005	SF	23 Mil Thick, Traffic Coating, Two-Component, Elastomeric Polyurethane Waterproofing, Concrete Coating With Primer (Sika Sikalastic® 720)	3.84
<small>Note: Excludes crack repair or caulking.</small>			
07 18 16 00-0006	SF	12 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Protective Concrete Coating (Sika Sikalastic®-745 AL)	2.35
<small>Note: Excludes crack repair or caulking.</small>			
07 18 16 00-0007	SF	14 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Protective Concrete Coating (Sika Sikalastic®-745 AL)	2.50
<small>Note: Excludes crack repair or caulking.</small>			
07 18 16 00-0008	SF	16 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Protective Concrete Coating (Sika Sikalastic®-745 AL)	2.66
<small>Note: Excludes crack repair or caulking.</small>			
07 18 16 00-0009	SF	18 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Protective Concrete Coating (Sika Sikalastic®-745 AL)	2.80
<small>Note: Excludes crack repair or caulking.</small>			
07 18 16 00-0010	SF	14 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Wear And Top Concrete Coating (Sika Sikalastic®-745 Textured)	2.72
<small>Note: Excludes crack repair or caulking.</small>			



Thermal And Moisture Protection	07
Dampproofing and Waterproofing	07 10
Traffic Coatings	07 18

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 18 16 00-0011 SF 16 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Wear And Top Concrete Coating (Sika Sikalastic®-745 Textured)	2.95	
Note: Excludes crack repair or caulking.		
07 18 16 00-0012 SF 18 Mil Thick, Vehicular Traffic Bearing Two-Component Aliphatic, Elastomeric Polyurethane, Wear And Top Concrete Coating (Sika Sikalastic®-745 Textured)	3.20	
Note: Excludes crack repair or caulking.		
07 18 21 Traffic-Bearing Roof Deck Surfacing (07 18)		
07 18 21 00-0001 Decking Coating System (Polycoat POLY-I-GARD® 575FC) (07 18 21) Note: Excludes surface preparaion, deck crack repair or other joint sealants. See CSI section 07 18 16 00-0001 for surface preparaion.		
07 18 21 00-0002 SF 4 Dry Mils, Epoxy Primer For Deck Coating System (Polycoat Polyprime® 21)	1.28	
07 18 21 00-0003 SF 24 ± 2 Dry Mils, Base For Deck Coating System (Polycoat PC-260)	3.69	
07 18 21 00-0004 SF 18 ± 2 Dry Mils, Topcoat For Deck Coating System (Polycoat Poly-I-Gard® 295)	3.45	
07 18 21 00-0005 SF 15 ± 2 Dry Mils, Topcoat For Deck Coating System (Polycoat Poly-I-Gard® 295)	3.06	
Note: Additional coat for ramps, turn radii, and other heavy traffic areas.		
07 18 21 00-0006 Weatherwear Roof Deck Coating System (Dex-O-Tex) (07 18 21)		
07 18 21 00-0007 SF Dex-O-Tex Weatherwear Promenade Roof Deck System	37.25	
Note: Includes mobilize and set up. Install Dex-O-Tex Weatherwear Promenade Roof Deck System per manufacturer's specifications and waterproof at drain locations. (Supply and installation of drains by others). Final clean up and demobilize.		
07 18 21 00-0008 LF Dex-O-Tex 26G Bonderized 4" x 8" flashing	17.02	
Note: supply and install 26G Bonderized 4" x 8" flashing at deck to wall transitions per plans and specifications. (Flashing per detail A.1/3.)		
07 18 21 00-0009 SF Dex-O-Tex G-26 Underlayment at 3" Average for Sloping	43.66	
Note: Includes mobilize and set up. Install Dex-O-Tex G-26 Cementitious Underlayment for sloping at 3" average per A.1/B. Clean up.		
07 18 21 00-0010 SF Mechanically Prepare Surface For Underlayment	3.24	
Note: Mechanically prepare surface to create bonding profile per manufacturer specifications.		
07 19 Water Repellents (07 19)		
07 19 13 Acrylic Sealer (07 19)		
Note: Per coat.		
07 19 13 00-0001 SF Spray On Concrete, Acrylic Sealer	2.72	
07 19 13 00-0002 SF Spray On Concrete Block/Brick, Acrylic Sealer	3.23	
07 19 13 00-0003 SF Spray On Stone, Acrylic Sealer	3.55	
07 19 16 Silane Water Repellents (07 19)		
07 19 16 00-0001 Silane Concrete Sealer (07 19 16)		
07 19 16 00-0002 SF Spray On Concrete, Water Based, Silane Penetrating Water Repellent Sealer (Specchem SpecSilane 40 WB)	0.75	
07 19 16 00-0003 SF Spray On Concrete Block/Brick, Water Based, Silane Penetrating Water Repellent Sealer (Specchem SpecSilane 40 WB)	1.11	
07 19 16 00-0004 Silane/Siloxane Concrete Sealer (07 19 16)		
07 19 16 00-0005 SF Spray On Concrete, Solvent Based, Silane/Siloxane Concrete Penetrating Water Repellent Sealer (Anti-Hydro Aridox 40)	1.33	
Note: 40% silane, alcohol based.		
07 19 16 00-0006 SF Spray On Concrete Block/Brick, Solvent Based, Silane/Siloxane Penetrating Water Repellent Sealer (Anti-Hydro Aridox 40)	1.95	
Note: 40% silane, alcohol based.		
07 19 16 00-0007 SF Spray On Concrete, Water-Based, Silane/Siloxane Penetrating Water Repellent Sealer (Prosoco Saltguard WB)	0.52	
Note: 200 SF/GAL		
07 19 16 00-0008 SF Spray On Concrete Block/Masonry, Water-Based, Silane/Siloxane Penetrating Water Repellent Sealer (Prosoco Saltguard WB)	0.76	
07 20 Thermal Protection (07)		
07 21 Thermal Insulation (07 20)		
07 21 13 Board Insulation (07 21)		
Note: Types are stock sizes, mastic applied.		
07 21 13 13 Foam Board Insulation (07 21 13)		
07 21 13 13-0001 Cold Adhesive Applied Foam Board Insulation (07 21 13 13)		
07 21 13 13-0002 Cold Adhesive Applied, Foam Glass (Cellular Glass), Foam Board Insulation (07 21 13 13-0001)		
07 21 13 13-0003 SF 1" Thick, R3.44, Foam Glass (Cellular Glass), Foam Board Insulation, Cold Adhesive Applied	4.14	0.37
For Horizontal Surface Application, Deduct	-0.06	
For Vapor Barrier, Integral With Insulation, Add	0.05	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 21 Thermal Insulation**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
07 21 13 13-0004	SF	1-1/2" Thick, R5.16, Foam Glass (Cellular Glass), Foam Board Insulation, Cold Adhesive Applied.....	5.84	0.38
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0005	SF	2" Thick, R6.88, Foam Glass (Cellular Glass), Foam Board Insulation, Cold Adhesive Applied.....	6.97	0.38
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0006	SF	2-3/4" Thick, R8.17, Foam Glass (Cellular Glass), Foam Board Insulation, Cold Adhesive Applied.....	9.23	0.39
		<i>For Horizontal Surface Application, Deduct</i>	-0.07	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0007		Cold Adhesive Applied, Expanded Polystyrene, Foam Board Insulation (07 21 13 13-0001)		
07 21 13 13-0008	SF	3/8" Thick, R1.44, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	1.77	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0009	SF	1/2" Thick, R1.93, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	1.85	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0010	SF	3/4" Thick, R2.89, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	2.13	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0011	SF	1" Thick, R3.85, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	2.40	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0012	SF	2" Thick, R7.70, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	3.50	0.38
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0013	SF	3" Thick, R11.55, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	4.59	0.39
		<i>For Horizontal Surface Application, Deduct</i>	-0.07	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0014	SF	4" Thick, R15.40, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	5.69	0.40
		<i>For Horizontal Surface Application, Deduct</i>	-0.07	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0015	SF	5" Thick, R19.25, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	6.78	0.41
		<i>For Horizontal Surface Application, Deduct</i>	-0.07	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0016	SF	6" Thick, R23.1, Molded Expanded Polystyrene, Foam Board Insulation (MEPS), Cold Adhesive Applied.....	7.88	0.42
		<i>For Horizontal Surface Application, Deduct</i>	-0.07	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
07 21 13 13-0017		Cold Adhesive Applied, Extruded Polystyrene, Foam Board Insulation (07 21 13 13-0001)		
		Note: 15 PSI compressive strength.		
07 21 13 13-0018	SF	3/8" Thick, R1.9, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied.....	2.04	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
		<i>For 25 PSI Compressive Strength, Add</i>	0.23	
		<i>For 40 PSI Compressive Strength, Add</i>	0.54	
		<i>For 60 PSI Compressive Strength, Add</i>	0.86	
		<i>For 115 PSI Compressive Strength, Add</i>	3.74	
07 21 13 13-0019	SF	1/2" Thick, R2.5, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied.....	2.41	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
		<i>For 25 PSI Compressive Strength, Add</i>	0.29	
		<i>For 40 PSI Compressive Strength, Add</i>	0.68	
		<i>For 60 PSI Compressive Strength, Add</i>	1.07	
		<i>For 115 PSI Compressive Strength, Add</i>	4.69	
07 21 13 13-0020	SF	3/4" Thick, R3.7, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied.....	2.72	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
		<i>For 25 PSI Compressive Strength, Add</i>	0.34	
		<i>For 40 PSI Compressive Strength, Add</i>	0.80	
		<i>For 60 PSI Compressive Strength, Add</i>	1.25	
		<i>For 115 PSI Compressive Strength, Add</i>	5.46	
07 21 13 13-0021	SF	1" Thick, R5.0, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied.....	2.79	0.37
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
		<i>For 25 PSI Compressive Strength, Add</i>	0.35	
		<i>For 40 PSI Compressive Strength, Add</i>	0.82	
		<i>For 60 PSI Compressive Strength, Add</i>	1.29	
		<i>For 115 PSI Compressive Strength, Add</i>	5.64	
07 21 13 13-0022	SF	2" Thick, R10.0, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied.....	4.29	0.38
		<i>For Horizontal Surface Application, Deduct</i>	-0.06	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
		<i>For 25 PSI Compressive Strength, Add</i>	0.58	
		<i>For 40 PSI Compressive Strength, Add</i>	1.39	
		<i>For 60 PSI Compressive Strength, Add</i>	2.15	
		<i>For 115 PSI Compressive Strength, Add</i>	9.44	
07 21 13 13-0023	SF	3" Thick, R15.0, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied.....	5.78	0.39
		<i>For Horizontal Surface Application, Deduct</i>	-0.07	
		<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
		<i>For 25 PSI Compressive Strength, Add</i>	0.82	
		<i>For 40 PSI Compressive Strength, Add</i>	1.95	
		<i>For 60 PSI Compressive Strength, Add</i>	3.01	
		<i>For 115 PSI Compressive Strength, Add</i>	13.25	



Thermal And Moisture Protection			07
Thermal Protection			07 20
Thermal Insulation			07 21

07

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 21 13 13-0024	SF 4" Thick, R20.0, Extruded Polystyrene, Foam Board Insulation, Cold Adhesive Applied..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	6.54 -0.07 0.05 0.94 2.23 3.44 15.15	0.40
07 21 13 13-0025	Mechanically Fastened Foam Board Insulation (07 21 13 13) Note: Mechanically fastened to wood or steel.		
07 21 13 13-0026	Mechanically Fastened, Foam Glass (Cellular Glass), Foam Board Insulation (07 21 13 13-0026) Note: Mechanically fastened to wood or steel.		
07 21 13 13-0027	SF 1" Thick, R3.44, Foam Glass (Cellular Glass), Foam Board Insulation, Mechanically Fastened..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.10 -0.07 0.05 1.67 2.21 0.78 2.28 2.74 1.17 3.41 4.11	0.37
07 21 13 13-0028	SF 1-1/2" Thick, R5.16, Foam Glass (Cellular Glass), Foam Board Insulation, Mechanically Fastened..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.90 -0.08 0.05 1.72 2.14 0.96 2.35 2.74 1.44 3.48 4.11	0.38
07 21 13 13-0029	SF 2" Thick, R6.88, Foam Glass (Cellular Glass), Foam Board Insulation, Mechanically Fastened..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	7.03 -0.08 0.05 1.72 2.14 0.96 2.35 2.77 1.44 3.48 4.15	0.38
07 21 13 13-0030	SF 2-3/4" Thick, R8.17, Foam Glass (Cellular Glass), Foam Board Insulation, Mechanically Fastened..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	9.40 -0.08 0.05 1.77 2.23 1.09 2.49 2.95 1.65 3.74 4.43	0.39
07 21 13 13-0031	Mechanically Fastened, Expanded Polystyrene, Foam Board Insulation (07 21 13 13-0031) Note: Mechanically fastened to wood or steel.		
07 21 13 13-0032	SF 3/8" Thick, R1.44, Molded Expanded Polystyrene, Foam Board Insulation (MEPS)..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	1.72 -0.07 0.05 1.67 2.21 0.78 2.28 2.74 1.17 3.41 4.11	0.37
07 21 13 13-0033	SF 1/2" Thick, R1.93, Molded Expanded Polystyrene, Foam Board Insulation (MEPS)..... <i>For Horizontal Surface Application, Deduct</i> <i>For Vapor Barrier, Integral With Insulation, Add</i> <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	1.80 -0.07 0.05 1.67 2.21 0.78 2.28 2.74 1.17 3.41 4.11	0.37

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 21 Thermal Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 21 13 13-0034	SF	3/4"	Thick, R2.89, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	2.07	0.37
			<i>For Horizontal Surface Application, Deduct</i>	-0.07	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 13-0035	SF	1"	Thick, R3.85, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	2.35	0.37
			<i>For Horizontal Surface Application, Deduct</i>	-0.07	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 13-0036	SF	2"	Thick, R7.70, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	3.56	0.38
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 21 13 13-0037	SF	3"	Thick, R11.55, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	4.76	0.39
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 21 13 13-0038	SF	4"	Thick, R15.40, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	6.02	0.40
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	
07 21 13 13-0039	SF	5"	Thick, R19.25, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	7.32	0.41
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.61	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	8.48	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 21 13 13-0040	SF	6"	Thick, R23.1, Molded Expanded Polystyrene, Foam Board Insulation (MEPS).....	8.65	0.42
			<i>For Horizontal Surface Application, Deduct</i>	-0.09	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	

07 21 13 13-0041 Mechanically Fastened, Extruded Polystyrene, Foam Board Insulation^{(07 21 13}

¹³⁻⁰⁰²⁵⁾

Note: 15 PSI compressive strength. Mechanically fastened to wood or steel.



Thermal And Moisture Protection		07
Thermal Protection		07 20
Thermal Insulation		07 21

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 21 13 13-0042 SF 3/8" Thick, R1.9, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened.....	1.99	0.37
<i>For Horizontal Surface Application, Deduct</i>	-0.07	
<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
<i>For 25 PSI Compressive Strength, Add</i>	0.20	
<i>For 40 PSI Compressive Strength, Add</i>	0.48	
<i>For 60 PSI Compressive Strength, Add</i>	0.77	
<i>For 115 PSI Compressive Strength, Add</i>	3.31	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 13-0043 SF 1/2" Thick, R2.5, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened.....	2.37	0.37
<i>For Horizontal Surface Application, Deduct</i>	-0.07	
<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
<i>For 25 PSI Compressive Strength, Add</i>	0.26	
<i>For 40 PSI Compressive Strength, Add</i>	0.62	
<i>For 60 PSI Compressive Strength, Add</i>	0.99	
<i>For 115 PSI Compressive Strength, Add</i>	4.29	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 13-0044 SF 3/4" Thick, R3.7, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened.....	2.67	0.37
<i>For Horizontal Surface Application, Deduct</i>	-0.07	
<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
<i>For 25 PSI Compressive Strength, Add</i>	0.31	
<i>For 40 PSI Compressive Strength, Add</i>	0.74	
<i>For 60 PSI Compressive Strength, Add</i>	1.16	
<i>For 115 PSI Compressive Strength, Add</i>	5.06	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 13-0045 SF 1" Thick, R5.0, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened.....	2.75	0.37
<i>For Horizontal Surface Application, Deduct</i>	-0.07	
<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
<i>For 25 PSI Compressive Strength, Add</i>	0.32	
<i>For 40 PSI Compressive Strength, Add</i>	0.76	
<i>For 60 PSI Compressive Strength, Add</i>	1.20	
<i>For 115 PSI Compressive Strength, Add</i>	5.24	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 13-0046 SF 2" Thick, R10.0, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened.....	4.35	0.38
<i>For Horizontal Surface Application, Deduct</i>	-0.08	
<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
<i>For 25 PSI Compressive Strength, Add</i>	0.57	
<i>For 40 PSI Compressive Strength, Add</i>	1.36	
<i>For 60 PSI Compressive Strength, Add</i>	2.11	
<i>For 115 PSI Compressive Strength, Add</i>	9.28	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 21 Thermal Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 21 13 13-0047	SF 3" Thick, R15.0, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened	5.95	0.39
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For 25 PSI Compressive Strength, Add</i>	0.82	
	<i>For 40 PSI Compressive Strength, Add</i>	1.96	
	<i>For 60 PSI Compressive Strength, Add</i>	3.03	
	<i>For 115 PSI Compressive Strength, Add</i>	13.32	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 21 13 13-0048	SF 4" Thick, R20.0, Extruded Polystyrene, Foam Board Insulation, Mechanically Fastened	6.87	0.40
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For 25 PSI Compressive Strength, Add</i>	0.97	
	<i>For 40 PSI Compressive Strength, Add</i>	2.30	
	<i>For 60 PSI Compressive Strength, Add</i>	3.56	
	<i>For 115 PSI Compressive Strength, Add</i>	15.66	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	

07 21 13 16 Fibrous Board Insulation (07 21 13)

07 21 13 16-0001 Cold Adhesive Applied Fibrous Board Insulation (07 21 13 16)

07 21 13 16-0002 Cold Adhesive Applied, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation (07 21 13 16-0001)

07 21 13 16-0003	SF 1" Thick, R2.6, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation, Cold Adhesive Applied	2.59	0.47
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 16-0004	SF 2" Thick, R5.2, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation, Cold Adhesive Applied	3.85	0.56
	<i>For Horizontal Surface Application, Deduct</i>	-0.09	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 16-0005	SF 3" Thick, R7.8, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation, Cold Adhesive Applied	5.11	0.65
	<i>For Horizontal Surface Application, Deduct</i>	-0.11	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	

07 21 13 16-0006 Cold Adhesive Applied, Fiberglass, Fibrous Board Insulation (07 21 13 16-0001)

07 21 13 16-0007	SF 1" Thick, R4.2, Fiberglass, Fibrous Board Insulation, Cold Adhesive Applied	4.79	0.37
	<i>For Horizontal Surface Application, Deduct</i>	-0.06	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 16-0008	SF 1-1/2" Thick, R6.0, Fiberglass, Fibrous Board Insulation, Cold Adhesive Applied	5.62	0.38
	<i>For Horizontal Surface Application, Deduct</i>	-0.06	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 16-0009	SF 2" Thick, R8.0, Fiberglass, Fibrous Board Insulation, Cold Adhesive Applied	6.96	0.38
	<i>For Horizontal Surface Application, Deduct</i>	-0.06	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 16-0010	SF 2-1/2" Thick, R10.0, Fiberglass, Fibrous Board Insulation, Cold Adhesive Applied	8.05	0.38
	<i>For Horizontal Surface Application, Deduct</i>	-0.06	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 16-0011	SF 3" Thick, R12.4, Fiberglass, Fibrous Board Insulation, Cold Adhesive Applied	9.13	0.39
	<i>For Horizontal Surface Application, Deduct</i>	-0.07	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	

07 21 13 16-0012 Mechanically Fastened Fibrous Board Insulation (07 21 13 16)

Note: Mechanically fastened to wood or steel.

07 21 13 16-0013 Mechanically Fastened, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation (07 21 13 16-0012)

Note: Mechanically fastened to wood or steel.



Thermal And Moisture Protection			07
Thermal Protection			07 20
Thermal Insulation			07 21

07

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 21 13 16-0014	SF 1" Thick, R2.6, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation, Mechanically Fastened.....	2.43	0.47
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 16-0015	SF 2" Thick, R5.2, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation, Mechanically Fastened.....	3.78	0.56
	<i>For Horizontal Surface Application, Deduct</i>	-0.09	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 21 13 16-0016	SF 3" Thick, R7.8, Wood Fiber (Cellulosic-Fiber), Fibrous Board Insulation, Mechanically Fastened.....	5.14	0.65
	<i>For Horizontal Surface Application, Deduct</i>	-0.11	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 21 13 16-0017	Mechanically Fastened, Fiberglass, Fibrous Board Insulation <small>(07 21 13 16-0012)</small>		
	Note: Mechanically fastened to wood or steel.		
07 21 13 16-0018	SF 1" Thick, R4.2, Fiberglass, Fibrous Board Insulation, Mechanically Fastened.....	4.74	0.37
	<i>For Horizontal Surface Application, Deduct</i>	-0.07	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 16-0019	SF 1-1/2" Thick, R6.0, Fiberglass, Fibrous Board Insulation, Mechanically Fastened	5.68	0.38
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 16-0020	SF 2" Thick, R8.0, Fiberglass, Fibrous Board Insulation, Mechanically Fastened.....	7.02	0.38
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 21 Thermal Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 21 13 16-0021	SF		2-1/2" Thick, R10.0, Fiberglass, Fibrous Board Insulation, Mechanically Fastened.....	8.23	0.38
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.17	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	
07 21 13 16-0022	SF		3" Thick, R12.4, Fiberglass, Fibrous Board Insulation, Mechanically Fastened.....	9.31	0.39
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	

07 21 13 19 Mineral Board Insulation (07 21 13)

07 21 13 19-0001 Cold Adhesive Applied Mineral Board Insulation (07 21 13 19)

07 21 13 19-0002 Cold Adhesive Applied, High-Density Fiberboard, Mineral Board Insulation

07 21 13 19-0003	SF		1/2" Thick, R1.3, High-Density Fiberboard, Mineral Board Insulation, Cold Adhesive Applied	1.94	0.42
			<i>For Horizontal Surface Application, Deduct</i>	-0.07	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 19-0004	SF		25/32" Thick, R1.9, High-Density Fiberboard, Mineral Board Insulation, Cold Adhesive Applied	2.33	0.44
			<i>For Horizontal Surface Application, Deduct</i>	-0.07	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 19-0005	SF		1" Thick, R2.5, High-Density Fiberboard, Mineral Board Insulation, Cold Adhesive Applied	2.73	0.47
			<i>For Horizontal Surface Application, Deduct</i>	-0.08	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 19-0006	SF		1-1/2" Thick, R3.8, High-Density Fiberboard, Mineral Board Insulation, Cold Adhesive Applied	3.42	0.51
			<i>For Horizontal Surface Application, Deduct</i>	-0.09	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 19-0007	SF		2" Thick, R5.0, High-Density Fiberboard, Mineral Board Insulation, Cold Adhesive Applied	4.12	0.56
			<i>For Horizontal Surface Application, Deduct</i>	-0.09	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
07 21 13 19-0008	SF		3" Thick, R7.5, High-Density Fiberboard, Mineral Board Insulation, Cold Adhesive Applied	5.52	0.65
			<i>For Horizontal Surface Application, Deduct</i>	-0.11	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	

07 21 13 19-0009 Mechanically Fastened Mineral Board Insulation (07 21 13 19)

Note: Mechanically fastened to wood or steel.

07 21 13 19-0010 Mechanically Fastened, High-Density Fiberboard, Mineral Board Insulation

(07 21 13 19-0009)

Note: Mechanically fastened to wood or steel.

07 21 13 19-0011	SF		1/2" Thick, R1.3, High-Density Fiberboard, Mineral Board Insulation, Mechanically Fastened.....	1.77	0.42
			<i>For Horizontal Surface Application, Deduct</i>	-0.07	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 19-0012	SF		25/32" Thick, R1.9, High-Density Fiberboard, Mineral Board Insulation, Mechanically Fastened.....	2.16	0.44
			<i>For Horizontal Surface Application, Deduct</i>	-0.07	
			<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
			<i>For Factory Painted On One Surface Add</i>	0.17	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	



Thermal And Moisture Protection		07
Thermal Protection		07 20
Thermal Insulation		07 21

07

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 21 13 19-0013	SF 1" Thick, R2.5, High-Density Fiberboard, Mineral Board Insulation, Mechanically Fastened.....	2.56	0.47
	<i>For Horizontal Surface Application, Deduct</i>	-0.08	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.28	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.41	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 19-0014	SF 1-1/2" Thick, R3.8, High-Density Fiberboard, Mineral Board Insulation, Mechanically Fastened	3.35	0.51
	<i>For Horizontal Surface Application, Deduct</i>	-0.09	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 21 13 19-0015	SF 2" Thick, R5.0, High-Density Fiberboard, Mineral Board Insulation, Mechanically Fastened.....	4.05	0.56
	<i>For Horizontal Surface Application, Deduct</i>	-0.09	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.48	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 21 13 19-0016	SF 3" Thick, R7.5, High-Density Fiberboard, Mineral Board Insulation, Mechanically Fastened.....	5.54	0.65
	<i>For Horizontal Surface Application, Deduct</i>	-0.11	
	<i>For Vapor Barrier, Integral With Insulation, Add</i>	0.05	
	<i>For Factory Painted On One Surface Add</i>	0.17	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 21 16	Blanket Insulation (07 21)		
	Note: All insulation rolls or batts applied to wood or steel studs or between rafters or between metal building "skin" and framing.		
07 21 16 00-0001	Fiberglass Flexible Insulation (07 21 16)		
	Note: Rolls or batts.		
07 21 16 00-0002	Kraft Faced, Fiberglass Flexible Insulation (07 21 16 00-0001)		
07 21 16 00-0003	SF 3-1/2" Thick, Kraft Faced, R-11 Fiberglass Flexible Insulation	1.38	0.43
	<i>For >1,600, Deduct</i>	-0.15	
07 21 16 00-0004	SF 3-1/2" Thick, Kraft Faced, R-13 Fiberglass Flexible Insulation	1.49	0.43
	<i>For >1,600, Deduct</i>	-0.17	
07 21 16 00-0005	SF 3-1/2" Thick, Kraft Faced, R-15 Fiberglass Flexible Insulation	1.53	0.43
	<i>For >1,600, Deduct</i>	-0.18	
07 21 16 00-0006	SF 5-1/2" Thick, Kraft Faced, R-21 Fiberglass Flexible Insulation	2.03	0.43
	<i>For >1,600, Deduct</i>	-0.28	
07 21 16 00-0007	SF 6-1/4" Thick, Kraft Faced, R-19 Fiberglass Flexible Insulation	1.73	0.43
	<i>For >1,600, Deduct</i>	-0.21	
07 21 16 00-0008	SF 9-1/2" Thick, Kraft Faced, R-30 Fiberglass Flexible Insulation	2.40	0.53
	<i>For >1,600, Deduct</i>	-0.32	
07 21 16 00-0009	SF 12" Thick, Kraft Faced, R-38 Fiberglass Flexible Insulation.....	2.73	0.53
	<i>For >1,600, Deduct</i>	-0.36	
07 21 16 00-0010	Unfaced, Fiberglass Flexible Insulation (07 21 16 00-0001)		
07 21 16 00-0011	SF 3-1/2" Thick, Unfaced, R-11 Fiberglass Flexible Insulation.....	1.31	0.43
	<i>For >1,600, Deduct</i>	-0.14	
07 21 16 00-0012	SF 3-1/2" Thick, Unfaced, R-13 Fiberglass Flexible Insulation.....	1.44	0.43
	<i>For >1,600, Deduct</i>	-0.16	
07 21 16 00-0013	SF 3-1/2" Thick, Unfaced, R-15 Fiberglass Flexible Insulation.....	1.91	0.43
	<i>For >1,600, Deduct</i>	-0.26	
07 21 16 00-0014	SF 5-1/2" Thick, Unfaced, R-21 Fiberglass Flexible Insulation.....	1.95	0.43
	<i>For >1,600, Deduct</i>	-0.26	
07 21 16 00-0015	SF 6-1/4" Thick, Unfaced, R-19 Fiberglass Flexible Insulation.....	1.68	0.43
	<i>For >1,600, Deduct</i>	-0.20	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 21 Thermal Insulation**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
07 21 16 00-0016	SF	9-1/2" Thick, Unfaced, R-30 Fiberglass Flexible Insulation.....	2.26	0.53
		<i>For >1,600, Deduct</i>	-0.29	
07 21 16 00-0017	SF	12" Thick, Unfaced, R-38 Fiberglass Flexible Insulation.....	2.64	0.53
		<i>For >1,600, Deduct</i>	-0.35	
07 21 16 00-0018		Foil Faced, Fiberglass Flexible Insulation (07 21 16 00-0001)		
07 21 16 00-0019	SF	3-1/2" Thick, Foil Faced, R-11 Fiberglass Flexible Insulation	1.58	0.43
		<i>For >1,600, Deduct</i>	-0.19	
07 21 16 00-0020	SF	3-1/2" Thick, Foil Faced, R-13 Fiberglass Flexible Insulation	1.76	0.43
		<i>For >1,600, Deduct</i>	-0.23	
07 21 16 00-0021	SF	6-1/4" Thick, Foil Faced, R-19 Fiberglass Flexible Insulation	1.99	0.43
		<i>For >1,600, Deduct</i>	-0.26	
07 21 16 00-0022	SF	10-1/4" Thick, Foil Faced, R-38 Fiberglass Flexible Insulation	2.80	0.53
		<i>For >1,600, Deduct</i>	-0.39	
07 21 16 00-0023	SF	12" Thick, Foil Faced, R-38 Fiberglass Flexible Insulation	3.07	0.53
		<i>For >1,600, Deduct</i>	-0.43	
07 21 16 00-0024		Poly-Encapsulated, Fiberglass Flexible Insulation (07 21 16 00-0001)		
07 21 16 00-0025	SF	3-1/2" Thick, Poly-Encapsulated, R-11 Fiberglass Flexible Insulation	1.42	0.43
		<i>For >1,600, Deduct</i>	-0.16	
07 21 16 00-0026	SF	3-1/2" Thick, Poly-Encapsulated, R-13 Fiberglass Flexible Insulation	1.53	0.43
		<i>For >1,600, Deduct</i>	-0.18	
07 21 16 00-0027	SF	5-1/2" Thick, Poly-Encapsulated, R-21 Fiberglass Flexible Insulation	2.10	0.43
		<i>For >1,600, Deduct</i>	-0.29	
07 21 16 00-0028	SF	6-1/2" Thick, Poly-Encapsulated, R-19 Fiberglass Flexible Insulation	1.75	0.43
		<i>For >1,600, Deduct</i>	-0.21	
07 21 16 00-0029	SF	8-1/4" Thick, Poly-Encapsulated, R-25 Fiberglass Flexible Insulation	2.33	0.53
		<i>For >1,600, Deduct</i>	-0.32	
07 21 16 00-0030	SF	10-1/4" Thick, Poly-Encapsulated, R-30 Fiberglass Flexible Insulation	2.64	0.53
		<i>For >1,600, Deduct</i>	-0.35	
07 21 16 00-0031		Mineral Wool Flexible Insulation (07 21 16)		
07 21 16 00-0032		Kraft Faced, Mineral Wool Flexible Insulation (07 21 16 00-0031)		
07 21 16 00-0033	SF	3-1/2" Kraft Faced, R-11 Mineral Wool Flexible Insulation.....	1.54	0.43
		<i>For >1,600, Deduct</i>	-0.18	
07 21 16 00-0034	SF	6-1/4" Kraft Faced, R-19 Mineral Wool Flexible Insulation.....	2.06	0.43
		<i>For >1,600, Deduct</i>	-0.27	
07 21 16 00-0035	SF	9-1/2" Kraft Faced, R-30 Mineral Wool Flexible Insulation.....	3.22	0.43
		<i>For >1,600, Deduct</i>	-0.49	
07 21 16 00-0036	SF	12" Kraft Faced, R-38 Mineral Wool Flexible Insulation.....	3.83	0.43
		<i>For >1,600, Deduct</i>	-0.58	
07 21 16 00-0037		Unfaced, Mineral Wool Flexible Insulation (07 21 16 00-0031)		
07 21 16 00-0038	SF	3-1/2" Unfaced, R-11 Mineral Wool Flexible Insulation.....	1.44	0.43
		<i>For >1,600, Deduct</i>	-0.16	
07 21 16 00-0039	SF	6-1/4" Unfaced, R-19 Mineral Wool Flexible Insulation.....	1.89	0.43
		<i>For >1,600, Deduct</i>	-0.24	
07 21 16 00-0040	SF	9-1/2" Unfaced, R-30 Mineral Wool Flexible Insulation.....	2.89	0.43
		<i>For >1,600, Deduct</i>	-0.42	
07 21 16 00-0041	SF	12" Unfaced, R-38 Mineral Wool Flexible Insulation	3.44	0.43
		<i>For >1,600, Deduct</i>	-0.51	
07 21 16 00-0042		Natural Cotton Insulation (07 21 16)		
07 21 16 00-0043		UltraTouch™ Natural Cotton Insulation (07 21 16 00-0042)		
		Note: 85% recycled denim cotton.		
07 21 16 00-0044	SF	3-1/2", R-13 UltraTouch™ Natural Cotton Insulation	2.11	0.43
		<i>For >1,600, Deduct</i>	-0.30	
07 21 16 00-0045	SF	5-1/2", R-19 UltraTouch™ Natural Cotton Insulation	2.36	0.43
		<i>For >1,600, Deduct</i>	-0.34	
07 21 16 00-0046	SF	5-1/2", R-21 UltraTouch™ Natural Cotton Insulation	2.64	0.43
		<i>For >1,600, Deduct</i>	-0.40	
07 21 16 00-0047	SF	8", R-30 UltraTouch™ Natural Cotton Insulation	3.51	0.43
		<i>For >1,600, Deduct</i>	-0.56	
07 21 23		Loose-Fill Insulation (07 21)		
07 21 23 00-0001		Poured Type, Loose Fill Insulation (07 21 23)		
07 21 23 00-0002	CF	R-4/Inch, Poured Type, Fiberglass Loose Fill Insulation	6.40	2.48
07 21 23 00-0003	CF	R-3.8/Inch, Poured Type, Cellulose Loose Fill Insulation.....	6.43	2.48
07 21 23 00-0004		Concrete Block Wall Cavity Insulation (07 21 23)		
07 21 23 00-0005	CF	R-2.7, Vermiculite Or Perlite, Concrete Block Wall Cavity Insulation.....	8.91	2.48
07 21 23 00-0006	CF	R-4, Polystyrene Foam, Concrete Block Wall Cavity Insulation.....	8.83	2.48



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 21 26 Blown Insulation (07 21)

07 21 26 00-0001	Fiberglass Blown-In Insulation (07 21 26)		
07 21 26 00-0002	Attic, Fiberglass Blown-In Insulation (07 21 26 00-0001)		
07 21 26 00-0003	SF 4-1/2" Thick, R-11 Attic, Fiberglass Blown In Insulation.....	1.43	1.15
07 21 26 00-0004	SF 5-1/4" Thick, R-13 Attic, Fiberglass Blown In Insulation.....	1.58	1.26
07 21 26 00-0005	SF 6-1/2" Thick, R-17 Attic, Fiberglass Blown In Insulation.....	1.77	1.38
07 21 26 00-0006	SF 7-1/2" Thick, R-19 Attic, Fiberglass Blown In Insulation.....	1.98	1.50
07 21 26 00-0007	SF 8-1/2" Thick, R-22 Attic, Fiberglass Blown In Insulation.....	2.10	1.55
07 21 26 00-0008	SF 10-1/4" Thick, R-26 Attic, Fiberglass Blown In Insulation.....	2.26	1.61
07 21 26 00-0009	SF 11-1/2" Thick, R-30 Attic, Fiberglass Blown In Insulation.....	2.42	1.66
07 21 26 00-0010	SF 12-1/2" Thick, R-32 Attic, Fiberglass Blown In Insulation.....	2.56	1.73
07 21 26 00-0011	SF 13-1/2" Thick, R-35 Attic, Fiberglass Blown In Insulation.....	2.74	1.84
07 21 26 00-0012	SF 14-1/2" Thick, R-38 Attic, Fiberglass Blown In Insulation.....	2.89	1.90
07 21 26 00-0013	SF 16-1/2" Thick, R-44 Attic, Fiberglass Blown In Insulation.....	3.10	1.95
07 21 26 00-0014	SF 18-1/2" Thick, R-49 Attic, Fiberglass Blown In Insulation.....	3.36	2.06
07 21 26 00-0015	SF 21-3/4" Thick, R-60 Attic, Fiberglass Blown In Insulation.....	3.90	2.30

07 21 26 00-0016 New Wall, Fiberglass Blown-In Insulation (07 21 26 00-0001)

07 21 26 00-0017	SF 3-1/2" Thick, R-15 New Wall, Fiberglass Blown In Insulation	2.09	1.15
07 21 26 00-0018	SF 5-1/2" Thick, R-23 New Wall, Fiberglass Blown In Insulation	2.78	1.38
07 21 26 00-0019	SF 7-1/4" Thick, R-31 New Wall, Fiberglass Blown In Insulation	3.30	1.50
07 21 26 00-0020	SF 9-1/4" Thick, R-39 New Wall, Fiberglass Blown In Insulation	3.93	1.61

07 21 26 00-0021 Existing Wall, Fiberglass Blown-In Insulation (07 21 26 00-0001)

Note: Includes drilling. Excludes patching.

07 21 26 00-0022	SF 3-1/2" Thick, R-15 Existing Wall, Fiberglass Blown In Insulation	1.98	1.15
07 21 26 00-0023	SF 5-1/2" Thick, R-23 Existing Wall, Fiberglass Blown In Insulation	2.68	1.38
07 21 26 00-0024	SF 7-1/4" Thick, R-31 Existing Wall, Fiberglass Blown In Insulation	3.20	1.50
07 21 26 00-0025	SF 9-1/4" Thick, R-39 Existing Wall, Fiberglass Blown In Insulation	3.82	1.61

07 21 26 00-0026 Cellulose Blown-In Insulation (07 21 26)

07 21 26 00-0027 Attic, Cellulose Blown-In Insulation (07 21 26 00-0026)

07 21 26 00-0028	SF 3-3/4" Thick, R-13 Attic, Cellulose Blown In Insulation	1.40	1.15
07 21 26 00-0029	SF 5-1/2" Thick, R-19 Attic, Cellulose Blown In Insulation	1.65	1.26
07 21 26 00-0030	SF 6-1/4" Thick, R-22 Attic, Cellulose Blown In Insulation	1.84	1.38
07 21 26 00-0031	SF 7-3/4" Thick, R-28 Attic, Cellulose Blown In Insulation	2.12	1.50
07 21 26 00-0032	SF 8-1/2" Thick, R-30 Attic, Cellulose Blown In Insulation	2.15	1.50
07 21 26 00-0033	SF 10-3/4" Thick, R-38 Attic, Cellulose Blown In Insulation	2.46	1.61
07 21 26 00-0034	SF 11-1/4" Thick, R-40 Attic, Cellulose Blown In Insulation	2.52	1.61
07 21 26 00-0035	SF 12-1/2" Thick, R-45 Attic, Cellulose Blown In Insulation	2.75	1.73
07 21 26 00-0036	SF 13-3/4" Thick, R-50 Attic, Cellulose Blown In Insulation	2.89	1.73
07 21 26 00-0037	SF 15-1/2" Thick, R-55 Attic, Cellulose Blown In Insulation	3.11	1.84
07 21 26 00-0038	SF 16-1/2" Thick, R-60 Attic, Cellulose Blown In Insulation	3.25	1.84

07 21 26 00-0039 New Wall, Cellulose Blown-In Insulation (07 21 26 00-0026)

07 21 26 00-0040	SF 3-1/2" Thick, R-13 New Wall, Cellulose Blown In Insulation	1.80	1.15
07 21 26 00-0041	SF 5-1/2" Thick, R-20 New Wall, Cellulose Blown In Insulation	2.34	1.38
07 21 26 00-0042	SF 7-1/4" Thick, R-27 New Wall, Cellulose Blown In Insulation	2.72	1.50
07 21 26 00-0043	SF 9-1/4" Thick, R-34 New Wall, Cellulose Blown In Insulation	3.16	1.61

07 21 26 00-0044 Existing Wall, Cellulose Blown-In Insulation (07 21 26 00-0026)

Note: Includes drilling. Excludes patching.

07 21 26 00-0045	SF 3-1/2" Thick, R-13 Existing Wall, Cellulose Blown In Insulation.....	1.69	1.15
07 21 26 00-0046	SF 5-1/2" Thick, R-20 Existing Wall, Cellulose Blown In Insulation.....	2.24	1.38
07 21 26 00-0047	SF 7-1/4" Thick, R-27 Existing Wall, Cellulose Blown In Insulation.....	2.61	1.50
07 21 26 00-0048	SF 9-1/4" Thick, R-34 Existing Wall, Cellulose Blown In Insulation.....	3.06	1.61

07 21 29 Sprayed Insulation (07 21)

07 21 29 00-0001 Fiber Sprayed On Insulation (07 21 29)

Note: Per each 1" of thickness.

07 21 29 00-0002	SF 1" Thick, R2.7, Spray-on Perlite Insulation	2.46	0.74
07 21 29 00-0003	SF 1" Thick, R3.7, Spray-on Fibrous/Cementitious Insulation.....	1.80	0.74

07 21 29 00-0004 Cellulose Sprayed On Insulation (07 21 29)

07 21 29 00-0005	SF 1" Thick, Spray-on Cellulose Insulation	3.47	0.74
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07 21 53 Reflective Insulation (07 21)

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 21 Thermal Insulation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 21 53 00-0001	Reflective Barrier Insulation (Foil - Single Bubble - Foil) <small>(07 21 53)</small>		
07 21 53 00-0002	SF 3/16" Nominal Thickness, Reflective Barrier Insulation, With Single Bubble Air Space	1.12	
07 21 53 00-0003	Reflective Radiant Foil Backed Paper <small>(07 21 53)</small>		
07 21 53 00-0004	CSF Reflective Radiant Foil Backed Kraft Paper With Tape.....	70.35	22.89
	<i>For >15' To 20' Installed Height, Add</i>	4.57	
	<i>For >20' To 25' Installed Height, Add</i>	6.85	
	<i>For >25' To 30' Installed Height, Add</i>	11.42	

07 22 Roof and Deck Insulation (07 20)**07 22 16 Roof Board Insulation** (07 22)

Note: Use these items for specified related installations with systems per CSI section 07 50 00. Items are for single layer of panels attached per FM I-90 requirements. Types are stock sizes set in cold applied adhesive. Apply modifiers for specified alternate attachment.

07 22 16 00-0001	Rigid Board Roofing Insulation <small>(07 22 16)</small>		
	Note: Use these items for specified related installations with systems per CSI section 07 50 00. Items are for single layer of panels attached per FM I-90 requirements. See CSI section 07 22 16 00-0466 for demolition of insulation board.		
07 22 16 00-0002	Cold Adhesive Applied Rigid Board Roofing Insulation <small>(07 22 16 00-0001)</small>		
07 22 16 00-0003	Cold Adhesive Applied, High-Density Fiberboard, Roof Board Insulation <small>(07 22 16 00-0002)</small>		
07 22 16 00-0004	SF 1/2" Thick, R1.3, High-Density Fiberboard, Roof Board Insulation, Cold Adhesive Applied	2.58	
07 22 16 00-0005	SF 25/32" Thick, R1.9, High-Density Fiberboard, Roof Board Insulation, Cold Adhesive Applied	3.01	
07 22 16 00-0006	SF 1" Thick, R2.5, High-Density Fiberboard, Roof Board Insulation, Cold Adhesive Applied	3.44	
07 22 16 00-0007	SF 1-1/2" Thick, R3.8, High-Density Fiberboard, Roof Board Insulation, Cold Adhesive Applied	4.21	
07 22 16 00-0008	SF 2" Thick, R5, High-Density Fiberboard, Roof Board Insulation, Cold Adhesive Applied	4.97	
07 22 16 00-0009	Cold Adhesive Applied, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation <small>(07 22 16 00-0002)</small>		
07 22 16 00-0010	SF 1/2" Thick, R1.3, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation, Cold Adhesive Applied.....	2.81	
07 22 16 00-0011	SF 1" Thick, R2.6, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation, Cold Adhesive Applied.....	3.30	
07 22 16 00-0012	Cold Adhesive Applied, Perlite, Roof Board Insulation <small>(07 22 16 00-0002)</small>		
07 22 16 00-0013	SF 1/2" Thick, R1.32, Perlite, Roof Board Insulation, Cold Adhesive Applied	2.50	
07 22 16 00-0014	SF 1/2" Thick, R1.32, Perlite, Roof Board Insulation, Cold Adhesive Applied	2.50	
07 22 16 00-0015	SF 3/4" Thick, R2.08, Perlite, Roof Board Insulation, Cold Adhesive Applied	2.76	
07 22 16 00-0016	SF 1" Thick, R2.78, Perlite, Roof Board Insulation, Cold Adhesive Applied	3.06	
07 22 16 00-0017	SF 1-1/2" Thick, R4.17, Perlite, Roof Board Insulation, Cold Adhesive Applied.....	3.80	
07 22 16 00-0018	SF 2" Thick, R5.56, Perlite, Roof Board Insulation, Cold Adhesive Applied	4.27	
07 22 16 00-0019	Cold Adhesive Applied, Basalt Mineral Wool, Roof Board Insulation <small>(07 22 16 00-0002)</small>		
07 22 16 00-0020	SF 1" Thick, R3.5, Basalt Mineral Wool, Roof Board Insulation, Cold Adhesive Applied	3.47	
07 22 16 00-0021	SF 2" Thick, R7.4, Basalt Mineral Wool, Roof Board Insulation, Cold Adhesive Applied	4.64	
07 22 16 00-0022	SF 3" Thick, R11.1, Basalt Mineral Wool, Roof Board Insulation, Cold Adhesive Applied	6.03	
07 22 16 00-0023	Cold Adhesive Applied, Foam Glass (Cellular Glass), Roof Board Insulation <small>(07 22 16 00-0002)</small>		
07 22 16 00-0024	SF 1-1/2" Thick, R5.16, Foam Glass (Cellular Glass), Roof Board Insulation, Cold Adhesive Applied	6.41	
07 22 16 00-0025	SF 2" Thick, R6.88, Foam Glass (Cellular Glass), Roof Board Insulation, Cold Adhesive Applied	7.55	
07 22 16 00-0026	SF 2-3/4" Thick, R8.17, Foam Glass (Cellular Glass), Roof Board Insulation, Cold Adhesive Applied	9.83	
07 22 16 00-0027	SF 3-1/2" Thick, R12.04, Foam Glass (Cellular Glass), Roof Board Insulation, Cold Adhesive Applied	12.73	
07 22 16 00-0028	Cold Adhesive Applied, Molded Expanded Polystyrene, Roof Board Insulation <small>(07 22 16 00-0002)</small>		
07 22 16 00-0029	SF 3/8" Thick, R1.44, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	2.19	
	<i>For Loose-Laid, Deduct</i>	-1.20	
07 22 16 00-0030	SF 1/2" Thick, R1.93, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	2.27	
	<i>For Loose-Laid, Deduct</i>	-1.20	
07 22 16 00-0031	SF 3/4" Thick, R2.89, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	2.55	
	<i>For Loose-Laid, Deduct</i>	-1.20	
07 22 16 00-0032	SF 1" Thick, R3.85, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	2.82	
	<i>For Loose-Laid, Deduct</i>	-1.20	
07 22 16 00-0033	SF 2" Thick, R7.70, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	3.93	
	<i>For Loose-Laid, Deduct</i>	-1.22	
07 22 16 00-0034	SF 3" Thick, R11.55, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	5.04	
	<i>For Loose-Laid, Deduct</i>	-1.23	
07 22 16 00-0035	SF 4" Thick, R15.40, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	6.14	
	<i>For Loose-Laid, Deduct</i>	-1.24	
07 22 16 00-0036	SF 5" Thick, R19.25, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied	7.25	
	<i>For Loose-Laid, Deduct</i>	-1.26	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0037 SF 6" Thick, R23.1, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Cold Adhesive Applied <i>For Loose-Laid, Deduct</i>	8.35 -1.27	
07 22 16 00-0038 Cold Adhesive Applied, Extruded Polystyrene, Roof Board Insulation (07 22 16 00-0002) Note: 15 PSI compressive strength.		
07 22 16 00-0039 SF 3/4" Thick, R3.7, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	3.28 -1.27 0.34 0.80 1.28 5.52	
07 22 16 00-0040 SF 1" Thick, R5.0, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	3.36 -1.28 0.35 0.82 1.32 5.70	
07 22 16 00-0041 SF 1-1/2" Thick, R7.5, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 100 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	4.24 -1.28 0.49 1.16 1.83 2.35 7.96	
07 22 16 00-0042 SF 2" Thick, R10.0, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	4.87 -1.29 0.58 1.39 2.18 9.50	
07 22 16 00-0043 SF 2-1/2" Thick, R12.5, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 100 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	5.83 -1.29 0.74 1.75 2.73 3.52 11.97	
07 22 16 00-0044 SF 3" Thick, R15.0, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	6.38 -1.31 0.82 1.95 3.04 13.31	
07 22 16 00-0045 SF 4" Thick, R20.0, Extruded Polystyrene, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For 25 PSI Compressive Strength, Add</i> <i>For 40 PSI Compressive Strength, Add</i> <i>For 60 PSI Compressive Strength, Add</i> <i>For 115 PSI Compressive Strength, Add</i>	7.15 -1.32 0.94 2.23 3.47 15.21	
07 22 16 00-0046 Cold Adhesive Applied, Polyisocyanurate Board Roofing Insulation (07 22 16 00-0002)		
07 22 16 00-0047 SF 3/4" Thick, R4.3, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	2.94 -1.27 0.36 0.18	
07 22 16 00-0048 SF 1" Thick, R5.7, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	3.06 -1.28 0.36 0.19	
07 22 16 00-0049 SF 1-1/2" Thick, R8.6, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	3.23 -1.28 0.36 0.20	
07 22 16 00-0050 SF 2" Thick, R11.4, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	3.69 -1.29 0.36 0.25	
07 22 16 00-0051 SF 2-1/2" Thick, R14.4, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	4.14 -1.30 0.36 0.29	
07 22 16 00-0052 SF 3" Thick, R17.4, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	4.61 -1.31 0.36 0.34	
07 22 16 00-0053 SF 3-1/2" Thick, R20.5, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	5.10 -1.31 0.36 0.38	
07 22 16 00-0054 SF 4" Thick, R23.6, Polyisocyanurate, Roof Board Insulation, Cold Adhesive Applied <i>For Loose-Laid, Deduct</i> <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	5.55 -1.32 0.36 0.43	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0055		Cold Adhesive Applied, High-Density Polyisocyanurate Cover Board And Roofing Insulation (07 22 16 00-0002)	
07 22 16 00-0056	SF	1/2" Thick, R2.5, High-Density Polyisocyanurate Cover Board And Roofing Insulation, Cold Adhesive Applied.....	3.34
07 22 16 00-0057		Cold Adhesive Applied, Gypsum-Fiber, Roof Board Insulation (USG Securock) (07 22 16 00-0002)	
07 22 16 00-0058	SF	1/4" Thick, R0.2, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Cold Adhesive Applied.....	3.16
07 22 16 00-0059	SF	3/8" Thick, R0.3, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Cold Adhesive Applied.....	3.35
07 22 16 00-0060	SF	1/2" Thick, R0.5, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Cold Adhesive Applied.....	3.48
07 22 16 00-0061	SF	5/8" Thick, R0.6, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Cold Adhesive Applied.....	3.54
07 22 16 00-0062		Cold Adhesive Applied, Glass-Mat, Roof Board Insulation (USG Securock) (07 22 16 00-0002)	
07 22 16 00-0063	SF	1/4" Thick, R0.36, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Cold Adhesive Applied.....	3.10
07 22 16 00-0064	SF	1/2" Thick, R0.53, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Cold Adhesive Applied.....	3.38
07 22 16 00-0065	SF	5/8" Thick, R0.54, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Cold Adhesive Applied.....	3.45
07 22 16 00-0066		Cold Adhesive Applied, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation (07 22 16 00-0002)	
		Note: Includes a polyisocyanurate foam core bonded to a 7/16" oriented strand board (OSB) facer.	
07 22 16 00-0067	SF	1.5" Thick, R6.2, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	5.35
07 22 16 00-0068	SF	2" Thick, R9.1, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	5.61
07 22 16 00-0069	SF	2.5" Thick, R12.0, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	5.98
07 22 16 00-0070	SF	3" Thick, R15.0, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	6.20
07 22 16 00-0071	SF	3.5" Thick, R18.0, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	6.73
07 22 16 00-0072	SF	4" Thick, R21.1, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	6.96
07 22 16 00-0073	SF	4.5" Thick, R24.2, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	7.31
07 22 16 00-0074		Cold Adhesive Applied, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation (07 22 16 00-0002)	
		Note: Includes a polyisocyanurate foam core bonded to a 7/16" oriented strand board (OSB) facer.	
07 22 16 00-0075	SF	2.5" Thick, R5.7, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	5.40
07 22 16 00-0076	SF	3" Thick, R8.6, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	5.86
07 22 16 00-0077	SF	3.5" Thick, R11.4, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	6.43
07 22 16 00-0078	SF	4" Thick, R14.4, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	6.79
07 22 16 00-0079	SF	4.5" Thick, R17.4, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	7.26
07 22 16 00-0080	SF	5" Thick, R20.5, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	7.76
07 22 16 00-0081	SF	5.5" Thick, R23.6, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Cold Adhesive Applied.....	8.67
07 22 16 00-0082		Hot-Mopped Rigid Board Roofing Insulation (07 22 16 00-0001)	
07 22 16 00-0083		Hot-Mopped, High-Density Fiberboard, Roof Board Insulation (07 22 16 00-0082)	
07 22 16 00-0084	SF	1/2" Thick, R1.3, High-Density Fiberboard, Roof Board Insulation, Hot-Mopped.....	2.31
07 22 16 00-0085	SF	25/32" Thick, R1.9, High-Density Fiberboard, Roof Board Insulation, Hot-Mopped.....	2.74
07 22 16 00-0086	SF	1" Thick, R2.5, High-Density Fiberboard, Roof Board Insulation, Hot-Mopped.....	3.18
07 22 16 00-0087	SF	1-1/2" Thick, R3.8, High-Density Fiberboard, Roof Board Insulation, Hot-Mopped.....	3.96
07 22 16 00-0088	SF	2" Thick, R5, High-Density Fiberboard, Roof Board Insulation, Hot-Mopped.....	4.74
07 22 16 00-0089		Hot-Mopped, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation (07 22 16 00-0082)	
07 22 16 00-0090	SF	1/2" Thick, R1.3, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation, Hot-Mopped.....	2.55
07 22 16 00-0091	SF	1" Thick, R2.6, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation, Hot-Mopped.....	3.05
07 22 16 00-0092		Hot-Mopped, Perlite, Roof Board Insulation (07 22 16 00-0082)	
07 22 16 00-0093	SF	1/2" Thick, R1.32, Perlite, Roof Board Insulation, Hot-Mopped.....	2.23
07 22 16 00-0094	SF	3/4" Thick, R2.08, Perlite, Roof Board Insulation, Hot-Mopped.....	2.47
07 22 16 00-0095	SF	1" Thick, R2.78, Perlite, Roof Board Insulation, Hot-Mopped.....	2.78
07 22 16 00-0096	SF	1-1/2" Thick, R4.17, Perlite, Roof Board Insulation, Hot-Mopped.....	3.51
07 22 16 00-0097	SF	2" Thick, R5.56, Perlite, Roof Board Insulation, Hot-Mopped.....	3.98



Thermal And Moisture Protection			07
Thermal Protection			07 20
Roof and Deck Insulation			07 22

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0098 Hot-Mopped, Basalt Mineral Wool, Roof Board Insulation <small>(07 22 16 00-0082)</small>		
07 22 16 00-0099 SF 1" Thick, R3.5, Basalt Mineral Wool, Roof Board Insulation, Hot-Mopped.....	3.18	
07 22 16 00-0100 SF 2" Thick, R7.4, Basalt Mineral Wool, Roof Board Insulation, Hot-Mopped.....	4.35	
07 22 16 00-0101 SF 3" Thick, R11.1, Basalt Mineral Wool, Roof Board Insulation, Hot-Mopped.....	5.77	
07 22 16 00-0102 Hot-Mopped, Foam Glass (Cellular Glass), Roof Board Insulation <small>(07 22 16 00-0082)</small>		
07 22 16 00-0103 SF 1-1/2" Thick, R5.16, Foam Glass (Cellular Glass), Roof Board Insulation, Hot-Mopped.....	6.12	
07 22 16 00-0104 SF 2" Thick, R6.88, Foam Glass (Cellular Glass), Roof Board Insulation, Hot-Mopped.....	7.27	
07 22 16 00-0105 SF 2-3/4" Thick, R8.17, Foam Glass (Cellular Glass), Roof Board Insulation, Hot-Mopped.....	9.56	
07 22 16 00-0106 SF 3-1/2" Thick, R12.04, Foam Glass (Cellular Glass), Roof Board Insulation, Hot-Mopped.....	12.46	
07 22 16 00-0107 Hot-Mopped, Molded Expanded Polystyrene, Roof Board Insulation <small>(07 22 16 00-0082)</small>		
07 22 16 00-0108 SF 3/8" Thick, R1.44, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	1.89	
07 22 16 00-0109 SF 1/2" Thick, R1.93, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	1.97	
07 22 16 00-0110 SF 3/4" Thick, R2.89, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	2.14	
07 22 16 00-0111 SF 1" Thick, R3.85, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	2.51	
07 22 16 00-0112 SF 2" Thick, R7.70, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	3.62	
07 22 16 00-0113 SF 3" Thick, R11.55, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	4.74	
07 22 16 00-0114 SF 4" Thick, R15.40, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	5.84	
07 22 16 00-0115 SF 5" Thick, R19.25, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	6.96	
07 22 16 00-0116 SF 6" Thick, R23.1, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Hot-Mopped.....	8.06	
07 22 16 00-0117 Hot-Mopped, Extruded Polystyrene, Roof Board Insulation <small>(07 22 16 00-0082)</small>		
Note: 15 PSI compressive strength.		
07 22 16 00-0118 SF 3/4" Thick, R3.7, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	2.99	
For 25 PSI Compressive Strength, Add	0.27	
For 40 PSI Compressive Strength, Add	0.64	
For 60 PSI Compressive Strength, Add	1.05	
For 115 PSI Compressive Strength, Add	4.47	
07 22 16 00-0119 SF 1" Thick, R5.0, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	3.07	
For 25 PSI Compressive Strength, Add	0.28	
For 40 PSI Compressive Strength, Add	0.67	
For 60 PSI Compressive Strength, Add	1.09	
For 115 PSI Compressive Strength, Add	4.65	
07 22 16 00-0120 SF 1-1/2" Thick, R7.5, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	3.95	
For 25 PSI Compressive Strength, Add	0.42	
For 40 PSI Compressive Strength, Add	1.00	
For 60 PSI Compressive Strength, Add	1.60	
For 100 PSI Compressive Strength, Add	2.05	
For 115 PSI Compressive Strength, Add	6.92	
07 22 16 00-0121 SF 2" Thick, R10.0, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	4.72	
For 25 PSI Compressive Strength, Add	0.52	
For 40 PSI Compressive Strength, Add	1.23	
For 60 PSI Compressive Strength, Add	1.95	
For 115 PSI Compressive Strength, Add	8.47	
07 22 16 00-0122 SF 2-1/2" Thick, R12.5, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	17.62	
For 25 PSI Compressive Strength, Add	0.67	
For 40 PSI Compressive Strength, Add	1.60	
For 60 PSI Compressive Strength, Add	3.11	
For 100 PSI Compressive Strength, Add	3.83	
For 115 PSI Compressive Strength, Add	12.16	
07 22 16 00-0123 SF 3" Thick, R15.0, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	6.11	
For 25 PSI Compressive Strength, Add	0.76	
For 40 PSI Compressive Strength, Add	1.79	
For 60 PSI Compressive Strength, Add	2.81	
For 115 PSI Compressive Strength, Add	12.27	
07 22 16 00-0124 SF 4" Thick, R20.0, Extruded Polystyrene, Roof Board Insulation, Hot-Mopped.....	6.87	
For 25 PSI Compressive Strength, Add	0.87	
For 40 PSI Compressive Strength, Add	2.07	
For 60 PSI Compressive Strength, Add	3.24	
For 115 PSI Compressive Strength, Add	14.17	
07 22 16 00-0125 Hot-Mopped, Polyisocyanurate Board Roofing Insulation <small>(07 22 16 00-0082)</small>		
07 22 16 00-0126 SF 3/4" Thick, R4.3, Polyisocyanurate, Roof Board Insulation, Hot-Mopped.....	2.66	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.14	
07 22 16 00-0127 SF 1" Thick, R5.7, Polyisocyanurate, Roof Board Insulation, Hot-Mopped.....	2.77	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.15	
07 22 16 00-0128 SF 1-1/2" Thick, R8.6, Polyisocyanurate, Roof Board Insulation, Hot-Mopped.....	2.94	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.16	
07 22 16 00-0129 SF 2" Thick, R11.4, Polyisocyanurate, Roof Board Insulation, Hot-Mopped.....	3.40	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.21	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 22 16 00-0130	SF	2-1/2"	Thick, R14.4, Polyisocyanurate, Roof Board Insulation, Hot-Mopped <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	3.88	
				0.36	
				0.25	
07 22 16 00-0131	SF	3"	Thick, R17.4, Polyisocyanurate, Roof Board Insulation, Hot-Mopped <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	4.34	
				0.36	
				0.30	
07 22 16 00-0132	SF	3-1/2"	Thick, R20.5, Polyisocyanurate, Roof Board Insulation, Hot-Mopped <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	4.69	
				0.36	
				0.34	
07 22 16 00-0133	SF	4"	Thick, R23.6, Polyisocyanurate, Roof Board Insulation, Hot-Mopped <i>For Foil Facer, Add</i> <i>For 25 PSI Compressive Strength, Add</i>	5.27	
				0.36	
				0.39	

07 22 16 00-0134 Hot-Mopped, Gypsum-Fiber, Roof Board Insulation (USG Securock) (07 22 16 00-0082)

07 22 16 00-0135	SF	1/4"	Thick, R0.2, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Hot-Mopped	2.89	
07 22 16 00-0136	SF	3/8"	Thick, R0.3, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Hot-Mopped	3.08	
07 22 16 00-0137	SF	1/2"	Thick, R0.5, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Hot-Mopped	3.21	
07 22 16 00-0138	SF	5/8"	Thick, R0.6, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Hot-Mopped	3.27	

07 22 16 00-0139 Hot-Mopped, Glass-Mat, Roof Board Insulation (USG Securock) (07 22 16 00-0082)

07 22 16 00-0140	SF	1/4"	Thick, R0.36, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Hot-Mopped	2.83	
07 22 16 00-0141	SF	1/2"	Thick, R0.53, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Hot-Mopped	3.11	
07 22 16 00-0142	SF	5/8"	Thick, R0.54, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Hot-Mopped	3.18	

07 22 16 00-0143 Mechanically Fastened Rigid Board Roofing Insulation (07 22 16 00-0001)

Note: Mechanically fastened to wood or steel.

07 22 16 00-0144 Mechanically Fastened, High-Density Fiberboard, Roof Board Insulation (07 22 16 00-0143)

Note: Mechanically fastened to wood or steel.

07 22 16 00-0145	SF	1/2"	Thick, R1.3, High-Density Fiberboard, Roof Board Insulation, Mechanically Fastened <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	2.41	
				1.67	
				2.21	
				0.78	
				2.63	
				2.74	
				1.17	
				3.73	
				4.11	
07 22 16 00-0146	SF	25/32"	Thick, R1.9, High-Density Fiberboard, Roof Board Insulation, Mechanically Fastened <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	2.84	
				1.67	
				2.21	
				0.78	
				2.66	
				2.74	
				1.17	
				3.76	
				4.11	
07 22 16 00-0147	SF	1"	Thick, R2.5, High-Density Fiberboard, Roof Board Insulation, Mechanically Fastened <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	3.27	
				1.67	
				2.21	
				0.78	
				2.69	
				2.74	
				1.17	
				3.79	
				4.11	
07 22 16 00-0148	SF	1-1/2"	Thick, R3.8, High-Density Fiberboard, Roof Board Insulation, Mechanically Fastened <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.14	
				1.72	
				2.21	
				0.96	
				2.35	
				2.74	
				1.44	
				3.52	
				4.11	
07 22 16 00-0149	SF	2"	Thick, R5, High-Density Fiberboard, Roof Board Insulation, Mechanically Fastened <i>For Mechanically Fastened To Concrete, Add</i> <i>For Mechanically Fastened To Gypsum, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i> <i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i> <i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.90	
				1.72	
				2.14	
				0.96	
				2.35	
				2.77	
				1.44	
				3.52	
				4.15	

07 22 16 00-0150 Mechanically Fastened, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation (07 22 16 00-0143)

Note: Mechanically fastened to wood or steel.



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0151 SF 1/2" Thick, R1.3, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation, Mechanically Fastened	2.64	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.69	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.79	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0152 SF 1" Thick, R2.6, Wood Fiber (Cellulosic-Fiber), Roof Board Insulation, Mechanically Fastened	3.14	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.69	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.79	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0153 Mechanically Fastened, Perlite, Roof Board Insulation <small>(07 22 16 00-0143)</small>		
Note: Mechanically fastened to wood or steel.		
07 22 16 00-0154 SF 1/2" Thick, R1.32, Perlite, Roof Board Insulation, Mechanically Fastened	2.34	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.58	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.68	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0155 SF 3/4" Thick, R2.08, Perlite, Roof Board Insulation, Mechanically Fastened	2.59	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.58	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.68	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0156 SF 1" Thick, R2.78, Perlite, Roof Board Insulation, Mechanically Fastened	2.90	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.58	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.68	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0157 SF 1-1/2" Thick, R4.17, Perlite, Roof Board Insulation, Mechanically Fastened	3.73	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0158 SF 2" Thick, R5.56, Perlite, Roof Board Insulation, Mechanically Fastened	4.20	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 22 16 00-0159 Mechanically Fastened, Basalt Mineral Wool, Roof Board Insulation <small>(07 22 16 00-0143)</small>		
Note: Mechanically fastened to wood or steel.		
07 22 16 00-0160 SF 1" Thick, R3.5, Basalt Mineral Wool, Roof Board Insulation, Mechanically Fastened	3.30	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.58	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.68	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0161	SF 2" Thick, R7.4, Basalt Mineral Wool, Roof Board Insulation, Mechanically Fastened.....	4.57
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15
07 22 16 00-0162	SF 3" Thick, R11.1, Basalt Mineral Wool, Roof Board Insulation, Mechanically Fastened.....	6.06
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.90
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.00
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.15
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43

07 22 16 00-0163 Mechanically Fastened, Foam Glass (Cellular Glass), Roof Board Insulation (07 22 16 00-0143)

Note: Mechanically fastened to wood or steel.

07 22 16 00-0164	SF 1-1/2" Thick, R5.16, Foam Glass (Cellular Glass), Roof Board Insulation, Mechanically Fastened.....	6.34
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0165	SF 2" Thick, R6.88, Foam Glass (Cellular Glass), Roof Board Insulation, Mechanically Fastened.....	7.48
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15
07 22 16 00-0166	SF 2-3/4" Thick, R8.17, Foam Glass (Cellular Glass), Roof Board Insulation, Mechanically Fastened.....	9.86
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.90
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.00
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.15
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43
07 22 16 00-0167	SF 3-1/2" Thick, R12.04, Foam Glass (Cellular Glass), Roof Board Insulation, Mechanically Fastened.....	12.92
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.16
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.45
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.96

07 22 16 00-0168 Mechanically Fastened, Molded Expanded Polystyrene, Roof Board Insulation (07 22 16 00-0143)

Note: Mechanically fastened to wood or steel.

07 22 16 00-0169	SF 3/8" Thick, R1.44, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened.....	2.02
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.53
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.63
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0170	SF 1/2" Thick, R1.93, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened.....	2.10
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.53
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.63
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11



Thermal And Moisture Protection		07
Thermal Protection		07 20
Roof and Deck Insulation		07 22

07

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0171	SF	3/4"	Thick, R2.89, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened.....	2.38	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.53	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.63	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0172	SF	1"	Thick, R3.85, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened	2.65	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.53	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.63	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0173	SF	2"	Thick, R7.70, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened	3.86	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 22 16 00-0174	SF	3"	Thick, R11.55, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened	5.06	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.85	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.00	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.10	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 22 16 00-0175	SF	4"	Thick, R15.40, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened	6.33	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	
07 22 16 00-0176	SF	5"	Thick, R19.25, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened	7.64	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.20	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.66	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.30	
07 22 16 00-0177	SF	6"	Thick, R23.1, Molded Expanded Polystyrene, Roof Board Insulation (MEPS), Mechanically Fastened	9.24	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.94	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.70	
07 22 16 00-0178			Mechanically Fastened, Extruded Polystyrene, Roof Board Insulation <small>(07 22 16 00-0143)</small>		
			<small>Note: 15 PSI compressive strength. Mechanically fastened to wood or steel.</small>		
07 22 16 00-0179	SF	3/4"	Thick, R3.7, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened	3.12	
			<i>For 25 PSI Compressive Strength, Add</i>	0.31	
			<i>For 40 PSI Compressive Strength, Add</i>	0.74	
			<i>For 60 PSI Compressive Strength, Add</i>	1.18	
			<i>For 115 PSI Compressive Strength, Add</i>	5.10	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
			<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.58	
			<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.68	
			<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0180	SF 1" Thick, R5.0, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened.....	3.20
	<i>For 25 PSI Compressive Strength, Add</i>	0.32
	<i>For 40 PSI Compressive Strength, Add</i>	0.76
	<i>For 60 PSI Compressive Strength, Add</i>	1.23
	<i>For 115 PSI Compressive Strength, Add</i>	5.28
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.58
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.68
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0181	SF 1-1/2" Thick, R7.5, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened	4.17
	<i>For 25 PSI Compressive Strength, Add</i>	0.48
	<i>For 40 PSI Compressive Strength, Add</i>	1.13
	<i>For 60 PSI Compressive Strength, Add</i>	1.79
	<i>For 100 PSI Compressive Strength, Add</i>	2.29
	<i>For 115 PSI Compressive Strength, Add</i>	7.78
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0182	SF 2" Thick, R10.0, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened.....	4.80
	<i>For 25 PSI Compressive Strength, Add</i>	0.57
	<i>For 40 PSI Compressive Strength, Add</i>	1.36
	<i>For 60 PSI Compressive Strength, Add</i>	2.14
	<i>For 115 PSI Compressive Strength, Add</i>	9.32
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.14
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15
07 22 16 00-0183	SF 2-1/2" Thick, R12.5, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened	5.86
	<i>For 25 PSI Compressive Strength, Add</i>	0.74
	<i>For 40 PSI Compressive Strength, Add</i>	1.76
	<i>For 60 PSI Compressive Strength, Add</i>	2.75
	<i>For 100 PSI Compressive Strength, Add</i>	3.54
	<i>For 115 PSI Compressive Strength, Add</i>	12.05
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.17
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.89
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.89
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.14
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.34
07 22 16 00-0184	SF 3" Thick, R15.0, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened.....	6.40
	<i>For 25 PSI Compressive Strength, Add</i>	0.82
	<i>For 40 PSI Compressive Strength, Add</i>	1.96
	<i>For 60 PSI Compressive Strength, Add</i>	3.05
	<i>For 115 PSI Compressive Strength, Add</i>	13.36
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.90
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.00
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.15
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43
07 22 16 00-0185	SF 4" Thick, R20.0, Extruded Polystyrene, Roof Board Insulation, Mechanically Fastened.....	7.34
	<i>For 25 PSI Compressive Strength, Add</i>	0.97
	<i>For 40 PSI Compressive Strength, Add</i>	2.30
	<i>For 60 PSI Compressive Strength, Add</i>	3.58
	<i>For 115 PSI Compressive Strength, Add</i>	15.70
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67

07 22 16 00-0186 Mechanically Fastened, Polyisocyanurate Board Roofing Insulation (07 22 16 00-0143)
Note: Mechanically fastened to wood or steel.



Thermal And Moisture Protection			07
Thermal Protection			07 20
Roof and Deck Insulation			07 22

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 22 16 00-0187 SF 3/4" Thick, R4.3, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	2.78	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.16	
For Mechanically Fastened To Concrete, Add	1.67	
For Mechanically Fastened To Gypsum, Add	2.21	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	0.78	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.58	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	2.74	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.17	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	3.68	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.11	
07 22 16 00-0188 SF 1" Thick, R5.7, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	2.89	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.17	
For Mechanically Fastened To Concrete, Add	1.67	
For Mechanically Fastened To Gypsum, Add	2.21	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	0.78	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.58	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	2.74	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.17	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	3.68	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.11	
07 22 16 00-0189 SF 1-1/2" Thick, R8.6, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	3.16	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.20	
For Mechanically Fastened To Concrete, Add	1.72	
For Mechanically Fastened To Gypsum, Add	2.21	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	0.96	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.35	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	2.74	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.44	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	3.52	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.11	
07 22 16 00-0190 SF 2" Thick, R11.4, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	3.62	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.24	
For Mechanically Fastened To Concrete, Add	1.72	
For Mechanically Fastened To Gypsum, Add	2.14	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	0.96	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.35	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	2.77	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.44	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	3.52	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.15	
07 22 16 00-0191 SF 2-1/2" Thick, R14.4, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	4.17	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.29	
For Mechanically Fastened To Concrete, Add	1.77	
For Mechanically Fastened To Gypsum, Add	2.17	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	1.09	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.90	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	2.89	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.65	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	4.15	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.34	
07 22 16 00-0192 SF 3" Thick, R17.4, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	4.64	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.34	
For Mechanically Fastened To Concrete, Add	1.77	
For Mechanically Fastened To Gypsum, Add	2.23	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	1.09	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.90	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	3.00	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.65	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	4.15	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.43	
07 22 16 00-0193 SF 3-1/2" Thick, R20.5, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	5.29	
For Foil Facer, Add	0.36	
For 25 PSI Compressive Strength, Add	0.40	
For Mechanically Fastened To Concrete, Add	1.82	
For Mechanically Fastened To Gypsum, Add	2.16	
For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add	1.30	
For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add	2.71	
For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add	3.46	
For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add	1.95	
For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add	4.05	
For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add	4.97	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0194	SF 4" Thick, R23.6, Polyisocyanurate, Roof Board Insulation, Mechanically Fastened	5.74
	<i>For Foil Facer, Add</i>	0.36
	<i>For 25 PSI Compressive Strength, Add</i>	0.45
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67
07 22 16 00-0195	Mechanically Fastened, High-Density Polyisocyanurate Cover Board And Roofing Insulation (07 22 16 00-0143)	
	Note: Mechanically fastened to wood or steel.	
07 22 16 00-0196	SF 1/2" Thick, R2.5, High-Density Polyisocyanurate Cover Board And Roofing Insulation, Mechanically Fastened	3.17
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0197	Mechanically Fastened, Gypsum-Fiber, Roof Board Insulation (USG Securock) (07 22 16 00-0143)	
	Note: Mechanically fastened to wood or steel.	
07 22 16 00-0198	SF 1/4" Thick, R0.2, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Mechanically Fastened.....	3.00
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0199	SF 3/8" Thick, R0.3, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Mechanically Fastened.....	3.18
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0200	SF 1/2" Thick, R0.5, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Mechanically Fastened.....	3.31
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0201	SF 5/8" Thick, R0.6, Gypsum-Fiber, Roof Board Insulation (USG Securock Gypsum), Mechanically Fastened.....	3.38
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0202	Mechanically Fastened, Glass-Mat, Roof Board Insulation (USG Securock) (07 22 16 00-0143)	
	Note: Mechanically fastened to wood or steel.	
07 22 16 00-0203	SF 1/4" Thick, R0.36, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Mechanically Fastened.....	2.93
	<i>For Mechanically Fastened To Concrete, Add</i>	1.67
	<i>For Mechanically Fastened To Gypsum, Add</i>	2.21
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63
	<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73
	<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0204 SF 1/2" Thick, R0.53, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Mechanically Fastened.....	3.22	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0205 SF 5/8" Thick, R0.54, Glass-Mat, Roof Board Insulation (USG Securock Glass-Mat), Mechanically Fastened.....	3.28	
<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.63	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.73	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0206 Mechanically Fastened, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation <small>07 22 16 00-0143</small>		
Note: Includes a polyisocyanurate foam core bonded to a 7/16" oriented strand board (OSB) facer. Mechanically fastened to wood or steel.		
07 22 16 00-0207 SF 1.5" Thick, R6.2, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened	5.28	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 22 16 00-0208 SF 2" Thick, R9.1, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened	5.54	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.14	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.77	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.15	
07 22 16 00-0209 SF 2.5" Thick, R12.0, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened	6.01	
<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.17	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.09	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.34	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	
07 22 16 00-0210 SF 3" Thick, R15.0, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened	6.23	
<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.09	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.00	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.34	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 22 16 00-0211 SF 3.5" Thick, R18.0, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened	6.93	
<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.16	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.66	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.17	
07 22 16 00-0212 SF 4" Thick, R21.1, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened	7.15	
<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
<i>For Mechanically Fastened To Gypsum, Add</i>	2.23	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0213	SF	4.5" Thick, R24.2, Polyisocyanurate And Oriented Strand Board, Nailbase Roof Board Insulation, Mechanically Fastened.....	7.70
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.95
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.59
07 22 16 00-0214		Mechanically Fastened, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation (07 22 16 00-0143)	
		Note: Includes a polyisocyanurate foam core bonded to a 7/16" oriented strand board (OSB) facer. Mechanically fastened to wood or steel.	
07 22 16 00-0215	SF	2.5" Thick, R5.7, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	5.43
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.17
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.08
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.89
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.33
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.34
07 22 16 00-0216	SF	3" Thick, R8.6, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	5.89
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.08
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.00
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.33
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.43
07 22 16 00-0217	SF	3.5" Thick, R11.4, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	6.82
		<i>For Mechanically Fastened To Concrete, Add</i>	1.82
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.16
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.64
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.15
07 22 16 00-0218	SF	4" Thick, R14.4, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	6.98
		<i>For Mechanically Fastened To Concrete, Add</i>	1.82
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.12
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.67
07 22 16 00-0219	SF	4.5" Thick, R17.4, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	7.65
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.90
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.54
07 22 16 00-0220	SF	5" Thick, R20.5, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	8.15
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	3.90
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.54
07 22 16 00-0221	SF	5.5" Thick, R23.6, Polyisocyanurate And Oriented Strand Board With Air Vent Spacer Strips, Nailbase Roof Board Insulation, Mechanically Fastened.....	9.29
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	4.22
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	5.98

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 22 16 00-0222	Rigid Board Tapered Roofing Insulation <small>(07 22 16)</small> Note: Includes tapered board and filler board required to maintain slope starting at 1/2" minimum thickness. Excludes base layer of board, if required. Average thickness and average R-value of tapered system excludes thickness and R-value of base layer insulation and/or cover board. See CSI section 07 22 16 00-0466 for demolition of insulation board.		
07 22 16 00-0223	Cold Adhesive Applied Rigid Board Tapered Roofing Insulation <small>(07 22 16 00-0223)</small>		
07 22 16 00-0224	Cold Adhesive Applied, Tapered Polyisocyanurate Board <small>(07 22 16 00-0224)</small> Note: Includes polyurethane adhesive.		
07 22 16 00-0225	Cold Adhesive Applied, 1/8" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0224)</small>		
07 22 16 00-0226	SF 2.25" Average Thickness (12.8 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	5.17	
	For 25 PSI Compressive Strength, Add	0.34	
07 22 16 00-0227	SF 2.75" Average Thickness (15.7 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	7.19	
	For 25 PSI Compressive Strength, Add	0.40	
07 22 16 00-0228	SF 3.25" Average Thickness (18.5 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	7.80	
	For 25 PSI Compressive Strength, Add	0.46	
07 22 16 00-0229	SF 3.75" Average Thickness (21.4 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	8.40	
	For 25 PSI Compressive Strength, Add	0.52	
07 22 16 00-0230	SF 4.25" Average Thickness (24.2 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	9.01	
	For 25 PSI Compressive Strength, Add	0.58	
07 22 16 00-0231	SF 4.75" Average Thickness (27.1 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	11.05	
	For 25 PSI Compressive Strength, Add	0.65	
07 22 16 00-0232	SF 5.25" Average Thickness (30.0 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	11.65	
	For 25 PSI Compressive Strength, Add	0.71	
07 22 16 00-0233	SF 5.75" Average Thickness (32.8 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	12.26	
	For 25 PSI Compressive Strength, Add	0.77	
07 22 16 00-0234	SF 6.25" Average Thickness (35.6 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	12.86	
	For 25 PSI Compressive Strength, Add	0.83	
07 22 16 00-0235	SF 6.75" Average Thickness (38.5 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	14.89	
	For 25 PSI Compressive Strength, Add	0.89	
07 22 16 00-0236	Cold Adhesive Applied, 1/4" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0224)</small>		
07 22 16 00-0237	SF 2" Average Thickness (11.4 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	4.87	
	For 25 PSI Compressive Strength, Add	0.31	
07 22 16 00-0238	SF 3" Average Thickness (17.1 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	7.50	
	For 25 PSI Compressive Strength, Add	0.43	
07 22 16 00-0239	SF 4" Average Thickness (22.8 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	8.70	
	For 25 PSI Compressive Strength, Add	0.55	
07 22 16 00-0240	SF 5" Average Thickness (28.5 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	11.35	
	For 25 PSI Compressive Strength, Add	0.68	
07 22 16 00-0241	SF 6" Average Thickness (34.2 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	12.56	
	For 25 PSI Compressive Strength, Add	0.80	
07 22 16 00-0242	SF 7" Average Thickness (39.9 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	15.19	
	For 25 PSI Compressive Strength, Add	0.92	
07 22 16 00-0243	Cold Adhesive Applied, 1/2" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0224)</small>		
07 22 16 00-0244	SF 3.5" Average Thickness (20.0 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	8.10	
	For 25 PSI Compressive Strength, Add	0.49	
07 22 16 00-0245	SF 5.5" Average Thickness (31.4 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	11.95	
	For 25 PSI Compressive Strength, Add	0.74	
07 22 16 00-0246	SF 7.5" Average Thickness (42.8 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	15.80	
	For 25 PSI Compressive Strength, Add	0.98	
07 22 16 00-0247	SF 9.5" Average Thickness (54.2 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Cold Adhesive Applied	19.65	
	For 25 PSI Compressive Strength, Add	1.22	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0248	Cold Adhesive Applied, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0223) Note: Includes polyurethane adhesive.	
07 22 16 00-0249	Cold Adhesive Applied, 1/8" Slope, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0248)	
07 22 16 00-0250	SF 2.25" Average Thickness (10.13 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	4.49
07 22 16 00-0251	SF 2.75" Average Thickness (12.38 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	6.52
07 22 16 00-0252	SF 3.25" Average Thickness (14.63 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	6.98
07 22 16 00-0253	SF 3.75" Average Thickness (16.88 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	7.43
07 22 16 00-0254	SF 4.25" Average Thickness (19.13 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	7.88
07 22 16 00-0255	SF 4.75" Average Thickness (21.38 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	9.93
07 22 16 00-0256	SF 5.25" Average Thickness (23.63 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	10.38
07 22 16 00-0257	SF 5.75" Average Thickness (25.88 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	10.83
07 22 16 00-0258	SF 6.25" Average Thickness (28.13 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	11.29
07 22 16 00-0259	SF 6.75" Average Thickness (30.38 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	13.33
07 22 16 00-0260	Cold Adhesive Applied, 1/4" Slope, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0248)	
07 22 16 00-0261	SF 2" Average Thickness (9 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	4.27
07 22 16 00-0262	SF 3" Average Thickness (13.5 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	6.75
07 22 16 00-0263	SF 4" Average Thickness (18 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	7.66
07 22 16 00-0264	SF 5" Average Thickness (22.5 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	10.15
07 22 16 00-0265	SF 6" Average Thickness (27 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	11.06
07 22 16 00-0266	SF 7" Average Thickness (31.5 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	13.55
07 22 16 00-0267	Cold Adhesive Applied, 1/2" Slope, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0248)	
07 22 16 00-0268	SF 3.5" Average Thickness (15.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	7.20
07 22 16 00-0269	SF 5.5" Average Thickness (24.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	10.61
07 22 16 00-0270	SF 7.5" Average Thickness (33.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	14.01
07 22 16 00-0271	SF 9.5" Average Thickness (42.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Cold Adhesive Applied.....	17.86
07 22 16 00-0272	Cold Adhesive Applied, Tapered Extruded Polystyrene Board (XEPS) (07 22 16 00-0223) Note: Includes polyurethane adhesive.	
07 22 16 00-0273	Cold Adhesive Applied, 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS) (07 22 16 00-0272)	
07 22 16 00-0274	SF 2.25" Average Thickness (12.38 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	5.04
07 22 16 00-0275	SF 2.75" Average Thickness (15.125 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	7.06
07 22 16 00-0276	SF 3.25" Average Thickness (17.88 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	7.63
07 22 16 00-0277	SF 3.75" Average Thickness (20.63 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	8.21
07 22 16 00-0278	SF 4.25" Average Thickness (23.38 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	8.78
07 22 16 00-0279	SF 4.75" Average Thickness (26.13 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	10.82
07 22 16 00-0280	SF 5.25" Average Thickness (28.88 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	11.40
07 22 16 00-0281	SF 5.75" Average Thickness (31.63 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	11.97
07 22 16 00-0282	SF 6.25" Average Thickness (34.38 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	12.55
07 22 16 00-0283	SF 6.75" Average Thickness (37.13 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	14.58



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 22 16 00-0284	Cold Adhesive Applied, 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS) <small>(07 22 16 00-0272)</small>			
07 22 16 00-0285	SF		2" Average Thickness (11 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	4.75
07 22 16 00-0286	SF		3" Average Thickness (16.5 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	7.35
07 22 16 00-0287	SF		4" Average Thickness (22 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	8.49
07 22 16 00-0288	SF		5" Average Thickness (27.5 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	11.11
07 22 16 00-0289	SF		6" Average Thickness (33 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	12.26
07 22 16 00-0290	SF		7" Average Thickness (38.5 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	14.86

07 22 16 00-0291	Cold Adhesive Applied, 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS) <small>(07 22 16 00-0272)</small>			
07 22 16 00-0292	SF		3.5" Average Thickness (19.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	7.92
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
07 22 16 00-0293	SF		5.5" Average Thickness (30.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	11.68
07 22 16 00-0294	SF		7.5" Average Thickness (41.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	15.44
07 22 16 00-0295	SF		9.5" Average Thickness (52.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Cold Adhesive Applied.....	19.20

07 22 16 00-0296 Cold Adhesive Applied, Tapered Perlite Board (07 22 16 00-0223)
 Note: Includes polyurethane adhesive.

07 22 16 00-0297	Cold Adhesive Applied, 1/8" Slope, Tapered Perlite Board <small>(07 22 16 00-0296)</small>			
07 22 16 00-0298	SF		2.25" Average Thickness (6.26 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	7.62
07 22 16 00-0299	SF		2.75" Average Thickness (7.65 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	8.87
07 22 16 00-0300	SF		3.25" Average Thickness (9.04 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	10.20
07 22 16 00-0301	SF		3.75" Average Thickness (10.43 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	10.70
07 22 16 00-0302	SF		4.25" Average Thickness (11.82 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	12.03
07 22 16 00-0303	SF		4.75" Average Thickness (13.21 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	13.28
07 22 16 00-0304	SF		5.25" Average Thickness (14.60 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	14.62
07 22 16 00-0305	SF		5.75" Average Thickness (15.99 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	15.11
07 22 16 00-0306	SF		6.25" Average Thickness (17.38 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	16.44
07 22 16 00-0307	SF		6.75" Average Thickness (18.77 Average R-Value), 1/8" Slope, Tapered Perlite Board, Cold Adhesive Applied	17.71

07 22 16 00-0308	Cold Adhesive Applied, 1/4" Slope, Tapered Perlite Board <small>(07 22 16 00-0296)</small>			
07 22 16 00-0309	SF		2" Average Thickness (5.56 Average R-Value), 1/4" Slope, Tapered Perlite Board, Cold Adhesive Applied	6.95
07 22 16 00-0310	SF		3" Average Thickness (8.34 Average R-Value), 1/4" Slope, Tapered Perlite Board, Cold Adhesive Applied	9.54
07 22 16 00-0311	SF		4" Average Thickness (11.12 Average R-Value), 1/4" Slope, Tapered Perlite Board, Cold Adhesive Applied	11.36
07 22 16 00-0312	SF		5" Average Thickness (13.9 Average R-Value), 1/4" Slope, Tapered Perlite Board, Cold Adhesive Applied	13.95
07 22 16 00-0313	SF		6" Average Thickness (16.68 Average R-Value), 1/4" Slope, Tapered Perlite Board, Cold Adhesive Applied	15.78
07 22 16 00-0314	SF		7" Average Thickness (19.46 Average R-Value), 1/4" Slope, Tapered Perlite Board, Cold Adhesive Applied	18.37

07 22 16 00-0315	Cold Adhesive Applied, 1/2" Slope, Tapered Perlite Board <small>(07 22 16 00-0296)</small>			
07 22 16 00-0316	SF		3.5" Average Thickness (9.73 Average R-Value), 1/2" Slope, Tapered Perlite Board, Cold Adhesive Applied	10.87
07 22 16 00-0317	SF		5.5" Average Thickness (15.29 Average R-Value), 1/2" Slope, Tapered Perlite Board, Cold Adhesive Applied	15.28
07 22 16 00-0318	SF		7.5" Average Thickness (20.85 Average R-Value), 1/2" Slope, Tapered Perlite Board, Cold Adhesive Applied	19.71
07 22 16 00-0319	SF		9.5" Average Thickness (26.41 Average R-Value), 1/2" Slope, Tapered Perlite Board, Cold Adhesive Applied	24.12

07 22 16 00-0320 Hot-Mopped Rigid Board Tapered Roofing Insulation (07 22 16 00-0222)

07 22 16 00-0321 Hot-Mopped, Tapered Polyisocyanurate Board (07 22 16 00-0320)

07 22 16 00-0322	Hot-Mopped, 1/8" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0321)</small>			
07 22 16 00-0323	SF		2.25" Average Thickness (12.8 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	4.77
			<i>For 25 PSI Compressive Strength, Add</i>	0.30
07 22 16 00-0324	SF		2.75" Average Thickness (15.7 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	6.76
			<i>For 25 PSI Compressive Strength, Add</i>	0.33
07 22 16 00-0325	SF		3.25" Average Thickness (18.5 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	7.36
			<i>For 25 PSI Compressive Strength, Add</i>	0.39
07 22 16 00-0326	SF		3.75" Average Thickness (21.4 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	7.63
			<i>For 25 PSI Compressive Strength, Add</i>	0.45
07 22 16 00-0327	SF		4.25" Average Thickness (24.2 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	8.57
			<i>For 25 PSI Compressive Strength, Add</i>	0.51
07 22 16 00-0328	SF		4.75" Average Thickness (27.1 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	10.39
			<i>For 25 PSI Compressive Strength, Add</i>	0.53
07 22 16 00-0329	SF		5.25" Average Thickness (30.0 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped	10.99
			<i>For 25 PSI Compressive Strength, Add</i>	0.59

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0330	SF	5.75" Average Thickness (32.8 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	11.60	
		<i>For 25 PSI Compressive Strength, Add</i>	0.66	
07 22 16 00-0331	SF	6.25" Average Thickness (35.6 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	12.20	
		<i>For 25 PSI Compressive Strength, Add</i>	0.72	
07 22 16 00-0332	SF	6.75" Average Thickness (38.5 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	14.00	
		<i>For 25 PSI Compressive Strength, Add</i>	0.74	
07 22 16 00-0333		Hot-Mopped, 1/4" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0321)</small>		
07 22 16 00-0334	SF	2" Average Thickness (11.4 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	4.64	
		<i>For 25 PSI Compressive Strength, Add</i>	0.27	
07 22 16 00-0335	SF	3" Average Thickness (17.1 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	7.06	
		<i>For 25 PSI Compressive Strength, Add</i>	0.36	
07 22 16 00-0336	SF	4" Average Thickness (22.8 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	8.27	
		<i>For 25 PSI Compressive Strength, Add</i>	0.48	
07 22 16 00-0337	SF	5" Average Thickness (28.5 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	10.69	
		<i>For 25 PSI Compressive Strength, Add</i>	0.56	
07 22 16 00-0338	SF	6" Average Thickness (34.2 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	11.90	
		<i>For 25 PSI Compressive Strength, Add</i>	0.69	
07 22 16 00-0339	SF	7" Average Thickness (39.9 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	14.30	
		<i>For 25 PSI Compressive Strength, Add</i>	0.77	
07 22 16 00-0340		Hot-Mopped, 1/2" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0321)</small>		
07 22 16 00-0341	SF	3.5" Average Thickness (20.0 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	7.66	
		<i>For 25 PSI Compressive Strength, Add</i>	0.42	
07 22 16 00-0342	SF	5.5" Average Thickness (31.4 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	11.30	
		<i>For 25 PSI Compressive Strength, Add</i>	0.63	
07 22 16 00-0343	SF	7.5" Average Thickness (42.8 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	14.91	
		<i>For 25 PSI Compressive Strength, Add</i>	0.83	
07 22 16 00-0344	SF	9.5" Average Thickness (54.2 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Hot-Mopped.....	18.54	
		<i>For 25 PSI Compressive Strength, Add</i>	1.04	
07 22 16 00-0345		Hot-Mopped, Tapered Perlite Board <small>(07 22 16 00-0320)</small>		
07 22 16 00-0346		Hot-Mopped, 1/8" Slope, Tapered Perlite Board <small>(07 22 16 00-0345)</small>		
07 22 16 00-0347	SF	2.25" Average Thickness (6.26 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	6.74	
07 22 16 00-0348	SF	2.75" Average Thickness (7.65 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	8.43	
07 22 16 00-0349	SF	3.25" Average Thickness (9.04 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	9.77	
07 22 16 00-0350	SF	3.75" Average Thickness (10.43 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	9.61	
07 22 16 00-0351	SF	4.25" Average Thickness (11.82 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	10.94	
07 22 16 00-0352	SF	4.75" Average Thickness (13.21 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	12.63	
07 22 16 00-0353	SF	5.25" Average Thickness (14.60 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	13.96	
07 22 16 00-0354	SF	5.75" Average Thickness (15.99 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	13.80	
07 22 16 00-0355	SF	6.25" Average Thickness (17.38 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	15.14	
07 22 16 00-0356	SF	6.75" Average Thickness (18.77 Average R-Value), 1/8" Slope, Tapered Perlite Board, Hot-Mopped.....	16.82	
07 22 16 00-0357		Hot-Mopped, 1/4" Slope, Tapered Perlite Board <small>(07 22 16 00-0345)</small>		
07 22 16 00-0358	SF	2" Average Thickness (5.56 Average R-Value), 1/4" Slope, Tapered Perlite Board, Hot-Mopped.....	6.07	
07 22 16 00-0359	SF	3" Average Thickness (8.34 Average R-Value), 1/4" Slope, Tapered Perlite Board, Hot-Mopped.....	9.10	
07 22 16 00-0360	SF	4" Average Thickness (11.12 Average R-Value), 1/4" Slope, Tapered Perlite Board, Hot-Mopped.....	10.28	
07 22 16 00-0361	SF	5" Average Thickness (13.9 Average R-Value), 1/4" Slope, Tapered Perlite Board, Hot-Mopped.....	13.29	
07 22 16 00-0362	SF	6" Average Thickness (16.68 Average R-Value), 1/4" Slope, Tapered Perlite Board, Hot-Mopped.....	14.47	
07 22 16 00-0363	SF	7" Average Thickness (19.46 Average R-Value), 1/4" Slope, Tapered Perlite Board, Hot-Mopped.....	17.49	
07 22 16 00-0364		Hot-Mopped, 1/2" Slope, Tapered Perlite Board <small>(07 22 16 00-0345)</small>		
07 22 16 00-0365	SF	3.5" Average Thickness (9.73 Average R-Value), 1/2" Slope, Tapered Perlite Board, Hot-Mopped.....	10.43	
07 22 16 00-0366	SF	5.5" Average Thickness (15.29 Average R-Value), 1/2" Slope, Tapered Perlite Board, Hot-Mopped.....	14.63	
07 22 16 00-0367	SF	7.5" Average Thickness (20.85 Average R-Value), 1/2" Slope, Tapered Perlite Board, Hot-Mopped.....	78.21	
07 22 16 00-0368	SF	9.5" Average Thickness (26.41 Average R-Value), 1/2" Slope, Tapered Perlite Board, Hot-Mopped.....	23.01	
07 22 16 00-0369		Mechanically Fastened Tapered Roofing Insulation <small>(07 22 16 00-0222)</small>		
		Note: Mechanically fastened to wood or steel. Includes tapered board and filler board required to maintain slope starting at 1/2" minimum thickness. Excludes base layer of board, if required. Average thickness and average R-value of tapered system excludes thickness and R-value of base layer insulation and/or coverboard.		
07 22 16 00-0370		Mechanically Fastened, Tapered Polyisocyanurate Board <small>(07 22 16 00-0369)</small>		
		Note: Mechanically fastened to wood or steel.		
07 22 16 00-0371		Mechanically Fastened, 1/8" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0370)</small>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0372 SF 2.25" Average Thickness (12.8 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	5.10	
<i>For 25 PSI Compressive Strength, Add</i>	0.33	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0373 SF 2.75" Average Thickness (15.7 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	6.57	
<i>For 25 PSI Compressive Strength, Add</i>	0.34	
<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	
07 22 16 00-0374 SF 3.25" Average Thickness (18.5 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	7.18	
<i>For 25 PSI Compressive Strength, Add</i>	0.40	
<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 22 16 00-0375 SF 3.75" Average Thickness (21.4 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	7.95	
<i>For 25 PSI Compressive Strength, Add</i>	0.48	
<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55	
07 22 16 00-0376 SF 4.25" Average Thickness (24.2 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	8.55	
<i>For 25 PSI Compressive Strength, Add</i>	0.54	
<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	
07 22 16 00-0377 SF 4.75" Average Thickness (27.1 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	10.14	
<i>For 25 PSI Compressive Strength, Add</i>	0.56	
<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0378 SF 5.25" Average Thickness (30.0 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	10.75	
<i>For 25 PSI Compressive Strength, Add</i>	0.62	
<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0379	SF	5.75" Average Thickness (32.8 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	11.58
		<i>For 25 PSI Compressive Strength, Add</i>	0.70
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31
07 22 16 00-0380	SF	6.25" Average Thickness (35.6 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	12.18
		<i>For 25 PSI Compressive Strength, Add</i>	0.76
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31
07 22 16 00-0381	SF	6.75" Average Thickness (38.5 Average R-Value), 1/8" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	13.95
		<i>For 25 PSI Compressive Strength, Add</i>	0.80
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93
07 22 16 00-0382		Mechanically Fastened, 1/4" Slope, Tapered Polyisocyanurate Board <small>(07 22 16 00-0370)</small>	
07 22 16 00-0383	SF	2" Average Thickness (11.4 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	4.80
		<i>For 25 PSI Compressive Strength, Add</i>	0.30
		<i>For Mechanically Fastened To Concrete, Add</i>	1.72
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0384	SF	3" Average Thickness (17.1 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	6.88
		<i>For 25 PSI Compressive Strength, Add</i>	0.37
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34
07 22 16 00-0385	SF	4" Average Thickness (22.8 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	8.25
		<i>For 25 PSI Compressive Strength, Add</i>	0.51
		<i>For Mechanically Fastened To Concrete, Add</i>	1.82
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55
07 22 16 00-0386	SF	5" Average Thickness (28.5 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened.....	10.44
		<i>For 25 PSI Compressive Strength, Add</i>	0.59
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92



Thermal And Moisture Protection			07
Thermal Protection			07 20
Roof and Deck Insulation			07 22

07

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 22 16 00-0387	SF 6" Average Thickness (34.2 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	11.88	
	<i>For 25 PSI Compressive Strength, Add</i>	0.73	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	
07 22 16 00-0388	SF 7" Average Thickness (39.9 Average R-Value), 1/4" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	14.25	
	<i>For 25 PSI Compressive Strength, Add</i>	0.83	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93	
07 22 16 00-0389	Mechanically Fastened, 1/2" Slope, Tapered Polyisocyanurate Board (07 22 16 00-0370)		
07 22 16 00-0390	SF 3.5" Average Thickness (20.0 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	7.48	
	<i>For 25 PSI Compressive Strength, Add</i>	0.43	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 22 16 00-0391	SF 5.5" Average Thickness (31.4 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	10.64	
	<i>For 25 PSI Compressive Strength, Add</i>	0.61	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0392	SF 7.5" Average Thickness (42.8 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	14.86	
	<i>For 25 PSI Compressive Strength, Add</i>	0.89	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93	
07 22 16 00-0393	SF 9.5" Average Thickness (54.2 Average R-Value), 1/2" Slope, Tapered Polyisocyanurate Board, Mechanically Fastened	18.91	
	<i>For 25 PSI Compressive Strength, Add</i>	1.15	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.70	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	3.07	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	4.24	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	4.63	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	6.37	
07 22 16 00-0394	Mechanically Fastened, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0369)		
	Note: Mechanically fastened to wood or steel.		
07 22 16 00-0395	Mechanically Fastened, 1/8" Slope, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0394)		
07 22 16 00-0396	SF 2.25" Average Thickness (10.13 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened	4.42	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	

07 Thermal And Moisture Protection

07 20 Thermal Protection

07 22 Roof and Deck Insulation



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 22 16 00-0397	SF		2.75" Average Thickness (12.38 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	5.90	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	
07 22 16 00-0398	SF		3.25" Average Thickness (14.63 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	6.36	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 22 16 00-0399	SF		3.75" Average Thickness (16.88 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	6.97	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55	
07 22 16 00-0400	SF		4.25" Average Thickness (19.13 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	7.43	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	
07 22 16 00-0401	SF		4.75" Average Thickness (21.38 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	9.02	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0402	SF		5.25" Average Thickness (23.63 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	9.48	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0403	SF		5.75" Average Thickness (25.88 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	10.16	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	
07 22 16 00-0404	SF		6.25" Average Thickness (28.13 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	10.61	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 22 16 00-0405 SF 6.75" Average Thickness (30.38 Average R-Value), 1/8" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	12.39	
<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93	
07 22 16 00-0406 Mechanically Fastened, 1/4" Slope, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0394)		
07 22 16 00-0407 SF 2" Average Thickness (9 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	4.20	
<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0408 SF 3" Average Thickness (13.5 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	6.13	
<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	
07 22 16 00-0409 SF 4" Average Thickness (18 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	7.20	
<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55	
07 22 16 00-0410 SF 5" Average Thickness (22.5 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	9.25	
<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0411 SF 6" Average Thickness (27 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	10.39	
<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	
07 22 16 00-0412 SF 7" Average Thickness (31.5 Average R-Value), 1/4" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	12.61	
<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26	
<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20	
<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96	
<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29	
<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42	
<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93	
07 22 16 00-0413 Mechanically Fastened, 1/2" Slope, Tapered Expanded Polystyrene Board (EPS) (07 22 16 00-0394)		

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0414	SF	3.5" Average Thickness (15.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	6.58
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43
07 22 16 00-0415	SF	5.5" Average Thickness (24.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	9.70
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92
07 22 16 00-0416	SF	7.5" Average Thickness (33.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	13.07
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93
07 22 16 00-0417	SF	9.5" Average Thickness (42.75 Average R-Value), 1/2" Slope, Tapered Expanded Polystyrene Board (EPS), Mechanically Fastened.....	17.12
		<i>For Mechanically Fastened To Concrete, Add</i>	1.70
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	3.07
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	4.24
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	4.63
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	6.37
07 22 16 00-0418		Mechanically Fastened, Tapered Extruded Polystyrene Board (XEPS) <small>(07 22 16 00-0369)</small>	
		Note: Mechanically fastened to wood or steel.	
07 22 16 00-0419		Mechanically Fastened, 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS) <small>(07 22 16 00-0418)</small>	
07 22 16 00-0420	SF	2.25" Average Thickness (12.38 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	4.97
		<i>For Mechanically Fastened To Concrete, Add</i>	1.72
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0421	SF	2.75" Average Thickness (15.125 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	6.44
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34
07 22 16 00-0422	SF	3.25" Average Thickness (17.88 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	8.36
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43
07 22 16 00-0423	SF	3.75" Average Thickness (20.63 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	7.75
		<i>For Mechanically Fastened To Concrete, Add</i>	1.82
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0424	SF		4.25" Average Thickness (23.38 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	8.33	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	
07 22 16 00-0425	SF		4.75" Average Thickness (26.13 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	9.92	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0426	SF		5.25" Average Thickness (28.88 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	10.49	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0427	SF		5.75" Average Thickness (31.63 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	11.30	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	
07 22 16 00-0428	SF		6.25" Average Thickness (34.38 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	11.87	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	
07 22 16 00-0429	SF		6.75" Average Thickness (37.13 Average R-Value), 1/8" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	13.64	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93	
07 22 16 00-0430			Mechanically Fastened, 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS) <small>(07 22 16 00-0418)</small>		
07 22 16 00-0431	SF		2" Average Thickness (11 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	4.68	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0432	SF		3" Average Thickness (16.5 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	6.73	
			<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17	
			<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
			<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
			<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
			<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
			<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0433	SF	4" Average Thickness (22 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	8.04
		<i>For Mechanically Fastened To Concrete, Add</i>	1.82
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55
07 22 16 00-0434	SF	5" Average Thickness (27.5 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	10.21
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92
07 22 16 00-0435	SF	6" Average Thickness (33 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	11.58
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31
07 22 16 00-0436	SF	7" Average Thickness (38.5 Average R-Value), 1/4" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	13.92
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93
07 22 16 00-0437		Mechanically Fastened, 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS) <small>(07 22 16 00-0418)</small>	
07 22 16 00-0438	SF	3.5" Average Thickness (19.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	7.30
		<i>For Mechanically Fastened To Concrete, Add</i>	1.77
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43
07 22 16 00-0439	SF	5.5" Average Thickness (30.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	10.78
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92
07 22 16 00-0440	SF	7.5" Average Thickness (41.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	14.50
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93
07 22 16 00-0441	SF	9.5" Average Thickness (52.25 Average R-Value), 1/2" Slope, Tapered Extruded Polystyrene Board (XEPS), Mechanically Fastened.....	18.19
		<i>For Mechanically Fastened To Concrete, Add</i>	1.70
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	3.07
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	4.24
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	4.63
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	6.37

07 22 16 00-0442 Mechanically Fastened, Tapered Perlite Board (07 22 16 00-0369)

Note: Mechanically fastened to wood or steel.

	MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 22 16 00-0443	Mechanically Fastened, 1/8" Slope, Tapered Perlite Board <small>(07 22 16 00-0442)</small>		
07 22 16 00-0444	SF 2.25" Average Thickness (6.26 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	6.90	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 22 16 00-0445	SF 2.75" Average Thickness (7.65 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	8.25	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34	
07 22 16 00-0446	SF 3.25" Average Thickness (9.04 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	9.58	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43	
07 22 16 00-0447	SF 3.75" Average Thickness (10.43 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	9.59	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55	
07 22 16 00-0448	SF 4.25" Average Thickness (11.82 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	10.93	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.12	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.67	
07 22 16 00-0449	SF 4.75" Average Thickness (13.21 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	12.38	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0450	SF 5.25" Average Thickness (14.60 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	13.71	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.87	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92	
07 22 16 00-0451	SF 5.75" Average Thickness (15.99 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	13.79	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	
07 22 16 00-0452	SF 6.25" Average Thickness (17.38 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	15.12	
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23	
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81	
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55	
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71	
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84	
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31	

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 22 Roof and Deck Insulation**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 22 16 00-0453	SF 6.75" Average Thickness (18.77 Average R-Value), 1/8" Slope, Tapered Perlite Board, Mechanically Fastened.....	16.77
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93

07 22 16 00-0454 Mechanically Fastened, 1/4" Slope, Tapered Perlite Board (07 22 16 00-0442)

07 22 16 00-0455	SF 2" Average Thickness (5.56 Average R-Value), 1/4" Slope, Tapered Perlite Board, Mechanically Fastened.....	6.23
	<i>For Mechanically Fastened To Concrete, Add</i>	1.72
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.11
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.96
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.35
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.74
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.44
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.52
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.11
07 22 16 00-0456	SF 3" Average Thickness (8.34 Average R-Value), 1/4" Slope, Tapered Perlite Board, Mechanically Fastened.....	8.92
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.17
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.89
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.34
07 22 16 00-0457	SF 4" Average Thickness (11.12 Average R-Value), 1/4" Slope, Tapered Perlite Board, Mechanically Fastened.....	10.26
	<i>For Mechanically Fastened To Concrete, Add</i>	1.82
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.16
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.30
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.71
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.04
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.95
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.05
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.55
07 22 16 00-0458	SF 5" Average Thickness (13.9 Average R-Value), 1/4" Slope, Tapered Perlite Board, Mechanically Fastened.....	13.05
	<i>For Mechanically Fastened To Concrete, Add</i>	1.87
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.96
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.28
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92
07 22 16 00-0459	SF 6" Average Thickness (16.68 Average R-Value), 1/4" Slope, Tapered Perlite Board, Mechanically Fastened.....	14.45
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.81
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.23
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.55
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.71
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.84
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.31
07 22 16 00-0460	SF 7" Average Thickness (19.46 Average R-Value), 1/4" Slope, Tapered Perlite Board, Mechanically Fastened.....	17.43
	<i>For Mechanically Fastened To Concrete, Add</i>	1.92
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93

07 22 16 00-0461 Mechanically Fastened, 1/2" Slope, Tapered Perlite Board (07 22 16 00-0442)

07 22 16 00-0462	SF 3.5" Average Thickness (9.73 Average R-Value), 1/2" Slope, Tapered Perlite Board, Mechanically Fastened.....	10.25
	<i>For Mechanically Fastened To Concrete, Add</i>	1.77
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.23
	<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.09
	<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	2.49
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.95
	<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.65
	<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	3.74
	<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.43



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

07 22 16 00-0463	SF	5.5" Average Thickness (15.29 Average R-Value), 1/2" Slope, Tapered Perlite Board, Mechanically Fastened.....	14.38
		<i>For Mechanically Fastened To Concrete, Add</i>	1.87
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.20
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	1.55
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.26
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	2.98
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	2.31
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.43
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	4.92
07 22 16 00-0464	SF	7.5" Average Thickness (20.85 Average R-Value), 1/2" Slope, Tapered Perlite Board, Mechanically Fastened.....	18.77
		<i>For Mechanically Fastened To Concrete, Add</i>	1.92
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, Add</i>	2.26
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	2.20
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.62
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	3.29
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	5.42
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93
07 22 16 00-0465	SF	9.5" Average Thickness (26.41 Average R-Value), 1/2" Slope, Tapered Perlite Board, Mechanically Fastened.....	23.38
		<i>For Mechanically Fastened To Concrete, Add</i>	1.70
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	3.07
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	4.24
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >90 To 120 MPH Wind, Add</i>	3.96
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	4.63
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	6.37
		<i>For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum, >120 To 135 MPH Wind, Add</i>	5.93

07 22 16 00-0466		Demolish Rigid Board Roofing Insulation <small>(07 22 16)</small>	
		Note: Includes removing any combination of roofing insulation systems and/or recovery board. Includes removal of any basic roof accessories and any sheet metals; except special existing conditions (mechanical equipment piping, electrical, ducts, etc.).	
07 22 16 00-0467	SF	Demolish Up To 1/2" Average Thickness, Rigid Board Roofing Insulation	0.65
07 22 16 00-0468	SF	Demolish >1/2" To 1" Average Thickness, Rigid Board Roofing Insulation	0.67
07 22 16 00-0469	SF	Demolish >1" To 2" Average Thickness, Rigid Board Roofing Insulation	0.69
07 22 16 00-0470	SF	Demolish >2" To 3" Average Thickness, Rigid Board Roofing Insulation	0.72
07 22 16 00-0471	SF	Demolish >3" To 4" Average Thickness, Rigid Board Roofing Insulation	0.73
07 22 16 00-0472	SF	Demolish >4" To 5" Average Thickness, Rigid Board Roofing Insulation	0.75
07 22 16 00-0473	SF	Demolish >5" To 6" Average Thickness, Rigid Board Roofing Insulation	0.77
07 22 16 00-0474	SF	Demolish >6" To 7" Average Thickness, Rigid Board Roofing Insulation	0.78
07 22 16 00-0475	SF	Demolish >7" To 8" Average Thickness, Rigid Board Roofing Insulation	0.80
07 22 16 00-0476	SF	Demolish >8" To 9" Average Thickness, Rigid Board Roofing Insulation	0.82
07 22 16 00-0477	SF	Demolish >9" To 10" Average Thickness, Rigid Board Roofing Insulation	0.84
07 22 16 00-0478	SF	Demolish >10" To 11" Average Thickness, Rigid Board Roofing Insulation	0.86
07 22 16 00-0479	SF	Demolish >11" To 12" Average Thickness, Rigid Board Roofing Insulation	0.88

07 24 Exterior Insulation and Finish Systems (07 20)

07 24 13 Polymer-Based Exterior Insulation and Finish System (07 24)

07 24 13 00-0001		Exterior Insulation Finishing System (EIFS) <small>(07 24 13)</small>	
07 24 13 00-0002		Insulation For Exterior Insulation Finishing Systems (EIFS) <small>(07 24 13 00-0001)</small>	
07 24 13 00-0003	SF	1" Thick, R3.85, Molded Expanded Polystyrene, Foam Board Insulation For Exterior Insulation Finishing Systems (EIFS), Adhesive Applied	4.06
		<i>For Up To 100, Add</i>	0.80
		<i>For >100 To 500, Add</i>	0.40
		<i>For >5,000, Deduct</i>	-0.16
		<i>For Adhesive And Mechanically Fastened To Wood Or Steel, Add</i>	1.59
		<i>For Adhesive And Mechanically Fastened To Concrete Or Masonry, Add</i>	2.36
07 24 13 00-0004	SF	1-1/2" Thick, R5.78, Molded Expanded Polystyrene, Foam Board Insulation For Exterior Insulation Finishing Systems (EIFS), Adhesive Applied	4.63
		<i>For Up To 100, Add</i>	0.82
		<i>For >100 To 500, Add</i>	0.41
		<i>For >5,000, Deduct</i>	-0.16
		<i>For Adhesive And Mechanically Fastened To Wood Or Steel, Add</i>	1.62
		<i>For Adhesive And Mechanically Fastened To Concrete Or Masonry, Add</i>	2.38
07 24 13 00-0005	SF	2" Thick, R7.70, Molded Expanded Polystyrene, Foam Board Insulation For Exterior Insulation Finishing Systems (EIFS), Adhesive Applied	5.19
		<i>For Up To 100, Add</i>	0.83
		<i>For >100 To 500, Add</i>	0.41
		<i>For >5,000, Deduct</i>	-0.17
		<i>For Adhesive And Mechanically Fastened To Wood Or Steel, Add</i>	1.79
		<i>For Adhesive And Mechanically Fastened To Concrete Or Masonry, Add</i>	2.52
07 24 13 00-0006	SF	2-1/2" Thick, R9.63, Molded Expanded Polystyrene, Foam Board Insulation For Exterior Insulation Finishing Systems (EIFS), Adhesive Applied	5.75
		<i>For Up To 100, Add</i>	0.84
		<i>For >100 To 500, Add</i>	0.42
		<i>For >5,000, Deduct</i>	-0.17
		<i>For Adhesive And Mechanically Fastened To Wood Or Steel, Add</i>	1.87
		<i>For Adhesive And Mechanically Fastened To Concrete Or Masonry, Add</i>	2.65

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 24 Exterior Insulation and Finish Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
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07 24 13 00-0007	SF	3" Thick, R11.55, Molded Expanded Polystyrene, Foam Board Insulation For Exterior Insulation Finishing Systems (EIFS), Adhesive Applied.....	6.31
		<i>For Up To 100, Add</i>	0.85
		<i>For >100 To 500, Add</i>	0.42
		<i>For >5,000, Deduct</i>	-0.17
		<i>For Adhesive And Mechanically Fastened To Wood Or Steel, Add</i>	1.87
		<i>For Adhesive And Mechanically Fastened To Concrete Or Masonry, Add</i>	2.65
07 24 13 00-0008	SF	4" Thick, R15.40, Molded Expanded Polystyrene, Foam Board Insulation For Exterior Insulation Finishing Systems (EIFS), Adhesive Applied.....	7.41
		<i>For Up To 100, Add</i>	0.86
		<i>For >100 To 500, Add</i>	0.43
		<i>For >5,000, Deduct</i>	-0.17
		<i>For Adhesive And Mechanically Fastened To Wood Or Steel, Add</i>	2.10
		<i>For Adhesive And Mechanically Fastened To Concrete Or Masonry, Add</i>	2.83

07 24 13 00-0009 Fiberglass Reinforcing Mesh For Exterior Insulation Finishing Systems(EIFS) (07 24 13 00-0001)

Note: Includes applying a layer of base coat to the insulation board and fully embedding the reinforcing fabric in the wet base coat.

07 24 13 00-0010	SF	4.3 OZ, Fiberglass Reinforcing Mesh For Exterior Insulation Finishing Systems (EIFS) (Dryvit S-Mesh), Embedded In A Layer Of Base Coat.....	5.22
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32
07 24 13 00-0011	SF	6.0 OZ, Fiberglass Reinforcing Mesh For Exterior Insulation Finishing Systems (EIFS) (Dryvit SP-Mesh), Embedded In A Layer Of Base Coat.....	5.81
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32
07 24 13 00-0012	SF	15.0 OZ, Fiberglass Reinforcing Mesh For Exterior Insulation Finishing Systems (EIFS) (Dryvit Panzer® 15), Embedded In A Layer Of Base Coat.....	7.41
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32
07 24 13 00-0013	SF	20.0 OZ, Fiberglass Reinforcing Mesh For Exterior Insulation Finishing Systems (EIFS) (Dryvit Panzer® 20), Embedded In A Layer Of Base Coat.....	7.89
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32

07 24 13 00-0014 Base Coats For Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)

07 24 13 00-0015	SF	Polymer-Based, Fiber-Reinforced Base Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Genesis® DM).....	2.54
		<i>For Up To 100, Add</i>	0.80
		<i>For >100 To 500, Add</i>	0.40
		<i>For >5,000, Deduct</i>	-0.16
07 24 13 00-0016	SF	Acrylic-Modified, Fiber-Reinforced Base Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Genesis®).....	2.98
		<i>For Up To 100, Add</i>	0.80
		<i>For >100 To 500, Add</i>	0.40
		<i>For >5,000, Deduct</i>	-0.16
07 24 13 00-0017	SF	Water Resistant, Acrylic Co-Polymer Base Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Dryflex®).....	5.35
		<i>For Up To 100, Add</i>	0.80
		<i>For >100 To 500, Add</i>	0.40
		<i>For >5,000, Deduct</i>	-0.16
07 24 13 00-0018	SF	Hydrostatic Water Resistant, Acrylic Co-Polymer Base Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Dryflex®).....	7.23
		<i>For Up To 100, Add</i>	0.80
		<i>For >100 To 500, Add</i>	0.40
		<i>For >5,000, Deduct</i>	-0.16

07 24 13 00-0019 Finish Coats For Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)

Note: Includes all standard manufacturers' colors.

07 24 13 00-0020	SF	100% Acrylic-Based Aggregate Fine Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit DPR Finish).....	4.27
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32
07 24 13 00-0021	SF	100% Acrylic-Based Aggregate Textured Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit DPR Finish).....	4.36
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32
07 24 13 00-0022	SF	Lightweight Elastic, 100% Acrylic-Based Aggregate Fine Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit E™ Finish).....	5.06
		<i>For Up To 100, Add</i>	1.61
		<i>For >100 To 500, Add</i>	0.80
		<i>For >5,000, Deduct</i>	-0.32



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 24 13 00-0023 SF Lightweight Elastic, 100% Acrylic-Based Aggregate Textured Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit E™ Finish)	5.67	
<i>For Up To 100, Add</i>	1.61	
<i>For >100 To 500, Add</i>	0.80	
<i>For >5,000, Deduct</i>	-0.32	
07 24 13 00-0024 SF Mildew Resistant, 100% Acrylic-Based Aggregate Fine Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit PMR™ Finish).....	5.06	
<i>For Up To 100, Add</i>	1.61	
<i>For >100 To 500, Add</i>	0.80	
<i>For >5,000, Deduct</i>	-0.32	
07 24 13 00-0025 SF Mildew Resistant, 100% Acrylic-Based Aggregate Textured Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit PMR™ Finish).....	5.68	
<i>For Up To 100, Add</i>	1.61	
<i>For >100 To 500, Add</i>	0.80	
<i>For >5,000, Deduct</i>	-0.32	
07 24 13 00-0026 SF Flexible Elastomeric, 100% Acrylic-Based Smooth Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Weatherlastic® Smooth)	4.46	
<i>For Up To 100, Add</i>	1.61	
<i>For >100 To 500, Add</i>	0.80	
<i>For >5,000, Deduct</i>	-0.32	
07 24 13 00-0027 SF Flexible Elastomeric, 100% Acrylic-Based Textured Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Weatherlastic®).....	5.11	
<i>For Up To 100, Add</i>	1.61	
<i>For >100 To 500, Add</i>	0.80	
<i>For >5,000, Deduct</i>	-0.32	
07 24 13 00-0028 SF 100% Acrylic-Based Finish With Multi-Colored Quartz Aggregates, Finish Coat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Ameristone™).....	10.60	
<i>For Up To 100, Add</i>	1.61	
<i>For >100 To 500, Add</i>	0.80	
<i>For >5,000, Deduct</i>	-0.32	
07 24 13 00-0029 Primer And Sealers For Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)		
07 24 13 00-0030 SF 100% Acrylic-Based Primer/Adhesion Promoter For Exterior Insulation Finishing Systems (EIFS) (Dryvit Prymit®).....	1.29	
<i>For Up To 100, Add</i>	0.45	
<i>For >100 To 500, Add</i>	0.23	
<i>For >5,000, Deduct</i>	-0.09	
07 24 13 00-0031 SF 100% Acrylic Emulsion Primer/Sealer For Exterior Insulation Finishing Systems (EIFS) (Dryvit SealClear™).....	1.32	
<i>For Up To 100, Add</i>	0.45	
<i>For >100 To 500, Add</i>	0.23	
<i>For >5,000, Deduct</i>	-0.09	
07 24 13 00-0032 Air/Water/Vapor Barriers For Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)		
07 24 13 00-0033 SF Smooth, High Performance, Polymer-Based, Non-Cementitious Water-Resistive Membrane And Air Barrier For Exterior Insulation Finishing Systems (EIFS) (Dryvit Backstop® NT™), Per Coat	1.80	
<i>For Up To 100, Add</i>	0.45	
<i>For >100 To 500, Add</i>	0.23	
<i>For >5,000, Deduct</i>	-0.09	
07 24 13 00-0034 SF Texture, High Performance, Polymer-Based, Non-Cementitious Water-Resistive Membrane And Air Barrier For Exterior Insulation Finishing Systems (EIFS) (Dryvit Backstop® NT™), Per Coat	2.25	
<i>For Up To 100, Add</i>	0.45	
<i>For >100 To 500, Add</i>	0.23	
<i>For >5,000, Deduct</i>	-0.09	
07 24 13 00-0035 Drainage Accessories For Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)		
07 24 13 00-0036 SF 1/8" Thick, Flexible Polyamide Drainage Mat For Exterior Insulation Finishing Systems (EIFS) (Dryvit Drainage Mat).....	2.80	
<i>For Up To 100, Add</i>	0.50	
<i>For >100 To 500, Add</i>	0.25	
<i>For >5,000, Deduct</i>	-0.10	
07 24 13 00-0037 Starter Tracks For Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)		
07 24 13 00-0038 LF 1" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track (Dryvit Starter Trac STWP).....	4.12	
07 24 13 00-0039 LF 1-1/2" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track (Dryvit Starter Trac STWP).....	4.45	
07 24 13 00-0040 LF 2" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track (Dryvit Starter Trac STWP).....	4.84	
07 24 13 00-0041 LF 3" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track (Dryvit Starter Trac STWP).....	5.65	
07 24 13 00-0042 LF 1" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track With Drip Edge (Dryvit Starter Trac STDE).....	4.45	
07 24 13 00-0043 LF 1-1/2" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track With Drip Edge (Dryvit Starter Trac STDE).....	4.84	
07 24 13 00-0044 LF 2" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track With Drip Edge (Dryvit Starter Trac STDE).....	5.22	
07 24 13 00-0045 LF 3" Width, Polyvinyl Chloride (PVC) Perforated "J" Channel Drainage Track With Drip Edge (Dryvit Starter Trac STDE).....	6.12	
07 24 13 00-0046 Demolish Exterior Insulation Finishing Systems (EIFS) (07 24 13 00-0001)		

07 Thermal And Moisture Protection**07 20 Thermal Protection****07 24 Exterior Insulation and Finish Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 24 13 00-0047	SF	Demolish Exterior Insulation Finishing Systems (EIFS).....	6.72	
		Note: Includes demolition of all finish coats, base coats, reinforcing layers and insulation layers down to the substrate. Excludes demolition of sheathing.		
		For Up To 100, Add	3.36	
		For >100 To 500, Add	1.68	
		For >5,000, Deduct	-0.67	

07 25 Weather Barriers (07)**07 26 Vapor Retarders** (07 25)**07 26 13 Above-Grade Vapor Retarders** (07 26)

07 26 13 00-0001	CSF	Two Layer Kraft Paper Laminated With Asphalt, Grade "B" Building Paper (Aquabar B).....	30.21	
07 26 13 00-0002	CSF	Asphalt Saturated Kraft Building Paper, Grade D (Fortifiber Jumbo Tex).....	27.94	
07 26 13 00-0003	CSF	60 Minute Asphalt Saturated Kraft Building Paper, Grade D (Fortifiber Super Jumbo Tex 60 Minute).....	35.20	
07 26 13 00-0004	CSF	Two Ply 60 Minute Asphalt Saturated Kraft Building Paper, Grade D (Fortifiber Two Ply Super Jumbo Tex 60 Minute).....	45.84	
07 26 13 00-0005	CSF	Regular Weight Red Rosin Sized Sheathing	25.61	
07 26 13 00-0006	CLF	6" Wide Two Layer Kraft Paper Laminated With Asphalt, Building Flashing Paper (Bond Beam Paper).....	85.95	
07 26 13 00-0007	CLF	4" Wide Self Adhering Butyl Sealing Tape	132.14	
07 26 13 00-0008	CLF	6" Wide Self Adhesive Butyl Sealing Tape	191.60	
07 26 13 00-0009	CLF	9" Wide Self Adhesive Butyl Sealing Tape	267.18	
07 26 13 00-0010	CSF	Building Wrap (Tyvek).....	73.70	

07 27 Air Barriers (07 25)**07 27 23 Board Product Air Barriers** (07 27)**07 27 23 00-0001 Barriers For Plenums** (07 27 23)

07 27 23 00-0002	SF	0.5" Thick Leaded Vinyl Acoustic Plenum Barrier 0.48 LB/SF	12.76	3.25
		For Up To 50, Add	4.47	
		For >50 To 200, Add	2.55	
		For >200 To 500, Add	0.96	
		For >2,500, Deduct	-0.64	
07 27 23 00-0003	SF	0.625" Thick Leaded Vinyl Acoustic Plenum Barrier 0.87 LB/SF	13.78	3.25
		For Up To 50, Add	4.87	
		For >50 To 200, Add	2.78	
		For >200 To 500, Add	1.04	
		For >2,500, Deduct	-0.69	
07 27 23 00-0004	SF	Aluminum Foil Fiberglass Reinforced Plenum Bar Parallel With Joists 1" Thick.....	4.83	2.16
		For Up To 50, Add	2.30	
		For >50 To 200, Add	1.27	
		For >200 To 500, Add	0.44	
		For >2,500, Deduct	-0.24	
07 27 23 00-0005	SF	Aluminum Foil Fiberglass Reinforced Plenum Bar Perpendicular With Joists 1" Thick.....	8.85	3.25
		For Up To 50, Add	4.13	
		For >50 To 200, Add	2.29	
		For >200 To 500, Add	0.79	
		For >2,500, Deduct	-0.44	
07 27 23 00-0006	SF	Aluminum Mesh Barrier For Plenum Kraft Paper Backed.....	6.19	2.16
		For Up To 50, Add	2.51	
		For >50 To 200, Add	1.41	
		For >200 To 500, Add	0.51	
		For >2,500, Deduct	-0.31	
07 27 23 00-0007	SF	1/64" Thick Sheet Lead Barrier For Plenum 1 LB/SF.....	9.93	2.16
		For Up To 50, Add	2.93	
		For >50 To 200, Add	1.72	
		For >200 To 500, Add	0.68	
		For >2,500, Deduct	-0.50	

07 27 23 00-0008 Under Slab Insulation, Extruded Polystyrene (XPS) Sheets (07 27 23)

07 27 23 00-0009	SF	1" Extruded Polystyrene Foam (XPS) Sheet Under Slab Insulation	2.00	
07 27 23 00-0010	SF	2" Extruded Polystyrene Foam (XPS) Sheet Under Slab Insulation	3.04	
07 27 23 00-0011	SF	3" Extruded Polystyrene Foam (XPS) Sheet Under Slab Insulation	3.96	
07 27 23 00-0012	SF	4" Extruded Polystyrene Foam (XPS) Sheet Under Slab Insulation	4.88	

07 30 Steep Slope Roofing (07)

Note: Includes starter strips and manufacturer's product specific warranties.

07 31 Shingles and Shakes (07 30)**07 31 13 Asphalt Shingles** (07 31)**07 31 13 13 Fiberglass-Reinforced Asphalt Shingles** (07 31 13)

07 31 13 13-0001		Three Tab Fiberglass Reinforced, Asphalt Composition Shingle (07 31 13 13)		
		Note: Excludes underlayment, drip edges, and ridge vent/shingles.		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 31 13 13-0002 SQ 200 LB/SQ, 5" Exposure, Three Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed CT 20)	306.09	215.60
<i>For >35 To 75, Deduct</i>	-11.00	
<i>For >75 To 100, Deduct</i>	-18.10	
<i>For >100 To 200, Deduct</i>	-27.41	
<i>For >200, Deduct</i>	-41.61	
<i>For Steep Roof, Over 7 To 12, Add</i>	62.75	
07 31 13 13-0003 SQ 220 LB/SQ, 5" Exposure, Three Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed XT 25)	321.03	226.43
<i>For >35 To 75, Deduct</i>	-11.52	
<i>For >75 To 100, Deduct</i>	-18.97	
<i>For >100 To 200, Deduct</i>	-28.72	
<i>For >200, Deduct</i>	-43.62	
<i>For Steep Roof, Over 7 To 12, Add</i>	65.87	
07 31 13 13-0004 SQ 230 LB/SQ, 5" Exposure, Three Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed XT 30)	367.96	237.72
<i>For >35 To 75, Deduct</i>	-15.18	
<i>For >75 To 100, Deduct</i>	-23.62	
<i>For >100 To 200, Deduct</i>	-35.09	
<i>For >200, Deduct</i>	-51.97	
<i>For Steep Roof, Over 7 To 12, Add</i>	69.18	
07 31 13 13-0005 Architectural Fiberglass Reinforced, Asphalt Composition Shingle <small>(07 31 13 13)</small>		
<small>Note: Excludes underlayment, drip edges, and ridge vent/shingles.</small>		
07 31 13 13-0006 SQ 245 LB/SQ, 5" Exposure, Two Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Landmark)	382.67	275.24
<i>For >35 To 75, Deduct</i>	-13.25	
<i>For >75 To 100, Deduct</i>	-22.15	
<i>For >100 To 200, Deduct</i>	-33.71	
<i>For >200, Deduct</i>	-51.52	
<i>For Steep Roof, Over 7 To 12, Add</i>	80.06	
07 31 13 13-0007 SQ 240 LB/SQ, 8" Exposure, Four Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Highland Slate)	400.78	262.06
<i>For >35 To 75, Deduct</i>	-16.25	
<i>For >75 To 100, Deduct</i>	-25.46	
<i>For >100 To 200, Deduct</i>	-37.91	
<i>For >200, Deduct</i>	-56.33	
<i>For Steep Roof, Over 7 To 12, Add</i>	76.26	
07 31 13 13-0008 SQ 265 LB/SQ, 5" Exposure, Two Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Landmark Plus)	434.91	289.00
<i>For >35 To 75, Deduct</i>	-17.21	
<i>For >75 To 100, Deduct</i>	-27.23	
<i>For >100 To 200, Deduct</i>	-40.68	
<i>For >200, Deduct</i>	-60.71	
<i>For Steep Roof, Over 7 To 12, Add</i>	84.09	
07 31 13 13-0009 SQ 235 LB/SQ, 8" Exposure, Four Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Hatteras)	415.62	249.59
<i>For >35 To 75, Deduct</i>	-18.87	
<i>For >75 To 100, Deduct</i>	-28.32	
<i>For >100 To 200, Deduct</i>	-41.54	
<i>For >200, Deduct</i>	-60.44	
<i>For Steep Roof, Over 7 To 12, Add</i>	72.60	
07 31 13 13-0010 SQ 300 LB/SQ, 5" Exposure, Two Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Landmark Premium)	470.32	303.46
<i>For >35 To 75, Deduct</i>	-19.45	
<i>For >75 To 100, Deduct</i>	-30.24	
<i>For >100 To 200, Deduct</i>	-44.91	
<i>For >200, Deduct</i>	-66.48	
<i>For Steep Roof, Over 7 To 12, Add</i>	88.26	
07 31 13 13-0011 SQ 300 LB/SQ, 5" Exposure, Random Laminated Tabs, One Piece, Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Independence)	498.83	303.46
<i>For >35 To 75, Deduct</i>	-22.30	
<i>For >75 To 100, Deduct</i>	-33.66	
<i>For >100 To 200, Deduct</i>	-49.47	
<i>For >200, Deduct</i>	-72.18	
<i>For Steep Roof, Over 7 To 12, Add</i>	88.26	
07 31 13 13-0012 SQ 355 LB/SQ, 4" Exposure, Sculpted Edge, Two Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Presidential Shake)	545.24	334.52
<i>For >35 To 75, Deduct</i>	-24.11	
<i>For >75 To 100, Deduct</i>	-36.53	
<i>For >100 To 200, Deduct</i>	-53.78	
<i>For >200, Deduct</i>	-78.63	
<i>For Steep Roof, Over 7 To 12, Add</i>	97.33	
07 31 13 13-0013 SQ 340 LB/SQ, 5" Exposure, Three Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Landmark TL)	538.77	318.64
<i>For >35 To 75, Deduct</i>	-24.92	
<i>For >75 To 100, Deduct</i>	-37.14	
<i>For >100 To 200, Deduct</i>	-54.35	
<i>For >200, Deduct</i>	-78.80	
<i>For Steep Roof, Over 7 To 12, Add</i>	92.67	
07 31 13 13-0014 SQ 300 LB/SQ, 5" Exposure, Reflective Two Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Landmark Solaris)	533.89	303.46
<i>For >35 To 75, Deduct</i>	-25.81	
<i>For >75 To 100, Deduct</i>	-37.86	
<i>For >100 To 200, Deduct</i>	-55.08	
<i>For >200, Deduct</i>	-79.20	
<i>For Steep Roof, Over 7 To 12, Add</i>	88.26	

07 Thermal And Moisture Protection**07 30 Steep Slope Roofing****07 31 Shingles and Shakes**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 31 13 13-0015	SQ 355 LB/SQ, 8" Exposure, Two Full Size Layers, Four Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Centennial Slate).....	621.99	334.52
	<i>For >35 To 75, Deduct</i>	-31.78	
	<i>For >75 To 100, Deduct</i>	-45.74	
	<i>For >100 To 200, Deduct</i>	-66.06	
	<i>For >200, Deduct</i>	-93.98	
	<i>For Steep Roof, Over 7 To 12, Add</i>	97.33	
07 31 13 13-0016	SQ 355 LB/SQ, 8" Exposure, Scalloped Cut, Two Full Size Layers, Four Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Carriage House).....	641.98	334.52
	<i>For >35 To 75, Deduct</i>	-33.78	
	<i>For >75 To 100, Deduct</i>	-48.14	
	<i>For >100 To 200, Deduct</i>	-69.26	
	<i>For >200, Deduct</i>	-97.98	
	<i>For Steep Roof, Over 7 To 12, Add</i>	97.33	
07 31 13 13-0017	SQ 480 LB/SQ, 4" Exposure, Sculpted Edge, Three Layer Laminated Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed Presidential Shake TL).....	712.80	368.87
	<i>For >35 To 75, Deduct</i>	-37.75	
	<i>For >75 To 100, Deduct</i>	-53.68	
	<i>For >100 To 200, Deduct</i>	-77.16	
	<i>For >200, Deduct</i>	-109.03	
	<i>For Steep Roof, Over 7 To 12, Add</i>	107.31	
07 31 13 13-0018	SQ 425 LB/SQ, 8" Exposure, Random Laminated Tabs, Two Full Size Layers, Four Tab Fiberglass Reinforced, Asphalt Composition Shingle (CertainTeed GrandManor).....	700.26	351.22
	<i>For >35 To 75, Deduct</i>	-38.09	
	<i>For >75 To 100, Deduct</i>	-53.69	
	<i>For >100 To 200, Deduct</i>	-76.91	
	<i>For >200, Deduct</i>	-108.12	
	<i>For Steep Roof, Over 7 To 12, Add</i>	102.19	
07 31 13 13-0019	Asphalt Shingle Accessories (07 31 13 13)		
07 31 13 13-0020	LF Hip And Ridge Roll Vent Note: Excludes shingles.	9.02	1.29
07 31 13 13-0021	LF Three Tab Hip And Ridge Shingles	4.36	3.21
07 31 13 13-0022	LF Architectural Hip And Ridge Shingles	5.23	3.57
07 31 13 13-0023	SQ Demolish Each Additional Layer Of Shingles.....	99.98	
07 31 16	Metal Shingles (07 31)		
07 31 16 00-0001	Aluminum Shingles (07 31 16)		
07 31 16 00-0002	SQ Aluminum Shingles, Mill Finish, 0.020" Thick..... <i>For Colors, Anodized Finish, Add</i> <i>For Bonderized Finish, Add</i> <i>For 1" Factory Applied Polystyrene, Add</i>	809.27 30.00 47.00 37.00	207.38
07 31 16 00-0003	SQ Aluminum Shingles, Mill Finish, 0.030" Thick..... <i>For Colors, Anodized Finish, Add</i> <i>For Bonderized Finish, Add</i> <i>For 1" Factory Applied Polystyrene, Add</i>	1,088.01 30.00 47.00 37.00	226.66
07 31 16 00-0004	LF Aluminum Shingles, Ridge Cap, 0.020" Thick.....	14.55	2.98
07 31 16 00-0005	LF Aluminum Shingles, Ridge Cap, 0.030" Thick.....	15.20	2.98
07 31 16 00-0006	LF Aluminum Shingles, Valley Section, 0.020" Thick.....	9.75	2.98
07 31 16 00-0007	LF Aluminum Shingles, Valley Section, 0.030" Thick.....	11.03	2.98
07 31 16 00-0008	Galvanized Steel Shingles (07 31 16)		
07 31 16 00-0009	SQ 24 Gauge, 0.0276" Thickness, Galvanized Steel Shingles <i>For Factory Applied 1" Polystyrene Insulation, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Steep Roof, Over 7 To 12, Add</i>	634.14 24.75 -10.87 -28.08 -48.01 -65.22 115.96	181.17
07 31 16 00-0010	SQ 26 Gauge, 0.0217" Thickness, Galvanized Steel Shingles <i>For Factory Applied 1" Polystyrene Insulation, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Steep Roof, Over 7 To 12, Add</i>	608.67 24.75 -9.97 -26.44 -45.40 -61.86 114.98	179.72
07 31 16 00-0011	SQ 24 Gauge, 0.0276" Thickness, Galvanized And Bonderized Steel Shingles..... <i>For Factory Applied 1" Polystyrene Insulation, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Steep Roof, Over 7 To 12, Add</i>	1,030.33 24.75 -26.72 -55.82 -91.59 -120.69 115.96	181.17
07 31 16 00-0012	SQ 26 Gauge, 0.0276" Thickness, Galvanized And Bonderized Steel Shingles..... <i>For Factory Applied 1" Polystyrene Insulation, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Steep Roof, Over 7 To 12, Add</i>	944.90 24.75 -23.42 -49.97 -82.38 -108.93 114.98	179.72



Thermal And Moisture Protection	07
Steep Slope Roofing	07 30
Shingles and Shakes	07 31

07

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 31 16 00-0013 LF Galvanized Steel Shingles, Ridge Or Valley.....	10.46	2.42
For Factory Applied 1" Polystyrene Insulation, Add	24.75	
For >50 To 75, Deduct	-0.23	
For >75 To 100, Deduct	-0.52	
For >100 To 200, Deduct	-0.87	
For >200, Deduct	-1.16	
For Steep Roof, Over 7 To 12, Add	1.51	
07 31 26 Slate Shingles (07 31)		
Note: Includes 30 LB felt and fasteners.		
07 31 26 00-0001 Shingles Including 30 LB Felt And Nails (07 31 26)		
07 31 26 00-0002 SQ Slate Shingles, Buckingham, Virginia Black, 3/16" Thick.....	1,456.59	309.01
For >50 To 75, Deduct	-30.80	
For >75 To 100, Deduct	-71.06	
For >100 To 200, Deduct	-119.03	
For >200, Deduct	-159.29	
For Graduated Shapes, Add	115.49	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0003 SQ Slate Shingles, Buckingham, Virginia Black, 1/4" Thick.....	1,667.96	309.01
For >50 To 75, Deduct	-39.25	
For >75 To 100, Deduct	-85.86	
For >100 To 200, Deduct	-142.28	
For >200, Deduct	-188.88	
For Graduated Shapes, Add	147.20	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0004 SQ Slate Shingles, Penn Black Bangor.....	1,604.55	309.01
For >50 To 75, Deduct	-36.72	
For >75 To 100, Deduct	-81.42	
For >100 To 200, Deduct	-135.30	
For >200, Deduct	-180.01	
For Graduated Shapes, Add	137.69	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0005 SQ Slate Shingles, Vermont, Unfading Colors, Green.....	1,625.68	309.01
For >50 To 75, Deduct	-37.56	
For >75 To 100, Deduct	-82.90	
For >100 To 200, Deduct	-137.63	
For >200, Deduct	-182.96	
For Graduated Shapes, Add	140.86	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0006 SQ Slate Shingles, Vermont, Unfading Colors, Semi-Weathered, Green/Gray.....	1,710.23	309.01
For >50 To 75, Deduct	-40.94	
For >75 To 100, Deduct	-88.82	
For >100 To 200, Deduct	-146.93	
For >200, Deduct	-194.80	
For Graduated Shapes, Add	153.54	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0007 SQ Slate Shingles, Vermont, Unfading Color, Purple.....	1,604.55	309.01
For >50 To 75, Deduct	-36.72	
For >75 To 100, Deduct	-81.42	
For >100 To 200, Deduct	-135.30	
For >200, Deduct	-180.01	
For Graduated Shapes, Add	137.69	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0008 SQ Slate Shingles, Vermont, Unfading Color, Black Or Gray.....	1,541.14	309.01
For >50 To 75, Deduct	-34.18	
For >75 To 100, Deduct	-76.98	
For >100 To 200, Deduct	-128.33	
For >200, Deduct	-171.13	
For Graduated Shapes, Add	128.18	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0009 SQ Slate Shingles, Vermont, Unfading Color, Red.....	2,861.87	309.01
For >50 To 75, Deduct	-87.01	
For >75 To 100, Deduct	-169.43	
For >100 To 200, Deduct	-273.61	
For >200, Deduct	-356.03	
For Graduated Shapes, Add	326.28	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 26 00-0010 SQ Slate Shingles, Vermont, Unfading Color, Variegated Purple.....	1,604.55	309.01
For >50 To 75, Deduct	-36.72	
For >75 To 100, Deduct	-81.42	
For >100 To 200, Deduct	-135.30	
For >200, Deduct	-180.01	
For Graduated Shapes, Add	137.69	
For Steep Roof, Over 7 To 12, Add	219.72	
07 31 29 Wood Shingles and Shakes (07 31)		
07 31 29 13 Wood Shingles (07 31 29)		
07 31 29 13-0001 #1 Grade, Red Cedar Shingles (07 31 29 13)		
07 31 29 13-0002 #1 Grade, Red Cedar Shingles Installed On Roofs (07 31 29 13-0001)		

07 Thermal And Moisture Protection**07 30 Steep Slope Roofing****07 31 Shingles and Shakes**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 31 29 13-0003	SQ		3-3/4" Exposure, 16" Shingle, #1 Grade, Red Cedar Shingles Installed On Roof.....	913.44	216.91
			<i>For Steep Roof, Over 7 To 12, Add</i>	138.82	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	71.94	
07 31 29 13-0004	SQ		5" Exposure, 16" Shingle, #1 Grade, Red Cedar Shingles Installed On Roof.....	661.11	162.68
			<i>For Steep Roof, Over 7 To 12, Add</i>	104.12	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	50.36	
07 31 29 13-0005	SQ		4-1/2" Exposure, 18" Shingle, #1 Grade, Red Cedar Shingles Installed On Roof.....	812.38	184.38
			<i>For Steep Roof, Over 7 To 12, Add</i>	118.00	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	66.54	
07 31 29 13-0006	SQ		5-1/2" Exposure, 18" Shingle, #1 Grade, Red Cedar Shingles Installed On Roof.....	665.23	151.84
			<i>For Steep Roof, Over 7 To 12, Add</i>	97.17	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	54.23	
07 31 29 13-0007	SQ		5-3/4" Exposure, 24" Shingle, #1 Grade, Red Cedar Shingles Installed On Roof.....	891.76	143.71
			<i>For Steep Roof, Over 7 To 12, Add</i>	91.97	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	90.65	
07 31 29 13-0008	SQ		7-1/2" Exposure, 24" Shingle, #1 Grade, Red Cedar Shingles Installed On Roof.....	688.22	122.01
			<i>For Steep Roof, Over 7 To 12, Add</i>	78.09	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	66.63	
07 31 29 13-0009			#1 Grade, Red Cedar Shingles Installed On Walls (07 31 29 13-0001)		
07 31 29 13-0010	SQ		7" Exposure, 16" Shingle, #1 Grade, Red Cedar Shingles Installed On Wall	630.25	195.22
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	35.97	
07 31 29 13-0011	SQ		8" Exposure, 18" Shingle, #1 Grade, Red Cedar Shingles Installed On Wall	618.10	184.38
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	37.40	
07 31 29 13-0012	SQ		10-1/2" Exposure, 24" Shingle, #1 Grade, Red Cedar Shingles Installed On Wall	637.23	159.98
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	47.59	
07 31 29 13-0013			#2 Grade, Red Cedar Shingles (07 31 29 13)		
07 31 29 13-0014			#2 Grade, Red Cedar Shingles Installed On Roofs (07 31 29 13-0013)		
07 31 29 13-0015	SQ		3-1/2" Exposure, 16" Shingle, #2 Grade, Red Cedar Shingles Installed On Roof.....	842.90	227.76
			<i>For Steep Roof, Over 7 To 12, Add</i>	145.76	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	58.11	
07 31 29 13-0016	SQ		4" Exposure, 16" Shingle, #2 Grade, Red Cedar Shingles Installed On Roof.....	751.09	206.06
			<i>For Steep Roof, Over 7 To 12, Add</i>	131.88	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	50.84	
07 31 29 13-0017	SQ		4" Exposure, 18" Shingle, #2 Grade, Red Cedar Shingles Installed On Roof.....	803.97	206.06
			<i>For Steep Roof, Over 7 To 12, Add</i>	131.88	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	58.78	
07 31 29 13-0018	SQ		4-1/2" Exposure, 18" Shingle, #2 Grade, Red Cedar Shingles Installed On Roof.....	717.32	184.38
			<i>For Steep Roof, Over 7 To 12, Add</i>	118.00	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	52.29	
07 31 29 13-0019	SQ		5-3/4" Exposure, 24" Shingle, #2 Grade, Red Cedar Shingles Installed On Roof.....	709.05	143.71
			<i>For Steep Roof, Over 7 To 12, Add</i>	91.97	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	63.25	
07 31 29 13-0020	SQ		6-1/2" Exposure, 24" Shingle, #2 Grade, Red Cedar Shingles Installed On Roof.....	577.87	124.72
			<i>For Steep Roof, Over 7 To 12, Add</i>	79.82	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	49.26	
07 31 29 13-0021			#2 Grade, Red Cedar Shingles Installed On Walls (07 31 29 13-0013)		
07 31 29 13-0022	SQ		6" Exposure, 16" Shingle, #2 Grade, Red Cedar Shingles Installed On Wall	605.82	206.06
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	29.05	
07 31 29 13-0023	SQ		7" Exposure, 18" Shingle, #2 Grade, Red Cedar Shingles Installed On Wall	586.36	195.22
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	29.39	
07 31 29 13-0024	SQ		9" Exposure, 24" Shingle, #2 Grade, Red Cedar Shingles Installed On Wall	568.42	173.53
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	33.20	
07 31 29 16			Wood Shakes (07 31 29)		
07 31 29 16-0001			#1 Grade, Red Cedar Shakes (07 31 29 16)		
07 31 29 16-0002			#1 Grade, Red Cedar Shakes Installed On Roofs (07 31 29 16-0001)		
07 31 29 16-0003	SQ		8-1/2" Exposure, 1/2" Thick, 18" Shake, #1 Grade, Red Cedar Shakes Installed On Roof	662.39	176.24
			<i>For Steep Roof, Over 7 To 12, Add</i>	112.79	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	46.49	
07 31 29 16-0004	SQ		8-1/2" Exposure, 3/4" Thick, 18" Shake, #1 Grade, Red Cedar Shakes Installed On Roof	765.69	176.24
			<i>For Steep Roof, Over 7 To 12, Add</i>	112.79	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	61.98	
07 31 29 16-0005	SQ		10" Exposure, 1/2" Thick, 24" Shake, #1 Grade, Red Cedar Shakes Installed On Roof.....	713.53	143.71
			<i>For Steep Roof, Over 7 To 12, Add</i>	91.97	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	63.92	
07 31 29 16-0006	SQ		10" Exposure, 3/4" Thick, 24" Shake, #1 Grade, Red Cedar Shakes Installed On Roof.....	757.43	143.71
			<i>For Steep Roof, Over 7 To 12, Add</i>	91.97	
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	70.50	
07 31 29 16-0007			#1 Grade, Red Cedar Shakes Installed On Walls (07 31 29 16-0001)		
07 31 29 16-0008	SQ		8-1/2" Exposure, 1/2" Thick, 18" Shake, #1 Grade, Red Cedar Shakes Installed On Wall	689.51	189.79
			<i>For Pressure-Impregnated Treated (Preservative), Add</i>	46.49	



Thermal And Moisture Protection			07
Steep Slope Roofing			07 30
Shingles and Shakes			07 31

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 31 29 16-0009 SQ 8-1/2" Exposure, 3/4" Thick, 18" Shake, #1 Grade, Red Cedar Shakes Installed On Wall <i>For Pressure-Impregnated Treated (Preservative), Add</i>	792.81 61.98	189.79
07 31 29 16-0010 SQ 10" Exposure, 1/2" Thick, 24" Shake, #1 Grade, Red Cedar Shakes Installed On Wall <i>For Pressure-Impregnated Treated (Preservative), Add</i>	751.50 63.92	162.68
07 31 29 16-0011 SQ 10" Exposure, 3/4" Thick, 24" Shake, #1 Grade, Red Cedar Shakes Installed On Wall <i>For Pressure-Impregnated Treated (Preservative), Add</i>	795.40 70.50	162.68
07 31 29 17 Wood Hip and Ridge Cap (07 31 29)		
07 31 29 17-0001 Accessories (07 31 29 17)		
07 31 29 17-0002 LF Hip Or Ridge Cap For Wood Shingles Or Shakes <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Pressure-Impregnated Treated (Preservative) Ridge, Add</i>	11.46 1.05 1.23	1.41
07 31 33 Composite Rubber Shingles (07 31)		
07 31 33 00-0001 Synthetic Polymeric Rubber Slate Shingles (07 31 33)		
Note: As manufactured by EcoStar.		
07 31 33 00-0002 SQ Class C Rectangular Edges Polymeric Rubber Slate Shingles, 7.0" Exposure Note: Gray or black. <i>For Purple Or Green Color, Add</i> <i>For Brown Or Red Color, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For 6.5" Exposure, Add</i> <i>For 6.0" Exposure, Add</i>	1,401.93 135.39 346.93 177.85 -21.15 -56.20 -91.25 -140.19 97.49 194.98	277.92
07 31 33 00-0003 SQ Class A Rectangular Edges Polymeric Rubber Slate Shingles, 7.0" Exposure Note: Fire resistant. Gray or black. <i>For Purple, Green, Brown Or Red, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For 6.5" Exposure, Add</i> <i>For 6.0" Exposure, Add</i>	1,966.04 211.54 177.85 -35.26 -84.41 -133.56 -196.60 137.79 275.57	277.92
07 31 33 00-0004 SQ Class C Shaped Polymeric Rubber Slate Shingle, 7.0" Exposure Note: Beaver tail, chisel point or beveled edges. Gray or black. <i>For Purple, Green, Brown Or Red, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For 6.5" Exposure, Add</i> <i>For 6.0" Exposure, Add</i>	1,634.21 388.24 177.85 -26.96 -67.82 -108.67 -163.42 114.09 228.16	277.92
07 31 33 00-0005 SQ Class A Shaped Polymeric Rubber Slate Shingle, 7.0" Exposure Note: Fire resistant. Beaver tail, chisel point or beveled edges. Gray or black. <i>For Purple, Green, Brown Or Red, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For 6.5" Exposure, Add</i> <i>For 6.0" Exposure, Add</i>	2,082.18 167.91 177.85 -38.16 -90.21 -142.27 -208.22 146.08 292.16	277.92
07 31 33 00-0006 LF Hip Or Ridge Polymeric Rubber Slate Shingle Note: Beveled or pointed edges, gray or black.	15.85	1.87
07 32 Roof Tiles (07 30)		
07 32 13 Clay Roof Tiles (07 32)		
Note: 8-1/4" x 11" exposure. Includes mortar, battens, fasteners, felt underlayment and 90# cap sheet.		
07 32 13 00-0001 Clay Roofing Tile 8-1/4" x 11" Exposure (07 32 13)		
Note: Includes mortar, battens, fasteners, felt underlayment and 90# cap sheet.		
07 32 13 00-0002 SQ Lanai Or Classic Tile, 158 Piece Per SQ <i>For >25 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For 20 Year Warranty, Add</i>	1,370.75 -47.07 -93.11 -131.30 -161.65 -184.15 54.92	293.06
07 32 13 00-0003 SQ Americana (Most Colors) Tile Roofing, 158 Piece Per SQ <i>For >25 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For 20 Year Warranty, Add</i>	1,622.21 -62.16 -118.26 -163.99 -199.37 -224.38 72.52	293.06

07 Thermal And Moisture Protection**07 30 Steep Slope Roofing****07 32 Roof Tiles**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 32 13 00-0004	SQ		Americana (Green, Gray Or Brown) Tile, 158 Piece Per SQ	1,622.21	293.06
			<i>For >25 To 50, Deduct</i>	-62.16	
			<i>For >50 To 75, Deduct</i>	-118.26	
			<i>For >75 To 100, Deduct</i>	-163.99	
			<i>For >100 To 200, Deduct</i>	-199.37	
			<i>For >200, Deduct</i>	-224.38	
			<i>For 20 Year Warranty, Add</i>	72.52	
07 32 13 00-0005	SQ		Americana (Blue) Tile, 158 Piece Per SQ	1,835.57	293.06
			<i>For >25 To 50, Deduct</i>	-74.96	
			<i>For >50 To 75, Deduct</i>	-139.59	
			<i>For >75 To 100, Deduct</i>	-191.73	
			<i>For >100 To 200, Deduct</i>	-231.37	
			<i>For >200, Deduct</i>	-258.52	
			<i>For 20 Year Warranty, Add</i>	87.46	
07 32 13 00-0006	SQ		French Tile Roofing, Red, 133 Piece Per SQ	1,636.37	358.32
			<i>For >25 To 50, Deduct</i>	-55.19	
			<i>For >50 To 75, Deduct</i>	-109.89	
			<i>For >75 To 100, Deduct</i>	-155.40	
			<i>For >100 To 200, Deduct</i>	-191.71	
			<i>For >200, Deduct</i>	-218.82	
			<i>For 20 Year Warranty, Add</i>	64.38	
07 32 13 00-0007	SQ		French Tile Roofing, Blue Or Green, 133 Piece Per SQ	2,011.71	358.32
			<i>For >25 To 50, Deduct</i>	-77.71	
			<i>For >50 To 75, Deduct</i>	-147.43	
			<i>For >75 To 100, Deduct</i>	-204.19	
			<i>For >100 To 200, Deduct</i>	-248.01	
			<i>For >200, Deduct</i>	-278.88	
			<i>For 20 Year Warranty, Add</i>	90.66	
07 32 13 00-0008	SQ		Norman Tile Roofing, 317 Piece Per SQ	2,574.01	483.39
			<i>For >25 To 50, Deduct</i>	-96.45	
			<i>For >50 To 75, Deduct</i>	-184.91	
			<i>For >75 To 100, Deduct</i>	-257.30	
			<i>For >100 To 200, Deduct</i>	-313.61	
			<i>For >200, Deduct</i>	-353.85	
			<i>For 20 Year Warranty, Add</i>	112.53	
07 32 13 00-0009	SQ		Williamsburg Tile Roofing, Aged Cedar, 158 Piece Per SQ	1,448.58	358.32
			<i>For >25 To 50, Deduct</i>	-43.92	
			<i>For >50 To 75, Deduct</i>	-91.11	
			<i>For >75 To 100, Deduct</i>	-130.99	
			<i>For >100 To 200, Deduct</i>	-163.54	
			<i>For >200, Deduct</i>	-188.78	
			<i>For 20 Year Warranty, Add</i>	51.24	
07 32 13 00-0010	SQ		Williamsburg Tile Roofing, Gray Or Green, 158 Piece Per SQ	1,752.63	358.32
			<i>For >25 To 50, Deduct</i>	-62.16	
			<i>For >50 To 75, Deduct</i>	-121.52	
			<i>For >75 To 100, Deduct</i>	-170.51	
			<i>For >100 To 200, Deduct</i>	-209.15	
			<i>For >200, Deduct</i>	-237.42	
			<i>For 20 Year Warranty, Add</i>	72.52	
07 32 13 00-0011	SQ		Spanish Tile Roofing, Red, 171 Piece Per SQ	1,229.75	268.29
			<i>For >25 To 50, Deduct</i>	-41.59	
			<i>For >50 To 75, Deduct</i>	-82.73	
			<i>For >75 To 100, Deduct</i>	-116.94	
			<i>For >100 To 200, Deduct</i>	-144.22	
			<i>For >200, Deduct</i>	-164.56	
			<i>For 20 Year Warranty, Add</i>	48.52	
07 32 13 00-0012	SQ		Spanish Tile Roofing, Blend, 171 Piece Per SQ	1,557.41	268.29
			<i>For >25 To 50, Deduct</i>	-61.25	
			<i>For >50 To 75, Deduct</i>	-115.49	
			<i>For >75 To 100, Deduct</i>	-159.53	
			<i>For >100 To 200, Deduct</i>	-193.36	
			<i>For >200, Deduct</i>	-216.99	
			<i>For 20 Year Warranty, Add</i>	71.45	
07 32 13 00-0013	SQ		Spanish Tile Roofing, Glazed White, 171 Piece Per SQ	1,839.35	268.29
			<i>For >25 To 50, Deduct</i>	-78.16	
			<i>For >50 To 75, Deduct</i>	-143.69	
			<i>For >75 To 100, Deduct</i>	-196.19	
			<i>For >100 To 200, Deduct</i>	-235.66	
			<i>For >200, Deduct</i>	-262.10	
			<i>For 20 Year Warranty, Add</i>	91.19	
07 32 13 00-0014	SQ		Two Piece Mission Tile Roofing, 192 Piece Per SQ	2,258.12	420.55
			<i>For >25 To 50, Deduct</i>	-85.02	
			<i>For >50 To 75, Deduct</i>	-162.73	
			<i>For >75 To 100, Deduct</i>	-226.27	
			<i>For >100 To 200, Deduct</i>	-275.64	
			<i>For >200, Deduct</i>	-310.83	
			<i>For 20 Year Warranty, Add</i>	99.19	
07 32 13 00-0015	SQ		One Piece Mission Tile Roofing, 75 Piece Per SQ	1,043.09	293.06
			<i>For >25 To 50, Deduct</i>	-27.41	
			<i>For >50 To 75, Deduct</i>	-60.34	
			<i>For >75 To 100, Deduct</i>	-88.71	
			<i>For >100 To 200, Deduct</i>	-112.50	
			<i>For >200, Deduct</i>	-131.72	
			<i>For 20 Year Warranty, Add</i>	31.98	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 32 13 00-0016 SQ One Piece Mission Tile Roofing, 134 Piece Per SQ	1,400.87	420.55
<i>For >25 To 50, Deduct</i>	-33.59	
<i>For >50 To 75, Deduct</i>	-77.00	
<i>For >75 To 100, Deduct</i>	-114.83	
<i>For >100 To 200, Deduct</i>	-147.05	
<i>For >200, Deduct</i>	-173.67	
<i>For 20 Year Warranty, Add</i>	39.18	
07 32 16 Concrete Roof Tiles (07 32)		
07 32 16 00-0001 Corrugated Tiles And Shakes Nailed To Wood (07 32 16)		
Note: Includes 30 lb felt underlayment.		
07 32 16 00-0002 SQ 13" x 16-1/2" Concrete Roof Tile, 90/SQ, 950 LB/SQ, Earhtone Colors, Corrugated	1,183.65	444.24
<i>For >50 To 75, Deduct</i>	-11.80	
<i>For >75 To 100, Deduct</i>	-42.87	
<i>For >100 To 200, Deduct</i>	-76.89	
<i>For >200, Deduct</i>	-107.95	
<i>For Steep Roof, Over 7 To 12, Add</i>	284.35	
07 32 16 00-0003 SQ 13" x 16-1/2" Concrete Roof Tile, 90/SQ, 950 LB/SQ, Custom Blues, Corrugated	1,477.96	444.24
<i>For >50 To 75, Deduct</i>	-23.57	
<i>For >75 To 100, Deduct</i>	-63.47	
<i>For >100 To 200, Deduct</i>	-109.26	
<i>For >200, Deduct</i>	-149.16	
<i>For Steep Roof, Over 7 To 12, Add</i>	284.35	
07 32 16 00-0004 SQ 13" x 16-1/2" Concrete Roof Tile, 90/SQ, 950 LB/SQ, Custom Greens Corrugated	1,242.51	444.24
<i>For >50 To 75, Deduct</i>	-14.16	
<i>For >75 To 100, Deduct</i>	-46.99	
<i>For >100 To 200, Deduct</i>	-83.36	
<i>For >200, Deduct</i>	-116.19	
<i>For Steep Roof, Over 7 To 12, Add</i>	284.35	
07 32 16 00-0005 SQ 13" x 16-1/2" Concrete Roof Tile, 90/SQ, 950 LB/SQ, Colors, Shakes	1,163.70	397.47
<i>For >50 To 75, Deduct</i>	-14.75	
<i>For >75 To 100, Deduct</i>	-45.68	
<i>For >100 To 200, Deduct</i>	-80.30	
<i>For >200, Deduct</i>	-111.24	
<i>For Steep Roof, Over 7 To 12, Add</i>	254.42	
07 32 16 00-0006 Accessories (07 32 16)		
07 32 16 00-0007 EA Ridge And Hip, 10" X 16-1/2", 8 LB Each For Concrete Tile Roof	4.97	
07 32 16 00-0008 EA Rake, 6-1/2" X 16-3/4", 9 LB Each For Concrete Tile Roof	3.27	
07 32 16 00-0009 EA Mansard Hip, 10" X 16-1/2", 9.2 LB Each For Concrete Tile Roof	4.94	
07 32 16 00-0010 EA Hip Starter, 10" X 16-1/2", 10.5 LB Each For Concrete Tile Roof	5.66	
07 32 16 00-0011 EA 3 Or 4 Way Apex, 10" Each Side, 11.5 LB Each For Concrete Tile Roof	5.89	
07 34 Roofing Underlayment (07 30)		
07 34 00 00-0001 Mechanically Fastened, Roofing Underlayment (07 34)		
Note: Standard slope.		
07 34 00 00-0002 SQ 15 LB, Asphalt Saturated Organic Felt Roofing Underlayment, Mechanically Fastened	40.38	8.95
<i>For Steep Roof, Over 7 To 12, Add</i>	5.73	
<i>For >50 To 75, Deduct</i>	-0.90	
<i>For >75 To 100, Deduct</i>	-2.02	
<i>For >100 To 200, Deduct</i>	-3.37	
<i>For >200, Deduct</i>	-4.94	
07 34 00 00-0003 SQ 30 LB, Asphalt Saturated Organic Felt Roofing Underlayment, Mechanically Fastened	62.18	12.32
<i>For Steep Roof, Over 7 To 12, Add</i>	7.88	
<i>For >50 To 75, Deduct</i>	-1.50	
<i>For >75 To 100, Deduct</i>	-3.24	
<i>For >100 To 200, Deduct</i>	-5.36	
<i>For >200, Deduct</i>	-7.72	
07 34 00 00-0004 SQ 30 LB, Asphalt Saturated Organic Felt Shake Underlayment, Mechanically Fastened	69.25	12.32
<i>For Steep Roof, Over 7 To 12, Add</i>	7.88	
<i>For >50 To 75, Deduct</i>	-1.78	
<i>For >75 To 100, Deduct</i>	-3.74	
<i>For >100 To 200, Deduct</i>	-6.14	
<i>For >200, Deduct</i>	-8.71	
07 34 00 00-0005 SQ Fire Rated, Polypropylene Roofing Underlayment, Mechanically Fastened (Rex™ Synfelt)	77.42	18.66
<i>For Steep Roof, Over 7 To 12, Add</i>	11.94	
<i>For >50 To 75, Deduct</i>	-1.60	
<i>For >75 To 100, Deduct</i>	-3.74	
<i>For >100 To 200, Deduct</i>	-6.28	
<i>For >200, Deduct</i>	-9.35	
07 34 00 00-0006 SQ 17 Mil, Fire Rated, High Temperature, Coated Woven Synthetic Roofing Underlayment, Mechanically Fastened (TITANIUM™ UDL 25)	85.79	18.66
<i>For Steep Roof, Over 7 To 12, Add</i>	11.94	
<i>For >50 To 75, Deduct</i>	-1.94	
<i>For >75 To 100, Deduct</i>	-4.33	
<i>For >100 To 200, Deduct</i>	-7.20	
<i>For >200, Deduct</i>	-10.52	

07 Thermal And Moisture Protection**07 30 Steep Slope Roofing****07 34 Roofing Underlayment**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
07 34 00 00-0007	SQ	25 Mil, Fire Rated, High Temperature, Coated Woven Synthetic Roofing Underlayment, Mechanically Fastened (TITANIUM™ UDL 30).....	99.59	18.66
		<i>For Steep Roof, Over 7 To 12, Add</i>	11.94	
		<i>For >50 To 75, Deduct</i>	-2.49	
		<i>For >75 To 100, Deduct</i>	-5.29	
		<i>For >100 To 200, Deduct</i>	-8.72	
		<i>For >200, Deduct</i>	-12.45	
07 34 00 00-0008	SQ	30 Mil, Fire Rated, High Temperature, Coated Woven Synthetic Roofing Underlayment, Mechanically Fastened (TITANIUM™ UDL 50).....	92.69	18.66
		<i>For Steep Roof, Over 7 To 12, Add</i>	11.94	
		<i>For >50 To 75, Deduct</i>	-2.21	
		<i>For >75 To 100, Deduct</i>	-4.81	
		<i>For >100 To 200, Deduct</i>	-7.96	
		<i>For >200, Deduct</i>	-11.48	
07 34 00 00-0009		Self-Adhering, Roofing Underlayment^(07 34)		
		Note: Standard slope.		
07 34 00 00-0010	SQ	48 Mil, Fire Rated, Polymeric Asphalt Surfaced, Fiberglass Mat Reinforced, Styrene-Butadiene-Styrene (SBS) Modified Roofing Underlayment, Self-Adhering (Owens Corning® WeatherLock® Mat)	159.78	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-4.58	
		<i>For >75 To 100, Deduct</i>	-9.15	
		<i>For >100 To 200, Deduct</i>	-14.86	
		<i>For >200, Deduct</i>	-20.56	
07 34 00 00-0011	SQ	60 Mil, Fire Rated, Granule Surfaced, Rubberized Asphalt Adhesive, Roofing Underlayment, Self-Adhering (Grace Basik®).....	239.77	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-7.78	
		<i>For >75 To 100, Deduct</i>	-14.75	
		<i>For >100 To 200, Deduct</i>	-23.66	
		<i>For >200, Deduct</i>	-31.76	
07 34 00 00-0012	SQ	53 Mil, Fire Rated, Granule Surfaced, Fiberglass Mat Reinforced, Styrene-Butadiene-Styrene (SBS) Modified Roofing Underlayment, Self-Adhering (Owens Corning® WeatherLock® G).....	169.67	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-4.98	
		<i>For >75 To 100, Deduct</i>	-9.84	
		<i>For >100 To 200, Deduct</i>	-15.95	
		<i>For >200, Deduct</i>	-21.94	
07 34 00 00-0013	SQ	65 Mil, Fire Rated, Polyester Non-Woven Fabric Surfaced, Fiberglass Mat Reinforced, Styrene-Butadiene-Styrene (SBS) Modified Roofing Underlayment, Self Adhering (Owens Corning® WeatherLock® Specialty Tile And Metal).....	159.78	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-4.58	
		<i>For >75 To 100, Deduct</i>	-9.15	
		<i>For >100 To 200, Deduct</i>	-14.86	
		<i>For >200, Deduct</i>	-20.56	
07 34 00 00-0014	SQ	45 Mil, Fire Rated, High Temperature, Synthetic Polymer Surfaced, Modified Rubberized Asphalt, Roofing Underlayment, Self-Adhering (TITANIUM™ PSU-30)	228.23	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-7.32	
		<i>For >75 To 100, Deduct</i>	-13.94	
		<i>For >100 To 200, Deduct</i>	-22.39	
		<i>For >200, Deduct</i>	-30.14	
07 34 00 00-0015	SQ	25 Mil, Fire Rated, Embossed Surface, Rubberized Asphalt Adhesive, High Density Cross Laminated Polyethylene Reinforcement, Roofing Underlayment, Self-Adhering (Grace Select).....	192.09	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-5.87	
		<i>For >75 To 100, Deduct</i>	-11.41	
		<i>For >100 To 200, Deduct</i>	-18.41	
		<i>For >200, Deduct</i>	-25.08	
07 34 00 00-0016	SQ	40 Mil, Fire Rated, Embossed Surface, Rubberized Asphalt Adhesive, High Density Cross Laminated Polyethylene Reinforcement, Roofing Underlayment, Self-Adhering (Grace Ice And Water Shield®).....	285.23	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-9.60	
		<i>For >75 To 100, Deduct</i>	-17.93	
		<i>For >100 To 200, Deduct</i>	-28.66	
		<i>For >200, Deduct</i>	-38.12	
07 34 00 00-0017	SQ	40 Mil, Fire Rated, High Temperature, Embossed Surface, Rubberized Asphalt Adhesive, High Density Cross Laminated Polyethylene Reinforcement, Roofing Underlayment, Self-Adhering (Grace Ice And Water Shield® HT).....	326.03	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-11.23	
		<i>For >75 To 100, Deduct</i>	-20.79	
		<i>For >100 To 200, Deduct</i>	-33.15	
		<i>For >200, Deduct</i>	-43.83	
07 34 00 00-0018	SQ	30 Mil, Fire Rated, High Temperature, Fire Rated, Embossed Surface, Butyl Rubber Based Adhesive, High Density Cross Laminated Polyethylene Reinforcement, Roofing Underlayment, Self-Adhering (Grace Ultra).....	479.11	22.64
		<i>For Steep Roof, Over 7 To 12, Add</i>	14.48	
		<i>For >50 To 75, Deduct</i>	-17.35	
		<i>For >75 To 100, Deduct</i>	-31.50	
		<i>For >100 To 200, Deduct</i>	-49.99	
		<i>For >200, Deduct</i>	-65.27	

07 40 Roofing and Siding Panels⁽⁰⁷⁾



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 41 Roof Panels (07 40)

Note: Includes standard fasteners, grommets, cleats for installation.

07 41 13 Metal Roof Panels (07 41)

07 41 13 00-0001	Exposed Fastener Metal Roofing <small>(07 41 13)</small> <small>Note: Includes 15 year warranty and all warranties are no dollar limit to include material and labor.</small>		
07 41 13 00-0002	Galvanized Exposed Fastener Metal Roofing <small>(07 41 13 00-0001)</small>		
07 41 13 00-0003	Galvanized Steel Exposed Fastener Metal Roof Panels <small>(07 41 13 00-0002)</small>		
07 41 13 00-0004	SF 18 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	8.45 1.98 1.41	2.76
07 41 13 00-0005	SF 20 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	7.74 1.98 1.41	2.76
07 41 13 00-0006	SF 22 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	7.24 1.98 1.41	2.76
07 41 13 00-0007	SF 24 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	6.75 1.98 1.41	2.76
07 41 13 00-0008	SF 26 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	6.34 1.98 1.41	2.76
07 41 13 00-0009	SF 28 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	5.99 1.98 1.41	2.76
07 41 13 00-0010	SF 30 Gauge, Corrugated Or Ribbed, Galvanized Exposed Fastener Metal Roof Panels..... <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	5.85 1.98 1.41	2.76
07 41 13 00-0011	Galvanized Exposed Fastener Metal Roof Accessories <small>(07 41 13 00-0002)</small> <small>See CSI section 07 41 13 00-0038 for accessories.</small>		
07 41 13 00-0012	LF Ridge Flashing For Galvanized Steel Exposed Fastener Roofing <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	27.57 3.71 1.60	2.87
07 41 13 00-0013	LF 9" To 12" Girth, Eave Or Gable Flashing For Galvanized Steel Exposed Fastener Roofing <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	17.20 2.47 0.95	1.88
07 41 13 00-0014	LF Valley Flashing For Galvanized Steel Exposed Fastener Roofing..... <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	33.85 3.71 2.23	2.87
07 41 13 00-0015	LF Hip Flashing For Galvanized Steel Exposed Fastener Roofing <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	28.14 3.71 1.66	2.87
07 41 13 00-0016	Aluminum Exposed Fastener Metal Roofing <small>(07 41 13 00-0001)</small>		
07 41 13 00-0017	Aluminum Exposed Fastener Metal Roof Panels <small>(07 41 13 00-0016)</small>		
07 41 13 00-0018	SF 0.0155", Corrugated Or Ribbed, Aluminum Exposed Fastener Metal Roof Panels <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	5.99 1.98 1.41	2.76
07 41 13 00-0019	SF 0.018", Corrugated Or Ribbed, Aluminum Exposed Fastener Metal Roof Panels <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	6.25 1.98 1.41	2.76
07 41 13 00-0020	SF 0.024", Corrugated Or Ribbed, Aluminum Exposed Fastener Metal Roof Panels <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	6.86 1.98 1.41	2.76
07 41 13 00-0021	SF 0.032", Corrugated Or Ribbed, Aluminum Exposed Fastener Metal Roof Panels <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	7.67 1.98 1.41	2.76
07 41 13 00-0022	SF 0.040", Corrugated Or Ribbed, Aluminum Exposed Fastener Metal Roof Panels <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	8.48 1.98 1.41	2.76
07 41 13 00-0023	SF 0.050", Corrugated Or Ribbed, Aluminum Exposed Fastener Metal Roof Panels <i>For Fluoropolymer (Kynar®) Coating, Add</i> <i>For Steep Roof, Over 7 To 12, Add</i>	9.49 1.98 1.41	2.76
07 41 13 00-0024	Aluminum Exposed Fastener Metal Roof Accessories <small>(07 41 13 00-0016)</small>		
07 41 13 00-0025	LF Ridge Flashing For Aluminum Exposed Fastener Metal Roofing..... <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	31.42 3.71 1.98	2.87
07 41 13 00-0026	LF 9" To 12" Girth, Eave Or Gable Flashing For Aluminum Exposed Fastener Metal Roofing..... <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	19.42 2.47 1.17	1.99
07 41 13 00-0027	LF Valley Flashing For Aluminum Exposed Fastener Metal Roofing <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	39.26 3.71 2.77	2.87

07	07 Thermal And Moisture Protection
	07 40 Roofing and Siding Panels
	07 41 Roof Panels



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 41 13 00-0028 LF Hip Flashing For Aluminum Exposed Fastener Metal Roofing..... <i>For Steep Roof, Over 7 To 12, Add</i> <i>For Fluoropolymer (Kynar®) Coating, Add</i>	32.13 3.71 2.05	2.87
07 41 13 00-0029 Standing Seam Roofs <small>(07 41 13)</small> Note: Includes all profiles of vertical leg and batten style standing seam roofing. Includes all clips, neoprene closures, metal closures, battens, tape sealer, tube sealant, fasteners, vent material, panel starters and cleats. Based on Garland R-Mer Clad or R-Mer Seam architectural roofing, R-Mer Loc architectural/structural roofing, and R-Mer Span structural roofing. Architectural roofing requires a solid substrate and underlayment, requires a minimum 3:12 pitch, and includes a 20 year no dollar limit warranty. Architectural/structural roofing does not require a solid substrate or underlayment, requires a minimum 3:12 pitch, and includes a 25 year no dollar limit warranty. Structural roofing does not require a solid substrate or underlayment, requires a minimum 1/4" per foot slope, and includes a 25 year no dollar limit warranty.		
07 41 13 00-0030 Galvanized Steel Standing Seam Concealed Fastener Roofing <small>(07 41 13 00-0029)</small> Note: All steel is galvanized G90 rated or galvalume®. Factory paint finish is Kynar 500®, Hylar 5000® or equal polyvinylidene fluoride (PVDF) finish.		
07 41 13 00-0031 Galvanized Steel Standing Seam Concealed Fastener Roofing <small>(07 41 13 00-0030)</small>		
07 41 13 00-0032 SF Architectural 24 Gauge Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	13.13 1.76 0.73 1.74 3.28 1.97 0.33	2.93
07 41 13 00-0033 SF Architectural 22 Gauge Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	13.82 1.76 0.74 1.77 3.46 2.07 0.35	2.93
07 41 13 00-0034 SF Architectural/Structural 24 Gauge Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	12.53 1.76 0.72 1.71 3.13 1.88 0.31	2.93
07 41 13 00-0035 SF Architectural/Structural 22 Gauge Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	12.77 1.76 0.72 1.72 3.19 1.92 0.32	2.93
07 41 13 00-0036 SF Structural 24 Gauge Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	13.04 1.76 0.73 1.73 3.26 1.96 0.33	2.93
07 41 13 00-0037 SF Structural 22 Gauge Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	14.03 1.76 0.75 1.78 3.51 2.10 0.35	2.93
07 41 13 00-0038 Accessories For Galvanized Steel Standing Seam Roofing <small>(07 41 13 00-0030)</small>		
07 41 13 00-0039 LF Ridge Flashing For Galvanized Steel Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	29.17 3.48 1.51	2.87
07 41 13 00-0040 LF 9" To 12" Girth, Eave Or Gable Flashing For Galvanized Steel Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	18.15 2.32 0.98	1.99
07 41 13 00-0041 LF Valley Flashing For Galvanized Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	36.07 3.48 1.65	2.87
07 41 13 00-0042 LF Hip Flashing For Galvanized Steel Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	29.79 3.48 1.52	2.87
07 41 13 00-0043 Aluminum Standing Seam Concealed Fastener Roofing <small>(07 41 13 00-0029)</small> Note: Factory paint finish is Kynar 500®, Hylar 5000® or equal polyvinylidene fluoride (PVDF) finish.		
07 41 13 00-0044 Aluminum Standing Seam Concealed Fastener Roofing <small>(07 41 13 00-0043)</small>		



Thermal And Moisture Protection	07
Roofing and Siding Panels	07 40
Roof Panels	07 41

07

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 41 13 00-0045 SF Architectural 0.032" Aluminum Standing Seam Concealed Fastener Roofing.....	13.61	2.93
For Steep Roof, Over 6 To 12, Add	1.76	
For 140 MPH Wind Load, Add	0.74	
For Panels <16" Wide, Add	1.76	
For Up To 1,500, Add	3.40	
For >1,500 To 5,000, Add	2.04	
For >5,000 To 10,000, Add	0.34	
07 41 13 00-0046 SF Architectural 0.040" Aluminum Standing Seam Concealed Fastener Roofing.....	14.19	2.93
For Steep Roof, Over 6 To 12, Add	1.76	
For 140 MPH Wind Load, Add	0.75	
For Panels <16" Wide, Add	1.79	
For Up To 1,500, Add	3.55	
For >1,500 To 5,000, Add	2.13	
For >5,000 To 10,000, Add	0.35	
07 41 13 00-0047 SF Architectural/Structural Or Structural 0.032" Aluminum Standing Seam Concealed Fastener Roofing	13.28	2.93
For Steep Roof, Over 6 To 12, Add	1.76	
For 140 MPH Wind Load, Add	0.73	
For Panels <16" Wide, Add	1.75	
For Up To 1,500, Add	3.32	
For >1,500 To 5,000, Add	1.99	
For >5,000 To 10,000, Add	0.33	
07 41 13 00-0048 SF Architectural/Structural Or Structural 0.040" Aluminum Standing Seam Concealed Fastener Roofing	14.35	2.93
For Steep Roof, Over 6 To 12, Add	1.76	
For 140 MPH Wind Load, Add	0.76	
For Panels <16" Wide, Add	1.80	
For Up To 1,500, Add	3.59	
For >1,500 To 5,000, Add	2.15	
For >5,000 To 10,000, Add	0.36	
07 41 13 00-0049 Accessories For Aluminum Standing Seam Roofing (07 41 13 00-0043)		
07 41 13 00-0050 LF Ridge Flashing For Aluminum Standing Seam Concealed Fastener Roofing.....	33.40	2.87
For Steep Roof, Over 6 To 12, Add	3.48	
For 140 MPH Wind Load, Add	1.60	
07 41 13 00-0051 LF 9" To 12" Girth, Eave Or Gable Flashing For Aluminum Standing Seam Concealed Fastener Roofing	20.59	1.99
For Steep Roof, Over 6 To 12, Add	2.32	
For 140 MPH Wind Load, Add	1.03	
07 41 13 00-0052 LF Valley Flashing For Aluminum Standing Seam Concealed Fastener Roofing	42.03	2.87
For Steep Roof, Over 6 To 12, Add	3.48	
For 140 MPH Wind Load, Add	1.77	
07 41 13 00-0053 LF Hip Flashing For Aluminum Standing Seam Concealed Fastener Roofing.....	34.19	2.87
For Steep Roof, Over 6 To 12, Add	3.48	
For 140 MPH Wind Load, Add	1.61	
07 41 13 00-0054 Stainless Steel Standing Seam Concealed Fastener Roofing (07 41 13 00-0029)		
07 41 13 00-0055 Stainless Steel Standing Seam Concealed Fastener Roofing (07 41 13 00-0054)		
07 41 13 00-0056 SF Architectural 24 Gauge T304 Stainless Steel Standing Seam Concealed Fastener Roofing	25.53	3.51
For Steep Roof, Over 6 To 12, Add	2.63	
For 140 MPH Wind Load, Add	1.21	
For Panels <16" Wide, Add	2.90	
For Up To 1,500, Add	6.38	
For >1,500 To 5,000, Add	3.83	
For >5,000 To 10,000, Add	0.64	
07 41 13 00-0057 SF Architectural 22 Gauge T304 Stainless Steel Standing Seam Concealed Fastener Roofing	29.10	3.51
For Steep Roof, Over 6 To 12, Add	2.63	
For 140 MPH Wind Load, Add	1.28	
For Panels <16" Wide, Add	3.08	
For Up To 1,500, Add	7.28	
For >1,500 To 5,000, Add	4.37	
For >5,000 To 10,000, Add	0.73	
07 41 13 00-0058 SF Architectural 24 Gauge T316 Stainless Steel Standing Seam Concealed Fastener Roofing	33.32	3.51
For Steep Roof, Over 6 To 12, Add	2.63	
For 140 MPH Wind Load, Add	1.37	
For Panels <16" Wide, Add	3.29	
For Up To 1,500, Add	8.33	
For >1,500 To 5,000, Add	5.00	
For >5,000 To 10,000, Add	0.83	
07 41 13 00-0059 SF Architectural 22 Gauge T316 Stainless Steel Standing Seam Concealed Fastener Roofing	38.74	3.51
For Steep Roof, Over 6 To 12, Add	2.63	
For 140 MPH Wind Load, Add	1.48	
For Panels <16" Wide, Add	3.56	
For Up To 1,500, Add	9.69	
For >1,500 To 5,000, Add	5.81	
For >5,000 To 10,000, Add	0.97	
07 41 13 00-0060 Accessories For Stainless Steel Standing Seam Concealed Fastener Roofing (07 41 13 00-0054)		
07 41 13 00-0061 LF Ridge Flashing For Stainless Steel Standing Seam Concealed Fastener Roofing.....	78.23	3.20
For Steep Roof, Over 6 To 12, Add	3.84	
For 140 MPH Wind Load, Add	2.59	

07 Thermal And Moisture Protection**07 40 Roofing and Siding Panels****07 41 Roof Panels**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 41 13 00-0062	LF		9" To 12" Girth, Eave Or Gable Flashing For Stainless Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	42.24 2.55 1.52	2.10
07 41 13 00-0063	LF		Valley Flashing For Stainless Steel Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	108.08 3.81 3.18	3.20
07 41 13 00-0064	LF		Hip Flashing For Stainless Steel Standing Seam Concealed Fastener Roofing <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i>	80.60 3.84 2.64	3.20
07 41 13 00-0065			Metal Roof Surfacing (07 41 13)		
07 41 13 00-0066	SF		Acrylic, Metal Roof Primer, One Coat <i>For Steep Roof, Over 7 To 12, Add</i>	0.79 0.17	
07 41 13 00-0067	SF		Acrylic Elastomeric, Surface Or Base Coating For Metal Roofing, One Coat Note: 55% solids by volume. <i>For Steep Roof, Over 7 To 12, Add</i>	1.04 0.17	
07 41 33			Plastic Roof Panels (07 41)		
07 41 33 00-0001			Polyvinyl Chloride (PVC) Roofing Panels (07 41 33)		
07 41 33 00-0002			Polyvinyl Chloride (PVC) Roofing Panels (07 41 33 00-0001)		
07 41 33 00-0003	SF		Solid Polyvinyl Chloride (PVC) Roofing Panels, 8" Wide	8.45	2.49
07 41 33 00-0004	SF		Solid Polyvinyl Chloride (PVC) Roofing Panels, 10" Wide	8.21	2.24
07 41 33 00-0005	SF		Solid Polyvinyl Chloride (PVC) Roofing Panels, Double 8" Wide	8.84	2.49
07 41 33 00-0006	SF		Solid Polyvinyl Chloride (PVC) Roofing Panels, Double 10" Wide	8.54	2.24
07 41 33 00-0007			Polyvinyl Chloride (PVC) Roofing Accessories (07 41 33 00-0001)		
07 41 33 00-0008	LF		1" "J" Channel, Starter Strip Trim.....	4.91	1.87
07 41 33 00-0009	LF		3-1/2" "J" Channel, Starter Strip Trim	7.87	1.87
07 41 33 00-0010	LF		Outside Corner Post, 7/8" Pocket	8.73	1.87
07 41 33 00-0011	LF		Inside Corner Post, 7/8" Pocket.....	6.43	1.87
07 41 33 00-0012			Fiberglass Roofing Panel (07 41 33)		
07 41 33 00-0013			Corrugated Panels (07 41 33 00-0012)		
07 41 33 00-0014	SF		8 Ounce Corrugated Fiberglass Panel	7.57	1.99
07 41 33 00-0015	SF		12 Ounce Corrugated Fiberglass Panel.....	8.73	1.99
07 42			Wall Panels (07 40)		
07 42 13			Metal Wall Panels (07 42)		
07 42 13 19			Insulated Metal Wall Panels (07 42 13)		
07 42 13 19-0001			Insulated Panels For Sash/Window Replacement (07 42 13 19) Note: Porcelain or polymer finish on aluminum panel with polystyrene core.		
07 42 13 19-0002	SF		1" Insulated Panel For Sash Or Window Replacement..... <i>For Non-Insulated Panels, Deduct</i>	31.45 -5.68	4.34
07 42 13 19-0003	SF		1-1/4" Insulated Panel For Sash Or Window Replacement <i>For Non-Insulated Panels, Deduct</i>	33.95 -6.07	4.88
07 42 13 19-0004	SF		1-3/4" Insulated Panel For Sash Or Window Replacement <i>For Non-Insulated Panels, Deduct</i>	36.26 -6.46	5.43
07 42 13 19-0005	SF		2-1/4" Insulated Panel For Sash Or Window Replacement <i>For Non-Insulated Panels, Deduct</i>	38.70 -6.85	5.64
07 42 13 19-0006	SF		3-1/4" Insulated Panel For Sash Or Window Replacement <i>For Non-Insulated Panels, Deduct</i>	44.16 -7.96	6.18
07 42 13 19-0007	SF		4-1/4" Insulated Panel For Sash Or Window Replacement <i>For Non-Insulated Panels, Deduct</i>	51.76 -9.55	6.84
07 42 13 23			Metal Composite Material Wall Panels (07 42 13)		
07 42 13 23-0001			24 Gauge, Galvanized Steel Insulated Tongue And Groove Metal Siding Panels (07 42 13 23) Note: G-90 galvanized steel, 24 gauge exterior face and 24 gauge interior liner. Galvalume® AZ-55 coating designation with texture. Non-CFC polyurethane foam core. Standard color on exterior and interior panels. CF Mesa Profile wall panels as manufactured by Metl-Span Corporation.		
07 42 13 23-0002	SF		2" Polyurethane Foam, 24 Gauge (Each Side), Galvanized Steel Insulated Tongue And Groove Metal Siding Panels..... <i>For AZ-50 Aluminum-Zinc Coated Exterior, Add</i> <i>For Premium Exterior Colors, Add</i>	22.68 0.24 0.12	2.54
07 42 13 23-0003	SF		2-1/2" Polyurethane Foam, 24 Gauge (Each Side), Galvanized Steel Insulated Tongue And Groove Metal Siding Panels..... <i>For AZ-50 Aluminum-Zinc Coated Exterior, Add</i> <i>For Premium Exterior Colors, Add</i>	25.41 0.24 0.12	2.87



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 42 13 23-0004 SF 3" Polyurethane Foam, 24 Gauge (Each Side), Galvanized Steel Insulated Tongue And Groove Metal Siding Panels <i>For AZ-50 Aluminum-Zinc Coated Exterior, Add For Premium Exterior Colors, Add</i>	27.71 0.24 0.12	3.26
07 42 13 23-0005 SF 4" Polyurethane Foam, 24 Gauge (Each Side), Galvanized Steel Insulated Tongue And Groove Metal Siding Panels <i>For AZ-50 Aluminum-Zinc Coated Exterior, Add For Premium Exterior Colors, Add</i>	30.79 0.24 0.12	4.31
07 42 93 Soffit Panels (07 42)		
07 42 93 00-0001 Aluminum Soffit And Fascia (07 42 93) Note: Excludes J-channel.		
07 42 93 00-0002 LF 6" Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	4.56 -0.11	1.51
07 42 93 00-0003 LF 10" Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	5.72 -0.18	1.60
07 42 93 00-0004 LF 1' Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	6.30 -0.22	1.64
07 42 93 00-0005 LF 1'-6" Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	7.98 -0.33	1.73
07 42 93 00-0006 LF 2' Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	9.83 -0.44	1.89
07 42 93 00-0007 LF 3' Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	13.23 -0.66	2.08
07 42 93 00-0008 LF 4' Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	16.66 -0.88	2.30
07 42 93 00-0009 LF 5' Overhang, 0.019" Thick, Solid Or Vented Aluminum Soffit <i>For 0.015" Thick, Deduct</i>	20.14 -1.10	2.52
07 42 93 00-0010 LF 4" Exposure, 0.024" Thick, Aluminum Fascia	5.44	1.48
07 42 93 00-0011 LF 6" Exposure, 0.024" Thick, Aluminum Fascia	5.98	1.51
07 42 93 00-0012 LF 8" Exposure, 0.024" Thick, Aluminum Fascia	7.08	1.57
07 42 93 00-0013 LF 10" Exposure, 0.024" Thick, Aluminum Fascia	8.27	1.60
07 46 Siding (07 40)		
07 46 16 Aluminum Siding (07 46) Note: Includes fasteners, all necessary furring strips, trim for corners, windows and doors.		
07 46 16 00-0001 Aluminum Coil Stock Cladding (07 46 16) Note: Per SF of board, includes overlappage.		
07 46 16 00-0002 SF 0.016" Thick, Aluminum Clad Siding	12.03	3.78
07 46 16 00-0003 SF 0.019" Thick, Aluminum Clad Siding	12.20	3.78
07 46 16 00-0004 SF 0.024" Thick, Aluminum Clad Siding	12.49	3.78
07 46 16 00-0005 Aluminum Siding Panels (07 46 16)		
07 46 16 00-0006 Corrugated Aluminum Siding Panels (07 46 16 00-0005) Note: Includes factory applied polyvinylidene fluoride (PVDF) paint finish.		
07 46 16 00-0007 SF 0.019", Painted Finish, Corrugated Aluminum Siding Panel	9.02	2.21
07 46 16 00-0008 SF 0.021", Painted Finish, Corrugated Aluminum Siding Panel	9.43	2.21
07 46 16 00-0009 SF 0.024", Painted Finish, Corrugated Aluminum Siding Panel	10.71	2.21
07 46 16 00-0010 SF 0.032", Painted Finish, Corrugated Aluminum Siding Panel	13.22	2.21
07 46 16 00-0011 V- Beam Aluminum Siding Panels (07 46 16 00-0005) Note: Includes factory applied polyvinylidene fluoride (PVDF) paint finish.		
07 46 16 00-0012 SF 0.032", Painted Finish, V- Beam Aluminum Siding Panel	13.12	2.21
07 46 16 00-0013 SF 0.040", Painted Finish, V- Beam Aluminum Siding Panel	14.80	2.21
07 46 16 00-0014 SF 0.050", Painted Finish, V- Beam Aluminum Siding Panel	18.79	2.21
07 46 16 00-0015 Box Ribbed Aluminum Siding Panels (07 46 16 00-0005) Note: Includes factory applied polyvinylidene fluoride (PVDF) paint finish.		
07 46 16 00-0016 SF 0.032", Painted Finish, Box Ribbed Aluminum Siding Panel	13.86	2.21
07 46 16 00-0017 SF 0.040", Painted Finish, Box Ribbed Aluminum Siding Panel	15.49	2.21
07 46 16 00-0018 SF 0.050", Painted Finish, Box Ribbed Aluminum Siding Panel	16.48	2.21
07 46 16 00-0019 Aluminum Siding Accessories (07 46 16)		
07 46 16 00-0020 LF 3/8" Pocket, Aluminum J-Channel	3.50	1.42
07 46 16 00-0021 LF 1/2" Pocket, Aluminum J-Channel	3.50	1.42
07 46 16 00-0022 LF 3/4" Pocket, Aluminum J-Channel	4.19	1.42
07 46 16 00-0023 LF 3/8" Pocket, Aluminum F-Channel	3.91	1.42
07 46 16 00-0024 LF 1/2" Pocket, Aluminum F-Channel	3.91	1.42
07 46 19 Steel Siding (07 46) Note: Includes fasteners, all necessary furring strips, trim for corners, windows and doors.		
07 46 19 00-0001 Steel Siding Panels (07 46 19)		

07 Thermal And Moisture Protection**07 40 Roofing and Siding Panels****07 46 Siding**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 46 19 00-0002			Corrugated Steel Siding Panels (07 46 19 00-0001) Note: Includes factory applied polyvinylidene fluoride (PVDF) paint finish.		
07 46 19 00-0003	SF		20 Gauge, Painted Finish, Corrugated Steel Siding Panel 13.36	13.36	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 2.24		
07 46 19 00-0004	SF		22 Gauge, Painted Finish, Corrugated Steel Siding Panel 12.20	12.20	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.95		
07 46 19 00-0005	SF		24 Gauge, Painted Finish, Corrugated Steel Siding Panel 11.92	11.92	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.88		
07 46 19 00-0006	SF		26 Gauge, Painted Finish, Corrugated Steel Siding Panel 8.51	8.51	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.02		
07 46 19 00-0007	SF		28 Gauge, Painted Finish, Corrugated Steel Siding Panel 8.27	8.27	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 0.96		
07 46 19 00-0008	SF		30 Gauge, Painted Finish, Corrugated Steel Siding Panel 8.11	8.11	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 0.92		
07 46 19 00-0009			Box Ribbed Steel Siding Panels (07 46 19 00-0001) Note: Includes factory applied polyvinylidene fluoride (PVDF) paint finish.		
07 46 19 00-0010	SF		20 Gauge, Painted Finish, Box Ribbed Steel Siding Panel 12.49	12.49	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 2.02		
07 46 19 00-0011	SF		22 Gauge, Painted Finish, Box Ribbed Steel Siding Panel 11.97	11.97	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.89		
07 46 19 00-0012	SF		24 Gauge, Painted Finish, Box Ribbed Steel Siding Panel 11.63	11.63	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.80		
07 46 19 00-0013	SF		26 Gauge, Painted Finish, Box Ribbed Steel Siding Panel 11.05	11.05	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.66		
07 46 19 00-0014	SF		28 Gauge, Painted Finish, Box Ribbed Steel Siding Panel 9.81	9.81	2.21
			<i>For Galvanized Instead Of Painted Steel, Add</i> 1.35		
07 46 19 00-0015			Clapboard Steel Siding Panels (07 46 19 00-0001) Note: Includes factory applied polyvinylidene fluoride (PVDF) paint finish.		
07 46 19 00-0016	SF		29 Gauge, Painted Finish, Clapboard Steel Siding Panel 10.09	10.09	1.10
07 46 23			Wood Siding (07 46) Note: Includes fasteners, all necessary furring strips, trim for corners, windows and doors.		
07 46 23 00-0001			Wood Lap Siding (07 46 23)		
07 46 23 00-0002	LF		8" Wide Rough Sawn Cedar Lap Siding 4.15	4.15	1.57
07 46 23 00-0003	LF		10" Wide Rough Sawn Cedar Lap Siding 4.70	4.70	1.68
07 46 23 00-0004	LF		12" Wide Rough Sawn Cedar Lap Siding 5.27	5.27	1.78
07 46 23 00-0005	LF		6" To 8" Wide Southern Yellow Pine Lap Siding, D Grade 4.45	4.45	1.57
07 46 23 00-0006	LF		6" To 8" Wide Spruce Lap Siding, #2 Or Better 4.97	4.97	1.57
07 46 23 00-0007	LF		6" To 8" Wide Western Red Cedar, B Grade Lap Siding 6.08	6.08	1.57
07 46 23 00-0008	LF		6" To 8" Wide Western Red Cedar, A Grade Lap Siding 6.51	6.51	1.57
07 46 23 00-0009	LF		6" To 8" Wide Clear Heart Redwood Lap Siding 5.89	5.89	1.57
07 46 23 00-0010	LF		1" x 8" Cedar Round Or Flat Front Siding, Log Cabin 4.03	4.03	1.68
07 46 23 00-0011	LF		1" x 8" Cedar Beveled Siding, Channel, Rustic 4.03	4.03	1.68
07 46 23 00-0012			Tongue And Groove Siding (07 46 23)		
07 46 23 00-0013	SF		1" x 6" Tongue And Groove Southern Yellow Pine Siding 4.15	4.15	1.57
07 46 23 00-0014	SF		1" x 8" Tongue And Groove Southern Yellow Pine Siding 4.61	4.61	1.57
07 46 23 00-0015	SF		1" x 6" 105 Southern Yellow Pine Siding 4.26	4.26	1.57
07 46 23 00-0016	SF		1" x 8" 105 Southern Yellow Pine Siding 4.88	4.88	1.57
07 46 29			Plywood Siding (07 46) Note: Includes fasteners, all necessary furring strips, trim for corners, windows and doors.		
07 46 29 00-0001			T-111 Siding (07 46 29)		
07 46 29 00-0002	SF		5/8" T-111, Fine Grade Siding, Paint Ready Applied To Blackboard / Stud 3.01	3.01	0.76
			<i>For Pressure Treated, Add</i> 0.18		
07 46 33			Plastic Siding (07 46) Note: Includes fasteners, all necessary furring strips, trim for corners, windows and doors.		
07 46 33 00-0001			Vinyl Siding (07 46 33) Note: Includes standard manufacturer's colors.		
07 46 33 00-0002			Vinyl Siding Panels (07 46 33 00-0001) Note: Excludes J-channels, starter strips and trim.		
07 46 33 00-0003			Horizontal Vinyl Siding Panels (07 46 33 00-0002) Note: Includes single, double or triple profiles. Includes traditional clapboard or dutch lap styles.		
07 46 33 00-0004	SF		7" Exposure, 0.044" Thick, Horizontal Vinyl Siding Panel 5.28	5.28	1.86
			<i>For 0.040" Thick, Deduct</i> -0.21		
			<i>For 0.042" Thick, Deduct</i> -0.08		
			<i>For 0.046" Thick, Add</i> 0.63		
			<i>For Manufacturer's Custom Colors, Add</i> 0.08		



Thermal And Moisture Protection	07
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07 46 33 00-0005 SF 8" Exposure, 0.044" Thick, Horizontal Vinyl Siding Panel.....	5.06	1.75
For 0.040" Thick, Deduct	-0.21	
For 0.042" Thick, Deduct	-0.08	
For 0.046" Thick, Add	0.63	
For Manufacturer's Custom Colors, Add	0.08	
07 46 33 00-0006 SF 9" Exposure, 0.044" Thick, Horizontal Vinyl Siding Panel.....	4.89	1.67
For 0.040" Thick, Deduct	-0.21	
For 0.042" Thick, Deduct	-0.08	
For 0.046" Thick, Add	0.63	
For Manufacturer's Custom Colors, Add	0.08	
07 46 33 00-0007 SF 10" Exposure, 0.044" Thick, Horizontal Vinyl Siding Panel.....	4.73	1.59
For 0.040" Thick, Deduct	-0.21	
For 0.042" Thick, Deduct	-0.08	
For 0.046" Thick, Add	0.63	
For Manufacturer's Custom Colors, Add	0.08	
07 46 33 00-0008 SF 12" Exposure, 0.044" Thick, Horizontal Vinyl Siding Panel.....	4.51	1.47
For 0.040" Thick, Deduct	-0.21	
For 0.042" Thick, Deduct	-0.08	
For 0.046" Thick, Add	0.63	
For Manufacturer's Custom Colors, Add	0.08	
07 46 33 00-0009 Vertical Vinyl Siding Panels (07 46 33 00-0002)		
07 46 33 00-0010 SF 7" Exposure, 0.048" Thick, Board And Batten, Vinyl Siding Panel.....	6.48	1.86
For Manufacturer's Custom Colors, Add	0.14	
07 46 33 00-0011 Vinyl Siding Accessories (07 46 33 00-0001)		
07 46 33 00-0012 LF 3/4" Pocket, Outside Corner Post For Vinyl Siding.....	6.81	1.42
For Manufacturer's Custom Colors, Add	0.20	
07 46 33 00-0013 LF 1-1/8" Pocket, Outside Corner Post For Vinyl Siding.....	12.87	1.42
For Manufacturer's Custom Colors, Add	0.50	
07 46 33 00-0014 LF 3/4" Pocket, Inside Corner Post For Vinyl Siding.....	5.28	1.42
For Manufacturer's Custom Colors, Add	0.12	
07 46 33 00-0015 LF 1-1/8" Pocket, Inside Corner Post For Vinyl Siding.....	6.56	1.42
For Manufacturer's Custom Colors, Add	0.19	
07 46 33 00-0016 LF 3/8" Pocket, J-Channel For Vinyl Siding.....	3.83	1.42
For Manufacturer's Custom Colors, Add	0.06	
07 46 33 00-0017 LF 1/2" Pocket, J-Channel For Vinyl Siding.....	3.54	1.42
For Manufacturer's Custom Colors, Add	0.05	
07 46 33 00-0018 LF 5/8" Pocket, J-Channel For Vinyl Siding.....	3.48	1.42
For Manufacturer's Custom Colors, Add	0.04	
07 46 33 00-0019 LF 3/4" Pocket, J-Channel For Vinyl Siding.....	3.67	1.42
For Manufacturer's Custom Colors, Add	0.05	
07 46 33 00-0020 LF 1" Pocket, J-Channel For Vinyl Siding.....	4.40	1.42
For Manufacturer's Custom Colors, Add	0.08	
07 46 33 00-0021 LF 1-1/4" Pocket, J-Channel For Vinyl Siding.....	4.84	1.42
For Manufacturer's Custom Colors, Add	0.10	
07 46 33 00-0022 LF 2-1/2" Pocket, J-Channel For Vinyl Siding.....	5.37	1.42
For Manufacturer's Custom Colors, Add	0.09	
07 46 33 00-0023 LF 1/2" Pocket, F-Channel For Vinyl Siding.....	3.70	1.42
For Manufacturer's Custom Colors, Add	0.08	
07 46 33 00-0024 LF 3/4" Pocket, 3-1/2" Lineal Trim For Vinyl Siding.....	8.60	1.97
For Manufacturer's Custom Colors, Add	0.23	
07 46 33 00-0025 LF 3/4" Pocket, 5" Lineal Trim For Vinyl Siding.....	9.03	1.97
For Manufacturer's Custom Colors, Add	0.26	
07 46 33 00-0026 LF 1-1/8" Pocket, 3-1/2" Lineal Trim For Vinyl Siding.....	9.97	1.97
For Manufacturer's Custom Colors, Add	0.30	
07 46 33 00-0027 LF 3/8" Pocket, 1-7/8" H-Mold For Vinyl Siding.....	5.04	1.42
For Manufacturer's Custom Colors, Add	0.11	
07 46 33 00-0028 LF Vinyl Starter Strip For Vinyl Siding.....	6.38	1.42
For Manufacturer's Custom Colors, Add	0.18	
07 46 33 00-0029 LF Undersill Trim For Vinyl Siding.....	5.41	1.42
For Manufacturer's Custom Colors, Add	0.13	
07 46 33 00-0030 Vinyl Soffit And Fascia (07 46 33 00-0001)		
Note: Excludes J-channel.		
07 46 33 00-0031 LF 6" Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	4.48	1.51
For 0.038" Thick, Deduct	-0.64	
For 0.040" Thick, Deduct	-0.55	
For Manufacturer's Custom Colors, Add	0.07	
07 46 33 00-0032 LF 10" Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	5.58	1.60
For 0.038" Thick, Deduct	-1.09	
For 0.040" Thick, Deduct	-0.90	
For Manufacturer's Custom Colors, Add	0.12	
07 46 33 00-0033 LF 1' Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	6.14	1.64
For 0.038" Thick, Deduct	-1.31	
For 0.040" Thick, Deduct	-1.10	
For Manufacturer's Custom Colors, Add	0.14	
07 46 33 00-0034 LF 1'-6" Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	7.74	1.73
For 0.038" Thick, Deduct	-1.97	
For 0.040" Thick, Deduct	-1.65	
For Manufacturer's Custom Colors, Add	0.21	

07 Thermal And Moisture Protection**07 40 Roofing and Siding Panels****07 46 Siding**MINOR
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07 46 33 00-0035	LF	2' Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	9.51	1.89
		<i>For 0.038" Thick, Deduct</i>	-2.61	
		<i>For 0.040" Thick, Deduct</i>	-2.20	
		<i>For Manufacturer's Custom Colors, Add</i>	0.29	
07 46 33 00-0036	LF	3' Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	12.75	2.08
		<i>For 0.038" Thick, Deduct</i>	-3.94	
		<i>For 0.040" Thick, Deduct</i>	-3.29	
		<i>For Manufacturer's Custom Colors, Add</i>	0.43	
07 46 33 00-0037	LF	4' Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	16.01	2.30
		<i>For 0.038" Thick, Deduct</i>	-5.24	
		<i>For 0.040" Thick, Deduct</i>	-4.39	
		<i>For Manufacturer's Custom Colors, Add</i>	0.57	
07 46 33 00-0038	LF	5' Overhang, 0.044" Thick, Solid Or Vented Vinyl Soffit.....	19.33	2.52
		<i>For 0.038" Thick, Deduct</i>	-6.55	
		<i>For 0.040" Thick, Deduct</i>	-5.49	
		<i>For Manufacturer's Custom Colors, Add</i>	0.71	
07 46 33 00-0039	LF	4" Exposure, Vinyl Fascia.....	4.69	1.48
		<i>For Manufacturer's Custom Colors, Add</i>	0.09	
07 46 33 00-0040	LF	6" Exposure, Vinyl Fascia.....	5.27	1.51
		<i>For Manufacturer's Custom Colors, Add</i>	0.11	
07 46 33 00-0041	LF	8" Exposure, Vinyl Fascia.....	5.18	1.57
		<i>For Manufacturer's Custom Colors, Add</i>	0.10	
07 46 33 00-0042	LF	10" Exposure, Vinyl Fascia.....	6.00	1.60
		<i>For Manufacturer's Custom Colors, Add</i>	0.14	
07 46 33 00-0043		Fiberglass Siding (07 46 33)		
07 46 33 00-0044		Corrugated Panels (07 46 33 00-0043)		
07 46 33 00-0045	SF	6 Ounce Corrugated Fiberglass Panels.....	7.03	2.19
07 46 33 00-0046	SF	8 Ounce Corrugated Fiberglass Panels.....	7.51	1.97
07 46 33 00-0047	SF	12 Ounce Corrugated Fiberglass Panels.....	8.40	1.97
07 46 33 00-0048		Flat Panels (07 46 33 00-0043)		
07 46 33 00-0049	SF	6 Ounce Flat Fiberglass Panels.....	6.71	1.97
07 46 33 00-0050	SF	8 Ounce Flat Fiberglass Panels.....	7.51	1.97
07 46 46		Fiber-Cement Siding (07 46)		
		Note: Smooth or patterns. Includes sealer and primer.		
07 46 46 00-0001		5/16" Thick, Fiber Cement Lap Siding (07 46 46)		
07 46 46 00-0002	SF	5-1/4" Board with 4" Exposure, 5/16" Thick, Fiber Cement Lap Siding.....	6.14	2.30
07 46 46 00-0003	SF	6-1/4" Board with 5" Exposure, 5/16" Thick, Fiber Cement Lap Siding.....	5.83	2.19
07 46 46 00-0004	SF	7-1/4" Board with 6" Exposure, 5/16" Thick, Fiber Cement Lap Siding.....	5.70	2.14
07 46 46 00-0005	SF	8-1/4" Board with 7" Exposure, 5/16" Thick, Fiber Cement Lap Siding.....	5.57	2.07
07 46 46 00-0006	SF	9-1/2" Board with 8" Exposure, 5/16" Thick, Fiber Cement Lap Siding.....	5.31	1.97
07 46 46 00-0007	SF	12" Board with 10-3/4" Exposure, 5/16" Thick, Fiber Cement Lap Siding.....	5.07	1.86
07 46 46 00-0008	LF	Starter Strip, Fiber Cement Lap Siding.....	1.34	0.55
07 46 46 00-0009		Fiber Cement Shingle Siding (07 46 46)		
07 46 46 00-0010	SF	Fiber Cement Shingle Siding.....	8.76	2.02
07 46 46 00-0011		Fiber Cement Vertical Panel Siding (07 46 46)		
07 46 46 00-0012	SF	Fiber Cement Vertical Panel Siding.....	4.49	1.64
07 46 46 00-0013		Fiber Cement Trim Boards (07 46 46)		
07 46 46 00-0014		7/16" Thick, Fiber Cement Trim Boards (07 46 46 00-0013)		
07 46 46 00-0015	LF	4" Wide, 7/16" Thick, Fiber Cement Trim Board.....	2.94	1.10
07 46 46 00-0016	LF	6" Wide, 7/16" Thick, Fiber Cement Trim Board.....	3.66	1.20
07 46 46 00-0017	LF	8" Wide, 7/16" Thick, Fiber Cement Trim Board.....	4.34	1.31
07 46 46 00-0018	LF	12" Wide, 7/16" Thick, Fiber Cement Trim Board.....	5.62	1.54
07 46 46 00-0019		3/4" Thick Fiber Cement Trim Boards (07 46 46 00-0013)		
07 46 46 00-0020	LF	4" Wide, 3/4" Thick, Fiber Cement Trim Board.....	3.06	1.10
07 46 46 00-0021	LF	6" Wide, 3/4" Thick, Fiber Cement Trim Board.....	3.85	1.20
07 46 46 00-0022	LF	8" Wide, 3/4" Thick, Fiber Cement Trim Board.....	4.65	1.31
07 46 46 00-0023	LF	12" Wide, 3/4" Thick, Fiber Cement Trim Board.....	4.93	1.54
07 46 46 00-0024		1" Thick Fiber Cement Trim Boards (07 46 46 00-0013)		
07 46 46 00-0025	LF	4" Wide, 1" Thick, Fiber Cement Trim Board.....	3.22	1.10
07 46 46 00-0026	LF	6" Wide, 1" Thick, Fiber Cement Trim Board.....	4.13	1.20
07 46 46 00-0027	LF	8" Wide, 1" Thick, Fiber Cement Trim Board.....	5.05	1.31
07 46 46 00-0028	LF	12" Wide, 1" Thick, Fiber Cement Trim Board.....	6.65	1.54



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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 46 46 00-0029	Fiber Cement Fascia Board (07 46 46)		
07 46 46 00-0030	LF 5/4" x 3-1/2" Fiber Cement Fascia Board	5.58	2.16
07 46 46 00-0031	LF 5/4" x 5-1/2" Fiber Cement Fascia Board	6.79	2.41
07 46 46 00-0032	LF 5/4" x 7-1/4" Fiber Cement Fascia Board	7.41	2.41
07 46 46 00-0033	LF 5/4" x 11-1/4" Fiber Cement Fascia Board.....	9.60	2.83

07 46 46 00-0034	Fiber Cement Soffit Boards (07 46 46)		
07 46 46 00-0035	SF 1/4" Thick, Non-Vented Fiber Cement Soffit.....	7.14	1.57
07 46 46 00-0036	SF 1/4" Thick, Vented Fiber Cement Soffit.....	7.66	1.57

07 46 63 Fabricated Panel Assemblies with Siding (07 46)

07 46 63 00-0001	Metal Liner Panels (07 46 63)		
07 46 63 00-0002	Galvanized Metal Liner Panels (07 46 63 00-0001)		
07 46 63 00-0003	SF 24 Gauge, 1-3/8" Thick Galvanized Metal Liner Panel	10.34	1.83
07 46 63 00-0004	SF 22 Gauge, 1-3/8" Thick Galvanized Metal Liner Panel	11.41	1.83
07 46 63 00-0005	SF 20 Gauge, 1-3/8" Thick Galvanized Metal Liner Panel	13.30	1.83
07 46 63 00-0006	SF 18 Gauge, 1-3/8" Thick Galvanized Metal Liner Panel	13.49	1.83

07 50 Membrane Roofing (07)

See CSI section 07 22 16 00-0000 for insulation, 07 60 00 00-0000 for additional flashing, sheet metal and trim, 07 70 00 00-0000 for additional roof accessories.

07 51 Built-Up Bituminous Roofing (07 50)

07 51 13 Built-Up Asphalt Roofing (07 51)

07 51 13 00-0001	Built-Up Asphalt Roofing Components (07 51 13)		
07 51 13 00-0002	Built-Up Asphalt Membrane Roofing (07 51 13 00-0001)		
Note: Includes all standard manufacturers' colors including white for granule and smooth surfaced cap sheets and flashing. See CSI section 07 51 13 00-0067 for built-up roofing demolition.			
07 51 13 00-0003	Cold Adhesive Applied, Built-Up Asphalt Membrane Roofing (07 51 13 00-0002)		
Note: Includes applying cold adhesive and embedding the membrane.			
07 51 13 00-0004	Cold Adhesive Applied, Built-Up Asphalt Roofing Base, Ply And Cap Sheets (07 51 13 00-0003)		
07 51 13 00-0005	SQ Type IV, Asphalt Coated Fiberglass Ply Sheet, Cold Adhesive Applied	117.95	
	For >20 To 40, Add	9.82	
	For >75 To 100, Deduct	-4.91	
	For >100 To 200, Deduct	-10.80	
	For >200, Deduct	-15.71	
	For Up To 10, Add	31.43	
	For >10 To 20, Add	17.68	
07 51 13 00-0006	SQ Asphalt Coated Polyester And Fiberglass Scrim, Base Or Ply Sheet, Cold Adhesive Applied	323.19	
	For >20 To 40, Add	20.08	
	For >75 To 100, Deduct	-10.04	
	For >100 To 200, Deduct	-21.06	
	For >200, Deduct	-31.10	
	For Up To 10, Add	72.48	
	For >10 To 20, Add	38.20	
07 51 13 00-0007	Cold Adhesive Applied, Built-Up Asphalt Roofing Flashing (07 51 13 00-0003)		
07 51 13 00-0008	SF Asphalt Coated Polyester And Fiberglass Scrim, Flashing, Cold Adhesive Applied.....	7.80	
07 51 13 00-0009	Hot-Mopped, Built-Up Asphalt Membrane Roofing (07 51 13 00-0002)		
Note: Includes mopping hot asphalt and embedding the membrane.			
07 51 13 00-0010	Hot-Mopped, Built-Up Asphalt Roofing Base, Ply And Cap Sheets (07 51 13 00-0009)		
07 51 13 00-0011	SQ Type IV, Asphalt Coated Fiberglass Ply Sheet, Hot-Mopped	87.34	
	For >20 To 40, Add	8.35	
	For >75 To 100, Deduct	-4.18	
	For >100 To 200, Deduct	-9.35	
	For >200, Deduct	-13.52	
	For Up To 10, Add	25.44	
	For >10 To 20, Add	14.71	
07 51 13 00-0012	SQ Type VI, Asphalt Coated Fiberglass Ply Sheet, Hot-Mopped	93.19	
	For >20 To 40, Add	8.64	
	For >75 To 100, Deduct	-4.32	
	For >100 To 200, Deduct	-9.64	
	For >200, Deduct	-13.96	
	For Up To 10, Add	26.61	
	For >10 To 20, Add	15.30	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 51 Built-Up Bituminous Roofing**

MINOR

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07 51 13 00-0013	SQ	Fine Mineral Surfaced, Asphalt Coated Fiberglass Base Sheet, Hot-Mopped.....	99.84	
		<i>For >20 To 40, Add</i>	8.98	
		<i>For >75 To 100, Deduct</i>	-4.49	
		<i>For >100 To 200, Deduct</i>	-9.97	
		<i>For >200, Deduct</i>	-14.46	
		<i>For Up To 10, Add</i>	27.94	
		<i>For >10 To 20, Add</i>	15.96	
07 51 13 00-0014	SQ	Asphalt Coated Fiberglass Venting Base Sheet, Hot-Mopped.....	173.59	
		<i>For >20 To 40, Add</i>	12.66	
		<i>For >75 To 100, Deduct</i>	-6.33	
		<i>For >100 To 200, Deduct</i>	-13.66	
		<i>For >200, Deduct</i>	-19.99	
		<i>For Up To 10, Add</i>	42.69	
		<i>For >10 To 20, Add</i>	23.34	
07 51 13 00-0015	SQ	Asphalt Coated Polyester And Fiberglass Scrim, Base Or Ply Sheet, Hot-Mopped	292.59	
		<i>For >20 To 40, Add</i>	18.61	
		<i>For >75 To 100, Deduct</i>	-9.31	
		<i>For >100 To 200, Deduct</i>	-19.61	
		<i>For >200, Deduct</i>	-28.92	
		<i>For Up To 10, Add</i>	66.49	
		<i>For >10 To 20, Add</i>	35.24	
07 51 13 00-0016	SQ	Granule Surfaced, Asphalt Coated Fiberglass Cap Sheet, Hot-Mopped	222.38	
		<i>For >20 To 40, Add</i>	15.48	
		<i>For >75 To 100, Deduct</i>	-7.74	
		<i>For >100 To 200, Deduct</i>	-16.57	
		<i>For >200, Deduct</i>	-24.32	
		<i>For Up To 10, Add</i>	53.20	
		<i>For >10 To 20, Add</i>	28.78	
07 51 13 00-0017		Hot-Mopped, Built-Up Asphalt Roofing Flashing (07 51 13 00-0009)		
07 51 13 00-0018	SF	Asphalt Coated Polyester And Fiberglass Scrim, Flashing, Hot-Mopped	5.01	
07 51 13 00-0019		Mechanically Fastened, Built-Up Asphalt Membrane Roofing (07 51 13 00-0002)		
		Note: Includes fasteners.		
07 51 13 00-0020		Mechanically Fastened, Built-Up Asphalt Roofing Base, Ply And Cap Sheets (07 51 13 00-0019)		
07 51 13 00-0021	SQ	Type VI, Asphalt Coated Fiberglass Ply Sheet, Mechanically Fastened.....	90.89	
		<i>For >20 To 40, Add</i>	6.50	
		<i>For >75 To 100, Deduct</i>	-3.25	
		<i>For >100 To 200, Deduct</i>	-6.99	
		<i>For >200, Deduct</i>	-10.24	
		<i>For Up To 10, Add</i>	22.09	
		<i>For >10 To 20, Add</i>	12.03	
07 51 13 00-0022	SQ	Asphalt Coated Fiberglass Venting Base Sheet, Mechanically Fastened.....	171.29	
		<i>For >20 To 40, Add</i>	10.52	
		<i>For >75 To 100, Deduct</i>	-5.26	
		<i>For >100 To 200, Deduct</i>	-11.01	
		<i>For >200, Deduct</i>	-16.27	
		<i>For Up To 10, Add</i>	38.17	
		<i>For >10 To 20, Add</i>	20.07	
07 51 13 00-0023	SQ	Asphalt Coated Polyester And Fiberglass Scrim, Base Or Ply Sheet, Mechanically Fastened.....	290.28	
		<i>For >20 To 40, Add</i>	16.47	
		<i>For >75 To 100, Deduct</i>	-8.24	
		<i>For >100 To 200, Deduct</i>	-16.96	
		<i>For >200, Deduct</i>	-25.20	
		<i>For Up To 10, Add</i>	61.97	
		<i>For >10 To 20, Add</i>	31.97	
07 51 13 00-0024		Mechanically Fastened, Built-Up Asphalt Roofing Flashing (07 51 13 00-0019)		
07 51 13 00-0025	SF	Asphalt Coated Polyester And Fiberglass Scrim, Flashing, Mechanically Fastened	6.04	
07 51 13 00-0026		Asphalt Saturated Organic Felt (07 51 13 00-0001)		
07 51 13 00-0027		Cold Adhesive Applied, Asphalt Saturated Organic Felt (07 51 13 00-0026)		
		Note: Includes applying cold adhesive and embedding the felt.		
07 51 13 00-0028	SQ	15 LB, Asphalt Saturated Organic Base Or Ply Sheet, Cold Adhesive Applied	114.29	
		<i>For >20 To 40, Add</i>	9.63	
		<i>For >75 To 100, Deduct</i>	-4.82	
		<i>For >100 To 200, Deduct</i>	-10.61	
		<i>For >200, Deduct</i>	-15.43	
		<i>For Up To 10, Add</i>	30.70	
		<i>For >10 To 20, Add</i>	17.31	
07 51 13 00-0029	SQ	30 LB, Asphalt Saturated Organic Base Or Ply Sheet, Cold Adhesive Applied	129.38	
		<i>For >20 To 40, Add</i>	10.39	
		<i>For >75 To 100, Deduct</i>	-5.19	
		<i>For >100 To 200, Deduct</i>	-11.37	
		<i>For >200, Deduct</i>	-16.56	
		<i>For Up To 10, Add</i>	33.72	
		<i>For >10 To 20, Add</i>	18.82	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 51 13 00-0030 Hot-Mopped, Asphalt Saturated Organic Felt ^(07 51 13 00-0026) Note: Includes mopping hot asphalt and embedding the felt.		
07 51 13 00-0031 SQ 15 LB, Asphalt Saturated Organic Base Or Ply Sheet, Hot-Mopped	83.68	
For >20 To 40, Add	8.17	
For >75 To 100, Deduct	-4.08	
For >100 To 200, Deduct	-9.17	
For >200, Deduct	-13.25	
For Up To 10, Add	24.71	
For >10 To 20, Add	14.35	
07 51 13 00-0032 SQ 30 LB, Asphalt Saturated Organic Base Or Ply Sheet, Hot-Mopped	98.77	
For >20 To 40, Add	8.92	
For >75 To 100, Deduct	-4.46	
For >100 To 200, Deduct	-9.92	
For >200, Deduct	-14.38	
For Up To 10, Add	27.72	
For >10 To 20, Add	15.85	
07 51 13 00-0033 Mechanically Fastened, Asphalt Saturated Organic Felt ^(07 51 13 00-0026) Note: Includes fasteners.		
07 51 13 00-0034 SQ 15 LB, Asphalt Saturated Organic Base Or Ply Sheet, Mechanically Fastened	42.04	
For >20 To 40, Add	4.06	
For >75 To 100, Deduct	-2.03	
For >100 To 200, Deduct	-4.55	
For >200, Deduct	-6.58	
For Up To 10, Add	12.32	
For >10 To 20, Add	7.14	
07 51 13 00-0035 SQ 30 LB, Asphalt Saturated Organic Base Or Ply Sheet, Mechanically Fastened	57.13	
For >20 To 40, Add	4.81	
For >75 To 100, Deduct	-2.41	
For >100 To 200, Deduct	-5.30	
For >200, Deduct	-7.71	
For Up To 10, Add	15.34	
For >10 To 20, Add	8.65	
07 51 13 00-0036 Surfacing ^(07 51 13 00-0001)		
07 51 13 00-0037 SQ 400 LB/SQ Gravel Roofing Ballast, Set In Hot Asphalt Flood Coat	185.92	
For >20 To 40, Add	19.10	
For >75 To 100, Deduct	-9.55	
For >100 To 200, Deduct	-21.55	
For >200, Deduct	-31.10	
For Up To 10, Add	56.79	
For >10 To 20, Add	33.30	
07 51 13 00-0038 SQ 400 LB/SQ Gravel Roofing Ballast, Set In Cold Adhesive Flood Coat.....	274.73	
For >20 To 40, Add	23.54	
For >75 To 100, Deduct	-11.77	
For >100 To 200, Deduct	-25.99	
For >200, Deduct	-37.76	
For Up To 10, Add	74.55	
For >10 To 20, Add	42.18	
07 51 13 00-0039 CY Gravel Roofing Ballast, Spread To Desired Thickness	194.38	
Note: Excludes hot asphalt or cold adhesive.		
07 51 13 00-0040 SQ Protective Polypropylene Fabric Mat, Loose Laid.....	53.49	
Note: Installed as a separator mat (under membrane), a crushed stone mat (above membrane) or as a stone separator mat in ballasted systems.		
For >20 To 40, Add	3.97	
For >75 To 100, Deduct	-1.98	
For >100 To 200, Deduct	-4.29	
For >200, Deduct	-6.27	
For Up To 10, Add	13.28	
For >10 To 20, Add	7.29	
07 51 13 00-0041 SQ Clay-Stabilized, Water-Based Asphalt Emulsion With Reinforcing Fibers, Weather-Proofing Surface Coating, Price Per Coat	132.72	
Note: Protective coating for use over built-up, SBS and APP modified bitumen, metal, concrete and wood roofs.		
For >20 To 40, Add	8.99	
For >75 To 100, Deduct	-4.49	
For >100 To 200, Deduct	-9.58	
For >200, Deduct	-14.07	
For Up To 10, Add	31.25	
For >10 To 20, Add	16.80	
07 51 13 00-0042 SQ Fibrated Aluminum, Asphalt-Based, Reflective Weather-Proofing Surface Coating, Price Per Coat.....	118.03	
Note: Protective and reflective coating for use over built-up, SBS and APP modified bitumen and metal roofs.		
For >20 To 40, Add	8.25	
For >75 To 100, Deduct	-4.13	
For >100 To 200, Deduct	-8.84	
For >200, Deduct	-12.97	
For Up To 10, Add	28.31	
For >10 To 20, Add	15.33	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 51 Built-Up Bituminous Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 51 13 00-0043	SQ	Aluminum Flakes And Reinforcing Fibers Suspended In Emulsified Asphalt, Reflective Surface Coating, Price Per Coat.....	158.11
		Note: Reflective coating for use over smooth-surfaced built-up roofs.	
		For >20 To 40, Add	10.26
		For >75 To 100, Deduct	-5.13
		For >100 To 200, Deduct	-10.85
		For >200, Deduct	-15.97
		For Up To 10, Add	36.33
		For >10 To 20, Add	19.34
07 51 13 00-0044	SQ	100% Acrylic Elastomeric, Reflective Surface Coating, Price Per Coat.....	159.42
		Note: Reflective coating for use over built-up, SBS and APP modified bitumen roofs. For use on smooth or granule surfaced roofing systems.	
		For Installation Over Granule Surfaced Asphalt Roof Systems, Add	47.20
		For >20 To 40, Add	10.32
		For >75 To 100, Deduct	-5.16
		For >100 To 200, Deduct	-10.91
		For >200, Deduct	-16.07
		For Up To 10, Add	36.59
		For >10 To 20, Add	19.47
07 51 13 00-0045	SQ	100% Acrylic Elastomeric, Bleed Blocking Base Coating, Price Per Coat.....	164.82
		Note: Bleed blocking coating for use over built-up, Styrene-Butadiene-Styrene (SBS) and Atactic-Polypropylene (APP) modified bitumen roofs. For use on smooth or granule surfaced roofing systems.	
		For Installation Over Granule Surfaced Asphalt Roof Systems, Add	48.98
		For >20 To 40, Add	10.59
		For >75 To 100, Deduct	-5.30
		For >100 To 200, Deduct	-11.18
		For >200, Deduct	-16.48
		For Up To 10, Add	37.67
		For >10 To 20, Add	20.01
07 51 13 00-0046	SF	Ceramic Coated Roofing Granules, Hand Broadcast	2.65
		Note: For application over liquid flashing/membranes, asphalt bleed-out areas, modified or BUR membrane repairs, etc.	
07 51 13 00-0047	SF	Energy Star, Ceramic Coated UltraWhite Roofing Granules, Hand Broadcast.....	4.61
		Note: For application over liquid flashing/membranes, asphalt bleed-out areas, modified or BUR membrane repairs, etc.	
07 51 13 00-0048	SQ	Vapor Permeable Synthetic Underlayment (GAF Deck-Armor™).....	41.99
07 51 13 00-0049		Walkway Pads (07 51 13 00-0001)	
		Note: Set in hot asphalt or cold adhesive.	
07 51 13 00-0050	LF	5/16" Thick, 32" Wide, Skid Resistant, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Walkway Pad	33.24
07 51 13 00-0051	LF	1/2" Thick, 32" Wide, Skid Resistant, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Walkway Pad	39.56
07 51 13 00-0052		Cant And Tapered Edge Strips (07 51 13 00-0001)	
07 51 13 00-0053	LF	2" x 2" Perlite Cant Strip	4.70
07 51 13 00-0054	LF	3" x 3" Perlite Cant Strip	4.85
07 51 13 00-0055	LF	4" x 4" Perlite Cant Strip	5.54
07 51 13 00-0056	LF	3" x 3" Pressure Treated Wood Cant Strip, Cut Diagonally	4.39
07 51 13 00-0057	LF	4" x 4" Pressure Treated Wood Cant Strip, Cut Diagonally	4.50
07 51 13 00-0058	LF	1/2" x 6" Perlite Tapered Edge Strip	5.26
07 51 13 00-0059	LF	1/2" x 12" Perlite Tapered Edge Strip	6.05
07 51 13 00-0060	LF	1" x 12" Perlite Tapered Edge Strip	6.27
07 51 13 00-0061	LF	1" x 24" Perlite Tapered Edge Strip	7.09
07 51 13 00-0062	LF	1-1/2" x 12" Perlite Tapered Edge Strip	7.01
07 51 13 00-0063	LF	1-1/2" x 18" Perlite Tapered Edge Strip	8.51
07 51 13 00-0064	LF	1-1/2" x 24" Perlite Tapered Edge Strip	9.59
07 51 13 00-0065		Asphalt Primer (07 51 13 00-0001)	
07 51 13 00-0066	SQ	Asphalt Primer For Roofing Systems	39.05
		Note: Foundation coating for hot-mopped and cold applied asphalt coatings, roof cements, and asphalt based roof adhesives. For use on weathered roofing, asphalt, concrete, gypsum, masonry, block, brick and metal surfaces.	
07 51 13 00-0067		Demolish Built-Up Roofing (07 51 13 00-0001)	
		Note: For removing any asphalt, coal tar or modified bitumen roofing system, including surfacing material down to the insulation or recovery board. Includes removal of any basic roof accessories and any sheet metals; except special existing conditions (mechanical equipment piping, electrical, ducts, etc.).	
07 51 13 00-0068	SQ	Demolish Gravel/Slag Surfaced, Built Up Roofing System	411.68
		For Up To 10, Add	102.18
		For >10 To 25, Add	61.31
07 51 13 00-0069	SQ	Demolish Cap Sheet Surfaced, Built Up Roofing System	317.59
		Note: Includes protective surfacing.	
		For Up To 10, Add	78.82
		For >10 To 25, Add	47.29
07 51 13 00-0070		Roofing System Warranty (07 51 13 00-0001)	
		Note: The warranty tasks below are only to be used in conjunction with the built-up bituminous and modified bituminous membrane roofing sections. The appropriate task is to be applied to the completed roofing membrane systems, not individual components. All warranties are no dollar limit to include material, equipment and labor.	
07 51 13 00-0071	EA	Up To 50 SQ, 10 Year, Built-Up Bituminous Or Modified Bituminous Membrane, Roofing System Warranty	634.62

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 51 13 00-0072 SQ >50 SQ, 10 Year, Built-Up Bituminous Or Modified Bituminous Membrane, Roofing System Warranty.....	9.07	
07 51 13 00-0073 EA Up To 50 SQ, 15 Year, Built-Up Bituminous Or Modified Bituminous Membrane, Roofing System Warranty.....	725.28	
07 51 13 00-0074 SQ >50 SQ, 15 Year, Built-Up Bituminous Or Modified Bituminous Membrane, Roofing System Warranty.....	14.51	
07 51 13 00-0075 EA Up To 50 SQ, 20 Year, Built-Up Bituminous Or Modified Bituminous Membrane, Roofing System Warranty.....	997.26	
07 51 13 00-0076 SQ >50 SQ, 20 Year, Built-Up Bituminous Or Modified Bituminous Membrane, Roofing System Warranty.....	19.95	
07 51 13 00-0077 Built-Up Roofing Components (Garland) <small>(07 51 13)</small>		
Note: All tasks presented as a single layer. Adhesives are priced separately.		
07 51 13 00-0078 Modified Cap Membranes <small>(07 51 13 00-0077)</small>		
See CSI section 07 51 13 00-0102 for base membrane.		
07 51 13 00-0079 Modified Cap Membranes, Hot/Cold Applied <small>(07 51 13 00-0078)</small>		
Note: As manufactured by Garland. Pricing represents single ply per square. Includes 30 year leak-free warranty.		
07 51 13 00-0080 SQ Stressply® FR Mineral Dual Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Fiberglass Reinforced Membrane, Minimum 145 Mil.....	725.62	
07 51 13 00-0081 SQ Stressply® Plus Poly/Fiberglass Reinforced, Smooth Styrene-Butadiene-Styrene (SBS) Modified Membrane With Recycled Rubber, 105 Mil.....	519.29	
07 51 13 00-0082 SQ Stressply® Plus FR Mineral Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Fiberglass Reinforced Membrane With Recycled Rubber, Minimum 155 Mil.....	642.80	
07 51 13 00-0083 SQ Stressply® E Eco-Responsible, Smooth Styrene-Butadiene-Styrene (SBS)/Styrene-Isoprene-Styrene (SIS) Membrane With High Recycled Content And Renewable Materials.....	667.93	
07 51 13 00-0084 SQ Stressply® E FR Mineral Eco-Responsible, Styrene-Butadiene-Styrene (SBS)/Styrene-Isoprene-Styrene (SIS) Membrane With High Recycled Content And Renewable Materials, Minimum 160 Mil.....	929.72	
07 51 13 00-0085 SQ Stressply® EUV Fiberglass Reinforced, Minimum Poly/Fiberglass Reinforced White T-24 Styrene-Butadiene-Styrene (SBS)/Styrene-Isoprene-Styrene (SIS) Modified Membrane With Recycled Rubber, 160 Mil.....	1,045.08	
07 51 13 00-0086 SQ Versiply® III 80 Dual Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Membrane, 80 Mil.....	438.84	
Note: Low strength cap sheet for hot or cold modified systems used with gravel.		
07 51 13 00-0087 SQ Versiply® III Mineral Dual Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Membrane, Minimum 145 Mil.....	554.06	
07 51 13 00-0088 SQ BiFlex® Cap Fiberglass Reinforced, Mineral Surfaced Styrene-Butadiene-Styrene (SBS) Modified Membrane, 140 Mil.....	339.07	
07 51 13 00-0089 Modified Cap Membranes, Self-Adhering <small>(07 51 13 00-0078)</small>		
Note: As manufactured by Garland. Pricing represents single ply per square. Includes 25 year leak-free warranty.		
07 51 13 00-0090 SQ Stressply® SA FR Mineral Styrene-Butadiene-Styrene (SBS) Modified Self-Adhering Fiberglass Reinforced Membrane, Minimum 140 Mil.....	656.84	
Note: Self adhering system. One HPR SA FR base with one ply Stress Ply SA FR cap sheet.		
07 51 13 00-0091 Modified Cap Membranes, Torch-Applied <small>(07 51 13 00-0078)</small>		
Note: As manufactured by Garland. Pricing represents single ply per square. Includes 30 year leak-free warranty.		
07 51 13 00-0092 SQ Stressply® IV Dual Fiberglass Reinforced, Smooth Styrene-Butadiene-Styrene (SBS) Modified Membrane, Torch Applied, 180 Mil.....	808.45	
Note: Smooth surfaced Styrene-Butadiene-Styrene (SBS) torch modified top ply of torch system with gravel.		
07 51 13 00-0093 SQ Stressply® IV Mineral Dual Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Membrane, Torch Applied, Minimum 195 Mil.....	879.45	
07 51 13 00-0094 SQ Stressply® IV UV Mineral Fiberglass Reinforced, Starburst Surface Styrene-Butadiene-Styrene (SBS) Modified Membrane, Torch Applied, Title 24 Compliant, 195 Mil.....	926.77	
07 51 13 00-0095 SQ StressPly® IV Plus Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Membrane, Torch Applied, 180 Mil.....	846.90	
07 51 13 00-0096 SQ StressPly® IV Plus Mineral Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Mineral Surfaced Membrane, Torch Applied, 195 Mil.....	897.19	
07 51 13 00-0097 SQ StressPly® IV Plus UV Mineral Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Reflective Mineral Membrane, Torch Applied, 195 Mil.....	941.56	
07 51 13 00-0098 Modified Cap Membranes, Coal Tar Pitch Systems <small>(07 51 13 00-0078)</small>		
Note: As manufactured by Garland. Pricing represents single ply per square. Includes 30 year leak-free warranty.		
07 51 13 00-0099 SQ Millennium® Poly/Fiberglass Reinforced, Smooth Styrene-Butadiene-Styrene (SBS) Modified Coal Tar Membrane, Minimum 120 Mil.....	744.60	
07 51 13 00-0100 SQ Millennium® FR Mineral Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Coal Tar Fiberglass Reinforced Membrane, Minimum 160 Mil.....	1,178.19	
07 51 13 00-0101 SQ Millennium® Mineral Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Coal Tar Membrane, Minimum 160 Mil.....	959.31	
07 51 13 00-0102 Base Ply <small>(07 51 13 00-0077)</small>		
Note: Used with modified cap membranes, underlayment for metal systems, and reinforcement for restoration systems. See CSI section 07 51 13 00-0078 for cap membrane.		
07 51 13 00-0103 SQ Flexbase® E120 Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Base Sheet Used As Base Ply With Biflex Cap, 120 Mil.....	663.50	
07 51 13 00-0104 SQ Flexbase® 80 Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Base Sheet Used As Base Ply With Biflex Cap, 80 Mil.....	417.24	
07 51 13 00-0105 SQ HPR® Glasbase Heavy Duty Double Coated ASTM D 4601, Type II Fiberglass, Type II, 55 Mil.....	95.72	
Note: Glasbase used in cold system, nailed to deck, or inner ply 2 plies with cap.		
07 51 13 00-0106 SQ HPR® Glasfelt Asphalt Saturated Fiberglass Felt, ASTM D 2178 Type IV, 20 Mil.....	63.48	
Note: Inner ply felts for hot applied built up and modified BUR systems.		
07 51 13 00-0107 SQ HPR® Premium Glasbase High Strength, Double Coated Premium Base Sheet, Far Exceeds ASTM D 4601 Type II, 55 Mil.....	77.22	
07 51 13 00-0108 SQ HPR® Premium Glasfelt Premium Asphalt Saturated Fiberglass Felt, ASTM D 2178 Type VI, 25 Mil.....	83.88	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 51 Built-Up Bituminous Roofing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 51 13 00-0109	SQ		HPR® Tribase Premium Poly/Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Base Sheet, 60 Mil Note: Inner plies for cold applied modified, Styrene-Butadiene-Styrene (SBS) modified, or 2 plies under cap sheet.	130.08	
07 51 13 00-0110	SQ		Millennium® Base Poly/Fiberglass Reinforced Coal Tar Base Sheet For Cold Millennium Systems, 80 Mil	422.19	
07 51 13 00-0111	SQ		HPR® SA FR Base Sheet Styrene-Butadiene-Styrene (SBS) Modified Self-Adhering Underlayment Used In SP SA Fiberglass Reinforced Systems, Minimum 80 Mil Note: Self adhering base ply for self adhering 2 ply system.	364.75	
07 51 13 00-0112	SQ		SA Base IV Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Underlayment Used With StressPly Cap Sheets, 110 Mil	339.93	
07 51 13 00-0113	SQ		StressBase® 120 Fiberglass Reinforced Styrene-Butadiene-Styrene (SBS) Modified Underlayment Used With VersiPly And StressPly Cap Sheets, 120 Mil	370.07	
07 51 13 00-0114	SQ		StressBase® 80 Fiberglass Reinforced, Smooth Styrene-Butadiene-Styrene (SBS) Modified Underlayment Used With VersiPly And StressPly Cap Sheets, 80 Mil	307.22	
07 51 13 00-0115	LF		Garmesh® 6" Styrene-Butadiene-Styrene (SBS) Coated Woven Fiberglass Reinforcing Fabric	5.69	
07 51 13 00-0116	LF		Grip Polyester® Firm Polyester Reinforcement Used For Cold Application Over Smooth BUR Or Modified Roof Systems	15.57	
07 51 13 00-0117	SQ		Grip Polyester® Soft Polyester Reinforcement Used For Cold Applications Over Metal, Modified, Or Single Ply Roof Systems	73.90	
07 51 13 00-0118	LF		Grip Polyester® Soft 12" Polyester Reinforcement Used For Cold Applications Over Metal, Modified, Or Single Ply Roof Systems	7.41	
07 51 13 00-0119	LF		Grip Polyester® Soft 4" Polyester Reinforcement Used For Cold Applications Over Metal, Modified, Or Single Ply Roof Systems	5.39	
07 51 13 00-0120	LF		Grip Polyester® Soft 6" Polyester Reinforcement Used For Cold Applications Over Metal, Modified, Or Single Ply Roof Systems	6.26	
07 51 13 00-0121	SQ		HPR® Polyscrim Plus Polyester Reinforcement For Hot Bitumen Applications	161.10	
07 51 13 00-0122			Coatings And Mastics For Roof Installation, Restoration And Repairs (07 51 13 00-0077)		
07 51 13 00-0123	SQ		Water Based Roof Primer, GarlaPrime VOC Primer	47.16	
07 51 13 00-0124	SQ		Black-Knight® Primer	43.68	
07 51 13 00-0125	SQ		Black-Knight® Cold, Cold Process Polymer Modified Coal Tar, Interply	177.68	
07 51 13 00-0126	SQ		Black-Knight® Cold, Cold Process Polymer Modified Coal Tar, Flood Coat (4-5 GAL/SQ)	188.55	
07 51 13 00-0127	SQ		Black-Knight® Cold, Cold Process Polymer Modified Coal Tar, Restoration (6-8 GAL/SQ)	300.22	
07 51 13 00-0128	SQ		Black-Knight® LV Hot Applied Polymer Modified Lower Viscosity Coal Tar Adhesive, Interply	481.54	
07 51 13 00-0129	SQ		Black-Knight® LV Hot Applied Polymer Modified Lower Viscosity Coal Tar Adhesive, Flood Coat	496.02	
07 51 13 00-0130	SQ		Energizer® K Plus FR Cold Applied Styrene-Butadiene-Styrene (SBS) Modified Asphalt Coating With Kevlar® For Smooth And Mineral Restoration, One Coat (3 GAL/SQ)	232.12	
07 51 13 00-0131	SQ		Energizer® K Plus FR Cold Applied Styrene-Butadiene-Styrene (SBS) Modified Asphalt Coating With Kevlar® For Smooth And Mineral Restoration, Restoration	383.65	
07 51 13 00-0132	SQ		Energizer® LO Low Odor Cold Applied Polyurethane Modified Asphalt Liquid Membrane For Smooth And Mineral Restoration, One Coat (3 GAL/SQ)	590.52	
07 51 13 00-0133	SQ		Energizer® LO Low Odor Cold Applied Polyurethane Modified Asphalt Liquid Membrane For Smooth And Mineral Restoration, Restoration	981.17	
07 51 13 00-0134	SQ		Garlastic® KM Plus Premium Hot Applied, Styrene-Ethylene-Butadiene-Styrene (SEBS) Modified Adhesive/Waterproof, Interply	411.23	
07 51 13 00-0135	SQ		Garlastic® KM Plus Premium Hot Applied, Styrene-Ethylene-Butadiene-Styrene (SEBS) Modified Adhesive/Waterproof, Flood Coat	425.71	
07 51 13 00-0136	SQ		Green-Lock® Flashing Adhesive 100% Solids Polyether, Zero VOC, Flashing Adhesive To Be Used With Styrene-Butadiene-Styrene (SBS) Sheets Only	900.79	
07 51 13 00-0137	SQ		Green-Lock® Membrane Adhesive 100% Solids Polyether, Zero VOC, Membrane Adhesive To Be Used With Styrene-Butadiene-Styrene (SBS) Sheets Only	390.55	
07 51 13 00-0138	SQ		HPR® All-Temp Asphalt Hot Applied, High Softening Point, High Penetration Mopping Asphalt, Interply	191.41	
07 51 13 00-0139	SQ		HPR® All-Temp Asphalt Hot Applied, High Softening Point, High Penetration Mopping Asphalt, Flood Coat	205.89	
07 51 13 00-0140	SQ		Insul-Lock® E HR Bio-Based High Rise Urethane Insulation Adhesive For New Construction Or Gravel	179.06	
07 51 13 00-0141	SQ		Insul-Lock® HR High Rise Urethane Insulation Adhesive For New Construction Or Gravel Recovers	167.31	
07 51 13 00-0142	SQ		Insul-Lock® HR Universal Primer All-Purpose Water Based Primer Designed For Use With The Insul-Lock Products	21.57	
			Note: Adheres all insulation layers for cold systems.		
07 51 13 00-0143	SQ		Pyramic® Plus LO White, Water-Based Acrylic, Low VOC, Reflective Roof Coating, Energy Star, Top Coat Required	201.52	
07 51 13 00-0144	SQ		Pyramic® Plus LO Base Coat, Water-Based, Acrylic, Low VOC, Base Coating For A Pyramic System	195.37	
07 51 13 00-0145	LF		Silver-Flash® Aluminized Asphalt Fibered Trowel Grade Mastic Used With GarMesh	25.29	
07 51 13 00-0146	SQ		Solex® White, Kynar® Acrylic Topcoat Roof Coating Used With Pyramic Base Coat	260.70	
07 51 13 00-0147	SQ		Tuff-Flash™ Multi-Purpose Asphaltic Polyurethane Liquid Flashing Membrane Used With Reinforcing Fabric	1,500.19	
07 51 13 00-0148	SQ		Weatherscreen™ Rubberized, Fiber-Reinforced Fire-Rated Restoration For Modified And Gravel, Flood Coat (4-5 GAL/SQ)	333.27	
07 51 13 00-0149	SQ		Weatherscreen™ Rubberized, Fiber-Reinforced Fire-Rated Restoration For Modified And Gravel	406.32	
07 51 13 00-0150	SQ		Weatherking® Cold Applied Rubber Modified Asphalt Interply Adhesive For Slopes Up To 3:12, Interply	151.68	
07 51 13 00-0151	SQ		Weatherking® Flashing Adhesive Brush Grade, Cold Applied Asphalt Adhesive For Flashings In A Weatherking System	507.56	
07 51 13 00-0152	SQ		Weatherking® Plus WC Cold Applied Rubber Modified, VOC Compliant Asphalt Interply Adhesive For Slopes Up To 2:12, Interply	150.55	
			Note: Inner ply and flood coat SEBS modified adhesive for all cold systems with gravel.		
07 51 13 00-0153			Built-Up Roofing Components (Tremco) (07 51 13)		
			Note: All tasks presented as a single layer. Adhesives are priced separately.		
07 51 13 00-0154			Cold Applied BUR Base Plies And Ply Sheets (07 51 13 00-0153)		
07 51 13 00-0155	SQ		BURmastic Composite Ply, Cold Applied BUR Component	145.98	
			Note: Asphalt coated polyester/glass/polyester trilaminate reinforced ply sheet. Type II. 55 mils. Also used as a hot or cold applied base sheet.		



Thermal And Moisture Protection		07
Membrane Roofing		07 50
Built-Up Bituminous Roofing		07 51

07

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 51 13 00-0156 SQ BURmastic Premium Composite Ply, Cold Applied BUR Component Note: Asphalt coated polyester/glass/polyester trilaminate reinforced high strength ply sheet. Type II. 57 mil. Also used as a hot or cold applied base sheet.	177.01	
07 51 13 00-0157 SQ BURmastic Supreme Composite Ply, Cold Applied BUR Component Note: Asphalt coated polyester/glass/polyester trilaminate reinforced high strength ply sheet. Type II. 51 mil. Also used as a hot or cold applied base sheet.	203.66	
07 51 13 00-0158 SQ 28 LB BURmastic Glass Ply, Cold Applied BUR Component Note: Asphalt coated fiberglass base or ply sheet. Type II.	46.37	
07 51 13 00-0159 SQ 33 LB BURmastic Glass Ply, Cold Applied BUR Component Note: Asphalt coated fiberglass base or ply sheet. Type II.	67.17	
07 51 13 00-0160 SQ POWERply Modified HE Base Sheet, Hot Or Cold Applied BUR Component Note: Smooth surfaced, high elongation polyester reinforced modified bitumen base sheet. Type I, Grade S. 94 mil.	278.50	
07 51 13 00-0161 SQ POWERply Modified Heavy Duty Base Sheet, Hot Applied BUR Component Note: A smooth surfaced, non-woven fiberglass/scrim fiberglass bilaminate reinforced modified bitumen membrane. 120 mil.	257.64	
07 51 13 00-0162 Hot Or Cold Applied Modified Bitumen Cap Membrane (07 51 13 00-0153)		
07 51 13 00-0163 SQ POWERply Standard Smooth Cap Membrane, Hot Or Cold Applied BUR Component Note: Fiberglass reinforced modified bitumen membrane. Type I, Grade S. 80 mils. Also used as a hot or cold applied ply.	157.83	
07 51 13 00-0164 SQ POWERply Premium Smooth Cap Membrane, Hot Or Cold Applied BUR Component Note: Polyester/glass bilaminate reinforced modified bitumen membrane. Type III, Grade S. 90 mils. Also used as a hot or cold applied ply.	417.47	
07 51 13 00-0165 SQ POWERply Supreme Smooth Cap Membrane, Hot Or Cold Applied BUR Component Note: Polyester/glass bilaminate reinforced modified bitumen membrane. Type III, Grade S. 98 mils. Also used as a hot or cold applied ply.	690.32	
07 51 13 00-0166 SQ POWERply Standard Cap Membrane, Hot Or Cold Applied BUR Component Note: Granule surface, fiberglass reinforced modified bitumen cap sheet membrane. 120 mils. Black or white surface.	184.44	
07 51 13 00-0167 SQ POWERply Standard FR Cap Membrane, Hot Or Cold Applied BUR Component Note: Fire rated, granule surfaced, fiberglass reinforced modified bitumen membrane. Type I, Grade G. 120 mils.	282.77	
07 51 13 00-0168 SQ POWERply Premium FR Cap Membrane, Hot Or Cold Applied BUR Component Note: Fire rated, granule surfaced, polyester/glass bilaminate reinforced modified bitumen membrane. Type III, Grade S. 160 mils. Black or white surface.	685.03	
07 51 13 00-0169 SQ POWERply Standard FR GT24W Cap Membrane, Hot Or Cold Applied BUR Component Note: Highly reflective, fire rated, granule surfaced, fiberglass reinforced modified bitumen membrane meeting California's Title 24 requirements. Type I, Grade G. 120 mils.	498.71	
07 51 13 00-0170 SQ POWERply HE FR Cap Sheet, Hot Applied BUR Component Note: High elongation, fire rated, granule surfaced, polyester reinforced modified bitumen membrane. 160 mils.	494.17	
07 51 13 00-0171 Self Adhesive Base Plies And Ply Sheets (07 51 13 00-0153)		
07 51 13 00-0172 SQ POWERply SA Base Sheet, Self Adhesive Roofing Note: A self adhesive, fiberglass reinforced Styrene-Butadiene-Styrene (SBS) modified bitumen base sheet/underlayment. Type 1, Grade S. 80 mils.	286.98	
07 51 13 00-0173 SQ POWERply SA FR Membrane, Self Adhesive Roofing Note: A fire rated, granule surfaced, polyester reinforced, self adhesive Styrene-Butadiene-Styrene (SBS) modified bitumen membrane. Type I, Grade G. 130 mils.	568.72	
07 51 13 00-0174 Flashings (07 51 13 00-0153)		
07 51 13 00-0175 LF 11-1/2" Hypalon Elastomeric Flashing Note: 45 mils.	17.80	
07 51 13 00-0176 LF 19" Hypalon Elastomeric Flashing Note: 45 mils.	28.87	
07 51 13 00-0177 LF 25" Hypalon Elastomeric Flashing Note: 45 mils.	38.34	
07 51 13 00-0178 LF 38" Hypalon Elastomeric Flashing Note: 45 mils.	56.25	
07 51 13 00-0179 LF 60-1/2" Hypalon Elastomeric Flashing Note: 45 mils.	92.61	
07 51 13 00-0180 LF 12" TRA Elastomeric Flashing Membrane Note: Polyester reinforced flashing membrane. 45 mils.	14.11	
07 51 13 00-0181 LF 18" TRA Elastomeric Flashing Membrane Note: Polyester reinforced flashing membrane. 45 mils.	22.96	
07 51 13 00-0182 LF 24" TRA Elastomeric Flashing Membrane Note: Polyester reinforced flashing membrane. 45 mils.	30.59	
07 51 13 00-0183 LF 36" TRA Elastomeric Flashing Membrane Note: Polyester reinforced flashing membrane. 45 mils.	44.72	
07 51 13 00-0184 LF 60" TRA Elastomeric Flashing Membrane Note: Polyester reinforced flashing membrane. 45 mils.	75.26	
07 51 13 00-0185 LF 4" BURmesh Fabric Note: Glass membrane for reinforcement or repair of roof membranes and flashings.	3.98	
07 51 13 00-0186 LF 6" BURmesh Fabric Note: Glass membrane for reinforcement or repair of roof membranes and flashings.	4.16	
07 51 13 00-0187 LF 12" BURmesh Fabric Note: Glass membrane for reinforcement or repair of roof membranes and flashings.	5.85	
07 51 13 00-0188 LF 36" BURmesh Fabric Note: Glass membrane for reinforcement or repair of roof membranes and flashings.	15.15	
07 51 13 00-0189 Cold Applied Adhesives (07 51 13 00-0153)		

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 51 Built-Up Bituminous Roofing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 51 13 00-0190	SQ		BURmastic Inter-Ply Cold Applied Adhesive.....	178.54	
07 51 13 00-0191	SQ		BURmastic Flood Coat Cold Applied Adhesive.....	294.34	
07 51 13 00-0192	SQ		BURmastic SF Inter-Ply Cold Applied Adhesive.....	227.29	
07 51 13 00-0193	SQ		BURmastic LV Inter-Ply Cold Applied Adhesive.....	178.54	
07 51 13 00-0194	SQ		POWERply Standard Inter-Ply Cold Applied Adhesive.....	90.68	
07 51 13 00-0195	SQ		POWERply Standard Flood Coat Cold Applied Adhesive.....	201.33	
07 51 13 00-0196	SQ		POWERply White On White Cold Applied Adhesive.....	198.68	
07 51 13 00-0197	SQ		Rock-It Cold Applied Adhesive For Gravel Applications.....	553.18	
07 51 13 00-0198	SQ		FAS-n-FREE Cold Applied Adhesive (Beads 12" OC).....	305.76	
			Note: For insulation only.		
07 51 13 00-0199	SQ		ECOLastic Cold Applied Adhesive.....	343.80	
07 51 13 00-0200			Hot Applied Adhesives (07 51 13 00-0153)		
07 51 13 00-0201	SQ		Premium III Asphalt Inter-Ply Hot Applied Adhesive.....	64.59	
07 51 13 00-0202	SQ		Premium III Asphalt Flood Coat Hot Applied Adhesive.....	119.28	
07 51 13 00-0203			Flashings Adhesives (07 51 13 00-0153)		
07 51 13 00-0204	LF		Sheeting Bond Flashing Adhesive.....	21.81	
			Note: Used to attach Hypalon sheeting to asphalt or coal-tar roofing membranes.		
07 51 13 00-0205	LF		Polyroof SF Flashing Mastic.....	28.79	
			Note: A solvent free, one part elastomeric roof mastic. Used to seal edges or as a repair mastic for split or cracked seals.		
07 51 13 00-0206	LF		ELS Flashing Mastic.....	17.62	
			Note: Used for repairing flashings and asphalt built-up roof defects.		
07 51 13 00-0207	LF		TremSEAL D General Purpose Sealant.....	6.72	
07 51 13 00-0208	LF		TremSEAL HP High Performance Sealant.....	6.90	
07 51 13 00-0209	LF		TremSEAL S Silicone Sealant.....	6.76	
07 51 13 00-0210			Surfacing (07 51 13 00-0153)		
07 51 13 00-0211	SQ		TremLastic SP Non-Fibered Elastomeric Emulsion Cold Applied Coating.....	265.94	
07 51 13 00-0212	SQ		ICE Coating, Water Based, Heavy Bodied Elastomeric Roof Coating.....	594.87	
07 51 13 00-0213	SQ		Polar Coat.....	152.95	
07 51 13 00-0214	SQ		Alumanation 301, Asphalt Based, Fibrated Aluminum Roof Coating.....	187.41	
07 51 13 00-0215	SQ		Wall-Tite, Elastomeric Coating For Exterior Above-Grade Walls.....	544.19	
07 51 13 00-0216	SQ		Solarguard Hy-Build, Elastomeric Coating For Exterior Above-Grade Walls.....	247.03	
07 51 13 00-0217	SQ		100% Stitchbonded, Polyester Fabric (Tremco PERMAFAB).....	70.14	
07 51 13 00-0218			Walkway Protection Pads (07 51 13 00-0153)		
07 51 13 00-0219	LF		36" Wide, Fiberglass Reinforced Asphaltic Walkway Protection Pad (Tremco Trem-Tred®).....	34.55	
07 51 13 00-0220			Primer (07 51 13 00-0153)		
07 51 13 00-0221	SQ		TREmprime WB Primer.....	39.48	
			Note: Water based polymer modified asphalt primer.		
07 51 13 00-0222	SQ		Solarguard Masonry Primer, Acrylic Latex Primer For Wall Tite F Coating.....	87.65	
07 51 13 00-0223			Liquid Applied Roofing (07 51 13 00-0153)		
07 51 13 00-0224	SQ		Trem-LAR LRM H Waterproofing (Horizontal).....	452.48	
			Note: One part liquid applied elastomeric roofing membrane. 60 mils.		
07 51 13 00-0225	SQ		Trem-LAR LRM V Waterproofing (Vertical).....	460.93	
			Note: One part liquid applied elastomeric roofing membrane. 60 mils.		
07 51 13 00-0226	SQ		AlphaGuard BIO Base Coat, High Performance, Two-Part, Polyurethane Roof Coating For Smooth BUR/MB, Concrete Or Single Ply Surfaces.....	591.93	
			Note: Two part liquid applied polyurethane roof coating. 48 mils.		
07 51 13 00-0227	SQ		AlphaGuard BIO Base Coat, High Performance, Two-Part, Polyurethane Roof Coating For Granule MB Surfaces.....	769.92	
			Note: Two part liquid applied polyurethane roof coating. 64 mils.		
07 51 13 00-0228	SQ		AlphaGuard BIO Top Coat, High Performance, Two-Part, Polyurethane Roof Coating.....	449.22	
			Note: Two part liquid applied polyurethane roof coating. 32 mils.		
07 51 13 00-0229	SQ		AlphaGuard Glass Mat.....	86.32	
			Note: Reinforcement mat for AlphaGuard systems.		
07 51 13 00-0230	SQ		AlphaGuard C-Prime Primer.....	87.73	
			Note: 100% solids epoxy primer for concrete surfaces.		
07 51 13 00-0231	SQ		AlphaGuard M-Prime Primer.....	94.26	
			Note: Water based primer for metal and plastic surfaces.		
07 51 13 00-0232	SQ		Geogard Primer.....	69.58	
			Note: Reactivation primer for cured AlphaGuard MT roof systems and coatings.		
07 51 13 00-0233	SQ		AlphaGuard Primer WB.....	62.63	
			Note: Water based polymer modified primer which conditions a variety of roofing substrates prior to the application of AlphaGuard systems.		
07 51 13 00-0234			Atactic-Polypropylene (APP) Products (07 51 13 00-0153)		
07 51 13 00-0235	SQ		POWERply Atactic-Polypropylene (APP) Base Sheet.....	233.48	
07 51 13 00-0236	SQ		POWERply Atactic-Polypropylene (APP) FR.....	441.63	
07 51 13 00-0237	SQ		POWERply Atactic-Polypropylene (APP) Smooth.....	353.92	



MINOR	CSI	UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 51 13 00-0238	Tri-Polymer Alloy (TPA) White Membrane <small>(07 51 13 00-0153)</small>			
07 51 13 00-0239	SQ 45 Mil Tri-Polymer Alloy (TPA) White Membrane		620.45	
07 51 13 00-0240	SQ 60 Mil Tri-Polymer Alloy (TPA) White Membrane		850.45	
07 51 13 00-0241	SQ 80 Mil Tri-Polymer Alloy (TPA) White Membrane		966.04	

07 51 13 00-0242	Tri-Polymer Alloy (TPA) Polyester Fleece Backed White Membrane <small>(07 51 13 00-0153)</small>			
07 51 13 00-0243	SQ 45 Mil Tri-Polymer Alloy (TPA) Polyester Fleece Backed White Membrane		713.16	
07 51 13 00-0244	SQ 60 Mil Tri-Polymer Alloy (TPA) Polyester Fleece Backed White Membrane		874.51	
07 51 13 00-0245	SQ 80 Mil Tri-Polymer Alloy (TPA) Polyester Fleece Backed White Membrane		1,069.59	

07 51 13 00-0246	Tri-Polymer Alloy (TPA) Membrane Accessories <small>(07 51 13 00-0153)</small>			
07 51 13 00-0247	EA >1" To 4" Pipe Diameter, Prefabricated Tri-Polymer Alloy (TPA) Pipe Cone/Boot (Tremco)		127.62	
07 51 13 00-0248	EA >4" To 8" Pipe Diameter, Prefabricated Tri-Polymer Alloy (TPA) Pipe Cone/Boot (Tremco)		144.95	
07 51 13 00-0249	LF 36" Wide, Thermoplastic Tri-Polymer Alloy (TPA) Walkway Protection Pad (Tremco)		20.86	
07 51 13 00-0250	SQ Factory Coated Steel Fasteners And Steel Or Plastic Membrane Plates (Tremco)		72.20	

07 51 13 00-0251	Thermoplastic Polyolefin (TPO) Polyester White Membrane <small>(07 51 13 00-0153)</small>			
07 51 13 00-0252	SQ 45 Mil Thermoplastic Polyolefin (TPO) Polyester White Membrane		333.82	
07 51 13 00-0253	SQ 60 Mil Thermoplastic Polyolefin (TPO) Polyester White Membrane		337.99	
07 51 13 00-0254	SQ 80 Mil Thermoplastic Polyolefin (TPO) Polyester White Membrane		601.75	

07 51 13 00-0255	Thermoplastic Polyolefin (TPO) Polyester Fleece Backed White Membrane <small>(07 51 13 00-0153)</small>			
07 51 13 00-0256	SQ 45 Mil Thermoplastic Polyolefin (TPO) Polyester Fleece Backed White Membrane		387.73	
07 51 13 00-0257	SQ 60 Mil Thermoplastic Polyolefin (TPO) Polyester Fleece Backed White Membrane		436.66	
07 51 13 00-0258	SQ 80 Mil Thermoplastic Polyolefin (TPO) Polyester Fleece Backed White Membrane		634.85	

07 51 13 00-0259	Chlorosulfonated Polyethylene (CSPE) White Membrane (Tremplly HP 4510) <small>(07 51 13 00-0153)</small>			
07 51 13 00-0260	SQ 45 Mil Chlorosulfonated Polyethylene (CSPE) White Membrane (Tremplly HP 4510)		1,039.81	

07 51 13 00-0261	Single Ply Adhesives <small>(07 51 13 00-0153)</small>			
07 51 13 00-0262	SQ Low VOC, TPA Bonding Adhesive (Tremco)		168.89	
07 51 13 00-0263	SQ Water Based, TPA Bonding Adhesive (Tremco)		190.68	
07 51 13 00-0264	SQ Water Based, Fleece Backed Single Ply Bonding Adhesive (Tremco)		165.73	
07 51 13 00-0265	SQ Low VOC, TPO Bonding Adhesive (Tremco)		110.80	

07 51 13 00-0266	Warranty (Tremco) <small>(07 51 13 00-0153)</small>			
07 51 13 00-0267	EA Up To 10,000 SF 15 Year Roofing System Warranty		1,500.00	
07 51 13 00-0268	SF >10,000 SF 15 Year Roofing System Warranty		0.15	
07 51 13 00-0269	EA Up To 10,000 SF 20 Year Roofing System Warranty		2,000.00	
07 51 13 00-0270	SF >10,000 SF 20 Year Roofing System Warranty		0.20	

07 51 13 00-0271	Built-Up Roofing Components (GAF) <small>(07 51 13)</small>			
07 51 13 00-0272	SQ 75 LB, Base Or Ply Sheet (GAF GAFGLAS®)		45.31	
	For >20 To 40, Add		4.22	
	For >75 To 100, Deduct		-2.11	
	For >100 To 200, Deduct		-4.71	
	For >200, Deduct		-6.82	
	For Up To 10, Add		12.98	
	For >10 To 20, Add		7.47	
07 51 13 00-0273	SQ Single Ply Sheet, Torch Applied (GAF RUBEROID® Torch Smooth)		169.50	
	For >20 To 40, Add		12.40	
	For >75 To 100, Deduct		-6.20	
	For >100 To 200, Deduct		-13.38	
	For >200, Deduct		-19.57	
	For Up To 10, Add		41.74	
	For >10 To 20, Add		22.83	
07 51 13 00-0274	SQ Surface Membrane Sheet, Torch Applied (GAF RUBEROID® EnergyCap™ Torch Granule FR)		171.33	
	For >20 To 40, Add		12.49	
	For >75 To 100, Deduct		-6.24	
	For >100 To 200, Deduct		-13.47	
	For >200, Deduct		-19.71	
	For Up To 10, Add		42.11	
	For >10 To 20, Add		23.01	

07 52 Modified Bituminous Membrane Roofing (07 50)
07 52 13 Atactic-Polypropylene Modified Bituminous Membrane Roofing (07 52)

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 52 Modified Bituminous Membrane Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

Note: Includes all standard manufacturers' colors including white for granule and smooth surfaced cap sheets and flashing.
See CSI section 07 51 13 00-0001 for additional components such as concrete primers, cant strips, surfacing, walkway boards, demolition and warranties.

07 52 13 11 Cold Adhesive Applied Atactic-Polypropylene-Modified Bituminous Membrane Roofing (07 52 13)

07 52 13 11-0001	Cold Adhesive Applied Atactic-Polypropylene (APP) Modified Bituminous Membrane Roofing (07 52 13 11)		
Note: Includes fiberglass and/or polyester reinforcement. Includes applying cold adhesive and embedding the membrane. Includes heat welding side and end laps when required.			
07 52 13 11-0002	Cold Adhesive Applied, Atactic-Polypropylene (APP) Modified Bitumen Roofing Base, Ply And Cap Sheets (07 52 13 11-0001)		
07 52 13 11-0003	SQ 80 Mil, Atactic-Polypropylene (APP) Modified Bitumen Base Sheet, Cold Adhesive Applied	216.33	
	For >20 To 40, Add	14.74	
	For >75 To 100, Deduct	-7.37	
	For >100 To 200, Deduct	-15.72	
	For >200, Deduct	-23.08	
	For Up To 10, Add	51.11	
	For >10 To 20, Add	27.51	
07 52 13 11-0004	SQ 90 Mil, Atactic-Polypropylene (APP) Modified Bitumen Base Or Ply Sheet, Cold Adhesive Applied	263.19	
	For >20 To 40, Add	17.08	
	For >75 To 100, Deduct	-8.54	
	For >100 To 200, Deduct	-18.06	
	For >200, Deduct	-26.60	
	For Up To 10, Add	60.48	
	For >10 To 20, Add	32.20	
07 52 13 11-0005	SQ 160 Mil, Atactic-Polypropylene (APP) Modified Bitumen Ply Sheet, Cold Adhesive Applied	412.83	
	For >20 To 40, Add	24.56	
	For >75 To 100, Deduct	-12.28	
	For >100 To 200, Deduct	-25.54	
	For >200, Deduct	-37.82	
	For Up To 10, Add	90.41	
	For >10 To 20, Add	47.16	
07 52 13 11-0006	SQ 160 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Cold Adhesive Applied	416.56	
	For >20 To 40, Add	25.12	
	For >75 To 100, Deduct	-12.56	
	For >100 To 200, Deduct	-26.19	
	For >200, Deduct	-38.75	
	For Up To 10, Add	91.90	
	For >10 To 20, Add	48.10	
07 52 13 11-0007	SQ 160 Mil, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Cold Adhesive Applied	298.37	
	For Factory Applied White Reflective Surfacing, Add	105.13	
	For >20 To 40, Add	19.21	
	For >75 To 100, Deduct	-9.61	
	For >100 To 200, Deduct	-20.28	
	For >200, Deduct	-29.89	
	For Up To 10, Add	68.26	
	For >10 To 20, Add	36.28	
07 52 13 11-0008	SQ 160 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Cold Adhesive Applied	345.77	
	For Factory Applied White Reflective Surfacing, Add	105.13	
	For >20 To 40, Add	21.58	
	For >75 To 100, Deduct	-10.79	
	For >100 To 200, Deduct	-22.65	
	For >200, Deduct	-33.45	
	For Up To 10, Add	77.74	
	For >10 To 20, Add	41.02	
07 52 13 11-0009	SQ 180 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Cold Adhesive Applied	474.92	
	For Factory Applied White Reflective Surfacing, Add	105.13	
	For >20 To 40, Add	28.04	
	For >75 To 100, Deduct	-14.02	
	For >100 To 200, Deduct	-29.11	
	For >200, Deduct	-43.13	
	For Up To 10, Add	103.57	
	For >10 To 20, Add	53.93	
07 52 13 11-0010	Cold Adhesive Applied, Atactic-Polypropylene (APP) Modified Bitumen Roofing Flashing (07 52 13 11-0001)		
07 52 13 11-0011	SF 160 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Cold Adhesive Applied	6.12	
07 52 13 11-0012	SF 180 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Cold Adhesive Applied	9.28	
	For Factory Applied White Reflective Surfacing, Add	1.05	

07 52 13 13 Torch-Applied Atactic-Polypropylene-Modified Bituminous Membrane Roofing (07 52 13)**07 52 13 13-0001 Torch-Applied Atactic-Polypropylene (APP) Modified Bituminous Membrane Roofing (07 52 13 13)**

Note: Includes fiberglass and/or polyester reinforcement. Includes adhering the membrane with a torch.



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 52 13 13-0002 Torch-Applied, Atactic-Polypropylene (APP) Modified Bitumen Roofing Base, Ply And Cap Sheets <small>(07 52 13 13-0001)</small>		
07 52 13 13-0003 SQ 80 Mil, Atactic-Polypropylene (APP) Modified Bitumen Base Sheet, Torch-Applied.....	156.30	
<i>For >20 To 40, Add</i>	11.73	
<i>For >75 To 100, Deduct</i>	-5.87	
<i>For >100 To 200, Deduct</i>	-12.71	
<i>For >200, Deduct</i>	-18.58	
<i>For Up To 10, Add</i>	39.09	
<i>For >10 To 20, Add</i>	21.51	
07 52 13 13-0004 SQ 90 Mil, Atactic-Polypropylene (APP) Modified Bitumen Base Or Ply Sheet, Torch-Applied.....	203.17	
<i>For >20 To 40, Add</i>	14.08	
<i>For >75 To 100, Deduct</i>	-7.04	
<i>For >100 To 200, Deduct</i>	-15.05	
<i>For >200, Deduct</i>	-22.09	
<i>For Up To 10, Add</i>	48.47	
<i>For >10 To 20, Add</i>	26.19	
07 52 13 13-0005 SQ 150 Mil, Atactic-Polypropylene (APP) Modified Bitumen Ply Sheet, Torch-Applied	244.82	
<i>For >20 To 40, Add</i>	18.12	
<i>For >75 To 100, Deduct</i>	-9.06	
<i>For >100 To 200, Deduct</i>	-19.59	
<i>For >200, Deduct</i>	-28.66	
<i>For Up To 10, Add</i>	60.73	
<i>For >10 To 20, Add</i>	33.31	
07 52 13 13-0006 SQ 160 Mil, Atactic-Polypropylene (APP) Modified Bitumen Ply Sheet, Torch-Applied	256.81	
<i>For >20 To 40, Add</i>	18.72	
<i>For >75 To 100, Deduct</i>	-9.36	
<i>For >100 To 200, Deduct</i>	-20.19	
<i>For >200, Deduct</i>	-29.55	
<i>For Up To 10, Add</i>	63.13	
<i>For >10 To 20, Add</i>	34.50	
07 52 13 13-0007 SQ 180 Mil, Atactic-Polypropylene (APP) Modified Bitumen Ply Sheet, Torch-Applied	354.16	
<i>For >20 To 40, Add</i>	23.59	
<i>For >75 To 100, Deduct</i>	-11.80	
<i>For >100 To 200, Deduct</i>	-25.06	
<i>For >200, Deduct</i>	-36.86	
<i>For Up To 10, Add</i>	82.60	
<i>For >10 To 20, Add</i>	44.24	
07 52 13 13-0008 SQ 150 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied.....	244.82	
<i>For >20 To 40, Add</i>	18.12	
<i>For >75 To 100, Deduct</i>	-9.06	
<i>For >100 To 200, Deduct</i>	-19.59	
<i>For >200, Deduct</i>	-28.66	
<i>For Up To 10, Add</i>	60.73	
<i>For >10 To 20, Add</i>	33.31	
07 52 13 13-0009 SQ 160 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied.....	259.81	
<i>For >20 To 40, Add</i>	18.87	
<i>For >75 To 100, Deduct</i>	-9.44	
<i>For >100 To 200, Deduct</i>	-20.34	
<i>For >200, Deduct</i>	-29.78	
<i>For Up To 10, Add</i>	63.73	
<i>For >10 To 20, Add</i>	34.80	
07 52 13 13-0010 SQ 180 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied.....	354.16	
<i>For >20 To 40, Add</i>	23.59	
<i>For >75 To 100, Deduct</i>	-11.80	
<i>For >100 To 200, Deduct</i>	-25.06	
<i>For >200, Deduct</i>	-36.86	
<i>For Up To 10, Add</i>	82.60	
<i>For >10 To 20, Add</i>	44.24	
07 52 13 13-0011 SQ 160 Mil, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied	254.26	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	18.60	
<i>For >75 To 100, Deduct</i>	-9.30	
<i>For >100 To 200, Deduct</i>	-20.07	
<i>For >200, Deduct</i>	-29.36	
<i>For Up To 10, Add</i>	62.62	
<i>For >10 To 20, Add</i>	34.25	
07 52 13 13-0012 SQ 170 Mil, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied	268.81	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	19.32	
<i>For >75 To 100, Deduct</i>	-9.66	
<i>For >100 To 200, Deduct</i>	-20.79	
<i>For >200, Deduct</i>	-30.45	
<i>For Up To 10, Add</i>	65.53	
<i>For >10 To 20, Add</i>	35.70	
07 52 13 13-0013 SQ 160 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied.....	304.51	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	21.11	
<i>For >75 To 100, Deduct</i>	-10.55	
<i>For >100 To 200, Deduct</i>	-22.58	
<i>For >200, Deduct</i>	-33.13	
<i>For Up To 10, Add</i>	72.67	
<i>For >10 To 20, Add</i>	39.27	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 52 Modified Bituminous Membrane Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 52 13 13-0014	SQ	170 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied.....	308.86
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	21.33
		<i>For >75 To 100, Deduct</i>	-10.66
		<i>For >100 To 200, Deduct</i>	-22.80
		<i>For >200, Deduct</i>	-33.46
		<i>For Up To 10, Add</i>	73.54
		<i>For >10 To 20, Add</i>	39.71
07 52 13 13-0015	SQ	180 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Cap Sheet, Torch-Applied.....	430.81
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	27.42
		<i>For >75 To 100, Deduct</i>	-13.71
		<i>For >100 To 200, Deduct</i>	-28.89
		<i>For >200, Deduct</i>	-42.60
		<i>For Up To 10, Add</i>	97.93
		<i>For >10 To 20, Add</i>	51.90
07 52 13 13-0016		Torch-Applied, Atactic-Polypropylene (APP) Modified Bitumen Roofing	
		Flashing <small>(07 52 13 13-0001)</small>	
07 52 13 13-0017	SF	150 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Torch-Applied	3.62
07 52 13 13-0018	SF	160 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Torch-Applied	3.77
07 52 13 13-0019	SF	180 Mil, Smooth Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Torch-Applied	4.71
07 52 13 13-0020	SF	170 Mil, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Torch-Applied.....	3.86
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 13 13-0021	SF	170 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Torch-Applied	4.26
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 13 13-0022	SF	180 Mil, Fire Rated, Granule Surfaced, Atactic-Polypropylene (APP) Modified Bitumen Flashing, Torch-Applied	5.48
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 13 14		Mechanically Fastened Atactic-Polypropylene-Modified Bituminous	
		Membrane Roofing <small>(07 52 13)</small>	
07 52 13 14-0001		Mechanically Fastened Atactic-Polypropylene (APP) Modified Bituminous	
		Membrane Roofing <small>(07 52 13 14)</small>	
		Note: Includes fiberglass and/or polyester reinforcement. Includes fasteners.	
07 52 13 14-0002		Mechanically Fastened, Atactic-Polypropylene (APP) Modified Bitumen	
		Roofing Base And Ply Sheets <small>(07 52 13 14-0001)</small>	
07 52 13 14-0003	SQ	90 Mil, Atactic-Polypropylene (APP) Modified Bitumen Base Or Ply Sheet, Mechanically Fastened.....	230.29
		<i>For >20 To 40, Add</i>	13.47
		<i>For >75 To 100, Deduct</i>	-6.74
		<i>For >100 To 200, Deduct</i>	-13.96
		<i>For >200, Deduct</i>	-20.70
		<i>For Up To 10, Add</i>	49.97
		<i>For >10 To 20, Add</i>	25.97
07 52 16		Styrene-Butadiene-Styrene Modified Bituminous Membrane Roofing <small>(07 52)</small>	
		Note: Includes all standard manufacturers' colors including white for granule and smooth surfaced cap sheets and flashing. See CSI section 07 51 13 00-0001 for additional components such as concrete primers, cant strips, surfacing, walkway boards, demolition and warranties.	
07 52 16 11		Cold Adhesive Applied Styrene-Butadiene-Styrene Modified Bituminous	
		Membrane Roofing <small>(07 52 16)</small>	
07 52 16 11-0001		Cold Adhesive Applied Styrene-Butadiene-Styrene (SBS) Modified	
		Bituminous Membrane Roofing <small>(07 52 16 11)</small>	
		Note: Includes fiberglass and/or polyester reinforcement. Includes applying cold adhesive and embedding the membrane. Includes heat welding side and end laps when required.	
07 52 16 11-0002		Cold Adhesive Applied, Styrene-Butadiene-Styrene (SBS) Modified	
		Bitumen Roofing Base, Ply And Cap Sheets <small>(07 52 16 11-0001)</small>	
07 52 16 11-0003	SQ	50 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Cold Adhesive Applied.....	170.45
		<i>For >20 To 40, Add</i>	12.44
		<i>For >75 To 100, Deduct</i>	-6.22
		<i>For >100 To 200, Deduct</i>	-13.42
		<i>For >200, Deduct</i>	-19.64
		<i>For Up To 10, Add</i>	41.93
		<i>For >10 To 20, Add</i>	22.93
07 52 16 11-0004	SQ	80 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Cold Adhesive Applied.....	222.48
		<i>For >20 To 40, Add</i>	15.04
		<i>For >75 To 100, Deduct</i>	-7.52
		<i>For >100 To 200, Deduct</i>	-16.02
		<i>For >200, Deduct</i>	-23.55
		<i>For Up To 10, Add</i>	52.34
		<i>For >10 To 20, Add</i>	28.13



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 52 16 11-0005 SQ 90 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Cold Adhesive Applied	229.19	
<i>For >20 To 40, Add</i>	15.38	
<i>For >75 To 100, Deduct</i>	-7.69	
<i>For >100 To 200, Deduct</i>	-16.36	
<i>For >200, Deduct</i>	-24.05	
<i>For Up To 10, Add</i>	53.68	
<i>For >10 To 20, Add</i>	28.80	
07 52 16 11-0006 SQ 120 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Or Ply Sheet, Cold Adhesive Applied.....	312.19	
<i>For >20 To 40, Add</i>	19.53	
<i>For >75 To 100, Deduct</i>	-9.76	
<i>For >100 To 200, Deduct</i>	-20.51	
<i>For >200, Deduct</i>	-30.27	
<i>For Up To 10, Add</i>	70.28	
<i>For >10 To 20, Add</i>	37.10	
07 52 16 11-0007 SQ 125 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Ply Sheet, Cold Adhesive Applied.....	396.19	
<i>For >20 To 40, Add</i>	23.73	
<i>For >75 To 100, Deduct</i>	-11.86	
<i>For >100 To 200, Deduct</i>	-24.71	
<i>For >200, Deduct</i>	-36.57	
<i>For Up To 10, Add</i>	87.08	
<i>For >10 To 20, Add</i>	45.50	
07 52 16 11-0008 SQ 140 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	330.29	
<i>For >20 To 40, Add</i>	20.81	
<i>For >75 To 100, Deduct</i>	-10.40	
<i>For >100 To 200, Deduct</i>	-21.88	
<i>For >200, Deduct</i>	-32.28	
<i>For Up To 10, Add</i>	74.64	
<i>For >10 To 20, Add</i>	39.47	
07 52 16 11-0009 SQ 150 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	339.32	
<i>For >20 To 40, Add</i>	21.26	
<i>For >75 To 100, Deduct</i>	-10.63	
<i>For >100 To 200, Deduct</i>	-22.33	
<i>For >200, Deduct</i>	-32.96	
<i>For Up To 10, Add</i>	76.45	
<i>For >10 To 20, Add</i>	40.37	
07 52 16 11-0010 SQ 125 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	297.02	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	19.14	
<i>For >75 To 100, Deduct</i>	-9.57	
<i>For >100 To 200, Deduct</i>	-20.22	
<i>For >200, Deduct</i>	-29.79	
<i>For Up To 10, Add</i>	67.99	
<i>For >10 To 20, Add</i>	36.14	
07 52 16 11-0011 SQ 140 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	300.92	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	19.34	
<i>For >75 To 100, Deduct</i>	-9.67	
<i>For >100 To 200, Deduct</i>	-20.41	
<i>For >200, Deduct</i>	-30.08	
<i>For Up To 10, Add</i>	68.77	
<i>For >10 To 20, Add</i>	36.53	
07 52 16 11-0012 SQ 150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	336.92	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	21.14	
<i>For >75 To 100, Deduct</i>	-10.57	
<i>For >100 To 200, Deduct</i>	-22.21	
<i>For >200, Deduct</i>	-32.78	
<i>For Up To 10, Add</i>	75.97	
<i>For >10 To 20, Add</i>	40.13	
07 52 16 11-0013 SQ 160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	342.92	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	21.44	
<i>For >75 To 100, Deduct</i>	-10.72	
<i>For >100 To 200, Deduct</i>	-22.51	
<i>For >200, Deduct</i>	-33.23	
<i>For Up To 10, Add</i>	77.17	
<i>For >10 To 20, Add</i>	40.73	
07 52 16 11-0014 SQ 170 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied	395.42	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	24.06	
<i>For >75 To 100, Deduct</i>	-12.03	
<i>For >100 To 200, Deduct</i>	-25.14	
<i>For >200, Deduct</i>	-37.17	
<i>For Up To 10, Add</i>	87.67	
<i>For >10 To 20, Add</i>	45.98	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 52 Modified Bituminous Membrane Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 52 16 11-0015	SQ	180 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied.....	491.06
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	28.85
		<i>For >75 To 100, Deduct</i>	-14.42
		<i>For >100 To 200, Deduct</i>	-29.92
		<i>For >200, Deduct</i>	-44.34
		<i>For Up To 10, Add</i>	106.80
		<i>For >10 To 20, Add</i>	55.55
07 52 16 11-0016	SQ	125 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied.....	303.53
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	19.47
		<i>For >75 To 100, Deduct</i>	-9.73
		<i>For >100 To 200, Deduct</i>	-20.54
		<i>For >200, Deduct</i>	-30.28
		<i>For Up To 10, Add</i>	69.29
		<i>For >10 To 20, Add</i>	36.79
07 52 16 11-0017	SQ	140 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied.....	312.92
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	19.94
		<i>For >75 To 100, Deduct</i>	-9.97
		<i>For >100 To 200, Deduct</i>	-21.01
		<i>For >200, Deduct</i>	-30.98
		<i>For Up To 10, Add</i>	71.17
		<i>For >10 To 20, Add</i>	37.73
07 52 16 11-0018	SQ	150 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied.....	363.92
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	22.49
		<i>For >75 To 100, Deduct</i>	-11.24
		<i>For >100 To 200, Deduct</i>	-23.56
		<i>For >200, Deduct</i>	-34.81
		<i>For Up To 10, Add</i>	81.37
		<i>For >10 To 20, Add</i>	42.83
07 52 16 11-0019	SQ	160 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied.....	365.12
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	22.55
		<i>For >75 To 100, Deduct</i>	-11.27
		<i>For >100 To 200, Deduct</i>	-23.62
		<i>For >200, Deduct</i>	-34.90
		<i>For Up To 10, Add</i>	81.61
		<i>For >10 To 20, Add</i>	42.95
07 52 16 11-0020	SQ	170 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Cold Adhesive Applied.....	387.92
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	23.69
		<i>For >75 To 100, Deduct</i>	-11.84
		<i>For >100 To 200, Deduct</i>	-24.76
		<i>For >200, Deduct</i>	-36.61
		<i>For Up To 10, Add</i>	86.17
		<i>For >10 To 20, Add</i>	45.23

07 52 16 11-0021 Cold Adhesive Applied, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Flashing (07 52 16 11-0001)

07 52 16 11-0022	SF	150 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	5.34
07 52 16 11-0023	SF	125 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	4.92
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0024	SF	140 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	4.96
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0025	SF	160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	5.38
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0026	SF	170 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	5.90
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0027	SF	180 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	6.86
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0028	SF	125 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	4.99
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0029	SF	140 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	5.08
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0030	SF	160 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	5.60
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0031	SF	170 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	5.83
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 11-0032	SF	145 Mil, Aluminum Foil Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	7.70
07 52 16 11-0033	SF	160 Mil, Copper Foil Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Cold Adhesive Applied.....	14.44



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 52 16 12 Hot-Mopped Styrene-Butadiene-Styrene Modified Bituminous Membrane Roofing (07 52 16)

07 52 16 12-0001		Hot-Mopped Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing <small>(07 52 16 12)</small>		
		Note: Includes fiberglass and/or polyester reinforcement. Includes mopping hot asphalt and embedding the membrane.		
07 52 16 12-0002		Hot-Mopped, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Base, Ply And Cap Sheets <small>(07 52 16 12-0001)</small>		
07 52 16 12-0003	SQ	50 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Hot-Mopped.....	139.84	
		<i>For >20 To 40, Add</i>	10.98	
		<i>For >75 To 100, Deduct</i>	-5.49	
		<i>For >100 To 200, Deduct</i>	-11.97	
		<i>For >200, Deduct</i>	-17.46	
		<i>For Up To 10, Add</i>	35.94	
		<i>For >10 To 20, Add</i>	19.96	
07 52 16 12-0004	SQ	80 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Hot-Mopped.....	191.88	
		<i>For >20 To 40, Add</i>	13.58	
		<i>For >75 To 100, Deduct</i>	-6.79	
		<i>For >100 To 200, Deduct</i>	-14.58	
		<i>For >200, Deduct</i>	-21.36	
		<i>For Up To 10, Add</i>	46.35	
		<i>For >10 To 20, Add</i>	25.17	
07 52 16 12-0005	SQ	90 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Hot-Mopped.....	198.59	
		<i>For >20 To 40, Add</i>	13.91	
		<i>For >75 To 100, Deduct</i>	-6.96	
		<i>For >100 To 200, Deduct</i>	-14.91	
		<i>For >200, Deduct</i>	-21.87	
		<i>For Up To 10, Add</i>	47.69	
		<i>For >10 To 20, Add</i>	25.84	
07 52 16 12-0006	SQ	120 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Or Ply Sheet, Hot-Mopped.....	281.59	
		<i>For >20 To 40, Add</i>	18.06	
		<i>For >75 To 100, Deduct</i>	-9.03	
		<i>For >100 To 200, Deduct</i>	-19.06	
		<i>For >200, Deduct</i>	-28.09	
		<i>For Up To 10, Add</i>	64.29	
		<i>For >10 To 20, Add</i>	34.14	
07 52 16 12-0007	SQ	125 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Ply Sheet, Hot-Mopped.....	365.59	
		<i>For >20 To 40, Add</i>	22.26	
		<i>For >75 To 100, Deduct</i>	-11.13	
		<i>For >100 To 200, Deduct</i>	-23.26	
		<i>For >200, Deduct</i>	-34.39	
		<i>For Up To 10, Add</i>	81.09	
		<i>For >10 To 20, Add</i>	42.54	
07 52 16 12-0008	SQ	140 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	299.75	
		<i>For >20 To 40, Add</i>	19.35	
		<i>For >75 To 100, Deduct</i>	-9.68	
		<i>For >100 To 200, Deduct</i>	-20.44	
		<i>For >200, Deduct</i>	-30.12	
		<i>For Up To 10, Add</i>	68.68	
		<i>For >10 To 20, Add</i>	36.52	
07 52 16 12-0009	SQ	150 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	308.78	
		<i>For >20 To 40, Add</i>	19.80	
		<i>For >75 To 100, Deduct</i>	-9.90	
		<i>For >100 To 200, Deduct</i>	-20.89	
		<i>For >200, Deduct</i>	-30.80	
		<i>For Up To 10, Add</i>	70.48	
		<i>For >10 To 20, Add</i>	37.42	
07 52 16 12-0010	SQ	125 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	266.48	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
		<i>For >20 To 40, Add</i>	17.69	
		<i>For >75 To 100, Deduct</i>	-8.84	
		<i>For >100 To 200, Deduct</i>	-18.78	
		<i>For >200, Deduct</i>	-27.62	
		<i>For Up To 10, Add</i>	62.02	
		<i>For >10 To 20, Add</i>	33.19	
07 52 16 12-0011	SQ	140 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	270.38	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
		<i>For >20 To 40, Add</i>	17.88	
		<i>For >75 To 100, Deduct</i>	-8.94	
		<i>For >100 To 200, Deduct</i>	-18.97	
		<i>For >200, Deduct</i>	-27.92	
		<i>For Up To 10, Add</i>	62.80	
		<i>For >10 To 20, Add</i>	33.58	
07 52 16 12-0012	SQ	150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	306.38	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
		<i>For >20 To 40, Add</i>	19.68	
		<i>For >75 To 100, Deduct</i>	-9.84	
		<i>For >100 To 200, Deduct</i>	-20.77	
		<i>For >200, Deduct</i>	-30.62	
		<i>For Up To 10, Add</i>	70.00	
		<i>For >10 To 20, Add</i>	37.18	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 52 Modified Bituminous Membrane Roofing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 52 16 12-0013	SQ		160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	312.38	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	19.98	
			<i>For >75 To 100, Deduct</i>	-9.99	
			<i>For >100 To 200, Deduct</i>	-21.07	
			<i>For >200, Deduct</i>	-31.07	
			<i>For Up To 10, Add</i>	71.20	
			<i>For >10 To 20, Add</i>	37.78	
07 52 16 12-0014	SQ		170 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	364.88	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	22.61	
			<i>For >75 To 100, Deduct</i>	-11.30	
			<i>For >100 To 200, Deduct</i>	-23.70	
			<i>For >200, Deduct</i>	-35.00	
			<i>For Up To 10, Add</i>	81.70	
			<i>For >10 To 20, Add</i>	43.03	
07 52 16 12-0015	SQ		180 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	460.51	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	27.39	
			<i>For >75 To 100, Deduct</i>	-13.69	
			<i>For >100 To 200, Deduct</i>	-28.48	
			<i>For >200, Deduct</i>	-42.18	
			<i>For Up To 10, Add</i>	100.83	
			<i>For >10 To 20, Add</i>	52.60	
07 52 16 12-0016	SQ		125 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	272.99	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	18.01	
			<i>For >75 To 100, Deduct</i>	-9.01	
			<i>For >100 To 200, Deduct</i>	-19.10	
			<i>For >200, Deduct</i>	-28.11	
			<i>For Up To 10, Add</i>	63.33	
			<i>For >10 To 20, Add</i>	33.85	
07 52 16 12-0017	SQ		140 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	282.38	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	18.48	
			<i>For >75 To 100, Deduct</i>	-9.24	
			<i>For >100 To 200, Deduct</i>	-19.57	
			<i>For >200, Deduct</i>	-28.82	
			<i>For Up To 10, Add</i>	65.20	
			<i>For >10 To 20, Add</i>	34.78	
07 52 16 12-0018	SQ		150 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	333.38	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	21.03	
			<i>For >75 To 100, Deduct</i>	-10.52	
			<i>For >100 To 200, Deduct</i>	-22.12	
			<i>For >200, Deduct</i>	-32.64	
			<i>For Up To 10, Add</i>	75.40	
			<i>For >10 To 20, Add</i>	39.88	
07 52 16 12-0019	SQ		160 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	334.58	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	21.09	
			<i>For >75 To 100, Deduct</i>	-10.55	
			<i>For >100 To 200, Deduct</i>	-22.18	
			<i>For >200, Deduct</i>	-32.73	
			<i>For Up To 10, Add</i>	75.64	
			<i>For >10 To 20, Add</i>	40.00	
07 52 16 12-0020	SQ		170 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Hot-Mopped.....	357.38	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
			<i>For >20 To 40, Add</i>	22.23	
			<i>For >75 To 100, Deduct</i>	-11.12	
			<i>For >100 To 200, Deduct</i>	-23.32	
			<i>For >200, Deduct</i>	-34.44	
			<i>For Up To 10, Add</i>	80.20	
			<i>For >10 To 20, Add</i>	42.28	

07 52 16 12-0021 Hot-Mopped, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Flashing (07 52 16 12-0001)

07 52 16 12-0022	SF		150 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	5.14	
07 52 16 12-0023	SF		125 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	4.72	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	
07 52 16 12-0024	SF		140 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	4.75	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	
07 52 16 12-0025	SF		150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	5.11	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	
07 52 16 12-0026	SF		160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	5.17	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	
07 52 16 12-0027	SF		170 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	5.70	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	
07 52 16 12-0028	SF		180 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped	6.66	
			<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 52 16 12-0029 SF 125 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped <i>For Factory Applied White Reflective Surfacing, Add</i>	4.78 1.05	
07 52 16 12-0030 SF 140 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped <i>For Factory Applied White Reflective Surfacing, Add</i>	4.87 1.05	
07 52 16 12-0031 SF 160 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped <i>For Factory Applied White Reflective Surfacing, Add</i>	5.30 1.05	
07 52 16 12-0032 SF 170 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped <i>For Factory Applied White Reflective Surfacing, Add</i>	5.62 1.05	
07 52 16 12-0033 SF 145 Mil, Aluminum Foil Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped.....	7.49	
07 52 16 12-0034 SF 160 Mil, Copper Foil Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Hot-Mopped.....	14.23	

07 52 16 13 Torch-Applied Styrene-Butadiene-Styrene Modified Bituminous Membrane Roofing (07 52 16)

07 52 16 13-0001 Torch-Applied Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing (07 52 16 13)
Note: Includes fiberglass and/or polyester reinforcement. Includes adhering the membrane with a torch.

07 52 16 13-0002 Torch-Applied, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Base, Ply And Cap Sheets (07 52 16 13-0001)

07 52 16 13-0003 SQ 120 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Or Ply Sheet, Torch-Applied	286.81	
<i>For >20 To 40, Add</i>	20.22	
<i>For >75 To 100, Deduct</i>	-10.11	
<i>For >100 To 200, Deduct</i>	-21.69	
<i>For >200, Deduct</i>	-31.80	
<i>For Up To 10, Add</i>	69.13	
<i>For >10 To 20, Add</i>	37.50	
07 52 16 13-0004 SQ 150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied.....	257.71	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	18.77	
<i>For >75 To 100, Deduct</i>	-9.38	
<i>For >100 To 200, Deduct</i>	-20.24	
<i>For >200, Deduct</i>	-29.62	
<i>For Up To 10, Add</i>	63.31	
<i>For >10 To 20, Add</i>	34.59	
07 52 16 13-0005 SQ 160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied.....	291.91	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	20.48	
<i>For >75 To 100, Deduct</i>	-10.24	
<i>For >100 To 200, Deduct</i>	-21.95	
<i>For >200, Deduct</i>	-32.19	
<i>For Up To 10, Add</i>	70.15	
<i>For >10 To 20, Add</i>	38.01	
07 52 16 13-0006 SQ 180 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied.....	446.95	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	28.23	
<i>For >75 To 100, Deduct</i>	-14.11	
<i>For >100 To 200, Deduct</i>	-29.70	
<i>For >200, Deduct</i>	-43.81	
<i>For Up To 10, Add</i>	101.15	
<i>For >10 To 20, Add</i>	53.52	
07 52 16 13-0007 SQ 150 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied	267.49	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	19.26	
<i>For >75 To 100, Deduct</i>	-9.63	
<i>For >100 To 200, Deduct</i>	-20.73	
<i>For >200, Deduct</i>	-30.36	
<i>For Up To 10, Add</i>	65.26	
<i>For >10 To 20, Add</i>	35.57	
07 52 16 13-0008 SQ 160 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied	307.81	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	21.27	
<i>For >75 To 100, Deduct</i>	-10.64	
<i>For >100 To 200, Deduct</i>	-22.74	
<i>For >200, Deduct</i>	-33.38	
<i>For Up To 10, Add</i>	73.33	
<i>For >10 To 20, Add</i>	39.60	
07 52 16 13-0009 SQ 165 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied	320.77	
<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
<i>For >20 To 40, Add</i>	22.02	
<i>For >75 To 100, Deduct</i>	-11.01	
<i>For >100 To 200, Deduct</i>	-23.51	
<i>For >200, Deduct</i>	-34.52	
<i>For Up To 10, Add</i>	76.11	
<i>For >10 To 20, Add</i>	41.04	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 52 Modified Bituminous Membrane Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 52 16 13-0010	SQ	180 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Torch-Applied.....	414.88
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13
		<i>For >20 To 40, Add</i>	26.72
		<i>For >75 To 100, Deduct</i>	-13.36
		<i>For >100 To 200, Deduct</i>	-28.22
		<i>For >200, Deduct</i>	-41.58
		<i>For Up To 10, Add</i>	94.93
		<i>For >10 To 20, Add</i>	50.46

07 52 16 13-0011 Torch-Applied, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Flashing (07 52 16 13-0001)

07 52 16 13-0012	SF	150 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	4.12
07 52 16 13-0013	SF	150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	4.10
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 13-0014	SF	180 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	5.64
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 13-0015	SF	160 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	4.29
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 13-0016	SF	165 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	4.37
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 13-0017	SF	180 Mil, Fire Rated, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	5.32
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05
07 52 16 13-0018	SF	150 Mil, Aluminum Foil Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	5.52
07 52 16 13-0019	SF	160 Mil, Copper Foil Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Torch-Applied.....	13.22

07 52 16 14 Mechanically Fastened Styrene-Butadiene-Styrene Modified Bituminous Membrane Roofing (07 52 16)**07 52 16 14-0001 Mechanically Fastened Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing** (07 52 16 14)
Note: Includes fiberglass and/or polyester reinforcement. Includes fasteners.**07 52 16 14-0002 Mechanically Fastened, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Base And Ply Sheets** (07 52 16 14-0001)

07 52 16 14-0003	SQ	35 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Ply Sheet, Mechanically Fastened.....	178.59
		<i>For >20 To 40, Add</i>	10.89
		<i>For >75 To 100, Deduct</i>	-5.44
		<i>For >100 To 200, Deduct</i>	-11.38
		<i>For >200, Deduct</i>	-16.82
		<i>For Up To 10, Add</i>	39.63
		<i>For >10 To 20, Add</i>	20.80
07 52 16 14-0004	SQ	50 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Mechanically Fastened.....	137.54
		<i>For >20 To 40, Add</i>	8.84
		<i>For >75 To 100, Deduct</i>	-4.42
		<i>For >100 To 200, Deduct</i>	-9.32
		<i>For >200, Deduct</i>	-13.74
		<i>For Up To 10, Add</i>	31.42
		<i>For >10 To 20, Add</i>	16.69
07 52 16 14-0005	SQ	80 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Mechanically Fastened.....	177.95
		<i>For >20 To 40, Add</i>	10.86
		<i>For >75 To 100, Deduct</i>	-5.43
		<i>For >100 To 200, Deduct</i>	-11.35
		<i>For >200, Deduct</i>	-16.77
		<i>For Up To 10, Add</i>	39.51
		<i>For >10 To 20, Add</i>	20.73
07 52 16 14-0006	SQ	90 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Mechanically Fastened.....	222.59
		<i>For >20 To 40, Add</i>	13.09
		<i>For >75 To 100, Deduct</i>	-6.54
		<i>For >100 To 200, Deduct</i>	-13.58
		<i>For >200, Deduct</i>	-20.12
		<i>For Up To 10, Add</i>	48.43
		<i>For >10 To 20, Add</i>	25.20
07 52 16 14-0007	SQ	120 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Or Ply Sheet, Mechanically Fastened.....	279.29
		<i>For >20 To 40, Add</i>	15.92
		<i>For >75 To 100, Deduct</i>	-7.96
		<i>For >100 To 200, Deduct</i>	-16.41
		<i>For >200, Deduct</i>	-24.37
		<i>For Up To 10, Add</i>	59.77
		<i>For >10 To 20, Add</i>	30.87

07 52 16 14-0008 Mechanically Fastened, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Flashing (07 52 16 14-0001)

07 52 16 14-0009	SF	150 Mil, Smooth Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Mechanically Fastened.....	3.54
07 52 16 14-0010	SF	160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Mechanically Fastened.....	3.62



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 52 16 15 Self-Adhering Styrene-Butadiene-Styrene Modified Bituminous Membrane Roofing (07 52 16)

07 52 16 15-0001		Self-Adhering Styrene-Butadiene-Styrene (SBS) Modified Bituminous Membrane Roofing <small>(07 52 16 15)</small>		
		Note: Includes fiberglass and/or polyester reinforcement. Includes removing the release film(s) from the membrane and applying the membrane.		
07 52 16 15-0002		Self-Adhering, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Base, Ply And Cap Sheets <small>(07 52 16 15-0001)</small>		
07 52 16 15-0003	SQ	60 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Self-Adhering.....	143.41	
		<i>For >20 To 40, Add</i>	9.52	
		<i>For >75 To 100, Deduct</i>	-4.76	
		<i>For >100 To 200, Deduct</i>	-10.11	
		<i>For >200, Deduct</i>	-14.87	
		<i>For Up To 10, Add</i>	33.39	
		<i>For >10 To 20, Add</i>	17.87	
07 52 16 15-0004	SQ	70 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Self-Adhering.....	151.92	
		<i>For >20 To 40, Add</i>	9.95	
		<i>For >75 To 100, Deduct</i>	-4.97	
		<i>For >100 To 200, Deduct</i>	-10.54	
		<i>For >200, Deduct</i>	-15.51	
		<i>For Up To 10, Add</i>	35.09	
		<i>For >10 To 20, Add</i>	18.72	
07 52 16 15-0005	SQ	120 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Base Sheet, Self-Adhering.....	255.92	
		<i>For >20 To 40, Add</i>	15.33	
		<i>For >75 To 100, Deduct</i>	-7.66	
		<i>For >100 To 200, Deduct</i>	-15.96	
		<i>For >200, Deduct</i>	-23.62	
		<i>For Up To 10, Add</i>	56.24	
		<i>For >10 To 20, Add</i>	29.39	
07 52 16 15-0006	SQ	150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Self-Adhering	305.78	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
		<i>For >20 To 40, Add</i>	17.82	
		<i>For >75 To 100, Deduct</i>	-8.91	
		<i>For >100 To 200, Deduct</i>	-18.45	
		<i>For >200, Deduct</i>	-27.36	
		<i>For Up To 10, Add</i>	66.21	
		<i>For >10 To 20, Add</i>	34.37	
07 52 16 15-0007	SQ	160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Cap Sheet, Self-Adhering	452.78	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	105.13	
		<i>For >20 To 40, Add</i>	25.17	
		<i>For >75 To 100, Deduct</i>	-12.58	
		<i>For >100 To 200, Deduct</i>	-25.80	
		<i>For >200, Deduct</i>	-38.38	
		<i>For Up To 10, Add</i>	95.61	
		<i>For >10 To 20, Add</i>	49.07	
07 52 16 15-0008		Self-Adhering, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Roofing Flashing <small>(07 52 16 15-0001)</small>		
07 52 16 15-0009	SF	70 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Self-Adhering.....	4.08	
07 52 16 15-0010	SF	150 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Self-Adhering.....	4.56	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	
07 52 16 15-0011	SF	160 Mil, Granule Surfaced, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Flashing, Self-Adhering.....	6.03	
		<i>For Factory Applied White Reflective Surfacing, Add</i>	1.05	

07 53 Elastomeric Membrane Roofing (07 50)

Note: Includes 10 year warranty. All warranties are no dollar limit to include material, equipment and labor. Excludes concrete primer, insulation, slip sheets, wood nailers, cant strips, coping removal and reinstallation, gravel stop, walkway pads and drainage devices. See CSI section 07 26 13 00-0000 for wood deck building paper.

07 53 16 Chlorosulfonate-Polyethylene Roofing (07 53)

07 53 16 00-0001		Chlorosulfonated Polyethylene-Hypalon (CSPE) Roofing Membranes <small>(07 53 16)</small>		
		Note: Includes hot air welding or adhesive bonding of seams.		
07 53 16 00-0002	SQ	45 Mil, Single Ply Chlorosulfonated Polyethylene-Hypalon (CSPE) Roofing Membrane, Fully Adhered	624.93	94.10
		Note: Includes adhesive.		
		<i>For 15 Year Warranty, Add</i>	3.00	
		<i>For >20 To 40, Add</i>	50.07	
		<i>For >75 To 100, Deduct</i>	-25.03	
		<i>For >100 To 200, Deduct</i>	-54.77	
		<i>For >200, Deduct</i>	-79.80	
		<i>For Up To 10, Add</i>	162.63	
		<i>For >10 To 20, Add</i>	90.72	
07 53 16 00-0003	SQ	45 Mil, Single Ply Chlorosulfonated Polyethylene-Hypalon (CSPE) Roofing Membrane, Ballasted	479.76	47.05
		Note: Includes ballast.		
		<i>For 15 Year Warranty, Add</i>	3.00	
		<i>For >20 To 40, Add</i>	33.40	
		<i>For >75 To 100, Deduct</i>	-16.70	
		<i>For >100 To 200, Deduct</i>	-35.75	
		<i>For >200, Deduct</i>	-52.45	
		<i>For Up To 10, Add</i>	114.77	
		<i>For >10 To 20, Add</i>	62.09	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 53 Elastomeric Membrane Roofing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 53 16 00-0004	SQ	45 Mil, Single Ply Chlorosulfonated Polyethylene-Hypalon (CSPE) Roofing Membrane, Mechanically Fastened.....	511.02	70.57
		Note: Includes fasteners.		
		For 15 Year Warranty, Add	3.00	
		For Mechanically Fastened To Concrete Decks, Add	35.29	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	36.57	
		For >20 To 40, Add	39.67	
		For >75 To 100, Deduct	-19.83	
		For >100 To 200, Deduct	-43.19	
		For >200, Deduct	-63.03	
		For Up To 10, Add	130.43	
		For >10 To 20, Add	72.27	

07 53 23 Ethylene-Propylene-Diene-Monomer Roofing (07 53)**07 53 23 00-0001 Ethylene Propylene Diene Monomer (EPDM) Roofing Membranes (07 53 23)**

Note: Includes splicing of seams using adhesive or seam tape. Black ethylene propylene diene monomer (EPDM).

07 53 23 00-0002	SQ	45 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Ballasted	326.59	47.05
		Note: Includes ballast.		
		For 15 Year Warranty, Add	3.00	
		For Low Slope Fire Rated, Add	8.45	
		For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
		For >20 To 40, Add	25.74	
		For >75 To 100, Deduct	-12.87	
		For >100 To 200, Deduct	-28.09	
		For >200, Deduct	-40.96	
		For Up To 10, Add	84.14	
		For >10 To 20, Add	46.77	
07 53 23 00-0003	SQ	60 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Ballasted	425.35	49.99
		Note: Includes ballast.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low Slope Fire Rated, Add	8.45	
		For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
		For >20 To 40, Add	31.27	
		For >75 To 100, Deduct	-15.63	
		For >100 To 200, Deduct	-33.77	
		For >200, Deduct	-49.40	
		For Up To 10, Add	105.07	
		For >10 To 20, Add	57.53	
07 53 23 00-0004	SQ	90 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Ballasted	577.42	52.93
		Note: Includes ballast.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low Slope Fire Rated, Add	8.45	
		For >20 To 40, Add	39.46	
		For >75 To 100, Deduct	-19.73	
		For >100 To 200, Deduct	-42.10	
		For >200, Deduct	-61.83	
		For Up To 10, Add	136.66	
		For >10 To 20, Add	73.62	
07 53 23 00-0005	SQ	45 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Partially Adhered (40%)	393.47	70.57
		Note: Includes adhesive and fasteners.		
		For 15 Year Warranty, Add	3.00	
		For Low Slope Fire Rated, Add	8.45	
		For Low VOC Adhesive, Add	22.05	
		For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
		For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
		For Integral Polyester Fleece-Backing, Add	107.95	
		For >20 To 40, Add	33.79	
		For >75 To 100, Deduct	-16.89	
		For >100 To 200, Deduct	-37.32	
		For >200, Deduct	-54.21	
		For Up To 10, Add	106.92	
		For >10 To 20, Add	60.52	
07 53 23 00-0006	SQ	60 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Partially Adhered (40%)	492.23	73.51
		Note: Includes adhesive and fasteners.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low Slope Fire Rated, Add	8.45	
		For Low VOC Adhesive, Add	22.05	
		For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
		For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
		For Integral Polyester Fleece-Backing, Add	120.34	
		For >20 To 40, Add	39.31	
		For >75 To 100, Deduct	-19.66	
		For >100 To 200, Deduct	-42.99	
		For >200, Deduct	-62.65	
		For Up To 10, Add	127.85	
		For >10 To 20, Add	71.28	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 53 23 00-0007 SQ 90 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Partially Adhered (40%).....	644.29	76.45
Note: Includes adhesive and fasteners.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Low Slope Fire Rated, Add	8.45	
For Low VOC Adhesive, Add	22.05	
For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
For Integral Polyester Fleece-Backing, Add	133.85	
For >20 To 40, Add	47.51	
For >75 To 100, Deduct	-23.75	
For >100 To 200, Deduct	-51.33	
For >200, Deduct	-75.08	
For Up To 10, Add	159.44	
For >10 To 20, Add	87.37	
07 53 23 00-0008 SQ 45 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Fully Adhered.....	518.68	94.10
Note: Includes adhesive and fasteners.		
For 15 Year Warranty, Add	3.00	
For Low Slope Fire Rated, Add	8.45	
For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
For Low VOC Adhesive, Add	55.11	
For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
For Integral Polyester Fleece-Backing, Add	107.95	
For >20 To 40, Add	44.75	
For >75 To 100, Deduct	-22.38	
For >100 To 200, Deduct	-49.46	
For >200, Deduct	-71.84	
For Up To 10, Add	141.38	
For >10 To 20, Add	80.10	
07 53 23 00-0009 SQ 60 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Fully Adhered.....	617.45	97.04
Note: Includes adhesive and fasteners.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Low Slope Fire Rated, Add	8.45	
For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
For Low VOC Adhesive, Add	55.11	
For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
For Integral Polyester Fleece-Backing, Add	120.34	
For >20 To 40, Add	50.28	
For >75 To 100, Deduct	-25.14	
For >100 To 200, Deduct	-55.13	
For >200, Deduct	-80.27	
For Up To 10, Add	162.31	
For >10 To 20, Add	90.86	
07 53 23 00-0010 SQ 90 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Fully Adhered.....	769.51	99.98
Note: Includes adhesive and fasteners.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Low Slope Fire Rated, Add	8.45	
For Low VOC Adhesive, Add	55.11	
For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
For Integral Polyester Fleece-Backing, Add	133.85	
For >20 To 40, Add	58.47	
For >75 To 100, Deduct	-29.24	
For >100 To 200, Deduct	-63.47	
For >200, Deduct	-92.71	
For Up To 10, Add	193.89	
For >10 To 20, Add	106.95	
07 53 23 00-0011 SQ 45 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Mechanically Fastened	357.61	70.57
Note: Includes fasteners.		
For 15 Year Warranty, Add	3.00	
For Low Slope Fire Rated, Add	8.45	
For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
For Mechanically Fastened To Concrete Decks, Add	35.29	
For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	36.57	
For >20 To 40, Add	32.00	
For >75 To 100, Deduct	-16.00	
For >100 To 200, Deduct	-35.52	
For >200, Deduct	-51.52	
For Up To 10, Add	99.75	
For >10 To 20, Add	56.93	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 53 Elastomeric Membrane Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 53 23 00-0012	SQ	60 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Mechanically Fastened	456.37	73.51
		Note: Includes fasteners.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low Slope Fire Rated, Add	8.45	
		For Reinforced Ethylene Propylene Diene Monomer (EPDM), Add	32.63	
		For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
		For Mechanically Fastened To Concrete Decks, Add	36.76	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	38.04	
		For >20 To 40, Add	37.52	
		For >75 To 100, Deduct	-18.76	
		For >100 To 200, Deduct	-41.20	
		For >200, Deduct	-59.96	
		For Up To 10, Add	120.68	
		For >10 To 20, Add	67.69	
07 53 23 00-0013	SQ	90 Mil, Single Ply Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane, Mechanically Fastened	608.43	76.45
		Note: Includes fasteners.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low Slope Fire Rated, Add	8.45	
		For White Ethylene Propylene Diene Monomer (EPDM) Or Factory Applied White Coating, Add	80.60	
		For Mechanically Fastened To Concrete Decks, Add	38.23	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	39.51	
		For >20 To 40, Add	45.71	
		For >75 To 100, Deduct	-22.86	
		For >100 To 200, Deduct	-49.54	
		For >200, Deduct	-72.39	
		For Up To 10, Add	152.27	
		For >10 To 20, Add	83.78	

07 53 23 00-0014 Ethylene Propylene Diene Monomer (EPDM) Roofing Membrane**Accessories** (07 53 23)

07 53 23 00-0015	SQ	Acrylic, Ethylene Propylene Diene Monomer (EPDM) Roofing Primer, Price Per Coat	72.94	
		For >20 To 40, Add	6.00	
		For >75 To 100, Deduct	-3.00	
		For >100 To 200, Deduct	-6.59	
		For >200, Deduct	-9.59	
		For Up To 10, Add	19.29	
		For >10 To 20, Add	10.82	
07 53 23 00-0016	SQ	Acrylic Elastomeric, Surface Or Base Coating For Ethylene Propylene Diene Monomer (EPDM) Roofing, Price Per Coat	75.41	
		Note: 55% solids by volume.		
		For >20 To 40, Add	6.12	
		For >75 To 100, Deduct	-3.06	
		For >100 To 200, Deduct	-6.71	
		For >200, Deduct	-9.77	
		For Up To 10, Add	19.79	
		For >10 To 20, Add	11.07	
07 53 23 00-0017	EA	Up To 4" Pipe Diameter, Prefabricated Ethylene Propylene Diene Monomer (EPDM) Pipe Cone/Boot.....	46.35	11.17
		Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 53 23 00-0018	EA	>4" To 8" Pipe Diameter, Prefabricated Ethylene Propylene Diene Monomer (EPDM) Pipe Cone/Boot.....	65.85	11.17
		Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 53 23 00-0019	EA	>8" To 13" Pipe Diameter, Prefabricated Ethylene Propylene Diene Monomer (EPDM) Pipe Cone/Boot.....	122.13	11.17
		Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 53 23 00-0020	EA	6" Diameter, Prefabricated Ethylene Propylene Diene Monomer (EPDM) Penetration Pocket.....	161.71	12.35
		Note: Includes attaching the pocket to the membrane, sealing around the penetration and filling the pocket with pourable sealer.		
07 53 23 00-0021	LF	30" Wide, Ethylene Propylene Diene Monomer (EPDM) Walkway Protection Pad.....	35.85	6.82
		Note: Includes factory installed peel and stick adhesive tape.		
07 53 23 00-0022	SF	Ethylene Propylene Diene Monomer (EPDM) Membrane Base Flashing	6.85	1.76
07 53 23 00-0023	SF	Ethylene Propylene Diene Monomer (EPDM) Membrane Curb Flashing	8.61	2.65

07 53 29 Polyisobutylene Roofing (07 53)**07 53 29 00-0001 Polyisobutylene (PIB) Roofing Membranes** (07 53 29)

Note: Includes integral polyester fleece-backing. Includes splicing of seams using adhesive or seam tape.

07 53 29 00-0002	SQ	100 Mil, Single Ply PIB Roofing Membrane, Ballasted	526.83	52.93
		Note: Includes ballast.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For >20 To 40, Add	36.93	
		For >75 To 100, Deduct	-18.46	
		For >100 To 200, Deduct	-39.58	
		For >200, Deduct	-58.04	
		For Up To 10, Add	126.54	
		For >10 To 20, Add	68.56	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 53 29 00-0003 SQ 100 Mil, Single Ply PIB Roofing Membrane, Partially Adhered (40%)	590.13	76.45
Note: Includes adhesive.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For >20 To 40, Add	44.80	
For >75 To 100, Deduct	-22.40	
For >100 To 200, Deduct	-48.62	
For >200, Deduct	-71.02	
For Up To 10, Add	148.61	
For >10 To 20, Add	81.95	
07 53 29 00-0004 SQ 100 Mil, Single Ply PIB Roofing Membrane, Fully Adhered	709.98	99.98
Note: Includes adhesive.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For >20 To 40, Add	55.50	
For >75 To 100, Deduct	-27.75	
For >100 To 200, Deduct	-60.49	
For >200, Deduct	-88.24	
For Up To 10, Add	181.99	
For >10 To 20, Add	100.99	

07 54 Thermoplastic Membrane Roofing (07 50)

Note: Includes 10 year warranty. All warranties are no dollar limit to include material, equipment and labor. Excludes concrete primer, insulation, slip sheets, wood nailers, cant strips, coping removal and reinstallation, gravel stop, walkway pads and drainage devices. See CSI section 07 26 13 00-0000 for wood deck building paper.

07 54 19 Polyvinyl-Chloride Roofing (07 54)

07 54 19 00-0001 Reinforced Polyvinyl Chloride (RPVC) Roofing Membranes (07 54 19)

Note: Includes polyester fabric reinforcement and hot air welding of seams. RPVC membranes meet or exceed all of the requirements of ASTM D4434 Type III.

07 54 19 00-0002 SQ 48 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Ballasted	205.60	47.05
Note: Includes ballast.		
For 15 Year Warranty, Add	3.00	
For Colors, Add	26.00	
For Integral Polyester Fleece-Backing, Add	27.13	
For >20 To 40, Add	19.69	
For >75 To 100, Deduct	-9.85	
For >100 To 200, Deduct	-22.04	
For >200, Deduct	-31.89	
For Up To 10, Add	59.94	
For >10 To 20, Add	34.68	
07 54 19 00-0003 SQ 60 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Ballasted	225.67	49.99
Note: Includes ballast.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Colors, Add	26.00	
For Integral Polyester Fleece-Backing, Add	27.13	
For >20 To 40, Add	21.28	
For >75 To 100, Deduct	-10.64	
For >100 To 200, Deduct	-23.78	
For >200, Deduct	-34.42	
For Up To 10, Add	65.13	
For >10 To 20, Add	37.56	
07 54 19 00-0004 SQ 72 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Ballasted	246.74	51.46
Note: Includes ballast.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Colors, Add	26.00	
For Integral Polyester Fleece-Backing, Add	27.13	
For >20 To 40, Add	22.63	
For >75 To 100, Deduct	-11.31	
For >100 To 200, Deduct	-25.20	
For >200, Deduct	-36.52	
For Up To 10, Add	69.93	
For >10 To 20, Add	40.11	
07 54 19 00-0005 SQ 80 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Ballasted	257.58	52.93
Note: Includes ballast.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Colors, Add	26.00	
For Integral Polyester Fleece-Backing, Add	27.13	
For >20 To 40, Add	23.47	
For >75 To 100, Deduct	-11.73	
For >100 To 200, Deduct	-26.11	
For >200, Deduct	-37.85	
For Up To 10, Add	72.69	
For >10 To 20, Add	41.64	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 54 Thermoplastic Membrane Roofing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 54 19 00-0006	SQ	48 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Fully Adhered	428.18	94.10
		Note: Includes adhesive.		
		For 15 Year Warranty, Add	3.00	
		For Colors, Add	26.00	
		For Low VOC Adhesive, Add	87.43	
		For Integral Polyester Fleece-Backing, Add	27.13	
		For >20 To 40, Add	40.23	
		For >75 To 100, Deduct	-20.11	
		For >100 To 200, Deduct	-44.93	
		For >200, Deduct	-65.05	
		For Up To 10, Add	123.28	
		For >10 To 20, Add	71.05	
07 54 19 00-0007	SQ	60 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Fully Adhered	448.25	97.04
		Note: Includes adhesive.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Colors, Add	26.00	
		For Low VOC Adhesive, Add	87.43	
		For Integral Polyester Fleece-Backing, Add	27.13	
		For >20 To 40, Add	41.82	
		For >75 To 100, Deduct	-20.91	
		For >100 To 200, Deduct	-46.67	
		For >200, Deduct	-67.58	
		For Up To 10, Add	128.47	
		For >10 To 20, Add	73.94	
07 54 19 00-0008	SQ	72 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Fully Adhered	469.31	98.51
		Note: Includes adhesive.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Colors, Add	26.00	
		For Low VOC Adhesive, Add	87.43	
		For Integral Polyester Fleece-Backing, Add	27.13	
		For >20 To 40, Add	43.17	
		For >75 To 100, Deduct	-21.58	
		For >100 To 200, Deduct	-48.09	
		For >200, Deduct	-69.68	
		For Up To 10, Add	133.26	
		For >10 To 20, Add	76.48	
07 54 19 00-0009	SQ	80 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Fully Adhered	480.14	99.98
		Note: Includes adhesive.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Colors, Add	26.00	
		For Low VOC Adhesive, Add	87.43	
		For Integral Polyester Fleece-Backing, Add	27.13	
		For >20 To 40, Add	44.00	
		For >75 To 100, Deduct	-22.00	
		For >100 To 200, Deduct	-49.00	
		For >200, Deduct	-71.00	
		For Up To 10, Add	136.02	
		For >10 To 20, Add	78.01	
07 54 19 00-0010	SQ	48 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Mechanically Fastened	228.62	70.57
		Note: Includes fasteners.		
		For 15 Year Warranty, Add	3.00	
		For Colors, Add	26.00	
		For Integral Polyester Fleece-Backing, Add	27.13	
		For Mechanically Fastened To Concrete Decks, Add	35.29	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	36.57	
		For >20 To 40, Add	25.55	
		For >75 To 100, Deduct	-12.77	
		For >100 To 200, Deduct	-29.07	
		For >200, Deduct	-41.85	
		For Up To 10, Add	73.95	
		For >10 To 20, Add	44.03	
07 54 19 00-0011	SQ	60 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Mechanically Fastened	248.69	73.51
		Note: Includes fasteners.		
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Colors, Add	26.00	
		For Integral Polyester Fleece-Backing, Add	27.13	
		For Mechanically Fastened To Concrete Decks, Add	36.76	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	38.04	
		For >20 To 40, Add	27.14	
		For >75 To 100, Deduct	-13.57	
		For >100 To 200, Deduct	-30.81	
		For >200, Deduct	-44.38	
		For Up To 10, Add	79.14	
		For >10 To 20, Add	46.92	



Thermal And Moisture Protection		07
Membrane Roofing		07 50
Thermoplastic Membrane Roofing		07 54

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 54 19 00-0012 SQ 72 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Mechanically Fastened Note: Includes fasteners. For 15 Year Warranty, Add For 20 Year Warranty, Add For 25 Year Warranty, Add For Colors, Add For Integral Polyester Fleece-Backing, Add For Mechanically Fastened To Concrete Decks, Add For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add For >20 To 40, Add For >75 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For Up To 10, Add For >10 To 20, Add	269.76 3.00 7.00 9.00 26.00 27.13 37.49 38.77 28.49 -14.24 -32.23 -46.48 83.95 49.47	74.98
07 54 19 00-0013 SQ 80 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane, Mechanically Fastened Note: Includes fasteners. For 15 Year Warranty, Add For 20 Year Warranty, Add For 25 Year Warranty, Add For Colors, Add For Integral Polyester Fleece-Backing, Add For Mechanically Fastened To Concrete Decks, Add For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add For >20 To 40, Add For >75 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For Up To 10, Add For >10 To 20, Add	280.58 3.00 7.00 9.00 26.00 27.13 38.23 39.51 29.32 -14.66 -33.14 -47.80 86.70 50.99	76.45
07 54 19 00-0014 Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane Accessories (07 54 19)		
07 54 19 00-0015 SQ Acrylic, Polyvinyl Chloride (PVC) Roofing Cleaner/Primer, Price Per Coat For >20 To 40, Add For >75 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For Up To 10, Add For >10 To 20, Add	72.94 6.00 -3.00 -6.59 -9.59 19.29 10.82	
07 54 19 00-0016 SQ Acrylic Elastomeric, Surface Or Base Coating For Polyvinyl Chloride (PVC) Roofing, Price Per Coat..... Note: 55% solids by volume. For >20 To 40, Add For >75 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For Up To 10, Add For >10 To 20, Add	75.41 6.12 -3.06 -6.71 -9.77 19.79 11.07	
07 54 19 00-0017 EA Up To 3" Pipe Diameter, Prefabricated Polyvinyl Chloride (PVC) Pipe Cone/Boot..... Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.	75.93	10.00
07 54 19 00-0018 EA >3" To 7" Pipe Diameter, Prefabricated Polyvinyl Chloride (PVC) Pipe Cone/Boot..... Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.	106.31	11.17
07 54 19 00-0019 EA >7" To 12" Pipe Diameter, Prefabricated Polyvinyl Chloride (PVC) Pipe Cone/Boot..... Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.	135.78	12.35
07 54 19 00-0020 EA 6" Diameter, Prefabricated Polyvinyl Chloride (PVC) Penetration Pocket Note: Includes attaching the pocket to the membrane, sealing around the penetration and filling the pocket with pourable sealer.	172.40	12.35
07 54 19 00-0021 LF 36" Wide, Polyvinyl Chloride (PVC) Walkway Protection Pad	30.81	6.82
07 54 19 00-0022 SF Polyvinyl Chloride (PVC) Membrane Base Flashing	8.12	1.76
07 54 19 00-0023 SF Polyvinyl Chloride (PVC) Membrane Curb Flashing	9.88	2.65
07 54 19 00-0024 SF Polyvinyl Chloride (PVC) Clad Edge Metal Or Base Flashing..... Note: 20 Mil polyvinyl chloride (PVC) membrane laminated to 24 gauge galvanized steel.	10.92	1.76
07 54 19 00-0025 Reinforced Polyvinyl Chloride (RPVC) Roofing Membranes (Sika Sarnafil® EnergySmart Roof® Membranes) (07 54 19)		
07 54 19 00-0026 Reinforced Polyvinyl Chloride (RPVC) Roofing Membranes (Sika Sarnafil® EnergySmart Roof® Membranes) (07 54 19 00-0025) Note: Includes integral fiberglass mat reinforcement and hot air welding of seams. Sarnafil® G410 fully adhered membranes meet or exceed all of the requirements of ASTM D4434 Type II. Sarnafil® S327 mechanically attached membranes meet or exceed all of the requirements of ASTM D4434 Type III.		
07 54 19 00-0027 SQ 48 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Fully Adhered Note: Includes adhesive. For >20 To 40, Add For >75 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For 15 Year Warranty, Add For 20 Year Warranty, Add For 25 Year Warranty, Add For Integral Felt Backing, Add For Up To 10, Add For >10 To 20, Add	457.78 41.71 -20.85 -46.41 -67.27 2.94 10.29 19.10 51.42 129.20 74.01	94.10

07 Thermal And Moisture Protection

07 50 Membrane Roofing

07 54 Thermoplastic Membrane Roofing



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 54 19 00-0028	SQ	60 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Fully Adhered	490.20	97.04
		Note: Includes adhesive.		
		For >20 To 40, Add	43.92	
		For >75 To 100, Deduct	-21.96	
		For >100 To 200, Deduct	-48.77	
		For >200, Deduct	-70.73	
		For 15 Year Warranty, Add	2.94	
		For 20 Year Warranty, Add	10.29	
		For 25 Year Warranty, Add	19.10	
		For Integral Felt Backing, Add	51.42	
		For Up To 10, Add	136.86	
		For >10 To 20, Add	78.13	
07 54 19 00-0029	SQ	72 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Fully Adhered	521.33	98.51
		Note: Includes adhesive.		
		For >20 To 40, Add	45.77	
		For >75 To 100, Deduct	-22.88	
		For >100 To 200, Deduct	-50.69	
		For >200, Deduct	-73.58	
		For 15 Year Warranty, Add	2.94	
		For 20 Year Warranty, Add	10.29	
		For 25 Year Warranty, Add	19.10	
		For Integral Felt Backing, Add	51.42	
		For Up To 10, Add	143.67	
		For >10 To 20, Add	81.68	
07 54 19 00-0030	SQ	80 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Fully Adhered	554.13	99.98
		Note: Includes adhesive.		
		For >20 To 40, Add	47.70	
		For >75 To 100, Deduct	-23.85	
		For >100 To 200, Deduct	-52.70	
		For >200, Deduct	-76.55	
		For 15 Year Warranty, Add	2.94	
		For 20 Year Warranty, Add	10.29	
		For 25 Year Warranty, Add	19.10	
		For Integral Felt Backing, Add	51.42	
		For Up To 10, Add	150.82	
		For >10 To 20, Add	85.41	
07 54 19 00-0031	SQ	48 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Mechanically Fastened	368.37	70.57
		Note: Includes fasteners and plates for mechanically fastening to wood or steel decks.		
		For Mechanically Fastened To Concrete Decks, Add	35.29	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	36.57	
		For >20 To 40, Add	32.53	
		For >75 To 100, Deduct	-16.27	
		For >100 To 200, Deduct	-36.06	
		For >200, Deduct	-52.33	
		For 15 Year Warranty, Add	2.94	
		For 20 Year Warranty, Add	10.29	
		For 25 Year Warranty, Add	19.10	
		For Integral Felt Backing, Add	51.42	
		For Mechanically Fastened With Sarnabar, Add	30.20	
		For Up To 10, Add	101.90	
		For >10 To 20, Add	58.01	
07 54 19 00-0032	SQ	60 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Mechanically Fastened	400.79	73.51
		Note: Includes fasteners and plates for mechanically fastening to wood or steel decks.		
		For Mechanically Fastened To Concrete Decks, Add	36.76	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	38.04	
		For >20 To 40, Add	34.74	
		For >75 To 100, Deduct	-17.37	
		For >100 To 200, Deduct	-38.42	
		For >200, Deduct	-55.79	
		For 15 Year Warranty, Add	2.94	
		For 20 Year Warranty, Add	10.29	
		For 25 Year Warranty, Add	19.10	
		For Integral Felt Backing, Add	51.42	
		For Mechanically Fastened With Sarnabar, Add	30.20	
		For Up To 10, Add	109.56	
		For >10 To 20, Add	62.13	
07 54 19 00-0033	SQ	72 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Mechanically Fastened	431.93	74.98
		Note: Includes fasteners and plates for mechanically fastening to wood or steel decks.		
		For Mechanically Fastened To Concrete Decks, Add	37.49	
		For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	38.77	
		For >20 To 40, Add	36.59	
		For >75 To 100, Deduct	-18.30	
		For >100 To 200, Deduct	-40.34	
		For >200, Deduct	-58.64	
		For 15 Year Warranty, Add	2.94	
		For 20 Year Warranty, Add	10.29	
		For 25 Year Warranty, Add	19.10	
		For Integral Felt Backing, Add	51.42	
		For Mechanically Fastened With Sarnabar, Add	30.20	
		For Up To 10, Add	116.38	
		For >10 To 20, Add	65.69	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 54 19 00-0034 SQ 80 Mil, Single Ply Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane (Sika Sarnafil® EnergySmart Roof® Membranes), Mechanically Fastened.....	464.73	76.45
Note: Includes fasteners and plates for mechanically fastening to wood or steel decks.		
For Mechanically Fastened To Concrete Decks, Add	38.23	
For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	39.51	
For >20 To 40, Add	38.53	
For >75 To 100, Deduct	-19.26	
For >100 To 200, Deduct	-42.35	
For >200, Deduct	-61.61	
For 15 Year Warranty, Add	2.94	
For 20 Year Warranty, Add	10.29	
For 25 Year Warranty, Add	19.10	
For Integral Felt Backing, Add	51.42	
For Mechanically Fastened With Sarnabar, Add	30.20	
For Up To 10, Add	123.53	
For >10 To 20, Add	69.41	
07 54 19 00-0035 Reinforced Polyvinyl Chloride (RPVC) Roofing Membrane Accessories (Sika Sarnafil® EnergySmart Roof® Membranes) (07 54 19 00-0025)		
07 54 19 00-0036 LF 3/4" Wide Multi-Purpose Tape (Sika Sarnafil®).....	1.08	
07 54 19 00-0037 LF Roofing Membrane Aluminum Termination Bar (Sika Sarnafil® Sarnastop).....	5.08	1.69
Note: Includes fasteners and caulking.		
07 54 19 00-0038 EA 4-1/2" Diameter, Polyvinyl Chloride (PVC) Membrane Prefabricated Patch (Sika Sarnafil® Sarnacircles).....	5.14	1.47
07 54 19 00-0039 LF 8" Polyvinyl Chloride (PVC) Membrane Cover Strip (Sika Sarnafil® Coverstrip).....	5.59	1.47
Note: Includes aluminum tape.		
07 54 19 00-0040 LF 12" Polyvinyl Chloride (PVC) Membrane Cover Strip (Sika Sarnafil® Coverstrip).....	5.59	1.47
Note: Includes aluminum tape.		
07 54 19 00-0041 LF Surface Mount Vertical Termination Bar (Sika Sarnafil® Sarnareglet).....	7.43	1.87
Note: Includes fasteners, splice plates and caulking.		
07 54 19 00-0042 SF Polyvinyl Chloride (PVC) Membrane Flashing (Sika Sarnafil® G459).....	7.72	1.76
07 54 19 00-0043 SF Polyvinyl Chloride (PVC) Membrane Flashing (Sika Sarnafil® Detail Membrane).....	9.47	2.65
07 54 19 00-0044 SF Polyvinyl Chloride (PVC) Clad Edge Metal Or Base Flashing (Sika Sarnafil® Sarnaclad).....	10.87	1.76
Note: 20 Mil white polyvinyl chloride (PVC) membrane laminated to 24 gauge galvanized steel.		
For Colored PVC, Add	1.06	
07 54 19 00-0045 LF 39" Wide, 96 Mil, Polyester Reinforced, Polyvinyl Chloride (PVC) Walkway Protection Pad (Sika Sarnafil® Sarnatred -V).....	29.98	6.82
07 54 19 00-0046 EA Up To 3" Pipe Diameter, Prefabricated Polyvinyl Chloride (PVC) Pipe Cone/Boot (Sika Sarnafil® Sarnastack).....	77.37	10.00
Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 54 19 00-0047 EA >3" To 5" Pipe Diameter, Prefabricated Polyvinyl Chloride (PVC) Pipe Cone/Boot (Sika Sarnafil® Sarnastack).....	79.73	11.17
Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 54 19 00-0048 EA >5" To 7" Pipe Diameter, Prefabricated Polyvinyl Chloride (PVC) Pipe Cone/Boot (Sika Sarnafil® Sarnastack).....	82.08	12.35
Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 54 19 00-0049 EA 6" Diameter, Seamless Heavy-Duty Aluminum Roof Drain (Sika Sarnafil® Sarnadrain With U-Flow®).....	1,127.92	211.47
07 54 19 00-0050 EA Inside Corner, Prefabricated Polyvinyl Chloride (PVC) Membrane Flashing (Sika Sarnafil® Sarnacorners - Inside).....	23.17	
07 54 19 00-0051 EA Outside Corner, Prefabricated Polyvinyl Chloride (PVC) Membrane Flashing (Sika Sarnafil® Sarnacorners - Outside).....	23.17	
07 54 19 00-0052 SQ 9 OZ/SY, Protective Polypropylene Fabric Separation Layer (Sika Sarnafil® Sarnafelt NWP), Loose Laid.....	53.43	
07 54 19 00-0053 SQ 11 OZ/SY, Protective Polypropylene Fabric Separation Layer (Sika Sarnafil® Sarnafelt), Loose Laid.....	82.36	
07 54 19 00-0054 SQ 10 Mil, Low Density Polyethylene, Vapor/Air Barrier Sheet (Sika Sarnafil® Samavap - 10), Loose Laid.....	46.88	
07 54 19 00-0055 SQ 32 Mil, Styrene-Butadiene-Styrene (SBS) Modified Bitumen Vapor/Air Barrier Sheet (Sika Sarnafil® Sarnavap Self-Adhered), Self-Adhering.....	129.99	
07 54 19 00-0056 Snap-On Cover Fascia (Sika Sarnafil® Edge Grip) (07 54 19 00-0025)		
07 54 19 00-0057 Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0056)		
07 54 19 00-0058 Mill Finish, Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0057)		
07 54 19 00-0059 Mill Finish, Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0058)		
07 54 19 00-0060 LF 8.25" Face Height, Mill Finish, Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip).....	18.85	3.36
07 54 19 00-0061 Accessories For Mill Finish, Aluminum Snap-On Cover Fascia Systems (07 54 19 00-0059)		
07 54 19 00-0062 EA Fascia Overflow Scupper For 8.25" Face Height, Mill Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip).....	114.06	12.44
07 54 19 00-0063 EA Fascia Spillout Scupper For 8.25" Face Height, Mill Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip).....	114.06	12.44
07 54 19 00-0064 EA Fascia Downspout Scupper For 8.25" Face Height, Mill Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip).....	138.32	12.44
07 54 19 00-0065 EA Inside/Outside Miter For 8.25" Face Height, Mill Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip).....	51.74	3.36
07 54 19 00-0066 KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0057)		

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 54 Thermoplastic Membrane Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 54 19 00-0067		KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0066)		
07 54 19 00-0068	LF	8.25" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip)	21.65	3.36
07 54 19 00-0069		Accessories For KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems (07 54 19 00-0066)		
07 54 19 00-0070	EA	Fascia Overflow Scupper For 8.25" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	119.66	12.44
07 54 19 00-0071	EA	Fascia Spillout Scupper For 8.25" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	119.66	12.44
07 54 19 00-0072	EA	Fascia Downspout Scupper For 8.25" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	149.52	12.44
07 54 19 00-0073	EA	Inside/Outside Miter For 8.25" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	57.36	3.36
07 54 19 00-0074		Galvanized Steel Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0056)		
07 54 19 00-0075		KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0074)		
07 54 19 00-0076		KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip) (07 54 19 00-0075)		
07 54 19 00-0077	LF	8.25" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia System With Continuous Retainer Bar (Sika Sarnafil® Edge Grip)	19.50	3.36
07 54 19 00-0078		Accessories For KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip) (07 54 19 00-0075)		
07 54 19 00-0079	EA	Fascia Overflow Scupper For 8.25" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	115.36	12.44
07 54 19 00-0080	EA	Fascia Spillout Scupper For 8.25" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	115.36	12.44
07 54 19 00-0081	EA	Fascia Downspout Scupper For 8.25" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	140.91	12.44
07 54 19 00-0082	EA	Inside/Outside Miter For 8.25" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems (Sika Sarnafil® Edge Grip)	53.04	3.36
07 54 23		Thermoplastic-Polyolefin Roofing (07 54)		
07 54 23 00-0001		Thermoplastic Polyolefin (TPO) Roofing Membranes (07 54 23) Note: Includes polyester fabric reinforcement and hot air welding of seams.		
07 54 23 00-0002	SQ	45 Mil, Single Ply TPO Roofing Membrane, Fully Adhered..... Note: Includes adhesive.	471.38	94.10
		For 15 Year Warranty, Add	3.00	
		For Low VOC Adhesive, Add	55.11	
		For Integral Polyester Fleece-Backing, Add	33.25	
		For >20 To 40, Add	42.39	
		For >75 To 100, Deduct	-21.19	
		For >100 To 200, Deduct	-47.09	
		For >200, Deduct	-68.29	
		For Up To 10, Add	131.92	
		For >10 To 20, Add	75.37	
07 54 23 00-0003	SQ	50 Mil, Single Ply TPO Roofing Membrane, Fully Adhered..... Note: Includes adhesive.	493.39	95.57
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low VOC Adhesive, Add	55.11	
		For Integral Polyester Fleece-Backing, Add	33.25	
		For >20 To 40, Add	43.78	
		For >75 To 100, Deduct	-21.89	
		For >100 To 200, Deduct	-48.56	
		For >200, Deduct	-70.45	
		For Up To 10, Add	136.91	
		For >10 To 20, Add	78.01	
07 54 23 00-0004	SQ	60 Mil, Single Ply TPO Roofing Membrane, Fully Adhered..... Note: Includes adhesive.	504.82	97.04
		For 15 Year Warranty, Add	3.00	
		For 20 Year Warranty, Add	7.00	
		For 25 Year Warranty, Add	9.00	
		For Low VOC Adhesive, Add	55.11	
		For Integral Polyester Fleece-Backing, Add	33.25	
		For >20 To 40, Add	44.65	
		For >75 To 100, Deduct	-22.32	
		For >100 To 200, Deduct	-49.50	
		For >200, Deduct	-71.83	
		For Up To 10, Add	139.78	
		For >10 To 20, Add	79.59	



Thermal And Moisture Protection		07
Membrane Roofing		07 50
Thermoplastic Membrane Roofing		07 54

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 54 23 00-0005 SQ 80 Mil, Single Ply TPO Roofing Membrane, Fully Adhered	652.34	99.98
Note: Includes adhesive.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Low VOC Adhesive, Add	55.11	
For Integral Polyester Fleece-Backing, Add	33.25	
For >20 To 40, Add	52.61	
For >75 To 100, Deduct	-26.31	
For >100 To 200, Deduct	-57.61	
For >200, Deduct	-83.92	
For Up To 10, Add	170.46	
For >10 To 20, Add	95.23	
07 54 23 00-0006 SQ 45 Mil, Single Ply TPO Roofing Membrane, Mechanically Fastened	313.15	70.57
Note: Includes fasteners.		
For 15 Year Warranty, Add	3.00	
For Integral Polyester Fleece-Backing, Add	33.25	
For Mechanically Fastened To Concrete Decks, Add	35.29	
For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	36.57	
For >20 To 40, Add	29.77	
For >75 To 100, Deduct	-14.89	
For >100 To 200, Deduct	-33.30	
For >200, Deduct	-48.19	
For Up To 10, Add	90.86	
For >10 To 20, Add	52.49	
07 54 23 00-0007 SQ 50 Mil, Single Ply TPO Roofing Membrane, Mechanically Fastened	335.17	72.04
Note: Includes fasteners.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Integral Polyester Fleece-Backing, Add	33.25	
For Mechanically Fastened To Concrete Decks, Add	36.02	
For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	37.30	
For >20 To 40, Add	31.17	
For >75 To 100, Deduct	-15.58	
For >100 To 200, Deduct	-34.77	
For >200, Deduct	-50.35	
For Up To 10, Add	95.85	
For >10 To 20, Add	55.13	
07 54 23 00-0008 SQ 60 Mil, Single Ply TPO Roofing Membrane, Mechanically Fastened	346.60	73.51
Note: Includes fasteners.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Integral Polyester Fleece-Backing, Add	33.25	
For Mechanically Fastened To Concrete Decks, Add	36.76	
For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	38.04	
For >20 To 40, Add	32.03	
For >75 To 100, Deduct	-16.02	
For >100 To 200, Deduct	-35.71	
For >200, Deduct	-51.73	
For Up To 10, Add	98.73	
For >10 To 20, Add	56.71	
07 54 23 00-0009 SQ 80 Mil, Single Ply TPO Roofing Membrane, Mechanically Fastened	494.12	76.45
Note: Includes fasteners.		
For 15 Year Warranty, Add	3.00	
For 20 Year Warranty, Add	7.00	
For 25 Year Warranty, Add	9.00	
For Integral Polyester Fleece-Backing, Add	33.25	
For Mechanically Fastened To Concrete Decks, Add	38.23	
For Mechanically Fastened To Cementitious Wood Fiber Or Gypsum Decks, Add	39.51	
For >20 To 40, Add	40.00	
For >75 To 100, Deduct	-20.00	
For >100 To 200, Deduct	-43.82	
For >200, Deduct	-63.82	
For Up To 10, Add	129.41	
For >10 To 20, Add	72.35	
07 54 23 00-0010 Thermoplastic Polyolefin (TPO) Roofing Membrane Accessories (07 54 23)		
07 54 23 00-0011 SQ Acrylic, Thermoplastic Polyolefin (TPO) Roofing Primer, Price Per Coat	86.52	
For >20 To 40, Add	6.68	
For >75 To 100, Deduct	-3.34	
For >100 To 200, Deduct	-7.27	
For >200, Deduct	-10.61	
For Up To 10, Add	22.01	
For >10 To 20, Add	12.18	
07 54 23 00-0012 SQ Acrylic Elastomeric, Surface Or Base Coating For TPO Roofing, Price Per Coat.....	75.41	
Note: 55% solids by volume.		
For Tan Or Gray Color, Add	2.59	
For >20 To 40, Add	6.12	
For >75 To 100, Deduct	-3.06	
For >100 To 200, Deduct	-6.71	
For >200, Deduct	-9.77	
For Up To 10, Add	19.79	
For >10 To 20, Add	11.07	

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 54 Thermoplastic Membrane Roofing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 54 23 00-0013	EA		Up To 3" Pipe Diameter, Prefabricated Thermoplastic Polyolefin Pipe Cone/Boot.....	65.55	10.00
			Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 54 23 00-0014	EA		>3" To 8" Pipe Diameter, Prefabricated Thermoplastic Polyolefin Pipe Cone/Boot	70.80	11.17
			Note: Includes attaching the boot to the membrane, caulking around the pipe and installing a draw band.		
07 54 23 00-0015	EA		6" Diameter, Prefabricated TPO Penetration Pocket	129.17	12.35
			Note: Includes attaching the pocket to the membrane, sealing around the penetration and filling the pocket with pourable sealer.		
07 54 23 00-0016	LF		30" Wide, TPO Walkway Protection Pad	30.44	6.82
07 54 23 00-0017	SF		Thermoplastic Polyolefin Membrane Base Flashing	8.48	1.76
07 54 23 00-0018	SF		Thermoplastic Polyolefin Curb Flashing.....	7.42	1.76
			<i>For Tan Or Gray Color, Add</i>	0.11	
07 54 23 00-0019	SF		Thermoplastic Polyolefin Clad Edge Metal Or Base Flashing.....	12.35	1.76
			Note: 20 Mil TPO membrane laminated to 24 gauge galvanized steel.		

07 56 Fluid-Applied Roofing (07 50)

07 56 00 00-0001			Neoprene Hypalon Liquid Roofing, 5 Coats <small>(07 56)</small>		
07 56 00 00-0002	SQ		60 Mil 5 Coat Spray-on Neoprene Hypalon Liquid Roofing.....	1,048.30	156.91
			<i>For Each Additional Coat, Add</i>	157.25	
07 56 00 00-0003			Vinyl Spray Liquid Roofing <small>(07 56)</small>		
07 56 00 00-0004	SQ		2 Mil Vinyl Liquid Roofing.....	1,294.68	165.36
07 56 00 00-0005	SQ		4 Mil Vinyl Liquid Roofing.....	1,448.76	184.67
07 56 00 00-0006			Silicone Elastomeric Liquid Roofing <small>(07 56)</small>		
07 56 00 00-0007	SQ		65% Solids, Silicone Elastomeric Spray-on Roofing, 3 Coats, 16 Mil Per Coat.....	455.89	94.74
07 56 00 00-0008	SQ		65% Solids, Silicone Elastomeric Rolled-on Roofing, 3 Coats, 16 Mil Per Coat	547.71	94.74
07 56 00 00-0009	SQ		65% Solids, Silicone Elastomeric Brushed-on Roofing, 3 Coats, 16 Mil Per Coat.....	616.78	94.74
07 56 00 00-0010			High Tensile Elastomeric Roof Coating <small>(07 56)</small>		
07 56 00 00-0011	SQ		Up To 45 SQ, High Tensile Elastomeric Roof Coating (Roof Mate HT).....	116.93	
			Note: Includes 20 year warranty		
07 56 00 00-0012	SQ		> 45 To 100 SQ, High Tensile Elastomeric Roof Coating (Roof Mate HT)	108.10	
			Note: Includes 20 year warranty		
07 56 00 00-0013	SQ		> 100 To 500 SQ, High Tensile Elastomeric Roof Coating (Roof Mate HT)	97.71	
			Note: Includes 20 year warranty		
07 56 00 00-0014	SQ		> 500 SQ, High Tensile Elastomeric Roof Coating (Roof Mate HT).....	87.70	
			Note: Includes 20 year warranty		
07 56 00 00-0015			Elastomeric Asphalt/Urethane Liquid Roofing Membrane <small>(07 56)</small>		
07 56 00 00-0016	SQ		90 Mil, Elastomeric Asphalt/Urethane Liquid Roofing Membrane	1,820.19	94.74
			Note: Includes applying a 30 mil base coat, rolling in a stichbonded polyester reinforcing scrim and applying a 60 mil second coat.		
07 56 00 00-0017			Urethane Liquid Roofing Membrane <small>(07 56)</small>		
			Note: Garland White Knight Energy Star single component urethane restoration system. 10 year warranty. Used for restoration of membrane, built up, metal and modified roofing systems.		
07 56 00 00-0018	SQ		Ulti-Mat™ 38" Non-Woven Fiberglass Reinforcing Membrane For White-Knight Systems.....	98.28	
07 56 00 00-0019	LF		Ulti-Mat™ 6" Non-Woven Fiberglass Reinforcing Membrane For White-Knight Systems.....	5.56	
07 56 00 00-0020	SQ		White-Knight® Premium Multi-Purpose Urethane Restoration Reflective Coating For Metal, Membrane, BUR, Single-Ply (2 GAL/SQ).....	374.75	
07 56 00 00-0021	SQ		White-Knight® Metal Primer One Component Metal Primer For Placement Under The White-Knight System	97.02	
07 56 00 00-0022	SQ		White-Knight® Plus High Strength, Multi-Purpose Urethane Restoration Coating For Metal, Membrane, BUR, Single-Ply	922.88	
07 56 00 00-0023	SQ		White-Knight® Plus Base Coat High Strength, Multi-Purpose Urethane Restoration Coating For Metal, Membrane, BUR, Single-Ply	1,394.29	
07 56 00 00-0024	SQ		White-Knight® Plus WC High Strength, Multi-Purpose, VOC Compliant, Urethane Restoration Coating For Metal, Membrane, BUR, Single-Ply	954.73	
07 56 00 00-0025	SQ		White-Star Premium, White Polyurea Restoration Adhesive For Mineral And Smooth Modified And BUR (2 GAL/SQ)	247.14	

07 57 Coated Foamed Roofing (07 50)**07 57 13 Sprayed Polyurethane Foam Roofing** (07 57)

Note: Includes power washing. Excludes ballast removal and priming metal surfaces. Excludes walkways.

07 57 13 00-0001			Sprayed Polyurethane Foam Roofing Systems <small>(07 57 13)</small>		
07 57 13 00-0002			Sprayed Polyurethane Foam Roofing Systems With Acrylic Elastomeric Coating <small>(07 57 13 00-0001)</small>		
07 57 13 00-0003			Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating <small>(07 57 13 00-0002)</small>		
			Note: Includes UL 790 fire rated 2.8 LB density polyurethane foam roofing system with acrylic elastomeric coating. Includes 5 year warranty.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 57 13 00-0004 SQ 1" Thick, R6.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	382.42	58.06
07 57 13 00-0005 SQ 1-1/2" Thick, R9.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	458.18	62.20
07 57 13 00-0006 SQ 2" Thick, R13.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	533.94	66.35
07 57 13 00-0007 SQ 2-1/2" Thick, R16.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	617.18	70.50
07 57 13 00-0008 SQ 3" Thick, R19.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	700.43	74.64
07 57 13 00-0009 SQ 3-1/2" Thick, R22.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	768.69	78.79
07 57 13 00-0010 SQ 4" Thick, R26.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	836.93	82.93
07 57 13 00-0011 SQ 4-1/2" Thick, R29.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	912.70	87.09
07 57 13 00-0012 SQ 5" Thick, R32.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	988.45	91.23
07 57 13 00-0013 SQ 5-1/2" Thick, R35.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	1,064.20	95.38
07 57 13 00-0014 SQ 6" Thick, R39.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 28 Mil Acrylic Elastomeric Coating	1,139.95	99.52
07 57 13 00-0015 Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating <small>(07 57 13 00-0002)</small>		
<small>Note: Includes UL 790 fire rated 2.8 LB density polyurethane foam roofing system with acrylic elastomeric coating. Includes 10 year warranty.</small>		
07 57 13 00-0016 SQ 1" Thick, R6.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	394.09	58.06
07 57 13 00-0017 SQ 1-1/2" Thick, R9.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	469.85	62.20
07 57 13 00-0018 SQ 2" Thick, R13.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	545.60	66.35
07 57 13 00-0019 SQ 2-1/2" Thick, R16.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	621.34	70.50
07 57 13 00-0020 SQ 3" Thick, R19.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	697.10	74.64
07 57 13 00-0021 SQ 3-1/2" Thick, R22.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	772.85	78.79
07 57 13 00-0022 SQ 4" Thick, R26.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	848.60	82.93
07 57 13 00-0023 SQ 4-1/2" Thick, R29.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	924.36	87.09
07 57 13 00-0024 SQ 5" Thick, R32.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	1,000.11	91.23
07 57 13 00-0025 SQ 5-1/2" Thick, R35.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	1,075.86	95.38
07 57 13 00-0026 SQ 6" Thick, R39.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 32 Mil Acrylic Elastomeric Coating	1,151.61	99.52
07 57 13 00-0027 Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating <small>(07 57 13 00-0002)</small>		
<small>Note: Includes UL 790 fire rated 2.8 LB density polyurethane foam roofing system with acrylic elastomeric coating. Includes 15 year warranty.</small>		
07 57 13 00-0028 SQ 1" Thick, R6.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	422.41	58.06
07 57 13 00-0029 SQ 1-1/2" Thick, R9.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	495.67	62.20
07 57 13 00-0030 SQ 2" Thick, R13.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	568.92	66.35
07 57 13 00-0031 SQ 2-1/2" Thick, R16.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	644.67	70.50
07 57 13 00-0032 SQ 3" Thick, R19.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	720.43	74.64
07 57 13 00-0033 SQ 3-1/2" Thick, R22.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	827.34	78.79
07 57 13 00-0034 SQ 4" Thick, R26.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	934.23	82.93
07 57 13 00-0035 SQ 4-1/2" Thick, R29.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	1,016.33	87.09
07 57 13 00-0036 SQ 5" Thick, R32.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	1,098.41	91.23
07 57 13 00-0037 SQ 5-1/2" Thick, R35.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	1,180.49	95.38
07 57 13 00-0038 SQ 6" Thick, R39.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 40 Mil Acrylic Elastomeric Coating	1,262.58	99.52
07 57 13 00-0039 Sprayed Polyurethane Foam Roofing Systems With Silicone Elastomeric Coating <small>(07 57 13 00-0001)</small>		

07 Thermal And Moisture Protection**07 50 Membrane Roofing****07 57 Coated Foamed Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 57 13 00-0040			Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating <small>(07 57 13 00-0039)</small> Note: Includes UL 790 fire rated 2.8 LB density polyurethane foam roofing system with 65% solids silicone elastomeric coating. Includes 5 year warranty.		
07 57 13 00-0041	SQ		1" Thick, R6.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	430.74	58.06
07 57 13 00-0042	SQ		1-1/2" Thick, R9.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	512.83	62.20
07 57 13 00-0043	SQ		2" Thick, R13.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	594.92	66.35
07 57 13 00-0044	SQ		2-1/2" Thick, R16.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	676.99	70.50
07 57 13 00-0045	SQ		3" Thick, R19.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	759.08	74.64
07 57 13 00-0046	SQ		3-1/2" Thick, R22.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	841.16	78.79
07 57 13 00-0047	SQ		4" Thick, R26.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	923.24	82.93
07 57 13 00-0048	SQ		4-1/2" Thick, R29.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	1,005.33	87.09
07 57 13 00-0049	SQ		5" Thick, R32.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	1,087.41	91.23
07 57 13 00-0050	SQ		5-1/2" Thick, R35.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	1,169.50	95.38
07 57 13 00-0051	SQ		6" Thick, R39.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 20 Mil Silicone Elastomeric Coating.....	1,251.58	99.52
07 57 13 00-0052			Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating <small>(07 57 13 00-0039)</small> Note: Includes UL 790 fire rated 2.8 LB density polyurethane foam roofing system with 65% solids silicone elastomeric coating. Includes 10 year warranty.		
07 57 13 00-0053	SQ		1" Thick, R6.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	447.23	58.06
07 57 13 00-0054	SQ		1-1/2" Thick, R9.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	529.33	62.20
07 57 13 00-0055	SQ		2" Thick, R13.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	611.41	66.35
07 57 13 00-0056	SQ		2-1/2" Thick, R16.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	693.48	70.50
07 57 13 00-0057	SQ		3" Thick, R19.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	775.58	74.64
07 57 13 00-0058	SQ		3-1/2" Thick, R22.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	857.66	78.79
07 57 13 00-0059	SQ		4" Thick, R26.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	939.73	82.93
07 57 13 00-0060	SQ		4-1/2" Thick, R29.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	1,021.82	87.09
07 57 13 00-0061	SQ		5" Thick, R32.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	1,103.91	91.23
07 57 13 00-0062	SQ		5-1/2" Thick, R35.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	1,185.99	95.38
07 57 13 00-0063	SQ		6" Thick, R39.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 22 Mil Silicone Elastomeric Coating.....	1,268.07	99.52
07 57 13 00-0064			Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating <small>(07 57 13 00-0039)</small> Note: Includes UL 790 fire rated 2.8 LB density polyurethane foam roofing system with 65% solids silicone elastomeric coating. Includes 15 year warranty.		
07 57 13 00-0065	SQ		1" Thick, R6.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	460.06	58.06
07 57 13 00-0066	SQ		1-1/2" Thick, R9.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	542.16	62.20
07 57 13 00-0067	SQ		2" Thick, R13.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	624.24	66.35
07 57 13 00-0068	SQ		2-1/2" Thick, R16.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	706.31	70.50
07 57 13 00-0069	SQ		3" Thick, R19.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	788.40	74.64
07 57 13 00-0070	SQ		3-1/2" Thick, R22.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	870.49	78.79
07 57 13 00-0071	SQ		4" Thick, R26.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	952.56	82.93
07 57 13 00-0072	SQ		4-1/2" Thick, R29.25, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	1,034.65	87.09
07 57 13 00-0073	SQ		5" Thick, R32.5, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	1,116.74	91.23
07 57 13 00-0074	SQ		5-1/2" Thick, R35.75, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	1,198.82	95.38
07 57 13 00-0075	SQ		6" Thick, R39.0, 2.8 PCF, Closed Cell, Sprayed Polyurethane Foam Roofing System With 25 Mil Silicone Elastomeric Coating.....	1,280.90	99.52



Thermal And Moisture Protection	07
Membrane Roofing	07 50
Coated Foamed Roofing	07 57

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 58 Roll Roofing (07 50)

07 58 00 00-0001	Prepared Roll Roofing <small>(07 58)</small> Note: Fastened with roofing nails and roofing cement. Includes fasteners and adhesive. Excludes warranty. See CSI section 07 51 13 00-0033 for underlayment.		
07 58 00 00-0002	SQ Granule Surfaced, 90 LB, Asphalt Saturated Organic Felt Roll Roofing.....	260.31	37.32

07 59 Membrane Roofing Termination Bar (07 50)

07 59 00 00-0001	Membrane Roofing Termination Bar <small>(07 59)</small>		
07 59 00 00-0002	LF Membrane Roofing Termination Bar..... Note: Includes fasteners and caulking.	5.24	1.69

07 60 Flashing and Sheet Metal (07)

07 61 Sheet Metal Roofing (07 60)

07 61 13 Standing Seam Sheet Metal Roofing (07 61)

07 61 13 00-0001	Standing Seam Concealed Fastener Roofing <small>(07 61 13)</small>		
07 61 13 00-0002	Copper Standing Seam Concealed Fastener Roofing <small>(07 61 13 00-0001)</small>		
07 61 13 00-0003	SF Architectural 16 Ounce Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	36.66 2.04 1.28 3.09 9.17 5.50 0.92	3.40
07 61 13 00-0004	SF Architectural 18 Ounce Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	40.15 2.21 1.39 3.37 10.04 6.02 1.00	3.69
07 61 13 00-0005	SF Architectural 20 Ounce Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i>	47.37 2.41 1.59 3.85 11.84 7.11 1.18	4.01
07 61 13 00-0006	Zinc/Copper Standing Seam Concealed Fastener Roofing <small>(07 61 13 00-0001)</small>		
07 61 13 00-0007	SF 0.020" Thick, Zinc/Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i> <i>For Tin/Copper, Deduct</i>	42.91 2.21 1.45 3.51 10.73 6.44 1.07 -0.71	3.69
07 61 13 00-0008	SF 0.027" Thick, Zinc/Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i> <i>For Tin/Copper, Deduct</i>	52.12 2.30 1.66 4.03 13.03 7.82 1.30 -0.89	3.84
07 61 13 00-0009	SF 0.032" Thick, Zinc/Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i> <i>For Tin/Copper, Deduct</i>	59.32 2.41 1.83 4.45 14.83 8.90 1.48 -1.03	4.01
07 61 13 00-0010	SF 0.040" Thick, Zinc/Copper Standing Seam Concealed Fastener Roofing..... <i>For Steep Roof, Over 6 To 12, Add</i> <i>For 140 MPH Wind Load, Add</i> <i>For Panels <16" Wide, Add</i> <i>For Up To 1,500, Add</i> <i>For >1,500 To 5,000, Add</i> <i>For >5,000 To 10,000, Add</i> <i>For Tin/Copper, Deduct</i>	74.56 2.52 2.16 5.28 18.64 11.18 1.86 -1.32	4.21

07 Thermal And Moisture Protection**07 60 Flashing and Sheet Metal****07 61 Sheet Metal Roofing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 61 13 00-0011	Accessories For Copper Standing Seam Concealed Fastener Roofing <small>(07 61 13 00-0001)</small>		
07 61 13 00-0012	LF Ridge Flashing For Copper Standing Seam Concealed Fastener Roofing.....	155.13	7.02
	<i>For Steep Roof, Over 6 To 12, Add</i>	5.27	
	<i>For 140 MPH Wind Load, Add</i>	4.51	
07 61 13 00-0013	LF Eave Flashing For Copper Standing Seam Concealed Fastener Roofing.....	88.50	7.02
	<i>For Steep Roof, Over 6 To 12, Add</i>	5.27	
	<i>For 140 MPH Wind Load, Add</i>	3.17	
07 61 13 00-0014	LF Valley Flashing For Copper Standing Seam Concealed Fastener Roofing.....	218.12	7.02
	<i>For Steep Roof, Over 6 To 12, Add</i>	5.27	
	<i>For 140 MPH Wind Load, Add</i>	5.77	
07 61 13 00-0015	LF Hip Flashing For Copper Standing Seam Concealed Fastener Roofing.....	160.11	7.02
	<i>For Steep Roof, Over 6 To 12, Add</i>	5.27	
	<i>For 140 MPH Wind Load, Add</i>	4.61	

07 61 16 Batten Seam Sheet Metal Roofing (07 61)

07 61 16 00-0001	Copper Batten Seam Concealed Fastener Roofing <small>(07 61 16)</small>		
07 61 16 00-0002	Copper Batten Seam Concealed Fastener Roofing <small>(07 61 16 00-0001)</small>		
07 61 16 00-0003	SF 16 Ounce Copper Batten Seam Concealed Fastener Roofing.....	45.19	4.01
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.41	
	<i>For 140 MPH Wind Load, Add</i>	1.55	
	<i>For Panels <16" Wide, Add</i>	3.75	
	<i>For Up To 1,500, Add</i>	11.30	
	<i>For >1,500 To 5,000, Add</i>	6.78	
	<i>For >5,000 To 10,000, Add</i>	1.13	
07 61 16 00-0004	SF 18 Ounce Copper Batten Seam Concealed Fastener Roofing.....	49.96	4.22
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.53	
	<i>For 140 MPH Wind Load, Add</i>	1.67	
	<i>For Panels <16" Wide, Add</i>	4.06	
	<i>For Up To 1,500, Add</i>	12.49	
	<i>For >1,500 To 5,000, Add</i>	7.49	
	<i>For >5,000 To 10,000, Add</i>	1.25	
07 61 16 00-0005	SF 20 Ounce Copper Batten Seam Concealed Fastener Roofing.....	58.38	4.42
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.65	
	<i>For 140 MPH Wind Load, Add</i>	1.87	
	<i>For Panels <16" Wide, Add</i>	4.55	
	<i>For Up To 1,500, Add</i>	14.60	
	<i>For >1,500 To 5,000, Add</i>	8.76	
	<i>For >5,000 To 10,000, Add</i>	1.46	
07 61 16 00-0006	Zinc/Copper Batten Seam Concealed Fastener Roofing <small>(07 61 16 00-0001)</small>		
07 61 16 00-0007	SF 0.020" Thick, Zinc/Copper Batten Seam Concealed Fastener Roofing.....	45.97	3.69
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.21	
	<i>For 140 MPH Wind Load, Add</i>	1.51	
	<i>For Panels <16" Wide, Add</i>	3.66	
	<i>For Up To 1,500, Add</i>	11.49	
	<i>For >1,500 To 5,000, Add</i>	6.90	
	<i>For >5,000 To 10,000, Add</i>	1.15	
	<i>For Tin/Copper, Deduct</i>	-0.77	
07 61 16 00-0008	SF 0.027" Thick, Zinc/Copper Batten Seam Concealed Fastener Roofing.....	56.50	3.84
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.31	
	<i>For 140 MPH Wind Load, Add</i>	1.75	
	<i>For Panels <16" Wide, Add</i>	4.25	
	<i>For Up To 1,500, Add</i>	14.13	
	<i>For >1,500 To 5,000, Add</i>	8.48	
	<i>For >5,000 To 10,000, Add</i>	1.41	
	<i>For Tin/Copper, Deduct</i>	-0.98	
07 61 16 00-0009	SF 0.032" Thick, Zinc/Copper Batten Seam Concealed Fastener Roofing.....	63.40	4.01
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.41	
	<i>For 140 MPH Wind Load, Add</i>	1.91	
	<i>For Panels <16" Wide, Add</i>	4.66	
	<i>For Up To 1,500, Add</i>	15.85	
	<i>For >1,500 To 5,000, Add</i>	9.51	
	<i>For >5,000 To 10,000, Add</i>	1.59	
	<i>For Tin/Copper, Deduct</i>	-1.11	
07 61 16 00-0010	SF 0.040" Thick, Zinc/Copper Batten Seam Concealed Fastener Roofing.....	79.81	4.21
	<i>For Steep Roof, Over 6 To 12, Add</i>	2.52	
	<i>For 140 MPH Wind Load, Add</i>	2.27	
	<i>For Panels <16" Wide, Add</i>	5.55	
	<i>For Up To 1,500, Add</i>	19.95	
	<i>For >1,500 To 5,000, Add</i>	11.97	
	<i>For >5,000 To 10,000, Add</i>	2.00	
	<i>For Tin/Copper, Deduct</i>	-1.43	

07 61 19 Flat Seam Sheet Metal Roofing (07 61)

07 61 19 00-0001	Copper Flat Seam Concealed Fastener Roofing <small>(07 61 19)</small>		
07 61 19 00-0002	Copper Flat Seam Concealed Fastener Roofing <small>(07 61 19 00-0001)</small>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 61 19 00-0003 SF 16 Ounce Copper Flat Seam Concealed Fastener Roofing.....	34.75	3.69
<i>For Steep Roof, Over 6 To 12, Add</i>	2.21	
<i>For 140 MPH Wind Load, Add</i>	1.28	
<i>For Panels <16" Wide, Add</i>	3.10	
<i>For Up To 1,500, Add</i>	8.69	
<i>For >1,500 To 5,000, Add</i>	5.21	
<i>For >5,000 To 10,000, Add</i>	0.87	
07 61 19 00-0004 SF 18 Ounce Copper Flat Seam Concealed Fastener Roofing.....	38.29	3.84
<i>For Steep Roof, Over 6 To 12, Add</i>	2.31	
<i>For 140 MPH Wind Load, Add</i>	1.38	
<i>For Panels <16" Wide, Add</i>	3.34	
<i>For Up To 1,500, Add</i>	9.57	
<i>For >1,500 To 5,000, Add</i>	5.74	
<i>For >5,000 To 10,000, Add</i>	0.96	
07 61 19 00-0005 SF 20 Ounce Copper Flat Seam Concealed Fastener Roofing.....	44.46	4.01
<i>For Steep Roof, Over 6 To 12, Add</i>	2.41	
<i>For 140 MPH Wind Load, Add</i>	1.53	
<i>For Panels <16" Wide, Add</i>	3.71	
<i>For Up To 1,500, Add</i>	11.12	
<i>For >1,500 To 5,000, Add</i>	6.67	
<i>For >5,000 To 10,000, Add</i>	1.11	
07 61 19 00-0006 Zinc/Copper Flat Seam Concealed Fastener Roofing (07 61 19 00-0001)		
07 61 19 00-0007 SF 0.020" Thick, Zinc/Copper Flat Seam Concealed Fastener Roofing.....	40.15	3.69
<i>For Steep Roof, Over 6 To 12, Add</i>	2.21	
<i>For 140 MPH Wind Load, Add</i>	1.39	
<i>For Panels <16" Wide, Add</i>	3.37	
<i>For Up To 1,500, Add</i>	10.04	
<i>For >1,500 To 5,000, Add</i>	6.02	
<i>For >5,000 To 10,000, Add</i>	1.00	
<i>For Tin/Copper, Deduct</i>	-0.66	
07 61 19 00-0008 SF 0.027" Thick, Zinc/Copper Flat Seam Concealed Fastener Roofing.....	49.22	3.84
<i>For Steep Roof, Over 6 To 12, Add</i>	2.31	
<i>For 140 MPH Wind Load, Add</i>	1.60	
<i>For Panels <16" Wide, Add</i>	3.88	
<i>For Up To 1,500, Add</i>	12.31	
<i>For >1,500 To 5,000, Add</i>	7.38	
<i>For >5,000 To 10,000, Add</i>	1.23	
<i>For Tin/Copper, Deduct</i>	-0.83	
07 61 19 00-0009 SF 0.032" Thick, Zinc/Copper Flat Seam Concealed Fastener Roofing.....	55.39	4.01
<i>For Steep Roof, Over 6 To 12, Add</i>	2.41	
<i>For 140 MPH Wind Load, Add</i>	1.75	
<i>For Panels <16" Wide, Add</i>	4.26	
<i>For Up To 1,500, Add</i>	13.85	
<i>For >1,500 To 5,000, Add</i>	8.31	
<i>For >5,000 To 10,000, Add</i>	1.38	
<i>For Tin/Copper, Deduct</i>	-0.95	
07 61 19 00-0010 SF 0.040" Thick, Zinc/Copper Flat Seam Concealed Fastener Roofing.....	69.61	4.21
<i>For Steep Roof, Over 6 To 12, Add</i>	2.52	
<i>For 140 MPH Wind Load, Add</i>	2.07	
<i>For Panels <16" Wide, Add</i>	5.04	
<i>For Up To 1,500, Add</i>	17.40	
<i>For >1,500 To 5,000, Add</i>	10.44	
<i>For >5,000 To 10,000, Add</i>	1.74	
<i>For Tin/Copper, Deduct</i>	-1.22	

07 62 Sheet Metal Flashing and Trim (07 60)

07 62 13 Fabricated Copings (07 62)

07 62 13 00-0001 Lead Flashing And Trim (07 62 13)

07 62 13 00-0002 SF 2.5 LB/SF Sheet Lead Flashing.....	23.38	5.50
<i>For Up To 100, Add</i>	5.85	
07 62 13 00-0003 SF 4 LB/SF Sheet Lead Flashing.....	30.69	5.50
<i>For Up To 100, Add</i>	7.67	

07 62 13 00-0004 Copper Flashing And Trim (07 62 13)

07 62 13 00-0005 Copper Flashing And Trim (07 62 13 00-0004)

07 62 13 00-0006 SF 16 Ounce, 0.021" Thick, Copper Flashing And Trim.....	29.93	5.37
<i>For Up To 100, Add</i>	7.48	
<i>For >500 To 2,000, Deduct</i>	-4.10	
<i>For >2,000, Deduct</i>	-5.07	
<i>For Copper Valley For Steep Slope Roofing, Over 7 To 12, Add</i>	2.13	
<i>For Wrap Around Window Panning, Add</i>	10.63	
07 62 13 00-0007 SF 20 Ounce, 0.027" Thick, Copper Flashing And Trim.....	30.89	5.50
<i>For Up To 100, Add</i>	7.72	
<i>For >500 To 2,000, Deduct</i>	-4.24	
<i>For >2,000, Deduct</i>	-5.23	
<i>For Copper Valley For Steep Slope Roofing, Over 7 To 12, Add</i>	2.22	
<i>For Wrap Around Window Panning, Add</i>	11.11	

07 Thermal And Moisture Protection**07 60 Flashing and Sheet Metal****07 62 Sheet Metal Flashing and Trim**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 62 13 00-0008	SF 24 Ounce, 0.032" Thick, Copper Flashing And Trim.....	35.38	5.87
	<i>For Up To 100, Add</i>	8.85	
	<i>For >500 To 2,000, Deduct</i>	-4.83	
	<i>For >2,000, Deduct</i>	-6.02	
	<i>For Copper Valley For Steep Slope Roofing, Over 7 To 12, Add</i>	2.33	
	<i>For Wrap Around Window Panning, Add</i>	11.64	
07 62 13 00-0009	SF 32 Ounce, 0.043" Thick, Copper Flashing And Trim.....	43.87	6.11
	<i>For Up To 100, Add</i>	10.97	
	<i>For >500 To 2,000, Deduct</i>	-5.95	
	<i>For >2,000, Deduct</i>	-7.53	
	<i>For Copper Valley For Steep Slope Roofing, Over 7 To 12, Add</i>	2.44	
	<i>For Wrap Around Window Panning, Add</i>	12.22	
07 62 13 00-0010	Stainless Steel Flashing And Trim (07 62 13)		
07 62 13 00-0011	Stainless Steel Flashing And Trim (07 62 13 00-0010)		
07 62 13 00-0012	SF 32 Gauge, 0.010" Thick, Stainless Steel Flashing And Trim.....	10.27	2.93
	<i>For Up To 100, Add</i>	2.57	
	<i>For Wrap Around Window Panning, Add</i>	7.54	
	<i>For Mechanically Keyed Flashing, Add</i>	1.09	
07 62 13 00-0013	SF 30 Gauge, 0.0125" Thick, Stainless Steel Flashing And Trim.....	11.08	3.30
	<i>For Up To 100, Add</i>	2.77	
	<i>For Wrap Around Window Panning, Add</i>	7.67	
	<i>For Mechanically Keyed Flashing, Add</i>	1.36	
07 62 13 00-0014	SF 28 Gauge, 0.0156" Thick, Stainless Steel Flashing And Trim.....	11.87	3.66
	<i>For Up To 100, Add</i>	2.97	
	<i>For Wrap Around Window Panning, Add</i>	7.79	
	<i>For Mechanically Keyed Flashing, Add</i>	1.63	
07 62 13 00-0015	SF 26 Gauge, 0.0187" Thick, Stainless Steel Flashing And Trim.....	13.15	4.04
	<i>For Up To 100, Add</i>	3.29	
	<i>For Wrap Around Window Panning, Add</i>	8.04	
	<i>For Mechanically Keyed Flashing, Add</i>	2.04	
07 62 13 00-0016	SF 24 Gauge, 0.025" Thick, Stainless Steel Flashing And Trim.....	15.29	4.28
	<i>For Up To 100, Add</i>	3.82	
	<i>For Wrap Around Window Panning, Add</i>	8.49	
	<i>For Mechanically Keyed Flashing, Add</i>	2.72	
07 62 13 00-0017	SF 22 Gauge, 0.031" Thick, Stainless Steel Flashing And Trim.....	16.66	4.49
	<i>For Up To 100, Add</i>	4.17	
	<i>For Wrap Around Window Panning, Add</i>	8.98	
	<i>For Mechanically Keyed Flashing, Add</i>	3.07	
07 62 13 00-0018	SF 20 Gauge, 0.0375" Thick, Stainless Steel Flashing And Trim.....	17.83	4.76
	<i>For Up To 100, Add</i>	4.46	
	<i>For Wrap Around Window Panning, Add</i>	9.51	
	<i>For Mechanically Keyed Flashing, Add</i>	3.33	
07 62 13 00-0019	Aluminum Flashing And Trim (07 62 13)		
07 62 13 00-0020	Aluminum Flashing And Trim (07 62 13 00-0019)		
07 62 13 00-0021	SF 0.013" Thick, Mill Finish, Aluminum Flashing And Trim.....	12.54	3.78
	<i>For Up To 100, Add</i>	3.14	
	<i>For Baked Aluminum Colors, Add</i>	0.41	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0022	SF 0.016" Thick, Mill Finish, Aluminum Flashing And Trim.....	13.44	3.78
	<i>For Up To 100, Add</i>	3.36	
	<i>For Baked Aluminum Colors, Add</i>	0.50	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0023	SF 0.019" Thick, Mill Finish, Aluminum Flashing And Trim.....	14.15	3.78
	<i>For Up To 100, Add</i>	3.54	
	<i>For Baked Aluminum Colors, Add</i>	0.57	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0024	SF 0.024" Thick, Mill Finish, Aluminum Flashing And Trim.....	15.19	3.78
	<i>For Up To 100, Add</i>	3.80	
	<i>For Baked Aluminum Colors, Add</i>	0.68	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0025	SF 0.032" Thick, Mill Finish, Aluminum Flashing And Trim.....	16.63	3.78
	<i>For Up To 100, Add</i>	4.16	
	<i>For Baked Aluminum Colors, Add</i>	0.82	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0026	SF 0.040" Thick, Mill Finish, Aluminum Flashing And Trim.....	17.51	3.78
	<i>For Up To 100, Add</i>	4.38	
	<i>For Baked Aluminum Colors, Add</i>	0.91	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0027	SF 0.050" Thick, Mill Finish, Aluminum Flashing And Trim.....	18.23	3.78
	<i>For Up To 100, Add</i>	4.56	
	<i>For Baked Aluminum Colors, Add</i>	0.98	
	<i>For Wrap Around Window Panning, Add</i>	8.42	
07 62 13 00-0028	Steel Flashing And Trim (07 62 13)		
07 62 13 00-0029	Galvanized Steel Flashing And Trim (07 62 13 00-0028)		
07 62 13 00-0030	SF 28 Gauge, 0.019" Thick, Galvanized Steel Flashing.....	12.27	3.66
	<i>For Up To 100, Add</i>	3.07	
	<i>For Wrap Around Window Panning, Add</i>	7.79	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 62 13 00-0031 SF 26 Gauge, 0.022" Thick, Galvanized Steel Flashing..... <i>For Up To 100, Add</i> <i>For Wrap Around Window Panning, Add</i>	12.76 3.19 8.04	4.04
07 62 13 00-0032 SF 24 Gauge, 0.028" Thick, Galvanized Steel Flashing..... <i>For Up To 100, Add</i> <i>For Wrap Around Window Panning, Add</i>	13.59 3.40 8.49	4.28
07 62 13 00-0033 SF 22 Gauge, 0.034" Thick, Galvanized Steel Flashing..... <i>For Up To 100, Add</i> <i>For Wrap Around Window Panning, Add</i>	14.45 3.61 8.98	4.49
07 62 13 00-0034 SF 20 Gauge, 0.04" Thick, Galvanized Steel Flashing..... <i>For Up To 100, Add</i> <i>For Wrap Around Window Panning, Add</i>	15.63 3.91 9.51	4.76
07 62 19 Fabricated Gravel Stops and Fasciae (07 62)		
07 62 19 00-0001 Drip Edge (07 62 19)		
07 62 19 00-0002 Aluminum Drip Edge (07 62 19 00-0001) <i>Note: Girth (stretch-out) equals the total (flattened) width of the drip edge.</i>		
07 62 19 00-0003 KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0002)		
07 62 19 00-0004 0.016" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0005 LF Up To 5" Girth, 0.016" Thick, KYNAR 500® Finish, Aluminum Drip Edge	13.16	1.87
07 62 19 00-0006 LF >5" To 7" Girth, 0.016" Thick, KYNAR 500® Finish, Aluminum Drip Edge	16.38	1.99
07 62 19 00-0007 LF >7" To 9" Girth, 0.016" Thick, KYNAR 500® Finish, Aluminum Drip Edge	18.49	2.24
07 62 19 00-0008 LF >9" To 12" Girth, 0.016" Thick, KYNAR 500® Finish, Aluminum Drip Edge	22.22	2.36
07 62 19 00-0009 LF >12" To 15" Girth, 0.016" Thick, KYNAR 500® Finish, Aluminum Drip Edge	28.35	2.49
07 62 19 00-0010 0.019" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0011 LF Up To 5" Girth, 0.019" Thick, KYNAR 500® Finish, Aluminum Drip Edge	14.07	1.87
07 62 19 00-0012 LF >5" To 7" Girth, 0.019" Thick, KYNAR 500® Finish, Aluminum Drip Edge	17.39	1.99
07 62 19 00-0013 LF >7" To 9" Girth, 0.019" Thick, KYNAR 500® Finish, Aluminum Drip Edge	20.01	2.24
07 62 19 00-0014 LF >9" To 12" Girth, 0.019" Thick, KYNAR 500® Finish, Aluminum Drip Edge	24.04	2.36
07 62 19 00-0015 LF >12" To 15" Girth, 0.019" Thick, KYNAR 500® Finish, Aluminum Drip Edge	30.06	2.49
07 62 19 00-0016 0.025" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0017 LF Up To 5" Girth, 0.025" Thick, KYNAR 500® Finish, Aluminum Drip Edge	14.98	1.87
07 62 19 00-0018 LF >5" To 7" Girth, 0.025" Thick, KYNAR 500® Finish, Aluminum Drip Edge	18.60	1.99
07 62 19 00-0019 LF >7" To 9" Girth, 0.025" Thick, KYNAR 500® Finish, Aluminum Drip Edge	21.47	2.24
07 62 19 00-0020 LF >9" To 12" Girth, 0.025" Thick, KYNAR 500® Finish, Aluminum Drip Edge	25.85	2.36
07 62 19 00-0021 LF >12" To 15" Girth, 0.025" Thick, KYNAR 500® Finish, Aluminum Drip Edge	32.48	2.49
07 62 19 00-0022 0.032" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0023 LF Up To 5" Girth, 0.032" Thick, KYNAR 500® Finish, Aluminum Drip Edge	16.80	1.87
07 62 19 00-0024 LF >5" To 7" Girth, 0.032" Thick, KYNAR 500® Finish, Aluminum Drip Edge	21.02	1.99
07 62 19 00-0025 LF >7" To 9" Girth, 0.032" Thick, KYNAR 500® Finish, Aluminum Drip Edge	24.34	2.24
07 62 19 00-0026 LF >9" To 12" Girth, 0.032" Thick, KYNAR 500® Finish, Aluminum Drip Edge	29.48	2.36
07 62 19 00-0027 LF >12" To 15" Girth, 0.032" Thick, KYNAR 500® Finish, Aluminum Drip Edge	37.33	2.49
07 62 19 00-0028 0.040" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0029 LF Up To 5" Girth, 0.040" Thick, KYNAR 500® Finish, Aluminum Drip Edge	17.40	1.87
07 62 19 00-0030 LF >5" To 7" Girth, 0.040" Thick, KYNAR 500® Finish, Aluminum Drip Edge	21.93	1.99
07 62 19 00-0031 LF >7" To 9" Girth, 0.040" Thick, KYNAR 500® Finish, Aluminum Drip Edge	25.30	2.24
07 62 19 00-0032 LF >9" To 12" Girth, 0.040" Thick, KYNAR 500® Finish, Aluminum Drip Edge	30.69	2.36
07 62 19 00-0033 LF >12" To 15" Girth, 0.040" Thick, KYNAR 500® Finish, Aluminum Drip Edge	38.94	2.49
07 62 19 00-0034 0.050" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0035 LF Up To 5" Girth, 0.050" Thick, KYNAR 500® Finish, Aluminum Drip Edge	19.52	1.87
07 62 19 00-0036 LF >5" To 7" Girth, 0.050" Thick, KYNAR 500® Finish, Aluminum Drip Edge	24.65	1.99
07 62 19 00-0037 LF >7" To 9" Girth, 0.050" Thick, KYNAR 500® Finish, Aluminum Drip Edge	28.63	2.24
07 62 19 00-0038 LF >9" To 12" Girth, 0.050" Thick, KYNAR 500® Finish, Aluminum Drip Edge	34.93	2.36
07 62 19 00-0039 LF >12" To 15" Girth, 0.050" Thick, KYNAR 500® Finish, Aluminum Drip Edge	44.59	2.49
07 62 19 00-0040 0.063" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0041 LF Up To 5" Girth, 0.063" Thick, KYNAR 500® Finish, Aluminum Drip Edge	22.55	1.87
07 62 19 00-0042 LF >5" To 7" Girth, 0.063" Thick, KYNAR 500® Finish, Aluminum Drip Edge	28.68	1.99
07 62 19 00-0043 LF >7" To 9" Girth, 0.063" Thick, KYNAR 500® Finish, Aluminum Drip Edge	33.42	2.24
07 62 19 00-0044 LF >9" To 12" Girth, 0.063" Thick, KYNAR 500® Finish, Aluminum Drip Edge	40.98	2.36
07 62 19 00-0045 LF >12" To 15" Girth, 0.063" Thick, KYNAR 500® Finish, Aluminum Drip Edge	52.66	2.49
07 62 19 00-0046 0.080" Thick, KYNAR 500® Finish, Aluminum Drip Edge (07 62 19 00-0003)		
07 62 19 00-0047 LF Up To 5" Girth, 0.080" Thick, KYNAR 500® Finish, Aluminum Drip Edge	26.18	1.87

07 Thermal And Moisture Protection**07 60 Flashing and Sheet Metal****07 62 Sheet Metal Flashing and Trim**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	UNIT COST
07 62 19 00-0048	LF	>5" To 7" Girth, 0.080" Thick, KYNAR 500® Finish, Aluminum Drip Edge	33.53		1.99
07 62 19 00-0049	LF	>7" To 9" Girth, 0.080" Thick, KYNAR 500® Finish, Aluminum Drip Edge	39.17		2.24
07 62 19 00-0050	LF	>9" To 12" Girth, 0.080" Thick, KYNAR 500® Finish, Aluminum Drip Edge	48.24		2.36
07 62 19 00-0051	LF	>12" To 15" Girth, 0.080" Thick, KYNAR 500® Finish, Aluminum Drip Edge	62.34		2.49
07 62 19 00-0052		Mill Finish, Aluminum Drip Edge (07 62 19 00-0002)			
07 62 19 00-0053		0.016" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0054	LF	Up To 5" Girth, 0.016" Thick, Mill Finish, Aluminum Drip Edge	10.82		1.87
07 62 19 00-0055	LF	>5" To 7" Girth, 0.016" Thick, Mill Finish, Aluminum Drip Edge	13.19		1.99
07 62 19 00-0056	LF	>7" To 9" Girth, 0.016" Thick, Mill Finish, Aluminum Drip Edge	14.80		2.24
07 62 19 00-0057	LF	>9" To 12" Girth, 0.016" Thick, Mill Finish, Aluminum Drip Edge	17.52		2.36
07 62 19 00-0058	LF	>12" To 15" Girth, 0.016" Thick, Mill Finish, Aluminum Drip Edge	21.87		2.49
07 62 19 00-0059		0.019" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0060	LF	Up To 5" Girth, 0.019" Thick, Mill Finish, Aluminum Drip Edge	11.44		1.87
07 62 19 00-0061	LF	>5" To 7" Girth, 0.019" Thick, Mill Finish, Aluminum Drip Edge	13.88		1.99
07 62 19 00-0062	LF	>7" To 9" Girth, 0.019" Thick, Mill Finish, Aluminum Drip Edge	15.84		2.24
07 62 19 00-0063	LF	>9" To 12" Girth, 0.019" Thick, Mill Finish, Aluminum Drip Edge	18.78		2.36
07 62 19 00-0064	LF	>12" To 15" Girth, 0.019" Thick, Mill Finish, Aluminum Drip Edge	23.05		2.49
07 62 19 00-0065		0.025" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0066	LF	Up To 5" Girth, 0.025" Thick, Mill Finish, Aluminum Drip Edge	12.07		1.87
07 62 19 00-0067	LF	>5" To 7" Girth, 0.025" Thick, Mill Finish, Aluminum Drip Edge	14.72		1.99
07 62 19 00-0068	LF	>7" To 9" Girth, 0.025" Thick, Mill Finish, Aluminum Drip Edge	16.85		2.24
07 62 19 00-0069	LF	>9" To 12" Girth, 0.025" Thick, Mill Finish, Aluminum Drip Edge	20.03		2.36
07 62 19 00-0070	LF	>12" To 15" Girth, 0.025" Thick, Mill Finish, Aluminum Drip Edge	24.72		2.49
07 62 19 00-0071		0.032" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0072	LF	Up To 5" Girth, 0.032" Thick, Mill Finish, Aluminum Drip Edge	13.32		1.87
07 62 19 00-0073	LF	>5" To 7" Girth, 0.032" Thick, Mill Finish, Aluminum Drip Edge	16.39		1.99
07 62 19 00-0074	LF	>7" To 9" Girth, 0.032" Thick, Mill Finish, Aluminum Drip Edge	18.83		2.24
07 62 19 00-0075	LF	>9" To 12" Girth, 0.032" Thick, Mill Finish, Aluminum Drip Edge	22.53		2.36
07 62 19 00-0076	LF	>12" To 15" Girth, 0.032" Thick, Mill Finish, Aluminum Drip Edge	28.06		2.49
07 62 19 00-0077		0.040" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0078	LF	Up To 5" Girth, 0.040" Thick, Mill Finish, Aluminum Drip Edge	13.74		1.87
07 62 19 00-0079	LF	>5" To 7" Girth, 0.040" Thick, Mill Finish, Aluminum Drip Edge	17.01		1.99
07 62 19 00-0080	LF	>7" To 9" Girth, 0.040" Thick, Mill Finish, Aluminum Drip Edge	19.49		2.24
07 62 19 00-0081	LF	>9" To 12" Girth, 0.040" Thick, Mill Finish, Aluminum Drip Edge	23.37		2.36
07 62 19 00-0082	LF	>12" To 15" Girth, 0.040" Thick, Mill Finish, Aluminum Drip Edge	29.17		2.49
07 62 19 00-0083		0.050" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0084	LF	Up To 5" Girth, 0.050" Thick, Mill Finish, Aluminum Drip Edge	15.20		1.87
07 62 19 00-0085	LF	>5" To 7" Girth, 0.050" Thick, Mill Finish, Aluminum Drip Edge	18.89		1.99
07 62 19 00-0086	LF	>7" To 9" Girth, 0.050" Thick, Mill Finish, Aluminum Drip Edge	21.79		2.24
07 62 19 00-0087	LF	>9" To 12" Girth, 0.050" Thick, Mill Finish, Aluminum Drip Edge	26.29		2.36
07 62 19 00-0088	LF	>12" To 15" Girth, 0.050" Thick, Mill Finish, Aluminum Drip Edge	33.07		2.49
07 62 19 00-0089		0.063" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0090	LF	Up To 5" Girth, 0.063" Thick, Mill Finish, Aluminum Drip Edge	17.29		1.87
07 62 19 00-0091	LF	>5" To 7" Girth, 0.063" Thick, Mill Finish, Aluminum Drip Edge	21.67		1.99
07 62 19 00-0092	LF	>7" To 9" Girth, 0.063" Thick, Mill Finish, Aluminum Drip Edge	25.09		2.24
07 62 19 00-0093	LF	>9" To 12" Girth, 0.063" Thick, Mill Finish, Aluminum Drip Edge	30.46		2.36
07 62 19 00-0094	LF	>12" To 15" Girth, 0.063" Thick, Mill Finish, Aluminum Drip Edge	38.63		2.49
07 62 19 00-0095		0.080" Thick, Mill Finish, Aluminum Drip Edge (07 62 19 00-0052)			
07 62 19 00-0096	LF	Up To 5" Girth, 0.080" Thick, Mill Finish, Aluminum Drip Edge	19.79		1.87
07 62 19 00-0097	LF	>5" To 7" Girth, 0.080" Thick, Mill Finish, Aluminum Drip Edge	25.01		1.99
07 62 19 00-0098	LF	>7" To 9" Girth, 0.080" Thick, Mill Finish, Aluminum Drip Edge	29.06		2.24
07 62 19 00-0099	LF	>9" To 12" Girth, 0.080" Thick, Mill Finish, Aluminum Drip Edge	35.47		2.36
07 62 19 00-0100	LF	>12" To 15" Girth, 0.080" Thick, Mill Finish, Aluminum Drip Edge	45.31		2.49
07 62 19 00-0101		Clear Anodized Finish, Aluminum Drip Edge (07 62 19 00-0002)			
07 62 19 00-0102		0.016" Thick, Clear Anodized Finish, Aluminum Drip Edge (07 62 19 00-0101)			
07 62 19 00-0103	LF	Up To 5" Girth, 0.016" Thick, Clear Anodized Finish, Aluminum Drip Edge	13.62		1.87
07 62 19 00-0104	LF	>5" To 7" Girth, 0.016" Thick, Clear Anodized Finish, Aluminum Drip Edge	17.00		1.99
07 62 19 00-0105	LF	>7" To 9" Girth, 0.016" Thick, Clear Anodized Finish, Aluminum Drip Edge	19.21		2.24
07 62 19 00-0106	LF	>9" To 12" Girth, 0.016" Thick, Clear Anodized Finish, Aluminum Drip Edge	23.13		2.36
07 62 19 00-0107	LF	>12" To 15" Girth, 0.016" Thick, Clear Anodized Finish, Aluminum Drip Edge	29.60		2.49



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 62 19 00-0108		0.019" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0109	LF	Up To 5" Girth, 0.019" Thick, Clear Anodized Finish, Aluminum Drip Edge	14.58	1.87
07 62 19 00-0110	LF	>5" To 7" Girth, 0.019" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	18.06	1.99
07 62 19 00-0111	LF	>7" To 9" Girth, 0.019" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	20.81	2.24
07 62 19 00-0112	LF	>9" To 12" Girth, 0.019" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	25.05	2.36
07 62 19 00-0113	LF	>12" To 15" Girth, 0.019" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	31.42	2.49
07 62 19 00-0114		0.025" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0115	LF	Up To 5" Girth, 0.025" Thick, Clear Anodized Finish, Aluminum Drip Edge	15.54	1.87
07 62 19 00-0116	LF	>5" To 7" Girth, 0.025" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	19.35	1.99
07 62 19 00-0117	LF	>7" To 9" Girth, 0.025" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	22.36	2.24
07 62 19 00-0118	LF	>9" To 12" Girth, 0.025" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	26.98	2.36
07 62 19 00-0119	LF	>12" To 15" Girth, 0.025" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	33.99	2.49
07 62 19 00-0120		0.032" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0121	LF	Up To 5" Girth, 0.032" Thick, Clear Anodized Finish, Aluminum Drip Edge	17.47	1.87
07 62 19 00-0122	LF	>5" To 7" Girth, 0.032" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	21.91	1.99
07 62 19 00-0123	LF	>7" To 9" Girth, 0.032" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	25.41	2.24
07 62 19 00-0124	LF	>9" To 12" Girth, 0.032" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	30.83	2.36
07 62 19 00-0125	LF	>12" To 15" Girth, 0.032" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	39.12	2.49
07 62 19 00-0126		0.040" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0127	LF	Up To 5" Girth, 0.040" Thick, Clear Anodized Finish, Aluminum Drip Edge	18.11	1.87
07 62 19 00-0128	LF	>5" To 7" Girth, 0.040" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	22.88	1.99
07 62 19 00-0129	LF	>7" To 9" Girth, 0.040" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	26.42	2.24
07 62 19 00-0130	LF	>9" To 12" Girth, 0.040" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	32.11	2.36
07 62 19 00-0131	LF	>12" To 15" Girth, 0.040" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	40.83	2.49
07 62 19 00-0132		0.050" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0133	LF	Up To 5" Girth, 0.050" Thick, Clear Anodized Finish, Aluminum Drip Edge	20.35	1.87
07 62 19 00-0134	LF	>5" To 7" Girth, 0.050" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	25.76	1.99
07 62 19 00-0135	LF	>7" To 9" Girth, 0.050" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	29.95	2.24
07 62 19 00-0136	LF	>9" To 12" Girth, 0.050" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	36.60	2.36
07 62 19 00-0137	LF	>12" To 15" Girth, 0.050" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	46.82	2.49
07 62 19 00-0138		0.063" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0139	LF	Up To 5" Girth, 0.063" Thick, Clear Anodized Finish, Aluminum Drip Edge	23.56	1.87
07 62 19 00-0140	LF	>5" To 7" Girth, 0.063" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	30.04	1.99
07 62 19 00-0141	LF	>7" To 9" Girth, 0.063" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	35.03	2.24
07 62 19 00-0142	LF	>9" To 12" Girth, 0.063" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	43.01	2.36
07 62 19 00-0143	LF	>12" To 15" Girth, 0.063" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	55.37	2.49
07 62 19 00-0144		0.080" Thick, Clear Anodized Finish, Aluminum Drip Edge <small>(07 62 19 00-0101)</small>		
07 62 19 00-0145	LF	Up To 5" Girth, 0.080" Thick, Clear Anodized Finish, Aluminum Drip Edge	27.41	1.87
07 62 19 00-0146	LF	>5" To 7" Girth, 0.080" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	35.17	1.99
07 62 19 00-0147	LF	>7" To 9" Girth, 0.080" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	41.12	2.24
07 62 19 00-0148	LF	>9" To 12" Girth, 0.080" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	50.71	2.36
07 62 19 00-0149	LF	>12" To 15" Girth, 0.080" Thick, Clear Anodized Finish, Aluminum Drip Edge.....	65.63	2.49
07 62 19 00-0150		Galvanized Steel Drip Edge <small>(07 62 19 00-0001)</small>		
		Note: Girth (stretch-out) equals the total (flattened) width of the drip edge.		
07 62 19 00-0151		Galvanized Steel Drip Edge <small>(07 62 19 00-0150)</small>		
07 62 19 00-0152		26 Gauge, Galvanized Steel Drip Edge <small>(07 62 19 00-0151)</small>		
07 62 19 00-0153	LF	Up To 5" Girth, 26 Gauge, Galvanized Steel Drip Edge	12.56	1.87
07 62 19 00-0154	LF	>5" To 7" Girth, 26 Gauge, Galvanized Steel Drip Edge.....	15.43	1.99
07 62 19 00-0155	LF	>7" To 9" Girth, 26 Gauge, Galvanized Steel Drip Edge.....	17.63	2.24
07 62 19 00-0156	LF	>9" To 12" Girth, 26 Gauge, Galvanized Steel Drip Edge.....	21.01	2.36
07 62 19 00-0157	LF	>12" To 15" Girth, 26 Gauge, Galvanized Steel Drip Edge.....	26.03	2.49
07 62 19 00-0158		24 Gauge, Galvanized Steel Drip Edge <small>(07 62 19 00-0151)</small>		
07 62 19 00-0159	LF	Up To 5" Girth, 24 Gauge, Galvanized Steel Drip Edge	13.61	1.87
07 62 19 00-0160	LF	>5" To 7" Girth, 24 Gauge, Galvanized Steel Drip Edge.....	16.83	1.99
07 62 19 00-0161	LF	>7" To 9" Girth, 24 Gauge, Galvanized Steel Drip Edge.....	19.28	2.24
07 62 19 00-0162	LF	>9" To 12" Girth, 24 Gauge, Galvanized Steel Drip Edge.....	23.11	2.36
07 62 19 00-0163	LF	>12" To 15" Girth, 24 Gauge, Galvanized Steel Drip Edge.....	28.81	2.49
07 62 19 00-0164		KYNAR 500® Finish, Galvanized Steel Drip Edge <small>(07 62 19 00-0150)</small>		

07 Thermal And Moisture Protection**07 60 Flashing and Sheet Metal****07 62 Sheet Metal Flashing and Trim**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 62 19 00-0165	26 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge <small>(07 62 19 00-0164)</small>		
07 62 19 00-0166	LF Up To 5" Girth, 26 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	15.69	1.87
07 62 19 00-0167	LF >5" To 7" Girth, 26 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	19.63	1.99
07 62 19 00-0168	LF >7" To 9" Girth, 26 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	22.59	2.24
07 62 19 00-0169	LF >9" To 12" Girth, 26 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	27.28	2.36
07 62 19 00-0170	LF >12" To 15" Girth, 26 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	34.38	2.49
07 62 19 00-0171	24 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge <small>(07 62 19 00-0164)</small>		
07 62 19 00-0172	LF Up To 5" Girth, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	17.21	1.87
07 62 19 00-0173	LF >5" To 7" Girth, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	21.67	1.99
07 62 19 00-0174	LF >7" To 9" Girth, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	24.99	2.24
07 62 19 00-0175	LF >9" To 12" Girth, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	30.30	2.36
07 62 19 00-0176	LF >12" To 15" Girth, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Drip Edge.....	38.42	2.49
07 62 19 00-0177	Stainless Steel Drip Edge <small>(07 62 19 00-0001)</small>		
	Note: Girth (stretch-out) equals the total (flattened) width of the drip edge.		
07 62 19 00-0178	26 Gauge, Stainless Steel Drip Edge <small>(07 62 19 00-0177)</small>		
07 62 19 00-0179	LF Up To 5" Girth, 26 Gauge, Stainless Steel Drip Edge.....	21.47	1.87
07 62 19 00-0180	LF >5" To 7" Girth, 26 Gauge, Stainless Steel Drip Edge.....	27.25	1.99
07 62 19 00-0181	LF >7" To 9" Girth, 26 Gauge, Stainless Steel Drip Edge.....	31.72	2.24
07 62 19 00-0182	LF >9" To 12" Girth, 26 Gauge, Stainless Steel Drip Edge.....	38.83	2.36
07 62 19 00-0183	LF >12" To 15" Girth, 26 Gauge, Stainless Steel Drip Edge.....	49.79	2.49
07 62 19 00-0184	24 Gauge, Stainless Steel Drip Edge <small>(07 62 19 00-0177)</small>		
07 62 19 00-0185	LF Up To 5" Girth, 24 Gauge, Stainless Steel Drip Edge.....	26.47	1.87
07 62 19 00-0186	LF >5" To 7" Girth, 24 Gauge, Stainless Steel Drip Edge.....	33.91	1.99
07 62 19 00-0187	LF >7" To 9" Girth, 24 Gauge, Stainless Steel Drip Edge.....	39.66	2.24
07 62 19 00-0188	LF >9" To 12" Girth, 24 Gauge, Stainless Steel Drip Edge.....	48.83	2.36
07 62 19 00-0189	LF >12" To 15" Girth, 24 Gauge, Stainless Steel Drip Edge.....	63.12	2.49
07 62 19 00-0190	22 Gauge, Stainless Steel Drip Edge <small>(07 62 19 00-0177)</small>		
07 62 19 00-0191	LF Up To 5" Girth, 22 Gauge, Stainless Steel Drip Edge.....	32.35	1.87
07 62 19 00-0192	LF >5" To 7" Girth, 22 Gauge, Stainless Steel Drip Edge.....	41.75	1.99
07 62 19 00-0193	LF >7" To 9" Girth, 22 Gauge, Stainless Steel Drip Edge.....	48.96	2.24
07 62 19 00-0194	LF >9" To 12" Girth, 22 Gauge, Stainless Steel Drip Edge.....	60.58	2.36
07 62 19 00-0195	LF >12" To 15" Girth, 22 Gauge, Stainless Steel Drip Edge.....	78.80	2.49

07 63 Sheet Metal Roofing Specialties (07 60)

07 63 00 00-0001	Pitch Pockets <small>(07 63)</small>		
	Note: Cut into deck, filled with non-shrink grout, includes blocking.		
07 63 00 00-0002	24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pockets <small>(07 63 00 00-0001)</small>		
07 63 00 00-0003	EA 4" x 4" 24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	94.52	
	For Pourable Sealer Filled, Add	39.41	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	19.71	
07 63 00 00-0004	EA 6" x 6" 24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	114.41	
	For Pourable Sealer Filled, Add	88.72	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	44.48	
07 63 00 00-0005	EA 8" x 8" 24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	139.62	
	For Pourable Sealer Filled, Add	157.63	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	78.64	
07 63 00 00-0006	EA 8" x 10" 24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	153.16	
	For Pourable Sealer Filled, Add	197.04	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	98.84	
07 63 00 00-0007	EA 8" x 12" 24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	166.06	
	For Pourable Sealer Filled, Add	236.45	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	118.24	
07 63 00 00-0008	SF 24 Gauge Galvanized Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	195.23	
	For Pourable Sealer Filled, Add	354.67	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	176.24	
07 63 00 00-0009	16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pockets <small>(07 63 00 00-0001)</small>		
07 63 00 00-0010	EA 4" x 4" 16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	94.77	
	For Pourable Sealer Filled, Add	39.41	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	19.71	
07 63 00 00-0011	EA 6" x 6" 16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	114.38	
	For Pourable Sealer Filled, Add	88.72	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	44.48	
07 63 00 00-0012	EA 8" x 8" 16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pocket.....	140.11	
	For Pourable Sealer Filled, Add	157.63	
	For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add	78.64	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 63 00 00-0013 EA 8" x 10" 16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	156.35 197.04	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	98.84	
07 63 00 00-0014 EA 8" x 12" 16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	168.93 236.45	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	118.24	
07 63 00 00-0015 SF 16 Ounce Copper Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	198.50 354.67	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	176.24	
07 63 00 00-0016 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pockets <small>(07 63 00 00-0001)</small>		
07 63 00 00-0017 EA 4" x 4" 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	100.47 39.41	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	19.71	
07 63 00 00-0018 EA 6" x 6" 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	120.29 88.72	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	44.48	
07 63 00 00-0019 EA 8" x 8" 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	140.65 157.63	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	78.64	
07 63 00 00-0020 EA 8" x 10" 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	153.14 197.04	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	98.84	
07 63 00 00-0021 EA 8" x 12" 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	164.72 236.45	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	118.24	
07 63 00 00-0022 SF 24 Gauge Stainless Steel Sheet Metal, Non-Shrink Grout Filled Pitch Pocket..... <i>For Pourable Sealer Filled, Add</i>	191.40 354.67	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	176.24	
07 63 00 00-0023 Clean, Repair And Refill Existing Pitch Pockets With Non-Shrink Grout <small>(07 63 00 00-0001)</small>		
<small>Note: Includes removing existing filler and refilling with non-shrink grout.</small>		
07 63 00 00-0024 EA Clean, Repair And Refill Existing 4" x 4" Pitch Pocket With Non-Shrink Grout..... <i>For Pourable Sealer Filled, Add</i>	82.12 39.41	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	19.71	
07 63 00 00-0025 EA Clean, Repair And Refill Existing 6" x 6" Pitch Pocket With Non-Shrink Grout..... <i>For Pourable Sealer Filled, Add</i>	93.92 88.72	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	44.48	
07 63 00 00-0026 EA Clean, Repair And Refill Existing 8" x 8" Pitch Pocket With Non-Shrink Grout..... <i>For Pourable Sealer Filled, Add</i>	109.55 157.63	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	78.64	
07 63 00 00-0027 EA Clean, Repair And Refill Existing 8" x 10" Pitch Pocket With Non-Shrink Grout..... <i>For Pourable Sealer Filled, Add</i>	119.53 197.04	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	98.84	
07 63 00 00-0028 EA Clean, Repair And Refill Existing 8" x 12" Pitch Pocket With Non-Shrink Grout..... <i>For Pourable Sealer Filled, Add</i>	129.50 236.45	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	118.24	
07 63 00 00-0029 SF Clean, Repair And Refill Existing Pitch Pocket With Non-Shrink Grout..... <i>For Pourable Sealer Filled, Add</i>	154.44 354.67	
<i>For Pourable Sealer Top Filled (2" Non-Shrink Grout Topped With 2" Pourable Sealer), Add</i>	176.24	
07 63 00 00-0030 Lead Pipe Flashing For Roofs <small>(07 63)</small>		
<small>Note: Includes 6" skirt base.</small>		
07 63 00 00-0031 EA 1-1/4" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 3/4" Pipe.....	92.78	30.20
07 63 00 00-0032 EA 1-1/2" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 1" Pipe.....	92.78	30.20
07 63 00 00-0033 EA 2-3/4" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 2" Pipe.....	110.93	30.20
07 63 00 00-0034 EA 3-3/4" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 3" Pipe.....	121.31	30.20
07 63 00 00-0035 EA 4-1/4" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 3-1/2" Pipe.....	126.49	30.20
07 63 00 00-0036 EA 4-3/4" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 4" Pipe.....	129.09	30.20
07 63 00 00-0037 EA 6-7/8" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 6" Pipe.....	155.02	30.20
07 63 00 00-0038 EA 8-7/8" ID x 12" Riser Pipe, 4 LB Lead Pipe Flashing For Roofs, Fits 8" Pipe.....	166.69	30.20
07 63 00 00-0039 Galvanized Metal Flashing With Neoprene Collar, Shingle Roofing <small>(07 63)</small>		
07 63 00 00-0040 EA 2" Vent Through Roof, Galvanized Metal Flashing With Neoprene Collar, Shingle Roofing.....	81.91	19.51
07 63 00 00-0041 EA 3" Vent Through Roof, Galvanized Metal Flashing With Neoprene Collar, Shingle Roofing.....	83.23	19.51
07 63 00 00-0042 EA 4" Vent Through Roof, Galvanized Metal Flashing With Neoprene Collar, Shingle Roofing.....	88.04	19.51
07 63 00 00-0043 EA 6" Vent Through Roof, Galvanized Metal Flashing With Neoprene Collar, Shingle Roofing.....	92.18	19.51
07 65 Flexible Flashing <small>(07 60)</small>		
07 65 16 Modified Bituminous Sheet Flashing <small>(07 65)</small>		
07 65 16 00-0001 Liquid Flashing System For Modified And BUR Systems <small>(07 65 16)</small>		
<small>See CSI section 07 51 13 00-0036 for ceramic coated roofing granules.</small>		
07 65 16 00-0002 SF 60 Mil, Urethane Elastomer Liquid Applied Flashing.....	14.65	2.36
<small>Note: Includes applying a 30 mil base coat, rolling in a stitchbonded polyester reinforcing scrim and applying a 30 mil second coat.</small>		

07 Thermal And Moisture Protection**07 60 Flashing and Sheet Metal****07 65 Flexible Flashing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**07 65 19 Plastic Sheet Flashing** (07 65)

07 65 19 00-0001	Plastic Flashing And Trim	(07 65 19)		
07 65 19 00-0002	Neoprene Flashing	(07 65 19 00-0001)		
07 65 19 00-0003	60 Mil Thick	(07 65 19 00-0002)		
07 65 19 00-0004	LF	6" Wide Strip, 60 Mil, Neoprene Flashing	10.35	3.36
07 65 19 00-0005	LF	12" Wide Strip, 60 Mil, Neoprene Flashing	13.66	3.60
07 65 19 00-0006	LF	18" Wide Strip, 60 Mil, Neoprene Flashing	17.32	3.98
07 65 19 00-0007	LF	24" Wide Strip, 60 Mil, Neoprene Flashing	21.22	4.48

07 65 33 Flexible Roof Boot (07 65)

07 65 33 00-0001	Neoprene Roof Boot	(07 65 33)		
07 65 33 00-0002	EA	2" Diameter Pipe, Neoprene Roof Boot	56.86	10.33
07 65 33 00-0003	EA	3" Diameter Pipe, Neoprene Roof Boot	67.74	11.57
07 65 33 00-0004	EA	4" Diameter Pipe, Neoprene Roof Boot	75.96	12.44

07 70 Roof and Wall Specialties and Accessories (07)**07 71 Roof Specialties** (07 70)**07 71 13 Manufactured Copings** (07 71)

07 71 13 00-0001	Galvanized Steel Copings	(07 71 13)		
07 71 13 00-0002	KYNAR 500® Finish, Galvanized Steel Coping System With Galvanized Steel Cleats	(07 71 13 00-0001)		
		Note: Stretch-out width = face height + wall thickness + back leg. Coping system includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.		
07 71 13 00-0003	LF	10" To 14" Wide (Stretch-out), 24 Gauge, KYNAR 500® Finish, Galvanized Steel Coping System With Galvanized Steel Cleats	34.65	2.69
		For Up To 25 LF, Add	5.26	
		For >25 To 100 LF, Add	2.63	
		For >1,000 LF, Deduct	-0.45	
07 71 13 00-0004	LF	>14" To 16" Wide (Stretch-out), 24 Gauge, KYNAR 500® Finish, Galvanized Steel Coping System With Galvanized Steel Cleats	36.57	2.91
		For Up To 25 LF, Add	5.60	
		For >25 To 100 LF, Add	2.80	
		For >1,000 LF, Deduct	-0.49	
07 71 13 00-0005	LF	>16" To 22" Wide (Stretch-out), 24 Gauge, KYNAR 500® Finish, Galvanized Steel Coping System With Galvanized Steel Cleats	41.65	3.06
		For Up To 25 LF, Add	6.21	
		For >25 To 100 LF, Add	3.10	
		For >1,000 LF, Deduct	-0.51	
07 71 13 00-0006	LF	>22" To 30" Wide (Stretch-out), 24 Gauge, KYNAR 500® Finish, Galvanized Steel Coping System With Galvanized Steel Cleats	48.35	3.36
		For Up To 25 LF, Add	7.08	
		For >25 To 100 LF, Add	3.54	
		For >1,000 LF, Deduct	-0.56	
07 71 13 00-0007	LF	>30" To 42" Wide (Stretch-out), 24 Gauge, KYNAR 500® Finish, Galvanized Steel Coping System With Galvanized Steel Cleats	58.33	3.51
		For Up To 25 LF, Add	8.17	
		For >25 To 100 LF, Add	4.09	
		For >1,000 LF, Deduct	-0.59	

07 71 13 00-0008 Aluminum Copings (07 71 13)

07 71 13 00-0009	Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	(07 71 13 00-0008)		
		Note: Stretch-out width = face height + wall thickness + back leg. Coping system includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.		
07 71 13 00-0010	0.040" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	(07 71 13 00-0009)		
07 71 13 00-0011	LF	10" To 14" Wide (Stretch-out), 0.040" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	27.61	2.69
		For Up To 25 LF, Add	4.55	
		For >25 To 100 LF, Add	2.28	
		For >1,000 LF, Deduct	-0.45	
07 71 13 00-0012	LF	>14" To 16" Wide (Stretch-out), 0.040" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	29.48	2.91
		For Up To 25 LF, Add	4.89	
		For >25 To 100 LF, Add	2.44	
		For >1,000 LF, Deduct	-0.49	
07 71 13 00-0013	LF	>16" To 22" Wide (Stretch-out), 0.040" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	34.31	3.06
		For Up To 25 LF, Add	5.47	
		For >25 To 100 LF, Add	2.74	
		For >1,000 LF, Deduct	-0.51	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 13 00-0014 LF >22" To 30" Wide (Stretch-out), 0.040" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	40.91	3.36
<i>For Up To 25 LF, Add</i>	6.33	
<i>For >25 To 100 LF, Add</i>	3.17	
<i>For >1,000 LF, Deduct</i>	-0.56	
07 71 13 00-0015 LF >30" To 42" Wide (Stretch-out), 0.040" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	50.70	3.51
<i>For Up To 25 LF, Add</i>	7.41	
<i>For >25 To 100 LF, Add</i>	3.71	
<i>For >1,000 LF, Deduct</i>	-0.59	
07 71 13 00-0016 0.050" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats <small>(07 71 13 00-0009)</small>		
07 71 13 00-0017 LF 10" To 14" Wide (Stretch-out), 0.050" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	29.93	2.69
<i>For Up To 25 LF, Add</i>	4.79	
<i>For >25 To 100 LF, Add</i>	2.39	
<i>For >1,000 LF, Deduct</i>	-0.45	
07 71 13 00-0018 LF >14" To 16" Wide (Stretch-out), 0.050" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	31.95	2.91
<i>For Up To 25 LF, Add</i>	5.14	
<i>For >25 To 100 LF, Add</i>	2.57	
<i>For >1,000 LF, Deduct</i>	-0.49	
07 71 13 00-0019 LF >16" To 22" Wide (Stretch-out), 0.050" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	37.23	3.06
<i>For Up To 25 LF, Add</i>	5.76	
<i>For >25 To 100 LF, Add</i>	2.88	
<i>For >1,000 LF, Deduct</i>	-0.51	
07 71 13 00-0020 LF >22" To 30" Wide (Stretch-out), 0.050" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	44.44	3.36
<i>For Up To 25 LF, Add</i>	6.68	
<i>For >25 To 100 LF, Add</i>	3.34	
<i>For >1,000 LF, Deduct</i>	-0.56	
07 71 13 00-0021 LF >30" To 42" Wide (Stretch-out), 0.050" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	55.19	3.51
<i>For Up To 25 LF, Add</i>	7.86	
<i>For >25 To 100 LF, Add</i>	3.93	
<i>For >1,000 LF, Deduct</i>	-0.59	
07 71 13 00-0022 0.063" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats <small>(07 71 13 00-0009)</small>		
07 71 13 00-0023 LF 10" To 14" Wide (Stretch-out), 0.063" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	31.83	2.69
<i>For Up To 25 LF, Add</i>	4.98	
<i>For >25 To 100 LF, Add</i>	2.49	
<i>For >1,000 LF, Deduct</i>	-0.45	
07 71 13 00-0024 LF >14" To 16" Wide (Stretch-out), 0.063" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	34.15	2.91
<i>For Up To 25 LF, Add</i>	5.36	
<i>For >25 To 100 LF, Add</i>	2.68	
<i>For >1,000 LF, Deduct</i>	-0.49	
07 71 13 00-0025 LF >16" To 22" Wide (Stretch-out), 0.063" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	40.86	3.06
<i>For Up To 25 LF, Add</i>	6.13	
<i>For >25 To 100 LF, Add</i>	3.06	
<i>For >1,000 LF, Deduct</i>	-0.51	
07 71 13 00-0026 LF >22" To 30" Wide (Stretch-out), 0.063" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	50.94	3.36
<i>For Up To 25 LF, Add</i>	7.33	
<i>For >25 To 100 LF, Add</i>	3.67	
<i>For >1,000 LF, Deduct</i>	-0.56	
07 71 13 00-0027 LF >30" To 42" Wide (Stretch-out), 0.063" Thick, Mill Finish, Aluminum Coping System With Galvanized Steel Cleats	65.72	3.51
<i>For Up To 25 LF, Add</i>	8.91	
<i>For >25 To 100 LF, Add</i>	4.46	
<i>For >1,000 LF, Deduct</i>	-0.59	
07 71 13 00-0028 KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats <small>(07 71 13 00-0008)</small>		
<small>Note: Stretch-out width = face height + wall thickness + back leg. Coping system includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.</small>		
07 71 13 00-0029 0.040" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats <small>(07 71 13 00-0028)</small>		
07 71 13 00-0030 LF 10" To 14" Wide (Stretch-out), 0.040" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	38.02	2.69
<i>For Up To 25 LF, Add</i>	5.59	
<i>For >25 To 100 LF, Add</i>	2.80	
<i>For >1,000 LF, Deduct</i>	-0.45	
07 71 13 00-0031 LF >14" To 16" Wide (Stretch-out), 0.040" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	40.57	2.91
<i>For Up To 25 LF, Add</i>	6.00	
<i>For >25 To 100 LF, Add</i>	3.00	
<i>For >1,000 LF, Deduct</i>	-0.49	
07 71 13 00-0032 LF >16" To 22" Wide (Stretch-out), 0.040" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	47.45	3.06
<i>For Up To 25 LF, Add</i>	6.79	
<i>For >25 To 100 LF, Add</i>	3.39	
<i>For >1,000 LF, Deduct</i>	-0.51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 13 00-0033	LF		>22" To 30" Wide (Stretch-out), 0.040" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	56.79	3.36
			For Up To 25 LF, Add	7.92	
			For >25 To 100 LF, Add	3.96	
			For >1,000 LF, Deduct	-0.56	
07 71 13 00-0034	LF		>30" To 42" Wide (Stretch-out), 0.040" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	70.88	3.51
			For Up To 25 LF, Add	9.43	
			For >25 To 100 LF, Add	4.71	
			For >1,000 LF, Deduct	-0.59	
07 71 13 00-0035			0.050" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats (07 71 13 00-0028)		
07 71 13 00-0036	LF		10" To 14" Wide (Stretch-out), 0.050" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	41.38	2.69
			For Up To 25 LF, Add	5.93	
			For >25 To 100 LF, Add	2.97	
			For >1,000 LF, Deduct	-0.45	
07 71 13 00-0037	LF		>14" To 16" Wide (Stretch-out), 0.050" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	44.14	2.91
			For Up To 25 LF, Add	6.35	
			For >25 To 100 LF, Add	3.18	
			For >1,000 LF, Deduct	-0.49	
07 71 13 00-0038	LF		>16" To 22" Wide (Stretch-out), 0.050" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	51.68	3.06
			For Up To 25 LF, Add	7.21	
			For >25 To 100 LF, Add	3.60	
			For >1,000 LF, Deduct	-0.51	
07 71 13 00-0039	LF		>22" To 30" Wide (Stretch-out), 0.050" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	61.91	3.36
			For Up To 25 LF, Add	8.43	
			For >25 To 100 LF, Add	4.22	
			For >1,000 LF, Deduct	-0.56	
07 71 13 00-0040	LF		>30" To 42" Wide (Stretch-out), 0.050" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	77.39	3.51
			For Up To 25 LF, Add	10.08	
			For >25 To 100 LF, Add	5.04	
			For >1,000 LF, Deduct	-0.59	
07 71 13 00-0041			0.063" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats (07 71 13 00-0028)		
07 71 13 00-0042	LF		10" To 14" Wide (Stretch-out), 0.063" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	44.13	2.69
			For Up To 25 LF, Add	6.21	
			For >25 To 100 LF, Add	3.10	
			For >1,000 LF, Deduct	-0.45	
07 71 13 00-0043	LF		>14" To 16" Wide (Stretch-out), 0.063" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	47.33	2.91
			For Up To 25 LF, Add	6.67	
			For >25 To 100 LF, Add	3.34	
			For >1,000 LF, Deduct	-0.49	
07 71 13 00-0044	LF		>16" To 22" Wide (Stretch-out), 0.063" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	56.95	3.06
			For Up To 25 LF, Add	7.74	
			For >25 To 100 LF, Add	3.87	
			For >1,000 LF, Deduct	-0.51	
07 71 13 00-0045	LF		>22" To 30" Wide (Stretch-out), 0.063" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	71.35	3.36
			For Up To 25 LF, Add	9.38	
			For >25 To 100 LF, Add	4.69	
			For >1,000 LF, Deduct	-0.56	
07 71 13 00-0046	LF		>30" To 42" Wide (Stretch-out), 0.063" Thick, KYNAR 500® Finish, Aluminum Coping System With Galvanized Steel Cleats	92.66	3.51
			For Up To 25 LF, Add	11.61	
			For >25 To 100 LF, Add	5.80	
			For >1,000 LF, Deduct	-0.59	
07 71 13 00-0047			Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats (07 71 13 00-0008)		
			Note: Stretch-out width = face height + wall thickness + back leg. Coping system includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.		
07 71 13 00-0048			0.040" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats (07 71 13 00-0047)		
07 71 13 00-0049	LF		10" To 14" Wide (Stretch-out), 0.040" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	40.04	2.69
			For Up To 25 LF, Add	5.80	
			For >25 To 100 LF, Add	2.90	
			For >1,000 LF, Deduct	-0.45	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
07 71 13 00-0050 LF >14" To 16" Wide (Stretch-out), 0.040" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	42.71	2.91
<i>For Up To 25 LF, Add</i>	6.21	
<i>For >25 To 100 LF, Add</i>	3.11	
<i>For >1,000 LF, Deduct</i>	-0.49	
07 71 13 00-0051 LF >16" To 22" Wide (Stretch-out), 0.040" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	49.99	3.06
<i>For Up To 25 LF, Add</i>	7.04	
<i>For >25 To 100 LF, Add</i>	3.52	
<i>For >1,000 LF, Deduct</i>	-0.51	
07 71 13 00-0052 LF >22" To 30" Wide (Stretch-out), 0.040" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	59.87	3.36
<i>For Up To 25 LF, Add</i>	8.23	
<i>For >25 To 100 LF, Add</i>	4.11	
<i>For >1,000 LF, Deduct</i>	-0.56	
07 71 13 00-0053 LF >30" To 42" Wide (Stretch-out), 0.040" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	74.79	3.51
<i>For Up To 25 LF, Add</i>	9.82	
<i>For >25 To 100 LF, Add</i>	4.91	
<i>For >1,000 LF, Deduct</i>	-0.59	
07 71 13 00-0054 0.050" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats (07 71 13 00-0047)		
07 71 13 00-0055 LF 10" To 14" Wide (Stretch-out), 0.050" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	43.59	2.69
<i>For Up To 25 LF, Add</i>	6.15	
<i>For >25 To 100 LF, Add</i>	3.08	
<i>For >1,000 LF, Deduct</i>	-0.45	
07 71 13 00-0056 LF >14" To 16" Wide (Stretch-out), 0.050" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	46.50	2.91
<i>For Up To 25 LF, Add</i>	6.59	
<i>For >25 To 100 LF, Add</i>	3.30	
<i>For >1,000 LF, Deduct</i>	-0.49	
07 71 13 00-0057 LF >16" To 22" Wide (Stretch-out), 0.050" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	54.48	3.06
<i>For Up To 25 LF, Add</i>	7.49	
<i>For >25 To 100 LF, Add</i>	3.74	
<i>For >1,000 LF, Deduct</i>	-0.51	
07 71 13 00-0058 LF >22" To 30" Wide (Stretch-out), 0.050" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	65.29	3.36
<i>For Up To 25 LF, Add</i>	8.77	
<i>For >25 To 100 LF, Add</i>	4.38	
<i>For >1,000 LF, Deduct</i>	-0.56	
07 71 13 00-0059 LF >30" To 42" Wide (Stretch-out), 0.050" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	81.68	3.51
<i>For Up To 25 LF, Add</i>	10.51	
<i>For >25 To 100 LF, Add</i>	5.25	
<i>For >1,000 LF, Deduct</i>	-0.59	
07 71 13 00-0060 0.063" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats (07 71 13 00-0047)		
07 71 13 00-0061 LF 10" To 14" Wide (Stretch-out), 0.063" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	46.51	2.69
<i>For Up To 25 LF, Add</i>	6.44	
<i>For >25 To 100 LF, Add</i>	3.22	
<i>For >1,000 LF, Deduct</i>	-0.45	
07 71 13 00-0062 LF >14" To 16" Wide (Stretch-out), 0.063" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	49.88	2.91
<i>For Up To 25 LF, Add</i>	6.93	
<i>For >25 To 100 LF, Add</i>	3.46	
<i>For >1,000 LF, Deduct</i>	-0.49	
07 71 13 00-0063 LF >16" To 22" Wide (Stretch-out), 0.063" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	60.06	3.06
<i>For Up To 25 LF, Add</i>	8.05	
<i>For >25 To 100 LF, Add</i>	4.02	
<i>For >1,000 LF, Deduct</i>	-0.51	
07 71 13 00-0064 LF >22" To 30" Wide (Stretch-out), 0.063" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	75.29	3.36
<i>For Up To 25 LF, Add</i>	9.77	
<i>For >25 To 100 LF, Add</i>	4.88	
<i>For >1,000 LF, Deduct</i>	-0.56	
07 71 13 00-0065 LF >30" To 42" Wide (Stretch-out), 0.063" Thick, Clear Anodized Finish, Aluminum Coping System With Galvanized Steel Cleats	97.86	3.51
<i>For Up To 25 LF, Add</i>	12.13	
<i>For >25 To 100 LF, Add</i>	6.06	
<i>For >1,000 LF, Deduct</i>	-0.59	
07 71 13 00-0066 Removal And Reinstallation Of Metal Coping (07 71 13)		
07 71 13 00-0067 LF Removal And Reinstallation Of Metal Coping	8.49	
<i>For Up To 25 LF, Add</i>	4.25	
<i>For >25 To 100 LF, Add</i>	2.12	
<i>For >1,000 LF, Deduct</i>	-0.85	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 71 19 Manufactured Gravel Stops and Fasciae (07 71)

07 71 19 00-0001	Gravel Stop (07 71 19)		
07 71 19 00-0002	Aluminum Gravel Stop (07 71 19 00-0001)		
07 71 19 00-0003	Aluminum Gravel Stop (07 71 19 00-0002)		
07 71 19 00-0004	KYNAR 500® Finish, Aluminum Gravel Stop (07 71 19 00-0003)		
07 71 19 00-0005	0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop (07 71 19 00-0004)		
07 71 19 00-0006	LF 4" To 6" Face Height, 0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	40.30	2.12
	For Up To 25 LF, Add	6.52	
	For >25 To 100 LF, Add	3.26	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0007	LF >6" To 10" Face Height, 0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	41.69	2.49
	For Up To 25 LF, Add	7.11	
	For >25 To 100 LF, Add	3.55	
	For >1,000 LF, Deduct	-0.73	
07 71 19 00-0008	LF >10" To 18" Face Height, 0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	43.13	2.74
	For Up To 25 LF, Add	7.65	
	For >25 To 100 LF, Add	3.82	
	For >1,000 LF, Deduct	-0.83	
07 71 19 00-0009	0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop (07 71 19 00-0004)		
07 71 19 00-0010	LF 4" To 6" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	42.81	2.12
	For Up To 25 LF, Add	6.77	
	For >25 To 100 LF, Add	3.38	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0011	LF >6" To 10" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	44.31	2.49
	For Up To 25 LF, Add	7.37	
	For >25 To 100 LF, Add	3.68	
	For >1,000 LF, Deduct	-0.73	
07 71 19 00-0012	LF >10" To 18" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	45.89	2.74
	For Up To 25 LF, Add	7.92	
	For >25 To 100 LF, Add	3.96	
	For >1,000 LF, Deduct	-0.83	
07 71 19 00-0013	0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop (07 71 19 00-0004)		
07 71 19 00-0014	LF 4" To 6" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	46.08	2.12
	For Up To 25 LF, Add	7.10	
	For >25 To 100 LF, Add	3.55	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0015	LF >6" To 10" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	47.44	2.49
	For Up To 25 LF, Add	7.68	
	For >25 To 100 LF, Add	3.84	
	For >1,000 LF, Deduct	-0.73	
07 71 19 00-0016	LF >10" To 18" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	49.37	2.74
	For Up To 25 LF, Add	8.27	
	For >25 To 100 LF, Add	4.13	
	For >1,000 LF, Deduct	-0.83	
07 71 19 00-0017	0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop (07 71 19 00-0004)		
07 71 19 00-0018	LF 4" To 6" Face Height, 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	48.30	2.12
	For Up To 25 LF, Add	7.32	
	For >25 To 100 LF, Add	3.66	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0019	LF >6" To 10" Face Height, 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	49.74	2.49
	For Up To 25 LF, Add	7.91	
	For >25 To 100 LF, Add	3.96	
	For >1,000 LF, Deduct	-0.73	
07 71 19 00-0020	LF >10" To 18" Face Height, 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop.....	51.81	2.74
	For Up To 25 LF, Add	8.51	
	For >25 To 100 LF, Add	4.26	
	For >1,000 LF, Deduct	-0.83	
07 71 19 00-0021	Mill Finish, Aluminum Gravel Stop (07 71 19 00-0003)		
07 71 19 00-0022	0.032" Thick, Mill Finish, Aluminum Gravel Stop (07 71 19 00-0021)		
07 71 19 00-0023	LF 4" To 6" Face Height, 0.032" Thick, Mill Finish, Aluminum Gravel Stop.....	26.39	2.12
	For Up To 25 LF, Add	5.13	
	For >25 To 100 LF, Add	2.56	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0024	LF >6" To 10" Face Height, 0.032" Thick, Mill Finish, Aluminum Gravel Stop.....	28.49	2.49
	For Up To 25 LF, Add	5.79	
	For >25 To 100 LF, Add	2.89	
	For >1,000 LF, Deduct	-0.73	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0025 LF >10" To 18" Face Height, 0.032" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	30.59 6.39 3.20 -0.83	2.74
07 71 19 00-0026 0.040" Thick, Mill Finish, Aluminum Gravel Stop (07 71 19 00-0021)		
07 71 19 00-0027 LF 4" To 6" Face Height, 0.040" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	28.48 5.34 2.67 -0.62	2.12
07 71 19 00-0028 LF >6" To 10" Face Height, 0.040" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	30.30 5.97 2.98 -0.73	2.49
07 71 19 00-0029 LF >10" To 18" Face Height, 0.040" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	31.98 6.53 3.27 -0.83	2.74
07 71 19 00-0030 0.050" Thick, Mill Finish, Aluminum Gravel Stop (07 71 19 00-0021)		
07 71 19 00-0031 LF 4" To 6" Face Height, 0.050" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	30.57 5.55 2.77 -0.62	2.12
07 71 19 00-0032 LF >6" To 10" Face Height, 0.050" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	32.38 6.17 3.09 -0.73	2.49
07 71 19 00-0033 LF >10" To 18" Face Height, 0.050" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	34.24 6.76 3.38 -0.83	2.74
07 71 19 00-0034 0.063" Thick, Mill Finish, Aluminum Gravel Stop (07 71 19 00-0021)		
07 71 19 00-0035 LF 4" To 6" Face Height, 0.063" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	32.83 5.77 2.89 -0.62	2.12
07 71 19 00-0036 LF >6" To 10" Face Height, 0.063" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	34.47 6.38 3.19 -0.73	2.49
07 71 19 00-0037 LF >10" To 18" Face Height, 0.063" Thick, Mill Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	35.92 6.92 3.46 -0.83	2.74
07 71 19 00-0038 Clear Anodized Finish, Aluminum Gravel Stop (07 71 19 00-0003)		
07 71 19 00-0039 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop (07 71 19 00-0038)		
07 71 19 00-0040 LF 4" To 6" Face Height, 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	48.02 7.29 3.65 -0.62	2.12
07 71 19 00-0041 LF >6" To 10" Face Height, 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	49.75 7.91 3.96 -0.73	2.49
07 71 19 00-0042 LF >10" To 18" Face Height, 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	51.30 8.46 4.23 -0.83	2.74
07 71 19 00-0043 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop (07 71 19 00-0038)		
07 71 19 00-0044 LF 4" To 6" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	51.03 7.59 3.80 -0.62	2.12
07 71 19 00-0045 LF >6" To 10" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	52.89 8.23 4.11 -0.73	2.49
07 71 19 00-0046 LF >10" To 18" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop <i>For Up To 25 LF, Add</i> <i>For >25 To 100 LF, Add</i> <i>For >1,000 LF, Deduct</i>	54.59 8.79 4.40 -0.83	2.74
07 71 19 00-0047 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop (07 71 19 00-0038)		

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0048	LF		4" To 6" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop	54.95	2.12
			<i>For Up To 25 LF, Add</i>	7.98	
			<i>For >25 To 100 LF, Add</i>	3.99	
			<i>For >1,000 LF, Deduct</i>	-0.62	
07 71 19 00-0049	LF		>6" To 10" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop	56.65	2.49
			<i>For Up To 25 LF, Add</i>	8.60	
			<i>For >25 To 100 LF, Add</i>	4.30	
			<i>For >1,000 LF, Deduct</i>	-0.73	
07 71 19 00-0050	LF		>10" To 18" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop	58.07	2.74
			<i>For Up To 25 LF, Add</i>	9.14	
			<i>For >25 To 100 LF, Add</i>	4.57	
			<i>For >1,000 LF, Deduct</i>	-0.83	
07 71 19 00-0051			0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop (07 71 19 00-0038)		
07 71 19 00-0052	LF		4" To 6" Face Height, 0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop	57.62	2.12
			<i>For Up To 25 LF, Add</i>	8.25	
			<i>For >25 To 100 LF, Add</i>	4.13	
			<i>For >1,000 LF, Deduct</i>	-0.62	
07 71 19 00-0053	LF		>6" To 10" Face Height, 0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop	59.41	2.49
			<i>For Up To 25 LF, Add</i>	8.88	
			<i>For >25 To 100 LF, Add</i>	4.44	
			<i>For >1,000 LF, Deduct</i>	-0.73	
07 71 19 00-0054	LF		>10" To 18" Face Height, 0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop	60.94	2.74
			<i>For Up To 25 LF, Add</i>	9.43	
			<i>For >25 To 100 LF, Add</i>	4.71	
			<i>For >1,000 LF, Deduct</i>	-0.83	
07 71 19 00-0055			Aluminum Gravel Stop System With Continuous Cleat (07 71 19 00-0002)		
			Note: Includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.		
07 71 19 00-0056			KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat (07 71 19 00-0055)		
07 71 19 00-0057			0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat (07 71 19 00-0056)		
07 71 19 00-0058	LF		4" To 6" Face Height, 0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	45.45	2.24
			<i>For Up To 25 LF, Add</i>	7.29	
			<i>For >25 To 100 LF, Add</i>	3.64	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0059	LF		>6" To 10" Face Height, 0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	48.36	2.67
			<i>For Up To 25 LF, Add</i>	8.07	
			<i>For >25 To 100 LF, Add</i>	4.04	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0060	LF		>10" To 18" Face Height, 0.032" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	51.66	3.05
			<i>For Up To 25 LF, Add</i>	8.85	
			<i>For >25 To 100 LF, Add</i>	4.42	
			<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0061			0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat (07 71 19 00-0056)		
07 71 19 00-0062	LF		4" To 6" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	47.96	2.24
			<i>For Up To 25 LF, Add</i>	7.54	
			<i>For >25 To 100 LF, Add</i>	3.77	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0063	LF		>6" To 10" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	50.97	2.67
			<i>For Up To 25 LF, Add</i>	8.33	
			<i>For >25 To 100 LF, Add</i>	4.17	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0064	LF		>10" To 18" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	54.42	3.05
			<i>For Up To 25 LF, Add</i>	9.12	
			<i>For >25 To 100 LF, Add</i>	4.56	
			<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0065			0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat (07 71 19 00-0056)		
07 71 19 00-0066	LF		4" To 6" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	51.23	2.24
			<i>For Up To 25 LF, Add</i>	7.86	
			<i>For >25 To 100 LF, Add</i>	3.93	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0067	LF		>6" To 10" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat	54.11	2.67
			<i>For Up To 25 LF, Add</i>	8.65	
			<i>For >25 To 100 LF, Add</i>	4.32	
			<i>For >1,000 LF, Deduct</i>	-0.81	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0068 LF >10" To 18" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat.....	57.89	3.05
<i>For Up To 25 LF, Add</i>	9.47	
<i>For >25 To 100 LF, Add</i>	4.73	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0069 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0056)</small>		
07 71 19 00-0070 LF 4" To 6" Face Height, 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat.....	53.45	2.24
<i>For Up To 25 LF, Add</i>	8.09	
<i>For >25 To 100 LF, Add</i>	4.04	
<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0071 LF >6" To 10" Face Height, 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat.....	56.41	2.67
<i>For Up To 25 LF, Add</i>	8.88	
<i>For >25 To 100 LF, Add</i>	4.44	
<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0072 LF >10" To 18" Face Height, 0.063" Thick, KYNAR 500® Finish, Aluminum Gravel Stop System With Continuous Cleat.....	60.33	3.05
<i>For Up To 25 LF, Add</i>	9.71	
<i>For >25 To 100 LF, Add</i>	4.86	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0073 Mill Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0055)</small>		
07 71 19 00-0074 0.032" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0073)</small>		
07 71 19 00-0075 LF 4" To 6" Face Height, 0.032" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	33.47	2.24
<i>For Up To 25 LF, Add</i>	6.09	
<i>For >25 To 100 LF, Add</i>	3.04	
<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0076 LF >6" To 10" Face Height, 0.032" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	35.86	2.67
<i>For Up To 25 LF, Add</i>	6.82	
<i>For >25 To 100 LF, Add</i>	3.41	
<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0077 LF >10" To 18" Face Height, 0.032" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	38.59	3.05
<i>For Up To 25 LF, Add</i>	7.54	
<i>For >25 To 100 LF, Add</i>	3.77	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0078 0.040" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0073)</small>		
07 71 19 00-0079 LF 4" To 6" Face Height, 0.040" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	35.20	2.24
<i>For Up To 25 LF, Add</i>	6.26	
<i>For >25 To 100 LF, Add</i>	3.13	
<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0080 LF >6" To 10" Face Height, 0.040" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	37.67	2.67
<i>For Up To 25 LF, Add</i>	7.00	
<i>For >25 To 100 LF, Add</i>	3.50	
<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0081 LF >10" To 18" Face Height, 0.040" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	40.50	3.05
<i>For Up To 25 LF, Add</i>	7.73	
<i>For >25 To 100 LF, Add</i>	3.87	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0082 0.050" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0073)</small>		
07 71 19 00-0083 LF 4" To 6" Face Height, 0.050" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	37.46	2.24
<i>For Up To 25 LF, Add</i>	6.49	
<i>For >25 To 100 LF, Add</i>	3.24	
<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0084 LF >6" To 10" Face Height, 0.050" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	39.82	2.67
<i>For Up To 25 LF, Add</i>	7.22	
<i>For >25 To 100 LF, Add</i>	3.61	
<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0085 LF >10" To 18" Face Height, 0.050" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	42.76	3.05
<i>For Up To 25 LF, Add</i>	7.96	
<i>For >25 To 100 LF, Add</i>	3.98	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0086 0.063" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0073)</small>		
07 71 19 00-0087 LF 4" To 6" Face Height, 0.063" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	38.99	2.24
<i>For Up To 25 LF, Add</i>	6.64	
<i>For >25 To 100 LF, Add</i>	3.32	
<i>For >1,000 LF, Deduct</i>	-0.69	

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0088	LF		>6" To 10" Face Height, 0.063" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	41.41	2.67
			<i>For Up To 25 LF, Add</i>	7.38	
			<i>For >25 To 100 LF, Add</i>	3.69	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0089	LF		>10" To 18" Face Height, 0.063" Thick, Mill Finish, Aluminum Gravel Stop System With Continuous Cleat.....	44.44	3.05
			<i>For Up To 25 LF, Add</i>	8.12	
			<i>For >25 To 100 LF, Add</i>	4.06	
			<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0090			Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0055)</small>		
07 71 19 00-0091			0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0090)</small>		
07 71 19 00-0092	LF		4" To 6" Face Height, 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	53.17	2.24
			<i>For Up To 25 LF, Add</i>	8.06	
			<i>For >25 To 100 LF, Add</i>	4.03	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0093	LF		>6" To 10" Face Height, 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	56.41	2.67
			<i>For Up To 25 LF, Add</i>	8.88	
			<i>For >25 To 100 LF, Add</i>	4.44	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0094	LF		>10" To 18" Face Height, 0.032" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	59.82	3.05
			<i>For Up To 25 LF, Add</i>	9.66	
			<i>For >25 To 100 LF, Add</i>	4.83	
			<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0095			0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0090)</small>		
07 71 19 00-0096	LF		4" To 6" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	56.18	2.24
			<i>For Up To 25 LF, Add</i>	8.36	
			<i>For >25 To 100 LF, Add</i>	4.18	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0097	LF		>6" To 10" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	59.55	2.67
			<i>For Up To 25 LF, Add</i>	9.19	
			<i>For >25 To 100 LF, Add</i>	4.60	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0098	LF		>10" To 18" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	63.11	3.05
			<i>For Up To 25 LF, Add</i>	9.99	
			<i>For >25 To 100 LF, Add</i>	5.00	
			<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0099			0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0090)</small>		
07 71 19 00-0100	LF		4" To 6" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	60.11	2.24
			<i>For Up To 25 LF, Add</i>	8.75	
			<i>For >25 To 100 LF, Add</i>	4.38	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0101	LF		>6" To 10" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	63.31	2.67
			<i>For Up To 25 LF, Add</i>	9.57	
			<i>For >25 To 100 LF, Add</i>	4.78	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0102	LF		>10" To 18" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	66.59	3.05
			<i>For Up To 25 LF, Add</i>	10.34	
			<i>For >25 To 100 LF, Add</i>	5.17	
			<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0103			0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0090)</small>		
07 71 19 00-0104	LF		4" To 6" Face Height, 0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	62.77	2.24
			<i>For Up To 25 LF, Add</i>	9.02	
			<i>For >25 To 100 LF, Add</i>	4.51	
			<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0105	LF		>6" To 10" Face Height, 0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	66.07	2.67
			<i>For Up To 25 LF, Add</i>	9.84	
			<i>For >25 To 100 LF, Add</i>	4.92	
			<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0106	LF		>10" To 18" Face Height, 0.063" Thick, Clear Anodized Finish, Aluminum Gravel Stop System With Continuous Cleat.....	69.46	3.05
			<i>For Up To 25 LF, Add</i>	10.63	
			<i>For >25 To 100 LF, Add</i>	5.31	
			<i>For >1,000 LF, Deduct</i>	-0.92	



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0107		Stainless Steel Gravel Stop <small>(07 71 19 00-0001)</small>		
07 71 19 00-0108		Stainless Steel Gravel Stop <small>(07 71 19 00-0107)</small>		
07 71 19 00-0109		26 Gauge, Stainless Steel Gravel Stop <small>(07 71 19 00-0108)</small>		
07 71 19 00-0110	LF	4" To 6" Face Height, 26 Gauge, Stainless Steel Gravel Stop.....	38.65	2.12
		For Up To 25 LF, Add	6.35	
		For >25 To 100 LF, Add	3.18	
		For >1,000 LF, Deduct	-0.62	
07 71 19 00-0111	LF	>6" To 10" Face Height, 26 Gauge, Stainless Steel Gravel Stop	50.74	2.49
		For Up To 25 LF, Add	8.01	
		For >25 To 100 LF, Add	4.01	
		For >1,000 LF, Deduct	-0.73	
07 71 19 00-0112	LF	>10" To 18" Face Height, 26 Gauge, Stainless Steel Gravel Stop	75.15	2.74
		For Up To 25 LF, Add	10.85	
		For >25 To 100 LF, Add	5.42	
		For >1,000 LF, Deduct	-0.83	
07 71 19 00-0113		24 Gauge, Stainless Steel Gravel Stop <small>(07 71 19 00-0108)</small>		
07 71 19 00-0114	LF	4" To 6" Face Height, 24 Gauge, Stainless Steel Gravel Stop.....	48.05	2.12
		For Up To 25 LF, Add	7.29	
		For >25 To 100 LF, Add	3.65	
		For >1,000 LF, Deduct	-0.62	
07 71 19 00-0115	LF	>6" To 10" Face Height, 24 Gauge, Stainless Steel Gravel Stop	63.28	2.49
		For Up To 25 LF, Add	9.26	
		For >25 To 100 LF, Add	4.63	
		For >1,000 LF, Deduct	-0.73	
07 71 19 00-0116	LF	>10" To 18" Face Height, 24 Gauge, Stainless Steel Gravel Stop	93.96	2.74
		For Up To 25 LF, Add	12.73	
		For >25 To 100 LF, Add	6.36	
		For >1,000 LF, Deduct	-0.83	
07 71 19 00-0117		22 Gauge, Stainless Steel Gravel Stop <small>(07 71 19 00-0108)</small>		
07 71 19 00-0118	LF	4" To 6" Face Height, 22 Gauge, Stainless Steel Gravel Stop.....	58.05	2.12
		For Up To 25 LF, Add	8.29	
		For >25 To 100 LF, Add	4.15	
		For >1,000 LF, Deduct	-0.62	
07 71 19 00-0119	LF	>6" To 10" Face Height, 22 Gauge, Stainless Steel Gravel Stop	76.61	2.49
		For Up To 25 LF, Add	10.60	
		For >25 To 100 LF, Add	5.30	
		For >1,000 LF, Deduct	-0.73	
07 71 19 00-0120	LF	>10" To 18" Face Height, 22 Gauge, Stainless Steel Gravel Stop	113.95	2.74
		For Up To 25 LF, Add	14.73	
		For >25 To 100 LF, Add	7.36	
		For >1,000 LF, Deduct	-0.83	
07 71 19 00-0121		Stainless Steel Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0107)</small>		
		Note: Includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.		
07 71 19 00-0122		26 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0121)</small>		
07 71 19 00-0123	LF	4" To 6" Face Height, 26 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat	45.65	2.24
		For Up To 25 LF, Add	7.31	
		For >25 To 100 LF, Add	3.65	
		For >1,000 LF, Deduct	-0.69	
07 71 19 00-0124	LF	>6" To 10" Face Height, 26 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat.....	59.82	2.67
		For Up To 25 LF, Add	9.22	
		For >25 To 100 LF, Add	4.61	
		For >1,000 LF, Deduct	-0.81	
07 71 19 00-0125	LF	>10" To 18" Face Height, 26 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat.....	86.80	3.05
		For Up To 25 LF, Add	12.36	
		For >25 To 100 LF, Add	6.18	
		For >1,000 LF, Deduct	-0.92	
07 71 19 00-0126		24 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0121)</small>		
07 71 19 00-0127	LF	4" To 6" Face Height, 24 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat	55.05	2.24
		For Up To 25 LF, Add	8.25	
		For >25 To 100 LF, Add	4.12	
		For >1,000 LF, Deduct	-0.69	
07 71 19 00-0128	LF	>6" To 10" Face Height, 24 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat.....	72.36	2.67
		For Up To 25 LF, Add	10.47	
		For >25 To 100 LF, Add	5.24	
		For >1,000 LF, Deduct	-0.81	
07 71 19 00-0129	LF	>10" To 18" Face Height, 24 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat.....	105.61	3.05
		For Up To 25 LF, Add	14.24	
		For >25 To 100 LF, Add	7.12	
		For >1,000 LF, Deduct	-0.92	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 71 19 00-0130	22 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat ^(07 71 19 00-0121)		
07 71 19 00-0131	LF 4" To 6" Face Height, 22 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat	65.05	2.24
	For Up To 25 LF, Add	9.25	
	For >25 To 100 LF, Add	4.62	
	For >1,000 LF, Deduct	-0.69	
07 71 19 00-0132	LF >6" To 10" Face Height, 22 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat	85.69	2.67
	For Up To 25 LF, Add	11.81	
	For >25 To 100 LF, Add	5.90	
	For >1,000 LF, Deduct	-0.81	
07 71 19 00-0133	LF >10" To 18" Face Height, 22 Gauge, Stainless Steel Gravel Stop System With Continuous Cleat	125.59	3.05
	For Up To 25 LF, Add	16.24	
	For >25 To 100 LF, Add	8.12	
	For >1,000 LF, Deduct	-0.92	
07 71 19 00-0134	Galvanized Steel Gravel Stop ^(07 71 19 00-0001)		
07 71 19 00-0135	Galvanized Steel Gravel Stop ^(07 71 19 00-0134)		
07 71 19 00-0136	KYNAR 500® Finish, Galvanized Steel Gravel Stop ^(07 71 19 00-0135)		
07 71 19 00-0137	24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop ^(07 71 19 00-0136)		
07 71 19 00-0138	LF 4" To 6" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop	37.00	2.12
	For Up To 25 LF, Add	6.19	
	For >25 To 100 LF, Add	3.09	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0139	LF >6" To 10" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop	38.34	2.49
	For Up To 25 LF, Add	6.77	
	For >25 To 100 LF, Add	3.39	
	For >1,000 LF, Deduct	-0.73	
07 71 19 00-0140	LF >10" To 18" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop	39.94	2.74
	For Up To 25 LF, Add	7.33	
	For >25 To 100 LF, Add	3.66	
	For >1,000 LF, Deduct	-0.83	
07 71 19 00-0141	Galvanized Steel Gravel Stop System With Continuous Cleat ^(07 71 19 00-0134)		
	Note: Includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.		
07 71 19 00-0142	KYNAR 500® Finish, Galvanized Steel Gravel Stop System With Continuous Cleat ^(07 71 19 00-0141)		
07 71 19 00-0143	24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop System With Continuous Cleat ^(07 71 19 00-0142)		
07 71 19 00-0144	LF 4" To 6" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop System With Continuous Cleat	42.30	2.24
	For Up To 25 LF, Add	6.97	
	For >25 To 100 LF, Add	3.49	
	For >1,000 LF, Deduct	-0.69	
07 71 19 00-0145	LF >6" To 10" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop System With Continuous Cleat	45.19	2.67
	For Up To 25 LF, Add	7.76	
	For >25 To 100 LF, Add	3.88	
	For >1,000 LF, Deduct	-0.81	
07 71 19 00-0146	LF >10" To 18" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Gravel Stop System With Continuous Cleat	48.71	3.05
	For Up To 25 LF, Add	8.55	
	For >25 To 100 LF, Add	4.28	
	For >1,000 LF, Deduct	-0.92	
07 71 19 00-0147	Copper Gravel Stop ^(07 71 19 00-0001)		
07 71 19 00-0148	Copper Gravel Stop ^(07 71 19 00-0147)		
07 71 19 00-0149	20 Ounce, Copper Gravel Stop ^(07 71 19 00-0148)		
07 71 19 00-0150	LF 4" To 6" Face Height, 20 Ounce, Copper Gravel Stop	61.72	2.12
	For Up To 25 LF, Add	8.66	
	For >25 To 100 LF, Add	4.33	
	For >1,000 LF, Deduct	-0.62	
07 71 19 00-0151	LF >6" To 10" Face Height, 20 Ounce, Copper Gravel Stop	70.68	2.49
	For Up To 25 LF, Add	10.00	
	For >25 To 100 LF, Add	5.00	
	For >1,000 LF, Deduct	-0.73	
07 71 19 00-0152	LF >10" To 18" Face Height, 20 Ounce, Copper Gravel Stop	81.65	2.74
	For Up To 25 LF, Add	11.50	
	For >25 To 100 LF, Add	5.75	
	For >1,000 LF, Deduct	-0.83	
07 71 19 00-0153	16 Ounce, Copper Gravel Stop ^(07 71 19 00-0148)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0154 LF 4" To 6" Face Height, 16 Ounce, Copper Gravel Stop.....	74.89	2.12
<i>For Up To 25 LF, Add</i>	9.98	
<i>For >25 To 100 LF, Add</i>	4.99	
<i>For >1,000 LF, Deduct</i>	-0.62	
07 71 19 00-0155 LF >6" To 10" Face Height, 16 Ounce, Copper Gravel Stop.....	86.77	2.49
<i>For Up To 25 LF, Add</i>	11.61	
<i>For >25 To 100 LF, Add</i>	5.81	
<i>For >1,000 LF, Deduct</i>	-0.73	
07 71 19 00-0156 LF >10" To 18" Face Height, 16 Ounce, Copper Gravel Stop.....	99.20	2.74
<i>For Up To 25 LF, Add</i>	13.25	
<i>For >25 To 100 LF, Add</i>	6.63	
<i>For >1,000 LF, Deduct</i>	-0.83	
07 71 19 00-0157 Copper Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0147)</small>		
<i>Note: Includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.</i>		
07 71 19 00-0158 20 Ounce, Copper Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0157)</small>		
07 71 19 00-0159 LF 4" To 6" Face Height, 20 Ounce, Copper Gravel Stop System With Continuous Cleat.....	64.25	2.24
<i>For Up To 25 LF, Add</i>	9.17	
<i>For >25 To 100 LF, Add</i>	4.58	
<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0160 LF >6" To 10" Face Height, 20 Ounce, Copper Gravel Stop System With Continuous Cleat.....	73.92	2.67
<i>For Up To 25 LF, Add</i>	10.63	
<i>For >25 To 100 LF, Add</i>	5.31	
<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0161 LF >10" To 18" Face Height, 20 Ounce, Copper Gravel Stop System With Continuous Cleat.....	85.74	3.05
<i>For Up To 25 LF, Add</i>	12.25	
<i>For >25 To 100 LF, Add</i>	6.13	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0162 16 Ounce, Copper Gravel Stop System With Continuous Cleat <small>(07 71 19 00-0157)</small>		
07 71 19 00-0163 LF 4" To 6" Face Height, 16 Ounce, Copper Gravel Stop System With Continuous Cleat.....	77.42	2.24
<i>For Up To 25 LF, Add</i>	10.48	
<i>For >25 To 100 LF, Add</i>	5.24	
<i>For >1,000 LF, Deduct</i>	-0.69	
07 71 19 00-0164 LF >6" To 10" Face Height, 16 Ounce, Copper Gravel Stop System With Continuous Cleat.....	90.01	2.67
<i>For Up To 25 LF, Add</i>	12.24	
<i>For >25 To 100 LF, Add</i>	6.12	
<i>For >1,000 LF, Deduct</i>	-0.81	
07 71 19 00-0165 LF >10" To 18" Face Height, 16 Ounce, Copper Gravel Stop System With Continuous Cleat.....	103.29	3.05
<i>For Up To 25 LF, Add</i>	14.01	
<i>For >25 To 100 LF, Add</i>	7.00	
<i>For >1,000 LF, Deduct</i>	-0.92	
07 71 19 00-0166 Fascia <small>(07 71 19)</small>		
07 71 19 00-0167 Snap-On Cover Fascia <small>(07 71 19 00-0166)</small>		
<i>Note: Includes matching joint splice plate, galvanized steel cleats and stainless steel fasteners.</i>		
07 71 19 00-0168 Galvanized Steel Snap-On Cover Fascia <small>(07 71 19 00-0167)</small>		
07 71 19 00-0169 KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia <small>(07 71 19 00-0168)</small>		
07 71 19 00-0170 24 Gauge, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia <small>(07 71 19 00-0169)</small>		
07 71 19 00-0171 LF 3" To 5" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia System With Continuous Cleat.....	45.17	3.11
<i>For Up To 25 LF, Add</i>	7.01	
<i>For >25 To 100 LF, Add</i>	3.50	
<i>For >1,000 LF, Deduct</i>	-0.62	
07 71 19 00-0172 LF >5" To 7" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia System With Continuous Cleat.....	50.79	3.23
<i>For Up To 25 LF, Add</i>	7.66	
<i>For >25 To 100 LF, Add</i>	3.83	
<i>For >1,000 LF, Deduct</i>	-0.65	
07 71 19 00-0173 LF >7" To 9" Face Height, 24 Gauge, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia System With Continuous Cleat.....	54.40	3.36
<i>For Up To 25 LF, Add</i>	8.13	
<i>For >25 To 100 LF, Add</i>	4.06	
<i>For >1,000 LF, Deduct</i>	-0.67	
07 71 19 00-0174 Accessories For KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems <small>(07 71 19 00-0169)</small>		
07 71 19 00-0175 Fascia Sumps For KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems <small>(07 71 19 00-0174)</small>		
07 71 19 00-0176 EA Fascia Sump For 3" To 5" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems.....	313.11	4.36
07 71 19 00-0177 EA Fascia Sump For >5" To 7" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems.....	334.40	4.36
07 71 19 00-0178 EA Fascia Sump For >7" To 9" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems.....	347.78	4.36

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 71 19 00-0179		Fascia Spillout Scuppers For KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems <small>(07 71 19 00-0174)</small>		
07 71 19 00-0180	EA	Fascia Spillout Scupper For 3" To 5" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems.....	255.12	4.36
07 71 19 00-0181	EA	Fascia Spillout Scupper For >5" To 7" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems	265.87	4.36
07 71 19 00-0182	EA	Fascia Spillout Scupper For >7" To 9" Face Height, KYNAR 500® Finish, Galvanized Steel Snap-On Cover Fascia Systems	272.41	4.36
07 71 19 00-0183		Aluminum Snap-On Cover Fascia <small>(07 71 19 00-0167)</small>		
07 71 19 00-0184		KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat <small>(07 71 19 00-0183)</small>		
07 71 19 00-0185		0.040" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat <small>(07 71 19 00-0184)</small>		
07 71 19 00-0186	LF	3" To 5" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat	27.78	3.11
		For Up To 25 LF, Add	5.27	
		For >25 To 100 LF, Add	2.63	
		For >1,000 LF, Deduct	-0.62	
07 71 19 00-0187	LF	>5" To 7" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat	31.42	3.23
		For Up To 25 LF, Add	5.73	
		For >25 To 100 LF, Add	2.86	
		For >1,000 LF, Deduct	-0.65	
07 71 19 00-0188	LF	>7" To 9" Face Height, 0.040" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat	33.36	3.36
		For Up To 25 LF, Add	6.02	
		For >25 To 100 LF, Add	3.01	
		For >1,000 LF, Deduct	-0.67	
07 71 19 00-0189		0.050" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat <small>(07 71 19 00-0184)</small>		
07 71 19 00-0190	LF	3" To 5" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat	29.19	3.11
		For Up To 25 LF, Add	5.41	
		For >25 To 100 LF, Add	2.70	
		For >1,000 LF, Deduct	-0.62	
07 71 19 00-0191	LF	>5" To 7" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat	33.24	3.23
		For Up To 25 LF, Add	5.91	
		For >25 To 100 LF, Add	2.95	
		For >1,000 LF, Deduct	-0.65	
07 71 19 00-0192	LF	>7" To 9" Face Height, 0.050" Thick, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat	35.39	3.36
		For Up To 25 LF, Add	6.23	
		For >25 To 100 LF, Add	3.11	
		For >1,000 LF, Deduct	-0.67	
07 71 19 00-0193		Accessories For KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems <small>(07 71 19 00-0184)</small>		
07 71 19 00-0194		Fascia Sumps For KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems <small>(07 71 19 00-0193)</small>		
07 71 19 00-0195	EA	Fascia Sump For 3" To 5" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems	180.30	4.36
07 71 19 00-0196	EA	Fascia Sump For >5" To 7" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems	195.54	4.36
07 71 19 00-0197	EA	Fascia Sump For >7" To 9" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems	202.21	4.36
07 71 19 00-0198		Fascia Spillout Scuppers For KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems <small>(07 71 19 00-0193)</small>		
07 71 19 00-0199	EA	Fascia Spillout Scupper For 3" To 5" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems.....	142.74	4.36
07 71 19 00-0200	EA	Fascia Spillout Scupper For >5" To 7" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems.....	150.33	4.36
07 71 19 00-0201	EA	Fascia Spillout Scupper For >7" To 9" Face Height, KYNAR 500® Finish, Aluminum Snap-On Cover Fascia Systems.....	153.65	4.36
07 71 19 00-0202		Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat <small>(07 71 19 00-0183)</small>		
07 71 19 00-0203		0.040" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat <small>(07 71 19 00-0202)</small>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 19 00-0204 LF 3" To 5" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat.....	32.09	3.11
<i>For Up To 25 LF, Add</i>	5.70	
<i>For >25 To 100 LF, Add</i>	2.85	
<i>For >1,000 LF, Deduct</i>	-0.62	
07 71 19 00-0205 LF >5" To 7" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat.....	36.42	3.23
<i>For Up To 25 LF, Add</i>	6.23	
<i>For >25 To 100 LF, Add</i>	3.11	
<i>For >1,000 LF, Deduct</i>	-0.65	
07 71 19 00-0206 LF >7" To 9" Face Height, 0.040" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat.....	38.68	3.36
<i>For Up To 25 LF, Add</i>	6.56	
<i>For >25 To 100 LF, Add</i>	3.28	
<i>For >1,000 LF, Deduct</i>	-0.67	
07 71 19 00-0207 0.050" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat <small>(07 71 19 00-0202)</small>		
07 71 19 00-0208 LF 3" To 5" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat.....	33.79	3.11
<i>For Up To 25 LF, Add</i>	5.87	
<i>For >25 To 100 LF, Add</i>	2.93	
<i>For >1,000 LF, Deduct</i>	-0.62	
07 71 19 00-0209 LF >5" To 7" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat.....	38.59	3.23
<i>For Up To 25 LF, Add</i>	6.44	
<i>For >25 To 100 LF, Add</i>	3.22	
<i>For >1,000 LF, Deduct</i>	-0.65	
07 71 19 00-0210 LF >7" To 9" Face Height, 0.050" Thick, Clear Anodized Finish, Aluminum Snap-On Cover Fascia System With Continuous Cleat.....	41.12	3.36
<i>For Up To 25 LF, Add</i>	6.80	
<i>For >25 To 100 LF, Add</i>	3.40	
<i>For >1,000 LF, Deduct</i>	-0.67	
07 71 19 00-0211 Accessories For Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems <small>(07 71 19 00-0202)</small>		
07 71 19 00-0212 Fascia Sumps For Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems <small>(07 71 19 00-0211)</small>		
07 71 19 00-0213 EA Fascia Sump For 3" To 5" Face Height, Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems.....	223.20	4.36
07 71 19 00-0214 EA Fascia Sump For >5" To 7" Face Height, Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems.....	242.25	4.36
07 71 19 00-0215 EA Fascia Sump For >7" To 9" Face Height, Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems.....	250.58	4.36
07 71 19 00-0216 Fascia Spillout Scuppers For Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems <small>(07 71 19 00-0211)</small>		
07 71 19 00-0217 EA Fascia Spillout Scupper For 3" To 5" Face Height, Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems.....	176.24	4.36
07 71 19 00-0218 EA Fascia Spillout Scupper For >5" To 7" Face Height, Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems.....	185.73	4.36
07 71 19 00-0219 EA Fascia Spillout Scupper For >7" To 9" Face Height, Clear Anodized Finish, Aluminum Snap-On Cover Fascia Systems.....	189.88	4.36
07 71 23 Manufactured Gutters and Downspouts <small>(07 71)</small>		
Note: Includes all necessary support straps.		
07 71 23 00-0001 Aluminum Gutters And Downspouts <small>(07 71 23)</small>		
07 71 23 00-0002 Aluminum Gutters <small>(07 71 23 00-0001)</small>		
Note: Includes drop outlets, hangers and fasteners. Excludes end caps, miters and downspouts.		
07 71 23 00-0003 K-Style Aluminum Gutters <small>(07 71 23 00-0002)</small>		
07 71 23 00-0004 LF 5", 0.027" Thick, K-Style Aluminum Gutter	11.04	4.52
<i>For Up To 100', Add</i>	2.22	
<i>For >100' To 250', Add</i>	0.93	
<i>For >1,000', Deduct</i>	-0.75	
<i>For Kynar 500® Finish, Add</i>	1.61	
07 71 23 00-0005 LF 6", 0.027" Thick, K-Style Aluminum Gutter	12.39	4.76
<i>For Up To 100', Add</i>	2.41	
<i>For >100' To 250', Add</i>	1.01	
<i>For >1,000', Deduct</i>	-0.78	
<i>For Kynar 500® Finish, Add</i>	2.06	
07 71 23 00-0006 LF 5", 0.032" Thick, K-Style Aluminum Gutter	11.56	4.52
<i>For Up To 100', Add</i>	2.28	
<i>For >100' To 250', Add</i>	0.95	
<i>For >1,000', Deduct</i>	-0.75	
<i>For Kynar 500® Finish, Add</i>	1.85	

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 71 23 00-0007	LF	6"	0.032" Thick, K-Style Aluminum Gutter	13.05	4.76
			<i>For Up To 100', Add</i>	2.48	
			<i>For >100' To 250', Add</i>	1.04	
			<i>For >1,000', Deduct</i>	-0.78	
			<i>For Kynar 500® Finish, Add</i>	2.35	
07 71 23 00-0008	LF	7"	0.032" Thick, K-Style Aluminum Gutter	25.33	5.01
			<i>For Up To 100', Add</i>	3.80	
			<i>For >100' To 250', Add</i>	1.69	
			<i>For >1,000', Deduct</i>	-0.84	
			<i>For Kynar 500® Finish, Add</i>	7.61	
07 71 23 00-0009	LF	8"	0.032" Thick, K-Style Aluminum Gutter	27.76	5.62
			<i>For Up To 100', Add</i>	4.17	
			<i>For >100' To 250', Add</i>	1.85	
			<i>For >1,000', Deduct</i>	-0.93	
			<i>For Kynar 500® Finish, Add</i>	8.31	
07 71 23 00-0010	LF	8"	0.040" Thick, K-Style Aluminum Gutter	31.33	5.62
			<i>For Up To 100', Add</i>	4.53	
			<i>For >100' To 250', Add</i>	2.03	
			<i>For >1,000', Deduct</i>	-0.93	
			<i>For Kynar 500® Finish, Add</i>	9.92	
07 71 23 00-0011			Half Round Aluminum Gutters (07 71 23 00-0002)		
07 71 23 00-0012	LF	5"	0.027" Thick, Half Round Aluminum Gutter	21.37	4.52
			<i>For Up To 100', Add</i>	3.26	
			<i>For >100' To 250', Add</i>	1.44	
			<i>For >1,000', Deduct</i>	-0.75	
			<i>For Kynar 500® Finish, Add</i>	6.26	
07 71 23 00-0013	LF	6"	0.032" Thick, Half Round Aluminum Gutter	25.93	4.76
			<i>For Up To 100', Add</i>	3.77	
			<i>For >100' To 250', Add</i>	1.69	
			<i>For >1,000', Deduct</i>	-0.78	
			<i>For Kynar 500® Finish, Add</i>	8.15	
07 71 23 00-0014			Box Style Aluminum Gutters (07 71 23 00-0002)		
07 71 23 00-0015	LF	6"	0.027" Thick, Box Style Aluminum Gutter	22.20	5.62
			<i>For Up To 100', Add</i>	3.61	
			<i>For >100' To 250', Add</i>	1.57	
			<i>For >1,000', Deduct</i>	-0.93	
			<i>For Kynar 500® Finish, Add</i>	5.81	
07 71 23 00-0016	LF	6"	0.032" Thick, Box Style Aluminum Gutter	22.26	5.62
			<i>For Up To 100', Add</i>	3.62	
			<i>For >100' To 250', Add</i>	1.58	
			<i>For >1,000', Deduct</i>	-0.93	
			<i>For Kynar 500® Finish, Add</i>	5.84	
07 71 23 00-0017	LF	7"	0.032" Thick, Box Style Aluminum Gutter	26.05	5.99
			<i>For Up To 100', Add</i>	4.09	
			<i>For >100' To 250', Add</i>	1.80	
			<i>For >1,000', Deduct</i>	-0.99	
			<i>For Kynar 500® Finish, Add</i>	7.27	
07 71 23 00-0018	LF	8"	0.032" Thick, Box Style Aluminum Gutter	29.54	6.35
			<i>For Up To 100', Add</i>	4.53	
			<i>For >100' To 250', Add</i>	2.00	
			<i>For >1,000', Deduct</i>	-1.05	
			<i>For Kynar 500® Finish, Add</i>	8.56	
07 71 23 00-0019			Aluminum Gutter End Caps (07 71 23 00-0001)		
07 71 23 00-0020			K-Style, Aluminum Gutter End Caps (07 71 23 00-0019)		
07 71 23 00-0021	EA	5"	K-Style Aluminum Gutter End Cap	3.69	
			<i>For Kynar 500® Finish, Add</i>	0.56	
07 71 23 00-0022	EA	6"	K-Style Aluminum Gutter End Cap	4.70	
			<i>For Kynar 500® Finish, Add</i>	1.01	
07 71 23 00-0023	EA	7"	K-Style Aluminum Gutter End Cap	10.86	
			<i>For Kynar 500® Finish, Add</i>	3.78	
07 71 23 00-0024	EA	8"	K-Style Aluminum Gutter End Cap	12.74	
			<i>For Kynar 500® Finish, Add</i>	4.63	
07 71 23 00-0025			Half Round, Aluminum Gutter End Caps (07 71 23 00-0019)		
07 71 23 00-0026	EA	5"	Half Round Aluminum Gutter End Cap	6.28	
			<i>For Kynar 500® Finish, Add</i>	1.72	
07 71 23 00-0027	EA	6"	Half Round Aluminum Gutter End Cap	10.01	
			<i>For Kynar 500® Finish, Add</i>	3.40	
07 71 23 00-0028			Box Style, Aluminum Gutter End Caps (07 71 23 00-0019)		
07 71 23 00-0029	EA	6"	Box Style Aluminum Gutter End Cap	11.89	
			<i>For Kynar 500® Finish, Add</i>	4.25	
07 71 23 00-0030	EA	7"	Box Style Aluminum Gutter End Cap	12.97	
			<i>For Kynar 500® Finish, Add</i>	4.73	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0031 EA 8", Box Style Aluminum Gutter End Cap..... <i>For Kynar 500® Finish, Add</i>	15.32 5.79	
07 71 23 00-0032 Aluminum Gutter Miters (07 71 23 00-0001) Note: Inside or outside miters.		
07 71 23 00-0033 K-Style, Aluminum Gutter Miters (07 71 23 00-0032)		
07 71 23 00-0034 EA 5", K-Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	22.18 4.43	
07 71 23 00-0035 EA 6", K-Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	30.23 7.66	
07 71 23 00-0036 EA 7", K-Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	96.02 36.89	
07 71 23 00-0037 EA 8", K-Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	104.29 40.17	
07 71 23 00-0038 Half Round, Aluminum Gutter Miters (07 71 23 00-0032)		
07 71 23 00-0039 EA 5", Half Round Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	40.24 12.56	
07 71 23 00-0040 EA 6", Half Round Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	64.59 23.13	
07 71 23 00-0041 Box Style, Aluminum Gutter Miters (07 71 23 00-0032)		
07 71 23 00-0042 EA 6", Box Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	77.44 28.91	
07 71 23 00-0043 EA 7", Box Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	116.53 46.12	
07 71 23 00-0044 EA 8", Box Style Aluminum Gutter Miter..... <i>For Kynar 500® Finish, Add</i>	126.60 50.21	
07 71 23 00-0045 Aluminum Gutter Wire Strainers (07 71 23 00-0001)		
07 71 23 00-0046 EA 3" Diameter, Round Aluminum Wire Strainer..... <i>For Kynar 500® Finish, Add</i> <i>For 0.024" Thick, Add</i> <i>For 0.027" Thick, Add</i> <i>For 0.031" Thick, Add</i>	15.63 4.17 1.30 2.69 3.89	3.06
07 71 23 00-0047 EA 4" Diameter, Round Aluminum Wire Strainer..... <i>For Kynar 500® Finish, Add</i> <i>For 0.024" Thick, Add</i> <i>For 0.027" Thick, Add</i> <i>For 0.031" Thick, Add</i>	23.43 7.68 2.39 4.95 7.17	3.06
07 71 23 00-0048 Aluminum Downspouts (07 71 23 00-0001) Note: Includes elbows, hangers and fasteners.		
07 71 23 00-0049 Round Aluminum Downspouts (07 71 23 00-0048)		
07 71 23 00-0050 LF 3" Diameter, 0.019" Thick, Round Aluminum Downspout..... <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 0.024" Thick, Add</i> <i>For 0.027" Thick, Add</i> <i>For 0.031" Thick, Add</i>	8.09 1.29 0.56 -0.32 2.21 0.69 1.42 2.06	2.93
07 71 23 00-0051 LF 4" Diameter, 0.019" Thick, Round Aluminum Downspout..... <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 0.024" Thick, Add</i> <i>For 0.027" Thick, Add</i> <i>For 0.031" Thick, Add</i>	9.24 1.40 0.62 -0.32 2.73 0.85 1.76 2.55	2.93
07 71 23 00-0052 Rectangular Aluminum Downspouts (07 71 23 00-0048)		
07 71 23 00-0053 LF 2" x 3", 0.019" Thick, Rectangular Aluminum Downspout..... <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 0.024" Thick, Add</i> <i>For 0.027" Thick, Add</i> <i>For 0.031" Thick, Add</i>	5.70 1.05 0.44 -0.32 1.13 0.35 0.73 1.06	2.93

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 71 23 00-0054	LF 3" x 4", 0.019" Thick, Rectangular Aluminum Downspout.....	7.16	2.93
	For Up To 100', Add	1.19	
	For >100 To 250', Add	0.52	
	For >1,000', Deduct	-0.32	
	For Kynar 500® Finish, Add	1.79	
	For 0.024" Thick, Add	0.56	
	For 0.027" Thick, Add	1.15	
	For 0.031" Thick, Add	1.67	
07 71 23 00-0055	LF 4" x 5", 0.019" Thick, Rectangular Aluminum Downspout.....	13.32	2.93
	For Up To 100', Add	1.81	
	For >100 To 250', Add	0.83	
	For >1,000', Deduct	-0.32	
	For Kynar 500® Finish, Add	4.56	
	For 0.024" Thick, Add	1.42	
	For 0.027" Thick, Add	2.94	
	For 0.031" Thick, Add	4.26	
07 71 23 00-0056	Aluminum Devices (07 71 23 00-0001)		
07 71 23 00-0057	EA Thru-Wall Aluminum Scupper Outlet.....	271.19	27.99
	For Kynar 500® Finish, Add	80.05	
07 71 23 00-0058	EA Aluminum Leader/Conductor Head.....	275.73	31.10
	For Kynar 500® Finish, Add	96.09	
07 71 23 00-0059	Copper Gutters And Downspouts (07 71 23)		
07 71 23 00-0060	Copper Gutters (07 71 23 00-0059)		
	Note: Includes drop outlets, hangers and fasteners. Excludes end caps, miters and downspouts.		
07 71 23 00-0061	K-Style Copper Gutters (07 71 23 00-0060)		
07 71 23 00-0062	LF 4", 16 Ounce, K-Style Copper Gutter.....	18.00	4.28
	For Up To 100', Add	2.86	
	For >100' To 250', Add	1.25	
	For >1,000', Deduct	-0.71	
07 71 23 00-0063	LF 5", 16 Ounce, K-Style Copper Gutter.....	25.18	4.52
	For Up To 100', Add	3.64	
	For >100' To 250', Add	1.63	
	For >1,000', Deduct	-0.75	
07 71 23 00-0064	LF 6", 16 Ounce, K-Style Copper Gutter.....	29.89	4.76
	For Up To 100', Add	4.16	
	For >100' To 250', Add	1.89	
	For >1,000', Deduct	-0.78	
07 71 23 00-0065	LF 5", 20 Ounce, K-Style Copper Gutter.....	31.55	4.52
	For Up To 100', Add	4.27	
	For >100' To 250', Add	1.95	
	For >1,000', Deduct	-0.75	
07 71 23 00-0066	LF 6", 20 Ounce, K-Style Copper Gutter.....	38.91	4.76
	For Up To 100', Add	5.06	
	For >100' To 250', Add	2.34	
	For >1,000', Deduct	-0.78	
07 71 23 00-0067	LF 7", 20 Ounce, K-Style Copper Gutter.....	45.44	5.01
	For Up To 100', Add	5.81	
	For >100' To 250', Add	2.69	
	For >1,000', Deduct	-0.84	
07 71 23 00-0068	LF 8", 20 Ounce, K-Style Copper Gutter.....	50.50	5.62
	For Up To 100', Add	6.44	
	For >100' To 250', Add	2.99	
	For >1,000', Deduct	-0.93	
07 71 23 00-0069	Half Round Copper Gutters (07 71 23 00-0060)		
07 71 23 00-0070	LF 5", 16 Ounce, Half Round Copper Gutter.....	21.86	4.52
	For Up To 100', Add	3.31	
	For >100' To 250', Add	1.47	
	For >1,000', Deduct	-0.75	
07 71 23 00-0071	LF 6", 16 Ounce, Half Round Copper Gutter.....	27.42	4.76
	For Up To 100', Add	3.92	
	For >100' To 250', Add	1.76	
	For >1,000', Deduct	-0.78	
07 71 23 00-0072	LF 7", 16 Ounce, Half Round Copper Gutter.....	45.33	5.01
	For Up To 100', Add	5.80	
	For >100' To 250', Add	2.69	
	For >1,000', Deduct	-0.84	
07 71 23 00-0073	LF 5", 20 Ounce, Half Round Copper Gutter.....	25.34	4.52
	For Up To 100', Add	3.65	
	For >100' To 250', Add	1.64	
	For >1,000', Deduct	-0.75	
07 71 23 00-0074	LF 6", 20 Ounce, Half Round Copper Gutter.....	31.11	4.76
	For Up To 100', Add	4.28	
	For >100' To 250', Add	1.95	
	For >1,000', Deduct	-0.78	
07 71 23 00-0075	LF 7", 20 Ounce, Half Round Copper Gutter.....	47.59	5.01
	For Up To 100', Add	6.02	
	For >100' To 250', Add	2.80	
	For >1,000', Deduct	-0.84	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0076 LF 8", 20 Ounce, Half Round Copper Gutter	54.03	5.62
For Up To 100', Add	6.80	
For >100' To 250', Add	3.17	
For >1,000', Deduct	-0.93	
07 71 23 00-0077 Box Style Copper Gutters (07 71 23 00-0060)		
07 71 23 00-0078 LF 5", 16 Ounce, Box Style Copper Gutter	25.47	5.13
For Up To 100', Add	3.83	
For >100' To 250', Add	1.70	
For >1,000', Deduct	-0.86	
07 71 23 00-0079 LF 6", 16 Ounce, Box Style Copper Gutter	27.42	5.62
For Up To 100', Add	4.14	
For >100' To 250', Add	1.84	
For >1,000', Deduct	-0.93	
07 71 23 00-0080 LF 7", 16 Ounce, Box Style Copper Gutter	33.07	5.99
For Up To 100', Add	4.79	
For >100' To 250', Add	2.15	
For >1,000', Deduct	-0.99	
07 71 23 00-0081 LF 8", 16 Ounce, Box Style Copper Gutter	33.83	6.35
For Up To 100', Add	4.96	
For >100' To 250', Add	2.22	
For >1,000', Deduct	-1.05	
07 71 23 00-0082 LF 5", 20 Ounce, Box Style Copper Gutter	28.87	5.13
For Up To 100', Add	4.17	
For >100' To 250', Add	1.87	
For >1,000', Deduct	-0.86	
07 71 23 00-0083 LF 6", 20 Ounce, Box Style Copper Gutter	30.81	5.62
For Up To 100', Add	4.47	
For >100' To 250', Add	2.01	
For >1,000', Deduct	-0.93	
07 71 23 00-0084 LF 7", 20 Ounce, Box Style Copper Gutter	36.47	5.99
For Up To 100', Add	5.13	
For >100' To 250', Add	2.32	
For >1,000', Deduct	-0.99	
07 71 23 00-0085 LF 8", 20 Ounce, Box Style Copper Gutter	37.22	6.35
For Up To 100', Add	5.30	
For >100' To 250', Add	2.39	
For >1,000', Deduct	-1.05	
07 71 23 00-0086 Copper Gutter End Caps (07 71 23 00-0059)		
07 71 23 00-0087 K-Style, Copper Gutter End Caps (07 71 23 00-0086)		
07 71 23 00-0088 EA 4", K-Style Copper Gutter End Cap	6.21	
07 71 23 00-0089 EA 5", K-Style Copper Gutter End Cap	6.63	
07 71 23 00-0090 EA 6", K-Style Copper Gutter End Cap	7.04	
07 71 23 00-0091 EA 7", K-Style Copper Gutter End Cap	18.17	
07 71 23 00-0092 EA 8", K-Style Copper Gutter End Cap	22.07	
07 71 23 00-0093 Half Round, Copper Gutter End Caps (07 71 23 00-0086)		
07 71 23 00-0094 EA 4", Half Round Copper Gutter End Cap	7.44	
07 71 23 00-0095 EA 5", Half Round Copper Gutter End Cap	8.32	
07 71 23 00-0096 EA 6", Half Round Copper Gutter End Cap	12.40	
07 71 23 00-0097 EA 7", Half Round Copper Gutter End Cap	36.63	
07 71 23 00-0098 EA 8", Half Round Copper Gutter End Cap	43.20	
07 71 23 00-0099 Box Style, Copper Gutter End Caps (07 71 23 00-0086)		
07 71 23 00-0100 EA 5", Box Style Copper Gutter End Cap	14.00	
07 71 23 00-0101 EA 6", Box Style Copper Gutter End Cap	14.68	
07 71 23 00-0102 EA 7", Box Style Copper Gutter End Cap	15.35	
07 71 23 00-0103 EA 8", Box Style Copper Gutter End Cap	16.71	
07 71 23 00-0104 Copper Gutter Miters (07 71 23 00-0059)		
Note: Inside or outside miters.		
07 71 23 00-0105 K-Style, Copper Gutter Miters (07 71 23 00-0104)		
07 71 23 00-0106 EA 4", K-Style Copper Gutter Miter	39.36	
07 71 23 00-0107 EA 5", K-Style Copper Gutter Miter	44.50	
07 71 23 00-0108 EA 6", K-Style Copper Gutter Miter	63.44	
07 71 23 00-0109 EA 7", K-Style Copper Gutter Miter	89.13	
07 71 23 00-0110 EA 8", K-Style Copper Gutter Miter	104.37	
07 71 23 00-0111 Half Round, Copper Gutter Miters (07 71 23 00-0104)		
07 71 23 00-0112 EA 4", Half Round Copper Gutter Miter	60.60	
07 71 23 00-0113 EA 5", Half Round Copper Gutter Miter	56.27	
07 71 23 00-0114 EA 6", Half Round Copper Gutter Miter	80.47	
07 71 23 00-0115 EA 7", Half Round Copper Gutter Miter	95.74	
07 71 23 00-0116 EA 8", Half Round Copper Gutter Miter	112.93	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0117			Box Style, Copper Gutter Miters (07 71 23 00-0104)		
07 71 23 00-0118	EA		5", 16 Ounce Box Style Copper Gutter Miter	66.61	
07 71 23 00-0119	EA		6", 16 Ounce Box Style Copper Gutter Miter	68.83	
07 71 23 00-0120	EA		7", 16 Ounce Box Style Copper Gutter Miter	75.11	
07 71 23 00-0121	EA		8", 16 Ounce Box Style Copper Gutter Miter	76.71	
07 71 23 00-0122	EA		5", 20 Ounce Box Style Copper Gutter Miter	73.40	
07 71 23 00-0123	EA		6", 20 Ounce Box Style Copper Gutter Miter	75.62	
07 71 23 00-0124	EA		7", 20 Ounce Box Style Copper Gutter Miter	81.90	
07 71 23 00-0125	EA		8", 20 Ounce Box Style Copper Gutter Miter	89.67	
07 71 23 00-0126			Copper Gutter Wire Strainers (07 71 23 00-0059)		
07 71 23 00-0127	EA		2" Diameter, Round Copper Wire Strainer	20.38	3.06
07 71 23 00-0128	EA		3" Diameter, Round Copper Wire Strainer	24.99	3.06
07 71 23 00-0129	EA		4" Diameter, Round Copper Wire Strainer	40.03	3.06
07 71 23 00-0130	EA		5" Diameter, Round Copper Wire Strainer	53.13	3.06
07 71 23 00-0131	EA		6" Diameter, Round Copper Wire Strainer	64.11	3.06
07 71 23 00-0132			Copper Downspouts (07 71 23 00-0059) Note: Includes elbows, hangers and fasteners.		
07 71 23 00-0133			Round Copper Downspouts (07 71 23 00-0132)		
07 71 23 00-0134	LF		2" Diameter, 16 Ounce, Round Copper Downspout	24.72	2.93
			For Up To 100', Add	2.95	
			For >100 To 250', Add	1.40	
			For >1,000', Deduct	-0.32	
07 71 23 00-0135	LF		3" Diameter, 16 Ounce, Round Copper Downspout	17.37	2.93
			For Up To 100', Add	2.21	
			For >100 To 250', Add	1.03	
			For >1,000', Deduct	-0.32	
07 71 23 00-0136	LF		4" Diameter, 16 Ounce, Round Copper Downspout	21.76	2.93
			For Up To 100', Add	2.65	
			For >100 To 250', Add	1.25	
			For >1,000', Deduct	-0.32	
07 71 23 00-0137	LF		5" Diameter, 16 Ounce, Round Copper Downspout	34.48	2.93
			For Up To 100', Add	3.93	
			For >100 To 250', Add	1.88	
			For >1,000', Deduct	-0.32	
07 71 23 00-0138	LF		6" Diameter, 16 Ounce, Round Copper Downspout	44.19	2.93
			For Up To 100', Add	4.90	
			For >100 To 250', Add	2.37	
			For >1,000', Deduct	-0.32	
07 71 23 00-0139	LF		3" Diameter, 20 Ounce, Round Copper Downspout	23.32	2.93
			For Up To 100', Add	2.81	
			For >100 To 250', Add	1.33	
			For >1,000', Deduct	-0.32	
07 71 23 00-0140	LF		4" Diameter, 20 Ounce, Round Copper Downspout	30.11	2.93
			For Up To 100', Add	3.49	
			For >100 To 250', Add	1.66	
			For >1,000', Deduct	-0.32	
07 71 23 00-0141	LF		5" Diameter, 20 Ounce, Round Copper Downspout	45.52	2.93
			For Up To 100', Add	5.03	
			For >100 To 250', Add	2.44	
			For >1,000', Deduct	-0.32	
07 71 23 00-0142			Square Copper Downspouts (07 71 23 00-0132)		
07 71 23 00-0143	LF		3" Diameter, 16 Ounce, Square Copper Downspout	12.18	2.93
			For Up To 100', Add	1.70	
			For >100 To 250', Add	0.77	
			For >1,000', Deduct	-0.32	
07 71 23 00-0144	LF		4" Diameter, 16 Ounce, Square Copper Downspout	15.10	2.93
			For Up To 100', Add	1.99	
			For >100 To 250', Add	0.91	
			For >1,000', Deduct	-0.32	
07 71 23 00-0145	LF		5" Diameter, 16 Ounce, Square Copper Downspout	21.40	2.93
			For Up To 100', Add	2.62	
			For >100 To 250', Add	1.23	
			For >1,000', Deduct	-0.32	
07 71 23 00-0146	LF		3" Diameter, 20 Ounce, Square Copper Downspout	13.98	2.93
			For Up To 100', Add	1.88	
			For >100 To 250', Add	0.86	
			For >1,000', Deduct	-0.32	
07 71 23 00-0147	LF		4" Diameter, 20 Ounce, Square Copper Downspout	17.63	2.93
			For Up To 100', Add	2.24	
			For >100 To 250', Add	1.04	
			For >1,000', Deduct	-0.32	
07 71 23 00-0148	LF		5" Diameter, 20 Ounce, Square Copper Downspout	25.11	2.93
			For Up To 100', Add	2.99	
			For >100 To 250', Add	1.41	
			For >1,000', Deduct	-0.32	



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 71 23 00-0149		Rectangular Copper Downspouts <small>(07 71 23 00-0132)</small>		
07 71 23 00-0150	LF	2" x 3", 16 Ounce, Rectangular Copper Downspout.....	17.82	2.93
		<i>For Up To 100', Add</i>	2.26	
		<i>For >100 To 250', Add</i>	1.05	
		<i>For >1,000', Deduct</i>	-0.32	
07 71 23 00-0151	LF	3" x 4", 16 Ounce, Rectangular Copper Downspout.....	22.41	2.93
		<i>For Up To 100', Add</i>	2.72	
		<i>For >100 To 250', Add</i>	1.28	
		<i>For >1,000', Deduct</i>	-0.32	
07 71 23 00-0152	LF	4" x 5", 16 Ounce, Rectangular Copper Downspout.....	31.67	2.93
		<i>For Up To 100', Add</i>	3.64	
		<i>For >100 To 250', Add</i>	1.74	
		<i>For >1,000', Deduct</i>	-0.32	
07 71 23 00-0153	LF	2" x 3", 20 Ounce, Rectangular Copper Downspout.....	20.67	2.93
		<i>For Up To 100', Add</i>	2.54	
		<i>For >100 To 250', Add</i>	1.19	
		<i>For >1,000', Deduct</i>	-0.32	
07 71 23 00-0154	LF	3" x 4", 20 Ounce, Rectangular Copper Downspout.....	26.36	2.93
		<i>For Up To 100', Add</i>	3.11	
		<i>For >100 To 250', Add</i>	1.48	
		<i>For >1,000', Deduct</i>	-0.32	
07 71 23 00-0155	LF	4" x 5", 20 Ounce, Rectangular Copper Downspout.....	37.63	2.93
		<i>For Up To 100', Add</i>	4.24	
		<i>For >100 To 250', Add</i>	2.04	
		<i>For >1,000', Deduct</i>	-0.32	
07 71 23 00-0156		Copper Devices And Accessories <small>(07 71 23 00-0059)</small>		
07 71 23 00-0157	EA	Thru-Wall Copper Scupper Outlet.....	215.90	27.99
07 71 23 00-0158	EA	Copper Leader/Conductor Head.....	295.60	31.10
07 71 23 00-0159	EA	Copper Eave Box.....	132.00	18.33
07 71 23 00-0160		Galvanized Steel Gutters And Downspouts <small>(07 71 23)</small>		
07 71 23 00-0161		Galvanized Steel Gutters <small>(07 71 23 00-0160)</small>		
		Note: Includes drop outlets, hangers and fasteners. Excludes end caps, miters and downspouts.		
07 71 23 00-0162		K-Style Galvanized Steel Gutters <small>(07 71 23 00-0161)</small>		
07 71 23 00-0163	LF	5", 26 Gauge, K-Style Galvanized Steel Gutter.....	13.97	4.52
		<i>For Up To 100', Add</i>	2.52	
		<i>For >100' To 250', Add</i>	1.07	
		<i>For >1,000', Deduct</i>	-0.75	
		<i>For Kynar 500® Finish, Add</i>	2.93	
		<i>For 24 Gauge, Add</i>	1.82	
		<i>For 22 Gauge, Add</i>	3.58	
07 71 23 00-0164	LF	6", 26 Gauge, K-Style Galvanized Steel Gutter.....	16.32	4.76
		<i>For Up To 100', Add</i>	2.81	
		<i>For >100' To 250', Add</i>	1.21	
		<i>For >1,000', Deduct</i>	-0.78	
		<i>For Kynar 500® Finish, Add</i>	3.83	
		<i>For 24 Gauge, Add</i>	2.38	
		<i>For 22 Gauge, Add</i>	4.68	
07 71 23 00-0165	LF	7", 26 Gauge, K-Style Galvanized Steel Gutter.....	34.59	5.01
		<i>For Up To 100', Add</i>	4.72	
		<i>For >100' To 250', Add</i>	2.15	
		<i>For >1,000', Deduct</i>	-0.84	
		<i>For Kynar 500® Finish, Add</i>	11.77	
		<i>For 24 Gauge, Add</i>	7.32	
		<i>For 22 Gauge, Add</i>	14.39	
07 71 23 00-0166	LF	8", 26 Gauge, K-Style Galvanized Steel Gutter.....	36.44	5.62
		<i>For Up To 100', Add</i>	5.04	
		<i>For >100' To 250', Add</i>	2.29	
		<i>For >1,000', Deduct</i>	-0.93	
		<i>For Kynar 500® Finish, Add</i>	12.22	
		<i>For 24 Gauge, Add</i>	7.60	
		<i>For 22 Gauge, Add</i>	14.93	
07 71 23 00-0167		Half Round Galvanized Steel Gutters <small>(07 71 23 00-0161)</small>		
07 71 23 00-0168	LF	5", 26 Gauge, Half Round Galvanized Steel Gutter.....	20.70	4.52
		<i>For Up To 100', Add</i>	3.19	
		<i>For >100' To 250', Add</i>	1.41	
		<i>For >1,000', Deduct</i>	-0.75	
		<i>For Kynar 500® Finish, Add</i>	5.96	
		<i>For 24 Gauge, Add</i>	3.71	
		<i>For 22 Gauge, Add</i>	7.28	

07 Thermal And Moisture Protection
07 70 Roof and Wall Specialties and Accessories
07 71 Roof Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0169	LF		6", 26 Gauge, Half Round Galvanized Steel Gutter	26.23	4.76
			<i>For Up To 100', Add</i>	3.80	
			<i>For >100' To 250', Add</i>	1.70	
			<i>For >1,000', Deduct</i>	-0.78	
			<i>For Kynar 500® Finish, Add</i>	8.28	
			<i>For 24 Gauge, Add</i>	5.15	
			<i>For 22 Gauge, Add</i>	10.13	
07 71 23 00-0170	LF		7", 26 Gauge, Half Round Galvanized Steel Gutter	67.08	5.01
			<i>For Up To 100', Add</i>	7.97	
			<i>For >100' To 250', Add</i>	3.78	
			<i>For >1,000', Deduct</i>	-0.84	
			<i>For Kynar 500® Finish, Add</i>	26.39	
			<i>For 24 Gauge, Add</i>	16.42	
			<i>For 22 Gauge, Add</i>	32.26	
07 71 23 00-0171	LF		8", 26 Gauge, Half Round Galvanized Steel Gutter	71.54	5.62
			<i>For Up To 100', Add</i>	8.55	
			<i>For >100' To 250', Add</i>	4.04	
			<i>For >1,000', Deduct</i>	-0.93	
			<i>For Kynar 500® Finish, Add</i>	28.01	
			<i>For 24 Gauge, Add</i>	17.43	
			<i>For 22 Gauge, Add</i>	34.24	
07 71 23 00-0172			Box Style Galvanized Steel Gutters (07 71 23 00-0161)		
07 71 23 00-0173	LF		5", 24 Gauge, Box Style Galvanized Steel Gutter	24.80	5.13
			<i>For Up To 100', Add</i>	3.76	
			<i>For >100' To 250', Add</i>	1.67	
			<i>For >1,000', Deduct</i>	-0.86	
			<i>For Kynar 500® Finish, Add</i>	7.31	
			<i>For 22 Gauge, Add</i>	3.57	
07 71 23 00-0174	LF		6", 24 Gauge, Box Style Galvanized Steel Gutter	29.18	5.62
			<i>For Up To 100', Add</i>	4.31	
			<i>For >100' To 250', Add</i>	1.92	
			<i>For >1,000', Deduct</i>	-0.93	
			<i>For Kynar 500® Finish, Add</i>	8.95	
			<i>For 22 Gauge, Add</i>	4.38	
07 71 23 00-0175	LF		7", 24 Gauge, Box Style Galvanized Steel Gutter	37.18	5.01
			<i>For Up To 100', Add</i>	4.98	
			<i>For >100' To 250', Add</i>	2.28	
			<i>For >1,000', Deduct</i>	-0.84	
			<i>For Kynar 500® Finish, Add</i>	12.94	
			<i>For 22 Gauge, Add</i>	6.33	
07 71 23 00-0176	LF		8", 24 Gauge, Box Style Galvanized Steel Gutter	41.19	6.35
			<i>For Up To 100', Add</i>	5.70	
			<i>For >100' To 250', Add</i>	2.59	
			<i>For >1,000', Deduct</i>	-1.05	
			<i>For Kynar 500® Finish, Add</i>	13.81	
			<i>For 22 Gauge, Add</i>	6.75	
07 71 23 00-0177			Galvanized Steel Gutter End Caps (07 71 23 00-0160)		
07 71 23 00-0178			K-Style, Galvanized Steel Gutter End Caps (07 71 23 00-0177)		
07 71 23 00-0179	EA		5", K-Style Galvanized Steel Gutter End Cap	6.35	
			<i>For Kynar 500® Finish, Add</i>	1.76	
07 71 23 00-0180	EA		6", K-Style Galvanized Steel Gutter End Cap	7.38	
			<i>For Kynar 500® Finish, Add</i>	2.22	
07 71 23 00-0181	EA		7", K-Style Galvanized Steel Gutter End Cap	16.49	
			<i>For Kynar 500® Finish, Add</i>	6.32	
07 71 23 00-0182	EA		8", K-Style Galvanized Steel Gutter End Cap	24.10	
			<i>For Kynar 500® Finish, Add</i>	9.74	
07 71 23 00-0183			Half Round, Galvanized Steel Gutter End Caps (07 71 23 00-0177)		
07 71 23 00-0184	EA		5", Half Round Galvanized Steel Gutter End Cap	8.28	
			<i>For Kynar 500® Finish, Add</i>	2.62	
07 71 23 00-0185	EA		6", Half Round Galvanized Steel Gutter End Cap	9.59	
			<i>For Kynar 500® Finish, Add</i>	3.21	
07 71 23 00-0186	EA		7", Half Round Galvanized Steel Gutter End Cap	18.23	
			<i>For Kynar 500® Finish, Add</i>	7.10	
07 71 23 00-0187	EA		8", Half Round Galvanized Steel Gutter End Cap	24.79	
			<i>For Kynar 500® Finish, Add</i>	10.05	
07 71 23 00-0188			Box Style, Galvanized Steel Gutter End Caps (07 71 23 00-0177)		
07 71 23 00-0189	EA		5", Box Style Galvanized Steel Gutter End Cap	15.18	
			<i>For Kynar 500® Finish, Add</i>	5.73	
07 71 23 00-0190	EA		6", Box Style Galvanized Steel Gutter End Cap	18.36	
			<i>For Kynar 500® Finish, Add</i>	7.16	
07 71 23 00-0191	EA		7", Box Style Galvanized Steel Gutter End Cap	20.62	
			<i>For Kynar 500® Finish, Add</i>	8.18	
07 71 23 00-0192	EA		8", Box Style Galvanized Steel Gutter End Cap	27.76	
			<i>For Kynar 500® Finish, Add</i>	11.39	



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0193		Galvanized Steel Gutter Miters (07 71 23 00-0160) Note: Inside or outside miters.		
07 71 23 00-0194		K-Style, Galvanized Steel Gutter Miters (07 71 23 00-0193)		
07 71 23 00-0195	EA	5", K-Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	38.79 11.90	
07 71 23 00-0196	EA	6", K-Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	63.80 22.77	
07 71 23 00-0197	EA	7", K-Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	103.04 40.05	
07 71 23 00-0198	EA	8", K-Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	115.93 45.41	
07 71 23 00-0199		Half Round, Galvanized Steel Gutter Miters (07 71 23 00-0193)		
07 71 23 00-0200	EA	5", Half Round Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	53.74 18.63	
07 71 23 00-0201	EA	6", Half Round Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	60.49 21.28	
07 71 23 00-0202	EA	7", Half Round Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	174.87 72.37	
07 71 23 00-0203	EA	8", Half Round Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	184.78 76.39	
07 71 23 00-0204		Box Style, Galvanized Steel Gutter Miters (07 71 23 00-0193)		
07 71 23 00-0205	EA	5", Box Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	50.74 17.28	
07 71 23 00-0206	EA	6", Box Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	83.59 31.68	
07 71 23 00-0207	EA	7", Box Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	108.99 42.72	
07 71 23 00-0208	EA	8", Box Style Galvanized Steel Gutter Miter <i>For Kynar 500® Finish, Add</i>	115.93 45.41	
07 71 23 00-0209		Galvanized Steel Gutter Wire Strainers (07 71 23 00-0160)		
07 71 23 00-0210	EA	3" Diameter, Round Galvanized Steel Wire Strainer <i>For Kynar 500® Finish, Add</i>	13.74 3.32	3.06
07 71 23 00-0211	EA	4" Diameter, Round Galvanized Steel Wire Strainer <i>For Kynar 500® Finish, Add</i>	20.03 6.15	3.06
07 71 23 00-0212		Galvanized Steel Downspouts (07 71 23 00-0160) Note: Includes elbows, hangers and fasteners.		
07 71 23 00-0213		Round Galvanized Steel Downspouts (07 71 23 00-0212)		
07 71 23 00-0214	LF	3" Diameter, 26 Gauge, Round Galvanized Steel Downspout <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 24 Gauge, Add</i> <i>For 22 Gauge, Add</i>	7.94 1.27 0.56 -0.32 2.14 1.33 2.62	2.93
07 71 23 00-0215	LF	4" Diameter, 26 Gauge, Round Galvanized Steel Downspout <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 24 Gauge, Add</i> <i>For 22 Gauge, Add</i>	9.97 1.47 0.66 -0.32 3.06 1.90 3.73	2.93
07 71 23 00-0216	LF	5" Diameter, 26 Gauge, Round Galvanized Steel Downspout <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 24 Gauge, Add</i> <i>For 22 Gauge, Add</i>	13.73 1.85 0.85 -0.32 4.75 2.95 5.80	2.93
07 71 23 00-0217	LF	6" Diameter, 26 Gauge, Round Galvanized Steel Downspout <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For Kynar 500® Finish, Add</i> <i>For 24 Gauge, Add</i> <i>For 22 Gauge, Add</i>	31.11 3.59 1.71 -0.32 12.57 7.82 15.36	2.93
07 71 23 00-0218		Square Galvanized Steel Downspouts (07 71 23 00-0212)		

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0219	LF		4" x 4", 26 Gauge, Square Galvanized Steel Downspout	9.07	2.93
			<i>For Up To 100', Add</i>	1.38	
			<i>For >100 To 250', Add</i>	0.61	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For Kynar 500® Finish, Add</i>	2.65	
			<i>For 24 Gauge, Add</i>	1.65	
			<i>For 22 Gauge, Add</i>	3.24	
07 71 23 00-0220	LF		5" x 5", 26 Gauge, Square Galvanized Steel Downspout	11.75	2.93
			<i>For Up To 100', Add</i>	1.65	
			<i>For >100 To 250', Add</i>	0.75	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For Kynar 500® Finish, Add</i>	3.86	
			<i>For 24 Gauge, Add</i>	2.40	
			<i>For 22 Gauge, Add</i>	4.71	
07 71 23 00-0221			Rectangular Galvanized Steel Downspouts (07 71 23 00-0212)		
07 71 23 00-0222	LF		2" x 3", 26 Gauge, Rectangular Galvanized Steel Downspout.....	8.09	2.93
			<i>For Up To 100', Add</i>	1.29	
			<i>For >100 To 250', Add</i>	0.56	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For Kynar 500® Finish, Add</i>	2.21	
			<i>For 24 Gauge, Add</i>	1.37	
			<i>For 22 Gauge, Add</i>	2.70	
07 71 23 00-0223	LF		3" x 4", 26 Gauge, Rectangular Galvanized Steel Downspout.....	10.44	2.93
			<i>For Up To 100', Add</i>	1.52	
			<i>For >100 To 250', Add</i>	0.68	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For Kynar 500® Finish, Add</i>	3.27	
			<i>For 24 Gauge, Add</i>	2.03	
			<i>For 22 Gauge, Add</i>	3.99	
07 71 23 00-0224	LF		4" x 5", 26 Gauge, Rectangular Galvanized Steel Downspout.....	19.78	2.93
			<i>For Up To 100', Add</i>	2.46	
			<i>For >100 To 250', Add</i>	1.15	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For Kynar 500® Finish, Add</i>	7.47	
			<i>For 24 Gauge, Add</i>	4.65	
			<i>For 22 Gauge, Add</i>	9.13	
07 71 23 00-0225			Galvanized Steel Devices (07 71 23 00-0160)		
07 71 23 00-0226	EA		Galvanized Steel Leader/Conductor Head.....	366.03	31.10
			<i>For Kynar 500® Finish, Add</i>	136.72	
07 71 23 00-0227	EA		Thru-Wall Galvanized Steel Scupper Outlet	199.78	27.99
			<i>For Kynar 500® Finish, Add</i>	47.92	
07 71 23 00-0228			Stainless Steel Gutters And Downspouts (07 71 23)		
			Note: AISI type 304 stainless steel.		
07 71 23 00-0229			Stainless Steel Gutters (07 71 23 00-0228)		
			Note: Includes drop outlets, hangers and fasteners. Excludes end caps, miters and downspouts.		
07 71 23 00-0230			K-Style, Stainless Steel Gutters (07 71 23 00-0229)		
07 71 23 00-0231	LF		5", 26 Gauge, K-Style Stainless Steel Gutter.....	28.66	4.52
			<i>For Up To 100', Add</i>	3.99	
			<i>For >100' To 250', Add</i>	1.81	
			<i>For >1,000', Deduct</i>	-0.75	
			<i>For 316 Stainless Steel, Add</i>	8.06	
			<i>For 24 Gauge, Add</i>	7.00	
			<i>For 22 Gauge, Add</i>	13.99	
			<i>For 20 Gauge, Add</i>	20.99	
07 71 23 00-0232	LF		6", 26 Gauge, K-Style Stainless Steel Gutter.....	34.33	4.76
			<i>For Up To 100', Add</i>	4.61	
			<i>For >100' To 250', Add</i>	2.11	
			<i>For >1,000', Deduct</i>	-0.78	
			<i>For 316 Stainless Steel, Add</i>	10.07	
			<i>For 24 Gauge, Add</i>	8.75	
			<i>For 22 Gauge, Add</i>	17.50	
			<i>For 20 Gauge, Add</i>	26.24	
07 71 23 00-0233			Half Round, Stainless Steel Gutters (07 71 23 00-0229)		
07 71 23 00-0234	LF		5", 26 Gauge, Half Round Stainless Steel Gutter	39.56	4.52
			<i>For Up To 100', Add</i>	5.08	
			<i>For >100' To 250', Add</i>	2.35	
			<i>For >1,000', Deduct</i>	-0.75	
			<i>For 316 Stainless Steel, Add</i>	12.20	
			<i>For 24 Gauge, Add</i>	10.59	
			<i>For 22 Gauge, Add</i>	21.19	
			<i>For 20 Gauge, Add</i>	31.78	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0235 LF 6", 26 Gauge, Half Round Stainless Steel Gutter	47.88	4.76
<i>For Up To 100', Add</i>	5.96	
<i>For >100' To 250', Add</i>	2.79	
<i>For >1,000', Deduct</i>	-0.78	
<i>For 316 Stainless Steel, Add</i>	15.22	
<i>For 24 Gauge, Add</i>	13.22	
<i>For 22 Gauge, Add</i>	26.44	
<i>For 20 Gauge, Add</i>	39.66	
07 71 23 00-0236 Box Style, Stainless Steel Gutters (07 71 23 00-0229)		
07 71 23 00-0237 LF 5", 26 Gauge, Box Style Stainless Steel Gutter	38.79	5.13
<i>For Up To 100', Add</i>	5.16	
<i>For >100' To 250', Add</i>	2.37	
<i>For >1,000', Deduct</i>	-0.86	
<i>For 316 Stainless Steel, Add</i>	11.49	
<i>For 24 Gauge, Add</i>	9.98	
<i>For 22 Gauge, Add</i>	19.95	
<i>For 20 Gauge, Add</i>	29.93	
<i>For 18 Gauge, Add</i>	50.18	
<i>For Seamless Gutter, Add</i>	-0.23	
07 71 23 00-0238 LF 6", 26 Gauge, Box Style Stainless Steel Gutter	47.27	5.62
<i>For Up To 100', Add</i>	6.12	
<i>For >100' To 250', Add</i>	2.83	
<i>For >1,000', Deduct</i>	-0.93	
<i>For 316 Stainless Steel, Add</i>	14.43	
<i>For 24 Gauge, Add</i>	12.53	
<i>For 22 Gauge, Add</i>	25.07	
<i>For 20 Gauge, Add</i>	37.60	
<i>For 18 Gauge, Add</i>	63.05	
<i>For Seamless Gutter, Add</i>	-0.51	
07 71 23 00-0239 LF 7", 26 Gauge, Box Style Stainless Steel Gutter	55.78	5.99
<i>For Up To 100', Add</i>	7.06	
<i>For >100' To 250', Add</i>	3.28	
<i>For >1,000', Deduct</i>	-0.99	
<i>For 316 Stainless Steel, Add</i>	17.44	
<i>For 24 Gauge, Add</i>	15.14	
<i>For 22 Gauge, Add</i>	30.29	
<i>For 20 Gauge, Add</i>	45.43	
<i>For 18 Gauge, Add</i>	76.18	
<i>For Seamless Gutter, Add</i>	-0.81	
07 71 23 00-0240 LF 8", 26 Gauge, Box Style Stainless Steel Gutter	60.65	6.35
<i>For Up To 100', Add</i>	7.64	
<i>For >100' To 250', Add</i>	3.56	
<i>For >1,000', Deduct</i>	-1.05	
<i>For 316 Stainless Steel, Add</i>	19.05	
<i>For 24 Gauge, Add</i>	16.55	
<i>For 22 Gauge, Add</i>	33.09	
<i>For 20 Gauge, Add</i>	49.64	
<i>For 18 Gauge, Add</i>	83.23	
<i>For Seamless Gutter, Add</i>	-0.93	
07 71 23 00-0241 Stainless Steel Gutter End Caps (07 71 23 00-0228)		
07 71 23 00-0242 K-Style, Stainless Steel Gutter End Caps (07 71 23 00-0241)		
07 71 23 00-0243 EA 5", K-Style Stainless Steel Gutter End Cap	9.08	
<i>For 316 Stainless Steel, Add</i>	2.52	
07 71 23 00-0244 EA 6", K-Style Stainless Steel Gutter End Cap	10.41	
<i>For 316 Stainless Steel, Add</i>	3.02	
07 71 23 00-0245 Half Round, Stainless Steel Gutter End Caps (07 71 23 00-0241)		
07 71 23 00-0246 EA 5", Half Round Stainless Steel Gutter End Cap	10.74	
<i>For 316 Stainless Steel, Add</i>	3.15	
07 71 23 00-0247 EA 6", Half Round Stainless Steel Gutter End Cap	12.40	
<i>For 316 Stainless Steel, Add</i>	3.78	
07 71 23 00-0248 Box Style, Stainless Steel Gutter End Caps (07 71 23 00-0241)		
07 71 23 00-0249 EA 5", Box Style Stainless Steel Gutter End Cap	11.35	
<i>For 316 Stainless Steel, Add</i>	3.15	
07 71 23 00-0250 EA 6", Box Style Stainless Steel Gutter End Cap	13.01	
<i>For 316 Stainless Steel, Add</i>	3.78	
07 71 23 00-0251 EA 7", Box Style Stainless Steel Gutter End Cap	13.59	
<i>For 316 Stainless Steel, Add</i>	4.08	
07 71 23 00-0252 EA 8", Box Style Stainless Steel Gutter End Cap	16.48	
<i>For 316 Stainless Steel, Add</i>	5.03	
07 71 23 00-0253 Stainless Steel Gutter Miters (07 71 23 00-0228)		
Note: Inside or outside box miters.		
07 71 23 00-0254 K-Style, Stainless Steel Gutter Miters (07 71 23 00-0253)		

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0255	EA		5", K-Style Stainless Steel Gutter Miter	46.60	
			<i>For 316 Stainless Steel, Add</i>	13.02	
07 71 23 00-0256	EA		6", K-Style Stainless Steel Gutter Miter	73.99	
			<i>For 316 Stainless Steel, Add</i>	23.10	
07 71 23 00-0257			Half Round, Stainless Steel Gutter Miters (07 71 23 00-0253)		
07 71 23 00-0258	EA		5", Half Round Stainless Steel Gutter Miter	112.92	
			<i>For 316 Stainless Steel, Add</i>	38.22	
07 71 23 00-0259	EA		6", Half Round Stainless Steel Gutter Miter	138.05	
			<i>For 316 Stainless Steel, Add</i>	47.44	
07 71 23 00-0260			Box-Style, Stainless Steel Gutter Miters (07 71 23 00-0253)		
07 71 23 00-0261	EA		5", Box-Style Stainless Steel Gutter Miter.....	53.45	
			<i>For 316 Stainless Steel, Add</i>	15.62	
07 71 23 00-0262	EA		6", Box-Style Stainless Steel Gutter Miter.....	86.15	
			<i>For 316 Stainless Steel, Add</i>	27.72	
07 71 23 00-0263	EA		7", Box-Style Stainless Steel Gutter Miter.....	99.15	
			<i>For 316 Stainless Steel, Add</i>	32.34	
07 71 23 00-0264	EA		8", Box-Style Stainless Steel Gutter Miter.....	112.29	
			<i>For 316 Stainless Steel, Add</i>	36.96	
07 71 23 00-0265			Stainless Steel Gutter Wire Strainers (07 71 23 00-0228)		
07 71 23 00-0266	EA		3" Diameter, Round Stainless Steel Wire Strainer.....	46.06	3.06
07 71 23 00-0267	EA		4" Diameter, Round Stainless Steel Wire Strainer.....	47.15	3.06
07 71 23 00-0268			Stainless Steel Downspouts (07 71 23 00-0228)		
			Note: Includes elbows, hangers and fasteners.		
07 71 23 00-0269			Round Stainless Steel Downspouts (07 71 23 00-0268)		
07 71 23 00-0270	LF		3" Diameter, 26 Gauge, Round Stainless Steel Downspout.....	16.88	2.93
			<i>For Up To 100', Add</i>	2.17	
			<i>For >100 To 250', Add</i>	1.00	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For 316 Stainless Steel, Add</i>	5.21	
			<i>For 24 Gauge, Add</i>	4.52	
			<i>For 22 Gauge, Add</i>	9.04	
			<i>For 20 Gauge, Add</i>	13.56	
07 71 23 00-0271	LF		4" Diameter, 26 Gauge, Round Stainless Steel Downspout.....	22.19	2.93
			<i>For Up To 100', Add</i>	2.70	
			<i>For >100 To 250', Add</i>	1.27	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For 316 Stainless Steel, Add</i>	7.22	
			<i>For 24 Gauge, Add</i>	6.27	
			<i>For 22 Gauge, Add</i>	12.55	
			<i>For 20 Gauge, Add</i>	18.82	
07 71 23 00-0272	LF		5" Diameter, 26 Gauge, Round Stainless Steel Downspout.....	32.22	2.93
			<i>For Up To 100', Add</i>	3.70	
			<i>For >100 To 250', Add</i>	1.77	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For 316 Stainless Steel, Add</i>	11.04	
			<i>For 24 Gauge, Add</i>	9.58	
			<i>For 22 Gauge, Add</i>	19.17	
			<i>For 20 Gauge, Add</i>	28.75	
07 71 23 00-0273			Rectangular Stainless Steel Downspouts (07 71 23 00-0268)		
07 71 23 00-0274	LF		2" x 3", 26 Gauge, Rectangular Stainless Steel Downspout.....	17.27	2.93
			<i>For Up To 100', Add</i>	2.20	
			<i>For >100 To 250', Add</i>	1.02	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For 316 Stainless Steel, Add</i>	5.35	
			<i>For 24 Gauge, Add</i>	4.65	
			<i>For 22 Gauge, Add</i>	9.30	
			<i>For 20 Gauge, Add</i>	13.95	
			<i>For 18 Gauge, Add</i>	23.39	
07 71 23 00-0275	LF		3" x 4", 26 Gauge, Rectangular Stainless Steel Downspout.....	22.99	2.93
			<i>For Up To 100', Add</i>	2.78	
			<i>For >100 To 250', Add</i>	1.31	
			<i>For >1,000', Deduct</i>	-0.32	
			<i>For 316 Stainless Steel, Add</i>	7.53	
			<i>For 24 Gauge, Add</i>	6.54	
			<i>For 22 Gauge, Add</i>	13.07	
			<i>For 20 Gauge, Add</i>	19.61	
			<i>For 18 Gauge, Add</i>	32.88	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0276 LF 4" x 5", 26 Gauge, Rectangular Stainless Steel Downspout..... <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i> <i>For 316 Stainless Steel, Add</i> <i>For 24 Gauge, Add</i> <i>For 22 Gauge, Add</i> <i>For 20 Gauge, Add</i> <i>For 18 Gauge, Add</i>	29.67 3.44 1.64 -0.32 10.07 8.74 17.48 26.23 43.97	2.93
07 71 23 00-0277 Stainless Steel Devices (07 71 23 00-0228)		
07 71 23 00-0278 EA Thru-Wall Stainless Steel Scupper Outlet..... <i>For 316 Stainless Steel, Add</i>	271.66 68.41	27.50
07 71 23 00-0279 EA Stainless Steel Leader/Conductor Head..... <i>For 316 Stainless Steel, Add</i>	486.46 161.64	27.50
07 71 23 00-0280 Vinyl Gutters And Downspouts (07 71 23)		
07 71 23 00-0281 Vinyl Gutters (07 71 23 00-0280) Note: Includes drop outlets, hangers and fasteners. Excludes end caps, miters and downspouts.		
07 71 23 00-0282 K-Style Vinyl Gutters (07 71 23 00-0281)		
07 71 23 00-0283 LF 4", K-Style Vinyl Gutter..... <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	11.76 1.94 0.84 -0.51	3.06
07 71 23 00-0284 LF 5", K-Style Vinyl Gutter..... <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	15.19 2.28 1.01 -0.51	3.06
07 71 23 00-0285 Half Round Vinyl Gutters (07 71 23 00-0281)		
07 71 23 00-0286 LF 4", Half Round Vinyl Gutter..... <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	12.15 1.98 0.86 -0.51	3.06
07 71 23 00-0287 LF 5", Half Round Vinyl Gutter..... <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	12.78 2.04 0.89 -0.51	3.06
07 71 23 00-0288 Vinyl Gutter End Caps (07 71 23 00-0280)		
07 71 23 00-0289 K-Style, Vinyl Gutter End Caps (07 71 23 00-0288)		
07 71 23 00-0290 EA 4", K-Style Vinyl Gutter End Cap.....	7.29	
07 71 23 00-0291 EA 5", K-Style Vinyl Gutter End Cap.....	10.14	
07 71 23 00-0292 Half Round, Vinyl Gutter End Caps (07 71 23 00-0288)		
07 71 23 00-0293 EA 4", Half Round Vinyl Gutter End Cap.....	8.34	
07 71 23 00-0294 EA 5", Half Round Vinyl Gutter End Cap.....	7.87	
07 71 23 00-0295 Vinyl Gutter Miters (07 71 23 00-0280) Note: Inside or outside miters.		
07 71 23 00-0296 K-Style, Vinyl Gutter Miters (07 71 23 00-0295)		
07 71 23 00-0297 EA 4", K-Style Vinyl Gutter Miter.....	18.18	
07 71 23 00-0298 EA 5", K-Style Vinyl Gutter Miter.....	27.38	
07 71 23 00-0299 Half Round, Vinyl Gutter Miters (07 71 23 00-0295)		
07 71 23 00-0300 EA 4", Half Round Vinyl Gutter Miter.....	18.18	
07 71 23 00-0301 EA 5", Half Round Vinyl Gutter Miter.....	19.77	
07 71 23 00-0302 Vinyl Downspouts (07 71 23 00-0280) Note: Includes elbows, hangers and fasteners.		
07 71 23 00-0303 Round Vinyl Downspouts (07 71 23 00-0302)		
07 71 23 00-0304 LF 2-1/2" Diameter, Round Vinyl Downspout..... <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i>	7.73 1.25 0.55 -0.32	2.93
07 71 23 00-0305 LF 3" Diameter, Round Vinyl Downspout..... <i>For Up To 100', Add</i> <i>For >100 To 250', Add</i> <i>For >1,000', Deduct</i>	8.07 1.28 0.56 -0.32	2.93

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 71 23 00-0306	Square Vinyl Downspouts (07 71 23 00-0302)		
07 71 23 00-0307	LF 2-1/2", Square Vinyl Downspout.....	7.59	2.93
	For Up To 100', Add	1.24	
	For >100 To 250', Add	0.54	
	For >1,000', Deduct	-0.32	
07 71 23 00-0308	Rectangular Vinyl Downspouts (07 71 23 00-0302)		
07 71 23 00-0309	LF 2" x 3", Rectangular Vinyl Downspout.....	9.74	2.93
	For Up To 100', Add	1.45	
	For >100 To 250', Add	0.65	
	For >1,000', Deduct	-0.32	
07 71 23 00-0310	Gutter And Downspout Boots (07 71 23)		
07 71 23 00-0311	Cast Iron Roof Drainage Downspout Boots (07 71 23 00-0310)		
07 71 23 00-0312	EA 2" x 3" x 18" Long, Cast Iron Roof Drainage Downspout Boot.....	337.76	4.40
07 71 23 00-0313	EA 3" x 4" x 18" Long, Cast Iron Roof Drainage Downspout Boot.....	440.52	4.40
07 71 23 00-0314	EA 4" x 5" x 24" Long, Cast Iron Roof Drainage Downspout Boot.....	525.97	4.40
07 71 23 00-0315	Cast Iron Roof Drainage Downspout Boots With Cleanouts (07 71 23 00-0310)		
07 71 23 00-0316	EA 3" x 4" x 18" Long, Cast Iron Roof Drainage Downspout Boot With Cleanout	584.18	4.40
07 71 23 00-0317	EA 4" x 5" x 24" Long, Cast Iron Roof Drainage Downspout Boot With Cleanout	713.86	4.40
07 71 23 00-0318	EA 5" x 7" x 30" Long, Cast Iron Roof Drainage Downspout Boot With Cleanout	1,296.24	4.40
07 71 23 00-0319	Wall Mounted Downspout Covers With Hinged Perforated Cover (07 71 23)		
07 71 23 00-0320	EA 3" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-03).....	1,164.22	28.55
	For Polished Brass Finish (-PB), Add	110.71	
	For Chrome Plated Finish (-CP), Add	166.07	
	For Vandal Proof (-U), Add	55.36	
07 71 23 00-0321	EA 4" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-04).....	1,183.26	38.06
	For Polished Brass Finish (-PB), Add	110.71	
	For Chrome Plated Finish (-CP), Add	166.07	
	For Vandal Proof (-U), Add	55.36	
07 71 23 00-0322	EA 6" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-06).....	1,271.67	51.19
	For Polished Brass Finish (-PB), Add	116.93	
	For Chrome Plated Finish (-CP), Add	175.40	
	For Vandal Proof (-U), Add	58.47	
07 71 23 00-0323	EA 8" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-08).....	1,354.82	64.63
	For Polished Brass Finish (-PB), Add	122.56	
	For Chrome Plated Finish (-CP), Add	183.83	
	For Vandal Proof (-U), Add	61.28	
07 71 23 00-0324	EA 10" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-10).....	1,456.08	79.63
	For Polished Brass Finish (-PB), Add	129.68	
	For Chrome Plated Finish (-CP), Add	194.53	
	For Vandal Proof (-U), Add	64.84	
07 71 23 00-0325	EA 12" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-12).....	1,597.94	111.16
	For Polished Brass Finish (-PB), Add	137.56	
	For Chrome Plated Finish (-CP), Add	206.34	
	For Vandal Proof (-U), Add	68.78	
07 71 23 00-0326	EA 15" Pipe Size, Type 304 Stainless Steel Downspout Cover With Hinged Perforated Cover (JR Smith 1775-15).....	1,762.49	154.60
	For Polished Brass Finish (-PB), Add	145.33	
	For Chrome Plated Finish (-CP), Add	218.00	
	For Vandal Proof (-U), Add	72.67	
07 71 23 00-0327	Wall Mounted Downspout Nozzle (07 71 23)		
07 71 23 00-0328	EA 3" Pipe Size, Rough Bronze Finish Downspout Nozzle (JR Smith 1770-03).....	296.09	28.55
	For Nickel Bronze Finish (-NB), Add	167.30	
	For Polished Bronze Finish (-PB), Add	131.45	
	For Chrome Plated Finish (-CP), Add	212.71	
07 71 23 00-0329	EA 4" Pipe Size, Rough Bronze Finish Downspout Nozzle (JR Smith 1770-04).....	315.13	38.06
	For Nickel Bronze Finish (-NB), Add	167.30	
	For Polished Bronze Finish (-PB), Add	131.45	
	For Chrome Plated Finish (-CP), Add	212.71	
07 71 23 00-0330	EA 6" Pipe Size, Rough Bronze Finish Downspout Nozzle (JR Smith 1770-06).....	669.33	51.19
	For Nickel Bronze Finish (-NB), Add	170.09	
	For Polished Bronze Finish (-PB), Add	96.38	
	For Chrome Plated Finish (-CP), Add	249.46	
07 71 23 00-0331	EA 8" Pipe Size, Rough Bronze Finish Downspout Nozzle (JR Smith 1770-08).....	989.89	64.63
	For Nickel Bronze Finish (-NB), Add	146.31	
	For Polished Bronze Finish (-PB), Add	111.88	
	For Chrome Plated Finish (-CP), Add	249.58	
07 71 23 00-0332	EA 10" Pipe Size, Rough Bronze Finish Downspout Nozzle (JR Smith 1770-10).....	1,276.56	79.63
	For Nickel Bronze Finish (-NB), Add	189.94	
	For Polished Bronze Finish (-PB), Add	145.25	
	For Chrome Plated Finish (-CP), Add	324.02	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 71 23 00-0333 EA 12" Pipe Size, Rough Bronze Finish Downspout Nozzle (JR Smith 1770-12) <i>For Nickel Bronze Finish (-NB), Add</i> <i>For Polished Bronze Finish (-PB), Add</i> <i>For Chrome Plated Finish (-CP), Add</i>	1,627.95 238.96 182.73 407.63	111.16
07 71 23 00-0334 Leaf Guards And Cleaning <small>(07 71 23)</small>		
07 71 23 00-0335 LF Aluminum Mesh Gutter Leaf Guard <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	3.88 0.65 0.28 -0.17	0.87
07 71 23 00-0336 LF Vinyl Mesh Gutter Leaf Guard <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	2.92 0.55 0.23 -0.17	0.87
07 71 23 00-0337 LF 6" Wide Stainless Steel Gutter Leaf Guard, 1/4" x 1/4" x 0.08" Wire <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	16.67 2.00 0.94 -0.22	1.09
07 71 23 00-0338 LF 9" Wide Stainless Steel Gutter Leaf Guard, 1/4" x 1/4" x 0.08" Wire <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	23.94 2.72 1.31 -0.22	1.09
07 71 23 00-0339 LF 6" Wide Stainless Steel Gutter Leaf Guard, 3/8" x 3/8" Mesh <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	12.68 1.53 0.72 -0.17	1.09
07 71 23 00-0340 LF 9" Wide Stainless Steel Gutter Leaf Guard, 3/8" x 3/8" Mesh <i>For Up To 100', Add</i> <i>For >100' To 250', Add</i> <i>For >1,000', Deduct</i>	19.65 2.22 1.07 -0.17	1.09
07 71 23 00-0341 EA Cleanout Roof Drain Note: Includes removing dome and flushing.	170.02	
07 71 23 00-0342 LF Cleanout Roof Gutters And Downspouts	1.99	
07 71 23 00-0343 LF Cleanout Blocked Downspouts By Hydrojetting	3.36	
07 71 26 Reglets <small>(07 71)</small>		
07 71 26 00-0001 Counter Flashing With Reglet <small>(07 71 26)</small> Note: Includes reglet cut.		
07 71 26 00-0002 Galvanized Steel Counter Flashing With Reglet <small>(07 71 26 00-0001)</small>		
07 71 26 00-0003 Galvanized Steel Counter Flashing With Reglet <small>(07 71 26 00-0002)</small>		
07 71 26 00-0004 LF 28 Gauge, Up To 12" Wide, Galvanized Steel Counter Flashing With Reglet	16.54	5.54
07 71 26 00-0005 LF 26 Gauge, Up To 12" Wide, Galvanized Steel Counter Flashing With Reglet	16.69	5.54
07 71 26 00-0006 LF 24 Gauge, Up To 12" Wide, Galvanized Steel Counter Flashing With Reglet	16.95	5.54
07 71 26 00-0007 LF 22 Gauge, Up To 12" Wide, Galvanized Steel Counter Flashing With Reglet	17.94	5.54
07 71 26 00-0008 LF 20 Gauge, Up To 12" Wide, Galvanized Steel Counter Flashing With Reglet	18.50	5.54
07 71 26 00-0009 LF 18 Gauge, Up To 12" Wide, Galvanized Steel Counter Flashing With Reglet	19.15	5.54
07 71 26 00-0010 KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet <small>(07 71 26 00-0002)</small>		
07 71 26 00-0011 LF 28 Gauge, Up To 12" Wide, KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet.....	18.99	5.54
07 71 26 00-0012 LF 26 Gauge, Up To 12" Wide, KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet.....	19.21	5.54
07 71 26 00-0013 LF 24 Gauge, Up To 12" Wide, KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet.....	19.59	5.54
07 71 26 00-0014 LF 22 Gauge, Up To 12" Wide, KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet.....	21.03	5.54
07 71 26 00-0015 LF 20 Gauge, Up To 12" Wide, KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet.....	21.85	5.54
07 71 26 00-0016 LF 18 Gauge, Up To 12" Wide, KYNAR 500® Finish, Galvanized Steel Counter Flashing With Reglet.....	22.79	5.54
07 71 26 00-0017 Aluminum Counter Flashing With Reglet <small>(07 71 26 00-0001)</small>		
07 71 26 00-0018 KYNAR 500® Finish, Aluminum Counter Flashing With Reglet <small>(07 71 26 00-0017)</small>		
07 71 26 00-0019 LF 0.019" Thick, Up To 12" Wide, KYNAR 500® Finish, Aluminum Counter Flashing With Reglet.....	15.97	5.54
07 71 26 00-0020 LF 0.025" Thick, Up To 12" Wide, KYNAR 500® Finish, Aluminum Counter Flashing With Reglet.....	16.74	5.54
07 71 26 00-0021 LF 0.032" Thick, Up To 12" Wide, KYNAR 500® Finish, Aluminum Counter Flashing With Reglet.....	17.52	5.54
07 71 26 00-0022 LF 0.040" Thick, Up To 12" Wide, KYNAR 500® Finish, Aluminum Counter Flashing With Reglet.....	18.07	5.54
07 71 26 00-0023 LF 0.050" Thick, Up To 12" Wide, KYNAR 500® Finish, Aluminum Counter Flashing With Reglet.....	19.32	5.54
07 71 26 00-0024 LF 0.063" Thick, Up To 12" Wide, KYNAR 500® Finish, Aluminum Counter Flashing With Reglet.....	21.13	5.54
07 71 26 00-0025 Mill Finish, Aluminum Counter Flashing With Reglet <small>(07 71 26 00-0017)</small>		
07 71 26 00-0026 LF 0.019" Thick, Up To 12" Wide, Mill Finish, Aluminum Counter Flashing With Reglet	14.20	5.54
07 71 26 00-0027 LF 0.025" Thick, Up To 12" Wide, Mill Finish, Aluminum Counter Flashing With Reglet	14.69	5.54
07 71 26 00-0028 LF 0.032" Thick, Up To 12" Wide, Mill Finish, Aluminum Counter Flashing With Reglet	15.19	5.54
07 71 26 00-0029 LF 0.040" Thick, Up To 12" Wide, Mill Finish, Aluminum Counter Flashing With Reglet	15.54	5.54
07 71 26 00-0030 LF 0.050" Thick, Up To 12" Wide, Mill Finish, Aluminum Counter Flashing With Reglet	16.34	5.54
07 71 26 00-0031 LF 0.063" Thick, Up To 12" Wide, Mill Finish, Aluminum Counter Flashing With Reglet	17.49	5.54
07 71 26 00-0032 Clear Anodized Finish, Aluminum Counter Flashing With Reglet <small>(07 71 26 00-0017)</small>		

07	Thermal And Moisture Protection
07 70	Roof and Wall Specialties and Accessories
07 71	Roof Specialties



MINOR
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TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 71 26 00-0033	LF	0.019" Thick, Up To 12" Wide, Clear Anodized Finish, Aluminum Counter Flashing With Reglet	15.61	5.54
07 71 26 00-0034	LF	0.025" Thick, Up To 12" Wide, Clear Anodized Finish, Aluminum Counter Flashing With Reglet	16.32	5.54
07 71 26 00-0035	LF	0.032" Thick, Up To 12" Wide, Clear Anodized Finish, Aluminum Counter Flashing With Reglet	17.04	5.54
07 71 26 00-0036	LF	0.040" Thick, Up To 12" Wide, Clear Anodized Finish, Aluminum Counter Flashing With Reglet	17.56	5.54
07 71 26 00-0037	LF	0.050" Thick, Up To 12" Wide, Clear Anodized Finish, Aluminum Counter Flashing With Reglet	18.71	5.54
07 71 26 00-0038	LF	0.063" Thick, Up To 12" Wide, Clear Anodized Finish, Aluminum Counter Flashing With Reglet	20.38	5.54

07 71 26 00-0039 Stainless Steel Counter Flashing With Reglet (07 71 26 00-0001)

07 71 26 00-0040 Stainless Steel Counter Flashing With Reglet (07 71 26 00-0039)

07 71 26 00-0041	LF	24 Gauge, Up To 12" Wide, Stainless Steel Counter Flashing With Reglet.....	20.82	5.54
07 71 26 00-0042	LF	22 Gauge, Up To 12" Wide, Stainless Steel Counter Flashing With Reglet.....	22.12	5.54
07 71 26 00-0043	LF	20 Gauge, Up To 12" Wide, Stainless Steel Counter Flashing With Reglet.....	22.55	5.54

07 71 26 00-0044 Copper Counter Flashing With Reglet (07 71 26 00-0001)

07 71 26 00-0045 Copper Counter Flashing With Reglet (07 71 26 00-0044)

07 71 26 00-0046	LF	16 Ounce, Up To 12" Wide, Copper Counter Flashing With Reglet.....	54.08	5.54
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07 72 Roof Accessories (07 70)

07 72 13 Manufactured Curbs (07 72)

07 72 13 00-0001 Insulated Galvanized Steel, Prefabricated Roof Curbs (07 72 13)

Note: Includes fasteners and sealants. Excludes flashing. See CSI section 07 62 13 00-0000 for flashing and trim.

07 72 13 00-0002 Insulated Galvanized Steel, Prefabricated Roof Curbs (07 72 13 00-0001)

Note: Includes pressure treated wood nailer, 1-1/2" rigid foam insulation, mill finish galvanized steel exterior wall construction, painted galvanized steel interior wall construction, installation clips and 3/16" wire mesh, 6" x 6" grids, safety security guard with installation clips.

07 72 13 00-0003 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curbs (07 72 13 00-0002)

07 72 13 00-0004 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curbs

07 72 13 00-0005	EA	26" x 26" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,003.11	255.00
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	68.44	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	168.75	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-33.73	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.38	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.02	
07 72 13 00-0006	EA	26" x 38" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,018.67	255.00
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	69.99	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	171.86	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-41.40	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	18.76	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	40.24	
07 72 13 00-0007	EA	26" x 50" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,106.14	286.88
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	74.75	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	185.37	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-50.60	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	24.60	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	39.64	
07 72 13 00-0008	EA	26" x 74" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,165.77	286.88
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	80.72	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	197.29	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-67.45	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	29.21	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	44.25	
07 72 13 00-0009	EA	26" x 98" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,209.85	286.88
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	85.13	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	206.11	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.66	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	124.94	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	137.83	
07 72 13 00-0010	EA	26" x 122" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,465.86	318.76
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	106.74	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	253.33	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-111.92	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-15.25	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	25.57	
07 72 13 00-0011	EA	38" x 38" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,023.85	255.00
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	70.51	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	172.89	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	11.28	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.22	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	135.89	
07 72 13 00-0012	EA	38" x 50" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,108.73	286.88
		<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	75.01	
		<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	185.89	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-64.40	
		<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	25.84	
		<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	62.36	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0013 EA 38" x 62" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,142.44	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	78.38	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	192.63	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-79.73	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	14.80	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	44.88	
07 72 13 00-0014 EA 38" x 74" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,155.40	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	79.68	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	195.22	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	19.98	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	123.11	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	151.04	
07 72 13 00-0015 EA 38" x 98" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,424.37	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	102.59	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	245.03	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	25.78	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	139.65	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	182.62	
07 72 13 00-0016 EA 38" x 122" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,558.51	350.64
For Sloped Roofs Up To 1 In 12 Pitch, Add	112.02	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	267.87	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	31.58	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	162.64	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	214.21	
07 72 13 00-0017 EA 50" x 50" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,228.00	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	86.94	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	209.74	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-82.80	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	11.73	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	35.37	
07 72 13 00-0018 EA 50" x 62" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,341.40	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	94.30	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	228.44	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-99.65	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-11.56	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	31.39	
07 72 13 00-0019 EA 50" x 74" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,369.92	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	97.15	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	234.14	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-118.05	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-42.87	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	30.18	
07 72 13 00-0020 EA 50" x 86" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,504.06	350.64
For Sloped Roofs Up To 1 In 12 Pitch, Add	106.58	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	256.98	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-138.00	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-41.30	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	27.43	
07 72 13 00-0021 EA 51" x 99" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,614.87	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	113.67	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	275.16	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	33.19	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	153.51	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	207.22	
07 72 13 00-0022 EA 51" x 122" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,746.41	414.38
For Sloped Roofs Up To 1 In 12 Pitch, Add	122.84	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	297.48	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-190.12	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-54.78	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	18.27	
07 72 13 00-0023 EA 62" x 62" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,369.92	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	97.15	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	234.14	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	26.43	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	97.33	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	178.97	
07 72 13 00-0024 EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,475.54	350.64
For Sloped Roofs Up To 1 In 12 Pitch, Add	103.73	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	251.28	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-144.12	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-38.84	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	27.74	
07 72 13 00-0025 EA 62" x 86" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,612.27	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	113.41	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	274.64	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-187.05	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-81.79	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	-19.47	
07 72 13 00-0026 EA 62" x 98" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,638.20	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	116.01	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	279.83	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	39.32	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	144.59	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	252.02	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0027	EA		62" x 122" Outside Frame Dimensions, 9" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,774.94	414.38
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	125.70	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	303.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-236.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-128.71	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	8.79	
07 72 13 00-0028			12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof		
			Curbs <small>(07 72 13 00-0003)</small>		
07 72 13 00-0029	EA		26" x 26" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,036.82	255.00
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	71.81	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	175.49	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-33.73	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.38	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.02	
07 72 13 00-0030	EA		26" x 38" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,044.60	255.00
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	72.58	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	177.04	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-41.40	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	18.76	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	40.24	
07 72 13 00-0031	EA		26" x 50" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,132.06	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	77.35	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	190.55	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-50.60	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	24.60	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	39.64	
07 72 13 00-0032	EA		26" x 74" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,199.48	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	84.09	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	204.04	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-67.45	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	29.21	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	44.25	
07 72 13 00-0033	EA		26" x 98" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,248.74	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	89.01	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	213.89	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.66	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	124.94	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	137.83	
07 72 13 00-0034	EA		26" x 122" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,496.97	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	109.85	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	259.55	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-111.92	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-15.25	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	25.57	
07 72 13 00-0035	EA		38" x 38" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,047.19	255.00
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	72.84	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	177.56	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	11.28	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.22	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	135.89	
07 72 13 00-0036	EA		38" x 50" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,178.74	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	82.01	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	199.89	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-64.40	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	25.84	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	62.36	
07 72 13 00-0037	EA		38" x 62" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,230.59	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	87.20	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	210.26	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-79.73	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	14.80	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	44.88	
07 72 13 00-0038	EA		38" x 74" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,290.23	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	93.16	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	222.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.98	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	123.11	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	151.04	
07 72 13 00-0039	EA		38" x 98" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,465.86	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	106.74	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	253.33	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	25.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	139.65	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	182.62	
07 72 13 00-0040	EA		38" x 122" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,610.37	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	117.21	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	278.25	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	31.58	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	162.64	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	214.21	

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0041	EA	50" x 50" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,259.12 90.05 215.96 -82.80 11.73 35.37	286.88
07 72 13 00-0042	EA	50" x 62" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,367.33 96.89 233.62 -99.65 -11.56 31.39	318.76
07 72 13 00-0043	EA	50" x 74" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,408.81 101.04 241.92 -118.05 -42.87 30.18	318.76
07 72 13 00-0044	EA	50" x 86" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,545.55 110.73 265.28 -138.00 -41.30 27.43	350.64
07 72 13 00-0045	EA	51" x 99" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,664.13 118.60 285.01 33.19 153.51 207.22	382.50
07 72 13 00-0046	EA	51" x 122" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,803.46 128.55 308.89 -190.12 -54.78 18.27	414.38
07 72 13 00-0047	EA	62" x 62" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,408.81 101.04 241.92 26.43 97.33 178.97	318.76
07 72 13 00-0048	EA	62-3/8" x 74-3/8" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,517.03 107.87 259.58 -144.12 -38.84 27.74	350.64
07 72 13 00-0049	EA	62" x 86" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,656.35 117.82 283.46 -187.05 -81.79 -19.47	382.50
07 72 13 00-0050	EA	62" x 98" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,690.06 121.19 290.20 39.32 144.59 252.02	382.50
07 72 13 00-0051	EA	62" x 122" Outside Frame Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,831.98 131.40 314.60 -236.12 -128.71 8.79	414.38
07 72 13 00-0052		14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curbs <small>(07 72 13 00-0003)</small>		
07 72 13 00-0053	EA	26" x 26" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,054.97 73.62 179.12 -33.73 11.38 35.02	255.00
07 72 13 00-0054	EA	26" x 38" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb..... <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,062.75 74.40 180.67 -41.40 18.76 40.24	255.00

07 Thermal And Moisture Protection
07 70 Roof and Wall Specialties and Accessories
07 72 Roof Accessories



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0055	EA		26" x 50" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,145.03 78.64 193.15 -50.60 24.60 39.64	286.88
07 72 13 00-0056	EA		26" x 74" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,220.22 86.16 208.18 -67.45 29.21 44.25	286.88
07 72 13 00-0057	EA		26" x 98" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,277.27 91.87 219.59 19.66 124.94 137.83	286.88
07 72 13 00-0058	EA		26" x 122" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,533.27 113.48 266.81 -111.92 -15.25 25.57	318.76
07 72 13 00-0059	EA		38" x 38" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,062.75 74.40 180.67 11.28 97.22 135.89	255.00
07 72 13 00-0060	EA		38" x 50" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,145.03 78.64 193.15 -64.40 25.84 62.36	286.88
07 72 13 00-0061	EA		38" x 62" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,277.27 91.87 219.59 -79.73 14.80 44.88	286.88
07 72 13 00-0062	EA		38" x 74" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,339.50 98.09 232.04 19.98 123.11 151.04	286.88
07 72 13 00-0063	EA		38" x 98" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,496.97 109.85 259.55 25.78 139.65 182.62	318.76
07 72 13 00-0064	EA		38" x 122" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,644.08 120.58 284.99 31.58 162.64 214.21	350.64
07 72 13 00-0065	EA		50" x 50" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,279.86 92.13 220.11 -82.80 11.73 35.37	286.88
07 72 13 00-0066	EA		50" x 62" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,293.19 89.47 218.79 -99.65 -11.56 31.39	318.76
07 72 13 00-0067	EA		50" x 74" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,434.74 103.63 247.10 -118.05 -42.87 30.18	318.76
07 72 13 00-0068	EA		50" x 86" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,576.66 113.84 271.50 -138.00 -41.30 27.43	350.64

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0069 EA 51" x 99" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,695.25	382.50
For Sloped Roofs Up To 1 In 12 To 3 In 12 Pitch, Add	121.71	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	291.24	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	33.19	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	153.51	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	207.22	
07 72 13 00-0070 EA 51" x 122" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,839.76	414.38
For Sloped Roofs Up To 1 In 12 Pitch, Add	132.18	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	316.15	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-190.12	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-54.78	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	18.27	
07 72 13 00-0071 EA 62" x 62" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,434.74	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	103.63	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	247.10	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	26.43	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	97.33	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	178.97	
07 72 13 00-0072 EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,545.55	350.64
For Sloped Roofs Up To 1 In 12 Pitch, Add	110.73	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	265.28	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-144.12	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-38.84	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	27.74	
07 72 13 00-0073 EA 62" x 86" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,690.06	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	121.19	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	290.20	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-187.05	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-81.79	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	-19.47	
07 72 13 00-0074 EA 62" x 98" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,723.77	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	124.56	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	296.94	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	39.32	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	144.59	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	252.02	
07 72 13 00-0075 EA 62" x 122" Outside Frame Dimensions, 14" Height, 18 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,870.87	414.38
For Sloped Roofs Up To 1 In 12 Pitch, Add	135.29	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	322.38	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-236.12	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-128.71	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	8.79	
07 72 13 00-0076 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curbs (07 72 13 00-0002)		
07 72 13 00-0077 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curbs (07 72 13 00-0076)		
07 72 13 00-0078 EA 26" x 26" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	974.59	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	65.58	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	163.04	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-33.73	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	11.38	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	35.02	
07 72 13 00-0079 EA 26" x 38" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,008.29	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	68.95	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	169.78	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-41.40	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	18.76	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	40.24	
07 72 13 00-0080 EA 26" x 50" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,152.81	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	79.42	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	194.70	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-50.60	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	24.60	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	39.64	
07 72 13 00-0081 EA 26" x 74" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,230.59	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	87.20	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	210.26	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-67.45	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	29.21	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	44.25	
07 72 13 00-0082 EA 26" x 98" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,287.64	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	92.90	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	221.67	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	19.66	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	124.94	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	137.83	
07 72 13 00-0083 EA 26" x 122" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,574.76	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	117.63	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	275.11	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-111.92	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-15.25	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	25.57	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0084	EA		38" x 38" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,070.52	255.00
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	75.18	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	182.23	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	11.28	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.22	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	135.89	
07 72 13 00-0085	EA		38" x 50" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,173.55	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	81.50	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	198.85	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-64.40	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	25.84	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	62.36	
07 72 13 00-0086	EA		38" x 62" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,199.48	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	84.09	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	204.04	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-79.73	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	14.80	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	44.88	
07 72 13 00-0087	EA		38" x 74" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,222.82	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	86.42	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	208.70	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.98	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	123.11	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	151.04	
07 72 13 00-0088	EA		38" x 98" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,512.53	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	111.41	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	262.66	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	25.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	139.65	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	182.62	
07 72 13 00-0089	EA		38" x 122" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,662.23	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	122.39	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	288.62	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	31.58	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	162.64	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	214.21	
07 72 13 00-0090	EA		50" x 50" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,290.23	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	93.16	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	222.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-82.80	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.73	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.37	
07 72 13 00-0091	EA		50" x 62" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,406.22	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	100.78	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	241.40	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-99.65	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-11.56	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	31.39	
07 72 13 00-0092	EA		50" x 74" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,447.71	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	104.93	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	249.70	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-118.05	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-42.87	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	30.18	
07 72 13 00-0093	EA		50" x 86" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,592.22	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	115.39	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	274.62	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-138.00	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-41.30	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.43	
07 72 13 00-0094	EA		51" x 99" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,710.80	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	123.27	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	294.35	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	33.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	153.51	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	207.22	
07 72 13 00-0095	EA		51" x 122" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,857.91	414.38
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	133.99	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	319.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-190.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-54.78	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	18.27	
07 72 13 00-0096	EA		62" x 62" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,447.71	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	104.93	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	249.70	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	26.43	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.33	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	178.97	
07 72 13 00-0097	EA		62-3/8" x 74-3/8" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,558.51	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	112.02	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	267.87	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-144.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-38.84	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.74	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0098 EA 62" x 86" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,705.62	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	122.75	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	293.31	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-187.05	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-81.79	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	-19.47	
07 72 13 00-0099 EA 62" x 98" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,741.92	382.50
For Sloped Roofs Up To 1 In 12 Pitch, Add	126.38	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	300.57	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	39.32	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	144.59	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	252.02	
07 72 13 00-0100 EA 62" x 122" Outside Frame Dimensions, 9" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,891.62	414.38
For Sloped Roofs Up To 1 In 12 Pitch, Add	137.36	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	326.53	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-236.12	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-128.71	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	8.79	
07 72 13 00-0101 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof		
Curbs (07 72 13 00-0076)		
07 72 13 00-0102 EA 26" x 26" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	997.92	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	67.92	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	167.71	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-33.73	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	11.38	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	35.02	
07 72 13 00-0103 EA 26" x 38" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,036.82	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	71.81	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	175.49	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-41.40	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	18.76	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	40.24	
07 72 13 00-0104 EA 26" x 50" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,191.70	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	83.31	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	202.48	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-50.60	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	24.60	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	39.64	
07 72 13 00-0105 EA 26" x 74" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,277.27	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	91.87	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	219.59	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-67.45	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	29.21	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	44.25	
07 72 13 00-0106 EA 26" x 98" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,347.27	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	98.87	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	233.59	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	19.66	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	124.94	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	137.83	
07 72 13 00-0107 EA 26" x 122" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof		
Curb.....	1,585.13	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	118.67	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	277.18	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-111.92	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-15.25	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	25.57	
07 72 13 00-0108 EA 38" x 38" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,104.23	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	78.55	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	188.97	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	11.28	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	97.22	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	135.89	
07 72 13 00-0109 EA 38" x 50" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,215.04	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	85.64	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	207.15	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-64.40	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	25.84	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	62.36	
07 72 13 00-0110 EA 38" x 62" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,248.74	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	89.01	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	213.89	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-79.73	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	14.80	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	44.88	
07 72 13 00-0111 EA 38" x 74" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,279.86	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	92.13	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	220.11	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	19.98	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	123.11	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	151.04	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0112	EA		38" x 98" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,574.76	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	117.63	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	275.11	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	25.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	139.65	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	182.62	
07 72 13 00-0113	EA		38" x 122" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,737.42	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	129.91	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	303.66	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	31.58	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	162.64	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	214.21	
07 72 13 00-0114	EA		50" x 50" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,336.90	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	97.83	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	231.52	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-82.80	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.73	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.37	
07 72 13 00-0115	EA		50" x 62" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,458.08	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	105.96	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	251.77	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-99.65	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-11.56	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	31.39	
07 72 13 00-0116	EA		50" x 74" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,507.34	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	110.89	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	261.62	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-118.05	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-42.87	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	30.18	
07 72 13 00-0117	EA		50" x 86" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,654.45	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	121.62	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	287.06	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-138.00	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-41.30	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.43	
07 72 13 00-0118	EA		51" x 99" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,783.41	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	130.53	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	308.87	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	33.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	153.51	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	207.22	
07 72 13 00-0119	EA		51" x 122" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,940.88	414.38
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	142.29	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	336.38	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-190.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-54.78	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	18.27	
07 72 13 00-0120	EA		62" x 62" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,507.34	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	110.89	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	261.62	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	26.43	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.33	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	178.97	
07 72 13 00-0121	EA		62-3/8" x 74-3/8" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,625.93	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	118.76	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	281.36	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-144.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-38.84	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.74	
07 72 13 00-0122	EA		62" x 86" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,778.22	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	130.01	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	307.83	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-187.05	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-81.79	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	-19.47	
07 72 13 00-0123	EA		62" x 98" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,817.11	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	133.90	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	315.61	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	39.32	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	144.59	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	252.02	
07 72 13 00-0124	EA		62" x 122" Outside Frame Dimensions, 12" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,979.78	414.38
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	146.18	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	344.16	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-236.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-128.71	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	8.79	

07 72 13 00-0125 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curbs (07 72 13 00-0076)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0126 EA 26" x 26" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,016.07	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	69.73	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	171.34	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-33.73	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	11.38	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	35.02	
07 72 13 00-0127 EA 26" x 38" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,057.56	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	73.88	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	179.64	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-41.40	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	18.76	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	40.24	
07 72 13 00-0128 EA 26" x 50" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,215.04	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	85.64	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	207.15	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-50.60	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	24.60	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	39.64	
07 72 13 00-0129 EA 26" x 74" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,308.38	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	94.98	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	225.82	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-67.45	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	29.21	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	44.25	
07 72 13 00-0130 EA 26" x 98" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,386.17	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	102.76	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	241.37	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	19.66	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	124.94	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	137.83	
07 72 13 00-0131 EA 26" x 122" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,668.10	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	126.97	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	293.78	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-111.92	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-15.25	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	25.57	
07 72 13 00-0132 EA 38" x 38" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,130.16	255.00
For Sloped Roofs Up To 1 In 12 Pitch, Add	81.14	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	194.16	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	11.28	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	97.22	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	135.89	
07 72 13 00-0133 EA 38" x 50" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,259.12	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	90.05	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	215.96	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-64.40	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	25.84	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	62.36	
07 72 13 00-0134 EA 38" x 62" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,305.79	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	94.72	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	225.30	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-79.73	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	14.80	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	44.88	
07 72 13 00-0135 EA 38" x 74" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,316.16	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	95.76	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	227.37	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	19.98	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	123.11	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	151.04	
07 72 13 00-0136 EA 38" x 98" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,621.43	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	122.30	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	284.44	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	25.78	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	139.65	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	182.62	
07 72 13 00-0137 EA 38" x 122" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,789.28	350.64
For Sloped Roofs Up To 1 In 12 Pitch, Add	135.10	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	314.03	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	31.58	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	162.64	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	214.21	
07 72 13 00-0138 EA 50" x 50" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,368.02	286.88
For Sloped Roofs Up To 1 In 12 Pitch, Add	100.94	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	237.74	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-82.80	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	11.73	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	35.37	
07 72 13 00-0139 EA 50" x 62" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb.....	1,372.69	318.76
For Sloped Roofs Up To 1 In 12 Pitch, Add	97.42	
For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	234.69	
For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add	-99.65	
For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add	-11.56	
For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	31.39	

07 Thermal And Moisture Protection
07 70 Roof and Wall Specialties and Accessories
07 72 Roof Accessories



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0140	EA		50" x 74" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,546.24 114.78 269.40 -118.05 -42.87 30.18	318.76
07 72 13 00-0141	EA		50" x 86" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,701.12 126.28 296.40 -138.00 -41.30 27.43	350.64
07 72 13 00-0142	EA		51" x 99" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,830.08 135.19 318.20 33.19 153.51 207.22	382.50
07 72 13 00-0143	EA		51" x 122" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,997.93 148.00 347.79 -190.12 -54.78 18.27	414.38
07 72 13 00-0144	EA		62" x 62" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,546.24 114.78 269.40 26.43 97.33 178.97	318.76
07 72 13 00-0145	EA		62-3/8" x 74-3/8" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,672.60 123.43 290.69 -144.12 -38.84 27.74	350.64
07 72 13 00-0146	EA		62" x 86" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,822.30 134.42 316.65 -187.05 -81.79 -19.47	382.50
07 72 13 00-0147	EA		62" x 98" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	1,868.97 139.08 325.98 39.32 144.59 252.02	382.50
07 72 13 00-0148	EA		62" x 122" Outside Frame Dimensions, 14" Height, 14 Gauge, Insulated Galvanized Steel, Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add	2,036.82 151.88 355.57 -236.12 -128.71 8.79	414.38
07 72 13 00-0149			Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curbs <small>(07 72 13 00-0001)</small> Note: Includes 1" rigid foam insulation, mill finish galvanized steel exterior wall construction, painted galvanized steel interior wall construction and installation clips.		
07 72 13 00-0150			6" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curbs <small>(07 72 13 00-0149)</small>		
07 72 13 00-0151	EA		14-1/2" To 23" Square Outside Dimensions, 6" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	958.50 63.97 159.82	255.00
07 72 13 00-0152	EA		23-1/2" To 32" Square Outside Dimensions, 6" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	1,101.00 78.22 188.32	255.00
07 72 13 00-0153	EA		32-1/2" To 41" Square Outside Dimensions, 6" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	1,259.94 90.13 216.13	286.88
07 72 13 00-0154	EA		41" To 49-1/2" Square Outside Dimensions, 6" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	1,373.72 101.51 238.88	286.88
07 72 13 00-0155	EA		50" To 58-1/2" Square Outside Dimensions, 6" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb For Sloped Roofs Up To 1 In 12 Pitch, Add For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add	1,519.58 112.11 264.07	318.76



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0156				12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curbs <small>(07 72 13 00-0149)</small>		
07 72 13 00-0157	EA			14-1/2" To 23" Square Outside Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,167.16	1,167.16	255.00
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 84.84	84.84	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 201.56	201.56	
07 72 13 00-0158	EA			23-1/2" To 32" Square Outside Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,360.56	1,360.56	255.00
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 104.18	104.18	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 240.24	240.24	
07 72 13 00-0159	EA			32-1/2" To 41" Square Outside Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,445.70	1,445.70	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 108.71	108.71	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 253.28	253.28	
07 72 13 00-0160	EA			41" To 49-1/2" Square Outside Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,518.41	1,518.41	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 115.98	115.98	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 267.82	267.82	
07 72 13 00-0161	EA			50" To 58-1/2" Square Outside Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,699.88	1,699.88	318.76
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 130.14	130.14	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 300.13	300.13	
07 72 13 00-0162	EA			64" To 72-1/2" Square Outside Dimensions, 12" Height, 18 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 2,669.51	2,669.51	350.64
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 223.12	223.12	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 490.07	490.07	
07 72 13 00-0163				18" To 24" Height, 16 Gauge, Ventilated Galvanized Steel, Adjustable Width Prefabricated Roof Curbs <small>(07 72 13 00-0149)</small>		
07 72 13 00-0164	EA			17-1/2" To 22" Square Outside Dimensions, 24" Height, 16 Gauge, Ventilated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,509.97	1,509.97	255.00
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 119.12	119.12	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 270.12	270.12	
07 72 13 00-0165	EA			24" To 29" Square Outside Dimensions, 24" Height, 16 Gauge, Ventilated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 1,707.72	1,707.72	255.00
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 138.90	138.90	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 309.67	309.67	
07 72 13 00-0166	EA			31" To 46" Square Outside Dimensions, 18" Height, 16 Gauge, Insulated Galvanized Steel, Adjustable Width Prefabricated Roof Curb 2,022.25	2,022.25	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 166.37	166.37	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 368.59	368.59	
07 72 13 00-0167				Wood, Prefabricated Roof Curbs <small>(07 72 13)</small>		
				Note: Includes Douglas fir construction, galvanized steel corner straps, fasteners, sealants, and installation clips. Includes 3/16" wire mesh, 6" x 6" grids, safety security guard with installation clips. Excludes flashing. See CSI section 07 62 13 00-0000 for flashing and trim.		
07 72 13 00-0168				Wood Framed, Prefabricated Roof Curbs <small>(07 72 13 00-0167)</small>		
07 72 13 00-0169				2 x 6 Wood Framed, Prefabricated Roof Curbs <small>(07 72 13 00-0168)</small>		
07 72 13 00-0170	EA			26" x 26" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb 811.54	811.54	255.00
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 49.28	49.28	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 130.43	130.43	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> -33.73	-33.73	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> 11.38	11.38	
				<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i> 35.02	35.02	
07 72 13 00-0171	EA			26" x 50" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb 904.12	904.12	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 54.55	54.55	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 144.96	144.96	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> -50.60	-50.60	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> 24.60	24.60	
				<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i> 39.64	39.64	
07 72 13 00-0172	EA			26" x 98" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb 959.98	959.98	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 60.14	60.14	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 156.14	156.14	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> 19.66	19.66	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> 124.94	124.94	
				<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i> 137.83	137.83	
07 72 13 00-0173	EA			38" x 62" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb 953.54	953.54	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 59.49	59.49	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 154.85	154.85	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> -79.73	-79.73	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> 14.80	14.80	
				<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i> 44.88	44.88	
07 72 13 00-0174	EA			38" x 74" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb 968.57	968.57	286.88
				<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> 61.00	61.00	
				<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> 157.85	157.85	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> 19.98	19.98	
				<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> 123.11	123.11	
				<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i> 151.04	151.04	

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 72 13 00-0175	EA 38" x 98" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,084.79 68.63 177.11 25.78 139.65 182.62	318.76
07 72 13 00-0176	EA 50" x 50" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	964.28 60.57 157.00 -82.80 11.73 35.37	286.88
07 72 13 00-0177	EA 50" x 74" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,104.13 70.57 180.98 -118.05 -42.87 30.18	318.76
07 72 13 00-0178	EA 51" x 99" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,263.51 78.54 204.89 33.19 153.51 207.22	382.50
07 72 13 00-0179	EA 62" x 62" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,065.45 66.70 173.25 26.43 97.33 178.97	318.76
07 72 13 00-0180	EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,170.92 73.26 190.36 -144.12 -38.84 27.74	350.64
07 72 13 00-0181	EA 62" x 98" Outside Frame Dimensions, 2 x 6 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,306.48 82.83 213.48 39.32 144.59 252.02	382.50
07 72 13 00-0182	2 x 8 Wood Framed, Prefabricated Roof Curbs <small>(07 72 13 00-0188)</small>		
07 72 13 00-0183	EA 26" x 26" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	824.43 50.57 133.01 -33.73 11.38 35.02	255.00
07 72 13 00-0184	EA 26" x 50" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	919.16 56.06 147.97 -50.60 24.60 39.64	286.88
07 72 13 00-0185	EA 26" x 98" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,000.80 64.22 164.30 19.66 124.94 137.83	286.88
07 72 13 00-0186	EA 38" x 62" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	979.32 62.07 160.00 -79.73 14.80 44.88	286.88
07 72 13 00-0187	EA 38" x 74" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,000.80 64.22 164.30 19.98 123.11 151.04	286.88
07 72 13 00-0188	EA 38" x 98" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,117.02 71.86 183.56 25.78 139.65 182.62	318.76



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0189 EA 50" x 50" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	987.91 62.93 161.72 -82.80 11.73 35.37	286.88
07 72 13 00-0190 EA 50" x 74" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,134.20 73.58 187.00 -118.05 -42.87 30.18	318.76
07 72 13 00-0191 EA 51" x 99" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,293.58 81.54 210.90 33.19 153.51 207.22	382.50
07 72 13 00-0192 EA 62" x 62" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,089.09 69.06 177.97 26.43 97.33 178.97	318.76
07 72 13 00-0193 EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,198.86 76.06 195.94 -144.12 -38.84 27.74	350.64
07 72 13 00-0194 EA 62" x 98" Outside Frame Dimensions, 2 x 8 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,336.55 85.84 219.50 39.32 144.59 252.02	382.50
07 72 13 00-0195 2 x 10 Wood Framed, Prefabricated Roof Curbs <small>(07 72 13 00-0188)</small>		
07 72 13 00-0196 EA 26" x 26" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	833.02 51.43 134.73 -33.73 11.38 35.02	255.00
07 72 13 00-0197 EA 26" x 50" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	934.20 57.56 150.98 -50.60 24.60 39.64	286.88
07 72 13 00-0198 EA 26" x 98" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,005.10 64.65 165.16 19.66 124.94 137.83	286.88
07 72 13 00-0199 EA 38" x 62" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	994.36 63.58 163.01 -79.73 14.80 44.88	286.88
07 72 13 00-0200 EA 38" x 74" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,020.14 66.15 168.17 19.98 123.11 151.04	286.88
07 72 13 00-0201 EA 38" x 98" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,138.50 74.01 187.86 25.78 139.65 182.62	318.76
07 72 13 00-0202 EA 50" x 50" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,002.95 64.44 164.73 -82.80 11.73 35.37	286.88

07 Thermal And Moisture Protection
07 70 Roof and Wall Specialties and Accessories
07 72 Roof Accessories



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 72 13 00-0203	EA 50" x 74" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,153.54 75.51 190.86 -118.05 -42.87 30.18	318.76
07 72 13 00-0204	EA 51" x 99" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,312.92 83.48 214.77 33.19 153.51 207.22	382.50
07 72 13 00-0205	EA 62" x 62" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,104.13 70.57 180.98 26.43 97.33 178.97	318.76
07 72 13 00-0206	EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,216.04 77.78 199.38 -144.12 -38.84 27.74	350.64
07 72 13 00-0207	EA 62" x 98" Outside Frame Dimensions, 2 x 10 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,358.04 87.99 223.79 39.32 144.59 252.02	382.50
07 72 13 00-0208	2 x 12 Wood Framed, Prefabricated Roof Curbs (07 72 13 00-0168)		
07 72 13 00-0209	EA 26" x 26" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	843.77 52.50 136.88 -33.73 11.38 35.02	255.00
07 72 13 00-0210	EA 26" x 50" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	942.79 58.42 152.70 -50.60 24.60 39.64	286.88
07 72 13 00-0211	EA 26" x 98" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,024.44 66.58 169.03 19.66 124.94 137.83	286.88
07 72 13 00-0212	EA 38" x 74" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,041.62 68.30 172.46 19.98 123.11 151.04	286.88
07 72 13 00-0213	EA 38" x 98" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,162.13 76.37 192.58 25.78 139.65 182.62	318.76
07 72 13 00-0214	EA 50" x 50" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,022.29 66.37 168.60 -82.80 11.73 35.37	286.88
07 72 13 00-0215	EA 50" x 74" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,175.03 77.66 195.16 -118.05 -42.87 30.18	318.76
07 72 13 00-0216	EA 51" x 99" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,338.70 86.06 219.93 33.19 153.51 207.22	382.50



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0217 EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 12 Wood Framed, Prefabricated Roof Curb.....	1,233.23	350.64
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	79.49	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	202.82	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-144.12	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-38.84	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.74	
07 72 13 00-0218 Wood Framed With Liner, Prefabricated Roof Curbs (07 72 13 00-0167)		
07 72 13 00-0219 2 x 6 Wood Framed With Liner, Prefabricated Roof Curbs (07 72 13 00-0218)		
07 72 13 00-0220 EA 26" x 26" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	828.73	255.00
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	51.00	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	133.87	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-33.73	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.38	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.02	
07 72 13 00-0221 EA 26" x 50" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	919.16	286.88
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	56.06	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	147.97	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-50.60	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	24.60	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	39.64	
07 72 13 00-0222 EA 26" x 98" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	987.91	286.88
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	62.93	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	161.72	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.66	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	124.94	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	137.83	
07 72 13 00-0223 EA 38" x 62" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	972.87	286.88
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	61.43	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	158.71	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-79.73	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	14.80	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	44.88	
07 72 13 00-0224 EA 38" x 74" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	992.21	286.88
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	63.36	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	162.58	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.98	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	123.11	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	151.04	
07 72 13 00-0225 EA 38" x 98" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	1,110.57	318.76
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	71.21	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	182.27	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	25.78	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	139.65	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	182.62	
07 72 13 00-0226 EA 50" x 50" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	983.61	286.88
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	62.50	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	160.86	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-82.80	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.73	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.37	
07 72 13 00-0227 EA 50" x 74" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	1,127.76	318.76
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	72.93	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	185.71	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-118.05	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-42.87	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	30.18	
07 72 13 00-0228 EA 51" x 99" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	1,287.14	382.50
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	80.90	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	209.61	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	33.19	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	153.51	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	207.22	
07 72 13 00-0229 EA 62" x 62" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	1,091.23	318.76
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	69.28	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	178.40	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	26.43	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.33	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	178.97	
07 72 13 00-0230 EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb.....	1,194.56	350.64
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	75.63	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	195.08	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-144.12	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-38.84	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.74	
07 72 13 00-0231 EA 62" x 98" Outside Frame Dimensions, 2 x 6 Wood Framed With Liner, Prefabricated Roof Curb	1,336.55	382.50
<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	85.84	
<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	219.50	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	39.32	
<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	144.59	
<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	252.02	
07 72 13 00-0232 2 x 8 Wood Framed With Liner, Prefabricated Roof Curbs (07 72 13 00-0218)		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 72 13 00-0233	EA		26" x 26" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	843.77	255.00
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	52.50	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	136.88	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-33.73	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.38	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.02	
07 72 13 00-0234	EA		26" x 50" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	936.35	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	57.78	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	151.41	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-50.60	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	24.60	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	39.64	
07 72 13 00-0235	EA		26" x 98" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,013.69	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	65.51	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	166.88	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.66	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	124.94	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	137.83	
07 72 13 00-0236	EA		38" x 62" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	998.65	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	64.01	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	163.87	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-79.73	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	14.80	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	44.88	
07 72 13 00-0237	EA		38" x 74" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,026.58	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	66.80	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	169.46	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.98	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	123.11	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	151.04	
07 72 13 00-0238	EA		38" x 98" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,149.24	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	75.08	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	190.00	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	25.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	139.65	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	182.62	
07 72 13 00-0239	EA		50" x 50" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,013.69	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	65.51	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	166.88	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-82.80	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.73	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.37	
07 72 13 00-0240	EA		50" x 74" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,164.28	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	76.58	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	193.01	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-118.05	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-42.87	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	30.18	
07 72 13 00-0241	EA		51" x 99" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,327.96	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	84.98	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	217.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	33.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	153.51	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	207.22	
07 72 13 00-0242	EA		62" x 62" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,119.17	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	72.07	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	183.99	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	26.43	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	97.33	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	178.97	
07 72 13 00-0243	EA		62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,226.79	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	78.85	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	201.53	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-144.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-38.84	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.74	
07 72 13 00-0244	EA		62" x 98" Outside Frame Dimensions, 2 x 8 Wood Framed With Liner, Prefabricated Roof Curb	1,373.08	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	89.49	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	226.80	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	39.32	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	144.59	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	252.02	

07 72 13 00-0245 2 x 10 Wood Framed With Liner, Prefabricated Roof Curbs (07 72 13 00-0218)

07 72 13 00-0246	EA		26" x 26" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb	856.66	255.00
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	53.79	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	139.46	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-33.73	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.38	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.02	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0247 EA 26" x 50" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	953.54 59.49 154.65 -50.60 24.60 39.64	286.88
07 72 13 00-0248 EA 26" x 98" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,039.48 68.09 172.04 19.66 124.94 137.83	286.88
07 72 13 00-0249 EA 38" x 62" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,017.99 65.94 167.74 -79.73 14.80 44.88	286.88
07 72 13 00-0250 EA 38" x 74" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,052.37 69.38 174.61 19.98 123.11 151.04	286.88
07 72 13 00-0251 EA 38" x 98" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,177.17 77.87 195.59 25.78 139.65 182.62	318.76
07 72 13 00-0252 EA 50" x 50" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,033.03 67.44 170.75 -82.80 11.73 35.37	286.88
07 72 13 00-0253 EA 50" x 74" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,187.92 78.95 197.74 -118.05 -42.87 30.18	318.76
07 72 13 00-0254 EA 51" x 99" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,353.74 87.56 222.93 33.19 153.51 207.22	382.50
07 72 13 00-0255 EA 62" x 62" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,140.65 74.22 188.29 26.43 97.33 178.97	318.76
07 72 13 00-0256 EA 62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,250.42 81.21 206.26 -144.12 -38.84 27.74	350.64
07 72 13 00-0257 EA 62" x 98" Outside Frame Dimensions, 2 x 10 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	1,401.01 92.29 232.39 39.32 144.59 252.02	382.50
07 72 13 00-0258 2 x 12 Wood Framed With Liner, Prefabricated Roof Curbs (07 72 13 00-0218)		
07 72 13 00-0259 EA 26" x 26" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	882.44 56.37 144.61 -33.73 11.38 35.02	255.00
07 72 13 00-0260 EA 26" x 50" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb <i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i> <i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i> <i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i> <i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	966.43 60.78 157.43 -50.60 24.60 39.64	286.88

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 13 00-0261	EA		26" x 98" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,058.81	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	70.02	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	175.90	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.66	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	124.94	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	137.83	
07 72 13 00-0262	EA		38" x 74" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,073.85	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	71.53	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	178.91	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	19.98	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	123.11	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	151.04	
07 72 13 00-0263	EA		38" x 98" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,258.82	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	86.04	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	211.92	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	25.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	139.65	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	182.62	
07 72 13 00-0264	EA		50" x 50" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,095.34	286.88
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	73.67	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	183.21	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-82.80	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	11.73	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	35.37	
07 72 13 00-0265	EA		50" x 74" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,263.11	318.76
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	86.47	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	212.78	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-118.05	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-42.87	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	30.18	
07 72 13 00-0266	EA		51" x 99" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,439.68	382.50
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	96.15	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	240.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	33.19	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	153.51	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	207.22	
07 72 13 00-0267	EA		62-3/8" x 74-3/8" Outside Frame Dimensions, 2 x 12 Wood Framed With Liner, Prefabricated Roof Curb	1,329.91	350.64
			<i>For Sloped Roofs Up To 1 In 12 Pitch, Add</i>	89.16	
			<i>For Sloped Roofs >1 In 12 To 3 In 12 Pitch, Add</i>	222.15	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Clip Attached, Safety Security Guard, Add</i>	-144.12	
			<i>For 3/16" Wire Diameter, 4" x 4" Grids, Z Channel Attached, Safety Security Guard, Add</i>	-38.84	
			<i>For 1/2" Diameter, 8" On Center, Hot Rolled Steel, Burglar Bars, Add</i>	27.74	

07 72 23 Relief Vents (07 72)**07 72 23 00-0001 Wind Driven Turbine Ventilators (07 72 23)**

Note: Excludes curb or flange base.

07 72 23 00-0002 Galvanized Steel, Wind Driven Turbine Ventilators (07 72 23 00-0001)

07 72 23 00-0003	EA		6" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	188.23	34.15
			<i>For Curb Or Flange Base, Add</i>	205.10	
07 72 23 00-0004	EA		9" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	226.57	37.81
			<i>For Curb Or Flange Base, Add</i>	225.08	
07 72 23 00-0005	EA		12" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	243.45	45.13
			<i>For Curb Or Flange Base, Add</i>	249.24	
07 72 23 00-0006	EA		15" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	476.98	50.01
			<i>For Curb Or Flange Base, Add</i>	409.75	
07 72 23 00-0007	EA		18" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	660.22	56.10
			<i>For Curb Or Flange Base, Add</i>	443.18	
07 72 23 00-0008	EA		21" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	798.40	60.98
			<i>For Curb Or Flange Base, Add</i>	481.28	
07 72 23 00-0009	EA		24" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	1,022.16	68.30
			<i>For Curb Or Flange Base, Add</i>	591.58	
07 72 23 00-0010	EA		36" Neck Diameter, 26 Gauge, Galvanized Steel, Outside Braced, Wind Driven Turbine Ventilator	1,694.02	91.47
			<i>For Curb Or Flange Base, Add</i>	977.85	

07 72 23 00-0011 Mill Finish Aluminum, Wind Driven Turbine Ventilators (07 72 23 00-0001)

07 72 23 00-0012	EA		6" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	181.17	34.15
			<i>For Curb Or Flange Base, Add</i>	212.24	
07 72 23 00-0013	EA		9" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	226.93	37.81
			<i>For Curb Or Flange Base, Add</i>	233.39	
07 72 23 00-0014	EA		12" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	253.38	45.13
			<i>For Curb Or Flange Base, Add</i>	257.45	
07 72 23 00-0015	EA		15" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	459.52	50.01
			<i>For Curb Or Flange Base, Add</i>	452.16	
07 72 23 00-0016	EA		18" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	595.23	56.10
			<i>For Curb Or Flange Base, Add</i>	482.17	
07 72 23 00-0017	EA		21" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	755.76	60.98
			<i>For Curb Or Flange Base, Add</i>	544.52	
07 72 23 00-0018	EA		24" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	1,024.05	68.30
			<i>For Curb Or Flange Base, Add</i>	659.76	
07 72 23 00-0019	EA		36" Neck Diameter, 0.025", Mill Finish Aluminum, Outside Braced, Wind Driven Turbine Ventilator	1,528.08	91.47
			<i>For Curb Or Flange Base, Add</i>	996.70	



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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07 72 23 00-0020		Stationary Siphon Ventilators <small>(07 72 23)</small> Note: Excludes curb or flange base.		
07 72 23 00-0021		Galvanized Steel, Stationary Siphon Ventilators <small>(07 72 23 00-0020)</small>		
07 72 23 00-0022	EA	6" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	157.61 205.10	34.15
07 72 23 00-0023	EA	9" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	209.06 225.08	37.81
07 72 23 00-0024	EA	12" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	229.10 249.24	45.13
07 72 23 00-0025	EA	15" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	398.42 409.75	50.01
07 72 23 00-0026	EA	18" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	461.40 443.18	56.10
07 72 23 00-0027	EA	21" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	657.89 481.28	60.98
07 72 23 00-0028	EA	24" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	859.31 591.58	68.30
07 72 23 00-0029	EA	36" Neck Diameter, 26 Gauge, Galvanized Steel, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	1,247.30 977.85	91.47
07 72 23 00-0030		Mill Finish Aluminum, Stationary Siphon Ventilators <small>(07 72 23 00-0020)</small>		
07 72 23 00-0031	EA	6" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	173.82 212.24	34.15
07 72 23 00-0032	EA	9" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	231.33 233.39	37.81
07 72 23 00-0033	EA	12" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	257.07 257.45	45.13
07 72 23 00-0034	EA	15" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	424.90 452.16	50.01
07 72 23 00-0035	EA	18" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	536.41 482.17	56.10
07 72 23 00-0036	EA	21" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	660.17 544.52	60.98
07 72 23 00-0037	EA	24" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	950.55 659.76	68.30
07 72 23 00-0038	EA	36" Neck Diameter, 0.025", Mill Finish Aluminum, Stationary Siphon Ventilator <i>For Curb Or Flange Base, Add</i>	1,434.12 996.70	91.47
07 72 23 00-0039		Spun Aluminum, Stationary Mushroom Gravity Ventilators <small>(07 72 23)</small> Note: Includes flange base and bird screen. Excludes curb.		
07 72 23 00-0040	EA	8" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	346.88 199.65 279.85	54.88
07 72 23 00-0041	EA	10" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	431.97 218.44 305.90	60.98
07 72 23 00-0042	EA	12" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	485.95 298.30 389.16	73.18
07 72 23 00-0043	EA	16" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	598.21 340.58 452.27	80.50
07 72 23 00-0044	EA	24" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	1,657.89 427.49 594.31	109.78
07 72 23 00-0045	EA	30" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	2,029.42 505.00 711.81	126.85
07 72 23 00-0046	EA	36" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	2,782.88 505.00 736.04	146.36
07 72 23 00-0047	EA	42" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	3,943.15 528.49 760.57	158.56
07 72 23 00-0048	EA	48" Orifice Diameter, Spun Aluminum, Stationary Mushroom Gravity Ventilator <i>For Backdraft Damper, Add</i> <i>For Curb Base, Add</i>	5,711.80 587.21 857.93	170.76
07 72 23 00-0049		Galvanized Steel, Stationary Gooseneck Ventilators <small>(07 72 23)</small> Note: Includes flange base and bird screen. Excludes curb.		
07 72 23 00-0050	EA	8" x 8", 26 Gauge, Galvanized Steel, Stationary Gooseneck Ventilator	664.90	60.98
07 72 23 00-0051	EA	12" x 12", 26 Gauge, Galvanized Steel, Stationary Gooseneck Ventilator	774.09	80.50
07 72 23 00-0052	EA	16" x 16", 26 Gauge, Galvanized Steel, Stationary Gooseneck Ventilator	1,118.54	109.78
07 72 23 00-0053	EA	24" x 24", 26 Gauge, Galvanized Steel, Stationary Gooseneck Ventilator	1,764.21	126.85

07 72 26 Ridge Vents (07 72)

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 72 26 00-0001	Aluminum Ridge Vents (07 72 26)		
07 72 26 00-0002	LF Aluminum Ridge Vent Strips	15.47	3.54
07 72 26 00-0003	EA Aluminum Ridge Univent Connectors	57.14	21.99
07 72 26 00-0004	EA Aluminum Ridge Univent End Cap	52.54	21.99
07 72 26 00-0005	Galvanized Ridge Vents (07 72 26)		
07 72 26 00-0006	LF Galvanized Sheet Metal Ridge Vent Strips	14.05	3.78
07 72 29	Rafter Vent (07 72)		
07 72 29 00-0001	Rafter Vent (07 72 29)		
	Note: Built-in baffle is designed to help keep air flowing freely from soffits to ridge vents.		
07 72 29 00-0002	EA 22" x 4' Rafter Vent	10.49	
07 72 29 00-0003	EA 14" x 4' Rafter Vent	9.42	
07 72 33	Roof Hatches (07 72)		
	Note: Includes curb with integral insulation, lockable hatch and gaskets.		
07 72 33 00-0001	Galvanized Steel Cover And Curb (07 72 33)		
07 72 33 00-0002	EA 2'-6" x 3'-0" Galvanized Steel Roof Hatch	1,500.00	159.01
07 72 33 00-0003	EA 2'-6" x 4'-6" Galvanized Steel Roof Hatch	2,222.38	176.67
07 72 33 00-0004	EA 2'-6" x 8'-0" Galvanized Steel Roof Hatch	3,950.95	240.94
07 72 33 00-0005	EA 3'-0" x 3'-0" Galvanized Steel Roof Hatch	2,194.20	176.67
07 72 33 00-0006	EA 4'-0" x 4'-0" Galvanized Steel Roof Hatch	2,477.48	196.33
07 72 33 00-0007	EA 3'-0" x 8'-0" Galvanized Steel Roof Hatch	4,084.19	267.77
07 72 33 00-0008	Aluminum Cover And Curb (07 72 33)		
07 72 33 00-0009	EA 2'-6" x 3'-0" Aluminum Roof Hatch	1,263.58	159.01
07 72 33 00-0010	EA 2'-6" x 4'-6" Aluminum Roof Hatch	1,640.26	176.67
07 72 33 00-0011	EA 2'-6" x 8'-0" Aluminum Roof Hatch	2,975.75	240.94
07 72 33 00-0012	EA 3'-0" x 3'-0" Aluminum Roof Hatch	1,604.23	176.67
07 72 33 00-0013	EA 4'-0" x 4'-0" Aluminum Roof Hatch	2,851.96	196.33
07 72 33 00-0014	EA 3'-0" x 8'-0" Aluminum Roof Hatch	3,136.10	267.77
07 72 33 00-0015	EA 3'-0" x 2'-6" Aluminum Roof Scuttle With Skylight	1,797.17	176.67
07 72 33 00-0016	Steel, Plain, Primed (07 72 33)		
07 72 33 00-0017	EA 2'-6" x 3'-0" Plain Steel Roof Hatch Primed	1,435.96	159.01
07 72 33 00-0018	EA 2'-6" x 4'-6" Plain Steel Roof Hatch Primed	1,956.38	176.67
07 72 33 00-0019	EA 2'-6" x 8'-0" Plain Steel Roof Hatch Primed	2,680.55	240.94
07 72 33 00-0020	EA 3'-0" x 3'-0" Plain Steel Roof Hatch Primed	1,816.05	176.67
07 72 33 00-0021	EA 4'-0" x 4'-0" Plain Steel Roof Hatch Primed	2,233.51	196.33
07 72 33 00-0022	EA 3'-0" x 8'-0" Plain Steel Roof Hatch Primed	3,035.12	267.77
07 72 33 00-0023	Stainless Steel (07 72 33)		
07 72 33 00-0024	EA 2'-6" x 3'-0" Stainless Steel Roof Hatch	3,045.74	159.01
07 72 33 00-0025	EA 2'-6" x 4'-6" Stainless Steel Roof Hatch	5,848.01	176.67
07 72 33 00-0026	EA 2'-6" x 8'-0" Stainless Steel Roof Hatch	8,797.92	240.94
07 72 33 00-0027	EA 3'-0" x 3'-0" Stainless Steel Roof Hatch	4,689.91	176.67
07 72 33 00-0028	EA 4'-0" x 4'-0" Stainless Steel Roof Hatch	9,937.44	196.33
07 72 33 00-0029	EA 3'-0" x 8'-0" Stainless Steel Roof Hatch	11,123.75	267.77
07 72 33 00-0030	Removal And Reinstallation Of Roof Hatch (07 72 33)		
	Note: Includes storage, cleaning and supply materials.		
07 72 33 00-0031	EA Removal And Reinstallation Of Roof Hatch (All Types)	489.08	
07 72 33 00-0032	Aluminum Cover And Galvanized Steel Curb (07 72 33)		
07 72 33 00-0033	EA Aluminum Cover, Galvanized Steel Curb 3'-0" x 2'-6" Roof	1,224.35	176.67
07 72 33 00-0034	EA Aluminum Cover, Galvanized Steel Curb 2'-6" x 4'-6" Roof	1,601.02	196.33
07 72 33 00-0035	EA Aluminum Cover, Galvanized Steel Curb 2'-6" x 8'-0" Roof	2,873.74	267.66
07 72 33 00-0036	EA Aluminum Cover, Galvanized Steel Curb 3'-0" x 3'-0" Roof	1,572.84	182.20
07 72 33 00-0037	EA Aluminum Cover, Galvanized Steel Curb 4'-0" x 4'-0" Roof	2,765.64	201.85
07 72 33 00-0038	Roof Hatch Accessories (07 72 33)		
07 72 33 00-0039	EA Enamel Steel, Roof Hatch Ladderup Safety Post	944.01	82.82
07 72 33 00-0040	Roof Hatch Safety Railing (07 72 33)		
	Note: Included mounting bracket to attach to roof hatch		
07 72 33 00-0041	EA 24" x 24" Painted Steel, Roof Hatch Safety Railing With Self Closing Gate	2,027.28	
07 72 33 00-0042	EA 24" x 36" Painted Steel, Roof Hatch Safety Railing With Self Closing Gate	2,104.41	
07 72 33 00-0043	EA 30" x 30" Painted Steel, Roof Hatch Safety Railing With Self Closing Gate	2,157.63	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 33 00-0044 EA 30" x 36" Painted Steel, Roof Hatch Safety Railing With Self Closing Gate	2,348.55	
07 72 33 00-0045 EA 36" x 36" Painted Steel, Roof Hatch Safety Railing With Self Closing Gate	2,568.85	
07 72 33 00-0046 EA 48" x 48" Painted Steel, Roof Hatch Safety Railing With Self Closing Gate	3,288.35	
07 72 36 Smoke Vents (07 72)		
07 72 36 00-0001 Fire Vent (07 72 36)		
07 72 36 00-0002 Galvanized Steel Covers And Curb (07 72 36 00-0001)		
07 72 36 00-0003 EA 4'-0" x 4'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	4,026.76	147.31
07 72 36 00-0004 EA 4'-0" x 6'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	4,621.92	202.51
07 72 36 00-0005 EA 4'-0" x 7'-6" Galvanized Steel Covers And Curb, Smoke And Fire Vent	5,271.64	220.95
07 72 36 00-0006 EA 4'-0" x 8'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	5,373.59	232.00
07 72 36 00-0007 EA 5'-0" x 5'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	6,256.51	202.51
07 72 36 00-0008 EA 5'-0" x 6'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	6,650.07	220.95
07 72 36 00-0009 EA 5'-0" x 7'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	7,019.21	239.39
07 72 36 00-0010 EA 5'-0" x 8'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	7,998.29	257.83
07 72 36 00-0011 EA 5'-0" x 10'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	9,941.06	276.16
07 72 36 00-0012 EA 5'-6" x 5'-6" Galvanized Steel Covers And Curb, Smoke And Fire Vent	6,641.06	239.39
07 72 36 00-0013 EA 5'-6" x 12'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	14,042.96	294.60
07 72 36 00-0014 EA 6'-0" x 6'-0" Galvanized Steel Covers And Curb, Smoke And Fire Vent	7,641.97	313.04
07 72 36 00-0015 Aluminum Covers And Galvanized Steel Curb (07 72 36 00-0001)		
07 72 36 00-0016 EA 4'-0" x 4'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	2,763.22	147.31
07 72 36 00-0017 EA 4'-0" x 6'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	3,167.77	202.51
07 72 36 00-0018 EA 4'-0" x 7'-6" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	3,564.17	220.95
07 72 36 00-0019 EA 4'-0" x 8'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	3,690.59	232.00
07 72 36 00-0020 EA 5'-0" x 5'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	3,583.65	202.51
07 72 36 00-0021 EA 5'-0" x 6'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	4,576.42	220.95
07 72 36 00-0022 EA 5'-0" x 7'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	4,894.34	239.39
07 72 36 00-0023 EA 5'-0" x 8'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	4,765.00	257.83
07 72 36 00-0024 EA 5'-0" x 10'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	6,691.55	276.16
07 72 36 00-0025 EA 5'-6" x 5'-6" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	4,619.70	239.39
07 72 36 00-0026 EA 5'-6" x 12'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	8,775.04	294.60
07 72 36 00-0027 EA 6'-0" x 6'-0" Aluminum Covers And Galvanized Steel Curb, Smoke And Fire Vent	4,533.95	313.04
07 72 36 00-0028 Aluminum Covers And Curb (07 72 36 00-0001)		
07 72 36 00-0029 EA 4'-0" x 4'-0" Aluminum Covers And Curb, Smoke And Fire Vent	3,014.32	147.31
07 72 36 00-0030 EA 4'-0" x 6'-0" Aluminum Covers And Curb, Smoke And Fire Vent	3,583.65	202.51
07 72 36 00-0031 EA 4'-0" x 7'-6" Aluminum Covers And Curb, Smoke And Fire Vent	3,932.97	220.95
07 72 36 00-0032 EA 4'-0" x 8'-0" Aluminum Covers And Curb, Smoke And Fire Vent	4,161.40	232.00
07 72 36 00-0033 EA 5'-0" x 5'-0" Aluminum Covers And Curb, Smoke And Fire Vent	3,771.98	202.51
07 72 36 00-0034 EA 5'-0" x 6'-0" Aluminum Covers And Curb, Smoke And Fire Vent	4,772.59	220.95
07 72 36 00-0035 EA 5'-0" x 7'-0" Aluminum Covers And Curb, Smoke And Fire Vent	5,066.97	239.39
07 72 36 00-0036 EA 5'-0" x 8'-0" Aluminum Covers And Curb, Smoke And Fire Vent	5,235.81	257.83
07 72 36 00-0037 EA 5'-0" x 10'-0" Aluminum Covers And Curb, Smoke And Fire Vent	6,354.14	276.16
07 72 36 00-0038 EA 5'-6" x 5'-6" Aluminum Covers And Curb, Smoke And Fire Vent	4,839.41	239.39
07 72 36 00-0039 EA 5'-6" x 12'-0" Aluminum Covers And Curb, Smoke And Fire Vent	9,583.27	294.60
07 72 36 00-0040 EA 6'-0" x 6'-0" Aluminum Covers And Curb, Smoke And Fire Vent	5,004.76	313.04
07 72 36 00-0041 Polycarbonate Translucent Cover With Aluminum Frame And Aluminum Curb (07 72 36)		
07 72 36 00-0042 EA 4'-0" x 4'-0" Polycarbonate Translucent Cover With Aluminum Frame And Aluminum Curb, Smoke And Fire Vent	2,982.93	146.86
07 72 36 00-0043 EA 4'-0" x 6'-0" Polycarbonate Translucent Cover With Aluminum Frame And Aluminum Curb, Smoke And Fire Vent	3,779.81	202.51
07 72 36 00-0044 EA 4'-0" x 8'-0" Polycarbonate Translucent Cover With Aluminum Frame And Aluminum Curb, Smoke And Fire Vent	3,996.61	232.00
07 72 36 00-0045 EA 5'-0" x 5'-0" Polycarbonate Translucent Cover With Aluminum Frame And Aluminum Curb, Smoke And Fire Vent	4,289.87	202.51
07 72 36 00-0046 EA 5'-0" x 8'-0" Polycarbonate Translucent Cover With Aluminum Frame And Aluminum Curb, Smoke And Fire Vent	4,529.62	257.83
07 72 46 Roof Walkways (07 72)		
07 72 46 00-0001 Recycled Rubber Walkway Pads (07 72 46)		
07 72 46 00-0002 SF 3/8" Thick, Button Surface, Recycled Rubber Walkway Pad	12.73	3.02
<i>For Diamond Surface, Add</i>	1.13	
07 72 46 00-0003 SF 1/2" Thick, Button Surface, Recycled Rubber Walkway Pad	14.17	3.62
<i>For Diamond Surface, Add</i>	1.32	
07 72 46 00-0004 SF 3/4" Thick, Button Surface, Recycled Rubber Walkway Pad	15.65	3.62
<i>For Diamond Surface, Add</i>	1.47	
07 72 63 Waste Containment Assemblies (07 72)		
07 72 63 00-0001 Rooftop Oil And Grease Containment System (07 72 63)		
07 72 63 00-0002 Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD-E) (07 72 63 00-0001)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 63 00-0003 EA 48" Length, 48" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD100-E).....	3,148.01	248.80
07 72 63 00-0004 EA 60" Length, 60" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD101-E).....	3,515.75	248.80
07 72 63 00-0005 EA 60" Length, 90" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD106-E).....	4,308.80	258.76
07 72 63 00-0006 EA 72" Length, 72" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD102-E).....	4,287.78	258.76
07 72 63 00-0007 EA 72" Length, 108" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD103-E).....	5,595.41	279.91
07 72 63 00-0008 EA 72" Length, 144" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD111-E).....	4,371.01	279.91
07 72 63 00-0009 EA 90" Length, 90" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD105-E).....	4,873.35	331.66
07 72 63 00-0010 EA 108" Length, 108" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD112-E).....	7,171.57	414.63
07 72 63 00-0011 EA 120" Length, 120" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD107-E).....	8,895.17	414.63
07 72 63 00-0012 EA 144" Length, 144" Width, 3.5" Height, Light Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD113-E).....	11,259.88	414.63
07 72 63 00-0013 Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD) (07 72 63 00-0001)		
07 72 63 00-0014 EA 48" Length, 48" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD100).....	3,867.83	248.80
07 72 63 00-0015 EA 60" Length, 60" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD101).....	4,346.04	248.80
07 72 63 00-0016 EA 60" Length, 90" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD106).....	5,365.05	258.76
07 72 63 00-0017 EA 72" Length, 72" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD102).....	5,459.66	258.76
07 72 63 00-0018 EA 72" Length, 108" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD103).....	7,786.71	279.91
07 72 63 00-0019 EA 72" Length, 144" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD111).....	8,538.17	279.91
07 72 63 00-0020 EA 90" Length, 90" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD105).....	7,942.21	331.66
07 72 63 00-0021 EA 108" Length, 108" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD112).....	8,947.72	414.63
07 72 63 00-0022 EA 120" Length, 120" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD107).....	11,191.56	414.63
07 72 63 00-0023 EA 144" Length, 144" Width, 3.5" Height, Heavy Duty, Rooftop Oil And Grease Containment System (Grease Guard® GRD113).....	14,265.68	414.63
07 72 63 00-0024 Replacement Filter Sets For Rooftop Oil And Grease Containment System (07 72 63)		
Note: Includes removing old filters and installing new filters.		
07 72 63 00-0025 Top And Center Replacement Filter Sets For Rooftop Oil And Grease Containment System (07 72 63 00-0024)		
07 72 63 00-0026 Light Duty, Top And Center Replacement Filter Sets For Rooftop Oil And Grease Containment System (07 72 63 00-0025)		
07 72 63 00-0027 SET 48" Length, 48" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL100-E).....	258.99	
07 72 63 00-0028 SET 60" Length, 60" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL101-E).....	364.10	
07 72 63 00-0029 SET 60" Length, 90" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL106-E).....	521.73	
07 72 63 00-0030 SET 72" Length, 72" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL102-E).....	481.63	
07 72 63 00-0031 SET 72" Length, 108" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL103-E).....	902.02	
07 72 63 00-0032 SET 72" Length, 144" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL111-E).....	912.52	
07 72 63 00-0033 SET 90" Length, 90" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL105-E).....	704.28	
07 72 63 00-0034 SET 108" Length, 108" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL112-E).....	914.47	
07 72 63 00-0035 SET 120" Length, 120" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL107-E).....	1,340.12	
07 72 63 00-0036 SET 144" Length, 144" Width, 3.5" Height, Light Duty, Top And Center Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL113-E).....	1,765.77	
07 72 63 00-0037 Complete Replacement Filter Sets For Rooftop Oil And Grease Containment System (07 72 63 00-0024)		
07 72 63 00-0038 Light Duty, Complete Replacement Filter Sets For Rooftop Oil And Grease Containment System (07 72 63 00-0037)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 72 63 00-0039 SET 48" Length, 48" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL100-EC)	540.39	
07 72 63 00-0040 SET 60" Length, 60" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL101-EC)	719.07	
07 72 63 00-0041 SET 60" Length, 90" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL106-EC)	1,044.88	
07 72 63 00-0042 SET 72" Length, 72" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL102-EC)	973.23	
07 72 63 00-0043 SET 72" Length, 108" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL103-EC)	1,871.82	
07 72 63 00-0044 SET 72" Length, 144" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL111-EC)	1,882.32	
07 72 63 00-0045 SET 90" Length, 90" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL105-EC)	1,395.55	
07 72 63 00-0046 SET 108" Length, 108" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL112-EC)	1,884.27	
07 72 63 00-0047 SET 120" Length, 120" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL107-EC)	2,761.83	
07 72 63 00-0048 SET 144" Length, 144" Width, 3.5" Height, Light Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL113-EC)	3,676.19	
07 72 63 00-0049 Heavy Duty, Complete Replacement Filter Sets For Rooftop Oil And Grease Containment System <small>(07 72 63 00-0037)</small>		
07 72 63 00-0050 SET 48" Length, 48" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL100-C)	671.77	
07 72 63 00-0051 SET 60" Length, 60" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL101-C)	834.68	
07 72 63 00-0052 SET 60" Length, 90" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL106-C)	1,223.53	
07 72 63 00-0053 SET 72" Length, 72" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL102-C)	1,157.15	
07 72 63 00-0054 SET 72" Length, 108" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL103-C)	2,255.42	
07 72 63 00-0055 SET 72" Length, 144" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL111-C)	2,244.92	
07 72 63 00-0056 SET 90" Length, 90" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL105-C)	1,637.30	
07 72 63 00-0057 SET 108" Length, 108" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL112-C)	2,267.87	
07 72 63 00-0058 SET 120" Length, 120" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL107-C)	3,182.23	
07 72 63 00-0059 SET 144" Length, 144" Width, 3.5" Height, Heavy Duty, Complete Replacement Filter Set For Rooftop Oil And Grease Containment System (Grease Guard® FIL113-C)	4,427.65	
07 73 Roof Protection Board <small>(07 70)</small>		
07 73 00 00-0001 Roof Protection Board <small>(07 73)</small>		
<small>Note: Use these items for specified related installations with systems per CSI section 07 50 00. Items are for single layer of panels attached per FM I-90 requirements.</small>		
07 73 00 00-0002 Cold Adhesive Applied, Roof Protection Board (Georgia-Pacific DensDeck®) <small>(07 73 00 00-0001)</small>		
07 73 00 00-0003 SF 1/4" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Cold Adhesive Applied (Georgia-Pacific DensDeck®)	4.18	0.62
<i>For No Adhesive, Deduct</i>		
07 73 00 00-0004 SF 1/2" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Cold Adhesive Applied (Georgia-Pacific DensDeck®)	4.71	0.68
<i>For No Adhesive, Deduct</i>		
07 73 00 00-0005 SF 5/8" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Cold Adhesive Applied (Georgia-Pacific DensDeck®)	4.97	0.74
<i>For No Adhesive, Deduct</i>		
07 73 00 00-0006 SF 1/4" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Cold Adhesive Applied (Georgia-Pacific DensDeck® Prime)	4.24	0.62
<i>For No Adhesive, Deduct</i>		
07 73 00 00-0007 SF 1/2" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Cold Adhesive Applied (Georgia-Pacific DensDeck® Prime)	4.80	0.68
<i>For No Adhesive, Deduct</i>		
07 73 00 00-0008 SF 5/8" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Cold Adhesive Applied (Georgia-Pacific DensDeck® Prime)	5.06	0.74
<i>For No Adhesive, Deduct</i>		
07 73 00 00-0009 Hot-Mopped, Roof Protection Board (Georgia-Pacific DensDeck®) <small>(07 73 00 00-0001)</small>		
07 73 00 00-0010 SF 1/4" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Hot-Mopped (Georgia-Pacific DensDeck®)	4.02	0.62
07 73 00 00-0011 SF 1/2" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Hot-Mopped (Georgia-Pacific DensDeck®)	4.58	0.68
07 73 00 00-0012 SF 5/8" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Hot-Mopped (Georgia-Pacific DensDeck®)	4.86	0.74
07 73 00 00-0013 SF 1/4" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Hot-Mopped (Georgia-Pacific DensDeck® Prime)	4.08	0.62

07 Thermal And Moisture Protection
07 70 Roof and Wall Specialties and Accessories
07 73 Roof Protection Board



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

07 73 00 00-0014	SF	1/2" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Hot-Mopped (Georgia-Pacific DensDeck® Prime)	4.67	0.68
07 73 00 00-0015	SF	5/8" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Hot-Mopped (Georgia-Pacific DensDeck® Prime)	4.95	0.74

07 73 00 00-0016 Mechanically Fastened, Roof Protection Board (Georgia-Pacific DensDeck®) (07 73 00 00-0001)

Note: Mechanically fastened to wood or steel.

07 73 00 00-0017	SF	1/4" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Mechanically Fastened (Georgia-Pacific DensDeck®)	4.01	0.62
		<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.01	
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.11	
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 73 00 00-0018	SF	1/2" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Mechanically Fastened (Georgia-Pacific DensDeck®)	4.55	0.68
		<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.10	
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.20	
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 73 00 00-0019	SF	5/8" Thick, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Mechanically Fastened (Georgia-Pacific DensDeck®)	4.81	0.74
		<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.17	
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.27	
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 73 00 00-0020	SF	1/4" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Mechanically Fastened (Georgia-Pacific DensDeck® Prime)	4.07	0.62
		<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.01	
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.11	
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 73 00 00-0021	SF	1/2" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Mechanically Fastened (Georgia-Pacific DensDeck® Prime)	4.64	0.68
		<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.10	
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.20	
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	
07 73 00 00-0022	SF	5/8" Thick, Surface Primed, Fiberglass Mat Faced, Moisture Resistant Gypsum Core, Roof Protection Board, Mechanically Fastened (Georgia-Pacific DensDeck® Prime)	4.89	0.74
		<i>For Mechanically Fastened To Concrete, Add</i>	1.67	
		<i>For Mechanically Fastened To Gypsum, Add</i>	2.21	
		<i>For Mechanically Fastened To Wood Or Steel, >90 To 120 MPH Wind, Add</i>	0.78	
		<i>For Mechanically Fastened To Concrete, >90 To 120 MPH Wind, Add</i>	3.17	
		<i>For Mechanically Fastened To Gypsum, >90 To 120 MPH Wind, Add</i>	2.74	
		<i>For Mechanically Fastened To Wood Or Steel, >120 To 135 MPH Wind, Add</i>	1.17	
		<i>For Mechanically Fastened To Concrete, >120 To 135 MPH Wind, Add</i>	4.27	
		<i>For Mechanically Fastened To Gypsum, >120 To 135 MPH Wind, Add</i>	4.11	

07 76 Roof Pavers (07 70)

07 76 16 Roof Decking Pavers (07 76)

07 76 16 00-0001 Roof Pavers (07 76 16)

Note: For walkway application over roofing system.

07 76 16 00-0002	SF	Up To 100 SF, 2" Concrete Roof Paver	12.86	7.85
		<i>For 1-1/2" Thickness, Deduct</i>	-1.29	
		<i>For 2-1/2" Thickness, Add</i>	1.42	
		<i>For 3" Thickness, Add</i>	2.83	
07 76 16 00-0003	SF	>100 To 200 SF, 2" Concrete Roof Paver	11.51	5.92
		<i>For 1-1/2" Thickness, Deduct</i>	-1.15	
		<i>For 2-1/2" Thickness, Add</i>	1.27	
		<i>For 3" Thickness, Add</i>	2.55	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 76 16 00-0004 SF >200 To 400 SF, 2" Concrete Roof Paver	10.77	4.71
<i>For 1-1/2" Thickness, Deduct</i>	-1.08	
<i>For 2-1/2" Thickness, Add</i>	1.19	
<i>For 3" Thickness, Add</i>	2.39	
07 76 16 00-0005 SF >400 To 1,000 SF, 2" Concrete Roof Paver	10.33	4.11
<i>For 1-1/2" Thickness, Deduct</i>	-1.03	
<i>For 2-1/2" Thickness, Add</i>	1.14	
<i>For 3" Thickness, Add</i>	2.29	
07 76 16 00-0006 SF >1,000 SF, 2" Concrete Roof Paver	9.78	3.74
<i>For 1-1/2" Thickness, Deduct</i>	-0.98	
<i>For 2-1/2" Thickness, Add</i>	1.08	
<i>For 3" Thickness, Add</i>	2.16	
07 76 16 00-0007 Roof Paver Pedestal (07 76 16)		
07 76 16 00-0008 EA 2" To 3" High Adjustable Roof Paver Pedestal, 2" Base, 2" Top (Hanover Elevator)	26.12	1.24
07 76 16 00-0009 EA 3" To 4-3/4" High Adjustable Roof Paver Pedestal, 3" Base, 3" Top (Hanover Elevator)	27.36	1.24
07 76 16 00-0010 EA 4-3/4" To 7-3/4" High Adjustable Roof Paver Pedestal, 4" Base, 4" Top (Hanover Elevator)	28.61	1.24
07 76 16 00-0011 EA Adjustable Roof Paver Pedestal Coupler, Adds 2-1/2" To 4" (Hanover Elevator)	14.50	1.24
07 76 16 00-0012 EA Stay Bar, Used With Roof Paver Pedestals >16' High (Hanover Elevator)	12.95	1.24
07 76 16 00-0013 EA 5/8" High Tab Roof Paver Pedestal (Hanover High Tab Pedestal)	13.26	1.24
Note: Stackable.		
07 76 16 00-0014 EA 1/16" And 1/8" Flexible Leveling Plates For Roof Paver Pedestal	7.46	1.24
Note: Used with High Tab and Elevator pedestals.		
07 76 16 00-0015 EA Roof Paver Leveling System, Twist To Adjust Pitch (Hanover Compensator)	9.95	1.24
Note: Each Compensator levels 1/8" of slope and are stackable. Used with High Tab and Elevator pedestals.		
07 76 19 Composite Insulation Concrete Protection Board (07 76)		
Note: Manufactured by T. Clear Corp. 25 year warranty.		
07 76 19 00-0001 Composite Insulation Concrete Protection Board (07 76 19)		
Note: Manufactured by T. Clear Corp. 25 year warranty.		
07 76 19 00-0002 SF 2" Extruded Polystyrene Insulation Board Lightguard Composite With 3/8" Latex Modified Concrete, 4.5 PSF	6.17	
<i>For 20 Year Warranty, Deduct</i>	-0.36	
<i>For 15 Year Warranty, Deduct</i>	-0.73	
<i>For 10 Year Warranty, Deduct</i>	-0.99	
<i>For Winds >90 MPH To 120 MPH Warranty, Add</i>	0.10	
07 76 19 00-0003 SF 3" Extruded Polystyrene Insulation Board Lightguard Composite With 3/8" Latex Modified Concrete, 4.5 PSF	8.04	
<i>For 20 Year Warranty, Deduct</i>	-0.52	
<i>For 15 Year Warranty, Deduct</i>	-1.04	
<i>For 10 Year Warranty, Deduct</i>	-1.40	
<i>For Winds >90 MPH To 120 MPH Warranty, Add</i>	0.10	
07 76 19 00-0004 SF 2" Extruded Polystyrene Insulation Board Heavyguard Composite With 15/16" Latex Modified Concrete, 11 PSF	9.44	
<i>For 20 Year Warranty, Deduct</i>	-0.60	
<i>For 15 Year Warranty, Deduct</i>	-1.20	
<i>For 10 Year Warranty, Deduct</i>	-1.63	
<i>For Winds >90 MPH To 120 MPH Warranty, Add</i>	0.10	
07 76 19 00-0005 SF 3" Extruded Polystyrene Insulation Board Heavyguard Composite With 15/16" Latex Modified Concrete, 11 PSF	11.40	
<i>For 20 Year Warranty, Deduct</i>	-0.75	
<i>For 15 Year Warranty, Deduct</i>	-1.51	
<i>For 10 Year Warranty, Deduct</i>	-2.04	
<i>For Winds >90 MPH To 120 MPH Warranty, Add</i>	0.10	
07 80 Fire and Smoke Protection (07)		
07 81 Applied Fireproofing (07 80)		
Note: Includes bonding agents as required.		
07 81 16 Cementitious Fireproofing (07 81)		
07 81 16 00-0001 Monokote Fireproofing (07 81 16)		
07 81 16 00-0002 SF Monokote Fireproofing For Ceiling/Decking, Per Inch Of Thickness	2.30	0.79
07 81 16 00-0003 SF Monokote Fireproofing For Structural Steel, Per Inch Of Thickness	3.19	1.17
07 81 16 00-0004 Gunitite Fireproofing (07 81 16)		
07 81 16 00-0005 SF 1" Thick, Non-Reinforced, Gunitite Fireproofing	3.33	0.70
07 81 16 00-0006 SF 1" Thick, Reinforced, Gunitite Fireproofing	4.78	0.70
07 81 23 Intumescent Fireproofing (07 81)		
07 81 23 00-0001 Intumescent Thin Film Fireproofing (Albi Clad TF) (07 81 23)		
07 81 23 00-0002 Intumescent Thin Film Fireproofing For Beams (Albi Clad TF) (07 81 23 00-0001)		
Note: Excludes primer.		
07 81 23 00-0003 SF 1 Hour, Intumescent Thin Film Fireproofing For Beams (Albi Clad TF)	17.24	
<i>For >10,000, Deduct</i>	-1.67	
07 81 23 00-0004 SF 1-1/2 Hour, Intumescent Thin Film Fireproofing For Beams (Albi Clad TF)	27.86	
<i>For >10,000, Deduct</i>	-2.72	

07 Thermal And Moisture Protection**07 80 Fire and Smoke Protection****07 81 Applied Fireproofing**MINOR
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07 81 23 00-0005	Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF) <small>(07 81 23 00-0001)</small>		
	Note: Excludes primer.		
07 81 23 00-0006	SF 1 Hour, Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF)	11.06	
	<i>For >10,000, Deduct</i>	-1.04	
07 81 23 00-0007	SF 1-1/2 Hour, Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF)	24.91	
	<i>For >10,000, Deduct</i>	-2.43	
07 81 23 00-0008	SF 2 Hour, Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF)	56.80	
	<i>For >10,000, Deduct</i>	-5.61	
07 81 23 00-0009	SF 2-1/2 Hour, Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF)	78.31	
	<i>For >10,000, Deduct</i>	-7.76	
07 81 23 00-0010	SF 3 Hour, Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF)	99.84	
	<i>For >10,000, Deduct</i>	-9.91	
07 81 23 00-0011	SF 3-1/2 Hour, Intumescent Thin Film Fireproofing For Wide Flange Columns (Albi Clad TF)	121.39	
	<i>For >10,000, Deduct</i>	-12.06	
07 81 23 00-0012	Intumescent Thin Film Fireproofing For Hollow Section Columns (Albi Clad TF) <small>(07 81 23 00-0001)</small>		
	Note: Excludes primer.		
07 81 23 00-0013	SF 1 Hour, Intumescent Thin Film Fireproofing For Hollow Section Columns (Albi Clad TF)	22.68	
	<i>For >10,000, Deduct</i>	-2.21	
07 81 23 00-0014	SF 1-1/2 Hour, Intumescent Thin Film Fireproofing For Hollow Section Columns (Albi Clad TF)	42.42	
	<i>For >10,000, Deduct</i>	-4.18	
07 81 23 00-0015	SF 2 Hour, Intumescent Thin Film Fireproofing For Hollow Section Columns (Albi Clad TF)	67.53	
	<i>For >10,000, Deduct</i>	-6.68	
07 81 23 00-0016	SF 2-1/2 Hour, Intumescent Thin Film Fireproofing For Hollow Section Columns (Albi Clad TF)	94.42	
	<i>For >10,000, Deduct</i>	-9.37	
07 81 23 00-0017	SF 3 Hour, Intumescent Thin Film Fireproofing For Hollow Section Columns (Albi Clad TF)	119.53	
	<i>For >10,000, Deduct</i>	-11.88	
07 81 23 00-0018	Intumescent Thin Film Fireproofing (Albi Clad FP) <small>(07 81 23)</small>		
07 81 23 00-0019	Intumescent Thin Film Fireproofing For Exposed Wood, Wallboard And Non-Ferrous Substrates (Albi Clad FP) <small>(07 81 23 00-0018)</small>		
	Note: Excludes primer.		
07 81 23 00-0020	SF 1 Hour, Intumescent Thin Film Fireproofing For Exposed Wood, Wallboard And Non-Ferrous Substrates (Albi Clad FP)	10.92	
	<i>For >10,000, Deduct</i>	-1.05	
07 81 23 00-0021	SF 1-1/2 Hour, Intumescent Thin Film Fireproofing For Exposed Wood, Wallboard And Non-Ferrous Substrates (Albi Clad FP)	25.16	
	<i>For >10,000, Deduct</i>	-2.47	
07 81 23 00-0022	SF 2 Hour, Intumescent Thin Film Fireproofing For Exposed Wood, Wallboard And Non-Ferrous Substrates (Albi Clad FP)	57.99	
	<i>For >10,000, Deduct</i>	-5.75	
07 81 23 00-0023	SF 2-1/2 Hour, Intumescent Thin Film Fireproofing For Exposed Wood, Wallboard And Non-Ferrous Substrates (Albi Clad FP)	80.11	
	<i>For >10,000, Deduct</i>	-7.96	
07 81 23 00-0024	SF 3 Hour, Intumescent Thin Film Fireproofing For Exposed Wood, Wallboard And Non-Ferrous Substrates (Albi Clad FP)	102.25	
	<i>For >10,000, Deduct</i>	-10.17	
07 81 33 Mineral-Fiber Fireproofing <small>(07 81)</small>			
07 81 33 00-0001	Cellulose Fireproofing <small>(07 81 33)</small>		
07 81 33 00-0002	SF Cellulose Fireproofing, Per Inch Of Thickness	2.65	0.70
07 84 Firestopping <small>(07 80)</small>			
07 84 13 Penetration Firestopping <small>(07 84)</small>			
07 84 13 16 Penetration Firestopping Devices <small>(07 84 13)</small>			
07 84 13 16-0001	Firestopping Systems For Cable Penetrations <small>(07 84 13 16)</small>		
07 84 13 16-0002	Intumescent Firestop Cable Sleeve For New Installations <small>(07 84 13 16-0001)</small>		
	Note: Includes putty, escutcheon plates, gaskets and bushings.		
07 84 13 16-0003	EA 1" Diameter Intumescent Firestop Sleeve (STI FS100)	67.17	
07 84 13 16-0004	EA 2" Diameter Intumescent Firestop Sleeve (STI FS201)	92.06	
07 84 13 16-0005	EA 4" Diameter Intumescent Firestop Sleeve (STI FS401)	152.63	
07 84 13 16-0006	Intumescent Firestop Cable Pathway For New Or Existing Cable Installations <small>(07 84 13 16-0001)</small>		
	Note: Includes pathway, putty and wall/floor mounting plates.		
07 84 13 16-0007	EA 1-1/64" x 1-1/64" Intumescent Firestop Cable Pathway Through Up To 9" Thick Walls (STI EZD22)	127.30	
07 84 13 16-0008	EA 3" x 3" Intumescent Firestop Cable Pathway Through Up To 9" Thick Walls (STI EZDP33FWS)	226.44	
07 84 13 16-0009	EA 4" x 4-5/8" Intumescent Firestop Cable Pathway Through Up To 10" Thick Walls (STI EZDP44)	418.48	



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07 84 13 16-0010		3M Intumescent Firestopping Multi-Trade Pass Through Device <small>(07 84 13 16)</small>		
	EA	2-1/2" Square Opening, Intumescent Firestop Multi-Trade Pass Through Device (3M QP2.5SD)	287.83	
	EA	4" Square Opening, Intumescent Firestop Multi-Trade Pass Through Device (3M QP4SD)	265.83	
	EA	4" Diameter Intumescent Firestop Multi-Trade Pass Through Device (3M QP2.5SD)	274.19	
07 84 13 16-0014		Intumescent Firestopping Pipe Collar <small>(07 84 13 16)</small>		
	EA	1-1/2" Intumescent Firestop Pipe Collar (3M ULTRAPPD1.5)	42.10	11.48
	EA	2" Intumescent Firestop Pipe Collar (3M ULTRAPPD2.0)	51.32	11.48
	EA	3" Intumescent Firestop Pipe Collar (3M ULTRAPPD3.0)	59.86	12.63
	EA	4" Intumescent Firestop Pipe Collar (3M ULTRAPPD4.0)	94.96	14.35
	EA	8" Intumescent Firestop Pipe Collar (Hilti CP644 8")	479.05	17.22
	EA	10" Intumescent Firestop Pipe Collar (Hilti CP644 10")	619.68	18.94
07 84 13 16-0021		Fire Rated Enclosures (Fire Rated Product Specialties Corp.) <small>(07 84 13 16)</small>		
		Note: Includes fasteners. Excludes additional perimeter caulk where required. See CSI section 07 84 43 00-0001 for perimeter sealant caulk where required.		
	EA	12.2" Wide x 20.2" Long x 9.5" Deep Fire Rated Enclosure, 1 Hour Rated (FRPS #FN-Z-12-20-9)	164.72	
		Note: Used for recessed lighting, speakers, controls, valves, plumbing drain terminations, etc.		
	EA	15.2" Wide x 16.2" Long x 9.5" Deep Fire Rated Enclosure, 1 Hour Rated (FRPS #FN-Z-15-16-9)	175.28	
		Note: Used for recessed lighting, speakers, controls, valves, plumbing drain terminations, etc.		
	EA	11.8" Wide x 19.8" Long x 9.12" Deep Fire Rated Enclosure, 1 Hour Rated (FRPS #FN-Z-12-20-9-EXH)	352.14	
		Note: Includes 4" duct connector. For use with bathroom ventilation and exhaust fans.		
	EA	14.0" Wide x 14.0" Long x 3.2" Deep Fire Rated Enclosure, 1 Hour Rated (FRPS #FN-Z-14-14-3)	221.72	
		Note: Used for shut-off valves, shower and tub valves, washer boxes, icemaker water feeds, speakers, controls, junction boxes, etc.		
07 84 13 16-0026		Intumescent Firestopping Wrap Strips <small>(07 84 13 16)</small>		
	LF	1/8" Thick, 1-1/2" Wide, Intumescent Firestopping Wrap Strip (STI SpecSeal SSW Series)	7.06	
07 84 13 19		Penetration Firestopping Caulk <small>(07 84 13)</small>		
07 84 13 19-0001		Intumescent Firestopping For Sealing Pipe Penetrations (3M CP 25WB+) <small>(07 84 13 19)</small>		
		Note: Includes firestop caulk and batt for floor or ceiling penetration or one side of a wall penetration. 1/2" thick caulk for annular spaces 1" and less. 1" thick caulk for annular spaces 1-1/4" or more.		
	EA	1" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	21.89	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.08	
	EA	1-1/2" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	27.08	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.42	
	EA	1-1/2" Diameter Hole With 3/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	26.81	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.31	
	EA	1-1/2" Diameter Hole With 1" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	26.37	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.14	
	EA	2" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	31.52	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.89	
	EA	2" Diameter Hole With 3/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	31.26	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.79	
	EA	2" Diameter Hole With 1" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	30.82	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.61	
	EA	2" Diameter Hole With 1-1/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	30.14	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.34	
	EA	2" Diameter Hole With 1-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	29.55	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.10	
	EA	2-1/2" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	38.45	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.50	
	EA	2-1/2" Diameter Hole With 3/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	38.19	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.40	
	EA	2-1/2" Diameter Hole With 1" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	37.75	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.22	
	EA	2-1/2" Diameter Hole With 1-1/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	37.06	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.94	
	EA	2-1/2" Diameter Hole With 1-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	36.49	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.72	
	EA	2-1/2" Diameter Hole With 2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	35.11	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.16	
	EA	3" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	53.49	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	4.04	
	EA	3" Diameter Hole With 3/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	48.74	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	2.14	
	EA	3" Diameter Hole With 1" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	48.30	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.97	
	EA	3" Diameter Hole With 1-1/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	47.61	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.69	
	EA	3" Diameter Hole With 1-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	47.03	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.46	
	EA	3" Diameter Hole With 2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	45.66	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.91	
	EA	3" Diameter Hole With 2-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	43.88	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	0.20	

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07 84 13 19-0024	EA	4" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	72.89	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	7.46	
07 84 13 19-0025	EA	4" Diameter Hole With 3/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	72.40	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	7.27	
07 84 13 19-0026	EA	4" Diameter Hole With 1" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	71.62	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	6.96	
07 84 13 19-0027	EA	4" Diameter Hole With 1-1/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	70.39	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	6.46	
07 84 13 19-0028	EA	4" Diameter Hole With 1-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	69.34	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	6.04	
07 84 13 19-0029	EA	4" Diameter Hole With 2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	61.25	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	2.81	
07 84 13 19-0030	EA	4" Diameter Hole With 2-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	59.47	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	2.10	
07 84 13 19-0031	EA	4" Diameter Hole With 3" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	56.77	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	1.02	
07 84 13 19-0032	EA	6" Diameter Hole With 1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	118.96	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	17.22	
07 84 13 19-0033	EA	6" Diameter Hole With 3/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	118.48	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	17.02	
07 84 13 19-0034	EA	6" Diameter Hole With 1" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	117.70	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	16.71	
07 84 13 19-0035	EA	6" Diameter Hole With 1-1/4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	116.47	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	16.22	
07 84 13 19-0036	EA	6" Diameter Hole With 1-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	115.43	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	15.80	
07 84 13 19-0037	EA	6" Diameter Hole With 2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	112.95	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	14.81	
07 84 13 19-0038	EA	6" Diameter Hole With 2-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	109.75	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	13.53	
07 84 13 19-0039	EA	6" Diameter Hole With 3" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	104.89	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	11.59	
07 84 13 19-0040	EA	6" Diameter Hole With 4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	86.60	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	4.27	
07 84 13 19-0041	EA	8" Diameter Hole With 2-1/2" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	160.16	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	27.19	
07 84 13 19-0042	EA	8" Diameter Hole With 3" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	155.29	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	25.24	
07 84 13 19-0043	EA	8" Diameter Hole With 4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	145.54	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	21.34	
07 84 13 19-0044	EA	8" Diameter Hole With 6" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	105.76	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	5.43	
07 84 13 19-0045	EA	10" Diameter Hole With 4" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	205.73	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	38.91	
07 84 13 19-0046	EA	10" Diameter Hole With 6" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	176.80	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	27.34	
07 84 13 19-0047	EA	10" Diameter Hole With 8" Pipe, Sealed With Intumescent Firestop Sealant (3M CP 25WB+)	125.75	
		<i>For Intumescent Sealant For Plastic Pipe, Add</i>	6.92	

07 84 13 19-0048 Smoke, Noise And Infectious/Dust Control Sealant For Sealing Pipe Penetrations (07 84 13 19)

Note: Includes sealant and fiberglass or mineral wool batt for floor, ceiling or wall penetrations.

07 84 13 19-0049	EA	1-1/2" Diameter Hole With 1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	26.39	
07 84 13 19-0050	EA	1-1/2" Diameter Hole With 3/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	26.29	
07 84 13 19-0051	EA	1-1/2" Diameter Hole With 1" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	26.15	
07 84 13 19-0052	EA	2" Diameter Hole With 1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	30.04	
07 84 13 19-0053	EA	2" Diameter Hole With 3/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	29.93	
07 84 13 19-0054	EA	2" Diameter Hole With 1" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	29.79	
07 84 13 19-0055	EA	2" Diameter Hole With 1-1/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	29.59	
07 84 13 19-0056	EA	2" Diameter Hole With 1-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	29.39	
07 84 13 19-0057	EA	2.5" Diameter Hole With 1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	35.99	
07 84 13 19-0058	EA	2.5" Diameter Hole With 3/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	35.90	
07 84 13 19-0059	EA	2.5" Diameter Hole With 1" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	35.75	
07 84 13 19-0060	EA	2.5" Diameter Hole With 1-1/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	35.54	
07 84 13 19-0061	EA	2.5" Diameter Hole With 1-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	35.36	
07 84 13 19-0062	EA	2.5" Diameter Hole With 2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	34.88	
07 84 13 19-0063	EA	3" Diameter Hole With 1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound)	45.29	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 84 13 19-0064	EA			3" Diameter Hole With 3/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	45.20	
07 84 13 19-0065	EA			3" Diameter Hole With 1" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	45.06	
07 84 13 19-0066	EA			3" Diameter Hole With 1-1/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	44.84	
07 84 13 19-0067	EA			3" Diameter Hole With 1-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	44.66	
07 84 13 19-0068	EA			3" Diameter Hole With 2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	44.18	
07 84 13 19-0069	EA			3" Diameter Hole With 2-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	43.53	
07 84 13 19-0070	EA			4" Diameter Hole With 1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	57.79	
07 84 13 19-0071	EA			4" Diameter Hole With 3/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	57.69	
07 84 13 19-0072	EA			4" Diameter Hole With 1" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	57.55	
07 84 13 19-0073	EA			4" Diameter Hole With 1-1/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	57.32	
07 84 13 19-0074	EA			4" Diameter Hole With 1-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	57.10	
07 84 13 19-0075	EA			4" Diameter Hole With 2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	56.62	
07 84 13 19-0076	EA			4" Diameter Hole With 2-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	56.03	
07 84 13 19-0077	EA			4" Diameter Hole With 3" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	55.08	
07 84 13 19-0078	EA			6" Diameter Hole With 1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	84.12	
07 84 13 19-0079	EA			6" Diameter Hole With 3/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	84.02	
07 84 13 19-0080	EA			6" Diameter Hole With 1" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	83.88	
07 84 13 19-0081	EA			6" Diameter Hole With 1-1/4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	83.68	
07 84 13 19-0082	EA			6" Diameter Hole With 1-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	83.49	
07 84 13 19-0083	EA			6" Diameter Hole With 2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	83.01	
07 84 13 19-0084	EA			6" Diameter Hole With 2-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	82.36	
07 84 13 19-0085	EA			6" Diameter Hole With 3" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	81.47	
07 84 13 19-0086	EA			6" Diameter Hole With 4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	79.55	
07 84 13 19-0087	EA			8" Diameter Hole With 2-1/2" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	105.14	
07 84 13 19-0088	EA			8" Diameter Hole With 3" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	104.25	
07 84 13 19-0089	EA			8" Diameter Hole With 4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	102.33	
07 84 13 19-0090	EA			8" Diameter Hole With 6" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	96.88	
07 84 13 19-0091	EA			10" Diameter Hole With 4" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	127.01	
07 84 13 19-0092	EA			10" Diameter Hole With 6" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	121.55	
07 84 13 19-0093	EA			10" Diameter Hole With 8" Pipe, Sealed With Smoke, Noise And Infectious/Dust Control Sealant (STI SpecSeal Smoke 'N' Sound).....	114.34	

07 84 16 Annular Space Firestopping Protection (07 84)

07 84 16 00-0001 Intumescent Firestopping For Electrical Outlet Boxes (07 84 16)

07 84 16 00-0002 Intumescent Putty Pads For Wrapping Outlet Box Exteriors (07 84 16 00-0001)

07 84 16 00-0003	EA			1 Gang Outlet Box, Intumescent Firestop Putty Exterior Wrap (3M MPP+).....	36.32	
07 84 16 00-0004	EA			2 Gang Outlet Box, Intumescent Firestop Putty Exterior Wrap (3M MPP+).....	53.12	
07 84 16 00-0005	EA			3 Gang Outlet Box, Intumescent Firestop Putty Exterior Wrap (3M MPP+).....	55.29	
07 84 16 00-0006	EA			4 Gang Outlet Box, Intumescent Firestop Putty Exterior Wrap (3M MPP+).....	57.46	
07 84 16 00-0007	EA			5 Gang Outlet Box, Intumescent Firestop Putty Exterior Wrap (3M MPP+).....	59.63	
07 84 16 00-0008	EA			6 Gang Outlet Box, Intumescent Firestop Putty Exterior Wrap (3M MPP+).....	76.42	

07 84 16 00-0009 Intumescent Firestop Gasket For Wall Plates (07 84 16 00-0001)

07 84 16 00-0010	EA			Single Switch Wall Plate, Intumescent Firestop Gasket (RectorSeal 66276).....	14.37	
07 84 16 00-0011	EA			Double Switch Wall Plate, Intumescent Firestop Gasket (RectorSeal 66274).....	14.99	
07 84 16 00-0012	EA			Single Receptacle Wall Plate, Intumescent Firestop Gasket (RectorSeal 66272).....	13.85	
07 84 16 00-0013	EA			Double Receptacle Wall Plate, Intumescent Firestop Gasket (RectorSeal 66270).....	15.03	
07 84 16 00-0014	EA			Single Decor Wall Plate, Intumescent Firestop Gasket (RectorSeal 66266).....	14.57	
07 84 16 00-0015	EA			Double Decor Wall Plate, Intumescent Firestop Gasket (RectorSeal 66265).....	13.92	

07 Thermal And Moisture Protection**07 80 Fire and Smoke Protection****07 84 Firestopping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
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07 84 16 00-0016	Intumescent Fire Barrier Pillows For Sealing Large Openings ^(07 84 16)			
07 84 16 00-0017	EA 2" x 4" x 9" Intumescent Fire Barrier Pillow (3M FB249).....	40.56		
07 84 16 00-0018	EA 2" x 6" x 9" Intumescent Fire Barrier Pillow (3M FB269).....	43.57		
07 84 16 00-0019	EA 3" x 6" x 9" Intumescent Fire Barrier Pillow (3M FB369).....	47.27		
07 84 16 00-0020	Intumescent Fire Barrier Sheets For Sealing Large Openings ^(07 84 16)			
	Note: Price includes intumescent sheet, mounting fasteners and caulk for sealing one side of an opening.			
07 84 16 00-0021	EA 16" x 28" Intumescent Firestop Sheet (3M CS-195+16x28).....	363.66		
07 84 16 00-0022	EA 36" x 24" Intumescent Firestop Sheet (3M CS-195+3x2).....	517.51		
07 84 16 00-0023	EA 36" x 36" Intumescent Firestop Sheet (3M CS-195+3x3).....	704.60		
07 84 16 00-0024	Endothermic Mat Wrap Fire Barrier ^(07 84 16)			
	Note: Price includes endothermic mat wrap and sealant. Excludes cavity fill material; putty or fireproof caulk/sealant. See CSI section 07 84 16 00-0026 for filling openings.			
07 84 16 00-0025	SF 0.408" Thick Aluminum Foil Faced Endothermic Mat (3M Interam E-5A-4).....	52.97		
07 84 16 00-0026	Firestopping Caulk For Filling Opening ^(07 84 16)			
07 84 16 00-0027	GAL Latex Based Intumescent Fire Barrier Sealant (3M CP-25WB+).....	149.46		
07 84 16 00-0028	Firestopping Mortar For Filling Opening ^(07 84 16)			
07 84 16 00-0029	CF Light-Weight Portland Cement-Based Firestop Mortar (STI SpecSeal SSM Series).....	188.49		
07 84 23	Silicone Firestopping Foams^(07 84)			
07 84 23 00-0001	Silicone RTV Foam Seal For Blank Openings ^(07 84 23)			
	Note: Includes 7" depth of silicone foam barrier and 1" depth backer board			
07 84 23 00-0002	EA 2" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	43.13		
07 84 23 00-0003	EA 4" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	96.93		
07 84 23 00-0004	EA 6" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	176.04		
07 84 23 00-0005	EA 8" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	266.67		
07 84 23 00-0006	EA 10" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	382.45		
07 84 23 00-0007	EA 12" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	520.71		
07 84 23 00-0008	EA 16" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	1,069.42		
07 84 23 00-0009	EA 20" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	1,605.11		
07 84 23 00-0010	EA 24" Diameter Hole Sealed With Room Temperature Vulcanizing Silicone Fire Barrier Foam.....	2,256.97		
07 84 43	Joint Firestopping^(07 84)			
07 84 43 00-0001	Intumescent Firestopping Sealant For Joints (3M CP 25WB+) ^(07 84 43)			
07 84 43 00-0002	CLF 1/4" x 1/4" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	396.39	97.61	
	For Up To 6 CLF, Add	22.41		
	For >30 CLF, Deduct	-25.00		
07 84 43 00-0003	CLF 1/4" x 3/8" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	448.21	97.61	
	For Up To 4 CLF, Add	26.30		
	For >20 CLF, Deduct	-30.18		
07 84 43 00-0004	CLF 1/4" x 1/2" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	510.83	100.86	
	For Up To 3 CLF, Add	30.72		
	For >15 CLF, Deduct	-35.90		
07 84 43 00-0005	CLF 3/8" x 3/8" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	536.73	100.86	
	For Up To 2.5 CLF, Add	32.66		
	For >13 CLF, Deduct	-38.49		
07 84 43 00-0006	CLF 3/8" x 1/2" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	614.42	100.86	
	For Up To 2 CLF, Add	38.49		
	For >10 CLF, Deduct	-46.26		
07 84 43 00-0007	CLF 3/8" x 5/8" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	692.10	100.86	
	For Up To 1.5 CLF, Add	44.32		
	For >8 CLF, Deduct	-54.03		
07 84 43 00-0008	CLF 3/8" x 3/4" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	780.64	105.20	
	For Up To 1.3 CLF, Add	50.69		
	For >7 CLF, Deduct	-62.34		
07 84 43 00-0009	CLF 1/2" x 1/2" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	728.85	105.20	
	For Up To 1.4 CLF, Add	46.80		
	For >7.5 CLF, Deduct	-57.16		
07 84 43 00-0010	CLF 1/2" x 5/8" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	843.28	108.45	
	For Up To 1.15 CLF, Add	55.11		
	For >6 CLF, Deduct	-68.06		
07 84 43 00-0011	CLF 1/2" x 3/4" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	946.86	108.45	
	For Up To 1 CLF, Add	62.88		
	For >5 CLF, Deduct	-78.42		
07 84 43 00-0012	CLF 1/2" x 7/8" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	1,061.29	111.71	
	For Up To 0.8 CLF, Add	71.19		
	For >4.5 CLF, Deduct	-89.32		
07 84 43 00-0013	CLF 1/2" x 1" Joint, Intumescent Firestop Sealant (3M CP 25WB+).....	1,175.72	116.05	
	For Up To 0.75 CLF, Add	79.50		
	For >4 CLF, Deduct	-100.22		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 84 43 00-0014 CLF 3/4" x 3/4" Joint, Intumescent Firestop Sealant (3M CP 25WB+) <i>For Up To 0.65 CLF, Add</i> <i>For >3.5 CLF, Deduct</i>	1,290.14 87.81 -111.12	119.30
07 84 43 00-0015 CLF 3/4" x 1" Joint, Intumescent Firestop Sealant (3M CP 25WB+) <i>For Up To 0.5 CLF, Add</i> <i>For >2.5 CLF, Deduct</i> <i>For Silicone Sealant (Bio Fireshield BFS 100 or 200), add</i>	1,633.42 112.75 -143.82 186.45	130.15
07 84 43 00-0016 CLF 1" x 1" Joint, Intumescent Firestop Sealant (3M CP 25WB+) <i>For Up To 0.4 CLF, Add</i> <i>For >2 CLF, Deduct</i>	2,091.13 145.99 -187.42	144.25
07 84 43 00-0017 Latex-Based, Intumescent Firestop Sealant For Joints (STI SSS Series) ^(07 84 43)		
07 84 43 00-0018 CLF 1/4" x 1/4" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 6 CLF, Add</i> <i>For >30 CLF, Deduct</i>	410.81 23.49 -26.44	97.61
07 84 43 00-0019 CLF 1/4" x 3/8" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 4 CLF, Add</i> <i>For >20 CLF, Deduct</i>	469.81 27.92 -32.34	97.61
07 84 43 00-0020 CLF 1/4" x 1/2" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 3 CLF, Add</i> <i>For >15 CLF, Deduct</i>	539.64 32.88 -38.78	100.86
07 84 43 00-0021 CLF 3/8" x 3/8" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 2.5 CLF, Add</i> <i>For >13 CLF, Deduct</i>	569.13 35.09 -41.73	100.86
07 84 43 00-0022 CLF 3/8" x 1/2" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 2 CLF, Add</i> <i>For >10 CLF, Deduct</i>	657.62 41.73 -50.58	100.86
07 84 43 00-0023 CLF 3/8" x 5/8" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 1.5 CLF, Add</i> <i>For >8 CLF, Deduct</i>	746.11 48.37 -59.43	100.86
07 84 43 00-0024 CLF 3/8" x 3/4" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 1.3 CLF, Add</i> <i>For >7 CLF, Deduct</i>	845.45 55.55 -68.82	105.20
07 84 43 00-0025 CLF 1/2" x 1/2" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 1.4 CLF, Add</i> <i>For >7.5 CLF, Deduct</i>	786.46 51.12 -62.92	105.20
07 84 43 00-0026 CLF 1/2" x 5/8" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 1.15 CLF, Add</i> <i>For >6 CLF, Deduct</i>	915.29 60.51 -75.26	108.45
07 84 43 00-0027 CLF 1/2" x 3/4" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 1 CLF, Add</i> <i>For >5 CLF, Deduct</i>	1,033.27 69.36 -87.06	108.45
07 84 43 00-0028 CLF 1/2" x 7/8" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 0.8 CLF, Add</i> <i>For >4.5 CLF, Deduct</i>	1,162.10 78.75 -99.40	111.71
07 84 43 00-0029 CLF 1/2" x 1" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 0.75 CLF, Add</i> <i>For >4 CLF, Deduct</i>	1,290.93 88.14 -111.74	116.05
07 84 43 00-0030 CLF 3/4" x 3/4" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 0.65 CLF, Add</i> <i>For >3.5 CLF, Deduct</i>	1,419.75 97.53 -124.08	119.30
07 84 43 00-0031 CLF 3/4" x 1" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 0.5 CLF, Add</i> <i>For >2.5 CLF, Deduct</i>	1,806.25 125.71 -161.10	130.15
07 84 43 00-0032 CLF 1" x 1" Joint, Latex-Based, Intumescent Firestop Sealant (STI SSS Series) <i>For Up To 0.4 CLF, Add</i> <i>For >2 CLF, Deduct</i>	2,321.56 163.27 -210.47	144.25
07 84 43 00-0033 Passive Smoke And Fire Protection Sealant For Joints (STI ES Series) ^(07 84 43)		
07 84 43 00-0034 CLF 1/4" x 1/4" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series) <i>For Up To 6 CLF, Add</i> <i>For >30 CLF, Deduct</i>	353.86 19.22 -20.74	97.61
07 84 43 00-0035 CLF 1/4" x 3/8" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series) <i>For Up To 4 CLF, Add</i> <i>For >20 CLF, Deduct</i>	384.37 21.51 -23.80	97.61
07 84 43 00-0036 CLF 1/4" x 1/2" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series) <i>For Up To 3 CLF, Add</i> <i>For >15 CLF, Deduct</i>	425.72 24.34 -27.39	100.86
07 84 43 00-0037 CLF 3/8" x 3/8" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series) <i>For Up To 2.5 CLF, Add</i> <i>For >13 CLF, Deduct</i>	440.98 25.48 -28.91	100.86
07 84 43 00-0038 CLF 3/8" x 1/2" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series) <i>For Up To 2 CLF, Add</i> <i>For >10 CLF, Deduct</i>	486.75 28.91 -33.49	100.86

07 Thermal And Moisture Protection**07 80 Fire and Smoke Protection****07 84 Firestopping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
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07 84 43 00-0039	CLF 3/8" x 5/8" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	532.52	100.86
	<i>For Up To 1.5 CLF, Add</i>	32.35	
	<i>For >8 CLF, Deduct</i>	-38.07	
07 84 43 00-0040	CLF 3/8" x 3/4" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	589.14	105.20
	<i>For Up To 1.3 CLF, Add</i>	36.32	
	<i>For >7 CLF, Deduct</i>	-43.19	
07 84 43 00-0041	CLF 1/2" x 1/2" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	558.62	105.20
	<i>For Up To 1.4 CLF, Add</i>	34.03	
	<i>For >7.5 CLF, Deduct</i>	-40.14	
07 84 43 00-0042	CLF 1/2" x 5/8" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	630.50	108.45
	<i>For Up To 1.15 CLF, Add</i>	39.15	
	<i>For >6 CLF, Deduct</i>	-46.78	
07 84 43 00-0043	CLF 1/2" x 3/4" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	691.53	108.45
	<i>For Up To 1 CLF, Add</i>	43.73	
	<i>For >5 CLF, Deduct</i>	-52.88	
07 84 43 00-0044	CLF 1/2" x 7/8" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	763.39	111.71
	<i>For Up To 0.8 CLF, Add</i>	48.85	
	<i>For >4.5 CLF, Deduct</i>	-59.53	
07 84 43 00-0045	CLF 1/2" x 1" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	835.27	116.05
	<i>For Up To 0.75 CLF, Add</i>	53.97	
	<i>For >4 CLF, Deduct</i>	-66.17	
07 84 43 00-0046	CLF 3/4" x 3/4" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	907.13	119.30
	<i>For Up To 0.65 CLF, Add</i>	59.09	
	<i>For >3.5 CLF, Deduct</i>	-72.82	
07 84 43 00-0047	CLF 3/4" x 1" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	1,122.75	130.15
	<i>For Up To 0.5 CLF, Add</i>	74.45	
	<i>For >2.5 CLF, Deduct</i>	-92.75	
07 84 43 00-0048	CLF 1" x 1" Joint, Non-Halogenated Latex-Based Elastomeric, Passive Smoke And Fire Protection Sealant (STI SpecSeal ES Series).....	1,410.24	144.25
	<i>For Up To 0.4 CLF, Add</i>	94.92	
	<i>For >2 CLF, Deduct</i>	-119.33	

07 84 56 Fire Safing (07 84)**07 84 56 13 Fibrous Fire Safing** (07 84 56)**07 84 56 13-0001 Thermal Barrier Wrap** (07 84 56 13)

Note: Includes cutting wrap to fit pipe or conduit and sealing edges.

07 84 56 13-0002	SF 1/2" Thick Fire Barrier Plenum Wrap (3M Plenum Wrap 5A).....	11.02	
	<i>For Work In Restricted Working Space, Add</i>	1.34	
07 84 56 13-0003	SF 1-1/2" Thick Fire Barrier Duct Wrap (3M Duct Wrap 15A).....	18.07	
	Note: Includes cutting wrap to fit pipe or conduit and sealing edges.		
	<i>For Work In Restricted Working Space, Add</i>	1.34	
07 84 56 13-0004	SF 2" Thick Fire Barrier Duct Wrap (3M Duct Wrap 20A).....	19.77	
	Note: Includes cutting wrap to fit pipe or conduit and sealing edges.		
	<i>For Work In Restricted Working Space, Add</i>	1.34	

07 84 56 13-0005 FireMaster Blanket Wrap Fireproofing (07 84 56 13)

07 84 56 13-0006	SF 1/2" Thermal Ceramics FireMaster Blanket Wrap.....	19.60	11.24
	<i>For Work In Restricted Working Space, Add</i>	4.52	
	<i>For >500 To 5,000, Deduct</i>	-1.80	
	<i>For >5,000, Deduct</i>	-3.19	
07 84 56 13-0007	SF 1" Thermal Ceramics FireMaster Blanket Wrap.....	23.36	11.24
	<i>For Work In Restricted Working Space, Add</i>	4.52	
	<i>For >500 To 5,000, Deduct</i>	-2.66	
	<i>For >5,000, Deduct</i>	-4.58	
07 84 56 13-0008	SF 1-1/2" Thermal Ceramics FireMaster Blanket Wrap.....	27.49	11.24
	<i>For Work In Restricted Working Space, Add</i>	4.52	
	<i>For >500 To 5,000, Deduct</i>	-3.61	
	<i>For >5,000, Deduct</i>	-6.11	
07 84 56 13-0009	SF 2" Thermal Ceramics FireMaster Blanket Wrap.....	31.62	11.24
	<i>For Work In Restricted Working Space, Add</i>	4.52	
	<i>For >500 To 5,000, Deduct</i>	-4.56	
	<i>For >5,000, Deduct</i>	-7.64	

07 90 Joint Protection (07)**07 91 Preformed Joint Seals** (07 90)**07 91 23 Backer Rods** (07 91)**07 91 23 00-0001 Backer Rods** (07 91 23)

07 91 23 00-0002	LF 1/4" Polyethylene Or Polyurethane Backer Rod.....	2.31	0.62
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 91 23 00-0003 LF 3/8" Polyethylene Or Polyurethane Backer Rod	2.50	0.62
07 91 23 00-0004 LF 1/2" Polyethylene Or Polyurethane Backer Rod	2.79	0.62
07 91 23 00-0005 LF 5/8" Polyethylene Or Polyurethane Backer Rod	3.29	0.62
07 91 23 00-0006 LF 3/4" Polyethylene Or Polyurethane Backer Rod	3.43	0.74
07 91 23 00-0007 LF 7/8" Polyethylene Or Polyurethane Backer Rod	3.85	0.74
07 91 23 00-0008 LF 1" Polyethylene Or Polyurethane Backer Rod	4.96	0.74
07 91 23 00-0009 LF 1-1/4" Polyethylene Or Polyurethane Backer Rod	6.01	0.87
07 91 23 00-0010 LF 1-1/2" Polyethylene Or Polyurethane Backer Rod	7.18	0.99
07 91 23 00-0011 LF 2" Polyethylene Or Polyurethane Backer Rod	9.98	1.12
07 91 23 00-0012 LF 3" Polyethylene Or Polyurethane Backer Rod	21.02	1.37
 07 91 26 Joint Fillers (07 91)		
07 91 26 00-0001 Butyl Rubber Fillers (07 91 26)		
07 91 26 00-0002 LF 1/4" x 1/4" Butyl Rubber Filler	2.87	0.74
<i>For Custom Match Coloring, Add</i>		<i>0.05</i>
07 91 26 00-0003 LF 1/2" x 1/2" Butyl Rubber Filler	8.67	2.12
<i>For Custom Match Coloring, Add</i>		<i>0.21</i>
07 91 26 00-0004 LF 1/2" x 3/4" Butyl Rubber Filler	10.53	2.24
<i>For Custom Match Coloring, Add</i>		<i>0.33</i>
07 91 26 00-0005 LF 3/4" x 3/4" Butyl Rubber Filler	11.51	2.36
07 91 26 00-0006 LF 1" x 1" Butyl Rubber Filler	15.52	4.36
 07 91 26 00-0007 Closed Cell Neoprene (07 91 26)		
07 91 26 00-0008 CLF 1/8" x 3" Neoprene Gasket Closed Cell, Adhesive	491.49	143.56
07 91 26 00-0009 CLF 1/8" x 6" Neoprene Gasket Closed Cell, Adhesive	769.25	207.38
07 91 26 00-0010 CLF 1/4" x 3" Neoprene Gasket Closed Cell, Adhesive	624.55	177.78
07 91 26 00-0011 CLF 1/4" x 6" Neoprene Gasket Closed Cell, Adhesive	704.48	186.61
07 91 26 00-0012 CLF 1/2" x 6" Neoprene Gasket Closed Cell, Adhesive	1,076.25	287.13
07 91 26 00-0013 CLF 1/2" x 9" Neoprene Gasket Closed Cell, Adhesive	1,217.53	311.00
07 91 26 00-0014 CLF 1/2" x 12" Neoprene Gasket Closed Cell, Adhesive	1,055.07	226.17
 07 91 26 00-0015 Closed Cell Polyvinyl Chloride (07 91 26)		
07 91 26 00-0016 CLF 1/8" x 3" Polyethylene Joint Backing, Closed Cell	503.77	177.78
07 91 26 00-0017 CLF 1/8" x 6" Polyethylene Joint Backing, Closed Cell	842.92	287.13
07 91 26 00-0018 CLF 1/4" x 3" Polyethylene Joint Backing, Closed Cell	655.92	245.08
07 91 26 00-0019 CLF 1/4" x 6" Polyethylene Joint Backing, Closed Cell	782.24	258.76
07 91 26 00-0020 CLF 1/2" x 6" Polyethylene Joint Backing, Closed Cell	1,191.53	396.85
07 91 26 00-0021 CLF 1/2" x 9" Polyethylene Joint Backing, Closed Cell	1,388.06	430.68
07 91 26 00-0022 CLF 1/2" x 12" Polyethylene Joint Backing, Closed Cell	1,827.30	516.27
 07 91 26 00-0023 Silicon RTV Foam Penetration Seal (07 91 26)		
07 91 26 00-0024 CLF 1/4" x 1/2" Silicon RTV Foam Seal	166.05	28.49
07 91 26 00-0025 CLF 1/2" x 1/2" Silicon RTV Foam Seal	332.10	56.85
07 91 26 00-0026 CLF 1/2" x 3/4" Silicon RTV Foam Seal	494.95	84.47
07 91 26 00-0027 CLF 3/4" x 3/4" Silicon RTV Foam Seal	699.88	113.83
07 91 26 00-0028 CLF 1/8" x 1" Silicon RTV Foam Seal	166.05	28.49
07 91 26 00-0029 CLF 1/8" x 3" Silicon RTV Foam Seal	494.44	84.23
07 91 26 00-0030 CLF 1/4" x 3" Silicon RTV Foam Seal	848.86	126.51
07 91 26 00-0031 CLF 1/4" x 6" Silicon RTV Foam Seal	1,695.50	252.16
07 91 26 00-0032 CLF 1/2" x 6" Silicon RTV Foam Seal	3,219.63	455.20
07 91 26 00-0033 CLF 1/2" x 9" Silicon RTV Foam Seal	4,920.95	711.09
07 91 26 00-0034 CLF 1/2" x 12" Silicon RTV Foam Seal	7,212.50	1,137.79
 07 91 26 00-0035 Seals O-Ring Type Cord "J-Seal" (07 91 26)		
07 91 26 00-0036 LF 1/4" Seals O-Ring Cord, J-Seal	5.30	1.62
07 91 26 00-0037 LF 1/2" Seals O-Ring Cord, J-Seal	5.61	1.62
07 91 26 00-0038 LF 3/4" Seals O-Ring Cord, J-Seal	5.89	1.75
07 91 26 00-0039 LF 1" Seals O-Ring Cord, J-Seal	6.20	1.87
07 91 26 00-0040 LF 1-1/4" Seals O-Ring Cord, J-Seal	6.61	1.99
07 91 26 00-0041 LF 1-1/2" Seals O-Ring Cord, J-Seal	6.91	1.99
07 91 26 00-0042 LF 1-3/4" Seals O-Ring Cord, J-Seal	7.29	2.12
07 91 26 00-0043 LF 2" Seals O-Ring Cord, J-Seal	7.51	2.12
 07 91 33 Expansion Joint Seal Systems (07 91)		
07 91 33 00-0001 Expansion Joint Seal Systems (Wabo®) (07 91 33)		
07 91 33 00-0002 Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal Systems (Wabo® HSeal) (07 91 33 00-0001)		
<i>Note: Includes a pre-compressed seal, epoxy adhesive and traffic grade elastomeric top coating.</i>		
07 91 33 00-0003 LF 1/2" Minimum, 1-1/2" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 25EH)	92.03	6.88
07 91 33 00-0004 LF 3/4" Minimum, 2-1/4" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 40EH)	124.44	7.22

07 Thermal And Moisture Protection**07 90 Joint Protection****07 91 Prefomed Joint Seals**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 91 33 00-0005	LF		1" Minimum, 3" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 50EH).....	158.64	7.54
07 91 33 00-0006	LF		1-1/4" Minimum, 3-3/4" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 65EH).....	196.71	7.87
07 91 33 00-0007	LF		1-1/2" Minimum, 4-1/2" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 75EH).....	256.55	8.20
07 91 33 00-0008	LF		1-3/4" Minimum, 5-1/4" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 90EH).....	295.27	8.53
07 91 33 00-0009	LF		2" Minimum, 6" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® HSeal 100EH).....	343.36	8.86
07 91 33 00-0010			Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal Systems (Wabo® CompressionSeal) (07 91 33 00-0001) Note: Includes prefomed neoprene joint seal and lubricant adhesive.		
07 91 33 00-0011	LF		0.625" Minimum, 1.381" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-162).....	44.79	6.88
07 91 33 00-0012	LF		0.688" Minimum, 1.488" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-175).....	49.25	6.99
07 91 33 00-0013	LF		0.875" Minimum, 1.700" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-200).....	60.45	7.09
07 91 33 00-0014	LF		0.953" Minimum, 1.913" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-225).....	64.37	7.22
07 91 33 00-0015	LF		1.000" Minimum, 2.125" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-175).....	69.05	7.31
07 91 33 00-0016	LF		1.125" Minimum, 2.550" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-300).....	85.70	7.41
07 91 33 00-0017	LF		1.375" Minimum, 2.975" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-350).....	106.80	7.54
07 91 33 00-0018	LF		1.625" Minimum, 3.400" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-400).....	127.03	7.87
07 91 33 00-0019	LF		1.687" Minimum, 4.250" Maximum Joint Opening, Neoprene, Prefomed Elastomeric Horizontal Expansion Joint Seal System (Wabo® CompressionSeal WA-500).....	144.31	8.20
07 91 33 00-0020			Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal Systems (Wabo® CompressionSeal) (07 91 33 00-0001) Note: Includes prefomed Santoprene® joint seal and lubricant adhesive.		
07 91 33 00-0021	LF		0.500" Minimum, 1.500" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-100).....	36.74	6.88
07 91 33 00-0022	LF		0.688" Minimum, 1.938" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-225).....	48.93	7.22
07 91 33 00-0023	LF		1.063" Minimum, 2.125" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-250).....	60.90	7.54
07 91 33 00-0024	LF		1.250" Minimum, 2.563" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-300).....	64.49	7.71
07 91 33 00-0025	LF		1.250" Minimum, 3.375" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-400).....	71.99	7.87
07 91 33 00-0026	LF		1.438" Minimum, 4.250" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-500).....	105.37	8.20
07 91 33 00-0027	LF		1.813" Minimum, 5.125" Maximum Joint Opening, Santoprene®, Prefomed Elastomeric Vertical Expansion Joint Seal System (Wabo® CompressionSeal WE-600).....	146.70	8.53
07 91 33 00-0028			Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal Systems (Wabo® Seismic WeatherSeal) (07 91 33 00-0001) Note: Includes a pre-compressed foam seal and silicone sealant.		
07 91 33 00-0029	LF		1/2" Minimum, 1-1/2" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-100).....	34.62	2.73
07 91 33 00-0030	LF		3/4" Minimum, 2-1/4" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-150).....	58.76	2.85
07 91 33 00-0031	LF		1" Minimum, 3" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-200).....	89.01	2.95
07 91 33 00-0032	LF		1-1/4" Minimum, 3-3/4" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-250).....	112.50	3.06
07 91 33 00-0033	LF		1-1/2" Minimum, 4-1/2" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-300).....	148.39	3.17
07 91 33 00-0034	LF		1-3/4" Minimum, 5-1/4" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-350).....	196.69	3.28
07 91 33 00-0035	LF		2" Minimum, 6" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-400).....	241.50	3.39
07 91 33 00-0036	LF		2-1/2" Minimum, 7-1/2" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-500).....	326.13	3.50
07 91 33 00-0037	LF		3" Minimum, 9" Maximum Joint Opening, Coated Foam, Pre-Compressed, Elastomeric Expansion Joint Seal System (Wabo® Seismic WeatherSeal SWS-600).....	380.95	3.61
07 91 33 00-0038			Silicone Faced Foam, Prefomed Elastomeric Expansion Joint Seal Systems (Wabo® WeatherSeal II) (07 91 33 00-0001) Note: Includes a pre-compressed foam seal and silicone sealant.		
07 91 33 00-0039	LF		0.75" Minimum, 1.25" Maximum Joint Opening, Silicone Faced Foam, Prefomed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-100).....	33.75	2.73



Thermal And Moisture Protection			07
Joint Protection			07 90
Preformed Joint Seals			07 91

07

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 91 33 00-0040	LF		1.13" Minimum, 1.88" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-150).....	44.84	2.85
07 91 33 00-0041	LF		1.50" Minimum, 2.50" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-200).....	60.51	2.95
07 91 33 00-0042	LF		1.88" Minimum, 3.13" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-250).....	82.48	3.06
07 91 33 00-0043	LF		2.25" Minimum, 3.75" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-300).....	94.23	3.17
07 91 33 00-0044	LF		2.63" Minimum, 4.38" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-350).....	131.21	3.28
07 91 33 00-0045	LF		3.00" Minimum, 5.00" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-400).....	176.68	3.39
07 91 33 00-0046	LF		3.75" Minimum, 6.25" Maximum Joint Opening, Silicone Faced Foam, Preformed Elastomeric Expansion Joint Seal System (Wabo® WeatherSeal II WS-500).....	190.82	3.50
07 91 33 00-0047			Molded EPDM Rubber Cover, For Pedestrian Foot Traffic And Slow Speed Non-Commercial Vehicular Traffic (Wabo® SafetyFlex) (07 91 33 00-0001)		
07 91 33 00-0048	LF		2-1/2" Minimum, 12" Maximum Joint Opening, Elastomeric Hinged Cover System for Pedestrian Walkway And Low-speed Vehicular Traffic Areas (Wabo® SafetyFlex SFP-600).....	253.76	8.86
07 91 33 00-0049			Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal) (07 91 33 00-0001)		
Note: Includes epoxy adhesive.					
07 91 33 00-0050	LF		0.45" Minimum, 1.25" Maximum Joint Opening, Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal IV-100).....	27.85	
07 91 33 00-0051	LF		0.675" Minimum, 1.875" Maximum Joint Opening, Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal IV-150).....	30.50	
07 91 33 00-0052	LF		0.90" Minimum, 2.50" Maximum Joint Opening, Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal IV-200).....	40.23	
07 91 33 00-0053	LF		1.125" Minimum, 3.125" Maximum Joint Opening, Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal IV-250).....	50.04	
07 91 33 00-0054	LF		1.35" Minimum, 3.75" Maximum Joint Opening, Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal IV-300).....	115.30	
07 91 33 00-0055	LF		1.80" Minimum, 5.00" Maximum Joint Opening, Closed Cell Neoprene Expanded Rubber Foam Seal, Preformed Flexible Joint Seal Systems (Wabo® InverSeal IV-400).....	151.84	

07 92 Joint Sealants (07 90)

07 92 13 Elastomeric Joint Sealants (07 92)

07 92 13 00-0001 Silicone Sealant And Caulking (07 92 13)

07 92 13 00-0002	CLF	1/4" x 1/4" Joint, Silicone Sealant And Caulking.....	351.30	97.61
		<i>For Custom Match Coloring, Add</i>	14.03	
		<i>For Up To 6 CLF, Add</i>	19.03	
		<i>For >30 CLF, Deduct</i>	-20.49	
		<i>For 1 Part Mildew Resistant, Add</i>	20.46	
		<i>For High-Modulus Non-Acid Curing, Add</i>	11.69	
07 92 13 00-0003	CLF	1/4" x 3/8" Joint, Silicone Sealant And Caulking.....	380.53	97.61
		<i>For Custom Match Coloring, Add</i>	21.05	
		<i>For Up To 4 CLF, Add</i>	21.22	
		<i>For >20 CLF, Deduct</i>	-23.41	
		<i>For 1 Part Mildew Resistant, Add</i>	30.70	
		<i>For High-Modulus Non-Acid Curing, Add</i>	17.54	
07 92 13 00-0004	CLF	1/4" x 1/2" Joint, Silicone Sealant And Caulking.....	420.61	100.86
		<i>For Custom Match Coloring, Add</i>	28.07	
		<i>For Up To 3 CLF, Add</i>	23.95	
		<i>For >15 CLF, Deduct</i>	-26.88	
		<i>For 1 Part Mildew Resistant, Add</i>	40.93	
		<i>For High-Modulus Non-Acid Curing, Add</i>	23.39	
07 92 13 00-0005	CLF	3/8" x 3/8" Joint, Silicone Sealant And Caulking.....	435.22	100.86
		<i>For Custom Match Coloring, Add</i>	31.57	
		<i>For Up To 2.5 CLF, Add</i>	25.05	
		<i>For >13 CLF, Deduct</i>	-28.34	
		<i>For 1 Part Mildew Resistant, Add</i>	46.04	
		<i>For High-Modulus Non-Acid Curing, Add</i>	26.31	
07 92 13 00-0006	CLF	3/8" x 1/2" Joint, Silicone Sealant And Caulking.....	479.07	100.86
		<i>For Custom Match Coloring, Add</i>	42.10	
		<i>For Up To 2 CLF, Add</i>	28.34	
		<i>For >10 CLF, Deduct</i>	-32.72	
		<i>For 1 Part Mildew Resistant, Add</i>	61.39	
		<i>For High-Modulus Non-Acid Curing, Add</i>	35.08	
07 92 13 00-0007	CLF	3/8" x 5/8" Joint, Silicone Sealant And Caulking.....	522.93	100.86
		<i>For Custom Match Coloring, Add</i>	52.62	
		<i>For Up To 1.5 CLF, Add</i>	31.63	
		<i>For >8 CLF, Deduct</i>	-37.11	
		<i>For 1 Part Mildew Resistant, Add</i>	76.74	
		<i>For High-Modulus Non-Acid Curing, Add</i>	43.85	

07 Thermal And Moisture Protection**07 90 Joint Protection****07 92 Joint Sealants**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 92 13 00-0008	CLF 3/8" x 3/4" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 1.3 CLF, Add</i> <i>For >7 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	577.63 63.15 35.46 -42.04 92.09 52.62	105.20
07 92 13 00-0009	CLF 1/2" x 1/2" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 1.4 CLF, Add</i> <i>For >7.5 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	548.39 56.13 33.27 -39.11 81.85 46.77	105.20
07 92 13 00-0010	CLF 1/2" x 5/8" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 1.15 CLF, Add</i> <i>For >6 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	617.71 70.16 38.19 -45.50 102.32 58.47	108.45
07 92 13 00-0011	CLF 1/2" x 3/4" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 1 CLF, Add</i> <i>For >5 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	676.18 84.19 42.58 -51.35 122.78 70.16	108.45
07 92 13 00-0012	CLF 1/2" x 7/8" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 0.8 CLF, Add</i> <i>For >4.5 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	745.49 98.23 47.51 -57.74 143.25 81.86	111.71
07 92 13 00-0013	CLF 1/2" x 1" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 0.75 CLF, Add</i> <i>For >4 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	814.81 112.26 52.43 -64.13 163.71 93.55	116.05
07 92 13 00-0014	CLF 3/4" x 3/4" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 0.65 CLF, Add</i> <i>For >3.5 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	884.11 126.29 57.36 -70.52 184.17 105.24	119.30
07 92 13 00-0015	CLF 3/4" x 1" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 0.5 CLF, Add</i> <i>For >2.5 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,092.06 168.39 72.14 -89.68 245.57 140.32	130.15
07 92 13 00-0016	CLF 1" x 1" Joint, Silicone Sealant And Caulking <i>For Custom Match Coloring, Add</i> <i>For Up To 0.4 CLF, Add</i> <i>For >2 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,369.31 224.52 91.85 -115.24 327.42 187.10	144.25
07 92 13 00-0017	Acrylic/Latex Sealant And Caulking ^(07 92 13)		
07 92 13 00-0018	CLF 1/4" x 1/4" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 6 CLF, Add</i> <i>For >30 CLF, Deduct</i>	313.34 16.18 -16.69	97.61
07 92 13 00-0019	CLF 1/4" x 3/8" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 4 CLF, Add</i> <i>For >20 CLF, Deduct</i>	323.60 16.95 -17.72	97.61
07 92 13 00-0020	CLF 1/4" x 1/2" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 3 CLF, Add</i> <i>For >15 CLF, Deduct</i>	344.70 18.26 -19.29	100.86
07 92 13 00-0021	CLF 3/8" x 3/8" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 2.5 CLF, Add</i> <i>For >13 CLF, Deduct</i>	349.82 18.64 -19.80	100.86
07 92 13 00-0022	CLF 3/8" x 1/2" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 2 CLF, Add</i> <i>For >10 CLF, Deduct</i>	365.21 19.80 -21.34	100.86
07 92 13 00-0023	CLF 3/8" x 5/8" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 1.5 CLF, Add</i> <i>For >8 CLF, Deduct</i>	380.59 20.95 -22.88	100.86
07 92 13 00-0024	CLF 3/8" x 3/4" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 1.3 CLF, Add</i> <i>For >7 CLF, Deduct</i>	406.83 22.65 -24.96	105.20
07 92 13 00-0025	CLF 1/2" x 1/2" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 1.4 CLF, Add</i> <i>For >7.5 CLF, Deduct</i>	396.57 21.88 -23.93	105.20
07 92 13 00-0026	CLF 1/2" x 5/8" Joint, Acrylic/Latex Sealant And Caulking <i>For Up To 1.15 CLF, Add</i> <i>For >6 CLF, Deduct</i>	427.93 23.96 -26.52	108.45

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 92 13 00-0027 CLF 1/2" x 3/4" Joint, Acrylic/Latex Sealant And Caulking	448.45	108.45
For Up To 1 CLF, Add	25.50	
For >5 CLF, Deduct	-28.58	
07 92 13 00-0028 CLF 1/2" x 7/8" Joint, Acrylic/Latex Sealant And Caulking	479.80	111.71
For Up To 0.8 CLF, Add	27.58	
For >4.5 CLF, Deduct	-31.17	
07 92 13 00-0029 CLF 1/2" x 1" Joint, Acrylic/Latex Sealant And Caulking	511.16	116.05
For Up To 0.75 CLF, Add	29.66	
For >4 CLF, Deduct	-33.76	
07 92 13 00-0030 CLF 3/4" x 3/4" Joint, Acrylic/Latex Sealant And Caulking	542.51	119.30
For Up To 0.65 CLF, Add	31.74	
For >3.5 CLF, Deduct	-36.36	
07 92 13 00-0031 CLF 3/4" x 1" Joint, Acrylic/Latex Sealant And Caulking	636.59	130.15
For Up To 0.5 CLF, Add	37.98	
For >2.5 CLF, Deduct	-44.14	
07 92 13 00-0032 CLF 1" x 1" Joint, Acrylic/Latex Sealant And Caulking	762.02	144.25
For Up To 0.4 CLF, Add	46.31	
For >2 CLF, Deduct	-54.51	
07 92 13 00-0033 Polyurethane Sealant And Caulking <small>(07 92 13)</small>		
Note: 1 or 2 part, non-sag.		
07 92 13 00-0034 CLF 1/4" x 1/4" Joint, Polyurethane Sealant And Caulking	337.67	97.61
For Up To 6 CLF, Add	18.00	
For >30 CLF, Deduct	-19.13	
07 92 13 00-0035 CLF 1/4" x 3/8" Joint, Polyurethane Sealant And Caulking	360.10	97.61
For Up To 4 CLF, Add	19.69	
For >20 CLF, Deduct	-21.37	
07 92 13 00-0036 CLF 1/4" x 1/2" Joint, Polyurethane Sealant And Caulking	393.36	100.86
For Up To 3 CLF, Add	21.91	
For >15 CLF, Deduct	-24.15	
07 92 13 00-0037 CLF 3/8" x 3/8" Joint, Polyurethane Sealant And Caulking	404.57	100.86
For Up To 2.5 CLF, Add	22.75	
For >13 CLF, Deduct	-25.27	
07 92 13 00-0038 CLF 3/8" x 1/2" Joint, Polyurethane Sealant And Caulking	438.20	100.86
For Up To 2 CLF, Add	25.27	
For >10 CLF, Deduct	-28.64	
07 92 13 00-0039 CLF 3/8" x 5/8" Joint, Polyurethane Sealant And Caulking	471.83	100.86
For Up To 1.5 CLF, Add	27.80	
For >8 CLF, Deduct	-32.00	
07 92 13 00-0040 CLF 3/8" x 3/4" Joint, Polyurethane Sealant And Caulking	516.31	105.20
For Up To 1.3 CLF, Add	30.86	
For >7 CLF, Deduct	-35.91	
07 92 13 00-0041 CLF 1/2" x 1/2" Joint, Polyurethane Sealant And Caulking	493.89	105.20
For Up To 1.4 CLF, Add	29.18	
For >7.5 CLF, Deduct	-33.66	
07 92 13 00-0042 CLF 1/2" x 5/8" Joint, Polyurethane Sealant And Caulking	549.59	108.45
For Up To 1.15 CLF, Add	33.09	
For >6 CLF, Deduct	-38.69	
07 92 13 00-0043 CLF 1/2" x 3/4" Joint, Polyurethane Sealant And Caulking	594.43	108.45
For Up To 1 CLF, Add	36.45	
For >5 CLF, Deduct	-43.17	
07 92 13 00-0044 CLF 1/2" x 7/8" Joint, Polyurethane Sealant And Caulking	650.11	111.71
For Up To 0.8 CLF, Add	40.35	
For >4.5 CLF, Deduct	-48.20	
07 92 13 00-0045 CLF 1/2" x 1" Joint, Polyurethane Sealant And Caulking	705.81	116.05
For Up To 0.75 CLF, Add	44.26	
For >4 CLF, Deduct	-53.23	
07 92 13 00-0046 CLF 3/4" x 3/4" Joint, Polyurethane Sealant And Caulking	761.49	119.30
For Up To 0.65 CLF, Add	48.16	
For >3.5 CLF, Deduct	-58.25	
07 92 13 00-0047 CLF 3/4" x 1" Joint, Polyurethane Sealant And Caulking	928.56	130.15
For Up To 0.5 CLF, Add	59.88	
For >2.5 CLF, Deduct	-73.33	
07 92 13 00-0048 Flexible Polysulfide Sealant And Caulking, Clear <small>(07 92 13)</small>		
Note: 1 or 2 part, non-sag.		
07 92 13 00-0049 CLF 1/4" x 1/4" Joint, Polysulfide Sealant And Caulking	341.93	97.61
For Up To 6 CLF, Add	18.32	
For >30 CLF, Deduct	-19.55	
07 92 13 00-0050 CLF 1/4" x 3/8" Joint, Polysulfide Sealant And Caulking	366.50	97.61
For Up To 4 CLF, Add	20.17	
For >20 CLF, Deduct	-22.01	
07 92 13 00-0051 CLF 1/4" x 1/2" Joint, Polysulfide Sealant And Caulking	401.89	100.86
For Up To 3 CLF, Add	22.55	
For >15 CLF, Deduct	-25.01	
07 92 13 00-0052 CLF 3/8" x 3/8" Joint, Polysulfide Sealant And Caulking	414.16	100.86
For Up To 2.5 CLF, Add	23.47	
For >13 CLF, Deduct	-26.23	
07 92 13 00-0053 CLF 3/8" x 1/2" Joint, Polysulfide Sealant And Caulking	451.01	100.86
For Up To 2 CLF, Add	26.23	
For >10 CLF, Deduct	-29.92	

07 Thermal And Moisture Protection**07 90 Joint Protection****07 92 Joint Sealants**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
07 92 13 00-0054	CLF 3/8" x 5/8" Joint, Polysulfide Sealant And Caulking <i>For Up To 1.5 CLF, Add</i> <i>For >8 CLF, Deduct</i>	487.83 29.00 -33.60	100.86
07 92 13 00-0055	CLF 3/8" x 3/4" Joint, Polysulfide Sealant And Caulking <i>For Up To 1.3 CLF, Add</i> <i>For >7 CLF, Deduct</i>	535.51 32.30 -37.83	105.20
07 92 13 00-0056	CLF 1/2" x 1/2" Joint, Polysulfide Sealant And Caulking <i>For Up To 1.4 CLF, Add</i> <i>For >7.5 CLF, Deduct</i>	510.96 30.46 -35.37	105.20
07 92 13 00-0057	CLF 1/2" x 5/8" Joint, Polysulfide Sealant And Caulking <i>For Up To 1.15 CLF, Add</i> <i>For >6 CLF, Deduct</i>	570.93 34.69 -40.82	108.45
07 92 13 00-0058	CLF 1/2" x 3/4" Joint, Polysulfide Sealant And Caulking <i>For Up To 1 CLF, Add</i> <i>For >5 CLF, Deduct</i>	620.03 38.37 -45.73	108.45
07 92 13 00-0059	CLF 1/2" x 7/8" Joint, Polysulfide Sealant And Caulking <i>For Up To 0.8 CLF, Add</i> <i>For >4.5 CLF, Deduct</i>	679.99 42.59 -51.19	111.71
07 92 13 00-0060	CLF 1/2" x 1" Joint, Polysulfide Sealant And Caulking <i>For Up To 0.75 CLF, Add</i> <i>For >4 CLF, Deduct</i>	739.94 46.82 -56.64	116.05
07 92 13 00-0061	CLF 3/4" x 3/4" Joint, Polysulfide Sealant And Caulking <i>For Up To 0.65 CLF, Add</i> <i>For >3.5 CLF, Deduct</i>	799.90 51.05 -62.10	119.30
07 92 13 00-0062	CLF 3/4" x 1" Joint, Polysulfide Sealant And Caulking <i>For Up To 0.5 CLF, Add</i> <i>For >2.5 CLF, Deduct</i>	979.75 63.72 -78.45	130.15
07 92 13 00-0063	Flexible Polyurethane Security Sealant And Caulking <small>(07 92 13)</small> Note: 1 or 2 part, non-sag.		
07 92 13 00-0064	CLF 1/4" x 1/4" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 6 CLF, Add</i> <i>For >30 CLF, Deduct</i>	352.35 19.11 -20.59	97.61
07 92 13 00-0065	CLF 1/4" x 3/8" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 4 CLF, Add</i> <i>For >20 CLF, Deduct</i>	382.11 21.34 -23.57	97.61
07 92 13 00-0066	CLF 1/4" x 1/2" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 3 CLF, Add</i> <i>For >15 CLF, Deduct</i>	422.70 24.11 -27.09	100.86
07 92 13 00-0067	CLF 3/8" x 3/8" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 2.5 CLF, Add</i> <i>For >13 CLF, Deduct</i>	437.58 25.23 -28.57	100.86
07 92 13 00-0068	CLF 3/8" x 1/2" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 2 CLF, Add</i> <i>For >10 CLF, Deduct</i>	482.22 28.57 -33.04	100.86
07 92 13 00-0069	CLF 3/8" x 5/8" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 1.5 CLF, Add</i> <i>For >8 CLF, Deduct</i>	526.86 31.92 -37.50	100.86
07 92 13 00-0070	CLF 3/8" x 3/4" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 1.3 CLF, Add</i> <i>For >7 CLF, Deduct</i>	582.34 35.81 -42.51	105.20
07 92 13 00-0071	CLF 1/2" x 1/2" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 1.4 CLF, Add</i> <i>For >7.5 CLF, Deduct</i>	552.59 33.58 -39.53	105.20
07 92 13 00-0072	CLF 1/2" x 5/8" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 1.15 CLF, Add</i> <i>For >6 CLF, Deduct</i>	622.95 38.59 -46.03	108.45
07 92 13 00-0073	CLF 1/2" x 3/4" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 1 CLF, Add</i> <i>For >5 CLF, Deduct</i>	682.47 43.05 -51.98	108.45
07 92 13 00-0074	CLF 1/2" x 7/8" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 0.8 CLF, Add</i> <i>For >4.5 CLF, Deduct</i>	752.82 48.06 -58.47	111.71
07 92 13 00-0075	CLF 1/2" x 1" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 0.75 CLF, Add</i> <i>For >4 CLF, Deduct</i>	823.19 53.06 -64.97	116.05
07 92 13 00-0076	CLF 3/4" x 3/4" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 0.65 CLF, Add</i> <i>For >3.5 CLF, Deduct</i>	893.55 58.07 -71.46	119.30
07 92 13 00-0077	CLF 3/4" x 1" Joint, Flexible Polyurethane Security Sealant And Caulking <i>For Up To 0.5 CLF, Add</i> <i>For >2.5 CLF, Deduct</i>	1,104.64 73.09 -90.94	130.15
07 92 19	Acoustical Joint Sealants <small>(07 92)</small>		
07 92 19 00-0001	Acoustical Sealant <small>(07 92 19)</small>		
07 92 19 00-0002	CLF 1/4" x 1/4" Joint, Acoustical Sealant..... <i>For Custom Match Coloring, Add</i> <i>For Up To 6 CLF, Add</i> <i>For >30 CLF, Deduct</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	343.92 12.26 18.47 -19.75 17.88 10.22	97.61



Thermal And Moisture Protection		07
Joint Protection		07 90
Joint Sealants		07 92

07

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
07 92 19 00-0003	CLF		1/4" x 3/8" Joint, Acoustical Sealant	363.33	97.61
			<i>For Custom Match Coloring, Add</i>	16.92	
			<i>For Up To 4 CLF, Add</i>	19.93	
			<i>For >20 CLF, Deduct</i>	-21.69	
			<i>For 1 Part Mildew Resistant, Add</i>	24.68	
			<i>For High-Modulus Non-Acid Curing, Add</i>	14.10	
07 92 19 00-0004	CLF		1/4" x 1/2" Joint, Acoustical Sealant	385.61	100.86
			<i>For Custom Match Coloring, Add</i>	19.67	
			<i>For Up To 3 CLF, Add</i>	21.33	
			<i>For >15 CLF, Deduct</i>	-23.38	
			<i>For 1 Part Mildew Resistant, Add</i>	28.68	
			<i>For High-Modulus Non-Acid Curing, Add</i>	16.39	
07 92 19 00-0005	CLF		3/8" x 3/8" Joint, Acoustical Sealant	417.36	100.86
			<i>For Custom Match Coloring, Add</i>	27.29	
			<i>For Up To 2.5 CLF, Add</i>	23.71	
			<i>For >13 CLF, Deduct</i>	-26.55	
			<i>For 1 Part Mildew Resistant, Add</i>	39.79	
			<i>For High-Modulus Non-Acid Curing, Add</i>	22.74	
07 92 19 00-0006	CLF		3/8" x 1/2" Joint, Acoustical Sealant	450.36	100.86
			<i>For Custom Match Coloring, Add</i>	35.21	
			<i>For Up To 2 CLF, Add</i>	26.19	
			<i>For >10 CLF, Deduct</i>	-29.85	
			<i>For 1 Part Mildew Resistant, Add</i>	51.34	
			<i>For High-Modulus Non-Acid Curing, Add</i>	29.34	
07 92 19 00-0007	CLF		1/2" x 1/2" Joint, Acoustical Sealant	521.22	105.20
			<i>For Custom Match Coloring, Add</i>	49.61	
			<i>For Up To 1.4 CLF, Add</i>	31.23	
			<i>For >7.5 CLF, Deduct</i>	-36.40	
			<i>For 1 Part Mildew Resistant, Add</i>	72.35	
			<i>For High-Modulus Non-Acid Curing, Add</i>	41.34	

07 95 Expansion Control (07 90)

07 95 13 Expansion Joint Cover Assemblies (07 95)

Note: Includes necessary waterproofing mastics/caulking.

07 95 13 13 Interior Expansion Joint Cover Assemblies (07 95 13)

07 95 13 13-0001	Interior Floor Expansion Joint Cover Assemblies <small>(07 95 13 13)</small>				
07 95 13 13-0002	With 1" Space <small>(07 95 13 13-0001)</small>				
07 95 13 13-0003	LF	1"	Opening Floor Assembly Type, With Aluminum Expansion Joint Cover.....	77.47	6.70
07 95 13 13-0004	LF	1"	Opening Floor Assembly Type, With Bronze Expansion Joint Cover.....	64.20	6.70
07 95 13 13-0005	LF	1"	Opening Floor Assembly Type, With Stainless Steel Expansion Joint Cover.....	95.82	6.70
07 95 13 13-0006	With 2" Space <small>(07 95 13 13-0001)</small>				
07 95 13 13-0007	LF	2"	Opening Floor Assembly Type, Aluminum Expansion Joint Cover.....	104.43	6.70
07 95 13 13-0008	LF	2"	Opening Floor Assembly Type, Bronze Expansion Joint Cover.....	77.75	6.70
07 95 13 13-0009	LF	2"	Opening Floor Assembly Type, Stainless Steel Expansion Joint Cover.....	131.97	6.70
07 95 13 13-0010	Interior Ceiling And Wall Expansion Joint Cover Assemblies <small>(07 95 13 13)</small>				
07 95 13 13-0011	With 1" Space <small>(07 95 13 13-0010)</small>				
07 95 13 13-0012	LF	1"	Opening Ceiling And Wall Assembly Type, Aluminum Expansion Joint Cover.....	56.32	6.70
07 95 13 13-0013	LF	1"	Opening Ceiling And Wall Assembly Type, Bronze Expansion Joint Cover.....	56.47	6.70
07 95 13 13-0014	LF	1"	Opening Ceiling And Wall Assembly Type, Stainless Steel Expansion Joint Cover.....	83.57	6.70
07 95 13 13-0015	With 2" Space <small>(07 95 13 13-0010)</small>				
07 95 13 13-0016	LF	2"	Opening Ceiling And Wall Assembly Type, Aluminum Expansion Joint Cover.....	72.50	6.70
07 95 13 13-0017	LF	2"	Opening Ceiling And Wall Assembly Type, Bronze Expansion Joint Cover.....	63.24	6.70
07 95 13 13-0018	LF	2"	Opening Ceiling And Wall Assembly Type, Stainless Steel Expansion Joint Cover.....	101.64	6.70

07 95 13 16 Exterior Expansion Joint Cover Assemblies (07 95 13)

07 95 13 16-0001	Exterior Roof Aluminum Expansion Joint Cover Assemblies <small>(07 95 13 16)</small>				
07 95 13 16-0002	Roof To Roof <small>(07 95 13 16-0001)</small>				
07 95 13 16-0003	LF	1"	Opening Aluminum Assemblies, Exterior Roof To Roof Expansion Joint.....	106.63	4.46
07 95 13 16-0004	LF	2"	Opening Aluminum Assemblies, Exterior Roof To Roof Expansion Joint.....	129.33	4.46
07 95 13 16-0005	LF	3"	Opening Aluminum Assemblies, Exterior Roof To Roof Expansion Joint.....	144.96	4.46
07 95 13 16-0006	Roof To Wall <small>(07 95 13 16-0001)</small>				
07 95 13 16-0007	LF	1"	Opening Aluminum Assemblies, Exterior Roof To Wall Expansion Joint.....	78.20	4.46
07 95 13 16-0008	LF	2"	Opening Aluminum Assemblies, Exterior Roof To Wall Expansion Joint.....	105.98	4.46
07 95 13 16-0009	Flat Wall To Wall <small>(07 95 13 16-0001)</small>				
07 95 13 16-0010	LF	1"	Opening Aluminum Assemblies, Exterior Wall To Wall Expansion Joint.....	57.48	4.46

07	07 Thermal And Moisture Protection
	07 90 Joint Protection
	07 95 Expansion Control



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
07 95 13 16-0011	LF	2" Opening Aluminum Assemblies, Exterior Wall To Wall Expansion Joint	74.15		4.46
07 95 13 16-0012	LF	3" Opening Aluminum Assemblies, Exterior Wall To Wall Expansion Joint	94.27		4.46
07 95 13 16-0013		Corner To Flat Wall <small>(07 95 13 16-0001)</small>			
07 95 13 16-0014	LF	1" Opening Aluminum Assemblies, Exterior Corner To Wall Expansion Joint	53.63		4.46
07 95 13 16-0015	LF	2" Opening Aluminum Assemblies, Exterior Corner To Wall Expansion Joint	64.74		4.46
07 95 13 16-0016	LF	3" Opening Aluminum Assemblies, Exterior Corner To Wall Expansion Joint	95.97		4.46

END OF SECTION 07



Openings	08	08
Operation and Maintenance of Openings	08 01	
Operation and Maintenance of Doors and Frames	08 01 10	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 Openings

08 01 Operation and Maintenance of Openings ⁽⁰⁸⁾

08 01 10 Operation and Maintenance of Doors and Frames ^(08 01)

08 01 11 Operation and Maintenance of Metal Doors and Frames ^(08 01 10)

08 01 11 61 Metal Doors and Frames Repair ^(08 01 11)

08 01 11 61-0001		Hollow Metal Door Repair ^(08 01 11 61)	
		Note: Repairs are based on holes or damage of less than 1/2 of a square foot.	
08 01 11 61-0002	EA	Up To 1 SI, Patch Small Drill Holes	24.35
		Note: Per hinge location - sand to bare metal, mix/patch with bondo, fine grit sand smooth for finish	
08 01 11 61-0003	EA	>1 To 6 SI, Patch Small Drill Holes	48.84
		Note: Per hinge location - sand to bare metal, mix/patch with bondo, fine grit sand smooth for finish	
08 01 11 61-0004	LF	Patch Deep Scrapes Or Cuts In Doors	58.81

08 01 50 Operation and Maintenance of Windows ^(08 01)

08 01 52 Operation and Maintenance of Wood Windows ^(08 01 50)

08 01 52 61 Wood Window Repairs ^(08 01 52)

08 01 52 61-0001		Window Restoration And Replacement ^(08 01 52 61)	
08 01 52 61-0002	EA	Removal And Replacement Of Sash Guides	12.18
08 01 52 61-0003	EA	Removal And Replacement Of Window Arms	34.58
08 01 52 61-0004	EA	Removal And Replacement Of Window Crank Operator	40.53
08 01 52 61-0005	EA	Removal And Replacement Of Brass Window Sash Pull	24.14
08 01 52 61-0006	EA	Removal And Replacement Of Brass Window Sash Lock	21.63
08 01 52 61-0007	EA	Removal And Replacement Of Window Balance, Removable Sash Window	27.37
		Note: Channel, spiral or coil balance.	
08 01 52 61-0008	EA	Removal And Replacement Of Window Balance, Sash Window, Wooden Stops And/or Casing	81.62
		Note: Channel, spiral or coil balance.	
		For Replacing Two Balances In One Window, Deduct	-29.95

08 01 70 Operation and Maintenance of Hardware ^(08 01)

08 01 71 Operation and Maintenance of Door Hardware ^(08 01 70)

08 01 71 81 Door Hardware Replacement ^(08 01 71)

08 01 71 81-0001		Replace Door Hardware ^(08 01 71 81)	
08 01 71 81-0002		Replace Door Hardware Strikes ^(08 01 71 81-0001)	
08 01 71 81-0003	EA	Replace 2-1/4" x 1" Round Corner, Door Strike (Pamex FD5SP)	12.67
		Note: All finishes.	
08 01 71 81-0004		Replace Door Hardware Deadbolts, Latches And Accessories ^(08 01 71 81-0001)	
08 01 71 81-0005	EA	Replace 1" x 2-1/4" Dual Option Deadbolt Latch (Schlage 12-321)	72.35
		Note: Includes all finishes	
08 01 71 81-0006	EA	Replace 1" x 2-1/4" Satin Chrome Finish, Adjustable Deadbolt Latch (Schlage 12-288-626)	60.24
08 01 71 81-0007	EA	Replace 1" x 2-1/4" Satin Nickel Finish, Adjustable Deadbolt Latch (Schlage 12-288-619)	84.62
08 01 71 81-0008	EA	Replace Dead Bolt Adaptor Ring (Schlage 38-017)	59.89
		Note: Includes one 38-031 adaptor for cylinder and one 38-032 adaptor for B250 thumbturn	

08 01 80 Maintenance of Glazing ^(08 01)

08 01 81 Maintenance of Glass Glazing ^(08 01 80)

08 01 81 10 Maintenance of Glass Glazing ^(08 01 81)

08 01 81 10-0001		Glazing Compound Repair ^(08 01 81 10)	
08 01 81 10-0002	LF	Removal And Replacement Of Up To 1/2" Wide Damaged, Broken Or Cracked Window Glazing (For Glazing Compound Repair)	9.46

08 05 Common Work Results for Openings ⁽⁰⁸⁾

08 05 13 Door Options and Modifications ^(08 05)

Note: Excludes removal and reinstallation of door.

08 05 13 00-0001		Door Vision Panels (Pemko LT-S1) ^(08 05 13)	
		Note: Factory primed or powder coated. See CSI section 08 81 00 00-0000 for glazing.	
08 05 13 00-0002	EA	For Up To 1 SF, Factory Installed 20 Gauge Galvannealed Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	146.78
		For 9/16" To 1-1/16" Glazing Pocket, Add	73.39

08 Openings**08 05 Common Work Results for Openings****08 05 13 Door Options and Modifications**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 05 13 00-0003	EA	For >1 To 2 SF, Factory Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	185.80	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	92.90	
08 05 13 00-0004	EA	For >2 To 4 SF, Factory Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	215.53	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	107.77	
08 05 13 00-0005	EA	For >4 To 6 SF, Factory Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	274.98	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	137.49	
08 05 13 00-0006	EA	For >6 To 8 SF, Factory Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	356.73	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	178.37	
08 05 13 00-0007	EA	For >8 To 10 SF, Factory Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	455.21	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	227.61	
08 05 13 00-0008	EA	For >10 SF, Factory Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	483.08	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	241.54	
08 05 13 00-0009	EA	For Up To 1 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	241.94	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	66.72	
08 05 13 00-0010	EA	For >1 To 2 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	288.27	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	84.46	
08 05 13 00-0011	EA	For >2 To 4 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	326.13	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	97.97	
08 05 13 00-0012	EA	For >4 To 6 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	391.03	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	124.99	
08 05 13 00-0013	EA	For >6 To 8 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	476.21	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	162.15	
08 05 13 00-0014	EA	For >8 To 10 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	576.57	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	206.91	
08 05 13 00-0015	EA	For >10 SF, Site Installed 20 Gauge Galvanized Steel Frame With 3/8" Glazing Pocket For Vision Glass In Door, Add	612.76	
		<i>For 9/16" To 1-1/16" Glazing Pocket, Add</i>	219.58	
08 05 13 00-0016		Door Louvers, Inverted "Y" 50% Free Air (Pemko LV-IY) <small>(08 05 13)</small>		
		Note: Factory primed or powder coated.		
08 05 13 00-0017	EA	For Up To 1 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	139.96	
08 05 13 00-0018	EA	For >1 To 2 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	158.99	
08 05 13 00-0019	EA	For >2 To 4 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	216.09	
08 05 13 00-0020	EA	For >4 To 6 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	402.96	
08 05 13 00-0021	EA	For >6 To 8 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	498.32	
08 05 13 00-0022	EA	For >8 To 10 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	595.22	
08 05 13 00-0023	EA	For >10 To 14 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	776.71	
08 05 13 00-0024	EA	For >14 To 18 SF, Factory Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	914.30	
		<i>For 18 Gauge Louver And 18 Gauge Frame, Add</i>	109.72	
08 05 13 00-0025	EA	For Up To 1 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	221.34	
08 05 13 00-0026	EA	For >1 To 2 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	248.50	
08 05 13 00-0027	EA	For >2 To 4 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	313.74	
08 05 13 00-0028	EA	For >4 To 6 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	508.75	
08 05 13 00-0029	EA	For >6 To 8 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	612.25	
08 05 13 00-0030	EA	For >8 To 10 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	717.28	
08 05 13 00-0031	EA	For >10 To 14 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	906.91	
08 05 13 00-0032	EA	For >14 To 18 SF, Site Installed 20 Gauge Galvanized Inverted "Y" Blades, 18 Gauge Galvanized Frame Louver In Door, Add	1,049.93	
		<i>For 18 Gauge Louver And 18 Gauge Frame, Add</i>	109.72	
08 05 13 00-0033		Fire Rated Fusible Link Louvers (Pemko LV-FL) <small>(08 05 13)</small>		
		Note: Factory primed or powder coated.		
08 05 13 00-0034	EA	For Up To 1 SF, Factory Installed 16 Gauge Galvanized Adjustable "Z" Blades, 18 Gauge Galvanized Frame Fire Rated Fusible Link Louver In Door, Add	283.42	
08 05 13 00-0035	EA	For >1 To 2 SF, Factory Installed 16 Gauge Galvanized Adjustable "Z" Blades, 18 Gauge Galvanized Frame Fire Rated Fusible Link Louver In Door, Add	324.32	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 05 13 00-0036 EA For >2 To 4 SF, Factory Installed 16 Gauge Galvannealed Adjustable "Z Blades, 18 Gauge Galvannealed Frame Fire Rated Fusible Link Louver In Door, Add.....	380.94	
08 05 13 00-0037 EA For Up To 1 SF, Site Installed 16 Gauge Galvannealed Adjustable "Z Blades, 18 Gauge Galvannealed Frame Fire Rated Fusible Link Louver In Door, Add.....	381.07	
08 05 13 00-0038 EA For >1 To 2 SF, Site Installed 16 Gauge Galvannealed Adjustable "Z Blades, 18 Gauge Galvannealed Frame Fire Rated Fusible Link Louver In Door, Add.....	432.82	
08 05 13 00-0039 EA For >2 To 4 SF, Site Installed 16 Gauge Galvannealed Adjustable "Z Blades, 18 Gauge Galvannealed Frame Fire Rated Fusible Link Louver In Door, Add.....	498.12	
08 05 13 00-0040 Door Hardware Preparation (08 05 13)		
08 05 13 00-0041 EA Factory Prepare Wood Door (Rated Or Non-Rated) For Mortise Lockset Hardware.....	81.34	
08 05 13 00-0042 EA Prepare Existing Wood Door (Rated) For Mortise Lockset Hardware..... Note: Requires door to be taken off site for UL certification.	200.64	
08 05 13 00-0043 EA Prepare Existing Wood Door (Non-Rated) For Mortise Lockset Hardware.....	92.18	
08 05 13 00-0044 EA Prepare Existing Wood Door (Rated) For Cylindrical Lockset Hardware..... Note: Requires door to be taken off site for UL certification.	162.69	
08 05 13 00-0045 EA Prepare Existing Wood Door (Non-Rated) For Cylindrical Lockset Hardware.....	27.11	
08 05 13 00-0046 EA Prepare Existing Wood Door (Rated) For Concealed Vertical Rod..... Note: Requires door to be taken off site for UL certification.	298.29	
08 05 13 00-0047 EA Prepare Existing Wood Door (Non-Rated) For Concealed Vertical Rod.....	189.79	
08 05 13 00-0048 EA Prepare Existing Wood Door (Rated) For Electric Hardware..... Note: Requires door to be taken off site for UL certification.	200.64	
08 05 13 00-0049 EA Prepare Existing Door (Non-Rated) For Electric Hardware.....	92.18	
08 05 13 00-0050 Door Modifications (08 05 13)		
08 05 13 00-0051 EA Removal And Reinstallation Of Door.....	92.22	
08 05 13 00-0052 EA Removal And Reinstallation Of Metal Door Frame.....	180.84	
08 05 13 00-0053 EA Trim Bottom Of Existing Steel Door For Installation Of Carpet Or Tile..... Note: Excludes removal and reinstallation of door.	97.65	
08 05 13 00-0054 EA Modify Metal Door Frame For Door Swing..... Note: Includes removal of door; install blank hinge plates, new continuous hinge, blank strike plate, new strike plate and reinstallation of door.	1,269.17	
08 05 13 00-0055 EA Factory Installed Sound Proofing (STC 28) In Metal Door.....	123.92	
08 05 13 00-0056 SF For 16 Gauge Steel Metal Plate Bolted On Door..... Note: Includes mounting hardware.	25.28	
08 05 13 00-0057 EA Removal And Reinstallation Of Wood Door Frame.....	109.31	
08 05 13 00-0058 EA Trim Bottom Of Existing Wood Door For Installation Of Carpet Or Tile..... Note: Excludes removal and reinstallation of door.	49.19	
08 05 13 00-0059 EA Factory Trim Wood Door Edge For Custom Width.....	71.05	
08 10 Doors and Frames (08)		
08 11 Metal Doors and Frames (08 10)		
08 11 63 Metal Screen and Storm Doors and Frames (08 11)		
08 11 63 13 Steel Screen and Storm Doors and Frames (08 11 63)		
08 11 63 13-0001 Steel Screen Door (08 11 63 13)		
Note: Includes frame, trim, necessary anchors and hardware (closures, chain and spring, latching, screens, etc.).		
08 11 63 13-0002 EA 2'-8" x 7', Residential, Steel Screen Door With Frame, Trim, Hardware.....	892.31	149.19
08 11 63 13-0003 EA 3' x 7' Steel Screen Door, Residential, With Frame, Trim, Hardware.....	903.20	154.62
08 11 63 13-0004 EA Steel Combination Type Residential Storm Door, With Mesh And Tempered Glass With Frame, Trim, Hardware.....	1,399.65	154.62
08 11 63 23 Aluminum Screen and Storm Doors and Frames (08 11 63)		
08 11 63 23-0001 Aluminum Combination Type With Tempered Glass At Top And Bottom (08 11 63 23)		
Note: Includes frame trim, necessary anchors and usual hardware (closures, chain and spring, latching, screens, etc.).		
08 11 63 23-0002 EA Aluminum Combination Type Residential Storm Door, Tempered Glass Top With Frame, Trim, Hardware..... <i>For Special Finished, Add</i>	1,097.26 105.63	86.81
08 11 63 23-0003 EA Aluminum Combination Type Residential Storm Door, Tempered Glass Top And Bottom With Frame, Trim, Hardware.....	1,156.63	86.81
08 11 63 23-0004 EA Aluminum Screen Door.....	306.34	54.23
08 11 63 23-0005 SF Repair Screen Door.....	13.49	
08 11 73 Sliding Metal Fire Doors (08 11)		
08 11 73 00-0001 Motor Operated Fire Door With Fusible Link (08 11 73)		
Note: 3 hour rating. Excludes electrical hook-up of motor.		
08 11 73 00-0002 EA 3' x 6' 8" Sliding Metal Fire Door, Motor Operated Door With 3 Hour Rating.....	4,574.88	557.84
08 11 73 00-0003 EA 3' 8" x 6' 8" Sliding Metal Fire Door, Motor Operated Door With 3 Hour Rating.....	4,876.01	557.84
08 11 73 00-0004 EA 4' x 8' Sliding Metal Fire Door, Motor Operated Door With 3 Hour Rating.....	5,380.06	557.84
08 11 73 00-0005 EA 5' x 8' Sliding Metal Fire Door, Motor Operated Door With 3 Hour Rating.....	5,928.15	557.84
08 12 Metal Frames (08 10)		

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

Note: Includes perimeter caulk, sealant (as required), anchors and silencers.

08 12 13 Hollow Metal Frames (08 12)**08 12 13 13 Standard Hollow Metal Frames (08 12 13)**

Note: Shop prime coat. See CSI section 04 05 16 26-0017 for grouting frames.

08 12 13 13-0001	4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames (08 12 13 13)		
	Note: For non-rated or fire rated frame assemblies		
08 12 13 13-0002	6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames (08 12 13 13-0001)		
08 12 13 13-0003	EA 2' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	583.20	81.38
	For Auxiliary Frame Reinforcement For Hinges, Add	63.07	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	50.45	
	For Type 304 Stainless Steel Frame, Add	764.95	
	For Type 316 Stainless Steel Frame, Add	891.08	
	For Baked Enamel Finish, Add	150.55	
	For 18 Gauge Frame, Deduct	-42.05	
	For 14 Gauge Frame, Add	105.11	
	For 12 Gauge Frame, Add	159.77	
08 12 13 13-0004	EA 2'-4" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	679.57	89.51
	For Auxiliary Frame Reinforcement For Hinges, Add	75.08	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	60.06	
	For Type 304 Stainless Steel Frame, Add	909.92	
	For Type 316 Stainless Steel Frame, Add	1,060.09	
	For Baked Enamel Finish, Add	177.02	
	For 18 Gauge Frame, Deduct	-50.05	
	For 14 Gauge Frame, Add	125.14	
	For 12 Gauge Frame, Add	190.21	
08 12 13 13-0005	EA 2'-6" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	698.43	94.94
	For Auxiliary Frame Reinforcement For Hinges, Add	76.28	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	61.03	
	For Type 304 Stainless Steel Frame, Add	924.88	
	For Type 316 Stainless Steel Frame, Add	1,077.45	
	For Baked Enamel Finish, Add	181.05	
	For 18 Gauge Frame, Deduct	-50.86	
	For 14 Gauge Frame, Add	127.14	
	For 12 Gauge Frame, Add	193.25	
08 12 13 13-0006	EA 2'-8" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	714.70	103.08
	For Auxiliary Frame Reinforcement For Hinges, Add	76.28	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	61.03	
	For Type 304 Stainless Steel Frame, Add	925.70	
	For Type 316 Stainless Steel Frame, Add	1,078.26	
	For Baked Enamel Finish, Add	183.49	
	For 18 Gauge Frame, Deduct	-50.86	
	For 14 Gauge Frame, Add	127.14	
	For 12 Gauge Frame, Add	193.25	
08 12 13 13-0007	EA 2'-10" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	728.14	105.79
	For Auxiliary Frame Reinforcement For Hinges, Add	77.48	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	61.99	
	For Type 304 Stainless Steel Frame, Add	940.39	
	For Type 316 Stainless Steel Frame, Add	1,095.36	
	For Baked Enamel Finish, Add	186.71	
	For 18 Gauge Frame, Deduct	-51.66	
	For 14 Gauge Frame, Add	129.14	
	For 12 Gauge Frame, Add	196.29	
08 12 13 13-0008	EA 3' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	741.58	108.50
	For Auxiliary Frame Reinforcement For Hinges, Add	78.69	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	62.95	
	For Type 304 Stainless Steel Frame, Add	955.08	
	For Type 316 Stainless Steel Frame, Add	1,112.45	
	For Baked Enamel Finish, Add	189.92	
	For 18 Gauge Frame, Deduct	-52.46	
	For 14 Gauge Frame, Add	131.14	
	For 12 Gauge Frame, Add	199.34	
08 12 13 13-0009	EA 3'-4" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	788.45	113.93
	For Auxiliary Frame Reinforcement For Hinges, Add	84.09	
	For Welded Frames, Add	245.10	
	For Galvanized Frames, Add	67.27	
	For Type 304 Stainless Steel Frame, Add	1,020.47	
	For Type 316 Stainless Steel Frame, Add	1,188.65	
	For Baked Enamel Finish, Add	202.36	
	For 18 Gauge Frame, Deduct	-56.06	
	For 14 Gauge Frame, Add	140.15	
	For 12 Gauge Frame, Add	213.03	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0010	EA	3'-6" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	799.30	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	84.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	67.27	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,021.02	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,189.20	
			<i>For Baked Enamel Finish, Add</i>	203.99	
			<i>For 18 Gauge Frame, Deduct</i>	-56.06	
			<i>For 14 Gauge Frame, Add</i>	140.15	
			<i>For 12 Gauge Frame, Add</i>	213.03	
08 12 13	13-0011	EA	4' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	830.19	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	87.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	69.68	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,057.61	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,231.80	
			<i>For Baked Enamel Finish, Add</i>	211.62	
			<i>For 18 Gauge Frame, Deduct</i>	-58.06	
			<i>For 14 Gauge Frame, Add</i>	145.16	
			<i>For 12 Gauge Frame, Add</i>	220.64	
08 12 13	13-0012	EA	5' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	861.06	130.20
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	90.10	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	72.08	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,094.19	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,274.39	
			<i>For Baked Enamel Finish, Add</i>	219.26	
			<i>For 18 Gauge Frame, Deduct</i>	-60.07	
			<i>For 14 Gauge Frame, Add</i>	150.16	
			<i>For 12 Gauge Frame, Add</i>	228.25	
08 12 13	13-0013	EA	5'-4" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	871.90	135.63
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	90.10	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	72.08	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,094.73	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,274.93	
			<i>For Baked Enamel Finish, Add</i>	220.88	
			<i>For 18 Gauge Frame, Deduct</i>	-60.07	
			<i>For 14 Gauge Frame, Add</i>	150.16	
			<i>For 12 Gauge Frame, Add</i>	228.25	
08 12 13	13-0014	EA	5'-8" x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	887.34	138.34
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	91.60	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	73.28	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,113.02	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,296.22	
			<i>For Baked Enamel Finish, Add</i>	224.70	
			<i>For 18 Gauge Frame, Deduct</i>	-61.07	
			<i>For 14 Gauge Frame, Add</i>	152.67	
			<i>For 12 Gauge Frame, Add</i>	232.05	
08 12 13	13-0015	EA	6' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	902.78	141.05
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	93.10	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	74.48	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,131.31	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,317.51	
			<i>For Baked Enamel Finish, Add</i>	228.52	
			<i>For 18 Gauge Frame, Deduct</i>	-62.07	
			<i>For 14 Gauge Frame, Add</i>	155.17	
			<i>For 12 Gauge Frame, Add</i>	235.85	
08 12 13	13-0016	EA	7' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	948.24	143.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	99.11	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	79.29	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,203.65	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,401.87	
			<i>For Baked Enamel Finish, Add</i>	241.34	
			<i>For 18 Gauge Frame, Deduct</i>	-66.07	
			<i>For 14 Gauge Frame, Add</i>	165.18	
			<i>For 12 Gauge Frame, Add</i>	251.07	
08 12 13	13-0017	EA	8' x 6'-8" Through 7'-2" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	993.72	146.48
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	105.11	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	84.09	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,276.02	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,486.24	
			<i>For Baked Enamel Finish, Add</i>	254.17	
			<i>For 18 Gauge Frame, Deduct</i>	-70.08	
			<i>For 14 Gauge Frame, Add</i>	175.19	
			<i>For 12 Gauge Frame, Add</i>	266.29	

08 12 13 13-0018 >7'-2" Through 9'-0" High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames (08 12 13 13-0001)

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0019	EA		2' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	629.92	81.38
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	70.08	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	56.06	
			<i>For Type 304 Stainless Steel Frame, Add</i>	849.04	
			<i>For Type 316 Stainless Steel Frame, Add</i>	989.19	
			<i>For Baked Enamel Finish, Add</i>	164.56	
			<i>For 18 Gauge Frame, Deduct</i>	-46.72	
			<i>For 14 Gauge Frame, Add</i>	116.79	
			<i>For 12 Gauge Frame, Add</i>	177.52	
08 12 13 13-0020	EA		2'-4" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	735.19	89.51
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	83.42	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	66.74	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,010.04	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,176.89	
			<i>For Baked Enamel Finish, Add</i>	193.70	
			<i>For 18 Gauge Frame, Deduct</i>	-55.62	
			<i>For 14 Gauge Frame, Add</i>	139.04	
			<i>For 12 Gauge Frame, Add</i>	211.34	
08 12 13 13-0021	EA		2'-6" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	754.93	94.94
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	84.76	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	67.81	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,026.58	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,196.10	
			<i>For Baked Enamel Finish, Add</i>	198.00	
			<i>For 18 Gauge Frame, Deduct</i>	-56.51	
			<i>For 14 Gauge Frame, Add</i>	141.26	
			<i>For 12 Gauge Frame, Add</i>	214.72	
08 12 13 13-0022	EA		2'-8" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	771.20	103.08
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	84.76	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	67.81	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,027.40	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,196.91	
			<i>For Baked Enamel Finish, Add</i>	200.44	
			<i>For 18 Gauge Frame, Deduct</i>	-56.51	
			<i>For 14 Gauge Frame, Add</i>	141.26	
			<i>For 12 Gauge Frame, Add</i>	214.72	
08 12 13 13-0023	EA		2'-10" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	785.53	105.79
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	86.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	68.87	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,043.69	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,215.87	
			<i>For Baked Enamel Finish, Add</i>	203.92	
			<i>For 18 Gauge Frame, Deduct</i>	-57.40	
			<i>For 14 Gauge Frame, Add</i>	143.49	
			<i>For 12 Gauge Frame, Add</i>	218.10	
08 12 13 13-0024	EA		3' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	799.86	108.50
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	87.43	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	69.94	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,059.98	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,234.84	
			<i>For Baked Enamel Finish, Add</i>	207.41	
			<i>For 18 Gauge Frame, Deduct</i>	-58.29	
			<i>For 14 Gauge Frame, Add</i>	145.71	
			<i>For 12 Gauge Frame, Add</i>	221.48	
08 12 13 13-0025	EA		3'-4" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	850.74	113.93
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	93.43	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	74.75	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,132.59	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,319.46	
			<i>For Baked Enamel Finish, Add</i>	221.04	
			<i>For 18 Gauge Frame, Deduct</i>	-62.29	
			<i>For 14 Gauge Frame, Add</i>	155.72	
			<i>For 12 Gauge Frame, Add</i>	236.70	
08 12 13 13-0026	EA		3'-6" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	861.59	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	93.43	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	74.75	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,133.14	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,320.00	
			<i>For Baked Enamel Finish, Add</i>	222.67	
			<i>For 18 Gauge Frame, Deduct</i>	-62.29	
			<i>For 14 Gauge Frame, Add</i>	155.72	
			<i>For 12 Gauge Frame, Add</i>	236.70	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0027	EA	4' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	894.70	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	96.77	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	77.42	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,173.73	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,367.27	
			<i>For Baked Enamel Finish, Add</i>	230.98	
			<i>For 18 Gauge Frame, Deduct</i>	-64.51	
			<i>For 14 Gauge Frame, Add</i>	161.29	
			<i>For 12 Gauge Frame, Add</i>	245.15	
08 12 13	13-0028	EA	5' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	927.80	130.20
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	100.11	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	80.09	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,214.32	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,414.54	
			<i>For Baked Enamel Finish, Add</i>	239.28	
			<i>For 18 Gauge Frame, Deduct</i>	-66.74	
			<i>For 14 Gauge Frame, Add</i>	166.85	
			<i>For 12 Gauge Frame, Add</i>	253.61	
08 12 13	13-0029	EA	5'-4" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	938.64	135.63
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	100.11	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	80.09	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,214.86	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,415.08	
			<i>For Baked Enamel Finish, Add</i>	240.90	
			<i>For 18 Gauge Frame, Deduct</i>	-66.74	
			<i>For 14 Gauge Frame, Add</i>	166.85	
			<i>For 12 Gauge Frame, Add</i>	253.61	
08 12 13	13-0030	EA	5'-8" x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	955.19	138.34
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	101.78	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	81.42	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,235.15	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,438.71	
			<i>For Baked Enamel Finish, Add</i>	245.06	
			<i>For 18 Gauge Frame, Deduct</i>	-67.85	
			<i>For 14 Gauge Frame, Add</i>	169.63	
			<i>For 12 Gauge Frame, Add</i>	257.83	
08 12 13	13-0031	EA	6' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	971.74	141.05
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	103.44	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	82.76	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,255.44	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,462.33	
			<i>For Baked Enamel Finish, Add</i>	249.21	
			<i>For 18 Gauge Frame, Deduct</i>	-68.96	
			<i>For 14 Gauge Frame, Add</i>	172.41	
			<i>For 12 Gauge Frame, Add</i>	262.06	
08 12 13	13-0032	EA	7' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,021.65	143.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	110.12	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	88.09	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,335.79	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,556.03	
			<i>For Baked Enamel Finish, Add</i>	263.37	
			<i>For 18 Gauge Frame, Deduct</i>	-73.41	
			<i>For 14 Gauge Frame, Add</i>	183.53	
			<i>For 12 Gauge Frame, Add</i>	278.97	
08 12 13	13-0033	EA	8' x >7'-2" Through 9' High, 4-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,071.58	146.48
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	116.79	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	93.43	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,416.16	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,649.75	
			<i>For Baked Enamel Finish, Add</i>	277.53	
			<i>For 18 Gauge Frame, Deduct</i>	-77.86	
			<i>For 14 Gauge Frame, Add</i>	194.66	
			<i>For 12 Gauge Frame, Add</i>	295.88	
08 12 13	13-0034		5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13)</small>		
			Note: For non-rated or fire rated frame assemblies		
08 12 13	13-0035		6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13-0034)</small>		
08 12 13	13-0036	EA	2' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	629.92	81.38
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	70.08	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	56.06	
			<i>For Type 304 Stainless Steel Frame, Add</i>	849.04	
			<i>For Type 316 Stainless Steel Frame, Add</i>	989.19	
			<i>For Baked Enamel Finish, Add</i>	164.56	
			<i>For 18 Gauge Frame, Deduct</i>	-46.72	
			<i>For 14 Gauge Frame, Add</i>	116.79	
			<i>For 12 Gauge Frame, Add</i>	177.52	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0037	EA	2'-4" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	735.18	89.51
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	83.42	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	66.74	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,010.02	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,176.87	
			<i>For Baked Enamel Finish, Add</i>	193.70	
			<i>For 18 Gauge Frame, Deduct</i>	-55.62	
			<i>For 14 Gauge Frame, Add</i>	139.04	
			<i>For 12 Gauge Frame, Add</i>	211.34	
08 12 13	13-0038	EA	2'-6" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	754.93	94.94
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	84.76	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	67.81	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,026.58	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,196.10	
			<i>For Baked Enamel Finish, Add</i>	198.00	
			<i>For 18 Gauge Frame, Deduct</i>	-56.51	
			<i>For 14 Gauge Frame, Add</i>	141.26	
			<i>For 12 Gauge Frame, Add</i>	214.72	
08 12 13	13-0039	EA	2'-8" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	771.20	103.08
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	84.76	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	67.81	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,027.40	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,196.91	
			<i>For Baked Enamel Finish, Add</i>	200.44	
			<i>For 18 Gauge Frame, Deduct</i>	-56.51	
			<i>For 14 Gauge Frame, Add</i>	141.26	
			<i>For 12 Gauge Frame, Add</i>	214.72	
08 12 13	13-0040	EA	2'-10" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	785.53	105.79
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	86.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	68.87	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,043.69	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,215.87	
			<i>For Baked Enamel Finish, Add</i>	203.92	
			<i>For 18 Gauge Frame, Deduct</i>	-57.40	
			<i>For 14 Gauge Frame, Add</i>	143.49	
			<i>For 12 Gauge Frame, Add</i>	218.10	
08 12 13	13-0041	EA	3' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	799.86	108.50
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	87.43	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	69.94	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,059.98	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,234.84	
			<i>For Baked Enamel Finish, Add</i>	207.41	
			<i>For 18 Gauge Frame, Deduct</i>	-58.29	
			<i>For 14 Gauge Frame, Add</i>	145.71	
			<i>For 12 Gauge Frame, Add</i>	221.48	
08 12 13	13-0042	EA	3'-4" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	850.74	113.93
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	93.43	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	74.75	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,132.59	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,319.46	
			<i>For Baked Enamel Finish, Add</i>	221.04	
			<i>For 18 Gauge Frame, Deduct</i>	-62.29	
			<i>For 14 Gauge Frame, Add</i>	155.72	
			<i>For 12 Gauge Frame, Add</i>	236.70	
08 12 13	13-0043	EA	3'-6" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	861.59	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	93.43	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	74.75	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,133.14	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,320.00	
			<i>For Baked Enamel Finish, Add</i>	222.67	
			<i>For 18 Gauge Frame, Deduct</i>	-62.29	
			<i>For 14 Gauge Frame, Add</i>	155.72	
			<i>For 12 Gauge Frame, Add</i>	236.70	
08 12 13	13-0044	EA	4' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	894.70	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	96.77	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	77.42	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,173.73	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,367.27	
			<i>For Baked Enamel Finish, Add</i>	230.98	
			<i>For 18 Gauge Frame, Deduct</i>	-64.51	
			<i>For 14 Gauge Frame, Add</i>	161.29	
			<i>For 12 Gauge Frame, Add</i>	245.15	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 12 13 13-0045 EA 5' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	927.80	130.20
For Auxiliary Frame Reinforcement For Hinges, Add	100.11	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	80.09	
For Type 304 Stainless Steel Frame, Add	1,214.32	
For Type 316 Stainless Steel Frame, Add	1,414.54	
For Baked Enamel Finish, Add	239.28	
For 18 Gauge Frame, Deduct	-66.74	
For 14 Gauge Frame, Add	166.85	
For 12 Gauge Frame, Add	253.61	
08 12 13 13-0046 EA 5'-4" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	938.64	135.63
For Auxiliary Frame Reinforcement For Hinges, Add	100.11	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	80.09	
For Type 304 Stainless Steel Frame, Add	1,214.86	
For Type 316 Stainless Steel Frame, Add	1,415.08	
For Baked Enamel Finish, Add	240.90	
For 18 Gauge Frame, Deduct	-66.74	
For 14 Gauge Frame, Add	166.85	
For 12 Gauge Frame, Add	253.61	
08 12 13 13-0047 EA 5'-8" x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	955.19	138.34
For Auxiliary Frame Reinforcement For Hinges, Add	101.78	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	81.42	
For Type 304 Stainless Steel Frame, Add	1,235.15	
For Type 316 Stainless Steel Frame, Add	1,438.71	
For Baked Enamel Finish, Add	245.06	
For 18 Gauge Frame, Deduct	-67.85	
For 14 Gauge Frame, Add	169.63	
For 12 Gauge Frame, Add	257.83	
08 12 13 13-0048 EA 6' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	971.74	141.05
For Auxiliary Frame Reinforcement For Hinges, Add	103.44	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	82.76	
For Type 304 Stainless Steel Frame, Add	1,255.44	
For Type 316 Stainless Steel Frame, Add	1,462.33	
For Baked Enamel Finish, Add	249.21	
For 18 Gauge Frame, Deduct	-68.96	
For 14 Gauge Frame, Add	172.41	
For 12 Gauge Frame, Add	262.06	
08 12 13 13-0049 EA 7' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,021.65	143.77
For Auxiliary Frame Reinforcement For Hinges, Add	110.12	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	88.09	
For Type 304 Stainless Steel Frame, Add	1,335.79	
For Type 316 Stainless Steel Frame, Add	1,556.03	
For Baked Enamel Finish, Add	263.37	
For 18 Gauge Frame, Deduct	-73.41	
For 14 Gauge Frame, Add	183.53	
For 12 Gauge Frame, Add	278.97	
08 12 13 13-0050 EA 8' x 6'-8" Through 7'-2" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,071.58	146.48
For Auxiliary Frame Reinforcement For Hinges, Add	116.79	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	93.43	
For Type 304 Stainless Steel Frame, Add	1,416.16	
For Type 316 Stainless Steel Frame, Add	1,649.75	
For Baked Enamel Finish, Add	277.53	
For 18 Gauge Frame, Deduct	-77.86	
For 14 Gauge Frame, Add	194.66	
For 12 Gauge Frame, Add	295.88	
08 12 13 13-0051 >7'-2" Through 9'-0" High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13-0034)</small>		
08 12 13 13-0052 EA 2' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	681.83	81.38
For Auxiliary Frame Reinforcement For Hinges, Add	77.86	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	62.29	
For Type 304 Stainless Steel Frame, Add	942.48	
For Type 316 Stainless Steel Frame, Add	1,098.21	
For Baked Enamel Finish, Add	180.14	
For 18 Gauge Frame, Deduct	-51.91	
For 14 Gauge Frame, Add	129.77	
For 12 Gauge Frame, Add	197.25	
08 12 13 13-0053 EA 2'-4" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	796.98	89.51
For Auxiliary Frame Reinforcement For Hinges, Add	92.69	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	74.15	
For Type 304 Stainless Steel Frame, Add	1,121.26	
For Type 316 Stainless Steel Frame, Add	1,306.65	
For Baked Enamel Finish, Add	212.24	
For 18 Gauge Frame, Deduct	-61.80	
For 14 Gauge Frame, Add	154.49	
For 12 Gauge Frame, Add	234.82	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0054	EA		2'-8" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	817.72	94.94
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	94.18	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	75.34	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,139.61	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,327.96	
			<i>For Baked Enamel Finish, Add</i>	216.83	
			<i>For 18 Gauge Frame, Deduct</i>	-62.78	
			<i>For 14 Gauge Frame, Add</i>	156.96	
			<i>For 12 Gauge Frame, Add</i>	238.58	
08 12 13 13-0055	EA		2'-8" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	833.99	103.08
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	94.18	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	75.34	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,140.42	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,328.77	
			<i>For Baked Enamel Finish, Add</i>	219.27	
			<i>For 18 Gauge Frame, Deduct</i>	-62.78	
			<i>For 14 Gauge Frame, Add</i>	156.96	
			<i>For 12 Gauge Frame, Add</i>	238.58	
08 12 13 13-0056	EA		2'-10" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	849.30	105.79
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	95.66	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	76.53	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,158.48	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,349.79	
			<i>For Baked Enamel Finish, Add</i>	223.05	
			<i>For 18 Gauge Frame, Deduct</i>	-63.77	
			<i>For 14 Gauge Frame, Add</i>	159.43	
			<i>For 12 Gauge Frame, Add</i>	242.33	
08 12 13 13-0057	EA		3' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	864.62	108.50
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	97.14	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	77.71	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,176.55	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,370.83	
			<i>For Baked Enamel Finish, Add</i>	226.83	
			<i>For 18 Gauge Frame, Deduct</i>	-64.76	
			<i>For 14 Gauge Frame, Add</i>	161.90	
			<i>For 12 Gauge Frame, Add</i>	246.09	
08 12 13 13-0058	EA		3'-4" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	919.95	113.93
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	103.82	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	83.05	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,257.17	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,464.80	
			<i>For Baked Enamel Finish, Add</i>	241.81	
			<i>For 18 Gauge Frame, Deduct</i>	-69.21	
			<i>For 14 Gauge Frame, Add</i>	173.03	
			<i>For 12 Gauge Frame, Add</i>	263.00	
08 12 13 13-0059	EA		3'-6" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	930.80	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	103.82	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	83.05	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,257.72	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,465.35	
			<i>For Baked Enamel Finish, Add</i>	243.44	
			<i>For 18 Gauge Frame, Deduct</i>	-69.21	
			<i>For 14 Gauge Frame, Add</i>	173.03	
			<i>For 12 Gauge Frame, Add</i>	263.00	
08 12 13 13-0060	EA		4' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	966.38	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	107.52	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	86.02	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,302.75	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,517.80	
			<i>For Baked Enamel Finish, Add</i>	252.48	
			<i>For 18 Gauge Frame, Deduct</i>	-71.68	
			<i>For 14 Gauge Frame, Add</i>	179.21	
			<i>For 12 Gauge Frame, Add</i>	272.39	
08 12 13 13-0061	EA		5' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,001.95	130.20
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	111.23	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	88.98	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,347.79	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,570.25	
			<i>For Baked Enamel Finish, Add</i>	261.52	
			<i>For 18 Gauge Frame, Deduct</i>	-74.15	
			<i>For 14 Gauge Frame, Add</i>	185.39	
			<i>For 12 Gauge Frame, Add</i>	281.79	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0062	EA	5'-4" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,012.79 111.23 245.10 88.98 1,348.33 1,570.80 263.15 -74.15 185.39 281.79	135.63
08 12 13	13-0063	EA	5'-8" x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,030.58 113.09 245.10 90.47 1,370.85 1,597.02 267.67 -75.39 188.48 286.48	138.34
08 12 13	13-0064	EA	6' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,048.37 114.94 245.10 91.95 1,393.37 1,623.25 272.19 -76.63 191.57 291.18	141.05
08 12 13	13-0065	EA	7' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,103.22 122.35 245.10 97.88 1,482.62 1,727.33 287.84 -81.57 203.92 309.96	143.77
08 12 13	13-0066	EA	8' x >7'-2" Through 9' High, 5-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,158.09 129.77 245.10 103.82 1,571.88 1,831.42 303.48 -86.51 216.28 328.75	146.48
08 12 13	13-0067		6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13)</small> Note: For non-rated or fire rated frame assemblies		
08 12 13	13-0068		6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13-0067)</small>		
08 12 13	13-0069	EA	2' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	902.33 110.94 245.10 88.75 1,339.38 1,561.26 246.29 -73.96 184.90 281.04	81.38
08 12 13	13-0070	EA	2'-4" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,059.48 132.07 245.10 105.65 1,593.76 1,857.90 290.99 -88.05 220.11 334.57	89.51
08 12 13	13-0071	EA	2'-6" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,084.42 134.18 245.10 107.34 1,619.67 1,888.03 296.84 -89.45 223.64 339.93	94.94

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0072	EA	2'-8" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,100.69	103.08
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	134.18	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	107.34	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,620.48	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,888.84	
			<i>For Baked Enamel Finish, Add</i>	299.28	
			<i>For 18 Gauge Frame, Deduct</i>	-89.45	
			<i>For 14 Gauge Frame, Add</i>	223.64	
			<i>For 12 Gauge Frame, Add</i>	339.93	
08 12 13	13-0073	EA	2'-10" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,120.21	105.79
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	136.29	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	109.04	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,646.11	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,918.70	
			<i>For Baked Enamel Finish, Add</i>	304.33	
			<i>For 18 Gauge Frame, Deduct</i>	-90.86	
			<i>For 14 Gauge Frame, Add</i>	227.16	
			<i>For 12 Gauge Frame, Add</i>	345.28	
08 12 13	13-0074	EA	3' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,139.73	108.50
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	138.41	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	110.73	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,671.75	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,948.56	
			<i>For Baked Enamel Finish, Add</i>	309.37	
			<i>For 18 Gauge Frame, Deduct</i>	-92.27	
			<i>For 14 Gauge Frame, Add</i>	230.68	
			<i>For 12 Gauge Frame, Add</i>	350.63	
08 12 13	13-0075	EA	3'-4" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,213.96	113.93
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	147.92	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	118.33	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,786.39	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,082.22	
			<i>For Baked Enamel Finish, Add</i>	330.01	
			<i>For 18 Gauge Frame, Deduct</i>	-98.61	
			<i>For 14 Gauge Frame, Add</i>	246.53	
			<i>For 12 Gauge Frame, Add</i>	374.72	
08 12 13	13-0076	EA	3'-6" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,224.81	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	147.92	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	118.33	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,786.93	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,082.77	
			<i>For Baked Enamel Finish, Add</i>	331.64	
			<i>For 18 Gauge Frame, Deduct</i>	-98.61	
			<i>For 14 Gauge Frame, Add</i>	246.53	
			<i>For 12 Gauge Frame, Add</i>	374.72	
08 12 13	13-0077	EA	4' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,270.89	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	153.20	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	122.56	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,850.87	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,157.27	
			<i>For Baked Enamel Finish, Add</i>	343.83	
			<i>For 18 Gauge Frame, Deduct</i>	-102.13	
			<i>For 14 Gauge Frame, Add</i>	255.33	
			<i>For 12 Gauge Frame, Add</i>	388.11	
08 12 13	13-0078	EA	5' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,316.95	130.20
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	158.48	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	126.78	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,914.79	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,231.75	
			<i>For Baked Enamel Finish, Add</i>	356.02	
			<i>For 18 Gauge Frame, Deduct</i>	-105.65	
			<i>For 14 Gauge Frame, Add</i>	264.14	
			<i>For 12 Gauge Frame, Add</i>	401.49	
08 12 13	13-0079	EA	5'-4" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,327.79	135.63
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	158.48	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	126.78	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,915.33	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,232.30	
			<i>For Baked Enamel Finish, Add</i>	357.65	
			<i>For 18 Gauge Frame, Deduct</i>	-105.65	
			<i>For 14 Gauge Frame, Add</i>	264.14	
			<i>For 12 Gauge Frame, Add</i>	401.49	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0080	EA	5'-8" x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,350.83	138.34
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	161.12	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	128.90	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,947.30	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,269.55	
			<i>For Baked Enamel Finish, Add</i>	363.75	
			<i>For 18 Gauge Frame, Deduct</i>	-107.42	
			<i>For 14 Gauge Frame, Add</i>	268.54	
			<i>For 12 Gauge Frame, Add</i>	408.18	
08 12 13	13-0081	EA	6' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,373.87	141.05
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	163.76	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	131.01	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,979.27	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,306.80	
			<i>For Baked Enamel Finish, Add</i>	369.84	
			<i>For 18 Gauge Frame, Deduct</i>	-109.18	
			<i>For 14 Gauge Frame, Add</i>	272.94	
			<i>For 12 Gauge Frame, Add</i>	414.87	
08 12 13	13-0082	EA	7' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,449.72	143.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	174.33	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	139.46	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,106.32	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,454.98	
			<i>For Baked Enamel Finish, Add</i>	391.79	
			<i>For 18 Gauge Frame, Deduct</i>	-116.22	
			<i>For 14 Gauge Frame, Add</i>	290.55	
			<i>For 12 Gauge Frame, Add</i>	441.63	
08 12 13	13-0083	EA	8' x 6'-8" Through 7'-2" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,525.60	146.48
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	184.90	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	147.92	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,233.40	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,603.19	
			<i>For Baked Enamel Finish, Add</i>	413.74	
			<i>For 18 Gauge Frame, Deduct</i>	-123.26	
			<i>For 14 Gauge Frame, Add</i>	308.16	
			<i>For 12 Gauge Frame, Add</i>	468.40	
08 12 13	13-0084		>7'-2" Through 9'-0" High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13-0067)</small>		
08 12 13	13-0085	EA	2' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	984.51	81.38
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	123.26	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	98.61	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,487.31	
			<i>For Type 316 Stainless Steel Frame, Add</i>	1,733.83	
			<i>For Baked Enamel Finish, Add</i>	270.94	
			<i>For 18 Gauge Frame, Deduct</i>	-82.18	
			<i>For 14 Gauge Frame, Add</i>	205.44	
			<i>For 12 Gauge Frame, Add</i>	312.27	
08 12 13	13-0086	EA	2'-4" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,157.31	89.51
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	146.74	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	117.39	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,769.86	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,063.34	
			<i>For Baked Enamel Finish, Add</i>	320.34	
			<i>For 18 Gauge Frame, Deduct</i>	-97.83	
			<i>For 14 Gauge Frame, Add</i>	244.57	
			<i>For 12 Gauge Frame, Add</i>	371.75	
08 12 13	13-0087	EA	2'-6" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,183.81	94.94
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	149.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	119.27	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,798.57	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,096.75	
			<i>For Baked Enamel Finish, Add</i>	326.66	
			<i>For 18 Gauge Frame, Deduct</i>	-99.39	
			<i>For 14 Gauge Frame, Add</i>	248.48	
			<i>For 12 Gauge Frame, Add</i>	377.69	
08 12 13	13-0088	EA	2'-8" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,200.08	103.08
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	149.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	119.27	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,799.38	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,097.56	
			<i>For Baked Enamel Finish, Add</i>	329.10	
			<i>For 18 Gauge Frame, Deduct</i>	-99.39	
			<i>For 14 Gauge Frame, Add</i>	248.48	
			<i>For 12 Gauge Frame, Add</i>	377.69	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 12 13 13-0089	EA		2'-10" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,221.17	105.79
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	151.44	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	121.15	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,827.84	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,130.72	
			<i>For Baked Enamel Finish, Add</i>	334.61	
			<i>For 18 Gauge Frame, Deduct</i>	-100.96	
			<i>For 14 Gauge Frame, Add</i>	252.40	
			<i>For 12 Gauge Frame, Add</i>	383.64	
08 12 13 13-0090	EA		3' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,242.25	108.50
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	153.79	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	123.03	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,856.28	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,163.85	
			<i>For Baked Enamel Finish, Add</i>	340.12	
			<i>For 18 Gauge Frame, Deduct</i>	-102.52	
			<i>For 14 Gauge Frame, Add</i>	256.31	
			<i>For 12 Gauge Frame, Add</i>	389.59	
08 12 13 13-0091	EA		3'-4" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,323.53	113.93
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	164.35	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	131.48	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,983.62	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,312.32	
			<i>For Baked Enamel Finish, Add</i>	362.88	
			<i>For 18 Gauge Frame, Deduct</i>	-109.57	
			<i>For 14 Gauge Frame, Add</i>	273.92	
			<i>For 12 Gauge Frame, Add</i>	416.36	
08 12 13 13-0092	EA		3'-6" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,334.38	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	164.35	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	131.48	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,984.16	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,312.86	
			<i>For Baked Enamel Finish, Add</i>	364.51	
			<i>For 18 Gauge Frame, Deduct</i>	-109.57	
			<i>For 14 Gauge Frame, Add</i>	273.92	
			<i>For 12 Gauge Frame, Add</i>	416.36	
08 12 13 13-0093	EA		4' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,384.37	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	170.22	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	136.18	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,055.14	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,395.58	
			<i>For Baked Enamel Finish, Add</i>	377.88	
			<i>For 18 Gauge Frame, Deduct</i>	-113.48	
			<i>For 14 Gauge Frame, Add</i>	283.70	
			<i>For 12 Gauge Frame, Add</i>	431.23	
08 12 13 13-0094	EA		5' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,434.35	130.20
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	176.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	140.87	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,126.11	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,478.29	
			<i>For Baked Enamel Finish, Add</i>	391.24	
			<i>For 18 Gauge Frame, Deduct</i>	-117.39	
			<i>For 14 Gauge Frame, Add</i>	293.49	
			<i>For 12 Gauge Frame, Add</i>	446.10	
08 12 13 13-0095	EA		5'-4" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,445.19	135.63
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	176.09	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	140.87	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,126.65	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,478.84	
			<i>For Baked Enamel Finish, Add</i>	392.87	
			<i>For 18 Gauge Frame, Deduct</i>	-117.39	
			<i>For 14 Gauge Frame, Add</i>	293.49	
			<i>For 12 Gauge Frame, Add</i>	446.10	
08 12 13 13-0096	EA		5'-8" x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,470.18	138.34
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	179.03	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	143.22	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,162.13	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,520.18	
			<i>For Baked Enamel Finish, Add</i>	399.55	
			<i>For 18 Gauge Frame, Deduct</i>	-119.35	
			<i>For 14 Gauge Frame, Add</i>	298.38	
			<i>For 12 Gauge Frame, Add</i>	453.53	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0097 EA 6' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,495.18	141.05
For Auxiliary Frame Reinforcement For Hinges, Add	181.96	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	145.57	
For Type 304 Stainless Steel Frame, Add	2,197.63	
For Type 316 Stainless Steel Frame, Add	2,561.55	
For Baked Enamel Finish, Add	406.24	
For 18 Gauge Frame, Deduct	-121.31	
For 14 Gauge Frame, Add	303.27	
For 12 Gauge Frame, Add	460.97	
08 12 13 13-0098 EA 7' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,578.85	143.77
For Auxiliary Frame Reinforcement For Hinges, Add	193.70	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	154.96	
For Type 304 Stainless Steel Frame, Add	2,338.75	
For Type 316 Stainless Steel Frame, Add	2,726.15	
For Baked Enamel Finish, Add	430.53	
For 18 Gauge Frame, Deduct	-129.13	
For 14 Gauge Frame, Add	322.83	
For 12 Gauge Frame, Add	490.70	
08 12 13 13-0099 EA 8' x >7'-2" Through 9' High, 6-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,662.55	146.48
For Auxiliary Frame Reinforcement For Hinges, Add	205.44	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	164.35	
For Type 304 Stainless Steel Frame, Add	2,479.91	
For Type 316 Stainless Steel Frame, Add	2,890.79	
For Baked Enamel Finish, Add	454.82	
For 18 Gauge Frame, Deduct	-136.96	
For 14 Gauge Frame, Add	342.40	
For 12 Gauge Frame, Add	520.44	
 08 12 13 13-0100 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13)</small> Note: For non-rated or fire rated frame assemblies		
08 12 13 13-0101 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13-0100)</small>		
08 12 13 13-0102 EA 2' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	957.80	81.38
For Auxiliary Frame Reinforcement For Hinges, Add	119.26	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	95.41	
For Type 304 Stainless Steel Frame, Add	1,439.23	
For Type 316 Stainless Steel Frame, Add	1,677.74	
For Baked Enamel Finish, Add	262.93	
For 18 Gauge Frame, Deduct	-79.51	
For 14 Gauge Frame, Add	198.76	
For 12 Gauge Frame, Add	302.12	
08 12 13 13-0103 EA 2'-4" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,125.52	89.51
For Auxiliary Frame Reinforcement For Hinges, Add	141.97	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	113.58	
For Type 304 Stainless Steel Frame, Add	1,712.63	
For Type 316 Stainless Steel Frame, Add	1,996.58	
For Baked Enamel Finish, Add	310.80	
For 18 Gauge Frame, Deduct	-94.65	
For 14 Gauge Frame, Add	236.62	
For 12 Gauge Frame, Add	359.67	
08 12 13 13-0104 EA 2'-6" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,151.51	94.94
For Auxiliary Frame Reinforcement For Hinges, Add	144.24	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	115.40	
For Type 304 Stainless Steel Frame, Add	1,740.43	
For Type 316 Stainless Steel Frame, Add	2,028.92	
For Baked Enamel Finish, Add	316.97	
For 18 Gauge Frame, Deduct	-96.16	
For 14 Gauge Frame, Add	240.41	
For 12 Gauge Frame, Add	365.42	
08 12 13 13-0105 EA 2'-8" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,167.78	103.08
For Auxiliary Frame Reinforcement For Hinges, Add	144.24	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	115.40	
For Type 304 Stainless Steel Frame, Add	1,741.24	
For Type 316 Stainless Steel Frame, Add	2,029.73	
For Baked Enamel Finish, Add	319.41	
For 18 Gauge Frame, Deduct	-96.16	
For 14 Gauge Frame, Add	240.41	
For 12 Gauge Frame, Add	365.42	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0106	EA	2'-10" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,188.36 146.52 245.10 117.21 1,768.78 2,061.82 324.77 -97.68 244.20 371.18	105.79
08 12 13	13-0107	EA	3' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame..... <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,208.93 148.79 245.10 119.03 1,796.31 2,093.88 330.13 -99.19 247.98 376.93	108.50
08 12 13	13-0108	EA	3'-4" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,287.92 159.01 245.10 127.21 1,919.52 2,237.54 352.20 -106.01 265.02 402.83	113.93
08 12 13	13-0109	EA	3'-6" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,298.77 159.01 245.10 127.21 1,920.06 2,238.08 353.83 -106.01 265.02 402.83	119.36
08 12 13	13-0110	EA	4' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame..... <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,347.49 164.69 245.10 131.75 1,988.75 2,318.13 366.81 -109.79 274.48 417.21	124.77
08 12 13	13-0111	EA	5' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame..... <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,396.20 170.37 245.10 136.29 2,057.44 2,398.18 379.80 -113.58 283.95 431.60	130.20
08 12 13	13-0112	EA	5'-4" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,407.04 170.37 245.10 136.29 2,057.98 2,398.72 381.42 -113.58 283.95 431.60	135.63
08 12 13	13-0113	EA	5'-8" x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame <i>For Auxiliary Frame Reinforcement For Hinges, Add</i> <i>For Welded Frames, Add</i> <i>For Galvanized Frames, Add</i> <i>For Type 304 Stainless Steel Frame, Add</i> <i>For Type 316 Stainless Steel Frame, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 18 Gauge Frame, Deduct</i> <i>For 14 Gauge Frame, Add</i> <i>For 12 Gauge Frame, Add</i>	1,431.40 173.21 245.10 138.57 2,092.33 2,438.75 387.92 -115.47 288.68 438.79	138.34



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0114 EA 6' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,455.76	141.05
For Auxiliary Frame Reinforcement For Hinges, Add	176.05	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	140.84	
For Type 304 Stainless Steel Frame, Add	2,126.68	
For Type 316 Stainless Steel Frame, Add	2,478.77	
For Baked Enamel Finish, Add	394.41	
For 18 Gauge Frame, Deduct	-117.37	
For 14 Gauge Frame, Add	293.41	
For 12 Gauge Frame, Add	445.99	
08 12 13 13-0115 EA 7' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,536.89	143.77
For Auxiliary Frame Reinforcement For Hinges, Add	187.40	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	149.92	
For Type 304 Stainless Steel Frame, Add	2,263.22	
For Type 316 Stainless Steel Frame, Add	2,638.03	
For Baked Enamel Finish, Add	417.94	
For 18 Gauge Frame, Deduct	-124.94	
For 14 Gauge Frame, Add	312.34	
For 12 Gauge Frame, Add	474.76	
08 12 13 13-0116 EA 8' x 6'-8" Through 7'-2" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,618.04	146.48
For Auxiliary Frame Reinforcement For Hinges, Add	198.76	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	159.01	
For Type 304 Stainless Steel Frame, Add	2,399.79	
For Type 316 Stainless Steel Frame, Add	2,797.32	
For Baked Enamel Finish, Add	441.47	
For 18 Gauge Frame, Deduct	-132.51	
For 14 Gauge Frame, Add	331.27	
For 12 Gauge Frame, Add	503.53	
08 12 13 13-0117 >7'-2" Through 9'-0" High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames (08 12 13 13-0100)		
08 12 13 13-0118 EA 2' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,046.14	81.38
For Auxiliary Frame Reinforcement For Hinges, Add	132.51	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	106.01	
For Type 304 Stainless Steel Frame, Add	1,598.24	
For Type 316 Stainless Steel Frame, Add	1,863.26	
For Baked Enamel Finish, Add	289.43	
For 18 Gauge Frame, Deduct	-88.34	
For 14 Gauge Frame, Add	220.85	
For 12 Gauge Frame, Add	335.69	
08 12 13 13-0119 EA 2'-4" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,230.68	89.51
For Auxiliary Frame Reinforcement For Hinges, Add	157.75	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	126.20	
For Type 304 Stainless Steel Frame, Add	1,901.92	
For Type 316 Stainless Steel Frame, Add	2,217.42	
For Baked Enamel Finish, Add	342.35	
For 18 Gauge Frame, Deduct	-105.17	
For 14 Gauge Frame, Add	262.91	
For 12 Gauge Frame, Add	399.63	
08 12 13 13-0120 EA 2'-6" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,258.36	94.94
For Auxiliary Frame Reinforcement For Hinges, Add	160.27	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	128.22	
For Type 304 Stainless Steel Frame, Add	1,932.76	
For Type 316 Stainless Steel Frame, Add	2,253.30	
For Baked Enamel Finish, Add	349.03	
For 18 Gauge Frame, Deduct	-106.85	
For 14 Gauge Frame, Add	267.12	
For 12 Gauge Frame, Add	406.02	
08 12 13 13-0121 EA 2'-8" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,274.63	103.08
For Auxiliary Frame Reinforcement For Hinges, Add	160.27	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	128.22	
For Type 304 Stainless Steel Frame, Add	1,933.57	
For Type 316 Stainless Steel Frame, Add	2,254.12	
For Baked Enamel Finish, Add	351.47	
For 18 Gauge Frame, Deduct	-106.85	
For 14 Gauge Frame, Add	267.12	
For 12 Gauge Frame, Add	406.02	
08 12 13 13-0122 EA 2'-10" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,296.89	105.79
For Auxiliary Frame Reinforcement For Hinges, Add	162.80	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	130.24	
For Type 304 Stainless Steel Frame, Add	1,964.14	
For Type 316 Stainless Steel Frame, Add	2,289.73	
For Baked Enamel Finish, Add	357.33	
For 18 Gauge Frame, Deduct	-108.53	
For 14 Gauge Frame, Add	271.33	
For 12 Gauge Frame, Add	412.42	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 12 13 13-0123	EA 3' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,319.14	108.50
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	165.32	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	132.26	
	<i>For Type 304 Stainless Steel Frame, Add</i>	1,994.68	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,325.32	
	<i>For Baked Enamel Finish, Add</i>	363.19	
	<i>For 18 Gauge Frame, Deduct</i>	-110.21	
	<i>For 14 Gauge Frame, Add</i>	275.53	
	<i>For 12 Gauge Frame, Add</i>	418.81	
08 12 13 13-0124	EA 3'-4" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,405.70	113.93
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	176.68	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	141.34	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,131.52	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,484.88	
	<i>For Baked Enamel Finish, Add</i>	387.53	
	<i>For 18 Gauge Frame, Deduct</i>	-117.79	
	<i>For 14 Gauge Frame, Add</i>	294.46	
	<i>For 12 Gauge Frame, Add</i>	447.58	
08 12 13 13-0125	EA 3'-6" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,416.55	119.36
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	176.68	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	141.34	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,132.07	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,485.42	
	<i>For Baked Enamel Finish, Add</i>	389.16	
	<i>For 18 Gauge Frame, Deduct</i>	-117.79	
	<i>For 14 Gauge Frame, Add</i>	294.46	
	<i>For 12 Gauge Frame, Add</i>	447.58	
08 12 13 13-0126	EA 4' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,469.48	124.77
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	182.99	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	146.39	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,208.33	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,574.31	
	<i>For Baked Enamel Finish, Add</i>	403.41	
	<i>For 18 Gauge Frame, Deduct</i>	-121.99	
	<i>For 14 Gauge Frame, Add</i>	304.98	
	<i>For 12 Gauge Frame, Add</i>	463.57	
08 12 13 13-0127	EA 5' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,522.39	130.20
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	189.30	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	151.44	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,284.58	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,663.18	
	<i>For Baked Enamel Finish, Add</i>	417.66	
	<i>For 18 Gauge Frame, Deduct</i>	-126.20	
	<i>For 14 Gauge Frame, Add</i>	315.50	
	<i>For 12 Gauge Frame, Add</i>	479.55	
08 12 13 13-0128	EA 5'-4" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,533.23	135.63
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	189.30	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	151.44	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,285.13	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,663.72	
	<i>For Baked Enamel Finish, Add</i>	419.28	
	<i>For 18 Gauge Frame, Deduct</i>	-126.20	
	<i>For 14 Gauge Frame, Add</i>	315.50	
	<i>For 12 Gauge Frame, Add</i>	479.55	
08 12 13 13-0129	EA 5'-8" x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,559.70	138.34
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	192.45	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	153.96	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,323.27	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,708.18	
	<i>For Baked Enamel Finish, Add</i>	426.41	
	<i>For 18 Gauge Frame, Deduct</i>	-128.30	
	<i>For 14 Gauge Frame, Add</i>	320.76	
	<i>For 12 Gauge Frame, Add</i>	487.55	
08 12 13 13-0130	EA 6' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,586.16	141.05
	<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	195.61	
	<i>For Welded Frames, Add</i>	245.10	
	<i>For Galvanized Frames, Add</i>	156.49	
	<i>For Type 304 Stainless Steel Frame, Add</i>	2,361.40	
	<i>For Type 316 Stainless Steel Frame, Add</i>	2,752.61	
	<i>For Baked Enamel Finish, Add</i>	433.53	
	<i>For 18 Gauge Frame, Deduct</i>	-130.41	
	<i>For 14 Gauge Frame, Add</i>	326.01	
	<i>For 12 Gauge Frame, Add</i>	495.54	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0131 EA 7' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,675.70	143.77
For Auxiliary Frame Reinforcement For Hinges, Add	208.23	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	166.58	
For Type 304 Stainless Steel Frame, Add	2,513.08	
For Type 316 Stainless Steel Frame, Add	2,929.53	
For Baked Enamel Finish, Add	459.58	
For 18 Gauge Frame, Deduct	-138.82	
For 14 Gauge Frame, Add	347.04	
For 12 Gauge Frame, Add	527.50	
08 12 13 13-0132 EA 8' x >7'-2" Through 9' High, 6-7/8" Through 8-3/4" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,765.27	146.48
For Auxiliary Frame Reinforcement For Hinges, Add	220.85	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	176.68	
For Type 304 Stainless Steel Frame, Add	2,664.81	
For Type 316 Stainless Steel Frame, Add	3,106.50	
For Baked Enamel Finish, Add	485.64	
For 18 Gauge Frame, Deduct	-147.23	
For 14 Gauge Frame, Add	368.08	
For 12 Gauge Frame, Add	559.48	
08 12 13 13-0133 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13)</small>		
Note: For non-rated or fire rated frame assemblies		
08 12 13 13-0134 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames <small>(08 12 13 13-0133)</small>		
08 12 13 13-0135 EA 2' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	994.78	81.38
For Auxiliary Frame Reinforcement For Hinges, Add	124.80	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	99.84	
For Type 304 Stainless Steel Frame, Add	1,505.79	
For Type 316 Stainless Steel Frame, Add	1,755.40	
For Baked Enamel Finish, Add	274.02	
For 18 Gauge Frame, Deduct	-83.20	
For 14 Gauge Frame, Add	208.01	
For 12 Gauge Frame, Add	316.17	
08 12 13 13-0136 EA 2'-4" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,169.54	89.51
For Auxiliary Frame Reinforcement For Hinges, Add	148.58	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	118.86	
For Type 304 Stainless Steel Frame, Add	1,791.87	
For Type 316 Stainless Steel Frame, Add	2,089.02	
For Baked Enamel Finish, Add	324.01	
For 18 Gauge Frame, Deduct	-99.05	
For 14 Gauge Frame, Add	247.63	
For 12 Gauge Frame, Add	376.39	
08 12 13 13-0137 EA 2'-6" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,196.24	94.94
For Auxiliary Frame Reinforcement For Hinges, Add	150.95	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	120.76	
For Type 304 Stainless Steel Frame, Add	1,820.94	
For Type 316 Stainless Steel Frame, Add	2,122.85	
For Baked Enamel Finish, Add	330.39	
For 18 Gauge Frame, Deduct	-100.64	
For 14 Gauge Frame, Add	251.59	
For 12 Gauge Frame, Add	382.42	
08 12 13 13-0138 EA 2'-8" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,212.51	103.08
For Auxiliary Frame Reinforcement For Hinges, Add	150.95	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	120.76	
For Type 304 Stainless Steel Frame, Add	1,821.76	
For Type 316 Stainless Steel Frame, Add	2,123.66	
For Baked Enamel Finish, Add	332.83	
For 18 Gauge Frame, Deduct	-100.64	
For 14 Gauge Frame, Add	251.59	
For 12 Gauge Frame, Add	382.42	
08 12 13 13-0139 EA 2'-10" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,233.79	105.79
For Auxiliary Frame Reinforcement For Hinges, Add	153.33	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	122.67	
For Type 304 Stainless Steel Frame, Add	1,850.56	
For Type 316 Stainless Steel Frame, Add	2,157.22	
For Baked Enamel Finish, Add	338.40	
For 18 Gauge Frame, Deduct	-102.22	
For 14 Gauge Frame, Add	255.55	
For 12 Gauge Frame, Add	388.44	

08 Openings

08 10 Doors and Frames

08 12 Metal Frames



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13	13-0140	EA	3' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,255.07	108.50
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	155.71	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	124.57	
			<i>For Type 304 Stainless Steel Frame, Add</i>	1,879.36	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,190.78	
			<i>For Baked Enamel Finish, Add</i>	343.97	
			<i>For 18 Gauge Frame, Deduct</i>	-103.81	
			<i>For 14 Gauge Frame, Add</i>	259.52	
			<i>For 12 Gauge Frame, Add</i>	394.46	
08 12 13	13-0141	EA	3'-4" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,337.22	113.93
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	166.41	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	133.12	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,008.26	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,341.07	
			<i>For Baked Enamel Finish, Add</i>	366.99	
			<i>For 18 Gauge Frame, Deduct</i>	-110.94	
			<i>For 14 Gauge Frame, Add</i>	277.34	
			<i>For 12 Gauge Frame, Add</i>	421.56	
08 12 13	13-0142	EA	3'-6" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,348.07	119.36
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	166.41	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	133.12	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,008.80	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,341.61	
			<i>For Baked Enamel Finish, Add</i>	368.62	
			<i>For 18 Gauge Frame, Deduct</i>	-110.94	
			<i>For 14 Gauge Frame, Add</i>	277.34	
			<i>For 12 Gauge Frame, Add</i>	421.56	
08 12 13	13-0143	EA	4' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,398.55	124.77
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	172.35	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	137.88	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,080.66	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,425.36	
			<i>For Baked Enamel Finish, Add</i>	382.13	
			<i>For 18 Gauge Frame, Deduct</i>	-114.90	
			<i>For 14 Gauge Frame, Add</i>	287.25	
			<i>For 12 Gauge Frame, Add</i>	436.62	
08 12 13	13-0144	EA	5' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,449.02	130.20
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	178.29	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	142.63	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,152.52	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,509.10	
			<i>For Baked Enamel Finish, Add</i>	395.64	
			<i>For 18 Gauge Frame, Deduct</i>	-118.86	
			<i>For 14 Gauge Frame, Add</i>	297.15	
			<i>For 12 Gauge Frame, Add</i>	451.67	
08 12 13	13-0145	EA	5'-4" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,459.86	135.63
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	178.29	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	142.63	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,153.06	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,509.64	
			<i>For Baked Enamel Finish, Add</i>	397.27	
			<i>For 18 Gauge Frame, Deduct</i>	-118.86	
			<i>For 14 Gauge Frame, Add</i>	297.15	
			<i>For 12 Gauge Frame, Add</i>	451.67	
08 12 13	13-0146	EA	5'-8" x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,485.10	138.34
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	181.26	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	145.01	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,188.99	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,551.52	
			<i>For Baked Enamel Finish, Add</i>	404.03	
			<i>For 18 Gauge Frame, Deduct</i>	-120.84	
			<i>For 14 Gauge Frame, Add</i>	302.11	
			<i>For 12 Gauge Frame, Add</i>	459.20	
08 12 13	13-0147	EA	6' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,510.34	141.05
			<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	184.23	
			<i>For Welded Frames, Add</i>	245.10	
			<i>For Galvanized Frames, Add</i>	147.39	
			<i>For Type 304 Stainless Steel Frame, Add</i>	2,224.92	
			<i>For Type 316 Stainless Steel Frame, Add</i>	2,593.39	
			<i>For Baked Enamel Finish, Add</i>	410.79	
			<i>For 18 Gauge Frame, Deduct</i>	-122.82	
			<i>For 14 Gauge Frame, Add</i>	307.06	
			<i>For 12 Gauge Frame, Add</i>	466.73	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0148 EA 7' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,594.99	143.77
For Auxiliary Frame Reinforcement For Hinges, Add	196.12	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	156.90	
For Type 304 Stainless Steel Frame, Add	2,367.80	
For Type 316 Stainless Steel Frame, Add	2,760.04	
For Baked Enamel Finish, Add	435.37	
For 18 Gauge Frame, Deduct	-130.75	
For 14 Gauge Frame, Add	326.87	
For 12 Gauge Frame, Add	496.83	
08 12 13 13-0149 EA 8' x 6'-8" Through 7'-2" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,679.68	146.48
For Auxiliary Frame Reinforcement For Hinges, Add	208.01	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	166.41	
For Type 304 Stainless Steel Frame, Add	2,510.74	
For Type 316 Stainless Steel Frame, Add	2,926.76	
For Baked Enamel Finish, Add	459.96	
For 18 Gauge Frame, Deduct	-138.67	
For 14 Gauge Frame, Add	346.68	
For 12 Gauge Frame, Add	526.95	
08 12 13 13-0150 >7'-2" Through 9'-0" High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frames (08 12 13 13-0133)		
08 12 13 13-0151 EA 2' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,087.23	81.38
For Auxiliary Frame Reinforcement For Hinges, Add	138.67	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	110.94	
For Type 304 Stainless Steel Frame, Add	1,672.20	
For Type 316 Stainless Steel Frame, Add	1,949.55	
For Baked Enamel Finish, Add	301.76	
For 18 Gauge Frame, Deduct	-92.45	
For 14 Gauge Frame, Add	231.12	
For 12 Gauge Frame, Add	351.30	
08 12 13 13-0152 EA 2'-4" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,279.60	89.51
For Auxiliary Frame Reinforcement For Hinges, Add	165.09	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	132.07	
For Type 304 Stainless Steel Frame, Add	1,989.98	
For Type 316 Stainless Steel Frame, Add	2,320.15	
For Baked Enamel Finish, Add	357.03	
For 18 Gauge Frame, Deduct	-110.06	
For 14 Gauge Frame, Add	275.14	
For 12 Gauge Frame, Add	418.22	
08 12 13 13-0153 EA 2'-6" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,308.06	94.94
For Auxiliary Frame Reinforcement For Hinges, Add	167.73	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	134.18	
For Type 304 Stainless Steel Frame, Add	2,022.22	
For Type 316 Stainless Steel Frame, Add	2,357.67	
For Baked Enamel Finish, Add	363.94	
For 18 Gauge Frame, Deduct	-111.82	
For 14 Gauge Frame, Add	279.55	
For 12 Gauge Frame, Add	424.91	
08 12 13 13-0154 EA 2'-8" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,324.33	103.08
For Auxiliary Frame Reinforcement For Hinges, Add	167.73	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	134.18	
For Type 304 Stainless Steel Frame, Add	2,023.03	
For Type 316 Stainless Steel Frame, Add	2,358.49	
For Baked Enamel Finish, Add	366.38	
For 18 Gauge Frame, Deduct	-111.82	
For 14 Gauge Frame, Add	279.55	
For 12 Gauge Frame, Add	424.91	
08 12 13 13-0155 EA 2'-10" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,347.37	105.79
For Auxiliary Frame Reinforcement For Hinges, Add	170.37	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	136.29	
For Type 304 Stainless Steel Frame, Add	2,055.00	
For Type 316 Stainless Steel Frame, Add	2,395.74	
For Baked Enamel Finish, Add	372.47	
For 18 Gauge Frame, Deduct	-113.58	
For 14 Gauge Frame, Add	283.95	
For 12 Gauge Frame, Add	431.60	
08 12 13 13-0156 EA 3' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,370.40	108.50
For Auxiliary Frame Reinforcement For Hinges, Add	173.01	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	138.41	
For Type 304 Stainless Steel Frame, Add	2,086.95	
For Type 316 Stainless Steel Frame, Add	2,432.97	
For Baked Enamel Finish, Add	378.57	
For 18 Gauge Frame, Deduct	-115.34	
For 14 Gauge Frame, Add	288.35	
For 12 Gauge Frame, Add	438.29	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 12 13 13-0157	EA	3'-4" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,460.49	113.93
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	184.90	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	147.92	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,230.14	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,599.94	
		<i>For Baked Enamel Finish, Add</i>	403.97	
		<i>For 18 Gauge Frame, Deduct</i>	-123.26	
		<i>For 14 Gauge Frame, Add</i>	308.16	
		<i>For 12 Gauge Frame, Add</i>	468.40	
08 12 13 13-0158	EA	3'-6" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,471.34	119.36
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	184.90	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	147.92	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,230.69	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,600.48	
		<i>For Baked Enamel Finish, Add</i>	405.60	
		<i>For 18 Gauge Frame, Deduct</i>	-123.26	
		<i>For 14 Gauge Frame, Add</i>	308.16	
		<i>For 12 Gauge Frame, Add</i>	468.40	
08 12 13 13-0159	EA	4' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,526.22	124.77
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	191.50	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	153.20	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,310.47	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,693.46	
		<i>For Baked Enamel Finish, Add</i>	420.43	
		<i>For 18 Gauge Frame, Deduct</i>	-127.67	
		<i>For 14 Gauge Frame, Add</i>	319.17	
		<i>For 12 Gauge Frame, Add</i>	485.13	
08 12 13 13-0160	EA	5' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,581.09	130.20
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	198.10	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	158.48	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,390.24	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,786.45	
		<i>For Baked Enamel Finish, Add</i>	435.27	
		<i>For 18 Gauge Frame, Deduct</i>	-132.07	
		<i>For 14 Gauge Frame, Add</i>	330.17	
		<i>For 12 Gauge Frame, Add</i>	501.86	
08 12 13 13-0161	EA	5'-4" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,591.93	135.63
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	198.10	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	158.48	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,390.79	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,786.99	
		<i>For Baked Enamel Finish, Add</i>	436.89	
		<i>For 18 Gauge Frame, Deduct</i>	-132.07	
		<i>For 14 Gauge Frame, Add</i>	330.17	
		<i>For 12 Gauge Frame, Add</i>	501.86	
08 12 13 13-0162	EA	5'-8" x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame.....	1,619.37	138.34
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	201.40	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	161.12	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,430.68	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,833.48	
		<i>For Baked Enamel Finish, Add</i>	444.31	
		<i>For 18 Gauge Frame, Deduct</i>	-134.27	
		<i>For 14 Gauge Frame, Add</i>	335.67	
		<i>For 12 Gauge Frame, Add</i>	510.22	
08 12 13 13-0163	EA	6' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,646.81	141.05
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	204.71	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	163.76	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,470.57	
		<i>For Type 316 Stainless Steel Frame, Add</i>	2,879.98	
		<i>For Baked Enamel Finish, Add</i>	451.73	
		<i>For 18 Gauge Frame, Deduct</i>	-136.47	
		<i>For 14 Gauge Frame, Add</i>	341.18	
		<i>For 12 Gauge Frame, Add</i>	518.59	
08 12 13 13-0164	EA	7' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,740.26	143.77
		<i>For Auxiliary Frame Reinforcement For Hinges, Add</i>	217.91	
		<i>For Welded Frames, Add</i>	245.10	
		<i>For Galvanized Frames, Add</i>	174.33	
		<i>For Type 304 Stainless Steel Frame, Add</i>	2,629.29	
		<i>For Type 316 Stainless Steel Frame, Add</i>	3,065.11	
		<i>For Baked Enamel Finish, Add</i>	478.95	
		<i>For 18 Gauge Frame, Deduct</i>	-145.27	
		<i>For 14 Gauge Frame, Add</i>	363.18	
		<i>For 12 Gauge Frame, Add</i>	552.04	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0165 EA 8' x >7'-2" Through 9' High, 8-7/8" Through 13" Deep, 16 Gauge, Knock Down Hollow Metal Door Frame	1,833.75	146.48
For Auxiliary Frame Reinforcement For Hinges, Add	231.12	
For Welded Frames, Add	245.10	
For Galvanized Frames, Add	184.89	
For Type 304 Stainless Steel Frame, Add	2,788.07	
For Type 316 Stainless Steel Frame, Add	3,250.31	
For Baked Enamel Finish, Add	506.18	
For 18 Gauge Frame, Deduct	-154.08	
For 14 Gauge Frame, Add	385.20	
For 12 Gauge Frame, Add	585.50	
08 12 13 13-0166 Sidelights And Transoms (08 12 13 13)		
Note: For non-rated or fire rated frame assemblies		
08 12 13 13-0167 Operable Steel Transom Sash (08 12 13 13-0166)		
Note: Includes hardware.		
08 12 13 13-0168 SF 4-3/4" Deep, 16 Gauge Frame, Operable Steel Transom Sash.....	155.76	15.19
For 18 Gauge Frame, Deduct	-12.54	
For 14 Gauge Frame, Add	31.34	
For 12 Gauge Frame, Add	47.64	
08 12 13 13-0169 SF 5-3/4" Deep, 16 Gauge Frame, Operable Steel Transom Sash.....	163.12	15.73
For 18 Gauge Frame, Deduct	-13.17	
For 14 Gauge Frame, Add	32.92	
For 12 Gauge Frame, Add	50.03	
08 12 13 13-0170 SF 6-3/4" Deep, 16 Gauge Frame, Operable Steel Transom Sash.....	170.77	16.28
For 18 Gauge Frame, Deduct	-13.82	
For 14 Gauge Frame, Add	34.56	
For 12 Gauge Frame, Add	52.52	
08 12 13 13-0171 Sidelights, Steel Frame (08 12 13 13-0166)		
Note: Excludes glazing. See CSI section 08 80 00 00-0000 for glazing.		
08 12 13 13-0172 SF 4-3/4" Deep Sidelights, 16 Gauge Frame	110.79	15.19
For 18 Gauge Frame, Deduct	-8.04	
For 14 Gauge Frame, Add	20.10	
For 12 Gauge Frame, Add	30.55	
08 12 13 13-0173 SF 5-3/4" Deep Sidelights, 16 Gauge Frame	115.90	15.73
For 18 Gauge Frame, Deduct	-8.44	
For 14 Gauge Frame, Add	21.11	
For 12 Gauge Frame, Add	32.09	
08 12 13 13-0174 SF 6-3/4" Deep Sidelights, 16 Gauge Frame	121.18	16.28
For 18 Gauge Frame, Deduct	-8.86	
For 14 Gauge Frame, Add	22.16	
For 12 Gauge Frame, Add	33.68	
08 12 13 13-0175 Sundry Hollow Metal Frame Sections (08 12 13 13)		
Note: For non-rated or fire rated frame assemblies		
08 12 13 13-0176 16 Gauge, Hollow Metal Frame Vertical Mullions (08 12 13 13-0175)		
08 12 13 13-0177 LF 4-3/4" x 1-3/4", 16 Gauge, Hollow Metal Frame Vertical Mullion	35.15	6.07
For 18 Gauge Frame, Deduct	-1.99	
For 14 Gauge Frame, Add	4.97	
For 12 Gauge Frame, Add	7.55	
For 3 Hour Frame, Add	8.00	
For 1-1/2 Hour Frame, Add	5.00	
For 3/4 Hour Frame, Add	4.00	
08 12 13 13-0178 LF 4-3/4" x 2", 16 Gauge, Hollow Metal Frame Vertical Mullion.....	35.96	6.07
For 18 Gauge Frame, Deduct	-2.07	
For 14 Gauge Frame, Add	5.17	
For 12 Gauge Frame, Add	7.86	
For 3 Hour Frame, Add	8.00	
For 1-1/2 Hour Frame, Add	5.00	
For 3/4 Hour Frame, Add	4.00	
08 12 13 13-0179 LF 5-1/4" x 1-3/4", 16 Gauge, Hollow Metal Frame Vertical Mullion	35.59	6.29
For 18 Gauge Frame, Deduct	-1.99	
For 14 Gauge Frame, Add	4.97	
For 12 Gauge Frame, Add	7.55	
For 3 Hour Frame, Add	8.00	
For 1-1/2 Hour Frame, Add	5.00	
For 3/4 Hour Frame, Add	4.00	
08 12 13 13-0180 LF 5-1/4" x 2", 16 Gauge, Hollow Metal Frame Vertical Mullion.....	36.83	6.29
For 18 Gauge Frame, Deduct	-2.11	
For 14 Gauge Frame, Add	5.28	
For 12 Gauge Frame, Add	8.02	
For 3 Hour Frame, Add	8.00	
For 1-1/2 Hour Frame, Add	5.00	
For 3/4 Hour Frame, Add	4.00	
08 12 13 13-0181 LF 6-3/4" x 1-3/4", 16 Gauge, Hollow Metal Frame Vertical Mullion	36.94	6.41
For 18 Gauge Frame, Deduct	-2.09	
For 14 Gauge Frame, Add	5.22	
For 12 Gauge Frame, Add	7.93	
For 3 Hour Frame, Add	8.00	
For 1-1/2 Hour Frame, Add	5.00	
For 3/4 Hour Frame, Add	4.00	

08 Openings**08 10 Doors and Frames****08 12 Metal Frames**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 12 13 13-0182	LF	6-3/4" x 2", 16 Gauge, Hollow Metal Frame Vertical Mullion.....	37.41	6.41
		<i>For 18 Gauge Frame, Deduct</i>	-2.13	
		<i>For 14 Gauge Frame, Add</i>	5.34	
		<i>For 12 Gauge Frame, Add</i>	8.11	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0183		16 Gauge, Hollow Metal Frame Horizontal Rails (08 12 13 13-0175)		
08 12 13 13-0184	LF	4-3/4" x 1-3/4", 16 Gauge, Hollow Metal Frame Horizontal Rail	25.22	6.07
		<i>For 18 Gauge Frame, Deduct</i>	-0.99	
		<i>For 14 Gauge Frame, Add</i>	2.49	
		<i>For 12 Gauge Frame, Add</i>	3.78	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0185	LF	4-3/4" x 2", 16 Gauge, Hollow Metal Frame Horizontal Rail.....	26.23	6.07
		<i>For 18 Gauge Frame, Deduct</i>	-1.10	
		<i>For 14 Gauge Frame, Add</i>	2.74	
		<i>For 12 Gauge Frame, Add</i>	4.16	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0186	LF	5-1/4" x 1-3/4", 16 Gauge, Hollow Metal Frame Horizontal Rail	25.66	6.29
		<i>For 18 Gauge Frame, Deduct</i>	-0.99	
		<i>For 14 Gauge Frame, Add</i>	2.49	
		<i>For 12 Gauge Frame, Add</i>	3.78	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0187	LF	5-1/4" x 2", 16 Gauge, Hollow Metal Frame Horizontal Rail.....	26.67	6.29
		<i>For 18 Gauge Frame, Deduct</i>	-1.10	
		<i>For 14 Gauge Frame, Add</i>	2.74	
		<i>For 12 Gauge Frame, Add</i>	4.16	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0188	LF	6-3/4" x 1-3/4", 16 Gauge, Hollow Metal Frame Horizontal Rail	26.50	6.41
		<i>For 18 Gauge Frame, Deduct</i>	-1.04	
		<i>For 14 Gauge Frame, Add</i>	2.61	
		<i>For 12 Gauge Frame, Add</i>	3.96	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0189	LF	6-3/4" x 2", 16 Gauge, Hollow Metal Frame Horizontal Rail.....	27.38	6.41
		<i>For 18 Gauge Frame, Deduct</i>	-1.13	
		<i>For 14 Gauge Frame, Add</i>	2.83	
		<i>For 12 Gauge Frame, Add</i>	4.30	
		<i>For 3 Hour Frame, Add</i>	8.00	
		<i>For 1-1/2 Hour Frame, Add</i>	5.00	
		<i>For 3/4 Hour Frame, Add</i>	4.00	
08 12 13 13-0190		16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullions (08 12 13 13-0175)		
08 12 13 13-0191	EA	4-3/4" x 1-3/4" x 7'-6", 16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullion	894.94	42.53
		<i>For 18 Gauge Frame, Deduct</i>	-78.86	
		<i>For 14 Gauge Frame, Add</i>	197.15	
		<i>For 12 Gauge Frame, Add</i>	299.67	
08 12 13 13-0192	EA	4-3/4" x 2" x 7'-6", 16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullion.....	926.40	42.53
		<i>For 18 Gauge Frame, Deduct</i>	-82.01	
		<i>For 14 Gauge Frame, Add</i>	205.02	
		<i>For 12 Gauge Frame, Add</i>	311.63	
08 12 13 13-0193	EA	5-1/4" x 1-3/4" x 7'-6", 16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullion	1,025.14	44.49
		<i>For 18 Gauge Frame, Deduct</i>	-91.56	
		<i>For 14 Gauge Frame, Add</i>	228.89	
		<i>For 12 Gauge Frame, Add</i>	347.91	
		<i>For 3 Hour Frame, Add</i>	56.00	
		<i>For 1-1/2 Hour Frame, Add</i>	36.00	
		<i>For 3/4 Hour Frame, Add</i>	28.00	
08 12 13 13-0194	EA	5-1/4" x 2" x 7'-6", 16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullion.....	1,053.23	44.49
		<i>For 18 Gauge Frame, Deduct</i>	-94.36	
		<i>For 14 Gauge Frame, Add</i>	235.91	
		<i>For 12 Gauge Frame, Add</i>	358.58	
		<i>For 3 Hour Frame, Add</i>	56.00	
		<i>For 1-1/2 Hour Frame, Add</i>	36.00	
		<i>For 3/4 Hour Frame, Add</i>	28.00	
08 12 13 13-0195	EA	6-3/4" x 1-3/4" x 7'-6", 16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullion	1,190.13	45.57
		<i>For 18 Gauge Frame, Deduct</i>	-107.62	
		<i>For 14 Gauge Frame, Add</i>	269.05	
		<i>For 12 Gauge Frame, Add</i>	408.96	
		<i>For 3 Hour Frame, Add</i>	56.00	
		<i>For 1-1/2 Hour Frame, Add</i>	36.00	
		<i>For 3/4 Hour Frame, Add</i>	28.00	



Openings	08	08
Doors and Frames	08 10	
Metal Frames	08 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 12 13 13-0196 EA 6-3/4" x 2" x 7'-6", 16 Gauge, Hollow Metal Frame Keyed Removable Vertical Mullion	1,209.22	45.57
<i>For 18 Gauge Frame, Deduct</i>	-109.53	
<i>For 14 Gauge Frame, Add</i>	273.82	
<i>For 12 Gauge Frame, Add</i>	416.21	
<i>For 3 Hour Frame, Add</i>	56.00	
<i>For 1-1/2 Hour Frame, Add</i>	36.00	
<i>For 3/4 Hour Frame, Add</i>	28.00	
 08 12 13 13-0197 Metal Frames Accessories <small>(08 12 13 13)</small>		
08 12 13 13-0198 EA For 1' Extension Of New Door Frame	35.67	
 08 13 Metal Doors <small>(08 10)</small>		
Note: Includes machining for all hardware. Excludes frames, finish hardware. See CSI section 08 70 00 00-0000 for finish hardware.		
08 13 13 Hollow Metal Doors <small>(08 13)</small>		
08 13 13 13 Standard Hollow Metal Doors <small>(08 13 13)</small>		
Note: Hollow Metal Doors are full flush, fabricated from cold rolled steel conforming to ASTM A1008, honeycomb core, interlocking mechanical vertical edge seam, with epoxy baked-on primer. Galvanized steel doors are fabricated from a carbon steel sheet and coated with zinc on two sides by the continuous hot-dip process. Hollow Metal Doors are organized by the following levels: 20 Gauge, Level 1 Standard Duty; 18 Gauge, Level 2 Heavy Duty; 16 Gauge, Level 3 Extra Heavy Duty; 14 Gauge, Level 4 Maximum Duty.		
08 13 13 13-0001 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13)</small>		
08 13 13 13-0002 6'-8" High, 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13-0001)</small>		
08 13 13 13-0003 EA 2' x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	577.48	59.67
<i>For Galvanized Steel Door, Add</i>	91.62	
<i>For Type 304 Stainless Steel Door, Add</i>	366.50	
<i>For Type 316 Stainless Steel Door, Add</i>	595.56	
<i>For Embossed Panel Door, Add</i>	109.95	
<i>For Baked Enamel Finish, Add</i>	155.34	
<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
<i>For >50 To 100, Deduct</i>	-31.86	
<i>For >100, Deduct</i>	-46.30	
<i>For Polystyrene Core, Add</i>	45.81	
<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	114.53	
<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	57.27	
08 13 13 13-0004 EA 2'-4" x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	577.48	59.67
<i>For Galvanized Steel Door, Add</i>	91.62	
<i>For Type 304 Stainless Steel Door, Add</i>	366.50	
<i>For Type 316 Stainless Steel Door, Add</i>	595.56	
<i>For Embossed Panel Door, Add</i>	109.95	
<i>For Baked Enamel Finish, Add</i>	155.34	
<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
<i>For >50 To 100, Deduct</i>	-31.86	
<i>For >100, Deduct</i>	-46.30	
<i>For Polystyrene Core, Add</i>	45.81	
<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	114.53	
<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	57.27	
08 13 13 13-0005 EA 2'-6" x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	592.26	62.39
<i>For Galvanized Steel Door, Add</i>	93.50	
<i>For Type 304 Stainless Steel Door, Add</i>	373.99	
<i>For Type 316 Stainless Steel Door, Add</i>	607.74	
<i>For Embossed Panel Door, Add</i>	112.20	
<i>For Baked Enamel Finish, Add</i>	158.96	
<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
<i>For >50 To 100, Deduct</i>	-32.73	
<i>For >100, Deduct</i>	-47.54	
<i>For Polystyrene Core, Add</i>	46.75	
<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	116.87	
<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	58.44	

08 Openings**08 10 Doors and Frames****08 13 Metal Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 13 13 13-0006	EA 2'-8" x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	599.24	62.39
	For Galvanized Steel Door, Add	94.89	
	For Type 304 Stainless Steel Door, Add	379.58	
	For Type 316 Stainless Steel Door, Add	616.81	
	For Embossed Panel Door, Add	113.87	
	For Baked Enamel Finish, Add	161.06	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-33.08	
	For >100, Deduct	-48.06	
	For Polystyrene Core, Add	47.45	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	118.62	
	For Continuously Welded And Filled Vertical Edge Seam, Add	59.31	
08 13 13 13-0007	EA 2'-10" x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	604.75	63.74
	For Galvanized Steel Door, Add	95.45	
	For Type 304 Stainless Steel Door, Add	381.81	
	For Type 316 Stainless Steel Door, Add	620.44	
	For Embossed Panel Door, Add	114.54	
	For Baked Enamel Finish, Add	162.30	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-33.42	
	For >100, Deduct	-48.54	
	For Polystyrene Core, Add	47.73	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	119.32	
	For Continuously Welded And Filled Vertical Edge Seam, Add	59.66	
08 13 13 13-0008	EA 3' x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	610.25	65.10
	For Galvanized Steel Door, Add	96.01	
	For Type 304 Stainless Steel Door, Add	384.04	
	For Type 316 Stainless Steel Door, Add	624.07	
	For Embossed Panel Door, Add	115.21	
	For Baked Enamel Finish, Add	163.55	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-33.77	
	For >100, Deduct	-49.02	
	For Polystyrene Core, Add	48.01	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	120.01	
	For Continuously Welded And Filled Vertical Edge Seam, Add	60.01	
08 13 13 13-0009	EA 2'-4" x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	646.54	65.10
	For Galvanized Steel Door, Add	103.27	
	For Type 304 Stainless Steel Door, Add	413.07	
	For Type 316 Stainless Steel Door, Add	671.24	
	For Embossed Panel Door, Add	123.92	
	For Baked Enamel Finish, Add	174.43	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-35.58	
	For >100, Deduct	-51.75	
	For Polystyrene Core, Add	51.63	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	129.09	
	For Continuously Welded And Filled Vertical Edge Seam, Add	64.54	
08 13 13 13-0010	EA 3'-6" x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	665.92	67.81
	For Galvanized Steel Door, Add	106.06	
	For Type 304 Stainless Steel Door, Add	424.23	
	For Type 316 Stainless Steel Door, Add	689.38	
	For Embossed Panel Door, Add	127.27	
	For Baked Enamel Finish, Add	179.43	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-36.69	
	For >100, Deduct	-53.33	
	For Polystyrene Core, Add	53.03	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	132.57	
	For Continuously Welded And Filled Vertical Edge Seam, Add	66.29	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0011 EA 4' x 6'-8" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	732.59	73.24
For Galvanized Steel Door, Add	117.22	
For Type 304 Stainless Steel Door, Add	468.89	
For Type 316 Stainless Steel Door, Add	761.94	
For Embossed Panel Door, Add	140.67	
For Baked Enamel Finish, Add	197.81	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-40.29	
For >100, Deduct	-58.61	
For Polystyrene Core, Add	58.61	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	146.53	
For Continuously Welded And Filled Vertical Edge Seam, Add	73.26	
08 13 13 13-0012 7' High, 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Doors (08 13 13 13-0001)		
08 13 13 13-0013 EA 2' x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	589.49	59.67
For Galvanized Steel Door, Add	94.03	
For Type 304 Stainless Steel Door, Add	376.10	
For Type 316 Stainless Steel Door, Add	611.17	
For Embossed Panel Door, Add	112.83	
For Baked Enamel Finish, Add	158.94	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-32.46	
For >100, Deduct	-47.20	
For Polystyrene Core, Add	47.01	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	117.53	
For Continuously Welded And Filled Vertical Edge Seam, Add	58.77	
08 13 13 13-0014 EA 2'-4" x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	589.49	59.67
For Galvanized Steel Door, Add	94.03	
For Type 304 Stainless Steel Door, Add	376.10	
For Type 316 Stainless Steel Door, Add	611.17	
For Embossed Panel Door, Add	112.83	
For Baked Enamel Finish, Add	158.94	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-32.46	
For >100, Deduct	-47.20	
For Polystyrene Core, Add	47.01	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	117.53	
For Continuously Welded And Filled Vertical Edge Seam, Add	58.77	
08 13 13 13-0015 EA 2'-6" x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	604.51	62.39
For Galvanized Steel Door, Add	95.95	
For Type 304 Stainless Steel Door, Add	383.79	
For Type 316 Stainless Steel Door, Add	623.66	
For Embossed Panel Door, Add	115.14	
For Baked Enamel Finish, Add	162.64	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-33.34	
For >100, Deduct	-48.46	
For Polystyrene Core, Add	47.97	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	119.94	
For Continuously Welded And Filled Vertical Edge Seam, Add	59.97	
08 13 13 13-0016 EA 2'-8" x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	611.67	62.39
For Galvanized Steel Door, Add	97.38	
For Type 304 Stainless Steel Door, Add	389.52	
For Type 316 Stainless Steel Door, Add	632.97	
For Embossed Panel Door, Add	116.86	
For Baked Enamel Finish, Add	164.79	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-33.70	
For >100, Deduct	-48.99	
For Polystyrene Core, Add	48.69	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	121.73	
For Continuously Welded And Filled Vertical Edge Seam, Add	60.86	

08 Openings**08 10 Doors and Frames****08 13 Metal Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 13 13 13-0017	EA 2'-10" x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	617.25	63.74
	For Galvanized Steel Door, Add	97.95	
	For Type 304 Stainless Steel Door, Add	391.81	
	For Type 316 Stainless Steel Door, Add	636.69	
	For Embossed Panel Door, Add	117.54	
	For Baked Enamel Finish, Add	166.05	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-34.05	
	For >100, Deduct	-49.48	
	For Polystyrene Core, Add	48.98	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	122.44	
	For Continuously Welded And Filled Vertical Edge Seam, Add	61.22	
08 13 13 13-0018	EA 3' x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	622.83	65.10
	For Galvanized Steel Door, Add	98.53	
	For Type 304 Stainless Steel Door, Add	394.10	
	For Type 316 Stainless Steel Door, Add	640.42	
	For Embossed Panel Door, Add	118.23	
	For Baked Enamel Finish, Add	167.32	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-34.40	
	For >100, Deduct	-49.97	
	For Polystyrene Core, Add	49.26	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	123.16	
	For Continuously Welded And Filled Vertical Edge Seam, Add	61.58	
08 13 13 13-0019	EA 3'-4" x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	660.06	65.10
	For Galvanized Steel Door, Add	105.97	
	For Type 304 Stainless Steel Door, Add	423.89	
	For Type 316 Stainless Steel Door, Add	688.82	
	For Embossed Panel Door, Add	127.17	
	For Baked Enamel Finish, Add	178.49	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-36.26	
	For >100, Deduct	-52.76	
	For Polystyrene Core, Add	52.99	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	132.47	
	For Continuously Welded And Filled Vertical Edge Seam, Add	66.23	
08 13 13 13-0020	EA 3'-6" x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	679.81	67.81
	For Galvanized Steel Door, Add	108.84	
	For Type 304 Stainless Steel Door, Add	435.34	
	For Type 316 Stainless Steel Door, Add	707.43	
	For Embossed Panel Door, Add	130.60	
	For Baked Enamel Finish, Add	183.60	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-37.38	
	For >100, Deduct	-54.38	
	For Polystyrene Core, Add	54.42	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	136.05	
	For Continuously Welded And Filled Vertical Edge Seam, Add	68.02	
08 13 13 13-0021	EA 4' x 7' x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door	747.95	73.24
	For Galvanized Steel Door, Add	120.29	
	For Type 304 Stainless Steel Door, Add	481.18	
	For Type 316 Stainless Steel Door, Add	781.91	
	For Embossed Panel Door, Add	144.35	
	For Baked Enamel Finish, Add	202.41	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-41.06	
	For >100, Deduct	-59.76	
	For Polystyrene Core, Add	60.15	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	150.37	
	For Continuously Welded And Filled Vertical Edge Seam, Add	75.18	

08 13 13 13-0022 7'-2" High, 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Doors (08 13 13 13-0001)



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0023	EA	2' x 7'-2" x 1-3/4"	20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door <i>For Galvanized Steel Door, Add</i> <i>For Type 304 Stainless Steel Door, Add</i> <i>For Type 316 Stainless Steel Door, Add</i> <i>For Embossed Panel Door, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 20 Minute Fire Rated Door, Add</i> <i>For 45 Minute Fire Rated Door, Add</i> <i>For 60 Minute Fire Rated Door, Add</i> <i>For 90 Minute Fire Rated Door, Add</i> <i>For 3 Hour Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Polystyrene Core, Add</i> <i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i> <i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	601.15	59.67
08 13 13 13-0024	EA	2'-4" x 7'-2" x 1-3/4"	20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door <i>For Galvanized Steel Door, Add</i> <i>For Type 304 Stainless Steel Door, Add</i> <i>For Type 316 Stainless Steel Door, Add</i> <i>For Embossed Panel Door, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 20 Minute Fire Rated Door, Add</i> <i>For 45 Minute Fire Rated Door, Add</i> <i>For 60 Minute Fire Rated Door, Add</i> <i>For 90 Minute Fire Rated Door, Add</i> <i>For 3 Hour Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Polystyrene Core, Add</i> <i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i> <i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	601.15	59.67
08 13 13 13-0025	EA	2'-6" x 7'-2" x 1-3/4"	20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door <i>For Galvanized Steel Door, Add</i> <i>For Type 304 Stainless Steel Door, Add</i> <i>For Type 316 Stainless Steel Door, Add</i> <i>For Embossed Panel Door, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 20 Minute Fire Rated Door, Add</i> <i>For 45 Minute Fire Rated Door, Add</i> <i>For 60 Minute Fire Rated Door, Add</i> <i>For 90 Minute Fire Rated Door, Add</i> <i>For 3 Hour Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Polystyrene Core, Add</i> <i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i> <i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	616.41	62.39
08 13 13 13-0026	EA	2'-8" x 7'-2" x 1-3/4"	20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door <i>For Galvanized Steel Door, Add</i> <i>For Type 304 Stainless Steel Door, Add</i> <i>For Type 316 Stainless Steel Door, Add</i> <i>For Embossed Panel Door, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 20 Minute Fire Rated Door, Add</i> <i>For 45 Minute Fire Rated Door, Add</i> <i>For 60 Minute Fire Rated Door, Add</i> <i>For 90 Minute Fire Rated Door, Add</i> <i>For 3 Hour Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Polystyrene Core, Add</i> <i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i> <i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	623.75	62.39
08 13 13 13-0027	EA	2'-10" x 7'-2" x 1-3/4"	20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door <i>For Galvanized Steel Door, Add</i> <i>For Type 304 Stainless Steel Door, Add</i> <i>For Type 316 Stainless Steel Door, Add</i> <i>For Embossed Panel Door, Add</i> <i>For Baked Enamel Finish, Add</i> <i>For 20 Minute Fire Rated Door, Add</i> <i>For 45 Minute Fire Rated Door, Add</i> <i>For 60 Minute Fire Rated Door, Add</i> <i>For 90 Minute Fire Rated Door, Add</i> <i>For 3 Hour Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Polystyrene Core, Add</i> <i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i> <i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	629.40	63.74

08 Openings**08 10 Doors and Frames****08 13 Metal Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 13 13 13-0028	EA 3' x 7'-2" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	635.05	65.10
	For Galvanized Steel Door, Add	100.97	
	For Type 304 Stainless Steel Door, Add	403.88	
	For Type 316 Stainless Steel Door, Add	656.31	
	For Embossed Panel Door, Add	121.16	
	For Baked Enamel Finish, Add	170.99	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-35.01	
	For >100, Deduct	-50.88	
	For Polystyrene Core, Add	50.49	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	126.21	
	For Continuously Welded And Filled Vertical Edge Seam, Add	63.11	
08 13 13 13-0029	EA 3'-4" x 7'-2" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	673.20	65.10
	For Galvanized Steel Door, Add	108.60	
	For Type 304 Stainless Steel Door, Add	434.40	
	For Type 316 Stainless Steel Door, Add	705.90	
	For Embossed Panel Door, Add	130.32	
	For Baked Enamel Finish, Add	182.43	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-36.92	
	For >100, Deduct	-53.75	
	For Polystyrene Core, Add	54.30	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	135.75	
	For Continuously Welded And Filled Vertical Edge Seam, Add	67.88	
08 13 13 13-0030	EA 3'-6" x 7'-2" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	693.31	67.81
	For Galvanized Steel Door, Add	111.54	
	For Type 304 Stainless Steel Door, Add	446.14	
	For Type 316 Stainless Steel Door, Add	724.98	
	For Embossed Panel Door, Add	133.84	
	For Baked Enamel Finish, Add	187.65	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-38.06	
	For >100, Deduct	-55.39	
	For Polystyrene Core, Add	55.77	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	139.42	
	For Continuously Welded And Filled Vertical Edge Seam, Add	69.71	
08 13 13 13-0031	EA 4' x 7'-2" x 1-3/4", 20 Gauge, Level 1 Standard Duty, Honeycomb Core, Hollow Metal Door.....	762.86	73.24
	For Galvanized Steel Door, Add	123.28	
	For Type 304 Stainless Steel Door, Add	493.10	
	For Type 316 Stainless Steel Door, Add	801.29	
	For Embossed Panel Door, Add	147.93	
	For Baked Enamel Finish, Add	206.89	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-41.81	
	For >100, Deduct	-60.88	
	For Polystyrene Core, Add	61.64	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	154.10	
	For Continuously Welded And Filled Vertical Edge Seam, Add	77.05	

08 13 13 13-0032 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Doors (08 13 13

13)

08 13 13 13-0033 6'-8" High, 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal
Doors (08 13 13 13-0032)



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0034 EA 2' x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	614.55	59.67
For Galvanized Steel Door, Add	99.04	
For Type 304 Stainless Steel Door, Add	396.15	
For Type 316 Stainless Steel Door, Add	643.75	
For Embossed Panel Door, Add	118.85	
For Baked Enamel Finish, Add	166.46	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-33.71	
For >100, Deduct	-49.08	
For 2" Thick Door, Add	38.89	
For Polystyrene Core, Add	49.52	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	123.80	
For Continuously Welded And Filled Vertical Edge Seam, Add	61.90	
For Steel Stiffened, Add	123.80	
08 13 13 13-0035 EA 2'-4" x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	614.55	59.67
For Galvanized Steel Door, Add	99.04	
For Type 304 Stainless Steel Door, Add	396.15	
For Type 316 Stainless Steel Door, Add	643.75	
For Embossed Panel Door, Add	118.85	
For Baked Enamel Finish, Add	166.46	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-33.71	
For >100, Deduct	-49.08	
For 2" Thick Door, Add	38.89	
For Polystyrene Core, Add	49.52	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	123.80	
For Continuously Welded And Filled Vertical Edge Seam, Add	61.90	
For Steel Stiffened, Add	123.80	
08 13 13 13-0036 EA 2'-6" x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	630.08	62.39
For Galvanized Steel Door, Add	101.06	
For Type 304 Stainless Steel Door, Add	404.25	
For Type 316 Stainless Steel Door, Add	656.90	
For Embossed Panel Door, Add	121.27	
For Baked Enamel Finish, Add	170.31	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-34.62	
For >100, Deduct	-50.38	
For 2" Thick Door, Add	39.75	
For Polystyrene Core, Add	50.53	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	126.33	
For Continuously Welded And Filled Vertical Edge Seam, Add	63.16	
For Steel Stiffened, Add	126.33	
08 13 13 13-0037 EA 2'-8" x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	637.62	62.39
For Galvanized Steel Door, Add	102.57	
For Type 304 Stainless Steel Door, Add	410.28	
For Type 316 Stainless Steel Door, Add	666.71	
For Embossed Panel Door, Add	123.08	
For Baked Enamel Finish, Add	172.57	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-35.00	
For >100, Deduct	-50.94	
For 2" Thick Door, Add	40.30	
For Polystyrene Core, Add	51.29	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	128.21	
For Continuously Welded And Filled Vertical Edge Seam, Add	64.11	
For Steel Stiffened, Add	128.21	

08	08	Openings
	08 10	Doors and Frames
	08 13	Metal Doors



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0038	EA 2'-10" x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	643.35	63.74
	<i>For Galvanized Steel Door, Add</i>	103.17	
	<i>For Type 304 Stainless Steel Door, Add</i>	412.69	
	<i>For Type 316 Stainless Steel Door, Add</i>	670.62	
	<i>For Embossed Panel Door, Add</i>	123.81	
	<i>For Baked Enamel Finish, Add</i>	173.88	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-35.35	
	<i>For >100, Deduct</i>	-51.44	
	<i>For 2" Thick Door, Add</i>	40.59	
	<i>For Polystyrene Core, Add</i>	51.59	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	128.97	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	64.48	
	<i>For Steel Stiffened, Add</i>	128.97	
08 13 13 13-0039	EA 3' x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	649.09	65.10
	<i>For Galvanized Steel Door, Add</i>	103.78	
	<i>For Type 304 Stainless Steel Door, Add</i>	415.11	
	<i>For Type 316 Stainless Steel Door, Add</i>	674.56	
	<i>For Embossed Panel Door, Add</i>	124.53	
	<i>For Baked Enamel Finish, Add</i>	175.20	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-35.71	
	<i>For >100, Deduct</i>	-51.94	
	<i>For 2" Thick Door, Add</i>	40.87	
	<i>For Polystyrene Core, Add</i>	51.89	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	129.72	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	64.86	
	<i>For Steel Stiffened, Add</i>	129.72	
08 13 13 13-0040	EA 3'-4" x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	688.31	65.10
	<i>For Galvanized Steel Door, Add</i>	111.62	
	<i>For Type 304 Stainless Steel Door, Add</i>	446.49	
	<i>For Type 316 Stainless Steel Door, Add</i>	725.54	
	<i>For Embossed Panel Door, Add</i>	133.95	
	<i>For Baked Enamel Finish, Add</i>	186.96	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-37.67	
	<i>For >100, Deduct</i>	-54.88	
	<i>For 2" Thick Door, Add</i>	43.72	
	<i>For Polystyrene Core, Add</i>	55.81	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	139.53	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	69.76	
	<i>For Steel Stiffened, Add</i>	139.53	
08 13 13 13-0041	EA 3'-6" x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	708.82	67.81
	<i>For Galvanized Steel Door, Add</i>	114.64	
	<i>For Type 304 Stainless Steel Door, Add</i>	458.55	
	<i>For Type 316 Stainless Steel Door, Add</i>	745.15	
	<i>For Embossed Panel Door, Add</i>	137.57	
	<i>For Baked Enamel Finish, Add</i>	192.30	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-38.83	
	<i>For >100, Deduct</i>	-56.55	
	<i>For 2" Thick Door, Add</i>	44.95	
	<i>For Polystyrene Core, Add</i>	57.32	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	143.30	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	71.65	
	<i>For Steel Stiffened, Add</i>	143.30	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0042 EA 4' x 6'-8" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	780.01	73.24
For Galvanized Steel Door, Add	126.71	
For Type 304 Stainless Steel Door, Add	506.82	
For Type 316 Stainless Steel Door, Add	823.59	
For Embossed Panel Door, Add	152.05	
For Baked Enamel Finish, Add	212.03	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-42.66	
For >100, Deduct	-62.16	
For 2" Thick Door, Add	49.59	
For Polystyrene Core, Add	63.35	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	158.38	
For Continuously Welded And Filled Vertical Edge Seam, Add	79.19	
For Steel Stiffened, Add	158.38	
08 13 13 13-0043 7' High, 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Doors (08 13 13 13-0032)		
08 13 13 13-0044 EA 2' x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	626.30	59.67
For Galvanized Steel Door, Add	101.39	
For Type 304 Stainless Steel Door, Add	405.55	
For Type 316 Stainless Steel Door, Add	659.02	
For Embossed Panel Door, Add	121.67	
For Baked Enamel Finish, Add	169.99	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-34.30	
For >100, Deduct	-49.96	
For 2" Thick Door, Add	39.74	
For Polystyrene Core, Add	50.69	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	126.74	
For Continuously Welded And Filled Vertical Edge Seam, Add	63.37	
For Steel Stiffened, Add	126.74	
08 13 13 13-0045 EA 2'-4" x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	626.30	59.67
For Galvanized Steel Door, Add	101.39	
For Type 304 Stainless Steel Door, Add	405.55	
For Type 316 Stainless Steel Door, Add	659.02	
For Embossed Panel Door, Add	121.67	
For Baked Enamel Finish, Add	169.99	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-34.30	
For >100, Deduct	-49.96	
For 2" Thick Door, Add	39.74	
For Polystyrene Core, Add	50.69	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	126.74	
For Continuously Welded And Filled Vertical Edge Seam, Add	63.37	
For Steel Stiffened, Add	126.74	
08 13 13 13-0046 EA 2'-6" x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	642.08	62.39
For Galvanized Steel Door, Add	103.46	
For Type 304 Stainless Steel Door, Add	413.85	
For Type 316 Stainless Steel Door, Add	672.50	
For Embossed Panel Door, Add	124.15	
For Baked Enamel Finish, Add	173.91	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-35.22	
For >100, Deduct	-51.28	
For 2" Thick Door, Add	40.62	
For Polystyrene Core, Add	51.73	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	129.33	
For Continuously Welded And Filled Vertical Edge Seam, Add	64.66	
For Steel Stiffened, Add	129.33	

08	08	Openings
	08 10	Doors and Frames
	08 13	Metal Doors



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0047	EA 2'-8" x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	649.80	62.39
	For Galvanized Steel Door, Add	105.01	
	For Type 304 Stainless Steel Door, Add	420.02	
	For Type 316 Stainless Steel Door, Add	682.54	
	For Embossed Panel Door, Add	126.01	
	For Baked Enamel Finish, Add	176.22	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-35.61	
	For >100, Deduct	-51.85	
	For 2" Thick Door, Add	41.18	
	For Polystyrene Core, Add	52.50	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	131.26	
	For Continuously Welded And Filled Vertical Edge Seam, Add	65.63	
	For Steel Stiffened, Add	131.26	
08 13 13 13-0048	EA 2'-10" x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	655.60	63.74
	For Galvanized Steel Door, Add	105.62	
	For Type 304 Stainless Steel Door, Add	422.49	
	For Type 316 Stainless Steel Door, Add	686.54	
	For Embossed Panel Door, Add	126.75	
	For Baked Enamel Finish, Add	177.56	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-35.97	
	For >100, Deduct	-52.36	
	For 2" Thick Door, Add	41.48	
	For Polystyrene Core, Add	52.81	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	132.03	
	For Continuously Welded And Filled Vertical Edge Seam, Add	66.01	
	For Steel Stiffened, Add	132.03	
08 13 13 13-0049	EA 3' x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	661.40	65.10
	For Galvanized Steel Door, Add	106.24	
	For Type 304 Stainless Steel Door, Add	424.96	
	For Type 316 Stainless Steel Door, Add	690.56	
	For Embossed Panel Door, Add	127.49	
	For Baked Enamel Finish, Add	178.89	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-36.33	
	For >100, Deduct	-52.86	
	For 2" Thick Door, Add	41.77	
	For Polystyrene Core, Add	53.12	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	132.80	
	For Continuously Welded And Filled Vertical Edge Seam, Add	66.40	
	For Steel Stiffened, Add	132.80	
08 13 13 13-0050	EA 3'-4" x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	701.55	65.10
	For Galvanized Steel Door, Add	114.27	
	For Type 304 Stainless Steel Door, Add	457.08	
	For Type 316 Stainless Steel Door, Add	742.76	
	For Embossed Panel Door, Add	137.12	
	For Baked Enamel Finish, Add	190.94	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-38.33	
	For >100, Deduct	-55.87	
	For 2" Thick Door, Add	44.68	
	For Polystyrene Core, Add	57.14	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	142.84	
	For Continuously Welded And Filled Vertical Edge Seam, Add	71.42	
	For Steel Stiffened, Add	142.84	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0051 EA 3'-6" x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	722.42	67.81
For Galvanized Steel Door, Add	117.36	
For Type 304 Stainless Steel Door, Add	469.43	
For Type 316 Stainless Steel Door, Add	762.83	
For Embossed Panel Door, Add	140.83	
For Baked Enamel Finish, Add	196.38	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-39.51	
For >100, Deduct	-57.57	
For 2" Thick Door, Add	45.93	
For Polystyrene Core, Add	58.68	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	146.70	
For Continuously Welded And Filled Vertical Edge Seam, Add	73.35	
For Steel Stiffened, Add	146.70	
08 13 13 13-0052 EA 4' x 7' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	795.04	73.24
For Galvanized Steel Door, Add	129.71	
For Type 304 Stainless Steel Door, Add	518.85	
For Type 316 Stainless Steel Door, Add	843.13	
For Embossed Panel Door, Add	155.65	
For Baked Enamel Finish, Add	216.54	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-43.41	
For >100, Deduct	-63.29	
For 2" Thick Door, Add	50.68	
For Polystyrene Core, Add	64.86	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	162.14	
For Continuously Welded And Filled Vertical Edge Seam, Add	81.07	
For Steel Stiffened, Add	162.14	
08 13 13 13-0053 7'-2" High, 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Doors (08 13 13 13-0032)		
08 13 13 13-0054 EA 2' x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	638.05	59.67
For Galvanized Steel Door, Add	103.74	
For Type 304 Stainless Steel Door, Add	414.95	
For Type 316 Stainless Steel Door, Add	674.30	
For Embossed Panel Door, Add	124.49	
For Baked Enamel Finish, Add	173.51	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-34.89	
For >100, Deduct	-50.84	
For 2" Thick Door, Add	40.59	
For Polystyrene Core, Add	51.87	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	129.67	
For Continuously Welded And Filled Vertical Edge Seam, Add	64.84	
For Steel Stiffened, Add	129.67	
08 13 13 13-0055 EA 2'-4" x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	638.05	59.67
For Galvanized Steel Door, Add	103.74	
For Type 304 Stainless Steel Door, Add	414.95	
For Type 316 Stainless Steel Door, Add	674.30	
For Embossed Panel Door, Add	124.49	
For Baked Enamel Finish, Add	173.51	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-34.89	
For >100, Deduct	-50.84	
For 2" Thick Door, Add	40.59	
For Polystyrene Core, Add	51.87	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	129.67	
For Continuously Welded And Filled Vertical Edge Seam, Add	64.84	
For Steel Stiffened, Add	129.67	

08	08	Openings
	08 10	Doors and Frames
	08 13	Metal Doors



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0056	EA 2'-6" x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	654.07	62.39
	For Galvanized Steel Door, Add	105.86	
	For Type 304 Stainless Steel Door, Add	423.44	
	For Type 316 Stainless Steel Door, Add	688.09	
	For Embossed Panel Door, Add	127.03	
	For Baked Enamel Finish, Add	177.51	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-35.82	
	For >100, Deduct	-52.17	
	For 2" Thick Door, Add	41.49	
	For Polystyrene Core, Add	52.93	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	132.33	
	For Continuously Welded And Filled Vertical Edge Seam, Add	66.16	
	For Steel Stiffened, Add	132.33	
08 13 13 13-0057	EA 2'-8" x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	661.97	62.39
	For Galvanized Steel Door, Add	107.44	
	For Type 304 Stainless Steel Door, Add	429.76	
	For Type 316 Stainless Steel Door, Add	698.36	
	For Embossed Panel Door, Add	128.93	
	For Baked Enamel Finish, Add	179.88	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-36.22	
	For >100, Deduct	-52.77	
	For 2" Thick Door, Add	42.07	
	For Polystyrene Core, Add	53.72	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	134.30	
	For Continuously Welded And Filled Vertical Edge Seam, Add	67.15	
	For Steel Stiffened, Add	134.30	
08 13 13 13-0058	EA 3' x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	673.72	65.10
	For Galvanized Steel Door, Add	108.70	
	For Type 304 Stainless Steel Door, Add	434.82	
	For Type 316 Stainless Steel Door, Add	706.58	
	For Embossed Panel Door, Add	130.44	
	For Baked Enamel Finish, Add	182.59	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-36.94	
	For >100, Deduct	-53.78	
	For 2" Thick Door, Add	42.66	
	For Polystyrene Core, Add	54.35	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	135.88	
	For Continuously Welded And Filled Vertical Edge Seam, Add	67.94	
	For Steel Stiffened, Add	135.88	
08 13 13 13-0059	EA 3'-4" x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	714.80	65.10
	For Galvanized Steel Door, Add	116.92	
	For Type 304 Stainless Steel Door, Add	467.68	
	For Type 316 Stainless Steel Door, Add	759.98	
	For Embossed Panel Door, Add	140.30	
	For Baked Enamel Finish, Add	194.91	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-39.00	
	For >100, Deduct	-56.87	
	For 2" Thick Door, Add	45.64	
	For Polystyrene Core, Add	58.46	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	146.15	
	For Continuously Welded And Filled Vertical Edge Seam, Add	73.08	
	For Steel Stiffened, Add	146.15	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0060 EA 3'-6" x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	736.03	67.81
For Galvanized Steel Door, Add	120.08	
For Type 304 Stainless Steel Door, Add	480.32	
For Type 316 Stainless Steel Door, Add	780.52	
For Embossed Panel Door, Add	144.10	
For Baked Enamel Finish, Add	200.46	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-40.19	
For >100, Deduct	-58.59	
For 2" Thick Door, Add	46.92	
For Polystyrene Core, Add	60.04	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	150.10	
For Continuously Welded And Filled Vertical Edge Seam, Add	75.05	
For Steel Stiffened, Add	150.10	
08 13 13 13-0061 EA 4' x 7'-2" x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	810.08	73.24
For Galvanized Steel Door, Add	132.72	
For Type 304 Stainless Steel Door, Add	530.88	
For Type 316 Stainless Steel Door, Add	862.68	
For Embossed Panel Door, Add	159.26	
For Baked Enamel Finish, Add	221.05	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-44.17	
For >100, Deduct	-64.42	
For 2" Thick Door, Add	51.77	
For Polystyrene Core, Add	66.36	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	165.90	
For Continuously Welded And Filled Vertical Edge Seam, Add	82.95	
For Steel Stiffened, Add	165.90	
08 13 13 13-0062 8' High, 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Doors (08 13 13 13-0032)		
08 13 13 13-0063 EA 2' x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door.....	734.99	59.67
For Up To 1' Extra Height, Add	170.34	
For 1' To 1'-6" Extra Height, Add	324.99	
For Galvanized Steel Door, Add	123.13	
For Type 304 Stainless Steel Door, Add	492.50	
For Type 316 Stainless Steel Door, Add	800.32	
For Embossed Panel Door, Add	147.75	
For Baked Enamel Finish, Add	202.59	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-39.73	
For >100, Deduct	-58.11	
For 2" Thick Door, Add	47.62	
For Polystyrene Core, Add	61.56	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	153.91	
For Continuously Welded And Filled Vertical Edge Seam, Add	76.95	
For Steel Stiffened, Add	153.91	
08 13 13 13-0064 EA 2'-4" x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	734.99	59.67
For Up To 1' Extra Height, Add	170.34	
For 1' To 1'-6" Extra Height, Add	324.99	
For Galvanized Steel Door, Add	123.13	
For Type 304 Stainless Steel Door, Add	492.50	
For Type 316 Stainless Steel Door, Add	800.32	
For Embossed Panel Door, Add	147.75	
For Baked Enamel Finish, Add	202.59	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-39.73	
For >100, Deduct	-58.11	
For 2" Thick Door, Add	47.62	
For Polystyrene Core, Add	61.56	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	153.91	
For Continuously Welded And Filled Vertical Edge Seam, Add	76.95	
For Steel Stiffened, Add	153.91	

08 Openings**08 10 Doors and Frames****08 13 Metal Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 13 13 13-0065	EA 2'-6" x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	752.99	62.39
	For Up To 1' Extra Height, Add	173.83	
	For 1' To 1'-6" Extra Height, Add	331.64	
	For Galvanized Steel Door, Add	125.64	
	For Type 304 Stainless Steel Door, Add	502.58	
	For Type 316 Stainless Steel Door, Add	816.69	
	For Embossed Panel Door, Add	150.77	
	For Baked Enamel Finish, Add	207.18	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-40.77	
	For >100, Deduct	-59.59	
	For 2" Thick Door, Add	48.67	
	For Polystyrene Core, Add	62.82	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	157.06	
	For Continuously Welded And Filled Vertical Edge Seam, Add	78.53	
	For Steel Stiffened, Add	157.06	
08 13 13 13-0066	EA 2'-8" x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	762.37	62.39
	For Up To 1' Extra Height, Add	176.42	
	For 1' To 1'-6" Extra Height, Add	336.59	
	For Galvanized Steel Door, Add	127.52	
	For Type 304 Stainless Steel Door, Add	510.08	
	For Type 316 Stainless Steel Door, Add	828.88	
	For Embossed Panel Door, Add	153.02	
	For Baked Enamel Finish, Add	210.00	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-41.24	
	For >100, Deduct	-60.30	
	For 2" Thick Door, Add	49.35	
	For Polystyrene Core, Add	63.76	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	159.40	
	For Continuously Welded And Filled Vertical Edge Seam, Add	79.70	
	For Steel Stiffened, Add	159.40	
08 13 13 13-0067	EA 2'-10" x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	768.83	63.74
	For Up To 1' Extra Height, Add	177.46	
	For 1' To 1'-6" Extra Height, Add	338.56	
	For Galvanized Steel Door, Add	128.27	
	For Type 304 Stainless Steel Door, Add	513.07	
	For Type 316 Stainless Steel Door, Add	833.74	
	For Embossed Panel Door, Add	153.92	
	For Baked Enamel Finish, Add	211.53	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-41.63	
	For >100, Deduct	-60.85	
	For 2" Thick Door, Add	49.68	
	For Polystyrene Core, Add	64.13	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	160.34	
	For Continuously Welded And Filled Vertical Edge Seam, Add	80.17	
	For Steel Stiffened, Add	160.34	
08 13 13 13-0068	EA 3' x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	775.29	65.10
	For Up To 1' Extra Height, Add	178.50	
	For 1' To 1'-6" Extra Height, Add	340.54	
	For Galvanized Steel Door, Add	129.02	
	For Type 304 Stainless Steel Door, Add	516.07	
	For Type 316 Stainless Steel Door, Add	838.62	
	For Embossed Panel Door, Add	154.82	
	For Baked Enamel Finish, Add	213.06	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-42.02	
	For >100, Deduct	-61.40	
	For 2" Thick Door, Add	50.02	
	For Polystyrene Core, Add	64.51	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	161.27	
	For Continuously Welded And Filled Vertical Edge Seam, Add	80.64	
	For Steel Stiffened, Add	161.27	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13	13-0069	EA	3'-4" x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	824.05	65.10
			<i>For Up To 1' Extra Height, Add</i>	191.99	
			<i>For 1' To 1'-6" Extra Height, Add</i>	366.28	
			<i>For Galvanized Steel Door, Add</i>	138.77	
			<i>For Type 304 Stainless Steel Door, Add</i>	555.08	
			<i>For Type 316 Stainless Steel Door, Add</i>	902.01	
			<i>For Embossed Panel Door, Add</i>	166.52	
			<i>For Baked Enamel Finish, Add</i>	227.69	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-44.46	
			<i>For >100, Deduct</i>	-65.06	
			<i>For 2" Thick Door, Add</i>	53.56	
			<i>For Polystyrene Core, Add</i>	69.39	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	173.46	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	86.73	
			<i>For Steel Stiffened, Add</i>	173.46	
08 13 13	13-0070	EA	3'-6" x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	848.24	67.81
			<i>For Up To 1' Extra Height, Add</i>	197.18	
			<i>For 1' To 1'-6" Extra Height, Add</i>	376.19	
			<i>For Galvanized Steel Door, Add</i>	142.52	
			<i>For Type 304 Stainless Steel Door, Add</i>	570.09	
			<i>For Type 316 Stainless Steel Door, Add</i>	926.39	
			<i>For Embossed Panel Door, Add</i>	171.03	
			<i>For Baked Enamel Finish, Add</i>	234.13	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-45.80	
			<i>For >100, Deduct</i>	-67.01	
			<i>For 2" Thick Door, Add</i>	55.05	
			<i>For Polystyrene Core, Add</i>	71.26	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	178.15	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	89.08	
			<i>For Steel Stiffened, Add</i>	178.15	
08 13 13	13-0071	EA	4' x 8' x 1-3/4", 18 Gauge, Level 2 Heavy Duty, Honeycomb Core, Hollow Metal Door	934.10	73.24
			<i>For Up To 1' Extra Height, Add</i>	217.93	
			<i>For 1' To 1'-6" Extra Height, Add</i>	415.78	
			<i>For Galvanized Steel Door, Add</i>	157.52	
			<i>For Type 304 Stainless Steel Door, Add</i>	630.10	
			<i>For Type 316 Stainless Steel Door, Add</i>	1,023.91	
			<i>For Embossed Panel Door, Add</i>	189.03	
			<i>For Baked Enamel Finish, Add</i>	258.26	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-50.37	
			<i>For >100, Deduct</i>	-73.72	
			<i>For 2" Thick Door, Add</i>	60.76	
			<i>For Polystyrene Core, Add</i>	78.76	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	196.91	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	98.45	
			<i>For Steel Stiffened, Add</i>	196.91	
08 13 13	13-0072		16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13)</small>		
08 13 13	13-0073		6'-8" High, 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13-0072)</small>		
08 13 13	13-0074	EA	2' x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	805.19	59.67
			<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	274.33	
			<i>For Galvanized Steel Door, Add</i>	137.17	
			<i>For Type 304 Stainless Steel Door, Add</i>	548.66	
			<i>For Type 316 Stainless Steel Door, Add</i>	891.58	
			<i>For Embossed Panel Door, Add</i>	164.60	
			<i>For Baked Enamel Finish, Add</i>	223.65	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-43.24	
			<i>For >100, Deduct</i>	-63.37	
			<i>For 2" Thick Door, Add</i>	52.71	
			<i>For Polystyrene Core, Add</i>	68.58	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	171.46	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	85.73	
			<i>For Steel Stiffened, Add</i>	171.46	

08 Openings**08 10 Doors and Frames****08 13 Metal Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 13 13 13-0075	EA 2'-4" x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	805.19	59.67
	For 14 Gauge, Level 4 Maximum Duty, Add	274.33	
	For Galvanized Steel Door, Add	137.17	
	For Type 304 Stainless Steel Door, Add	548.66	
	For Type 316 Stainless Steel Door, Add	891.58	
	For Embossed Panel Door, Add	164.60	
	For Baked Enamel Finish, Add	223.65	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-43.24	
	For >100, Deduct	-63.37	
	For 2" Thick Door, Add	52.71	
	For Polystyrene Core, Add	68.58	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	171.46	
	For Continuously Welded And Filled Vertical Edge Seam, Add	85.73	
	For Steel Stiffened, Add	171.46	
08 13 13 13-0076	EA 2'-6" x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	824.63	62.39
	For 14 Gauge, Level 4 Maximum Duty, Add	279.94	
	For Galvanized Steel Door, Add	139.97	
	For Type 304 Stainless Steel Door, Add	559.89	
	For Type 316 Stainless Steel Door, Add	909.82	
	For Embossed Panel Door, Add	167.97	
	For Baked Enamel Finish, Add	228.67	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-44.35	
	For >100, Deduct	-64.97	
	For 2" Thick Door, Add	53.86	
	For Polystyrene Core, Add	69.99	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	174.97	
	For Continuously Welded And Filled Vertical Edge Seam, Add	87.48	
	For Steel Stiffened, Add	174.97	
08 13 13 13-0077	EA 2'-8" x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	835.07	62.39
	For 14 Gauge, Level 4 Maximum Duty, Add	284.12	
	For Galvanized Steel Door, Add	142.06	
	For Type 304 Stainless Steel Door, Add	568.24	
	For Type 316 Stainless Steel Door, Add	923.39	
	For Embossed Panel Door, Add	170.47	
	For Baked Enamel Finish, Add	231.81	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-44.87	
	For >100, Deduct	-65.75	
	For 2" Thick Door, Add	54.62	
	For Polystyrene Core, Add	71.03	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	177.58	
	For Continuously Welded And Filled Vertical Edge Seam, Add	88.79	
	For Steel Stiffened, Add	177.58	
08 13 13 13-0078	EA 2'-10" x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	841.99	63.74
	For 14 Gauge, Level 4 Maximum Duty, Add	285.80	
	For Galvanized Steel Door, Add	142.90	
	For Type 304 Stainless Steel Door, Add	571.60	
	For Type 316 Stainless Steel Door, Add	928.85	
	For Embossed Panel Door, Add	171.48	
	For Baked Enamel Finish, Add	233.47	
	For 20 Minute Fire Rated Door, Add	27.63	
	For 45 Minute Fire Rated Door, Add	41.40	
	For 60 Minute Fire Rated Door, Add	55.27	
	For 90 Minute Fire Rated Door, Add	93.38	
	For 3 Hour Fire Rated Door, Add	131.50	
	For >50 To 100, Deduct	-45.29	
	For >100, Deduct	-66.34	
	For 2" Thick Door, Add	54.99	
	For Polystyrene Core, Add	71.45	
	For Mineral Core, 250 Degree Maximum Temperature Rise, Add	178.63	
	For Continuously Welded And Filled Vertical Edge Seam, Add	89.31	
	For Steel Stiffened, Add	178.63	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0079	EA		3' x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	848.86	65.10
			<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	287.46	
			<i>For Galvanized Steel Door, Add</i>	143.73	
			<i>For Type 304 Stainless Steel Door, Add</i>	574.93	
			<i>For Type 316 Stainless Steel Door, Add</i>	934.26	
			<i>For Embossed Panel Door, Add</i>	172.48	
			<i>For Baked Enamel Finish, Add</i>	235.13	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-45.70	
			<i>For >100, Deduct</i>	-66.92	
			<i>For 2" Thick Door, Add</i>	55.36	
			<i>For Polystyrene Core, Add</i>	71.87	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	179.67	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	89.83	
			<i>For Steel Stiffened, Add</i>	179.67	
08 13 13 13-0080	EA		3'-4" x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	903.18	65.10
			<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	309.19	
			<i>For Galvanized Steel Door, Add</i>	154.60	
			<i>For Type 304 Stainless Steel Door, Add</i>	618.38	
			<i>For Type 316 Stainless Steel Door, Add</i>	1,004.87	
			<i>For Embossed Panel Door, Add</i>	185.52	
			<i>For Baked Enamel Finish, Add</i>	251.42	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-48.41	
			<i>For >100, Deduct</i>	-70.99	
			<i>For 2" Thick Door, Add</i>	59.30	
			<i>For Polystyrene Core, Add</i>	77.30	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	193.25	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	96.62	
			<i>For Steel Stiffened, Add</i>	193.25	
08 13 13 13-0081	EA		3'-6" x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	929.50	67.81
			<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	317.55	
			<i>For Galvanized Steel Door, Add</i>	158.77	
			<i>For Type 304 Stainless Steel Door, Add</i>	635.10	
			<i>For Type 316 Stainless Steel Door, Add</i>	1,032.03	
			<i>For Embossed Panel Door, Add</i>	190.53	
			<i>For Baked Enamel Finish, Add</i>	258.51	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-49.87	
			<i>For >100, Deduct</i>	-73.10	
			<i>For 2" Thick Door, Add</i>	60.95	
			<i>For Polystyrene Core, Add</i>	79.39	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	198.47	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	99.23	
			<i>For Steel Stiffened, Add</i>	198.47	
08 13 13 13-0082	EA		4' x 6'-8" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	1,023.91	73.24
			<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	350.97	
			<i>For Galvanized Steel Door, Add</i>	175.49	
			<i>For Type 304 Stainless Steel Door, Add</i>	701.94	
			<i>For Type 316 Stainless Steel Door, Add</i>	1,140.66	
			<i>For Embossed Panel Door, Add</i>	210.58	
			<i>For Baked Enamel Finish, Add</i>	285.20	
			<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
			<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
			<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
			<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
			<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
			<i>For >50 To 100, Deduct</i>	-54.86	
			<i>For >100, Deduct</i>	-80.46	
			<i>For 2" Thick Door, Add</i>	67.28	
			<i>For Polystyrene Core, Add</i>	87.74	
			<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	219.36	
			<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	109.68	
			<i>For Steel Stiffened, Add</i>	219.36	
08 13 13 13-0083			7' High, 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13-0072)</small>		

08	08	Openings
	08 10	Doors and Frames
	08 13	Metal Doors



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0084	EA 2' x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	821.47	59.67
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	280.84	
	<i>For Galvanized Steel Door, Add</i>	140.42	
	<i>For Type 304 Stainless Steel Door, Add</i>	561.69	
	<i>For Type 316 Stainless Steel Door, Add</i>	912.74	
	<i>For Embossed Panel Door, Add</i>	168.51	
	<i>For Baked Enamel Finish, Add</i>	228.54	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-44.06	
	<i>For >100, Deduct</i>	-64.59	
	<i>For 2" Thick Door, Add</i>	53.89	
	<i>For Polystyrene Core, Add</i>	70.21	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	175.53	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	87.76	
	<i>For Steel Stiffened, Add</i>	175.53	
08 13 13 13-0085	EA 2'-4" x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	821.47	59.67
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	280.84	
	<i>For Galvanized Steel Door, Add</i>	140.42	
	<i>For Type 304 Stainless Steel Door, Add</i>	561.69	
	<i>For Type 316 Stainless Steel Door, Add</i>	912.74	
	<i>For Embossed Panel Door, Add</i>	168.51	
	<i>For Baked Enamel Finish, Add</i>	228.54	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-44.06	
	<i>For >100, Deduct</i>	-64.59	
	<i>For 2" Thick Door, Add</i>	53.89	
	<i>For Polystyrene Core, Add</i>	70.21	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	175.53	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	87.76	
	<i>For Steel Stiffened, Add</i>	175.53	
08 13 13 13-0086	EA 2'-6" x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	841.24	62.39
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	286.59	
	<i>For Galvanized Steel Door, Add</i>	143.29	
	<i>For Type 304 Stainless Steel Door, Add</i>	573.18	
	<i>For Type 316 Stainless Steel Door, Add</i>	931.41	
	<i>For Embossed Panel Door, Add</i>	171.95	
	<i>For Baked Enamel Finish, Add</i>	233.66	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-45.18	
	<i>For >100, Deduct</i>	-66.21	
	<i>For 2" Thick Door, Add</i>	55.06	
	<i>For Polystyrene Core, Add</i>	71.65	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	179.12	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	89.56	
	<i>For Steel Stiffened, Add</i>	179.12	
08 13 13 13-0087	EA 2'-8" x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	851.93	62.39
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	290.86	
	<i>For Galvanized Steel Door, Add</i>	145.43	
	<i>For Type 304 Stainless Steel Door, Add</i>	581.73	
	<i>For Type 316 Stainless Steel Door, Add</i>	945.31	
	<i>For Embossed Panel Door, Add</i>	174.52	
	<i>For Baked Enamel Finish, Add</i>	236.86	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-45.72	
	<i>For >100, Deduct</i>	-67.01	
	<i>For 2" Thick Door, Add</i>	55.84	
	<i>For Polystyrene Core, Add</i>	72.72	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	181.79	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	90.90	
	<i>For Steel Stiffened, Add</i>	181.79	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0088 EA 2'-10" x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	858.93	63.74
For 14 Gauge, Level 4 Maximum Duty, Add	292.58	
For Galvanized Steel Door, Add	146.29	
For Type 304 Stainless Steel Door, Add	585.15	
For Type 316 Stainless Steel Door, Add	950.87	
For Embossed Panel Door, Add	175.55	
For Baked Enamel Finish, Add	238.56	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-46.13	
For >100, Deduct	-67.61	
For 2" Thick Door, Add	56.22	
For Polystyrene Core, Add	73.14	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	182.86	
For Continuously Welded And Filled Vertical Edge Seam, Add	91.43	
For Steel Stiffened, Add	182.86	
08 13 13 13-0089 EA 3' x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	865.91	65.10
For 14 Gauge, Level 4 Maximum Duty, Add	294.28	
For Galvanized Steel Door, Add	147.14	
For Type 304 Stainless Steel Door, Add	588.57	
For Type 316 Stainless Steel Door, Add	956.42	
For Embossed Panel Door, Add	176.57	
For Baked Enamel Finish, Add	240.24	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-46.55	
For >100, Deduct	-68.20	
For 2" Thick Door, Add	56.59	
For Polystyrene Core, Add	73.57	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	183.93	
For Continuously Welded And Filled Vertical Edge Seam, Add	91.96	
For Steel Stiffened, Add	183.93	
08 13 13 13-0090 EA 3'-4" x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	921.52	65.10
For 14 Gauge, Level 4 Maximum Duty, Add	316.53	
For Galvanized Steel Door, Add	158.26	
For Type 304 Stainless Steel Door, Add	633.06	
For Type 316 Stainless Steel Door, Add	1,028.72	
For Embossed Panel Door, Add	189.92	
For Baked Enamel Finish, Add	256.93	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-49.33	
For >100, Deduct	-72.37	
For 2" Thick Door, Add	60.63	
For Polystyrene Core, Add	79.13	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	197.83	
For Continuously Welded And Filled Vertical Edge Seam, Add	98.92	
For Steel Stiffened, Add	197.83	
08 13 13 13-0091 EA 3'-6" x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	948.34	67.81
For 14 Gauge, Level 4 Maximum Duty, Add	325.08	
For Galvanized Steel Door, Add	162.54	
For Type 304 Stainless Steel Door, Add	650.17	
For Type 316 Stainless Steel Door, Add	1,056.52	
For Embossed Panel Door, Add	195.05	
For Baked Enamel Finish, Add	264.16	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-50.81	
For >100, Deduct	-74.52	
For 2" Thick Door, Add	62.31	
For Polystyrene Core, Add	81.27	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	203.18	
For Continuously Welded And Filled Vertical Edge Seam, Add	101.59	
For Steel Stiffened, Add	203.18	

08	08	Openings
	08 10	Doors and Frames
	08 13	Metal Doors



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0092	EA 4' x 7' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door For 14 Gauge, Level 4 Maximum Duty, Add For Galvanized Steel Door, Add For Type 304 Stainless Steel Door, Add For Type 316 Stainless Steel Door, Add For Embossed Panel Door, Add For Baked Enamel Finish, Add For 20 Minute Fire Rated Door, Add For 45 Minute Fire Rated Door, Add For 60 Minute Fire Rated Door, Add For 90 Minute Fire Rated Door, Add For 3 Hour Fire Rated Door, Add For >50 To 100, Deduct For >100, Deduct For 2" Thick Door, Add For Polystyrene Core, Add For Mineral Core, 250 Degree Maximum Temperature Rise, Add For Continuously Welded And Filled Vertical Edge Seam, Add For Steel Stiffened, Add	1,044.74 359.30 179.65 718.61 1,167.74 215.58 291.45 27.63 41.40 55.27 93.38 131.50 -55.90 -82.02 68.79 89.83 224.57 112.28 224.57	73.24
08 13 13 13-0093	7'-2" High, 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13-0072)</small>		
08 13 13 13-0094	EA 2' x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door For 14 Gauge, Level 4 Maximum Duty, Add For Galvanized Steel Door, Add For Type 304 Stainless Steel Door, Add For Type 316 Stainless Steel Door, Add For Embossed Panel Door, Add For Baked Enamel Finish, Add For 20 Minute Fire Rated Door, Add For 45 Minute Fire Rated Door, Add For 60 Minute Fire Rated Door, Add For 90 Minute Fire Rated Door, Add For 3 Hour Fire Rated Door, Add For >50 To 100, Deduct For >100, Deduct For 2" Thick Door, Add For Polystyrene Core, Add For Mineral Core, 250 Degree Maximum Temperature Rise, Add For Continuously Welded And Filled Vertical Edge Seam, Add For Steel Stiffened, Add	837.75 287.36 143.68 574.71 933.91 172.41 233.42 27.63 41.40 55.27 93.38 131.50 -44.87 -65.82 55.07 71.84 179.60 89.80 179.60	59.67
08 13 13 13-0095	EA 2'-4" x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door..... For 14 Gauge, Level 4 Maximum Duty, Add For Galvanized Steel Door, Add For Type 304 Stainless Steel Door, Add For Type 316 Stainless Steel Door, Add For Embossed Panel Door, Add For Baked Enamel Finish, Add For 20 Minute Fire Rated Door, Add For 45 Minute Fire Rated Door, Add For 60 Minute Fire Rated Door, Add For 90 Minute Fire Rated Door, Add For 3 Hour Fire Rated Door, Add For >50 To 100, Deduct For >100, Deduct For 2" Thick Door, Add For Polystyrene Core, Add For Mineral Core, 250 Degree Maximum Temperature Rise, Add For Continuously Welded And Filled Vertical Edge Seam, Add For Steel Stiffened, Add	837.75 287.36 143.68 574.71 933.91 172.41 233.42 27.63 41.40 55.27 93.38 131.50 -44.87 -65.82 55.07 71.84 179.60 89.80 179.60	59.67
08 13 13 13-0096	EA 2'-6" x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door..... For 14 Gauge, Level 4 Maximum Duty, Add For Galvanized Steel Door, Add For Type 304 Stainless Steel Door, Add For Type 316 Stainless Steel Door, Add For Embossed Panel Door, Add For Baked Enamel Finish, Add For 20 Minute Fire Rated Door, Add For 45 Minute Fire Rated Door, Add For 60 Minute Fire Rated Door, Add For 90 Minute Fire Rated Door, Add For 3 Hour Fire Rated Door, Add For >50 To 100, Deduct For >100, Deduct For 2" Thick Door, Add For Polystyrene Core, Add For Mineral Core, 250 Degree Maximum Temperature Rise, Add For Continuously Welded And Filled Vertical Edge Seam, Add For Steel Stiffened, Add	857.85 293.23 146.62 586.46 953.00 175.94 238.64 27.63 41.40 55.27 93.38 131.50 -46.01 -67.46 56.27 73.31 183.27 91.64 183.27	62.39



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0097 EA 2'-8" x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	868.79	62.39
For 14 Gauge, Level 4 Maximum Duty, Add	297.61	
For Galvanized Steel Door, Add	148.80	
For Type 304 Stainless Steel Door, Add	595.22	
For Type 316 Stainless Steel Door, Add	967.23	
For Embossed Panel Door, Add	178.56	
For Baked Enamel Finish, Add	241.92	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-46.56	
For >100, Deduct	-68.28	
For 2" Thick Door, Add	57.06	
For Polystyrene Core, Add	74.40	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	186.01	
For Continuously Welded And Filled Vertical Edge Seam, Add	93.00	
For Steel Stiffened, Add	186.01	
08 13 13 13-0098 EA 2'-10" x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	875.90	63.74
For 14 Gauge, Level 4 Maximum Duty, Add	299.36	
For Galvanized Steel Door, Add	149.68	
For Type 304 Stainless Steel Door, Add	598.73	
For Type 316 Stainless Steel Door, Add	972.93	
For Embossed Panel Door, Add	179.62	
For Baked Enamel Finish, Add	243.65	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-46.98	
For >100, Deduct	-68.88	
For 2" Thick Door, Add	57.45	
For Polystyrene Core, Add	74.84	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	187.10	
For Continuously Welded And Filled Vertical Edge Seam, Add	93.55	
For Steel Stiffened, Add	187.10	
08 13 13 13-0099 EA 3' x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	882.97	65.10
For 14 Gauge, Level 4 Maximum Duty, Add	301.11	
For Galvanized Steel Door, Add	150.55	
For Type 304 Stainless Steel Door, Add	602.22	
For Type 316 Stainless Steel Door, Add	978.60	
For Embossed Panel Door, Add	180.66	
For Baked Enamel Finish, Add	245.36	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-47.40	
For >100, Deduct	-69.48	
For 2" Thick Door, Add	57.83	
For Polystyrene Core, Add	75.28	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	188.19	
For Continuously Welded And Filled Vertical Edge Seam, Add	94.10	
For Steel Stiffened, Add	188.19	
08 13 13 13-0100 EA 3'-4" x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	939.87	65.10
For 14 Gauge, Level 4 Maximum Duty, Add	323.87	
For Galvanized Steel Door, Add	161.93	
For Type 304 Stainless Steel Door, Add	647.74	
For Type 316 Stainless Steel Door, Add	1,052.57	
For Embossed Panel Door, Add	194.32	
For Baked Enamel Finish, Add	262.43	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-50.25	
For >100, Deduct	-73.75	
For 2" Thick Door, Add	61.96	
For Polystyrene Core, Add	80.97	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	202.42	
For Continuously Welded And Filled Vertical Edge Seam, Add	101.21	
For Steel Stiffened, Add	202.42	

08	08	Openings
	08 10	Doors and Frames
	08 13	Metal Doors



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 13 13 13-0101	EA 3'-6" x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	967.18	67.81
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	332.62	
	<i>For Galvanized Steel Door, Add</i>	166.31	
	<i>For Type 304 Stainless Steel Door, Add</i>	665.24	
	<i>For Type 316 Stainless Steel Door, Add</i>	1,081.02	
	<i>For Embossed Panel Door, Add</i>	199.57	
	<i>For Baked Enamel Finish, Add</i>	269.81	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-51.75	
	<i>For >100, Deduct</i>	-75.93	
	<i>For 2" Thick Door, Add</i>	63.68	
	<i>For Polystyrene Core, Add</i>	83.16	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	207.89	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	103.94	
	<i>For Steel Stiffened, Add</i>	207.89	
08 13 13 13-0102	EA 4' x 7'-2" x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	1,065.56	73.24
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	367.63	
	<i>For Galvanized Steel Door, Add</i>	183.82	
	<i>For Type 304 Stainless Steel Door, Add</i>	735.26	
	<i>For Type 316 Stainless Steel Door, Add</i>	1,194.80	
	<i>For Embossed Panel Door, Add</i>	220.58	
	<i>For Baked Enamel Finish, Add</i>	297.70	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-56.94	
	<i>For >100, Deduct</i>	-83.58	
	<i>For 2" Thick Door, Add</i>	70.30	
	<i>For Polystyrene Core, Add</i>	91.91	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	229.77	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	114.89	
	<i>For Steel Stiffened, Add</i>	229.77	
08 13 13 13-0103	8' High, 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Doors <small>(08 13 13 13-0072)</small>		
08 13 13 13-0104	EA 2' x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	972.01	59.67
	<i>For Up To 1' Extra Height, Add</i>	235.93	
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	341.06	
	<i>For Galvanized Steel Door, Add</i>	170.53	
	<i>For Type 304 Stainless Steel Door, Add</i>	682.12	
	<i>For Type 316 Stainless Steel Door, Add</i>	1,108.45	
	<i>For Embossed Panel Door, Add</i>	204.64	
	<i>For Baked Enamel Finish, Add</i>	273.70	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-51.58	
	<i>For >100, Deduct</i>	-75.88	
	<i>For 2" Thick Door, Add</i>	64.80	
	<i>For Polystyrene Core, Add</i>	85.27	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	213.16	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	106.58	
	<i>For Steel Stiffened, Add</i>	213.16	
08 13 13 13-0105	EA 2'-4" x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	972.01	59.67
	<i>For Up To 1' Extra Height, Add</i>	235.93	
	<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	341.06	
	<i>For Galvanized Steel Door, Add</i>	170.53	
	<i>For Type 304 Stainless Steel Door, Add</i>	682.12	
	<i>For Type 316 Stainless Steel Door, Add</i>	1,108.45	
	<i>For Embossed Panel Door, Add</i>	204.64	
	<i>For Baked Enamel Finish, Add</i>	273.70	
	<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
	<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
	<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
	<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
	<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
	<i>For >50 To 100, Deduct</i>	-51.58	
	<i>For >100, Deduct</i>	-75.88	
	<i>For 2" Thick Door, Add</i>	64.80	
	<i>For Polystyrene Core, Add</i>	85.27	
	<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	213.16	
	<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	106.58	
	<i>For Steel Stiffened, Add</i>	213.16	



Openings	08	08
Doors and Frames	08 10	
Metal Doors	08 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 13 13 13-0106 EA 2'-6" x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	994.86	62.39
For Up To 1' Extra Height, Add	240.75	
For 14 Gauge, Level 4 Maximum Duty, Add	348.04	
For Galvanized Steel Door, Add	174.02	
For Type 304 Stainless Steel Door, Add	696.07	
For Type 316 Stainless Steel Door, Add	1,131.12	
For Embossed Panel Door, Add	208.82	
For Baked Enamel Finish, Add	279.74	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-52.86	
For >100, Deduct	-77.73	
For 2" Thick Door, Add	66.20	
For Polystyrene Core, Add	87.01	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	217.52	
For Continuously Welded And Filled Vertical Edge Seam, Add	108.76	
For Steel Stiffened, Add	217.52	
08 13 13 13-0107 EA 2'-8" x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	1,007.84	62.39
For Up To 1' Extra Height, Add	244.35	
For 14 Gauge, Level 4 Maximum Duty, Add	353.23	
For Galvanized Steel Door, Add	176.61	
For Type 304 Stainless Steel Door, Add	706.46	
For Type 316 Stainless Steel Door, Add	1,147.99	
For Embossed Panel Door, Add	211.94	
For Baked Enamel Finish, Add	283.64	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-53.51	
For >100, Deduct	-78.71	
For 2" Thick Door, Add	67.14	
For Polystyrene Core, Add	88.31	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	220.77	
For Continuously Welded And Filled Vertical Edge Seam, Add	110.38	
For Steel Stiffened, Add	220.77	
08 13 13 13-0108 EA 2'-10" x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	1,015.75	63.74
For Up To 1' Extra Height, Add	245.78	
For 14 Gauge, Level 4 Maximum Duty, Add	355.30	
For Galvanized Steel Door, Add	177.65	
For Type 304 Stainless Steel Door, Add	710.61	
For Type 316 Stainless Steel Door, Add	1,154.74	
For Embossed Panel Door, Add	213.18	
For Baked Enamel Finish, Add	285.60	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-53.97	
For >100, Deduct	-79.37	
For 2" Thick Door, Add	67.59	
For Polystyrene Core, Add	88.83	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	222.07	
For Continuously Welded And Filled Vertical Edge Seam, Add	111.03	
For Steel Stiffened, Add	222.07	
08 13 13 13-0109 EA 3' x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door.....	1,023.66	65.10
For Up To 1' Extra Height, Add	247.22	
For 14 Gauge, Level 4 Maximum Duty, Add	357.38	
For Galvanized Steel Door, Add	178.69	
For Type 304 Stainless Steel Door, Add	714.77	
For Type 316 Stainless Steel Door, Add	1,161.50	
For Embossed Panel Door, Add	214.43	
For Baked Enamel Finish, Add	287.57	
For 20 Minute Fire Rated Door, Add	27.63	
For 45 Minute Fire Rated Door, Add	41.40	
For 60 Minute Fire Rated Door, Add	55.27	
For 90 Minute Fire Rated Door, Add	93.38	
For 3 Hour Fire Rated Door, Add	131.50	
For >50 To 100, Deduct	-54.44	
For >100, Deduct	-80.03	
For 2" Thick Door, Add	68.03	
For Polystyrene Core, Add	89.35	
For Mineral Core, 250 Degree Maximum Temperature Rise, Add	223.37	
For Continuously Welded And Filled Vertical Edge Seam, Add	111.68	
For Steel Stiffened, Add	223.37	

08 Openings**08 10 Doors and Frames****08 13 Metal Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 13 13 13-0110	EA	3'-4" x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	1,091.19	65.10
		<i>For Up To 1' Extra Height, Add</i>	265.91	
		<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	384.40	
		<i>For Galvanized Steel Door, Add</i>	192.20	
		<i>For Type 304 Stainless Steel Door, Add</i>	768.79	
		<i>For Type 316 Stainless Steel Door, Add</i>	1,249.29	
		<i>For Embossed Panel Door, Add</i>	230.64	
		<i>For Baked Enamel Finish, Add</i>	307.83	
		<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
		<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
		<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
		<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
		<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
		<i>For >50 To 100, Deduct</i>	-57.81	
		<i>For >100, Deduct</i>	-85.09	
		<i>For 2" Thick Door, Add</i>	72.93	
		<i>For Polystyrene Core, Add</i>	96.10	
		<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	240.25	
		<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	120.12	
		<i>For Steel Stiffened, Add</i>	240.25	
08 13 13 13-0111	EA	3'-6" x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	1,122.59	67.81
		<i>For Up To 1' Extra Height, Add</i>	273.09	
		<i>For 1' To 1'-6" Extra Height, Add</i>	521.02	
		<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	394.78	
		<i>For Galvanized Steel Door, Add</i>	197.39	
		<i>For Type 304 Stainless Steel Door, Add</i>	789.57	
		<i>For Type 316 Stainless Steel Door, Add</i>	1,283.05	
		<i>For Embossed Panel Door, Add</i>	236.87	
		<i>For Baked Enamel Finish, Add</i>	316.43	
		<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
		<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
		<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
		<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
		<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
		<i>For >50 To 100, Deduct</i>	-59.52	
		<i>For >100, Deduct</i>	-87.59	
		<i>For 2" Thick Door, Add</i>	74.95	
		<i>For Polystyrene Core, Add</i>	98.70	
		<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	246.74	
		<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	123.37	
		<i>For Steel Stiffened, Add</i>	246.74	
08 13 13 13-0112	EA	4' x 8' x 1-3/4", 16 Gauge, Level 3 Extra Heavy Duty, Honeycomb Core, Hollow Metal Door	1,237.33	73.24
		<i>For Up To 1' Extra Height, Add</i>	301.84	
		<i>For 1' To 1'-6" Extra Height, Add</i>	575.86	
		<i>For 14 Gauge, Level 4 Maximum Duty, Add</i>	436.34	
		<i>For Galvanized Steel Door, Add</i>	218.17	
		<i>For Type 304 Stainless Steel Door, Add</i>	872.68	
		<i>For Type 316 Stainless Steel Door, Add</i>	1,418.11	
		<i>For Embossed Panel Door, Add</i>	261.80	
		<i>For Baked Enamel Finish, Add</i>	349.23	
		<i>For 20 Minute Fire Rated Door, Add</i>	27.63	
		<i>For 45 Minute Fire Rated Door, Add</i>	41.40	
		<i>For 60 Minute Fire Rated Door, Add</i>	55.27	
		<i>For 90 Minute Fire Rated Door, Add</i>	93.38	
		<i>For 3 Hour Fire Rated Door, Add</i>	131.50	
		<i>For >50 To 100, Deduct</i>	-65.53	
		<i>For >100, Deduct</i>	-96.46	
		<i>For 2" Thick Door, Add</i>	82.75	
		<i>For Polystyrene Core, Add</i>	109.09	
		<i>For Mineral Core, 250 Degree Maximum Temperature Rise, Add</i>	272.71	
		<i>For Continuously Welded And Filled Vertical Edge Seam, Add</i>	136.36	
		<i>For Steel Stiffened, Add</i>	272.71	

08 13 76 Bifolding Metal Doors (08 13)**08 13 76 00-0001 Bi-Fold Metal Doors (08 13 76)****08 13 76 00-0002 Steel Full Louver Bi-Fold Doors (08 13 76 00-0001)**

08 13 76 00-0003	EA	1'-6", Two 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	251.48	59.65
08 13 76 00-0004	EA	2'-0", Two 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	272.59	65.07
08 13 76 00-0005	EA	2'-6", Two 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	297.11	70.50
08 13 76 00-0006	EA	3'-0", Two 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	333.61	81.34
08 13 76 00-0007	EA	4'-0", Four 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	436.78	86.77
08 13 76 00-0008	EA	5'-0", Four 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	477.26	92.18
08 13 76 00-0009	EA	6'-0", Four 1" Doors, Painted, 24 Gauge Steel, Full Louvered Bi-Fold	506.34	97.61

08 13 76 00-0010 Steel Half Louver, Half Panel Bi-Fold Doors (08 13 76 00-0001)

08 13 76 00-0011	EA	2'-0", Two 1" Doors, Painted, 24 Gauge Steel, Half Louvered Half Paneled Bi-Fold	286.27	65.07
08 13 76 00-0012	EA	2'-6", Two 1" Doors, Painted, 24 Gauge Steel, Half Louvered Half Paneled Bi-Fold	311.92	70.50
08 13 76 00-0013	EA	3'-0", Two 1" Doors, Painted, 24 Gauge Steel, Half Louvered Half Paneled Bi-Fold	342.73	81.34
08 13 76 00-0014	EA	4'-0", Four 1" Doors, Painted, 24 Gauge Steel, Half Louvered Half Paneled Bi-Fold	461.85	86.77
08 13 76 00-0015	EA	5'-0", Four 1" Doors, Painted, 24 Gauge Steel, Half Louvered Half Paneled Bi-Fold	495.50	92.18
08 13 76 00-0016	EA	6'-0", Four 1" Doors, Painted, 24 Gauge Steel, Half Louvered Half Paneled Bi-Fold	533.69	97.61

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 14 Wood Doors (08 10)

Note: Includes machining for all hardware, except mortised locks. Excludes frames, finish hardware (unless note states included).
See CSI section 08 05 13 00-0040 for mortise preparation, 08 70 00 00-0000 for finish hardware.

08 14 16 Flush Wood Doors (08 14)

08 14 16 00-0001 1-3/8" Thick, Hollow Core (HC), Wood Doors (08 14 16)

08 14 16 00-0002 Birch Faced Wood Door (08 14 16 00-0001)

08 14 16 00-0003	EA 2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	239.28	59.67
	For >50 To 100, Deduct	-14.95	
	For >100, Deduct	-20.93	
08 14 16 00-0004	EA 2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	239.28	59.67
	For >50 To 100, Deduct	-14.95	
	For >100, Deduct	-20.93	
08 14 16 00-0005	EA 2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	253.20	62.39
	For >50 To 100, Deduct	-15.78	
	For >100, Deduct	-22.11	
08 14 16 00-0006	EA 2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	259.45	62.39
	For >50 To 100, Deduct	-16.09	
	For >100, Deduct	-22.58	
08 14 16 00-0007	EA 2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	260.91	62.39
	For >50 To 100, Deduct	-16.16	
	For >100, Deduct	-22.69	
08 14 16 00-0008	EA 3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	267.08	65.10
	For >50 To 100, Deduct	-16.61	
	For >100, Deduct	-23.29	
08 14 16 00-0009	EA 3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	280.45	65.10
	For >50 To 100, Deduct	-17.28	
	For >100, Deduct	-24.29	
08 14 16 00-0010	EA 3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	295.50	67.81
	For >50 To 100, Deduct	-18.17	
	For >100, Deduct	-25.55	
08 14 16 00-0011	EA 2'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	246.28	59.67
	For >50 To 100, Deduct	-15.30	
	For >100, Deduct	-21.46	
08 14 16 00-0012	EA 2'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	246.28	59.67
	For >50 To 100, Deduct	-15.30	
	For >100, Deduct	-21.46	
08 14 16 00-0013	EA 2'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	260.68	62.39
	For >50 To 100, Deduct	-16.15	
	For >100, Deduct	-22.67	
08 14 16 00-0014	EA 2'-8" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	267.29	62.39
	For >50 To 100, Deduct	-16.48	
	For >100, Deduct	-23.17	
08 14 16 00-0015	EA 2'-10" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	268.84	62.39
	For >50 To 100, Deduct	-16.56	
	For >100, Deduct	-23.28	
08 14 16 00-0016	EA 3'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	275.04	65.10
	For >50 To 100, Deduct	-17.01	
	For >100, Deduct	-23.88	
08 14 16 00-0017	EA 3'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	289.19	65.10
	For >50 To 100, Deduct	-17.71	
	For >100, Deduct	-24.94	
08 14 16 00-0018	EA 3'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	304.79	67.81
	For >50 To 100, Deduct	-18.63	
	For >100, Deduct	-26.25	
08 14 16 00-0019	EA 2'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	271.02	59.67
	For >50 To 100, Deduct	-16.54	
	For >100, Deduct	-23.31	
	For 9' Door Height, Add	31.85	
08 14 16 00-0020	EA 2'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	271.02	59.67
	For >50 To 100, Deduct	-16.54	
	For >100, Deduct	-23.31	
	For 9' Door Height, Add	31.85	
08 14 16 00-0021	EA 2'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	287.19	62.39
	For >50 To 100, Deduct	-17.48	
	For >100, Deduct	-24.66	
	For 9' Door Height, Add	34.11	
08 14 16 00-0022	EA 2'-8" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	295.07	62.39
	For >50 To 100, Deduct	-17.87	
	For >100, Deduct	-25.25	
	For 9' Door Height, Add	35.76	
08 14 16 00-0023	EA 2'-10" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	296.93	62.39
	For >50 To 100, Deduct	-17.97	
	For >100, Deduct	-25.39	
	For 9' Door Height, Add	36.15	
08 14 16 00-0024	EA 3'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	303.28	65.10
	For >50 To 100, Deduct	-18.42	
	For >100, Deduct	-26.00	
	For 9' Door Height, Add	36.35	

08	08	Openings
	08 10	Doors and Frames
	08 14	Wood Doors



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0025	EA	3'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	320.19	65.10
		<i>For >50 To 100, Deduct</i>	-19.26	
		<i>For >100, Deduct</i>	-27.27	
		<i>For 9' Door Height, Add</i>	39.90	
08 14 16 00-0026	EA	3'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door	337.77	67.81
		<i>For >50 To 100, Deduct</i>	-20.28	
		<i>For >100, Deduct</i>	-28.72	
		<i>For 9' Door Height, Add</i>	42.45	
08 14 16 00-0027 Oak Faced Wood Door <small>(08 14 16 00-0001)</small>				
08 14 16 00-0028	EA	2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	296.90	59.67
		<i>For >50 To 100, Deduct</i>	-17.83	
		<i>For >100, Deduct</i>	-25.25	
08 14 16 00-0029	EA	2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	296.90	59.67
		<i>For >50 To 100, Deduct</i>	-17.83	
		<i>For >100, Deduct</i>	-25.25	
08 14 16 00-0030	EA	2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	314.89	62.39
		<i>For >50 To 100, Deduct</i>	-18.86	
		<i>For >100, Deduct</i>	-26.74	
08 14 16 00-0031	EA	2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	324.15	62.39
		<i>For >50 To 100, Deduct</i>	-19.33	
		<i>For >100, Deduct</i>	-27.43	
08 14 16 00-0032	EA	2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	325.78	62.39
		<i>For >50 To 100, Deduct</i>	-19.41	
		<i>For >100, Deduct</i>	-27.55	
08 14 16 00-0033	EA	3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	332.84	65.10
		<i>For >50 To 100, Deduct</i>	-19.90	
		<i>For >100, Deduct</i>	-28.22	
08 14 16 00-0034	EA	3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	352.61	65.10
		<i>For >50 To 100, Deduct</i>	-20.89	
		<i>For >100, Deduct</i>	-29.70	
08 14 16 00-0035	EA	3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	372.28	67.81
		<i>For >50 To 100, Deduct</i>	-22.00	
		<i>For >100, Deduct</i>	-31.31	
08 14 16 00-0036	EA	2'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	307.23	59.67
		<i>For >50 To 100, Deduct</i>	-18.35	
		<i>For >100, Deduct</i>	-26.03	
08 14 16 00-0037	EA	2'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	307.23	59.67
		<i>For >50 To 100, Deduct</i>	-18.35	
		<i>For >100, Deduct</i>	-26.03	
08 14 16 00-0038	EA	2'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	325.96	62.39
		<i>For >50 To 100, Deduct</i>	-19.42	
		<i>For >100, Deduct</i>	-27.57	
08 14 16 00-0039	EA	2'-8" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	335.75	62.39
		<i>For >50 To 100, Deduct</i>	-19.91	
		<i>For >100, Deduct</i>	-28.30	
08 14 16 00-0040	EA	2'-10" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	337.47	62.39
		<i>For >50 To 100, Deduct</i>	-19.99	
		<i>For >100, Deduct</i>	-28.43	
08 14 16 00-0041	EA	3'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	344.62	65.10
		<i>For >50 To 100, Deduct</i>	-20.49	
		<i>For >100, Deduct</i>	-29.10	
08 14 16 00-0042	EA	3'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	365.54	65.10
		<i>For >50 To 100, Deduct</i>	-21.53	
		<i>For >100, Deduct</i>	-30.67	
08 14 16 00-0043	EA	3'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	386.05	67.81
		<i>For >50 To 100, Deduct</i>	-22.69	
		<i>For >100, Deduct</i>	-32.34	
08 14 16 00-0044	EA	2'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	343.87	59.67
		<i>For >50 To 100, Deduct</i>	-20.18	
		<i>For >100, Deduct</i>	-28.77	
		<i>For 9' Door Height, Add</i>	47.15	
08 14 16 00-0045	EA	2'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	343.87	59.67
		<i>For >50 To 100, Deduct</i>	-20.18	
		<i>For >100, Deduct</i>	-28.77	
		<i>For 9' Door Height, Add</i>	47.15	
08 14 16 00-0046	EA	2'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	365.19	62.39
		<i>For >50 To 100, Deduct</i>	-21.38	
		<i>For >100, Deduct</i>	-30.51	
		<i>For 9' Door Height, Add</i>	50.49	
08 14 16 00-0047	EA	2'-8" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	376.88	62.39
		<i>For >50 To 100, Deduct</i>	-21.96	
		<i>For >100, Deduct</i>	-31.39	
		<i>For 9' Door Height, Add</i>	52.94	
08 14 16 00-0048	EA	2'-10" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	378.96	62.39
		<i>For >50 To 100, Deduct</i>	-22.07	
		<i>For >100, Deduct</i>	-31.54	
		<i>For 9' Door Height, Add</i>	53.38	
08 14 16 00-0049	EA	3'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door	386.44	65.10
		<i>For >50 To 100, Deduct</i>	-22.58	
		<i>For >100, Deduct</i>	-32.24	
		<i>For 9' Door Height, Add</i>	53.81	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0050	EA 3'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	411.45 -23.83 -34.11 59.06	65.10
08 14 16 00-0051	EA 3'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	434.89 -25.14 -36.01 62.84	67.81
08 14 16 00-0052	Maple Faced Wood Door <small>(08 14 16 00-0001)</small>		
08 14 16 00-0053	EA 2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	297.37 -17.85 -25.29	59.67
08 14 16 00-0054	EA 2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	297.37 -17.85 -25.29	59.67
08 14 16 00-0055	EA 2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	315.38 -18.89 -26.77	62.39
08 14 16 00-0056	EA 2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	324.68 -19.35 -27.47	62.39
08 14 16 00-0057	EA 2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	326.31 -19.43 -27.59	62.39
08 14 16 00-0058	EA 3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	333.38 -19.92 -28.26	65.10
08 14 16 00-0059	EA 3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	353.19 -20.91 -29.74	65.10
08 14 16 00-0060	EA 3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	372.90 -22.04 -31.36	67.81
08 14 16 00-0061	EA 2'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	307.71 -18.37 -26.06	59.67
08 14 16 00-0062	EA 2'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	307.71 -18.37 -26.06	59.67
08 14 16 00-0063	EA 2'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	326.49 -19.44 -27.61	62.39
08 14 16 00-0064	EA 2'-8" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	336.30 -19.93 -28.34	62.39
08 14 16 00-0065	EA 2'-10" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	338.04 -20.02 -28.47	62.39
08 14 16 00-0066	EA 3'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	345.18 -20.51 -29.14	65.10
08 14 16 00-0067	EA 3'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	366.16 -21.56 -30.72	65.10
08 14 16 00-0068	EA 3'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	386.71 -22.73 -32.39	67.81
08 14 16 00-0069	EA 2'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	344.46 -20.21 -28.82 47.27	59.67
08 14 16 00-0070	EA 2'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	344.46 -20.21 -28.82 47.27	59.67
08 14 16 00-0071	EA 2'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	365.81 -21.41 -30.56 50.62	62.39
08 14 16 00-0072	EA 2'-8" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	377.53 -22.00 -31.43 53.08	62.39
08 14 16 00-0073	EA 2'-10" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	379.62 -22.10 -31.59 53.52	62.39
08 14 16 00-0074	EA 3'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	387.11 -22.61 -32.29 53.95	65.10

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0075	EA	3'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door.....	412.20	65.10
		<i>For >50 To 100, Deduct</i>	-23.87	
		<i>For >100, Deduct</i>	-34.17	
		<i>For 9' Door Height, Add</i>	59.22	
08 14 16 00-0076	EA	3'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door.....	435.67	67.81
		<i>For >50 To 100, Deduct</i>	-25.17	
		<i>For >100, Deduct</i>	-36.07	
		<i>For 9' Door Height, Add</i>	63.01	
08 14 16 00-0077 Luan Faced Wood Doors (08 14 16 00-0001)				
08 14 16 00-0078	EA	2'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	210.54	59.67
		<i>For >50 To 100, Deduct</i>	-13.51	
		<i>For >100, Deduct</i>	-18.77	
08 14 16 00-0079	EA	2'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	210.54	59.67
		<i>For >50 To 100, Deduct</i>	-13.51	
		<i>For >100, Deduct</i>	-18.77	
08 14 16 00-0080	EA	2'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	222.13	62.39
		<i>For >50 To 100, Deduct</i>	-14.23	
		<i>For >100, Deduct</i>	-19.78	
08 14 16 00-0081	EA	2'-8" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	227.35	62.39
		<i>For >50 To 100, Deduct</i>	-14.49	
		<i>For >100, Deduct</i>	-20.17	
08 14 16 00-0082	EA	2'-10" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	229.19	62.39
		<i>For >50 To 100, Deduct</i>	-14.58	
		<i>For >100, Deduct</i>	-20.31	
08 14 16 00-0083	EA	3'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	236.46	65.10
		<i>For >50 To 100, Deduct</i>	-15.08	
		<i>For >100, Deduct</i>	-20.99	
08 14 16 00-0084	EA	3'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	246.62	65.10
		<i>For >50 To 100, Deduct</i>	-15.59	
		<i>For >100, Deduct</i>	-21.75	
08 14 16 00-0085	EA	3'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	259.51	67.81
		<i>For >50 To 100, Deduct</i>	-16.37	
		<i>For >100, Deduct</i>	-22.85	
08 14 16 00-0086	EA	2'-0" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	215.84	59.67
		<i>For >50 To 100, Deduct</i>	-13.78	
		<i>For >100, Deduct</i>	-19.17	
08 14 16 00-0087	EA	2'-4" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door	214.24	59.67
		<i>For >50 To 100, Deduct</i>	-13.70	
		<i>For >100, Deduct</i>	-19.05	
08 14 16 00-0088	EA	2'-6" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	227.80	62.39
		<i>For >50 To 100, Deduct</i>	-14.51	
		<i>For >100, Deduct</i>	-20.20	
08 14 16 00-0089	EA	2'-8" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	233.31	62.39
		<i>For >50 To 100, Deduct</i>	-14.78	
		<i>For >100, Deduct</i>	-20.62	
08 14 16 00-0090	EA	2'-10" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	233.44	62.39
		<i>For >50 To 100, Deduct</i>	-14.79	
		<i>For >100, Deduct</i>	-20.63	
08 14 16 00-0091	EA	3'-0" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	242.64	65.10
		<i>For >50 To 100, Deduct</i>	-15.39	
		<i>For >100, Deduct</i>	-21.45	
08 14 16 00-0092	EA	3'-4" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	253.39	65.10
		<i>For >50 To 100, Deduct</i>	-15.92	
		<i>For >100, Deduct</i>	-22.26	
08 14 16 00-0093	EA	3'-6" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	264.54	67.81
		<i>For >50 To 100, Deduct</i>	-16.62	
		<i>For >100, Deduct</i>	-23.23	
08 14 16 00-0094	EA	2'-0" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	234.67	59.67
		<i>For >50 To 100, Deduct</i>	-14.72	
		<i>For >100, Deduct</i>	-20.58	
		<i>For 9' Door Height, Add</i>	24.22	
08 14 16 00-0095	EA	2'-4" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	234.64	59.67
		<i>For >50 To 100, Deduct</i>	-14.72	
		<i>For >100, Deduct</i>	-20.58	
		<i>For 9' Door Height, Add</i>	24.21	
08 14 16 00-0096	EA	2'-6" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	247.89	62.39
		<i>For >50 To 100, Deduct</i>	-15.51	
		<i>For >100, Deduct</i>	-21.71	
		<i>For 9' Door Height, Add</i>	25.86	
08 14 16 00-0097	EA	2'-8" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	254.47	62.39
		<i>For >50 To 100, Deduct</i>	-15.84	
		<i>For >100, Deduct</i>	-22.20	
		<i>For 9' Door Height, Add</i>	27.24	
08 14 16 00-0098	EA	2'-10" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	256.81	62.39
		<i>For >50 To 100, Deduct</i>	-15.96	
		<i>For >100, Deduct</i>	-22.38	
		<i>For 9' Door Height, Add</i>	27.73	
08 14 16 00-0099	EA	3'-0" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Luan Faced Wood Door.....	264.56	65.10
		<i>For >50 To 100, Deduct</i>	-16.48	
		<i>For >100, Deduct</i>	-23.10	
		<i>For 9' Door Height, Add</i>	28.22	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0100	EA 3'-4" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	277.42 -17.13 -24.06 30.92	65.10
08 14 16 00-0101	EA 3'-6" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	292.25 -18.00 -25.31 32.89	67.81
08 14 16 00-0102	Medium Density Overlay (MDO) Faced Wood Doors <small>(08 14 16 00-0001)</small>		
08 14 16 00-0103	EA 2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	226.81 -14.32 -19.99	59.67
08 14 16 00-0104	EA 2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	226.81 -14.32 -19.99	59.67
08 14 16 00-0105	EA 2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	240.06 -15.12 -21.12	62.39
08 14 16 00-0106	EA 2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	243.76 -15.31 -21.40	62.39
08 14 16 00-0107	EA 2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	247.49 -15.49 -21.68	62.39
08 14 16 00-0108	EA 3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	256.62 -16.09 -22.50	65.10
08 14 16 00-0109	EA 3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	270.53 -16.78 -23.54	65.10
08 14 16 00-0110	EA 3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	284.93 -17.64 -24.76	67.81
08 14 16 00-0111	EA 2'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	233.05 -14.64 -20.46	59.67
08 14 16 00-0112	EA 2'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	233.06 -14.64 -20.46	59.67
08 14 16 00-0113	EA 2'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	246.76 -15.46 -21.63	62.39
08 14 16 00-0114	EA 2'-8" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	250.69 -15.65 -21.92	62.39
08 14 16 00-0115	EA 2'-10" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	254.63 -15.85 -22.22	62.39
08 14 16 00-0116	EA 3'-0" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	263.99 -16.45 -23.05	65.10
08 14 16 00-0117	EA 3'-4" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	278.70 -17.19 -24.16	65.10
08 14 16 00-0118	EA 3'-6" x 7' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	293.63 -18.07 -25.41	67.81
08 14 16 00-0119	EA 2'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	255.21 -15.74 -22.12 28.53	59.67
08 14 16 00-0120	EA 2'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	255.24 -15.75 -22.13 28.53	59.67
08 14 16 00-0121	EA 2'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	270.54 -16.65 -23.41 30.61	62.39
08 14 16 00-0122	EA 2'-8" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	275.26 -16.88 -23.76 31.60	62.39
08 14 16 00-0123	EA 2'-10" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	279.97 -17.12 -24.12 32.59	62.39
08 14 16 00-0124	EA 3'-0" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	290.09 -17.76 -25.01 33.58	65.10

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0125	EA 3'-4" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	307.67 -18.64 -26.33 37.27	65.10
08 14 16 00-0126	EA 3'-6" x 8' x 1-3/8" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	324.44 -19.61 -27.72 39.65	67.81
08 14 16 00-0127	1-3/4" Thick, Hollow Core (HC), Wood Doors <small>(08 14 16)</small>		
08 14 16 00-0128	Birch Faced Wood Doors <small>(08 14 16 00-0127)</small>		
08 14 16 00-0129	EA 2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	269.26 -16.45 -23.18	59.67
08 14 16 00-0130	EA 2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	269.26 -16.45 -23.18	59.67
08 14 16 00-0131	EA 2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	280.32 -17.14 -24.14	62.39
08 14 16 00-0132	EA 2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	282.43 -17.24 -24.30	62.39
08 14 16 00-0133	EA 2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	287.04 -17.47 -24.65	62.39
08 14 16 00-0134	EA 3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	297.08 -18.11 -25.54	65.10
08 14 16 00-0135	EA 3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	321.55 -19.33 -27.37	65.10
08 14 16 00-0136	EA 3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	376.64 -22.22 -31.64	67.81
08 14 16 00-0137	EA 3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	388.69 -22.83 -32.54	67.81
08 14 16 00-0138	EA 4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	412.79 -24.03 -34.35	67.81
08 14 16 00-0139	EA 2'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	277.99 -16.88 -23.83	59.67
08 14 16 00-0140	EA 2'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	277.99 -16.88 -23.83	59.67
08 14 16 00-0141	EA 2'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	289.37 -17.59 -24.82	62.39
08 14 16 00-0142	EA 2'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	291.61 -17.70 -24.99	62.39
08 14 16 00-0143	EA 2'-10" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	296.49 -17.94 -25.36	62.39
08 14 16 00-0144	EA 3'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	306.78 -18.59 -26.26	65.10
08 14 16 00-0145	EA 3'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	332.69 -19.89 -28.21	65.10
08 14 16 00-0146	EA 3'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	390.68 -22.92 -32.69	67.81
08 14 16 00-0147	EA 3'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	403.42 -23.56 -33.65	67.81
08 14 16 00-0148	EA 4'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	428.93 -24.84 -35.56	67.81
08 14 16 00-0149	EA 2'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	308.93 -18.43 -26.15 39.81	59.67
08 14 16 00-0150	EA 2'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	308.93 -18.43 -26.15 39.81	59.67
08 14 16 00-0151	EA 2'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	321.48 -19.19 -27.23 41.31	62.39

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0152 EA 2'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	324.13 -19.33 -27.43 41.87	62.39
08 14 16 00-0153 EA 2'-10" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	329.98 -19.62 -27.87 43.09	62.39
08 14 16 00-0154 EA 3'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	341.21 -20.32 -28.85 44.31	65.10
08 14 16 00-0155 EA 3'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	372.18 -21.86 -31.17 50.82	65.10
08 14 16 00-0156 EA 3'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	440.41 -25.41 -36.42 64.00	67.81
08 14 16 00-0157 EA 3'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	455.63 -26.17 -37.56 67.20	67.81
08 14 16 00-0158 EA 4'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Birch Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	486.13 -27.70 -39.85 73.61	67.81
08 14 16 00-0159 Oak Faced Wood Doors <small>(08 14 16 00-0127)</small>		
08 14 16 00-0160 EA 2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	355.45 -20.76 -29.64	59.67
08 14 16 00-0161 EA 2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	355.45 -20.76 -29.64	59.67
08 14 16 00-0162 EA 2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	369.73 -21.61 -30.85	62.39
08 14 16 00-0163 EA 2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	373.05 -21.77 -31.10	62.39
08 14 16 00-0164 EA 2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	380.32 -22.14 -31.64	62.39
08 14 16 00-0165 EA 3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	392.99 -22.90 -32.73	65.10
08 14 16 00-0166 EA 3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	431.54 -24.63 -35.62	65.10
08 14 16 00-0167 EA 3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	515.19 -29.15 -42.03	67.81
08 14 16 00-0168 EA 3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	534.18 -30.10 -43.45	67.81
08 14 16 00-0169 EA 4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	572.16 -32.00 -46.30	67.81
08 14 16 00-0170 EA 2'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	369.18 -21.44 -30.67	59.67
08 14 16 00-0171 EA 2'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	369.19 -21.44 -30.67	59.67
08 14 16 00-0172 EA 2'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	383.98 -22.32 -31.92	62.39
08 14 16 00-0173 EA 2'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	387.50 -22.49 -32.18	62.39
08 14 16 00-0174 EA 2'-10" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	395.19 -22.88 -32.76	62.39
08 14 16 00-0175 EA 3'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	408.29 -23.67 -33.88	65.10
08 14 16 00-0176 EA 3'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	449.08 -25.71 -36.94	65.10
08 14 16 00-0177 EA 3'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	537.28 -30.25 -43.69	67.81

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0178	EA 3'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	557.39 -31.26 -45.20	67.81
08 14 16 00-0179	EA 4'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	597.57 -33.27 -48.21	67.81
08 14 16 00-0180	EA 2'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	417.88 -23.88 -34.33	59.67
	<i>For 9' Door Height, Add</i>	62.69	
08 14 16 00-0181	EA 2'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	417.91 -23.88 -34.33	59.67
	<i>For 9' Door Height, Add</i>	62.70	
08 14 16 00-0182	EA 2'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	434.54 -24.85 -35.71	62.39
	<i>For 9' Door Height, Add</i>	65.05	
08 14 16 00-0183	EA 2'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	438.72 -25.06 -36.02	62.39
	<i>For 9' Door Height, Add</i>	65.93	
08 14 16 00-0184	EA 2'-10" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	447.92 -25.52 -36.71	62.39
	<i>For 9' Door Height, Add</i>	67.86	
08 14 16 00-0185	EA 3'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	462.52 -26.38 -37.94	65.10
	<i>For 9' Door Height, Add</i>	69.79	
08 14 16 00-0186	EA 3'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	511.27 -28.82 -41.60	65.10
	<i>For 9' Door Height, Add</i>	80.02	
08 14 16 00-0187	EA 3'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	615.61 -34.17 -49.56	67.81
	<i>For 9' Door Height, Add</i>	100.80	
08 14 16 00-0188	EA 3'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	639.64 -35.37 -51.36	67.81
	<i>For 9' Door Height, Add</i>	105.84	
08 14 16 00-0189	EA 4'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Oak Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	687.66 -37.77 -54.97	67.81
	<i>For 9' Door Height, Add</i>	115.93	
08 14 16 00-0190	Maple Faced Wood Doors <small>(08 14 16 00-0127)</small>		
08 14 16 00-0191	EA 2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	356.06 -20.79 -29.69	59.67
08 14 16 00-0192	EA 2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	356.06 -20.79 -29.69	59.67
08 14 16 00-0193	EA 2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	370.37 -21.64 -30.90	62.39
08 14 16 00-0194	EA 2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	373.84 -21.81 -31.16	62.39
08 14 16 00-0195	EA 2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	381.06 -22.17 -31.70	62.39
08 14 16 00-0196	EA 3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	393.68 -22.94 -32.78	65.10
08 14 16 00-0197	EA 3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	432.33 -24.87 -35.68	65.10
08 14 16 00-0198	EA 3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	497.26 -28.25 -40.69	67.81
08 14 16 00-0199	EA 3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	535.22 -30.15 -43.53	67.81
08 14 16 00-0200	EA 4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	573.30 -32.06 -46.39	67.81
08 14 16 00-0201	EA 2'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	369.84 -21.48 -30.72	59.67
08 14 16 00-0202	EA 2'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	369.84 -21.48 -30.72	59.67

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0203	EA			2'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	384.65 -22.35	62.39
				<i>For >100, Deduct</i>	-31.97	
08 14 16 00-0204	EA			2'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	388.34 -22.54	62.39
				<i>For >100, Deduct</i>	-32.24	
08 14 16 00-0205	EA			2'-10" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	395.96 -22.92	62.39
				<i>For >100, Deduct</i>	-32.82	
08 14 16 00-0206	EA			3'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	409.00 -23.71	65.10
				<i>For >100, Deduct</i>	-33.93	
08 14 16 00-0207	EA			3'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	449.91 -25.75	65.10
				<i>For >100, Deduct</i>	-37.00	
08 14 16 00-0208	EA			3'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	518.21 -29.30	67.81
				<i>For >100, Deduct</i>	-42.26	
08 14 16 00-0209	EA			3'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	558.50 -31.32	67.81
				<i>For >100, Deduct</i>	-45.28	
08 14 16 00-0210	EA			4'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	598.76 -33.33	67.81
				<i>For >100, Deduct</i>	-48.30	
08 14 16 00-0211	EA			2'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	418.69 -23.92	59.67
				<i>For >100, Deduct</i>	-34.39	
				<i>For 9' Door Height, Add</i>	62.86	
08 14 16 00-0212	EA			2'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	418.69 -23.92	59.67
				<i>For >100, Deduct</i>	-34.39	
				<i>For 9' Door Height, Add</i>	62.86	
08 14 16 00-0213	EA			2'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	435.33 -24.89	62.39
				<i>For >100, Deduct</i>	-35.77	
				<i>For 9' Door Height, Add</i>	65.22	
08 14 16 00-0214	EA			2'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	439.74 -25.11	62.39
				<i>For >100, Deduct</i>	-36.10	
				<i>For 9' Door Height, Add</i>	66.14	
08 14 16 00-0215	EA			2'-10" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	448.81 -25.56	62.39
				<i>For >100, Deduct</i>	-36.78	
				<i>For 9' Door Height, Add</i>	68.05	
08 14 16 00-0216	EA			3'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	463.37 -26.42	65.10
				<i>For >100, Deduct</i>	-38.01	
				<i>For 9' Door Height, Add</i>	69.97	
08 14 16 00-0217	EA			3'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	512.24 -28.87	65.10
				<i>For >100, Deduct</i>	-41.67	
				<i>For 9' Door Height, Add</i>	80.23	
08 14 16 00-0218	EA			3'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	592.84 -33.03	67.81
				<i>For >100, Deduct</i>	-47.85	
				<i>For 9' Door Height, Add</i>	96.01	
08 14 16 00-0219	EA			3'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	640.96 -35.44	67.81
				<i>For >100, Deduct</i>	-51.46	
				<i>For 9' Door Height, Add</i>	106.12	
08 14 16 00-0220	EA			4'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Maple Faced Wood Door..... <i>For >50 To 100, Deduct</i>	689.11 -37.85	67.81
				<i>For >100, Deduct</i>	-55.07	
				<i>For 9' Door Height, Add</i>	116.23	
08 14 16 00-0221 Walnut Faced Wood Doors (08 14 16 00-0127)						
08 14 16 00-0222	EA			2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door..... <i>For >50 To 100, Deduct</i>	439.19 -24.94	59.67
				<i>For >100, Deduct</i>	-35.92	
08 14 16 00-0223	EA			2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door..... <i>For >50 To 100, Deduct</i>	439.19 -24.94	59.67
				<i>For >100, Deduct</i>	-35.92	
08 14 16 00-0224	EA			2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door..... <i>For >50 To 100, Deduct</i>	446.82 -25.46	62.39
				<i>For >100, Deduct</i>	-36.63	
08 14 16 00-0225	EA			2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door..... <i>For >50 To 100, Deduct</i>	461.01 -26.17	62.39
				<i>For >100, Deduct</i>	-37.70	
08 14 16 00-0226	EA			2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door..... <i>For >50 To 100, Deduct</i>	463.17 -26.28	62.39
				<i>For >100, Deduct</i>	-37.86	
08 14 16 00-0227	EA			3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door..... <i>For >50 To 100, Deduct</i>	470.77 -26.79	65.10
				<i>For >100, Deduct</i>	-38.56	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 14 16 00-0228	EA	3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	508.78		65.10
		<i>For >50 To 100, Deduct</i>	-28.69		
		<i>For >100, Deduct</i>	-41.41		
08 14 16 00-0229	EA	3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	612.34		67.81
		<i>For >50 To 100, Deduct</i>	-34.01		
		<i>For >100, Deduct</i>	-49.32		
08 14 16 00-0230	EA	3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	636.17		67.81
		<i>For >50 To 100, Deduct</i>	-35.20		
		<i>For >100, Deduct</i>	-51.10		
08 14 16 00-0231	EA	4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	683.89		67.81
		<i>For >50 To 100, Deduct</i>	-37.59		
		<i>For >100, Deduct</i>	-54.68		
08 14 16 00-0232	EA	2'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	457.79		59.67
		<i>For >50 To 100, Deduct</i>	-25.87		
		<i>For >100, Deduct</i>	-37.32		
08 14 16 00-0233	EA	2'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	457.79		59.67
		<i>For >50 To 100, Deduct</i>	-25.87		
		<i>For >100, Deduct</i>	-37.32		
08 14 16 00-0234	EA	2'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	465.58		62.39
		<i>For >50 To 100, Deduct</i>	-26.40		
		<i>For >100, Deduct</i>	-38.04		
08 14 16 00-0235	EA	2'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	480.56		62.39
		<i>For >50 To 100, Deduct</i>	-27.15		
		<i>For >100, Deduct</i>	-39.16		
08 14 16 00-0236	EA	2'-10" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	482.88		62.39
		<i>For >50 To 100, Deduct</i>	-27.26		
		<i>For >100, Deduct</i>	-39.34		
08 14 16 00-0237	EA	3'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	490.59		65.10
		<i>For >50 To 100, Deduct</i>	-27.78		
		<i>For >100, Deduct</i>	-40.05		
08 14 16 00-0238	EA	3'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	530.80		65.10
		<i>For >50 To 100, Deduct</i>	-29.80		
		<i>For >100, Deduct</i>	-43.07		
08 14 16 00-0239	EA	3'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	640.09		67.81
		<i>For >50 To 100, Deduct</i>	-35.40		
		<i>For >100, Deduct</i>	-51.40		
08 14 16 00-0240	EA	3'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	665.31		67.81
		<i>For >50 To 100, Deduct</i>	-36.66		
		<i>For >100, Deduct</i>	-53.29		
08 14 16 00-0241	EA	4'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	715.79		67.81
		<i>For >50 To 100, Deduct</i>	-39.18		
		<i>For >100, Deduct</i>	-57.08		
08 14 16 00-0242	EA	2'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	523.79		59.67
		<i>For >50 To 100, Deduct</i>	-29.17		
		<i>For >100, Deduct</i>	-42.27		
		<i>For 9' Door Height, Add</i>	84.93		
08 14 16 00-0243	EA	2'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	523.79		59.67
		<i>For >50 To 100, Deduct</i>	-29.17		
		<i>For >100, Deduct</i>	-42.27		
		<i>For 9' Door Height, Add</i>	84.93		
08 14 16 00-0244	EA	2'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	532.05		62.39
		<i>For >50 To 100, Deduct</i>	-29.72		
		<i>For >100, Deduct</i>	-43.02		
		<i>For 9' Door Height, Add</i>	85.53		
08 14 16 00-0245	EA	2'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	549.94		62.39
		<i>For >50 To 100, Deduct</i>	-30.62		
		<i>For >100, Deduct</i>	-44.36		
		<i>For 9' Door Height, Add</i>	89.29		
08 14 16 00-0246	EA	2'-10" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	552.70		62.39
		<i>For >50 To 100, Deduct</i>	-30.75		
		<i>For >100, Deduct</i>	-44.57		
		<i>For 9' Door Height, Add</i>	89.87		
08 14 16 00-0247	EA	3'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	560.86		65.10
		<i>For >50 To 100, Deduct</i>	-31.30		
		<i>For >100, Deduct</i>	-45.32		
		<i>For 9' Door Height, Add</i>	90.44		
08 14 16 00-0248	EA	3'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	608.93		65.10
		<i>For >50 To 100, Deduct</i>	-33.70		
		<i>For >100, Deduct</i>	-48.92		
		<i>For 9' Door Height, Add</i>	100.53		
08 14 16 00-0249	EA	3'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	738.46		67.81
		<i>For >50 To 100, Deduct</i>	-40.31		
		<i>For >100, Deduct</i>	-58.78		
		<i>For 9' Door Height, Add</i>	126.59		
08 14 16 00-0250	EA	3'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	768.61		67.81
		<i>For >50 To 100, Deduct</i>	-41.82		
		<i>For >100, Deduct</i>	-61.04		
		<i>For 9' Door Height, Add</i>	132.93		
08 14 16 00-0251	EA	4'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Walnut Faced Wood Door	828.90		67.81
		<i>For >50 To 100, Deduct</i>	-44.84		
		<i>For >100, Deduct</i>	-65.56		
		<i>For 9' Door Height, Add</i>	145.59		

08 14 16 00-0252 Lauan Faced Wood Doors (08 14 16 00-0127)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0253 EA 2'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	235.20 -14.74 -20.62	59.67
08 14 16 00-0254 EA 2'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	235.20 -14.74 -20.62	59.67
08 14 16 00-0255 EA 2'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	248.57 -15.55 -21.76	62.39
08 14 16 00-0256 EA 2'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	255.05 -15.87 -22.25	62.39
08 14 16 00-0257 EA 2'-10" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	256.34 -15.94 -22.34	62.39
08 14 16 00-0258 EA 3'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	263.05 -16.41 -22.98	65.10
08 14 16 00-0259 EA 3'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	277.65 -17.14 -24.08	65.10
08 14 16 00-0260 EA 3'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	301.91 -18.49 -26.03	67.81
08 14 16 00-0261 EA 3'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	310.20 -18.90 -26.66	67.81
08 14 16 00-0262 EA 4'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	326.84 -19.73 -27.90	67.81
08 14 16 00-0263 EA 2'-0" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	241.93 -15.08 -21.13	59.67
08 14 16 00-0264 EA 2'-4" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	241.93 -15.08 -21.13	59.67
08 14 16 00-0265 EA 2'-6" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	255.78 -15.91 -22.30	62.39
08 14 16 00-0266 EA 2'-8" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	262.64 -16.25 -22.82	62.39
08 14 16 00-0267 EA 2'-10" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	264.00 -16.32 -22.92	62.39
08 14 16 00-0268 EA 3'-0" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	270.78 -16.79 -23.56	65.10
08 14 16 00-0269 EA 3'-4" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	286.24 -17.57 -24.72	65.10
08 14 16 00-0270 EA 3'-6" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	311.57 -18.97 -26.76	67.81
08 14 16 00-0271 EA 3'-8" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	320.36 -19.41 -27.42	67.81
08 14 16 00-0272 EA 4'-0" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	337.96 -20.29 -28.74	67.81
08 14 16 00-0273 EA 2'-0" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	265.82 -16.28 -22.92	59.67
08 14 16 00-0274 EA 2'-4" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	265.82 -16.28 -22.92 30.76	59.67
08 14 16 00-0275 EA 2'-6" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	281.32 -17.19 -24.22 32.88	62.39
08 14 16 00-0276 EA 2'-8" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	289.51 -17.59 -24.83 34.60	62.39
08 14 16 00-0277 EA 2'-10" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	291.15 -17.68 -24.96 34.94	62.39
08 14 16 00-0278 EA 3'-0" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	298.19 -18.16 -25.62 35.28	65.10

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0279	EA	3'-4" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door.....	316.67	65.10
		<i>For >50 To 100, Deduct</i>	-19.09	
		<i>For >100, Deduct</i>	-27.01	
		<i>For 9' Door Height, Add</i>	39.16	
08 14 16 00-0280	EA	3'-6" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door.....	345.87	67.81
		<i>For >50 To 100, Deduct</i>	-20.68	
		<i>For >100, Deduct</i>	-29.33	
		<i>For 9' Door Height, Add</i>	44.15	
08 14 16 00-0281	EA	3'-8" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door.....	356.39	67.81
		<i>For >50 To 100, Deduct</i>	-21.21	
		<i>For >100, Deduct</i>	-30.12	
		<i>For 9' Door Height, Add</i>	46.36	
08 14 16 00-0282	EA	4'-0" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), Lauan Faced Wood Door.....	377.41	67.81
		<i>For >50 To 100, Deduct</i>	-22.26	
		<i>For >100, Deduct</i>	-31.70	
		<i>For 9' Door Height, Add</i>	50.77	
08 14 16 00-0283		Medium Density Overlay (MDO) Faced Wood Doors <small>(08 14 16 00-0127)</small>		
08 14 16 00-0284	EA	2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	253.22	59.67
		<i>For >50 To 100, Deduct</i>	-15.65	
		<i>For >100, Deduct</i>	-21.98	
08 14 16 00-0285	EA	2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	253.24	59.67
		<i>For >50 To 100, Deduct</i>	-15.65	
		<i>For >100, Deduct</i>	-21.98	
08 14 16 00-0286	EA	2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	262.36	62.39
		<i>For >50 To 100, Deduct</i>	-16.24	
		<i>For >100, Deduct</i>	-22.80	
08 14 16 00-0287	EA	2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	269.82	62.39
		<i>For >50 To 100, Deduct</i>	-16.61	
		<i>For >100, Deduct</i>	-23.36	
08 14 16 00-0288	EA	2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	273.55	62.39
		<i>For >50 To 100, Deduct</i>	-16.80	
		<i>For >100, Deduct</i>	-23.64	
08 14 16 00-0289	EA	3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	282.65	65.10
		<i>For >50 To 100, Deduct</i>	-17.39	
		<i>For >100, Deduct</i>	-24.45	
08 14 16 00-0290	EA	3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	291.16	65.10
		<i>For >50 To 100, Deduct</i>	-17.81	
		<i>For >100, Deduct</i>	-25.09	
08 14 16 00-0291	EA	3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	324.24	67.81
		<i>For >50 To 100, Deduct</i>	-19.60	
		<i>For >100, Deduct</i>	-27.71	
08 14 16 00-0292	EA	3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	333.67	67.81
		<i>For >50 To 100, Deduct</i>	-20.07	
		<i>For >100, Deduct</i>	-28.42	
08 14 16 00-0293	EA	4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	352.55	67.81
		<i>For >50 To 100, Deduct</i>	-21.02	
		<i>For >100, Deduct</i>	-29.83	
08 14 16 00-0294	EA	2'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	261.02	59.67
		<i>For >50 To 100, Deduct</i>	-16.04	
		<i>For >100, Deduct</i>	-22.56	
08 14 16 00-0295	EA	2'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	261.02	59.67
		<i>For >50 To 100, Deduct</i>	-16.04	
		<i>For >100, Deduct</i>	-22.56	
08 14 16 00-0296	EA	2'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	270.36	62.39
		<i>For >50 To 100, Deduct</i>	-16.64	
		<i>For >100, Deduct</i>	-23.40	
08 14 16 00-0297	EA	2'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	278.25	62.39
		<i>For >50 To 100, Deduct</i>	-17.03	
		<i>For >100, Deduct</i>	-23.99	
08 14 16 00-0298	EA	2'-10" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	282.20	62.39
		<i>For >50 To 100, Deduct</i>	-17.23	
		<i>For >100, Deduct</i>	-24.28	
08 14 16 00-0299	EA	3'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	291.54	65.10
		<i>For >50 To 100, Deduct</i>	-17.83	
		<i>For >100, Deduct</i>	-25.12	
08 14 16 00-0300	EA	3'-4" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	300.53	65.10
		<i>For >50 To 100, Deduct</i>	-18.28	
		<i>For >100, Deduct</i>	-25.79	
08 14 16 00-0301	EA	3'-6" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	335.23	67.81
		<i>For >50 To 100, Deduct</i>	-20.15	
		<i>For >100, Deduct</i>	-28.53	
08 14 16 00-0302	EA	3'-8" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	345.21	67.81
		<i>For >50 To 100, Deduct</i>	-20.65	
		<i>For >100, Deduct</i>	-29.28	
08 14 16 00-0303	EA	4'-0" x 7' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	365.16	67.81
		<i>For >50 To 100, Deduct</i>	-21.65	
		<i>For >100, Deduct</i>	-30.78	
08 14 16 00-0304	EA	2'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	288.65	59.67
		<i>For >50 To 100, Deduct</i>	-17.42	
		<i>For >100, Deduct</i>	-24.63	
		<i>For 9' Door Height, Add</i>	35.55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0305 EA 2'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	288.65	59.67
<i>For >50 To 100, Deduct</i>	-17.42	
<i>For >100, Deduct</i>	-24.63	
<i>For 9' Door Height, Add</i>	35.55	
08 14 16 00-0306 EA 2'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	298.74	62.39
<i>For >50 To 100, Deduct</i>	-18.06	
<i>For >100, Deduct</i>	-25.52	
<i>For 9' Door Height, Add</i>	36.53	
08 14 16 00-0307 EA 2'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	308.17	62.39
<i>For >50 To 100, Deduct</i>	-18.53	
<i>For >100, Deduct</i>	-26.23	
<i>For 9' Door Height, Add</i>	38.51	
08 14 16 00-0308 EA 2'-10" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	312.89	62.39
<i>For >50 To 100, Deduct</i>	-18.76	
<i>For >100, Deduct</i>	-26.59	
<i>For 9' Door Height, Add</i>	39.51	
08 14 16 00-0309 EA 3'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	323.00	65.10
<i>For >50 To 100, Deduct</i>	-19.41	
<i>For >100, Deduct</i>	-27.48	
<i>For 9' Door Height, Add</i>	40.49	
08 14 16 00-0310 EA 3'-4" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	333.76	65.10
<i>For >50 To 100, Deduct</i>	-19.94	
<i>For >100, Deduct</i>	-28.29	
<i>For 9' Door Height, Add</i>	42.75	
08 14 16 00-0311 EA 3'-6" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	374.16	67.81
<i>For >50 To 100, Deduct</i>	-22.10	
<i>For >100, Deduct</i>	-31.45	
<i>For 9' Door Height, Add</i>	50.09	
08 14 16 00-0312 EA 3'-8" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	386.07	67.81
<i>For >50 To 100, Deduct</i>	-22.69	
<i>For >100, Deduct</i>	-32.35	
<i>For 9' Door Height, Add</i>	52.59	
08 14 16 00-0313 EA 4'-0" x 8' x 1-3/4" Thick, 5 Ply, Hollow Core (HC), Medium Density Overlay (MDO) Faced Wood Door.....	409.94	67.81
<i>For >50 To 100, Deduct</i>	-23.89	
<i>For >100, Deduct</i>	-34.14	
<i>For 9' Door Height, Add</i>	57.61	
08 14 16 00-0314 1-3/8" Thick, Particleboard Core (PC), Wood Doors <small>(08 14 16)</small>		
Note: PC = Particleboard, medium-density fiberboard (MDF), or agrifiber core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.		
08 14 16 00-0315 Birch Faced Wood Doors <small>(08 14 16 00-0314)</small>		
08 14 16 00-0316 EA 2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	274.93	59.67
<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.11	
<i>For Stave Lumber Core (SLC), Add</i>	116.68	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	70.01	
<i>For >50 To 100, Deduct</i>	-16.73	
<i>For >100, Deduct</i>	-23.60	
08 14 16 00-0317 EA 2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	274.96	59.67
<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.11	
<i>For Stave Lumber Core (SLC), Add</i>	116.70	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	70.02	
<i>For >50 To 100, Deduct</i>	-16.73	
<i>For >100, Deduct</i>	-23.61	
08 14 16 00-0318 EA 2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	288.52	62.39
<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.28	
<i>For Stave Lumber Core (SLC), Add</i>	122.81	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	73.69	
<i>For >50 To 100, Deduct</i>	-17.55	
<i>For >100, Deduct</i>	-24.76	
08 14 16 00-0319 EA 2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	296.68	62.39
<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.44	
<i>For Stave Lumber Core (SLC), Add</i>	128.93	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	77.36	
<i>For >50 To 100, Deduct</i>	-17.95	
<i>For >100, Deduct</i>	-25.37	
08 14 16 00-0320 EA 2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	301.66	62.39
<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.54	
<i>For Stave Lumber Core (SLC), Add</i>	132.67	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	79.60	
<i>For >50 To 100, Deduct</i>	-18.20	
<i>For >100, Deduct</i>	-25.74	
08 14 16 00-0321 EA 3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	312.09	65.10
<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.64	
<i>For Stave Lumber Core (SLC), Add</i>	136.42	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	81.85	
<i>For >50 To 100, Deduct</i>	-18.86	
<i>For >100, Deduct</i>	-26.66	
08 14 16 00-0322 EA 3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	332.04	65.10
<i>For 7 Ply Cold Press Construction, Deduct</i>	-4.04	
<i>For Stave Lumber Core (SLC), Add</i>	151.38	
<i>For Structural Composite Lumber Core (SCLC), Add</i>	90.83	
<i>For >50 To 100, Deduct</i>	-19.86	
<i>For >100, Deduct</i>	-28.16	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0323	EA 3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	350.38 -4.30 161.06 96.64 -20.91 -29.67	67.81
08 14 16 00-0324	EA 2'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	283.99 -3.29 123.47 74.08 -17.18 -24.28	59.67
08 14 16 00-0325	EA 2'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	284.00 -3.29 123.48 74.09 -17.18 -24.28	59.67
08 14 16 00-0326	EA 2'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	298.05 -3.47 129.96 77.98 -18.02 -25.47	62.39
08 14 16 00-0327	EA 2'-8" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	306.70 -3.64 136.45 81.87 -18.45 -26.12	62.39
08 14 16 00-0328	EA 2'-10" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	311.96 -3.74 140.39 84.24 -18.72 -26.52	62.39
08 14 16 00-0329	EA 3'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	322.67 -3.85 144.35 86.61 -19.39 -27.46	65.10
08 14 16 00-0330	EA 3'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	343.80 -4.27 160.20 96.12 -20.45 -29.04	65.10
08 14 16 00-0331	EA 3'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	362.88 -4.55 170.44 102.26 -21.53 -30.61	67.81
08 14 16 00-0332	EA 2'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	316.10 -3.93 147.56 88.53 -18.79 -26.69 41.32	59.67
08 14 16 00-0333	EA 2'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	316.10 -3.93 147.56 88.53 -18.79 -26.69 41.32	59.67
08 14 16 00-0334	EA 2'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	331.84 -4.14 155.30 93.18 -19.71 -28.01 43.48	62.39
08 14 16 00-0335	EA 2'-8" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	342.17 -4.35 163.05 97.83 -20.23 -28.78 45.65	62.39



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0336	EA		2'-10" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	348.46 -4.47 167.77 100.66 -20.54 -29.25 46.97	62.39
08 14 16 00-0337	EA		3'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	360.21 -4.60 172.51 103.50 -21.27 -30.27 48.30	65.10
08 14 16 00-0338	EA		3'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	385.44 -5.10 191.43 114.86 -22.53 -32.16 53.60	65.10
08 14 16 00-0339	EA		3'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	407.19 -5.43 203.67 122.20 -23.75 -33.93 57.03	67.81
08 14 16 00-0340 Oak Faced Wood Doors (08 14 16 00-0314)					
08 14 16 00-0341	EA		2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	391.61 -5.45 204.19 122.51 -22.56 -32.35	59.67
08 14 16 00-0342	EA		2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	391.61 -5.45 204.19 122.51 -22.56 -32.35	59.67
08 14 16 00-0343	EA		2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	411.35 -5.73 214.94 128.96 -23.69 -33.97	62.39
08 14 16 00-0344	EA		2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	425.64 -6.02 225.65 135.39 -24.40 -35.04	62.39
08 14 16 00-0345	EA		2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	434.34 -6.19 232.18 139.31 -24.84 -35.69	62.39
08 14 16 00-0346	EA		3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	448.51 -6.37 238.73 143.24 -25.68 -36.89	65.10
08 14 16 00-0347	EA		3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	483.44 -7.06 264.93 158.96 -27.43 -39.51	65.10
08 14 16 00-0348	EA		3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	511.44 -7.52 281.86 169.11 -28.96 -41.75	67.81
08 14 16 00-0349	EA		2'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	407.44 -5.76 216.06 129.64 -23.36 -33.54	59.67

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0350	EA	2'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	407.44	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.76	
		<i>For Stave Lumber Core (SLC), Add</i>	216.06	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	129.64	
		<i>For >50 To 100, Deduct</i>	-23.36	
		<i>For >100, Deduct</i>	-33.54	
08 14 16 00-0351	EA	2'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	428.04	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.07	
		<i>For Stave Lumber Core (SLC), Add</i>	227.45	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	136.47	
		<i>For >50 To 100, Deduct</i>	-24.52	
		<i>For >100, Deduct</i>	-35.22	
08 14 16 00-0352	EA	2'-8" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	443.16	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.37	
		<i>For Stave Lumber Core (SLC), Add</i>	238.79	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	143.28	
		<i>For >50 To 100, Deduct</i>	-25.28	
		<i>For >100, Deduct</i>	-36.36	
08 14 16 00-0353	EA	2'-10" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	452.36	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.55	
		<i>For Stave Lumber Core (SLC), Add</i>	245.69	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	147.42	
		<i>For >50 To 100, Deduct</i>	-25.74	
		<i>For >100, Deduct</i>	-37.05	
08 14 16 00-0354	EA	3'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	467.03	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.74	
		<i>For Stave Lumber Core (SLC), Add</i>	252.62	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	151.57	
		<i>For >50 To 100, Deduct</i>	-26.61	
		<i>For >100, Deduct</i>	-38.28	
08 14 16 00-0355	EA	3'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	504.00	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.48	
		<i>For Stave Lumber Core (SLC), Add</i>	280.35	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	168.21	
		<i>For >50 To 100, Deduct</i>	-28.46	
		<i>For >100, Deduct</i>	-41.06	
08 14 16 00-0356	EA	3'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	533.33	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.95	
		<i>For Stave Lumber Core (SLC), Add</i>	298.28	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	178.97	
		<i>For >50 To 100, Deduct</i>	-30.06	
		<i>For >100, Deduct</i>	-43.39	
08 14 16 00-0357	EA	2'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	463.61	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.89	
		<i>For Stave Lumber Core (SLC), Add</i>	258.19	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	154.91	
		<i>For >50 To 100, Deduct</i>	-26.16	
		<i>For >100, Deduct</i>	-37.75	
		<i>For 9' Door Height, Add</i>	72.29	
08 14 16 00-0358	EA	2'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	463.61	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.89	
		<i>For Stave Lumber Core (SLC), Add</i>	258.19	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	154.91	
		<i>For >50 To 100, Deduct</i>	-26.16	
		<i>For >100, Deduct</i>	-37.75	
		<i>For 9' Door Height, Add</i>	72.29	
08 14 16 00-0359	EA	2'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	487.18	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.25	
		<i>For Stave Lumber Core (SLC), Add</i>	271.81	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	163.08	
		<i>For >50 To 100, Deduct</i>	-27.48	
		<i>For >100, Deduct</i>	-39.66	
		<i>For 9' Door Height, Add</i>	76.11	
08 14 16 00-0360	EA	2'-8" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	505.24	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.61	
		<i>For Stave Lumber Core (SLC), Add</i>	285.35	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	171.21	
		<i>For >50 To 100, Deduct</i>	-28.38	
		<i>For >100, Deduct</i>	-41.01	
		<i>For 9' Door Height, Add</i>	79.90	
08 14 16 00-0361	EA	2'-10" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	516.23	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.83	
		<i>For Stave Lumber Core (SLC), Add</i>	293.60	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	176.16	
		<i>For >50 To 100, Deduct</i>	-28.93	
		<i>For >100, Deduct</i>	-41.84	
		<i>For 9' Door Height, Add</i>	82.21	
08 14 16 00-0362	EA	3'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	532.73	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-8.05	
		<i>For Stave Lumber Core (SLC), Add</i>	301.90	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	181.14	
		<i>For >50 To 100, Deduct</i>	-29.89	
		<i>For >100, Deduct</i>	-43.21	
		<i>For 9' Door Height, Add</i>	84.53	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0363 EA 3'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	576.90	65.10
For 7 Ply Cold Press Construction, Deduct	-8.93	
For Stave Lumber Core (SLC), Add	335.03	
For Structural Composite Lumber Core (SCLC), Add	201.02	
For >50 To 100, Deduct	-32.10	
For >100, Deduct	-46.52	
For 9' Door Height, Add	93.81	
08 14 16 00-0364 EA 3'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	610.88	67.81
For 7 Ply Cold Press Construction, Deduct	-9.51	
For Stave Lumber Core (SLC), Add	356.44	
For Structural Composite Lumber Core (SCLC), Add	213.86	
For >50 To 100, Deduct	-33.93	
For >100, Deduct	-49.21	
For 9' Door Height, Add	99.80	
08 14 16 00-0365 Maple Faced Wood Doors (08 14 16 00-0314)		
08 14 16 00-0366 EA 2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	349.72	59.67
For 7 Ply Cold Press Construction, Deduct	-4.61	
For Stave Lumber Core (SLC), Add	172.77	
For Structural Composite Lumber Core (SCLC), Add	103.66	
For >50 To 100, Deduct	-20.47	
For >100, Deduct	-29.21	
08 14 16 00-0367 EA 2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	349.72	59.67
For 7 Ply Cold Press Construction, Deduct	-4.61	
For Stave Lumber Core (SLC), Add	172.77	
For Structural Composite Lumber Core (SCLC), Add	103.66	
For >50 To 100, Deduct	-20.47	
For >100, Deduct	-29.21	
08 14 16 00-0368 EA 2'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	367.26	62.39
For 7 Ply Cold Press Construction, Deduct	-4.85	
For Stave Lumber Core (SLC), Add	181.87	
For Structural Composite Lumber Core (SCLC), Add	109.12	
For >50 To 100, Deduct	-21.48	
For >100, Deduct	-30.66	
08 14 16 00-0369 EA 2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	379.36	62.39
For 7 Ply Cold Press Construction, Deduct	-5.09	
For Stave Lumber Core (SLC), Add	190.94	
For Structural Composite Lumber Core (SCLC), Add	114.57	
For >50 To 100, Deduct	-22.09	
For >100, Deduct	-31.57	
08 14 16 00-0370 EA 2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	386.71	62.39
For 7 Ply Cold Press Construction, Deduct	-5.24	
For Stave Lumber Core (SLC), Add	196.46	
For Structural Composite Lumber Core (SCLC), Add	117.87	
For >50 To 100, Deduct	-22.45	
For >100, Deduct	-32.12	
08 14 16 00-0371 EA 3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	399.54	65.10
For 7 Ply Cold Press Construction, Deduct	-5.39	
For Stave Lumber Core (SLC), Add	202.01	
For Structural Composite Lumber Core (SCLC), Add	121.20	
For >50 To 100, Deduct	-23.23	
For >100, Deduct	-33.22	
08 14 16 00-0372 EA 3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	429.09	65.10
For 7 Ply Cold Press Construction, Deduct	-5.98	
For Stave Lumber Core (SLC), Add	224.17	
For Structural Composite Lumber Core (SCLC), Add	134.50	
For >50 To 100, Deduct	-24.71	
For >100, Deduct	-35.44	
08 14 16 00-0373 EA 3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door	453.62	67.81
For 7 Ply Cold Press Construction, Deduct	-6.36	
For Stave Lumber Core (SLC), Add	238.49	
For Structural Composite Lumber Core (SCLC), Add	143.10	
For >50 To 100, Deduct	-26.07	
For >100, Deduct	-37.41	
08 14 16 00-0374 EA 2'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	363.11	59.67
For 7 Ply Cold Press Construction, Deduct	-4.88	
For Stave Lumber Core (SLC), Add	182.81	
For Structural Composite Lumber Core (SCLC), Add	109.69	
For >50 To 100, Deduct	-21.14	
For >100, Deduct	-30.22	
08 14 16 00-0375 EA 2'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	363.11	59.67
For 7 Ply Cold Press Construction, Deduct	-4.88	
For Stave Lumber Core (SLC), Add	182.81	
For Structural Composite Lumber Core (SCLC), Add	109.69	
For >50 To 100, Deduct	-21.14	
For >100, Deduct	-30.22	
08 14 16 00-0376 EA 2'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	381.38	62.39
For 7 Ply Cold Press Construction, Deduct	-5.13	
For Stave Lumber Core (SLC), Add	192.46	
For Structural Composite Lumber Core (SCLC), Add	115.47	
For >50 To 100, Deduct	-22.19	
For >100, Deduct	-31.72	

08	08	Openings
	08 10	Doors and Frames
	08 14	Wood Doors



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0377	EA	2'-8" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	394.18	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.39	
		<i>For Stave Lumber Core (SLC), Add</i>	202.06	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	121.23	
		<i>For >50 To 100, Deduct</i>	-22.83	
		<i>For >100, Deduct</i>	-32.68	
08 14 16 00-0378	EA	2'-10" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	401.96	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.54	
		<i>For Stave Lumber Core (SLC), Add</i>	207.89	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	124.74	
		<i>For >50 To 100, Deduct</i>	-23.22	
		<i>For >100, Deduct</i>	-33.27	
08 14 16 00-0379	EA	3'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	415.22	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.70	
		<i>For Stave Lumber Core (SLC), Add</i>	213.77	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	128.26	
		<i>For >50 To 100, Deduct</i>	-24.02	
		<i>For >100, Deduct</i>	-34.40	
08 14 16 00-0380	EA	3'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	446.49	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.33	
		<i>For Stave Lumber Core (SLC), Add</i>	237.22	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	142.33	
		<i>For >50 To 100, Deduct</i>	-25.58	
		<i>For >100, Deduct</i>	-36.74	
08 14 16 00-0381	EA	3'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	472.13	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.73	
		<i>For Stave Lumber Core (SLC), Add</i>	252.38	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	151.43	
		<i>For >50 To 100, Deduct</i>	-27.00	
		<i>For >100, Deduct</i>	-38.80	
08 14 16 00-0382	EA	2'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	410.65	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.83	
		<i>For Stave Lumber Core (SLC), Add</i>	218.47	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	131.08	
		<i>For >50 To 100, Deduct</i>	-23.52	
		<i>For >100, Deduct</i>	-33.78	
		<i>For 9' Door Height, Add</i>	61.17	
08 14 16 00-0383	EA	2'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	410.65	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.83	
		<i>For Stave Lumber Core (SLC), Add</i>	218.47	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	131.08	
		<i>For >50 To 100, Deduct</i>	-23.52	
		<i>For >100, Deduct</i>	-33.78	
		<i>For 9' Door Height, Add</i>	61.17	
08 14 16 00-0384	EA	2'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	431.41	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.13	
		<i>For Stave Lumber Core (SLC), Add</i>	229.98	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	137.99	
		<i>For >50 To 100, Deduct</i>	-24.69	
		<i>For >100, Deduct</i>	-35.48	
		<i>For 9' Door Height, Add</i>	64.39	
08 14 16 00-0385	EA	2'-8" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	446.70	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.44	
		<i>For Stave Lumber Core (SLC), Add</i>	241.45	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	144.87	
		<i>For >50 To 100, Deduct</i>	-25.45	
		<i>For >100, Deduct</i>	-36.62	
		<i>For 9' Door Height, Add</i>	67.61	
08 14 16 00-0386	EA	2'-10" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	456.02	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.63	
		<i>For Stave Lumber Core (SLC), Add</i>	248.44	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	149.06	
		<i>For >50 To 100, Deduct</i>	-25.92	
		<i>For >100, Deduct</i>	-37.32	
		<i>For 9' Door Height, Add</i>	69.56	
08 14 16 00-0387	EA	3'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	470.79	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.81	
		<i>For Stave Lumber Core (SLC), Add</i>	255.44	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	153.27	
		<i>For >50 To 100, Deduct</i>	-26.79	
		<i>For >100, Deduct</i>	-38.56	
		<i>For 9' Door Height, Add</i>	71.52	
08 14 16 00-0388	EA	3'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	508.18	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.56	
		<i>For Stave Lumber Core (SLC), Add</i>	283.49	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	170.09	
		<i>For >50 To 100, Deduct</i>	-28.66	
		<i>For >100, Deduct</i>	-41.37	
		<i>For 9' Door Height, Add</i>	79.38	
08 14 16 00-0389	EA	3'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	537.75	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-8.04	
		<i>For Stave Lumber Core (SLC), Add</i>	301.59	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	180.95	
		<i>For >50 To 100, Deduct</i>	-30.28	
		<i>For >100, Deduct</i>	-43.72	
		<i>For 9' Door Height, Add</i>	84.45	

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0390		Lauan Faced Wood Doors <small>(08 14 16 00-0314)</small>		
08 14 16 00-0391	EA	2'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	340.75	59.67
		<i>For >50 To 100, Deduct</i>	-20.02	
		<i>For >100, Deduct</i>	-28.54	
08 14 16 00-0392	EA	2'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	340.75	59.67
		<i>For >50 To 100, Deduct</i>	-20.02	
		<i>For >100, Deduct</i>	-28.54	
08 14 16 00-0393	EA	2'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	358.28	62.39
		<i>For >50 To 100, Deduct</i>	-21.03	
		<i>For >100, Deduct</i>	-29.99	
08 14 16 00-0394	EA	2'-8" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	370.49	62.39
		<i>For >50 To 100, Deduct</i>	-21.64	
		<i>For >100, Deduct</i>	-30.91	
08 14 16 00-0395	EA	2'-10" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	376.62	62.39
		<i>For >50 To 100, Deduct</i>	-21.95	
		<i>For >100, Deduct</i>	-31.37	
08 14 16 00-0396	EA	3'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	388.22	65.10
		<i>For >50 To 100, Deduct</i>	-22.67	
		<i>For >100, Deduct</i>	-32.37	
08 14 16 00-0397	EA	3'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	416.56	65.10
		<i>For >50 To 100, Deduct</i>	-24.08	
		<i>For >100, Deduct</i>	-34.50	
08 14 16 00-0398	EA	3'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	444.43	67.81
		<i>For >50 To 100, Deduct</i>	-25.61	
		<i>For >100, Deduct</i>	-36.72	
08 14 16 00-0399	EA	2'-0" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	353.64	59.67
		<i>For >50 To 100, Deduct</i>	-20.67	
		<i>For >100, Deduct</i>	-29.51	
08 14 16 00-0400	EA	2'-4" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	353.64	59.67
		<i>For >50 To 100, Deduct</i>	-20.67	
		<i>For >100, Deduct</i>	-29.51	
08 14 16 00-0401	EA	2'-6" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	371.89	62.39
		<i>For >50 To 100, Deduct</i>	-21.71	
		<i>For >100, Deduct</i>	-31.01	
08 14 16 00-0402	EA	2'-8" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	384.79	62.39
		<i>For >50 To 100, Deduct</i>	-22.36	
		<i>For >100, Deduct</i>	-31.98	
08 14 16 00-0403	EA	2'-10" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	391.29	62.39
		<i>For >50 To 100, Deduct</i>	-22.68	
		<i>For >100, Deduct</i>	-32.47	
08 14 16 00-0404	EA	3'-0" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	403.22	65.10
		<i>For >50 To 100, Deduct</i>	-23.42	
		<i>For >100, Deduct</i>	-33.50	
08 14 16 00-0405	EA	3'-4" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	433.25	65.10
		<i>For >50 To 100, Deduct</i>	-24.92	
		<i>For >100, Deduct</i>	-35.75	
08 14 16 00-0406	EA	3'-6" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	462.38	67.81
		<i>For >50 To 100, Deduct</i>	-26.51	
		<i>For >100, Deduct</i>	-38.07	
08 14 16 00-0407	EA	2'-0" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	399.35	59.67
		<i>For >50 To 100, Deduct</i>	-22.95	
		<i>For >100, Deduct</i>	-32.94	
		<i>For 9' Door Height, Add</i>	58.80	
08 14 16 00-0408	EA	2'-4" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	399.35	59.67
		<i>For >50 To 100, Deduct</i>	-22.95	
		<i>For >100, Deduct</i>	-32.94	
		<i>For 9' Door Height, Add</i>	58.80	
08 14 16 00-0409	EA	2'-6" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	420.06	62.39
		<i>For >50 To 100, Deduct</i>	-24.12	
		<i>For >100, Deduct</i>	-34.62	
		<i>For 9' Door Height, Add</i>	62.01	
08 14 16 00-0410	EA	2'-8" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	435.50	62.39
		<i>For >50 To 100, Deduct</i>	-24.89	
		<i>For >100, Deduct</i>	-35.78	
		<i>For 9' Door Height, Add</i>	65.25	
08 14 16 00-0411	EA	2'-10" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	443.27	62.39
		<i>For >50 To 100, Deduct</i>	-25.28	
		<i>For >100, Deduct</i>	-36.36	
		<i>For 9' Door Height, Add</i>	66.89	
08 14 16 00-0412	EA	3'-0" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	456.47	65.10
		<i>For >50 To 100, Deduct</i>	-26.08	
		<i>For >100, Deduct</i>	-37.49	
		<i>For 9' Door Height, Add</i>	68.52	
08 14 16 00-0413	EA	3'-4" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	492.33	65.10
		<i>For >50 To 100, Deduct</i>	-27.87	
		<i>For >100, Deduct</i>	-40.18	
		<i>For 9' Door Height, Add</i>	76.05	
08 14 16 00-0414	EA	3'-6" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door	526.09	67.81
		<i>For >50 To 100, Deduct</i>	-29.70	
		<i>For >100, Deduct</i>	-42.85	
		<i>For 9' Door Height, Add</i>	82.00	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0415			Medium Density Overlay (MDO) Faced Wood Doors (08 14 16 00-0314)		
08 14 16 00-0416	EA		2'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 301.10	301.10	59.67
			<i>For Stave Lumber Core (SLC), Add</i>	136.31	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	81.78	
			<i>For >50 To 100, Deduct</i>	-18.04	
			<i>For >100, Deduct</i>	-25.57	
08 14 16 00-0417	EA		2'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 301.10	301.10	59.67
			<i>For Stave Lumber Core (SLC), Add</i>	136.31	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	81.78	
			<i>For >50 To 100, Deduct</i>	-18.04	
			<i>For >100, Deduct</i>	-25.57	
08 14 16 00-0418	EA		2'-8" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 317.07	317.07	62.39
			<i>For Stave Lumber Core (SLC), Add</i>	144.23	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	86.54	
			<i>For >50 To 100, Deduct</i>	-18.97	
			<i>For >100, Deduct</i>	-26.90	
08 14 16 00-0419	EA		3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 327.59	327.59	62.39
			<i>For Stave Lumber Core (SLC), Add</i>	152.12	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	91.27	
			<i>For >50 To 100, Deduct</i>	-19.50	
			<i>For >100, Deduct</i>	-27.69	
08 14 16 00-0420	EA		2'-10" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 329.52	329.52	62.39
			<i>For Stave Lumber Core (SLC), Add</i>	153.56	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	92.14	
			<i>For >50 To 100, Deduct</i>	-19.60	
			<i>For >100, Deduct</i>	-27.83	
08 14 16 00-0421	EA		3'-0" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 336.91	336.91	65.10
			<i>For Stave Lumber Core (SLC), Add</i>	155.03	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	93.02	
			<i>For >50 To 100, Deduct</i>	-20.10	
			<i>For >100, Deduct</i>	-28.52	
08 14 16 00-0422	EA		3'-4" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 359.72	359.72	65.10
			<i>For Stave Lumber Core (SLC), Add</i>	172.14	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	103.28	
			<i>For >50 To 100, Deduct</i>	-21.24	
			<i>For >100, Deduct</i>	-30.23	
08 14 16 00-0423	EA		3'-6" x 6'-8" x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 406.72	406.72	67.81
			<i>For Stave Lumber Core (SLC), Add</i>	203.32	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	121.99	
			<i>For >50 To 100, Deduct</i>	-23.73	
			<i>For >100, Deduct</i>	-33.89	
08 14 16 00-0424	EA		2'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 311.68	311.68	59.67
			<i>For Stave Lumber Core (SLC), Add</i>	144.24	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	86.54	
			<i>For >50 To 100, Deduct</i>	-18.57	
			<i>For >100, Deduct</i>	-26.36	
08 14 16 00-0425	EA		2'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 311.69	311.69	59.67
			<i>For Stave Lumber Core (SLC), Add</i>	144.25	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	86.55	
			<i>For >50 To 100, Deduct</i>	-18.57	
			<i>For >100, Deduct</i>	-26.36	
08 14 16 00-0426	EA		2'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 328.26	328.26	62.39
			<i>For Stave Lumber Core (SLC), Add</i>	152.62	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	91.57	
			<i>For >50 To 100, Deduct</i>	-19.53	
			<i>For >100, Deduct</i>	-27.74	
08 14 16 00-0427	EA		2'-8" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 339.39	339.39	62.39
			<i>For Stave Lumber Core (SLC), Add</i>	160.97	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	96.58	
			<i>For >50 To 100, Deduct</i>	-20.09	
			<i>For >100, Deduct</i>	-28.57	
08 14 16 00-0428	EA		2'-10" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 341.45	341.45	62.39
			<i>For Stave Lumber Core (SLC), Add</i>	162.51	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	97.51	
			<i>For >50 To 100, Deduct</i>	-20.19	
			<i>For >100, Deduct</i>	-28.73	
08 14 16 00-0429	EA		3'-0" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 348.95	348.95	65.10
			<i>For Stave Lumber Core (SLC), Add</i>	164.06	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	98.44	
			<i>For >50 To 100, Deduct</i>	-20.70	
			<i>For >100, Deduct</i>	-29.43	
08 14 16 00-0430	EA		3'-4" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 373.07	373.07	65.10
			<i>For Stave Lumber Core (SLC), Add</i>	182.15	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	109.29	
			<i>For >50 To 100, Deduct</i>	-21.91	
			<i>For >100, Deduct</i>	-31.24	
08 14 16 00-0431	EA		3'-6" x 7' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door 422.52	422.52	67.81
			<i>For Stave Lumber Core (SLC), Add</i>	215.17	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	129.10	
			<i>For >50 To 100, Deduct</i>	-24.52	
			<i>For >100, Deduct</i>	-35.08	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0432	EA 2'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	349.16 172.35 103.41 -20.44 -29.17 48.26	59.67
08 14 16 00-0433	EA 2'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	349.20 172.38 103.43 -20.44 -29.17 48.27	59.67
08 14 16 00-0434	EA 2'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	367.94 182.38 109.43 -21.52 -30.71 51.07	62.39
08 14 16 00-0435	EA 2'-8" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	381.23 192.35 115.41 -22.18 -31.71 53.86	62.39
08 14 16 00-0436	EA 2'-10" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	383.69 194.19 116.51 -22.30 -31.90 54.37	62.39
08 14 16 00-0437	EA 3'-0" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	391.61 196.06 117.63 -22.84 -32.63 54.90	65.10
08 14 16 00-0438	EA 3'-4" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	420.45 217.69 130.61 -24.28 -34.79 60.95	65.10
08 14 16 00-0439	EA 3'-6" x 8' x 1-3/8" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door..... <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	478.47 257.13 154.28 -27.31 -39.28 72.00	67.81
08 14 16 00-0440	1-3/4" Thick, Particleboard Core (PC), Wood Doors <small>(08 14 16)</small> Note: PC = Particleboard, medium-density fiberboard (MDF), or agrifiber core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.		
08 14 16 00-0441	Birch Faced Wood Doors <small>(08 14 16 00-0440)</small>		
08 14 16 00-0442	EA 2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door..... <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	308.73 -3.79 142.03 85.22 22.72 102.26 142.03 227.24 -18.42 -26.14	59.67
08 14 16 00-0443	EA 2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door..... <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	308.73 -3.79 142.03 85.22 22.72 102.26 142.03 227.24 -18.42 -26.14	59.67
08 14 16 00-0444	EA 2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door..... <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	304.16 -3.59 134.54 80.73 21.53 96.87 134.54 215.27 -18.33 -25.93	62.39

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 16 00-0445	EA 2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	311.64	62.39
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.74	
	<i>For Stave Lumber Core (SLC), Add</i>	140.15	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	84.09	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	22.42	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	100.91	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	140.15	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	224.24	
	<i>For >50 To 100, Deduct</i>	-18.70	
	<i>For >100, Deduct</i>	-26.49	
08 14 16 00-0446	EA 2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	316.64	62.39
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.84	
	<i>For Stave Lumber Core (SLC), Add</i>	143.90	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	86.34	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	23.02	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	103.61	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	143.90	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	230.24	
	<i>For >50 To 100, Deduct</i>	-18.95	
	<i>For >100, Deduct</i>	-26.87	
08 14 16 00-0447	EA 3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	327.04	65.10
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.94	
	<i>For Stave Lumber Core (SLC), Add</i>	147.63	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	88.58	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	23.62	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	106.29	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	147.63	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	236.21	
	<i>For >50 To 100, Deduct</i>	-19.61	
	<i>For >100, Deduct</i>	-27.78	
08 14 16 00-0448	EA 3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	348.69	65.10
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-4.37	
	<i>For Stave Lumber Core (SLC), Add</i>	163.87	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	98.32	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	26.22	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	117.98	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	163.87	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	262.19	
	<i>For >50 To 100, Deduct</i>	-20.69	
	<i>For >100, Deduct</i>	-29.41	
08 14 16 00-0449	EA 3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	400.90	67.81
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.31	
	<i>For Stave Lumber Core (SLC), Add</i>	198.95	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	119.37	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	31.83	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	143.25	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	198.95	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	318.32	
	<i>For >50 To 100, Deduct</i>	-23.44	
	<i>For >100, Deduct</i>	-33.46	
08 14 16 00-0450	EA 3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	414.16	67.81
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-5.57	
	<i>For Stave Lumber Core (SLC), Add</i>	208.90	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	125.34	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	33.42	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	150.41	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	208.90	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	334.24	
	<i>For >50 To 100, Deduct</i>	-24.10	
	<i>For >100, Deduct</i>	-34.45	
08 14 16 00-0451	EA 4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	451.53	73.24
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-6.10	
	<i>For Stave Lumber Core (SLC), Add</i>	228.79	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	137.27	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	36.61	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	164.73	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	228.79	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	366.06	
	<i>For >50 To 100, Deduct</i>	-26.24	
	<i>For >100, Deduct</i>	-37.53	
08 14 16 00-0452	EA 2'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door.....	299.77	59.67
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-3.61	
	<i>For Stave Lumber Core (SLC), Add</i>	135.31	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	81.18	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	21.65	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	97.42	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	135.31	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	216.49	
	<i>For >50 To 100, Deduct</i>	-17.97	
	<i>For >100, Deduct</i>	-25.47	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0453 EA 2'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	299.77 -3.61 135.31 81.18 21.65 97.42 135.31 216.49 -17.97 -25.47	59.67
08 14 16 00-0454 EA 2'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	314.61 -3.80 142.38 85.43 22.78 102.51 142.38 227.81 -18.85 -26.72	62.39
08 14 16 00-0455 EA 2'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	322.51 -3.95 148.31 88.98 23.73 106.78 148.31 237.29 -19.24 -27.31	62.39
08 14 16 00-0456 EA 2'-10" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	327.80 -4.06 152.27 91.36 24.36 109.64 152.27 243.64 -19.51 -27.70	62.39
08 14 16 00-0457 EA 3'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	338.49 -4.17 156.22 93.73 24.99 112.48 156.22 249.95 -20.18 -28.64	65.10
08 14 16 00-0458 EA 3'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	361.40 -4.62 173.40 104.04 27.74 124.85 173.40 277.44 -21.33 -30.36	65.10
08 14 16 00-0459 EA 3'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	416.34 -5.61 210.53 126.32 33.69 151.58 210.53 336.85 -24.21 -34.62	67.81
08 14 16 00-0460 EA 3'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door For 7 Ply Cold Press Construction, Deduct For Stave Lumber Core (SLC), Add For Structural Composite Lumber Core (SCLC), Add For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	430.38 -5.90 221.06 132.64 35.37 159.17 221.06 353.70 -24.91 -35.67	67.81

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0461	EA 4'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	469.29 -6.46 242.11 145.26 38.74 174.32 242.11 387.37 -27.13 -38.86	73.24
08 14 16 00-0462	EA 2'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	358.82 -4.79 179.60 107.76 28.74 129.31 179.60 287.35 -20.93 -29.90 50.29	59.67
08 14 16 00-0463	EA 2'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	358.82 -4.79 179.60 107.76 28.74 129.31 179.60 287.35 -20.93 -29.90 50.29	59.67
08 14 16 00-0464	EA 2'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	351.62 -4.54 170.14 102.08 27.22 122.50 170.14 272.22 -20.70 -29.49 47.64	62.39
08 14 16 00-0465	EA 2'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	361.07 -4.73 177.23 106.34 28.36 127.60 177.23 283.56 -21.17 -30.20 49.62	62.39
08 14 16 00-0466	EA 2'-10" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	367.38 -4.85 181.96 109.17 29.11 131.01 181.96 291.13 -21.49 -30.67 50.95	62.39
08 14 16 00-0467	EA 3'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	379.10 -4.98 186.68 112.01 29.87 134.41 186.68 298.68 -22.21 -31.69 52.27	65.10
08 14 16 00-0468	EA 3'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	406.48 -5.53 207.21 124.33 33.15 149.19 207.21 331.54 -23.58 -33.74 58.02	65.10



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0469	EA 3'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	471.07 -6.71 251.58 150.95 40.25 181.14 251.58 402.53 -26.94 -38.72 70.44	67.81
08 14 16 00-0470	EA 3'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	487.84 -7.04 264.16 158.49 42.27 190.19 264.16 422.65 -27.78 -39.98 73.96	67.81
08 14 16 00-0471	EA 4'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Birch Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	532.24 -7.72 289.32 173.59 46.29 208.31 289.32 462.91 -30.27 -43.58 81.01	73.24
08 14 16 00-0472	Oak Faced Wood Doors (08 14 16 00-0440)		
08 14 16 00-0473	EA 2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	482.09 -7.25 272.05 163.23 43.53 195.87 272.05 435.28 -27.09 -39.14	59.67
08 14 16 00-0474	EA 2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	482.09 -7.25 272.05 163.23 43.53 195.87 272.05 435.28 -27.09 -39.14	59.67
08 14 16 00-0475	EA 2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	487.50 -7.25 272.05 163.23 43.53 195.87 272.05 435.28 -27.49 -39.68	62.39
08 14 16 00-0476	EA 2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	491.23 -7.33 274.85 164.91 43.98 197.89 274.85 439.75 -27.68 -39.96	62.39
08 14 16 00-0477	EA 2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	492.91 -7.36 276.11 165.66 44.18 198.80 276.11 441.77 -27.76 -40.09	62.39

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 14 16 00-0478	EA	3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	500.03	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.40	
		<i>For Stave Lumber Core (SLC), Add</i>	277.37	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	166.42	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	44.38	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	199.71	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	277.37	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	443.80	
		<i>For >50 To 100, Deduct</i>	-28.26	
		<i>For >100, Deduct</i>	-40.76	
08 14 16 00-0479	EA	3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	540.65	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-8.21	
		<i>For Stave Lumber Core (SLC), Add</i>	307.84	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	184.70	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	49.25	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	221.64	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	307.84	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	492.54	
		<i>For >50 To 100, Deduct</i>	-30.29	
		<i>For >100, Deduct</i>	-43.80	
08 14 16 00-0480	EA	3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	650.68	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-10.30	
		<i>For Stave Lumber Core (SLC), Add</i>	386.29	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	231.77	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	61.81	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	278.13	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	386.29	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	618.06	
		<i>For >50 To 100, Deduct</i>	-35.92	
		<i>For >100, Deduct</i>	-52.19	
08 14 16 00-0481	EA	3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	676.79	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-10.82	
		<i>For Stave Lumber Core (SLC), Add</i>	405.87	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	243.52	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	64.94	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	292.23	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	405.87	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	649.39	
		<i>For >50 To 100, Deduct</i>	-37.23	
		<i>For >100, Deduct</i>	-54.15	
08 14 16 00-0482	EA	4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	738.80	73.24
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.85	
		<i>For Stave Lumber Core (SLC), Add</i>	444.24	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	266.54	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	71.08	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	319.85	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	444.24	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	710.78	
		<i>For >50 To 100, Deduct</i>	-40.60	
		<i>For >100, Deduct</i>	-59.07	
08 14 16 00-0483	EA	2'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	503.19	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.68	
		<i>For Stave Lumber Core (SLC), Add</i>	287.87	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	172.72	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	46.06	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	207.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	287.87	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	460.60	
		<i>For >50 To 100, Deduct</i>	-28.14	
		<i>For >100, Deduct</i>	-40.72	
08 14 16 00-0484	EA	2'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	503.19	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.68	
		<i>For Stave Lumber Core (SLC), Add</i>	287.87	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	172.72	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	46.06	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	207.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	287.87	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	460.60	
		<i>For >50 To 100, Deduct</i>	-28.14	
		<i>For >100, Deduct</i>	-40.72	
08 14 16 00-0485	EA	2'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	508.60	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.68	
		<i>For Stave Lumber Core (SLC), Add</i>	287.87	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	172.72	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	46.06	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	207.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	287.87	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	460.60	
		<i>For >50 To 100, Deduct</i>	-28.55	
		<i>For >100, Deduct</i>	-41.26	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0486 EA 2'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	512.54	62.39
For 7 Ply Cold Press Construction, Deduct	-7.76	
For Stave Lumber Core (SLC), Add	290.83	
For Structural Composite Lumber Core (SCLC), Add	174.50	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	46.53	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	209.40	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	290.83	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	465.32	
For >50 To 100, Deduct	-28.75	
For >100, Deduct	-41.56	
08 14 16 00-0487 EA 2'-10" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	514.33	62.39
For 7 Ply Cold Press Construction, Deduct	-7.79	
For Stave Lumber Core (SLC), Add	292.17	
For Structural Composite Lumber Core (SCLC), Add	175.30	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	46.75	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	210.36	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	292.17	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	467.47	
For >50 To 100, Deduct	-28.84	
For >100, Deduct	-41.69	
08 14 16 00-0488 EA 3'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	521.56	65.10
For 7 Ply Cold Press Construction, Deduct	-7.83	
For Stave Lumber Core (SLC), Add	293.52	
For Structural Composite Lumber Core (SCLC), Add	176.11	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	46.96	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	211.33	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	293.52	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	469.63	
For >50 To 100, Deduct	-29.33	
For >100, Deduct	-42.37	
08 14 16 00-0489 EA 3'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	564.54	65.10
For 7 Ply Cold Press Construction, Deduct	-8.69	
For Stave Lumber Core (SLC), Add	325.76	
For Structural Composite Lumber Core (SCLC), Add	195.45	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	52.12	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	234.54	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	325.76	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	521.21	
For >50 To 100, Deduct	-31.48	
For >100, Deduct	-45.60	
08 14 16 00-0490 EA 3'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	680.66	67.81
For 7 Ply Cold Press Construction, Deduct	-10.90	
For Stave Lumber Core (SLC), Add	408.77	
For Structural Composite Lumber Core (SCLC), Add	245.26	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	65.40	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	294.32	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	408.77	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	654.04	
For >50 To 100, Deduct	-37.42	
For >100, Deduct	-54.44	
08 14 16 00-0491 EA 3'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	708.28	67.81
For 7 Ply Cold Press Construction, Deduct	-11.45	
For Stave Lumber Core (SLC), Add	429.49	
For Structural Composite Lumber Core (SCLC), Add	257.69	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	68.72	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	309.23	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	429.49	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	687.18	
For >50 To 100, Deduct	-38.80	
For >100, Deduct	-56.51	
08 14 16 00-0492 EA 4'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	773.26	73.24
For 7 Ply Cold Press Construction, Deduct	-12.54	
For Stave Lumber Core (SLC), Add	470.09	
For Structural Composite Lumber Core (SCLC), Add	282.05	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	75.21	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	338.46	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	470.09	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	752.14	
For >50 To 100, Deduct	-42.33	
For >100, Deduct	-61.66	
08 14 16 00-0493 EA 2'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door.....	578.02	59.67
For 7 Ply Cold Press Construction, Deduct	-9.17	
For Stave Lumber Core (SLC), Add	344.00	
For Structural Composite Lumber Core (SCLC), Add	206.40	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	55.04	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	247.68	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	344.00	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	550.39	
For >50 To 100, Deduct	-31.89	
For >100, Deduct	-46.34	
For 9' Door Height, Add	96.32	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 16 00-0494	EA	2'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	578.02	59.67
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-9.17	
		<i>For Stave Lumber Core (SLC), Add</i>	344.00	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	206.40	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	55.04	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	247.68	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	344.00	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	550.39	
		<i>For >50 To 100, Deduct</i>	-31.89	
		<i>For >100, Deduct</i>	-46.34	
		<i>For 9' Door Height, Add</i>	96.32	
08 14 16 00-0495	EA	2'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	583.43	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-9.17	
		<i>For Stave Lumber Core (SLC), Add</i>	344.00	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	206.40	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	55.04	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	247.68	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	344.00	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	550.39	
		<i>For >50 To 100, Deduct</i>	-32.29	
		<i>For >100, Deduct</i>	-46.88	
		<i>For 9' Door Height, Add</i>	96.32	
08 14 16 00-0496	EA	2'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	588.16	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-9.27	
		<i>For Stave Lumber Core (SLC), Add</i>	347.54	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	208.53	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	55.61	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	250.23	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	347.54	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	556.07	
		<i>For >50 To 100, Deduct</i>	-32.53	
		<i>For >100, Deduct</i>	-47.23	
		<i>For 9' Door Height, Add</i>	97.31	
08 14 16 00-0497	EA	2'-10" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	590.31	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-9.31	
		<i>For Stave Lumber Core (SLC), Add</i>	349.16	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	209.49	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	55.86	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	251.39	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	349.16	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	558.65	
		<i>For >50 To 100, Deduct</i>	-32.63	
		<i>For >100, Deduct</i>	-47.39	
		<i>For 9' Door Height, Add</i>	97.76	
08 14 16 00-0498	EA	3'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	597.86	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-9.35	
		<i>For Stave Lumber Core (SLC), Add</i>	350.75	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	210.45	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	56.12	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	252.54	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	350.75	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	561.19	
		<i>For >50 To 100, Deduct</i>	-33.15	
		<i>For >100, Deduct</i>	-48.09	
		<i>For 9' Door Height, Add</i>	98.21	
08 14 16 00-0499	EA	3'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	649.22	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-10.38	
		<i>For Stave Lumber Core (SLC), Add</i>	389.27	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	233.56	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	62.28	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	280.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	389.27	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	622.82	
		<i>For >50 To 100, Deduct</i>	-35.72	
		<i>For >100, Deduct</i>	-51.95	
		<i>For 9' Door Height, Add</i>	108.99	
08 14 16 00-0500	EA	3'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door	786.95	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-13.03	
		<i>For Stave Lumber Core (SLC), Add</i>	488.49	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	293.09	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	78.16	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	351.71	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	488.49	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	781.58	
		<i>For >50 To 100, Deduct</i>	-42.74	
		<i>For >100, Deduct</i>	-62.41	
		<i>For 9' Door Height, Add</i>	136.78	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0501	EA 3'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door..... <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	819.94 -13.69 513.23 307.94 82.12 369.53 513.23 821.17 -44.39 -64.89 143.71	67.81
08 14 16 00-0502	EA 4'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Oak Faced Wood Door..... <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	895.48 -14.98 561.75 337.05 89.88 404.46 561.75 898.80 -48.44 -70.82 157.29	73.24
08 14 16 00-0503 Maple Faced Wood Doors (08 14 16 00-0440)			
08 14 16 00-0504	EA 2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	426.28 -6.14 230.19 138.11 36.83 165.74 230.19 368.30 -24.30 -34.96	59.67
08 14 16 00-0505	EA 2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	426.28 -6.14 230.19 138.11 36.83 165.74 230.19 368.30 -24.30 -34.96	59.67
08 14 16 00-0506	EA 2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	431.69 -6.14 230.19 138.11 36.83 165.74 230.19 368.30 -24.70 -35.50	62.39
08 14 16 00-0507	EA 2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	434.85 -6.20 232.56 139.54 37.21 167.44 232.56 372.10 -24.86 -35.73	62.39
08 14 16 00-0508	EA 2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	436.26 -6.23 233.62 140.17 37.38 168.20 233.62 373.79 -24.93 -35.84	62.39
08 14 16 00-0509	EA 3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	443.13 -6.26 234.70 140.82 37.55 168.98 234.70 375.52 -25.41 -36.49	65.10

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0510	EA 3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	477.51 -6.95 260.48 156.29 41.68 187.55 260.48 416.77 -27.13 -39.07	65.10
08 14 16 00-0511	EA 3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	549.65 -8.28 310.52 186.31 49.68 223.57 310.52 496.82 -30.87 -44.61	67.81
08 14 16 00-0512	EA 3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	593.22 -9.15 343.19 205.92 54.91 247.10 343.19 549.11 -33.05 -47.88	67.81
08 14 16 00-0513	EA 4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	636.84 -10.02 375.91 225.54 60.15 270.65 375.91 601.45 -35.23 -51.15	67.81
08 14 16 00-0514	EA 2'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	444.14 -6.50 243.59 146.15 38.97 175.38 243.59 389.74 -25.19 -36.29	59.67
08 14 16 00-0515	EA 2'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	444.14 -6.50 243.59 146.15 38.97 175.38 243.59 389.74 -25.19 -36.29	59.67
08 14 16 00-0516	EA 2'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	449.55 -6.50 243.59 146.15 38.97 175.38 243.59 389.74 -25.60 -36.84	62.39
08 14 16 00-0517	EA 2'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	452.88 -6.56 246.08 147.65 39.37 177.18 246.08 393.73 -25.76 -37.09	62.39



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0518 EA 2'-10" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	454.40	62.39
For 7 Ply Cold Press Construction, Deduct	-6.59	
For Stave Lumber Core (SLC), Add	247.22	
For Structural Composite Lumber Core (SCLC), Add	148.33	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	39.56	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	178.00	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	247.22	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	395.56	
For >50 To 100, Deduct	-25.84	
For >100, Deduct	-37.20	
08 14 16 00-0519 EA 3'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	461.35	65.10
For 7 Ply Cold Press Construction, Deduct	-6.62	
For Stave Lumber Core (SLC), Add	248.36	
For Structural Composite Lumber Core (SCLC), Add	149.02	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	39.74	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	178.82	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	248.36	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	397.38	
For >50 To 100, Deduct	-26.32	
For >100, Deduct	-37.86	
08 14 16 00-0520 EA 3'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	497.72	65.10
For 7 Ply Cold Press Construction, Deduct	-7.35	
For Stave Lumber Core (SLC), Add	275.64	
For Structural Composite Lumber Core (SCLC), Add	165.38	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	44.10	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	198.46	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	275.64	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	441.02	
For >50 To 100, Deduct	-28.14	
For >100, Deduct	-40.58	
08 14 16 00-0521 EA 3'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	573.75	67.81
For 7 Ply Cold Press Construction, Deduct	-8.76	
For Stave Lumber Core (SLC), Add	328.59	
For Structural Composite Lumber Core (SCLC), Add	197.15	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	52.57	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	236.58	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	328.59	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	525.74	
For >50 To 100, Deduct	-32.08	
For >100, Deduct	-46.42	
08 14 16 00-0522 EA 3'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	619.87	67.81
For 7 Ply Cold Press Construction, Deduct	-9.68	
For Stave Lumber Core (SLC), Add	363.18	
For Structural Composite Lumber Core (SCLC), Add	217.91	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	58.11	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	261.49	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	363.18	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	581.09	
For >50 To 100, Deduct	-34.38	
For >100, Deduct	-49.88	
08 14 16 00-0523 EA 4'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	666.02	67.81
For 7 Ply Cold Press Construction, Deduct	-10.61	
For Stave Lumber Core (SLC), Add	397.79	
For Structural Composite Lumber Core (SCLC), Add	238.68	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	63.65	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	286.41	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	397.79	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	636.47	
For >50 To 100, Deduct	-36.69	
For >100, Deduct	-53.34	
08 14 16 00-0524 EA 2'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	507.46	59.67
For 7 Ply Cold Press Construction, Deduct	-7.76	
For Stave Lumber Core (SLC), Add	291.08	
For Structural Composite Lumber Core (SCLC), Add	174.65	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	46.57	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	209.57	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	291.08	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	465.72	
For >50 To 100, Deduct	-28.36	
For >100, Deduct	-41.04	
For 9' Door Height, Add	81.50	
08 14 16 00-0525 EA 2'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	507.46	59.67
For 7 Ply Cold Press Construction, Deduct	-7.76	
For Stave Lumber Core (SLC), Add	291.08	
For Structural Composite Lumber Core (SCLC), Add	174.65	
For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	46.57	
For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	209.57	
For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	291.08	
For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	465.72	
For >50 To 100, Deduct	-28.36	
For >100, Deduct	-41.04	
For 9' Door Height, Add	81.50	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 16 00-0526	EA 2'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	512.87	62.39
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.76	
	<i>For Stave Lumber Core (SLC), Add</i>	291.08	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	174.65	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	46.57	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	209.57	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	291.08	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	465.72	
	<i>For >50 To 100, Deduct</i>	-28.76	
	<i>For >100, Deduct</i>	-41.58	
	<i>For 9' Door Height, Add</i>	81.50	
08 14 16 00-0527	EA 2'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	516.87	62.39
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.84	
	<i>For Stave Lumber Core (SLC), Add</i>	294.08	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	176.45	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	47.05	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	211.73	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	294.08	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	470.52	
	<i>For >50 To 100, Deduct</i>	-28.96	
	<i>For >100, Deduct</i>	-41.88	
	<i>For 9' Door Height, Add</i>	82.34	
08 14 16 00-0528	EA 2'-10" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	518.68	62.39
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.88	
	<i>For Stave Lumber Core (SLC), Add</i>	295.43	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	177.26	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	47.27	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	212.71	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	295.43	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	472.69	
	<i>For >50 To 100, Deduct</i>	-29.05	
	<i>For >100, Deduct</i>	-42.02	
	<i>For 9' Door Height, Add</i>	82.72	
08 14 16 00-0529	EA 3'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	525.91	65.10
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-7.91	
	<i>For Stave Lumber Core (SLC), Add</i>	296.78	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	178.07	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	47.49	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	213.68	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	296.78	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	474.85	
	<i>For >50 To 100, Deduct</i>	-29.55	
	<i>For >100, Deduct</i>	-42.70	
	<i>For 9' Door Height, Add</i>	83.10	
08 14 16 00-0530	EA 3'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	569.38	65.10
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-8.78	
	<i>For Stave Lumber Core (SLC), Add</i>	329.39	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	197.63	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	52.70	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	237.16	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	329.39	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	527.02	
	<i>For >50 To 100, Deduct</i>	-31.72	
	<i>For >100, Deduct</i>	-45.96	
	<i>For 9' Door Height, Add</i>	92.23	
08 14 16 00-0531	EA 3'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	659.17	67.81
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-10.47	
	<i>For Stave Lumber Core (SLC), Add</i>	392.66	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	235.59	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	62.82	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	282.71	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	392.66	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	628.25	
	<i>For >50 To 100, Deduct</i>	-36.35	
	<i>For >100, Deduct</i>	-52.83	
	<i>For 9' Door Height, Add</i>	109.94	
08 14 16 00-0532	EA 3'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	714.29	67.81
	<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.57	
	<i>For Stave Lumber Core (SLC), Add</i>	434.00	
	<i>For Structural Composite Lumber Core (SCLC), Add</i>	260.40	
	<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	69.44	
	<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	312.48	
	<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	434.00	
	<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	694.39	
	<i>For >50 To 100, Deduct</i>	-39.11	
	<i>For >100, Deduct</i>	-56.96	
	<i>For 9' Door Height, Add</i>	121.52	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0533	EA		4'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Maple Faced Wood Door.....	769.43	67.81
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-12.68	
			<i>For Stave Lumber Core (SLC), Add</i>	475.35	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	285.21	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	76.06	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	342.25	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	475.35	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	760.56	
			<i>For >50 To 100, Deduct</i>	-41.86	
			<i>For >100, Deduct</i>	-61.10	
			<i>For 9' Door Height, Add</i>	133.10	
08 14 16 00-0534			Walnut Faced Wood Doors <small>(08 14 16 00-0440)</small>		
08 14 16 00-0535	EA		2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	675.89	59.67
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.13	
			<i>For Stave Lumber Core (SLC), Add</i>	417.40	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	250.44	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	66.78	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	300.53	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	417.40	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	667.84	
			<i>For >50 To 100, Deduct</i>	-36.78	
			<i>For >100, Deduct</i>	-53.68	
08 14 16 00-0536	EA		2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	675.89	59.67
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.13	
			<i>For Stave Lumber Core (SLC), Add</i>	417.40	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	250.44	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	66.78	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	300.53	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	417.40	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	667.84	
			<i>For >50 To 100, Deduct</i>	-36.78	
			<i>For >100, Deduct</i>	-53.68	
08 14 16 00-0537	EA		2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	681.48	62.39
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.13	
			<i>For Stave Lumber Core (SLC), Add</i>	417.53	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	250.52	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	66.81	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	300.62	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	417.53	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	668.05	
			<i>For >50 To 100, Deduct</i>	-37.19	
			<i>For >100, Deduct</i>	-54.23	
08 14 16 00-0538	EA		2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	687.21	62.39
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.25	
			<i>For Stave Lumber Core (SLC), Add</i>	421.83	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	253.10	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	67.49	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	303.72	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	421.83	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	674.93	
			<i>For >50 To 100, Deduct</i>	-37.48	
			<i>For >100, Deduct</i>	-54.66	
08 14 16 00-0539	EA		2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	702.22	62.39
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.55	
			<i>For Stave Lumber Core (SLC), Add</i>	433.09	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	259.85	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	69.29	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	311.82	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	433.09	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	692.94	
			<i>For >50 To 100, Deduct</i>	-38.23	
			<i>For >100, Deduct</i>	-55.79	
08 14 16 00-0540	EA		3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	722.62	65.10
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-11.85	
			<i>For Stave Lumber Core (SLC), Add</i>	444.32	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	266.59	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	71.09	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	319.91	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	444.32	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	710.90	
			<i>For >50 To 100, Deduct</i>	-39.39	
			<i>For >100, Deduct</i>	-57.45	
08 14 16 00-0541	EA		3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door.....	761.53	65.10
			<i>For 7 Ply Cold Press Construction, Deduct</i>	-12.63	
			<i>For Stave Lumber Core (SLC), Add</i>	473.50	
			<i>For Structural Composite Lumber Core (SCLC), Add</i>	284.10	
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	75.76	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	340.92	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	473.50	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	757.60	
			<i>For >50 To 100, Deduct</i>	-41.33	
			<i>For >100, Deduct</i>	-60.37	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0542	EA 3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	931.17 -15.91 596.66 357.99 95.46 429.59 596.66 954.65 -49.95 -73.23	67.81
08 14 16 00-0543	EA 3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	970.93 -16.71 626.48 375.89 100.24 451.06 626.48 1,002.36 -51.94 -76.21	67.81
08 14 16 00-0544	EA 4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,050.52 -18.30 686.17 411.70 109.79 494.04 686.17 1,097.87 -55.92 -82.18	67.81
08 14 16 00-0545	EA 2'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	708.27 -11.78 441.68 265.01 70.67 318.01 441.68 706.69 -38.40 -56.10	59.67
08 14 16 00-0546	EA 2'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	708.27 -11.78 441.68 265.01 70.67 318.01 441.68 706.69 -38.40 -56.10	59.67
08 14 16 00-0547	EA 2'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	713.86 -11.78 441.82 265.09 70.69 318.11 441.82 706.91 -38.81 -56.66	62.39
08 14 16 00-0548	EA 2'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	719.95 -11.90 446.39 267.83 71.42 321.40 446.39 714.22 -39.12 -57.12	62.39
08 14 16 00-0549	EA 2'-10" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	735.82 -12.22 458.29 274.97 73.33 329.97 458.29 733.26 -39.91 -58.31	62.39



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0550 EA 3'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	757.08 -12.54 470.16 282.10 75.23 338.52 470.16 752.26 -41.11 -60.04	65.10
08 14 16 00-0551 EA 3'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	798.28 -13.36 501.06 300.64 80.17 360.76 501.06 801.70 -43.17 -63.13	65.10
08 14 16 00-0552 EA 3'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	977.45 -16.84 631.37 378.82 101.02 454.58 631.37 1,010.18 -52.26 -76.70	67.81
08 14 16 00-0553 EA 3'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,019.54 -17.68 662.93 397.76 106.07 477.31 662.93 1,060.69 -54.37 -79.86	67.81
08 14 16 00-0554 EA 4'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,103.76 -19.36 726.10 435.66 116.18 522.79 726.10 1,161.76 -58.58 -86.17	67.81
08 14 16 00-0555 EA 2'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	823.12 -14.08 527.82 316.69 84.45 380.03 527.82 844.51 -44.14 -64.72 147.79	59.67
08 14 16 00-0556 EA 2'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	823.12 -14.08 527.82 316.69 84.45 380.03 527.82 844.51 -44.14 -64.72 147.79	59.67
08 14 16 00-0557 EA 2'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door <i>For 7 Ply Cold Press Construction, Deduct</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	828.74 -14.08 527.98 316.79 84.48 380.14 527.98 844.76 -44.56 -65.27 147.83	62.39

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 16 00-0558	EA	2'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	836.02	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-14.23	
		<i>For Stave Lumber Core (SLC), Add</i>	533.44	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	320.06	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	85.35	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	384.08	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	533.44	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	853.50	
		<i>For >50 To 100, Deduct</i>	-44.92	
		<i>For >100, Deduct</i>	-65.82	
		<i>For 9' Door Height, Add</i>	149.36	
08 14 16 00-0559	EA	2'-10" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	854.97	62.39
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-14.60	
		<i>For Stave Lumber Core (SLC), Add</i>	547.65	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	328.59	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	87.62	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	394.31	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	547.65	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	876.24	
		<i>For >50 To 100, Deduct</i>	-45.87	
		<i>For >100, Deduct</i>	-67.24	
		<i>For 9' Door Height, Add</i>	153.34	
08 14 16 00-0560	EA	3'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	879.35	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-14.98	
		<i>For Stave Lumber Core (SLC), Add</i>	561.86	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	337.12	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	89.90	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	404.54	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	561.86	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	898.98	
		<i>For >50 To 100, Deduct</i>	-47.22	
		<i>For >100, Deduct</i>	-69.21	
		<i>For 9' Door Height, Add</i>	157.32	
08 14 16 00-0561	EA	3'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	928.56	65.10
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-15.97	
		<i>For Stave Lumber Core (SLC), Add</i>	598.77	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	359.26	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	95.80	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	431.11	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	598.77	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	958.03	
		<i>For >50 To 100, Deduct</i>	-49.68	
		<i>For >100, Deduct</i>	-72.90	
		<i>For 9' Door Height, Add</i>	167.66	
08 14 16 00-0562	EA	3'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	1,141.62	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-20.12	
		<i>For Stave Lumber Core (SLC), Add</i>	754.49	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	452.70	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	120.72	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	543.23	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	754.49	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	1,207.19	
		<i>For >50 To 100, Deduct</i>	-60.47	
		<i>For >100, Deduct</i>	-89.01	
		<i>For 9' Door Height, Add</i>	211.26	
08 14 16 00-0563	EA	3'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	1,191.91	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-21.13	
		<i>For Stave Lumber Core (SLC), Add</i>	792.21	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	475.33	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	126.75	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	570.39	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	792.21	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	1,267.54	
		<i>For >50 To 100, Deduct</i>	-62.99	
		<i>For >100, Deduct</i>	-92.78	
		<i>For 9' Door Height, Add</i>	221.82	
08 14 16 00-0564	EA	4'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Walnut Faced Wood Door	1,292.54	67.81
		<i>For 7 Ply Cold Press Construction, Deduct</i>	-23.14	
		<i>For Stave Lumber Core (SLC), Add</i>	867.68	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	520.61	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	138.83	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	624.73	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	867.68	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	1,388.29	
		<i>For >50 To 100, Deduct</i>	-68.02	
		<i>For >100, Deduct</i>	-100.33	
		<i>For 9' Door Height, Add</i>	242.95	

08 14 16 00-0565 Luan Faced Wood Doors (08 14 16 00-0440)

08 14 16 00-0566	EA	2'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door	420.73	59.67
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	36.16	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	162.74	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	226.03	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	361.64	
		<i>For >50 To 100, Deduct</i>	-24.02	
		<i>For >100, Deduct</i>	-34.54	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0567 EA 2'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	420.73 36.16 162.74 226.03 361.64 -24.02 -34.54	59.67
08 14 16 00-0568 EA 2'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	427.01 36.27 163.21 226.68 362.69 -24.47 -35.15	62.39
08 14 16 00-0569 EA 2'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	435.69 37.31 167.90 233.19 373.10 -24.90 -35.80	62.39
08 14 16 00-0570 EA 2'-10" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	438.83 37.69 169.59 235.55 376.87 -25.06 -36.03	62.39
08 14 16 00-0571 EA 3'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	447.40 38.06 171.29 237.90 380.64 -25.63 -36.81	65.10
08 14 16 00-0572 EA 3'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	476.07 41.50 186.77 259.40 415.04 -27.06 -38.96	65.10
08 14 16 00-0573 EA 3'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	506.16 44.46 200.09 277.90 444.64 -28.70 -41.35	67.81
08 14 16 00-0574 EA 3'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	524.69 46.69 210.09 291.80 466.87 -29.63 -42.74	67.81
08 14 16 00-0575 EA 4'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	561.76 51.14 230.11 319.60 511.36 -31.48 -45.52	67.81
08 14 16 00-0576 EA 2'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	438.25 38.27 172.20 239.17 382.67 -24.90 -35.85	59.67
08 14 16 00-0577 EA 2'-4" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	438.25 38.27 172.20 239.17 382.67 -24.90 -35.85	59.67
08 14 16 00-0578 EA 2'-6" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add For >50 To 100, Deduct For >100, Deduct	444.59 38.38 172.70 239.87 383.78 -25.35 -36.46	62.39

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0579	EA		2'-8" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....453.77	453.77	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	39.48	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	177.66	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	246.75	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	394.80	
			<i>For >50 To 100, Deduct</i>	-25.81	
			<i>For >100, Deduct</i>	-37.15	
08 14 16 00-0580	EA		2'-10" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door.....457.12	457.12	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	39.88	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	179.47	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	249.26	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	398.82	
			<i>For >50 To 100, Deduct</i>	-25.98	
			<i>For >100, Deduct</i>	-37.40	
08 14 16 00-0581	EA		3'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....465.86	465.86	65.10
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	40.28	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	181.26	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	251.75	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	402.79	
			<i>For >50 To 100, Deduct</i>	-26.55	
			<i>For >100, Deduct</i>	-38.19	
08 14 16 00-0582	EA		3'-4" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....496.19	496.19	65.10
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	43.92	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	197.63	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	274.49	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	439.19	
			<i>For >50 To 100, Deduct</i>	-28.06	
			<i>For >100, Deduct</i>	-40.47	
08 14 16 00-0583	EA		3'-6" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....527.73	527.73	67.81
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	47.05	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	211.73	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	294.08	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	470.52	
			<i>For >50 To 100, Deduct</i>	-29.78	
			<i>For >100, Deduct</i>	-42.97	
08 14 16 00-0584	EA		3'-8" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....547.33	547.33	67.81
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	49.40	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	222.32	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	308.78	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	494.04	
			<i>For >50 To 100, Deduct</i>	-30.76	
			<i>For >100, Deduct</i>	-44.44	
08 14 16 00-0585	EA		4'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....586.57	586.57	67.81
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	54.11	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	243.51	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	338.21	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	541.13	
			<i>For >50 To 100, Deduct</i>	-32.72	
			<i>For >100, Deduct</i>	-47.38	
08 14 16 00-0586	EA		2'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....500.41	500.41	59.67
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	45.73	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	205.77	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	285.79	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	457.26	
			<i>For >50 To 100, Deduct</i>	-28.00	
			<i>For >100, Deduct</i>	-40.51	
			<i>For 9' Door Height, Add</i>	80.02	
08 14 16 00-0587	EA		2'-4" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....500.41	500.41	59.67
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	45.73	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	205.77	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	285.79	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	457.26	
			<i>For >50 To 100, Deduct</i>	-28.00	
			<i>For >100, Deduct</i>	-40.51	
			<i>For 9' Door Height, Add</i>	80.02	
08 14 16 00-0588	EA		2'-6" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....506.93	506.93	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	45.86	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	206.37	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	286.62	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	458.59	
			<i>For >50 To 100, Deduct</i>	-28.47	
			<i>For >100, Deduct</i>	-41.14	
			<i>For 9' Door Height, Add</i>	80.25	
08 14 16 00-0589	EA		2'-8" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Lauan Faced Wood Door .....517.94	517.94	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	47.18	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	212.31	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	294.88	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	471.80	
			<i>For >50 To 100, Deduct</i>	-29.02	
			<i>For >100, Deduct</i>	-41.96	
			<i>For 9' Door Height, Add</i>	82.57	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0590	EA			2'-10" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	521.94 47.66 214.47 297.88 476.60 -29.22 -42.26 83.41	62.39
08 14 16 00-0591	EA			3'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	531.33 48.14 216.61 300.85 481.36 -29.82 -43.10 84.24	65.10
08 14 16 00-0592	EA			3'-4" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	567.58 52.49 236.19 328.04 524.86 -31.63 -45.82 91.85	65.10
08 14 16 00-0593	EA			3'-6" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	604.19 56.23 253.02 351.42 562.27 -33.60 -48.71 98.40	67.81
08 14 16 00-0594	EA			3'-8" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	627.60 59.04 265.66 368.98 590.36 -34.77 -50.46 103.31	67.81
08 14 16 00-0595	EA			4'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), Luan Faced Wood Door <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 9' Door Height, Add</i>	674.51 64.67 291.00 404.16 646.66 -37.12 -53.98 113.16	67.81
08 14 16 00-0596				Medium Density Overlay (MDO) Wood Doors <small>(08 14 16 00-0440)</small>		
08 14 16 00-0597	EA			2'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	347.72 171.27 102.76 27.40 -20.37 -29.06	59.67
08 14 16 00-0598	EA			2'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	347.72 171.27 102.76 27.40 -20.37 -29.06	59.67
08 14 16 00-0599	EA			2'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	366.36 181.19 108.72 28.99 -21.44 -30.60	62.39
08 14 16 00-0600	EA			2'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	379.55 191.09 114.65 30.57 -22.10 -31.59	62.39
08 14 16 00-0601	EA			2'-10" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	382.01 192.93 115.76 30.87 -22.22 -31.77	62.39
08 14 16 00-0602	EA			3'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	389.93 194.80 116.88 31.17 -22.75 -32.50	65.10

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 16 00-0603	EA	3'-4" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	418.56	65.10
		<i>For Stave Lumber Core (SLC), Add</i>	216.27	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	129.76	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	34.60	
		<i>For >50 To 100, Deduct</i>	-24.18	
		<i>For >100, Deduct</i>	-34.65	
08 14 16 00-0604	EA	3'-6" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	476.26	67.81
		<i>For Stave Lumber Core (SLC), Add</i>	255.47	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	153.28	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	40.88	
		<i>For >50 To 100, Deduct</i>	-27.20	
		<i>For >100, Deduct</i>	-39.11	
08 14 16 00-0605	EA	3'-8" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	493.31	67.81
		<i>For Stave Lumber Core (SLC), Add</i>	268.26	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	160.96	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	42.92	
		<i>For >50 To 100, Deduct</i>	-28.06	
		<i>For >100, Deduct</i>	-40.39	
08 14 16 00-0606	EA	4'-0" x 6'-8" x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	527.34	67.81
		<i>For Stave Lumber Core (SLC), Add</i>	293.78	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	176.27	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	47.01	
		<i>For >50 To 100, Deduct</i>	-29.76	
		<i>For >100, Deduct</i>	-42.94	
08 14 16 00-0607	EA	2'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	361.02	59.67
		<i>For Stave Lumber Core (SLC), Add</i>	181.25	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	108.75	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	29.00	
		<i>For >50 To 100, Deduct</i>	-21.04	
		<i>For >100, Deduct</i>	-30.06	
08 14 16 00-0608	EA	2'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	361.02	59.67
		<i>For Stave Lumber Core (SLC), Add</i>	181.25	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	108.75	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	29.00	
		<i>For >50 To 100, Deduct</i>	-21.04	
		<i>For >100, Deduct</i>	-30.06	
08 14 16 00-0609	EA	2'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	380.43	62.39
		<i>For Stave Lumber Core (SLC), Add</i>	191.75	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	115.05	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	30.68	
		<i>For >50 To 100, Deduct</i>	-22.14	
		<i>For >100, Deduct</i>	-31.65	
08 14 16 00-0610	EA	2'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	394.39	62.39
		<i>For Stave Lumber Core (SLC), Add</i>	202.22	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	121.33	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	32.35	
		<i>For >50 To 100, Deduct</i>	-22.84	
		<i>For >100, Deduct</i>	-32.70	
08 14 16 00-0611	EA	2'-10" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	396.99	62.39
		<i>For Stave Lumber Core (SLC), Add</i>	204.17	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	122.50	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	32.67	
		<i>For >50 To 100, Deduct</i>	-22.97	
		<i>For >100, Deduct</i>	-32.89	
08 14 16 00-0612	EA	3'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	405.05	65.10
		<i>For Stave Lumber Core (SLC), Add</i>	206.14	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	123.68	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	32.98	
		<i>For >50 To 100, Deduct</i>	-23.51	
		<i>For >100, Deduct</i>	-33.63	
08 14 16 00-0613	EA	3'-4" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	435.33	65.10
		<i>For Stave Lumber Core (SLC), Add</i>	228.85	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	137.31	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	36.62	
		<i>For >50 To 100, Deduct</i>	-25.02	
		<i>For >100, Deduct</i>	-35.90	
08 14 16 00-0614	EA	3'-6" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	496.08	67.81
		<i>For Stave Lumber Core (SLC), Add</i>	270.34	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	162.20	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	43.25	
		<i>For >50 To 100, Deduct</i>	-28.19	
		<i>For >100, Deduct</i>	-40.60	
08 14 16 00-0615	EA	3'-8" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	514.12	67.81
		<i>For Stave Lumber Core (SLC), Add</i>	283.87	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	170.32	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	45.42	
		<i>For >50 To 100, Deduct</i>	-29.10	
		<i>For >100, Deduct</i>	-41.95	
08 14 16 00-0616	EA	4'-0" x 7' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door	550.15	67.81
		<i>For Stave Lumber Core (SLC), Add</i>	310.89	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	186.53	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	49.74	
		<i>For >50 To 100, Deduct</i>	-30.90	
		<i>For >100, Deduct</i>	-44.65	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 16 00-0617	EA			2'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	408.14	59.67
				<i>For Stave Lumber Core (SLC), Add</i>	216.59	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	129.95	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	34.65	
				<i>For >50 To 100, Deduct</i>	-23.39	
				<i>For >100, Deduct</i>	-33.59	
				<i>For 9' Door Height, Add</i>	60.64	
08 14 16 00-0618	EA			2'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	408.14	59.67
				<i>For Stave Lumber Core (SLC), Add</i>	216.59	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	129.95	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	34.65	
				<i>For >50 To 100, Deduct</i>	-23.39	
				<i>For >100, Deduct</i>	-33.59	
				<i>For 9' Door Height, Add</i>	60.64	
08 14 16 00-0619	EA			2'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	430.28	62.39
				<i>For Stave Lumber Core (SLC), Add</i>	229.13	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	137.48	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	36.66	
				<i>For >50 To 100, Deduct</i>	-24.63	
				<i>For >100, Deduct</i>	-35.39	
				<i>For 9' Door Height, Add</i>	64.16	
08 14 16 00-0620	EA			2'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	446.98	62.39
				<i>For Stave Lumber Core (SLC), Add</i>	241.66	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	144.99	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	38.67	
				<i>For >50 To 100, Deduct</i>	-25.47	
				<i>For >100, Deduct</i>	-36.64	
				<i>For 9' Door Height, Add</i>	67.66	
08 14 16 00-0621	EA			2'-10" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	450.07	62.39
				<i>For Stave Lumber Core (SLC), Add</i>	243.98	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	146.39	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	39.04	
				<i>For >50 To 100, Deduct</i>	-25.62	
				<i>For >100, Deduct</i>	-36.87	
				<i>For 9' Door Height, Add</i>	68.31	
08 14 16 00-0622	EA			3'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	458.66	65.10
				<i>For Stave Lumber Core (SLC), Add</i>	246.35	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	147.81	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	39.42	
				<i>For >50 To 100, Deduct</i>	-26.19	
				<i>For >100, Deduct</i>	-37.65	
				<i>For 9' Door Height, Add</i>	68.98	
08 14 16 00-0623	EA			3'-4" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	494.83	65.10
				<i>For Stave Lumber Core (SLC), Add</i>	273.47	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	164.08	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	43.76	
				<i>For >50 To 100, Deduct</i>	-28.00	
				<i>For >100, Deduct</i>	-40.37	
				<i>For 9' Door Height, Add</i>	76.57	
08 14 16 00-0624	EA			3'-6" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	566.36	67.81
				<i>For Stave Lumber Core (SLC), Add</i>	323.05	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	193.83	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	51.69	
				<i>For >50 To 100, Deduct</i>	-31.71	
				<i>For >100, Deduct</i>	-45.87	
				<i>For 9' Door Height, Add</i>	90.45	
08 14 16 00-0625	EA			3'-8" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	587.93	67.81
				<i>For Stave Lumber Core (SLC), Add</i>	339.23	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	203.54	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	54.28	
				<i>For >50 To 100, Deduct</i>	-32.79	
				<i>For >100, Deduct</i>	-47.49	
				<i>For 9' Door Height, Add</i>	94.98	
08 14 16 00-0626	EA			4'-0" x 8' x 1-3/4" Thick, 5 Ply, Particleboard Core (PC), Medium Density Overlay (MDO) Faced Wood Door.....	630.98	67.81
				<i>For Stave Lumber Core (SLC), Add</i>	371.51	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	222.91	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	59.44	
				<i>For >50 To 100, Deduct</i>	-34.94	
				<i>For >100, Deduct</i>	-50.71	
				<i>For 9' Door Height, Add</i>	104.02	
08 14 16 00-0627				Manufacturer Prefinished Options For Flush Wood Doors <small>(08 14 16)</small>		
08 14 16 00-0628	EA			Two Coats, Clear Or Colored Catalyzed Polyurethane Factory Finish For Flush Wood Door.....	74.13	
				<i>Note: Includes (2) coats any standard manufacturer color on six sides.</i>		
				<i>For Custom Color To Match Non-Standard Manufacturer Finish, Add</i>	24.69	
08 14 16 00-0629	EA			Three Coats, Clear Or Colored Catalyzed Polyurethane Factory Finish For Flush Wood Door.....	111.20	
				<i>Note: Includes (3) coats any standard manufacturer color on six sides.</i>		
				<i>For Custom Color To Match Non-Standard Manufacturer Finish, Add</i>	24.69	
08 14 23				Clad Wood Doors <small>(08 14)</small>		
08 14 23 16				Plastic-Laminate-Faced Wood Doors <small>(08 14 23)</small>		

08	08	Openings
	08 10	Doors and Frames
	08 14	Wood Doors



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 14 23 16-0001	1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Doors ^(08 14 23 16) Note: PC = Particleboard, medium-density fiberboard (MDF), or agrifiber core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.		
08 14 23 16-0002	EA 2'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	290.71 77.11 6.00 -17.52 -24.79	59.67
08 14 23 16-0003	EA 2'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	290.71 77.11 6.00 -17.52 -24.79	59.67
08 14 23 16-0004	EA 2'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	305.55 81.35 6.33 -18.40 -26.04	62.39
08 14 23 16-0005	EA 2'-8" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	314.97 85.59 6.66 -18.87 -26.74	62.39
08 14 23 16-0006	EA 2'-10" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	319.73 87.73 6.82 -19.11 -27.10	62.39
08 14 23 16-0007	EA 3'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	329.89 89.86 6.99 -19.75 -28.00	65.10
08 14 23 16-0008	EA 3'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	351.85 99.74 7.76 -20.85 -29.64	65.10
08 14 23 16-0009	EA 3'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	371.46 106.12 8.25 -21.96 -31.25	67.81
08 14 23 16-0010	EA 2'-0" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	300.68 81.59 6.35 -18.02 -25.54	59.67
08 14 23 16-0011	EA 2'-4" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	300.68 81.59 6.35 -18.02 -25.54	59.67
08 14 23 16-0012	EA 2'-6" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	316.07 86.09 6.70 -18.92 -26.82	62.39
08 14 23 16-0013	EA 2'-8" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	326.04 90.57 7.04 -19.42 -27.57	62.39
08 14 23 16-0014	EA 2'-10" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For 5 Ply Construction, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	331.07 92.84 7.22 -19.67 -27.95	62.39

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 23 16-0015	EA			3'-0" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	341.51	65.10
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	95.09	
				<i>For 5 Ply Construction, Add</i>	7.40	
				<i>For >50 To 100, Deduct</i>	-20.33	
				<i>For >100, Deduct</i>	-28.87	
08 14 23 16-0016	EA			3'-4" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	364.74	65.10
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	105.54	
				<i>For 5 Ply Construction, Add</i>	8.21	
				<i>For >50 To 100, Deduct</i>	-21.49	
				<i>For >100, Deduct</i>	-30.61	
08 14 23 16-0017	EA			3'-6" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	385.18	67.81
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	112.30	
				<i>For 5 Ply Construction, Add</i>	8.73	
				<i>For >50 To 100, Deduct</i>	-22.65	
				<i>For >100, Deduct</i>	-32.28	
08 14 23 16-0018	EA			2'-0" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	336.04	59.67
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	97.51	
				<i>For 5 Ply Construction, Add</i>	7.58	
				<i>For >50 To 100, Deduct</i>	-19.79	
				<i>For >100, Deduct</i>	-28.19	
08 14 23 16-0019	EA			2'-4" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	336.04	59.67
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	97.51	
				<i>For 5 Ply Construction, Add</i>	7.58	
				<i>For >50 To 100, Deduct</i>	-19.79	
				<i>For >100, Deduct</i>	-28.19	
08 14 23 16-0020	EA			2'-6" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	353.38	62.39
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	102.87	
				<i>For 5 Ply Construction, Add</i>	8.00	
				<i>For >50 To 100, Deduct</i>	-20.79	
				<i>For >100, Deduct</i>	-29.62	
08 14 23 16-0021	EA			2'-8" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	365.29	62.39
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	108.23	
				<i>For 5 Ply Construction, Add</i>	8.42	
				<i>For >50 To 100, Deduct</i>	-21.38	
				<i>For >100, Deduct</i>	-30.52	
08 14 23 16-0022	EA			2'-10" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	371.30	62.39
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	110.94	
				<i>For 5 Ply Construction, Add</i>	8.63	
				<i>For >50 To 100, Deduct</i>	-21.68	
				<i>For >100, Deduct</i>	-30.97	
08 14 23 16-0023	EA			3'-0" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	382.72	65.10
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	113.63	
				<i>For 5 Ply Construction, Add</i>	8.84	
				<i>For >50 To 100, Deduct</i>	-22.39	
				<i>For >100, Deduct</i>	-31.96	
08 14 23 16-0024	EA			3'-4" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	410.48	65.10
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	126.13	
				<i>For 5 Ply Construction, Add</i>	9.81	
				<i>For >50 To 100, Deduct</i>	-23.78	
				<i>For >100, Deduct</i>	-34.04	
08 14 23 16-0025	EA			3'-6" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	433.84	67.81
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	134.19	
				<i>For 5 Ply Construction, Add</i>	10.44	
				<i>For >50 To 100, Deduct</i>	-25.08	
				<i>For >100, Deduct</i>	-35.93	
08 14 23 16-0026				1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Doors <small>(08 14 23 16)</small>		
				Note: PC = Particleboard, medium-density fiberboard (MDF), or agrifiber core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.		
08 14 23 16-0027	EA			2'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	411.29	59.67
				<i>For 5 Ply Construction, Add</i>	10.22	
				<i>For Stave Lumber Core (SLC), Add</i>	218.95	
				<i>For Structural Composite Lumber Core (SCLC), Add</i>	131.37	
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	35.03	
				<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	157.64	
				<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	218.95	
				<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	350.32	
				<i>For >50 To 100, Deduct</i>	-23.55	
				<i>For >100, Deduct</i>	-33.83	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 23 16-0028	EA	2'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	411.28	59.67
		<i>For 5 Ply Construction, Add</i>	10.22	
		<i>For Stave Lumber Core (SLC), Add</i>	218.94	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	131.36	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	35.03	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	157.64	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	218.94	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	350.30	
		<i>For >50 To 100, Deduct</i>	-23.55	
		<i>For >100, Deduct</i>	-33.83	
08 14 23 16-0029	EA	2'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	425.82	62.39
		<i>For 5 Ply Construction, Add</i>	10.54	
		<i>For Stave Lumber Core (SLC), Add</i>	225.79	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	135.47	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	36.13	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	162.57	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	225.79	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	361.26	
		<i>For >50 To 100, Deduct</i>	-24.41	
		<i>For >100, Deduct</i>	-35.06	
08 14 23 16-0030	EA	2'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	425.82	62.39
		<i>For 5 Ply Construction, Add</i>	10.54	
		<i>For Stave Lumber Core (SLC), Add</i>	225.79	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	135.47	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	36.13	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	162.57	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	225.79	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	361.26	
		<i>For >50 To 100, Deduct</i>	-24.41	
		<i>For >100, Deduct</i>	-35.06	
08 14 23 16-0031	EA	2'-10" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	443.90	62.39
		<i>For 5 Ply Construction, Add</i>	11.17	
		<i>For Stave Lumber Core (SLC), Add</i>	239.35	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	143.61	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	38.30	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	172.33	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	239.35	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	382.96	
		<i>For >50 To 100, Deduct</i>	-25.31	
		<i>For >100, Deduct</i>	-36.41	
08 14 23 16-0032	EA	3'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	467.41	65.10
		<i>For 5 Ply Construction, Add</i>	11.80	
		<i>For Stave Lumber Core (SLC), Add</i>	252.91	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	151.74	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	40.47	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	182.09	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	252.91	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	404.65	
		<i>For >50 To 100, Deduct</i>	-26.63	
		<i>For >100, Deduct</i>	-38.31	
08 14 23 16-0033	EA	3'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	485.89	65.10
		<i>For 5 Ply Construction, Add</i>	12.45	
		<i>For Stave Lumber Core (SLC), Add</i>	266.77	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	160.06	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	42.68	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	192.07	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	266.77	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	426.83	
		<i>For >50 To 100, Deduct</i>	-27.55	
		<i>For >100, Deduct</i>	-39.70	
08 14 23 16-0034	EA	3'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door	500.55	67.81
		<i>For 5 Ply Construction, Add</i>	12.77	
		<i>For Stave Lumber Core (SLC), Add</i>	273.69	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	164.21	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	43.79	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	197.06	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	273.69	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	437.90	
		<i>For >50 To 100, Deduct</i>	-28.42	
		<i>For >100, Deduct</i>	-40.93	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 23 16-0035	EA 3'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	518.79 13.41 287.37 172.42 45.98 206.91 287.37 459.79 -29.33 -42.30	67.81
08 14 23 16-0036	EA 4'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	566.13 14.69 314.74 188.84 50.36 226.61 314.74 503.58 -31.97 -46.12	73.24
08 14 23 16-0037	EA 2'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	428.28 10.81 231.69 139.01 37.07 166.82 231.69 370.70 -24.40 -35.11	59.67
08 14 23 16-0038	EA 2'-4" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	428.27 10.81 231.68 139.01 37.07 166.81 231.68 370.69 -24.40 -35.10	59.67
08 14 23 16-0039	EA 2'-6" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	443.35 11.15 238.94 143.36 38.23 172.03 238.94 382.30 -25.29 -36.37	62.39
08 14 23 16-0040	EA 2'-8" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	443.35 11.15 238.94 143.36 38.23 172.03 238.94 382.30 -25.29 -36.37	62.39
08 14 23 16-0041	EA 2'-10" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door <i>For 5 Ply Construction, Add</i> <i>For Stave Lumber Core (SLC), Add</i> <i>For Structural Composite Lumber Core (SCLC), Add</i> <i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i> <i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i> <i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	462.48 11.82 253.28 151.97 40.53 182.36 253.28 405.25 -26.24 -37.81	62.39

08 Openings

08 10 Doors and Frames

08 14 Wood Doors



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 23 16-0042	EA	3'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	487.04	65.10
		For 5 Ply Construction, Add	12.49	
		For Stave Lumber Core (SLC), Add	267.63	
		For Structural Composite Lumber Core (SCLC), Add	160.58	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	42.82	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	192.69	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	267.63	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	428.21	
		For >50 To 100, Deduct	-27.61	
		For >100, Deduct	-39.78	
08 14 23 16-0043	EA	3'-4" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	506.58	65.10
		For 5 Ply Construction, Add	13.17	
		For Stave Lumber Core (SLC), Add	282.29	
		For Structural Composite Lumber Core (SCLC), Add	169.37	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	45.17	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	203.25	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	282.29	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	451.66	
		For >50 To 100, Deduct	-28.58	
		For >100, Deduct	-41.25	
08 14 23 16-0044	EA	3'-6" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	521.78	67.81
		For 5 Ply Construction, Add	13.52	
		For Stave Lumber Core (SLC), Add	289.61	
		For Structural Composite Lumber Core (SCLC), Add	173.77	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	46.34	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	208.52	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	289.61	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	463.38	
		For >50 To 100, Deduct	-29.48	
		For >100, Deduct	-42.52	
08 14 23 16-0045	EA	3'-8" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	541.09	67.81
		For 5 Ply Construction, Add	14.19	
		For Stave Lumber Core (SLC), Add	304.10	
		For Structural Composite Lumber Core (SCLC), Add	182.46	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	48.66	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	218.95	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	304.10	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	486.55	
		For >50 To 100, Deduct	-30.45	
		For >100, Deduct	-43.97	
08 14 23 16-0046	EA	4'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	590.55	73.24
		For 5 Ply Construction, Add	15.54	
		For Stave Lumber Core (SLC), Add	333.05	
		For Structural Composite Lumber Core (SCLC), Add	199.83	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	53.29	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	239.80	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	333.05	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	532.88	
		For >50 To 100, Deduct	-33.19	
		For >100, Deduct	-47.95	
08 14 23 16-0047	EA	2'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	488.53	59.67
		For 5 Ply Construction, Add	12.92	
		For Stave Lumber Core (SLC), Add	276.88	
		For Structural Composite Lumber Core (SCLC), Add	166.13	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	44.30	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	199.35	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	276.88	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	443.00	
		For >50 To 100, Deduct	-27.41	
		For >100, Deduct	-39.62	
08 14 23 16-0048	EA	2'-4" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	488.51	59.67
		For 5 Ply Construction, Add	12.92	
		For Stave Lumber Core (SLC), Add	276.86	
		For Structural Composite Lumber Core (SCLC), Add	166.12	
		For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	44.30	
		For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	199.34	
		For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	276.86	
		For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	442.98	
		For >50 To 100, Deduct	-27.41	
		For >100, Deduct	-39.62	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 23 16-0049	EA 2'-6" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	505.47	62.39
	For 5 Ply Construction, Add	13.32	
	For Stave Lumber Core (SLC), Add	285.53	
	For Structural Composite Lumber Core (SCLC), Add	171.32	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	45.68	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	205.58	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	285.53	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	456.84	
	For >50 To 100, Deduct	-28.39	
	For >100, Deduct	-41.03	
08 14 23 16-0050	EA 2'-8" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	505.47	62.39
	For 5 Ply Construction, Add	13.32	
	For Stave Lumber Core (SLC), Add	285.53	
	For Structural Composite Lumber Core (SCLC), Add	171.32	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	45.68	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	205.58	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	285.53	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	456.84	
	For >50 To 100, Deduct	-28.39	
	For >100, Deduct	-41.03	
08 14 23 16-0051	EA 2'-10" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	528.33	62.39
	For 5 Ply Construction, Add	14.12	
	For Stave Lumber Core (SLC), Add	302.67	
	For Structural Composite Lumber Core (SCLC), Add	181.60	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	48.43	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	217.92	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	302.67	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	484.27	
	For >50 To 100, Deduct	-29.54	
	For >100, Deduct	-42.74	
08 14 23 16-0052	EA 3'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	556.63	65.10
	For 5 Ply Construction, Add	14.93	
	For Stave Lumber Core (SLC), Add	319.82	
	For Structural Composite Lumber Core (SCLC), Add	191.89	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	51.17	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	230.27	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	319.82	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	511.72	
	For >50 To 100, Deduct	-31.09	
	For >100, Deduct	-45.00	
08 14 23 16-0053	EA 3'-4" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	579.98	65.10
	For 5 Ply Construction, Add	15.74	
	For Stave Lumber Core (SLC), Add	337.34	
	For Structural Composite Lumber Core (SCLC), Add	202.40	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	53.97	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	242.88	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	337.34	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	539.74	
	For >50 To 100, Deduct	-32.25	
	For >100, Deduct	-46.75	
08 14 23 16-0054	EA 3'-6" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	597.08	67.81
	For 5 Ply Construction, Add	16.15	
	For Stave Lumber Core (SLC), Add	346.09	
	For Structural Composite Lumber Core (SCLC), Add	207.65	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	55.37	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	249.18	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	346.09	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	553.74	
	For >50 To 100, Deduct	-33.24	
	For >100, Deduct	-48.17	
08 14 23 16-0055	EA 3'-8" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	620.14	67.81
	For 5 Ply Construction, Add	16.96	
	For Stave Lumber Core (SLC), Add	363.38	
	For Structural Composite Lumber Core (SCLC), Add	218.03	
	For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add	58.14	
	For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add	261.64	
	For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add	363.38	
	For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add	581.41	
	For >50 To 100, Deduct	-34.40	
	For >100, Deduct	-49.90	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 23 16-0056	EA	4'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Pressure Decorative Laminate (HPDL) Faced Wood Door.....	677.15	73.24
		<i>For 5 Ply Construction, Add</i>	18.57	
		<i>For Stave Lumber Core (SLC), Add</i>	398.00	
		<i>For Structural Composite Lumber Core (SCLC), Add</i>	238.80	
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	63.68	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	286.56	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	398.00	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	636.80	
		<i>For >50 To 100, Deduct</i>	-37.52	
		<i>For >100, Deduct</i>	-54.45	

08 14 23 19 Molded-Hardboard-Faced Wood Doors (08 14 23)

08 14 23 19-0001		1-3/8" Thick, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Doors (08 14 23 19)		
08 14 23 19-0002	EA	2'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	211.47	59.67
		<i>For >50 To 100, Deduct</i>	-13.56	
		<i>For >100, Deduct</i>	-18.84	
08 14 23 19-0003	EA	2'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	211.47	59.67
		<i>For >50 To 100, Deduct</i>	-13.56	
		<i>For >100, Deduct</i>	-18.84	
08 14 23 19-0004	EA	2'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	223.59	62.39
		<i>For >50 To 100, Deduct</i>	-14.30	
		<i>For >100, Deduct</i>	-19.89	
08 14 23 19-0005	EA	2'-8" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	226.79	62.39
		<i>For >50 To 100, Deduct</i>	-14.46	
		<i>For >100, Deduct</i>	-20.13	
08 14 23 19-0006	EA	2'-10" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	229.97	62.39
		<i>For >50 To 100, Deduct</i>	-14.62	
		<i>For >100, Deduct</i>	-20.37	
08 14 23 19-0007	EA	3'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	238.60	65.10
		<i>For >50 To 100, Deduct</i>	-15.19	
		<i>For >100, Deduct</i>	-21.15	
08 14 23 19-0008	EA	3'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	250.50	65.10
		<i>For >50 To 100, Deduct</i>	-15.78	
		<i>For >100, Deduct</i>	-22.04	
08 14 23 19-0009	EA	3'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	263.64	67.81
		<i>For >50 To 100, Deduct</i>	-16.57	
		<i>For >100, Deduct</i>	-23.16	
08 14 23 19-0010	EA	2'-0" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	216.82	59.67
		<i>For >50 To 100, Deduct</i>	-13.83	
		<i>For >100, Deduct</i>	-19.25	
08 14 23 19-0011	EA	2'-4" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	216.82	59.67
		<i>For >50 To 100, Deduct</i>	-13.83	
		<i>For >100, Deduct</i>	-19.25	
08 14 23 19-0012	EA	2'-6" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	229.35	62.39
		<i>For >50 To 100, Deduct</i>	-14.59	
		<i>For >100, Deduct</i>	-20.32	
08 14 23 19-0013	EA	2'-8" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	232.72	62.39
		<i>For >50 To 100, Deduct</i>	-14.76	
		<i>For >100, Deduct</i>	-20.57	
08 14 23 19-0014	EA	2'-10" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	236.09	62.39
		<i>For >50 To 100, Deduct</i>	-14.92	
		<i>For >100, Deduct</i>	-20.83	
08 14 23 19-0015	EA	3'-0" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	244.89	65.10
		<i>For >50 To 100, Deduct</i>	-15.50	
		<i>For >100, Deduct</i>	-21.62	
08 14 23 19-0016	EA	3'-4" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	257.49	65.10
		<i>For >50 To 100, Deduct</i>	-16.13	
		<i>For >100, Deduct</i>	-22.57	
08 14 23 19-0017	EA	3'-6" x 7' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	271.07	67.81
		<i>For >50 To 100, Deduct</i>	-16.94	
		<i>For >100, Deduct</i>	-23.72	
08 14 23 19-0018	EA	2'-0" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	235.84	59.67
		<i>For >50 To 100, Deduct</i>	-14.78	
		<i>For >100, Deduct</i>	-20.67	
08 14 23 19-0019	EA	2'-4" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	235.84	59.67
		<i>For >50 To 100, Deduct</i>	-14.78	
		<i>For >100, Deduct</i>	-20.67	
08 14 23 19-0020	EA	2'-6" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	249.75	62.39
		<i>For >50 To 100, Deduct</i>	-15.61	
		<i>For >100, Deduct</i>	-21.85	
08 14 23 19-0021	EA	2'-8" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	253.77	62.39
		<i>For >50 To 100, Deduct</i>	-15.81	
		<i>For >100, Deduct</i>	-22.15	
08 14 23 19-0022	EA	2'-10" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	257.81	62.39
		<i>For >50 To 100, Deduct</i>	-16.01	
		<i>For >100, Deduct</i>	-22.46	
08 14 23 19-0023	EA	3'-0" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	267.26	65.10
		<i>For >50 To 100, Deduct</i>	-16.62	
		<i>For >100, Deduct</i>	-23.30	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 23 19-0024	EA 3'-4" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	282.31 -17.37 -24.43	65.10
08 14 23 19-0025	EA 3'-6" x 8' x 1-3/8" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	297.48 -18.26 -25.70	67.81
08 14 23 19-0026	1-3/4" Thick, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Doors <small>(08 14 23 19)</small>		
08 14 23 19-0027	EA 2'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	234.13 -14.69 -20.54	59.67
08 14 23 19-0028	EA 2'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	234.13 -14.69 -20.54	59.67
08 14 23 19-0029	EA 2'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	242.71 -15.25 -21.32	62.39
08 14 23 19-0030	EA 2'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	249.11 -15.57 -21.80	62.39
08 14 23 19-0031	EA 2'-10" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	252.31 -15.73 -22.04	62.39
08 14 23 19-0032	EA 3'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	260.88 -16.30 -22.82	65.10
08 14 23 19-0033	EA 3'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	268.17 -16.66 -23.37	65.10
08 14 23 19-0034	EA 3'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	297.31 -18.26 -25.69	67.81
08 14 23 19-0035	EA 3'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	305.39 -18.66 -26.30	67.81
08 14 23 19-0036	EA 4'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	321.58 -19.47 -27.51	67.81
08 14 23 19-0037	EA 2'-0" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	240.80 -15.02 -21.04	59.67
08 14 23 19-0038	EA 2'-4" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	240.80 -15.02 -21.04	59.67
08 14 23 19-0039	EA 2'-6" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	249.58 -15.60 -21.84	62.39
08 14 23 19-0040	EA 2'-8" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	256.35 -15.94 -22.35	62.39
08 14 23 19-0041	EA 2'-10" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	259.72 -16.11 -22.60	62.39
08 14 23 19-0042	EA 3'-0" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	268.50 -16.68 -23.39	65.10
08 14 23 19-0043	EA 3'-4" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	276.21 -17.07 -23.97	65.10
08 14 23 19-0044	EA 3'-6" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	306.73 -18.73 -26.40	67.81
08 14 23 19-0045	EA 3'-8" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	315.28 -19.15 -27.04	67.81
08 14 23 19-0046	EA 4'-0" x 7' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	332.39 -20.01 -28.32	67.81
08 14 23 19-0047	EA 2'-0" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	264.47 -16.21 -22.82	59.67
08 14 23 19-0048	EA 2'-4" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	264.47 -16.21 -22.82	59.67
08 14 23 19-0049	EA 2'-6" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	273.92 -16.82 -23.66	62.39
08 14 23 19-0050	EA 2'-8" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	282.01 -17.22 -24.27	62.39

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 23 19-0051	EA	2'-10" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	286.02 -17.42 -24.57	62.39
08 14 23 19-0052	EA	3'-0" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	295.47 -18.03 -25.42	65.10
08 14 23 19-0053	EA	3'-4" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	304.67 -18.49 -26.11	65.10
08 14 23 19-0054	EA	3'-6" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	340.10 -20.40 -28.90	67.81
08 14 23 19-0055	EA	3'-8" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	350.31 -20.91 -29.66	67.81
08 14 23 19-0056	EA	4'-0" x 8' x 1-3/4" Thick, 3 Ply, Hollow Core (HC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	370.77 -21.93 -31.20	67.81
08 14 23 19-0057		1-3/8" Thick, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Doors <small>(08 14 23 19)</small>		
		Note: PC = Particleboard, medium-density fiberboard (MDF), or agrifiber core, solid core door with stiles and rails bonded to the core and abrasive planed flat prior to the application of the faces.		
08 14 23 19-0058	EA	2'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	250.20 -15.49 -21.75	59.67
08 14 23 19-0059	EA	2'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	250.20 -15.49 -21.75	59.67
08 14 23 19-0060	EA	2'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	263.21 -16.28 -22.86	62.39
08 14 23 19-0061	EA	2'-8" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	270.79 -16.66 -23.43	62.39
08 14 23 19-0062	EA	2'-10" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	272.18 -16.73 -23.53	62.39
08 14 23 19-0063	EA	3'-0" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	279.03 -17.21 -24.18	65.10
08 14 23 19-0064	EA	3'-4" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	295.44 -18.03 -25.41	65.10
08 14 23 19-0065	EA	3'-6" x 6'-8" x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	330.81 -19.93 -28.20	67.81
08 14 23 19-0066	EA	2'-0" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	257.83 -15.88 -22.32	59.67
08 14 23 19-0067	EA	2'-4" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	257.83 -15.88 -22.32	59.67
08 14 23 19-0068	EA	2'-6" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	271.27 -16.68 -23.46	62.39
08 14 23 19-0069	EA	2'-8" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	279.28 -17.08 -24.07	62.39
08 14 23 19-0070	EA	2'-10" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	280.77 -17.16 -24.18	62.39
08 14 23 19-0071	EA	3'-0" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	287.69 -17.64 -24.83	65.10
08 14 23 19-0072	EA	3'-4" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door <i>For >50 To 100, Deduct</i>	305.07 -18.51 -26.14	65.10

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 23 19-0073	EA			3'-6" x 7' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	342.17	67.81
				<i>For >50 To 100, Deduct</i>	-20.50	
				<i>For >100, Deduct</i>	-29.05	
08 14 23 19-0074	EA			2'-0" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	284.83	59.67
				<i>For >50 To 100, Deduct</i>	-17.23	
				<i>For >100, Deduct</i>	-24.35	
08 14 23 19-0075	EA			2'-4" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	284.83	59.67
				<i>For >50 To 100, Deduct</i>	-17.23	
				<i>For >100, Deduct</i>	-24.35	
08 14 23 19-0076	EA			2'-6" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	299.84	62.39
				<i>For >50 To 100, Deduct</i>	-18.11	
				<i>For >100, Deduct</i>	-25.61	
08 14 23 19-0077	EA			2'-8" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	309.41	62.39
				<i>For >50 To 100, Deduct</i>	-18.59	
				<i>For >100, Deduct</i>	-26.33	
08 14 23 19-0078	EA			2'-10" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	311.18	62.39
				<i>For >50 To 100, Deduct</i>	-18.68	
				<i>For >100, Deduct</i>	-26.46	
08 14 23 19-0079	EA			3'-0" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	318.40	65.10
				<i>For >50 To 100, Deduct</i>	-19.18	
				<i>For >100, Deduct</i>	-27.14	
08 14 23 19-0080	EA			3'-4" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	339.17	65.10
				<i>For >50 To 100, Deduct</i>	-20.21	
				<i>For >100, Deduct</i>	-28.69	
08 14 23 19-0081	EA			3'-6" x 8' x 1-3/8" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	382.46	67.81
				<i>For >50 To 100, Deduct</i>	-22.51	
				<i>For >100, Deduct</i>	-32.08	
08 14 23 19-0082				1-3/4" Thick, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Doors <small>(08 14 23 19)</small>		
				Note: PC = Particleboard, medium-density fiberboard (MDF), or agrifiber core, solid core door with stiles and rails banded to the core and abrasive planed flat prior to the application of the faces.		
08 14 23 19-0083	EA			2'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	283.77	59.67
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	19.73	
				<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	88.78	
				<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	123.31	
				<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	197.29	
				<i>For >50 To 100, Deduct</i>	-17.17	
				<i>For >100, Deduct</i>	-24.27	
08 14 23 19-0084	EA			2'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	283.77	59.67
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	19.73	
				<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	88.78	
				<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	123.31	
				<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	197.29	
				<i>For >50 To 100, Deduct</i>	-17.17	
				<i>For >100, Deduct</i>	-24.27	
08 14 23 19-0085	EA			2'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	298.70	62.39
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	20.87	
				<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	93.92	
				<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	130.45	
				<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	208.72	
				<i>For >50 To 100, Deduct</i>	-18.05	
				<i>For >100, Deduct</i>	-25.52	
08 14 23 19-0086	EA			2'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	308.20	62.39
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	22.01	
				<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	99.05	
				<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	137.57	
				<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	220.12	
				<i>For >50 To 100, Deduct</i>	-18.53	
				<i>For >100, Deduct</i>	-26.23	
08 14 23 19-0087	EA			2'-10" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	309.97	62.39
				<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	22.22	
				<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	100.01	
				<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	138.90	
				<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	222.24	
				<i>For >50 To 100, Deduct</i>	-18.62	
				<i>For >100, Deduct</i>	-26.37	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 23 19-0088	EA		3'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	317.19	65.10
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	22.44	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	100.97	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	140.24	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	224.39	
			<i>For >50 To 100, Deduct</i>	-19.11	
			<i>For >100, Deduct</i>	-27.04	
08 14 23 19-0089	EA		3'-4" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	337.80	65.10
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	24.91	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	112.10	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	155.70	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	249.12	
			<i>For >50 To 100, Deduct</i>	-20.15	
			<i>For >100, Deduct</i>	-28.59	
08 14 23 19-0090	EA		3'-6" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	380.87	67.81
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	29.43	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	132.43	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	183.93	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	294.29	
			<i>For >50 To 100, Deduct</i>	-22.43	
			<i>For >100, Deduct</i>	-31.96	
08 14 23 19-0091	EA		3'-8" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	393.15	67.81
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	30.90	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	139.06	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	193.14	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	309.02	
			<i>For >50 To 100, Deduct</i>	-23.05	
			<i>For >100, Deduct</i>	-32.88	
08 14 23 19-0092	EA		4'-0" x 6'-8" x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	417.65	67.81
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	33.84	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	152.29	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	211.52	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	338.42	
			<i>For >50 To 100, Deduct</i>	-24.27	
			<i>For >100, Deduct</i>	-34.71	
08 14 23 19-0093	EA		2'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	293.34	59.67
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	20.88	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	93.95	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	130.49	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	208.78	
			<i>For >50 To 100, Deduct</i>	-17.65	
			<i>For >100, Deduct</i>	-24.98	
08 14 23 19-0094	EA		2'-4" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	293.34	59.67
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	20.88	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	93.95	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	130.49	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	208.78	
			<i>For >50 To 100, Deduct</i>	-17.65	
			<i>For >100, Deduct</i>	-24.98	
08 14 23 19-0095	EA		2'-6" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	308.83	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	22.09	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	99.39	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	138.05	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	220.87	
			<i>For >50 To 100, Deduct</i>	-18.56	
			<i>For >100, Deduct</i>	-26.28	
08 14 23 19-0096	EA		2'-8" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	318.89	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	23.29	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	104.82	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	145.59	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	232.94	
			<i>For >50 To 100, Deduct</i>	-19.06	
			<i>For >100, Deduct</i>	-27.04	
08 14 23 19-0097	EA		2'-10" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door	320.75	62.39
			<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	23.52	
			<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	105.83	
			<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	146.99	
			<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	235.18	
			<i>For >50 To 100, Deduct</i>	-19.16	
			<i>For >100, Deduct</i>	-27.18	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 14 23 19-0098	EA	3'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	328.08	65.10
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	23.75	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	106.86	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	148.41	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	237.46	
		<i>For >50 To 100, Deduct</i>	-19.66	
		<i>For >100, Deduct</i>	-27.86	
08 14 23 19-0099	EA	3'-4" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	349.88	65.10
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	26.36	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	118.63	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	164.76	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	263.62	
		<i>For >50 To 100, Deduct</i>	-20.75	
		<i>For >100, Deduct</i>	-29.50	
08 14 23 19-0100	EA	3'-6" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	395.14	67.81
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	31.14	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	140.14	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	194.63	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	311.41	
		<i>For >50 To 100, Deduct</i>	-23.15	
		<i>For >100, Deduct</i>	-33.03	
08 14 23 19-0101	EA	3'-8" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	408.12	67.81
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	32.70	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	147.14	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	204.37	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	326.99	
		<i>For >50 To 100, Deduct</i>	-23.80	
		<i>For >100, Deduct</i>	-34.00	
08 14 23 19-0102	EA	4'-0" x 7' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	434.07	67.81
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	35.81	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	161.16	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	223.83	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	358.13	
		<i>For >50 To 100, Deduct</i>	-25.09	
		<i>For >100, Deduct</i>	-35.95	
08 14 23 19-0103	EA	2'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	327.27	59.67
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	24.95	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	112.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	155.93	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	249.49	
		<i>For >50 To 100, Deduct</i>	-19.35	
		<i>For >100, Deduct</i>	-27.53	
08 14 23 19-0104	EA	2'-4" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	327.27	59.67
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	24.95	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	112.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	155.93	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	249.49	
		<i>For >50 To 100, Deduct</i>	-19.35	
		<i>For >100, Deduct</i>	-27.53	
08 14 23 19-0105	EA	2'-6" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	344.73	62.39
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	26.40	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	118.78	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	164.97	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	263.95	
		<i>For >50 To 100, Deduct</i>	-20.36	
		<i>For >100, Deduct</i>	-28.97	
08 14 23 19-0106	EA	2'-8" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	356.75	62.39
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	27.84	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	125.27	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	173.99	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	278.38	
		<i>For >50 To 100, Deduct</i>	-20.96	
		<i>For >100, Deduct</i>	-29.88	
08 14 23 19-0107	EA	2'-10" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	358.97	62.39
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	28.10	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	126.47	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	175.65	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	281.04	
		<i>For >50 To 100, Deduct</i>	-21.07	
		<i>For >100, Deduct</i>	-30.04	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 23 19-0108	EA	3'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	366.67	65.10
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	28.38	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	127.69	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	177.35	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	283.76	
		<i>For >50 To 100, Deduct</i>	-21.59	
		<i>For >100, Deduct</i>	-30.76	
08 14 23 19-0109	EA	3'-4" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	392.72	65.10
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	31.50	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	141.76	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	196.89	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	315.02	
		<i>For >50 To 100, Deduct</i>	-22.89	
		<i>For >100, Deduct</i>	-32.71	
08 14 23 19-0110	EA	3'-6" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	445.73	67.81
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	37.21	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	167.45	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	232.58	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	372.12	
		<i>For >50 To 100, Deduct</i>	-25.68	
		<i>For >100, Deduct</i>	-36.82	
08 14 23 19-0111	EA	3'-8" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	461.27	67.81
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	39.08	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	175.85	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	244.23	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	390.77	
		<i>For >50 To 100, Deduct</i>	-26.45	
		<i>For >100, Deduct</i>	-37.99	
08 14 23 19-0112	EA	4'-0" x 8' x 1-3/4" Thick, 3 Ply, Particleboard Core (PC), High Density Fiberboard/Hardboard (HDF) Faced Wood Door.....	492.26	67.81
		<i>For Commercial Grade 45 Minute Particleboard Core (PC), Fire Rated Door, Add</i>	42.80	
		<i>For Commercial Grade 45 Minute Mineral Core (MC), Fire Rated Door, Add</i>	192.58	
		<i>For Commercial Grade 60 Minute Mineral Core (MC), Fire Rated Door, Add</i>	267.47	
		<i>For Commercial Grade 90 Minute Mineral Core (MC), Rated Fire Door, Add</i>	427.96	
		<i>For >50 To 100, Deduct</i>	-28.00	
		<i>For >100, Deduct</i>	-40.31	

08 14 66 Wood Screen Doors (08 14)

08 14 66 00-0001		Wood Screen Storm Door, Residential Grade (08 14 66) Note: Includes frame, trim, necessary anchors and usual hardware (closures, chain and spring, latching, screens, etc.).		
08 14 66 00-0002	EA	2'-8" x 6'-8" x 1-3/8" Thick, Wood Screen Door, Residential, With Frame, Trim, Hardware.....	466.57	156.25
08 14 66 00-0003	EA	3' x 6'-8" x 1-3/8" Thick, Wood Screen Door, Residential, With Frame, Trim, Hardware.....	490.68	173.60
08 14 66 00-0004	EA	2'-8" x 7" x 1-3/8" Thick, Wood Screen Door, Residential, With Frame, Trim, Hardware.....	466.57	156.25
08 14 66 00-0005	EA	3' x 7' x 1-3/8" Thick, Wood Screen Door, Residential, With Frame, Trim, Hardware.....	490.68	173.60

08 14 73 Sliding Wood Doors (08 14)

08 14 73 00-0001		Sliding Pocket Door (08 14 73) Note: Includes unfinished door, frame and trim, and all mounting and door hardware. See CSI section 08 14 73 00-0055 for accessories to be added.		
08 14 73 00-0002		Birch Faced Pocket Door (08 14 73 00-0001) Note: Includes door, frame and trim, and all mounting and door hardware.		
08 14 73 00-0003		1-3/8" Thick, Birch Faced Wood Pocket Door (08 14 73 00-0002) See CSI section 08 14 73 00-0055 for all jambs and track hardware.		
08 14 73 00-0004		6'-8" High, 1-3/8" Thick, Birch Faced Wood Pocket Door (08 14 73 00-0003)		
08 14 73 00-0005	EA	2'-0" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	485.02	37.98
		<i>For Oak, Add</i>	112.91	
		<i>For Ash/Hickory, Add</i>	164.45	
		<i>For Walnut, Add</i>	239.72	
		<i>For Cherry, Add</i>	389.85	
08 14 73 00-0006	EA	2'-4" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	500.36	40.69
		<i>For Oak, Add</i>	115.64	
		<i>For Ash/Hickory, Add</i>	168.44	
		<i>For Walnut, Add</i>	245.53	
		<i>For Cherry, Add</i>	399.31	
08 14 73 00-0007	EA	2'-6" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	518.17	43.40
		<i>For Oak, Add</i>	119.07	
		<i>For Ash/Hickory, Add</i>	173.42	
		<i>For Walnut, Add</i>	252.80	
		<i>For Cherry, Add</i>	411.12	
08 14 73 00-0008	EA	2'-8" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	531.04	46.12
		<i>For Oak, Add</i>	121.12	
		<i>For Ash/Hickory, Add</i>	176.41	
		<i>For Walnut, Add</i>	257.16	
		<i>For Cherry, Add</i>	418.21	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 73 00-0009	EA 2'-10" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	548.87 124.54 181.39 264.42 430.02	48.83
08 14 73 00-0010	EA 3'-0" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	564.21 127.28 185.38 270.23 439.48	51.54
08 14 73 00-0011	EA 4' Wide, Two 2'-0" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	953.80 225.81 328.90 479.45 779.72	67.81
08 14 73 00-0012	EA 5' Wide, Two 2'-6" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	1,009.27 238.13 346.85 505.60 822.25	73.24
08 14 73 00-0013	EA 6' Wide, Two 3'-0" x 6'-8" x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	1,079.64 254.55 370.76 540.47 878.95	78.67
08 14 73 00-0014	7' High, 1-3/8" Thick Birch Faced Wood Pocket Door <small>(08 14 73 00-0003)</small>		
08 14 73 00-0015	EA 2'-0" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	571.80 116.03 116.03 190.91 358.51	37.98
08 14 73 00-0016	EA 2'-4" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	599.53 121.25 121.25 199.50 374.64	40.69
08 14 73 00-0017	EA 2'-6" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	619.82 124.73 124.73 205.22 385.40	43.40
08 14 73 00-0018	EA 2'-8" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	637.65 127.64 127.64 210.00 394.36	46.12
08 14 73 00-0019	EA 2'-10" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	653.00 129.95 129.95 213.81 401.53	48.83
08 14 73 00-0020	EA 3'-0" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	673.30 133.44 133.44 219.54 412.28	51.54
08 14 73 00-0021	EA 4' Wide, Two 2'-0" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	1,127.35 232.06 232.06 381.81 717.01	67.81
08 14 73 00-0022	EA 5' Wide, Two 2'-6" x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	1,212.57 249.47 249.47 410.45 770.79	73.24
08 14 73 00-0023	EA 6' Wide, Two 3' x 7' x 1-3/8" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	1,297.82 266.87 266.87 439.08 824.57	78.67
08 14 73 00-0024	1-3/4" Thick, Birch Faced Wood Pocket Door <small>(08 14 73 00-0002)</small> See CSI section 08 14 73 00-0055 for all jambs and track hardware.		
08 14 73 00-0025	6'-8" High, 1-3/4" Thick Birch Faced Wood Pocket Door <small>(08 14 73 00-0024)</small>		
08 14 73 00-0026	EA 2'-0" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door <i>For Oak, Add</i> <i>For Ash/Hickory, Add</i> <i>For Walnut, Add</i> <i>For Cherry, Add</i>	720.56 150.84 150.84 248.18 466.06	37.98

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 14 73 00-0027	EA 2'-4" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	755.73	40.69
	For Oak, Add	157.80	
	For Ash/Hickory, Add	157.80	
	For Walnut, Add	259.63	
	For Cherry, Add	487.57	
08 14 73 00-0028	EA 2'-8" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	776.02	43.40
	For Oak, Add	161.28	
	For Ash/Hickory, Add	161.28	
	For Walnut, Add	265.36	
	For Cherry, Add	498.33	
08 14 73 00-0029	EA 2'-8" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	798.80	46.12
	For Oak, Add	165.34	
	For Ash/Hickory, Add	165.34	
	For Walnut, Add	272.04	
	For Cherry, Add	510.87	
08 14 73 00-0030	EA 2'-10" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	819.12	48.83
	For Oak, Add	168.83	
	For Ash/Hickory, Add	168.83	
	For Walnut, Add	277.77	
	For Cherry, Add	521.63	
08 14 73 00-0031	EA 3'-0" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	839.41	51.54
	For Oak, Add	172.31	
	For Ash/Hickory, Add	172.31	
	For Walnut, Add	283.49	
	For Cherry, Add	532.38	
08 14 73 00-0032	EA 4' Wide, Two 2'-0" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,424.87	67.81
	For Oak, Add	301.68	
	For Ash/Hickory, Add	301.68	
	For Walnut, Add	496.36	
	For Cherry, Add	932.12	
08 14 73 00-0033	EA 5' Wide, Two 2'-6" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,524.96	73.24
	For Oak, Add	322.57	
	For Ash/Hickory, Add	322.57	
	For Walnut, Add	530.72	
	For Cherry, Add	996.65	
08 14 73 00-0034	EA 6' Wide, Two 3'-0" x 6'-8" x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,630.04	78.67
	For Oak, Add	344.61	
	For Ash/Hickory, Add	344.61	
	For Walnut, Add	566.99	
	For Cherry, Add	1,064.76	
08 14 73 00-0035	7' High, 1-3/4" Thick Birch Faced Wood Pocket Door (08 14 73 00-0024)		
08 14 73 00-0036	EA 2'-0" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	770.14	37.98
	For Oak, Add	162.44	
	For Ash/Hickory, Add	162.44	
	For Walnut, Add	267.27	
	For Cherry, Add	501.91	
08 14 73 00-0037	EA 2'-4" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	810.27	40.69
	For Oak, Add	170.56	
	For Ash/Hickory, Add	170.56	
	For Walnut, Add	280.63	
	For Cherry, Add	527.00	
08 14 73 00-0038	EA 2'-6" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	833.04	43.40
	For Oak, Add	174.63	
	For Ash/Hickory, Add	174.63	
	For Walnut, Add	287.31	
	For Cherry, Add	539.55	
08 14 73 00-0039	EA 2'-8" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	855.82	46.12
	For Oak, Add	178.69	
	For Ash/Hickory, Add	178.69	
	For Walnut, Add	293.99	
	For Cherry, Add	552.10	
08 14 73 00-0040	EA 2'-10" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	876.14	48.83
	For Oak, Add	182.17	
	For Ash/Hickory, Add	182.17	
	For Walnut, Add	299.72	
	For Cherry, Add	562.86	
08 14 73 00-0041	EA 3'-0" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	898.92	51.54
	For Oak, Add	186.23	
	For Ash/Hickory, Add	186.23	
	For Walnut, Add	306.41	
	For Cherry, Add	575.41	
08 14 73 00-0042	EA 4' Wide, Two 2'-0" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,524.04	67.81
	For Oak, Add	324.89	
	For Ash/Hickory, Add	324.89	
	For Walnut, Add	534.54	
	For Cherry, Add	1,003.82	
08 14 73 00-0043	EA 5' Wide, Two 2'-6" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,639.01	73.24
	For Oak, Add	349.25	
	For Ash/Hickory, Add	349.25	
	For Walnut, Add	574.63	
	For Cherry, Add	1,079.11	



Openings	08	08
Doors and Frames	08 10	
Wood Doors	08 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 73 00-0044	EA		6' Wide, Two 3'-0" x 7' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,749.05	78.67
			<i>For Oak, Add</i>	372.46	
			<i>For Ash/Hickory, Add</i>	372.46	
			<i>For Walnut, Add</i>	612.81	
			<i>For Cherry, Add</i>	1,150.81	
08 14 73 00-0045			8' High, 1-3/4" Thick Birch Faced Wood Pocket Door (08 14 73 00-0024)		
08 14 73 00-0046	EA		2'-0" x 8' x 1-3/4" High Wood Pocket Door, Hollow Core, Birch Faced	819.73	37.98
			<i>For Oak, Add</i>	174.05	
			<i>For Ash/Hickory, Add</i>	174.05	
			<i>For Walnut, Add</i>	286.36	
			<i>For Cherry, Add</i>	537.76	
08 14 73 00-0047	EA		2'-4" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door	859.86	40.69
			<i>For Oak, Add</i>	182.17	
			<i>For Ash/Hickory, Add</i>	182.17	
			<i>For Walnut, Add</i>	299.72	
			<i>For Cherry, Add</i>	562.86	
08 14 73 00-0048	EA		2'-6" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door	885.10	43.40
			<i>For Oak, Add</i>	186.81	
			<i>For Ash/Hickory, Add</i>	186.81	
			<i>For Walnut, Add</i>	307.36	
			<i>For Cherry, Add</i>	577.19	
08 14 73 00-0049	EA		2'-8" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door	910.37	46.12
			<i>For Oak, Add</i>	191.45	
			<i>For Ash/Hickory, Add</i>	191.45	
			<i>For Walnut, Add</i>	315.00	
			<i>For Cherry, Add</i>	591.54	
08 14 73 00-0050	EA		2'-10" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door	930.68	48.83
			<i>For Oak, Add</i>	194.93	
			<i>For Ash/Hickory, Add</i>	194.93	
			<i>For Walnut, Add</i>	320.72	
			<i>For Cherry, Add</i>	602.29	
08 14 73 00-0051	EA		3'-0" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door	955.94	51.54
			<i>For Oak, Add</i>	199.57	
			<i>For Ash/Hickory, Add</i>	199.57	
			<i>For Walnut, Add</i>	328.36	
			<i>For Cherry, Add</i>	616.63	
08 14 73 00-0052	EA		4' Wide, Two 2'-0" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,623.21	67.81
			<i>For Oak, Add</i>	348.09	
			<i>For Ash/Hickory, Add</i>	348.09	
			<i>For Walnut, Add</i>	572.72	
			<i>For Cherry, Add</i>	1,075.52	
08 14 73 00-0053	EA		5' Wide, Two 2'-6" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,743.14	73.24
			<i>For Oak, Add</i>	373.62	
			<i>For Ash/Hickory, Add</i>	373.62	
			<i>For Walnut, Add</i>	614.72	
			<i>For Cherry, Add</i>	1,154.39	
08 14 73 00-0054	EA		6' Wide, Two 3'-0" x 8' x 1-3/4" Thick, Hollow Core (HC), Birch Faced Wood Pocket Door.....	1,863.10	78.67
			<i>For Oak, Add</i>	399.15	
			<i>For Ash/Hickory, Add</i>	399.15	
			<i>For Walnut, Add</i>	656.72	
			<i>For Cherry, Add</i>	1,233.26	
08 14 73 00-0055			Accessories (08 14 73 00-0001)		
08 14 73 00-0056			Jamb Replacement (08 14 73 00-0055)		
08 14 73 00-0057	EA		4-9/16 Or 4-3/4" Birch Jamb Replacement For Pocket Doors	124.03	
			<i>For Oak, Add</i>	7.89	
			<i>For Ash/Hickory, Add</i>	12.35	
			<i>For Walnut, Add</i>	27.00	
			<i>For Cherry, Add</i>	42.78	
08 14 73 00-0058	EA		5-1/4" Birch Jamb Replacement For Pocket Doors	126.28	
			<i>For Oak, Add</i>	8.14	
			<i>For Ash/Hickory, Add</i>	12.75	
			<i>For Walnut, Add</i>	27.88	
			<i>For Cherry, Add</i>	44.15	
08 14 73 00-0059	EA		6-9/16" Or 6-3/4" Birch Jamb Replacement For Pocket Doors	140.91	
			<i>For Oak, Add</i>	9.79	
			<i>For Ash/Hickory, Add</i>	15.34	
			<i>For Walnut, Add</i>	33.54	
			<i>For Cherry, Add</i>	53.12	
08 14 73 00-0060			Track And Hardware Replacement Kits (08 14 73 00-0055)		
			Note: For double doors, use 2 appropriate sized hardware and 1 converging kit.		
08 14 73 00-0061	EA		Up To 2'-6" x 6'-8" Door Track And Hardware Replacement For Pocket Door	304.66	
08 14 73 00-0062	EA		2'-8" x 6'-8" Door Track And Hardware Replacement For Pocket Door	307.45	
08 14 73 00-0063	EA		3'-0" x 6'-8" Door Track And Hardware Replacement For Pocket Door	313.03	
08 14 73 00-0064	EA		Up To 2'-6" x 7' Door Track And Hardware Replacement For Pocket Door	366.06	
08 14 73 00-0065	EA		2'-8" x 7' Door Track And Hardware Replacement For Pocket Door.....	368.85	
08 14 73 00-0066	EA		3'-0" x 7' Door Track And Hardware Replacement For Pocket Door.....	374.44	
08 14 73 00-0067	EA		Up To 2'-6" x 8' Door Track And Hardware.....	393.97	
08 14 73 00-0068	EA		2'-8" x 8' Door Track And Hardware Replacement For Pocket Door.....	396.76	

08 Openings**08 10 Doors and Frames****08 14 Wood Doors**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 14 73 00-0069	EA	3'-0" x 8' Door Track And Hardware Replacement For Pocket Door.....	402.34	
08 14 73 00-0070	EA	Double Door Converging Kit For Pocket Door	44.19	
08 14 73 00-0071		Bi-Pass Doors <small>(08 14 73)</small>		
		Note: Includes unfinished doors, fascia track, hangers, door guide, doorstop, and pulls. 125 LB maximum door weight (each opening).		
08 14 73 00-0072		Flush, Hollow Core (HC), Birch Faced Wood Bi-Pass Doors <small>(08 14 73 00-0071)</small>		
08 14 73 00-0073	EA	4' Wide, Two 2'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Pass Doors.....	439.56	86.77
08 14 73 00-0074	EA	5' Wide, Two 2'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Pass Doors.....	483.67	92.18
08 14 73 00-0075	EA	6' Wide, Two 3'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Pass Doors.....	528.31	97.61
08 14 73 00-0076	EA	8' Wide, Four 2'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Pass Doors.....	732.87	103.04
08 14 73 00-0077		Flush, Hollow Core (HC), Lauan Faced Wood Bi-Pass Doors <small>(08 14 73 00-0071)</small>		
08 14 73 00-0078	EA	4' Wide, Two 2'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Pass Doors.....	408.74	86.77
08 14 73 00-0079	EA	5' Wide, Two 2'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Pass Doors.....	435.62	92.18
08 14 73 00-0080	EA	6' Wide, Two 3'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Pass Doors.....	475.43	97.61
08 14 73 00-0081	EA	8' Wide, Four 2'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Pass Doors.....	671.24	103.04
08 14 73 00-0082		Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Pass Doors <small>(08 14 73 00-0071)</small>		
08 14 73 00-0083	EA	4' Wide, Two 2'-0" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Pass Doors	440.42	86.77
08 14 73 00-0084	EA	5' Wide, Two 2'-6" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Pass Doors	481.52	92.18
08 14 73 00-0085	EA	6' Wide, Two 3'-0" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Pass Doors	524.75	97.61
08 14 73 00-0086	EA	8' Wide, Four 2'-0" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Pass Doors	734.61	103.04
08 14 76 Bifolding Wood Doors <small>(08 14)</small>				
08 14 76 00-0001		Bi-Fold Wood Doors <small>(08 14 76)</small>		
		Note: Includes doors, track, top and bottom pivots, door guide, track stop, panel hinge, bottom pivot bracket, top pivot lock, and 4-door aligner (when necessary). Excludes doorframe and knobs.		
08 14 76 00-0002		Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors <small>(08 14 76 00-0001)</small>		
08 14 76 00-0003	EA	2'-0" Wide, Two 1'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors	205.58	65.07
08 14 76 00-0004	EA	2'-6" Wide, Two 1'-3" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors	216.42	70.50
08 14 76 00-0005	EA	2'-8" Wide, Two 1'-4" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors	232.30	75.92
08 14 76 00-0006	EA	3'-0" Wide, Two 1'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors	243.14	81.34
08 14 76 00-0007	EA	4'-0" Wide, Four 1'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors.....	318.29	86.77
08 14 76 00-0008	EA	5'-0" Wide, Four 1'-3" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors.....	329.14	92.18
08 14 76 00-0009	EA	6'-0" Wide, Four 1'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Lauan Faced Wood Bi-Fold Doors.....	350.65	97.61
08 14 76 00-0010		Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors <small>(08 14 76 00-0001)</small>		
08 14 76 00-0011	EA	2'-0" Wide, Two 1'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors	217.88	65.07
08 14 76 00-0012	EA	2'-6" Wide, Two 1'-3" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors	232.76	70.50
08 14 76 00-0013	EA	2'-8" Wide, Two 1'-4" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors	251.36	75.92
08 14 76 00-0014	EA	3'-0" Wide, Two 1'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors	262.20	81.34
08 14 76 00-0015	EA	4'-0" Wide, Four 1'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors.....	344.64	86.77
08 14 76 00-0016	EA	5'-0" Wide, Four 1'-3" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors.....	370.22	92.18
08 14 76 00-0017	EA	6'-0" Wide, Four 1'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Birch Faced Wood Bi-Fold Doors.....	397.33	97.61
08 14 76 00-0018		Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors <small>(08 14 76 00-0001)</small>		
08 14 76 00-0019	EA	2'-0" Wide, Two 1'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors.....	218.45	65.07
08 14 76 00-0020	EA	2'-6" Wide, Two 1'-3" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors.....	240.65	70.50
08 14 76 00-0021	EA	2'-8" Wide, Two 1'-4" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors.....	258.63	75.92
08 14 76 00-0022	EA	3'-0" Wide, Two 1'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors.....	269.47	81.34
08 14 76 00-0023	EA	4'-0" Wide, Four 1'-0" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	351.00	86.77
08 14 76 00-0024	EA	5'-0" Wide, Four 1'-3" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	364.41	92.18
08 14 76 00-0025	EA	6'-0" Wide, Four 1'-6" x 6'-8" x 1-3/8" Thick, Flush, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	397.33	97.61
08 14 76 00-0026		Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors <small>(08 14 76 00-0001)</small>		
08 14 76 00-0027	EA	2'-0" Wide, Two 1'-0" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	584.27	65.07
08 14 76 00-0028	EA	2'-6" Wide, Two 1'-3" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	668.49	70.50
08 14 76 00-0029	EA	2'-8" Wide, Two 1'-4" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	764.61	75.92
08 14 76 00-0030	EA	3'-0" Wide, Two 1'-6" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	775.45	81.34
08 14 76 00-0031	EA	4'-0" Wide, Four 1'-0" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	1,081.78	86.77
08 14 76 00-0032	EA	5'-0" Wide, Four 1'-3" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	1,239.38	92.18
08 14 76 00-0033	EA	6'-0" Wide, Four 1'-6" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Pine Faced Wood Bi-Fold Doors.....	1,420.76	97.61
08 14 76 00-0034		Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors <small>(08 14 76 00-0001)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 14 76 00-0035 EA 2'-0" Wide, Two 1'-0" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	752.84	65.07
08 14 76 00-0036 EA 2'-6" Wide, Two 1'-3" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	817.22	70.50
08 14 76 00-0037 EA 2'-8" Wide, Two 1'-4" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	893.51	75.92
08 14 76 00-0038 EA 3'-0" Wide, Two 1'-6" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	904.35	81.34
08 14 76 00-0039 EA 4'-0" Wide, Four 1'-0" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	1,418.90	86.77
08 14 76 00-0040 EA 5'-0" Wide, Four 1'-3" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	1,536.84	92.18
08 14 76 00-0041 EA 6'-0" Wide, Four 1'-6" x 6'-8" x 1-3/8" Thick, Raised Panel, Hollow Core (HC), Oak Faced Wood Bi-Fold Doors	1,678.56	97.61
08 14 76 00-0042 Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors <small>(08 14 76 00-0001)</small>		
08 14 76 00-0043 EA 2'-0" Wide, Two 1'-0" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	209.91	65.07
08 14 76 00-0044 EA 2'-6" Wide, Two 1'-3" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	225.81	70.50
08 14 76 00-0045 EA 2'-8" Wide, Two 1'-4" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	247.37	75.92
08 14 76 00-0046 EA 3'-0" Wide, Two 1'-6" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	249.18	81.34
08 14 76 00-0047 EA 4'-0" Wide, Four 1'-0" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	311.16	86.77
08 14 76 00-0048 EA 5'-0" Wide, Four 1'-3" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	336.17	92.18
08 14 76 00-0049 EA 6'-0" Wide, Four 1'-6" x 6'-8" x 1-3/8" Thick, Molded Panel, Hollow Core (HC), High Density Fiberboard (HDF) Faced Wood Bi-Fold Doors	377.59	97.61
08 16 Composite Doors <small>(08 10)</small>		
Note: Includes machining for all hardware. Excludes frames, finish hardware. See CSI section 08 70 00 00-0000 for finish hardware.		
08 16 13 Fiberglass Doors <small>(08 16)</small>		
See CSI section 08 70 00 00-0000 for finish hardware.		
08 16 13 00-0001 Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Frames And Doors <small>(08 16 13)</small>		
08 16 13 00-0002 Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0001)</small>		
08 16 13 00-0003 Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0002)</small>		
Note: White, tan, brown or gray finish. Includes factory hardware prep and 25 Mil resin rich gel coat.		
08 16 13 00-0004 Standard, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0003)</small>		
Note: Includes fiberglass reinforced polyester (FRP) doorframe, 4-1/2" x 4-1/2" stainless steel hinges and factory hardware prep. Excludes hardware.		
08 16 13 00-0005 6'-8" High, Standard Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0004)</small>		
08 16 13 00-0006 EA 3' x 6'-8", Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)	3,218.89	65.10
For Custom Color Finish, Add		168.10
For Stainless Steel Continuous Hinge, Add		374.17
08 16 13 00-0007 EA 3'-6" x 6'-8", Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)	3,436.46	67.81
For Custom Color Finish, Add		168.10
For Stainless Steel Continuous Hinge, Add		374.17
08 16 13 00-0008 EA 4' x 6'-8", Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)	3,767.33	73.24
For Custom Color Finish, Add		168.10
For Stainless Steel Continuous Hinge, Add		374.17
08 16 13 00-0009 7' High, Standard Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0004)</small>		
08 16 13 00-0010 EA 3' x 7', Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)	3,218.89	65.10
For Custom Color Finish, Add		168.10
For Stainless Steel Continuous Hinge, Add		374.17
08 16 13 00-0011 EA 3'-6" x 7', Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)	3,522.76	67.81
For Custom Color Finish, Add		168.10
For Stainless Steel Continuous Hinge, Add		374.17
08 16 13 00-0012 EA 4' x 7', Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)	3,859.02	73.24
For Custom Color Finish, Add		168.10
For Stainless Steel Continuous Hinge, Add		374.17
08 16 13 00-0013 Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0003)</small>		
Note: Includes fiberglass reinforced polyester (FRP) doorframe, 4-1/2" x 4-1/2" stainless steel hinges and factory hardware prep. Excludes hardware.		
08 16 13 00-0014 45 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0013)</small>		

08	08	Openings
	08 10	Doors and Frames
	08 16	Composite Doors



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 16 13 00-0015	6'-8" High, 45 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0014)</small>		
08 16 13 00-0016	EA 3' x 6'-8", 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,822.96	65.10
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0017	EA 3'-6" x 6'-8", 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,902.10	67.81
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0018	EA 4' x 6'-8", 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	4,450.51	73.24
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0019	7' High, 45 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0014)</small>		
08 16 13 00-0020	EA 3' x 7', 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,822.96	65.10
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0021	EA 3'-6" x 7', 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	4,182.57	67.81
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0022	EA 4' x 7', 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	4,554.78	73.24
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0023	60 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0013)</small>		
08 16 13 00-0024	6'-8" High, 60 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0023)</small>		
08 16 13 00-0025	EA 3' x 6'-8", 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,822.96	65.10
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0026	EA 3'-6" x 6'-8", 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,902.10	67.81
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0027	EA 4' x 6'-8", 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	4,450.51	73.24
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0028	7' High, 60 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0023)</small>		
08 16 13 00-0029	EA 3' x 7', 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,822.96	65.10
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0030	EA 3'-6" x 7', 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	4,182.57	67.81
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0031	EA 4' x 7', 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	4,554.78	73.24
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0032	90 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0013)</small>		
08 16 13 00-0033	6'-8" High, 90 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) <small>(08 16 13 00-0032)</small>		
08 16 13 00-0034	EA 3' x 6'-8", 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,822.96	65.10
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0035	EA 3'-6" x 6'-8", 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf).....	3,902.10	67.81
	<i>For Custom Color Finish, Add</i>	168.10	
	<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	



Openings	08	08
Doors and Frames	08 10	
Composite Doors	08 16	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 16 13 00-0036	EA	4' x 6'-8", 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,450.51 168.10 374.17	73.24
08 16 13 00-0037 7' High, 90 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) (08 16 13 00-0032)				
08 16 13 00-0038	EA	3' x 7', 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	3,822.96 168.10 374.17	65.10
08 16 13 00-0039	EA	3'-6" x 7', 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,182.57 168.10 374.17	67.81
08 16 13 00-0040	EA	4' x 7', 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,554.78 168.10 374.17	73.24
08 16 13 00-0041		Storm Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) (08 16 13 00-0003) Note: Includes fiberglass reinforced polyester (FRP) doorframe, 4-1/2" x 4-1/2" stainless steel hinges and factory hardware prep. Excludes hardware.		
08 16 13 00-0042		6'-8" High, Storm Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) (08 16 13 00-0041)		
08 16 13 00-0043	EA	3' x 6'-8", Storm Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	3,404.07 168.10 374.17	65.10
08 16 13 00-0044		7' High, Storm Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Chem-Pruf) (08 16 13 00-0041)		
08 16 13 00-0045	EA	3' x 7', Storm Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Chem-Pruf)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	3,404.07 168.10 374.17	65.10
08 16 13 00-0046		Accessories For Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Doors (Chem-Pruf) (08 16 13 00-0002)		
08 16 13 00-0047	SI	1/4" Tempered, Factory Installed Vision Glass (Chem-Pruf).....	0.46	
08 16 13 00-0048	SI	1/4" Laminated, Factory Installed Vision Glass (Chem-Pruf).....	0.47	
08 16 13 00-0049	SI	1/4" Wire, Factory Installed Vision Glass (Chem-Pruf).....	0.62	
08 16 13 00-0050	SI	1/2" Insulated, Factory Installed Vision Glass (Chem-Pruf).....	0.59	
08 16 13 00-0051	SI	Factory Installed Molded Louver (Chem-Pruf).....	1.18	
08 16 13 00-0052	SI	Factory Installed Molded Louver With Insect Screen (Chem-Pruf).....	1.32	
08 16 13 00-0053	LF	Weather Strip (Chem-Pruf).....	12.58	
08 16 13 00-0054	LF	Fiberglass Reinforced Polyester (FRP) Astragal With Seal (Chem-Pruf).....	16.18	
08 16 13 00-0055	LF	1/2" Fiberglass Reinforced Polyester (FRP) Grooved Saddle Threshold (Chem-Pruf).....	34.16	
08 16 13 00-0056	LF	Fiberglass Reinforced Polyester (FRP) Door Sweep (Chem-Pruf).....	37.75	
08 16 13 00-0057	LF	2-1/4" Fiberglass Reinforced Polyester (FRP) Center Door Mullion (Chem-Pruf).....	73.71	
08 16 13 00-0058		Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) (08 16 13 00-0001)		
08 16 13 00-0059		Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) (08 16 13 00-0058) Note: White, tan, brown or gray finish. Includes factory hardware prep.		
08 16 13 00-0060		Standard, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) (08 16 13 00-0059) Note: Includes fiberglass reinforced polyester (FRP) doorframe, 4-1/2" x 4-1/2" stainless steel hinges and factory hardware prep. Excludes hardware.		
08 16 13 00-0061		6'-8" High, Standard Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) (08 16 13 00-0060)		
08 16 13 00-0062	EA	3' x 6'-8", Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	2,457.65 168.10 374.17	65.10
08 16 13 00-0063	EA	3'-6" x 6'-8", Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	2,491.36 168.10 374.17	67.81
08 16 13 00-0064	EA	4' x 6'-8", Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door)..... <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	2,610.98 168.10 374.17	73.24

08	08	Openings
	08 10	Doors and Frames
	08 16	Composite Doors



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 16 13 00-0065		7' High, Standard Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0060)</small>		
08 16 13 00-0066	EA	3' x 7', Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	2,457.65	65.10
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0067	EA	3'-6" x 7', Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	2,600.13	67.81
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0068	EA	4' x 7', Standard Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	2,610.98	73.24
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0069		Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0059)</small>		
		Note: Includes fiberglass reinforced polyester (FRP) doorframe, 4-1/2" x 4-1/2" stainless steel hinges and factory hardware prep. Excludes hardware.		
08 16 13 00-0070		45 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0069)</small>		
08 16 13 00-0071		6'-8" High, 45 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0070)</small>		
08 16 13 00-0072	EA	3' x 6'-8", 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,089.19	65.10
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0073	EA	3'-6" x 6'-8", 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,172.93	67.81
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0074	EA	4' x 6'-8", 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,370.86	73.24
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0075		7' High, 45 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0070)</small>		
08 16 13 00-0076	EA	3' x 7', 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,089.19	65.10
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0077	EA	3'-6" x 7', 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,203.39	67.81
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0078	EA	4' x 7', 45 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,464.41	73.24
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0079		60 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0069)</small>		
08 16 13 00-0080		6'-8" High, 60 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0079)</small>		
08 16 13 00-0081	EA	3' x 6'-8", 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,089.19	65.10
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0082	EA	3'-6" x 6'-8", 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,172.93	67.81
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0083	EA	4' x 6'-8", 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,370.86	73.24
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0084		7' High, 60 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0079)</small>		
08 16 13 00-0085	EA	3' x 7', 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,089.19	65.10
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	
08 16 13 00-0086	EA	3'-6" x 7', 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door).....	4,203.39	67.81
		<i>For Custom Color Finish, Add</i>	168.10	
		<i>For Stainless Steel Continuous Hinge, Add</i>	374.17	



Openings	08	08
Doors and Frames	08 10	
Composite Doors	08 16	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 16 13 00-0087	EA	4' x 7', 60 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,464.41 168.10 374.17	73.24
08 16 13 00-0088		90 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0069)</small>		
08 16 13 00-0089		6'-8" High, 90 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0088)</small>		
08 16 13 00-0090	EA	3' x 6'-8", 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,089.19 168.10 374.17	65.10
08 16 13 00-0091	EA	3'-6" x 6'-8", 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,172.93 168.10 374.17	67.81
08 16 13 00-0092	EA	4' x 6'-8", 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,370.86 168.10 374.17	73.24
08 16 13 00-0093		7' High, 90 Minute Fire Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0088)</small>		
08 16 13 00-0094	EA	3' x 7', 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,089.19 168.10 374.17	65.10
08 16 13 00-0095	EA	3'-6" x 7', 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,203.39 168.10 374.17	67.81
08 16 13 00-0096	EA	4' x 7', 90 Minute Fire Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	4,464.41 168.10 374.17	73.24
08 16 13 00-0097		Storm Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0059)</small> Note: Includes fiberglass reinforced polyester (FRP) doorframe, 4-1/2" x 4-1/2" stainless steel hinges and factory hardware prep. Excludes hardware.		
08 16 13 00-0098		6'-8" High, Storm Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0097)</small>		
08 16 13 00-0099	EA	3' x 6'-8", Storm Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	2,783.96 168.10 374.17	65.10
08 16 13 00-0100		7' High, Storm Rated, Corrosion-Resistant Fiberglass Reinforced Polyester (FRP) Doors And Frames (Skule Door) <small>(08 16 13 00-0097)</small>		
08 16 13 00-0101	EA	3' x 7', Storm Rated, Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Door And Frame (Skule Door) <i>For Custom Color Finish, Add</i> <i>For Stainless Steel Continuous Hinge, Add</i>	2,783.96 168.10 374.17	65.10
08 16 13 00-0102		Accessories For Corrosion Resistant Fiberglass Reinforced Polyester (FRP) Doors (Skule Door) <small>(08 16 13 00-0058)</small>		
08 16 13 00-0103	SI	1/4" Tempered, Factory Installed Vision Glass (Skule Door).....	1.03	
08 16 13 00-0104	SI	1/4" Laminated, Factory Installed Vision Glass (Skule Door).....	1.06	
08 16 13 00-0105	SI	1/4" Wire, Factory Installed Vision Glass (Skule Door).....	1.12	
08 16 13 00-0106	SI	1/2" Insulated, Factory Installed Vision Glass (Skule Door).....	1.60	
08 16 13 00-0107	SI	Factory Installed Molded Louver (Skule Door).....	0.63	
08 16 13 00-0108	SI	Factory Installed Molded Louver With Insect Screen (Skule Door).....	1.01	
08 16 13 00-0109	LF	Weather Strip (Skule Door).....	8.70	
08 16 13 00-0110	LF	Fiberglass Reinforced Polyester (FRP) Astragal With Seal (Skule Door).....	10.88	
08 16 13 00-0111	LF	1/2" Fiberglass Reinforced Polyester (FRP) Grooved Saddle Threshold (Skule Door).....	34.81	
08 16 13 00-0112	LF	Fiberglass Reinforced Polyester (FRP) Door Sweep (Skule Door).....	124.00	
08 16 13 00-0113	LF	2-1/4" Fiberglass Reinforced Polyester (FRP) Center Door Mullion (Skule Door).....	47.86	
08 16 13 00-0114		Galvanized Insulated Poly Core Composite Doors <small>(08 16 13)</small>		
08 16 13 00-0115	EA	3'-0" x 7'-0" x 1-3/4" Thick, Flush, 18 Gauge, Galvanized, Insulated Poly Core Composite Door (Curries 707N).....	1,340.53	65.10

08 17 Integrated Door Opening Assemblies (08 10)

08 Openings**08 10 Doors and Frames****08 17 Integrated Door Opening Assemblies**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**08 17 23 Integrated Metal Door Opening Assemblies (08 17)**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 17 23 00-0001			Pre-Hung Interior Door Units (08 17 23) Note: Includes door, frame, and trim, all mounting hardware (standard duty ball bearing hinges). Excludes lockset.		
08 17 23 00-0002			Hollow Core Doors, 1-3/8" Thick (08 17 23 00-0001)		
08 17 23 00-0003			Birch Faced (08 17 23 00-0002)		
08 17 23 00-0004	EA		2'-0" Or 2'-4" x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	367.20	67.81
			<i>For 8' Door Height, Add</i>	55.58	
08 17 23 00-0005	EA		2'-6" x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	381.42	67.81
			<i>For 8' Door Height, Add</i>	58.99	
08 17 23 00-0006	EA		2'-8" x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	401.09	70.53
			<i>For 8' Door Height, Add</i>	62.41	
08 17 23 00-0007	EA		3' x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	410.75	73.24
			<i>For 8' Door Height, Add</i>	63.42	
08 17 23 00-0008	EA		3'-4" x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	436.56	73.24
			<i>For 8' Door Height, Add</i>	69.62	
08 17 23 00-0009	EA		3'-6" x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	460.56	75.95
			<i>For 8' Door Height, Add</i>	74.08	
08 17 23 00-0010	EA		Pair 2' x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	685.56	111.22
			<i>For 8' Door Height, Add</i>	111.15	
08 17 23 00-0011	EA		Pair 2'-6" x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	730.32	119.36
			<i>For 8' Door Height, Add</i>	117.99	
08 17 23 00-0012	EA		Pair 3' x 7' x 1-3/8" Prehung Hollow Core, Birch Faced Door	783.52	127.49
			<i>For 8' Door Height, Add</i>	126.85	
08 17 23 00-0013			Lauan Faced (08 17 23 00-0002)		
08 17 23 00-0014	EA		2'-0" Or 2'-4" x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	340.28	67.81
			<i>For 8' Door Height, Add</i>	49.12	
08 17 23 00-0015	EA		2'-6" x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	354.16	67.81
			<i>For 8' Door Height, Add</i>	52.45	
08 17 23 00-0016	EA		2'-8" x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	371.28	70.53
			<i>For 8' Door Height, Add</i>	55.26	
08 17 23 00-0017	EA		3' x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	384.97	73.24
			<i>For 8' Door Height, Add</i>	57.24	
08 17 23 00-0018	EA		3'-4" x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	407.78	73.24
			<i>For 8' Door Height, Add</i>	62.71	
08 17 23 00-0019	EA		3'-6" x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	425.32	75.95
			<i>For 8' Door Height, Add</i>	65.62	
08 17 23 00-0020	EA		Pair 2' x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	631.75	111.22
			<i>For 8' Door Height, Add</i>	98.23	
08 17 23 00-0021	EA		Pair 2'-6" x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	675.71	119.36
			<i>For 8' Door Height, Add</i>	104.88	
08 17 23 00-0022	EA		Pair 3' x 7' x 1-3/8" Prehung Hollow Core, Lauan Faced Door	732.04	127.49
			<i>For 8' Door Height, Add</i>	114.49	
08 17 23 00-0023			Tempered Hardboard Faced (08 17 23 00-0002)		
08 17 23 00-0024	EA		2'-0" Or 2'-4" x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	293.41	67.81
			<i>For 8' Door Height, Add</i>	37.87	
08 17 23 00-0025	EA		2'-6" x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	304.92	67.81
			<i>For 8' Door Height, Add</i>	40.63	
08 17 23 00-0026	EA		2'-8" x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	315.80	70.53
			<i>For 8' Door Height, Add</i>	41.94	
08 17 23 00-0027	EA		3' x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	332.15	73.24
			<i>For 8' Door Height, Add</i>	44.56	
08 17 23 00-0028	EA		3'-4" x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	352.56	73.24
			<i>For 8' Door Height, Add</i>	49.46	
08 17 23 00-0029	EA		3'-6" x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	374.86	75.95
			<i>For 8' Door Height, Add</i>	53.51	
08 17 23 00-0030	EA		Pair 2' x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	543.30	111.22
			<i>For 8' Door Height, Add</i>	77.01	
08 17 23 00-0031	EA		Pair 2'-6" x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	577.27	119.36
			<i>For 8' Door Height, Add</i>	81.26	
08 17 23 00-0032	EA		Pair 3' x 7' x 1-3/8" Prehung Hollow Core, Hardboard Faced Door	626.31	127.49
			<i>For 8' Door Height, Add</i>	89.12	
08 17 23 00-0033			Solid Core Doors, 1-3/8" Thick (08 17 23 00-0001)		
08 17 23 00-0034			Birch Faced (08 17 23 00-0033)		
08 17 23 00-0035	EA		2'-0" Or 2'-4" x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door	483.02	67.81
			<i>For 8' Door Height, Add</i>	83.37	
08 17 23 00-0036	EA		2'-6" x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door	501.29	67.81
			<i>For 8' Door Height, Add</i>	87.76	
08 17 23 00-0037	EA		2'-8" x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door	524.94	70.53
			<i>For 8' Door Height, Add</i>	92.13	
08 17 23 00-0038	EA		3' x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door	552.61	73.24
			<i>For 8' Door Height, Add</i>	97.47	
08 17 23 00-0039	EA		3'-4" x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door	597.20	73.24
			<i>For 8' Door Height, Add</i>	108.17	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 17 23 00-0040 EA 3'-6" x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	642.03 117.63	75.95
08 17 23 00-0041 EA Pair 2' x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	917.21 166.74	111.22
08 17 23 00-0042 EA Pair 2'-6" x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	970.02 175.52	119.36
08 17 23 00-0043 EA Pair 3' x 7' x 1-3/8" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	1,067.23 194.94	127.49
08 17 23 00-0044 Luan Faced <small>(08 17 23 00-0033)</small>		
08 17 23 00-0045 EA 2'-0" Or 2'-4" x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	710.32 137.93	67.81
08 17 23 00-0046 EA 2'-6" x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	741.92 145.51	67.81
08 17 23 00-0047 EA 2'-8" x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	778.90 153.08	70.53
08 17 23 00-0048 EA 3' x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	816.22 160.74	73.24
08 17 23 00-0049 EA 3'-4" x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	889.88 178.42	73.24
08 17 23 00-0050 EA 3'-6" x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	942.88 189.83	75.95
08 17 23 00-0051 EA Pair 2' x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,371.80 275.85	111.22
08 17 23 00-0052 EA Pair 2'-6" x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,451.32 291.03	119.36
08 17 23 00-0053 EA Pair 3' x 7' x 1-3/8" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,594.45 321.48	127.49
08 17 23 00-0054 Tempered Hardboard Faced <small>(08 17 23 00-0033)</small>		
08 17 23 00-0055 EA 2'-0" - 2'-4" x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	394.87 62.22	67.81
08 17 23 00-0056 EA 2'-6" x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	409.87 65.82	67.81
08 17 23 00-0057 EA 2'-8" x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	430.35 69.43	70.53
08 17 23 00-0058 EA 3' x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	441.35 70.77	73.24
08 17 23 00-0059 EA 3'-4" x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	473.87 78.57	73.24
08 17 23 00-0060 EA 3'-6" x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	500.26 83.60	75.95
08 17 23 00-0061 PR Pair 2' x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	740.90 124.43	111.22
08 17 23 00-0062 PR Pair 2'-6" x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	787.18 131.64	119.36
08 17 23 00-0063 PR Pair 3' x 7' x 1-3/8" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	844.70 141.54	127.49
08 17 23 00-0064 Hollow Core Doors, 1-3/4" Thick <small>(08 17 23 00-0001)</small>		
08 17 23 00-0065 Birch Faced <small>(08 17 23 00-0064)</small>		
08 17 23 00-0066 EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	425.05 69.46	67.81
08 17 23 00-0067 EA 2'-6" x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	435.98 72.08	67.81
08 17 23 00-0068 EA 2'-8" x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	445.44 73.05	70.53
08 17 23 00-0069 EA 3' x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	468.67 77.33	73.24
08 17 23 00-0070 EA 3'-4" x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	515.94 88.67	73.24
08 17 23 00-0071 EA 3'-6" x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	576.58 101.92	75.95
08 17 23 00-0072 EA Pair 2' x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	801.31 138.93	111.22
08 17 23 00-0073 EA Pair 2'-6" x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	839.39 144.17	119.36
08 17 23 00-0074 EA Pair 3' x 7' x 1-3/4" Prehung Hollow Core, Birch Faced Door <i>For 8' Door Height, Add</i>	899.39 154.66	127.49
08 17 23 00-0075 Luan Faced <small>(08 17 23 00-0064)</small>		
08 17 23 00-0076 EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door <i>For 8' Door Height, Add</i>	395.61 62.40	67.81
08 17 23 00-0077 EA 2'-6" x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door <i>For 8' Door Height, Add</i>	413.52 66.69	67.81
08 17 23 00-0078 EA 2'-8" x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door <i>For 8' Door Height, Add</i>	433.48 70.18	70.53

08 Openings**08 10 Doors and Frames****08 17 Integrated Door Opening Assemblies**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 17 23 00-0079	EA 3' x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door..... <i>For 8' Door Height, Add</i>	444.66 71.56	73.24
08 17 23 00-0080	EA 3'-4" x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door <i>For 8' Door Height, Add</i>	477.45 79.43	73.24
08 17 23 00-0081	EA 3'-6" x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door <i>For 8' Door Height, Add</i>	504.05 84.51	75.95
08 17 23 00-0082	EA Pair 2' x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door..... <i>For 8' Door Height, Add</i>	742.40 124.79	111.22
08 17 23 00-0083	EA Pair 2'-6" x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door <i>For 8' Door Height, Add</i>	794.49 133.39	119.36
08 17 23 00-0084	EA Pair 3' x 7' x 1-3/4" Prehung Hollow Core, Luan Faced Door..... <i>For 8' Door Height, Add</i>	851.36 143.13	127.49
08 17 23 00-0085	Tempered Hardboard Faced <small>(08 17 23 00-0064)</small>		
08 17 23 00-0086	EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	332.21 47.18	67.81
08 17 23 00-0087	EA 2'-6" x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	337.69 48.49	67.81
08 17 23 00-0088	EA 2'-8" x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	354.03 51.12	70.53
08 17 23 00-0089	EA 3' x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	370.39 53.74	73.24
08 17 23 00-0090	EA 3'-4" x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	382.86 56.73	73.24
08 17 23 00-0091	EA 3'-6" x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	407.65 61.38	75.95
08 17 23 00-0092	EA Pair 2' x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door..... <i>For 8' Door Height, Add</i>	622.17 95.94	111.22
08 17 23 00-0093	EA Pair 2'-6" x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	642.82 96.99	119.36
08 17 23 00-0094	EA Pair 3' x 7' x 1-3/4" Prehung Hollow Core, Hardboard Faced Door..... <i>For 8' Door Height, Add</i>	702.81 107.48	127.49
08 17 23 00-0095	Solid Core Doors, 1-3/4" Thick <small>(08 17 23 00-0001)</small>		
08 17 23 00-0096	Birch Faced <small>(08 17 23 00-0095)</small>		
08 17 23 00-0097	EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	536.21 96.14	67.81
08 17 23 00-0098	EA 2'-6" x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	552.89 100.14	67.81
08 17 23 00-0099	EA 2'-8" x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	563.89 101.48	70.53
08 17 23 00-0100	EA 3' x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	586.00 105.48	73.24
08 17 23 00-0101	EA 3'-4" x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	634.35 117.09	73.24
08 17 23 00-0102	EA 3'-6" x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	688.59 128.81	75.95
08 17 23 00-0103	EA Pair 2' x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	1,023.60 192.28	111.22
08 17 23 00-0104	EA Pair 2'-6" x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door..... <i>For 8' Door Height, Add</i>	1,073.22 200.28	119.36
08 17 23 00-0105	EA Pair 3' x 7' x 1-3/4" Prehung Solid Core, Birch Faced Door <i>For 8' Door Height, Add</i>	1,134.03 210.97	127.49
08 17 23 00-0106	Luan Faced <small>(08 17 23 00-0095)</small>		
08 17 23 00-0107	EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	917.88 187.74	67.81
08 17 23 00-0108	EA 2'-6" x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	920.15 188.28	67.81
08 17 23 00-0109	EA 2'-8" x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	948.11 193.69	70.53
08 17 23 00-0110	EA 3' x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door..... <i>For 8' Door Height, Add</i>	969.86 197.61	73.24
08 17 23 00-0111	EA 3'-4" x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,044.28 215.47	73.24
08 17 23 00-0112	EA 3'-6" x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,107.14 229.26	75.95
08 17 23 00-0113	EA Pair 2' x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,786.98 375.49	111.22
08 17 23 00-0114	EA Pair 2'-6" x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door..... <i>For 8' Door Height, Add</i>	1,807.75 376.57	119.36
08 17 23 00-0115	EA Pair 3' x 7' x 1-3/4" Prehung Solid Core, Luan Faced Door <i>For 8' Door Height, Add</i>	1,901.74 395.22	127.49
08 17 23 00-0116	Tempered Hardboard Faced <small>(08 17 23 00-0095)</small>		
08 17 23 00-0117	EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	452.75 76.11	67.81

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 17 23 00-0118 EA 2'-6" x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	458.30 77.44	67.81
08 17 23 00-0119 EA 2'-8" x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	469.30 78.78	70.53
08 17 23 00-0120 EA 3' x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door..... <i>For 8' Door Height, Add</i>	485.86 81.45	73.24
08 17 23 00-0121 EA 3'-4" x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	510.76 87.43	73.24
08 17 23 00-0122 EA 3'-6" x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	539.51 93.02	75.95
08 17 23 00-0123 EA Pair 2' x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	856.67 152.22	111.22
08 17 23 00-0124 EA Pair 2'-6" x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door..... <i>For 8' Door Height, Add</i>	884.05 154.88	119.36
08 17 23 00-0125 EA Pair 3' x 7' x 1-3/4" Prehung Solid Core, Hardboard Faced Door <i>For 8' Door Height, Add</i>	933.75 162.90	127.49
08 17 23 00-0126 Oak Or Maple Faced <small>(08 17 23 00-0095)</small>		
08 17 23 00-0127 EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door..... <i>For 8' Door Height, Add</i>	849.94 171.44	67.81
08 17 23 00-0128 EA 2'-6" x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door..... <i>For 8' Door Height, Add</i>	854.30 172.48	67.81
08 17 23 00-0129 EA 2'-8" x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door..... <i>For 8' Door Height, Add</i>	896.65 181.34	70.53
08 17 23 00-0130 EA 3' x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door <i>For 8' Door Height, Add</i>	911.71 183.66	73.24
08 17 23 00-0131 EA 3'-4" x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door..... <i>For 8' Door Height, Add</i>	994.67 203.57	73.24
08 17 23 00-0132 EA 3'-6" x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door..... <i>For 8' Door Height, Add</i>	1,098.39 227.16	75.95
08 17 23 00-0133 EA Pair 2' x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door..... <i>For 8' Door Height, Add</i>	1,651.07 342.88	111.22
08 17 23 00-0134 EA Pair 2'-6" x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door <i>For 8' Door Height, Add</i>	1,676.08 344.97	119.36
08 17 23 00-0135 EA Pair 3' x 7' x 1-3/4" Prehung Solid Core, Oak Or Maple Faced Door <i>For 8' Door Height, Add</i>	1,785.46 367.31	127.49
08 17 23 00-0136 Walnut Faced <small>(08 17 23 00-0095)</small>		
08 17 23 00-0137 EA 2'-0" Or 2'-4" x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door..... <i>For 8' Door Height, Add</i>	1,073.02 224.97	67.81
08 17 23 00-0138 EA 2'-6" x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	1,112.00 234.33	67.81
08 17 23 00-0139 EA 2'-8" x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	1,130.48 237.46	70.53
08 17 23 00-0140 EA 3' x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	1,174.95 246.83	73.24
08 17 23 00-0141 EA 3'-4" x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	1,288.09 273.99	73.24
08 17 23 00-0142 EA 3'-6" x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	1,407.77 301.41	75.95
08 17 23 00-0143 EA Pair 2' x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	2,097.23 449.95	111.22
08 17 23 00-0144 EA Pair 2'-6" x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door..... <i>For 8' Door Height, Add</i>	2,191.44 468.66	119.36
08 17 23 00-0145 EA Pair 3' x 7' x 1-3/4" Prehung Solid Core, Walnut Faced Door <i>For 8' Door Height, Add</i>	2,311.92 493.66	127.49
08 18 Glass Doors <small>(08 10)</small>		
08 18 16 Sliding Glass Doors <small>(08 18)</small>		
08 18 16 00-0001 Sliding Aluminum-Framed Glass Doors <small>(08 18 16)</small>		
08 18 16 00-0002 Residential Sliding Aluminum-Framed Glass Doors <small>(08 18 16 00-0001)</small>		
08 18 16 00-0003 5/8" Insulating Glass, Sliding Aluminum-Framed Glass Doors <small>(08 18 16 00-0002)</small>		
08 18 16 00-0004 SF Up To 6' Wide Sliding Glass Door 5/8" Insulated Glass With Frame, Trim, Hardware..... <i>For Custom Quality, Add</i> <i>For Tempered Glass, Add</i> <i>For Anodized Or Colored Aluminum Frames, Add</i>	43.39 7.62 1.42 5.48	4.88
08 18 16 00-0005 SF >6' Up To 12' Wide Sliding Glass Door 5/8" Insulated Glass With Frame, Trim, Hardware..... <i>For Custom Quality, Add</i> <i>For Tempered Glass, Add</i> <i>For Anodized Or Colored Aluminum Frames, Add</i>	36.65 7.28 1.42 5.24	3.04
08 18 16 00-0006 1" Insulating Glass, Sliding Aluminum-Framed Glass Doors <small>(08 18 16 00-0002)</small>		
08 18 16 00-0007 SF Up To 6' Wide Sliding Glass Door 1" Insulated Glass With Frame, Trim, Hardware..... <i>For Custom Quality, Add</i> <i>For Tempered Glass, Add</i> <i>For Anodized Or Colored Aluminum Frames, Add</i>	48.85 8.98 1.42 6.47	4.88

08	08	Openings
	08 10	Doors and Frames
	08 18	Glass Doors



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 18 16 00-0008	SF	>6' Up To 12' Wide Sliding Glass Door 1" Insulated Glass With Frame, Trim, Hardware <i>For Custom Quality, Add</i> <i>For Tempered Glass, Add</i> <i>For Anodized Or Colored Aluminum Frames, Add</i>	42.03 8.63 1.42 6.21	3.04
08 18 16 00-0009		Sliding Plastic-Framed Glass Doors (08 18 16)		
08 18 16 00-0010		Sliding Vinyl-Framed Glass Doors (08 18 16 00-0009)		
08 18 16 00-0011		Vinyl Sliding Glass Doors (Pella Vinyl 10 Series) (08 18 16 00-0010) Note: Includes white solid vinyl interior and exterior, standard hardware and tempered clear insulated glass. Excludes grilles and insect screens.		
08 18 16 00-0012	EA	5' x 6' 8", Vinyl Sliding Glass Door (Pella Vinyl 10 Series) <i>For Insect Screen, Add</i> <i>For Grilles Between The Glass, Add</i> <i>For Low-E Tempered Insulated Glass, Add</i>	1,896.72 303.44 381.47 780.29	81.38
08 18 16 00-0013	EA	6' x 6' 8", Vinyl Sliding Glass Door (Pella Vinyl 10 Series) <i>For Insect Screen, Add</i> <i>For Grilles Between The Glass, Add</i> <i>For Low-E Tempered Insulated Glass, Add</i>	1,967.78 313.98 394.72 807.38	86.81
08 18 16 00-0014		Vinyl Sliding Glass Doors (Superior Windows & Doors 9900) (08 18 16 00-0010) Note: Includes white solid vinyl interior and exterior, 5-1/2" frame depth, standard hardware and 7/8" clear Low-E insulated glass. Excludes grilles and insect screens.		
08 18 16 00-0015	EA	69-1/2" x 78-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	1,920.31	85.72
08 18 16 00-0016	EA	93-1/2" x 78-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	2,384.29	101.99
08 18 16 00-0017	EA	59-1/2" x 79-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	1,793.46	81.38
08 18 16 00-0018	EA	69-1/2" x 79-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	1,920.31	85.72
08 18 16 00-0019	EA	71-1/2" x 79-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	1,946.11	86.81
08 18 16 00-0020	EA	93-1/2" x 79-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	2,384.29	101.99
08 18 16 00-0021	EA	95-1/2" x 79-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	3,260.41	104.16
08 18 16 00-0022	EA	119-1/2" x 79-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	3,707.42	117.18
08 18 16 00-0023	EA	71-1/2" x 95-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	2,900.97	93.31
08 18 16 00-0024	EA	95-1/2" x 95-1/2" Frame Opening, 2-Panel Vinyl Sliding Glass Door	3,207.61	112.84
08 18 16 00-0025	EA	104-7/8" x 78-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	2,630.51	105.25
08 18 16 00-0026	EA	140-7/8" x 78-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	3,275.24	129.11
08 18 16 00-0027	EA	89-7/8" x 79-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	2,456.15	99.83
08 18 16 00-0028	EA	107-7/8" x 79-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	2,634.85	107.42
08 18 16 00-0029	EA	143-7/8" x 79-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	2,715.30	131.29
08 18 16 00-0030	EA	107-7/8" x 95-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	2,966.07	125.86
08 18 16 00-0031	EA	143-7/8" x 95-1/2" Frame Opening, 3-Panel Vinyl Sliding Glass Door	3,270.54	144.31
08 18 16 00-0032	EA	118-5/16" x 79-1/2" Frame Opening, 4-Panel Vinyl Sliding Glass Door	4,446.90	107.42
08 18 16 00-0033	EA	142-5/16" x 79-1/2" Frame Opening, 4-Panel Vinyl Sliding Glass Door	4,551.84	131.29
08 18 16 00-0034	EA	190-5/16" x 79-1/2" Frame Opening, 4-Panel Vinyl Sliding Glass Door	4,606.08	158.41
08 18 16 00-0035	EA	142-5/16" x 95-1/2" Frame Opening, 4-Panel Vinyl Sliding Glass Door	5,503.32	144.31
08 18 16 00-0036		Premium Vinyl Sliding Glass Doors (Jeld Wen V4500) (08 18 16 00-0010) Note: Includes white solid vinyl interior and exterior, standard hardware and clear high-performance Low-E insulating glass. Excludes grilles and insect screens.		
08 18 16 00-0037	EA	61-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Jeld Wen V4500)	2,038.16	85.72
08 18 16 00-0038	EA	73-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Jeld Wen V4500)	2,065.57	86.81
08 18 16 00-0039	EA	97-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Jeld Wen V4500)	2,970.88	104.16
08 18 16 00-0040		Premium Vinyl Sliding Glass Doors (Pella V350) (08 18 16 00-0010) Note: Includes white solid vinyl interior and exterior, standard hardware and clear high-performance Low-E insulating glass. Excludes grilles and insect screens.		
08 18 16 00-0041	EA	61-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Pella V350)	2,131.51	85.72
08 18 16 00-0042	EA	73-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Pella V350)	2,160.18	86.81
08 18 16 00-0043	EA	97-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Pella V350)	3,109.01	104.16
08 18 16 00-0044		Premium Vinyl Sliding Glass Doors (Milgard Style Line™ Series) (08 18 16 00-0010) Note: Includes white solid vinyl interior and exterior, standard hardware and clear high-performance Low-E insulating glass. Excludes grilles and insect screens. Minimum STC rating of 32 included in price.		
08 18 16 00-0045	EA	61-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series) <i>For STC 44 Rating, Add</i>	4,589.09 5,080.31	85.72
08 18 16 00-0046	EA	73-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series) <i>For STC 44 Rating, Add</i>	5,041.80 5,598.43	86.81
08 18 16 00-0047	EA	97-3/4" x 81-3/4" Frame Opening, 2-Panel Vinyl Sliding Glass Door (Milgard Style Line™ Series) <i>For STC 44 Rating, Add</i>	6,742.17 7,513.92	104.16
08 18 16 00-0048		Sliding Wood-Framed Glass Doors (08 18 16)		
08 18 16 00-0049		Residential Wood Sliding Doors With 5/8" Glass (08 18 16 00-0048)		
08 18 16 00-0050	EA	6' x 6' 8" Sliding Glass Door, Wood, 5/8" Insulated Glass With Frame, Trim, Hardware	1,906.08	146.48
08 18 16 00-0051	EA	8' x 6' 8" Sliding Glass Door, Wood, 5/8" Insulated Glass With Frame, Trim, Hardware	2,326.95	179.03
08 18 16 00-0052	EA	9' x 6' 8" Sliding Glass Door, Wood, 5/8" Insulated Glass With Frame, Trim, Hardware	2,688.75	206.15
08 18 16 00-0053	EA	6' x 6' 8" Sliding Glass Door, Wood, 5/8" Insulated Glass With Grille, Frame, Trim, Hardware	2,093.78	146.48



Openings	08	08
Doors and Frames	08 10	
Glass Doors	08 18	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 18 16 00-0054	EA	8' x 6' 8" Sliding Glass Door, Wood, 5/8" Insulated Glass With Grille, Frame, Trim, Hardware	2,569.37		179.03
08 18 16 00-0055	EA	9' x 6' 8" Sliding Glass Door, Wood, 5/8" Insulated Glass With Grille, Frame, Trim, Hardware	2,988.76		206.15

08 30 Specialty Doors and Frames (08)

Note: Includes caulk, sealant and mounting anchors.

08 31 Access Doors and Panels (08 30)

See CSI section 07 72 33 00-0000 for roof hatches, 23 33 33 00-0000 for duct-mounted access doors.

08 31 13 Access Doors and Frames (08 31)

08 31 13 00-0001		Stainless Steel Access Doors <small>(08 31 13)</small>			
08 31 13 00-0002		Fire Rated Stainless Steel Access Doors <small>(08 31 13 00-0001)</small>			
08 31 13 00-0003	EA	12" x 12" Fire Rated Stainless Steel Access Door With Cam Latch	461.01		59.65
08 31 13 00-0004	EA	12" x 18" Fire Rated Stainless Steel Access Door With Cam Latch	537.06		63.54
08 31 13 00-0005	EA	18" x 18" Fire Rated Stainless Steel Access Door With Cam Latch	627.75		67.21
08 31 13 00-0006	EA	24" x 18" Fire Rated Stainless Steel Access Door With Cam Latch	725.25		70.62
08 31 13 00-0007	EA	24" x 24" Fire Rated Stainless Steel Access Door With Cam Latch	742.05		70.98
08 31 13 00-0008	EA	24" x 36" Fire Rated Stainless Steel Access Door With Cam Latch	960.12		73.18

08 31 13 00-0009 Stainless Steel Access Doors (08 31 13 00-0001)

08 31 13 00-0010	EA	8" x 8" Stainless Steel Access Door With Cam Latch	182.22		45.74
08 31 13 00-0011	EA	12" x 12" Stainless Steel Access Door With Cam Latch	218.33		59.65
08 31 13 00-0012	EA	12" x 18" Stainless Steel Access Door With Cam Latch	312.36		63.54
08 31 13 00-0013	EA	18" x 18" Stainless Steel Access Door With Cam Latch	335.35		67.21
08 31 13 00-0014	EA	24" x 18" Stainless Steel Access Door With Cam Latch	389.81		70.62
08 31 13 00-0015	EA	24" x 24" Stainless Steel Access Door With Cam Latch	444.91		70.98

08 31 13 00-0016 Steel Access Doors (08 31 13)

Note: Includes paintable powder coated finish.

08 31 13 00-0017 Insulated Fire Rated Steel Access Doors (08 31 13 00-0016)

08 31 13 00-0018	EA	12" x 12" Insulated Fire Rated Steel Access Door With Cam Latch	310.02		60.01
08 31 13 00-0019	EA	12" x 18" Insulated Fire Rated Steel Access Door With Cam Latch	386.36		63.54
08 31 13 00-0020	EA	18" x 18" Insulated Fire Rated Steel Access Door With Cam Latch	385.24		67.21
08 31 13 00-0021	EA	24" x 18" Insulated Fire Rated Steel Access Door With Cam Latch	459.62		70.98
08 31 13 00-0022	EA	24" x 24" Insulated Fire Rated Steel Access Door With Cam Latch	481.18		70.98
08 31 13 00-0023	EA	24" x 36" Insulated Fire Rated Steel Access Door With Cam Latch	635.03		73.18
08 31 13 00-0024	EA	24" x 48" Insulated Fire Rated Steel Access Door With Cam Latch	734.56		76.23
08 31 13 00-0025	EA	36" x 36" Insulated Fire Rated Steel Access Door With Cam Latch	913.01		76.23
08 31 13 00-0026	EA	48" x 48" Insulated Fire Rated Steel Access Door With Cam Latch	1,173.42		91.47

08 31 13 00-0027 Steel Access Doors (08 31 13 00-0016)

08 31 13 00-0028	EA	8" x 8" Steel Access Door With Cam Latch	152.95		45.98
08 31 13 00-0029	EA	12" x 12" Steel Access Door With Cam Latch	163.88		60.01
08 31 13 00-0030	EA	12" x 18" Steel Access Door With Cam Latch	189.94		63.54
08 31 13 00-0031	EA	18" x 18" Steel Access Door With Cam Latch	194.81		67.21
08 31 13 00-0032	EA	24" x 18" Steel Access Door With Cam Latch	233.26		70.98
08 31 13 00-0033	EA	24" x 24" Steel Access Door With Cam Latch	239.21		70.98
08 31 13 00-0034	EA	24" x 36" Steel Access Door With Cam Latch	310.44		73.18
08 31 13 00-0035	EA	36" x 36" Steel Access Door With Cam Latch	415.77		76.23

08 31 13 00-0036 Fiberglass Reinforced Polyester (FRP) Access Doors (08 31 13)

08 31 13 00-0037	EA	8" x 8" Fiberglass Reinforced Polyester (FRP) Access Door With Lock	185.05		45.74
08 31 13 00-0038	EA	12" x 12" Fiberglass Reinforced Polyester (FRP) Access Door With Lock	204.98		48.79
08 31 13 00-0039	EA	12" x 18" Fiberglass Reinforced Polyester (FRP) Access Door With Lock	253.73		51.83
08 31 13 00-0040	EA	18" x 18" Fiberglass Reinforced Polyester (FRP) Access Door With Lock	302.32		54.88
08 31 13 00-0041	EA	24" x 18" Fiberglass Reinforced Polyester (FRP) Access Door With Lock	354.24		57.69
08 31 13 00-0042	EA	24" x 24" Fiberglass Reinforced Polyester (FRP) Access Door With Lock	380.27		57.93

08 31 13 00-0043 Steel Recessed Access Doors For Drywall Application (08 31 13)

Note: Includes paintable powder coated finish.

08 31 13 00-0044	EA	8" x 8" Recessed Steel Access Door With Cam Latch	224.41		45.74
		<i>For Recessed Doors In Acoustical Tile, Add</i>	16.65		
08 31 13 00-0045	EA	12" x 12" Recessed Steel Access Door With Cam Latch	234.54		49.03
		<i>For Recessed Doors In Acoustical Tile, Add</i>	18.72		
08 31 13 00-0046	EA	12" x 18" Recessed Steel Access Door With Cam Latch	252.31		51.83
		<i>For Recessed Doors In Acoustical Tile, Add</i>	19.19		
08 31 13 00-0047	EA	18" x 18" Recessed Steel Access Door With Cam Latch	297.81		54.88
		<i>For Recessed Doors In Acoustical Tile, Add</i>	15.71		
08 31 13 00-0048	EA	24" x 18" Recessed Steel Access Door With Cam Latch	313.28		57.93
		<i>For Recessed Doors In Acoustical Tile, Add</i>	16.75		
08 31 13 00-0049	EA	24" x 24" Recessed Steel Access Door With Cam Latch	344.64		57.93
		<i>For Recessed Doors In Acoustical Tile, Add</i>	12.04		

08 Openings**08 30 Specialty Doors and Frames****08 31 Access Doors and Panels**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 31 13 00-0050	EA	24" x 36" Recessed Steel Access Door With Cam Latch..... <i>For Recessed Doors In Acoustical Tile, Add</i>	429.01 16.15	73.18
08 31 13 00-0051	EA	36" x 36" Recessed Steel Access Door With Cam Latch..... <i>For Recessed Doors In Acoustical Tile, Add</i>	621.32 -9.35	76.23
08 31 13 00-0052		Steel Crawl Space Doors And Frames (08 31 13) Note: Includes paintable powder coated finish.		
08 31 13 00-0053	EA	24" x 24" Steel Crawl Space Door With Cam Latch.....	256.52	77.20
08 31 13 00-0054	EA	30" x 24" Steel Crawl Space Door With Cam Latch.....	363.86	93.55
08 31 13 00-0055	EA	30" x 30" Steel Crawl Space Door With Cam Latch.....	408.51	101.60
08 31 13 00-0056		Attic Access Doors And Frames (08 31 13) Note: Non-rated attic access doors and frames. Door: White mineral board face, extruded polystyrene (EPS) R-42 core 10" thick, and fire rated rubber sealing gasket over top of EPS core. Door is prefinished and painted satin white to match trim. Frame: Plywood frame is installed into a wood framed 22-1/2" x 30-1/2" rough opening. Frame is 12" tall and provides insulation dam. Wood trim is pre-secured to frame. Rubber gasket is installed on trim on each side of frame. Trim: Tapered wood trim 2" wide is pre-secured to frame and painted satin white to match door.		
08 31 13 00-0057	EA	22-1/2" x 30-1/2" Rough Opening, Wood, R-42 Insulated, Attic Access Door (Battic Doors Model 22 x 30 E-Z Hatch®).....	781.82	217.01
08 31 13 00-0058	EA	22-1/2" x 30-1/2" Rough Opening, Wood, R-50 Insulated, Attic Access Door (Battic Doors Model 22 x 30 E-Z Hatch®).....	869.21	217.01
08 33 Coiling Doors and Grilles (08 30)				
08 33 13 Coiling Counter Doors (08 33)				
08 33 13 00-0001		Overhead Rolling Counter Doors (08 33 13)		
08 33 13 00-0002		Galvanized Steel Overhead Rolling Counter Doors (08 33 13 00-0001) Note: Includes necessary anchors, track and hardware. Includes galvanized steel primed with choice of baked-on polyester topcoat finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0003	EA	4' x 4', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	6,083.91 761.57	446.28
08 33 13 00-0004	EA	6' x 4', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	6,385.01 761.57	446.28
08 33 13 00-0005	EA	8' x 4', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	6,892.92 767.19	474.17
08 33 13 00-0006	EA	10' x 4', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,409.75 788.77	557.84
08 33 13 00-0007	EA	4' x 6', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,438.87 761.57	446.28
08 33 13 00-0008	EA	6' x 6', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,788.66 773.97	495.81
08 33 13 00-0009	EA	8' x 6', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,988.79 778.92	515.68
08 33 13 00-0010	EA	10' x 6', Galvanized Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 650)..... <i>For Motor Operator (With Safety Reverse), Add</i>	8,470.55 789.46	557.84
08 33 13 00-0011		Stainless Steel Overhead Rolling Counter Doors (08 33 13 00-0001) Note: Includes necessary anchors, track and hardware. Includes No. 4 stainless steel finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0012	EA	4' x 4', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	6,836.67 761.57	446.28
08 33 13 00-0013	EA	6' x 4', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,664.70 761.57	446.28
08 33 13 00-0014	EA	8' x 4', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,871.50 767.19	474.17
08 33 13 00-0015	EA	10' x 4', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	9,592.75 788.77	557.84
08 33 13 00-0016	EA	4' x 6', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	8,191.63 761.57	446.28
08 33 13 00-0017	EA	6' x 6', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	8,466.15 773.97	495.81
08 33 13 00-0018	EA	8' x 6', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	8,666.28 778.92	515.68
08 33 13 00-0019	EA	10' x 6', Stainless Steel Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 651)..... <i>For Motor Operator (With Safety Reverse), Add</i>	11,029.94 789.46	557.84
08 33 13 00-0020		Aluminum Overhead Rolling Counter Doors (08 33 13 00-0001) Note: Includes necessary anchors, track and hardware. Includes clear anodized aluminum finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0021	EA	4' x 4', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652)..... <i>For Motor Operator (With Safety Reverse), Add</i>	6,686.11 761.57	446.28
08 33 13 00-0022	EA	6' x 4', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652)..... <i>For Motor Operator (With Safety Reverse), Add</i>	6,987.22 761.57	446.28
08 33 13 00-0023	EA	8' x 4', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652)..... <i>For Motor Operator (With Safety Reverse), Add</i>	7,796.23 767.19	474.17

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 13 00-0024 EA 10' x 4', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652) <i>For Motor Operator (With Safety Reverse), Add</i>	9,216.37 788.77	557.84
08 33 13 00-0025 EA 4' x 6', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652) <i>For Motor Operator (With Safety Reverse), Add</i>	8,041.08 761.57	446.28
08 33 13 00-0026 EA 6' x 6', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652) <i>For Motor Operator (With Safety Reverse), Add</i>	8,390.87 773.97	495.81
08 33 13 00-0027 EA 8' x 6', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652) <i>For Motor Operator (With Safety Reverse), Add</i>	8,628.64 778.92	515.68
08 33 13 00-0028 EA 10' x 6', Aluminum Overhead Rolling Counter Doors, Manual Lift (Overhead Door Company, Series 652) <i>For Motor Operator (With Safety Reverse), Add</i>	10,879.39 789.46	557.84
08 33 13 00-0029 Galvanized Steel Overhead Rolling Counter Fire Doors <small>(08 33 13 00-0001)</small> Note: Includes necessary anchors, track and hardware. Includes galvanized steel primed with choice of baked-on polyester top coat finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0030 EA 4' x 4', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	7,890.53 761.57	446.28
08 33 13 00-0031 EA 6' x 4', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	8,342.19 761.57	446.28
08 33 13 00-0032 EA 8' x 4', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	9,000.64 767.19	474.17
08 33 13 00-0033 EA 10' x 4', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	9,668.03 788.77	557.84
08 33 13 00-0034 EA 4' x 6', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	8,793.84 761.57	446.28
08 33 13 00-0035 EA 6' x 6', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	9,218.91 773.97	495.81
08 33 13 00-0036 EA 8' x 6', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	9,569.59 778.92	515.68
08 33 13 00-0037 EA 10' x 6', Galvanized Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 640) <i>For Motor Operator (With Safety Reverse), Add</i>	9,825.52 789.46	557.84
08 33 13 00-0038 Stainless Steel Overhead Rolling Counter Fire Doors <small>(08 33 13 00-0001)</small> Note: Includes necessary anchors, track and hardware. Includes No. 4 stainless steel finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0039 EA 4' x 4', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	8,944.39 761.57	446.28
08 33 13 00-0040 EA 6' x 4', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	10,148.81 761.57	446.28
08 33 13 00-0041 EA 8' x 4', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	10,355.61 767.19	474.17
08 33 13 00-0042 EA 10' x 4', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	12,679.07 788.77	557.84
08 33 13 00-0043 EA 4' x 6', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	9,697.15 761.57	446.28
08 33 13 00-0044 EA 6' x 6', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	10,046.94 773.97	495.81
08 33 13 00-0045 EA 8' x 6', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	10,397.63 778.92	515.68
08 33 13 00-0046 EA 10' x 6', Stainless Steel Overhead Rolling Counter Fire Doors, Manual Lift (Overhead Door Company, Series 641) <i>For Motor Operator (With Safety Reverse), Add</i>	12,836.56 789.46	557.84
08 33 13 00-0047 Integral Frame And Sill, Overhead Rolling Counter Doors <small>(08 33 13)</small>		
08 33 13 00-0048 Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill <small>(08 33 13 00-0047)</small> Note: Includes necessary anchors, track and hardware. Stainless surfaces feature a standard No. 4 finish, aluminum slats are finished with clear anodized finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0049 EA 4' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655) <i>For Motor Operator (With Safety Reverse), Add</i>	12,858.75 761.57	446.28
08 33 13 00-0050 EA 6' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655) <i>For Motor Operator (With Safety Reverse), Add</i>	13,159.85 761.57	446.28
08 33 13 00-0051 EA 8' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655) <i>For Motor Operator (With Safety Reverse), Add</i>	20,363.88 767.19	474.17
08 33 13 00-0052 EA 10' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655) <i>For Motor Operator (With Safety Reverse), Add</i>	14,034.04 788.77	557.84
08 33 13 00-0053 EA 4' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655) <i>For Motor Operator (With Safety Reverse), Add</i>	13,310.40 761.57	446.28

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 13 00-0054	EA		6' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655).....	13,735.47	495.81
			<i>For Motor Operator (With Safety Reverse), Add</i>	773.97	
08 33 13 00-0055	EA		8' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655).....	14,086.15	515.68
			<i>For Motor Operator (With Safety Reverse), Add</i>	778.92	
08 33 13 00-0056	EA		10' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 655).....	15,697.05	557.84
			<i>For Motor Operator (With Safety Reverse), Add</i>	789.46	
08 33 13 00-0057			Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Frame and Stainless Steel Sill <small>(08 33 13 00-0047)</small>		
			Note: Includes necessary anchors, track and hardware. Galvanized steel surfaces feature a baked-on primer coat to enhance overall durability and minimize field painting. Stainless surfaces feature a standard No. 4 finish, aluminum slats are finished with clear anodized finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0058	EA		4' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	11,353.23	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	
08 33 13 00-0059	EA		6' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	11,654.33	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	
08 33 13 00-0060	EA		8' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	12,011.68	474.17
			<i>For Motor Operator (With Safety Reverse), Add</i>	767.19	
08 33 13 00-0061	EA		10' x 4', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	12,528.52	557.84
			<i>For Motor Operator (With Safety Reverse), Add</i>	788.77	
08 33 13 00-0062	EA		4' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	12,708.19	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	
08 33 13 00-0063	EA		6' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	13,133.26	495.81
			<i>For Motor Operator (With Safety Reverse), Add</i>	773.97	
08 33 13 00-0064	EA		8' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	13,634.49	515.68
			<i>For Motor Operator (With Safety Reverse), Add</i>	778.92	
08 33 13 00-0065	EA		10' x 6', Integral Frame And Sill, Aluminum Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 656).....	14,040.98	557.84
			<i>For Motor Operator (With Safety Reverse), Add</i>	789.46	
08 33 13 00-0066			Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill <small>(08 33 13 00-0047)</small>		
			Note: Includes necessary anchors, track and hardware. Stainless surfaces feature a standard No. 4 finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0067	EA		4' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	17,676.41	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	
08 33 13 00-0068	EA		6' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	19,181.93	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	
08 33 13 00-0069	EA		8' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	22,249.22	474.17
			<i>For Motor Operator (With Safety Reverse), Add</i>	767.19	
08 33 13 00-0070	EA		10' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	23,970.47	557.84
			<i>For Motor Operator (With Safety Reverse), Add</i>	788.77	
08 33 13 00-0071	EA		4' x 6', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	19,934.69	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	
08 33 13 00-0072	EA		6' x 6', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	21,564.17	495.81
			<i>For Motor Operator (With Safety Reverse), Add</i>	773.97	
08 33 13 00-0073	EA		8' x 6', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	23,872.03	515.68
			<i>For Motor Operator (With Safety Reverse), Add</i>	778.92	
08 33 13 00-0074	EA		10' x 6', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Doors With Stainless Steel Frame and Sill, Manual Lift (Overhead Door Company, Series 657).....	26,988.45	557.84
			<i>For Motor Operator (With Safety Reverse), Add</i>	789.46	
08 33 13 00-0075			Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Frame and Stainless Steel Sill <small>(08 33 13 00-0047)</small>		
			Note: Includes necessary anchors, track and hardware. Galvanized steel surfaces feature a baked-on primer coat to enhance overall durability and minimize field painting. Stainless surfaces feature a standard No. 4 finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.		
08 33 13 00-0076	EA		4' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658).....	14,966.47	446.28
			<i>For Motor Operator (With Safety Reverse), Add</i>	761.57	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 13 00-0077 EA 6' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	15,267.58	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0078 EA 8' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	15,926.04	474.17
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>767.19</i>	
08 33 13 00-0079 EA 10' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	17,195.63	557.84
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>788.77</i>	
08 33 13 00-0080 EA 4' x 6', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	15,869.79	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0081 EA 6' x 6', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	16,897.06	495.81
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>773.97</i>	
08 33 13 00-0082 EA 8' x 6', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	17,849.95	515.68
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>778.92</i>	
08 33 13 00-0083 EA 10' x 6', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Doors With Galvanized Steel Frame, Stainless Steel Sill, Manual Lift (Overhead Door Company, Series 658)	20,966.37	557.84
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>789.46</i>	
08 33 13 00-0084 Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood <small>(08 33 13 00-0047)</small>		
<i>Note: Includes necessary anchors, track and hardware. Stainless surfaces feature a standard No. 4 finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.</i>		
08 33 13 00-0085 EA 4' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 660)	21,440.21	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0086 EA 6' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 660)	22,192.97	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0087 EA 8' x 4', Integral Frame And Sill, Stainless Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 660)	25,260.26	474.17
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>767.19</i>	
08 33 13 00-0088 Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Galvanized Steel Frame and Hood <small>(08 33 13 00-0047)</small>		
<i>Note: Includes necessary anchors, track and hardware. Galvanized steel surfaces feature a baked-on primer coat to enhance overall durability and minimize field painting. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.</i>		
08 33 13 00-0089 EA 4' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Galvanized Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 661)	16,170.89	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0090 EA 6' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Galvanized Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 661)	22,192.97	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0091 EA 8' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Galvanized Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 661)	25,260.26	474.17
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>767.19</i>	
08 33 13 00-0092 Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood <small>(08 33 13 00-0047)</small>		
<i>Note: Includes necessary anchors, track and hardware. Galvanized steel surfaces feature a baked-on primer coat to enhance overall durability and minimize field painting. Stainless surfaces feature a standard No. 4 finish. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.</i>		
08 33 13 00-0093 EA 4' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 662)	14,063.16	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0094 EA 6' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 662)	15,869.79	446.28
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>761.57</i>	
08 33 13 00-0095 EA 8' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 662)	16,979.90	474.17
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>767.19</i>	
08 33 13 00-0096 EA 10' x 4', Integral Frame And Sill, Galvanized Steel Overhead Rolling Counter Fire Doors With Stainless Steel Frame and Hood, Manual Lift (Overhead Door Company, Series 662)	18,701.15	557.84
<i>For Motor Operator (With Safety Reverse), Add</i>	<i>788.77</i>	
08 33 16 Coiling Counter Grilles <small>(08 33)</small>		
08 33 16 00-0001 Galvanized Steel Overhead Coiling Counter Grilles (Width x Height) <small>(08 33 16)</small>		
08 33 16 00-0002 EA 4' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift	1,746.28	195.25
<i>For Lexan Lattice Pattern, Add</i>	<i>178.27</i>	
<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	<i>103.71</i>	
<i>For Staggered Brick Pattern, Add</i>	<i>184.63</i>	

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 33 16 00-0003	EA 6' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	1,898.27	195.25
	<i>For Lexan Lattice Pattern, Add</i>	201.06	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	142.71	
	<i>For Staggered Brick Pattern, Add</i>	250.47	
08 33 16 00-0004	EA 8' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	2,237.62	260.29
	<i>For Lexan Lattice Pattern, Add</i>	224.07	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	181.73	
	<i>For Staggered Brick Pattern, Add</i>	316.31	
08 33 16 00-0005	EA 12' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	2,603.40	260.29
	<i>For Lexan Lattice Pattern, Add</i>	278.94	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	259.74	
	<i>For Staggered Brick Pattern, Add</i>	448.00	
08 33 16 00-0006	EA 16' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	3,574.51	390.49
	<i>For Lexan Lattice Pattern, Add</i>	368.82	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	389.12	
	<i>For Staggered Brick Pattern, Add</i>	590.74	
08 33 16 00-0007	EA 18' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	4,059.33	446.28
	<i>For Lexan Lattice Pattern, Add</i>	413.77	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	389.12	
	<i>For Staggered Brick Pattern, Add</i>	590.74	
08 33 16 00-0008	EA 20' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	4,545.63	520.47
	<i>For Lexan Lattice Pattern, Add</i>	458.71	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	518.49	
	<i>For Staggered Brick Pattern, Add</i>	733.48	
08 33 16 00-0009	EA 24' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	5,642.55	624.78
	<i>For Lexan Lattice Pattern, Add</i>	578.19	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	622.20	
	<i>For Staggered Brick Pattern, Add</i>	758.46	
08 33 16 00-0010	EA 30' x 4', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	6,942.94	780.99
	<i>For Lexan Lattice Pattern, Add</i>	706.73	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	728.26	
	<i>For Staggered Brick Pattern, Add</i>	870.63	
08 33 16 00-0011	EA 4' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	1,862.30	195.25
	<i>For Lexan Lattice Pattern, Add</i>	195.67	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	155.54	
	<i>For Staggered Brick Pattern, Add</i>	214.50	
08 33 16 00-0012	EA 6' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	2,080.59	195.25
	<i>For Lexan Lattice Pattern, Add</i>	228.41	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	233.29	
	<i>For Staggered Brick Pattern, Add</i>	291.73	
08 33 16 00-0013	EA 8' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	2,395.31	260.41
	<i>For Lexan Lattice Pattern, Add</i>	247.73	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	311.03	
	<i>For Staggered Brick Pattern, Add</i>	368.96	
08 33 16 00-0014	EA 12' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	2,816.74	260.41
	<i>For Lexan Lattice Pattern, Add</i>	310.94	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	466.64	
	<i>For Staggered Brick Pattern, Add</i>	523.40	
08 33 16 00-0015	EA 16' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	3,873.76	390.49
	<i>For Lexan Lattice Pattern, Add</i>	413.71	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	622.20	
	<i>For Staggered Brick Pattern, Add</i>	720.53	
08 33 16 00-0016	EA 18' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	4,401.52	446.28
	<i>For Lexan Lattice Pattern, Add</i>	465.09	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	622.20	
	<i>For Staggered Brick Pattern, Add</i>	720.53	
08 33 16 00-0017	EA 20' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	4,926.81	520.47
	<i>For Lexan Lattice Pattern, Add</i>	516.48	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	777.75	
	<i>For Staggered Brick Pattern, Add</i>	917.65	
08 33 16 00-0018	EA 24' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	6,141.65	624.78
	<i>For Lexan Lattice Pattern, Add</i>	653.05	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	933.29	
	<i>For Staggered Brick Pattern, Add</i>	1,057.87	
08 33 16 00-0019	EA 30' x 6', Galvanized Steel Overhead Coiling Counter Grilles, Manual Lift.....	7,440.04	780.99
	<i>For Lexan Lattice Pattern, Add</i>	781.30	
	<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,086.60	
	<i>For Staggered Brick Pattern, Add</i>	1,185.94	

08 33 23 Overhead Coiling Doors (08 33)

Note: Excludes lifting equipment (forklift or scissor lift) where required. See CSI section 01 22 23 00-0873 for forklift.

08 33 23 11 Overhead Coiling Doors (08 33 23)

Note: Includes panels, guides, counterbalance mechanisms, hardware, and/or trim as required. Excludes lifting equipment (forklift or scissor lift) where required.

08 33 23 11-0001 Galvanized Steel Overhead Coiling Doors (Width x Height) (08 33 23 11)

Note: Includes necessary anchors, track, and hardware. Includes galvanized steel primed with choice of baked-on polyester top coat finish. 20 psf wind load. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.

08 33 23 11-0002 26 Gauge Galvanized Steel Overhead Coiling Doors (08 33 23 11-0001)

08 33 23 11-0003	EA 4' x 7', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift.....	1,304.48	560.51
08 33 23 11-0004	EA 4' x 8', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift.....	1,395.68	593.48
08 33 23 11-0005	EA 5' x 7', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift.....	1,392.73	593.48
08 33 23 11-0006	EA 5' x 8', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift.....	1,487.80	626.46

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 11-0007 EA 6' x 7', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,513.98	642.97
08 33 23 11-0008 EA 6' x 8', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,641.69	692.40
08 33 23 11-0009 EA 6' x 9', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,747.77	725.37
08 33 23 11-0010 EA 8' x 7', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,718.61	725.37
08 33 23 11-0011 EA 8' x 8', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,772.71	741.85
08 33 23 11-0012 EA 8' x 9', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,836.19	758.34
08 33 23 11-0013 EA 8' x 10', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,961.16	791.31
08 33 23 11-0014 EA 10' x 7', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,832.12	758.34
08 33 23 11-0015 EA 10' x 8', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	1,941.75	791.31
08 33 23 11-0016 EA 10' x 9', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	2,065.91	824.29
08 33 23 11-0017 EA 10' x 10', 26 Gauge Galvanized Steel Overhead Coiling Door, Manual Lift	2,161.95	857.25
08 33 23 11-0018 24 Gauge Galvanized Steel Overhead Coiling Doors (08 33 23 11-0001)		
Note: With curtain hood (barrel cover).		
08 33 23 11-0019 EA 8' x 7', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,061.98	834.17
For 3/4" Insulated Slats, Add	1,253.77	
08 33 23 11-0020 EA 8' x 8', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,148.12	853.14
For 3/4" Insulated Slats, Add	1,294.63	
08 33 23 11-0021 EA 8' x 10', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,403.10	910.01
For 3/4" Insulated Slats, Add	1,414.81	
08 33 23 11-0022 EA 8' x 12', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,625.89	947.93
For 3/4" Insulated Slats, Add	1,534.51	
08 33 23 11-0023 EA 10' x 7', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,272.30	872.09
For 3/4" Insulated Slats, Add	1,364.11	
08 33 23 11-0024 EA 10' x 8', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,533.83	947.93
For 3/4" Insulated Slats, Add	1,465.47	
08 33 23 11-0025 EA 10' x 10', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,719.52	985.84
For 3/4" Insulated Slats, Add	1,557.33	
08 33 23 11-0026 EA 10' x 12', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,953.67	1,023.76
For 3/4" Insulated Slats, Add	1,685.55	
08 33 23 11-0027 EA 12' x 7', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,492.07	910.01
For 3/4" Insulated Slats, Add	1,481.54	
08 33 23 11-0028 EA 12' x 8', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,695.17	947.93
For 3/4" Insulated Slats, Add	1,586.47	
08 33 23 11-0029 EA 12' x 10', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,974.13	1,023.76
For 3/4" Insulated Slats, Add	1,700.90	
08 33 23 11-0030 EA 12' x 12', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,271.33	1,056.74
For 3/4" Insulated Slats, Add	1,882.59	
08 33 23 11-0031 EA 14' x 8', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,379.14	1,122.67
For 3/4" Insulated Slats, Add	1,881.01	
08 33 23 11-0032 EA 14' x 10', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,775.94	1,188.62
For 3/4" Insulated Slats, Add	2,096.19	
08 33 23 11-0033 EA 14' x 12', 24 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	5,188.80	1,254.56
For 3/4" Insulated Slats, Add	2,323.40	
08 33 23 11-0034 22 Gauge Galvanized Steel Overhead Coiling Doors (08 33 23 11-0001)		
Note: With curtain hood (barrel cover).		
08 33 23 11-0035 EA 4' x 8', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	2,702.32	750.76
For 3/4" Insulated Slats, Add	1,088.29	
08 33 23 11-0036 EA 4' x 10', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	2,905.88	792.47
For 3/4" Insulated Slats, Add	1,188.79	
08 33 23 11-0037 EA 4' x 12', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,051.12	825.44
For 3/4" Insulated Slats, Add	1,256.50	
08 33 23 11-0038 EA 6' x 8', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,086.93	875.89
For 3/4" Insulated Slats, Add	1,220.30	
08 33 23 11-0039 EA 6' x 10', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,387.28	959.31
For 3/4" Insulated Slats, Add	1,341.29	
08 33 23 11-0040 EA 6' x 12', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,575.90	992.27
For 3/4" Insulated Slats, Add	1,441.54	
08 33 23 11-0041 EA 6' x 14', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,019.42	1,025.25
For 3/4" Insulated Slats, Add	1,732.97	
08 33 23 11-0042 EA 6' x 16', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,495.92	1,074.71
For 3/4" Insulated Slats, Add	2,028.52	
08 33 23 11-0043 EA 8' x 8', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,353.40	938.44
For 3/4" Insulated Slats, Add	1,342.01	
08 33 23 11-0044 EA 8' x 10', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,626.20	1,001.01
For 3/4" Insulated Slats, Add	1,468.39	
08 33 23 11-0045 EA 8' x 12', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,844.01	1,042.73
For 3/4" Insulated Slats, Add	1,579.57	
08 33 23 11-0046 EA 8' x 14', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,270.63	1,075.70
For 3/4" Insulated Slats, Add	1,858.32	
08 33 23 11-0047 EA 8' x 16', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,730.23	1,125.15
For 3/4" Insulated Slats, Add	2,141.20	
08 33 23 11-0048 EA 10' x 10', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	3,953.44	1,084.42
For 3/4" Insulated Slats, Add	1,609.54	
08 33 23 11-0049 EA 10' x 12', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,235.88	1,126.14
For 3/4" Insulated Slats, Add	1,769.20	
08 33 23 11-0050 EA 10' x 14', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	4,745.24	1,192.08
For 3/4" Insulated Slats, Add	2,068.79	
08 33 23 11-0051 EA 10' x 16', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift	5,320.56	1,291.00
For 3/4" Insulated Slats, Add	2,376.64	

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 33 23 11-0052	EA	10' x 18', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	5,916.37	1,422.88
		<i>For 3/4" Insulated Slats, Add</i>	2,658.64	
08 33 23 11-0053	EA	10' x 20', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,578.13	1,587.74
		<i>For 3/4" Insulated Slats, Add</i>	2,948.89	
08 33 23 11-0054	EA	10' x 22', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,305.84	1,785.57
		<i>For 3/4" Insulated Slats, Add</i>	3,247.38	
08 33 23 11-0055	EA	10' x 24', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,098.07	2,016.37
		<i>For 3/4" Insulated Slats, Add</i>	3,553.06	
08 33 23 11-0056	EA	12' x 10', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	4,249.22	1,126.14
		<i>For 3/4" Insulated Slats, Add</i>	1,779.20	
08 33 23 11-0057	EA	12' x 12', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	4,528.12	1,162.41
		<i>For 3/4" Insulated Slats, Add</i>	1,943.05	
08 33 23 11-0058	EA	12' x 14', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	5,159.90	1,228.35
		<i>For 3/4" Insulated Slats, Add</i>	2,334.45	
08 33 23 11-0059	EA	12' x 16', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	5,857.60	1,327.26
		<i>For 3/4" Insulated Slats, Add</i>	2,734.08	
08 33 23 11-0060	EA	12' x 18', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,551.88	1,459.16
		<i>For 3/4" Insulated Slats, Add</i>	3,089.94	
08 33 23 11-0061	EA	12' x 20', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,312.11	1,624.00
		<i>For 3/4" Insulated Slats, Add</i>	3,454.04	
08 33 23 11-0062	EA	12' x 22', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,138.29	1,821.84
		<i>For 3/4" Insulated Slats, Add</i>	3,826.39	
08 33 23 11-0063	EA	12' x 24', 22 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,096.33	2,085.60
		<i>For 3/4" Insulated Slats, Add</i>	4,215.20	

08 33 23 11-0064 20 Gauge Galvanized Steel Overhead Coiling Doors (08 33 23 11-0001)

Note: With curtain hood (barrel cover)

08 33 23 11-0065	EA	14' x 10', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	5,174.47	1,311.28
		<i>For 3/4" Insulated Slats, Add</i>	2,241.77	
08 33 23 11-0066	EA	14' x 12', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	5,652.85	1,377.23
		<i>For 3/4" Insulated Slats, Add</i>	2,518.12	
08 33 23 11-0067	EA	14' x 14', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,223.39	1,443.17
		<i>For 3/4" Insulated Slats, Add</i>	2,863.60	
08 33 23 11-0068	EA	14' x 16', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,802.26	1,542.08
		<i>For 3/4" Insulated Slats, Add</i>	3,174.11	
08 33 23 11-0069	EA	14' x 18', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,478.55	1,673.97
		<i>For 3/4" Insulated Slats, Add</i>	3,516.47	
08 33 23 11-0070	EA	14' x 20', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,154.26	1,805.85
		<i>For 3/4" Insulated Slats, Add</i>	3,858.40	
08 33 23 11-0071	EA	14' x 22', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,518.43	1,970.71
		<i>For 3/4" Insulated Slats, Add</i>	4,675.45	
08 33 23 11-0072	EA	14' x 24', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,948.54	2,168.54
		<i>For 3/4" Insulated Slats, Add</i>	5,500.76	
08 33 23 11-0073	EA	16' x 10', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,207.40	1,507.98
		<i>For 3/4" Insulated Slats, Add</i>	2,770.58	
08 33 23 11-0074	EA	16' x 12', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,747.76	1,573.92
		<i>For 3/4" Insulated Slats, Add</i>	3,093.42	
08 33 23 11-0075	EA	16' x 14', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,232.06	1,639.86
		<i>For 3/4" Insulated Slats, Add</i>	3,374.21	
08 33 23 11-0076	EA	16' x 16', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,798.50	1,738.78
		<i>For 3/4" Insulated Slats, Add</i>	3,675.41	
08 33 23 11-0077	EA	16' x 18', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,477.62	1,870.66
		<i>For 3/4" Insulated Slats, Add</i>	4,019.88	
08 33 23 11-0078	EA	16' x 20', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,245.02	2,002.54
		<i>For 3/4" Insulated Slats, Add</i>	4,430.58	
08 33 23 11-0079	EA	16' x 22', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,393.70	2,167.40
		<i>For 3/4" Insulated Slats, Add</i>	5,086.02	
08 33 23 11-0080	EA	16' x 24', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	11,616.82	2,365.23
		<i>For 3/4" Insulated Slats, Add</i>	5,756.08	
08 33 23 11-0081	EA	18' x 10', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	6,734.80	1,696.48
		<i>For 3/4" Insulated Slats, Add</i>	2,930.46	
08 33 23 11-0082	EA	18' x 12', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,221.35	1,762.43
		<i>For 3/4" Insulated Slats, Add</i>	3,212.95	
08 33 23 11-0083	EA	18' x 14', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,995.32	1,861.34
		<i>For 3/4" Insulated Slats, Add</i>	3,669.78	
08 33 23 11-0084	EA	18' x 16', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,726.69	1,993.22
		<i>For 3/4" Insulated Slats, Add</i>	4,053.46	
08 33 23 11-0085	EA	18' x 18', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,528.36	2,158.08
		<i>For 3/4" Insulated Slats, Add</i>	4,448.64	
08 33 23 11-0086	EA	18' x 20', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,396.53	2,355.91
		<i>For 3/4" Insulated Slats, Add</i>	4,852.48	
08 33 23 11-0087	EA	18' x 22', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	11,835.20	2,586.70
		<i>For 3/4" Insulated Slats, Add</i>	5,642.99	
08 33 23 11-0088	EA	18' x 24', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	13,365.66	2,850.48
		<i>For 3/4" Insulated Slats, Add</i>	6,461.11	
08 33 23 11-0089	EA	20' x 10', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	7,702.71	1,950.96
		<i>For 3/4" Insulated Slats, Add</i>	3,338.31	
08 33 23 11-0090	EA	20' x 12', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,605.78	2,016.89
		<i>For 3/4" Insulated Slats, Add</i>	3,933.18	
08 33 23 11-0091	EA	20' x 14', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,776.83	2,385.37
		<i>For 3/4" Insulated Slats, Add</i>	4,350.94	
08 33 23 11-0092	EA	20' x 16', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,751.08	2,484.28
		<i>For 3/4" Insulated Slats, Add</i>	4,957.99	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 11-0093	EA			20' x 18', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	11,927.54 5,675.48	2,616.17
08 33 23 11-0094	EA			20' x 20', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	13,233.36 6,489.98	2,748.05
08 33 23 11-0095	EA			20' x 22', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	14,611.20 7,317.29	2,912.91
08 33 23 11-0096	EA			20' x 24', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	16,076.39 8,168.90	3,110.74
08 33 23 11-0097	EA			22' x 10', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	8,495.00 3,484.36	2,309.54
08 33 23 11-0098	EA			22' x 12', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	9,516.67 4,126.97	2,408.45
08 33 23 11-0099	EA			22' x 14', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	10,918.95 4,909.31	2,623.90
08 33 23 11-0100	EA			22' x 16', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	12,175.49 5,728.07	2,722.82
08 33 23 11-0101	EA			22' x 18', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	13,502.02 6,558.11	2,854.70
08 33 23 11-0102	EA			22' x 20', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	14,957.44 7,484.82	2,986.58
08 33 23 11-0103	EA			22' x 22', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	16,483.04 8,422.95	3,151.44
08 33 23 11-0104	EA			22' x 24', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	18,065.99 9,362.88	3,349.27
08 33 23 11-0105	EA			24' x 10', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	9,361.21 3,845.27	2,540.48
08 33 23 11-0106	EA			24' x 12', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	10,056.26 4,284.13	2,606.43
08 33 23 11-0107	EA			24' x 14', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	11,531.06 5,307.80	2,672.36
08 33 23 11-0108	EA			24' x 16', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	12,928.23 6,232.04	2,771.28
08 33 23 11-0109	EA			24' x 18', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	14,338.54 7,124.92	2,903.17
08 33 23 11-0110	EA			24' x 20', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	15,876.78 8,113.74	3,035.05
08 33 23 11-0111	EA			24' x 22', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	17,751.99 9,293.47	3,216.39
08 33 23 11-0112	EA			24' x 24', 20 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	19,670.36 10,505.56	3,397.74
08 33 23 11-0113				18 Gauge Galvanized Steel Overhead Coiling Doors (08 33 23 11-0001) Note: With curtain hood (barrel cover).		
08 33 23 11-0114	EA			14' x 10', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	5,688.35 2,545.24	1,376.88
08 33 23 11-0115	EA			14' x 12', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	6,225.30 2,861.41	1,446.12
08 33 23 11-0116	EA			14' x 14', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	6,868.24 3,257.06	1,515.37
08 33 23 11-0117	EA			14' x 16', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	7,514.16 3,611.67	1,619.16
08 33 23 11-0118	EA			14' x 18', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	8,265.51 4,002.09	1,757.64
08 33 23 11-0119	EA			14' x 20', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	9,016.20 4,392.01	1,896.11
08 33 23 11-0120	EA			14' x 22', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	10,552.03 5,327.50	2,069.28
08 33 23 11-0121	EA			14' x 24', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	12,157.10 6,271.66	2,277.00
08 33 23 11-0122	EA			16' x 10', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	6,836.86 3,148.46	1,583.41
08 33 23 11-0123	EA			16' x 12', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	7,445.08 3,518.08	1,652.66
08 33 23 11-0124	EA			16' x 14', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	7,988.84 3,839.34	1,721.90
08 33 23 11-0125	EA			16' x 16', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	8,620.46 4,183.24	1,825.69
08 33 23 11-0126	EA			16' x 18', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	9,375.07 4,576.09	1,964.17
08 33 23 11-0127	EA			16' x 20', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	10,231.21 5,045.10	2,102.65
08 33 23 11-0128	EA			16' x 22', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	11,519.22 5,794.73	2,275.82
08 33 23 11-0129	EA			16' x 24', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	12,886.24 6,560.35	2,483.53
08 33 23 11-0130	EA			18' x 10', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	7,405.67 3,327.62	1,781.24
08 33 23 11-0131	EA			18' x 12', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	7,952.00 3,650.82	1,850.48
08 33 23 11-0132	EA			18' x 14', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	8,822.29 4,173.71	1,954.41
08 33 23 11-0133	EA			18' x 16', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift <i>For 3/4" Insulated Slats, Add</i>	9,637.01 4,611.65	2,092.89

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 33 23 11-0134	EA	18' x 18', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,525.94	2,265.92
		<i>For 3/4" Insulated Slats, Add</i>	5,061.97	
08 33 23 11-0135	EA	18' x 20', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	11,484.78	2,473.65
		<i>For 3/4" Insulated Slats, Add</i>	5,521.45	
08 33 23 11-0136	EA	18' x 22', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	13,093.09	2,716.05
		<i>For 3/4" Insulated Slats, Add</i>	6,424.76	
08 33 23 11-0137	EA	18' x 24', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	14,800.36	2,993.01
		<i>For 3/4" Insulated Slats, Add</i>	7,359.01	
08 33 23 11-0138	EA	20' x 10', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	8,467.87	2,048.44
		<i>For 3/4" Insulated Slats, Add</i>	3,790.27	
08 33 23 11-0139	EA	20' x 12', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,493.21	2,117.68
		<i>For 3/4" Insulated Slats, Add</i>	4,472.72	
08 33 23 11-0140	EA	20' x 14', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,571.64	2,504.63
		<i>For 3/4" Insulated Slats, Add</i>	4,797.94	
08 33 23 11-0141	EA	20' x 16', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	11,642.06	2,608.56
		<i>For 3/4" Insulated Slats, Add</i>	5,470.93	
08 33 23 11-0142	EA	20' x 18', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	12,933.12	2,747.04
		<i>For 3/4" Insulated Slats, Add</i>	6,266.12	
08 33 23 11-0143	EA	20' x 20', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	14,367.91	2,885.52
		<i>For 3/4" Insulated Slats, Add</i>	7,169.11	
08 33 23 11-0144	EA	20' x 22', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	15,878.71	3,058.55
		<i>For 3/4" Insulated Slats, Add</i>	8,085.84	
08 33 23 11-0145	EA	20' x 24', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	17,482.50	3,266.27
		<i>For 3/4" Insulated Slats, Add</i>	9,029.03	
08 33 23 11-0146	EA	22' x 10', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	9,156.59	2,424.97
		<i>For 3/4" Insulated Slats, Add</i>	3,836.22	
08 33 23 11-0147	EA	22' x 12', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,279.69	2,528.90
		<i>For 3/4" Insulated Slats, Add</i>	4,548.72	
08 33 23 11-0148	EA	22' x 14', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	11,811.53	2,755.08
		<i>For 3/4" Insulated Slats, Add</i>	5,414.71	
08 33 23 11-0149	EA	22' x 16', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	13,195.58	2,859.01
		<i>For 3/4" Insulated Slats, Add</i>	6,322.92	
08 33 23 11-0150	EA	22' x 18', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	14,653.40	2,997.49
		<i>For 3/4" Insulated Slats, Add</i>	7,243.19	
08 33 23 11-0151	EA	22' x 20', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	16,254.40	3,135.97
		<i>For 3/4" Insulated Slats, Add</i>	8,270.84	
08 33 23 11-0152	EA	22' x 22', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	17,929.36	3,309.00
		<i>For 3/4" Insulated Slats, Add</i>	9,310.69	
08 33 23 11-0153	EA	22' x 24', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	19,664.03	3,516.72
		<i>For 3/4" Insulated Slats, Add</i>	10,352.04	
08 33 23 11-0154	EA	24' x 10', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,090.79	2,667.52
		<i>For 3/4" Insulated Slats, Add</i>	4,233.71	
08 33 23 11-0155	EA	24' x 12', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	10,855.02	2,736.75
		<i>For 3/4" Insulated Slats, Add</i>	4,720.33	
08 33 23 11-0156	EA	24' x 14', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	12,485.62	2,805.99
		<i>For 3/4" Insulated Slats, Add</i>	5,856.72	
08 33 23 11-0157	EA	24' x 16', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	14,025.94	2,909.79
		<i>For 3/4" Insulated Slats, Add</i>	6,882.14	
08 33 23 11-0158	EA	24' x 18', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	15,576.85	3,048.26
		<i>For 3/4" Insulated Slats, Add</i>	7,872.23	
08 33 23 11-0159	EA	24' x 20', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	17,269.89	3,186.75
		<i>For 3/4" Insulated Slats, Add</i>	8,968.90	
08 33 23 11-0160	EA	24' x 22', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	19,331.34	3,377.19
		<i>For 3/4" Insulated Slats, Add</i>	10,276.94	
08 33 23 11-0161	EA	24' x 24', 18 Gauge Galvanized Steel Overhead Coiling Door, Chain Lift.....	21,440.63	3,567.63
		<i>For 3/4" Insulated Slats, Add</i>	11,620.93	

08 33 23 11-0162 Aluminum Overhead Coiling Doors (Width x Height) (08 33 23 11)

Note: Includes necessary anchors, track and hardware. Includes clear anodized aluminum finish. 20 psf wind load. Non-galvanized exposed ferrous surfaces shall receive one coat of rust-inhibitive primer. Excludes steel framing supports.

08 33 23 11-0163 0.04" Aluminum Overhead Coiling Doors (08 33 23 11-0162)

08 33 23 11-0164	EA	4' x 8', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	2,717.99	750.76
08 33 23 11-0165	EA	4' x 10', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	2,920.72	792.47
08 33 23 11-0166	EA	4' x 12', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	3,431.67	825.44
08 33 23 11-0167	EA	6' x 8', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	3,328.58	875.89
08 33 23 11-0168	EA	6' x 10', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	3,642.95	959.31
08 33 23 11-0169	EA	6' x 12', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	3,856.49	992.27
08 33 23 11-0170	EA	6' x 14', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,114.27	1,025.25
08 33 23 11-0171	EA	6' x 16', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,408.25	1,074.71
08 33 23 11-0172	EA	8' x 8', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	3,635.72	938.44
08 33 23 11-0173	EA	8' x 10', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	3,960.59	1,001.01
08 33 23 11-0174	EA	8' x 12', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,246.90	1,042.73
08 33 23 11-0175	EA	8' x 14', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,504.90	1,075.70
08 33 23 11-0176	EA	8' x 16', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,796.93	1,125.15
08 33 23 11-0177	EA	10' x 10', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,345.92	1,084.42
08 33 23 11-0178	EA	10' x 12', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	4,627.63	1,126.14
08 33 23 11-0179	EA	10' x 14', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	5,004.00	1,192.08
08 33 23 11-0180	EA	10' x 16', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	5,447.69	1,291.00
08 33 23 11-0181	EA	10' x 18', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	6,131.88	1,422.88
08 33 23 11-0182	EA	10' x 20', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	6,881.91	1,587.74
08 33 23 11-0183	EA	10' x 22', 0.04" Aluminum Overhead Coiling Door, Chain Lift.....	7,693.89	1,785.57

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 11-0184 EA 10' x 24', 0.04" Aluminum Overhead Coiling Door, Chain Lift	8,572.96	2,016.37
08 33 23 11-0185 EA 12' x 10', 0.04" Aluminum Overhead Coiling Door, Chain Lift	4,622.65	1,126.14
08 33 23 11-0186 EA 12' x 12', 0.04" Aluminum Overhead Coiling Door, Chain Lift	5,174.00	1,162.41
08 33 23 11-0187 EA 12' x 14', 0.04" Aluminum Overhead Coiling Door, Chain Lift	5,679.05	1,228.35
08 33 23 11-0188 EA 12' x 16', 0.04" Aluminum Overhead Coiling Door, Chain Lift	6,252.29	1,327.26
08 33 23 11-0189 EA 12' x 18', 0.04" Aluminum Overhead Coiling Door, Chain Lift	7,024.58	1,459.16
08 33 23 11-0190 EA 12' x 20', 0.04" Aluminum Overhead Coiling Door, Chain Lift	7,864.75	1,624.00
08 33 23 11-0191 EA 12' x 22', 0.04" Aluminum Overhead Coiling Door, Chain Lift	8,489.94	1,821.84
08 33 23 11-0192 EA 12' x 24', 0.04" Aluminum Overhead Coiling Door, Chain Lift	9,249.61	2,085.60
08 33 23 11-0193 0.05" Aluminum Overhead Coiling Doors <small>(08 33 23 11-0162)</small>		
08 33 23 11-0194 EA 14' x 10', 0.05" Aluminum Overhead Coiling Door, Chain Lift	5,286.81	1,311.28
08 33 23 11-0195 EA 14' x 12', 0.05" Aluminum Overhead Coiling Door, Chain Lift	5,951.55	1,377.23
08 33 23 11-0196 EA 14' x 14', 0.05" Aluminum Overhead Coiling Door, Chain Lift	6,603.69	1,443.17
08 33 23 11-0197 EA 14' x 16', 0.05" Aluminum Overhead Coiling Door, Chain Lift	7,271.30	1,542.08
08 33 23 11-0198 EA 14' x 18', 0.05" Aluminum Overhead Coiling Door, Chain Lift	8,045.87	1,673.97
08 33 23 11-0199 EA 14' x 20', 0.05" Aluminum Overhead Coiling Door, Chain Lift	8,820.40	1,805.85
08 33 23 11-0200 EA 14' x 22', 0.05" Aluminum Overhead Coiling Door, Chain Lift	9,671.93	1,970.71
08 33 23 11-0201 EA 14' x 24', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,589.52	2,168.54
08 33 23 11-0202 EA 16' x 10', 0.05" Aluminum Overhead Coiling Door, Chain Lift	6,161.06	1,507.98
08 33 23 11-0203 EA 16' x 12', 0.05" Aluminum Overhead Coiling Door, Chain Lift	6,855.76	1,573.92
08 33 23 11-0204 EA 16' x 14', 0.05" Aluminum Overhead Coiling Door, Chain Lift	7,522.07	1,639.86
08 33 23 11-0205 EA 16' x 16', 0.05" Aluminum Overhead Coiling Door, Chain Lift	8,274.82	1,738.78
08 33 23 11-0206 EA 16' x 18', 0.05" Aluminum Overhead Coiling Door, Chain Lift	9,150.29	1,870.66
08 33 23 11-0207 EA 16' x 20', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,073.02	2,002.54
08 33 23 11-0208 EA 16' x 22', 0.05" Aluminum Overhead Coiling Door, Chain Lift	11,023.84	2,167.40
08 33 23 11-0209 EA 16' x 24', 0.05" Aluminum Overhead Coiling Door, Chain Lift	11,991.76	2,365.23
08 33 23 11-0210 EA 18' x 10', 0.05" Aluminum Overhead Coiling Door, Chain Lift	6,886.53	1,696.48
08 33 23 11-0211 EA 18' x 12', 0.05" Aluminum Overhead Coiling Door, Chain Lift	7,630.09	1,762.43
08 33 23 11-0212 EA 18' x 14', 0.05" Aluminum Overhead Coiling Door, Chain Lift	8,511.14	1,861.34
08 33 23 11-0213 EA 18' x 16', 0.05" Aluminum Overhead Coiling Door, Chain Lift	9,445.88	1,993.22
08 33 23 11-0214 EA 18' x 18', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,456.64	2,158.08
08 33 23 11-0215 EA 18' x 20', 0.05" Aluminum Overhead Coiling Door, Chain Lift	11,527.05	2,355.91
08 33 23 11-0216 EA 18' x 22', 0.05" Aluminum Overhead Coiling Door, Chain Lift	12,661.80	2,586.70
08 33 23 11-0217 EA 18' x 24', 0.05" Aluminum Overhead Coiling Door, Chain Lift	13,868.81	2,850.48
08 33 23 11-0218 EA 20' x 10', 0.05" Aluminum Overhead Coiling Door, Chain Lift	7,868.42	1,950.96
08 33 23 11-0219 EA 20' x 12', 0.05" Aluminum Overhead Coiling Door, Chain Lift	8,626.17	2,016.89
08 33 23 11-0220 EA 20' x 14', 0.05" Aluminum Overhead Coiling Door, Chain Lift	9,469.19	2,115.81
08 33 23 11-0221 EA 20' x 16', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,399.99	2,247.70
08 33 23 11-0222 EA 20' x 18', 0.05" Aluminum Overhead Coiling Door, Chain Lift	11,426.86	2,412.56
08 33 23 11-0223 EA 20' x 20', 0.05" Aluminum Overhead Coiling Door, Chain Lift	12,553.06	2,610.38
08 33 23 11-0224 EA 20' x 22', 0.05" Aluminum Overhead Coiling Door, Chain Lift	13,782.74	2,841.18
08 33 23 11-0225 EA 20' x 24', 0.05" Aluminum Overhead Coiling Door, Chain Lift	15,114.52	3,104.95
08 33 23 11-0226 EA 22' x 10', 0.05" Aluminum Overhead Coiling Door, Chain Lift	9,290.17	2,309.54
08 33 23 11-0227 EA 22' x 12', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,288.85	2,408.45
08 33 23 11-0228 EA 22' x 14', 0.05" Aluminum Overhead Coiling Door, Chain Lift	11,334.23	2,623.90
08 33 23 11-0229 EA 22' x 16', 0.05" Aluminum Overhead Coiling Door, Chain Lift	12,425.91	2,722.82
08 33 23 11-0230 EA 22' x 18', 0.05" Aluminum Overhead Coiling Door, Chain Lift	13,568.99	2,854.70
08 33 23 11-0231 EA 22' x 20', 0.05" Aluminum Overhead Coiling Door, Chain Lift	14,764.08	2,986.58
08 33 23 11-0232 EA 22' x 22', 0.05" Aluminum Overhead Coiling Door, Chain Lift	16,012.21	3,151.44
08 33 23 11-0233 EA 22' x 24', 0.05" Aluminum Overhead Coiling Door, Chain Lift	17,314.15	3,349.27
08 33 23 11-0234 EA 24' x 10', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,239.29	2,540.48
08 33 23 11-0235 EA 24' x 12', 0.05" Aluminum Overhead Coiling Door, Chain Lift	10,851.99	2,606.43
08 33 23 11-0236 EA 24' x 14', 0.05" Aluminum Overhead Coiling Door, Chain Lift	11,511.32	2,672.36
08 33 23 11-0237 EA 24' x 16', 0.05" Aluminum Overhead Coiling Door, Chain Lift	12,218.27	2,771.28
08 33 23 11-0238 EA 24' x 18', 0.05" Aluminum Overhead Coiling Door, Chain Lift	12,974.54	2,903.17
08 33 23 11-0239 EA 24' x 20', 0.05" Aluminum Overhead Coiling Door, Chain Lift	13,776.83	3,035.05
08 33 23 11-0240 EA 24' x 22', 0.05" Aluminum Overhead Coiling Door, Chain Lift	14,624.99	3,199.91
08 33 23 11-0241 EA 24' x 24', 0.05" Aluminum Overhead Coiling Door, Chain Lift	15,525.43	3,397.74
08 33 23 11-0242 Overhead Coiling Door Accessories <small>(08 33 23 11)</small>		
08 33 23 11-0243 LF Bottom Of Door, Weather Strip Seal For Coiling Doors, Astragal Only	4.96	1.36
08 33 23 11-0244 LF Top Of Door (Lintel), Weather Strip Seal For Coiling Doors	33.88	1.63
08 33 23 11-0245 LF Side Of Door (Guides), Weather Strip Seal For Coiling Doors	32.29	1.63
08 33 23 11-0246 EA Cylinder Lock For Coiling Doors	284.23	67.81
08 33 23 11-0247 EA Up To 12' Height, 1/2 HP Motorized Jackshaft Operator For Coiling Doors And Grilles	1,797.50	217.01
Note: Includes three button inside station controls and mounting hardware.		
08 33 23 11-0248 EA Up To 12' Height, 3/4 HP Motorized Jackshaft Operator For Coiling Doors And Grilles	2,283.86	217.01
Note: Includes three button inside station controls and mounting hardware.		
08 33 23 11-0249 EA >12' To 18' Height, 1/2 HP Motorized Jackshaft Operator For Coiling Doors And Grilles	2,131.49	244.13
Note: Includes three button inside station controls and mounting hardware.		
08 33 23 11-0250 EA >12' To 18' Height, 3/4 HP Motorized Jackshaft Operator For Coiling Doors And Grilles	2,530.81	244.13
Note: Includes three button inside station controls and mounting hardware.		
08 33 23 11-0251 EA >18' To 24' Height, 3/4 HP Motorized Jackshaft Operator For Coiling Doors And Grilles	2,757.30	271.25
Note: Includes motor, supports, push button operator, stationary electronic eye, signal wiring from eye to motor and motor to operator.		
08 33 23 11-0252 EA >18' To 24' Height, 1 HP Motorized Jackshaft Operator For Coiling Doors And Grilles	2,999.55	271.25
Note: Includes motor, supports, push button operator, stationary electronic eye, signal wiring from eye to motor and motor to operator.		

08	08	Openings
	08 30	Specialty Doors and Frames
	08 33	Coiling Doors and Grilles



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 33 23 11-0253	LF	Safety Edge Bottom Bar Obstruction Detection Device, Electric For Coiling Doors And Grilles	86.97	
08 33 23 11-0254	EA	Remote Transmitter Kit For Coiling Door Operators	369.82	108.50
08 33 23 11-0255		Removal And Reinstallation Of Roll-Up Door And Support (08 33 23 11)		
		Note: Includes storage, cleaning and supply materials.		
08 33 23 11-0256	SF	Removal And Reinstallation Of Metal Roll-up Door And Supports.....	23.17	
08 33 23 13		Overhead Rapid Coiling Doors (08 33 23)		
		Note: Includes panels, guides, counterbalance mechanisms, hardware, operators, frame, supports and/or trim as required. Excludes lifting equipment (forklift or scissor lift) where required. See CSI section 01 22 23 00-0873 for forklift.		
08 33 23 13-0001		32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13)		
		Note: Door panel is 32 ounce vinyl. Side frames are fully bolted together, anodized aluminum construction with weather seal. Bottom bar releases in either direction when impacted, without damage to door. Manual drive system.		
08 33 23 13-0002		32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0001)		
08 33 23 13-0003		5' Wide, 32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0002)		
08 33 23 13-0004	EA	5' x 5', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	4,938.76	397.12
08 33 23 13-0005	EA	5' x 6', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,207.30	415.56
08 33 23 13-0006	EA	5' x 7', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,474.04	434.01
08 33 23 13-0007	EA	5' x 8', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,738.98	452.46
08 33 23 13-0008	EA	5' x 9', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,007.52	470.90
08 33 23 13-0009	EA	5' x 10', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,274.26	489.35
08 33 23 13-0010		6' Wide, 32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0002)		
08 33 23 13-0011	EA	6' x 5', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,207.30	415.56
08 33 23 13-0012	EA	6' x 6', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,474.04	434.01
08 33 23 13-0013	EA	6' x 7', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,738.98	452.46
08 33 23 13-0014	EA	6' x 8', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,007.52	470.90
08 33 23 13-0015	EA	6' x 9', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,274.26	489.35
08 33 23 13-0016	EA	6' x 10', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,541.01	507.79
08 33 23 13-0017		7' Wide, 32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0002)		
08 33 23 13-0018	EA	7' x 5', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,474.04	434.01
08 33 23 13-0019	EA	7' x 6', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,738.98	452.46
08 33 23 13-0020	EA	7' x 7', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,007.52	470.90
08 33 23 13-0021	EA	7' x 8', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,274.26	489.35
08 33 23 13-0022	EA	7' x 9', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,541.01	507.79
08 33 23 13-0023	EA	7' x 10', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,809.55	526.24
08 33 23 13-0024		8' Wide, 32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0002)		
08 33 23 13-0025	EA	8' x 5', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	5,738.98	452.46
08 33 23 13-0026	EA	8' x 6', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,007.52	470.90
08 33 23 13-0027	EA	8' x 7', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,274.26	489.35
08 33 23 13-0028	EA	8' x 8', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,541.01	507.79
08 33 23 13-0029	EA	8' x 9', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,809.55	526.24
08 33 23 13-0030	EA	8' x 10', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	7,074.50	544.68
08 33 23 13-0031		9' Wide, 32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0002)		
08 33 23 13-0032	EA	9' x 5', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,007.52	470.90
08 33 23 13-0033	EA	9' x 6', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,274.26	489.35
08 33 23 13-0034	EA	9' x 7', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,541.01	507.79
08 33 23 13-0035	EA	9' x 8', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,809.55	526.24
08 33 23 13-0036	EA	9' x 9', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	7,074.50	544.68
08 33 23 13-0037	EA	9' x 10', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	7,343.04	563.13
08 33 23 13-0038		10' Wide, 32 Ounce Vinyl Panels, Manually Operated Rolling Doors (Rytec® Bantam®) (08 33 23 13-0002)		
08 33 23 13-0039	EA	10' x 5', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,274.26	489.35
08 33 23 13-0040	EA	10' x 6', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,541.01	507.79
08 33 23 13-0041	EA	10' x 7', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	6,809.55	526.24
08 33 23 13-0042	EA	10' x 8', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	7,074.50	544.68
08 33 23 13-0043	EA	10' x 9', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	7,343.04	563.13



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0044 EA 10' x 10', 32 Ounce Vinyl Panels, Manually Operated Rolling Door (Rytec® Bantam®)	7,609.78	581.57
08 33 23 13-0045 Rytec® Bantam® Door Options (08 33 23 13-0001)		
08 33 23 13-0046 SF Upgrade To 2-Ply Rilon Panel Material For Rytec® Bantam® High-Speed Rolling Doors	11.22	
08 33 23 13-0047 SF Upgrade To 3-Ply Rilon Panel Material For Rytec® Bantam® High-Speed Rolling Doors	24.69	
08 33 23 13-0048 LF 31" High Full Vision Panel For Rytec® Bantam® High-Speed Rolling Doors	35.91	
Note: Multiply linear foot price x width of door.		
08 33 23 13-0049 EA Two 17" x 17", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Bantam® High-Speed Rolling Doors	341.19	
08 33 23 13-0050 EA Roll Cover For Rytec® Bantam® High-Speed Rolling Doors	647.22	54.25
08 33 23 13-0051 EA Motor Cover For Rytec® Bantam® High-Speed Rolling Doors	647.22	54.25
08 33 23 13-0052 EA Motor Operator For Rytec® Bantam® High-Speed Rolling Doors	2,775.91	108.50
Note: Includes open/close/stop pushbutton, pneumatic reversing edge and coil cord.		
08 33 23 13-0053 EA Additional NEMA 4 Pushbutton Control For Rytec® Bantam® Motor Operator	341.94	54.25
Note: Includes open/close/stop control.		
08 33 23 13-0054 EA Auto Close Feature For Rytec® Bantam® Motor Operator	332.96	54.25
08 33 23 13-0055 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13)		
Note: Rytec® PredaDoor® PD5500. Door panel is 2-ply multi-filament Rilon. Includes full width vision panel. Side frames are fully bolted together, anodized aluminum construction with weather seal. Bottom bar releases in either direction when impacted, without damage to door. Drive system is a 3 phase, variable-speed AC Drive with brake and absolute encoder. Opens at 50" per second and closes at 21" per second.		
08 33 23 13-0056 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0055)		
08 33 23 13-0057 6' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0058 EA 6' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	15,306.92	434.01
08 33 23 13-0059 EA 6' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	15,553.31	452.46
08 33 23 13-0060 EA 6' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	15,837.95	470.90
08 33 23 13-0061 EA 6' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,235.64	489.35
08 33 23 13-0062 EA 6' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,641.66	507.79
08 33 23 13-0063 EA 6' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,327.01	526.24
08 33 23 13-0064 EA 6' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,812.83	544.68
08 33 23 13-0065 7' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0066 EA 7' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	15,608.18	452.46
08 33 23 13-0067 EA 7' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	15,922.74	470.90
08 33 23 13-0068 EA 7' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,318.78	489.35
08 33 23 13-0069 EA 7' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,738.10	507.79
08 33 23 13-0070 EA 7' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,292.09	526.24
08 33 23 13-0071 EA 7' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,960.81	544.68
08 33 23 13-0072 EA 7' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,488.19	563.13
08 33 23 13-0073 8' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0074 EA 8' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	15,975.95	470.90
08 33 23 13-0075 EA 8' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,370.32	489.35
08 33 23 13-0076 EA 8' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,806.27	507.79
08 33 23 13-0077 EA 8' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,376.89	526.24
08 33 23 13-0078 EA 8' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,890.97	544.68
08 33 23 13-0079 EA 8' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,619.55	563.13
08 33 23 13-0080 EA 8' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,216.77	581.57
08 33 23 13-0081 9' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0082 EA 9' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,425.19	489.35
08 33 23 13-0083 EA 9' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,857.81	507.79
08 33 23 13-0084 EA 9' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,428.43	526.24
08 33 23 13-0085 EA 9' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,959.14	544.68
08 33 23 13-0086 EA 9' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,516.46	563.13
08 33 23 13-0087 EA 9' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,095.39	581.57
08 33 23 13-0088 EA 9' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,730.85	600.02
08 33 23 13-0089 10' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0090 EA 10' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	16,901.04	507.79
08 33 23 13-0091 EA 10' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,483.30	526.24
08 33 23 13-0092 EA 10' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,009.03	544.68
08 33 23 13-0093 EA 10' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,571.33	563.13
08 33 23 13-0094 EA 10' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,195.15	581.57
08 33 23 13-0095 EA 10' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,318.50	600.02

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 33 23 13-0096	EA	10' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	20,381.27	618.46
08 33 23 13-0097		11' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0098	EA	11' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	17,514.89	526.24
08 33 23 13-0099	EA	11' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,053.92	544.68
08 33 23 13-0100	EA	11' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,622.87	563.13
08 33 23 13-0101	EA	11' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,248.36	581.57
08 33 23 13-0102	EA	11' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,657.69	600.02
08 33 23 13-0103	EA	11' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	20,471.06	618.46
08 33 23 13-0104	EA	11' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	21,136.46	636.91
08 33 23 13-0105		12' Wide, 2 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® PredaDoor®) (08 33 23 13-0056)		
08 33 23 13-0106	EA	12' x 6', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,068.88	544.68
08 33 23 13-0107	EA	12' x 7', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	18,652.80	563.13
08 33 23 13-0108	EA	12' x 8', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,289.93	581.57
08 33 23 13-0109	EA	12' x 9', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	19,714.23	600.02
08 33 23 13-0110	EA	12' x 10', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	20,273.20	618.46
08 33 23 13-0111	EA	12' x 11', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	21,212.94	636.91
08 33 23 13-0112	EA	12' x 12', 2 Ply Fabric Panel, High-Speed Rolling Door (Rytec® PredaDoor®)	21,865.03	655.35
08 33 23 13-0113		Rytec® PredaDoor® Door Options (08 33 23 13-0055)		
08 33 23 13-0114	EA	Up To 10' Wide Doors, Roll And Motor Hood For Rytec® PredaDoor® High-Speed Rolling Doors	757.39	108.50
08 33 23 13-0115	EA	>10' To 15' Wide Doors, Roll And Motor Hood For Rytec® PredaDoor® High-Speed Rolling Doors	1,114.87	108.50
08 33 23 13-0116	SF	Upgrade To 3-Ply Rilon Panel Material For Rytec® PredaDoor® High-Speed Rolling Doors	13.47	
08 33 23 13-0117		3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13)		
		Note: Rytec® Fast-Seal® FS1000. Door panel is heavy-duty 3-ply multi-filament Rilon. Independent opening and closing speeds up to 50" per second. Side frames are fully bolted together, reinforced with front and rear wind bar guides and full height vinyl weather seal on either side of the door panel. Counterbalance system consists of guided counterweights custom-sized to provide to provide proper balancing of each door system. The independent tension system maintains constant panel tensioning. The drive system is a 3 phase, variable speed AC drive motor with brake and absolute encoder. Bottom bar breaks away in either direction without damage to the bar, safety astragal, or side covers.		
08 33 23 13-0118		3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0117)		
08 33 23 13-0119		8' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0120	EA	8' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)	23,165.80	976.52
		For NEMA 4X Control Box, Add	675.00	
		For 2 Speed Motor, 60" Open, 30" Close, Add	1,100.00	
		For AC Variable Speed Motor And Controls, Add	2,750.00	
		For 304 Stainless Steel Side Frame Tower, Add	2,200.00	
		For 316 Stainless Steel Side Frame Tower, Add	3,300.00	
08 33 23 13-0121	EA	8' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)	24,220.42	1,004.20
		For NEMA 4X Control Box, Add	675.00	
		For 2 Speed Motor, 60" Open, 30" Close, Add	1,100.00	
		For AC Variable Speed Motor And Controls, Add	2,750.00	
		For 304 Stainless Steel Side Frame Tower, Add	2,200.00	
		For 316 Stainless Steel Side Frame Tower, Add	3,300.00	
08 33 23 13-0122	EA	8' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)	25,138.70	1,031.86
		For NEMA 4X Control Box, Add	675.00	
		For 2 Speed Motor, 60" Open, 30" Close, Add	1,100.00	
		For AC Variable Speed Motor And Controls, Add	2,750.00	
		For 304 Stainless Steel Side Frame Tower, Add	2,200.00	
		For 316 Stainless Steel Side Frame Tower, Add	3,300.00	
08 33 23 13-0123	EA	8' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)	26,126.81	1,059.53
		For NEMA 4X Control Box, Add	675.00	
		For 2 Speed Motor, 60" Open, 30" Close, Add	1,100.00	
		For AC Variable Speed Motor And Controls, Add	2,750.00	
		For 304 Stainless Steel Side Frame Tower, Add	2,200.00	
		For 316 Stainless Steel Side Frame Tower, Add	3,300.00	
08 33 23 13-0124	EA	8' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)	27,247.94	1,087.19
		For NEMA 4X Control Box, Add	675.00	
		For 2 Speed Motor, 60" Open, 30" Close, Add	1,100.00	
		For AC Variable Speed Motor And Controls, Add	2,750.00	
		For 304 Stainless Steel Side Frame Tower, Add	2,200.00	
		For 316 Stainless Steel Side Frame Tower, Add	3,300.00	
08 33 23 13-0125	EA	8' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)	27,833.68	1,114.86
		For NEMA 4X Control Box, Add	675.00	
		For 2 Speed Motor, 60" Open, 30" Close, Add	1,100.00	
		For AC Variable Speed Motor And Controls, Add	2,750.00	
		For 304 Stainless Steel Side Frame Tower, Add	2,200.00	
		For 316 Stainless Steel Side Frame Tower, Add	3,300.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0126 EA 8' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	28,751.95 675.00 1,100.00 2,750.00 2,200.00 3,300.00	1,142.54
08 33 23 13-0127 EA 8' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	29,569.35 675.00 1,100.00 2,750.00 2,200.00 3,300.00	1,172.24
08 33 23 13-0128 EA 8' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	30,874.75 675.00 1,100.00 2,750.00 2,200.00 3,300.00	1,202.71
08 33 23 13-0129 EA 8' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	31,928.53 675.00 1,100.00 2,750.00 2,200.00 3,300.00	1,233.98
08 33 23 13-0130 EA 8' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	33,235.33 675.00 1,100.00 2,750.00 2,200.00 3,300.00	1,266.07
08 33 23 13-0131 9' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0132 EA 9' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	24,220.42 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,004.20
08 33 23 13-0133 EA 9' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	25,138.70 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,031.86
08 33 23 13-0134 EA 9' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	26,126.81 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,059.53
08 33 23 13-0135 EA 9' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,247.94 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,087.19
08 33 23 13-0136 EA 9' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,833.68 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,114.86
08 33 23 13-0137 EA 9' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	28,751.95 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,142.54
08 33 23 13-0138 EA 9' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	29,937.93 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,170.20
08 33 23 13-0139 EA 9' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	30,874.75 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,202.71

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0140	EA 9' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	31,928.53 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,233.98
08 33 23 13-0141	EA 9' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	33,235.33 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,266.07
08 33 23 13-0142	EA 9' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	34,793.41 675.00 1,100.00 2,750.00 2,750.00 4,125.00	1,298.98
08 33 23 13-0143 10' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>			
08 33 23 13-0144	EA 10' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	25,138.70 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,031.86
08 33 23 13-0145	EA 10' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	26,126.81 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,059.53
08 33 23 13-0146	EA 10' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,247.94 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,087.19
08 33 23 13-0147	EA 10' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,833.68 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,114.86
08 33 23 13-0148	EA 10' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	28,751.95 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,142.54
08 33 23 13-0149	EA 10' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	29,937.93 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,170.20
08 33 23 13-0150	EA 10' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	31,057.40 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,197.87
08 33 23 13-0151	EA 10' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	31,927.32 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,233.39
08 33 23 13-0152	EA 10' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	33,234.09 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,265.46
08 33 23 13-0153	EA 10' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	34,792.14 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,298.36



Openings	08	08
Specialty Doors and Frames	08 30	
Coiling Doors and Grilles	08 33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0154 EA 10' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	36,104.09 675.00 1,100.00 2,750.00 3,300.00 4,950.00	1,332.11
08 33 23 13-0155 11' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0156 EA 11' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	26,126.81 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,059.53
08 33 23 13-0157 EA 11' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,247.94 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,087.19
08 33 23 13-0158 EA 11' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,833.68 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,114.86
08 33 23 13-0159 EA 11' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	28,751.95 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,142.54
08 33 23 13-0160 EA 11' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	29,937.93 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,170.20
08 33 23 13-0161 EA 11' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	31,057.40 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,197.87
08 33 23 13-0162 EA 11' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	32,309.87 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,225.53
08 33 23 13-0163 EA 11' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	33,231.13 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,263.98
08 33 23 13-0164 EA 11' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	34,789.10 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,296.84
08 33 23 13-0165 EA 11' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	36,100.97 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,330.56
08 33 23 13-0166 EA 11' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	37,660.61 675.00 1,100.00 2,750.00 3,850.00 5,775.00	1,365.15
08 33 23 13-0167 12' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0168	EA 12' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,247.94 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,087.19
08 33 23 13-0169	EA 12' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	27,833.68 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,114.86
08 33 23 13-0170	EA 12' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	28,751.95 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,142.54
08 33 23 13-0171	EA 12' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	29,937.93 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,170.20
08 33 23 13-0172	EA 12' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	31,057.40 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,197.87
08 33 23 13-0173	EA 12' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	32,309.87 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,225.53
08 33 23 13-0174	EA 12' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	33,208.20 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,253.20
08 33 23 13-0175	EA 12' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	34,784.56 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,294.56
08 33 23 13-0176	EA 12' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	36,096.30 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,328.22
08 33 23 13-0177	EA 12' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	37,655.81 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,362.76
08 33 23 13-0178	EA 12' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	39,217.13 675.00 1,100.00 2,750.00 4,400.00 6,600.00	1,398.19
08 33 23 13-0179	13' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0180	EA 13' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	28,518.71 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,114.86
08 33 23 13-0181	EA 13' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	29,694.70 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,142.54

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0182 EA 13' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	30,809.18 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,170.20
08 33 23 13-0183 EA 13' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	32,104.90 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,197.87
08 33 23 13-0184 EA 13' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	33,395.62 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,225.53
08 33 23 13-0185 EA 13' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	34,352.14 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,253.20
08 33 23 13-0186 EA 13' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	35,077.54 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,280.88
08 33 23 13-0187 EA 13' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	36,192.70 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,325.24
08 33 23 13-0188 EA 13' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	37,753.86 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,359.69
08 33 23 13-0189 EA 13' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	39,322.19 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,395.06
08 33 23 13-0190 EA 13' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	40,702.01 675.00 1,100.00 2,750.00 4,950.00 6,975.00	1,431.32
08 33 23 13-0191 14' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0192 EA 14' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	29,694.70 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,142.54
08 33 23 13-0193 EA 14' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	30,809.18 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,170.20
08 33 23 13-0194 EA 14' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	32,104.90 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,197.87
08 33 23 13-0195 EA 14' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	33,395.62 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,225.53

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0196	EA 14' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	34,352.14 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,253.20
08 33 23 13-0197	EA 14' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	35,077.54 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,280.88
08 33 23 13-0198	EA 14' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	36,158.77 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,308.54
08 33 23 13-0199	EA 14' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	37,746.18 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,355.86
08 33 23 13-0200	EA 14' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	39,314.30 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,391.11
08 33 23 13-0201	EA 14' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	40,693.93 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,427.27
08 33 23 13-0202	EA 14' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	43,707.73 675.00 1,100.00 2,750.00 5,480.00 7,370.00	1,464.39
08 33 23 13-0203	15' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0204	EA 15' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	30,754.38 675.00 1,100.00 2,750.00	1,142.54
08 33 23 13-0205	EA 15' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	32,050.56 675.00 1,100.00 2,750.00	1,170.20
08 33 23 13-0206	EA 15' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	33,341.35 675.00 1,100.00 2,750.00	1,197.87
08 33 23 13-0207	EA 15' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	34,298.13 675.00 1,100.00 2,750.00	1,225.53
08 33 23 13-0208	EA 15' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	35,023.27 675.00 1,100.00 2,750.00	1,253.20
08 33 23 13-0209	EA 15' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	36,103.96 675.00 1,100.00 2,750.00	1,280.88
08 33 23 13-0210	EA 15' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	37,711.73 675.00 1,100.00 2,750.00	1,338.64
08 33 23 13-0211	EA 15' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	39,306.17 675.00 1,100.00 2,750.00	1,387.04
08 33 23 13-0212	EA 15' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	40,685.58 675.00 1,100.00 2,750.00	1,423.10
08 33 23 13-0213	EA 15' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	43,699.17 675.00 1,100.00 2,750.00	1,460.11



Openings	08	08
Specialty Doors and Frames	08 30	
Coiling Doors and Grilles	08 33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0214 EA 15' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	45,816.83 675.00 1,100.00 2,750.00	1,498.07
08 33 23 13-0215 16' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0216 EA 16' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	32,101.55 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,195.69
08 33 23 13-0217 EA 16' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	33,394.91 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,224.65
08 33 23 13-0218 EA 16' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	34,354.27 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,253.60
08 33 23 13-0219 EA 16' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	35,081.98 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,282.56
08 33 23 13-0220 EA 16' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	36,165.25 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,311.51
08 33 23 13-0221 EA 16' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	37,715.40 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,340.47
08 33 23 13-0222 EA 16' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	39,270.94 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,369.42
08 33 23 13-0223 EA 16' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	40,677.26 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,418.94
08 33 23 13-0224 EA 16' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	43,690.63 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,455.84
08 33 23 13-0225 EA 16' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	45,808.07 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,493.68
08 33 23 13-0226 EA 16' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	47,938.25 675.00 1,100.00 2,750.00 6,070.00 7,790.00	1,532.52
08 33 23 13-0227 17' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0228 EA 17' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	33,273.47 675.00 1,100.00 2,750.00	1,223.20

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0229	EA 17' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	34,352.69 675.00 1,100.00 2,750.00	1,252.82
08 33 23 13-0230	EA 17' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	35,659.96 675.00 1,100.00 2,750.00	1,282.44
08 33 23 13-0231	EA 17' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	37,096.51 675.00 1,100.00 2,750.00	1,312.06
08 33 23 13-0232	EA 17' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	38,414.56 675.00 1,100.00 2,750.00	1,341.68
08 33 23 13-0233	EA 17' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	40,377.26 675.00 1,100.00 2,750.00	1,371.30
08 33 23 13-0234	EA 17' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	42,268.13 675.00 1,100.00 2,750.00	1,400.93
08 33 23 13-0235	EA 17' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	43,682.11 675.00 1,100.00 2,750.00	1,451.58
08 33 23 13-0236	EA 17' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	45,799.34 675.00 1,100.00 2,750.00	1,489.32
08 33 23 13-0237	EA 17' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	47,929.29 675.00 1,100.00 2,750.00	1,528.04
08 33 23 13-0238	EA 17' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	49,994.81 675.00 1,100.00 2,750.00	1,567.77
08 33 23 13-0239	18' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0240	EA 18' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	34,698.08 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,251.33
08 33 23 13-0241	EA 18' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	36,125.23 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,281.63
08 33 23 13-0242	EA 18' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	37,679.87 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,311.94
08 33 23 13-0243	EA 18' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	39,229.13 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,342.23
08 33 23 13-0244	EA 18' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	40,844.83 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,372.54
08 33 23 13-0245	EA 18' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	43,142.90 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,402.84
08 33 23 13-0246	EA 18' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i> <i>For 304 Stainless Steel Side Frame Tower, Add</i> <i>For 316 Stainless Steel Side Frame Tower, Add</i>	45,505.62 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,433.15



Openings	08	08
Specialty Doors and Frames	08 30	
Coiling Doors and Grilles	08 33	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0247	EA 18' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	46,661.54 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,484.96
08 33 23 13-0248	EA 18' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	47,920.35 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,523.58
08 33 23 13-0249	EA 18' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	49,926.38 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,563.19
08 33 23 13-0250	EA 18' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add For 304 Stainless Steel Side Frame Tower, Add For 316 Stainless Steel Side Frame Tower, Add	51,997.32 675.00 1,100.00 2,750.00 6,720.00 8,230.00	1,603.82
08 33 23 13-0251	19' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0252	EA 19' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	36,122.18 675.00 1,100.00 2,750.00	1,280.11
08 33 23 13-0253	EA 19' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	37,678.22 675.00 1,100.00 2,750.00	1,311.11
08 33 23 13-0254	EA 19' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	39,228.87 675.00 1,100.00 2,750.00	1,342.11
08 33 23 13-0255	EA 19' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	40,845.96 675.00 1,100.00 2,750.00	1,373.11
08 33 23 13-0256	EA 19' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	43,145.43 675.00 1,100.00 2,750.00	1,404.11
08 33 23 13-0257	EA 19' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	45,509.55 675.00 1,100.00 2,750.00	1,435.11
08 33 23 13-0258	EA 19' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	46,623.84 675.00 1,100.00 2,750.00	1,466.11
08 33 23 13-0259	EA 19' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	47,911.44 675.00 1,100.00 2,750.00	1,519.11
08 33 23 13-0260	EA 19' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	49,917.24 675.00 1,100.00 2,750.00	1,558.61
08 33 23 13-0261	EA 19' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	51,987.94 675.00 1,100.00 2,750.00	1,599.14
08 33 23 13-0262	EA 19' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	54,060.75 675.00 1,100.00 2,750.00	1,640.72
08 33 23 13-0263	20' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0264	EA 20' x 8', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	37,675.11 675.00 1,100.00 2,750.00	1,309.55
08 33 23 13-0265	EA 20' x 9', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... For NEMA 4X Control Box, Add For 2 Speed Motor, 60" Open, 30" Close, Add For AC Variable Speed Motor And Controls, Add	39,227.19 675.00 1,100.00 2,750.00	1,341.26

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0266	EA 20' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	40,845.70 675.00 1,100.00 2,750.00	1,372.98
08 33 23 13-0267	EA 20' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	43,146.60 675.00 1,100.00 2,750.00	1,404.69
08 33 23 13-0268	EA 20' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	45,512.14 675.00 1,100.00 2,750.00	1,436.40
08 33 23 13-0269	EA 20' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	46,627.85 675.00 1,100.00 2,750.00	1,468.11
08 33 23 13-0270	EA 20' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	47,872.86 675.00 1,100.00 2,750.00	1,499.83
08 33 23 13-0271	EA 20' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	49,908.12 675.00 1,100.00 2,750.00	1,554.06
08 33 23 13-0272	EA 20' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	51,978.59 675.00 1,100.00 2,750.00	1,594.47
08 33 23 13-0273	EA 20' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	54,051.16 675.00 1,100.00 2,750.00	1,635.92
08 33 23 13-0274	EA 20' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	55,874.48 675.00 1,100.00 2,750.00	1,678.45
08 33 23 13-0275	21' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0276	EA 21' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	47,159.76 675.00 1,100.00 2,750.00	1,404.55
08 33 23 13-0277	EA 21' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	49,462.10 675.00 1,100.00 2,750.00	1,436.99
08 33 23 13-0278	EA 21' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	51,827.30 675.00 1,100.00 2,750.00	1,469.44
08 33 23 13-0279	EA 21' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	52,948.07 675.00 1,100.00 2,750.00	1,501.88
08 33 23 13-0280	EA 21' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	54,192.74 675.00 1,100.00 2,750.00	1,534.32
08 33 23 13-0281	EA 21' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	56,230.50 675.00 1,100.00 2,750.00	1,589.81
08 33 23 13-0282	EA 21' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	58,302.84 675.00 1,100.00 2,750.00	1,631.14
08 33 23 13-0283	EA 21' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	60,377.30 675.00 1,100.00 2,750.00	1,673.55
08 33 23 13-0284	EA 21' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	62,202.58 675.00 1,100.00 2,750.00	1,717.06
08 33 23 13-0285	22' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) (08 33 23 13-0118)		
08 33 23 13-0286	EA 22' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	48,962.61 675.00 1,100.00 2,750.00	1,436.86



Openings	08	08
Specialty Doors and Frames	08 30	
Coiling Doors and Grilles	08 33	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 33 23 13-0287	EA 22' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	51,268.25 675.00 1,100.00 2,750.00	1,470.05
08 33 23 13-0288	EA 22' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	53,633.15 675.00 1,100.00 2,750.00	1,503.23
08 33 23 13-0289	EA 22' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	54,753.61 675.00 1,100.00 2,750.00	1,536.43
08 33 23 13-0290	EA 22' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	56,003.37 675.00 1,100.00 2,750.00	1,569.61
08 33 23 13-0291	EA 22' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	58,043.68 675.00 1,100.00 2,750.00	1,626.36
08 33 23 13-0292	EA 22' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	60,117.92 675.00 1,100.00 2,750.00	1,668.65
08 33 23 13-0293	EA 22' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	62,192.54 675.00 1,100.00 2,750.00	1,712.04
08 33 23 13-0294	EA 22' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	64,021.62 675.00 1,100.00 2,750.00	1,756.55
08 33 23 13-0295	23' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0296	EA 23' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	50,768.76 675.00 1,100.00 2,750.00	1,469.91
08 33 23 13-0297	EA 23' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	53,074.13 675.00 1,100.00 2,750.00	1,503.86
08 33 23 13-0298	EA 23' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	55,442.35 675.00 1,100.00 2,750.00	1,537.81
08 33 23 13-0299	EA 23' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	56,564.34 675.00 1,100.00 2,750.00	1,571.76
08 33 23 13-0300	EA 23' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	57,813.83 675.00 1,100.00 2,750.00	1,605.72
08 33 23 13-0301	EA 23' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	59,858.55 675.00 1,100.00 2,750.00	1,663.77
08 33 23 13-0302	EA 23' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	61,932.92 675.00 1,100.00 2,750.00	1,707.04
08 33 23 13-0303	EA 23' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	64,011.35 675.00 1,100.00 2,750.00	1,751.41
08 33 23 13-0304	EA 23' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	65,842.48 675.00 1,100.00 2,750.00	1,796.95
08 33 23 13-0305	24' Wide, 3 Ply Fabric Panel, High-Speed Rolling Doors (Rytec® Fast-Seal®) <small>(08 33 23 13-0118)</small>		
08 33 23 13-0306	EA 24' x 10', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	52,574.64 675.00 1,100.00 2,750.00	1,503.72
08 33 23 13-0307	EA 24' x 11', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	54,881.56 675.00 1,100.00 2,750.00	1,538.45

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23	13-0308	EA	24' x 12', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	57,253.13 675.00 1,100.00 2,750.00	1,573.18
08 33 23	13-0309	EA	24' x 13', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	58,376.70 675.00 1,100.00 2,750.00	1,607.91
08 33 23	13-0310	EA	24' x 14', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	59,625.95 675.00 1,100.00 2,750.00	1,642.64
08 33 23	13-0311	EA	24' x 15', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	61,671.54 675.00 1,100.00 2,750.00	1,702.04
08 33 23	13-0312	EA	24' x 16', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	63,749.71 675.00 1,100.00 2,750.00	1,746.29
08 33 23	13-0313	EA	24' x 17', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	65,831.96 675.00 1,100.00 2,750.00	1,791.70
08 33 23	13-0314	EA	24' x 18', 3 Ply Fabric Panel, High-Speed Rolling Door (Rytec® Fast-Seal®)..... <i>For NEMA 4X Control Box, Add</i> <i>For 2 Speed Motor, 60" Open, 30" Close, Add</i> <i>For AC Variable Speed Motor And Controls, Add</i>	67,661.59 675.00 1,100.00 2,750.00	1,838.28

08 33 23 13-0315 Rytec® Fast-Seal® Door Options (08 33 23 13-0117)

08 33 23	13-0316	LF	Strapped Windbar For Rytec® Fast-Seal® High-Speed Rolling Doors Note: Multiply linear foot price x width of door.	49.88	
08 33 23	13-0317	EA	Up To 10' Wide Doors, Roll And Motor Hood For Rytec® Fast-Seal® High-Speed Rolling Doors	540.38	
08 33 23	13-0318	EA	>10' To 15' Wide Doors, Roll And Motor Hood For Rytec® Fast-Seal® High-Speed Rolling Doors	897.86	
08 33 23	13-0319	EA	>15' To 20' Wide Doors, Roll And Motor Hood For Rytec® Fast-Seal® High-Speed Rolling Doors	1,320.38	
08 33 23	13-0320	EA	>20' To 24' Wide Doors, Roll And Motor Hood For Rytec® Fast-Seal® High-Speed Rolling Doors	1,975.29	
08 33 23	13-0321	EA	One 17" x 17", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Window With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	315.91	
08 33 23	13-0322	EA	Two 17" x 17", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	623.51	
			Note: Door must be at least 90" wide.		
08 33 23	13-0323	EA	Three 17" x 17", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	789.78	
			Note: Door must be at least 102" wide.		
08 33 23	13-0324	EA	Four 17" x 17", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	1,247.03	
			Note: Door must be at least 136" wide.		
08 33 23	13-0325	EA	One 24" x 24", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Window With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	365.79	
08 33 23	13-0326	EA	Two 24" x 24", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	723.28	
			Note: Door must be at least 108" wide.		
08 33 23	13-0327	EA	Three 24" x 24", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	897.86	
			Note: Door must be at least 144" wide.		
08 33 23	13-0328	EA	Four 24" x 24", 2mm Thick, Replaceable Polyvinyl Chloride (PVC) Windows With Velcro For Rytec® Fast-Seal® High-Speed Rolling Doors	1,446.55	
			Note: Door must be at least 192" wide.		
08 33 23	13-0329	EA	Sloped Roll And Motor Cover For Interior Or Exterior Door Widths Of 8' Or 10'	752.35	
			<i>For 304 Stainless Steel, Add</i>	120.38	
			<i>For 316 Stainless Steel, Add</i>	526.65	
08 33 23	13-0330	EA	Sloped Roll And Motor Cover For Interior Or Exterior Door Widths Of 12' Or 14'	978.06	
			<i>For 304 Stainless Steel, Add</i>	156.49	
			<i>For 316 Stainless Steel, Add</i>	684.64	
08 33 23	13-0331	EA	Sloped Roll And Motor Cover For Interior Or Exterior Door Widths Of 16' Or 18'	1,279.00	
			<i>For 304 Stainless Steel, Add</i>	204.64	
			<i>For 316 Stainless Steel, Add</i>	895.30	
08 33 23	13-0332	EA	Through Wall Brake Release	185.83	
08 33 23	13-0333	EA	Explosion Proof Upgrade Package: Control Box (including internal components), Motor, Rotary Limit Switch, Photo-eyes, Safety Bar, Push Buttons..... <i>For NEMA 12 Control Box Mounted Outside Explosion Proof Area, Deduct</i>	21,592.44 -6,200.00	

08 33 23 13-0334 High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13)

Note: Rytec® Powerhouse™. Door panel is styrene butadiene rubber (SBR) panel 1/4" thick, made of two 1/8" thick layers, 60 durometer; sandwiched with 1-ply, 110 lbs polyester cord center. Panel includes bonded SBR beveled segmented windlocks to allow the door panel to effectively release from the side frame in case of accidental impact. Vertical orange stripes for visual safety awareness. Side frames are structural columns consisting of 5 x 2 x 1/4" structural steel tubing, welded to a reinforced 0.22" thick steel 'Z' mounting bracket and 0.18" thick steel hinged cover. Drive system is a 480 volt, 3-phase variable speed AC Drive motor with brake and absolute encoder. Opens at up to 60" per second and closes at 21" per second.

		MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0335		High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0334)		
08 33 23 13-0336		8' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0337	EA	8' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	30,684.54	976.52
08 33 23 13-0338	EA	8' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	30,951.77	1,004.20
08 33 23 13-0339	EA	8' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	31,429.10	1,031.86
08 33 23 13-0340	EA	8' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	31,906.43	1,059.53
08 33 23 13-0341	EA	8' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,385.55	1,087.19
08 33 23 13-0342	EA	8' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,862.89	1,114.86
08 33 23 13-0343	EA	8' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,128.32	1,142.54
08 33 23 13-0344	EA	8' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,611.52	1,172.24
08 33 23 13-0345	EA	8' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,516.46	1,202.72
08 33 23 13-0346	EA	8' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,790.91	1,233.98
08 33 23 13-0347	EA	8' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,488.95	1,266.07
08 33 23 13-0348		9' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0349	EA	9' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	30,951.77	1,004.20
08 33 23 13-0350	EA	9' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	31,217.20	1,031.86
08 33 23 13-0351	EA	9' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	31,696.33	1,059.53
08 33 23 13-0352	EA	9' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,385.55	1,087.19
08 33 23 13-0353	EA	9' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,650.99	1,114.86
08 33 23 13-0354	EA	9' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,128.32	1,142.54
08 33 23 13-0355	EA	9' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,607.44	1,170.20
08 33 23 13-0356	EA	9' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,094.47	1,202.72
08 33 23 13-0357	EA	9' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,212.90	1,233.98
08 33 23 13-0358	EA	9' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,334.73	1,266.07
08 33 23 13-0359	EA	9' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	37,456.46	1,298.99
08 33 23 13-0360		10' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0361	EA	10' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,484.98	1,031.86
08 33 23 13-0362	EA	10' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,752.22	1,059.53
08 33 23 13-0363	EA	10' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,229.54	1,087.19
08 33 23 13-0364	EA	10' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,918.77	1,114.86
08 33 23 13-0365	EA	10' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,396.09	1,142.54
08 33 23 13-0366	EA	10' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,875.22	1,170.20
08 33 23 13-0367	EA	10' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,352.56	1,197.87
08 33 23 13-0368	EA	10' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,057.47	1,233.38
08 33 23 13-0369	EA	10' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,965.60	1,265.46
08 33 23 13-0370	EA	10' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	38,299.17	1,298.35
08 33 23 13-0371	EA	10' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	39,424.38	1,332.11
08 33 23 13-0372		11' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0373	EA	11' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,540.32	1,059.53
08 33 23 13-0374	EA	11' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,017.65	1,087.19
08 33 23 13-0375	EA	11' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,496.77	1,114.86
08 33 23 13-0376	EA	11' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,185.99	1,142.54
08 33 23 13-0377	EA	11' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,663.33	1,170.20
08 33 23 13-0378	EA	11' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,140.66	1,197.87
08 33 23 13-0379	EA	11' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,253.67	1,225.53
08 33 23 13-0380	EA	11' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	37,596.52	1,263.97
08 33 23 13-0381	EA	11' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	38,930.04	1,296.83
08 33 23 13-0382	EA	11' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	40,265.25	1,330.56
08 33 23 13-0383	EA	11' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	41,390.32	1,365.14
08 33 23 13-0384		12' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0385	EA	12' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	32,807.55	1,087.19
08 33 23 13-0386	EA	12' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,284.88	1,114.86
08 33 23 13-0387	EA	12' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,762.20	1,142.54
08 33 23 13-0388	EA	12' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,451.43	1,170.20
08 33 23 13-0389	EA	12' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,140.66	1,197.87
08 33 23 13-0390	EA	12' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,463.77	1,225.53
08 33 23 13-0391	EA	12' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	37,786.88	1,253.20
08 33 23 13-0392	EA	12' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	39,137.37	1,294.56
08 33 23 13-0393	EA	12' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	40,682.56	1,328.22
08 33 23 13-0394	EA	12' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	42,019.41	1,362.75
08 33 23 13-0395	EA	12' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	43,358.05	1,398.19

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0396			13' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) <small>(08 33 23 13-0335)</small>		
08 33 23 13-0397	EA		13' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,284.88	1,114.86
08 33 23 13-0398	EA		13' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,552.10	1,142.54
08 33 23 13-0399	EA		13' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,029.44	1,170.20
08 33 23 13-0400	EA		13' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,930.56	1,197.87
08 33 23 13-0401	EA		13' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,463.77	1,225.53
08 33 23 13-0402	EA		13' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	37,998.78	1,253.20
08 33 23 13-0403	EA		13' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	39,321.89	1,280.88
08 33 23 13-0404	EA		13' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	40,888.51	1,325.24
08 33 23 13-0405	EA		13' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	42,437.09	1,359.70
08 33 23 13-0406	EA		13' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	43,985.67	1,395.05
08 33 23 13-0407	EA		13' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	45,325.99	1,431.32
08 33 23 13-0408			14' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) <small>(08 33 23 13-0335)</small>		
08 33 23 13-0409	EA		14' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,552.10	1,142.54
08 33 23 13-0410	EA		14' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	33,817.54	1,170.20
08 33 23 13-0411	EA		14' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,506.77	1,197.87
08 33 23 13-0412	EA		14' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,829.88	1,225.53
08 33 23 13-0413	EA		14' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	37,786.88	1,253.20
08 33 23 13-0414	EA		14' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	39,321.89	1,280.88
08 33 23 13-0415	EA		14' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	41,067.00	1,308.54
08 33 23 13-0416	EA		14' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	42,639.49	1,358.86
08 33 23 13-0417	EA		14' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	44,189.68	1,391.11
08 33 23 13-0418	EA		14' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	45,739.89	1,427.27
08 33 23 13-0419	EA		14' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	47,505.67	1,464.39
08 33 23 13-0420			15' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) <small>(08 33 23 13-0335)</small>		
08 33 23 13-0421	EA		15' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	34,872.44	1,168.81
08 33 23 13-0422	EA		15' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,351.05	1,197.12
08 33 23 13-0423	EA		15' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,041.54	1,225.41
08 33 23 13-0424	EA		15' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,942.14	1,253.72
08 33 23 13-0425	EA		15' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	39,112.31	1,282.03
08 33 23 13-0426	EA		15' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	40,858.68	1,310.33
08 33 23 13-0427	EA		15' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	42,605.07	1,338.64
08 33 23 13-0428	EA		15' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	44,181.56	1,387.04
08 33 23 13-0429	EA		15' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	45,943.45	1,423.09
08 33 23 13-0430	EA		15' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	47,707.21	1,460.11
08 33 23 13-0431	EA		15' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	49,472.92	1,498.07
08 33 23 13-0432			16' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) <small>(08 33 23 13-0335)</small>		
08 33 23 13-0433	EA		16' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,136.31	1,195.70
08 33 23 13-0434	EA		16' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,828.11	1,224.65
08 33 23 13-0435	EA		16' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,519.92	1,253.60
08 33 23 13-0436	EA		16' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	38,267.59	1,282.56
08 33 23 13-0437	EA		16' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	40,649.16	1,311.51
08 33 23 13-0438	EA		16' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	42,398.63	1,340.47
08 33 23 13-0439	EA		16' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	44,146.33	1,369.42
08 33 23 13-0440	EA		16' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	45,935.13	1,418.94
08 33 23 13-0441	EA		16' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	47,698.67	1,455.84
08 33 23 13-0442	EA		16' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	49,464.15	1,493.69
08 33 23 13-0443	EA		16' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	51,443.49	1,532.52
08 33 23 13-0444			17' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) <small>(08 33 23 13-0335)</small>		
08 33 23 13-0445	EA		17' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	35,615.09	1,223.20
08 33 23 13-0446	EA		17' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,096.32	1,252.82
08 33 23 13-0447	EA		17' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	37,845.34	1,282.44
08 33 23 13-0448	EA		17' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	39,594.36	1,312.06
08 33 23 13-0449	EA		17' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	41,977.25	1,341.68
08 33 23 13-0450	EA		17' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	43,938.16	1,371.30
08 33 23 13-0451	EA		17' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	45,687.19	1,400.92
08 33 23 13-0452	EA		17' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	47,690.17	1,451.58
08 33 23 13-0453	EA		17' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	49,455.42	1,489.31
08 33 23 13-0454	EA		17' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	51,434.53	1,528.04
08 33 23 13-0455	EA		17' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	53,415.65	1,567.78
08 33 23 13-0456			18' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) <small>(08 33 23 13-0335)</small>		
08 33 23 13-0457	EA		18' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	36,093.35	1,251.33



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0458 EA 18' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	36,575.96	1,281.63
08 33 23 13-0459 EA 18' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	38,960.22	1,311.94
08 33 23 13-0460 EA 18' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	40,922.49	1,342.23
08 33 23 13-0461 EA 18' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	43,306.76	1,372.54
08 33 23 13-0462 EA 18' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	45,269.03	1,402.84
08 33 23 13-0463 EA 18' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	47,443.20	1,433.15
08 33 23 13-0464 EA 18' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	49,446.71	1,484.96
08 33 23 13-0465 EA 18' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	51,425.58	1,523.58
08 33 23 13-0466 EA 18' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	53,406.48	1,563.19
08 33 23 13-0467 EA 18' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	55,389.43	1,603.83
08 33 23 13-0468 19' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0469 EA 19' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	36,994.90	1,280.10
08 33 23 13-0470 EA 19' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	37,690.79	1,311.11
08 33 23 13-0471 EA 19' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	40,288.34	1,342.11
08 33 23 13-0472 EA 19' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	42,252.01	1,373.11
08 33 23 13-0473 EA 19' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	44,849.56	1,404.11
08 33 23 13-0474 EA 19' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	46,813.24	1,435.11
08 33 23 13-0475 EA 19' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	48,987.00	1,466.11
08 33 23 13-0476 EA 19' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	50,994.69	1,519.12
08 33 23 13-0477 EA 19' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	53,185.45	1,558.61
08 33 23 13-0478 EA 19' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	55,168.15	1,599.14
08 33 23 13-0479 EA 19' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	57,364.87	1,640.73
08 33 23 13-0480 20' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0481 EA 20' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	38,321.57	1,309.55
08 33 23 13-0482 EA 20' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	39,018.89	1,341.26
08 33 23 13-0483 EA 20' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	41,405.97	1,372.98
08 33 23 13-0484 EA 20' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	43,582.96	1,404.68
08 33 23 13-0485 EA 20' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	46,181.93	1,436.40
08 33 23 13-0486 EA 20' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	48,357.14	1,468.11
08 33 23 13-0487 EA 20' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	50,534.12	1,499.83
08 33 23 13-0488 EA 20' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	52,754.34	1,554.06
08 33 23 13-0489 EA 20' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	54,948.71	1,594.47
08 33 23 13-0490 EA 20' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	57,143.38	1,635.91
08 33 23 13-0491 EA 20' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	59,340.22	1,678.46
08 33 23 13-0492 21' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0493 EA 21' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	38,593.70	1,339.67
08 33 23 13-0494 EA 21' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	40,560.26	1,372.11
08 33 23 13-0495 EA 21' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	42,526.80	1,404.55
08 33 23 13-0496 EA 21' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	44,915.34	1,436.99
08 33 23 13-0497 EA 21' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	47,515.78	1,469.44
08 33 23 13-0498 EA 21' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	49,904.33	1,501.88
08 33 23 13-0499 EA 21' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	52,080.97	1,534.32
08 33 23 13-0500 EA 21' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	54,515.59	1,589.81
08 33 23 13-0501 EA 21' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	56,711.82	1,631.14
08 33 23 13-0502 EA 21' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	58,908.41	1,673.54
08 33 23 13-0503 EA 21' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	61,319.08	1,717.06
08 33 23 13-0504 22' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0505 EA 22' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	39,077.33	1,370.48
08 33 23 13-0506 EA 22' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	40,833.47	1,403.68
08 33 23 13-0507 EA 22' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	43,859.19	1,436.85
08 33 23 13-0508 EA 22' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	46,249.22	1,470.05
08 33 23 13-0509 EA 22' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	49,061.25	1,503.24
08 33 23 13-0510 EA 22' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	51,451.28	1,536.43
08 33 23 13-0511 EA 22' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	53,631.22	1,569.61
08 33 23 13-0512 EA 22' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	56,068.39	1,626.36
08 33 23 13-0513 EA 22' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	58,476.62	1,668.65
08 33 23 13-0514 EA 22' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	60,887.05	1,712.04
08 33 23 13-0515 EA 22' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	63,299.73	1,756.55
08 33 23 13-0516 23' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™) (08 33 23 13-0335)		
08 33 23 13-0517 EA 23' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	40,620.04	1,402.00
08 33 23 13-0518 EA 23' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	42,165.81	1,435.96
08 33 23 13-0519 EA 23' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	44,981.16	1,469.91
08 33 23 13-0520 EA 23' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	47,584.62	1,503.86
08 33 23 13-0521 EA 23' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™).....	50,398.18	1,537.81

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 33 23 13-0522	EA	23' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	52,789.74	1,571.76
08 33 23 13-0523	EA	23' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	55,393.20	1,605.72
08 33 23 13-0524	EA	23' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	57,832.98	1,663.78
08 33 23 13-0525	EA	23' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	60,243.15	1,707.03
08 33 23 13-0526	EA	23' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	62,867.48	1,751.42
08 33 23 13-0527	EA	23' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	65,282.21	1,796.95

08 33 23 13-0528 **24' Wide, High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)** (08 33 23 13-0335)

08 33 23 13-0529	EA	24' x 8', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	41,952.32	1,434.25
08 33 23 13-0530	EA	24' x 9', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	43,077.66	1,468.98
08 33 23 13-0531	EA	24' x 10', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	46,316.56	1,538.72
08 33 23 13-0532	EA	24' x 11', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	48,709.68	1,538.45
08 33 23 13-0533	EA	24' x 12', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	51,736.69	1,573.18
08 33 23 13-0534	EA	24' x 13', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	54,341.71	1,607.91
08 33 23 13-0535	EA	24' x 14', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	56,944.95	1,642.64
08 33 23 13-0536	EA	24' x 15', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	59,599.28	1,702.04
08 33 23 13-0537	EA	24' x 16', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	62,011.45	1,746.29
08 33 23 13-0538	EA	24' x 17', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	64,637.81	1,791.70
08 33 23 13-0539	EA	24' x 18', High Performance Rubber, High-Speed Rolling Door (Rytec® Powerhouse™)	67,266.53	1,838.29

08 33 23 13-0540 **Rytec® Powerhouse™ Door Options** (08 33 23 13-0334)

08 33 23 13-0541	EA	Up To 8' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	2,747.45	
08 33 23 13-0542	EA	9' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	2,801.32	
08 33 23 13-0543	EA	10' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	2,855.19	
08 33 23 13-0544	EA	11' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	2,909.06	
08 33 23 13-0545	EA	12' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	2,962.94	
08 33 23 13-0546	EA	13' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,016.81	
08 33 23 13-0547	EA	14' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,070.68	
08 33 23 13-0548	EA	15' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,124.55	
08 33 23 13-0549	EA	16' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,178.42	
08 33 23 13-0550	EA	17' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,232.29	
08 33 23 13-0551	EA	18' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,286.16	
08 33 23 13-0552	EA	19' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,340.04	
08 33 23 13-0553	EA	20' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,393.91	
08 33 23 13-0554	EA	21' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,447.78	
08 33 23 13-0555	EA	22' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,501.65	
08 33 23 13-0556	EA	23' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,555.52	
08 33 23 13-0557	EA	24' Wide Doors, Sloped Roll And Motor Hood For Rytec® Powerhouse™ High-Speed Rolling Doors	3,609.39	
08 33 23 13-0558	EA	11" x 20" Window For Rytec® Powerhouse™ High-Speed Rolling Doors	628.50	
08 33 23 13-0559	EA	208-230 Volt Application For Rytec® Powerhouse™ Door	1,544.32	

Note: Includes System 4 Controller In NEMA 4 Enclosure

08 33 23 13-0560 **Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral®)** (08 33 23 13-0560)

Note: Door panels are double-walled aluminum slats that are 6" high x 1-3/16" thick. Width is variable. Side frames are galvanized steel with full height weather seal on both sides. There are extension springs in each column for counterbalance. The drive system is a 2 HP, 208,230/460 Volt, three-phase motor with variable speed AC drive. Opening and closing speeds up to 60" per second.

08 33 23 13-0561 **Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral®)** (08 33 23 13-0560)

08 33 23 13-0562 **8' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)** (08 33 23 13-0561)

08 33 23 13-0563	EA	8' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	32,989.94	1,302.03
08 33 23 13-0564	EA	8' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	33,944.79	1,329.70
08 33 23 13-0565	EA	8' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	34,899.66	1,357.37
08 33 23 13-0566	EA	8' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	35,856.18	1,385.03
08 33 23 13-0567	EA	8' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	36,811.04	1,412.70
08 33 23 13-0568	EA	8' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	37,765.89	1,440.38
08 33 23 13-0569	EA	8' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	40,518.12	1,468.04
08 33 23 13-0570	EA	8' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	41,468.06	1,497.40
08 33 23 13-0571	EA	8' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	42,418.64	1,527.34
08 33 23 13-0572	EA	8' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	43,370.40	1,557.89
08 33 23 13-0573	EA	8' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	44,323.40	1,589.05

08 33 23 13-0574 **9' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)** (08 33 23 13-0561)

08 33 23 13-0575	EA	9' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	33,944.79	1,329.70
08 33 23 13-0576	EA	9' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	34,899.66	1,357.37
08 33 23 13-0577	EA	9' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	35,856.18	1,385.03
08 33 23 13-0578	EA	9' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	36,811.04	1,412.70
08 33 23 13-0579	EA	9' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	37,765.89	1,440.38
08 33 23 13-0580	EA	9' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	38,720.74	1,468.04
08 33 23 13-0581	EA	9' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	41,473.00	1,495.71
08 33 23 13-0582	EA	9' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	42,409.33	1,525.62
08 33 23 13-0583	EA	9' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	43,377.65	1,556.14

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0584 EA 9' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	44,330.57	1,587.27
08 33 23 13-0585 EA 9' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	45,284.75	1,619.00
08 33 23 13-0586 10' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <i>(08 33 23 13-0561)</i>		
08 33 23 13-0587 EA 10' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	34,899.66	1,357.37
08 33 23 13-0588 EA 10' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	35,856.18	1,385.03
08 33 23 13-0589 EA 10' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	36,811.04	1,412.70
08 33 23 13-0590 EA 10' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	37,765.89	1,440.38
08 33 23 13-0591 EA 10' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	38,720.74	1,468.04
08 33 23 13-0592 EA 10' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	39,675.61	1,495.71
08 33 23 13-0593 EA 10' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	42,427.85	1,523.37
08 33 23 13-0594 EA 10' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	43,380.26	1,553.84
08 33 23 13-0595 EA 10' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	44,333.09	1,584.92
08 33 23 13-0596 EA 10' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	45,287.15	1,616.63
08 33 23 13-0597 EA 10' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	46,242.50	1,648.94
08 33 23 13-0598 11' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <i>(08 33 23 13-0561)</i>		
08 33 23 13-0599 EA 11' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	35,856.18	1,385.03
08 33 23 13-0600 EA 11' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	36,811.04	1,412.70
08 33 23 13-0601 EA 11' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	37,765.89	1,440.38
08 33 23 13-0602 EA 11' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	38,720.74	1,468.04
08 33 23 13-0603 EA 11' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	39,675.61	1,495.71
08 33 23 13-0604 EA 11' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	40,630.47	1,523.37
08 33 23 13-0605 EA 11' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	43,381.05	1,551.04
08 33 23 13-0606 EA 11' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	44,336.36	1,582.06
08 33 23 13-0607 EA 11' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	45,290.31	1,613.70
08 33 23 13-0608 EA 11' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	46,245.54	1,645.98
08 33 23 13-0609 EA 11' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	47,202.04	1,678.91
08 33 23 13-0610 12' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <i>(08 33 23 13-0561)</i>		
08 33 23 13-0611 EA 12' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	36,811.04	1,412.70
08 33 23 13-0612 EA 12' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	37,765.89	1,440.38
08 33 23 13-0613 EA 12' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	38,720.74	1,468.04
08 33 23 13-0614 EA 12' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	39,675.61	1,495.71
08 33 23 13-0615 EA 12' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	40,630.47	1,523.37
08 33 23 13-0616 EA 12' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	41,585.33	1,551.04
08 33 23 13-0617 EA 12' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	44,337.56	1,578.72
08 33 23 13-0618 EA 12' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	45,292.45	1,610.29
08 33 23 13-0619 EA 12' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	46,247.54	1,642.49
08 33 23 13-0620 EA 12' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	47,203.92	1,675.34
08 33 23 13-0621 EA 12' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	48,163.41	1,708.85
08 33 23 13-0622 13' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <i>(08 33 23 13-0561)</i>		
08 33 23 13-0623 EA 13' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	37,765.89	1,440.38
08 33 23 13-0624 EA 13' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	38,720.74	1,468.04
08 33 23 13-0625 EA 13' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	39,675.61	1,495.71
08 33 23 13-0626 EA 13' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	40,630.47	1,523.37
08 33 23 13-0627 EA 13' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	41,585.33	1,551.04
08 33 23 13-0628 EA 13' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	42,540.18	1,578.72
08 33 23 13-0629 EA 13' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	45,292.43	1,606.38
08 33 23 13-0630 EA 13' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	46,248.56	1,638.51
08 33 23 13-0631 EA 13' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	47,204.76	1,671.27
08 33 23 13-0632 EA 13' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	48,162.30	1,704.71
08 33 23 13-0633 EA 13' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	49,121.15	1,738.80
08 33 23 13-0634 14' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <i>(08 33 23 13-0561)</i>		
08 33 23 13-0635 EA 14' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	40,518.12	1,468.04
08 33 23 13-0636 EA 14' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	41,473.00	1,495.71
08 33 23 13-0637 EA 14' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	42,427.85	1,523.37
08 33 23 13-0638 EA 14' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	43,381.05	1,551.04
08 33 23 13-0639 EA 14' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	44,337.56	1,578.72
08 33 23 13-0640 EA 14' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	45,292.43	1,606.38
08 33 23 13-0641 EA 14' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	46,238.97	1,634.05
08 33 23 13-0642 EA 14' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	47,195.67	1,666.73
08 33 23 13-0643 EA 14' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	48,153.01	1,700.07
08 33 23 13-0644 EA 14' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	49,111.69	1,734.07
08 33 23 13-0645 EA 14' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	50,071.74	1,768.74

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0646			15' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <small>(08 33 23 13-0561)</small>		
08 33 23 13-0647	EA		15' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	41,468.06	1,497.40
08 33 23 13-0648	EA		15' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	42,425.95	1,525.62
08 33 23 13-0649	EA		15' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	43,380.26	1,553.84
08 33 23 13-0650	EA		15' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	44,336.36	1,582.06
08 33 23 13-0651	EA		15' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	45,292.45	1,610.29
08 33 23 13-0652	EA		15' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	46,248.56	1,638.51
08 33 23 13-0653	EA		15' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	47,195.67	1,666.73
08 33 23 13-0654	EA		15' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	48,153.01	1,700.07
08 33 23 13-0655	EA		15' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	49,111.69	1,734.07
08 33 23 13-0656	EA		15' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	50,071.74	1,768.74
08 33 23 13-0657	EA		15' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,033.16	1,804.12
08 33 23 13-0658			16' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <small>(08 33 23 13-0561)</small>		
08 33 23 13-0659	EA		16' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	42,418.64	1,527.34
08 33 23 13-0660	EA		16' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	43,377.65	1,556.14
08 33 23 13-0661	EA		16' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	44,333.09	1,584.92
08 33 23 13-0662	EA		16' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	45,290.31	1,613.70
08 33 23 13-0663	EA		16' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	46,247.54	1,642.49
08 33 23 13-0664	EA		16' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	47,204.76	1,671.27
08 33 23 13-0665	EA		16' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	48,153.01	1,700.07
08 33 23 13-0666	EA		16' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	49,111.69	1,734.07
08 33 23 13-0667	EA		16' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	50,071.74	1,768.74
08 33 23 13-0668	EA		16' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,033.16	1,804.12
08 33 23 13-0669	EA		16' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,997.80	1,840.20
08 33 23 13-0670			17' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <small>(08 33 23 13-0561)</small>		
08 33 23 13-0671	EA		17' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	43,370.40	1,557.89
08 33 23 13-0672	EA		17' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	44,330.57	1,587.27
08 33 23 13-0673	EA		17' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	45,287.15	1,616.63
08 33 23 13-0674	EA		17' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	46,245.54	1,645.98
08 33 23 13-0675	EA		17' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	47,203.92	1,675.34
08 33 23 13-0676	EA		17' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	48,162.30	1,704.71
08 33 23 13-0677	EA		17' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	49,111.69	1,734.07
08 33 23 13-0678	EA		17' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	50,071.74	1,768.74
08 33 23 13-0679	EA		17' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,033.16	1,804.12
08 33 23 13-0680	EA		17' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,997.80	1,840.20
08 33 23 13-0681	EA		17' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	52,962.07	1,877.01
08 33 23 13-0682			18' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <small>(08 33 23 13-0561)</small>		
08 33 23 13-0683	EA		18' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	44,522.72	1,589.05
08 33 23 13-0684	EA		18' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	45,482.28	1,619.00
08 33 23 13-0685	EA		18' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	46,441.82	1,648.94
08 33 23 13-0686	EA		18' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	47,399.57	1,678.91
08 33 23 13-0687	EA		18' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	48,360.93	1,708.85
08 33 23 13-0688	EA		18' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	49,318.68	1,738.80
08 33 23 13-0689	EA		18' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	50,271.07	1,768.74
08 33 23 13-0690	EA		18' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,232.48	1,804.12
08 33 23 13-0691	EA		18' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	52,195.33	1,840.20
08 33 23 13-0692	EA		18' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	53,159.60	1,877.01
08 33 23 13-0693	EA		18' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	54,125.37	1,914.55
08 33 23 13-0694			19' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <small>(08 33 23 13-0561)</small>		
08 33 23 13-0695	EA		19' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	45,773.25	1,620.84
08 33 23 13-0696	EA		19' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	46,735.80	1,651.39
08 33 23 13-0697	EA		19' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	47,694.76	1,681.93
08 33 23 13-0698	EA		19' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	48,655.51	1,712.47
08 33 23 13-0699	EA		19' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	49,616.26	1,743.03
08 33 23 13-0700	EA		19' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	50,577.00	1,773.57
08 33 23 13-0701	EA		19' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	51,528.77	1,804.12
08 33 23 13-0702	EA		19' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	52,491.62	1,840.20
08 33 23 13-0703	EA		19' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	53,455.90	1,877.01
08 33 23 13-0704	EA		19' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	54,421.66	1,914.55
08 33 23 13-0705	EA		19' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	55,390.72	1,952.84
08 33 23 13-0706			20' Wide, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®) <small>(08 33 23 13-0561)</small>		
08 33 23 13-0707	EA		20' x 8', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®)	47,322.72	1,653.58

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0708	EA			20' x 9', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	48,287.09	1,683.96
08 33 23 13-0709	EA			20' x 10', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	49,246.80	1,715.43
08 33 23 13-0710	EA			20' x 11', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	50,209.40	1,746.89
08 33 23 13-0711	EA			20' x 12', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	51,170.88	1,778.36
08 33 23 13-0712	EA			20' x 13', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	52,132.39	1,808.74
08 33 23 13-0713	EA			20' x 14', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	53,086.00	1,840.20
08 33 23 13-0714	EA			20' x 15', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	54,050.46	1,877.09
08 33 23 13-0715	EA			20' x 16', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	55,016.00	1,915.07
08 33 23 13-0716	EA			20' x 17', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	55,983.71	1,953.05
08 33 23 13-0717	EA			20' x 18', Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral®).....	56,952.51	1,992.11
08 33 23 13-0718				Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0560)		
08 33 23 13-0719				8' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23 13-0720	EA			8' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	33,214.31	868.02
08 33 23 13-0721	EA			8' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	33,944.55	886.46
08 33 23 13-0722	EA			8' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	34,674.79	904.91
08 33 23 13-0723	EA			8' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	35,401.71	923.35
08 33 23 13-0724	EA			8' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,131.95	941.80
08 33 23 13-0725	EA			8' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,862.18	960.24
08 33 23 13-0726	EA			8' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	44,522.56	978.69
08 33 23 13-0727				9' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23 13-0728	EA			9' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	33,944.55	886.46
08 33 23 13-0729	EA			9' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	34,674.79	904.91
08 33 23 13-0730	EA			9' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	35,401.71	923.35
08 33 23 13-0731	EA			9' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,131.95	941.80
08 33 23 13-0732	EA			9' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,862.18	960.24
08 33 23 13-0733	EA			9' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	37,592.42	978.69
08 33 23 13-0734	EA			9' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	45,252.80	997.14
08 33 23 13-0735				10' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23 13-0736	EA			10' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	34,674.79	904.91
08 33 23 13-0737	EA			10' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	35,401.71	923.35
08 33 23 13-0738	EA			10' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,131.95	941.80
08 33 23 13-0739	EA			10' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,862.18	960.24
08 33 23 13-0740	EA			10' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	37,592.42	978.69
08 33 23 13-0741	EA			10' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	38,322.66	997.14
08 33 23 13-0742	EA			10' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	45,983.03	1,015.59
08 33 23 13-0743				11' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23 13-0744	EA			11' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	35,401.71	923.35
08 33 23 13-0745	EA			11' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,131.95	941.80
08 33 23 13-0746	EA			11' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,862.18	960.24
08 33 23 13-0747	EA			11' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	37,592.42	978.69
08 33 23 13-0748	EA			11' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	38,322.66	997.14
08 33 23 13-0749	EA			11' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	39,052.89	1,015.59
08 33 23 13-0750	EA			11' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	46,709.94	1,034.03
08 33 23 13-0751				12' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23 13-0752	EA			12' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,131.95	941.80
08 33 23 13-0753	EA			12' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,862.18	960.24
08 33 23 13-0754	EA			12' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	37,592.42	978.69
08 33 23 13-0755	EA			12' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	38,322.66	997.14
08 33 23 13-0756	EA			12' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	39,052.89	1,015.59
08 33 23 13-0757	EA			12' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	39,783.12	1,034.03
08 33 23 13-0758	EA			12' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	47,440.18	1,052.48
08 33 23 13-0759				13' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23 13-0760	EA			13' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	36,862.18	960.24
08 33 23 13-0761	EA			13' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	37,592.42	978.69
08 33 23 13-0762	EA			13' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	38,322.66	997.14
08 33 23 13-0763	EA			13' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	39,052.89	1,015.59
08 33 23 13-0764	EA			13' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	39,783.12	1,034.03
08 33 23 13-0765	EA			13' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®).....	40,513.37	1,052.48

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 33 23	13-0766	EA	13' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	48,170.42	1,070.92
08 33 23	13-0767		14' Wide, Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral LH®) (08 33 23 13-0718)		
08 33 23	13-0768	EA	14' x 8', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	44,522.56	978.69
08 33 23	13-0769	EA	14' x 9', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	45,252.80	997.14
08 33 23	13-0770	EA	14' x 10', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	45,983.03	1,015.59
08 33 23	13-0771	EA	14' x 11', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	46,709.94	1,034.03
08 33 23	13-0772	EA	14' x 12', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	47,440.18	1,052.48
08 33 23	13-0773	EA	14' x 13', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	48,170.42	1,070.92
08 33 23	13-0774	EA	14' x 14', Low-Headroom, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral LH®)	48,900.66	1,089.37
08 33 23	13-0775		Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0560)		
08 33 23	13-0776		8' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23	13-0777	EA	8' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	30,838.31	868.02
08 33 23	13-0778	EA	8' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	31,568.55	886.46
08 33 23	13-0779	EA	8' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	32,298.79	904.91
08 33 23	13-0780	EA	8' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,027.37	923.35
08 33 23	13-0781	EA	8' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,757.61	941.80
08 33 23	13-0782	EA	8' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	34,476.41	955.37
08 33 23	13-0783	EA	8' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	39,502.55	960.24
08 33 23	13-0784		9' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23	13-0785	EA	9' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	31,568.55	886.46
08 33 23	13-0786	EA	9' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	32,298.79	904.91
08 33 23	13-0787	EA	9' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,027.37	923.35
08 33 23	13-0788	EA	9' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,757.61	941.80
08 33 23	13-0789	EA	9' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	34,486.18	960.24
08 33 23	13-0790	EA	9' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,202.31	971.64
08 33 23	13-0791	EA	9' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	37,742.06	978.69
08 33 23	13-0792		10' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23	13-0793	EA	10' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	32,298.79	904.91
08 33 23	13-0794	EA	10' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,027.37	923.35
08 33 23	13-0795	EA	10' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,757.61	941.80
08 33 23	13-0796	EA	10' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	34,486.18	960.24
08 33 23	13-0797	EA	10' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,216.42	978.69
08 33 23	13-0798	EA	10' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,936.88	992.25
08 33 23	13-0799	EA	10' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	38,678.47	997.14
08 33 23	13-0800		11' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23	13-0801	EA	11' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,027.37	923.35
08 33 23	13-0802	EA	11' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,757.61	941.80
08 33 23	13-0803	EA	11' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	34,486.18	960.24
08 33 23	13-0804	EA	11' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,216.42	978.69
08 33 23	13-0805	EA	11' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,946.65	997.14
08 33 23	13-0806	EA	11' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	36,667.12	1,010.70
08 33 23	13-0807	EA	11' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	39,614.89	1,015.59
08 33 23	13-0808		12' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23	13-0809	EA	12' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	33,757.61	941.80
08 33 23	13-0810	EA	12' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	34,486.18	960.24
08 33 23	13-0811	EA	12' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,216.42	978.69
08 33 23	13-0812	EA	12' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,946.65	997.14
08 33 23	13-0813	EA	12' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	36,676.89	1,015.59
08 33 23	13-0814	EA	12' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	37,395.19	1,028.06
08 33 23	13-0815	EA	12' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	40,551.29	1,034.03
08 33 23	13-0816		13' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23	13-0817	EA	13' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	34,486.18	960.24
08 33 23	13-0818	EA	13' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,216.42	978.69
08 33 23	13-0819	EA	13' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	35,946.65	997.14
08 33 23	13-0820	EA	13' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®)	36,676.89	1,015.59



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 23 13-0821 EA 13' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	37,407.12	1,034.03
08 33 23 13-0822 EA 13' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	38,126.52	1,047.05
08 33 23 13-0823 EA 13' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	41,487.71	1,052.48
08 33 23 13-0824 14' Wide, Full Vision, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral FV®) (08 33 23 13-0775)		
08 33 23 13-0825 EA 14' x 8', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	39,539.44	978.69
08 33 23 13-0826 EA 14' x 9', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	40,475.86	997.14
08 33 23 13-0827 EA 14' x 10', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	41,412.27	1,015.59
08 33 23 13-0828 EA 14' x 11', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	42,347.01	1,034.03
08 33 23 13-0829 EA 14' x 12', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	43,285.09	1,052.48
08 33 23 13-0830 EA 14' x 12' 9", Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	44,211.74	1,066.03
08 33 23 13-0831 EA 14' x 13', Full Vision, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral FV®).....	44,221.50	1,070.92
08 33 23 13-0832 Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0560)		
08 33 23 13-0833 8' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)		
08 33 23 13-0834 EA 8' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	41,396.27	868.02
08 33 23 13-0835 EA 8' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	42,325.63	886.46
08 33 23 13-0836 EA 8' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	43,253.20	904.91
08 33 23 13-0837 EA 8' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	44,180.78	923.35
08 33 23 13-0838 EA 8' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,097.78	941.80
08 33 23 13-0839 EA 8' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	47,520.97	960.24
08 33 23 13-0840 EA 8' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	48,944.15	978.69
08 33 23 13-0841 9' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)		
08 33 23 13-0842 EA 9' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	42,325.63	886.46
08 33 23 13-0843 EA 9' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	43,253.20	904.91
08 33 23 13-0844 EA 9' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	44,180.78	923.35
08 33 23 13-0845 EA 9' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	45,603.96	941.80
08 33 23 13-0846 EA 9' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	47,025.35	960.24
08 33 23 13-0847 EA 9' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	48,448.53	978.69
08 33 23 13-0848 EA 9' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	49,880.70	997.14
08 33 23 13-0849 10' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)		
08 33 23 13-0850 EA 10' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	43,253.20	904.91
08 33 23 13-0851 EA 10' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	44,180.78	923.35
08 33 23 13-0852 EA 10' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	45,108.34	941.80
08 33 23 13-0853 EA 10' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,531.53	960.24
08 33 23 13-0854 EA 10' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	47,952.91	978.69
08 33 23 13-0855 EA 10' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	49,376.10	997.14
08 33 23 13-0856 EA 10' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	50,817.24	1,015.59
08 33 23 13-0857 11' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)		
08 33 23 13-0858 EA 11' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	44,180.78	923.35
08 33 23 13-0859 EA 11' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	45,108.34	941.80
08 33 23 13-0860 EA 11' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,035.91	960.24
08 33 23 13-0861 EA 11' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	47,459.09	978.69
08 33 23 13-0862 EA 11' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	48,882.28	997.14
08 33 23 13-0863 EA 11' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	50,303.67	1,015.59
08 33 23 13-0864 EA 11' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	51,751.98	1,034.03
08 33 23 13-0865 12' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)		
08 33 23 13-0866 EA 12' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	45,108.34	941.80
08 33 23 13-0867 EA 12' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,035.91	960.24
08 33 23 13-0868 EA 12' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,963.47	978.69
08 33 23 13-0869 EA 12' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	48,386.66	997.14
08 33 23 13-0870 EA 12' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	49,809.84	1,015.59
08 33 23 13-0871 EA 12' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	51,231.22	1,034.03
08 33 23 13-0872 EA 12' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	52,690.33	1,052.48
08 33 23 13-0873 13' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)		
08 33 23 13-0874 EA 13' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,035.91	960.24
08 33 23 13-0875 EA 13' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,963.47	978.69

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 33 23 13-0876	EA	13' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	47,891.04	997.14
08 33 23 13-0877	EA	13' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	49,314.22	1,015.59
08 33 23 13-0878	EA	13' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	50,737.40	1,034.03
08 33 23 13-0879	EA	13' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	52,160.59	1,052.48
08 33 23 13-0880	EA	13' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	53,626.88	1,070.92

08 33 23 13-0881 14' Wide, Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Doors (Rytec® Spiral SST-HZ®) (08 33 23 13-0832)

08 33 23 13-0882	EA	14' x 8', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	46,963.47	978.69
08 33 23 13-0883	EA	14' x 9', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	47,891.04	997.14
08 33 23 13-0884	EA	14' x 10', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	48,818.61	1,015.59
08 33 23 13-0885	EA	14' x 11', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	50,241.78	1,034.03
08 33 23 13-0886	EA	14' x 12', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	51,664.98	1,052.48
08 33 23 13-0887	EA	14' x 13', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	53,088.16	1,070.92
08 33 23 13-0888	EA	14' x 14', Hurricane Zone, Aluminum Rigid Panels, High-Speed Rolling Door (Rytec® Spiral SST-HZ®).....	54,554.44	1,089.37

08 33 23 13-0889 Rytec® Spiral® Door Options (08 33 23 13-0560)

08 33 23 13-0890	EA	Insulated Slats For Rytec® Spiral® High-Speed Rolling Doors.....	540.38	
		Note: Per door price.		
08 33 23 13-0891	EA	Up To 13' Wide Doors, Width Of Door, Ventilated Slats For Rytec® Spiral® High-Speed Rolling Doors.....	365.79	
		Note: Maximum of 4 per door.		
08 33 23 13-0892	EA	>13' Wide Doors, Width Of Door, Ventilated Slats For Rytec® Spiral® High-Speed Rolling Doors.....	540.38	
		Note: Maximum of 4 per door.		
08 33 23 13-0893	EA	Up To 13' Wide Doors, 6" High x Width Of Door, Window Slats For Rytec® Spiral® High-Speed Rolling Doors.....	365.79	
		Note: Maximum of 4 per door.		
08 33 23 13-0894	EA	>13' Wide Doors, 6" High x Width Of Door, Window Slats For Rytec® Spiral® High-Speed Rolling Doors.....	540.38	
		Note: Maximum of 4 per door.		
08 33 23 13-0895	EA	Right Hand Motor Mount For Rytec® Spiral® High-Speed Rolling Doors.....	1,006.36	54.25
08 33 23 13-0896	EA	Up To 13' Wide Doors, Full Hood For Rytec® Spiral® High-Speed Rolling Doors.....	2,910.59	108.50
08 33 23 13-0897	EA	>13' To 16' Wide Doors, Full Hood For Rytec® Spiral® High-Speed Rolling Doors.....	5,246.68	108.50
08 33 23 13-0898	EA	>16' Wide Doors, Full Hood For Rytec® Spiral® High-Speed Rolling Doors.....	5,969.96	108.50
08 33 23 13-0899	EA	Through Wall Brake Release For Rytec® Spiral® High-Speed Rolling Doors.....	628.50	

08 33 23 13-0900 Activation And Control Box Options For High Speed Doors (08 33 23 13)

08 33 23 13-0901	EA	Pull Cord For High-Speed Rolling Doors.....	241.52	54.25
08 33 23 13-0902	EA	Emergency Stop, Pushbutton Control For High-Speed Rolling Doors.....	187.27	27.12
08 33 23 13-0903	EA	NEMA 4 Mushroom Remote Pushbutton Control For High-Speed Rolling Doors.....	237.15	27.12
08 33 23 13-0904	EA	On/Off Selector Switch, Remote Control For High-Speed Rolling Doors.....	162.33	27.12
08 33 23 13-0905	EA	On/Off Key Switch, Remote Control For High-Speed Rolling Doors.....	253.77	27.12
08 33 23 13-0906	EA	Keyed Remote Single Pushbutton Control For High-Speed Rolling Doors.....	420.04	27.12
08 33 23 13-0907	EA	Open/Close/Stop, Remote Pushbutton Control For High-Speed Rolling Doors.....	461.61	27.12
08 33 23 13-0908	EA	Radio Control For High-Speed Rolling Doors.....	703.13	48.83
		Note: Includes one receiver and two transmitters.		
08 33 23 13-0909	EA	Floor Loop For High-Speed Rolling Doors.....	920.14	
		Note: Excludes sealant.		
08 33 23 13-0910	EA	Reflective Type Photo Eye For High-Speed Rolling Doors.....	602.88	48.83
08 33 23 13-0911	EA	Thru-Beam Type Photo Eye For High-Speed Rolling Doors.....	794.58	48.83
08 33 23 13-0912	EA	Motion Detector For High-Speed Rolling Doors.....	696.93	32.55
08 33 23 13-0913	EA	Remote Warning Horn For High-Speed Rolling Doors.....	474.29	54.25
		Note: Includes wall box and mounting hardware.		
08 33 23 13-0914	EA	Remote Strobe Light For High-Speed Rolling Doors.....	648.88	54.25
		Note: Includes wall box and mounting hardware.		
08 33 23 13-0915	EA	Remote Warning Horn And Strobe Light For High-Speed Rolling Doors.....	740.33	54.25
		Note: Includes wall box and mounting hardware.		
08 33 23 13-0916	EA	Red And Green Red Light For High-Speed Rolling Doors.....	923.22	54.25
		Note: Includes mounting hardware.		

08 33 26 Overhead Coiling Grilles (08 33)

Note: Includes curtains, guides, counterbalance mechanisms, hardware, operators, frame, supports and/or trim as required.
Excludes lifting equipment (forklift or scissor lift) where required. See CSI section 01 22 23 00-0873 for forklift.

08 33 26 00-0001 Galvanized Steel Overhead Coiling Grilles (Width x Height) (08 33 26)

08 33 26 00-0002	EA	4' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift.....	2,146.88	234.30
		For Lexan Lattice Pattern, Add	221.70	
		For Aluminum With Clear Or Anodized Bronze Finish, Add	207.40	
		For Staggered Brick Pattern, Add	280.75	
08 33 26 00-0003	EA	6' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift.....	2,410.60	234.30
		For Lexan Lattice Pattern, Add	261.26	
		For Aluminum With Clear Or Anodized Bronze Finish, Add	311.11	
		For Staggered Brick Pattern, Add	380.22	
08 33 26 00-0004	EA	8' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift.....	2,909.42	292.87
		For Lexan Lattice Pattern, Add	310.77	
		For Aluminum With Clear Or Anodized Bronze Finish, Add	414.80	
		For Staggered Brick Pattern, Add	479.69	
08 33 26 00-0005	EA	12' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift.....	3,289.74	292.87
		For Lexan Lattice Pattern, Add	367.82	
		For Aluminum With Clear Or Anodized Bronze Finish, Add	436.11	
		For Staggered Brick Pattern, Add	678.62	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 26 00-0006 EA 16' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	4,575.96 485.25 829.60 957.02	468.59
08 33 26 00-0007 EA 20' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	5,688.03 602.68 1,037.00 1,235.39	585.74
08 33 26 00-0008 EA 24' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	7,145.09 770.77 1,244.40 1,389.66	702.88
08 33 26 00-0009 EA 30' x 8', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	8,711.25 939.68 1,441.30 1,515.61	859.08
08 33 26 00-0010 EA 4' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	2,338.03 250.37 259.25 333.53	234.30
08 33 26 00-0011 EA 6' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	2,687.54 302.80 388.86 473.64	234.30
08 33 26 00-0012 EA 8' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	3,215.82 357.11 518.51 613.74	292.87
08 33 26 00-0013 EA 12' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	3,692.12 428.55 777.75 893.94	292.87
08 33 26 00-0014 EA 16' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	5,105.34 564.66 1,037.00 1,232.63	468.59
08 33 26 00-0015 EA 20' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	6,341.88 700.75 1,296.24 1,571.30	585.74
08 33 26 00-0016 EA 24' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	7,935.08 889.27 1,555.69 1,819.68	702.88
08 33 26 00-0017 EA 30' x 10', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	9,931.09 1,122.66 1,821.48 2,038.45	859.08
08 33 26 00-0018 EA 4' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	2,556.92 283.21 311.11 385.55	234.30
08 33 26 00-0019 EA 6' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	2,620.28 292.71 466.64 565.49	234.30
08 33 26 00-0020 EA 8' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	3,197.16 353.93 622.18 745.42	292.87
08 33 26 00-0021 EA 12' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	4,149.61 496.80 933.26 1,105.29	292.87
08 33 26 00-0022 EA 16' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	5,853.68 676.91 1,244.38 1,536.68	468.59
08 33 26 00-0023 EA 20' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	7,383.58 857.01 1,555.49 1,968.06	585.74
08 33 26 00-0024 EA 24' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	8,947.43 1,041.12 1,866.59 2,080.96	702.88
08 33 26 00-0025 EA 30' x 12', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	11,136.31 1,303.44 2,163.11 2,267.23	859.08
08 33 26 00-0026 EA 4' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	2,948.42 341.93 362.81 713.12	234.30

08 Openings**08 30 Specialty Doors and Frames****08 33 Coiling Doors and Grilles**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 26 00-0027	EA		6' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	3,375.87	234.30
			<i>For Lexan Lattice Pattern, Add</i>	406.05	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	544.33	
			<i>For Staggered Brick Pattern, Add</i>	875.62	
08 33 26 00-0028	EA		8' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	3,974.24	292.87
			<i>For Lexan Lattice Pattern, Add</i>	470.87	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	725.83	
			<i>For Staggered Brick Pattern, Add</i>	1,019.59	
08 33 26 00-0029	EA		12' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	4,872.17	292.87
			<i>For Lexan Lattice Pattern, Add</i>	605.56	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,088.84	
			<i>For Staggered Brick Pattern, Add</i>	1,292.92	
08 33 26 00-0030	EA		16' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	6,600.31	468.59
			<i>For Lexan Lattice Pattern, Add</i>	788.90	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,451.80	
			<i>For Staggered Brick Pattern, Add</i>	1,729.69	
08 33 26 00-0031	EA		20' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	8,151.81	585.74
			<i>For Lexan Lattice Pattern, Add</i>	972.24	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,814.73	
			<i>For Staggered Brick Pattern, Add</i>	2,166.46	
08 33 26 00-0032	EA		24' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	9,745.05	702.88
			<i>For Lexan Lattice Pattern, Add</i>	1,160.76	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	2,177.69	
			<i>For Staggered Brick Pattern, Add</i>	2,457.01	
08 33 26 00-0033	EA		30' x 14', Galvanized Steel Overhead Coiling Grilles, Manual Lift	12,435.72	859.08
			<i>For Lexan Lattice Pattern, Add</i>	1,498.35	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	2,570.78	
			<i>For Staggered Brick Pattern, Add</i>	2,807.25	
08 33 26 00-0034			Coiling Grilles Accessories (08 33 26)		
08 33 26 00-0035	LF		For Overhead Framed Rolling Grille Supports	106.57	
08 33 36			Side Coiling Grilles (08 33)		
08 33 36 00-0001			Galvanized Steel Side Coiling Grilles (Width x Height) (08 33 36)		
08 33 36 00-0002	EA		12' x 8', Galvanized Steel Side Coiling Grilles, Manually Operated	3,894.08	655.13
			<i>For Lexan Lattice Pattern, Add</i>	303.32	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	622.20	
			<i>For Staggered Brick Pattern, Add</i>	678.62	
08 33 36 00-0003	EA		18' x 8', Galvanized Steel Side Coiling Grilles, Manually Operated	5,373.50	841.56
			<i>For Lexan Lattice Pattern, Add</i>	445.35	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	954.39	
			<i>For Staggered Brick Pattern, Add</i>	1,086.93	
08 33 36 00-0004	EA		24' x 8', Galvanized Steel Side Coiling Grilles, Manually Operated	6,931.35	1,061.13
			<i>For Lexan Lattice Pattern, Add</i>	584.94	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,244.40	
			<i>For Staggered Brick Pattern, Add</i>	1,389.66	
08 33 36 00-0005	EA		30' x 8', Galvanized Steel Side Coiling Grilles, Manually Operated	8,222.88	1,171.47
			<i>For Lexan Lattice Pattern, Add</i>	731.17	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,441.30	
			<i>For Staggered Brick Pattern, Add</i>	1,515.61	
08 33 36 00-0006	EA		12' x 10', Galvanized Steel Side Coiling Grilles, Manually Operated	4,659.93	746.95
			<i>For Lexan Lattice Pattern, Add</i>	378.88	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	777.75	
			<i>For Staggered Brick Pattern, Add</i>	893.94	
08 33 36 00-0007	EA		18' x 10', Galvanized Steel Side Coiling Grilles, Manually Operated	6,456.07	959.38
			<i>For Lexan Lattice Pattern, Add</i>	557.02	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,145.43	
			<i>For Staggered Brick Pattern, Add</i>	1,357.43	
08 33 36 00-0008	EA		24' x 10', Galvanized Steel Side Coiling Grilles, Manually Operated	8,242.14	1,209.29
			<i>For Lexan Lattice Pattern, Add</i>	717.88	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,555.69	
			<i>For Staggered Brick Pattern, Add</i>	1,819.68	
08 33 36 00-0009	EA		30' x 10', Galvanized Steel Side Coiling Grilles, Manually Operated	9,922.67	1,335.48
			<i>For Lexan Lattice Pattern, Add</i>	913.70	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,821.48	
			<i>For Staggered Brick Pattern, Add</i>	2,038.45	
08 33 36 00-0010	EA		12' x 12', Galvanized Steel Side Coiling Grilles, Manually Operated	5,436.43	841.56
			<i>For Lexan Lattice Pattern, Add</i>	454.79	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	933.26	
			<i>For Staggered Brick Pattern, Add</i>	1,105.29	
08 33 36 00-0011	EA		18' x 12', Galvanized Steel Side Coiling Grilles, Manually Operated	7,548.22	1,080.88
			<i>For Lexan Lattice Pattern, Add</i>	667.36	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,377.98	
			<i>For Staggered Brick Pattern, Add</i>	1,685.29	
08 33 36 00-0012	EA		24' x 12', Galvanized Steel Side Coiling Grilles, Manually Operated	9,723.30	1,362.81
			<i>For Lexan Lattice Pattern, Add</i>	877.41	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	1,866.59	
			<i>For Staggered Brick Pattern, Add</i>	2,080.96	
08 33 36 00-0013	EA		30' x 12', Galvanized Steel Side Coiling Grilles, Manually Operated	11,609.45	1,503.39
			<i>For Lexan Lattice Pattern, Add</i>	1,096.76	
			<i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i>	2,163.11	
			<i>For Staggered Brick Pattern, Add</i>	2,267.23	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 33 36 00-0014	EA			12' x 14', Galvanized Steel Side Coiling Grilles, Manually Operated <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	6,201.48 531.76 1,088.84 1,292.92	930.48
08 33 36 00-0015	EA			18' x 14', Galvanized Steel Side Coiling Grilles, Manually Operated <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	8,637.02 779.03 1,574.86 1,872.47	1,194.90
08 33 36 00-0016	EA			24' x 14', Galvanized Steel Side Coiling Grilles, Manually Operated <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	11,115.39 1,023.64 2,177.69 2,457.01	1,506.51
08 33 36 00-0017	EA			30' x 14', Galvanized Steel Side Coiling Grilles, Manually Operated <i>For Lexan Lattice Pattern, Add</i> <i>For Aluminum With Clear Or Anodized Bronze Finish, Add</i> <i>For Staggered Brick Pattern, Add</i>	13,277.57 1,278.89 2,570.78 2,807.25	1,663.49

08 33 43 Overhead Coiling Smoke Curtains (08 33)

08 33 43 00-0001				Elevator Smoke Guard (08 33 43)		
08 33 43 00-0002	EA			Elevator Smoke Guard, 55" Width Housing (Smoke Guard 400).....	15,171.87	655.13
08 33 43 00-0003	EA			Elevator Smoke Guard, 64" Width Housing (Smoke Guard 400).....	15,734.90	655.13
08 33 43 00-0004	EA			Elevator Smoke Guard, 73" Width Housing (Smoke Guard 400).....	16,297.92	655.13

08 34 Special Function Doors (08 30)

08 34 53 Security Doors and Frames (08 34)

08 34 53 00-0001				Metal Security Doors, Bullet Resistant (08 34 53) Note: Includes door, frame, hardware hinges, lockset and cylinder, all UL 753 Listed.		
08 34 53 00-0002	SF			Metal Security Door	78.58	9.15
08 34 53 00-0003	EA			Up To 3' x 7' (.38 caliber) Medium-Small Arms Metal Security Door	3,220.03	456.87
08 34 53 00-0004	EA			Up To 3' x 7' (.44 caliber) Super-Small Arms Metal Security Door	3,819.48	484.99

08 34 53 00-0005 Metal Security Doors (08 34 53)

				Note: Includes standard pitcher handle latch, pneumatic closure, hinges and baked enamel finish.		
08 34 53 00-0006	EA			Up To 3' x 7' Steel Narrowline Security Door (Kane Screens S-501-28-O)	1,143.20	83.67
				Note: Top and bottom section are #12 mesh 0.028" stainless steel wire cloth with a bottom kick plate.		
08 34 53 00-0007	EA			Up To 3' x 7' Steel Narrowline Security Door (Kane Screens S-503-28-O)	1,143.20	83.67
				Note: Top section is #12 mesh 0.028" stainless steel wire cloth and bottom section is a double kick panel.		
08 34 53 00-0008	EA			Up To 3' x 7' Steel Narrowline Security Door (Kane Screens S-504-28-O)	1,631.13	83.67
				Note: Top section includes 1/8" tempered sash unit and #12 mesh 0.028" stainless steel wire cloth. Bottom section is a double kick panel.		

08 34 73 Sound Control Door Assemblies (08 34)

08 34 73 13 Metal Sound Control Door Assemblies (08 34 73)

08 34 73 13-0001				Steel Acoustical Door Assembly (08 34 73 13) Note: Includes seal.		
08 34 73 13-0002				Steel Acoustical Doors (08 34 73 13-0001) Note: Includes hardware: cam lift hinges and seals. Excludes frame, hardware: locksets, closer, electromagnetic release, etc.		
08 34 73 13-0003	EA			3' x 7', 16 Gauge, STC 50, Steel Acoustical Door (Unrated)	4,600.85	195.30
				Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
				<i>For Accent Window Vision Lite, Add</i>	1,685.16	
				<i>For Half Window Vision Lite, Add</i>	1,744.23	
				<i>For Full Window Vision Lite, Add</i>	1,803.30	
				<i>For 8' Height, Add</i>	572.13	
				<i>For 45 Minutes Fire Rated, Add</i>	240.90	
				<i>For 60 Minutes Fire Rated, Add</i>	361.34	
				<i>For 90 Minutes Fire Rated, Add</i>	602.24	
				<i>For 120 Minutes Fire Rated, Add</i>	843.14	
				<i>For 45 STC Rating, Deduct</i>	-1,007.75	
				<i>For 48 STC Rating, Deduct</i>	-722.69	
				<i>For 52 STC Rating, Add</i>	562.09	
				<i>For 55 STC Rating, Add</i>	1,525.68	
08 34 73 13-0004	EA			3'-6" x 7', 16 Gauge, STC 50, Steel Acoustical Door (Unrated).....	4,867.78	203.44
				Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
				<i>For Accent Window Vision Lite, Add</i>	1,685.16	
				<i>For Half Window Vision Lite, Add</i>	1,744.23	
				<i>For Full Window Vision Lite, Add</i>	1,803.30	
				<i>For 8' Height, Add</i>	606.69	
				<i>For 45 Minutes Fire Rated, Add</i>	255.45	
				<i>For 60 Minutes Fire Rated, Add</i>	383.17	
				<i>For 90 Minutes Fire Rated, Add</i>	638.62	
				<i>For 120 Minutes Fire Rated, Add</i>	894.07	
				<i>For 45 STC Rating, Deduct</i>	-1,068.62	
				<i>For 48 STC Rating, Deduct</i>	-766.34	
				<i>For 52 STC Rating, Add</i>	596.04	
				<i>For 55 STC Rating, Add</i>	1,617.83	

08 Openings**08 30 Specialty Doors and Frames****08 34 Special Function Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 34 73 13-0005	EA	4' x 7', 16 Gauge, STC 50, Steel Acoustical Door (Unrated).....	5,159.12	219.72
		Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
		For Accent Window Vision Lite, Add	1,685.16	
		For Half Window Vision Lite, Add	1,744.23	
		For Full Window Vision Lite, Add	1,803.30	
		For 8' Height, Add	641.25	
		For 45 Minutes Fire Rated, Add	270.00	
		For 60 Minutes Fire Rated, Add	405.00	
		For 90 Minutes Fire Rated, Add	675.00	
		For 120 Minutes Fire Rated, Add	944.99	
		For 45 STC Rating, Deduct	-1,129.49	
		For 48 STC Rating, Deduct	-809.99	
		For 52 STC Rating, Add	630.00	
		For 55 STC Rating, Add	1,709.99	
08 34 73 13-0006	PR	Pair 3' x 7', 16 Gauge, STC 50, Steel Acoustical Doors (Unrated).....	9,143.12	371.08
		Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
		For Pair Accent Window Vision Lites, Add	3,370.31	
		For Pair Half Window Vision Lites, Add	3,488.46	
		For Pair Full Window Vision Lites, Add	3,606.61	
		For 8' Height, Add	1,144.26	
		For 45 Minutes Fire Rated, Add	481.79	
		For 60 Minutes Fire Rated, Add	722.69	
		For 90 Minutes Fire Rated, Add	1,204.48	
		For 120 Minutes Fire Rated, Add	1,686.27	
		For 45 STC Rating, Deduct	-2,015.50	
		For 48 STC Rating, Deduct	-1,445.38	
		For 52 STC Rating, Add	1,124.18	
		For 55 STC Rating, Add	3,051.35	
08 34 73 13-0007	PR	Pair 3'-6" x 7', 16 Gauge, STC 50, Steel Acoustical Door (Unrated).....	9,637.91	374.33
		Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
		For Pair Accent Window Vision Lites, Add	3,370.31	
		For Pair Half Window Vision Lites, Add	3,488.46	
		For Pair Full Window Vision Lites, Add	3,606.61	
		For 8' Height, Add	1,213.37	
		For 45 Minutes Fire Rated, Add	510.89	
		For 60 Minutes Fire Rated, Add	766.34	
		For 90 Minutes Fire Rated, Add	1,277.24	
		For 120 Minutes Fire Rated, Add	1,788.13	
		For 45 STC Rating, Deduct	-2,137.24	
		For 48 STC Rating, Deduct	-1,532.68	
		For 52 STC Rating, Add	1,192.09	
		For 55 STC Rating, Add	3,235.67	
08 34 73 13-0008	EA	3' x 7', 14 Gauge, STC 50, Steel Acoustical Door (Unrated).....	5,172.17	122.61
		Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
		For Accent Window Vision Lite, Add	1,685.16	
		For Half Window Vision Lite, Add	1,744.23	
		For Full Window Vision Lite, Add	1,803.30	
		For 8' Height, Add	649.37	
		For 45 Minutes Fire Rated, Add	273.42	
		For 60 Minutes Fire Rated, Add	410.13	
		For 90 Minutes Fire Rated, Add	683.54	
		For 120 Minutes Fire Rated, Add	956.96	
		For 45 STC Rating, Deduct	-1,143.80	
		For 48 STC Rating, Deduct	-820.25	
		For 52 STC Rating, Add	637.97	
		For 55 STC Rating, Add	1,731.64	
08 34 73 13-0009	EA	3'-6" x 7', 14 Gauge, STC 50, Steel Acoustical Door (Unrated).....	5,472.38	213.75
		Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
		For Accent Window Vision Lite, Add	1,685.16	
		For Half Window Vision Lite, Add	1,744.23	
		For Full Window Vision Lite, Add	1,803.30	
		For 8' Height, Add	688.59	
		For 45 Minutes Fire Rated, Add	289.93	
		For 60 Minutes Fire Rated, Add	434.90	
		For 90 Minutes Fire Rated, Add	724.83	
		For 120 Minutes Fire Rated, Add	1,014.76	
		For 45 STC Rating, Deduct	-1,212.88	
		For 48 STC Rating, Deduct	-869.80	
		For 52 STC Rating, Add	676.51	
		For 55 STC Rating, Add	1,836.24	
08 34 73 13-0010	EA	4' x 7', 14 Gauge, STC 50, Steel Acoustical Door (Unrated).....	5,799.71	231.11
		Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
		For Accent Window Vision Lite, Add	1,685.16	
		For Half Window Vision Lite, Add	1,744.23	
		For Full Window Vision Lite, Add	1,803.30	
		For 8' Height, Add	727.81	
		For 45 Minutes Fire Rated, Add	306.45	
		For 60 Minutes Fire Rated, Add	459.67	
		For 90 Minutes Fire Rated, Add	766.12	
		For 120 Minutes Fire Rated, Add	1,072.57	
		For 45 STC Rating, Deduct	-1,281.97	
		For 48 STC Rating, Deduct	-919.34	
		For 52 STC Rating, Add	715.04	
		For 55 STC Rating, Add	1,940.83	



Openings	08	08
Specialty Doors and Frames	08 30	
Special Function Doors	08 34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 34 73 13-0011 PR Pair 3' x 7', 14 Gauge, STC 50, Steel Acoustical Doors (Unrated) 9,740.47	9,740.47	389.52
Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
For Pair Accent Window Vision Lites, Add	3,370.31	
For Pair Half Window Vision Lites, Add	3,488.46	
For Pair Full Window Vision Lites, Add	3,606.61	
For 8' Height, Add	1,221.50	
For 45 Minutes Fire Rated, Add	514.31	
For 60 Minutes Fire Rated, Add	771.47	
For 90 Minutes Fire Rated, Add	1,285.79	
For 120 Minutes Fire Rated, Add	1,800.10	
For 45 STC Rating, Deduct	-2,151.55	
For 48 STC Rating, Deduct	-1,542.94	
For 52 STC Rating, Add	1,200.07	
For 55 STC Rating, Add	3,257.32	
08 34 73 13-0012 PR Pair 3'-6" x 7', 14 Gauge, STC 50, Steel Acoustical Door (Unrated)..... 10,269.10	10,269.10	392.78
Note: Excludes steel acoustical doorframe See CSI section 08 34 73 13-0013 for steel acoustical door frames.		
For Pair Accent Window Vision Lites, Add	3,370.31	
For Pair Half Window Vision Lites, Add	3,488.46	
For Pair Full Window Vision Lites, Add	3,606.61	
For 8' Height, Add	1,295.28	
For 45 Minutes Fire Rated, Add	545.38	
For 60 Minutes Fire Rated, Add	818.07	
For 90 Minutes Fire Rated, Add	1,363.45	
For 120 Minutes Fire Rated, Add	1,908.83	
For 45 STC Rating, Deduct	-2,281.51	
For 48 STC Rating, Deduct	-1,636.14	
For 52 STC Rating, Add	1,272.55	
For 55 STC Rating, Add	3,454.07	
08 34 73 13-0013 Steel Acoustical Door Frames (08 34 73 13-0001)		
Note: Includes threshold and rating up to STC 55.		
08 34 73 13-0014 EA 3' x 7', 4-1/2" To 6-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame..... 3,265.82	3,265.82	108.50
For 8' Height, Add	325.66	
For 45 Minutes Fire Rated, Add	198.23	
For 60 Minutes Fire Rated, Add	339.82	
For 90 Minutes Fire Rated, Add	481.41	
For 120 Minutes Fire Rated, Add	679.63	
08 34 73 13-0015 EA 3' x 7', 6-1/2" To 8-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame..... 3,346.03	3,346.03	108.50
For 8' Height, Add	334.88	
For 45 Minutes Fire Rated, Add	203.84	
For 60 Minutes Fire Rated, Add	349.44	
For 90 Minutes Fire Rated, Add	495.04	
For 120 Minutes Fire Rated, Add	698.88	
08 34 73 13-0016 EA 3' x 7', 8-1/2" To 10-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame..... 3,426.25	3,426.25	108.50
For 8' Height, Add	344.11	
For 45 Minutes Fire Rated, Add	209.46	
For 60 Minutes Fire Rated, Add	359.07	
For 90 Minutes Fire Rated, Add	508.68	
For 120 Minutes Fire Rated, Add	718.14	
08 34 73 13-0017 EA 3' x 7', 10-1/2" To 12-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame..... 3,506.47	3,506.47	108.50
For 8' Height, Add	353.33	
For 45 Minutes Fire Rated, Add	215.07	
For 60 Minutes Fire Rated, Add	368.70	
For 90 Minutes Fire Rated, Add	522.32	
For 120 Minutes Fire Rated, Add	737.39	
08 34 73 13-0018 EA 3'-6" x 7', 4-1/2" To 6-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame 3,727.09	3,727.09	119.36
For 8' Height, Add	373.71	
For 45 Minutes Fire Rated, Add	227.48	
For 60 Minutes Fire Rated, Add	389.96	
For 90 Minutes Fire Rated, Add	552.45	
For 120 Minutes Fire Rated, Add	779.92	
08 34 73 13-0019 EA 3'-6" x 7', 6-1/2" To 8-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame 3,816.63	3,816.63	119.36
For 8' Height, Add	384.01	
For 45 Minutes Fire Rated, Add	233.75	
For 60 Minutes Fire Rated, Add	400.71	
For 90 Minutes Fire Rated, Add	567.67	
For 120 Minutes Fire Rated, Add	801.41	
08 34 73 13-0020 EA 3'-6" x 7', 8-1/2" To 10-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame..... 3,896.85	3,896.85	119.36
For 8' Height, Add	393.24	
For 45 Minutes Fire Rated, Add	239.36	
For 60 Minutes Fire Rated, Add	410.33	
For 90 Minutes Fire Rated, Add	581.30	
For 120 Minutes Fire Rated, Add	820.67	
08 34 73 13-0021 EA 3'-6" x 7', 10-1/2" To 12-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame 3,996.34	3,996.34	119.36
For 8' Height, Add	404.68	
For 45 Minutes Fire Rated, Add	246.33	
For 60 Minutes Fire Rated, Add	422.27	
For 90 Minutes Fire Rated, Add	598.22	
For 120 Minutes Fire Rated, Add	844.54	
08 34 73 13-0022 EA 4' x 7', 4-1/2" To 6-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame..... 4,187.19	4,187.19	124.77
For 8' Height, Add	424.13	
For 45 Minutes Fire Rated, Add	258.16	
For 60 Minutes Fire Rated, Add	442.57	
For 90 Minutes Fire Rated, Add	626.97	
For 120 Minutes Fire Rated, Add	885.14	

08 Openings**08 30 Specialty Doors and Frames****08 34 Special Function Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 34 73 13-0023	EA 4' x 7', 6-1/2" To 8-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame	4,267.40	124.77
	For 8' Height, Add	433.35	
	For 45 Minutes Fire Rated, Add	263.78	
	For 60 Minutes Fire Rated, Add	452.19	
	For 90 Minutes Fire Rated, Add	640.61	
	For 120 Minutes Fire Rated, Add	904.39	
08 34 73 13-0024	EA 4' x 7', 8-1/2" To 10-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame	4,347.62	124.77
	For 8' Height, Add	442.58	
	For 45 Minutes Fire Rated, Add	269.40	
	For 60 Minutes Fire Rated, Add	461.82	
	For 90 Minutes Fire Rated, Add	654.25	
	For 120 Minutes Fire Rated, Add	923.64	
08 34 73 13-0025	EA 4' x 7', 10-1/2" To 12-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame	4,437.16	124.77
	For 8' Height, Add	452.87	
	For 45 Minutes Fire Rated, Add	275.66	
	For 60 Minutes Fire Rated, Add	472.56	
	For 90 Minutes Fire Rated, Add	669.47	
	For 120 Minutes Fire Rated, Add	945.13	
08 34 73 13-0026	EA 6' x 7', 4-1/2" To 6-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,276.24	141.05
	For 8' Height, Add	771.88	
	For 45 Minutes Fire Rated, Add	469.84	
	For 60 Minutes Fire Rated, Add	805.44	
	For 90 Minutes Fire Rated, Add	1,141.04	
	For 120 Minutes Fire Rated, Add	1,610.88	
08 34 73 13-0027	EA 6' x 7', 6-1/2" To 8-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,352.73	141.05
	For 8' Height, Add	780.68	
	For 45 Minutes Fire Rated, Add	475.20	
	For 60 Minutes Fire Rated, Add	814.62	
	For 90 Minutes Fire Rated, Add	1,154.05	
	For 120 Minutes Fire Rated, Add	1,629.24	
08 34 73 13-0028	EA 6' x 7', 8-1/2" To 10-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,434.81	141.05
	For 8' Height, Add	790.12	
	For 45 Minutes Fire Rated, Add	480.94	
	For 60 Minutes Fire Rated, Add	824.47	
	For 90 Minutes Fire Rated, Add	1,168.00	
	For 120 Minutes Fire Rated, Add	1,648.94	
08 34 73 13-0029	EA 6' x 7', 10-1/2" To 12-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,518.75	141.05
	For 8' Height, Add	799.77	
	For 45 Minutes Fire Rated, Add	486.82	
	For 60 Minutes Fire Rated, Add	834.54	
	For 90 Minutes Fire Rated, Add	1,182.27	
	For 120 Minutes Fire Rated, Add	1,669.09	
08 34 73 13-0030	EA 7' x 7', 4-1/2" To 6-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,801.33	146.48
	For 8' Height, Add	829.77	
	For 45 Minutes Fire Rated, Add	505.08	
	For 60 Minutes Fire Rated, Add	865.85	
	For 90 Minutes Fire Rated, Add	1,226.62	
	For 120 Minutes Fire Rated, Add	1,731.70	
08 34 73 13-0031	EA 7' x 7', 6-1/2" To 8-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,883.55	146.48
	For 8' Height, Add	839.23	
	For 45 Minutes Fire Rated, Add	510.83	
	For 60 Minutes Fire Rated, Add	875.72	
	For 90 Minutes Fire Rated, Add	1,240.60	
	For 120 Minutes Fire Rated, Add	1,751.43	
08 34 73 13-0032	EA 7' x 7', 8-1/2" To 10-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	7,971.79	146.48
	For 8' Height, Add	849.38	
	For 45 Minutes Fire Rated, Add	517.01	
	For 60 Minutes Fire Rated, Add	886.31	
	For 90 Minutes Fire Rated, Add	1,255.60	
	For 120 Minutes Fire Rated, Add	1,772.61	
08 34 73 13-0033	EA 7' x 7', 10-1/2" To 12-1/2" Wall Thickness, 16 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,062.03	146.48
	For 8' Height, Add	859.75	
	For 45 Minutes Fire Rated, Add	523.33	
	For 60 Minutes Fire Rated, Add	897.13	
	For 90 Minutes Fire Rated, Add	1,270.94	
	For 120 Minutes Fire Rated, Add	1,794.27	
08 34 73 13-0034	EA 3' x 7', 4-1/2" To 6-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	3,580.46	108.50
	For 8' Height, Add	361.84	
	For 45 Minutes Fire Rated, Add	220.25	
	For 60 Minutes Fire Rated, Add	377.57	
	For 90 Minutes Fire Rated, Add	534.90	
	For 120 Minutes Fire Rated, Add	755.15	
08 34 73 13-0035	EA 3' x 7', 6-1/2" To 8-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	3,669.59	108.50
	For 8' Height, Add	372.09	
	For 45 Minutes Fire Rated, Add	226.49	
	For 60 Minutes Fire Rated, Add	388.27	
	For 90 Minutes Fire Rated, Add	550.05	
	For 120 Minutes Fire Rated, Add	776.54	



Openings	08	08
Specialty Doors and Frames	08 30	
Special Function Doors	08 34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 34 73 13-0036 EA 3' x 7', 8-1/2" To 10-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	3,758.72	108.50
For 8' Height, Add	382.34	
For 45 Minutes Fire Rated, Add	232.73	
For 60 Minutes Fire Rated, Add	398.97	
For 90 Minutes Fire Rated, Add	565.20	
For 120 Minutes Fire Rated, Add	797.93	
08 34 73 13-0037 EA 3' x 7', 10-1/2" To 12-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	3,847.85	108.50
For 8' Height, Add	392.59	
For 45 Minutes Fire Rated, Add	238.97	
For 60 Minutes Fire Rated, Add	409.66	
For 90 Minutes Fire Rated, Add	580.35	
For 120 Minutes Fire Rated, Add	819.32	
08 34 73 13-0038 EA 3'-6" x 7', 4-1/2" To 6-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,088.16	119.36
For 8' Height, Add	415.24	
For 45 Minutes Fire Rated, Add	252.75	
For 60 Minutes Fire Rated, Add	433.29	
For 90 Minutes Fire Rated, Add	613.83	
For 120 Minutes Fire Rated, Add	866.58	
08 34 73 13-0039 EA 3'-6" x 7', 6-1/2" To 8-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,187.66	119.36
For 8' Height, Add	426.68	
For 45 Minutes Fire Rated, Add	259.72	
For 60 Minutes Fire Rated, Add	445.23	
For 90 Minutes Fire Rated, Add	630.74	
For 120 Minutes Fire Rated, Add	890.46	
08 34 73 13-0040 EA 3'-6" x 7', 8-1/2" To 10-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame.....	4,276.78	119.36
For 8' Height, Add	436.93	
For 45 Minutes Fire Rated, Add	265.96	
For 60 Minutes Fire Rated, Add	455.92	
For 90 Minutes Fire Rated, Add	645.89	
For 120 Minutes Fire Rated, Add	911.85	
08 34 73 13-0041 EA 3'-6" x 7', 10-1/2" To 12-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,387.33	119.36
For 8' Height, Add	449.64	
For 45 Minutes Fire Rated, Add	273.69	
For 60 Minutes Fire Rated, Add	469.19	
For 90 Minutes Fire Rated, Add	664.69	
For 120 Minutes Fire Rated, Add	938.38	
08 34 73 13-0042 EA 4' x 7', 4-1/2" To 6-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,596.97	124.77
For 8' Height, Add	471.25	
For 45 Minutes Fire Rated, Add	286.85	
For 60 Minutes Fire Rated, Add	491.74	
For 90 Minutes Fire Rated, Add	696.63	
For 120 Minutes Fire Rated, Add	983.48	
08 34 73 13-0043 EA 4' x 7', 6-1/2" To 8-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,686.10	124.77
For 8' Height, Add	481.50	
For 45 Minutes Fire Rated, Add	293.09	
For 60 Minutes Fire Rated, Add	502.44	
For 90 Minutes Fire Rated, Add	711.79	
For 120 Minutes Fire Rated, Add	1,004.88	
08 34 73 13-0044 EA 4' x 7', 8-1/2" To 10-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,775.23	124.77
For 8' Height, Add	491.75	
For 45 Minutes Fire Rated, Add	299.33	
For 60 Minutes Fire Rated, Add	513.13	
For 90 Minutes Fire Rated, Add	726.94	
For 120 Minutes Fire Rated, Add	1,026.27	
08 34 73 13-0045 EA 4' x 7', 10-1/2" To 12-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame	4,874.72	124.77
For 8' Height, Add	503.19	
For 45 Minutes Fire Rated, Add	306.29	
For 60 Minutes Fire Rated, Add	525.07	
For 90 Minutes Fire Rated, Add	743.85	
For 120 Minutes Fire Rated, Add	1,050.14	
08 34 73 13-0046 EA 6' x 7', 4-1/2" To 6-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,022.02	141.05
For 8' Height, Add	857.65	
For 45 Minutes Fire Rated, Add	522.05	
For 60 Minutes Fire Rated, Add	894.94	
For 90 Minutes Fire Rated, Add	1,267.83	
For 120 Minutes Fire Rated, Add	1,789.87	
08 34 73 13-0047 EA 6' x 7', 6-1/2" To 8-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,107.00	141.05
For 8' Height, Add	867.42	
For 45 Minutes Fire Rated, Add	527.99	
For 60 Minutes Fire Rated, Add	905.13	
For 90 Minutes Fire Rated, Add	1,282.27	
For 120 Minutes Fire Rated, Add	1,810.27	
08 34 73 13-0048 EA 6' x 7', 8-1/2" To 10-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,198.21	141.05
For 8' Height, Add	877.91	
For 45 Minutes Fire Rated, Add	534.38	
For 60 Minutes Fire Rated, Add	916.08	
For 90 Minutes Fire Rated, Add	1,297.78	
For 120 Minutes Fire Rated, Add	1,832.16	

08 Openings**08 30 Specialty Doors and Frames****08 34 Special Function Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 34 73 13-0049	EA	6' x 7', 10-1/2" To 12-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,291.48	141.05
		<i>For 8' Height, Add</i>	888.63	
		<i>For 45 Minutes Fire Rated, Add</i>	540.91	
		<i>For 60 Minutes Fire Rated, Add</i>	927.27	
		<i>For 90 Minutes Fire Rated, Add</i>	1,313.63	
		<i>For 120 Minutes Fire Rated, Add</i>	1,854.54	
08 34 73 13-0050	EA	7' x 7', 4-1/2" To 6-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,603.05	146.48
		<i>For 8' Height, Add</i>	921.97	
		<i>For 45 Minutes Fire Rated, Add</i>	561.20	
		<i>For 60 Minutes Fire Rated, Add</i>	962.06	
		<i>For 90 Minutes Fire Rated, Add</i>	1,362.91	
		<i>For 120 Minutes Fire Rated, Add</i>	1,924.11	
08 34 73 13-0051	EA	7' x 7', 6-1/2" To 8-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,694.40	146.48
		<i>For 8' Height, Add</i>	932.48	
		<i>For 45 Minutes Fire Rated, Add</i>	567.59	
		<i>For 60 Minutes Fire Rated, Add</i>	973.02	
		<i>For 90 Minutes Fire Rated, Add</i>	1,378.44	
		<i>For 120 Minutes Fire Rated, Add</i>	1,946.04	
08 34 73 13-0052	EA	7' x 7', 8-1/2" To 10-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,792.45	146.48
		<i>For 8' Height, Add</i>	943.75	
		<i>For 45 Minutes Fire Rated, Add</i>	574.46	
		<i>For 60 Minutes Fire Rated, Add</i>	984.78	
		<i>For 90 Minutes Fire Rated, Add</i>	1,395.11	
		<i>For 120 Minutes Fire Rated, Add</i>	1,969.57	
08 34 73 13-0053	EA	7' x 7', 10-1/2" To 12-1/2" Wall Thickness, 14 Gauge, Split-Frame, Steel Acoustical Door Frame With Removable Center Mullion	8,892.71	146.48
		<i>For 8' Height, Add</i>	955.28	
		<i>For 45 Minutes Fire Rated, Add</i>	581.48	
		<i>For 60 Minutes Fire Rated, Add</i>	996.82	
		<i>For 90 Minutes Fire Rated, Add</i>	1,412.16	
		<i>For 120 Minutes Fire Rated, Add</i>	1,993.63	

08 34 73 16 Wood Sound Control Door Assemblies (08 34 73)**08 34 73 16-0001 Composite With Wood Veneer Cladding (08 34 73 16)**

Note: Includes the door, frame, hinges, caulking and seals.

08 34 73 16-0002	EA	3' x 7' x 1-3/4" Thick, STC 27, Wood Acoustical Door System (Unrated)	2,507.96	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0003	EA	3' x 7' x 1-3/4" Thick, STC 29, Wood Acoustical Door System (Unrated)	2,704.55	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0004	EA	3' x 7' x 1-3/4" Thick, STC 30, Wood Acoustical Door System (Unrated)	2,813.76	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0005	EA	3' x 7' x 1-3/4" Thick, STC 31, Wood Acoustical Door System (Unrated)	2,922.98	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0006	EA	3' x 7' x 1-3/4" Thick, STC 36, Wood Acoustical Door System (Unrated)	3,403.52	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0007	EA	3' x 7' x 1-3/4" Thick, STC 40, Wood Acoustical Door System (Unrated)	4,451.99	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0008	EA	3' x 7' x 1-3/4" Thick, STC 42, Wood Acoustical Door System (Unrated)	4,655.13	303.80
		Note: Includes the prefinished door, frame, hinges and seals.		
		<i>For 20 Minutes Fire Rated, Add</i>	50.00	
		<i>For 45 Minutes Fire Rated, Add</i>	80.00	
		<i>For 60 Minutes Fire Rated, Add</i>	115.00	
		<i>For 90 Minutes Fire Rated, Add</i>	145.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 34 73 16-0009 EA 3' x 7' x 1-3/4" Thick, STC 46, Wood Acoustical Door System (Unrated) Note: Includes the prefinished door, frame, hinges and seals.	5,467.69	303.80
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0010 EA 3' x 7' x 1-3/4" Thick, STC 49, Wood Acoustical Door System (Unrated) Note: Includes the prefinished door, frame, hinges and seals.	6,073.83	303.80
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0011 EA 3'-6" x 7' x 1-3/4" Thick, STC 27, Wood Acoustical Door System (Unrated).....	2,576.00	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0012 EA 3'-6" x 7' x 1-3/4" Thick, STC 29, Wood Acoustical Door System (Unrated).....	2,802.08	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0013 EA 3'-6" x 7' x 1-3/4" Thick, STC 30, Wood Acoustical Door System (Unrated).....	2,927.67	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0014 EA 3'-6" x 7' x 1-3/4" Thick, STC 31, Wood Acoustical Door System (Unrated).....	3,053.27	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0015 EA 3'-6" x 7' x 1-3/4" Thick, STC 36, Wood Acoustical Door System (Unrated).....	3,605.90	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0016 EA 3'-6" x 7' x 1-3/4" Thick, STC 40, Wood Acoustical Door System (Unrated).....	4,811.63	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0017 EA 3'-6" x 7' x 1-3/4" Thick, STC 42, Wood Acoustical Door System (Unrated).....	5,045.24	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0018 EA 3'-6" x 7' x 1-3/4" Thick, STC 46, Wood Acoustical Door System (Unrated).....	5,979.69	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0019 EA 3'-6" x 7' x 1-3/4" Thick, STC 49, Wood Acoustical Door System (Unrated).....	6,676.75	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0020 EA 4' x 7' x 1-3/4" Thick, STC 27, Wood Acoustical Door System (Unrated).....	2,766.04	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0021 EA 4' x 7' x 1-3/4" Thick, STC 29, Wood Acoustical Door System (Unrated).....	3,011.77	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0022 EA 4' x 7' x 1-3/4" Thick, STC 30, Wood Acoustical Door System (Unrated).....	3,148.29	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0023 EA 4' x 7' x 1-3/4" Thick, STC 31, Wood Acoustical Door System (Unrated).....	3,284.81	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0024 EA 4' x 7' x 1-3/4" Thick, STC 36, Wood Acoustical Door System (Unrated).....	3,885.49	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0025 EA 4' x 7' x 1-3/4" Thick, STC 40, Wood Acoustical Door System (Unrated).....	5,196.07	195.30
<i>For 20 Minutes Fire Rated, Add</i>	50.00	
<i>For 45 Minutes Fire Rated, Add</i>	80.00	
<i>For 60 Minutes Fire Rated, Add</i>	115.00	
<i>For 90 Minutes Fire Rated, Add</i>	145.00	

08	08	Openings
	08 30	Specialty Doors and Frames
	08 34	Special Function Doors



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 34 73 16-0026	EA		4' x 7' x 1-3/4" Thick, STC 42, Wood Acoustical Door System (Unrated)	5,449.99	195.30
			<i>For 20 Minutes Fire Rated, Add</i>	50.00	
			<i>For 45 Minutes Fire Rated, Add</i>	80.00	
			<i>For 60 Minutes Fire Rated, Add</i>	115.00	
			<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0027	EA		4' x 7' x 1-3/4" Thick, STC 46, Wood Acoustical Door System (Unrated)	6,465.69	195.30
			<i>For 20 Minutes Fire Rated, Add</i>	50.00	
			<i>For 45 Minutes Fire Rated, Add</i>	80.00	
			<i>For 60 Minutes Fire Rated, Add</i>	115.00	
			<i>For 90 Minutes Fire Rated, Add</i>	145.00	
08 34 73 16-0028	EA		4' x 7' x 1-3/4" Thick, STC 49, Wood Acoustical Door System (Unrated)	7,223.37	195.30
			<i>For 20 Minutes Fire Rated, Add</i>	50.00	
			<i>For 45 Minutes Fire Rated, Add</i>	80.00	
			<i>For 60 Minutes Fire Rated, Add</i>	115.00	
			<i>For 90 Minutes Fire Rated, Add</i>	145.00	

08 35 Folding Doors and Grilles (08 30)

08 35 13 Folding Doors (08 35)

08 35 13 13 Accordion Folding Doors (08 35 13)

08 35 13 13-0001 Accordion Folding Doors (08 35 13 13)

Note: Includes track, fittings and hardware, complete.

08 35 13 13-0002	SF		Fire-Resistant, Vinyl Fabric Installed On Welded Steel Frames, Accordion Folding Door	94.75	10.85
08 35 13 13-0003	SF		1/32" Thick, Single Ply Vinyl, Accordion Folding Door	18.40	10.85
08 35 13 13-0004	SF		0.04" Thick, Fire-Resistant, Rigid Vinyl Panels, Accordion Folding Door	42.31	10.85
08 35 13 13-0005	SF		3/8" Thick, Fire-Resistant, Wood Veneer, Vinyl Or High Pressure Laminate, High Density Engineered Wood Core Panel, Accordion Folding Door	60.35	10.85

08 36 Panel Doors (08 30)

08 36 13 Sectional Doors (08 36)

Note: Excludes lifting equipment (forklift or scissor lift) where required. See CSI section 01 22 23 00-0873 for forklift.

08 36 13 00-0001 Sectional Wood Overhead Doors (Width x Height) (08 36 13)

08 36 13 00-0002 Wood Sectional Overhead Doors (08 36 13 00-0001)

Note: Includes 1-3/4" door, tracks and hardware. Excludes frame.

08 36 13 00-0003	EA		8' x 8', Wood Sectional Door, Manual Lift	2,721.21	434.01
08 36 13 00-0004	EA		10' x 10', Wood Sectional Door, Manual Lift	3,375.01	481.75
08 36 13 00-0005	EA		12' x 12', Wood Sectional Door, Manual Lift	4,300.53	577.23
08 36 13 00-0006	EA		14' x 14', Wood Sectional Door, Manual Lift	6,172.75	668.38
08 36 13 00-0007	EA		12' x 16', Wood Sectional Door, Manual Lift	6,657.28	868.02
08 36 13 00-0008	EA		20' x 8', Wood Sectional Door, Manual Lift	6,380.71	1,085.03
08 36 13 00-0009	EA		20' x 16', Wood Sectional Door, Manual Lift	11,565.79	1,446.34

08 36 13 00-0010 Residential Grade, Wood Sectional Overhead Doors (08 36 13 00-0001)

Note: Includes 1-3/4" door, tracks and hardware. Excludes frame.

08 36 13 00-0011	EA		9' x 7', Residential Grade, Wood Sectional Door, Manual Lift	1,403.66	217.01
			<i>For Hardboard Face, Add</i>	115.00	
			<i>For Insulation, Add</i>	117.00	
			<i>For Motor Operator With Remote Controls, Add</i>	446.44	
			<i>For Each Glass Vision Panel In Door, Add</i>	50.00	
08 36 13 00-0012	EA		16' x 7', Residential Grade, Wood Sectional Door, Manual Lift	2,199.18	217.01
			<i>For Hardboard Face, Add</i>	115.00	
			<i>For Insulation, Add</i>	117.00	
			<i>For Motor Operator With Remote Controls, Add</i>	478.70	
			<i>For Each Glass Vision Panel In Door, Add</i>	50.00	

08 36 13 00-0013 Sectional Metal Overhead Doors (Width x Height) (08 36 13)

Note: Includes tracks and all hardware.

08 36 13 00-0014 Galvanized Steel Sectional Overhead Doors (08 36 13 00-0013)

08 36 13 00-0015 Non-Insulated, 24 Gauge Galvanized Steel Sectional Doors (08 36 13 00-0014)

Note: Includes 2" door, tracks and hardware. Excludes frame.

08 36 13 00-0016	EA		8' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift	1,812.85	379.76
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	152.73	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	263.33	
			<i>For Aluminum, Mill Finish, Add</i>	120.08	
			<i>For Aluminum, Anodized Finish, Add</i>	336.01	
08 36 13 00-0017	EA		8' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift	2,139.63	434.01
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	184.38	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	317.90	
			<i>For Aluminum, Mill Finish, Add</i>	144.96	
			<i>For Aluminum, Anodized Finish, Add</i>	405.64	
08 36 13 00-0018	EA		8' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift	2,639.76	542.51
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	225.44	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	388.68	
			<i>For Aluminum, Mill Finish, Add</i>	177.24	
			<i>For Aluminum, Anodized Finish, Add</i>	495.96	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 36 13 00-0019 EA 10' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	2,042.42 170.29 293.60 133.88 374.63	434.01
08 36 13 00-0020 EA 10' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	2,515.25 207.38 357.56 163.05 456.24	542.51
08 36 13 00-0021 EA 10' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	3,159.69 253.63 437.29 199.40 557.98	705.27
08 36 13 00-0022 EA 10' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	3,727.39 288.75 497.84 227.01 635.24	868.02
08 36 13 00-0023 EA 12' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	2,433.41 195.52 337.10 153.72 430.13	542.51
08 36 13 00-0024 EA 12' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	3,036.90 235.82 406.59 185.41 518.81	705.27
08 36 13 00-0025 EA 12' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	3,705.20 285.53 492.29 224.48 628.16	868.02
08 36 13 00-0026 EA 12' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	4,370.12 334.74 577.14 263.18 736.43	1,030.77
08 36 13 00-0027 EA 12' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	5,211.74 393.85 679.05 309.65 866.46	1,247.78
08 36 13 00-0028 EA 14' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	2,874.88 212.33 366.09 166.94 467.13	705.27
08 36 13 00-0029 EA 14' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	3,536.37 261.05 450.08 205.24 574.31	868.02
08 36 13 00-0030 EA 14' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	4,360.93 317.68 547.72 249.76 698.89	1,085.03
08 36 13 00-0031 EA 14' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	5,029.25 367.39 633.43 288.84 808.25	1,247.78
08 36 13 00-0032 EA 14' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	5,787.95 430.20 741.72 338.23 946.44	1,410.53
08 36 13 00-0033 EA 16' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	3,476.66 252.39 435.16 198.43 555.26	868.02
08 36 13 00-0034 EA 16' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	4,297.82 308.53 531.94 242.57 678.76	1,085.03
08 36 13 00-0035 EA 16' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	5,061.63 372.08 641.52 292.53 818.58	1,247.78

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 36 13 00-0036	EA		16' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	6,043.77	1,410.53
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	467.29	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	805.68	
			<i>For Aluminum, Mill Finish, Add</i>	367.39	
			<i>For Aluminum, Anodized Finish, Add</i>	1,028.04	
08 36 13 00-0037	EA		16' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	7,042.31	1,627.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	549.15	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	946.81	
			<i>For Aluminum, Mill Finish, Add</i>	431.74	
			<i>For Aluminum, Anodized Finish, Add</i>	1,208.12	
08 36 13 00-0038	EA		18' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	4,429.17	1,085.03
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	327.57	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	564.78	
			<i>For Aluminum, Mill Finish, Add</i>	257.54	
			<i>For Aluminum, Anodized Finish, Add</i>	720.66	
08 36 13 00-0039	EA		18' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,297.01	1,247.78
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	406.21	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	700.37	
			<i>For Aluminum, Mill Finish, Add</i>	319.37	
			<i>For Aluminum, Anodized Finish, Add</i>	893.67	
08 36 13 00-0040	EA		18' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	6,418.97	1,410.53
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	521.70	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	899.48	
			<i>For Aluminum, Mill Finish, Add</i>	410.16	
			<i>For Aluminum, Anodized Finish, Add</i>	1,147.73	
08 36 13 00-0041	EA		18' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	7,419.23	1,627.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	603.80	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,041.04	
			<i>For Aluminum, Mill Finish, Add</i>	474.71	
			<i>For Aluminum, Anodized Finish, Add</i>	1,328.36	
08 36 13 00-0042	EA		18' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	8,525.23	1,844.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	701.24	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,209.03	
			<i>For Aluminum, Mill Finish, Add</i>	551.32	
			<i>For Aluminum, Anodized Finish, Add</i>	1,542.72	
08 36 13 00-0043	EA		20' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,029.25	1,247.78
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	367.39	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	633.43	
			<i>For Aluminum, Mill Finish, Add</i>	288.84	
			<i>For Aluminum, Anodized Finish, Add</i>	808.25	
08 36 13 00-0044	EA		20' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,897.10	1,410.53
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	446.03	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	769.01	
			<i>For Aluminum, Mill Finish, Add</i>	350.67	
			<i>For Aluminum, Anodized Finish, Add</i>	981.26	
08 36 13 00-0045	EA		20' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	7,287.91	1,627.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	584.76	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,008.21	
			<i>For Aluminum, Mill Finish, Add</i>	459.74	
			<i>For Aluminum, Anodized Finish, Add</i>	1,286.47	
08 36 13 00-0046	EA		20' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	8,288.16	1,844.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	666.86	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,149.76	
			<i>For Aluminum, Mill Finish, Add</i>	524.29	
			<i>For Aluminum, Anodized Finish, Add</i>	1,467.10	
08 36 13 00-0047	EA		20' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	10,253.71	2,061.55
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	888.93	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,532.65	
			<i>For Aluminum, Mill Finish, Add</i>	698.89	
			<i>For Aluminum, Anodized Finish, Add</i>	1,955.66	
08 36 13 00-0048	EA		22' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,596.92	1,410.53
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	402.50	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	693.97	
			<i>For Aluminum, Mill Finish, Add</i>	316.45	
			<i>For Aluminum, Anodized Finish, Add</i>	885.50	
08 36 13 00-0049	EA		22' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	6,921.24	1,627.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	531.59	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	916.54	
			<i>For Aluminum, Mill Finish, Add</i>	417.94	
			<i>For Aluminum, Anodized Finish, Add</i>	1,169.50	
08 36 13 00-0050	EA		22' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	8,211.41	1,844.54
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	655.73	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,130.58	
			<i>For Aluminum, Mill Finish, Add</i>	515.54	
			<i>For Aluminum, Anodized Finish, Add</i>	1,442.61	
08 36 13 00-0051	EA		22' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	9,702.84	2,061.55
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	809.06	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,394.93	
			<i>For Aluminum, Mill Finish, Add</i>	636.09	
			<i>For Aluminum, Anodized Finish, Add</i>	1,779.93	
08 36 13 00-0052	EA		22' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	10,946.91	2,278.56
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	926.52	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,597.46	
			<i>For Aluminum, Mill Finish, Add</i>	728.44	
			<i>For Aluminum, Anodized Finish, Add</i>	2,038.35	



Openings	08	08
Specialty Doors and Frames	08 30	
Panel Doors	08 36	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 36 13 00-0053	EA 24' x 8', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	6,196.40 426.49 735.33 335.31 938.28	1,627.54
08 36 13 00-0054	EA 24' x 10', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	7,573.54 563.24 971.11 442.83 1,239.13	1,844.54
08 36 13 00-0055	EA 24' x 12', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	9,245.77 742.78 1,280.66 583.98 1,634.12	2,061.55
08 36 13 00-0056	EA 24' x 14', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	10,339.76 838.49 1,445.67 659.22 1,844.67	2,278.56
08 36 13 00-0057	EA 24' x 16', Non-Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift..... <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i>	11,614.59 960.40 1,655.87 755.08 2,112.89	2,495.56
08 36 13 00-0058	Insulated, 24 Gauge Galvanized Steel Sectional Doors <small>(08 36 13 00-0014)</small> Note: Includes 2" door with polystyrene insulation, 26 gauge interior cover, tracks and hardware. Excludes frame.		
08 36 13 00-0059	EA 8' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,314.75 177.30 496.12 194.40 388.81 1,010.90 1,944.04	379.76
08 36 13 00-0060	EA 8' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,762.60 215.98 604.37 236.82 473.65 1,231.48 2,368.23	434.01
08 36 13 00-0061	EA 8' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,391.30 262.91 735.70 288.28 576.57 1,499.08 2,882.84	542.51
08 36 13 00-0062	EA 10' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,693.42 208.10 582.30 228.18 456.35 1,186.51 2,281.75	434.01
08 36 13 00-0063	EA 10' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,306.08 253.20 708.51 277.63 555.26 1,443.68 2,776.31	542.51
08 36 13 00-0064	EA 10' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,199.27 317.92 889.61 348.59 697.19 1,812.68 3,485.93	705.27
08 36 13 00-0065	EA 10' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,862.53 356.42 997.35 390.81 781.62 2,032.22 3,908.11	868.02
08 36 13 00-0066	EA 12' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum, Mill Finish, Add</i> <i>For Aluminum, Anodized Finish, Add</i> <i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i> <i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,175.81 238.35 666.96 261.35 522.70 1,359.01 2,613.48	542.51

08 Openings**08 30 Specialty Doors and Frames****08 36 Panel Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 36 13 00-0067	EA 12' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	3,953.23	705.27
	<i>For Aluminum, Mill Finish, Add</i>	289.87	
	<i>For Aluminum, Anodized Finish, Add</i>	811.12	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	317.84	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	635.68	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,652.76	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,178.38	
08 36 13 00-0068	EA 12' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	4,819.12	868.02
	<i>For Aluminum, Mill Finish, Add</i>	351.47	
	<i>For Aluminum, Anodized Finish, Add</i>	983.50	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	385.39	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	770.77	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,004.00	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,853.85	
08 36 13 00-0069	EA 12' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,631.92	1,030.77
	<i>For Aluminum, Mill Finish, Add</i>	407.02	
	<i>For Aluminum, Anodized Finish, Add</i>	1,138.95	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	446.30	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	892.59	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,320.74	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,462.96	
08 36 13 00-0070	EA 12' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	6,837.89	1,247.78
	<i>For Aluminum, Mill Finish, Add</i>	495.03	
	<i>For Aluminum, Anodized Finish, Add</i>	1,385.21	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	542.79	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,085.59	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,822.52	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,427.93	
08 36 13 00-0071	EA 14' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	3,761.85	705.27
	<i>For Aluminum, Mill Finish, Add</i>	268.05	
	<i>For Aluminum, Anodized Finish, Add</i>	750.07	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	293.92	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	587.83	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,528.36	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,939.15	
08 36 13 00-0072	EA 14' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	4,666.33	868.02
	<i>For Aluminum, Mill Finish, Add</i>	334.05	
	<i>For Aluminum, Anodized Finish, Add</i>	934.76	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	366.29	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	732.57	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,904.69	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,662.86	
08 36 13 00-0073	EA 14' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,671.27	1,085.03
	<i>For Aluminum, Mill Finish, Add</i>	399.14	
	<i>For Aluminum, Anodized Finish, Add</i>	1,116.89	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	437.65	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	875.31	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,275.79	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,376.53	
08 36 13 00-0074	EA 14' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	6,689.92	1,247.78
	<i>For Aluminum, Mill Finish, Add</i>	478.16	
	<i>For Aluminum, Anodized Finish, Add</i>	1,338.00	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	524.30	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,048.59	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,726.34	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,242.96	
08 36 13 00-0075	EA 14' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	7,682.86	1,410.53
	<i>For Aluminum, Mill Finish, Add</i>	554.25	
	<i>For Aluminum, Anodized Finish, Add</i>	1,550.91	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	607.73	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,215.45	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,160.17	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	6,077.25	
08 36 13 00-0076	EA 16' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	4,500.68	868.02
	<i>For Aluminum, Mill Finish, Add</i>	315.17	
	<i>For Aluminum, Anodized Finish, Add</i>	881.92	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	345.58	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	691.16	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,797.02	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,455.80	
08 36 13 00-0077	EA 16' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	5,799.93	1,085.03
	<i>For Aluminum, Mill Finish, Add</i>	413.81	
	<i>For Aluminum, Anodized Finish, Add</i>	1,157.93	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	453.74	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	907.47	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,359.42	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,537.35	
08 36 13 00-0078	EA 16' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	6,776.77	1,247.78
	<i>For Aluminum, Mill Finish, Add</i>	488.06	
	<i>For Aluminum, Anodized Finish, Add</i>	1,365.71	
	<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	535.15	
	<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,070.31	
	<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,782.79	
	<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,351.53	



Openings	08
Specialty Doors and Frames	08 30
Panel Doors	08 36

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 36 13 00-0079	EA		16' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	7,760.04 563.04 1,575.53 617.37 1,234.75 3,210.34 6,173.73	1,410.53
08 36 13 00-0080	EA		16' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	9,184.76 675.98 1,891.56 741.21 1,482.42 3,854.29 7,412.09	1,627.54
08 36 13 00-0081	EA		18' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	5,175.92 342.67 958.87 375.73 751.47 1,953.82 3,757.34	1,085.03
08 36 13 00-0082	EA		18' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	6,434.20 449.01 1,256.43 492.33 984.66 2,560.12 4,923.31	1,247.78
08 36 13 00-0083	EA		18' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	7,476.98 530.77 1,485.24 581.99 1,163.98 3,026.35 5,819.90	1,410.53
08 36 13 00-0084	EA		18' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	9,348.80 694.68 1,943.89 761.71 1,523.43 3,960.91 7,617.14	1,627.54
08 36 13 00-0085	EA		18' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	10,231.52 745.83 2,087.03 817.80 1,635.60 4,252.57 8,178.01	1,844.54
08 36 13 00-0086	EA		20' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	6,403.64 445.52 1,246.68 488.51 977.02 2,540.26 4,885.11	1,247.78
08 36 13 00-0087	EA		20' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	7,547.77 538.84 1,507.82 590.84 1,181.68 3,072.36 5,908.39	1,410.53
08 36 13 00-0088	EA		20' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	9,678.48 732.27 2,049.06 802.92 1,605.85 4,175.20 8,029.24	1,627.54
08 36 13 00-0089	EA		20' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	10,525.83 779.39 2,180.91 854.59 1,709.18 4,443.87 8,545.90	1,844.54
08 36 13 00-0090	EA		20' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift For Aluminum, Mill Finish, Add For Aluminum, Anodized Finish, Add For 22 Gauge Steel Ribbed, Heavy Duty Door, Add For 20 Gauge Steel Ribbed, Heavy Duty Door, Add For 18 Gauge Steel Ribbed, Heavy Duty Door, Add For 16 Gauge Steel Ribbed, Heavy Duty Door, Add	12,241.63 925.51 2,589.80 1,014.81 2,029.63 5,277.03 10,148.13	2,061.55

08 Openings**08 30 Specialty Doors and Frames****08 36 Panel Doors**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 36 13 00-0091	EA		22' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	7,018.64	1,410.53
			<i>For Aluminum, Mill Finish, Add</i>	478.52	
			<i>For Aluminum, Anodized Finish, Add</i>	1,339.03	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	524.70	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,049.40	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,728.43	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,246.98	
08 36 13 00-0092	EA		22' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	8,697.46	1,627.54
			<i>For Aluminum, Mill Finish, Add</i>	620.43	
			<i>For Aluminum, Anodized Finish, Add</i>	1,736.12	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	680.30	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,360.59	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,537.54	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	6,802.96	
08 36 13 00-0093	EA		22' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	10,348.94	1,844.54
			<i>For Aluminum, Mill Finish, Add</i>	759.22	
			<i>For Aluminum, Anodized Finish, Add</i>	2,124.49	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	832.48	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,664.96	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,328.89	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	8,324.79	
08 36 13 00-0094	EA		22' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	11,632.10	2,061.55
			<i>For Aluminum, Mill Finish, Add</i>	856.02	
			<i>For Aluminum, Anodized Finish, Add</i>	2,395.36	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	938.62	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,877.24	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,880.83	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	9,386.21	
08 36 13 00-0095	EA		22' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	13,283.51	2,278.56
			<i>For Aluminum, Mill Finish, Add</i>	994.81	
			<i>For Aluminum, Anodized Finish, Add</i>	2,783.73	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,090.80	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,181.61	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,672.17	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	10,908.03	
08 36 13 00-0096	EA		24' x 8', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	7,808.09	1,627.54
			<i>For Aluminum, Mill Finish, Add</i>	519.04	
			<i>For Aluminum, Anodized Finish, Add</i>	1,452.41	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	569.13	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,138.25	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,959.45	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,691.25	
08 36 13 00-0097	EA		24' x 10', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	9,665.44	1,844.54
			<i>For Aluminum, Mill Finish, Add</i>	681.30	
			<i>For Aluminum, Anodized Finish, Add</i>	1,906.45	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	747.04	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,494.08	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	3,884.61	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	7,470.41	
08 36 13 00-0098	EA		24' x 12', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	11,225.23	2,061.55
			<i>For Aluminum, Mill Finish, Add</i>	809.64	
			<i>For Aluminum, Anodized Finish, Add</i>	2,265.57	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	887.76	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,775.53	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	4,616.37	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	8,877.63	
08 36 13 00-0099	EA		24' x 14', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	12,879.86	2,278.56
			<i>For Aluminum, Mill Finish, Add</i>	948.80	
			<i>For Aluminum, Anodized Finish, Add</i>	2,654.96	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,040.35	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,080.69	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	5,409.80	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	10,403.46	
08 36 13 00-0100	EA		24' x 16', Insulated, 24 Gauge Galvanized Steel Sectional Door, Manual Lift.....	14,507.20	2,495.56
			<i>For Aluminum, Mill Finish, Add</i>	1,084.83	
			<i>For Aluminum, Anodized Finish, Add</i>	3,035.63	
			<i>For 22 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	1,189.51	
			<i>For 20 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	2,379.02	
			<i>For 18 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	6,185.46	
			<i>For 16 Gauge Steel Ribbed, Heavy Duty Door, Add</i>	11,895.11	
08 36 13 00-0101			Residential Grade, Galvanized Steel Sectional Overhead Doors <small>(08 36 13 00-0013)</small>		
			Note: Includes track and hardware. Excludes frame.		
08 36 13 00-0102	EA		9' x 7', Non-Insulated, 25 Gauge Residential Grade Galvanized Steel Sectional Door, Manual Lift.....	1,021.24	217.01
			<i>For Aluminum And Fiberglass, Add</i>	148.41	
			<i>For Each Glass Vision Panel In Door, Add</i>	27.00	
			<i>For Insulated Door, Add</i>	253.73	
08 36 13 00-0103	EA		9' x 8', Non-Insulated, 25 Gauge Residential Grade Galvanized Steel Sectional Door, Manual Lift.....	1,107.15	217.01
			<i>For Aluminum And Fiberglass, Add</i>	175.04	
			<i>For Each Glass Vision Panel In Door, Add</i>	27.00	
			<i>For Insulated Door, Add</i>	299.26	
08 36 13 00-0104	EA		16' x 7', Non-Insulated, 25 Gauge Residential Grade Galvanized Steel Sectional Door, Manual Lift.....	1,411.01	248.25
			<i>For Aluminum And Fiberglass, Add</i>	245.43	
			<i>For Each Glass Vision Panel In Door, Add</i>	27.00	
			<i>For Insulated Door, Add</i>	419.60	



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 36 13 00-0105	EA	16' x 8', Non-Insulated, 25 Gauge Residential Grade Galvanized Steel Sectional Door, Manual Lift <i>For Aluminum And Fiberglass, Add</i> <i>For Each Glass Vision Panel In Door, Add</i> <i>For Insulated Door, Add</i>	1,546.01 287.28 27.00 491.15	248.25
08 36 13 00-0106		Removal And Reinstallation Of Sectional Metal Overhead Doors And Supports <small>(08 36 13 00-0103)</small> Note: Includes storage, cleaning and supply materials.		
08 36 13 00-0107	SF	Removal And Reinstallation Of Sectional Metal Overhead Door And Supports	15.52	
08 36 13 00-0108		Sectional Fiberglass Overhead Doors (Width x Height) <small>(08 36 13)</small>		
08 36 13 00-0109		Fiberglass Sectional Overhead Doors <small>(08 36 13 00-0108)</small>		
08 36 13 00-0110		Non-Insulated, Fiberglass Sectional Doors <small>(08 36 13 00-0109)</small> Note: Includes 2" door, tracks and hardware. Excludes frame.		
08 36 13 00-0111	EA	8' x 8', Non-Insulated, Fiberglass Sectional Door, Manual Lift	2,199.54	379.76
08 36 13 00-0112	EA	8' x 10', Non-Insulated, Fiberglass Sectional Door, Manual Lift	2,603.98	434.01
08 36 13 00-0113	EA	8' x 12', Non-Insulated, Fiberglass Sectional Door, Manual Lift	3,093.35	542.51
08 36 13 00-0114	EA	10' x 8', Non-Insulated, Fiberglass Sectional Door, Manual Lift	2,575.56	434.01
08 36 13 00-0115	EA	10' x 10', Non-Insulated, Fiberglass Sectional Door, Manual Lift	3,060.55	488.26
08 36 13 00-0116	EA	10' x 12', Non-Insulated, Fiberglass Sectional Door, Manual Lift	3,845.36	678.15
08 36 13 00-0117	EA	10' x 14', Non-Insulated, Fiberglass Sectional Door, Manual Lift	4,634.29	868.02
08 36 13 00-0118	EA	12' x 8', Non-Insulated, Fiberglass Sectional Door, Manual Lift	3,053.09	542.51
08 36 13 00-0119	EA	12' x 10', Non-Insulated, Fiberglass Sectional Door, Manual Lift	3,828.79	678.15
08 36 13 00-0120	EA	12' x 12', Non-Insulated, Fiberglass Sectional Door, Manual Lift	4,594.69	813.77
08 36 13 00-0121	EA	12' x 14', Non-Insulated, Fiberglass Sectional Door, Manual Lift	5,630.14	1,085.03
08 36 13 00-0122	EA	12' x 16', Non-Insulated, Fiberglass Sectional Door, Manual Lift	6,563.03	1,302.03
08 36 13 00-0123	EA	14' x 8', Non-Insulated, Fiberglass Sectional Door, Manual Lift	3,747.36	759.52
08 36 13 00-0124	EA	14' x 10', Non-Insulated, Fiberglass Sectional Door, Manual Lift	4,534.82	868.02
08 36 13 00-0125	EA	14' x 12', Non-Insulated, Fiberglass Sectional Door, Manual Lift	5,544.88	1,085.03
08 36 13 00-0126	EA	14' x 14', Non-Insulated, Fiberglass Sectional Door, Manual Lift	6,553.55	1,302.03
08 36 13 00-0127	EA	14' x 16', Non-Insulated, Fiberglass Sectional Door, Manual Lift	7,347.90	1,410.53
08 36 13 00-0128	EA	16' x 8', Non-Insulated, Fiberglass Sectional Door, Manual Lift	4,257.73	868.02
08 36 13 00-0129	EA	16' x 10', Non-Insulated, Fiberglass Sectional Door, Manual Lift	5,100.36	976.52
08 36 13 00-0130	EA	16' x 12', Non-Insulated, Fiberglass Sectional Door, Manual Lift	6,174.73	1,193.53
08 36 13 00-0131	EA	16' x 14', Non-Insulated, Fiberglass Sectional Door, Manual Lift	7,236.59	1,410.53
08 36 13 00-0132	EA	16' x 16', Non-Insulated, Fiberglass Sectional Door, Manual Lift	8,082.06	1,519.03
08 36 13 00-0133		Insulated, Fiberglass Sectional Doors <small>(08 36 13 00-0109)</small> Note: Includes 2" door with polystyrene insulation, tracks and hardware. Excludes frame.		
08 36 13 00-0134	EA	8' x 8', Insulated, Fiberglass Sectional Door, Manual Lift	2,674.71	379.76
08 36 13 00-0135	EA	8' x 10', Insulated, Fiberglass Sectional Door, Manual Lift	3,176.85	434.01
08 36 13 00-0136	EA	8' x 12', Insulated, Fiberglass Sectional Door, Manual Lift	3,756.09	542.51
08 36 13 00-0137	EA	10' x 8', Insulated, Fiberglass Sectional Door, Manual Lift	3,139.05	434.01
08 36 13 00-0138	EA	10' x 10', Insulated, Fiberglass Sectional Door, Manual Lift	3,748.31	488.26
08 36 13 00-0139	EA	10' x 12', Insulated, Fiberglass Sectional Door, Manual Lift	4,666.76	678.15
08 36 13 00-0140	EA	10' x 14', Insulated, Fiberglass Sectional Door, Manual Lift	5,590.89	868.02
08 36 13 00-0141	EA	12' x 8', Insulated, Fiberglass Sectional Door, Manual Lift	3,702.55	542.51
08 36 13 00-0142	EA	12' x 10', Insulated, Fiberglass Sectional Door, Manual Lift	4,644.71	678.15
08 36 13 00-0143	EA	12' x 12', Insulated, Fiberglass Sectional Door, Manual Lift	5,573.96	813.77
08 36 13 00-0144	EA	12' x 14', Insulated, Fiberglass Sectional Door, Manual Lift	6,771.96	1,085.03
08 36 13 00-0145	EA	12' x 16', Insulated, Fiberglass Sectional Door, Manual Lift	7,869.76	1,302.03
08 36 13 00-0146	EA	14' x 8', Insulated, Fiberglass Sectional Door, Manual Lift	4,482.79	759.52
08 36 13 00-0147	EA	14' x 10', Insulated, Fiberglass Sectional Door, Manual Lift	5,458.60	868.02
08 36 13 00-0148	EA	14' x 12', Insulated, Fiberglass Sectional Door, Manual Lift	6,658.57	1,085.03
08 36 13 00-0149	EA	14' x 14', Insulated, Fiberglass Sectional Door, Manual Lift	7,857.16	1,302.03
08 36 13 00-0150	EA	14' x 16', Insulated, Fiberglass Sectional Door, Manual Lift	8,842.20	1,410.53
08 36 13 00-0151	EA	16' x 8', Insulated, Fiberglass Sectional Door, Manual Lift	5,090.07	868.02
08 36 13 00-0152	EA	16' x 10', Insulated, Fiberglass Sectional Door, Manual Lift	6,139.03	976.52
08 36 13 00-0153	EA	16' x 12', Insulated, Fiberglass Sectional Door, Manual Lift	7,424.41	1,193.53
08 36 13 00-0154	EA	16' x 14', Insulated, Fiberglass Sectional Door, Manual Lift	8,694.16	1,410.53
08 36 13 00-0155	EA	16' x 16', Insulated, Fiberglass Sectional Door, Manual Lift	9,746.74	1,519.03
08 36 13 00-0156		Sectional Overhead Door Accessories <small>(08 36 13)</small>		
08 36 13 00-0157		Sectional Overhead Door Accessories <small>(08 36 13 00-0156)</small>		
08 36 13 00-0158	LF	Flap Seal For Sectional Overhead Doors	3.85	
08 36 13 00-0159	LF	Weather Seal At Top Of Door For Sectional Overhead Doors	5.51	
08 36 13 00-0160	LF	Astragal Only, Weather Strip At Bottom Of Door For Sectional Overhead Doors	3.18	
08 36 13 00-0161	EA	Cylinder Lock For Sectional Overhead Doors	322.63	
08 36 13 00-0162	EA	Manual Chain Hoist For Sectional Overhead Doors	637.20	
08 36 13 00-0163	EA	3/4 HP, Electric Chain Lift Operator For Sectional Overhead Doors Note: Includes motor, supports, push button operator, stationary electronic eye, signal wiring from eye to motor and motor to operator.	2,590.34	
08 36 13 00-0164	EA	1/2 HP Trolley Operator For Sectional Overhead Doors Note: Includes motor, supports, push button operator, stationary electronic eye, signal wiring from eye to motor and motor to operator.	1,188.95	

08 Openings**08 30 Specialty Doors and Frames****08 36 Panel Doors**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 36 13 00-0165	EA	3/4 HP Trolley Operator For Sectional Overhead Doors.....	1,540.21	
		Note: Includes motor, supports, push button operator, stationary electronic eye, signal wiring from eye to motor and motor to operator.		
		<i>For Door Height >12', Add</i>	10.00	
		Note: Includes motor, supports, push button operator, stationary electronic eye, signal wiring from eye to motor and motor to operator.		
08 36 13 00-0166	SF	Up To 2 SF Per Window 1/8" Double Strength Glass (DSB) Glazing For Sectional Overhead Doors.....	38.13	
		Note: Additional cost for factory supplied.		
08 36 13 00-0167	SF	>2 SF Per Window 1/8" Double Strength Glass (DSB) Glazing For Sectional Overhead Doors.....	23.78	
		Note: Additional cost for factory supplied.		
08 36 13 00-0168	SF	Up To 2 SF Per Window 1/8" Plexiglas Glazing For Sectional Overhead Doors.....	39.86	
		Note: Additional cost for factory supplied.		
08 36 13 00-0169	SF	>2 SF Per Window 1/8" Plexiglas Glazing For Sectional Overhead Doors.....	27.18	
		Note: Additional cost for factory supplied.		
08 36 13 00-0170	SF	Up To 2 SF Per Window 3/4" Insulated Glazing For Sectional Overhead Doors.....	64.13	
		Note: Additional cost for factory supplied.		
08 36 13 00-0171	SF	>2 SF Per Window 3/4" Insulated Glazing For Sectional Overhead Doors.....	43.28	
		Note: Additional cost for factory supplied.		
08 36 13 00-0172	EA	Vertical Lift Track For Sectional Overhead Doors Up To 12' High Door.....	582.21	
		Note: Includes additional installation of vertical track, spring bumpers, counterweights and vertical lift springs.		
08 36 13 00-0173	EA	Vertical Lift Track For Sectional Overhead Doors >12' To 16' High Door.....	907.21	
		Note: Includes additional installation of vertical track, spring bumpers, counterweights and vertical lift springs.		
08 36 13 00-0174	EA	Vertical Lift Track For Sectional Overhead Doors >16' To 20' High Door.....	1,339.92	
		Note: Includes additional installation of vertical track, spring bumpers, counterweights and vertical lift springs.		
08 36 13 00-0175	SF	25,000 Cycle Spring In Lieu Of 10,000 Cycle For Sectional Overhead Doors.....	1.76	
		Note: Additional cost for factory supplied/installed spring. Per SF of Door.		
08 36 13 00-0176	SF	50,000 Cycle Spring In Lieu Of 10,000 Cycle For Sectional Overhead Doors.....	2.27	
		Note: Additional cost for factory supplied/installed spring. Per SF of Door.		
08 36 13 00-0177	SF	100,000 Cycle Spring In Lieu Of 10,000 Cycle For Sectional Overhead Doors.....	3.00	
		Note: Additional cost for factory supplied/installed spring. Per SF of Door.		

08 38 Traffic Doors (08 30)**08 38 13 Flexible Strip Doors** (08 38)**08 38 13 00-0001 Clear Polyvinyl Chloride (PVC) Strip Doors** (08 38 13)

08 38 13 00-0002	SF	8" Smooth Strip, 0.080" Thick, 50% Overlap, Clear Polyvinyl Chloride (PVC) Strip Door.....	21.73	6.51
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	0.76	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	1.60	
08 38 13 00-0003	SF	8" Smooth Strip, 0.080" Thick, 100% Overlap, Clear Polyvinyl Chloride (PVC) Strip Door.....	30.28	8.68
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	1.08	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	2.26	
08 38 13 00-0004	SF	12" Smooth Strip, 0.120" Thick, 66% Overlap, Clear Polyvinyl Chloride (PVC) Strip Door.....	19.37	5.43
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	0.96	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	2.02	
08 38 13 00-0005	SF	12" Smooth Strip, 0.120" Thick, 100% Overlap, Clear Polyvinyl Chloride (PVC) Strip Door.....	25.08	5.97
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	1.21	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	2.53	
08 38 13 00-0006	SF	16" Smooth Strip, 0.160" Thick, 66% Overlap, Clear Polyvinyl Chloride (PVC) Strip Door.....	20.89	5.43
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	1.22	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	2.56	

08 38 13 00-0007 Clear Polyvinyl Chloride (PVC) Replacement Strips (08 38 13)

08 38 13 00-0008	EA	8" Smooth Strip, 0.080" Thick, 7' Long, Replacement Strip.....	64.94	30.60
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	1.50	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	3.16	
08 38 13 00-0009	EA	8" Smooth Strip, 0.080" Thick, 8' Long, Replacement Strip.....	67.05	30.60
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	1.71	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	3.60	
08 38 13 00-0010	EA	12" Smooth Strip, 0.120" Thick, 8' Long, Replacement Strip.....	96.99	37.87
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	3.51	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	7.38	
08 38 13 00-0011	EA	12" Smooth Strip, 0.120" Thick, 10' Long, Replacement Strip.....	104.12	37.87
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	4.23	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	8.88	
08 38 13 00-0012	EA	12" Smooth Strip, 0.120" Thick, 12' Long, Replacement Strip.....	110.82	37.87
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	4.90	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	10.28	
08 38 13 00-0013	EA	16" Smooth Strip, 0.160" Thick, 14' Long, Replacement Strip.....	192.01	38.62
		<i>For Cooler/Freezer Doors, USDA Grade, Add</i>	11.47	
		Note: Low temperature to -40 degree F.		
		<i>For Ribbed Strip Material, Add</i>	24.09	



Openings	08	08
Specialty Doors and Frames	08 30	
Traffic Doors	08 38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 38 16

Flexible Traffic Doors (08 38)

Note: Impact traffic doors also known as double action traffic doors. Includes hardware. Excludes door frame.

08 38 16 00-0001		0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Doors (TMI Mega-Pro) <small>(08 38 16)</small>		
08 38 16 00-0002		Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Doors <small>(08 38 16 00-0001)</small>		
08 38 16 00-0003		Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Doors <small>(08 38 16 00-0002)</small>		
08 38 16 00-0004	EA	72" x 84" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	6,704.80	108.50
08 38 16 00-0005	EA	72" x 96" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	7,262.49	108.50
08 38 16 00-0006	EA	96" x 96" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	15,295.54	124.77
08 38 16 00-0007	EA	96" x 120" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	17,172.14	135.63
08 38 16 00-0008	EA	108" x 108" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	26,823.36	135.63
08 38 16 00-0009	EA	108" x 120" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	28,071.88	135.63
08 38 16 00-0010	EA	120" x 120" Opening, Double Door, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	31,224.40	162.75

08 38 16 00-0011 Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Doors (08 38 16 00-0002)

08 38 16 00-0012	EA	72" x 84" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	7,481.18	108.50
08 38 16 00-0013	EA	72" x 96" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	8,102.23	108.50
08 38 16 00-0014	EA	96" x 96" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	18,155.29	124.77
08 38 16 00-0015	EA	96" x 120" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	20,019.19	135.63
08 38 16 00-0016	EA	108" x 108" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	30,088.54	135.63
08 38 16 00-0017	EA	108" x 120" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	31,358.55	135.63
08 38 16 00-0018	EA	120" x 120" Opening, Double Door With Impact Plate, 0.160" Thick, Clear Polyvinyl Chloride (PVC) Flexible Impact Traffic Door.....	34,880.91	162.75

08 38 16 00-0019 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors (Eliason FMP) (08 38 16)

Note: Includes pebble embossed finish and a 14" x 16" vinyl window.

08 38 16 00-0020		Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors <small>(08 38 16 00-0019)</small>		
08 38 16 00-0021		84" Height, Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors <small>(08 38 16 00-0020)</small>		
08 38 16 00-0022	EA	24" To 36" Width x 84" Height Opening, Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	2,891.15	59.67
08 38 16 00-0023	EA	40" To 44" Width x 84" Height Opening, Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	3,124.63	59.67

08 38 16 00-0024 96" Height, Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors (08 38 16 00-0020)

08 38 16 00-0025	EA	24" To 36" Width x 96" Height Opening, Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	3,124.63	59.67
08 38 16 00-0026	EA	40" To 44" Width x 96" Height Opening, Single Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	3,190.49	59.67

08 38 16 00-0027 Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors (08 38 16 00-0019)

08 38 16 00-0028		84" Height, Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors <small>(08 38 16 00-0027)</small>		
08 38 16 00-0029	EA	48" To 72" Width x 84" Height Opening, Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	5,749.75	103.08
08 38 16 00-0030	EA	80" To 88" Width x 84" Height Opening, Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	6,216.71	103.08

08 38 16 00-0031 96" Height, Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors (08 38 16 00-0027)

08 38 16 00-0032	EA	48" To 72" Width x 96" Height Opening, Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	6,216.71	103.08
08 38 16 00-0033	EA	80" To 88" Width x 96" Height Opening, Double Door, 0.240" Thick, Double Ply Vinyl Flexible Impact Traffic Doors.....	6,348.41	103.08

08 38 19 **Rigid Traffic Doors (08 38)**

Note: Impact traffic doors also known as double action traffic doors. Includes hardware. Excludes door frame.

08 38 19 00-0001		0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors (Eliason LWP-3) <small>(08 38 19)</small>		
08 38 19 00-0002		Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors <small>(08 38 19 00-0001)</small>		

08	08	Openings
	08 30	Specialty Doors and Frames
	08 38	Traffic Doors



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 38 19 00-0003	84" Height, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors <small>(08 38 19 00-0002)</small>		
08 38 19 00-0004	EA 24" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,364.56	59.67
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0005	EA 28" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,472.32	59.67
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0006	EA 30" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,519.66	62.39
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0007	EA 32" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,585.51	62.39
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0008	EA 36" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,656.81	65.10
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0009	EA 40" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,800.49	65.10
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0010	EA 42" x 84" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,858.65	73.24
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0011	96" Height, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors <small>(08 38 19 00-0002)</small>		
08 38 19 00-0012	EA 24" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,550.15	59.67
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0013	EA 28" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,633.96	59.67
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0014	EA 30" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,687.28	62.39
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0015	EA 32" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,735.18	62.39
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0016	EA 36" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,902.27	65.10
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0017	EA 40" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,938.19	65.10
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0018	EA 42" x 96" Opening, Single Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	1,990.36	73.24
	<i>For Each 14" x 16" Window, Add</i>	22.00	
	<i>For Each 15" x 20" Window, Add</i>	28.00	
	<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0019	Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors <small>(08 38 19 00-0001)</small>		
08 38 19 00-0020	84" Height, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors <small>(08 38 19 00-0019)</small>		



Openings	08	08
Specialty Doors and Frames	08 30	
Traffic Doors	08 38	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0021	EA 48" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	2,696.56	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0022	EA 56" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	2,912.08	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0023	EA 64" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	2,995.89	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0024	EA 64" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,127.60	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0025	EA 72" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,270.20	108.50
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0026	EA 80" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,557.56	108.50
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0027	EA 84" x 84" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,641.37	108.50
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0028	96" Height, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Doors <small>(08 38 19 00-0019)</small>		
08 38 19 00-0029	EA 48" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,067.73	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0030	EA 56" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,235.36	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0031	EA 60" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,331.15	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0032	EA 64" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,426.93	103.08
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0033	EA 72" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,761.10	108.50
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0034	EA 80" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,832.94	108.50
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0035	EA 84" x 96" Opening, Double Door, 0.063" Thick, Satin Anodized Finish, Tempered Aluminum Alloy Impact Traffic Door.....	3,904.78	108.50
	For Each 14" x 16" Window, Add	22.00	
	For Each 15" x 20" Window, Add	28.00	
	For Each 18" x 30" Window, Add	41.00	
08 38 19 00-0036	3/4" Thick, Polymer Cell Core Impact Traffic Doors (Eliason P-11 Plus) <small>(08 38 19)</small>		
	Note: Includes 0.125" thick thermoplastic exterior finish, 14 gauge back channel and a 14" x 16" acrylic window.		
08 38 19 00-0037	Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Doors <small>(08 38 19 00-0036)</small>		
08 38 19 00-0038	84" Height, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Doors <small>(08 38 19 00-0037)</small>		
08 38 19 00-0039	EA 24" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door.....	2,466.10	59.67
	For Each 15" x 20" Window, Add	6.00	
	For Each 18" x 30" Window, Add	19.00	

08 Openings**08 30 Specialty Doors and Frames****08 38 Traffic Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0040	EA 28" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	2,747.48 6.00 19.00	59.67
08 38 19 00-0041	EA 30" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	2,866.65 6.00 19.00	62.39
08 38 19 00-0042	EA 32" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	2,986.38 6.00 19.00	62.39
08 38 19 00-0043	EA 36" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,027.75 6.00 19.00	65.10
08 38 19 00-0044	EA 40" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,273.21 6.00 19.00	65.10
08 38 19 00-0045	EA 42" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,510.96 6.00 19.00	73.24
08 38 19 00-0046	EA 44" x 84" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,552.87 6.00 19.00	73.24
08 38 19 00-0047	96" Height, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Doors		
	<small>(08 38 19 00-0037)</small>		
08 38 19 00-0048	EA 24" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	2,705.57 6.00 19.00	59.67
08 38 19 00-0049	EA 28" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	2,998.91 6.00 19.00	59.67
08 38 19 00-0050	EA 30" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,118.09 6.00 19.00	62.39
08 38 19 00-0051	EA 32" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,267.76 6.00 19.00	62.39
08 38 19 00-0052	EA 36" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,380.97 6.00 19.00	65.10
08 38 19 00-0053	EA 40" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,620.43 6.00 19.00	65.10
08 38 19 00-0054	EA 42" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,732.47 6.00 19.00	73.24
08 38 19 00-0055	EA 44" x 96" Opening, Single Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,882.13 6.00 19.00	73.24
08 38 19 00-0056	Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Doors		
	<small>(08 38 19 00-0036)</small>		
08 38 19 00-0057	84" Height, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Doors		
	<small>(08 38 19 00-0056)</small>		
08 38 19 00-0058	EA 48" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,899.65 6.00 19.00	103.08
08 38 19 00-0059	EA 56" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	5,462.39 6.00 19.00	103.08
08 38 19 00-0060	EA 60" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	5,689.88 6.00 19.00	103.08
08 38 19 00-0061	EA 64" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	5,929.35 6.00 19.00	103.08
08 38 19 00-0062	EA 72" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,012.08 6.00 19.00	108.50
08 38 19 00-0063	EA 80" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,502.98 6.00 19.00	108.50
08 38 19 00-0064	EA 84" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,945.99 6.00 19.00	108.50
08 38 19 00-0065	EA 88" x 84" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,029.81 6.00 19.00	108.50
08 38 19 00-0066	96" Height, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Doors		
	<small>(08 38 19 00-0056)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 38 19 00-0067 EA 48" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	5,378.58 6.00 19.00	103.08
08 38 19 00-0068 EA 56" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	5,965.27 6.00 19.00	103.08
08 38 19 00-0069 EA 60" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,192.76 6.00 19.00	103.08
08 38 19 00-0070 EA 64" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,492.09 6.00 19.00	103.08
08 38 19 00-0071 EA 72" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,718.50 6.00 19.00	108.50
08 38 19 00-0072 EA 80" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,197.43 6.00 19.00	108.50
08 38 19 00-0073 EA 84" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,389.00 6.00 19.00	108.50
08 38 19 00-0074 EA 88" x 96" Opening, Double Door, 3/4" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,688.34 6.00 19.00	108.50
08 38 19 00-0075 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Doors (Eliason PMP-2) <small>(08 38 19)</small> Note: Includes textured finish, 16 gauge back channel and a 14" x 16" window.		
08 38 19 00-0076 Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Doors <small>(08 38 19 00-0075)</small>		
08 38 19 00-0077 84" Height, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Doors <small>(08 38 19 00-0076)</small>		
08 38 19 00-0078 EA 24" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,022.22 6.00 19.00	59.67
08 38 19 00-0079 EA 28" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,440.90 6.00 19.00	59.67
08 38 19 00-0080 EA 30" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,557.98 6.00 19.00	62.39
08 38 19 00-0081 EA 32" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,599.85 6.00 19.00	62.39
08 38 19 00-0082 EA 36" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,647.17 6.00 19.00	65.10
08 38 19 00-0083 EA 40" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,037.94 6.00 19.00	65.10
08 38 19 00-0084 EA 42" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,375.18 6.00 19.00	73.24
08 38 19 00-0085 EA 44" x 84" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,424.03 6.00 19.00	73.24
08 38 19 00-0086 96" Height, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Doors <small>(08 38 19 00-0076)</small>		
08 38 19 00-0087 EA 24" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,112.93 6.00 19.00	59.67
08 38 19 00-0088 EA 28" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,629.31 6.00 19.00	59.67
08 38 19 00-0089 EA 30" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,753.37 6.00 19.00	62.39
08 38 19 00-0090 EA 32" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,809.19 6.00 19.00	62.39
08 38 19 00-0091 EA 36" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,828.60 6.00 19.00	65.10
08 38 19 00-0092 EA 40" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,114.70 6.00 19.00	65.10
08 38 19 00-0093 EA 42" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,444.96 6.00 19.00	73.24

08 Openings**08 30 Specialty Doors and Frames****08 38 Traffic Doors**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0094	EA	44" x 96" Opening, Single Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door.....	4,500.79	73.24
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0095		Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS)		
		Impact Traffic Doors <small>(08 38 19 00-0075)</small>		
08 38 19 00-0096		84" Height, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene		
		Styrene (ABS) Impact Traffic Doors <small>(08 38 19 00-0095)</small>		
08 38 19 00-0097	EA	48" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	6,011.87	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0098	EA	56" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	6,849.24	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0099	EA	60" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,072.54	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0100	EA	64" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,156.28	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0101	EA	72" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,250.90	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0102	EA	80" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	8,032.45	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0103	EA	84" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	8,674.43	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0104	EA	88" x 84" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	8,772.12	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0105		96" Height, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene		
		Styrene (ABS) Impact Traffic Doors <small>(08 38 19 00-0095)</small>		
08 38 19 00-0106	EA	48" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	6,193.30	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0107	EA	56" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,226.06	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0108	EA	60" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,463.31	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0109	EA	64" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,574.96	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0110	EA	72" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	7,613.76	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0111	EA	80" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	8,185.97	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0112	EA	84" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	8,813.99	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0113	EA	88" x 96" Opening, Double Door, 3/4" Thick, Double Ply Acrylonitrile Butadiene Styrene (ABS) Impact Traffic Door	8,925.64	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0114		1" Thick, Exterior Grade Solid Wood Core Impact Traffic Doors (Eliaison		
		SCP-2) <small>(08 38 19)</small>		
		Note: Includes 0.032" tempered aluminum alloy top panel, 48" high 16 gauge stainless steel front and galvanized back base plate, 14 gauge galvanized steel back channel and a 9" x 14" window.		
08 38 19 00-0115		Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic		
		Doors <small>(08 38 19 00-0114)</small>		
08 38 19 00-0116		84" Height, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact		
		Traffic Doors <small>(08 38 19 00-0115)</small>		
08 38 19 00-0117	EA	24" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door	3,328.18	59.67
		<i>For Each 14" x 16" Window, Add</i>	22.00	
		<i>For Each 15" x 20" Window, Add</i>	28.00	
		<i>For Each 18" x 30" Window, Add</i>	41.00	
08 38 19 00-0118	EA	28" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door	3,645.47	59.67
		<i>For Each 14" x 16" Window, Add</i>	22.00	
		<i>For Each 15" x 20" Window, Add</i>	28.00	
		<i>For Each 18" x 30" Window, Add</i>	41.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 38 19 00-0119 EA 30" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,734.71 22.00 28.00 41.00	62.39
08 38 19 00-0120 EA 32" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,812.54 22.00 28.00 41.00	62.39
08 38 19 00-0121 EA 36" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,949.70 22.00 28.00 41.00	65.10
08 38 19 00-0122 EA 40" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,099.36 22.00 28.00 41.00	65.10
08 38 19 00-0123 EA 42" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,235.35 22.00 28.00 41.00	73.24
08 38 19 00-0124 EA 44" x 84" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,337.12 22.00 28.00 41.00	73.24
08 38 19 00-0125 96" Height, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Doors <small>(08 38 19 00-0115)</small>		
08 38 19 00-0126 EA 24" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,597.58 22.00 28.00 41.00	59.67
08 38 19 00-0127 EA 28" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,932.83 22.00 28.00 41.00	59.67
08 38 19 00-0128 EA 30" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,028.06 22.00 28.00 41.00	62.39
08 38 19 00-0129 EA 32" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,069.97 22.00 28.00 41.00	62.39
08 38 19 00-0130 EA 36" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,195.15 22.00 28.00 41.00	65.10
08 38 19 00-0131 EA 40" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,392.71 22.00 28.00 41.00	65.10
08 38 19 00-0132 EA 42" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,504.74 22.00 28.00 41.00	73.24
08 38 19 00-0133 EA 44" x 96" Opening, Single Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,606.52 22.00 28.00 41.00	73.24
08 38 19 00-0134 Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Doors <small>(08 38 19 00-0114)</small>		
08 38 19 00-0135 84" Height, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Doors <small>(08 38 19 00-0134)</small>		
08 38 19 00-0136 EA 48" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,623.80 22.00 28.00 41.00	103.08
08 38 19 00-0137 EA 56" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,258.38 22.00 28.00 41.00	103.08
08 38 19 00-0138 EA 60" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,426.01 22.00 28.00 41.00	103.08
08 38 19 00-0139 EA 64" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,581.66 22.00 28.00 41.00	103.08

08 Openings**08 30 Specialty Doors and Frames****08 38 Traffic Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0140	EA 72" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,855.96 22.00 28.00 41.00	108.50
08 38 19 00-0141	EA 80" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,155.29 22.00 28.00 41.00	108.50
08 38 19 00-0142	EA 84" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,394.76 22.00 28.00 41.00	108.50
08 38 19 00-0143	EA 88" x 84" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,598.31 22.00 28.00 41.00	108.50
08 38 19 00-0144 96" Height, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Doors <small>(08 38 19 00-0134)</small>			
08 38 19 00-0145	EA 48" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,162.60 22.00 28.00 41.00	103.08
08 38 19 00-0146	EA 56" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,833.10 22.00 28.00 41.00	103.08
08 38 19 00-0147	EA 60" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,012.70 22.00 28.00 41.00	103.08
08 38 19 00-0148	EA 64" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,096.51 22.00 28.00 41.00	103.08
08 38 19 00-0149	EA 72" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,346.87 22.00 28.00 41.00	108.50
08 38 19 00-0150	EA 80" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,741.99 22.00 28.00 41.00	108.50
08 38 19 00-0151	EA 84" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,933.56 22.00 28.00 41.00	108.50
08 38 19 00-0152	EA 88" x 96" Opening, Double Door, 1" Thick, Exterior Grade Solid Wood Core Impact Traffic Door..... <i>For Each 14" x 16" Window, Add</i> <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	9,137.10 22.00 28.00 41.00	108.50
08 38 19 00-0153 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors (Eliason HCP-10) <small>(08 38 19 00-0153)</small>			
<small>Note: Includes 0.125" thick thermoplastic exterior finish, 14" x 16" acrylic window and 18" high easy spring bumpers.</small>			
08 38 19 00-0154 Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors <small>(08 38 19 00-0153)</small>			
08 38 19 00-0155 84" Height, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors <small>(08 38 19 00-0154)</small>			
08 38 19 00-0156	EA 24" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,268.31 6.00 19.00	59.67
08 38 19 00-0157	EA 28" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,441.93 6.00 19.00	59.67
08 38 19 00-0158	EA 30" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,603.01 6.00 19.00	62.39
08 38 19 00-0159	EA 32" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,704.78 6.00 19.00	62.39
08 38 19 00-0160	EA 36" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,961.67 6.00 19.00	65.10
08 38 19 00-0161	EA 40" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,165.22 6.00 19.00	65.10
08 38 19 00-0162	EA 42" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door..... <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,343.10 6.00 19.00	73.24



Openings	08	08
Specialty Doors and Frames	08 30	
Traffic Doors	08 38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 38 19 00-0163 EA 44" x 84" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,534.68	73.24
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0164 90" Height, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors (08 38 19 00-0154)		
08 38 19 00-0165 EA 24" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,388.05	59.67
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0166 EA 28" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,597.58	59.67
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0167 EA 30" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,704.78	62.39
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0168 EA 32" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,848.46	62.39
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0169 EA 36" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,123.31	65.10
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0170 EA 40" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,368.76	65.10
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0171 EA 42" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,534.68	73.24
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0172 EA 44" x 90" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,714.28	73.24
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0173 96" Height, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors (08 38 19 00-0154)		
08 38 19 00-0174 EA 24" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,693.36	59.67
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0175 EA 28" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,735.27	59.67
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0176 EA 30" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	3,914.31	62.39
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0177 EA 32" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,046.02	62.39
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0178 EA 36" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,326.85	65.10
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0179 EA 40" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,620.20	65.10
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0180 EA 42" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,774.14	73.24
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0181 EA 44" x 96" Opening, Single Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	4,953.74	73.24
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0182 Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors (08 38 19 00-0153)		
08 38 19 00-0183 84" Height, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors (08 38 19 00-0182)		
08 38 19 00-0184 EA 48" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	6,504.07	103.08
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0185 EA 56" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	6,851.29	103.08
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0186 EA 60" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,162.60	103.08
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0187 EA 64" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,366.14	103.08
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0188 EA 72" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,879.91	108.50
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	
08 38 19 00-0189 EA 80" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,287.00	108.50
For Each 15" x 20" Window, Add	6.00	
For Each 18" x 30" Window, Add	19.00	

08	08	Openings
	08 30	Specialty Doors and Frames
	08 38	Traffic Doors



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0190	EA	84" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,610.28	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0191	EA	88" x 84" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,993.42	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0192 90" Height, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors <small>(08 38 19 00-0192)</small>				
08 38 19 00-0193	EA	48" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	6,743.53	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0194	EA	56" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,162.60	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0195	EA	60" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,366.14	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0196	EA	64" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,653.50	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0197	EA	72" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,203.19	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0198	EA	80" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,694.09	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0199	EA	84" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,993.42	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0200	EA	88" x 90" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	9,352.62	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0201 96" Height, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Doors <small>(08 38 19 00-0192)</small>				
08 38 19 00-0202	EA	48" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,354.17	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0203	EA	56" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,437.98	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0204	EA	60" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	7,785.21	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0205	EA	64" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,048.62	103.08
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0206	EA	72" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	8,610.28	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0207	EA	80" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	9,196.97	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0208	EA	84" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	9,472.36	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0209	EA	88" x 96" Opening, Double Door, 1-1/2" Thick, Polymer Cell Core Impact Traffic Door.....	9,831.55	108.50
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0210		1-1/2" Thick, Urethane Foam Core Impact Traffic Doors (Eliason HFG-10) <small>(08 38 19 00-0210)</small>		
		Note: Includes 0.125" thick thermoplastic exterior finish, 14" x 16" acrylic window, 18" high easy spring bumpers, and perimeter gasketing.		
08 38 19 00-0211		Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0210)</small>		
08 38 19 00-0212		84" Height, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0211)</small>		
08 38 19 00-0213	EA	24" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door	3,268.31	59.67
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0214	EA	28" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door	3,441.93	59.67
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	
08 38 19 00-0215	EA	30" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door	3,603.01	62.39
		<i>For Each 15" x 20" Window, Add</i>	6.00	
		<i>For Each 18" x 30" Window, Add</i>	19.00	



Openings	08	08
Specialty Doors and Frames	08 30	
Traffic Doors	08 38	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0216	EA 32" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,704.78 6.00 19.00	62.39
08 38 19 00-0217	EA 36" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,961.67 6.00 19.00	65.10
08 38 19 00-0218	EA 40" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,165.22 6.00 19.00	65.10
08 38 19 00-0219	EA 42" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,343.10 6.00 19.00	73.24
08 38 19 00-0220	EA 44" x 84" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,534.68 6.00 19.00	73.24
08 38 19 00-0221	90" Height, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0211)</small>		
08 38 19 00-0222	EA 24" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,388.05 6.00 19.00	59.67
08 38 19 00-0223	EA 28" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,597.58 6.00 19.00	59.67
08 38 19 00-0224	EA 30" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,704.78 6.00 19.00	62.39
08 38 19 00-0225	EA 32" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,848.46 6.00 19.00	62.39
08 38 19 00-0226	EA 36" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,123.31 6.00 19.00	65.10
08 38 19 00-0227	EA 40" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,368.76 6.00 19.00	65.10
08 38 19 00-0228	EA 42" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,534.68 6.00 19.00	73.24
08 38 19 00-0229	EA 44" x 90" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,714.28 6.00 19.00	73.24
08 38 19 00-0230	96" Height, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0211)</small>		
08 38 19 00-0231	EA 24" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,693.36 6.00 19.00	59.67
08 38 19 00-0232	EA 28" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,735.27 6.00 19.00	59.67
08 38 19 00-0233	EA 30" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	3,914.31 6.00 19.00	62.39
08 38 19 00-0234	EA 32" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,046.02 6.00 19.00	62.39
08 38 19 00-0235	EA 36" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,326.85 6.00 19.00	65.10
08 38 19 00-0236	EA 40" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,620.20 6.00 19.00	65.10
08 38 19 00-0237	EA 42" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,774.14 6.00 19.00	73.24
08 38 19 00-0238	EA 44" x 96" Opening, Single Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	4,953.74 6.00 19.00	73.24
08 38 19 00-0239	Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0210)</small>		
08 38 19 00-0240	84" Height, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0239)</small>		
08 38 19 00-0241	EA 48" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,504.07 6.00 19.00	103.08
08 38 19 00-0242	EA 56" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,851.29 6.00 19.00	103.08

08 Openings**08 30 Specialty Doors and Frames****08 38 Traffic Doors**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 38 19 00-0243	EA 60" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,162.60 6.00 19.00	103.08
08 38 19 00-0244	EA 64" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,366.14 6.00 19.00	103.08
08 38 19 00-0245	EA 72" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,879.91 6.00 19.00	108.50
08 38 19 00-0246	EA 80" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,287.00 6.00 19.00	108.50
08 38 19 00-0247	EA 84" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,610.28 6.00 19.00	108.50
08 38 19 00-0248	EA 88" x 84" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,993.42 6.00 19.00	108.50
08 38 19 00-0249 90" Height, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0239)</small>			
08 38 19 00-0250	EA 48" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	6,743.53 6.00 19.00	103.08
08 38 19 00-0251	EA 56" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,162.60 6.00 19.00	103.08
08 38 19 00-0252	EA 60" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,366.14 6.00 19.00	103.08
08 38 19 00-0253	EA 64" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,653.50 6.00 19.00	103.08
08 38 19 00-0254	EA 72" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,203.19 6.00 19.00	108.50
08 38 19 00-0255	EA 80" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,694.09 6.00 19.00	108.50
08 38 19 00-0256	EA 84" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,993.42 6.00 19.00	108.50
08 38 19 00-0257	EA 88" x 90" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	9,352.62 6.00 19.00	108.50
08 38 19 00-0258 96" Height, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Doors <small>(08 38 19 00-0239)</small>			
08 38 19 00-0259	EA 48" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,354.17 6.00 19.00	103.08
08 38 19 00-0260	EA 56" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,437.98 6.00 19.00	103.08
08 38 19 00-0261	EA 60" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	7,785.21 6.00 19.00	103.08
08 38 19 00-0262	EA 64" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,048.62 6.00 19.00	103.08
08 38 19 00-0263	EA 72" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	8,610.28 6.00 19.00	108.50
08 38 19 00-0264	EA 80" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	9,196.97 6.00 19.00	108.50
08 38 19 00-0265	EA 84" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	9,472.36 6.00 19.00	108.50
08 38 19 00-0266	EA 88" x 96" Opening, Double Door, 1-1/2" Thick, Urethane Foam Core Impact Traffic Door <i>For Each 15" x 20" Window, Add</i> <i>For Each 18" x 30" Window, Add</i>	9,831.55 6.00 19.00	108.50
08 38 19 00-0267	Rigid Impact Traffic Door Accessories <small>(08 38 19)</small>		
08 38 19 00-0268	Bumper Strips For Impact Traffic Doors <small>(08 38 19 00-0267)</small> Note: Includes two bumpers per set.		
08 38 19 00-0269	SET 24" Wide, Bumper Strips For Impact Traffic Doors	264.91	43.40
08 38 19 00-0270	SET 30" Wide, Bumper Strips For Impact Traffic Doors	294.84	43.40
08 38 19 00-0271	SET 36" Wide, Bumper Strips For Impact Traffic Doors	318.79	43.40
08 38 19 00-0272	SET 48" Wide, Bumper Strips For Impact Traffic Doors	360.69	43.40



Openings	08	08
Specialty Doors and Frames	08 30	
Traffic Doors	08 38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 38 19 00-0273 Easy Spring Bumpers For Impact Traffic Doors <small>(08 38 19 00-0267)</small>		
<small>Note: Includes two bumpers per set.</small>		
08 38 19 00-0274 SET 18" Height, Easy Spring Bumpers For Impact Traffic Doors	749.82	43.40
08 38 19 00-0275 SET 24" Height, Easy Spring Bumpers For Impact Traffic Doors	1,001.26	43.40
08 38 19 00-0276 SET 36" Height, Easy Spring Bumpers For Impact Traffic Doors	1,486.18	43.40
08 38 19 00-0277 SET 42" Height, Easy Spring Bumpers For Impact Traffic Doors	1,719.66	43.40
08 38 19 00-0278 SET 48" Height, Easy Spring Bumpers For Impact Traffic Doors	1,959.12	43.40
08 38 19 00-0279 Scuff Plates For Impact Traffic Doors <small>(08 38 19 00-0267)</small>		
<small>Note: Includes two 0.090" thermoplastic plates per set.</small>		
08 38 19 00-0280 12" High, Scuff Plates For Impact Traffic Doors <small>(08 38 19 00-0279)</small>		
08 38 19 00-0281 SET 24" Wide x 12" High, Impact Traffic Door Scuff Plates	318.79	43.40
08 38 19 00-0282 SET 30" Wide x 12" High, Impact Traffic Door Scuff Plates	342.73	43.40
08 38 19 00-0283 SET 36" Wide x 12" High, Impact Traffic Door Scuff Plates	372.67	43.40
08 38 19 00-0284 SET 42" Wide x 12" High, Impact Traffic Door Scuff Plates	414.57	43.40
08 38 19 00-0285 SET 48" Wide x 12" High, Impact Traffic Door Scuff Plates	438.52	43.40
08 38 19 00-0286 24" High, Scuff Plates For Impact Traffic Doors <small>(08 38 19 00-0279)</small>		
08 38 19 00-0287 SET 24" Wide x 24" High, Impact Traffic Door Scuff Plates	438.52	43.40
08 38 19 00-0288 SET 30" Wide x 24" High, Impact Traffic Door Scuff Plates	546.28	43.40
08 38 19 00-0289 SET 36" Wide x 24" High, Impact Traffic Door Scuff Plates	606.14	43.40
08 38 19 00-0290 SET 42" Wide x 24" High, Impact Traffic Door Scuff Plates	689.96	43.40
08 38 19 00-0291 SET 48" Wide x 24" High, Impact Traffic Door Scuff Plates	743.84	43.40
08 38 19 00-0292 30" High, Scuff Plates For Impact Traffic Doors <small>(08 38 19 00-0279)</small>		
08 38 19 00-0293 SET 24" Wide x 30" High, Impact Traffic Door Scuff Plates	546.28	43.40
08 38 19 00-0294 SET 30" Wide x 30" High, Impact Traffic Door Scuff Plates	642.06	43.40
08 38 19 00-0295 SET 36" Wide x 30" High, Impact Traffic Door Scuff Plates	713.90	43.40
08 38 19 00-0296 SET 42" Wide x 30" High, Impact Traffic Door Scuff Plates	845.61	43.40
08 38 19 00-0297 SET 48" Wide x 30" High, Impact Traffic Door Scuff Plates	935.41	43.40
08 38 19 00-0298 36" High, Scuff Plates For Impact Traffic Doors <small>(08 38 19 00-0279)</small>		
08 38 19 00-0299 SET 24" Wide x 36" High, Impact Traffic Door Scuff Plates	606.14	43.40
08 38 19 00-0300 SET 30" Wide x 36" High, Impact Traffic Door Scuff Plates	713.90	43.40
08 38 19 00-0301 SET 36" Wide x 36" High, Impact Traffic Door Scuff Plates	833.64	43.40
08 38 19 00-0302 SET 42" Wide x 36" High, Impact Traffic Door Scuff Plates	899.49	43.40
08 38 19 00-0303 SET 48" Wide x 36" High, Impact Traffic Door Scuff Plates	1,001.26	43.40
08 38 19 00-0304 48" High, Scuff Plates For Impact Traffic Doors <small>(08 38 19 00-0279)</small>		
08 38 19 00-0305 SET 24" Wide x 48" High, Impact Traffic Door Scuff Plates	743.84	43.40
08 38 19 00-0306 SET 30" Wide x 48" High, Impact Traffic Door Scuff Plates	935.41	43.40
08 38 19 00-0307 SET 36" Wide x 48" High, Impact Traffic Door Scuff Plates	1,001.26	43.40
08 38 19 00-0308 SET 42" Wide x 48" High, Impact Traffic Door Scuff Plates	1,126.98	43.40
08 38 19 00-0309 SET 48" Wide x 48" High, Impact Traffic Door Scuff Plates	1,264.67	43.40
08 38 19 00-0310 Base Plates For Impact Traffic Doors <small>(08 38 19 00-0267)</small>		
<small>Note: Includes two base plates per set.</small>		
08 38 19 00-0311 Galvanized, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0310)</small>		
08 38 19 00-0312 12" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0311)</small>		
08 38 19 00-0313 SET 24" Wide x 12" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	306.81	43.40
08 38 19 00-0314 SET 30" Wide x 12" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	330.76	43.40
08 38 19 00-0315 SET 36" Wide x 12" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	342.73	43.40
08 38 19 00-0316 SET 42" Wide x 12" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	396.61	43.40
08 38 19 00-0317 SET 48" Wide x 12" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	420.56	43.40
08 38 19 00-0318 24" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0311)</small>		
08 38 19 00-0319 SET 24" Wide x 24" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	396.61	43.40
08 38 19 00-0320 SET 30" Wide x 24" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	432.53	43.40
08 38 19 00-0321 SET 36" Wide x 24" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	468.45	43.40
08 38 19 00-0322 SET 42" Wide x 24" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	498.38	43.40
08 38 19 00-0323 SET 48" Wide x 24" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	546.28	43.40
08 38 19 00-0324 30" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0311)</small>		
08 38 19 00-0325 SET 24" Wide x 30" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	456.48	43.40
08 38 19 00-0326 SET 30" Wide x 30" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	486.41	43.40
08 38 19 00-0327 SET 36" Wide x 30" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors	558.25	43.40

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 38 19 00-0328	SET	42" Wide x 30" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	636.08	43.40
08 38 19 00-0329	SET	48" Wide x 30" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	672.00	43.40
08 38 19 00-0330		36" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0311)		
08 38 19 00-0331	SET	24" Wide x 36" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	486.41	43.40
08 38 19 00-0332	SET	30" Wide x 36" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	546.28	43.40
08 38 19 00-0333	SET	36" Wide x 36" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	636.08	43.40
08 38 19 00-0334	SET	42" Wide x 36" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	707.92	43.40
08 38 19 00-0335	SET	48" Wide x 36" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	749.82	43.40
08 38 19 00-0336		48" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0311)		
08 38 19 00-0337	SET	24" Wide x 48" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	624.10	43.40
08 38 19 00-0338	SET	30" Wide x 48" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	707.92	43.40
08 38 19 00-0339	SET	36" Wide x 48" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	821.66	43.40
08 38 19 00-0340	SET	42" Wide x 48" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	875.54	43.40
08 38 19 00-0341	SET	48" Wide x 48" High, Galvanized, 18 Gauge Base Plates For Impact Traffic Doors.....	947.38	43.40
08 38 19 00-0342		Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0310)		
08 38 19 00-0343		12" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0342)		
08 38 19 00-0344	SET	24" Wide x 12" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	414.57	43.40
08 38 19 00-0345	SET	30" Wide x 12" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	438.52	43.40
08 38 19 00-0346	SET	36" Wide x 12" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	510.36	43.40
08 38 19 00-0347	SET	42" Wide x 12" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	546.28	43.40
08 38 19 00-0348	SET	48" Wide x 12" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	648.05	43.40
08 38 19 00-0349		24" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0342)		
08 38 19 00-0350	SET	24" Wide x 24" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	582.20	43.40
08 38 19 00-0351	SET	30" Wide x 24" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	689.96	43.40
08 38 19 00-0352	SET	36" Wide x 24" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	797.72	43.40
08 38 19 00-0353	SET	42" Wide x 24" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	929.42	43.40
08 38 19 00-0354	SET	48" Wide x 24" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,049.16	43.40
08 38 19 00-0355		30" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0342)		
08 38 19 00-0356	SET	24" Wide x 30" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	666.01	43.40
08 38 19 00-0357	SET	30" Wide x 30" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	809.69	43.40
08 38 19 00-0358	SET	36" Wide x 30" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	941.40	43.40
08 38 19 00-0359	SET	42" Wide x 30" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,079.09	43.40
08 38 19 00-0360	SET	48" Wide x 30" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,240.73	43.40
08 38 19 00-0361		36" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0342)		
08 38 19 00-0362	SET	24" Wide x 36" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	773.77	43.40
08 38 19 00-0363	SET	30" Wide x 36" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	929.42	43.40
08 38 19 00-0364	SET	36" Wide x 36" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,109.02	43.40
08 38 19 00-0365	SET	42" Wide x 36" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,282.63	43.40
08 38 19 00-0366	SET	48" Wide x 36" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,432.30	43.40
08 38 19 00-0367		48" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0342)		
08 38 19 00-0368	SET	24" Wide x 48" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	965.34	43.40
08 38 19 00-0369	SET	30" Wide x 48" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,336.51	43.40
08 38 19 00-0370	SET	36" Wide x 48" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,432.30	43.40
08 38 19 00-0371	SET	42" Wide x 48" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,719.66	43.40
08 38 19 00-0372	SET	48" Wide x 48" High, Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	1,887.29	43.40
08 38 19 00-0373		One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0310)		
08 38 19 00-0374		12" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0373)		
08 38 19 00-0375	SET	24" Wide x 12" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	366.68	43.40
08 38 19 00-0376	SET	30" Wide x 12" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	396.61	43.40
08 38 19 00-0377	SET	36" Wide x 12" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	432.53	43.40
08 38 19 00-0378	SET	42" Wide x 12" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	474.44	43.40
08 38 19 00-0379	SET	48" Wide x 12" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors.....	540.29	43.40
08 38 19 00-0380		24" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors (08 38 19 00-0373)		



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 38 19 00-0381	SET	24" Wide x 24" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	498.38	43.40
08 38 19 00-0382	SET	30" Wide x 24" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	570.22	43.40
08 38 19 00-0383	SET	36" Wide x 24" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	642.06	43.40
08 38 19 00-0384	SET	42" Wide x 24" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	719.89	43.40
08 38 19 00-0385	SET	48" Wide x 24" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	809.69	43.40
08 38 19 00-0386		30" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0373)</small>		
08 38 19 00-0387	SET	24" Wide x 30" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	570.22	43.40
08 38 19 00-0388	SET	30" Wide x 30" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	660.02	43.40
08 38 19 00-0389	SET	36" Wide x 30" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	761.80	43.40
08 38 19 00-0390	SET	42" Wide x 30" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	887.52	43.40
08 38 19 00-0391	SET	48" Wide x 30" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	971.33	43.40
08 38 19 00-0392		36" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0373)</small>		
08 38 19 00-0393	SET	24" Wide x 36" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	642.06	43.40
08 38 19 00-0394	SET	30" Wide x 36" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	761.80	43.40
08 38 19 00-0395	SET	36" Wide x 36" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	887.52	43.40
08 38 19 00-0396	SET	42" Wide x 36" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	1,013.24	43.40
08 38 19 00-0397	SET	48" Wide x 36" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	1,103.04	43.40
08 38 19 00-0398		48" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors <small>(08 38 19 00-0373)</small>		
08 38 19 00-0399	SET	24" Wide x 48" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	809.69	43.40
08 38 19 00-0400	SET	30" Wide x 48" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	995.28	43.40
08 38 19 00-0401	SET	36" Wide x 48" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	1,103.04	43.40
08 38 19 00-0402	SET	42" Wide x 48" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	1,318.55	43.40
08 38 19 00-0403	SET	48" Wide x 48" High, One Galvanized And One Stainless Steel, 18 Gauge Base Plates For Impact Traffic Doors	1,378.42	43.40
08 38 19 00-0404		Jamb Guards For Impact Traffic Doors <small>(08 38 19 00-0267)</small>		
08 38 19 00-0405	EA	3" x 9", Jamb Guard For Impact Traffic Doors	503.25	54.25
08 38 19 00-0406	EA	5" x 18", Jamb Guard For Impact Traffic Doors	682.85	54.25
08 38 19 00-0407	EA	5" x 18", Stainless Steel Jamb Guard For Impact Traffic Doors	1,341.38	54.25
08 38 19 00-0408		Other Impact Traffic Door Accessories <small>(08 38 19 00-0267)</small>		
08 38 19 00-0409	EA	Push Plate For Impact Traffic Doors	122.91	27.12
08 38 19 00-0410	EA	Pull Handle For Impact Traffic Doors	164.81	27.12
08 38 19 00-0411	EA	Deadbolt Lock For Impact Traffic Doors	422.24	27.12
08 38 19 00-0412	PR	Lock Hole Reinforcements For Impact Traffic Doors	530.00	27.12
08 38 19 00-0413	PR	Padlock Brackets For Impact Traffic Doors	206.72	27.12
08 38 19 00-0414		Impact Traffic Door Knock Down Frames <small>(08 38 19)</small>		
Note: Frames are 16 gauge galvanized steel with reinforcement at hardware locations.				
08 38 19 00-0415		Single Door, Impact Traffic Door Knock Down Frames <small>(08 38 19 00-0414)</small>		
08 38 19 00-0416		84" Height, Single Door, Impact Traffic Door Knock Down Frames <small>(08 38 19 00-0415)</small>		
08 38 19 00-0417	EA	24" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,232.02	81.38
08 38 19 00-0418	EA	28" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,451.97	89.51
08 38 19 00-0419	EA	30" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,483.16	94.94
08 38 19 00-0420	EA	32" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,517.22	103.08
08 38 19 00-0421	EA	36" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,551.01	108.50
08 38 19 00-0422	EA	40" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,616.75	113.93
08 38 19 00-0423	EA	42" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,664.36	119.36
08 38 19 00-0424	EA	44" x 84" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,695.33	124.77
08 38 19 00-0425		90" Height, Single Door, Impact Traffic Door Knock Down Frames <small>(08 38 19 00-0415)</small>		
08 38 19 00-0426	EA	24" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,258.72	81.38
08 38 19 00-0427	EA	28" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,483.76	89.51
08 38 19 00-0428	EA	30" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,515.50	94.94
08 38 19 00-0429	EA	32" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,550.00	103.08
08 38 19 00-0430	EA	36" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,584.36	108.50
08 38 19 00-0431	EA	40" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,651.47	113.93
08 38 19 00-0432	EA	42" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,699.98	119.36
08 38 19 00-0433	EA	44" x 90" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,731.49	124.77
08 38 19 00-0434		96" Height, Single Door, Impact Traffic Door Knock Down Frames <small>(08 38 19 00-0415)</small>		
08 38 19 00-0435	EA	24" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,294.23	81.38
08 38 19 00-0436	EA	28" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,526.02	89.51
08 38 19 00-0437	EA	30" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame	1,558.43	94.94

08 Openings**08 30 Specialty Doors and Frames****08 38 Traffic Doors**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 38 19 00-0438	EA	32" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame.....	1,583.02	103.08
08 38 19 00-0439	EA	36" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame.....	1,628.66	108.50
08 38 19 00-0440	EA	40" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame.....	1,686.20	113.93
08 38 19 00-0441	EA	42" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame.....	1,747.33	119.36
08 38 19 00-0442	EA	44" x 96" Opening, Single Door, Impact Traffic Door Knock Down Frame.....	1,782.14	122.06

08 38 19 00-0443 Double Door, Impact Traffic Door Knock Down Frames (08 38 19 00-0414)**08 38 19 00-0444 84" Height, Double Door, Impact Traffic Door Knock Down Frames (08 38 19 00-0443)**

08 38 19 00-0445	EA	48" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,726.16	124.77
08 38 19 00-0446	EA	56" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,753.21	126.95
08 38 19 00-0447	EA	60" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,787.90	130.20
08 38 19 00-0448	EA	64" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,833.16	135.63
08 38 19 00-0449	EA	72" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,860.49	141.05
08 38 19 00-0450	EA	80" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,924.91	142.14
08 38 19 00-0451	EA	84" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,967.77	143.77
08 38 19 00-0452	EA	88" x 84" Opening, Double Door, Impact Traffic Door Knock Down Frame	2,019.09	146.48

08 38 19 00-0453 90" Height, Double Door, Impact Traffic Door Knock Down Frames (08 38 19 00-0443)

08 38 19 00-0454	EA	48" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,763.04	124.77
08 38 19 00-0455	EA	56" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,790.63	126.95
08 38 19 00-0456	EA	60" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,826.10	130.20
08 38 19 00-0457	EA	64" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,872.20	135.63
08 38 19 00-0458	EA	72" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,900.00	141.05
08 38 19 00-0459	EA	80" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,965.92	142.14
08 38 19 00-0460	EA	84" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	2,009.77	143.77
08 38 19 00-0461	EA	88" x 90" Opening, Double Door, Impact Traffic Door Knock Down Frame	2,062.25	146.48

08 38 19 00-0462 96" Height, Double Door, Impact Traffic Door Knock Down Frames (08 38 19 00-0443)

08 38 19 00-0463	EA	48" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,806.09	124.77
08 38 19 00-0464	EA	56" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,827.98	126.95
08 38 19 00-0465	EA	60" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,876.80	130.20
08 38 19 00-0466	EA	64" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,911.23	135.63
08 38 19 00-0467	EA	72" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	1,952.38	141.05
08 38 19 00-0468	EA	80" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	2,026.38	142.14
08 38 19 00-0469	EA	84" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	2,065.56	143.77
08 38 19 00-0470	EA	88" x 96" Opening, Double Door, Impact Traffic Door Knock Down Frame	2,108.74	146.48

08 40 Entrances, Storefronts, and Curtain Walls (08)**08 42 Entrances (08 40)****08 42 13 Aluminum-Framed Entrances (08 42)****08 42 13 00-0001 Aluminum Framed Entrance Doors (08 42 13)**

Note: Includes frame, trim, necessary anchors, tempered glass, standard hardware (hinges, pull handle, push plate, threshold, door sweep) and prepared for panic device. Fixed doors mullion (on pairs). Excludes exit device and closer. See CSI section 08 71 11 00-2087 for exit device, 08 71 11 00-2236 for closer.

08 42 13 00-0002	EA	3' x 7' x 1-3/4" Medium Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors.....	7,098.19	744.16
		Note: Including Glazing, Trim And Hardware		
		For Bronze Finish, Add	664.06	
		For Black Finish, Add	1,907.22	
		For 8' High Door, Add	687.99	
		For 10' High Door, Add	1,495.63	
		For 1" Insulated Glazing, Add	153.40	
08 42 13 00-0003	EA	3'-6" x 7' x 1-3/4" Medium Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors	7,248.52	817.80
		Note: Including Glazing, Trim And Hardware		
		For Bronze Finish, Add	668.36	
		For Black Finish, Add	1,919.58	
		For 8' High Door, Add	692.44	
		For 10' High Door, Add	1,505.32	
		For 1" Insulated Glazing, Add	153.40	
08 42 13 00-0004	PR	6' x 7' x 1-3/4" Medium Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors.....	12,035.98	1,116.02
		Note: Including Glazing, Trim And Hardware		
		For Bronze Finish, Add	1,150.60	
		For Black Finish, Add	3,304.61	
		For 8' High Door, Add	1,192.07	
		For 10' High Door, Add	2,591.45	
		For 1" Insulated Glazing, Add	306.80	
08 42 13 00-0005	PR	7' x 7' x 1-3/4" Medium Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors.....	14,102.80	1,216.10
		Note: Including Glazing, Trim And Hardware		
		For Bronze Finish, Add	1,362.31	
		For Black Finish, Add	3,912.65	
		For 8' High Door, Add	1,411.40	
		For 10' High Door, Add	3,068.27	
		For 1" Insulated Glazing, Add	306.80	



Openings	08
Entrances, Storefronts, and Curtain Walls	08 40
Entrances	08 42

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 42 13 00-0006	EA		3' x 7' x 1-3/4" Wide Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors Note: Including Glazing, Trim And Hardware	7,912.27	744.16
			<i>For Bronze Finish, Add</i>	754.42	
			<i>For Black Finish, Add</i>	2,166.75	
			<i>For 8' High Door, Add</i>	781.61	
			<i>For 10' High Door, Add</i>	1,699.15	
			<i>For 1" Insulated Glazing, Add</i>	153.40	
08 42 13 00-0007	EA		3'-6" x 7' x 1-3/4" Wide Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors Note: Including Glazing, Trim And Hardware	8,113.00	817.80
			<i>For Bronze Finish, Add</i>	764.32	
			<i>For Black Finish, Add</i>	2,195.17	
			<i>For 8' High Door, Add</i>	791.86	
			<i>For 10' High Door, Add</i>	1,721.44	
			<i>For 1" Insulated Glazing, Add</i>	153.40	
08 42 13 00-0008	PR		6' x 7' x 1-3/4" Wide Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors Note: Including Glazing, Trim And Hardware	13,574.99	1,116.02
			<i>For Bronze Finish, Add</i>	1,321.43	
			<i>For Black Finish, Add</i>	3,795.25	
			<i>For 8' High Door, Add</i>	1,369.05	
			<i>For 10' High Door, Add</i>	2,976.20	
			<i>For 1" Insulated Glazing, Add</i>	306.80	
08 42 13 00-0009	PR		7' x 7' x 1-3/4" Wide Stile, Clear Anodized Finish, Aluminum Framed Entrance Doors Note: Including Glazing, Trim And Hardware	15,596.89	1,216.10
			<i>For Bronze Finish, Add</i>	1,528.15	
			<i>For Black Finish, Add</i>	4,388.97	
			<i>For 8' High Door, Add</i>	1,583.22	
			<i>For 10' High Door, Add</i>	3,441.79	
			<i>For 1" Insulated Glazing, Add</i>	306.80	

08 42 29 Automatic Entrances (08 42)

08 42 29 33 Swinging Automatic Entrances (08 42 29)

Note: Excludes glazing.

08 42 29 33-0001 Swing Door Operators, Up To 350 LB Panel Weight (08 42 29 33)

Note: Includes electro-mechanical swinging door operator and electrical controls, aluminum header, connecting hardware, actuating controls, and on/off/hold open switch. Excludes activation device, doors, and power connection. Stanley Magic Force or equal.

08 42 29 33-0002	EA		Concealed Single Door Swing Door Operator, Up To 350 LB Panel Note: For new storefront or existing concealed operator installations.	4,442.44	611.40
08 42 29 33-0003	EA		Concealed Pair Of Doors Swing Door Operator, Up To 350 LB Panel Note: For new storefront or existing concealed operator installations.	7,662.83	815.24
08 42 29 33-0004	EA		Exposed Single Door Swing Door Operator, Up To 350 LB Panel	3,695.88	489.12
08 42 29 33-0005	EA		Exposed Pair Of Doors Swing Door Operator, Up To 350 LB Panel	6,657.44	733.68

08 42 29 33-0006 Activation Devices For Door Operators (08 42 29 33)

08 42 29 33-0007	EA		Overhead Active Infrared Presence Detector For Door Operators (MS Sedco DH97) Note: Includes wiring harness and relays.	384.92	48.91
08 42 29 33-0008	EA		On Door Active Infrared Presence Detector For Door Operator (Stanley Sentrex RS) Note: Includes wiring harness and relays.	344.22	48.91
08 42 29 33-0009	EA		Microwave Motion Sensor For Door Operator (MS Sedco D38) Note: Includes wiring harness and relays.	347.46	48.91
08 42 29 33-0010	EA		4" x 4", Americans With Disabilities Act Compliant Push Button For Door Operator (MS Sedco 59-H) Note: Excludes wiring from operator to push plate.	203.18	48.91
08 42 29 33-0011	EA		1-1/2" x 4", Americans With Disabilities Act Compliant Push Button For Door Operator (MS Sedco 59J-H) Note: Excludes wiring from operator to push button.	218.48	48.91
08 42 29 33-0012	EA		1-11/16" x 4-1/2", Jamb Mounted Push Button For Door Operator (MS Sedco 425) Note: Excludes wiring from operator to push button.	133.57	48.91
08 42 29 33-0013	EA		Radio Control System For Door Operator (MS Sedco Clearpath) Note: Includes receiver and two push plate transmitters.	640.20	122.28
			<i>For Single Transmitter (Includes Receiver, One Push Plate Transmitter, And One Jamb Mounted Push Button), Deduct</i>	-64.00	
08 42 29 33-0014	EA		Combination Digital Camera/Motion Detector For Door Operators (Stanley StanVision) Note: Includes wiring harness and relays.	809.78	61.14
08 42 29 33-0015	EA		Guard Rail For Door With Operator	260.11	61.14

08 44 Curtain Wall and Glazed Assemblies (08 40)

08 44 13 Glazed Aluminum Curtain Walls (08 44)

08 44 13 00-0001			Curtain Walls (08 44 13)		
08 44 13 00-0002			Coping Sections (08 44 13 00-0001)		
08 44 13 00-0003	LF		Curtain Wall, 1/8" x 8" Coping Section Shaped (3") Aluminum System Framing Section <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	71.99 7.86 32.43 14.15	3.34
08 44 13 00-0004	LF		Curtain Wall, 1/8" x 9" Coping Section Shaped (4") Aluminum System Framing Section <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	74.79 8.28 34.11 14.91	3.34

08 Openings**08 40 Entrances, Storefronts, and Curtain Walls****08 44 Curtain Wall and Glazed Assemblies**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 44 13 00-0005	LF Curtain Wall, 1/8" x 12-1/2" Coping Section Shaped (5-1/2") Aluminum Framing Section..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	89.92 9.83 40.54 17.69	4.46
08 44 13 00-0006	Sill Section (08 44 13 00-0001)		
08 44 13 00-0007	LF Aluminum Curtain Wall, 1/8" x 6" Sill Section Shaped Aluminum System Framing Section <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	55.51 6.26 25.73 11.27	2.24
08 44 13 00-0008	LF Aluminum Curtain Wall, 1/8" x 7" Sill Section Shaped Aluminum System Framing Section <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	59.97 6.93 28.41 12.47	2.24
08 44 13 00-0009	LF Aluminum Curtain Wall, 1/8" x 8-1/2" Sill Section Shaped Aluminum System Framing Section <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	64.48 7.61 31.11 13.69	2.24
08 44 13 00-0010	Aluminum Column Covers (08 44 13 00-0001) Note: Includes all clips and fasteners.		
08 44 13 00-0011	LF Aluminum Column Covers, 1/8" x 26", Shaped..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	145.94 17.18 70.28 30.92	5.58
08 44 13 00-0012	LF Aluminum Column Covers, 1/8" x 34", Shaped..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	179.49 21.93 89.38 39.47	5.58
08 44 13 00-0013	LF Aluminum Column Covers, 1/8" x 38", Shaped..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	192.46 23.87 97.16 42.97	5.58
08 44 13 00-0014	Spandrel Covers (08 44 13 00-0001) Note: Where exterior facing only is described in the following the interior face will be tempered hardboard (to be painted).		
08 44 13 00-0015	SF 1" Spandrel Cover, Aluminum Both Faces..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	59.04 7.45 30.27 13.41	2.24
08 44 13 00-0016	SF 1" Spandrel Cover, Aluminum Exterior Face..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	51.67 6.34 25.84 11.42	2.24
08 44 13 00-0017	SF 1" Spandrel Cover, Epoxy Both Faces..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	112.69 15.50 62.46 27.89	2.24
08 44 13 00-0018	SF 1" Spandrel Cover, Epoxy Exterior Face Only <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	91.91 12.38 49.99 22.28	2.24
08 44 13 00-0019	SF 2" Spandrel Cover, Aluminum Both Faces..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	66.29 8.17 33.28 14.71	2.24
08 44 13 00-0020	SF 2" Spandrel Cover, Aluminum Exterior Face..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	59.31 7.13 29.09 12.83	2.24
08 44 13 00-0021	SF 2" Spandrel Cover, Epoxy Both Faces..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	128.72 17.54 70.74 31.57	2.24
08 44 13 00-0022	SF 2" Spandrel Cover, Epoxy Exterior Face Only <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	104.75 13.94 56.35 25.09	2.24
08 44 13 00-0023	Curtain Wall, Aluminum System Framing Sections (08 44 13 00-0001) Note: The prices are based on stock shapes of anodized aluminum, plain color and of 0.125" thickness.		
08 44 13 00-0024	LF Aluminum System Curtain Wall, 1-1/2" x 3" Jamb Aluminum Framed Window Walls..... <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	79.62 10.62 42.90 19.11	2.24
08 44 13 00-0025	LF Aluminum System Curtain Wall, 1-1/2" x 3" Head Aluminum Framed Window Walls <i>For Bronze Anodized Aluminum, Add</i> <i>For Stainless Steel, Add</i> <i>For Black Anodized Finish, Add</i>	79.45 10.62 42.90 19.11	2.24



Openings	08
Entrances, Storefronts, and Curtain Walls	08 40
Curtain Wall and Glazed Assemblies	08 44

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 44 13 00-0026	LF		Aluminum System Curtain Wall, 1-1/2" x 3" Mullion Aluminum Framed Window Walls	79.45	2.24
			<i>For Bronze Anodized Aluminum, Add</i>	10.62	
			<i>For Stainless Steel, Add</i>	42.90	
			<i>For Black Anodized Finish, Add</i>	19.11	
			<i>For Corner Mullion, Add</i>	18.99	
08 44 13 00-0027	LF		Aluminum System Curtain Wall, 2" x 4" Jamb Aluminum Framed Window Walls	97.95	4.46
			<i>For Bronze Anodized Aluminum, Add</i>	12.68	
			<i>For Stainless Steel, Add</i>	51.41	
			<i>For Black Anodized Finish, Add</i>	22.83	
08 44 13 00-0028	LF		Aluminum System Curtain Wall, 2" x 4" Horizontal Aluminum Framed Window Walls	97.95	4.46
			<i>For Bronze Anodized Aluminum, Add</i>	12.68	
			<i>For Stainless Steel, Add</i>	51.41	
			<i>For Black Anodized Finish, Add</i>	22.83	
08 44 13 00-0029	LF		Aluminum System Curtain Wall, 2" x 4" Mullion Aluminum Framed Window Walls	97.95	4.46
			<i>For Bronze Anodized Aluminum, Add</i>	12.68	
			<i>For Stainless Steel, Add</i>	51.41	
			<i>For Black Anodized Finish, Add</i>	22.83	
			<i>For Corner Mullion, Add</i>	23.15	
08 44 13 00-0030	LF		Aluminum System Curtain Wall, 2" x 6" Jamb Aluminum Framed Window Walls	107.54	4.91
			<i>For Bronze Anodized Aluminum, Add</i>	13.90	
			<i>For Stainless Steel, Add</i>	56.35	
			<i>For Black Anodized Finish, Add</i>	25.02	
08 44 13 00-0031	LF		Aluminum System Curtain Wall, 2" x 6" Horizontal Aluminum Framed Window Walls	107.54	4.91
			<i>For Bronze Anodized Aluminum, Add</i>	13.90	
			<i>For Stainless Steel, Add</i>	56.35	
			<i>For Black Anodized Finish, Add</i>	25.02	
08 44 13 00-0032	LF		Aluminum System Curtain Wall, 2" x 6" Mullion Aluminum Framed Window Walls	107.54	4.91
			<i>For Bronze Anodized Aluminum, Add</i>	13.90	
			<i>For Stainless Steel, Add</i>	56.35	
			<i>For Black Anodized Finish, Add</i>	25.02	
			<i>For Corner Mullion, Add</i>	25.40	
08 44 13 00-0033	LF		Aluminum System Curtain Wall, 3" x 5-1/2" Jamb Aluminum Framed Window Walls	117.36	5.58
			<i>For Bronze Anodized Aluminum, Add</i>	15.12	
			<i>For Stainless Steel, Add</i>	61.32	
			<i>For Black Anodized Finish, Add</i>	27.22	
08 44 13 00-0034	LF		Aluminum System Curtain Wall, 3" x 5-1/2" Horizontal Aluminum Framed Window Walls	117.36	5.58
			<i>For Bronze Anodized Aluminum, Add</i>	15.12	
			<i>For Stainless Steel, Add</i>	61.32	
			<i>For Black Anodized Finish, Add</i>	27.22	
08 44 13 00-0035	LF		Aluminum System Curtain Wall, 3" x 5-1/2" Mullion Aluminum Framed Window Walls	117.36	5.58
			<i>For Bronze Anodized Aluminum, Add</i>	15.12	
			<i>For Stainless Steel, Add</i>	61.32	
			<i>For Black Anodized Finish, Add</i>	27.22	
			<i>For Corner Mullion, Add</i>	27.69	
08 44 13 00-0036	LF		Aluminum System Curtain Wall, 3" x 6-3/4" Jamb Aluminum Framed Window Walls	131.76	6.02
			<i>For Bronze Anodized Aluminum, Add</i>	17.06	
			<i>For Stainless Steel, Add</i>	69.13	
			<i>For Black Anodized Finish, Add</i>	30.70	
08 44 13 00-0037	LF		Aluminum System Curtain Wall, 3" x 6-3/4" Horizontal Aluminum Framed Window Walls	131.76	6.02
			<i>For Bronze Anodized Aluminum, Add</i>	17.06	
			<i>For Stainless Steel, Add</i>	69.13	
			<i>For Black Anodized Finish, Add</i>	30.70	
08 44 13 00-0038	LF		Aluminum System Curtain Wall, 3" x 6-3/4" Mullion Aluminum Framed Window Walls	131.76	6.02
			<i>For Bronze Anodized Aluminum, Add</i>	17.06	
			<i>For Stainless Steel, Add</i>	69.13	
			<i>For Black Anodized Finish, Add</i>	30.70	
			<i>For Corner Mullion, Add</i>	31.14	
08 44 13 00-0039	LF		Aluminum System Curtain Wall, 3" x 8-3/4" Jamb Aluminum Framed Window Walls	151.26	6.70
			<i>For Bronze Anodized Aluminum, Add</i>	19.58	
			<i>For Stainless Steel, Add</i>	79.37	
			<i>For Black Anodized Finish, Add</i>	35.25	
08 44 13 00-0040	LF		Aluminum System Curtain Wall, 3" x 8-3/4" Horizontal Aluminum Framed Window Walls	151.26	6.70
			<i>For Bronze Anodized Aluminum, Add</i>	19.58	
			<i>For Stainless Steel, Add</i>	79.37	
			<i>For Black Anodized Finish, Add</i>	35.25	
08 44 13 00-0041	LF		Aluminum System Curtain Wall, 3" x 8-3/4" Mullion Aluminum Framed Window Walls	151.26	6.70
			<i>For Bronze Anodized Aluminum, Add</i>	19.58	
			<i>For Stainless Steel, Add</i>	79.37	
			<i>For Black Anodized Finish, Add</i>	35.25	
			<i>For Corner Mullion, Add</i>	35.75	

08 45 Translucent Wall and Roof Assemblies (08 40)

08 45 23 Fiberglass-Sandwich-Panel Assemblies (08 45)

08 45 23 00-0001 Translucent Fiberglass Sandwich-Panels 2-3/4" Thick (08 45 23)

08 45 23 00-0002	SF	<5,000 SF Translucent Fiberglass Sandwich-Panel 2-3/4" Thick, Metal Framed	151.97	5.96
		<i>For Aluminum Frame, Add</i>	14.30	
08 45 23 00-0003	SF	>5,000 SF Translucent Fiberglass Sandwich-Panel 2-3/4" Thick, Metal Framed	139.37	5.08
		<i>For Aluminum Frame, Add</i>	13.18	

08 50 Windows (08)

Note: Includes hardware, caulk, sealant and mounting anchors. Operable windows include weather stripping. Demolition includes

08 Openings**08 50 Windows****08 45 Translucent Wall and Roof Assemblies**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

removal of frame, glass and insect screens.

08 52 Wood Windows (08 50)**08 52 11 Wood Windows** (08 52)

08 52 11 00-0001	Sash-Only Replacement Kits For Double Hung Wood Windows (08 52 11) Note: Includes demo of the existing sashes and jamb liners. Includes two sashes, jamb liners, insulated glass and all hardware needed for installation. Includes primed pine wood interior and exterior. Excludes window frame, trim, insect screens and grilles.		
08 52 11 00-0002	30" Height, Sash-Only Replacement Kits For Double Hung Wood Windows (08 52 11 00-0001)		
08 52 11 00-0003	EA 20" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	329.26	
	For Low-E Insulated Glass, Add	27.81	
	For Aluminum Clad Exterior, Add	29.79	
08 52 11 00-0004	EA 24" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	349.62	
	For Low-E Insulated Glass, Add	29.81	
	For Aluminum Clad Exterior, Add	31.94	
08 52 11 00-0005	EA 28" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	371.42	
	For Low-E Insulated Glass, Add	32.01	
	For Aluminum Clad Exterior, Add	34.29	
08 52 11 00-0006	EA 30" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	383.02	
	For Low-E Insulated Glass, Add	33.21	
	For Aluminum Clad Exterior, Add	35.58	
08 52 11 00-0007	EA 32" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	393.21	
	For Low-E Insulated Glass, Add	34.21	
	For Aluminum Clad Exterior, Add	36.65	
08 52 11 00-0008	EA 34" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	406.26	
	For Low-E Insulated Glass, Add	35.61	
	For Aluminum Clad Exterior, Add	38.15	
08 52 11 00-0009	EA 36" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	412.19	
	For Low-E Insulated Glass, Add	36.02	
	For Aluminum Clad Exterior, Add	38.59	
08 52 11 00-0010	EA 40" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	438.23	
	For Low-E Insulated Glass, Add	38.81	
	For Aluminum Clad Exterior, Add	41.58	
08 52 11 00-0011	EA 44" x 30", Sash-Only Replacement Kit For Double Hung Wood Windows.....	460.02	
	For Low-E Insulated Glass, Add	41.01	
	For Aluminum Clad Exterior, Add	43.94	
08 52 11 00-0012	34" Height, Sash-Only Replacement Kits For Double Hung Wood Windows (08 52 11 00-0001)		
08 52 11 00-0013	EA 20" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	349.62	
	For Low-E Insulated Glass, Add	29.81	
	For Aluminum Clad Exterior, Add	31.94	
08 52 11 00-0014	EA 24" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	371.42	
	For Low-E Insulated Glass, Add	32.01	
	For Aluminum Clad Exterior, Add	34.29	
08 52 11 00-0015	EA 28" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	390.17	
	For Low-E Insulated Glass, Add	34.21	
	For Aluminum Clad Exterior, Add	36.65	
08 52 11 00-0016	EA 30" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	406.26	
	For Low-E Insulated Glass, Add	35.61	
	For Aluminum Clad Exterior, Add	38.15	
08 52 11 00-0017	EA 32" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	416.43	
	For Low-E Insulated Glass, Add	36.61	
	For Aluminum Clad Exterior, Add	39.22	
08 52 11 00-0018	EA 34" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	428.05	
	For Low-E Insulated Glass, Add	37.81	
	For Aluminum Clad Exterior, Add	40.51	
08 52 11 00-0019	EA 36" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	438.23	
	For Low-E Insulated Glass, Add	38.81	
	For Aluminum Clad Exterior, Add	41.58	
08 52 11 00-0020	EA 40" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	460.02	
	For Low-E Insulated Glass, Add	41.01	
	For Aluminum Clad Exterior, Add	43.94	
08 52 11 00-0021	EA 44" x 34", Sash-Only Replacement Kit For Double Hung Wood Windows.....	481.82	
	For Low-E Insulated Glass, Add	43.21	
	For Aluminum Clad Exterior, Add	46.30	
08 52 11 00-0022	36" Height, Sash-Only Replacement Kits For Double Hung Wood Windows (08 52 11 00-0001)		
08 52 11 00-0023	EA 20" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows.....	359.71	
	For Low-E Insulated Glass, Add	31.01	
	For Aluminum Clad Exterior, Add	33.22	
08 52 11 00-0024	EA 24" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows.....	381.51	
	For Low-E Insulated Glass, Add	33.21	
	For Aluminum Clad Exterior, Add	35.58	
08 52 11 00-0025	EA 28" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows.....	404.74	
	For Low-E Insulated Glass, Add	35.61	
	For Aluminum Clad Exterior, Add	38.15	
08 52 11 00-0026	EA 30" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows.....	414.92	
	For Low-E Insulated Glass, Add	36.61	
	For Aluminum Clad Exterior, Add	39.22	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				08 52 11 00-0027 EA 32" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows 426.53		
				For Low-E Insulated Glass, Add	37.81	
				For Aluminum Clad Exterior, Add	40.51	
				08 52 11 00-0028 EA 34" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows 436.71		
				For Low-E Insulated Glass, Add	38.81	
				For Aluminum Clad Exterior, Add	41.58	
				08 52 11 00-0029 EA 36" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows 448.33		
				For Low-E Insulated Glass, Add	40.01	
				For Aluminum Clad Exterior, Add	42.87	
				08 52 11 00-0030 EA 40" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows 468.68		
				For Low-E Insulated Glass, Add	42.01	
				For Aluminum Clad Exterior, Add	45.01	
				08 52 11 00-0031 EA 44" x 36", Sash-Only Replacement Kit For Double Hung Wood Windows 490.48		
				For Low-E Insulated Glass, Add	44.21	
				For Aluminum Clad Exterior, Add	47.37	
				08 52 11 00-0032 38" Height, Sash-Only Replacement Kits For Double Hung Wood Windows		
				<small>(08 52 11 00-0001)</small>		
				08 52 11 00-0033 EA 20" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 372.94		
				For Low-E Insulated Glass, Add	32.01	
				For Aluminum Clad Exterior, Add	34.29	
				08 52 11 00-0034 EA 24" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 394.74		
				For Low-E Insulated Glass, Add	34.21	
				For Aluminum Clad Exterior, Add	36.65	
				08 52 11 00-0035 EA 28" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 417.95		
				For Low-E Insulated Glass, Add	36.61	
				For Aluminum Clad Exterior, Add	39.22	
				08 52 11 00-0036 EA 30" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 429.57		
				For Low-E Insulated Glass, Add	37.81	
				For Aluminum Clad Exterior, Add	40.51	
				08 52 11 00-0037 EA 32" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 439.75		
				For Low-E Insulated Glass, Add	38.81	
				For Aluminum Clad Exterior, Add	41.58	
				08 52 11 00-0038 EA 34" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 451.36		
				For Low-E Insulated Glass, Add	40.01	
				For Aluminum Clad Exterior, Add	42.87	
				08 52 11 00-0039 EA 36" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 461.54		
				For Low-E Insulated Glass, Add	41.01	
				For Aluminum Clad Exterior, Add	43.94	
				08 52 11 00-0040 EA 40" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 483.34		
				For Low-E Insulated Glass, Add	43.21	
				For Aluminum Clad Exterior, Add	46.30	
				08 52 11 00-0041 EA 44" x 38", Sash-Only Replacement Kit For Double Hung Wood Windows 505.13		
				For Low-E Insulated Glass, Add	45.41	
				For Aluminum Clad Exterior, Add	48.66	
				08 52 11 00-0042 46" Height, Sash-Only Replacement Kits For Double Hung Wood Windows		
				<small>(08 52 11 00-0001)</small>		
				08 52 11 00-0043 EA 20" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 416.43		
				For Low-E Insulated Glass, Add	36.61	
				For Aluminum Clad Exterior, Add	39.22	
				08 52 11 00-0044 EA 24" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 438.23		
				For Low-E Insulated Glass, Add	38.81	
				For Aluminum Clad Exterior, Add	41.58	
				08 52 11 00-0045 EA 28" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 460.02		
				For Low-E Insulated Glass, Add	41.01	
				For Aluminum Clad Exterior, Add	43.94	
				08 52 11 00-0046 EA 30" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 470.21		
				For Low-E Insulated Glass, Add	42.01	
				For Aluminum Clad Exterior, Add	45.01	
				08 52 11 00-0047 EA 32" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 481.82		
				For Low-E Insulated Glass, Add	43.21	
				For Aluminum Clad Exterior, Add	46.30	
				08 52 11 00-0048 EA 34" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 492.00		
				For Low-E Insulated Glass, Add	44.21	
				For Aluminum Clad Exterior, Add	47.37	
				08 52 11 00-0049 EA 36" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 503.62		
				For Low-E Insulated Glass, Add	45.41	
				For Aluminum Clad Exterior, Add	48.66	
				08 52 11 00-0050 EA 40" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 525.40		
				For Low-E Insulated Glass, Add	47.61	
				For Aluminum Clad Exterior, Add	51.01	
				08 52 11 00-0051 EA 44" x 46", Sash-Only Replacement Kit For Double Hung Wood Windows 548.63		
				For Low-E Insulated Glass, Add	50.01	
				For Aluminum Clad Exterior, Add	53.58	
				08 52 11 00-0052 48" Height, Sash-Only Replacement Kits For Double Hung Wood Windows		
				<small>(08 52 11 00-0001)</small>		
				08 52 11 00-0053 EA 20" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows 426.53		
				For Low-E Insulated Glass, Add	37.81	
				For Aluminum Clad Exterior, Add	40.51	

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 11 00-0054	EA 24" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	448.33 40.01 42.87	
08 52 11 00-0055	EA 28" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	468.68 42.01 45.01	
08 52 11 00-0056	EA 30" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	480.30 43.21 46.30	
08 52 11 00-0057	EA 32" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	490.48 44.21 47.37	
08 52 11 00-0058	EA 34" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	502.10 45.41 48.66	
08 52 11 00-0059	EA 36" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	512.27 46.41 49.73	
08 52 11 00-0060	EA 40" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	535.50 48.81 52.30	
08 52 11 00-0061	EA 44" x 48", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	557.30 51.01 54.66	
08 52 11 00-0062	50" Height, Sash-Only Replacement Kits For Double Hung Wood Windows <small>(08 52 11 00-0001)</small>		
08 52 11 00-0063	EA 20" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	439.75 38.81 41.58	
08 52 11 00-0064	EA 24" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	461.54 41.01 43.94	
08 52 11 00-0065	EA 28" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	483.34 43.21 46.30	
08 52 11 00-0066	EA 30" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	493.52 44.21 47.37	
08 52 11 00-0067	EA 32" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	505.13 45.41 48.66	
08 52 11 00-0068	EA 34" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	515.31 46.41 49.73	
08 52 11 00-0069	EA 36" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	526.92 47.61 51.01	
08 52 11 00-0070	EA 40" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	550.15 50.01 53.58	
08 52 11 00-0071	EA 44" x 50", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	571.94 52.21 55.94	
08 52 11 00-0072	54" Height, Sash-Only Replacement Kits For Double Hung Wood Windows <small>(08 52 11 00-0001)</small>		
08 52 11 00-0073	EA 20" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	461.54 41.01 43.94	
08 52 11 00-0074	EA 24" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	483.34 43.21 46.30	
08 52 11 00-0075	EA 28" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	505.13 45.41 48.66	
08 52 11 00-0076	EA 30" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	515.31 46.41 49.73	
08 52 11 00-0077	EA 32" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	526.92 47.61 51.01	
08 52 11 00-0078	EA 34" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	538.54 48.81 52.30	
08 52 11 00-0079	EA 36" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	550.15 50.01 53.58	
08 52 11 00-0080	EA 40" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	571.94 52.21 55.94	
08 52 11 00-0081	EA 44" x 54", Sash-Only Replacement Kit For Double Hung Wood Windows..... <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	593.74 54.41 58.30	

	MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 52 11 00-0082 58" Height, Sash-Only Replacement Kits For Double Hung Wood Windows
(08 52 11 00-0001)

08 52 11 00-0083	EA 20" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	481.82 43.21 46.30	
08 52 11 00-0084	EA 24" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	503.62 45.41 48.66	
08 52 11 00-0085	EA 28" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	525.40 47.61 51.01	
08 52 11 00-0086	EA 30" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	537.02 48.81 52.30	
08 52 11 00-0087	EA 32" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	548.63 50.01 53.58	
08 52 11 00-0088	EA 34" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	558.82 51.01 54.66	
08 52 11 00-0089	EA 36" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	570.43 52.21 55.94	
08 52 11 00-0090	EA 40" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	592.22 54.41 58.30	
08 52 11 00-0091	EA 44" x 58", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	612.59 56.41 60.44	

08 52 11 00-0092 60" Height, Sash-Only Replacement Kits For Double Hung Wood Windows
(08 52 11 00-0001)

08 52 11 00-0093	EA 20" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	490.48 44.21 47.37	
08 52 11 00-0094	EA 24" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	512.27 46.41 49.73	
08 52 11 00-0095	EA 28" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	535.50 48.81 52.30	
08 52 11 00-0096	EA 30" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	547.11 50.01 53.58	
08 52 11 00-0097	EA 32" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	557.30 51.01 54.66	
08 52 11 00-0098	EA 34" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	568.91 52.21 55.94	
08 52 11 00-0099	EA 36" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	579.08 53.21 57.01	
08 52 11 00-0100	EA 40" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	600.88 55.41 59.37	
08 52 11 00-0101	EA 44" x 60", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	622.68 57.61 61.73	

08 52 11 00-0102 62" Height, Sash-Only Replacement Kits For Double Hung Wood Windows
(08 52 11 00-0001)

08 52 11 00-0103	EA 20" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	505.13 45.41 48.66	
08 52 11 00-0104	EA 24" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	526.92 47.61 51.01	
08 52 11 00-0105	EA 28" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	550.15 50.01 53.58	
08 52 11 00-0106	EA 30" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	560.34 51.01 54.66	
08 52 11 00-0107	EA 32" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	571.94 52.21 55.94	
08 52 11 00-0108	EA 34" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	582.12 53.21 57.01	

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 52 11 00-0109	EA 36" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows.....	593.74
	<i>For Low-E Insulated Glass, Add</i>	54.41
	<i>For Aluminum Clad Exterior, Add</i>	58.30
08 52 11 00-0110	EA 40" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows.....	614.11
	<i>For Low-E Insulated Glass, Add</i>	56.41
	<i>For Aluminum Clad Exterior, Add</i>	60.44
08 52 11 00-0111	EA 44" x 62", Sash-Only Replacement Kit For Double Hung Wood Windows.....	635.90
	<i>For Low-E Insulated Glass, Add</i>	58.62
	<i>For Aluminum Clad Exterior, Add</i>	62.80

08 52 11 00-0112 66" Height, Sash-Only Replacement Kits For Double Hung Wood Windows

(08 52 11 00-0001)

08 52 11 00-0113	EA 20" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	526.92
	<i>For Low-E Insulated Glass, Add</i>	47.61
	<i>For Aluminum Clad Exterior, Add</i>	51.01
08 52 11 00-0114	EA 24" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	550.15
	<i>For Low-E Insulated Glass, Add</i>	50.01
	<i>For Aluminum Clad Exterior, Add</i>	53.58
08 52 11 00-0115	EA 28" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	571.94
	<i>For Low-E Insulated Glass, Add</i>	52.21
	<i>For Aluminum Clad Exterior, Add</i>	55.94
08 52 11 00-0116	EA 30" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	582.12
	<i>For Low-E Insulated Glass, Add</i>	53.21
	<i>For Aluminum Clad Exterior, Add</i>	57.01
08 52 11 00-0117	EA 32" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	593.74
	<i>For Low-E Insulated Glass, Add</i>	54.41
	<i>For Aluminum Clad Exterior, Add</i>	58.30
08 52 11 00-0118	EA 34" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	603.91
	<i>For Low-E Insulated Glass, Add</i>	55.41
	<i>For Aluminum Clad Exterior, Add</i>	59.37
08 52 11 00-0119	EA 36" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	614.11
	<i>For Low-E Insulated Glass, Add</i>	56.41
	<i>For Aluminum Clad Exterior, Add</i>	60.44
08 52 11 00-0120	EA 40" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	635.90
	<i>For Low-E Insulated Glass, Add</i>	58.62
	<i>For Aluminum Clad Exterior, Add</i>	62.80
08 52 11 00-0121	EA 44" x 66", Sash-Only Replacement Kit For Double Hung Wood Windows.....	657.69
	<i>For Low-E Insulated Glass, Add</i>	60.81
	<i>For Aluminum Clad Exterior, Add</i>	65.16

08 52 11 00-0122 70" Height, Sash-Only Replacement Kits For Double Hung Wood Windows

(08 52 11 00-0001)

08 52 11 00-0123	EA 20" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	548.63
	<i>For Low-E Insulated Glass, Add</i>	50.01
	<i>For Aluminum Clad Exterior, Add</i>	53.58
08 52 11 00-0124	EA 24" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	570.43
	<i>For Low-E Insulated Glass, Add</i>	52.21
	<i>For Aluminum Clad Exterior, Add</i>	55.94
08 52 11 00-0125	EA 28" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	592.22
	<i>For Low-E Insulated Glass, Add</i>	54.41
	<i>For Aluminum Clad Exterior, Add</i>	58.30
08 52 11 00-0126	EA 30" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	602.39
	<i>For Low-E Insulated Glass, Add</i>	55.41
	<i>For Aluminum Clad Exterior, Add</i>	59.37
08 52 11 00-0127	EA 32" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	612.59
	<i>For Low-E Insulated Glass, Add</i>	56.41
	<i>For Aluminum Clad Exterior, Add</i>	60.44
08 52 11 00-0128	EA 34" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	628.44
	<i>For Low-E Insulated Glass, Add</i>	58.21
	<i>For Aluminum Clad Exterior, Add</i>	62.37
08 52 11 00-0129	EA 36" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	635.87
	<i>For Low-E Insulated Glass, Add</i>	58.82
	<i>For Aluminum Clad Exterior, Add</i>	63.03
08 52 11 00-0130	EA 40" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	656.17
	<i>For Low-E Insulated Glass, Add</i>	60.81
	<i>For Aluminum Clad Exterior, Add</i>	65.16
08 52 11 00-0131	EA 44" x 70", Sash-Only Replacement Kit For Double Hung Wood Windows.....	679.39
	<i>For Low-E Insulated Glass, Add</i>	63.22
	<i>For Aluminum Clad Exterior, Add</i>	67.73

08 52 11 00-0132 74" Height, Sash-Only Replacement Kits For Double Hung Wood Windows

(08 52 11 00-0001)

08 52 11 00-0133	EA 20" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows.....	571.94
	<i>For Low-E Insulated Glass, Add</i>	52.21
	<i>For Aluminum Clad Exterior, Add</i>	55.94
08 52 11 00-0134	EA 24" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows.....	593.74
	<i>For Low-E Insulated Glass, Add</i>	54.41
	<i>For Aluminum Clad Exterior, Add</i>	58.30
08 52 11 00-0135	EA 28" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows.....	614.11
	<i>For Low-E Insulated Glass, Add</i>	56.41
	<i>For Aluminum Clad Exterior, Add</i>	60.44

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 11 00-0136 EA 30" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	625.72 57.61 61.73	
08 52 11 00-0137 EA 32" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	635.90 58.62 62.80	
08 52 11 00-0138 EA 34" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	647.51 59.82 64.09	
08 52 11 00-0139 EA 36" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	657.69 60.81 65.16	
08 52 11 00-0140 EA 40" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	680.92 63.22 67.73	
08 52 11 00-0141 EA 44" x 74", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	702.71 65.42 70.09	
08 52 11 00-0142 78" Height, Sash-Only Replacement Kits For Double Hung Wood Windows <small>(08 52 11 00-0001)</small>		
08 52 11 00-0143 EA 20" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	599.82 54.41 58.30	
08 52 11 00-0144 EA 24" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	620.18 56.41 60.44	
08 52 11 00-0145 EA 28" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	641.98 58.62 62.80	
08 52 11 00-0146 EA 30" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	653.58 59.82 64.09	
08 52 11 00-0147 EA 32" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	663.77 60.81 65.16	
08 52 11 00-0148 EA 34" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	675.39 62.02 66.45	
08 52 11 00-0149 EA 36" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	686.99 63.22 67.73	
08 52 11 00-0150 EA 40" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	708.79 65.42 70.09	
08 52 11 00-0151 EA 44" x 78", Sash-Only Replacement Kit For Double Hung Wood Windows <i>For Low-E Insulated Glass, Add</i> <i>For Aluminum Clad Exterior, Add</i>	730.58 67.62 72.45	
08 52 11 00-0152 Commercial And Institutional Heavy Double Hung Windows <small>(08 52 11)</small> Note: With true divided lites. Performance grade DP 40 in NWWDA I.S. 2-93. Includes complete unit with hardware, blocking and accessories, glazing, caulking, prepare opening, anchors, testing and certifications. Excludes painting.		
08 52 11 00-0153 SF Up To 21 SF Double Hung Wood Window With True Divided Lite <i>For Insulating Glass, Add</i>	229.13 17.17	13.57
08 52 11 00-0154 SF 21 To 40 SF Double Hung Wood Window With True Divided Lite <i>For Insulating Glass, Add</i>	211.02 15.37	15.09
08 52 11 00-0155 SF 40 SF And Over Double Hung Wood Window With True Divided Lite <i>For Insulating Glass, Add</i>	193.08 13.53	16.93
08 52 11 00-0156 Architectural And Historic Reproduction Wood Windows <small>(08 52 11)</small> Note: Fixed casement, awning, and double hung. With true divided lites. Casement performance grade DP 40; awning performance grade DP 25; double hung performance grade DP 30. Includes complete unit with hardware, blocking and accessories, glazing, caulking, prepare opening, anchors, testing and certifications. Excludes painting.		
08 52 11 00-0157 SF Up To 21 SF Architectural And Historic Reproduction Wood Window <i>For Insulating Glass, Add</i>	250.44 18.98	13.56
08 52 11 00-0158 SF 21 To 40 SF Architectural And Historic Reproduction Wood Window <i>For Insulating Glass, Add</i>	222.53 16.35	15.08
08 52 11 00-0159 SF 40 SF And Over Architectural And Historic Reproduction Wood Window <i>For Insulating Glass, Add</i>	199.83 14.10	16.92
08 52 11 00-0160 Removal And Reinstallation Of Wood Window And Frame <small>(08 52 11)</small> Note: Includes storage, cleaning and supply materials.		
08 52 11 00-0161 SF Removal And Reinstallation Of Wood Windows And Frames.....	27.07	
08 52 16 Plastic-Clad Wood Windows <small>(08 52)</small>		
08 52 16 00-0001 Double Hung Wood Clad Windows <small>(08 52 16)</small> Note: Double hung windows feature two movable sashes that operate vertically and open independently.		

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0002		Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0001)</small>		
		Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0003		35-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0004	EA	23-1/2" x 35-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	352.58	49.91
		<i>For Low-E Insulated Glass, Add</i>	30.33	
		<i>For Tempered Clear Insulated Glass, Add</i>	50.55	
08 52 16 00-0005	EA	27-1/2" x 35-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	373.30	52.08
		<i>For Low-E Insulated Glass, Add</i>	32.30	
		<i>For Tempered Clear Insulated Glass, Add</i>	53.83	
08 52 16 00-0006	EA	31-1/2" x 35-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	392.67	54.25
		<i>For Low-E Insulated Glass, Add</i>	34.10	
		<i>For Tempered Clear Insulated Glass, Add</i>	56.83	
08 52 16 00-0007	EA	35-1/2" x 35-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	412.04	56.42
		<i>For Low-E Insulated Glass, Add</i>	35.90	
		<i>For Tempered Clear Insulated Glass, Add</i>	59.84	
08 52 16 00-0008		41-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0009	EA	23-1/2" x 41-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	382.30	53.17
		<i>For Low-E Insulated Glass, Add</i>	33.12	
		<i>For Tempered Clear Insulated Glass, Add</i>	55.19	
08 52 16 00-0010	EA	27-1/2" x 41-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	403.04	55.33
		<i>For Low-E Insulated Glass, Add</i>	35.08	
		<i>For Tempered Clear Insulated Glass, Add</i>	58.47	
08 52 16 00-0011	EA	31-1/2" x 41-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	422.42	57.51
		<i>For Low-E Insulated Glass, Add</i>	36.89	
		<i>For Tempered Clear Insulated Glass, Add</i>	61.48	
08 52 16 00-0012	EA	35-1/2" x 41-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	441.78	59.67
		<i>For Low-E Insulated Glass, Add</i>	38.69	
		<i>For Tempered Clear Insulated Glass, Add</i>	64.48	
08 52 16 00-0013		47-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0014	EA	23-1/2" x 47-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	412.04	56.42
		<i>For Low-E Insulated Glass, Add</i>	35.90	
		<i>For Tempered Clear Insulated Glass, Add</i>	59.84	
08 52 16 00-0015	EA	27-1/2" x 47-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	431.41	58.60
		<i>For Low-E Insulated Glass, Add</i>	37.71	
		<i>For Tempered Clear Insulated Glass, Add</i>	62.85	
08 52 16 00-0016	EA	31-1/2" x 47-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	452.14	60.76
		<i>For Low-E Insulated Glass, Add</i>	39.67	
		<i>For Tempered Clear Insulated Glass, Add</i>	66.12	
08 52 16 00-0017	EA	35-1/2" x 47-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	471.51	62.94
		<i>For Low-E Insulated Glass, Add</i>	41.48	
		<i>For Tempered Clear Insulated Glass, Add</i>	69.13	
08 52 16 00-0018		53-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0019	EA	23-1/2" x 53-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	441.78	59.67
		<i>For Low-E Insulated Glass, Add</i>	38.69	
		<i>For Tempered Clear Insulated Glass, Add</i>	64.48	
08 52 16 00-0020	EA	27-1/2" x 53-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	461.15	61.85
		<i>For Low-E Insulated Glass, Add</i>	40.49	
		<i>For Tempered Clear Insulated Glass, Add</i>	67.49	
08 52 16 00-0021	EA	31-1/2" x 53-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	480.52	64.01
		<i>For Low-E Insulated Glass, Add</i>	42.30	
		<i>For Tempered Clear Insulated Glass, Add</i>	70.50	
08 52 16 00-0022	EA	35-1/2" x 53-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	501.25	66.19
		<i>For Low-E Insulated Glass, Add</i>	44.26	
		<i>For Tempered Clear Insulated Glass, Add</i>	73.77	
08 52 16 00-0023		56-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0024	EA	19-1/2" x 56-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	436.59	59.67
		<i>For Low-E Insulated Glass, Add</i>	38.20	
		<i>For Tempered Clear Insulated Glass, Add</i>	63.66	
08 52 16 00-0025	EA	23-1/2" x 56-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	455.96	61.30
		<i>For Low-E Insulated Glass, Add</i>	40.00	
		<i>For Tempered Clear Insulated Glass, Add</i>	66.67	
08 52 16 00-0026	EA	27-1/2" x 56-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	476.70	64.01
		<i>For Low-E Insulated Glass, Add</i>	41.97	
		<i>For Tempered Clear Insulated Glass, Add</i>	69.95	
08 52 16 00-0027	EA	31-1/2" x 56-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series).....	496.07	66.19
		<i>For Low-E Insulated Glass, Add</i>	43.77	
		<i>For Tempered Clear Insulated Glass, Add</i>	72.96	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 52 16 00-0028 EA 35-1/2" x 56-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	515.43 45.58 75.96	68.35
08 52 16 00-0029 EA 39-1/2" x 56-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	534.80 47.38 78.97	70.53
08 52 16 00-0030 59-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0031 EA 19-1/2" x 59-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	452.14 39.67 66.12	60.76
08 52 16 00-0032 EA 23-1/2" x 59-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	471.51 41.48 69.13	62.94
08 52 16 00-0033 EA 27-1/2" x 59-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	490.88 43.28 72.14	65.10
08 52 16 00-0034 EA 31-1/2" x 59-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	510.24 45.08 75.14	67.27
08 52 16 00-0035 EA 35-1/2" x 59-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	529.61 46.89 78.15	69.44
08 52 16 00-0036 EA 39-1/2" x 59-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	550.35 48.86 81.43	71.61
08 52 16 00-0037 65-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0038 EA 23-1/2" x 65-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	501.25 44.26 73.77	66.19
08 52 16 00-0039 EA 27-1/2" x 65-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	520.61 46.07 76.78	68.35
08 52 16 00-0040 EA 31-1/2" x 65-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	539.98 47.87 79.79	70.53
08 52 16 00-0041 EA 35-1/2" x 65-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	559.35 49.68 82.79	72.70
08 52 16 00-0042 71-1/2" Height, Double Hung Wood Clad Windows (Andersen 200 TW Series) <small>(08 52 16 00-0002)</small>		
08 52 16 00-0043 EA 23-1/2" x 71-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	529.61 46.89 78.15	69.44
08 52 16 00-0044 EA 27-1/2" x 71-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	550.35 48.86 81.43	71.61
08 52 16 00-0045 EA 31-1/2" x 71-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	569.73 50.66 84.43	73.78
08 52 16 00-0046 EA 35-1/2" x 71-1/2" Double Hung Wood Clad Window (Andersen 200 TW Series)..... <i>For Low-E Insulated Glass, Add</i> <i>For Tempered Clear Insulated Glass, Add</i>	589.09 52.46 87.44	75.95
08 52 16 00-0047 Double Hung Wood Clad Windows (Andersen 400 TW Series) <small>(08 52 16 00-0001)</small>		
<small>Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and Low-E insulated glass. Excludes grilles and insect screens.</small>		
08 52 16 00-0048 36-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) <small>(08 52 16 00-0047)</small>		
08 52 16 00-0049 EA 21-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	433.46 66.94	49.91
08 52 16 00-0050 EA 25-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	459.66 71.32	51.54
08 52 16 00-0051 EA 29-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	487.22 75.96	53.71
08 52 16 00-0052 EA 31-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	501.69 78.42	55.33
08 52 16 00-0053 EA 33-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	514.79 80.61	56.42
08 52 16 00-0054 EA 35-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	527.89 82.79	57.51
08 52 16 00-0055 EA 37-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	542.35 85.25	58.05

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 52 16 00-0056	EA	41-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	568.54		60.22
		<i>For Tempered Low-E Insulated Glass, Add</i>	89.62		
08 52 16 00-0057	EA	45-5/8" x 36-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	596.11		62.39
		<i>For Tempered Low-E Insulated Glass, Add</i>	94.27		
08 52 16 00-0058 40-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)					
08 52 16 00-0059	EA	21-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	459.66		52.08
		<i>For Tempered Low-E Insulated Glass, Add</i>	71.32		
08 52 16 00-0060	EA	25-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	487.22		53.71
		<i>For Tempered Low-E Insulated Glass, Add</i>	75.96		
08 52 16 00-0061	EA	29-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	514.79		55.88
		<i>For Tempered Low-E Insulated Glass, Add</i>	80.61		
08 52 16 00-0062	EA	31-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	527.89		57.51
		<i>For Tempered Low-E Insulated Glass, Add</i>	82.79		
08 52 16 00-0063	EA	33-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	542.35		58.60
		<i>For Tempered Low-E Insulated Glass, Add</i>	85.25		
08 52 16 00-0064	EA	35-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	555.45		59.67
		<i>For Tempered Low-E Insulated Glass, Add</i>	87.44		
08 52 16 00-0065	EA	37-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	568.54		60.22
		<i>For Tempered Low-E Insulated Glass, Add</i>	89.62		
08 52 16 00-0066	EA	41-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	596.11		62.39
		<i>For Tempered Low-E Insulated Glass, Add</i>	94.27		
08 52 16 00-0067	EA	45-5/8" x 40-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	623.67		64.56
		<i>For Tempered Low-E Insulated Glass, Add</i>	98.91		
08 52 16 00-0068 44-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)					
08 52 16 00-0069	EA	21-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	487.22		54.25
		<i>For Tempered Low-E Insulated Glass, Add</i>	75.96		
08 52 16 00-0070	EA	25-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	514.79		55.88
		<i>For Tempered Low-E Insulated Glass, Add</i>	80.61		
08 52 16 00-0071	EA	29-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	542.35		58.05
		<i>For Tempered Low-E Insulated Glass, Add</i>	85.25		
08 52 16 00-0072	EA	31-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	555.45		59.67
		<i>For Tempered Low-E Insulated Glass, Add</i>	87.44		
08 52 16 00-0073	EA	33-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	568.54		60.76
		<i>For Tempered Low-E Insulated Glass, Add</i>	89.62		
08 52 16 00-0074	EA	35-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	583.02		61.85
		<i>For Tempered Low-E Insulated Glass, Add</i>	92.08		
08 52 16 00-0075	EA	37-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	596.11		62.39
		<i>For Tempered Low-E Insulated Glass, Add</i>	94.27		
08 52 16 00-0076	EA	41-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	623.67		64.56
		<i>For Tempered Low-E Insulated Glass, Add</i>	98.91		
08 52 16 00-0077	EA	45-5/8" x 44-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	651.25		66.73
		<i>For Tempered Low-E Insulated Glass, Add</i>	103.56		
08 52 16 00-0078 48-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)					
08 52 16 00-0079	EA	21-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	514.79		56.42
		<i>For Tempered Low-E Insulated Glass, Add</i>	80.61		
08 52 16 00-0080	EA	25-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	542.35		58.05
		<i>For Tempered Low-E Insulated Glass, Add</i>	85.25		
08 52 16 00-0081	EA	29-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	568.54		60.22
		<i>For Tempered Low-E Insulated Glass, Add</i>	89.62		
08 52 16 00-0082	EA	31-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	583.02		61.85
		<i>For Tempered Low-E Insulated Glass, Add</i>	92.08		
08 52 16 00-0083	EA	33-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	596.11		62.94
		<i>For Tempered Low-E Insulated Glass, Add</i>	94.27		
08 52 16 00-0084	EA	35-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	609.22		64.01
		<i>For Tempered Low-E Insulated Glass, Add</i>	96.45		
08 52 16 00-0085	EA	37-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	623.67		64.56
		<i>For Tempered Low-E Insulated Glass, Add</i>	98.91		
08 52 16 00-0086	EA	41-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	651.25		66.73
		<i>For Tempered Low-E Insulated Glass, Add</i>	103.56		
08 52 16 00-0087	EA	45-5/8" x 48-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	677.45		68.90
		<i>For Tempered Low-E Insulated Glass, Add</i>	107.93		
08 52 16 00-0088 52-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)					
08 52 16 00-0089	EA	21-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	542.35		58.60
		<i>For Tempered Low-E Insulated Glass, Add</i>	85.25		
08 52 16 00-0090	EA	25-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	568.54		60.22
		<i>For Tempered Low-E Insulated Glass, Add</i>	89.62		
08 52 16 00-0091	EA	29-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	596.11		62.39
		<i>For Tempered Low-E Insulated Glass, Add</i>	94.27		
08 52 16 00-0092	EA	31-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	609.22		64.01
		<i>For Tempered Low-E Insulated Glass, Add</i>	96.45		



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0093	EA 33-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	623.67 98.91	65.10
08 52 16 00-0094	EA 35-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	636.78 101.10	66.19
08 52 16 00-0095	EA 37-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	651.25 103.56	66.73
08 52 16 00-0096	EA 41-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	677.45 107.93	68.90
08 52 16 00-0097	EA 45-5/8" x 52-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	705.01 112.57	71.07
08 52 16 00-0098	56-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0099	EA 21-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	568.54 89.62	60.76
08 52 16 00-0100	EA 25-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	596.11 94.27	62.39
08 52 16 00-0101	EA 29-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	623.67 98.91	64.56
08 52 16 00-0102	EA 31-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	636.78 101.10	66.19
08 52 16 00-0103	EA 33-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	651.25 103.56	67.27
08 52 16 00-0104	EA 35-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	664.35 105.74	68.35
08 52 16 00-0105	EA 37-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	677.45 107.93	68.90
08 52 16 00-0106	EA 41-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	705.01 112.57	71.07
08 52 16 00-0107	EA 45-5/8" x 56-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	732.58 117.22	73.24
08 52 16 00-0108	60-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0109	EA 21-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	596.11 94.27	62.94
08 52 16 00-0110	EA 25-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	623.67 98.91	64.56
08 52 16 00-0111	EA 29-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	651.25 103.56	66.73
08 52 16 00-0112	EA 31-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	664.35 105.74	68.35
08 52 16 00-0113	EA 33-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	677.45 107.93	69.44
08 52 16 00-0114	EA 35-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	691.91 110.39	70.53
08 52 16 00-0115	EA 37-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	705.01 112.57	71.07
08 52 16 00-0116	EA 41-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	732.58 117.22	73.24
08 52 16 00-0117	EA 45-5/8" x 60-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	758.78 121.59	75.40
08 52 16 00-0118	64-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0119	EA 21-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	623.67 98.91	65.10
08 52 16 00-0120	EA 25-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	651.25 103.56	66.73
08 52 16 00-0121	EA 29-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	677.45 107.93	68.90
08 52 16 00-0122	EA 31-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	691.91 110.39	70.53
08 52 16 00-0123	EA 33-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	705.01 112.57	71.61
08 52 16 00-0124	EA 35-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	718.11 114.76	72.70
08 52 16 00-0125	EA 37-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	732.58 117.22	73.24
08 52 16 00-0126	EA 41-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	758.78 121.59	75.40
08 52 16 00-0127	EA 45-5/8" x 64-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	786.34 126.24	77.58
08 52 16 00-0128	68-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0129	EA 21-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	651.25 103.56	67.27

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0130	EA	25-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	677.45	68.90
		<i>For Tempered Low-E Insulated Glass, Add</i>	107.93	
08 52 16 00-0131	EA	29-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	705.01	71.07
		<i>For Tempered Low-E Insulated Glass, Add</i>	112.57	
08 52 16 00-0132	EA	31-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	718.11	72.70
		<i>For Tempered Low-E Insulated Glass, Add</i>	114.76	
08 52 16 00-0133	EA	33-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	732.58	73.78
		<i>For Tempered Low-E Insulated Glass, Add</i>	117.22	
08 52 16 00-0134	EA	35-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	745.68	74.87
		<i>For Tempered Low-E Insulated Glass, Add</i>	119.41	
08 52 16 00-0135	EA	37-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	758.78	75.40
		<i>For Tempered Low-E Insulated Glass, Add</i>	121.59	
08 52 16 00-0136	EA	41-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	786.34	77.58
		<i>For Tempered Low-E Insulated Glass, Add</i>	126.24	
08 52 16 00-0137	EA	45-5/8" x 68-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	813.91	79.75
		<i>For Tempered Low-E Insulated Glass, Add</i>	130.88	
08 52 16 00-0138		72-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0139	EA	21-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	677.45	69.44
		<i>For Tempered Low-E Insulated Glass, Add</i>	107.93	
08 52 16 00-0140	EA	25-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	705.01	71.07
		<i>For Tempered Low-E Insulated Glass, Add</i>	112.57	
08 52 16 00-0141	EA	29-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	732.58	73.24
		<i>For Tempered Low-E Insulated Glass, Add</i>	117.22	
08 52 16 00-0142	EA	31-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	745.68	74.87
		<i>For Tempered Low-E Insulated Glass, Add</i>	119.41	
08 52 16 00-0143	EA	33-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	758.78	75.95
		<i>For Tempered Low-E Insulated Glass, Add</i>	121.59	
08 52 16 00-0144	EA	35-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	773.23	77.04
		<i>For Tempered Low-E Insulated Glass, Add</i>	124.05	
08 52 16 00-0145	EA	37-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	786.34	77.58
		<i>For Tempered Low-E Insulated Glass, Add</i>	126.24	
08 52 16 00-0146	EA	41-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	813.91	79.75
		<i>For Tempered Low-E Insulated Glass, Add</i>	130.88	
08 52 16 00-0147	EA	45-5/8" x 72-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	841.48	81.92
		<i>For Tempered Low-E Insulated Glass, Add</i>	135.53	
08 52 16 00-0148		76-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0149	EA	21-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	705.01	71.61
		<i>For Tempered Low-E Insulated Glass, Add</i>	112.57	
08 52 16 00-0150	EA	25-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	732.58	73.24
		<i>For Tempered Low-E Insulated Glass, Add</i>	117.22	
08 52 16 00-0151	EA	29-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	758.78	75.40
		<i>For Tempered Low-E Insulated Glass, Add</i>	121.59	
08 52 16 00-0152	EA	31-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	773.23	77.04
		<i>For Tempered Low-E Insulated Glass, Add</i>	124.05	
08 52 16 00-0153	EA	33-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	786.34	78.12
		<i>For Tempered Low-E Insulated Glass, Add</i>	126.24	
08 52 16 00-0154	EA	35-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	800.80	79.21
		<i>For Tempered Low-E Insulated Glass, Add</i>	128.70	
08 52 16 00-0155	EA	37-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	813.91	79.75
		<i>For Tempered Low-E Insulated Glass, Add</i>	130.88	
08 52 16 00-0156	EA	41-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	841.48	81.92
		<i>For Tempered Low-E Insulated Glass, Add</i>	135.53	
08 52 16 00-0157	EA	45-5/8" x 76-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	867.67	84.09
		<i>For Tempered Low-E Insulated Glass, Add</i>	139.90	
08 52 16 00-0158		84-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) (08 52 16 00-0047)		
08 52 16 00-0159	EA	21-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,083.93	75.95
		<i>For Tempered Low-E Insulated Glass, Add</i>	186.62	
08 52 16 00-0160	EA	25-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,122.43	77.58
		<i>For Tempered Low-E Insulated Glass, Add</i>	193.45	
08 52 16 00-0161	EA	29-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,160.92	79.75
		<i>For Tempered Low-E Insulated Glass, Add</i>	200.28	
08 52 16 00-0162	EA	31-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,179.49	81.38
		<i>For Tempered Low-E Insulated Glass, Add</i>	203.56	
08 52 16 00-0163	EA	33-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,199.42	82.46
		<i>For Tempered Low-E Insulated Glass, Add</i>	207.12	
08 52 16 00-0164	EA	35-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,217.98	83.55
		<i>For Tempered Low-E Insulated Glass, Add</i>	210.39	
08 52 16 00-0165	EA	37-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,236.55	84.09
		<i>For Tempered Low-E Insulated Glass, Add</i>	213.67	
08 52 16 00-0166	EA	41-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,275.04	86.26
		<i>For Tempered Low-E Insulated Glass, Add</i>	220.50	
08 52 16 00-0167	EA	45-5/8" x 84-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series).....	1,313.54	88.43
		<i>For Tempered Low-E Insulated Glass, Add</i>	227.34	



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 52 16 00-0168	88-7/8" Height, Double Hung Wood Clad Windows (Andersen 400 TW Series) <small>(08 52 16 00-0047)</small>		
08 52 16 00-0169	EA 21-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,122.43 193.45	78.12
08 52 16 00-0170	EA 25-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,160.92 200.28	79.75
08 52 16 00-0171	EA 29-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,199.42 207.12	81.92
08 52 16 00-0172	EA 31-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,217.98 210.39	83.55
08 52 16 00-0173	EA 33-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,236.55 213.67	84.63
08 52 16 00-0174	EA 35-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,256.48 217.23	85.72
08 52 16 00-0175	EA 37-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,275.04 220.50	86.26
08 52 16 00-0176	EA 41-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,313.54 227.34	88.43
08 52 16 00-0177	EA 45-5/8" x 88-7/8" Double Hung Wood Clad Window (Andersen 400 TW Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,352.03 234.17	90.60
08 52 16 00-0178	Casement Wood Clad Windows <small>(08 52 16)</small> Note: Casement windows are hinged on one side and swing inward or outward with a crank or push out operation.		
08 52 16 00-0179	Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0178)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0180	One Operating Sash, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0179)</small>		
08 52 16 00-0181	24-1/8" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0180)</small>		
08 52 16 00-0182	EA 17" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	391.64 62.05	41.23
08 52 16 00-0183	EA 20-1/2" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	414.13 65.90	42.32
08 52 16 00-0184	EA 24-1/8" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	439.33 70.07	44.49
08 52 16 00-0185	EA 28-3/8" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	462.57 73.85	46.66
08 52 16 00-0186	28-3/8" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0180)</small>		
08 52 16 00-0187	EA 17" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	420.04 66.86	43.40
08 52 16 00-0188	EA 20-1/2" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	442.54 70.71	44.49
08 52 16 00-0189	EA 24-1/8" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	467.73 74.88	46.66
08 52 16 00-0190	EA 28-3/8" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	480.31 76.53	48.83
08 52 16 00-0191	EA 31-1/2" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	509.42 81.70	50.99
08 52 16 00-0192	35-15/16" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0180)</small>		
08 52 16 00-0193	EA 17" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	470.94 75.53	46.66
08 52 16 00-0194	EA 20-1/2" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	495.04 79.70	48.83
08 52 16 00-0195	EA 24-1/8" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	520.24 83.87	50.46
08 52 16 00-0196	EA 28-3/8" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	559.87 90.92	52.62
08 52 16 00-0197	EA 31-1/2" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	597.56 97.81	54.25
08 52 16 00-0198	EA 35-15/16" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	634.26 104.72	55.33
08 52 16 00-0199	40-13/16" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0180)</small>		
08 52 16 00-0200	EA 17" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	505.24 81.30	49.91

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0201	EA 20-1/2" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	527.74 85.15	50.99
08 52 16 00-0202	EA 24-1/8" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	552.93 89.32	53.17
08 52 16 00-0203	EA 28-3/8" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	610.20 99.91	55.33
08 52 16 00-0204	EA 31-1/2" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	649.69 107.15	57.51
08 52 16 00-0205	EA 35-15/16" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	686.78 113.70	59.67
08 52 16 00-0206 48" Height, One Operating Sash, Casement Wood Clad Windows			
(Andersen 200 Series) <small>(08 52 16 00-0180)</small>			
08 52 16 00-0207	EA 17" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	554.02 89.32	54.25
08 52 16 00-0208	EA 20-1/2" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	578.12 93.49	55.33
08 52 16 00-0209	EA 24-1/8" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	603.32 97.66	57.51
08 52 16 00-0210	EA 28-3/8" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	682.24 112.58	59.67
08 52 16 00-0211	EA 31-1/2" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	713.19 118.12	61.85
08 52 16 00-0212	EA 35-15/16" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	759.62 126.53	64.01
08 52 16 00-0213 52-13/16" Height, One Operating Sash, Casement Wood Clad Windows			
(Andersen 200 Series) <small>(08 52 16 00-0180)</small>			
08 52 16 00-0214	EA 17" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	587.23 95.09	56.42
08 52 16 00-0215	EA 20-1/2" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	609.74 98.94	57.51
08 52 16 00-0216	EA 24-1/8" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	634.93 103.11	59.67
08 52 16 00-0217	EA 28-3/8" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	732.31 121.72	61.85
08 52 16 00-0218	EA 31-1/2" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	778.44 130.30	64.01
08 52 16 00-0219	EA 35-15/16" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	808.87 135.52	66.19
08 52 16 00-0220 59-7/8" Height, One Operating Sash, Casement Wood Clad Windows			
(Andersen 200 Series) <small>(08 52 16 00-0180)</small>			
08 52 16 00-0221	EA 17" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	634.93 103.11	59.67
08 52 16 00-0222	EA 20-1/2" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	659.04 107.29	61.85
08 52 16 00-0223	EA 24-1/8" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	684.23 111.46	63.47
08 52 16 00-0224	EA 28-3/8" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	804.06 134.55	65.65
08 52 16 00-0225	EA 31-1/2" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	836.79 140.45	67.27
08 52 16 00-0226	EA 35-15/16" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	880.62 148.35	69.44
08 52 16 00-0227 64-13/16" Height, One Operating Sash, Casement Wood Clad Windows			
(Andersen 200 Series) <small>(08 52 16 00-0180)</small>			
08 52 16 00-0228	EA 17" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	669.22 108.89	62.94
08 52 16 00-0229	EA 20-1/2" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	691.73 112.74	64.01
08 52 16 00-0230	EA 24-1/8" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	716.93 116.91	66.19
08 52 16 00-0231	EA 28-3/8" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	854.39 143.54	68.35
08 52 16 00-0232	EA 31-1/2" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	884.86 148.98	70.53
08 52 16 00-0233	EA 35-15/16" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	930.96 157.33	72.70
08 52 16 00-0234 71-7/8" Height, One Operating Sash, Casement Wood Clad Windows			
(Andersen 200 Series) <small>(08 52 16 00-0180)</small>			
08 52 16 00-0235	EA 17" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	716.93 116.91	66.19



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0236	EA 20-1/2" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	741.03 121.08	68.35
08 52 16 00-0237	EA 24-1/8" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	766.22 125.25	69.99
08 52 16 00-0238	EA 28-3/8" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	926.15 156.37	72.15
08 52 16 00-0239	EA 31-1/2" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	963.52 163.19	73.78
08 52 16 00-0240	EA 35-15/16" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,002.73 170.16	75.95
08 52 16 00-0241	Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) (08 52 16 00-0179)		
08 52 16 00-0242	24-1/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) (08 52 16 00-0241)		
08 52 16 00-0243	EA 40-3/4" x 24-1/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	700.41 118.82	53.17
08 52 16 00-0244	EA 48" x 24-1/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	795.96 136.19	57.51
08 52 16 00-0245	EA 56-1/2" x 24-1/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	906.61 156.58	61.85
08 52 16 00-0246	28-3/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) (08 52 16 00-0241)		
08 52 16 00-0247	EA 40-3/4" x 28-3/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	755.65 129.00	55.33
08 52 16 00-0248	EA 48" x 28-3/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	851.20 146.37	59.67
08 52 16 00-0249	EA 56-1/2" x 28-3/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	961.85 166.76	64.01
08 52 16 00-0250	35-15/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) (08 52 16 00-0241)		
08 52 16 00-0251	EA 33-3/4" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	748.83 127.63	55.33
08 52 16 00-0252	EA 40-3/4" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	846.25 145.60	59.67
08 52 16 00-0253	EA 48" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	947.97 164.20	64.01
08 52 16 00-0254	EA 56-1/2" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,065.72 186.02	67.81
08 52 16 00-0255	EA 62-3/4" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,144.62 200.50	71.07
08 52 16 00-0256	EA 71-5/8" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,276.09 224.84	75.95
08 52 16 00-0257	40-13/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) (08 52 16 00-0241)		
08 52 16 00-0258	EA 33-3/4" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	816.81 140.14	58.05
08 52 16 00-0259	EA 40-3/4" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	914.24 158.11	61.85
08 52 16 00-0260	EA 48" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,015.95 176.71	66.19
08 52 16 00-0261	EA 56-1/2" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,133.70 198.53	70.53
08 52 16 00-0262	EA 62-3/4" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,221.11 214.71	73.78
08 52 16 00-0263	EA 71-5/8" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,589.47 286.43	78.67
08 52 16 00-0264	48" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) (08 52 16 00-0241)		
08 52 16 00-0265	EA 33-3/4" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	916.91 158.43	62.39
08 52 16 00-0266	EA 40-3/4" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,015.95 176.71	66.19
08 52 16 00-0267	EA 48" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,117.66 195.32	70.53
08 52 16 00-0268	EA 56-1/2" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,235.41 217.14	74.87
08 52 16 00-0269	EA 62-3/4" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,319.13 232.66	78.12
08 52 16 00-0270	EA 71-5/8" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,445.78 255.95	83.01

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 52 16 00-0271	52-13/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0241)</small>		
08 52 16 00-0272	EA 33-3/4" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	983.81	64.56
	<i>For Tempered Clear Insulated Glass, Add</i>	170.94	
08 52 16 00-0273	EA 40-3/4" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,081.24	68.35
	<i>For Tempered Clear Insulated Glass, Add</i>	188.91	
08 52 16 00-0274	EA 48" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,171.05	72.70
	<i>For Tempered Clear Insulated Glass, Add</i>	205.13	
08 52 16 00-0275	EA 56-1/2" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,300.71	77.04
	<i>For Tempered Clear Insulated Glass, Add</i>	229.33	
08 52 16 00-0276	EA 62-3/4" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,388.44	80.29
	<i>For Tempered Clear Insulated Glass, Add</i>	245.57	
08 52 16 00-0277	EA 71-5/8" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,512.68	85.17
	<i>For Tempered Clear Insulated Glass, Add</i>	268.47	
08 52 16 00-0278	59-7/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0241)</small>		
08 52 16 00-0279	EA 33-3/4" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,082.84	68.35
	<i>For Tempered Clear Insulated Glass, Add</i>	189.23	
08 52 16 00-0280	EA 40-3/4" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,180.27	72.70
	<i>For Tempered Clear Insulated Glass, Add</i>	207.19	
08 52 16 00-0281	EA 48" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,281.97	77.04
	<i>For Tempered Clear Insulated Glass, Add</i>	225.80	
08 52 16 00-0282	EA 56-1/2" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,399.74	80.83
	<i>For Tempered Clear Insulated Glass, Add</i>	247.61	
08 52 16 00-0283	EA 62-3/4" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,487.46	84.09
	<i>For Tempered Clear Insulated Glass, Add</i>	263.86	
08 52 16 00-0284	EA 71-5/8" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,610.09	88.97
	<i>For Tempered Clear Insulated Glass, Add</i>	286.43	
08 52 16 00-0285	64-13/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0241)</small>		
08 52 16 00-0286	EA 33-3/4" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,150.83	71.07
	<i>For Tempered Clear Insulated Glass, Add</i>	201.74	
08 52 16 00-0287	EA 40-3/4" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,248.24	74.87
	<i>For Tempered Clear Insulated Glass, Add</i>	219.70	
08 52 16 00-0288	EA 48" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,351.56	79.21
	<i>For Tempered Clear Insulated Glass, Add</i>	238.63	
08 52 16 00-0289	EA 56-1/2" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,469.32	83.55
	<i>For Tempered Clear Insulated Glass, Add</i>	260.45	
08 52 16 00-0290	71-7/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0241)</small>		
08 52 16 00-0291	EA 33-3/4" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,249.85	74.87
	<i>For Tempered Clear Insulated Glass, Add</i>	220.02	
08 52 16 00-0292	EA 40-3/4" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,347.26	79.21
	<i>For Tempered Clear Insulated Glass, Add</i>	237.99	
08 52 16 00-0293	EA 48" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,448.99	83.55
	<i>For Tempered Clear Insulated Glass, Add</i>	256.60	
08 52 16 00-0294	EA 56-1/2" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,566.74	87.35
	<i>For Tempered Clear Insulated Glass, Add</i>	278.41	
08 52 16 00-0295	One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0179)</small>		
08 52 16 00-0296	24-1/8" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0297	EA 71-7/8" x 24-1/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,110.30	69.99
	<i>For Tempered Clear Insulated Glass, Add</i>	194.07	
08 52 16 00-0298	EA 84-5/8" x 24-1/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,291.39	77.04
	<i>For Tempered Clear Insulated Glass, Add</i>	227.46	
08 52 16 00-0299	28-3/8" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0300	EA 71-7/8" x 28-3/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,178.18	72.15
	<i>For Tempered Clear Insulated Glass, Add</i>	206.77	
08 52 16 00-0301	EA 84-5/8" x 28-3/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series)	1,347.36	79.21
	<i>For Tempered Clear Insulated Glass, Add</i>	237.79	



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0302		35-15/16" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0303	EA	61" x 35-15/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,134.02	70.53
		<i>For Tempered Clear Insulated Glass, Add</i>	198.59	
08 52 16 00-0304	EA	71-7/8" x 35-15/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,279.30	75.95
		<i>For Tempered Clear Insulated Glass, Add</i>	225.48	
08 52 16 00-0305	EA	84-5/8" x 35-15/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,458.61	83.55
		<i>For Tempered Clear Insulated Glass, Add</i>	258.52	
08 52 16 00-0306		40-13/16" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0307	EA	61" x 40-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,198.74	73.78
		<i>For Tempered Clear Insulated Glass, Add</i>	210.45	
08 52 16 00-0308	EA	71-7/8" x 40-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,348.87	78.67
		<i>For Tempered Clear Insulated Glass, Add</i>	238.31	
08 52 16 00-0309	EA	84-5/8" x 40-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,526.59	85.72
		<i>For Tempered Clear Insulated Glass, Add</i>	271.03	
08 52 16 00-0310		48" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0311	EA	71-7/8" x 48", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,448.99	83.01
		<i>For Tempered Clear Insulated Glass, Add</i>	256.60	
08 52 16 00-0312	EA	84-5/8" x 48", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,626.71	90.06
		<i>For Tempered Clear Insulated Glass, Add</i>	289.32	
08 52 16 00-0313		52-13/16" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0314	EA	71-7/8" x 52-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,515.89	85.17
		<i>For Tempered Clear Insulated Glass, Add</i>	269.11	
08 52 16 00-0315	EA	84-5/8" x 52-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,693.61	92.22
		<i>For Tempered Clear Insulated Glass, Add</i>	301.83	
08 52 16 00-0316		59-7/8" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0295)</small>		
08 52 16 00-0317	EA	71-7/8" x 59-7/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,613.30	88.97
		<i>For Tempered Clear Insulated Glass, Add</i>	287.07	
08 52 16 00-0318	EA	84-5/8" x 59-7/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 200 Series).....	1,792.63	96.56
		<i>For Tempered Clear Insulated Glass, Add</i>	320.12	
08 52 16 00-0319		Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0178)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and Low-E insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0320		One Operating Sash, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0319)</small>		
08 52 16 00-0321		24-1/8" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0320)</small>		
08 52 16 00-0322	EA	17" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series).....	466.22	41.23
		<i>For Tempered Low-E Insulated Glass, Add</i>	76.97	
08 52 16 00-0323	EA	20-1/2" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series).....	493.53	42.32
		<i>For Tempered Low-E Insulated Glass, Add</i>	81.78	
08 52 16 00-0324	EA	24-1/8" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series).....	523.94	44.49
		<i>For Tempered Low-E Insulated Glass, Add</i>	86.99	
08 52 16 00-0325	EA	28-3/8" x 24-1/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series).....	551.91	46.66
		<i>For Tempered Low-E Insulated Glass, Add</i>	91.72	
08 52 16 00-0326		28-3/8" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0320)</small>		
08 52 16 00-0327	EA	17" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series).....	500.64	43.40
		<i>For Tempered Low-E Insulated Glass, Add</i>	82.98	
08 52 16 00-0328	EA	20-1/2" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series).....	527.95	44.49
		<i>For Tempered Low-E Insulated Glass, Add</i>	87.80	

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 52 16 00-0329	EA	24-1/8" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	558.36		46.66
		<i>For Tempered Low-E Insulated Glass, Add</i>	93.01		
08 52 16 00-0330	EA	28-3/8" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	573.00		48.83
		<i>For Tempered Low-E Insulated Glass, Add</i>	95.07		
08 52 16 00-0331	EA	31-1/2" x 28-3/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	608.57		50.99
		<i>For Tempered Low-E Insulated Glass, Add</i>	101.53		
08 52 16 00-0332		35-15/16" Height, One Operating Sash, Casement Wood Clad Windows			
		(Andersen 400 Series) <small>(08 52 16 00-0320)</small>			
08 52 16 00-0333	EA	17" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	562.37		46.66
		<i>For Tempered Low-E Insulated Glass, Add</i>	93.81		
08 52 16 00-0334	EA	20-1/2" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	591.68		48.83
		<i>For Tempered Low-E Insulated Glass, Add</i>	99.02		
08 52 16 00-0335	EA	24-1/8" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	622.10		50.46
		<i>For Tempered Low-E Insulated Glass, Add</i>	104.24		
08 52 16 00-0336	EA	28-3/8" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	670.55		52.62
		<i>For Tempered Low-E Insulated Glass, Add</i>	113.06		
08 52 16 00-0337	EA	31-1/2" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	716.84		54.25
		<i>For Tempered Low-E Insulated Glass, Add</i>	121.67		
08 52 16 00-0338	EA	35-15/16" x 35-15/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	762.18		55.33
		<i>For Tempered Low-E Insulated Glass, Add</i>	130.30		
08 52 16 00-0339		40-13/16" Height, One Operating Sash, Casement Wood Clad Windows			
		(Andersen 400 Series) <small>(08 52 16 00-0320)</small>			
08 52 16 00-0340	EA	17" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	603.89		49.91
		<i>For Tempered Low-E Insulated Glass, Add</i>	101.03		
08 52 16 00-0341	EA	20-1/2" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	631.20		50.99
		<i>For Tempered Low-E Insulated Glass, Add</i>	105.84		
08 52 16 00-0342	EA	24-1/8" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	661.60		53.17
		<i>For Tempered Low-E Insulated Glass, Add</i>	111.05		
08 52 16 00-0343	EA	28-3/8" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	732.11		55.33
		<i>For Tempered Low-E Insulated Glass, Add</i>	124.29		
08 52 16 00-0344	EA	31-1/2" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	780.65		57.51
		<i>For Tempered Low-E Insulated Glass, Add</i>	133.34		
08 52 16 00-0345	EA	35-15/16" x 40-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	825.93		59.67
		<i>For Tempered Low-E Insulated Glass, Add</i>	141.53		
08 52 16 00-0346		48" Height, One Operating Sash, Casement Wood Clad Windows			
		(Andersen 400 Series) <small>(08 52 16 00-0320)</small>			
08 52 16 00-0347	EA	17" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	662.69		54.25
		<i>For Tempered Low-E Insulated Glass, Add</i>	111.05		
08 52 16 00-0348	EA	20-1/2" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	692.01		55.33
		<i>For Tempered Low-E Insulated Glass, Add</i>	116.27		
08 52 16 00-0349	EA	24-1/8" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	722.42		57.51
		<i>For Tempered Low-E Insulated Glass, Add</i>	121.48		
08 52 16 00-0350	EA	28-3/8" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	819.99		59.67
		<i>For Tempered Low-E Insulated Glass, Add</i>	140.13		
08 52 16 00-0351	EA	31-1/2" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	857.85		61.85
		<i>For Tempered Low-E Insulated Glass, Add</i>	147.05		
08 52 16 00-0352	EA	35-15/16" x 48", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	914.81		64.01
		<i>For Tempered Low-E Insulated Glass, Add</i>	157.57		
08 52 16 00-0353		52-13/16" Height, One Operating Sash, Casement Wood Clad Windows			
		(Andersen 400 Series) <small>(08 52 16 00-0320)</small>			
08 52 16 00-0354	EA	17" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	703.12		56.42
		<i>For Tempered Low-E Insulated Glass, Add</i>	118.27		
08 52 16 00-0355	EA	20-1/2" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	730.44		57.51
		<i>For Tempered Low-E Insulated Glass, Add</i>	123.08		
08 52 16 00-0356	EA	24-1/8" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	760.85		59.67
		<i>For Tempered Low-E Insulated Glass, Add</i>	128.30		
08 52 16 00-0357	EA	28-3/8" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	881.48		61.85
		<i>For Tempered Low-E Insulated Glass, Add</i>	151.56		
08 52 16 00-0358	EA	31-1/2" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	938.34		64.01
		<i>For Tempered Low-E Insulated Glass, Add</i>	162.28		
08 52 16 00-0359	EA	35-15/16" x 52-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	975.29		66.19
		<i>For Tempered Low-E Insulated Glass, Add</i>	168.80		
08 52 16 00-0360		59-7/8" Height, One Operating Sash, Casement Wood Clad Windows			
		(Andersen 400 Series) <small>(08 52 16 00-0320)</small>			
08 52 16 00-0361	EA	17" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	760.85		59.67
		<i>For Tempered Low-E Insulated Glass, Add</i>	128.30		
08 52 16 00-0362	EA	20-1/2" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	790.17		61.85
		<i>For Tempered Low-E Insulated Glass, Add</i>	133.51		
08 52 16 00-0363	EA	24-1/8" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series)	820.57		63.47
		<i>For Tempered Low-E Insulated Glass, Add</i>	138.72		



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0364	EA 28-3/8" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	969.27 167.60	65.65
08 52 16 00-0365	EA 31-1/2" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,009.38 174.97	67.27
08 52 16 00-0366	EA 35-15/16" x 59-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,063.08 184.84	69.44
08 52 16 00-0367	64-13/16" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0320)</small>		
08 52 16 00-0368	EA 17" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	802.35 135.52	62.94
08 52 16 00-0369	EA 20-1/2" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	829.68 140.33	64.01
08 52 16 00-0370	EA 24-1/8" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	860.09 145.54	66.19
08 52 16 00-0371	EA 28-3/8" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,030.83 178.82	68.35
08 52 16 00-0372	EA 31-1/2" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,068.10 185.63	70.53
08 52 16 00-0373	EA 35-15/16" x 64-13/16", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,124.65 196.07	72.70
08 52 16 00-0374	71-7/8" Height, One Operating Sash, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0320)</small>		
08 52 16 00-0375	EA 17" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	860.09 145.54	66.19
08 52 16 00-0376	EA 20-1/2" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	889.40 150.75	68.35
08 52 16 00-0377	EA 24-1/8" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	919.81 155.97	69.99
08 52 16 00-0378	EA 28-3/8" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,118.64 194.87	72.15
08 52 16 00-0379	EA 31-1/2" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,164.54 203.39	73.78
08 52 16 00-0380	EA 35-15/16" x 71-7/8", One Operating Sash, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,212.45 212.11	75.95
08 52 16 00-0381	Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0319)</small>		
08 52 16 00-0382	24-1/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0381)</small>		
08 52 16 00-0383	EA 40-3/4" x 24-1/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	842.97 147.33	53.17
08 52 16 00-0384	EA 48" x 24-1/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	960.24 169.04	57.51
08 52 16 00-0385	EA 56-1/2" x 24-1/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,096.38 194.54	61.85
08 52 16 00-0386	28-3/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0381)</small>		
08 52 16 00-0387	EA 40-3/4" x 28-3/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	910.94 160.05	55.33
08 52 16 00-0388	EA 48" x 28-3/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,028.21 181.77	59.67
08 52 16 00-0389	EA 56-1/2" x 28-3/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,164.35 207.26	64.01
08 52 16 00-0390	35-15/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0381)</small>		
08 52 16 00-0391	EA 33-3/4" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	902.41 158.35	55.33
08 52 16 00-0392	EA 40-3/4" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,022.30 180.81	59.67
08 52 16 00-0393	EA 48" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,147.27 204.06	64.01
08 52 16 00-0394	EA 56-1/2" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,292.29 231.33	67.81
08 52 16 00-0395	EA 62-3/4" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,389.28 249.43	71.07
08 52 16 00-0396	EA 71-5/8" x 35-15/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,551.18 279.85	75.95
08 52 16 00-0397	40-13/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0381)</small>		

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 52 16 00-0398	EA		33-3/4" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	986.04 173.99	58.05
08 52 16 00-0399	EA		40-3/4" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,105.92 196.44	61.85
08 52 16 00-0400	EA		48" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,230.89 219.70	66.19
08 52 16 00-0401	EA		56-1/2" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,375.91 246.97	70.53
08 52 16 00-0402	EA		62-3/4" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,483.54 267.19	73.78
08 52 16 00-0403	EA		71-5/8" x 40-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,941.56 356.85	78.67
08 52 16 00-0404			48" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0381)		
08 52 16 00-0405	EA		33-3/4" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,109.00 196.85	62.39
08 52 16 00-0406	EA		40-3/4" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,230.89 219.70	66.19
08 52 16 00-0407	EA		48" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,355.86 242.96	70.53
08 52 16 00-0408	EA		56-1/2" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,500.88 270.23	74.87
08 52 16 00-0409	EA		62-3/4" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,603.90 289.53	78.12
08 52 16 00-0410	EA		71-5/8" x 48", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,759.77 318.75	83.01
08 52 16 00-0411			52-13/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0381)		
08 52 16 00-0412	EA		33-3/4" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,191.53 212.48	64.56
08 52 16 00-0413	EA		40-3/4" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,311.42 234.94	68.35
08 52 16 00-0414	EA		48" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,424.48 255.82	72.70
08 52 16 00-0415	EA		56-1/2" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,581.41 285.47	77.04
08 52 16 00-0416	EA		62-3/4" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,689.45 305.77	80.29
08 52 16 00-0417	EA		71-5/8" x 52-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,842.31 334.39	85.17
08 52 16 00-0418			59-7/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0381)		
08 52 16 00-0419	EA		33-3/4" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,313.42 235.34	68.35
08 52 16 00-0420	EA		40-3/4" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,433.30 257.80	72.70
08 52 16 00-0421	EA		48" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,558.27 281.06	77.04
08 52 16 00-0422	EA		56-1/2" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,703.30 308.33	80.83
08 52 16 00-0423	EA		62-3/4" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,811.33 328.63	84.09
08 52 16 00-0424	EA		71-5/8" x 59-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,962.18 356.85	88.97
08 52 16 00-0425			64-13/16" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0381)		
08 52 16 00-0426	EA		33-3/4" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,397.05 250.98	71.07
08 52 16 00-0427	EA		40-3/4" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,516.92 273.44	74.87
08 52 16 00-0428	EA		48" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,643.90 297.10	79.21
08 52 16 00-0429	EA		56-1/2" x 64-13/16", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,788.92 324.37	83.55
08 52 16 00-0430			71-7/8" Height, Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0381)		
08 52 16 00-0431	EA		33-3/4" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,518.93 273.84	74.87
08 52 16 00-0432	EA		40-3/4" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,638.80 296.30	79.21



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0433	EA	48" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,763.78 319.55	83.55
08 52 16 00-0434	EA	56-1/2" x 71-7/8", Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,908.80 346.82	87.35
08 52 16 00-0435		One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0436		24-1/8" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0437	EA	71-7/8" x 24-1/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,349.90 241.99	69.99
08 52 16 00-0438	EA	84-5/8" x 24-1/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,569.76 283.14	77.04
08 52 16 00-0439		28-3/8" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0440	EA	71-7/8" x 28-3/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,430.69 257.28	72.15
08 52 16 00-0441	EA	84-5/8" x 28-3/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,638.64 296.05	79.21
08 52 16 00-0442		35-15/16" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0443	EA	61" x 35-15/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,376.31 247.05	70.53
08 52 16 00-0444	EA	71-7/8" x 35-15/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,555.19 280.66	75.95
08 52 16 00-0445	EA	84-5/8" x 35-15/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,775.81 321.96	83.55
08 52 16 00-0446		40-13/16" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0447	EA	61" x 40-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,455.85 261.87	73.78
08 52 16 00-0448	EA	71-7/8" x 40-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,640.80 296.70	78.67
08 52 16 00-0449	EA	84-5/8" x 40-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,859.43 337.60	85.72
08 52 16 00-0450		48" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0451	EA	71-7/8" x 48", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,763.78 319.55	83.01
08 52 16 00-0452	EA	84-5/8" x 48", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,982.41 360.46	90.06
08 52 16 00-0453		52-13/16" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0454	EA	71-7/8" x 52-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,846.32 335.19	85.17
08 52 16 00-0455	EA	84-5/8" x 52-13/16", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,064.94 376.10	92.22
08 52 16 00-0456		59-7/8" Height, One Stationary Sash And Two Operating Sashes, Casement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0435)</small>		
08 52 16 00-0457	EA	71-7/8" x 59-7/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,966.19 357.65	88.97

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 52 16 00-0458	EA	84-5/8" x 59-7/8", One Stationary Sash And Two Operating Sashes, Casement Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	2,186.82 398.95		96.56
08 52 16 00-0459		Awning Wood Clad Windows <small>(08 52 16)</small> Note: Awning windows are hinged at the top of the frame and swing outward with a crank or push out operation.			
08 52 16 00-0460		Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0459)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.			
08 52 16 00-0461		Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0460)</small>			
08 52 16 00-0462		17" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0463	EA	24-1/8" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	424.03 67.01		44.49
08 52 16 00-0464	EA	28-3/8" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	454.04 72.15		46.66
08 52 16 00-0465	EA	31-1/2" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	478.60 76.41		48.28
08 52 16 00-0466	EA	35-15/16" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	509.76 81.77		50.46
08 52 16 00-0467	EA	40-13/16" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	545.65 87.86		53.17
08 52 16 00-0468	EA	48" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	600.86 97.17		57.51
08 52 16 00-0469	EA	52-13/16" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	635.68 103.26		59.67
08 52 16 00-0470	EA	59-7/8" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	686.58 111.93		64.01
08 52 16 00-0471	EA	64-13/16" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	705.73 114.67		66.19
08 52 16 00-0472	EA	71-7/8" x 17", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	756.08 123.22		69.99
08 52 16 00-0473		20-1/2" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0474	EA	24-1/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	447.32 71.02		46.66
08 52 16 00-0475	EA	28-3/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	479.74 76.64		48.83
08 52 16 00-0476	EA	31-1/2" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	500.92 80.22		49.91
08 52 16 00-0477	EA	35-15/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	535.46 86.26		52.08
08 52 16 00-0478	EA	40-13/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	571.37 92.36		55.33
08 52 16 00-0479	EA	48" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	624.96 101.34		59.13
08 52 16 00-0480	EA	52-13/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	659.78 107.43		61.85
08 52 16 00-0481	EA	59-7/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	712.28 116.42		65.10
08 52 16 00-0482	EA	64-13/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	729.57 118.79		68.35
08 52 16 00-0483	EA	71-7/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	781.50 127.66		71.61
08 52 16 00-0484	EA	84-5/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	1,202.97 209.13		79.21
08 52 16 00-0485		24-1/8" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0486	EA	24-1/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	476.53 75.99		48.83
08 52 16 00-0487	EA	28-3/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	506.55 81.13		50.99
08 52 16 00-0488	EA	31-1/2" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	527.02 84.57		52.08
08 52 16 00-0489	EA	35-15/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	562.26 90.75		54.25
08 52 16 00-0490	EA	40-13/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	598.17 96.85		57.51
08 52 16 00-0491	EA	48" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	653.36 106.15		61.30
08 52 16 00-0492	EA	52-13/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	688.18 112.25		64.01
08 52 16 00-0493	EA	59-7/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	740.68 121.23		67.27
08 52 16 00-0494	EA	64-13/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	756.08 123.22		70.53



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 52 16 00-0495	EA	71-7/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		806.38	73.78
		<i>For Tempered Clear Insulated Glass, Add</i>		131.76	
08 52 16 00-0496	EA	84-5/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		1,265.81	81.38
		<i>For Tempered Clear Insulated Glass, Add</i>		220.83	
08 52 16 00-0497		28-3/8" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0498	EA	24-1/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		476.07	50.99
		<i>For Tempered Clear Insulated Glass, Add</i>		75.03	
08 52 16 00-0499	EA	28-3/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		522.12	53.17
		<i>For Tempered Clear Insulated Glass, Add</i>		83.37	
08 52 16 00-0500	EA	31-1/2" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		551.76	54.25
		<i>For Tempered Clear Insulated Glass, Add</i>		88.65	
08 52 16 00-0501	EA	35-15/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		606.70	56.42
		<i>For Tempered Clear Insulated Glass, Add</i>		98.77	
08 52 16 00-0502	EA	40-13/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		661.86	59.67
		<i>For Tempered Clear Insulated Glass, Add</i>		108.72	
08 52 16 00-0503	EA	48" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		742.72	63.47
		<i>For Tempered Clear Insulated Glass, Add</i>		123.15	
08 52 16 00-0504	EA	52-13/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		795.18	66.19
		<i>For Tempered Clear Insulated Glass, Add</i>		132.78	
08 52 16 00-0505	EA	59-7/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		874.95	69.44
		<i>For Tempered Clear Insulated Glass, Add</i>		147.21	
08 52 16 00-0506	EA	64-13/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		904.54	72.70
		<i>For Tempered Clear Insulated Glass, Add</i>		152.05	
08 52 16 00-0507	EA	71-7/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		981.83	75.95
		<i>For Tempered Clear Insulated Glass, Add</i>		165.98	
08 52 16 00-0508	EA	84-5/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series).....		1,300.20	83.55
		<i>For Tempered Clear Insulated Glass, Add</i>		226.84	
08 52 16 00-0509		31-1/2" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0510	EA	28-3/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		551.76	54.25
		<i>For Tempered Clear Insulated Glass, Add</i>		88.65	
08 52 16 00-0511	EA	31-1/2" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		583.59	55.88
		<i>For Tempered Clear Insulated Glass, Add</i>		94.37	
08 52 16 00-0512	EA	35-15/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		627.38	58.05
		<i>For Tempered Clear Insulated Glass, Add</i>		102.26	
08 52 16 00-0513	EA	40-13/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		676.33	60.76
		<i>For Tempered Clear Insulated Glass, Add</i>		110.96	
08 52 16 00-0514	EA	48" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		747.59	65.10
		<i>For Tempered Clear Insulated Glass, Add</i>		123.48	
08 52 16 00-0515	EA	52-13/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		796.82	67.27
		<i>For Tempered Clear Insulated Glass, Add</i>		132.46	
08 52 16 00-0516	EA	59-7/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		867.00	71.61
		<i>For Tempered Clear Insulated Glass, Add</i>		144.97	
08 52 16 00-0517	EA	64-13/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		915.96	73.78
		<i>For Tempered Clear Insulated Glass, Add</i>		153.68	
08 52 16 00-0518	EA	71-7/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		987.49	77.58
		<i>For Tempered Clear Insulated Glass, Add</i>		166.47	
08 52 16 00-0519	EA	84-5/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 200 Series).....		1,386.17	84.63
		<i>For Tempered Clear Insulated Glass, Add</i>		243.38	
08 52 16 00-0520		35-15/16" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0521	EA	31-1/2" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		627.38	58.05
		<i>For Tempered Clear Insulated Glass, Add</i>		102.26	
08 52 16 00-0522	EA	35-15/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		689.68	60.22
		<i>For Tempered Clear Insulated Glass, Add</i>		113.85	
08 52 16 00-0523	EA	40-13/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		744.83	62.94
		<i>For Tempered Clear Insulated Glass, Add</i>		123.79	
08 52 16 00-0524	EA	48" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		825.70	67.27
		<i>For Tempered Clear Insulated Glass, Add</i>		138.23	
08 52 16 00-0525	EA	52-13/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		879.76	69.44
		<i>For Tempered Clear Insulated Glass, Add</i>		148.18	
08 52 16 00-0526	EA	59-7/8" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		957.94	73.78
		<i>For Tempered Clear Insulated Glass, Add</i>		162.29	
08 52 16 00-0527	EA	64-13/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		837.71	75.95
		<i>For Tempered Clear Insulated Glass, Add</i>		137.16	
08 52 16 00-0528	EA	71-7/8" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 200 Series).....		899.14	79.75
		<i>For Tempered Clear Insulated Glass, Add</i>		147.93	
08 52 16 00-0529		40-3/4" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0461)</small>			
08 52 16 00-0530	EA	35-15/16" x 40-3/4", Venting, Awning Wood Clad Window (Andersen 200 Series).....		735.21	62.94
		<i>For Tempered Clear Insulated Glass, Add</i>		121.87	
08 52 16 00-0531	EA	40-13/16" x 40-3/4", Venting, Awning Wood Clad Window (Andersen 200 Series).....		827.26	66.19
		<i>For Tempered Clear Insulated Glass, Add</i>		139.19	

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 52 16 00-0532	48" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) ^(08 52 16 00-0461)		
08 52 16 00-0533	EA 35-15/16" x 48", Venting, Awning Wood Clad Window (Andersen 200 Series)	873.82	67.27
	<i>For Tempered Clear Insulated Glass, Add</i>	147.86	
08 52 16 00-0534	EA 40-13/16" x 48", Venting, Awning Wood Clad Window (Andersen 200 Series)	967.47	70.53
	<i>For Tempered Clear Insulated Glass, Add</i>	165.50	
08 52 16 00-0535	EA 48" x 48", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,104.47	74.33
	<i>For Tempered Clear Insulated Glass, Add</i>	191.16	
08 52 16 00-0536	59-13/16" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) ^(08 52 16 00-0461)		
08 52 16 00-0537	EA 35-15/16" x 59-13/16", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,081.10	73.24
	<i>For Tempered Clear Insulated Glass, Add</i>	186.92	
08 52 16 00-0538	EA 40-13/16" x 59-13/16", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,163.14	75.95
	<i>For Tempered Clear Insulated Glass, Add</i>	202.25	
08 52 16 00-0539	71-7/8" Height, Venting, Awning Wood Clad Windows (Andersen 200 Series) ^(08 52 16 00-0461)		
08 52 16 00-0540	EA 24-1/8" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,181.79	73.78
	<i>For Tempered Clear Insulated Glass, Add</i>	206.84	
08 52 16 00-0541	EA 35-15/16" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,222.95	79.75
	<i>For Tempered Clear Insulated Glass, Add</i>	212.69	
08 52 16 00-0542	EA 40-13/16" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,353.01	82.46
	<i>For Tempered Clear Insulated Glass, Add</i>	237.62	
08 52 16 00-0543	EA 48" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 200 Series)	1,486.01	86.81
	<i>For Tempered Clear Insulated Glass, Add</i>	262.48	
08 52 16 00-0544	Stationary, Awning Wood Clad Windows (Andersen 200 Series) ^(08 52 16 00-0460)		
08 52 16 00-0545	17" Height, Stationary, Awning Wood Clad Windows (Andersen 200 Series) ^(08 52 16 00-0544)		
08 52 16 00-0546	EA 24-1/8" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	374.31	44.49
	<i>For Tempered Clear Insulated Glass, Add</i>	57.07	
08 52 16 00-0547	EA 28-3/8" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	402.71	46.66
	<i>For Tempered Clear Insulated Glass, Add</i>	61.88	
08 52 16 00-0548	EA 31-1/2" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	421.47	48.28
	<i>For Tempered Clear Insulated Glass, Add</i>	64.98	
08 52 16 00-0549	EA 35-15/16" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	452.01	50.46
	<i>For Tempered Clear Insulated Glass, Add</i>	70.22	
08 52 16 00-0550	EA 40-13/16" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	484.70	53.17
	<i>For Tempered Clear Insulated Glass, Add</i>	75.67	
08 52 16 00-0551	EA 48" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	535.09	57.51
	<i>For Tempered Clear Insulated Glass, Add</i>	84.01	
08 52 16 00-0552	EA 52-13/16" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	565.10	59.67
	<i>For Tempered Clear Insulated Glass, Add</i>	89.15	
08 52 16 00-0553	EA 59-7/8" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	612.79	64.01
	<i>For Tempered Clear Insulated Glass, Add</i>	97.17	
08 52 16 00-0554	EA 64-13/16" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	645.49	66.19
	<i>For Tempered Clear Insulated Glass, Add</i>	102.62	
08 52 16 00-0555	EA 71-7/8" x 17", Stationary, Awning Wood Clad Window (Andersen 200 Series)	693.18	69.99
	<i>For Tempered Clear Insulated Glass, Add</i>	110.64	
08 52 16 00-0556	20-1/2" Height, Stationary, Awning Wood Clad Windows (Andersen 200 Series) ^(08 52 16 00-0544)		
08 52 16 00-0557	EA 24-1/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	396.80	46.66
	<i>For Tempered Clear Insulated Glass, Add</i>	60.92	
08 52 16 00-0558	EA 28-3/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	425.20	48.83
	<i>For Tempered Clear Insulated Glass, Add</i>	65.73	
08 52 16 00-0559	EA 31-1/2" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	442.42	49.91
	<i>For Tempered Clear Insulated Glass, Add</i>	68.52	
08 52 16 00-0560	EA 35-15/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	476.11	52.08
	<i>For Tempered Clear Insulated Glass, Add</i>	74.39	
08 52 16 00-0561	EA 40-13/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	508.81	55.33
	<i>For Tempered Clear Insulated Glass, Add</i>	79.84	
08 52 16 00-0562	EA 48" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	557.59	59.13
	<i>For Tempered Clear Insulated Glass, Add</i>	87.86	
08 52 16 00-0563	EA 52-13/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	589.20	61.85
	<i>For Tempered Clear Insulated Glass, Add</i>	93.32	
08 52 16 00-0564	EA 59-7/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	635.29	65.10
	<i>For Tempered Clear Insulated Glass, Add</i>	101.02	
08 52 16 00-0565	EA 64-13/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	669.59	68.35
	<i>For Tempered Clear Insulated Glass, Add</i>	106.79	
08 52 16 00-0566	EA 71-7/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	715.68	71.61
	<i>For Tempered Clear Insulated Glass, Add</i>	114.49	



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 52 16 00-0567 24-1/8" Height, Stationary, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0544)</small>		
08 52 16 00-0568 EA 24-1/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	422.00 65.09	48.83
08 52 16 00-0569 EA 28-3/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	450.41 69.90	50.99
08 52 16 00-0570 EA 31-1/2" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	465.80 72.33	52.08
08 52 16 00-0571 EA 35-15/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	499.70 78.24	54.25
08 52 16 00-0572 EA 40-13/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	532.40 83.69	57.51
08 52 16 00-0573 EA 48" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	581.18 91.71	61.30
08 52 16 00-0574 EA 52-13/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	612.79 97.17	64.01
08 52 16 00-0575 EA 59-7/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	660.48 105.19	67.27
08 52 16 00-0576 EA 64-13/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	693.18 110.64	70.53
08 52 16 00-0577 EA 71-7/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	740.88 118.66	73.78
08 52 16 00-0578 28-3/8" Height, Stationary, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0544)</small>		
08 52 16 00-0579 EA 24-1/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	424.74 64.77	50.99
08 52 16 00-0580 EA 28-3/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	462.77 71.50	53.17
08 52 16 00-0581 EA 31-1/2" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	483.74 75.05	54.25
08 52 16 00-0582 EA 35-15/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	504.04 78.24	56.42
08 52 16 00-0583 EA 40-13/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	575.24 91.39	59.67
08 52 16 00-0584 EA 48" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	640.06 102.62	63.47
08 52 16 00-0585 EA 52-13/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	682.90 110.32	66.19
08 52 16 00-0586 EA 59-7/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	746.63 121.55	69.44
08 52 16 00-0587 EA 64-13/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	792.16 129.57	72.70
08 52 16 00-0588 EA 71-7/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	855.90 140.80	75.95
08 52 16 00-0589 31-1/2" Height, Stationary, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0544)</small>		
08 52 16 00-0590 EA 28-3/8" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	483.74 75.05	54.25
08 52 16 00-0591 EA 31-1/2" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	510.13 79.67	55.88
08 52 16 00-0592 EA 35-15/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	545.76 85.93	58.05
08 52 16 00-0593 EA 40-13/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	586.55 93.01	60.76
08 52 16 00-0594 EA 48" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	645.56 103.07	65.10
08 52 16 00-0595 EA 52-13/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	685.27 110.15	67.27
08 52 16 00-0596 EA 59-7/8" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	743.21 120.21	71.61
08 52 16 00-0597 EA 64-13/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	782.65 127.02	73.78
08 52 16 00-0598 EA 71-7/8" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	840.57 137.08	77.58
08 52 16 00-0599 35-15/16" Height, Stationary, Awning Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0544)</small>		
08 52 16 00-0600 EA 31-1/2" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	545.76 85.93	58.05
08 52 16 00-0601 EA 35-15/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	598.25 95.56	60.22
08 52 16 00-0602 EA 40-13/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	642.18 103.26	62.94
08 52 16 00-0603 EA 48" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	708.60 114.81	67.27
08 52 16 00-0604 EA 52-13/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	751.44 122.51	69.44

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 52 16 00-0605	EA		59-7/8" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series)	815.18	73.78
			<i>For Tempered Clear Insulated Glass, Add</i>	133.74	
08 52 16 00-0606	EA		64-13/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series)	859.11	75.95
			<i>For Tempered Clear Insulated Glass, Add</i>	141.44	
08 52 16 00-0607	EA		71-7/8" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 200 Series)	922.84	79.75
			<i>For Tempered Clear Insulated Glass, Add</i>	152.67	
08 52 16 00-0608			Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0459)</small>		
			Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and Low-E insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0609			Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0608)</small>		
08 52 16 00-0610			17" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0611	EA		24-1/8" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	503.43	44.49
			<i>For Tempered Low-E Insulated Glass, Add</i>	82.89	
08 52 16 00-0612	EA		28-3/8" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	539.85	46.66
			<i>For Tempered Low-E Insulated Glass, Add</i>	89.31	
08 52 16 00-0613	EA		31-1/2" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	569.75	48.28
			<i>For Tempered Low-E Insulated Glass, Add</i>	94.64	
08 52 16 00-0614	EA		35-15/16" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	607.60	50.46
			<i>For Tempered Low-E Insulated Glass, Add</i>	101.34	
08 52 16 00-0615	EA		40-13/16" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	651.12	53.17
			<i>For Tempered Low-E Insulated Glass, Add</i>	108.96	
08 52 16 00-0616	EA		48" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	717.95	57.51
			<i>For Tempered Low-E Insulated Glass, Add</i>	120.59	
08 52 16 00-0617	EA		52-13/16" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	760.39	59.67
			<i>For Tempered Low-E Insulated Glass, Add</i>	128.21	
08 52 16 00-0618	EA		59-7/8" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	822.12	64.01
			<i>For Tempered Low-E Insulated Glass, Add</i>	139.03	
08 52 16 00-0619	EA		64-13/16" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	844.70	66.19
			<i>For Tempered Low-E Insulated Glass, Add</i>	142.46	
08 52 16 00-0620	EA		71-7/8" x 17", Venting, Awning Wood Clad Window (Andersen 400 Series)	905.74	69.99
			<i>For Tempered Low-E Insulated Glass, Add</i>	153.15	
08 52 16 00-0621			20-1/2" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0622	EA		24-1/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	531.73	46.66
			<i>For Tempered Low-E Insulated Glass, Add</i>	87.90	
08 52 16 00-0623	EA		28-3/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	571.17	48.83
			<i>For Tempered Low-E Insulated Glass, Add</i>	94.92	
08 52 16 00-0624	EA		31-1/2" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	596.83	49.91
			<i>For Tempered Low-E Insulated Glass, Add</i>	99.40	
08 52 16 00-0625	EA		35-15/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	638.92	52.08
			<i>For Tempered Low-E Insulated Glass, Add</i>	106.95	
08 52 16 00-0626	EA		40-13/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	682.45	55.33
			<i>For Tempered Low-E Insulated Glass, Add</i>	114.57	
08 52 16 00-0627	EA		48" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	747.27	59.13
			<i>For Tempered Low-E Insulated Glass, Add</i>	125.80	
08 52 16 00-0628	EA		52-13/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	789.71	61.85
			<i>For Tempered Low-E Insulated Glass, Add</i>	133.42	
08 52 16 00-0629	EA		59-7/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	853.44	65.10
			<i>For Tempered Low-E Insulated Glass, Add</i>	144.65	
08 52 16 00-0630	EA		64-13/16" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	873.69	68.35
			<i>For Tempered Low-E Insulated Glass, Add</i>	147.61	
08 52 16 00-0631	EA		71-7/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	936.71	71.61
			<i>For Tempered Low-E Insulated Glass, Add</i>	158.70	
08 52 16 00-0632	EA		84-5/8" x 20-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series)	1,460.01	79.21
			<i>For Tempered Low-E Insulated Glass, Add</i>	260.54	
08 52 16 00-0633			24-1/8" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0634	EA		24-1/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	567.16	48.83
			<i>For Tempered Low-E Insulated Glass, Add</i>	94.12	
08 52 16 00-0635	EA		28-3/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	603.59	50.99
			<i>For Tempered Low-E Insulated Glass, Add</i>	100.54	
08 52 16 00-0636	EA		31-1/2" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	628.36	52.08
			<i>For Tempered Low-E Insulated Glass, Add</i>	104.84	
08 52 16 00-0637	EA		35-15/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	671.33	54.25
			<i>For Tempered Low-E Insulated Glass, Add</i>	112.57	
08 52 16 00-0638	EA		40-13/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	714.86	57.51
			<i>For Tempered Low-E Insulated Glass, Add</i>	120.19	
08 52 16 00-0639	EA		48" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	781.69	61.30
			<i>For Tempered Low-E Insulated Glass, Add</i>	131.82	
08 52 16 00-0640	EA		52-13/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	824.12	64.01
			<i>For Tempered Low-E Insulated Glass, Add</i>	139.43	
08 52 16 00-0641	EA		59-7/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	887.85	67.27
			<i>For Tempered Low-E Insulated Glass, Add</i>	150.66	
08 52 16 00-0642	EA		64-13/16" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series)	905.74	70.53
			<i>For Tempered Low-E Insulated Glass, Add</i>	153.15	



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0643	EA 71-7/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	966.72 163.83	73.78
08 52 16 00-0644	EA 84-5/8" x 24-1/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,537.49 275.16	81.38
08 52 16 00-0645	28-3/8" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0646	EA 24-1/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	565.50 92.92	50.99
08 52 16 00-0647	EA 28-3/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	621.97 103.34	53.17
08 52 16 00-0648	EA 31-1/2" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	658.21 109.94	54.25
08 52 16 00-0649	EA 35-15/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 200 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	725.80 122.59	56.42
08 52 16 00-0650	EA 40-13/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	793.39 135.02	59.67
08 52 16 00-0651	EA 48" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	892.29 153.07	63.47
08 52 16 00-0652	EA 52-13/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	956.78 165.10	66.19
08 52 16 00-0653	EA 59-7/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,054.60 183.14	69.44
08 52 16 00-0654	EA 64-13/16" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,090.23 189.18	72.70
08 52 16 00-0655	EA 71-7/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,359.56 241.53	75.95
08 52 16 00-0656	EA 84-5/8" x 28-3/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,579.39 282.68	83.55
08 52 16 00-0657	31-1/2" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0658	EA 28-3/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	658.21 109.94	54.25
08 52 16 00-0659	EA 31-1/2" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	697.18 117.08	55.88
08 52 16 00-0660	EA 35-15/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	750.84 126.95	58.05
08 52 16 00-0661	EA 40-13/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	810.67 137.83	60.76
08 52 16 00-0662	EA 48" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	897.57 153.47	65.10
08 52 16 00-0663	EA 52-13/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	958.03 164.70	67.27
08 52 16 00-0664	EA 59-7/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,043.85 180.34	71.61
08 52 16 00-0665	EA 64-13/16" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,103.70 191.23	73.78
08 52 16 00-0666	EA 71-7/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,191.21 207.21	77.58
08 52 16 00-0667	EA 84-5/8" x 31-1/2", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,686.04 303.36	84.63
08 52 16 00-0668	35-15/16" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0669	EA 31-1/2" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	750.84 126.95	58.05
08 52 16 00-0670	EA 35-15/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	827.63 141.44	60.22
08 52 16 00-0671	EA 40-13/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	895.21 153.87	62.94
08 52 16 00-0672	EA 48" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	994.12 171.92	67.27
08 52 16 00-0673	EA 52-13/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,060.62 184.35	69.44
08 52 16 00-0674	EA 59-7/8" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,156.44 201.99	73.78
08 52 16 00-0675	EA 64-13/16" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,004.79 170.58	75.95
08 52 16 00-0676	EA 71-7/8" x 35-15/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,079.69 184.04	79.75
08 52 16 00-0677	40-3/4" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0609)</small>		
08 52 16 00-0678	EA 35-15/16" x 40-3/4", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	877.75 151.46	62.94
08 52 16 00-0679	EA 40-13/16" x 40-3/4", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,000.14 173.12	67.27

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 52 16 00-0680	48" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) ^(08 52 16 00-0609)		
08 52 16 00-0681	EA 35-15/16" x 48", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,054.27 183.95	67.27
08 52 16 00-0682	EA 40-13/16" x 48", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,169.98 206.00	70.53
08 52 16 00-0683	EA 48" x 48", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,339.06 238.08	74.33

08 52 16 00-0684	59-13/16" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) ^(08 52 16 00-0609)		
08 52 16 00-0685	EA 35-15/16" x 59-13/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,310.40 232.78	73.24
08 52 16 00-0686	EA 40-13/16" x 59-13/16", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,411.59 251.94	75.95

08 52 16 00-0687	71-7/8" Height, Venting, Awning Wood Clad Windows (Andersen 400 Series) ^(08 52 16 00-0609)		
08 52 16 00-0688	EA 24-1/8" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,435.98 257.68	73.78
08 52 16 00-0689	EA 35-15/16" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,484.45 264.99	79.75
08 52 16 00-0690	EA 40-13/16" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,645.67 296.15	82.46
08 52 16 00-0691	EA 48" x 71-7/8", Venting, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,809.74 327.23	86.81

08 52 16 00-0692 **Stationary, Awning Wood Clad Windows (Andersen 400 Series)**^(08 52 16 00-0608)

08 52 16 00-0693	17" Height, Stationary, Awning Wood Clad Windows (Andersen 400 Series) ^(08 52 16 00-0692)		
08 52 16 00-0694	EA 24-1/8" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	441.27 70.46	44.49
08 52 16 00-0695	EA 28-3/8" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	475.69 76.48	46.66
08 52 16 00-0696	EA 31-1/2" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	498.33 80.35	48.28
08 52 16 00-0697	EA 35-15/16" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	535.42 86.90	50.46
08 52 16 00-0698	EA 40-13/16" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	574.93 93.72	53.17
08 52 16 00-0699	EA 48" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	635.75 104.15	57.51
08 52 16 00-0700	EA 52-13/16" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	672.17 110.56	59.67
08 52 16 00-0701	EA 59-7/8" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	729.88 120.59	64.01
08 52 16 00-0702	EA 64-13/16" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	769.40 127.40	66.19
08 52 16 00-0703	EA 71-7/8" x 17", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	827.12 137.43	69.99

08 52 16 00-0704 **20-1/2" Height, Stationary, Awning Wood Clad Windows (Andersen 400 Series)**^(08 52 16 00-0692)

08 52 16 00-0705	EA 24-1/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	468.58 75.27	46.66
08 52 16 00-0706	EA 28-3/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	503.00 81.29	48.83
08 52 16 00-0707	EA 31-1/2" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	523.71 84.78	49.91
08 52 16 00-0708	EA 35-15/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	564.74 92.12	52.08
08 52 16 00-0709	EA 40-13/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	604.25 98.93	55.33
08 52 16 00-0710	EA 48" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	663.06 108.96	59.13
08 52 16 00-0711	EA 52-13/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	701.48 115.77	61.85
08 52 16 00-0712	EA 59-7/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	757.19 125.40	65.10
08 52 16 00-0713	EA 64-13/16" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	798.72 132.62	68.35
08 52 16 00-0714	EA 71-7/8" x 20-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	854.43 142.24	71.61

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 52 16 00-0715 24-1/8" Height, Stationary, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0692)</small>		
08 52 16 00-0716 EA 24-1/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	498.99	48.83
For Tempered Low-E Insulated Glass, Add	80.49	
08 52 16 00-0717 EA 28-3/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	533.42	50.99
For Tempered Low-E Insulated Glass, Add	86.50	
08 52 16 00-0718 EA 31-1/2" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	551.84	52.08
For Tempered Low-E Insulated Glass, Add	89.54	
08 52 16 00-0719 EA 35-15/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	593.14	54.25
For Tempered Low-E Insulated Glass, Add	96.93	
08 52 16 00-0720 EA 40-13/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	632.65	57.51
For Tempered Low-E Insulated Glass, Add	103.74	
08 52 16 00-0721 EA 48" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	691.46	61.30
For Tempered Low-E Insulated Glass, Add	113.77	
08 52 16 00-0722 EA 52-13/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	729.88	64.01
For Tempered Low-E Insulated Glass, Add	120.59	
08 52 16 00-0723 EA 59-7/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	787.60	67.27
For Tempered Low-E Insulated Glass, Add	130.61	
08 52 16 00-0724 EA 64-13/16" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	827.12	70.53
For Tempered Low-E Insulated Glass, Add	137.43	
08 52 16 00-0725 EA 71-7/8" x 24-1/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	884.84	73.78
For Tempered Low-E Insulated Glass, Add	147.45	
08 52 16 00-0726 28-3/8" Height, Stationary, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0692)</small>		
08 52 16 00-0727 EA 24-1/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	501.33	50.99
For Tempered Low-E Insulated Glass, Add	80.08	
08 52 16 00-0728 EA 28-3/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	547.78	53.17
For Tempered Low-E Insulated Glass, Add	88.51	
08 52 16 00-0729 EA 31-1/2" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	573.19	54.25
For Tempered Low-E Insulated Glass, Add	92.94	
08 52 16 00-0730 EA 35-15/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	597.48	56.42
For Tempered Low-E Insulated Glass, Add	96.93	
08 52 16 00-0731 EA 40-13/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	685.11	59.67
For Tempered Low-E Insulated Glass, Add	113.37	
08 52 16 00-0732 EA 48" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	763.97	63.47
For Tempered Low-E Insulated Glass, Add	127.40	
08 52 16 00-0733 EA 52-13/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	816.43	66.19
For Tempered Low-E Insulated Glass, Add	137.03	
08 52 16 00-0734 EA 59-7/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	894.20	69.44
For Tempered Low-E Insulated Glass, Add	151.06	
08 52 16 00-0735 EA 64-13/16" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	949.75	72.70
For Tempered Low-E Insulated Glass, Add	161.09	
08 52 16 00-0736 EA 71-7/8" x 28-3/8", Stationary, Awning Wood Clad Window (Andersen 400 Series)	1,027.53	75.95
For Tempered Low-E Insulated Glass, Add	175.12	
08 52 16 00-0737 31-1/2" Height, Stationary, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0692)</small>		
08 52 16 00-0738 EA 28-3/8" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 200 Series)	573.19	54.25
For Tempered Low-E Insulated Glass, Add	92.94	
08 52 16 00-0739 EA 31-1/2" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	605.36	55.88
For Tempered Low-E Insulated Glass, Add	98.72	
08 52 16 00-0740 EA 35-15/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	648.81	58.05
For Tempered Low-E Insulated Glass, Add	106.54	
08 52 16 00-0741 EA 40-13/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	698.44	60.76
For Tempered Low-E Insulated Glass, Add	115.38	
08 52 16 00-0742 EA 48" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	770.04	65.10
For Tempered Low-E Insulated Glass, Add	127.97	
08 52 16 00-0743 EA 52-13/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	818.59	67.27
For Tempered Low-E Insulated Glass, Add	136.81	
08 52 16 00-0744 EA 59-7/8" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	889.11	71.61
For Tempered Low-E Insulated Glass, Add	149.39	
08 52 16 00-0745 EA 64-13/16" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	937.05	73.78
For Tempered Low-E Insulated Glass, Add	157.90	
08 52 16 00-0746 EA 71-7/8" x 31-1/2", Stationary, Awning Wood Clad Window (Andersen 400 Series)	1,007.56	77.58
For Tempered Low-E Insulated Glass, Add	170.48	
08 52 16 00-0747 35-15/16" Height, Stationary, Awning Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-0692)</small>		
08 52 16 00-0748 EA 31-1/2" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series)	648.81	58.05
For Tempered Low-E Insulated Glass, Add	106.54	
08 52 16 00-0749 EA 35-15/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series)	713.34	60.22
For Tempered Low-E Insulated Glass, Add	118.58	
08 52 16 00-0750 EA 40-13/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series)	766.89	62.94
For Tempered Low-E Insulated Glass, Add	128.21	
08 52 16 00-0751 EA 48" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series)	847.75	67.27
For Tempered Low-E Insulated Glass, Add	142.64	
08 52 16 00-0752 EA 52-13/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series)	900.21	69.44
For Tempered Low-E Insulated Glass, Add	152.27	

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0753	EA	59-7/8" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	977.99 166.30	73.78
08 52 16 00-0754	EA	64-13/16" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,031.54 175.93	75.95
08 52 16 00-0755	EA	71-7/8" x 35-15/16", Stationary, Awning Wood Clad Window (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,109.31 189.96	79.75
08 52 16 00-0756		Horizontal Sliding Wood Clad Windows <small>(08 52 16)</small> Note: Sliding windows open horizontally with one or more operating sashes combined with stationary sashes		
08 52 16 00-0757		One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0756)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0758		17-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0759	EA	47-1/2" x 17-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	525.70 82.35	57.51
08 52 16 00-0760		23-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0761	EA	35-1/2" x 23-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	483.56 75.23	53.17
08 52 16 00-0762	EA	47-1/2" x 23-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	565.85 89.08	60.76
08 52 16 00-0763		35-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0764	EA	35-1/2" x 35-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	565.85 89.08	60.76
08 52 16 00-0765	EA	47-1/2" x 35-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	648.17 102.94	67.27
08 52 16 00-0766	EA	59-1/2" x 35-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	730.48 116.80	73.24
08 52 16 00-0767	EA	71-1/2" x 35-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	812.79 130.66	79.75
08 52 16 00-0768		41-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0769	EA	35-1/2" x 41-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	608.01 96.21	64.01
08 52 16 00-0770	EA	47-1/2" x 41-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	688.34 109.67	70.53
08 52 16 00-0771	EA	59-1/2" x 41-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	770.64 123.53	76.49
08 52 16 00-0772	EA	71-1/2" x 41-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	922.24 151.25	83.01
08 52 16 00-0773		47-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0774	EA	35-1/2" x 47-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	648.17 102.94	67.27
08 52 16 00-0775	EA	47-1/2" x 47-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	730.48 116.80	73.78
08 52 16 00-0776	EA	59-1/2" x 47-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	812.79 130.66	79.75
08 52 16 00-0777	EA	71-1/2" x 47-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	895.10 144.52	86.26
08 52 16 00-0778		53-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0779	EA	47-1/2" x 53-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	770.64 123.53	77.04
08 52 16 00-0780	EA	59-1/2" x 53-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	852.95 137.39	83.01
08 52 16 00-0781	EA	71-1/2" x 53-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	935.26 151.25	89.51
08 52 16 00-0782		59-1/2" Height, One Operating Sash, Horizontal Sliding Wood Clad Windows (Andersen 200 Series) <small>(08 52 16 00-0757)</small>		
08 52 16 00-0783	EA	47-1/2" x 59-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	812.79 130.66	80.29



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0784	EA 59-1/2" x 59-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	895.10 144.52	86.26
08 52 16 00-0785	EA 71-1/2" x 59-1/2", One Operating Sash, Horizontal Sliding Wood Clad Window (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	977.55 158.40	92.77
08 52 16 00-0786	Two Operating Sashes, Horizontal Sliding Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0786) Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and Low-E insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0787	22-1/4" Height, Two Operating Sashes, Horizontal Sliding Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0786)		
08 52 16 00-0788	EA 35-1/4" x 22-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,178.21 214.16	53.17
08 52 16 00-0789	EA 47-1/4" x 22-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,403.05 256.52	60.76
08 52 16 00-0790	35-1/4" Height, Two Operating Sashes, Horizontal Sliding Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0786)		
08 52 16 00-0791	EA 35-1/4" x 35-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,420.87 260.09	60.76
08 52 16 00-0792	EA 47-1/4" x 35-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,647.70 302.85	67.27
08 52 16 00-0793	EA 59-1/4" x 35-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,872.54 345.21	73.24
08 52 16 00-0794	EA 71-1/4" x 35-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,097.39 387.58	79.75
08 52 16 00-0795	41-1/4" Height, Two Operating Sashes, Horizontal Sliding Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0786)		
08 52 16 00-0796	EA 35-1/4" x 41-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,534.29 281.47	64.01
08 52 16 00-0797	EA 47-1/4" x 41-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,759.13 323.83	70.53
08 52 16 00-0798	EA 59-1/4" x 41-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,985.95 366.59	76.49
08 52 16 00-0799	EA 71-1/4" x 41-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,210.80 408.96	83.01
08 52 16 00-0800	47-1/4" Height, Two Operating Sashes, Horizontal Sliding Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0786)		
08 52 16 00-0801	EA 35-1/4" x 47-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,647.70 302.85	67.27
08 52 16 00-0802	EA 47-1/4" x 47-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,872.54 345.21	73.78
08 52 16 00-0803	EA 59-1/4" x 47-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,097.39 387.58	79.75
08 52 16 00-0804	EA 71-1/4" x 47-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,324.21 430.34	86.26
08 52 16 00-0805	59-1/4" Height, Two Operating Sashes, Horizontal Sliding Wood Clad Windows (Andersen 400 Series) (08 52 16 00-0786)		
08 52 16 00-0806	EA 35-1/4" x 59-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,872.54 345.21	73.78
08 52 16 00-0807	EA 47-1/4" x 59-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,097.39 387.58	80.29
08 52 16 00-0808	EA 59-1/4" x 59-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,324.21 430.34	86.26
08 52 16 00-0809	EA 71-1/4" x 59-1/4", Two Operating Sashes, Horizontal Sliding Wood Clad Window (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	2,549.05 472.70	92.77
08 52 16 00-0810	Picture Wood Clad Windows (08 52 16) Note: Picture windows are fixed windows.		
08 52 16 00-0811	Picture Wood Clad Windows For Awning And Casement Windows (08 52 16 00-0810)		
08 52 16 00-0812	Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) (08 52 16 00-0811) Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0813	12" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) (08 52 16 00-0812)		
08 52 16 00-0814	EA 40-13/16" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	413.48 65.33	43.40

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 52 16 00-0815	EA		48" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	484.04	47.74
			<i>For Tempered Clear Insulated Glass, Add</i>	77.71	
08 52 16 00-0816	EA		52-13/16" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	514.28	49.91
			<i>For Tempered Clear Insulated Glass, Add</i>	82.89	
08 52 16 00-0817	EA		59-7/8" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	557.85	54.25
			<i>For Tempered Clear Insulated Glass, Add</i>	90.09	
08 52 16 00-0818	EA		64-13/16" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	587.73	56.42
			<i>For Tempered Clear Insulated Glass, Add</i>	94.98	
08 52 16 00-0819	EA		71-7/8" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	631.30	60.76
			<i>For Tempered Clear Insulated Glass, Add</i>	102.17	
08 52 16 00-0820			35-15/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) (08 52 16 00-0812)		
08 52 16 00-0821	EA		35-15/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	458.76	53.17
			<i>For Tempered Clear Insulated Glass, Add</i>	70.49	
08 52 16 00-0822	EA		40-13/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	530.77	56.42
			<i>For Tempered Clear Insulated Glass, Add</i>	83.80	
08 52 16 00-0823	EA		48" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	636.89	60.22
			<i>For Tempered Clear Insulated Glass, Add</i>	103.29	
08 52 16 00-0824	EA		52-13/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	706.19	62.39
			<i>For Tempered Clear Insulated Glass, Add</i>	116.28	
08 52 16 00-0825	EA		59-7/8" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	809.62	66.19
			<i>For Tempered Clear Insulated Glass, Add</i>	135.45	
08 52 16 00-0826	EA		64-13/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	881.63	68.90
			<i>For Tempered Clear Insulated Glass, Add</i>	148.77	
08 52 16 00-0827	EA		71-7/8" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,309.86	72.70
			<i>For Tempered Clear Insulated Glass, Add</i>	232.89	
08 52 16 00-0828			40-13/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) (08 52 16 00-0812)		
08 52 16 00-0829	EA		35-15/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	530.77	56.42
			<i>For Tempered Clear Insulated Glass, Add</i>	83.80	
08 52 16 00-0830	EA		40-13/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	602.78	58.60
			<i>For Tempered Clear Insulated Glass, Add</i>	97.12	
08 52 16 00-0831	EA		48" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	708.91	62.94
			<i>For Tempered Clear Insulated Glass, Add</i>	116.61	
08 52 16 00-0832	EA		52-13/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	778.21	65.10
			<i>For Tempered Clear Insulated Glass, Add</i>	129.60	
08 52 16 00-0833	EA		59-7/8" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	881.63	69.44
			<i>For Tempered Clear Insulated Glass, Add</i>	148.77	
08 52 16 00-0834	EA		64-13/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	953.64	71.61
			<i>For Tempered Clear Insulated Glass, Add</i>	162.08	
08 52 16 00-0835	EA		71-7/8" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,057.06	75.95
			<i>For Tempered Clear Insulated Glass, Add</i>	181.25	
08 52 16 00-0836			48" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) (08 52 16 00-0812)		
08 52 16 00-0837	EA		35-15/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	636.89	60.76
			<i>For Tempered Clear Insulated Glass, Add</i>	103.29	
08 52 16 00-0838	EA		40-13/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	708.91	62.94
			<i>For Tempered Clear Insulated Glass, Add</i>	116.61	
08 52 16 00-0839	EA		48" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	815.03	67.27
			<i>For Tempered Clear Insulated Glass, Add</i>	136.10	
08 52 16 00-0840	EA		52-13/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	884.34	69.44
			<i>For Tempered Clear Insulated Glass, Add</i>	149.09	
08 52 16 00-0841	EA		59-7/8" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	987.76	73.78
			<i>For Tempered Clear Insulated Glass, Add</i>	168.26	
08 52 16 00-0842	EA		64-13/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,059.77	75.95
			<i>For Tempered Clear Insulated Glass, Add</i>	181.57	
08 52 16 00-0843	EA		71-7/8" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,163.18	80.29
			<i>For Tempered Clear Insulated Glass, Add</i>	200.74	
08 52 16 00-0844			52-13/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) (08 52 16 00-0812)		
08 52 16 00-0845	EA		35-15/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	706.19	62.94
			<i>For Tempered Clear Insulated Glass, Add</i>	116.28	
08 52 16 00-0846	EA		40-13/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	778.21	65.10
			<i>For Tempered Clear Insulated Glass, Add</i>	129.60	
08 52 16 00-0847	EA		48" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	884.34	69.44
			<i>For Tempered Clear Insulated Glass, Add</i>	149.09	
08 52 16 00-0848	EA		52-13/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	953.64	71.61
			<i>For Tempered Clear Insulated Glass, Add</i>	162.08	
08 52 16 00-0849	EA		59-7/8" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,057.06	75.95
			<i>For Tempered Clear Insulated Glass, Add</i>	181.25	
08 52 16 00-0850	EA		64-13/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,129.08	78.12
			<i>For Tempered Clear Insulated Glass, Add</i>	194.57	
08 52 16 00-0851	EA		71-7/8" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series).....	1,328.31	82.46
			<i>For Tempered Clear Insulated Glass, Add</i>	232.89	



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0852	59-7/8" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) <small>(08 52 16 00-0812)</small>		
08 52 16 00-0853	EA 35-15/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	809.62 135.45	66.19
08 52 16 00-0854	EA 40-13/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	881.63 148.77	69.44
08 52 16 00-0855	EA 48" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	987.76 168.26	73.24
08 52 16 00-0856	EA 52-13/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,057.06 181.25	75.40
08 52 16 00-0857	EA 59-7/8" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,160.47 200.41	79.21
08 52 16 00-0858	EA 64-13/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,232.49 213.73	81.92
08 52 16 00-0859	EA 71-7/8" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,335.90 232.89	85.72
08 52 16 00-0860	64-13/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) <small>(08 52 16 00-0812)</small>		
08 52 16 00-0861	EA 35-15/16" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	881.63 148.77	69.44
08 52 16 00-0862	EA 40-13/16" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	953.64 162.08	71.61
08 52 16 00-0863	EA 48" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,059.77 181.57	75.95
08 52 16 00-0864	EA 52-13/16" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,129.08 194.57	78.12
08 52 16 00-0865	EA 59-7/8" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,328.31 232.89	82.46
08 52 16 00-0866	71-7/8" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 200 Series) <small>(08 52 16 00-0812)</small>		
08 52 16 00-0867	EA 35-15/16" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	985.04 167.93	72.70
08 52 16 00-0868	EA 40-13/16" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,057.06 181.25	75.95
08 52 16 00-0869	EA 48" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,163.18 200.74	79.75
08 52 16 00-0870	EA 52-13/16" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,232.49 213.73	81.92
08 52 16 00-0871	EA 59-7/8" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	1,335.90 232.89	85.72
08 52 16 00-0872	Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) <small>(08 52 16 00-0811)</small>		
Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and Low-E insulated glass. Excludes grilles and insect screens.			
08 52 16 00-0873	12" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) <small>(08 52 16 00-0872)</small>		
08 52 16 00-0874	EA 40-13/16" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	490.10 80.66	43.40
08 52 16 00-0875	EA 48" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	575.18 95.94	47.74
08 52 16 00-0876	EA 52-13/16" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	611.50 102.33	49.91
08 52 16 00-0877	EA 59-7/8" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	663.50 111.22	54.25
08 52 16 00-0878	EA 64-13/16" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	699.12 117.26	56.42
08 52 16 00-0879	EA 71-7/8" x 12", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	751.13 126.14	60.76
08 52 16 00-0880	35-15/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) <small>(08 52 16 00-0872)</small>		
08 52 16 00-0881	EA 35-15/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	541.42 87.02	53.17
08 52 16 00-0882	EA 40-13/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	629.06 103.46	56.42
08 52 16 00-0883	EA 48" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	758.03 127.52	60.22
08 52 16 00-0884	EA 52-13/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	842.58 143.56	62.39
08 52 16 00-0885	EA 59-7/8" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	968.48 167.22	66.19

08 Openings**08 50 Windows****08 52 Wood Windows**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0886	EA	64-13/16" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,056.11	68.90
		<i>For Tempered Low-E Insulated Glass, Add</i>	183.66	
08 52 16 00-0887	EA	71-7/8" x 35-15/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,583.01	72.70
		<i>For Tempered Low-E Insulated Glass, Add</i>	287.52	
08 52 16 00-0888		40-13/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) (08 52 16 00-0872)		
08 52 16 00-0889	EA	35-15/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	629.06	56.42
		<i>For Tempered Low-E Insulated Glass, Add</i>	103.46	
08 52 16 00-0890	EA	40-13/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	716.69	58.60
		<i>For Tempered Low-E Insulated Glass, Add</i>	119.90	
08 52 16 00-0891	EA	48" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	845.67	62.94
		<i>For Tempered Low-E Insulated Glass, Add</i>	143.96	
08 52 16 00-0892	EA	52-13/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	930.21	65.10
		<i>For Tempered Low-E Insulated Glass, Add</i>	160.00	
08 52 16 00-0893	EA	59-7/8" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,056.11	69.44
		<i>For Tempered Low-E Insulated Glass, Add</i>	183.66	
08 52 16 00-0894	EA	64-13/16" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,143.74	71.61
		<i>For Tempered Low-E Insulated Glass, Add</i>	200.10	
08 52 16 00-0895	EA	71-7/8" x 40-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,269.63	75.95
		<i>For Tempered Low-E Insulated Glass, Add</i>	223.76	
08 52 16 00-0896		48" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) (08 52 16 00-0872)		
08 52 16 00-0897	EA	35-15/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	758.03	60.76
		<i>For Tempered Low-E Insulated Glass, Add</i>	127.52	
08 52 16 00-0898	EA	40-13/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	845.67	62.94
		<i>For Tempered Low-E Insulated Glass, Add</i>	143.96	
08 52 16 00-0899	EA	48" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	974.65	67.27
		<i>For Tempered Low-E Insulated Glass, Add</i>	168.02	
08 52 16 00-0900	EA	52-13/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,059.20	69.44
		<i>For Tempered Low-E Insulated Glass, Add</i>	184.06	
08 52 16 00-0901	EA	59-7/8" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,185.09	73.78
		<i>For Tempered Low-E Insulated Glass, Add</i>	207.72	
08 52 16 00-0902	EA	64-13/16" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,272.73	75.95
		<i>For Tempered Low-E Insulated Glass, Add</i>	224.16	
08 52 16 00-0903	EA	71-7/8" x 48", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,398.62	80.29
		<i>For Tempered Low-E Insulated Glass, Add</i>	247.82	
08 52 16 00-0904		52-13/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) (08 52 16 00-0872)		
08 52 16 00-0905	EA	35-15/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	842.58	62.94
		<i>For Tempered Low-E Insulated Glass, Add</i>	143.56	
08 52 16 00-0906	EA	40-13/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	930.21	65.10
		<i>For Tempered Low-E Insulated Glass, Add</i>	160.00	
08 52 16 00-0907	EA	48" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,059.20	69.44
		<i>For Tempered Low-E Insulated Glass, Add</i>	184.06	
08 52 16 00-0908	EA	52-13/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,143.74	71.61
		<i>For Tempered Low-E Insulated Glass, Add</i>	200.10	
08 52 16 00-0909	EA	59-7/8" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,269.63	75.95
		<i>For Tempered Low-E Insulated Glass, Add</i>	223.76	
08 52 16 00-0910	EA	64-13/16" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,357.27	78.12
		<i>For Tempered Low-E Insulated Glass, Add</i>	240.20	
08 52 16 00-0911	EA	71-7/8" x 52-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,601.46	82.46
		<i>For Tempered Low-E Insulated Glass, Add</i>	287.52	
08 52 16 00-0912		59-7/8" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) (08 52 16 00-0872)		
08 52 16 00-0913	EA	35-15/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	968.48	66.19
		<i>For Tempered Low-E Insulated Glass, Add</i>	167.22	
08 52 16 00-0914	EA	40-13/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,056.11	69.44
		<i>For Tempered Low-E Insulated Glass, Add</i>	183.66	
08 52 16 00-0915	EA	48" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,185.09	73.24
		<i>For Tempered Low-E Insulated Glass, Add</i>	207.72	
08 52 16 00-0916	EA	52-13/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,269.63	75.40
		<i>For Tempered Low-E Insulated Glass, Add</i>	223.76	
08 52 16 00-0917	EA	59-7/8" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,395.52	79.21
		<i>For Tempered Low-E Insulated Glass, Add</i>	247.42	
08 52 16 00-0918	EA	64-13/16" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,483.16	81.92
		<i>For Tempered Low-E Insulated Glass, Add</i>	263.86	
08 52 16 00-0919	EA	71-7/8" x 59-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series).....	1,609.05	85.72
		<i>For Tempered Low-E Insulated Glass, Add</i>	287.52	
08 52 16 00-0920		64-13/16" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) (08 52 16 00-0872)		



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0921	EA	35-15/16" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,056.11 183.66	69.44
08 52 16 00-0922	EA	40-13/16" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,143.74 200.10	71.61
08 52 16 00-0923	EA	48" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,272.73 224.16	75.95
08 52 16 00-0924	EA	52-13/16" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,357.27 240.20	78.12
08 52 16 00-0925	EA	59-7/8" x 64-13/16", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,601.46 287.52	82.46
08 52 16 00-0926		71-7/8" Height, Picture Wood Clad Windows For Awning And Casement Windows (Andersen 400 Series) (08 52 16 00-0872)		
08 52 16 00-0927	EA	35-15/16" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,182.00 207.32	72.70
08 52 16 00-0928	EA	40-13/16" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,269.63 223.76	75.95
08 52 16 00-0929	EA	48" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,398.62 247.82	79.75
08 52 16 00-0930	EA	52-13/16" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,483.16 263.86	81.92
08 52 16 00-0931	EA	59-7/8" x 71-7/8", Picture Wood Clad Window For Awning And Casement Windows (Andersen 400 Series)..... <i>For Tempered Low-E Insulated Glass, Add</i>	1,609.05 287.52	85.72
08 52 16 00-0932		Picture Wood Clad Windows For Double Hung Windows (08 52 16 00-0810)		
08 52 16 00-0933		Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0932) Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.		
08 52 16 00-0934		35-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0933)		
08 52 16 00-0935	EA	56-1/2" x 35-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	588.67 90.61	67.81
08 52 16 00-0936	EA	59-1/2" x 35-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	604.35 93.09	69.44
08 52 16 00-0937		47-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0933)		
08 52 16 00-0938	EA	47-1/2" x 47-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	604.35 93.09	69.44
08 52 16 00-0939	EA	71-1/2" x 47-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	733.45 113.70	82.46
08 52 16 00-0940		53-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0933)		
08 52 16 00-0941	EA	56-1/2" x 53-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	686.37 106.24	77.58
08 52 16 00-0942	EA	59-1/2" x 53-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	702.06 108.73	79.21
08 52 16 00-0943		56-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0933)		
08 52 16 00-0944	EA	35-1/2" x 56-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	588.67 90.61	68.35
08 52 16 00-0945	EA	53-1/2" x 56-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	686.37 106.24	77.58
08 52 16 00-0946		59-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0933)		
08 52 16 00-0947	EA	35-1/2" x 59-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	604.35 93.09	69.44
08 52 16 00-0948	EA	53-1/2" x 59-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	702.06 108.73	79.21
08 52 16 00-0949	EA	59-1/2" x 59-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	733.45 113.70	82.46
08 52 16 00-0950	EA	65-1/2" x 59-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series)..... <i>For Tempered Clear Insulated Glass, Add</i>	766.60 119.03	85.72
08 52 16 00-0951		65-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) (08 52 16 00-0933)		

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 52 16 00-0952	EA	59-1/2" x 65-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	766.60 119.03		85.72
08 52 16 00-0953		71-1/2" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 200 Series) <small>(08 52 16 00-0933)</small>			
08 52 16 00-0954	EA	47-1/2" x 71-1/2", Picture Wood Clad Window For Double Hung Windows (Andersen 200 Series) <i>For Tempered Clear Insulated Glass, Add</i>	733.45 113.70		82.46
08 52 16 00-0955		Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) <small>(08 52 16 00-0932)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and Low-E insulated glass. Excludes grilles and insect screens.			
08 52 16 00-0956		48-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) <small>(08 52 16 00-0955)</small>			
08 52 16 00-0957	EA	12" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	658.07 111.22		50.99
08 52 16 00-0958	EA	37-5/8" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	919.71 158.12		65.10
08 52 16 00-0959	EA	41-5/8" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	959.59 165.23		66.73
08 52 16 00-0960	EA	47-5/16" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,019.40 175.89		69.99
08 52 16 00-0961	EA	51-5/16" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,059.27 182.99		72.70
08 52 16 00-0962	EA	59-5/16" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,140.78 197.56		76.49
08 52 16 00-0963	EA	67-5/16" x 48-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,222.31 212.13		81.38
08 52 16 00-0964		52-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) <small>(08 52 16 00-0955)</small>			
08 52 16 00-0965	EA	12" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	699.72 118.68		53.17
08 52 16 00-0966	EA	37-5/8" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	959.59 165.23		67.27
08 52 16 00-0967	EA	41-5/8" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,001.24 172.69		68.90
08 52 16 00-0968	EA	47-5/16" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,059.27 182.99		72.15
08 52 16 00-0969	EA	51-5/16" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,100.92 190.45		74.87
08 52 16 00-0970	EA	59-5/16" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,182.43 205.02		78.67
08 52 16 00-0971	EA	67-5/16" x 52-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,263.96 219.59		83.55
08 52 16 00-0972		56-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) <small>(08 52 16 00-0955)</small>			
08 52 16 00-0973	EA	12" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	739.59 125.78		55.33
08 52 16 00-0974	EA	37-5/8" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,001.24 172.69		69.44
08 52 16 00-0975	EA	41-5/8" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,041.11 179.79		71.07
08 52 16 00-0976	EA	47-5/16" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,100.92 190.45		74.33
08 52 16 00-0977	EA	51-5/16" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,140.78 197.56		77.04
08 52 16 00-0978	EA	59-5/16" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,222.31 212.13		80.83
08 52 16 00-0979	EA	67-5/16" x 56-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,305.61 227.05		85.72
08 52 16 00-0980		60-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) <small>(08 52 16 00-0955)</small>			
08 52 16 00-0981	EA	12" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	781.25 133.25		57.51
08 52 16 00-0982	EA	37-5/8" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,041.11 179.79		71.61
08 52 16 00-0983	EA	41-5/8" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,082.76 187.26		73.24
08 52 16 00-0984	EA	47-5/16" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,140.78 197.56		76.49
08 52 16 00-0985	EA	51-5/16" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,182.43 205.02		79.21



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 52 16 00-0986	EA 59-5/16" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,263.96 219.59	83.01
08 52 16 00-0987	EA 67-5/16" x 60-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,345.48 234.16	87.88
08 52 16 00-0988	64-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) (08 52 16 00-0985)		
08 52 16 00-0989	EA 12" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	821.13 140.35	59.67
08 52 16 00-0990	EA 37-5/8" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,082.76 187.26	73.78
08 52 16 00-0991	EA 41-5/8" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,124.41 194.72	75.40
08 52 16 00-0992	EA 47-5/16" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,182.43 205.02	78.67
08 52 16 00-0993	EA 51-5/16" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,222.31 212.13	81.38
08 52 16 00-0994	EA 59-5/16" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,305.61 227.05	85.17
08 52 16 00-0995	EA 67-5/16" x 64-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,387.13 241.62	90.06
08 52 16 00-0996	68-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) (08 52 16 00-0995)		
08 52 16 00-0997	EA 12" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	862.77 147.81	61.85
08 52 16 00-0998	EA 37-5/8" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,124.41 194.72	75.95
08 52 16 00-0999	EA 41-5/8" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,164.28 201.82	77.58
08 52 16 00-1000	EA 47-5/16" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,222.31 212.13	80.83
08 52 16 00-1001	EA 51-5/16" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,263.96 219.59	83.55
08 52 16 00-1002	EA 59-5/16" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,345.48 234.16	87.35
08 52 16 00-1003	EA 67-5/16" x 68-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,427.00 248.73	92.22
08 52 16 00-1004	72-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) (08 52 16 00-0995)		
08 52 16 00-1005	EA 12" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	902.65 154.92	64.01
08 52 16 00-1006	EA 37-5/8" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,164.28 201.82	78.12
08 52 16 00-1007	EA 41-5/8" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,205.93 209.29	79.75
08 52 16 00-1008	EA 47-5/16" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,263.96 219.59	83.01
08 52 16 00-1009	EA 51-5/16" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,305.61 227.05	85.72
08 52 16 00-1010	EA 59-5/16" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,387.13 241.62	89.51
08 52 16 00-1011	EA 67-5/16" x 72-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,468.65 256.19	94.40
08 52 16 00-1012	76-7/8" Height, Picture Wood Clad Windows For Double Hung Windows (Andersen 400 Series) (08 52 16 00-0995)		
08 52 16 00-1013	EA 12" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	944.30 162.38	66.19
08 52 16 00-1014	EA 37-5/8" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,205.93 209.29	80.29
08 52 16 00-1015	EA 41-5/8" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,245.80 216.39	81.92
08 52 16 00-1016	EA 47-5/16" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,305.61 227.05	85.17
08 52 16 00-1017	EA 51-5/16" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,345.48 234.16	87.88
08 52 16 00-1018	EA 59-5/16" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,427.00 248.73	91.69
08 52 16 00-1019	EA 67-5/16" x 76-7/8", Picture Wood Clad Window For Double Hung Windows (Andersen 400 Series) <i>For Tempered Low-E Insulated Glass, Add</i>	1,508.53 263.30	96.56
08 52 16 00-1020	Picture Wood Clad Windows For Horizontal Sliding Windows (08 52 16 00-0810)		

08	08	Openings
	08 50	Windows
	08 52	Wood Windows



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 52 16 00-1021		Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1020)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware and clear insulated glass. Excludes grilles and insect screens.			
08 52 16 00-1022		35-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1023	EA	56-1/2" x 35-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	588.67		67.81
			90.61		
08 52 16 00-1024	EA	59-1/2" x 35-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	604.35		69.44
			93.09		
08 52 16 00-1025		47-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1026	EA	47-1/2" x 47-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	604.35		69.44
			93.09		
08 52 16 00-1027	EA	71-1/2" x 47-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	733.45		82.46
			113.70		
08 52 16 00-1028		53-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1029	EA	56-1/2" x 53-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	686.37		77.58
			106.24		
08 52 16 00-1030	EA	59-1/2" x 53-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	702.06		79.21
			108.73		
08 52 16 00-1031		56-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1032	EA	35-1/2" x 56-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	588.67		68.35
			90.61		
08 52 16 00-1033	EA	53-1/2" x 56-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	686.37		77.58
			106.24		
08 52 16 00-1034		59-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1035	EA	35-1/2" x 59-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	604.35		69.44
			93.09		
08 52 16 00-1036	EA	53-1/2" x 59-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	702.06		79.21
			108.73		
08 52 16 00-1037	EA	59-1/2" x 59-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	733.45		82.46
			113.70		
08 52 16 00-1038	EA	65-1/2" x 59-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	766.60		85.72
			119.03		
08 52 16 00-1039		65-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1040	EA	59-1/2" x 65-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	766.60		85.72
			119.03		
08 52 16 00-1041		71-1/2" Height, Picture Wood Clad Windows For Horizontal Sliding Windows (Andersen 200 Series) <small>(08 52 16 00-1021)</small>			
08 52 16 00-1042	EA	47-1/2" x 71-1/2", Picture Wood Clad Window For Horizontal Sliding Windows (Andersen 200 Series) <small>For Tempered Clear Insulated Glass, Add</small>	733.45		82.46
			113.70		
08 52 16 00-1043		Basement Wood Clad Windows <small>(08 52 16)</small> Note: Basement windows are hinged at the bottom of the frame and swing outward with a crank or push out operation.			
08 52 16 00-1044		Basement Wood Clad Windows (Andersen 400 Series) <small>(08 52 16 00-1043)</small> Note: Includes painted or stained wood interior, colored PVC clad exterior, standard hardware, Low-E insulated glass and insect screens. Excludes grilles.			
08 52 16 00-1045	EA	32-1/4" x 15-3/4", Basement Wood Clad Window (Andersen 400 Series)	311.17		43.40
08 52 16 00-1046	EA	32-1/4" x 19-3/4", Basement Wood Clad Window (Andersen 400 Series)	328.02		43.40
08 52 16 00-1047	EA	32-1/4" x 23-3/4", Basement Wood Clad Window (Andersen 400 Series)	342.85		43.40
08 52 16 00-1048		Factory Installed Grilles For Wood Clad Windows <small>(08 52 16)</small>			
08 52 16 00-1049		Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows <small>(08 52 16 00-1048)</small>			
08 52 16 00-1050	EA	Up To 9 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows			43.84



Openings	08	08
Windows	08 50	
Wood Windows	08 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 52 16 00-1051	EA	>9 To 18 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	64.60	
08 52 16 00-1052	EA	>18 To 24 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	87.68	
08 52 16 00-1053	EA	>24 To 36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	110.75	
08 52 16 00-1054	EA	>36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	156.90	

08 52 16 00-1055 Fixed Exterior And Removable Interior Grilles, Factory Installed Grilles For Wood Clad Windows (08 52 16 00-1048)

08 52 16 00-1056	EA	Up To 9 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	70.14	
08 52 16 00-1057	EA	>9 To 18 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	103.37	
08 52 16 00-1058	EA	>18 To 24 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	140.28	
08 52 16 00-1059	EA	>24 To 36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	177.20	
08 52 16 00-1060	EA	>36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Wood Clad Windows.....	251.03	

08 52 16 00-1061 Fixed Exterior And Interior Grilles, Factory Installed Grilles For Wood Clad Windows (08 52 16 00-1048)

08 52 16 00-1062	EA	Up To 9 SF Windows, Fixed Exterior And Interior Grilles, Factory Installed Grilles For Wood Clad Windows.....	84.17	
08 52 16 00-1063	EA	>9 To 18 SF Windows, Fixed Exterior And Interior Grilles, Factory Installed Grilles For Wood Clad Windows.....	124.04	
08 52 16 00-1064	EA	>18 To 24 SF Windows, Fixed Exterior And Interior Grilles, Factory Installed Grilles For Wood Clad Windows.....	168.34	
08 52 16 00-1065	EA	>24 To 36 SF Windows, Fixed Exterior And Interior Grilles, Factory Installed Grilles For Wood Clad Windows.....	212.64	
08 52 16 00-1066	EA	>36 SF Windows, Fixed Exterior And Interior Grilles, Factory Installed Grilles For Wood Clad Windows.....	301.24	

08 52 16 00-1067 Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Wood Clad Windows (08 52 16 00-1048)

08 52 16 00-1068	EA	Up To 9 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Wood Clad Windows.....	101.01	
08 52 16 00-1069	EA	>9 To 18 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Wood Clad Windows.....	148.84	
08 52 16 00-1070	EA	>18 To 24 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Wood Clad Windows.....	202.00	
08 52 16 00-1071	EA	>24 To 36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Wood Clad Windows.....	255.16	
08 52 16 00-1072	EA	>36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Wood Clad Windows.....	361.48	

08 52 66 Wood Window Screens (08 52)

08 52 66 00-0001 Insect Screens For Wood Clad Windows (08 52 66)

08 52 66 00-0002	EA	Up To 6 SF, Insect Screen For Wood Clad Windows.....	43.35	9.72
08 52 66 00-0003	EA	>6 To 9 SF, Insect Screen For Wood Clad Windows.....	50.18	9.72
08 52 66 00-0004	EA	>9 To 12 SF, Insect Screen For Wood Clad Windows.....	53.60	9.72
08 52 66 00-0005	EA	>12 To 15 SF, Insect Screen For Wood Clad Windows.....	60.43	9.72
08 52 66 00-0006	EA	>15 To 20 SF, Insect Screen For Wood Clad Windows.....	74.09	9.72
08 52 66 00-0007	EA	>20 To 25 SF, Insect Screen For Wood Clad Windows.....	80.92	9.72
08 52 66 00-0008	EA	>25 To 30 SF, Insect Screen For Wood Clad Windows.....	87.75	9.72
08 52 66 00-0009	EA	>30 To 35 SF, Insect Screen For Wood Clad Windows.....	94.58	9.72
08 52 66 00-0010	SF	>35 SF, Insect Screen For Wood Clad Windows.....	2.82	0.19

08 53 Plastic Windows (08 50)

08 53 13 Vinyl Windows (08 53)

See CSI section 01 95 99 99-0002 for Vinyl Windows.

08 53 13 00-0001 Single Hung Vinyl Windows (08 53 13)

08 53 13 00-0002 Single Hung Vinyl Windows (Milgard Style Line™ Series) (08 53 13 00-0001)

Note: Includes white solid vinyl interior and exterior, standard hardware, clear insulated glass and insect screen. Pricing calculated by the United Inch (the combined inches of one width and one height).

08 53 13 00-0003	EA	Up To 73" UI, Single Hung Vinyl Window (Milgard Style Line™ Series).....	407.85	56.96
		For Colored Vinyl, Add	29.39	
		For Tinted Glass, Add	35.27	
		For Low-E Insulated Glass, Add	73.48	
		For Obscure Glass, Add	80.83	
08 53 13 00-0004	EA	>73" To 83" UI, Single Hung Vinyl Window (Milgard Style Line™ Series).....	347.02	62.39
		For Colored Vinyl, Add	22.23	
		For Tinted Glass, Add	26.67	
		For Low-E Insulated Glass, Add	55.56	
		For Obscure Glass, Add	61.12	

08 Openings

08 50 Windows

08 53 Plastic Windows

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 53 13 00-0005	EA		>83" To 93" UI, Single Hung Vinyl Window (Milgard Style Line™ Series)	483.34	67.81
			<i>For Colored Vinyl, Add</i>	34.77	
			<i>For Tinted Glass, Add</i>	41.73	
			<i>For Low-E Insulated Glass, Add</i>	86.93	
			<i>For Obscure Glass, Add</i>	95.62	
08 53 13 00-0006	EA		>93" To 101" UI, Single Hung Vinyl Window (Milgard Style Line™ Series)	509.57	73.24
			<i>For Colored Vinyl, Add</i>	36.31	
			<i>For Tinted Glass, Add</i>	43.57	
			<i>For Low-E Insulated Glass, Add</i>	90.77	
			<i>For Obscure Glass, Add</i>	99.85	
08 53 13 00-0007	EA		>101" To 110" UI, Single Hung Vinyl Window (Milgard Style Line™ Series)	536.94	78.67
			<i>For Colored Vinyl, Add</i>	37.96	
			<i>For Tinted Glass, Add</i>	45.55	
			<i>For Low-E Insulated Glass, Add</i>	94.91	
			<i>For Obscure Glass, Add</i>	104.40	
08 53 13 00-0008	EA		>110" To 120" UI, Single Hung Vinyl Window (Milgard Style Line™ Series)	582.32	84.09
			<i>For Colored Vinyl, Add</i>	41.41	
			<i>For Tinted Glass, Add</i>	49.70	
			<i>For Low-E Insulated Glass, Add</i>	103.54	
			<i>For Obscure Glass, Add</i>	113.89	
08 53 13 00-0009	UI		>120" UI, Single Hung Vinyl Window (Milgard Style Line™ Series)	4.85	0.70
			<i>For Colored Vinyl, Add</i>	0.34	
			<i>For Tinted Glass, Add</i>	0.41	
			<i>For Low-E Insulated Glass, Add</i>	0.86	
			<i>For Obscure Glass, Add</i>	0.95	
08 53 13 00-0010			Single Hung Premium Vinyl Windows (Milgard Tuscany Series) <small>(08 53 13 00-0001)</small> Note: Includes white solid vinyl interior and exterior, standard hardware, clear high-performance Low-E insulating glass. Excludes grilles. Pricing calculated by the United Inch (the combined inches of one width and one height).		
08 53 13 00-0011	EA		Up To 60" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	424.23	54.25
08 53 13 00-0012	EA		>60" To 73" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	495.14	57.51
08 53 13 00-0013	EA		>73" To 83" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	568.34	62.94
08 53 13 00-0014	EA		>83" To 93" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	583.09	68.35
08 53 13 00-0015	EA		>93" To 101" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	619.66	73.78
08 53 13 00-0016	EA		>101" To 110" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	635.97	79.21
08 53 13 00-0017	EA		>110" To 120" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	685.81	84.63
08 53 13 00-0018	UI		>120" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Single Hung Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	5.72	0.70
08 53 13 00-0019			Double Hung Vinyl Windows <small>(08 53 13)</small>		
08 53 13 00-0020			Double Hung Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0019)</small> Note: Includes white solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Pricing calculated by the United Inch (the combined inches of one width and one height). Minimum STC rating of 32 included in price.		
08 53 13 00-0021	EA		Up To 73" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	798.05	56.96
			<i>For Colored Vinyl, Add</i>	68.41	
			<i>For STC 44 Rating, Add</i>	239.44	
			<i>For Tempered Glass, Add</i>	205.24	
08 53 13 00-0022	EA		>73" To 83" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	880.38	62.39
			<i>For Colored Vinyl, Add</i>	75.56	
			<i>For STC 44 Rating, Add</i>	264.46	
			<i>For Tempered Glass, Add</i>	226.68	
08 53 13 00-0023	EA		>83" To 93" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	957.39	67.81
			<i>For Colored Vinyl, Add</i>	82.18	
			<i>For STC 44 Rating, Add</i>	287.62	
			<i>For Tempered Glass, Add</i>	246.53	
08 53 13 00-0024	EA		>93" To 101" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,011.88	73.24
			<i>For Colored Vinyl, Add</i>	86.54	
			<i>For STC 44 Rating, Add</i>	302.89	
			<i>For Tempered Glass, Add</i>	259.62	
08 53 13 00-0025	EA		>101" To 110" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,070.39	78.67
			<i>For Colored Vinyl, Add</i>	91.31	
			<i>For STC 44 Rating, Add</i>	319.57	
			<i>For Tempered Glass, Add</i>	273.92	
08 53 13 00-0026	EA		>110" To 120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	1,164.25	84.09
			<i>For Colored Vinyl, Add</i>	99.61	
			<i>For STC 44 Rating, Add</i>	348.62	
			<i>For Tempered Glass, Add</i>	298.82	
08 53 13 00-0027	UI		>120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)	9.72	0.70
			<i>For Colored Vinyl, Add</i>	0.83	
			<i>For STC 44 Rating, Add</i>	2.91	
			<i>For Tempered Glass, Add</i>	2.49	
08 53 13 00-0028			Casement Vinyl Windows <small>(08 53 13)</small>		



Openings	08	08
Windows	08 50	
Plastic Windows	08 53	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 53 13 00-0029 Casement Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0028)</small>		
<small>Note: Includes white solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Pricing calculated by the United Inch (the combined inches of one width and one height). Minimum STC rating of 32 included in price.</small>		
08 53 13 00-0030 One Operating Sash, Casement Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0029)</small>		
08 53 13 00-0031 EA Up To 53" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	773.40	46.12
For Colored Vinyl, Add	68.12	
For STC 44 Rating, Add	238.41	
For Tempered Glass, Add	204.35	
08 53 13 00-0032 EA >53 To 63" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	879.05	51.54
For Colored Vinyl, Add	77.60	
For STC 44 Rating, Add	271.59	
For Tempered Glass, Add	232.79	
08 53 13 00-0033 EA >63 To 73" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	973.97	56.96
For Colored Vinyl, Add	86.00	
For STC 44 Rating, Add	301.01	
For Tempered Glass, Add	258.01	
08 53 13 00-0034 EA >73" To 83" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,058.18	62.39
For Colored Vinyl, Add	93.34	
For STC 44 Rating, Add	326.69	
For Tempered Glass, Add	280.02	
08 53 13 00-0035 EA >83" To 93" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,131.70	67.81
For Colored Vinyl, Add	99.61	
For STC 44 Rating, Add	348.62	
For Tempered Glass, Add	298.82	
08 53 13 00-0036 EA >93" To 101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,174.14	73.24
For Colored Vinyl, Add	102.77	
For STC 44 Rating, Add	359.68	
For Tempered Glass, Add	308.30	
08 53 13 00-0037 UI >101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series)	11.58	0.70
For Colored Vinyl, Add	1.02	
For STC 44 Rating, Add	3.56	
For Tempered Glass, Add	3.05	
08 53 13 00-0038 Two Operating Sashes, Casement Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0029)</small>		
08 53 13 00-0039 EA Up To 73" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,306.27	56.96
For Colored Vinyl, Add	119.23	
For STC 44 Rating, Add	417.32	
For Tempered Glass, Add	357.70	
08 53 13 00-0040 EA >73" To 83" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,435.98	62.39
For Colored Vinyl, Add	131.12	
For STC 44 Rating, Add	458.92	
For Tempered Glass, Add	393.36	
08 53 13 00-0041 EA >83" To 93" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,555.03	67.81
For Colored Vinyl, Add	141.94	
For STC 44 Rating, Add	496.79	
For Tempered Glass, Add	425.82	
08 53 13 00-0042 EA >93" To 101" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,633.89	73.24
For Colored Vinyl, Add	148.74	
For STC 44 Rating, Add	520.59	
For Tempered Glass, Add	446.22	
08 53 13 00-0043 EA >101" To 110" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,718.36	78.67
For Colored Vinyl, Add	156.10	
For STC 44 Rating, Add	546.36	
For Tempered Glass, Add	468.31	
08 53 13 00-0044 EA >110" To 120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	1,806.87	84.09
For Colored Vinyl, Add	163.87	
For STC 44 Rating, Add	573.54	
For Tempered Glass, Add	491.61	
08 53 13 00-0045 UI >120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series)	15.06	0.70
For Colored Vinyl, Add	1.37	
For STC 44 Rating, Add	4.78	
For Tempered Glass, Add	4.10	
08 53 13 00-0046 Awning Vinyl Windows <small>(08 53 13)</small>		
08 53 13 00-0047 Awning Vinyl Windows (Milgard Style Line™ Series) <small>(08 53 13 00-0046)</small>		
<small>Note: Includes white solid vinyl interior and exterior, standard hardware, clear insulated glass and insect screen. Pricing calculated by the United Inch (the combined inches of one width and one height).</small>		
08 53 13 00-0048 EA Up To 53" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	480.90	46.12
For Colored Vinyl, Add	38.87	
For Tinted Glass, Add	46.64	
For Low-E Insulated Glass, Add	97.17	
For Obscure Glass, Add	106.89	
08 53 13 00-0049 EA >53" To 63" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	556.04	51.54
For Colored Vinyl, Add	45.30	
For Tinted Glass, Add	54.36	
For Low-E Insulated Glass, Add	113.24	
For Obscure Glass, Add	124.56	

08	08	Openings
	08 50	Windows
	08 53	Plastic Windows



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 53 13 00-0050	EA >63" To 73" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	628.30	56.96
	For Colored Vinyl, Add	51.44	
	For Tinted Glass, Add	61.72	
	For Low-E Insulated Glass, Add	128.59	
	For Obscure Glass, Add	141.45	
08 53 13 00-0051	EA >73" To 83" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	697.65	62.39
	For Colored Vinyl, Add	57.29	
	For Tinted Glass, Add	68.75	
	For Low-E Insulated Glass, Add	143.22	
	For Obscure Glass, Add	157.54	
08 53 13 00-0052	EA >83" To 93" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	764.17	67.81
	For Colored Vinyl, Add	62.85	
	For Tinted Glass, Add	75.42	
	For Low-E Insulated Glass, Add	157.14	
	For Obscure Glass, Add	172.85	
08 53 13 00-0053	EA >93" To 101" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	800.03	73.24
	For Colored Vinyl, Add	65.36	
	For Tinted Glass, Add	78.43	
	For Low-E Insulated Glass, Add	163.39	
	For Obscure Glass, Add	179.73	
08 53 13 00-0054	UI >101" UI, Awning Vinyl Window (Milgard Style Line™ Series).....	7.88	0.70
	For Colored Vinyl, Add	0.65	
	For Tinted Glass, Add	0.78	
	For Low-E Insulated Glass, Add	1.62	
	For Obscure Glass, Add	1.78	
08 53 13 00-0055	Horizontal Sliding Vinyl Windows <small>(08 53 13)</small>		
08 53 13 00-0056	Horizontal Sliding Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0055)</small>		
	Note: Includes white solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Pricing calculated by the United Inch (the combined inches of one width and one height). Minimum STC rating of 32 included in price.		
08 53 13 00-0057	EA Up To 73" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	719.88	56.96
	For Colored Vinyl, Add	60.60	
	For STC 44 Rating, Add	212.08	
	For Tempered Glass, Add	181.79	
08 53 13 00-0058	EA >73" To 83" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	791.50	62.39
	For Colored Vinyl, Add	66.67	
	For STC 44 Rating, Add	233.36	
	For Tempered Glass, Add	200.02	
08 53 13 00-0059	EA >83" To 93" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	857.77	67.81
	For Colored Vinyl, Add	72.21	
	For STC 44 Rating, Add	252.75	
	For Tempered Glass, Add	216.64	
08 53 13 00-0060	EA >93" To 101" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	903.70	73.24
	For Colored Vinyl, Add	75.72	
	For STC 44 Rating, Add	265.03	
	For Tempered Glass, Add	227.17	
08 53 13 00-0061	EA >101" To 110" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	952.57	78.67
	For Colored Vinyl, Add	79.53	
	For STC 44 Rating, Add	278.34	
	For Tempered Glass, Add	238.58	
08 53 13 00-0062	EA >110" To 120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	1,035.72	84.09
	For Colored Vinyl, Add	86.75	
	For STC 44 Rating, Add	303.64	
	For Tempered Glass, Add	260.26	
08 53 13 00-0063	UI >120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	8.64	0.70
	For Colored Vinyl, Add	0.72	
	For STC 44 Rating, Add	2.53	
	For Tempered Glass, Add	2.17	
08 53 13 00-0064	Horizontal Sliding Vinyl Windows (Milgard Style Line™ Series) <small>(08 53 13 00-0055)</small>		
	Note: Includes white solid vinyl interior and exterior, standard hardware, clear insulated glass and insect screen. Pricing calculated by the United Inch (the combined inches of one width and one height).		
08 53 13 00-0065	EA Up To 73" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	473.00	56.96
	For Colored Vinyl, Add	35.91	
	For Tinted Glass, Add	43.09	
	For Low-E Insulated Glass, Add	89.77	
	For Obscure Glass, Add	98.74	
08 53 13 00-0066	EA >73" To 83" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	519.87	62.39
	For Colored Vinyl, Add	39.51	
	For Tinted Glass, Add	47.41	
	For Low-E Insulated Glass, Add	98.78	
	For Obscure Glass, Add	108.65	
08 53 13 00-0067	EA >83" To 93" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	563.58	67.81
	For Colored Vinyl, Add	42.80	
	For Tinted Glass, Add	51.35	
	For Low-E Insulated Glass, Add	106.99	
	For Obscure Glass, Add	117.69	
08 53 13 00-0068	EA >93" To 101" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	595.20	73.24
	For Colored Vinyl, Add	44.87	
	For Tinted Glass, Add	53.85	
	For Low-E Insulated Glass, Add	112.18	
	For Obscure Glass, Add	123.40	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 53 13 00-0069 EA >101" To 110" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	628.58	78.67
<i>For Colored Vinyl, Add</i>	47.13	
<i>For Tinted Glass, Add</i>	56.55	
<i>For Low-E Insulated Glass, Add</i>	117.82	
<i>For Obscure Glass, Add</i>	129.60	
08 53 13 00-0070 EA >110" To 120" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	682.28	84.09
<i>For Colored Vinyl, Add</i>	51.41	
<i>For Tinted Glass, Add</i>	61.69	
<i>For Low-E Insulated Glass, Add</i>	128.53	
<i>For Obscure Glass, Add</i>	141.38	
08 53 13 00-0071 UI >120" UI, Horizontal Sliding Vinyl Window (Milgard Style Line™ Series).....	5.70	0.70
<i>For Colored Vinyl, Add</i>	0.43	
<i>For Tinted Glass, Add</i>	0.51	
<i>For Low-E Insulated Glass, Add</i>	1.07	
<i>For Obscure Glass, Add</i>	1.18	
08 53 13 00-0072 Horizontal Sliding Premium Vinyl Windows (Milgard Tuscany Series) <small>(08 53 13 00-0055)</small>		
<small>Note: Includes white solid vinyl interior and exterior, standard hardware, clear high-performance Low-E insulating glass. Excludes grilles. Pricing calculated by the United Inch (the combined inches of one width and one height).</small>		
08 53 13 00-0073 EA Up To 60" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	424.23	54.25
08 53 13 00-0074 EA >60" To 73" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	488.90	57.51
08 53 13 00-0075 EA >73" To 83" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	562.10	62.94
08 53 13 00-0076 EA >83" To 93" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	576.85	62.94
08 53 13 00-0077 EA >93" To 101" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	625.91	73.78
08 53 13 00-0078 EA >101" To 110" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	642.20	79.21
08 53 13 00-0079 EA >110" To 120" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	846.39	84.63
08 53 13 00-0080 UI >120" (UI) United Inches, White Vinyl, Low-E2 Insulating Glass, Horizontal Slider Window With Standard Hardware, Insect Screen (Milgard Tuscany Series)	7.06	0.70
08 53 13 00-0081 Fixed Picture Vinyl Windows <small>(08 53 13)</small>		
08 53 13 00-0082 Fixed Picture Vinyl Windows (Milgard Style Line™ Series) <small>(08 53 13 00-0081)</small>		
<small>Note: Includes white solid vinyl interior and exterior, standard hardware, clear high-performance Low-E insulating glass. Excludes grilles. Pricing calculated by the United Inch (the combined inches of one width and one height). Minimum STC rating of 32 included in price.</small>		
08 53 13 00-0083 EA Up To 53" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series)	531.20	46.12
<i>For Colored Vinyl, Add</i>	43.90	
<i>For Tinted Glass, Add</i>	52.68	
<i>For Low-E Insulated Glass, Add</i>	109.75	
<i>For Obscure Glass, Add</i>	120.72	
<i>For STC 44 Rating, Add</i>	153.64	
08 53 13 00-0084 EA >53 To 63" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	603.16	51.54
<i>For Colored Vinyl, Add</i>	50.01	
<i>For Tinted Glass, Add</i>	60.01	
<i>For Low-E Insulated Glass, Add</i>	125.02	
<i>For Obscure Glass, Add</i>	137.52	
<i>For STC 44 Rating, Add</i>	175.03	
08 53 13 00-0085 EA >63 To 73" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	668.19	56.96
<i>For Colored Vinyl, Add</i>	55.43	
<i>For Tinted Glass, Add</i>	66.51	
<i>For Low-E Insulated Glass, Add</i>	138.57	
<i>For Obscure Glass, Add</i>	152.42	
<i>For STC 44 Rating, Add</i>	193.99	
08 53 13 00-0086 EA >73" To 83" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	726.31	62.39
<i>For Colored Vinyl, Add</i>	60.15	
<i>For Tinted Glass, Add</i>	72.18	
<i>For Low-E Insulated Glass, Add</i>	150.39	
<i>For Obscure Glass, Add</i>	165.42	
<i>For STC 44 Rating, Add</i>	210.54	
08 53 13 00-0087 EA >83" To 93" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	777.54	67.81
<i>For Colored Vinyl, Add</i>	64.19	
<i>For Tinted Glass, Add</i>	77.03	
<i>For Low-E Insulated Glass, Add</i>	160.48	
<i>For Obscure Glass, Add</i>	176.53	
<i>For STC 44 Rating, Add</i>	224.67	
08 53 13 00-0088 EA >93" To 101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	808.75	73.24
<i>For Colored Vinyl, Add</i>	66.23	
<i>For Tinted Glass, Add</i>	79.47	
<i>For Low-E Insulated Glass, Add</i>	165.57	
<i>For Obscure Glass, Add</i>	182.12	
<i>For STC 44 Rating, Add</i>	231.79	

08 Openings**08 50 Windows****08 53 Plastic Windows**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 53 13 00-0089	UI >101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series) <i>For Colored Vinyl, Add</i> <i>For Tinted Glass, Add</i> <i>For Low-E Insulated Glass, Add</i> <i>For Obscure Glass, Add</i> <i>For STC 44 Rating, Add</i>	7.97 0.66 0.79 1.64 1.80 2.30	0.70
08 53 13 00-0090	Accessories For Vinyl Windows (08 53 13)		
08 53 13 00-0091	Factory Installed Grilles For Vinyl Windows (08 53 13 00-0090)		
08 53 13 00-0092	Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows (08 53 13 00-0091)		
08 53 13 00-0093	EA Up To 9 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows.....	48.94	
08 53 13 00-0094	EA >9 To 18 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	62.93	
08 53 13 00-0095	EA >18 To 24 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	81.04	
08 53 13 00-0096	EA >24 To 36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	95.66	
08 53 13 00-0097	EA >36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	117.59	
08 53 13 00-0098	Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows (08 53 13 00-0091)		
08 53 13 00-0099	EA Up To 9 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	111.23	
08 53 13 00-0100	EA >9 To 18 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	133.48	
08 53 13 00-0101	EA >18 To 24 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	168.44	
08 53 13 00-0102	EA >24 To 36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	209.75	
08 53 13 00-0103	EA >36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	251.07	
08 53 13 00-0104	Vinyl Windows Replacement (08 53 13) Note: All labor, material and equipment to remove existing windows and Security bars install new windows (Milgard, Quite Line Series). Includes white solid vinyl interior and exterior, standard hardware, clear insulated low E glass and insect screen. Minimum STC rating of 44, Chip clean and repair any stucco as needed and repair drywall as needed (allow 2 SF each of stucco and drywall chip, cut and repair), stucco key replacement, caulking and sealants. This list may not cover all individual items involved in the new window removal and installation, however it is intended to represent the complete in-place window replacement.		
08 53 13 00-0105	Double Hung Vinyl Windows (08 53 13 00-0104)		
08 53 13 00-0106	Double Hung Flanged Vinyl Windows (Milgard Quiet Line™ Series) (08 53 13 00-0105)		
08 53 13 00-0107	EA Up To 73" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	855.01 27.11 25.63 562.35	
08 53 13 00-0108	EA >73" To 83" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	942.78 27.11 28.08 562.35	
08 53 13 00-0109	EA >83" To 93" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series) <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,025.20 27.11 30.52 562.35	
08 53 13 00-0110	EA >93" To 101" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,085.12 37.96 32.96 751.62	
08 53 13 00-0111	EA >101" To 110" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,149.06 37.96 35.40 751.62	
08 53 13 00-0112	EA >110" To 120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	1,139.84 37.96 21.57 751.62	
08 53 13 00-0113	UI >120" UI, Double Hung Vinyl Window (Milgard Quiet Line™ Series)..... <i>For Re-Installation Of Existing Security Bars, Add</i> <i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i> <i>For New Security Bar Installation (includes foot quick release), Add</i>	10.43 0.32 0.32 6.27	
08 53 13 00-0114	Casement Vinyl Windows (08 53 13 00-0104)		

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
		08 53 13 00-0115 Casement Flanged Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0114)</small>		
		08 53 13 00-0116 One Operating Sash, Casement Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0115)</small>		
		08 53 13 00-0117 EA Up To 53" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	819.52	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	20.75	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0118 EA >53 To 63" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	930.59	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	23.19	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0119 EA >63 To 73" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,030.93	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0120 EA >73" To 83" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,120.58	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0121 EA >83" To 93" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,199.51	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0122 EA >93" To 101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,247.38	
		For Re-Installation Of Existing Security Bars, Add	37.96	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
		For New Security Bar Installation (includes foot quick release), Add	751.62	
		08 53 13 00-0123 UI >101" UI, One Operating Sash, Casement Vinyl Window (Milgard Quiet Line™ Series).....	12.29	
		For Re-Installation Of Existing Security Bars, Add	0.32	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
		For New Security Bar Installation (includes foot quick release), Add	6.27	
		08 53 13 00-0124 Two Operating Sashes, Casement Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0115)</small>		
		08 53 13 00-0125 EA Up To 73" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,363.23	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	25.63	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0126 EA >73" To 83" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,498.38	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	28.08	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0127 EA >83" To 93" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,622.84	
		For Re-Installation Of Existing Security Bars, Add	27.11	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	30.52	
		For New Security Bar Installation (includes foot quick release), Add	562.35	
		08 53 13 00-0128 EA >93" To 101" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,707.13	
		For Re-Installation Of Existing Security Bars, Add	37.96	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	32.96	
		For New Security Bar Installation (includes foot quick release), Add	751.62	
		08 53 13 00-0129 EA >101" To 110" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,797.03	
		For Re-Installation Of Existing Security Bars, Add	37.96	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	35.40	
		For New Security Bar Installation (includes foot quick release), Add	751.62	
		08 53 13 00-0130 EA >110" To 120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	1,890.96	
		For Re-Installation Of Existing Security Bars, Add	37.96	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	37.84	
		For New Security Bar Installation (includes foot quick release), Add	751.62	
		08 53 13 00-0131 UI >120" UI, Two Operating Sashes, Casement Vinyl Window (Milgard Quiet Line™ Series).....	15.77	
		For Re-Installation Of Existing Security Bars, Add	0.32	
		For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add	0.32	
		For New Security Bar Installation (includes foot quick release), Add	6.27	
		08 53 13 00-0132 Horizontal Sliding Vinyl Windows <small>(08 53 13 00-0104)</small>		
		08 53 13 00-0133 Horizontal Flanged Sliding Vinyl Windows (Milgard Quiet Line™ Series) <small>(08 53 13 00-0132)</small>		

08 Openings

08 50 Windows

08 53 Plastic Windows

MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 53 13 00-0134	EA	Up To 73" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	776.84	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0135	EA	>73" To 83" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)	853.90	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0136	EA	>83" To 93" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)	925.58	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0137	EA	>93" To 101" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)	976.94	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
08 53 13 00-0138	EA	>101" To 110" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)	1,031.24	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	35.40	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
08 53 13 00-0139	EA	>110" To 120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series)	1,119.81	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	37.84	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
08 53 13 00-0140	UI	>120" UI, Horizontal Sliding Vinyl Window (Milgard Quiet Line™ Series).....	9.35	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	

08 53 13 00-0141 Fixed Picture Vinyl Windows (08 53 13 00-0104)

08 53 13 00-0142 Fixed Picture Flanged Vinyl Windows (Milgard Style Line™ Series) (08 53 13 00-0141)

08 53 13 00-0143	EA	Up To 53" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	577.32	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	20.75	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0144	EA	>53 To 63" UI, Fixed Picture Style Vinyl Window (Milgard Style Line™ Series).....	654.70	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	23.19	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0145	EA	>63 To 73" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	725.15	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	25.63	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0146	EA	>73" To 83" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	788.71	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	28.08	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0147	EA	>83" To 93" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	845.35	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	27.11	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	30.52	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	562.35	
08 53 13 00-0148	EA	>93" To 101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	881.99	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	37.96	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	32.96	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	751.62	
08 53 13 00-0149	UI	>101" UI, Fixed Picture Vinyl Window (Milgard Style Line™ Series).....	8.68	
		<i>For Re-Installation Of Existing Security Bars, Add</i>	0.32	
		<i>For Minor Welding And L Bracket Extensions And Paint Touchup. (Up to 1/8" thick steel and 1/8" tack welds all ground to match), Add</i>	0.32	
		<i>For New Security Bar Installation (includes foot quick release), Add</i>	6.27	

08 53 13 00-0150 Accessories For Vinyl Windows (08 53 13 00-0104)

08 53 13 00-0151 Factory Installed Grilles For Vinyl Windows (08 53 13 00-0150)

08 53 13 00-0152 Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows (08 53 13 00-0151)

08 53 13 00-0153	EA	Up To 9 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows.....	48.94	
08 53 13 00-0154	EA	>9 To 18 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	62.93	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 53 13 00-0155 EA >18 To 24 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	81.04	
08 53 13 00-0156 EA >24 To 36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	95.66	
08 53 13 00-0157 EA >36 SF Windows, Fixed Grille Installed Between Glass Panes, Factory Installed Grilles For Vinyl Windows	117.59	
08 53 13 00-0158 Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows <small>(08 53 13 00-0151)</small>		
08 53 13 00-0159 EA Up To 9 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	111.23	
08 53 13 00-0160 EA >9 To 18 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	133.48	
08 53 13 00-0161 EA >18 To 24 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	168.44	
08 53 13 00-0162 EA >24 To 36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	209.75	
08 53 13 00-0163 EA >36 SF Windows, Fixed Exterior And Interior Grilles With Spacers, Factory Installed Grilles For Vinyl Windows	251.07	
08 53 13 00-0164 Meeting Egress Code For Windows <small>(08 53 13 00-0104)</small>		
08 53 13 00-0165 EA Drop Sill Up To 47" Note: Includes king stud, trimmers, cripples, exterior flashing, stucco molding, stucco patch with fog coat, drywall texture to match existing 90%, insulation if applicable (R-15), lath and paper overlap, backer rod, caulking, paint touch-up to match existing minimum 90% (hand applied only)	344.33	
08 53 13 00-0166 EA Enlarge Sideways Up To 49" Wide Note: Includes header, king stud, trimmers, cripples, exterior flashing, stucco molding, stucco path with fog coat, drywall texture to match existing 90%, insulation if applicable (R-15), lath and paper overlap, backer rod, caulking, paint touch-up to match existing minimum 90% (hand applied only)	444.53	
08 53 66 Vinyl Window Screens <small>(08 53)</small>		
08 53 66 00-0001 Insect Screens For Vinyl Windows <small>(08 53 66)</small>		
08 53 66 00-0002 EA Up To 6 SF, Insect Screen For Vinyl Windows	51.22	9.72
08 53 66 00-0003 EA >6 To 9 SF, Insect Screen For Vinyl Windows	70.29	9.72
08 53 66 00-0004 EA >9 To 12 SF, Insect Screen For Vinyl Windows	76.65	9.72
08 53 66 00-0005 EA >12 To 15 SF, Insect Screen For Vinyl Windows	89.36	9.72
08 53 66 00-0006 EA >15 To 20 SF, Insect Screen For Vinyl Windows	117.96	9.72
08 53 66 00-0007 EA >20 To 25 SF, Insect Screen For Vinyl Windows	130.67	9.72
08 53 66 00-0008 EA >25 To 30 SF, Insect Screen For Vinyl Windows	149.74	9.72
08 53 66 00-0009 EA >30 To 35 SF, Insect Screen For Vinyl Windows	162.45	9.72
08 53 66 00-0010 SF >35 SF, Insect Screen For Vinyl Windows	4.93	0.19
08 56 Special Function Windows <small>(08 50)</small>		
08 56 19 Pass Windows <small>(08 56)</small>		
08 56 19 00-0001 Bullet Resistant Pass Through Service Window, Steel Frame <small>(08 56 19)</small>		
Note: Secure air passage for voice transmission; Natural Voice Transmission (NVR)		
08 56 19 00-0002 EA 24" x 36", Bullet Resistant Pass Through Service Window, 1.25" Acrylic Glazing Level I, Steel Frame	4,953.61	669.41
For 1.375" Acrylic Level II Bullet Resistant Glazing, Add	45.00	
For 1.25" Multi-Ply Polycarbonate Level III Bullet Resistant Glazing, Add	295.00	
08 56 19 00-0003 EA 30" x 36", Bullet Resistant Pass Through Service Window, 1.25" Acrylic Glazing Level I, Steel Frame	5,464.94	725.19
For 1.375" Acrylic Level II Bullet Resistant Glazing, Add	60.00	
For 1.25" Multi-Ply Polycarbonate Level III Bullet Resistant Glazing, Add	370.00	
08 56 19 00-0004 EA 36" x 36", Bullet Resistant Pass Through Service Window, 1.25" Acrylic Glazing Level I, Steel Frame	5,743.78	780.99
For 1.375" Acrylic Level II Bullet Resistant Glazing, Add	70.00	
For 1.25" Multi-Ply Polycarbonate Level III Bullet Resistant Glazing, Add	445.00	
08 56 19 00-0005 EA 48" x 40", Bullet Resistant Pass Through Service Window, 1.25" Acrylic Glazing Level I, Steel Frame	7,197.97	892.55
For 1.375" Acrylic Level II Bullet Resistant Glazing, Add	100.00	
For 1.25" Multi-Ply Polycarbonate Level III Bullet Resistant Glazing, Add	650.00	
08 56 19 00-0006 EA 72" x 40", Bullet Resistant Pass Through Service Window, 1.25" Acrylic Glazing Level I, Steel Frame	9,684.77	1,338.83
For 1.375" Acrylic Level II Bullet Resistant Glazing, Add	150.00	
For 1.25" Multi-Ply Polycarbonate Level III Bullet Resistant Glazing, Add	975.00	
08 56 56 Security Window Screens <small>(08 56)</small>		
Note: Includes frame and mounting hardware. Operable security screens include hinges and related hardware.		
08 56 56 00-0001 Wire Mesh Security Screen <small>(08 56 56)</small>		
08 56 56 00-0002 Wire Mesh, Inoperable, Security Window Screen <small>(08 56 56 00-0001)</small>		
08 56 56 00-0003 SF 13 Gauge, Wire Mesh, Inoperable, Steel Security Window Screen	23.75	5.02
For Painted Steel, Add	1.71	
For Galvanized Steel, Add	3.41	
For Aluminum, Add	6.82	
For Stainless Steel, Add	29.84	
08 56 56 00-0004 SF 11 Gauge, Wire Mesh, Inoperable, Steel Security Window Screen	24.24	5.02
For Painted Steel, Add	1.75	
For Galvanized Steel, Add	3.51	
For Aluminum, Add	7.02	
For Stainless Steel, Add	30.70	

08 Openings**08 50 Windows****08 56 Special Function Windows**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 56 56 00-0005	SF 9 Gauge, Wire Mesh, Inoperable, Steel Security Window Screen	26.49	5.02
	<i>For Painted Steel, Add</i>	1.98	
	<i>For Galvanized Steel, Add</i>	3.96	
	<i>For Aluminum, Add</i>	7.92	
	<i>For Stainless Steel, Add</i>	34.63	
08 56 56 00-0006	SF 6 Gauge, Wire Mesh, Inoperable, Steel Security Window Screen	31.30	5.02
	<i>For Painted Steel, Add</i>	2.46	
	<i>For Galvanized Steel, Add</i>	4.92	
	<i>For Aluminum, Add</i>	9.84	
	<i>For Stainless Steel, Add</i>	43.05	
08 56 56 00-0007	Wire Mesh, Operable, Security Window Screen (08 56 56 00-0001)		
08 56 56 00-0008	SF 13 Gauge, Wire Mesh, Operable, Steel Security Window Screen	33.21	6.13
	<i>For Painted Steel, Add</i>	2.43	
	<i>For Galvanized Steel, Add</i>	4.86	
	<i>For Aluminum, Add</i>	9.72	
	<i>For Stainless Steel, Add</i>	42.51	
08 56 56 00-0009	SF 11 Gauge, Wire Mesh, Operable, Steel Security Window Screen	33.95	6.13
	<i>For Painted Steel, Add</i>	2.50	
	<i>For Galvanized Steel, Add</i>	5.01	
	<i>For Aluminum, Add</i>	10.01	
	<i>For Stainless Steel, Add</i>	43.80	
08 56 56 00-0010	SF 9 Gauge, Wire Mesh, Operable, Steel Security Window Screen	37.18	6.13
	<i>For Painted Steel, Add</i>	2.83	
	<i>For Galvanized Steel, Add</i>	5.65	
	<i>For Aluminum, Add</i>	11.30	
	<i>For Stainless Steel, Add</i>	49.46	
08 56 56 00-0011	SF 6 Gauge, Wire Mesh, Operable, Steel Security Window Screen	43.93	6.13
	<i>For Painted Steel, Add</i>	3.50	
	<i>For Galvanized Steel, Add</i>	7.00	
	<i>For Aluminum, Add</i>	14.00	
	<i>For Stainless Steel, Add</i>	61.27	
08 56 56 00-0012	Wire Cloth Security Screen (08 56 56)		
	Note: Wire cloth has from 10 to 12 strands per 1".		
08 56 56 00-0013	Wire Cloth, Inoperable, Security Window Screens (08 56 56 00-0012)		
08 56 56 00-0014	SF 24 Gauge, Wire Cloth, Inoperable, Steel Security Window Screen	15.75	3.34
	<i>For Painted Steel, Add</i>	0.51	
	<i>For Galvanized Steel, Add</i>	1.53	
	<i>For Aluminum, Add</i>	3.05	
	<i>For Stainless Steel, Add</i>	12.71	
08 56 56 00-0015	SF 22 Gauge, Wire Cloth, Inoperable, Steel Security Window Screen	16.43	3.34
	<i>For Painted Steel, Add</i>	0.54	
	<i>For Galvanized Steel, Add</i>	1.63	
	<i>For Aluminum, Add</i>	3.26	
	<i>For Stainless Steel, Add</i>	13.56	
08 56 56 00-0016	SF 20 Gauge, Wire Cloth, Inoperable, Steel Security Window Screen	17.51	3.34
	<i>For Painted Steel, Add</i>	0.60	
	<i>For Galvanized Steel, Add</i>	1.79	
	<i>For Aluminum, Add</i>	3.58	
	<i>For Stainless Steel, Add</i>	14.91	
08 56 56 00-0017	SF 18 Gauge, Wire Cloth, Inoperable, Steel Security Window Screen	19.56	3.34
	<i>For Painted Steel, Add</i>	0.70	
	<i>For Galvanized Steel, Add</i>	2.10	
	<i>For Aluminum, Add</i>	4.19	
	<i>For Stainless Steel, Add</i>	17.48	
08 56 56 00-0018	Wire Cloth, Operable, Security Window Screens (08 56 56 00-0012)		
08 56 56 00-0019	SF 24 Gauge, Wire Cloth, Operable, Steel Security Window Screen	21.19	4.46
	<i>For Painted Steel, Add</i>	0.72	
	<i>For Galvanized Steel, Add</i>	2.17	
	<i>For Aluminum, Add</i>	4.35	
	<i>For Stainless Steel, Add</i>	18.11	
08 56 56 00-0020	SF 22 Gauge, Wire Cloth, Operable, Steel Security Window Screen	22.25	4.46
	<i>For Painted Steel, Add</i>	0.78	
	<i>For Galvanized Steel, Add</i>	2.33	
	<i>For Aluminum, Add</i>	4.67	
	<i>For Stainless Steel, Add</i>	19.44	
08 56 56 00-0021	SF 20 Gauge, Wire Cloth, Operable, Steel Security Window Screen	23.71	4.46
	<i>For Painted Steel, Add</i>	0.85	
	<i>For Galvanized Steel, Add</i>	2.55	
	<i>For Aluminum, Add</i>	5.10	
	<i>For Stainless Steel, Add</i>	21.26	
08 56 56 00-0022	SF 18 Gauge, Wire Cloth, Operable, Steel Security Window Screen	26.65	4.46
	<i>For Painted Steel, Add</i>	1.00	
	<i>For Galvanized Steel, Add</i>	2.99	
	<i>For Aluminum, Add</i>	5.99	
	<i>For Stainless Steel, Add</i>	24.94	



Openings	08	08
Windows	08 50	
Special Function Windows	08 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 56 56 00-0023 Expanded Metal Security Screen <small>(08 56 56)</small> Note: Flattened or standard pattern. Dimension given is the short distance across the opening (SWO). The # designation is the pattern number of the expanded metal and is not the gauge.		
08 56 56 00-0024 Expanded Metal, Inoperable, Security Screen <small>(08 56 56 00-0023)</small>		
08 56 56 00-0025 SF 1/4" #18, Thickness 0.04" Expanded Metal, Inoperable, Steel Security Window Screen	29.89	8.37
For Painted Steel, Add	0.99	
For Galvanized Steel, Add	2.98	
For Aluminum, Add	5.96	
For Stainless Steel, Add	24.81	
08 56 56 00-0026 SF 1/2" #13, Thickness 0.07" Expanded Metal, Inoperable, Steel Security Window Screen	34.95	10.04
For Painted Steel, Add	1.13	
For Galvanized Steel, Add	3.40	
For Aluminum, Add	6.80	
For Stainless Steel, Add	28.35	
08 56 56 00-0027 SF 3/4" #13, Thickness 0.07" Expanded Metal, Inoperable, Steel Security Window Screen	39.24	12.27
For Painted Steel, Add	1.24	
For Galvanized Steel, Add	3.71	
For Aluminum, Add	7.42	
For Stainless Steel, Add	30.93	
08 56 56 00-0028 SF 3/4" #9, Thickness 0.12" Expanded Metal, Inoperable, Steel Security Window Screen	46.11	14.50
For Painted Steel, Add	1.41	
For Galvanized Steel, Add	4.24	
For Aluminum, Add	8.48	
For Stainless Steel, Add	35.33	
08 56 56 00-0029 SF 1-1/2" #9, Thickness 0.11" Expanded Metal, Inoperable, Steel Security Window Screen	42.93	13.95
For Painted Steel, Add	1.31	
For Galvanized Steel, Add	3.93	
For Aluminum, Add	7.86	
For Stainless Steel, Add	32.75	
08 56 56 00-0030 SF 3 LB/SF Expanded Metal, Inoperable, Steel Security Window Screen	54.15	17.85
For Painted Steel, Add	1.65	
For Galvanized Steel, Add	4.94	
For Aluminum, Add	9.89	
For Stainless Steel, Add	41.19	
08 56 56 00-0031 Expanded Metal, Operable, Security Screen <small>(08 56 56 00-0023)</small>		
08 56 56 00-0032 SF 1/4" #18, Thickness 0.04" Expanded Metal, Operable, Steel Security Window Screen	36.22	10.04
For Painted Steel, Add	1.20	
For Galvanized Steel, Add	3.59	
For Aluminum, Add	7.19	
For Stainless Steel, Add	29.94	
08 56 56 00-0033 SF 1/2" #13, Thickness 0.07" Expanded Metal, Operable, Steel Security Window Screen	46.87	12.27
For Painted Steel, Add	1.62	
For Galvanized Steel, Add	4.86	
For Aluminum, Add	9.71	
For Stainless Steel, Add	40.46	
08 56 56 00-0034 SF 3/4" #13, Thickness 0.07" Expanded Metal, Operable, Steel Security Window Screen	52.03	13.95
For Painted Steel, Add	1.77	
For Galvanized Steel, Add	5.30	
For Aluminum, Add	10.59	
For Stainless Steel, Add	44.13	
08 56 56 00-0035 SF 1-1/2" #9, Thickness 0.11" Expanded Metal, Operable, Steel Security Window Screen	56.32	15.62
For Painted Steel, Add	1.87	
For Galvanized Steel, Add	5.60	
For Aluminum, Add	11.21	
For Stainless Steel, Add	46.69	
08 56 56 00-0036 SF 3/4" #9, Thickness 0.12" Expanded Metal, Operable, Steel Security Window Screen	61.47	17.85
For Painted Steel, Add	2.01	
For Galvanized Steel, Add	6.04	
For Aluminum, Add	12.08	
For Stainless Steel, Add	50.34	
08 56 56 00-0037 SF 3 LB/SF Expanded Metal, Operable, Steel Security Window Screen	70.36	19.52
For Painted Steel, Add	2.35	
For Galvanized Steel, Add	7.04	
For Aluminum, Add	14.08	
For Stainless Steel, Add	58.66	
08 56 56 00-0038 Perforated Metal Security Screen <small>(08 56 56)</small>		
08 56 56 00-0039 Perforated Metal, Inoperable, Steel Security Window Screen <small>(08 56 56 00-0038)</small>		
08 56 56 00-0040 SF 22 Gauge Perforated Metal, 63% Openings, Inoperable, Steel Security Window Screen	26.45	5.02
For Painted Steel, Add	0.99	
For Galvanized Steel, Add	2.96	
For Aluminum, Add	5.93	
For Stainless Steel, Add	19.75	
08 56 56 00-0041 SF 20 Gauge Perforated Metal, 63% Openings, Inoperable, Steel Security Window Screen	27.23	5.02
For Painted Steel, Add	1.03	
For Galvanized Steel, Add	3.08	
For Aluminum, Add	6.16	
For Stainless Steel, Add	20.53	

08 Openings**08 50 Windows****08 56 Special Function Windows**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 56 56 00-0042	SF		18 Gauge Perforated Metal, 63% Openings, Inoperable, Steel Security Window Screen	29.87	5.02
			<i>For Painted Steel, Add</i>	1.16	
			<i>For Galvanized Steel, Add</i>	3.48	
			<i>For Aluminum, Add</i>	6.95	
			<i>For Stainless Steel, Add</i>	23.17	
08 56 56 00-0043	SF		16 Gauge Perforated Metal, 63% Openings, Inoperable, Steel Security Window Screen	34.86	5.02
			<i>For Painted Steel, Add</i>	1.41	
			<i>For Galvanized Steel, Add</i>	4.22	
			<i>For Aluminum, Add</i>	8.45	
			<i>For Stainless Steel, Add</i>	28.16	
08 56 56 00-0044			Perforated Metal, Operable, Steel Security Window Screen (08 56 56 00-0038)		
08 56 56 00-0045	SF		22 Gauge Perforated Metal, 63% Openings, Operable, Steel Security Window Screen	36.98	6.13
			<i>For Painted Steel, Add</i>	1.40	
			<i>For Galvanized Steel, Add</i>	4.21	
			<i>For Aluminum, Add</i>	8.42	
			<i>For Stainless Steel, Add</i>	28.06	
08 56 56 00-0046	SF		20 Gauge Perforated Metal, 63% Openings, Operable, Steel Security Window Screen	38.35	6.13
			<i>For Painted Steel, Add</i>	1.47	
			<i>For Galvanized Steel, Add</i>	4.41	
			<i>For Aluminum, Add</i>	8.83	
			<i>For Stainless Steel, Add</i>	29.43	
08 56 56 00-0047	SF		18 Gauge Perforated Metal, 63% Openings, Operable, Steel Security Window Screen	41.77	6.13
			<i>For Painted Steel, Add</i>	1.64	
			<i>For Galvanized Steel, Add</i>	4.93	
			<i>For Aluminum, Add</i>	9.86	
			<i>For Stainless Steel, Add</i>	32.85	
08 56 56 00-0048	SF		16 Gauge Perforated Metal, 63% Openings, Operable, Steel Security Window Screen	48.91	6.13
			<i>For Painted Steel, Add</i>	2.00	
			<i>For Galvanized Steel, Add</i>	6.00	
			<i>For Aluminum, Add</i>	12.00	
			<i>For Stainless Steel, Add</i>	39.99	
08 56 56 00-0049			Removal And Reinstallation Of Security Screens And Guards (08 56 56)		
08 56 56 00-0050	SF		Removal And Reinstallation Of Security Screens	14.04	
08 56 59			Service and Teller Window Units (08 56)		
08 56 59 00-0001			Communicator For Window (08 56 59)		
08 56 59 00-0002	EA		Electronic Two-Way Talk-thru Hands-Free Audio Communicator (Haven SC-350).....	2,633.97	223.14
			Note: Communicator is designed for applications where a fire shutter or window shade is present. Two-way communication is accomplished through the use of speakers and micro-phones located on each side of the partition. The Master unit is equipped with a 15" gooseneck microphone, power on/off switch, power-on LED, and external volume controls. The Remote Unit is window-mounted and may incorporate a level 3 bullet-resistive insert.		
08 56 59 00-0003	EA		Electronic Two-Way Audio Communicator (Haven SC-300).....	2,291.31	223.14
			Note: Communicator is designed for application where a cutout in the barrier is impractical. Two-way communication is accomplished through the use of speakers and microphones located on each side of the partition. The master unit is equipped with a 20" gooseneck microphone, power on/off switch, power-on LED, and external volume controls. The Remote unit is vandal-resistant with all controls located within the housing.		
08 56 59 00-0004	EA		Electronic Two-Way Talk-Thru Communication System (Norcon TTU-1).....	2,078.16	223.14
08 56 59 00-0005			Speak-Thru Communicator For Window (08 56 59)		
08 56 59 00-0006	EA		5-5/16" Diameter, Satin Anodized Aluminum, No-Draft Speak-Thru (CRL 834A).....	148.36	
			Note: Includes gaskets and mounting screws for installation on glass from 1/4" (6 mm) to 1/2" (12 mm) thick. Require a minimum hole diameter of 2-1/4" (57 mm), and will cover holes up to 4-1/4" (108 mm). Recommended hole diameter is 3-1/2" (89 mm).		
08 56 59 00-0007	EA		6-3/16" Diameter, Polished Stainless Steel, No-Draft Speak-Thru (Brixwell 834LPS).....	222.57	
			Note: Includes gaskets and mounting screws for installation on glass from 1/4" (6 mm) to 1/2" (12 mm) thick. Require a minimum hole diameter of 2-1/4" (57 mm), and will cover holes up to 4-1/4" (108 mm). Recommended hole diameter is 3-1/2" (89 mm).		
08 56 59 00-0008			Counter Drop-In Deal Tray (08 56 59)		
08 56 59 00-0009	EA		16" Wide x 10" Deep x 1-9/16" High, Brushed Stainless Steel, Standard Drop-In Deal Tray (CRL CTDB16)	425.29	40.99
08 60			Roof Windows and Skylights (08)		
			Note: Includes hardware, caulk, sealant and necessary anchors.		
08 62			Unit Skylights (08 60)		
08 62 23			Tubular Skylights (08 62)		
08 62 23 00-0001			Aluminum Framed Solar Tube Skylights (08 62 23)		
			Note: Includes knock down curb with safety security guard, class 1 hail rated double glazed skylight, light shaft top trim, reflective light well, T-bar ceiling frame, acrylic diffuser lens and lens clip.		



Openings	08	08
Roof Windows and Skylights	08 60	
Unit Skylights	08 62	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 62 23 00-0002 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylights (08 62 23 00-0001)		
08 62 23 00-0003 EA 2' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,351.00	212.50
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,030.81	
08 62 23 00-0004 EA 3' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,426.10	217.82
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,031.87	
08 62 23 00-0005 EA 4' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,499.02	223.12
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,032.94	
08 62 23 00-0006 EA 5' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,602.03	228.44
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,034.00	
08 62 23 00-0007 EA 6' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,692.15	233.76
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,035.06	
08 62 23 00-0008 EA 7' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,765.09	239.06
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,036.12	
08 62 23 00-0009 EA 8' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,838.02	244.38
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,037.19	
08 62 23 00-0010 EA 9' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,958.21	249.70
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,038.25	
08 62 23 00-0011 EA 10' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,031.15	255.00
For Class 3 Hail Rated, Add	4.00	
For Polycarbonate Diffuser Lens, Add	7.00	
For High Velocity Hurricane Zone Rated, Add	14.00	
For FM Approved, Add	20.00	
For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add	49.00	
For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add	69.00	
For Single Blade Louver, Add	1,039.31	

08 Openings**08 60 Roof Windows and Skylights****08 62 Unit Skylights**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 62 23 00-0012	EA	11' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,106.23	260.32
		<i>For Class 3 Hail Rated, Add</i>	4.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	7.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	20.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	49.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	69.00	
		<i>For Single Blade Louver, Add</i>	1,040.37	
08 62 23 00-0013	EA	12' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,179.16	265.63
		<i>For Class 3 Hail Rated, Add</i>	4.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	7.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	20.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	49.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	69.00	
		<i>For Single Blade Louver, Add</i>	1,041.44	
08 62 23 00-0014	EA	13' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,299.35	270.94
		<i>For Class 3 Hail Rated, Add</i>	4.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	7.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	20.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	49.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	69.00	
		<i>For Single Blade Louver, Add</i>	1,042.50	
08 62 23 00-0015	EA	14' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,372.29	276.26
		<i>For Class 3 Hail Rated, Add</i>	4.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	7.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	20.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	49.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	69.00	
		<i>For Single Blade Louver, Add</i>	1,043.56	
08 62 23 00-0016	EA	15' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,445.23	281.56
		<i>For Class 3 Hail Rated, Add</i>	4.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	7.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	20.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	49.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	69.00	
		<i>For Single Blade Louver, Add</i>	1,044.62	
08 62 23 00-0017	EA	16' Shaft Length, 31-5/8" x 31-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,518.15	286.88
		<i>For Class 3 Hail Rated, Add</i>	4.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	7.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	20.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	49.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	69.00	
		<i>For Single Blade Louver, Add</i>	1,045.69	
08 62 23 00-0018		31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylights <small>(08 62 23 00-0001)</small>		
08 62 23 00-0019	EA	2' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,641.05	212.50
		<i>For Class 3 Hail Rated, Add</i>	5.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	22.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
		<i>For Single Blade Louver, Add</i>	1,030.81	
08 62 23 00-0020	EA	3' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,744.08	217.82
		<i>For Class 3 Hail Rated, Add</i>	5.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	22.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
		<i>For Single Blade Louver, Add</i>	1,031.87	
08 62 23 00-0021	EA	4' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,847.08	223.12
		<i>For Class 3 Hail Rated, Add</i>	5.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	22.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
		<i>For Single Blade Louver, Add</i>	1,032.94	



Openings	08	08
Roof Windows and Skylights	08 60	
Unit Skylights	08 62	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 62 23 00-0022 EA 5' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	1,950.09	228.44
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,034.00	
08 62 23 00-0023 EA 6' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,117.56	233.76
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,035.06	
08 62 23 00-0024 EA 7' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,220.57	239.06
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,036.12	
08 62 23 00-0025 EA 8' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,323.58	244.38
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,037.19	
08 62 23 00-0026 EA 9' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,491.04	249.70
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,038.25	
08 62 23 00-0027 EA 10' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,594.05	255.00
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,039.31	
08 62 23 00-0028 EA 11' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,697.07	260.32
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,040.37	
08 62 23 00-0029 EA 12' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,800.08	265.63
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,041.44	
08 62 23 00-0030 EA 13' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,967.54	270.94
<i>For Class 3 Hail Rated, Add</i>	5.00	
<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
<i>For FM Approved, Add</i>	22.00	
<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
<i>For Single Blade Louver, Add</i>	1,042.50	

08 Openings**08 60 Roof Windows and Skylights****08 62 Unit Skylights**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 62 23 00-0031	EA	14' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,070.55	276.26
		<i>For Class 3 Hail Rated, Add</i>	5.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	22.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
		<i>For Single Blade Louver, Add</i>	1,043.56	
08 62 23 00-0032	EA	15' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,173.57	281.56
		<i>For Class 3 Hail Rated, Add</i>	5.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	22.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
		<i>For Single Blade Louver, Add</i>	1,044.62	
08 62 23 00-0033	EA	16' Shaft Length, 31-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,276.57	286.88
		<i>For Class 3 Hail Rated, Add</i>	5.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	8.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	14.00	
		<i>For FM Approved, Add</i>	22.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	50.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	86.00	
		<i>For Single Blade Louver, Add</i>	1,045.69	
08 62 23 00-0034		55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylights <small>(08 62 23 00-0001)</small>		
08 62 23 00-0035	EA	2' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,194.79	239.06
		<i>For Class 3 Hail Rated, Add</i>	10.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
		<i>For FM Approved, Add</i>	36.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
		<i>For Single Blade Louver, Add</i>	1,036.12	
08 62 23 00-0036	EA	3' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,338.62	244.38
		<i>For Class 3 Hail Rated, Add</i>	10.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
		<i>For FM Approved, Add</i>	36.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
		<i>For Single Blade Louver, Add</i>	1,037.19	
08 62 23 00-0037	EA	4' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,484.59	249.70
		<i>For Class 3 Hail Rated, Add</i>	10.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
		<i>For FM Approved, Add</i>	36.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
		<i>For Single Blade Louver, Add</i>	1,038.25	
08 62 23 00-0038	EA	5' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,628.43	255.00
		<i>For Class 3 Hail Rated, Add</i>	10.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
		<i>For FM Approved, Add</i>	36.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
		<i>For Single Blade Louver, Add</i>	1,039.31	
08 62 23 00-0039	EA	6' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	2,858.21	260.32
		<i>For Class 3 Hail Rated, Add</i>	10.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
		<i>For FM Approved, Add</i>	36.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
		<i>For Single Blade Louver, Add</i>	1,040.37	
08 62 23 00-0040	EA	7' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,002.04	265.63
		<i>For Class 3 Hail Rated, Add</i>	10.00	
		<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
		<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
		<i>For FM Approved, Add</i>	36.00	
		<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
		<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
		<i>For Single Blade Louver, Add</i>	1,041.44	



Openings	08
Roof Windows and Skylights	08 60
Unit Skylights	08 62

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 62 23 00-0041	EA		8' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,145.86	270.94
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,042.50	
08 62 23 00-0042	EA		9' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,377.79	276.26
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,043.56	
08 62 23 00-0043	EA		10' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,521.62	281.56
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,044.62	
08 62 23 00-0044	EA		11' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,665.45	286.88
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,045.69	
08 62 23 00-0045	EA		12' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	3,809.28	292.20
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,046.75	
08 62 23 00-0046	EA		13' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	4,039.06	297.50
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,047.81	
08 62 23 00-0047	EA		14' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	4,182.89	302.82
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,048.87	
08 62 23 00-0048	EA		15' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	4,328.87	308.13
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,049.94	
08 62 23 00-0049	EA		16' Shaft Length, 55-5/8" x 55-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Solar Tube Skylight.....	4,472.70	313.44
			<i>For Class 3 Hail Rated, Add</i>	10.00	
			<i>For Polycarbonate Diffuser Lens, Add</i>	14.00	
			<i>For High Velocity Hurricane Zone Rated, Add</i>	22.00	
			<i>For FM Approved, Add</i>	36.00	
			<i>For 18 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	95.00	
			<i>For 14 Gauge, Insulated Galvanized Steel Roof Curb, Add</i>	145.00	
			<i>For Single Blade Louver, Add</i>	1,051.00	

08 63 Metal-Framed Skylights (08 60)

08 63 13 Domed Metal-Framed Skylights (08 63)

08 Openings**08 60 Roof Windows and Skylights****08 63 Metal-Framed Skylights**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 63 13 00-0001		Domed Aluminum Framed Skylights <small>(08 63 13)</small>		
08 63 13 00-0002		Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0001)</small>		
08 63 13 00-0003		Industrial Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0002)</small>		
08 63 13 00-0004		Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0003)</small>		
		Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0005	EA	27-1/4" x 27-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	817.62	143.44
08 63 13 00-0006	EA	27-1/4" x 51-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	971.85	154.06
08 63 13 00-0007	EA	27-1/4" x 99-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,279.28	170.00
08 63 13 00-0008	EA	27-1/4" x 123-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,430.31	180.62
08 63 13 00-0009	EA	39-1/4" x 39-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,018.67	154.06
08 63 13 00-0010	EA	39-1/4" x 63-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,248.42	170.00
08 63 13 00-0011	EA	39-1/4" x 75-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,350.51	180.62
08 63 13 00-0012	EA	39-1/4" x 99-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,519.64	191.26
08 63 13 00-0013	EA	39-1/4" x 123-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,747.27	207.20
08 63 13 00-0014	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,271.80	180.62
08 63 13 00-0015	EA	51-1/4" x 63-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,369.66	185.94
08 63 13 00-0016	EA	51-1/4" x 75-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,524.98	191.26
08 63 13 00-0017	EA	51-1/4" x 87-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,641.99	196.56
08 63 13 00-0018	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,805.78	212.50
08 63 13 00-0019	EA	52-1/4" x 123-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	2,006.83	223.12
08 63 13 00-0020	EA	63-1/4" x 63-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,486.67	191.26
08 63 13 00-0021	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,611.12	201.88
08 63 13 00-0022	EA	63-1/4" x 87-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,798.34	207.20
08 63 13 00-0023	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,902.60	217.82
08 63 13 00-0024	EA	63-1/4" x 123-1/4" Inside Frame Dimensions, Class 1 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	2,167.49	228.44
08 63 13 00-0025		Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0003)</small>		
		Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0026	EA	27-1/4" x 27-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	977.22	143.44
08 63 13 00-0027	EA	27-1/4" x 51-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,128.25	154.06
08 63 13 00-0028	EA	27-1/4" x 99-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,403.77	170.00
08 63 13 00-0029	EA	27-1/4" x 123-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,557.99	180.62
08 63 13 00-0030	EA	39-1/4" x 39-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,133.58	154.06
08 63 13 00-0031	EA	39-1/4" x 63-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,337.79	170.00
08 63 13 00-0032	EA	39-1/4" x 75-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,446.27	180.62
08 63 13 00-0033	EA	39-1/4" x 99-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,628.16	191.26
08 63 13 00-0034	EA	39-1/4" x 123-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,811.11	207.20
08 63 13 00-0035	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,361.18	180.62
08 63 13 00-0036	EA	51-1/4" x 63-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,471.81	185.94
08 63 13 00-0037	EA	51-1/4" x 75-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,579.24	191.26
08 63 13 00-0038	EA	51-1/4" x 87-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,702.63	196.56
08 63 13 00-0039	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight	1,837.70	212.50

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 63 13 00-0040	EA			52-1/4" x 123-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	2,041.94	223.12
08 63 13 00-0041	EA			63-1/4" x 63-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,592.01	191.26
08 63 13 00-0042	EA			63-5/8" x 75-5/8" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,726.03	201.88
08 63 13 00-0043	EA			63-1/4" x 87-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,865.38	207.20
08 63 13 00-0044	EA			63-1/4" x 99-5/8" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,976.01	217.82
08 63 13 00-0045	EA			63-1/4" x 123-1/4" Inside Frame Dimensions, Class 3 Hail Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	2,215.37	228.44
08 63 13 00-0046				High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0003)</small> Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0047	EA			27-1/4" x 27-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	989.98	143.44
08 63 13 00-0048	EA			27-1/4" x 51-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,153.79	154.06
08 63 13 00-0049	EA			27-1/4" x 99-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,438.88	170.00
08 63 13 00-0050	EA			39-1/4" x 39-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,165.50	154.06
08 63 13 00-0051	EA			39-1/4" x 63-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,382.48	170.00
08 63 13 00-0052	EA			39-1/4" x 75-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,481.38	180.62
08 63 13 00-0053	EA			39-1/4" x 99-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,666.47	191.26
08 63 13 00-0054	EA			51-1/4" x 51-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,389.91	180.62
08 63 13 00-0055	EA			51-1/4" x 63-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,497.34	185.94
08 63 13 00-0056	EA			51-1/4" x 75-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,620.74	191.26
08 63 13 00-0057	EA			51-1/4" x 87-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,744.13	196.56
08 63 13 00-0058	EA			52-1/4" x 100-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,888.77	212.50
08 63 13 00-0059	EA			63-1/4" x 63-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,630.31	191.26
08 63 13 00-0060	EA			63-5/8" x 75-5/8" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,777.10	201.88
08 63 13 00-0061	EA			63-1/4" x 87-1/4" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,916.45	207.20
08 63 13 00-0062	EA			63-1/4" x 99-5/8" Inside Frame Dimensions, High Velocity Hurricane Zone Rated, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	2,027.08	217.82
08 63 13 00-0063				FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0003)</small> Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0064	EA			27-1/4" x 27-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,012.33	143.44
08 63 13 00-0065	EA			27-1/4" x 51-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,188.90	154.06
08 63 13 00-0066	EA			27-1/4" x 99-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,470.80	170.00
08 63 13 00-0067	EA			27-1/4" x 123-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,672.90	180.62
08 63 13 00-0068	EA			39-1/4" x 39-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,197.42	154.06
08 63 13 00-0069	EA			39-1/4" x 63-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,411.21	170.00
08 63 13 00-0070	EA			39-1/4" x 75-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,513.30	180.62
08 63 13 00-0071	EA			39-1/4" x 99-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,714.35	191.26
08 63 13 00-0072	EA			51-1/4" x 51-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,425.02	180.62
08 63 13 00-0073	EA			51-1/4" x 63-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,532.45	185.94
08 63 13 00-0074	EA			51-1/4" x 75-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,665.42	191.26
08 63 13 00-0075	EA			51-1/4" x 87-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,792.01	196.56
08 63 13 00-0076	EA			52-1/4" x 100-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,939.85	212.50

08 Openings**08 60 Roof Windows and Skylights****08 63 Metal-Framed Skylights**

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 63 13 00-0077	EA	63-1/4" x 63-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,678.19	191.26
08 63 13 00-0078	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,824.98	201.88
08 63 13 00-0079	EA	63-1/4" x 87-1/4" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	1,967.52	207.20
08 63 13 00-0080	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, FM Approved, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Fixed Dome, Aluminum Framed Skylight.....	2,084.54	217.82
08 63 13 00-0081		Curb Top Inserts <small>(08 63 13 00-0003)</small> Note: For use with industrial style fixed dome skylights for better u-value and solar heat gain coefficient/shading coefficient (SHGC/SC) properties. Includes mill finish aluminum frame and acrylic or polycarbonate glazing. Excludes roof curb and flashing.		
08 63 13 00-0082		Single Glazed, Aluminum Framed Curb Top Inserts <small>(08 63 13 00-0081)</small>		
08 63 13 00-0083	EA	27-1/4" x 51-1/4" Inside Frame Dimensions, Single Glazed, Aluminum Framed Curb Top Insert	289.85	69.06
08 63 13 00-0084	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Single Glazed, Aluminum Framed Curb Top Insert	378.71	79.68
08 63 13 00-0085	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, Single Glazed, Aluminum Framed Curb Top Insert	602.36	106.26
08 63 13 00-0086	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, Single Glazed, Aluminum Framed Curb Top Insert	556.47	95.62
08 63 13 00-0087	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, Single Glazed, Aluminum Framed Curb Top Insert	662.52	106.26
08 63 13 00-0088		Double Glazed, Aluminum Framed Curb Top Inserts <small>(08 63 13 00-0081)</small>		
08 63 13 00-0089	EA	27-1/4" x 51-1/4" Inside Frame Dimensions, Double Glazed, Aluminum Framed Curb Top Insert	377.93	69.06
08 63 13 00-0090	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Double Glazed, Aluminum Framed Curb Top Insert	548.44	79.68
08 63 13 00-0091	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, Double Glazed, Aluminum Framed Curb Top Insert	909.60	106.26
08 63 13 00-0092	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, Double Glazed, Aluminum Framed Curb Top Insert	883.04	95.62
08 63 13 00-0093	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, Double Glazed, Aluminum Framed Curb Top Insert	1,087.92	106.26
08 63 13 00-0094		Triple Glazed, Aluminum Framed Curb Top Inserts <small>(08 63 13 00-0081)</small>		
08 63 13 00-0095	EA	27-1/4" x 51-1/4" Inside Frame Dimensions, Triple Glazed, Aluminum Framed Curb Top Insert	463.87	69.06
08 63 13 00-0096	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Triple Glazed, Aluminum Framed Curb Top Insert	709.58	79.68
08 63 13 00-0097	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, Triple Glazed, Aluminum Framed Curb Top Insert	1,287.73	106.26
08 63 13 00-0098	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, Triple Glazed, Aluminum Framed Curb Top Insert	1,188.12	95.62
08 63 13 00-0099	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, Triple Glazed, Aluminum Framed Curb Top Insert	1,483.25	106.26
08 63 13 00-0100		Pyramid Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0002)</small>		
08 63 13 00-0101		Acrylic/Acrylic Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight <small>(08 63 13 00-0100)</small> Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0102	EA	27-1/4" x 27-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight	760.16	143.44
08 63 13 00-0103	EA	39-1/4" x 39-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight	929.30	154.06
08 63 13 00-0104	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight	1,182.43	180.62
08 63 13 00-0105	EA	63-1/4" x 63-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight	1,451.56	191.26
08 63 13 00-0106		Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight <small>(08 63 13 00-0100)</small> Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0107	EA	27-1/4" x 27-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight.....	1,009.14	143.44
08 63 13 00-0108	EA	39-1/4" x 39-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight.....	1,184.66	154.06
08 63 13 00-0109	EA	51-1/4" x 51-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight.....	1,415.44	180.62
08 63 13 00-0110	EA	63-1/4" x 63-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Pyramid Style Fixed Dome, Aluminum Framed Skylight.....	1,665.42	191.26
08 63 13 00-0111		Double Hip Style Fixed Dome, Aluminum Framed Skylights <small>(08 63 13 00-0002)</small>		
08 63 13 00-0112		Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight <small>(08 63 13 00-0111)</small> Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0113	EA	27-1/4" x 51-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	878.26	143.44
08 63 13 00-0114	EA	27-1/4" x 99-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,183.52	170.00
08 63 13 00-0115	EA	27-1/4" x 123-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,379.24	180.62

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 63 13 00-0116 EA 39-1/4" x 63-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,127.12	170.00
08 63 13 00-0117 EA 39-1/4" x 75-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,226.02	180.62
08 63 13 00-0118 EA 39-1/4" x 99-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,449.41	191.26
08 63 13 00-0119 EA 39-1/4" x 123-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,680.24	207.20
08 63 13 00-0120 EA 51-1/4" x 63-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,283.48	185.94
08 63 13 00-0121 EA 51-1/4" x 75-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,400.49	191.26
08 63 13 00-0122 EA 51-1/4" x 87-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,527.07	196.56
08 63 13 00-0123 EA 52-1/4" x 100-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,665.33	212.50
08 63 13 00-0124 EA 52-1/4" x 123-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,936.60	223.12
08 63 13 00-0125 EA 63-5/8" x 75-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,576.01	201.88
08 63 13 00-0126 EA 63-1/4" x 87-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,750.46	207.20
08 63 13 00-0127 EA 63-1/4" x 99-5/8" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,870.68	217.82
08 63 13 00-0128 EA 63-1/4" x 123-1/4" Inside Frame Dimensions, Acrylic/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	2,132.38	228.44
08 63 13 00-0129 Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight <small>(08 63 13 00-0111)</small>		
Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0130 EA 27-1/4" x 27-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	986.79	143.44
08 63 13 00-0131 EA 27-1/4" x 51-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,144.21	154.06
08 63 13 00-0132 EA 27-1/4" x 99-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,419.73	170.00
08 63 13 00-0133 EA 39-1/4" x 39-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,155.93	154.06
08 63 13 00-0134 EA 39-1/4" x 51-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,270.80	164.69
08 63 13 00-0135 EA 39-1/4" x 63-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,363.33	170.00
08 63 13 00-0136 EA 39-1/4" x 75-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,462.23	180.62
08 63 13 00-0137 EA 39-1/4" x 99-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,650.51	191.26
08 63 13 00-0138 EA 51-1/4" x 51-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,377.14	185.94
08 63 13 00-0139 EA 51-1/4" x 63-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,484.57	185.94
08 63 13 00-0140 EA 51-1/4" x 75-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,601.58	191.26
08 63 13 00-0141 EA 51-1/4" x 87-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,721.79	196.56
08 63 13 00-0142 EA 52-1/4" x 100-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,863.24	212.50
08 63 13 00-0143 EA 63-1/4" x 63-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,607.97	191.26
08 63 13 00-0144 EA 63-5/8" x 75-5/8" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,754.76	201.88
08 63 13 00-0145 EA 63-1/4" x 87-1/4" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,890.91	207.20
08 63 13 00-0146 EA 63-1/4" x 99-5/8" Inside Frame Dimensions, Polycarbonate/Acrylic Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight.....	1,998.36	217.82
08 63 13 00-0147 Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight <small>(08 63 13 00-0111)</small>		
Note: Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, weather sweep, curb seal tape and fasteners. Excludes roof curb and flashing.		
08 63 13 00-0148 EA 27-1/4" x 51-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,134.64	154.06
08 63 13 00-0149 EA 27-1/4" x 99-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,461.23	170.00
08 63 13 00-0150 EA 39-1/4" x 63-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,398.44	170.00
08 63 13 00-0151 EA 39-1/4" x 75-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,503.73	180.62
08 63 13 00-0152 EA 39-1/4" x 99-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,701.58	191.26

08 Openings**08 60 Roof Windows and Skylights****08 63 Metal-Framed Skylights**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 63 13 00-0153	EA	51-1/4" x 63-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,522.88		185.94
08 63 13 00-0154	EA	51-1/4" x 75-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,649.46		191.26
08 63 13 00-0155	EA	51-1/4" x 87-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,779.24		196.56
08 63 13 00-0156	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,914.31		212.50
08 63 13 00-0157	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,812.22		201.88
08 63 13 00-0158	EA	63-1/4" x 87-1/4" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	1,954.75		207.20
08 63 13 00-0159	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Double Hip Style Fixed Dome, Aluminum Framed Skylight	2,068.58		217.82
08 63 13 00-0160		Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0001)			
08 63 13 00-0161		Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0160) Note: UL listed or FM approved. Includes mill finish aluminum frame, integral condensation and weepage gutters, insulated thermal break, curb seal tape, weather sweep, fasteners, fusible link with a minimum temperature rating of 165 degrees, gas shocks and exterior manual release cable for testing. Excludes roof curb and flashing.			
08 63 13 00-0162		Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0161)			
08 63 13 00-0163		10 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0162)			
08 63 13 00-0164	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, 10 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	4,365.77		212.50
08 63 13 00-0165	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, 10 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	4,054.04		201.88
08 63 13 00-0166	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, 10 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	4,579.63		212.50
08 63 13 00-0167		25 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0162)			
08 63 13 00-0168	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, 25 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,639.37		212.50
08 63 13 00-0169	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, 25 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,340.42		201.88
08 63 13 00-0170	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, 25 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,929.85		212.50
08 63 13 00-0171		30 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0162)			
08 63 13 00-0172	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, 30 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	6,006.45		212.50
08 63 13 00-0173	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, 30 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,701.12		201.88
08 63 13 00-0174	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, 30 LB Uplift Rated, Acrylic/Acrylic Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	6,290.54		212.50
08 63 13 00-0175		Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0161)			
08 63 13 00-0176		10 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0175)			
08 63 13 00-0177	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, 10 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	4,384.92		212.50
08 63 13 00-0178	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, 10 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	4,073.20		201.88
08 63 13 00-0179	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, 10 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	4,608.36		212.50
08 63 13 00-0180		25 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights (08 63 13 00-0175)			
08 63 13 00-0181	EA	52-1/4" x 100-1/4" Inside Frame Dimensions, 25 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,664.91		212.50
08 63 13 00-0182	EA	63-5/8" x 75-5/8" Inside Frame Dimensions, 25 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,359.57		201.88
08 63 13 00-0183	EA	63-1/4" x 99-5/8" Inside Frame Dimensions, 25 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight	5,961.77		212.50



Openings	08	08
Roof Windows and Skylights	08 60	
Metal-Framed Skylights	08 63	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 63 13 00-0184	30 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylights <small>(08 63 13 00-0175)</small>		
08 63 13 00-0185	EA 52-1/4" x 100-1/4" Inside Frame Dimensions, 30 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight.....	6,025.61	212.50
08 63 13 00-0186	EA 63-5/8" x 75-5/8" Inside Frame Dimensions, 30 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight.....	5,720.27	201.88
08 63 13 00-0187	EA 63-1/4" x 99-5/8" Inside Frame Dimensions, 30 LB Uplift Rated, Polycarbonate/Polycarbonate Double Glazed Prismatic Lens, Industrial Style Smoke Vent Dome, Aluminum Framed Skylight.....	6,322.46	212.50

08 66 Wood-Framed Skylights (08 60)

08 66 00 00-0001	Wood-Framed Skylights (Andersen 400 Series) <small>(08 66)</small>		
08 66 00 00-0002	EA 16-1/2" x 38", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	664.24 98.25 78.60	135.63
08 66 00 00-0003	EA 16-1/2" x 46", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	680.28 102.26 81.81	135.63
08 66 00 00-0004	EA 24-1/2" x 27", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	642.18 92.73 74.19	135.63
08 66 00 00-0005	EA 24-1/2" x 38", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	692.31 105.27 84.21	135.63
08 66 00 00-0006	EA 24-1/2" x 46", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	734.42 115.79 92.63	135.63
08 66 00 00-0007	EA 24-1/2" x 57", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	802.59 132.84 106.27	135.63
08 66 00 00-0008	EA 24-1/2" x 72", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	888.80 154.39 123.51	135.63
08 66 00 00-0009	EA 27" x 24-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	642.18 92.73 74.19	135.63
08 66 00 00-0010	EA 28" x 38", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	744.44 118.30 94.64	135.63
08 66 00 00-0011	EA 28" x 46", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	802.59 132.84 106.27	135.63
08 66 00 00-0012	EA 28" x 57", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	868.75 149.38 119.50	135.63
08 66 00 00-0013	EA 28" x 72", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	956.97 171.43 137.14	135.63
08 66 00 00-0014	EA 38" x 16-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	664.24 98.25 78.60	135.63
08 66 00 00-0015	EA 38" x 24-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	692.31 105.27 84.21	135.63
08 66 00 00-0016	EA 38" x 28", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	744.44 118.30 94.64	135.63
08 66 00 00-0017	EA 44" x 46", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	928.90 164.41 131.53	135.63
08 66 00 00-0018	EA 46" x 16-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	680.28 102.26 81.81	135.63
08 66 00 00-0019	EA 46" x 24-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	734.42 115.79 92.63	135.63
08 66 00 00-0020	EA 46" x 28", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	802.59 132.84 106.27	135.63
08 66 00 00-0021	EA 46" x 44", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	928.90 164.41 131.53	135.63
08 66 00 00-0022	EA 57" x 24-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	802.59 132.84 106.27	135.63
08 66 00 00-0023	EA 57" x 28", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	868.75 149.38 119.50	135.63
08 66 00 00-0024	EA 72" x 24-1/2", Domed, Wood-Framed Skylight (Andersen 400 Series)..... <i>For Tempered Laminated Low-E Insulated Glass, Add</i> <i>For Aluminum Shingle Flashing, Add</i>	888.80 154.39 123.51	135.63

08	08 Openings
	08 60 Roof Windows and Skylights
	08 66 Wood-Framed Skylights



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 66 00 00-0025	EA 72" x 28", Domed, Wood-Framed Skylight (Andersen 400 Series).....	956.97	135.63
	For Tempered Laminated Low-E Insulated Glass, Add	171.43	
	For Aluminum Shingle Flashing, Add	137.14	

08 70 Hardware (08)

08 71 Door Hardware (08 70)

08 71 11 Door Hardware (08 71)

Note: All hardware is ANSI/BHMA Grade 1 unless otherwise noted. See CSI section 08 05 13 00-0050 for removal and reinstallation of existing door where required for modifications.

08 71 11 00-0001 Hinges (08 71 11)
 Note: Unit of measure "PR" indicates that two (2) sets of hinges (top and bottom) are priced. For doors with three (3) sets of hinges (top, middle and bottom), use 1.5 pairs. Excludes mortise preparation for wood doors.

08 71 11 00-0002 Brass/Bronze, Satin Chrome Finish Hinges (08 71 11 00-0001)
 Note: US26D (BHMA 626) satin chrome finish.

08 71 11 00-0003 Standard Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinges (08 71 11 00-0002)

Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.

08 71 11 00-0004	PR 3-1/2" x 3-1/2" Standard Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	86.95	7.59
	For Clear Coated Bright Brass, Add	6.55	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0005	PR 4" x 4" Standard Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	95.48	10.85
	For Clear Coated Bright Brass, Add	7.29	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0006	PR 4-1/2" x 4-1/2" Standard Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	105.56	11.93
	For Clear Coated Bright Brass, Add	6.10	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	

08 71 11 00-0007 Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinges (08 71 11 00-0002)

Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.

08 71 11 00-0008	PR 3-1/2" x 3-1/2" Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge	100.98	7.59
	For Clear Coated Bright Brass, Add	8.41	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0009	PR 4" x 4" Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge	114.29	10.85
	For Clear Coated Bright Brass, Add	8.41	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0010	PR 4-1/2" x 4-1/2" Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge	115.06	11.93
	For Clear Coated Bright Brass, Add	7.43	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0011	PR 5" x 4-1/2" Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	134.41	14.11
	For Clear Coated Bright Brass, Add	8.69	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0012	PR 5" x 5" Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	135.35	14.11
	For Clear Coated Bright Brass, Add	8.82	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0013	PR 6" x 5" Standard Duty, Full Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	146.16	18.12
	For Clear Coated Bright Brass, Add	10.34	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	

08 71 11 00-0014 Standard Duty, Full Mortise, Concealed Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinges (08 71 11 00-0002)

Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.

08 71 11 00-0015	PR 3-1/2" x 3-1/2", Standard Duty, Full Mortise, Concealed Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge	115.45	7.59
08 71 11 00-0016	PR 4" x 4", Standard Duty, Full Mortise, Concealed Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	128.75	10.85
08 71 11 00-0017	PR 4-1/2" x 4-1/2", Standard Duty, Full Mortise, Concealed Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge	130.79	11.93
08 71 11 00-0018	PR 5" x 4", Standard Duty, Full Mortise, Concealed Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	151.77	14.11

08 71 11 00-0019 Standard Duty, Half Surface, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinges (08 71 11 00-0002)

Note: Surface mounted to the face of the door and set into mortised rabbet edge of the frame.

08 71 11 00-0020	PR 4-1/2" x 4-1/2" Standard Duty, Half Surface, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge	146.62	11.93
	For Clear Coated Bright Brass, Add	11.85	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0021	PR 5" x 4" Standard Duty, Half Surface, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	166.24	14.11
	For Clear Coated Bright Brass, Add	13.15	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	
08 71 11 00-0022	PR 5" x 5" Standard Duty, Half Surface, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge.....	186.12	14.11
	For Clear Coated Bright Brass, Add	15.93	
	For Pair Of Non-Removable Pins (NRP), Add	6.00	

08 71 11 00-0023 Standard Duty, Half Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinges (08 71 11 00-0002)

Note: Set into mortised edge of the door and surface applied to the face of the frame.



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0024	PR 4-1/2" x 4-1/2" Standard Duty, Half Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge..... <i>For Clear Coated Bright Brass, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	150.55 12.40 6.00	11.93
08 71 11 00-0025	PR 5" x 4" Standard Duty, Half Mortise, Ball Bearing, Brass/Bronze, Satin Chrome Finish Hinge..... <i>For Clear Coated Bright Brass, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	177.43 14.71 6.00	14.11
08 71 11 00-0026	Heavy Duty, Full Mortise, Plain Bearing, Brass/Bronze Satin Chrome Finish Hinge <small>(08 71 11 00-0002)</small> Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.		
08 71 11 00-0027	PR 4-1/2" x 4-1/2" Heavy Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinge..... <i>For Clear Coated Bright Brass, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	145.79 11.73 6.00	11.93
08 71 11 00-0028	PR 5" x 5" Heavy Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinge..... <i>For Clear Coated Bright Brass, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	168.41 13.45 6.00	18.12
08 71 11 00-0029	PR 6" x 5" Heavy Duty, Full Mortise, Plain Bearing, Brass/Bronze, Satin Chrome Finish Hinge..... <i>For Clear Coated Bright Brass, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	202.56 18.23 6.00	18.12
08 71 11 00-0030	Mortised, Wrought Steel Hinges <small>(08 71 11 00-0001)</small> Note: Clear coated, US 26D satin chrome finish (BHMA 652).		
08 71 11 00-0031	Full Mortise, Plain Bearing, Wrought Steel Hinges <small>(08 71 11 00-0030)</small> Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.		
08 71 11 00-0032	PR 3-1/2" x 3-1/2", Standard Duty, Full Mortise, Plain Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	58.34 -3.48 2.18 -2.09 9.57 2.61 6.00	7.59
08 71 11 00-0033	PR 4" x 4", Standard Duty, Full Mortise, Plain Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	73.45 -3.84 2.40 -2.30 10.56 2.88 6.00	10.85
08 71 11 00-0034	PR 4-1/2" x 4-1/2", Standard Duty, Full Mortise, Plain Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	85.40 -4.68 2.93 -2.81 12.87 3.51 6.00	11.93
08 71 11 00-0035	Full Mortise, Ball Bearing, Wrought Steel Hinges <small>(08 71 11 00-0030)</small> Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.		
08 71 11 00-0036	PR 3-1/2" x 3-1/2", Standard Duty, Full Mortise, Ball Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	104.37 -12.69 7.93 -7.61 34.89 9.51 6.00	7.59
08 71 11 00-0037	PR 4" x 4", Standard Duty, Full Mortise, Ball Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	126.08 -14.37 8.98 -8.62 39.51 10.77 6.00	10.85
08 71 11 00-0038	PR 4-1/2" x 4-1/2", Standard Duty, Full Mortise, Ball Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	103.47 -8.29 5.18 -4.98 22.81 6.22 6.00	11.93
08 71 11 00-0039	PR 5" x 4-1/2", Standard Duty, Full Mortise, Ball Bearing, Wrought Steel Hinge..... <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	177.34 -21.00 13.13 -12.60 57.76 15.75 6.00	14.11

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0040	PR	5" x 5", Standard Duty, Full Mortise, Ball Bearing, Wrought Steel Hinge	192.16	14.11
		<i>For Primed For Paint Finish, Deduct</i>	-23.97	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	14.98	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-14.38	
		<i>For Stainless Steel, Add</i>	65.91	
		<i>For Heavy Duty, Add</i>	17.97	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0041	PR	6" x 5", Standard Duty, Full Mortise, Ball Bearing, Wrought Steel Hinge	237.34	14.11
		<i>For Primed For Paint Finish, Deduct</i>	-33.00	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	20.63	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-19.80	
		<i>For Stainless Steel, Add</i>	90.76	
		<i>For Heavy Duty, Add</i>	24.75	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0042		Half Surface, Plain Bearing, Wrought Steel Hinges (08 71 11 00-0030)		
		Note: Surface mounted to the face of the door and set into mortised rabbet edge of the frame.		
08 71 11 00-0043	PR	3-1/2" x 3-1/2", Standard Duty, Half Surface, Plain Bearing, Wrought Steel Hinge	130.95	7.59
		<i>For Primed For Paint Finish, Deduct</i>	-18.00	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	11.25	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-10.80	
		<i>For Stainless Steel, Add</i>	49.51	
		<i>For Heavy Duty, Add</i>	13.50	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0044	PR	4" x 4", Standard Duty, Half Surface, Plain Bearing, Wrought Steel Hinge	156.26	10.85
		<i>For Primed For Paint Finish, Deduct</i>	-20.40	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	12.75	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-12.24	
		<i>For Stainless Steel, Add</i>	56.11	
		<i>For Heavy Duty, Add</i>	15.30	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0045	PR	4-1/2" x 4-1/2", Standard Duty, Half Surface, Plain Bearing, Wrought Steel Hinge	176.01	11.93
		<i>For Primed For Paint Finish, Deduct</i>	-22.80	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	14.25	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-13.68	
		<i>For Stainless Steel, Add</i>	62.71	
		<i>For Heavy Duty, Add</i>	17.10	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0046	PR	5" x 4-1/2", Standard Duty, Half Surface, Plain Bearing, Wrought Steel Hinge	198.34	14.11
		<i>For Primed For Paint Finish, Deduct</i>	-25.20	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	15.75	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-15.12	
		<i>For Stainless Steel, Add</i>	69.31	
		<i>For Heavy Duty, Add</i>	18.90	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0047		Half Surface, Ball Bearing, Wrought Steel Hinges (08 71 11 00-0030)		
		Note: Surface mounted to the face of the door and set into mortised rabbet edge of the frame.		
08 71 11 00-0048	PR	4" x 4", Standard Duty, Half Surface, Ball Bearing, Wrought Steel Hinge	183.26	11.93
		<i>For Primed For Paint Finish, Deduct</i>	-25.80	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	16.13	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-15.48	
		<i>For Stainless Steel, Add</i>	70.96	
		<i>For Heavy Duty, Add</i>	19.35	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0049	PR	4-1/2" x 4-1/2", Standard Duty, Half Surface, Ball Bearing, Wrought Steel Hinge	204.75	11.93
		<i>For Primed For Paint Finish, Deduct</i>	-28.55	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	17.84	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-17.13	
		<i>For Stainless Steel, Add</i>	78.51	
		<i>For Heavy Duty, Add</i>	21.41	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0050	PR	5" x 5", Standard Duty, Half Surface, Ball Bearing, Wrought Steel Hinge	237.34	14.11
		<i>For Primed For Paint Finish, Deduct</i>	-33.00	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	20.63	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-19.80	
		<i>For Stainless Steel, Add</i>	90.76	
		<i>For Heavy Duty, Add</i>	24.75	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0051		Slide-In, Full Mortise, Ball Bearing, Wrought Steel Hinges (08 71 11 00-0030)		
		Note: Both leaves slide into a cavity prepared in the door and door frame.		
08 71 11 00-0052	PR	4-1/2" x 4-1/2", Standard Duty, Slide In, Full Mortise, Ball Bearing, Wrought Steel Hinge	147.64	11.93
		<i>For Primed For Paint Finish, Deduct</i>	-17.13	
		<i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i>	10.71	
		<i>For Satin Brass Plated Clear Coated Finish, Deduct</i>	-10.28	
		<i>For Stainless Steel, Add</i>	47.10	
		<i>For Heavy Duty, Add</i>	12.85	
		<i>For Pair Of Non-Removable Pins (NRP), Add</i>	6.00	
08 71 11 00-0053		Blank Butt Hinges (08 71 11 00-0030)		



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0054	PR 3-1/2" x 3-1/2" To 5" x 5", Blank Butt With Screws, Steel Hinge <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i> <i>For Heavy Duty, Add</i> <i>For Pair Of Non-Removable Pins (NRP), Add</i>	30.30 -2.18 1.36 -1.31 6.00 1.64 6.00	4.88
08 71 11 00-0055	Full Mortise, Single Acting Spring, Wrought Steel Hinges (08 71 11 00-0030) Note: Set into the mortised edge of the door and mortised rabbet edge of the frame.		
08 71 11 00-0056	PR 3-1/2" x 3-1/2", Full Mortise, Single Acting Spring, Wrought Steel Hinge <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i>	122.74 -16.36 10.23 -9.82 44.99	7.59
08 71 11 00-0057	PR 4" x 4", Full Mortise, Single Acting Spring, Wrought Steel Hinge <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i>	161.25 -21.40 13.38 -12.84 58.85	10.85
08 71 11 00-0058	PR 4-1/2" x 4-1/2", Full Mortise, Single Acting Spring, Wrought Steel Hinge <i>For Primed For Paint Finish, Deduct</i> <i>For Bright Chrome Plated Finish US26 (BHMA 625), Add</i> <i>For Satin Brass Plated Clear Coated Finish, Deduct</i> <i>For Stainless Steel, Add</i>	219.39 -31.48 19.67 -18.89 86.56	11.93
08 71 11 00-0059	Offset And Pivot Hinges (08 71 11 00-0001) Note: Satin chrome plated, US26D.		
08 71 11 00-0060	Offset Swing Clear Hinges (08 71 11 00-0059) Note: For use on 1-3/8" and 1-3/4" doors. Allows doors to swing completely clear of the openings.		
08 71 11 00-0061	EA 4-1/2", Steel, Satin Chrome Finish, Swing Clear, Offset Hinges	190.24	3.38
08 71 11 00-0062	Offset Pivot Hinges (08 71 11 00-0059)		
08 71 11 00-0063	3/4" Offset Pivot Hinges (08 71 11 00-0062)		
08 71 11 00-0064	3/4" Offset Pivot Hinges (08 71 11 00-0063)		
08 71 11 00-0065	Top Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0064)		
08 71 11 00-0066	200 LB Max Door Weight, Top Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0065)		
08 71 11 00-0067	EA Painted Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	144.96	10.85
08 71 11 00-0068	EA Satin Chrome Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	195.39	10.85
08 71 11 00-0069	EA Bright Brass Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	223.41	10.85
08 71 11 00-0070	EA Satin Brass Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	223.41	10.85
08 71 11 00-0071	EA Satin Bronze Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	223.41	10.85
08 71 11 00-0072	EA Dark Bronze Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	223.41	10.85
08 71 11 00-0073	EA Bright Chrome Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7212 Top)	223.41	10.85
08 71 11 00-0074	EA Painted Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	159.53	10.85
08 71 11 00-0075	EA Satin Chrome Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	203.25	10.85
08 71 11 00-0076	EA Bright Brass Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	232.37	10.85
08 71 11 00-0077	EA Satin Brass Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	232.37	10.85
08 71 11 00-0078	EA Satin Bronze Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	232.37	10.85
08 71 11 00-0079	EA Dark Bronze Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	232.37	10.85
08 71 11 00-0080	EA Bright Chrome Finish, 200 LB Max Door Weight, Top Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212V Top)	232.37	10.85
08 71 11 00-0081	EA Painted Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	144.96	10.85
08 71 11 00-0082	EA Satin Chrome Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	195.39	10.85
08 71 11 00-0083	EA Bright Brass Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	223.41	10.85
08 71 11 00-0084	EA Satin Brass Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	223.41	10.85
08 71 11 00-0085	EA Satin Bronze Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	223.41	10.85
08 71 11 00-0086	EA Dark Bronze Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	223.41	10.85
08 71 11 00-0087	EA Bright Chrome Finish, 200 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7222 Top)	223.41	10.85
08 71 11 00-0088	500 LB Max Door Weight, Top Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0065)		
08 71 11 00-0089	EA Painted Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	150.38	13.57
08 71 11 00-0090	EA Satin Chrome Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	200.81	13.57
08 71 11 00-0091	EA Bright Brass Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	228.83	13.57
08 71 11 00-0092	EA Satin Brass Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	228.83	13.57
08 71 11 00-0093	EA Satin Bronze Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	228.83	13.57
08 71 11 00-0094	EA Dark Bronze Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	228.83	13.57
08 71 11 00-0095	EA Bright Chrome Finish, 500 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7215 Top)	228.83	13.57
08 71 11 00-0096	600 LB Max Door Weight, Top Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0065)		
08 71 11 00-0097	EA Painted Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top)	150.38	13.57
08 71 11 00-0098	EA Satin Chrome Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top)	200.81	13.57
08 71 11 00-0099	EA Bright Brass Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top)	228.83	13.57
08 71 11 00-0100	EA Satin Brass Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top)	228.83	13.57
08 71 11 00-0101	EA Satin Bronze Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top)	228.83	13.57

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 71 11 00-0102	EA	Dark Bronze Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top).....	228.83		13.57
08 71 11 00-0103	EA	Bright Chrome Finish, 600 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7226 Top)	228.83		13.57
08 71 11 00-0104		700 LB Max Door Weight, Top Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0065)			
08 71 11 00-0105	EA	Painted Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top)	150.38		13.57
08 71 11 00-0106	EA	Satin Chrome Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top).....	200.81		13.57
08 71 11 00-0107	EA	Bright Brass Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top).....	228.83		13.57
08 71 11 00-0108	EA	Satin Brass Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top)	228.83		13.57
08 71 11 00-0109	EA	Satin Bronze Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top).....	228.83		13.57
08 71 11 00-0110	EA	Dark Bronze Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top).....	228.83		13.57
08 71 11 00-0111	EA	Bright Chrome Finish, 700 LB Max Door Weight, Top Header Mount, 3/4" Offset Pivot Hinge (Ives 7227 Top)	228.83		13.57
08 71 11 00-0112		Intermediate Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0064)			
08 71 11 00-0113		200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0112)			
08 71 11 00-0114	EA	Painted Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	180.82		10.85
08 71 11 00-0115	EA	Satin Chrome Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	223.41		10.85
08 71 11 00-0116	EA	Bright Brass Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	253.66		10.85
08 71 11 00-0117	EA	Satin Brass Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	253.66		10.85
08 71 11 00-0118	EA	Satin Bronze Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	253.66		10.85
08 71 11 00-0119	EA	Dark Bronze Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	253.66		10.85
08 71 11 00-0120	EA	Bright Chrome Finish, 200 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7212-7212V-7222 INT).....	253.66		10.85
08 71 11 00-0121		500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0112)			
08 71 11 00-0122	EA	Painted Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT).....	200.81		13.57
08 71 11 00-0123	EA	Satin Chrome Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT)	214.26		13.57
08 71 11 00-0124	EA	Bright Brass Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT)	237.79		13.57
08 71 11 00-0125	EA	Satin Brass Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT).....	237.79		13.57
08 71 11 00-0126	EA	Satin Bronze Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT).....	237.79		13.57
08 71 11 00-0127	EA	Dark Bronze Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT).....	237.79		13.57
08 71 11 00-0128	EA	Bright Chrome Finish, 500 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7215 INT).....	237.79		13.57
08 71 11 00-0129		600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0112)			
08 71 11 00-0130	EA	Painted Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT).....	200.81		13.57
08 71 11 00-0131	EA	Satin Chrome Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT)	214.26		13.57
08 71 11 00-0132	EA	Bright Brass Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT)	237.79		13.57
08 71 11 00-0133	EA	Satin Brass Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT).....	237.79		13.57
08 71 11 00-0134	EA	Satin Bronze Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT).....	237.79		13.57
08 71 11 00-0135	EA	Dark Bronze Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT).....	237.79		13.57
08 71 11 00-0136	EA	Bright Chrome Finish, 600 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7226 INT).....	237.79		13.57
08 71 11 00-0137		700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0112)			
08 71 11 00-0138	EA	Painted Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT).....	200.81		13.57
08 71 11 00-0139	EA	Satin Chrome Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT)	214.26		13.57
08 71 11 00-0140	EA	Bright Brass Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT)	237.79		13.57
08 71 11 00-0141	EA	Satin Brass Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT).....	237.79		13.57
08 71 11 00-0142	EA	Satin Bronze Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT).....	237.79		13.57
08 71 11 00-0143	EA	Dark Bronze Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT).....	237.79		13.57
08 71 11 00-0144	EA	Bright Chrome Finish, 700 LB Max Door Weight, Intermediate Mount, 3/4" Offset Pivot Hinge (Ives 7227 INT).....	237.79		13.57
08 71 11 00-0145		Bottom Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0064)			
08 71 11 00-0146		200 LB Max Door Weight, Bottom Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0145)			
08 71 11 00-0147	EA	Painted Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	159.53		10.85
08 71 11 00-0148	EA	Satin Chrome Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	203.25		10.85
08 71 11 00-0149	EA	Bright Brass Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	232.37		10.85
08 71 11 00-0150	EA	Satin Brass Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	232.37		10.85
08 71 11 00-0151	EA	Satin Bronze Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	232.37		10.85
08 71 11 00-0152	EA	Dark Bronze Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	301.07		10.85
08 71 11 00-0153	EA	Bright Chrome Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 BTM).....	232.37		10.85
08 71 11 00-0154	EA	Painted Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM)	159.53		10.85
08 71 11 00-0155	EA	Satin Chrome Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM).....	203.25		10.85
08 71 11 00-0156	EA	Bright Brass Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM).....	232.37		10.85
08 71 11 00-0157	EA	Satin Brass Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM).....	232.37		10.85
08 71 11 00-0158	EA	Satin Bronze Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM).....	232.37		10.85
08 71 11 00-0159	EA	Dark Bronze Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM).....	232.37		10.85



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-0160	EA		Bright Chrome Finish, 200 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7212 VBTM)	232.37	10.85
08 71 11 00-0161	EA		Painted Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	138.24	10.85
08 71 11 00-0162	EA		Satin Chrome Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	188.68	10.85
08 71 11 00-0163	EA		Bright Brass Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	217.80	10.85
08 71 11 00-0164	EA		Satin Brass Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	217.80	10.85
08 71 11 00-0165	EA		Satin Bronze Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	217.80	10.85
08 71 11 00-0166	EA		Dark Bronze Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	217.80	10.85
08 71 11 00-0167	EA		Bright Chrome Finish, 200 LB Max Door Weight, Bottom Base Plate Mount, 3/4" Offset Pivot Hinge (Ives 7222 BTM)	217.80	10.85
08 71 11 00-0168			500 LB Max Door Weight, Bottom Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0145)		
08 71 11 00-0169	EA		Satin Chrome Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	243.40	13.57
08 71 11 00-0170	EA		Bright Brass Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	259.08	13.57
08 71 11 00-0171	EA		Satin Brass Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	259.08	13.57
08 71 11 00-0172	EA		Satin Bronze Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	259.08	13.57
08 71 11 00-0173	EA		Dark Bronze Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	259.08	13.57
08 71 11 00-0174	EA		Bright Chrome Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	259.08	13.57
08 71 11 00-0175	EA		Painted Finish, 500 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7215 BTM)	263.56	13.57
08 71 11 00-0176			600 LB Max Door Weight, Bottom Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0145)		
08 71 11 00-0177	EA		Painted Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	208.67	13.57
08 71 11 00-0178	EA		Satin Chrome Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	228.83	13.57
08 71 11 00-0179	EA		Bright Brass Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	243.40	13.57
08 71 11 00-0180	EA		Satin Brass Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	243.40	13.57
08 71 11 00-0181	EA		Satin Bronze Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	243.40	13.57
08 71 11 00-0182	EA		Dark Bronze Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	243.40	13.57
08 71 11 00-0183	EA		Bright Chrome Finish, 600 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7226 BTM)	243.40	13.57
08 71 11 00-0184			700 LB Max Door Weight, Bottom Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0145)		
08 71 11 00-0185	EA		Painted Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	482.08	13.57
08 71 11 00-0186	EA		Satin Chrome Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	517.94	13.57
08 71 11 00-0187	EA		Bright Brass Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	575.10	13.57
08 71 11 00-0188	EA		Satin Brass Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	575.10	13.57
08 71 11 00-0189	EA		Satin Bronze Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	575.10	13.57
08 71 11 00-0190	EA		Dark Bronze Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	575.10	13.57
08 71 11 00-0191	EA		Bright Chrome Finish, 700 LB Max Door Weight, Bottom Jamb Mount, 3/4" Offset Pivot Hinge (Ives 7227 BTM)	575.10	13.57
08 71 11 00-0192			Fire Rated, 3/4" Offset Pivot Hinges (08 71 11 00-0063)		
08 71 11 00-0193			Top Mount, Fire Rated, 3/4" Offset Pivot Hinges (08 71 11 00-0192)		
08 71 11 00-0194			500 LB Max Door Weight, Top Mount, Fire Rated, 3/4" Offset Pivot Hinges (08 71 11 00-0193)		
08 71 11 00-0195	EA		Painted Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F Top)	286.00	13.57
08 71 11 00-0196	EA		Satin Stainless Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F Top)	338.64	13.57
08 71 11 00-0197	EA		Bright Stainless Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F Top)	381.23	13.57
08 71 11 00-0198	EA		Bright Brass Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F Top)	381.23	13.57
08 71 11 00-0199	EA		Satin Bronze Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F Top)	381.23	13.57
08 71 11 00-0200			600 LB Max Door Weight, Top Mount, Fire Rated, 3/4" Offset Pivot Hinges (08 71 11 00-0193)		
08 71 11 00-0201	EA		Painted Finish, 600 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F Top)	286.00	13.57
08 71 11 00-0202	EA		Satin Stainless Finish, 600 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F Top)	338.64	13.57
08 71 11 00-0203	EA		Bright Stainless Finish, 600 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F Top)	381.23	13.57
08 71 11 00-0204	EA		Bright Brass Finish, 600 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F Top)	381.23	13.57
08 71 11 00-0205	EA		Satin Bronze Finish, 600 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F Top)	381.23	13.57
08 71 11 00-0206			700 LB Max Door Weight, Top Mount, Fire Rated, 3/4" Offset Pivot Hinges (08 71 11 00-0193)		
08 71 11 00-0207	EA		Painted Finish, 700 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227F Top)	286.00	13.57
08 71 11 00-0208	EA		Satin Stainless Finish, 700 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227F Top)	338.64	13.57

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0209	EA	Bright Stainless Finish, 700 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227F Top).....	381.23	13.57
08 71 11 00-0210	EA	Bright Brass Finish, 700 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227F Top).....	381.23	13.57
08 71 11 00-0211	EA	Satin Bronze Finish, 700 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227F Top).....	381.23	13.57
08 71 11 00-0212		1,000 LB Max Door Weight, Top Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0193)</small>		
08 71 11 00-0213	EA	Painted Finish, 1,000 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F Top).....	300.37	16.28
08 71 11 00-0214	EA	Satin Stainless Finish, 1,000 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F Top).....	344.07	16.28
08 71 11 00-0215	EA	Bright Stainless Finish, 1,000 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F Top).....	364.25	16.28
08 71 11 00-0216	EA	Bright Brass Finish, 1,000 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F Top).....	364.25	16.28
08 71 11 00-0217	EA	Satin Bronze Finish, 1,000 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F Top).....	364.25	16.28
08 71 11 00-0218		1,750 LB Max Door Weight, Top Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0193)</small>		
08 71 11 00-0219	EA	Painted Finish, 1,750 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F Top).....	300.37	16.28
08 71 11 00-0220	EA	Satin Stainless Finish, 1,750 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F Top).....	344.07	16.28
08 71 11 00-0221	EA	Bright Stainless Finish, 1,750 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F Top).....	364.25	16.28
08 71 11 00-0222	EA	Bright Brass Finish, 1,750 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F Top).....	364.25	16.28
08 71 11 00-0223	EA	Satin Bronze Finish, 1,750 LB Max Door Weight, Top Header Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F Top).....	364.25	16.28
08 71 11 00-0224		Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0192)</small>		
08 71 11 00-0225		500 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0224)</small>		
08 71 11 00-0226	EA	Painted Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215 FINT).....	294.94	13.57
08 71 11 00-0227	EA	Satin Stainless Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215 FINT).....	344.25	13.57
08 71 11 00-0228	EA	Bright Stainless Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215 FINT).....	358.82	13.57
08 71 11 00-0229	EA	Bright Brass Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215 FINT).....	358.82	13.57
08 71 11 00-0230	EA	Satin Bronze Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215 FINT).....	358.82	13.57
08 71 11 00-0231		600 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0224)</small>		
08 71 11 00-0232	EA	Painted Finish, 600 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226 FINT).....	294.94	13.57
08 71 11 00-0233	EA	Satin Stainless Finish, 600 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226 FINT).....	344.25	13.57
08 71 11 00-0234	EA	Bright Stainless Finish, 600 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226 FINT).....	358.82	13.57
08 71 11 00-0235	EA	Bright Brass Finish, 600 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226 FINT).....	358.82	13.57
08 71 11 00-0236	EA	Satin Bronze Finish, 600 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226 FINT).....	358.82	13.57
08 71 11 00-0237		700 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0224)</small>		
08 71 11 00-0238	EA	Painted Finish, 700 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227 FINT).....	294.94	13.57
08 71 11 00-0239	EA	Satin Stainless Finish, 700 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227 FINT).....	344.25	13.57
08 71 11 00-0240	EA	Bright Stainless Finish, 700 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227 FINT).....	358.82	13.57
08 71 11 00-0241	EA	Bright Brass Finish, 700 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227 FINT).....	358.82	13.57
08 71 11 00-0242	EA	Satin Bronze Finish, 700 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7227 FINT).....	358.82	13.57



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0243		1,000 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0224)</small>		
08 71 11 00-0244	EA	Painted Finish, 1,000 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230 FINT).....	329.52	16.28
08 71 11 00-0245	EA	Satin Stainless Finish, 1,000 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230 FINT).....	379.93	16.28
08 71 11 00-0246	EA	Bright Stainless Finish, 1,000 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230 FINT).....	393.38	16.28
08 71 11 00-0247	EA	Bright Brass Finish, 1,000 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230 FINT).....	393.38	16.28
08 71 11 00-0248	EA	Satin Bronze Finish, 1,000 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230 FINT).....	393.38	16.28
08 71 11 00-0249		1,750 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0224)</small>		
08 71 11 00-0250	EA	Painted Finish, 1,750 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237 FINT).....	329.52	16.28
08 71 11 00-0251	EA	Satin Stainless Finish, 1,750 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237 FINT).....	379.93	16.28
08 71 11 00-0252	EA	Bright Stainless Finish, 1,750 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237 FINT).....	393.38	16.28
08 71 11 00-0253	EA	Bright Brass Finish, 1,750 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237 FINT).....	393.38	16.28
08 71 11 00-0254	EA	Satin Bronze Finish, 1,750 LB Max Door Weight, Intermediate Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237 FINT).....	393.38	16.28
08 71 11 00-0255		Bottom Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0192)</small>		
08 71 11 00-0256		500 LB Max Door Weight, Bottom Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0255)</small>		
08 71 11 00-0257	EA	Painted Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F BTM).....	329.70	13.57
08 71 11 00-0258	EA	Satin Stainless Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F BTM).....	409.25	13.57
08 71 11 00-0259	EA	Bright Stainless Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F BTM).....	439.50	13.57
08 71 11 00-0260	EA	Bright Brass Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F BTM).....	439.50	13.57
08 71 11 00-0261	EA	Satin Bronze Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7215F BTM).....	439.50	13.57
08 71 11 00-0262		600 LB Max Door Weight, Bottom Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0255)</small>		
08 71 11 00-0263	EA	Painted Finish, 600 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F BTM).....	324.09	13.57
08 71 11 00-0264	EA	Satin Stainless Finish, 600 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F BTM).....	344.25	13.57
08 71 11 00-0265	EA	Bright Stainless Finish, 600 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F BTM).....	395.81	13.57
08 71 11 00-0266	EA	Bright Brass Finish, 600 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F BTM).....	395.81	13.57
08 71 11 00-0267	EA	Satin Bronze Finish, 600 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7226F BTM).....	395.81	13.57
08 71 11 00-0268		1,000 LB Max Door Weight, Bottom Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0255)</small>		
08 71 11 00-0269	EA	Painted Finish, 1,000 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F BTM).....	372.09	16.28
08 71 11 00-0270	EA	Satin Stainless Finish, 1,000 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F BTM).....	414.68	16.28
08 71 11 00-0271	EA	Bright Stainless Finish, 1,000 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F BTM).....	430.36	16.28
08 71 11 00-0272	EA	Bright Brass Finish, 1,000 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F BTM).....	430.36	16.28
08 71 11 00-0273	EA	Satin Bronze Finish, 1,000 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7230F BTM).....	430.36	16.28
08 71 11 00-0274		1,750 LB Max Door Weight, Bottom Mount, Fire Rated, 3/4" Offset Pivot Hinges <small>(08 71 11 00-0255)</small>		
08 71 11 00-0275	EA	Painted Finish, 1,750 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F BTM).....	530.10	16.28
08 71 11 00-0276	EA	Satin Stainless Finish, 1,750 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F BTM).....	565.96	16.28
08 71 11 00-0277	EA	Bright Stainless Finish, 1,750 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F BTM).....	580.53	16.28

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0278	EA	Bright Brass Finish, 1,750 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F BTM).....	580.53	16.28
08 71 11 00-0279	EA	Satin Bronze Finish, 1,750 LB Max Door Weight, Bottom Jamb Mount, Fire Rated, 3/4" Offset Pivot Hinge (Ives 7237F BTM).....	580.53	16.28
08 71 11 00-0280		1-1/2" Offset Pivot Hinges (08 71 11 00-0062)		
08 71 11 00-0281		Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0280)		
08 71 11 00-0282		Top Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0281)		
08 71 11 00-0283		400 LB Max Door Weight, Top Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0282)		
08 71 11 00-0284	EA	Painted Finish, 400 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 Top).....	338.64	13.57
08 71 11 00-0285	EA	Satin Stainless Finish, 400 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 Top).....	366.66	13.57
08 71 11 00-0286	EA	Bright Stainless Finish, 400 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 Top).....	387.95	13.57
08 71 11 00-0287	EA	Bright Bronze Finish, 400 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 Top).....	387.95	13.57
08 71 11 00-0288	EA	Satin Bronze Finish, 400 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 Top).....	387.95	13.57
08 71 11 00-0289		500 LB Max Door Weight, Top Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0282)		
08 71 11 00-0290	EA	Painted Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 Top).....	338.64	13.57
08 71 11 00-0291	EA	Satin Stainless Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 Top).....	366.66	13.57
08 71 11 00-0292	EA	Bright Stainless Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 Top).....	387.95	13.57
08 71 11 00-0293	EA	Bright Bronze Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 Top).....	387.95	13.57
08 71 11 00-0294	EA	Satin Bronze Finish, 500 LB Max Door Weight, Top Header Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 Top).....	387.95	13.57
08 71 11 00-0295		Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0281)		
08 71 11 00-0296		400 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0295)		
08 71 11 00-0297	EA	Painted Finish, 400 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 FINT).....	352.09	13.57
08 71 11 00-0298	EA	Satin Stainless Finish, 400 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 FINT).....	395.81	13.57
08 71 11 00-0299	EA	Bright Stainless Finish, 400 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 FINT).....	417.09	13.57
08 71 11 00-0300	EA	Bright Brass Finish, 400 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 FINT).....	417.09	13.57
08 71 11 00-0301	EA	Satin Bronze Finish, 400 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 FINT).....	417.09	13.57
08 71 11 00-0302		500 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0295)		
08 71 11 00-0303	EA	Painted Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 FINT).....	352.09	13.57
08 71 11 00-0304	EA	Satin Stainless Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 FINT).....	395.81	13.57
08 71 11 00-0305	EA	Bright Stainless Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 FINT).....	417.09	13.57
08 71 11 00-0306	EA	Bright Brass Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 FINT).....	417.09	13.57
08 71 11 00-0307	EA	Satin Bronze Finish, 500 LB Max Door Weight, Intermediate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 FINT).....	417.09	13.57
08 71 11 00-0308		Bottom Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0281)		
08 71 11 00-0309		400 LB Max Door Weight, Bottom Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0308)		
08 71 11 00-0310	EA	Painted Finish, 400 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 BTM).....	344.25	13.57
08 71 11 00-0311	EA	Satin Stainless Finish, 400 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 BTM).....	395.81	13.57
08 71 11 00-0312	EA	Bright Stainless Finish, 400 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 BTM).....	417.09	13.57
08 71 11 00-0313	EA	Bright Brass Finish, 400 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 BTM).....	417.09	13.57



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-0314	EA	Satin Bronze Finish, 400 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7244 BTM).....		417.09	13.57
08 71 11 00-0315		500 LB Max Door Weight, Bottom Mount, Fire Rated, 1-1/2" Offset Pivot Hinges (08 71 11 00-0308)			
08 71 11 00-0316	EA	Painted Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 BTM).....		560.53	13.57
08 71 11 00-0317	EA	Satin Stainless Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 BTM).....		618.80	13.57
08 71 11 00-0318	EA	Bright Stainless Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 BTM).....		633.38	13.57
08 71 11 00-0319	EA	Bright Brass Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 BTM).....		633.38	13.57
08 71 11 00-0320	EA	Satin Bronze Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Fire Rated, 1-1/2" Offset Pivot Hinge (Ives 7245 BTM).....		633.38	13.57
08 71 11 00-0321		Center Hung Pivot Hinges (08 71 11 00-0059)			
08 71 11 00-0322		Top Mount, Center Hung Pivot Hinges (08 71 11 00-0321)			
08 71 11 00-0323		300 LB Max Door Weight, Top Mount, Center Hung Pivot Hinges (08 71 11 00-0322)			
08 71 11 00-0324	EA	Painted Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		174.10	10.85
08 71 11 00-0325	EA	Satin Chrome Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		188.68	10.85
08 71 11 00-0326	EA	Bright Brass Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		188.68	10.85
08 71 11 00-0327	EA	Satin Brass Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		188.68	10.85
08 71 11 00-0328	EA	Satin Bronze Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		188.68	10.85
08 71 11 00-0329	EA	Dark Bronze Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		188.68	10.85
08 71 11 00-0330	EA	Bright Chrome Finish, 300 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7253 Top).....		188.68	10.85
08 71 11 00-0331		500 LB Max Door Weight, Top Mount, Center Hung Pivot Hinges (08 71 11 00-0322)			
08 71 11 00-0332	EA	Painted Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		179.52	13.57
08 71 11 00-0333	EA	Satin Chrome Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		194.10	13.57
08 71 11 00-0334	EA	Bright Brass Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		194.10	13.57
08 71 11 00-0335	EA	Satin Brass Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		194.10	13.57
08 71 11 00-0336	EA	Satin Bronze Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		194.10	13.57
08 71 11 00-0337	EA	Dark Bronze Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		194.10	13.57
08 71 11 00-0338	EA	Bright Chrome Finish, 500 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7255 Top).....		194.10	13.57
08 71 11 00-0339		600 LB Max Door Weight, Top Mount, Center Hung Pivot Hinges (08 71 11 00-0322)			
08 71 11 00-0340	EA	Painted Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		179.52	13.57
08 71 11 00-0341	EA	Satin Chrome Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		194.10	13.57
08 71 11 00-0342	EA	Bright Brass Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		194.10	13.57
08 71 11 00-0343	EA	Satin Brass Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		194.10	13.57
08 71 11 00-0344	EA	Satin Bronze Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		194.10	13.57
08 71 11 00-0345	EA	Dark Bronze Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		194.10	13.57
08 71 11 00-0346	EA	Bright Chrome Finish, 600 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7256 Top).....		194.10	13.57
08 71 11 00-0347		1,000 LB Max Door Weight, Top Mount, Center Hung Pivot Hinges (08 71 11 00-0322)			
08 71 11 00-0348	EA	Painted Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		285.80	16.28
08 71 11 00-0349	EA	Satin Chrome Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		335.13	16.28
08 71 11 00-0350	EA	Bright Brass Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		386.66	16.28
08 71 11 00-0351	EA	Satin Brass Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		386.66	16.28
08 71 11 00-0352	EA	Satin Bronze Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		386.66	16.28
08 71 11 00-0353	EA	Dark Bronze Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		386.66	16.28
08 71 11 00-0354	EA	Bright Chrome Finish, 1,000 LB Max Door Weight, Top Header Mount, Center Hung Pivot Hinge (Ives 7259 Top).....		386.66	16.28
08 71 11 00-0355		Bottom Mount, Center Hung Pivot Hinges (08 71 11 00-0321)			
08 71 11 00-0356		300 LB Max Door Weight, Bottom Mount, Center Hung Pivot Hinges (08 71 11 00-0355)			
08 71 11 00-0357	EA	Painted Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		131.51	10.85
08 71 11 00-0358	EA	Satin Chrome Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		152.82	10.85
08 71 11 00-0359	EA	Bright Brass Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		174.10	10.85
08 71 11 00-0360	EA	Satin Brass Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		174.10	10.85
08 71 11 00-0361	EA	Satin Bronze Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		174.10	10.85
08 71 11 00-0362	EA	Dark Bronze Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		174.10	10.85
08 71 11 00-0363	EA	Bright Chrome Finish, 300 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7253 BTM).....		174.10	10.85

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 71 11 00-0364			500 LB Max Door Weight, Bottom Mount, 3/4" Offset Pivot Hinges (08 71 11 00-0355)		
08 71 11 00-0365	EA		Painted Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	194.10	13.57
08 71 11 00-0366	EA		Satin Chrome Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	200.81	13.57
08 71 11 00-0367	EA		Bright Brass Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	200.81	13.57
08 71 11 00-0368	EA		Satin Brass Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	200.81	13.57
08 71 11 00-0369	EA		Satin Bronze Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	200.81	13.57
08 71 11 00-0370	EA		Dark Bronze Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	200.81	13.57
08 71 11 00-0371	EA		Bright Chrome Finish, 500 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7255 BTM)	200.81	13.57
08 71 11 00-0372	EA		Painted Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	194.10	13.57
08 71 11 00-0373	EA		Satin Chrome Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	200.81	13.57
08 71 11 00-0374	EA		Bright Brass Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	200.81	13.57
08 71 11 00-0375	EA		Satin Brass Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	200.81	13.57
08 71 11 00-0376	EA		Satin Bronze Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	200.81	13.57
08 71 11 00-0377	EA		Dark Bronze Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	200.81	13.57
08 71 11 00-0378	EA		Bright Chrome Finish, 500 LB Max Door Weight, Bottom Jamb Mount, Center Hung Pivot Hinge (Ives 7255 JBTM)	200.81	13.57

08 71 11 00-0379			600 LB Max Door Weight, Bottom Mount, Center Hung Pivot Hinges (08 71 11 00-0355)		
08 71 11 00-0380	EA		Painted Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	395.81	13.57
08 71 11 00-0381	EA		Satin Chrome Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	417.09	13.57
08 71 11 00-0382	EA		Bright Brass Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	439.50	13.57
08 71 11 00-0383	EA		Satin Brass Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	439.50	13.57
08 71 11 00-0384	EA		Satin Bronze Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	439.50	13.57
08 71 11 00-0385	EA		Dark Bronze Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	439.50	13.57
08 71 11 00-0386	EA		Bright Chrome Finish, 600 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7256 BTM)	439.50	13.57

08 71 11 00-0387			1,000 LB Max Door Weight, Bottom Mount, Center Hung Pivot Hinges (08 71 11 00-0355)		
08 71 11 00-0388	EA		Painted Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	731.81	16.28
08 71 11 00-0389	EA		Satin Chrome Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	753.10	16.28
08 71 11 00-0390	EA		Bright Brass Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	782.24	16.28
08 71 11 00-0391	EA		Satin Brass Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	782.24	16.28
08 71 11 00-0392	EA		Satin Bronze Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	782.24	16.28
08 71 11 00-0393	EA		Dark Bronze Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	782.24	16.28
08 71 11 00-0394	EA		Bright Chrome Finish, 1,000 LB Max Door Weight, Bottom Base Plate Mount, Center Hung Pivot Hinge (Ives 7259 BTM)	782.24	16.28

08 71 11 00-0395			Continuous Barrel-Type Hinge (08 71 11 00-0001)		
08 71 11 00-0396	LF		1-1/2" Wide, Steel, Continuous Barrel-Type Hinge	29.18	4.34
			<i>For Stainless Steel, Add</i>	6.50	
			<i>For Brass Or Nickel, Add</i>	7.09	
			<i>For Aluminum, Add</i>	2.32	
			<i>For Medium Gauge, Deduct</i>	-2.36	
08 71 11 00-0397	LF		2" Wide, Steel, Continuous Barrel-Type Hinge	29.97	4.34
			<i>For Stainless Steel, Add</i>	6.94	
			<i>For Brass Or Nickel, Add</i>	7.57	
			<i>For Aluminum, Add</i>	2.47	
			<i>For Medium Gauge, Deduct</i>	-2.52	
08 71 11 00-0398	LF		2-1/2" Wide, Steel, Continuous Barrel-Type Hinge	31.54	4.34
			<i>For Stainless Steel, Add</i>	7.80	
			<i>For Brass Or Nickel, Add</i>	8.51	
			<i>For Aluminum, Add</i>	2.78	
			<i>For Medium Gauge, Deduct</i>	-2.84	
08 71 11 00-0399	LF		3" Wide, Steel, Continuous Barrel-Type Hinge	33.33	4.34
			<i>For Stainless Steel, Add</i>	8.78	
			<i>For Brass Or Nickel, Add</i>	9.58	
			<i>For Aluminum, Add</i>	3.13	
			<i>For Medium Gauge, Deduct</i>	-3.19	

08 71 11 00-0400			Continuous Geared Hinges (08 71 11 00-0001)		
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Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0401	LF Half Surface, Aluminum Geared Continuous Hinge, Standard Duty (Roton 780-053)..... <i>For Bronze Finish, Add For Heavy Duty, Add</i>	60.15 16.05 11.43	4.34
08 71 11 00-0402	LF Full Surface, Aluminum Geared Continuous Hinge, Standard Duty (Roton 780-057)..... <i>For Bronze Finish, Add For Heavy Duty, Add</i>	65.15 17.92 12.77	4.34
08 71 11 00-0403	LF Concealed (Full Mortise), Aluminum Geared Continuous Hinge, Standard Duty (Roton 780-112)..... <i>For Bronze Finish, Add</i>	40.08 8.52	4.34
08 71 11 00-0404	LF Concealed (Full Mortise), Aluminum Geared Continuous Hinge, Heavy Duty (Roton 780-112HD)..... <i>For Bronze Finish, Add</i>	47.33 11.24	4.34
08 71 11 00-0405	Mortised, Primed Steel, Double Acting Spring Hinges (08 71 11 00-0001)		
08 71 11 00-0406	PR 2", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	175.45 32.99	7.59
08 71 11 00-0407	PR 3", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	186.35 33.00	9.77
08 71 11 00-0408	PR 4", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	204.70 34.81	11.93
08 71 11 00-0409	PR 5", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	271.17 48.15	14.11
08 71 11 00-0410	PR 6", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	302.36 53.04	16.28
08 71 11 00-0411	PR 7", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	365.95 65.70	18.44
08 71 11 00-0412	PR 8", Mortised, Primed Steel, Double Acting Spring Hinge <i>For Satin Brass, Add</i>	505.68 96.62	51.54
08 71 11 00-0413	Security Hinges (08 71 11 00-0001)		
08 71 11 00-0414	EA 4-1/2" x 4-1/2", Non-Removable Pin, Full Mortise, Ball Bearing, Steel Security Hinge.....	41.12	7.59
08 71 11 00-0415	Concealed Circuit Electric Hinge Option (08 71 11 00-0001) Note: Excludes the hinge. These tasks are used in conjunction with other hinges in the Construction Task Catalog® to electrify the hinge.		
08 71 11 00-0416	EA 4 Wire Concealed Circuit Electric Hinge Option.....	306.58	
08 71 11 00-0417	EA 6 Wire Concealed Circuit Electric Hinge Option.....	361.97	
08 71 11 00-0418	EA 8 Wire Concealed Circuit Electric Hinge Option.....	417.36	
08 71 11 00-0419	Hinge Filler Plates For Door Frames (08 71 11 00-0001)		
08 71 11 00-0420	PR Hinge Filler Plates For Door Frames	20.88	5.43
08 71 11 00-0421	Door Trim (08 71 11)		
08 71 11 00-0422	Floor Stops, Wall Stops And Bumpers (08 71 11 00-0421)		
08 71 11 00-0423	Floor Stops (08 71 11 00-0422)		
08 71 11 00-0424	Aluminum Floor Stops (08 71 11 00-0423)		
08 71 11 00-0425	EA 1-5/16" Overall Height, Satin Aluminum Finish, Aluminum Floor Stop (Ives FS430)	30.90	13.57
08 71 11 00-0426	EA 1" Overall Height, 3/16" Base Height, Satin Aluminum Finish, Aluminum Dome Floor Stop (Ives FS436)	34.65	13.57
08 71 11 00-0427	EA 1-3/8" Overall Height, 9/16" Base Height, Satin Aluminum Finish, Aluminum Dome Floor Stop (Ives FS438)	36.08	13.57
08 71 11 00-0428	EA 2-1/8" Overall Height, Satin Aluminum Finish, Aluminum Floor Stop (Ives FS441)	57.87	13.57
08 71 11 00-0429	EA 3" Overall Height, Satin Aluminum Finish, Aluminum Floor Stop (Ives FS444/448)	60.47	13.57
08 71 11 00-0430	Brass Floor Stops (08 71 11 00-0423)		
08 71 11 00-0431	EA 1" Overall Height, 3/16" Base Height, Satin Chrome Finish, Brass Dome Floor Stop (Ives FS436)	35.17	13.57
08 71 11 00-0432	EA 1" Overall Height, 3/16" Base Height, Satin Brass Finish, Brass Dome Floor Stop (Ives FS436)	36.61	13.57
08 71 11 00-0433	EA 1" Overall Height, 3/16" Base Height, Bright Brass Finish, Brass Dome Floor Stop (Ives FS436)	36.61	13.57
08 71 11 00-0434	EA 1" Overall Height, 3/16" Base Height, Bright Chrome Finish, Brass Dome Floor Stop (Ives FS436)	37.16	13.57
08 71 11 00-0435	EA 1" Overall Height, 3/16" Base Height, Satin Bronze Finish, Brass Dome Floor Stop (Ives FS436)	37.90	13.57
08 71 11 00-0436	EA 1" Overall Height, 3/16" Base Height, Dark Bronze Finish, Brass Dome Floor Stop (Ives FS436)	37.90	13.57
08 71 11 00-0437	EA 1" Overall Height, 3/16" Base Height, Satin Nickel Finish, Brass Dome Floor Stop (Ives FS436)	37.90	13.57
08 71 11 00-0438	EA 1-3/8" Overall Height, 9/16" Base Height, Satin Chrome Finish, Brass Dome Floor Stop (Ives FS438)	36.08	13.57
08 71 11 00-0439	EA 1-3/8" Overall Height, 9/16" Base Height, Satin Brass Finish, Brass Dome Floor Stop (Ives FS438)	38.25	13.57
08 71 11 00-0440	EA 1-3/8" Overall Height, 9/16" Base Height, Bright Brass Finish, Brass Dome Floor Stop (Ives FS438)	38.25	13.57
08 71 11 00-0441	EA 1-3/8" Overall Height, 9/16" Base Height, Bright Chrome Finish, Brass Dome Floor Stop (Ives FS438)	39.10	13.57
08 71 11 00-0442	EA 1-3/8" Overall Height, 9/16" Base Height, Satin Bronze Finish, Brass Dome Floor Stop (Ives FS438)	39.83	13.57
08 71 11 00-0443	EA 1-3/8" Overall Height, 9/16" Base Height, Dark Bronze Finish, Brass Dome Floor Stop (Ives FS438)	39.83	13.57
08 71 11 00-0444	EA 1-3/8" Overall Height, 9/16" Base Height, Satin Nickel Finish, Brass Dome Floor Stop (Ives FS438)	43.25	13.57
08 71 11 00-0445	EA 1" Overall Height, 5/32" Base Height, Satin Chrome Finish, Brass Dome Floor Stop (Ives FS13)	38.39	13.57
08 71 11 00-0446	EA 1" Overall Height, 5/32" Base Height, Bright Brass Finish, Brass Dome Floor Stop (Ives FS13)	38.39	13.57
08 71 11 00-0447	EA 1" Overall Height, 5/32" Base Height, Bright Chrome Finish, Brass Dome Floor Stop (Ives FS13)	40.76	13.57
08 71 11 00-0448	EA 1" Overall Height, 5/32" Base Height, Satin Brass Finish, Brass Dome Floor Stop (Ives FS13)	40.76	13.57
08 71 11 00-0449	EA 1" Overall Height, 5/32" Base Height, Satin Bronze Finish, Brass Dome Floor Stop (Ives FS13)	40.76	13.57
08 71 11 00-0450	EA 1" Overall Height, 5/32" Base Height, Dark Bronze Finish, Brass Dome Floor Stop (Ives FS13)	40.76	13.57
08 71 11 00-0451	EA 1-11/32" Overall Height, 1/2" Base Height, Satin Chrome Finish, Brass Dome Floor Stop (Ives FS17)	40.03	13.57
08 71 11 00-0452	EA 1-11/32" Overall Height, 1/2" Base Height, Bright Brass Finish, Brass Dome Floor Stop (Ives FS17)	40.03	13.57

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-0453	EA	1-11/32" Overall Height, 1/2" Base Height, Bright Chrome Finish, Brass Dome Floor Stop (Ives FS17).....	42.35	13.57
08 71 11 00-0454	EA	1-11/32" Overall Height, 1/2" Base Height, Satin Brass Finish, Brass Dome Floor Stop (Ives FS17).....	42.35	13.57
08 71 11 00-0455	EA	1-11/32" Overall Height, 1/2" Base Height, Satin Bronze Finish, Brass Dome Floor Stop (Ives FS17).....	42.35	13.57
08 71 11 00-0456	EA	1-11/32" Overall Height, 1/2" Base Height, Dark Bronze Finish, Brass Dome Floor Stop (Ives FS17).....	42.35	13.57
08 71 11 00-0457	EA	2-1/8" Overall Height, Satin Chrome Finish, Brass Floor Stop (Ives FS441).....	59.97	13.57
08 71 11 00-0458	EA	2-1/8" Overall Height, Bright Brass Finish, Brass Floor Stop (Ives FS441).....	61.00	13.57
08 71 11 00-0459	EA	2-1/8" Overall Height, Dark Bronze Finish, Brass Floor Stop (Ives FS441).....	63.49	13.57
08 71 11 00-0460	EA	2-1/8" Overall Height, Satin Brass Finish, Brass Floor Stop (Ives FS441).....	65.51	13.57
08 71 11 00-0461	EA	2-1/8" Overall Height, Satin Bronze Finish, Brass Floor Stop (Ives FS441).....	65.51	13.57
08 71 11 00-0462	EA	2-1/8" Overall Height, Bright Chrome Finish, Brass Floor Stop (Ives FS441).....	73.74	13.57
08 71 11 00-0463	EA	2-1/8" Overall Height, Satin Nickel Finish, Brass Floor Stop (Ives FS441).....	73.74	13.57
08 71 11 00-0464	EA	3" Overall Height, Dark Bronze Finish, Brass Floor Stop (Ives FS444/448).....	70.69	13.57
08 71 11 00-0465	EA	3" Overall Height, Satin Chrome Finish, Brass Floor Stop (Ives FS444/448).....	72.15	13.57
08 71 11 00-0466	EA	3" Overall Height, Satin Brass Finish, Brass Floor Stop (Ives FS444/448).....	72.15	13.57
08 71 11 00-0467	EA	3" Overall Height, Bright Brass Finish, Brass Floor Stop (Ives FS444/448).....	72.15	13.57
08 71 11 00-0468	EA	3" Overall Height, Satin Bronze Finish, Brass Floor Stop (Ives FS444/448).....	72.15	13.57
08 71 11 00-0469	EA	3" Overall Height, Bright Chrome Finish, Brass Floor Stop (Ives FS444/448).....	83.43	13.57
08 71 11 00-0470	EA	3" Overall Height, Satin Nickel Finish, Brass Floor Stop (Ives FS444/448).....	83.43	13.57
08 71 11 00-0471	EA	1-5/16" Overall Height, Satin Brass Finish, Brass Floor Stop (Ives FS430).....	47.70	13.57
08 71 11 00-0472	EA	1-5/16" Overall Height, Bright Brass Finish, Brass Floor Stop (Ives FS430).....	49.58	13.57
08 71 11 00-0473	EA	1-5/16" Overall Height, Satin Chrome Finish, Brass Floor Stop (Ives FS430).....	53.82	13.57
08 71 11 00-0474	EA	1-5/16" Overall Height, Bright Chrome Finish, Brass Floor Stop (Ives FS430).....	53.82	13.57
08 71 11 00-0475	EA	1-5/16" Overall Height, Dark Bronze Finish, Brass Floor Stop (Ives FS430).....	53.82	13.57
08 71 11 00-0476	EA	1-5/16" Overall Height, Satin Nickel Finish, Brass Floor Stop (Ives FS430).....	55.08	13.57

08 71 11 00-0477 Steel Floor Stops (08 71 11 00-0423)

08 71 11 00-0478	EA	2-5/8" Overall Height, Zinc Plated Finish, Wrought Steel Floor Stop (Ives FS434).....	40.38	13.57
08 71 11 00-0479	EA	1-1/2" Overall Height, Grout In, Molded Rubber Security Floor Stop (Ives FS18S)..... Note: Includes drilling, Excludes Grout.	110.13	13.57
08 71 11 00-0480	EA	3-1/2" Overall Height, Grout In, Molded Rubber Security Floor Stop (Ives FS18L)..... Note: Includes drilling, Excludes Grout.	116.08	13.57

08 71 11 00-0481 Wall Stops (08 71 11 00-0422)**08 71 11 00-0482 Aluminum Wall Stops** (08 71 11 00-0481)

08 71 11 00-0483	EA	3-3/4" Projection, Rigid Type, Satin Aluminum Finish, Aluminum Wall Stop (Ives WS65).....	23.31	8.14
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08 71 11 00-0484 Brass Wall Stops (08 71 11 00-0481)

08 71 11 00-0485	EA	3-3/4" Projection, Residential Rigid Type, Satin Chrome Finish, Brass Wall Stop (Ives 60).....	28.80	5.43
08 71 11 00-0486	EA	3-3/4" Projection, Residential Rigid Type, Satin Brass Finish, Brass Wall Stop (Ives 60).....	28.80	5.43
08 71 11 00-0487	EA	3-3/4" Projection, Residential Rigid Type, Bright Brass Finish, Brass Wall Stop (Ives 60).....	28.80	5.43
08 71 11 00-0488	EA	3-3/4" Projection, Residential Rigid Type, Satin Nickel Finish, Brass Wall Stop (Ives 60).....	34.36	5.43
08 71 11 00-0489	EA	3-3/4" Projection, Residential Rigid Type, Bright Chrome Finish, Brass Wall Stop (Ives 60).....	34.89	5.43
08 71 11 00-0490	EA	3-3/4" Projection, Residential Rigid Type, Satin Bronze Finish, Brass Wall Stop (Ives 60).....	34.89	5.43
08 71 11 00-0491	EA	3-3/4" Projection, Residential Rigid Type, Dark Bronze Finish, Brass Wall Stop (Ives 60).....	34.89	5.43
08 71 11 00-0492	EA	3-3/4" Projection, Rigid Type, Satin Chrome Finish, Brass Wall Stop (Ives WS11).....	82.63	8.14
08 71 11 00-0493	EA	3-3/4" Projection, Rigid Type, Dark Bronze Finish, Brass Wall Stop (Ives WS11).....	84.59	8.14
08 71 11 00-0494	EA	3-3/4" Projection, Rigid Type, Bright Brass Finish, Brass Wall Stop (Ives WS11).....	84.59	8.14
08 71 11 00-0495	EA	3-3/4" Projection, Rigid Type, Satin Bronze Finish, Brass Wall Stop (Ives WS11).....	84.59	8.14
08 71 11 00-0496	EA	3-3/4" Projection, Rigid Type, Bright Chrome Finish, Brass Wall Stop (Ives WS11).....	84.59	8.14
08 71 11 00-0497	EA	3-3/4" Projection, Rigid Type, Satin Brass Finish, Brass Wall Stop (Ives WS11).....	84.59	8.14
08 71 11 00-0498	EA	3-3/4" Projection, Rigid Type, Bright Brass Finish, Brass Wall Stop (Ives WS443/447).....	68.81	8.14
08 71 11 00-0499	EA	3-3/4" Projection, Rigid Type, Satin Bronze Finish, Brass Wall Stop (Ives WS443/447).....	79.41	8.14
08 71 11 00-0500	EA	3-3/4" Projection, Rigid Type, Bright Chrome Finish, Brass Wall Stop (Ives WS443/447).....	79.41	8.14
08 71 11 00-0501	EA	3-3/4" Projection, Rigid Type, Dark Bronze Finish, Brass Wall Stop (Ives WS443/447).....	79.41	8.14
08 71 11 00-0502	EA	3-3/4" Projection, Rigid Type, Satin Chrome Finish, Brass Wall Stop (Ives WS443/447).....	79.41	8.14
08 71 11 00-0503	EA	3-3/4" Projection, Rigid Type, Satin Brass Finish, Brass Wall Stop (Ives WS443/447).....	81.93	8.14
08 71 11 00-0504	EA	3-3/4" Projection, Rigid Type, Satin Nickel Finish, Brass Wall Stop (Ives WS443/447).....	81.93	8.14
08 71 11 00-0505	EA	3-3/4" Projection, Rigid Type, Satin Chrome Finish, Brass Wall Stop (Ives WS33).....	134.28	8.14

08 71 11 00-0506 Steel Wall Stops (08 71 11 00-0481)

08 71 11 00-0507	EA	3" Projection, Residential Spring Type, Bright Brass Finish, Steel Wall Stop (Ives 63).....	11.93	5.43
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08 71 11 00-0508 Hinge Pin Door Stops (08 71 11 00-0422)**08 71 11 00-0509 Aluminum Hinge Pin Door Stops** (08 71 11 00-0508)

08 71 11 00-0510	EA	Satin Aluminum Finish, Aluminum Hinge Pin Door Stop (Ives 70).....	24.92	10.85
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08 71 11 00-0511 Brass Hinge Pin Door Stops (08 71 11 00-0508)

08 71 11 00-0512	EA	Satin Brass Finish, Brass Hinge Pin Door Stop (Ives 73).....	29.40	10.85
08 71 11 00-0513	EA	Satin Chrome Finish, Brass Hinge Pin Door Stop (Ives 70).....	38.71	10.85
08 71 11 00-0514	EA	Satin Brass Finish, Brass Hinge Pin Door Stop (Ives 70).....	38.71	10.85
08 71 11 00-0515	EA	Bright Brass Finish, Brass Hinge Pin Door Stop (Ives 70).....	38.71	10.85
08 71 11 00-0516	EA	Bright Chrome Finish, Brass Hinge Pin Door Stop (Ives 70).....	43.08	10.85
08 71 11 00-0517	EA	Satin Bronze Finish, Brass Hinge Pin Door Stop (Ives 70).....	43.08	10.85



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-0518	EA	Dark Bronze Finish, Brass Hinge Pin Door Stop (Ives 70).....		43.08	10.85
08 71 11 00-0519	EA	Satin Nickel Finish, Brass Hinge Pin Door Stop (Ives 70).....		43.08	10.85
08 71 11 00-0520		Wall Bumpers (08 71 11 00-0422)			
08 71 11 00-0521		Brass Wall Bumpers (08 71 11 00-0520)			
08 71 11 00-0522	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Chrome Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.21	13.57
08 71 11 00-0523	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Brass Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.21	13.57
08 71 11 00-0524	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Bright Brass Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.21	13.57
08 71 11 00-0525	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Bright Chrome Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.74	13.57
08 71 11 00-0526	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Bronze Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.74	13.57
08 71 11 00-0527	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Dark Bronze Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.74	13.57
08 71 11 00-0528	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Nickel Finish, Wrought Brass Wall Bumper (Ives WS406/407).....		33.74	13.57
08 71 11 00-0529	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Bright Brass Finish, Cast Brass Wall Bumper (Ives WS401/402).....		51.66	13.57
08 71 11 00-0530	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Chrome Finish, Cast Brass Wall Bumper (Ives WS401/402).....		56.52	13.57
08 71 11 00-0531	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Bright Chrome Finish, Cast Brass Wall Bumper (Ives WS401/402).....		56.52	13.57
08 71 11 00-0532	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Brass Finish, Cast Brass Wall Bumper (Ives WS401/402).....		56.52	13.57
08 71 11 00-0533	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Bronze Finish, Cast Brass Wall Bumper (Ives WS401/402).....		56.52	13.57
08 71 11 00-0534	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Dark Bronze Finish, Cast Brass Wall Bumper (Ives WS401/402).....		56.52	13.57
08 71 11 00-0535	EA	2-1/2" Base Diameter, Convex Or Concave Rubber Insert, Satin Nickel Finish, Cast Brass Wall Bumper (Ives WS401/402).....		57.60	13.57
08 71 11 00-0536		Rubber Wall Bumpers (08 71 11 00-0520)			
08 71 11 00-0537	EA	1-7/8" Base Diameter, Adhesive-Backed, Concave Rubber Wall Bumper (Ives WS411R-W).....		31.28	13.57
08 71 11 00-0538		Holders (08 71 11 00-0421)			
08 71 11 00-0539		Plunger Type Door Holders (08 71 11 00-0538)			
08 71 11 00-0540		Aluminum Plunger Type Door Holders (08 71 11 00-0539)			
08 71 11 00-0541	EA	Satin Aluminum Finish, Aluminum Plunger Type Door Holder (Ives FS1153).....		87.46	8.14
08 71 11 00-0542		Brass Plunger Type Door Holders (08 71 11 00-0539)			
08 71 11 00-0543	EA	Satin Chrome Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0544	EA	Bright Chrome Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0545	EA	Satin Brass Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0546	EA	Bright Brass Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0547	EA	Satin Bronze Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0548	EA	Dark Bronze Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0549	EA	Satin Nickel Finish, Brass Plunger Type Door Holder (Ives FS1154).....		144.68	8.14
08 71 11 00-0550		Kick Down Door Holders (08 71 11 00-0538)			
08 71 11 00-0551		Aluminum Kick Down Door Holders (08 71 11 00-0550)			
08 71 11 00-0552	EA	Satin Aluminum Finish, Aluminum Kick Down Door Holder (Ives FS455).....		27.90	8.14
08 71 11 00-0553		Brass Kick Down Door Holders (08 71 11 00-0550)			
08 71 11 00-0554	EA	Satin Brass Finish, Brass Kick Down Door Holder (Ives FS455).....		63.48	8.14
08 71 11 00-0555	EA	Bright Brass Finish, Brass Kick Down Door Holder (Ives FS455).....		63.48	8.14
08 71 11 00-0556	EA	Satin Bronze Finish, Brass Kick Down Door Holder (Ives FS455).....		63.48	8.14
08 71 11 00-0557	EA	Satin Chrome Finish, Brass Kick Down Door Holder (Ives FS455).....		72.76	8.14
08 71 11 00-0558	EA	Bright Chrome Finish, Brass Kick Down Door Holder (Ives FS455).....		72.76	8.14
08 71 11 00-0559	EA	Dark Bronze Finish, Brass Kick Down Door Holder (Ives FS455).....		72.76	8.14
08 71 11 00-0560	EA	Satin Nickel Finish, Brass Kick Down Door Holder (Ives FS455).....		75.11	8.14
08 71 11 00-0561		Steel Kick Down Door Holders (08 71 11 00-0550)			
08 71 11 00-0562	EA	Steel Kick Down Door Holder (Ives FS544).....		35.08	8.14
08 71 11 00-0563		Floor Mounted Door Holders (08 71 11 00-0538)			
08 71 11 00-0564		Brass Floor Mounted Door Holders (08 71 11 00-0563)			

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR		TOTAL DIRECT DEMOLITION		
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0565	EA	Up To 1/2" Door To Floor Clearance, Satin Chrome Finish, Brass Floor Stop And Automatic Door Holder (Ives FS40).....	124.17	16.28
		<i>For >1/2" To 1-1/16" Door To Floor Clearance, Add</i>	1.78	
		<i>For >1-1/16" To 1-9/16" Door To Floor Clearance, Add</i>	10.53	
		<i>For >1-9/16" To 2-11/16" Door To Floor Clearance, Add</i>	15.80	
08 71 11 00-0566	EA	Up To 1/2" Door To Floor Clearance, Satin Brass Finish, Brass Floor Stop And Automatic Door Holder (Ives FS40).....	124.17	16.28
		<i>For >1/2" To 1-1/16" Door To Floor Clearance, Add</i>	1.78	
		<i>For >1-1/16" To 1-9/16" Door To Floor Clearance, Add</i>	10.53	
		<i>For >1-9/16" To 2-11/16" Door To Floor Clearance, Add</i>	15.80	
08 71 11 00-0567	EA	Up To 1/2" Door To Floor Clearance, Bright Chrome Finish, Brass Floor Stop And Automatic Door Holder (Ives FS40).....	155.00	16.28
		<i>For >1/2" To 1-1/16" Door To Floor Clearance, Add</i>	1.78	
		<i>For >1-1/16" To 1-9/16" Door To Floor Clearance, Add</i>	10.53	
		<i>For >1-9/16" To 2-11/16" Door To Floor Clearance, Add</i>	15.80	
08 71 11 00-0568	EA	Up To 1/2" Door To Floor Clearance, Bright Brass Finish, Brass Floor Stop And Automatic Door Holder (Ives FS40).....	155.00	16.28
		<i>For >1/2" To 1-1/16" Door To Floor Clearance, Add</i>	1.78	
		<i>For >1-1/16" To 1-9/16" Door To Floor Clearance, Add</i>	10.53	
		<i>For >1-9/16" To 2-11/16" Door To Floor Clearance, Add</i>	15.80	
08 71 11 00-0569	EA	Up To 1/2" Door To Floor Clearance, Satin Bronze Finish, Brass Floor Stop And Automatic Door Holder (Ives FS40).....	155.00	16.28
		<i>For >1/2" To 1-1/16" Door To Floor Clearance, Add</i>	1.78	
		<i>For >1-1/16" To 1-9/16" Door To Floor Clearance, Add</i>	10.53	
		<i>For >1-9/16" To 2-11/16" Door To Floor Clearance, Add</i>	15.80	
08 71 11 00-0570	EA	Up To 1/2" Door To Floor Clearance, Dark Bronze Finish, Brass Floor Stop And Automatic Door Holder (Ives FS40).....	155.00	16.28
		<i>For >1/2" To 1-1/16" Door To Floor Clearance, Add</i>	1.78	
		<i>For >1-1/16" To 1-9/16" Door To Floor Clearance, Add</i>	10.53	
		<i>For >1-9/16" To 2-11/16" Door To Floor Clearance, Add</i>	15.80	
08 71 11 00-0571		Wall Mounted Door Holders (08 71 11 00-0538)		
08 71 11 00-0572		Aluminum Wall Mounted Door Holders (08 71 11 00-0571)		
08 71 11 00-0573	EA	4" Projection, Rigid Type, Satin Aluminum Finish, Aluminum Wall Stop And Manual Door Holder (Ives WS20).....	111.68	9.50
08 71 11 00-0574	EA	Wall Mounted, Satin Aluminum Finish, Aluminum Automatic Door Holder (Ives WS40).....	163.11	16.28
08 71 11 00-0575		Brass Wall Mounted Door Holders (08 71 11 00-0571)		
08 71 11 00-0576	EA	3-11/16" Projection, Rigid Type, Bright Brass Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	102.34	9.50
08 71 11 00-0577	EA	3-11/16" Projection, Rigid Type, Satin Chrome Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	119.06	9.50
08 71 11 00-0578	EA	3-11/16" Projection, Rigid Type, Bright Chrome Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	119.06	9.50
08 71 11 00-0579	EA	3-11/16" Projection, Rigid Type, Satin Brass Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	119.06	9.50
08 71 11 00-0580	EA	3-11/16" Projection, Rigid Type, Satin Bronze Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	119.06	9.50
08 71 11 00-0581	EA	3-11/16" Projection, Rigid Type, Dark Bronze Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	119.06	9.50
08 71 11 00-0582	EA	3-11/16" Projection, Rigid Type, Satin Nickel Finish, Brass Wall Stop And Manual Door Holder (Ives WS445/449).....	122.99	9.50
08 71 11 00-0583	EA	4" Projection, Rigid Type, Satin Chrome Finish, Brass Wall Stop And Manual Door Holder (Ives WS20).....	116.34	9.50
08 71 11 00-0584	EA	4" Projection, Rigid Type, Bright Chrome Finish, Brass Wall Stop And Manual Door Holder (Ives WS20).....	139.15	9.50
08 71 11 00-0585	EA	4" Projection, Rigid Type, Satin Brass Finish, Brass Wall Stop And Manual Door Holder (Ives WS20).....	139.15	9.50
08 71 11 00-0586	EA	4" Projection, Rigid Type, Bright Brass Finish, Brass Wall Stop And Manual Door Holder (Ives WS20).....	139.15	9.50
08 71 11 00-0587	EA	4" Projection, Rigid Type, Satin Bronze Finish, Brass Wall Stop And Manual Door Holder (Ives WS20).....	139.15	9.50
08 71 11 00-0588	EA	4" Projection, Rigid Type, Dark Bronze Finish, Brass Wall Stop And Manual Door Holder (Ives WS20).....	139.15	9.50
08 71 11 00-0589	EA	Wall Mounted, Satin Chrome Finish, Brass Automatic Door Holder (Ives WS40).....	185.87	16.28
08 71 11 00-0590	EA	Wall Mounted, Bright Chrome Finish, Brass Automatic Door Holder (Ives WS40).....	196.11	16.28
08 71 11 00-0591	EA	Wall Mounted, Satin Brass Finish, Brass Automatic Door Holder (Ives WS40).....	196.11	16.28
08 71 11 00-0592	EA	Wall Mounted, Bright Brass Finish, Brass Automatic Door Holder (Ives WS40).....	196.11	16.28
08 71 11 00-0593	EA	Wall Mounted, Satin Bronze Finish, Brass Automatic Door Holder (Ives WS40).....	196.11	16.28
08 71 11 00-0594	EA	Wall Mounted, Dark Bronze Finish, Brass Automatic Door Holder (Ives WS40).....	196.11	16.28
08 71 11 00-0595		Overhead Door Holders (08 71 11 00-0538)		
08 71 11 00-0596		Surface Mounted, Overhead Door Holders (08 71 11 00-0595)		
08 71 11 00-0597	EA	Surface Mounted, Aluminum Finish, Overhead Door Holder/Stop Without Hold Open (Glynn Johnson 81).....	575.82	27.12
		<i>For Hold Open, Add</i>	67.43	
08 71 11 00-0598	EA	Surface Mounted, Dark Bronze Finish, Overhead Door Holder/Stop Without Hold Open (Glynn Johnson 81).....	661.91	27.12
		<i>For Hold Open, Add</i>	79.85	
08 71 11 00-0599	EA	Surface Mounted, Polished Brass Finish, Overhead Door Holder/Stop Without Hold Open (Glynn Johnson 81).....	661.91	27.12
		<i>For Hold Open, Add</i>	79.85	
08 71 11 00-0600	EA	Surface Mounted, Polished Chrome Finish, Overhead Door Holder/Stop Without Hold Open (Glynn Johnson 81).....	661.91	27.12
		<i>For Hold Open, Add</i>	79.85	
08 71 11 00-0601	EA	Surface Mounted, Stainless Steel Finish, Overhead Door Holder/Stop Without Hold Open (Glynn Johnson 81).....	658.98	27.12
		<i>For Hold Open, Add</i>	79.43	
08 71 11 00-0602		Heavy Duty, Surface Mounted, Overhead Door Holders (08 71 11 00-0595)		
		Note: With or without hold open feature.		
08 71 11 00-0603	EA	Heavy Duty, Surface Mounted, Aluminum Finish, Overhead Door Holder/Stop (Glynn Johnson 90).....	445.82	27.12
08 71 11 00-0604	EA	Heavy Duty, Surface Mounted, Stainless Steel Finish, Overhead Door Holder/Stop (Glynn Johnson 90).....	651.37	27.12
08 71 11 00-0605	EA	Heavy Duty, Surface Mounted, Dark Bronze Finish, Overhead Door Holder/Stop (Glynn Johnson 90).....	740.97	27.12



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-0606	EA		Heavy Duty, Surface Mounted, Polished Brass Finish, Overhead Door Holder/Stop (Glynn Johnson 90).....	740.97	27.12
08 71 11 00-0607	EA		Heavy Duty, Surface Mounted, Polished Chrome Finish, Overhead Door Holder/Stop (Glynn Johnson 90).....	740.97	27.12
08 71 11 00-0608			Concealed Mounted, Overhead Door Holders (08 71 11 00-0595) Note: With or without hold open feature.		
08 71 11 00-0609	EA		Concealed Mounted, Aluminum Finish, Overhead Door Holder/Stop (Glynn Johnson 100).....	629.70	27.12
08 71 11 00-0610	EA		Concealed Mounted, Stainless Steel Finish, Overhead Door Holder/Stop (Glynn Johnson 100).....	629.70	27.12
08 71 11 00-0611	EA		Concealed Mounted, Dark Bronze Finish, Overhead Door Holder/Stop (Glynn Johnson 100).....	664.84	27.12
08 71 11 00-0612	EA		Concealed Mounted, Polished Brass Finish, Overhead Door Holder/Stop (Glynn Johnson 100).....	694.71	27.12
08 71 11 00-0613	EA		Concealed Mounted, Polished Chrome Finish, Overhead Door Holder/Stop (Glynn Johnson 100).....	694.71	27.12
08 71 11 00-0614			Silencers (08 71 11 00-0421)		
08 71 11 00-0615	EA		Replacement Of Rubber Door Silencers.....	1.67	
			Note: For repair / maintenance only. This task is not to be used in conjunction with new door or frame installations.		
08 71 11 00-0616			Bolts (08 71 11 00-0421)		
08 71 11 00-0617			Brass Surface Bolts (08 71 11 00-0616)		
08 71 11 00-0618	EA		8" Length, Satin Chrome Finish, Brass Surface Bolt With Strike (Ives SB1640).....	189.45	13.57
08 71 11 00-0619	EA		8" Length, Bright Brass Finish, Brass Surface Bolt With Strike (Ives SB1640).....	202.98	13.57
08 71 11 00-0620	EA		8" Length, Dark Bronze Finish, Brass Surface Bolt With Strike (Ives SB1640).....	202.98	13.57
08 71 11 00-0621			Steel Surface Bolts (08 71 11 00-0616)		
08 71 11 00-0622	EA		8" Length, Zinc Plated Finish, Steel Surface Bolt With Strike (Ives SB453).....	84.63	13.57
08 71 11 00-0623	EA		8" Length, Bright Brass Finish, Steel Surface Bolt With Strike (Ives SB453).....	84.63	13.57
08 71 11 00-0624	EA		8" Length, Satin Brass Finish, Steel Surface Bolt With Strike (Ives SB453).....	84.63	13.57
08 71 11 00-0625	EA		8" Length, Satin Bronze Finish, Steel Surface Bolt With Strike (Ives SB453).....	96.46	13.57
08 71 11 00-0626	EA		8" Length, Satin Chrome Finish, Steel Surface Bolt With Strike (Ives SB453).....	98.16	13.57
08 71 11 00-0627	EA		8" Length, Dark Bronze Finish, Steel Surface Bolt With Strike (Ives SB453).....	101.52	13.57
08 71 11 00-0628	EA		12" Length, Zinc Plated Finish, Steel Surface Bolt With Strike (Ives SB453).....	99.82	13.57
08 71 11 00-0629	EA		12" Length, Satin Bronze Finish, Steel Surface Bolt With Strike (Ives SB453).....	104.92	13.57
08 71 11 00-0630	EA		12" Length, Dark Bronze Finish, Steel Surface Bolt With Strike (Ives SB453).....	111.68	13.57
08 71 11 00-0631	EA		12" Length, Satin Chrome Finish, Steel Surface Bolt With Strike (Ives SB453).....	116.75	13.57
08 71 11 00-0632	EA		12" Length, Zinc Plated Finish, Steel Surface Bolt With Strike (Ives SB360).....	184.39	13.57
08 71 11 00-0633			Door Viewer (08 71 11 00-0421)		
08 71 11 00-0634			Brass Door Viewer (08 71 11 00-0633)		
08 71 11 00-0635	EA		120 Degree Angle Of View, Satin Chrome Finish, Brass One-Way Door Viewer (Ives U700).....	43.25	13.57
08 71 11 00-0636	EA		120 Degree Angle Of View, Satin Brass Finish, Brass One-Way Door Viewer (Ives U700).....	43.25	13.57
08 71 11 00-0637	EA		120 Degree Angle Of View, Dark Bronze Finish, Brass One-Way Door Viewer (Ives U700).....	43.25	13.57
08 71 11 00-0638	EA		150 Degree Angle Of View, Satin Chrome Finish, Brass One-Way Door Viewer (Ives U696).....	50.81	13.57
08 71 11 00-0639	EA		150 Degree Angle Of View, Dark Bronze Finish, Brass One-Way Door Viewer (Ives U696).....	50.81	13.57
08 71 11 00-0640	EA		150 Degree Angle Of View, Satin Brass Finish, Brass One-Way Door Viewer (Ives U696).....	50.81	13.57
08 71 11 00-0641	EA		190 Degree Angle Of View, Satin Chrome Finish, Brass One-Way Wide Angle Door Viewer (Ives U698).....	60.12	13.57
08 71 11 00-0642	EA		190 Degree Angle Of View, Bright Brass Finish, Brass One-Way Wide Angle Door Viewer (Ives U698).....	60.12	13.57
08 71 11 00-0643			Door Knockers (08 71 11 00-0421)		
08 71 11 00-0644			Brass Door Knockers (08 71 11 00-0643)		
08 71 11 00-0645	EA		5-15/16" Length, 3" Width, Bright Brass Finish, Brass Door Knocker (Ives 3125).....	66.56	13.57
08 71 11 00-0646	EA		5-15/16" Length, 3" Width, Satin Chrome Finish, Brass Door Knocker (Ives 3125).....	73.74	13.57
08 71 11 00-0647	EA		5-15/16" Length, 3" Width, Bright Chrome Finish, Brass Door Knocker (Ives 3125).....	73.74	13.57
08 71 11 00-0648	EA		5-15/16" Length, 3" Width, Satin Nickel Finish, Brass Door Knocker (Ives 3125).....	73.74	13.57
08 71 11 00-0649	EA		8-1/2" Length, 4-1/8" Width, Bright Brass Finish, Brass Door Knocker (Ives 3107).....	100.97	13.57
08 71 11 00-0650	EA		8-1/2" Length, 4-1/8" Width, Satin Nickel Finish, Brass Door Knocker (Ives 3107).....	118.27	13.57
08 71 11 00-0651			Hasps (08 71 11 00-0421)		
08 71 11 00-0652	EA		3-1/4", Zinc Plated Finish, Steel Hasp Assembly.....	30.26	10.23
08 71 11 00-0653	EA		4-1/2", Zinc Plated Finish, Steel Hasp Assembly.....	32.27	10.85
08 71 11 00-0654	EA		6", Zinc Plated Finish, Steel Hasp Assembly.....	41.57	12.21
08 71 11 00-0655	EA		6", Zinc Plated Finish, Steel High Security Hasp Assembly.....	178.05	14.64
08 71 11 00-0656			Flush Bolts (08 71 11 00-0421)		
08 71 11 00-0657			Flush Bolts For Metal Doors (08 71 11 00-0656)		
08 71 11 00-0658			Brass Flush Bolts For Metal Doors (08 71 11 00-0657)		
08 71 11 00-0659			Manual, Brass Flush Bolts For Metal Doors (08 71 11 00-0658) Note: Includes brass construction with bright brass, satin brass, satin bronze, dark bronze, satin nickel, bright chrome or satin chrome finish.		
08 71 11 00-0660	EA		Top Or Bottom Bolt, Manual, Brass Flush Bolt For Metal Doors (Ives FB457/458).....	64.34	13.57

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 71 11 00-0661		
Automatic, Brass Flush Bolts For Metal Doors <small>(08 71 11 00-0658)</small>		
Note: Includes brass construction with bright brass, satin brass, satin bronze or dark bronze finish.		
08 71 11 00-0662	EA	Top Bolt Only, Automatic, Brass Flush Bolt For Metal Doors (Ives FB31T).....135.06
08 71 11 00-0663	EA	Bottom Bolt Only, Automatic, Brass Flush Bolt For Metal Doors (Ives FB31B).....135.06
08 71 11 00-0664	EA	Top And Bottom Bolt, Automatic, Brass Flush Bolt For Metal Doors (Ives FB31P) .....235.16
08 71 11 00-0665	EA	Top Bolt With Auxiliary Fire Latch, Automatic, Brass Flush Bolt For Metal Doors (Ives FB32) .....242.53
08 71 11 00-0666	EA	Top Bolt With Auxiliary Fire Latch And Retrofit Plate, Automatic, Brass Flush Bolt For Metal Doors (Ives FB33).....252.01

08 71 11 00-0667		
Constant Latching, Brass Flush Bolts For Metal Doors <small>(08 71 11 00-0658)</small>		
Note: Includes brass construction with bright brass, satin brass, satin bronze or dark bronze finish.		
08 71 11 00-0668	EA	Top Bolt Only, Constant Latching, Brass Flush Bolt For Metal Doors (Ives FB51T) .....160.55
08 71 11 00-0669	EA	Top And Bottom Bolt, Constant Latching, Brass Flush Bolt For Metal Doors (Ives FB51P).....299.08
08 71 11 00-0670	EA	Top Bolt With Auxiliary Fire Latch, Constant Latching, Brass Flush Bolt For Metal Doors (Ives FB52) .....293.66
08 71 11 00-0671	EA	Top Bolt With Auxiliary Fire Latch And Retrofit Plate, Constant Latching, Brass Flush Bolt For Metal Doors (Ives FB53).....304.83

08 71 11 00-0672		
Stainless Steel Flush Bolts For Metal Doors <small>(08 71 11 00-0657)</small>		
08 71 11 00-0673		
Automatic, Stainless Steel Flush Bolts For Metal Doors <small>(08 71 11 00-0672)</small>		
Note: Includes stainless steel construction with bright or satin finish.		
08 71 11 00-0674	EA	Top Bolt Only, Automatic, Stainless Steel Flush Bolt For Metal Doors (Ives FB31T) .....135.06
08 71 11 00-0675	EA	Bottom Bolt Only, Automatic, Stainless Steel Flush Bolt For Metal Doors (Ives FB31B).....135.06
08 71 11 00-0676	EA	Top And Bottom Bolt, Automatic, Stainless Steel Flush Bolt For Metal Doors (Ives FB31P).....235.16
08 71 11 00-0677	EA	Top Bolt With Auxiliary Fire Latch, Automatic, Stainless Steel Flush Bolt For Metal Doors (Ives FB32) .....242.53
08 71 11 00-0678	EA	Top Bolt With Auxiliary Fire Latch And Retrofit Plate, Automatic, Stainless Steel Flush Bolt For Metal Doors (Ives FB33).....252.01

08 71 11 00-0679		
Constant Latching, Stainless Steel Flush Bolts For Metal Doors <small>(08 71 11 00-0672)</small>		
Note: Includes stainless steel construction with bright or satin finish.		
08 71 11 00-0680	EA	Top Bolt Only, Constant Latching, Stainless Steel Flush Bolt For Metal Doors (Ives FB51T).....160.55
08 71 11 00-0681	EA	Top And Bottom Bolt, Constant Latching, Stainless Steel Flush Bolt For Metal Doors (Ives FB51P).....299.08
08 71 11 00-0682	EA	Top Bolt With Auxiliary Fire Latch, Constant Latching, Stainless Steel Flush Bolt For Metal Doors (Ives FB52) .....293.66
08 71 11 00-0683	EA	Top Bolt With Auxiliary Fire Latch And Retrofit Plate, Constant Latching, Stainless Steel Flush Bolt For Metal Doors (Ives FB53).....304.83

08 71 11 00-0684		
Flush Bolts For Wood Doors <small>(08 71 11 00-0656)</small>		
08 71 11 00-0685		
Brass Flush Bolts For Wood Doors <small>(08 71 11 00-0684)</small>		
08 71 11 00-0686		
Manual, Brass Flush Bolts For Wood Doors <small>(08 71 11 00-0685)</small>		
Note: Includes brass construction with bright brass, satin brass, satin bronze, dark bronze, satin nickel, bright chrome or satin chrome finish.		
08 71 11 00-0687	EA	Top Or Bottom Bolt, Manual, Brass Flush Bolt For Wood Doors (Ives FB358).....76.99

08 71 11 00-0688		
Automatic, Brass Flush Bolts For Wood Doors <small>(08 71 11 00-0685)</small>		
Note: Includes brass construction with bright brass, satin brass, satin bronze or dark bronze finish.		
08 71 11 00-0689	EA	Top Bolt Only, Automatic, Brass Flush Bolt For Wood Doors (Ives FB41T) .....168.64
08 71 11 00-0690	EA	Bottom Bolt Only, Automatic, Brass Flush Bolt For Metal Doors (Ives FB41B).....168.64
08 71 11 00-0691	EA	Top And Bottom Bolt, Automatic, Brass Flush Bolt For Wood Doors (Ives FB41P).....313.28
08 71 11 00-0692	EA	Top Bolt With Auxiliary Fire Latch, Automatic, Brass Flush Bolt For Wood Doors (Ives FB42) .....307.86

08 71 11 00-0693		
Constant Latching, Brass Flush Bolts For Wood Doors <small>(08 71 11 00-0685)</small>		
Note: Includes brass construction with bright brass, satin brass, satin bronze or dark bronze finish.		
08 71 11 00-0694	EA	Top Bolt Only, Constant Latching, Brass Flush Bolt For Wood Doors (Ives FB61T) .....167.32
08 71 11 00-0695	EA	Top And Bottom Bolt, Constant Latching, Brass Flush Bolt For Wood Doors (Ives FB61P).....313.28
08 71 11 00-0696	EA	Top Bolt With Auxiliary Fire Latch, Constant Latching, Brass Flush Bolt For Wood Doors (Ives FB62) .....307.86

08 71 11 00-0697		
Stainless Steel Flush Bolts For Wood Doors <small>(08 71 11 00-0684)</small>		
08 71 11 00-0698		
Automatic, Stainless Steel Flush Bolts For Wood Doors <small>(08 71 11 00-0697)</small>		
Note: Includes stainless steel construction with bright or satin finish.		
08 71 11 00-0699	EA	Top Bolt Only, Automatic, Stainless Steel Flush Bolt For Wood Doors (Ives FB41T).....168.64
08 71 11 00-0700	EA	Bottom Bolt Only, Automatic, Stainless Steel Flush Bolt For Metal Doors (Ives FB41B).....168.64
08 71 11 00-0701	EA	Top And Bottom Bolt, Automatic, Stainless Steel Flush Bolt For Wood Doors (Ives FB41P) .....313.28
08 71 11 00-0702	EA	Top Bolt With Auxiliary Fire Latch, Automatic, Stainless Steel Flush Bolt For Wood Doors (Ives FB42).....307.86

08 71 11 00-0703		
Constant Latching, Stainless Steel Flush Bolts For Wood Doors <small>(08 71 11 00-0697)</small>		
Note: Includes stainless steel construction with bright or satin finish.		
08 71 11 00-0704	EA	Top Bolt Only, Constant Latching, Stainless Steel Flush Bolt For Wood Doors (Ives FB61T).....167.32
08 71 11 00-0705	EA	Top And Bottom Bolt, Constant Latching, Stainless Steel Flush Bolt For Wood Doors (Ives FB61P) .....313.28
08 71 11 00-0706	EA	Top Bolt With Auxiliary Fire Latch, Constant Latching, Stainless Steel Flush Bolt For Wood Doors (Ives FB62) .....307.86



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0707		Dust Proof Strikes (08 71 11 00-0656)		
08 71 11 00-0708	EA	Satin Brass Finish, Brass Dust Proof Strike (Ives DP1).....	57.89	10.85
08 71 11 00-0709	EA	Satin Chrome Finish, Brass Dust Proof Strike (Ives DP1).....	57.89	10.85
08 71 11 00-0710	EA	Bright Brass Finish, Brass Dust Proof Strike (Ives DP1).....	57.89	10.85
08 71 11 00-0711	EA	Satin Bronze Finish, Brass Dust Proof Strike (Ives DP1).....	57.89	10.85
08 71 11 00-0712	EA	Dark Bronze Finish, Brass Dust Proof Strike (Ives DP1).....	57.89	10.85
08 71 11 00-0713	EA	Satin Bronze Finish, Brass Dust Proof Strike With Plate (Ives DP2).....	67.35	10.85
08 71 11 00-0714	EA	Satin Chrome Finish, Brass Dust Proof Strike With Plate (Ives DP2).....	67.35	10.85
08 71 11 00-0715	EA	Satin Brass Finish, Brass Dust Proof Strike With Plate (Ives DP2).....	67.35	10.85
08 71 11 00-0716	EA	Bright Brass Finish, Brass Dust Proof Strike With Plate (Ives DP2).....	67.35	10.85
08 71 11 00-0717	EA	Dark Bronze Finish, Brass Dust Proof Strike With Plate (Ives DP2).....	67.35	10.85
08 71 11 00-0718		Roller Bumpers (08 71 11 00-0421)		
08 71 11 00-0719		Brass Roller Bumpers (08 71 11 00-0718)		
08 71 11 00-0720	EA	5" Length, Bright Brass Finish, Brass Offset Arm Roller Bumper (Ives RB470).....	61.67	8.14
08 71 11 00-0721	EA	5" Length, Satin Chrome Finish, Brass Offset Arm Roller Bumper (Ives RB470).....	72.97	8.14
08 71 11 00-0722	EA	5" Length, Bright Chrome Finish, Brass Offset Arm Roller Bumper (Ives RB470).....	72.97	8.14
08 71 11 00-0723	EA	4-1/2" Length, Bright Brass Finish, Brass Straight Arm Roller Bumper (Ives RB471).....	59.12	8.14
08 71 11 00-0724	EA	4-1/2" Length, Satin Chrome Finish, Brass Straight Arm Roller Bumper (Ives RB471).....	67.73	8.14
08 71 11 00-0725	EA	4-1/2" Length, Bright Chrome Finish, Brass Straight Arm Roller Bumper (Ives RB471).....	67.73	8.14
08 71 11 00-0726	EA	4-1/2" Length, Satin Brass Finish, Brass Straight Arm Roller Bumper (Ives RB471).....	67.73	8.14
08 71 11 00-0727	EA	6" Length, Bright Brass Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	61.84	8.14
08 71 11 00-0728	EA	6" Length, Satin Nickel Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	67.93	8.14
08 71 11 00-0729	EA	6" Length, Satin Chrome Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	70.80	8.14
08 71 11 00-0730	EA	6" Length, Bright Chrome Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	70.80	8.14
08 71 11 00-0731	EA	6" Length, Satin Brass Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	70.80	8.14
08 71 11 00-0732	EA	6" Length, Satin Bronze Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	70.80	8.14
08 71 11 00-0733	EA	6" Length, Dark Bronze Finish, Brass Straight Arm Roller Bumper (Ives RB472).....	70.80	8.14
08 71 11 00-0734		Other Door Trim (08 71 11 00-0421)		
08 71 11 00-0735		Coat And Hat Hooks (08 71 11 00-0734)		
08 71 11 00-0736		Aluminum Coat And Hat Hooks (08 71 11 00-0735)		
08 71 11 00-0737	EA	1-1/4" Height, 1-1/4" Width, Bright Brass Finish, Aluminum Wardrobe Hook (Ives 581).....	19.27	8.14
08 71 11 00-0738	EA	1-1/4" Height, 1-1/4" Width, Aluminum Finish, Aluminum Wardrobe Hook (Ives 581).....	19.27	8.14
08 71 11 00-0739	EA	1-1/4" Height, 1-1/4" Width, Satin Nickel Finish, Aluminum Wardrobe Hook (Ives 581).....	19.48	8.14
08 71 11 00-0740	EA	1-3/4" Height, 1-1/4" Width, Satin Bronze Finish, Aluminum Coat And Hat Hook (Ives 571).....	19.13	8.14
08 71 11 00-0741	EA	1-3/4" Height, 1-1/4" Width, Bright Brass Finish, Aluminum Coat And Hat Hook (Ives 571).....	19.13	8.14
08 71 11 00-0742	EA	1-3/4" Height, 1-1/4" Width, Aluminum Finish, Aluminum Coat And Hat Hook (Ives 571).....	19.13	8.14
08 71 11 00-0743	EA	1-3/4" Height, 1-1/4" Width, Satin Nickel Finish, Aluminum Coat And Hat Hook (Ives 571).....	19.48	8.14
08 71 11 00-0744	EA	1-1/2" Height, 2-1/2" Width, Satin Brass Finish, Aluminum Coat And Hat Hook (Ives 405).....	20.53	8.14
08 71 11 00-0745	EA	1-1/2" Height, 2-1/2" Width, Bright Brass Finish, Aluminum Coat And Hat Hook (Ives 405).....	20.53	8.14
08 71 11 00-0746	EA	1-1/2" Height, 2-1/2" Width, Satin Bronze Finish, Aluminum Coat And Hat Hook (Ives 405).....	20.53	8.14
08 71 11 00-0747	EA	1-1/2" Height, 2-1/2" Width, Dark Bronze Finish, Aluminum Coat And Hat Hook (Ives 405).....	20.53	8.14
08 71 11 00-0748	EA	1-1/2" Height, 2-1/2" Width, Aluminum Finish, Aluminum Coat And Hat Hook (Ives 405).....	20.53	8.14
08 71 11 00-0749		Brass Coat And Hat Hooks (08 71 11 00-0735)		
08 71 11 00-0750	EA	1-1/4" Height, 1-1/4" Width, Bright Brass Finish, Brass Wardrobe Hook (Ives 581).....	25.01	8.14
08 71 11 00-0751	EA	1-1/4" Height, 1-1/4" Width, Satin Brass Finish, Brass Wardrobe Hook (Ives 581).....	25.57	8.14
08 71 11 00-0752	EA	1-1/4" Height, 1-1/4" Width, Dark Bronze Finish, Brass Wardrobe Hook (Ives 581).....	26.45	8.14
08 71 11 00-0753	EA	1-1/4" Height, 1-1/4" Width, Satin Chrome Finish, Brass Wardrobe Hook (Ives 581).....	26.45	8.14
08 71 11 00-0754	EA	1-1/4" Height, 1-1/4" Width, Satin Nickel Finish, Brass Wardrobe Hook (Ives 581).....	27.00	8.14
08 71 11 00-0755	EA	1-3/4" Height, 1-1/4" Width, Bright Brass Finish, Brass Coat And Hat Hook (Ives 571).....	28.79	8.14
08 71 11 00-0756	EA	1-3/4" Height, 1-1/4" Width, Satin Brass Finish, Brass Coat And Hat Hook (Ives 571).....	31.31	8.14
08 71 11 00-0757	EA	1-3/4" Height, 1-1/4" Width, Dark Bronze Finish, Brass Coat And Hat Hook (Ives 571).....	31.31	8.14
08 71 11 00-0758	EA	1-3/4" Height, 1-1/4" Width, Satin Chrome Finish, Brass Coat And Hat Hook (Ives 571).....	31.31	8.14
08 71 11 00-0759	EA	1-3/4" Height, 1-1/4" Width, Satin Nickel Finish, Brass Coat And Hat Hook (Ives 571).....	31.86	8.14
08 71 11 00-0760		Letter Box Hood (08 71 11 00-0421)		
08 71 11 00-0761	EA	12-3/4" Wide x 3-3/16" High x 1-5/8" Deep, Letter Box Hood, Nickel Finish (Deltana MSH158).....	88.47	13.57
		Note: Compatible with Deltana MS0030 and MS211 mail slot models.		
08 71 11 00-0762		Door Plates And Pulls (08 71 11)		
08 71 11 00-0763		Kick Plate (08 71 11 00-0762)		
		Note: Ives 8400.		
08 71 11 00-0764		Aluminum Base Material Kick Plate (08 71 11 00-0763)		
08 71 11 00-0765		Satin Aluminum Finish, Aluminum Kick Plate (08 71 11 00-0764)		
08 71 11 00-0766	EA	8" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate.....	60.53	8.14
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0767	EA	8" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	63.11 1.76 11.40	8.14
08 71 11 00-0768	EA	8" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	65.63 1.76 11.40	8.14
08 71 11 00-0769	EA	8" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	68.18 1.76 11.40	8.14
08 71 11 00-0770	EA	8" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	72.93 1.76 11.40	8.68
08 71 11 00-0771	EA	8" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	75.42 1.76 11.40	8.68
08 71 11 00-0772	EA	8" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	77.97 1.76 11.40	8.68
08 71 11 00-0773	EA	8" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	80.52 1.76 11.40	8.68
08 71 11 00-0774	EA	8" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	85.24 1.76 11.40	9.23
08 71 11 00-0775	EA	8" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	87.79 1.76 11.40	9.23
08 71 11 00-0776	EA	8" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	90.31 1.76 11.40	9.23
08 71 11 00-0777	EA	8" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	95.06 1.76 11.40	9.77
08 71 11 00-0778	EA	8" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	97.61 1.76 11.40	9.77
08 71 11 00-0779	EA	8" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	100.13 1.76 11.40	9.77
08 71 11 00-0780	EA	10" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	67.57 1.76 11.40	8.14
08 71 11 00-0781	EA	10" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	70.76 1.76 11.40	8.14
08 71 11 00-0782	EA	10" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	73.90 1.76 11.40	8.14
08 71 11 00-0783	EA	10" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	77.09 1.76 11.40	8.14
08 71 11 00-0784	EA	10" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	82.45 1.76 11.40	8.68
08 71 11 00-0785	EA	10" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	85.62 1.76 11.40	8.68
08 71 11 00-0786	EA	10" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	88.81 1.76 11.40	8.68
08 71 11 00-0787	EA	10" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	91.98 1.76 11.40	8.68
08 71 11 00-0788	EA	10" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	97.34 1.76 11.40	9.23
08 71 11 00-0789	EA	10" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	100.51 1.76 11.40	9.23
08 71 11 00-0790	EA	10" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	103.70 1.76 11.40	9.23
08 71 11 00-0791	EA	10" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	109.06 1.76 11.40	9.77
08 71 11 00-0792	EA	10" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	112.20 1.76 11.40	9.77
08 71 11 00-0793	EA	10" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	115.39 1.76 11.40	9.77
08 71 11 00-0794	EA	12" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	74.57 1.76 11.40	8.14

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0795 EA 12" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	78.35 1.76 11.40	8.14
08 71 11 00-0796 EA 12" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	82.22 1.76 11.40	8.14
08 71 11 00-0797 EA 12" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	85.97 1.76 11.40	8.14
08 71 11 00-0798 EA 12" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	91.98 1.76 11.40	8.68
08 71 11 00-0799 EA 12" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	95.79 1.76 11.40	8.68
08 71 11 00-0800 EA 12" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	99.60 1.76 11.40	8.68
08 71 11 00-0801 EA 12" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	103.44 1.76 11.40	8.68
08 71 11 00-0802 EA 12" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	109.41 1.76 11.40	9.23
08 71 11 00-0803 EA 12" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	113.22 1.76 11.40	9.23
08 71 11 00-0804 EA 12" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	117.06 1.76 11.40	9.23
08 71 11 00-0805 EA 12" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	123.04 1.76 11.40	9.77
08 71 11 00-0806 EA 12" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	126.85 1.76 11.40	9.77
08 71 11 00-0807 EA 12" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	130.69 1.76 11.40	9.77
08 71 11 00-0808 EA 14" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	83.69 1.76 11.40	8.68
08 71 11 00-0809 EA 14" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	88.14 1.76 11.40	8.68
08 71 11 00-0810 EA 14" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	92.65 1.76 11.40	8.68
08 71 11 00-0811 EA 14" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	97.11 1.76 11.40	8.68
08 71 11 00-0812 EA 14" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	103.70 1.76 11.40	9.23
08 71 11 00-0813 EA 14" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	108.15 1.76 11.40	9.23
08 71 11 00-0814 EA 14" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	112.61 1.76 11.40	9.23
08 71 11 00-0815 EA 14" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	117.06 1.76 11.40	9.23
08 71 11 00-0816 EA 14" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	123.69 1.76 11.40	9.77
08 71 11 00-0817 EA 14" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	128.11 1.76 11.40	9.77
08 71 11 00-0818 EA 14" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	132.57 1.76 11.40	9.77
08 71 11 00-0819 EA 14" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	139.19 1.76 11.40	10.30
08 71 11 00-0820 EA 14" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	143.67 1.76 11.40	10.30
08 71 11 00-0821 EA 14" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	148.13 1.76 11.40	10.30
08 71 11 00-0822 EA 16" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	90.72 1.76 11.40	8.68

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0823	EA	16" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	95.79 1.76 11.40	8.68
08 71 11 00-0824	EA	16" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	100.92 1.76 11.40	8.68
08 71 11 00-0825	EA	16" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	105.98 1.76 11.40	8.68
08 71 11 00-0826	EA	16" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	108.15 1.76 11.40	9.23
08 71 11 00-0827	EA	16" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	118.35 1.76 11.40	9.23
08 71 11 00-0828	EA	16" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	123.45 1.76 11.40	9.23
08 71 11 00-0829	EA	16" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	128.52 1.76 11.40	9.23
08 71 11 00-0830	EA	16" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	135.76 1.76 11.40	9.77
08 71 11 00-0831	EA	16" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	140.89 1.76 11.40	9.77
08 71 11 00-0832	EA	16" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	145.96 1.76 11.40	9.77
08 71 11 00-0833	EA	16" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	153.20 1.76 11.40	10.30
08 71 11 00-0834	EA	16" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	158.30 1.76 11.40	10.30
08 71 11 00-0835	EA	16" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	163.42 1.76 11.40	10.30
08 71 11 00-0836	EA	18" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	101.74 6.30 11.40	8.68
08 71 11 00-0837	EA	18" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	107.83 6.30 11.40	8.68
08 71 11 00-0838	EA	18" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	113.93 6.30 11.40	8.68
08 71 11 00-0839	EA	18" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	120.02 6.30 11.40	8.68
08 71 11 00-0840	EA	18" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	128.26 6.30 11.40	9.23
08 71 11 00-0841	EA	18" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	134.35 6.30 11.40	9.23
08 71 11 00-0842	EA	18" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	140.45 6.30 11.40	9.23
08 71 11 00-0843	EA	18" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	146.54 6.30 11.40	9.23
08 71 11 00-0844	EA	18" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	154.81 6.30 11.40	9.77
08 71 11 00-0845	EA	18" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	160.90 6.30 11.40	9.77
08 71 11 00-0846	EA	18" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	167.00 6.30 11.40	9.77
08 71 11 00-0847	EA	18" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	175.26 6.30 11.40	10.30
08 71 11 00-0848	EA	18" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	181.36 6.30 11.40	10.30
08 71 11 00-0849	EA	18" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	187.45 6.30 11.40	10.30
08 71 11 00-0850	EA	20" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	111.35 6.30 11.40	9.23

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0851 EA 20" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	118.12 6.30 11.40	9.23
08 71 11 00-0852 EA 20" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	124.89 6.30 11.40	9.23
08 71 11 00-0853 EA 20" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	131.66 6.30 11.40	9.23
08 71 11 00-0854 EA 20" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	140.59 6.30 11.40	9.77
08 71 11 00-0855 EA 20" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	147.36 6.30 11.40	9.77
08 71 11 00-0856 EA 20" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	154.13 6.30 11.40	9.77
08 71 11 00-0857 EA 20" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	160.90 6.30 11.40	9.77
08 71 11 00-0858 EA 20" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	169.84 6.30 11.40	10.30
08 71 11 00-0859 EA 20" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	176.61 6.30 11.40	10.30
08 71 11 00-0860 EA 20" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	183.38 6.30 11.40	10.30
08 71 11 00-0861 EA 20" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	192.32 6.30 11.40	10.85
08 71 11 00-0862 EA 20" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	199.09 6.30 11.40	10.85
08 71 11 00-0863 EA 20" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	205.86 6.30 11.40	10.85
08 71 11 00-0864 EA 22" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	118.79 6.30 11.40	9.23
08 71 11 00-0865 EA 22" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	126.23 6.30 11.40	9.23
08 71 11 00-0866 EA 22" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	133.68 6.30 11.40	9.23
08 71 11 00-0867 EA 22" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	141.12 6.30 11.40	9.23
08 71 11 00-0868 EA 22" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	150.76 6.30 11.40	9.77
08 71 11 00-0869 EA 22" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	158.21 6.30 11.40	9.77
08 71 11 00-0870 EA 22" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	165.65 6.30 11.40	9.77
08 71 11 00-0871 EA 22" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	173.09 6.30 11.40	9.77
08 71 11 00-0872 EA 22" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	182.70 6.30 11.40	10.30
08 71 11 00-0873 EA 22" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	190.15 6.30 11.40	10.30
08 71 11 00-0874 EA 22" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	197.59 6.30 11.40	10.30
08 71 11 00-0875 EA 22" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	207.20 6.30 11.40	10.85
08 71 11 00-0876 EA 22" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	214.65 6.30 11.40	10.85
08 71 11 00-0877 EA 22" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	222.09 6.30 11.40	10.85
08 71 11 00-0878 EA 24" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	126.23 6.30 11.40	9.23

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0879	EA 24" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	134.35 6.30 11.40	9.23
08 71 11 00-0880	EA 24" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	142.50 6.30 11.40	9.23
08 71 11 00-0881	EA 24" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	150.61 6.30 11.40	9.23
08 71 11 00-0882	EA 24" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	160.90 6.30 11.40	9.77
08 71 11 00-0883	EA 24" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	169.02 6.30 11.40	9.77
08 71 11 00-0884	EA 24" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	177.14 6.30 11.40	9.77
08 71 11 00-0885	EA 24" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	185.28 6.30 11.40	9.77
08 71 11 00-0886	EA 24" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	195.57 6.30 11.40	10.30
08 71 11 00-0887	EA 24" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	203.69 6.30 11.40	10.30
08 71 11 00-0888	EA 24" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	211.80 6.30 11.40	10.30
08 71 11 00-0889	EA 24" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	222.09 6.30 11.40	10.85
08 71 11 00-0890	EA 24" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	230.24 6.30 11.40	10.85
08 71 11 00-0891	EA 24" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	238.35 6.30 11.40	10.85
08 71 11 00-0892	Brass Base Material Kick Plate (08 71 11 00-0763)		
08 71 11 00-0893	Bright/Satin Brass Finish, Brass Kick Plate (08 71 11 00-0892)		
08 71 11 00-0894	EA 8" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	125.58 1.76 11.40	8.14
08 71 11 00-0895	EA 8" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	134.02 1.76 11.40	8.14
08 71 11 00-0896	EA 8" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	142.50 1.76 11.40	8.14
08 71 11 00-0897	EA 8" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	150.95 1.76 11.40	8.14
08 71 11 00-0898	EA 8" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	161.56 1.76 11.40	8.68
08 71 11 00-0899	EA 8" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	170.07 1.76 11.40	8.68
08 71 11 00-0900	EA 8" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	178.52 1.76 11.40	8.68
08 71 11 00-0901	EA 8" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	186.96 1.76 11.40	8.68
08 71 11 00-0902	EA 8" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	197.58 1.76 11.40	9.23
08 71 11 00-0903	EA 8" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	206.02 1.76 11.40	9.23
08 71 11 00-0904	EA 8" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	214.47 1.76 11.40	9.23
08 71 11 00-0905	EA 8" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	225.09 1.76 11.40	9.77
08 71 11 00-0906	EA 8" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	233.59 1.76 11.40	9.77

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0907 EA 8" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	242.04 1.76 11.40	9.77
08 71 11 00-0908 EA 10" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	148.86 1.76 11.40	8.14
08 71 11 00-0909 EA 10" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	159.39 1.76 11.40	8.14
08 71 11 00-0910 EA 10" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	169.99 1.76 11.40	8.14
08 71 11 00-0911 EA 10" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	180.55 1.76 11.40	8.14
08 71 11 00-0912 EA 10" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	193.26 1.76 11.40	8.68
08 71 11 00-0913 EA 10" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	203.85 1.76 11.40	8.68
08 71 11 00-0914 EA 10" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	214.45 1.76 11.40	8.68
08 71 11 00-0915 EA 10" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	225.01 1.76 11.40	8.68
08 71 11 00-0916 EA 10" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	237.72 1.76 11.40	9.23
08 71 11 00-0917 EA 10" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	248.32 1.76 11.40	9.23
08 71 11 00-0918 EA 10" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	258.91 1.76 11.40	9.23
08 71 11 00-0919 EA 10" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	271.62 1.76 11.40	9.77
08 71 11 00-0920 EA 10" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	282.21 1.76 11.40	9.77
08 71 11 00-0921 EA 10" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	292.78 1.76 11.40	9.77
08 71 11 00-0922 EA 12" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	172.05 1.76 11.40	8.14
08 71 11 00-0923 EA 12" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	184.79 1.76 11.40	8.14
08 71 11 00-0924 EA 12" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	197.45 1.76 11.40	8.14
08 71 11 00-0925 EA 12" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	210.13 1.76 11.40	8.14
08 71 11 00-0926 EA 12" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	225.01 1.76 11.40	8.68
08 71 11 00-0927 EA 12" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	237.70 1.76 11.40	8.68
08 71 11 00-0928 EA 12" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	250.38 1.76 11.40	8.68
08 71 11 00-0929 EA 12" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	263.04 1.76 11.40	8.68
08 71 11 00-0930 EA 12" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	277.95 1.76 11.40	9.23
08 71 11 00-0931 EA 12" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	290.61 1.76 11.40	9.23
08 71 11 00-0932 EA 12" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	303.29 1.76 11.40	9.23
08 71 11 00-0933 EA 12" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	318.14 1.76 11.40	9.77
08 71 11 00-0934 EA 12" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	330.80 1.76 11.40	9.77

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0935	EA	12" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	343.54	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0936	EA	14" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	197.53	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0937	EA	14" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	212.30	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0938	EA	14" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	227.10	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0939	EA	14" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	241.94	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0940	EA	14" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	258.91	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0941	EA	14" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	273.71	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0942	EA	14" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	288.49	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0943	EA	14" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	303.29	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0944	EA	14" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	320.26	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0945	EA	14" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	335.07	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0946	EA	14" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	349.84	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0947	EA	14" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	366.81	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0948	EA	14" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	381.65	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0949	EA	14" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	396.45	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0950	EA	16" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	279.84	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0951	EA	16" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	302.18	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0952	EA	16" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	324.46	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0953	EA	16" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	346.71	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0954	EA	16" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	371.16	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0955	EA	16" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	393.46	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0956	EA	16" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	415.77	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0957	EA	16" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	437.99	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0958	EA	16" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	462.50	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0959	EA	16" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	484.81	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0960	EA	16" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	507.09	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0961	EA	16" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	531.50	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-0962	EA	16" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	553.78	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0963 EA 16" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	576.09	10.30
For Four Beveled Edges, Add	1.76	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0964 EA 18" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	310.01	8.68
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0965 EA 18" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	335.02	8.68
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0966 EA 18" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	360.01	8.68
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0967 EA 18" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	385.08	8.68
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0968 EA 18" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	412.27	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0969 EA 18" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	437.26	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0970 EA 18" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	462.33	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0971 EA 18" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	487.32	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0972 EA 18" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	514.56	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0973 EA 18" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	539.58	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0974 EA 18" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	564.56	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0975 EA 18" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	591.81	10.30
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0976 EA 18" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	616.79	10.30
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0977 EA 18" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	641.81	10.30
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0978 EA 20" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	342.76	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0979 EA 20" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	370.54	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0980 EA 20" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	398.38	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0981 EA 20" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	426.13	9.23
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0982 EA 20" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	456.14	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0983 EA 20" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	483.95	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0984 EA 20" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	511.74	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0985 EA 20" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	539.58	9.77
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0986 EA 20" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	569.50	10.30
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0987 EA 20" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	597.34	10.30
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0988 EA 20" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	625.15	10.30
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0989 EA 20" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	655.10	10.85
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	
08 71 11 00-0990 EA 20" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate.....	682.94	10.85
For Four Beveled Edges, Add	6.30	
For UL Label (Fire Rated), Add	11.40	

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-0991	EA	20" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	710.70 6.30 11.40	10.85
08 71 11 00-0992	EA	22" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	373.36 6.30 11.40	9.23
08 71 11 00-0993	EA	22" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	403.91 6.30 11.40	9.23
08 71 11 00-0994	EA	22" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	434.49 6.30 11.40	9.23
08 71 11 00-0995	EA	22" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	465.10 6.30 11.40	9.23
08 71 11 00-0996	EA	22" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	497.84 6.30 11.40	9.77
08 71 11 00-0997	EA	22" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	528.45 6.30 11.40	9.77
08 71 11 00-0998	EA	22" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	559.03 6.30 11.40	9.77
08 71 11 00-0999	EA	22" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	589.64 6.30 11.40	9.77
08 71 11 00-1000	EA	22" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	622.35 6.30 11.40	10.30
08 71 11 00-1001	EA	22" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	652.93 6.30 11.40	10.30
08 71 11 00-1002	EA	22" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	683.54 6.30 11.40	10.30
08 71 11 00-1003	EA	22" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	716.29 6.30 11.40	10.85
08 71 11 00-1004	EA	22" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	746.89 6.30 11.40	10.85
08 71 11 00-1005	EA	22" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	777.41 6.30 11.40	10.85
08 71 11 00-1006	EA	24" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	403.91 6.30 11.40	9.23
08 71 11 00-1007	EA	24" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	437.26 6.30 11.40	9.23
08 71 11 00-1008	EA	24" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	470.66 6.30 11.40	9.23
08 71 11 00-1009	EA	24" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	504.03 6.30 11.40	9.23
08 71 11 00-1010	EA	24" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	539.58 6.30 11.40	9.77
08 71 11 00-1011	EA	24" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	572.92 6.30 11.40	9.77
08 71 11 00-1012	EA	24" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	606.29 6.30 11.40	9.77
08 71 11 00-1013	EA	24" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	641.49 6.30 11.40	9.77
08 71 11 00-1014	EA	24" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	675.18 6.30 11.40	10.30
08 71 11 00-1015	EA	24" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	708.53 6.30 11.40	10.30
08 71 11 00-1016	EA	24" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	741.90 6.30 11.40	10.30
08 71 11 00-1017	EA	24" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	777.41 6.30 11.40	10.85
08 71 11 00-1018	EA	24" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	810.85 6.30 11.40	10.85



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1019	EA 24" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	844.19 6.30 11.40	10.85
08 71 11 00-1020	Bright/Satin Chrome Finish, Stainless Kick Plate <small>(08 71 11 00-0892)</small>		
08 71 11 00-1021	EA 8" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	135.44 1.76 11.40	8.14
08 71 11 00-1022	EA 8" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	144.80 1.76 11.40	8.14
08 71 11 00-1023	EA 8" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	154.15 1.76 11.40	8.14
08 71 11 00-1024	EA 8" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	163.51 1.76 11.40	8.14
08 71 11 00-1025	EA 8" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	175.03 1.76 11.40	8.68
08 71 11 00-1026	EA 8" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	184.36 1.76 11.40	8.68
08 71 11 00-1027	EA 8" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	193.72 1.76 11.40	8.68
08 71 11 00-1028	EA 8" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	203.07 1.76 11.40	8.68
08 71 11 00-1029	EA 8" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	214.60 1.76 11.40	9.23
08 71 11 00-1030	EA 8" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	223.99 1.76 11.40	9.23
08 71 11 00-1031	EA 8" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	233.34 1.76 11.40	9.23
08 71 11 00-1032	EA 8" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	244.87 1.76 11.40	9.77
08 71 11 00-1033	EA 8" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	254.22 1.76 11.40	9.77
08 71 11 00-1034	EA 8" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	263.58 1.76 11.40	9.77
08 71 11 00-1035	EA 10" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	161.18 1.76 11.40	8.14
08 71 11 00-1036	EA 10" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	172.86 1.76 11.40	8.14
08 71 11 00-1037	EA 10" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	184.55 1.76 11.40	8.14
08 71 11 00-1038	EA 10" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	196.24 1.76 11.40	8.14
08 71 11 00-1039	EA 10" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	210.13 1.76 11.40	8.68
08 71 11 00-1040	EA 10" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	221.82 1.76 11.40	8.68
08 71 11 00-1041	EA 10" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	233.50 1.76 11.40	8.68
08 71 11 00-1042	EA 10" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	245.19 1.76 11.40	8.68
08 71 11 00-1043	EA 10" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	259.05 1.76 11.40	9.23
08 71 11 00-1044	EA 10" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	270.74 1.76 11.40	9.23
08 71 11 00-1045	EA 10" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	282.43 1.76 11.40	9.23
08 71 11 00-1046	EA 10" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	296.28 1.76 11.40	9.77

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1047	EA	10" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	307.97	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1048	EA	10" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	319.66	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1049	EA	12" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	186.88	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1050	EA	12" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	200.90	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1051	EA	12" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	214.98	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1052	EA	12" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	229.00	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1053	EA	12" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	245.19	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1054	EA	12" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	259.24	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1055	EA	12" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	273.26	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1056	EA	12" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	287.28	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1057	EA	12" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	303.47	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1058	EA	12" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	317.49	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1059	EA	12" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	331.54	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1060	EA	12" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	347.73	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1061	EA	12" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	361.81	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1062	EA	12" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	375.83	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1063	EA	14" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	214.76	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1064	EA	14" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	231.17	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1065	EA	14" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	247.55	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1066	EA	14" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	263.90	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1067	EA	14" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	282.43	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1068	EA	14" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	298.81	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1069	EA	14" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	315.16	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1070	EA	14" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	331.54	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1071	EA	14" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	350.12	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1072	EA	14" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	366.47	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1073	EA	14" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	382.82	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1074	EA	14" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	371.86	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1075 EA 14" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	417.72 1.76 11.40	10.30
08 71 11 00-1076 EA 14" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	434.10 1.76 11.40	10.30
08 71 11 00-1077 EA 16" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	309.09 1.76 11.40	8.68
08 71 11 00-1078 EA 16" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	334.06 1.76 11.40	8.68
08 71 11 00-1079 EA 16" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	359.00 1.76 11.40	8.68
08 71 11 00-1080 EA 16" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	383.94 1.76 11.40	8.68
08 71 11 00-1081 EA 16" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	411.05 1.76 11.40	9.23
08 71 11 00-1082 EA 16" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	435.99 1.76 11.40	9.23
08 71 11 00-1083 EA 16" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	460.96 1.76 11.40	9.23
08 71 11 00-1084 EA 16" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	485.90 1.76 11.40	9.23
08 71 11 00-1085 EA 16" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	513.01 1.76 11.40	9.77
08 71 11 00-1086 EA 16" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	537.95 1.76 11.40	9.77
08 71 11 00-1087 EA 16" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	562.89 1.76 11.40	9.77
08 71 11 00-1088 EA 16" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	590.00 1.76 11.40	10.30
08 71 11 00-1089 EA 16" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	614.94 1.76 11.40	10.30
08 71 11 00-1090 EA 16" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	639.88 1.76 11.40	10.30
08 71 11 00-1091 EA 18" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	342.50 6.30 11.40	8.68
08 71 11 00-1092 EA 18" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	370.51 6.30 11.40	8.68
08 71 11 00-1093 EA 18" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	398.46 6.30 11.40	8.68
08 71 11 00-1094 EA 18" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	426.47 6.30 11.40	8.68
08 71 11 00-1095 EA 18" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	456.59 6.30 11.40	9.23
08 71 11 00-1096 EA 18" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	484.57 6.30 11.40	9.23
08 71 11 00-1097 EA 18" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	512.55 6.30 11.40	9.23
08 71 11 00-1098 EA 18" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	540.53 6.30 11.40	9.23
08 71 11 00-1099 EA 18" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	570.65 6.30 11.40	9.77
08 71 11 00-1100 EA 18" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	598.66 6.30 11.40	9.77
08 71 11 00-1101 EA 18" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	626.67 6.30 11.40	9.77
08 71 11 00-1102 EA 18" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	656.79 6.30 11.40	10.30

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1103	EA	18" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	684.80	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1104	EA	18" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	712.76	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1105	EA	20" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	378.85	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1106	EA	20" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	409.99	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1107	EA	20" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	441.04	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1108	EA	20" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	472.18	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1109	EA	20" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	505.40	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1110	EA	20" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	536.48	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1111	EA	20" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	567.59	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1112	EA	20" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	598.66	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1113	EA	20" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	631.97	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1114	EA	20" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	663.02	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1115	EA	20" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	694.10	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1116	EA	20" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	727.38	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1117	EA	20" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Brass Kick Plate.....	758.46	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1118	EA	20" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	789.57	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1119	EA	22" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	413.06	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1120	EA	22" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	447.30	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1121	EA	22" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	481.47	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1122	EA	22" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	515.65	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1123	EA	22" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	552.06	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1124	EA	22" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	586.24	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1125	EA	22" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	620.45	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1126	EA	22" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	654.62	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1127	EA	22" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	691.03	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1128	EA	22" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	725.21	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1129	EA	22" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	759.42	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1130	EA	22" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate.....	795.77	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1131 EA 22" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	829.95 6.30 11.40	10.85
08 71 11 00-1132 EA 22" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	864.18 6.30 11.40	10.85
08 71 11 00-1133 EA 24" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	447.30 6.30 11.40	9.23
08 71 11 00-1134 EA 24" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	484.57 6.30 11.40	9.23
08 71 11 00-1135 EA 24" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	521.88 6.30 11.40	9.23
08 71 11 00-1136 EA 24" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	559.19 6.30 11.40	9.23
08 71 11 00-1137 EA 24" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	598.66 6.30 11.40	9.77
08 71 11 00-1138 EA 24" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	635.97 6.30 11.40	9.77
08 71 11 00-1139 EA 24" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	673.34 6.30 11.40	9.77
08 71 11 00-1140 EA 24" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	710.59 6.30 11.40	9.77
08 71 11 00-1141 EA 24" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	750.06 6.30 11.40	10.30
08 71 11 00-1142 EA 24" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	787.40 6.30 11.40	10.30
08 71 11 00-1143 EA 24" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	824.71 6.30 11.40	10.30
08 71 11 00-1144 EA 24" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	864.18 6.30 11.40	10.85
08 71 11 00-1145 EA 24" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	901.49 6.30 11.40	10.85
08 71 11 00-1146 EA 24" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	938.80 6.30 11.40	10.85
08 71 11 00-1147 Satin/Dark Bronze Finish, Brass Kick Plate <small>(08 71 11 00-0892)</small>		
08 71 11 00-1148 EA 8" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	136.96 1.76 11.40	8.14
08 71 11 00-1149 EA 8" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	146.40 1.76 11.40	8.14
08 71 11 00-1150 EA 8" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	155.94 1.76 11.40	8.14
08 71 11 00-1151 EA 8" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	165.38 1.76 11.40	8.14
08 71 11 00-1152 EA 8" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	177.09 1.76 11.40	8.68
08 71 11 00-1153 EA 8" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	186.56 1.76 11.40	8.68
08 71 11 00-1154 EA 8" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	196.07 1.76 11.40	8.68
08 71 11 00-1155 EA 8" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	205.54 1.76 11.40	8.68
08 71 11 00-1156 EA 8" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	217.16 1.76 11.40	9.23
08 71 11 00-1157 EA 8" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	226.69 1.76 11.40	9.23
08 71 11 00-1158 EA 8" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	236.17 1.76 11.40	9.23

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1159	EA	8" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	247.84	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1160	EA	8" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	257.32	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1161	EA	8" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	266.82	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1162	EA	10" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	163.03	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1163	EA	10" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	174.92	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1164	EA	10" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	186.75	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1165	EA	10" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	198.61	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1166	EA	10" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	212.64	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1167	EA	10" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	224.52	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1168	EA	10" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	236.35	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1169	EA	10" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	248.21	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1170	EA	10" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	262.27	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1171	EA	10" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	274.13	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1172	EA	10" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	285.96	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1173	EA	10" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	300.05	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1174	EA	10" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	311.88	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1175	EA	10" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	323.74	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1176	EA	12" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	189.13	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1177	EA	12" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	203.37	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1178	EA	12" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	217.59	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1179	EA	12" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	231.83	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1180	EA	12" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	248.21	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1181	EA	12" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	262.48	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1182	EA	12" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	276.73	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1183	EA	12" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	290.94	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1184	EA	12" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	307.35	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1185	EA	12" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	321.57	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1186	EA	12" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	335.78	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1187 EA 12" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	352.19 1.76 11.40	9.77
08 71 11 00-1188 EA 12" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	366.46 1.76 11.40	9.77
08 71 11 00-1189 EA 12" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	380.68 1.76 11.40	9.77
08 71 11 00-1190 EA 14" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	217.37 1.76 11.40	8.68
08 71 11 00-1191 EA 14" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	234.00 1.76 11.40	8.68
08 71 11 00-1192 EA 14" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	250.60 1.76 11.40	8.68
08 71 11 00-1193 EA 14" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	267.19 1.76 11.40	8.68
08 71 11 00-1194 EA 14" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	285.96 1.76 11.40	9.23
08 71 11 00-1195 EA 14" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	302.59 1.76 11.40	9.23
08 71 11 00-1196 EA 14" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	319.18 1.76 11.40	9.23
08 71 11 00-1197 EA 14" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	335.78 1.76 11.40	9.23
08 71 11 00-1198 EA 14" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	354.58 1.76 11.40	9.77
08 71 11 00-1199 EA 14" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	371.17 1.76 11.40	9.77
08 71 11 00-1200 EA 14" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	387.77 1.76 11.40	9.77
08 71 11 00-1201 EA 14" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	406.57 1.76 11.40	10.30
08 71 11 00-1202 EA 14" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	423.22 1.76 11.40	10.30
08 71 11 00-1203 EA 14" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	439.82 1.76 11.40	10.30
08 71 11 00-1204 EA 16" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	308.27 1.76 11.40	8.68
08 71 11 00-1205 EA 16" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	333.17 1.76 11.40	8.68
08 71 11 00-1206 EA 16" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	358.03 1.76 11.40	8.68
08 71 11 00-1207 EA 16" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	382.90 1.76 11.40	8.68
08 71 11 00-1208 EA 16" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	409.94 1.76 11.40	9.23
08 71 11 00-1209 EA 16" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	434.80 1.76 11.40	9.23
08 71 11 00-1210 EA 16" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	459.70 1.76 11.40	9.23
08 71 11 00-1211 EA 16" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	484.56 1.76 11.40	9.23
08 71 11 00-1212 EA 16" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	511.60 1.76 11.40	9.77
08 71 11 00-1213 EA 16" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	536.46 1.76 11.40	9.77
08 71 11 00-1214 EA 16" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	561.33 1.76 11.40	9.77

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1215	EA	16" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	588.37 1.76 11.40	10.30
08 71 11 00-1216	EA	16" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	613.23 1.76 11.40	10.30
08 71 11 00-1217	EA	16" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	638.10 1.76 11.40	10.30
08 71 11 00-1218	EA	18" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	341.58 6.30 11.40	8.68
08 71 11 00-1219	EA	18" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	369.51 6.30 11.40	8.68
08 71 11 00-1220	EA	18" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	397.38 6.30 11.40	8.68
08 71 11 00-1221	EA	18" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	425.30 6.30 11.40	8.68
08 71 11 00-1222	EA	18" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	455.34 6.30 11.40	9.23
08 71 11 00-1223	EA	18" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	483.24 6.30 11.40	9.23
08 71 11 00-1224	EA	18" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	511.14 6.30 11.40	9.23
08 71 11 00-1225	EA	18" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	539.03 6.30 11.40	9.23
08 71 11 00-1226	EA	18" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	569.07 6.30 11.40	9.77
08 71 11 00-1227	EA	18" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	597.00 6.30 11.40	9.77
08 71 11 00-1228	EA	18" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	624.92 6.30 11.40	9.77
08 71 11 00-1229	EA	18" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	654.96 6.30 11.40	10.30
08 71 11 00-1230	EA	18" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	682.89 6.30 11.40	10.30
08 71 11 00-1231	EA	18" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	710.75 6.30 11.40	10.30
08 71 11 00-1232	EA	20" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	377.83 6.30 11.40	9.23
08 71 11 00-1233	EA	20" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	408.88 6.30 11.40	9.23
08 71 11 00-1234	EA	20" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	439.83 6.30 11.40	9.23
08 71 11 00-1235	EA	20" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	470.88 6.30 11.40	9.23
08 71 11 00-1236	EA	20" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	504.01 6.30 11.40	9.77
08 71 11 00-1237	EA	20" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	534.99 6.30 11.40	9.77
08 71 11 00-1238	EA	20" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	566.01 6.30 11.40	9.77
08 71 11 00-1239	EA	20" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	597.00 6.30 11.40	9.77
08 71 11 00-1240	EA	20" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	630.21 6.30 11.40	10.30
08 71 11 00-1241	EA	20" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	661.17 6.30 11.40	10.30
08 71 11 00-1242	EA	20" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	692.16 6.30 11.40	10.30

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1243 EA 20" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	725.34 6.30 11.40	10.85
08 71 11 00-1244 EA 20" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	756.33 6.30 11.40	10.85
08 71 11 00-1245 EA 20" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	787.34 6.30 11.40	10.85
08 71 11 00-1246 EA 22" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	411.94 6.30 11.40	9.23
08 71 11 00-1247 EA 22" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	446.07 6.30 11.40	9.23
08 71 11 00-1248 EA 22" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	480.15 6.30 11.40	9.23
08 71 11 00-1249 EA 22" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	514.23 6.30 11.40	9.23
08 71 11 00-1250 EA 22" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	550.53 6.30 11.40	9.77
08 71 11 00-1251 EA 22" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	584.61 6.30 11.40	9.77
08 71 11 00-1252 EA 22" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	618.71 6.30 11.40	9.77
08 71 11 00-1253 EA 22" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	652.79 6.30 11.40	9.77
08 71 11 00-1254 EA 22" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	689.09 6.30 11.40	10.30
08 71 11 00-1255 EA 22" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	723.17 6.30 11.40	10.30
08 71 11 00-1256 EA 22" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	757.28 6.30 11.40	10.30
08 71 11 00-1257 EA 22" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	793.52 6.30 11.40	10.85
08 71 11 00-1258 EA 22" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	827.60 6.30 11.40	10.85
08 71 11 00-1259 EA 22" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	861.74 6.30 11.40	10.85
08 71 11 00-1260 EA 24" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	446.07 6.30 11.40	9.23
08 71 11 00-1261 EA 24" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	483.24 6.30 11.40	9.23
08 71 11 00-1262 EA 24" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	520.43 6.30 11.40	9.23
08 71 11 00-1263 EA 24" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	557.63 6.30 11.40	9.23
08 71 11 00-1264 EA 24" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	597.00 6.30 11.40	9.77
08 71 11 00-1265 EA 24" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	634.19 6.30 11.40	9.77
08 71 11 00-1266 EA 24" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	671.45 6.30 11.40	9.77
08 71 11 00-1267 EA 24" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	708.58 6.30 11.40	9.77
08 71 11 00-1268 EA 24" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	747.95 6.30 11.40	10.30
08 71 11 00-1269 EA 24" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	785.17 6.30 11.40	10.30
08 71 11 00-1270 EA 24" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	822.37 6.30 11.40	10.30

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-1271	EA	24" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	.....	861.74	10.85
		<i>For Four Beveled Edges, Add</i>		6.30	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1272	EA	24" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	.....	898.93	10.85
		<i>For Four Beveled Edges, Add</i>		6.30	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1273	EA	24" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Kick Plate	.....	936.13	10.85
		<i>For Four Beveled Edges, Add</i>		6.30	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1274 Satin Nickel Finish, Stainless Kick Plate (08 71 11 00-0892)					
08 71 11 00-1275	EA	8" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	139.26	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1276	EA	8" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	148.92	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1277	EA	8" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	158.66	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1278	EA	8" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	168.32	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1279	EA	8" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	180.23	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1280	EA	8" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	189.92	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1281	EA	8" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	199.63	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1282	EA	8" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	209.32	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1283	EA	8" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	221.14	9.23
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1284	EA	8" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	230.89	9.23
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1285	EA	8" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	240.57	9.23
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1286	EA	8" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	252.46	9.77
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1287	EA	8" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	262.14	9.77
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1288	EA	8" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	271.86	9.77
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1289	EA	10" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	165.91	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1290	EA	10" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	178.06	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1291	EA	10" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	190.15	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1292	EA	10" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	202.27	8.14
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1293	EA	10" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	216.57	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1294	EA	10" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	228.72	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1295	EA	10" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	240.81	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1296	EA	10" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	252.93	8.68
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1297	EA	10" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	267.25	9.23
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	
08 71 11 00-1298	EA	10" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	.....	279.37	9.23
		<i>For Four Beveled Edges, Add</i>		1.76	
		<i>For UL Label (Fire Rated), Add</i>		11.40	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-1299 EA 10" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	291.46 1.76 11.40	9.23
08 71 11 00-1300 EA 10" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	305.81 1.76 11.40	9.77
08 71 11 00-1301 EA 10" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	317.90 1.76 11.40	9.77
08 71 11 00-1302 EA 10" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	330.02 1.76 11.40	9.77
08 71 11 00-1303 EA 12" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	192.59 1.76 11.40	8.14
08 71 11 00-1304 EA 12" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	207.15 1.76 11.40	8.14
08 71 11 00-1305 EA 12" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	221.67 1.76 11.40	8.14
08 71 11 00-1306 EA 12" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	236.23 1.76 11.40	8.14
08 71 11 00-1307 EA 12" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	252.93 1.76 11.40	8.68
08 71 11 00-1308 EA 12" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	267.52 1.76 11.40	8.68
08 71 11 00-1309 EA 12" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	282.07 1.76 11.40	8.68
08 71 11 00-1310 EA 12" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	296.60 1.76 11.40	8.68
08 71 11 00-1311 EA 12" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	313.33 1.76 11.40	9.23
08 71 11 00-1312 EA 12" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	327.85 1.76 11.40	9.23
08 71 11 00-1313 EA 12" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	342.38 1.76 11.40	9.23
08 71 11 00-1314 EA 12" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	359.11 1.76 11.40	9.77
08 71 11 00-1315 EA 12" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	373.70 1.76 11.40	9.77
08 71 11 00-1316 EA 12" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	388.22 1.76 11.40	9.77
08 71 11 00-1317 EA 14" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	221.41 1.76 11.40	8.68
08 71 11 00-1318 EA 14" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	238.40 1.76 11.40	8.68
08 71 11 00-1319 EA 14" x 26", 0.050" Thick, Satin Nickel Finish, Brass Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	255.36 1.76 11.40	8.68
08 71 11 00-1320 EA 14" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	272.33 1.76 11.40	8.68
08 71 11 00-1321 EA 14" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	291.46 1.76 11.40	9.23
08 71 11 00-1322 EA 14" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	308.46 1.76 11.40	9.23
08 71 11 00-1323 EA 14" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	325.42 1.76 11.40	9.23
08 71 11 00-1324 EA 14" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	342.38 1.76 11.40	9.23
08 71 11 00-1325 EA 14" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	361.55 1.76 11.40	9.77
08 71 11 00-1326 EA 14" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	378.51 1.76 11.40	9.77

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1327	EA	14" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	395.47	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1328	EA	14" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	414.64	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1329	EA	14" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	431.66	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1330	EA	14" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	448.62	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1331	EA	16" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	314.32	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1332	EA	16" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	339.76	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1333	EA	16" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	365.18	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1334	EA	16" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	390.59	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1335	EA	16" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	418.18	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1336	EA	16" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	443.59	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1337	EA	16" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	469.04	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1338	EA	16" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	494.45	9.23
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1339	EA	16" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	522.04	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1340	EA	16" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	547.45	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1341	EA	16" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	572.87	9.77
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1342	EA	16" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	600.45	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1343	EA	16" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	625.87	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1344	EA	16" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	651.28	10.30
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1345	EA	18" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	348.36	8.68
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1346	EA	18" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	376.91	8.68
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1347	EA	18" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	405.39	8.68
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1348	EA	18" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	433.93	8.68
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1349	EA	18" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	464.58	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1350	EA	18" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	493.10	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1351	EA	18" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	521.61	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1352	EA	18" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	550.12	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1353	EA	18" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	580.78	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1354	EA	18" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	609.32	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1355 EA 18" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	637.86 6.30 11.40	9.77
08 71 11 00-1356 EA 18" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	668.52 6.30 11.40	10.30
08 71 11 00-1357 EA 18" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	697.06 6.30 11.40	10.30
08 71 11 00-1358 EA 18" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	725.54 6.30 11.40	10.30
08 71 11 00-1359 EA 20" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	385.36 6.30 11.40	9.23
08 71 11 00-1360 EA 20" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	417.09 6.30 11.40	9.23
08 71 11 00-1361 EA 20" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	448.73 6.30 11.40	9.23
08 71 11 00-1362 EA 20" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	480.47 6.30 11.40	9.23
08 71 11 00-1363 EA 20" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	514.28 6.30 11.40	9.77
08 71 11 00-1364 EA 20" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	545.95 6.30 11.40	9.77
08 71 11 00-1365 EA 20" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	577.65 6.30 11.40	9.77
08 71 11 00-1366 EA 20" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	609.32 6.30 11.40	9.77
08 71 11 00-1367 EA 20" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	643.22 6.30 11.40	10.30
08 71 11 00-1368 EA 20" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	674.86 6.30 11.40	10.30
08 71 11 00-1369 EA 20" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	706.53 6.30 11.40	10.30
08 71 11 00-1370 EA 20" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	740.40 6.30 11.40	10.85
08 71 11 00-1371 EA 20" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	772.08 6.30 11.40	10.85
08 71 11 00-1372 EA 20" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	803.78 6.30 11.40	10.85
08 71 11 00-1373 EA 22" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	420.22 6.30 11.40	9.23
08 71 11 00-1374 EA 22" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	455.11 6.30 11.40	9.23
08 71 11 00-1375 EA 22" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	489.94 6.30 11.40	9.23
08 71 11 00-1376 EA 22" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	524.77 6.30 11.40	9.23
08 71 11 00-1377 EA 22" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	561.83 6.30 11.40	9.77
08 71 11 00-1378 EA 22" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	596.66 6.30 11.40	9.77
08 71 11 00-1379 EA 22" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	631.52 6.30 11.40	9.77
08 71 11 00-1380 EA 22" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	666.35 6.30 11.40	9.77
08 71 11 00-1381 EA 22" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	703.41 6.30 11.40	10.30
08 71 11 00-1382 EA 22" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	738.23 6.30 11.40	10.30

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1383	EA	22" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	773.09	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1384	EA	22" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	810.09	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1385	EA	22" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	844.92	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1386	EA	22" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	879.81	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1387	EA	24" x 22", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	455.11	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1388	EA	24" x 24", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	493.10	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1389	EA	24" x 26", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	531.12	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1390	EA	24" x 28", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	569.13	9.23
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1391	EA	24" x 30", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	609.32	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1392	EA	24" x 32", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	647.34	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1393	EA	24" x 34", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	685.41	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1394	EA	24" x 36", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	723.37	9.77
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1395	EA	24" x 38", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	763.56	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1396	EA	24" x 40", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	801.61	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1397	EA	24" x 42", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	839.62	10.30
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1398	EA	24" x 44", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	879.81	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1399	EA	24" x 46", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	917.83	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1400	EA	24" x 48", 0.050" Thick, Satin Nickel Finish, Stainless Kick Plate	955.85	10.85
		<i>For Four Beveled Edges, Add</i>	6.30	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1401		Stainless Base Material Kick Plate <small>(08 71 11 00-0763)</small>		
08 71 11 00-1402		Satin Stainless Finish, Stainless Kick Plate <small>(08 71 11 00-1401)</small>		
08 71 11 00-1403	EA	8" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	64.54	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1404	EA	8" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	67.48	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1405	EA	8" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	70.34	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1406	EA	8" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	73.32	8.14
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1407	EA	8" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	78.38	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1408	EA	8" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	81.24	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1409	EA	8" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	84.22	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	
08 71 11 00-1410	EA	8" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate	87.10	8.68
		<i>For Four Beveled Edges, Add</i>	1.76	
		<i>For UL Label (Fire Rated), Add</i>	11.40	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1411 EA 8" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	92.19 1.76 11.40	9.23
08 71 11 00-1412 EA 8" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	95.11 1.76 11.40	9.23
08 71 11 00-1413 EA 8" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	98.00 1.76 11.40	9.23
08 71 11 00-1414 EA 8" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	103.09 1.76 11.40	9.77
08 71 11 00-1415 EA 8" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	106.01 1.76 11.40	9.77
08 71 11 00-1416 EA 8" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	108.90 1.76 11.40	9.77
08 71 11 00-1417 EA 10" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	72.54 1.76 11.40	8.14
08 71 11 00-1418 EA 10" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	76.21 1.76 11.40	8.14
08 71 11 00-1419 EA 10" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	79.85 1.76 11.40	8.14
08 71 11 00-1420 EA 10" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	83.46 1.76 11.40	8.14
08 71 11 00-1421 EA 10" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	89.30 1.76 11.40	8.68
08 71 11 00-1422 EA 10" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	92.94 1.76 11.40	8.68
08 71 11 00-1423 EA 10" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	96.55 1.76 11.40	8.68
08 71 11 00-1424 EA 10" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	100.16 1.76 11.40	8.68
08 71 11 00-1425 EA 10" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	106.03 1.76 11.40	9.23
08 71 11 00-1426 EA 10" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	109.65 1.76 11.40	9.23
08 71 11 00-1427 EA 10" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	113.26 1.76 11.40	9.23
08 71 11 00-1428 EA 10" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	119.10 1.76 11.40	9.77
08 71 11 00-1429 EA 10" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	122.74 1.76 11.40	9.77
08 71 11 00-1430 EA 10" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	126.35 1.76 11.40	9.77
08 71 11 00-1431 EA 12" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	80.57 1.76 11.40	8.14
08 71 11 00-1432 EA 12" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	84.93 1.76 11.40	8.14
08 71 11 00-1433 EA 12" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	89.30 1.76 11.40	8.14
08 71 11 00-1434 EA 12" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	93.66 1.76 11.40	8.14
08 71 11 00-1435 EA 12" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	100.16 1.76 11.40	8.68
08 71 11 00-1436 EA 12" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	104.56 1.76 11.40	8.68
08 71 11 00-1437 EA 12" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	108.89 1.76 11.40	8.68
08 71 11 00-1438 EA 12" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	113.28 1.76 11.40	8.68

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1439	EA	12" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	119.79 1.76 11.40	9.23
08 71 11 00-1440	EA	12" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	124.18 1.76 11.40	9.23
08 71 11 00-1441	EA	12" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	128.57 1.76 11.40	9.23
08 71 11 00-1442	EA	12" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	135.07 1.76 11.40	9.77
08 71 11 00-1443	EA	12" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	139.47 1.76 11.40	9.77
08 71 11 00-1444	EA	12" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	143.80 1.76 11.40	9.77
08 71 11 00-1445	EA	14" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	90.75 1.76 11.40	8.68
08 71 11 00-1446	EA	14" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	95.83 1.76 11.40	8.68
08 71 11 00-1447	EA	14" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	100.94 1.76 11.40	8.68
08 71 11 00-1448	EA	14" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	106.03 1.76 11.40	8.68
08 71 11 00-1449	EA	14" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	113.26 1.76 11.40	9.23
08 71 11 00-1450	EA	14" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	118.37 1.76 11.40	9.23
08 71 11 00-1451	EA	14" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	123.46 1.76 11.40	9.23
08 71 11 00-1452	EA	14" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	128.57 1.76 11.40	9.23
08 71 11 00-1453	EA	14" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	135.85 1.76 11.40	9.77
08 71 11 00-1454	EA	14" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	140.88 1.76 11.40	9.77
08 71 11 00-1455	EA	14" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	146.00 1.76 11.40	9.77
08 71 11 00-1456	EA	14" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	153.28 1.76 11.40	10.30
08 71 11 00-1457	EA	14" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	158.37 1.76 11.40	10.30
08 71 11 00-1458	EA	14" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	163.48 1.76 11.40	10.30
08 71 11 00-1459	EA	16" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	102.94 1.76 11.40	8.68
08 71 11 00-1460	EA	16" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	109.44 1.76 11.40	8.68
08 71 11 00-1461	EA	16" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	115.68 1.76 11.40	8.68
08 71 11 00-1462	EA	16" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	121.89 1.76 11.40	8.68
08 71 11 00-1463	EA	16" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	130.28 1.76 11.40	9.23
08 71 11 00-1464	EA	16" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	136.52 1.76 11.40	9.23
08 71 11 00-1465	EA	16" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	142.76 1.76 11.40	9.23
08 71 11 00-1466	EA	16" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	148.97 1.76 11.40	9.23

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1467 EA 16" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	157.35 1.76 11.40	9.77
08 71 11 00-1468 EA 16" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	163.62 1.76 11.40	9.77
08 71 11 00-1469 EA 16" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	169.86 1.76 11.40	9.77
08 71 11 00-1470 EA 16" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	178.77 1.76 11.40	10.30
08 71 11 00-1471 EA 16" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	184.46 1.76 11.40	10.30
08 71 11 00-1472 EA 16" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	190.70 1.76 11.40	10.30
08 71 11 00-1473 EA 18" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	110.05 6.30 11.40	8.68
08 71 11 00-1474 EA 18" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	116.92 6.30 11.40	8.68
08 71 11 00-1475 EA 18" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	123.74 6.30 11.40	8.68
08 71 11 00-1476 EA 18" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	130.59 6.30 11.40	8.68
08 71 11 00-1477 EA 18" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	139.64 6.30 11.40	9.23
08 71 11 00-1478 EA 18" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	146.46 6.30 11.40	9.23
08 71 11 00-1479 EA 18" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	153.30 6.30 11.40	9.23
08 71 11 00-1480 EA 18" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	160.12 6.30 11.40	9.23
08 71 11 00-1481 EA 18" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	169.17 6.30 11.40	9.77
08 71 11 00-1482 EA 18" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	176.02 6.30 11.40	9.77
08 71 11 00-1483 EA 18" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	182.84 6.30 11.40	9.77
08 71 11 00-1484 EA 18" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	191.88 6.30 11.40	10.30
08 71 11 00-1485 EA 18" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	198.76 6.30 11.40	10.30
08 71 11 00-1486 EA 18" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	205.58 6.30 11.40	10.30
08 71 11 00-1487 EA 20" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	120.60 6.30 11.40	9.23
08 71 11 00-1488 EA 20" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	128.19 6.30 11.40	9.23
08 71 11 00-1489 EA 20" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	135.82 6.30 11.40	9.23
08 71 11 00-1490 EA 20" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	143.39 6.30 11.40	9.23
08 71 11 00-1491 EA 20" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	153.19 6.30 11.40	9.77
08 71 11 00-1492 EA 20" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	160.82 6.30 11.40	9.77
08 71 11 00-1493 EA 20" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	168.39 6.30 11.40	9.77
08 71 11 00-1494 EA 20" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	176.02 6.30 11.40	9.77

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1495	EA	20" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	185.79 6.30 11.40	10.30
08 71 11 00-1496	EA	20" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	193.41 6.30 11.40	10.30
08 71 11 00-1497	EA	20" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	201.04 6.30 11.40	10.30
08 71 11 00-1498	EA	20" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	210.78 6.30 11.40	10.85
08 71 11 00-1499	EA	20" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	218.41 6.30 11.40	10.85
08 71 11 00-1500	EA	20" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	226.01 6.30 11.40	10.85
08 71 11 00-1501	EA	22" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	128.95 6.30 11.40	9.23
08 71 11 00-1502	EA	22" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	137.35 6.30 11.40	9.23
08 71 11 00-1503	EA	22" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	145.68 6.30 11.40	9.23
08 71 11 00-1504	EA	22" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	154.08 6.30 11.40	9.23
08 71 11 00-1505	EA	22" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	164.58 6.30 11.40	9.77
08 71 11 00-1506	EA	22" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	172.98 6.30 11.40	9.77
08 71 11 00-1507	EA	22" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	181.33 6.30 11.40	9.77
08 71 11 00-1508	EA	22" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	189.71 6.30 11.40	9.77
08 71 11 00-1509	EA	22" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	200.23 6.30 11.40	10.30
08 71 11 00-1510	EA	22" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	208.61 6.30 11.40	10.30
08 71 11 00-1511	EA	22" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	217.02 6.30 11.40	10.30
08 71 11 00-1512	EA	22" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	227.51 6.30 11.40	10.85
08 71 11 00-1513	EA	22" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	235.92 6.30 11.40	10.85
08 71 11 00-1514	EA	22" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	244.24 6.30 11.40	10.85
08 71 11 00-1515	EA	24" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	137.35 6.30 11.40	9.23
08 71 11 00-1516	EA	24" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	146.46 6.30 11.40	9.23
08 71 11 00-1517	EA	24" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	155.62 6.30 11.40	9.23
08 71 11 00-1518	EA	24" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	164.72 6.30 11.40	9.23
08 71 11 00-1519	EA	24" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	176.02 6.30 11.40	9.77
08 71 11 00-1520	EA	24" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	185.15 6.30 11.40	9.77
08 71 11 00-1521	EA	24" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	194.28 6.30 11.40	9.77
08 71 11 00-1522	EA	24" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	203.41 6.30 11.40	9.77

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1523 EA 24" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	214.71 6.30 11.40	10.30
08 71 11 00-1524 EA 24" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	223.84 6.30 11.40	10.30
08 71 11 00-1525 EA 24" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	232.97 6.30 11.40	10.30
08 71 11 00-1526 EA 24" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	244.24 6.30 11.40	10.85
08 71 11 00-1527 EA 24" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	253.40 6.30 11.40	10.85
08 71 11 00-1528 EA 24" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	262.56 6.30 11.40	10.85
 08 71 11 00-1529 Bright Stainless Finish, Stainless Kick Plate <small>(08 71 11 00-1401)</small>		
08 71 11 00-1530 EA 8" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	107.88 1.76 11.40	8.14
08 71 11 00-1531 EA 8" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	114.76 1.76 11.40	8.14
08 71 11 00-1532 EA 8" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	121.59 1.76 11.40	8.14
08 71 11 00-1533 EA 8" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	128.44 1.76 11.40	8.14
08 71 11 00-1534 EA 8" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	137.43 1.76 11.40	8.68
08 71 11 00-1535 EA 8" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	144.31 1.76 11.40	8.68
08 71 11 00-1536 EA 8" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	151.13 1.76 11.40	8.68
08 71 11 00-1537 EA 8" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	158.01 1.76 11.40	8.68
08 71 11 00-1538 EA 8" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	166.97 1.76 11.40	9.23
08 71 11 00-1539 EA 8" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	173.85 1.76 11.40	9.23
08 71 11 00-1540 EA 8" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	180.74 1.76 11.40	9.23
08 71 11 00-1541 EA 8" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	189.73 1.76 11.40	9.77
08 71 11 00-1542 EA 8" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	196.58 1.76 11.40	9.77
08 71 11 00-1543 EA 8" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	203.40 1.76 11.40	9.77
08 71 11 00-1544 EA 10" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	126.72 1.76 11.40	8.14
08 71 11 00-1545 EA 10" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	135.26 1.76 11.40	8.14
08 71 11 00-1546 EA 10" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	143.85 1.76 11.40	8.14
08 71 11 00-1547 EA 10" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	152.42 1.76 11.40	8.14
08 71 11 00-1548 EA 10" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	163.12 1.76 11.40	8.68
08 71 11 00-1549 EA 10" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	171.68 1.76 11.40	8.68
08 71 11 00-1550 EA 10" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	180.28 1.76 11.40	8.68

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-1551	EA 10" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	188.84 1.76 11.40	8.68
08 71 11 00-1552	EA 10" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	199.55 1.76 11.40	9.23
08 71 11 00-1553	EA 10" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	208.11 1.76 11.40	9.23
08 71 11 00-1554	EA 10" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	216.70 1.76 11.40	9.23
08 71 11 00-1555	EA 10" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	227.38 1.76 11.40	9.77
08 71 11 00-1556	EA 10" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	235.97 1.76 11.40	9.77
08 71 11 00-1557	EA 10" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	244.54 1.76 11.40	9.77
08 71 11 00-1558	EA 12" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	145.54 1.76 11.40	8.14
08 71 11 00-1559	EA 12" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	155.84 1.76 11.40	8.14
08 71 11 00-1560	EA 12" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	166.12 1.76 11.40	8.14
08 71 11 00-1561	EA 12" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	176.40 1.76 11.40	8.14
08 71 11 00-1562	EA 12" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	188.84 1.76 11.40	8.68
08 71 11 00-1563	EA 12" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	199.06 1.76 11.40	8.68
08 71 11 00-1564	EA 12" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	209.37 1.76 11.40	8.68
08 71 11 00-1565	EA 12" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	219.64 1.76 11.40	8.68
08 71 11 00-1566	EA 12" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	232.09 1.76 11.40	9.23
08 71 11 00-1567	EA 12" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	242.37 1.76 11.40	9.23
08 71 11 00-1568	EA 12" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	252.61 1.76 11.40	9.23
08 71 11 00-1569	EA 12" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	265.09 1.76 11.40	9.77
08 71 11 00-1570	EA 12" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	275.34 1.76 11.40	9.77
08 71 11 00-1571	EA 12" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	285.61 1.76 11.40	9.77
08 71 11 00-1572	EA 14" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	166.58 1.76 11.40	8.68
08 71 11 00-1573	EA 14" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	178.57 1.76 11.40	8.68
08 71 11 00-1574	EA 14" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	190.56 1.76 11.40	8.68
08 71 11 00-1575	EA 14" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	202.54 1.76 11.40	8.68
08 71 11 00-1576	EA 14" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	216.70 1.76 11.40	9.23
08 71 11 00-1577	EA 14" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	228.66 1.76 11.40	9.23
08 71 11 00-1578	EA 14" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	240.65 1.76 11.40	9.23

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-1579 EA 14" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	252.61 1.76 11.40	9.23
08 71 11 00-1580 EA 14" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	266.80 1.76 11.40	9.77
08 71 11 00-1581 EA 14" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	278.79 1.76 11.40	9.77
08 71 11 00-1582 EA 14" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	290.78 1.76 11.40	9.77
08 71 11 00-1583 EA 14" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	304.94 1.76 11.40	10.30
08 71 11 00-1584 EA 14" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	316.87 1.76 11.40	10.30
08 71 11 00-1585 EA 14" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	328.86 1.76 11.40	10.30
08 71 11 00-1586 EA 16" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	185.39 1.76 11.40	8.68
08 71 11 00-1587 EA 16" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	199.06 1.76 11.40	8.68
08 71 11 00-1588 EA 16" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	212.82 1.76 11.40	8.68
08 71 11 00-1589 EA 16" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	226.49 1.76 11.40	8.68
08 71 11 00-1590 EA 16" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	242.37 1.76 11.40	9.23
08 71 11 00-1591 EA 16" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	256.07 1.76 11.40	9.23
08 71 11 00-1592 EA 16" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	269.74 1.76 11.40	9.23
08 71 11 00-1593 EA 16" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	283.44 1.76 11.40	9.23
08 71 11 00-1594 EA 16" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	299.32 1.76 11.40	9.77
08 71 11 00-1595 EA 16" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	312.99 1.76 11.40	9.77
08 71 11 00-1596 EA 16" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	326.69 1.76 11.40	9.77
08 71 11 00-1597 EA 16" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	342.56 1.76 11.40	10.30
08 71 11 00-1598 EA 16" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	356.30 1.76 11.40	10.30
08 71 11 00-1599 EA 16" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	370.00 1.76 11.40	10.30
08 71 11 00-1600 EA 18" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	206.24 6.30 11.40	8.68
08 71 11 00-1601 EA 18" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	221.89 6.30 11.40	8.68
08 71 11 00-1602 EA 18" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	237.42 6.30 11.40	8.68
08 71 11 00-1603 EA 18" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	253.07 6.30 11.40	8.68
08 71 11 00-1604 EA 18" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	270.83 6.30 11.40	9.23
08 71 11 00-1605 EA 18" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	286.37 6.30 11.40	9.23
08 71 11 00-1606 EA 18" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	302.02 6.30 11.40	9.23

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 71 11 00-1607	EA	18" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	326.47 6.30 11.40		9.23
08 71 11 00-1608	EA	18" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	335.37 6.30 11.40		9.77
08 71 11 00-1609	EA	18" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	350.97 6.30 11.40		9.77
08 71 11 00-1610	EA	18" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	366.56 6.30 11.40		9.77
08 71 11 00-1611	EA	18" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	384.32 6.30 11.40		10.30
08 71 11 00-1612	EA	18" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	399.91 6.30 11.40		10.30
08 71 11 00-1613	EA	18" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	415.51 6.30 11.40		10.30
08 71 11 00-1614	EA	20" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	227.51 6.30 11.40		9.23
08 71 11 00-1615	EA	20" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	244.82 6.30 11.40		9.23
08 71 11 00-1616	EA	20" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	262.15 6.30 11.40		9.23
08 71 11 00-1617	EA	20" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	279.46 6.30 11.40		9.23
08 71 11 00-1618	EA	20" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	298.96 6.30 11.40		9.77
08 71 11 00-1619	EA	20" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	316.33 6.30 11.40		9.77
08 71 11 00-1620	EA	20" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	333.60 6.30 11.40		9.77
08 71 11 00-1621	EA	20" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	350.97 6.30 11.40		9.77
08 71 11 00-1622	EA	20" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	370.41 6.30 11.40		10.30
08 71 11 00-1623	EA	20" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	387.78 6.30 11.40		10.30
08 71 11 00-1624	EA	20" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	405.11 6.30 11.40		10.30
08 71 11 00-1625	EA	20" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	424.59 6.30 11.40		10.85
08 71 11 00-1626	EA	20" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	441.92 6.30 11.40		10.85
08 71 11 00-1627	EA	20" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	459.23 6.30 11.40		10.85
08 71 11 00-1628	EA	22" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	246.56 6.30 11.40		9.23
08 71 11 00-1629	EA	22" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	265.61 6.30 11.40		9.23
08 71 11 00-1630	EA	22" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	284.66 6.30 11.40		9.23
08 71 11 00-1631	EA	22" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	303.70 6.30 11.40		9.23
08 71 11 00-1632	EA	22" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	324.95 6.30 11.40		9.77
08 71 11 00-1633	EA	22" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	344.03 6.30 11.40		9.77
08 71 11 00-1634	EA	22" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add For UL Label (Fire Rated), Add</i>	363.10 6.30 11.40		9.77

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1635 EA 22" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	382.15 6.30 11.40	9.77
08 71 11 00-1636 EA 22" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	403.37 6.30 11.40	10.30
08 71 11 00-1637 EA 22" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	422.42 6.30 11.40	10.30
08 71 11 00-1638 EA 22" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	441.46 6.30 11.40	10.30
08 71 11 00-1639 EA 22" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	462.68 6.30 11.40	10.85
08 71 11 00-1640 EA 22" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	481.79 6.30 11.40	10.85
08 71 11 00-1641 EA 22" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	500.84 6.30 11.40	10.85
08 71 11 00-1642 EA 24" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	265.61 6.30 11.40	9.23
08 71 11 00-1643 EA 24" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	286.37 6.30 11.40	9.23
08 71 11 00-1644 EA 24" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	307.19 6.30 11.40	9.23
08 71 11 00-1645 EA 24" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	327.98 6.30 11.40	9.23
08 71 11 00-1646 EA 24" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	350.97 6.30 11.40	9.77
08 71 11 00-1647 EA 24" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	371.73 6.30 11.40	9.77
08 71 11 00-1648 EA 24" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	392.52 6.30 11.40	9.77
08 71 11 00-1649 EA 24" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	413.34 6.30 11.40	9.77
08 71 11 00-1650 EA 24" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	436.30 6.30 11.40	10.30
08 71 11 00-1651 EA 24" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	457.06 6.30 11.40	10.30
08 71 11 00-1652 EA 24" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	477.88 6.30 11.40	10.30
08 71 11 00-1653 EA 24" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	500.84 6.30 11.40	10.85
08 71 11 00-1654 EA 24" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	521.65 6.30 11.40	10.85
08 71 11 00-1655 EA 24" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Kick Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	542.41 6.30 11.40	10.85
08 71 11 00-1656 Plastic Kick Plate <small>(08 71 11 00-0763)</small>		
08 71 11 00-1657 Clear Or Black Finish, Plastic Kick Plate <small>(08 71 11 00-1656)</small>		
<i>Note: With four beveled edges.</i>		
08 71 11 00-1658 EA 8" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	56.28	8.14
08 71 11 00-1659 EA 8" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	58.40	8.14
08 71 11 00-1660 EA 8" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	60.60	8.14
08 71 11 00-1661 EA 8" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	62.75	8.14
08 71 11 00-1662 EA 8" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	67.09	8.68
08 71 11 00-1663 EA 8" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	69.24	8.68
08 71 11 00-1664 EA 8" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	71.36	8.68
08 71 11 00-1665 EA 8" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	73.56	8.68
08 71 11 00-1666 EA 8" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	80.49	9.23
08 71 11 00-1667 EA 8" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	80.00	9.23
08 71 11 00-1668 EA 8" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	82.20	9.23
08 71 11 00-1669 EA 8" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	86.51	9.77
08 71 11 00-1670 EA 8" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	88.69	9.77
08 71 11 00-1671 EA 8" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	90.84	9.77
08 71 11 00-1672 EA 10" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	62.20	8.14
08 71 11 00-1673 EA 10" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	64.92	8.14

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-1674	EA	10" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	67.59	8.14
08 71 11 00-1675	EA	10" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	70.26	8.14
08 71 11 00-1676	EA	10" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	75.16	8.68
08 71 11 00-1677	EA	10" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	77.83	8.68
08 71 11 00-1678	EA	10" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	80.55	8.68
08 71 11 00-1679	EA	10" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	83.22	8.68
08 71 11 00-1680	EA	10" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	88.12	9.23
08 71 11 00-1681	EA	10" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	90.79	9.23
08 71 11 00-1682	EA	10" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	93.51	9.23
08 71 11 00-1683	EA	10" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	98.35	9.77
08 71 11 00-1684	EA	10" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	101.08	9.77
08 71 11 00-1685	EA	10" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	103.75	9.77
08 71 11 00-1686	EA	12" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	68.14	8.14
08 71 11 00-1687	EA	12" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	71.39	8.14
08 71 11 00-1688	EA	12" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	74.58	8.14
08 71 11 00-1689	EA	12" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	77.86	8.14
08 71 11 00-1690	EA	12" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	83.22	8.68
08 71 11 00-1691	EA	12" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	86.50	8.68
08 71 11 00-1692	EA	12" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	89.74	8.68
08 71 11 00-1693	EA	12" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	92.96	8.68
08 71 11 00-1694	EA	12" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	98.33	9.23
08 71 11 00-1695	EA	12" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	101.58	9.23
08 71 11 00-1696	EA	12" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	104.85	9.23
08 71 11 00-1697	EA	12" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	110.22	9.77
08 71 11 00-1698	EA	12" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	113.49	9.77
08 71 11 00-1699	EA	12" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	116.68	9.77
08 71 11 00-1700	EA	14" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	76.23	8.68
08 71 11 00-1701	EA	14" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	80.03	8.68
08 71 11 00-1702	EA	14" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	83.77	8.68
08 71 11 00-1703	EA	14" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	87.57	8.68
08 71 11 00-1704	EA	14" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	93.51	9.23
08 71 11 00-1705	EA	14" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	97.26	9.23
08 71 11 00-1706	EA	14" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	101.05	9.23
08 71 11 00-1707	EA	14" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	104.85	9.23
08 71 11 00-1708	EA	14" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	110.77	9.77
08 71 11 00-1709	EA	14" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	114.56	9.77
08 71 11 00-1710	EA	14" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	118.33	9.77
08 71 11 00-1711	EA	14" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	124.25	10.30
08 71 11 00-1712	EA	14" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	128.05	10.30
08 71 11 00-1713	EA	14" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	131.79	10.30
08 71 11 00-1714	EA	16" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	89.27	8.68
08 71 11 00-1715	EA	16" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	94.25	8.68
08 71 11 00-1716	EA	16" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	99.15	8.68
08 71 11 00-1717	EA	16" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	104.12	8.68
08 71 11 00-1718	EA	16" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	111.27	9.23
08 71 11 00-1719	EA	16" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	116.22	9.23
08 71 11 00-1720	EA	16" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	121.19	9.23
08 71 11 00-1721	EA	16" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	126.12	9.23
08 71 11 00-1722	EA	16" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	133.26	9.77
08 71 11 00-1723	EA	16" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	138.21	9.77
08 71 11 00-1724	EA	16" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	143.19	9.77
08 71 11 00-1725	EA	16" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	150.33	10.30
08 71 11 00-1726	EA	16" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	155.23	10.30
08 71 11 00-1727	EA	16" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	160.21	10.30
08 71 11 00-1728	EA	18" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	96.05	8.68
08 71 11 00-1729	EA	18" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	101.66	8.68
08 71 11 00-1730	EA	18" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	107.21	8.68
08 71 11 00-1731	EA	18" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	112.82	8.68
08 71 11 00-1732	EA	18" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	124.36	9.23
08 71 11 00-1733	EA	18" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	126.12	9.23
08 71 11 00-1734	EA	18" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	131.72	9.23
08 71 11 00-1735	EA	18" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	137.27	9.23
08 71 11 00-1736	EA	18" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	145.05	9.77
08 71 11 00-1737	EA	18" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	150.63	9.77
08 71 11 00-1738	EA	18" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	156.18	9.77
08 71 11 00-1739	EA	18" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	163.95	10.30
08 71 11 00-1740	EA	18" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	169.50	10.30
08 71 11 00-1741	EA	18" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	175.11	10.30
08 71 11 00-1742	EA	20" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	105.06	9.23
08 71 11 00-1743	EA	20" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	111.27	9.23
08 71 11 00-1744	EA	20" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	117.45	9.23
08 71 11 00-1745	EA	20" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	123.65	9.23
08 71 11 00-1746	EA	20" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	132.03	9.77
08 71 11 00-1747	EA	20" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	138.21	9.77
08 71 11 00-1748	EA	20" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	144.42	9.77
08 71 11 00-1749	EA	20" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	150.63	9.77
08 71 11 00-1750	EA	20" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	158.98	10.30
08 71 11 00-1751	EA	20" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	165.18	10.30
08 71 11 00-1752	EA	20" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	171.36	10.30
08 71 11 00-1753	EA	20" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	179.74	10.85
08 71 11 00-1754	EA	20" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate.....	185.95	10.85

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1755	EA	20" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	192.13	10.85
08 71 11 00-1756	EA	22" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	111.90	9.23
08 71 11 00-1757	EA	22" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	118.68	9.23
08 71 11 00-1758	EA	22" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	125.51	9.23
08 71 11 00-1759	EA	22" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	132.30	9.23
08 71 11 00-1760	EA	22" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	141.33	9.77
08 71 11 00-1761	EA	22" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	148.16	9.77
08 71 11 00-1762	EA	22" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	154.95	9.77
08 71 11 00-1763	EA	22" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	161.78	9.77
08 71 11 00-1764	EA	22" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	170.74	10.30
08 71 11 00-1765	EA	22" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	177.57	10.30
08 71 11 00-1766	EA	22" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	184.41	10.30
08 71 11 00-1767	EA	22" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	193.36	10.85
08 71 11 00-1768	EA	22" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	200.19	10.85
08 71 11 00-1769	EA	22" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	206.98	10.85
08 71 11 00-1770	EA	24" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	118.68	9.23
08 71 11 00-1771	EA	24" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	126.12	9.23
08 71 11 00-1772	EA	24" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	133.58	9.23
08 71 11 00-1773	EA	24" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	141.02	9.23
08 71 11 00-1774	EA	24" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	150.63	9.77
08 71 11 00-1775	EA	24" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	158.04	9.77
08 71 11 00-1776	EA	24" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	165.47	9.77
08 71 11 00-1777	EA	24" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	172.94	9.77
08 71 11 00-1778	EA	24" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	182.55	10.30
08 71 11 00-1779	EA	24" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	189.96	10.30
08 71 11 00-1780	EA	24" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	197.40	10.30
08 71 11 00-1781	EA	24" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	206.98	10.85
08 71 11 00-1782	EA	24" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	214.47	10.85
08 71 11 00-1783	EA	24" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Kick Plate	221.90	10.85

08 71 11 00-1784 Mop Plate (08 71 11 00-0762)
Note: Ives 8400.

08 71 11 00-1785 Aluminum Base Material Mop Plate (08 71 11 00-1784)

08 71 11 00-1786 Satin Aluminum Finish, Aluminum Mop Plate (08 71 11 00-1785)

08 71 11 00-1787	EA	4" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	48.30	7.92
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1788	EA	4" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	49.85	7.92
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1789	EA	4" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	51.33	7.92
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1790	EA	4" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	52.88	7.92
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1791	EA	4" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	55.72	8.25
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1792	EA	4" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	57.21	8.25
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1793	EA	4" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	58.76	8.25
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1794	EA	4" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	60.24	8.25
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1795	EA	4" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	63.64	8.68
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1796	EA	4" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	65.15	8.68
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1797	EA	4" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	66.67	8.68
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1798	EA	4" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	70.36	9.23
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1799	EA	4" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	71.90	9.23
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1800	EA	4" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	73.39	9.23
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	
08 71 11 00-1801	EA	6" x 22", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate	56.67	7.92
		For Four Beveled Edges, Add	1.76	
		For UL Label (Fire Rated), Add	11.40	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1802	EA 6" x 24", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	58.94 1.76 11.40	7.92
08 71 11 00-1803	EA 6" x 26", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	61.25 1.76 11.40	7.92
08 71 11 00-1804	EA 6" x 28", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	63.52 1.76 11.40	7.92
08 71 11 00-1805	EA 6" x 30", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	67.12 1.76 11.40	8.25
08 71 11 00-1806	EA 6" x 32", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	69.37 1.76 11.40	8.25
08 71 11 00-1807	EA 6" x 34", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	71.70 1.76 11.40	8.25
08 71 11 00-1808	EA 6" x 36", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	73.94 1.76 11.40	8.25
08 71 11 00-1809	EA 6" x 38", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	78.10 1.76 11.40	8.68
08 71 11 00-1810	EA 6" x 40", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	80.37 1.76 11.40	8.68
08 71 11 00-1811	EA 6" x 42", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	82.67 1.76 11.40	8.68
08 71 11 00-1812	EA 6" x 44", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	87.12 1.76 11.40	9.23
08 71 11 00-1813	EA 6" x 46", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	89.42 1.76 11.40	9.23
08 71 11 00-1814	EA 6" x 48", 0.050" Thick, Satin Aluminum Finish, Aluminum Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	91.66 1.76 11.40	9.23
08 71 11 00-1815	Brass Base Material Mop Plate <small>(08 71 11 00-1784)</small>		
08 71 11 00-1816	Bright/Satin Brass Finish, Brass Mop Plate <small>(08 71 11 00-1815)</small>		
08 71 11 00-1817	EA 4" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	80.74 1.76 11.40	7.92
08 71 11 00-1818	EA 4" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	85.25 1.76 11.40	7.92
08 71 11 00-1819	EA 4" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	89.71 1.76 11.40	7.92
08 71 11 00-1820	EA 4" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	94.20 1.76 11.40	7.92
08 71 11 00-1821	EA 4" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	99.96 1.76 11.40	8.25
08 71 11 00-1822	EA 4" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	104.42 1.76 11.40	8.25
08 71 11 00-1823	EA 4" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	108.91 1.76 11.40	8.25
08 71 11 00-1824	EA 4" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	113.37 1.76 11.40	8.25
08 71 11 00-1825	EA 4" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	119.71 1.76 11.40	8.68
08 71 11 00-1826	EA 4" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	124.17 1.76 11.40	8.68
08 71 11 00-1827	EA 4" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	128.62 1.76 11.40	8.68
08 71 11 00-1828	EA 4" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	135.28 1.76 11.40	9.23
08 71 11 00-1829	EA 4" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	139.74 1.76 11.40	9.23

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1830 EA 4" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	144.26 1.76 11.40	9.23
08 71 11 00-1831 EA 6" x 22", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	105.38 1.76 11.40	7.92
08 71 11 00-1832 EA 6" x 24", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	112.07 1.76 11.40	7.92
08 71 11 00-1833 EA 6" x 26", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	118.79 1.76 11.40	7.92
08 71 11 00-1834 EA 6" x 28", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	125.47 1.76 11.40	7.92
08 71 11 00-1835 EA 6" x 30", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	133.49 1.76 11.40	8.25
08 71 11 00-1836 EA 6" x 32", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	140.24 1.76 11.40	8.25
08 71 11 00-1837 EA 6" x 34", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	146.90 1.76 11.40	8.25
08 71 11 00-1838 EA 6" x 36", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	153.65 1.76 11.40	8.25
08 71 11 00-1839 EA 6" x 38", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	162.16 1.76 11.40	8.68
08 71 11 00-1840 EA 6" x 40", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	168.90 1.76 11.40	8.68
08 71 11 00-1841 EA 6" x 42", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	175.62 1.76 11.40	8.68
08 71 11 00-1842 EA 6" x 44", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	184.48 1.76 11.40	9.23
08 71 11 00-1843 EA 6" x 46", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	191.20 1.76 11.40	9.23
08 71 11 00-1844 EA 6" x 48", 0.050" Thick, Bright/Satin Brass Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	197.89 1.76 11.40	9.23
08 71 11 00-1845 Bright/Satin Chrome Finish, Stainless Mop Plate (08 71 11 00-1815)		
08 71 11 00-1846 EA 4" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	85.65 1.76 11.40	7.92
08 71 11 00-1847 EA 4" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	90.55 1.76 11.40	7.92
08 71 11 00-1848 EA 4" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	95.47 1.76 11.40	7.92
08 71 11 00-1849 EA 4" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	100.39 1.76 11.40	7.92
08 71 11 00-1850 EA 4" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	106.58 1.76 11.40	8.25
08 71 11 00-1851 EA 4" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	111.51 1.76 11.40	8.25
08 71 11 00-1852 EA 4" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	116.43 1.76 11.40	8.25
08 71 11 00-1853 EA 4" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	121.32 1.76 11.40	8.25
08 71 11 00-1854 EA 4" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	128.09 1.76 11.40	8.68
08 71 11 00-1855 EA 4" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	133.05 1.76 11.40	8.68
08 71 11 00-1856 EA 4" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	137.97 1.76 11.40	8.68
08 71 11 00-1857 EA 4" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	145.06 1.76 11.40	9.23

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1858	EA 4" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	149.95 1.76 11.40	9.23
08 71 11 00-1859	EA 4" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	154.87 1.76 11.40	9.23
08 71 11 00-1860	EA 6" x 22", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	112.68 1.76 11.40	7.92
08 71 11 00-1861	EA 6" x 24", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	120.02 1.76 11.40	7.92
08 71 11 00-1862	EA 6" x 26", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	127.42 1.76 11.40	7.92
08 71 11 00-1863	EA 6" x 28", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	134.82 1.76 11.40	7.92
08 71 11 00-1864	EA 6" x 30", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	143.46 1.76 11.40	8.25
08 71 11 00-1865	EA 6" x 32", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	150.85 1.76 11.40	8.25
08 71 11 00-1866	EA 6" x 34", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	158.19 1.76 11.40	8.25
08 71 11 00-1867	EA 6" x 36", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	165.59 1.76 11.40	8.25
08 71 11 00-1868	EA 6" x 38", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	174.84 1.76 11.40	8.68
08 71 11 00-1869	EA 6" x 40", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	182.18 1.76 11.40	8.68
08 71 11 00-1870	EA 6" x 42", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	189.58 1.76 11.40	8.68
08 71 11 00-1871	EA 6" x 44", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	199.09 1.76 11.40	9.23
08 71 11 00-1872	EA 6" x 46", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	206.48 1.76 11.40	9.23
08 71 11 00-1873	EA 6" x 48", 0.050" Thick, Bright/Satin Chrome Finish, Stainless Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	213.85 1.76 11.40	9.23
08 71 11 00-1874	Satin/Dark Bronze Finish, Brass Mop Plate <small>(08 71 11 00-1815)</small>		
08 71 11 00-1875	EA 4" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	86.55 1.76 11.40	7.92
08 71 11 00-1876	EA 4" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	91.54 1.76 11.40	7.92
08 71 11 00-1877	EA 4" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	96.55 1.76 11.40	7.92
08 71 11 00-1878	EA 4" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	101.53 1.76 11.40	7.92
08 71 11 00-1879	EA 4" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	107.84 1.76 11.40	8.25
08 71 11 00-1880	EA 4" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	112.85 1.76 11.40	8.25
08 71 11 00-1881	EA 4" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	117.87 1.76 11.40	8.25
08 71 11 00-1882	EA 4" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	122.88 1.76 11.40	8.25
08 71 11 00-1883	EA 4" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	129.68 1.76 11.40	8.68
08 71 11 00-1884	EA 4" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	134.69 1.76 11.40	8.68
08 71 11 00-1885	EA 4" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	139.71 1.76 11.40	8.68

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1886 EA 4" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	146.89 1.76 11.40	9.23
08 71 11 00-1887 EA 4" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	151.90 1.76 11.40	9.23
08 71 11 00-1888 EA 4" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	156.85 1.76 11.40	9.23
08 71 11 00-1889 EA 6" x 22", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	114.03 1.76 11.40	7.92
08 71 11 00-1890 EA 6" x 24", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	121.58 1.76 11.40	7.92
08 71 11 00-1891 EA 6" x 26", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	129.07 1.76 11.40	7.92
08 71 11 00-1892 EA 6" x 28", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	151.15 1.76 11.40	7.92
08 71 11 00-1893 EA 6" x 30", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	145.34 1.76 11.40	8.25
08 71 11 00-1894 EA 6" x 32", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	152.83 1.76 11.40	8.25
08 71 11 00-1895 EA 6" x 34", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	160.32 1.76 11.40	8.25
08 71 11 00-1896 EA 6" x 36", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	167.81 1.76 11.40	8.25
08 71 11 00-1897 EA 6" x 38", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	177.21 1.76 11.40	8.68
08 71 11 00-1898 EA 6" x 40", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	184.69 1.76 11.40	8.68
08 71 11 00-1899 EA 6" x 42", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	192.18 1.76 11.40	8.68
08 71 11 00-1900 EA 6" x 44", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	201.84 1.76 11.40	9.23
08 71 11 00-1901 EA 6" x 46", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	209.33 1.76 11.40	9.23
08 71 11 00-1902 EA 6" x 48", 0.050" Thick, Satin/Dark Bronze Finish, Brass Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	216.82 1.76 11.40	9.23
08 71 11 00-1903 Satin Nickel Finish, Stainless Mop Plate <small>(08 71 11 00-1815)</small>		
08 71 11 00-1904 EA 4" x 22", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	87.51 1.76 11.40	7.92
08 71 11 00-1905 EA 4" x 24", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	92.54 1.76 11.40	7.92
08 71 11 00-1906 EA 4" x 26", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	97.66 1.76 11.40	7.92
08 71 11 00-1907 EA 4" x 28", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	102.75 1.76 11.40	7.92
08 71 11 00-1908 EA 4" x 30", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	109.14 1.76 11.40	8.25
08 71 11 00-1909 EA 4" x 32", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	114.20 1.76 11.40	8.25
08 71 11 00-1910 EA 4" x 34", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	119.29 1.76 11.40	8.25
08 71 11 00-1911 EA 4" x 36", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	124.38 1.76 11.40	8.25
08 71 11 00-1912 EA 4" x 38", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	131.36 1.76 11.40	8.68
08 71 11 00-1913 EA 4" x 40", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	136.42 1.76 11.40	8.68

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1914	EA 4" x 42", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	141.48 1.76 11.40	8.68
08 71 11 00-1915	EA 4" x 44", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	148.77 1.76 11.40	9.23
08 71 11 00-1916	EA 4" x 46", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	153.86 1.76 11.40	9.23
08 71 11 00-1917	EA 4" x 48", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	158.89 1.76 11.40	9.23
08 71 11 00-1918	EA 6" x 22", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	115.46 1.76 11.40	7.92
08 71 11 00-1919	EA 6" x 24", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	123.08 1.76 11.40	7.92
08 71 11 00-1920	EA 6" x 26", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	130.71 1.76 11.40	7.92
08 71 11 00-1921	EA 6" x 28", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	138.33 1.76 11.40	7.92
08 71 11 00-1922	EA 6" x 30", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	147.25 1.76 11.40	8.25
08 71 11 00-1923	EA 6" x 32", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	154.87 1.76 11.40	8.25
08 71 11 00-1924	EA 6" x 34", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	162.49 1.76 11.40	8.25
08 71 11 00-1925	EA 6" x 36", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	170.14 1.76 11.40	8.25
08 71 11 00-1926	EA 6" x 38", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	179.61 1.76 11.40	8.68
08 71 11 00-1927	EA 6" x 40", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	187.26 1.76 11.40	8.68
08 71 11 00-1928	EA 6" x 42", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	194.89 1.76 11.40	8.68
08 71 11 00-1929	EA 6" x 44", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	204.68 1.76 11.40	9.23
08 71 11 00-1930	EA 6" x 46", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	212.30 1.76 11.40	9.23
08 71 11 00-1931	EA 6" x 48", 0.050" Thick, Satin/Nickel Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	219.95 1.76 11.40	9.23
08 71 11 00-1932	Stainless Base Material Mop Plate <small>(08 71 11 00-1784)</small>		
08 71 11 00-1933	Satin Stainless Finish, Stainless Mop Plate <small>(08 71 11 00-1932)</small>		
08 71 11 00-1934	EA 4" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	49.75 1.76 11.40	7.92
08 71 11 00-1935	EA 4" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	51.36 1.76 11.40	7.92
08 71 11 00-1936	EA 4" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	53.03 1.76 11.40	7.92
08 71 11 00-1937	EA 4" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	54.66 1.76 11.40	7.92
08 71 11 00-1938	EA 4" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	57.63 1.76 11.40	8.25
08 71 11 00-1939	EA 4" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	59.30 1.76 11.40	8.25
08 71 11 00-1940	EA 4" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	60.90 1.76 11.40	8.25
08 71 11 00-1941	EA 4" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	62.57 1.76 11.40	8.25

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1942 EA 4" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	66.06 1.76 11.40	8.68
08 71 11 00-1943 EA 4" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	67.72 1.76 11.40	8.68
08 71 11 00-1944 EA 4" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	69.39 1.76 11.40	8.68
08 71 11 00-1945 EA 4" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	73.17 1.76 11.40	9.23
08 71 11 00-1946 EA 4" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	74.84 1.76 11.40	9.23
08 71 11 00-1947 EA 4" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	76.47 1.76 11.40	9.23
08 71 11 00-1948 EA 6" x 22", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	58.77 1.76 11.40	7.92
08 71 11 00-1949 EA 6" x 24", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	61.27 1.76 11.40	7.92
08 71 11 00-1950 EA 6" x 26", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	63.74 1.76 11.40	7.92
08 71 11 00-1951 EA 6" x 28", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	66.24 1.76 11.40	7.92
08 71 11 00-1952 EA 6" x 30", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	69.98 1.76 11.40	8.25
08 71 11 00-1953 EA 6" x 32", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	72.45 1.76 11.40	8.25
08 71 11 00-1954 EA 6" x 34", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	74.95 1.76 11.40	8.25
08 71 11 00-1955 EA 6" x 36", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	77.42 1.76 11.40	8.25
08 71 11 00-1956 EA 6" x 38", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	81.77 1.76 11.40	8.68
08 71 11 00-1957 EA 6" x 40", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	84.21 1.76 11.40	8.68
08 71 11 00-1958 EA 6" x 42", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	86.68 1.76 11.40	8.68
08 71 11 00-1959 EA 6" x 44", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	91.35 1.76 11.40	9.23
08 71 11 00-1960 EA 6" x 46", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	93.79 1.76 11.40	9.23
08 71 11 00-1961 EA 6" x 48", 0.050" Thick, Satin Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	96.29 1.76 11.40	9.23
08 71 11 00-1962 Bright Stainless Finish, Stainless Mop Plate (08 71 11 00-1932)		
08 71 11 00-1963 EA 4" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	71.45 1.76 11.40	7.92
08 71 11 00-1964 EA 4" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	75.09 1.76 11.40	7.92
08 71 11 00-1965 EA 4" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	78.74 1.76 11.40	7.92
08 71 11 00-1966 EA 4" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	82.33 1.76 11.40	7.92
08 71 11 00-1967 EA 4" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	87.27 1.76 11.40	8.25
08 71 11 00-1968 EA 4" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	90.89 1.76 11.40	8.25
08 71 11 00-1969 EA 4" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	94.54 1.76 11.40	8.25

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-1970	EA 4" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	98.18 1.76 11.40	8.25
08 71 11 00-1971	EA 4" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	103.62 1.76 11.40	8.68
08 71 11 00-1972	EA 4" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	107.27 1.76 11.40	8.68
08 71 11 00-1973	EA 4" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	110.91 1.76 11.40	8.68
08 71 11 00-1974	EA 4" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	116.70 1.76 11.40	9.23
08 71 11 00-1975	EA 4" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	120.35 1.76 11.40	9.23
08 71 11 00-1976	EA 4" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	123.93 1.76 11.40	9.23
08 71 11 00-1977	EA 6" x 22", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	91.38 1.76 11.40	7.92
08 71 11 00-1978	EA 6" x 24", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	96.88 1.76 11.40	7.92
08 71 11 00-1979	EA 6" x 26", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	102.32 1.76 11.40	7.92
08 71 11 00-1980	EA 6" x 28", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	107.76 1.76 11.40	7.92
08 71 11 00-1981	EA 6" x 30", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	114.47 1.76 11.40	8.25
08 71 11 00-1982	EA 6" x 32", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	119.91 1.76 11.40	8.25
08 71 11 00-1983	EA 6" x 34", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	125.35 1.76 11.40	8.25
08 71 11 00-1984	EA 6" x 36", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	130.80 1.76 11.40	8.25
08 71 11 00-1985	EA 6" x 38", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	138.12 1.76 11.40	8.68
08 71 11 00-1986	EA 6" x 40", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	143.56 1.76 11.40	8.68
08 71 11 00-1987	EA 6" x 42", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	149.00 1.76 11.40	8.68
08 71 11 00-1988	EA 6" x 44", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	156.61 1.76 11.40	9.23
08 71 11 00-1989	EA 6" x 46", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	162.02 1.76 11.40	9.23
08 71 11 00-1990	EA 6" x 48", 0.050" Thick, Bright Stainless Finish, Stainless Mop Plate..... <i>For Four Beveled Edges, Add</i> <i>For UL Label (Fire Rated), Add</i>	167.46 1.76 11.40	9.23
08 71 11 00-1991	Plastic Mop Plate <small>(08 71 11 00-1784)</small>		
08 71 11 00-1992	Clear Or Black Finish, Plastic Mop Plate <small>(08 71 11 00-1991)</small> Note: With four beveled edges.		
08 71 11 00-1993	EA 4" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	45.85	7.92
08 71 11 00-1994	EA 4" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	47.15	7.92
08 71 11 00-1995	EA 4" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	48.47	7.92
08 71 11 00-1996	EA 4" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	49.76	7.92
08 71 11 00-1997	EA 4" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	52.36	8.25
08 71 11 00-1998	EA 4" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	53.65	8.25
08 71 11 00-1999	EA 4" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	54.94	8.25
08 71 11 00-2000	EA 4" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	56.26	8.25



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2001	EA	4" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	59.41	8.68
08 71 11 00-2002	EA	4" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	60.70	8.68
08 71 11 00-2003	EA	4" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	61.99	8.68
08 71 11 00-2004	EA	4" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	65.46	9.23
08 71 11 00-2005	EA	4" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	66.78	9.23
08 71 11 00-2006	EA	4" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	68.07	9.23
08 71 11 00-2007	EA	6" x 22", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	53.00	7.92
08 71 11 00-2008	EA	6" x 24", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	54.96	7.92
08 71 11 00-2009	EA	6" x 26", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	56.90	7.92
08 71 11 00-2010	EA	6" x 28", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	58.84	7.92
08 71 11 00-2011	EA	6" x 30", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	62.11	8.25
08 71 11 00-2012	EA	6" x 32", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	64.05	8.25
08 71 11 00-2013	EA	6" x 34", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	65.99	8.25
08 71 11 00-2014	EA	6" x 36", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	67.93	8.25
08 71 11 00-2015	EA	6" x 38", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	71.75	8.68
08 71 11 00-2016	EA	6" x 40", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	73.69	8.68
08 71 11 00-2017	EA	6" x 42", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	75.63	8.68
08 71 11 00-2018	EA	6" x 44", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	79.77	9.23
08 71 11 00-2019	EA	6" x 46", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	81.71	9.23
08 71 11 00-2020	EA	6" x 48", 1/8" Thick, Clear Or Black Finish, High Impact Polyethylene Plastic Mop Plate..... Note: 4 sides beveled.	83.65	9.23
08 71 11 00-2021		Armor Door Plate <small>(08 71 11 00-0762)</small> Note: Size ranges of 26" to 48" high, 22" to 48" wide. Ives 8400.		
08 71 11 00-2022	SF	4 to 8 SF, 0.050" Thick, Satin Aluminum Finish, Aluminum Door Armor Plate	29.80	1.36
08 71 11 00-2023	SF	>8 to 16 SF, 0.050" Thick, Satin Aluminum Finish, Aluminum Door Armor Plate	28.60	1.06
08 71 11 00-2024	SF	4 to 8 SF, 0.050" Thick, Satin Stainless Finish, Stainless Door Armor Plate	32.82	1.36
08 71 11 00-2025	SF	>8 to 16 SF, 0.050" Thick, Satin Stainless Finish, Stainless Door Armor Plate	31.62	1.06
08 71 11 00-2026	SF	4 to 8 SF, 0.050" Thick, Bright Stainless Finish, Stainless Door Armor Plate	67.81	1.36
08 71 11 00-2027	SF	>8 to 16 SF, 0.050" Thick, Bright Stainless Finish, Stainless Door Armor Plate	66.61	1.06
08 71 11 00-2028		Pull Handle And Plates <small>(08 71 11 00-0762)</small>		
08 71 11 00-2029		Pull Handle <small>(08 71 11 00-2028)</small>		
08 71 11 00-2030	EA	3/4" Diameter, 6" Center to Center, Aluminum Door Pulls (Ives 8102HD-6)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	60.37 10.32 14.00	8.95
08 71 11 00-2031	EA	3/4" Diameter, 8" Center to Center, Aluminum Door Pulls (Ives 8102HD-8)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	63.56 11.66 15.82	8.95
08 71 11 00-2032	EA	3/4" Diameter, 10" Center to Center, Aluminum Door Pulls (Ives 8102HD-10)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	68.59 13.77 18.69	8.95
08 71 11 00-2033	EA	1" Diameter, 8" Center to Center, Aluminum Door Pulls (Ives 8103HD-8)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	71.38 14.94 20.28	8.95
08 71 11 00-2034	EA	1" Diameter, 10" Center to Center, Aluminum Door Pulls (Ives 8103HD-10)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	76.43 17.06 23.16	8.95
08 71 11 00-2035	EA	1" Diameter, 12" Center to Center, Aluminum Door Pulls (Ives 8103HD-12)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	82.95 19.80 26.88	8.95
08 71 11 00-2036	EA	1" Flattened x 1/2" Round, 6" Center To Center, Aluminum Door Pulls (Ives 8105-6)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	63.80 11.76 15.96	8.95
08 71 11 00-2037	EA	1" Flattened x 1/2" Round, 8" Center To Center, Aluminum Door Pulls (Ives 8105-8)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	70.76 14.68 19.93	8.95
08 71 11 00-2038	EA	1" Flattened x 1/2" Round, 10" Center To Center, Aluminum Door Pulls (Ives 8105-10)..... <i>For Stainless Steel, Add</i> <i>For Brass, Add</i>	71.90 15.16 20.58	8.95

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-2039	EA	1" Diameter, 8" Center to Center, Satin Stainless Steel Offset Door Pulls (Ives 8190HD-8)	142.18		8.95
		<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	20.11		
		<i>For Brass, Add</i>	18.51		
08 71 11 00-2040	EA	1" Diameter, 10" Center to Center, Satin Stainless Steel Offset Door Pulls (Ives 8190HD-0)	146.48		8.95
		<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	20.92		
		<i>For Brass, Add</i>	19.26		
08 71 11 00-2041	EA	1" Diameter, 12" Center to Center, Satin Stainless Steel Offset Door Pulls (Ives 8190HD-2)	155.13		8.95
		<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	22.55		
		<i>For Brass, Add</i>	20.76		
08 71 11 00-2042	EA	1" Diameter, 18" Center to Center, Satin Stainless Steel Offset Door Pulls (Ives 8190HD-18)	205.25		8.95
		<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	32.03		
		<i>For Brass, Add</i>	29.48		
08 71 11 00-2043		Pull Plate (08 71 11 00-2028)			
08 71 11 00-2044	EA	3-1/2" x 15" Aluminum Pull Plate Door Hardware (Ives 8302)	97.16		6.78
		<i>For Stainless Steel, Add</i>	41.32		
		<i>For Brass, Add</i>	52.53		
08 71 11 00-2045	EA	4" x 16" Aluminum Pull Plate Door Hardware (Ives 8302)	99.60		6.78
		<i>For Stainless Steel, Add</i>	42.76		
		<i>For Brass, Add</i>	54.36		
08 71 11 00-2046	EA	6" x 16" Aluminum Pull Plate Door Hardware (Ives 8302)	105.15		6.78
		<i>For Stainless Steel, Add</i>	46.04		
		<i>For Brass, Add</i>	58.52		
08 71 11 00-2047		Push Bars And Plates (08 71 11 00-0762)			
08 71 11 00-2048		Push Bars (08 71 11 00-2047)			
08 71 11 00-2049	EA	3/8" x 2-1/2" Bronze Push Bar, Rectangular, With Base Plate.....	269.07		6.78
		Note: Up to 34" wide. All finishes.			
08 71 11 00-2050	EA	3/4" Diameter Stainless Steel Push Bar, Up To 34" Wide.....	264.30		6.78
		<i>For Brass Push Bar, Add</i>	41.27		
08 71 11 00-2051	EA	1" Diameter Stainless Steel Push Bar, Up To 34" Wide.....	274.25		6.78
		<i>For Brass Push Bar, Add</i>	43.00		
08 71 11 00-2052	EA	1-1/4" Diameter Stainless Steel Push Bar, Up To 34" Wide	521.38		6.78
		<i>For Brass Push Bar, Add</i>	86.00		
08 71 11 00-2053		Push Plates (08 71 11 00-2047)			
08 71 11 00-2054		Aluminum Push Plates (08 71 11 00-2053)			
08 71 11 00-2055		Clear Anodized Finish, Aluminum Push Plates (08 71 11 00-2054)			
		Note: Ives 8200 Series.			
08 71 11 00-2056	EA	3" x 12", Clear Anodized Finish, Aluminum Push Plate Door Hardware	44.72		6.78
08 71 11 00-2057	EA	4" x 16", Clear Anodized Finish, Aluminum Push Plate Door Hardware	44.72		6.78
08 71 11 00-2058	EA	6" x 16", Clear Anodized Finish, Aluminum Push Plate Door Hardware	44.72		6.78
08 71 11 00-2059	EA	8" x 16", Clear Anodized Finish, Aluminum Push Plate Door Hardware	49.17		6.78
08 71 11 00-2060		Stainless Steel Push Plates (08 71 11 00-2053)			
08 71 11 00-2061		Satin Finish, Stainless Steel Push Plates (08 71 11 00-2060)			
		Note: Ives 8200 Series.			
08 71 11 00-2062	EA	3" x 12", Satin Finish, Stainless Steel Push Plate Door Hardware.....	44.72		6.78
08 71 11 00-2063	EA	4" x 16", Satin Finish, Stainless Steel Push Plate Door Hardware.....	48.14		6.78
08 71 11 00-2064	EA	6" x 16", Satin Finish, Stainless Steel Push Plate Door Hardware.....	55.96		6.78
08 71 11 00-2065	EA	8" x 16", Satin Finish, Stainless Steel Push Plate Door Hardware.....	67.53		6.78
08 71 11 00-2066		Brass Push Plates (08 71 11 00-2053)			
08 71 11 00-2067		Bright/Satin Brass Finish, Brass Push Plates (08 71 11 00-2066)			
		Note: Ives 8200 Series.			
08 71 11 00-2068	EA	3" x 12", Bright/Satin Brass Finish, Brass Push Plate Door Hardware	55.17		6.78
08 71 11 00-2069	EA	4" x 16", Bright/Satin Brass Finish, Brass Push Plate Door Hardware	63.96		6.78
08 71 11 00-2070	EA	6" x 16", Bright/Satin Brass Finish, Brass Push Plate Door Hardware	85.13		6.78
08 71 11 00-2071	EA	8" x 16", Bright/Satin Brass Finish, Brass Push Plate Door Hardware.....	99.03		6.78
08 71 11 00-2072		Bright/Satin Chrome Finish, Brass Push Plates (08 71 11 00-2066)			
		Note: Ives 8200 Series.			
08 71 11 00-2073	EA	3" x 12", Bright/Satin Chrome Finish, Brass Push Plate Door Hardware	62.20		6.78
08 71 11 00-2074	EA	4" x 16", Bright/Satin Chrome Finish, Brass Push Plate Door Hardware	69.34		6.78
08 71 11 00-2075	EA	6" x 16", Bright/Satin Chrome Finish, Brass Push Plate Door Hardware	88.73		6.78
08 71 11 00-2076	EA	8" x 16", Bright/Satin Chrome Finish, Brass Push Plate Door Hardware	107.85		6.78
08 71 11 00-2077		Satin/Dark Bronze Finish, Brass Push Plates (08 71 11 00-2066)			
		Note: Ives 8200 Series.			
08 71 11 00-2078	EA	3" x 12", Satin/Dark Bronze Finish, Brass Push Plate Door Hardware	62.20		6.78
08 71 11 00-2079	EA	4" x 16", Satin/Dark Bronze Finish, Brass Push Plate Door Hardware	69.34		6.78
08 71 11 00-2080	EA	6" x 16", Satin/Dark Bronze Finish, Brass Push Plate Door Hardware	92.15		6.78



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 71 11 00-2081	EA	8" x 16", Satin/Dark Bronze Finish, Brass Push Plate Door Hardware	109.75		6.78
08 71 11 00-2082		Satin Nickel Finish, Brass Push Plates <small>(08 71 11 00-2066)</small>			
		Note: Ives 8200 Series.			
08 71 11 00-2083	EA	3" x 12", Satin Nickel Finish, Brass Push Plate Door Hardware	62.20		6.78
08 71 11 00-2084	EA	4" x 16", Satin Nickel Finish, Brass Push Plate Door Hardware	71.13		6.78
08 71 11 00-2085	EA	6" x 16", Satin Nickel Finish, Brass Push Plate Door Hardware	97.57		6.78
08 71 11 00-2086	EA	8" x 16", Satin Nickel Finish, Brass Push Plate Door Hardware	115.17		6.78
08 71 11 00-2087		Exit Devices <small>(08 71 11)</small>			
08 71 11 00-2088		Push Bar Exit Device, Von Duprin Series 22 <small>(08 71 11 00-2087)</small>			
		Note: Grade 1, BHMA 156.3.			
08 71 11 00-2089	EA	3' Push Bar, Rim Type, Exit Device (Von Duprin Series 22).....	759.61		122.06
		Note: Anodized finish: aluminum or dark brown.			
		<i>For 4' Push Bar, Add</i>	13.87		
08 71 11 00-2090	EA	3' Push Bar, Fire Rated, Rim Type, Exit Device (Von Duprin Series 22-F).....	845.50		122.06
		Note: Anodized finish: aluminum or dark brown.			
		<i>For 4' Push Bar, Add</i>	13.87		
08 71 11 00-2091	EA	3' Push Bar, Surface Vertical Rods, Exit Device (Von Duprin Series 2227).....	1,102.76		146.48
		Note: Anodized finish: aluminum or dark brown.			
		<i>For 4' Push Bar, Add</i>	13.87		
08 71 11 00-2092	EA	3' Push Bar, Fire Rated, Surface Vertical Rods, Exit Device (Von Duprin Series 2227-F).....	1,316.70		135.63
		Note: Anodized finish: aluminum or dark brown.			
		<i>For 4' Push Bar, Add</i>	13.87		
08 71 11 00-2093	EA	Dummy Trim (Von Duprin Series 22, 210DT)	102.79		20.34
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2094	EA	Night Latch Trim With Cylinder (Von Duprin Series 22, 210NL)	222.01		27.12
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2095	EA	Knob Trim With Cylinder (Von Duprin Series 22, 210K)	416.99		40.69
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2096	EA	Lever Trim With Cylinder (Von Duprin Series 22, 230L)	413.03		40.69
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2097	EA	Thumbpiece Trim With Cylinder (Von Duprin Series 22, 230TP).....	412.04		40.69
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2098	EA	Blank Escutcheon Knob (Von Duprin Series 22, 210K-BE)	327.39		40.69
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2099	EA	Exit Only Trim Plate (Von Duprin Series 22, 230EO).....	132.54		16.28
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2100	EA	Dummy Trim (Von Duprin Series 22, 230DT)	153.29		20.34
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2101	EA	Night Latch Trim With Cylinder (Von Duprin Series 22, 230NL)	274.50		27.12
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2102	EA	Blank Escutcheon Lever (Von Duprin Series 22, 230L-BE).....	323.43		40.69
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2103	EA	Blank Escutcheon Thumbpiece (Von Duprin Series 22, 230TP-BE).....	322.44		40.69
		Note: Anodized finish: aluminum or dark brown.			
08 71 11 00-2104		Push Bar Exit Device, Narrow Stile, Von Duprin Series 33/35 <small>(08 71 11 00-2087)</small>			
		Note: Grade 1, BHMA 156.3. Series 33 has a ribbed case, Series 35 has a smooth case.			
08 71 11 00-2105	EA	3' Push Bar, Rim Type, Narrow Stile Exit Device (Von Duprin Series 33/35)	1,579.73		122.06
		Note: Aluminum anodized finish.			
		<i>For 4' Push Bar, Add</i>	13.87		
		<i>For Accessible Device (AX), Add</i>	125.42		
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	128.43		
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	121.03		
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	47.66		
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	366.23		
08 71 11 00-2106	EA	3' Push Bar, Surface Vertical Rods, Narrow Stile Exit Device (Von Duprin Series 3327/3527)	2,154.39		146.48
		Note: Aluminum anodized finish.			
		<i>For 4' Push Bar, Add</i>	13.87		
		<i>For Accessible Device (AX), Add</i>	176.38		
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	180.61		
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	170.20		
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	67.02		
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	515.02		
08 71 11 00-2107	EA	3' Push Bar, Fire Rated, Surface Vertical Rods, Narrow Stile Exit Device (Von Duprin Series 3327-F/3527-F).....	2,197.12		146.48
		Note: Aluminum anodized finish.			
		<i>For 4' Push Bar, Add</i>	13.87		
		<i>For Accessible Device (AX), Add</i>	180.65		
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	184.99		
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	174.33		
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	68.65		
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	527.50		
08 71 11 00-2108	EA	3' Push Bar, Concealed Vertical Rods, Narrow Stile Exit Device (Von Duprin Series 3347/3547)	2,229.80		168.18
		Note: Aluminum anodized finish.			
		<i>For 4' Push Bar, Add</i>	13.87		
		<i>For Accessible Device (AX), Add</i>	177.95		
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	182.22		
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	171.72		
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	67.62		
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	519.62		

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-2109	EA	3' Push Bar, Fire Rated, Concealed Vertical Rods, Narrow Stile Exit Device (Von Duprin Series 3347-F/3547-F).....	2,340.04	168.18
		Note: Aluminum anodized finish.		
		For 4' Push Bar, Add	13.87	
		For Accessible Device (AX), Add	188.98	
		For DuraNodic Dark Bronze US313 (BHMA 710) Finish, Add	193.51	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	182.36	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	71.81	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	551.81	
08 71 11 00-2110	EA	3' Push Bar, Concealed Vertical Rods, Narrow Stile Exit Device (Von Duprin Series 3348/3548)	2,494.14	168.18
		Note: Aluminum anodized finish.		
		For 4' Push Bar, Add	13.87	
		For Accessible Device (AX), Add	204.39	
		For DuraNodic Dark Bronze US313 (BHMA 710) Finish, Add	209.29	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	197.23	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	77.67	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	596.81	
08 71 11 00-2111	EA	3' Push Bar, Fire Rated, Concealed Vertical Rods, Narrow Stile Exit Device (Von Duprin Series 3348-F/3548-F).....	2,604.38	168.18
		Note: Aluminum anodized finish.		
		For 4' Push Bar, Add	13.87	
		For Accessible Device (AX), Add	215.41	
		For DuraNodic Dark Bronze US313 (BHMA 710) Finish, Add	220.58	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	207.87	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	81.86	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	629.00	
08 71 11 00-2112	EA	Dummy Trim (Von Duprin Series 33/35, DT).....	355.70	20.34
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	29.09	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	11.46	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	88.02	
08 71 11 00-2113	EA	Night Latch With Cylinder, Less Pull (Von Duprin Series 33/35, NL-OP).....	406.44	27.12
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	31.89	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	12.56	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	96.50	
08 71 11 00-2114	EA	Night Latch With Cylinder (Von Duprin Series 33/35, NL).....	656.67	27.12
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	56.04	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	22.07	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	169.57	
08 71 11 00-2115	EA	Lever Trim With Cylinder (Von Duprin Series 33/35, 360L).....	668.46	40.69
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	54.04	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	21.28	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	163.51	
08 71 11 00-2116	EA	Blank Escutcheon Lever With Cylinder (Von Duprin Series 33/35, 360L-BE).....	792.02	40.69
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	65.96	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	25.97	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	199.59	
08 71 11 00-2117	EA	Lever Dummy Trim With Cylinder (Von Duprin Series 33/35, 360L-DT).....	776.44	40.69
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	64.46	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	25.38	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	195.04	
08 71 11 00-2118	EA	Thumbturn Trim With Cylinder (Von Duprin Series 33/35, 360T).....	783.72	40.69
		Note: Anodized finish: aluminum or dark brown.		
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	65.16	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	25.66	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	197.16	

08 71 11 00-2119 Push Bar Exit Device, Von Duprin Series 98/99 (08 71 11 00-2087)

Note: Grade 1, BHMA 156.3. Series 98 has a smooth case, Series 99 has a grooved case.

08 71 11 00-2120	EA	3' Push Bar, Rim Type, Exit Device (Von Duprin Series 98/99).....	1,521.08	122.06
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For DuraNodic Dark Bronze US313 (BHMA 710) Finish, Add	72.93	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	115.97	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	185.31	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	379.00	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	119.56	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	175.75	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	119.56	



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2121	EA 3' Push Bar, Fire Rated, Rim Type, Exit Device (Von Duprin Series 98-F/99-F) Note: Clear anodized satin aluminum US28 (BHMA 628) finish.	1,730.21	122.06
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	85.69	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	136.26	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	217.73	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	445.29	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	140.47	
	<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	206.49	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	140.47	
08 71 11 00-2122	EA 3' Push Bar, Rim Type, Exit Device (Von Duprin Series XP98/XP99) Note: Clear anodized satin aluminum US28 (BHMA 628) finish.	1,375.40	122.06
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	64.04	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	101.84	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	162.73	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	332.82	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	104.99	
	<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	154.33	
	<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
	<i>For Special Center Case Dogging (SD), Add</i>	262.29	
	<i>For Cylinder Dogging Indicator (CI), Add</i>	174.58	
	<i>For Dogging Indicator (DI), Add</i>	160.38	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	104.99	
08 71 11 00-2123	EA 3' Push Bar, Fire Rated, Rim Type, Exit Device (Von Duprin Series XP98-F/XP99-F) Note: Clear anodized satin aluminum US28 (BHMA 628) finish.	1,535.85	122.06
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	73.83	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	117.40	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	187.60	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	383.68	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	121.03	
	<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	177.92	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	121.03	
08 71 11 00-2124	EA 3' Push Bar, Surface Vertical Rods, Exit Device (Von Duprin Series 9827/9927) Note: Clear anodized satin aluminum US28 (BHMA 628) finish.	2,175.77	146.48
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	108.89	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	173.16	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	276.70	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	565.90	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	178.52	
	<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	262.42	
	<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
	<i>For Special Center Case Dogging (SD), Add</i>	262.29	
	<i>For Cylinder Dogging Indicator (CI), Add</i>	174.58	
	<i>For Dogging Indicator (DI), Add</i>	160.38	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	178.52	
08 71 11 00-2125	EA 3' Push Bar, Fire Rated, Surface Vertical Rods, Exit Device (Von Duprin Series 9827-F/9927-F) Note: Clear anodized satin aluminum US28 (BHMA 628) finish.	2,459.23	146.48
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	126.19	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	200.66	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	320.64	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	655.75	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	206.86	
	<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	304.09	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	206.86	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-2126	EA	3' Push Bar, Concealed Vertical Rods, Exit Device (Von Duprin Series 9847/9947).....	2,282.05	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		<i>For 4' Push Bar, Add</i>	13.00	
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	170.35	
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	177.68	
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	283.92	
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	580.67	
		<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	183.18	
		<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	269.27	
		<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
		<i>For Special Center Case Dogging (SD), Add</i>	262.29	
		<i>For Cylinder Dogging Indicator (CI), Add</i>	174.58	
		<i>For Dogging Indicator (DI), Add</i>	160.38	
		<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
		<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
		<i>For Safety Glow Touchpad, Add</i>	292.35	
		<i>For Accessible Device (AX), Add</i>	183.18	
08 71 11 00-2127	EA	3' Push Bar, Fire Rated, Concealed Vertical Rods, Exit Device (Von Duprin Series 9847-F/9947-F).....	2,571.81	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		<i>For 4' Push Bar, Add</i>	13.00	
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	197.30	
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	205.79	
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	328.84	
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	672.53	
		<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	212.15	
		<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	311.86	
		<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
		<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
		<i>For Safety Glow Touchpad, Add</i>	292.35	
		<i>For Accessible Device (AX), Add</i>	212.15	
08 71 11 00-2128	EA	3' Push Bar, Concealed Vertical Rods, Exit Device (Von Duprin Series 9848/9948).....	2,578.10	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		<i>For 4' Push Bar, Add</i>	13.00	
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	197.89	
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	206.40	
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	329.81	
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	674.52	
		<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	212.78	
		<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	312.79	
		<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
		<i>For Special Center Case Dogging (SD), Add</i>	262.29	
		<i>For Cylinder Dogging Indicator (CI), Add</i>	174.58	
		<i>For Dogging Indicator (DI), Add</i>	160.38	
		<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
		<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
		<i>For Safety Glow Touchpad, Add</i>	292.35	
		<i>For Accessible Device (AX), Add</i>	212.78	
08 71 11 00-2129	EA	3' Push Bar, Fire Rated, Concealed Vertical Rods, Exit Device (Von Duprin Series 9848-F/9948-F).....	2,350.98	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		<i>For 4' Push Bar, Add</i>	13.00	
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	176.77	
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	184.37	
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	294.61	
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	602.52	
		<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	190.07	
		<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	279.40	
		<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
		<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
		<i>For Safety Glow Touchpad, Add</i>	292.35	
		<i>For Accessible Device (AX), Add</i>	190.07	
08 71 11 00-2130	EA	3' Push Bar, Concealed Vertical Rods, Exit Device For Wood Door (Von Duprin Series 9847WDC/9947WDC).....	2,055.82	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		<i>For 4' Push Bar, Add</i>	13.00	
		<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	149.32	
		<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	155.74	
		<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	248.86	
		<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	508.96	
		<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	160.55	
		<i>For Satin Stainless Steel, US32D (BHMA 630) Finish, Add</i>	236.01	
		<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
		<i>For Special Center Case Dogging (SD), Add</i>	262.29	
		<i>For Cylinder Dogging Indicator (CI), Add</i>	174.58	
		<i>For Dogging Indicator (DI), Add</i>	160.38	
		<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
		<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
		<i>For Safety Glow Touchpad, Add</i>	292.35	
		<i>For Accessible Device (AX), Add</i>	160.55	



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2131	EA	3' Push Bar, Fire Rated, Concealed Vertical Rods, Exit Device For Wood Door (Von Duprin Series 9847WDC-F/9947WDC-F).....	2,312.35	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	173.17	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	180.62	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	288.62	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	590.28	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	186.21	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	273.72	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	186.21	
08 71 11 00-2132	EA	3' Push Bar, Surface Mount, Three Point Latch, Exit Device (Von Duprin Series 9857/9957).....	2,227.92	146.48
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	112.08	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	178.22	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	284.78	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	582.43	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	183.73	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	270.08	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	183.73	
08 71 11 00-2133	EA	3' Push Bar, Fire Rated, Surface Mount, Three Point Latch, Exit Device (Von Duprin Series 9857-F/9957-F).....	2,375.50	146.48
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	121.08	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	192.53	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	307.66	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	629.21	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	198.49	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	291.78	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	198.49	
08 71 11 00-2134	EA	3' Push Bar, Mortise Lock, Exit Device (Von Duprin Series 9875/9975).....	2,154.25	151.91
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	64.65	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	169.49	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	270.84	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	553.92	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	174.74	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	256.86	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	174.74	
08 71 11 00-2135	EA	3' Push Bar, Fire Rated, Mortise Lock, Exit Device (Von Duprin Series 9875-F/9975-F).....	2,367.14	151.91
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	72.53	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	190.15	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	303.84	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	621.40	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	196.03	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	288.16	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	196.03	

08 Openings

08 70 Hardware

08 71 Door Hardware

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-2136	EA	3' Push Bar, Concealed Vertical Cable, Exit Device (Von Duprin Series 9849/9949).....	1,960.73	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	140.47	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	146.51	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	234.12	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	478.81	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	151.05	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	222.04	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	151.05	
08 71 11 00-2137	EA	3' Push Bar, Fire Rated, Concealed Vertical Cable, Exit Device(Von Duprin Series 9849-F/9949-F).....	2,127.12	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	155.95	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	162.65	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	259.91	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	531.56	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	167.68	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	246.50	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	167.68	
08 71 11 00-2138	EA	3' Push Bar, Concealed Vertical Cable, Exit Device For Wood Door (Von Duprin Series 9849WDC/9949WDC)	2,133.07	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	156.50	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	163.23	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	260.83	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	533.44	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	168.28	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	247.37	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	168.28	
08 71 11 00-2139	EA	3' Push Bar, Fire Rated, Concealed Vertical Cable, Exit Device For Wood Door (Von Duprin Series 9849WDC-F/9949WDC-F)	2,430.21	168.18
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	184.13	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	192.05	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	306.89	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	627.64	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	197.99	
		For Satin Stainless Steel, US32D (BHMA 630) Finish, Add	291.05	
		For Standard Baseplate Cylinder Dogging (CD), Add	62.65	
		For Special Center Case Dogging (SD), Add	262.29	
		For Cylinder Dogging Indicator (CI), Add	174.58	
		For Dogging Indicator (DI), Add	160.38	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	197.99	
08 71 11 00-2140	EA	3' Push Bar, Chexit Delayed Egress, Exit Device (Von Duprin Series CX98/CX99).....	3,407.08	141.05
		Note: Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	469.23	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	959.66	
		For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add	302.73	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	112.62	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	126.54	
		For Center Case Dogging (CD-CX), Add	283.16	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	302.73	



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2141	EA 3' Push Bar, Fire Rated, Chexit Delayed Egress, Exit Device (Von Duprin Series CX98-F/CX99-F) Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.	3,616.21	141.05
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	501.65	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	1,025.95	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	323.65	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	120.40	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	135.28	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	323.65	
08 71 11 00-2142	EA 3' Push Bar, Mortise Chexit Delayed Egress, Exit Device (Von Duprin Series CX9875/CX9975) Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.	4,051.10	173.60
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	554.76	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	1,134.58	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	357.91	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	133.14	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	149.61	
	<i>For Center Case Dogging (CD-CX), Add</i>	283.16	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	357.91	
08 71 11 00-2143	EA 3' Push Bar, Fire Rated, Mortise Chexit Delayed Egress, Exit Device (Von Duprin Series CX9875-F/CX9975-F) Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.	4,264.01	173.60
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	587.76	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	1,202.07	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	379.20	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	141.06	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	158.51	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	379.20	
08 71 11 00-2144	EA 3' Push Bar, Electric Latch Retraction, Exit Device (Von Duprin Series E98/E99) Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.	2,172.48	141.05
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	277.87	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	568.29	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	179.27	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	66.69	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	102.90	
	<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
	<i>For Special Center Case Dogging (SD), Add</i>	262.29	
	<i>For Dogging Indicator (DI), Add</i>	160.38	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	179.27	
08 71 11 00-2145	EA 3' Push Bar, Fire Rated, Electric Latch Retraction, Exit Device (Von Duprin Series E98-F/E99-F) Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.	2,381.61	141.05
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	310.29	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	634.59	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	200.19	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	74.47	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	114.91	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	200.19	
08 71 11 00-2146	EA 3' Push Bar, Mortise Electric Latch Retraction, Exit Device (Von Duprin Series E9875/E9975) Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.	2,816.50	173.60
	<i>For 4' Push Bar, Add</i>	13.00	
	<i>For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add</i>	363.40	
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	743.21	
	<i>For Satin Brass, Clear Coated US4 (BHMA 606) Finish, Add</i>	234.45	
	<i>For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add</i>	87.22	
	<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	134.58	
	<i>For Standard Baseplate Cylinder Dogging (CD), Add</i>	62.65	
	<i>For Special Center Case Dogging (SD), Add</i>	262.29	
	<i>For Dogging Indicator (DI), Add</i>	160.38	
	<i>For Quiet Electric Latch Retraction (QEL), Add</i>	833.54	
	<i>For Vision Impaired Touchpad, Raised Letters and Braille, Add</i>	81.03	
	<i>For Safety Glow Touchpad, Add</i>	292.35	
	<i>For Accessible Device (AX), Add</i>	234.45	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 71 11 00-2147	EA	3' Push Bar, Fire Rated, Mortise Electric Latch Retraction, Exit Device (Von Duprin Series E9875-F/E9975-F).....	3,029.39	173.60
		Note: Excludes power supply. Clear anodized satin aluminum US28 (BHMA 628) finish.		
		For 4' Push Bar, Add	13.00	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	396.40	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	810.70	
		For Satin Bronze, Clear Coated US4 (BHMA 606) Finish, Add	255.74	
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	95.14	
		For Satin Chrome Plated US26D (BHMA 626) Finish, Add	146.80	
		For Quiet Electric Latch Retraction (QEL), Add	833.54	
		For Vision Impaired Touchpad, Raised Letters and Braille, Add	81.03	
		For Safety Glow Touchpad, Add	292.35	
		For Accessible Device (AX), Add	255.74	
08 71 11 00-2148	EA	Exit Only Trim Plate (Von Duprin Series 98/99, EO).....	177.27	16.28
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	4.02	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	6.02	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	22.76	
08 71 11 00-2149	EA	Dummy Trim (Von Duprin Series 98/99, 990DT).....	262.49	20.34
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	6.25	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	9.37	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	35.40	
08 71 11 00-2150	EA	Night Latch Pull Trim With 110NL Cylinder (Von Duprin Series 98/99, 990NL).....	388.66	27.12
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	9.38	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	14.07	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	53.16	
08 71 11 00-2151	EA	Night Latch Pull Trim Without Cylinder (Von Duprin Series 98/99, 990NL).....	299.06	27.12
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	6.69	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	10.04	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	37.93	
08 71 11 00-2152	EA	Lever Trim With 110NL Cylinder (Von Duprin Series 98/99, 996L).....	679.38	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	17.13	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	25.69	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	97.05	
08 71 11 00-2153	EA	Lever Trim Without Cylinder (Von Duprin Series 98/99, 996L).....	589.79	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	14.44	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	21.66	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	81.82	
08 71 11 00-2154	EA	Blank Escutcheon, Lever (Von Duprin Series 98/99, 996L-BE).....	589.79	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	14.44	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	21.66	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	81.82	
08 71 11 00-2155	EA	Night Latch, Lever With 110NL Cylinder (Von Duprin Series 98/99, 996L-NL).....	573.14	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	13.94	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	20.91	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	78.99	
08 71 11 00-2156	EA	Night Latch, Lever Without Cylinder (Von Duprin Series 98/99, 996L-NL).....	483.54	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	11.25	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	16.88	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	63.76	
08 71 11 00-2157	EA	Lever Dummy Trim (Von Duprin Series 98/99, 996L-DT).....	483.54	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	11.25	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	16.88	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	63.76	
08 71 11 00-2158	EA	Knob Trim With 110NL Cylinder (Von Duprin Series 98/99, K).....	556.15	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	13.43	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	20.14	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	76.10	
08 71 11 00-2159	EA	Knob Trim Without Cylinder (Von Duprin Series 98/99, K).....	466.55	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	10.74	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	16.11	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	60.87	
08 71 11 00-2160	EA	Blank Escutcheon, Knob (Von Duprin Series 98/99, K-BE).....	466.55	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	10.74	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	16.11	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	60.87	
08 71 11 00-2161	EA	Night Latch, Knob With 110NL Cylinder (Von Duprin Series 98/99, K-NL).....	546.59	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	13.14	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	19.71	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	74.48	
08 71 11 00-2162	EA	Night Latch, Knob Without Cylinder (Von Duprin Series 98/99, K-NL).....	456.99	40.69
		Note: Satin chrome plated US26D (BHMA 626) finish.		
		For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	10.45	
		For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	15.68	
		For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	59.24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2163 EA Dummy Trim For Knob Without Cylinder (Von Duprin Series 98/99, K-DT).....	456.99	40.69
Note: Satin chrome plated US26D (BHMA 626) finish.		
For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	10.45	
For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	15.68	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	59.24	
08 71 11 00-2164 EA Thumbpiece Trim With 110NL Cylinder (Von Duprin Series 98/99, TP).....	494.52	40.69
Note: Satin chrome plated US26D (BHMA 626) finish.		
For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	11.58	
For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	17.37	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	65.62	
08 71 11 00-2165 EA Thumbpiece Trim Without Cylinder (Von Duprin Series 98/99, TP).....	404.92	40.69
Note: Satin chrome plated US26D (BHMA 626) finish.		
For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	8.89	
For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	13.34	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	50.39	
08 71 11 00-2166 EA Blank Escutcheon, Thumbpiece (Von Duprin Series 98/99, T-BE).....	404.92	40.69
Note: Satin chrome plated US26D (BHMA 626) finish.		
For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	8.89	
For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	13.34	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	50.39	
08 71 11 00-2167 EA Push/Pull Hospital Latch Trim With 110NL Cylinder (Von Duprin Series 98/99, HL).....	404.70	40.69
Note: Satin chrome plated US26D (BHMA 626) finish.		
For Duranodic Dark Bronze US313 (BHMA 710) Finish, Add	8.89	
For Satin Bronze, Clear Coated US10 (BHMA 612) Finish, Add	13.33	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	50.35	
08 71 11 00-2168 Option And Kits For Series 22, 33, 35, 98 Or 99 <small>(08 71 11 00-2087)</small>		
08 71 11 00-2169 EA Alarm Kit With Switch And 9 Volt Battery Back-up.....	971.17	40.69
08 71 11 00-2170 EA 4 Amperes Output Current, 12-24 Volt DC, Power Supply (Von Duprin PS914).....	827.60	40.69
For Battery Backup (Includes Board And 2 Batteries), Add	59.40	
For Fire Alarm Interface, Add	29.70	
For 2 Relay Panic Device Control Board, Add	68.91	
For 2 Relay Quiet Electric Latch Panic Device Control Board, Add	80.78	
For 4 Relay Output Board, Add	66.53	
For 4 Relay Logic Board, Add	182.47	
For Fused 8 Zone Distribution Board, Add	23.76	
08 71 11 00-2171 EA Jamb Mounted Concealed Electric Power Transfer (Von Duprin EPT-10).....	771.77	40.69
08 71 11 00-2172 EA 2 Amperes Output Current, 12/24 Volt DC, Power Supply (Von Duprin PS902).....	391.50	40.69
For Battery Backup (Includes Board And 2 Batteries), Add	59.40	
For Fire Alarm Interface, Add	29.70	
For 2 Relay Quiet Electric Latch Panic Device Control Board, Add	80.78	
For 4 Relay Output Board, Add	66.53	
For 4 Relay Logic Board, Add	182.47	
For Fused 8 Zone Distribution Board, Add	23.76	
08 71 11 00-2173 EA 4 Amperes Output Current, 12/24 Volt DC, Power Supply (Von Duprin PS904).....	641.93	40.69
For Battery Backup (Includes Board And 2 Batteries), Add	59.40	
For Fire Alarm Interface, Add	29.70	
For 2 Relay Quiet Electric Latch Panic Device Control Board, Add	80.78	
For 4 Relay Output Board, Add	66.53	
For 4 Relay Logic Board, Add	182.47	
For Fused 8 Zone Distribution Board, Add	23.76	
08 71 11 00-2174 EA Request to Exit Push Pad Monitor Switch (RX).....	226.06	27.12
08 71 11 00-2175 EA EL Conversion Kit, Electric Latch Retraction (Von Duprin).....	1,058.34	
Note: For Von Duprin Series 33A/35A/98/99 Exit Device		
08 71 11 00-2176 Removable Verticals, Mullions (Von Duprin) <small>(08 71 11 00-2087)</small>		
08 71 11 00-2177 EA 7'-2" Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness (Von Duprin 4954-72).....	564.11	27.12
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-455.61	
08 71 11 00-2178 EA 8'-2" Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness (Von Duprin 4954-82).....	599.77	27.12
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-491.27	
08 71 11 00-2179 EA 10'-2" Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness (Von Duprin 4954-102).....	984.37	27.12
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-875.87	
08 71 11 00-2180 EA 7'-6" Keyed Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness (Von Duprin KR4954-76).....	966.15	32.55
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-835.95	
08 71 11 00-2181 EA 8'-6" Keyed Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness (Von Duprin KR4954-86).....	1,001.80	32.55
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-871.60	
08 71 11 00-2182 EA 10'-6" Keyed Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness (Von Duprin KR4954-106).....	1,080.05	32.55
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-949.85	
08 71 11 00-2183 EA 7'-3" Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness, Fire Rated (Von Duprin 9954-73).....	1,005.48	27.12
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-896.98	
08 71 11 00-2184 EA 8'-3" Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness, Fire Rated (Von Duprin 9954-83).....	1,052.10	27.12
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-943.60	
08 71 11 00-2185 EA 10'-3" Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness, Fire Rated (Von Duprin 9954-103).....	1,146.58	27.12
Note: For use with Von Duprin Panic rim devices.		
For Owner Furnished Material, Deduct	-1,038.08	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2186	EA		7'-5" Keyed Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness, Fire Rated (Von Duprin KR9954-75).....	1,560.08	32.55
			Note: For use with Von Duprin Panic rim devices.		
			<i>For Owner Furnished Material, Deduct</i>	-1,429.88	
08 71 11 00-2187	EA		8'-5" Keyed Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness, Fire Rated (Von Duprin KR9954-85).....	1,606.70	32.55
			Note: For use with Von Duprin Panic rim devices.		
			<i>For Owner Furnished Material, Deduct</i>	-1,476.50	
08 71 11 00-2188	EA		10'-5" Keyed Removable Steel Mullion, 2" x 3" x 1/8" Wall Thickness, Fire Rated (Von Duprin KR9954-105).....	3,071.48	32.55
			Note: For use with Von Duprin Panic rim devices.		
			<i>For Owner Furnished Material, Deduct</i>	-2,941.28	
08 71 11 00-2189	EA		Mullion Stabilizer Set (Von Duprin 154).....	117.68	21.70
			Note: For use with Von Duprin Panic rim devices.		
			<i>For Owner Furnished Material, Deduct</i>	-74.28	
08 71 11 00-2190			Cross Bar Exit Device, Narrow Stile, Von Duprin Series 55 <small>(08 71 11 00-2087)</small>		
			Note: Grade 1, BHMA 156.3.		
08 71 11 00-2191	EA		42" Crossbar Exit Device, Rim Type, Narrow Stile.....	2,217.29	122.06
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 55.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	238.36	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	274.31	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	361.33	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	393.49	
08 71 11 00-2192	EA		42" Crossbar Exit Device, Concealed Vertical Rod, Narrow Stile.....	2,854.13	168.18
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 5547.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	302.89	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	348.56	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	459.14	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	500.00	
08 71 11 00-2193	EA		42" Crossbar Exit Device, Concealed Vertical Rod, Narrow Stile, Fire Rated.....	3,122.54	168.18
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 5547-F.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	336.70	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	387.48	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	510.40	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	555.83	
08 71 11 00-2194	EA		42" Crossbar Exit Device, Wood Door Concealed Vertical Rod, Narrow Stile.....	2,920.49	168.18
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 5547WDC.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	311.25	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	358.18	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	471.81	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	513.80	
08 71 11 00-2195	EA		42" Crossbar Exit Device, Wood Door Concealed Vertical Rod, Narrow Stile, Fire Rated.....	3,180.98	168.18
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 5547WDC-F.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	344.07	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	395.95	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	521.56	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	567.99	
08 71 11 00-2196	EA		42" Crossbar Exit Device, Mortise Lock, Narrow Stile.....	2,211.49	151.91
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 5575.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	227.38	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	261.67	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	344.68	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	375.36	
08 71 11 00-2197	EA		42" Crossbar Exit Device, Mortise Lock, Narrow Stile, Fire Rated.....	2,386.81	151.91
			Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 5575-F.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	249.47	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	287.09	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	378.17	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	411.83	
08 71 11 00-2198	EA		Dummy Trim (DT) Pull Bracket, Von Duprin Series 55.....	380.12	20.34
			Note: Anodized finish: dull brass or dull bronze.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	41.06	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	47.25	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	62.24	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	67.78	
08 71 11 00-2199	EA		Cylinder Assembly, Von Duprin Series 55.....	168.07	28.75
			Note: Anodized finish: dull brass or dull bronze.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	11.61	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	13.36	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	17.59	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	19.16	
08 71 11 00-2200	EA		Night Latch Pull Trim (NL) With Cylinder, Von Duprin Series 55.....	635.03	28.75
			Note: Anodized finish: dull brass or dull bronze.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	70.44	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	81.07	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	106.78	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	116.29	
08 71 11 00-2201	EA		Thumbturn Trim (376T) With Cylinder, Von Duprin Series 55.....	679.47	40.69
			Note: Anodized finish: dull brass or dull bronze.		
			<i>For Satin Chrome Plated US26D (BHMA 626) Finish, Add</i>	71.94	
			<i>For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add</i>	82.79	
			<i>For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add</i>	109.06	
			<i>For Bright Stainless Steel US32 (BHMA 629) Finish, Add</i>	118.76	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2202 EA Thumbturn - Blank Escutcheon (376T-BE), Von Duprin Series 55	558.17	40.69
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	56.66	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	65.20	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	85.89	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	93.53	
08 71 11 00-2203 EA Lever Trim (371L) With Cylinder, Von Duprin Series 55	679.47	40.69
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	71.94	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	82.79	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	109.06	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	118.76	
08 71 11 00-2204 EA Lever Trim (575L) With Cylinder, Von Duprin Series 55	784.45	40.69
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	85.17	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	98.01	
For Bright Brass, Clear Coated US3 (BHMA 605) Or Bright Chrome Plated US26 (BHMA 625) Finish, Add	129.11	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	140.60	
08 71 11 00-2205 Cross Bar Exit Device, Von Duprin Series 88 <small>(08 71 11 00-2087)</small>		
Note: Grade 1, BHMA 156.3.		
08 71 11 00-2206 EA 42" Crossbar, Rim Type, Exit Device	1,398.18	122.06
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 88.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	33.25	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	34.33	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	292.84	
08 71 11 00-2207 EA 42" Crossbar, Fire Rated, Rim Type, Exit Device	1,634.90	122.06
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 88-F.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	40.59	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	41.90	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	357.46	
08 71 11 00-2208 EA 42" Crossbar, Surface Vertical Rods, Exit Device	1,810.93	146.48
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 8827.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	44.03	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	45.45	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	387.75	
08 71 11 00-2209 EA 42" Crossbar, Fire Rated, Surface Vertical Rods, Exit Device	2,322.99	146.48
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 8827-F.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	59.90	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	61.84	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	527.54	
08 71 11 00-2210 EA 42" Crossbar, Concealed Vertical Rods, Exit Device	1,741.74	168.18
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 8847.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	40.04	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	41.33	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	352.57	
08 71 11 00-2211 EA 42" Crossbar, Fire Rated, Concealed Vertical Rods, Exit Device	2,207.36	168.18
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 8847-F.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	54.47	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	56.23	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	479.68	
08 71 11 00-2212 EA 42" Crossbar, Mortise Lock, Exit Device	1,872.76	151.91
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 8875.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	45.44	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	46.91	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	400.19	
08 71 11 00-2213 EA 42" Crossbar, Fire Rated, Mortise Lock, Exit Device	1,993.60	151.91
Note: Anodized finish: dull brass or dull bronze. Von Duprin Series 8875-F.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	49.19	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	50.78	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	433.17	
08 71 11 00-2214 EA Dummy Trim (Von Duprin Series 88, DT)	210.75	20.34
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	4.85	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	5.01	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	42.72	
08 71 11 00-2215 EA Night Latch Pull Trim With Cylinder (Von Duprin Series 88, NL)	330.95	27.12
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	7.91	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	8.16	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	69.62	
08 71 11 00-2216 EA Thumbturn Trim With Cylinder (Von Duprin Series 88, 376T Or 377T)	589.87	40.69
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	14.92	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	15.40	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	131.41	
08 71 11 00-2217 EA Lever Trim With Cylinder (Von Duprin Series 88, 373L)	550.25	40.69
Note: Anodized finish: dull brass or dull bronze.		
For Satin Chrome Plated US26D (BHMA 626) Finish, Add	13.69	
For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	14.14	
For Bright Stainless Steel US32 (BHMA 629) Finish, Add	120.60	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2218	EA		Knob Trim With Cylinder (Von Duprin Series 88, K)	409.06	40.69
			Note: Anodized finish: dull brass or dull bronze.		
			For Satin Chrome Plated US26D (BHMA 626) Finish, Add	9.32	
			For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	9.62	
			For Bright Stainless Steel US32 (BHMA 629) Finish, Add	82.05	
08 71 11 00-2219	EA		Thumbpiece Trim With Cylinder (Von Duprin Series 88, TP)	409.06	40.69
			Note: Anodized finish: dull brass or dull bronze.		
			For Satin Chrome Plated US26D (BHMA 626) Finish, Add	9.32	
			For Dark Oxidized Satin Bronze, Oil Rubbed, US10B (BHMA 613) Finish, Add	9.62	
			For Bright Stainless Steel US32 (BHMA 629) Finish, Add	82.05	
08 71 11 00-2220			Push Bar Exit Device, Precision Hardware Apex 2000 Series (08 71 11 00-2087)		
			Note: Grade 1, BHMA 156.3. Anodized Aluminum Finish.		
08 71 11 00-2221	EA		3' Push Bar Exit Device, Rim Type (Precision Hardware 2100 Series)	2,039.09	122.06
			For 4' Push Bar, Add	13.87	
			For Owner Furnished Material, Deduct	-1,713.58	
08 71 11 00-2222	EA		3' Push Bar Exit Device, Rim Type, Fire Rated (Precision Hardware 2100 Series)	2,156.84	122.06
			For 4' Push Bar, Add	13.87	
			For Owner Furnished Material, Deduct	-1,831.33	
08 71 11 00-2223	EA		3' Push Bar Exit Device, Surface Vertical Rod (Top Only) (Precision Hardware 2200 Series)	2,809.15	146.48
			For 4' Push Bar, Add	13.87	
			For Owner Furnished Material, Deduct	-2,418.54	
08 71 11 00-2224	EA		3' Push Bar Exit Device, Surface Vertical Rod (Top Only), Fire Rated (Precision Hardware 2200 Series)	2,926.89	146.48
			For 4' Push Bar, Add	13.87	
			For Owner Furnished Material, Deduct	-2,536.28	
08 71 11 00-2225	EA		Exit Only, Cover Plate, Lever/Knob Trim (Precision 4901)	247.92	16.28
			For Owner Furnished Material, Deduct	-204.52	
08 71 11 00-2226	EA		Exit Only, Dummy Trim, Lever/Knob Trim (Precision 4902A)	675.54	20.34
			For Owner Furnished Material, Deduct	-621.29	
08 71 11 00-2227	EA		Key Retracts Latchbolt, Lever/Knob Trim (Precision 4903A)	729.79	40.69
			For Owner Furnished Material, Deduct	-621.29	
08 71 11 00-2228	EA		Key Controls Lever/Knob, Lever/Knob Trim (Precision 4908A)	884.73	40.69
			For Owner Furnished Material, Deduct	-776.23	
08 71 11 00-2229	EA		Key Controls Lever, Lever/Knob Trim (Precision V4908A)	884.73	40.69
			For Owner Furnished Material, Deduct	-776.23	
08 71 11 00-2230	EA		Lever/Knob Always Active, Lever/Knob Trim (Precision 4914A)	884.73	40.69
			For Owner Furnished Material, Deduct	-776.23	
08 71 11 00-2231	EA		Exit Only, Cover Plate, Pull Trim (Precision 1701)	179.73	16.28
			For Owner Furnished Material, Deduct	-136.33	
08 71 11 00-2232	EA		Exit Only, Dummy Trim, Pull Trim (Precision 1702A)	392.01	20.34
			For Owner Furnished Material, Deduct	-337.76	
08 71 11 00-2233	EA		Key Retracts Latchbolt, Pull Trim (Precision 1703A)	413.71	27.12
			For Owner Furnished Material, Deduct	-337.76	
08 71 11 00-2234	EA		Key Controls Thumb Piece, Pull Trim (Precision 1705A)	582.59	40.69
			For Owner Furnished Material, Deduct	-474.09	
08 71 11 00-2235	EA		Thumb Piece Always Active, Pull Trim (Precision 1715A)	582.59	40.69
			For Owner Furnished Material, Deduct	-474.09	
08 71 11 00-2236			Door Closers (08 71 11)		
			Note: Includes standard cover and arm.		
08 71 11 00-2237	EA		Surface Mounted Standard Duty Door Closer (LCN 1460 Series)	466.73	31.46
			For Delayed Action, Add	12.60	
			For AVB (5 LB Per Push), Add	6.60	
			For Fusible Link Arm, Add	39.60	
			For Shock Absorbing Arm, Add	19.80	
			For Hold Open Arm, Add	13.80	
			For Plated Brass Finish, Add	101.40	
			For Plated Finish With Clear Coat, Add	127.20	
			For Parallel Arm, Add	22.40	
08 71 11 00-2238	EA		Surface Mounted Heavy Duty Door Closer (LCN 4010/4020/4110 Series)	570.42	31.46
			For Delayed Action, Add	12.60	
			For AVB (5 LB Per Push), Add	6.60	
			For Fusible Link Arm, Add	39.60	
			For Shock Absorbing Arm, Add	19.80	
			For Hold Open Arm, Add	13.80	
			For Plated Brass Finish, Add	101.40	
			For Plated Finish With Clear Coat, Add	127.20	
08 71 11 00-2239	EA		Surface Mounted Heavy Duty Door Closer (LCN 4040XP/4041 Series)	586.91	31.46
			For Delayed Action, Add	12.60	
			For AVB (5 LB Per Push), Add	6.60	
			For Fusible Link Arm, Add	39.60	
			For Shock Absorbing Arm, Add	19.80	
			For Hold Open Arm, Add	13.80	
			For Plated Brass Finish, Add	101.40	
			For Plated Finish With Clear Coat, Add	127.20	
			For Spring Cush Arm, Add	67.20	
			For Parallel Arm And PA Shoe, Add	22.40	
			For Stainless Steel Finish, Add	145.00	



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2240	EA Surface Mounted High Security Door Closer With Metal Cover (LCN 4510)	607.55	31.46
	<i>For Delayed Action, Add</i>	12.60	
	<i>For AVB (5 LB Per Push), Add</i>	6.60	
	<i>For Fusible Link Arm, Add</i>	39.60	
	<i>For Shock Absorbing Arm, Add</i>	19.80	
	<i>For Hold Open Arm, Add</i>	13.80	
	<i>For Plated Brass Finish, Add</i>	101.40	
	<i>For Plated Finish With Clear Coat, Add</i>	127.20	
08 71 11 00-2241	EA Surface Mounted Standard Duty Door Closer (Norton 8301)	389.06	31.46
	<i>For Parallel Arm, Add</i>	22.40	
08 71 11 00-2242	EA Surface Mounted Standard Duty Door Closer (Norton 8501)	392.54	31.46
	<i>For Parallel Arm, Add</i>	22.40	
08 71 11 00-2243	EA Screen Door - Closer	55.06	11.80
08 71 11 00-2244	EA Screen Door - Locking Handle	59.72	16.94
08 71 11 00-2245	Concealed Door Closers (08 71 11)		
08 71 11 00-2246	EA Non-Hold Open, Floor Concealed Door Closer (Rixson 27/28)	1,315.82	93.31
08 71 11 00-2247	EA Selective Hold Open, Floor Concealed Door Closer (Rixson 27/27)	1,413.01	93.31
08 71 11 00-2248	EA Concealed (In Door) Overhead Door Closer (LCN 3130)	673.99	37.98
	<i>For Hold Open Arm, Add</i>	13.80	
	<i>For Plated Brass Finish, Add</i>	101.40	
	<i>For Plated Finish With Clear Coat, Add</i>	127.20	
08 71 11 00-2249	EA Concealed (In Frame) Overhead Door Closer (LCN 5010)	730.84	37.98
	<i>For Delayed Action, Add</i>	12.60	
	<i>For Hold Open Arm, Add</i>	13.80	
	<i>For Plated Brass Finish, Add</i>	101.40	
	<i>For Plated Finish With Clear Coat, Add</i>	127.20	
08 71 11 00-2250	Locks And Latches (08 71 11)		
	Note: All locksets are supplied with knob, lever or thumb piece, set of 3 keys and include a core. Multi purchase locksets can be keyed alike and to an existing master key (when required). The cost for boring hole or preparing mortise is included with the new door.		
08 71 11 00-2251	Locksmith Services (08 71 11 00-2250)		
08 71 11 00-2252	EA Provide Extra Keys (Above The Three Provided For New Locks) Or Duplicate Keys	1.86	
	<i>For >50, Deduct</i>	-0.37	
08 71 11 00-2253	EA Rekey Existing Cylinder To Match Existing Cylinders Or Master Key	130.26	
	<i>For >5, Deduct</i>	-13.03	
08 71 11 00-2254	EA Removal And Replacement Of Cylinder With Owner Supplied Cylinder	130.26	
	<i>For >5, Deduct</i>	-13.03	
08 71 11 00-2255	EA Removal And Replacement Of Cylinder With New Cylinder	150.13	
	Note: Excludes core.		
	<i>For >5, Deduct</i>	-13.03	
08 71 11 00-2256	EA Open Locked Doors	130.26	
08 71 11 00-2257	EA Install Owner Furnished Cores And Cylinders	54.66	
08 71 11 00-2258	Mortise Locksets And Latchsets (08 71 11 00-2250)		
	Note: Satin chrome plated US 26D (BHMA 626) - BHMA 156.13 Grade 1. Levers or knobs.		
08 71 11 00-2259	EA Passage/Closet F01 Mortise Latchset	821.77	27.12
	Note: Both sides always unlocked.		
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add</i>	23.54	
	<i>For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add</i>	21.40	
	<i>For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add</i>	35.66	
	<i>For Satin Stainless Steel US32D (BHMA 630) Finish, Add</i>	251.78	
08 71 11 00-2260	EA Bath/Bedroom Privacy F02/F19 Mortise Lockset	980.26	27.12
	Note: Locked with thumb knob inside.		
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add</i>	28.77	
	<i>For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add</i>	26.15	
	<i>For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add</i>	43.59	
	<i>For Satin Stainless Steel US32D (BHMA 630) Finish, Add</i>	307.73	
08 71 11 00-2261	EA Entrance/Office F04 Mortise Lockset	1,092.35	27.12
	Note: Locked with key outside and thumb knob inside.		
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add</i>	32.47	
	<i>For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add</i>	29.52	
	<i>For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add</i>	49.19	
	<i>For Satin Stainless Steel US32D (BHMA 630) Finish, Add</i>	347.30	
08 71 11 00-2262	EA Classroom F05 Mortise Lockset	1,018.73	27.12
	Note: Locked with key outside. Inside always unlocked.		
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add</i>	30.04	
	<i>For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add</i>	27.31	
	<i>For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add</i>	45.51	
	<i>For Satin Stainless Steel US32D (BHMA 630) Finish, Add</i>	321.31	
	<i>For Security Function (Double Cylinder) With Visual Indicator, Add</i>	78.95	
08 71 11 00-2263	EA Storeroom/Closet F07 Mortise Lockset	1,018.73	27.12
	Note: Locked with key outside. Inside always unlocked. Fixed outside handle.		
	<i>For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add</i>	30.04	
	<i>For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add</i>	27.31	
	<i>For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add</i>	45.51	
	<i>For Satin Stainless Steel US32D (BHMA 630) Finish, Add</i>	321.31	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2264	EA	Entrance F08 Mortise Lockset..... Note: Locked with key outside and thumb knob inside. For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add	1,139.29 34.02 30.92 51.54 363.87	27.12
08 71 11 00-2265	EA	Dormitory/Exit F13 Mortise Lockset..... Note: Locked with key outside and thumb knob inside. For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add	979.15 28.73 26.12 43.53 307.34	27.12
08 71 11 00-2266		Locks And Latches (08 71 11 00-2250)		
08 71 11 00-2267		Preassembled Locks And Latches (08 71 11 00-2266)		
08 71 11 00-2268	EA	Note: Satin chrome plated US 26D (BHMA 626) - BHMA 156.2-1989 Grade 1, with knob handles. Passage/Closet F36 Pre-Assembled Latchset (Corbin Russwin UT5210)..... Note: Both sides always unlocked. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct	1,725.87 49.33 82.22 580.50 305.88 -639.71	27.12
08 71 11 00-2269	EA	Bath/Bedroom Privacy F37 Pre-Assembled Lockset (Corbin Russwin UT5220)..... Note: Locked with push button inside. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct	1,869.64 53.65 89.41 631.26 332.62 -695.63	27.12
08 71 11 00-2270	EA	Entrance/Office F41 Pre-Assembled Lockset (Corbin Russwin UT5261)..... Note: Locked with key outside and push button inside. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct	2,127.43 61.38 102.30 722.26 380.57 -795.91	27.12
08 71 11 00-2271	EA	Classroom F42 Pre-Assembled Lockset (Corbin Russwin UT5255)..... Note: Locked with key outside. Inside always unlocked. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct	2,127.43 61.38 102.30 722.26 380.57 -795.91	27.12
08 71 11 00-2272	EA	Storeroom/Closet F44 Pre-Assembled Lockset (Corbin Russwin UT5257)..... Note: Locked with key outside. Inside always unlocked. Fixed outside handle. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct	2,127.43 61.38 102.30 722.26 380.57 -795.91	27.12
08 71 11 00-2273		Bored Locks And Latches (08 71 11 00-2266)		
08 71 11 00-2274	EA	Note: Satin chrome plated US 26D (BHMA 626) - BHMA 156.2-1989, Grade 1, 6 pins or 7 pins. Levers or knobs. Passage/Closet F75 Bored Latchset Note: Both sides always unlocked. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add For Interchangeable Core, Add	279.76 5.14 8.56 60.45 31.85 -8.56 3.43 9.45	27.12
08 71 11 00-2275	EA	Bath/Bedroom Privacy F76 Bored Lockset Note: Locked with push button inside. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add For Interchangeable Core, Add	320.60 6.36 10.61 74.87 39.45 -10.61 4.24 9.45	27.12
08 71 11 00-2276	EA	Entrance/Office F82 Bored Lockset..... Note: Locked with key outside and push button inside. For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add For Satin Stainless Steel US32D (BHMA 630) Finish, Add For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add For Grade 2, Deduct For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add For Interchangeable Core, Add	353.52 7.35 12.25 86.49 45.57 -12.25 4.90 9.45	27.12

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2277 EA Classroom F84 Bored Lockset.....	353.52	27.12
Note: Locked with key outside. Inside always unlocked.		
For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add	7.35	
For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add	12.25	
For Satin Stainless Steel US32D (BHMA 630) Finish, Add	86.49	
For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add	45.57	
For Grade 2, Deduct	-12.25	
For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add	4.90	
For Interchangeable Core, Add	9.45	
08 71 11 00-2278 EA Storeroom/Closet F86 Bored Lockset.....	353.52	27.12
Note: Locked with key outside. Inside always unlocked. Fixed outside handle.		
For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add	7.35	
For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add	12.25	
For Satin Stainless Steel US32D (BHMA 630) Finish, Add	86.49	
For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add	45.57	
For Grade 2, Deduct	-12.25	
For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add	4.90	
For Interchangeable Core, Add	9.45	
08 71 11 00-2279 EA Corridor/Dormitory F90 Bored Lockset.....	353.52	27.12
Note: Locked with key outside and push button inside.		
For Oxidized Satin Bronze, Oil Rubbed US10B (BHMA 613) Finish, Add	7.35	
For Satin Brass Clear Coat US4 (BHMA 606) Finish, Add	12.25	
For Satin Stainless Steel US32D (BHMA 630) Finish, Add	86.49	
For Bright Chrome Plated Finish US26 (BHMA 625) Finish, Add	45.57	
For Grade 2, Deduct	-12.25	
For Bright Brass, Clear Coated US3 (BHMA 605) Finish, Add	4.90	
For Interchangeable Core, Add	9.45	
08 71 11 00-2280 Occupancy Indicator Locks (08 71 11 00-2266)		
08 71 11 00-2281 EA Occupancy Indicator Deadbolt With Thumbturn (Schlage B571).....	139.92	27.11
Note: Standard finish is satin chrome		
For Bright Brass Finish, Add	5.13	
For Oil Rubbed Bronze Finish, Add	13.71	
For Aged Bronze Finish, Add	5.13	
For Satin Nickel Finish, Add	5.13	
08 71 11 00-2282 EA Occupancy Indicator Lock And Lever (Vizilok C3F).....	212.28	27.11
Note: Included finishes are satin chrome, satin nickel, & polished chrome. Lever on both sides		
For Oil Rubbed Bronze Finish, Add	5.56	
08 71 11 00-2283 Other Locks (08 71 11 00-2250)		
Note: BHMA A156.5.		
08 71 11 00-2284 PR Screen Door - Hinges.....	33.26	9.40
08 71 11 00-2285 EA Steel Exit Lock With Alarm, Single Door Satin Chrome Plated, BHMA E0421.....	920.32	141.05
08 71 11 00-2286 EA Exit Lock With Alarm At Active Leaf And Vertical Rod - Inactive Leaf Rod For Inactive Leaf (Pair Doors) Steel With Satin Chrome Plating BHMA - E0461.....	2,092.52	282.11
08 71 11 00-2287 Pushbutton Combination Locks (08 71 11 00-2250)		
08 71 11 00-2288 Mechanical Pushbutton Combination Locks (08 71 11 00-2287)		
Note: Passage option allows access without using the lock entry code and is activated from the inside with a thumbturn or key. Lockout option disables the lock from the inside so that the entry code cannot be used to gain access.		
08 71 11 00-2289 Mechanical Pushbutton Combination Locks (Kaba® Simplex® 1000 Series)		
(08 71 11 00-2289)		
Note: Satin chrome or antique brass finish.		
08 71 11 00-2290 EA Five Button, Cylindrical Locking Device, Mechanical Pushbutton Combination Lock, Knob (Kaba® Simplex® 1011 Series).....	761.78	68.31
For Bright Chrome Or Bright Brass Finish, Add	17.50	
For Schlage Core, Add	47.92	
For Fire Rated, Add	65.55	
08 71 11 00-2291 EA Five Button, Cylindrical Locking Device With Passage, Mechanical Pushbutton Combination Lock, Knob (Kaba® Simplex® 1311 Series).....	819.24	68.31
For Bright Chrome Or Bright Brass Finish, Add	17.50	
For Schlage Core, Add	47.92	
For Fire Rated, Add	65.55	
08 71 11 00-2292 EA Five Button, Cylindrical Locking Device, Mechanical Pushbutton Combination Lock With Key Override, Knob (Kaba® Simplex® 1021 Series).....	842.23	68.31
For Bright Chrome Or Bright Brass Finish, Add	17.50	
For Schlage Core, Add	47.92	
For Fire Rated, Add	65.55	
08 71 11 00-2293 EA Five Button, Cylindrical Locking Device With Passage, Mechanical Pushbutton Combination Lock With Key Override, Knob (Kaba® Simplex® 1041 Series).....	899.70	68.31
For Bright Chrome Or Bright Brass Finish, Add	17.50	
For Schlage Core, Add	47.92	
For Fire Rated, Add	65.55	
08 71 11 00-2294 EA Five Button, Cylindrical Locking Device, Mechanical Pushbutton Combination Lock, Lever (Kaba® Simplex® L1011 Series).....	859.47	68.31
For Bright Chrome Or Bright Brass Finish, Add	17.50	
For Schlage Core, Add	47.92	
For Fire Rated, Add	65.55	

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-2295	EA	Five Button, Cylindrical Locking Device With Passage, Mechanical Pushbutton Combination Lock, Lever (Kaba® Simplex® L1031 Series).....	916.94		68.31
		<i>For Bright Chrome Or Bright Brass Finish, Add</i>	17.50		
		<i>For Schlage Core, Add</i>	47.92		
		<i>For Fire Rated, Add</i>	65.55		
08 71 11 00-2296	EA	Five Button, Cylindrical Locking Device, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® L1021 Series).....	939.93		68.31
		<i>For Bright Chrome Or Bright Brass Finish, Add</i>	17.50		
		<i>For Schlage Core, Add</i>	47.92		
		<i>For Fire Rated, Add</i>	65.55		
08 71 11 00-2297	EA	Five Button, Cylindrical Locking Device With Passage, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® L1041 Series).....	997.40		68.31
		<i>For Bright Chrome Or Bright Brass Finish, Add</i>	17.50		
		<i>For Schlage Core, Add</i>	47.92		
		<i>For Fire Rated, Add</i>	65.55		
08 71 11 00-2298		Mechanical Pushbutton Combination Locks (Kaba® Simplex® 5000 Series) <small>(08 71 11 00-2288)</small> Note: ANSI/BHMA Grade 1, Satin chrome finish or black with satin chrome accents.			
08 71 11 00-2299	EA	Five Button, Cylindrical Locking Device, Mechanical Pushbutton Combination Lock With Key Override, Knob Or Lever (Kaba® Simplex® 5000 Series).....	845.68		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2300	EA	Five Button, Cylindrical Locking Device With Passage, Mechanical Pushbutton Combination Lock With Key Override, Knob Or Lever (Kaba® Simplex® 5000 Series).....	891.66		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2301	EA	Five Button, Mortise Locking Device, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® 5000 Series).....	983.61		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2302	EA	Five Button, Mortise Locking Device With Passage, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® 5000 Series).....	1,018.09		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2303	EA	Five Button, Mortise Locking Device With Deadbolt And Lockout, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® 5000 Series).....	1,018.09		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2304	EA	Five Button, Exit Trim, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® 5000 Series).....	960.62		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2305		Mechanical Pushbutton Combination Locks (Kaba® Simplex® 8100 Series) <small>(08 71 11 00-2288)</small> Note: Satin chrome or antique brass finish.			
08 71 11 00-2306	EA	Five Button, Mortise Locking Device With Passage And Lockout, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® 8100 Series).....	1,026.14		68.31
		<i>For Bright Chrome Or Bright Brass Finish, Add</i>	17.50		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2307	EA	Five Button, Mortise Locking Device With Deadbolt, Passage And Lockout, Mechanical Pushbutton Combination Lock With Key Override, Lever (Kaba® Simplex® 8100 Series).....	1,060.62		68.31
		<i>For Bright Chrome Or Bright Brass Finish, Add</i>	17.50		
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2308		Mechanical Pushbutton Combination Locks (Kaba® Simplex® LD 450/470) <small>(08 71 11 00-2288)</small> Note: Satin stainless, bright brass or antique brass finish.			
08 71 11 00-2309	EA	Twelve Button, Tubular Latch Locking Device, Light Duty, Mechanical Pushbutton Combination Lock, Knob (Kaba® Simplex® LD 450 Series).....	431.90		68.31
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2310	EA	Twelve Button, Tubular Latch Locking Device With Passage, Light Duty, Mechanical Pushbutton Combination Lock, Lever (Kaba® Simplex® LD 470 Series).....	583.62		68.31
		<i>For Schlage Core, Add</i>	47.92		
08 71 11 00-2311		Electrical Pushbutton Combination Locks <small>(08 71 11 00-2287)</small> Note: Privacy option limits access to privileged users (master codes).			
08 71 11 00-2312		Electrical Pushbutton Combination Locks (Kaba® E-Plex® 2000 Series) <small>(08 71 11 00-2311)</small> Note: ANSI/BHMA Grade 1. Satin chrome finish. Includes 100 access codes and 1,000 audit events.			
08 71 11 00-2313	EA	Twelve Button, Cylindrical Locking Device, Electrical Pushbutton Combination Lock, Lever (Kaba® E-Plex® 2000 Series).....	790.51		68.31
		<i>For Satin Brass Finish, Add</i>	17.50		



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2314	EA		Twelve Button, Mortise Locking Device, Electrical Pushbutton Combination Lock, Lever (Kaba® E-Plex® 2000 Series).....	928.44	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2315	EA		Twelve Button, Mortise Locking Device With Deadbolt, Electrical Pushbutton Combination Lock, Lever (Kaba® E-Plex® 2000 Series).....	962.92	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2316	EA		Twelve Button, Exit Trim, Electrical Pushbutton Combination Lock, Lever (Kaba® E-Plex® 2000 Series).....	905.45	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2317	EA		Twelve Button, Cylindrical Locking Device, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 2000 Series).....	847.98	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2318	EA		Twelve Button, Cylindrical Locking Device With Privacy, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 2000 Series).....	962.92	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2319	EA		Twelve Button, Mortise Locking Device, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 2000 Series).....	985.91	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2320	EA		Twelve Button, Mortise Locking Device With Deadbolt, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 2000 Series).....	1,020.39	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2321	EA		Twelve Button, Exit Trim, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 2000 Series).....	962.92	68.31
			<i>For Satin Brass Finish, Add</i>	17.50	
08 71 11 00-2322			Narrow Stile Application, Electrical Pushbutton Combination Locks (Kaba® E-Plex® 3000 Series) (08 71 11 00-2311)		
			Note: ANSI/BHMA Grade 1. Satin chrome finish. Includes 300 access codes and 9,000 audit events.		
08 71 11 00-2323	EA		Twelve Button, Mortise Locking Device, Narrow Stile Application, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 3000 Series).....	1,020.39	68.31
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2324	EA		Twelve Button, Mortise Locking Device With Deadbolt, Narrow Stile Application, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 3000 Series).....	1,020.39	68.31
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2325			Narrow Stile Application, Electrical Pushbutton Combination Locks (Kaba® E-Plex® 3200 Series) (08 71 11 00-2311)		
			Note: ANSI/BHMA Grade 1. Satin chrome finish. Includes 3,000 access codes and 30,000 audit events.		
08 71 11 00-2326	EA		Twelve Button, Mortise Locking Device, Narrow Stile Application, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 3200 Series).....	1,198.55	68.31
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2327	EA		Twelve Button, Mortise Locking Device With Deadbolt, Narrow Stile Application, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 3200 Series).....	1,198.55	68.31
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2328			Electrical Pushbutton Combination Locks (Kaba® E-Plex® 5200 Series) (08 71 11 00-2311)		
			Note: ANSI/BHMA Grade 1. Satin chrome finish. Includes 3,000 access codes and 30,000 audit events.		
08 71 11 00-2329	EA		Twelve Button, Cylindrical Locking Device, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 5200 Series).....	1,290.50	68.31
			<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50	
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2330	EA		Twelve Button, Cylindrical Locking Device With Privacy, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 5200 Series).....	1,405.44	68.31
			<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50	
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2331	EA		Twelve Button, Mortise Locking Device, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 5200 Series).....	1,428.43	68.31
			<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50	
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		
08 71 11 00-2332	EA		Twelve Button, Mortise Locking Device With Deadbolt, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 5200 Series).....	1,462.91	68.31
			<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50	
			<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00	
			<i>For Remote Unlock, Add</i>	96.99	
			Note: Excludes momentary contact switch.		

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-2333	EA	Twelve Button, Exit Trim, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® E-Plex® 5200 Series).....	1,405.44		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Remote Unlock, Add</i>	96.99		
		<i>Note: Excludes momentary contact switch.</i>			
08 71 11 00-2334		Electrical Pushbutton Combination Lock/Card Readers (Kaba® E-Plex® 5800 Series) <small>(08 71 11 00-2311)</small>			
		<i>Note: ANSI/BHMA Grade 1. Satin chrome or black with satin chrome accents finish. Includes 3,000 access codes and 30,000 audit events.</i>			
08 71 11 00-2335	EA	Twelve Button, Cylindrical Locking Device, Electrical Pushbutton Combination Lock/Card Reader With Key Override, Lever (Kaba® E-Plex® 5800 Series).....	1,836.46		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Remote Unlock, Add</i>	96.99		
		<i>Note: Excludes momentary contact switch.</i>			
08 71 11 00-2336	EA	Twelve Button, Cylindrical Locking Device With Privacy, Electrical Pushbutton Combination Lock/Card Reader With Key Override, Lever (Kaba® E-Plex® 5800 Series).....	1,951.40		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Remote Unlock, Add</i>	96.99		
		<i>Note: Excludes momentary contact switch.</i>			
08 71 11 00-2337	EA	Twelve Button, Mortise Locking Device, Electrical Pushbutton Combination Lock/Card Reader With Key Override, Lever (Kaba® E-Plex® 5800 Series).....	1,974.39		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Remote Unlock, Add</i>	96.99		
		<i>Note: Excludes momentary contact switch.</i>			
08 71 11 00-2338	EA	Twelve Button, Mortise Locking Device With Deadbolt, Electrical Pushbutton Combination Lock/Card Reader With Key Override, Lever (Kaba® E-Plex® 5800 Series).....	2,008.87		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Remote Unlock, Add</i>	96.99		
		<i>Note: Excludes momentary contact switch.</i>			
08 71 11 00-2339	EA	Twelve Button, Exit Trim, Electrical Pushbutton Combination Lock/Card Reader With Key Override, Lever (Kaba® E-Plex® 5800 Series).....	1,951.40		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Remote Unlock, Add</i>	96.99		
		<i>Note: Excludes momentary contact switch.</i>			
08 71 11 00-2340		Entry/Egress, Electrical Pushbutton Combination Lock/Card Readers (Kaba® E-Plex® 5886 Series) <small>(08 71 11 00-2311)</small>			
		<i>Note: ANSI/BHMA Grade 1. Satin chrome or black with satin chrome accents finish. Includes 3,000 access codes and 30,000 audit events.</i>			
08 71 11 00-2341	EA	Twelve Button, Mortise Locking Device, Entry/Egress, Electrical Pushbutton Combination Lock/Card Reader With Key Override, Lever (Kaba® E-Plex® 5886 Series).....	2,618.06		68.31
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	35.00		
08 71 11 00-2342		Stand Alone Access Controller, Electrical Pushbutton Combination Lock/Card Readers (Kaba® E-Plex® 5870 Series) <small>(08 71 11 00-2311)</small>			
		<i>Note: ANSI/BHMA Grade 1. Satin chrome or black with satin chrome accents finish. Includes 3,000 access codes and 30,000 audit events.</i>			
08 71 11 00-2343	EA	Twelve Button, Stand Alone Access Controller, Electrical Pushbutton Combination Lock/Card Reader (Kaba® E-Plex® 5870 Series).....	1,635.32		68.31
		<i>For Bright Chrome, Bright Brass Or Satin Brass Finish, Add</i>	17.50		
		<i>For Dark Bronze Finish With Brass Accents, Add</i>	70.00		
08 71 11 00-2344		Electrical Pushbutton Combination Lock Accessories (Kaba® E-Plex®) <small>(08 71 11 00-2311)</small>			
08 71 11 00-2345	EA	Standard Software Implementation Kit (Kaba® E-Plex®).....	793.32		
08 71 11 00-2346	EA	Enterprise Software Implementation Kit (Kaba® E-Plex®).....	1,023.20		
08 71 11 00-2347	EA	E-Plex General FIPS Software Implementation Kit (Kaba® E-Plex®).....	1,368.02		
08 71 11 00-2348	EA	USB FIPS/DESFire Card Reader/Enroller (Kaba® E-Plex®).....	402.41		
08 71 11 00-2349	EA	High Capacity Battery Kit (Kaba® E-Plex® E5x00 Series).....	123.88		
		<i>Note: Includes 4 C-cell battery pack.</i>			
08 71 11 00-2350	EA	12-24 Volt DC Power Interface Kit (Kaba® E-Plex® E5x00 Series).....	148.02		
08 71 11 00-2351		Self-Powered, Electrical Pushbutton Combination Locks (Kaba® PowerPlex® 2000 Series) <small>(08 71 11 00-2311)</small>			
		<i>Note: ANSI/BHMA Grade 1. Satin chrome finish.</i>			
08 71 11 00-2352	EA	Twelve Button, Cylindrical Locking Device, Self-Powered, Electrical Pushbutton Combination Lock, Lever (Kaba® PowerPlex® 2000 Series).....	991.66		68.31
		<i>For Satin Brass Finish, Add</i>	17.50		
		<i>For Owner Furnished Material, Deduct</i>	-718.38		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 71 11 00-2353 EA Twelve Button, Mortise Locking Device, Self-Powered, Electrical Pushbutton Combination Lock, Lever (Kaba® PowerPlex® 2000 Series)	1,129.58	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-856.30	
08 71 11 00-2354 EA Twelve Button, Mortise Locking Device With Deadbolt, Self-Powered, Electrical Pushbutton Combination Lock, Lever (Kaba® PowerPlex® 2000 Series)	1,164.06	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-890.78	
08 71 11 00-2355 EA Twelve Button, Exit Trim, Self-Powered, Electrical Pushbutton Combination Lock, Lever (Kaba® PowerPlex® 2000 Series)	1,106.60	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-833.32	
08 71 11 00-2356 EA Twelve Button, Cylindrical Locking Device, Self-Powered, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® PowerPlex® 2000 Series)	1,049.12	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-775.84	
08 71 11 00-2357 EA Twelve Button, Cylindrical Locking Device With Privacy, Self-Powered, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® PowerPlex® 2000 Series)	1,164.06	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-890.78	
08 71 11 00-2358 EA Twelve Button, Mortise Locking Device, Self-Powered, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® PowerPlex® 2000 Series)	1,187.05	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-913.77	
08 71 11 00-2359 EA Twelve Button, Mortise Locking Device With Deadbolt, Self-Powered, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® PowerPlex® 2000 Series)	1,221.54	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-948.26	
08 71 11 00-2360 EA Twelve Button, Exit Trim, Self-Powered, Electrical Pushbutton Combination Lock With Key Override, Lever (Kaba® PowerPlex® 2000 Series)	1,164.06	68.31
<i>For Satin Brass Finish, Add</i>	17.50	
<i>For Owner Furnished Material, Deduct</i>	-890.78	
08 71 11 00-2361 Electrical Pushbutton Combination Locks (Schlage) (08 71 11 00-2311)		
Note: ANSI/BHMA Grade 1. Satin chrome finish.		
08 71 11 00-2362 EA Class 100, Cylindrical, Classroom/Storeroom, Keypad, Sparta Lever, Standalone Electronic Lock (Schlage CO100CY70KP626BD-D)	1,008.19	67.81
<i>For Owner Furnished Material, Deduct</i>	-736.94	
08 71 11 00-2363 EA Class 200, Cylindrical, Classroom/Storeroom, Keypad, Sparta Lever, Standalone Electronic Lock (Schlage CO200CY70KP-D)	1,173.62	67.81
<i>For Owner Furnished Material, Deduct</i>	-902.37	
08 71 11 00-2364 EA Class 200, Cylindrical, Classroom/Storeroom, Magnetic Strip + Keypad, Sparta Lever, Standalone Electronic Lock (Schlage CO200CY70MSK626)	1,329.39	67.81
<i>For Owner Furnished Material, Deduct</i>	-1,058.14	
08 71 11 00-2365 EA Class 200, Cylindrical, Classroom/Storeroom, Keypad, Sparta Lever, Standalone Electronic Lock (Schlage AD200CY70KP626)	1,748.34	67.81
<i>For Owner Furnished Material, Deduct</i>	-1,477.09	
08 71 11 00-2366 EA Class 200, Cylindrical, Classroom/Storeroom, Magnetic Strip + Keypad, Sparta Lever, Standalone Electronic Lock (Schlage AD200CY70MKS626)	1,914.85	67.81
<i>For Owner Furnished Material, Deduct</i>	-1,643.60	
08 71 11 00-2367 EA Class 400, Cylindrical, Classroom/Storeroom, Magnetic Strip + Keypad, Sparta Lever, Networked Wireless Electronic Lock (Schlage AD400CY70MSKSPA626)	2,110.37	67.81
<i>For Owner Furnished Material, Deduct</i>	-1,839.12	
08 71 11 00-2368 EA Class 300, Cylindrical, Classroom/Storeroom, Magnetic Strip + Keypad, Sparta Lever, Networked Wireless Electronic Lock (Schlage AD300CY70MSKSPA626)	1,936.34	67.81
<i>For Owner Furnished Material, Deduct</i>	-1,665.09	
08 71 11 00-2369 Residential Locks And Latchsets (08 71 11 00-2250)		
08 71 11 00-2370 EA Residential Entry Lock Core Replacement, Master Keyed - Falcon Or Equal	76.66	
08 71 11 00-2371 EA Residential Deadbolt Core Replacement, Master Keyed - Falcon Or Equal	82.68	
08 71 11 00-2372 EA Residential Entry Lockset With Knobs (Master Keyed)	81.75	16.40
08 71 11 00-2373 EA Residential Privacy Lockset With Knobs	79.93	16.40
08 71 11 00-2374 EA Residential Passage Lockset With Knobs	79.69	16.40
08 71 11 00-2375 EA Residential Dummy Lockset With Knobs	63.01	13.66
08 71 11 00-2376 EA Residential Entry Lockset With Levers (Master Keyed)	94.29	16.40
08 71 11 00-2377 EA Residential Privacy Lockset With Levers	90.12	16.40
08 71 11 00-2378 EA Residential Passage Lockset With Levers	87.11	16.40
08 71 11 00-2379 EA Residential Dummy Lockset With Levers	64.45	13.66
08 71 11 00-2380 Deadbolts (08 71 11 00-2250)		
08 71 11 00-2381 Cylindrical Deadbolts, Grade 1, ANSI 156.5 (08 71 11 00-2380)		
Note: 2-3/8" or 2-3/4" backset.		
08 71 11 00-2382 EA Single Cylinder Deadbolt, Key One Side, Knob One Side	188.23	27.12
Note: Cylindrical, ANSI Grade 1, interchangeable core, bright brass or satin chromium finish.		
<i>For Bright Chromium Or Oiled Rubbed Bronze Finish, Add</i>	4.20	
08 71 11 00-2383 EA Double Cylinder Deadbolt, Key Both Sides	215.08	27.12
Note: Cylindrical, ANSI Grade 1, interchangeable core, bright brass or satin chromium finish.		
<i>For Bright Chromium Or Oiled Rubbed Bronze Finish, Add</i>	4.20	

08	08	Openings
	08 70	Hardware
	08 71	Door Hardware



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
08 71 11 00-2384		Cylindrical Deadbolts, Grade 2, ANSI 156.5 (08 71 11 00-2380) Note: 2-3/8" or 2-3/4" backset.			
08 71 11 00-2385	EA	Single Cylinder Deadbolt, Key One Side, Knob One Side Note: Cylindrical, ANSI Grade 2, interchangeable core, bright brass or satin chromium finish. <i>For Bright Chromium Or Oiled Rubbed Bronze Finish, Add</i>	169.84	27.12	
			4.20		
08 71 11 00-2386	EA	Double Cylinder Deadbolt, Key Both Sides Note: Cylindrical, ANSI Grade 2, interchangeable core, bright brass or satin chromium finish. <i>For Bright Chromium Or Oiled Rubbed Bronze Finish, Add</i>	199.17	27.12	
			4.20		
08 71 11 00-2387		Small Case Mortised Deadbolts, Grade 1, ANSI 156.5 (08 71 11 00-2380) Note: Interchangeable cores with small case size, 4-1/2" x 3-1/2" nominal.			
08 71 11 00-2388	EA	Small Case Mortised Deadbolt, Key One Side, Knob One Side Note: ANSI Grade 1, interchangeable cores, all finishes. Case size 4-1/2" x 3-1/2" (nominal).	243.73	27.12	
08 71 11 00-2389	EA	Small Case Mortised Deadbolt, Key Both Sides Note: ANSI Grade 1, interchangeable cores, all finishes. Case size 4-1/2" x 3-1/2" (nominal). Also used for Classroom version.	268.59	27.12	
08 71 11 00-2390	EA	Small Case Mortised Deadbolt, Key One Side, Cover Plate One Side Note: ANSI Grade 1, interchangeable cores, all finishes. Case size 4-1/2" x 3-1/2" (nominal).	238.76	27.12	
08 71 11 00-2391		Mortised Deadbolts, Grade 1, ANSI 156.5 (08 71 11 00-2380) Note: Interchangeable cores with standard case size, 4-1/2" x 6" nominal.			
08 71 11 00-2392	EA	Mortised Deadbolt, Key One Side, Knob One Side Note: ANSI Grade 1, interchangeable cores, all finishes. Case size 4-1/2" x 6" (nominal).	311.34	27.12	
08 71 11 00-2393	EA	Mortised Deadbolt, Key Both Sides Note: ANSI Grade 1, interchangeable cores, all finishes. Case size 4-1/2" x 6" (nominal). Also used for Classroom version.	352.11	27.12	
08 71 11 00-2394	EA	Mortised Deadbolt, Key One Side, Cover Plate One Side Note: ANSI Grade 1, interchangeable cores, all finishes. Case size 4-1/2" x 6" (nominal).	276.54	27.12	
08 71 11 00-2395		Surface Mounted Deadbolts (08 71 11 00-2380)			
08 71 11 00-2396	EA	Single Cylinder Surface Mounted Deadbolt Note: Key one side, knob one side, bright brass finish. <i>For Brushed Chrome Finish, Add</i>	129.78	27.12	
			10.50		
08 71 11 00-2397	EA	Double Cylinder Surface Mounted Deadbolt Note: Key both sides, bright brass finish. <i>For Brushed Chrome Finish, Add</i>	147.75	27.12	
			10.50		
08 71 11 00-2398	EA	Single Cylinder Surface Mounted Interlocking Deadbolt Note: Jimmy proof, key one side, knob one side, bright brass finish. <i>For Brushed Chrome Finish, Add</i>	162.03	27.12	
			10.50		
08 71 11 00-2399	EA	Double Cylinder Surface Mounted Interlocking Deadbolt Note: Jimmy proof, key both sides, bright brass finish. <i>For Brushed Chrome Finish, Add</i>	179.99	27.12	
			10.50		
08 71 11 00-2400		Surface Mounted Deadlatches (08 71 11 00-2250)			
08 71 11 00-2401	EA	Single Cylinder Surface Mounted Deadlatch Note: Key one side, knob one side, bright brass finish. <i>For Brushed Chrome Finish, Add</i>	131.19	27.12	
			10.50		
08 71 11 00-2402	EA	Single Cylinder Surface Mounted Interlocking Deadlatch Note: Jimmy proof, key one side, knob one side, bright brass finish. <i>For Brushed Chrome Finish, Add</i>	162.10	27.12	
			10.50		
08 71 11 00-2403		Electric Strikes (08 71 11 00-2250)			
08 71 11 00-2404	EA	12/24 Volt DC, Fail Safe/Fail Secure, Aluminum/Steel Body Electric Strike (Von Duprin 5100).....	362.97	54.25	
08 71 11 00-2405	EA	12/24 Volt DC, Fail Secure, Dual Monitor Switch, Stainless Steel Body Electric Strike (Von Duprin 6111)..... Note: For rim mounted lock	1,102.25	54.25	
08 71 11 00-2406	EA	12/24 Volt DC, Fail Secure, Dual Monitor Switch, Stainless Steel Body Electric Strike (Von Duprin 6112)..... Note: For rim mounted lock	1,052.22	54.25	
08 71 11 00-2407	EA	24 Volt DC, Fail Secure, Stainless Steel Body Electric Strike (Von Duprin 6211)..... Note: For mortise or cylindrical locks	806.42	54.25	
08 71 11 00-2408	EA	24 Volt DC, Fail Secure, Dual Monitor Switch, Stainless Steel Body Electric Strike (Von Duprin 6212)..... Note: For mortise or cylindrical locks	1,107.58	54.25	
08 71 11 00-2409	EA	24 Volt DC, Fail Secure, Dual Monitor Switch, Stainless Steel Body Electric Strike (Von Duprin 6213)..... Note: For mortise or cylindrical locks	1,085.87	54.25	
08 71 11 00-2410	EA	24 Volt DC, Fail Secure, Dual Monitor Switch, Stainless Steel Body Electric Strike (Von Duprin 6214)..... Note: For mortise or cylindrical locks	1,186.02	54.25	
08 71 11 00-2411	EA	24 Volt DC, Fail Secure, Dual Monitor Switch, Stainless Steel Body Electric Strike (Von Duprin 6215)..... Note: For mortise or cylindrical locks	1,103.15	54.25	
08 71 11 00-2412	EA	12/24 Volt DC, 3,070 LB Static Strength, Stainless Steel Body, Dual Voltage Electric Strike (HES 1006).....	670.05	54.25	
08 71 11 00-2413	EA	12/24 Volt DC, 3,000 LB Static Strength, Stainless Steel Body, Fire Rated Electric Strike (HES 4500).....	666.00	54.25	
08 71 11 00-2414	EA	12/24 Volt DC, 1,500 LB Static Strength, Steel Body, Low Profile Electric Strike (HES 5000).....	316.92	54.25	
08 71 11 00-2415	EA	12/24 Volt DC, 1,500 LB Static Strength, Steel Body, Adjustable Electric Strike (HES 5200).....	316.92	54.25	
08 71 11 00-2416	EA	12/24 Volt DC, 1,500 LB Static Strength, Cylindrical Or Rim Exit Device, Stainless Steel Body, Electric Strike With Preload (HES 7000).....	411.74	54.25	
08 71 11 00-2417	EA	12/24 Volt DC, 1,500 LB Static Strength, Stainless Steel Body, Cylindrical Lock Electric Strike (HES 7500).....	747.08	54.25	
08 71 11 00-2418	EA	12/24 Volt DC, 1,500 LB Static Strength, Stainless Steel Body, Compact Concealed Electric Strike (HES 8000).....	360.84	54.25	
08 71 11 00-2419	EA	12/24 Volt DC, 1,500 LB Static Strength, Stainless Steel Body, Fire Rated Compact Concealed Electric Strike (HES 8300).....	685.14	54.25	
08 71 11 00-2420	EA	12/24 Volt DC, 1,500 LB Static Strength, Stainless Steel Body, Fire Rated Concealed Electric Strike (HES 8500).....	603.39	54.25	



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 11 00-2421	EA	12/24 Volt DC, 1,500 LB Static Strength, Stainless Steel Body, Slim Line Surface Mounted Electric Strike (HES 9400)		714.26	71.61
08 71 11 00-2422	EA	12/24 Volt DC, 1,500 LB Static Strength, Rim Exit Device, Stainless Steel Body, Fire Rated Surface Mounted Electric Strike (HES 9500)		816.22	71.61
08 71 11 00-2423	EA	12/24 Volt DC, 1,500 LB Static Strength, Rim Exit Device, Stainless Steel Body, Surface Mounted Electric Strike (HES 9600)		714.80	71.61
08 71 11 00-2424		Electric Hardware (08 71 11 00-2250)			
08 71 11 00-2425	EA	Electrified Cylindrical Lock Option Note: Excludes the lock. This task is used in conjunction with other locks in the CTC to electrify the lock.		200.93	
08 71 11 00-2426	EA	Electrified Mortise Lock Option Note: Excludes the lock. This task is used in conjunction with other locks in the CTC to electrify the lock.		235.01	
08 71 11 00-2427	EA	24" Long, 3/8" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		118.64	27.12
08 71 11 00-2428	EA	1 Ampere At 12/24 Volt DC, Door Hardware Power Supply		392.52	27.12
08 71 11 00-2429	EA	3 Amperes At 12 Volt DC, 2 Amperes At 24 Volt DC, Door Hardware Power Supply		694.27	27.12
08 71 11 00-2430	EA	4-1/2 Amperes At 12 Volt DC, 3 Amperes At 24 Volt DC, Door Hardware Power Supply		1,073.05	27.12
08 71 11 00-2431	EA	6 Amperes At 12 Volt DC, 4 Amperes At 24 Volt DC, Door Hardware Power Supply		1,186.63	27.12
08 71 11 00-2432	EA	9 Amperes At 12 Volt DC, 6 Amperes At 24 Volt DC, Door Hardware Power Supply		1,420.23	27.12
08 71 11 00-2433	EA	15 Amperes At 12 Volt DC, 10 Amperes At 24 Volt DC, Door Hardware Power Supply		1,726.42	27.12
08 71 11 00-2434	EA	18" Long, 1/4" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		98.80	27.12
08 71 11 00-2435	EA	24" Long, 1/4" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		101.14	27.12
08 71 11 00-2436	EA	30" Long, 1/4" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		115.50	27.12
08 71 11 00-2437	EA	45" Long, 1/4" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		118.34	27.12
08 71 11 00-2438	EA	60" Long, 1/4" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		119.80	27.12
08 71 11 00-2439	EA	72" Long, 1/4" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		128.03	27.12
08 71 11 00-2440	EA	12" Long, 3/8" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		100.29	27.12
08 71 11 00-2441	EA	18" Long, 3/8" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		111.80	27.12
08 71 11 00-2442	EA	36" Long, 3/8" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		120.91	27.12
08 71 11 00-2443	EA	49" Long, 3/8" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		136.66	27.12
08 71 11 00-2444	EA	60" Long, 3/8" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		141.03	27.12
08 71 11 00-2445	EA	12" Long, 1/2" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		114.67	27.12
08 71 11 00-2446	EA	18" Long, 1/2" Flexible Aluminum Conduit, Armored Power Transfer Door Loop		130.79	27.12
08 71 11 00-2447	EA	18" Long, 1/4" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		76.40	27.12
08 71 11 00-2448	EA	24" Long, 1/4" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		88.86	27.12
08 71 11 00-2449	EA	30" Long, 1/4" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		95.45	27.12
08 71 11 00-2450	EA	36" Long, 1/4" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		102.51	27.12
08 71 11 00-2451	EA	60" Long, 1/4" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		139.22	27.12
08 71 11 00-2452	EA	72" Long, 1/4" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		154.55	27.12
08 71 11 00-2453	EA	12" Long, 3/8" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		81.49	27.12
08 71 11 00-2454	EA	18" Long, 3/8" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		86.30	27.12
08 71 11 00-2455	EA	24" Long, 3/8" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		100.61	27.12
08 71 11 00-2456	EA	36" Long, 3/8" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		123.38	27.12
08 71 11 00-2457	EA	48" Long, 3/8" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		143.75	27.12
08 71 11 00-2458	EA	60" Long, 3/8" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		177.21	27.12
08 71 11 00-2459	EA	12" Long, 1/2" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		89.50	27.12
08 71 11 00-2460	EA	18" Long, 1/2" Flexible Conduit, Stainless Steel Armored Power Transfer Door Loop		96.87	27.12
08 71 11 00-2461	EA	Two 18 Gauge Wire, Door Frame To Edge Of Door Electrical Power Transfer		735.09	27.12
08 71 11 00-2462	EA	Ten 24 Gauge Wire, Door Frame To Edge Of Door Electrical Power Transfer		796.94	37.98
08 71 11 00-2463		Magnetic Locks (08 71 11 00-2250)			
08 71 11 00-2464	EA	Electromagnetic Lock, 500 lb. Holding Force, Stainless Steel (Schlage 40)		822.59	130.20
08 71 11 00-2465	EA	Electromagnetic Lock, 500 lb. Holding Force, Stainless Steel (Schlage 40TJ)		992.19	146.48
08 71 11 00-2466	EA	Electromagnetic Lock, 1,000 lb. Holding Force, Stainless Steel (Schlage 70)		973.94	130.20
08 71 11 00-2467	EA	Electromagnetic Lock, 1,000 lb. Holding Force, Stainless Steel (Schlage 70TJ)		1,143.23	146.48
08 71 11 00-2468	EA	Electromagnetic Lock, 500 lb. Holding Force, Aluminum (Schlage M420)		1,016.77	141.05
08 71 11 00-2469	EA	Electromagnetic Lock, 1,000 lb. Holding Force, Aluminum (Schlage M450)		1,120.57	141.05
08 71 11 00-2470	EA	Electromagnetic Lock, 1500 lb. Holding Force, Aluminum (Schlage M490)		1,201.37	141.05
08 71 11 00-2471	EA	Electromagnetic Lock, 500 lb. Holding Force, Aluminum (Schlage M420P) Note: Includes magnetic bond sensor, door position switch and relock time delay.		1,315.62	162.75
08 71 11 00-2472	EA	Electromagnetic Lock, 1,000 lb. Holding Force, Aluminum (Schlage M450P) Note: Includes magnetic bond sensor, door position switch and relock time delay.		1,453.61	162.75
08 71 11 00-2473	EA	Electromagnetic Lock, 1500 lb. Holding Force, Aluminum (Schlage M490P) Note: Includes magnetic bond sensor, door position switch and relock time delay.		1,515.76	162.75
08 71 11 00-2474	EA	2 Amperes Output Current, 12-24 Volt DC, 4 Relay with Fire Alarm (Schlage PS902)		451.12	54.25
08 71 11 00-2475	EA	4 Amperes Output Current, 12-24 Volt DC, 4 Relay with Fire Alarm (Schlage PS904)		761.12	54.25
08 71 11 00-2476	EA	6 Amperes Output Current, 12-24 Volt DC, 4 Relay with Fire Alarm (Schlage PS906)		922.23	54.25
08 71 11 00-2477		Door Coordinators (08 71 11)			
08 71 11 00-2478	EA	32" Satin Chrome Finish, Door Coordinator (Ives COR 32" Series) Note: Satin chrome finish. Includes two mounting brackets. For Anodized Aluminum Finish, Deduct		509.58 -149.58	33.91
08 71 11 00-2479	EA	42" Satin Chrome Finish, Door Coordinator (Ives COR 42" Series) Note: Satin chrome finish. Includes two mounting brackets. For Anodized Aluminum Finish, Deduct		535.43 -157.75	35.26
08 71 11 00-2480	EA	52" Satin Chrome Finish, Door Coordinator (Ives COR 52" Series) Note: Satin chrome finish. Includes two mounting brackets. For Anodized Aluminum Finish, Deduct		547.75 -160.51	36.62

08 Openings**08 70 Hardware****08 71 Door Hardware**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 71 11 00-2481	EA		60" Satin Chrome Finish, Door Coordinator (Ives COR 60" Series) Note: Satin chrome finish. Includes two mounting brackets.	571.78	37.98
			<i>For Anodized Aluminum Finish, Deduct</i>	-167.95	
08 71 11 00-2482	EA		72" Satin Chrome Finish, Door Coordinator (Ives COR 72" Series) Note: Satin chrome finish. Includes two mounting brackets.	614.11	39.33
			<i>For Anodized Aluminum Finish, Deduct</i>	-182.72	
08 71 11 00-2483	EA		Up To 20", Satin Chrome Finish, Filler Bar For Door Coordinator (Ives FL 20") <i>For Anodized Aluminum Finish, Deduct</i>	117.66 -29.70	10.85
08 71 11 00-2484	EA		Up To 32", Satin Chrome Finish, Filler Bar For Door Coordinator (Ives FL 32") <i>For Anodized Aluminum Finish, Deduct</i>	129.38 -32.22	12.21
08 71 11 00-2485	EA		Up To 44", Satin Chrome Finish, Filler Bar For Door Coordinator (Ives FL 44") <i>For Anodized Aluminum Finish, Deduct</i>	149.03 -37.91	13.57
08 71 11 00-2486	EA		Satin Chrome Finish, Carry Bar For Door Coordinator (Ives CB1)	107.04	13.57
08 71 11 00-2487	EA		7" Projection COR Series Gravity Type Door Coordinator <i>For Anodized Aluminum Finish, Deduct</i>	157.97 -30.64	20.34
08 71 11 00-2488	EA		9" Projection COR Series Gravity Type Door Coordinator <i>For Anodized Aluminum Finish, Deduct</i>	170.22 -35.54	20.34
08 71 11 00-2489			Removal And Reinstallation Of Door Hardware (08 71 11) Note: Includes storage and cleaning. Excludes removal of door where required. See CSI section 08 05 13 00-0050 for removal and reinstallation of door.		
08 71 11 00-2490	EA		Removal And Reinstallation Of Door Lockset, Entrance	81.38	
08 71 11 00-2491	EA		Removal And Reinstallation Of Door Lockset, Mortise	130.20	
08 71 11 00-2492	EA		Removal And Reinstallation Of Deadbolt Lock	86.81	
08 71 11 00-2493	PR		Removal And Reinstallation Of Butts/Hinges	21.70	
08 71 11 00-2494	EA		Removal And Reinstallation Of Door Bumper	7.59	
08 71 11 00-2495	EA		Removal And Reinstallation Of Surface Mounted Panic Device	217.01	
08 71 11 00-2496	EA		Removal And Reinstallation Of Kick Plate	27.12	
08 71 11 00-2497	EA		Removal And Reinstallation Of Push Plate	21.69	
08 71 11 00-2498	EA		Removal And Reinstallation Of Surface Mounted Door Closer Or Holder	108.50	
08 71 11 00-2499	EA		Removal And Reinstallation Of Door Handles	16.28	
08 71 11 00-2500			Electromagnetic Door Release (08 71 11)		
08 71 11 00-2501	EA		120 Volt AC, 24 Volt AC/DC, 12 Volt DC, Wall Mount, Surface Wiring, Electro-Magnetic Door Release	584.81	68.35
08 71 11 00-2502	EA		120 Volt AC, 24 Volt AC/DC, 12 Volt DC, Wall Mount, Recessed Wiring, Electro-Magnetic Door Release	569.58	68.35
08 71 11 00-2503	EA		120 Volt AC, 24 Volt AC/DC, 12 Volt DC, Adjustable, Wall Mount, Recessed Wiring, Electro-Magnetic Door Release	646.34	68.35
08 71 11 00-2504	EA		24 Volt AC/DC, High Hold, Wall Mount, Surface Or Recessed Wiring, Electro-Magnetic Door Release	1,099.45	68.35
08 71 11 00-2505	EA		24 Volt DC, Sliding Door, Electro-Magnetic Door Release	1,059.04	68.35
08 71 11 00-2506	EA		120 Volt AC, 24 Volt AC/DC, 12 Volt DC, Overhead Door, Electro-Magnetic Door Release	1,059.04	68.35
08 71 11 00-2507	EA		120 Volt AC, 24 Volt AC/DC, 12 Volt DC, Floor Mount, Single Door, Electro-Magnetic Door Release	960.22	68.35
08 71 11 00-2508	EA		120 Volt AC, 24 Volt AC/DC, 12 Volt DC, Floor Mount, Back-to-Back Door, Electro-Magnetic Door Release	1,210.08	68.35
08 71 11 00-2509	EA		Photo Electric Smoke Detector Suitable For Door Holder Release	1,143.28	68.35
08 71 11 00-2510	EA		Ionization Type Smoke Detector Suitable For Door Holder Release	1,424.55	68.35
08 71 11 00-2511	EA		Surface Wall Mount, Electromagnetic Door Holder (Sargent 1560) Note: 120 volt AC, 24 volt AC/DC, 12 volt DC	660.78	68.35
08 71 11 00-2512	EA		Flush Mount, Electromagnetic Door Holder (Sargent 1561) Note: 120 volt AC, 24 volt AC/DC, 12 volt DC	648.98	68.35
08 71 11 00-2513	EA		Floor Mount, Electromagnetic Door Holder (LCN SEM7820) Note: 120 volt AC, 24 volt AC/DC, 12 volt DC	1,018.00	68.35
08 71 11 00-2514	EA		Surface Wall Mount, Electromagnetic Door Holder (LCN SEM7830) Note: 120 volt AC, 24 volt AC/DC, 12 volt DC	698.52	68.35
08 71 11 00-2515	EA		Low Profile Recessed Wall Mount, Electromagnetic Door Holder (LCN SEM7840) Note: 120 volt AC, 24 volt AC/DC, 12 volt DC	698.52	68.35
08 71 11 00-2516	EA		Recessed Wall Mount, Electromagnetic Door Holder (LCN SEM7850) Note: 120 volt AC, 24 volt AC/DC, 12 volt DC	698.52	68.35
08 71 13			Automatic Door Operators (08 71)		
08 71 13 00-0001			Automatic Door Operators (LCN) (08 71 13)		
08 71 13 00-0002	EA		Automatic Door Operator, Surface Mount Americans With Disabilities Act Compliant Door Operator With Pull Arm (LCN 9531) Note: Opens doors automatically for wheelchair access, and allows for manual operation for regular pedestrian traffic.	4,425.04	135.63
08 71 13 00-0003	EA		Automatic Door Operator, Surface Mount Americans With Disabilities Act Compliant Door Operator With Push Arm (LCN 9542) Note: Opens doors automatically for wheelchair access, and allows for manual operation for regular pedestrian traffic.	4,425.04	135.63
08 71 13 00-0004			Automatic Door Operators (Stanley) (08 71 13)		
08 71 13 00-0005	EA		Automatic Door Operator, Surface Mount With Key Switch (Stanley D-4990)	4,265.27	135.63
08 71 13 00-0006	EA		6" Round Stainless Steel Actuator (Stanley CL2216)	272.47	
08 71 13 00-0007	EA		Power Supply (Stanley Precision ELR151)	949.30	
08 71 13 00-0008	EA		Low Energy Door Operator, Push Side Mount Application With Standard Arm (Stanley D-4990) Note: Includes control box with conduit access, motor, operator and D-4550 door closer. Excludes electrical connections	3,110.29	108.50
08 71 13 00-0009	EA		Door Operator Free Standing Push Plate Post (Stanley CL2247) Note: Includes mounting post only	489.77	72.37



Openings	08	08
Hardware	08 70	
Door Hardware	08 71	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 71 13 00-0010	EA	Dual Vestibule Push Plate Door Operator (Stanley CL2388).....		337.97	40.79
		Note: Includes 4-3/4" Dual Vestibule Push Plate and electrical connection. Excludes junction Box			
08 71 13 00-0011	EA	Jamb Mount, Push Plate Door Operator (Stanley CL2055).....		212.40	40.79
		Note: Includes 4-3/4" Jamb Mount Push Plate and Electrical Connections. Excludes junction Box			
08 71 13 00-0012	EA	Touchless Plate Door Operator (Stanley CL2025).....		333.66	40.79
		Note: Includes Touchless Plate and Electrical Connection. Excludes junction Box			
08 71 13 00-0013	EA	Door Operator Push Plate Assembly (Stanley CL4976).....		1,130.05	61.24
		Note: Includes 2 Push Plates, 2 Surface Boxes, 2 Transmitters and 1 Receiver			
08 71 13 00-0014		Miscellaneous Devices (08 71 13)			
08 71 13 00-0015	EA	Electric Power Transformer (Von Duprin EPT-2) For Magnetic Monitor Switches.....		538.77	40.69
08 71 13 00-0016	EA	Magnetic Monitor Switch, SS Finish (Von Duprin MS 764).....		158.21	24.41
08 71 13 00-0017	EA	24 Volt AC, 3 Amperes, Transformer (Von Duprin PT 750).....		201.96	24.41
08 71 13 00-0018	EA	Automatic Door Bottoms, Fully Mortise Cam Bottom Type To Fit 1-1/2" x 3/4" Mortise Channel At Door Bottom (National Guard Products 320S).....		111.75	24.41
08 71 53		Security Door Hardware (08 71)			
08 71 53 00-0001		Door Exit Alarm Hardware (08 71 53)			
08 71 53 00-0002	EA	Door Or Wall Mount Exit Alarm, Audible Alarm, 9 Volt Battery Back-up (Detex EAX-500).....		378.13	40.69
08 71 53 00-0003	EA	Weatherized Door Or Wall Mount Exit Alarm, Audible Alarm, 9 Volt Battery Back-up (Detex EAX-500W).....		528.10	40.69
08 71 53 00-0004	EA	Door Or Wall Mount Exit Alarm, Audible Alarm, 9 Volt Battery Back-up (Detex EAX-300).....		442.19	40.69
		Note: Door propped alarm for applications where doors may be used for egress or ingress, but may not be held or propped open. Door open times from 1 second to 4 minutes (15 second default) are field selectable.			
08 71 53 00-0005	EA	Weatherized Door Or Wall Mount Exit Alarm, Audible Alarm, 9 Volt Battery Back-up (Detex EAX-300W).....		574.83	40.69
		Note: Door propped alarm for applications where doors may be used for egress or ingress, but may not be held or propped open. Door open times from 1 second to 4 minutes (15 second default) are field selectable.			
08 71 53 00-0006	EA	Wall Mount Exit Alarm, Audible Alarm, AC/DC (Detex EAX-2500).....		665.63	54.25
08 71 53 00-0007	EA	Surface Mounted Magnetic Switch (Detex MS-1039S or MS-1059S).....		116.09	54.25
		Note: For use with Detex EAX exit alarms.			
08 72		Weatherstripping, Thresholds and Seals (08 70)			
08 72 33		Weatherstripping and Seals (08 72)			
08 72 33 00-0001		Weather-Stripping And Seals (08 72 33)			
08 72 33 00-0002		Astragals (08 72 33 00-0001)			
		Note: Astragal and meeting stile seals are used to seal the gap between a pair of doors.			
08 72 33 00-0003		Adhesive Backed Astragals (08 72 33 00-0002)			
08 72 33 00-0004	LF	7/16" Width, 9/32" Height, Edge Mount, Single Fin, Adhesive Backed Flexible Astragal (Pemko S771).....		5.44	0.82
08 72 33 00-0005	LF	1/2" Width, 3/16" Height, Edge Mount, Double Fin, Adhesive Backed Flexible Astragal (Pemko S772).....		6.11	0.82
08 72 33 00-0006	LF	1-1/8" Width, 3/16" Height, Mullion Mount, Adhesive Backed Mullion Gasketing (Pemko 5110).....		4.57	0.82
08 72 33 00-0007		Overlapping Astragals (08 72 33 00-0002)			
08 72 33 00-0008		Aluminum, Overlapping Astragals (08 72 33 00-0007)			
08 72 33 00-0009	LF	2" Width, 1/8" Height, Clear Anodized Aluminum, Overlapping Astragal (Pemko 357C).....		20.86	4.88
		For Color Anodized Finish, Add		3.36	
08 72 33 00-0010		Stainless Steel, Overlapping Astragals (08 72 33 00-0007)			
08 72 33 00-0011	LF	2" Width, 1/8" Height, Stainless Steel, Overlapping Astragal (Pemko 357SS).....		44.76	4.88
08 72 33 00-0012		"T" Astragals (08 72 33 00-0002)			
08 72 33 00-0013		Aluminum, "T" Astragals (08 72 33 00-0012)			
08 72 33 00-0014	LF	1" Width, 11/16" Height, Mill Aluminum, "T" Astragal (Pemko 359A).....		12.67	4.88
		For Color Anodized Finish, Add		1.06	
08 72 33 00-0015	LF	Vinyl Insert, 3/4" Width, 1/4" Height, Mill Aluminum, "T" Astragal (Pemko 356AV).....		16.60	4.88
		For Color Anodized Finish, Add		1.39	
08 72 33 00-0016	LF	Vinyl Or Pile Insert, 1-3/8" Width, 1/4" Height, Clear Anodized Aluminum, "T" Astragal (Pemko 355CP).....		17.21	4.88
		For Color Anodized Finish, Add		2.65	
		For Silicone Insert, Add		0.63	
08 72 33 00-0017	LF	Neoprene Sponge Insert, 1-1/8" Width, 1/2" Height, Clear Anodized Aluminum, "T" Astragal (Pemko 352CR).....		34.05	4.88
		For Color Anodized Finish, Add		8.54	
08 72 33 00-0018		Brass/Bronze, "T" Astragals (08 72 33 00-0012)			
08 72 33 00-0019	LF	Vinyl Or Pile Insert, 1-3/8" Width, 1/4" Height, Brass/Bronze, "T" Astragal (Pemko 355BP).....		62.38	4.88
		For Silicone Insert, Add		0.63	
08 72 33 00-0020		Locking Astragals (08 72 33 00-0002)			

08 Openings**08 70 Hardware****08 72 Weatherstripping, Thresholds and Seals**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 72 33 00-0021	Outswing Locking Astragals (08 72 33 00-0020)		
	Note: Includes two units. A housing containing the locking bolt which fastens to the inactive leaf and a "T" astragal with a seal that fastens to the active leaf.		
08 72 33 00-0022	Aluminum, Outswing Locking Astragals (08 72 33 00-0021)		
08 72 33 00-0023	LF Slide Bolt, 1-1/4" Width, 3/8" Height, Clear Anodized Aluminum, Slimline Style, Outswing Locking Astragal (Pemko 3443CS).....	46.45	4.88
	Note: Includes pile seal at inner door edge and neoprene bottom seal.		
	<i>For Color Anodized Finish, Add</i>	7.36	
08 72 33 00-0024	LF Locking Springbolt, 1-1/4" Width, 3/8" Height, Clear Anodized Aluminum, Slimline Style, Outswing Locking Astragal (Pemko 3444CS).....	54.34	4.88
	Note: Includes pile seal at inner door edge and neoprene bottom seal.		
	<i>For Color Anodized Finish, Add</i>	8.94	
08 72 33 00-0025	LF Slide Bolt, 1-13/32" Width, 11/16" Height, Gold Anodized Aluminum, Colonial Style, Outswing Locking Astragal (Pemko 3445BDQ).....	52.43	4.88
	Note: Includes pile seal at inner door edge and kerf-in foam bottom seal.		
	<i>For Thermal Break, Add</i>	2.57	
08 72 33 00-0026	LF Locking Springbolt, 1-13/32" Width, 11/16" Height, Gold Anodized Aluminum, Colonial Style, Outswing Locking Astragal (Pemko 3446BDGQ).....	58.84	4.88
	Note: Includes pile seal at inner door edge and kerf-in foam bottom seal.		
	<i>For Thermal Break, Add</i>	2.95	
08 72 33 00-0027	Inswing Locking Astragals (08 72 33 00-0020)		
	Note: Includes one unit containing the locking bolt and astragal with seal, which fastens to the inactive leaf.		
08 72 33 00-0028	Wood, Inswing Locking Astragals (08 72 33 00-0027)		
08 72 33 00-0029	LF Flush Bolt, 1-1/4" Width, 1/2" Height, Wood, Inswing Locking Astragal (Pemko 34832).....	54.83	4.88
08 72 33 00-0030	LF Flush Bolt, 1-1/4" Width, 1-3/16" Height, Wood, Inswing Locking Astragal (Pemko 3481Q).....	54.54	4.88
	Note: Includes kerf-in foam seal.		
08 72 33 00-0031	Aluminum, Inswing Locking Astragals (08 72 33 00-0027)		
08 72 33 00-0032	LF Slide Bolt, 1-3/8" Width, 9/32" Height, Clear Anodized Aluminum, Slimline Style, Inswing Locking Astragal (Pemko 3493CV).....	29.92	4.88
	Note: Includes pile seal at inner door edge and neoprene bottom seal.		
	<i>For Silicone Insert, Add</i>	0.63	
	<i>For Color Anodized Finish, Add</i>	4.05	
08 72 33 00-0033	LF Locking Springbolt, 1-3/8" Width, 9/32" Height, Clear Anodized Aluminum, Slimline Style, Inswing Locking Astragal (Pemko 3494CV).....	36.51	4.88
	Note: Includes pile seal at inner door edge and neoprene bottom seal.		
	<i>For Silicone Insert, Add</i>	0.63	
	<i>For Color Anodized Finish, Add</i>	5.37	
08 72 33 00-0034	LF Slide Bolt, 1-13/32" Width, 3/4" Height, Clear Anodized Aluminum, Colonial Style, Inswing Locking Astragal (Pemko 3495CQ).....	32.41	4.88
	Note: Includes pile seal at inner door edge and kerf-in foam bottom seal.		
	<i>For Magnetic Kerf-In Insert, Add</i>	0.47	
	<i>For Color Anodized Finish, Add</i>	4.55	
08 72 33 00-0035	LF Locking Springbolt, 1-13/32" Width, 3/4" Height, Clear Anodized Aluminum, Colonial Style, Inswing Locking Astragal (Pemko 3496CQ).....	38.95	4.88
	Note: Includes pile seal at inner door edge and kerf-in foam bottom seal.		
	<i>For Magnetic Kerf-In Insert, Add</i>	0.47	
	<i>For Color Anodized Finish, Add</i>	5.86	
08 72 33 00-0036	Security Astragals (08 72 33 00-0002)		
08 72 33 00-0037	LF Vinyl Seal, 1/2" Thick Cam, 1-3/4" Width, Clear Anodized Aluminum, Security Astragal (Pemko 378C).....	27.72	4.88
	<i>For Color Anodized Finish, Add</i>	18.07	
08 72 33 00-0038	LF 2-1/4" Width, 10 Gauge Galvanized Steel, Offset Security Bar, Security Astragal (Pemko 3572SP).....	48.48	4.88
08 72 33 00-0039	Meeting Stile Astragals (08 72 33 00-0002)		
08 72 33 00-0040	One Piece, Meeting Stile Astragals (08 72 33 00-0039)		
	Note: Includes an astragal for one door only.		
08 72 33 00-0041	LF 1/4" Vinyl Or Pile Insert, 5/32" Width, 13/32" Height, Surface/Mortise Mount, Clear Anodized Aluminum, One Piece, Meeting Stile Astragal (Pemko 369AP).....	16.37	4.88
	<i>For Color Anodized Finish, Add</i>	2.02	
08 72 33 00-0042	LF 1/4" Neoprene Loop Insert, 7/16" Width, 3/4" Height, Surface/Mortise Mount, Mill Aluminum, One Piece, Meeting Stile Astragal (Pemko 313AN).....	25.70	7.27
	<i>For Color Anodized Finish, Add</i>	4.48	
08 72 33 00-0043	LF 9/16" Neoprene Loop Insert, 3/4" Width, 1-3/8" Height, Surface/Mortise Mount, Clear Anodized Aluminum, One Piece, Meeting Stile Astragal (Pemko 314CN).....	35.45	7.27
	<i>For Color Anodized Finish, Add</i>	2.10	
08 72 33 00-0044	LF 15/16" Neoprene Loop Insert, 1-1/8" Width, 1-3/4" Height, Surface/Mortise Mount, Clear Anodized Aluminum, One Piece, Meeting Stile Astragal (Pemko 358CN).....	36.70	7.27
	<i>For Color Anodized Finish, Add</i>	5.55	
08 72 33 00-0045	LF 1/8" Width, 1-1/2" Height, Side Mount, Spring Bronze, One Piece, Meeting Stile Astragal (Pemko B71).....	38.27	7.27
08 72 33 00-0046	Two Piece, Meeting Stile Split Astragals (08 72 33 00-0039)		
	Note: Includes one astragal for each door.		



Openings	08	08
Hardware	08 70	
Weatherstripping, Thresholds and Seals	08 72	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 72 33 00-0047	LF	1/4" Vinyl Insert, 13/16" Width, 1/4" Height, Face Mount, Mill Aluminum, Two Piece, Meeting Stile Split Astragals (Pemko 297AV)	19.64		7.27
		<i>For Silicone Insert, Add</i>	0.95		
		<i>For Color Anodized Finish, Add</i>	5.15		
08 72 33 00-0048	LF	1/4" Vinyl Insert, 11/16" Width, 1/4" Height, Face Mount, Mill Aluminum, Two Piece, Meeting Stile Split Astragals (Pemko 316AV)	19.64		7.27
		<i>For Color Anodized Finish, Add</i>	5.15		
08 72 33 00-0049	LF	1/4" Vinyl Insert, 7/8" Width, 1/4" Height, Face Mount, Mill Aluminum, Two Piece, Meeting Stile Split Astragals (Pemko 303AV)	19.64		7.27
		<i>For Silicone Insert, Add</i>	0.95		
		<i>For Color Anodized Finish, Add</i>	5.15		
08 72 33 00-0050	LF	3/8" Neoprene Insert, 7/8" Width, 3/16" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Split Astragals (Pemko 305CN)	33.32		7.27
		<i>For Silicone Insert, Add</i>	0.63		
		<i>For Color Anodized Finish, Add</i>	3.77		
08 72 33 00-0051	LF	3/8" Brush Insert, 3/4" Width, 1/4" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Split Astragals (Pemko 18041CNB)	26.59		7.27
		<i>For Color Anodized Finish, Add</i>	4.84		
08 72 33 00-0052	LF	5/8" Brush Insert, 3/4" Width, 1/4" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Split Astragals (Pemko 18061CNB)	27.49		7.27
		<i>For Color Anodized Finish, Add</i>	5.20		
08 72 33 00-0053	LF	3/16" Vinyl Or Pile Insert, 3/4" Width, 3/8" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Split Astragals With Concealed Fasteners (Pemko 29310CV)	34.21		7.27
		<i>For Color Anodized Finish, Add</i>	9.86		
		<i>For Silicone Insert, Add</i>	0.95		
08 72 33 00-0054	LF	3/8" Brush Insert, 7/8" Width, 1/4" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Split Astragals With Concealed Fasteners (Pemko 29324CNB)	35.11		7.27
		<i>For Color Anodized Finish, Add</i>	8.25		
08 72 33 00-0055	LF	5/8" Brush Insert, 7/8" Width, 1/4" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Split Astragals With Concealed Fasteners (Pemko 29326CNB)	36.01		7.27
		<i>For Color Anodized Finish, Add</i>	8.61		
08 72 33 00-0056		Two Piece, Adjustable Meeting Stile Split Astragals (08 72 33 00-0039)			
		Note: Includes one astragal for each door.			
08 72 33 00-0057		Aluminum, Two Piece, Meeting Stile Adjustable Split Astragals (08 72 33 00-0056)			
08 72 33 00-0058	LF	3/8" Vinyl Or Pile Insert, 21/32" Width, 9/16" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Adjustable Split Astragals (Pemko 354CP)	67.83		7.27
		<i>For Color Anodized Finish, Add</i>	13.34		
		<i>For Silicone Insert, Add</i>	0.63		
08 72 33 00-0059	LF	3/8" Vinyl Or Pile Insert, 1" Width, 9/16" Height, Face Mount, Clear Anodized Aluminum, Two Piece, Meeting Stile Adjustable Split Astragals (Pemko 351CP)	69.24		7.27
		<i>For Silicone Insert, Add</i>	0.63		
		<i>For Color Anodized Finish, Add</i>	10.95		
08 72 33 00-0060		Brass/Bronze, Two Piece, Meeting Stile Adjustable Split Astragals (08 72 33 00-0056)			
08 72 33 00-0061	LF	3/8" Vinyl Or Pile Insert, 21/32" Width, 9/16" Height, Mortise Mount, Brass/Bronze, Two Piece, Meeting Stile Adjustable Split Astragals (Pemko 354BP)	193.07		7.27
		<i>For Silicone Insert, Add</i>	0.63		
08 72 33 00-0062	LF	3/8" Vinyl Or Pile Insert, 1" Width, 9/16" Height, Face Mount, Brass/Bronze, Two Piece, Meeting Stile Adjustable Split Astragals (Pemko 351BP)	180.58		7.27
		<i>For Silicone Insert, Add</i>	0.63		
08 72 33 00-0063		Door Sweeps (08 72 33 00-0001)			
08 72 33 00-0064		Tack On Door Sweeps (08 72 33 00-0063)			
08 72 33 00-0065	LF	For Sealing Up To 3/4" Gap, Side Mount, Vinyl Tack On Door Sweep (Pemko V365)	7.01		2.71
08 72 33 00-0066	LF	For Sealing Up To 5/8" Gap, Bottom Mount, Rubber Tack On Door Sweep (Pemko R364)	7.14		2.71
08 72 33 00-0067	LF	For Sealing Up To 1-3/8" Gap, Bottom Mount, Vinyl Tack On Door Sweep (Pemko P361V)	7.54		2.71
08 72 33 00-0068		Aluminum Retainer Door Sweeps (08 72 33 00-0063)			
08 72 33 00-0069		35 Degree, Aluminum Retainer Door Sweeps (08 72 33 00-0068)			
		Note: The retainer mounts to the door face with the sweep positioned 35 degrees from the door. Includes clear anodized finish.			
08 72 33 00-0070	LF	5/16" Brush Insert, 35 Degree, Aluminum Retainer Door Sweep (Pemko 35041CNB)	17.34		5.43
		<i>For Color Anodized Finish, Add</i>	2.60		
08 72 33 00-0071	LF	1/2" Brush Insert, 35 Degree, Aluminum Retainer Door Sweep (Pemko 35061CNB)	18.01		5.43
		<i>For Color Anodized Finish, Add</i>	2.51		
08 72 33 00-0072		45 Degree, Aluminum Retainer Door Sweeps (08 72 33 00-0068)			
		Note: The retainer mounts to the door face with the sweep positioned 45 degrees from the door. Includes clear anodized finish.			
08 72 33 00-0073	LF	1-3/4" Brush Insert, 45 Degree, Aluminum Retainer Door Sweep (Pemko 45175CNB)	28.77		5.43
		<i>For Color Anodized Finish, Add</i>	7.17		
08 72 33 00-0074	LF	2-1/2" Brush Insert, 45 Degree, Aluminum Retainer Door Sweep (Pemko 45250CNB)	31.46		5.43
		<i>For Color Anodized Finish, Add</i>	8.25		
08 72 33 00-0075	LF	4" Brush Insert, 45 Degree, Aluminum Retainer Door Sweep (Pemko 45400CNB)	37.29		5.43
		<i>For Color Anodized Finish, Add</i>	10.58		

08 Openings**08 70 Hardware****08 72 Weatherstripping, Thresholds and Seals**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 72 33 00-0076	90 Degree, Aluminum Retainer Door Sweeps (08 72 33 00-0068) Note: The retainer mounts to the door bottom with the sweep positioned perpendicular to the threshold. Includes clear anodized finish.		
08 72 33 00-0077	LF 3/8" Brush Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 90041CNB).....	19.58	5.43
	<i>For Color Anodized Finish, Add</i>	0.87	
08 72 33 00-0078	LF 5/8" Brush Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 90062CNB).....	19.36	5.43
	<i>For Color Anodized Finish, Add</i>	0.85	
08 72 33 00-0079	LF 1" Brush Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 90100CNB).....	20.93	5.43
	<i>For Color Anodized Finish, Add</i>	3.53	
08 72 33 00-0080	LF 1-3/8" Brush Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 90137CNB).....	21.60	5.43
	<i>For Color Anodized Finish, Add</i>	4.30	
08 72 33 00-0081	LF 7/16" Neoprene Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 315CN).....	18.91	5.43
	<i>For Color Anodized Finish, Add</i>	2.02	
08 72 33 00-0082	LF 11/16" Neoprene Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 368CN).....	25.18	5.43
	<i>For Color Anodized Finish, Add</i>	2.87	
08 72 33 00-0083	LF 15/16" Neoprene Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 321CN).....	20.25	5.43
	<i>For Color Anodized Finish, Add</i>	1.88	
08 72 33 00-0084	LF 9/16" Vinyl Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 308AV).....	14.37	5.43
	Note: Includes mill finish. <i>For Color Anodized Finish, Add</i>	1.77	
08 72 33 00-0085	LF 1" Vinyl Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 307AV).....	14.54	5.43
	Note: Includes mill finish. <i>For Color Anodized Finish, Add</i>	1.85	
08 72 33 00-0086	LF 1-9/16" Vinyl Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 56AV).....	16.44	5.43
	Note: Includes mill finish. <i>For Color Anodized Finish, Add</i>	1.96	
08 72 33 00-0087	180 Degree, Aluminum Retainer Door Sweeps (08 72 33 00-0068) Note: The retainer mounts to the door face with the sweep positioned perpendicular to the threshold. Includes clear anodized finish.		
08 72 33 00-0088	180 Degree, Aluminum Retainer Door Sweeps (08 72 33 00-0087)		
08 72 33 00-0089	LF 3/8" Brush Insert, 180 Degree, Aluminum Retainer Door Sweep (Pemko 18041CNB).....	16.89	5.43
	<i>For Color Anodized Finish, Add</i>	2.42	
08 72 33 00-0090	LF 5/8" Brush Insert, 180 Degree, Aluminum Retainer Door Sweep (Pemko 18061CNB).....	17.34	5.43
	<i>For Color Anodized Finish, Add</i>	2.60	
08 72 33 00-0091	LF 1" Brush Insert, 180 Degree, Aluminum Retainer Door Sweep (Pemko 18100CNB).....	20.93	5.43
	<i>For Color Anodized Finish, Add</i>	3.53	
08 72 33 00-0092	180 Degree, Concealed Fastener, Aluminum Retainer Door Sweeps (08 72 33 00-0087)		
08 72 33 00-0093	LF 3/8" Brush Insert, 180 Degree, Concealed Fastener, Aluminum Retainer Door Sweep (Pemko 29324CNB).....	21.15	5.43
	<i>For Color Anodized Finish, Add</i>	4.12	
08 72 33 00-0094	LF 5/8" Brush Insert, 180 Degree, Concealed Fastener, Aluminum Retainer Door Sweep (Pemko 29326CNB).....	21.60	5.43
	<i>For Color Anodized Finish, Add</i>	4.30	
08 72 33 00-0095	LF 1" Brush Insert, 180 Degree, Concealed Fastener, Aluminum Retainer Door Sweep (Pemko 293100CNB).....	23.48	5.43
	<i>For Color Anodized Finish, Add</i>	5.06	
08 72 33 00-0096	Mortised, Aluminum Retainer Door Sweeps (08 72 33 00-0068) Note: The retainer is mortised into the door bottom with the sweep positioned perpendicular to the threshold. Includes mill finish. Excludes mortising.		
08 72 33 00-0097	LF 1/4" Brush Insert, Mortised, Aluminum Retainer Door Sweep (Pemko 5025ASB).....	14.87	5.43
08 72 33 00-0098	LF 13/32" Brush Insert, Mortised, Aluminum Retainer Door Sweep (Pemko 5041ANB).....	14.87	5.43
08 72 33 00-0099	LF 5/8" Brush Insert, Mortised, Aluminum Retainer Door Sweep (Pemko 5061ANB).....	15.10	5.43
08 72 33 00-0100	Aluminum Retainer Door Sweeps With Rain Drip (08 72 33 00-0063)		
08 72 33 00-0101	90 Degree, Aluminum Retainer Door Sweeps With Rain Drip (08 72 33 00-0100) Note: The retainer mounts to the door bottom with the sweep positioned perpendicular to the threshold. Includes mill finish.		
08 72 33 00-0102	LF 1/4" Vinyl Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 3452AV).....	14.43	5.43
	<i>For Color Anodized Finish, Add</i>	2.51	
08 72 33 00-0103	LF 1/2" Vinyl Insert, 90 Degree, Aluminum Retainer Door Sweep (Pemko 345AV).....	17.34	5.43
	<i>For Color Anodized Finish, Add</i>	2.60	
08 72 33 00-0104	LF 3/8" Brush Insert, 90 Degree, Aluminum Retainer Door Sweeps With Rain Drip (Pemko 3452CNB).....	19.52	5.43
	Note: Includes clear anodized finish. <i>For Color Anodized Finish, Add</i>	1.74	
08 72 33 00-0105	LF 7/16" Brush Insert, 90 Degree, Aluminum Retainer Door Sweeps With Rain Drip (Pemko 345ANB).....	19.92	5.43
	<i>For Color Anodized Finish, Add</i>	1.82	
08 72 33 00-0106	Brass/Bronze Retainer Door Sweeps (08 72 33 00-0063)		
08 72 33 00-0107	90 Degree, Brass/Bronze Retainer Door Sweeps (08 72 33 00-0106) Note: The retainer mounts to the door bottom with the sweep positioned perpendicular to the threshold.		
08 72 33 00-0108	LF 7/16" Neoprene Insert, 90 Degree, Brass/Bronze Retainer Door Sweep (Pemko 315BN).....	24.29	5.43



Openings	08	08
Hardware	08 70	
Weatherstripping, Thresholds and Seals	08 72	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 72 33 00-0109 Oak Retainer Door Sweeps (08 72 33 00-0063)		
08 72 33 00-0110 90 Degree, Oak Retainer Door Sweeps (08 72 33 00-0109)		
Note: The retainer mounts to the door bottom with the sweep positioned perpendicular to the threshold.		
08 72 33 00-0111 LF 9/16" Brush Insert, 90 Degree, Oak Retainer Door Sweep (Pemko 18062WNB)	19.13	5.43
08 72 33 00-0112 LF 15/16" Brush Insert, 90 Degree, Oak Retainer Door Sweep (Pemko 18100WNB)	22.67	5.43
08 72 33 00-0113 Door Shoes And Bottoms (08 72 33 00-0001)		
08 72 33 00-0114 Door Shoes (08 72 33 00-0113)		
08 72 33 00-0115 Aluminum Retainer Door Shoes (08 72 33 00-0114)		
08 72 33 00-0116 Bottom Mount, Aluminum Retainer Door Shoes (08 72 33 00-0115)		
08 72 33 00-0117 LF Vinyl Insert, 1-3/16" Width, Bottom Mount, Aluminum Retainer Door Shoe (Pemko 234AV)	16.22	5.43
For Color Anodized Finish, Add	2.15	
For Thermo-Plastic Elastomer Insert, Add	0.68	
08 72 33 00-0118 LF Vinyl Insert, 1-3/8" Width, Bottom Mount, Aluminum Retainer Door Shoe (Pemko 209AV)	16.89	5.43
For Color Anodized Finish, Add	2.42	
08 72 33 00-0119 LF Notched Vinyl Insert, 1-3/16" Width, Bottom Mount, Aluminum Retainer Door Shoe (Pemko 2343AV)	23.39	5.43
For Color Anodized Finish, Add	2.51	
08 72 33 00-0120 Side Mount, Aluminum Retainer Door Shoes (08 72 33 00-0115)		
08 72 33 00-0121 LF Vinyl Insert, 1-3/4" Width, Side Mount, Aluminum Retainers Door Shoe (Pemko 318AV)	19.13	5.43
For Color Anodized Finish, Add	3.32	
For Thermo-Plastic Elastomer Insert, Add	0.68	
08 72 33 00-0122 L Or U Shaped, Aluminum Retainer Door Shoes (08 72 33 00-0115)		
08 72 33 00-0123 LF Vinyl Insert, 1-1/4" Width, L-Shaped, Aluminum Retainer Door Shoe (Pemko 211AV)	17.34	5.43
For Color Anodized Finish, Add	3.25	
For Thermo-Plastic Elastomer Insert, Add	0.42	
08 72 33 00-0124 LF Vinyl Insert, 1-3/8" Width, U-Shaped, Aluminum Retainer Door Shoe (Pemko 220AV)	18.68	5.43
For Color Anodized Finish, Add	3.14	
For Thermo-Plastic Elastomer Insert, Add	0.42	
08 72 33 00-0125 LF Vinyl Insert, 1-3/4" Width, U-Shaped, Aluminum Retainer Door Shoe (Pemko 217AV)	19.13	5.43
For Color Anodized Finish, Add	3.32	
For Thermo-Plastic Elastomer Insert, Add	0.42	
08 72 33 00-0126 LF Notched Vinyl Insert, 1-5/16" Width, L-Shaped, Aluminum Retainer Door Shoe (Pemko 2113AV)	28.25	5.43
For Color Anodized Finish, Add	3.48	
08 72 33 00-0127 LF Notched Vinyl Insert, 1-3/4" Width, U-Shaped, Aluminum Retainer Door Shoe (Pemko 2173AV)	28.70	5.43
For Color Anodized Finish, Add	3.57	
08 72 33 00-0128 L Or U Shaped With Rain Drip, Aluminum Retainer Door Shoes (08 72 33 00-0115)		
08 72 33 00-0129 LF Vinyl Insert, 1-1/4" Width, L-Shaped With Rain Drip, Aluminum Retainer Door Shoe (Pemko 210AV)	17.79	5.43
For Color Anodized Finish, Add	3.48	
For Thermo-Plastic Elastomer Insert, Add	0.42	
08 72 33 00-0130 LF Vinyl Insert, 1-3/8" Width, U-Shaped With Rain Drip, Aluminum Retainer Door Shoe (Pemko 215AV)	19.13	5.43
For Color Anodized Finish, Add	3.32	
For Thermo-Plastic Elastomer Insert, Add	0.42	
08 72 33 00-0131 LF Vinyl Insert, 1-3/4" Width, U-Shaped With Rain Drip, Aluminum Retainer Door Shoe (Pemko 216AV)	19.36	5.43
For Color Anodized Finish, Add	3.41	
For Thermo-Plastic Elastomer Insert, Add	0.42	
08 72 33 00-0132 Vinyl Door Shoes (08 72 33 00-0114)		
08 72 33 00-0133 LF 1-3/4" Width, L-Shaped, Vinyl Door Shoe (Pemko V80)	22.17	5.43
08 72 33 00-0134 LF 1-3/4" Width, U-Shaped, Vinyl Door Shoe (Pemko 2170DV)	27.28	5.43
08 72 33 00-0135 Door Bottoms (08 72 33 00-0113)		
08 72 33 00-0136 Automatic Door Bottoms (08 72 33 00-0135)		
08 72 33 00-0137 Aluminum Automatic Door Bottoms (08 72 33 00-0136)		
08 72 33 00-0138 LF Sponge Neoprene Insert, 9/16" Width, 1-7/8" Height, Surface/Mortise Mount, Aluminum Retainer, Automatic Door Bottom (Pemko 4131CRL)	40.36	5.43
For Color Anodized Finish, Add	5.90	
08 72 33 00-0139 LF Sponge Neoprene Insert, 31/32" Width, 2-1/8" Height, Surface/Mortise Mount, Aluminum Retainer, Automatic Door Bottom (Pemko 4301CRL)	58.83	5.43
For Color Anodized Finish, Add	9.60	
08 72 33 00-0140 Door Top Protection (08 72 33 00-0001)		
08 72 33 00-0141 LF Aluminum, Door Top Cover For 1-3/8" Wood Doors (Pemko PA343)	13.59	4.34
For Dark Bronze Or Gold Anodized Aluminum Or Painted White, Add	1.35	
08 72 33 00-0142 LF Aluminum, Door Top Cover For 1-3/4" Wood Doors (Pemko PA344)	13.59	4.34
For Dark Bronze Or Gold Anodized Aluminum Or Painted White, Add	1.35	
08 72 33 00-0143 LF 2-1/2" Aluminum Overhead Rain Drip With Slotted Holes (Pemko 346C)	17.32	4.34
For Dark Bronze Or Gold Anodized Aluminum Or Painted White, Add	2.37	

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08 72 33 00-0144	EA	For 20 Oz Copper Drip Cap For Exterior Door.....	63.42	
08 72 33 00-0145		Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0001)</small>		
		Note: Perimeter gasketing is used to seal the gap around the top and the two sides of a door assembly.		
08 72 33 00-0146		Adhesive Backed Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0145)</small>		
08 72 33 00-0147	LF	3/8" x 3/16", Silicon Compression Bulb, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko PK33)	4.30	2.71
		<i>For Intumescent Seal, Add</i>	1.50	
08 72 33 00-0148	LF	1/2" x 3/16", Silicon Compression Bulb, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko PK55)	4.35	2.71
		<i>For Intumescent Seal, Add</i>	1.50	
08 72 33 00-0149	LF	1/2" x 1/4", Silicon Compression Bulb, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko S88).....	5.78	2.71
08 72 33 00-0150	LF	7/16" x 5/16", Silicone Single Fin, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko S44)	4.78	2.71
08 72 33 00-0151	LF	5/16" x 1/2", Silicone Single Fin, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko S77)	6.52	2.71
		<i>For Intumescent Seal, Add</i>	1.50	
08 72 33 00-0152	LF	1/2" x 3/8", Silicone Triple Fin, Hospitality, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko S773).....	6.00	2.71
		<i>For Intumescent Seal, Add</i>	1.50	
08 72 33 00-0153	LF	7/16" x 5/16", Intumescent And Silicone Single Fin, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko HSS2000xS44).....	8.15	2.71
08 72 33 00-0154	LF	1/2" x 1/4", Intumescent And Silicon Compression Bulb, Adhesive Backed Perimeter Gasketing Weather-Strip (Pemko HSS2000xS88).....	7.48	2.71
08 72 33 00-0155		Kerf-In Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0145)</small>		
08 72 33 00-0156	LF	3/8" x 1/4" Silicone Bulb, Kerf-In Perimeter Gasketing Weather-Strip (Pemko P50).....	3.75	2.71
08 72 33 00-0157	LF	7/16" x 3/8" Silicone Bulb, Kerf-In Perimeter Gasketing Weather-Strip (Pemko S52).....	5.95	2.71
08 72 33 00-0158	LF	3/8" Foam, Kerf-In Perimeter Gasketing Weather-Strip (Pemko Q103).....	4.29	2.71
08 72 33 00-0159	LF	5/8" Foam, Kerf-In Perimeter Gasketing Weather-Strip (Pemko Q102).....	4.22	2.71
08 72 33 00-0160	LF	3/8" Magnetic, Kerf-In Perimeter Gasketing Weather-Strip (Pemko MAG349).....	5.72	2.71
08 72 33 00-0161		Cushion/Spring Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0145)</small>		
08 72 33 00-0162		Spring Bronze Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0161)</small>		
08 72 33 00-0163	LF	1-1/8" Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B70C).....	8.84	2.71
08 72 33 00-0164	LF	1-1/4" Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B70D).....	8.84	2.71
08 72 33 00-0165	LF	1-3/8" Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B70E).....	9.52	2.71
08 72 33 00-0166	LF	1-1/2" Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B70F).....	9.66	2.71
08 72 33 00-0167		Cushion "V", Spring Bronze Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0161)</small>		
08 72 33 00-0168	LF	5/8" Cushion "V", Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B73)	8.47	2.71
08 72 33 00-0169	LF	7/8" Cushion "V", Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B74)	9.52	2.71
08 72 33 00-0170	LF	1-1/8" Cushion "V", Spring Bronze Perimeter Gasketing Weather-Strip (Pemko B75)	10.67	2.71
08 72 33 00-0171		Aluminum Retainer, Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0145)</small>		
08 72 33 00-0172		Aluminum Retainer, Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0171)</small>		
08 72 33 00-0173	LF	1/4" Vinyl Insert, 13/16" Width, 1/4" Height, Mill Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 297AV).....	8.01	2.71
		<i>For Silicone Insert, Add</i>	0.95	
		<i>For Color Anodized Finish, Add</i>	2.58	
08 72 33 00-0174	LF	1/4" Vinyl Insert, 11/16" Width, 1/4" Height, Mill Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 316AV).....	8.01	2.71
		<i>For Silicone Insert, Add</i>	0.95	
		<i>For Color Anodized Finish, Add</i>	2.58	
08 72 33 00-0175	LF	1/4" Vinyl Insert, 7/8" Width, 1/4" Height, Mill Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 303AV).....	8.01	2.71
		<i>For Silicone Insert, Add</i>	0.95	
		<i>For Color Anodized Finish, Add</i>	2.58	
08 72 33 00-0176	LF	3/8" Neoprene Insert, 7/8" Width, 3/16" Height, Clear Anodized Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 305CN).....	14.84	2.71
		<i>For Silicone Insert, Add</i>	0.63	
		<i>For Color Anodized Finish, Add</i>	1.88	
08 72 33 00-0177	LF	3/16" Vinyl Or Pile Insert, 3/4" Width, 3/8" Height, Clear Anodized Aluminum Retainer, Perimeter Gasketing Weather-Strip With Concealed Fasteners (Pemko 29310CV).....	15.29	2.71
		<i>For Color Anodized Finish, Add</i>	4.93	
		<i>For Silicone Insert, Add</i>	0.95	
08 72 33 00-0178	LF	Neoprene Sponge Insert, 1-5/8" Width, 7/16" Height, Clear Anodized Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 375CR).....	15.29	2.71
		<i>For Color Anodized Finish, Add</i>	3.45	
08 72 33 00-0179		Heavy Duty, Aluminum Retainer, Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0171)</small>		
08 72 33 00-0180		Standard Jamb, Heavy Duty, Aluminum Retainer, Perimeter Gasketing Weather-Strip <small>(08 72 33 00-0179)</small>		
08 72 33 00-0181	LF	1/4" Vinyl Insert, 1-1/2" Width, 1/4" Height, Standard Jamb, Heavy Duty, Mill Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 290AV)	14.51	2.71
		<i>For Silicone Insert, Add</i>	0.95	



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08 72 33 00-0182 Head Section, Heavy Duty, Aluminum Retainer, Perimeter Gasketing Weather-Strip (08 72 33 00-0179)		
08 72 33 00-0183 LF 1/4" Vinyl Insert, 1-1/2" Width, 1/4" Height, Head Section, Heavy Duty, Mill Aluminum Retainer, Perimeter Gasketing Weather-Strip (Pemko 2891AV).....	16.28	2.71
08 72 33 00-0184 Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (08 72 33 00-0145)		
08 72 33 00-0185 Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (08 72 33 00-0184)		
08 72 33 00-0186 LF 3/8" Neoprene Insert, 7/8" Width, 3/16" Height, Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (Pemko 305BR).....	25.90	2.71
<i>For Silicone Insert, Add</i>	1.58	
08 72 33 00-0187 LF Neoprene Sponge Insert, 1-5/8" Width, 7/16" Height, Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (Pemko 375BR).....	44.24	2.71
08 72 33 00-0188 Heavy Duty, Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (08 72 33 00-0184)		
08 72 33 00-0189 Standard Jamb, Heavy Duty, Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (08 72 33 00-0188)		
08 72 33 00-0190 LF 1/4" Vinyl Insert, 1-1/2" Width, 1/4" Height, Standard Jamb, Heavy Duty, Brass/Bronze Retainer, Perimeter Gasketing Weather-Strip (Pemko 290BV).....	38.14	2.71
<i>For Silicone Insert, Add</i>	0.63	
08 72 33 00-0191 Aluminum Interlock, Perimeter Gasketing Weather-Strip (08 72 33 00-0145)		
08 72 33 00-0192 LF Side Mount, Mill Aluminum, Interlock Perimeter Gasketing Weather-Strip (Pemko 335AR, 336A).....	20.12	5.43
Note: For weather-stripping latch or hinge side of door. Includes aluminum interlocking devices for door and door frame.		
<i>For Color Anodized Finish, Add</i>	3.71	
08 72 33 00-0193 LF Top Mount, Mill Aluminum, Interlock Perimeter Gasketing Weather-Strip (Pemko 347A, 68AR).....	20.91	5.43
Note: For weather-stripping the top of doors. Includes rain drip shield and aluminum interlocking devices for door and door frame.		
<i>For Color Anodized Finish, Add</i>	4.03	
08 72 33 00-0194 Adjustable Aluminum Retainer, Perimeter Gasketing Weather-Strip (08 72 33 00-0145)		
Note: Seals gaps from 1/16" to 1/4".		
08 72 33 00-0195 LF Sponge Neoprene Insert, 7/8" Width, 1-3/8" Height, Adjustable, Clear Anodized Aluminum Retainer, Stop Gasketing Weather-Strip (Pemko 350CSR).....	27.52	2.71
<i>For Color Anodized Finish, Add</i>	4.42	
08 72 33 00-0196 LF Sponge Neoprene Insert, 7/8" Width, 1-3/8" Height, Adjustable, Clear Anodized Aluminum Retainer, Jamb Gasketing Weather-Strip (Pemko 350CR).....	29.09	2.71
<i>For Color Anodized Finish, Add</i>	4.73	
08 72 43 Thresholds (08 72)		
08 72 43 00-0001 Thresholds (08 72 43) Note: Includes material, fasteners, installation, caulk and sealants.		
08 72 43 00-0002 Metal Thresholds (08 72 43 00-0001)		
08 72 43 00-0003 Saddle Thresholds (08 72 43 00-0002)		
08 72 43 00-0004 Aluminum Saddle Thresholds (08 72 43 00-0003) Note: Includes mill finish.		
08 72 43 00-0005 3/16" Height, Aluminum Saddle Thresholds (08 72 43 00-0004)		
08 72 43 00-0006 LF 2-1/4" Width, 3/16" Height, Aluminum Saddle Threshold (Pemko 173A).....	30.21	8.68
<i>For Color Anodized Finish, Add</i>	3.41	
08 72 43 00-0007 1/4" Height, Aluminum Saddle Thresholds (08 72 43 00-0004)		
08 72 43 00-0008 LF 3" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 151A).....	34.02	8.68
<i>For Color Anodized Finish, Add</i>	4.93	
08 72 43 00-0009 LF 4" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 270A).....	39.21	10.84
<i>For Color Anodized Finish, Add</i>	8.47	
08 72 43 00-0010 LF 5" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 271A).....	43.49	10.84
<i>For Color Anodized Finish, Add</i>	8.19	
08 72 43 00-0011 LF 6" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 272A).....	48.63	10.84
<i>For Color Anodized Finish, Add</i>	7.53	
08 72 43 00-0012 LF 7" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 276A).....	56.25	10.84
<i>For Color Anodized Finish, Add</i>	7.29	
08 72 43 00-0013 LF 8" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 2748A).....	67.51	13.02
<i>For Color Anodized Finish, Add</i>	8.74	
08 72 43 00-0014 LF 9" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 2749A).....	72.67	13.02
<i>For Color Anodized Finish, Add</i>	10.03	
08 72 43 00-0015 LF 10" Width, 1/4" Height, Aluminum Saddle Threshold (Pemko 2750A).....	80.89	13.02
<i>For Color Anodized Finish, Add</i>	12.09	

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08 72 43 00-0016	5/16" Height, Aluminum Saddle Thresholds (08 72 43 00-0004)		
08 72 43 00-0017	LF 2-1/2" Width, 5/16" Height, Aluminum Saddle Threshold (Pemko 166A).....	33.34	8.68
	For Color Anodized Finish, Add	4.08	
08 72 43 00-0018	1/2" Height, Aluminum Saddle Thresholds (08 72 43 00-0004)		
08 72 43 00-0019	LF 3" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 169A).....	33.57	8.68
	For Color Anodized Finish, Add	5.94	
08 72 43 00-0020	LF 4" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 170A).....	41.01	10.84
	For Color Anodized Finish, Add	9.73	
08 72 43 00-0021	LF 5" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 171A).....	45.38	10.84
	For Color Anodized Finish, Add	9.14	
08 72 43 00-0022	LF 6" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 172A).....	49.07	10.84
	For Color Anodized Finish, Add	7.69	
08 72 43 00-0023	LF 7" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 176A).....	56.25	10.84
	For Color Anodized Finish, Add	7.29	
08 72 43 00-0024	LF 8" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 2548A).....	70.20	13.02
	For Color Anodized Finish, Add	13.18	
08 72 43 00-0025	LF 9" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 2549A).....	74.91	13.02
	For Color Anodized Finish, Add	16.94	
08 72 43 00-0026	LF 10" Width, 1/2" Height, Aluminum Saddle Threshold (Pemko 2550A).....	79.62	13.02
	For Color Anodized Finish, Add	18.83	
08 72 43 00-0027	Brass/Bronze Saddle Thresholds (08 72 43 00-0003)		
08 72 43 00-0028	3/16" Height, Brass/Bronze Saddle Thresholds (08 72 43 00-0027)		
08 72 43 00-0029	LF 2-1/4" Width, 3/16" Height, Brass/Bronze Saddle Threshold (Pemko 173B).....	77.36	8.68
08 72 43 00-0030	1/4" Height, Brass/Bronze Saddle Thresholds (08 72 43 00-0027)		
08 72 43 00-0031	LF 3" Width, 1/4" Height, Brass/Bronze Saddle Threshold (Pemko 151B).....	119.94	8.68
08 72 43 00-0032	LF 4" Width, 1/4" Height, Brass/Bronze Saddle Threshold (Pemko 270B).....	145.01	10.84
08 72 43 00-0033	LF 5" Width, 1/4" Height, Brass/Bronze Saddle Threshold (Pemko 271B).....	174.48	10.84
08 72 43 00-0034	LF 6" Width, 1/4" Height, Brass/Bronze Saddle Threshold (Pemko 272B).....	203.14	10.84
08 72 43 00-0035	LF 7" Width, 1/4" Height, Brass/Bronze Saddle Threshold (Pemko 276B).....	235.89	10.84
08 72 43 00-0036	LF 8" Width, 1/4" Height, Brass/Bronze Saddle Threshold (Pemko 274X4B).....	302.73	13.02
08 72 43 00-0037	1/2" Height, Brass/Bronze Saddle Thresholds (08 72 43 00-0027)		
08 72 43 00-0038	LF 4" Width, 1/2" Height, Brass/Bronze Saddle Threshold (Pemko 170B).....	158.11	10.84
08 72 43 00-0039	LF 5" Width, 1/2" Height, Brass/Bronze Saddle Threshold (Pemko 171B).....	190.86	10.84
08 72 43 00-0040	LF 6" Width, 1/2" Height, Brass/Bronze Saddle Threshold (Pemko 172B).....	223.61	10.84
08 72 43 00-0041	LF 7" Width, 1/2" Height, Brass/Bronze Saddle Threshold (Pemko 176B).....	264.54	10.84
08 72 43 00-0042	LF 8" Width, 1/2" Height, Brass/Bronze Saddle Threshold (Pemko 254X4B).....	375.05	13.02
08 72 43 00-0043	LF 10" Width, 1/2" Height, Brass/Bronze Saddle Threshold (Pemko 255X5B).....	356.28	13.02
08 72 43 00-0044	Stainless Steel Saddle Thresholds (08 72 43 00-0003)		
08 72 43 00-0045	1/2" Height, Stainless Steel Saddle Thresholds (08 72 43 00-0044)		
08 72 43 00-0046	LF 4" Width, 1/2" Height, Stainless Steel Saddle Threshold (Pemko 175SS).....	133.54	10.84
08 72 43 00-0047	LF 5" Width, 1/2" Height, Stainless Steel Saddle Threshold (Pemko 154SS).....	141.73	10.84
08 72 43 00-0048	Half Saddle Thresholds (08 72 43 00-0002)		
08 72 43 00-0049	Aluminum Half Saddle Thresholds (08 72 43 00-0048)		
	Note: Includes mill finish.		
08 72 43 00-0050	3/4" Height, Aluminum Half Saddle Thresholds (08 72 43 00-0049)		
08 72 43 00-0051	LF 5" Width, 3/4" Height, Aluminum Half Saddle Threshold (Pemko 1875A).....	49.60	10.84
	For Color Anodized Finish, Add	9.00	
08 72 43 00-0052	LF 7" Width, 3/4" Height, Aluminum Half Saddle Threshold (Pemko 1877A).....	65.88	10.84
	For Color Anodized Finish, Add	3.88	
08 72 43 00-0053	Offset Saddle Thresholds (08 72 43 00-0002)		
08 72 43 00-0054	Aluminum Offset Saddle Thresholds (08 72 43 00-0053)		
	Note: Includes mill finish.		
08 72 43 00-0055	1/2" Height, Aluminum Offset Saddle Thresholds (08 72 43 00-0054)		
08 72 43 00-0056	LF 5-1/2" Width, 1/2" Height, 1/4" Offset, Aluminum Offset Saddle Threshold (Pemko 158A).....	49.75	10.84
	For Color Anodized Finish, Add	11.32	
08 72 43 00-0057	LF 7" Width, 1/2" Height, 1/4" Offset, Aluminum Offset Saddle Threshold (Pemko 2727A).....	55.57	10.84
	For Color Anodized Finish, Add	9.96	
08 72 43 00-0058	3/4" Height, Aluminum Offset Saddle Thresholds (08 72 43 00-0054)		
08 72 43 00-0059	LF 5-1/2" Width, 3/4" Height, 1/2" Offset, Aluminum Offset Saddle Threshold (Pemko 157A).....	49.75	10.84
	For Color Anodized Finish, Add	11.32	



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08 72 43 00-0060 1" Height, Aluminum Offset Saddle Thresholds <small>(08 72 43 00-0054)</small>		
08 72 43 00-0061 LF 7" Width, 1" Height, 1/2" Offset, Aluminum Offset Saddle Threshold (Pemko 182A).....	57.81	10.84
<i>For Color Anodized Finish, Add</i>	10.75	
08 72 43 00-0062 Modular Ramp Thresholds <small>(08 72 43 00-0001)</small>		
Note: Includes mill finish.		
08 72 43 00-0063 Flush, Aluminum Modular Ramp Thresholds <small>(08 72 43 00-0062)</small>		
08 72 43 00-0064 LF 6-1/8" Length, 1/2" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R.5FA)	54.16	10.84
<i>For Non-Slip Surfacing, Add</i>	97.41	
08 72 43 00-0065 LF 9-1/4" Length, 3/4" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R.75FA)	68.33	11.93
<i>For Non-Slip Surfacing, Add</i>	124.52	
08 72 43 00-0066 LF 12-3/8" Length, 1" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R1FA)	87.60	13.56
<i>For Non-Slip Surfacing, Add</i>	169.37	
08 72 43 00-0067 LF 15-1/2" Length, 1-1/4" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R1.25FA)	112.77	14.10
<i>For Non-Slip Surfacing, Add</i>	228.34	
08 72 43 00-0068 LF 18-5/8" Length, 1-1/2" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R1.5FA)	131.80	15.18
<i>For Non-Slip Surfacing, Add</i>	304.29	
08 72 43 00-0069 LF 21-3/4" Length, 1-3/4" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R1.75FA)	164.15	16.81
<i>For Non-Slip Surfacing, Add</i>	339.38	
08 72 43 00-0070 LF 24-7/8" Length, 2" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R2FA)	183.23	18.43
<i>For Non-Slip Surfacing, Add</i>	380.51	
08 72 43 00-0071 LF 28" Length, 2-1/4" Height, Flush, Aluminum Modular Ramp Threshold (Pemko R2.25FA)	194.36	19.52
<i>For Non-Slip Surfacing, Add</i>	388.30	
08 72 43 00-0072 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Thresholds <small>(08 72 43 00-0062)</small>		
08 72 43 00-0073 LF 12-3/4" Length, 1/2" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R.5OSSA)	93.81	13.56
<i>For Non-Slip Surfacing, Add</i>	180.09	
08 72 43 00-0074 LF 15-7/8" Length, 3/4" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R.75OSSA)	110.92	14.10
<i>For Non-Slip Surfacing, Add</i>	223.34	
08 72 43 00-0075 LF 18" Length, 1" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1OSSA).....	139.33	16.27
<i>For Non-Slip Surfacing, Add</i>	277.65	
08 72 43 00-0076 LF 22-1/8" Length, 1-1/4" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1.25OSSA)	164.53	17.36
<i>For Non-Slip Surfacing, Add</i>	337.56	
08 72 43 00-0077 LF 25-1/4" Length, 1-1/2" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1.5OSSA)	189.64	18.43
<i>For Non-Slip Surfacing, Add</i>	397.18	
08 72 43 00-0078 LF 28-3/8" Length, 1-3/4" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1.75OSSA)	207.62	19.52
<i>For Non-Slip Surfacing, Add</i>	438.31	
08 72 43 00-0079 LF 31-1/2" Length, 2" Height, 3-1/2" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R2OSSA)	255.84	20.61
<i>For Non-Slip Surfacing, Add</i>	558.04	
08 72 43 00-0080 7" Top Plate, Offset, Aluminum Modular Ramp Thresholds <small>(08 72 43 00-0062)</small>		
08 72 43 00-0081 LF 16-1/4" Length, 1/2" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R.5OSA)	108.98	14.64
<i>For Non-Slip Surfacing, Add</i>	223.13	
08 72 43 00-0082 LF 19-3/8" Length, 3/4" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R.75OSA)	128.26	16.27
<i>For Non-Slip Surfacing, Add</i>	268.02	
08 72 43 00-0083 LF 22-1/2" Length, 1" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1OSA).....	154.49	17.36
<i>For Non-Slip Surfacing, Add</i>	323.43	
08 72 43 00-0084 LF 25-5/8" Length, 1-1/4" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1.25OSA)	173.54	18.43
<i>For Non-Slip Surfacing, Add</i>	368.98	
08 72 43 00-0085 LF 28-3/4" Length, 1-1/2" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1.5OSA)	204.80	19.52
<i>For Non-Slip Surfacing, Add</i>	430.98	
08 72 43 00-0086 LF 31-7/8" Length, 1-3/4" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R1.75OSA)	222.79	20.61
<i>For Non-Slip Surfacing, Add</i>	472.11	
08 72 43 00-0087 LF 35" Length, 2" Height, 7" Top Plate, Offset, Aluminum Modular Ramp Threshold (Pemko R2OSA).....	258.01	21.69
<i>For Non-Slip Surfacing, Add</i>	536.58	
08 72 43 00-0088 Accessories For Aluminum Modular Ramp Thresholds <small>(08 72 43 00-0062)</small>		
08 72 43 00-0089 Wings/Miter Returns For Flush, Aluminum Modular Ramp Thresholds <small>(08 72 43 00-0088)</small>		
08 72 43 00-0090 PR Up To 1" Height, Wings/Miter Returns For Flush, Aluminum Modular Ramp Thresholds	268.04	13.56
<i>For Non-Slip Surfacing, Add</i>	28.91	
08 72 43 00-0091 PR >1" To 1-1/4" Height, Wings/Miter Returns For Flush, Aluminum Modular Ramp Thresholds	415.59	13.56
<i>For Non-Slip Surfacing, Add</i>	46.62	
08 72 43 00-0092 PR >1-1/4" To 2-1/4" Height, Wings/Miter Returns For Flush, Aluminum Modular Ramp Thresholds	826.13	18.98
<i>For Non-Slip Surfacing, Add</i>	94.58	
08 72 43 00-0093 Wings/Miter Returns For Offset, Aluminum Modular Ramp Thresholds <small>(08 72 43 00-0088)</small>		
08 72 43 00-0094 PR Up To 1/2" Height, Wings/Miter Returns For Offset, Aluminum Modular Ramp Thresholds	268.04	13.56
<i>For Non-Slip Surfacing, Add</i>	28.91	
08 72 43 00-0095 PR >1/2" To 1" Height, Wings/Miter Returns For Offset, Aluminum Modular Ramp Thresholds	415.59	13.56
<i>For Non-Slip Surfacing, Add</i>	46.62	
08 72 43 00-0096 PR >1" To 2" Height, Wings/Miter Returns For Offset, Aluminum Modular Ramp Thresholds	826.13	18.98
<i>For Non-Slip Surfacing, Add</i>	94.58	

08	08	Openings
	08 70	Hardware
	08 72	Weatherstripping, Thresholds and Seals



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 72 43 00-0097	Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0001)</small> Note: Includes vinyl or pile seal.		
08 72 43 00-0098	Aluminum, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0097)</small> Note: Includes mill finish.		
08 72 43 00-0099	Aluminum, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0098)</small>		
08 72 43 00-0100	7/8" Height, Aluminum, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0099)</small>		
08 72 43 00-0101	LF 4" Width, 7/8" Height, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 252X226AP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	61.40 12.00 0.63	10.84
08 72 43 00-0102	LF 5" Width, 7/8" Height, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 177AP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	49.97 11.43 0.63	10.84
08 72 43 00-0103	LF 6" Width, 7/8" Height, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 254X226AP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	68.57 14.51 0.63	10.84
08 72 43 00-0104	LF 7" Width, 7/8" Height, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 255X226AP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	71.71 15.61 0.63	10.84
08 72 43 00-0105	1" Height, Aluminum, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0099)</small>		
08 72 43 00-0106	LF 3-5/8" Width, 1" Height, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 185AP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	47.28 10.09 0.63	10.84
08 72 43 00-0107	LF 5" Width, 1" Height, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 181AP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	50.42 11.66 0.63	10.84
08 72 43 00-0108	Thermal Barrier, Aluminum, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0098)</small>		
08 72 43 00-0109	7/8" Height, Thermal Barrier, Aluminum, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0108)</small>		
08 72 43 00-0110	LF 4-1/8" Width, 7/8" Height, Thermal Barrier, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 252X226AFGP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	53.78 10.67 0.63	10.84
08 72 43 00-0111	LF 5-1/8" Width, 7/8" Height, Thermal Barrier, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 253X226AFGP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	56.69 11.83 0.63	10.84
08 72 43 00-0112	LF 6-1/8" Width, 7/8" Height, Thermal Barrier, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 254X226AFGP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	60.95 11.84 0.63	10.84
08 72 43 00-0113	LF 7-1/8" Width, 7/8" Height, Thermal Barrier, Aluminum, Latching Panic Exit Saddle Threshold (Pemko 255X226AFGP)..... <i>For Color Anodized Finish, Add</i> <i>For Thermoseal, Add</i>	65.77 13.53 0.63	10.84
08 72 43 00-0114	Brass/Bronze, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0097)</small>		
08 72 43 00-0115	Brass/Bronze, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0114)</small>		
08 72 43 00-0116	7/8" Height, Brass/Bronze, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0115)</small>		
08 72 43 00-0117	LF 4" Width, 7/8" Height, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 252X226BV)..... <i>For Thermoseal, Add</i>	225.24 0.63	10.84
08 72 43 00-0118	LF 5" Width, 7/8" Height, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 177BV)..... <i>For Thermoseal, Add</i>	208.87 0.63	10.84
08 72 43 00-0119	LF 6" Width, 7/8" Height, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 254X226BV)..... <i>For Thermoseal, Add</i>	300.57 0.63	10.84
08 72 43 00-0120	LF 7" Width, 7/8" Height, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 255X226BV)..... <i>For Thermoseal, Add</i>	268.80 0.63	10.84
08 72 43 00-0121	1" Height, Brass/Bronze, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0115)</small>		
08 72 43 00-0122	LF 5" Width, 1" Height, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 181BV)..... <i>For Thermoseal, Add</i>	221.64 0.63	10.84
08 72 43 00-0123	Thermal Barrier, Brass/Bronze, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0114)</small>		
08 72 43 00-0124	7/8" Height, Thermal Barrier, Brass/Bronze, Latching Panic Exit Saddle Thresholds <small>(08 72 43 00-0123)</small>		
08 72 43 00-0125	LF 4-1/8" Width, 7/8" Height, Thermal Barrier, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 252X226BFGV)..... <i>For Thermoseal, Add</i>	229.04 0.63	11.93



Openings	08	08
Hardware	08 70	
Weatherstripping, Thresholds and Seals	08 72	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 72 43 00-0126	LF		5-1/8" Width, 7/8" Height, Thermal Barrier, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 253X226BFGV).....	240.34	11.93
			<i>For Thermoseal, Add</i>	0.63	
08 72 43 00-0127	LF		6-1/8" Width, 7/8" Height, Thermal Barrier, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 254X226BFGV).....	301.42	11.93
			<i>For Thermoseal, Add</i>	0.63	
08 72 43 00-0128	LF		7-1/8" Width, 7/8" Height, Thermal Barrier, Brass/Bronze, Latching Panic Exit Saddle Threshold (Pemko 255X226BFGV).....	274.28	12.47
			<i>For Thermoseal, Add</i>	0.63	
08 72 43 00-0129			Carpet Separator Thresholds (08 72 43 00-0001)		
08 72 43 00-0130			Aluminum, Carpet Separator Thresholds (08 72 43 00-0129) Note: Includes mill finish.		
08 72 43 00-0131			3/8" Height, Aluminum, Carpet Separator Thresholds (08 72 43 00-0130)		
08 72 43 00-0132	LF		2-1/2" Width, 3/8" Height, Aluminum, Carpet Separator Threshold (Pemko 174C).....	35.36	8.68
			<i>For Color Anodized Finish, Add</i>	5.47	
08 72 43 00-0133			7/16" Height, Aluminum, Carpet Separator Thresholds (08 72 43 00-0130)		
08 72 43 00-0134	LF		1-3/4" Width, 7/16" Height, Aluminum, Carpet Separator Threshold (Pemko 236A).....	28.39	7.59
			<i>For Color Anodized Finish, Add</i>	3.29	
08 72 43 00-0135	LF		4" Width, 7/16" Height, Aluminum, Carpet Separator Threshold (Pemko 2364A).....	43.92	8.68
			<i>For Color Anodized Finish, Add</i>	6.72	
08 72 43 00-0136	LF		6" Width, 7/16" Height, Aluminum, Carpet Separator Threshold (Pemko 2366A).....	53.33	8.68
			<i>For Color Anodized Finish, Add</i>	10.49	
08 72 43 00-0137			1/2" Height, Aluminum, Carpet Separator Thresholds (08 72 43 00-0130)		
08 72 43 00-0138	LF		1-3/8" Width, 1/2" Height, Aluminum, Carpet Separator Threshold (Pemko 1951A).....	25.48	7.59
			<i>For Color Anodized Finish, Add</i>	1.63	
08 72 43 00-0139			3/4" Height, Aluminum, Carpet Separator Thresholds (08 72 43 00-0130)		
08 72 43 00-0140	LF		1-3/4" Width, 3/4" Height, Aluminum, Carpet Separator Threshold (Pemko 246A).....	28.39	7.59
			<i>For Color Anodized Finish, Add</i>	2.82	
08 72 43 00-0141	LF		3" Width, 3/4" Height, Aluminum, Carpet Separator Threshold (Pemko 230A).....	44.59	10.84
			<i>For Color Anodized Finish, Add</i>	6.99	
08 72 43 00-0142	LF		4" Width, 3/4" Height, Aluminum, Carpet Separator Threshold (Pemko 2464A).....	47.28	10.84
			<i>For Color Anodized Finish, Add</i>	6.05	
08 72 43 00-0143			Brass/Bronze, Carpet Separator Thresholds (08 72 43 00-0129)		
08 72 43 00-0144			3/8" Height, Brass/Bronze, Carpet Separator Thresholds (08 72 43 00-0143)		
08 72 43 00-0145	LF		2-1/2" Width, 3/8" Height, Brass/Bronze, Carpet Separator Threshold (Pemko 174B).....	121.74	8.68
08 72 43 00-0146			7/16" Height, Brass/Bronze, Carpet Separator Thresholds (08 72 43 00-0143)		
08 72 43 00-0147	LF		1-3/4" Width, 7/16" Height, Brass/Bronze, Carpet Separator Threshold (Pemko 236B).....	160.82	7.59
08 72 43 00-0148	LF		4" Width, 7/16" Height, Brass/Bronze, Carpet Separator Threshold (Pemko 2364B).....	145.83	10.84
08 72 43 00-0149			Vinyl Transition Thresholds (08 72 43 00-0001) Note: Serves as a transition where carpet meets carpet, tile, VCT or concrete beneath a door.		
08 72 43 00-0150			Carpet To Carpet, Vinyl Transition Thresholds (08 72 43 00-0149) Note: Serves as a transition where carpet meets carpet beneath a door.		
08 72 43 00-0151	LF		2-3/4" Width, 23/32" Height, Carpet To Carpet, Vinyl Transition Threshold (Pemko V232BL).....	43.58	8.68
08 72 43 00-0152			Carpet To Tile, Vinyl Transition Thresholds (08 72 43 00-0149) Note: Serves as a transition where carpet meets tile beneath a door.		
08 72 43 00-0153	LF		2-3/4" Width, 23/32" Height, Carpet To Tile, Vinyl Transition Threshold (Pemko V2325BL).....	43.58	8.68
08 72 43 00-0154			Carpet To Concrete, Vinyl Transition Thresholds (08 72 43 00-0149) Note: Serves as a transition where carpet meets concrete beneath a door.		
08 72 43 00-0155	LF		3-1/2" Width, 23/32" Height, Carpet To Concrete, Vinyl Transition Threshold (Pemko V2320BL).....	45.74	10.84
08 72 43 00-0156			Carpet To VCT Tile, Vinyl Transition Thresholds (08 72 43 00-0149) Note: Serves as a transition where carpet meets VCT Tile beneath a door.		
08 72 43 00-0157	LF		3-7/16" Width, 23/32" Height, Carpet To VCT Tile, Vinyl Transition Threshold (Pemko V2322BL).....	49.37	10.84
08 72 43 00-0158			Residential Thresholds (08 72 43 00-0001)		
08 72 43 00-0159			Wood Residential Thresholds (08 72 43 00-0158)		
08 72 43 00-0160	LF		1-1/4" Width, 1/4" Height, Oak Residential Threshold (Pemko 2219W).....	17.67	5.43
08 72 43 00-0161	LF		1-3/4" Width, 5/16" Height, Oak Residential Threshold (Pemko 2175W).....	18.42	5.43

08 Openings**08 70 Hardware****08 72 Weatherstripping, Thresholds and Seals**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 72 43 00-0162	LF	3" Width, 3/8" Height, Oak Residential Threshold (Pemko 2300W).....		25.85	5.77
08 72 43 00-0163	LF	3-1/2" Width, 1/2" Height, Oak Residential Threshold (Pemko 2350W).....		26.18	5.99
08 72 43 00-0164	LF	5" Width, 1/2" Height, Oak Residential Threshold (Pemko 2500W).....		41.55	6.16
08 72 43 00-0165		Vinyl Top, Wood Residential Thresholds (08 72 43 00-0158)			
08 72 43 00-0166	LF	1-5/8" Width, 15/16" Height, Vinyl Top, Wood Residential Threshold (Pemko 208OAK).....		21.78	5.43
08 72 43 00-0167	LF	3-1/2" Width, 1-1/8" Height, Vinyl Top, Wood Residential Threshold (Pemko 203OAK).....		26.85	5.99
08 72 43 00-0168	LF	3-5/8" Width, 1-3/8" Height, Vinyl Top, Wood Residential Threshold (Pemko 204OAK).....		53.07	5.99
08 72 43 00-0169		Vinyl Top, Aluminum Residential Thresholds (08 72 43 00-0158)			
08 72 43 00-0170	LF	1-3/8" Width, 1/2" Height, Vinyl Top, Aluminum Residential Threshold (Pemko 208AV).....		21.85	5.43
		<i>For Color Anodized Finish, Add</i>		3.32	
08 72 43 00-0171	LF	3-1/4" Width, 3/4" Height, Vinyl Top, Aluminum Residential Threshold (Pemko 206AV).....		25.73	5.99
		<i>For Color Anodized Finish, Add</i>		4.30	
08 72 43 00-0172	LF	3-1/2" Width, 1-1/8" Height, Vinyl Top, Aluminum Residential Threshold (Pemko 207AV).....		27.52	5.99
		<i>For Color Anodized Finish, Add</i>		5.02	
08 72 43 00-0173		Interlocking Residential Thresholds (08 72 43 00-0158)			
08 72 43 00-0174		Aluminum Interlocking Residential Thresholds (08 72 43 00-0173)			
08 72 43 00-0175		1/2" Height, Aluminum Interlocking Residential Thresholds (08 72 43 00-0174)			
08 72 43 00-0176	LF	4-1/4" Width, 1/2" Height, Aluminum Interlocking Residential Threshold (Pemko 114A).....		51.93	6.16
		<i>For Color Anodized Finish, Add</i>		10.96	
08 72 43 00-0177		5/8" Height, Aluminum Interlocking Residential Thresholds (08 72 43 00-0174)			
08 72 43 00-0178	LF	3" Width, 5/8" Height, Aluminum Interlocking Residential Threshold (Pemko 121A).....		33.48	5.77
		<i>For Color Anodized Finish, Add</i>		5.72	
08 72 43 00-0179	LF	3-1/2" Width, 5/8" Height, Aluminum Interlocking Residential Threshold (Pemko 110A).....		29.99	5.99
		<i>For Color Anodized Finish, Add</i>		7.51	
08 72 43 00-0180	LF	4-1/4" Width, 5/8" Height, Aluminum Interlocking Residential Threshold (Pemko 115A).....		35.35	6.16
		<i>For Color Anodized Finish, Add</i>		5.99	
08 72 43 00-0181		7/8" Height, Aluminum Interlocking Residential Thresholds (08 72 43 00-0174)			
08 72 43 00-0182	LF	4-1/2" Width, 7/8" Height, Aluminum Interlocking Residential Threshold (Pemko 120A).....		38.93	6.16
		<i>For Color Anodized Finish, Add</i>		11.77	
08 72 43 00-0183		Brass/Bronze Interlocking Residential Thresholds (08 72 43 00-0173)			
08 72 43 00-0184		1/2" Height, Brass/Bronze Interlocking Residential Thresholds (08 72 43 00-0183)			
08 72 43 00-0185	LF	4-1/4" Width, 1/2" Height, Brass/Bronze Interlocking Residential Threshold (Pemko 114B).....		166.87	6.16
08 72 43 00-0186		5/8" Height, Brass/Bronze Interlocking Residential Thresholds (08 72 43 00-0183)			
08 72 43 00-0187	LF	3-1/2" Width, 5/8" Height, Brass/Bronze Interlocking Residential Threshold (Pemko 110B).....		125.50	5.99
08 72 43 00-0188		7/8" Height, Brass/Bronze Interlocking Residential Thresholds (08 72 43 00-0183)			
08 72 43 00-0189	LF	4-1/2" Width, 7/8" Height, Brass/Bronze Interlocking Residential Threshold (Pemko 120B).....		170.96	6.16
08 72 43 00-0190	LF	5-3/4" Width, 7/8" Height, 3/4" Offset, Brass/Bronze Interlocking Residential Threshold (Pemko 123B).....		245.08	6.33
08 72 43 00-0191		Residential Door Sills (08 72 43 00-0001)			
08 72 43 00-0192		Fixed Aluminum Residential Door Sills (08 72 43 00-0191)			
08 72 43 00-0193	LF	4-9/16" Width, 1-1/4" Height, Fixed Aluminum Residential Door Sill (Pemko 84514A).....		28.18	6.16
		<i>For Color Anodized Finish, Add</i>		6.39	
08 72 43 00-0194	LF	5-5/8" Width, 1-1/4" Height, Fixed Aluminum Residential Door Sill (Pemko 85514A).....		30.37	6.33
		<i>For Color Anodized Finish, Add</i>		5.81	
08 72 43 00-0195		Adjustable Aluminum Top, Aluminum Residential Door Sills (08 72 43 00-0191)			
08 72 43 00-0196	LF	4-7/8" Width, 1-1/8" To 1-3/8" Height, Adjustable Aluminum Top, Aluminum Residential Door Sill (Pemko 94518A).....		41.86	6.16
		<i>For Color Anodized Finish, Add</i>		9.26	
08 72 43 00-0197	LF	5-3/4" Width, 1-1/8" To 1-3/8" Height, Adjustable Aluminum Top, Aluminum Residential Door Sill (Pemko 95518A).....		42.97	6.33
		<i>For Color Anodized Finish, Add</i>		9.50	
08 72 43 00-0198		Adjustable Wood Top, Aluminum Residential Door Sills (08 72 43 00-0191)			
08 72 43 00-0199	LF	3-3/4" Width, 1-1/8" To 1-3/8" Height, Adjustable Aluminum Top, Aluminum Residential Door Sill (Pemko 93518AW).....		42.50	5.99
		<i>For Color Anodized Finish, Add</i>		9.64	
08 72 43 00-0200	LF	4-7/8" Width, 1-1/8" To 1-3/8" Height, Adjustable Aluminum Top, Aluminum Residential Door Sill (Pemko 94518AW).....		42.94	6.16
		<i>For Color Anodized Finish, Add</i>		6.89	



Openings	08	08
Hardware	08 70	
Weatherstripping, Thresholds and Seals	08 72	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 72 43 00-0201	LF	5-3/4" Width, 1-1/8" To 1-3/8" Height, Adjustable Aluminum Top, Aluminum Residential Door Sill (Pemko 95518AW).....	44.87	
		<i>For Color Anodized Finish, Add</i>	7.26	6.33

08 72 43 00-0202 Extenders For Aluminum Residential Door Sills (08 72 43 00-0191)

08 72 43 00-0203	LF	3/4" Extender For Aluminum Residential Door Sills (Pemko EXT3/4A)	16.44	
		<i>For Color Anodized Finish, Add</i>	3.92	5.43
08 72 43 00-0204	LF	2" Extender For Aluminum Residential Door Sills (Pemko EXT2A)	18.24	
		<i>For Color Anodized Finish, Add</i>	3.70	5.43
08 72 43 00-0205	LF	3" Extender For Aluminum Residential Door Sills (Pemko EXT3A)	20.03	
		<i>For Color Anodized Finish, Add</i>	2.30	5.43

08 72 43 00-0206 Stone Thresholds (08 72 43 00-0001)

08 72 43 00-0207 Marble Thresholds (08 72 43 00-0206)

08 72 43 00-0208	LF	2" Width, 5/8" Height, Plain Marble Threshold.....	20.14	7.62
08 72 43 00-0209	LF	4" Width, 5/8" Height, Plain Marble Threshold.....	22.53	7.62
08 72 43 00-0210	LF	6" Width, 5/8" Height, Plain Marble Threshold.....	25.72	7.62
08 72 43 00-0211	LF	4" Width, 7/8" Height, Plain Marble Threshold.....	32.89	7.62
08 72 43 00-0212	LF	6" Width, 7/8" Height, Plain Marble Threshold.....	41.31	7.62

08 72 43 00-0213 Corian Thresholds (08 72 43 00-0206)

08 72 43 00-0214	LF	Up To 5-3/4" Width, Corian Threshold.....	88.21	9.00
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08 75 Window Hardware (08 70)

08 75 13 Automatic Window Equipment (08 75)

08 75 13 00-0001 Window Opener Electric, With 1/2 HP Motor (08 75 13)

08 75 13 00-0002	EA	Gym Window Electronic Opener.....	1,874.06	231.11
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08 78 Special Function Hardware (08 70)

08 78 00 00-0001 Pad Locks (08 78)

08 78 00 00-0002	EA	Combination Padlock.....	24.45	5.43
08 78 00 00-0003	EA	Resettable Combination Padlock With Control Key, 4 Digit, 2" Wide Case, 1" Shackle Height.....	59.29	5.43
08 78 00 00-0004	EA	Resettable Combination Padlock, 4 Digit, 2" Wide Case, 1" Shackle Height.....	54.56	5.43
08 78 00 00-0005	EA	Resettable Combination Padlock, 4 Digit, 2" Wide Case, 2-1/4" Shackle Height.....	60.42	5.43
08 78 00 00-0006	EA	Commercial U-Bar Lock.....	73.95	5.43
08 78 00 00-0007	EA	Weather Tough Padlocks Keyed Alike.....	61.60	5.43
08 78 00 00-0008	EA	High Security Padlocks.....	55.34	5.43
08 78 00 00-0009	EA	Standard Key, Medium Security Padlock Keyed Alike.....	27.88	5.43

08 79 Hardware Accessories (08 70)

08 79 13 Key Storage Equipment (08 79)

08 79 13 00-0001 Key Cabinet (08 79 13)

08 79 13 00-0002 Key Cabinets (08 79 13 00-0001)

08 79 13 00-0003	EA	Wall Mounted Key Cabinet, Up To 30 Keys.....	601.79	19.52
08 79 13 00-0004	EA	Wall Mounted Key Cabinet, Up To 60 Keys.....	815.72	21.69
08 79 13 00-0005	EA	Wall Mounted Key Cabinet, Up To 240 Keys.....	1,844.66	32.54
08 79 13 00-0006	EA	Wall Mounted Key Cabinet, Up To 1,200 Keys.....	4,789.67	43.38
08 79 13 00-0007	EA	Drawer Type Key Cabinet, Up To 600 Keys.....	5,126.19	28.74
08 79 13 00-0008	EA	Drawer Type Key Cabinet, Up To 2,400 Keys.....	11,617.82	21.69
08 79 13 00-0009	EA	Tray Type Key Cabinet, Up To 20 Keys.....	252.51	8.68
08 79 13 00-0010	EA	Tray Type Key Cabinet, Up To 50 Keys.....	361.35	10.84

08 79 13 00-0011 Key Boxes Wall Mounted On Any Type Wall, With Anchor (08 79 13 00-0001)

08 79 13 00-0012	EA	Key Box, Metal, 30 Key Hooks, Key Lock Door 3" Deep x 10" Wide x 12" High.....	340.85	16.28
08 79 13 00-0013	EA	Key Box, Metal, 60 Key Hooks, Key Lock Door, 3" Deep x 10" Wide x 12" High.....	387.88	16.28
08 79 13 00-0014	EA	Relocate 10" Wide x 12" High x 3" Deep Metal Key Box.....	55.33	
		Note: Including Storage And Cleaning		
08 79 13 00-0015	EA	Relocate Heavy Duty Key Box, With Combo Lock Door.....	124.77	
		Note: Including Storage And Cleaning		

08 80 Glazing (08)

Note: Includes neoprene setting blocks and spacers and elastomeric sealants for all glazing tasks. Demolition for all glazing includes removal of glazing (broken or whole), sealant compound and/or astragal, taking down and resetting mullion where necessary.

08 81 Glass Glazing (08 80)

08	08	Openings
	08 80	Glazing
	08 81	Glass Glazing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 81 23 Exterior Glass Glazing (08 81)

08 81 23 13 Factory Installed Glass Glazing (08 81 23)

08 81 23 13-0001 Clear Float Factory Installed Glass (08 81 23 13)

08 81 23 13-0002 Clear Float Factory Installed Glass (08 81 23 13-0001)

Note: Type I, Class I, Quality Q3.

08 81 23 13-0003	SF 1/8" Thick, Clear Float Factory Installed Glass	7.99
	For >50 To 200, Deduct	-0.24
	For >200 To 400, Deduct	-0.48
	For >400, Deduct	-0.72
	For Tinted Glass, Add	2.00
	For Reflective Coated Glass, Add	3.60
	For Low-E Coated Glass, Add	2.00
08 81 23 13-0004	SF 3/16" Thick, Clear Float Factory Installed Glass	8.57
	For >50 To 200, Deduct	-0.26
	For >200 To 400, Deduct	-0.51
	For >400, Deduct	-0.77
	For Tinted Glass, Add	2.14
	For Reflective Coated Glass, Add	3.86
	For Low-E Coated Glass, Add	2.14
08 81 23 13-0005	SF 1/4" Thick, Clear Float Factory Installed Glass	10.39
	For >50 To 200, Deduct	-0.31
	For >200 To 400, Deduct	-0.62
	For >400, Deduct	-0.94
	For Tinted Glass, Add	2.60
	For Reflective Coated Glass, Add	4.68
	For Low-E Coated Glass, Add	2.60
08 81 23 13-0006	SF 5/16" Thick, Clear Float Factory Installed Glass	17.27
	For >50 To 200, Deduct	-0.52
	For >200 To 400, Deduct	-1.04
	For >400, Deduct	-1.55
	For Tinted Glass, Add	4.32
	For Reflective Coated Glass, Add	7.77
	For Low-E Coated Glass, Add	4.32
08 81 23 13-0007	SF 3/8" Thick, Clear Float Factory Installed Glass	25.13
	For >50 To 200, Deduct	-0.75
	For >200 To 400, Deduct	-1.51
	For >400, Deduct	-2.26
	For Tinted Glass, Add	6.28
	For Reflective Coated Glass, Add	11.31
	For Low-E Coated Glass, Add	6.28
08 81 23 13-0008	SF 1/2" Thick, Clear Float Factory Installed Glass	27.61
	For >50 To 200, Deduct	-0.83
	For >200 To 400, Deduct	-1.66
	For >400, Deduct	-2.48
	For Tinted Glass, Add	6.90
	For Reflective Coated Glass, Add	12.42
	For Low-E Coated Glass, Add	6.90
08 81 23 13-0009	SF 5/8" Thick, Clear Float Factory Installed Glass	33.03
	For >50 To 200, Deduct	-0.99
	For >200 To 400, Deduct	-1.98
	For >400, Deduct	-2.97
	For Tinted Glass, Add	8.26
	For Reflective Coated Glass, Add	14.86
	For Low-E Coated Glass, Add	8.26
08 81 23 13-0010	SF 3/4" Thick, Clear Float Factory Installed Glass	40.80
	For >50 To 200, Deduct	-1.22
	For >200 To 400, Deduct	-2.45
	For >400, Deduct	-3.67
	For Tinted Glass, Add	10.20
	For Reflective Coated Glass, Add	18.36
	For Low-E Coated Glass, Add	10.20

08 81 23 13-0011 Heat Treated Factory Installed Glass (08 81 23 13)

08 81 23 13-0012 Tempered, Clear Float Factory Installed Glass (08 81 23 13-0011)

Note: Type I, Class I, Quality Q3.

08 81 23 13-0013	SF 1/8" Thick, Tempered, Clear Float Factory Installed Glass	11.88
	For >50 To 200, Deduct	-0.36
	For >200 To 400, Deduct	-0.71
	For >400, Deduct	-1.07
	For Tinted Glass, Add	2.97
	For Reflective Coated Glass, Add	5.35
	For Low-E Coated Glass, Add	2.97
08 81 23 13-0014	SF 3/16" Thick, Tempered, Clear Float Factory Installed Glass	12.70
	For >50 To 200, Deduct	-0.38
	For >200 To 400, Deduct	-0.76
	For >400, Deduct	-1.14
	For Tinted Glass, Add	3.18
	For Reflective Coated Glass, Add	5.72
	For Low-E Coated Glass, Add	3.18



Openings	08	08
Glazing	08 80	
Glass Glazing	08 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 81 23 13-0015 SF 1/4" Thick, Tempered, Clear Float Factory Installed Glass.....	15.45	
For >50 To 200, Deduct	-0.46	
For >200 To 400, Deduct	-0.93	
For >400, Deduct	-1.39	
For Tinted Glass, Add	3.86	
For Reflective Coated Glass, Add	6.95	
For Low-E Coated Glass, Add	3.86	
08 81 23 13-0016 SF 5/16" Thick, Tempered, Clear Float Factory Installed Glass.....	25.72	
For >50 To 200, Deduct	-0.77	
For >200 To 400, Deduct	-1.54	
For >400, Deduct	-2.31	
For Tinted Glass, Add	6.43	
For Reflective Coated Glass, Add	11.57	
For Low-E Coated Glass, Add	6.43	
08 81 23 13-0017 SF 3/8" Thick, Tempered, Clear Float Factory Installed Glass.....	37.37	
For >50 To 200, Deduct	-1.12	
For >200 To 400, Deduct	-2.24	
For >400, Deduct	-3.36	
For Tinted Glass, Add	9.34	
For Reflective Coated Glass, Add	16.82	
For Low-E Coated Glass, Add	9.34	
08 81 23 13-0018 SF 1/2" Thick, Tempered, Clear Float Factory Installed Glass.....	41.06	
For >50 To 200, Deduct	-1.23	
For >200 To 400, Deduct	-2.46	
For >400, Deduct	-3.70	
For Tinted Glass, Add	10.27	
For Reflective Coated Glass, Add	18.48	
For Low-E Coated Glass, Add	10.27	
08 81 23 13-0019 SF 5/8" Thick, Tempered, Clear Float Factory Installed Glass.....	49.12	
For >50 To 200, Deduct	-1.47	
For >200 To 400, Deduct	-2.95	
For >400, Deduct	-4.42	
For Tinted Glass, Add	12.28	
For Reflective Coated Glass, Add	22.10	
For Low-E Coated Glass, Add	12.28	
08 81 23 13-0020 SF 3/4" Thick, Tempered, Clear Float Factory Installed Glass.....	60.68	
For >50 To 200, Deduct	-1.82	
For >200 To 400, Deduct	-3.64	
For >400, Deduct	-5.46	
For Tinted Glass, Add	15.17	
For Reflective Coated Glass, Add	27.31	
For Low-E Coated Glass, Add	15.17	
08 81 23 13-0021 Patterned Factory Installed Glass (08 81 23 13)		
08 81 23 13-0022 Rough Obscure, Factory Installed Glass (08 81 23 13-0021)		
Note: Class II, Form 3, Finish F1.		
08 81 23 13-0023 SF 1/4" Thick, Rough Obscure, Factory Installed Glass	55.53	
08 81 23 13-0024 Patterned, Figured Factory Installed Glass (08 81 23 13-0021)		
Note: Kind HS, Type II, Class I, Form 3, Quality Q8, Finish F2, Pattern P4.		
08 81 23 13-0025 SF 1/8" Thick, Patterned, Figured Factory Installed Glass.....	33.73	
08 81 23 13-0026 SF 7/32" Thick, Patterned, Figured Factory Installed Glass.....	33.73	
08 81 23 13-0027 Wired Factory Installed Glass (08 81 23 13)		
08 81 23 13-0028 Square Or Diamond Pattern, Wired Factory Installed Glass (08 81 23 13-0027)		
Note: Class I, Form 2, Mesh M1 Or M2, Pattern P2.		
08 81 23 13-0029 SF 1/4" Thick, Square Pattern, Wired Factory Installed Glass	87.31	
08 81 23 13-0030 SF 1/4" Thick, Diamond Pattern, Wired Factory Installed Glass	87.31	
08 81 23 13-0031 Polished, Wired Factory Installed Glass (08 81 23 13-0027)		
08 81 23 13-0032 SF 1/4" Thick, Polished, Wired Factory Installed Glass	95.45	
08 81 23 13-0033 Frosted Factory Installed Glass (08 81 23 13)		
08 81 23 13-0034 Frosted Factory Installed Glass (08 81 23 13-0033)		
08 81 23 13-0035 SF 1/8" Thick, Frosted Factory Installed Glass	44.15	
For >50 To 200, Deduct	-1.32	
For >200 To 400, Deduct	-2.65	
For >400, Deduct	-3.97	
08 81 23 13-0036 SF 3/16" Thick, Frosted Factory Installed Glass	57.92	
For >50 To 200, Deduct	-1.74	
For >200 To 400, Deduct	-3.48	
For >400, Deduct	-5.21	
08 81 23 13-0037 SF 1/4" Thick, Frosted Factory Installed Glass	73.21	
For >50 To 200, Deduct	-2.20	
For >200 To 400, Deduct	-4.39	
For >400, Deduct	-6.59	

08	08	Openings
	08 80	Glazing
	08 81	Glass Glazing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 81 23 13-0038	SF 3/8" Thick, Frosted Factory Installed Glass.....	109.44	
	<i>For >50 To 200, Deduct</i>	-3.28	
	<i>For >200 To 400, Deduct</i>	-6.57	
	<i>For >400, Deduct</i>	-9.85	
08 81 23 13-0039	Fire Rated Factory Installed Glass (08 81 23 13)		
08 81 23 13-0040	Fire Rated Factory Installed Glass (08 81 23 13-0039)		
08 81 23 13-0041	SF 20 Minute, Fire Rated Factory Installed Glass.....	49.05	
08 81 23 13-0042	SF 45 Minute, Fire Rated Factory Installed Glass.....	97.66	
08 81 23 13-0043	SF 60 Minute, Fire Rated Factory Installed Glass.....	150.94	
08 81 23 13-0044	SF 90 Minute, Fire Rated Factory Installed Glass.....	199.77	
08 81 23 13-0045	Laminated Factory Installed Glass (08 81 23 13)		
08 81 23 13-0046	Laminated Glass With PVB Interlayer, Factory Installed Glass (08 81 23 13-0045)		
	Note: Type I, Class I, Quality Q3.		
08 81 23 13-0047	SF 1/4" Thick, Laminated Glass With PVB Interlayer, Factory Installed Glass.....	27.97	
	<i>For >50 To 200, Deduct</i>	-0.84	
	<i>For >200 To 400, Deduct</i>	-1.68	
	<i>For >400, Deduct</i>	-2.52	
	<i>For Tinted Glass, Add</i>	5.59	
	<i>For Reflective Coated Glass, Add</i>	8.39	
	<i>For Low-E Coated Glass, Add</i>	6.99	
	<i>For One Piece Heat Strengthened Glass, Add</i>	5.59	
	<i>For One Piece Fully Tempered Glass, Add</i>	5.59	
08 81 23 13-0048	SF 3/8" Thick, Laminated Glass With PVB Interlayer, Factory Installed Glass.....	34.91	
	<i>For >50 To 200, Deduct</i>	-1.05	
	<i>For >200 To 400, Deduct</i>	-2.09	
	<i>For >400, Deduct</i>	-3.14	
	<i>For Tinted Glass, Add</i>	6.98	
	<i>For Reflective Coated Glass, Add</i>	10.47	
	<i>For Low-E Coated Glass, Add</i>	8.73	
	<i>For One Piece Heat Strengthened Glass, Add</i>	6.98	
	<i>For One Piece Fully Tempered Glass, Add</i>	6.98	
08 81 23 13-0049	SF 1/2" Thick, Laminated Glass With PVB Interlayer, Factory Installed Glass.....	40.34	
	<i>For >50 To 200, Deduct</i>	-1.21	
	<i>For >200 To 400, Deduct</i>	-2.42	
	<i>For >400, Deduct</i>	-3.63	
	<i>For Tinted Glass, Add</i>	8.07	
	<i>For Reflective Coated Glass, Add</i>	12.10	
	<i>For Low-E Coated Glass, Add</i>	10.09	
	<i>For One Piece Heat Strengthened Glass, Add</i>	8.07	
	<i>For One Piece Fully Tempered Glass, Add</i>	8.07	
08 81 23 13-0050	Insulated Factory Installed Glass (08 81 23 13)		
08 81 23 13-0051	Insulated, Factory Installed Glass (08 81 23 13-0050)		
	Note: Type I, Class I, Quality Q3.		
08 81 23 13-0052	3/16" Air Space, Insulated, Factory Installed Glass (08 81 23 13-0051)		
	Note: Type I, Class I, Quality Q3.		
08 81 23 13-0053	SF 3/8" Thick, Insulated Factory Installed Glass.....	20.10	
	Note: Two 3/32" lites with 3/16" air space.		
	<i>For >50 To 200, Deduct</i>	-0.60	
	<i>For >200 To 400, Deduct</i>	-1.21	
	<i>For >400, Deduct</i>	-1.81	
	<i>For Tinted Glass, Add</i>	3.02	
	<i>For Reflective Coated Glass, Add</i>	6.03	
	<i>For Low-E Coated Glass, Add</i>	5.03	
	<i>For One Piece Heat Strengthened Glass, Add</i>	4.02	
	<i>For One Piece Fully Tempered Glass, Add</i>	4.02	
	<i>For One Piece Obscure Glass, Add</i>	8.54	
	<i>For Argon Gas, Add</i>	2.76	
08 81 23 13-0054	SF 1/2" Thick, Insulated Factory Installed Glass.....	21.97	
	Note: One 3/16" lite and one 1/8" lite with 3/16" air space.		
	<i>For >50 To 200, Deduct</i>	-0.66	
	<i>For >200 To 400, Deduct</i>	-1.32	
	<i>For >400, Deduct</i>	-1.98	
	<i>For Tinted Glass, Add</i>	3.30	
	<i>For Reflective Coated Glass, Add</i>	6.59	
	<i>For Low-E Coated Glass, Add</i>	5.49	
	<i>For One Piece Heat Strengthened Glass, Add</i>	4.39	
	<i>For One Piece Fully Tempered Glass, Add</i>	4.39	
	<i>For One Piece Obscure Glass, Add</i>	9.34	
	<i>For Argon Gas, Add</i>	3.02	



Openings	08	08
Glazing	08 80	
Glass Glazing	08 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 81 23 13-0055 SF 9/16" Thick, Insulated Factory Installed Glass.....	22.01	
Note: Two 3/16" lites with 3/16" air space.		
<i>For >50 To 200, Deduct</i>	-0.66	
<i>For >200 To 400, Deduct</i>	-1.32	
<i>For >400, Deduct</i>	-1.98	
<i>For Tinted Glass, Add</i>	3.30	
<i>For Reflective Coated Glass, Add</i>	6.60	
<i>For Low-E Coated Glass, Add</i>	5.50	
<i>For One Piece Heat Strengthened Glass, Add</i>	4.40	
<i>For One Piece Fully Tempered Glass, Add</i>	4.40	
<i>For One Piece Obscure Glass, Add</i>	9.35	
<i>For Argon Gas, Add</i>	3.03	
08 81 23 13-0056 1/4" Air Space, Insulated, Factory Installed Glass (08 81 23 13-0051)		
Note: Type I, Class I, Quality Q3.		
08 81 23 13-0057 SF 7/16" Thick, Insulated Factory Installed Glass.....	20.70	
Note: Two 3/32" lites with 1/4" air space.		
<i>For >50 To 200, Deduct</i>	-0.62	
<i>For >200 To 400, Deduct</i>	-1.24	
<i>For >400, Deduct</i>	-1.86	
<i>For Tinted Glass, Add</i>	3.11	
<i>For Reflective Coated Glass, Add</i>	6.21	
<i>For Low-E Coated Glass, Add</i>	5.18	
<i>For One Piece Heat Strengthened Glass, Add</i>	4.14	
<i>For One Piece Fully Tempered Glass, Add</i>	4.14	
<i>For One Piece Obscure Glass, Add</i>	8.80	
<i>For Argon Gas, Add</i>	2.85	
08 81 23 13-0058 SF 1/2" Thick, Insulated Factory Installed Glass.....	21.97	
Note: Two 1/8" lites with 1/4" air space.		
<i>For >50 To 200, Deduct</i>	-0.66	
<i>For >200 To 400, Deduct</i>	-1.32	
<i>For >400, Deduct</i>	-1.98	
<i>For Tinted Glass, Add</i>	3.30	
<i>For Reflective Coated Glass, Add</i>	6.59	
<i>For Low-E Coated Glass, Add</i>	5.49	
<i>For One Piece Heat Strengthened Glass, Add</i>	4.39	
<i>For One Piece Fully Tempered Glass, Add</i>	4.39	
<i>For One Piece Obscure Glass, Add</i>	9.34	
<i>For Argon Gas, Add</i>	3.02	
08 81 23 13-0059 SF 5/8" Thick, Insulated Factory Installed Glass.....	22.22	
Note: Two 3/16" lites with 1/4" air space.		
<i>For >50 To 200, Deduct</i>	-0.67	
<i>For >200 To 400, Deduct</i>	-1.33	
<i>For >400, Deduct</i>	-2.00	
<i>For Tinted Glass, Add</i>	3.33	
<i>For Reflective Coated Glass, Add</i>	6.67	
<i>For Low-E Coated Glass, Add</i>	5.56	
<i>For One Piece Heat Strengthened Glass, Add</i>	4.44	
<i>For One Piece Fully Tempered Glass, Add</i>	4.44	
<i>For One Piece Obscure Glass, Add</i>	9.44	
<i>For Argon Gas, Add</i>	3.06	
08 81 23 13-0060 SF 5/8" Thick, Insulated Factory Installed Glass.....	22.22	
Note: One 1/4" lite and one 1/8" lite with 1/4" air space.		
<i>For >50 To 200, Deduct</i>	-0.67	
<i>For >200 To 400, Deduct</i>	-1.33	
<i>For >400, Deduct</i>	-2.00	
<i>For Tinted Glass, Add</i>	3.33	
<i>For Reflective Coated Glass, Add</i>	6.67	
<i>For Low-E Coated Glass, Add</i>	5.56	
<i>For One Piece Heat Strengthened Glass, Add</i>	4.44	
<i>For One Piece Fully Tempered Glass, Add</i>	4.44	
<i>For One Piece Obscure Glass, Add</i>	9.44	
<i>For Argon Gas, Add</i>	3.06	
08 81 23 13-0061 SF 3/4" Thick, Insulated Factory Installed Glass.....	25.39	
Note: Two 1/4" lites with 1/4" air space.		
<i>For >50 To 200, Deduct</i>	-0.76	
<i>For >200 To 400, Deduct</i>	-1.52	
<i>For >400, Deduct</i>	-2.29	
<i>For Tinted Glass, Add</i>	3.81	
<i>For Reflective Coated Glass, Add</i>	7.62	
<i>For Low-E Coated Glass, Add</i>	6.35	
<i>For One Piece Heat Strengthened Glass, Add</i>	5.08	
<i>For One Piece Fully Tempered Glass, Add</i>	5.08	
<i>For One Piece Obscure Glass, Add</i>	10.79	
<i>For Argon Gas, Add</i>	3.49	
08 81 23 13-0062 3/8" Air Space, Insulated, Factory Installed Glass (08 81 23 13-0051)		
Note: Type I, Class I, Quality Q3.		

08 Openings**08 80 Glazing****08 81 Glass Glazing**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

08 81 23 13-0063	SF	5/8" Thick, Insulated Factory Installed Glass	22.22
		Note: Two 1/8" lites with 3/8" air space.	
		For >50 To 200, Deduct	-0.67
		For >200 To 400, Deduct	-1.33
		For >400, Deduct	-2.00
		For Tinted Glass, Add	3.33
		For Reflective Coated Glass, Add	6.67
		For Low-E Coated Glass, Add	5.56
		For One Piece Heat Strengthened Glass, Add	4.44
		For One Piece Fully Tempered Glass, Add	4.44
		For One Piece Obscure Glass, Add	9.44
		For Argon Gas, Add	3.06
08 81 23 13-0064	SF	3/4" Thick, Insulated Factory Installed Glass	23.28
		Note: Two 3/16" lites with 3/8" air space.	
		For >50 To 200, Deduct	-0.70
		For >200 To 400, Deduct	-1.40
		For >400, Deduct	-2.10
		For Tinted Glass, Add	3.49
		For Reflective Coated Glass, Add	6.98
		For Low-E Coated Glass, Add	5.82
		For One Piece Heat Strengthened Glass, Add	4.66
		For One Piece Fully Tempered Glass, Add	4.66
		For One Piece Obscure Glass, Add	9.89
		For Argon Gas, Add	3.20
08 81 23 13-0065	SF	7/8" Thick, Insulated Factory Installed Glass	25.82
		Note: Two 1/4" lites with 3/8" air space.	
		For >50 To 200, Deduct	-0.77
		For >200 To 400, Deduct	-1.55
		For >400, Deduct	-2.32
		For Tinted Glass, Add	3.87
		For Reflective Coated Glass, Add	7.75
		For Low-E Coated Glass, Add	6.46
		For One Piece Heat Strengthened Glass, Add	5.16
		For One Piece Fully Tempered Glass, Add	5.16
		For One Piece Obscure Glass, Add	10.97
		For Argon Gas, Add	3.55
08 81 23 13-0066	SF	1" Thick, Insulated Factory Installed Glass	29.16
		Note: Two 5/16" lites with 3/8" air space.	
		For >50 To 200, Deduct	-0.87
		For >200 To 400, Deduct	-1.75
		For >400, Deduct	-2.62
		For Tinted Glass, Add	4.37
		For Reflective Coated Glass, Add	8.75
		For Low-E Coated Glass, Add	7.29
		For One Piece Heat Strengthened Glass, Add	5.83
		For One Piece Fully Tempered Glass, Add	5.83
		For One Piece Obscure Glass, Add	12.39
		For Argon Gas, Add	4.01
08 81 23 13-0067		1/2" Air Space, Insulated, Factory Installed Glass (08 81 23 13-0051)	
		Note: Type I, Class I, Quality Q3.	
08 81 23 13-0068	SF	3/4" Thick, Insulated Factory Installed Glass	23.28
		Note: Two 1/8" lites with 1/2" air space.	
		For >50 To 200, Deduct	-0.70
		For >200 To 400, Deduct	-1.40
		For >400, Deduct	-2.10
		For Tinted Glass, Add	3.49
		For Reflective Coated Glass, Add	6.98
		For Low-E Coated Glass, Add	5.82
		For One Piece Heat Strengthened Glass, Add	4.66
		For One Piece Fully Tempered Glass, Add	4.66
		For One Piece Obscure Glass, Add	9.89
		For Argon Gas, Add	3.20
08 81 23 13-0069	SF	7/8" Thick, Insulated Factory Installed Glass	25.82
		Note: Two 3/16" lites with 1/2" air space.	
		For >50 To 200, Deduct	-0.77
		For >200 To 400, Deduct	-1.55
		For >400, Deduct	-2.32
		For Tinted Glass, Add	3.87
		For Reflective Coated Glass, Add	7.75
		For Low-E Coated Glass, Add	6.46
		For One Piece Heat Strengthened Glass, Add	5.16
		For One Piece Fully Tempered Glass, Add	5.16
		For One Piece Obscure Glass, Add	10.97
		For Argon Gas, Add	3.55



Openings	08	08
Glazing	08 80	
Glass Glazing	08 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 81 23 13-0070	SF	7/8" Thick, Insulated Factory Installed Glass	25.82
		Note: One 1/4" lite and one 1/8" lite with 1/2" air space.	
		For >50 To 200, Deduct	-0.77
		For >200 To 400, Deduct	-1.55
		For >400, Deduct	-2.32
		For Tinted Glass, Add	3.87
		For Reflective Coated Glass, Add	7.75
		For Low-E Coated Glass, Add	6.46
		For One Piece Heat Strengthened Glass, Add	5.16
		For One Piece Fully Tempered Glass, Add	5.16
		For One Piece Obscure Glass, Add	10.97
		For Argon Gas, Add	3.55
08 81 23 13-0071	SF	1" Thick, Insulated Factory Installed Glass	28.23
		Note: Two 1/4" lites with 1/2" air space.	
		For >50 To 200, Deduct	-0.85
		For >200 To 400, Deduct	-1.69
		For >400, Deduct	-2.54
		For Tinted Glass, Add	4.23
		For Reflective Coated Glass, Add	8.47
		For Low-E Coated Glass, Add	7.06
		For One Piece Heat Strengthened Glass, Add	5.65
		For One Piece Fully Tempered Glass, Add	5.65
		For One Piece Obscure Glass, Add	12.00
		For Argon Gas, Add	3.88

08 81 23 23 Field Installed Glass Glazing (08 81 23)

08 81 23 23-0001	Clear Float Field Installed Glass (08 81 23 23)		
08 81 23 23-0002	Clear Float Field Installed Glass (08 81 23 23-0001)	Note: Type I, Class I, Quality Q3.	
08 81 23 23-0003	SF	1/8" Thick, Clear Float Field Installed Glass	22.62
		For >50 To 200, Deduct	-0.24
		For >200 To 400, Deduct	-0.48
		For >400, Deduct	-0.72
		For Glass Removal And Preparing Opening For New Glazing, Add	14.63
		For Tinted Glass, Add	2.00
		For Reflective Coated Glass, Add	3.60
		For Low-E Coated Glass, Add	2.00
08 81 23 23-0004	SF	3/16" Thick, Clear Float Field Installed Glass	24.32
		For >50 To 200, Deduct	-0.26
		For >200 To 400, Deduct	-0.51
		For >400, Deduct	-0.77
		For Glass Removal And Preparing Opening For New Glazing, Add	15.75
		For Tinted Glass, Add	2.14
		For Reflective Coated Glass, Add	3.86
		For Low-E Coated Glass, Add	2.14
08 81 23 23-0005	SF	1/4" Thick, Clear Float Field Installed Glass	27.26
		For >50 To 200, Deduct	-0.31
		For >200 To 400, Deduct	-0.62
		For >400, Deduct	-0.94
		For Glass Removal And Preparing Opening For New Glazing, Add	16.87
		For Tinted Glass, Add	2.60
		For Reflective Coated Glass, Add	4.68
		For Low-E Coated Glass, Add	2.60
08 81 23 23-0006	SF	5/16" Thick, Clear Float Field Installed Glass	36.40
		For >50 To 200, Deduct	-0.52
		For >200 To 400, Deduct	-1.04
		For >400, Deduct	-1.55
		For Glass Removal And Preparing Opening For New Glazing, Add	19.13
		For Tinted Glass, Add	4.32
		For Reflective Coated Glass, Add	7.77
		For Low-E Coated Glass, Add	4.32
08 81 23 23-0007	SF	3/8" Thick, Clear Float Field Installed Glass	46.50
		For >50 To 200, Deduct	-0.75
		For >200 To 400, Deduct	-1.51
		For >400, Deduct	-2.26
		For Glass Removal And Preparing Opening For New Glazing, Add	21.37
		For Tinted Glass, Add	6.28
		For Reflective Coated Glass, Add	11.31
		For Low-E Coated Glass, Add	6.28
08 81 23 23-0008	SF	1/2" Thick, Clear Float Field Installed Glass	51.23
		For >50 To 200, Deduct	-0.83
		For >200 To 400, Deduct	-1.66
		For >400, Deduct	-2.48
		For Glass Removal And Preparing Opening For New Glazing, Add	23.62
		For Tinted Glass, Add	6.90
		For Reflective Coated Glass, Add	12.42
		For Low-E Coated Glass, Add	6.90

08	08	Openings
	08 80	Glazing
	08 81	Glass Glazing



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 81 23 23-0009	SF 5/8" Thick, Clear Float Field Installed Glass	62.27	
	<i>For >50 To 200, Deduct</i>	-0.99	
	<i>For >200 To 400, Deduct</i>	-1.98	
	<i>For >400, Deduct</i>	-2.97	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	29.24	
	<i>For Tinted Glass, Add</i>	8.26	
	<i>For Reflective Coated Glass, Add</i>	14.86	
	<i>For Low-E Coated Glass, Add</i>	8.26	
08 81 23 23-0010	SF 3/4" Thick, Clear Float Field Installed Glass	75.67	
	<i>For >50 To 200, Deduct</i>	-1.22	
	<i>For >200 To 400, Deduct</i>	-2.45	
	<i>For >400, Deduct</i>	-3.67	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	34.87	
	<i>For Tinted Glass, Add</i>	10.20	
	<i>For Reflective Coated Glass, Add</i>	18.36	
	<i>For Low-E Coated Glass, Add</i>	10.20	
08 81 23 23-0011	Heat Treated Field Installed Glass <small>(08 81 23 23)</small>		
08 81 23 23-0012	Tempered, Clear Float Field Installed Glass <small>(08 81 23 23-0011)</small> Note: Type I, Class I, Quality Q3.		
08 81 23 23-0013	SF 1/8" Thick, Tempered, Clear Float Field Installed Glass	26.51	
	<i>For >50 To 200, Deduct</i>	-0.36	
	<i>For >200 To 400, Deduct</i>	-0.71	
	<i>For >400, Deduct</i>	-1.07	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	14.63	
	<i>For Tinted Glass, Add</i>	2.97	
	<i>For Reflective Coated Glass, Add</i>	5.35	
	<i>For Low-E Coated Glass, Add</i>	2.97	
08 81 23 23-0014	SF 3/16" Thick, Tempered, Clear Float Field Installed Glass	28.45	
	<i>For >50 To 200, Deduct</i>	-0.38	
	<i>For >200 To 400, Deduct</i>	-0.76	
	<i>For >400, Deduct</i>	-1.14	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	15.75	
	<i>For Tinted Glass, Add</i>	3.18	
	<i>For Reflective Coated Glass, Add</i>	5.72	
	<i>For Low-E Coated Glass, Add</i>	3.18	
08 81 23 23-0015	SF 1/4" Thick, Tempered, Clear Float Field Installed Glass	32.32	
	<i>For >50 To 200, Deduct</i>	-0.46	
	<i>For >200 To 400, Deduct</i>	-0.93	
	<i>For >400, Deduct</i>	-1.39	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	16.87	
	<i>For Tinted Glass, Add</i>	3.86	
	<i>For Reflective Coated Glass, Add</i>	6.95	
	<i>For Low-E Coated Glass, Add</i>	3.86	
08 81 23 23-0016	SF 5/16" Thick, Tempered, Clear Float Field Installed Glass	44.85	
	<i>For >50 To 200, Deduct</i>	-0.77	
	<i>For >200 To 400, Deduct</i>	-1.54	
	<i>For >400, Deduct</i>	-2.31	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	19.13	
	<i>For Tinted Glass, Add</i>	6.43	
	<i>For Reflective Coated Glass, Add</i>	11.57	
	<i>For Low-E Coated Glass, Add</i>	6.43	
08 81 23 23-0017	SF 3/8" Thick, Tempered, Clear Float Field Installed Glass	58.74	
	<i>For >50 To 200, Deduct</i>	-1.12	
	<i>For >200 To 400, Deduct</i>	-2.24	
	<i>For >400, Deduct</i>	-3.36	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	21.37	
	<i>For Tinted Glass, Add</i>	9.34	
	<i>For Reflective Coated Glass, Add</i>	16.82	
	<i>For Low-E Coated Glass, Add</i>	9.34	
08 81 23 23-0018	SF 1/2" Thick, Tempered, Clear Float Field Installed Glass	64.68	
	<i>For >50 To 200, Deduct</i>	-1.23	
	<i>For >200 To 400, Deduct</i>	-2.46	
	<i>For >400, Deduct</i>	-3.70	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	23.62	
	<i>For Tinted Glass, Add</i>	10.27	
	<i>For Reflective Coated Glass, Add</i>	18.48	
	<i>For Low-E Coated Glass, Add</i>	10.27	
08 81 23 23-0019	SF 5/8" Thick, Tempered, Clear Float Field Installed Glass	78.36	
	<i>For >50 To 200, Deduct</i>	-1.47	
	<i>For >200 To 400, Deduct</i>	-2.95	
	<i>For >400, Deduct</i>	-4.42	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	29.24	
	<i>For Tinted Glass, Add</i>	12.28	
	<i>For Reflective Coated Glass, Add</i>	22.10	
	<i>For Low-E Coated Glass, Add</i>	12.28	
08 81 23 23-0020	SF 3/4" Thick, Tempered, Clear Float Field Installed Glass	95.55	
	<i>For >50 To 200, Deduct</i>	-1.82	
	<i>For >200 To 400, Deduct</i>	-3.64	
	<i>For >400, Deduct</i>	-5.46	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	34.87	
	<i>For Tinted Glass, Add</i>	15.17	
	<i>For Reflective Coated Glass, Add</i>	27.31	
	<i>For Low-E Coated Glass, Add</i>	15.17	



Openings	08	08
Glazing	08 80	
Glass Glazing	08 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 81 23 23-0021 Patterned Field Installed Glass <small>(08 81 23 23)</small>		
08 81 23 23-0022 Rough Obscure Field Installed Glass <small>(08 81 23 23-0021)</small> Note: Class II, Form 3, Finish F1.		
08 81 23 23-0023 SF 1/4" Thick, Rough Obscure Field Installed Glass.....	72.40	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0024 Patterned, Figured Field Installed Glass <small>(08 81 23 23-0021)</small> Note: Kind HS, Type II, Class I, Form 3, Quality Q8, Finish F2, Pattern P4.		
08 81 23 23-0025 SF 1/8" Thick, Patterned, Figured Field Installed Glass.....	48.36	
For Glass Removal And Preparing Opening For New Glazing, Add	14.63	
08 81 23 23-0026 SF 7/32" Thick, Patterned, Figured Field Installed Glass.....	50.04	
For Glass Removal And Preparing Opening For New Glazing, Add	16.31	
08 81 23 23-0027 Wired Field Installed Glass <small>(08 81 23 23)</small>		
08 81 23 23-0028 Square Or Diamond Pattern, Wired Field Installed Glass <small>(08 81 23 23-0027)</small> Note: Class I, Form 2, Mesh M1 Or M2, Pattern P2.		
08 81 23 23-0029 SF 1/4" Thick, Square Pattern, Wired Field Installed Glass.....	104.18	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0030 SF 1/4" Thick, Diamond Pattern, Wired Field Installed Glass.....	104.18	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0031 Polished, Wired Field Installed Glass <small>(08 81 23 23-0027)</small>		
08 81 23 23-0032 SF 1/4" Thick, Polished, Wired Field Installed Glass.....	112.32	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0033 Frosted Field Installed Glass <small>(08 81 23 23)</small>		
08 81 23 23-0034 Frosted Field Installed Glass <small>(08 81 23 23-0033)</small>		
08 81 23 23-0035 SF 1/8" Thick, Frosted Field Installed Glass.....	58.78	
For >50 To 200, Deduct	-1.32	
For >200 To 400, Deduct	-2.65	
For >400, Deduct	-3.97	
For Glass Removal And Preparing Opening For New Glazing, Add	14.63	
08 81 23 23-0036 SF 3/16" Thick, Frosted Field Installed Glass.....	73.67	
For >50 To 200, Deduct	-1.74	
For >200 To 400, Deduct	-3.48	
For >400, Deduct	-5.21	
For Glass Removal And Preparing Opening For New Glazing, Add	15.75	
08 81 23 23-0037 SF 1/4" Thick, Frosted Field Installed Glass.....	90.08	
For >50 To 200, Deduct	-2.20	
For >200 To 400, Deduct	-4.39	
For >400, Deduct	-6.59	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0038 SF 3/8" Thick, Frosted Field Installed Glass.....	130.81	
For >50 To 200, Deduct	-3.28	
For >200 To 400, Deduct	-6.57	
For >400, Deduct	-9.85	
For Glass Removal And Preparing Opening For New Glazing, Add	21.37	
08 81 23 23-0039 Fire Rated Field Installed Glass <small>(08 81 23 23)</small>		
08 81 23 23-0040 Fire Rated Field Installed Glass <small>(08 81 23 23-0039)</small>		
08 81 23 23-0041 SF 20 Minute, Fire Rated Field Installed Glass.....	65.92	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0042 SF 45 Minute, Fire Rated Field Installed Glass.....	114.53	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0043 SF 60 Minute, Fire Rated Field Installed Glass.....	167.81	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0044 SF 90 Minute, Fire Rated Field Installed Glass.....	216.64	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
08 81 23 23-0045 Laminated Field Installed Glass <small>(08 81 23 23)</small>		
08 81 23 23-0046 Laminated Glass With PVB Interlayer, Field Installed Glass <small>(08 81 23 23-0045)</small> Note: Type I, Class I, Quality Q3.		
08 81 23 23-0047 SF 1/4" Thick, Laminated Glass With PVB Interlayer, Field Installed Glass.....	44.84	
For >50 To 200, Deduct	-0.84	
For >200 To 400, Deduct	-1.68	
For >400, Deduct	-2.52	
For Glass Removal And Preparing Opening For New Glazing, Add	16.87	
For Tinted Glass, Add	5.59	
For Reflective Coated Glass, Add	8.39	
For Low-E Coated Glass, Add	6.99	
For One Piece Heat Strengthened Glass, Add	5.59	
For One Piece Fully Tempered Glass, Add	5.59	

08	08	Openings
	08 80	Glazing
	08 81	Glass Glazing



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 81 23 23-0048 SF 3/8" Thick, Laminated Glass With PVB Interlayer, Field Installed Glass.....	56.28	
For >50 To 200, Deduct	-1.05	
For >200 To 400, Deduct	-2.09	
For >400, Deduct	-3.14	
For Glass Removal And Preparing Opening For New Glazing, Add	21.37	
For Tinted Glass, Add	6.98	
For Reflective Coated Glass, Add	10.47	
For Low-E Coated Glass, Add	8.73	
For One Piece Heat Strengthened Glass, Add	6.98	
For One Piece Fully Tempered Glass, Add	6.98	
08 81 23 23-0049 SF 1/2" Thick, Laminated Glass With PVB Interlayer, Field Installed Glass.....	63.96	
For >50 To 200, Deduct	-1.21	
For >200 To 400, Deduct	-2.42	
For >400, Deduct	-3.63	
For Glass Removal And Preparing Opening For New Glazing, Add	23.62	
For Tinted Glass, Add	8.07	
For Reflective Coated Glass, Add	12.10	
For Low-E Coated Glass, Add	10.09	
For One Piece Heat Strengthened Glass, Add	8.07	
For One Piece Fully Tempered Glass, Add	8.07	
 08 81 23 23-0050 Insulated Field Installed Glass (08 81 23 23)		
 08 81 23 23-0051 Insulated Glass, Field Installed Glass (08 81 23 23-0050)		
Note: Type I, Class I, Quality Q3.		
 08 81 23 23-0052 3/16" Air Space, Insulated, Field Installed Glass (08 81 23 23-0051)		
Note: Type I, Class I, Quality Q3.		
08 81 23 23-0053 SF 3/8" Thick, Insulated Field Installed Glass	39.00	
Note: Two 3/32" lites with 3/16" air space.		
For >50 To 200, Deduct	-0.60	
For >200 To 400, Deduct	-1.21	
For >400, Deduct	-1.81	
For Glass Removal And Preparing Opening For New Glazing, Add	18.90	
For Tinted Glass, Add	3.02	
For Reflective Coated Glass, Add	6.03	
For Low-E Coated Glass, Add	5.03	
For One Piece Heat Strengthened Glass, Add	4.02	
For One Piece Fully Tempered Glass, Add	4.02	
For One Piece Obscure Glass, Add	8.54	
For Argon Gas, Add	2.76	
08 81 23 23-0054 SF 1/2" Thick, Insulated Field Installed Glass	41.66	
Note: One 3/16" lite and one 1/8" lite with 3/16" air space.		
For >50 To 200, Deduct	-0.66	
For >200 To 400, Deduct	-1.32	
For >400, Deduct	-1.98	
For Glass Removal And Preparing Opening For New Glazing, Add	19.69	
For Tinted Glass, Add	3.30	
For Reflective Coated Glass, Add	6.59	
For Low-E Coated Glass, Add	5.49	
For One Piece Heat Strengthened Glass, Add	4.39	
For One Piece Fully Tempered Glass, Add	4.39	
For One Piece Obscure Glass, Add	9.34	
For Argon Gas, Add	3.02	
08 81 23 23-0055 SF 9/16" Thick, Insulated Field Installed Glass	42.03	
Note: Two 3/16" lites with 3/16" air space.		
For >50 To 200, Deduct	-0.66	
For >200 To 400, Deduct	-1.32	
For >400, Deduct	-1.98	
For Glass Removal And Preparing Opening For New Glazing, Add	20.02	
For Tinted Glass, Add	3.30	
For Reflective Coated Glass, Add	6.60	
For Low-E Coated Glass, Add	5.50	
For One Piece Heat Strengthened Glass, Add	4.40	
For One Piece Fully Tempered Glass, Add	4.40	
For One Piece Obscure Glass, Add	9.35	
For Argon Gas, Add	3.03	
 08 81 23 23-0056 1/4" Air Space, Insulated, Field Installed Glass (08 81 23 23-0051)		
Note: Type I, Class I, Quality Q3.		
08 81 23 23-0057 SF 7/16" Thick, Insulated Field Installed Glass	39.94	
Note: Two 3/32" lites with 1/4" air space.		
For >50 To 200, Deduct	-0.62	
For >200 To 400, Deduct	-1.24	
For >400, Deduct	-1.86	
For Glass Removal And Preparing Opening For New Glazing, Add	19.24	
For Tinted Glass, Add	3.11	
For Reflective Coated Glass, Add	6.21	
For Low-E Coated Glass, Add	5.18	
For One Piece Heat Strengthened Glass, Add	4.14	
For One Piece Fully Tempered Glass, Add	4.14	
For One Piece Obscure Glass, Add	8.80	
For Argon Gas, Add	2.85	



Openings	08	08
Glazing	08 80	
Glass Glazing	08 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 81 23 23-0058 SF 1/2" Thick, Insulated Field Installed Glass .....41.66 Note: Two 1/8" lites with 1/4" air space.		
For >50 To 200, Deduct	-0.66	
For >200 To 400, Deduct	-1.32	
For >400, Deduct	-1.98	
For Glass Removal And Preparing Opening For New Glazing, Add	19.69	
For Tinted Glass, Add	3.30	
For Reflective Coated Glass, Add	6.59	
For Low-E Coated Glass, Add	5.49	
For One Piece Heat Strengthened Glass, Add	4.39	
For One Piece Fully Tempered Glass, Add	4.39	
For One Piece Obscure Glass, Add	9.34	
For Argon Gas, Add	3.02	
08 81 23 23-0059 SF 5/8" Thick, Insulated Field Installed Glass .....43.22 Note: Two 3/16" lites with 1/4" air space.		
For >50 To 200, Deduct	-0.67	
For >200 To 400, Deduct	-1.33	
For >400, Deduct	-2.00	
For Glass Removal And Preparing Opening For New Glazing, Add	21.00	
For Tinted Glass, Add	3.33	
For Reflective Coated Glass, Add	6.67	
For Low-E Coated Glass, Add	5.56	
For One Piece Heat Strengthened Glass, Add	4.44	
For One Piece Fully Tempered Glass, Add	4.44	
For One Piece Obscure Glass, Add	9.44	
For Argon Gas, Add	3.06	
08 81 23 23-0060 SF 5/8" Thick, Insulated Field Installed Glass .....43.22 Note: One 1/4" lite and one 1/8" lite with 1/4" air space.		
For >50 To 200, Deduct	-0.67	
For >200 To 400, Deduct	-1.33	
For >400, Deduct	-2.00	
For Glass Removal And Preparing Opening For New Glazing, Add	21.00	
For Tinted Glass, Add	3.33	
For Reflective Coated Glass, Add	6.67	
For Low-E Coated Glass, Add	5.56	
For One Piece Heat Strengthened Glass, Add	4.44	
For One Piece Fully Tempered Glass, Add	4.44	
For One Piece Obscure Glass, Add	9.44	
For Argon Gas, Add	3.06	
08 81 23 23-0061 SF 3/4" Thick, Insulated Field Installed Glass .....48.31 Note: Two 1/4" lites with 1/4" air space.		
For >50 To 200, Deduct	-0.76	
For >200 To 400, Deduct	-1.52	
For >400, Deduct	-2.29	
For Glass Removal And Preparing Opening For New Glazing, Add	22.92	
For Tinted Glass, Add	3.81	
For Reflective Coated Glass, Add	7.62	
For Low-E Coated Glass, Add	6.35	
For One Piece Heat Strengthened Glass, Add	5.08	
For One Piece Fully Tempered Glass, Add	5.08	
For One Piece Obscure Glass, Add	10.79	
For Argon Gas, Add	3.49	
08 81 23 23-0062 3/8" Air Space, Insulated, Field Installed Glass (08 81 23 23-0051) Note: Type I, Class I, Quality Q3.		
08 81 23 23-0063 SF 5/8" Thick, Insulated Field Installed Glass .....43.22 Note: Two 1/8" lites with 3/8" air space.		
For >50 To 200, Deduct	-0.67	
For >200 To 400, Deduct	-1.33	
For >400, Deduct	-2.00	
For Glass Removal And Preparing Opening For New Glazing, Add	21.00	
For Tinted Glass, Add	3.33	
For Reflective Coated Glass, Add	6.67	
For Low-E Coated Glass, Add	5.56	
For One Piece Heat Strengthened Glass, Add	4.44	
For One Piece Fully Tempered Glass, Add	4.44	
For One Piece Obscure Glass, Add	9.44	
For Argon Gas, Add	3.06	
08 81 23 23-0064 SF 3/4" Thick, Insulated Field Installed Glass .....46.20 Note: Two 3/16" lites with 3/8" air space.		
For >50 To 200, Deduct	-0.70	
For >200 To 400, Deduct	-1.40	
For >400, Deduct	-2.10	
For Glass Removal And Preparing Opening For New Glazing, Add	22.92	
For Tinted Glass, Add	3.49	
For Reflective Coated Glass, Add	6.98	
For Low-E Coated Glass, Add	5.82	
For One Piece Heat Strengthened Glass, Add	4.66	
For One Piece Fully Tempered Glass, Add	4.66	
For One Piece Obscure Glass, Add	9.89	
For Argon Gas, Add	3.20	

08	08	Openings
	08 80	Glazing
	08 81	Glass Glazing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 81 23 23-0065	SF	7/8" Thick, Insulated Field Installed Glass	49.22
		Note: Two 1/4" lites with 3/8" air space.	
		For >50 To 200, Deduct	-0.77
		For >200 To 400, Deduct	-1.55
		For >400, Deduct	-2.32
		For Glass Removal And Preparing Opening For New Glazing, Add	23.40
		For Tinted Glass, Add	3.87
		For Reflective Coated Glass, Add	7.75
		For Low-E Coated Glass, Add	6.46
		For One Piece Heat Strengthened Glass, Add	5.16
		For One Piece Fully Tempered Glass, Add	5.16
		For One Piece Obscure Glass, Add	10.97
		For Argon Gas, Add	3.55
08 81 23 23-0066	SF	1" Thick, Insulated Field Installed Glass	52.78
		Note: Two 5/16" lites with 3/8" air space.	
		For >50 To 200, Deduct	-0.87
		For >200 To 400, Deduct	-1.75
		For >400, Deduct	-2.62
		For Glass Removal And Preparing Opening For New Glazing, Add	23.62
		For Tinted Glass, Add	4.37
		For Reflective Coated Glass, Add	8.75
		For Low-E Coated Glass, Add	7.29
		For One Piece Heat Strengthened Glass, Add	5.83
		For One Piece Fully Tempered Glass, Add	5.83
		For One Piece Obscure Glass, Add	12.39
		For Argon Gas, Add	4.01

08 81 23 23-0067 1/2" Air Space, Insulated, Field Installed Glass (08 81 23 23-0051)

08 81 23 23-0068	SF	3/4" Thick, Insulated Field Installed Glass	46.20
		Note: Two 1/8" lites with 1/2" air space.	
		For >50 To 200, Deduct	-0.70
		For >200 To 400, Deduct	-1.40
		For >400, Deduct	-2.10
		For Glass Removal And Preparing Opening For New Glazing, Add	22.92
		For Tinted Glass, Add	3.49
		For Reflective Coated Glass, Add	6.98
		For Low-E Coated Glass, Add	5.82
		For One Piece Heat Strengthened Glass, Add	4.66
		For One Piece Fully Tempered Glass, Add	4.66
		For One Piece Obscure Glass, Add	9.89
		For Argon Gas, Add	3.20
08 81 23 23-0069	SF	7/8" Thick, Insulated Field Installed Glass	49.22
		Note: Two 3/16" lites with 1/2" air space.	
		For >50 To 200, Deduct	-0.77
		For >200 To 400, Deduct	-1.55
		For >400, Deduct	-2.32
		For Glass Removal And Preparing Opening For New Glazing, Add	23.40
		For Tinted Glass, Add	3.87
		For Reflective Coated Glass, Add	7.75
		For Low-E Coated Glass, Add	6.46
		For One Piece Heat Strengthened Glass, Add	5.16
		For One Piece Fully Tempered Glass, Add	5.16
		For One Piece Obscure Glass, Add	10.97
		For Argon Gas, Add	3.55
08 81 23 23-0070	SF	7/8" Thick, Insulated Field Installed Glass	49.22
		Note: One 1/4" lite and one 1/8" lite with 1/2" air space.	
		For >50 To 200, Deduct	-0.77
		For >200 To 400, Deduct	-1.55
		For >400, Deduct	-2.32
		For Glass Removal And Preparing Opening For New Glazing, Add	23.40
		For Tinted Glass, Add	3.87
		For Reflective Coated Glass, Add	7.75
		For Low-E Coated Glass, Add	6.46
		For One Piece Heat Strengthened Glass, Add	5.16
		For One Piece Fully Tempered Glass, Add	5.16
		For One Piece Obscure Glass, Add	10.97
		For Argon Gas, Add	3.55
08 81 23 23-0071	SF	1" Thick, Insulated Field Installed Glass	51.85
		Note: Two 1/4" lites with 1/2" air space.	
		For >50 To 200, Deduct	-0.85
		For >200 To 400, Deduct	-1.69
		For >400, Deduct	-2.54
		For Glass Removal And Preparing Opening For New Glazing, Add	23.62
		For Tinted Glass, Add	4.23
		For Reflective Coated Glass, Add	8.47
		For Low-E Coated Glass, Add	7.06
		For One Piece Heat Strengthened Glass, Add	5.65
		For One Piece Fully Tempered Glass, Add	5.65
		For One Piece Obscure Glass, Add	12.00
		For Argon Gas, Add	3.88

08 81 23 23-0072 Spandrel Field Installed Glass (08 81 23 23)



Openings	08	08
Glazing	08 80	
Glass Glazing	08 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 81 23 23-0073	Monolithic Float Glass Panels Ceramic Back, Coated, Field Installed Glass <small>(08 81 23 23-0072)</small>		
08 81 23 23-0074	SF 1/4" - 5/16" Spandrel Glass, Up To 1,000 SF, Field Installed Glass	40.31	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	18.75	
08 81 23 23-0075	SF 1/4" - 5/16" Spandrel Glass, >1,000 SF, Field Installed Glass	35.68	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	18.75	
08 81 23 23-0076	Insulating Float Glass Panels Ceramic Back, Coated, Tempered, Field Installed Glass <small>(08 81 23 23-0072)</small>		
08 81 23 23-0077	1/4" Glass With 1" Fiberglass Insulation, Field Installed Glass <small>(08 81 23 23-0076)</small> Note: Also with aluminum foil vapor barrier.		
08 81 23 23-0078	SF 1/4" Spandrel Glass With 1" Fiberglass Insulation Up To 20,000 SF, Foil Vapor Barrier, Field Installed Glass.....	45.13	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	18.75	
08 81 23 23-0079	SF 1/4" Spandrel Glass With 1" Fiberglass Insulation >20,000 SF, Foil Vapor Barrier, Field Installed Glass	39.89	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	18.75	
08 81 23 23-0080	1/4" Glass With 3/4 To 7/8" Insulation, Field Installed Glass <small>(08 81 23 23-0076)</small>		
08 81 23 23-0081	SF 1/4" Spandrel Glass, 3/4" - 7/8" Insulation 24 Gauge Steel Interfacing, Field Installed Glass	54.23	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	18.75	
08 81 23 23-0082	SF 1/4" Spandrel Glass, 3/4" - 7/8" Insulation 16 Gauge Steel Interfacing, Field Installed Glass	43.94	
	<i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	18.75	

08 83 Mirrors (08 80)

Note: Kind FT, Type I, Class I, Quality Q1.

08 83 13 Mirrored Glass Glazing (08 83)

08 83 13 00-0001	Mirror Glass <small>(08 83 13)</small>		
08 83 13 00-0002	One-Way Vision Glass (Transparent Mirrors) <small>(08 83 13 00-0001)</small>		
08 83 13 00-0003	SF 1/4" One-Way Vision Glass (Transparent Mirrors).....	88.59	8.44
	<i>For >50 To 200, Deduct</i>	-2.16	
	<i>For >200 To 400, Deduct</i>	-3.60	
	<i>For >400, Deduct</i>	-5.75	
08 83 13 00-0004	Tempered, One-Way Vision Glass (Transparent Mirrors) <small>(08 83 13 00-0001)</small>		
08 83 13 00-0005	SF 1/4" Tempered, One-Way Vision Glass (Transparent Mirrors)	124.28	8.44
	<i>For >50 To 200, Deduct</i>	-3.23	
	<i>For >200 To 400, Deduct</i>	-5.38	
	<i>For >400, Deduct</i>	-8.61	
08 83 13 00-0006	Clear Mirror Glass <small>(08 83 13 00-0001)</small>		
08 83 13 00-0007	SF 1/8" Clear Mirror Glass	29.47	6.75
	<i>For >50 To 200, Deduct</i>	-0.48	
	<i>For >200 To 400, Deduct</i>	-0.80	
	<i>For >400, Deduct</i>	-1.28	
08 83 13 00-0008	SF 3/16" Clear Mirror Glass	34.87	7.87
	<i>For >50 To 200, Deduct</i>	-0.58	
	<i>For >200 To 400, Deduct</i>	-0.97	
	<i>For >400, Deduct</i>	-1.55	
08 83 13 00-0009	SF 1/4" Clear Mirror Glass	38.25	8.44
	<i>For >50 To 200, Deduct</i>	-0.65	
	<i>For >200 To 400, Deduct</i>	-1.08	
	<i>For >400, Deduct</i>	-1.73	
08 83 13 00-0010	Tempered, Clear Mirror Glass <small>(08 83 13 00-0001)</small>		
08 83 13 00-0011	SF 1/8" Tempered, Clear Mirror Glass	48.63	6.75
	<i>For >50 To 200, Deduct</i>	-1.05	
	<i>For >200 To 400, Deduct</i>	-1.76	
	<i>For >400, Deduct</i>	-2.81	
08 83 13 00-0012	SF 3/16" Tempered, Clear Mirror Glass	55.20	7.87
	<i>For >50 To 200, Deduct</i>	-1.19	
	<i>For >200 To 400, Deduct</i>	-1.98	
	<i>For >400, Deduct</i>	-3.18	
08 83 13 00-0013	SF 1/4" Tempered, Clear Mirror Glass	60.92	8.44
	<i>For >50 To 200, Deduct</i>	-1.33	
	<i>For >200 To 400, Deduct</i>	-2.21	
	<i>For >400, Deduct</i>	-3.54	
08 83 13 00-0014	Clear Mirror Glass With Laminated Safety Backing <small>(08 83 13 00-0001)</small>		
08 83 13 00-0015	SF 1/4" Clear Mirror Glass With Laminated Safety Backing.....	41.05	8.44
	<i>For >50 To 200, Deduct</i>	-0.73	
	<i>For >200 To 400, Deduct</i>	-1.22	
	<i>For >400, Deduct</i>	-1.95	

08	08	Openings
	08 80	Glazing
	08 83	Mirrors



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 83 13 00-0016	Laminated Safety Mirror Glass <small>(08 83 13 00-0001)</small>		
	Note: Clear glass laminated to face of mirror with PVB interlayer.		
08 83 13 00-0017	SF 1/4" Laminated Safety Mirror Glass	79.04	8.44
	For >50 To 200, Deduct	-1.87	
	For >200 To 400, Deduct	-3.12	
	For >400, Deduct	-4.99	
08 83 13 00-0018	Accessories For Mirror Glass <small>(08 83 13)</small>		
08 83 13 00-0019	LF 1/8" Aluminum J-Channel For Mounting Mirror Glass	5.55	
08 83 13 00-0020	LF 3/16" Aluminum J-Channel For Mounting Mirror Glass	5.66	
08 83 13 00-0021	LF 1/4" Aluminum J-Channel For Mounting Mirror Glass	7.15	
08 83 13 00-0022	LF Aluminum Frame For Mounting Mirror Glass	9.23	

08 84 Plastic Glazing (08 80)

08 84 00 00-0001	Clear Polycarbonate Glazing (GE Lexan) <small>(08 84)</small>		
08 84 00 00-0002	SF 1/8" Thick, Clear Polycarbonate Glazing (GE Lexan)	19.93	
	For >50 To 200, Deduct	-0.47	
	For >200 To 400, Deduct	-0.93	
	For >400, Deduct	-1.40	
	For Glass Removal And Preparing Opening For New Glazing, Add	10.61	
08 84 00 00-0003	SF 3/16" Thick, Clear Polycarbonate Glazing (GE Lexan)	21.01	
	For >50 To 200, Deduct	-0.50	
	For >200 To 400, Deduct	-1.00	
	For >400, Deduct	-1.50	
	For Glass Removal And Preparing Opening For New Glazing, Add	11.03	
08 84 00 00-0004	SF 1/4" Thick, Clear Polycarbonate Glazing (GE Lexan)	24.99	
	For >50 To 200, Deduct	-0.68	
	For >200 To 400, Deduct	-1.35	
	For >400, Deduct	-2.03	
	For Glass Removal And Preparing Opening For New Glazing, Add	11.47	
08 84 00 00-0005	SF 3/8" Thick, Clear Polycarbonate Glazing (GE Lexan)	36.09	
	For >50 To 200, Deduct	-1.21	
	For >200 To 400, Deduct	-2.43	
	For >400, Deduct	-3.64	
	For Glass Removal And Preparing Opening For New Glazing, Add	11.80	
08 84 00 00-0006	SF 1/2" Thick, Clear Polycarbonate Glazing (GE Lexan)	45.66	
	For >50 To 200, Deduct	-1.65	
	For >200 To 400, Deduct	-3.30	
	For >400, Deduct	-4.95	
	For Glass Removal And Preparing Opening For New Glazing, Add	12.65	
08 84 00 00-0007	Mar-Resistant, Clear Polycarbonate Glazing (GE Lexan MR10) <small>(08 84)</small>		
08 84 00 00-0008	SF 1/8" Thick, Mar-Resistant, Clear Polycarbonate Glazing (GE Lexan MR10)	29.77	
	For >50 To 200, Deduct	-0.96	
	For >200 To 400, Deduct	-1.92	
	For >400, Deduct	-2.87	
	For Glass Removal And Preparing Opening For New Glazing, Add	10.61	
08 84 00 00-0009	SF 3/16" Thick, Mar-Resistant, Clear Polycarbonate Glazing (GE Lexan MR10)	34.60	
	For >50 To 200, Deduct	-1.18	
	For >200 To 400, Deduct	-2.36	
	For >400, Deduct	-3.54	
	For Glass Removal And Preparing Opening For New Glazing, Add	11.03	
08 84 00 00-0010	SF 1/4" Thick, Mar-Resistant, Clear Polycarbonate Glazing (GE Lexan MR10)	36.55	
	For >50 To 200, Deduct	-1.25	
	For >200 To 400, Deduct	-2.51	
	For >400, Deduct	-3.76	
	For Glass Removal And Preparing Opening For New Glazing, Add	11.47	
08 84 00 00-0011	SF 3/8" Thick, Mar-Resistant, Clear Polycarbonate Glazing (GE Lexan MR10)	60.25	
	For >50 To 200, Deduct	-2.42	
	For >200 To 400, Deduct	-4.85	
	For >400, Deduct	-7.27	
	For Glass Removal And Preparing Opening For New Glazing, Add	11.80	
08 84 00 00-0012	SF 1/2" Thick, Mar-Resistant, Clear Polycarbonate Glazing (GE Lexan MR10)	64.00	
	For >50 To 200, Deduct	-2.57	
	For >200 To 400, Deduct	-5.14	
	For >400, Deduct	-7.70	
	For Glass Removal And Preparing Opening For New Glazing, Add	12.65	
08 84 00 00-0013	Clear Acrylic Glazing (Plexiglas) <small>(08 84)</small>		
08 84 00 00-0014	SF 1/10" Thick, Clear Acrylic Glazing (Plexiglas)	14.29	
	For >50 To 200, Deduct	-0.21	
	For >200 To 400, Deduct	-0.42	
	For >400, Deduct	-0.62	
	For Glass Removal And Preparing Opening For New Glazing, Add	10.13	
	For Colored, Add	0.83	
	For Shatterproof, Add	2.50	
	For Mirrored, Add	3.33	



Openings	08	08
Glazing	08 80	
Plastic Glazing	08 84	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 84 00 00-0015 SF 1/8" Thick, Clear Acrylic Glazing (Plexiglas).....	14.81	
For >50 To 200, Deduct	-0.21	
For >200 To 400, Deduct	-0.42	
For >400, Deduct	-0.63	
For Glass Removal And Preparing Opening For New Glazing, Add	10.61	
For Colored, Add	0.84	
For Shatterproof, Add	2.52	
For Mirrored, Add	3.36	
08 84 00 00-0016 SF 3/16" Thick, Clear Acrylic Glazing (Plexiglas).....	17.59	
For >50 To 200, Deduct	-0.33	
For >200 To 400, Deduct	-0.66	
For >400, Deduct	-0.98	
For Glass Removal And Preparing Opening For New Glazing, Add	11.03	
For Colored, Add	1.31	
For Shatterproof, Add	3.94	
For Mirrored, Add	5.25	
08 84 00 00-0017 SF 1/4" Thick, Clear Acrylic Glazing (Plexiglas).....	20.12	
For >50 To 200, Deduct	-0.43	
For >200 To 400, Deduct	-0.87	
For >400, Deduct	-1.30	
For Glass Removal And Preparing Opening For New Glazing, Add	11.47	
For Colored, Add	1.73	
For Shatterproof, Add	5.19	
For Mirrored, Add	6.92	
08 84 00 00-0018 SF 5/16" Thick, Clear Acrylic Glazing (Plexiglas).....	20.59	
For >50 To 200, Deduct	-0.45	
For >200 To 400, Deduct	-0.91	
For >400, Deduct	-1.36	
For Glass Removal And Preparing Opening For New Glazing, Add	11.53	
For Colored, Add	1.81	
For Shatterproof, Add	5.44	
For Mirrored, Add	7.25	
08 84 00 00-0019 SF 3/8" Thick, Clear Acrylic Glazing (Plexiglas).....	21.27	
For >50 To 200, Deduct	-0.47	
For >200 To 400, Deduct	-0.95	
For >400, Deduct	-1.42	
For Glass Removal And Preparing Opening For New Glazing, Add	11.80	
For Colored, Add	1.89	
For Shatterproof, Add	5.68	
For Mirrored, Add	7.58	
08 84 00 00-0020 SF 1/2" Thick, Clear Acrylic Glazing (Plexiglas).....	25.17	
For >50 To 200, Deduct	-0.63	
For >200 To 400, Deduct	-1.25	
For >400, Deduct	-1.88	
For Glass Removal And Preparing Opening For New Glazing, Add	12.65	
For Colored, Add	2.50	
For Shatterproof, Add	7.51	
For Mirrored, Add	10.02	
08 84 00 00-0021 SF 3/4" Thick, Clear Acrylic Glazing (Plexiglas).....	35.51	
For >50 To 200, Deduct	-0.98	
For >200 To 400, Deduct	-1.95	
For >400, Deduct	-2.93	
For Glass Removal And Preparing Opening For New Glazing, Add	16.01	
08 84 00 00-0022 SF 1" Thick, Clear Acrylic Glazing (Plexiglas).....	47.39	
For >50 To 200, Deduct	-1.50	
For >200 To 400, Deduct	-3.00	
For >400, Deduct	-4.50	
For Glass Removal And Preparing Opening For New Glazing, Add	17.39	

08 85 Glazing Accessories (08 80)

Note: Applicable to reglazing tasks only, new window installation includes the gasket.

08 85 00 00-0001 Framing For Glass Windscreens <small>(08 85)</small>		
Note: Excludes glazing.		
08 85 00 00-0002 LF 1-1/4" x 1-1/2" Aluminum Framed Window Walls.....	42.81	2.24
For Bronze Anodized Aluminum, Add	5.50	
For Stainless Steel, Add	22.31	
For Black Anodized Finish, Add	9.90	
08 85 00 00-0003 LF 1-1/2" x 2" Aluminum Framed Window Walls.....	53.32	2.79
For Bronze Anodized Aluminum, Add	6.99	
For Stainless Steel, Add	28.31	
For Black Anodized Finish, Add	12.59	
08 85 00 00-0004 LF 1-1/2" x 3" Aluminum Framed Window Walls.....	63.53	2.24
For Bronze Anodized Aluminum, Add	8.36	
For Stainless Steel, Add	33.82	
For Black Anodized Finish, Add	15.04	
08 85 00 00-0005 LF 1-1/2" x 4" Aluminum Framed Window Walls.....	76.63	3.34
For Bronze Anodized Aluminum, Add	9.99	
For Stainless Steel, Add	40.46	
For Black Anodized Finish, Add	17.98	
08 85 00 00-0006 LF 2" x 3" Aluminum Framed Window Walls.....	79.16	2.79
For Bronze Anodized Aluminum, Add	10.62	
For Stainless Steel, Add	42.89	
For Black Anodized Finish, Add	19.11	

08	08	Openings
	08 80	Glazing
	08 85	Glazing Accessories



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 85 00 00-0007 LF 2" x 4" Aluminum Framed Window Walls.....	95.71	3.34
<i>For Bronze Anodized Aluminum, Add</i>	12.68	
<i>For Stainless Steel, Add</i>	51.29	
<i>For Black Anodized Finish, Add</i>	22.83	

08 87 Glazing Surface Films (08 80)

08 87 13 Solar Control Films (08 87)

Note: Applied directly to one side of glazing with adhesive.

08 87 13 00-0001 Window Tinting And Film <small>(08 87 13)</small>		
Note: Applied directly to one side of glazing with adhesive. Includes cleaning of window glazing prior to installation.		
08 87 13 00-0002 SF 20% VLT, Bronze Window Tinting Film.....	10.84	
08 87 13 00-0003 SF 50% VLT, Bronze Window Tinting Film.....	10.84	
08 87 13 00-0004 SF Tinted, Abrasion Resistant, Solar Control Window Film (3M Scotchtint™).....	16.94	
08 87 13 00-0005 SF Low E, Abrasion Resistant, Solar Control Window Film (3M Scotchtint™).....	17.57	

08 87 23 Safety and Security Films (08 87)

08 87 23 16 Security Films (08 87 23)

Note: Applied directly to one side of glazing with adhesive and secured at window frame with clear silicone adhesive.

08 87 23 16-0001 High Performance, Security And Safety Glazing Films <small>(08 87 23 16)</small>		
Note: Includes cleaning of window glazing prior to installation.		
08 87 23 16-0002 Clear, High Performance, Security And Safety Glazing Films <small>(08 87 23 16-0001)</small>		
08 87 23 16-0003 SF 0.002" Clear, High Performance, Security And Safety Glazing Film (3M Scotchshield™ SCLARL150).....	17.23	
<i>For >1,000 To 5,000, Deduct</i>	-0.78	
<i>For >5,000, Deduct</i>	-1.14	
08 87 23 16-0004 SF 0.004" Clear, High Performance, Security And Safety Glazing Film (3M Scotchshield™ SCLARL400).....	18.42	
<i>For >1,000 To 5,000, Deduct</i>	-0.83	
<i>For >5,000, Deduct</i>	-1.25	
08 87 23 16-0005 SF 0.006" Clear, High Performance, Security And Safety Glazing Film (3M Scotchshield™ Ultra600).....	20.08	
<i>For >1,000 To 5,000, Deduct</i>	-0.89	
<i>For >5,000, Deduct</i>	-1.42	
08 87 23 16-0006 Tinted, High Performance Sun/Solar, Security And Safety Glazing Films <small>(08 87 23 16-0001)</small>		
08 87 23 16-0007 SF 0.004" Silver, 20% Transmission, High Performance Sun/Solar, Security And Safety Glazing Film (3M Scotchshield™ S20SIAR400).....	19.74	
<i>For >1,000 To 5,000, Deduct</i>	-0.87	
<i>For >5,000, Deduct</i>	-1.39	
08 87 23 16-0008 SF 0.004" Neutral, 35% Transmission, High Performance Sun/Solar, Security And Safety Glazing Film (3M Scotchshield™ S35NEAR400).....	19.74	
<i>For >1,000 To 5,000, Deduct</i>	-0.87	
<i>For >5,000, Deduct</i>	-1.39	
08 87 23 16-0009 SF 0.004" Neutral, 50% Transmission, High Performance Sun/Solar, Security And Safety Glazing Film (3M Scotchshield™ S50NEAR400).....	19.74	
<i>For >1,000 To 5,000, Deduct</i>	-0.87	
<i>For >5,000, Deduct</i>	-1.39	
08 87 23 16-0010 Security And Safety Glazing Films <small>(08 87 23 16)</small>		
Note: Includes cleaning of window glazing prior to installation.		
08 87 23 16-0011 SF 0.007" Clear Security And Safety Glazing Film (3M Scotchshield™ SH7CLARL).....	15.91	
<i>For >1,000 To 5,000, Deduct</i>	-0.74	
<i>For >5,000, Deduct</i>	-1.00	
08 87 23 16-0012 SF 0.008" Clear Security And Safety Glazing Film (3M Scotchshield™ SH8CLARL).....	16.23	
<i>For >1,000 To 5,000, Deduct</i>	-0.75	
<i>For >5,000, Deduct</i>	-1.04	
08 87 23 16-0013 SF 0.014" Clear Security And Safety Glazing Film (3M Scotchshield™ SH14CLARL).....	19.23	
<i>For >1,000 To 5,000, Deduct</i>	-0.85	
<i>For >5,000, Deduct</i>	-1.34	
08 87 23 16-0014 Anti-Graffiti Glazing Films <small>(08 87 23 16)</small>		
Note: Includes cleaning of window glazing prior to installation.		
08 87 23 16-0015 SF 0.004" Clear Anti-Graffiti Glazing Film (3M Scotchgard™ AG-4).....	15.91	
<i>For >1,000 To 5,000, Deduct</i>	-0.74	
<i>For >5,000, Deduct</i>	-1.00	
08 87 23 16-0016 SF 0.007" Clear Anti-Graffiti Glazing Film (3M Scotchgard™ AG-7).....	16.23	
<i>For >1,000 To 5,000, Deduct</i>	-0.75	
<i>For >5,000, Deduct</i>	-1.04	

08 88 Special Function Glazing (08 80)

08 88 53 Security Glazing (08 88)

08 88 53 00-0001 Forced Entry And/or Ballistic Resistant All Glass Laminate <small>(08 88 53)</small>	
08 88 53 00-0002 Ballistic Resistant Glass <small>(08 88 53 00-0001)</small>	



Openings	08	08
Glazing	08 80	
Special Function Glazing	08 88	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 88 53 00-0003 SF 1.28" All Glass Laminated Ballistic Resistant Glass, 16.2 LB/SF, For A Single Piece, Up To 15 SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	143.96 69.74	
08 88 53 00-0004 SF 1.28" All Glass Laminated Ballistic Resistant Glass, 16.2 LB/SF, For A Single Piece, >15 SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	169.11 69.74	
08 88 53 00-0005 SF 1.55" All Glass Laminated Ballistic Resistant Glass, 21.2 LB/SF, For A Single Piece, Up To 15 SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	191.81 78.75	
08 88 53 00-0006 SF 1.55" All Glass Laminated Ballistic Resistant Glass, 21.2 LB/SF, For A Single Piece, >15 SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	212.81 78.75	
08 88 53 00-0007 SF 2.05" All Glass Laminated Ballistic Resistant Glass, 26.1 LB/SF, For A Single Piece, Up To 15 SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	241.87 89.99	
08 88 53 00-0008 SF 2.05" All Glass Laminated Ballistic Resistant Glass, 26.1 LB/SF, For A Single Piece, >15 SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	258.75 89.99	
08 88 53 00-0009 Forced Entry Resistant Glass (08 88 53 00-0001)		
08 88 53 00-0010 SF 5/16" Forced Entry Resistant Laminated Glass Sheet <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	53.17 17.57	
08 88 53 00-0011 SF 1/2" Forced Entry Resistant Laminated Glass Sheet <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	60.37 18.75	
08 88 53 00-0012 SF 11/16" Forced Entry Resistant Laminated Glass Sheet <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	68.86 20.09	
08 88 53 00-0013 SF 7/8" Forced Entry Resistant Laminated Glass Sheet <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	83.33 21.63	
08 88 53 00-0014 Glass Clad Polycarbonate (08 88 53)		
08 88 53 00-0015 SF 0.75" Ballistic Resistant Glass/Poly, 7.84 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	210.68 85.49	
08 88 53 00-0016 SF 0.8125" Ballistic Resistant Glass/Poly, 8.99 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	235.56 98.99	
08 88 53 00-0017 SF 0.9375" Ballistic Resistant Glass/Poly, 11.11 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	301.08 112.49	
08 88 53 00-0018 Ballistic Resistant Acrylic (08 88 53)		
08 88 53 00-0019 SF 1.25" Ballistic Resistant Acrylic Glass, 7.7 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	361.88 85.49	
08 88 53 00-0020 SF 1.378" Ballistic Resistant Acrylic Glass, 8.5 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	424.15 98.99	
08 88 53 00-0021 SF 1.25" Ballistic Resistant Acrylic Glass, 7.5 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	567.71 112.49	
08 88 53 00-0022 Ballistic Resistant Fiberglass (08 88 53)		
08 88 53 00-0023 SF 5/16" Ballistic Resistant Fiberglass, Level 1, 3.2 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	88.92 42.75	
08 88 53 00-0024 SF 3/8" Ballistic Resistant Fiberglass, Level 2, 3.5 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	105.19 49.49	
08 88 53 00-0025 SF 7/16" Ballistic Resistant Fiberglass, Level 3, 4.5 LB/SF <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	119.32 56.24	
08 88 53 00-0026 Forced Entry And/or Ballistic Resistant Polycarbonate (08 88 53)		
08 88 53 00-0027 Forced Entry Resistant Monolithic Polycarbonate (08 88 53 00-0026) Note: GE-Lexan MR10.		
08 88 53 00-0028 SF 1/2" Overall Nominal Thickness, H.P. White TP-0500.01 Note: Level 1 or ASTM F1233, Class II (Step 5). <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	122.05 68.18	
08 88 53 00-0029 Forced Entry Resistant Glass Clad Polycarbonate Laminate (08 88 53 00-0026) Note: Chemically strengthened clear glass laminated to each side of a polycarbonate core. GE-Insulgard.		
08 88 53 00-0030 SF 9/16" Overall Nominal Thickness, H.P. White TP-0500.01 <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	150.88 84.37	
08 88 53 00-0031 Forced Entry Resistant Polycarbonate Laminate (08 88 53 00-0026) Note: GE-Lexgard MPC-500.		
08 88 53 00-0032 SF 1/2" Overall Nominal Thickness, H.P. White TP-0500.01 Note: Level II (Step 12) Or ASTM 1233 Class III (Step 15). <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	185.99 89.99	
08 88 53 00-0033 Fire Resistant, Forced Entry Resistant Polycarbonate Laminate (08 88 53 00-0026) Note: Wire glass clad. Chemically strengthened wire glass laminated to each side of a polycarbonate core. GE-Firegard.		
08 88 53 00-0034 SF 7/8" Overall Nominal Thickness, H.P. White TP-0500.01 Note: UL-9 Fire Resistant. <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	203.96 95.62	

08	08	Openings
	08 80	Glazing
	08 88	Special Function Glazing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 88 53 00-0035	Insulated, Forced Entry Resistant Polycarbonate Laminate <small>(08 88 53 00-0026)</small> Note: Glass clad. Chemically strengthened wire glass laminated to each side of a polycarbonate core. GE-Insulgard.		
08 88 53 00-0036	SF 1-5/16" Overall Nominal Thickness, H.P. White TP-0500.01 Note: Level I (1/4" tempered float glass, 1/2" airspace). <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	174.65	84.37
08 88 53 00-0037	Ballistic And Forced Entry Resistant Polycarbonate Laminate <small>(08 88 53 00-0026)</small>		
08 88 53 00-0038	SF 1" Nominal Thickness, Ballistic Or Forced Entry Resistant..... Note: 1" is the overall nominal thickness. (GE-Lexgard MP-1000) forced entry resistance: H.P. White TP-0500.01, level V (step 42) or ASTM 1233 class V (Step 40) ballistic resistance: UL 752, level 2-high powered small arms (.357 Magnum handgun). <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	403.26	186.73
08 88 53 00-0039	SF 1-1/4" Nominal Thickness, Ballistic Or Forced Entry Resistant..... Note: 1 1/4" is the overall nominal thickness. (GE-Lexgard MP-1000) forced entry resistance: H.P. White TP-0500.01, level V (Step 42) or ASTM 1233 class V (step 40) ballistic resistance: UL 752, level 3-super high powered small arms (.44 Magnum handgun). <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	408.37	186.73
08 88 53 00-0040	Ballistic Resistant Glass Clad Polycarbonate Laminate <small>(08 88 53 00-0026)</small> Note: Chemically strengthened clear glass laminated to attack side of a polycarbonate core.		
08 88 53 00-0041	SF 1-5/16" Overall Nominal Thickness, Ballistic Resistant..... Note: UL 752, Level 4 - Super High Powered Rifle (.30-06 Rifle), (GE-Armor-Gard). <i>For Glass Removal And Preparing Opening For New Glazing, Add</i>	268.32	125.98

08 90 Louvers and Vents (08)

08 91 Louvers (08 90)

08 91 13 Motorized Wall Louvers (08 91)

08 91 13 00-0001	Motorized Wall Louver Actuator <small>(08 91 13)</small> See CSI section 08 91 16 00-0001 for adjustable intake wall louvers.		
08 91 13 00-0002	EA 115 Volt Actuator For Adjustable Intake Louver.....	2,173.52	103.87
08 91 13 00-0003	EA 230 Volt Actuator For Adjustable Intake Louver.....	3,378.82	103.87
08 91 13 00-0004	EA 24 Volt Actuator For Adjustable Intake Louver.....	2,345.32	103.87
08 91 13 00-0005	EA 115 Volt Hazardous Location Actuator For Adjustable Intake Louver.....	9,420.06	103.87

08 91 16 Operable Wall Louvers (08 91)

08 91 16 00-0001	Adjustable Intake Wall Louvers <small>(08 91 16)</small> See CSI section 08 91 16 00-0137 for adjustable intake wall louver operators.		
08 91 16 00-0002	EA 12" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum Note: Includes bird screen. Excludes actuator. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	606.63	27.50
08 91 16 00-0003	EA 12" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum Note: Includes bird screen. Excludes actuator. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	758.44	33.61
08 91 16 00-0004	EA 12" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum Note: Includes bird screen. Excludes actuator. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	896.82	39.72
08 91 16 00-0005	EA 12" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum Note: Includes bird screen. Excludes actuator. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,049.97	45.83
08 91 16 00-0006	EA 12" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum Note: Includes bird screen. Excludes actuator. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,183.00	51.94



Openings	08
Louvers and Vents	08 90
Louvers	08 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0007	EA		12" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum.....	1,397.89	58.05
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	128.18	
			For Clear Lacquer Finish, Add	256.36	
			For Baked Enamel Standard Colors, Add	384.54	
			For Anodized Finish, Add	512.72	
			For Kynar® Standard Colors Finish, Add	704.99	
08 91 16 00-0008	EA		12" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum.....	1,593.99	64.16
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	146.57	
			For Clear Lacquer Finish, Add	293.14	
			For Baked Enamel Standard Colors, Add	439.70	
			For Anodized Finish, Add	586.27	
			For Kynar® Standard Colors Finish, Add	806.12	
08 91 16 00-0009	EA		12" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum.....	1,769.36	73.32
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	162.27	
			For Clear Lacquer Finish, Add	324.54	
			For Baked Enamel Standard Colors, Add	486.82	
			For Anodized Finish, Add	649.09	
			For Kynar® Standard Colors Finish, Add	892.50	
08 91 16 00-0010	EA		12" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum.....	1,887.61	79.42
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	172.88	
			For Clear Lacquer Finish, Add	345.75	
			For Baked Enamel Standard Colors, Add	518.63	
			For Anodized Finish, Add	691.50	
			For Kynar® Standard Colors Finish, Add	950.81	
08 91 16 00-0011	EA		12" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum.....	2,036.74	85.53
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	186.57	
			For Clear Lacquer Finish, Add	373.13	
			For Baked Enamel Standard Colors, Add	559.70	
			For Anodized Finish, Add	746.26	
			For Kynar® Standard Colors Finish, Add	1,026.11	
08 91 16 00-0012	EA		12" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum.....	2,167.07	91.64
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	198.38	
			For Clear Lacquer Finish, Add	396.75	
			For Baked Enamel Standard Colors, Add	595.13	
			For Anodized Finish, Add	793.51	
			For Kynar® Standard Colors Finish, Add	1,091.07	
08 91 16 00-0013	EA		12" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....	2,334.99	97.76
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	213.95	
			For Clear Lacquer Finish, Add	427.89	
			For Baked Enamel Standard Colors, Add	641.84	
			For Anodized Finish, Add	855.79	
			For Kynar® Standard Colors Finish, Add	1,176.71	
08 91 16 00-0014	EA		12" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....	2,496.19	103.87
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	228.85	
			For Clear Lacquer Finish, Add	457.69	
			For Baked Enamel Standard Colors, Add	686.54	
			For Anodized Finish, Add	915.38	
			For Kynar® Standard Colors Finish, Add	1,258.65	
08 91 16 00-0015	EA		12" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....	2,695.72	113.03
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	246.97	
			For Clear Lacquer Finish, Add	493.93	
			For Baked Enamel Standard Colors, Add	740.90	
			For Anodized Finish, Add	987.86	
			For Kynar® Standard Colors Finish, Add	1,358.31	
08 91 16 00-0016	EA		12" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum.....	2,841.55	122.20
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	259.72	
			For Clear Lacquer Finish, Add	519.43	
			For Baked Enamel Standard Colors, Add	779.15	
			For Anodized Finish, Add	1,038.86	
			For Kynar® Standard Colors Finish, Add	1,428.44	
08 91 16 00-0017	EA		18" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum.....	679.25	33.61
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	61.20	
			For Clear Lacquer Finish, Add	122.41	
			For Baked Enamel Standard Colors, Add	183.61	
			For Anodized Finish, Add	244.82	
			For Kynar® Standard Colors Finish, Add	336.62	
08 91 16 00-0018	EA		18" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum.....	857.29	42.77
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	77.18	
			For Clear Lacquer Finish, Add	154.35	
			For Baked Enamel Standard Colors, Add	231.53	
			For Anodized Finish, Add	308.70	
			For Kynar® Standard Colors Finish, Add	424.47	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 91 16 00-0019	EA	18" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum.....	1,006.43	48.88
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	90.87	
		<i>For Clear Lacquer Finish, Add</i>	181.73	
		<i>For Baked Enamel Standard Colors, Add</i>	272.60	
		<i>For Anodized Finish, Add</i>	363.47	
		<i>For Kynar® Standard Colors Finish, Add</i>	499.77	
08 91 16 00-0020	EA	18" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum.....	1,252.33	61.10
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	113.01	
		<i>For Clear Lacquer Finish, Add</i>	226.03	
		<i>For Baked Enamel Standard Colors, Add</i>	339.04	
		<i>For Anodized Finish, Add</i>	452.05	
		<i>For Kynar® Standard Colors Finish, Add</i>	621.57	
08 91 16 00-0021	EA	18" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum.....	1,425.62	67.21
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	129.12	
		<i>For Clear Lacquer Finish, Add</i>	258.24	
		<i>For Baked Enamel Standard Colors, Add</i>	387.36	
		<i>For Anodized Finish, Add</i>	516.48	
		<i>For Kynar® Standard Colors Finish, Add</i>	710.16	
08 91 16 00-0022	EA	18" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum.....	1,598.90	73.32
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	145.23	
		<i>For Clear Lacquer Finish, Add</i>	290.45	
		<i>For Baked Enamel Standard Colors, Add</i>	435.68	
		<i>For Anodized Finish, Add</i>	580.90	
		<i>For Kynar® Standard Colors Finish, Add</i>	798.74	
08 91 16 00-0023	EA	18" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum.....	1,807.08	79.42
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	164.82	
		<i>For Clear Lacquer Finish, Add</i>	329.64	
		<i>For Baked Enamel Standard Colors, Add</i>	494.47	
		<i>For Anodized Finish, Add</i>	659.29	
		<i>For Kynar® Standard Colors Finish, Add</i>	906.52	
08 91 16 00-0024	EA	18" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum.....	2,003.92	88.59
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	182.67	
		<i>For Clear Lacquer Finish, Add</i>	365.35	
		<i>For Baked Enamel Standard Colors, Add</i>	548.02	
		<i>For Anodized Finish, Add</i>	730.69	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,004.70	
08 91 16 00-0025	EA	18" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum.....	2,160.50	97.76
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	196.50	
		<i>For Clear Lacquer Finish, Add</i>	393.00	
		<i>For Baked Enamel Standard Colors, Add</i>	589.49	
		<i>For Anodized Finish, Add</i>	785.99	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,080.74	
08 91 16 00-0026	EA	18" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum.....	2,312.31	103.87
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	210.46	
		<i>For Clear Lacquer Finish, Add</i>	420.91	
		<i>For Baked Enamel Standard Colors, Add</i>	631.37	
		<i>For Anodized Finish, Add</i>	841.83	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,157.51	
08 91 16 00-0027	EA	18" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum.....	2,454.72	109.98
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	223.48	
		<i>For Clear Lacquer Finish, Add</i>	446.95	
		<i>For Baked Enamel Standard Colors, Add</i>	670.43	
		<i>For Anodized Finish, Add</i>	893.90	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,229.12	
08 91 16 00-0028	EA	18" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....	2,640.09	116.09
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	240.79	
		<i>For Clear Lacquer Finish, Add</i>	481.58	
		<i>For Baked Enamel Standard Colors, Add</i>	722.37	
		<i>For Anodized Finish, Add</i>	963.16	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,324.35	
08 91 16 00-0029	EA	18" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....	2,818.73	122.20
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	257.43	
		<i>For Clear Lacquer Finish, Add</i>	514.87	
		<i>For Baked Enamel Standard Colors, Add</i>	772.30	
		<i>For Anodized Finish, Add</i>	1,029.74	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,415.89	
08 91 16 00-0030	EA	18" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....	3,035.71	131.36
		Note: Includes bird screen. Excludes actuator.		
		<i>For Flange Frame, Add</i>	277.30	
		<i>For Clear Lacquer Finish, Add</i>	554.60	
		<i>For Baked Enamel Standard Colors, Add</i>	831.90	
		<i>For Anodized Finish, Add</i>	1,109.20	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,525.14	



	Openings 08
	Louvers and Vents 08 90
	Louvers 08 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0031	EA		18" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,198.99	140.53
			<i>For Flange Frame, Add</i>	291.79	
			<i>For Clear Lacquer Finish, Add</i>	583.59	
			<i>For Baked Enamel Standard Colors, Add</i>	875.38	
			<i>For Anodized Finish, Add</i>	1,167.18	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,604.87	
08 91 16 00-0032	EA		24" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	758.57	39.72
			<i>For Flange Frame, Add</i>	67.92	
			<i>For Clear Lacquer Finish, Add</i>	135.83	
			<i>For Baked Enamel Standard Colors, Add</i>	203.75	
			<i>For Anodized Finish, Add</i>	271.66	
			<i>For Kynar® Standard Colors Finish, Add</i>	373.53	
08 91 16 00-0033	EA		24" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	963.48	48.88
			<i>For Flange Frame, Add</i>	86.57	
			<i>For Clear Lacquer Finish, Add</i>	173.14	
			<i>For Baked Enamel Standard Colors, Add</i>	259.72	
			<i>For Anodized Finish, Add</i>	346.29	
			<i>For Kynar® Standard Colors Finish, Add</i>	476.15	
08 91 16 00-0034	EA		24" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,195.22	58.05
			<i>For Flange Frame, Add</i>	107.91	
			<i>For Clear Lacquer Finish, Add</i>	215.83	
			<i>For Baked Enamel Standard Colors, Add</i>	323.74	
			<i>For Anodized Finish, Add</i>	431.65	
			<i>For Kynar® Standard Colors Finish, Add</i>	593.52	
08 91 16 00-0035	EA		24" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,408.91	70.27
			<i>For Flange Frame, Add</i>	126.84	
			<i>For Clear Lacquer Finish, Add</i>	253.68	
			<i>For Baked Enamel Standard Colors, Add</i>	380.51	
			<i>For Anodized Finish, Add</i>	507.35	
			<i>For Kynar® Standard Colors Finish, Add</i>	697.61	
08 91 16 00-0036	EA		24" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,599.64	76.38
			<i>For Flange Frame, Add</i>	144.69	
			<i>For Clear Lacquer Finish, Add</i>	289.38	
			<i>For Baked Enamel Standard Colors, Add</i>	434.07	
			<i>For Anodized Finish, Add</i>	578.76	
			<i>For Kynar® Standard Colors Finish, Add</i>	795.79	
08 91 16 00-0037	EA		24" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,801.11	82.48
			<i>For Flange Frame, Add</i>	163.61	
			<i>For Clear Lacquer Finish, Add</i>	327.23	
			<i>For Baked Enamel Standard Colors, Add</i>	490.84	
			<i>For Anodized Finish, Add</i>	654.46	
			<i>For Kynar® Standard Colors Finish, Add</i>	899.88	
08 91 16 00-0038	EA		24" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,048.96	91.64
			<i>For Flange Frame, Add</i>	186.57	
			<i>For Clear Lacquer Finish, Add</i>	373.13	
			<i>For Baked Enamel Standard Colors, Add</i>	559.70	
			<i>For Anodized Finish, Add</i>	746.26	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,026.11	
08 91 16 00-0039	EA		24" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,255.94	103.87
			<i>For Flange Frame, Add</i>	204.82	
			<i>For Clear Lacquer Finish, Add</i>	409.64	
			<i>For Baked Enamel Standard Colors, Add</i>	614.46	
			<i>For Anodized Finish, Add</i>	819.28	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,126.51	
08 91 16 00-0040	EA		24" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,418.48	109.98
			<i>For Flange Frame, Add</i>	219.85	
			<i>For Clear Lacquer Finish, Add</i>	439.70	
			<i>For Baked Enamel Standard Colors, Add</i>	659.56	
			<i>For Anodized Finish, Add</i>	879.41	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,209.19	
08 91 16 00-0041	EA		24" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,593.24	122.20
			<i>For Flange Frame, Add</i>	234.89	
			<i>For Clear Lacquer Finish, Add</i>	469.77	
			<i>For Baked Enamel Standard Colors, Add</i>	704.66	
			<i>For Anodized Finish, Add</i>	939.54	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,291.87	
08 91 16 00-0042	EA		24" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,758.47	128.31
			<i>For Flange Frame, Add</i>	250.19	
			<i>For Clear Lacquer Finish, Add</i>	500.37	
			<i>For Baked Enamel Standard Colors, Add</i>	750.56	
			<i>For Anodized Finish, Add</i>	1,000.74	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,376.02	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0043	EA		24" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....	2,984.10	134.42
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	271.53	
			<i>For Clear Lacquer Finish, Add</i>	543.05	
			<i>For Baked Enamel Standard Colors, Add</i>	814.58	
			<i>For Anodized Finish, Add</i>	1,086.11	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,493.40	
08 91 16 00-0044	EA		24" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....	3,174.83	140.53
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	289.38	
			<i>For Clear Lacquer Finish, Add</i>	578.76	
			<i>For Baked Enamel Standard Colors, Add</i>	868.13	
			<i>For Anodized Finish, Add</i>	1,157.51	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,591.58	
08 91 16 00-0045	EA		24" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....	3,414.64	149.69
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	311.53	
			<i>For Clear Lacquer Finish, Add</i>	623.05	
			<i>For Baked Enamel Standard Colors, Add</i>	934.58	
			<i>For Anodized Finish, Add</i>	1,246.10	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,713.39	
08 91 16 00-0046	EA		24" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum.....	3,590.00	158.86
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	327.23	
			<i>For Clear Lacquer Finish, Add</i>	654.46	
			<i>For Baked Enamel Standard Colors, Add</i>	981.68	
			<i>For Anodized Finish, Add</i>	1,308.91	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,799.75	
08 91 16 00-0047	EA		30" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum.....	844.61	45.83
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	75.30	
			<i>For Clear Lacquer Finish, Add</i>	150.59	
			<i>For Baked Enamel Standard Colors, Add</i>	225.89	
			<i>For Anodized Finish, Add</i>	301.19	
			<i>For Kynar® Standard Colors Finish, Add</i>	414.13	
08 91 16 00-0048	EA		30" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum.....	1,124.82	61.10
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	100.26	
			<i>For Clear Lacquer Finish, Add</i>	200.52	
			<i>For Baked Enamel Standard Colors, Add</i>	300.79	
			<i>For Anodized Finish, Add</i>	401.05	
			<i>For Kynar® Standard Colors Finish, Add</i>	551.44	
08 91 16 00-0049	EA		30" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum.....	1,336.43	70.27
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	119.59	
			<i>For Clear Lacquer Finish, Add</i>	239.18	
			<i>For Baked Enamel Standard Colors, Add</i>	358.77	
			<i>For Anodized Finish, Add</i>	478.36	
			<i>For Kynar® Standard Colors Finish, Add</i>	657.75	
08 91 16 00-0050	EA		30" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum.....	1,568.17	79.42
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	140.93	
			<i>For Clear Lacquer Finish, Add</i>	281.86	
			<i>For Baked Enamel Standard Colors, Add</i>	422.79	
			<i>For Anodized Finish, Add</i>	563.72	
			<i>For Kynar® Standard Colors Finish, Add</i>	775.12	
08 91 16 00-0051	EA		30" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum.....	1,776.35	85.53
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	160.53	
			<i>For Clear Lacquer Finish, Add</i>	321.05	
			<i>For Baked Enamel Standard Colors, Add</i>	481.58	
			<i>For Anodized Finish, Add</i>	642.11	
			<i>For Kynar® Standard Colors Finish, Add</i>	882.90	
08 91 16 00-0052	EA		30" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum.....	1,990.64	94.70
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	180.12	
			<i>For Clear Lacquer Finish, Add</i>	360.25	
			<i>For Baked Enamel Standard Colors, Add</i>	540.37	
			<i>For Anodized Finish, Add</i>	720.49	
			<i>For Kynar® Standard Colors Finish, Add</i>	990.68	
08 91 16 00-0053	EA		30" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum.....	2,249.83	100.81
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	204.82	
			<i>For Clear Lacquer Finish, Add</i>	409.64	
			<i>For Baked Enamel Standard Colors, Add</i>	614.46	
			<i>For Anodized Finish, Add</i>	819.28	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,126.51	
08 91 16 00-0054	EA		30" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum.....	2,469.49	109.98
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	224.95	
			<i>For Clear Lacquer Finish, Add</i>	449.91	
			<i>For Baked Enamel Standard Colors, Add</i>	674.86	
			<i>For Anodized Finish, Add</i>	899.81	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,237.24	



Openings	08
Louvers and Vents	08 90
Louvers	08 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0055	EA		30" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,650.82	116.09
			<i>For Flange Frame, Add</i>	241.86	
			<i>For Clear Lacquer Finish, Add</i>	483.73	
			<i>For Baked Enamel Standard Colors, Add</i>	725.59	
			<i>For Anodized Finish, Add</i>	967.46	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,330.25	
08 91 16 00-0056	EA		30" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,847.06	128.31
			<i>For Flange Frame, Add</i>	259.05	
			<i>For Clear Lacquer Finish, Add</i>	518.09	
			<i>For Baked Enamel Standard Colors, Add</i>	777.14	
			<i>For Anodized Finish, Add</i>	1,036.18	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,424.75	
08 91 16 00-0057	EA		30" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,035.85	137.47
			<i>For Flange Frame, Add</i>	276.09	
			<i>For Clear Lacquer Finish, Add</i>	552.18	
			<i>For Baked Enamel Standard Colors, Add</i>	828.27	
			<i>For Anodized Finish, Add</i>	1,104.36	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,518.50	
08 91 16 00-0058	EA		30" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,276.24	143.58
			<i>For Flange Frame, Add</i>	298.91	
			<i>For Clear Lacquer Finish, Add</i>	597.82	
			<i>For Baked Enamel Standard Colors, Add</i>	896.72	
			<i>For Anodized Finish, Add</i>	1,195.63	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,643.99	
08 91 16 00-0059	EA		30" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,484.43	149.69
			<i>For Flange Frame, Add</i>	318.50	
			<i>For Clear Lacquer Finish, Add</i>	637.01	
			<i>For Baked Enamel Standard Colors, Add</i>	955.51	
			<i>For Anodized Finish, Add</i>	1,274.02	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,751.77	
08 91 16 00-0060	EA		30" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,736.30	158.86
			<i>For Flange Frame, Add</i>	341.86	
			<i>For Clear Lacquer Finish, Add</i>	683.72	
			<i>For Baked Enamel Standard Colors, Add</i>	1,025.57	
			<i>For Anodized Finish, Add</i>	1,367.43	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,880.22	
08 91 16 00-0061	EA		30" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,935.83	168.02
			<i>For Flange Frame, Add</i>	359.98	
			<i>For Clear Lacquer Finish, Add</i>	719.96	
			<i>For Baked Enamel Standard Colors, Add</i>	1,079.93	
			<i>For Anodized Finish, Add</i>	1,439.91	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,979.88	
08 91 16 00-0062	EA		36" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	923.95	51.94
			<i>For Flange Frame, Add</i>	82.01	
			<i>For Clear Lacquer Finish, Add</i>	164.02	
			<i>For Baked Enamel Standard Colors, Add</i>	246.02	
			<i>For Anodized Finish, Add</i>	328.03	
			<i>For Kynar® Standard Colors Finish, Add</i>	451.04	
08 91 16 00-0063	EA		36" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,252.47	67.21
			<i>For Flange Frame, Add</i>	111.81	
			<i>For Clear Lacquer Finish, Add</i>	223.61	
			<i>For Baked Enamel Standard Colors, Add</i>	335.42	
			<i>For Anodized Finish, Add</i>	447.22	
			<i>For Kynar® Standard Colors Finish, Add</i>	614.93	
08 91 16 00-0064	EA		36" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,465.42	76.38
			<i>For Flange Frame, Add</i>	131.27	
			<i>For Clear Lacquer Finish, Add</i>	262.53	
			<i>For Baked Enamel Standard Colors, Add</i>	393.80	
			<i>For Anodized Finish, Add</i>	525.07	
			<i>For Kynar® Standard Colors Finish, Add</i>	721.97	
08 91 16 00-0065	EA		36" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,719.98	85.53
			<i>For Flange Frame, Add</i>	154.89	
			<i>For Clear Lacquer Finish, Add</i>	309.78	
			<i>For Baked Enamel Standard Colors, Add</i>	464.67	
			<i>For Anodized Finish, Add</i>	619.56	
			<i>For Kynar® Standard Colors Finish, Add</i>	851.90	
08 91 16 00-0066	EA		36" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,956.10	92.87
			<i>For Flange Frame, Add</i>	177.04	
			<i>For Clear Lacquer Finish, Add</i>	354.07	
			<i>For Baked Enamel Standard Colors, Add</i>	531.11	
			<i>For Anodized Finish, Add</i>	708.14	
			<i>For Kynar® Standard Colors Finish, Add</i>	973.70	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0067	EA		36" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum.....	2,177.35	100.81
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	197.57	
			<i>For Clear Lacquer Finish, Add</i>	395.14	
			<i>For Baked Enamel Standard Colors, Add</i>	592.72	
			<i>For Anodized Finish, Add</i>	790.29	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,086.65	
08 91 16 00-0068	EA		36" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum.....	2,467.40	106.92
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	225.36	
			<i>For Clear Lacquer Finish, Add</i>	450.71	
			<i>For Baked Enamel Standard Colors, Add</i>	676.07	
			<i>For Anodized Finish, Add</i>	901.42	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,239.45	
08 91 16 00-0069	EA		36" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum.....	2,715.25	116.09
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	248.31	
			<i>For Clear Lacquer Finish, Add</i>	496.61	
			<i>For Baked Enamel Standard Colors, Add</i>	744.92	
			<i>For Anodized Finish, Add</i>	993.23	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,365.69	
08 91 16 00-0070	EA		36" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum.....	2,916.11	125.25
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	266.56	
			<i>For Clear Lacquer Finish, Add</i>	533.12	
			<i>For Baked Enamel Standard Colors, Add</i>	799.68	
			<i>For Anodized Finish, Add</i>	1,066.24	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,466.09	
08 91 16 00-0071	EA		36" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum.....	3,122.35	134.42
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	285.35	
			<i>For Clear Lacquer Finish, Add</i>	570.70	
			<i>For Baked Enamel Standard Colors, Add</i>	856.06	
			<i>For Anodized Finish, Add</i>	1,141.41	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,569.44	
08 91 16 00-0072	EA		36" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum.....	3,335.30	143.58
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	304.81	
			<i>For Clear Lacquer Finish, Add</i>	609.63	
			<i>For Baked Enamel Standard Colors, Add</i>	914.44	
			<i>For Anodized Finish, Add</i>	1,219.26	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,676.48	
08 91 16 00-0073	EA		36" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....	3,598.52	149.69
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	329.91	
			<i>For Clear Lacquer Finish, Add</i>	659.83	
			<i>For Baked Enamel Standard Colors, Add</i>	989.74	
			<i>For Anodized Finish, Add</i>	1,319.65	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,814.52	
08 91 16 00-0074	EA		36" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....	3,822.81	155.80
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	351.12	
			<i>For Clear Lacquer Finish, Add</i>	702.24	
			<i>For Baked Enamel Standard Colors, Add</i>	1,053.36	
			<i>For Anodized Finish, Add</i>	1,404.48	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,931.16	
08 91 16 00-0075	EA		36" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....	4,108.23	164.97
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	377.83	
			<i>For Clear Lacquer Finish, Add</i>	755.66	
			<i>For Baked Enamel Standard Colors, Add</i>	1,133.49	
			<i>For Anodized Finish, Add</i>	1,511.32	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,078.06	
08 91 16 00-0076	EA		36" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum.....	4,319.84	174.13
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	397.16	
			<i>For Clear Lacquer Finish, Add</i>	794.31	
			<i>For Baked Enamel Standard Colors, Add</i>	1,191.47	
			<i>For Anodized Finish, Add</i>	1,588.63	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,184.36	
08 91 16 00-0077	EA		42" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum.....	1,058.31	58.05
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	94.22	
			<i>For Clear Lacquer Finish, Add</i>	188.44	
			<i>For Baked Enamel Standard Colors, Add</i>	282.67	
			<i>For Anodized Finish, Add</i>	376.89	
			<i>For Kynar® Standard Colors Finish, Add</i>	518.22	
08 91 16 00-0078	EA		42" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum.....	1,350.59	73.32
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	120.40	
			<i>For Clear Lacquer Finish, Add</i>	240.79	
			<i>For Baked Enamel Standard Colors, Add</i>	361.19	
			<i>For Anodized Finish, Add</i>	481.58	
			<i>For Kynar® Standard Colors Finish, Add</i>	662.17	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0079 EA 42" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum.....	1,587.70	82.48
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	142.27	
<i>For Clear Lacquer Finish, Add</i>	284.55	
<i>For Baked Enamel Standard Colors, Add</i>	426.82	
<i>For Anodized Finish, Add</i>	569.09	
<i>For Kynar® Standard Colors Finish, Add</i>	782.50	
08 91 16 00-0080 EA 42" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum.....	1,857.76	94.70
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	166.84	
<i>For Clear Lacquer Finish, Add</i>	333.67	
<i>For Baked Enamel Standard Colors, Add</i>	500.51	
<i>For Anodized Finish, Add</i>	667.34	
<i>For Kynar® Standard Colors Finish, Add</i>	917.59	
08 91 16 00-0081 EA 42" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum.....	2,110.24	100.81
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	190.86	
<i>For Clear Lacquer Finish, Add</i>	381.72	
<i>For Baked Enamel Standard Colors, Add</i>	572.58	
<i>For Anodized Finish, Add</i>	763.44	
<i>For Kynar® Standard Colors Finish, Add</i>	1,049.74	
08 91 16 00-0082 EA 42" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum.....	2,349.29	106.92
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	213.54	
<i>For Clear Lacquer Finish, Add</i>	427.09	
<i>For Baked Enamel Standard Colors, Add</i>	640.63	
<i>For Anodized Finish, Add</i>	854.18	
<i>For Kynar® Standard Colors Finish, Add</i>	1,174.49	
08 91 16 00-0083 EA 42" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum.....	2,664.85	113.03
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	243.88	
<i>For Clear Lacquer Finish, Add</i>	487.76	
<i>For Baked Enamel Standard Colors, Add</i>	731.63	
<i>For Anodized Finish, Add</i>	975.51	
<i>For Kynar® Standard Colors Finish, Add</i>	1,341.33	
08 91 16 00-0084 EA 42" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum.....	2,916.71	122.20
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	267.23	
<i>For Clear Lacquer Finish, Add</i>	534.46	
<i>For Baked Enamel Standard Colors, Add</i>	801.70	
<i>For Anodized Finish, Add</i>	1,068.93	
<i>For Kynar® Standard Colors Finish, Add</i>	1,469.78	
08 91 16 00-0085 EA 42" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum.....	3,143.08	131.36
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	288.04	
<i>For Clear Lacquer Finish, Add</i>	576.07	
<i>For Baked Enamel Standard Colors, Add</i>	864.11	
<i>For Anodized Finish, Add</i>	1,152.14	
<i>For Kynar® Standard Colors Finish, Add</i>	1,584.20	
08 91 16 00-0086 EA 42" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum.....	3,354.69	140.53
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	307.36	
<i>For Clear Lacquer Finish, Add</i>	614.73	
<i>For Baked Enamel Standard Colors, Add</i>	922.09	
<i>For Anodized Finish, Add</i>	1,229.46	
<i>For Kynar® Standard Colors Finish, Add</i>	1,690.50	
08 91 16 00-0087 EA 42" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum.....	3,586.44	149.69
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	328.71	
<i>For Clear Lacquer Finish, Add</i>	657.41	
<i>For Baked Enamel Standard Colors, Add</i>	986.12	
<i>For Anodized Finish, Add</i>	1,314.82	
<i>For Kynar® Standard Colors Finish, Add</i>	1,807.88	
08 91 16 00-0088 EA 42" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....	3,869.78	155.80
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	355.82	
<i>For Clear Lacquer Finish, Add</i>	711.63	
<i>For Baked Enamel Standard Colors, Add</i>	1,067.45	
<i>For Anodized Finish, Add</i>	1,423.27	
<i>For Kynar® Standard Colors Finish, Add</i>	1,956.99	
08 91 16 00-0089 EA 42" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....	4,115.55	161.91
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	379.17	
<i>For Clear Lacquer Finish, Add</i>	758.34	
<i>For Baked Enamel Standard Colors, Add</i>	1,137.52	
<i>For Anodized Finish, Add</i>	1,516.69	
<i>For Kynar® Standard Colors Finish, Add</i>	2,085.45	
08 91 16 00-0090 EA 42" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....	4,435.87	171.08
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	409.37	
<i>For Clear Lacquer Finish, Add</i>	818.74	
<i>For Baked Enamel Standard Colors, Add</i>	1,228.11	
<i>For Anodized Finish, Add</i>	1,637.48	
<i>For Kynar® Standard Colors Finish, Add</i>	2,251.54	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0091	EA		42" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	4,656.87	180.24
			<i>For Flange Frame, Add</i>	429.64	
			<i>For Clear Lacquer Finish, Add</i>	859.28	
			<i>For Baked Enamel Standard Colors, Add</i>	1,288.91	
			<i>For Anodized Finish, Add</i>	1,718.55	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,363.01	
08 91 16 00-0092	EA		48" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,144.36	64.16
			<i>For Flange Frame, Add</i>	101.61	
			<i>For Clear Lacquer Finish, Add</i>	203.21	
			<i>For Baked Enamel Standard Colors, Add</i>	304.82	
			<i>For Anodized Finish, Add</i>	406.42	
			<i>For Kynar® Standard Colors Finish, Add</i>	558.83	
08 91 16 00-0093	EA		48" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,455.43	79.42
			<i>For Flange Frame, Add</i>	129.66	
			<i>For Clear Lacquer Finish, Add</i>	259.31	
			<i>For Baked Enamel Standard Colors, Add</i>	388.97	
			<i>For Anodized Finish, Add</i>	518.63	
			<i>For Kynar® Standard Colors Finish, Add</i>	713.11	
08 91 16 00-0094	EA		48" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,724.15	91.64
			<i>For Flange Frame, Add</i>	154.09	
			<i>For Clear Lacquer Finish, Add</i>	308.17	
			<i>For Baked Enamel Standard Colors, Add</i>	462.26	
			<i>For Anodized Finish, Add</i>	616.34	
			<i>For Kynar® Standard Colors Finish, Add</i>	847.47	
08 91 16 00-0095	EA		48" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,002.86	100.81
			<i>For Flange Frame, Add</i>	180.12	
			<i>For Clear Lacquer Finish, Add</i>	360.25	
			<i>For Baked Enamel Standard Colors, Add</i>	540.37	
			<i>For Anodized Finish, Add</i>	720.49	
			<i>For Kynar® Standard Colors Finish, Add</i>	990.68	
08 91 16 00-0096	EA		48" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,282.18	106.92
			<i>For Flange Frame, Add</i>	206.83	
			<i>For Clear Lacquer Finish, Add</i>	413.67	
			<i>For Baked Enamel Standard Colors, Add</i>	620.50	
			<i>For Anodized Finish, Add</i>	827.33	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,137.58	
08 91 16 00-0097	EA		48" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,552.10	113.03
			<i>For Flange Frame, Add</i>	232.60	
			<i>For Clear Lacquer Finish, Add</i>	465.21	
			<i>For Baked Enamel Standard Colors, Add</i>	697.81	
			<i>For Anodized Finish, Add</i>	930.41	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,279.32	
08 91 16 00-0098	EA		48" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,887.18	122.20
			<i>For Flange Frame, Add</i>	264.28	
			<i>For Clear Lacquer Finish, Add</i>	528.56	
			<i>For Baked Enamel Standard Colors, Add</i>	792.84	
			<i>For Anodized Finish, Add</i>	1,057.12	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,453.53	
08 91 16 00-0099	EA		48" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,163.21	131.36
			<i>For Flange Frame, Add</i>	290.05	
			<i>For Clear Lacquer Finish, Add</i>	580.10	
			<i>For Baked Enamel Standard Colors, Add</i>	870.15	
			<i>For Anodized Finish, Add</i>	1,160.20	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,595.27	
08 91 16 00-0100	EA		48" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,401.67	140.53
			<i>For Flange Frame, Add</i>	312.06	
			<i>For Clear Lacquer Finish, Add</i>	624.12	
			<i>For Baked Enamel Standard Colors, Add</i>	936.19	
			<i>For Anodized Finish, Add</i>	1,248.25	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,716.34	
08 91 16 00-0101	EA		48" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,644.15	149.69
			<i>For Flange Frame, Add</i>	334.48	
			<i>For Clear Lacquer Finish, Add</i>	668.95	
			<i>For Baked Enamel Standard Colors, Add</i>	1,003.43	
			<i>For Anodized Finish, Add</i>	1,337.90	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,839.62	
08 91 16 00-0102	EA		48" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,881.26	158.86
			<i>For Flange Frame, Add</i>	356.35	
			<i>For Clear Lacquer Finish, Add</i>	712.71	
			<i>For Baked Enamel Standard Colors, Add</i>	1,069.06	
			<i>For Anodized Finish, Add</i>	1,425.42	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,959.95	



Openings	08	08
Louvers and Vents	08 90	
Louvers	08 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0103	EA		48" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	4,202.19	164.97
			<i>For Flange Frame, Add</i>	387.23	
			<i>For Clear Lacquer Finish, Add</i>	774.45	
			<i>For Baked Enamel Standard Colors, Add</i>	1,161.68	
			<i>For Anodized Finish, Add</i>	1,548.90	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,129.74	
08 91 16 00-0104	EA		48" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	4,468.08	171.08
			<i>For Flange Frame, Add</i>	412.59	
			<i>For Clear Lacquer Finish, Add</i>	825.18	
			<i>For Baked Enamel Standard Colors, Add</i>	1,237.78	
			<i>For Anodized Finish, Add</i>	1,650.37	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,269.26	
08 91 16 00-0105	EA		48" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	4,797.06	177.19
			<i>For Flange Frame, Add</i>	444.27	
			<i>For Clear Lacquer Finish, Add</i>	888.54	
			<i>For Baked Enamel Standard Colors, Add</i>	1,332.80	
			<i>For Anodized Finish, Add</i>	1,777.07	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,443.47	
08 91 16 00-0106	EA		48" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	5,040.88	186.35
			<i>For Flange Frame, Add</i>	466.82	
			<i>For Clear Lacquer Finish, Add</i>	933.63	
			<i>For Baked Enamel Standard Colors, Add</i>	1,400.45	
			<i>For Anodized Finish, Add</i>	1,867.27	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,567.49	
08 91 16 00-0107	EA		54" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,329.12	73.32
			<i>For Flange Frame, Add</i>	118.25	
			<i>For Clear Lacquer Finish, Add</i>	236.50	
			<i>For Baked Enamel Standard Colors, Add</i>	354.74	
			<i>For Anodized Finish, Add</i>	472.99	
			<i>For Kynar® Standard Colors Finish, Add</i>	650.36	
08 91 16 00-0108	EA		54" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	1,707.30	88.59
			<i>For Flange Frame, Add</i>	153.01	
			<i>For Clear Lacquer Finish, Add</i>	306.02	
			<i>For Baked Enamel Standard Colors, Add</i>	459.03	
			<i>For Anodized Finish, Add</i>	612.04	
			<i>For Kynar® Standard Colors Finish, Add</i>	841.56	
08 91 16 00-0109	EA		54" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,000.92	103.87
			<i>For Flange Frame, Add</i>	179.32	
			<i>For Clear Lacquer Finish, Add</i>	358.64	
			<i>For Baked Enamel Standard Colors, Add</i>	537.95	
			<i>For Anodized Finish, Add</i>	717.27	
			<i>For Kynar® Standard Colors Finish, Add</i>	986.25	
08 91 16 00-0110	EA		54" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,304.40	109.98
			<i>For Flange Frame, Add</i>	208.44	
			<i>For Clear Lacquer Finish, Add</i>	416.89	
			<i>For Baked Enamel Standard Colors, Add</i>	625.33	
			<i>For Anodized Finish, Add</i>	833.78	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,146.44	
08 91 16 00-0111	EA		54" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,634.72	116.09
			<i>For Flange Frame, Add</i>	240.25	
			<i>For Clear Lacquer Finish, Add</i>	480.51	
			<i>For Baked Enamel Standard Colors, Add</i>	720.76	
			<i>For Anodized Finish, Add</i>	961.02	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,321.40	
08 91 16 00-0112	EA		54" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	2,930.13	122.20
			<i>For Flange Frame, Add</i>	268.57	
			<i>For Clear Lacquer Finish, Add</i>	537.15	
			<i>For Baked Enamel Standard Colors, Add</i>	805.72	
			<i>For Anodized Finish, Add</i>	1,074.30	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,477.16	
08 91 16 00-0113	EA		54" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,320.25	131.36
			<i>For Flange Frame, Add</i>	305.75	
			<i>For Clear Lacquer Finish, Add</i>	611.51	
			<i>For Baked Enamel Standard Colors, Add</i>	917.26	
			<i>For Anodized Finish, Add</i>	1,223.01	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,681.64	
08 91 16 00-0114	EA		54" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. Excludes actuator.	3,699.63	140.53
			<i>For Flange Frame, Add</i>	341.86	
			<i>For Clear Lacquer Finish, Add</i>	683.72	
			<i>For Baked Enamel Standard Colors, Add</i>	1,025.57	
			<i>For Anodized Finish, Add</i>	1,367.43	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,880.22	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 16 00-0115	EA		54" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum.....	3,982.39	149.69
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	368.30	
			<i>For Clear Lacquer Finish, Add</i>	736.60	
			<i>For Baked Enamel Standard Colors, Add</i>	1,104.90	
			<i>For Anodized Finish, Add</i>	1,473.20	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,025.65	
08 91 16 00-0116	EA		54" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum.....	4,261.10	158.86
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	394.34	
			<i>For Clear Lacquer Finish, Add</i>	788.68	
			<i>For Baked Enamel Standard Colors, Add</i>	1,183.01	
			<i>For Anodized Finish, Add</i>	1,577.35	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,168.86	
08 91 16 00-0117	EA		54" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum.....	4,531.03	164.97
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	420.11	
			<i>For Clear Lacquer Finish, Add</i>	840.22	
			<i>For Baked Enamel Standard Colors, Add</i>	1,260.33	
			<i>For Anodized Finish, Add</i>	1,680.44	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,310.60	
08 91 16 00-0118	EA		54" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....	4,889.53	171.08
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	454.74	
			<i>For Clear Lacquer Finish, Add</i>	909.47	
			<i>For Baked Enamel Standard Colors, Add</i>	1,364.21	
			<i>For Anodized Finish, Add</i>	1,818.95	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,501.05	
08 91 16 00-0119	EA		54" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....	5,187.64	177.19
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	483.33	
			<i>For Clear Lacquer Finish, Add</i>	966.65	
			<i>For Baked Enamel Standard Colors, Add</i>	1,449.98	
			<i>For Anodized Finish, Add</i>	1,933.30	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,658.29	
08 91 16 00-0120	EA		54" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....	5,572.99	183.30
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	520.64	
			<i>For Clear Lacquer Finish, Add</i>	1,041.28	
			<i>For Baked Enamel Standard Colors, Add</i>	1,561.92	
			<i>For Anodized Finish, Add</i>	2,082.56	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,863.51	
08 91 16 00-0121	EA		54" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum.....	5,858.42	192.47
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	547.35	
			<i>For Clear Lacquer Finish, Add</i>	1,094.70	
			<i>For Baked Enamel Standard Colors, Add</i>	1,642.05	
			<i>For Anodized Finish, Add</i>	2,189.40	
			<i>For Kynar® Standard Colors Finish, Add</i>	3,010.42	
08 91 16 00-0122	EA		60" Wide x 12" High Adjustable Intake Louver, Galvanized Aluminum.....	1,409.79	79.42
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	125.09	
			<i>For Clear Lacquer Finish, Add</i>	250.19	
			<i>For Baked Enamel Standard Colors, Add</i>	375.28	
			<i>For Anodized Finish, Add</i>	500.37	
			<i>For Kynar® Standard Colors Finish, Add</i>	688.01	
08 91 16 00-0123	EA		60" Wide x 18" High Adjustable Intake Louver, Galvanized Aluminum.....	1,818.24	97.76
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	162.27	
			<i>For Clear Lacquer Finish, Add</i>	324.54	
			<i>For Baked Enamel Standard Colors, Add</i>	486.82	
			<i>For Anodized Finish, Add</i>	649.09	
			<i>For Kynar® Standard Colors Finish, Add</i>	892.50	
08 91 16 00-0124	EA		60" Wide x 24" High Adjustable Intake Louver, Galvanized Aluminum.....	2,120.52	109.98
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	190.06	
			<i>For Clear Lacquer Finish, Add</i>	380.11	
			<i>For Baked Enamel Standard Colors, Add</i>	570.17	
			<i>For Anodized Finish, Add</i>	760.22	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,045.31	
08 91 16 00-0125	EA		60" Wide x 30" High Adjustable Intake Louver, Galvanized Aluminum.....	2,454.86	116.09
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	222.27	
			<i>For Clear Lacquer Finish, Add</i>	444.54	
			<i>For Baked Enamel Standard Colors, Add</i>	666.80	
			<i>For Anodized Finish, Add</i>	889.07	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,222.47	
08 91 16 00-0126	EA		60" Wide x 36" High Adjustable Intake Louver, Galvanized Aluminum.....	2,803.36	125.25
			Note: Includes bird screen. Excludes actuator.		
			<i>For Flange Frame, Add</i>	255.29	
			<i>For Clear Lacquer Finish, Add</i>	510.57	
			<i>For Baked Enamel Standard Colors, Add</i>	765.86	
			<i>For Anodized Finish, Add</i>	1,021.14	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,404.07	



Openings	08	08
Louvers and Vents	08 90	
Louvers	08 91	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 91 16 00-0127	EA	60" Wide x 42" High Adjustable Intake Louver, Galvanized Aluminum.....		3,116.24	131.36
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		285.35	
		<i>For Clear Lacquer Finish, Add</i>		570.70	
		<i>For Baked Enamel Standard Colors, Add</i>		856.06	
		<i>For Anodized Finish, Add</i>		1,141.41	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,569.44	
08 91 16 00-0128	EA	60" Wide x 48" High Adjustable Intake Louver, Galvanized Aluminum.....		3,534.54	140.53
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		325.35	
		<i>For Clear Lacquer Finish, Add</i>		650.70	
		<i>For Baked Enamel Standard Colors, Add</i>		976.05	
		<i>For Anodized Finish, Add</i>		1,301.40	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,789.42	
08 91 16 00-0129	EA	60" Wide x 54" High Adjustable Intake Louver, Galvanized Aluminum.....		3,924.67	149.69
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		362.53	
		<i>For Clear Lacquer Finish, Add</i>		725.06	
		<i>For Baked Enamel Standard Colors, Add</i>		1,087.58	
		<i>For Anodized Finish, Add</i>		1,450.11	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,993.90	
08 91 16 00-0130	EA	60" Wide x 60" High Adjustable Intake Louver, Galvanized Aluminum.....		4,227.55	158.86
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		390.98	
		<i>For Clear Lacquer Finish, Add</i>		781.97	
		<i>For Baked Enamel Standard Colors, Add</i>		1,172.95	
		<i>For Anodized Finish, Add</i>		1,563.93	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,150.41	
08 91 16 00-0131	EA	60" Wide x 66" High Adjustable Intake Louver, Galvanized Aluminum.....		4,525.06	168.02
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		418.90	
		<i>For Clear Lacquer Finish, Add</i>		837.80	
		<i>For Baked Enamel Standard Colors, Add</i>		1,256.70	
		<i>For Anodized Finish, Add</i>		1,675.60	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,303.96	
08 91 16 00-0132	EA	60" Wide x 72" High Adjustable Intake Louver, Galvanized Aluminum.....		4,812.43	174.13
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		446.42	
		<i>For Clear Lacquer Finish, Add</i>		892.83	
		<i>For Baked Enamel Standard Colors, Add</i>		1,339.25	
		<i>For Anodized Finish, Add</i>		1,785.66	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,455.29	
08 91 16 00-0133	EA	60" Wide x 78" High Adjustable Intake Louver, Galvanized Aluminum.....		5,201.81	180.24
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		484.13	
		<i>For Clear Lacquer Finish, Add</i>		968.26	
		<i>For Baked Enamel Standard Colors, Add</i>		1,452.40	
		<i>For Anodized Finish, Add</i>		1,936.53	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,662.73	
08 91 16 00-0134	EA	60" Wide x 84" High Adjustable Intake Louver, Galvanized Aluminum.....		5,514.68	186.35
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		514.20	
		<i>For Clear Lacquer Finish, Add</i>		1,028.39	
		<i>For Baked Enamel Standard Colors, Add</i>		1,542.59	
		<i>For Anodized Finish, Add</i>		2,056.79	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,828.08	
08 91 16 00-0135	EA	60" Wide x 90" High Adjustable Intake Louver, Galvanized Aluminum.....		5,920.16	192.47
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		553.52	
		<i>For Clear Lacquer Finish, Add</i>		1,107.05	
		<i>For Baked Enamel Standard Colors, Add</i>		1,660.57	
		<i>For Anodized Finish, Add</i>		2,214.09	
		<i>For Kynar® Standard Colors Finish, Add</i>		3,044.38	
08 91 16 00-0136	EA	60" Wide x 96" High Adjustable Intake Louver, Galvanized Aluminum.....		6,216.92	198.58
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		581.98	
		<i>For Clear Lacquer Finish, Add</i>		1,163.96	
		<i>For Baked Enamel Standard Colors, Add</i>		1,745.93	
		<i>For Anodized Finish, Add</i>		2,327.91	
		<i>For Kynar® Standard Colors Finish, Add</i>		3,200.88	
08 91 16 00-0137		Adjustable Intake Wall Louvers Operators (08 91 16)			
08 91 16 00-0138	EA	5' Chain Actuator For Adjustable Intake Louver.....		351.02	30.55
08 91 16 00-0139	EA	Panel Crank For Adjustable Intake Louver.....		800.23	12.22
08 91 19		Fixed Louvers (08 91)			
08 91 19 00-0001		Fixed Intake Wall Louvers (08 91 19)			

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91	19 00-0002	EA	12" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	460.33	27.50
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	40.53	
			For Clear Lacquer Finish, Add	81.07	
			For Baked Enamel Standard Colors, Add	121.60	
			For Anodized Finish, Add	162.14	
			For Kynar® Standard Colors Finish, Add	222.94	
08 91	19 00-0003	EA	12" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	546.38	33.61
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	47.92	
			For Clear Lacquer Finish, Add	95.83	
			For Baked Enamel Standard Colors, Add	143.75	
			For Anodized Finish, Add	191.67	
			For Kynar® Standard Colors Finish, Add	263.54	
08 91	19 00-0004	EA	12" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	633.75	39.72
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	55.43	
			For Clear Lacquer Finish, Add	110.87	
			For Baked Enamel Standard Colors, Add	166.30	
			For Anodized Finish, Add	221.73	
			For Kynar® Standard Colors Finish, Add	304.88	
08 91	19 00-0005	EA	12" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	743.95	45.83
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	65.23	
			For Clear Lacquer Finish, Add	130.46	
			For Baked Enamel Standard Colors, Add	195.69	
			For Anodized Finish, Add	260.92	
			For Kynar® Standard Colors Finish, Add	358.77	
08 91	19 00-0006	EA	12" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	836.71	51.94
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	73.28	
			For Clear Lacquer Finish, Add	146.57	
			For Baked Enamel Standard Colors, Add	219.85	
			For Anodized Finish, Add	293.14	
			For Kynar® Standard Colors Finish, Add	403.06	
08 91	19 00-0007	EA	12" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	988.52	58.05
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	87.24	
			For Clear Lacquer Finish, Add	174.49	
			For Baked Enamel Standard Colors, Add	261.73	
			For Anodized Finish, Add	348.97	
			For Kynar® Standard Colors Finish, Add	479.84	
08 91	19 00-0008	EA	12" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	1,070.53	64.16
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	94.22	
			For Clear Lacquer Finish, Add	188.44	
			For Baked Enamel Standard Colors, Add	282.67	
			For Anodized Finish, Add	376.89	
			For Kynar® Standard Colors Finish, Add	518.22	
08 91	19 00-0009	EA	12" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	1,196.24	73.32
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	104.96	
			For Clear Lacquer Finish, Add	209.92	
			For Baked Enamel Standard Colors, Add	314.88	
			For Anodized Finish, Add	419.84	
			For Kynar® Standard Colors Finish, Add	577.28	
08 91	19 00-0010	EA	12" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	1,271.54	79.42
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	111.27	
			For Clear Lacquer Finish, Add	222.54	
			For Baked Enamel Standard Colors, Add	333.80	
			For Anodized Finish, Add	445.07	
			For Kynar® Standard Colors Finish, Add	611.97	
08 91	19 00-0011	EA	12" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	1,375.03	85.53
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	120.40	
			For Clear Lacquer Finish, Add	240.79	
			For Baked Enamel Standard Colors, Add	361.19	
			For Anodized Finish, Add	481.58	
			For Kynar® Standard Colors Finish, Add	662.17	
08 91	19 00-0012	EA	12" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	1,465.10	91.64
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	128.18	
			For Clear Lacquer Finish, Add	256.36	
			For Baked Enamel Standard Colors, Add	384.54	
			For Anodized Finish, Add	512.72	
			For Kynar® Standard Colors Finish, Add	704.99	
08 91	19 00-0013	EA	12" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	1,572.62	97.76
			Note: Includes bird screen. Excludes actuator.		
			For Flange Frame, Add	137.71	
			For Clear Lacquer Finish, Add	275.42	
			For Baked Enamel Standard Colors, Add	413.13	
			For Anodized Finish, Add	550.84	
			For Kynar® Standard Colors Finish, Add	757.41	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 91 19 00-0014 EA 12" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	1,673.42	103.87
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	146.57	
<i>For Clear Lacquer Finish, Add</i>	293.14	
<i>For Baked Enamel Standard Colors, Add</i>	439.70	
<i>For Anodized Finish, Add</i>	586.27	
<i>For Kynar® Standard Colors Finish, Add</i>	806.12	
08 91 19 00-0015 EA 12" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	1,761.55	113.03
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	153.55	
<i>For Clear Lacquer Finish, Add</i>	307.10	
<i>For Baked Enamel Standard Colors, Add</i>	460.64	
<i>For Anodized Finish, Add</i>	614.19	
<i>For Kynar® Standard Colors Finish, Add</i>	844.51	
08 91 19 00-0016 EA 12" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	1,880.53	122.20
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	163.61	
<i>For Clear Lacquer Finish, Add</i>	327.23	
<i>For Baked Enamel Standard Colors, Add</i>	490.84	
<i>For Anodized Finish, Add</i>	654.46	
<i>For Kynar® Standard Colors Finish, Add</i>	899.88	
08 91 19 00-0017 EA 18" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	534.30	33.61
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	46.71	
<i>For Clear Lacquer Finish, Add</i>	93.42	
<i>For Baked Enamel Standard Colors, Add</i>	140.13	
<i>For Anodized Finish, Add</i>	186.84	
<i>For Kynar® Standard Colors Finish, Add</i>	256.90	
08 91 19 00-0018 EA 18" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	639.86	42.77
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	55.43	
<i>For Clear Lacquer Finish, Add</i>	110.87	
<i>For Baked Enamel Standard Colors, Add</i>	166.30	
<i>For Anodized Finish, Add</i>	221.73	
<i>For Kynar® Standard Colors Finish, Add</i>	304.88	
08 91 19 00-0019 EA 18" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	742.02	48.88
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	64.43	
<i>For Clear Lacquer Finish, Add</i>	128.85	
<i>For Baked Enamel Standard Colors, Add</i>	193.28	
<i>For Anodized Finish, Add</i>	257.70	
<i>For Kynar® Standard Colors Finish, Add</i>	354.34	
08 91 19 00-0020 EA 18" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	930.20	61.10
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	80.80	
<i>For Clear Lacquer Finish, Add</i>	161.60	
<i>For Baked Enamel Standard Colors, Add</i>	242.40	
<i>For Anodized Finish, Add</i>	323.20	
<i>For Kynar® Standard Colors Finish, Add</i>	444.40	
08 91 19 00-0021 EA 18" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	1,068.59	67.21
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	93.42	
<i>For Clear Lacquer Finish, Add</i>	186.83	
<i>For Baked Enamel Standard Colors, Add</i>	280.25	
<i>For Anodized Finish, Add</i>	373.67	
<i>For Kynar® Standard Colors Finish, Add</i>	513.79	
08 91 19 00-0022 EA 18" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	1,190.87	73.32
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	104.42	
<i>For Clear Lacquer Finish, Add</i>	208.85	
<i>For Baked Enamel Standard Colors, Add</i>	313.27	
<i>For Anodized Finish, Add</i>	417.69	
<i>For Kynar® Standard Colors Finish, Add</i>	574.33	
08 91 19 00-0023 EA 18" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	1,276.91	79.42
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	111.81	
<i>For Clear Lacquer Finish, Add</i>	223.61	
<i>For Baked Enamel Standard Colors, Add</i>	335.42	
<i>For Anodized Finish, Add</i>	447.22	
<i>For Kynar® Standard Colors Finish, Add</i>	614.93	
08 91 19 00-0024 EA 18" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	1,421.41	88.59
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	124.42	
<i>For Clear Lacquer Finish, Add</i>	248.84	
<i>For Baked Enamel Standard Colors, Add</i>	373.27	
<i>For Anodized Finish, Add</i>	497.69	
<i>For Kynar® Standard Colors Finish, Add</i>	684.32	
08 91 19 00-0025 EA 18" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	1,521.61	97.76
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	132.61	
<i>For Clear Lacquer Finish, Add</i>	265.22	
<i>For Baked Enamel Standard Colors, Add</i>	397.83	
<i>For Anodized Finish, Add</i>	530.44	
<i>For Kynar® Standard Colors Finish, Add</i>	729.35	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 91 19 00-0026	EA	18" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	1,654.63		103.87
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	144.69		
		<i>For Clear Lacquer Finish, Add</i>	289.38		
		<i>For Baked Enamel Standard Colors, Add</i>	434.07		
		<i>For Anodized Finish, Add</i>	578.76		
		<i>For Kynar® Standard Colors Finish, Add</i>	795.79		
08 91 19 00-0027	EA	18" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	1,755.44		109.98
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	153.55		
		<i>For Clear Lacquer Finish, Add</i>	307.10		
		<i>For Baked Enamel Standard Colors, Add</i>	460.64		
		<i>For Anodized Finish, Add</i>	614.19		
		<i>For Kynar® Standard Colors Finish, Add</i>	844.51		
08 91 19 00-0028	EA	18" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	1,868.32		116.09
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	163.61		
		<i>For Clear Lacquer Finish, Add</i>	327.23		
		<i>For Baked Enamel Standard Colors, Add</i>	490.84		
		<i>For Anodized Finish, Add</i>	654.46		
		<i>For Kynar® Standard Colors Finish, Add</i>	899.88		
08 91 19 00-0029	EA	18" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	1,986.57		122.20
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	174.22		
		<i>For Clear Lacquer Finish, Add</i>	348.44		
		<i>For Baked Enamel Standard Colors, Add</i>	522.65		
		<i>For Anodized Finish, Add</i>	696.87		
		<i>For Kynar® Standard Colors Finish, Add</i>	958.20		
08 91 19 00-0030	EA	18" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	2,089.45		131.36
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	182.67		
		<i>For Clear Lacquer Finish, Add</i>	365.35		
		<i>For Baked Enamel Standard Colors, Add</i>	548.02		
		<i>For Anodized Finish, Add</i>	730.69		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,004.70		
08 91 19 00-0031	EA	18" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	2,233.95		140.53
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	195.29		
		<i>For Clear Lacquer Finish, Add</i>	390.58		
		<i>For Baked Enamel Standard Colors, Add</i>	585.87		
		<i>For Anodized Finish, Add</i>	781.16		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,074.10		
08 91 19 00-0032	EA	24" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	617.64		39.72
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	53.82		
		<i>For Clear Lacquer Finish, Add</i>	107.64		
		<i>For Baked Enamel Standard Colors, Add</i>	161.47		
		<i>For Anodized Finish, Add</i>	215.29		
		<i>For Kynar® Standard Colors Finish, Add</i>	296.02		
08 91 19 00-0033	EA	24" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	735.30		48.88
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	63.75		
		<i>For Clear Lacquer Finish, Add</i>	127.51		
		<i>For Baked Enamel Standard Colors, Add</i>	191.26		
		<i>For Anodized Finish, Add</i>	255.02		
		<i>For Kynar® Standard Colors Finish, Add</i>	350.65		
08 91 19 00-0034	EA	24" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	912.01		58.05
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	79.59		
		<i>For Clear Lacquer Finish, Add</i>	159.18		
		<i>For Baked Enamel Standard Colors, Add</i>	238.78		
		<i>For Anodized Finish, Add</i>	318.37		
		<i>For Kynar® Standard Colors Finish, Add</i>	437.76		
08 91 19 00-0035	EA	24" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	1,074.70		70.27
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	93.42		
		<i>For Clear Lacquer Finish, Add</i>	186.83		
		<i>For Baked Enamel Standard Colors, Add</i>	280.25		
		<i>For Anodized Finish, Add</i>	373.67		
		<i>For Kynar® Standard Colors Finish, Add</i>	513.79		
08 91 19 00-0036	EA	24" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	1,231.88		76.38
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	107.91		
		<i>For Clear Lacquer Finish, Add</i>	215.83		
		<i>For Baked Enamel Standard Colors, Add</i>	323.74		
		<i>For Anodized Finish, Add</i>	431.65		
		<i>For Kynar® Standard Colors Finish, Add</i>	593.52		
08 91 19 00-0037	EA	24" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	1,376.98		82.48
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>	121.20		
		<i>For Clear Lacquer Finish, Add</i>	242.40		
		<i>For Baked Enamel Standard Colors, Add</i>	363.60		
		<i>For Anodized Finish, Add</i>	484.80		
		<i>For Kynar® Standard Colors Finish, Add</i>	666.61		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0038 EA 24" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	1,495.97	91.64
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	131.27	
<i>For Clear Lacquer Finish, Add</i>	262.53	
<i>For Baked Enamel Standard Colors, Add</i>	393.80	
<i>For Anodized Finish, Add</i>	525.07	
<i>For Kynar® Standard Colors Finish, Add</i>	721.97	
08 91 19 00-0039 EA 24" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	1,654.63	103.87
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	144.69	
<i>For Clear Lacquer Finish, Add</i>	289.38	
<i>For Baked Enamel Standard Colors, Add</i>	434.07	
<i>For Anodized Finish, Add</i>	578.76	
<i>For Kynar® Standard Colors Finish, Add</i>	795.79	
08 91 19 00-0040 EA 24" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	1,760.81	109.98
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	154.09	
<i>For Clear Lacquer Finish, Add</i>	308.17	
<i>For Baked Enamel Standard Colors, Add</i>	462.26	
<i>For Anodized Finish, Add</i>	616.34	
<i>For Kynar® Standard Colors Finish, Add</i>	847.47	
08 91 19 00-0041 EA 24" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	1,934.22	122.20
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	168.98	
<i>For Clear Lacquer Finish, Add</i>	337.97	
<i>For Baked Enamel Standard Colors, Add</i>	506.95	
<i>For Anodized Finish, Add</i>	675.93	
<i>For Kynar® Standard Colors Finish, Add</i>	929.41	
08 91 19 00-0042 EA 24" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	2,044.42	128.31
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	178.78	
<i>For Clear Lacquer Finish, Add</i>	357.56	
<i>For Baked Enamel Standard Colors, Add</i>	536.34	
<i>For Anodized Finish, Add</i>	715.12	
<i>For Kynar® Standard Colors Finish, Add</i>	983.30	
08 91 19 00-0043 EA 24" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	2,188.18	134.42
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	191.94	
<i>For Clear Lacquer Finish, Add</i>	383.87	
<i>For Baked Enamel Standard Colors, Add</i>	575.81	
<i>For Anodized Finish, Add</i>	767.74	
<i>For Kynar® Standard Colors Finish, Add</i>	1,055.64	
08 91 19 00-0044 EA 24" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	2,329.25	140.53
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	204.82	
<i>For Clear Lacquer Finish, Add</i>	409.64	
<i>For Baked Enamel Standard Colors, Add</i>	614.46	
<i>For Anodized Finish, Add</i>	819.28	
<i>For Kynar® Standard Colors Finish, Add</i>	1,126.51	
08 91 19 00-0045 EA 24" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	2,434.83	149.69
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	213.54	
<i>For Clear Lacquer Finish, Add</i>	427.09	
<i>For Baked Enamel Standard Colors, Add</i>	640.63	
<i>For Anodized Finish, Add</i>	854.18	
<i>For Kynar® Standard Colors Finish, Add</i>	1,174.49	
08 91 19 00-0046 EA 24" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	2,611.54	158.86
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	229.38	
<i>For Clear Lacquer Finish, Add</i>	458.76	
<i>For Baked Enamel Standard Colors, Add</i>	688.15	
<i>For Anodized Finish, Add</i>	917.53	
<i>For Kynar® Standard Colors Finish, Add</i>	1,261.60	
08 91 19 00-0047 EA 30" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	691.60	45.83
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	60.00	
<i>For Clear Lacquer Finish, Add</i>	119.99	
<i>For Baked Enamel Standard Colors, Add</i>	179.99	
<i>For Anodized Finish, Add</i>	239.98	
<i>For Kynar® Standard Colors Finish, Add</i>	329.98	
08 91 19 00-0048 EA 30" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	893.96	61.10
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	77.18	
<i>For Clear Lacquer Finish, Add</i>	154.35	
<i>For Baked Enamel Standard Colors, Add</i>	231.53	
<i>For Anodized Finish, Add</i>	308.70	
<i>For Kynar® Standard Colors Finish, Add</i>	424.47	
08 91 19 00-0049 EA 30" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	1,043.83	70.27
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	90.33	
<i>For Clear Lacquer Finish, Add</i>	180.66	
<i>For Baked Enamel Standard Colors, Add</i>	270.99	
<i>For Anodized Finish, Add</i>	361.32	
<i>For Kynar® Standard Colors Finish, Add</i>	496.82	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 91 19 00-0050	EA	30" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....		1,219.20	79.42
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		106.03	
		<i>For Clear Lacquer Finish, Add</i>		212.07	
		<i>For Baked Enamel Standard Colors, Add</i>		318.10	
		<i>For Anodized Finish, Add</i>		424.14	
		<i>For Kynar® Standard Colors Finish, Add</i>		583.19	
08 91 19 00-0051	EA	30" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....		1,408.59	85.53
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		123.75	
		<i>For Clear Lacquer Finish, Add</i>		247.50	
		<i>For Baked Enamel Standard Colors, Add</i>		371.25	
		<i>For Anodized Finish, Add</i>		495.00	
		<i>For Kynar® Standard Colors Finish, Add</i>		680.63	
08 91 19 00-0052	EA	30" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....		1,566.51	94.70
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		137.71	
		<i>For Clear Lacquer Finish, Add</i>		275.42	
		<i>For Baked Enamel Standard Colors, Add</i>		413.13	
		<i>For Anodized Finish, Add</i>		550.84	
		<i>For Kynar® Standard Colors Finish, Add</i>		757.41	
08 91 19 00-0053	EA	30" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....		1,684.76	100.81
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		148.31	
		<i>For Clear Lacquer Finish, Add</i>		296.63	
		<i>For Baked Enamel Standard Colors, Add</i>		444.94	
		<i>For Anodized Finish, Add</i>		593.25	
		<i>For Kynar® Standard Colors Finish, Add</i>		815.72	
08 91 19 00-0054	EA	30" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....		1,850.73	109.98
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		163.08	
		<i>For Clear Lacquer Finish, Add</i>		326.15	
		<i>For Baked Enamel Standard Colors, Add</i>		489.23	
		<i>For Anodized Finish, Add</i>		652.31	
		<i>For Kynar® Standard Colors Finish, Add</i>		896.92	
08 91 19 00-0055	EA	30" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....		1,983.75	116.09
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		175.16	
		<i>For Clear Lacquer Finish, Add</i>		350.31	
		<i>For Baked Enamel Standard Colors, Add</i>		525.47	
		<i>For Anodized Finish, Add</i>		700.63	
		<i>For Kynar® Standard Colors Finish, Add</i>		963.36	
08 91 19 00-0056	EA	30" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....		2,185.35	128.31
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		192.87	
		<i>For Clear Lacquer Finish, Add</i>		385.75	
		<i>For Baked Enamel Standard Colors, Add</i>		578.62	
		<i>For Anodized Finish, Add</i>		771.50	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,060.81	
08 91 19 00-0057	EA	30" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....		2,313.74	137.47
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		203.88	
		<i>For Clear Lacquer Finish, Add</i>		407.76	
		<i>For Baked Enamel Standard Colors, Add</i>		611.64	
		<i>For Anodized Finish, Add</i>		815.52	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,121.34	
08 91 19 00-0058	EA	30" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....		2,466.89	143.58
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		217.97	
		<i>For Clear Lacquer Finish, Add</i>		435.95	
		<i>For Baked Enamel Standard Colors, Add</i>		653.92	
		<i>For Anodized Finish, Add</i>		871.89	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,198.85	
08 91 19 00-0059	EA	30" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....		2,618.71	149.69
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		231.93	
		<i>For Clear Lacquer Finish, Add</i>		463.86	
		<i>For Baked Enamel Standard Colors, Add</i>		695.80	
		<i>For Anodized Finish, Add</i>		927.73	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,275.63	
08 91 19 00-0060	EA	30" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....		2,744.42	158.86
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		242.67	
		<i>For Clear Lacquer Finish, Add</i>		485.34	
		<i>For Baked Enamel Standard Colors, Add</i>		728.01	
		<i>For Anodized Finish, Add</i>		970.68	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,334.69	
08 91 19 00-0061	EA	30" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....		2,945.29	168.02
		Note: Includes bird screen. Excludes actuator.			
		<i>For Flange Frame, Add</i>		260.92	
		<i>For Clear Lacquer Finish, Add</i>		521.85	
		<i>For Baked Enamel Standard Colors, Add</i>		782.77	
		<i>For Anodized Finish, Add</i>		1,043.70	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,435.08	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0062 EA 36" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	766.92	51.94
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	66.31	
<i>For Clear Lacquer Finish, Add</i>	132.61	
<i>For Baked Enamel Standard Colors, Add</i>	198.92	
<i>For Anodized Finish, Add</i>	265.22	
<i>For Kynar® Standard Colors Finish, Add</i>	364.68	
08 91 19 00-0063 EA 36" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	1,006.85	67.21
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	87.24	
<i>For Clear Lacquer Finish, Add</i>	174.49	
<i>For Baked Enamel Standard Colors, Add</i>	261.73	
<i>For Anodized Finish, Add</i>	348.97	
<i>For Kynar® Standard Colors Finish, Add</i>	479.84	
08 91 19 00-0064 EA 36" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	1,164.77	76.38
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	101.20	
<i>For Clear Lacquer Finish, Add</i>	202.40	
<i>For Baked Enamel Standard Colors, Add</i>	303.61	
<i>For Anodized Finish, Add</i>	404.81	
<i>For Kynar® Standard Colors Finish, Add</i>	556.61	
08 91 19 00-0065 EA 36" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	1,353.56	85.53
Note: Includes bird screen. Excludes actuator.		
<i>For Flange Frame, Add</i>	118.25	
<i>For Clear Lacquer Finish, Add</i>	236.50	
<i>For Baked Enamel Standard Colors, Add</i>	354.74	
<i>For Anodized Finish, Add</i>	472.99	
<i>For Kynar® Standard Colors Finish, Add</i>	650.36	
08 91 19 00-0066 EA 36" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	1,566.86	92.87
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	138.11	
<i>For Clear Lacquer Finish, Add</i>	276.22	
<i>For Baked Enamel Standard Colors, Add</i>	414.34	
<i>For Anodized Finish, Add</i>	552.45	
<i>For Kynar® Standard Colors Finish, Add</i>	759.62	
08 91 19 00-0067 EA 36" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	1,731.74	100.81
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	153.01	
<i>For Clear Lacquer Finish, Add</i>	306.02	
<i>For Baked Enamel Standard Colors, Add</i>	459.03	
<i>For Anodized Finish, Add</i>	612.04	
<i>For Kynar® Standard Colors Finish, Add</i>	841.56	
08 91 19 00-0068 EA 36" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	1,874.15	106.92
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	166.03	
<i>For Clear Lacquer Finish, Add</i>	332.06	
<i>For Baked Enamel Standard Colors, Add</i>	498.09	
<i>For Anodized Finish, Add</i>	664.12	
<i>For Kynar® Standard Colors Finish, Add</i>	913.17	
08 91 19 00-0069 EA 36" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	2,064.28	116.09
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	183.21	
<i>For Clear Lacquer Finish, Add</i>	366.42	
<i>For Baked Enamel Standard Colors, Add</i>	549.63	
<i>For Anodized Finish, Add</i>	732.84	
<i>For Kynar® Standard Colors Finish, Add</i>	1,007.66	
08 91 19 00-0070 EA 36" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	2,207.43	125.25
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	195.69	
<i>For Clear Lacquer Finish, Add</i>	391.39	
<i>For Baked Enamel Standard Colors, Add</i>	587.08	
<i>For Anodized Finish, Add</i>	782.77	
<i>For Kynar® Standard Colors Finish, Add</i>	1,076.31	
08 91 19 00-0071 EA 36" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	2,436.48	134.42
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	216.77	
<i>For Clear Lacquer Finish, Add</i>	433.53	
<i>For Baked Enamel Standard Colors, Add</i>	650.30	
<i>For Anodized Finish, Add</i>	867.06	
<i>For Kynar® Standard Colors Finish, Add</i>	1,192.21	
08 91 19 00-0072 EA 36" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	2,586.35	143.58
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	229.92	
<i>For Clear Lacquer Finish, Add</i>	459.84	
<i>For Baked Enamel Standard Colors, Add</i>	689.76	
<i>For Anodized Finish, Add</i>	919.68	
<i>For Kynar® Standard Colors Finish, Add</i>	1,264.55	
08 91 19 00-0073 EA 36" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	2,750.25	149.69
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	245.09	
<i>For Clear Lacquer Finish, Add</i>	490.17	
<i>For Baked Enamel Standard Colors, Add</i>	735.26	
<i>For Anodized Finish, Add</i>	980.34	
<i>For Kynar® Standard Colors Finish, Add</i>	1,347.97	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 91 19 00-0074	EA	36" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	2,920.85		155.80
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	260.92		
		<i>For Clear Lacquer Finish, Add</i>	521.85		
		<i>For Baked Enamel Standard Colors, Add</i>	782.77		
		<i>For Anodized Finish, Add</i>	1,043.70		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,435.08		
08 91 19 00-0075	EA	36" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	3,065.34		164.97
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	273.54		
		<i>For Clear Lacquer Finish, Add</i>	547.08		
		<i>For Baked Enamel Standard Colors, Add</i>	820.62		
		<i>For Anodized Finish, Add</i>	1,094.16		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,504.47		
08 91 19 00-0076	EA	36" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	3,293.06		174.13
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	294.48		
		<i>For Clear Lacquer Finish, Add</i>	588.96		
		<i>For Baked Enamel Standard Colors, Add</i>	883.44		
		<i>For Anodized Finish, Add</i>	1,177.92		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,619.63		
08 91 19 00-0077	EA	42" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	893.22		58.05
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	77.71		
		<i>For Clear Lacquer Finish, Add</i>	155.43		
		<i>For Baked Enamel Standard Colors, Add</i>	233.14		
		<i>For Anodized Finish, Add</i>	310.85		
		<i>For Kynar® Standard Colors Finish, Add</i>	427.42		
08 91 19 00-0078	EA	42" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	1,094.23		73.32
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	94.76		
		<i>For Clear Lacquer Finish, Add</i>	189.52		
		<i>For Baked Enamel Standard Colors, Add</i>	284.28		
		<i>For Anodized Finish, Add</i>	379.04		
		<i>For Kynar® Standard Colors Finish, Add</i>	521.17		
08 91 19 00-0079	EA	42" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	1,269.60		82.48
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	110.46		
		<i>For Clear Lacquer Finish, Add</i>	220.93		
		<i>For Baked Enamel Standard Colors, Add</i>	331.39		
		<i>For Anodized Finish, Add</i>	441.85		
		<i>For Kynar® Standard Colors Finish, Add</i>	607.55		
08 91 19 00-0080	EA	42" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	1,485.98		94.70
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	129.66		
		<i>For Clear Lacquer Finish, Add</i>	259.31		
		<i>For Baked Enamel Standard Colors, Add</i>	388.97		
		<i>For Anodized Finish, Add</i>	518.63		
		<i>For Kynar® Standard Colors Finish, Add</i>	713.11		
08 91 19 00-0081	EA	42" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	1,718.32		100.81
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	151.67		
		<i>For Clear Lacquer Finish, Add</i>	303.34		
		<i>For Baked Enamel Standard Colors, Add</i>	455.01		
		<i>For Anodized Finish, Add</i>	606.68		
		<i>For Kynar® Standard Colors Finish, Add</i>	834.18		
08 91 19 00-0082	EA	42" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	1,903.68		106.92
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	168.98		
		<i>For Clear Lacquer Finish, Add</i>	337.97		
		<i>For Baked Enamel Standard Colors, Add</i>	506.95		
		<i>For Anodized Finish, Add</i>	675.93		
		<i>For Kynar® Standard Colors Finish, Add</i>	929.41		
08 91 19 00-0083	EA	42" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	2,063.54		113.03
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	183.75		
		<i>For Clear Lacquer Finish, Add</i>	367.49		
		<i>For Baked Enamel Standard Colors, Add</i>	551.24		
		<i>For Anodized Finish, Add</i>	734.99		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,010.61		
08 91 19 00-0084	EA	42" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	2,253.66		122.20
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	200.93		
		<i>For Clear Lacquer Finish, Add</i>	401.85		
		<i>For Baked Enamel Standard Colors, Add</i>	602.78		
		<i>For Anodized Finish, Add</i>	803.71		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,105.10		
08 91 19 00-0085	EA	42" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	2,415.61		131.36
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>	215.29		
		<i>For Clear Lacquer Finish, Add</i>	430.58		
		<i>For Baked Enamel Standard Colors, Add</i>	645.87		
		<i>For Anodized Finish, Add</i>	861.16		
		<i>For Kynar® Standard Colors Finish, Add</i>	1,184.09		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0086 EA 42" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	2,670.17	140.53
Note: Includes bird screen.		
For Flange Frame, Add	238.91	
For Clear Lacquer Finish, Add	477.82	
For Baked Enamel Standard Colors, Add	716.74	
For Anodized Finish, Add	955.65	
For Kynar® Standard Colors Finish, Add	1,314.02	
08 91 19 00-0087 EA 42" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	2,832.12	149.69
Note: Includes bird screen.		
For Flange Frame, Add	253.27	
For Clear Lacquer Finish, Add	506.55	
For Baked Enamel Standard Colors, Add	759.82	
For Anodized Finish, Add	1,013.09	
For Kynar® Standard Colors Finish, Add	1,393.00	
08 91 19 00-0088 EA 42" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	3,017.49	155.80
Note: Includes bird screen.		
For Flange Frame, Add	270.59	
For Clear Lacquer Finish, Add	541.18	
For Baked Enamel Standard Colors, Add	811.76	
For Anodized Finish, Add	1,082.35	
For Kynar® Standard Colors Finish, Add	1,488.23	
08 91 19 00-0089 EA 42" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	3,204.19	161.91
Note: Includes bird screen.		
For Flange Frame, Add	288.04	
For Clear Lacquer Finish, Add	576.07	
For Baked Enamel Standard Colors, Add	864.11	
For Anodized Finish, Add	1,152.14	
For Kynar® Standard Colors Finish, Add	1,584.20	
08 91 19 00-0090 EA 42" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	3,375.53	171.08
Note: Includes bird screen.		
For Flange Frame, Add	303.34	
For Clear Lacquer Finish, Add	606.67	
For Baked Enamel Standard Colors, Add	910.01	
For Anodized Finish, Add	1,213.35	
For Kynar® Standard Colors Finish, Add	1,668.35	
08 91 19 00-0091 EA 42" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	3,620.69	180.24
Note: Includes bird screen.		
For Flange Frame, Add	326.02	
For Clear Lacquer Finish, Add	652.04	
For Baked Enamel Standard Colors, Add	978.06	
For Anodized Finish, Add	1,304.08	
For Kynar® Standard Colors Finish, Add	1,793.11	
08 91 19 00-0092 EA 48" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	976.58	64.16
Note: Includes bird screen.		
For Flange Frame, Add	84.83	
For Clear Lacquer Finish, Add	169.65	
For Baked Enamel Standard Colors, Add	254.48	
For Anodized Finish, Add	339.31	
For Kynar® Standard Colors Finish, Add	466.55	
08 91 19 00-0093 EA 48" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	1,196.38	79.42
Note: Includes bird screen.		
For Flange Frame, Add	103.75	
For Clear Lacquer Finish, Add	207.50	
For Baked Enamel Standard Colors, Add	311.26	
For Anodized Finish, Add	415.01	
For Kynar® Standard Colors Finish, Add	570.64	
08 91 19 00-0094 EA 48" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	1,402.02	91.64
Note: Includes bird screen.		
For Flange Frame, Add	121.87	
For Clear Lacquer Finish, Add	243.74	
For Baked Enamel Standard Colors, Add	365.62	
For Anodized Finish, Add	487.49	
For Kynar® Standard Colors Finish, Add	670.30	
08 91 19 00-0095 EA 48" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	1,616.31	100.81
Note: Includes bird screen.		
For Flange Frame, Add	141.47	
For Clear Lacquer Finish, Add	282.94	
For Baked Enamel Standard Colors, Add	424.40	
For Anodized Finish, Add	565.87	
For Kynar® Standard Colors Finish, Add	778.07	
08 91 19 00-0096 EA 48" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	1,882.20	106.92
Note: Includes bird screen.		
For Flange Frame, Add	166.84	
For Clear Lacquer Finish, Add	333.67	
For Baked Enamel Standard Colors, Add	500.51	
For Anodized Finish, Add	667.34	
For Kynar® Standard Colors Finish, Add	917.59	
08 91 19 00-0097 EA 48" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	2,097.10	113.03
Note: Includes bird screen.		
For Flange Frame, Add	187.10	
For Clear Lacquer Finish, Add	374.21	
For Baked Enamel Standard Colors, Add	561.31	
For Anodized Finish, Add	748.41	
For Kynar® Standard Colors Finish, Add	1,029.07	

08 Openings

08 90 Louvers and Vents

08 91 Louvers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0098	EA		48" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	2,272.45	122.20
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	202.81	
			<i>For Clear Lacquer Finish, Add</i>	405.61	
			<i>For Baked Enamel Standard Colors, Add</i>	608.42	
			<i>For Anodized Finish, Add</i>	811.22	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,115.43	
08 91 19 00-0099	EA		48" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	2,551.17	131.36
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	228.85	
			<i>For Clear Lacquer Finish, Add</i>	457.69	
			<i>For Baked Enamel Standard Colors, Add</i>	686.54	
			<i>For Anodized Finish, Add</i>	915.38	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,258.65	
08 91 19 00-0100	EA		48" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	2,670.17	140.53
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	238.91	
			<i>For Clear Lacquer Finish, Add</i>	477.82	
			<i>For Baked Enamel Standard Colors, Add</i>	716.74	
			<i>For Anodized Finish, Add</i>	955.65	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,314.02	
08 91 19 00-0101	EA		48" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	2,942.18	149.69
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	264.28	
			<i>For Clear Lacquer Finish, Add</i>	528.56	
			<i>For Baked Enamel Standard Colors, Add</i>	792.84	
			<i>For Anodized Finish, Add</i>	1,057.12	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,453.53	
08 91 19 00-0102	EA		48" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	3,129.63	158.86
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	281.19	
			<i>For Clear Lacquer Finish, Add</i>	562.38	
			<i>For Baked Enamel Standard Colors, Add</i>	843.57	
			<i>For Anodized Finish, Add</i>	1,124.76	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,546.55	
08 91 19 00-0103	EA		48" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	3,336.47	164.97
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	300.65	
			<i>For Clear Lacquer Finish, Add</i>	601.31	
			<i>For Baked Enamel Standard Colors, Add</i>	901.96	
			<i>For Anodized Finish, Add</i>	1,202.61	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,653.59	
08 91 19 00-0104	EA		48" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	3,543.31	171.08
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	320.12	
			<i>For Clear Lacquer Finish, Add</i>	640.23	
			<i>For Baked Enamel Standard Colors, Add</i>	960.35	
			<i>For Anodized Finish, Add</i>	1,280.46	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,760.63	
08 91 19 00-0105	EA		48" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	3,715.25	177.19
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	336.09	
			<i>For Clear Lacquer Finish, Add</i>	672.17	
			<i>For Baked Enamel Standard Colors, Add</i>	1,008.26	
			<i>For Anodized Finish, Add</i>	1,344.35	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,848.48	
08 91 19 00-0106	EA		48" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	3,997.99	186.35
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	362.53	
			<i>For Clear Lacquer Finish, Add</i>	725.06	
			<i>For Baked Enamel Standard Colors, Add</i>	1,087.58	
			<i>For Anodized Finish, Add</i>	1,450.11	
			<i>For Kynar® Standard Colors Finish, Add</i>	1,993.90	
08 91 19 00-0107	EA		54" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	1,080.81	73.32
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	93.42	
			<i>For Clear Lacquer Finish, Add</i>	186.83	
			<i>For Baked Enamel Standard Colors, Add</i>	280.25	
			<i>For Anodized Finish, Add</i>	373.67	
			<i>For Kynar® Standard Colors Finish, Add</i>	513.79	
08 91 19 00-0108	EA		54" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	1,327.46	88.59
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	115.03	
			<i>For Clear Lacquer Finish, Add</i>	230.05	
			<i>For Baked Enamel Standard Colors, Add</i>	345.08	
			<i>For Anodized Finish, Add</i>	460.11	
			<i>For Kynar® Standard Colors Finish, Add</i>	632.65	
08 91 19 00-0109	EA		54" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	1,553.97	103.87
			Note: Includes bird screen.		
			<i>For Flange Frame, Add</i>	134.62	
			<i>For Clear Lacquer Finish, Add</i>	269.25	
			<i>For Baked Enamel Standard Colors, Add</i>	403.87	
			<i>For Anodized Finish, Add</i>	538.49	
			<i>For Kynar® Standard Colors Finish, Add</i>	740.43	



Openings	08	08
Louvers and Vents	08 90	
Louvers	08 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91	19 00-0110	EA	54" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,784.97 156.50 313.00 469.50 626.00 860.76	109.98
08 91	19 00-0111	EA	54" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,103.21 187.10 374.21 561.31 748.41 1,029.07	116.09
08 91	19 00-0112	EA	54" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,323.46 207.91 415.81 623.72 831.63 1,143.49	122.20
08 91	19 00-0113	EA	54" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,529.70 226.70 453.40 680.09 906.79 1,246.84	131.36
08 91	19 00-0114	EA	54" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,833.91 255.29 510.57 765.86 1,021.14 1,404.07	140.53
08 91	19 00-0115	EA	54" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,046.87 274.75 549.50 824.24 1,098.99 1,511.11	149.69
08 91	19 00-0116	EA	54" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,365.86 304.81 609.63 914.44 1,219.26 1,676.48	158.86
08 91	19 00-0117	EA	54" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,571.35 324.14 648.28 972.42 1,296.56 1,782.78	164.97
08 91	19 00-0118	EA	54" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,806.38 346.42 692.84 1,039.27 1,385.69 1,905.32	171.08
08 91	19 00-0119	EA	54" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,032.01 367.76 735.53 1,103.29 1,471.05 2,022.70	177.19
08 91	19 00-0120	EA	54" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,218.71 385.21 770.42 1,155.63 1,540.84 2,118.66	183.30
08 91	19 00-0121	EA	54" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,548.43 416.35 832.70 1,249.05 1,665.40 2,289.93	192.47

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
08 91 19 00-0122	EA	60" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	1,161.48	79.42
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	100.26	
		<i>For Clear Lacquer Finish, Add</i>	200.52	
		<i>For Baked Enamel Standard Colors, Add</i>	300.79	
		<i>For Anodized Finish, Add</i>	401.05	
		<i>For Kynar® Standard Colors Finish, Add</i>	551.44	
08 91 19 00-0123	EA	60" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	1,433.03	97.76
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	123.75	
		<i>For Clear Lacquer Finish, Add</i>	247.50	
		<i>For Baked Enamel Standard Colors, Add</i>	371.25	
		<i>For Anodized Finish, Add</i>	495.00	
		<i>For Kynar® Standard Colors Finish, Add</i>	680.63	
08 91 19 00-0124	EA	60" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	1,666.85	109.98
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	144.69	
		<i>For Clear Lacquer Finish, Add</i>	289.38	
		<i>For Baked Enamel Standard Colors, Add</i>	434.07	
		<i>For Anodized Finish, Add</i>	578.76	
		<i>For Kynar® Standard Colors Finish, Add</i>	795.79	
08 91 19 00-0125	EA	60" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	1,934.09	116.09
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	170.19	
		<i>For Clear Lacquer Finish, Add</i>	340.38	
		<i>For Baked Enamel Standard Colors, Add</i>	510.57	
		<i>For Anodized Finish, Add</i>	680.76	
		<i>For Kynar® Standard Colors Finish, Add</i>	936.05	
08 91 19 00-0126	EA	60" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	2,265.14	125.25
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	201.46	
		<i>For Clear Lacquer Finish, Add</i>	402.93	
		<i>For Baked Enamel Standard Colors, Add</i>	604.39	
		<i>For Anodized Finish, Add</i>	805.86	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,108.05	
08 91 19 00-0127	EA	60" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	2,512.25	131.36
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	224.95	
		<i>For Clear Lacquer Finish, Add</i>	449.91	
		<i>For Baked Enamel Standard Colors, Add</i>	674.86	
		<i>For Anodized Finish, Add</i>	899.81	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,237.24	
08 91 19 00-0128	EA	60" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	2,727.88	140.53
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	244.68	
		<i>For Clear Lacquer Finish, Add</i>	489.37	
		<i>For Baked Enamel Standard Colors, Add</i>	734.05	
		<i>For Anodized Finish, Add</i>	978.73	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,345.76	
08 91 19 00-0129	EA	60" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	3,053.58	149.69
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	275.42	
		<i>For Clear Lacquer Finish, Add</i>	550.84	
		<i>For Baked Enamel Standard Colors, Add</i>	826.26	
		<i>For Anodized Finish, Add</i>	1,101.68	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,514.80	
08 91 19 00-0130	EA	60" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	3,282.64	158.86
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	296.49	
		<i>For Clear Lacquer Finish, Add</i>	592.98	
		<i>For Baked Enamel Standard Colors, Add</i>	889.48	
		<i>For Anodized Finish, Add</i>	1,185.97	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,630.71	
08 91 19 00-0131	EA	60" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	3,628.47	168.02
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	329.24	
		<i>For Clear Lacquer Finish, Add</i>	658.48	
		<i>For Baked Enamel Standard Colors, Add</i>	987.73	
		<i>For Anodized Finish, Add</i>	1,316.97	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,810.83	
08 91 19 00-0132	EA	60" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	3,847.39	174.13
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	349.91	
		<i>For Clear Lacquer Finish, Add</i>	699.82	
		<i>For Baked Enamel Standard Colors, Add</i>	1,049.74	
		<i>For Anodized Finish, Add</i>	1,399.65	
		<i>For Kynar® Standard Colors Finish, Add</i>	1,924.52	
08 91 19 00-0133	EA	60" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	4,097.17	180.24
		Note: Includes bird screen.		
		<i>For Flange Frame, Add</i>	373.67	
		<i>For Clear Lacquer Finish, Add</i>	747.34	
		<i>For Baked Enamel Standard Colors, Add</i>	1,121.00	
		<i>For Anodized Finish, Add</i>	1,494.67	
		<i>For Kynar® Standard Colors Finish, Add</i>	2,055.17	



Openings	08	08
Louvers and Vents	08 90	
Louvers	08 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91	19 00-0134	EA	60" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,341.60 396.89 793.78 1,190.67 1,587.56 2,182.89	186.35
08 91	19 00-0135	EA	60" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,548.43 416.35 832.70 1,249.05 1,665.40 2,289.93	192.47
08 91	19 00-0136	EA	60" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,894.85 449.77 899.54 1,349.31 1,799.08 2,473.74	198.58
08 91	19 00-0137	EA	66" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,341.48 117.04 234.08 351.12 468.16 643.72	85.53
08 91	19 00-0138	EA	66" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,660.00 145.23 290.45 435.68 580.90 798.74	103.87
08 91	19 00-0139	EA	66" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,934.22 168.98 337.97 506.95 675.93 929.41	122.20
08 91	19 00-0140	EA	66" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,225.62 196.90 393.80 590.70 787.60 1,082.96	128.31
08 91	19 00-0141	EA	66" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,613.65 234.48 468.96 703.45 937.93 1,289.65	134.42
08 91	19 00-0142	EA	66" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,883.58 260.25 520.51 780.76 1,041.01 1,431.39	140.53
08 91	19 00-0143	EA	66" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,142.17 284.28 568.56 852.83 1,137.11 1,563.53	149.69
08 91	19 00-0144	EA	66" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,446.39 312.87 625.73 938.60 1,251.47 1,720.77	158.86
08 91	19 00-0145	EA	66" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,703.63 336.76 673.52 1,010.27 1,347.03 1,852.17	168.02

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
08 91 19 00-0146	EA	66" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....		4,099.86	180.24
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		373.94	
		<i>For Clear Lacquer Finish, Add</i>		747.87	
		<i>For Baked Enamel Standard Colors, Add</i>		1,121.81	
		<i>For Anodized Finish, Add</i>		1,495.75	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,056.65	
08 91 19 00-0147	EA	66" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....		4,347.71	189.41
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		396.89	
		<i>For Clear Lacquer Finish, Add</i>		793.78	
		<i>For Baked Enamel Standard Colors, Add</i>		1,190.67	
		<i>For Anodized Finish, Add</i>		1,587.56	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,182.89	
08 91 19 00-0148	EA	66" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....		4,612.25	195.52
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		422.12	
		<i>For Clear Lacquer Finish, Add</i>		844.24	
		<i>For Baked Enamel Standard Colors, Add</i>		1,266.37	
		<i>For Anodized Finish, Add</i>		1,688.49	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,321.67	
08 91 19 00-0149	EA	66" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....		4,882.17	201.63
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		447.89	
		<i>For Clear Lacquer Finish, Add</i>		895.78	
		<i>For Baked Enamel Standard Colors, Add</i>		1,343.68	
		<i>For Anodized Finish, Add</i>		1,791.57	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,463.41	
08 91 19 00-0150	EA	66" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....		5,115.85	207.74
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		470.04	
		<i>For Clear Lacquer Finish, Add</i>		940.08	
		<i>For Baked Enamel Standard Colors, Add</i>		1,410.11	
		<i>For Anodized Finish, Add</i>		1,880.15	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,585.21	
08 91 19 00-0151	EA	66" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....		5,502.55	213.85
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		507.49	
		<i>For Clear Lacquer Finish, Add</i>		1,014.97	
		<i>For Baked Enamel Standard Colors, Add</i>		1,522.46	
		<i>For Anodized Finish, Add</i>		2,029.94	
		<i>For Kynar® Standard Colors Finish, Add</i>		2,791.17	
08 91 19 00-0152	EA	72" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....		1,415.44	91.64
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		123.21	
		<i>For Clear Lacquer Finish, Add</i>		246.43	
		<i>For Baked Enamel Standard Colors, Add</i>		369.64	
		<i>For Anodized Finish, Add</i>		492.86	
		<i>For Kynar® Standard Colors Finish, Add</i>		677.68	
08 91 19 00-0153	EA	72" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....		1,750.07	109.98
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		153.01	
		<i>For Clear Lacquer Finish, Add</i>		306.02	
		<i>For Baked Enamel Standard Colors, Add</i>		459.03	
		<i>For Anodized Finish, Add</i>		612.04	
		<i>For Kynar® Standard Colors Finish, Add</i>		841.56	
08 91 19 00-0154	EA	72" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....		2,039.05	128.31
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		178.24	
		<i>For Clear Lacquer Finish, Add</i>		356.49	
		<i>For Baked Enamel Standard Colors, Add</i>		534.73	
		<i>For Anodized Finish, Add</i>		712.98	
		<i>For Kynar® Standard Colors Finish, Add</i>		980.34	
08 91 19 00-0155	EA	72" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....		2,354.01	137.47
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		207.91	
		<i>For Clear Lacquer Finish, Add</i>		415.81	
		<i>For Baked Enamel Standard Colors, Add</i>		623.72	
		<i>For Anodized Finish, Add</i>		831.63	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,143.49	
08 91 19 00-0156	EA	72" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....		2,770.23	143.58
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		248.31	
		<i>For Clear Lacquer Finish, Add</i>		496.61	
		<i>For Baked Enamel Standard Colors, Add</i>		744.92	
		<i>For Anodized Finish, Add</i>		993.23	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,365.69	
08 91 19 00-0157	EA	72" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....		3,054.93	149.69
		Note: Includes bird screen.			
		<i>For Flange Frame, Add</i>		275.55	
		<i>For Clear Lacquer Finish, Add</i>		551.11	
		<i>For Baked Enamel Standard Colors, Add</i>		826.66	
		<i>For Anodized Finish, Add</i>		1,102.22	
		<i>For Kynar® Standard Colors Finish, Add</i>		1,515.55	



Openings	08
Louvers and Vents	08 90
Louvers	08 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91	19 00-0158	EA	72" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,330.96 301.32 602.65 903.97 1,205.30 1,657.28	158.86
08 91	19 00-0159	EA	72" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,646.52 331.66 663.32 994.97 1,326.63 1,824.12	164.97
08 91	19 00-0160	EA	72" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,915.84 356.76 713.51 1,070.27 1,427.03 1,962.16	174.13
08 91	19 00-0161	EA	72" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,347.71 396.89 793.78 1,190.67 1,587.56 2,182.89	189.41
08 91	19 00-0162	EA	72" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,621.04 422.39 844.78 1,267.17 1,689.56 2,323.15	198.58
08 91	19 00-0163	EA	72" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,893.65 448.43 896.86 1,345.29 1,793.72 2,466.36	204.69
08 91	19 00-0164	EA	72" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	5,170.28 474.87 949.74 1,424.61 1,899.48 2,611.79	210.80
08 91	19 00-0165	EA	72" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	5,429.47 499.57 999.13 1,498.70 1,998.27 2,747.62	216.91
08 91	19 00-0166	EA	72" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	5,841.66 539.56 1,079.13 1,618.69 2,158.26 2,967.60	223.02
08 91	19 00-0167	EA	78" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,505.51 131.00 262.00 393.00 524.00 720.49	97.76
08 91	19 00-0168	EA	78" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	1,849.53 161.74 323.47 485.21 646.94 889.54	116.09
08 91	19 00-0169	EA	78" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,145.23 187.64 375.28 562.92 750.56 1,032.02	134.42

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91	19 00-0170	EA	78" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,481.66 219.45 438.90 658.35 877.80 1,206.98	143.58
08 91	19 00-0171	EA	78" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	2,922.05 262.27 524.53 786.80 1,049.06 1,442.46	149.69
08 91	19 00-0172	EA	78" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,218.82 290.72 581.44 872.16 1,162.88 1,598.97	155.80
08 91	19 00-0173	EA	78" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,514.98 318.50 637.01 955.51 1,274.02 1,751.77	164.97
08 91	19 00-0174	EA	78" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	3,849.33 350.72 701.43 1,052.15 1,402.87 1,928.94	171.08
08 91	19 00-0175	EA	78" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,138.78 377.83 755.66 1,133.49 1,511.32 2,078.06	180.24
08 91	19 00-0176	EA	78" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,598.83 420.78 841.56 1,262.34 1,683.12 2,314.29	195.52
08 91	19 00-0177	EA	78" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	4,885.60 447.62 895.25 1,342.87 1,790.50 2,461.93	204.69
08 91	19 00-0178	EA	78" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	5,185.79 475.81 951.62 1,427.43 1,903.24 2,616.96	213.85
08 91	19 00-0179	EA	78" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	5,462.42 502.25 1,004.50 1,506.75 2,009.00 2,762.38	219.96
08 91	19 00-0180	EA	78" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	5,739.06 528.69 1,057.39 1,586.08 2,114.77 2,907.81	226.07
08 91	19 00-0181	EA	78" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen. <i>For Flange Frame, Add</i> <i>For Clear Lacquer Finish, Add</i> <i>For Baked Enamel Standard Colors, Add</i> <i>For Anodized Finish, Add</i> <i>For Kynar® Standard Colors Finish, Add</i>	6,178.10 571.38 1,142.75 1,714.13 2,285.50 3,142.56	232.18

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0182 EA 84" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	1,578.13	103.87
Note: Includes bird screen.		
For Flange Frame, Add	137.04	
For Clear Lacquer Finish, Add	274.08	
For Baked Enamel Standard Colors, Add	411.12	
For Anodized Finish, Add	548.16	
For Kynar® Standard Colors Finish, Add	753.71	
08 91 19 00-0183 EA 84" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	1,936.90	122.20
Note: Includes bird screen.		
For Flange Frame, Add	169.25	
For Clear Lacquer Finish, Add	338.50	
For Baked Enamel Standard Colors, Add	507.75	
For Anodized Finish, Add	677.00	
For Kynar® Standard Colors Finish, Add	930.88	
08 91 19 00-0184 EA 84" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	2,264.82	140.53
Note: Includes bird screen.		
For Flange Frame, Add	198.38	
For Clear Lacquer Finish, Add	396.75	
For Baked Enamel Standard Colors, Add	595.13	
For Anodized Finish, Add	793.51	
For Kynar® Standard Colors Finish, Add	1,091.07	
08 91 19 00-0185 EA 84" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	2,612.00	149.69
Note: Includes bird screen.		
For Flange Frame, Add	231.26	
For Clear Lacquer Finish, Add	462.52	
For Baked Enamel Standard Colors, Add	693.78	
For Anodized Finish, Add	925.04	
For Kynar® Standard Colors Finish, Add	1,271.94	
08 91 19 00-0186 EA 84" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	3,080.57	155.80
Note: Includes bird screen.		
For Flange Frame, Add	276.90	
For Clear Lacquer Finish, Add	553.79	
For Baked Enamel Standard Colors, Add	830.69	
For Anodized Finish, Add	1,107.58	
For Kynar® Standard Colors Finish, Add	1,522.93	
08 91 19 00-0187 EA 84" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	3,394.78	161.91
Note: Includes bird screen.		
For Flange Frame, Add	307.10	
For Clear Lacquer Finish, Add	614.19	
For Baked Enamel Standard Colors, Add	921.29	
For Anodized Finish, Add	1,228.38	
For Kynar® Standard Colors Finish, Add	1,689.02	
08 91 19 00-0188 EA 84" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	3,697.66	171.08
Note: Includes bird screen.		
For Flange Frame, Add	335.55	
For Clear Lacquer Finish, Add	671.10	
For Baked Enamel Standard Colors, Add	1,006.65	
For Anodized Finish, Add	1,342.20	
For Kynar® Standard Colors Finish, Add	1,845.53	
08 91 19 00-0189 EA 84" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	4,058.85	177.19
Note: Includes bird screen.		
For Flange Frame, Add	370.45	
For Clear Lacquer Finish, Add	740.89	
For Baked Enamel Standard Colors, Add	1,111.34	
For Anodized Finish, Add	1,481.79	
For Kynar® Standard Colors Finish, Add	2,037.46	
08 91 19 00-0190 EA 84" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	4,363.07	186.35
Note: Includes bird screen.		
For Flange Frame, Add	399.04	
For Clear Lacquer Finish, Add	798.07	
For Baked Enamel Standard Colors, Add	1,197.11	
For Anodized Finish, Add	1,596.14	
For Kynar® Standard Colors Finish, Add	2,194.70	
08 91 19 00-0191 EA 84" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	4,851.30	201.63
Note: Includes bird screen.		
For Flange Frame, Add	444.81	
For Clear Lacquer Finish, Add	889.61	
For Baked Enamel Standard Colors, Add	1,334.42	
For Anodized Finish, Add	1,779.22	
For Kynar® Standard Colors Finish, Add	2,446.43	
08 91 19 00-0192 EA 84" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	5,148.81	210.80
Note: Includes bird screen.		
For Flange Frame, Add	472.72	
For Clear Lacquer Finish, Add	945.45	
For Baked Enamel Standard Colors, Add	1,418.17	
For Anodized Finish, Add	1,890.89	
For Kynar® Standard Colors Finish, Add	2,599.98	
08 91 19 00-0193 EA 84" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	5,475.84	219.96
Note: Includes bird screen.		
For Flange Frame, Add	503.59	
For Clear Lacquer Finish, Add	1,007.19	
For Baked Enamel Standard Colors, Add	1,510.78	
For Anodized Finish, Add	2,014.37	
For Kynar® Standard Colors Finish, Add	2,769.76	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
08 91 19 00-0194	EA 84" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	5,827.64	226.07
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	537.55	
	<i>For Clear Lacquer Finish, Add</i>	1,075.10	
	<i>For Baked Enamel Standard Colors, Add</i>	1,612.65	
	<i>For Anodized Finish, Add</i>	2,150.20	
	<i>For Kynar® Standard Colors Finish, Add</i>	2,956.53	
08 91 19 00-0195	EA 84" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	6,144.54	232.18
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	568.02	
	<i>For Clear Lacquer Finish, Add</i>	1,136.04	
	<i>For Baked Enamel Standard Colors, Add</i>	1,704.06	
	<i>For Anodized Finish, Add</i>	2,272.08	
	<i>For Kynar® Standard Colors Finish, Add</i>	3,124.10	
08 91 19 00-0196	EA 84" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	6,617.13	238.28
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	614.06	
	<i>For Clear Lacquer Finish, Add</i>	1,228.11	
	<i>For Baked Enamel Standard Colors, Add</i>	1,842.17	
	<i>For Anodized Finish, Add</i>	2,456.22	
	<i>For Kynar® Standard Colors Finish, Add</i>	3,377.31	
08 91 19 00-0197	EA 90" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	1,672.96	113.03
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	144.69	
	<i>For Clear Lacquer Finish, Add</i>	289.38	
	<i>For Baked Enamel Standard Colors, Add</i>	434.07	
	<i>For Anodized Finish, Add</i>	578.76	
	<i>For Kynar® Standard Colors Finish, Add</i>	795.79	
08 91 19 00-0198	EA 90" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	2,037.11	131.36
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	177.44	
	<i>For Clear Lacquer Finish, Add</i>	354.88	
	<i>For Baked Enamel Standard Colors, Add</i>	532.32	
	<i>For Anodized Finish, Add</i>	709.76	
	<i>For Kynar® Standard Colors Finish, Add</i>	975.91	
08 91 19 00-0199	EA 90" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	2,378.46	149.69
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	207.91	
	<i>For Clear Lacquer Finish, Add</i>	415.81	
	<i>For Baked Enamel Standard Colors, Add</i>	623.72	
	<i>For Anodized Finish, Add</i>	831.63	
	<i>For Kynar® Standard Colors Finish, Add</i>	1,143.49	
08 91 19 00-0200	EA 90" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	2,736.36	158.86
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	241.86	
	<i>For Clear Lacquer Finish, Add</i>	483.73	
	<i>For Baked Enamel Standard Colors, Add</i>	725.59	
	<i>For Anodized Finish, Add</i>	967.46	
	<i>For Kynar® Standard Colors Finish, Add</i>	1,330.25	
08 91 19 00-0201	EA 90" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	3,237.15	164.97
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	290.72	
	<i>For Clear Lacquer Finish, Add</i>	581.44	
	<i>For Baked Enamel Standard Colors, Add</i>	872.16	
	<i>For Anodized Finish, Add</i>	1,162.88	
	<i>For Kynar® Standard Colors Finish, Add</i>	1,598.97	
08 91 19 00-0202	EA 90" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	3,562.10	171.08
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	321.99	
	<i>For Clear Lacquer Finish, Add</i>	643.99	
	<i>For Baked Enamel Standard Colors, Add</i>	965.98	
	<i>For Anodized Finish, Add</i>	1,287.98	
	<i>For Kynar® Standard Colors Finish, Add</i>	1,770.97	
08 91 19 00-0203	EA 90" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum.....	3,872.29	177.19
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	351.79	
	<i>For Clear Lacquer Finish, Add</i>	703.58	
	<i>For Baked Enamel Standard Colors, Add</i>	1,055.37	
	<i>For Anodized Finish, Add</i>	1,407.16	
	<i>For Kynar® Standard Colors Finish, Add</i>	1,934.85	
08 91 19 00-0204	EA 90" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum.....	4,253.61	183.30
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	388.70	
	<i>For Clear Lacquer Finish, Add</i>	777.40	
	<i>For Baked Enamel Standard Colors, Add</i>	1,166.10	
	<i>For Anodized Finish, Add</i>	1,554.80	
	<i>For Kynar® Standard Colors Finish, Add</i>	2,137.86	
08 91 19 00-0205	EA 90" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum.....	4,573.94	192.47
	Note: Includes bird screen.		
	<i>For Flange Frame, Add</i>	418.90	
	<i>For Clear Lacquer Finish, Add</i>	837.80	
	<i>For Baked Enamel Standard Colors, Add</i>	1,256.70	
	<i>For Anodized Finish, Add</i>	1,675.60	
	<i>For Kynar® Standard Colors Finish, Add</i>	2,303.96	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
08 91 19 00-0206 EA 90" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum.....	5,090.35	207.74
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	467.49	
<i>For Clear Lacquer Finish, Add</i>	934.98	
<i>For Baked Enamel Standard Colors, Add</i>	1,402.46	
<i>For Anodized Finish, Add</i>	1,869.95	
<i>For Kynar® Standard Colors Finish, Add</i>	2,571.18	
08 91 19 00-0207 EA 90" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum.....	5,401.28	216.91
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	496.75	
<i>For Clear Lacquer Finish, Add</i>	993.50	
<i>For Baked Enamel Standard Colors, Add</i>	1,490.24	
<i>For Anodized Finish, Add</i>	1,986.99	
<i>For Kynar® Standard Colors Finish, Add</i>	2,732.11	
08 91 19 00-0208 EA 90" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum.....	5,757.85	226.07
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	530.57	
<i>For Clear Lacquer Finish, Add</i>	1,061.14	
<i>For Baked Enamel Standard Colors, Add</i>	1,591.72	
<i>For Anodized Finish, Add</i>	2,122.29	
<i>For Kynar® Standard Colors Finish, Add</i>	2,918.15	
08 91 19 00-0209 EA 90" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum.....	6,131.12	232.18
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	566.68	
<i>For Clear Lacquer Finish, Add</i>	1,133.35	
<i>For Baked Enamel Standard Colors, Add</i>	1,700.03	
<i>For Anodized Finish, Add</i>	2,266.71	
<i>For Kynar® Standard Colors Finish, Add</i>	3,116.72	
08 91 19 00-0210 EA 90" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum.....	6,446.08	241.34
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	596.34	
<i>For Clear Lacquer Finish, Add</i>	1,192.68	
<i>For Baked Enamel Standard Colors, Add</i>	1,789.02	
<i>For Anodized Finish, Add</i>	2,385.36	
<i>For Kynar® Standard Colors Finish, Add</i>	3,279.86	
08 91 19 00-0211 EA 90" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum.....	6,946.87	247.45
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	645.20	
<i>For Clear Lacquer Finish, Add</i>	1,290.39	
<i>For Baked Enamel Standard Colors, Add</i>	1,935.59	
<i>For Anodized Finish, Add</i>	2,580.78	
<i>For Kynar® Standard Colors Finish, Add</i>	3,548.58	
08 91 19 00-0212 EA 96" Wide x 12" High Fixed Intake Louver, Galvanized Aluminum.....	1,754.37	122.20
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	151.00	
<i>For Clear Lacquer Finish, Add</i>	302.00	
<i>For Baked Enamel Standard Colors, Add</i>	452.99	
<i>For Anodized Finish, Add</i>	603.99	
<i>For Kynar® Standard Colors Finish, Add</i>	830.49	
08 91 19 00-0213 EA 96" Wide x 18" High Fixed Intake Louver, Galvanized Aluminum.....	2,131.94	140.53
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	185.09	
<i>For Clear Lacquer Finish, Add</i>	370.18	
<i>For Baked Enamel Standard Colors, Add</i>	555.27	
<i>For Anodized Finish, Add</i>	740.36	
<i>For Kynar® Standard Colors Finish, Add</i>	1,017.99	
08 91 19 00-0214 EA 96" Wide x 24" High Fixed Intake Louver, Galvanized Aluminum.....	2,490.74	158.86
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	217.30	
<i>For Clear Lacquer Finish, Add</i>	434.60	
<i>For Baked Enamel Standard Colors, Add</i>	651.91	
<i>For Anodized Finish, Add</i>	869.21	
<i>For Kynar® Standard Colors Finish, Add</i>	1,195.16	
08 91 19 00-0215 EA 96" Wide x 30" High Fixed Intake Louver, Galvanized Aluminum.....	2,868.78	168.02
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	253.27	
<i>For Clear Lacquer Finish, Add</i>	506.55	
<i>For Baked Enamel Standard Colors, Add</i>	759.82	
<i>For Anodized Finish, Add</i>	1,013.09	
<i>For Kynar® Standard Colors Finish, Add</i>	1,393.00	
08 91 19 00-0216 EA 96" Wide x 36" High Fixed Intake Louver, Galvanized Aluminum.....	3,385.67	174.13
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	303.74	
<i>For Clear Lacquer Finish, Add</i>	607.48	
<i>For Baked Enamel Standard Colors, Add</i>	911.22	
<i>For Anodized Finish, Add</i>	1,214.96	
<i>For Kynar® Standard Colors Finish, Add</i>	1,670.57	
08 91 19 00-0217 EA 96" Wide x 42" High Fixed Intake Louver, Galvanized Aluminum.....	3,765.65	180.24
Note: Includes bird screen.		
<i>For Flange Frame, Add</i>	340.52	
<i>For Clear Lacquer Finish, Add</i>	681.03	
<i>For Baked Enamel Standard Colors, Add</i>	1,021.55	
<i>For Anodized Finish, Add</i>	1,362.06	
<i>For Kynar® Standard Colors Finish, Add</i>	1,872.84	

08 Openings**08 90 Louvers and Vents****08 91 Louvers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0218	EA		96" Wide x 48" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	4,095.97	186.35
			<i>For Flange Frame, Add</i>	372.33	
			<i>For Clear Lacquer Finish, Add</i>	744.65	
			<i>For Baked Enamel Standard Colors, Add</i>	1,116.98	
			<i>For Anodized Finish, Add</i>	1,489.30	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,047.79	
08 91 19 00-0219	EA		96" Wide x 54" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	4,458.51	192.47
			<i>For Flange Frame, Add</i>	407.36	
			<i>For Clear Lacquer Finish, Add</i>	814.72	
			<i>For Baked Enamel Standard Colors, Add</i>	1,222.07	
			<i>For Anodized Finish, Add</i>	1,629.43	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,240.47	
08 91 19 00-0220	EA		96" Wide x 60" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	4,794.19	198.58
			<i>For Flange Frame, Add</i>	439.71	
			<i>For Clear Lacquer Finish, Add</i>	879.41	
			<i>For Baked Enamel Standard Colors, Add</i>	1,319.12	
			<i>For Anodized Finish, Add</i>	1,758.82	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,418.38	
08 91 19 00-0221	EA		96" Wide x 66" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	5,349.54	213.85
			<i>For Flange Frame, Add</i>	492.19	
			<i>For Clear Lacquer Finish, Add</i>	984.37	
			<i>For Baked Enamel Standard Colors, Add</i>	1,476.56	
			<i>For Anodized Finish, Add</i>	1,968.74	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,707.02	
08 91 19 00-0222	EA		96" Wide x 72" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	4,227.00	223.02
			<i>For Flange Frame, Add</i>	378.10	
			<i>For Clear Lacquer Finish, Add</i>	756.20	
			<i>For Baked Enamel Standard Colors, Add</i>	1,134.29	
			<i>For Anodized Finish, Add</i>	1,512.39	
			<i>For Kynar® Standard Colors Finish, Add</i>	2,079.54	
08 91 19 00-0223	EA		96" Wide x 78" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	6,035.82	232.18
			<i>For Flange Frame, Add</i>	557.15	
			<i>For Clear Lacquer Finish, Add</i>	1,114.29	
			<i>For Baked Enamel Standard Colors, Add</i>	1,671.44	
			<i>For Anodized Finish, Add</i>	2,228.59	
			<i>For Kynar® Standard Colors Finish, Add</i>	3,064.31	
08 91 19 00-0224	EA		96" Wide x 84" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	6,422.52	238.28
			<i>For Flange Frame, Add</i>	594.60	
			<i>For Clear Lacquer Finish, Add</i>	1,189.19	
			<i>For Baked Enamel Standard Colors, Add</i>	1,783.79	
			<i>For Anodized Finish, Add</i>	2,378.38	
			<i>For Kynar® Standard Colors Finish, Add</i>	3,270.27	
08 91 19 00-0225	EA		96" Wide x 90" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	6,753.59	247.45
			<i>For Flange Frame, Add</i>	625.87	
			<i>For Clear Lacquer Finish, Add</i>	1,251.74	
			<i>For Baked Enamel Standard Colors, Add</i>	1,877.60	
			<i>For Anodized Finish, Add</i>	2,503.47	
			<i>For Kynar® Standard Colors Finish, Add</i>	3,442.27	
08 91 19 00-0226	EA		96" Wide x 96" High Fixed Intake Louver, Galvanized Aluminum..... Note: Includes bird screen.	7,291.35	256.61
			<i>For Flange Frame, Add</i>	677.81	
			<i>For Clear Lacquer Finish, Add</i>	1,355.62	
			<i>For Baked Enamel Standard Colors, Add</i>	2,033.43	
			<i>For Anodized Finish, Add</i>	2,711.24	
			<i>For Kynar® Standard Colors Finish, Add</i>	3,727.96	
08 91 19 00-0227			Gable Louver Vents <small>(08 91 19)</small> Note: 1" deep, residential/light commercial grade louvers.		
08 91 19 00-0228			Aluminum Gable Louver Vents <small>(08 91 19 00-0227)</small> Note: Includes screen.		
08 91 19 00-0229			Rectangular Aluminum Gable Louver Vents <small>(08 91 19 00-0228)</small> Note: Includes screen.		
08 91 19 00-0230	EA		12" x 18" Rectangular Fixed Aluminum Gable Louver Vent.....	267.93	10.32
08 91 19 00-0231	EA		12" x 24" Rectangular Fixed Aluminum Gable Louver Vent.....	292.80	11.84
08 91 19 00-0232	EA		18" x 24" Rectangular Fixed Aluminum Gable Louver Vent.....	337.97	13.37
08 91 19 00-0233	EA		18" x 30" Rectangular Fixed Aluminum Gable Louver Vent.....	370.90	14.21
08 91 19 00-0234	EA		24" x 30" Rectangular Fixed Aluminum Gable Louver Vent.....	424.12	15.05
08 91 19 00-0235	EA		24" x 36" Rectangular Fixed Aluminum Gable Louver Vent.....	473.73	18.06
08 91 19 00-0236	EA		30" x 36" Rectangular Fixed Aluminum Gable Louver Vent.....	548.14	22.57
08 91 19 00-0237	EA		30" x 42" Rectangular Fixed Aluminum Gable Louver Vent.....	610.16	26.34
08 91 19 00-0238	EA		36" x 42" Rectangular Fixed Aluminum Gable Louver Vent.....	696.97	31.60
08 91 19 00-0239	EA		42" x 48" Rectangular Fixed Aluminum Gable Louver Vent.....	870.58	42.13
08 91 19 00-0240			Square Aluminum Gable Louver Vents <small>(08 91 19 00-0228)</small> Note: Includes screen.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
08 91 19 00-0241 EA 12" x 12" Square Fixed Aluminum Gable Louver Vent	245.21	9.50
08 91 19 00-0242 EA 18" x 18" Square Fixed Aluminum Gable Louver Vent	303.52	12.04
08 91 19 00-0243 EA 24" x 24" Square Fixed Aluminum Gable Louver Vent	381.03	14.20
08 91 19 00-0244 EA 30" x 30" Square Fixed Aluminum Gable Louver Vent	486.14	18.81
08 91 19 00-0245 EA 36" x 36" Square Fixed Aluminum Gable Louver Vent	622.55	27.09
08 91 19 00-0246 EA 42" x 42" Square Fixed Aluminum Gable Louver Vent	783.70	36.85
08 91 19 00-0247 EA 48" x 48" Square Fixed Aluminum Gable Louver Vent	969.80	48.15
08 91 19 00-0248 Round Aluminum Gable Louver Vents (08 91 19 00-0228)		
Note: Includes screen.		
08 91 19 00-0249 EA 12" Diameter Round Fixed Aluminum Gable Louver Vent.....	245.21	9.50
08 91 19 00-0250 EA 18" Diameter Round Fixed Aluminum Gable Louver Vent.....	303.52	12.04
08 91 19 00-0251 EA 24" Diameter Round Fixed Aluminum Gable Louver Vent.....	381.03	14.20
08 91 19 00-0252 EA 30" Diameter Round Fixed Aluminum Gable Louver Vent.....	486.14	18.81
08 91 19 00-0253 EA 36" Diameter Round Fixed Aluminum Gable Louver Vent.....	622.55	27.09
08 91 19 00-0254 EA 42" Diameter Round Fixed Aluminum Gable Louver Vent.....	783.78	36.87
08 91 19 00-0255 Octagonal Aluminum Gable Louver Vents (08 91 19 00-0228)		
Note: Includes screen.		
08 91 19 00-0256 EA 12" x 12" Octagonal Fixed Aluminum Gable Louver Vent.....	245.21	9.50
08 91 19 00-0257 EA 12" x 18" Octagonal Fixed Aluminum Gable Louver Vent.....	267.93	10.32
08 91 19 00-0258 EA 12" x 24" Octagonal Fixed Aluminum Gable Louver Vent.....	292.80	11.84
08 91 19 00-0259 EA 18" x 18" Octagonal Fixed Aluminum Gable Louver Vent.....	303.52	12.04
08 91 19 00-0260 EA 18" x 24" Octagonal Fixed Aluminum Gable Louver Vent.....	337.97	13.37
08 91 19 00-0261 EA 18" x 30" Octagonal Fixed Aluminum Gable Louver Vent.....	370.90	14.21
08 91 19 00-0262 EA 24" x 24" Octagonal Fixed Aluminum Gable Louver Vent.....	381.03	14.20
08 91 19 00-0263 EA 24" x 30" Octagonal Fixed Aluminum Gable Louver Vent.....	424.12	15.05
08 91 19 00-0264 EA 24" x 36" Octagonal Fixed Aluminum Gable Louver Vent.....	473.73	18.06
08 91 19 00-0265 EA 30" x 30" Octagonal Fixed Aluminum Gable Louver Vent.....	486.14	18.81
08 91 19 00-0266 EA 30" x 36" Octagonal Fixed Aluminum Gable Louver Vent.....	548.14	22.57
08 91 19 00-0267 EA 30" x 42" Octagonal Fixed Aluminum Gable Louver Vent.....	610.16	26.34
08 91 19 00-0268 EA 36" x 36" Octagonal Fixed Aluminum Gable Louver Vent.....	622.55	27.09
08 91 19 00-0269 EA 36" x 42" Octagonal Fixed Aluminum Gable Louver Vent.....	696.97	31.60
08 91 19 00-0270 EA 36" x 48" Octagonal Fixed Aluminum Gable Louver Vent.....	771.37	36.12
08 91 19 00-0271 EA 42" x 42" Octagonal Fixed Aluminum Gable Louver Vent.....	783.78	36.87
08 91 19 00-0272 EA 42" x 48" Octagonal Fixed Aluminum Gable Louver Vent.....	870.58	42.13
08 91 19 00-0273 EA 48" x 48" Octagonal Fixed Aluminum Gable Louver Vent.....	969.80	48.15
08 91 19 00-0274 Round Top Aluminum Gable Louver Vents (08 91 19 00-0228)		
Note: Includes screen.		
08 91 19 00-0275 EA 12" x 12" Round Top Fixed Aluminum Gable Louver Vent.....	245.21	9.50
08 91 19 00-0276 EA 12" x 18" Round Top Fixed Aluminum Gable Louver Vent.....	267.93	10.32
08 91 19 00-0277 EA 12" x 24" Round Top Fixed Aluminum Gable Louver Vent.....	292.80	11.84
08 91 19 00-0278 EA 18" x 18" Round Top Fixed Aluminum Gable Louver Vent.....	303.52	12.04
08 91 19 00-0279 EA 18" x 24" Round Top Fixed Aluminum Gable Louver Vent.....	337.97	13.37
08 91 19 00-0280 EA 18" x 30" Round Top Fixed Aluminum Gable Louver Vent.....	370.90	14.21
08 91 19 00-0281 EA 24" x 24" Round Top Fixed Aluminum Gable Louver Vent.....	381.03	14.20
08 91 19 00-0282 EA 24" x 30" Round Top Fixed Aluminum Gable Louver Vent.....	424.12	15.05
08 91 19 00-0283 EA 24" x 36" Round Top Fixed Aluminum Gable Louver Vent.....	473.73	18.06
08 91 19 00-0284 EA 30" x 30" Round Top Fixed Aluminum Gable Louver Vent.....	486.14	18.81
08 91 19 00-0285 EA 30" x 36" Round Top Fixed Aluminum Gable Louver Vent.....	548.14	22.57
08 91 19 00-0286 EA 30" x 42" Round Top Fixed Aluminum Gable Louver Vent.....	610.16	26.34
08 91 19 00-0287 EA 36" x 36" Round Top Fixed Aluminum Gable Louver Vent.....	622.55	27.09
08 91 19 00-0288 EA 36" x 42" Round Top Fixed Aluminum Gable Louver Vent.....	696.97	31.60
08 91 19 00-0289 EA 36" x 48" Round Top Fixed Aluminum Gable Louver Vent.....	771.37	36.12
08 91 19 00-0290 EA 42" x 42" Round Top Fixed Aluminum Gable Louver Vent.....	783.78	36.87
08 91 19 00-0291 EA 42" x 48" Round Top Fixed Aluminum Gable Louver Vent.....	870.58	42.13
08 91 19 00-0292 EA 48" x 48" Round Top Fixed Aluminum Gable Louver Vent.....	969.80	48.15
08 91 19 00-0293 Triangle Aluminum Gable Louver Vents (08 91 19 00-0228)		
Note: Includes screen.		
08 91 19 00-0294 EA 36" Base x 30" High Triangle Fixed Aluminum Gable Louver Vent.....	515.94	11.84
08 91 19 00-0295 EA 36" Base x 36" High Triangle Fixed Aluminum Gable Louver Vent.....	583.88	14.20
08 91 19 00-0296 EA 48" Base x 30" High Triangle Fixed Aluminum Gable Louver Vent.....	626.97	15.05
08 91 19 00-0297 EA 48" Base x 36" High Triangle Fixed Aluminum Gable Louver Vent.....	717.15	18.06
08 91 19 00-0298 EA 48" Base x 42" High Triangle Fixed Aluminum Gable Louver Vent.....	800.55	18.81
08 91 19 00-0299 EA 60" Base x 24" High Triangle Fixed Aluminum Gable Louver Vent.....	649.56	22.57
08 91 19 00-0300 EA 60" Base x 30" High Triangle Fixed Aluminum Gable Louver Vent.....	762.30	26.34
08 91 19 00-0301 EA 60" Base x 36" High Triangle Fixed Aluminum Gable Louver Vent.....	865.97	27.09
08 91 19 00-0302 EA 60" Base x 42" High Triangle Fixed Aluminum Gable Louver Vent.....	980.96	31.60
08 91 19 00-0303 EA 72" Base x 24" High Triangle Fixed Aluminum Gable Louver Vent.....	771.37	36.12
08 91 19 00-0304 EA 72" Base x 30" High Triangle Fixed Aluminum Gable Louver Vent.....	895.34	36.87
08 91 19 00-0305 EA 72" Base x 36" High Triangle Fixed Aluminum Gable Louver Vent.....	1,032.86	42.13
08 91 19 00-0306 EA 72" Base x 42" High Triangle Fixed Aluminum Gable Louver Vent.....	1,172.65	48.15
08 91 19 00-0307 EA 72" Base x 48" High Triangle Fixed Aluminum Gable Louver Vent.....	1,315.92	55.34

08	08	Openings
	08 90	Louvers and Vents
	08 91	Louvers



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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08 91 19 00-0308 Vinyl Gable Louver Vents <small>(08 91 19 00-0227)</small>		
Note: Includes screen.		
08 91 19 00-0309 EA	12" x 12" Square Fixed Vinyl Gable Louver Vent.....	75.37 9.50
08 91 19 00-0310 EA	12" x 18" Rectangular Fixed Vinyl Gable Louver Vent.....	91.89 10.32
08 91 19 00-0311 EA	18" x 24" Rectangular Fixed Vinyl Gable Louver Vent.....	125.86 13.37
08 91 19 00-0312 EA	24" x 30" Rectangular Fixed Vinyl Gable Louver Vent.....	174.69 15.05
08 91 19 00-0313 EA	18" Diameter Round Fixed Vinyl Gable Louver Vent.....	122.50 12.04
08 91 19 00-0314 EA	22" Diameter Round Fixed Vinyl Gable Louver Vent.....	141.35 14.20
08 91 19 00-0315 EA	30" Diameter Round Fixed Vinyl Gable Louver Vent.....	200.18 18.81
08 91 19 00-0316 EA	36" Diameter Round Fixed Vinyl Gable Louver Vent.....	292.83 27.09
08 91 19 00-0317 EA	18" x 18" Octagonal Fixed Vinyl Gable Louver Vent.....	122.50 12.04
08 91 19 00-0318 EA	22" x 22" Octagonal Fixed Vinyl Gable Louver Vent.....	138.85 13.37
08 91 19 00-0319 EA	27" x 27" Octagonal Fixed Vinyl Gable Louver Vent.....	180.68 15.05
08 91 19 00-0320 EA	32" x 32" Octagonal Fixed Vinyl Gable Louver Vent.....	255.74 22.57
08 91 19 00-0321 EA	40" x 40" Octagonal Fixed Vinyl Gable Louver Vent.....	620.08 36.12
08 91 19 00-0322 EA	14" x 22" Round Top Fixed Vinyl Gable Louver Vent.....	120.03 11.84
08 91 19 00-0323 EA	22" x 32" Round Top Fixed Vinyl Gable Louver Vent.....	168.29 15.05
08 91 19 00-0324 EA	34" x 22" Half Round Fixed Vinyl Gable Louver Vent.....	172.65 18.06
08 91 19 00-0325 EA	52" Base x 26" High Triangle Fixed Vinyl Gable Louver Vent.....	409.36 22.57
08 91 19 00-0326 EA	56" Base x 23" High Triangle Fixed Vinyl Gable Louver Vent.....	409.36 22.57
08 91 19 00-0327 EA	56" Base x 26" High Triangle Fixed Vinyl Gable Louver Vent.....	409.36 22.57
08 91 19 00-0328 EA	62" Base x 23" High Triangle Fixed Vinyl Gable Louver Vent.....	409.36 22.57
08 91 19 00-0329 EA	62-1/2" Base x 21" High Triangle Fixed Vinyl Gable Louver Vent.....	409.36 22.57
08 91 19 00-0330 EA	70-1/2" Base x 17" High Triangle Fixed Vinyl Gable Louver Vent.....	450.03 36.12
08 91 19 00-0331 EA	70-1/2" Base x 20-1/2" High Triangle Fixed Vinyl Gable Louver Vent.....	450.03 36.12
08 91 19 00-0332 EA	72-1/2" Base x 18" High Triangle Fixed Vinyl Gable Louver Vent.....	450.03 36.12
08 91 19 00-0333 EA	74" Base x 14-1/2" High Triangle Fixed Vinyl Gable Louver Vent.....	450.03 36.12

08 95 Vents (08 90)

08 95 13 Soffit Vents <small>(08 95)</small>		
08 95 13 00-0001 Aluminum Soffit Vents <small>(08 95 13)</small>		
08 95 13 00-0002 LF	2-1/2" Wide Aluminum Soffit Vent.....	8.11 2.81
08 95 13 00-0003 LF	3" Wide Aluminum Soffit Vent.....	14.33 5.50
08 95 13 00-0004 EA	4" x 16" Under Eave Vent, Mill Finish.....	24.12 7.33
08 95 13 00-0005 EA	8" x 16" Under Eave Vent, Mill Finish.....	25.11 7.33

08 95 13 00-0006 Vinyl Soffit Vents <small>(08 95 13)</small>		
08 95 13 00-0007 LF	Up To 2" Vinyl Soffit Vent, Perforated, White.....	7.38 3.11
	<i>For Colors, Add</i>	<i>0.12</i>
08 95 13 00-0008 LF	3" To 4" Vinyl Soffit Vent, Perforated, White.....	7.57 3.11
	<i>For Colors, Add</i>	<i>0.14</i>

08 95 16 Wall Vents (08 95)

08 95 16 00-0001 Foundation Vents <small>(08 95 16)</small>		
08 95 16 00-0002 SI	Galvanized Steel Foundation Vent.....	0.49 0.19
08 95 16 00-0003 SI	Aluminum Foundation Vent.....	0.99 0.19
08 95 16 00-0004 SI	Stainless Steel Foundation Vent.....	1.09 0.19
08 95 16 00-0005 SI	Plastic Foundation Vent.....	0.68 0.19

END OF SECTION 08



Finishes	09	09
Maintenance of Finishes	09 01	
Maintenance of Plaster and Gypsum Board	09 01 20	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 Finishes

09 01 Maintenance of Finishes (09)

09 01 20 Maintenance of Plaster and Gypsum Board (09 01)

09 01 20 91 Plaster Restoration (09 01 20)

09 01 20 91-0001		Cut And Patch Hole In Gypsum Board To Match Existing <small>(09 01 20 91)</small> Note: Includes cutting of existing gypsum board, cutting new board to fit opening, taping, gypsum board finishing, and disposal of debris into dumpster. Per location. See CSI section 09 29 00 00-0000 for "Gypsum Board" repairs > 32 SF.	
09 01 20 91-0002	SF	Up To 2 SF, Cut And Patch Hole In Gypsum Board To Match Existing	21.20
		Note: Per location.	
09 01 20 91-0003	SF	>2 To 4 SF, Cut And Patch Hole In Gypsum Board To Match Existing	17.15
		Note: Per location.	
09 01 20 91-0004	SF	>4 To 8 SF, Cut And Patch Hole In Gypsum Board To Match Existing	15.40
		Note: Per location.	
09 01 20 91-0005	SF	>8 To 16 SF, Cut And Patch Hole In Gypsum Board To Match Existing	13.59
		Note: Per location.	
09 01 20 91-0006	SF	>16 To 32 SF, Cut And Patch Hole In Gypsum Board To Match Existing	12.18
		Note: Per location. See CSI section 09 29 10 00-0001 for "Gypsum Board" repairs > 32 SF.	

09 01 20 91-0007 Plaster/Stucco Repair (09 01 20 91)

Note: Per location.

09 01 20 91-0008		Clean And Repair Crack In Plaster/Stucco <small>(09 01 20 91-0007)</small> Note: Includes plaster weld.	
09 01 20 91-0009	LF	Up To 10', Chip, Clean And Repair Crack In Plaster/Stucco	20.55
09 01 20 91-0010	LF	>10' To 50', Chip, Clean And Repair Crack In Plaster/Stucco	16.50
09 01 20 91-0011	LF	>50' To 100', Chip, Clean And Repair Crack In Plaster/Stucco	13.46
09 01 20 91-0012	LF	>100' To 250', Chip, Clean And Repair Crack In Plaster/Stucco	10.41
09 01 20 91-0013	LF	>250' To 500', Chip, Clean And Repair Crack In Plaster/Stucco	8.38
09 01 20 91-0014	LF	>500', Chip, Clean And Repair Crack In Plaster/Stucco	6.36

09 01 20 91-0015 Cut And Patch Hole In Plaster/Stucco To Match Existing (09 01 20 91-0007)

Note: Includes plaster weld.

09 01 20 91-0016	SF	Up To 10 SF, Cut And Patch Hole In Plaster To Match Existing	19.69
09 01 20 91-0017	SF	>10 To 50 SF, Cut And Patch Hole In Plaster To Match Existing	17.44
09 01 20 91-0018	SF	>50 To 100 SF, Cut And Patch Hole In Plaster To Match Existing	16.06
09 01 20 91-0019	SF	>100 To 250 SF, Cut And Patch Hole In Plaster To Match Existing	14.94
09 01 20 91-0020	SF	>250 To 500 SF, Cut And Patch Hole In Plaster To Match Existing	13.95
09 01 20 91-0021	SF	>500 SF, Cut And Patch Hole In Plaster To Match Existing	12.84

09 01 20 91-0022 Chip, Clean And Repair Plaster/Stucco (09 01 20 91-0007)

Note: Includes plaster weld.

09 01 20 91-0023	SF	Up To 10 SF, Chip, Clean And Repair Plaster/Stucco	37.07
09 01 20 91-0024	SF	>10 To 50 SF, Chip, Clean And Repair Plaster/Stucco	26.93
09 01 20 91-0025	SF	>50 To 250 SF, Chip, Clean And Repair Plaster/Stucco	19.83
09 01 20 91-0026	SF	>250 SF, Chip, Clean And Repair Plaster/Stucco	15.78

09 01 20 91-0027 Patch/Finish Gypsum Board To Match Existing (09 01 20 91)

Note: Includes taping, gypsum board finishing. Per location. See CSI section 09 01 20 91-0001 for patching walls requiring gypsum board to be cut and installed.

09 01 20 91-0028	EA	Tape, Spackle And Finish Gypsum Board To Patch/Finish Small Diameter Holes Or Screw Head Pops	1.86
		<i>For ASTM C840 Level 1 Finish, Deduct</i>	-0.89
		<i>For ASTM C840 Level 2 Finish, Deduct</i>	-0.45
		<i>For ASTM C840 Level 3 Finish, Deduct</i>	-0.18
		<i>For ASTM C840 Level 5 High Quality Finish, Add</i>	1.38

09 01 30 Maintenance of Tiling (09 01)

09 01 30 91 Tile Restoration (09 01 30)

09 01 30 91-0001	SF	RegROUT Floor Tile Including Removal Of Loose Grout	7.49
09 01 30 91-0002	SF	RegROUT Wall Tile Including Removal Of Loose Grout	9.34
09 01 30 91-0003	SF	Up To 1 SF, Cut And Patch Hole In Wall Tile To Match Existing	48.47
		Note: Per location.	

09 01 60 Maintenance of Flooring (09 01)

09 01 60 91 Flooring Restoration (09 01 60)

09 01 60 91-0001		Grinding, Polishing And Sealing Terrazzo <small>(09 01 60 91)</small>	
09 01 60 91-0002	CSF	Grinding, Polishing And Sealing Existing Terrazzo	320.01

09 Finishes
09 01 Maintenance of Finishes
09 01 60 Maintenance of Flooring



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 01 60 91-0003	SF		Removal Of Setting Bed And Clean Area For Terrazzo Repair	4.84	
09 01 60 91-0004	SF		Repair Existing Terrazzo.....	22.90	
09 01 60 91-0005	LF		Repair Cracks In Existing Terrazzo	5.06	

09 01 60 91-0006 Prepare Existing Concrete Floor Prior To Installation Of Flooring (09 01 60 91)

09 01 60 91-0007	SY		Grinding Of Existing Concrete Floor Prior To Installation Of Flooring.....	9.77	
			Note: Up to 1/8" of material per pass		
09 01 60 91-0008	LF		Up To 6" Wide, Hand Detail Work/Grinding At Wall Of Existing Concrete Floor Prior To Installation Of Flooring.....	18.32	
			Note: Up to 1/4" of material per pass		
09 01 60 91-0009	SY		Chemical Prepare Existing Concrete Floor Prior To Installation Of Flooring.....	8.70	

09 01 60 91-0010 Floor Sealants (09 01 60 91)

09 01 60 91-0011	SF		Water-Based Emulsion, Masonry/Tile/Stone/Terrazzo Floor Sealant/Finish, Per Coat	1.28	
			Note: For terrazzo, concrete, quarry tile, brick and unglazed ceramic tile.		
09 01 60 91-0012	SF		Water-Based, Clear Acrylic, Concrete Floor Sealant/Finish, Per Coat	1.46	
			Note: For interior/exterior concrete surfaces.		
09 01 60 91-0013	SF		Fluorochemical Acrylate Copolymer Masonry/Tile/Stone/Terrazzo Floor Sealant	1.41	
09 01 60 91-0014	GAL		Masonry/Tile/Stone/Terrazzo Floor Sealant (Extra To Be Provided To Owner).....	50.82	

09 01 60 91-0015 Standard Flooring Maintenance (09 01 60 91)

09 01 60 91-0016	CSF		Steam Clean Carpet	49.59	
			For Up To 1, Add	23.56	
			For >1 To 5, Add	9.42	
09 01 60 91-0017	CSF		Wax And Polish Tile And VCT Flooring	54.53	
			For Up To 1, Add	24.80	
			For >1 To 5, Add	9.92	
			For Additional Coat, Add	45.60	
			For Stripping Existing Wax From Floor, Add	51.89	
09 01 60 91-0018	CSF		Wax And Polish Wood Flooring	33.10	
			For Up To 1, Add	13.24	
			For >1 To 5, Add	5.29	
			For Additional Coat, Add	29.13	
			For Stripping Existing Wax From Floor, Add	51.89	
09 01 60 91-0019	MSF		Vacuum Floors.....	27.62	

09 01 80 Maintenance of Acoustic Treatment (09 01)

09 01 80 00-0001			Removal Of Acoustical Ceiling Treatment (09 01 80)		
09 01 80 00-0002	SF		Removal Of Acoustical And Popcorn Ceilings Treatment.....	2.41	

09 01 90 Maintenance of Painting and Coating (09 01)

09 01 90 52 Maintenance Repainting (09 01 90)

09 01 90 52-0001 Cleaning And Preparation Of Painted And Unpainted Surfaces (09 01 90 52)

Note: In excess of surface preparation required. Water blast and pressure washing includes mild detergent and rinsing of surface until detergent free. Media blast and water blast includes canvas/plastic for protection of existing surfaces as well as for containment and collection.

09 01 90 52-0002 Concrete And Masonry Surfaces, Surface Preparation (09 01 90 52-0001)

09 01 90 52-0003	SF		Trisodium Phosphate (TSP), Clean Concrete Or Masonry Surfaces, Surface Preparation	0.45	
			For Up To 100, Add	0.32	
			For >100 To 250, Add	0.15	
			For >250 To 500, Add	0.06	
			For >5,000 To 10,000, Deduct	-0.02	
			For >10,000 To 15,000, Deduct	-0.04	
			For >15,000 To 30,000, Deduct	-0.07	
			For >30,000, Deduct	-0.09	
09 01 90 52-0004	SF		Calcimine Removal/Washing, Concrete And Masonry Surfaces, Surface Preparation.....	0.48	
			For Up To 100, Add	0.81	
			For >100 To 250, Add	0.22	
			For >250 To 500, Add	0.11	
			For >5,000 To 10,000, Deduct	-0.02	
			For >10,000 To 15,000, Deduct	-0.04	
			For >15,000 To 30,000, Deduct	-0.07	
			For >30,000, Deduct	-0.09	
09 01 90 52-0005	SF		Chemical Clean, Brush And Wash, Concrete And Masonry Surfaces, Surface Preparation	0.74	
			For Up To 100, Add	1.23	
			For >100 To 250, Add	0.33	
			For >250 To 500, Add	0.16	
			For >5,000 To 10,000, Deduct	-0.03	
			For >10,000 To 15,000, Deduct	-0.07	
			For >15,000 To 30,000, Deduct	-0.11	
			For >30,000, Deduct	-0.14	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 01 90 52-0006 SF Hand Scrape, Concrete And Masonry Surfaces, Surface Preparation	0.62	
For Up To 100, Add	1.24	
For >100 To 250, Add	0.31	
For >250 To 500, Add	0.16	
For >5,000 To 10,000, Deduct	-0.03	
For >10,000 To 15,000, Deduct	-0.06	
For >15,000 To 30,000, Deduct	-0.09	
For >30,000, Deduct	-0.12	
09 01 90 52-0007 SF Steam Clean, Concrete And Masonry Surfaces, Surface Preparation.....	0.90	
For Up To 100, Add	1.58	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.20	
For >5,000 To 10,000, Deduct	-0.04	
For >10,000 To 15,000, Deduct	-0.08	
For >15,000 To 30,000, Deduct	-0.13	
For >30,000, Deduct	-0.17	
09 01 90 52-0008 SF 2,000 To 5,000 PSI Pressure Wash, Concrete And Masonry Surfaces, Surface Preparation	0.59	
For Up To 100, Add	0.97	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.13	
For >5,000 To 10,000, Deduct	-0.03	
For >10,000 To 15,000, Deduct	-0.05	
For >15,000 To 30,000, Deduct	-0.08	
For >30,000, Deduct	-0.11	
09 01 90 52-0009 SF 10,000 To 12,000 PSI Water Blast, Concrete And Masonry Surfaces, Surface Preparation	1.62	
For Up To 100, Add	2.94	
For >100 To 250, Add	0.76	
For >250 To 500, Add	0.38	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 15,000, Deduct	-0.15	
For >15,000 To 30,000, Deduct	-0.24	
For >30,000, Deduct	-0.31	
09 01 90 52-0010 SF 30,000 To 40,000 PSI Water Blast, Concrete And Masonry Surfaces, Surface Preparation	2.68	
For Up To 100, Add	5.06	
For >100 To 250, Add	1.29	
For >250 To 500, Add	0.64	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 15,000, Deduct	-0.26	
For >15,000 To 30,000, Deduct	-0.40	
For >30,000, Deduct	-0.53	
09 01 90 52-0011 SF Abrasive Glass Media Blasting, Concrete And Masonry Surfaces, Surface Preparation	3.89	
Note: 3 lbs of sand or glass abrasive media material per SF		
For 4.5 lbs Of Abrasive Media Material per SF, Where Multiple Pass Is Required, Add	2.26	
For 6 lbs Of Abrasive Media Material per SF, Where Multiple Pass Is Required, Add	4.67	
For 9 lbs Of Abrasive Media Material per SF, Where Multiple Pass Is Required, Add	7.78	
For Up To 100, Add	6.64	
For >100 To 250, Add	1.76	
For >250 To 500, Add	0.86	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 15,000, Deduct	-0.36	
For >15,000 To 30,000, Deduct	-0.56	
For >30,000, Deduct	-0.74	
09 01 90 52-0012 Drywall Surfaces, Surface Preparation (09 01 90 52-0001)		
See CSI section 09 01 20 91-0027 for Patch holes other than nail/screw holes and greater than 1/2" diameter.		
09 01 90 52-0013 SF Hand Wash Drywall Surfaces With Mild Detergent Or Degreaser (No Sanding, Repairing Or Scraping), Surface Preparation	0.35	
For Up To 100, Add	0.70	
For >100 To 250, Add	0.18	
For >250 To 500, Add	0.09	
09 01 90 52-0014 SF Hand Wash, Minor Repair And Light Sanding Drywall Surfaces, Surface Preparation.....	0.58	
For Up To 100, Add	1.16	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.15	
09 01 90 52-0015 SF Hand Scrape, Repair And Sand Severely Damaged Drywall Surfaces, Surface Preparation.....	1.11	
For Up To 100, Add	2.10	
For >100 To 250, Add	0.54	
For >250 To 500, Add	0.27	
09 01 90 52-0016 Metal Surfaces, Surface Preparation (09 01 90 52-0001)		
09 01 90 52-0017 SF Trisodium Phosphate (TSP), Clean Metal Surfaces, Surface Preparation.....	0.43	
For Up To 100, Add	0.31	
For >100 To 250, Add	0.14	
For >250 To 500, Add	0.06	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 15,000, Deduct	-0.04	
For >15,000 To 30,000, Deduct	-0.06	
For >30,000, Deduct	-0.09	

09 Finishes

09 01 Maintenance of Finishes

09 01 90 Maintenance of Painting and Coating



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

09 01 90 52-0018	SF	Chemical Clean, Brush And Wash, Metal Surfaces, Surface Preparation	0.74
		<i>For Up To 100, Add</i>	0.43
		<i>For >100 To 250, Add</i>	0.20
		<i>For >250 To 500, Add</i>	0.09
		<i>For >5,000 To 10,000, Deduct</i>	-0.03
		<i>For >10,000 To 15,000, Deduct</i>	-0.07
		<i>For >15,000 To 30,000, Deduct</i>	-0.11
		<i>For >30,000, Deduct</i>	-0.14
09 01 90 52-0019	SF	Hand Scraping And Sanding, Metal Surfaces, Surface Preparation	0.62
		<i>For Up To 100, Add</i>	0.47
		<i>For >100 To 250, Add</i>	0.22
		<i>For >250 To 500, Add</i>	0.09
		<i>For >5,000 To 10,000, Deduct</i>	-0.03
		<i>For >10,000 To 15,000, Deduct</i>	-0.06
		<i>For >15,000 To 30,000, Deduct</i>	-0.09
		<i>For >30,000, Deduct</i>	-0.12
09 01 90 52-0020	SF	2,000 To 5,000 PSI Pressure Wash, Metal Surfaces, Surface Preparation	0.56
		<i>For Up To 100, Add</i>	0.34
		<i>For >100 To 250, Add</i>	0.16
		<i>For >250 To 500, Add</i>	0.07
		<i>For >5,000 To 10,000, Deduct</i>	-0.03
		<i>For >10,000 To 15,000, Deduct</i>	-0.05
		<i>For >15,000 To 30,000, Deduct</i>	-0.08
		<i>For >30,000, Deduct</i>	-0.11
09 01 90 52-0021	SF	Power Tool Cleaning, Metal Surfaces, Surface Preparation	1.38
		<i>For Up To 100, Add</i>	1.04
		<i>For >100 To 250, Add</i>	0.48
		<i>For >250 To 500, Add</i>	0.21
		<i>For >5,000 To 10,000, Deduct</i>	-0.07
		<i>For >10,000 To 15,000, Deduct</i>	-0.14
		<i>For >15,000 To 30,000, Deduct</i>	-0.21
		<i>For >30,000, Deduct</i>	-0.28
09 01 90 52-0022	SF	Steam Cleaning, Metal Surfaces, Surface Preparation.....	0.56
		<i>For Up To 100, Add</i>	0.31
		<i>For >100 To 250, Add</i>	0.14
		<i>For >250 To 500, Add</i>	0.06
		<i>For >5,000 To 10,000, Deduct</i>	-0.03
		<i>For >10,000 To 15,000, Deduct</i>	-0.05
		<i>For >15,000 To 30,000, Deduct</i>	-0.08
		<i>For >30,000, Deduct</i>	-0.10
09 01 90 52-0023	SF	Loose Mill Scale With Fine Powder, Commercial Blast, Metal Surfaces, Surface Preparation	1.21
		<i>For Up To 100, Add</i>	0.75
		<i>For >100 To 250, Add</i>	0.35
		<i>For >250 To 500, Add</i>	0.15
		<i>For >5,000 To 10,000, Deduct</i>	-0.06
		<i>For >10,000 To 15,000, Deduct</i>	-0.11
		<i>For >15,000 To 30,000, Deduct</i>	-0.18
		<i>For >30,000, Deduct</i>	-0.23
09 01 90 52-0024	SF	Tight Mill Scale With Fine Powder Rust, Commercial Blast, Metal Surfaces, Surface Preparation	1.63
		<i>For Up To 100, Add</i>	0.99
		<i>For >100 To 250, Add</i>	0.46
		<i>For >250 To 500, Add</i>	0.20
		<i>For >5,000 To 10,000, Deduct</i>	-0.08
		<i>For >10,000 To 15,000, Deduct</i>	-0.15
		<i>For >15,000 To 30,000, Deduct</i>	-0.24
		<i>For >30,000, Deduct</i>	-0.31
09 01 90 52-0025	SF	Exterior Coating Blistered Pitted, Rust, Commercial Blast, Metal Surfaces, Surface Preparation	2.40
		<i>For Up To 100, Add</i>	1.49
		<i>For >100 To 250, Add</i>	0.70
		<i>For >250 To 500, Add</i>	0.30
		<i>For >5,000 To 10,000, Deduct</i>	-0.11
		<i>For >10,000 To 15,000, Deduct</i>	-0.22
		<i>For >15,000 To 30,000, Deduct</i>	-0.35
		<i>For >30,000, Deduct</i>	-0.46
09 01 90 52-0026	SF	Badly Pitted With Rust Nodules, Commercial Blast, Metal Surfaces, Surface Preparation.....	4.02
		<i>For Up To 100, Add</i>	2.49
		<i>For >100 To 250, Add</i>	1.16
		<i>For >250 To 500, Add</i>	0.50
		<i>For >5,000 To 10,000, Deduct</i>	-0.19
		<i>For >10,000 To 15,000, Deduct</i>	-0.37
		<i>For >15,000 To 30,000, Deduct</i>	-0.58
		<i>For >30,000, Deduct</i>	-0.77
09 01 90 52-0027	SF	Loose Mill Scale With Fine Powder Rust, Near White Blast, Metal Surfaces, Surface Preparation	3.05
		<i>For Up To 100, Add</i>	1.86
		<i>For >100 To 250, Add</i>	0.87
		<i>For >250 To 500, Add</i>	0.37
		<i>For >5,000 To 10,000, Deduct</i>	-0.14
		<i>For >10,000 To 15,000, Deduct</i>	-0.28
		<i>For >15,000 To 30,000, Deduct</i>	-0.44
		<i>For >30,000, Deduct</i>	-0.58



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 01 90 52-0028 SF Tight Mill Scale Little Rust, Near White Blast, Metal Surfaces, Surface Preparation	3.78	
For Up To 100, Add	2.30	
For >100 To 250, Add	1.07	
For >250 To 500, Add	0.46	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000 To 15,000, Deduct	-0.35	
For >15,000 To 30,000, Deduct	-0.55	
For >30,000, Deduct	-0.72	
09 01 90 52-0029 SF Exterior Coat Blistered Pitted Rust, Near White Blast, Metal Surfaces, Surface Preparation	4.91	
For Up To 100, Add	2.99	
For >100 To 250, Add	1.39	
For >250 To 500, Add	0.60	
For >5,000 To 10,000, Deduct	-0.23	
For >10,000 To 15,000, Deduct	-0.45	
For >15,000 To 30,000, Deduct	-0.71	
For >30,000, Deduct	-0.94	
09 01 90 52-0030 SF Badly Pitted Rust Nodules, Near White Blast, Metal Surfaces, Surface Preparation	6.13	
For Up To 100, Add	3.73	
For >100 To 250, Add	1.74	
For >250 To 500, Add	0.75	
For >5,000 To 10,000, Deduct	-0.28	
For >10,000 To 15,000, Deduct	-0.57	
For >15,000 To 30,000, Deduct	-0.88	
For >30,000, Deduct	-1.17	
09 01 90 52-0031 Tile Surfaces, Surface Preparation (09 01 90 52-0001)		
09 01 90 52-0032 SF Trisodium Phosphate (TSP), Clean Tile Surfaces, Surface Preparation	0.40	
For Up To 100, Add	0.29	
For >100 To 250, Add	0.13	
For >250 To 500, Add	0.06	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 15,000, Deduct	-0.04	
For >15,000 To 30,000, Deduct	-0.06	
For >30,000, Deduct	-0.08	
09 01 90 52-0033 CSF Chemical Alkaline Cleaner, Brush And Wash Tile Surfaces, Surface Preparation	38.76	
For Up To 100, Add	28.80	
For >100 To 250, Add	13.44	
For >250 To 500, Add	5.76	
For >5,000 To 10,000, Deduct	-1.93	
For >10,000 To 15,000, Deduct	-3.86	
For >15,000 To 30,000, Deduct	-5.80	
For >30,000, Deduct	-7.73	
09 01 90 52-0034 SF 2,000 To 5,000 PSI, Pressure Wash Tile Surfaces, Surface Preparation	0.40	
For Up To 100, Add	0.25	
For >100 To 250, Add	0.12	
For >250 To 500, Add	0.05	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 15,000, Deduct	-0.04	
For >15,000 To 30,000, Deduct	-0.06	
For >30,000, Deduct	-0.08	
09 01 90 52-0035 Wood Surfaces, Surface Preparation (09 01 90 52-0001)		
09 01 90 52-0036 SF Prepare New Wood Floor For Finish, Multi Grit Sanding/Screening	1.45	
For Up To 100, Add	1.02	
For >100 To 250, Add	0.48	
For >250 To 500, Add	0.20	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 15,000, Deduct	-0.14	
For >15,000 To 30,000, Deduct	-0.21	
For >30,000, Deduct	-0.29	
09 01 90 52-0037 SF Trisodium Phosphate (TSP), Clean Wood Surfaces, Surface Preparation	0.41	
For Up To 100, Add	0.29	
For >100 To 250, Add	0.14	
For >250 To 500, Add	0.06	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 15,000, Deduct	-0.04	
For >15,000 To 30,000, Deduct	-0.06	
For >30,000, Deduct	-0.08	
09 01 90 52-0038 SF Chemical Clean, Brush And Wash Wood Surfaces, Surface Preparation	0.62	
For Up To 100, Add	0.34	
For >100 To 250, Add	0.16	
For >250 To 500, Add	0.07	
For >5,000 To 10,000, Deduct	-0.03	
For >10,000 To 15,000, Deduct	-0.06	
For >15,000 To 30,000, Deduct	-0.09	
For >30,000, Deduct	-0.12	
09 01 90 52-0039 SF Hand Scrape Wood Surfaces, Surface Preparation	0.93	
For Up To 100, Add	0.70	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For >5,000 To 10,000, Deduct	-0.05	
For >10,000 To 15,000, Deduct	-0.09	
For >15,000 To 30,000, Deduct	-0.14	
For >30,000, Deduct	-0.19	

09 Finishes

09 01 Maintenance of Finishes

09 01 90 Maintenance of Painting and Coating



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 01 90 52-0040	SF Steam Clean Wood Surfaces, Surface Preparation		0.88
	For Up To 100, Add	0.55	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >5,000 To 10,000, Deduct	-0.04	
	For >10,000 To 15,000, Deduct	-0.08	
	For >15,000 To 30,000, Deduct	-0.13	
	For >30,000, Deduct	-0.17	
09 01 90 52-0041	SF 2,000 To 5,000 PSI, Pressure Wash Wood Surfaces, Surface Preparation		0.60
	For Up To 100, Add	0.37	
	For >100 To 250, Add	0.17	
	For >250 To 500, Add	0.07	
	For >5,000 To 10,000, Deduct	-0.03	
	For >10,000 To 15,000, Deduct	-0.06	
	For >15,000 To 30,000, Deduct	-0.09	
	For >30,000, Deduct	-0.11	
09 01 90 52-0042	SF Sanding Wood Paneling, Boards, Doors Or Other Wood Surfaces, Surface Preparation		0.82
	For Up To 100, Add	0.56	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >5,000 To 10,000, Deduct	-0.04	
	For >10,000 To 15,000, Deduct	-0.08	
	For >15,000 To 30,000, Deduct	-0.12	
	For >30,000, Deduct	-0.16	
09 01 90 52-0043	SF Sanding Wood Trim Surfaces, Surface Preparation		1.11
	For Up To 100, Add	0.77	
	For >100 To 250, Add	0.36	
	For >250 To 500, Add	0.15	
	For >5,000 To 10,000, Deduct	-0.05	
	For >10,000 To 15,000, Deduct	-0.11	
	For >15,000 To 30,000, Deduct	-0.16	
	For >30,000, Deduct	-0.22	
09 01 90 52-0044	SF Prime Wood Surfaces With Linseed Oil, 1 Coat, Surface Preparation		0.75
	For Up To 100, Add	0.46	
	For >100 To 250, Add	0.21	
	For >250 To 500, Add	0.09	
	For >5,000 To 10,000, Deduct	-0.03	
	For >10,000 To 15,000, Deduct	-0.07	
	For >15,000 To 30,000, Deduct	-0.11	
	For >30,000, Deduct	-0.14	
09 01 90 52-0045	SF Paint Wood Surfaces With Linseed Oil, 1 Coat, Surface Preparation		0.86
	For Up To 100, Add	0.54	
	For >100 To 250, Add	0.25	
	For >250 To 500, Add	0.11	
	For >5,000 To 10,000, Deduct	-0.04	
	For >10,000 To 15,000, Deduct	-0.08	
	For >15,000 To 30,000, Deduct	-0.12	
	For >30,000, Deduct	-0.17	
09 01 90 52-0046	Vinyl Siding Surfaces, Surface Preparation (09 01 90 52-0001)		
09 01 90 52-0047	SF Trisodium Phosphate (TSP), Clean, Vinyl Siding Surfaces, Surface Preparation		0.40
	For Up To 100, Add	0.29	
	For >100 To 250, Add	0.13	
	For >250 To 500, Add	0.06	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 15,000, Deduct	-0.04	
	For >15,000 To 30,000, Deduct	-0.06	
	For >30,000, Deduct	-0.08	
09 01 90 52-0048	SF Hand Wash, Vinyl Siding Surfaces, Surface Preparation		0.62
	For Up To 100, Add	0.44	
	For >100 To 250, Add	0.20	
	For >250 To 500, Add	0.09	
	For >5,000 To 10,000, Deduct	-0.03	
	For >10,000 To 15,000, Deduct	-0.06	
	For >15,000 To 30,000, Deduct	-0.09	
	For >30,000, Deduct	-0.12	
09 01 90 52-0049	SF 2,000 To 5,000 PSI Pressure Wash, Vinyl Siding Surfaces, Surface Preparation		0.50
	For Up To 100, Add	0.29	
	For >100 To 250, Add	0.13	
	For >250 To 500, Add	0.06	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 15,000, Deduct	-0.05	
	For >15,000 To 30,000, Deduct	-0.07	
	For >30,000, Deduct	-0.09	
09 01 90 52-0050	SF Steam Clean, Vinyl Siding Surfaces, Surface Preparation		0.93
	For Up To 100, Add	0.55	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >5,000 To 10,000, Deduct	-0.04	
	For >10,000 To 15,000, Deduct	-0.09	
	For >15,000 To 30,000, Deduct	-0.13	
	For >30,000, Deduct	-0.18	



Finishes	09	09
Maintenance of Finishes	09 01	
Maintenance of Painting and Coating	09 01 90	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 01 90 52-0051	Plaster/Stucco Surfaces, Surface Preparation <small>(09 01 90 52-0001)</small>		
	Note: Based on total project quantity.		
09 01 90 52-0052	SF Trisodium Phosphate (TSP), Clean Plaster/Stucco Surfaces, Surface Preparation	0.45	
	For Up To 100, Add	0.32	
	For >100 To 250, Add	0.15	
	For >250 To 500, Add	0.06	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 15,000, Deduct	-0.04	
	For >15,000 To 30,000, Deduct	-0.07	
	For >30,000, Deduct	-0.09	
09 01 90 52-0053	SF 2,000 To 5,000 PSI Pressure Wash Plaster/Stucco Surfaces, Surface Preparation.....	0.65	
	For Up To 100, Add	0.38	
	For >100 To 250, Add	0.18	
	For >250 To 500, Add	0.08	
	For >5,000 To 10,000, Deduct	-0.03	
	For >10,000 To 15,000, Deduct	-0.06	
	For >15,000 To 30,000, Deduct	-0.09	
	For >30,000, Deduct	-0.12	
09 01 90 52-0054	Prep Work <small>(09 01 90 52-0001)</small>		
09 01 90 52-0055	SF Citrus Strip, Single Applications.....	1.11	
	Note: For removal of up to 40 mils each application (average 5 layers at 8 mils per layer) dried latex and oil-based paint, varnish, lacquer, polyurethane and shellac from wood, metal, and masonry surfaces. Multiple applications may be necessary, refer to manufacturer recommendations		
09 01 90 61	Repainting <small>(09 01 90)</small>		
09 01 90 61-0001	Touchup and "Spot" Painting Of Surfaces <small>(09 01 90 61)</small>		
	Note: For use on individual areas less than 10 SF.		
09 01 90 61-0002	SF "Spot" Paint Drywall, Plaster, Wood And Concrete Surfaces, Per Coat	1.49	
09 01 90 91	Paint Restoration <small>(09 01 90)</small>		
09 01 90 91-0001	Paint Removal, Strip To Bare Wood <small>(09 01 90 91)</small>		
09 01 90 91-0002	SF Flat Surfaces, Paint Removal, Strip To Bare Wood	7.05	
09 01 90 91-0003	SF Cornices And Decorative Trim To 12" Wide, Paint Removal, Strip To Bare Wood.....	7.51	

09 05 Common Work Results for Finishes (09)

09 05 61 Common Work Results for Flooring Preparation (09 05)

09 05 61 13 Moisture Vapor Emission Control (09 05 61)

09 05 61 13-0001	Moisture Vapor Reduction System (Koester VAP) <small>(09 05 61 13)</small>		
09 05 61 13-0002	EA Up To 200 SF, Water Vapor Emission Control System (Koester VAP 1-2000)	2,984.96	
	Note: Clear		
09 05 61 13-0003	SF >200 To 500 SF, Water Vapor Emission Control System (Koester VAP 1-2001)	15.80	
	Note: Clear		
09 05 61 13-0004	SF >500 To 1,000 SF, Water Vapor Emission Control System (Koester VAP 1-2002)	10.54	
	Note: Clear		
09 05 61 13-0005	SF >1,000 To 3,000 SF, Water Vapor Emission Control System (Koester VAP 1-2003)	8.78	
	Note: Clear		
09 05 61 13-0006	SF >3,000 SF, Water Vapor Emission Control System (Koester VAP 1-2004)	7.02	
	Note: Clear		
09 05 61 13-0007	Moisture Vapor Transmission Control (Dependable Cutdown® II) <small>(09 05 61 13)</small>		
09 05 61 13-0008	SF 8# Two Coats, Moisture Vapor Transmission Control (Dependable Cutdown® II)	4.77	
09 05 61 13-0009	SF 15# Two Coats, Moisture Vapor Transmission Control (Dependable Cutdown® II)	6.60	

09 05 71 Acoustic Underlayment (09 05)

09 05 71 00-0001	Tile And Stone Acoustical Underlayment <small>(09 05 71)</small>		
09 05 71 00-0002	SF 5 Mil Tile And Stone Acoustical Underlayment (EasyMat).....	4.43	
	For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add	0.52	
09 05 71 00-0003	Resilient Floor Acoustical Underlayment <small>(09 05 71)</small>		
09 05 71 00-0004	SF Vinyl, Linoleum, LVT And Vinyl Strip Flooring Acoustical Underlayment (Impacta, Soundseal VC300)	2.94	
09 05 71 00-0005	SF 2 MM Thick Resilient Plank Floor Acoustical Underlayment (Floormuffler)	1.44	
09 05 71 00-0006	SF 0.055" Thick High Density Polyurethane Foam Floor Acoustical Underlayment (Silencer LVT)	1.37	

09 20 Plaster and Gypsum Board (09)

09 22 Supports for Plaster and Gypsum Board (09 20)

09	09 Finishes
	09 20 Plaster and Gypsum Board
	09 22 Supports for Plaster and Gypsum Board



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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Note: Per SF of wall area measures one side. Do not deduct for opens of less than 25 SF when calculating total wall square footage.

09 22 13 Metal Furring (09 22)		
09 22 13 13 Metal Channel Furring (09 22 13)		
09 22 13 13-0001	Hat Furring Channel (09 22 13 13) Note: Includes clips where required.	
09 22 13 13-0002	Installed On Walls, Hat Furring Channel (09 22 13 13-0001)	
09 22 13 13-0003	SF 7/8", 25 Gauge, 16" On Center, Installed On Walls, Hat Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	4.22 0.49 -0.52 0.68 0.48 1.12
09 22 13 13-0004	SF 1-1/2", 25 Gauge, 16" On Center, Installed On Walls, Hat Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	4.60 0.49 -0.59 0.76 0.67 1.37
09 22 13 13-0005	Installed On Columns And Beams, Hat Furring Channel (09 22 13 13-0001)	
09 22 13 13-0006	SF 7/8", 25 Gauge, 16" On Center, Installed On Columns And Beams, Hat Furring Channel For Columns And Beams >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	5.97 1.00 -0.69 0.94 0.48 1.38
09 22 13 13-0007	SF 1-1/2", 25 Gauge, 16" On Center, Installed On Columns And Beams, Hat Furring Channel For Columns And Beams >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	6.35 1.00 -0.77 1.02 0.67 1.63
09 22 13 13-0008	Installed On Ceilings, Hat Furring Channel (09 22 13 13-0001)	
09 22 13 13-0009	SF 7/8", 25 Gauge, 16" On Center, Installed On Ceilings, Hat Furring Channel For Ceilings >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	5.59 0.60 -0.72 0.92 0.79 1.64
09 22 13 13-0010	SF 1-1/2", 25 Gauge, 16" On Center, Installed On Ceilings, Hat Furring Channel For Ceilings >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	5.96 0.60 -0.79 0.99 0.98 1.89
09 22 13 13-0011	Z Furring Channel (09 22 13 13)	
09 22 13 13-0012	Installed On Walls, Z Furring Channel (09 22 13 13-0011)	
09 22 13 13-0013	SF 1", 25 Gauge, 16" On Center, Installed On Walls, Z Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	3.59 0.49 -0.39 0.55 0.16 0.70
09 22 13 13-0014	SF 1-1/2", 25 Gauge, 16" On Center, Installed On Walls, Z Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	3.65 0.49 -0.40 0.57 0.19 0.74
09 22 13 13-0015	SF 2", 25 Gauge, 16" On Center, Installed On Walls, Z Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	3.70 0.49 -0.41 0.58 0.22 0.77
09 22 13 13-0016	SF 2-1/2", 25 Gauge, 16" On Center, Installed On Walls, Z Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	3.75 0.49 -0.42 0.59 0.24 0.81
09 22 13 13-0017	SF 3", 25 Gauge, 16" On Center, Installed On Walls, Z Furring Channel For Walls >10' High, Add For 24" On Center, Deduct For 12" On Center, Add For 22 Gauge, Add For 20 Gauge, Add	3.79 0.49 -0.43 0.59 0.26 0.83



Finishes	09	9
Plaster and Gypsum Board	09 20	
Supports for Plaster and Gypsum Board	09 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 22 13 23 Resilient Channel Furring (09 22 13)

09 22 13 23-0001	Single-Leg Resilient Channel, RC1 Furring Channel (09 22 13 23)		
	Note: Includes clips where required.		
09 22 13 23-0002	Installed On Walls, Single-Leg Resilient Channel, RC1 Furring Channel (09 22 13 23-0001)		
09 22 13 23-0003	SF 25 Gauge, 16" On Center, Installed On Walls, Single-Leg Resilient Channel, RC1 Furring Channel.....	3.94	1.63
	For Walls >10' High, Add	0.49	
	For 24" On Center, Deduct	-0.46	
	For 12" On Center, Add	0.62	
	For 20 Gauge, Add	0.93	
09 22 13 23-0004	Installed On Ceilings, Single-Leg Resilient Channel, RC1 Furring Channel (09 22 13 23-0001)		
09 22 13 23-0005	SF 25 Gauge, 16" On Center, Installed On Ceilings, Single-Leg Resilient Channel, RC1 Furring Channel.....	4.68	2.01
	For Ceilings >10' High, Add	0.60	
	For 24" On Center, Deduct	-0.54	
	For 12" On Center, Add	0.74	
	For 20 Gauge, Add	1.04	
09 22 13 23-0006	Double-Leg Resilient Channel, RC2 Furring Channel (09 22 13 23)		
	Note: Includes clips where required.		
09 22 13 23-0007	Installed On Walls, Double-Leg Resilient Channel, RC2 Furring Channel (09 22 13 23-0006)		
09 22 13 23-0008	SF 25 Gauge, 16" On Center, Installed On Walls, Double-Leg Resilient Channel, RC2 Furring Channel.....	4.19	1.63
	For Walls >10' High, Add	0.49	
	For 24" On Center, Deduct	-0.51	
	For 12" On Center, Add	0.67	
	For 20 Gauge, Add	1.10	
09 22 13 23-0009	Installed On Ceilings, Double-Leg Resilient Channel, RC2 Furring Channel (09 22 13 23-0006)		
09 22 13 23-0010	SF 25 Gauge, 16" On Center, Installed On Ceilings, Double-Leg Resilient Channel, RC2 Furring Channel.....	4.93	2.01
	For Ceilings >10' High, Add	0.60	
	For 24" On Center, Deduct	-0.59	
	For 12" On Center, Add	0.79	
	For 20 Gauge, Add	1.21	

09 22 16 Non-Structural Metal Framing (09 22)

Note: Includes studs, bridging, fasteners, and metal stiffener at half height. Do not deduct for openings of less than 25 SF.

09 22 16 13 Non-Structural Metal Stud Framing (09 22 16)

09 22 16 13-0001	25 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners (09 22 16 13)		
09 22 16 13-0002	SF 1-5/8" Width, 16" On Center, 25 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	2.75	0.68
	For Powder-Actuated Fasteners Every 2', Add	0.07	
	For Walls >10' High, Add	0.55	
	For Soffit, Columns Or Beams Up To 10' High, Add	1.64	
	For Soffit, Columns Or Beams >10' High, Add	2.15	
	For Horizontal Installation Up To 10' High, Add	0.53	
	For Horizontal Installation >10' High, Add	0.70	
	For Curved Wall, Add	0.51	
	For 12" On Center, Add	0.47	
	For 24" On Center, Deduct	-0.47	
	For Up To 100, Add	0.89	
	For >100 To 300, Add	0.45	
	For >1,000, Deduct	-0.24	
09 22 16 13-0003	SF 2-1/2" Width, 16" On Center, 25 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	2.96	0.71
	For Powder-Actuated Fasteners Every 2', Add	0.07	
	For Walls >10' High, Add	0.59	
	For Soffit, Columns Or Beams Up To 10' High, Add	1.72	
	For Soffit, Columns Or Beams >10' High, Add	2.25	
	For Horizontal Installation Up To 10' High, Add	0.56	
	For Horizontal Installation >10' High, Add	0.74	
	For Curved Wall, Add	0.53	
	For 12" On Center, Add	0.50	
	For 24" On Center, Deduct	-0.50	
	For Up To 100, Add	0.95	
	For >100 To 300, Add	0.47	
	For >1,000, Deduct	-0.27	

09 Finishes

09 20 Plaster and Gypsum Board

09 22 Supports for Plaster and Gypsum Board



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
09 22 16 13-0004	SF	3-5/8" Width, 16" On Center, 25 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners	3.22	0.74
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	0.64	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	1.82	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.38	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.60	
		<i>For Horizontal Installation >10' High, Add</i>	0.79	
		<i>For Curved Wall, Add</i>	0.56	
		<i>For 12" On Center, Add</i>	0.55	
		<i>For 24" On Center, Deduct</i>	-0.55	
		<i>For Up To 100, Add</i>	1.02	
		<i>For >100 To 300, Add</i>	0.51	
		<i>For >1,000, Deduct</i>	-0.30	
09 22 16 13-0005	SF	4" Width, 16" On Center, 25 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners	3.45	0.78
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	0.69	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	1.91	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.50	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.64	
		<i>For Horizontal Installation >10' High, Add</i>	0.84	
		<i>For Curved Wall, Add</i>	0.59	
		<i>For 12" On Center, Add</i>	0.59	
		<i>For 24" On Center, Deduct</i>	-0.59	
		<i>For Up To 100, Add</i>	1.08	
		<i>For >100 To 300, Add</i>	0.54	
		<i>For >1,000, Deduct</i>	-0.32	
09 22 16 13-0006	SF	6" Width, 16" On Center, 25 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners	3.88	0.82
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	0.78	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.04	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.65	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.70	
		<i>For Horizontal Installation >10' High, Add</i>	0.90	
		<i>For Curved Wall, Add</i>	0.62	
		<i>For 12" On Center, Add</i>	0.67	
		<i>For 24" On Center, Deduct</i>	-0.67	
		<i>For Up To 100, Add</i>	1.19	
		<i>For >100 To 300, Add</i>	0.59	
		<i>For >1,000, Deduct</i>	-0.38	
09 22 16 13-0007		20 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners <small>(09 22 16 13)</small>		
09 22 16 13-0008	SF	1-5/8" Width, 16" On Center, 20 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners	3.14	0.69
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	0.63	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	1.71	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.23	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.58	
		<i>For Horizontal Installation >10' High, Add</i>	0.75	
		<i>For Curved Wall, Add</i>	0.52	
		<i>For 12" On Center, Add</i>	0.54	
		<i>For 24" On Center, Deduct</i>	-0.54	
		<i>For Up To 100, Add</i>	0.98	
		<i>For >100 To 300, Add</i>	0.49	
		<i>For >1,000, Deduct</i>	-0.30	
09 22 16 13-0009	SF	2-1/2" Width, 16" On Center, 20 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners	3.47	0.73
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	0.69	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	1.81	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.36	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.62	
		<i>For Horizontal Installation >10' High, Add</i>	0.80	
		<i>For Curved Wall, Add</i>	0.55	
		<i>For 12" On Center, Add</i>	0.60	
		<i>For 24" On Center, Deduct</i>	-0.60	
		<i>For Up To 100, Add</i>	1.06	
		<i>For >100 To 300, Add</i>	0.53	
		<i>For >1,000, Deduct</i>	-0.34	



Finishes	09	09
Plaster and Gypsum Board	09 20	
Supports for Plaster and Gypsum Board	09 22	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 22 16 13-0010 SF 3-5/8" Width, 16" On Center, 20 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	3.86	0.76
For Powder-Actuated Fasteners Every 2', Add	0.07	
For Walls >10' High, Add	0.77	
For Soffit, Columns Or Beams Up To 10' High, Add	1.92	
For Soffit, Columns Or Beams >10' High, Add	2.50	
For Horizontal Installation Up To 10' High, Add	0.67	
For Horizontal Installation >10' High, Add	0.87	
For Curved Wall, Add	0.58	
For 12" On Center, Add	0.68	
For 24" On Center, Deduct	-0.68	
For Up To 100, Add	1.16	
For >100 To 300, Add	0.58	
For >1,000, Deduct	-0.39	
09 22 16 13-0011 SF 4" Width, 16" On Center, 20 Gauge, Non-Load Bearing, Non-Structural Structural, Galvanized Steel Framing With Tracks And Runners.....	4.12	0.80
For Powder-Actuated Fasteners Every 2', Add	0.07	
For Walls >10' High, Add	0.82	
For Soffit, Columns Or Beams Up To 10' High, Add	2.02	
For Soffit, Columns Or Beams >10' High, Add	2.62	
For Horizontal Installation Up To 10' High, Add	0.71	
For Horizontal Installation >10' High, Add	0.91	
For Curved Wall, Add	0.60	
For 12" On Center, Add	0.72	
For 24" On Center, Deduct	-0.72	
For Up To 100, Add	1.23	
For >100 To 300, Add	0.61	
For >1,000, Deduct	-0.42	
09 22 16 13-0012 SF 6" Width, 16" On Center, 20 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	5.87	0.84
For Powder-Actuated Fasteners Every 2', Add	0.07	
For Walls >10' High, Add	1.17	
For Soffit, Columns Or Beams Up To 10' High, Add	2.28	
For Soffit, Columns Or Beams >10' High, Add	2.91	
For Horizontal Installation Up To 10' High, Add	0.90	
For Horizontal Installation >10' High, Add	1.11	
For Curved Wall, Add	0.63	
For 12" On Center, Add	1.07	
For 24" On Center, Deduct	-1.07	
For Up To 100, Add	1.60	
For >100 To 300, Add	0.80	
For >1,000, Deduct	-0.67	
09 22 16 13-0013 18 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners (09 22 16 13)		
09 22 16 13-0014 SF 2-1/2" Width, 16" On Center, 18 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	4.93	0.74
For Powder-Actuated Fasteners Every 2', Add	0.07	
For Walls >10' High, Add	0.99	
For Soffit, Columns Or Beams Up To 10' High, Add	1.99	
For Soffit, Columns Or Beams >10' High, Add	2.55	
For Horizontal Installation Up To 10' High, Add	0.77	
For Horizontal Installation >10' High, Add	0.96	
For Curved Wall, Add	0.56	
For 12" On Center, Add	0.89	
For 24" On Center, Deduct	-0.89	
For Up To 100, Add	1.36	
For >100 To 300, Add	0.68	
For >1,000, Deduct	-0.55	
09 22 16 13-0015 SF 3-5/8" Width, 16" On Center, 18 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	5.48	0.78
For Powder-Actuated Fasteners Every 2', Add	0.07	
For Walls >10' High, Add	1.10	
For Soffit, Columns Or Beams Up To 10' High, Add	2.12	
For Soffit, Columns Or Beams >10' High, Add	2.72	
For Horizontal Installation Up To 10' High, Add	0.84	
For Horizontal Installation >10' High, Add	1.04	
For Curved Wall, Add	0.59	
For 12" On Center, Add	1.00	
For 24" On Center, Deduct	-1.00	
For Up To 100, Add	1.49	
For >100 To 300, Add	0.75	
For >1,000, Deduct	-0.63	

09 Finishes

09 20 Plaster and Gypsum Board

09 22 Supports for Plaster and Gypsum Board



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 22 16 13-0016	SF	4" Width, 16" On Center, 18 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	5.89	0.82
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	1.18	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.24	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.86	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.90	
		<i>For Horizontal Installation >10' High, Add</i>	1.10	
		<i>For Curved Wall, Add</i>	0.62	
		<i>For 12" On Center, Add</i>	1.08	
		<i>For 24" On Center, Deduct</i>	-1.08	
		<i>For Up To 100, Add</i>	1.59	
		<i>For >100 To 300, Add</i>	0.80	
		<i>For >1,000, Deduct</i>	-0.68	
09 22 16 13-0017	SF	6" Width, 16" On Center, 18 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	7.80	0.86
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	1.56	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.52	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	3.17	
		<i>For Horizontal Installation Up To 10' High, Add</i>	1.11	
		<i>For Horizontal Installation >10' High, Add</i>	1.32	
		<i>For Curved Wall, Add</i>	0.65	
		<i>For 12" On Center, Add</i>	1.45	
		<i>For 24" On Center, Deduct</i>	-1.45	
		<i>For Up To 100, Add</i>	1.99	
		<i>For >100 To 300, Add</i>	1.00	
		<i>For >1,000, Deduct</i>	-0.95	
09 22 16 13-0018	SF	8" Width, 16" On Center, 18 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	8.51	0.92
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	1.70	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.67	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	3.35	
		<i>For Horizontal Installation Up To 10' High, Add</i>	1.19	
		<i>For Horizontal Installation >10' High, Add</i>	1.42	
		<i>For Curved Wall, Add</i>	0.68	
		<i>For 12" On Center, Add</i>	1.59	
		<i>For 24" On Center, Deduct</i>	-1.59	
		<i>For Up To 100, Add</i>	2.16	
		<i>For >100 To 300, Add</i>	1.08	
		<i>For >1,000, Deduct</i>	-1.05	
09 22 16 13-0019		16 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners <small>(09 22 16 13)</small>		
09 22 16 13-0020	SF	2-1/2" Width, 16" On Center, 16 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	5.26	0.76
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	1.05	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.06	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.64	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.81	
		<i>For Horizontal Installation >10' High, Add</i>	1.01	
		<i>For Curved Wall, Add</i>	0.58	
		<i>For 12" On Center, Add</i>	0.96	
		<i>For 24" On Center, Deduct</i>	-0.96	
		<i>For Up To 100, Add</i>	1.44	
		<i>For >100 To 300, Add</i>	0.72	
		<i>For >1,000, Deduct</i>	-0.60	
09 22 16 13-0021	SF	3-5/8" Width, 16" On Center, 16 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	6.24	0.80
		<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
		<i>For Walls >10' High, Add</i>	1.25	
		<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.23	
		<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.84	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.93	
		<i>For Horizontal Installation >10' High, Add</i>	1.13	
		<i>For Curved Wall, Add</i>	0.60	
		<i>For 12" On Center, Add</i>	1.15	
		<i>For 24" On Center, Deduct</i>	-1.15	
		<i>For Up To 100, Add</i>	1.65	
		<i>For >100 To 300, Add</i>	0.83	
		<i>For >1,000, Deduct</i>	-0.74	



Finishes	09	9
Plaster and Gypsum Board	09 20	
Supports for Plaster and Gypsum Board	09 22	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

09 22 16 13-0022	SF 4" Width, 16" On Center, 16 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	6.60	0.84
	<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
	<i>For Walls >10' High, Add</i>	1.32	
	<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.35	
	<i>For Soffit, Columns Or Beams >10' High, Add</i>	2.98	
	<i>For Horizontal Installation Up To 10' High, Add</i>	0.98	
	<i>For Horizontal Installation >10' High, Add</i>	1.19	
	<i>For Curved Wall, Add</i>	0.63	
	<i>For 12" On Center, Add</i>	1.21	
	<i>For 24" On Center, Deduct</i>	-1.21	
	<i>For Up To 100, Add</i>	1.74	
	<i>For >100 To 300, Add</i>	0.87	
	<i>For >1,000, Deduct</i>	-0.78	
09 22 16 13-0023	SF 6" Width, 16" On Center, 16 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	8.44	0.89
	<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
	<i>For Walls >10' High, Add</i>	1.69	
	<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.62	
	<i>For Soffit, Columns Or Beams >10' High, Add</i>	3.29	
	<i>For Horizontal Installation Up To 10' High, Add</i>	1.18	
	<i>For Horizontal Installation >10' High, Add</i>	1.40	
	<i>For Curved Wall, Add</i>	0.67	
	<i>For 12" On Center, Add</i>	1.58	
	<i>For 24" On Center, Deduct</i>	-1.58	
	<i>For Up To 100, Add</i>	2.13	
	<i>For >100 To 300, Add</i>	1.07	
	<i>For >1,000, Deduct</i>	-1.04	
09 22 16 13-0024	SF 8" Width, 16" On Center, 16 Gauge, Non-Load Bearing, Non-Structural, Galvanized Steel Stud Framing With Tracks And Runners.....	9.32	0.94
	<i>For Powder-Actuated Fasteners Every 2', Add</i>	0.07	
	<i>For Walls >10' High, Add</i>	1.86	
	<i>For Soffit, Columns Or Beams Up To 10' High, Add</i>	2.80	
	<i>For Soffit, Columns Or Beams >10' High, Add</i>	3.50	
	<i>For Horizontal Installation Up To 10' High, Add</i>	1.28	
	<i>For Horizontal Installation >10' High, Add</i>	1.51	
	<i>For Curved Wall, Add</i>	0.70	
	<i>For 12" On Center, Add</i>	1.75	
	<i>For 24" On Center, Deduct</i>	-1.75	
	<i>For Up To 100, Add</i>	2.33	
	<i>For >100 To 300, Add</i>	1.17	
	<i>For >1,000, Deduct</i>	-1.17	

09 22 16 13-0025 Galvanized Steel Backing Plates (09 22 16 13)

Note: Used to attach fixtures, cabinets, shelves or handrails to metal stud walls.

09 22 16 13-0026	LF 3" Wide, 25 Gauge Galvanized Steel Backing Plate.....	1.44	
09 22 16 13-0027	LF 4" Wide, 25 Gauge Galvanized Steel Backing Plate.....	1.77	
09 22 16 13-0028	LF 6" Wide, 25 Gauge Galvanized Steel Backing Plate.....	2.30	
09 22 16 13-0029	LF 8" Wide, 25 Gauge Galvanized Steel Backing Plate.....	2.84	
09 22 16 13-0030	LF 10" Wide, 25 Gauge Galvanized Steel Backing Plate.....	3.36	
09 22 16 13-0031	LF 12" Wide, 25 Gauge Galvanized Steel Backing Plate.....	4.00	
09 22 16 13-0032	LF 3" Wide, 20 Gauge Galvanized Steel Backing Plate.....	1.89	
09 22 16 13-0033	LF 4" Wide, 20 Gauge Galvanized Steel Backing Plate.....	2.35	
09 22 16 13-0034	LF 6" Wide, 20 Gauge Galvanized Steel Backing Plate.....	3.16	
09 22 16 13-0035	LF 8" Wide, 20 Gauge Galvanized Steel Backing Plate.....	3.97	
09 22 16 13-0036	LF 10" Wide, 20 Gauge Galvanized Steel Backing Plate.....	4.80	
09 22 16 13-0037	LF 12" Wide, 20 Gauge Galvanized Steel Backing Plate.....	5.71	
09 22 16 13-0038	LF 3" Wide, 16 Gauge Galvanized Steel Backing Plate.....	2.59	
09 22 16 13-0039	LF 4" Wide, 16 Gauge Galvanized Steel Backing Plate.....	3.24	
09 22 16 13-0040	LF 6" Wide, 16 Gauge Galvanized Steel Backing Plate.....	4.44	
09 22 16 13-0041	LF 8" Wide, 16 Gauge Galvanized Steel Backing Plate.....	5.64	
09 22 16 13-0042	LF 10" Wide, 16 Gauge Galvanized Steel Backing Plate.....	6.93	
09 22 16 13-0043	LF 12" Wide, 16 Gauge Galvanized Steel Backing Plate.....	8.17	
09 22 16 13-0044	LF 3" Wide, 14 Gauge Galvanized Steel Backing Plate.....	3.08	
09 22 16 13-0045	LF 4" Wide, 14 Gauge Galvanized Steel Backing Plate.....	3.89	
09 22 16 13-0046	LF 6" Wide, 14 Gauge Galvanized Steel Backing Plate.....	5.41	
09 22 16 13-0047	LF 8" Wide, 14 Gauge Galvanized Steel Backing Plate.....	6.93	
09 22 16 13-0048	LF 10" Wide, 14 Gauge Galvanized Steel Backing Plate.....	8.54	
09 22 16 13-0049	LF 12" Wide, 14 Gauge Galvanized Steel Backing Plate.....	10.11	

09 22 36 Lath (09 22)

09 22 36 13 Gypsum Lath (09 22 36)

09 22 36 13-0001 Plaster Base Gypsum Panels (09 22 36 13)

09 22 36 13-0002	SF 3/8" Thick, Installed On Studs Or Furred Walls, Plaster Base Gypsum Panel.....	1.45	0.45
	<i>For Walls >10' High, Add</i>	0.11	
	<i>For Up To 100, Add</i>	0.46	
	<i>For >100 To 500, Add</i>	0.23	
	<i>For >5,000, Deduct</i>	-0.09	

09 Finishes

09 20 Plaster and Gypsum Board

09 22 Supports for Plaster and Gypsum Board



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 22 36 13-0003	SF		1/2" Thick, Installed On Studs Or Furred Walls, Plaster Base Gypsum Panel.....	2.05	0.52
			<i>For Walls >10' High, Add</i>	0.13	
			<i>For Up To 100, Add</i>	0.53	
			<i>For >100 To 500, Add</i>	0.26	
			<i>For >5,000, Deduct</i>	-0.11	
09 22 36 13-0004	SF		5/8" Thick, Installed On Studs Or Furred Walls, Plaster Base Gypsum Panel.....	2.65	0.60
			<i>For Walls >10' High, Add</i>	0.15	
			<i>For Up To 100, Add</i>	0.60	
			<i>For >100 To 500, Add</i>	0.30	
			<i>For >5,000, Deduct</i>	-0.12	
09 22 36 13-0005	SF		3/8" Thick, Installed On Ceiling, Plaster Base Gypsum Panel.....	1.81	0.63
			<i>For Ceilings >10' High, Add</i>	0.19	
			<i>For Up To 100, Add</i>	0.64	
			<i>For >100 To 500, Add</i>	0.32	
			<i>For >5,000, Deduct</i>	-0.13	
09 22 36 13-0006	SF		1/2" Thick, Installed On Ceiling, Plaster Base Gypsum Panel.....	2.46	0.73
			<i>For Ceilings >10' High, Add</i>	0.22	
			<i>For Up To 100, Add</i>	0.73	
			<i>For >100 To 500, Add</i>	0.37	
			<i>For >5,000, Deduct</i>	-0.15	
09 22 36 13-0007	SF		5/8" Thick, Installed On Ceiling, Plaster Base Gypsum Panel.....	3.12	0.84
			<i>For Ceilings >10' High, Add</i>	0.25	
			<i>For Up To 100, Add</i>	0.84	
			<i>For >100 To 500, Add</i>	0.42	
			<i>For >5,000, Deduct</i>	-0.17	
09 22 36 13-0008	SF		3/8" Thick, Installed On Columns And Beams, Plaster Base Gypsum Panel.....	2.17	0.81
			<i>For Columns And Beams >10' High, Add</i>	0.24	
			<i>For Up To 100, Add</i>	0.82	
			<i>For >100 To 500, Add</i>	0.41	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 13-0009	SF		1/2" Thick, Installed On Columns And Beams, Plaster Base Gypsum Panel.....	2.88	0.94
			<i>For Columns And Beams >10' High, Add</i>	0.28	
			<i>For Up To 100, Add</i>	0.94	
			<i>For >100 To 500, Add</i>	0.47	
			<i>For >5,000, Deduct</i>	-0.19	
09 22 36 13-0010	SF		5/8" Thick, Installed On Columns And Beams, Plaster Base Gypsum Panel.....	3.60	1.09
			<i>For Columns And Beams >10' High, Add</i>	0.32	
			<i>For Up To 100, Add</i>	1.08	
			<i>For >100 To 500, Add</i>	0.54	
			<i>For >5,000, Deduct</i>	-0.22	
09 22 36 13-0011			Firestop Plaster Base Gypsum Panels (09 22 36 13)		
09 22 36 13-0012	SF		3/8" Thick, Installed On Studs Or Furred Walls, Firestop Plaster Base Gypsum Panel.....	2.11	0.45
			<i>For Walls >10' High, Add</i>	0.11	
			<i>For Up To 100, Add</i>	0.46	
			<i>For >100 To 500, Add</i>	0.23	
			<i>For >5,000, Deduct</i>	-0.09	
09 22 36 13-0013	SF		1/2" Thick, Installed On Studs Or Furred Walls, Firestop Plaster Base Gypsum Panel.....	2.45	0.52
			<i>For Walls >10' High, Add</i>	0.13	
			<i>For Up To 100, Add</i>	0.53	
			<i>For >100 To 500, Add</i>	0.26	
			<i>For >5,000, Deduct</i>	-0.11	
09 22 36 13-0014	SF		3/8" Thick, Installed On Ceilings, Firestop Plaster Base Gypsum Panel.....	2.47	0.63
			<i>For Ceilings >10' High, Add</i>	0.19	
			<i>For Up To 100, Add</i>	0.64	
			<i>For >100 To 500, Add</i>	0.32	
			<i>For >5,000, Deduct</i>	-0.13	
09 22 36 13-0015	SF		1/2" Thick, Installed On Ceilings, Firestop Plaster Base Gypsum Panel.....	2.86	0.73
			<i>For Ceilings >10' High, Add</i>	0.22	
			<i>For Up To 100, Add</i>	0.73	
			<i>For >100 To 500, Add</i>	0.37	
			<i>For >5,000, Deduct</i>	-0.15	
09 22 36 13-0016	SF		3/8" Thick, Installed On Columns And Beams, Firestop Plaster Base Gypsum Panel.....	2.83	0.81
			<i>For Columns And Beams >10' High, Add</i>	0.24	
			<i>For Up To 100, Add</i>	0.82	
			<i>For >100 To 500, Add</i>	0.41	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 13-0017	SF		1/2" Thick, Installed On Columns And Beams, Firestop Plaster Base Gypsum Panel.....	3.28	0.94
			<i>For Columns And Beams >10' High, Add</i>	0.28	
			<i>For Up To 100, Add</i>	0.94	
			<i>For >100 To 500, Add</i>	0.47	
			<i>For >5,000, Deduct</i>	-0.19	
09 22 36 13-0018			Foil Back Plaster Base Gypsum Panels (09 22 36 13)		
09 22 36 13-0019	SF		3/8" Thick, Installed On Studs Or Furred Walls, Foil Back Plaster Base Gypsum Panel.....	2.11	0.45
			<i>For Walls >10' High, Add</i>	0.11	
			<i>For Up To 100, Add</i>	0.46	
			<i>For >100 To 500, Add</i>	0.23	
			<i>For >5,000, Deduct</i>	-0.09	
09 22 36 13-0020	SF		1/2" Thick, Installed On Studs Or Furred Walls, Foil Back Plaster Base Gypsum Panel.....	2.45	0.52
			<i>For Walls >10' High, Add</i>	0.13	
			<i>For Up To 100, Add</i>	0.53	
			<i>For >100 To 500, Add</i>	0.26	
			<i>For >5,000, Deduct</i>	-0.11	



Finishes	09	
Plaster and Gypsum Board	09 20	09
Supports for Plaster and Gypsum Board	09 22	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 22 36 13-0021	SF		3/8" Thick, Installed On Ceiling, Foil Back Plaster Base Gypsum Panel	2.47	0.63
			<i>For Ceilings >10' High, Add</i>	0.19	
			<i>For Up To 100, Add</i>	0.64	
			<i>For >100 To 500, Add</i>	0.32	
			<i>For >5,000, Deduct</i>	-0.13	
09 22 36 13-0022	SF		1/2" Thick, Installed On Ceiling, Foil Back Plaster Base Gypsum Panel	2.86	0.73
			<i>For Ceilings >10' High, Add</i>	0.22	
			<i>For Up To 100, Add</i>	0.73	
			<i>For >100 To 500, Add</i>	0.37	
			<i>For >5,000, Deduct</i>	-0.15	
09 22 36 13-0023	SF		3/8" Thick, Installed On Columns And Beams, Foil Back Plaster Base Gypsum Panel	2.83	0.81
			<i>For Columns And Beams >10' High, Add</i>	0.24	
			<i>For Up To 100, Add</i>	0.82	
			<i>For >100 To 500, Add</i>	0.41	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 13-0024	SF		1/2" Thick, Installed On Columns And Beams, Foil Back Plaster Base Gypsum Panel	3.28	0.94
			<i>For Columns And Beams >10' High, Add</i>	0.28	
			<i>For Up To 100, Add</i>	0.94	
			<i>For >100 To 500, Add</i>	0.47	
			<i>For >5,000, Deduct</i>	-0.19	

09 22 36 23 Metal Lath (09 22 36)

09 22 36 23-0001	Flat Diamond, Expanded Metal Lath (09 22 36 23)				
09 22 36 23-0002	SF		1.75 LB/SY, Installed On Studs Or Furred Walls, Flat Diamond, Expanded Metal Lath	2.36	0.62
			<i>For Walls >10' High, Add</i>	0.18	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.70	
			<i>For >100 To 500, Add</i>	0.35	
			<i>For >5,000, Deduct</i>	-0.14	
09 22 36 23-0003	SF		2 LB/SY, Installed On Studs Or Furred Walls, Flat Diamond, Expanded Metal Lath	2.49	0.62
			<i>For Walls >10' High, Add</i>	0.18	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.70	
			<i>For >100 To 500, Add</i>	0.35	
			<i>For >5,000, Deduct</i>	-0.14	
09 22 36 23-0004	SF		2.5 LB/SY, Installed On Studs Or Furred Walls, Flat Diamond, Expanded Metal Lath	2.62	0.62
			<i>For Walls >10' High, Add</i>	0.18	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.70	
			<i>For >100 To 500, Add</i>	0.35	
			<i>For >5,000, Deduct</i>	-0.14	
09 22 36 23-0005	SF		3.4 LB/SY, Installed On Studs Or Furred Walls, Flat Diamond, Expanded Metal Lath	3.03	0.67
			<i>For Walls >10' High, Add</i>	0.19	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.75	
			<i>For >100 To 500, Add</i>	0.37	
			<i>For >5,000, Deduct</i>	-0.15	
09 22 36 23-0006	SF		1.75 LB/SY, Installed On Ceiling, Flat Diamond, Expanded Metal Lath	2.55	0.71
			<i>For Ceilings >10' High, Add</i>	0.24	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.80	
			<i>For >100 To 500, Add</i>	0.40	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0007	SF		2 LB/SY, Installed On Ceiling, Flat Diamond, Expanded Metal Lath	2.68	0.71
			<i>For Ceilings >10' High, Add</i>	0.24	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.80	
			<i>For >100 To 500, Add</i>	0.40	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0008	SF		2.5 LB/SY, Installed On Ceiling, Flat Diamond, Expanded Metal Lath	2.81	0.71
			<i>For Ceilings >10' High, Add</i>	0.24	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.80	
			<i>For >100 To 500, Add</i>	0.40	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0009	SF		3.4 LB/SY, Installed On Ceiling, Flat Diamond, Expanded Metal Lath	3.13	0.71
			<i>For Ceilings >10' High, Add</i>	0.24	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	0.80	
			<i>For >100 To 500, Add</i>	0.40	
			<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0010	SF		1.75 LB/SY, Installed On Columns And Beams, Flat Diamond, Expanded Metal Lath	3.32	1.01
			<i>For Columns And Beams >10' High, Add</i>	0.33	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	1.12	
			<i>For >100 To 500, Add</i>	0.56	
			<i>For >5,000, Deduct</i>	-0.22	
09 22 36 23-0011	SF		2 LB/SY, Installed On Columns And Beams, Flat Diamond, Expanded Metal Lath	3.45	1.01
			<i>For Columns And Beams >10' High, Add</i>	0.33	
			<i>For Paper Backed Lath, Add</i>	0.06	
			<i>For Up To 100, Add</i>	1.12	
			<i>For >100 To 500, Add</i>	0.56	
			<i>For >5,000, Deduct</i>	-0.22	

09 Finishes**09 20 Plaster and Gypsum Board****09 22 Supports for Plaster and Gypsum Board**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 22 36 23-0012	SF 2.5 LB/SY, Installed On Columns And Beams, Flat Diamond, Expanded Metal Lath	3.58	1.01
	<i>For Columns And Beams >10' High, Add</i>	0.33	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	1.12	
	<i>For >100 To 500, Add</i>	0.56	
	<i>For >5,000, Deduct</i>	-0.22	
09 22 36 23-0013	SF 3.4 LB/SY, Installed On Columns And Beams, Flat Diamond, Expanded Metal Lath	4.47	1.26
	<i>For Columns And Beams >10' High, Add</i>	0.42	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	1.40	
	<i>For >100 To 500, Add</i>	0.70	
	<i>For >5,000, Deduct</i>	-0.28	
09 22 36 23-0014	Self Furring, Flat Diamond, Expanded Metal Lath <small>(09 22 36 23)</small>		
09 22 36 23-0015	SF 1.75 LB/SY, Installed On Solid Wall Surface, Self Furring, Flat Diamond, Expanded Metal Lath	2.45	0.67
	<i>For Walls >10' High, Add</i>	0.19	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	0.75	
	<i>For >100 To 500, Add</i>	0.37	
	<i>For >5,000, Deduct</i>	-0.15	
09 22 36 23-0016	SF 2.0 LB/SY, Installed On Solid Wall Surface, Self Furring, Flat Diamond, Expanded Metal Lath	2.58	0.67
	<i>For Walls >10' High, Add</i>	0.19	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	0.75	
	<i>For >100 To 500, Add</i>	0.37	
	<i>For >5,000, Deduct</i>	-0.15	
09 22 36 23-0017	SF 2.5 LB/SY, Installed On Solid Wall Surface, Self Furring, Flat Diamond, Expanded Metal Lath	2.71	0.67
	<i>For Walls >10' High, Add</i>	0.19	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	0.75	
	<i>For >100 To 500, Add</i>	0.37	
	<i>For >5,000, Deduct</i>	-0.15	
09 22 36 23-0018	SF 3.4 LB/SY, Installed On Solid Wall Surface, Self Furring, Flat Diamond, Expanded Metal Lath	3.03	0.67
	<i>For Walls >10' High, Add</i>	0.19	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	0.75	
	<i>For >100 To 500, Add</i>	0.37	
	<i>For >5,000, Deduct</i>	-0.15	
09 22 36 23-0019	SF 1.75 LB/SY, Installed On Columns And Beams, Self Furring, Flat Diamond, Expanded Metal Lath	3.88	1.26
	<i>For Columns And Beams >10' High, Add</i>	0.42	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	1.40	
	<i>For >100 To 500, Add</i>	0.70	
	<i>For >5,000, Deduct</i>	-0.28	
09 22 36 23-0020	SF 2.0 LB/SY, Installed On Columns And Beams, Self Furring, Flat Diamond, Expanded Metal Lath	4.01	1.26
	<i>For Columns And Beams >10' High, Add</i>	0.42	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	1.40	
	<i>For >100 To 500, Add</i>	0.70	
	<i>For >5,000, Deduct</i>	-0.28	
09 22 36 23-0021	SF 2.5 LB/SY, Installed On Columns And Beams, Self Furring, Flat Diamond, Expanded Metal Lath	4.14	1.26
	<i>For Columns And Beams >10' High, Add</i>	0.42	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	1.40	
	<i>For >100 To 500, Add</i>	0.70	
	<i>For >5,000, Deduct</i>	-0.28	
09 22 36 23-0022	SF 3.4 LB/SY, Installed On Columns And Beams, Self Furring, Flat Diamond, Expanded Metal Lath	4.87	1.44
	<i>For Columns And Beams >10' High, Add</i>	0.48	
	<i>For Paper Backed Lath, Add</i>	0.06	
	<i>For Up To 100, Add</i>	1.60	
	<i>For >100 To 500, Add</i>	0.80	
	<i>For >5,000, Deduct</i>	-0.32	
09 22 36 23-0023	High Rib Metal Lath <small>(09 22 36 23)</small>		
09 22 36 23-0024	SF 2.75 LB/SY, Installed On Ceiling, 1/8" High Rib Metal Lath	2.91	0.71
	<i>For Ceilings >10' High, Add</i>	0.24	
	<i>For Up To 100, Add</i>	0.80	
	<i>For >100 To 500, Add</i>	0.40	
	<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0025	SF 3.4 LB/SY, Installed On Ceiling, 1/8" High Rib Metal Lath	3.10	0.71
	<i>For Ceilings >10' High, Add</i>	0.24	
	<i>For Up To 100, Add</i>	0.80	
	<i>For >100 To 500, Add</i>	0.40	
	<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0026	SF 3.4 LB/SY, Installed On Ceiling, 3/8" High Rib Metal Lath	3.21	0.71
	<i>For Ceilings >10' High, Add</i>	0.24	
	<i>For Up To 100, Add</i>	0.80	
	<i>For >100 To 500, Add</i>	0.40	
	<i>For >5,000, Deduct</i>	-0.16	
09 22 36 23-0027	SF 4.0 LB/SY, Installed On Ceiling, 3/8" High Rib Metal Lath	3.42	0.71
	<i>For Ceilings >10' High, Add</i>	0.24	
	<i>For Up To 100, Add</i>	0.80	
	<i>For >100 To 500, Add</i>	0.40	
	<i>For >5,000, Deduct</i>	-0.16	



Finishes	09	9
Plaster and Gypsum Board	09 20	
Supports for Plaster and Gypsum Board	09 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 22 36 33 Fiberglass Lath (09 22 36)

09 22 36 33-0001 Non-Metallic, Fiberglass Lath (09 22 36 33)

09 22 36 33-0002	SF 1/8" Thick, Installed On Ceiling, Non-Metallic, Fiberglass Lath.....	3.20		0.71
	<i>For Ceilings >10' High, Add</i>	0.24		
	<i>For Up To 100, Add</i>	0.80		
	<i>For >100 To 500, Add</i>	0.40		
	<i>For >5,000, Deduct</i>	-0.16		
09 22 36 33-0003	SF 1/4" Thick, Installed On Ceiling, Non-Metallic, Fiberglass Lath.....	3.45		0.71
	<i>For Ceilings >10' High, Add</i>	0.24		
	<i>For Up To 100, Add</i>	0.80		
	<i>For >100 To 500, Add</i>	0.40		
	<i>For >5,000, Deduct</i>	-0.16		
09 22 36 33-0004	SF 1/8" Thick, Installed On Solid Wall Surface, Non-Metallic, Fiberglass Lath	3.10		0.67
	<i>For Walls >10' High, Add</i>	0.19		
	<i>For Up To 100, Add</i>	0.75		
	<i>For >100 To 500, Add</i>	0.37		
	<i>For >5,000, Deduct</i>	-0.15		
09 22 36 33-0005	SF 1/4" Thick, Installed On Solid Wall Surface, Non-Metallic, Fiberglass Lath	3.35		0.67
	<i>For Walls >10' High, Add</i>	0.19		
	<i>For Up To 100, Add</i>	0.75		
	<i>For >100 To 500, Add</i>	0.37		
	<i>For >5,000, Deduct</i>	-0.15		

09 23 Gypsum Plastering (09 20)

09 23 13 Acoustical Gypsum Plastering (09 23)

Note: Excludes lath, furring and studs. See CSI section 09 22 00 00-0000 for metal studs and furring, 09 22 36 00-0000 for lath.

09 23 13 00-0001 Casing And Corner Beads (09 23 13)

09 23 13 00-0002	LF Galvanized Expanded Flange Casing Bead For Plaster Applications.....	4.24		1.01
09 23 13 00-0003	LF Zinc Expanded Flange Casing Bead For Plaster Applications.....	4.25		1.01
09 23 13 00-0004	LF Vinyl Expanded Flange Casing Bead For Plaster Applications.....	4.53		1.01
09 23 13 00-0005	LF Galvanized Corner Bead For Plaster Applications.....	4.04		1.01
09 23 13 00-0006	LF Vinyl Corner Bead For Plaster Applications.....	4.07		1.01

09 23 13 00-0007 Trim (09 23 13)

09 23 13 00-0008	LF Galvanized "J" Trim For Plaster Applications.....	4.42		1.01
	<i>For Vinyl Instead Of Galvanized, Add</i>	0.25		
	<i>For Zinc Instead Of Galvanized, Add</i>	1.68		
09 23 13 00-0009	LF Galvanized "L" Trim For Plaster Applications	4.42		1.01
	<i>For Vinyl Instead Of Galvanized, Add</i>	0.25		
	<i>For Zinc Instead Of Galvanized, Add</i>	1.68		
09 23 13 00-0010	LF Galvanized "U" Trim For Plaster Applications.....	4.42		1.01
	<i>For Vinyl Instead Of Galvanized, Add</i>	0.25		
	<i>For Zinc Instead Of Galvanized, Add</i>	1.68		

09 23 13 00-0011 Plaster Forms And Expansion Joints (09 23 13)

09 23 13 00-0012	SF 1" Architectural Foam Forms To Cover With Plaster	4.92		
09 23 13 00-0013	LF 3/4" Galvanized Expansion Joint For Plaster Applications.....	5.14		1.01

09 23 13 00-0014 One Skim Coat Gypsum Plaster On Walls (09 23 13)

09 23 13 00-0015	SF Skim Coat One Coat Gypsum Plaster On Walls	1.33		
	<i>For Walls >10' High, Add</i>	0.11		
	<i>For Horizontal Installation Up To 10' High, Add</i>	0.17		
	<i>For Horizontal Installation >10' High, Add</i>	0.34		
	<i>For Columns Or Beams Up To 10' High, Add</i>	0.35		
	<i>For Columns Or Beams >10' High, Add</i>	0.52		
	<i>For Up To 100, Add</i>	0.56		
	<i>For >100 To 500, Add</i>	0.28		
	<i>For >5,000, Deduct</i>	-0.22		
09 23 13 00-0016	SF For Each Additional Coat Over One, Skim Coat Gypsum Plaster On Walls	0.97		
	<i>For Walls >10' High, Add</i>	0.08		
	<i>For Horizontal Installation Up To 10' High, Add</i>	0.12		
	<i>For Horizontal Installation >10' High, Add</i>	0.24		
	<i>For Columns Or Beams Up To 10' High, Add</i>	0.25		
	<i>For Columns Or Beams >10' High, Add</i>	0.37		
	<i>For Up To 100, Add</i>	0.41		
	<i>For >100 To 500, Add</i>	0.20		
	<i>For >5,000, Deduct</i>	-0.16		

09 23 13 00-0017 Two Coats Gypsum Plaster On Walls (09 23 13)

09	09 Finishes
	09 20 Plaster and Gypsum Board
	09 23 Gypsum Plastering



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 23 13 00-0018 SF Smooth Finish Two Coats Gypsum Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>6.57 0.62 0.93 1.85 1.92 2.84 3.09 1.55 -1.24	3.75
09 23 13 00-0019 SF Sand Aggregate Two Coats Gypsum Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>	.....6.73 0.58 0.87 1.74 1.80 2.67 2.90 1.45 -1.16	3.55
09 23 13 00-0020 SF Perlite Or Vermiculite Two Coats Gypsum Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>	.....6.82 0.58 0.87 1.74 1.80 2.67 2.90 1.45 -1.16	3.55
09 23 13 00-0021 Three Coats Gypsum Plaster On Walls <small>(09 23 13)</small>		
09 23 13 00-0022 SF Smooth Finish Three Coats Gypsum Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>	.....7.94 0.74 1.11 2.21 2.29 3.39 3.69 1.85 -1.48	4.57
09 23 13 00-0023 SF Sand Aggregate Three Coats Gypsum Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>	.....7.96 0.69 1.03 2.06 2.12 3.15 3.43 1.71 -1.37	4.15
09 23 13 00-0024 SF Perlite Or Vermiculite Three Coats Gypsum Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>	.....7.49 0.68 1.02 2.05 2.11 3.14 3.41 1.71 -1.36	4.15
09 23 13 00-0025 Plaster Bonding Agent <small>(09 23 13)</small>		
09 23 13 00-0026 SF 1 Coat, Brush/Roller Applied Plaster Bonding Agent <i>For Walls >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Ceiling Application Up To 10' High, Add</i> <i>For Ceiling Application >10' High, Add</i>	.....0.85 0.06 0.18 0.27 0.08 0.14	

09 24 Cement Plastering (09 20)

09 24 13 Acoustical Cement Plastering (09 24)

09 24 13 00-0001 Keene's Cement Plaster, Quick Setting, White Hard Plaster (09 24 13)
 Note: Used for areas with higher than normal moisture.

09 24 13 00-0002 SF 1 Coat Keene's Cement Plaster On Walls <i>For Walls >10' High, Add</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Columns Or Beams Up To 10' High, Add</i> <i>For Columns Or Beams >10' High, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 500, Add</i> <i>For >5,000, Deduct</i>5.17 0.41 0.61 1.22 1.26 1.86 2.03 1.01 -0.81	2.53
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Finishes	09	09
Plaster and Gypsum Board	09 20	
Cement Plastering	09 24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 24 13 00-0003	SF	2 Coat Keene's Cement Plaster On Walls	7.84	3.95
		<i>For Walls >10' High, Add</i>	0.64	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.96	
		<i>For Horizontal Installation >10' High, Add</i>	1.93	
		<i>For Columns Or Beams Up To 10' High, Add</i>	1.99	
		<i>For Columns Or Beams >10' High, Add</i>	2.96	
		<i>For Up To 100, Add</i>	3.22	
		<i>For >100 To 500, Add</i>	1.61	
		<i>For >5,000, Deduct</i>	-1.29	
09 24 13 00-0004	SF	3 Coat Keene's Cement Plaster On Walls	8.87	4.46
		<i>For Walls >10' High, Add</i>	0.73	
		<i>For Horizontal Installation Up To 10' High, Add</i>	1.09	
		<i>For Horizontal Installation >10' High, Add</i>	2.18	
		<i>For Columns Or Beams Up To 10' High, Add</i>	2.25	
		<i>For Columns Or Beams >10' High, Add</i>	3.34	
		<i>For Up To 100, Add</i>	3.64	
		<i>For >100 To 500, Add</i>	1.82	
		<i>For >5,000, Deduct</i>	-1.45	

09 24 23

Cement Stucco (09 24)

Note: Packaged product reinforced with fibers. All plastering excludes lath, furring or studs except as noted. See CSI section 09 22 00 00-0000 for metal studs and furring.

09 24 23 00-0001

Stucco (09 24 23)

Note: Excludes wall scaffolding or lifting equipment.

09 24 23 00-0002	SF	Scratch/Brown/Finish, Three Coat Troweled Stucco	9.86	3.14
		Note: Excludes lath and felt. Interior or exterior, one side.		
		<i>For Walls >10' High, Add</i>	0.86	
		<i>For Horizontal Installation Up To 10' High, Add</i>	1.29	
		<i>For Horizontal Installation >10' High, Add</i>	2.58	
		<i>For Columns Or Beams Up To 10' High, Add</i>	2.66	
		<i>For Columns Or Beams >10' High, Add</i>	3.95	
		<i>For Color Added To Finish Coat, Add</i>	0.15	
		<i>For Smooth Float Finish, Add</i>	1.80	
		<i>For Up To 100, Add</i>	4.30	
		<i>For >100 To 500, Add</i>	2.15	
		<i>For >5,000, Deduct</i>	-1.72	
09 24 23 00-0003	SF	Scratch/Brown, Two Coat Troweled Stucco	4.26	1.52
		Note: Excludes lath and felt. Interior or exterior, one side.		
		<i>For Walls >10' High, Add</i>	0.31	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.47	
		<i>For Horizontal Installation >10' High, Add</i>	0.94	
		<i>For Columns Or Beams Up To 10' High, Add</i>	0.97	
		<i>For Columns Or Beams >10' High, Add</i>	1.44	
		<i>For Up To 100, Add</i>	1.57	
		<i>For >100 To 500, Add</i>	0.79	
		<i>For >5,000, Deduct</i>	-0.63	
09 24 23 00-0004	SF	Scratch/Finish, Two Coat Troweled Stucco	6.51	1.52
		Note: Excludes lath and felt. Interior or exterior, one side.		
		<i>For Walls >10' High, Add</i>	0.56	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.84	
		<i>For Horizontal Installation >10' High, Add</i>	1.67	
		<i>For Columns Or Beams Up To 10' High, Add</i>	1.73	
		<i>For Columns Or Beams >10' High, Add</i>	2.57	
		<i>For Color Added To Finish Coat, Add</i>	0.15	
		<i>For Smooth Float Finish, Add</i>	1.53	
		<i>For Up To 100, Add</i>	2.79	
		<i>For >100 To 500, Add</i>	1.40	
		<i>For >5,000, Deduct</i>	-1.12	
09 24 23 00-0005	SF	Finish Coat Troweled Stucco	4.21	1.01
		Note: Excludes lath and felt. Interior or exterior, one side.		
		<i>For Walls >10' High, Add</i>	0.41	
		<i>For Horizontal Installation Up To 10' High, Add</i>	0.61	
		<i>For Horizontal Installation >10' High, Add</i>	1.22	
		<i>For Columns Or Beams Up To 10' High, Add</i>	1.26	
		<i>For Columns Or Beams >10' High, Add</i>	1.86	
		<i>For Color Added To Finish Coat, Add</i>	0.15	
		<i>For Smooth Float Finish, Add</i>	1.53	
		<i>For Up To 100, Add</i>	2.03	
		<i>For >100 To 500, Add</i>	1.01	
		<i>For >5,000, Deduct</i>	-0.81	

09 24 33

Cement Parging (09 24)

09 24 33 00-0001

Cement Parging (09 24 33)

09 24 33 00-0002	SF	1/8" Thick Sand And Cement Parging	3.87	
09 24 33 00-0003	SF	1/4" Thick Sand And Cement Parging	4.95	
09 24 33 00-0004	SF	1/2" Thick Sand And Cement Parging	7.58	

09 28 Backing Boards and Underlayments (09 20)

09 28 13

Cementitious Backing Boards (09 28)

09 Finishes**09 20 Plaster and Gypsum Board****09 28 Backing Boards and Underlayments**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 28 13 00-0001	Cementitious Backer Units <small>(09 28 13)</small> Note: Installed with mechanical fasteners to floor, wall and ceiling surfaces. Use thin-set from setting methods section for floor installations as applicable.		
09 28 13 00-0002	SF 1/4" Cementitious Backer Units For Installation On Floors	3.78	0.68
	For Up To 50, Add	2.98	
	For >50 To 250, Add	0.54	
	For >1,000, Deduct	-0.27	
	For Installation On Wall, Add	0.54	
	For Installation On Ceiling, Add	1.36	
09 28 13 00-0003	SF 1/2" Cementitious Backer Units For Installation On Floors	4.35	0.82
	For Up To 50, Add	3.53	
	For >50 To 250, Add	0.65	
	For >1,000, Deduct	-0.33	
	For Installation On Wall, Add	0.65	
	For Installation On Ceiling, Add	1.63	
09 28 13 00-0004	SF 5/8" Cementitious Backer Units For Installation On Floors	5.33	0.95
	For Up To 50, Add	4.18	
	For >50 To 250, Add	0.76	
	For >1,000, Deduct	-0.38	
	For Installation On Wall, Add	0.76	
	For Installation On Ceiling, Add	1.90	
09 28 16	Glass-Mat Faced Gypsum Backing Boards <small>(09 28)</small>		
09 28 16 00-0001	Glass Mat Faced Backer Units, DensShield <small>(09 28 16)</small> Note: Installed with mechanical fasteners to floor, wall and ceiling surfaces. Use thin-set from setting methods section for floor installations as applicable.		
09 28 16 00-0002	SF 1/2" DensShield Tile Backer For Installation On Floors	3.38	0.76
	For Up To 50, Add	2.31	
	For >50 To 250, Add	0.39	
	For >1,000, Deduct	-0.20	
	For Installation On Wall, Add	0.39	
	For Installation On Ceiling, Add	0.98	
09 28 16 00-0003	SF 5/8" DensShield Tile Backer For Installation On Floors	4.42	0.87
	For Up To 50, Add	2.73	
	For >50 To 250, Add	0.43	
	For >1,000, Deduct	-0.22	
	For Installation On Wall, Add	0.43	
	For Installation On Ceiling, Add	1.09	
09 29	Gypsum Board <small>(09 29)</small>		
	Note: Do not deduct for opens of less than 25 SF when calculating total wall square footage.		
09 29 10	Gypsum Board <small>(09 29)</small>		
09 29 10 00-0001	Standard Gypsum Board Application <small>(09 29 10)</small> Note: Includes gypsum board screwed in place on walls, ceilings, beams, columns, soffits, etc.. Excludes finishing. See CSI section 09 01 20 91-0001 for small repairs, 09 29 10 00-0034 for finishing gypsum board, 09 29 10 00-0047 for casing and corner bead.		
09 29 10 00-0002	Standard Gypsum Board Application <small>(09 29 10 00-0001)</small>		
09 29 10 00-0003	SF 1/4" Gypsum Board.....	1.43	0.43
	For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.21	
	For Adhesive Applied Sheets, Add	0.10	
	Note: Includes bracing until adhesive is bonded		
	For Horizontal Installation Up To 10' High, Add	0.30	
	For Horizontal Installation >10' High, Add	0.44	
	For Walls >10' High, Add	0.07	
	For Up To 128, Add	0.46	
	For >128 To 320, Add	0.27	
	For >1,536, Deduct	-0.13	
09 29 10 00-0004	SF 1/2" Gypsum Board.....	1.69	0.56
	For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.27	
	For Adhesive Applied Sheets, Add	0.12	
	Note: Includes bracing until adhesive is bonded		
	For Foil Back Board, Add	0.10	
	For Horizontal Installation Up To 10' High, Add	0.38	
	For Horizontal Installation >10' High, Add	0.57	
	For Walls >10' High, Add	0.09	
	For Up To 128, Add	0.56	
	For >128 To 320, Add	0.34	
	For >1,536, Deduct	-0.14	
09 29 10 00-0005	SF 5/8" Gypsum Board.....	1.98	0.64
	For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.30	
	For Adhesive Applied Sheets, Add	0.12	
	Note: Includes bracing until adhesive is bonded		
	For Foil Back Board, Add	0.10	
	For Horizontal Installation Up To 10' High, Add	0.44	
	For Horizontal Installation >10' High, Add	0.65	
	For Walls >10' High, Add	0.10	
	For Up To 128, Add	0.65	
	For >128 To 320, Add	0.39	
	For >1,536, Deduct	-0.17	



Finishes	09	9
Plaster and Gypsum Board	09 20	
Gypsum Board	09 29	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 29 10 00-0006 Fire Rated Gypsum Board Application <small>(09 29 10 00-0001)</small>		
09 29 10 00-0007 Type X, Fire Rated Gypsum Board <small>(09 29 10 00-0006)</small>		
09 29 10 00-0008 SF 5/8" Type X Fire Rated Gypsum Board.....	2.10	0.64
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.33	
For Adhesive Applied Sheets, Add	0.13	
Note: Includes bracing until adhesive is bonded		
For Foil Back Board, Add	0.10	
For Horizontal Installation Up To 10' High, Add	0.48	
For Horizontal Installation >10' High, Add	0.71	
For Walls >10' High, Add	0.11	
For Up To 128, Add	0.70	
For >128 To 320, Add	0.42	
For >1,536, Deduct	-0.17	
09 29 10 00-0009 Type C, Fire Rated Gypsum Board <small>(09 29 10 00-0006)</small>		
09 29 10 00-0010 SF 1/2" Type C Fire Rated Gypsum Board.....	1.95	0.56
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.29	
For Adhesive Applied Sheets, Add	0.12	
Note: Includes bracing until adhesive is bonded		
For Foil Back Board, Add	0.10	
For Horizontal Installation Up To 10' High, Add	0.42	
For Horizontal Installation >10' High, Add	0.62	
For Walls >10' High, Add	0.10	
For Up To 128, Add	0.64	
For >128 To 320, Add	0.38	
For >1,536, Deduct	-0.17	
09 29 10 00-0011 SF 5/8" Type C Fire Rated Gypsum Board.....	2.18	0.64
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.33	
For Adhesive Applied Sheets, Add	0.13	
Note: Includes bracing until adhesive is bonded		
For Foil Back Board, Add	0.10	
For Horizontal Installation Up To 10' High, Add	0.48	
For Horizontal Installation >10' High, Add	0.71	
For Walls >10' High, Add	0.11	
For Up To 128, Add	0.72	
For >128 To 320, Add	0.43	
For >1,536, Deduct	-0.19	
09 29 10 00-0012 Fire Rated Gypsum Board (Sheetrock® Ultracode®) <small>(09 29 10 00-0006)</small>		
09 29 10 00-0013 SF 3/4" Fire Rated Gypsum Board (Sheetrock® Ultracode®).....	3.15	0.64
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.34	
For Adhesive Applied Sheets, Add	0.13	
Note: Includes bracing until adhesive is bonded		
For Horizontal Installation Up To 10' High, Add	0.48	
For Horizontal Installation >10' High, Add	0.71	
For Walls >10' High, Add	0.11	
For Up To 128, Add	0.91	
For >128 To 320, Add	0.53	
For >1,536, Deduct	-0.33	
09 29 10 00-0014 Moisture Resistant Gypsum Board Application <small>(09 29 10 00-0001)</small>		
Note: Water-resistant gypsum core.		
09 29 10 00-0015 SF 1/2" Moisture Resistant Gypsum Board.....	1.87	0.56
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.27	
For Adhesive Applied Sheets, Add	0.12	
Note: Includes bracing until adhesive is bonded		
For Horizontal Installation Up To 10' High, Add	0.38	
For Horizontal Installation >10' High, Add	0.57	
For Walls >10' High, Add	0.09	
For Up To 128, Add	0.60	
For >128 To 320, Add	0.36	
For >1,536, Deduct	-0.17	
09 29 10 00-0016 SF 5/8" Moisture Resistant Gypsum Board.....	2.46	0.56
For Curved Surfaces With A 2'-0" Maximum Radius, Add	0.31	
For Adhesive Applied Sheets, Add	0.12	
Note: Includes bracing until adhesive is bonded		
For Horizontal Installation Up To 10' High, Add	0.44	
For Horizontal Installation >10' High, Add	0.65	
For Walls >10' High, Add	0.10	
For Up To 128, Add	0.75	
For >128 To 320, Add	0.44	
For >1,536, Deduct	-0.24	
09 29 10 00-0017 Vinyl Faced Gypsum Board Application <small>(09 29 10 00-0001)</small>		
Note: Includes clips and adhesive.		

09 Finishes

09 20 Plaster and Gypsum Board

09 29 Gypsum Board



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 29 10 00-0018	SF 1/2" Prefinished, Vinyl Faced Gypsum Board <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i>	3.95 0.29 0.12 0.38 0.57 0.09 1.02 0.56 -0.48 0.11	0.56
09 29 10 00-0019	SF 5/8" Prefinished, Vinyl Faced Gypsum Board <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i>	4.11 0.32 0.12 0.44 0.65 0.10 1.08 0.60 -0.49 0.13	0.64
09 29 10 00-0020	SF 1/2" Fire Rated, Prefinished Vinyl Faced Gypsum Board <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i>	4.60 0.32 0.12 0.42 0.62 0.10 1.17 0.65 -0.57 0.12	0.56
09 29 10 00-0021	SF 5/8" Fire Rated, Prefinished Vinyl Faced Gypsum Board <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i>	7.19 0.38 0.13 0.48 0.71 0.11 1.72 0.93 -0.94 0.14	0.64
09 29 10 00-0022	Moisture And Mold Resistant Gypsum Board Application <small>(09 29 10 00-0001)</small>		
09 29 10 00-0023	SF 1/2", Mesh Reinforced, Moisture And Mold Resistant Gypsum Board (Georgia-Pacific ToughRock® Mold-Guard™) <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i> <i>For Non-reinforced Board, Deduct</i>	2.24 0.27 0.12 0.38 0.57 0.09 0.67 0.39 -0.22 0.11 -0.08	0.54
09 29 10 00-0024	SF 5/8", Mesh Reinforced, Moisture And Mold Resistant Gypsum Board (Georgia-Pacific ToughRock® Mold-Guard™) <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i> <i>For Non-reinforced Board, Deduct</i>	2.65 0.31 0.12 0.44 0.65 0.10 0.79 0.46 -0.27 0.13 -0.08	0.61
09 29 10 00-0025	SF 1/2" Fire Rated, Mesh Reinforced, Moisture And Mold Resistant Gypsum Board (Georgia-Pacific ToughRock® Fireguard X® Mold-Guard™) <i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i> <i>For Adhesive Applied Sheets, Add</i> <i>Note: Includes bracing until adhesive is bonded</i> <i>For Horizontal Installation Up To 10' High, Add</i> <i>For Horizontal Installation >10' High, Add</i> <i>For Walls >10' High, Add</i> <i>For Up To 128, Add</i> <i>For >128 To 320, Add</i> <i>For >1,536, Deduct</i> <i>For Walls >10' High, Add</i>	2.68 0.30 0.12 0.42 0.62 0.10 0.78 0.45 -0.28 0.12	0.54



Finishes	09	9
Plaster and Gypsum Board	09 20	
Gypsum Board	09 29	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 29 10 00-0026	SF		5/8" Fire Rated, Mesh Reinforced, Moisture And Mold Resistant Gypsum Board (Georgia-Pacific ToughRock® Fireguard X® Mold-Guard™).....	2.98	0.61
			<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.34	
			<i>For Adhesive Applied Sheets, Add</i>	0.13	
			<i>Note: Includes bracing until adhesive is bonded</i>		
			<i>For Horizontal Installation Up To 10' High, Add</i>	0.48	
			<i>For Horizontal Installation >10' High, Add</i>	0.71	
			<i>For Walls >10' High, Add</i>	0.11	
			<i>For Up To 128, Add</i>	0.88	
			<i>For >128 To 320, Add</i>	0.51	
			<i>For >1,536, Deduct</i>	-0.31	
			<i>For Walls >10' High, Add</i>	0.14	
09 29 10 00-0027			Impact Resistant Gypsum Board (09 29 10 00-0001)		
			<i>Note: Includes tapered edge, mold and moisture resistant, fire-resistant, Type X gypsum core encased in a heavy, abrasion and mold/mildew/moisture resistant</i>		
09 29 10 00-0028	SF		5/8" Fire Rated, Impact Resistant Gypsum Board (National Gypsum Hi-Impact®).....	3.96	0.61
			<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.32	
			<i>For Adhesive Applied Sheets, Add</i>	0.12	
			<i>Note: Includes bracing until adhesive is bonded</i>		
			<i>For Horizontal Installation Up To 10' High, Add</i>	0.44	
			<i>For Horizontal Installation >10' High, Add</i>	0.64	
			<i>For Walls >10' High, Add</i>	0.10	
			<i>For Up To 128, Add</i>	1.05	
			<i>For >128 To 320, Add</i>	0.59	
			<i>For >1,536, Deduct</i>	-0.47	
			<i>For Walls >10' High, Add</i>	0.13	
09 29 10 00-0029			Abuse Resistant Gypsum Board (09 29 10 00-0001)		
			<i>Note: Includes tapered edge, mold and moisture resistant, fire-resistant Type X gypsum core encased in a heavy, abrasion and mold/mildew/moisture resistant</i>		
09 29 10 00-0030	SF		5/8" Fire Rated, Abuse Resistant Gypsum Board (National Gypsum Hi-Abuse®).....	2.74	0.61
			<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.31	
			<i>For Adhesive Applied Sheets, Add</i>	0.12	
			<i>Note: Includes bracing until adhesive is bonded</i>		
			<i>For Horizontal Installation Up To 10' High, Add</i>	0.44	
			<i>For Horizontal Installation >10' High, Add</i>	0.64	
			<i>For Walls >10' High, Add</i>	0.10	
			<i>For Up To 128, Add</i>	0.80	
			<i>For >128 To 320, Add</i>	0.47	
			<i>For >1,536, Deduct</i>	-0.28	
			<i>For Walls >10' High, Add</i>	0.13	
09 29 10 00-0031			Noise Reducing Gypsum Board (09 29 10 00-0001)		
09 29 10 00-0032	SF		1/2" Noise Reducing Gypsum Board (National Gypsum SoundBreak).....	5.30	0.65
			<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.34	
			<i>For Adhesive Applied Sheets, Add</i>	0.13	
			<i>Note: Includes bracing until adhesive is bonded</i>		
			<i>For Horizontal Installation Up To 10' High, Add</i>	0.44	
			<i>For Horizontal Installation >10' High, Add</i>	0.65	
			<i>For Walls >10' High, Add</i>	0.10	
			<i>For Up To 128, Add</i>	1.32	
			<i>For >128 To 320, Add</i>	0.73	
			<i>For >1,536, Deduct</i>	-0.67	
			<i>For Walls >10' High, Add</i>	0.13	
09 29 10 00-0033	SF		5/8" Noise Reducing Gypsum Board (National Gypsum SoundBreak).....	6.47	0.65
			<i>For Curved Surfaces With A 2'-0" Maximum Radius, Add</i>	0.35	
			<i>For Adhesive Applied Sheets, Add</i>	0.13	
			<i>Note: Includes bracing until adhesive is bonded</i>		
			<i>For Horizontal Installation Up To 10' High, Add</i>	0.44	
			<i>For Horizontal Installation >10' High, Add</i>	0.65	
			<i>For Walls >10' High, Add</i>	0.10	
			<i>For Up To 128, Add</i>	1.55	
			<i>For >128 To 320, Add</i>	0.84	
			<i>For >1,536, Deduct</i>	-0.84	
			<i>For Walls >10' High, Add</i>	0.13	
09 29 10 00-0034			Finishing Gypsum Board Applications (09 29 10)		
			<i>Note: Includes flat or curved walls, columns, soffits, recesses, and chases. Tape, spackle, sand and finish gypsum board to the appropriate level as defined by ASTM C 840. No taping or finishing is required for Level 0. For Level 1, tape is set in compound at joints and interior angles. Ridges and tool marks are acceptable. For Level 2, tape is set in compound and wiped with a joint knife leaving a thin coating of compound over joints, interior angles, fastener heads, and beads. Ridges and tool marks are acceptable. Compound applied over the body of the tape at the time of the tape is set satisfies the conditions for this level. For Level 3, tape is set in compound and one additional coat of compound is applied over all joints and interior angles. Fastener heads and accessories receive two separate coats of joint compound. Ridges and tool marks are not acceptable. For Level 4, tape is set in compound and two separate coats of compound are applied over all flat joints with one separate coat of compound applied over interior angles. Fastener heads and accessories receive three separate coats of compound. Ridges and tool marks are not acceptable. A Level 5 finish is a Level 4 finish plus a thin skim coat of compound applied to the entire drywall surface. All levels of finish require that the surface be free of excess compound. A single modifier may be used to change the level of finish to the appropriate level.</i>		

09	09 Finishes
	09 20 Plaster and Gypsum Board
	09 29 Gypsum Board



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 29 10 00-0035 Finish Gypsum Board Walls, ASTM C840 Level 4 <small>(09 29 10 00-0034)</small>		
09 29 10 00-0036 SF Up To 10' High, Walls, Tape, Spackle And Finish Gypsum Board.....	0.76	
For Up To 128, Add	0.29	
For >128 To 320, Add	0.18	
For >5,400, Deduct	-0.08	
For ASTM C840 Level 1 Finish, Deduct	-0.36	
For ASTM C840 Level 2 Finish, Deduct	-0.18	
For ASTM C840 Level 3 Finish, Deduct	-0.07	
For ASTM C840 Level 5 High Quality Finish, Add	0.56	
For Spray Applied Textured Or Orange Peel Finish, Add	0.56	
09 29 10 00-0037 SF >10' High, Walls, Tape, Spackle And Finish Gypsum Board.....	1.01	
Note: Use this task for the entire wall area when the wall is >10' high.		
For Up To 128, Add	0.39	
For >128 To 320, Add	0.24	
For >5,400, Deduct	-0.10	
For ASTM C840 Level 1 Finish, Deduct	-0.48	
For ASTM C840 Level 2 Finish, Deduct	-0.24	
For ASTM C840 Level 3 Finish, Deduct	-0.10	
For ASTM C840 Level 5 High Quality Finish, Add	0.75	
For Spray Applied Textured Or Orange Peel Finish, Add	0.75	
09 29 10 00-0038 Finish Gypsum Board Ceilings, ASTM C840 Level 4 <small>(09 29 10 00-0034)</small>		
09 29 10 00-0039 SF Up To 10' High, Ceilings, Tape, Spackle And Finish Gypsum Board.....	0.99	
For Up To 128, Add	0.38	
For >128 To 320, Add	0.24	
For >5,400, Deduct	-0.10	
For ASTM C840 Level 1 Finish, Deduct	-0.47	
For ASTM C840 Level 2 Finish, Deduct	-0.24	
For ASTM C840 Level 3 Finish, Deduct	-0.10	
For ASTM C840 Level 5 High Quality Finish, Add	0.73	
For Spray Applied Textured Or Orange Peel Finish, Add	0.73	
09 29 10 00-0040 SF >10' High, Ceilings, Tape, Spackle And Finish Gypsum Board.....	1.31	
Note: Use this task for the entire wall area when the wall is >10' high.		
For Up To 128, Add	0.51	
For >128 To 320, Add	0.32	
For >5,400, Deduct	-0.13	
For ASTM C840 Level 1 Finish, Deduct	-0.63	
For ASTM C840 Level 2 Finish, Deduct	-0.32	
For ASTM C840 Level 3 Finish, Deduct	-0.13	
For ASTM C840 Level 5 High Quality Finish, Add	0.97	
For Spray Applied Textured Or Orange Peel Finish, Add	0.97	
09 29 10 00-0041 Finish Gypsum Board Vertical Corners, ASTM C840 Level 4 <small>(09 29 10 00-0034)</small>		
Note: Inside or outside gypsum board corners.		
09 29 10 00-0042 LF Up To 10' High, Vertical Corners, Tape, Spackle And Finish Gypsum Board.....	1.52	
For ASTM C840 Level 1 Finish, Deduct	-0.70	
For ASTM C840 Level 2 Finish, Deduct	-0.35	
For ASTM C840 Level 3 Finish, Deduct	-0.14	
For ASTM C840 Level 5 High Quality Finish, Add	1.11	
09 29 10 00-0043 LF >10' High, Vertical Corners, Tape, Spackle And Finish Gypsum Board.....	1.80	
Note: Use this task for the entire wall area when the wall is >10' high.		
For ASTM C840 Level 1 Finish, Deduct	-0.84	
For ASTM C840 Level 2 Finish, Deduct	-0.42	
For ASTM C840 Level 3 Finish, Deduct	-0.17	
For ASTM C840 Level 5 High Quality Finish, Add	1.32	
09 29 10 00-0044 Finish Gypsum Board Horizontal Corners, ASTM C840 Level 4 <small>(09 29 10 00-0034)</small>		
Note: Inside or outside gypsum board corners.		
09 29 10 00-0045 LF Up To 10' High, Horizontal Corners, Tape, Spackle And Finish Gypsum Board.....	1.75	
For ASTM C840 Level 1 Finish, Deduct	-0.82	
For ASTM C840 Level 2 Finish, Deduct	-0.41	
For ASTM C840 Level 3 Finish, Deduct	-0.17	
For ASTM C840 Level 5 High Quality Finish, Add	1.28	
09 29 10 00-0046 LF >10' High, Horizontal Corners, Tape, Spackle And Finish Gypsum Board.....	2.10	
Note: Use this task for the entire wall area when the wall is >10' high.		
For ASTM C840 Level 1 Finish, Deduct	-0.99	
For ASTM C840 Level 2 Finish, Deduct	-0.50	
For ASTM C840 Level 3 Finish, Deduct	-0.20	
For ASTM C840 Level 5 High Quality Finish, Add	1.55	
09 29 10 00-0047 Casing And Corner Beads <small>(09 29 10)</small>		
09 29 10 00-0048 LF Casing, Galvanized Steel J-Bead For Gypsum Board.....	4.06	1.09
For Up To 100, Add	0.31	
For >500, Deduct	-0.20	
09 29 10 00-0049 LF Corner Bead, Galvanized Steel For Gypsum Board.....	3.89	1.09
For Up To 100, Add	0.27	
For >500, Deduct	-0.19	
09 29 10 00-0050 Preformed Architectural Profiles <small>(09 29 10)</small>		

09 Finishes**09 20 Plaster and Gypsum Board****09 29 Gypsum Board**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 29 10 00-0118			Double Fin Wall Reveals For Gypsum Board (09 29 10 00-0050)		
09 29 10 00-0119	LF		3/8" x 3/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	8.36	1.30
09 29 10 00-0120	LF		1/8" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	8.46	1.30
09 29 10 00-0121	LF		1/4" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	8.56	1.30
09 29 10 00-0122	LF		3/8" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	8.56	1.30
09 29 10 00-0123	LF		1/2" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.02	1.30
09 29 10 00-0124	LF		5/8" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.22	1.29
09 29 10 00-0125	LF		3/4" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.42	1.30
09 29 10 00-0126	LF		1" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.88	1.30
09 29 10 00-0127	LF		1-1/2" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	10.65	1.30
09 29 10 00-0128	LF		2" x 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	11.46	1.30
09 29 10 00-0129	LF		3/8" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	8.83	1.41
09 29 10 00-0130	LF		1/4" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	8.93	1.41
09 29 10 00-0131	LF		3/8" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.14	1.41
09 29 10 00-0132	LF		1/2" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.59	1.41
09 29 10 00-0133	LF		5/8" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.80	1.41
09 29 10 00-0134	LF		3/4" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	9.95	1.41
09 29 10 00-0135	LF		1" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	10.46	1.41
09 29 10 00-0136	LF		1-1/2" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	11.27	1.41
09 29 10 00-0137	LF		2" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	12.09	1.41
09 29 10 00-0138	LF		3" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	14.27	1.41
09 29 10 00-0139	LF		4" x 5/8" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	18.85	1.41
09 29 10 00-0140	LF		1-1/2" x 1" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	16.81	1.54
09 29 10 00-0141	LF		3/4" x 1 1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	19.08	1.88
09 29 10 00-0142	LF		1-1/2" x 1-1/2" Aluminum Extrusions, Double Fin Wall Reveal For Gypsum Board	19.74	1.88
09 29 10 00-0143	LF		1/2", Aluminum Extrusions, Double Fin Hanging Track Wall Reveal For Gypsum Board	15.32	1.29
09 29 10 00-0144	LF		1 3/16", Aluminum Extrusions, Double Fin Hanging Track Wall Reveal For Gypsum Board	13.94	1.88
09 29 10 00-0145	LF		1/4" Aluminum Extrusions, Double Fin Wall Covering Joinder For Gypsum Board	10.03	1.29
09 29 10 00-0146			Special Conditions Reveals For Gypsum Board (09 29 10 00-0050)		
09 29 10 00-0147			Radius Conditions (09 29 10 00-0146)		
09 29 10 00-0148	EA		8' Long Inside Radius For Gypsum Board	127.14	
			Note: Task used in conjunction with "Preformed Architectural Profiles" tasks.		
09 29 10 00-0149	EA		8' Long Outside Radius For Gypsum Board	127.14	
			Note: Task used in conjunction with "Preformed Architectural Profiles" tasks.		
09 29 10 00-0150	EA		8' Long Circular / Arched Radius For Gypsum Board	127.14	
			Note: Task used in conjunction with "Preformed Architectural Profiles" tasks.		
09 29 10 00-0151			Knee Brace Kit (09 29 10 00-0146)		
09 29 10 00-0152	EA		46" H, Aluminum Extrusions, Knee Brace Kit For Gypsum Board	271.21	13.56
09 29 10 00-0153			Wall Bumper Rail (09 29 10 00-0146)		
09 29 10 00-0154	LF		2-1/2" x 5/8", Aluminum Extrusions, Wall Bumper Rail For Gypsum Board	36.27	5.43
09 29 10 00-0155			Corners For Gypsum Board (09 29 10 00-0050)		
09 29 10 00-0156	LF		1/2"R, Aluminum Extrusions, Outside Corner For Gypsum Board	7.70	1.30
09 29 10 00-0157	LF		5/8"R, Aluminum Extrusions, Outside Corner For Gypsum Board	8.22	1.41
09 29 10 00-0158	LF		3/4"R, Aluminum Extrusions, Outside Corner For Gypsum Board	9.15	1.47
09 29 10 00-0159	LF		1"R, Aluminum Extrusions, Outside Corner For Gypsum Board	10.25	1.54
09 29 10 00-0160	LF		1-1/2" R, Aluminum Extrusions, Outside Corner For Gypsum Board	12.42	1.88
09 29 10 00-0161	LF		2" R, Aluminum Extrusions, Outside Corner For Gypsum Board	14.41	2.11
09 29 10 00-0162	LF		2-1/2" R, Aluminum Extrusions, Outside Corner For Gypsum Board	17.55	2.42
09 29 10 00-0163	LF		3" R, Aluminum Extrusions, Outside Corner For Gypsum Board	21.36	2.83
09 29 10 00-0164	LF		4" R, Aluminum Extrusions, Outside Corner For Gypsum Board	29.40	3.77
09 29 10 00-0165	LF		90 Degree 3/8" Aluminum Extrusions, Hi-Strength Corner For Gypsum Board	7.70	1.26
09 29 10 00-0166	LF		90 Degree 1-1/4" Aluminum Extrusions, Hi-Strength Corner For Gypsum Board	14.37	1.69
09 29 10 00-0167	LF		90 Degree 1-1/4" Aluminum Extrusions, Fabric Tuck Corner For Gypsum Board	10.15	1.69
09 29 10 00-0168	LF		90 Degree 1-1/4" Aluminum Extrusions, Corner With Vertical Reveal For Gypsum Board	18.85	1.69
09 29 10 00-0169	LF		45 Degree 2" Aluminum Extrusions, Corner For Gypsum Board	26.92	2.11
09 29 10 00-0170	LF		60 Degree 2" Aluminum Extrusions, Corner For Gypsum Board	25.80	2.11
09 29 10 00-0171	LF		3/4" Aluminum Extrusions, Chamfered Corner For Gypsum Board	7.48	1.47
09 29 10 00-0172	LF		5/8" R, Aluminum Extrusions, Corners Return For Gypsum Board	7.56	1.41
09 29 10 00-0173	LF		1/2" x 1/2" Aluminum Extrusions, Double Corner Step For Gypsum Board	7.64	1.30
09 29 10 00-0174	LF		5/8" x 5/8" Aluminum Extrusions, Double Corner Step For Gypsum Board	8.02	1.41
09 29 10 00-0175	LF		1" x 1" Aluminum Extrusions, Double Corner Step For Gypsum Board	10.91	1.54
09 29 10 00-0176	LF		1/2" x 1/2" Aluminum Extrusions, Triple Corner Step For Gypsum Board	9.63	1.30
09 29 10 00-0177	LF		5/8" x 5/8" Aluminum Extrusions, Triple Corner Step For Gypsum Board	10.15	1.41
09 29 10 00-0178	LF		1" x 1" Aluminum Extrusions, Triple Corner Step For Gypsum Board	15.08	1.54
09 29 10 00-0179	LF		1/3" x 1/2" Aluminum Extrusions, Quad Corner Step For Gypsum Board	16.75	1.30
09 29 10 00-0180	LF		3" Aluminum Extrusions, Bullnose For Gypsum Board	28.53	2.83
09 29 10 00-0181	LF		3-7/8" Aluminum Extrusions, Bullnose For Gypsum Board	30.57	2.83
09 29 10 00-0182	LF		5-3/8", Aluminum Extrusions, Bullnose For Gypsum Board	56.81	4.71
09 29 10 00-0183	LF		7-3/8", Aluminum Extrusions, Bullnose For Gypsum Board	94.71	6.67
09 29 10 00-0184	LF		3/4" R, Aluminum Extrusions, Inside Corner For Gypsum Board	9.20	1.45
09 29 10 00-0185	LF		1" R, Aluminum Extrusions, Inside Corner For Gypsum Board	10.56	1.52

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	09 29 10 00-0186	LF		1-1/2" R, Aluminum Extrusions, Inside Corner For Gypsum Board	12.67	1.85
	09 29 10 00-0187	LF		2"R, Aluminum Extrusions, Inside Corner For Gypsum Board.....	15.63	2.08
	09 29 10 00-0188	LF		2-1/2" R, Aluminum Extrusions, Inside Corner For Gypsum Board	22.38	2.39
	09 29 10 00-0189	LF		3"R, Aluminum Extrusions, Inside Corner For Gypsum Board.....	24.11	2.79
	09 29 10 00-0190	LF		4" R, Aluminum Extrusions, Inside Corner For Gypsum Board.....	27.16	3.71
	09 29 10 00-0191	LF		3-5/8", Aluminum Extrusions, Aluminum Wall Cap For Gypsum Board	17.09	2.79
	09 29 10 00-0192	LF		3-7/8", Aluminum Extrusions, Aluminum Wall Cap For Gypsum Board	17.35	2.79
	09 29 10 00-0193	LF		4-3/4", Aluminum Extrusions, Aluminum Wall Cap For Gypsum Board	18.97	2.79
	09 29 10 00-0194	LF		5", Aluminum Extrusions, Aluminum Wall Cap For Gypsum Board	19.48	2.79

09 29 82 Gypsum Board Fire Protection (09 29)

09 29 82 00-0001 Shaft Wall (09 29 82)

See CSI section 09 29 10 00-0034 for finishing drywall.						
	09 29 82 00-0002	SF		3/4" Fire Rated Shaft Wall Assembly	7.07	2.71
Note: 1/4" thick fiber-cement board with tapered edges over 1/2" thick type "X" gypsum board. Excludes studs or wall structure.						
For Horizontal Installation Up To 10' High, Add					1.85	
For Horizontal Installation >10' High, Add					2.72	
For Walls >10' High, Add					0.43	
For Up To 128, Add					2.50	
For >128 To 320, Add					1.52	
For >1,536, Deduct					-0.52	
	09 29 82 00-0003	SF		7/8" Fire Rated Shaft Wall Assembly	8.20	3.25
Note: 1/4" thick fiber-cement board with tapered edges over 5/8" thick type "X" gypsum board. Excludes studs or wall structure.						
For Horizontal Installation Up To 10' High, Add					2.21	
For Horizontal Installation >10' High, Add					3.26	
For Walls >10' High, Add					0.52	
For Up To 128, Add					2.94	
For >128 To 320, Add					1.80	
For >1,536, Deduct					-0.58	
	09 29 82 00-0004	SF		2-1/2", 25 Gauge C-H Stud/J-Runner, 1" Gypsum Liner Panel Shaft Wall Assembly	7.61	2.09
Note: Includes sealant installed at top of wall and panel gaps. Excludes additional gypsum panels and finishing.						
For Horizontal Installation Up To 10' High, Add					1.42	
For Horizontal Installation >10' High, Add					2.09	
For Walls >10' High, Add					0.33	
For Up To 128, Add					2.36	
For >128 To 320, Add					1.39	
For Glass Mat Surfaces, Add					0.40	
	09 29 82 00-0005	SF		4", 25 Gauge C-H Stud/J-Runner, 1" Gypsum Liner Panel Shaft Wall Assembly	8.13	2.20
Note: Includes sealant installed at top of wall and panel gaps. Excludes additional gypsum panels and finishing.						
For Horizontal Installation Up To 10' High, Add					1.49	
For Horizontal Installation >10' High, Add					2.19	
For Walls >10' High, Add					0.35	
For Up To 128, Add					2.50	
For >128 To 320, Add					1.47	
For Glass Mat Surfaces, Add					0.40	
	09 29 82 00-0006	SF		2-1/2", 20 Gauge C-H Stud/J-Runner, 1" Gypsum Liner Panel Shaft Wall Assembly	8.98	2.20
Note: Includes sealant installed at top of wall and panel gaps. Excludes additional gypsum panels and finishing.						
For Horizontal Installation Up To 10' High, Add					1.49	
For Horizontal Installation >10' High, Add					2.19	
For Walls >10' High, Add					0.35	
For Up To 128, Add					2.67	
For >128 To 320, Add					1.56	
For Glass Mat Surfaces, Add					0.40	
	09 29 82 00-0007	SF		4", 20 Gauge C-H Stud/J-Runner, 1" Gypsum Liner Panel Shaft Wall Assembly	9.53	2.30
Note: Includes sealant installed at top of wall and panel gaps. Excludes additional gypsum panels and finishing.						
For Horizontal Installation Up To 10' High, Add					1.56	
For Horizontal Installation >10' High, Add					2.30	
For Walls >10' High, Add					0.37	
For Up To 128, Add					2.83	
For >128 To 320, Add					1.64	
For Glass Mat Surfaces, Add					0.40	

09 30 Tiling (09)

Note: All tiles are standard grade ANSI 137.1 or higher, mounted and unmounted, cushioned or non-cushioned edge, all tile colors, all grout colors, PEI rating 1 through 4, and include patterns. Glazing shall meet ASTM C484 and C424. Mounted tiles are assembled into sheets to facilitate handling and installation. Perforated paper, fiber mesh, or other suitable bonding material applied to the front, backs or edges of the tile can be used to mount the tiles. Cushioned edge tile has facial edges with a distinct curvature that results in a slightly recessed joint. All floor, wall, ceiling, cove base and trim tile will be installed in accordance with ANSI 108.1 using these setting methods. Includes initial wax and seal.

09 30 13 Ceramic Tiling (09 30)

Note: Includes grout and sealing. Excludes setting method. See CSI section 09 31 00 00-0000 for thin-set, 09 32 00 00-0000 for mortar-bed, 09 35 00 00-0000 for chemical-resistant.

09 30 13 00-0001 Ceramic Tiling (09 30 13)

09 Finishes

09 30 Tiling

09 30 13 Ceramic Tiling



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 30 13 00-0002	SF		2" x 2" x 1/4" Thick, Mounted, Unpolished Ceramic Floor Tile Note: Tiles mounted from back, side or front in 12" x 12", 12" x 24", 12" x 48", or similar sized sheets.	16.67	2.89
			<i>For >1,000, Deduct</i>	-0.58	
			<i>For Up To 50, Add</i>	8.50	
			<i>For >50 To 250, Add</i>	1.16	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.32	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.49	
09 30 13 00-0003	SF		Less Than 8" x 8", Mounted, Ceramic Floor Tile Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles. Tiles mounted from back, side or front in 12" x 12", 12" x 24", or similar sized sheets.	11.46	2.89
			<i>For >1,000, Deduct</i>	-0.58	
			<i>For Up To 50, Add</i>	7.20	
			<i>For >50 To 250, Add</i>	1.16	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.32	
			<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.49	
09 30 13 00-0004	SF		8" x 8" And Larger Unmounted Ceramic Floor Tile Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles.	12.91	1.81
			<i>For >1,000, Deduct</i>	-0.72	
			<i>For Up To 50, Add</i>	8.65	
			<i>For >50 To 250, Add</i>	1.45	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
			<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.70	
09 30 13 00-0005	SF		2" x 2" x 1/4" Thick, Mounted, Unpolished Ceramic Wall Tile Note: Tiles mounted from back, side or front in 12" x 12", 12" x 24", 12" x 48", or similar sized sheets.	17.90	3.50
			<i>For Up To 50, Add</i>	9.73	
			<i>For >50 To 250, Add</i>	1.40	
			<i>For >1,000, Deduct</i>	-0.70	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.50	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.67	
09 30 13 00-0006	SF		Less than 8" x 8" Mounted Ceramic Wall Tile Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles. Tiles mounted from back, side or front in 12" x 12", 12" x 24", or similar sized sheets.	12.69	3.50
			<i>For Up To 50, Add</i>	8.43	
			<i>For >50 To 250, Add</i>	1.40	
			<i>For >1,000, Deduct</i>	-0.70	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.50	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.67	
09 30 13 00-0007	SF		8" x 8" And Larger Unmounted Ceramic Wall Tile Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles.	14.55	2.22
			<i>For Up To 50, Add</i>	10.29	
			<i>For >50 To 250, Add</i>	1.77	
			<i>For >1,000, Deduct</i>	-0.89	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.78	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.95	
09 30 13 00-0008	SF		Less than 8" x 8" Mounted Ceramic Ceiling Tile Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles. Tiles mounted from back, side or front in 12" x 12", 12" x 24", or similar sized sheets.	17.83	6.07
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	2.27	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	2.44	
			<i>For Up To 50, Add</i>	13.57	
			<i>For >50 To 250, Add</i>	2.43	
			<i>For >1,000, Deduct</i>	-1.22	
09 30 13 00-0009	SF		8" x 8" And Larger Unmounted Ceramic Ceiling Tile Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles.	20.26	3.64
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	2.64	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	2.81	
			<i>For Up To 50, Add</i>	16.00	
			<i>For >50 To 250, Add</i>	2.92	
			<i>For >1,000, Deduct</i>	-1.46	
09 30 13 00-0010	LF		4-1/4" To 4-1/2" High, Ceramic Cove Base Or Trim Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles.	11.53	2.53
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.74	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.83	
09 30 13 00-0011	LF		6" High x 12" Long, Unpolished Ceramic Cove Base (Daltile Portfolio) <i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	19.77	2.53
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.74	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.83	
09 30 13 00-0012	LF		6" High x 24" Long, Unpolished Ceramic Cove Base (Daltile Portfolio) <i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	22.40	2.53
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.74	
			<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.83	
09 30 13 00-0013	EA		6" High, Unpolished Ceramic Cove Base Outer Corner <i>For >1,000, Deduct</i>	18.43	0.55
			<i>For Up To 50, Add</i>	6.68	
			<i>For >50 To 250, Add</i>	1.16	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.32	
09 30 13 00-0014			Residential Ceramic Tiling <small>(09 30 13)</small>		
09 30 13 00-0015	SF		Mounted Ceramic Floor Tile, Residential Grade Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles. Tiles mounted from back, side or front in 12" x 12", 12" x 24", or similar sized sheets.	9.36	2.89
			<i>For >1,000, Deduct</i>	-0.58	
			<i>For Up To 50, Add</i>	6.68	
			<i>For >50 To 250, Add</i>	1.16	
			<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.32	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 30 13 00-0016 SF Mounted Ceramic Wall Tile, Residential Grade Note: Includes glazed porcelain, unglazed porcelain and glazed ceramic tiles. Tiles mounted from back, side or front in 12" x 12", 12" x 24", or similar sized sheets.	10.59	3.50
<i>For Up To 50, Add</i>	7.91	
<i>For >50 To 250, Add</i>	1.40	
<i>For >1,000, Deduct</i>	-0.70	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.50	
09 30 13 00-0017 SF 2" x 2" x 1/4" Thick, Unpolished Ceramic Mounted Floor Tile, Residential Grade Note: Tiles mounted from back, side or front in 12" x 12", 12" x 24", 12" x 48", or similar sized sheets.	11.57	2.89
<i>For >1,000, Deduct</i>	-0.58	
<i>For Up To 50, Add</i>	7.23	
<i>For >50 To 250, Add</i>	1.16	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.32	

09 30 16 Quarry Tiling (09 30)

Note: Includes grout and sealing. Excludes setting method. See CSI section 09 31 00 00-0000 for thin-set, 09 32 00 00-0000 for mortar-bed, 09 35 00 00-0000 for chemical-resistant.

09 30 16 00-0001 SF Unglazed Quarry Floor Tile..... Note: With or without embedded abrasive grit.	12.05	2.04
<i>For >1,000, Deduct</i>	-0.81	
<i>For Up To 50, Add</i>	9.08	
<i>For >50 To 250, Add</i>	1.62	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.66	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.83	
09 30 16 00-0002 SF Glazed Quarry Floor Tile <i>For >1,000, Deduct</i>	24.56	2.04
<i>For Up To 50, Add</i>	-0.81	
<i>For >50 To 250, Add</i>	12.21	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.62	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.66	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.83	
09 30 16 00-0003 SF Unglazed Quarry Wall Tile Note: With or without embedded abrasive grit.	13.67	2.41
<i>For Up To 50, Add</i>	10.70	
<i>For >50 To 250, Add</i>	1.94	
<i>For >1,000, Deduct</i>	-0.97	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.91	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	2.08	
09 30 16 00-0004 SF Glazed Quarry Wall Tile..... <i>For Up To 50, Add</i>	26.18	2.41
<i>For >50 To 250, Add</i>	13.83	
<i>For >1,000, Deduct</i>	1.94	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	-0.97	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.91	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	2.08	
09 30 16 00-0005 LF 6" High Unglazed Quarry Tile Cove Base Or Trim..... <i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	16.97	2.67
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.82	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.91	
09 30 16 00-0006 LF 6" High Glazed Quarry Tile Cove Base Or Trim <i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	37.48	2.67
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.82	
<i>For High-Modulus, Low-Viscosity, High-Strength Chemical Resistant Epoxy Grout, Add</i>	1.91	

09 30 33 Stone Tiling (09 30)

Note: Excludes setting method. See CSI section 09 31 00 00-0000 for thin-set, 09 32 00 00-0000 for mortar-bed, 09 35 00 00-0000 for chemical-resistant.

09 30 33 00-0001 Marble Floor Tile (09 30 33)

09 30 33 00-0002 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Cherry Blossom" <i>For >1,000, Deduct</i>	11.10	1.81
<i>For Up To 50, Add</i>	-0.72	
<i>For >50 To 250, Add</i>	8.20	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.45	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0003 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Laurent Brown"..... <i>For >1,000, Deduct</i>	11.46	1.81
<i>For Up To 50, Add</i>	-0.72	
<i>For >50 To 250, Add</i>	8.29	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.45	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0004 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Temple Gray" <i>For >1,000, Deduct</i>	11.65	1.81
<i>For Up To 50, Add</i>	-0.72	
<i>For >50 To 250, Add</i>	8.34	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.45	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0005 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Emperador Cafe"..... <i>For >1,000, Deduct</i>	11.74	1.81
<i>For Up To 50, Add</i>	-0.72	
<i>For >50 To 250, Add</i>	8.36	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.45	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0006 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "China Black" <i>For >1,000, Deduct</i>	11.79	1.81
<i>For Up To 50, Add</i>	-0.72	
<i>For >50 To 250, Add</i>	8.37	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.45	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	

09 Finishes**09 30 Tiling****09 30 33 Stone Tiling**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
09 30 33 00-0007	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Sea Grass Honed".....	11.87	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.39	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0008	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Gris Magma or Gris Nebula".....	12.07	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.44	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0009	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Dark Green".....	13.32	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.75	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0010	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Cappuccino Light".....	13.46	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.79	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0011	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Botticino Cream".....	13.73	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.86	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0012	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Crema Marfil Classic".....	14.02	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.93	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0013	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Arabescato Carrara".....	14.22	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	8.98	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0014	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Giallo Crystal Onyx".....	14.91	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.15	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0015	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Cafe Forest or Rain Forest".....	16.21	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.48	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0016	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Arabescato".....	16.30	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.50	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0017	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Carrara White".....	17.26	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.74	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0018	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Crema Marfil Select Or Sahara Gold".....	17.59	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.82	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0019	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Botticino Fiorito Or Michelangelo".....	17.73	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.86	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0020	SF	12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Crema Marfil Antique".....	17.95	1.81
		<i>For >1,000, Deduct</i>	-0.72	
		<i>For Up To 50, Add</i>	9.91	
		<i>For >50 To 250, Add</i>	1.45	
		<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
		<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 30 33 00-0021 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Emperador Dark Or Super Thassos Glass".....	19.75	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	10.36	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0022 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Rosa Verona".....	20.77	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	10.62	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0023 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Rojo Alicante".....	21.05	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	10.69	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0024 SF 12" x 12" x 3/8" And Larger Unmounted Marble Floor Tile, "Emperador Light".....	21.19	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	10.72	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0025 Granite Floor Tile <small>(09 30 33)</small>		
09 30 33 00-0026 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Crystal Gray".....	10.13	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	7.96	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0027 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Peach Flower".....	10.82	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	8.13	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0028 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Golden Yellow".....	11.38	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	8.27	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0029 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Absolute Black".....	13.59	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	8.82	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0030 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Tan Brown".....	14.02	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	8.93	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0031 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Black Galaxy".....	14.42	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	9.03	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0032 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Kashmir White Or Gold".....	14.83	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	9.13	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0033 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Giallo Santa Cecilia".....	15.33	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	9.26	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0034 SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Verde UbaTuba".....	15.80	1.81
<i>For >1,000, Deduct</i>	-0.72	
<i>For Up To 50, Add</i>	9.37	
<i>For >50 To 250, Add</i>	1.45	
<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	

09 Finishes**09 30 Tiling****09 30 33 Stone Tiling**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 30 33 00-0035	SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "New Venetian Gold"	16.30	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	9.50	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0036	SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Tropic Brown"	16.77	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	9.62	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0037	SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Baltic Brown Or Indian Dakota"	17.32	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	9.75	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0038	SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Dynamic Blue"	17.87	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	9.89	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0039	SF 12" x 12" x 3/8" And Larger Unmounted Granite Floor Tile, "Blue Pearl Or Emerald Pearl"	19.81	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	10.38	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0040	Slate Floor Tile <small>(09 30 33)</small>		
09 30 33 00-0041	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "Raja Classic"	9.30	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	7.75	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0042	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "Rustic Gold"	9.66	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	7.84	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0043	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "California Gold Or Black Rust"	9.86	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	7.89	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0044	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "Indian Autumn"	9.86	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	7.89	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0045	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "China Multi, Earth, Or Autumn Blend"	9.99	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	7.92	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0046	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "Lilac Kashmir Or Madras Yellow"	10.41	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	8.03	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0047	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "Montauk Blue, Copper Quartzite, Montauk Black, San Rio Rustic, Or Gold Green Quartzite"	10.82	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	8.13	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0048	SF 12" x 12" And Larger Unmounted Slate Floor Tile, "Ocean Green Quartzite Or Golden White Quartzite"	10.96	1.81
	<i>For >1,000, Deduct</i>	-0.72	
	<i>For Up To 50, Add</i>	8.16	
	<i>For >50 To 250, Add</i>	1.45	
	<i>For High-Modulus, High-Strength Epoxy Grout, Add</i>	1.53	
	<i>For Heavy Duty Floors With A PEI 5 Rating, Add</i>	1.00	
09 30 33 00-0049	Travertine Floor Tile <small>(09 30 33)</small>		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 30 33 00-0050 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Noce Rustic"	10.82	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.13	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0051 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Denizli Beige Or Oasis Walnut"	11.24	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.23	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0052 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Oasis Gold"	11.51	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.30	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0053 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Navona Light - Ivory"	11.93	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.41	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0054 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Oasis Noce"	12.07	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.44	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0055 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Durango Antique"	12.21	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.48	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0056 SF 12" x 12" x 3/8" And Larger Unmounted Travertine Floor Tile, "Durango Cream"	13.53	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.81	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0057 Limestone Floor Tile (09 30 33)		
09 30 33 00-0058 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Isis Gold"	13.45	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.79	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0059 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Tiara Beige"	13.86	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	8.89	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0060 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Halila Cream"	16.02	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	9.43	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0061 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Ramon Gold"	17.32	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	9.75	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0062 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Chestnut Brown Or Jerusalem Bone"	17.32	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	9.75	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	
09 30 33 00-0063 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Lagos Blue"	17.73	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	9.86	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	

09	09 Finishes
	09 30 Tiling
	09 30 33 Stone Tiling



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 30 33 00-0064 SF 12" x 12" And Larger Unmounted Limestone Floor Tile, "Jura Gray".....	19.25	1.81
For >1,000, Deduct	-0.72	
For Up To 50, Add	10.24	
For >50 To 250, Add	1.45	
For High-Modulus, High-Strength Epoxy Grout, Add	1.53	
For Heavy Duty Floors With A PEI 5 Rating, Add	1.00	

09 31 Thin-Set Tiling (09 30)

Note: Tile setting methods in this section are used with ceramic or quarry tile materials as applicable, for a complete installation.

09 31 13 Thin-Set Ceramic Tiling (09 31)

09 31 13 00-0001 Thin-Set Ceramic Tiling <small>(09 31 13)</small>		
09 31 13 00-0002 SF Thin Set - Latex Portland Cement Mortar	1.70	0.96
For Up To 50, Add	1.51	
For >50 To 250, Add	0.29	
For >1,000, Deduct	-0.15	
09 31 13 00-0003 SF Clean And Scarify Existing Tile For Installation Of New Tile Over Existing.....	0.92	
For Up To 50, Add	0.92	
For >50 To 250, Add	0.18	
For >1,000, Deduct	-0.09	

09 32 Mortar-Bed Tiling (09 30)

Note: Tile setting methods in this section are used with ceramic or quarry tile materials as applicable, for a complete installation.

09 32 13 Mortar-Bed Ceramic Tiling (09 32)

09 32 13 00-0001 Mortar-Bed Ceramic Tiling <small>(09 32 13)</small>		
09 32 13 00-0002 SF 3/4" Minimum Thickness Portland Cement Mortar Setting Bed	4.56	1.93
Note: For residential floors. Includes 15 LB felt and wire reinforcement.		
For Up To 50, Add	3.31	
For >50 To 250, Add	0.58	
For >1,000, Deduct	-0.29	
For Exterior Installation (Galvanized Reinforcement), Add	0.15	
09 32 13 00-0003 SF 1-1/4" Minimum Thickness Portland Cement Mortar Setting Bed	6.45	2.57
Note: For commercial floors. Includes 15 LB felt and wire reinforcement.		
For Up To 50, Add	4.51	
For >50 To 250, Add	0.77	
For >1,000, Deduct	-0.39	
For Exterior Installation (Galvanized Reinforcement), Add	0.15	
09 32 13 00-0004 SF 3/4" Portland Cement Plaster Scratch Coat for Walls	13.90	5.78
Note: Includes 15 LB felt and expanded metal lath.		
For Up To 50, Add	12.15	
For >50 To 250, Add	2.31	
For >1,000, Deduct	-1.16	
For Exterior Installation (Galvanized Reinforcement), Add	0.15	
For Installation Without Felt And Metal Lath, Deduct	-2.13	

09 34 Waterproofing-Membrane Tiling (09 30)

09 34 00 00-0001 Bonded Waterproofing System for Tiled Showers, Steam Showers, and Bathtub Surrounds <small>(09 34)</small>		
09 34 00 00-0002 Prefabricated Assemblies For Tiled Showers (Schluter® KERDI Shower ST) <small>(09 34 00 00-0001)</small>		
Note: For creating a watertight sloped shower assembly without a mortar bed. Includes a prefabricated polystyrene foam shower tray, 6" x 4-1/2" prefabricated polystyrene foam shower curb, waterproofing membrane for shower tray and surround, and center shower drain. Excludes tile, mortar, grout and shower accessories.		
09 34 00 00-0003 EA 48" x 48", Prefabricated Assembly For Tiled Showers (Schluter® KERDI Shower ST/SC)	1,375.18	
09 34 00 00-0004 EA 32" x 60", Prefabricated Assembly For Tiled Showers (Schluter® KERDI Shower ST/SC)	1,599.70	
09 34 00 00-0005 EA 72" x 72", Prefabricated Assembly For Tiled Showers (Schluter® KERDI Shower ST/SC)	2,377.97	
09 34 00 00-0006 Prefabricated Polystyrene Shower Curbs And Ramps <small>(09 34 00 00-0001)</small>		
Note: Prefabricated shower curbs and ramps for tiling over. Excludes tile.		
09 34 00 00-0007 EA 15-7/8" Width, 48" Length, Prefabricated Polystyrene Shower Ramp (Schluter® SR-122)	166.74	
09 34 00 00-0008 EA 4-1/2" Width, 6" Height, 48" Length, Prefabricated Polystyrene Shower Curb (Schluter® SC-122)	159.86	
09 34 00 00-0009 Prefabricated Polystyrene Shower Benches <small>(09 34 00 00-0001)</small>		
Note: Prefabricated shower bench for tiling over. Excludes tile.		
09 34 00 00-0010 EA 16" Width, 16" Depth, 20" Height, Triangular Prefabricated Polystyrene Shower Bench (Schluter® SB41)	349.23	
09 34 00 00-0011 EA 32" Width, 16" Depth, 20" Height, Rectangular Prefabricated Polystyrene Shower Bench (Schluter® SB4181)	703.94	
09 34 00 00-0012 EA 48" Width, 16" Depth, 20" Height, Rectangular Prefabricated Polystyrene Shower Bench (Schluter® SB41122)	869.47	
09 34 00 00-0013 EA 32" Width, 11-1/2" Depth, 20" Height, Rectangular Prefabricated Polystyrene Shower Bench (Schluter® SB2981)	633.00	
09 34 00 00-0014 EA 42" Width, 11-1/2" Depth, 20" Height, Rectangular Prefabricated Polystyrene Shower Bench (Schluter® SB29107)	703.94	
09 34 00 00-0015 EA 48" Width, 11-1/2" Depth, 20" Height, Rectangular Prefabricated Polystyrene Shower Bench (Schluter® SB29122)	751.23	



Finishes	09	09
Tiling	09 30	
Waterproofing-Membrane Tiling	09 34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 34 00 00-0016	Prefabricated Polystyrene Shower Tray <small>(09 34 00 00-0001)</small> Note: Prefabricated shower tray for tiling over. Excludes tile.		
09 34 00 00-0017	EA 32" x 60", Prefabricated Polystyrene Shower Tray (Schluter® ST-81/152)	296.80	
09 34 00 00-0018	EA 48" x 48", Prefabricated Polystyrene Shower Tray (Schluter® ST-122)	296.80	
09 34 00 00-0019	EA 72" x 72", Prefabricated Polystyrene Shower Tray (Schluter® ST-183)	462.33	

09 34 00 00-0020	Waterproofing, Uncoupling And Vapor Management Membranes (Schluter® DITRA) <small>(09 34 00 00-0001)</small>		
09 34 00 00-0021	SF 1/8" Thick, High-Density Polyethylene Membrane With Grid Structure And Underside Anchoring Fleece, Waterproofing, Uncoupling And Vapor Management Membrane (Schluter® DITRA)	5.11	
09 34 00 00-0022	SF 5/16" Thick, High-Density Polyethylene Membrane With Grid Structure And Underside Anchoring Fleece, Waterproofing, Uncoupling And Vapor Management Membrane (Schluter® DITRA-XL)	5.93	

09 34 00 00-0023	Bonded Waterproof Underlayment Membranes (Schluter® KERDI) <small>(09 34 00 00-0001)</small>		
09 34 00 00-0024	SF 0.008" Polyethylene Membrane With Polypropylene Fleece Laminated On Both Sides, Bonded Waterproof Underlayment Membrane (Schluter® KERDI 200/5M)	4.47	

09 35 Chemical-Resistant Tiling (09 30)

Note: Tile setting methods in this section are used with ceramic or quarry tile materials as applicable, for a complete installation.

09 35 13 Chemical-Resistant Ceramic Tiling (09 35)

09 35 13 00-0001	Chemical-Resistant Ceramic Tiling <small>(09 35 13)</small>		
09 35 13 00-0002	SF Thin Set - Epoxy Mortar	5.88	1.27
	Note: Impact and chemical resistant.		
	<i>For Up To 50, Add</i>	2.92	
	<i>For >50 To 250, Add</i>	0.39	
	<i>For >1,000, Deduct</i>	-0.19	

09 39 Tiling Transitions (09 30)

09 39 00 00-0001	Tile Waterproofing And Crack Prevention <small>(09 39)</small>		
09 39 00 00-0002	CSF 30 Mil Waterproofing And Crack Prevention Membrane; RedGard	130.58	

09 39 00 00-0003	Waterproof Strip Membranes (Schluter® KERDI) <small>(09 39)</small>		
09 39 00 00-0004	LF 5" Wide, 4 mil Polyethylene Waterproof Strip Membrane (Schluter® KERDI BAND)	5.37	
09 39 00 00-0005	LF 10" Wide, 12 mil Polyethylene Waterproof Strip Membrane (Schluter® KERDI FLEX)	11.67	

09 39 00 00-0006	Coved Shaped Transition Profiles For Floor To Wall For Tile <small>(09 39)</small>		
09 39 00 00-0007	LF 5/16" Height, Satin Anodized Aluminum Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-AHK)	7.66	
09 39 00 00-0008	LF 3/8" Height, Satin Anodized Aluminum Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-AHK)	7.64	
09 39 00 00-0009	LF 1/2" Height, Satin Anodized Aluminum Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-AHK)	7.93	
09 39 00 00-0010	LF 5/16" Height, PVC Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-PHK)	7.27	
09 39 00 00-0011	LF 3/8" Height, Aluminum Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-PHK)	7.57	

09 39 00 00-0012	Coved Shaped Inside Edge Protection And Transition Profiles For Wall To Wall For Tile <small>(09 39)</small>		
09 39 00 00-0013	LF 9/32" x 9/32" Height, Stainless Steel Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-EHK)	16.00	
09 39 00 00-0014	LF 11/32" x 11/32" Height, Stainless Steel Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-EHK)	16.46	
09 39 00 00-0015	LF 7/16" x 7/16" Height, Stainless Steel Cove Shaped Transition Profile Trim For Tile (Schluter® Dilex-EHK)	16.97	

09 39 00 00-0016	Tile Substrate (Schluter® KERDI BOARD) <small>(09 39)</small>		
09 39 00 00-0017	SF 1/2" Tile Substrate And Building Panel (Schluter® KERDI BOARD)	9.24	0.76
09 39 00 00-0018	SF 5/8" Tile Substrate And Building Panel (Schluter® KERDI BOARD)	10.41	0.87

09 39 00 00-0019	Floor Edge Protection And Transition Profiles For Tile <small>(09 39)</small>		
09 39 00 00-0020	LF 1/4" Height, Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE)	3.90	
09 39 00 00-0021	LF 5/16" Height, Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE)	4.02	
09 39 00 00-0022	LF 3/8" Height, Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE)	4.15	
09 39 00 00-0023	LF 1/2" Height, Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE)	4.37	
09 39 00 00-0024	LF 1/4" Height, Curved Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE-RADIUS)	5.24	
09 39 00 00-0025	LF 5/16" Height, Curved Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE-RADIUS)	5.41	
09 39 00 00-0026	LF 3/8" Height, Curved Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE-RADIUS)	5.54	
09 39 00 00-0027	LF 1/2" Height, Curved Aluminum Edge Protection Trim For Tile (Schluter® SCHIENE-RADIUS)	5.67	
09 39 00 00-0028	LF 9/16" Height, Aluminum Transition Trim For Tile (Schluter® RENO-T)	4.10	
09 39 00 00-0029	LF 1" Height, Aluminum Transition Trim For Tile (Schluter® RENO-T)	5.67	
09 39 00 00-0030	LF 1/4" Height, Aluminum Transition Trim For Tile (Schluter® RENO-TK)	5.27	
09 39 00 00-0031	LF 5/16" Height, Aluminum Transition Trim For Tile (Schluter® RENO-TK)	5.55	
09 39 00 00-0032	LF 3/8" Height, Aluminum Transition Trim For Tile (Schluter® RENO-TK)	5.83	
09 39 00 00-0033	LF 1/2" Height, Aluminum Transition Trim For Tile (Schluter® RENO-TK)	7.09	

09	09	Finishes
	09 30	Tiling
	09 39	Tiling Transitions



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

09 39 00 00-0034	LF	5/16" Height, Aluminum Transition Trim For Tile (Schluter® RENO-U)	5.45	
09 39 00 00-0035	LF	3/8" Height, Aluminum Transition Trim For Tile (Schluter® RENO-U)	5.74	
09 39 00 00-0036	LF	1/2" Height, Aluminum Transition Trim For Tile (Schluter® RENO-U)	7.00	

09 39 00 00-0037 Outside Wall Edge Protection And Transition Profiles For Tile (09 39)

09 39 00 00-0038	LF	1/4" Height, Aluminum Edge Protection Trim For Tile (Schluter® QUADEC)	5.43	
09 39 00 00-0039	LF	5/16" Height, Aluminum Edge Protection Trim For Tile (Schluter® QUADEC)	5.72	
09 39 00 00-0040	LF	3/8" Height, Aluminum Edge Protection Trim For Tile (Schluter® QUADEC)	6.16	
09 39 00 00-0041	LF	1/2" Height, Aluminum Edge Protection Trim For Tile (Schluter® QUADEC)	6.60	
09 39 00 00-0042	LF	1/4" Height, Aluminum Edge Protection Trim For Tile (Schluter® RONDEC)	6.02	
09 39 00 00-0043	LF	5/16" Height, Aluminum Edge Protection Trim For Tile (Schluter® RONDEC)	6.58	
09 39 00 00-0044	LF	3/8" Height, Aluminum Edge Protection Trim For Tile (Schluter® RONDEC)	7.14	
09 39 00 00-0045	LF	1/2" Height, Aluminum Edge Protection Trim For Tile (Schluter® RONDEC)	8.12	

09 50 Ceilings (09)

Note: Includes cutting for area around columns, speakers, sprinklers, diffusers, etc.

09 51 Acoustical Ceilings (09 51)

Note: Excludes suspension system. See CSI section 09 53 00 00-0000 for suspension systems.

09 51 13 Acoustical Panel Ceilings (09 51)

Note: Includes cutting around sprinkler heads, speakers, or other penetrations through the ceiling.

09 51 13 00-0001 Fiberglass Panels (09 51 13)

09 51 13 00-0002 Fiberglass Acoustical Panels (09 51 13 00-0001)

Note: Includes square or tegular edge and class A fire rating.

09 51 13 00-0003	SF	2' x 2' x 3/4" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Optima®)	7.91	0.43
		<i>For Up To 50, Add</i>	1.75	
		<i>For >50 To 200, Add</i>	1.07	
		<i>For >200 To 500, Add</i>	0.47	
		<i>For >2,500 To 4,000, Deduct</i>	-0.20	
		<i>For >4,000 To 5,000, Deduct</i>	-0.40	
		<i>For >5,000, Deduct</i>	-0.63	
		<i>For Individual Room Quantities <495, Add</i>	1.07	
		<i>Note: For use with projects >500 SF</i>		
		<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0004	SF	2' x 4' x 3/4" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Optima®)	7.86	0.43
		<i>For Up To 50, Add</i>	1.74	
		<i>For >50 To 200, Add</i>	1.07	
		<i>For >200 To 500, Add</i>	0.46	
		<i>For >2,500 To 4,000, Deduct</i>	-0.20	
		<i>For >4,000 To 5,000, Deduct</i>	-0.39	
		<i>For >5,000, Deduct</i>	-0.62	
		<i>For Individual Room Quantities <495, Add</i>	1.07	
		<i>Note: For use with projects >500 SF</i>		
		<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0005	SF	2' x 2' x 1" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Optima®)	8.36	0.54
		<i>For Up To 50, Add</i>	1.86	
		<i>For >50 To 200, Add</i>	1.14	
		<i>For >200 To 500, Add</i>	0.49	
		<i>For >2,500 To 4,000, Deduct</i>	-0.21	
		<i>For >4,000 To 5,000, Deduct</i>	-0.42	
		<i>For >5,000, Deduct</i>	-0.67	
		<i>For Individual Room Quantities <495, Add</i>	1.14	
		<i>Note: For use with projects >500 SF</i>		
		<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0006	SF	2' x 4' x 1" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Optima®)	8.45	0.54
		<i>For Up To 50, Add</i>	1.88	
		<i>For >50 To 200, Add</i>	1.15	
		<i>For >200 To 500, Add</i>	0.50	
		<i>For >2,500 To 4,000, Deduct</i>	-0.21	
		<i>For >4,000 To 5,000, Deduct</i>	-0.42	
		<i>For >5,000, Deduct</i>	-0.67	
		<i>For Individual Room Quantities <495, Add</i>	1.15	
		<i>Note: For use with projects >500 SF</i>		
		<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0007	SF	2' x 2' x 1" Thick, Square or Beveled Tegular Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Optima®)	8.68	0.54
		3352, 3354, and 3355)		
		<i>For Up To 50, Add</i>	1.91	
		<i>For >50 To 200, Add</i>	1.17	
		<i>For >200 To 500, Add</i>	0.51	
		<i>For >2,500 To 4,000, Deduct</i>	-0.22	
		<i>For >4,000 To 5,000, Deduct</i>	-0.43	
		<i>For >5,000, Deduct</i>	-0.69	
		<i>For Individual Room Quantities <495, Add</i>	1.17	
		<i>Note: For use with projects >500 SF</i>		
		<i>For Ceilings >10' High, Add</i>	0.11	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceilings	09 51	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0008 SF 2' x 4' x 1" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Optima® 3353)	8.67	0.54
For Up To 50, Add	1.91	
For >50 To 200, Add	1.17	
For >200 To 500, Add	0.51	
For >2,500 To 4,000, Deduct	-0.22	
For >4,000 To 5,000, Deduct	-0.43	
For >5,000, Deduct	-0.69	
For Individual Room Quantities <495, Add	1.17	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.11	
09 51 13 00-0009 SF 2' x 2' x 1" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Lyra™)	9.04	0.54
For Up To 50, Add	1.96	
For >50 To 200, Add	1.21	
For >200 To 500, Add	0.53	
For >2,500 To 4,000, Deduct	-0.23	
For >4,000 To 5,000, Deduct	-0.45	
For >5,000, Deduct	-0.72	
For Individual Room Quantities <495, Add	1.21	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.11	
09 51 13 00-0010 SF 2' x 4' x 1" Thick, Square Edge, Fiberglass Acoustical Ceiling Panel (Armstrong Lyra™)	9.03	0.54
For Up To 50, Add	1.96	
For >50 To 200, Add	1.21	
For >200 To 500, Add	0.53	
For >2,500 To 4,000, Deduct	-0.23	
For >4,000 To 5,000, Deduct	-0.45	
For >5,000, Deduct	-0.72	
For Individual Room Quantities <495, Add	1.21	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.11	
09 51 13 00-0011 Mineral Fiber Panels (09 51 13)		
09 51 13 00-0012 Mineral Fiber Acoustical Ceiling Panels (09 51 13 00-0011)		
Note: Includes square or tegular edge and class A fire rating.		
09 51 13 00-0013 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega)	2.56	0.43
For Up To 50, Add	0.95	
For >50 To 200, Add	0.54	
For >200 To 500, Add	0.20	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.23	
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0014 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega)	2.54	0.65
For Up To 50, Add	0.95	
For >50 To 200, Add	0.54	
For >200 To 500, Add	0.20	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.23	
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0015 SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega)	2.82	0.43
For Up To 50, Add	0.99	
For >50 To 200, Add	0.56	
For >200 To 500, Add	0.21	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.14	
For >5,000, Deduct	-0.25	
For Individual Room Quantities <495, Add	0.56	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0016 SF 2' x 4' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega)	2.82	0.43
For Up To 50, Add	0.99	
For >50 To 200, Add	0.56	
For >200 To 500, Add	0.21	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.14	
For >5,000, Deduct	-0.25	
For Individual Room Quantities <495, Add	0.56	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	

09	09 Finishes
	09 50 Ceilings
	09 51 Acoustical Ceilings



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 51 13 00-0017 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega Fire Guard)	3.03	0.65
For Up To 50, Add	1.02	
For >50 To 200, Add	0.59	
For >200 To 500, Add	0.22	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.15	
For >5,000, Deduct	-0.26	
For Individual Room Quantities <495, Add	0.59	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0018 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega Fire Guard)	3.04	0.65
For Up To 50, Add	1.02	
For >50 To 200, Add	0.59	
For >200 To 500, Add	0.22	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.15	
For >5,000, Deduct	-0.26	
For Individual Room Quantities <495, Add	0.59	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0019 SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cortega Fire Guard)	3.31	0.65
For Up To 50, Add	1.06	
For >50 To 200, Add	0.61	
For >200 To 500, Add	0.24	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.17	
For >5,000, Deduct	-0.28	
For Individual Room Quantities <495, Add	0.61	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0020 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Designer)	2.80	0.43
For Up To 50, Add	0.98	
For >50 To 200, Add	0.56	
For >200 To 500, Add	0.21	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.14	
For >5,000, Deduct	-0.25	
For Individual Room Quantities <495, Add	0.56	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0021 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Designer)	2.79	0.65
For Up To 50, Add	0.98	
For >50 To 200, Add	0.56	
For >200 To 500, Add	0.21	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.14	
For >5,000, Deduct	-0.24	
For Individual Room Quantities <495, Add	0.56	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0022 SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Designer)	3.21	0.43
For Up To 50, Add	1.05	
For >50 To 200, Add	0.60	
For >200 To 500, Add	0.23	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.16	
For >5,000, Deduct	-0.28	
For Individual Room Quantities <495, Add	0.60	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0023 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fissured)	2.56	0.43
For Up To 50, Add	0.95	
For >50 To 200, Add	0.54	
For >200 To 500, Add	0.20	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.23	
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceilings	09 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 51 13 00-0024 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fissured)	2.54	0.43
For Up To 50, Add	0.95	
For >50 To 200, Add	0.54	
For >200 To 500, Add	0.20	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.23	
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0025 SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fissured)	2.82	0.43
For Up To 50, Add	0.99	
For >50 To 200, Add	0.56	
For >200 To 500, Add	0.21	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.14	
For >5,000, Deduct	-0.25	
For Individual Room Quantities <495, Add	0.56	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0026 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	2.58	0.43
For Up To 50, Add	0.95	
For >50 To 200, Add	0.54	
For >200 To 500, Add	0.20	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.23	
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0027 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	2.57	0.43
For Up To 50, Add	0.95	
For >50 To 200, Add	0.54	
For >200 To 500, Add	0.20	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.23	
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0028 SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	2.96	0.43
For Up To 50, Add	1.01	
For >50 To 200, Add	0.58	
For >200 To 500, Add	0.22	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.15	
For >5,000, Deduct	-0.26	
For Individual Room Quantities <495, Add	0.58	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0029 SF 2' x 4' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	2.96	0.43
For Up To 50, Add	1.01	
For >50 To 200, Add	0.58	
For >200 To 500, Add	0.22	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.15	
For >5,000, Deduct	-0.26	
For Individual Room Quantities <495, Add	0.58	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0030 SF 2' x 2' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	3.11	0.43
For Up To 50, Add	1.03	
For >50 To 200, Add	0.59	
For >200 To 500, Add	0.23	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.16	
For >5,000, Deduct	-0.27	
For Individual Room Quantities <495, Add	0.59	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	

09 Finishes

09 50 Ceilings

09 51 Acoustical Ceilings



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 51 13 00-0031	SF		2' x 4' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured).....	3.66	0.43
			<i>For Up To 50, Add</i>	1.11	
			<i>For >50 To 200, Add</i>	0.65	
			<i>For >200 To 500, Add</i>	0.25	
			<i>For >2,500 To 4,000, Deduct</i>	-0.09	
			<i>For >4,000 To 5,000, Deduct</i>	-0.18	
			<i>For >5,000, Deduct</i>	-0.31	
			<i>For Individual Room Quantities <495, Add</i>	0.65	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0032	SF		2' x 2' x 3/4" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	3.03	0.43
			<i>For Up To 50, Add</i>	1.02	
			<i>For >50 To 200, Add</i>	0.59	
			<i>For >200 To 500, Add</i>	0.22	
			<i>For >2,500 To 4,000, Deduct</i>	-0.08	
			<i>For >4,000 To 5,000, Deduct</i>	-0.15	
			<i>For >5,000, Deduct</i>	-0.26	
			<i>For Individual Room Quantities <495, Add</i>	0.59	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0033	SF		2' x 4' x 3/4" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured)	3.68	0.43
			<i>For Up To 50, Add</i>	1.12	
			<i>For >50 To 200, Add</i>	0.65	
			<i>For >200 To 500, Add</i>	0.25	
			<i>For >2,500 To 4,000, Deduct</i>	-0.09	
			<i>For >4,000 To 5,000, Deduct</i>	-0.18	
			<i>For >5,000, Deduct</i>	-0.31	
			<i>For Individual Room Quantities <495, Add</i>	0.65	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0034	SF		30" x 60" x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured).....	2.84	0.43
			<i>For Up To 50, Add</i>	0.99	
			<i>For >50 To 200, Add</i>	0.57	
			<i>For >200 To 500, Add</i>	0.21	
			<i>For >2,500 To 4,000, Deduct</i>	-0.07	
			<i>For >4,000 To 5,000, Deduct</i>	-0.14	
			<i>For >5,000, Deduct</i>	-0.25	
			<i>For Individual Room Quantities <495, Add</i>	0.57	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0035	SF		2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured Fire Guard).....	3.11	0.65
			<i>For Up To 50, Add</i>	1.03	
			<i>For >50 To 200, Add</i>	0.59	
			<i>For >200 To 500, Add</i>	0.23	
			<i>For >2,500 To 4,000, Deduct</i>	-0.08	
			<i>For >4,000 To 5,000, Deduct</i>	-0.16	
			<i>For >5,000, Deduct</i>	-0.27	
			<i>For Individual Room Quantities <495, Add</i>	0.59	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0036	SF		2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured Fire Guard).....	3.05	0.65
			<i>For Up To 50, Add</i>	1.02	
			<i>For >50 To 200, Add</i>	0.59	
			<i>For >200 To 500, Add</i>	0.22	
			<i>For >2,500 To 4,000, Deduct</i>	-0.08	
			<i>For >4,000 To 5,000, Deduct</i>	-0.15	
			<i>For >5,000, Deduct</i>	-0.26	
			<i>For Individual Room Quantities <495, Add</i>	0.59	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	
09 51 13 00-0037	SF		2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured Fire Guard)	3.44	0.65
			<i>For Up To 50, Add</i>	1.08	
			<i>For >50 To 200, Add</i>	0.63	
			<i>For >200 To 500, Add</i>	0.24	
			<i>For >2,500 To 4,000, Deduct</i>	-0.09	
			<i>For >4,000 To 5,000, Deduct</i>	-0.17	
			<i>For >5,000, Deduct</i>	-0.29	
			<i>For Individual Room Quantities <495, Add</i>	0.63	
			<i>Note: For use with projects >500 SF</i>		
			<i>For Vertical Application, Add</i>	0.63	
			<i>For Ceilings >10' High, Add</i>	0.11	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceilings	09 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 51 13 00-0038 SF 2' x 4' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Fine Fissured Fire Guard).....	3.44	0.65
For Up To 50, Add	1.08	
For >50 To 200, Add	0.63	
For >200 To 500, Add	0.24	
For >2,500 To 4,000, Deduct	-0.09	
For >4,000 To 5,000, Deduct	-0.17	
For >5,000, Deduct	-0.29	
For Individual Room Quantities <495, Add	0.63	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0039 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ceramaguard Fine Fissured).....	8.23	0.76
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0040 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Georgian™).....	3.28	0.43
For Up To 50, Add	1.06	
For >50 To 200, Add	0.61	
For >200 To 500, Add	0.23	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.16	
For >5,000, Deduct	-0.28	
For Individual Room Quantities <495, Add	0.61	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0041 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Georgian™).....	3.27	0.43
For Up To 50, Add	1.05	
For >50 To 200, Add	0.61	
For >200 To 500, Add	0.23	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.16	
For >5,000, Deduct	-0.28	
For Individual Room Quantities <495, Add	0.61	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0042 SF 2' x 4' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Georgian™).....	3.84	0.43
For Up To 50, Add	1.14	
For >50 To 200, Add	0.67	
For >200 To 500, Add	0.26	
For >2,500 To 4,000, Deduct	-0.10	
For >4,000 To 5,000, Deduct	-0.19	
For >5,000, Deduct	-0.32	
For Individual Room Quantities <495, Add	0.67	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0043 SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Georgian™).....	3.51	0.43
For Up To 50, Add	1.09	
For >50 To 200, Add	0.63	
For >200 To 500, Add	0.25	
For >2,500 To 4,000, Deduct	-0.09	
For >4,000 To 5,000, Deduct	-0.18	
For >5,000, Deduct	-0.30	
For Individual Room Quantities <495, Add	0.63	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0044 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Dune).....	3.46	0.43
For Up To 50, Add	1.08	
For >50 To 200, Add	0.63	
For >200 To 500, Add	0.24	
For >2,500 To 4,000, Deduct	-0.09	
For >4,000 To 5,000, Deduct	-0.17	
For >5,000, Deduct	-0.29	
For Individual Room Quantities <495, Add	0.63	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0045 SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Dune).....	3.46	0.43
For Up To 50, Add	1.08	
For >50 To 200, Add	0.63	
For >200 To 500, Add	0.24	
For >2,500 To 4,000, Deduct	-0.09	
For >4,000 To 5,000, Deduct	-0.17	
For >5,000, Deduct	-0.29	
For Individual Room Quantities <495, Add	0.63	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	

09 Finishes

09 50 Ceilings

09 51 Acoustical Ceilings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0046	SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Dune)	3.64	0.43
	For Up To 50, Add	1.11	
	For >50 To 200, Add	0.65	
	For >200 To 500, Add	0.25	
	For >2,500 To 4,000, Deduct	-0.09	
	For >4,000 To 5,000, Deduct	-0.18	
	For >5,000, Deduct	-0.31	
	For Individual Room Quantities <495, Add	0.65	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0047	SF 2' x 4' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Dune)	3.78	0.43
	For Up To 50, Add	1.13	
	For >50 To 200, Add	0.66	
	For >200 To 500, Add	0.26	
	For >2,500 To 4,000, Deduct	-0.09	
	For >4,000 To 5,000, Deduct	-0.19	
	For >5,000, Deduct	-0.32	
	For Individual Room Quantities <495, Add	0.66	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0048	SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Dune Fire Guard).....	3.99	0.43
	For Up To 50, Add	1.16	
	For >50 To 200, Add	0.68	
	For >200 To 500, Add	0.27	
	For >2,500 To 4,000, Deduct	-0.10	
	For >4,000 To 5,000, Deduct	-0.20	
	For >5,000, Deduct	-0.33	
	For Individual Room Quantities <495, Add	0.68	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0049	SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Dune Fire Guard).....	3.96	0.43
	For Up To 50, Add	1.16	
	For >50 To 200, Add	0.68	
	For >200 To 500, Add	0.27	
	For >2,500 To 4,000, Deduct	-0.10	
	For >4,000 To 5,000, Deduct	-0.20	
	For >5,000, Deduct	-0.33	
	For Individual Room Quantities <495, Add	0.68	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0050	SF 2' x 2' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Mesa)	3.85	0.65
	For Up To 50, Add	1.14	
	For >50 To 200, Add	0.67	
	For >200 To 500, Add	0.26	
	For >2,500 To 4,000, Deduct	-0.10	
	For >4,000 To 5,000, Deduct	-0.19	
	For >5,000, Deduct	-0.32	
	For Individual Room Quantities <495, Add	0.67	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0051	SF 2' x 4' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Mesa)	3.84	0.65
	For Up To 50, Add	1.14	
	For >50 To 200, Add	0.67	
	For >200 To 500, Add	0.26	
	For >2,500 To 4,000, Deduct	-0.10	
	For >4,000 To 5,000, Deduct	-0.19	
	For >5,000, Deduct	-0.32	
	For Individual Room Quantities <495, Add	0.67	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0052	SF 2' x 2' x 3/4" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Mesa).....	4.16	0.43
	For Up To 50, Add	1.19	
	For >50 To 200, Add	0.70	
	For >200 To 500, Add	0.28	
	For >2,500 To 4,000, Deduct	-0.10	
	For >4,000 To 5,000, Deduct	-0.21	
	For >5,000, Deduct	-0.35	
	For Individual Room Quantities <495, Add	0.70	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceilings	09 51	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0053 SF 2' x 4' x 3/4" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Mesa).....	4.07	0.43
For Up To 50, Add	1.17	
For >50 To 200, Add	0.69	
For >200 To 500, Add	0.27	
For >2,500 To 4,000, Deduct	-0.10	
For >4,000 To 5,000, Deduct	-0.20	
For >5,000, Deduct	-0.34	
For Individual Room Quantities <495, Add	0.69	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0054 SF 2' x 2' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cirrus).....	4.99	0.65
For Up To 50, Add	1.31	
For >50 To 200, Add	0.78	
For >200 To 500, Add	0.32	
For >2,500 To 4,000, Deduct	-0.12	
For >4,000 To 5,000, Deduct	-0.25	
For >5,000, Deduct	-0.41	
For Individual Room Quantities <495, Add	0.78	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0055 SF 2' x 4' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cirrus).....	4.95	0.65
For Up To 50, Add	1.31	
For >50 To 200, Add	0.78	
For >200 To 500, Add	0.32	
For >2,500 To 4,000, Deduct	-0.12	
For >4,000 To 5,000, Deduct	-0.25	
For >5,000, Deduct	-0.41	
For Individual Room Quantities <495, Add	0.78	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0056 SF 2' x 2' x 3/4" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cirrus).....	4.99	0.65
For Up To 50, Add	1.31	
For >50 To 200, Add	0.78	
For >200 To 500, Add	0.32	
For >2,500 To 4,000, Deduct	-0.12	
For >4,000 To 5,000, Deduct	-0.25	
For >5,000, Deduct	-0.41	
For Individual Room Quantities <495, Add	0.78	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0057 SF 2' x 4' x 3/4" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cirrus).....	4.95	0.65
For Up To 50, Add	1.31	
For >50 To 200, Add	0.78	
For >200 To 500, Add	0.32	
For >2,500 To 4,000, Deduct	-0.12	
For >4,000 To 5,000, Deduct	-0.25	
For >5,000, Deduct	-0.41	
For Individual Room Quantities <495, Add	0.78	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0058 SF 2' x 4' x 3/4" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Cirrus Second Look).....	5.47	0.43
For Up To 50, Add	1.38	
For >50 To 200, Add	0.83	
For >200 To 500, Add	0.34	
For >2,500 To 4,000, Deduct	-0.14	
For >4,000 To 5,000, Deduct	-0.27	
For >5,000, Deduct	-0.45	
For Individual Room Quantities <495, Add	0.83	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0059 SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Tundra).....	5.43	0.65
For Up To 50, Add	1.38	
For >50 To 200, Add	0.83	
For >200 To 500, Add	0.34	
For >2,500 To 4,000, Deduct	-0.14	
For >4,000 To 5,000, Deduct	-0.27	
For >5,000, Deduct	-0.44	
For Individual Room Quantities <495, Add	0.83	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	

09	09 Finishes
	09 50 Ceilings
	09 51 Acoustical Ceilings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0060	SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Tundra).....	5.42	0.65
	For Up To 50, Add	1.38	
	For >50 To 200, Add	0.82	
	For >200 To 500, Add	0.34	
	For >2,500 To 4,000, Deduct	-0.14	
	For >4,000 To 5,000, Deduct	-0.27	
	For >5,000, Deduct	-0.44	
	For Individual Room Quantities <495, Add	0.82	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0061	SF 2' x 2' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Tundra)	5.86	0.43
	For Up To 50, Add	1.44	
	For >50 To 200, Add	0.87	
	For >200 To 500, Add	0.36	
	For >2,500 To 4,000, Deduct	-0.15	
	For >4,000 To 5,000, Deduct	-0.29	
	For >5,000, Deduct	-0.47	
	For Individual Room Quantities <495, Add	0.87	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0062	SF 2' x 4' x 5/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Tundra)	5.86	0.43
	For Up To 50, Add	1.44	
	For >50 To 200, Add	0.87	
	For >200 To 500, Add	0.36	
	For >2,500 To 4,000, Deduct	-0.15	
	For >4,000 To 5,000, Deduct	-0.29	
	For >5,000, Deduct	-0.47	
	For Individual Room Quantities <495, Add	0.87	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0063	SF 2' x 2' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima®)	5.45	0.43
	For Up To 50, Add	1.38	
	For >50 To 200, Add	0.83	
	For >200 To 500, Add	0.34	
	For >2,500 To 4,000, Deduct	-0.14	
	For >4,000 To 5,000, Deduct	-0.27	
	For >5,000, Deduct	-0.44	
	For Individual Room Quantities <495, Add	0.83	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0064	SF 2' x 4' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima®)	5.45	0.43
	For Up To 50, Add	1.38	
	For >50 To 200, Add	0.83	
	For >200 To 500, Add	0.34	
	For >2,500 To 4,000, Deduct	-0.14	
	For >4,000 To 5,000, Deduct	-0.27	
	For >5,000, Deduct	-0.44	
	For Individual Room Quantities <495, Add	0.83	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0065	SF 2' x 2' x 3/4" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima®)	5.45	0.43
	For Up To 50, Add	1.38	
	For >50 To 200, Add	0.83	
	For >200 To 500, Add	0.34	
	For >2,500 To 4,000, Deduct	-0.14	
	For >4,000 To 5,000, Deduct	-0.27	
	For >5,000, Deduct	-0.44	
	For Individual Room Quantities <495, Add	0.83	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0066	SF 2' x 4' x 3/4" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima®)	5.45	0.43
	For Up To 50, Add	1.38	
	For >50 To 200, Add	0.83	
	For >200 To 500, Add	0.34	
	For >2,500 To 4,000, Deduct	-0.14	
	For >4,000 To 5,000, Deduct	-0.27	
	For >5,000, Deduct	-0.44	
	For Individual Room Quantities <495, Add	0.83	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceilings	09 51	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0067 SF 2' x 2' x 7/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima High-NRC).....	5.86	0.54
For Up To 50, Add	1.49	
For >50 To 200, Add	0.89	
For >200 To 500, Add	0.37	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.29	
For >5,000, Deduct	-0.48	
For Individual Room Quantities <495, Add	0.89	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.68	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0068 SF 2' x 4' x 7/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima High-NRC).....	5.86	0.54
For Up To 50, Add	1.49	
For >50 To 200, Add	0.89	
For >200 To 500, Add	0.37	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.29	
For >5,000, Deduct	-0.48	
For Individual Room Quantities <495, Add	0.89	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.68	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0069 SF 2' x 2' x 7/8" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima High-NRC).....	5.86	0.54
For Up To 50, Add	1.49	
For >50 To 200, Add	0.89	
For >200 To 500, Add	0.37	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.29	
For >5,000, Deduct	-0.48	
For Individual Room Quantities <495, Add	0.89	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.68	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0070 SF 2' x 4' x 7/8" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima High-NRC).....	5.86	0.54
For Up To 50, Add	1.49	
For >50 To 200, Add	0.89	
For >200 To 500, Add	0.37	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.29	
For >5,000, Deduct	-0.48	
For Individual Room Quantities <495, Add	0.89	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.68	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0071 SF 2' x 2' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima Health Zone™).....	6.15	0.43
For Up To 50, Add	1.49	
For >50 To 200, Add	0.90	
For >200 To 500, Add	0.38	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.31	
For >5,000, Deduct	-0.50	
For Individual Room Quantities <495, Add	0.90	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0072 SF 2' x 4' x 3/4" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima Health Zone™).....	6.15	0.43
For Up To 50, Add	1.49	
For >50 To 200, Add	0.90	
For >200 To 500, Add	0.38	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.31	
For >5,000, Deduct	-0.50	
For Individual Room Quantities <495, Add	0.90	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0073 SF 2' x 2' x 3/4" Thick, Beveled Tegalur Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima Health Zone™).....	6.15	0.43
For Up To 50, Add	1.49	
For >50 To 200, Add	0.90	
For >200 To 500, Add	0.38	
For >2,500 To 4,000, Deduct	-0.15	
For >4,000 To 5,000, Deduct	-0.31	
For >5,000, Deduct	-0.50	
For Individual Room Quantities <495, Add	0.90	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	

09 Finishes

09 50 Ceilings

09 51 Acoustical Ceilings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0074	SF 2' x 2' x 7/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima Health Zone™ High-NRC).....	6.98	0.43
	For Up To 50, Add	1.66	
	For >50 To 200, Add	1.00	
	For >200 To 500, Add	0.43	
	For >2,500 To 4,000, Deduct	-0.17	
	For >4,000 To 5,000, Deduct	-0.35	
	For >5,000, Deduct	-0.56	
	For Individual Room Quantities <495, Add	1.00	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.68	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0075	SF 2' x 4' x 7/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima Health Zone™ High-NRC).....	6.88	0.43
	For Up To 50, Add	1.64	
	For >50 To 200, Add	0.99	
	For >200 To 500, Add	0.42	
	For >2,500 To 4,000, Deduct	-0.17	
	For >4,000 To 5,000, Deduct	-0.34	
	For >5,000, Deduct	-0.55	
	For Individual Room Quantities <495, Add	0.99	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.68	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0076	SF 2' x 2' x 7/8" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Ultima Health Zone™ High-NRC).....	6.93	0.43
	For Up To 50, Add	1.65	
	For >50 To 200, Add	1.00	
	For >200 To 500, Add	0.42	
	For >2,500 To 4,000, Deduct	-0.17	
	For >4,000 To 5,000, Deduct	-0.35	
	For >5,000, Deduct	-0.56	
	For Individual Room Quantities <495, Add	1.00	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.68	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0077	SF 2' x 2' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong VL).....	6.49	0.43
	For Up To 50, Add	1.54	
	For >50 To 200, Add	0.93	
	For >200 To 500, Add	0.40	
	For >2,500 To 4,000, Deduct	-0.16	
	For >4,000 To 5,000, Deduct	-0.32	
	For >5,000, Deduct	-0.52	
	For Individual Room Quantities <495, Add	0.93	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0078	SF 2' x 4' x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong VL).....	6.37	0.43
	For Up To 50, Add	1.52	
	For >50 To 200, Add	0.92	
	For >200 To 500, Add	0.39	
	For >2,500 To 4,000, Deduct	-0.16	
	For >4,000 To 5,000, Deduct	-0.32	
	For >5,000, Deduct	-0.51	
	For Individual Room Quantities <495, Add	0.92	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.63	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0079	SF 2' x 2' x 1" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Calla).....	7.05	0.54
	For Up To 50, Add	1.67	
	For >50 To 200, Add	1.01	
	For >200 To 500, Add	0.43	
	For >2,500 To 4,000, Deduct	-0.18	
	For >4,000 To 5,000, Deduct	-0.35	
	For >5,000, Deduct	-0.57	
	For Individual Room Quantities <495, Add	1.01	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.68	
	For Ceilings >10' High, Add	0.11	
09 51 13 00-0080	SF 2' x 4' x 1" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Calla).....	7.05	0.54
	For Up To 50, Add	1.67	
	For >50 To 200, Add	1.01	
	For >200 To 500, Add	0.43	
	For >2,500 To 4,000, Deduct	-0.18	
	For >4,000 To 5,000, Deduct	-0.35	
	For >5,000, Deduct	-0.57	
	For Individual Room Quantities <495, Add	1.01	
	Note: For use with projects >500 SF		
	For Vertical Application, Add	0.68	
	For Ceilings >10' High, Add	0.11	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceilings	09 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 51 13 00-0081 SF 2' x 2' x 1" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Calla)	7.05	0.43
For Up To 50, Add	1.67	
For >50 To 200, Add	1.01	
For >200 To 500, Add	0.43	
For >2,500 To 4,000, Deduct	-0.18	
For >4,000 To 5,000, Deduct	-0.35	
For >5,000, Deduct	-0.57	
For Individual Room Quantities <495, Add	1.01	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.68	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0082 SF 2' x 4' x 1" Thick, Beveled Tegular Edge, Mineral Fiber Acoustical Ceiling Panel (Armstrong Calla)	7.05	0.54
For Up To 50, Add	1.67	
For >50 To 200, Add	1.01	
For >200 To 500, Add	0.43	
For >2,500 To 4,000, Deduct	-0.18	
For >4,000 To 5,000, Deduct	-0.35	
For >5,000, Deduct	-0.57	
For Individual Room Quantities <495, Add	1.01	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.68	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0083 SF 20" x 60" x 5/8" Thick, Square Edge, Mineral Fiber Acoustical Ceiling Panel (USG Radar™ 2617).....	2.49	0.43
For Individual Room Quantities <495, Add	0.53	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0084 SF 20" x 60" x 5/8" Thick, Tapered Edge, Mineral Fiber Acoustical Ceiling Panel (USG Radar™ 2627).....	2.57	0.43
For Individual Room Quantities <495, Add	0.54	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0085 SF 2' x 4' x 3/4" Tapered Edge, Mineral Fiber Acoustical Ceiling Panel (USG Radar™ Illusion Basic Two 2742).....	3.87	0.43
For Individual Room Quantities <495, Add	0.67	
Note: For use with projects >500 SF		
For Vertical Application, Add	0.63	
For Ceilings >10' High, Add	0.11	
09 51 13 00-0086 Wood Fiber Panels (09 51 13)		
09 51 13 00-0087 SF 2' x 2' x 1/2" Wood Fiber Acoustical Ceiling Panels	6.51	0.65
For Up To 50, Add	1.75	
For >50 To 200, Add	1.04	
For >200 To 500, Add	0.42	
For >2,500 To 4,000, Deduct	-0.16	
For >4,000 To 5,000, Deduct	-0.33	
For >5,000, Deduct	-0.54	
For Individual Room Quantities <495, Add	1.04	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.14	
09 51 13 00-0088 SF 2' x 4' x 1/2" Wood Fiber Acoustical Ceiling Panels	6.31	0.65
For Up To 50, Add	1.64	
For >50 To 200, Add	0.98	
For >200 To 500, Add	0.40	
For >2,500 To 4,000, Deduct	-0.16	
For >4,000 To 5,000, Deduct	-0.32	
For >5,000, Deduct	-0.52	
For Individual Room Quantities <495, Add	0.98	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.13	
09 51 13 00-0089 SF 2' x 2' x 5/8" Wood Fiber Acoustical Ceiling Panels	8.55	0.65
For Up To 50, Add	2.05	
For >50 To 200, Add	1.24	
For >200 To 500, Add	0.52	
For >2,500 To 4,000, Deduct	-0.21	
For >4,000 To 5,000, Deduct	-0.43	
For >5,000, Deduct	-0.69	
For Individual Room Quantities <495, Add	1.24	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.14	
09 51 13 00-0090 SF 2' x 4' x 5/8" Wood Fiber Acoustical Ceiling Panels	8.35	0.65
For Up To 50, Add	1.94	
For >50 To 200, Add	1.18	
For >200 To 500, Add	0.50	
For >2,500 To 4,000, Deduct	-0.21	
For >4,000 To 5,000, Deduct	-0.42	
For >5,000, Deduct	-0.67	
For Individual Room Quantities <495, Add	1.18	
Note: For use with projects >500 SF		
For Ceilings >10' High, Add	0.13	

09	09 Finishes
	09 50 Ceilings
	09 51 Acoustical Ceilings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 51 13 00-0091	SF 2' x 2' x 3/4" Wood Fiber Acoustical Ceiling Panels	10.52	0.65
	For Up To 50, Add	2.35	
	For >50 To 200, Add	1.44	
	For >200 To 500, Add	0.62	
	For >2,500 To 4,000, Deduct	-0.26	
	For >4,000 To 5,000, Deduct	-0.53	
	For >5,000, Deduct	-0.84	
	For Individual Room Quantities <495, Add	1.44	
	Note: For use with projects >500 SF		
	For Ceilings >10' High, Add	0.14	
09 51 13 00-0092	SF 2' x 4' x 3/4" Wood Fiber Acoustical Ceiling Panels	10.32	0.65
	For Up To 50, Add	2.24	
	For >50 To 200, Add	1.38	
	For >200 To 500, Add	0.60	
	For >2,500 To 4,000, Deduct	-0.26	
	For >4,000 To 5,000, Deduct	-0.52	
	For >5,000, Deduct	-0.82	
	For Individual Room Quantities <495, Add	1.38	
	Note: For use with projects >500 SF		
	For Ceilings >10' High, Add	0.13	
09 51 13 00-0093	SF 2' x 2' x 1" Wood Fiber Acoustical Ceiling Panels	7.70	0.65
	For Up To 50, Add	1.93	
	For >50 To 200, Add	1.16	
	For >200 To 500, Add	0.48	
	For >2,500 To 4,000, Deduct	-0.19	
	For >4,000 To 5,000, Deduct	-0.39	
	For >5,000, Deduct	-0.63	
	For Individual Room Quantities <495, Add	1.16	
	Note: For use with projects >500 SF		
	For Ceilings >10' High, Add	0.14	
09 51 13 00-0094	SF 2' x 4' x 1" Wood Fiber Acoustical Ceiling Panels	7.50	0.65
	For Up To 50, Add	1.82	
	For >50 To 200, Add	1.10	
	For >200 To 500, Add	0.46	
	For >2,500 To 4,000, Deduct	-0.19	
	For >4,000 To 5,000, Deduct	-0.38	
	For >5,000, Deduct	-0.61	
	For Individual Room Quantities <495, Add	1.10	
	Note: For use with projects >500 SF		
	For Ceilings >10' High, Add	0.13	
09 51 13 00-0095	Removal And Reinstallation Of Acoustical Ceiling Panels (09 51 13)		
	Note: 2'x2' Or 2'x4'. Includes storage and cleaning.		
09 51 13 00-0096	SF Removal And Reinstallation Of Acoustical Panels Only	2.22	
	For Up To 50, Add	1.22	
	For >50 To 200, Add	0.67	
	For >200 To 500, Add	0.22	
	For >2,500 To 4,000, Deduct	-0.06	
	For >4,000 To 5,000, Deduct	-0.11	
	For >5,000, Deduct	-0.22	
	For Ceilings >10' High, Add	0.17	
09 51 23	Acoustical Tile Ceilings (09 51)		
	Note: Includes fastening with staples and/or adhesive.		
09 51 23 00-0001	Mineral Fiber Acoustical Tile Ceilings (09 51 23)		
09 51 23 00-0002	SF 12" x 12" x 1/2" Tongue And Groove Mineral Fiber Acoustical Ceiling Tile.....	5.94	1.20
	For Furring 1 x 3 Strips 12" On Center, Add	0.50	
	For Up To 50, Add	1.98	
	For >50 To 200, Add	1.14	
	For >200 To 500, Add	0.43	
	For >2,500, Deduct	-0.30	
	For Ceilings >10' High, Add	0.20	
09 51 23 00-0003	SF 12" x 12" x 5/8" Spline Mineral Fiber Acoustical Ceiling Tile.....	7.14	1.20
	For Furring 1 x 3 Strips 12" On Center, Add	0.50	
	For Up To 50, Add	2.16	
	For >50 To 200, Add	1.26	
	For >200 To 500, Add	0.49	
	For >2,500, Deduct	-0.36	
	For Placing Tiles In Suspended Ceiling System, Deduct	-0.52	
	For Ceilings >10' High, Add	0.20	
09 51 23 00-0004	SF 12" x 12" x 3/4" Spline Mineral Fiber Acoustical Ceiling Tile.....	8.11	1.20
	For Furring 1 x 3 Strips 12" On Center, Add	0.50	
	For Up To 50, Add	2.30	
	For >50 To 200, Add	1.35	
	For >200 To 500, Add	0.54	
	For >2,500, Deduct	-0.41	
	For Placing Tiles In Suspended Ceiling System, Deduct	-0.52	
	For Ceilings >10' High, Add	0.20	
09 51 23 00-0005	Wood Fiber Acoustical Tile Ceilings (09 51 23)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 51 23 00-0006 SF 12" x 12" x 1/2" Staple Flange Wood Fiber Acoustical Ceiling Tile <i>For Furring 1 x 3 Strips 12" On Center, Add</i> <i>For Up To 50, Add</i> <i>For >50 To 200, Add</i> <i>For >200 To 500, Add</i> <i>For >2,500, Deduct</i> <i>For Ceilings >10' High, Add</i>	5.43 0.50 1.90 1.09 0.41 -0.27 0.20	1.20
09 51 33 Acoustical Metal Pan Ceilings (09 51)		
09 51 33 13 Acoustical Snap-in Metal Pan Ceilings (09 51 33)		
09 51 33 13-0001 Galvanized Steel, Acoustical Snap-In Metal Ceiling Panels (09 51 33 13)		
09 51 33 13-0002 SF 24" x 24", Unperforated, Tamper-Resistant, 18 Gauge, Galvanized Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ SecureLock™)	23.09	0.95
09 51 33 13-0003 SF 24" x 24", Perforated, Tamper-Resistant, 18 Gauge, Galvanized Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ SecureLock™)	24.73	0.95
09 51 33 13-0004 Aluminum, Acoustical Snap-In Metal Ceiling Panels (09 51 33 13)		
09 51 33 13-0005 SF 24" x 24", Unperforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	17.06	1.09
09 51 33 13-0006 SF 24" x 24", Unperforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	29.24	1.09
09 51 33 13-0007 SF 24" x 24", Unperforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	57.63	1.09
09 51 33 13-0008 SF 24" x 24", Unperforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	25.87	1.09
09 51 33 13-0009 SF 24" x 24", Perforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	18.04	1.09
09 51 33 13-0010 SF 24" x 24", Perforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	28.48	1.09
09 51 33 13-0011 SF 24" x 24", Perforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	57.20	1.09
09 51 33 13-0012 SF 24" x 24", Perforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	25.65	1.09
09 51 33 13-0013 SF 30" x 30", Unperforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	23.37	1.09
09 51 33 13-0014 SF 30" x 30", Unperforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	30.88	1.09
09 51 33 13-0015 SF 30" x 30", Unperforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	63.61	1.09
09 51 33 13-0016 SF 30" x 30", Unperforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	30.55	1.09
09 51 33 13-0017 SF 30" x 30", Perforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	24.78	1.09
09 51 33 13-0018 SF 30" x 30", Perforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	31.64	1.09
09 51 33 13-0019 SF 30" x 30", Perforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	65.79	1.09
09 51 33 13-0020 SF 30" x 30", Perforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	31.31	1.09
09 51 33 13-0021 SF 12" x 48", Unperforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	21.09	1.09
09 51 33 13-0022 SF 12" x 48", Unperforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	34.79	1.09
09 51 33 13-0023 SF 12" x 48", Unperforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	62.20	1.09
09 51 33 13-0024 SF 12" x 48", Unperforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	29.79	1.09
09 51 33 13-0025 SF 12" x 48", Perforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	22.72	1.09
09 51 33 13-0026 SF 12" x 48", Perforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	35.23	1.09
09 51 33 13-0027 SF 12" x 48", Perforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	64.48	1.09
09 51 33 13-0028 SF 12" x 48", Perforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	30.77	1.09
09 51 33 13-0029 SF 24" x 48", Unperforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	16.60	1.09
09 51 33 13-0030 SF 24" x 48", Unperforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	25.74	1.09
09 51 33 13-0031 SF 24" x 48", Unperforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	54.02	1.09
09 51 33 13-0032 SF 24" x 48", Unperforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	24.44	1.09
09 51 33 13-0033 SF 24" x 48", Perforated, 0.040" Thick, Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	17.69	1.09
09 51 33 13-0034 SF 24" x 48", Perforated, 0.040" Thick, Metallic Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	25.52	1.09
09 51 33 13-0035 SF 24" x 48", Perforated, 0.040" Thick, Wood Tone Painted Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	54.13	1.09

09	09 Finishes
	09 50 Ceilings
	09 51 Acoustical Ceilings



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 51 33 13-0036	SF	24" x 48", Perforated, 0.040" Thick, Anodized Aluminum, Acoustical Snap-In Metal Ceiling Panel (Armstrong MetalWorks™)	24.44	1.09
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09 51 33 23 Acoustical Lay-in Metal Pan Ceilings (09 51 33)

09 51 33 23-0001 Acoustical Lay-In Metal Pan Ceilings (09 51 33 23)

09 51 33 23-0002 Aluminum, Acoustical Lay-In Metal Ceiling Panels (09 51 33 23-0001)

09 51 33 23-0003	SF	24" x 24", Unperforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	17.95	0.82
09 51 33 23-0004	SF	24" x 24", Unperforated, Metallic Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	20.39	0.82
09 51 33 23-0005	SF	24" x 24", Unperforated, Wood Tone Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	30.18	0.82
09 51 33 23-0006	SF	24" x 24", Perforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	25.56	0.82
09 51 33 23-0007	SF	24" x 24", Perforated, Metallic Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	27.46	0.82
09 51 33 23-0008	SF	24" x 24", Perforated, Wood Tone Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	43.51	0.82
09 51 33 23-0009	SF	30" x 30", Unperforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	27.04	0.82
09 51 33 23-0010	SF	30" x 30", Perforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	33.65	0.82
09 51 33 23-0011	SF	48" x 48", Unperforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	27.19	0.82
09 51 33 23-0012	SF	48" x 48", Perforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	33.85	0.82
09 51 33 23-0013	SF	12" x 48", Unperforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	27.33	0.82
09 51 33 23-0014	SF	12" x 48", Perforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	33.72	0.82
09 51 33 23-0015	SF	24" x 48", Unperforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	27.33	0.82
09 51 33 23-0016	SF	24" x 48", Perforated, Painted Aluminum, Acoustical Lay-In Metal Ceiling Panel (USG Panz™)	33.99	0.82

09 51 33 23-0017 Steel, Acoustical Lay-In Metal Ceiling Panels (09 51 33 23-0001)

09 51 33 23-0018	SF	24" x 24", Unperforated, 0.021" Thick, Painted Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ Vector®)	23.30	0.82
09 51 33 23-0019	SF	24" x 24", Unperforated, 0.021" Thick, Metallic Painted Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ Vector®)	27.87	0.82
09 51 33 23-0020	SF	24" x 24", Unperforated, 0.021" Thick, Wood Tone Painted Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ Vector®)	29.93	0.82
09 51 33 23-0021	SF	24" x 24", Perforated, 0.021" Thick, Painted Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ Vector®)	28.08	0.82
09 51 33 23-0022	SF	24" x 24", Perforated, 0.021" Thick, Metallic Painted Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ Vector®)	28.84	0.82
09 51 33 23-0023	SF	24" x 24", Perforated, 0.021" Thick, Wood Tone Painted Steel, Acoustical Lay-In Metal Ceiling Panel (Armstrong MetalWorks™ Vector®)	30.58	0.82

09 51 33 33 Acoustical Tegular Lay-in Metal Pan Ceilings (09 51 33)

09 51 33 33-0001 Acoustical Tegular Lay-In Metal Pan Ceilings (09 51 33 33)

09 51 33 33-0002 Steel, Acoustical Tegular Lay-In Metal Pan Ceilings (09 51 33 33-0001)

09 51 33 33-0003	SF	24" x 24", Unperforated, 0.021" Thick, Painted Steel, Acoustical Tegular Lay-In Metal Ceiling Panel (Armstrong MetalWorks™)	16.88	0.82
09 51 33 33-0004	SF	24" x 24", Unperforated, 0.021" Thick, Metallic Painted Steel, Acoustical Tegular Lay-In Metal Ceiling Panel (Armstrong MetalWorks™)	19.05	0.82
09 51 33 33-0005	SF	24" x 24", Unperforated, 0.021" Thick, Wood Tone Painted Steel, Acoustical Tegular Lay-In Metal Ceiling Panel (Armstrong MetalWorks™)	27.10	0.82
09 51 33 33-0006	SF	24" x 24", Perforated, 0.021" Thick, Painted Steel, Acoustical Tegular Lay-In Metal Ceiling Panel (Armstrong MetalWorks™)	19.27	0.82
09 51 33 33-0007	SF	24" x 24", Perforated, 0.021" Thick, Metallic Painted Steel, Acoustical Tegular Lay-In Metal Ceiling Panel (Armstrong MetalWorks™)	21.88	0.82
09 51 33 33-0008	SF	24" x 24", Perforated, 0.021" Thick, Wood Tone Painted Steel, Acoustical Tegular Lay-In Metal Ceiling Panel (Armstrong MetalWorks™)	29.61	0.82

09 53 Acoustical Ceiling Suspension Assemblies (09 50)

09 53 23 Metal Acoustical Ceiling Suspension Assemblies (09 53)

09 53 23 00-0001 Ceiling Suspension Systems (09 53 23)

Note: Hot-dipped galvanized steel. Includes single 8 gauge wire hangers (between 3' To 4') attached from wood deck or wood members above to main members 4' on center. Includes all main tees, cross tees, wall angle, wall anchors, connector clips, hold down clips, double faced tape (where required). All above shall be mechanically installed by minimum 2-1/4" x 3/8" wedge anchors. Excludes chain supports for lights.

09 53 23 00-0002	SF	1' x 1' Grid, Concealed, Hot Dipped Galvanized Steel, 15/16" T Bar Ceiling Suspension System	4.73	0.54
		Note: Excludes ceiling tile.		
		For Fastening To Concrete, Add	1.42	
		For Fastening To Steel, Add	1.53	
		For Vertical Application, Add	2.07	
		For Individual Room Quantities <495, Add	0.47	
		Note: For use with projects >500 SF		
		For Up To 50, Add	1.65	
		For >50 To 200, Add	0.95	
		For >200 To 500, Add	0.35	
		For >2,500 To 4,000, Deduct	-0.11	
		For >4,000 To 5,000, Deduct	-0.19	
		For >5,000, Deduct	-0.27	
		For Ceilings >10' High, Add	0.18	



Finishes	09	09
Ceilings	09 50	
Acoustical Ceiling Suspension Assemblies	09 53	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 53 23 00-0003 SF 1' x 2' Grid, Hot Dipped Galvanized Steel, 15/16" T Bar Ceiling Suspension System.....	3.79	0.54
For UL Listed (Fire Guard), Add	0.27	
For 1-1/2" Wide Faced Grid, Add	0.51	
For Fastening To Concrete, Add	1.38	
For Fastening To Steel, Add	1.49	
For Vertical Application, Add	1.72	
For Chemical Corrosion Resistant, Polyvinyl Chloride (PVC) Coated, Add	2.50	
For Individual Room Quantities <495, Add	0.39	
Note: For use with projects >500 SF		
For Aluminum T-Bar System, Add	0.82	
For Up To 50, Add	1.36	
For >50 To 200, Add	0.77	
For >200 To 500, Add	0.29	
For >2,500 To 4,000, Deduct	-0.09	
For >4,000 To 5,000, Deduct	-0.15	
For >5,000, Deduct	-0.22	
For Ceilings >10' High, Add	0.15	
09 53 23 00-0004 SF 2' x 2' Grid, Hot Dipped Galvanized Steel, 15/16" T Bar Ceiling Suspension System.....	3.14	0.54
For UL Listed (Fire Guard), Add	0.20	
For 1-1/2" Wide Faced Grid, Add	0.37	
For Fastening To Concrete, Add	1.36	
For Fastening To Steel, Add	1.47	
For Vertical Application, Add	1.58	
For Chemical Corrosion Resistant, Polyvinyl Chloride (PVC) Coated, Add	2.50	
For Individual Room Quantities <495, Add	0.34	
Note: For use with projects >500 SF		
For Aluminum T-Bar System, Add	0.60	
For Up To 50, Add	1.20	
For >50 To 200, Add	0.68	
For >200 To 500, Add	0.25	
For >2,500 To 4,000, Deduct	-0.07	
For >4,000 To 5,000, Deduct	-0.13	
For >5,000, Deduct	-0.19	
For Black Grid, Add	0.17	
For Ceilings >10' High, Add	0.14	
For Concealed Spline Grid, Add	0.51	
09 53 23 00-0005 SF 2' x 4' Grid, Hot Dipped Galvanized Steel, 15/16" T Bar Ceiling Suspension System.....	2.60	0.54
For UL Listed (Fire Guard), Add	0.16	
For 1-1/2" Wide Faced Grid, Add	0.30	
For Fastening To Concrete, Add	1.33	
For Fastening To Steel, Add	1.44	
For Vertical Application, Add	1.52	
For Chemical Corrosion Resistant, Polyvinyl Chloride (PVC) Coated, Add	2.50	
For Individual Room Quantities <495, Add	0.28	
Note: For use with projects >500 SF		
For Aluminum T-Bar System, Add	0.49	
For Up To 50, Add	1.00	
For >50 To 200, Add	0.56	
For >200 To 500, Add	0.21	
For >2,500 To 4,000, Deduct	-0.06	
For >4,000 To 5,000, Deduct	-0.11	
For >5,000, Deduct	-0.16	
For Black Grid, Add	0.14	
For Ceilings >10' High, Add	0.11	
For Concealed Spline Grid, Add	0.42	
09 53 23 00-0006 SF 1'-8" To 2' x 5' Grid, Hot Dipped Galvanized Steel, 15/16" T Bar Ceiling Suspension System	2.29	0.54
For UL Listed (Fire Guard), Add	0.15	
For 1-1/2" Wide Faced Grid, Add	0.28	
For Fastening To Concrete, Add	1.31	
For Fastening To Steel, Add	1.42	
For Chemical Corrosion Resistant, Polyvinyl Chloride (PVC) Coated, Add	2.50	
For Individual Room Quantities <495, Add	0.24	
Note: For use with projects >500 SF		
For Aluminum T-Bar System, Add	0.45	
For Up To 50, Add	0.86	
For >50 To 200, Add	0.49	
For >200 To 500, Add	0.18	
For >2,500 To 4,000, Deduct	-0.05	
For >4,000 To 5,000, Deduct	-0.09	
For >5,000, Deduct	-0.14	
For Ceilings >10' High, Add	0.10	
09 53 23 00-0007 SF 2' x 2' Grid, Hot Dipped Galvanized Steel, 9/16" T Bar Ceiling Suspension System	3.42	0.54
For UL Listed (Fire Guard), Add	0.24	
For Fastening To Concrete, Add	1.36	
For Fastening To Steel, Add	1.47	
For Vertical Application, Add	1.58	
For Chemical Corrosion Resistant, Polyvinyl Chloride (PVC) Coated, Add	2.50	
For Individual Room Quantities <495, Add	0.35	
Note: For use with projects >500 SF		
For Up To 50, Add	1.24	
For >50 To 200, Add	0.70	
For >200 To 500, Add	0.26	
For >2,500 To 4,000, Deduct	-0.08	
For >4,000 To 5,000, Deduct	-0.14	
For >5,000, Deduct	-0.20	
For Black Grid, Add	0.20	
For Ceilings >10' High, Add	0.14	

09 Finishes**09 50 Ceilings****09 53 Acoustical Ceiling Suspension Assemblies**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 53 23 00-0008	SF	2' x 4' Grid, Hot Dipped Galvanized Steel, 9/16" T Bar Ceiling Suspension System.....	2.82	0.54
		<i>For UL Listed (Fire Guard), Add</i>	0.20	
		<i>For Fastening To Concrete, Add</i>	1.33	
		<i>For Fastening To Steel, Add</i>	1.44	
		<i>For Vertical Application, Add</i>	1.52	
		<i>For Chemical Corrosion Resistant, Polyvinyl Chloride (PVC) Coated, Add</i>	2.50	
		<i>For Individual Room Quantities <495, Add</i>	0.29	
		<i>Note: For use with projects >500 SF</i>		
		<i>For Up To 50, Add</i>	1.03	
		<i>For >50 To 200, Add</i>	0.59	
		<i>For >200 To 500, Add</i>	0.22	
		<i>For >2,500 To 4,000, Deduct</i>	-0.06	
		<i>For >4,000 To 5,000, Deduct</i>	-0.12	
		<i>For >5,000, Deduct</i>	-0.17	
		<i>For Black Grid, Add</i>	0.16	
		<i>For Ceilings >10' High, Add</i>	0.11	
09 53 23 00-0009		Ceiling Suspension System Accessories (09 53 23)		
09 53 23 00-0010	LF	Pencil Rod Support For Suspended Ceiling with Accessories.....	1.41	
09 53 23 00-0011	LF	1" x 1/8" Flat Bar Bracing For Suspended Ceiling.....	3.37	1.52
		<i>For 304 Stainless Steel, Add</i>	3.11	
		<i>For 316 Stainless Steel, Add</i>	3.49	
		<i>For Aluminum, Add</i>	0.20	
		<i>For Galvanized Steel, Add</i>	0.68	
09 53 23 00-0012	LF	1" x 3/16" Flat Bar Bracing For Suspended Ceiling.....	4.83	1.63
		<i>For 304 Stainless Steel, Add</i>	4.73	
		<i>For 316 Stainless Steel, Add</i>	5.31	
		<i>For Aluminum, Add</i>	0.30	
		<i>For Galvanized Steel, Add</i>	1.03	
09 53 23 00-0013	LF	1-1/2" x 1/4" Flat Bar Bracing For Suspended Ceiling.....	6.89	1.73
		<i>For 304 Stainless Steel, Add</i>	9.43	
		<i>For 316 Stainless Steel, Add</i>	10.59	
		<i>For Aluminum, Add</i>	0.60	
		<i>For Galvanized Steel, Add</i>	2.05	
09 53 23 00-0014	EA	2', Exposed 15/16" Hot-dipped Galvanized Steel, Suspended Ceiling Cross Tee.....	7.11	0.31
		<i>Note: Can be used to convert an existing 2' x 4' suspension system to a 2' x 2' system or to replace an individual component.</i>		
09 53 23 00-0015	EA	Lateral Support For Suspended Ceiling Channel, Installed 12'-0" On Center Maximum.....	36.69	9.37
		<i>Note: Includes vertical center strut and four 12 gauge diagonal wires.</i>		
09 53 23 00-0016	EA	Up To 30" Compression Posts, Telescopic, With Splay Wires, Attached To Structure For Suspended Ceiling.....	89.67	22.05
09 53 23 00-0017	EA	>30" To 48" Compression Posts, Telescopic, With Splay Wires, Attached To Structure For Suspended Ceiling.....	93.14	22.47
09 53 23 00-0018	EA	>48" To 84" Compression Posts, Telescopic, With Splay Wires, Attached To Structure For Suspended Ceiling.....	105.74	22.47
09 53 23 00-0019		Removal And Reinstallation Of Acoustical Ceiling Suspension Assembly (09 53 23)		
		<i>Note: 2'x2' Or 2'x4'. Includes storage and cleaning.</i>		
09 53 23 00-0020	SF	Removal And Reinstallation Of 2' x 2' Or 2' x 4' Acoustical Ceiling Tile And Grid Assembly.....	2.99	
		<i>Note: Suspension system tie wire, wall angles and bracing to remain in place.</i>		
		<i>For Up To 50, Add</i>	1.64	
		<i>For >50 To 200, Add</i>	0.90	
		<i>For >200 To 500, Add</i>	0.30	
		<i>For >2,500 To 4,000, Deduct</i>	-0.07	
		<i>For >4,000 To 5,000, Deduct</i>	-0.15	
		<i>For >5,000, Deduct</i>	-0.22	
		<i>For Ceilings >10' High, Add</i>	0.22	
09 53 23 00-0021	SF	Removal And Reinstallation Of Grid System Assembly.....	1.30	
		<i>Note: Suspension system tie wire, wall angles and bracing to remain in place. Excludes ceiling tiles.</i>		
		<i>For Up To 50, Add</i>	0.72	
		<i>For >50 To 200, Add</i>	0.39	
		<i>For >200 To 500, Add</i>	0.13	
		<i>For >2,500 To 4,000, Deduct</i>	-0.03	
		<i>For >4,000 To 5,000, Deduct</i>	-0.07	
		<i>For >5,000, Deduct</i>	-0.10	
		<i>For Ceilings >10' High, Add</i>	0.10	
09 54 Specialty Ceilings (09 50)				
09 54 16 Luminous Ceilings (09 54)				
09 54 16 00-0001		Translucent Ceiling Panels (09 54 16)		
09 54 16 00-0002	SF	2' x 2' x 0.013" Thick, Rigid Vinyl Plastic, Translucent Ceiling Panel.....	3.21	0.54
		<i>For Ceilings >10' High, Add</i>	0.09	
		<i>For >100 To 200, Deduct</i>	-0.14	
		<i>For >200 To 300, Deduct</i>	-0.36	
		<i>For >300, Deduct</i>	-0.62	
09 54 23 Linear Metal Ceilings (09 54)				
09 54 23 00-0001		Linear Ceiling Systems (09 54 23)		



Finishes	09	09
Ceilings	09 50	
Specialty Ceilings	09 54	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 54 23 00-0002	0.032" Aluminum, Linear Ceiling Systems <small>(09 54 23 00-0001)</small>		
	<small>Note: For flat ceilings. Includes round or box style panels with KYNAR 500® or HYLAR 5000® PVDF finish. Includes ceiling suspension system and flush or recessed filler strips.</small>		
09 54 23 00-0003	SF 4" Panel Width, 0.032" Aluminum, Linear Ceiling System	22.37	2.29
	<i>For Up To 50, Add</i>	5.55	
	<i>For >50 To 200, Add</i>	3.33	
	<i>For >200 To 500, Add</i>	1.39	
	<i>For >2,500, Deduct</i>	-1.12	
	<i>For Ceilings >10' High, Add</i>	0.41	
	<i>For Linear Ceiling Systems Without Filler Strips, Deduct</i>	-4.18	
	<i>For Curved Ceilings, Add</i>	1.32	
09 54 23 00-0004	SF 8" Panel Width, 0.032" Aluminum, Linear Ceiling System	17.93	2.29
	<i>For Up To 50, Add</i>	4.84	
	<i>For >50 To 200, Add</i>	2.87	
	<i>For >200 To 500, Add</i>	1.17	
	<i>For >2,500, Deduct</i>	-0.90	
	<i>For Ceilings >10' High, Add</i>	0.40	
	<i>For Linear Ceiling Systems Without Filler Strips, Deduct</i>	-2.08	
	<i>For Curved Ceilings, Add</i>	1.30	
09 54 23 00-0005	SF 12" Panel Width, 0.032" Aluminum, Linear Ceiling System	16.21	2.29
	<i>For Up To 50, Add</i>	4.54	
	<i>For >50 To 200, Add</i>	2.67	
	<i>For >200 To 500, Add</i>	1.07	
	<i>For >2,500, Deduct</i>	-0.81	
	<i>For Ceilings >10' High, Add</i>	0.39	
	<i>For Linear Ceiling Systems Without Filler Strips, Deduct</i>	-1.38	
	<i>For Curved Ceilings, Add</i>	1.27	
09 54 23 00-0006	Tin Ceilings <small>(09 54 23)</small>		
09 54 23 00-0007	SF 2' x 2' Tin Ceiling Embossed Panels	21.83	3.55
	<i>For Up To 50, Add</i>	4.98	
	<i>For >50 To 200, Add</i>	3.04	
	<i>For >200 To 500, Add</i>	1.31	
	<i>For >2,500, Deduct</i>	-1.09	
	<i>For Ceilings >10' High, Add</i>	0.32	
09 54 23 00-0008	SF 12" x 12" Tin Ceiling Embossed Plates	32.49	2.29
	<i>For Up To 50, Add</i>	6.67	
	<i>For >50 To 200, Add</i>	4.15	
	<i>For >200 To 500, Add</i>	1.85	
	<i>For >2,500, Deduct</i>	-1.62	
	<i>For Ceilings >10' High, Add</i>	0.34	
09 54 23 00-0009	SF 12" x 24" Tin Ceiling Embossed Plates	23.58	2.29
	<i>For Up To 50, Add</i>	5.34	
	<i>For >50 To 200, Add</i>	3.26	
	<i>For >200 To 500, Add</i>	1.40	
	<i>For >2,500, Deduct</i>	-1.18	
	<i>For Ceilings >10' High, Add</i>	0.34	
09 54 23 00-0010	SF 24" x 24" Tin Ceiling Embossed Plates	21.67	2.29
	<i>For Up To 50, Add</i>	4.91	
	<i>For >50 To 200, Add</i>	3.00	
	<i>For >200 To 500, Add</i>	1.29	
	<i>For >2,500, Deduct</i>	-1.08	
	<i>For Ceilings >10' High, Add</i>	0.31	
09 54 23 00-0011	SF 24" x 48" Tin Ceiling Embossed Plates	18.90	1.71
	<i>For Up To 50, Add</i>	4.29	
	<i>For >50 To 200, Add</i>	2.62	
	<i>For >200 To 500, Add</i>	1.13	
	<i>For >2,500, Deduct</i>	-0.95	
	<i>For Ceilings >10' High, Add</i>	0.27	
09 54 23 00-0012	LF 3" Or 4" Wide Embossed Molding	14.41	3.43
09 54 23 00-0013	LF 6" Wide Embossed Molding	18.13	4.00
09 54 23 00-0014	LF 12" Wide Embossed Molding	24.38	4.69
09 54 23 00-0015	EA 3", 4" Or 6" Wide Embossed Cross, Tee Or Ell	41.55	10.86
09 54 23 00-0016	EA 12" Wide Embossed Cross, Tee Or Ell	58.02	12.69

09 57 Special Function Ceilings (09 50)

09 57 63 High Impact Ceilings (09 57)

09 57 63 00-0001 High Impact Ceilings (09 57 63)

09 57 63 00-0002	SF Polyvinyl Chloride Face High Impact Ceiling Panels	13.03	1.09
	<i>For Ceilings >10' High, Add</i>	0.13	
09 57 63 00-0003	EA High Impact Clips	5.65	0.87
	<i>For Ceilings >10' High, Add</i>	0.20	

09 60 Flooring (09)

Note: Perform moisture testing as recommended by manufacturer.

09 61 Flooring Treatment (09 60)

09 61 13 Slip-Resistant Flooring Treatment (09 61)

09	09 Finishes
	09 60 Flooring
	09 61 Flooring Treatment



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 61 13 00-0001	Anti-Slip Tape <small>(09 61 13)</small>		
	Note: Grit sandpaper surface with adhesive back.		
09 61 13 00-0002	LF 1" Anti-Slip Tape	2.93	2.16
09 61 13 00-0003	LF 2" Anti-Slip Tape	3.76	2.39
09 61 13 00-0004	LF 3" Anti-Slip Tape	4.56	2.63
09 61 13 00-0005	LF 4" Anti-Slip Tape	5.31	2.89
09 61 13 00-0006	LF 6" Anti-Slip Tape	6.83	3.18
09 61 13 00-0007	LF 12" Anti-Slip Tape	12.03	4.76
09 61 13 00-0008	LF 24" Anti-Slip Tape	16.99	7.15

09 64 Wood Flooring (09 60)

09 64 13 Wood Flooring Underlayment (09 64)

09 64 13 00-0001	Wood Flooring Underlayment <small>(09 64 13)</small>		
09 64 13 00-0002	SF Regular Weight Red Rosin Paper, Wood Flooring Underlayment	0.50	
09 64 13 00-0003	SF Heavy Weight Red Rosin Paper, Wood Flooring Underlayment.....	0.52	
09 64 13 00-0004	SF 30 LB, Waxed Paper, Wood Flooring Underlayment	0.54	
09 64 13 00-0005	SF 15 LB, Asphalt Saturated Organic Felt, Wood Flooring Underlayment	0.60	
09 64 13 00-0006	SF 6 Mil Thick, Polyethylene Film, Wood Flooring Underlayment	0.54	
09 64 13 00-0007	SF 8 Mil Thick, Polyethylene Film, Wood Flooring Underlayment.....	0.60	
09 64 13 00-0008	SF 1/8" Thick, Natural Cork, Wood Flooring Underlayment	2.40	0.35
09 64 13 00-0009	SF 1/4" Thick, Natural Cork, Wood Flooring Underlayment	2.51	0.35
09 64 13 00-0010	SF 3/32" Thick, Polyethylene Foam, Wood Flooring Underlayment (Roberts® Unison™ 70-025-15)	0.89	
09 64 13 00-0011	SF 2.0mm Thick, Progressive Foam Technology, Wood Flooring Underlayment (Roberts® Quiet Cushion 70-180).....	1.11	
09 64 13 00-0012	SF 4.0mm Thick, Compressed Fiber, Wood Flooring Underlayment (Roberts® Super Felt 70-193).....	1.20	
09 64 13 00-0013	SF 2.5mm Thick, Closed Cell Foam, Wood Flooring Underlayment (Roberts® Black Jack™ 70-026).....	1.46	
09 64 13 00-0014	SF 1/8" Thick, Moisture Barrier, Sound Reduction And Cushioning, Wood Flooring Underlayment (Roberts® AirGuard™ 70-105)	1.48	0.23

09 64 23 Wood Parquet Flooring (09 64)

Note: All wood parquet flooring is prefinished at factory.

09 64 23 00-0001	Hardwood Parquet Flooring <small>(09 64 23)</small>		
09 64 23 00-0002	SF 5/16" Thick Oak Parquet Flooring	11.81	1.09
	<i>For Up To 20, Add</i>	4.82	
	<i>For >20 To 50, Add</i>	2.54	
	<i>For >50 To 100, Add</i>	1.27	
	<i>For >100 To 300, Add</i>	0.63	

09 64 29 Wood Strip and Plank Flooring (09 64)

Note: All wood strip flooring is unfinished, tongue and groove.

09 64 29 00-0001	Unfinished Fir, Wood Strip Flooring <small>(09 64 29)</small>		
09 64 29 00-0002	SF 3-1/8" Plank Width, 3/4" Thick, Plain Sawn, Clear Vertical Grain (C Or Better) Unfinished Fir, Wood Strip Flooring	14.52	1.09
	<i>For Factory Finish, Add</i>	0.96	
	<i>For Random Width Floor, Add</i>	3.39	
	<i>For Up To 20, Add</i>	4.37	
	<i>For >20 To 50, Add</i>	2.43	
	<i>For >50 To 100, Add</i>	1.21	
	<i>For >100 To 300, Add</i>	0.61	

09 64 29 00-0003	Unfinished Oak, Wood Strip Flooring <small>(09 64 29)</small>		
09 64 29 00-0004	Unfinished White Oak, Wood Strip Flooring <small>(09 64 29 00-0003)</small>		
09 64 29 00-0005	SF 2-1/4" Plank Width, 3/4" Thick, Plain Sawn, #2 Common Unfinished White Oak, Wood Strip Flooring	11.41	1.09
	<i>For Factory Finish, Add</i>	0.50	
	<i>For Random Width Floor, Add</i>	2.53	
	<i>For Up To 20, Add</i>	4.58	
	<i>For >20 To 50, Add</i>	2.42	
	<i>For >50 To 100, Add</i>	1.21	
	<i>For >100 To 300, Add</i>	0.60	
09 64 29 00-0006	SF 2-1/4" Plank Width, 3/4" Thick, Plain Sawn, #1 Common Unfinished White Oak, Wood Strip Flooring	12.06	1.09
	<i>For Factory Finish, Add</i>	0.57	
	<i>For Random Width Floor, Add</i>	2.70	
	<i>For Up To 20, Add</i>	4.68	
	<i>For >20 To 50, Add</i>	2.48	
	<i>For >50 To 100, Add</i>	1.24	
	<i>For >100 To 300, Add</i>	0.62	
09 64 29 00-0007	SF 2-1/4" Plank Width, 3/4" Thick, Plain Sawn, Select Unfinished White Oak, Wood Strip Flooring.....	13.05	1.09
	<i>For Factory Finish, Add</i>	0.67	
	<i>For Random Width Floor, Add</i>	2.94	
	<i>For Up To 20, Add</i>	4.83	
	<i>For >20 To 50, Add</i>	2.58	
	<i>For >50 To 100, Add</i>	1.29	
	<i>For >100 To 300, Add</i>	0.65	



Finishes	09	09
Flooring	09 60	
Wood Flooring	09 64	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 64 29 00-0008 SF 3-1/4" Plank Width, 3/4" Thick, Plain Sawn, #2 Common Unfinished White Oak, Wood Strip Flooring.....	10.13	1.09
For Factory Finish, Add	0.53	
For Random Width Floor, Add	2.29	
For Up To 20, Add	3.72	
For >20 To 50, Add	1.99	
For >50 To 100, Add	0.99	
For >100 To 300, Add	0.50	
09 64 29 00-0009 SF 3-1/4" Plank Width, 3/4" Thick, Plain Sawn, #1 Common Unfinished White Oak, Wood Strip Flooring.....	10.65	1.09
For Factory Finish, Add	0.58	
For Random Width Floor, Add	2.42	
For Up To 20, Add	3.79	
For >20 To 50, Add	2.04	
For >50 To 100, Add	1.02	
For >100 To 300, Add	0.51	
09 64 29 00-0010 SF 3-1/4" Plank Width, 3/4" Thick, Plain Sawn, Select Unfinished White Oak, Wood Strip Flooring.....	11.66	1.09
For Factory Finish, Add	0.68	
For Random Width Floor, Add	2.67	
For Up To 20, Add	3.95	
For >20 To 50, Add	2.14	
For >50 To 100, Add	1.07	
For >100 To 300, Add	0.54	
09 64 29 00-0011 Unfinished Red Oak, Wood Strip Flooring (09 64 29 00-0003)		
09 64 29 00-0012 SF 2-1/4" Plank Width, 3/4" Thick, Plain Sawn, #2 Common Unfinished Red Oak, Wood Strip Flooring.....	11.52	1.09
For Factory Finish, Add	0.51	
For Random Width Floor, Add	2.56	
For Up To 20, Add	4.60	
For >20 To 50, Add	2.43	
For >50 To 100, Add	1.21	
For >100 To 300, Add	0.61	
09 64 29 00-0013 SF 2-1/4" Plank Width, 3/4" Thick, Plain Sawn, #1 Common Unfinished Red Oak, Wood Strip Flooring.....	12.17	1.09
For Factory Finish, Add	0.58	
For Random Width Floor, Add	2.72	
For Up To 20, Add	4.70	
For >20 To 50, Add	2.49	
For >50 To 100, Add	1.25	
For >100 To 300, Add	0.62	
09 64 29 00-0014 SF 2-1/4" Plank Width, 3/4" Thick, Plain Sawn, Select Unfinished Red Oak, Wood Strip Flooring.....	13.16	1.09
For Factory Finish, Add	0.68	
For Random Width Floor, Add	2.97	
For Up To 20, Add	4.85	
For >20 To 50, Add	2.59	
For >50 To 100, Add	1.30	
For >100 To 300, Add	0.65	
09 64 29 00-0015 SF 3-1/4" Plank Width, 3/4" Thick, Plain Sawn, #2 Common Unfinished Red Oak, Wood Strip Flooring.....	10.24	1.09
For Factory Finish, Add	0.54	
For Random Width Floor, Add	2.32	
For Up To 20, Add	3.73	
For >20 To 50, Add	2.00	
For >50 To 100, Add	1.00	
For >100 To 300, Add	0.50	
09 64 29 00-0016 SF 3-1/4" Plank Width, 3/4" Thick, Plain Sawn, #1 Common Unfinished Red Oak, Wood Strip Flooring.....	10.89	1.09
For Factory Finish, Add	0.60	
For Random Width Floor, Add	2.48	
For Up To 20, Add	3.83	
For >20 To 50, Add	2.07	
For >50 To 100, Add	1.03	
For >100 To 300, Add	0.52	
09 64 29 00-0017 SF 3-1/4" Plank Width, 3/4" Thick, Plain Sawn, Select Unfinished Red Oak, Wood Strip Flooring.....	11.77	1.09
For Factory Finish, Add	0.69	
For Random Width Floor, Add	2.70	
For Up To 20, Add	3.96	
For >20 To 50, Add	2.15	
For >50 To 100, Add	1.08	
For >100 To 300, Add	0.54	
09 64 29 00-0018 Unfinished Maple, Wood Strip Flooring (09 64 29)		
09 64 29 00-0019 25/32" Thick, Unfinished Maple, Wood Strip Flooring (09 64 29 00-0018)		
09 64 29 00-0020 SF 2-1/4" Plank Width, 25/32" Thick, Plain Sawn, First Grade (Select Or Better) Unfinished Maple, Wood Strip Flooring.....	13.92	1.09
For Factory Finish, Add	0.75	
For Random Width Floor, Add	3.16	
For Up To 20, Add	4.96	
For >20 To 50, Add	2.67	
For >50 To 100, Add	1.33	
For >100 To 300, Add	0.67	

09	09	Finishes
	09 60	Flooring
	09 64	Wood Flooring



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
09 64 29 00-0021	SF	2-1/4" Plank Width, 25/32" Thick, Plain Sawn, Second Grade (#1 Common) Unfinished Maple, Wood Strip Flooring.....	12.83	1.09
		<i>For Factory Finish, Add</i>	0.65	
		<i>For Random Width Floor, Add</i>	2.89	
		<i>For Up To 20, Add</i>	4.80	
		<i>For >20 To 50, Add</i>	2.56	
		<i>For >50 To 100, Add</i>	1.28	
		<i>For >100 To 300, Add</i>	0.64	
09 64 29 00-0022	SF	3" Plank Width, 25/32" Thick, Plain Sawn, First Grade (Select Or Better) Unfinished Maple, Wood Strip Flooring.....	12.86	1.09
		<i>For Factory Finish, Add</i>	0.80	
		<i>For Random Width Floor, Add</i>	2.97	
		<i>For Up To 20, Add</i>	4.13	
		<i>For >20 To 50, Add</i>	2.26	
		<i>For >50 To 100, Add</i>	1.13	
		<i>For >100 To 300, Add</i>	0.57	
09 64 29 00-0023	SF	3" Plank Width, 25/32" Thick, Plain Sawn, Second Grade (#1 Common) Unfinished Maple, Wood Strip Flooring.....	11.77	1.09
		<i>For Factory Finish, Add</i>	0.69	
		<i>For Random Width Floor, Add</i>	2.70	
		<i>For Up To 20, Add</i>	3.96	
		<i>For >20 To 50, Add</i>	2.15	
		<i>For >50 To 100, Add</i>	1.08	
		<i>For >100 To 300, Add</i>	0.54	
09 64 29 00-0024		33/32" Thick, Unfinished Maple, Wood Strip Flooring <small>(09 64 29 00-0018)</small>		
09 64 29 00-0025	SF	2-1/4" Plank Width, 33/32" Thick, Plain Sawn, First Grade (Select Or Better) Unfinished Maple, Wood Strip Flooring.....	16.28	1.09
		<i>For Factory Finish, Add</i>	0.99	
		<i>For Random Width Floor, Add</i>	3.75	
		<i>For Up To 20, Add</i>	5.31	
		<i>For >20 To 50, Add</i>	2.90	
		<i>For >50 To 100, Add</i>	1.45	
		<i>For >100 To 300, Add</i>	0.73	
09 64 29 00-0026	SF	2-1/4" Plank Width, 33/32" Thick, Plain Sawn, Second Grade (#1 Common) Unfinished Maple, Wood Strip Flooring.....	14.82	1.09
		<i>For Factory Finish, Add</i>	0.84	
		<i>For Random Width Floor, Add</i>	3.39	
		<i>For Up To 20, Add</i>	5.09	
		<i>For >20 To 50, Add</i>	2.76	
		<i>For >50 To 100, Add</i>	1.38	
		<i>For >100 To 300, Add</i>	0.69	
09 64 29 00-0027	SF	3" Plank Width, 33/32" Thick, Plain Sawn, First Grade (Select Or Better) Unfinished Maple, Wood Strip Flooring.....	15.37	1.09
		<i>For Factory Finish, Add</i>	1.05	
		<i>For Random Width Floor, Add</i>	3.60	
		<i>For Up To 20, Add</i>	4.50	
		<i>For >20 To 50, Add</i>	2.51	
		<i>For >50 To 100, Add</i>	1.26	
		<i>For >100 To 300, Add</i>	0.63	
09 64 29 00-0028	SF	3" Plank Width, 33/32" Thick, Plain Sawn, Second Grade (#1 Common) Unfinished Maple, Wood Strip Flooring.....	13.91	1.09
		<i>For Factory Finish, Add</i>	0.90	
		<i>For Random Width Floor, Add</i>	3.23	
		<i>For Up To 20, Add</i>	4.28	
		<i>For >20 To 50, Add</i>	2.37	
		<i>For >50 To 100, Add</i>	1.18	
		<i>For >100 To 300, Add</i>	0.59	
09 64 29 00-0029		Vented Cove Base <small>(09 64 29)</small>		
09 64 29 00-0030	LF	Vented Cove Base.....	15.65	
09 64 29 00-0031		Prefinished Engineered Wood Flooring <small>(09 64 29)</small>		
		Note: Glued or nailed. Excludes underlayment. See CSI section 09 64 13 00-0001 for wood flooring underlayment.		
09 64 29 00-0032	SF	1/2" Thick, Red Oak, Prefinished Engineered Wood Flooring.....	16.95	1.09
		<i>For Up To 20, Add</i>	4.46	
		<i>For >20 To 50, Add</i>	2.55	
		<i>For >50 To 100, Add</i>	1.27	
		<i>For >100 To 300, Add</i>	0.64	
09 64 29 00-0033	SF	1/2" Thick, White Oak, Prefinished Engineered Wood Flooring.....	16.95	1.09
		<i>For Up To 20, Add</i>	4.46	
		<i>For >20 To 50, Add</i>	2.55	
		<i>For >50 To 100, Add</i>	1.27	
		<i>For >100 To 300, Add</i>	0.64	
09 64 29 00-0034	SF	1/2" Thick, Select Maple, Prefinished Engineered Wood Flooring.....	16.39	1.09
		<i>For Up To 20, Add</i>	4.37	
		<i>For >20 To 50, Add</i>	2.49	
		<i>For >50 To 100, Add</i>	1.24	
		<i>For >100 To 300, Add</i>	0.62	
09 64 29 00-0035	SF	1/2" Thick, Natural Hickory, Prefinished Engineered Wood Flooring.....	16.81	1.09
		<i>For Up To 20, Add</i>	4.43	
		<i>For >20 To 50, Add</i>	2.53	
		<i>For >50 To 100, Add</i>	1.27	
		<i>For >100 To 300, Add</i>	0.63	



Finishes	09	09
Flooring	09 60	
Wood Flooring	09 64	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

09 64 66 Wood Athletic Flooring (09 64)
 Note: 1-1/2" or 2-1/4" widths. Excludes finish.

09 64 66 00-0001	Wood Gym/Stage/Dance Floors Applied On Existing Subfloor (09 64 66) Note: Includes sanding. Excludes concrete repairs to subbase, subflooring, thresholds, and finishing.		
09 64 66 00-0002	SF 25/32" Maple Wood Gym/Stage/Dance Floor For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	16.05 -0.20 -0.30 0.50	5.43
09 64 66 00-0003	SF 33/32" Maple Wood Gym/Stage/Dance Floor For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	19.41 -0.20 -0.30 0.50	5.64
09 64 66 00-0004	Wood Gym/Stage/Dance Floor Systems (09 64 66) Note: Includes sanding. Excludes concrete repairs to subbase, thresholds, and finishing.		
09 64 66 00-0005	SF Floating 25/32" Maple Wood Gym/Stage/Dance Floor System, Two Layers Of Plywood Panel Subfloor With Resilient Pads (Connor DuraCushion)..... Note: Includes 6 mil polyethylene vapor barrier, two layers of 15/32" plywood subfloor and 3/8" resilient pads. For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	21.51 -0.20 -0.30 0.50	7.05
09 64 66 00-0006	SF Floating 25/32" Maple Wood Gym/Stage/Dance Floor System, Two Layers Of Plywood Panel Subfloor With Two Stage Resilient Pads (Connor NeoShok) Note: Includes 6 mil polyethylene vapor barrier, two layers of 15/32" plywood subfloor and 3/4" hemispherical two stage polyurethane resilient pads. For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	22.86 -0.20 -0.30 0.50	7.05
09 64 66 00-0007	SF Floating 25/32" Maple Wood Gym/Stage/Dance Floor System, One Layer Of Plywood Subfloor With Continuous Steel Channel Encased Sleepers And Resilient Pads (Connor PermaFlex) Note: Includes 6 mil polyethylene vapor barrier, one layer of 15/32" plywood subfloor, a continuous steel channel encasing a 23/32" fixed sleeper, a 7/16" resilient pad and a 23/32" flex sleeper. For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	25.84 -0.20 -0.30 0.50	7.05
09 64 66 00-0008	SF Fixed Resilient 25/32" Maple Wood Gym/Stage/Dance Floor System, One Layer Of Plywood Panel Subfloor With Resilient Pads (Connor Focus)..... Note: Includes 6 mil polyethylene vapor barrier, one layer of 3/4" subfloor, 9/16" resilient pads and concrete anchors and clips. For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	24.49 -0.20 -0.30 0.50	7.05
09 64 66 00-0009	SF Clip And Channel, Fixed 33/32" Maple Wood Gym/Stage/Dance Floor System (Connor PermaLock) Note: Includes 6 mil polyethylene vapor barrier, one layer of 1/2" impregnated fiberboard with channel grooves for 16 gauge steel anchor channel. For Oak Or Birch, Deduct For Pine, Deduct For #1 Grade Material, Add	27.45 -0.20 -0.30 0.50	7.05

09 65 Resilient Flooring (09 60)

See CSI section 03 54 16 00-0001 for self leveling underlayment for uneven floors.

09 65 13 Resilient Base and Accessories (09 65)

09 65 13 13 Resilient Base (09 65 13)

09 65 13 13-0001	Type TV Thermoplastic Vinyl Wall Base (09 65 13 13) Note: Includes inside and outside corners.		
09 65 13 13-0002	LF 2-1/2" High, 1/8" Thick, Type TV Thermoplastic Vinyl Wall Base, All Colors For Up To 20, Add For >20 To 40, Add For >40 To 80, Add For >240 To 960, Deduct For >960, Deduct	4.04 1.49 0.85 0.31 -0.29 -0.44	1.11
09 65 13 13-0003	LF 4" High, 1/8" Thick, Type TV Thermoplastic Vinyl Wall Base, All Colors For Up To 20, Add For >20 To 40, Add For >40 To 80, Add For >240 To 960, Deduct For >960, Deduct	4.73 1.59 0.92 0.35 -0.36 -0.54	1.11
09 65 13 13-0004	LF 6" High, 1/8" Thick, Type TV Thermoplastic Vinyl Wall Base, All Colors For Up To 20, Add For >20 To 40, Add For >40 To 80, Add For >240 To 960, Deduct For >960, Deduct	6.21 1.82 1.06 0.42 -0.51 -0.77	1.11

09 65 13 13-0005 **Type TP Thermoplastic Rubber Wall Base** (09 65 13 13)
 Note: Includes inside and outside corners.

09 Finishes

09 60 Flooring

09 65 Resilient Flooring



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 65 13 13-0006	LF 2-1/2" High, 1/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	4.48	1.11
	<i>For Up To 20, Add</i>	1.56	
	<i>For >20 To 40, Add</i>	0.89	
	<i>For >40 To 80, Add</i>	0.33	
	<i>For >240 To 960, Deduct</i>	-0.34	
	<i>For >960, Deduct</i>	-0.51	
09 65 13 13-0007	LF 4" High, 1/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	5.00	1.11
	<i>For Up To 20, Add</i>	1.63	
	<i>For >20 To 40, Add</i>	0.94	
	<i>For >40 To 80, Add</i>	0.36	
	<i>For >240 To 960, Deduct</i>	-0.39	
	<i>For >960, Deduct</i>	-0.58	
09 65 13 13-0008	LF 6" High, 1/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	6.44	1.11
	<i>For Up To 20, Add</i>	1.85	
	<i>For >20 To 40, Add</i>	1.09	
	<i>For >40 To 80, Add</i>	0.43	
	<i>For >240 To 960, Deduct</i>	-0.53	
	<i>For >960, Deduct</i>	-0.80	
09 65 13 13-0009	LF 2-1/2" High, 3/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	8.46	1.11
	<i>For Up To 20, Add</i>	2.15	
	<i>For >20 To 40, Add</i>	1.29	
	<i>For >40 To 80, Add</i>	0.53	
	<i>For >240 To 960, Deduct</i>	-0.74	
	<i>For >960, Deduct</i>	-1.10	
09 65 13 13-0010	LF 3" High, 3/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	8.90	1.11
	<i>For Up To 20, Add</i>	2.22	
	<i>For >20 To 40, Add</i>	1.33	
	<i>For >40 To 80, Add</i>	0.56	
	<i>For >240 To 960, Deduct</i>	-0.78	
	<i>For >960, Deduct</i>	-1.17	
09 65 13 13-0011	LF 4-1/2" High, 3/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	11.16	1.11
	<i>For Up To 20, Add</i>	2.56	
	<i>For >20 To 40, Add</i>	1.56	
	<i>For >40 To 80, Add</i>	0.67	
	<i>For >240 To 960, Deduct</i>	-1.01	
	<i>For >960, Deduct</i>	-1.51	
09 65 13 13-0012	LF 6" High, 3/8" Thick, Type TP Thermoplastic Rubber Wall Base, All Colors	15.65	1.11
	<i>For Up To 20, Add</i>	3.23	
	<i>For >20 To 40, Add</i>	2.01	
	<i>For >40 To 80, Add</i>	0.89	
	<i>For >240 To 960, Deduct</i>	-1.45	
	<i>For >960, Deduct</i>	-2.18	
09 65 13 13-0013	Type TS Thermoset Vulcanized Rubber Wall Base <small>(09 65 13 13)</small>		
	Note: Includes inside and outside corners.		
09 65 13 13-0014	LF 2-1/2" High, 1/8" Thick, Type TS Thermoset Vulcanized Rubber Wall Base, All Colors	5.05	1.33
	<i>For Up To 20, Add</i>	1.64	
	<i>For >20 To 40, Add</i>	0.95	
	<i>For >40 To 80, Add</i>	0.36	
	<i>For >240 To 960, Deduct</i>	-0.39	
	<i>For >960, Deduct</i>	-0.59	
09 65 13 13-0015	LF 4" High, 1/8" Thick, Type TS Thermoset Vulcanized Rubber Wall Base, All Colors	5.08	1.11
	<i>For Up To 20, Add</i>	1.65	
	<i>For >20 To 40, Add</i>	0.95	
	<i>For >40 To 80, Add</i>	0.36	
	<i>For >240 To 960, Deduct</i>	-0.40	
	<i>For >960, Deduct</i>	-0.60	
09 65 13 13-0016	LF 6" High, 1/8" Thick, Type TS Thermoset Vulcanized Rubber Wall Base, All Colors	7.61	1.33
	<i>For Up To 20, Add</i>	2.21	
	<i>For >20 To 40, Add</i>	1.29	
	<i>For >40 To 80, Add</i>	0.51	
	<i>For >240 To 960, Deduct</i>	-0.63	
	<i>For >960, Deduct</i>	-0.94	
09 65 13 13-0017	Thermoset Rubber Wall Base (Type TS) <small>(09 65 13 13)</small>		
	Note: Includes inside and outside premolded corners.		
09 65 13 13-0018	LF 4" High, 1/8" Thermoset Rubber Base, Group I (Solid Colors)	4.30	1.11
09 65 13 13-0019	LF 6" High, 1/8" Thermoset Rubber Base, Group I (Solid Colors)	5.83	1.33
09 65 13 13-0020	Thermoplastic Rubber Wall Base (Type TP) <small>(09 65 13 13)</small>		
	Note: Includes inside and outside premolded corners.		
09 65 13 13-0021	LF 4" High, 1/8" Thermoplastic Rubber Base, Group I (Solid Colors)	4.10	1.11
09 65 13 13-0022	Thermoplastic Vinyl Wall Base (Type TV) <small>(09 65 13 13)</small>		
	Note: Includes inside and outside premolded corners.		
09 65 13 13-0023	LF 4" High, 0.080" Thermoplastic Rubber Base, Group I (Solid Colors)	3.23	1.11
09 65 13 13-0024	LF 4" High, 1/8" Thermoplastic Rubber Base, Group I (Solid Colors)	3.39	1.11



Finishes	09	09
Flooring	09 60	
Resilient Flooring	09 65	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 65 13 23 Resilient Stair Treads and Risers (09 65 13) Note: All treads have integral nosing. Abrasive strip modifier includes either 1 or 2 strips running the length of the tread. All colors.		
09 65 13 23-0001 Rubber Stair Treads and Risers (09 65 13 23)		
09 65 13 23-0002 Raised Disc Or Other Patterned Rubber Stair Tread (09 65 13 23-0001)		
09 65 13 23-0003 LF 3/16" Thick, 9" To 12-1/2" Deep, Rubber Stair Tread..... Note: Raised disc or other pattern.	14.07	1.77
For Abrasive Strip, Add	2.75	
For Photo Luminescent Abrasive Strip, Add	3.75	
09 65 13 23-0004 LF 1/4" Thick, 9" To 12-1/2" Deep, Rubber Stair Tread..... Note: Raised disc or other pattern.	15.10	1.90
For Abrasive Strip, Add	2.75	
For Photo Luminescent Abrasive Strip, Add	3.75	
09 65 13 23-0005 LF 5/16" Thick, 9" To 12-1/2" Deep, Rubber Stair Tread..... Note: Raised disc or other pattern.	18.25	2.03
For Abrasive Strip, Add	2.75	
For Photo Luminescent Abrasive Strip, Add	3.75	
09 65 13 23-0006 Smooth Surface Rubber Stair Tread (09 65 13 23-0001)		
09 65 13 23-0007 LF 3/16" Thick, 9" To 12-1/2" Deep, Rubber Stair Tread..... Note: Smooth surface.	13.29	1.77
For Abrasive Strip, Add	2.75	
For Photo Luminescent Abrasive Strip, Add	3.75	
09 65 13 23-0008 LF 1/4" Thick, 9" To 12-1/2" Deep, Rubber Stair Tread..... Note: Smooth surface.	13.93	1.90
For Abrasive Strip, Add	2.75	
For Photo Luminescent Abrasive Strip, Add	3.75	
09 65 13 23-0009 LF 5/16" Thick, 9" To 12-1/2" Deep, Rubber Stair Tread..... Note: Smooth surface.	17.09	2.04
For Abrasive Strip, Add	2.75	
For Photo Luminescent Abrasive Strip, Add	3.75	
09 65 13 23-0010 Smooth Surface Rubber Stair Riser (09 65 13 23-0001)		
09 65 13 23-0011 LF 1/8" Thick, Smooth Surface Rubber Stair Riser.....	7.75	1.07
09 65 13 23-0012 Smooth, Raised Disc or Other Patterned Rubber Landing Mats (09 65 13 23-0001)		
09 65 13 23-0013 SF 1/8" Thick, Rubber Landing Mats..... Note: Smooth, raised disc or other patterned surface.	26.01	1.64
09 65 13 23-0014 SF 3/16" Thick, Rubber Landing Mats..... Note: Smooth, raised disc or other patterned surface.	31.23	1.77
09 65 13 23-0015 SF 7/32" Thick, Rubber Landing Mats..... Note: Smooth, raised disc or other patterned surface.	33.85	1.99
09 65 13 23-0016 Vinyl Stair Treads and Risers (09 65 13 23)		
09 65 13 23-0017 Ribbed Vinyl Stair Tread (09 65 13 23-0016)		
09 65 13 23-0018 LF 1/8" Thick, 9" To 12-1/2" Deep, Ribbed Vinyl Stair Tread..... For Abrasive Strip, Add	17.37	1.61
09 65 13 23-0019 LF 3/16" Thick, 9" To 12-1/2" Deep, Ribbed Vinyl Stair Tread..... For Abrasive Strip, Add	19.21	1.77
09 65 13 23-0020 LF 1/4" Thick, 9" To 12-1/2" Deep, Ribbed Vinyl Stair Tread..... For Abrasive Strip, Add	23.26	1.91
09 65 13 23-0021 Smooth Surface Vinyl Stair Riser (09 65 13 23-0016)		
09 65 13 23-0022 LF 1/8" Thick, 7" High, Smooth Surface Vinyl Stair Riser.....	9.54	1.07
09 65 13 33 Resilient Accessories (09 65 13)		
09 65 13 33-0001 Flexible Self Leveling Cementitious Underlayments (09 65 13 33)		
09 65 13 33-0002 SF 1/8" Thick, Flexible Self Leveling Cementitious Underlayment With Liquid Latex Modifiers.....	1.70	0.89
09 65 13 33-0003 SF 1/4" Thick, Flexible Self Leveling Cementitious Underlayment With Liquid Latex Modifiers.....	2.66	0.89
09 65 13 33-0004 Concrete Floor Prep (09 65 13 33)		
09 65 13 33-0005 SF Removal Of Glue From Concrete Floor..... Note: For removal of glue from VCT or carpet placement. Not to be used in conjunction with demolition tasks associated with floor tile installation.	1.11	
09 65 13 36 Resilient Carpet Transitions (09 65 13)		
09 65 13 36-0001 Vinyl Transition Strip (09 65 13 36)		
09 65 13 36-0002 LF Vinyl Transition Strip, Brown Or Black..... For >240 To 960, Deduct For >960, Deduct	2.35 -0.18 -0.27	0.80

09 Finishes

09 60 Flooring

09 65 Resilient Flooring



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 65 13 36-0003	LF Vinyl Floor Tile Reducer Strip, Brown Or Black	2.08	0.80
	<i>For >240 To 960, Deduct</i>	-0.15	
	<i>For >960, Deduct</i>	-0.23	
09 65 13 36-0004	LF Vinyl Floor Tile Feature Strip, Brown Or Black	1.77	0.80
	<i>For >240 To 960, Deduct</i>	-0.12	
	<i>For >960, Deduct</i>	-0.18	
09 65 13 36-0005	LF 1/4" To 1/8" Material, Narrow, Vinyl, Slim Line Transition (Johnsonite SLT-XX-A)	2.99	1.11
	<i>For Up To 20, Add</i>	1.16	
	<i>For >20 To 40, Add</i>	0.65	
	<i>For >40 To 80, Add</i>	0.24	
	<i>For >240 To 960, Deduct</i>	-0.21	
	<i>For >960, Deduct</i>	-0.32	
09 65 13 36-0006 Vinyl, Wheeled Traffic Transitions <small>(09 65 13 36)</small>			
09 65 13 36-0007	LF 1/4" To 1/8" Material x 1-3/4", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-A)	3.77	1.11
	<i>For Up To 20, Add</i>	1.27	
	<i>For >20 To 40, Add</i>	0.73	
	<i>For >40 To 80, Add</i>	0.28	
	<i>For >240 To 960, Deduct</i>	-0.29	
	<i>For >960, Deduct</i>	-0.43	
09 65 13 36-0008	LF 1/4" To 1/8" Material x 1", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-C)	3.77	1.11
	<i>For Up To 20, Add</i>	1.27	
	<i>For >20 To 40, Add</i>	0.73	
	<i>For >40 To 80, Add</i>	0.28	
	<i>For >240 To 960, Deduct</i>	-0.29	
	<i>For >960, Deduct</i>	-0.43	
09 65 13 36-0009	LF 5/16" To 1/16" Or 1/8" Material x 1-5/8", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-D)	4.66	1.11
	<i>For Up To 20, Add</i>	1.41	
	<i>For >20 To 40, Add</i>	0.82	
	<i>For >40 To 80, Add</i>	0.32	
	<i>For >240 To 960, Deduct</i>	-0.38	
	<i>For >960, Deduct</i>	-0.57	
09 65 13 36-0010	LF 1/4" To 1/8" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-H)	7.82	1.11
	<i>For Up To 20, Add</i>	1.88	
	<i>For >20 To 40, Add</i>	1.14	
	<i>For >40 To 80, Add</i>	0.48	
	<i>For >240 To 960, Deduct</i>	-0.69	
	<i>For >960, Deduct</i>	-1.04	
09 65 13 36-0011	LF 1/4" To 1/8" Material x 4", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-HL)	7.84	1.11
	<i>For Up To 20, Add</i>	1.88	
	<i>For >20 To 40, Add</i>	1.14	
	<i>For >40 To 80, Add</i>	0.48	
	<i>For >240 To 960, Deduct</i>	-0.70	
	<i>For >960, Deduct</i>	-1.04	
09 65 13 36-0012	LF 1/4" To 0.08" Or 2 mm Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-HT)	5.13	1.11
	<i>For Up To 20, Add</i>	1.48	
	<i>For >20 To 40, Add</i>	0.87	
	<i>For >40 To 80, Add</i>	0.35	
	<i>For >240 To 960, Deduct</i>	-0.42	
	<i>For >960, Deduct</i>	-0.64	
09 65 13 36-0013	LF 1/4" Material To Floor x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-J)	7.61	1.11
	<i>For Up To 20, Add</i>	1.85	
	<i>For >20 To 40, Add</i>	1.12	
	<i>For >40 To 80, Add</i>	0.47	
	<i>For >240 To 960, Deduct</i>	-0.67	
	<i>For >960, Deduct</i>	-1.01	
09 65 13 36-0014	LF 1/4" Material To Floor x 4", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-JL)	7.90	1.11
	<i>For Up To 20, Add</i>	1.89	
	<i>For >20 To 40, Add</i>	1.14	
	<i>For >40 To 80, Add</i>	0.48	
	<i>For >240 To 960, Deduct</i>	-0.70	
	<i>For >960, Deduct</i>	-1.05	
09 65 13 36-0015	LF 3/8" To 1/8" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-K)	6.62	1.11
	<i>For Up To 20, Add</i>	1.70	
	<i>For >20 To 40, Add</i>	1.02	
	<i>For >40 To 80, Add</i>	0.42	
	<i>For >240 To 960, Deduct</i>	-0.57	
	<i>For >960, Deduct</i>	-0.86	
09 65 13 36-0016	LF 3/8" To 1/4" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-L)	7.25	1.11
	<i>For Up To 20, Add</i>	1.80	
	<i>For >20 To 40, Add</i>	1.08	
	<i>For >40 To 80, Add</i>	0.45	
	<i>For >240 To 960, Deduct</i>	-0.64	
	<i>For >960, Deduct</i>	-0.95	
09 65 13 36-0017	LF 1/4" To 1/4" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-M)	7.90	1.11
	<i>For Up To 20, Add</i>	1.89	
	<i>For >20 To 40, Add</i>	1.14	
	<i>For >40 To 80, Add</i>	0.48	
	<i>For >240 To 960, Deduct</i>	-0.70	
	<i>For >960, Deduct</i>	-1.05	



Finishes	09	09
Flooring	09 60	
Resilient Flooring	09 65	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 65 13 36-0018 LF 1/8" To 1/8" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-N)	6.50	1.11
For Up To 20, Add	1.68	
For >20 To 40, Add	1.00	
For >40 To 80, Add	0.41	
For >240 To 960, Deduct	-0.56	
For >960, Deduct	-0.84	
09 65 13 36-0019 LF 3/8" Material To Floor x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-P)	5.47	1.11
For Up To 20, Add	1.53	
For >20 To 40, Add	0.90	
For >40 To 80, Add	0.36	
For >240 To 960, Deduct	-0.46	
For >960, Deduct	-0.69	
09 65 13 36-0020 LF 3/8" Material To Floor x 4", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-PL).....	8.12	1.11
For Up To 20, Add	1.93	
For >20 To 40, Add	1.17	
For >40 To 80, Add	0.49	
For >240 To 960, Deduct	-0.72	
For >960, Deduct	-1.09	
09 65 13 36-0021 LF 1/2" Material To Floor x 4", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-Q)	10.51	1.11
For Up To 20, Add	2.28	
For >20 To 40, Add	1.41	
For >40 To 80, Add	0.61	
For >240 To 960, Deduct	-0.96	
For >960, Deduct	-1.44	
09 65 13 36-0022 LF 0.08" To 1/8" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-X)	5.31	1.11
For Up To 20, Add	1.50	
For >20 To 40, Add	0.89	
For >40 To 80, Add	0.35	
For >240 To 960, Deduct	-0.44	
For >960, Deduct	-0.66	
09 65 13 36-0023 LF 0.08" To 0.08" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-Y)	5.39	1.11
For Up To 20, Add	1.52	
For >20 To 40, Add	0.89	
For >40 To 80, Add	0.36	
For >240 To 960, Deduct	-0.45	
For >960, Deduct	-0.68	
09 65 13 36-0024 LF 0.08" To 3/8" Material x 2-1/2", Vinyl, Wheeled Traffic Transition (Johnsonite CTA-XX-Z).....	6.14	1.11
For Up To 20, Add	1.63	
For >20 To 40, Add	0.97	
For >40 To 80, Add	0.40	
For >240 To 960, Deduct	-0.53	
For >960, Deduct	-0.79	

09 65 16 Resilient Sheet Flooring (09 65)
 Note: Includes mastic and cleaning floor after installation is complete.

09 65 16 23 Vinyl Sheet Flooring (09 65 16)

09 65 16 23-0001 Vinyl Sheet Flooring (09 65 16 23)

Note: For flash cove application, add additional square foot of material to form cove base.

09 65 16 23-0002 SF 0.080" Overall Thickness, 0.080" Wear Layer, Homogeneous, Commercial Vinyl Sheet Flooring	11.05	0.66
For >40 To 100, Add	1.98	
For >1,000, Deduct	-0.97	
For Up To 40, Add	3.97	
09 65 16 23-0003 SF 0.080" Overall Thickness, 0.060" Wear Layer, Homogeneous, Commercial Vinyl Sheet Flooring	8.97	0.66
For >40 To 100, Add	1.77	
For >1,000, Deduct	-0.76	
For Up To 40, Add	3.55	
09 65 16 23-0004 SF 0.080" Overall Thickness, 0.050" Wear Layer, Inlaid With Polyglass Backing, Commercial Vinyl Sheet Flooring.....	5.74	0.66
For >40 To 100, Add	1.45	
For >1,000, Deduct	-0.44	
For Up To 40, Add	2.90	
09 65 16 23-0005 SF 0.080" Overall Thickness, 0.040" Wear Layer, Inlaid With Polyglass Backing, Commercial Vinyl Sheet Flooring.....	7.55	0.66
For >40 To 100, Add	1.63	
For >1,000, Deduct	-0.62	
For Up To 40, Add	3.27	
09 65 16 23-0006 SF 0.080" Overall Thickness, 0.060" Wear Layer, Inlaid With Felt Backing, Commercial Vinyl Sheet Flooring	10.21	0.66
For >40 To 100, Add	1.90	
For >1,000, Deduct	-0.89	
For Up To 40, Add	3.80	
09 65 16 23-0007 SF 0.080" Overall Thickness, 0.020" Wear Layer, Slip Retardant Surface, Commercial Vinyl Sheet Flooring	14.23	0.66
For >40 To 100, Add	2.30	
For >1,000, Deduct	-1.29	
For Up To 40, Add	4.60	

09 65 16 23-0008 Heat Welding Vinyl Sheet Flooring Seams (09 65 16 23)

Note: For areas requiring seamless installations and superior infection control. Includes routing or hand grooving seams, installing welding rod with heat welding gun, trimming the weld rod flush with the floor surface and applying a protective finish to seam.

09 65 16 23-0009 LF Heat Weld Non-Patterned Vinyl Sheet Flooring Seams.....	6.32
09 65 16 23-0010 LF Heat Weld Patterned Vinyl Sheet Flooring Seams	6.76

09 Finishes**09 60 Flooring****09 65 Resilient Flooring**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 65 16 23-0011	Forming Vinyl Sheet Flooring Inside/Outside Cove Corners (09 65 16 23) Note: Excludes heat welding.		
09 65 16 23-0012	EA Forming Vinyl Sheet Flooring Inside/Outside Cove Corners.....	14.76	
09 65 16 23-0013	Vinyl Sheet Flooring Accessories (09 65 16 23)		
09 65 16 23-0014	LF 1/2" Radius Vinyl Cove Filler Strip	4.16	
09 65 16 23-0015	LF 1-1/4" Radius Vinyl Cove Filler Strip.....	3.70	
09 65 16 23-0016	LF 1-1/2" Radius Vinyl Cove Filler Strip.....	5.78	
09 65 16 23-0017	LF 1/8" Aluminum Cove Cap.....	2.80	
09 65 19	Resilient Tile Flooring (09 65)		
	Note: Includes mastic and cleaning floor after installation is complete. Demolition includes removal of the tile and adhesive and cleaning of the surface for a new floor.		
09 65 19 19	Vinyl Composition Tile Flooring (09 65 19)		
09 65 19 19-0001	Vinyl Composition Tile (VCT) (09 65 19 19) Note: The following vinyl composition tiles are certified to ASTM F 1066 Class 1 solid color tile, Class 2 through pattern tile or Class 3 surface pattern tile as listed in the task description.		
09 65 19 19-0002	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Standard Excelon Imperial Texture®).....	3.79	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For 3/32" Thick, Deduct</i>	-0.22	
	<i>For >1,000 To 3,000, Deduct</i>	-0.08	
	<i>For >3,000 To 6,000, Deduct</i>	-0.21	
	<i>For >6,000, Deduct</i>	-0.38	
09 65 19 19-0003	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Standard Excelon MultiColor™).....	3.65	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.08	
	<i>For >3,000 To 6,000, Deduct</i>	-0.20	
	<i>For >6,000, Deduct</i>	-0.37	
09 65 19 19-0004	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Standard Excelon Rave®).....	3.65	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.08	
	<i>For >3,000 To 6,000, Deduct</i>	-0.20	
	<i>For >6,000, Deduct</i>	-0.37	
09 65 19 19-0005	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® ChromaSpin™)	5.57	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.12	
	<i>For >3,000 To 6,000, Deduct</i>	-0.28	
	<i>For >6,000, Deduct</i>	-0.48	
09 65 19 19-0006	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Excelon Companion Square®).....	5.59	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.12	
	<i>For >3,000 To 6,000, Deduct</i>	-0.28	
	<i>For >6,000, Deduct</i>	-0.48	
09 65 19 19-0007	SF 1/8" Thick, Class 3 Surface Pattern, Vinyl Composition Tile (VCT) (Armstrong® Arteffects®).....	5.96	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.13	
	<i>For >3,000 To 6,000, Deduct</i>	-0.30	
	<i>For >6,000, Deduct</i>	-0.51	
09 65 19 19-0008	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Excelon Stonetex®)	6.02	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.13	
	<i>For >3,000 To 6,000, Deduct</i>	-0.30	
	<i>For >6,000, Deduct</i>	-0.51	
09 65 19 19-0009	SF 1/8" Thick, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Raffia™).....	6.25	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.13	
	<i>For >3,000 To 6,000, Deduct</i>	-0.31	
	<i>For >6,000, Deduct</i>	-0.52	
09 65 19 19-0010	SF 1/8" Thick, Slip Retardant, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® Safety Zone™)	8.35	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.18	
	<i>For >3,000 To 6,000, Deduct</i>	-0.39	
	<i>For >6,000, Deduct</i>	-0.65	
09 65 19 19-0011	SF 1/8" Thick, Class 1 Solid Color, Vinyl Composition Tile (VCT) (Armstrong® Excelon Feature™).....	9.17	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-1.56	
	<i>For >1,000 To 3,000, Deduct</i>	-0.19	
	<i>For >3,000 To 6,000, Deduct</i>	-0.42	
	<i>For >6,000, Deduct</i>	-0.70	
09 65 19 19-0012	Static Dissipative Vinyl Composition Tile (VCT) (09 65 19 19) Note: The following vinyl composition tiles are certified to ASTM F 1066 Class 2 through pattern tile as listed in the task description.		
09 65 19 19-0013	SF 1/8" Thick, Static Dissipative, Class 2 Through Pattern, Vinyl Composition Tile (VCT) (Armstrong® SDT™).....	18.25	1.33
	<i>For Extra Stock, Material Only, Deduct</i>	-2.63	
	<i>For >1,000 To 3,000, Deduct</i>	-0.38	
	<i>For >3,000 To 6,000, Deduct</i>	-0.83	
	<i>For >6,000, Deduct</i>	-1.34	



Finishes	09	09
Flooring	09 60	
Resilient Flooring	09 65	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 65 19 19-0014 SF 1/8" Thick, Static Dissipative, Solid Vinyl Composition Tile (VCT) (Staticworx, Ameriworx® ESD)	13.81	1.33
For Extra Stock, Material Only, Deduct	-2.63	
For Up To 20, Add	3.18	
For >20 To 40, Add	1.94	
For >40 To 80, Add	0.83	
For >1,000 To 3,000, Deduct	-0.29	
For >3,000 To 6,000, Deduct	-0.65	
For >6,000, Deduct	-1.08	
09 65 19 23 Vinyl Tile Flooring (09 65 19)		
09 65 19 23-0001 Vinyl Tile (09 65 19 23)		
Note: Any size.		
09 65 19 23-0002 Solid Vinyl Tile (SVT) (09 65 19 23-0001)		
Note: The following solid vinyl tiles are certified to ASTM F 1700.		
09 65 19 23-0003 SF 1/8" Thick, Class 1 Type A, Homogeneous, Solid Vinyl Tile (SVT) (Tarkett® Azrock® Cortina Grande)	10.06	1.33
For Up To 20, Add	2.41	
For >20 To 40, Add	1.46	
For >40 To 80, Add	0.62	
For >1,000 To 3,000, Deduct	-0.21	
For >3,000 To 6,000, Deduct	-0.48	
For >6,000, Deduct	-0.81	
09 65 19 23-0004 SF 1/8" Thick, Class 1 Type A, Homogeneous, Solid Vinyl Tile (SVT) (Tarkett® Azrock® Karim Kolors)	10.35	1.33
For Up To 20, Add	2.46	
For >20 To 40, Add	1.49	
For >40 To 80, Add	0.63	
For >1,000 To 3,000, Deduct	-0.22	
For >3,000 To 6,000, Deduct	-0.49	
For >6,000, Deduct	-0.82	
09 65 19 23-0005 SF 1/8" Thick, Slip Retardant, Class 1 Type B, Homogeneous, Solid Vinyl Tile (SVT) (Tarkett® Azrock® Cortina Grande SR)	10.55	1.33
For Up To 20, Add	2.49	
For >20 To 40, Add	1.51	
For >40 To 80, Add	0.64	
For >1,000 To 3,000, Deduct	-0.22	
For >3,000 To 6,000, Deduct	-0.50	
For >6,000, Deduct	-0.84	
09 65 19 23-0006 Luxury Vinyl Tile (LVT) (09 65 19 23-0001)		
09 65 19 23-0007 SF 2.5mm Thick, Luxury Vinyl Tile (LVT) (Mannington Amtico)	13.98	1.33
For Up To 20, Add	3.00	
For >20 To 40, Add	1.85	
For >40 To 80, Add	0.81	
For >1,000 To 3,000, Deduct	-0.29	
For >3,000 To 6,000, Deduct	-0.64	
For >6,000, Deduct	-1.04	
09 65 19 33 Rubber Tile Flooring (09 65 19)		
09 65 19 33-0001 Rubber Tile (09 65 19 33)		
09 65 19 33-0002 Rubber Tile With Raised Discs, Assorted Colors (09 65 19 33-0001)		
09 65 19 33-0003 SF 1/8" Thick Rubber Tile With Raised Discs	22.87	0.80
Note: Smooth, raised disc or other patterned surface.		
For Up To 100, Add	1.23	
09 65 19 33-0004 SF 3/16" Thick Rubber Tile With Raised Discs	27.78	0.89
Note: Smooth, raised disc or other patterned surface.		
For Up To 100, Add	1.48	
09 65 19 33-0005 SF 7/32" Thick Rubber Tile With Raised Discs	30.83	1.07
Note: Smooth, raised disc or other patterned surface.		
For Up To 100, Add	1.65	
09 65 19 43 Polyester Composition Tile Flooring (09 65 19)		
09 65 19 43-0001 Polyester Composition Floor Tile (09 65 19 43)		
Note: Any size.		
09 65 19 43-0002 SF 1/8" Thick, Polyester Composition Floor Tile (Armstrong® BioBased Tile® Migrations®)	8.89	1.33
For Extra Stock, Material Only, Deduct	-1.56	
For >1,000 To 3,000, Deduct	-0.19	
For >3,000 To 6,000, Deduct	-0.41	
For >6,000, Deduct	-0.68	
09 65 19 43-0003 SF 1/8" Thick, Polyester Composition Floor Tile (Armstrong® BioBased Tile® Striations®)	6.58	1.33
For Extra Stock, Material Only, Deduct	-1.56	
For >1,000 To 3,000, Deduct	-0.14	
For >3,000 To 6,000, Deduct	-0.32	
For >6,000, Deduct	-0.54	
09 65 23 Resilient Plank Flooring (09 65)		
Note: Includes mastic and cleaning floor after installation is complete.		

09	09 Finishes
	09 60 Flooring
	09 65 Resilient Flooring



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 65 23 00-0001	Vinyl Plank Flooring <small>(09 65 23)</small>		
09 65 23 00-0002	SF 0.110" Overall Thickness, 0.012" Wear Layer, Vinyl Plank Flooring (Armstrong® Luxe Plank™)	8.22	0.66
	<i>For >40 To 100, Add</i>	1.70	
	<i>For >1,000, Deduct</i>	-0.69	
	<i>For Up To 40, Add</i>	3.40	
09 65 23 00-0003	SF 0.135" Overall Thickness, 0.020" Wear Layer, Vinyl Plank Flooring (Armstrong® Luxe Plank™)	10.43	0.66
	<i>For >40 To 100, Add</i>	1.92	
	<i>For >1,000, Deduct</i>	-0.91	
	<i>For Up To 40, Add</i>	3.84	
09 65 23 00-0004	SF 0.16" Overall Thickness, 0.020" Wear Layer, Vinyl Plank Flooring (Armstrong® Luxe Plank™)	11.80	0.66
	<i>For >40 To 100, Add</i>	2.06	
	<i>For >1,000, Deduct</i>	-1.05	
	<i>For Up To 40, Add</i>	4.12	

09 65 43	Linoleum Flooring <small>(09 65)</small>		
	Note: Includes mastic and cleaning floor after installation is complete.		
09 65 43 00-0001	Linoleum Flooring <small>(09 65 43)</small>		
09 65 43 00-0002	SF Linoleum Tile (Forbo Marmoleum Composition Tile, MCT).....	6.92	1.33
09 65 43 00-0003	SF 2.5 mm, Linoleum Sheet (Forbo Marmoleum)	5.23	0.66
	<i>For 3.2mm Thickness, Add</i>	0.78	
	<i>For 2mm Thickness, Deduct</i>	-0.37	
09 65 43 00-0004	LF Heat Weld Linoleum Sheet Flooring Seams	6.33	
	Note: For areas requiring seamless installations and superior infection control. Includes routing or hand grooving seams, installing welding rod with heat welding gun, trimming the weld rod flush with the floor surface and applying a protective finish to seam.		

09 65 66	Resilient Athletic Flooring <small>(09 65)</small>		
09 65 66 00-0001	Recycled Rubber, Interlocking Athletic Tiles <small>(09 65 66)</small>		
09 65 66 00-0002	SF 3/8" Height, Recycled Rubber, Interlocking Athletic Tile	7.56	0.62
	<i>For Colors, Add</i>	1.33	
09 65 66 00-0003	SF 1/2" Height, Recycled Rubber, Interlocking Athletic Tile	8.78	0.78
	<i>For Colors, Add</i>	1.53	
09 65 66 00-0004	SF 3/4" Height, Recycled Rubber, Interlocking Athletic Tile	10.11	1.24
	<i>For Colors, Add</i>	1.67	
09 65 66 00-0005	SF 1" Height, Recycled Rubber, Interlocking Athletic Tile	14.75	1.50
	<i>For Colors, Add</i>	2.52	

09 65 66 00-0006	Closed Cell, 100 Percent Virgin Rubber, Interlocking Athletic Tiles <small>(09 65 66)</small>		
09 65 66 00-0007	SF 3/8" Height, Black Hammered Surface, Closed Cell, 100 Percent Virgin Rubber, Hidden Interlocking Athletic Tile (Pawling HL-155).....	40.88	0.62
	<i>For Colors, Add</i>	5.00	
09 65 66 00-0008	SF 9/16" Height, Black Raised Squares Surface, Closed Cell, 100 Percent Virgin Rubber, Hidden Interlocking Athletic Tile (Pawling HL-100)	59.22	0.62
	<i>For Colors, Add</i>	7.29	
09 65 66 00-0009	SF 3/8" Height, Black Raised Discs Surface, Closed Cell, 100 Percent Virgin Rubber, Interlocking Athletic Tile (Pawling PL-100)	43.19	0.62
	<i>For Colors, Add</i>	5.29	
09 65 66 00-0010	SF 9/16" Height, Black Raised Nubs Surface, Closed Cell, 100 Percent Virgin Rubber, Interlocking Athletic Tile (Pawling PL-200)	53.18	0.62
	<i>For Colors, Add</i>	6.54	
09 65 66 00-0011	SF 7/16" Height, Black Reversible Hammered Surface, Closed Cell, 100 Percent Virgin Rubber, Interlocking Athletic Tile (Pawling FL-150).....	44.42	0.62
	<i>For Colors, Add</i>	5.44	

09 66	Terrazzo Flooring <small>(09 60)</small>		
09 66 13	Portland Cement Terrazzo Flooring <small>(09 66)</small>		
	Note: Excludes divider strips. See CSI section 09 66 33 00-0000 for conductive terrazzo.		
09 66 13 13	Sand Cushion Terrazzo Flooring <small>(09 66 13)</small>		
09 66 13 13-0001	Floors Not Bonded To Concrete <small>(09 66 13 13)</small>		
	Note: 3" Thick - 5/8" topping and 1/4" sand cushion.		
09 66 13 13-0002	SF Terrazzo Floor, Not Bonded, Gray Cement 3" Thick With 5/8" Topping, 1/4" Sand Cushion.....	33.70	2.90
	<i>For Venetian Type Terrazzo, Add</i>	9.11	
	<i>For Abrasive Heavy Duty Terrazzo, Add</i>	9.11	
	<i>For Colors, Add</i>	4.55	
	<i>For Up To 100, Add</i>	8.02	
	<i>For >100 To 250, Add</i>	4.01	
09 66 13 13-0003	SF Terrazzo Floor, Not Bonded, White Cement 3" Thick With 5/8" Topping, 1/4" Sand Cushion	33.88	2.90
	<i>For Venetian Type Terrazzo, Add</i>	9.20	
	<i>For Abrasive Heavy Duty Terrazzo, Add</i>	9.20	
	<i>For Colors, Add</i>	4.60	
	<i>For Up To 100, Add</i>	8.04	
	<i>For >100 To 250, Add</i>	4.02	

09 66 13 16	Monolithic Terrazzo Flooring <small>(09 66 13)</small>		
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Finishes	09	09
Flooring	09 60	
Terrazzo Flooring	09 66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 66 13 16-0001 Monolithic Terrazzo <small>(09 66 13 16)</small>		
09 66 13 16-0002 SF Monolithic Terrazzo, 3-1/2" Base 5/8" Topping, 4' To 5' Square Panels Topping.....	18.89	2.90
Note: Including Mesh And Felt		
For Venetian Type Terrazzo, Add	6.63	
For Abrasive Heavy Duty Terrazzo, Add	6.63	
For Colors, Add	3.32	
For Up To 100, Add	3.58	
For >100 To 250, Add	1.79	
 09 66 13 19 Bonded Terrazzo Flooring <small>(09 66 13)</small>		
09 66 13 19-0001 Floors Bonded To Concrete <small>(09 66 13 19)</small>		
Note: 1-3/4" Thick - 5/8" topping.		
09 66 13 19-0002 SF Terrazzo Floor, Bonded To Concrete, Gray Cement 1-3/4" Thick With 5/8" Topping.....	26.94	2.90
For Venetian Type Terrazzo, Add	7.52	
For Abrasive Heavy Duty Terrazzo, Add	7.52	
For Colors, Add	3.76	
For Up To 100, Add	6.27	
For >100 To 250, Add	3.13	
09 66 13 19-0003 SF Terrazzo Floor, Bonded To Concrete, White Cement 1-3/4" Thick With 5/8" Topping.....	27.12	2.90
For Venetian Type Terrazzo, Add	7.61	
For Abrasive Heavy Duty Terrazzo, Add	7.61	
For Colors, Add	3.80	
For Up To 100, Add	6.29	
For >100 To 250, Add	3.14	
 09 66 13 19-0004 Terrazzo Wainscot <small>(09 66 13 19)</small>		
09 66 13 19-0005 SF 1-1/2" Thick Terrazzo Wainscot, Cast In Place, Bonded To Concrete Or Masonry	35.52	3.87
For Venetian Type Terrazzo, Add	4.87	
 09 66 13 19-0006 Terrazzo Base <small>(09 66 13 19)</small>		
09 66 13 19-0007 SF 6" Cove Type Terrazzo Base, Cast In Place, Bonded To Concrete Or Masonry	35.52	2.57
For Venetian Type Terrazzo, Add	10.61	
 09 66 13 19-0008 Terrazzo Curb <small>(09 66 13 19)</small>		
09 66 13 19-0009 LF 6" x 6" Terrazzo Curb, Cast In Place, Polished Top And 2 Faces	85.48	17.16
For Venetian Type Terrazzo, Add	14.15	
 09 66 13 19-0010 Stairs Cast In Place <small>(09 66 13 19)</small>		
Note: Topping applied to concrete or metal.		
09 66 13 19-0011 LF 1-1/2" Thick x 12" Wide, Terrazzo Stair, Cast In Place, Bonded To Concrete Or Metal	36.10	5.81
For Each SF Of Abrasive Surface Finish, Add	0.35	
For Each LF Of Embedded Abrasive Strips, Add	0.56	
For Each LF Of Abrasive Metal Nosing, Add	3.90	
For Each SF Of Landings, Add	1.50	
09 66 13 19-0012 LF Terrazzo Stair Tread And Riser, Cast In Place, Bonded To Concrete Or Metal	89.58	19.35
For Each SF Of Abrasive Surface Finish, Add	0.35	
For Each LF Of Embedded Abrasive Strips, Add	0.56	
For Each LF Of Abrasive Metal Nosing, Add	3.90	
For Each SF Of Landings, Add	1.50	
09 66 13 19-0013 SF Terrazzo Stair Stringer And Fascia, Cast In Place, Bonded To Concrete Or Metal	36.63	5.81
For Each SF Of Abrasive Surface Finish, Add	0.35	
For Each LF Of Embedded Abrasive Strips, Add	0.56	
For Each LF Of Abrasive Metal Nosing, Add	3.90	
For Each SF Of Landings, Add	1.50	
 09 66 13 19-0014 Divider Strips <small>(09 66 13 19)</small>		
09 66 13 19-0015 LF 1-1/4" Deep, 14 Gauge, Zinc Plated Steel, Divider Strip.....	6.76	0.97
09 66 13 19-0016 LF 1-1/4" Deep, 14 Gauge, Brass, Divider Strip	6.12	0.97
09 66 13 19-0017 LF 1-1/4" Deep, 1/4" Thick, Zinc Plated Steel, Heavy Top Strip	10.68	0.97
09 66 13 19-0018 LF 1-1/4" Deep, 1/4" Thick, Galvanized Steel Bottom, Brass, Heavy Top Strip	16.25	0.97
09 66 13 19-0019 LF 1/2" x 1/2", 16 Gauge, Zinc Plated Steel, Divider Strip For Thin Set Floors.....	6.40	0.97
09 66 13 19-0020 LF 1/2" x 1/2", 16 Gauge, Brass, Divider Strip For Thin Set Floors.....	9.90	0.97
09 66 13 19-0021 LF Vinyl Plastic, Divider Strip For Floor	5.80	0.97
 09 66 16 Terrazzo Floor Tile <small>(09 66)</small>		
09 66 16 13 Portland Cement Terrazzo Floor Tile <small>(09 66 16)</small>		
09 66 16 13-0001 Flooring Tiles <small>(09 66 16 13)</small>		
Note: Gray cement setting bed 3/16" polyester matrix or 1/2" cement matrix 12" x 12".		
09 66 16 13-0002 Terrazzo Tiles With Non-Slip Surface <small>(09 66 16 13-0001)</small>		
09 66 16 13-0003 SF 9" x 9" x 1" Non-Slip Precast Terrazzo, Thin Set Floor Tile	30.81	2.77
For White Cement, Add	0.36	
For Venetian Type Terrazzo, Add	2.00	

09 Finishes**09 60 Flooring****09 66 Terrazzo Flooring**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 66 16 13-0004	SF		12" x 12" x 1" Non-Slip Precast Terrazzo, Thin Set Floor Tile	31.55	2.77
			<i>For White Cement, Add</i>	0.36	
			<i>For Venetian Type Terrazzo, Add</i>	2.00	
09 66 16 13-0005	SF		12" x 12" x 1-1/2" Non-Slip Precast Terrazzo, Thin Set Floor Tile	36.58	2.77
			<i>For White Cement, Add</i>	0.36	
			<i>For Venetian Type Terrazzo, Add</i>	2.00	
09 66 16 13-0006	SF		18" x 18" x 1-1/2" Non-Slip Precast Terrazzo, Thin Set Floor Tile	39.24	2.77
			<i>For White Cement, Add</i>	0.36	
			<i>For Venetian Type Terrazzo, Add</i>	2.00	
09 66 16 13-0007	SF		24" x 24" x 1-1/2" Non-Slip Precast Terrazzo, Thin Set Floor Tile	41.19	2.77
			<i>For White Cement, Add</i>	0.36	
			<i>For Venetian Type Terrazzo, Add</i>	2.00	
09 66 16 13-0008			Terrazzo Tile Thin Set <small>(09 66 16 13-0001)</small>		
09 66 16 13-0009	SF		Precast Terrazzo, 1/4" To 1/2" Chips Floor Tiles, Thin Set Gray Cement Bed	30.55	2.77
			<i>For White Cement, Add</i>	0.36	
			<i>For Venetian Type Terrazzo, Add</i>	2.00	
09 66 16 13-0010	SF		Precast Terrazzo, 3/8" To 1" Chips Floor Tiles, Thin Set Gray Cement Bed	32.63	2.77
			<i>For White Cement, Add</i>	0.36	
			<i>For Venetian Type Terrazzo, Add</i>	2.00	
09 66 16 13-0011			Thin Set Terrazzo Wainscot <small>(09 66 16 13-0001)</small>		
09 66 16 13-0012	SF		12" x 12" x 1" Terrazzo Tile Wainscot Thin Set	43.74	5.14
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0013	SF		18" x 18" x 1-1/2" Terrazzo Tile Wainscot Thin Set	49.75	5.14
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0014			Thin Set Terrazzo Base, Gray Cement <small>(09 66 16 13-0001)</small>		
09 66 16 13-0015	LF		6" High, Straight Terrazzo Base Thin Set, Gray Cement	14.84	2.57
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0016	LF		6" High, Cove Terrazzo Base Thin Set, Gray Cement	16.77	2.57
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0017	LF		8" High, Straight Terrazzo Base Thin Set, Gray Cement	17.42	2.57
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0018	LF		8" High, Cove Terrazzo Base Thin Set, Gray Cement	18.38	2.57
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0019			Terrazzo Curbs <small>(09 66 16 13-0001)</small>		
09 66 16 13-0020	LF		8" x 8" Curb, Terrazzo Tile	28.73	3.44
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0021	LF		6" x 6" Curb, Terrazzo Tile	27.77	3.44
			<i>For Each LF Of White Cement, Add</i>	0.50	
			<i>For Each LF Of Zinc Toe Strip, Add</i>	1.00	
09 66 16 13-0022			Precast Terrazzo Stair Treads 12" Wide <small>(09 66 16 13-0001)</small>		
09 66 16 13-0023	LF		1-1/2" Precast Terrazzo Stair Tread 12" Wide x 1-1/2" Thick, Diamond Pattern	75.74	3.44
09 66 16 13-0024	LF		1-1/2" Precast Terrazzo Stair Tread 12" Wide x 1-1/2" Thick, Non-Slip Surface	64.20	3.44
09 66 16 13-0025	LF		2" Precast Terrazzo Straight Stair Tread	56.50	3.44
09 66 16 13-0026	LF		2" Precast Terrazzo Curved Stair Tread	66.37	3.44
09 66 16 13-0027			Stair Risers, 1" Thick To 6" High, Straight <small>(09 66 16 13-0001)</small>		
09 66 16 13-0028	LF		1" To 6" High Precast Terrazzo Stair Riser Straight Section, Thin Set	33.80	2.57
09 66 16 13-0029	LF		1" To 6" High Precast Terrazzo Stair Riser Straight Cove Section, Thin Set	39.57	2.57
09 66 16 13-0030			Stair Risers, 1" Thick To 6" High, Curved <small>(09 66 16 13-0001)</small>		
09 66 16 13-0031	LF		1" To 6" High Precast Terrazzo Stair Riser Curved Vertical Section, Thin Set	50.41	2.57
09 66 16 13-0032	LF		1" To 6" High Precast Terrazzo Stair Riser Curved Cove Section, Thin Set	54.25	2.57
09 66 16 13-0033			Tread And Riser <small>(09 66 16 13)</small>		
09 66 16 13-0034			Stair Stringers, Notched For Treads And Risers <small>(09 66 16 13-0033)</small>		
09 66 16 13-0035	LF		1" Precast Terrazzo Stair Stringers Notched For Treads And Risers	83.75	6.86
09 66 16 13-0036	LF		2" Precast Terrazzo Stair Stringers Notched For Treads And Risers	101.30	6.86
09 66 16 13-0037			Structural Non-Slip Landings <small>(09 66 16 13-0033)</small>		
09 66 16 13-0038	SF		1-1/2" Thick Precast Terrazzo Stair Landing Structural, Non-Slip	60.57	3.44



Finishes	09	09
Flooring	09 60	
Terrazzo Flooring	09 66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 66 16 13-0039 SF 3" Thick Precast Terrazzo Stair Landing Structural, Non-Slip.....	74.99	3.44
09 66 16 13-0040 Combined Tread And Riser (09 66 16 13-0033)		
09 66 16 13-0041 Straight Sections (09 66 16 13-0040)		
09 66 16 13-0042 LF Precast Terrazzo Stair Tread And Riser 1-1/2" Tread, 3/4" Riser, Straight Section.....	134.10	6.86
09 66 16 13-0043 LF Precast Terrazzo Stair Tread And Riser 3" Tread, 1" Riser, Straight Section.....	161.03	6.86
09 66 16 13-0044 Curved Sections (09 66 16 13-0040)		
09 66 16 13-0045 LF Precast Terrazzo Stair Tread And Riser 2" Tread, 1" Riser, Curved Section.....	169.00	6.86
09 66 16 13-0046 LF Precast Terrazzo Stair Tread And Riser 3" Tread, 1" Riser, Curved Section.....	215.15	6.86
09 66 33 Conductive Terrazzo Flooring (09 66)		
Note: For anti-static areas.		
09 66 33 13 Conductive Epoxy-Resin Terrazzo (09 66 33)		
09 66 33 13-0001 SF Terrazzo, Epoxy System, Floor Sparkproof, Conductive, Industrial.....	26.32	4.29
09 66 33 13-0002 SF Terrazzo, Epoxy System, Base Sparkproof, Conductive, Industrial.....	48.56	4.29
09 66 33 16 Conductive Polyester-Resin Terrazzo Flooring (09 66 33)		
09 66 33 16-0001 SF Terrazzo, Polyester System, Floor Sparkproof, Conductive, Industrial.....	20.00	4.29
09 66 33 16-0002 SF Terrazzo, Polyester System, Base Sparkproof, Conductive, Industrial.....	35.20	4.29
09 66 33 19 Conductive Plastic-Matrix Terrazzo Flooring (09 66 33)		
09 66 33 19-0001 SF Terrazzo, Polyacrylate System, Floor Sparkproof, Conductive, Industrial	22.29	4.29
09 66 33 19-0002 SF Terrazzo, Polyacrylate System, Base Sparkproof, Conductive, Industrial	43.56	4.29
09 66 33 19-0003 SF Terrazzo, Synthetic Latex Mastic System, Floor Sparkproof, Conductive, Industrial	32.90	4.29
09 66 33 19-0004 SF Terrazzo, Synthetic Latex Mastic System, Base Sparkproof, Conductive, Industrial	37.04	4.29
09 68 Carpeting (09 60)		
Note: No VOC carpet and adhesives. Includes tack strips, glue and floor fastenings as required and vacuuming.		
09 68 13 Tile Carpeting (09 68)		
09 68 13 00-0001 Tufted Carpet Tiles (09 68 13)		
Note: Level-loop pile or textured-loop pile carpet tiles. Includes glue or peel and stick backing.		
09 68 13 00-0002 Non-Patterned Carpet Tiles (09 68 13 00-0001)		
09 68 13 00-0003 SY 18 Ounce, Non-Patterned, Nylon Carpet Tile	34.47	5.33
For Cushion Backed Tile, Add	6.00	
For Up To 15, Add	2.61	
For >15 To 33, Add	1.31	
For >200 To 400, Deduct	-0.43	
For >400 To 600, Deduct	-0.64	
For >600 To 900, Deduct	-1.27	
For >900 To 1,500, Deduct	-1.89	
For >1,500 To 2,200, Deduct	-2.79	
For >2,200 To 3,500, Deduct	-3.66	
For >3,500, Deduct	-4.52	
09 68 13 00-0004 SY 20 Ounce, Non-Patterned, Nylon Carpet Tile	35.77	5.33
For Cushion Backed Tile, Add	6.00	
For Up To 15, Add	2.61	
For >15 To 33, Add	1.31	
For >200 To 400, Deduct	-0.45	
For >400 To 600, Deduct	-0.68	
For >600 To 900, Deduct	-1.33	
For >900 To 1,500, Deduct	-1.98	
For >1,500 To 2,200, Deduct	-2.92	
For >2,200 To 3,500, Deduct	-3.82	
For >3,500, Deduct	-4.71	
09 68 13 00-0005 SY 22 Ounce, Non-Patterned, Nylon Carpet Tile	39.89	5.33
For Cushion Backed Tile, Add	6.00	
For Up To 15, Add	2.61	
For >15 To 33, Add	1.31	
For >200 To 400, Deduct	-0.54	
For >400 To 600, Deduct	-0.80	
For >600 To 900, Deduct	-1.54	
For >900 To 1,500, Deduct	-2.27	
For >1,500 To 2,200, Deduct	-3.34	
For >2,200 To 3,500, Deduct	-4.33	
For >3,500, Deduct	-5.33	

09 Finishes

09 60 Flooring

09 68 Carpeting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 68 13 00-0006	SY 24 Ounce, Non-Patterned, Nylon Carpet Tile	43.91	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.62	
	For >400 To 600, Deduct	-0.93	
	For >600 To 900, Deduct	-1.74	
	For >900 To 1,500, Deduct	-2.55	
	For >1,500 To 2,200, Deduct	-3.74	
	For >2,200 To 3,500, Deduct	-4.84	
	For >3,500, Deduct	-5.93	
09 68 13 00-0007	SY 26 Ounce, Non-Patterned, Nylon Carpet Tile	46.26	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.66	
	For >400 To 600, Deduct	-1.00	
	For >600 To 900, Deduct	-1.86	
	For >900 To 1,500, Deduct	-2.72	
	For >1,500 To 2,200, Deduct	-3.97	
	For >2,200 To 3,500, Deduct	-5.13	
	For >3,500, Deduct	-6.29	
09 68 13 00-0008	SY 28 Ounce, Non-Patterned, Nylon Carpet Tile	48.66	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.71	
	For >400 To 600, Deduct	-1.07	
	For >600 To 900, Deduct	-1.98	
	For >900 To 1,500, Deduct	-2.88	
	For >1,500 To 2,200, Deduct	-4.21	
	For >2,200 To 3,500, Deduct	-5.43	
	For >3,500, Deduct	-6.65	
09 68 13 00-0009	SY 30 Ounce, Non-Patterned, Nylon Carpet Tile	49.38	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.73	
	For >400 To 600, Deduct	-1.09	
	For >600 To 900, Deduct	-2.01	
	For >900 To 1,500, Deduct	-2.93	
	For >1,500 To 2,200, Deduct	-4.28	
	For >2,200 To 3,500, Deduct	-5.52	
	For >3,500, Deduct	-6.75	
09 68 13 00-0010	SY 32 Ounce, Non-Patterned, Nylon Carpet Tile	49.82	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.74	
	For >400 To 600, Deduct	-1.10	
	For >600 To 900, Deduct	-2.03	
	For >900 To 1,500, Deduct	-2.96	
	For >1,500 To 2,200, Deduct	-4.33	
	For >2,200 To 3,500, Deduct	-5.57	
	For >3,500, Deduct	-6.82	
09 68 13 00-0011	SY 34 Ounce, Non-Patterned, Nylon Carpet Tile	50.20	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.74	
	For >400 To 600, Deduct	-1.11	
	For >600 To 900, Deduct	-2.05	
	For >900 To 1,500, Deduct	-2.99	
	For >1,500 To 2,200, Deduct	-4.37	
	For >2,200 To 3,500, Deduct	-5.62	
	For >3,500, Deduct	-6.88	
09 68 13 00-0012	SY 36 Ounce, Non-Patterned, Nylon Carpet Tile	51.48	5.33
	For Cut And Loop Pile Combination Or Tip Shear Carpet, Add	2.00	
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.61	
	For >15 To 33, Add	1.31	
	For >200 To 400, Deduct	-0.77	
	For >400 To 600, Deduct	-1.15	
	For >600 To 900, Deduct	-2.12	
	For >900 To 1,500, Deduct	-3.08	
	For >1,500 To 2,200, Deduct	-4.49	
	For >2,200 To 3,500, Deduct	-5.78	
	For >3,500, Deduct	-7.07	



	Finishes	09
	Flooring	09 60
	Carpeting	09 68

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 68	13 00-0013	SY	38 Ounce, Non-Patterned, Nylon Carpet Tile <i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i> <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	54.02	5.33
09 68	13 00-0014	SY	40 Ounce, Non-Patterned, Nylon Carpet Tile <i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i> <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	56.75	5.33
09 68	13 00-0015	SY	42 Ounce, Non-Patterned, Nylon Carpet Tile <i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i> <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	61.99	5.33
09 68	13 00-0016	SY	Installation Of Owner Provided Non-Patterned Carpet Tiles.....	12.88	
09 68	13 00-0017		Patterned Carpet Tiles <small>(09 68 13 00-0001)</small> Note: Patterned carpet has a definitive repeating pattern as defined by the manufacturer.		
09 68	13 00-0018	SY	15 Ounce, Patterned, Nylon Carpet Tile <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	35.41	5.33
09 68	13 00-0019	SY	18 Ounce, Patterned, Nylon Carpet Tile <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	35.78	5.33
09 68	13 00-0020	SY	20 Ounce, Patterned, Nylon Carpet Tile <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	37.42	5.33
09 68	13 00-0021	SY	22 Ounce, Patterned, Nylon Carpet Tile <i>For Cushion Backed Tile, Add</i> <i>For Up To 15, Add</i> <i>For >15 To 33, Add</i> <i>For >200 To 400, Deduct</i> <i>For >400 To 600, Deduct</i> <i>For >600 To 900, Deduct</i> <i>For >900 To 1,500, Deduct</i> <i>For >1,500 To 2,200, Deduct</i> <i>For >2,200 To 3,500, Deduct</i> <i>For >3,500, Deduct</i>	41.61	5.33

09 Finishes

09 60 Flooring

09 68 Carpeting



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 68 13 00-0022	SY 24 Ounce, Patterned, Nylon Carpet Tile	45.68	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.63	
	For >400 To 600, Deduct	-0.94	
	For >600 To 900, Deduct	-1.78	
	For >900 To 1,500, Deduct	-2.62	
	For >1,500 To 2,200, Deduct	-3.85	
	For >2,200 To 3,500, Deduct	-4.99	
	For >3,500, Deduct	-6.13	
09 68 13 00-0023	SY 26 Ounce, Patterned, Nylon Carpet Tile	48.07	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.67	
	For >400 To 600, Deduct	-1.01	
	For >600 To 900, Deduct	-1.90	
	For >900 To 1,500, Deduct	-2.79	
	For >1,500 To 2,200, Deduct	-4.09	
	For >2,200 To 3,500, Deduct	-5.29	
	For >3,500, Deduct	-6.49	
09 68 13 00-0024	SY 28 Ounce, Patterned, Nylon Carpet Tile	50.51	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.72	
	For >400 To 600, Deduct	-1.08	
	For >600 To 900, Deduct	-2.02	
	For >900 To 1,500, Deduct	-2.96	
	For >1,500 To 2,200, Deduct	-4.33	
	For >2,200 To 3,500, Deduct	-5.59	
	For >3,500, Deduct	-6.86	
09 68 13 00-0025	SY 30 Ounce, Patterned, Nylon Carpet Tile	51.23	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.74	
	For >400 To 600, Deduct	-1.11	
	For >600 To 900, Deduct	-2.06	
	For >900 To 1,500, Deduct	-3.01	
	For >1,500 To 2,200, Deduct	-4.40	
	For >2,200 To 3,500, Deduct	-5.68	
	For >3,500, Deduct	-6.97	
09 68 13 00-0026	SY 32 Ounce, Patterned, Nylon Carpet Tile	51.69	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.75	
	For >400 To 600, Deduct	-1.12	
	For >600 To 900, Deduct	-2.08	
	For >900 To 1,500, Deduct	-3.04	
	For >1,500 To 2,200, Deduct	-4.45	
	For >2,200 To 3,500, Deduct	-5.74	
	For >3,500, Deduct	-7.03	
09 68 13 00-0027	SY 34 Ounce, Patterned, Nylon Carpet Tile	52.07	5.33
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.75	
	For >400 To 600, Deduct	-1.13	
	For >600 To 900, Deduct	-2.10	
	For >900 To 1,500, Deduct	-3.07	
	For >1,500 To 2,200, Deduct	-4.49	
	For >2,200 To 3,500, Deduct	-5.79	
	For >3,500, Deduct	-7.09	
09 68 13 00-0028	SY 36 Ounce, Patterned, Nylon Carpet Tile	53.37	5.33
	For Cut And Loop Pile Combination Or Tip Shear Carpet, Add	2.00	
	For Cushion Backed Tile, Add	6.00	
	For Up To 15, Add	2.88	
	For >15 To 33, Add	1.44	
	For >200 To 400, Deduct	-0.78	
	For >400 To 600, Deduct	-1.17	
	For >600 To 900, Deduct	-2.17	
	For >900 To 1,500, Deduct	-3.16	
	For >1,500 To 2,200, Deduct	-4.62	
	For >2,200 To 3,500, Deduct	-5.95	
	For >3,500, Deduct	-7.29	



Finishes	09	09
Flooring	09 60	
Carpeting	09 68	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 68 13 00-0029 SY 38 Ounce, Patterned, Nylon Carpet Tile	55.95	5.33
For Cut And Loop Pile Combination Or Tip Shear Carpet, Add	2.00	
For Cushion Backed Tile, Add	6.00	
For Up To 15, Add	2.88	
For >15 To 33, Add	1.44	
For >200 To 400, Deduct	-0.83	
For >400 To 600, Deduct	-1.25	
For >600 To 900, Deduct	-2.29	
For >900 To 1,500, Deduct	-3.34	
For >1,500 To 2,200, Deduct	-4.88	
For >2,200 To 3,500, Deduct	-6.27	
For >3,500, Deduct	-7.67	
09 68 13 00-0030 SY 40 Ounce, Patterned, Nylon Carpet Tile	58.72	5.33
For Cut And Loop Pile Combination Or Tip Shear Carpet, Add	2.00	
For Cushion Backed Tile, Add	6.00	
For Up To 15, Add	2.88	
For >15 To 33, Add	1.44	
For >200 To 400, Deduct	-0.89	
For >400 To 600, Deduct	-1.33	
For >600 To 900, Deduct	-2.43	
For >900 To 1,500, Deduct	-3.54	
For >1,500 To 2,200, Deduct	-5.15	
For >2,200 To 3,500, Deduct	-6.62	
For >3,500, Deduct	-8.09	
09 68 13 00-0031 SY 42 Ounce, Patterned, Nylon Carpet Tile	64.04	5.33
For Cut And Loop Pile Combination Or Tip Shear Carpet, Add	2.00	
For Cushion Backed Tile, Add	6.00	
For Up To 15, Add	2.88	
For >15 To 33, Add	1.44	
For >200 To 400, Deduct	-0.99	
For >400 To 600, Deduct	-1.49	
For >600 To 900, Deduct	-2.70	
For >900 To 1,500, Deduct	-3.91	
For >1,500 To 2,200, Deduct	-5.69	
For >2,200 To 3,500, Deduct	-7.29	
For >3,500, Deduct	-8.89	
09 68 13 00-0032 SY Installation Of Owner Provided Patterned Carpet Tiles	14.79	
09 68 13 00-0033 ESD Static Control Carpet Tiles (StaticSmart Mission Critical Discovery		
ECO Series) <small>(09 68 13 00-0001)</small>		
Note: Includes conductive ESD releasable adhesive and grounding clips.		
09 68 13 00-0034 SY 24 Ounce, ESD Static Control, Non-Patterned, Nylon Carpet Tile (StaticSmart Mission Critical Discovery ECO	91.73	5.33
Series)		
For Up To 15, Add	2.88	
For >15 To 33, Add	1.44	
For >200 To 400, Deduct	-1.55	
For >400 To 600, Deduct	-2.32	
For >600 To 900, Deduct	-4.08	
For >900 To 1,500, Deduct	-5.85	
For >1,500 To 2,200, Deduct	-8.45	
For >2,200 To 3,500, Deduct	-10.75	
For >3,500, Deduct	-13.04	
09 68 16 Sheet Carpeting <small>(09 68)</small>		
Note: Weights shown are face weight excluding backing weight and excludes padding. Demolition of carpet includes removal		
of glue if required. Residential carpet backing basis is for padding and commercial carpet backing is for glue down.		
09 68 16 00-0001 Carpet Cushion <small>(09 68 16)</small>		
09 68 16 00-0002 Carpet Padding <small>(09 68 16 00-0001)</small>		
09 68 16 00-0003 Prime Polyurethane Foam Carpet Padding <small>(09 68 16 00-0002)</small>		
09 68 16 00-0004 SY 7/16" Thick, Prime Polyurethane Foam Carpet Padding.....	17.12	2.77
For Up To 15, Add	0.84	
For >15 To 33, Add	0.42	
For >200 To 400, Deduct	-0.26	
For >400 To 600, Deduct	-0.39	
For >600 To 900, Deduct	-0.71	
For >900 To 1,500, Deduct	-1.03	
For >1,500 To 2,200, Deduct	-1.50	
For >2,200 To 3,500, Deduct	-1.93	
For >3,500, Deduct	-2.36	
09 68 16 00-0005 SY 1/2" Thick, Prime Polyurethane Foam Carpet Padding.....	17.88	2.77
For Up To 15, Add	0.84	
For >15 To 33, Add	0.42	
For >200 To 400, Deduct	-0.27	
For >400 To 600, Deduct	-0.41	
For >600 To 900, Deduct	-0.75	
For >900 To 1,500, Deduct	-1.08	
For >1,500 To 2,200, Deduct	-1.58	
For >2,200 To 3,500, Deduct	-2.03	
For >3,500, Deduct	-2.47	

09	09 Finishes
	09 60 Flooring
	09 68 Carpeting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 68 16 00-0006	Bonded (Rebond) Polyurethane Foam Carpet Padding <small>(09 68 16 00-0002)</small>		
09 68 16 00-0007	SY 1/4" Thick, 8 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	10.51	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.13	
	For >400 To 600, Deduct	-0.19	
	For >600 To 900, Deduct	-0.38	
	For >900 To 1,500, Deduct	-0.57	
	For >1,500 To 2,200, Deduct	-0.84	
	For >2,200 To 3,500, Deduct	-1.10	
	For >3,500, Deduct	-1.37	
09 68 16 00-0008	SY 5/16" Thick, 8 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	11.04	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.14	
	For >400 To 600, Deduct	-0.21	
	For >600 To 900, Deduct	-0.41	
	For >900 To 1,500, Deduct	-0.60	
	For >1,500 To 2,200, Deduct	-0.89	
	For >2,200 To 3,500, Deduct	-1.17	
	For >3,500, Deduct	-1.45	
09 68 16 00-0009	SY 3/8" Thick, 5.5 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	8.58	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.09	
	For >400 To 600, Deduct	-0.13	
	For >600 To 900, Deduct	-0.28	
	For >900 To 1,500, Deduct	-0.43	
	For >1,500 To 2,200, Deduct	-0.65	
	For >2,200 To 3,500, Deduct	-0.86	
	For >3,500, Deduct	-1.08	
09 68 16 00-0010	SY 3/8" Thick, 8 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	10.69	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.13	
	For >400 To 600, Deduct	-0.19	
	For >600 To 900, Deduct	-0.39	
	For >900 To 1,500, Deduct	-0.58	
	For >1,500 To 2,200, Deduct	-0.86	
	For >2,200 To 3,500, Deduct	-1.13	
	For >3,500, Deduct	-1.39	
09 68 16 00-0011	SY 7/16" Thick, 5.5 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	10.69	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.13	
	For >400 To 600, Deduct	-0.19	
	For >600 To 900, Deduct	-0.39	
	For >900 To 1,500, Deduct	-0.58	
	For >1,500 To 2,200, Deduct	-0.86	
	For >2,200 To 3,500, Deduct	-1.13	
	For >3,500, Deduct	-1.39	
09 68 16 00-0012	SY 7/16" Thick, 6 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	10.69	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.13	
	For >400 To 600, Deduct	-0.19	
	For >600 To 900, Deduct	-0.39	
	For >900 To 1,500, Deduct	-0.58	
	For >1,500 To 2,200, Deduct	-0.86	
	For >2,200 To 3,500, Deduct	-1.13	
	For >3,500, Deduct	-1.39	
09 68 16 00-0013	SY 7/16" Thick, 8 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	11.94	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.15	
	For >400 To 600, Deduct	-0.23	
	For >600 To 900, Deduct	-0.45	
	For >900 To 1,500, Deduct	-0.67	
	For >1,500 To 2,200, Deduct	-0.98	
	For >2,200 To 3,500, Deduct	-1.28	
	For >3,500, Deduct	-1.58	
09 68 16 00-0014	SY 1/2" Thick, 5.5 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	10.57	2.77
	For Up To 15, Add	0.84	
	For >15 To 33, Add	0.42	
	For >200 To 400, Deduct	-0.13	
	For >400 To 600, Deduct	-0.19	
	For >600 To 900, Deduct	-0.38	
	For >900 To 1,500, Deduct	-0.57	
	For >1,500 To 2,200, Deduct	-0.85	
	For >2,200 To 3,500, Deduct	-1.11	
	For >3,500, Deduct	-1.38	



	Finishes	09
	Flooring	09 60
	Carpeting	09 68

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	09 68 16 00-0015	SY	1/2" Thick, 6 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	10.98	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.14	
			For >400 To 600, Deduct	-0.20	
			For >600 To 900, Deduct	-0.40	
			For >900 To 1,500, Deduct	-0.60	
			For >1,500 To 2,200, Deduct	-0.89	
			For >2,200 To 3,500, Deduct	-1.16	
			For >3,500, Deduct	-1.44	
	09 68 16 00-0016	SY	1/2" Thick, 8 LB/CF Bonded (Rebond) Polyurethane Foam Carpet Padding.....	12.46	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.17	
			For >400 To 600, Deduct	-0.25	
			For >600 To 900, Deduct	-0.48	
			For >900 To 1,500, Deduct	-0.70	
			For >1,500 To 2,200, Deduct	-1.04	
			For >2,200 To 3,500, Deduct	-1.35	
			For >3,500, Deduct	-1.66	
	09 68 16 00-0017		Froth Polyurethane Foam Carpet Padding (09 68 16 00-0002)		
	09 68 16 00-0018	SY	0.175" Thick, 16 LB/CF Froth Polyurethane Foam Rubber Carpet Padding.....	18.27	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.28	
			For >400 To 600, Deduct	-0.42	
			For >600 To 900, Deduct	-0.77	
			For >900 To 1,500, Deduct	-1.11	
			For >1,500 To 2,200, Deduct	-1.62	
			For >2,200 To 3,500, Deduct	-2.07	
			For >3,500, Deduct	-2.53	
	09 68 16 00-0019	SY	0.250" Thick, 12 LB/CF Froth Polyurethane Foam Rubber Carpet Padding.....	20.45	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.33	
			For >400 To 600, Deduct	-0.49	
			For >600 To 900, Deduct	-0.88	
			For >900 To 1,500, Deduct	-1.26	
			For >1,500 To 2,200, Deduct	-1.84	
			For >2,200 To 3,500, Deduct	-2.35	
			For >3,500, Deduct	-2.86	
	09 68 16 00-0020	SY	0.250" Thick, 16 LB/CF Froth Polyurethane Foam Rubber Carpet Padding.....	22.13	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.36	
			For >400 To 600, Deduct	-0.54	
			For >600 To 900, Deduct	-0.96	
			For >900 To 1,500, Deduct	-1.38	
			For >1,500 To 2,200, Deduct	-2.00	
			For >2,200 To 3,500, Deduct	-2.56	
			For >3,500, Deduct	-3.11	
	09 68 16 00-0021		Waffle Rubber Carpet Padding (09 68 16 00-0002)		
	09 68 16 00-0022	SY	3/8" Thick, 90 OZ/SY Waffle Rubber Carpet Padding.....	21.04	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.34	
			For >400 To 600, Deduct	-0.51	
			For >600 To 900, Deduct	-0.91	
			For >900 To 1,500, Deduct	-1.30	
			For >1,500 To 2,200, Deduct	-1.89	
			For >2,200 To 3,500, Deduct	-2.42	
			For >3,500, Deduct	-2.95	
	09 68 16 00-0023		Flat Sponge Rubber Carpet Padding (09 68 16 00-0002)		
	09 68 16 00-0024	SY	0.156" Thick, 62 OZ/SY Flat Sponge Rubber Carpet Padding.....	12.58	2.77
			For Up To 15, Add	0.84	
			For >15 To 33, Add	0.42	
			For >200 To 400, Deduct	-0.17	
			For >400 To 600, Deduct	-0.25	
			For >600 To 900, Deduct	-0.48	
			For >900 To 1,500, Deduct	-0.71	
			For >1,500 To 2,200, Deduct	-1.05	
			For >2,200 To 3,500, Deduct	-1.36	
			For >3,500, Deduct	-1.68	

09 Finishes

09 60 Flooring

09 68 Carpeting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 68 16 00-0025	SY	0.250"	Thick, 68 OZ/SY Flat Sponge Rubber Carpet Padding.....	13.48	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.19	
			<i>For >400 To 600, Deduct</i>	-0.28	
			<i>For >600 To 900, Deduct</i>	-0.53	
			<i>For >900 To 1,500, Deduct</i>	-0.78	
			<i>For >1,500 To 2,200, Deduct</i>	-1.14	
			<i>For >2,200 To 3,500, Deduct</i>	-1.48	
			<i>For >3,500, Deduct</i>	-1.81	
09 68 16 00-0026	SY	0.250"	Thick, 80 OZ/SY Flat Sponge Rubber Carpet Padding.....	14.14	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.20	
			<i>For >400 To 600, Deduct</i>	-0.30	
			<i>For >600 To 900, Deduct</i>	-0.56	
			<i>For >900 To 1,500, Deduct</i>	-0.82	
			<i>For >1,500 To 2,200, Deduct</i>	-1.20	
			<i>For >2,200 To 3,500, Deduct</i>	-1.56	
			<i>For >3,500, Deduct</i>	-1.91	
09 68 16 00-0027	SY	0.250"	Thick, 100 OZ/SY Flat Sponge Rubber Carpet Padding.....	16.20	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.24	
			<i>For >400 To 600, Deduct</i>	-0.36	
			<i>For >600 To 900, Deduct</i>	-0.66	
			<i>For >900 To 1,500, Deduct</i>	-0.97	
			<i>For >1,500 To 2,200, Deduct</i>	-1.41	
			<i>For >2,200 To 3,500, Deduct</i>	-1.82	
			<i>For >3,500, Deduct</i>	-2.22	
09 68 16 00-0028	SY	0.370"	Thick, 100 OZ/SY Flat Sponge Rubber Carpet Padding.....	16.38	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.24	
			<i>For >400 To 600, Deduct</i>	-0.37	
			<i>For >600 To 900, Deduct</i>	-0.67	
			<i>For >900 To 1,500, Deduct</i>	-0.98	
			<i>For >1,500 To 2,200, Deduct</i>	-1.43	
			<i>For >2,200 To 3,500, Deduct</i>	-1.84	
			<i>For >3,500, Deduct</i>	-2.25	
09 68 16 00-0029	Synthetic Fiber Carpet Padding (09 68 16 00-0002)				
09 68 16 00-0030	SY	0.235"	Thick, 20 OZ/SY Synthetic Fiber Carpet Padding.....	5.93	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.03	
			<i>For >400 To 600, Deduct</i>	-0.05	
			<i>For >600 To 900, Deduct</i>	-0.15	
			<i>For >900 To 1,500, Deduct</i>	-0.25	
			<i>For >1,500 To 2,200, Deduct</i>	-0.38	
			<i>For >2,200 To 3,500, Deduct</i>	-0.53	
			<i>For >3,500, Deduct</i>	-0.68	
09 68 16 00-0031	SY	0.235"	Thick, 24 OZ/SY Synthetic Fiber Carpet Padding.....	7.30	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.06	
			<i>For >400 To 600, Deduct</i>	-0.09	
			<i>For >600 To 900, Deduct</i>	-0.22	
			<i>For >900 To 1,500, Deduct</i>	-0.34	
			<i>For >1,500 To 2,200, Deduct</i>	-0.52	
			<i>For >2,200 To 3,500, Deduct</i>	-0.70	
			<i>For >3,500, Deduct</i>	-0.89	
09 68 16 00-0032	SY	0.275"	Thick, 28 OZ/SY Synthetic Fiber Carpet Padding.....	6.67	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.05	
			<i>For >400 To 600, Deduct</i>	-0.07	
			<i>For >600 To 900, Deduct</i>	-0.19	
			<i>For >900 To 1,500, Deduct</i>	-0.30	
			<i>For >1,500 To 2,200, Deduct</i>	-0.46	
			<i>For >2,200 To 3,500, Deduct</i>	-0.62	
			<i>For >3,500, Deduct</i>	-0.79	
09 68 16 00-0033	SY	0.300"	Thick, 32 OZ/SY Synthetic Fiber Carpet Padding.....	6.91	2.77
			<i>For Up To 15, Add</i>	0.84	
			<i>For >15 To 33, Add</i>	0.42	
			<i>For >200 To 400, Deduct</i>	-0.05	
			<i>For >400 To 600, Deduct</i>	-0.08	
			<i>For >600 To 900, Deduct</i>	-0.20	
			<i>For >900 To 1,500, Deduct</i>	-0.32	
			<i>For >1,500 To 2,200, Deduct</i>	-0.48	
			<i>For >2,200 To 3,500, Deduct</i>	-0.65	
			<i>For >3,500, Deduct</i>	-0.83	



Finishes	09	09
Flooring	09 60	
Carpeting	09 68	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 68 16 00-0034 SY 0.350" Thick, 40 OZ/SY Synthetic Fiber Carpet Padding.....	8.31	2.77
For Up To 15, Add	0.84	
For >15 To 33, Add	0.42	
For >200 To 400, Deduct	-0.08	
For >400 To 600, Deduct	-0.12	
For >600 To 900, Deduct	-0.27	
For >900 To 1,500, Deduct	-0.41	
For >1,500 To 2,200, Deduct	-0.62	
For >2,200 To 3,500, Deduct	-0.83	
For >3,500, Deduct	-1.04	
09 68 16 00-0035 Double Stick Synthetic Fiber Carpet Padding (09 68 16 00-0002)		
09 68 16 00-0036 SY 0.300" Thick, 32 OZ/SY Double Stick Synthetic Fiber Carpet Padding	8.74	2.77
For Up To 15, Add	0.84	
For >15 To 33, Add	0.42	
For >200 To 400, Deduct	-0.09	
For >400 To 600, Deduct	-0.14	
For >600 To 900, Deduct	-0.29	
For >900 To 1,500, Deduct	-0.44	
For >1,500 To 2,200, Deduct	-0.66	
For >2,200 To 3,500, Deduct	-0.88	
For >3,500, Deduct	-1.10	
09 68 16 00-0037 SY 0.375" Thick, 40 OZ/SY Double Stick Synthetic Fiber Carpet Padding	9.83	2.77
For Up To 15, Add	0.84	
For >15 To 33, Add	0.42	
For >200 To 400, Deduct	-0.11	
For >400 To 600, Deduct	-0.17	
For >600 To 900, Deduct	-0.34	
For >900 To 1,500, Deduct	-0.52	
For >1,500 To 2,200, Deduct	-0.77	
For >2,200 To 3,500, Deduct	-1.02	
For >3,500, Deduct	-1.26	
09 68 16 00-0038 Commercial Broadloom Carpet (09 68 16)		
Note: Level-loop pile or textured-loop pile broadloom carpet.		
09 68 16 00-0039 Non-Patterned Broadloom Carpet (09 68 16 00-0038)		
09 68 16 00-0040 SY 22 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	48.45	21.89
For Installation On Stairs, Each Riser, Add	6.00	
For Moisture Barrier Backing, Add	3.50	
For Up To 15, Add	2.92	
For >15 To 33, Add	1.46	
For >200 To 400, Deduct	-0.68	
For >400 To 600, Deduct	-1.02	
For >600 To 900, Deduct	-1.91	
For >900, Deduct	-2.81	
09 68 16 00-0041 SY 24 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	48.45	21.89
For Installation On Stairs, Each Riser, Add	6.00	
For Moisture Barrier Backing, Add	3.50	
For Up To 15, Add	2.92	
For >15 To 33, Add	1.46	
For >200 To 400, Deduct	-0.68	
For >400 To 600, Deduct	-1.02	
For >600 To 900, Deduct	-1.91	
For >900, Deduct	-2.81	
09 68 16 00-0042 SY 26 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	48.45	21.89
For Installation On Stairs, Each Riser, Add	6.00	
For Moisture Barrier Backing, Add	3.50	
For Up To 15, Add	2.92	
For >15 To 33, Add	1.46	
For >200 To 400, Deduct	-0.68	
For >400 To 600, Deduct	-1.02	
For >600 To 900, Deduct	-1.91	
For >900, Deduct	-2.81	
09 68 16 00-0043 SY 28 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	52.52	23.72
For Installation On Stairs, Each Riser, Add	6.00	
For Moisture Barrier Backing, Add	3.50	
For Up To 15, Add	3.16	
For >15 To 33, Add	1.58	
For >200 To 400, Deduct	-0.73	
For >400 To 600, Deduct	-1.10	
For >600 To 900, Deduct	-2.07	
For >900, Deduct	-3.04	
09 68 16 00-0044 SY 30 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	53.55	23.72
For Installation On Stairs, Each Riser, Add	6.00	
For Cut Pile Carpet, Add	1.50	
For Moisture Barrier Backing, Add	3.50	
For Up To 15, Add	3.16	
For >15 To 33, Add	1.58	
For >200 To 400, Deduct	-0.75	
For >400 To 600, Deduct	-1.13	
For >600 To 900, Deduct	-2.12	
For >900, Deduct	-3.12	

09	09	Finishes
	09 60	Flooring
	09 68	Carpeting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 68 16 00-0045	SY 32 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	53.74	23.72
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Cut Pile Carpet, Add</i>	1.50	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.16	
	<i>For >15 To 33, Add</i>	1.58	
	<i>For >200 To 400, Deduct</i>	-0.76	
	<i>For >400 To 600, Deduct</i>	-1.14	
	<i>For >600 To 900, Deduct</i>	-2.13	
	<i>For >900, Deduct</i>	-3.13	
09 68 16 00-0046	SY 34 Ounce, Medium Traffic, Non-Patterned, Nylon Broadloom Carpet	59.08	25.54
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Cut Pile Carpet, Add</i>	1.50	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.41	
	<i>For >15 To 33, Add</i>	1.70	
	<i>For >200 To 400, Deduct</i>	-0.84	
	<i>For >400 To 600, Deduct</i>	-1.26	
	<i>For >600 To 900, Deduct</i>	-2.36	
	<i>For >900, Deduct</i>	-3.45	
09 68 16 00-0047	SY 36 Ounce, Heavy Traffic, Non-Patterned, Nylon Broadloom Carpet	59.83	25.54
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Cut Pile Carpet, Add</i>	1.50	
	<i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i>	2.00	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.41	
	<i>For >15 To 33, Add</i>	1.70	
	<i>For >200 To 400, Deduct</i>	-0.86	
	<i>For >400 To 600, Deduct</i>	-1.28	
	<i>For >600 To 900, Deduct</i>	-2.40	
	<i>For >900, Deduct</i>	-3.51	
09 68 16 00-0048	SY 38 Ounce, Heavy Traffic, Non-Patterned, Nylon Broadloom Carpet	60.74	25.54
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Cut Pile Carpet, Add</i>	1.50	
	<i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i>	2.00	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.41	
	<i>For >15 To 33, Add</i>	1.70	
	<i>For >200 To 400, Deduct</i>	-0.87	
	<i>For >400 To 600, Deduct</i>	-1.31	
	<i>For >600 To 900, Deduct</i>	-2.44	
	<i>For >900, Deduct</i>	-3.57	
09 68 16 00-0049	Patterned Broadloom Carpet <small>(09 68 16 00-0038)</small>		
	Note: Patterned carpet has a definitive repeating pattern as defined by the manufacturer.		
09 68 16 00-0050	SY 22 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet	50.42	21.89
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.21	
	<i>For >15 To 33, Add</i>	1.61	
	<i>For >200 To 400, Deduct</i>	-0.69	
	<i>For >400 To 600, Deduct</i>	-1.03	
	<i>For >600 To 900, Deduct</i>	-1.96	
	<i>For >900, Deduct</i>	-2.89	
09 68 16 00-0051	SY 24 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet	50.42	21.89
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.21	
	<i>For >15 To 33, Add</i>	1.61	
	<i>For >200 To 400, Deduct</i>	-0.69	
	<i>For >400 To 600, Deduct</i>	-1.03	
	<i>For >600 To 900, Deduct</i>	-1.96	
	<i>For >900, Deduct</i>	-2.89	
09 68 16 00-0052	SY 26 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet	50.42	21.89
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.21	
	<i>For >15 To 33, Add</i>	1.61	
	<i>For >200 To 400, Deduct</i>	-0.69	
	<i>For >400 To 600, Deduct</i>	-1.03	
	<i>For >600 To 900, Deduct</i>	-1.96	
	<i>For >900, Deduct</i>	-2.89	
09 68 16 00-0053	SY 28 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet	54.65	23.72
	<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
	<i>For Moisture Barrier Backing, Add</i>	3.50	
	<i>For Up To 15, Add</i>	3.48	
	<i>For >15 To 33, Add</i>	1.74	
	<i>For >200 To 400, Deduct</i>	-0.75	
	<i>For >400 To 600, Deduct</i>	-1.12	
	<i>For >600 To 900, Deduct</i>	-2.12	
	<i>For >900, Deduct</i>	-3.13	



	Finishes	09	
	Flooring	09 60	09
	Carpeting	09 68	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 68 16 00-0054	SY		30 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet.....	55.70	23.72
			<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
			<i>For Cut Pile Carpet, Add</i>	1.50	
			<i>For Moisture Barrier Backing, Add</i>	3.50	
			<i>For Up To 15, Add</i>	3.48	
			<i>For >15 To 33, Add</i>	1.74	
			<i>For >200 To 400, Deduct</i>	-0.77	
			<i>For >400 To 600, Deduct</i>	-1.15	
			<i>For >600 To 900, Deduct</i>	-2.18	
			<i>For >900, Deduct</i>	-3.20	
09 68 16 00-0055	SY		32 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet.....	55.89	23.72
			<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
			<i>For Cut Pile Carpet, Add</i>	1.50	
			<i>For Moisture Barrier Backing, Add</i>	3.50	
			<i>For Up To 15, Add</i>	3.48	
			<i>For >15 To 33, Add</i>	1.74	
			<i>For >200 To 400, Deduct</i>	-0.77	
			<i>For >400 To 600, Deduct</i>	-1.16	
			<i>For >600 To 900, Deduct</i>	-2.19	
			<i>For >900, Deduct</i>	-3.22	
09 68 16 00-0056	SY		34 Ounce, Medium Traffic, Patterned, Nylon Broadloom Carpet.....	61.41	25.54
			<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
			<i>For Cut Pile Carpet, Add</i>	1.50	
			<i>For Moisture Barrier Backing, Add</i>	3.50	
			<i>For Up To 15, Add</i>	3.75	
			<i>For >15 To 33, Add</i>	1.87	
			<i>For >200 To 400, Deduct</i>	-0.85	
			<i>For >400 To 600, Deduct</i>	-1.28	
			<i>For >600 To 900, Deduct</i>	-2.41	
			<i>For >900, Deduct</i>	-3.55	
09 68 16 00-0057	SY		36 Ounce, Heavy Traffic, Patterned, Nylon Broadloom Carpet.....	62.17	25.54
			<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
			<i>For Cut Pile Carpet, Add</i>	1.50	
			<i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i>	2.00	
			<i>For Moisture Barrier Backing, Add</i>	3.50	
			<i>For Up To 15, Add</i>	3.75	
			<i>For >15 To 33, Add</i>	1.87	
			<i>For >200 To 400, Deduct</i>	-0.87	
			<i>For >400 To 600, Deduct</i>	-1.30	
			<i>For >600 To 900, Deduct</i>	-2.45	
			<i>For >900, Deduct</i>	-3.60	
09 68 16 00-0058	SY		38 Ounce, Heavy Traffic, Patterned, Nylon Broadloom Carpet.....	63.10	25.54
			<i>For Installation On Stairs, Each Riser, Add</i>	6.00	
			<i>For Cut Pile Carpet, Add</i>	1.50	
			<i>For Cut And Loop Pile Combination Or Tip Shear Carpet, Add</i>	2.00	
			<i>For Moisture Barrier Backing, Add</i>	3.50	
			<i>For Up To 15, Add</i>	3.75	
			<i>For >15 To 33, Add</i>	1.87	
			<i>For >200 To 400, Deduct</i>	-0.89	
			<i>For >400 To 600, Deduct</i>	-1.33	
			<i>For >600 To 900, Deduct</i>	-2.50	
			<i>For >900, Deduct</i>	-3.67	
09 68 16 00-0059			Indoor/Outdoor Carpet (09 68 16) Note: Includes waterproof glue.		
09 68 16 00-0060	SY		Nylon Indoor/Outdoor Carpet.....	54.17	5.54
09 68 16 00-0061	SY		Ozite Indoor/Outdoor Carpet	41.23	5.54
09 68 16 00-0062			Carpet Accessories (09 68 16)		
09 68 16 00-0063	LF		Metal Carpet Saddle Strip, Up To 4" Wide.....	8.02	0.97
09 68 16 00-0064			Removal And Reinstallation Of Carpet And Pad (09 68 16) Note: Includes storage, cleaning and supply materials.		
09 68 16 00-0065	SY		Removal And Reinstallation Of Carpet And Pad.....	30.83	
09 68 16 00-0066			Carpeting Support Functions (09 68 16)		
09 68 16 00-0067			Relocate Partitions, Modular Work Stations (09 68 16 00-0066) Note: Includes disassembly and reassembly of work station. Excludes electrical disconnection or reconnection.		
09 68 16 00-0068	EA		Relocate Modular Work Station	340.25	
09 68 16 00-0069			Installation Of Owner Provided Broadloom Carpet (09 68 16)		
09 68 16 00-0070	SY		Up To 24 Oz, Installation Of Owner Provided Broadloom Carpet.....	13.10	
			Note: Includes adhesive for glue-down or tack strip for padded installations.		
			<i>For Up To 15, Add</i>	2.54	
			<i>For >15 To 33, Add</i>	1.27	
09 68 16 00-0071	SY		>24 To 34 Oz, Installation Of Owner Provided Broadloom Carpet	15.21	
			Note: Includes adhesive for glue-down or tack strip for padded installations.		
			<i>For Up To 15, Add</i>	2.96	
			<i>For >15 To 33, Add</i>	1.48	

09 Finishes**09 60 Flooring****09 68 Carpeting**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 68 16 00-0072	SY	>34 Oz. Installation Of Owner Provided Broadloom Carpet.....	18.17	
		Note: Includes adhesive for glue-down or tack strip for padded installations.		
		For Up To 15, Add	3.55	
		For >15 To 33, Add	1.78	

09 69 Access Flooring (09 60)**09 69 13 Rigid-Grid Access Flooring** (09 69)**09 69 13 00-0001 Panels, No Covering** (09 69 13)

09 69 13 00-0002	SF	2' x 2' Panels - No Covering Access And Pedestal Floors	21.23	0.97
		For Carpet Covering, Add	2.77	
		For Vinyl Floor Covering, Add	1.91	
09 69 13 00-0003	SF	2' x 2' Perforated Panels Access And Pedestal Floors	40.57	0.97
		For Carpet Covering, Add	2.77	
		For Vinyl Floor Covering, Add	1.91	
09 69 13 00-0004	SF	Tate 1250AS Panel Cover UTP Designer Plus Color Raf Blue 7153T	37.75	1.07
09 69 13 00-0005	SF	Tate 1250AS Panel Cover UTP Designer Plus Color Sage Brown 7777T	37.75	1.07
09 69 13 00-0006	SF	Tate 1250AS Panel Cover UTP Designer Plus Color Moodance 6808	37.75	1.07
09 69 13 00-0007	SF	Tate 1250AS Panel Cover UTP Designer Plus Color Mosaic 6280	37.75	1.07
09 69 13 00-0008	SF	Tate 1250AS Panel Cover HPL 1/8" Nevamar ST2-2 Beige Star/Brown Trim	35.65	1.07
09 69 13 00-0009	SF	Tate 1250AS Panel Cover HPL 1/8" Nevamar ST6-1 Gray Star/Black Trim	35.65	1.07
09 69 13 00-0010	SF	Tate Concore 1500 Panel Cover UTP Designer Plus Color Raf Blue 7153T	40.36	1.07
09 69 13 00-0011	SF	Tate Concore 1500 Panel Cover UTP Designer Plus Color Sage Brown 7777T	40.36	1.07
09 69 13 00-0012	SF	Tate Concore 1500 Panel Cover UTP Designer Plus Color Moodance 6808	40.36	1.07
09 69 13 00-0013	SF	Tate Concore 1500 Panel Cover UTP Designer Plus Color Mosaic 6280	40.36	1.07
09 69 13 00-0014	SF	Tate Concore 1500 Panel Cover HPL 1/8" Nevamar ST-2 Beige Star/Brown Trim	38.27	1.07
09 69 13 00-0015	SF	Tate Concore 1500 Panel Cover HPL 1/8" Nevamar ST6-1 Grey Star/Black Trim	38.27	1.07
09 69 13 00-0016	SF	Tate 1250AS Perforated 25% O/A Cover 1/8 " Nevamar HPL ST2-2 Beige Star Trim	48.67	1.07
09 69 13 00-0017	SF	Tate 1250AS Perforated 25% O/A Cover 1/8 " Nevamar HPL ST6-1 Gray Star Trim	48.67	1.07

09 69 13 00-0018 Pedestals (09 69 13)

09 69 13 00-0019	EA	6" To 12" Finished Floor Height, Pedestal Assembly	43.33	4.86
09 69 13 00-0020	EA	8" To 12" Finished Floor Height, Pedestal Assembly	45.94	4.86
09 69 13 00-0021	EA	18" To 24" Finished Floor Height, Pedestal Assembly	47.25	4.86
09 69 13 00-0022	EA	30" To 36" Finished Floor Height, Pedestal Assembly	51.99	4.86

09 69 13 00-0023 Stringers (09 69 13)

09 69 13 00-0024	EA	2' Bolted Stringers, Access And Pedestal Floors	21.00	5.83
09 69 13 00-0025	EA	4' Bolted Stringers, Access And Pedestal Floors	37.25	8.75
09 69 13 00-0026	EA	6' Bolted Stringers, Access And Pedestal Floors	58.49	14.59

09 69 13 00-0027 Understructure (09 69 13)

09 69 13 00-0028	SF	Standard Bolted Stringer Understructure 8" Or 12" Finished Floor Height	7.50	1.45
09 69 13 00-0029	SF	Standard Bolted Stringer Understructure 18" Or 24" Finished Floor Height	8.12	1.45
09 69 13 00-0030	SF	Standard Bolted Stringer Understructure 30" Or 36" Finished Floor Height	9.62	1.45

09 69 53 Access Flooring Accessories (09 69)**09 69 53 00-0001 Accessories** (09 69 53)

09 69 53 00-0002	SF	Accessories, Ramp Assembly Access And Pedestal Floors	46.97	3.89
09 69 53 00-0003	LF	Accessories, Handrail Access And Pedestal Floors	75.67	6.80
09 69 53 00-0004	LF	Accessories, Fascia Plate Access And Pedestal Floors	28.65	6.80
09 69 53 00-0005	EA	Machine Cutouts	233.93	
09 69 53 00-0006	SF	Tate Tamp, Cover Step Master Slip Retard- Tile, Buckskin Or Slate	79.11	
09 69 53 00-0007	LF	Tate 2 Or 3 Riser Steps In Raised Floor System	191.83	0.48
		Note: Includes baffles, fascia plates trim and cover.		
09 69 53 00-0008	LF	Tate Handrail	150.85	3.21
09 69 53 00-0009	SF	Hammered Aluminum Finish Fascia	53.65	3.21
		Note: Includes trim angles and hardware (8", 12", 18", 24").		
09 69 53 00-0010	EA	7" x 17" Lexan Floor Mounted Grille	244.57	12.15
		Note: Includes carpet trim to flush mount.		
09 69 53 00-0011	EA	Cut Hole In Raised Floor And Trim With Black 1/2" Trim Material	51.11	
09 69 53 00-0012	EA	Cut Round Hole In Raised Floor And Trim Carpet Install 4" Plastic Insert (Gromtec#GT003)	51.11	
09 69 53 00-0013	EA	Rehab Panel (Any Brand, Weight) Carpet Cover Only - New UTP Carpet	73.10	1.95
09 69 53 00-0014	EA	Rehab Panel (Any Brand, Weight) Carpet Cover Only - New HPL	90.08	1.95
09 69 53 00-0015	EA	Rehab Panel (Any Brand, Weight) HPL Cover Only - With New HPL/WA Edge Trim	68.40	1.95
09 69 53 00-0016	EA	Rehab Panel (Any Brand, Weight) HPL Cover Only - With New HPL Top set Trim Edge	90.06	1.95
09 69 53 00-0017	EA	Flush Mounted Electrical Box (Including Cutting Hole Trim Carpet) P/N Telo-7018-4	241.42	12.15
09 69 53 00-0018	EA	Flush Mounted Telephone Box (Grey/Black/Communications)	166.70	12.15
		Note: Includes cut hole.		
09 69 53 00-0019	EA	Flush Mounted Electrical Box (In Existing Hole) P/N Telo 7018-4	241.42	12.15
09 69 53 00-0020	EA	Flush Mounted Telephone Box (Grey/Black/Communications) (In Existing Hole) P/N Telo-7018-2	127.82	1.95
09 69 53 00-0021	EA	Removal And Reinstallation Of Flush Mounted Electrical, Telephone Or Communications Floor Box In Raised Floor	9.72	



		Finishes	09
		Flooring	09 60
		Access Flooring	09 69

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 69 53 00-0022			Final Cleaning For Computer Room Raised Floor System <small>(09 69 53)</small>		
			Note: Includes wipe dirt/dust from stringers and raised floor beneath raised floor. For new or existing systems.		
09 69 53 00-0023	SF		Vacuum Raised Floor Carpet Panel, Wipe Dirt/Dust From Stringers And Floor Beneath Raised Floor.....	3.49	
09 69 53 00-0024	SF		Vacuum/Shampoo Raised Floor Carpet Panel, Wipe Dirt/Dust From Stringers And Floor Beneath.....	3.65	
09 69 53 00-0025	SF		Vacuum/Wet Mop Clean Raised Floor HPL Panel Wipe Dirt/Dust Stringers And Raised Floor.....	3.60	

09 70 Wall Finishes (09)

09 72 Wall Coverings (09 70)

09 72 13 Cork Wall Coverings (09 72)

09 72 13 00-0001 Cork Wall Covering (09 72 13)

09 72 13 00-0002	SF	1/8" Cork Wall Covering.....	5.18	0.80
09 72 13 00-0003	SF	1/4" Cork Wall Covering.....	6.70	0.80
09 72 13 00-0004	SF	1/2" Cork Wall Covering.....	7.91	0.80
09 72 13 00-0005	SF	3/4" Cork Wall Covering.....	11.45	0.80

09 72 16 Vinyl-Coated Fabric Wall Coverings (09 72)

09 72 16 13 Flexible Vinyl Wall Coverings (09 72 16)

09 72 16 13-0001 Vinyl Wall Coverings (09 72 16 13)

		Note: Includes wall preparation adhesive, and sizing compound. Demolition includes the removal of wall covering and adhesive.		
09 72 16 13-0002	SF	7-10 Oz/SY Vinyl Wall Covering.....	3.32	0.80
		<i>For Owner Furnished Material, Deduct</i>	-2.06	
09 72 16 13-0003	SF	11-14 Oz/SY Vinyl Wall Covering.....	4.34	0.80
		<i>For Owner Furnished Material, Deduct</i>	-3.00	
09 72 16 13-0004	SF	15-19 Oz/SY Vinyl Wall Covering.....	5.10	0.80
		<i>For Owner Furnished Material, Deduct</i>	-3.76	
09 72 16 13-0005	SF	20 To 25 Ounces/SY Vinyl Wall Covering.....	6.03	0.80
		<i>For Owner Furnished Material, Deduct</i>	-4.34	
09 72 16 13-0006	SF	26-32 Oz/SY Vinyl Wall Covering.....	7.04	0.80
		<i>For Owner Furnished Material, Deduct</i>	-5.28	
09 72 16 13-0007	SF	33-38 Oz/SY Vinyl Wall Covering.....	8.51	0.80
		<i>For Owner Furnished Material, Deduct</i>	-6.67	

09 72 23 Wallpapering (09 72)

09 72 23 00-0001 Wallpaper Coverings (09 72 23)

		Note: Includes wall preparation adhesive, and sizing compound. Demolition includes the removal of wall covering and adhesive.		
09 72 23 00-0002	SF	Average Quality Wallpaper (Standard Grade).....	2.12	1.07
09 72 23 00-0003	SF	High Quality Wallpaper (Designer Grade).....	4.56	1.37
09 72 23 00-0004	SF	Textured Paintable Paper Installed On Ceiling.....	3.13	2.02

09 73 Wall Carpeting (09 70)

09 73 00 00-0001 Carpet Wall Covering (09 73)

09 73 00 00-0002	SY	28 Ounce, Nylon Carpet Wall Covering.....	46.85	24.31
09 73 00 00-0003	SY	32 Ounce, Nylon Carpet Wall Covering.....	48.08	24.31
09 73 00 00-0004	SY	34 Ounce, Nylon Carpet Wall Covering.....	51.97	26.18
09 73 00 00-0005	SY	35 Ounce, Nylon Carpet Wall Covering.....	54.97	26.18
09 73 00 00-0006	SY	36 Ounce, Nylon Carpet Wall Covering.....	58.08	26.18
09 73 00 00-0007	SY	38 Ounce, Nylon Carpet Wall Covering.....	59.56	26.18
09 73 00 00-0008	SY	40 Ounce, Nylon Carpet Wall Covering.....	62.08	28.28
09 73 00 00-0009	SY	42 Ounce, Nylon Carpet Wall Covering.....	64.83	28.28

09 74 Flexible Wood Sheets (09 70)

09 74 16 Flexible Wood Veneers (09 74)

09 74 16 00-0001 Flexible Wood Veneer (09 74 16)

09 74 16 00-0002	SF	1/32" Thick, Flexible Maple Wood Veneer.....	9.48	3.23
09 74 16 00-0003	SF	1/32" Thick, Flexible Oak Wood Veneer.....	9.67	3.23
09 74 16 00-0004	SF	1/32" Thick, Flexible Mahogany Wood Veneer.....	9.67	3.23
09 74 16 00-0005	SF	1/32" Thick, Flexible Birch Wood Veneer.....	9.86	3.23
09 74 16 00-0006	SF	1/32" Thick, Flexible Walnut Wood Veneer.....	10.81	3.23
09 74 16 00-0007	SF	1/32" Thick, Flexible Bamboo Wood Veneer.....	11.95	3.23
09 74 16 00-0008	SF	1/32" Thick, Flexible Fir Wood Veneer.....	13.27	3.23

09 74 16 00-0009 Flexible Exotic Wood Veneer (09 74 16)

09 74 16 00-0010	SF	1/32" Thick, Flexible Exotic Wood Veneer.....	16.56	3.23
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09 Finishes

09 70 Wall Finishes

09 78 Interior Wall Paneling



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 78 Interior Wall Paneling (09 70)

09 78 13 Metal Interior Wall Paneling (09 78)

09 78 13 00-0001 **Stainless Steel Wall Base** (09 78 13)
Note: Grade CS304 with #4 satin polish

09 78 13 00-0002 **22 Gauge Stainless Steel Wall Base** (09 78 13 00-0001)

09 78 13 00-0003	LF	2" Height, 22 Gauge, Stainless Steel Straight Wall Base	11.61	2.44
09 78 13 00-0004	LF	4" Height, 22 Gauge, Stainless Steel Straight Wall Base	17.30	2.69
09 78 13 00-0005	LF	4-3/4" Height, 22 Gauge, Stainless Steel Straight Wall Base	19.32	2.69
09 78 13 00-0006	LF	6" Height, 22 Gauge, Stainless Steel Straight Wall Base	23.25	2.93
09 78 13 00-0007	LF	8" Height, 22 Gauge, Stainless Steel Straight Wall Base	29.16	3.25
09 78 13 00-0008	LF	2" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	13.11	2.44
09 78 13 00-0009	LF	4" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	18.72	2.69
09 78 13 00-0010	LF	4-3/4" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	20.72	2.69
09 78 13 00-0011	LF	6" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	24.46	2.93
09 78 13 00-0012	LF	8" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	30.39	3.25
09 78 13 00-0013	EA	2" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	32.32	4.88
09 78 13 00-0014	EA	4" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	41.08	5.37
09 78 13 00-0015	EA	4-3/4" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	44.12	5.37
09 78 13 00-0016	EA	6" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	49.94	5.86
09 78 13 00-0017	EA	8" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	59.13	6.51
09 78 13 00-0018	EA	2" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	67.00	4.88
09 78 13 00-0019	EA	4" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	75.86	5.37
09 78 13 00-0020	EA	4-3/4" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	78.80	5.37
09 78 13 00-0021	EA	6" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	84.72	5.86
09 78 13 00-0022	EA	8" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	93.91	6.51
09 78 13 00-0023	EA	2" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	32.32	4.88
09 78 13 00-0024	EA	4" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	41.08	5.37
09 78 13 00-0025	EA	4-3/4" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	44.12	5.37
09 78 13 00-0026	EA	6" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	49.94	5.86
09 78 13 00-0027	EA	8" Height, 22 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	59.13	6.51
09 78 13 00-0028	EA	2" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	80.95	4.88
09 78 13 00-0029	EA	4" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	89.72	5.37
09 78 13 00-0030	EA	4-3/4" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	92.75	5.37
09 78 13 00-0031	EA	6" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	98.57	5.86
09 78 13 00-0032	EA	8" Height, 22 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	107.76	6.51

09 78 13 00-0033 **16 Gauge Stainless Steel Wall Base** (09 78 13 00-0001)

09 78 13 00-0034	LF	2" Height, 16 Gauge, Stainless Steel Straight Wall Base	20.27	2.44
09 78 13 00-0035	LF	4" Height, 16 Gauge, Stainless Steel Straight Wall Base	34.69	2.69
09 78 13 00-0036	LF	4-3/4" Height, 16 Gauge, Stainless Steel Straight Wall Base	39.87	2.69
09 78 13 00-0037	LF	6" Height, 16 Gauge, Stainless Steel Straight Wall Base	49.05	2.93
09 78 13 00-0038	LF	8" Height, 16 Gauge, Stainless Steel Straight Wall Base	65.36	3.25
09 78 13 00-0039	LF	2" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	21.66	2.44
09 78 13 00-0040	LF	4" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	36.05	2.69
09 78 13 00-0041	LF	4-3/4" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	40.86	2.69
09 78 13 00-0042	LF	6" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	50.45	2.93
09 78 13 00-0043	LF	8" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel Wall Base	64.99	3.25
09 78 13 00-0044	EA	2" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	45.26	4.88
09 78 13 00-0045	EA	4" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	67.07	5.37
09 78 13 00-0046	EA	4-3/4" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	74.75	5.37
09 78 13 00-0047	EA	6" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	88.87	5.86
09 78 13 00-0048	EA	8" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Inside Corner	111.10	6.51
09 78 13 00-0049	EA	2" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	80.00	4.88
09 78 13 00-0050	EA	4" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	101.81	5.37
09 78 13 00-0051	EA	4-3/4" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	109.64	5.37
09 78 13 00-0052	EA	6" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	123.65	5.86
09 78 13 00-0053	EA	8" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Inside Corner	145.78	6.51
09 78 13 00-0054	EA	2" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	45.26	4.88
09 78 13 00-0055	EA	4" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	67.07	5.37
09 78 13 00-0056	EA	4-3/4" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	74.75	5.37
09 78 13 00-0057	EA	6" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	88.87	5.86
09 78 13 00-0058	EA	8" Height, 16 Gauge, Stainless Steel Straight 12" x 12" Outside Corner	111.10	6.51
09 78 13 00-0059	EA	2" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	93.89	4.88
09 78 13 00-0060	EA	4" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	115.70	5.37
09 78 13 00-0061	EA	4-3/4" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	123.55	5.37
09 78 13 00-0062	EA	6" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	137.56	5.86
09 78 13 00-0063	EA	8" Height, 16 Gauge, 1/4" Cove Bend Stainless Steel 12" x 12" Outside Corner	159.73	6.51

09 80 Acoustic Treatment (09)

09 81 Acoustic Insulation (09 80)

09 81 16 Acoustic Blanket Insulation (09 81)

09 81 16 00-0001 **Sound Attenuation Fire Blankets (SAFB)** (09 81 16)
Note: Mineral wool



Finishes	09	09
Acoustic Treatment	09 80	
Acoustic Insulation	09 81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 81 16 00-0002 2.5 PCF Density, Sound Attenuation Fire Blankets (SAFB) <small>(09 81 16 00-0001)</small>		
09 81 16 00-0003 SF 1-1/2" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	1.94	0.32
09 81 16 00-0004 SF 2" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	2.10	0.32
09 81 16 00-0005 SF 2-1/2" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	2.33	0.32
09 81 16 00-0006 SF 3" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	2.50	0.32
09 81 16 00-0007 SF 3-1/2" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	2.73	0.32
09 81 16 00-0008 SF 4" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	2.95	0.32
09 81 16 00-0009 SF 5" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	3.24	0.32
09 81 16 00-0010 SF 6" Thick, 2.5 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	3.57	0.32
09 81 16 00-0011 4 PCF Density, Sound Attenuation Fire Blankets (SAFB) <small>(09 81 16 00-0001)</small>		
09 81 16 00-0012 SF 1" Thick, 4 PCF Density, Sound Attenuation Fire Blanket (Thermafiber SAFB)	1.90	0.32
09 81 16 00-0013 Sound Attenuation Batts <small>(09 81 16)</small>		
Note: NoiseReducer® by Certainteed, Quitezone® by Owens Corning, Sound-Shield® by Johns Mansville.		
09 81 16 00-0014 SF 2-1/2" Thick, Unfaced Sound Attenuation Batt.....	1.10	0.43
09 81 16 00-0015 SF 3-1/2" Thick, Unfaced Sound Attenuation Batt.....	1.17	0.43
09 81 16 00-0016 SF 3-1/2" Thick, Kraft Faced Sound Attenuation Batt	1.36	0.43
09 81 16 00-0017 SF 5-1/2" Thick, Unfaced Sound Attenuation Batt.....	1.52	0.43
09 81 16 00-0018 SF 5-1/2" Thick, Kraft Faced Sound Attenuation Batt	1.58	0.43
09 81 16 00-0019 SF 6-1/4" Thick, Unfaced Sound Attenuation Batt.....	1.56	0.43
09 81 16 00-0020 SF 6-1/4" Thick, Kraft Faced Sound Attenuation Batt	1.62	0.43
09 84 Acoustic Room Components <small>(09 80)</small>		
09 84 13 Fixed Sound-Absorptive Panels <small>(09 84)</small>		
09 84 13 00-0001 Sound Absorbing Panels And Attenuation Blankets <small>(09 84 13)</small>		
Note: No backs, 3" thick modular, ceiling or wall hung back. Excludes ceiling suspension systems and wall furring system.		
09 84 13 00-0002 SF 3" Thick Perforated Steel Sound Absorbing Panel Painted, No Back With Fiberglass Or Mineral Filler	12.36	2.16
09 84 13 00-0003 SF 1" Thick Fiberglass Sound Absorbing Panels With Glass Cloth Face For Walls	18.38	2.16
09 84 13 00-0004 Sound Absorbing Acoustical Wall Panel System <small>(09 84 13)</small>		
09 84 13 00-0005 Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System <small>(Armstrong® Soundsoak®)</small> <small>(09 84 13 00-0004)</small>		
Note: Includes tackable surface, molding and mounting hardware for flush mount.		
09 84 13 00-0006 SF 5/8" Panel Thickness, Vinyl Surface, Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 60 Signature Vinyl)	14.35	2.44
09 84 13 00-0007 SF 3/4" Panel Thickness, Composed Fabric Surface (Non-Woven), Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 60 Rhythms®)	13.23	2.44
09 84 13 00-0008 SF 3/4" Panel Thickness, Woven Fabric Surface, Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 60 FR-701)	16.76	2.44
09 84 13 00-0009 SF 3/4" Panel Thickness, Woven Fabric Surface, Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 60 Lido™)	16.79	2.44
09 84 13 00-0010 SF 3/4" Panel Thickness, Woven Fabric Surface, Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 60 Spinel™)	18.58	2.44
09 84 13 00-0011 SF 3/4" Panel Thickness, Woven Fabric Surface, Mineral Fiber Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 60 Zirconia™)	18.58	2.44
09 84 13 00-0012 Fiberglass Substrate, Sound Absorbing Acoustical Wall Panel System <small>(Armstrong® Soundsoak®)</small> <small>(09 84 13 00-0004)</small>		
Note: Includes molding and mounting hardware for flush mount.		
09 84 13 00-0013 SF 1" Panel Thickness, Composed Fabric Surface (Non-Woven), Fiberglass Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 85 Rhythms®).....	16.81	2.44
09 84 13 00-0014 SF 1" Panel Thickness, Woven Fabric Surface, Fiberglass Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 85 FR-701)	19.72	2.44
09 84 13 00-0015 SF 1" Panel Thickness, Woven Fabric Surface, Fiberglass Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 85 Lido™)	19.72	2.44
09 84 13 00-0016 SF 1" Panel Thickness, Woven Fabric Surface, Fiberglass Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 85 Spinel™)	22.63	2.44
09 84 13 00-0017 SF 1" Panel Thickness, Woven Fabric Surface, Fiberglass Substrate, Sound Absorbing Acoustical Wall Panel System (Armstrong® Soundsoak® 85 Zirconia™)	22.63	2.44
09 84 13 00-0018 Sound Absorbing Panel, Eggcrate Style <small>(09 84 13)</small>		
Note: Ceiling or wall hung back.		
09 84 13 00-0019 SF 2" Thick Polyurethane Sound Wave (Eggcrate Style).....	10.74	
For Pyramid Style, Add		1.18
09 84 13 00-0020 SF 3" Thick Polyurethane Sound Wave (Eggcrate Style).....	14.24	
For Pyramid Style, Add		1.18
09 84 13 00-0021 SF 4" Thick Polyurethane Sound Wave (Eggcrate Style).....	18.66	
For Pyramid Style, Add		1.18

09	09 Finishes
	09 80 Acoustic Treatment
	09 84 Acoustic Room Components



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 84 13 00-0022	SF 2" Thick Melamine Sound Wave (Eggcrate Style)	14.03	
	For Eggcrate Style With Hypalon Coating, Add	1.97	
	For Pyramid Style, Add	2.05	
	For Pyramid Style With Hypalon Coating, Add	4.02	
09 84 13 00-0023	SF 3" Thick Melamine Sound Wave (Eggcrate Style)	27.57	
	For Eggcrate Style With Hypalon Coating, Add	1.97	
	For Pyramid Style, Add	0.42	
	For Pyramid Style With Hypalon Coating, Add	2.40	
09 84 13 00-0024	SF 4" Thick Melamine Sound Wave (Eggcrate Style)	35.30	
	For Eggcrate Style With Hypalon Coating, Add	1.97	
	For Pyramid Style, Add	0.42	
	For Pyramid Style With Hypalon Coating, Add	2.40	
09 84 13 00-0025	Sound Deadening Fiberboard <small>(09 84 13)</small>		
09 84 13 00-0026	SF 1/2" Sound Deadening Fiberboard.....	1.55	0.54
	For Horizontal Installation Up To 10' High, Add	0.34	
	For Horizontal Installation >10' High, Add	0.50	
	For Walls >10' High, Add	0.08	
	For Up To 128, Add	0.51	
	For >128 To 320, Add	0.30	

09 90 Painting and Coating (09)

Note: Includes masking, safety signs, cleaning of area (dry wiping down walls, floors, doors, etc.), removal of loose paint (paint, caulk, etc.), feathering rough edges, sanding between coats, protective work to contain dust and paint splatters (drop cloths), unless otherwise noted, removal and reinstallation of cabinet hardware, switch covers and outlet plates, equipment to place paint and ladders. New construction work additionally includes filling knots, divots, depressions, holes (screw and nail holes in drywall to 1/4" diameter of unlimited quantity). All work designated as "brush/roller" includes brush work for cut and roller work up to cut in. See CSI section 07 92 00 00-0000 for caulking where required, 09 01 20 00-0000 for severely damaged surface preparation in excess of items included above, hand scrape, pressure washing and chemical cleaning where required.

09 91 Painting (09 90)

09 91 13 Exterior Painting (09 91)

Note: Acrylic latex paint unless otherwise stated. Paint tasks covers all paint sheens: flat, eggshell, satin, semi-gloss, or gloss.

09 91 13 00-0001 Paint Exterior Walls/Siding (09 91 13)

09 91 13 00-0002 Paint Exterior Brick Walls (09 91 13 00-0001)

09 91 13 00-0003	LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Brick Walls.....	0.23	
	For Work >20' To 30' Above Floor, Add	0.04	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.01	
	For Work >15' To 20' Above Floor, Add	0.03	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.07	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.09	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.14	
	For >100 To 250, Add	0.07	
	For >250 To 500, Add	0.03	
	For >2,500 To 5,000, Deduct	-0.01	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 20,000, Deduct	-0.03	
	For >20,000, Deduct	-0.05	
09 91 13 00-0004	SF 1 Coat Filler, Brush Work, Paint Exterior Brick Walls.....	1.05	
	For Work >20' To 30' Above Floor, Add	0.18	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.07	
	For Work >15' To 20' Above Floor, Add	0.11	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.29	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.40	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.59	
	For >100 To 250, Add	0.29	
	For >250 To 500, Add	0.12	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.16	
	For >20,000, Deduct	-0.21	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0005	SF	1	Coat Paint, Brush Work, Paint Exterior Brick Walls 1.45		
				For Work >20' To 30' Above Floor, Add	0.27	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.09	
				For Work >15' To 20' Above Floor, Add	0.16	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.43	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.59	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.86	
				For >100 To 250, Add	0.41	
				For >250 To 500, Add	0.18	
				For >2,500 To 5,000, Deduct	-0.07	
				For >5,000 To 10,000, Deduct	-0.15	
				For >10,000 To 20,000, Deduct	-0.22	
				For >20,000, Deduct	-0.29	
09 91	13 00-0006	SF	2	Coats Paint, Brush Work, Paint Exterior Brick Walls 2.20		
				For Work >20' To 30' Above Floor, Add	0.36	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.15	
				For Work >15' To 20' Above Floor, Add	0.21	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.57	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.79	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	1.19	
				For >100 To 250, Add	0.58	
				For >250 To 500, Add	0.25	
				For >2,500 To 5,000, Deduct	-0.11	
				For >5,000 To 10,000, Deduct	-0.22	
				For >10,000 To 20,000, Deduct	-0.33	
				For >20,000, Deduct	-0.44	
09 91	13 00-0007	SF	1	Coat Filler, Brush/Roller Work, Paint Exterior Brick Walls 0.76		
				For Work >20' To 30' Above Floor, Add	0.11	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.05	
				For Work >15' To 20' Above Floor, Add	0.06	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.17	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.24	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.37	
				For >100 To 250, Add	0.18	
				For >250 To 500, Add	0.08	
				For >2,500 To 5,000, Deduct	-0.04	
				For >5,000 To 10,000, Deduct	-0.08	
				For >10,000 To 20,000, Deduct	-0.11	
				For >20,000, Deduct	-0.15	
09 91	13 00-0008	SF	1	Coat Paint, Brush/Roller Work, Paint Exterior Brick Walls 1.22		
				For Work >20' To 30' Above Floor, Add	0.18	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.09	
				For Work >15' To 20' Above Floor, Add	0.11	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.29	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.40	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.62	
				For >100 To 250, Add	0.30	
				For >250 To 500, Add	0.13	
				For >2,500 To 5,000, Deduct	-0.06	
				For >5,000 To 10,000, Deduct	-0.12	
				For >10,000 To 20,000, Deduct	-0.18	
				For >20,000, Deduct	-0.24	
09 91	13 00-0009	SF	2	Coats Paint, Brush/Roller Work, Paint Exterior Brick Walls 1.89		
				For Work >20' To 30' Above Floor, Add	0.25	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.14	
				For Work >15' To 20' Above Floor, Add	0.15	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.40	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.56	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.89	
				For >100 To 250, Add	0.44	
				For >250 To 500, Add	0.20	
				For >2,500 To 5,000, Deduct	-0.09	
				For >5,000 To 10,000, Deduct	-0.19	
				For >10,000 To 20,000, Deduct	-0.28	
				For >20,000, Deduct	-0.38	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0010	SF	1	Coat Filler, Sprayed, Paint Exterior Brick Walls.....	0.78	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.10	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.16	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.22	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.36	
			<i>For >100 To 250, Add</i>	0.18	
			<i>For >250 To 500, Add</i>	0.08	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.08	
			<i>For >10,000 To 20,000, Deduct</i>	-0.12	
			<i>For >20,000, Deduct</i>	-0.16	
09 91 13 00-0011	SF	1	Coat Paint, Sprayed, Paint Exterior Brick Walls.....	0.86	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.05	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.17	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.32	
			<i>For >100 To 250, Add</i>	0.16	
			<i>For >250 To 500, Add</i>	0.07	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.13	
			<i>For >20,000, Deduct</i>	-0.17	
09 91 13 00-0012	SF	2	Coats Paint, Sprayed, Paint Exterior Brick Walls.....	1.72	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Oil Based Paint, Add</i>	0.13	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.43	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.73	
			<i>For >100 To 250, Add</i>	0.37	
			<i>For >250 To 500, Add</i>	0.17	
			<i>For >2,500 To 5,000, Deduct</i>	-0.09	
			<i>For >5,000 To 10,000, Deduct</i>	-0.17	
			<i>For >10,000 To 20,000, Deduct</i>	-0.26	
			<i>For >20,000, Deduct</i>	-0.34	
09 91 13 00-0013			Paint Exterior Concrete Walls (09 91 13 00-0001)		
09 91 13 00-0014	LF	1	Coat Paint, Cut-in Brush Work, Paint Exterior Concrete Walls.....	0.16	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.03	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Oil Based Paint, Add</i>	0.01	
			<i>For Epoxy Paint, Add</i>	0.02	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.02	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.05	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.07	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.10	
			<i>For >100 To 250, Add</i>	0.05	
			<i>For >250 To 500, Add</i>	0.02	
			<i>For >2,500 To 5,000, Deduct</i>	-0.01	
			<i>For >5,000 To 10,000, Deduct</i>	-0.02	
			<i>For >10,000 To 20,000, Deduct</i>	-0.02	
			<i>For >20,000, Deduct</i>	-0.03	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0015 SF 1 Coat Filler, Brush Work, Paint Exterior Concrete Walls	0.88	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.06	
For Epoxy Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.50	
For >100 To 250, Add	0.24	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.18	
09 91 13 00-0016 SF 1 Coat Filler, Brush Work, Paint Exterior Concrete Walls	0.92	
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.06	
For Epoxy Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.28	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.39	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.56	
For >100 To 250, Add	0.27	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.18	
09 91 13 00-0017 SF 2 Coats Paint, Brush Work, Paint Exterior Concrete Walls	1.75	
For Work >20' To 30' Above Floor, Add	0.33	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.11	
For Epoxy Paint, Add	0.22	
For Work >15' To 20' Above Floor, Add	0.20	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.52	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.72	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.05	
For >100 To 250, Add	0.50	
For >250 To 500, Add	0.22	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.26	
For >20,000, Deduct	-0.35	
09 91 13 00-0018 SF 1 Coat Filler, Brush/Roller Work, Paint Exterior Concrete Walls	0.74	
For Work >20' To 30' Above Floor, Add	0.12	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.07	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.19	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.26	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.39	
For >100 To 250, Add	0.19	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.15	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0019	SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Concrete Walls		0.79
	For Work >20' To 30' Above Floor, Add	0.14	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.11	
	For Work >15' To 20' Above Floor, Add	0.09	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.23	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.31	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.46	
	For >100 To 250, Add	0.22	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.08	
	For >10,000 To 20,000, Deduct	-0.12	
	For >20,000, Deduct	-0.16	
09 91 13 00-0020	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Concrete Walls		1.37
	For Work >20' To 30' Above Floor, Add	0.23	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.09	
	For Epoxy Paint, Add	0.20	
	For Work >15' To 20' Above Floor, Add	0.14	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.37	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.51	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.76	
	For >100 To 250, Add	0.37	
	For >250 To 500, Add	0.16	
	For >2,500 To 5,000, Deduct	-0.07	
	For >5,000 To 10,000, Deduct	-0.14	
	For >10,000 To 20,000, Deduct	-0.21	
	For >20,000, Deduct	-0.27	
09 91 13 00-0021	SF 1 Coat Filler, Sprayed, Paint Exterior Concrete Walls		0.70
	For Work >20' To 30' Above Floor, Add	0.09	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.13	
	For Work >15' To 20' Above Floor, Add	0.06	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.15	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.20	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.33	
	For >100 To 250, Add	0.16	
	For >250 To 500, Add	0.07	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.07	
	For >10,000 To 20,000, Deduct	-0.11	
	For >20,000, Deduct	-0.14	
09 91 13 00-0022	SF 1 Coat Paint, Sprayed, Paint Exterior Concrete Walls		0.62
	For Work >20' To 30' Above Floor, Add	0.09	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.04	
	For Epoxy Paint, Add	0.11	
	For Work >15' To 20' Above Floor, Add	0.05	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.14	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.19	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.30	
	For >100 To 250, Add	0.15	
	For >250 To 500, Add	0.07	
	For >2,500 To 5,000, Deduct	-0.03	
	For >5,000 To 10,000, Deduct	-0.06	
	For >10,000 To 20,000, Deduct	-0.09	
	For >20,000, Deduct	-0.12	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0023 SF 2 Coats Paint, Sprayed, Paint Exterior Concrete Walls	1.12	
For Work >20' To 30' Above Floor, Add	0.14	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.08	
For Epoxy Paint, Add	0.22	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.31	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.51	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	
 09 91 13 00-0024 Paint Exterior Concrete Block Walls (09 91 13 00-0001)		
09 91 13 00-0025 Paint Exterior Concrete Block Walls, Epoxy Paint (09 91 13 00-0024)		
09 91 13 00-0026 LF 1 Coat Epoxy Paint, Cut-in Brush Work, Paint Exterior Concrete Block Walls	0.23	
For Work >20' To 30' Above Floor, Add	0.04	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.06	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.08	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.12	
For >100 To 250, Add	0.06	
For >250 To 500, Add	0.03	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.05	
09 91 13 00-0027 SF 1 Coat Epoxy Filler, Brush Work, Paint Exterior Concrete Block Walls	1.28	
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.26	
09 91 13 00-0028 SF 1 Coat Epoxy Paint, Brush Work, Paint Exterior Concrete Block Walls	1.44	
For Work >20' To 30' Above Floor, Add	0.24	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.38	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.52	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.79	
For >100 To 250, Add	0.38	
For >250 To 500, Add	0.17	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000, Deduct	-0.29	
09 91 13 00-0029 SF 2 Coats Epoxy Paint, Brush Work, Paint Exterior Concrete Block Walls	2.57	
For Work >20' To 30' Above Floor, Add	0.40	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.24	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.64	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.87	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.34	
For >100 To 250, Add	0.65	
For >250 To 500, Add	0.29	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.26	
For >10,000 To 20,000, Deduct	-0.39	
For >20,000, Deduct	-0.51	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0030 SF 1 Coat Epoxy Filler, Brush/Roller Work, Paint Exterior Concrete Block Walls	1.10	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.53	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	
09 91 13 00-0031 SF 1 Coat Epoxy Paint, Brush/Roller Work, Paint Exterior Concrete Block Walls	1.19	
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.28	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.39	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.60	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	
09 91 13 00-0032 SF 2 Coats Epoxy Paint, Brush/Roller Work, Paint Exterior Concrete Block Walls	2.17	
For Work >20' To 30' Above Floor, Add	0.30	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.18	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.48	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.65	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.04	
For >100 To 250, Add	0.51	
For >250 To 500, Add	0.23	
For >2,500 To 5,000, Deduct	-0.11	
For >5,000 To 10,000, Deduct	-0.22	
For >10,000 To 20,000, Deduct	-0.33	
For >20,000, Deduct	-0.43	
09 91 13 00-0033 SF 1 Coat Epoxy Filler, Sprayed, Paint Exterior Concrete Block Walls	0.98	
For Work >20' To 30' Above Floor, Add	0.10	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.06	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.15	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.21	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.38	
For >100 To 250, Add	0.19	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	
09 91 13 00-0034 SF 1 Coat Epoxy Paint, Sprayed, Paint Exterior Concrete Block Walls	1.07	
For Work >20' To 30' Above Floor, Add	0.12	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.07	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.19	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.26	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0035 SF 2 Coats Epoxy Paint, Sprayed, Paint Exterior Concrete Block Walls.....	2.11	
For Work >20' To 30' Above Floor, Add	0.21	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.34	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.47	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.83	
For >100 To 250, Add	0.42	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.11	
For >5,000 To 10,000, Deduct	-0.21	
For >10,000 To 20,000, Deduct	-0.32	
For >20,000, Deduct	-0.42	
09 91 13 00-0036 Paint Exterior Concrete Block Walls, Acrylic Latex Paint (09 91 13 00-0024)	0.22	
09 91 13 00-0037 LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Concrete Block Walls	0.22	
For Work >20' To 30' Above Floor, Add	0.04	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.01	
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.06	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.08	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.12	
For >100 To 250, Add	0.06	
For >250 To 500, Add	0.03	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.04	
09 91 13 00-0038 SF 1 Coat Filler, Brush Work, Paint Exterior Concrete Block Walls	1.13	
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.07	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.44	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.65	
For >100 To 250, Add	0.31	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.23	
09 91 13 00-0039 SF 1 Coat Paint, Brush Work, Paint Exterior Concrete Block Walls	1.36	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.37	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.51	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.76	
For >100 To 250, Add	0.37	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
09 91 13 00-0040 SF 2 Coats Paint, Brush Work, Paint Exterior Concrete Block Walls	2.52	
For Work >20' To 30' Above Floor, Add	0.41	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.17	
For Work >15' To 20' Above Floor, Add	0.25	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.66	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.90	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.36	
For >100 To 250, Add	0.66	
For >250 To 500, Add	0.29	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.25	
For >10,000 To 20,000, Deduct	-0.38	
For >20,000, Deduct	-0.50	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0041	SF 1 Coat Texture Paint, Brush Work, Paint Exterior Concrete Block Walls.....	1.51	
	For Work >20' To 30' Above Floor, Add	0.26	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.10	
	For Work >15' To 20' Above Floor, Add	0.15	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.41	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.56	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.84	
	For >100 To 250, Add	0.41	
	For >250 To 500, Add	0.18	
	For >2,500 To 5,000, Deduct	-0.08	
	For >5,000 To 10,000, Deduct	-0.15	
	For >10,000 To 20,000, Deduct	-0.23	
	For >20,000, Deduct	-0.30	
09 91 13 00-0042	SF 1 Coat Filler, Brush/Roller Work, Paint Exterior Concrete Block Walls.....	0.92	
	For Work >20' To 30' Above Floor, Add	0.15	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.06	
	For Work >15' To 20' Above Floor, Add	0.09	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.24	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.32	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.49	
	For >100 To 250, Add	0.24	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.14	
	For >20,000, Deduct	-0.18	
09 91 13 00-0043	SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Concrete Block Walls.....	1.19	
	For Work >20' To 30' Above Floor, Add	0.19	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.08	
	For Work >15' To 20' Above Floor, Add	0.11	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.30	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.41	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.63	
	For >100 To 250, Add	0.31	
	For >250 To 500, Add	0.13	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.12	
	For >10,000 To 20,000, Deduct	-0.18	
	For >20,000, Deduct	-0.24	
09 91 13 00-0044	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Concrete Block Walls.....	2.10	
	For Work >20' To 30' Above Floor, Add	0.31	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.15	
	For Work >15' To 20' Above Floor, Add	0.18	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.49	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.67	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.05	
	For >100 To 250, Add	0.52	
	For >250 To 500, Add	0.23	
	For >2,500 To 5,000, Deduct	-0.11	
	For >5,000 To 10,000, Deduct	-0.21	
	For >10,000 To 20,000, Deduct	-0.32	
	For >20,000, Deduct	-0.42	
09 91 13 00-0045	SF 1 Coat Texture Paint, Brush/Roller Work, Paint Exterior Concrete Block Walls.....	1.32	
	For Work >20' To 30' Above Floor, Add	0.21	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.09	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.33	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.46	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.70	
	For >100 To 250, Add	0.34	
	For >250 To 500, Add	0.15	
	For >2,500 To 5,000, Deduct	-0.07	
	For >5,000 To 10,000, Deduct	-0.13	
	For >10,000 To 20,000, Deduct	-0.20	
	For >20,000, Deduct	-0.26	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0046 SF 1 Coat Filler, Sprayed, Paint Exterior Concrete Block Walls.....	0.96	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.07	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.46	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.19	
09 91 13 00-0047 SF 1 Coat Paint, Sprayed, Paint Exterior Concrete Block Walls	1.05	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.20	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.28	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.46	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 13 00-0048 SF 2 Coats Paint, Sprayed, Paint Exterior Concrete Block Walls	1.54	
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.35	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.48	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.76	
For >100 To 250, Add	0.37	
For >250 To 500, Add	0.17	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.15	
For >10,000 To 20,000, Deduct	-0.23	
For >20,000, Deduct	-0.31	
09 91 13 00-0049 SF 1 Coat Texture Paint, Sprayed, Paint Exterior Concrete Block Walls	1.32	
For Work >20' To 30' Above Floor, Add	0.17	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.26	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.36	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.26	

09 91 13 00-0050 Paint Exterior Drywall/Plaster Walls (09 91 13 00-0001)

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0051	LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Drywall/Plaster Walls.....	0.16	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.03	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Oil Based Paint, Add</i>	0.01	
	<i>For Epoxy Paint, Add</i>	0.02	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.02	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.05	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.07	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.10	
	<i>For >100 To 250, Add</i>	0.05	
	<i>For >250 To 500, Add</i>	0.02	
	<i>For >2,500 To 5,000, Deduct</i>	-0.01	
	<i>For >5,000 To 10,000, Deduct</i>	-0.02	
	<i>For >10,000 To 20,000, Deduct</i>	-0.02	
	<i>For >20,000, Deduct</i>	-0.03	
09 91 13 00-0052	SF 1 Coat Primer, Brush Work, Paint Exterior Drywall/Plaster Wall.....	0.90	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.16	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Oil Based Paint, Add</i>	0.06	
	<i>For Orange Peel Finish, Add</i>	0.12	
	<i>For Epoxy Paint, Add</i>	0.13	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.25	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.35	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.51	
	<i>For >100 To 250, Add</i>	0.25	
	<i>For >250 To 500, Add</i>	0.11	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.09	
	<i>For >10,000 To 20,000, Deduct</i>	-0.14	
	<i>For >20,000, Deduct</i>	-0.18	
09 91 13 00-0053	SF 1 Coat Paint, Brush Work, Paint Exterior Drywall/Plaster Walls.....	0.95	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.18	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Oil Based Paint, Add</i>	0.06	
	<i>For Orange Peel Finish, Add</i>	0.13	
	<i>For Epoxy Paint, Add</i>	0.11	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.29	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.40	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.58	
	<i>For >100 To 250, Add</i>	0.28	
	<i>For >250 To 500, Add</i>	0.12	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.10	
	<i>For >10,000 To 20,000, Deduct</i>	-0.14	
	<i>For >20,000, Deduct</i>	-0.19	
09 91 13 00-0054	SF 2 Coats Paint, Brush Work, Paint Exterior Drywall/Plaster Walls.....	1.76	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.33	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Oil Based Paint, Add</i>	0.11	
	<i>For Orange Peel Finish, Add</i>	0.24	
	<i>For Epoxy Paint, Add</i>	0.22	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.53	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.73	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	1.06	
	<i>For >100 To 250, Add</i>	0.51	
	<i>For >250 To 500, Add</i>	0.22	
	<i>For >2,500 To 5,000, Deduct</i>	-0.09	
	<i>For >5,000 To 10,000, Deduct</i>	-0.18	
	<i>For >10,000 To 20,000, Deduct</i>	-0.26	
	<i>For >20,000, Deduct</i>	-0.35	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0055 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Drywall/Plaster Walls.....	0.74	
For Work >20' To 30' Above Floor, Add	0.12	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Orange Peel Finish, Add	0.09	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.07	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.19	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.26	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.39	
For >100 To 250, Add	0.19	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.15	
09 91 13 00-0056 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Drywall/Plaster Walls.....	0.72	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Orange Peel Finish, Add	0.09	
For Epoxy Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.20	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.28	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.41	
For >100 To 250, Add	0.20	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.14	
09 91 13 00-0057 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Drywall/Plaster Walls.....	1.35	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.09	
For Orange Peel Finish, Add	0.17	
For Epoxy Paint, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.75	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
09 91 13 00-0058 SF 1 Coat Primer, Sprayed, Paint Exterior Drywall/Plaster Walls.....	0.69	
For Work >20' To 30' Above Floor, Add	0.09	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.05	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.14	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.20	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.32	
For >100 To 250, Add	0.16	
For >250 To 500, Add	0.07	
For >2,500 To 5,000, Deduct	-0.03	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.10	
For >20,000, Deduct	-0.14	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 13 00-0059	SF 1 Coat Paint, Sprayed, Paint Exterior Drywall/Plaster Walls.....	0.71
	<i>For Work >20' To 30' Above Floor, Add</i>	0.11
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Oil Based Paint, Add</i>	0.05
	<i>For Epoxy Paint, Add</i>	0.12
	<i>For Work >15' To 20' Above Floor, Add</i>	0.07
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.18
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.24
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	0.37
	<i>For >100 To 250, Add</i>	0.18
	<i>For >250 To 500, Add</i>	0.08
	<i>For >2,500 To 5,000, Deduct</i>	-0.04
	<i>For >5,000 To 10,000, Deduct</i>	-0.07
	<i>For >10,000 To 20,000, Deduct</i>	-0.11
	<i>For >20,000, Deduct</i>	-0.14
09 91 13 00-0060	SF 2 Coats Paint, Sprayed, Paint Exterior Drywall/Plaster Walls.....	1.20
	<i>For Work >20' To 30' Above Floor, Add</i>	0.16
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Oil Based Paint, Add</i>	0.09
	<i>For Epoxy Paint, Add</i>	0.23
	<i>For Work >15' To 20' Above Floor, Add</i>	0.10
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.26
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.36
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	0.57
	<i>For >100 To 250, Add</i>	0.28
	<i>For >250 To 500, Add</i>	0.13
	<i>For >2,500 To 5,000, Deduct</i>	-0.06
	<i>For >5,000 To 10,000, Deduct</i>	-0.12
	<i>For >10,000 To 20,000, Deduct</i>	-0.18
	<i>For >20,000, Deduct</i>	-0.24
09 91 13 00-0061	Paint Exterior Metal Walls <small>(09 91 13 00-0001)</small>	
09 91 13 00-0062	Paint Exterior Galvanized Walls <small>(09 91 13 00-0061)</small>	
	Note: Linseed oil or acrylic latex paint.	
09 91 13 00-0063	SF 1 Coat Primer, Brush Work, Paint Exterior Galvanized Wall Surfaces.....	1.17
	<i>For Work >20' To 30' Above Floor, Add</i>	0.18
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.11
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.28
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.39
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	0.60
	<i>For >100 To 250, Add</i>	0.29
	<i>For >250 To 500, Add</i>	0.13
	<i>For >2,500 To 5,000, Deduct</i>	-0.06
	<i>For >5,000 To 10,000, Deduct</i>	-0.12
	<i>For >10,000 To 20,000, Deduct</i>	-0.18
	<i>For >20,000, Deduct</i>	-0.23
09 91 13 00-0064	SF 1 Coat Paint, Brush Work, Paint Exterior Galvanized Wall Surfaces.....	1.27
	<i>For Work >20' To 30' Above Floor, Add</i>	0.20
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.32
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.45
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	0.68
	<i>For >100 To 250, Add</i>	0.33
	<i>For >250 To 500, Add</i>	0.14
	<i>For >2,500 To 5,000, Deduct</i>	-0.06
	<i>For >5,000 To 10,000, Deduct</i>	-0.13
	<i>For >10,000 To 20,000, Deduct</i>	-0.19
	<i>For >20,000, Deduct</i>	-0.25



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0065 SF 2 Coats Paint, Brush Work, Paint Exterior Galvanized Wall Surfaces	2.35	
For Work >20' To 30' Above Floor, Add	0.36	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.21	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.57	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.79	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.21	
For >100 To 250, Add	0.59	
For >250 To 500, Add	0.26	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.24	
For >10,000 To 20,000, Deduct	-0.35	
For >20,000, Deduct	-0.47	
09 91 13 00-0066 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Galvanized Walls.....	0.89	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.20	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.28	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.18	
09 91 13 00-0067 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Galvanized Walls	1.01	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.52	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	
09 91 13 00-0068 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Galvanized Walls	1.92	
For Work >20' To 30' Above Floor, Add	0.28	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.45	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.62	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.97	
For >100 To 250, Add	0.47	
For >250 To 500, Add	0.21	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.19	
For >10,000 To 20,000, Deduct	-0.29	
For >20,000, Deduct	-0.38	
09 91 13 00-0069 SF 1 Coat Primer, Sprayed, Paint Exterior Galvanized Walls	0.86	
For Work >20' To 30' Above Floor, Add	0.08	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.05	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.13	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.18	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.33	
For >100 To 250, Add	0.17	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.17	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0070	SF 1 Coat Paint, Sprayed, Paint Exterior Galvanized Walls.....	1.05	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.29	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.47	
	<i>For >100 To 250, Add</i>	0.24	
	<i>For >250 To 500, Add</i>	0.10	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.11	
	<i>For >10,000 To 20,000, Deduct</i>	-0.16	
	<i>For >20,000, Deduct</i>	-0.21	
09 91 13 00-0071	SF 2 Coats Paint, Sprayed, Paint Exterior Galvanized Walls.....	1.84	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.31	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.43	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.74	
	<i>For >100 To 250, Add</i>	0.38	
	<i>For >250 To 500, Add</i>	0.17	
	<i>For >2,500 To 5,000, Deduct</i>	-0.09	
	<i>For >5,000 To 10,000, Deduct</i>	-0.18	
	<i>For >10,000 To 20,000, Deduct</i>	-0.28	
	<i>For >20,000, Deduct</i>	-0.37	
09 91 13 00-0072	Paint Exterior Aluminum And Aluminum Alloy Walls (09 91 13 00-0061)		
	<i>Note: Alkyd enamel paint.</i>		
09 91 13 00-0073	SF 1 Coat Primer, Brush Work, Paint Exterior Aluminum And Aluminum Alloy Wall Surfaces.....	1.17	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.18	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.28	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.39	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.60	
	<i>For >100 To 250, Add</i>	0.29	
	<i>For >250 To 500, Add</i>	0.13	
	<i>For >2,500 To 5,000, Deduct</i>	-0.06	
	<i>For >5,000 To 10,000, Deduct</i>	-0.12	
	<i>For >10,000 To 20,000, Deduct</i>	-0.18	
	<i>For >20,000, Deduct</i>	-0.23	
09 91 13 00-0074	SF 1 Coat Paint, Brush Work, Paint Exterior Aluminum And Aluminum Alloy Wall Surfaces.....	1.27	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.45	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.68	
	<i>For >100 To 250, Add</i>	0.33	
	<i>For >250 To 500, Add</i>	0.14	
	<i>For >2,500 To 5,000, Deduct</i>	-0.06	
	<i>For >5,000 To 10,000, Deduct</i>	-0.13	
	<i>For >10,000 To 20,000, Deduct</i>	-0.19	
	<i>For >20,000, Deduct</i>	-0.25	
09 91 13 00-0075	SF 2 Coats Paint, Brush Work, Paint Exterior Aluminum And Aluminum Alloy Wall Surfaces.....	2.34	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.36	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.21	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.57	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.79	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	1.21	
	<i>For >100 To 250, Add</i>	0.59	
	<i>For >250 To 500, Add</i>	0.26	
	<i>For >2,500 To 5,000, Deduct</i>	-0.12	
	<i>For >5,000 To 10,000, Deduct</i>	-0.23	
	<i>For >10,000 To 20,000, Deduct</i>	-0.35	
	<i>For >20,000, Deduct</i>	-0.47	



		Finishes	09
		Painting and Coating	09 90
		Painting	09 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0076	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Aluminum And Aluminum Alloy Walls.....	1.04	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.28	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.46	
			<i>For >100 To 250, Add</i>	0.23	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.10	
			<i>For >10,000 To 20,000, Deduct</i>	-0.16	
			<i>For >20,000, Deduct</i>	-0.21	
09 91	13 00-0077	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Aluminum And Aluminum Alloy Walls.....	1.14	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.15	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.24	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.34	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.54	
			<i>For >100 To 250, Add</i>	0.27	
			<i>For >250 To 500, Add</i>	0.12	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.11	
			<i>For >10,000 To 20,000, Deduct</i>	-0.17	
			<i>For >20,000, Deduct</i>	-0.23	
09 91	13 00-0078	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Aluminum And Aluminum Alloy Walls.....	2.19	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.28	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >15' To 20' Above Floor, Add</i>	0.17	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.45	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.62	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.01	
			<i>For >100 To 250, Add</i>	0.50	
			<i>For >250 To 500, Add</i>	0.22	
			<i>For >2,500 To 5,000, Deduct</i>	-0.11	
			<i>For >5,000 To 10,000, Deduct</i>	-0.22	
			<i>For >10,000 To 20,000, Deduct</i>	-0.33	
			<i>For >20,000, Deduct</i>	-0.44	
09 91	13 00-0079	SF	1 Coat Primer, Sprayed, Paint Exterior Aluminum And Aluminum Alloy Walls.....	0.91	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.10	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >15' To 20' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.15	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.21	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.36	
			<i>For >100 To 250, Add</i>	0.19	
			<i>For >250 To 500, Add</i>	0.08	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	
09 91	13 00-0080	SF	1 Coat Paint, Sprayed, Paint Exterior Aluminum And Aluminum Alloy Walls.....	1.05	
			<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.29	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.47	
			<i>For >100 To 250, Add</i>	0.24	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.11	
			<i>For >10,000 To 20,000, Deduct</i>	-0.16	
			<i>For >20,000, Deduct</i>	-0.21	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0081	SF 2 Coats Paint, Sprayed, Paint Exterior Aluminum And Aluminum Alloy Walls	1.84	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.31	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.43	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.74	
	<i>For >100 To 250, Add</i>	0.38	
	<i>For >250 To 500, Add</i>	0.17	
	<i>For >2,500 To 5,000, Deduct</i>	-0.09	
	<i>For >5,000 To 10,000, Deduct</i>	-0.18	
	<i>For >10,000 To 20,000, Deduct</i>	-0.28	
	<i>For >20,000, Deduct</i>	-0.37	
09 91 13 00-0082	Paint Exterior Aluminum And Aluminum Alloy Roof Stacks (09 91 13 00-0061)		
09 91 13 00-0083	LF 1 Coat Primer, Paint Exterior Aluminum And Aluminum Alloy Roof Stack With Heat Resistant Paint, Per LF Of Stack.....	14.29	
	<i>For Work >20' To 30' Above Floor, Add</i>	2.91	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	1.75	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	4.66	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	6.41	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	9.13	
	<i>For >100 To 250, Add</i>	4.34	
	<i>For >250 To 500, Add</i>	1.88	
	<i>For >2,500 To 5,000, Deduct</i>	-0.71	
	<i>For >5,000 To 10,000, Deduct</i>	-1.43	
	<i>For >10,000 To 20,000, Deduct</i>	-2.14	
	<i>For >20,000, Deduct</i>	-2.86	
09 91 13 00-0084	LF 1 Coat Paint, Paint Exterior Aluminum And Aluminum Alloy Roof Stack With Heat Resistant Paint, Per LF Of Stack.....	15.91	
	<i>For Work >20' To 30' Above Floor, Add</i>	3.24	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	1.94	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	5.18	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	7.12	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	10.15	
	<i>For >100 To 250, Add</i>	4.83	
	<i>For >250 To 500, Add</i>	2.09	
	<i>For >2,500 To 5,000, Deduct</i>	-0.80	
	<i>For >5,000 To 10,000, Deduct</i>	-1.59	
	<i>For >10,000 To 20,000, Deduct</i>	-2.39	
	<i>For >20,000, Deduct</i>	-3.18	
09 91 13 00-0085	LF 2 Coats Paint, Paint Exterior Aluminum And Aluminum Alloy Roof Stack With Heat Resistant Paint, Per LF Of Stack.....	29.62	
	<i>For Work >20' To 30' Above Floor, Add</i>	6.09	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	3.65	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	9.74	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	13.39	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	19.05	
	<i>For >100 To 250, Add</i>	9.05	
	<i>For >250 To 500, Add</i>	3.92	
	<i>For >2,500 To 5,000, Deduct</i>	-1.48	
	<i>For >5,000 To 10,000, Deduct</i>	-2.96	
	<i>For >10,000 To 20,000, Deduct</i>	-4.44	
	<i>For >20,000, Deduct</i>	-5.92	
09 91 13 00-0086	Paint Exterior Corrugated Metal Walls (09 91 13 00-0061)		

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	09 91	13 00-0087	SF	1 Coat Primer, Sprayed, Paint Exterior Corrugated Metal Walls.....	1.04	
				For Work >20' To 30' Above Floor, Add	0.11	
				Note: Applied only to work area above 20'.		
				For Work >15' To 20' Above Floor, Add	0.06	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.17	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.24	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.41	
				For >100 To 250, Add	0.21	
				For >250 To 500, Add	0.10	
				For >2,500 To 5,000, Deduct	-0.05	
				For >5,000 To 10,000, Deduct	-0.10	
				For >10,000 To 20,000, Deduct	-0.16	
				For >20,000, Deduct	-0.21	
	09 91	13 00-0088	SF	1 Coat Paint, Sprayed, Paint Exterior Corrugated Metal Walls.....	1.31	
				For Work >20' To 30' Above Floor, Add	0.18	
				Note: Applied only to work area above 20'.		
				For Work >15' To 20' Above Floor, Add	0.11	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.28	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.39	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.62	
				For >100 To 250, Add	0.31	
				For >250 To 500, Add	0.14	
				For >2,500 To 5,000, Deduct	-0.07	
				For >5,000 To 10,000, Deduct	-0.13	
				For >10,000 To 20,000, Deduct	-0.20	
				For >20,000, Deduct	-0.26	
	09 91	13 00-0089	SF	2 Coats Paint, Sprayed, Paint Exterior Corrugated Metal Walls	2.25	
				For Work >20' To 30' Above Floor, Add	0.26	
				Note: Applied only to work area above 20'.		
				For Work >15' To 20' Above Floor, Add	0.16	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.42	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.57	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.96	
				For >100 To 250, Add	0.49	
				For >250 To 500, Add	0.22	
				For >2,500 To 5,000, Deduct	-0.11	
				For >5,000 To 10,000, Deduct	-0.23	
				For >10,000 To 20,000, Deduct	-0.34	
				For >20,000, Deduct	-0.45	
	09 91	13 00-0090		Paint Exterior Stucco Walls (09 91 13 00-0091)		
	09 91	13 00-0091	LF	1 Coat Paint, Cut-in Brush Work, Paint Exterior Stucco Wall Surfaces	0.26	
				For Work >20' To 30' Above Floor, Add	0.05	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.02	
				For Work >15' To 20' Above Floor, Add	0.03	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.08	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.11	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.16	
				For >100 To 250, Add	0.08	
				For >250 To 500, Add	0.03	
				For >2,500 To 5,000, Deduct	-0.01	
				For >5,000 To 10,000, Deduct	-0.03	
				For >10,000 To 20,000, Deduct	-0.04	
				For >20,000, Deduct	-0.05	
	09 91	13 00-0092	SF	1 Coat Primer, Brush Work, Paint Exterior Stucco Wall Surfaces.....	1.46	
				For Work >20' To 30' Above Floor, Add	0.28	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.09	
				For Work >15' To 20' Above Floor, Add	0.17	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.45	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.62	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.90	
				For >100 To 250, Add	0.43	
				For >250 To 500, Add	0.19	
				For >2,500 To 5,000, Deduct	-0.07	
				For >5,000 To 10,000, Deduct	-0.15	
				For >10,000 To 20,000, Deduct	-0.22	
				For >20,000, Deduct	-0.29	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0093	SF 1 Coat Paint, Brush Work, Paint Exterior Stucco Wall Surfaces.....	1.61	
	For Work >20' To 30' Above Floor, Add	0.37	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.10	
	For Work >15' To 20' Above Floor, Add	0.18	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.49	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.68	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.98	
	For >100 To 250, Add	0.47	
	For >250 To 500, Add	0.20	
	For >2,500 To 5,000, Deduct	-0.08	
	For >5,000 To 10,000, Deduct	-0.16	
	For >10,000 To 20,000, Deduct	-0.24	
	For >20,000, Deduct	-0.32	
09 91 13 00-0094	SF 2 Coats Paint, Brush Work, Paint Exterior Stucco Wall Surfaces.....	3.01	
	For Work >20' To 30' Above Floor, Add	0.56	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.19	
	For Work >15' To 20' Above Floor, Add	0.34	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.90	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	1.23	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.80	
	For >100 To 250, Add	0.86	
	For >250 To 500, Add	0.37	
	For >2,500 To 5,000, Deduct	-0.15	
	For >5,000 To 10,000, Deduct	-0.30	
	For >10,000 To 20,000, Deduct	-0.45	
	For >20,000, Deduct	-0.60	
09 91 13 00-0095	SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Stucco Walls.....	1.14	
	For Work >20' To 30' Above Floor, Add	0.20	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.07	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.32	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.45	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.66	
	For >100 To 250, Add	0.32	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.17	
	For >20,000, Deduct	-0.23	
09 91 13 00-0096	SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Stucco Walls.....	1.29	
	For Work >20' To 30' Above Floor, Add	0.23	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.08	
	For Work >15' To 20' Above Floor, Add	0.14	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.36	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.50	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.74	
	For >100 To 250, Add	0.36	
	For >250 To 500, Add	0.16	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.13	
	For >10,000 To 20,000, Deduct	-0.19	
	For >20,000, Deduct	-0.26	
09 91 13 00-0097	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Stucco Walls.....	2.41	
	For Work >20' To 30' Above Floor, Add	0.41	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.16	
	For Work >15' To 20' Above Floor, Add	0.25	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.66	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.90	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.35	
	For >100 To 250, Add	0.65	
	For >250 To 500, Add	0.28	
	For >2,500 To 5,000, Deduct	-0.12	
	For >5,000 To 10,000, Deduct	-0.24	
	For >10,000 To 20,000, Deduct	-0.36	
	For >20,000, Deduct	-0.48	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0098	SF	1 Coat Primer, Sprayed, Paint Exterior Stucco Walls	0.93	
			For Work >20' To 30' Above Floor, Add	0.14	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.07	
			For Work >15' To 20' Above Floor, Add	0.08	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.22	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.30	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.47	
			For >100 To 250, Add	0.23	
			For >250 To 500, Add	0.10	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.09	
			For >10,000 To 20,000, Deduct	-0.14	
			For >20,000, Deduct	-0.19	
09 91	13 00-0099	SF	1 Coat Paint, Sprayed, Paint Exterior Stucco Walls.....	1.14	
			For Work >20' To 30' Above Floor, Add	0.16	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.08	
			For Work >15' To 20' Above Floor, Add	0.10	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.26	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.36	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.56	
			For >100 To 250, Add	0.28	
			For >250 To 500, Add	0.12	
			For >2,500 To 5,000, Deduct	-0.06	
			For >5,000 To 10,000, Deduct	-0.11	
			For >10,000 To 20,000, Deduct	-0.17	
			For >20,000, Deduct	-0.23	
09 91	13 00-0100	SF	2 Coats Paint, Sprayed, Paint Exterior Stucco Walls.....	2.18	
			For Work >20' To 30' Above Floor, Add	0.33	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.15	
			For Work >15' To 20' Above Floor, Add	0.20	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.52	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.72	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.11	
			For >100 To 250, Add	0.54	
			For >250 To 500, Add	0.24	
			For >2,500 To 5,000, Deduct	-0.11	
			For >5,000 To 10,000, Deduct	-0.22	
			For >10,000 To 20,000, Deduct	-0.33	
			For >20,000, Deduct	-0.44	
09 91	13 00-0101		Paint Exterior Wood Siding (09 91 13 00-0001)		
09 91	13 00-0102		Paint Exterior Smooth Wood Siding (09 91 13 00-0101)		
			Note: Includes tongue and groove, beveled, drop or board and batten siding.		
09 91	13 00-0103	LF	1 Coat Paint, Cut-in Brush Work, Paint Exterior Wood Smooth Siding.....	0.21	
			For Work >20' To 30' Above Floor, Add	0.04	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.01	
			For Work >15' To 20' Above Floor, Add	0.02	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.06	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.09	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.13	
			For >100 To 250, Add	0.06	
			For >250 To 500, Add	0.03	
			For >2,500 To 5,000, Deduct	-0.01	
			For >5,000 To 10,000, Deduct	-0.02	
			For >10,000 To 20,000, Deduct	-0.03	
			For >20,000, Deduct	-0.04	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 13 00-0104	SF	1	Coat Primer, Brush Work, Paint Exterior Wood Smooth Siding	1.27	
			For Work >20' To 30' Above Floor, Add	0.22	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.08	
			For Work >15' To 20' Above Floor, Add	0.13	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.36	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.49	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.72	
			For >100 To 250, Add	0.35	
			For >250 To 500, Add	0.15	
			For >2,500 To 5,000, Deduct	-0.06	
			For >5,000 To 10,000, Deduct	-0.13	
			For >10,000 To 20,000, Deduct	-0.19	
			For >20,000, Deduct	-0.25	
09 91 13 00-0105	SF	1	Coat Paint, Brush Work, Paint Exterior Wood Smooth Siding	1.32	
			For Work >20' To 30' Above Floor, Add	0.25	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.08	
			For Work >15' To 20' Above Floor, Add	0.15	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.40	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.54	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.79	
			For >100 To 250, Add	0.38	
			For >250 To 500, Add	0.17	
			For >2,500 To 5,000, Deduct	-0.07	
			For >5,000 To 10,000, Deduct	-0.13	
			For >10,000 To 20,000, Deduct	-0.20	
			For >20,000, Deduct	-0.26	
09 91 13 00-0106	SF	2	Coats Paint, Brush Work, Paint Exterior Wood Smooth Siding	2.38	
			For Work >20' To 30' Above Floor, Add	0.43	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.15	
			For Work >15' To 20' Above Floor, Add	0.26	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.69	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.95	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.39	
			For >100 To 250, Add	0.67	
			For >250 To 500, Add	0.29	
			For >2,500 To 5,000, Deduct	-0.12	
			For >5,000 To 10,000, Deduct	-0.24	
			For >10,000 To 20,000, Deduct	-0.36	
			For >20,000, Deduct	-0.48	
09 91 13 00-0107	SF	1	Coat Primer, Brush/Roller Work, Paint Exterior Smooth Wood Siding	1.06	
			For Work >20' To 30' Above Floor, Add	0.16	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.08	
			For Work >15' To 20' Above Floor, Add	0.09	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.25	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.34	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.53	
			For >100 To 250, Add	0.26	
			For >250 To 500, Add	0.12	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.11	
			For >10,000 To 20,000, Deduct	-0.16	
			For >20,000, Deduct	-0.21	
09 91 13 00-0108	SF	1	Coat Paint, Brush/Roller Work, Paint Exterior Smooth Wood Siding	1.11	
			For Work >20' To 30' Above Floor, Add	0.18	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.07	
			For Work >15' To 20' Above Floor, Add	0.11	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.29	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.40	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.60	
			For >100 To 250, Add	0.29	
			For >250 To 500, Add	0.13	
			For >2,500 To 5,000, Deduct	-0.06	
			For >5,000 To 10,000, Deduct	-0.11	
			For >10,000 To 20,000, Deduct	-0.17	
			For >20,000, Deduct	-0.22	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0109 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Smooth Wood Siding	2.12	
For Work >20' To 30' Above Floor, Add	0.34	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.14	
For Work >15' To 20' Above Floor, Add	0.20	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.54	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.74	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.13	
For >100 To 250, Add	0.55	
For >250 To 500, Add	0.24	
For >2,500 To 5,000, Deduct	-0.11	
For >5,000 To 10,000, Deduct	-0.21	
For >10,000 To 20,000, Deduct	-0.32	
For >20,000, Deduct	-0.42	
09 91 13 00-0110 SF 1 Coat Primer, Sprayed, Paint Exterior Smooth Wood Siding	0.92	
For Work >20' To 30' Above Floor, Add	0.12	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.07	
For Work >15' To 20' Above Floor, Add	0.07	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.19	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.26	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.43	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.18	
09 91 13 00-0111 SF 1 Coat Paint, Sprayed, Paint Exterior Smooth Wood Siding.....	1.07	
For Work >20' To 30' Above Floor, Add	0.16	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.25	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.35	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.54	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 13 00-0112 SF 2 Coats Paint, Sprayed, Paint Exterior Smooth Wood Siding.....	1.75	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.37	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.51	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.82	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.26	
For >20,000, Deduct	-0.35	

09 91 13 00-0113 Paint Exterior Rough Wood Siding (09 91 13 00-0101)
 Note: Includes shingles, shakes or rough sawn siding.

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0114 SF 1 Coat Primer, Brush Work, Paint Exterior Wood Rough (Shingles, Shakes Or Rough Sawn) Siding	1.67	
For Work >20' To 30' Above Floor, Add	0.31	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.18	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.49	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.68	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.99	
For >100 To 250, Add	0.47	
For >250 To 500, Add	0.21	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000 To 20,000, Deduct	-0.25	
For >20,000, Deduct	-0.33	
09 91 13 00-0115 SF 1 Coat Paint, Brush Work, Paint Exterior Wood Rough (Shingles, Shakes Or Rough Sawn) Siding	1.62	
For Work >20' To 30' Above Floor, Add	0.32	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.19	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.52	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.71	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.02	
For >100 To 250, Add	0.48	
For >250 To 500, Add	0.21	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.32	
09 91 13 00-0116 SF 2 Coats Paint, Brush Work, Paint Exterior Wood Rough (Shingles, Shakes Or Rough Sawn) Siding	3.01	
For Work >20' To 30' Above Floor, Add	0.59	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.18	
For Work >15' To 20' Above Floor, Add	0.35	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.94	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.86	
For >100 To 250, Add	0.89	
For >250 To 500, Add	0.39	
For >2,500 To 5,000, Deduct	-0.15	
For >5,000 To 10,000, Deduct	-0.30	
For >10,000 To 20,000, Deduct	-0.45	
For >20,000, Deduct	-0.60	
09 91 13 00-0117 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Rough Wood Siding (Shingles, Shakes Or Rough Sawn)	1.62	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.79	
For >100 To 250, Add	0.39	
For >250 To 500, Add	0.17	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.32	
09 91 13 00-0118 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Rough Wood Siding (Shingles, Shakes Or Rough Sawn)	1.73	
For Work >20' To 30' Above Floor, Add	0.26	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.41	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.56	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.87	
For >100 To 250, Add	0.43	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000 To 20,000, Deduct	-0.26	
For >20,000, Deduct	-0.35	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0119 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Rough Wood Siding (Shingles, Shakes Or Rough Sawn).....	3.26	
For Work >20' To 30' Above Floor, Add	0.46	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.23	
For Work >15' To 20' Above Floor, Add	0.28	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.74	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.01	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.59	
For >100 To 250, Add	0.79	
For >250 To 500, Add	0.35	
For >2,500 To 5,000, Deduct	-0.16	
For >5,000 To 10,000, Deduct	-0.33	
For >10,000 To 20,000, Deduct	-0.49	
For >20,000, Deduct	-0.65	
09 91 13 00-0120 SF 1 Coat Primer, Sprayed, Paint Exterior Rough Wood Siding (Shingles, Shakes Or Rough Sawn).....	1.25	
For Work >20' To 30' Above Floor, Add	0.16	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.26	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.36	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.58	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 13 00-0121 SF 1 Coat Paint, Sprayed, Paint Exterior Rough Wood Siding (Shingles, Shakes Or Rough Sawn).....	1.38	
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.31	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.68	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.28	
09 91 13 00-0122 SF 2 Coats Paint, Sprayed, Paint Exterior Rough Wood Siding (Shingles, Shakes Or Rough Sawn).....	2.63	
For Work >20' To 30' Above Floor, Add	0.36	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.19	
For Work >15' To 20' Above Floor, Add	0.21	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.57	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.79	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.25	
For >100 To 250, Add	0.62	
For >250 To 500, Add	0.27	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.26	
For >10,000 To 20,000, Deduct	-0.39	
For >20,000, Deduct	-0.53	

09 91 13 00-0123 Paint Exterior Vinyl Siding (09 91 13 00-0001)

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0124	LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Vinyl Siding.....	0.17	
	For Work >20' To 30' Above Floor, Add	0.03	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.01	
	For Work >15' To 20' Above Floor, Add	0.02	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.04	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.06	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.09	
	For >100 To 250, Add	0.04	
	For >250 To 500, Add	0.02	
	For >2,500 To 5,000, Deduct	-0.01	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 20,000, Deduct	-0.03	
	For >20,000, Deduct	-0.03	
09 91 13 00-0125	SF 1 Coat Primer, Brush Work, Paint Exterior Vinyl Siding.....	0.99	
	For Work >20' To 30' Above Floor, Add	0.15	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.07	
	For Work >15' To 20' Above Floor, Add	0.09	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.24	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.34	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.51	
	For >100 To 250, Add	0.25	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.10	
	For >10,000 To 20,000, Deduct	-0.15	
	For >20,000, Deduct	-0.20	
09 91 13 00-0126	SF 1 Coat Paint, Brush Work, Paint Exterior Vinyl Siding.....	1.07	
	For Work >20' To 30' Above Floor, Add	0.17	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.07	
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.28	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.38	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.57	
	For >100 To 250, Add	0.28	
	For >250 To 500, Add	0.12	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.16	
	For >20,000, Deduct	-0.21	
09 91 13 00-0127	SF 2 Coats Paint, Brush Work, Paint Exterior Vinyl Siding.....	2.05	
	For Work >20' To 30' Above Floor, Add	0.31	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.14	
	For Work >15' To 20' Above Floor, Add	0.18	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.49	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.68	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.05	
	For >100 To 250, Add	0.51	
	For >250 To 500, Add	0.23	
	For >2,500 To 5,000, Deduct	-0.10	
	For >5,000 To 10,000, Deduct	-0.21	
	For >10,000 To 20,000, Deduct	-0.31	
	For >20,000, Deduct	-0.41	
09 91 13 00-0128	SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Vinyl Siding.....	0.95	
	For Work >20' To 30' Above Floor, Add	0.13	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.07	
	For Work >15' To 20' Above Floor, Add	0.08	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.20	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.28	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.45	
	For >100 To 250, Add	0.22	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.10	
	For >10,000 To 20,000, Deduct	-0.14	
	For >20,000, Deduct	-0.19	



		Finishes	09
		Painting and Coating	09 90
		Painting	09 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0129	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Vinyl Siding.....	0.95	
			For Work >20' To 30' Above Floor, Add	0.13	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.07	
			For Work >15' To 20' Above Floor, Add	0.08	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.20	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.28	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.45	
			For >100 To 250, Add	0.22	
			For >250 To 500, Add	0.10	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.10	
			For >10,000 To 20,000, Deduct	-0.14	
			For >20,000, Deduct	-0.19	
09 91	13 00-0130	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Vinyl Siding.....	1.79	
			For Work >20' To 30' Above Floor, Add	0.23	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.13	
			For Work >15' To 20' Above Floor, Add	0.14	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.36	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.50	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.81	
			For >100 To 250, Add	0.41	
			For >250 To 500, Add	0.18	
			For >2,500 To 5,000, Deduct	-0.09	
			For >5,000 To 10,000, Deduct	-0.18	
			For >10,000 To 20,000, Deduct	-0.27	
			For >20,000, Deduct	-0.36	
09 91	13 00-0131	SF	1 Coat Primer, Sprayed, Paint Exterior Vinyl Siding.....	0.94	
			For Work >20' To 30' Above Floor, Add	0.10	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.07	
			For Work >15' To 20' Above Floor, Add	0.06	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.16	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.21	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.38	
			For >100 To 250, Add	0.19	
			For >250 To 500, Add	0.09	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.09	
			For >10,000 To 20,000, Deduct	-0.14	
			For >20,000, Deduct	-0.19	
09 91	13 00-0132	SF	1 Coat Paint, Sprayed, Paint Exterior Vinyl Siding.....	1.10	
			For Work >20' To 30' Above Floor, Add	0.10	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.09	
			For Work >15' To 20' Above Floor, Add	0.06	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.16	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.21	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.40	
			For >100 To 250, Add	0.21	
			For >250 To 500, Add	0.09	
			For >2,500 To 5,000, Deduct	-0.06	
			For >5,000 To 10,000, Deduct	-0.11	
			For >10,000 To 20,000, Deduct	-0.17	
			For >20,000, Deduct	-0.22	
09 91	13 00-0133	SF	2 Coats Paint, Sprayed, Paint Exterior Vinyl Siding.....	2.15	
			For Work >20' To 30' Above Floor, Add	0.20	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.18	
			For Work >15' To 20' Above Floor, Add	0.12	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.31	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.43	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.79	
			For >100 To 250, Add	0.41	
			For >250 To 500, Add	0.19	
			For >2,500 To 5,000, Deduct	-0.11	
			For >5,000 To 10,000, Deduct	-0.22	
			For >10,000 To 20,000, Deduct	-0.32	
			For >20,000, Deduct	-0.43	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 13 00-0134	Paint Exterior Ceilings <small>(09 91 13)</small>	
09 91 13 00-0135	Paint Exterior Concrete Ceilings <small>(09 91 13 00-0134)</small>	
09 91 13 00-0136	LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Concrete Ceiling	0.17
	For Work >20' To 30' Above Floor, Add	0.03
	Note: Applied only to work area above 20'.	
	For Oil Based Paint, Add	0.01
	For Epoxy Paint, Add	0.02
	For Work >15' To 20' Above Floor, Add	0.02
	Note: Applied only to work area above 15' to 20'.	
	For Work >30' To 40' Above Floor, Add	0.05
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.07
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.10
	For >100 To 250, Add	0.05
	For >250 To 500, Add	0.02
	For >2,500 To 5,000, Deduct	-0.01
	For >5,000 To 10,000, Deduct	-0.02
	For >10,000 To 20,000, Deduct	-0.03
	For >20,000, Deduct	-0.03
09 91 13 00-0137	SF 1 Coat Filler, Brush Work, Paint Exterior Concrete Ceiling	0.98
	For Work >20' To 30' Above Floor, Add	0.18
	Note: Applied only to work area above 20'.	
	For Oil Based Paint, Add	0.06
	For Epoxy Paint, Add	0.13
	For Work >15' To 20' Above Floor, Add	0.11
	Note: Applied only to work area above 15' to 20'.	
	For Work >30' To 40' Above Floor, Add	0.28
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.39
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.57
	For >100 To 250, Add	0.28
	For >250 To 500, Add	0.12
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.10
	For >10,000 To 20,000, Deduct	-0.15
	For >20,000, Deduct	-0.20
09 91 13 00-0138	SF 1 Coat Paint, Brush Work, Paint Exterior Concrete Ceiling	1.03
	For Work >20' To 30' Above Floor, Add	0.20
	Note: Applied only to work area above 20'.	
	For Oil Based Paint, Add	0.06
	For Epoxy Paint, Add	0.12
	For Work >15' To 20' Above Floor, Add	0.12
	Note: Applied only to work area above 15' to 20'.	
	For Work >30' To 40' Above Floor, Add	0.32
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.45
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.64
	For >100 To 250, Add	0.31
	For >250 To 500, Add	0.13
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.10
	For >10,000 To 20,000, Deduct	-0.15
	For >20,000, Deduct	-0.21
09 91 13 00-0139	SF 2 Coats Paint, Brush Work, Paint Exterior Concrete Ceiling	1.87
	For Work >20' To 30' Above Floor, Add	0.36
	Note: Applied only to work area above 20'.	
	For Oil Based Paint, Add	0.12
	For Epoxy Paint, Add	0.23
	For Work >15' To 20' Above Floor, Add	0.21
	Note: Applied only to work area above 15' to 20'.	
	For Work >30' To 40' Above Floor, Add	0.57
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.79
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	1.14
	For >100 To 250, Add	0.54
	For >250 To 500, Add	0.24
	For >2,500 To 5,000, Deduct	-0.09
	For >5,000 To 10,000, Deduct	-0.19
	For >10,000 To 20,000, Deduct	-0.28
	For >20,000, Deduct	-0.37



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0140 SF 1 Coat Filler, Brush/Roller Work, Paint Exterior Concrete Ceiling.....	0.78	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.20	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.28	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.42	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
09 91 13 00-0141 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Concrete Ceiling	0.83	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.49	
For >100 To 250, Add	0.24	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.17	
09 91 13 00-0142 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Concrete Ceiling	1.57	
For Work >20' To 30' Above Floor, Add	0.28	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.10	
For Epoxy Paint, Add	0.21	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.45	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.62	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.91	
For >100 To 250, Add	0.44	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.31	
09 91 13 00-0143 SF 1 Coat Filler, Sprayed, Paint Exterior Concrete Ceiling	0.72	
For Work >20' To 30' Above Floor, Add	0.10	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.14	
For Work >15' To 20' Above Floor, Add	0.06	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.16	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.21	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.34	
For >100 To 250, Add	0.17	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.14	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0144 SF 1 Coat Paint, Sprayed, Paint Exterior Concrete Ceiling.....	0.79	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.43	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
09 91 13 00-0145 SF 2 Coats Paint, Sprayed, Paint Exterior Concrete Ceiling.....	1.33	
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.09	
For Epoxy Paint, Add	0.23	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.31	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
09 91 13 00-0146 Drywall/Plaster^(09 91 13 00-0134)		
09 91 13 00-0147 LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Drywall/Plaster Ceiling.....	0.17	
For Work >20' To 30' Above Floor, Add	0.03	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.01	
For Epoxy Paint, Add	0.02	
For Epoxy Paint, Add	0.02	
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.05	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.07	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.10	
For >100 To 250, Add	0.05	
For >250 To 500, Add	0.02	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.03	
09 91 13 00-0148 SF 1 Coat Primer, Brush Work, Paint Exterior Drywall/Plaster Ceiling.....	0.99	
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.06	
For Orange Peel Finish, Add	0.13	
For Epoxy Paint, Add	0.13	
For Epoxy Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.58	
For >100 To 250, Add	0.28	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0149	SF	1 Coat Paint, Brush Work, Paint Exterior Drywall/Plaster Ceiling	1.04	
			For Work >20' To 30' Above Floor, Add	0.21	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.06	
			For Orange Peel Finish, Add	0.14	
			For Epoxy Paint, Add	0.12	
			For Epoxy Paint, Add	0.12	
			For Work >15' To 20' Above Floor, Add	0.12	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.33	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.45	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.65	
			For >100 To 250, Add	0.31	
			For >250 To 500, Add	0.13	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.10	
			For >10,000 To 20,000, Deduct	-0.16	
			For >20,000, Deduct	-0.21	
09 91	13 00-0150	SF	2 Coats Paint, Brush Work, Paint Exterior Drywall/Plaster Ceiling	1.87	
			For Work >20' To 30' Above Floor, Add	0.36	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.12	
			For Orange Peel Finish, Add	0.25	
			For Epoxy Paint, Add	0.23	
			For Epoxy Paint, Add	0.23	
			For Work >15' To 20' Above Floor, Add	0.21	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.57	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.79	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.14	
			For >100 To 250, Add	0.54	
			For >250 To 500, Add	0.24	
			For >2,500 To 5,000, Deduct	-0.09	
			For >5,000 To 10,000, Deduct	-0.19	
			For >10,000 To 20,000, Deduct	-0.28	
			For >20,000, Deduct	-0.37	
09 91	13 00-0151	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Drywall/Plaster Ceiling	0.77	
			For Work >20' To 30' Above Floor, Add	0.13	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.05	
			For Orange Peel Finish, Add	0.10	
			For Epoxy Paint, Add	0.12	
			For Epoxy Paint, Add	0.12	
			For Work >15' To 20' Above Floor, Add	0.08	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.20	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.28	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.42	
			For >100 To 250, Add	0.20	
			For >250 To 500, Add	0.09	
			For >2,500 To 5,000, Deduct	-0.04	
			For >5,000 To 10,000, Deduct	-0.08	
			For >10,000 To 20,000, Deduct	-0.12	
			For >20,000, Deduct	-0.15	
09 91	13 00-0152	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Drywall/Plaster Ceiling.....	0.83	
			For Work >20' To 30' Above Floor, Add	0.15	
			Note: Applied only to work area above 20'.		
			For Oil Based Paint, Add	0.05	
			For Orange Peel Finish, Add	0.11	
			For Epoxy Paint, Add	0.11	
			For Epoxy Paint, Add	0.11	
			For Work >15' To 20' Above Floor, Add	0.09	
			Note: Applied only to work area above 15' to 20'.		
			For Work >30' To 40' Above Floor, Add	0.24	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.34	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.49	
			For >100 To 250, Add	0.24	
			For >250 To 500, Add	0.10	
			For >2,500 To 5,000, Deduct	-0.04	
			For >5,000 To 10,000, Deduct	-0.08	
			For >10,000 To 20,000, Deduct	-0.12	
			For >20,000, Deduct	-0.17	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0153	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Drywall/Plaster Ceiling 1.56		
	For Work >20' To 30' Above Floor, Add	0.28	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.10	
	For Orange Peel Finish, Add	0.21	
	For Epoxy Paint, Add	0.21	
	For Epoxy Paint, Add	0.21	
	For Work >15' To 20' Above Floor, Add	0.17	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.45	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.62	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.91	
	For >100 To 250, Add	0.44	
	For >250 To 500, Add	0.19	
	For >2,500 To 5,000, Deduct	-0.08	
	For >5,000 To 10,000, Deduct	-0.16	
	For >10,000 To 20,000, Deduct	-0.23	
	For >20,000, Deduct	-0.31	
09 91 13 00-0154	SF 1 Coat Primer, Sprayed, Paint Exterior Drywall/Plaster Ceiling 0.71		
	For Work >20' To 30' Above Floor, Add	0.10	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.13	
	For Epoxy Paint, Add	0.13	
	For Work >15' To 20' Above Floor, Add	0.06	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.15	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.21	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.33	
	For >100 To 250, Add	0.17	
	For >250 To 500, Add	0.07	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.07	
	For >10,000 To 20,000, Deduct	-0.11	
	For >20,000, Deduct	-0.14	
09 91 13 00-0155	SF 1 Coat Paint, Sprayed, Paint Exterior Drywall/Plaster Ceiling 0.79		
	For Work >20' To 30' Above Floor, Add	0.13	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.12	
	For Epoxy Paint, Add	0.12	
	For Work >15' To 20' Above Floor, Add	0.08	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.21	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.29	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.43	
	For >100 To 250, Add	0.21	
	For >250 To 500, Add	0.09	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.08	
	For >10,000 To 20,000, Deduct	-0.12	
	For >20,000, Deduct	-0.16	
09 91 13 00-0156	SF 2 Coats Paint, Sprayed, Paint Exterior Drywall/Plaster Ceiling 1.33		
	For Work >20' To 30' Above Floor, Add	0.20	
	Note: Applied only to work area above 20'.		
	For Oil Based Paint, Add	0.09	
	For Epoxy Paint, Add	0.23	
	For Epoxy Paint, Add	0.23	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.31	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.43	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.67	
	For >100 To 250, Add	0.33	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.07	
	For >5,000 To 10,000, Deduct	-0.13	
	For >10,000 To 20,000, Deduct	-0.20	
	For >20,000, Deduct	-0.27	

09 91 13 00-0157 Paint Exterior Wood Ceilings (09 91 13 00-0134)

09 91 13 00-0158 Paint Exterior Smooth Wood Ceilings (09 91 13 00-0157)



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0159 LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Wood Smooth Ceiling.....	0.20	
For Work >20' To 30' Above Floor, Add	0.04	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.01	
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.06	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.08	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.12	
For >100 To 250, Add	0.06	
For >250 To 500, Add	0.03	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.04	
09 91 13 00-0160 SF 1 Coat Primer, Brush Work, Paint Exterior Wood Smooth Ceiling.....	1.23	
For Work >20' To 30' Above Floor, Add	0.21	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.34	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.47	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.69	
For >100 To 250, Add	0.34	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.25	
09 91 13 00-0161 SF 1 Coat Paint, Brush Work, Paint Exterior Wood Smooth Ceiling.....	1.25	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.37	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.51	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.74	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 13 00-0162 SF 2 Coats Paint, Brush Work, Paint Exterior Wood Smooth Ceiling.....	2.30	
For Work >20' To 30' Above Floor, Add	0.41	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.15	
For Work >15' To 20' Above Floor, Add	0.25	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.66	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.90	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.33	
For >100 To 250, Add	0.64	
For >250 To 500, Add	0.28	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.23	
For >10,000 To 20,000, Deduct	-0.35	
For >20,000, Deduct	-0.46	
09 91 13 00-0163 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Smooth Wood Ceiling.....	1.05	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.07	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.52	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0164 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Smooth Wood Ceiling	1.09	
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.07	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.28	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.39	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.22	
09 91 13 00-0165 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Smooth Wood Ceiling	2.00	
For Work >20' To 30' Above Floor, Add	0.31	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.14	
For Work >15' To 20' Above Floor, Add	0.18	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.49	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.68	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.04	
For >100 To 250, Add	0.51	
For >250 To 500, Add	0.22	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.20	
For >10,000 To 20,000, Deduct	-0.30	
For >20,000, Deduct	-0.40	
09 91 13 00-0166 SF 1 Coat Primer, Sprayed, Paint Exterior Smooth Wood Ceiling	0.85	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.06	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.17	
09 91 13 00-0167 SF 1 Coat Paint, Sprayed, Paint Exterior Smooth Wood Ceiling	0.85	
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.06	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.17	
09 91 13 00-0168 SF 2 Coats Paint, Sprayed, Paint Exterior Smooth Wood Ceiling	1.57	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.78	
For >100 To 250, Add	0.38	
For >250 To 500, Add	0.17	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.31	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0169 Paint Exterior Rough Wood Ceilings (09 91 13 00-0157)		
09 91 13 00-0170 SF 1 Coat Primer, Brush Work, Paint Exterior Wood Rough Ceiling.....	1.83	
For Work >20' To 30' Above Floor, Add	0.32	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.19	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.51	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.70	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.04	
For >100 To 250, Add	0.50	
For >250 To 500, Add	0.22	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.27	
For >20,000, Deduct	-0.37	
09 91 13 00-0171 SF 1 Coat Paint, Brush Work, Paint Exterior Wood Rough Ceiling.....	1.76	
For Work >20' To 30' Above Floor, Add	0.36	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.21	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.57	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.79	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.12	
For >100 To 250, Add	0.53	
For >250 To 500, Add	0.23	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.26	
For >20,000, Deduct	-0.35	
09 91 13 00-0172 SF 2 Coats Paint, Brush Work, Paint Exterior Wood Rough Ceiling.....	3.11	
For Work >20' To 30' Above Floor, Add	0.61	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.19	
For Work >15' To 20' Above Floor, Add	0.37	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.98	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.35	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.94	
For >100 To 250, Add	0.92	
For >250 To 500, Add	0.40	
For >2,500 To 5,000, Deduct	-0.16	
For >5,000 To 10,000, Deduct	-0.31	
For >10,000 To 20,000, Deduct	-0.47	
For >20,000, Deduct	-0.62	
09 91 13 00-0173 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Rough Wood Ceiling.....	1.73	
For Work >20' To 30' Above Floor, Add	0.26	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.41	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.56	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.87	
For >100 To 250, Add	0.43	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000 To 20,000, Deduct	-0.26	
For >20,000, Deduct	-0.35	
09 91 13 00-0174 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Rough Wood Ceiling.....	1.83	
For Work >20' To 30' Above Floor, Add	0.28	
Note: Applied only to work area above 20'.		
For Oil Based Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.45	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.62	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.95	
For >100 To 250, Add	0.46	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.27	
For >20,000, Deduct	-0.37	

09 Finishes**09 90 Painting and Coating****09 91 Painting**

Los Angeles County Development Authority

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 13 00-0175	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Rough Wood Ceiling	3.35
	<i>For Work >20' To 30' Above Floor, Add</i>	0.48
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Oil Based Paint, Add</i>	0.24
	<i>For Work >15' To 20' Above Floor, Add</i>	0.29
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.77
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	1.06
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	1.66
	<i>For >100 To 250, Add</i>	0.82
	<i>For >250 To 500, Add</i>	0.36
	<i>For >2,500 To 5,000, Deduct</i>	-0.17
	<i>For >5,000 To 10,000, Deduct</i>	-0.34
	<i>For >10,000 To 20,000, Deduct</i>	-0.50
	<i>For >20,000, Deduct</i>	-0.67
09 91 13 00-0176	SF 1 Coat Primer, Sprayed, Paint Exterior Rough Wood Ceiling	1.37
	<i>For Work >20' To 30' Above Floor, Add</i>	0.19
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Oil Based Paint, Add</i>	0.10
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.31
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.42
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	0.67
	<i>For >100 To 250, Add</i>	0.33
	<i>For >250 To 500, Add</i>	0.15
	<i>For >2,500 To 5,000, Deduct</i>	-0.07
	<i>For >5,000 To 10,000, Deduct</i>	-0.14
	<i>For >10,000 To 20,000, Deduct</i>	-0.21
	<i>For >20,000, Deduct</i>	-0.27
09 91 13 00-0177	SF 1 Coat Paint, Sprayed, Paint Exterior Rough Wood Ceiling.....	1.51
	<i>For Work >20' To 30' Above Floor, Add</i>	0.23
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Oil Based Paint, Add</i>	0.11
	<i>For Work >15' To 20' Above Floor, Add</i>	0.14
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.36
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.50
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	0.77
	<i>For >100 To 250, Add</i>	0.38
	<i>For >250 To 500, Add</i>	0.17
	<i>For >2,500 To 5,000, Deduct</i>	-0.08
	<i>For >5,000 To 10,000, Deduct</i>	-0.15
	<i>For >10,000 To 20,000, Deduct</i>	-0.23
	<i>For >20,000, Deduct</i>	-0.30
09 91 13 00-0178	SF 2 Coats Paint, Sprayed, Paint Exterior Rough Wood Ceiling.....	2.76
	<i>For Work >20' To 30' Above Floor, Add</i>	0.39
	<i>Note: Applied only to work area above 20'.</i>	
	<i>For Oil Based Paint, Add</i>	0.20
	<i>For Work >15' To 20' Above Floor, Add</i>	0.23
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	0.62
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	0.86
	<i>Note: Applied only to work area above 40'.</i>	
	<i>For Up To 100, Add</i>	1.35
	<i>For >100 To 250, Add</i>	0.67
	<i>For >250 To 500, Add</i>	0.29
	<i>For >2,500 To 5,000, Deduct</i>	-0.14
	<i>For >5,000 To 10,000, Deduct</i>	-0.28
	<i>For >10,000 To 20,000, Deduct</i>	-0.41
	<i>For >20,000, Deduct</i>	-0.55

09 91 13 00-0179 Paint Exterior Metal Ceilings (09 91 13 00-0134)

09 91 13 00-0180 Paint Exterior Galvanized Ceilings (09 91 13 00-0179)
Note: Linseed oil or acrylic latex paint.



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0181 SF 1 Coat Primer, Brush Work, Paint Exterior Galvanized Ceiling.....	1.27	
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.45	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.68	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 13 00-0182 SF 1 Coat Paint, Brush Work, Paint Exterior Galvanized Ceiling.....	1.37	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.75	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.27	
09 91 13 00-0183 SF 2 Coats Paint, Brush Work, Paint Exterior Galvanized Ceiling.....	2.55	
For Work >20' To 30' Above Floor, Add	0.41	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.25	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.66	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.90	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.37	
For >100 To 250, Add	0.67	
For >250 To 500, Add	0.29	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.26	
For >10,000 To 20,000, Deduct	-0.38	
For >20,000, Deduct	-0.51	
09 91 13 00-0184 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Galvanized Ceiling.....	0.99	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.51	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	
09 91 13 00-0185 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Galvanized Ceiling.....	1.09	
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.28	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.39	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.22	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0186	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Galvanized Ceiling.....	1.98	
	For Work >20' To 30' Above Floor, Add	0.31	
	Note: Applied only to work area above 20'.		
	For Work >15' To 20' Above Floor, Add	0.18	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.49	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.68	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.04	
	For >100 To 250, Add	0.51	
	For >250 To 500, Add	0.22	
	For >2,500 To 5,000, Deduct	-0.10	
	For >5,000 To 10,000, Deduct	-0.20	
	For >10,000 To 20,000, Deduct	-0.30	
	For >20,000, Deduct	-0.40	
09 91 13 00-0187	SF 1 Coat Primer, Sprayed, Paint Exterior Galvanized Ceiling.....	1.05	
	For Work >20' To 30' Above Floor, Add	0.13	
	Note: Applied only to work area above 20'.		
	For Work >15' To 20' Above Floor, Add	0.08	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.21	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.29	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.47	
	For >100 To 250, Add	0.24	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.16	
	For >20,000, Deduct	-0.21	
09 91 13 00-0188	SF 1 Coat Paint, Sprayed, Paint Exterior Galvanized Ceiling.....	1.17	
	For Work >20' To 30' Above Floor, Add	0.16	
	Note: Applied only to work area above 20'.		
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.26	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.35	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.56	
	For >100 To 250, Add	0.28	
	For >250 To 500, Add	0.12	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.12	
	For >10,000 To 20,000, Deduct	-0.18	
	For >20,000, Deduct	-0.23	
09 91 13 00-0189	SF 2 Coats Paint, Sprayed, Paint Exterior Galvanized Ceiling.....	1.97	
	For Work >20' To 30' Above Floor, Add	0.23	
	Note: Applied only to work area above 20'.		
	For Work >15' To 20' Above Floor, Add	0.14	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.36	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.50	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.84	
	For >100 To 250, Add	0.42	
	For >250 To 500, Add	0.19	
	For >2,500 To 5,000, Deduct	-0.10	
	For >5,000 To 10,000, Deduct	-0.20	
	For >10,000 To 20,000, Deduct	-0.30	
	For >20,000, Deduct	-0.39	
09 91 13 00-0190	Paint Exterior Aluminum And Aluminum Alloy Ceilings (09 91 13 00-0179)		
	Note: Alkyd enamel paint.		
09 91 13 00-0191	SF 1 Coat Primer, Brush Work, Paint Exterior Aluminum And Aluminum Alloy Ceiling.....	1.27	
	For Work >20' To 30' Above Floor, Add	0.20	
	Note: Applied only to work area above 20'.		
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >30' To 40' Above Floor, Add	0.32	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.45	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.68	
	For >100 To 250, Add	0.33	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.13	
	For >10,000 To 20,000, Deduct	-0.19	
	For >20,000, Deduct	-0.25	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0192 SF 1 Coat Paint, Brush Work, Paint Exterior Aluminum And Aluminum Alloy Ceiling	1.37	
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.75	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.27	
09 91 13 00-0193 SF 2 Coats Paint, Brush Work, Paint Exterior Aluminum And Aluminum Alloy Ceiling	2.55	
For Work >20' To 30' Above Floor, Add	0.41	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.25	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.66	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.90	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.37	
For >100 To 250, Add	0.67	
For >250 To 500, Add	0.29	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.26	
For >10,000 To 20,000, Deduct	-0.38	
For >20,000, Deduct	-0.51	
09 91 13 00-0194 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Aluminum And Aluminum Alloy Ceiling	1.14	
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.24	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.54	
For >100 To 250, Add	0.27	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.23	
09 91 13 00-0195 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Aluminum And Aluminum Alloy Ceiling.....	1.24	
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.28	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.39	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.61	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 13 00-0196 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Aluminum And Aluminum Alloy Ceiling	2.29	
For Work >20' To 30' Above Floor, Add	0.31	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.18	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.49	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.68	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.08	
For >100 To 250, Add	0.54	
For >250 To 500, Add	0.24	
For >2,500 To 5,000, Deduct	-0.11	
For >5,000 To 10,000, Deduct	-0.23	
For >10,000 To 20,000, Deduct	-0.34	
For >20,000, Deduct	-0.46	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0197	SF 1 Coat Primer, Sprayed, Paint Exterior Aluminum And Aluminum Alloy Ceiling	1.05	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.29	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.47	
	<i>For >100 To 250, Add</i>	0.24	
	<i>For >250 To 500, Add</i>	0.10	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.11	
	<i>For >10,000 To 20,000, Deduct</i>	-0.16	
	<i>For >20,000, Deduct</i>	-0.21	
09 91 13 00-0198	SF 1 Coat Paint, Sprayed, Paint Exterior Aluminum And Aluminum Alloy Ceiling.....	1.05	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.29	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.47	
	<i>For >100 To 250, Add</i>	0.24	
	<i>For >250 To 500, Add</i>	0.10	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.11	
	<i>For >10,000 To 20,000, Deduct</i>	-0.16	
	<i>For >20,000, Deduct</i>	-0.21	
09 91 13 00-0199	SF 2 Coats Paint, Sprayed, Paint Exterior Aluminum And Aluminum Alloy Ceiling.....	1.97	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.36	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.50	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.84	
	<i>For >100 To 250, Add</i>	0.42	
	<i>For >250 To 500, Add</i>	0.19	
	<i>For >2,500 To 5,000, Deduct</i>	-0.10	
	<i>For >5,000 To 10,000, Deduct</i>	-0.20	
	<i>For >10,000 To 20,000, Deduct</i>	-0.30	
	<i>For >20,000, Deduct</i>	-0.39	
09 91 13 00-0200	Paint Exterior Corrugated Metal Ceilings (09 91 13 00-0179)		
09 91 13 00-0201	SF 1 Coat Primer, Sprayed, Paint Exterior Corrugated Metal Ceiling	1.17	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.14	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.22	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.31	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.51	
	<i>For >100 To 250, Add</i>	0.26	
	<i>For >250 To 500, Add</i>	0.11	
	<i>For >2,500 To 5,000, Deduct</i>	-0.06	
	<i>For >5,000 To 10,000, Deduct</i>	-0.12	
	<i>For >10,000 To 20,000, Deduct</i>	-0.18	
	<i>For >20,000, Deduct</i>	-0.23	
09 91 13 00-0202	SF 1 Coat Paint, Sprayed, Paint Exterior Corrugated Metal Ceiling.....	1.31	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.18	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.28	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.39	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.62	
	<i>For >100 To 250, Add</i>	0.31	
	<i>For >250 To 500, Add</i>	0.14	
	<i>For >2,500 To 5,000, Deduct</i>	-0.07	
	<i>For >5,000 To 10,000, Deduct</i>	-0.13	
	<i>For >10,000 To 20,000, Deduct</i>	-0.20	
	<i>For >20,000, Deduct</i>	-0.26	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0203 SF 2 Coats Paint, Sprayed, Paint Exterior Corrugated Metal Ceiling.....	2.41	
For Work >20' To 30' Above Floor, Add	0.30	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.18	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.48	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.66	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.08	
For >100 To 250, Add	0.54	
For >250 To 500, Add	0.24	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.24	
For >10,000 To 20,000, Deduct	-0.36	
For >20,000, Deduct	-0.48	
 09 91 13 00-0204 Paint Exterior Floors (09 91 13)		
09 91 13 00-0205 Paint Exterior Concrete Floors (09 91 13 00-0204)		
09 91 13 00-0206 LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Concrete Floors And Decks.....	0.14	
For Up To 100, Add	0.08	
For >100 To 250, Add	0.04	
For >250 To 500, Add	0.02	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.01	
For >10,000 To 20,000, Deduct	-0.02	
For >20,000, Deduct	-0.03	
09 91 13 00-0207 SF 1 Coat Primer, Brush Work, Paint Exterior Concrete Floors And Decks.....	0.78	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.12	
For Up To 100, Add	0.42	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
09 91 13 00-0208 SF 1 Coat Paint, Brush Work, Paint Exterior Concrete Floors And Decks.....	0.83	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.11	
For Up To 100, Add	0.49	
For >100 To 250, Add	0.24	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.17	
09 91 13 00-0209 SF 2 Coats Paint, Brush Work, Paint Exterior Concrete Floors And Decks.....	1.57	
For Oil Based Paint, Add	0.10	
For Epoxy Paint, Add	0.21	
For Up To 100, Add	0.91	
For >100 To 250, Add	0.44	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.31	
09 91 13 00-0210 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Concrete Floors And Decks.....	0.67	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.11	
For Up To 100, Add	0.34	
For >100 To 250, Add	0.17	
For >250 To 500, Add	0.07	
For >2,500 To 5,000, Deduct	-0.03	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.10	
For >20,000, Deduct	-0.13	
09 91 13 00-0211 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Concrete Floors And Decks.....	0.73	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.10	
For Up To 100, Add	0.42	
For >100 To 250, Add	0.20	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.15	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0212	SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Concrete Floors And Decks	1.24	
	For Oil Based Paint, Add	0.08	
	For Epoxy Paint, Add	0.19	
	For Up To 100, Add	0.67	
	For >100 To 250, Add	0.32	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.12	
	For >10,000 To 20,000, Deduct	-0.19	
	For >20,000, Deduct	-0.25	
09 91 13 00-0213	SF 1 Coat Primer, Sprayed, Paint Exterior Concrete Floors And Decks	0.59	
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.13	
	For Up To 100, Add	0.24	
	For >100 To 250, Add	0.12	
	For >250 To 500, Add	0.06	
	For >2,500 To 5,000, Deduct	-0.03	
	For >5,000 To 10,000, Deduct	-0.06	
	For >10,000 To 20,000, Deduct	-0.09	
	For >20,000, Deduct	-0.12	
09 91 13 00-0214	SF 1 Coat Paint, Sprayed, Paint Exterior Concrete Floors And Decks	0.65	
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.11	
	For Up To 100, Add	0.33	
	For >100 To 250, Add	0.16	
	For >250 To 500, Add	0.07	
	For >2,500 To 5,000, Deduct	-0.03	
	For >5,000 To 10,000, Deduct	-0.07	
	For >10,000 To 20,000, Deduct	-0.10	
	For >20,000, Deduct	-0.13	
09 91 13 00-0215	SF 2 Coats Paint, Sprayed, Paint Exterior Concrete Floors And Decks	1.20	
	For Oil Based Paint, Add	0.09	
	For Epoxy Paint, Add	0.23	
	For Up To 100, Add	0.57	
	For >100 To 250, Add	0.28	
	For >250 To 500, Add	0.13	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.12	
	For >10,000 To 20,000, Deduct	-0.18	
	For >20,000, Deduct	-0.24	
09 91 13 00-0216	SF 1 Coat Non-Slip Paint, Brush/Roller Work, Paint Exterior Concrete Floors And Decks	2.11	
	For Up To 100, Add	0.62	
	For >100 To 250, Add	0.34	
	For >250 To 500, Add	0.16	
	For >2,500 To 5,000, Deduct	-0.11	
	For >5,000 To 10,000, Deduct	-0.21	
	For >10,000 To 20,000, Deduct	-0.32	
	For >20,000, Deduct	-0.42	
09 91 13 00-0217	SF 1 Coat Anti-Slip Paint, Single Component Epoxy Coating, Brush/Roller Work, Paint Exterior Concrete Floors And Decks	5.18	
	For Up To 100, Add	1.08	
	For >100 To 250, Add	0.65	
	For >250 To 500, Add	0.31	
	For >2,500 To 5,000, Deduct	-0.26	
	For >5,000 To 10,000, Deduct	-0.52	
	For >10,000 To 20,000, Deduct	-0.78	
	For >20,000, Deduct	-1.04	
09 91 13 00-0218	SF 1 Coat Anti-Slip Paint, High Performance Epoxy Coating, Brush/Roller Work, Paint Exterior Concrete Floors And Decks	6.47	
	For Up To 100, Add	1.28	
	For >100 To 250, Add	0.77	
	For >250 To 500, Add	0.37	
	For >2,500 To 5,000, Deduct	-0.32	
	For >5,000 To 10,000, Deduct	-0.65	
	For >10,000 To 20,000, Deduct	-0.97	
	For >20,000, Deduct	-1.29	
09 91 13 00-0219	Paint Exterior Wood Floors (09 91 13 00-0204)		
09 91 13 00-0220	LF 1 Coat Paint, Cut-in Brush Work, Paint Exterior Wood Floors And Decks	0.17	
	For Up To 100, Add	0.10	
	For >100 To 250, Add	0.05	
	For >250 To 500, Add	0.02	
	For >2,500 To 5,000, Deduct	-0.01	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 20,000, Deduct	-0.03	
	For >20,000, Deduct	-0.03	
09 91 13 00-0221	SF 1 Coat Primer, Brush Work, Paint Exterior Wood Floors And Decks	1.00	
	For Oil Based Paint, Add	0.07	
	For Up To 100, Add	0.52	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.10	
	For >10,000 To 20,000, Deduct	-0.15	
	For >20,000, Deduct	-0.20	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0222 SF 1 Coat Paint, Brush Work, Paint Exterior Wood Floors And Decks	1.04	
<i>For Oil Based Paint, Add</i>	0.07	
<i>For Up To 100, Add</i>	0.58	
<i>For >100 To 250, Add</i>	0.28	
<i>For >250 To 500, Add</i>	0.12	
<i>For >2,500 To 5,000, Deduct</i>	-0.05	
<i>For >5,000 To 10,000, Deduct</i>	-0.10	
<i>For >10,000 To 20,000, Deduct</i>	-0.16	
<i>For >20,000, Deduct</i>	-0.21	
09 91 13 00-0223 SF 2 Coats Paint, Brush Work, Paint Exterior Wood Floors And Decks.....	1.98	
<i>For Oil Based Paint, Add</i>	0.13	
<i>For Up To 100, Add</i>	1.09	
<i>For >100 To 250, Add</i>	0.53	
<i>For >250 To 500, Add</i>	0.23	
<i>For >2,500 To 5,000, Deduct</i>	-0.10	
<i>For >5,000 To 10,000, Deduct</i>	-0.20	
<i>For >10,000 To 20,000, Deduct</i>	-0.30	
<i>For >20,000, Deduct</i>	-0.40	
09 91 13 00-0224 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Floors And Decks.....	0.96	
<i>For Oil Based Paint, Add</i>	0.07	
<i>For Up To 100, Add</i>	0.46	
<i>For >100 To 250, Add</i>	0.23	
<i>For >250 To 500, Add</i>	0.10	
<i>For >2,500 To 5,000, Deduct</i>	-0.05	
<i>For >5,000 To 10,000, Deduct</i>	-0.10	
<i>For >10,000 To 20,000, Deduct</i>	-0.14	
<i>For >20,000, Deduct</i>	-0.19	
09 91 13 00-0225 SF 1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Floors And Decks	0.99	
<i>For Oil Based Paint, Add</i>	0.07	
<i>For Up To 100, Add</i>	0.51	
<i>For >100 To 250, Add</i>	0.25	
<i>For >250 To 500, Add</i>	0.11	
<i>For >2,500 To 5,000, Deduct</i>	-0.05	
<i>For >5,000 To 10,000, Deduct</i>	-0.10	
<i>For >10,000 To 20,000, Deduct</i>	-0.15	
<i>For >20,000, Deduct</i>	-0.20	
09 91 13 00-0226 SF 2 Coats Paint, Brush/Roller Work, Paint Exterior Wood Floors And Decks	1.69	
<i>For Oil Based Paint, Add</i>	0.12	
<i>For Up To 100, Add</i>	0.81	
<i>For >100 To 250, Add</i>	0.40	
<i>For >250 To 500, Add</i>	0.18	
<i>For >2,500 To 5,000, Deduct</i>	-0.08	
<i>For >5,000 To 10,000, Deduct</i>	-0.17	
<i>For >10,000 To 20,000, Deduct</i>	-0.25	
<i>For >20,000, Deduct</i>	-0.34	
09 91 13 00-0227 SF 1 Coat Primer, Sprayed, Paint Exterior Wood Floors And Decks	0.72	
<i>For Oil Based Paint, Add</i>	0.05	
<i>For Up To 100, Add</i>	0.34	
<i>For >100 To 250, Add</i>	0.17	
<i>For >250 To 500, Add</i>	0.08	
<i>For >2,500 To 5,000, Deduct</i>	-0.04	
<i>For >5,000 To 10,000, Deduct</i>	-0.07	
<i>For >10,000 To 20,000, Deduct</i>	-0.11	
<i>For >20,000, Deduct</i>	-0.14	
09 91 13 00-0228 SF 1 Coat Paint, Sprayed, Paint Exterior Wood Floors And Decks.....	0.85	
<i>For Oil Based Paint, Add</i>	0.06	
<i>For Up To 100, Add</i>	0.44	
<i>For >100 To 250, Add</i>	0.22	
<i>For >250 To 500, Add</i>	0.09	
<i>For >2,500 To 5,000, Deduct</i>	-0.04	
<i>For >5,000 To 10,000, Deduct</i>	-0.09	
<i>For >10,000 To 20,000, Deduct</i>	-0.13	
<i>For >20,000, Deduct</i>	-0.17	
09 91 13 00-0229 SF 2 Coats Paint, Sprayed, Paint Exterior Wood Floors And Decks.....	1.44	
<i>For Oil Based Paint, Add</i>	0.11	
<i>For Up To 100, Add</i>	0.68	
<i>For >100 To 250, Add</i>	0.34	
<i>For >250 To 500, Add</i>	0.15	
<i>For >2,500 To 5,000, Deduct</i>	-0.07	
<i>For >5,000 To 10,000, Deduct</i>	-0.14	
<i>For >10,000 To 20,000, Deduct</i>	-0.22	
<i>For >20,000, Deduct</i>	-0.29	
09 91 13 00-0230 SF 1 Coat Non-Slip Paint, Brush Work, Paint Exterior Wood Floors And Decks.....	2.21	
<i>For Up To 100, Add</i>	0.70	
<i>For >100 To 250, Add</i>	0.37	
<i>For >250 To 500, Add</i>	0.17	
<i>For >2,500 To 5,000, Deduct</i>	-0.11	
<i>For >5,000 To 10,000, Deduct</i>	-0.22	
<i>For >10,000 To 20,000, Deduct</i>	-0.33	
<i>For >20,000, Deduct</i>	-0.44	

09 Finishes**09 90 Painting and Coating****09 91 Painting**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 13 00-0231	SF	1 Coat Non-Slip Epoxy Paint, Brush Work, Paint Exterior Wood Floors And Decks.....	6.57	
		<i>For Up To 100, Add</i>	1.35	
		<i>For >100 To 250, Add</i>	0.81	
		<i>For >250 To 500, Add</i>	0.39	
		<i>For >2,500 To 5,000, Deduct</i>	-0.33	
		<i>For >5,000 To 10,000, Deduct</i>	-0.66	
		<i>For >10,000 To 20,000, Deduct</i>	-0.99	
		<i>For >20,000, Deduct</i>	-1.31	
09 91 13 00-0232		Paint Exterior Doors And Windows (09 91 13)		
09 91 13 00-0233		Paint Exterior Door Frames (09 91 13 00-0232)		
09 91 13 00-0234	LF	1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Door Frame And Trim	1.18	
		<i>For Painting Either Interior Or Exterior Only, Deduct</i>	-0.32	
09 91 13 00-0235	LF	1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Door Frame And Trim.....	1.50	
		<i>For Painting Either Interior Or Exterior Only, Deduct</i>	-0.40	
09 91 13 00-0236	LF	2 Coats Paint, Brush/Roller Work, Paint Exterior Wood Door Frame And Trim	2.53	
		<i>For Painting Either Interior Or Exterior Only, Deduct</i>	-0.68	
09 91 13 00-0237	LF	1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Door Frame And Trim	1.20	
		<i>For Painting Either Interior Or Exterior Only, Deduct</i>	-0.33	
09 91 13 00-0238	LF	1 Coat Paint, Brush/Roller Work, Paint Exterior Metal Door Frame And Trim	1.52	
		<i>For Painting Either Interior Or Exterior Only, Deduct</i>	-0.41	
09 91 13 00-0239	LF	2 Coats Paint, Brush/Roller Work, Paint Exterior Metal Door Frame And Trim.....	2.56	
		<i>For Painting Either Interior Or Exterior Only, Deduct</i>	-0.69	
09 91 13 00-0240		Paint Exterior Metal Doors (09 91 13 00-0232)		
09 91 13 00-0241	EA	1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Door.....	60.82	
		Note: One face		
		<i>For Half Louvered Door, Add</i>	4.44	
		<i>For Full Louvered Door, Add</i>	7.41	
		<i>For Electrostatic Painting, Add</i>	10.76	
		<i>For >5 To 10, Deduct</i>	-3.04	
		<i>For >10 To 25, Deduct</i>	-6.08	
		<i>For >25, Deduct</i>	-9.12	
09 91 13 00-0242	EA	1 Coat Paint, Brush/Roller Work, Paint Exterior Metal Door	60.82	
		Note: One face		
		<i>For Half Louvered Door, Add</i>	4.44	
		<i>For Full Louvered Door, Add</i>	7.41	
		<i>For Electrostatic Painting, Add</i>	10.76	
		<i>For >5 To 10, Deduct</i>	-3.04	
		<i>For >10 To 25, Deduct</i>	-6.08	
		<i>For >25, Deduct</i>	-9.12	
09 91 13 00-0243	EA	2 Coat Paint, Brush/Roller Work, Paint Exterior Metal Door	112.03	
		Note: One face		
		<i>For Half Louvered Door, Add</i>	7.50	
		<i>For Full Louvered Door, Add</i>	12.51	
		<i>For Electrostatic Painting, Add</i>	20.50	
		<i>For >5 To 10, Deduct</i>	-5.60	
		<i>For >10 To 25, Deduct</i>	-11.20	
		<i>For >25, Deduct</i>	-16.80	
09 91 13 00-0244	EA	1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Door.....	109.17	
		Note: Both faces		
		<i>For Half Louvered Door, Add</i>	7.97	
		<i>For Full Louvered Door, Add</i>	13.28	
		<i>For Electrostatic Painting, Add</i>	19.33	
		<i>For >5 To 10, Deduct</i>	-5.46	
		<i>For >10 To 25, Deduct</i>	-10.92	
		<i>For >25, Deduct</i>	-16.38	
09 91 13 00-0245	EA	1 Coat Paint, Brush/Roller Work, Paint Exterior Metal Door	109.17	
		Note: Both faces		
		<i>For Half Louvered Door, Add</i>	7.97	
		<i>For Full Louvered Door, Add</i>	13.28	
		<i>For Electrostatic Painting, Add</i>	19.33	
		<i>For >5 To 10, Deduct</i>	-5.46	
		<i>For >10 To 25, Deduct</i>	-10.92	
		<i>For >25, Deduct</i>	-16.38	
09 91 13 00-0246	EA	2 Coats Paint, Brush/Roller Work, Paint Exterior Metal Door	201.97	
		Note: Both faces		
		<i>For Half Louvered Door, Add</i>	13.47	
		<i>For Full Louvered Door, Add</i>	22.46	
		<i>For Electrostatic Painting, Add</i>	37.02	
		<i>For >5 To 10, Deduct</i>	-10.10	
		<i>For >10 To 25, Deduct</i>	-20.20	
		<i>For >25, Deduct</i>	-30.30	
09 91 13 00-0247	EA	1 Coat Primer, Sprayed, Paint Exterior Metal Door	59.41	
		Note: One face		
		<i>For Half Louvered Door, Add</i>	3.76	
		<i>For Full Louvered Door, Add</i>	6.27	
		<i>For Electrostatic Painting, Add</i>	11.09	
		<i>For >5 To 10, Deduct</i>	-2.97	
		<i>For >10 To 25, Deduct</i>	-5.94	
		<i>For >25, Deduct</i>	-8.91	



		Finishes	09
		Painting and Coating	09 90
		Painting	09 91

09

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0248	EA	1 Coat Paint, Sprayed, Paint Exterior Metal Door.....	59.41	
			Note: One face		
			For Half Louvered Door, Add	3.76	
			For Full Louvered Door, Add	6.27	
			For Electrostatic Painting, Add	11.09	
			For >5 To 10, Deduct	-2.97	
			For >10 To 25, Deduct	-5.94	
			For >25, Deduct	-8.91	
09 91	13 00-0249	EA	2 Coats Paint, Sprayed, Paint Exterior Metal Door.....	110.58	
			Note: One face		
			For Half Louvered Door, Add	6.36	
			For Full Louvered Door, Add	10.59	
			For Electrostatic Painting, Add	21.29	
			For >5 To 10, Deduct	-5.53	
			For >10 To 25, Deduct	-11.06	
			For >25, Deduct	-16.59	
09 91	13 00-0250	EA	1 Coat Primer, Sprayed, Paint Exterior Metal Door	106.66	
			Note: Both faces		
			For Half Louvered Door, Add	6.75	
			For Full Louvered Door, Add	11.25	
			For Electrostatic Painting, Add	19.92	
			For >5 To 10, Deduct	-5.33	
			For >10 To 25, Deduct	-10.67	
			For >25, Deduct	-16.00	
09 91	13 00-0251	EA	1 Coat Paint, Sprayed, Paint Exterior Metal Door.....	106.66	
			Note: Both faces		
			For Half Louvered Door, Add	6.75	
			For Full Louvered Door, Add	11.25	
			For Electrostatic Painting, Add	19.92	
			For >5 To 10, Deduct	-5.33	
			For >10 To 25, Deduct	-10.67	
			For >25, Deduct	-16.00	
09 91	13 00-0252	EA	2 Coats Paint, Sprayed, Paint Exterior Metal Door.....	199.47	
			Note: Both faces		
			For Half Louvered Door, Add	11.42	
			For Full Louvered Door, Add	19.03	
			For Electrostatic Painting, Add	38.45	
			For >5 To 10, Deduct	-9.97	
			For >10 To 25, Deduct	-19.95	
			For >25, Deduct	-29.92	
09 91	13 00-0253	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Overhead, Sectional Door, Or Roll Up Door.....	2.56	
			For Electrostatic Painting, Add	0.34	
09 91	13 00-0254	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Metal Overhead, Sectional Door, Or Roll Up Door	2.76	
			For Electrostatic Painting, Add	0.39	
09 91	13 00-0255	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Metal Overhead, Section Door, Or Roll Up Door	5.58	
			For Electrostatic Painting, Add	0.76	
09 91	13 00-0256	SF	1 Coat Primer, Sprayed, Paint Exterior Metal Overhead, Sectional Door, Or Roll Up Door.....	2.89	
			For Electrostatic Painting, Add	0.37	
09 91	13 00-0257	SF	1 Coat Paint, Sprayed, Paint Exterior Metal Overhead, Sectional Door, Or Roll Up Door.....	3.09	
			For Electrostatic Painting, Add	0.42	
09 91	13 00-0258	SF	2 Coats Paint, Sprayed, Paint Exterior Metal Overhead, Sectional Door, Or Roll Up Door	5.97	
			For Electrostatic Painting, Add	0.81	
09 91 13 00-0259 Paint Exterior Wood Doors (09 91 13 00-0232)					
09 91	13 00-0260	EA	1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Door	55.48	
			Note: One face		
			For Half Louvered Door, Add	4.44	
			For Full Louvered Door, Add	7.40	
			For >5 To 10, Deduct	-2.77	
			For >10 To 25, Deduct	-5.55	
			For >25, Deduct	-8.32	
09 91	13 00-0261	EA	1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Door	55.48	
			Note: One face		
			For Half Louvered Door, Add	4.44	
			For Full Louvered Door, Add	7.40	
			For >5 To 10, Deduct	-2.77	
			For >10 To 25, Deduct	-5.55	
			For >25, Deduct	-8.32	
09 91	13 00-0262	EA	2 Coats Paint, Brush/Roller Work, Paint Exterior Wood Door.....	101.44	
			Note: One face		
			For Half Louvered Door, Add	7.50	
			For Full Louvered Door, Add	12.51	
			For >5 To 10, Deduct	-5.07	
			For >10 To 25, Deduct	-10.14	
			For >25, Deduct	-15.22	
09 91	13 00-0263	EA	1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Door	99.60	
			Note: Both faces		
			For Half Louvered Door, Add	7.97	
			For Full Louvered Door, Add	13.28	
			For >5 To 10, Deduct	-4.98	
			For >10 To 25, Deduct	-9.96	
			For >25, Deduct	-14.94	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0264	EA	1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Door.....	99.60	
			Note: Both faces		
			For Half Louvered Door, Add	7.97	
			For Full Louvered Door, Add	13.28	
			For >5 To 10, Deduct	-4.98	
			For >10 To 25, Deduct	-9.96	
			For >25, Deduct	-14.94	
09 91	13 00-0265	EA	2 Coats Paint, Brush Roller Work, Paint Exterior Wood Door.....	182.82	
			Note: Both faces		
			For Half Louvered Door, Add	13.47	
			For Full Louvered Door, Add	22.46	
			For >5 To 10, Deduct	-9.14	
			For >10 To 25, Deduct	-18.28	
			For >25, Deduct	-27.42	
09 91	13 00-0266	EA	1 Coat Primer, Sprayed, Paint Exterior Wood Door.....	53.55	
			Note: One face		
			For Half Louvered Door, Add	3.76	
			For Full Louvered Door, Add	6.27	
			For >5 To 10, Deduct	-2.68	
			For >10 To 25, Deduct	-5.36	
			For >25, Deduct	-8.03	
09 91	13 00-0267	EA	1 Coat Paint, Sprayed, Paint Exterior Wood Door.....	53.55	
			Note: One face		
			For Half Louvered Door, Add	3.76	
			For Full Louvered Door, Add	6.27	
			For >5 To 10, Deduct	-2.68	
			For >10 To 25, Deduct	-5.36	
			For >25, Deduct	-8.03	
09 91	13 00-0268	EA	2 Coats Paint, Sprayed, Paint Exterior Wood Door.....	98.95	
			Note: One face		
			For Half Louvered Door, Add	6.36	
			For Full Louvered Door, Add	10.60	
			For >5 To 10, Deduct	-4.95	
			For >10 To 25, Deduct	-9.90	
			For >25, Deduct	-14.84	
09 91	13 00-0269	EA	1 Coat Primer, Sprayed, Paint Exterior Wood Door.....	96.13	
			Note: Both faces		
			For Half Louvered Door, Add	6.75	
			For Full Louvered Door, Add	11.25	
			For >5 To 10, Deduct	-4.81	
			For >10 To 25, Deduct	-9.61	
			For >25, Deduct	-14.42	
09 91	13 00-0270	EA	1 Coat Paint, Sprayed, Paint Exterior Wood Door.....	96.13	
			Note: Both faces		
			For Half Louvered Door, Add	6.75	
			For Full Louvered Door, Add	11.25	
			For >5 To 10, Deduct	-4.81	
			For >10 To 25, Deduct	-9.61	
			For >25, Deduct	-14.42	
09 91	13 00-0271	EA	2 Coats Paint, Sprayed, Paint Exterior Wood Door.....	178.41	
			Note: Both faces		
			For Half Louvered Door, Add	11.42	
			For Full Louvered Door, Add	19.03	
			For >5 To 10, Deduct	-8.92	
			For >10 To 25, Deduct	-17.84	
			For >25, Deduct	-26.76	
09 91	13 00-0272	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Overhead, Sectional Door, Or Roll Up Door.....	2.48	
09 91	13 00-0273	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Overhead, Sectional Door, Or Roll Up Door.....	2.63	
09 91	13 00-0274	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Wood Overhead, Sectional Door, Or Roll Up Door.....	5.35	
09 91	13 00-0275	SF	1 Coat Primer, Sprayed, Paint Exterior Wood Overhead, Sectional Door, Or Roll Up Door.....	2.80	
09 91	13 00-0276	SF	1 Coat Paint, Sprayed, Paint Exterior Wood Overhead, Sectional Door, Or Roll Up Door.....	2.96	
09 91	13 00-0277	SF	2 Coats Paint, Sprayed, Paint Exterior Wood Overhead, Sectional Door, Or Roll Up Door.....	5.73	
09 91	13 00-0278		Paint Exterior Metal Windows (09 91 13 00-0232)		
			Note: Two finish coats paint over rust inhibitive primer.		
09 91	13 00-0279	EA	Up To 8 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Metal Window Including Trim.....	87.10	
			For Electrostatic Painting, Add	11.82	
			For >5 To 10, Deduct	-4.36	
			For >10 To 25, Deduct	-8.71	
			For >25, Deduct	-13.07	
09 91	13 00-0280	EA	>8 To 14 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Metal Window Including Trim.....	108.61	
			For Electrostatic Painting, Add	15.67	
			For >5 To 10, Deduct	-5.43	
			For >10 To 25, Deduct	-10.86	
			For >25, Deduct	-16.29	
09 91	13 00-0281	EA	>14 To 20 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Metal Window Including Trim.....	147.60	
			For Electrostatic Painting, Add	21.58	
			For >5 To 10, Deduct	-7.38	
			For >10 To 25, Deduct	-14.76	
			For >25, Deduct	-22.14	



Finishes	09	
Painting and Coating	09 90	09
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	13 00-0282	EA	>20 To 26 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Metal Window Including Trim	166.31	
			<i>For Electrostatic Painting, Add</i>	24.34	
			<i>For >5 To 10, Deduct</i>	-8.32	
			<i>For >10 To 25, Deduct</i>	-16.63	
			<i>For >25, Deduct</i>	-24.95	
09 91	13 00-0283	EA	>26 To 34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Metal Window Including Trim	184.21	
			<i>For Electrostatic Painting, Add</i>	26.90	
			<i>For >5 To 10, Deduct</i>	-9.21	
			<i>For >10 To 25, Deduct</i>	-18.42	
			<i>For >25, Deduct</i>	-27.63	
09 91	13 00-0284	SF	>34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Metal Window Including Trim	5.84	
			<i>For Electrostatic Painting, Add</i>	0.85	
09 91	13 00-0285		Paint Exterior Wood Windows (09 91 13 00-0232)		
			Note: Two finish coats paint over primer.		
09 91	13 00-0286	EA	Up To 8 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Wood Window Including Trim	83.56	
			<i>For >5 To 10, Deduct</i>	-4.18	
			<i>For >10 To 25, Deduct</i>	-8.36	
			<i>For >25, Deduct</i>	-12.53	
09 91	13 00-0287	EA	>8 To 14 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Wood Window Including Trim	103.14	
			<i>For >5 To 10, Deduct</i>	-5.16	
			<i>For >10 To 25, Deduct</i>	-10.31	
			<i>For >25, Deduct</i>	-15.47	
09 91	13 00-0288	EA	>14 To 20 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Wood Window Including Trim	139.83	
			<i>For >5 To 10, Deduct</i>	-6.99	
			<i>For >10 To 25, Deduct</i>	-13.98	
			<i>For >25, Deduct</i>	-20.97	
09 91	13 00-0289	EA	>20 To 26 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Wood Window Including Trim	157.53	
			<i>For >5 To 10, Deduct</i>	-7.88	
			<i>For >10 To 25, Deduct</i>	-15.75	
			<i>For >25, Deduct</i>	-23.63	
09 91	13 00-0290	EA	>26 To 34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Wood Window Including Trim	174.56	
			<i>For >5 To 10, Deduct</i>	-8.73	
			<i>For >10 To 25, Deduct</i>	-17.46	
			<i>For >25, Deduct</i>	-26.18	
09 91	13 00-0291	SF	>34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Exterior Wood Window Including Trim	5.80	
09 91	13 00-0292		Paint Exterior Security Screens (09 91 13 00-0232)		
09 91	13 00-0293	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Security Screen	1.55	
			<i>For Electrostatic Painting, Add</i>	0.22	
09 91	13 00-0294	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Security Screen	1.53	
			<i>For Electrostatic Painting, Add</i>	0.20	
09 91	13 00-0295	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Security Screen	2.54	
			<i>For Electrostatic Painting, Add</i>	0.34	
09 91	13 00-0296		Paint Exterior Window Guards (09 91 13 00-0232)		
09 91	13 00-0297	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Window Guards	1.55	
09 91	13 00-0298	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Metal Window Guards	1.53	
09 91	13 00-0299	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Metal Window Guards	2.54	
09 91	13 00-0300		Paint Exterior Window Trim (09 91 13 00-0232)		
09 91	13 00-0301	LF	1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Window Frame And Trim	1.44	
09 91	13 00-0302	LF	1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Window Frame And Trim	1.44	
09 91	13 00-0303	LF	2 Coats Paint, Brush/Roller Work, Paint Exterior Wood Window Frame And Trim	2.40	
09 91	13 00-0304	LF	1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Window Frame And Trim	1.74	
09 91	13 00-0305	LF	1 Coat Paint, Brush/Roller Work, Paint Exterior Metal Window Frame And Trim	1.74	
09 91	13 00-0306	LF	2 Coats Paint, Brush/Roller Work, Paint Exterior Metal Window Frame And Trim	3.01	
09 91	13 00-0307		Paint Exterior Roofing And Trim (09 91 13)		
09 91	13 00-0308		Paint Stain Or Seal Wood Roofing (09 91 13 00-0307)		
09 91	13 00-0309	SF	1 Coat Paint, Brush/Roller Work, Stain And Seal Shingles/Shake	2.24	
			<i>For Up To 100, Add</i>	0.99	
			<i>For >100 To 250, Add</i>	0.50	
			<i>For >250 To 500, Add</i>	0.22	
09 91	13 00-0310	SF	2 Coats Stain, Brush/Roller Work, Stain And Seal Shingles/Shake	4.14	
			<i>For Up To 100, Add</i>	1.79	
			<i>For >100 To 250, Add</i>	0.90	
			<i>For >250 To 500, Add</i>	0.40	
09 91	13 00-0311		Paint Metal Roofing (09 91 13 00-0307)		

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 13 00-0312	SF 1 Coat Paint, Brush/Roller Work, Paint Metal Roofing..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	1.02 0.41 0.21 0.09	
09 91 13 00-0313	SF 2 Coats Paint, Brush/Roller Work, Paint Metal Roofing..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	1.77 0.73 0.37 0.17	
09 91 13 00-0314	SF 1 Coat Epoxy Polyamide Cured Resin Primer, Sprayed, Paint Metal Roof..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	0.91 0.51 0.25 0.11	
09 91 13 00-0315	SF 1 Coat Aliphatic Polyurethane, Sprayed, Paint Metal Roof..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	0.88 0.39 0.20 0.09	
09 91 13 00-0316	Paint Fascia Board <small>(09 91 13 00-0307)</small>		
09 91 13 00-0317	LF 1 Coat Primer, Brush/Roller Work, Paint Fascia Board..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	0.92 0.40 0.20 0.09	
09 91 13 00-0318	LF 1 Coat Paint, Brush/Roller Work, Paint Fascia Board..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	0.92 0.40 0.20 0.09	
09 91 13 00-0319	LF 2 Coats Paint, Brush/Roller Work, Paint Fascia Board..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	1.60 0.71 0.36 0.16	
09 91 13 00-0320	Paint Soffit <small>(09 91 13 00-0307)</small>		
09 91 13 00-0321	SF 1 Coat Primer, Brush/Roller Work, Paint Soffit..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	1.14 0.43 0.22 0.10	
09 91 13 00-0322	SF 1 Coat Paint, Brush/Roller Work, Paint Soffit..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	1.14 0.43 0.22 0.10	
09 91 13 00-0323	SF 2 Coats Paint, Brush/Roller Work, Paint Soffit..... <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >250 To 500, Add</i>	1.93 0.76 0.39 0.17	
09 91 13 00-0324	Special Coatings For Metal Roofs <small>(09 91 13 00-0307)</small>		
09 91 13 00-0325	SF Carboline Carboxane 950 Coating System With 15 year warranty.....	11.67	
09 91 13 00-0326	SF Carboline Carbothane 134HG Coating System With 1 year warranty.....	7.15	
09 91 13 00-0327	Acrylic Elastomeric Coating For All Types Of Roofs <small>(09 91 13 00-0307)</small>		
09 91 13 00-0328	SF 2 Coats (20 Mil), Cool Roof Acrylic Elastomeric Roof Coating..... <i>For Each Coat Of Primer, Add</i>	2.18 0.47	
09 91 13 00-0329	SF 2 Coats, Energy-Armor Ultra SunWhite Ultra Premium Acrylic Elastomeric Roof Coating (ICP APOC® AP-252).....	3.07	
09 91 13 00-0330	Elastomeric Coating For All Types Of Roofs <small>(09 91 13 00-0307)</small>		
09 91 13 00-0331	SF 1 Coat, White Elastomeric Liquid Silicone Roof Membrane Coating (ICP APOC® Armor Flex® AP-585)..... Note: Per Coat	3.72	
09 91 13 00-0332	Acrylic Latex Elastomeric Coating For All Types Of Roofs <small>(09 91 13 00-0307)</small>		
	Note: (Henry)		
09 91 13 00-0333	SF 1 Coat, Premium Gray Elastomeric Roof Base Coating (Henry 291).....	1.34	
09 91 13 00-0334	SF 1 Coat, White Acrylic Latex Roof Coating (Henry 280DC).....	1.21	
09 91 13 00-0335	SF 1 Coat, White Elastomeric Roof Coating (Henry SolarFlex 287).....	1.06	
09 91 13 00-0336	Acrylic Coating For All Types Of Roofs <small>(09 91 13 00-0307)</small>		
	Note: (GAF)		
09 91 13 00-0337	SF 1 Coat, Water Based, Acrylic Elastomeric Roof Base Coating (GAF Roof Mate™ Base Coat).....	1.04	
09 91 13 00-0338	SF 1 Coat, Water Based, Acrylic Elastomeric Roof Top Coating (GAF Roof Mate™ Top Coat).....	1.21	
09 91 13 00-0339	Paint Metal Surfaces <small>(09 91 13)</small>		
	Note: Tasks can be used for exterior or interior applications.		
09 91 13 00-0340	Paint Structural Steel <small>(09 91 13 00-0339)</small>		
09 91 13 00-0341	Paint Structural Steel, Brush Work <small>(09 91 13 00-0340)</small>		



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0342 SF 1 Field Coat Primer, Brush/Roller Work, Paint Exterior Structural Steel.....	1.06	
For Up To 100, Add	0.62	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For Epoxy Paint, Add	0.14	
09 91 13 00-0343 SF 1 Field Coat Paint, Brush/Roller Work, Paint Exterior Structural Steel	0.95	
For Up To 100, Add	0.53	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For Epoxy Paint, Add	0.14	
09 91 13 00-0344 Paint Structural Steel, Spray Work (09 91 13 00-0340)		
09 91 13 00-0345 SF 1 Field Coat Primer, Sprayed, Paint Exterior Structural Steel.....	0.83	
For Electrostatic Painting, Add	0.13	
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.09	
For Epoxy Paint, Add	0.13	
09 91 13 00-0346 SF 1 Field Coat Paint, Sprayed, Paint Exterior Structural Steel	0.71	
For Electrostatic Painting, Add	0.12	
For Up To 100, Add	0.35	
For >100 To 250, Add	0.17	
For >250 To 500, Add	0.08	
For Epoxy Paint, Add	0.13	
09 91 13 00-0347 Paint Metal Decking, Beams And Bar Joist (09 91 13 00-0340)		
09 91 13 00-0348 SF 1 Coat Primer, Sprayed, Paint Exposed Metal Decking.....	0.93	
For Up To 100, Add	0.52	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For Epoxy Paint, Add	0.14	
09 91 13 00-0349 SF 1 Coat Paint, Sprayed, Paint Exposed Metal Decking	0.93	
For Up To 100, Add	0.52	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For Epoxy Paint, Add	0.14	
09 91 13 00-0350 SF 2 Coats Paint, Sprayed, Paint Exposed Metal Decking	1.60	
For Up To 100, Add	0.83	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.18	
For Epoxy Paint, Add	0.26	
09 91 13 00-0351 SF 1 Coat Primer, Brush/Roller Work, Paint Metal Beams And Bar Joists	1.37	
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.15	
For Epoxy Paint, Add	0.25	
09 91 13 00-0352 SF 1 Coat Paint, Brush/Roller Work, Paint Metal Beams And Bar Joists	1.30	
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For Epoxy Paint, Add	0.22	
09 91 13 00-0353 SF 2 Coats Paint, Brush/Roller Work, Paint Metal Beams And Bar Joists	2.49	
For Up To 100, Add	1.25	
For >100 To 250, Add	0.61	
For >250 To 500, Add	0.27	
For Epoxy Paint, Add	0.43	
09 91 13 00-0354 SF 1 Coat Primer, Sprayed, Paint Metal Beams And Bar Joists	1.16	
For Up To 100, Add	0.61	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For Epoxy Paint, Add	0.19	
09 91 13 00-0355 SF 1 Coat Paint, Sprayed, Paint Metal Beams And Bar Joists.....	1.16	
For Up To 100, Add	0.61	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For Epoxy Paint, Add	0.19	
09 91 13 00-0356 SF 2 Coats Paint, Sprayed, Paint Metal Beams And Bar Joists.....	2.02	
For Up To 100, Add	0.99	
For >100 To 250, Add	0.49	
For >250 To 500, Add	0.22	
For Epoxy Paint, Add	0.37	
09 91 13 00-0357 Paint Steel Pipes (09 91 13 00-0339)		
Note: Includes pipe, tubes, rails, conduit, etc.		
09 91 13 00-0358 LF 1 Coat Primer, 1/2" To 1-1/2" Diameter, Paint Conduit Or Steel Pipe.....	1.74	
For Electrostatic Painting, Add	0.24	
For Epoxy Paint, Add	0.23	
09 91 13 00-0359 LF 1 Coat Primer, 2" To 3-1/2" Diameter, Paint Conduit Or Steel Pipe.....	1.95	
For Electrostatic Painting, Add	0.27	
For Epoxy Paint, Add	0.26	

09 Finishes**09 90 Painting and Coating****09 91 Painting**

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0360	LF	1	Coat Primer, 4" Diameter, Paint Steel Pipes.....	2.19	
			<i>For Electrostatic Painting, Add</i>	0.31	
			<i>For Epoxy Paint, Add</i>	0.29	
09 91 13 00-0361	LF	1	Coat Primer, 6" To 8" Diameter, Paint Steel Pipes.....	2.74	
			<i>For Electrostatic Painting, Add</i>	0.38	
			<i>For Epoxy Paint, Add</i>	0.36	
09 91 13 00-0362	LF	1	Coat Primer, 10" To 12" Diameter, Paint Steel Pipes.....	3.45	
			<i>For Electrostatic Painting, Add</i>	0.48	
			<i>For Epoxy Paint, Add</i>	0.44	
09 91 13 00-0363	LF	1	Coat Paint, 1/2" To 1-1/2" Diameter, Paint Conduit Or Steel Pipe.....	1.74	
			<i>For Electrostatic Painting, Add</i>	0.24	
			<i>For Epoxy Paint, Add</i>	0.23	
09 91 13 00-0364	LF	1	Coat Paint, 2" To 3-1/2" Diameter, Paint Conduit Or Steel Pipe.....	1.95	
			<i>For Electrostatic Painting, Add</i>	0.27	
			<i>For Epoxy Paint, Add</i>	0.26	
09 91 13 00-0365	LF	1	Coat Paint, 4" Diameter, Paint Steel Pipes.....	2.19	
			<i>For Electrostatic Painting, Add</i>	0.31	
			<i>For Epoxy Paint, Add</i>	0.29	
09 91 13 00-0366	LF	1	Coat Paint, 6" To 8" Diameter, Paint Steel Pipes.....	2.74	
			<i>For Electrostatic Painting, Add</i>	0.38	
			<i>For Epoxy Paint, Add</i>	0.36	
09 91 13 00-0367	LF	1	Coat Paint, 10" To 12" Diameter, Paint Steel Pipes.....	3.45	
			<i>For Electrostatic Painting, Add</i>	0.48	
			<i>For Epoxy Paint, Add</i>	0.44	
09 91 13 00-0368	LF	2	Coats Paint, 1/2" To 1-1/2" Diameter, Paint Conduit Or Steel Pipe.....	3.62	
			<i>For Electrostatic Painting, Add</i>	0.54	
			<i>For Epoxy Paint, Add</i>	0.54	
09 91 13 00-0369	LF	2	Coats Paint, 2" To 3-1/2" Diameter, Paint Conduit Or Steel Pipe.....	3.89	
			<i>For Electrostatic Painting, Add</i>	0.55	
			<i>For Epoxy Paint, Add</i>	0.51	
09 91 13 00-0370	LF	2	Coats Paint, 4" Diameter, Paint Steel Pipes.....	4.23	
			<i>For Electrostatic Painting, Add</i>	0.60	
			<i>For Epoxy Paint, Add</i>	0.57	
09 91 13 00-0371	LF	2	Coats Paint, 6" To 8" Diameter, Paint Steel Pipes.....	5.32	
			<i>For Electrostatic Painting, Add</i>	0.75	
			<i>For Epoxy Paint, Add</i>	0.70	
09 91 13 00-0372	LF	2	Coats Paint, 10" To 12" Diameter, Paint Steel Pipes.....	6.58	
			<i>For Electrostatic Painting, Add</i>	0.94	
			<i>For Epoxy Paint, Add</i>	0.88	
09 91 13 00-0373	EA	1	Coat Paint, Paint Exposed Single Or Double Gang Outlet Box.....	7.81	
			<i>For Electrostatic Painting, Add</i>	0.85	
			<i>For Epoxy Paint, Add</i>	0.53	
09 91 13 00-0374			Paint Metal Louvers (09 91 13 00-0339)		
09 91 13 00-0375	SF	1	Coat Primer, Brush/Roller Work, Paint Ventilation Louver, SF Of Opening Area.....	1.41	
			<i>For Electrostatic Painting, Add</i>	0.18	
09 91 13 00-0376	SF	1	Coat Alkyd Paint, Brush/Roller Work, Paint Ventilation Louver, SF Of Opening Area.....	1.44	
			<i>For Electrostatic Painting, Add</i>	0.19	
09 91 13 00-0377	SF	2	Coats Alkyd Paint, Brush/Roller Work, Paint Ventilation Louver, SF Of Opening Area.....	2.98	
			<i>For Electrostatic Painting, Add</i>	0.40	
09 91 13 00-0378			Paint Ladders (09 91 13 00-0339)		
09 91 13 00-0379	LF	1	Coat Alkyd Primer, Brush/Roller Work, Paint Ladders.....	3.66	
			<i>For Epoxy Paint, Add</i>	0.25	
09 91 13 00-0380	LF	1	Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Ladders.....	4.08	
			<i>For Epoxy Paint, Add</i>	0.27	
09 91 13 00-0381	LF	2	Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Ladders.....	7.99	
			<i>For Epoxy Paint, Add</i>	0.49	
09 91 13 00-0382			Paint Handrails (09 91 13 00-0339)		
09 91 13 00-0383	LF	1	Coat Alkyd Primer, Brush/Roller Work, 1 Rail, Paint Hand Rail And Bracket.....	1.51	
			<i>For Epoxy Paint, Add</i>	0.14	
09 91 13 00-0384	LF	1	Coat Alkyd Enamel Paint, Brush/Roller Work, 1 Rail, Paint Hand Rail And Bracket.....	1.67	
			<i>For Epoxy Paint, Add</i>	0.15	
09 91 13 00-0385	LF	2	Coats Alkyd Enamel Paint, Brush/Roller Work, 1 Rail, Paint Hand Rail And Bracket.....	2.69	
			<i>For Epoxy Paint, Add</i>	0.20	
09 91 13 00-0386	LF	1	Coat Alkyd Primer, Brush/Roller Work, 1 Rail, Paint Pipe Rail And Pickets.....	3.02	
			<i>For Epoxy Paint, Add</i>	0.47	
09 91 13 00-0387	LF	1	Coat Alkyd Enamel Paint, Brush/Roller Work, 1 Rail, Paint Pipe Rail And Pickets.....	3.26	
			<i>For Epoxy Paint, Add</i>	0.48	
09 91 13 00-0388	LF	2	Coats Alkyd Enamel Paint, Brush/Roller Work, 1 Rail, Paint Pipe Rail And Pickets.....	5.51	
			<i>For Epoxy Paint, Add</i>	0.75	
09 91 13 00-0389	LF	1	Coat Alkyd Primer, Brush/Roller Work, 2 Rails, Paint Pipe Rail And Pickets.....	3.22	
			<i>For Epoxy Paint, Add</i>	0.48	
09 91 13 00-0390	LF	1	Coat Alkyd Enamel Paint, Brush/Roller Work, 2 Rails, Paint Pipe Rail And Pickets.....	3.49	
			<i>For Epoxy Paint, Add</i>	0.49	
09 91 13 00-0391	LF	2	Coats Alkyd Enamel Paint, Brush/Roller Work, 2 Rails, Paint Pipe Rail And Pickets.....	5.80	
			<i>For Epoxy Paint, Add</i>	0.77	
09 91 13 00-0392	LF	1	Coat Alkyd Primer, Brush/Roller Work, Paint Balustrades.....	1.77	
			<i>For Epoxy Paint, Add</i>	0.25	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0393 LF 1 Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Balustrades	1.93	
For Epoxy Paint, Add	0.26	
09 91 13 00-0394 LF 2 Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Balustrades	3.56	
For Epoxy Paint, Add	0.50	
09 91 13 00-0395 Paint Grating (09 91 13 00-0399)		
09 91 13 00-0396 SF 1 Coat Primer, Brush/Roller Work, Paint Gratings And Frames.....	2.70	
For Epoxy Paint, Add	0.20	
09 91 13 00-0397 SF 1 Coat Paint, Brush/Roller Work, Paint Gratings And Frames.....	2.77	
For Epoxy Paint, Add	0.23	
09 91 13 00-0398 SF 2 Coats Paint, Brush/Roller Work, Paint Gratings And Frames	4.21	
For Epoxy Paint, Add	0.39	
09 91 13 00-0399 Equipment And Tanks (09 91 13 00-0399)		
09 91 13 00-0400 Paint Valves (09 91 13 00-0399)		
Note: Includes 1 coat primer and 1 coat paint finish		
09 91 13 00-0401 EA Prime And Paint 4" And Smaller Valve	30.49	
09 91 13 00-0402 EA Prime And Paint 6" To 10" Valve	37.75	
09 91 13 00-0403 EA Prime And Paint 12" To 18" Valve	49.36	
09 91 13 00-0404 EA Prime And Paint 20" To 24" Valve	65.31	
09 91 13 00-0405 EA Prime And Paint >24" To 36" Valve	88.52	
09 91 13 00-0406 EA Prime And Paint >36" To 48" Valve	121.93	
09 91 13 00-0407 Paint Pumps And Motors (09 91 13 00-0399)		
Note: Includes 1 coat primer and 1 coat paint finish		
09 91 13 00-0408 EA Prime And Paint Pump Under 1 HP	94.39	
09 91 13 00-0409 EA Prime And Paint Pump, 1 HP To 5 HP	126.39	
09 91 13 00-0410 EA Prime And Paint Pump, >5 HP To 10 HP	154.07	
09 91 13 00-0411 EA Prime And Paint Pump, >10 HP To 20 HP	174.46	
09 91 13 00-0412 EA Prime And Paint Pump, >20 HP To 30 HP	203.55	
09 91 13 00-0413 EA Prime And Paint Pump, >30 HP To 50 HP	232.62	
09 91 13 00-0414 EA Prime And Paint Pump, >50 HP To 75 HP	257.36	
09 91 13 00-0415 EA Prime And Paint Pump, >75 HP	290.78	
09 91 13 00-0416 Paint Storage Tanks (09 91 13 00-0399)		
09 91 13 00-0417 SF 1 Coat Primer, Roller, Paint Storage Tank, Exterior Surface	1.25	
09 91 13 00-0418 SF 1 Coat Paint, Roller, Paint Storage Tank, Exterior Surface	1.69	
09 91 13 00-0419 SF 2 Coats Paint, Roller, Paint Storage Tank, Exterior Surface.....	3.25	
09 91 13 00-0420 SF 1 Coat Primer, Roller, Paint Storage Tank, Interior Surface	1.62	
09 91 13 00-0421 SF 1 Coat Paint, Roller, Paint Storage Tank, Interior Surface.....	2.10	
09 91 13 00-0422 SF 2 Coats Paint, Roller, Paint Storage Tank, Interior Surface.....	4.05	
09 91 13 00-0423 SF 1 Coat Primer, Sprayed, Paint Storage Tank, Exterior Surface	1.40	
09 91 13 00-0424 SF 1 Coat Paint, Sprayed, Paint Storage Tank, Exterior Surface	1.79	
09 91 13 00-0425 SF 2 Coats Paint, Sprayed, Paint Storage Tank, Exterior Surface.....	3.49	
09 91 13 00-0426 SF 1 Coat Primer, Sprayed, Paint Storage Tank, Interior Surface	1.56	
09 91 13 00-0427 SF 1 Coat Paint, Sprayed, Paint Storage Tank, Interior Surface.....	2.11	
09 91 13 00-0428 SF 2 Coats Paint, Sprayed, Paint Storage Tank, Interior Surface.....	4.11	
09 91 13 00-0429 Other Site Work Painting (09 91 13)		
09 91 13 00-0430 Paint Fencing (09 91 13 00-0429)		
Note: Per side of fence. Based on gross fence area (length of fence x height of fence).		
09 91 13 00-0431 SF 1 Coat Paint, Brush/Roller, Paint Existing Chain Link Fence.....	0.88	
For Epoxy Paint, Add	0.12	
For Up To 100, Add	0.50	
For >100 To 250, Add	0.24	
For >250 To 500, Add	0.11	
09 91 13 00-0432 SF 2 Coats Paint, Brush/Roller, Paint Existing Chain Link Fence	1.67	
For Epoxy Paint, Add	0.24	
For Up To 100, Add	0.93	
For >100 To 250, Add	0.45	
For >250 To 500, Add	0.20	
09 91 13 00-0433 SF 1 Coat Paint, Sprayed, Paint Existing Chain Link Fence	0.85	
For Epoxy Paint, Add	0.14	
For Electrostatic Painting, Add	0.13	
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.09	
09 91 13 00-0434 SF 2 Coats Paint, Sprayed, Paint Existing Chain Link Fence	1.60	
For Epoxy Paint, Add	0.28	
For Electrostatic Painting, Add	0.26	
For Up To 100, Add	0.80	
For >100 To 250, Add	0.40	
For >250 To 500, Add	0.17	

09 Finishes**09 90 Painting and Coating****09 91 Painting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0435	SF	1	Coat Primer, Brush/Roller, Paint Wrought Iron Fence	0.84	
			<i>For Epoxy Paint, Add</i>	0.14	
			<i>For Up To 100, Add</i>	0.43	
			<i>For >100 To 250, Add</i>	0.21	
			<i>For >250 To 500, Add</i>	0.09	
09 91 13 00-0436	SF	1	Coat Paint, Brush/Roller, Paint Wrought Iron Fence.....	0.77	
			<i>For Epoxy Paint, Add</i>	0.12	
			<i>For Up To 100, Add</i>	0.42	
			<i>For >100 To 250, Add</i>	0.20	
			<i>For >250 To 500, Add</i>	0.09	
09 91 13 00-0437	SF	Each	Additional Coat, Brush/Roller, Paint Wrought Iron Fence.....	0.58	
			<i>For Epoxy Paint, Add</i>	0.11	
			<i>For Up To 100, Add</i>	0.28	
			<i>For >100 To 250, Add</i>	0.14	
			<i>For >250 To 500, Add</i>	0.06	
09 91 13 00-0438	SF	1	Coat Primer, Brush/Roller, Paint Picket Fence	0.97	
			<i>For Epoxy Paint, Add</i>	0.10	
			<i>For Up To 100, Add</i>	0.63	
			<i>For >100 To 250, Add</i>	0.30	
			<i>For >250 To 500, Add</i>	0.13	
09 91 13 00-0439	SF	1	Coat Paint, Brush/Roller, Paint Picket Fence.....	0.97	
			<i>For Epoxy Paint, Add</i>	0.10	
			<i>For Up To 100, Add</i>	0.63	
			<i>For >100 To 250, Add</i>	0.30	
			<i>For >250 To 500, Add</i>	0.13	
09 91 13 00-0440	SF	Each	Additional Coat, Brush/Roller, Paint Picket Fence	0.71	
			<i>For Epoxy Paint, Add</i>	0.08	
			<i>For Up To 100, Add</i>	0.44	
			<i>For >100 To 250, Add</i>	0.21	
			<i>For >250 To 500, Add</i>	0.09	
09 91 13 00-0441	SF	1	Coat Paint, Brush/Roller, Paint Wood Fences	0.78	
			<i>For Up To 100, Add</i>	0.42	
			<i>For >100 To 250, Add</i>	0.21	
			<i>For >250 To 500, Add</i>	0.09	
09 91 13 00-0442	SF	2	Coats Paint, Brush/Roller, Paint Wood Fences	1.43	
			<i>For Up To 100, Add</i>	0.74	
			<i>For >100 To 250, Add</i>	0.36	
			<i>For >250 To 500, Add</i>	0.16	
09 91 13 00-0443	SF	1	Coat Paint, Sprayed, Paint Wood Fences.....	0.65	
			<i>For Up To 100, Add</i>	0.33	
			<i>For >100 To 250, Add</i>	0.16	
			<i>For >250 To 500, Add</i>	0.07	
09 91 13 00-0444	SF	2	Coats Paint, Sprayed, Paint Wood Fences.....	1.26	
			<i>For Up To 100, Add</i>	0.62	
			<i>For >100 To 250, Add</i>	0.30	
			<i>For >250 To 500, Add</i>	0.13	
09 91 13 00-0445			Paint Shutters Or Blinds, Solid Panel <small>(09 91 13 00-0429)</small>		
09 91 13 00-0446	SF	1	Coat Primer, Brush Work, Paint Shutter Or Blinds, Solid Panel.....	2.92	
09 91 13 00-0447	SF	1	Coat Paint, Brush Work, Paint Shutter Or Blinds, Solid Panel.....	2.93	
09 91 13 00-0448	SF	2	Coats Paint, Brush Work, Paint Shutter Or Blinds, Solid Panel	5.23	
09 91 13 00-0449	SF	1	Coat Primer, Sprayed, Paint Shutter Or Blinds, Solid Panel.....	1.95	
09 91 13 00-0450	SF	1	Coat Paint, Sprayed, Paint Shutter Or Blinds, Solid Panel	1.97	
09 91 13 00-0451	SF	2	Coats Paint, Sprayed, Paint Shutter Or Blinds, Solid Panel.....	3.66	
09 91 13 00-0452			Paint Shutters Or Blinds, Louvered Panel <small>(09 91 13 00-0429)</small>		
09 91 13 00-0453	SF	1	Coat Primer, Brush Work, Paint Shutter Or Blinds, Louvered Panel.....	3.59	
09 91 13 00-0454	SF	1	Coat Paint, Brush Work, Paint Shutter Or Blinds, Louvered Panel.....	3.60	
09 91 13 00-0455	SF	2	Coats Paint, Brush Work, Paint Shutter Or Blinds, Louvered Panel	6.41	
09 91 13 00-0456	SF	1	Coat Primer, Sprayed, Paint Shutter Or Blinds, Louvered Panel	2.34	
09 91 13 00-0457	SF	1	Coat Paint, Sprayed, Paint Shutter Or Blinds, Louvered Panel	2.36	
09 91 13 00-0458	SF	2	Coats Paint, Sprayed, Paint Shutter Or Blinds, Louvered Panel.....	4.37	
09 91 13 00-0459			Paint Flagpoles <small>(09 91 13 00-0429)</small>		
09 91 13 00-0460	EA	1	Coat Paint, 20' High, Paint Steel Flagpole	231.66	
09 91 13 00-0461	EA	1	Coat Paint, 30' High, Paint Steel Flagpole	313.51	
09 91 13 00-0462	EA	1	Coat Paint, 40' High, Paint Steel Flagpole	395.39	
09 91 13 00-0463	EA	1	Coat Paint, 50' High, Paint Steel Flagpole	477.29	
09 91 13 00-0464	EA	1	Coat Paint, 70' High, Paint Steel Flagpole	631.27	
09 91 13 00-0465	EA	1	Coat Paint, 80' High, Paint Steel Flagpole	711.93	
09 91 13 00-0466	EA	1	Coat Paint, 90' High, Paint Steel Flagpole	792.61	
09 91 13 00-0467			Paint Lattice Or Trellis <small>(09 91 13 00-0429)</small>		
09 91 13 00-0468	SF	1	Coat Paint, Sprayed, Per Side, Paint Wood Lattice Or Trellis.....	1.51	
			<i>For Up To 100, Add</i>	0.97	
			<i>For >100 To 250, Add</i>	0.46	
			<i>For >250 To 500, Add</i>	0.20	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 13 00-0469 SF 2 Coats Paint, Sprayed, Per Side, Paint Wood Lattice Or Trellis.....	2.83	
For Up To 100, Add	1.79	
For >100 To 250, Add	0.85	
For >250 To 500, Add	0.37	
09 91 13 00-0470 Paint Exterior Stairs (09 91 13)		
09 91 13 00-0471 Paint Exterior Concrete Stairs (09 91 13 00-0470)		
09 91 13 00-0472 RSR 1 Coat Primer, Brush/Roller Work, Paint Exterior Concrete Stair (To 4' Wide).....	15.91	
09 91 13 00-0473 RSR 1 Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Concrete Stair (To 4' Wide).....	15.91	
09 91 13 00-0474 RSR 1 Coat Non-Slip Paint, Brush/Roller Work, Paint Exterior Concrete Stair (To 4' Wide).....	21.82	
09 91 13 00-0475 RSR 1 Coat Non-Slip Epoxy Paint, Brush/Roller Work, Paint Exterior Concrete Stair (To 4' Wide).....	39.26	
09 91 13 00-0476 RSR 2 Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Concrete Stair (To 4' Wide).....	31.82	
09 91 13 00-0477 Paint Exterior Metal Stairs (09 91 13 00-0470)		
09 91 13 00-0478 RSR 1 Coat Primer, Brush/Roller Work, Paint Exterior Metal Stair (To 4' Wide).....	8.62	
For Oil Based Paint, Add	0.49	
09 91 13 00-0479 RSR 1 Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Metal Stair (To 4' Wide).....	8.62	
For Oil Based Paint, Add	0.49	
09 91 13 00-0480 RSR 2 Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Metal Stair (To 4' Wide).....	17.23	
For Oil Based Paint, Add	0.97	
09 91 13 00-0481 Paint Exterior Wood Stairs (09 91 13 00-0470)		
09 91 13 00-0482 RSR 1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Stair (To 4' Wide).....	8.43	
09 91 13 00-0483 RSR 1 Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Wood Stair (To 4' Wide).....	8.42	
09 91 13 00-0484 RSR 1 Coat Non-Slip Paint, Brush/Roller Work, Paint Exterior Wood Stair (To 4' Wide).....	14.33	
09 91 13 00-0485 RSR 1 Coat Non-Slip Epoxy Paint, Brush/Roller Work, Paint Exterior Wood Stair (To 4' Wide).....	31.77	
09 91 13 00-0486 RSR 2 Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Wood Stair (To 4' Wide).....	16.84	
09 91 13 00-0487 Paint Exterior Stair Nosing (09 91 13 00-0470)		
09 91 13 00-0488 LF 1 Coat Paint, Up To 2", Non-Slip, Brush Work, Paint Exterior Yellow Stair Safety Strip.....	1.59	
09 91 13 00-0489 Paint Exterior Trim (09 91 13)		
09 91 13 00-0490 Paint Exterior Metal Trim And Gutters (09 91 13 00-0489)		
09 91 13 00-0491 SF 1 Coat Primer, Brush Work, Paint Exterior Exposed Metal Trim.....	1.18	
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.35	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.48	
Note: Applied only to work area above 40'.		
09 91 13 00-0492 SF 1 Coat Paint, Brush Work, Paint Exterior Exposed Metal Trim.....	1.28	
For Work >20' To 30' Above Floor, Add	0.25	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.39	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.54	
Note: Applied only to work area above 40'.		
09 91 13 00-0493 SF 2 Coats Paint, Brush Work, Paint Exterior Exposed Metal Trim.....	2.32	
For Work >20' To 30' Above Floor, Add	0.43	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.26	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.69	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.95	
Note: Applied only to work area above 40'.		
09 91 13 00-0494 SF 1 Coat Primer, Brush/Roller Work, Paint Exterior Exposed Metal Trim.....	1.08	
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20'.		
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >30' To 40' Above Floor, Add	0.31	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		

09 Finishes**09 90 Painting and Coating****09 91 Painting**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 13 00-0495	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Exposed Metal Trim.....	1.17
		<i>For Work >20' To 30' Above Floor, Add</i>	0.22
		<i>Note: Applied only to work area above 20'.</i>	
		<i>For Work >15' To 20' Above Floor, Add</i>	0.13
		<i>Note: Applied only to work area above 15' to 20'.</i>	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.35
		<i>Note: Applied only to work area above 30' to 40'.</i>	
		<i>For Work >40' Above Floor, Add</i>	0.48
		<i>Note: Applied only to work area above 40'.</i>	
09 91 13 00-0496	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Exposed Metal Trim.....	2.10
		<i>For Work >20' To 30' Above Floor, Add</i>	0.38
		<i>Note: Applied only to work area above 20'.</i>	
		<i>For Work >15' To 20' Above Floor, Add</i>	0.23
		<i>Note: Applied only to work area above 15' to 20'.</i>	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.60
		<i>Note: Applied only to work area above 30' to 40'.</i>	
		<i>For Work >40' Above Floor, Add</i>	0.83
		<i>Note: Applied only to work area above 40'.</i>	
09 91 13 00-0497	LF	1 Coat Paint, Brush Work, Paint Exterior Gutter And Downspout.....	1.83
		<i>For Work >20' To 30' Above Floor, Add</i>	0.36
		<i>Note: Applied only to work area above 20'.</i>	
		<i>For Work >15' To 20' Above Floor, Add</i>	0.21
		<i>Note: Applied only to work area above 15' to 20'.</i>	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.57
		<i>Note: Applied only to work area above 30' to 40'.</i>	
		<i>For Work >40' Above Floor, Add</i>	0.79
		<i>Note: Applied only to work area above 40'.</i>	
09 91 13 00-0498	LF	2 Coats Paint, Brush Work, Paint Exterior Gutter And Downspout.....	2.15
		<i>For Work >20' To 30' Above Floor, Add</i>	0.52
		<i>Note: Applied only to work area above 20'.</i>	
		<i>For Work >15' To 20' Above Floor, Add</i>	0.31
		<i>Note: Applied only to work area above 15' to 20'.</i>	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.83
		<i>Note: Applied only to work area above 30' to 40'.</i>	
		<i>For Work >40' Above Floor, Add</i>	1.14
		<i>Note: Applied only to work area above 40'.</i>	

09 91 13 00-0499 Paint Exterior Wood Trim (09 91 13 00-0499)

09 91 13 00-0500	SF	1 Coat Primer, Brush Work, Paint Exterior Wood Trim.....	1.70
		<i>For Work >20' To 30' Above Floor, Add</i>	0.30
		<i>Note: Applied only to work area above 20'.</i>	
		<i>For Oil Based Paint, Add</i>	0.11
		<i>For Work >15' To 20' Above Floor, Add</i>	0.18
		<i>Note: Applied only to work area above 15' to 20'.</i>	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.48
		<i>Note: Applied only to work area above 30' to 40'.</i>	
		<i>For Work >40' Above Floor, Add</i>	0.67
		<i>Note: Applied only to work area above 40'.</i>	
		<i>For Up To 100, Add</i>	0.98
		<i>For >100 To 250, Add</i>	0.47
		<i>For >250 To 500, Add</i>	0.21
		<i>For >2,500 To 5,000, Deduct</i>	-0.09
		<i>For >5,000 To 10,000, Deduct</i>	-0.17
		<i>For >10,000 To 20,000, Deduct</i>	-0.26
		<i>For >20,000, Deduct</i>	-0.34
09 91 13 00-0501	SF	1 Coat Paint, Brush Work, Paint Exterior Wood Trim.....	1.86
		<i>For Work >20' To 30' Above Floor, Add</i>	0.33
		<i>Note: Applied only to work area above 20'.</i>	
		<i>For Oil Based Paint, Add</i>	0.12
		<i>For Work >15' To 20' Above Floor, Add</i>	0.20
		<i>Note: Applied only to work area above 15' to 20'.</i>	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.52
		<i>Note: Applied only to work area above 30' to 40'.</i>	
		<i>For Work >40' Above Floor, Add</i>	0.72
		<i>Note: Applied only to work area above 40'.</i>	
		<i>For Up To 100, Add</i>	1.07
		<i>For >100 To 250, Add</i>	0.51
		<i>For >250 To 500, Add</i>	0.22
		<i>For >2,500 To 5,000, Deduct</i>	-0.09
		<i>For >5,000 To 10,000, Deduct</i>	-0.19
		<i>For >10,000 To 20,000, Deduct</i>	-0.28
		<i>For >20,000, Deduct</i>	-0.37

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	09 91	13 00-0502	SF	2 Coats Paint, Brush Work, Paint Exterior Wood Trim.....	3.42	
				For Work >20' To 30' Above Floor, Add	0.58	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.23	
				For Work >15' To 20' Above Floor, Add	0.35	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.93	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	1.28	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	1.91	
				For >100 To 250, Add	0.92	
				For >250 To 500, Add	0.40	
				For >2,500 To 5,000, Deduct	-0.17	
				For >5,000 To 10,000, Deduct	-0.34	
				For >10,000 To 20,000, Deduct	-0.51	
				For >20,000, Deduct	-0.68	
	09 91	13 00-0503	SF	1 Coat Primer, Brush/Roller Work, Paint Exterior Wood Trim.....	1.40	
				For Work >20' To 30' Above Floor, Add	0.23	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.09	
				For Work >15' To 20' Above Floor, Add	0.14	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.36	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.50	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.76	
				For >100 To 250, Add	0.37	
				For >250 To 500, Add	0.16	
				For >2,500 To 5,000, Deduct	-0.07	
				For >5,000 To 10,000, Deduct	-0.14	
				For >10,000 To 20,000, Deduct	-0.21	
				For >20,000, Deduct	-0.28	
	09 91	13 00-0504	SF	1 Coat Paint, Brush/Roller Work, Paint Exterior Wood Trim.....	1.57	
				For Work >20' To 30' Above Floor, Add	0.26	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.11	
				For Work >15' To 20' Above Floor, Add	0.15	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.41	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.56	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.85	
				For >100 To 250, Add	0.41	
				For >250 To 500, Add	0.18	
				For >2,500 To 5,000, Deduct	-0.08	
				For >5,000 To 10,000, Deduct	-0.16	
				For >10,000 To 20,000, Deduct	-0.24	
				For >20,000, Deduct	-0.31	
	09 91	13 00-0505	SF	2 Coats Paint, Brush/Roller Work, Paint Exterior Wood Trim.....	2.93	
				For Work >20' To 30' Above Floor, Add	0.46	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.20	
				For Work >15' To 20' Above Floor, Add	0.28	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.74	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	1.01	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	1.54	
				For >100 To 250, Add	0.75	
				For >250 To 500, Add	0.33	
				For >2,500 To 5,000, Deduct	-0.15	
				For >5,000 To 10,000, Deduct	-0.29	
				For >10,000 To 20,000, Deduct	-0.44	
				For >20,000, Deduct	-0.59	
	09 91	13 00-0506	SF	1 Coat Primer, Sprayed, Paint Exterior Wood Trim.....	1.25	
				For Work >20' To 30' Above Floor, Add	0.16	
				Note: Applied only to work area above 20'.		
				For Oil Based Paint, Add	0.09	
				For Work >15' To 20' Above Floor, Add	0.10	
				Note: Applied only to work area above 15' to 20'.		
				For Work >30' To 40' Above Floor, Add	0.26	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.36	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.58	
				For >100 To 250, Add	0.29	
				For >250 To 500, Add	0.13	
				For >2,500 To 5,000, Deduct	-0.06	
				For >5,000 To 10,000, Deduct	-0.13	
				For >10,000 To 20,000, Deduct	-0.19	
				For >20,000, Deduct	-0.25	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 13 00-0507	SF 1 Coat Paint, Sprayed, Paint Exterior Wood Trim.....	1.38	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Oil Based Paint, Add</i>	0.10	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.31	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.43	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.68	
	<i>For >100 To 250, Add</i>	0.33	
	<i>For >250 To 500, Add</i>	0.15	
	<i>For >2,500 To 5,000, Deduct</i>	-0.07	
	<i>For >5,000 To 10,000, Deduct</i>	-0.14	
	<i>For >10,000 To 20,000, Deduct</i>	-0.21	
	<i>For >20,000, Deduct</i>	-0.28	
09 91 13 00-0508	SF 2 Coats Paint, Sprayed, Paint Exterior Wood Trim.....	2.63	
	<i>For Work >20' To 30' Above Floor, Add</i>	0.36	
	<i>Note: Applied only to work area above 20'.</i>		
	<i>For Oil Based Paint, Add</i>	0.19	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.21	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.57	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.79	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	1.25	
	<i>For >100 To 250, Add</i>	0.62	
	<i>For >250 To 500, Add</i>	0.27	
	<i>For >2,500 To 5,000, Deduct</i>	-0.13	
	<i>For >5,000 To 10,000, Deduct</i>	-0.26	
	<i>For >10,000 To 20,000, Deduct</i>	-0.39	
	<i>For >20,000, Deduct</i>	-0.53	

09 91 13 00-0509 Paint Exterior Miscellaneous Metal Surfaces (09 91 13)

09 91 13 00-0510	SF 1 Coat Alkyd Anticorrosive Metal Primer, Brush/Roller Work, Paint Exterior Miscellaneous Metal Surfaces.....	1.45	
	<i>For Epoxy Paint, Add</i>	0.21	
	<i>For Electrostatic Painting, Add</i>	0.21	
09 91 13 00-0511	SF 1 Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Miscellaneous Metal Surfaces	1.29	
	<i>For Epoxy Paint, Add</i>	0.15	
	<i>For Electrostatic Painting, Add</i>	0.17	
09 91 13 00-0512	SF 2 Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Exterior Miscellaneous Metal Surfaces.....	2.63	
	<i>For Epoxy Paint, Add</i>	0.33	
	<i>For Electrostatic Painting, Add</i>	0.36	

09 91 23 Interior Painting (09 91)

Note: Acrylic latex paint unless otherwise stated. VOC compliant in all regulated areas, review specifications for levels. Paint tasks covers all paint sheens: flat, eggshell, satin, semi-gloss, or gloss. See CSI section 09 91 13 00-0339 for additional interior materials.

09 91 23 00-0001 Paint Interior Walls (09 91 23)

09 91 23 00-0002 Paint Interior Brick Walls (09 91 23 00-0001)

09 91 23 00-0003	LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Brick Walls.....	0.21	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.02	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.04	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.06	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.08	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.12	
	<i>For >100 To 250, Add</i>	0.06	
	<i>For >250 To 500, Add</i>	0.03	
	<i>For >2,500 To 5,000, Deduct</i>	-0.01	
	<i>For >5,000 To 10,000, Deduct</i>	-0.02	
	<i>For >10,000 To 20,000, Deduct</i>	-0.03	
	<i>For >20,000, Deduct</i>	-0.04	



	Finishes	09	
	Painting and Coating	09 90	09
	Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0004	SF	1	Coat Filler, Brush Work, Paint Interior Brick Walls.....	1.12	
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.43	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.64	
			<i>For >100 To 250, Add</i>	0.31	
			<i>For >250 To 500, Add</i>	0.14	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.11	
			<i>For >10,000 To 20,000, Deduct</i>	-0.17	
			<i>For >20,000, Deduct</i>	-0.22	
09 91 23 00-0005	SF	1	Coat Paint, Brush Work, Paint Interior Brick Walls.....	1.29	
			<i>For Oil Based Paint, Add</i>	0.08	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.36	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.50	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.74	
			<i>For >100 To 250, Add</i>	0.36	
			<i>For >250 To 500, Add</i>	0.16	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.13	
			<i>For >10,000 To 20,000, Deduct</i>	-0.19	
			<i>For >20,000, Deduct</i>	-0.26	
09 91 23 00-0006	SF	2	Coat Paint, Brush Work, Paint Interior Brick Walls.....	2.36	
			<i>For Oil Based Paint, Add</i>	0.16	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.24	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.40	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.64	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.87	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.31	
			<i>For >100 To 250, Add</i>	0.63	
			<i>For >250 To 500, Add</i>	0.28	
			<i>For >2,500 To 5,000, Deduct</i>	-0.12	
			<i>For >5,000 To 10,000, Deduct</i>	-0.24	
			<i>For >10,000 To 20,000, Deduct</i>	-0.35	
			<i>For >20,000, Deduct</i>	-0.47	
09 91 23 00-0007	SF	1	Coat Filler, Brush/Roller Work, Paint Interior Brick Walls.....	0.95	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.16	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.25	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.34	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.51	
			<i>For >100 To 250, Add</i>	0.25	
			<i>For >250 To 500, Add</i>	0.11	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.10	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.19	
09 91 23 00-0008	SF	1	Coat Paint, Brush/Roller Work, Paint Interior Brick Walls.....	1.21	
			<i>For Oil Based Paint, Add</i>	0.09	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.18	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.29	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.40	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.61	
			<i>For >100 To 250, Add</i>	0.30	
			<i>For >250 To 500, Add</i>	0.13	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.12	
			<i>For >10,000 To 20,000, Deduct</i>	-0.18	
			<i>For >20,000, Deduct</i>	-0.24	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0009 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Brick Walls	2.11	
For Oil Based Paint, Add	0.15	
For Work >15' To 20' Above Floor, Add	0.18	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.31	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.49	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.68	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.05	
For >100 To 250, Add	0.52	
For >250 To 500, Add	0.23	
For >2,500 To 5,000, Deduct	-0.11	
For >5,000 To 10,000, Deduct	-0.21	
For >10,000 To 20,000, Deduct	-0.32	
For >20,000, Deduct	-0.42	
09 91 23 00-0010 SF 1 Coat Filler, Sprayed, Paint Interior Brick Walls	0.90	
For Oil Based Paint, Add	0.06	
For Backroll, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.45	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.18	
09 91 23 00-0011 SF 1 Coat Paint, Sprayed, Paint Interior Brick Walls	1.06	
For Oil Based Paint, Add	0.08	
For Backroll, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.20	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.28	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.47	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 23 00-0012 SF 2 Coats Paint, Sprayed, Paint Interior Brick Walls	1.81	
For Oil Based Paint, Add	0.14	
For Backroll, Add	0.18	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.35	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.48	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.80	
For >100 To 250, Add	0.40	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.27	
For >20,000, Deduct	-0.36	
09 91 23 00-0013 SF 1 Coat Bonding Agent, Brush Work, Paint Interior Brick Walls	1.18	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.65	
For >100 To 250, Add	0.32	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0014 SF 1 Coat Bonding Agent, Brush/Roller Work, Paint Interior Brick Walls.....	1.01	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.16	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.25	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.34	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.52	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	
09 91 23 00-0015 SF 1 Coat Bonding Agent, Sprayed, Paint Interior Brick Walls	0.97	
For Backroll, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.46	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.19	
09 91 23 00-0016 Paint Interior Concrete Walls (09 91 23 00-0001)		
09 91 23 00-0017 LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Concrete Walls	0.17	
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.03	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.05	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.07	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.10	
For >100 To 250, Add	0.05	
For >250 To 500, Add	0.02	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.03	
09 91 23 00-0018 SF 1 Coat Filler, Brush Work, Paint Interior Concrete Walls	0.95	
For Oil Based Paint, Add	0.06	
For Epoxy Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.17	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.27	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.37	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.55	
For >100 To 250, Add	0.27	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.19	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0019	SF 1 Coat Paint, Brush Work, Paint Interior Concrete Walls	1.00	
	For Oil Based Paint, Add	0.06	
	For Epoxy Paint, Add	0.12	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.20	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.31	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.43	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.62	
	For >100 To 250, Add	0.30	
	For >250 To 500, Add	0.13	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.10	
	For >10,000 To 20,000, Deduct	-0.15	
	For >20,000, Deduct	-0.20	
09 91 23 00-0020	SF 2 Coats Paint, Brush Work, Paint Interior Concrete Walls	1.70	
	For Oil Based Paint, Add	0.10	
	For Epoxy Paint, Add	0.16	
	For Work >15' To 20' Above Floor, Add	0.22	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.37	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.58	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.80	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.13	
	For >100 To 250, Add	0.54	
	For >250 To 500, Add	0.23	
	For >2,500 To 5,000, Deduct	-0.09	
	For >5,000 To 10,000, Deduct	-0.17	
	For >10,000 To 20,000, Deduct	-0.26	
	For >20,000, Deduct	-0.34	
09 91 23 00-0021	SF 1 Coat Filler, Brush/Roller Work, Paint Interior Concrete Walls	0.79	
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.12	
	For Work >15' To 20' Above Floor, Add	0.08	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.13	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.21	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.29	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.43	
	For >100 To 250, Add	0.21	
	For >250 To 500, Add	0.09	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.08	
	For >10,000 To 20,000, Deduct	-0.12	
	For >20,000, Deduct	-0.16	
09 91 23 00-0022	SF 1 Coat Paint, Brush/Roller Work, Paint Interior Concrete Walls	0.86	
	For Oil Based Paint, Add	0.05	
	For Epoxy Paint, Add	0.11	
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.16	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.26	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.35	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.51	
	For >100 To 250, Add	0.25	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.13	
	For >20,000, Deduct	-0.17	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0023 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Concrete Walls.....	1.59	
For Oil Based Paint, Add	0.10	
For Epoxy Paint, Add	0.21	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.29	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.46	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.63	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.93	
For >100 To 250, Add	0.45	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.32	
09 91 23 00-0024 SF 1 Coat Filler, Sprayed, Paint Interior Concrete Walls.....	0.74	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.14	
For Backroll, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.06	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.10	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.16	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.23	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.36	
For >100 To 250, Add	0.18	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.15	
09 91 23 00-0025 SF 1 Coat Paint, Sprayed, Paint Interior Concrete Walls.....	0.79	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.12	
For Backroll, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.13	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.21	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.29	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.43	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
09 91 23 00-0026 SF 2 Coats Paint, Sprayed, Paint Interior Concrete Walls.....	1.33	
For Oil Based Paint, Add	0.09	
For Epoxy Paint, Add	0.23	
For Backroll, Add	0.14	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.31	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0027	SF 1 Coat Bonding Agent, Brush Work, Paint Interior Concrete Walls.....	1.00	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.10	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.17	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.27	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.37	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.56	
	<i>For >100 To 250, Add</i>	0.27	
	<i>For >250 To 500, Add</i>	0.12	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.10	
	<i>For >10,000 To 20,000, Deduct</i>	-0.15	
	<i>For >20,000, Deduct</i>	-0.20	
09 91 23 00-0028	SF 1 Coat Bonding Agent, Brush/Roller Work, Paint Interior Concrete Walls	0.84	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.29	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.44	
	<i>For >100 To 250, Add</i>	0.21	
	<i>For >250 To 500, Add</i>	0.09	
	<i>For >2,500 To 5,000, Deduct</i>	-0.04	
	<i>For >5,000 To 10,000, Deduct</i>	-0.08	
	<i>For >10,000 To 20,000, Deduct</i>	-0.13	
	<i>For >20,000, Deduct</i>	-0.17	
09 91 23 00-0029	SF 1 Coat Bonding Agent, Sprayed, Paint Interior Concrete Walls	0.80	
	<i>For Backroll, Add</i>	0.08	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.06	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.10	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.16	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.23	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.37	
	<i>For >100 To 250, Add</i>	0.18	
	<i>For >250 To 500, Add</i>	0.08	
	<i>For >2,500 To 5,000, Deduct</i>	-0.04	
	<i>For >5,000 To 10,000, Deduct</i>	-0.08	
	<i>For >10,000 To 20,000, Deduct</i>	-0.12	
	<i>For >20,000, Deduct</i>	-0.16	
09 91 23 00-0030	Paint Interior Concrete Block Walls (09 91 23 00-0001)		
09 91 23 00-0031	Paint Interior Concrete Block Walls, Epoxy Paint (09 91 23 00-0030)		
09 91 23 00-0032	LF 1 Coat Epoxy Paint, Cut-in Brush Work, Paint Interior Concrete Block Walls.....	0.66	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.03	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.04	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.07	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.09	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.20	
	<i>For >100 To 250, Add</i>	0.11	
	<i>For >250 To 500, Add</i>	0.05	
	<i>For >2,500 To 5,000, Deduct</i>	-0.03	
	<i>For >5,000 To 10,000, Deduct</i>	-0.07	
	<i>For >10,000 To 20,000, Deduct</i>	-0.10	
	<i>For >20,000, Deduct</i>	-0.13	
09 91 23 00-0033	SF 1 Coat Epoxy Filler, Brush Work, Paint Interior Concrete Block Walls	1.37	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.13	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.22	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.35	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.48	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.73	
	<i>For >100 To 250, Add</i>	0.36	
	<i>For >250 To 500, Add</i>	0.16	
	<i>For >2,500 To 5,000, Deduct</i>	-0.07	
	<i>For >5,000 To 10,000, Deduct</i>	-0.14	
	<i>For >10,000 To 20,000, Deduct</i>	-0.21	
	<i>For >20,000, Deduct</i>	-0.27	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0034 SF 1 Coat Epoxy Paint, Brush Work, Paint Interior Concrete Block Walls	1.55	
For Work >15' To 20' Above Floor, Add	0.16	
Note: Applied only to work area above 15' to 20'		
For Work >20' To 30' Above Floor, Add	0.27	
Note: Applied only to work area above 20' to 30'		
For Work >30' To 40' Above Floor, Add	0.42	
Note: Applied only to work area above 30' to 40'		
For Work >40' Above Floor, Add	0.58	
Note: Applied only to work area above 40'		
For Up To 100, Add	0.87	
For >100 To 250, Add	0.42	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.23	
For >20,000, Deduct	-0.31	
09 91 23 00-0035 SF 2 Coats Epoxy Paint, Brush Work, Paint Interior Concrete Block Walls	2.82	
For Work >15' To 20' Above Floor, Add	0.28	
Note: Applied only to work area above 15' to 20'		
For Work >20' To 30' Above Floor, Add	0.46	
Note: Applied only to work area above 20' to 30'		
For Work >30' To 40' Above Floor, Add	0.74	
Note: Applied only to work area above 30' to 40'		
For Work >40' Above Floor, Add	1.01	
Note: Applied only to work area above 40'		
For Up To 100, Add	1.53	
For >100 To 250, Add	0.74	
For >250 To 500, Add	0.33	
For >2,500 To 5,000, Deduct	-0.14	
For >5,000 To 10,000, Deduct	-0.28	
For >10,000 To 20,000, Deduct	-0.42	
For >20,000, Deduct	-0.56	
09 91 23 00-0036 SF 1 Coat Epoxy Filler, Brush/Roller Work, Paint Interior Concrete Block Walls	1.16	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'		
For Work >20' To 30' Above Floor, Add	0.17	
Note: Applied only to work area above 20' to 30'		
For Work >30' To 40' Above Floor, Add	0.27	
Note: Applied only to work area above 30' to 40'		
For Work >40' Above Floor, Add	0.37	
Note: Applied only to work area above 40'		
For Up To 100, Add	0.58	
For >100 To 250, Add	0.28	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.23	
09 91 23 00-0037 SF 1 Coat Epoxy Paint, Brush/Roller Work, Paint Interior Concrete Block Walls	1.27	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'		
For Work >30' To 40' Above Floor, Add	0.31	
Note: Applied only to work area above 30' to 40'		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'		
For Up To 100, Add	0.66	
For >100 To 250, Add	0.32	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0038 SF 2 Coats Epoxy Paint, Brush/Roller Work, Paint Interior Concrete Block Walls	2.41	
For Work >15' To 20' Above Floor, Add	0.21	
Note: Applied only to work area above 15' to 20'		
For Work >20' To 30' Above Floor, Add	0.36	
Note: Applied only to work area above 20' to 30'		
For Work >30' To 40' Above Floor, Add	0.57	
Note: Applied only to work area above 30' to 40'		
For Work >40' Above Floor, Add	0.79	
Note: Applied only to work area above 40'		
For Up To 100, Add	1.22	
For >100 To 250, Add	0.60	
For >250 To 500, Add	0.26	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.24	
For >10,000 To 20,000, Deduct	-0.36	
For >20,000, Deduct	-0.48	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0039 SF 1 Coat Epoxy Filler, Sprayed, Paint Interior Concrete Block Walls.....	1.07	
For Backroll, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.07	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.12	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.19	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.26	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.44	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 23 00-0040 SF 1 Coat Epoxy Paint, Sprayed, Paint Interior Concrete Block Walls.....	1.24	
For Backroll, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.16	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.26	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.35	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.57	
For >100 To 250, Add	0.28	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0041 SF 2 Coats Epoxy Paint, Sprayed, Paint Interior Concrete Block Walls.....	2.34	
For Backroll, Add	0.23	
For Work >15' To 20' Above Floor, Add	0.16	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.27	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.43	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.59	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.00	
For >100 To 250, Add	0.50	
For >250 To 500, Add	0.23	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.23	
For >10,000 To 20,000, Deduct	-0.35	
For >20,000, Deduct	-0.47	
09 91 23 00-0042 Paint Interior Concrete Block Walls, Acrylic Latex Paint (09 91 23 00-0030)		
09 91 23 00-0043 LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Concrete Block Walls.....	0.24	
For Oil Based Paint, Add	0.02	
For Work >15' To 20' Above Floor, Add	0.03	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.04	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.07	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.09	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.14	
For >100 To 250, Add	0.07	
For >250 To 500, Add	0.03	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.04	
For >20,000, Deduct	-0.05	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0044 SF 1 Coat Filler, Brush Work, Paint Interior Concrete Block Walls	1.21	
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.35	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.48	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.71	
For >100 To 250, Add	0.34	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	
09 91 23 00-0045 SF 1 Coat Paint, Brush Work, Paint Interior Concrete Block Walls	1.47	
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.26	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.41	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.57	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.84	
For >100 To 250, Add	0.40	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.15	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000, Deduct	-0.29	
09 91 23 00-0046 SF 2 Coats Paint, Brush Work, Paint Interior Concrete Block Walls	2.70	
For Oil Based Paint, Add	0.18	
For Work >15' To 20' Above Floor, Add	0.27	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.46	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.73	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.00	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.50	
For >100 To 250, Add	0.73	
For >250 To 500, Add	0.32	
For >2,500 To 5,000, Deduct	-0.14	
For >5,000 To 10,000, Deduct	-0.27	
For >10,000 To 20,000, Deduct	-0.41	
For >20,000, Deduct	-0.54	
09 91 23 00-0047 SF 1 Coat Texture Paint, Brush Work, Paint Interior Concrete Block Walls	1.63	
For Oil Based Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.29	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.46	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.63	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.93	
For >100 To 250, Add	0.45	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.33	
09 91 23 00-0048 SF 1 Coat Filler, Brush/Roller Work, Paint Interior Concrete Block Walls	1.05	
For Oil Based Paint, Add	0.07	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0049 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Concrete Block Walls.....	1.27	
For Oil Based Paint, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.21	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.33	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.46	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.69	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0050 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Concrete Block Walls.....	2.31	
For Oil Based Paint, Add	0.16	
For Work >15' To 20' Above Floor, Add	0.21	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.36	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.57	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.79	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.20	
For >100 To 250, Add	0.59	
For >250 To 500, Add	0.26	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.23	
For >10,000 To 20,000, Deduct	-0.35	
For >20,000, Deduct	-0.46	
09 91 23 00-0051 SF 1 Coat Texture Paint, Brush/Roller Work, Paint Interior Concrete Block Walls.....	1.42	
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.37	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.51	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.77	
For >100 To 250, Add	0.37	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.28	
09 91 23 00-0052 SF 1 Coat Filler, Sprayed, Paint Interior Concrete Block Walls.....	1.02	
For Oil Based Paint, Add	0.07	
For Backroll, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.32	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.50	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	
09 91 23 00-0053 SF 1 Coat Paint, Sprayed, Paint Interior Concrete Block Walls.....	1.19	
For Oil Based Paint, Add	0.09	
For Backroll, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.16	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.26	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.35	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.56	
For >100 To 250, Add	0.28	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0054 SF 2 Coats Paint, Sprayed, Paint Interior Concrete Block Walls.....	2.02	
For Oil Based Paint, Add	0.15	
For Backroll, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.25	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.39	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.54	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.89	
For >100 To 250, Add	0.45	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.20	
For >10,000 To 20,000, Deduct	-0.30	
For >20,000, Deduct	-0.40	
09 91 23 00-0055 SF 1 Coat Texture Paint, Sprayed, Paint Interior Concrete Block Walls	1.39	
For Oil Based Paint, Add	0.10	
For Backroll, Add	0.14	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.65	
For >100 To 250, Add	0.32	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.28	
09 91 23 00-0056 Paint Interior Concrete Block Walls With Bonding Agent (09 91 23 00-0030)		
09 91 23 00-0057 SF 1 Coat Bonding Agent, Brush Work, Paint Interior Concrete Block Walls.....	1.27	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.35	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.48	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.72	
For >100 To 250, Add	0.35	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0058 SF 1 Coat Bonding Agent, Brush/Roller Work, Paint Interior Concrete Block Walls	1.11	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.60	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0059 SF 1 Coat Bonding Agent, Sprayed, Paint Interior Concrete Block Walls	1.10	
For Backroll, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.32	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.51	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	
09 91 23 00-0060 Paint Interior Plaster/Drywall Walls (09 91 23 00-0001)		
09 91 23 00-0061 Paint Interior Plaster/Drywall Walls (09 91 23 00-0060)		
09 91 23 00-0062 LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Plaster/Drywall Walls	0.17	
For Oil Based Paint, Add	0.01	
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.03	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.05	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.07	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.10	
For >100 To 250, Add	0.05	
For >250 To 500, Add	0.02	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.03	
09 91 23 00-0063 SF 1 Coat Primer, Brush Work, Paint Interior Plaster/Drywall Walls	0.99	
For Oil Based Paint, Add	0.06	
For Orange Peel Finish, Add	0.13	
For Epoxy Paint, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.58	
For >100 To 250, Add	0.28	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	
09 91 23 00-0064 SF 1 Coat Paint, Brush Work, Paint Interior Plaster/Drywall Walls	1.01	
For Oil Based Paint, Add	0.06	
For Orange Peel Finish, Add	0.14	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.63	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.20	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0065 SF 2 Coats Paint, Brush Work, Paint Interior Plaster/Drywall Walls.....	1.87	
For Oil Based Paint, Add	0.12	
For Orange Peel Finish, Add	0.25	
For Epoxy Paint, Add	0.23	
For Work >15' To 20' Above Floor, Add	0.21	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.36	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.57	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.79	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.14	
For >100 To 250, Add	0.54	
For >250 To 500, Add	0.24	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.19	
For >10,000 To 20,000, Deduct	-0.28	
For >20,000, Deduct	-0.37	
09 91 23 00-0066 SF 3 Coats Paint, Brush Work, Paint Interior Plaster/Drywall Walls.....	2.69	
For Oil Based Paint, Add	0.17	
For Orange Peel Finish, Add	0.36	
For Epoxy Paint, Add	0.33	
For Work >15' To 20' Above Floor, Add	0.30	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.51	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.81	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.12	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.62	
For >100 To 250, Add	0.78	
For >250 To 500, Add	0.34	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.27	
For >10,000 To 20,000, Deduct	-0.40	
For >20,000, Deduct	-0.54	
09 91 23 00-0067 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Plaster/Drywall Walls.....	0.81	
For Oil Based Paint, Add	0.05	
For Orange Peel Finish, Add	0.10	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.08	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.14	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.22	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.30	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.45	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
09 91 23 00-0068 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Plaster/Drywall Walls.....	0.90	
For Oil Based Paint, Add	0.06	
For Orange Peel Finish, Add	0.12	
For Epoxy Paint, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.16	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.26	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.36	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.53	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.18	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0069	SF		2 Coats Paint, Brush/Roller Work, Paint Interior Plaster/Drywall Walls	1.61	
			<i>For Oil Based Paint, Add</i>	0.11	
			<i>For Orange Peel Finish, Add</i>	0.21	
			<i>For Epoxy Paint, Add</i>	0.23	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.17	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.28	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.45	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.62	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.91	
			<i>For >100 To 250, Add</i>	0.44	
			<i>For >250 To 500, Add</i>	0.19	
			<i>For >2,500 To 5,000, Deduct</i>	-0.08	
			<i>For >5,000 To 10,000, Deduct</i>	-0.16	
			<i>For >10,000 To 20,000, Deduct</i>	-0.24	
			<i>For >20,000, Deduct</i>	-0.32	
09 91 23 00-0070	SF		1 Coat Primer, Sprayed, Paint Interior Plaster/Drywall Walls.....	0.76	
			<i>For Oil Based Paint, Add</i>	0.05	
			<i>For Epoxy Paint, Add</i>	0.14	
			<i>For Backroll, Add</i>	0.08	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.11	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.17	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.24	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.37	
			<i>For >100 To 250, Add</i>	0.18	
			<i>For >250 To 500, Add</i>	0.08	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.08	
			<i>For >10,000 To 20,000, Deduct</i>	-0.11	
			<i>For >20,000, Deduct</i>	-0.15	
09 91 23 00-0071	SF		1 Coat Paint, Sprayed, Paint Interior Plaster/Drywall Walls.....	0.79	
			<i>For Oil Based Paint, Add</i>	0.05	
			<i>For Epoxy Paint, Add</i>	0.12	
			<i>For Backroll, Add</i>	0.09	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.29	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.43	
			<i>For >100 To 250, Add</i>	0.21	
			<i>For >250 To 500, Add</i>	0.09	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.08	
			<i>For >10,000 To 20,000, Deduct</i>	-0.12	
			<i>For >20,000, Deduct</i>	-0.16	
09 91 23 00-0072	SF		2 Coats Paint, Sprayed, Paint Interior Plaster/Drywall Walls	1.33	
			<i>For Oil Based Paint, Add</i>	0.09	
			<i>For Epoxy Paint, Add</i>	0.23	
			<i>For Backroll, Add</i>	0.14	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.43	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.67	
			<i>For >100 To 250, Add</i>	0.33	
			<i>For >250 To 500, Add</i>	0.14	
			<i>For >2,500 To 5,000, Deduct</i>	-0.07	
			<i>For >5,000 To 10,000, Deduct</i>	-0.13	
			<i>For >10,000 To 20,000, Deduct</i>	-0.20	
			<i>For >20,000, Deduct</i>	-0.27	

09 91 23 00-0073 Paint Interior Plaster/Drywall Or Masonry Walls With Polymix Multi-Color Paint (09 91 23 00-0060)

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0074	SF			2 Tone Polymix With Base Coat, Sprayed, Paint Interior Plaster/Drywall Or Masonry Walls .....2.56		
				For Work >15' To 20' Above Floor, Add	0.14	
				Note: Applied only to work area above 15' to 20'.		
				For Work >20' To 30' Above Floor, Add	0.23	
				Note: Applied only to work area above 20' to 30'.		
				For Work >30' To 40' Above Floor, Add	0.37	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.51	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.94	
				For >100 To 250, Add	0.49	
				For >250 To 500, Add	0.22	
				For >2,500 To 5,000, Deduct	-0.13	
				For >5,000 To 10,000, Deduct	-0.26	
				For >10,000 To 20,000, Deduct	-0.38	
				For >20,000, Deduct	-0.51	
09 91 23 00-0075	SF			3 Tone Polymix With Base Coat, Sprayed, Paint Interior Plaster/Drywall Or Masonry Walls .....2.83		
				For Work >15' To 20' Above Floor, Add	0.14	
				Note: Applied only to work area above 15' to 20'.		
				For Work >20' To 30' Above Floor, Add	0.23	
				Note: Applied only to work area above 20' to 30'.		
				For Work >30' To 40' Above Floor, Add	0.37	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.51	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.98	
				For >100 To 250, Add	0.51	
				For >250 To 500, Add	0.23	
				For >2,500 To 5,000, Deduct	-0.14	
				For >5,000 To 10,000, Deduct	-0.28	
				For >10,000 To 20,000, Deduct	-0.42	
				For >20,000, Deduct	-0.57	
09 91 23 00-0076	SF			4 Tone Polymix With Base Coat, Sprayed, Paint Interior Plaster/Drywall Or Masonry Walls .....3.11		
				For Work >15' To 20' Above Floor, Add	0.14	
				Note: Applied only to work area above 15' to 20'.		
				For Work >20' To 30' Above Floor, Add	0.23	
				Note: Applied only to work area above 20' to 30'.		
				For Work >30' To 40' Above Floor, Add	0.37	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.51	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	1.02	
				For >100 To 250, Add	0.54	
				For >250 To 500, Add	0.25	
				For >2,500 To 5,000, Deduct	-0.16	
				For >5,000 To 10,000, Deduct	-0.31	
				For >10,000 To 20,000, Deduct	-0.47	
				For >20,000, Deduct	-0.62	
09 91 23 00-0077				Paint Interior Plaster/Drywall Walls, Acoustic Texture (09 91 23 00-0060)		
09 91 23 00-0078	SF			1 Coat Primer, Sprayed, Acoustic Texture, Paint Interior Plaster/Drywall Walls .....0.95		
				For Work >15' To 20' Above Floor, Add	0.08	
				Note: Applied only to work area above 15' to 20'.		
				For Work >20' To 30' Above Floor, Add	0.13	
				Note: Applied only to work area above 20' to 30'.		
				For Work >30' To 40' Above Floor, Add	0.20	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.28	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.45	
				For >100 To 250, Add	0.22	
				For >250 To 500, Add	0.10	
				For >2,500 To 5,000, Deduct	-0.05	
				For >5,000 To 10,000, Deduct	-0.10	
				For >10,000 To 20,000, Deduct	-0.14	
				For >20,000, Deduct	-0.19	
09 91 23 00-0079	SF			1 Coat Finish, Sprayed, Acoustic Texture, Paint Interior Plaster/Drywall Walls .....1.09		
				For Work >15' To 20' Above Floor, Add	0.10	
				Note: Applied only to work area above 15' to 20'.		
				For Work >20' To 30' Above Floor, Add	0.16	
				Note: Applied only to work area above 20' to 30'.		
				For Work >30' To 40' Above Floor, Add	0.26	
				Note: Applied only to work area above 30' to 40'.		
				For Work >40' Above Floor, Add	0.36	
				Note: Applied only to work area above 40'.		
				For Up To 100, Add	0.55	
				For >100 To 250, Add	0.27	
				For >250 To 500, Add	0.12	
				For >2,500 To 5,000, Deduct	-0.05	
				For >5,000 To 10,000, Deduct	-0.11	
				For >10,000 To 20,000, Deduct	-0.16	
				For >20,000, Deduct	-0.22	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0080	SF 2 Coats Finish, Sprayed, Acoustic Texture, Paint Interior Plaster/Drywall Walls 1.79		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.36	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.50	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.81	
	<i>For >100 To 250, Add</i>	0.41	
	<i>For >250 To 500, Add</i>	0.18	
	<i>For >2,500 To 5,000, Deduct</i>	-0.09	
	<i>For >5,000 To 10,000, Deduct</i>	-0.18	
	<i>For >10,000 To 20,000, Deduct</i>	-0.27	
	<i>For >20,000, Deduct</i>	-0.36	
09 91 23 00-0081	SF Stipple Finish (Drippowder), Paint Interior Plaster/Drywall Walls 1.48		
	<i>For Work >15' To 20' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.33	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.52	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.72	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	1.00	
	<i>For >100 To 250, Add</i>	0.47	
	<i>For >250 To 500, Add</i>	0.20	
	<i>For >2,500 To 5,000, Deduct</i>	-0.07	
	<i>For >5,000 To 10,000, Deduct</i>	-0.15	
	<i>For >10,000 To 20,000, Deduct</i>	-0.22	
	<i>For >20,000, Deduct</i>	-0.30	
09 91 23 00-0082	Paint Interior Metal Walls (09 91 23 00-0001)		
09 91 23 00-0083	Paint Interior Galvanized Walls (09 91 23 00-0082)		
	Note: Linseed oil or acrylic latex paint.		
09 91 23 00-0084	SF 1 Coat Primer, Brush Work, Paint Interior Galvanized Wall Surfaces 1.25		
	<i>For Electrostatic Painting, Add</i>	0.19	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.43	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.66	
	<i>For >100 To 250, Add</i>	0.32	
	<i>For >250 To 500, Add</i>	0.14	
	<i>For >2,500 To 5,000, Deduct</i>	-0.06	
	<i>For >5,000 To 10,000, Deduct</i>	-0.13	
	<i>For >10,000 To 20,000, Deduct</i>	-0.19	
	<i>For >20,000, Deduct</i>	-0.25	
09 91 23 00-0085	SF 1 Coat Paint, Brush Work, Paint Interior Galvanized Wall Surfaces 1.36		
	<i>For Electrostatic Painting, Add</i>	0.21	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.36	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.50	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.74	
	<i>For >100 To 250, Add</i>	0.36	
	<i>For >250 To 500, Add</i>	0.16	
	<i>For >2,500 To 5,000, Deduct</i>	-0.07	
	<i>For >5,000 To 10,000, Deduct</i>	-0.14	
	<i>For >10,000 To 20,000, Deduct</i>	-0.20	
	<i>For >20,000, Deduct</i>	-0.27	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0086	SF		2 Coats Paint, Brush Work, Paint Interior Galvanized Wall Surfaces	2.50	
			For Electrostatic Painting, Add	0.39	
			For Work >15' To 20' Above Floor, Add	0.24	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.40	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.63	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.87	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.32	
			For >100 To 250, Add	0.65	
			For >250 To 500, Add	0.28	
			For >2,500 To 5,000, Deduct	-0.13	
			For >5,000 To 10,000, Deduct	-0.25	
			For >10,000 To 20,000, Deduct	-0.38	
			For >20,000, Deduct	-0.50	
09 91 23 00-0087	SF		1 Coat Primer, Brush/Roller Work, Paint Interior Galvanized Walls.....	0.95	
			For Electrostatic Painting, Add	0.15	
			For Work >15' To 20' Above Floor, Add	0.09	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.14	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.23	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.31	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.48	
			For >100 To 250, Add	0.24	
			For >250 To 500, Add	0.10	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.10	
			For >10,000 To 20,000, Deduct	-0.14	
			For >20,000, Deduct	-0.19	
09 91 23 00-0088	SF		1 Coat Paint, Brush/Roller Work, Paint Interior Galvanized Wall.....	1.08	
			For Electrostatic Painting, Add	0.17	
			For Work >15' To 20' Above Floor, Add	0.10	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.17	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.27	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.37	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.57	
			For >100 To 250, Add	0.28	
			For >250 To 500, Add	0.12	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.11	
			For >10,000 To 20,000, Deduct	-0.16	
			For >20,000, Deduct	-0.22	
09 91 23 00-0089	SF		2 Coats Paint, Brush/Roller Work, Paint Interior Galvanized Walls	2.04	
			For Electrostatic Painting, Add	0.32	
			For Work >15' To 20' Above Floor, Add	0.19	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.31	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.50	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.69	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.06	
			For >100 To 250, Add	0.52	
			For >250 To 500, Add	0.23	
			For >2,500 To 5,000, Deduct	-0.10	
			For >5,000 To 10,000, Deduct	-0.20	
			For >10,000 To 20,000, Deduct	-0.31	
			For >20,000, Deduct	-0.41	
09 91 23 00-0090	SF		1 Coat Primer, Sprayed, Paint Interior Galvanized Walls	0.89	
			For Electrostatic Painting, Add	0.17	
			For Backroll, Add	0.08	
			For Work >15' To 20' Above Floor, Add	0.05	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.09	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.14	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.20	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.35	
			For >100 To 250, Add	0.18	
			For >250 To 500, Add	0.08	
			For >2,500 To 5,000, Deduct	-0.04	
			For >5,000 To 10,000, Deduct	-0.09	
			For >10,000 To 20,000, Deduct	-0.13	
			For >20,000, Deduct	-0.18	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0091 SF 1 Coat Paint, Sprayed, Paint Interior Galvanized Walls.....	1.11	
For Electrostatic Painting, Add	0.19	
For Backroll, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.32	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.51	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	
09 91 23 00-0092 SF 2 Coats Paint, Sprayed, Paint Interior Galvanized Walls.....	1.92	
For Electrostatic Painting, Add	0.35	
For Backroll, Add	0.18	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.34	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.47	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.80	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.19	
For >10,000 To 20,000, Deduct	-0.29	
For >20,000, Deduct	-0.38	
09 91 23 00-0093 Paint Interior Aluminum And Aluminum Alloy Walls (09 91 23 00-0092)		
Note: Alkyd enamel paint.		
09 91 23 00-0094 SF 1 Coat Primer, Brush Work, Paint Interior Aluminum And Aluminum Alloy Wall Surfaces.....	1.25	
For Electrostatic Painting, Add	0.19	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.66	
For >100 To 250, Add	0.32	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0095 SF 1 Coat Paint, Brush Work, Paint Interior Aluminum And Aluminum Alloy Wall Surfaces.....	1.36	
For Electrostatic Painting, Add	0.21	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.74	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0096 SF 2 Coats Paint, Brush Work, Paint Interior Aluminum And Aluminum Alloy Wall Surfaces	2.49	
For Electrostatic Painting, Add	0.39	
For Work >15' To 20' Above Floor, Add	0.24	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.40	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.63	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.87	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.32	
For >100 To 250, Add	0.64	
For >250 To 500, Add	0.28	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.25	
For >10,000 To 20,000, Deduct	-0.37	
For >20,000, Deduct	-0.50	
09 91 23 00-0097 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Aluminum And Aluminum Alloy Walls	1.10	
For Electrostatic Painting, Add	0.19	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.14	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.31	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.51	
For >100 To 250, Add	0.25	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	
09 91 23 00-0098 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Aluminum And Aluminum Alloy Walls	1.21	
For Electrostatic Painting, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.17	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.27	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.37	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	
09 91 23 00-0099 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Aluminum And Aluminum Alloy Walls	2.31	
For Electrostatic Painting, Add	0.39	
For Work >15' To 20' Above Floor, Add	0.19	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.31	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.50	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.69	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.10	
For >100 To 250, Add	0.54	
For >250 To 500, Add	0.24	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.23	
For >10,000 To 20,000, Deduct	-0.35	
For >20,000, Deduct	-0.46	
09 91 23 00-0100 SF 1 Coat Primer, Sprayed, Paint Interior Aluminum And Aluminum Alloy Walls	0.97	
For Electrostatic Painting, Add	0.18	
For Backroll, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.07	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.11	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.18	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.24	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.41	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.10	
For >10,000 To 20,000, Deduct	-0.15	
For >20,000, Deduct	-0.19	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0101	SF 1 Coat Paint, Sprayed, Paint Interior Aluminum And Aluminum Alloy Walls.....	1.11	
	For Electrostatic Painting, Add	0.19	
	For Backroll, Add	0.11	
	For Work >15' To 20' Above Floor, Add	0.09	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.15	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.23	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.32	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.51	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.17	
	For >20,000, Deduct	-0.22	
09 91 23 00-0102	SF 2 Coats Paint, Sprayed, Paint Interior Aluminum And Aluminum Alloy Walls.....	1.92	
	For Electrostatic Painting, Add	0.35	
	For Backroll, Add	0.18	
	For Work >15' To 20' Above Floor, Add	0.13	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.22	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.34	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.47	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.80	
	For >100 To 250, Add	0.41	
	For >250 To 500, Add	0.18	
	For >2,500 To 5,000, Deduct	-0.10	
	For >5,000 To 10,000, Deduct	-0.19	
	For >10,000 To 20,000, Deduct	-0.29	
	For >20,000, Deduct	-0.38	
09 91 23 00-0103	Paint Interior Corrugated Metal Walls (09 91 23 00-0082)		
09 91 23 00-0104	SF 1 Coat Primer, Sprayed, Paint Interior Corrugated Metal Walls.....	1.09	
	For Electrostatic Painting, Add	0.20	
	For Backroll, Add	0.10	
	For Work >15' To 20' Above Floor, Add	0.07	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.12	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.19	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.26	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.45	
	For >100 To 250, Add	0.23	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.16	
	For >20,000, Deduct	-0.22	
09 91 23 00-0105	SF 1 Coat Paint, Sprayed, Paint Interior Corrugated Metal Walls.....	1.38	
	For Electrostatic Painting, Add	0.23	
	For Backroll, Add	0.15	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.19	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.31	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.42	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.67	
	For >100 To 250, Add	0.33	
	For >250 To 500, Add	0.15	
	For >2,500 To 5,000, Deduct	-0.07	
	For >5,000 To 10,000, Deduct	-0.14	
	For >10,000 To 20,000, Deduct	-0.21	
	For >20,000, Deduct	-0.28	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0106 SF 2 Coats Paint, Sprayed, Paint Interior Corrugated Metal Walls	2.36	
For Electrostatic Painting, Add	0.42	
For Backroll, Add	0.23	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.29	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.46	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.63	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.04	
For >100 To 250, Add	0.52	
For >250 To 500, Add	0.23	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.24	
For >10,000 To 20,000, Deduct	-0.35	
For >20,000, Deduct	-0.47	
09 91 23 00-0107 Paint Interior Stucco Walls (09 91 23 00-0001)		
09 91 23 00-0108 LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Stucco Wall Surfaces.....	0.28	
For Oil Based Paint, Add	0.02	
For Work >15' To 20' Above Floor, Add	0.03	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.06	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.09	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.12	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.17	
For >100 To 250, Add	0.08	
For >250 To 500, Add	0.04	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.03	
For >10,000 To 20,000, Deduct	-0.04	
For >20,000, Deduct	-0.06	
09 91 23 00-0109 SF 1 Coat Primer, Brush Work, Paint Interior Stucco Wall Surfaces.....	1.58	
For Oil Based Paint, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.19	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.31	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.50	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.69	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.99	
For >100 To 250, Add	0.47	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.08	
For >5,000 To 10,000, Deduct	-0.16	
For >10,000 To 20,000, Deduct	-0.24	
For >20,000, Deduct	-0.32	
09 91 23 00-0110 SF 1 Coat Paint, Brush Work, Paint Interior Stucco Wall Surfaces.....	1.74	
For Oil Based Paint, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.20	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.34	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.54	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.75	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.08	
For >100 To 250, Add	0.51	
For >250 To 500, Add	0.22	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.17	
For >10,000 To 20,000, Deduct	-0.26	
For >20,000, Deduct	-0.35	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 23 00-0111	SF	2 Coats Paint, Brush Work, Paint Interior Stucco Wall Surfaces	3.13	
		<i>For Oil Based Paint, Add</i>		0.20	
		<i>For Work >15' To 20' Above Floor, Add</i>		0.35	
		<i>Note: Applied only to work area above 15' to 20'.</i>			
		<i>For Work >20' To 30' Above Floor, Add</i>		0.59	
		<i>Note: Applied only to work area above 20' to 30'.</i>			
		<i>For Work >30' To 40' Above Floor, Add</i>		0.94	
		<i>Note: Applied only to work area above 30' to 40'.</i>			
		<i>For Work >40' Above Floor, Add</i>		1.30	
		<i>Note: Applied only to work area above 40'.</i>			
		<i>For Up To 100, Add</i>		1.89	
		<i>For >100 To 250, Add</i>		0.90	
		<i>For >250 To 500, Add</i>		0.39	
		<i>For >2,500 To 5,000, Deduct</i>		-0.16	
		<i>For >5,000 To 10,000, Deduct</i>		-0.31	
		<i>For >10,000 To 20,000, Deduct</i>		-0.47	
		<i>For >20,000, Deduct</i>		-0.63	
09 91 23 00-0112	SF	1 Coat Primer, Brush/Roller Work, Paint Interior Stucco Wall Surfaces	.....	1.23	
		<i>For Oil Based Paint, Add</i>		0.08	
		<i>For Work >15' To 20' Above Floor, Add</i>		0.14	
		<i>Note: Applied only to work area above 15' to 20'.</i>			
		<i>For Work >20' To 30' Above Floor, Add</i>		0.23	
		<i>Note: Applied only to work area above 20' to 30'.</i>			
		<i>For Work >30' To 40' Above Floor, Add</i>		0.36	
		<i>Note: Applied only to work area above 30' to 40'.</i>			
		<i>For Work >40' Above Floor, Add</i>		0.50	
		<i>Note: Applied only to work area above 40'.</i>			
		<i>For Up To 100, Add</i>		0.72	
		<i>For >100 To 250, Add</i>		0.35	
		<i>For >250 To 500, Add</i>		0.15	
		<i>For >2,500 To 5,000, Deduct</i>		-0.06	
		<i>For >5,000 To 10,000, Deduct</i>		-0.12	
		<i>For >10,000 To 20,000, Deduct</i>		-0.18	
		<i>For >20,000, Deduct</i>		-0.25	
09 91 23 00-0113	SF	1 Coat Paint, Brush/Roller Work, Paint Interior Stucco Wall Surfaces	.....	1.40	
		<i>For Oil Based Paint, Add</i>		0.09	
		<i>For Work >15' To 20' Above Floor, Add</i>		0.15	
		<i>Note: Applied only to work area above 15' to 20'.</i>			
		<i>For Work >20' To 30' Above Floor, Add</i>		0.26	
		<i>Note: Applied only to work area above 20' to 30'.</i>			
		<i>For Work >30' To 40' Above Floor, Add</i>		0.41	
		<i>Note: Applied only to work area above 30' to 40'.</i>			
		<i>For Work >40' Above Floor, Add</i>		0.56	
		<i>Note: Applied only to work area above 40'.</i>			
		<i>For Up To 100, Add</i>		0.82	
		<i>For >100 To 250, Add</i>		0.40	
		<i>For >250 To 500, Add</i>		0.17	
		<i>For >2,500 To 5,000, Deduct</i>		-0.07	
		<i>For >5,000 To 10,000, Deduct</i>		-0.14	
		<i>For >10,000 To 20,000, Deduct</i>		-0.21	
		<i>For >20,000, Deduct</i>		-0.28	
09 91 23 00-0114	SF	2 Coats Paint, Brush/Roller Work, Paint Interior Stucco Wall Surfaces	.....	2.59	
		<i>For Oil Based Paint, Add</i>		0.17	
		<i>For Work >15' To 20' Above Floor, Add</i>		0.27	
		<i>Note: Applied only to work area above 15' to 20'.</i>			
		<i>For Work >20' To 30' Above Floor, Add</i>		0.46	
		<i>Note: Applied only to work area above 20' to 30'.</i>			
		<i>For Work >30' To 40' Above Floor, Add</i>		0.73	
		<i>Note: Applied only to work area above 30' to 40'.</i>			
		<i>For Work >40' Above Floor, Add</i>		1.00	
		<i>Note: Applied only to work area above 40'.</i>			
		<i>For Up To 100, Add</i>		1.48	
		<i>For >100 To 250, Add</i>		0.71	
		<i>For >250 To 500, Add</i>		0.31	
		<i>For >2,500 To 5,000, Deduct</i>		-0.13	
		<i>For >5,000 To 10,000, Deduct</i>		-0.26	
		<i>For >10,000 To 20,000, Deduct</i>		-0.39	
		<i>For >20,000, Deduct</i>		-0.52	
09 91 23 00-0115	SF	1 Coat Primer, Sprayed, Paint Interior Stucco Wall Surfaces	.....	0.98	
		<i>For Oil Based Paint, Add</i>		0.07	
		<i>For Backroll, Add</i>		0.11	
		<i>For Work >15' To 20' Above Floor, Add</i>		0.09	
		<i>Note: Applied only to work area above 15' to 20'.</i>			
		<i>For Work >20' To 30' Above Floor, Add</i>		0.15	
		<i>Note: Applied only to work area above 20' to 30'.</i>			
		<i>For Work >30' To 40' Above Floor, Add</i>		0.24	
		<i>Note: Applied only to work area above 30' to 40'.</i>			
		<i>For Work >40' Above Floor, Add</i>		0.33	
		<i>Note: Applied only to work area above 40'.</i>			
		<i>For Up To 100, Add</i>		0.51	
		<i>For >100 To 250, Add</i>		0.25	
		<i>For >250 To 500, Add</i>		0.11	
		<i>For >2,500 To 5,000, Deduct</i>		-0.05	
		<i>For >5,000 To 10,000, Deduct</i>		-0.10	
		<i>For >10,000 To 20,000, Deduct</i>		-0.15	
		<i>For >20,000, Deduct</i>		-0.20	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	23 00-0116	SF	1 Coat Paint, Sprayed, Paint Interior Stucco Wall Surfaces	1.22	
			<i>For Oil Based Paint, Add</i>	0.09	
			<i>For Backroll, Add</i>	0.13	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.18	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.29	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.40	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.62	
			<i>For >100 To 250, Add</i>	0.30	
			<i>For >250 To 500, Add</i>	0.13	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.12	
			<i>For >10,000 To 20,000, Deduct</i>	-0.18	
			<i>For >20,000, Deduct</i>	-0.24	
09 91	23 00-0117	SF	2 Coats Paint, Sprayed, Paint Interior Stucco Wall Surfaces.....	2.33	
			<i>For Oil Based Paint, Add</i>	0.16	
			<i>For Backroll, Add</i>	0.26	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.22	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.36	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.58	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.80	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.22	
			<i>For >100 To 250, Add</i>	0.60	
			<i>For >250 To 500, Add</i>	0.26	
			<i>For >2,500 To 5,000, Deduct</i>	-0.12	
			<i>For >5,000 To 10,000, Deduct</i>	-0.23	
			<i>For >10,000 To 20,000, Deduct</i>	-0.35	
			<i>For >20,000, Deduct</i>	-0.47	
09 91	23 00-0118		Paint Interior Wood Walls (09 91 23 00-0001)		
09 91	23 00-0119		Interior Wood Walls (09 91 23 00-0118)		
09 91	23 00-0120	LF	1 Coat Paint, Cut-in Brush Work, Paint Interior Wood Wall Surfaces	0.20	
			<i>For Oil Based Paint, Add</i>	0.01	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.02	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.04	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.12	
			<i>For >100 To 250, Add</i>	0.06	
			<i>For >250 To 500, Add</i>	0.03	
			<i>For >2,500 To 5,000, Deduct</i>	-0.01	
			<i>For >5,000 To 10,000, Deduct</i>	-0.02	
			<i>For >10,000 To 20,000, Deduct</i>	-0.03	
			<i>For >20,000, Deduct</i>	-0.04	
09 91	23 00-0121	SF	1 Coat Paint, Brush Work, Paint Interior Wood Wall Surfaces.....	1.19	
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.37	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.51	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.73	
			<i>For >100 To 250, Add</i>	0.35	
			<i>For >250 To 500, Add</i>	0.15	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.12	
			<i>For >10,000 To 20,000, Deduct</i>	-0.18	
			<i>For >20,000, Deduct</i>	-0.24	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 23 00-0122	SF		2 Coats Paint, Brush Work, Paint Interior Wood Wall Surfaces	2.21	
			<i>For Oil Based Paint, Add</i>	0.14	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.25	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.42	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.66	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.91	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.33	
			<i>For >100 To 250, Add</i>	0.64	
			<i>For >250 To 500, Add</i>	0.28	
			<i>For >2,500 To 5,000, Deduct</i>	-0.11	
			<i>For >5,000 To 10,000, Deduct</i>	-0.22	
			<i>For >10,000 To 20,000, Deduct</i>	-0.33	
			<i>For >20,000, Deduct</i>	-0.44	
09 91 23 00-0123	SF		3 Coats Paint, Brush Work, Paint Interior Wood Wall Surfaces	3.15	
			<i>For Oil Based Paint, Add</i>	0.20	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.35	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.58	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.93	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	1.28	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.87	
			<i>For >100 To 250, Add</i>	0.90	
			<i>For >250 To 500, Add</i>	0.39	
			<i>For >2,500 To 5,000, Deduct</i>	-0.16	
			<i>For >5,000 To 10,000, Deduct</i>	-0.32	
			<i>For >10,000 To 20,000, Deduct</i>	-0.47	
			<i>For >20,000, Deduct</i>	-0.63	
09 91 23 00-0124	SF		1 Coat Primer, Brush/Roller Work, Paint Interior Wood Walls	0.88	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.15	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.24	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.34	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.50	
			<i>For >100 To 250, Add</i>	0.24	
			<i>For >250 To 500, Add</i>	0.11	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.13	
			<i>For >20,000, Deduct</i>	-0.18	
09 91 23 00-0125	SF		1 Coat Paint, Brush/Roller Work, Paint Interior Wood Walls	0.98	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.18	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.28	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.39	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.57	
			<i>For >100 To 250, Add</i>	0.28	
			<i>For >250 To 500, Add</i>	0.12	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.10	
			<i>For >10,000 To 20,000, Deduct</i>	-0.15	
			<i>For >20,000, Deduct</i>	-0.20	
09 91 23 00-0126	SF		2 Coats Paint, Brush/Roller Work, Paint Interior Wood Walls	1.78	
			<i>For Oil Based Paint, Add</i>	0.12	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.18	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.49	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.68	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.01	
			<i>For >100 To 250, Add</i>	0.49	
			<i>For >250 To 500, Add</i>	0.21	
			<i>For >2,500 To 5,000, Deduct</i>	-0.09	
			<i>For >5,000 To 10,000, Deduct</i>	-0.18	
			<i>For >10,000 To 20,000, Deduct</i>	-0.27	
			<i>For >20,000, Deduct</i>	-0.36	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0127	SF		1 Coat Primer, Sprayed, Paint Interior Wood Walls.....	0.73	
			<i>For Oil Based Paint, Add</i>	0.05	
			<i>For Backroll, Add</i>	0.08	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.10	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.16	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.22	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.35	
			<i>For >100 To 250, Add</i>	0.17	
			<i>For >250 To 500, Add</i>	0.08	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.07	
			<i>For >10,000 To 20,000, Deduct</i>	-0.11	
			<i>For >20,000, Deduct</i>	-0.15	
09 91 23 00-0128	SF		1 Coat Paint, Sprayed, Paint Interior Wood Walls	0.90	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Backroll, Add</i>	0.10	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.29	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.45	
			<i>For >100 To 250, Add</i>	0.22	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	
09 91 23 00-0129	SF		2 Coats Paint, Sprayed, Paint Interior Wood Walls.....	1.69	
			<i>For Oil Based Paint, Add</i>	0.12	
			<i>For Backroll, Add</i>	0.18	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.37	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.51	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.81	
			<i>For >100 To 250, Add</i>	0.40	
			<i>For >250 To 500, Add</i>	0.18	
			<i>For >2,500 To 5,000, Deduct</i>	-0.08	
			<i>For >5,000 To 10,000, Deduct</i>	-0.17	
			<i>For >10,000 To 20,000, Deduct</i>	-0.25	
			<i>For >20,000, Deduct</i>	-0.34	
09 91 23 00-0130			Paint Interior Ceilings (09 91 23)		
09 91 23 00-0131			Paint Interior Acoustical Ceilings (09 91 23 00-0130)		
			Note: Includes grid.		
09 91 23 00-0132	LF		1 Coat Paint, Cut-in Brush Work, Paint Interior Acoustical Ceiling	0.39	
			<i>For Oil Based Paint, Add</i>	0.03	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.03	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.04	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.07	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.16	
			<i>For >100 To 250, Add</i>	0.08	
			<i>For >250 To 500, Add</i>	0.04	
			<i>For >2,500 To 5,000, Deduct</i>	-0.02	
			<i>For >5,000 To 10,000, Deduct</i>	-0.04	
			<i>For >10,000 To 20,000, Deduct</i>	-0.06	
			<i>For >20,000, Deduct</i>	-0.08	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 23 00-0133	SF 1 Coat Primer, Brush Work, Paint Interior Acoustical Ceiling.....	1.06
	For Oil Based Paint, Add	0.07
	For Work >15' To 20' Above Floor, Add	0.12
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.20
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.32
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.43
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.63
	For >100 To 250, Add	0.30
	For >250 To 500, Add	0.13
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.11
	For >10,000 To 20,000, Deduct	-0.16
	For >20,000, Deduct	-0.21
09 91 23 00-0134	SF 1 Coat Paint, Brush Work, Paint Interior Acoustical Ceiling.....	1.13
	For Oil Based Paint, Add	0.07
	For Work >15' To 20' Above Floor, Add	0.14
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.23
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.36
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.50
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.72
	For >100 To 250, Add	0.34
	For >250 To 500, Add	0.15
	For >2,500 To 5,000, Deduct	-0.06
	For >5,000 To 10,000, Deduct	-0.11
	For >10,000 To 20,000, Deduct	-0.17
	For >20,000, Deduct	-0.23
09 91 23 00-0135	SF 2 Coats Paint, Brush Work, Paint Interior Acoustical Ceiling	2.03
	For Oil Based Paint, Add	0.12
	For Work >15' To 20' Above Floor, Add	0.24
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.40
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.64
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.87
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	1.26
	For >100 To 250, Add	0.60
	For >250 To 500, Add	0.26
	For >2,500 To 5,000, Deduct	-0.10
	For >5,000 To 10,000, Deduct	-0.20
	For >10,000 To 20,000, Deduct	-0.30
	For >20,000, Deduct	-0.41
09 91 23 00-0136	SF 1 Coat Primer, Brush/Roller Work, Paint Interior Acoustical Ceiling	0.93
	For Oil Based Paint, Add	0.06
	For Work >15' To 20' Above Floor, Add	0.10
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.17
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.26
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.36
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.54
	For >100 To 250, Add	0.26
	For >250 To 500, Add	0.11
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.09
	For >10,000 To 20,000, Deduct	-0.14
	For >20,000, Deduct	-0.19
09 91 23 00-0137	SF 1 Coat Paint, Brush/Roller Work, Paint Interior Acoustical Ceiling.....	0.90
	For Oil Based Paint, Add	0.06
	For Work >15' To 20' Above Floor, Add	0.10
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.17
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.27
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.37
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.54
	For >100 To 250, Add	0.26
	For >250 To 500, Add	0.11
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.09
	For >10,000 To 20,000, Deduct	-0.14
	For >20,000, Deduct	-0.18



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0138	SF		2 Coats Paint, Brush/Roller Work, Paint Interior Acoustical Ceiling.....	1.69	
			<i>For Oil Based Paint, Add</i>	0.11	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.19	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.50	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.69	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.00	
			<i>For >100 To 250, Add</i>	0.48	
			<i>For >250 To 500, Add</i>	0.21	
			<i>For >2,500 To 5,000, Deduct</i>	-0.08	
			<i>For >5,000 To 10,000, Deduct</i>	-0.17	
			<i>For >10,000 To 20,000, Deduct</i>	-0.25	
			<i>For >20,000, Deduct</i>	-0.34	
09 91 23 00-0139	SF		1 Coat Primer, Sprayed, Paint Interior Acoustical Ceiling.....	0.90	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Backroll, Add</i>	0.10	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.48	
			<i>For >100 To 250, Add</i>	0.23	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	
09 91 23 00-0140	SF		1 Coat Paint, Sprayed, Paint Interior Acoustical Ceiling.....	0.85	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Backroll, Add</i>	0.10	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.15	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.32	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.48	
			<i>For >100 To 250, Add</i>	0.23	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.13	
			<i>For >20,000, Deduct</i>	-0.17	
09 91 23 00-0141	SF		2 Coats Paint, Sprayed, Paint Interior Acoustical Ceiling.....	1.42	
			<i>For Oil Based Paint, Add</i>	0.10	
			<i>For Backroll, Add</i>	0.16	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.22	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.35	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.48	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.74	
			<i>For >100 To 250, Add</i>	0.36	
			<i>For >250 To 500, Add</i>	0.16	
			<i>For >2,500 To 5,000, Deduct</i>	-0.07	
			<i>For >5,000 To 10,000, Deduct</i>	-0.14	
			<i>For >10,000 To 20,000, Deduct</i>	-0.21	
			<i>For >20,000, Deduct</i>	-0.28	

09 91 23 00-0142 Paint Interior Concrete Ceilings (09 91 23 00-0130)

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 23 00-0143	LF	1	Coat Paint, Cut-in Brush Work, Paint Interior Concrete Ceiling	0.19	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.02	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.04	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.12	
			<i>For >100 To 250, Add</i>	0.06	
			<i>For >250 To 500, Add</i>	0.02	
			<i>For >2,500 To 5,000, Deduct</i>	-0.01	
			<i>For >5,000 To 10,000, Deduct</i>	-0.02	
			<i>For >10,000 To 20,000, Deduct</i>	-0.03	
			<i>For >20,000, Deduct</i>	-0.04	
09 91 23 00-0144	SF	1	Coat Filler, Brush Work, Paint Interior Concrete Ceiling	1.06	
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Epoxy Paint, Add</i>	0.13	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.43	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.63	
			<i>For >100 To 250, Add</i>	0.30	
			<i>For >250 To 500, Add</i>	0.13	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.11	
			<i>For >10,000 To 20,000, Deduct</i>	-0.16	
			<i>For >20,000, Deduct</i>	-0.21	
09 91 23 00-0145	SF	1	Coat Paint, Brush Work, Paint Interior Concrete Ceiling.....	1.12	
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Epoxy Paint, Add</i>	0.12	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.36	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.50	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.71	
			<i>For >100 To 250, Add</i>	0.34	
			<i>For >250 To 500, Add</i>	0.15	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.11	
			<i>For >10,000 To 20,000, Deduct</i>	-0.17	
			<i>For >20,000, Deduct</i>	-0.22	
09 91 23 00-0146	SF	2	Coats Paint, Brush Work, Paint Interior Concrete Ceiling.....	2.02	
			<i>For Oil Based Paint, Add</i>	0.12	
			<i>For Epoxy Paint, Add</i>	0.23	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.24	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.40	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.63	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.87	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	1.25	
			<i>For >100 To 250, Add</i>	0.60	
			<i>For >250 To 500, Add</i>	0.26	
			<i>For >2,500 To 5,000, Deduct</i>	-0.10	
			<i>For >5,000 To 10,000, Deduct</i>	-0.20	
			<i>For >10,000 To 20,000, Deduct</i>	-0.30	
			<i>For >20,000, Deduct</i>	-0.40	
09 91 23 00-0147	SF	1	Coat Filler, Brush/Roller Work, Paint Interior Concrete Ceiling.....	0.84	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Epoxy Paint, Add</i>	0.12	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.47	
			<i>For >100 To 250, Add</i>	0.23	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.08	
			<i>For >10,000 To 20,000, Deduct</i>	-0.13	
			<i>For >20,000, Deduct</i>	-0.17	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	23 00-0148	SF	1 Coat Paint, Brush/Roller Work, Paint Interior Concrete Ceiling	0.90	
			For Oil Based Paint, Add	0.06	
			For Epoxy Paint, Add	0.11	
			For Work >15' To 20' Above Floor, Add	0.10	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.17	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.27	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.37	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.54	
			For >100 To 250, Add	0.26	
			For >250 To 500, Add	0.11	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.09	
			For >10,000 To 20,000, Deduct	-0.14	
			For >20,000, Deduct	-0.18	
09 91	23 00-0149	SF	2 Coats Paint, Brush/Roller Work, Paint Interior Concrete Ceiling	1.69	
			For Oil Based Paint, Add	0.11	
			For Epoxy Paint, Add	0.22	
			For Work >15' To 20' Above Floor, Add	0.19	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.31	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.50	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.69	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.00	
			For >100 To 250, Add	0.48	
			For >250 To 500, Add	0.21	
			For >2,500 To 5,000, Deduct	-0.08	
			For >5,000 To 10,000, Deduct	-0.17	
			For >10,000 To 20,000, Deduct	-0.25	
			For >20,000, Deduct	-0.34	
09 91	23 00-0150	SF	1 Coat Filler, Sprayed, Paint Interior Concrete Ceiling	0.86	
			For Oil Based Paint, Add	0.06	
			For Epoxy Paint, Add	0.14	
			For Backroll, Add	0.10	
			For Work >15' To 20' Above Floor, Add	0.08	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.13	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.21	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.29	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.45	
			For >100 To 250, Add	0.22	
			For >250 To 500, Add	0.10	
			For >2,500 To 5,000, Deduct	-0.04	
			For >5,000 To 10,000, Deduct	-0.09	
			For >10,000 To 20,000, Deduct	-0.13	
			For >20,000, Deduct	-0.17	
09 91	23 00-0151	SF	1 Coat Paint, Sprayed, Paint Interior Concrete Ceiling	0.85	
			For Oil Based Paint, Add	0.06	
			For Epoxy Paint, Add	0.12	
			For Backroll, Add	0.10	
			For Work >15' To 20' Above Floor, Add	0.09	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.15	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.23	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.32	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.48	
			For >100 To 250, Add	0.23	
			For >250 To 500, Add	0.10	
			For >2,500 To 5,000, Deduct	-0.04	
			For >5,000 To 10,000, Deduct	-0.09	
			For >10,000 To 20,000, Deduct	-0.13	
			For >20,000, Deduct	-0.17	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0152	SF		2 Coats Paint, Sprayed, Paint Interior Concrete Ceiling	1.41	
			<i>For Oil Based Paint, Add</i>	0.10	
			<i>For Epoxy Paint, Add</i>	0.24	
			<i>For Backroll, Add</i>	0.16	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.22	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.34	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.47	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.73	
			<i>For >100 To 250, Add</i>	0.36	
			<i>For >250 To 500, Add</i>	0.16	
			<i>For >2,500 To 5,000, Deduct</i>	-0.07	
			<i>For >5,000 To 10,000, Deduct</i>	-0.14	
			<i>For >10,000 To 20,000, Deduct</i>	-0.21	
			<i>For >20,000, Deduct</i>	-0.28	
09 91 23 00-0153	SF		1 Coat Bonding Agent, Brush Work, Paint Interior Concrete Ceiling	1.11	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.43	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.64	
			<i>For >100 To 250, Add</i>	0.31	
			<i>For >250 To 500, Add</i>	0.13	
			<i>For >2,500 To 5,000, Deduct</i>	-0.06	
			<i>For >5,000 To 10,000, Deduct</i>	-0.11	
			<i>For >10,000 To 20,000, Deduct</i>	-0.17	
			<i>For >20,000, Deduct</i>	-0.22	
09 91 23 00-0154	SF		1 Coat Bonding Agent, Brush/Roller, Paint Interior Concrete Ceiling	0.89	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.23	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.48	
			<i>For >100 To 250, Add</i>	0.23	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.13	
			<i>For >20,000, Deduct</i>	-0.18	
09 91 23 00-0155	SF		1 Coat Bonding Agent, Sprayed, Paint Interior Concrete Ceiling	0.92	
			<i>For Backroll, Add</i>	0.10	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 20' to 30'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.21	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.29	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.46	
			<i>For >100 To 250, Add</i>	0.22	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	

09 91 23 00-0156 Paint Interior Drywall/Plaster Ceilings (09 91 23 00-0130)



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0157 LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Drywall/Plaster Ceiling.....	0.19	
For Epoxy Paint, Add	0.02	
For Oil Based Paint, Add	0.01	
For Work >15' To 20' Above Floor, Add	0.02	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.04	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.06	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.08	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.12	
For >100 To 250, Add	0.06	
For >250 To 500, Add	0.02	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.03	
For >20,000, Deduct	-0.04	
09 91 23 00-0158 SF 1 Coat Primer, Brush Work, Pain Interior Drywall/Plaster Ceiling.....	1.06	
For Epoxy Paint, Add	0.13	
For Oil Based Paint, Add	0.07	
For Orange Peel Finish, Add	0.14	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.63	
For >100 To 250, Add	0.30	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 23 00-0159 SF 1 Coat Paint, Brush Work, Paint Interior Drywall/Plaster Ceiling.....	1.13	
For Epoxy Paint, Add	0.12	
For Oil Based Paint, Add	0.07	
For Orange Peel Finish, Add	0.16	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.72	
For >100 To 250, Add	0.34	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.23	
09 91 23 00-0160 SF 2 Coats Paint, Brush Work, Paint Interior Drywall/Plaster Ceiling.....	2.03	
For Epoxy Paint, Add	0.23	
For Oil Based Paint, Add	0.12	
For Orange Peel Finish, Add	0.28	
For Work >15' To 20' Above Floor, Add	0.24	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.40	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.64	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.87	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.26	
For >100 To 250, Add	0.60	
For >250 To 500, Add	0.26	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.20	
For >10,000 To 20,000, Deduct	-0.30	
For >20,000, Deduct	-0.41	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0161	SF 1 Coat Primer, Brush/Roller Work, Paint Interior Drywall/Plaster Ceiling.....		0.93
	For Epoxy Paint, Add	0.13	
	For Oil Based Paint, Add	0.06	
	For Orange Peel Finish, Add	0.12	
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.17	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.26	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.36	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.54	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.14	
	For >20,000, Deduct	-0.19	
09 91 23 00-0162	SF 1 Coat Paint, Brush/Roller Work, Paint Interior Drywall/Plaster Ceiling.....		0.90
	For Epoxy Paint, Add	0.11	
	For Oil Based Paint, Add	0.06	
	For Orange Peel Finish, Add	0.12	
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.17	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.27	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.37	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.54	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.14	
	For >20,000, Deduct	-0.18	
09 91 23 00-0163	SF 2 Coats Paint, Brush/Roller Work, Paint Interior Drywall/Plaster Ceiling.....		1.69
	For Epoxy Paint, Add	0.22	
	For Oil Based Paint, Add	0.11	
	For Orange Peel Finish, Add	0.22	
	For Work >15' To 20' Above Floor, Add	0.19	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.31	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.50	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.69	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.00	
	For >100 To 250, Add	0.48	
	For >250 To 500, Add	0.21	
	For >2,500 To 5,000, Deduct	-0.08	
	For >5,000 To 10,000, Deduct	-0.17	
	For >10,000 To 20,000, Deduct	-0.25	
	For >20,000, Deduct	-0.34	
09 91 23 00-0164	SF 1 Coat Primer, Sprayed, Paint Interior Drywall/Plaster Ceiling.....		0.90
	For Epoxy Paint, Add	0.14	
	For Oil Based Paint, Add	0.06	
	For Backroll, Add	0.10	
	For Work >15' To 20' Above Floor, Add	0.09	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.14	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.23	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.31	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.48	
	For >100 To 250, Add	0.23	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.14	
	For >20,000, Deduct	-0.18	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0165 SF 1 Coat Paint, Sprayed, Paint Interior Drywall/Plaster Ceiling.....	0.85	
For Epoxy Paint, Add	0.12	
For Oil Based Paint, Add	0.06	
For Backroll, Add	0.10	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.32	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.48	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.17	
09 91 23 00-0166 SF 2 Coats Paint, Sprayed, Paint Interior Drywall/Plaster Ceiling.....	1.42	
For Epoxy Paint, Add	0.24	
For Oil Based Paint, Add	0.10	
For Backroll, Add	0.16	
For Work >15' To 20' Above Floor, Add	0.13	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.22	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.35	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.48	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.74	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.21	
For >20,000, Deduct	-0.28	
09 91 23 00-0167 Paint Interior Metal Ceilings (09 91 23 00-0130)		
09 91 23 00-0168 Galvanized Surfaces, Galvanized Primer (09 91 23 00-0167)		
Note: Linseed oil or acrylic latex paint.		
09 91 23 00-0169 SF 1 Coat Primer, Brush Work, Paint Interior Galvanized Ceiling.....	1.36	
For Electrostatic Painting, Add	0.21	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.74	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
09 91 23 00-0170 SF 1 Coat Paint, Brush Work, Paint Interior Galvanized Ceiling.....	1.49	
For Electrostatic Painting, Add	0.22	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.26	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.41	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.57	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.84	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.15	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000, Deduct	-0.30	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0171	SF 2 Coats Paint, Brush Work, Paint Interior Galvanized Ceiling.....	2.73	
	For Electrostatic Painting, Add	0.41	
	For Work >15' To 20' Above Floor, Add	0.27	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.46	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.73	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	1.00	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.50	
	For >100 To 250, Add	0.73	
	For >250 To 500, Add	0.32	
	For >2,500 To 5,000, Deduct	-0.14	
	For >5,000 To 10,000, Deduct	-0.27	
	For >10,000 To 20,000, Deduct	-0.41	
	For >20,000, Deduct	-0.55	
09 91 23 00-0172	SF 1 Coat Primer, Brush/Roller Work, Paint Interior Galvanized Ceiling.....	1.06	
	For Electrostatic Painting, Add	0.16	
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.17	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.27	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.37	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.57	
	For >100 To 250, Add	0.28	
	For >250 To 500, Add	0.12	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.16	
	For >20,000, Deduct	-0.21	
09 91 23 00-0173	SF 1 Coat Paint, Brush/Roller Work, Paint Interior Galvanized Ceiling.....	1.17	
	For Electrostatic Painting, Add	0.17	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.20	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.32	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.43	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.65	
	For >100 To 250, Add	0.31	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.12	
	For >10,000 To 20,000, Deduct	-0.18	
	For >20,000, Deduct	-0.23	
09 91 23 00-0174	SF 2 Coats Paint, Brush/Roller Work, Paint Interior Galvanized Ceiling.....	2.18	
	For Electrostatic Painting, Add	0.33	
	For Work >15' To 20' Above Floor, Add	0.21	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.36	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.57	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.79	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.19	
	For >100 To 250, Add	0.58	
	For >250 To 500, Add	0.25	
	For >2,500 To 5,000, Deduct	-0.11	
	For >5,000 To 10,000, Deduct	-0.22	
	For >10,000 To 20,000, Deduct	-0.33	
	For >20,000, Deduct	-0.44	
09 91 23 00-0175	SF 1 Coat Primer, Sprayed, Paint Interior Galvanized Ceiling.....	1.11	
	For Electrostatic Painting, Add	0.19	
	For Backroll, Add	0.11	
	For Work >15' To 20' Above Floor, Add	0.09	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.15	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.23	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.32	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.51	
	For >100 To 250, Add	0.26	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.17	
	For >20,000, Deduct	-0.22	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0176 SF 1 Coat Paint, Sprayed, Paint Interior Galvanized Ceiling.....	1.25	
For Electrostatic Painting, Add	0.20	
For Backroll, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.62	
For >100 To 250, Add	0.31	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0177 SF 2 Coats Paint, Sprayed, Paint Interior Galvanized Ceiling.....	2.07	
For Electrostatic Painting, Add	0.37	
For Backroll, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.25	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.40	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.56	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.92	
For >100 To 250, Add	0.46	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.21	
For >10,000 To 20,000, Deduct	-0.31	
For >20,000, Deduct	-0.41	
09 91 23 00-0178 Aluminum And Aluminum Alloy Surface Pretreatment Primer (09 91 23 00-0167)		
Note: Alkyd enamel paint.		
09 91 23 00-0179 SF 1 Coat Primer, Brush Work, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	1.36	
For Electrostatic Painting, Add	0.21	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.23	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.36	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.50	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.74	
For >100 To 250, Add	0.36	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
09 91 23 00-0180 SF 1 Coat Paint, Brush Work, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	1.49	
For Electrostatic Painting, Add	0.22	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.26	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.41	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.57	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.84	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.15	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000, Deduct	-0.30	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0181 SF 2 Coats Paint, Brush Work, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	2.73	
For Electrostatic Painting, Add	0.41	
For Work >15' To 20' Above Floor, Add	0.27	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.46	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.73	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.00	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.50	
For >100 To 250, Add	0.73	
For >250 To 500, Add	0.32	
For >2,500 To 5,000, Deduct	-0.14	
For >5,000 To 10,000, Deduct	-0.27	
For >10,000 To 20,000, Deduct	-0.41	
For >20,000, Deduct	-0.55	
09 91 23 00-0182 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	1.21	
For Electrostatic Painting, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.17	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.27	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.37	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	
09 91 23 00-0183 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	1.32	
For Electrostatic Painting, Add	0.21	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.67	
For >100 To 250, Add	0.33	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.26	
09 91 23 00-0184 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	2.52	
For Electrostatic Painting, Add	0.41	
For Work >15' To 20' Above Floor, Add	0.22	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.37	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.58	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.80	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.25	
For >100 To 250, Add	0.62	
For >250 To 500, Add	0.27	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.25	
For >10,000 To 20,000, Deduct	-0.38	
For >20,000, Deduct	-0.50	
09 91 23 00-0185 SF 1 Coat Primer, Sprayed, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	1.11	
For Electrostatic Painting, Add	0.19	
For Backroll, Add	0.11	
For Work >15' To 20' Above Floor, Add	0.09	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.15	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.23	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.32	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.51	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0186 SF 1 Coat Paint, Sprayed, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	1.25	
For Electrostatic Painting, Add	0.20	
For Backroll, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.62	
For >100 To 250, Add	0.31	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.19	
For >20,000, Deduct	-0.25	
09 91 23 00-0187 SF 2 Coats Paint, Sprayed, Paint Interior Aluminum And Aluminum Alloy Ceiling.....	2.07	
For Electrostatic Painting, Add	0.37	
For Backroll, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.25	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.40	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.56	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.92	
For >100 To 250, Add	0.46	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.10	
For >5,000 To 10,000, Deduct	-0.21	
For >10,000 To 20,000, Deduct	-0.31	
For >20,000, Deduct	-0.41	
09 91 23 00-0188 Paint Interior Ceiling Tile Grid (09 91 23 00-0167)		
Note: Grid only.		
09 91 23 00-0189 LF 1 Coat Paint, Brush/Roller Work, Paint Interior Ceiling Tile Grid.....	0.28	
For Electrostatic Painting, Add	0.04	
For Work >15' To 20' Above Floor, Add	0.03	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.05	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.08	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.12	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.17	
For >100 To 250, Add	0.08	
For >250 To 500, Add	0.04	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.03	
For >10,000 To 20,000, Deduct	-0.04	
For >20,000, Deduct	-0.06	
09 91 23 00-0190 LF 2 Coats Paint, Brush/Roller Work, Paint Interior Ceiling Tile Grid.....	0.56	
For Electrostatic Painting, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.06	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.11	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.17	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.24	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.34	
For >100 To 250, Add	0.16	
For >250 To 500, Add	0.07	
For >2,500 To 5,000, Deduct	-0.03	
For >5,000 To 10,000, Deduct	-0.06	
For >10,000 To 20,000, Deduct	-0.08	
For >20,000, Deduct	-0.11	
09 91 23 00-0191 Paint Interior Corrugated Metal Ceilings (09 91 23 00-0167)		

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0192	SF 1 Coat Primer, Sprayed, Paint Interior Corrugated Metal Ceiling.....		1.47
	For Electrostatic Painting, Add	0.25	
	For Backroll, Add	0.15	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.19	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.31	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.42	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.68	
	For >100 To 250, Add	0.34	
	For >250 To 500, Add	0.15	
	For >2,500 To 5,000, Deduct	-0.07	
	For >5,000 To 10,000, Deduct	-0.15	
	For >10,000 To 20,000, Deduct	-0.22	
	For >20,000, Deduct	-0.29	
09 91 23 00-0193	SF 1 Coat Paint, Sprayed, Paint Interior Corrugated Metal Ceiling.....		1.65
	For Electrostatic Painting, Add	0.27	
	For Backroll, Add	0.18	
	For Work >15' To 20' Above Floor, Add	0.14	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.24	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.38	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.52	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.82	
	For >100 To 250, Add	0.40	
	For >250 To 500, Add	0.18	
	For >2,500 To 5,000, Deduct	-0.08	
	For >5,000 To 10,000, Deduct	-0.17	
	For >10,000 To 20,000, Deduct	-0.25	
	For >20,000, Deduct	-0.33	
09 91 23 00-0194	SF 2 Coats Paint, Sprayed, Paint Interior Corrugated Metal Ceiling.....		2.75
	For Electrostatic Painting, Add	0.49	
	For Backroll, Add	0.27	
	For Work >15' To 20' Above Floor, Add	0.20	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.34	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.54	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.74	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	1.22	
	For >100 To 250, Add	0.61	
	For >250 To 500, Add	0.27	
	For >2,500 To 5,000, Deduct	-0.14	
	For >5,000 To 10,000, Deduct	-0.28	
	For >10,000 To 20,000, Deduct	-0.41	
	For >20,000, Deduct	-0.55	
09 91 23 00-0195	Paint Interior Wood Ceilings (09 91 23 00-0130)		
09 91 23 00-0196	Paint Interior Smooth Wood Ceilings (09 91 23 00-0195)		
09 91 23 00-0197	LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Wood Smooth Ceiling.....		0.22
	For Oil Based Paint, Add	0.01	
	For Work >15' To 20' Above Floor, Add	0.03	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.04	
	Note: Applied only to work area above 20' to 30'.		
	For Work >30' To 40' Above Floor, Add	0.07	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.09	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.14	
	For >100 To 250, Add	0.06	
	For >250 To 500, Add	0.03	
	For >2,500 To 5,000, Deduct	-0.01	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 20,000, Deduct	-0.03	
	For >20,000, Deduct	-0.04	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0198 SF 1 Coat Primer, Brush Work, Paint Interior Wood Smooth Ceiling.....	1.32	
For Oil Based Paint, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.14	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.24	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.38	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.52	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.76	
For >100 To 250, Add	0.37	
For >250 To 500, Add	0.16	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.26	
09 91 23 00-0199 SF 1 Coat Paint, Brush Work, Paint Interior Wood Smooth Ceiling.....	1.36	
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.15	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.26	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.41	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.57	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.82	
For >100 To 250, Add	0.39	
For >250 To 500, Add	0.17	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.14	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.27	
09 91 23 00-0200 SF 2 Coats Paint, Brush Work, Paint Interior Wood Smooth Ceiling.....	2.48	
For Oil Based Paint, Add	0.16	
For Work >15' To 20' Above Floor, Add	0.27	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.46	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.73	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.00	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.46	
For >100 To 250, Add	0.70	
For >250 To 500, Add	0.31	
For >2,500 To 5,000, Deduct	-0.12	
For >5,000 To 10,000, Deduct	-0.25	
For >10,000 To 20,000, Deduct	-0.37	
For >20,000, Deduct	-0.50	
09 91 23 00-0201 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Smooth Wood Ceiling.....	1.12	
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.10	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.17	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.27	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.37	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.58	
For >100 To 250, Add	0.28	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.17	
For >20,000, Deduct	-0.22	
09 91 23 00-0202 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Smooth Wood Ceiling.....	1.17	
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.65	
For >100 To 250, Add	0.31	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.23	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 23 00-0203	SF 2 Coats Paint, Brush/Roller Work, Paint Interior Smooth Wood Ceiling	2.23
	For Oil Based Paint, Add	0.15
	For Work >15' To 20' Above Floor, Add	0.22
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.37
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.58
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.80
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	1.21
	For >100 To 250, Add	0.59
	For >250 To 500, Add	0.26
	For >2,500 To 5,000, Deduct	-0.11
	For >5,000 To 10,000, Deduct	-0.22
	For >10,000 To 20,000, Deduct	-0.33
	For >20,000, Deduct	-0.45
09 91 23 00-0204	SF 1 Coat Primer, Sprayed, Paint Interior Smooth Wood Ceiling.....	0.91
	For Oil Based Paint, Add	0.06
	For Backroll, Add	0.10
	For Work >15' To 20' Above Floor, Add	0.09
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.15
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.23
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.32
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.48
	For >100 To 250, Add	0.24
	For >250 To 500, Add	0.10
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.09
	For >10,000 To 20,000, Deduct	-0.14
	For >20,000, Deduct	-0.18
09 91 23 00-0205	SF 1 Coat Paint, Sprayed, Paint Interior Smooth Wood Ceiling.....	1.06
	For Oil Based Paint, Add	0.07
	For Backroll, Add	0.13
	For Work >15' To 20' Above Floor, Add	0.11
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.18
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.29
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.40
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.60
	For >100 To 250, Add	0.29
	For >250 To 500, Add	0.13
	For >2,500 To 5,000, Deduct	-0.05
	For >5,000 To 10,000, Deduct	-0.11
	For >10,000 To 20,000, Deduct	-0.16
	For >20,000, Deduct	-0.21
09 91 23 00-0206	SF 2 Coats Paint, Sprayed, Paint Interior Smooth Wood Ceiling	1.67
	For Oil Based Paint, Add	0.12
	For Backroll, Add	0.18
	For Work >15' To 20' Above Floor, Add	0.15
	Note: Applied only to work area above 15' to 20'.	
	For Work >20' To 30' Above Floor, Add	0.25
	Note: Applied only to work area above 20' to 30'.	
	For Work >30' To 40' Above Floor, Add	0.40
	Note: Applied only to work area above 30' to 40'.	
	For Work >40' Above Floor, Add	0.56
	Note: Applied only to work area above 40'.	
	For Up To 100, Add	0.86
	For >100 To 250, Add	0.42
	For >250 To 500, Add	0.18
	For >2,500 To 5,000, Deduct	-0.08
	For >5,000 To 10,000, Deduct	-0.17
	For >10,000 To 20,000, Deduct	-0.25
	For >20,000, Deduct	-0.33

09 91 23 00-0207 Paint Interior Wood Beams (09 91 23 00-0130)



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0208 SF 1 Coat Primer, Brush Work, Paint Interior Wood Beams	1.45	
For Oil Based Paint, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.16	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.27	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.43	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.59	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.86	
For >100 To 250, Add	0.41	
For >250 To 500, Add	0.18	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.15	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000, Deduct	-0.29	
09 91 23 00-0209 SF 1 Coat Paint, Brush Work, Paint Interior Wood Beams.....	1.46	
For Oil Based Paint, Add	0.09	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.28	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.45	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.62	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.90	
For >100 To 250, Add	0.43	
For >250 To 500, Add	0.19	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.15	
For >10,000 To 20,000, Deduct	-0.22	
For >20,000, Deduct	-0.29	
09 91 23 00-0210 SF 2 Coats Paint, Brush Work, Paint Interior Wood Beams.....	2.68	
For Oil Based Paint, Add	0.17	
For Work >15' To 20' Above Floor, Add	0.30	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.51	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.81	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	1.11	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.61	
For >100 To 250, Add	0.77	
For >250 To 500, Add	0.34	
For >2,500 To 5,000, Deduct	-0.13	
For >5,000 To 10,000, Deduct	-0.27	
For >10,000 To 20,000, Deduct	-0.40	
For >20,000, Deduct	-0.54	
09 91 23 00-0211 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Wood Beams.....	1.22	
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.31	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.65	
For >100 To 250, Add	0.32	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.24	
09 91 23 00-0212 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Wood Beams	1.17	
For Oil Based Paint, Add	0.08	
For Work >15' To 20' Above Floor, Add	0.12	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.20	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.32	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.43	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.65	
For >100 To 250, Add	0.31	
For >250 To 500, Add	0.14	
For >2,500 To 5,000, Deduct	-0.06	
For >5,000 To 10,000, Deduct	-0.12	
For >10,000 To 20,000, Deduct	-0.18	
For >20,000, Deduct	-0.23	

09	09	Finishes
	09 90	Painting and Coating
	09 91	Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0213 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Wood Beams.....	2.23	
For Oil Based Paint, Add	0.15	
For Work >15' To 20' Above Floor, Add	0.22	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.37	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.58	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.80	
Note: Applied only to work area above 40'.		
For Up To 100, Add	1.21	
For >100 To 250, Add	0.59	
For >250 To 500, Add	0.26	
For >2,500 To 5,000, Deduct	-0.11	
For >5,000 To 10,000, Deduct	-0.22	
For >10,000 To 20,000, Deduct	-0.33	
For >20,000, Deduct	-0.45	
09 91 23 00-0214 SF 1 Coat Primer, Sprayed, Paint Interior Wood Beams.....	1.06	
For Oil Based Paint, Add	0.07	
For Backroll, Add	0.13	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.60	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.13	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 23 00-0215 SF 1 Coat Paint, Sprayed, Paint Interior Wood Beams.....	1.05	
For Oil Based Paint, Add	0.07	
For Backroll, Add	0.12	
For Work >15' To 20' Above Floor, Add	0.11	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.18	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.29	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.40	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.59	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.12	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.11	
For >10,000 To 20,000, Deduct	-0.16	
For >20,000, Deduct	-0.21	
09 91 23 00-0216 SF 2 Coats Paint, Sprayed, Paint Interior Wood Beams.....	1.79	
For Oil Based Paint, Add	0.12	
For Backroll, Add	0.20	
For Work >15' To 20' Above Floor, Add	0.17	
Note: Applied only to work area above 15' to 20'.		
For Work >20' To 30' Above Floor, Add	0.28	
Note: Applied only to work area above 20' to 30'.		
For Work >30' To 40' Above Floor, Add	0.45	
Note: Applied only to work area above 30' to 40'.		
For Work >40' Above Floor, Add	0.62	
Note: Applied only to work area above 40'.		
For Up To 100, Add	0.95	
For >100 To 250, Add	0.46	
For >250 To 500, Add	0.20	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.27	
For >20,000, Deduct	-0.36	
09 91 23 00-0217 Paint Interior Floors And Decks (09 91 23)		
09 91 23 00-0218 Paint Interior Concrete Floors And Decks (09 91 23 00-0217)		
09 91 23 00-0219 LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Concrete Floors And Decks.....	0.15	
For Up To 100, Add	0.09	
For >100 To 250, Add	0.04	
For >250 To 500, Add	0.02	
For >2,500 To 5,000, Deduct	-0.01	
For >5,000 To 10,000, Deduct	-0.02	
For >10,000 To 20,000, Deduct	-0.02	
For >20,000, Deduct	-0.03	



Finishes	09	09
Painting and Coating	09 90	
Painting	09 91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0220 SF 1 Coat Primer, Brush Work, Paint Interior Concrete Floors And Decks	0.84	
For Oil Based Paint, Add	0.06	
For Epoxy Paint, Add	0.12	
For Up To 100, Add	0.47	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.13	
For >20,000, Deduct	-0.17	
09 91 23 00-0221 SF 1 Coat Paint, Brush Work, Paint Interior Concrete Floors And Decks	0.90	
For Oil Based Paint, Add	0.06	
For Epoxy Paint, Add	0.11	
For Up To 100, Add	0.54	
For >100 To 250, Add	0.26	
For >250 To 500, Add	0.11	
For >2,500 To 5,000, Deduct	-0.05	
For >5,000 To 10,000, Deduct	-0.09	
For >10,000 To 20,000, Deduct	-0.14	
For >20,000, Deduct	-0.18	
09 91 23 00-0222 SF 2 Coats Paint, Brush Work, Paint Interior Concrete Floors And Decks	1.77	
For Oil Based Paint, Add	0.11	
For Epoxy Paint, Add	0.22	
For Up To 100, Add	1.06	
For >100 To 250, Add	0.51	
For >250 To 500, Add	0.22	
For >2,500 To 5,000, Deduct	-0.09	
For >5,000 To 10,000, Deduct	-0.18	
For >10,000 To 20,000, Deduct	-0.27	
For >20,000, Deduct	-0.35	
09 91 23 00-0223 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Concrete Floors And Decks	0.83	
For Oil Based Paint, Add	0.06	
For Epoxy Paint, Add	0.12	
For Up To 100, Add	0.46	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.17	
09 91 23 00-0224 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Concrete Floors And Decks	0.79	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.11	
For Up To 100, Add	0.46	
For >100 To 250, Add	0.22	
For >250 To 500, Add	0.10	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.08	
For >10,000 To 20,000, Deduct	-0.12	
For >20,000, Deduct	-0.16	
09 91 23 00-0225 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Concrete Floors And Decks	1.32	
For Oil Based Paint, Add	0.09	
For Epoxy Paint, Add	0.20	
For Up To 100, Add	0.73	
For >100 To 250, Add	0.35	
For >250 To 500, Add	0.15	
For >2,500 To 5,000, Deduct	-0.07	
For >5,000 To 10,000, Deduct	-0.13	
For >10,000 To 20,000, Deduct	-0.20	
For >20,000, Deduct	-0.26	
09 91 23 00-0226 SF 1 Coat Primer, Sprayed, Paint Interior Concrete Floors And Decks	0.73	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.14	
For Backroll, Add	0.08	
For Up To 100, Add	0.35	
For >100 To 250, Add	0.17	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.15	
09 91 23 00-0227 SF 1 Coat Paint, Sprayed, Paint Interior Concrete Floors And Decks	0.71	
For Oil Based Paint, Add	0.05	
For Epoxy Paint, Add	0.12	
For Backroll, Add	0.08	
For Up To 100, Add	0.37	
For >100 To 250, Add	0.18	
For >250 To 500, Add	0.08	
For >2,500 To 5,000, Deduct	-0.04	
For >5,000 To 10,000, Deduct	-0.07	
For >10,000 To 20,000, Deduct	-0.11	
For >20,000, Deduct	-0.14	

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0228	SF 2 Coats Paint, Sprayed, Paint Interior Concrete Floors And Decks.....		1.28
	For Oil Based Paint, Add	0.09	
	For Epoxy Paint, Add	0.23	
	For Backroll, Add	0.14	
	For Up To 100, Add	0.63	
	For >100 To 250, Add	0.31	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.13	
	For >10,000 To 20,000, Deduct	-0.19	
	For >20,000, Deduct	-0.26	
09 91 23 00-0229	SF 1 Coat Bonding Agent, Brush Work, Paint Interior Concrete Floors And Decks.....		0.89
	For Up To 100, Add	0.48	
	For >100 To 250, Add	0.23	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.13	
	For >20,000, Deduct	-0.18	
09 91 23 00-0230	SF 1 Coat Bonding Agent, Brush/Roller Work, Paint Interior Concrete Floors And Decks.....		0.88
	For Up To 100, Add	0.47	
	For >100 To 250, Add	0.23	
	For >250 To 500, Add	0.10	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.09	
	For >10,000 To 20,000, Deduct	-0.13	
	For >20,000, Deduct	-0.18	
09 91 23 00-0231	SF 1 Coat Bonding Agent, Sprayed, Paint Interior Concrete Floors And Decks.....		0.79
	For Backroll, Add	0.08	
	For Up To 100, Add	0.36	
	For >100 To 250, Add	0.18	
	For >250 To 500, Add	0.08	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.08	
	For >10,000 To 20,000, Deduct	-0.12	
	For >20,000, Deduct	-0.16	
09 91 23 00-0232	SF 1 Coat Non-Slip Paint, Brush Work, Paint Interior Concrete Floors And Decks.....		2.28
	For Up To 100, Add	0.75	
	For >100 To 250, Add	0.40	
	For >250 To 500, Add	0.18	
	For >2,500 To 5,000, Deduct	-0.11	
	For >5,000 To 10,000, Deduct	-0.23	
	For >10,000 To 20,000, Deduct	-0.34	
	For >20,000, Deduct	-0.46	
09 91 23 00-0233	SF 1 Coat Non-Slip Epoxy Paint, Brush Work, Paint Interior Concrete Floors And Decks (Rust-Oleum® AS91864251).....		6.65
	For Up To 100, Add	1.41	
	For >100 To 250, Add	0.84	
	For >250 To 500, Add	0.40	
	For >2,500 To 5,000, Deduct	-0.33	
	For >5,000 To 10,000, Deduct	-0.67	
	For >10,000 To 20,000, Deduct	-1.00	
	For >20,000, Deduct	-1.33	
09 91 23 00-0234	Paint Interior Wood Floors And Decks (09 91 23 00-0217)		
09 91 23 00-0235	LF 1 Coat Paint, Cut-in Brush Work, Paint Interior Wood Floors And Decks.....		0.18
	For Up To 100, Add	0.11	
	For >100 To 250, Add	0.05	
	For >250 To 500, Add	0.02	
	For >2,500 To 5,000, Deduct	-0.01	
	For >5,000 To 10,000, Deduct	-0.02	
	For >10,000 To 20,000, Deduct	-0.03	
	For >20,000, Deduct	-0.04	
09 91 23 00-0236	SF 1 Coat Primer, Brush Work, Paint Interior Wood Floors And Decks.....		1.06
	For Oil Based Paint, Add	0.07	
	For Up To 100, Add	0.57	
	For >100 To 250, Add	0.28	
	For >250 To 500, Add	0.12	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.16	
	For >20,000, Deduct	-0.21	
09 91 23 00-0237	SF 1 Coat Paint, Brush Work, Paint Interior Wood Floors And Decks.....		1.12
	For Oil Based Paint, Add	0.07	
	For Up To 100, Add	0.64	
	For >100 To 250, Add	0.31	
	For >250 To 500, Add	0.14	
	For >2,500 To 5,000, Deduct	-0.06	
	For >5,000 To 10,000, Deduct	-0.11	
	For >10,000 To 20,000, Deduct	-0.17	
	For >20,000, Deduct	-0.22	



		Finishes	09
		Painting and Coating	09 90
		Painting	09 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	23 00-0238	SF	2 Coats Paint, Brush Work, Paint Interior Wood Floors And Decks.....	2.13	
			<i>For Oil Based Paint, Add</i>	0.14	
			<i>For Up To 100, Add</i>	1.20	
			<i>For >100 To 250, Add</i>	0.58	
			<i>For >250 To 500, Add</i>	0.25	
			<i>For >2,500 To 5,000, Deduct</i>	-0.11	
			<i>For >5,000 To 10,000, Deduct</i>	-0.21	
			<i>For >10,000 To 20,000, Deduct</i>	-0.32	
			<i>For >20,000, Deduct</i>	-0.43	
09 91	23 00-0239	SF	1 Coat Primer, Brush/Roller Work, Paint Interior Wood Floors And Decks.....	0.92	
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Up To 100, Add</i>	0.43	
			<i>For >100 To 250, Add</i>	0.21	
			<i>For >250 To 500, Add</i>	0.09	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	
09 91	23 00-0240	SF	1 Coat Paint, Brush/Roller Work, Paint Interior Wood Floors And Decks.....	0.95	
			<i>For Oil Based Paint, Add</i>	0.07	
			<i>For Up To 100, Add</i>	0.48	
			<i>For >100 To 250, Add</i>	0.24	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.10	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.19	
09 91	23 00-0241	SF	2 Coats Paint, Brush/Roller Work, Paint Interior Wood Floors And Decks.....	1.90	
			<i>For Oil Based Paint, Add</i>	0.13	
			<i>For Up To 100, Add</i>	0.96	
			<i>For >100 To 250, Add</i>	0.47	
			<i>For >250 To 500, Add</i>	0.21	
			<i>For >2,500 To 5,000, Deduct</i>	-0.10	
			<i>For >5,000 To 10,000, Deduct</i>	-0.19	
			<i>For >10,000 To 20,000, Deduct</i>	-0.29	
			<i>For >20,000, Deduct</i>	-0.38	
09 91	23 00-0242	SF	1 Coat Primer, Sprayed, Paint Interior Wood Floors And Decks.....	0.77	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Backroll, Add</i>	0.08	
			<i>For Up To 100, Add</i>	0.38	
			<i>For >100 To 250, Add</i>	0.19	
			<i>For >250 To 500, Add</i>	0.08	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.08	
			<i>For >10,000 To 20,000, Deduct</i>	-0.12	
			<i>For >20,000, Deduct</i>	-0.15	
09 91	23 00-0243	SF	1 Coat Paint, Sprayed, Paint Interior Wood Floors And Decks.....	0.91	
			<i>For Oil Based Paint, Add</i>	0.06	
			<i>For Backroll, Add</i>	0.10	
			<i>For Up To 100, Add</i>	0.48	
			<i>For >100 To 250, Add</i>	0.24	
			<i>For >250 To 500, Add</i>	0.10	
			<i>For >2,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.18	
09 91	23 00-0244	SF	2 Coats Paint, Sprayed, Paint Interior Wood Floors And Decks.....	1.39	
			<i>For Oil Based Paint, Add</i>	0.10	
			<i>For Backroll, Add</i>	0.14	
			<i>For Up To 100, Add</i>	0.65	
			<i>For >100 To 250, Add</i>	0.32	
			<i>For >250 To 500, Add</i>	0.14	
			<i>For >2,500 To 5,000, Deduct</i>	-0.07	
			<i>For >5,000 To 10,000, Deduct</i>	-0.14	
			<i>For >10,000 To 20,000, Deduct</i>	-0.21	
			<i>For >20,000, Deduct</i>	-0.28	
09 91	23 00-0245	SF	1 Coat Non-Slip Paint, Brush Work, Paint Interior Wood Floors And Decks.....	2.28	
			<i>For Up To 100, Add</i>	0.75	
			<i>For >100 To 250, Add</i>	0.40	
			<i>For >250 To 500, Add</i>	0.18	
			<i>For >2,500 To 5,000, Deduct</i>	-0.11	
			<i>For >5,000 To 10,000, Deduct</i>	-0.23	
			<i>For >10,000 To 20,000, Deduct</i>	-0.34	
			<i>For >20,000, Deduct</i>	-0.46	
09 91	23 00-0246	SF	1 Coat Non-Slip Epoxy Paint, Brush Work, Paint Interior Wood Floors And Decks.....	6.65	
			<i>For Up To 100, Add</i>	1.41	
			<i>For >100 To 250, Add</i>	0.84	
			<i>For >250 To 500, Add</i>	0.40	
			<i>For >2,500 To 5,000, Deduct</i>	-0.33	
			<i>For >5,000 To 10,000, Deduct</i>	-0.67	
			<i>For >10,000 To 20,000, Deduct</i>	-1.00	
			<i>For >20,000, Deduct</i>	-1.33	

09 91 23 00-0247 Paint Interior Doors And Windows (09 91 23)

09 91 23 00-0248 Paint Interior Door Frames (09 91 23 00-0247)

09 Finishes**09 90 Painting and Coating****09 91 Painting**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0249	LF 1 Coat Primer, Brush/Roller Work, Paint Interior Wood Door Frame And Trim.....	1.18	
	<i>For Oil Based Paint, Add</i>	0.07	
	<i>For Painting One Face Of Frame Only, Deduct</i>	-0.32	
09 91 23 00-0250	LF 1 Coat Paint, Brush/Roller Work, Paint Interior Wood Door Frame And Trim.....	1.50	
	<i>For Oil Based Paint, Add</i>	0.08	
	<i>For Painting One Face Of Frame Only, Deduct</i>	-0.40	
09 91 23 00-0251	LF 2 Coats Paint, Brush/Roller Work, Paint Interior Wood Door Frame And Trime.....	2.53	
	<i>For Oil Based Paint, Add</i>	0.14	
	<i>For Painting One Face Of Frame Only, Deduct</i>	-0.68	
09 91 23 00-0252	LF 1 Coat Primer, Brush/Roller Work, Paint Interior Metal Door Frame And Trim.....	1.20	
	<i>For Oil Based Paint, Add</i>	0.07	
	<i>For Painting One Face Of Frame Only, Deduct</i>	-0.33	
09 91 23 00-0253	LF 1 Coat Paint, Brush/Roller Work, Paint Interior Metal Door Frame And Trim.....	1.52	
	<i>For Oil Based Paint, Add</i>	0.09	
	<i>For Painting One Face Of Frame Only, Deduct</i>	-0.41	
09 91 23 00-0254	LF 2 Coats Paint, Brush/Roller Work, Paint Interior Metal Door Frame And Trim.....	2.56	
	<i>For Oil Based Paint, Add</i>	0.15	
	<i>For Painting One Face Of Frame Only, Deduct</i>	-0.69	
09 91 23 00-0255	Paint Interior Metal Doors <small>(09 91 23 00-0247)</small>		
09 91 23 00-0256	EA 1 Coat Primer, Brush/Roller Work, One Face, Paint Interior Metal Door.....	64.10	
	<i>For Electrostatic Painting, Add</i>	11.09	
	<i>For Half Louvered Door, Add</i>	4.94	
	<i>For Full Louvered Door, Add</i>	8.23	
	<i>For Oil Based Paint, Add</i>	4.77	
	<i>For >5 To 10, Deduct</i>	-3.21	
	<i>For >10 To 25, Deduct</i>	-6.41	
	<i>For >25, Deduct</i>	-9.62	
09 91 23 00-0257	EA 1 Coat Paint, Brush/Roller Work, One Face, Paint Interior Metal Door.....	64.10	
	<i>For Electrostatic Painting, Add</i>	11.09	
	<i>For Half Louvered Door, Add</i>	4.94	
	<i>For Full Louvered Door, Add</i>	8.23	
	<i>For Oil Based Paint, Add</i>	4.77	
	<i>For >5 To 10, Deduct</i>	-3.21	
	<i>For >10 To 25, Deduct</i>	-6.41	
	<i>For >25, Deduct</i>	-9.62	
09 91 23 00-0258	EA 2 Coats Paint, Brush/Roller Work, One Face, Paint Interior Metal Door.....	117.59	
	<i>For Electrostatic Painting, Add</i>	21.06	
	<i>For Half Louvered Door, Add</i>	8.34	
	<i>For Full Louvered Door, Add</i>	13.90	
	<i>For Oil Based Paint, Add</i>	8.98	
	<i>For >5 To 10, Deduct</i>	-5.88	
	<i>For >10 To 25, Deduct</i>	-11.76	
	<i>For >25, Deduct</i>	-17.64	
09 91 23 00-0259	EA 1 Coat Primer, Brush/Roller Work, Both Faces, Paint Interior Metal Door.....	115.06	
	<i>For Electrostatic Painting, Add</i>	19.92	
	<i>For Half Louvered Door, Add</i>	8.85	
	<i>For Full Louvered Door, Add</i>	14.75	
	<i>For Oil Based Paint, Add</i>	8.56	
	<i>For >5 To 10, Deduct</i>	-5.75	
	<i>For >10 To 25, Deduct</i>	-11.51	
	<i>For >25, Deduct</i>	-17.26	
09 91 23 00-0260	EA 1 Coat Paint, Brush/Roller Work, Both Faces, Paint Interior Metal Door.....	115.07	
	<i>For Electrostatic Painting, Add</i>	19.92	
	<i>For Half Louvered Door, Add</i>	8.85	
	<i>For Full Louvered Door, Add</i>	14.75	
	<i>For Oil Based Paint, Add</i>	8.56	
	<i>For >5 To 10, Deduct</i>	-5.75	
	<i>For >10 To 25, Deduct</i>	-11.51	
	<i>For >25, Deduct</i>	-17.26	
09 91 23 00-0261	EA 2 Coats Paint, Brush/Roller Work, Both Faces, Paint Interior Metal Door.....	211.96	
	<i>For Electrostatic Painting, Add</i>	38.02	
	<i>For Half Louvered Door, Add</i>	14.97	
	<i>For Full Louvered Door, Add</i>	24.96	
	<i>For Oil Based Paint, Add</i>	16.21	
	<i>For >5 To 10, Deduct</i>	-10.60	
	<i>For >10 To 25, Deduct</i>	-21.20	
	<i>For >25, Deduct</i>	-31.79	
09 91 23 00-0262	EA 1 Coat Primer, Sprayed, One Face, Paint Interior Metal Door.....	59.41	
	<i>For Electrostatic Painting, Add</i>	11.09	
	<i>For Half Louvered Door, Add</i>	3.76	
	<i>For Full Louvered Door, Add</i>	6.27	
	<i>For Oil Based Paint, Add</i>	4.69	
	<i>For >5 To 10, Deduct</i>	-2.97	
	<i>For >10 To 25, Deduct</i>	-5.94	
	<i>For >25, Deduct</i>	-8.91	
	<i>For Backroll, Add</i>	5.48	



		Finishes	09
		Painting and Coating	09 90
		Painting	09 91

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0263 EA 1 Coat Paint, Sprayed, One Face, Paint Interior Metal Door	59.41	
For Electrostatic Painting, Add	11.09	
For Half Louvered Door, Add	3.76	
For Full Louvered Door, Add	6.27	
For Oil Based Paint, Add	4.69	
For >5 To 10, Deduct	-2.97	
For >10 To 25, Deduct	-5.94	
For >25, Deduct	-8.91	
For Backroll, Add	5.48	
09 91 23 00-0264 EA 2 Coats Paint, Sprayed, One Face, Paint Interior Metal Door	110.58	
For Electrostatic Painting, Add	21.29	
For Half Louvered Door, Add	6.36	
For Full Louvered Door, Add	10.59	
For Oil Based Paint, Add	8.94	
For >5 To 10, Deduct	-5.53	
For >10 To 25, Deduct	-11.06	
For >25, Deduct	-16.59	
For Backroll, Add	9.77	
09 91 23 00-0265 EA 1 Coat Primer, Sprayed, Both Faces, Paint Interior Metal Door	106.66	
For Electrostatic Painting, Add	19.92	
For Half Louvered Door, Add	6.75	
For Full Louvered Door, Add	11.25	
For Oil Based Paint, Add	8.42	
For >5 To 10, Deduct	-5.33	
For >10 To 25, Deduct	-10.67	
For >25, Deduct	-16.00	
For Backroll, Add	9.83	
09 91 23 00-0266 EA 1 Coat Paint, Sprayed, Both Faces, Paint Interior Metal Door	106.66	
For Electrostatic Painting, Add	19.92	
For Half Louvered Door, Add	6.75	
For Full Louvered Door, Add	11.25	
For Oil Based Paint, Add	8.42	
For >5 To 10, Deduct	-5.33	
For >10 To 25, Deduct	-10.67	
For >25, Deduct	-16.00	
For Backroll, Add	9.83	
09 91 23 00-0267 EA 2 Coats Paint, Sprayed, Both Faces, Paint Interior Metal Door	199.47	
For Electrostatic Painting, Add	38.45	
For Half Louvered Door, Add	11.42	
For Full Louvered Door, Add	19.03	
For Oil Based Paint, Add	16.14	
For >5 To 10, Deduct	-9.97	
For >10 To 25, Deduct	-19.95	
For >25, Deduct	-29.92	
For Backroll, Add	17.59	
09 91 23 00-0268 Paint Interior Wood Doors (09 91 23 00-0247)		
09 91 23 00-0269 EA 1 Coat Primer, Brush/Roller Work, One Face, Paint Interior Wood Door	58.77	
For Oil Based Paint, Add	4.23	
For Half Louvered Door, Add	4.94	
For Full Louvered Door, Add	8.23	
For >5 To 10, Deduct	-2.94	
For >10 To 25, Deduct	-5.88	
For >25, Deduct	-8.82	
09 91 23 00-0270 EA 1 Coat Paint, Brush/Roller Work, One Face, Paint Interior Wood Door	58.77	
For Oil Based Paint, Add	4.23	
For Half Louvered Door, Add	4.94	
For Full Louvered Door, Add	8.23	
For >5 To 10, Deduct	-2.94	
For >10 To 25, Deduct	-5.88	
For >25, Deduct	-8.82	
09 91 23 00-0271 EA 2 Coats Paint, Brush/Roller Work, One Face, Paint Interior Wood Door	107.01	
For Oil Based Paint, Add	7.92	
For Half Louvered Door, Add	8.34	
For Full Louvered Door, Add	13.90	
For >5 To 10, Deduct	-5.35	
For >10 To 25, Deduct	-10.70	
For >25, Deduct	-16.05	
09 91 23 00-0272 EA 1 Coat Primer, Brush/Roller Work, Both Faces, Paint Interior Wood Door	105.50	
For Oil Based Paint, Add	7.60	
For Half Louvered Door, Add	8.85	
For Full Louvered Door, Add	14.75	
For >5 To 10, Deduct	-5.28	
For >10 To 25, Deduct	-10.55	
For >25, Deduct	-15.83	
09 91 23 00-0273 EA 1 Coat Paint, Brush/Roller Work, Both Faces, Paint Interior Wood Door	105.50	
For Oil Based Paint, Add	7.60	
For Half Louvered Door, Add	8.85	
For Full Louvered Door, Add	14.75	
For >5 To 10, Deduct	-5.28	
For >10 To 25, Deduct	-10.55	
For >25, Deduct	-15.83	

09 Finishes**09 90 Painting and Coating****09 91 Painting**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 23 00-0274	EA 2 Coats Paint, Brush/Roller Work, Both Faces, Paint Interior Wood Door.....	192.81
	<i>For Oil Based Paint, Add</i>	14.29
	<i>For Half Louvered Door, Add</i>	14.97
	<i>For Full Louvered Door, Add</i>	24.96
	<i>For >5 To 10, Deduct</i>	-9.64
	<i>For >10 To 25, Deduct</i>	-19.28
	<i>For >25, Deduct</i>	-28.92
09 91 23 00-0275	EA 1 Coat Primer, Sprayed, One Face, Paint Interior Wood Door.....	53.55
	<i>For Oil Based Paint, Add</i>	4.10
	<i>For Half Louvered Door, Add</i>	3.76
	<i>For Full Louvered Door, Add</i>	6.27
	<i>For Backroll, Add</i>	5.19
	<i>For >5 To 10, Deduct</i>	-2.68
	<i>For >10 To 25, Deduct</i>	-5.36
	<i>For >25, Deduct</i>	-8.03
09 91 23 00-0276	EA 1 Coat Paint, Sprayed, One Face, Paint Interior Wood Door.....	53.55
	<i>For Oil Based Paint, Add</i>	4.10
	<i>For Half Louvered Door, Add</i>	3.76
	<i>For Full Louvered Door, Add</i>	6.27
	<i>For Backroll, Add</i>	5.19
	<i>For >5 To 10, Deduct</i>	-2.68
	<i>For >10 To 25, Deduct</i>	-5.36
	<i>For >25, Deduct</i>	-8.03
09 91 23 00-0277	EA 2 Coats Paint, Sprayed, One Face, Paint Interior Wood Door.....	98.95
	<i>For Oil Based Paint, Add</i>	7.78
	<i>For Half Louvered Door, Add</i>	6.36
	<i>For Full Louvered Door, Add</i>	10.60
	<i>For Backroll, Add</i>	9.19
	<i>For >5 To 10, Deduct</i>	-4.95
	<i>For >10 To 25, Deduct</i>	-9.90
	<i>For >25, Deduct</i>	-14.84
09 91 23 00-0278	EA 1 Coat Primer, Sprayed, Both Faces, Paint Interior Wood Door.....	96.13
	<i>For Oil Based Paint, Add</i>	7.36
	<i>For Half Louvered Door, Add</i>	6.75
	<i>For Full Louvered Door, Add</i>	11.25
	<i>For Backroll, Add</i>	9.30
	<i>For >5 To 10, Deduct</i>	-4.81
	<i>For >10 To 25, Deduct</i>	-9.61
	<i>For >25, Deduct</i>	-14.42
09 91 23 00-0279	EA 1 Coat Paint, Sprayed, Both Faces, Paint Interior Wood Door.....	96.13
	<i>For Oil Based Paint, Add</i>	7.36
	<i>For Half Louvered Door, Add</i>	6.75
	<i>For Full Louvered Door, Add</i>	11.25
	<i>For Backroll, Add</i>	9.30
	<i>For >5 To 10, Deduct</i>	-4.81
	<i>For >10 To 25, Deduct</i>	-9.61
	<i>For >25, Deduct</i>	-14.42
09 91 23 00-0280	EA 2 Coats Paint, Sprayed, Both Faces, Paint Interior Wood Door.....	178.41
	<i>For Oil Based Paint, Add</i>	14.04
	<i>For Half Louvered Door, Add</i>	11.42
	<i>For Full Louvered Door, Add</i>	19.03
	<i>For Backroll, Add</i>	16.53
	<i>For >5 To 10, Deduct</i>	-8.92
	<i>For >10 To 25, Deduct</i>	-17.84
	<i>For >25, Deduct</i>	-26.76

09 91 23 00-0281 Paint Interior Metal Windows (09 91 23 00-0247)

Note: Two finish coats paint over rust inhibitive primer.

09 91 23 00-0282	EA Up To 8 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Metal Window Including Trim, Brush/Roller Work.....	94.48
	<i>For Oil Based Paint, Add</i>	5.76
	<i>For Electrostatic Painting, Add</i>	12.56
	<i>For >5 To 10, Deduct</i>	-4.72
	<i>For >10 To 25, Deduct</i>	-9.45
	<i>For >25, Deduct</i>	-14.17
09 91 23 00-0283	EA >8 To 14 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Metal Window Including Trim, Brush/Roller Work.....	117.12
	<i>For Oil Based Paint, Add</i>	7.46
	<i>For Electrostatic Painting, Add</i>	16.52
	<i>For >5 To 10, Deduct</i>	-5.86
	<i>For >10 To 25, Deduct</i>	-11.71
	<i>For >25, Deduct</i>	-17.57
09 91 23 00-0284	EA >14 To 20 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Metal Window Including Trim, Brush/Roller Work.....	158.95
	<i>For Oil Based Paint, Add</i>	10.22
	<i>For Electrostatic Painting, Add</i>	22.72
	<i>For >5 To 10, Deduct</i>	-7.95
	<i>For >10 To 25, Deduct</i>	-15.90
	<i>For >25, Deduct</i>	-23.84
09 91 23 00-0285	EA >20 To 26 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Metal Window Including Trim, Brush/Roller Work.....	179.09
	<i>For Oil Based Paint, Add</i>	11.53
	<i>For Electrostatic Painting, Add</i>	25.62
	<i>For >5 To 10, Deduct</i>	-8.95
	<i>For >10 To 25, Deduct</i>	-17.91
	<i>For >25, Deduct</i>	-26.86



Finishes	09	
Painting and Coating	09 90	09
Painting	09 91	

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0286	EA	>26 To 34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Metal Window Including Trim, Brush/Roller Work	198.39	
		<i>For Oil Based Paint, Add</i>	12.75	
		<i>For Electrostatic Painting, Add</i>	28.32	
		<i>For >5 To 10, Deduct</i>	-9.92	
		<i>For >10 To 25, Deduct</i>	-19.84	
		<i>For >25, Deduct</i>	-29.76	
09 91 23 00-0287	SF	>34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Metal Window Including Trim, Brush/Roller Work	6.29	
		<i>For Oil Based Paint, Add</i>	0.40	
		<i>For Electrostatic Painting, Add</i>	0.90	
09 91 23 00-0288		Paint Interior Wood Windows <small>(09 91 23 00-0247)</small>		
		Note: Two finish coats paint over primer.		
09 91 23 00-0289	EA	Up To 8 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Wood Windows Including Trim, Brush/Roller Work	90.94	
		<i>For Oil Based Paint, Add</i>	5.41	
		<i>For >5 To 10, Deduct</i>	-4.55	
		<i>For >10 To 25, Deduct</i>	-9.09	
		<i>For >25, Deduct</i>	-13.64	
09 91 23 00-0290	EA	>8 To 14 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Wood Windows Including Trim, Brush/Roller Work	111.65	
		<i>For Oil Based Paint, Add</i>	6.91	
		<i>For >5 To 10, Deduct</i>	-5.58	
		<i>For >10 To 25, Deduct</i>	-11.17	
		<i>For >25, Deduct</i>	-16.75	
09 91 23 00-0291	EA	>14 To 20 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Wood Windows Including Trim, Brush/Roller Work	158.20	
		<i>For Oil Based Paint, Add</i>	9.80	
		<i>For >5 To 10, Deduct</i>	-7.91	
		<i>For >10 To 25, Deduct</i>	-15.82	
		<i>For >25, Deduct</i>	-23.73	
09 91 23 00-0292	EA	>20 To 26 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Wood Windows Including Trim, Brush/Roller Work	178.20	
		<i>For Oil Based Paint, Add</i>	11.04	
		<i>For >5 To 10, Deduct</i>	-8.91	
		<i>For >10 To 25, Deduct</i>	-17.82	
		<i>For >25, Deduct</i>	-26.73	
09 91 23 00-0293	EA	>26 To 34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Wood Windows Including Trim, Brush/Roller Work	188.74	
		<i>For Oil Based Paint, Add</i>	11.78	
		<i>For >5 To 10, Deduct</i>	-9.44	
		<i>For >10 To 25, Deduct</i>	-18.87	
		<i>For >25, Deduct</i>	-28.31	
09 91 23 00-0294	SF	>34 SF Window Size, 1 Coat Primer And Two Coats Paint, Brush Work, Interior Wood Windows Including Trim, Brush/Roller Work	6.27	
		<i>For Oil Based Paint, Add</i>	0.39	
09 91 23 00-0295		Paint Interior Security Screens <small>(09 91 23 00-0247)</small>		
09 91 23 00-0296	SF	1 Coat Primer, Brush/Roller Work, Paint Interior Security Screen	1.55	
		<i>For Oil Based Paint, Add</i>	0.10	
		<i>For Electrostatic Painting, Add</i>	0.22	
09 91 23 00-0297	SF	1 Coat Paint, Brush/Roller Work, Paint Interior Security Screen	1.53	
		<i>For Oil Based Paint, Add</i>	0.09	
		<i>For Electrostatic Painting, Add</i>	0.20	
09 91 23 00-0298	SF	2 Coats Paint, Brush/Roller Work, Paint Interior Security Screen	2.54	
		<i>For Oil Based Paint, Add</i>	0.16	
		<i>For Electrostatic Painting, Add</i>	0.34	
09 91 23 00-0299		Paint Interior Window Guards <small>(09 91 23 00-0247)</small>		
09 91 23 00-0300	SF	1 Coat Primer, Brush/Roller Work, Paint Interior Metal Window Guards	1.55	
		<i>For Oil Based Paint, Add</i>	0.10	
09 91 23 00-0301	SF	1 Coat Paint, Brush/Roller Work, Paint Interior Metal Window Guards	1.53	
		<i>For Oil Based Paint, Add</i>	0.09	
09 91 23 00-0302	SF	2 Coats Paint, Brush/Roller Work, Paint Interior Metal Window Guards	2.54	
		<i>For Oil Based Paint, Add</i>	0.16	
09 91 23 00-0303		Paint Interior Window Trim <small>(09 91 23 00-0247)</small>		
09 91 23 00-0304	LF	1 Coat Primer, Brush/Roller Work, Paint Interior Wood Window Frame And Trim	1.54	
		<i>For Oil Based Paint, Add</i>	0.10	
		<i>For Painting One Face Of Frame Only, Deduct</i>	-0.46	
09 91 23 00-0305	LF	1 Coat Paint, Brush/Roller Work, Paint Interior Wood Window Frame And Trim	1.54	
		<i>For Oil Based Paint, Add</i>	0.10	
		<i>For Painting One Face Of Frame Only, Deduct</i>	-0.46	
09 91 23 00-0306	LF	2 Coats Paint, Brush/Roller Work, Paint Interior Wood Window Frame And Trim	3.33	
		<i>For Oil Based Paint, Add</i>	0.22	
		<i>For Painting One Face Of Frame Only, Deduct</i>	-0.98	
09 91 23 00-0307	LF	1 Coat Primer, Brush/Roller Work, Paint Interior Metal Window Frame And Trim	1.74	
		Note: Brush/roller work		
		<i>For Painting One Face Of Frame Only, Deduct</i>	-0.54	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0308	LF	1	Coat Paint, Brush/Roller Work, Paint Interior Metal Window Frame And Trim..... Note: Brush/roller work.	1.74	
			<i>For Painting One Face Of Frame Only, Deduct</i>	-0.54	
09 91 23 00-0309	LF	2	Coats Paint, Brush/Roller Work, Paint Interior Metal Window Frame And Trim..... Note: Brush/roller work.	3.73	
			<i>For Painting One Face Of Frame Only, Deduct</i>	-1.14	
09 91 23 00-0310			Paint Interior Cabinets And Casework (09 91 23)		
09 91 23 00-0311			Paint Interior Wood Cabinets And Casework (09 91 23 00-0310)		
09 91 23 00-0312	SF	1	Coat Paint, Brush/Roller Work, Paint Interior Wood Cabinets And Casework	1.27	
			<i>For >5,000 To 10,000, Deduct</i>	-0.06	
			<i>For >10,000 To 20,000, Deduct</i>	-0.13	
			<i>For >20,000, Deduct</i>	-0.19	
09 91 23 00-0313	SF	1	Coat Enamel Primer And 1 Coat Alkyd Or Latex Paint, Brush/Roller Work, Paint Interior Wood Cabinets And Casework.....	1.77	
			<i>For >5,000 To 10,000, Deduct</i>	-0.09	
			<i>For >10,000 To 20,000, Deduct</i>	-0.18	
			<i>For >20,000, Deduct</i>	-0.27	
09 91 23 00-0314	SF	1	Coat Enamel Primer And 2 Coats Alkyd Or Latex Paint, Brush/Roller Work, Paint Interior Wood Cabinets And Casework.....	3.14	
			<i>For >5,000 To 10,000, Deduct</i>	-0.16	
			<i>For >10,000 To 20,000, Deduct</i>	-0.31	
			<i>For >20,000, Deduct</i>	-0.47	
09 91 23 00-0315			Paint Exposed Metal Lockers And Cabinets (09 91 23 00-0310)		
09 91 23 00-0316	SF	1	Coat Primer, Brush/Roller Work, Paint Exposed Metal Locker	1.45	
			<i>For >5,000 To 10,000, Deduct</i>	-0.07	
			<i>For >10,000 To 20,000, Deduct</i>	-0.15	
			<i>For >20,000, Deduct</i>	-0.22	
09 91 23 00-0317	SF	1	Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Exposed Metal Locker.....	1.40	
			<i>For >5,000 To 10,000, Deduct</i>	-0.07	
			<i>For >10,000 To 20,000, Deduct</i>	-0.14	
			<i>For >20,000, Deduct</i>	-0.21	
09 91 23 00-0318	SF	2	Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Exposed Metal Locker	2.63	
			<i>For >5,000 To 10,000, Deduct</i>	-0.13	
			<i>For >10,000 To 20,000, Deduct</i>	-0.26	
			<i>For >20,000, Deduct</i>	-0.39	
09 91 23 00-0319			Paint Interior Stairs (09 91 23)		
09 91 23 00-0320			Paint Interior Concrete Stairs (09 91 23 00-0319) Note: Includes the riser and tread.		
09 91 23 00-0321	RSR	1	Coat Primer, Brush/Roller Work, Paint Interior Concrete Stair (To 4' Wide)	17.57	
09 91 23 00-0322	RSR	1	Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Concrete Stair (To 4' Wide).....	17.57	
09 91 23 00-0323	RSR	1	Coat Non-Slip Paint, Brush/Roller Work, Paint Interior Concrete Stair (To 4' Wide)	15.17	
			Note: Excludes riser.		
09 91 23 00-0324	RSR	1	Coat Non-Slip Epoxy Paint, Brush/Roller Work, Paint Interior Concrete Stair (To 4' Wide).....	32.61	
			Note: Excludes riser.		
09 91 23 00-0325	RSR	2	Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Concrete Stair (To 4' Wide).....	35.15	
09 91 23 00-0326			Paint Interior Metal Stairs (09 91 23 00-0319) Note: Includes the riser and tread.		
09 91 23 00-0327	RSR	1	Coat Primer, Brush/Roller Work, Paint Interior Metal Stair (To 4' Wide)	9.81	
09 91 23 00-0328	RSR	1	Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Metal Stair (To 4' Wide).....	9.45	
09 91 23 00-0329	RSR	2	Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Metal Stair (To 4' Wide).....	18.89	
09 91 23 00-0330			Paint Interior Wood Stairs (09 91 23 00-0319) Note: Includes the riser and tread.		
09 91 23 00-0331	RSR	1	Coat Primer, Brush/Roller Work, Paint Interior Wood Stair (To 4' Wide)	9.26	
09 91 23 00-0332	RSR	1	Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Wood Stair (To 4' Wide).....	9.26	
09 91 23 00-0333	RSR	1	Coat Non-Slip Paint, Brush/Roller Work, Paint Interior Wood Stair (To 4' Wide)	11.01	
			Note: Excludes riser.		
09 91 23 00-0334	RSR	1	Coat Non-Slip Epoxy Paint, Brush/Roller Work, Paint Interior Wood Stair (To 4' Wide).....	28.45	
			Note: Excludes riser.		
09 91 23 00-0335	RSR	2	Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Wood Stair (To 4' Wide)	18.51	
09 91 23 00-0336			Paint Interior Stair Nosing (09 91 23 00-0319)		
09 91 23 00-0337	LF	1	Coat Paint, Up To 2", Non-Slip, Brush Work, Paint Interior Yellow Stair Safety Strip	1.59	
09 91 23 00-0338			Paint Interior Trim (09 91 23)		
09 91 23 00-0339			Paint Interior Metal Trim (09 91 23 00-0338)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0340 SF 1 Coat Primer, Brush Work, Paint Interior Exposed Metal Trim.....	1.28	
<i>For Work >15' To 20' Above Floor, Add</i>	0.15	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.25	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.39	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.54	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0341 SF 1 Coat Paint, Brush Work, Paint Interior Exposed Metal Trim.....	1.38	
<i>For Work >15' To 20' Above Floor, Add</i>	0.16	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.27	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.43	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.59	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0342 SF 2 Coats Paint, Brush Work, Paint Interior Exposed Metal Trim.....	2.51	
<i>For Work >15' To 20' Above Floor, Add</i>	0.29	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.48	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.77	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	1.06	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0343 SF 1 Coat Primer, Brush/Roller Work, Paint Interior Exposed Metal Trim.....	1.09	
<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.32	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.43	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0344 SF 1 Coat Paint, Brush/Roller Work, Paint Interior Exposed Metal Trim.....	1.17	
<i>For Work >15' To 20' Above Floor, Add</i>	0.13	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.22	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.35	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.48	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0345 SF 2 Coats Paint, Brush/Roller Work, Paint Interior Exposed Metal Trim.....	2.13	
<i>For Work >15' To 20' Above Floor, Add</i>	0.23	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.39	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.62	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.85	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0346 Paint Interior Wood Trim (09 91 23 00-0338)		
09 91 23 00-0347 LF 1 Coat Primer, Brush Work, Paint Interior Wood Trim To 6" Wide.....	0.79	
<i>For Oil Based Paint, Add</i>	0.05	
<i>For Work >15' To 20' Above Floor, Add</i>	0.10	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.17	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.27	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.37	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0348 LF 1 Coat Paint, Brush Work, Paint Interior Wood Trim To 6" Wide.....	0.88	
<i>For Oil Based Paint, Add</i>	0.05	
<i>For Work >15' To 20' Above Floor, Add</i>	0.11	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.19	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.30	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.41	
<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0349 LF 2 Coats Paint, Brush Work, Paint Interior Wood Trim To 6" Wide.....	1.81	
<i>For Oil Based Paint, Add</i>	0.10	
<i>For Work >15' To 20' Above Floor, Add</i>	0.24	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.41	
<i>Note: Applied only to work area above 20' to 30'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.65	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.89	
<i>Note: Applied only to work area above 40'.</i>		

09 Finishes

09 90 Painting and Coating

09 91 Painting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 91 23 00-0350	SF 1 Coat Primer, Brush Work, Paint Interior Wood Trim	2.51	
	<i>For Oil Based Paint, Add</i>	0.15	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.30	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.51	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.81	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	1.11	
	<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0351	SF 1 Coat Paint, Brush Work, Paint Interior Wood Trim.....	2.79	
	<i>For Oil Based Paint, Add</i>	0.17	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.34	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.56	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.90	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	1.23	
	<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0352	SF 2 Coats Paint, Brush Work, Paint Interior Wood Trim	5.10	
	<i>For Oil Based Paint, Add</i>	0.31	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.60	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	1.00	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	1.60	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	2.21	
	<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0353	SF 1 Coat Primer, Brush/Roller Work, Paint Interior Wood Trim	2.10	
	<i>For Oil Based Paint, Add</i>	0.13	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.24	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.40	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.64	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.89	
	<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0354	SF 1 Coat Paint, Brush/Roller Work, Paint Interior Wood Trim	2.35	
	<i>For Oil Based Paint, Add</i>	0.15	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.27	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.45	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.72	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.99	
	<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0355	SF 2 Coats Paint, Brush/Roller Work, Paint Interior Wood Trim.....	4.27	
	<i>For Oil Based Paint, Add</i>	0.27	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.48	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.80	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	1.27	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	1.75	
	<i>Note: Applied only to work area above 40'.</i>		
09 91 23 00-0356	Paint Interior Metal Surfaces (09 91 23)		
09 91 23 00-0357	Paint Interior Miscellaneous Metal Surfaces (09 91 23 00-0356)		
09 91 23 00-0358	SF 1 Coat Alkyd Anticorrosive Metal Primer, Brush/Roller Work, Paint Interior Miscellaneous Metal Surfaces.....	0.90	
	<i>For Electrostatic Painting, Add</i>	0.14	
	<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
	<i>Note: Applied only to work area above 15' to 20'.</i>		
	<i>For Work >20' To 30' Above Floor, Add</i>	0.15	
	<i>Note: Applied only to work area above 20' to 30'.</i>		
	<i>For Work >30' To 40' Above Floor, Add</i>	0.24	
	<i>Note: Applied only to work area above 30' to 40'.</i>		
	<i>For Work >40' Above Floor, Add</i>	0.33	
	<i>Note: Applied only to work area above 40'.</i>		
	<i>For Up To 100, Add</i>	0.50	
	<i>For >100 To 250, Add</i>	0.24	
	<i>For >250 To 500, Add</i>	0.11	
	<i>For >2,500 To 5,000, Deduct</i>	-0.05	
	<i>For >5,000 To 10,000, Deduct</i>	-0.09	
	<i>For >10,000 To 20,000, Deduct</i>	-0.14	
	<i>For >20,000, Deduct</i>	-0.18	



Finishes	09	9
Painting and Coating	09 90	
Painting	09 91	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91 23 00-0359	SF	1	Coat Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Miscellaneous Metal Surfaces	1.06	
			For Electrostatic Painting, Add	0.15	
			For Work >15' To 20' Above Floor, Add	0.11	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.19	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.30	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.42	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.62	
			For >100 To 250, Add	0.30	
			For >250 To 500, Add	0.13	
			For >2,500 To 5,000, Deduct	-0.05	
			For >5,000 To 10,000, Deduct	-0.11	
			For >10,000 To 20,000, Deduct	-0.16	
			For >20,000, Deduct	-0.21	
09 91 23 00-0360	SF	2	Coats Alkyd Enamel Paint, Brush/Roller Work, Paint Interior Miscellaneous Metal Surfaces.....	1.87	
			For Electrostatic Painting, Add	0.27	
			For Work >15' To 20' Above Floor, Add	0.20	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.34	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.54	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.74	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.08	
			For >100 To 250, Add	0.52	
			For >250 To 500, Add	0.23	
			For >2,500 To 5,000, Deduct	-0.09	
			For >5,000 To 10,000, Deduct	-0.19	
			For >10,000 To 20,000, Deduct	-0.28	
			For >20,000, Deduct	-0.37	
09 91 23 00-0361	SF	1	Coat Alkyd Anticorrosive Metal Primer, Sprayed, Paint Interior Miscellaneous Metal Surfaces	1.23	
			For Electrostatic Painting, Add	0.17	
			For Backroll, Add	0.15	
			For Work >15' To 20' Above Floor, Add	0.13	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.22	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.36	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.49	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.72	
			For >100 To 250, Add	0.35	
			For >250 To 500, Add	0.15	
			For >2,500 To 5,000, Deduct	-0.06	
			For >5,000 To 10,000, Deduct	-0.12	
			For >10,000 To 20,000, Deduct	-0.18	
			For >20,000, Deduct	-0.25	
09 91 23 00-0362	SF	1	Coat Alkyd Enamel Paint, Sprayed, Paint Interior Miscellaneous Metal Surfaces.....	1.23	
			For Electrostatic Painting, Add	0.17	
			For Backroll, Add	0.15	
			For Work >15' To 20' Above Floor, Add	0.13	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.22	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.36	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.49	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	0.72	
			For >100 To 250, Add	0.35	
			For >250 To 500, Add	0.15	
			For >2,500 To 5,000, Deduct	-0.06	
			For >5,000 To 10,000, Deduct	-0.12	
			For >10,000 To 20,000, Deduct	-0.18	
			For >20,000, Deduct	-0.25	
09 91 23 00-0363	SF	2	Coats Alkyd Enamel Paint, Sprayed, Paint Interior Miscellaneous Metal Surfaces	2.02	
			For Electrostatic Painting, Add	0.30	
			For Backroll, Add	0.24	
			For Work >15' To 20' Above Floor, Add	0.21	
			Note: Applied only to work area above 15' to 20'.		
			For Work >20' To 30' Above Floor, Add	0.35	
			Note: Applied only to work area above 20' to 30'.		
			For Work >30' To 40' Above Floor, Add	0.55	
			Note: Applied only to work area above 30' to 40'.		
			For Work >40' Above Floor, Add	0.76	
			Note: Applied only to work area above 40'.		
			For Up To 100, Add	1.13	
			For >100 To 250, Add	0.55	
			For >250 To 500, Add	0.24	
			For >2,500 To 5,000, Deduct	-0.10	
			For >5,000 To 10,000, Deduct	-0.20	
			For >10,000 To 20,000, Deduct	-0.30	
			For >20,000, Deduct	-0.40	

09	09 Finishes
	09 90 Painting and Coating
	09 91 Painting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 91 23 00-0364	Paint Additives <small>(09 91 23)</small>	
09 91 23 00-0365	SF Mildewcide/Mold Killing Paint Additive Per Each Coat.....	0.02
09 91 23 00-0366	SF Class "B" Fire Rating, Fire Resistant Paint Additive.....	0.08
	<i>For Class "A" Fire Rating, Add</i>	<i>0.08</i>

09 91 23 00-0367	Hand Painting Letters/Numbers <small>(09 91 23)</small>	
	Note: Painting on walls, floors, poles, signs, etc.	
09 91 23 00-0368	EA Up To 1" High, Hand Paint, Per Letter/Number	2.46
09 91 23 00-0369	EA 1" To 2" High, Hand Paint, Per Letter/Number.....	2.84
09 91 23 00-0370	EA 2" To 3" High, Hand Paint, Per Letter/Number.....	4.26
09 91 23 00-0371	EA 3" To 4" High, Hand Paint, Per Letter/Number.....	5.21
09 91 23 00-0372	EA 4" To 6" High, Hand Paint, Per Letter/Number.....	7.16
09 91 23 00-0373	EA 6" To 12" High, Hand Paint, Per Letter/Number.....	9.06
09 91 23 00-0374	EA Over 12" High, Hand Paint, Per Letter/Number	10.58

09 91 23 00-0375	Glove/Mitt Application <small>(09 91 23)</small>	
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09 91 23 00-0376	Conduit/Pipe <small>(09 91 23 00-0375)</small>	
09 91 23 00-0377	CSF Acid Wash (Muriatic Acid) Conduit Or Pipe With Glove/Mitt.....	46.00
	<i>For Work >15' To 20' Above Floor, Add</i>	<i>6.13</i>
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >20' To 30' Above Floor, Add</i>	<i>10.21</i>
	<i>Note: Applied only to work area above 20' to 30'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	<i>16.34</i>
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	<i>22.47</i>
	<i>Note: Applied only to work area above 40'.</i>	
09 91 23 00-0378	CSF Metal Primer Conduit Or Pipe With Glove/Mitt.....	90.64
	<i>For Work >15' To 20' Above Floor, Add</i>	<i>7.35</i>
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >20' To 30' Above Floor, Add</i>	<i>12.26</i>
	<i>Note: Applied only to work area above 20' to 30'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	<i>19.61</i>
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	<i>26.96</i>
	<i>Note: Applied only to work area above 40'.</i>	
09 91 23 00-0379	CSF Enamel Paint, Oil Base Paint, First Coat Conduit Or Pipe With Glove/Mitt.....	73.43
	<i>For Work >15' To 20' Above Floor, Add</i>	<i>5.39</i>
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >20' To 30' Above Floor, Add</i>	<i>8.99</i>
	<i>Note: Applied only to work area above 20' to 30'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	<i>14.38</i>
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	<i>19.77</i>
	<i>Note: Applied only to work area above 40'.</i>	
09 91 23 00-0380	CSF Enamel Paint, Oil Base Paint, Second Coat Conduit Or Pipe With Glove/Mitt.....	62.08
	<i>For Work >15' To 20' Above Floor, Add</i>	<i>4.05</i>
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >20' To 30' Above Floor, Add</i>	<i>6.74</i>
	<i>Note: Applied only to work area above 20' to 30'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	<i>10.79</i>
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	<i>14.83</i>
	<i>Note: Applied only to work area above 40'.</i>	
09 91 23 00-0381	CSF Epoxy Paint, First Coat Conduit Or Pipe With Glove/Mitt.....	125.50
	<i>For Work >15' To 20' Above Floor, Add</i>	<i>6.13</i>
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >20' To 30' Above Floor, Add</i>	<i>10.21</i>
	<i>Note: Applied only to work area above 20' to 30'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	<i>16.34</i>
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	<i>22.47</i>
	<i>Note: Applied only to work area above 40'.</i>	
09 91 23 00-0382	CSF Epoxy Paint, Second Coat Conduit Or Pipe With Glove/Mitt	117.09
	<i>For Work >15' To 20' Above Floor, Add</i>	<i>5.39</i>
	<i>Note: Applied only to work area above 15' to 20'.</i>	
	<i>For Work >20' To 30' Above Floor, Add</i>	<i>8.99</i>
	<i>Note: Applied only to work area above 20' to 30'.</i>	
	<i>For Work >30' To 40' Above Floor, Add</i>	<i>14.38</i>
	<i>Note: Applied only to work area above 30' to 40'.</i>	
	<i>For Work >40' Above Floor, Add</i>	<i>19.77</i>
	<i>Note: Applied only to work area above 40'.</i>	

09 91 23 00-0383	Ductwork <small>(09 91 23 00-0375)</small>	
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	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 91	23	00-0384	CSF	Acid Wash (Muriatic Acid) Ductwork With Glove/Mitt.....	46.00	
				<i>For Work >15' To 20' Above Floor, Add</i>	6.13	
				<i>Note: Applied only to work area above 15' to 20'</i>		
				<i>For Work >20' To 30' Above Floor, Add</i>	10.21	
				<i>Note: Applied only to work area above 20' to 30'</i>		
				<i>For Work >30' To 40' Above Floor, Add</i>	16.34	
				<i>Note: Applied only to work area above 30' to 40'</i>		
				<i>For Work >40' Above Floor, Add</i>	22.47	
				<i>Note: Applied only to work area above 40'</i>		
09 91	23	00-0385	CSF	Metal Primer Ductwork With Glove/Mitt.....	81.37	
				<i>For Work >15' To 20' Above Floor, Add</i>	6.13	
				<i>Note: Applied only to work area above 15' to 20'</i>		
				<i>For Work >20' To 30' Above Floor, Add</i>	10.21	
				<i>Note: Applied only to work area above 20' to 30'</i>		
				<i>For Work >30' To 40' Above Floor, Add</i>	16.34	
				<i>Note: Applied only to work area above 30' to 40'</i>		
				<i>For Work >40' Above Floor, Add</i>	22.47	
				<i>Note: Applied only to work area above 40'</i>		
09 91	23	00-0386	CSF	Enamel Paint, Oil Base Paint Ductwork With Glove/Mitt.....	66.72	
				<i>For Work >15' To 20' Above Floor, Add</i>	4.90	
				<i>Note: Applied only to work area above 15' to 20'</i>		
				<i>For Work >20' To 30' Above Floor, Add</i>	8.17	
				<i>Note: Applied only to work area above 20' to 30'</i>		
				<i>For Work >30' To 40' Above Floor, Add</i>	13.07	
				<i>Note: Applied only to work area above 30' to 40'</i>		
				<i>For Work >40' Above Floor, Add</i>	17.97	
				<i>Note: Applied only to work area above 40'</i>		
09 91	23	00-0387	CSF	Epoxy Paint, First Coat Ductwork With Glove/Mitt.....	119.43	
				<i>For Work >15' To 20' Above Floor, Add</i>	6.13	
				<i>Note: Applied only to work area above 15' to 20'</i>		
				<i>For Work >20' To 30' Above Floor, Add</i>	10.21	
				<i>Note: Applied only to work area above 20' to 30'</i>		
				<i>For Work >30' To 40' Above Floor, Add</i>	16.34	
				<i>Note: Applied only to work area above 30' to 40'</i>		
				<i>For Work >40' Above Floor, Add</i>	22.47	
				<i>Note: Applied only to work area above 40'</i>		
09 91	23	00-0388	CSF	Epoxy Paint, Second Coat Ductwork With Glove/Mitt.....	106.35	
				<i>For Work >15' To 20' Above Floor, Add</i>	4.90	
				<i>Note: Applied only to work area above 15' to 20'</i>		
				<i>For Work >20' To 30' Above Floor, Add</i>	8.17	
				<i>Note: Applied only to work area above 20' to 30'</i>		
				<i>For Work >30' To 40' Above Floor, Add</i>	13.07	
				<i>Note: Applied only to work area above 30' to 40'</i>		
				<i>For Work >40' Above Floor, Add</i>	17.97	
				<i>Note: Applied only to work area above 40'</i>		

09 91 33 Painting Materials (09 91)

Note: Paint per gallon for owners to obtain extra paint. Not to be used in conjunction with other painting tasks.

09 91	33	00-0001	Primer (09 91 33)			
09 91	33	00-0002	GAL	Alkyd Primer/Sealer, Interior, 500 SF Per Gallon.....	77.18	
09 91	33	00-0003	GAL	Alkyd Wood Primer, Exterior, 400 SF Per Gallon.....	62.77	
09 91	33	00-0004	GAL	Prime Coat Oil Wood Primer, 310 SF Per Gallon.....	79.59	
09 91	33	00-0005	GAL	Catalyzed Epoxy Primer, Two Component Type, 425 SF Per Gallon.....	176.62	
09 91	33	00-0006	EA	Cement Base Primer, 25 LB Sack.....	65.64	
09 91	33	00-0007	GAL	Alkali Resistant Concrete And Masonry Primer, Exterior, 225 SF Per Gallon.....	101.20	
09 91	33	00-0008	GAL	Alkali Resistant Concrete And Masonry Primer, Interior, 225 SF Per Gallon.....	81.23	
09 91	33	00-0009	GAL	Acrylic Latex Primer, Flat Exterior, Fast Drying Wood Undercoat And Back Primer, 400 SF per Gallon.....	62.77	
09 91	33	00-0010	GAL	Acrylic (Vinyl Acrylic) Block Filler, 50 SF Per Gallon.....	57.03	
09 91	33	00-0011	GAL	Acrylic (Vinyl Acrylic) Rust Inhibiting Metal, Primer - 500 SF Per Gallon: Paint - 260 SF Per Gallon.....	100.52	
09 91	33	00-0012	GAL	Acrylic Heavy Duty Wall Primer/Sealer, Low Odor Type, Alkali-Resistant, 800 SF Per Gallon.....	83.69	
09 91	33	00-0013	GAL	Acrylic (Vinyl Acrylic) Undercoat, All Purpose, Interior/Exterior, 500 SF Per Gallon.....	83.69	
09 91	33	00-0014	GAL	Latex Wood Primer, Exterior, 300 SF Per Gallon.....	94.36	
09 91	33	00-0015	GAL	Linseed (Oil Base) Primer, Exterior/Interior, 300 SF Per Gallon.....	61.54	
09 91	33	00-0016	GAL	Red Alkyd Primer, 500 SF Per Gallon.....	132.09	
09 91	33	00-0017	GAL	Wood Sealer/Primer, Interior, Clear, 600 SF Per Gallon.....	65.64	
09 91	33	00-0018	GAL	Zinc Chromate Primer, 300 SF Per Gallon.....	52.51	
09 91	33	00-0019	GAL	Zinc Dust/Zinc Oxide Primer, 300 SF Per Gallon.....	135.80	
09 91	33	00-0020	GAL	Stain Killer, Alcohol Base.....	84.68	
09 91	33	00-0021	GAL	Sealer, Primer Kilz, 400 SF Per Gallon.....	95.55	
09 91	33	00-0022	Paint (09 91 33)			
09 91	33	00-0023	GAL	Aluminum Fiber Roof Coat On Composition Roof, 50 SF Per Gallon.....	45.95	
09 91	33	00-0024	GAL	Acrylic Urethane Sealer.....	227.83	
09 91	33	00-0025	GAL	Asphalt-Fiber Roof And Foundation Coating, Solvent Type.....	24.62	
				<i>Note: 75 SF per gallon on roof or concrete, 100 SF per gallon on metal.</i>		
09 91	33	00-0026	GAL	Concrete Enamel Epoxy, 350 SF Per Gallon.....	142.36	
09 91	33	00-0027	GAL	Concrete Acrylic Sealer, 400 SF Per Gallon.....	74.67	
09 91	33	00-0028	GAL	Tar Emulsion, Driveway Coating, 120 SF Per Gallon.....	24.62	
09 91	33	00-0029	GAL	Acrylic Latex, Driveway Coating, 250 SF Per Gallon.....	37.33	
09 91	33	00-0030	GAL	Exterior, Oil Base, Gloss Enamel, 400 SF Per Gallon.....	101.82	
09 91	33	00-0031	GAL	Exterior, Oil Base, Gloss, 400 SF Per Gallon.....	100.52	

09 Finishes**09 90 Painting and Coating****09 91 Painting**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

09 91 33 00-0032	GAL	Exterior, Oil Base, Semi-Gloss, 400 SF Per Gallon	82.05	
09 91 33 00-0033	GAL	Exterior, Flat, Oil Base	75.22	
09 91 33 00-0034	GAL	Exterior, Latex, Semi-Gloss, 400 SF Per Gallon	71.39	
09 91 33 00-0035	GAL	Exterior, Flat Latex, Trim Paint, 500 SF Per Gallon	84.10	
09 91 33 00-0036	GAL	Exterior, Latex Flat Paint, 300 SF Per Gallon	74.67	
09 91 33 00-0037	GAL	Exterior, Water Base, Latex Gloss Enamel	106.29	
09 91 33 00-0038	GAL	Cold Galvanizing Paint	352.88	
09 91 33 00-0039	GAL	High Heat Paint	187.01	
09 91 33 00-0040	GAL	Heat Resistant Paint	124.67	
09 91 33 00-0041	GAL	Zinc Chromate Paint	112.80	
09 91 33 00-0042	QT	Anti-Rust Enamel, 500 SF Per Quart	44.53	
09 91 33 00-0043	GAL	Rust Inhibitor, Ferrous Metal	124.67	
09 91 33 00-0044	GAL	Masonry Waterproofing, 100 SF Per Gallon	74.67	
09 91 33 00-0045	GAL	Alkyd Latex, Black	92.52	
09 91 33 00-0046	GAL	Alkyd Latex, White	84.10	
09 91 33 00-0047	GAL	Alkyd Latex, Colors	101.42	
09 91 33 00-0048	QT	Wrought Iron Paint, Black	113.79	
09 91 33 00-0049	GAL	Vinyl Paint	125.54	
09 91 33 00-0050	GAL	Silicone Alkyd	152.62	
09 91 33 00-0051	GAL	2 Component Solvent Based Acrylic Epoxy	155.08	
09 91 33 00-0052	GAL	2 Component Solvent Based Polyester Epoxy	194.47	
09 91 33 00-0053	GAL	Chlorinated Rubber	142.77	
09 91 33 00-0054	GAL	Polyamide Epoxy Sealer	147.70	
09 91 33 00-0055	GAL	Coal Tar Epoxy	105.85	
09 91 33 00-0056	GAL	Swimming Pool Enamel, 350 SF Per Gallon	132.11	
09 91 33 00-0057	GAL	Swimming Pool Epoxy Or Urethane Base	172.31	
09 91 33 00-0058	GAL	Swimming Pool Rubber Base	118.16	
09 91 33 00-0059	GAL	Interior, Latex Flat Paint, 300 SF Per Gallon	75.08	
09 91 33 00-0060	GAL	Interior, Latex Eggshell Or Semi-Gloss Enamel, 300 SF Per Gallon	92.51	
09 91 33 00-0061	GAL	Interior, Fire-Retardant Flat Paint, 200 SF Per Gallon	153.85	
09 91 33 00-0062	GAL	Interior, Ceiling White Latex Flat, 350 SF Per Gallon	52.10	
09 91 33 00-0063	GAL	Linseed Oil	45.54	
09 91 33 00-0064	GAL	Latex Floor Paint, 300 SF Per Gallon	74.67	
09 91 33 00-0065	GAL	Acrylic Floor Paint, 400 SF Per Gallon	84.10	
09 91 33 00-0066	GAL	Textured Paint, Sand Texture Latex, Armor Coat, 100 SF Per Gallon	76.92	
09 91 33 00-0067	GAL	Acoustic Spray-On Texture, Finish	61.81	

09 91 33 00-0068 Stain, Varnish (09 91 33)

09 91 33 00-0069	GAL	Thompson Water Sealer, 150 SF Per Gallon	42.67	
09 91 33 00-0070	GAL	Latex Redwood Stain, Water Base, 300 SF Per Gallon	79.59	
09 91 33 00-0071	GAL	Redwood Oil Stain, 300 SF Per Gallon	70.98	
09 91 33 00-0072	GAL	Varnish, Clear	43.29	
09 91 33 00-0073	GAL	Penetrating Water-Repellent Stain	31.45	
09 91 33 00-0074	GAL	Redwood Hue Or Clear Stain	28.10	
09 91 33 00-0075	GAL	Polyurethane	49.34	
09 91 33 00-0076	GAL	Lacquer, Semi-Gloss	74.89	
09 91 33 00-0077	GAL	Shellac, Clear	98.24	
09 91 33 00-0078	GAL	Acetone	32.41	
09 91 33 00-0079	GAL	Paint Thinner	8.00	
09 91 33 00-0080	GAL	Shellac Or Lacquer Thinner	32.82	
09 91 33 00-0081	GAL	Turpentine	45.13	
09 91 33 00-0082	GAL	Wood Filler Paste	77.13	
09 91 33 00-0083	GAL	Wood Preservative, Pentachlorophenol, General Purpose, 40%, 150 SF Per Gallon	61.54	
09 91 33 00-0084	GAL	Waterbased Alkyd Urethane (Sherwin Williams B53W01153)	103.41	

09 91 43 Surface Preparation (09 91)

See CSI section 09 01 90 52-0000 for preparation on painted or unpainted surfaces.

09 93 Staining and Transparent Finishing (09 90)

Note: Includes light sanding or screening between coats.

09 93 23 Interior Staining and Finishing (09 93)

Note: VOC compliant in all regulated areas, review specifications for levels.

09 93 23 13 Interior Staining (09 93 23)**09 93 23 13-0001 Stain Wood Trim (09 93 23 13)**

09 93 23 13-0002	LF	Stain Wood Trim, Up To 6" Wide, 1 Coat Stain, With Brush And Wipe Off	1.11	
		For Up To 100, Add	0.78	
		For >100 To 250, Add	0.37	
		For >250 To 500, Add	0.16	
		For >4,000, Deduct	-0.06	
09 93 23 13-0003	SF	Stain Wood Trim, 1 Coat Stain, With Brush And Wipe Off	1.64	
		For Up To 100, Add	1.15	
		For >100 To 250, Add	0.54	
		For >250 To 500, Add	0.23	
		For >4,000, Deduct	-0.08	

09 93 23 13-0004 Stain Wood Floor (09 93 23 13)



Finishes	09	9
Painting and Coating	09 90	
Staining and Transparent Finishing	09 93	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 93 23 13-0005 SF Stain Or Varnish Wood Floor, 1 Coat Stain, Brush Work.....	0.54	
For Up To 100, Add	0.32	
For >100 To 250, Add	0.15	
For >250 To 500, Add	0.07	
For >4,000, Deduct	-0.03	
09 93 23 13-0006 SF Stain Or Varnish Wood Floor, 1 Coat Stain, Brush/Roller Work	0.40	
For Up To 100, Add	0.22	
For >100 To 250, Add	0.11	
For >250 To 500, Add	0.05	
For >4,000, Deduct	-0.02	
09 93 23 13-0007 Stain Wood Door And Window (09 93 23 13)		
09 93 23 13-0008 EA Stain Wood Door, 1 Coat Stain With Brush And Wipe Off Wood Door (Per Face)	52.86	
For Up To 4, Add	38.33	
For >4 To 10, Add	17.95	
For >10 To 20, Add	7.71	
For >160, Deduct	-2.64	
09 93 23 13-0009 EA Stain Wood Window, 1 Coat Stain With Brush And Wipe Off Wood Window And Frame (Per Face).....	37.94	
For Up To 4, Add	26.52	
For >4 To 10, Add	12.47	
For >10 To 20, Add	5.37	
For >160, Deduct	-1.90	
09 93 23 13-0010 Stain Wood Cabinet (09 93 23 13)		
09 93 23 13-0011 SF Stain Cabinet, 1 Coat Stain With Brush And Wipe.....	1.33	
09 93 23 53 Interior Finishing (09 93 23)		
09 93 23 53-0001 Concrete Finishes (09 93 23 53)		
09 93 23 53-0002 SF Finish Concrete Floor, 1 Coat Polyurethane.....	0.81	
For Up To 100, Add	0.47	
For >100 To 250, Add	0.23	
For >250 To 500, Add	0.10	
For >4,000, Deduct	-0.04	
09 93 23 53-0003 Wood Trim Finishes (09 93 23 53)		
09 93 23 53-0004 SF Finish Wood Trim, 1 Coat Sealer And 1 Coat Varnish Or Polyurethane.....	1.37	
For Up To 100, Add	0.89	
For >100 To 250, Add	0.42	
For >250 To 500, Add	0.18	
For >4,000, Deduct	-0.07	
09 93 23 53-0005 SF Finish Wood Trim, 1 Coat Varnish Or Polyurethane.....	0.89	
For Up To 100, Add	0.61	
For >100 To 250, Add	0.29	
For >250 To 500, Add	0.12	
For >4,000, Deduct	-0.04	
09 93 23 53-0006 Wood Floor Finishes (09 93 23 53)		
09 93 23 53-0007 SF Refinish Wood Floor, 2 Coats Polyurethane.....	3.08	
Note: Includes sanding existing floor.		
For Up To 100, Add	2.17	
For >100 To 250, Add	1.02	
For >250 To 500, Add	0.44	
For >4,000, Deduct	-0.15	
09 93 23 53-0008 SF Polyurethane Wood Floor, 1 Coat Polyurethane, With Wool Applicator Or Brush Work.....	0.69	
Note: Includes screening between coats.		
For Up To 100, Add	0.45	
For >100 To 250, Add	0.21	
For >250 To 500, Add	0.09	
For >4,000, Deduct	-0.03	
09 93 23 53-0009 SF Refinish Wood Floor, 1 Coat Sealer And 2 Coats Polyurethane.....	3.55	
Note: Includes sanding existing floor.		
For Up To 100, Add	2.45	
For >100 To 250, Add	1.16	
For >250 To 500, Add	0.50	
For >4,000, Deduct	-0.18	
09 93 23 53-0010 Wood Door And Window Finishes (09 93 23 53)		
See CSI section 08 14 16 00-0627 for factory finish.		
09 93 23 53-0011 EA Varnish Or Polyurethane Wood Door, 1 Coat Shellac (Per Face)	38.20	
For Up To 4, Add	27.61	
For >4 To 10, Add	12.94	
For >10 To 20, Add	5.56	
For >160, Deduct	-1.91	

09	09 Finishes
	09 90 Painting and Coating
	09 93 Staining and Transparent Finishing



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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09 93 23 53-0012	EA	Varnish Or Polyurethane Wood Door, 3 Coats Shellac, With Light Sanding Between Coats (Per Face)	116.38
		<i>For Up To 4, Add</i>	82.50
		<i>For >4 To 10, Add</i>	38.74
		<i>For >10 To 20, Add</i>	16.66
		<i>For >160, Deduct</i>	-5.82

09 93 23 53-0013 Cabinet Finishes (09 93 23 53)

09 93 23 53-0014	SF	Finish Cabinet, 1 Coat Shellac, Varnish Or Polyurethane.....	1.34
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09 93 23 53-0015 Gym, Stage And Dance Floor Finishes (09 93 23 53)

09 93 23 53-0016	SF	Yearly Maintenance Refinish Of Gym, Stage Or Dance Floor	0.90
		Note: Includes screening, one coat of finish and buffing. Excludes repainting of game lines.	
09 93 23 53-0017	SF	Finish New Elementary School Wood Gym, Stage Or Dance Floor	3.94
		Note: Includes sanding to level, vacuuming, tack cloth wiping, seal coat, light sanding between coats, painting of all game lines, logos, court markings and solid paint areas, seal and finish coats per manufacturer's instructions, minimum four coats total with not less than two finish coats.	
		<i>For Stage Or Dance Floors, Deduct</i>	-0.08
09 93 23 53-0018	SF	Finish New Middle Or Junior School Wood Gym, Stage Or Dance Floor	4.02
		Note: Includes sanding to level, vacuuming, tack cloth wiping, seal coat, light sanding between coats, painting of all game lines, logos, court markings and solid paint areas, seal and finish coats per manufacturer's instructions, minimum four coats total with not less than two finish coats.	
		<i>For Stage Or Dance Floors, Deduct</i>	-0.08
09 93 23 53-0019	SF	Finish New High School Wood Gym, Stage Or Dance Floor	4.10
		Note: Includes sanding to level, vacuuming, tack cloth wiping, seal coat, light sanding between coats, painting of all game lines, logos, court markings and solid paint areas, seal and finish coats per manufacturer's instructions, minimum four coats total with not less than two finish coats.	
		<i>For Stage Or Dance Floors, Deduct</i>	-0.08
09 93 23 53-0020	SF	Refinish Existing Elementary School Wood Gym, Stage Or Dance Floor.....	3.94
		Note: Includes removal of existing finish and sanding to level, vacuuming, tack cloth wiping, seal coat, light sanding between coats, painting of all game lines, logos, court markings and solid paint areas, seal and finish coats per manufacturer's instructions, minimum four coats total with not less than two finish coats.	
		<i>For Stage Or Dance Floors, Deduct</i>	-0.08
09 93 23 53-0021	SF	Refinish Existing Middle Or Junior School Wood Gym, Stage Or Dance Floor.....	4.02
		Note: Includes removal of existing finish and sanding to level, vacuuming, tack cloth wiping, seal coat, light sanding between coats, painting of all game lines, logos, court markings and solid paint areas, seal and finish coats per manufacturer's instructions, minimum four coats total with not less than two finish coats.	
		<i>For Stage Or Dance Floors, Deduct</i>	-0.08
09 93 23 53-0022	SF	Refinish Existing High School Wood Gym, Stage Or Dance Floor	4.10
		Note: Includes removal of existing finish and sanding to level, vacuuming, tack cloth wiping, seal coat, light sanding between coats, painting of all game lines, logos, court markings and solid paint areas, seal and finish coats per manufacturer's instructions, minimum four coats total with not less than two finish coats.	
		<i>For Stage Or Dance Floors, Deduct</i>	-0.08

09 96 High-Performance Coatings (09 96)

09 96 23 Graffiti-Resistant Coatings (09 96)

09 96 23 00-0001 Anti-Graffiti Coating (09 96 23)

09 96 23 00-0002	SF	Sacrificial Anti-Graffiti Coating, Per Coat.....	1.43
		<i>For Up To 100, Add</i>	0.83
		<i>For >100 To 250, Add</i>	0.40
		<i>For >250 To 500, Add</i>	0.17
09 96 23 00-0003	SF	Permanent (Non-Sacrificial) Anti-Graffiti Coating, Per Coat.....	1.53
		<i>For Up To 100, Add</i>	0.85
		<i>For >100 To 250, Add</i>	0.41
		<i>For >250 To 500, Add</i>	0.18

09 96 53 Elastomeric Coatings (09 96)

09 96 53 00-0001 Elastomeric (09 96 53)

Note: Per coat.			
09 96 53 00-0002	SF	1 Coat, 5.3 To 8 Wet Mills, Brush Work, Elastomeric Primer Applied To Walls And Floors.....	0.85
		<i>For Work >15' To 20' Above Floor, Add</i>	0.10
		Note: Applied only to work area above 15' to 20'.	
		<i>For Work >20' To 30' Above Floor, Add</i>	0.17
		Note: Applied only to work area above 20'.	
		<i>For Work >30' To 40' Above Floor, Add</i>	0.26
		Note: Applied only to work area above 30' to 40'.	
		<i>For Work >40' Above Floor, Add</i>	0.36
		Note: Applied only to work area above 40'.	
		<i>For Up To 100, Add</i>	0.52
		<i>For >100 To 250, Add</i>	0.25
		<i>For >250 To 500, Add</i>	0.11
		<i>For >2,500 To 5,000, Deduct</i>	-0.04
		<i>For >5,000 To 10,000, Deduct</i>	-0.09
		<i>For >10,000 To 20,000, Deduct</i>	-0.13
		<i>For >20,000, Deduct</i>	-0.17



Finishes	09	09
Painting and Coating	09 90	
High-Performance Coatings	09 96	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 96 53 00-0003	SF	1	Coat, 5.3 To 8 Wet Mils, Brush/Roller Work, Elastomeric Primer Applied To Walls And Floors	0.73	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.14	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.22	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.45	
			<i>For >100 To 250, Add</i>	0.21	
			<i>For >250 To 500, Add</i>	0.09	
			<i>For >2,500 To 5,000, Deduct</i>	-0.04	
			<i>For >5,000 To 10,000, Deduct</i>	-0.07	
			<i>For >10,000 To 20,000, Deduct</i>	-0.11	
			<i>For >20,000, Deduct</i>	-0.15	
09 96 53 00-0004	SF	1	Coat, 5.3 To 8 Wet Mils, Sprayed, Elastomeric Primer Applied To Walls And Floors.....	0.66	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.06	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.11	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.17	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.24	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.36	
			<i>For >100 To 250, Add</i>	0.17	
			<i>For >250 To 500, Add</i>	0.08	
			<i>For >2,500 To 5,000, Deduct</i>	-0.03	
			<i>For >5,000 To 10,000, Deduct</i>	-0.07	
			<i>For >10,000 To 20,000, Deduct</i>	-0.10	
			<i>For >20,000, Deduct</i>	-0.13	
09 96 53 00-0005	SF	1	Coat, 13 To 16 Wet Mils, Brush Work, Elastomeric Paint Applied To Walls And Floors.....	1.92	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.12	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.31	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.43	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.76	
			<i>For >100 To 250, Add</i>	0.39	
			<i>For >250 To 500, Add</i>	0.17	
			<i>For >2,500 To 5,000, Deduct</i>	-0.10	
			<i>For >5,000 To 10,000, Deduct</i>	-0.19	
			<i>For >10,000 To 20,000, Deduct</i>	-0.29	
			<i>For >20,000, Deduct</i>	-0.38	
09 96 53 00-0006	SF	1	Coat, 13 To 16 Wet Mils, Brush/Roller Work, Elastomeric Paint Applied To Walls And Floors	1.79	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.10	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.16	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.26	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.36	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.66	
			<i>For >100 To 250, Add</i>	0.34	
			<i>For >250 To 500, Add</i>	0.15	
			<i>For >2,500 To 5,000, Deduct</i>	-0.09	
			<i>For >5,000 To 10,000, Deduct</i>	-0.18	
			<i>For >10,000 To 20,000, Deduct</i>	-0.27	
			<i>For >20,000, Deduct</i>	-0.36	
09 96 53 00-0007	SF	1	Coat, 13 To 16 Wet Mils, Sprayed, Elastomeric Paint Applied To Walls And Floors	2.04	
			<i>For Work >15' To 20' Above Floor, Add</i>	0.08	
			<i>Note: Applied only to work area above 15' to 20'.</i>		
			<i>For Work >20' To 30' Above Floor, Add</i>	0.13	
			<i>Note: Applied only to work area above 20'.</i>		
			<i>For Work >30' To 40' Above Floor, Add</i>	0.20	
			<i>Note: Applied only to work area above 30' to 40'.</i>		
			<i>For Work >40' Above Floor, Add</i>	0.28	
			<i>Note: Applied only to work area above 40'.</i>		
			<i>For Up To 100, Add</i>	0.61	
			<i>For >100 To 250, Add</i>	0.33	
			<i>For >250 To 500, Add</i>	0.15	
			<i>For >2,500 To 5,000, Deduct</i>	-0.10	
			<i>For >5,000 To 10,000, Deduct</i>	-0.20	
			<i>For >10,000 To 20,000, Deduct</i>	-0.31	
			<i>For >20,000, Deduct</i>	-0.41	

09	09	Finishes
	09 90	Painting and Coating
	09 96	High-Performance Coatings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
09 96 53 00-0008	SF 1 Coat, 5.3 To 8 Wet Mills, Brush Work, Elastomeric Primer Applied To Ceilings And Overhead.....	0.96	
	For Work >15' To 20' Above Floor, Add	0.12	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.19	
	Note: Applied only to work area above 20'.		
	For Work >30' To 40' Above Floor, Add	0.31	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.42	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.61	
	For >100 To 250, Add	0.29	
	For >250 To 500, Add	0.13	
	For >2,500 To 5,000, Deduct	-0.05	
	For >5,000 To 10,000, Deduct	-0.10	
	For >10,000 To 20,000, Deduct	-0.14	
	For >20,000, Deduct	-0.19	
09 96 53 00-0009	SF 1 Coat, 5.3 To 8 Wet Mills, Brush/Roller Work, Elastomeric Primer Applied To Ceilings And Overhead	0.82	
	For Work >15' To 20' Above Floor, Add	0.10	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.16	
	Note: Applied only to work area above 20'.		
	For Work >30' To 40' Above Floor, Add	0.26	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.36	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.51	
	For >100 To 250, Add	0.24	
	For >250 To 500, Add	0.11	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.08	
	For >10,000 To 20,000, Deduct	-0.12	
	For >20,000, Deduct	-0.16	
09 96 53 00-0010	SF 1 Coat, 5.3 To 8 Wet Mills, Sprayed, Elastomeric Primer Applied To Ceilings And Overhead	0.73	
	For Work >15' To 20' Above Floor, Add	0.08	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.13	
	Note: Applied only to work area above 20'.		
	For Work >30' To 40' Above Floor, Add	0.20	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.28	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.41	
	For >100 To 250, Add	0.20	
	For >250 To 500, Add	0.09	
	For >2,500 To 5,000, Deduct	-0.04	
	For >5,000 To 10,000, Deduct	-0.07	
	For >10,000 To 20,000, Deduct	-0.11	
	For >20,000, Deduct	-0.15	
09 96 53 00-0011	SF 1 Coat, 13 To 16 Wet Mills, Brush Work, Elastomeric Paint Applied To Ceilings And Overhead	2.04	
	For Work >15' To 20' Above Floor, Add	0.14	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.23	
	Note: Applied only to work area above 20'.		
	For Work >30' To 40' Above Floor, Add	0.36	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.50	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.85	
	For >100 To 250, Add	0.43	
	For >250 To 500, Add	0.19	
	For >2,500 To 5,000, Deduct	-0.10	
	For >5,000 To 10,000, Deduct	-0.20	
	For >10,000 To 20,000, Deduct	-0.31	
	For >20,000, Deduct	-0.41	
09 96 53 00-0012	SF 1 Coat, 13 To 16 Wet Mills, Brush/Roller Work, Elastomeric Paint Applied To Ceilings And Overhead.....	1.90	
	For Work >15' To 20' Above Floor, Add	0.11	
	Note: Applied only to work area above 15' to 20'.		
	For Work >20' To 30' Above Floor, Add	0.19	
	Note: Applied only to work area above 20'.		
	For Work >30' To 40' Above Floor, Add	0.30	
	Note: Applied only to work area above 30' to 40'.		
	For Work >40' Above Floor, Add	0.42	
	Note: Applied only to work area above 40'.		
	For Up To 100, Add	0.74	
	For >100 To 250, Add	0.38	
	For >250 To 500, Add	0.17	
	For >2,500 To 5,000, Deduct	-0.10	
	For >5,000 To 10,000, Deduct	-0.19	
	For >10,000 To 20,000, Deduct	-0.29	
	For >20,000, Deduct	-0.38	



Finishes	09	09
Painting and Coating	09 90	
High-Performance Coatings	09 96	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
09 96 53 00-0013 SF 1 Coat, 13 To 16 Wet Mils, Sprayed, Elastomeric Paint Applied To Ceilings And Overhead	2.12	
<i>For Work >15' To 20' Above Floor, Add</i>	0.09	
<i>Note: Applied only to work area above 15' to 20'.</i>		
<i>For Work >20' To 30' Above Floor, Add</i>	0.15	
<i>Note: Applied only to work area above 20'.</i>		
<i>For Work >30' To 40' Above Floor, Add</i>	0.23	
<i>Note: Applied only to work area above 30' to 40'.</i>		
<i>For Work >40' Above Floor, Add</i>	0.32	
<i>Note: Applied only to work area above 40'.</i>		
<i>For Up To 100, Add</i>	0.67	
<i>For >100 To 250, Add</i>	0.36	
<i>For >250 To 500, Add</i>	0.16	
<i>For >2,500 To 5,000, Deduct</i>	-0.11	
<i>For >5,000 To 10,000, Deduct</i>	-0.21	
<i>For >10,000 To 20,000, Deduct</i>	-0.32	
<i>For >20,000, Deduct</i>	-0.42	

09 97 Special Coatings (09 90)

09 97 35 Dry Erase Coatings (09 97)

09 97 35 00-0001 Dry-Erase Paint (09 97 35)

09 97 35 00-0002 Dry-Erase Paint (IdeaPaint™ PRO) (09 97 35 00-0001)

09 97 35 00-0003 SF Dry-Erase Paint (IdeaPaint™ PRO), Applied With Roller 12.46
Note: Includes two coats of primer and white, white sand, light beige or light gray surface.

09 97 35 00-0004 Low VOC/Odorless, Dry-Erase Paint (IdeaPaint™ CREATE) (09 97 35 00-0001)

09 97 35 00-0005 SF Clear, Low VOC/Odorless, Dry-Erase Paint (IdeaPaint™ CREATE), Applied With Roller 6.85
Note: For application over existing latex-based top coats.

09 97 35 00-0006 SF Black Or White, Low VOC/Odorless, Dry-Erase Paint (IdeaPaint™ CREATE), Applied With Roller 13.35
Note: Includes two coats of primer and white or black surface coat.

END OF SECTION 09

09	09	Finishes
	09 90	Painting and Coating
	09 97	Special Coatings



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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Specialties	10
Operation and Maintenance of Specialties	10 01
Operation and Maintenance of Fireplaces and Stoves	10 01 30

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 Specialties

10 01 Operation and Maintenance of Specialties ⁽¹⁰⁾

10 01 30 Operation and Maintenance of Fireplaces and Stoves ^(10 01)

10 01 30 00-0001	Fireplace Cleaning ^(10 01 30)		
10 01 30 00-0002	EA Inspect And Clean Fireplace Insert.....		243.01
10 01 30 00-0003	EA Inspect And Clean Fireplace Insert And Chimney		291.61
10 01 30 00-0004	EA Inspect And Clean Fireplace Brick/Masonry Chimney		388.81

10 01 40 Operation and Maintenance of Safety Specialties ^(10 01)

10 01 40 00-0001	Recharge Existing Portable Fire Extinguishers ^(10 01 40)		
Note: Includes removal, filling, testing, certification and reinstallation.			
10 01 40 00-0002	Recharge Carbon Dioxide, Class BC Portable Fire Extinguishers ^(10 01 40 00-0001)		
10 01 40 00-0003	EA Recharge 2.5 LB Carbon Dioxide Portable Fire Extinguisher		17.95
10 01 40 00-0004	EA Recharge 5 LB Carbon Dioxide Portable Fire Extinguisher		19.94
10 01 40 00-0005	EA Recharge 10 LB Carbon Dioxide Portable Fire Extinguisher		20.74
10 01 40 00-0006	EA Recharge 15 LB Carbon Dioxide Portable Fire Extinguisher		23.48
10 01 40 00-0007	EA Recharge 20 LB Carbon Dioxide Portable Fire Extinguisher		27.12
10 01 40 00-0008	Recharge Dry Chemical, Class ABC Portable Fire Extinguishers ^(10 01 40 00-0001)		
10 01 40 00-0009	EA Recharge 2.5 LB Dry Chemical Portable Fire Extinguisher		21.65
10 01 40 00-0010	EA Recharge 5 LB Dry Chemical Portable Fire Extinguisher		26.21
10 01 40 00-0011	EA Recharge 10 LB Dry Chemical Portable Fire Extinguisher		37.04
10 01 40 00-0012	EA Recharge 20 LB Dry Chemical Portable Fire Extinguisher		58.47
10 01 40 00-0013	Recharge Other Portable Fire Extinguishers ^(10 01 40 00-0001)		
10 01 40 00-0014	EA Recharge 2.5 Gallon Pressurized Water Portable Fire Extinguisher		21.43
10 01 40 00-0015	EA Recharge 1.6 Gallon Wet Chemical Class K Fire Extinguisher		152.72
10 01 40 00-0016	EA Recharge 2.5 Gallon Wet Chemical Class K Fire Extinguisher		213.81
10 01 40 00-0017	EA Recharge 30 LB Dry Powder Class D Portable Fire Extinguisher		88.02

10 01 50 Operation and Maintenance of Storage Specialties ^(10 01)

10 01 50 11	Operation and Maintenance of Storage Specialties ^(10 01 50)		
10 01 50 11-0001	Locker Repair And Refinishing ^(10 01 50 11)		
10 01 50 11-0002	EA Removal And Replacement Of Single Tier Locker Door		353.71
10 01 50 11-0003	EA Removal And Replacement Of Two Tier Locker Door		278.10
10 01 50 11-0004	EA Removal And Replacement Of Three Tier Locker Door		238.27
10 01 50 11-0005	EA Removal And Replacement Of Four Tier Locker Door		200.92
10 01 50 11-0006	EA Removal And Replacement Of Six Tier Or Sixteen Person Locker Door		110.81
10 01 50 11-0007	EA Realign Metal Locker Door For Proper Closure		48.60
10 01 50 11-0008	EA Patch Small Drill Holes In Locker		9.72

10 01 70 Operation and Maintenance of Exterior Specialties ^(10 01)

10 01 70 11	Operation and Maintenance of Exterior Specialties ^(10 01 70)		
10 01 70 11-0001	Wrought Iron Boot Scrapers ^(10 01 70 11)		
10 01 70 11-0002	EA Black Wrought Iron Boot Scrapers Bolted To Concrete		170.30
Note: Rensup; Ultimate Boot Brush			

10 01 80 Operation and Maintenance of Other Specialties ^(10 01)

10 01 80 00-0001	Rope - Material Only ^(10 01 80)		
Note: SAFE WORK LOAD - Safe working load is 5-20% of the listed tensile strength (minimum break) depending on the age and condition of the rope.			
10 01 80 00-0002	Solid Braid Nylon Rope ^(10 01 80 00-0001)		
10 01 80 00-0003	LF 1/8" Solid Braid Nylon Rope		0.06
Note: 338 lbs. minimum break			
For <100, Add 0.01			
For >600, Deduct -0.01			
10 01 80 00-0004	LF 3/16" Solid Braid Nylon Rope		0.11
Note: 827 lbs. minimum break			
For <100, Add 0.02			
For >600, Deduct -0.02			

10 Specialties
10 01 Operation and Maintenance of Specialties
10 01 80 Operation and Maintenance of Other Specialties



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 01 80 00-0005	LF	1/4" Solid Braid Nylon Rope.....	0.13		
		Note: 1238 lbs. minimum break			
		For <100, Add		0.02	
		For >600, Deduct		-0.03	
10 01 80 00-0006	LF	5/16" Solid Braid Nylon Rope.....	0.19		
		Note: 1931 lbs. minimum break			
		For <100, Add		0.03	
		For >600, Deduct		-0.04	
10 01 80 00-0007	LF	3/8" Solid Braid Nylon Rope.....	0.31		
		Note: 2475 lbs. minimum break			
		For <100, Add		0.05	
		For >600, Deduct		-0.06	
10 01 80 00-0008	LF	1/2" Solid Braid Nylon Rope.....	0.49		
		Note: 3,960 lbs. minimum break			
		For <100, Add		0.07	
		For >600, Deduct		-0.10	
10 01 80 00-0009		Hollow Braid Polypropylene Rope (10 01 80 00-0001)			
10 01 80 00-0010	LF	3/16" Hollow Braid Polypropylene Rope	0.02		
		Note: 693 lbs. minimum break			
		For <100, Add		0.00	
		For >600, Deduct		0.00	
10 01 80 00-0011	LF	1/4" Hollow Braid Polypropylene Rope	0.04		
		Note: 990 lbs. minimum break			
		For <100, Add		0.01	
		For >600, Deduct		-0.01	
10 01 80 00-0012	LF	5/16" Hollow Braid Polypropylene Rope	0.07		
		Note: 1,238 lbs. minimum break			
		For <100, Add		0.01	
		For >600, Deduct		-0.01	
10 01 80 00-0013	LF	3/8" Hollow Braid Polypropylene Rope	0.10		
		Note: 1,980 lbs. minimum break			
		For <100, Add		0.02	
		For >600, Deduct		-0.02	
10 01 80 00-0014	LF	1/2" Hollow Braid Polypropylene Rope	0.15		
		Note: 2,880 lbs. minimum break			
		For <100, Add		0.02	
		For >600, Deduct		-0.03	
10 01 80 00-0015		Three Strand Twisted Manila Natural Fiber Rope (10 01 80 00-0001)			
10 01 80 00-0016	LF	1/4" Three Strand Twisted Manila Natural Fiber Rope.....	0.07		
		Note: 540 lbs minimum break			
		For <100, Add		0.01	
		For >600, Deduct		-0.01	
10 01 80 00-0017	LF	3/8" Three Strand Twisted Manila Natural Fiber Rope.....	0.15		
		Note: 1220 lbs minimum break			
		For <100, Add		0.02	
		For >600, Deduct		-0.03	
10 01 80 00-0018	LF	1/2" Three Strand Twisted Manila Natural Fiber Rope.....	0.27		
		Note: 2,380 lbs minimum break			
		For <100, Add		0.04	
		For >600, Deduct		-0.05	
10 01 80 00-0019	LF	5/8" Three Strand Twisted Manila Natural Fiber Rope.....	0.46		
		Note: 3,960 lbs minimum break			
		For <100, Add		0.07	
		For >600, Deduct		-0.09	
10 01 80 00-0020	LF	3/4" Three Strand Twisted Manila Natural Fiber Rope.....	0.57		
		Note: 4,860 lbs minimum break			
		For <100, Add		0.09	
		For >600, Deduct		-0.11	
10 01 80 00-0021	LF	1" Three Strand Twisted Manila Natural Fiber Rope.....	0.86		
		Note: 8,100 lbs minimum break			
		For <100, Add		0.13	
		For >600, Deduct		-0.17	
10 01 80 00-0022	LF	1-1/4" Three Strand Twisted Manila Natural Fiber Rope	1.44		
		Note: 12,200 lbs minimum break			
		For <100, Add		0.22	
		For >600, Deduct		-0.29	
10 01 80 00-0023	LF	1-1/2" Three Strand Twisted Manila Natural Fiber Rope	1.87		
		Note: 16,700 lbs minimum break			
		For <100, Add		0.28	
		For >600, Deduct		-0.37	
10 01 80 00-0024	LF	2" Three Strand Twisted Manila Natural Fiber Rope.....	3.94		
		Note: 28,800 lbs minimum break			
		For <100, Add		0.59	
		For >600, Deduct		-0.79	
10 01 80 00-0025	LF	3" Three Strand Twisted Manila Natural Fiber Rope.....	7.49		
		Note: 64,800 lbs minimum break			
		For <100, Add		1.12	
		For >600, Deduct		-1.50	
10 01 80 00-0026		Three Strand Twisted Nylon Rope (10 01 80 00-0001)			



Specialties	10
Operation and Maintenance of Specialties	10 01
Operation and Maintenance of Other Specialties	10 01 80

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 01 80 00-0027	LF		1/4" Three Strand Twisted Nylon Rope.....	0.13	
			Note: 1,490 lbs minimum break		
			For <100, Add	0.02	
			For >600, Deduct	-0.03	
10 01 80 00-0028	LF		5/16" Three Strand Twisted Nylon Rope.....	0.22	
			Note: 2,300 lbs minimum break		
			For <100, Add	0.03	
			For >600, Deduct	-0.04	
10 01 80 00-0029	LF		3/8" Three Strand Twisted Nylon Rope.....	0.30	
			Note: 3,340 lbs minimum break		
			For <100, Add	0.05	
			For >600, Deduct	-0.06	
10 01 80 00-0030	LF		1/2" Three Strand Twisted Nylon Rope.....	0.54	
			Note: 5,750 lbs minimum break		
			For <100, Add	0.08	
			For >600, Deduct	-0.11	
10 01 80 00-0031	LF		5/8" Three Strand Twisted Nylon Rope.....	0.90	
			Note: 9,350 lbs minimum break		
			For <100, Add	0.14	
			For >600, Deduct	-0.18	
10 01 80 00-0032	LF		3/4" Three Strand Twisted Nylon Rope.....	1.21	
			Note: 12,800 lbs minimum break		
			For <100, Add	0.18	
			For >600, Deduct	-0.24	
10 01 80 00-0033	LF		1" Three Strand Twisted Nylon Rope.....	2.19	
			Note: 22,600 lbs minimum break		
			For <100, Add	0.33	
			For >600, Deduct	-0.44	
10 01 80 00-0034	LF		1-1/4" Three Strand Twisted Nylon Rope	3.42	
			Note: 37,500 lbs minimum break		
			For <100, Add	0.51	
			For >600, Deduct	-0.68	
10 01 80 00-0035	LF		1-1/2" Three Strand Twisted Nylon Rope	4.60	
			Note: 53,000 lbs minimum break		
			For <100, Add	0.69	
			For >600, Deduct	-0.92	
10 01 80 00-0036	LF		2" Three Strand Twisted Nylon Rope.....	8.73	
			Note: 92,000 lbs minimum break		
			For <100, Add	1.31	
			For >600, Deduct	-1.75	
10 01 80 00-0037			Three Strand Twisted Cotton Rope (10 01 80 00-0001)		
10 01 80 00-0038	LF		1/4" Three Strand Twisted Cotton Rope	0.13	
			Note: 500 lbs minimum break		
			For <100, Add	0.02	
			For >600, Deduct	-0.03	
10 01 80 00-0039	LF		3/8" Three Strand Twisted Cotton Rope	0.28	
			Note: 1,125 lbs minimum break		
			For <100, Add	0.04	
			For >600, Deduct	-0.06	
10 01 80 00-0040	LF		1/2" Three Strand Twisted Cotton Rope	0.44	
			Note: 1,500 lbs minimum break		
			For <100, Add	0.07	
			For >600, Deduct	-0.09	
10 01 80 00-0041	LF		5/8" Three Strand Twisted Cotton Rope	0.63	
			Note: 1,950 lbs minimum break		
			For <100, Add	0.09	
			For >600, Deduct	-0.13	
10 01 80 00-0042	LF		3/4" Three Strand Twisted Cotton Rope	0.93	
			Note: 2,600 lbs minimum break		
			For <100, Add	0.14	
			For >600, Deduct	-0.19	
10 01 80 00-0043	LF		1" Three Strand Twisted Cotton Rope	1.40	
			Note: 3,500 lbs minimum break		
			For <100, Add	0.21	
			For >600, Deduct	-0.28	
10 01 80 00-0044			Three Strand Twisted Poly Combo Rope (10 01 80 00-0001)		
10 01 80 00-0045	LF		3/8" Three Strand Twisted Poly Combo Rope	0.26	
			Note: 2,700 lbs minimum break		
			For <100, Add	0.04	
			For >600, Deduct	-0.05	
10 01 80 00-0046	LF		1/2" Three Strand Twisted Poly Combo Rope	0.33	
			Note: 4,400 lbs minimum break		
			For <100, Add	0.05	
			For >600, Deduct	-0.07	
10 01 80 00-0047	LF		8/8" Three Strand Twisted Poly Combo Rope	0.58	
			Note: 6,500 lbs minimum break		
			For <100, Add	0.09	
			For >600, Deduct	-0.12	

10 Specialties**10 01 Operation and Maintenance of Specialties****10 01 80 Operation and Maintenance of Other Specialties**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
10 01 80 00-0048	LF	3/4" Three Strand Twisted Poly Combo Rope Note: 9,000 lbs minimum break	0.95	
		<i>For <100, Add</i>	0.14	
		<i>For >600, Deduct</i>	-0.19	
10 01 80 00-0049	LF	1" Three Strand Twisted Poly Combo Rope Note: 18,750 lbs minimum break	1.71	
		<i>For <100, Add</i>	0.26	
		<i>For >600, Deduct</i>	-0.34	
10 01 80 00-0050		Double Braid Polyester Rope <small>(10 01 80 00-0001)</small>		
10 01 80 00-0051	LF	3/8" Double Braid Polyester Rope Note: 4,468 lbs minimum break	0.61	
		<i>For <100, Add</i>	0.09	
		<i>For >600, Deduct</i>	-0.12	
10 01 80 00-0052	LF	1/2" Double Braid Polyester Rope Note: 7,894 lbs minimum break	0.95	
		<i>For <100, Add</i>	0.14	
		<i>For >600, Deduct</i>	-0.19	
10 01 80 00-0053	LF	5/8" Double Braid Polyester Rope Note: 12,274 lbs minimum break	1.47	
		<i>For <100, Add</i>	0.22	
		<i>For >600, Deduct</i>	-0.29	
10 01 80 00-0054	LF	3/4" Double Braid Polyester Rope Note: 17,600 lbs minimum break	2.36	
		<i>For <100, Add</i>	0.35	
		<i>For >600, Deduct</i>	-0.47	
10 01 80 00-0055	LF	1" Double Braid Polyester Rope Note: 30,900 lbs minimum break	3.77	
		<i>For <100, Add</i>	0.57	
		<i>For >600, Deduct</i>	-0.75	
10 01 80 00-0056		Braided Cable Pulling Rope <small>(10 01 80 00-0001)</small>		
10 01 80 00-0057	LF	1/4" Braided Cable Pulling Rope Note: 2,600 lbs minimum break	0.59	
		<i>For <100, Add</i>	0.09	
		<i>For >600, Deduct</i>	-0.12	
10 01 80 00-0058	LF	3/8" Braided Cable Pulling Rope Note: 6,200 lbs minimum break	0.73	
		<i>For <100, Add</i>	0.11	
		<i>For >600, Deduct</i>	-0.15	
10 01 80 00-0059	LF	1/2" Braided Cable Pulling Rope Note: 10,500 lbs minimum break	0.91	
		<i>For <100, Add</i>	0.14	
		<i>For >600, Deduct</i>	-0.18	
10 01 80 00-0060	LF	9/16" Braided Cable Pulling Rope Note: 12,285 lbs minimum break	1.08	
		<i>For <100, Add</i>	0.16	
		<i>For >600, Deduct</i>	-0.22	
10 01 80 00-0061	LF	5/8" Braided Cable Pulling Rope Note: 15,320 lbs minimum break	1.32	
		<i>For <100, Add</i>	0.20	
		<i>For >600, Deduct</i>	-0.26	
10 01 80 00-0062	LF	3/4" Braided Cable Pulling Rope Note: 25,370 lbs minimum break	1.75	
		<i>For <100, Add</i>	0.26	
		<i>For >600, Deduct</i>	-0.35	
10 01 80 00-0063	LF	7/8" Braided Cable Pulling Rope Note: 30,150 lbs minimum break	2.43	
		<i>For <100, Add</i>	0.36	
		<i>For >600, Deduct</i>	-0.49	
10 01 80 00-0064	LF	1" Braided Cable Pulling Rope Note: 40,200 lbs minimum break	2.87	
		<i>For <100, Add</i>	0.43	
		<i>For >600, Deduct</i>	-0.57	
10 01 80 00-0065	LF	1-1/8" Braided Cable Pulling Rope Note: 49,925 lbs minimum break	3.24	
		<i>For <100, Add</i>	0.49	
		<i>For >600, Deduct</i>	-0.65	

10 10 Information Specialties (10)**10 11 Visual Display Units** (10 10)**10 11 13 Chalkboards** (10 11)**10 11 13 13 Fixed Chalkboards** (10 11 13)

Note: Select task based off the square footage of an individual chalkboard. For example use the >12 To 16 SF range for each 3' x 5' chalkboard.

10 11 13 13-0001 Porcelain Enamel Steel Chalkboards (10 11 13 13)



Specialties	10	10
Information Specialties	10 10	
Visual Display Units	10 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 13 13-0002	5/8" Face Aluminum Frame, Porcelain Enamel Steel Chalkboards (Claridge 800 Series) <small>(10 11 13 13-0001)</small> Note: Includes up to 1/2" core material, aluminum backing, full length map rail, map hooks, chalk tray and mounting hardware.		
10 11 13 13-0003	SF Up To 6 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard.....	49.84	9.23
10 11 13 13-0004	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	32.00	4.34
10 11 13 13-0005	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	27.65	3.75
10 11 13 13-0006	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	23.01	2.44
10 11 13 13-0007	SF >24 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	19.30	1.36

10 11 13 13-0008	1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Chalkboards (Claridge 1300 Series) <small>(10 11 13 13-0001)</small> Note: Includes up to 1/2" core material, aluminum backing, full length map rail, map hooks, chalk tray and mounting hardware.		
10 11 13 13-0009	SF Up To 6 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	52.75	9.23
10 11 13 13-0010	SF >6 To 12 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	34.84	4.34
10 11 13 13-0011	SF >12 To 16 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	30.27	3.75
10 11 13 13-0012	SF >16 To 24 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	26.18	2.44
10 11 13 13-0013	SF >24 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Chalkboard	22.41	1.36

10 11 13 13-0014	1-3/4" Face Wood Frame, Porcelain Enamel Steel Chalkboards (Claridge 1600 Series) <small>(10 11 13 13-0001)</small> Note: Includes up to 1/2" core material, aluminum backing, chalk tray and mounting hardware.		
10 11 13 13-0015	SF Up To 6 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Chalkboard	48.04	9.23
10 11 13 13-0016	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Chalkboard	30.16	4.34
10 11 13 13-0017	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Chalkboard	25.90	3.75
10 11 13 13-0018	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Chalkboard	21.54	2.44
10 11 13 13-0019	SF >24 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Chalkboard	17.66	1.36

10 11 13 13-0020	Removal And Reinstallation Of Chalkboards <small>(10 11 13 13)</small> Note: Includes storage and cleaning.		
10 11 13 13-0021	SF Removal And Reinstallation Of Chalkboard.....	11.37	

10 11 13 13-0022	Field Applied Chalkboard And Accessories <small>(10 11 13 13)</small>		
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10 11 13 13-0023	Chalkboard Face Sheets And Panels <small>(10 11 13 13-0022)</small>		
10 11 13 13-0024	SF Porcelain Enamel Steel Chalkboard Face Sheet (Claridge Vitracite)	16.51	4.34
	Note: Includes porcelain enamel steel chalkboard skin.		
10 11 13 13-0025	SF Porcelain Enamel Steel Chalkboard Panel (Claridge VIT).....	19.75	4.34
	Note: Includes porcelain enamel steel surface mounted on either particle board or hardboard core with an aluminum moisture barrier back.		

10 11 13 13-0026	Chalkboard And Markerboard Accessory Trays And Trim <small>(10 11 13 13-0022)</small>		
10 11 13 13-0027	LF Chalk And Marker Tray, Field Applied	23.97	5.97
10 11 13 13-0028	PR Chalk And Marker Tray End Closures, Field Applied.....	29.63	10.85
10 11 13 13-0029	LF Mullion Trim For Chalkboards And Markerboards, Field Applied.....	16.82	5.97
10 11 13 13-0030	LF Screw On Trim For Chalkboards And Markerboards, Field Applied	16.43	5.97
10 11 13 13-0031	LF 1/2" Leg Map Rail For Chalkboards And Markerboards, Field Applied	17.53	5.97
10 11 13 13-0032	LF 1/4" Leg Map Rail For Chalkboards And Markerboards, Field Applied	19.62	5.97
10 11 13 13-0033	LF No Leg Map Rail For Chalkboards And Markerboards, Field Applied.....	17.53	5.97

10 11 13 33 Rail-Mounted Chalkboards (10 11 13)

10 11 13 33-0001	Horizontal Sliding, Porcelain Enamel Steel Chalkboards (Claridge HS Series) <small>(10 11 13 33)</small>		
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10 11 13 33-0002	Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboards <small>(10 11 13 33-0001)</small>		
10 11 13 33-0003	EA 4' x 6' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	2,320.43	108.50
10 11 13 33-0004	EA 4' x 8' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	2,606.27	108.50
10 11 13 33-0005	EA 4' x 10' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	2,952.48	115.56
10 11 13 33-0006	EA 4' x 12' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	3,284.59	115.56
10 11 13 33-0007	EA 4' x 14' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	4,094.52	124.24
10 11 13 33-0008	EA 4' x 16' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	4,359.43	124.24
10 11 13 33-0009	EA 4' x 20' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	4,926.52	130.20
10 11 13 33-0010	EA 4' x 24' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard.....	5,584.13	130.20

10 11 13 33-0011	Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboards <small>(10 11 13 33-0001)</small>		
10 11 13 33-0012	EA 4' x 6' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	3,173.06	108.50
10 11 13 33-0013	EA 4' x 8' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	3,765.14	108.50
10 11 13 33-0014	EA 4' x 10' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	4,309.64	115.56

10	10	Specialties
	10 10	Information Specialties
	10 11	Visual Display Units



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 13 33-0015	EA		4' x 12' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	4,853.25	115.56
10 11 13 33-0016	EA		4' x 14' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	5,533.19	124.24
10 11 13 33-0017	EA		4' x 16' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	5,772.77	124.24
10 11 13 33-0018	EA		4' x 20' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	6,770.59	130.20
10 11 13 33-0019	EA		4' x 24' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	7,570.30	130.20

10 11 13 33-0020 Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboards (10 11 13 33-0001)

10 11 13 33-0021	EA		4' x 6' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	3,536.59	108.50
10 11 13 33-0022	EA		4' x 8' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	4,020.71	108.50
10 11 13 33-0023	EA		4' x 10' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	4,544.28	115.56
10 11 13 33-0024	EA		4' x 12' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	5,100.01	115.56
10 11 13 33-0025	EA		4' x 14' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	6,176.52	124.24
10 11 13 33-0026	EA		4' x 16' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	6,431.52	124.24
10 11 13 33-0027	EA		4' x 20' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	7,595.68	130.20
10 11 13 33-0028	EA		4' x 24' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Chalkboard	8,480.83	130.20

10 11 13 33-0029 Vertical Sliding, Porcelain Enamel Steel Chalkboards (Claridge TW Series)

10 11 13 33-0030 One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboards (10 11 13 33 13 33-0029)

10 11 13 33-0031	EA		8' x 4' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	2,774.81	108.50
10 11 13 33-0032	EA		8' x 5' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	3,062.86	108.50
10 11 13 33-0033	EA		8' x 6' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	3,349.58	115.56
10 11 13 33-0034	EA		8' x 8' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	3,849.66	115.56
10 11 13 33-0035	EA		8' x 10' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	4,217.28	124.24
10 11 13 33-0036	EA		8' x 12' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	4,678.80	124.24

10 11 13 33-0037 Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboards (11 13 33-0029)

10 11 13 33-0038	EA		8' x 4' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	4,072.40	108.50
10 11 13 33-0039	EA		8' x 5' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	4,519.60	108.50
10 11 13 33-0040	EA		8' x 6' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	4,967.68	115.56
10 11 13 33-0041	EA		8' x 8' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	5,790.48	115.56
10 11 13 33-0042	EA		8' x 10' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	6,302.37	124.24
10 11 13 33-0043	EA		8' x 12' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	7,049.16	124.24

10 11 13 33-0044 Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboards (10 11 13 33-0029)

10 11 13 33-0045	EA		8' x 4' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	5,562.76	108.50
10 11 13 33-0046	EA		8' x 5' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	6,172.43	108.50
10 11 13 33-0047	EA		8' x 6' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	6,782.97	115.56
10 11 13 33-0048	EA		8' x 8' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	7,927.39	115.56
10 11 13 33-0049	EA		8' x 10' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	8,596.76	124.24
10 11 13 33-0050	EA		8' x 12' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Chalkboard	9,648.65	124.24

10 11 13 33-0051 Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboards (Claridge MO Series) (10 11 13 33)

Note: Excludes remotes.

10 11 13 33-0052 One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboards (10 11 13 33-0051)

10 11 13 33-0053	EA		10' x 4' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	8,921.10	217.01
10 11 13 33-0054	EA		10' x 5' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	9,176.23	217.01
10 11 13 33-0055	EA		10' x 6' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	9,460.34	223.79
10 11 13 33-0056	EA		10' x 8' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	9,927.63	223.79
10 11 13 33-0057	EA		10' x 10' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	10,443.75	230.56
10 11 13 33-0058	EA		10' x 12' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	10,894.52	230.56
10 11 13 33-0059	EA		10' x 14' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	11,874.73	244.13
10 11 13 33-0060	EA		10' x 16' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	11,999.43	244.13

10 11 13 33-0061 Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboards (10 11 13 33-0051)

10 11 13 33-0062	EA		10' x 4' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	14,039.53	217.01
10 11 13 33-0063	EA		10' x 5' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	14,376.83	217.01
10 11 13 33-0064	EA		10' x 6' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	14,753.04	223.79
10 11 13 33-0065	EA		10' x 8' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	15,439.77	223.79
10 11 13 33-0066	EA		10' x 10' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	16,122.45	230.56
10 11 13 33-0067	EA		10' x 12' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	16,775.03	230.56
10 11 13 33-0068	EA		10' x 14' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	18,099.16	244.13
10 11 13 33-0069	EA		10' x 16' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard.....	18,296.78	244.13

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 13 33-0070	Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboards <small>(10 11 13 33-0051)</small>	
10 11 13 33-0071	EA 10' x 4' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	18,242.53 217.01
10 11 13 33-0072	EA 10' x 5' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	19,093.84 217.01
10 11 13 33-0073	EA 10' x 6' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	19,544.51 223.79
10 11 13 33-0074	EA 10' x 8' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	20,437.46 223.79
10 11 13 33-0075	EA 10' x 10' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	21,375.93 230.56
10 11 13 33-0076	EA 10' x 12' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	22,278.79 230.56
10 11 13 33-0077	EA 10' x 14' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	24,059.20 244.13
10 11 13 33-0078	EA 10' x 16' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Chalkboard	24,406.86 244.13

10 11 13 33-0079	Sliding Chalkboard And Markerboard Accessories <small>(10 11 13 33)</small>	
10 11 13 33-0080	EA One Sliding Panel, Remote Control For Motor Operated Sliding Chalkboard Or Markerboard	670.70
10 11 13 33-0081	EA Two Sliding Panel, Remote Control For Motor Operated Sliding Chalkboard Or Markerboard	1,145.49

10 11 16 Markerboards (10 11)

10 11 16 13	Fixed Markerboards <small>(10 11 16)</small>	
Note: Select task based off the square footage of an individual markerboard. For example use the >12 To 16 SF range for each 3' x 5' markerboard.		
10 11 16 13-0001	Porcelain Enamel Steel Markerboards <small>(10 11 16 13)</small>	
10 11 16 13-0002	5/8" Face Aluminum Frame, Porcelain Enamel Steel Markerboards (Claridge 800 Series) <small>(10 11 16 13-0001)</small>	
Note: Includes up to 1/2" core material, aluminum backing, full length map rail, map hooks, marker tray and mounting hardware.		
10 11 16 13-0003	SF Up To 6 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	50.02 9.23
10 11 16 13-0004	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	32.64 4.34
10 11 16 13-0005	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	27.65 3.75
10 11 16 13-0006	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	23.24 2.44
10 11 16 13-0007	SF >24 SF, 5/8" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	19.04 1.36

10 11 16 13-0008	1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Markerboards (Claridge 1300 Series) <small>(10 11 16 13-0001)</small>	
Note: Includes up to 1/2" core material, aluminum backing, full length map rail, map hooks, marker tray and mounting hardware.		
10 11 16 13-0009	SF Up To 6 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	52.79 9.23
10 11 16 13-0010	SF >6 To 12 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	33.47 4.34
10 11 16 13-0011	SF >12 To 16 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	28.89 3.75
10 11 16 13-0012	SF >16 To 24 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	24.80 2.44
10 11 16 13-0013	SF >24 SF, 1-1/4" Face Aluminum Frame, Porcelain Enamel Steel Markerboard	21.60 1.36

10 11 16 13-0014	1-3/4" Face Wood Frame, Porcelain Enamel Steel Markerboards (Claridge LCS Series) <small>(10 11 16 13-0001)</small>	
Note: Includes up to 1/2" core material, aluminum backing, marker tray and mounting hardware.		
10 11 16 13-0015	SF Up To 6 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Markerboard	48.02 9.23
10 11 16 13-0016	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Markerboard	30.17 4.34
10 11 16 13-0017	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Markerboard	27.24 3.75
10 11 16 13-0018	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Markerboard	21.68 2.44
10 11 16 13-0019	SF >24 SF, 1-3/4" Face Wood Frame, Porcelain Enamel Steel Markerboard	17.35 1.36

10 11 16 13-0020	Melamine Markerboards <small>(10 11 16 13)</small>	
10 11 16 13-0021	1-1/4" Face Aluminum Frame, Melamine Markerboard (Claridge MLC Series) <small>(10 11 16 13-0020)</small>	
Note: Includes full length map rail, map hooks, marker tray and mounting hardware.		
10 11 16 13-0022	SF Up To 6 SF, 1-1/4" Face Aluminum Frame, Melamine Markerboard	39.55 9.23
10 11 16 13-0023	SF >6 To 12 SF, 1-1/4" Face Aluminum Frame, Melamine Markerboard	24.34 4.34
10 11 16 13-0024	SF >12 To 16 SF, 1-1/4" Face Aluminum Frame, Melamine Markerboard	21.11 3.75
10 11 16 13-0025	SF >16 To 24 SF, 1-1/4" Face Aluminum Frame, Melamine Markerboard	15.90 2.44
10 11 16 13-0026	SF >24 SF, 1-1/4" Face Aluminum Frame, Melamine Markerboard	12.94 1.36

10 11 16 13-0027	1-3/4" Face Wood Frame, Melamine Markerboard (Claridge MLC Series) <small>(10 11 16 13-0020)</small>	
Note: Includes marker tray and mounting hardware.		
10 11 16 13-0028	SF Up To 6 SF, 1-3/4" Face Wood Frame, Melamine Markerboard	38.61 9.23
10 11 16 13-0029	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Melamine Markerboard	23.90 4.34
10 11 16 13-0030	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Melamine Markerboard	20.49 3.75
10 11 16 13-0031	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Melamine Markerboard	14.79 2.44
10 11 16 13-0032	SF >24 SF, 1-3/4" Face Wood Frame, Melamine Markerboard	11.94 1.36

10 11 16 13-0033	Nonporous, Non-Staining Markerboards <small>(10 11 16 13)</small>	
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10	10	Specialties
	10 10	Information Specialties
	10 11	Visual Display Units



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 16 13-0034	5/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboards (EverWhite Classic Series) <small>(10 11 16 13-0033)</small> Note: Includes non-staining permanent marker resistant surface, non-magnetic surface, marker tray and mounting hardware.		
10 11 16 13-0035	SF Up To 6 SF, 5/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	54.05	9.23
	<i>For Magnetic Surface, Add</i>	3.56	
10 11 16 13-0036	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	35.77	4.34
	<i>For Magnetic Surface, Add</i>	2.71	
10 11 16 13-0037	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	30.85	3.75
	<i>For Magnetic Surface, Add</i>	2.34	
10 11 16 13-0038	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	27.33	2.44
	<i>For Magnetic Surface, Add</i>	2.25	
10 11 16 13-0039	SF >24 SF, 5/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	23.65	1.36
	<i>For Magnetic Surface, Add</i>	2.09	

10 11 16 13-0040	1-1/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboards (EverWhite Classic Series) <small>(10 11 16 13-0033)</small> Note: Includes non-staining permanent marker resistant surface, non-magnetic surface, marker tray and mounting hardware.		
10 11 16 13-0041	SF Up To 6 SF, 1-1/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	54.05	9.23
	<i>For Magnetic Surface, Add</i>	3.56	
10 11 16 13-0042	SF >6 To 12 SF, 1-1/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	35.77	4.34
	<i>For Magnetic Surface, Add</i>	2.71	
10 11 16 13-0043	SF >12 To 16 SF, 1-1/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	30.85	3.75
	<i>For Magnetic Surface, Add</i>	2.34	
10 11 16 13-0044	SF >16 To 24 SF, 1-1/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	27.33	2.44
	<i>For Magnetic Surface, Add</i>	2.25	
10 11 16 13-0045	SF >24 SF, 1-1/8" Face Aluminum Frame, Nonporous, Non-Staining Markerboard.....	23.65	1.36
	<i>For Magnetic Surface, Add</i>	2.09	

10 11 16 13-0046	1-1/4" Face Wood Frame, Nonporous, Non-Staining Markerboards (EverWhite Classic Series) <small>(10 11 16 13-0033)</small> Note: Includes non-staining permanent marker resistant surface, non-magnetic surface, marker tray and mounting hardware.		
10 11 16 13-0047	SF Up To 6 SF, 1-1/4" Face Wood Frame, Nonporous, Non-Staining Markerboard.....	98.17	9.23
	<i>For Magnetic Surface, Add</i>	7.97	
10 11 16 13-0048	SF >6 To 12 SF, 1-1/4" Face Wood Frame, Nonporous, Non-Staining Markerboard.....	62.28	4.34
	<i>For Magnetic Surface, Add</i>	5.36	
10 11 16 13-0049	SF >12 To 16 SF, 1-1/4" Face Wood Frame, Nonporous, Non-Staining Markerboard.....	52.62	3.75
	<i>For Magnetic Surface, Add</i>	4.51	
10 11 16 13-0050	SF >16 To 24 SF, 1-1/4" Face Wood Frame, Nonporous, Non-Staining Markerboard.....	44.55	2.44
	<i>For Magnetic Surface, Add</i>	3.97	
10 11 16 13-0051	SF >24 SF, 1-1/4" Face Wood Frame, Nonporous, Non-Staining Markerboard.....	34.64	1.36
	<i>For Magnetic Surface, Add</i>	3.19	

10 11 16 13-0052	Nonporous, Non-Staining Markerboard Resurfacing Panels (EverWhite EverEZ Resurfacing Panels) <small>(10 11 16 13-0033)</small> Note: Includes non-staining, permanent marker resistant, magnetic dry erase surface. Excludes frame. Resurfacing panel for mounting to existing chalkboard or markerboard consists of dry erase surface, 24-gauge treated steel interlayer and pressure-sensitive adhesive backing.		
10 11 16 13-0053	SF Up To 16 SF, Nonporous, Non-Staining Markerboard Resurfacing Panel With Pressure-Sensitive Adhesive Backing.....	24.32	3.75
10 11 16 13-0054	SF >16 To 24 SF, Nonporous, Non-Staining Markerboard Resurfacing Panel With Pressure-Sensitive Adhesive Backing.....	20.84	2.44
10 11 16 13-0055	SF >24 SF, Nonporous, Non-Staining Markerboard Resurfacing Panel With Pressure-Sensitive Adhesive Backing.....	17.59	1.36

10 11 16 13-0056	Removal And Reinstallation Of Markerboard <small>(10 11 16 13)</small> Note: Includes storage and cleaning.		
10 11 16 13-0057	EA Up To 6 SF, Removal And Reinstallation Of Markerboard.....	65.10	
10 11 16 13-0058	EA >6 To 12 SF, Removal And Reinstallation Of Markerboard.....	75.95	
10 11 16 13-0059	EA >12 To 16 SF, Removal And Reinstallation Of Markerboard.....	86.81	
10 11 16 13-0060	EA >16 To 24 SF, Removal And Reinstallation Of Markerboard.....	97.65	
10 11 16 13-0061	EA >24 SF, Removal And Reinstallation Of Markerboard.....	108.50	

10 11 16 13-0062	Field Applied Markerboard And Accessories <small>(10 11 16 13)</small>		
10 11 16 13-0063	Markerboard Face Sheets And Panels <small>(10 11 16 13-0062)</small>		
10 11 16 13-0064	SF Porcelain Enamel Steel Markerboard Face Sheet (Claridge LCS).....	16.25	4.34
	Note: Includes porcelain enamel steel markerboard skin backed with double sided tape.		
10 11 16 13-0065	SF Porcelain Enamel Steel Markerboard Face Sheet With Double Sided Tape (Claridge LCS EZ Stick).....	19.16	4.34
	Note: Includes porcelain enamel steel markerboard skin backed with double sided tape.		
10 11 16 13-0066	SF Porcelain Enamel Steel Markerboard Panel (Claridge LCS).....	19.09	4.34
	Note: Includes porcelain enamel steel surface mounted on either 3/8" particle board or 1/4" hardboard core with an aluminum moisture barrier back.		
10 11 16 13-0067	SF Melamine Markerboard Panel (Claridge 1032).....	10.98	4.34
	Note: Includes 1/4" thick melamine panel.		



Specialties	10	10
Information Specialties	10 10	
Visual Display Units	10 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 16 13-0068	Chalkboard And Markerboard Accessory Trays And Trim <small>(10 11 16 13-0062)</small> See CSI section 10 11 13 13-0026 for chalkboard and markerboard accessory trays and trim.		
10 11 16 33 Rail-Mounted Markerboards <small>(10 11 16)</small>			
10 11 16 33-0001	Horizontal Sliding, Porcelain Enamel Steel Markerboards (Claridge HS Series) <small>(10 11 16 33)</small>		
10 11 16 33-0002	Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0001)</small>		
10 11 16 33-0003	EA 4' x 6' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	2,292.41	108.50
10 11 16 33-0004	EA 4' x 8' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	2,568.90	108.50
10 11 16 33-0005	EA 4' x 10' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	2,905.77	115.56
10 11 16 33-0006	EA 4' x 12' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	3,228.54	115.56
10 11 16 33-0007	EA 4' x 14' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	4,029.13	124.24
10 11 16 33-0008	EA 4' x 16' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	4,284.70	124.24
10 11 16 33-0009	EA 4' x 20' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	4,833.11	130.20
10 11 16 33-0010	EA 4' x 24' Frame, Two Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	5,472.03	130.20
10 11 16 33-0011	Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0001)</small>		
10 11 16 33-0012	EA 4' x 6' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	3,145.04	108.50
10 11 16 33-0013	EA 4' x 8' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	3,727.78	108.50
10 11 16 33-0014	EA 4' x 10' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	4,262.93	115.56
10 11 16 33-0015	EA 4' x 12' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	4,797.20	115.56
10 11 16 33-0016	EA 4' x 14' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	5,467.80	124.24
10 11 16 33-0017	EA 4' x 16' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	5,698.04	124.24
10 11 16 33-0018	EA 4' x 20' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	6,677.17	130.20
10 11 16 33-0019	EA 4' x 24' Frame, Three Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	7,458.20	130.20
10 11 16 33-0020	Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0001)</small>		
10 11 16 33-0021	EA 4' x 6' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	3,508.56	108.50
10 11 16 33-0022	EA 4' x 8' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	3,983.35	108.50
10 11 16 33-0023	EA 4' x 10' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	4,497.57	115.56
10 11 16 33-0024	EA 4' x 12' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	5,043.96	115.56
10 11 16 33-0025	EA 4' x 14' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	6,111.13	124.24
10 11 16 33-0026	EA 4' x 16' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	6,356.79	124.24
10 11 16 33-0027	EA 4' x 20' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	7,502.26	130.20
10 11 16 33-0028	EA 4' x 24' Frame, Four Sliding Panels, Horizontal Sliding, Porcelain Enamel Steel Markerboard.....	8,396.75	130.20
10 11 16 33-0029	Vertical Sliding, Porcelain Enamel Steel Markerboards (Claridge TW Series) <small>(10 11 16 33)</small>		
10 11 16 33-0030	One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0029)</small>		
10 11 16 33-0031	EA 8' x 4' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	2,737.45	108.50
10 11 16 33-0032	EA 8' x 5' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	3,016.15	108.50
10 11 16 33-0033	EA 8' x 6' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	3,293.53	115.56
10 11 16 33-0034	EA 8' x 8' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	3,774.93	115.56
10 11 16 33-0035	EA 8' x 10' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	4,123.86	124.24
10 11 16 33-0036	EA 8' x 12' Frame, One Sliding Panel, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	4,566.70	124.24
10 11 16 33-0037	Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0029)</small>		
10 11 16 33-0038	EA 8' x 4' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	3,997.67	108.50
10 11 16 33-0039	EA 8' x 5' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	4,426.19	108.50
10 11 16 33-0040	EA 8' x 6' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	4,855.58	115.56
10 11 16 33-0041	EA 8' x 8' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	5,641.02	115.56
10 11 16 33-0042	EA 8' x 10' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	6,115.54	124.24
10 11 16 33-0043	EA 8' x 12' Frame, Two Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	6,824.96	124.24
10 11 16 33-0044	Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0029)</small>		
10 11 16 33-0045	EA 8' x 4' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	5,450.66	108.50
10 11 16 33-0046	EA 8' x 5' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	6,032.30	108.50
10 11 16 33-0047	EA 8' x 6' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	6,614.82	115.56
10 11 16 33-0048	EA 8' x 8' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	7,703.19	115.56
10 11 16 33-0049	EA 8' x 10' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	8,316.52	124.24
10 11 16 33-0050	EA 8' x 12' Frame, Three Sliding Panels, Vertical Sliding, Porcelain Enamel Steel Markerboard.....	9,312.35	124.24

10	10	Specialties
	10 10	Information Specialties
	10 11	Visual Display Units



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 16 33-0051	Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboards (Claridge MO Series) <small>(10 11 16 33)</small> Note: Excludes remotes.		
10 11 16 33-0052	One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0051)</small>		
10 11 16 33-0053	EA 10' x 4' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	8,874.39	217.01
10 11 16 33-0054	EA 10' x 5' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	9,117.84	217.01
10 11 16 33-0055	EA 10' x 6' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	9,390.28	223.79
10 11 16 33-0056	EA 10' x 8' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	9,834.22	223.79
10 11 16 33-0057	EA 10' x 10' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	10,326.98	230.56
10 11 16 33-0058	EA 10' x 12' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	10,754.40	230.56
10 11 16 33-0059	EA 10' x 14' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	11,711.26	244.13
10 11 16 33-0060	EA 10' x 16' Frame, One Sliding Panel, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	11,812.61	244.13
10 11 16 33-0061	Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0051)</small>		
10 11 16 33-0062	EA 10' x 4' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	13,946.11	217.01
10 11 16 33-0063	EA 10' x 5' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	14,260.07	217.01
10 11 16 33-0064	EA 10' x 6' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	14,612.92	223.79
10 11 16 33-0065	EA 10' x 8' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	15,252.94	223.79
10 11 16 33-0066	EA 10' x 10' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	15,888.91	230.56
10 11 16 33-0067	EA 10' x 12' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	16,494.78	230.56
10 11 16 33-0068	EA 10' x 14' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	17,772.21	244.13
10 11 16 33-0069	EA 10' x 16' Frame, Two Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	17,923.12	244.13
10 11 16 33-0070	Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboards <small>(10 11 16 33-0051)</small>		
10 11 16 33-0071	EA 10' x 4' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	18,102.41	217.01
10 11 16 33-0072	EA 10' x 5' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	18,918.69	217.01
10 11 16 33-0073	EA 10' x 6' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	19,334.33	223.79
10 11 16 33-0074	EA 10' x 8' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	20,157.22	223.79
10 11 16 33-0075	EA 10' x 10' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	21,025.62	230.56
10 11 16 33-0076	EA 10' x 12' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	21,858.42	230.56
10 11 16 33-0077	EA 10' x 14' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	23,568.77	244.13
10 11 16 33-0078	EA 10' x 16' Frame, Three Sliding Panels, Motor Operated Vertical Sliding, Porcelain Enamel Steel Markerboard.....	23,846.37	244.13
10 11 16 33-0079	Sliding Chalkboard And Markerboard Accessories <small>(10 11 16 33)</small> See CSI section 10 11 13 33-0079 for sliding chalkboard and markerboard accessories.		
10 11 23	Tackboards <small>(10 11)</small>		
10 11 23 13	Fixed Tackboards <small>(10 11 23)</small> Note: Select task based off the square footage of an individual tackboard. For example use the >12 To 16 SF range for each 3' x 5' tackboard.		
10 11 23 13-0001	Fixed Tackboards <small>(10 11 23 13)</small> Note: Select task based off the square footage of an individual tackboard. For example use the >12 To 16 SF range for each 3' x 5' tackboard.		
10 11 23 13-0002	Cork Surface, Fixed Tackboards <small>(10 11 23 13-0001)</small> Note: Includes up to 1/4" cork surface, unmounted or mounted on duracore or hardboard.		
10 11 23 13-0003	5/8" Face Aluminum Frame, Cork Surface, Fixed Tackboards (Claridge 800 Series) <small>(10 11 23 13-0002)</small>		
10 11 23 13-0004	SF Up To 6 SF, 5/8" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	33.22	9.23
10 11 23 13-0005	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	18.96	4.34
10 11 23 13-0006	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	16.43	3.75
10 11 23 13-0007	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	13.14	2.44
10 11 23 13-0008	SF >24 SF, 5/8" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	10.77	1.36
10 11 23 13-0009	1-1/4" Face Aluminum Frame, Cork Surface, Fixed Tackboards (Claridge 900A Series) <small>(10 11 23 13-0002)</small>		
10 11 23 13-0010	SF Up To 6 SF, 1-1/4" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	34.96	9.23
10 11 23 13-0011	SF >6 To 12 SF, 1-1/4" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	19.77	4.34
10 11 23 13-0012	SF >12 To 16 SF, 1-1/4" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	16.02	3.75
10 11 23 13-0013	SF >16 To 24 SF, 1-1/4" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	12.50	2.44
10 11 23 13-0014	SF >24 SF, 1-1/4" Face Aluminum Frame, Cork Surface, Fixed Tackboard.....	9.76	1.36
10 11 23 13-0015	1-3/4" Face Wood Frame, Cork Surface, Fixed Tackboards (Claridge 700 Series) <small>(10 11 23 13-0002)</small>		
10 11 23 13-0016	SF Up To 6 SF, 1-3/4" Face Wood Frame, Cork Surface, Fixed Tackboard.....	35.15	9.23
10 11 23 13-0017	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Cork Surface, Fixed Tackboard.....	21.47	4.34
10 11 23 13-0018	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Cork Surface, Fixed Tackboard.....	19.87	3.75
10 11 23 13-0019	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Cork Surface, Fixed Tackboard.....	15.30	2.44
10 11 23 13-0020	SF >24 SF, 1-3/4" Face Wood Frame, Cork Surface, Fixed Tackboard.....	12.11	1.36



Specialties	10	10
Information Specialties	10 10	
Visual Display Units	10 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 11 23 13-0021	Burlap Backed Cork Surface, Fixed Tackboards <small>(10 11 23 13-0001)</small> Note: Includes burlap backed 1/4" self healing cork surface, unmounted or mounted on hardboard.		
10 11 23 13-0022	5/8" Face Aluminum Frame, Burlap Backed Cork Surface, Fixed Tackboards (Claridge 800 Series) <small>(10 11 23 13-0021)</small>		
10 11 23 13-0023	SF Up To 6 SF, 5/8" Face Aluminum Frame, Burlap Backed Cork Surface, Fixed Tackboard	38.27	9.23
10 11 23 13-0024	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Burlap Backed Cork Surface, Fixed Tackboard	25.02	4.34
10 11 23 13-0025	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Burlap Backed Cork Surface, Fixed Tackboard	22.83	3.75
10 11 23 13-0026	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Burlap Backed Cork Surface, Fixed Tackboard	19.57	2.44
10 11 23 13-0027	SF >24 SF, 5/8" Face Aluminum Frame, Burlap Backed Cork Surface, Fixed Tackboard	17.31	1.36
10 11 23 13-0028	1-3/4" Face Wood Frame, Burlap Backed Cork Surface, Fixed Tackboards (Claridge 700 Series) <small>(10 11 23 13-0021)</small>		
10 11 23 13-0029	SF Up To 6 SF, 1-3/4" Face Wood Frame, Burlap Backed Cork Surface, Fixed Tackboard	42.49	9.23
10 11 23 13-0030	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Burlap Backed Cork Surface, Fixed Tackboard	29.53	4.34
10 11 23 13-0031	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Burlap Backed Cork Surface, Fixed Tackboard	27.38	3.75
10 11 23 13-0032	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Burlap Backed Cork Surface, Fixed Tackboard	22.87	2.44
10 11 23 13-0033	SF >24 SF, 1-3/4" Face Wood Frame, Burlap Backed Cork Surface, Fixed Tackboard	19.72	1.36
10 11 23 13-0034	Polyester Fabric Surface, Fixed Tackboards <small>(10 11 23 13-0001)</small> Note: Includes polyester fabric on cork underlay, unmounted or mounted on duracore. Class A rating.		
10 11 23 13-0035	5/8" Face Aluminum Frame, Polyester Fabric Surface, Fixed Tackboards (Claridge 800 Series) <small>(10 11 23 13-0034)</small>		
10 11 23 13-0036	SF Up To 6 SF, 5/8" Face Aluminum Frame, Polyester Fabric Surface, Fixed Tackboard	34.41	9.23
10 11 23 13-0037	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Polyester Fabric Surface, Fixed Tackboard	20.43	4.34
10 11 23 13-0038	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Polyester Fabric Surface, Fixed Tackboard	18.08	3.75
10 11 23 13-0039	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Polyester Fabric Surface, Fixed Tackboard	14.84	2.44
10 11 23 13-0040	SF >24 SF, 5/8" Face Aluminum Frame, Polyester Fabric Surface, Fixed Tackboard	12.28	1.36
10 11 23 13-0041	1-3/4" Face Wood Frame, Polyester Fabric Surface, Fixed Tackboards (Claridge 700 Series) <small>(10 11 23 13-0034)</small>		
10 11 23 13-0042	SF Up To 6 SF, 1-3/4" Face Wood Frame, Polyester Fabric Surface, Fixed Tackboard	36.80	9.23
10 11 23 13-0043	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Polyester Fabric Surface, Fixed Tackboard	23.53	4.34
10 11 23 13-0044	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Polyester Fabric Surface, Fixed Tackboard	21.80	3.75
10 11 23 13-0045	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Polyester Fabric Surface, Fixed Tackboard	17.41	2.44
10 11 23 13-0046	SF >24 SF, 1-3/4" Face Wood Frame, Polyester Fabric Surface, Fixed Tackboard	14.31	1.36
10 11 23 13-0047	Vinyl Fabric Surface, Fixed Tackboards <small>(10 11 23 13-0001)</small> Note: Includes vinyl fabric on cork underlay, unmounted or mounted on duracore.		
10 11 23 13-0048	5/8" Face Aluminum Frame, Vinyl Fabric Surface, Fixed Tackboards (Claridge 800 Series) <small>(10 11 23 13-0047)</small>		
10 11 23 13-0049	SF Up To 6 SF, 5/8" Face Aluminum Frame, Vinyl Fabric Surface, Fixed Tackboard	33.22	9.23
10 11 23 13-0050	SF >6 To 12 SF, 5/8" Face Aluminum Frame, Vinyl Fabric Surface, Fixed Tackboard	19.05	4.34
10 11 23 13-0051	SF >12 To 16 SF, 5/8" Face Aluminum Frame, Vinyl Fabric Surface, Fixed Tackboard	16.57	3.75
10 11 23 13-0052	SF >16 To 24 SF, 5/8" Face Aluminum Frame, Vinyl Fabric Surface, Fixed Tackboard	13.14	2.44
10 11 23 13-0053	SF >24 SF, 5/8" Face Aluminum Frame, Vinyl Fabric Surface, Fixed Tackboard	10.56	1.36
10 11 23 13-0054	1-3/4" Face Wood Frame, Vinyl Fabric Surface, Fixed Tackboards (Claridge 700 Series) <small>(10 11 23 13-0047)</small>		
10 11 23 13-0055	SF Up To 6 SF, 1-3/4" Face Wood Frame, Vinyl Fabric Surface, Fixed Tackboard	35.15	9.23
10 11 23 13-0056	SF >6 To 12 SF, 1-3/4" Face Wood Frame, Vinyl Fabric Surface, Fixed Tackboard	22.32	4.34
10 11 23 13-0057	SF >12 To 16 SF, 1-3/4" Face Wood Frame, Vinyl Fabric Surface, Fixed Tackboard	19.87	3.75
10 11 23 13-0058	SF >16 To 24 SF, 1-3/4" Face Wood Frame, Vinyl Fabric Surface, Fixed Tackboard	15.30	2.44
10 11 23 13-0059	SF 4' x 8', 1-3/4" Face Wood Frame, Vinyl Fabric Surface, Fixed Tackboard	12.11	1.36

10 13 Directories (10 10)

10 13 11 Directory and Bulletin Boards (10 13)

Note: Select task based off the square footage of an individual directory or bulletin board. For example use the >12 To 16 SF range for each 3' x 5' directory or bulletin board.

10 13 11 00-0001	Wall Mounted Directories <small>(10 13 11)</small> Note: Includes changeable letters.		
10 13 11 00-0002	Open Face, Wall Mounted Directories <small>(10 13 11 00-0001)</small> Note: Includes vinyl or felt back panel.		
10 13 11 00-0003	Wood Frame, Open Face, Wall Mounted Directories (Claridge 350 Series) <small>(10 13 11 00-0002)</small>		
10 13 11 00-0004	SF Up To 6 SF, Wood Frame, Open Face, Wall Mounted Directory	55.53	9.23
10 13 11 00-0005	SF >6 To 12 SF, Wood Frame, Open Face, Wall Mounted Directory	36.50	4.34
10 13 11 00-0006	SF >12 To 16 SF, Wood Frame, Open Face, Wall Mounted Directory	33.18	3.75

10	10	Specialties
	10 10	Information Specialties
	10 13	Directories



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 13 11 00-0007	SF	>16 To 24 SF, Wood Frame, Open Face, Wall Mounted Directory.....	25.40		2.44
10 13 11 00-0008	SF	>24 SF, Wood Frame, Open Face, Wall Mounted Directory.....	20.34		1.36
10 13 11 00-0009		Aluminum Frame, Open Face, Wall Mounted Directories (Claridge 432 Series) <small>(10 13 11 00-0002)</small>			
10 13 11 00-0010	SF	Up To 6 SF, Aluminum Frame, Open Face, Wall Mounted Directory <i>For Bronze Anodize Finish, Add</i>	56.08 12.00		9.23
10 13 11 00-0011	SF	>6 To 12 SF, Aluminum Frame, Open Face, Wall Mounted Directory <i>For Bronze Anodize Finish, Add</i>	36.86 12.00		4.34
10 13 11 00-0012	SF	>12 To 16 SF, Aluminum Frame, Open Face, Wall Mounted Directory <i>For Bronze Anodize Finish, Add</i>	33.92 12.00		3.75
10 13 11 00-0013	SF	>16 To 24 SF, Aluminum Frame, Open Face, Wall Mounted Directory <i>For Bronze Anodize Finish, Add</i>	24.20 12.00		2.44
10 13 11 00-0014	SF	>24 SF, Aluminum Frame, Open Face, Wall Mounted Directory <i>For Bronze Anodize Finish, Add</i>	20.89 12.00		1.36
10 13 11 00-0015		Glass Encased, Wall Mounted Directory Cabinets <small>(10 13 11 00-0001)</small> Note: Includes vinyl or felt back panel, 3/16" tempered glass and flat key tumbler lock. Surface or recess mounted.			
10 13 11 00-0016		Wood Frame, Glass Encased, Wall Mounted Directory Cabinets <small>(10 13 11 00-0015)</small>			
10 13 11 00-0017		Hinged Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinets (Claridge 3052 Series) <small>(10 13 11 00-0016)</small>			
10 13 11 00-0018	SF	Up To 6 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	138.33 15.00		9.23
10 13 11 00-0019	SF	>6 To 12 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	111.22 15.00		4.34
10 13 11 00-0020	SF	>12 To 16 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	93.13 15.00		3.75
10 13 11 00-0021	SF	>16 To 24 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	86.35 15.00		2.44
10 13 11 00-0022	SF	>24 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	78.17 15.00		1.36
10 13 11 00-0023		Sliding Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinets (Claridge 345 Series) <small>(10 13 11 00-0016)</small>			
10 13 11 00-0024	SF	Up To 12 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	118.87 15.00		9.23
10 13 11 00-0025	SF	>12 To 16 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	96.19 15.00		3.75
10 13 11 00-0026	SF	>16 To 24 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	69.00 15.00		2.44
10 13 11 00-0027	SF	>24 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i>	62.20 15.00		1.36
10 13 11 00-0028		Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinets <small>(10 13 11 00-0015)</small>			
10 13 11 00-0029		Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinets (Claridge Contemporary Series) <small>(10 13 11 00-0028)</small>			
10 13 11 00-0030	SF	Up To 6 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	123.74 15.00 12.00 21.06		9.23
10 13 11 00-0031	SF	>6 To 12 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	96.08 15.00 12.00 17.48		4.34
10 13 11 00-0032	SF	>12 To 16 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	81.30 15.00 12.00 14.76		3.75
10 13 11 00-0033	SF	>16 To 24 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	59.79 15.00 12.00 10.98		2.44
10 13 11 00-0034	SF	>24 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	55.87 15.00 12.00 10.63		1.36
10 13 11 00-0035		Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinets (Claridge Contemporary Series) <small>(10 13 11 00-0028)</small>			
10 13 11 00-0036	SF	Up To 6 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	191.12 15.00 12.00 34.54		9.23



Specialties	10	10
Information Specialties	10 10	
Directories	10 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 13 11 00-0037 SF >6 To 12 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	111.14 15.00 12.00 20.49	4.34
10 13 11 00-0038 SF >12 To 16 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	93.62 15.00 12.00 17.23	3.75
10 13 11 00-0039 SF >16 To 24 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	72.22 15.00 12.00 13.47	2.44
10 13 11 00-0040 SF >24 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	66.89 15.00 12.00 12.84	1.36
10 13 11 00-0041 Outdoor, Glass Encased, Wall Mounted Directory Cabinets <small>(10 13 11 00-0001)</small> Note: Includes vinyl or felt back panel, 3/16" tempered glass and flat key tumbler lock. Surface or recess mounted.		
10 13 11 00-0042 Aluminum Frame, Outdoor, Glass Encased, Wall Mounted Directory Cabinets <small>(10 13 11 00-0041)</small>		
10 13 11 00-0043 Hinged Door, Aluminum Frame, Outdoor, Glass Encased, Wall Mounted Directory Cabinets (Claridge 548 Series) <small>(10 13 11 00-0042)</small>		
10 13 11 00-0044 SF Up To 6 SF, Hinged Door, Outdoor, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i>	187.72 15.00 12.00	9.23
10 13 11 00-0045 SF >6 To 12 SF, Hinged Door, Outdoor, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i>	125.55 15.00 12.00	4.34
10 13 11 00-0046 SF >12 SF, Hinged Door, Outdoor, Glass Encased, Wall Mounted Directory Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i>	122.05 15.00 12.00	3.75
10 13 11 00-0047 Wall Mounted Bulletin Boards <small>(10 13 11)</small>		
10 13 11 00-0048 Glass Encased, Wall Mounted Bulletin Board Cabinets <small>(10 13 11 00-0047)</small> Note: Includes cork, fabric or hook-fab back panel, 3/16" tempered glass and flat key tumbler lock. Surface or recess mounted.		
10 13 11 00-0049 Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinets <small>(10 13 11 00-0048)</small>		
10 13 11 00-0050 Hinged Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinets (Claridge 3070 Series) <small>(10 13 11 00-0049)</small>		
10 13 11 00-0051 SF Up To 6 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	135.02 15.00	9.23
10 13 11 00-0052 SF >6 To 12 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	108.74 15.00	4.34
10 13 11 00-0053 SF >12 To 16 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	90.65 15.00	3.75
10 13 11 00-0054 SF >16 To 24 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	84.01 15.00	2.44
10 13 11 00-0055 SF >24 SF, Hinged Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	77.07 15.00	1.36
10 13 11 00-0056 Sliding Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinets (Claridge 310 Series) <small>(10 13 11 00-0049)</small>		
10 13 11 00-0057 SF Up To 12 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	112.99 15.00	9.23
10 13 11 00-0058 SF >12 To 16 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	90.61 15.00	3.75
10 13 11 00-0059 SF >16 To 24 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	64.69 15.00	2.44
10 13 11 00-0060 SF >24 SF, Sliding Door, Wood Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i>	58.89 15.00	1.36
10 13 11 00-0061 Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinets <small>(10 13 11 00-0048)</small>		
10 13 11 00-0062 Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinets (Claridge Contemporary Series) <small>(10 13 11 00-0061)</small>		
10 13 11 00-0063 SF Up To 6 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet..... <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	126.76 15.00 12.00 21.66	9.23

10	10	Specialties
	10 10	Information Specialties
	10 13	Directories



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 13 11 00-0064	SF		>6 To 12 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	99.10 15.00 12.00 18.08	4.34
10 13 11 00-0065	SF		>12 To 16 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	84.32 15.00 12.00 15.37	3.75
10 13 11 00-0066	SF		>16 To 24 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	62.81 15.00 12.00 11.59	2.44
10 13 11 00-0067	SF		>24 SF, Hinged Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	58.89 15.00 12.00 11.24	1.36

10 13 11 00-0068 Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinets (Claridge Contemporary Series) (10 13 11 00-0061)

10 13 11 00-0069	SF		Up To 6 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	194.14 15.00 12.00 35.14	9.23
10 13 11 00-0070	SF		>6 To 12 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	114.16 15.00 12.00 21.10	4.34
10 13 11 00-0071	SF		>12 To 16 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	96.64 15.00 12.00 17.83	3.75
10 13 11 00-0072	SF		>16 To 24 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	75.24 15.00 12.00 14.07	2.44
10 13 11 00-0073	SF		>24 SF, Sliding Door, Aluminum Frame, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i> <i>For Header Panel, Add</i>	69.91 15.00 12.00 13.44	1.36

10 13 11 00-0074 Outdoor, Glass Encased, Wall Mounted Bulletin Board Cabinets (10 13 11 00-0047)

Note: Includes cork, fabric or hook-fab back panel, 3/16" tempered glass and flat key tumbler lock. Surface or recess mounted.

10 13 11 00-0075 Aluminum Frame, Outdoor, Glass Encased, Wall Mounted Bulletin Board Cabinets (10 13 11 00-0074)

10 13 11 00-0076 Hinged Door, Aluminum Frame, Outdoor, Glass Encased, Wall Mounted Bulletin Board Cabinets (10 13 11 00-0075)

10 13 11 00-0077	SF		Up To 6 SF, Hinged Door, Outdoor, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i>	184.70 15.00 12.00	9.23
10 13 11 00-0078	SF		>6 To 12 SF, Hinged Door, Outdoor, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i>	122.54 15.00 12.00	4.34
10 13 11 00-0079	SF		>12 SF, Hinged Door, Outdoor, Glass Encased, Wall Mounted Bulletin Board Cabinet <i>For Fluorescent Lights, Add</i> <i>For Bronze Anodize Finish, Add</i>	119.06 15.00 12.00	3.75

10 14 Signage (10 10)

Note: Where required, signage excludes electrical connection, disconnect, or terminations unless title states otherwise. See CSI section 26 05 19 16-0011 for electrical connection wiring, 26 05 83 00-0110 for terminations.

10 14 19 Dimensional Letter Signage (10 14)

Note: Mounted on masonry or concrete.

10 14 19 00-0001 Cast Characters (10 14 19)

Note: Any font.

10 14 19 00-0002 Satin Finish, Cast Aluminum Characters (10 14 19 00-0001)

10 14 19 00-0003	EA		2" High x 3/8" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Patina Finish, Add</i> <i>For Color Anodized, Add</i>	50.45 -5.23 2.33 7.00 9.34 11.67	6.78
10 14 19 00-0004	EA		3" High x 1/2" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Patina Finish, Add</i> <i>For Color Anodized, Add</i>	59.81 -5.92 3.05 9.16 12.21 15.26	7.32



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 14 19 00-0005	EA 4" High x 5/8" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	65.56	7.86
	<i>For Installation With Adhesive, Deduct</i>	-6.42	
	<i>For Clear Anodized, Add</i>	3.41	
	<i>For Satin Face And Enameled Return, Add</i>	10.23	
	<i>For Patina Finish, Add</i>	13.64	
	<i>For Color Anodized, Add</i>	17.06	
10 14 19 00-0006	EA 5" High x 3/4" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	75.29	9.00
	<i>For Installation With Adhesive, Deduct</i>	-7.34	
	<i>For Clear Anodized, Add</i>	3.95	
	<i>For Satin Face And Enameled Return, Add</i>	11.85	
	<i>For Patina Finish, Add</i>	15.80	
	<i>For Color Anodized, Add</i>	19.75	
10 14 19 00-0007	EA 6" High x 3/4" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	82.85	9.49
	<i>For Installation With Adhesive, Deduct</i>	-7.94	
	<i>For Clear Anodized, Add</i>	4.49	
	<i>For Satin Face And Enameled Return, Add</i>	13.47	
	<i>For Patina Finish, Add</i>	17.96	
	<i>For Color Anodized, Add</i>	22.45	
10 14 19 00-0008	EA 8" High x 3/4" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	99.04	10.84
	<i>For Installation With Adhesive, Deduct</i>	-9.29	
	<i>For Clear Anodized, Add</i>	5.57	
	<i>For Satin Face And Enameled Return, Add</i>	16.70	
	<i>For Patina Finish, Add</i>	22.26	
	<i>For Color Anodized, Add</i>	27.83	
10 14 19 00-0009	EA 9" High x 3/4" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	110.19	11.39
	<i>For Installation With Adhesive, Deduct</i>	-10.06	
	<i>For Clear Anodized, Add</i>	6.46	
	<i>For Satin Face And Enameled Return, Add</i>	19.39	
	<i>For Patina Finish, Add</i>	25.86	
	<i>For Color Anodized, Add</i>	32.32	
10 14 19 00-0010	EA 10" High x 1" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	126.01	12.20
	<i>For Installation With Adhesive, Deduct</i>	-11.18	
	<i>For Clear Anodized, Add</i>	7.72	
	<i>For Satin Face And Enameled Return, Add</i>	23.16	
	<i>For Patina Finish, Add</i>	30.88	
	<i>For Color Anodized, Add</i>	38.61	
10 14 19 00-0011	EA 12" High x 1" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	153.36	14.10
	<i>For Installation With Adhesive, Deduct</i>	-13.31	
	<i>For Clear Anodized, Add</i>	9.70	
	<i>For Satin Face And Enameled Return, Add</i>	29.09	
	<i>For Patina Finish, Add</i>	38.78	
	<i>For Color Anodized, Add</i>	48.48	
10 14 19 00-0012	EA 14" High x 1" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	183.57	16.27
	<i>For Installation With Adhesive, Deduct</i>	-15.69	
	<i>For Clear Anodized, Add</i>	11.85	
	<i>For Satin Face And Enameled Return, Add</i>	35.55	
	<i>For Patina Finish, Add</i>	47.40	
	<i>For Color Anodized, Add</i>	59.25	
10 14 19 00-0013	EA 15" High x 1-1/4" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	201.62	18.08
	<i>For Installation With Adhesive, Deduct</i>	-17.32	
	<i>For Clear Anodized, Add</i>	12.93	
	<i>For Satin Face And Enameled Return, Add</i>	38.78	
	<i>For Patina Finish, Add</i>	51.71	
	<i>For Color Anodized, Add</i>	64.64	
10 14 19 00-0014	EA 16" High x 1-1/4" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	225.32	19.52
	<i>For Installation With Adhesive, Deduct</i>	-19.08	
	<i>For Clear Anodized, Add</i>	14.72	
	<i>For Satin Face And Enameled Return, Add</i>	44.17	
	<i>For Patina Finish, Add</i>	58.89	
	<i>For Color Anodized, Add</i>	73.62	
10 14 19 00-0015	EA 18" High x 1-1/2" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	273.50	21.69
	<i>For Installation With Adhesive, Deduct</i>	-22.35	
	<i>For Clear Anodized, Add</i>	18.67	
	<i>For Satin Face And Enameled Return, Add</i>	56.02	
	<i>For Patina Finish, Add</i>	74.69	
	<i>For Color Anodized, Add</i>	93.37	
10 14 19 00-0016	EA 20" High x 1-1/2" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	331.03	24.40
	<i>For Installation With Adhesive, Deduct</i>	-26.31	
	<i>For Clear Anodized, Add</i>	23.34	
	<i>For Satin Face And Enameled Return, Add</i>	70.03	
	<i>For Patina Finish, Add</i>	93.37	
	<i>For Color Anodized, Add</i>	116.71	
10 14 19 00-0017	EA 24" High x 1-1/2" Deep, Satin Finish, Cast Aluminum Sign Letter/Character, Installed With Studs	399.32	27.11
	<i>For Installation With Adhesive, Deduct</i>	-30.81	
	<i>For Clear Anodized, Add</i>	29.09	
	<i>For Satin Face And Enameled Return, Add</i>	87.26	
	<i>For Patina Finish, Add</i>	116.35	
	<i>For Color Anodized, Add</i>	145.44	
10 14 19 00-0018	Satin Finish, Cast Bronze Characters <small>(10 14 19 00-0001)</small>		
10 14 19 00-0019	EA 2" High x 3/8" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs	61.07	7.46
	<i>For Installation With Adhesive, Deduct</i>	-6.04	
	<i>For Oxidized Finish, Add</i>	4.69	
	<i>For Polished Or Patina Finish, Add</i>	9.37	

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 14 19 00-0020	EA	3" High x 1/2" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	87.58		8.13
		<i>For Installation With Adhesive, Deduct</i>	-7.63		
		<i>For Oxidized Finish, Add</i>	8.26		
		<i>For Polished Or Patina Finish, Add</i>	16.51		
10 14 19 00-0021	EA	4" High x 5/8" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	95.70		8.68
		<i>For Installation With Adhesive, Deduct</i>	-8.26		
		<i>For Oxidized Finish, Add</i>	9.15		
		<i>For Polished Or Patina Finish, Add</i>	18.30		
10 14 19 00-0022	EA	5" High x 3/4" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	116.40		9.76
		<i>For Installation With Adhesive, Deduct</i>	-9.72		
		<i>For Oxidized Finish, Add</i>	11.60		
		<i>For Polished Or Patina Finish, Add</i>	23.21		
10 14 19 00-0023	EA	6" High x 1/2" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	129.53		10.41
		<i>For Installation With Adhesive, Deduct</i>	-10.65		
		<i>For Oxidized Finish, Add</i>	13.17		
		<i>For Polished Or Patina Finish, Add</i>	26.33		
10 14 19 00-0024	EA	8" High x 3/4" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	172.69		11.93
		<i>For Installation With Adhesive, Deduct</i>	-13.41		
		<i>For Oxidized Finish, Add</i>	18.75		
		<i>For Polished Or Patina Finish, Add</i>	37.49		
10 14 19 00-0025	EA	9" High x 3/4" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	197.17		12.47
		<i>For Installation With Adhesive, Deduct</i>	-14.85		
		<i>For Oxidized Finish, Add</i>	22.09		
		<i>For Polished Or Patina Finish, Add</i>	44.18		
10 14 19 00-0026	EA	10" High x 1" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	220.85		13.56
		<i>For Installation With Adhesive, Deduct</i>	-16.47		
		<i>For Oxidized Finish, Add</i>	24.99		
		<i>For Polished Or Patina Finish, Add</i>	49.99		
10 14 19 00-0027	EA	12" High x 1" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	262.26		15.72
		<i>For Installation With Adhesive, Deduct</i>	-19.40		
		<i>For Oxidized Finish, Add</i>	29.90		
		<i>For Polished Or Patina Finish, Add</i>	59.81		
10 14 19 00-0028	EA	14" High x 1" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	308.12		17.90
		<i>For Installation With Adhesive, Deduct</i>	-22.56		
		<i>For Oxidized Finish, Add</i>	35.48		
		<i>For Polished Or Patina Finish, Add</i>	70.96		
10 14 19 00-0029	EA	15" High x 1-1/4" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	364.97		21.69
		<i>For Installation With Adhesive, Deduct</i>	-26.93		
		<i>For Oxidized Finish, Add</i>	41.73		
		<i>For Polished Or Patina Finish, Add</i>	83.46		
10 14 19 00-0030	EA	16" High x 1-1/4" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	378.91		23.32
		<i>For Installation With Adhesive, Deduct</i>	-28.27		
		<i>For Oxidized Finish, Add</i>	42.85		
		<i>For Polished Or Patina Finish, Add</i>	85.69		
10 14 19 00-0031	EA	18" High x 1-1/2" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	538.39		27.11
		<i>For Installation With Adhesive, Deduct</i>	-37.76		
		<i>For Oxidized Finish, Add</i>	64.49		
		<i>For Polished Or Patina Finish, Add</i>	128.98		
10 14 19 00-0032	EA	20" High x 1-1/2" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	648.65		30.51
		<i>For Installation With Adhesive, Deduct</i>	-44.63		
		<i>For Oxidized Finish, Add</i>	79.00		
		<i>For Polished Or Patina Finish, Add</i>	157.99		
10 14 19 00-0033	EA	24" High x 1-1/2" Deep, Satin Finish, Cast Bronze Sign Letter/Character, Installed With Studs.....	825.33		35.24
		<i>For Installation With Adhesive, Deduct</i>	-55.37		
		<i>For Oxidized Finish, Add</i>	102.65		
		<i>For Polished Or Patina Finish, Add</i>	205.30		
10 14 19 00-0034		Molded Characters <small>(10 14 19)</small>			
		Note: Any font.			
10 14 19 00-0035		Molded Plastic Characters <small>(10 14 19 00-0034)</small>			
10 14 19 00-0036	EA	4" High x 3/4" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	38.71		5.43
		<i>For Installation With Adhesive, Deduct</i>	-4.10		
10 14 19 00-0037	EA	5" High x 3/4" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	41.91		5.97
		<i>For Installation With Adhesive, Deduct</i>	-4.48		
10 14 19 00-0038	EA	6" High x 3/4" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	46.29		6.50
		<i>For Installation With Adhesive, Deduct</i>	-4.92		
10 14 19 00-0039	EA	8" High x 3/4" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	59.34		7.05
		<i>For Installation With Adhesive, Deduct</i>	-5.79		
10 14 19 00-0040	EA	9" High x 3/4" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	64.13		7.59
		<i>For Installation With Adhesive, Deduct</i>	-6.24		
10 14 19 00-0041	EA	10" High x 1" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	69.46		8.13
		<i>For Installation With Adhesive, Deduct</i>	-6.73		
10 14 19 00-0042	EA	12" High x 1" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	80.95		9.49
		<i>For Installation With Adhesive, Deduct</i>	-7.84		
10 14 19 00-0043	EA	15" High x 1" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	106.69		11.93
		<i>For Installation With Adhesive, Deduct</i>	-10.11		
10 14 19 00-0044	EA	18" High x 1-1/2" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	135.88		14.10
		<i>For Installation With Adhesive, Deduct</i>	-12.43		
10 14 19 00-0045	EA	24" High x 1-1/2" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	201.31		17.36
		<i>For Installation With Adhesive, Deduct</i>	-17.01		
10 14 19 00-0046	EA	30" High x 1-1/2" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	299.13		20.34
		<i>For Installation With Adhesive, Deduct</i>	-23.09		
10 14 19 00-0047	EA	36" High x 1-1/2" Deep, Molded Plastic Sign Letter/Character, Installed With Studs.....	392.82		23.32
		<i>For Installation With Adhesive, Deduct</i>	-28.97		



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 14 19 00-0048	EA 48" High x 1-1/2" Deep, Molded Plastic Sign Letter/Character, Installed With Studs..... <i>For Installation With Adhesive, Deduct</i>	735.17 -49.23	31.18
10 14 19 00-0049	Cutout Characters (10 14 19) Note: Any font.		
10 14 19 00-0050	Satin Finish, Aluminum Characters (10 14 19 00-0049)		
10 14 19 00-0051	1/4" Deep, Satin Finish, Aluminum Characters (10 14 19 00-0050)		
10 14 19 00-0052	EA 2" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	46.86 -5.05 1.98 6.91 9.88 9.88 14.81	6.78
10 14 19 00-0053	EA 4" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	65.56 -6.42 3.41 11.94 17.06 17.06 25.58	7.86
10 14 19 00-0054	EA 6" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	88.23 -8.21 5.03 17.59 25.14 25.14 37.70	9.49
10 14 19 00-0055	EA 8" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	108.02 -9.74 6.46 22.62 32.32 32.32 48.48	10.84
10 14 19 00-0056	EA 10" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	124.21 -11.09 7.54 26.39 37.71 37.71 56.56	12.20
10 14 19 00-0057	EA 12" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	142.58 -12.77 8.62 30.16 43.09 43.09 64.64	14.10
10 14 19 00-0058	EA 14" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	167.41 -14.88 10.23 35.82 51.17 51.17 76.76	16.27
10 14 19 00-0059	EA 16" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	198.39 -17.73 12.03 42.11 60.15 60.15 90.23	19.52
10 14 19 00-0060	EA 18" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	223.23 -19.84 13.65 47.76 68.23 68.23 102.35	21.69
10 14 19 00-0061	EA 20" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	268.18 -23.17 17.06 59.70 85.29 85.29 127.93	24.40
10 14 19 00-0062	EA 22" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	307.73 -25.69 20.47 71.64 102.35 102.35 153.52	25.76

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0063	EA		24" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	381.37	27.11
			<i>For Installation With Adhesive, Deduct</i>	-29.91	
			<i>For Clear Anodized, Add</i>	27.29	
			<i>For Satin Face And Enameled Return, Add</i>	95.52	
			<i>For Color Anodized, Add</i>	136.46	
			<i>For Polished Or Patina Finish, Add</i>	136.46	
			<i>For Polished Anodized Finish, Add</i>	204.69	
10 14 19 00-0064	EA		30" High x 1/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	546.11	32.54
			<i>For Installation With Adhesive, Deduct</i>	-40.32	
			<i>For Clear Anodized, Add</i>	41.60	
			<i>For Satin Face And Enameled Return, Add</i>	145.59	
			<i>For Color Anodized, Add</i>	207.98	
			<i>For Polished Or Patina Finish, Add</i>	207.98	
			<i>For Polished Anodized Finish, Add</i>	311.97	
10 14 19 00-0065			3/8" Deep, Satin Finish, Aluminum Characters (10 14 19 00-0050)		
10 14 19 00-0066	EA		2" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	59.50	6.78
			<i>For Installation With Adhesive, Deduct</i>	-5.69	
			<i>For Clear Anodized, Add</i>	3.24	
			<i>For Satin Face And Enameled Return, Add</i>	11.34	
			<i>For Color Anodized, Add</i>	16.20	
			<i>For Polished Or Patina Finish, Add</i>	16.20	
			<i>For Polished Anodized Finish, Add</i>	24.29	
10 14 19 00-0067	EA		4" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	85.35	7.86
			<i>For Installation With Adhesive, Deduct</i>	-7.41	
			<i>For Clear Anodized, Add</i>	5.39	
			<i>For Satin Face And Enameled Return, Add</i>	18.87	
			<i>For Color Anodized, Add</i>	26.95	
			<i>For Polished Or Patina Finish, Add</i>	26.95	
			<i>For Polished Anodized Finish, Add</i>	40.43	
10 14 19 00-0068	EA		6" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	107.84	9.49
			<i>For Installation With Adhesive, Deduct</i>	-9.19	
			<i>For Clear Anodized, Add</i>	6.99	
			<i>For Satin Face And Enameled Return, Add</i>	24.46	
			<i>For Color Anodized, Add</i>	34.94	
			<i>For Polished Or Patina Finish, Add</i>	34.94	
			<i>For Polished Anodized Finish, Add</i>	52.41	
10 14 19 00-0069	EA		8" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	135.17	10.84
			<i>For Installation With Adhesive, Deduct</i>	-11.10	
			<i>For Clear Anodized, Add</i>	9.18	
			<i>For Satin Face And Enameled Return, Add</i>	32.13	
			<i>For Color Anodized, Add</i>	45.90	
			<i>For Polished Or Patina Finish, Add</i>	45.90	
			<i>For Polished Anodized Finish, Add</i>	68.84	
10 14 19 00-0070	EA		10" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	156.64	12.20
			<i>For Installation With Adhesive, Deduct</i>	-12.71	
			<i>For Clear Anodized, Add</i>	10.78	
			<i>For Satin Face And Enameled Return, Add</i>	37.74	
			<i>For Color Anodized, Add</i>	53.92	
			<i>For Polished Or Patina Finish, Add</i>	53.92	
			<i>For Polished Anodized Finish, Add</i>	80.88	
10 14 19 00-0071	EA		12" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	183.95	14.10
			<i>For Installation With Adhesive, Deduct</i>	-14.84	
			<i>For Clear Anodized, Add</i>	12.76	
			<i>For Satin Face And Enameled Return, Add</i>	44.64	
			<i>For Color Anodized, Add</i>	63.78	
			<i>For Polished Or Patina Finish, Add</i>	63.78	
			<i>For Polished Anodized Finish, Add</i>	95.66	
10 14 19 00-0072	EA		14" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	215.51	16.27
			<i>For Installation With Adhesive, Deduct</i>	-17.28	
			<i>For Clear Anodized, Add</i>	15.04	
			<i>For Satin Face And Enameled Return, Add</i>	52.65	
			<i>For Color Anodized, Add</i>	75.22	
			<i>For Polished Or Patina Finish, Add</i>	75.22	
			<i>For Polished Anodized Finish, Add</i>	112.83	
10 14 19 00-0073	EA		16" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	266.96	19.52
			<i>For Installation With Adhesive, Deduct</i>	-21.16	
			<i>For Clear Anodized, Add</i>	18.89	
			<i>For Satin Face And Enameled Return, Add</i>	66.10	
			<i>For Color Anodized, Add</i>	94.44	
			<i>For Polished Or Patina Finish, Add</i>	94.44	
			<i>For Polished Anodized Finish, Add</i>	141.65	
10 14 19 00-0074	EA		18" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	309.20	21.69
			<i>For Installation With Adhesive, Deduct</i>	-24.14	
			<i>For Clear Anodized, Add</i>	22.24	
			<i>For Satin Face And Enameled Return, Add</i>	77.85	
			<i>For Color Anodized, Add</i>	111.22	
			<i>For Polished Or Patina Finish, Add</i>	111.22	
			<i>For Polished Anodized Finish, Add</i>	166.82	
10 14 19 00-0075	EA		20" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	358.59	24.40
			<i>For Installation With Adhesive, Deduct</i>	-27.69	
			<i>For Clear Anodized, Add</i>	26.10	
			<i>For Satin Face And Enameled Return, Add</i>	91.34	
			<i>For Color Anodized, Add</i>	130.49	
			<i>For Polished Or Patina Finish, Add</i>	130.49	
			<i>For Polished Anodized Finish, Add</i>	195.74	



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0076	EA		22" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	401.88	25.76
			<i>For Installation With Adhesive, Deduct</i>	-30.40	
			<i>For Clear Anodized, Add</i>	29.88	
			<i>For Satin Face And Enameled Return, Add</i>	104.59	
			<i>For Color Anodized, Add</i>	149.42	
			<i>For Polished Or Patina Finish, Add</i>	149.42	
			<i>For Polished Anodized Finish, Add</i>	224.13	
10 14 19 00-0077	EA		24" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	446.87	27.11
			<i>For Installation With Adhesive, Deduct</i>	-33.19	
			<i>For Clear Anodized, Add</i>	33.84	
			<i>For Satin Face And Enameled Return, Add</i>	118.45	
			<i>For Color Anodized, Add</i>	169.21	
			<i>For Polished Or Patina Finish, Add</i>	169.21	
			<i>For Polished Anodized Finish, Add</i>	253.82	
10 14 19 00-0078	EA		30" High x 3/8" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	614.93	32.54
			<i>For Installation With Adhesive, Deduct</i>	-43.76	
			<i>For Clear Anodized, Add</i>	48.48	
			<i>For Satin Face And Enameled Return, Add</i>	169.67	
			<i>For Color Anodized, Add</i>	242.39	
			<i>For Polished Or Patina Finish, Add</i>	242.39	
			<i>For Polished Anodized Finish, Add</i>	363.59	
10 14 19 00-0079			1/2" Deep, Satin Finish, Aluminum Characters <small>(10 14 19 00-0050)</small>		
10 14 19 00-0080	EA		2" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	74.12	6.78
			<i>For Installation With Adhesive, Deduct</i>	-6.42	
			<i>For Clear Anodized, Add</i>	4.70	
			<i>For Satin Face And Enameled Return, Add</i>	16.45	
			<i>For Color Anodized, Add</i>	23.51	
			<i>For Polished Or Patina Finish, Add</i>	23.51	
			<i>For Polished Anodized Finish, Add</i>	35.26	
10 14 19 00-0081	EA		4" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	95.93	7.86
			<i>For Installation With Adhesive, Deduct</i>	-7.94	
			<i>For Clear Anodized, Add</i>	6.45	
			<i>For Satin Face And Enameled Return, Add</i>	22.57	
			<i>For Color Anodized, Add</i>	32.24	
			<i>For Polished Or Patina Finish, Add</i>	32.24	
			<i>For Polished Anodized Finish, Add</i>	48.36	
10 14 19 00-0082	EA		6" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	120.41	9.49
			<i>For Installation With Adhesive, Deduct</i>	-9.82	
			<i>For Clear Anodized, Add</i>	8.25	
			<i>For Satin Face And Enameled Return, Add</i>	28.86	
			<i>For Color Anodized, Add</i>	41.23	
			<i>For Polished Or Patina Finish, Add</i>	41.23	
			<i>For Polished Anodized Finish, Add</i>	61.84	
10 14 19 00-0083	EA		8" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	142.28	10.84
			<i>For Installation With Adhesive, Deduct</i>	-11.45	
			<i>For Clear Anodized, Add</i>	9.89	
			<i>For Satin Face And Enameled Return, Add</i>	34.62	
			<i>For Color Anodized, Add</i>	49.45	
			<i>For Polished Or Patina Finish, Add</i>	49.45	
			<i>For Polished Anodized Finish, Add</i>	74.18	
10 14 19 00-0084	EA		10" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	165.69	12.20
			<i>For Installation With Adhesive, Deduct</i>	-13.16	
			<i>For Clear Anodized, Add</i>	11.69	
			<i>For Satin Face And Enameled Return, Add</i>	40.91	
			<i>For Color Anodized, Add</i>	58.45	
			<i>For Polished Or Patina Finish, Add</i>	58.45	
			<i>For Polished Anodized Finish, Add</i>	87.67	
10 14 19 00-0085	EA		12" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	203.77	14.10
			<i>For Installation With Adhesive, Deduct</i>	-15.83	
			<i>For Clear Anodized, Add</i>	14.74	
			<i>For Satin Face And Enameled Return, Add</i>	51.58	
			<i>For Color Anodized, Add</i>	73.69	
			<i>For Polished Or Patina Finish, Add</i>	73.69	
			<i>For Polished Anodized Finish, Add</i>	110.53	
10 14 19 00-0086	EA		14" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	251.34	16.27
			<i>For Installation With Adhesive, Deduct</i>	-19.07	
			<i>For Clear Anodized, Add</i>	18.63	
			<i>For Satin Face And Enameled Return, Add</i>	65.19	
			<i>For Color Anodized, Add</i>	93.14	
			<i>For Polished Or Patina Finish, Add</i>	93.14	
			<i>For Polished Anodized Finish, Add</i>	139.70	
10 14 19 00-0087	EA		16" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	304.25	19.52
			<i>For Installation With Adhesive, Deduct</i>	-23.02	
			<i>For Clear Anodized, Add</i>	22.62	
			<i>For Satin Face And Enameled Return, Add</i>	79.16	
			<i>For Color Anodized, Add</i>	113.08	
			<i>For Polished Or Patina Finish, Add</i>	113.08	
			<i>For Polished Anodized Finish, Add</i>	169.62	
10 14 19 00-0088	EA		18" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs	369.24	21.69
			<i>For Installation With Adhesive, Deduct</i>	-27.14	
			<i>For Clear Anodized, Add</i>	28.25	
			<i>For Satin Face And Enameled Return, Add</i>	98.86	
			<i>For Color Anodized, Add</i>	141.24	
			<i>For Polished Or Patina Finish, Add</i>	141.24	
			<i>For Polished Anodized Finish, Add</i>	211.85	

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0089	EA		20" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	435.34	24.40
			<i>For Installation With Adhesive, Deduct</i>	-31.53	
			<i>For Clear Anodized, Add</i>	33.77	
			<i>For Satin Face And Enameled Return, Add</i>	118.21	
			<i>For Color Anodized, Add</i>	168.87	
			<i>For Polished Or Patina Finish, Add</i>	168.87	
			<i>For Polished Anodized Finish, Add</i>	253.30	
10 14 19 00-0090	EA		22" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	500.13	25.76
			<i>For Installation With Adhesive, Deduct</i>	-35.31	
			<i>For Clear Anodized, Add</i>	39.71	
			<i>For Satin Face And Enameled Return, Add</i>	138.98	
			<i>For Color Anodized, Add</i>	198.55	
			<i>For Polished Or Patina Finish, Add</i>	198.55	
			<i>For Polished Anodized Finish, Add</i>	297.82	
10 14 19 00-0091	EA		24" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	561.49	27.11
			<i>For Installation With Adhesive, Deduct</i>	-38.92	
			<i>For Clear Anodized, Add</i>	45.30	
			<i>For Satin Face And Enameled Return, Add</i>	158.56	
			<i>For Color Anodized, Add</i>	226.52	
			<i>For Polished Or Patina Finish, Add</i>	226.52	
			<i>For Polished Anodized Finish, Add</i>	339.78	
10 14 19 00-0092	EA		30" High x 1/2" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	779.76	32.54
			<i>For Installation With Adhesive, Deduct</i>	-52.00	
			<i>For Clear Anodized, Add</i>	64.96	
			<i>For Satin Face And Enameled Return, Add</i>	227.36	
			<i>For Color Anodized, Add</i>	324.81	
			<i>For Polished Or Patina Finish, Add</i>	324.81	
			<i>For Polished Anodized Finish, Add</i>	487.21	
10 14 19 00-0093			3/4" Deep, Satin Finish, Aluminum Characters <small>(10 14 19 00-0050)</small>		
10 14 19 00-0094	EA		2" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	77.47	6.78
			<i>For Installation With Adhesive, Deduct</i>	-6.58	
			<i>For Clear Anodized, Add</i>	5.04	
			<i>For Satin Face And Enameled Return, Add</i>	17.63	
			<i>For Color Anodized, Add</i>	25.18	
			<i>For Polished Or Patina Finish, Add</i>	25.18	
			<i>For Polished Anodized Finish, Add</i>	37.77	
10 14 19 00-0095	EA		4" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	99.68	7.86
			<i>For Installation With Adhesive, Deduct</i>	-8.13	
			<i>For Clear Anodized, Add</i>	6.82	
			<i>For Satin Face And Enameled Return, Add</i>	23.88	
			<i>For Color Anodized, Add</i>	34.12	
			<i>For Polished Or Patina Finish, Add</i>	34.12	
			<i>For Polished Anodized Finish, Add</i>	51.17	
10 14 19 00-0096	EA		6" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	131.47	9.49
			<i>For Installation With Adhesive, Deduct</i>	-10.37	
			<i>For Clear Anodized, Add</i>	9.35	
			<i>For Satin Face And Enameled Return, Add</i>	32.73	
			<i>For Color Anodized, Add</i>	46.76	
			<i>For Polished Or Patina Finish, Add</i>	46.76	
			<i>For Polished Anodized Finish, Add</i>	70.13	
10 14 19 00-0097	EA		8" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	174.60	10.84
			<i>For Installation With Adhesive, Deduct</i>	-13.07	
			<i>For Clear Anodized, Add</i>	13.12	
			<i>For Satin Face And Enameled Return, Add</i>	45.93	
			<i>For Color Anodized, Add</i>	65.61	
			<i>For Polished Or Patina Finish, Add</i>	65.61	
			<i>For Polished Anodized Finish, Add</i>	98.42	
10 14 19 00-0098	EA		10" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	219.23	12.20
			<i>For Installation With Adhesive, Deduct</i>	-15.84	
			<i>For Clear Anodized, Add</i>	17.04	
			<i>For Satin Face And Enameled Return, Add</i>	59.65	
			<i>For Color Anodized, Add</i>	85.22	
			<i>For Polished Or Patina Finish, Add</i>	85.22	
			<i>For Polished Anodized Finish, Add</i>	127.82	
10 14 19 00-0099	EA		12" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	275.31	14.10
			<i>For Installation With Adhesive, Deduct</i>	-19.41	
			<i>For Clear Anodized, Add</i>	21.89	
			<i>For Satin Face And Enameled Return, Add</i>	76.62	
			<i>For Color Anodized, Add</i>	109.46	
			<i>For Polished Or Patina Finish, Add</i>	109.46	
			<i>For Polished Anodized Finish, Add</i>	164.18	
10 14 19 00-0100	EA		14" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	343.44	16.27
			<i>For Installation With Adhesive, Deduct</i>	-23.68	
			<i>For Clear Anodized, Add</i>	27.84	
			<i>For Satin Face And Enameled Return, Add</i>	97.43	
			<i>For Color Anodized, Add</i>	139.19	
			<i>For Polished Or Patina Finish, Add</i>	139.19	
			<i>For Polished Anodized Finish, Add</i>	208.78	
10 14 19 00-0101	EA		16" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	424.55	19.52
			<i>For Installation With Adhesive, Deduct</i>	-29.04	
			<i>For Clear Anodized, Add</i>	34.65	
			<i>For Satin Face And Enameled Return, Add</i>	121.26	
			<i>For Color Anodized, Add</i>	173.23	
			<i>For Polished Or Patina Finish, Add</i>	173.23	
			<i>For Polished Anodized Finish, Add</i>	259.85	

	Specialties	10
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0102	EA		18" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	519.34 -34.64 43.26 151.40 216.29 216.29 324.43	21.69
10 14 19 00-0103	EA		20" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	617.86 -40.65 52.03 182.09 260.13 260.13 390.19	24.40
10 14 19 00-0104	EA		22" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	717.10 -46.16 61.41 214.92 307.03 307.03 460.55	25.76
10 14 19 00-0105	EA		24" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	820.76 -51.88 71.23 249.31 356.16 356.16 534.23	27.11
10 14 19 00-0106	EA		30" High x 3/4" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	1,128.81 -69.46 99.87 349.53 499.33 499.33 749.00	32.54
10 14 19 00-0107			1" Deep, Satin Finish, Aluminum Characters <small>(10 14 19 00-0050)</small>		
10 14 19 00-0108	EA		2" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	86.36 -7.03 5.93 20.74 29.63 29.63 44.44	6.78
10 14 19 00-0109	EA		4" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	106.84 -8.49 7.54 26.39 37.70 37.70 56.54	7.86
10 14 19 00-0110	EA		6" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	140.52 -10.82 10.26 35.90 51.28 51.28 76.92	9.49
10 14 19 00-0111	EA		8" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	192.69 -13.97 14.93 52.26 74.66 74.66 111.98	10.84
10 14 19 00-0112	EA		10" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	262.21 -17.99 21.34 74.69 106.71 106.71 160.06	12.20
10 14 19 00-0113	EA		12" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	343.39 -22.81 28.70 100.45 143.50 143.50 215.24	14.10
10 14 19 00-0114	EA		14" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Clear Anodized, Add</i> <i>For Satin Face And Enameled Return, Add</i> <i>For Color Anodized, Add</i> <i>For Polished Or Patina Finish, Add</i> <i>For Polished Anodized Finish, Add</i>	434.53 -28.23 36.95 129.31 184.73 184.73 277.10	16.27

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0115	EA		16" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	540.04	19.52
			<i>For Installation With Adhesive, Deduct</i>	-34.81	
			<i>For Clear Anodized, Add</i>	46.20	
			<i>For Satin Face And Enameled Return, Add</i>	161.68	
			<i>For Color Anodized, Add</i>	230.98	
			<i>For Polished Or Patina Finish, Add</i>	230.98	
			<i>For Polished Anodized Finish, Add</i>	346.46	
10 14 19 00-0116	EA		18" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	654.44	21.69
			<i>For Installation With Adhesive, Deduct</i>	-41.40	
			<i>For Clear Anodized, Add</i>	56.77	
			<i>For Satin Face And Enameled Return, Add</i>	198.68	
			<i>For Color Anodized, Add</i>	283.84	
			<i>For Polished Or Patina Finish, Add</i>	283.84	
			<i>For Polished Anodized Finish, Add</i>	425.75	
10 14 19 00-0117	EA		20" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	805.49	24.40
			<i>For Installation With Adhesive, Deduct</i>	-50.04	
			<i>For Clear Anodized, Add</i>	70.79	
			<i>For Satin Face And Enameled Return, Add</i>	247.76	
			<i>For Color Anodized, Add</i>	353.94	
			<i>For Polished Or Patina Finish, Add</i>	353.94	
			<i>For Polished Anodized Finish, Add</i>	530.91	
10 14 19 00-0118	EA		22" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	960.68	25.76
			<i>For Installation With Adhesive, Deduct</i>	-58.34	
			<i>For Clear Anodized, Add</i>	85.76	
			<i>For Satin Face And Enameled Return, Add</i>	300.17	
			<i>For Color Anodized, Add</i>	428.82	
			<i>For Polished Or Patina Finish, Add</i>	428.82	
			<i>For Polished Anodized Finish, Add</i>	643.23	
10 14 19 00-0119	EA		24" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	1,134.61	27.11
			<i>For Installation With Adhesive, Deduct</i>	-67.58	
			<i>For Clear Anodized, Add</i>	102.62	
			<i>For Satin Face And Enameled Return, Add</i>	359.16	
			<i>For Color Anodized, Add</i>	513.08	
			<i>For Polished Or Patina Finish, Add</i>	513.08	
			<i>For Polished Anodized Finish, Add</i>	769.62	
10 14 19 00-0120	EA		30" High x 1" Deep, Satin Finish, Aluminum Sign Letter/Character, Installed With Studs.....	1,603.90	32.54
			<i>For Installation With Adhesive, Deduct</i>	-93.21	
			<i>For Clear Anodized, Add</i>	147.38	
			<i>For Satin Face And Enameled Return, Add</i>	515.81	
			<i>For Color Anodized, Add</i>	736.88	
			<i>For Polished Or Patina Finish, Add</i>	736.88	
			<i>For Polished Anodized Finish, Add</i>	1,105.31	
10 14 19 00-0121			Satin Finish, Brass Characters <small>(10 14 19 00-0049)</small>		
10 14 19 00-0122			1/4" Deep, Satin Finish, Brass Characters <small>(10 14 19 00-0121)</small>		
10 14 19 00-0123	EA		2" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	63.56	6.78
			<i>For Installation With Adhesive, Deduct</i>	-5.89	
			<i>For Oxidized Finish, Add</i>	5.47	
			<i>For Polished Finish, Add</i>	10.94	
10 14 19 00-0124	EA		4" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	82.18	7.86
			<i>For Installation With Adhesive, Deduct</i>	-7.25	
			<i>For Oxidized Finish, Add</i>	7.61	
			<i>For Polished Finish, Add</i>	15.22	
10 14 19 00-0125	EA		6" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	113.47	9.49
			<i>For Installation With Adhesive, Deduct</i>	-9.47	
			<i>For Oxidized Finish, Add</i>	11.33	
			<i>For Polished Finish, Add</i>	22.65	
10 14 19 00-0126	EA		8" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	148.84	10.84
			<i>For Installation With Adhesive, Deduct</i>	-11.78	
			<i>For Oxidized Finish, Add</i>	15.82	
			<i>For Polished Finish, Add</i>	31.64	
10 14 19 00-0127	EA		10" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	190.71	12.20
			<i>For Installation With Adhesive, Deduct</i>	-14.42	
			<i>For Oxidized Finish, Add</i>	21.29	
			<i>For Polished Finish, Add</i>	42.57	
10 14 19 00-0128	EA		12" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	241.28	14.10
			<i>For Installation With Adhesive, Deduct</i>	-17.70	
			<i>For Oxidized Finish, Add</i>	27.73	
			<i>For Polished Finish, Add</i>	55.46	
10 14 19 00-0129	EA		14" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	302.02	16.27
			<i>For Installation With Adhesive, Deduct</i>	-21.61	
			<i>For Oxidized Finish, Add</i>	35.54	
			<i>For Polished Finish, Add</i>	71.09	
10 14 19 00-0130	EA		16" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	368.42	19.52
			<i>For Installation With Adhesive, Deduct</i>	-26.23	
			<i>For Oxidized Finish, Add</i>	43.55	
			<i>For Polished Finish, Add</i>	87.10	
10 14 19 00-0131	EA		18" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	447.59	21.69
			<i>For Installation With Adhesive, Deduct</i>	-31.06	
			<i>For Oxidized Finish, Add</i>	54.12	
			<i>For Polished Finish, Add</i>	108.25	



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 14 19 00-0132	EA 20" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	532.46 -36.38 65.23 130.46	24.40
10 14 19 00-0133	EA 22" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	655.06 -43.06 82.80 165.61	25.76
10 14 19 00-0134	EA 24" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	718.50 -46.77 91.51 183.02	27.11
10 14 19 00-0135	EA 30" High x 1/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	1,081.37 -67.08 142.68 285.37	32.54
10 14 19 00-0136	3/8" Deep, Satin Finish, Brass Characters <small>(10 14 19 00-0121)</small>		
10 14 19 00-0137	EA 2" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	76.32 -6.53 7.38 14.76	6.78
10 14 19 00-0138	EA 4" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	99.93 -8.14 10.27 20.54	7.86
10 14 19 00-0139	EA 6" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	143.68 -10.98 15.86 31.72	9.49
10 14 19 00-0140	EA 8" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	191.02 -13.89 22.15 44.29	10.84
10 14 19 00-0141	EA 10" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	254.57 -17.61 30.87 61.73	12.20
10 14 19 00-0142	EA 12" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	324.47 -21.86 40.21 80.42	14.10
10 14 19 00-0143	EA 14" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	408.65 -26.94 51.54 103.07	16.27
10 14 19 00-0144	EA 16" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	484.56 -32.04 60.97 121.94	19.52
10 14 19 00-0145	EA 18" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	609.96 -39.18 78.48 156.96	21.69
10 14 19 00-0146	EA 20" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	706.40 -45.08 91.32 182.64	24.40
10 14 19 00-0147	EA 22" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	870.35 -53.82 115.10 230.19	25.76
10 14 19 00-0148	EA 24" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	993.03 -60.50 132.69 265.37	27.11
10 14 19 00-0149	EA 30" High x 3/8" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	1,376.25 -81.83 186.92 373.83	32.54
10 14 19 00-0150	1/2" Deep, Satin Finish, Brass Characters <small>(10 14 19 00-0121)</small>		
10 14 19 00-0151	EA 2" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	96.37 -7.53 10.39 20.78	6.78
10 14 19 00-0152	EA 4" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	125.29 -9.41 14.08 28.15	7.86

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 14 19 00-0153	EA	6" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	181.43		9.49
		<i>For Installation With Adhesive, Deduct</i>	-12.87		
		<i>For Oxidized Finish, Add</i>	21.52		
		<i>For Polished Finish, Add</i>	43.04		
10 14 19 00-0154	EA	8" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	249.02		10.84
		<i>For Installation With Adhesive, Deduct</i>	-16.79		
		<i>For Oxidized Finish, Add</i>	30.85		
		<i>For Polished Finish, Add</i>	61.69		
10 14 19 00-0155	EA	10" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	346.81		12.20
		<i>For Installation With Adhesive, Deduct</i>	-22.22		
		<i>For Oxidized Finish, Add</i>	44.70		
		<i>For Polished Finish, Add</i>	89.40		
10 14 19 00-0156	EA	12" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	463.13		14.10
		<i>For Installation With Adhesive, Deduct</i>	-28.80		
		<i>For Oxidized Finish, Add</i>	61.01		
		<i>For Polished Finish, Add</i>	122.02		
10 14 19 00-0157	EA	14" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	574.52		16.27
		<i>For Installation With Adhesive, Deduct</i>	-35.23		
		<i>For Oxidized Finish, Add</i>	76.42		
		<i>For Polished Finish, Add</i>	152.84		
10 14 19 00-0158	EA	16" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	684.89		19.52
		<i>For Installation With Adhesive, Deduct</i>	-42.05		
		<i>For Oxidized Finish, Add</i>	91.02		
		<i>For Polished Finish, Add</i>	182.04		
10 14 19 00-0159	EA	18" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	934.71		21.69
		<i>For Installation With Adhesive, Deduct</i>	-55.41		
		<i>For Oxidized Finish, Add</i>	127.19		
		<i>For Polished Finish, Add</i>	254.38		
10 14 19 00-0160	EA	20" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	1,054.28		24.40
		<i>For Installation With Adhesive, Deduct</i>	-62.48		
		<i>For Oxidized Finish, Add</i>	143.50		
		<i>For Polished Finish, Add</i>	287.00		
10 14 19 00-0161	EA	22" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	1,317.49		25.76
		<i>For Installation With Adhesive, Deduct</i>	-76.18		
		<i>For Oxidized Finish, Add</i>	182.17		
		<i>For Polished Finish, Add</i>	364.34		
10 14 19 00-0162	EA	24" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	1,542.07		27.11
		<i>For Installation With Adhesive, Deduct</i>	-87.95		
		<i>For Oxidized Finish, Add</i>	215.04		
		<i>For Polished Finish, Add</i>	430.09		
10 14 19 00-0163	EA	30" High x 1/2" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	2,327.48		32.54
		<i>For Installation With Adhesive, Deduct</i>	-129.39		
		<i>For Oxidized Finish, Add</i>	329.60		
		<i>For Polished Finish, Add</i>	659.20		
10 14 19 00-0164		3/4" Deep, Satin Finish, Brass Characters (10 14 19 00-0121)			
10 14 19 00-0165	EA	2" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	118.25		6.78
		<i>For Installation With Adhesive, Deduct</i>	-8.62		
		<i>For Oxidized Finish, Add</i>	13.67		
		<i>For Polished Finish, Add</i>	27.34		
10 14 19 00-0166	EA	4" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	165.87		7.86
		<i>For Installation With Adhesive, Deduct</i>	-11.44		
		<i>For Oxidized Finish, Add</i>	20.16		
		<i>For Polished Finish, Add</i>	40.33		
10 14 19 00-0167	EA	6" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	226.74		9.49
		<i>For Installation With Adhesive, Deduct</i>	-15.13		
		<i>For Oxidized Finish, Add</i>	28.32		
		<i>For Polished Finish, Add</i>	56.63		
10 14 19 00-0168	EA	8" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	307.02		10.84
		<i>For Installation With Adhesive, Deduct</i>	-19.69		
		<i>For Oxidized Finish, Add</i>	39.55		
		<i>For Polished Finish, Add</i>	79.09		
10 14 19 00-0169	EA	10" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	417.77		12.20
		<i>For Installation With Adhesive, Deduct</i>	-25.77		
		<i>For Oxidized Finish, Add</i>	55.35		
		<i>For Polished Finish, Add</i>	110.69		
10 14 19 00-0170	EA	12" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	574.05		14.10
		<i>For Installation With Adhesive, Deduct</i>	-34.34		
		<i>For Oxidized Finish, Add</i>	77.65		
		<i>For Polished Finish, Add</i>	155.30		
10 14 19 00-0171	EA	14" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	716.69		16.27
		<i>For Installation With Adhesive, Deduct</i>	-42.34		
		<i>For Oxidized Finish, Add</i>	97.74		
		<i>For Polished Finish, Add</i>	195.49		
10 14 19 00-0172	EA	16" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	835.86		19.52
		<i>For Installation With Adhesive, Deduct</i>	-49.60		
		<i>For Oxidized Finish, Add</i>	113.67		
		<i>For Polished Finish, Add</i>	227.33		
10 14 19 00-0173	EA	18" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs	1,115.12		21.69
		<i>For Installation With Adhesive, Deduct</i>	-64.43		
		<i>For Oxidized Finish, Add</i>	154.25		
		<i>For Polished Finish, Add</i>	308.51		



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 14 19 00-0174	EA 20" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	1,219.52 -70.74 168.29 336.57	24.40
10 14 19 00-0175	EA 22" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	1,549.34 -87.77 216.95 433.89	25.76
10 14 19 00-0176	EA 24" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	1,969.11 -109.30 279.10 558.20	27.11
10 14 19 00-0177	EA 30" High x 3/4" Deep, Satin Finish, Brass Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Finish, Add</i>	2,974.31 -161.73 426.62 853.25	32.54
10 14 19 00-0178	Satin Finish, Bronze Characters <small>(10 14 19 00-0049)</small>		
10 14 19 00-0179	1/4" Deep, Satin Finish, Bronze Characters <small>(10 14 19 00-0178)</small>		
10 14 19 00-0180	EA 2" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	67.61 -6.09 6.08 12.15	6.78
10 14 19 00-0181	EA 4" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	87.86 -7.54 8.46 16.92	7.86
10 14 19 00-0182	EA 6" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	121.85 -9.89 12.58 25.17	9.49
10 14 19 00-0183	EA 8" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	160.54 -12.37 17.57 35.15	10.84
10 14 19 00-0184	EA 10" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	206.45 -15.20 23.65 47.30	12.20
10 14 19 00-0185	EA 12" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	261.78 -18.73 30.81 61.61	14.10
10 14 19 00-0186	EA 14" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	328.31 -22.92 39.49 78.97	16.27
10 14 19 00-0187	EA 16" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	407.86 -28.20 49.47 98.93	19.52
10 14 19 00-0188	EA 18" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	488.86 -33.12 60.31 120.63	21.69
10 14 19 00-0189	EA 20" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	580.70 -38.80 72.46 144.93	24.40
10 14 19 00-0190	EA 22" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	678.70 -44.24 86.35 172.70	25.76
10 14 19 00-0191	EA 24" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	786.80 -50.19 101.75 203.51	27.11
10 14 19 00-0192	EA 30" High x 1/4" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	1,197.57 -72.89 160.11 320.23	32.54
10 14 19 00-0193	3/8" Deep, Satin Finish, Bronze Characters <small>(10 14 19 00-0178)</small>		
10 14 19 00-0194	EA 2" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	80.57 -6.74 8.02 16.04	6.78
10 14 19 00-0195	EA 4" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs <i>For Installation With Adhesive, Deduct</i> <i>For Oxidized Finish, Add</i> <i>For Polished Or Patina Finish, Add</i>	105.35 -8.41 11.09 22.17	7.86

10 Specialties
10 10 Information Specialties
10 14 Signage



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0196	EA		6" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	153.73	9.49
			<i>For Installation With Adhesive, Deduct</i>	-11.48	
			<i>For Oxidized Finish, Add</i>	17.37	
			<i>For Polished Or Patina Finish, Add</i>	34.73	
10 14 19 00-0197	EA		8" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	203.88	10.84
			<i>For Installation With Adhesive, Deduct</i>	-14.53	
			<i>For Oxidized Finish, Add</i>	24.08	
			<i>For Polished Or Patina Finish, Add</i>	48.15	
10 14 19 00-0198	EA		10" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	277.40	12.20
			<i>For Installation With Adhesive, Deduct</i>	-18.75	
			<i>For Oxidized Finish, Add</i>	34.29	
			<i>For Polished Or Patina Finish, Add</i>	68.58	
10 14 19 00-0199	EA		12" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	352.15	14.10
			<i>For Installation With Adhesive, Deduct</i>	-23.25	
			<i>For Oxidized Finish, Add</i>	44.36	
			<i>For Polished Or Patina Finish, Add</i>	88.73	
10 14 19 00-0200	EA		14" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	441.50	16.27
			<i>For Installation With Adhesive, Deduct</i>	-28.58	
			<i>For Oxidized Finish, Add</i>	56.46	
			<i>For Polished Or Patina Finish, Add</i>	112.93	
10 14 19 00-0201	EA		16" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	546.37	19.52
			<i>For Installation With Adhesive, Deduct</i>	-35.13	
			<i>For Oxidized Finish, Add</i>	70.24	
			<i>For Polished Or Patina Finish, Add</i>	140.48	
10 14 19 00-0202	EA		18" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	661.76	21.69
			<i>For Installation With Adhesive, Deduct</i>	-41.77	
			<i>For Oxidized Finish, Add</i>	86.25	
			<i>For Polished Or Patina Finish, Add</i>	172.50	
10 14 19 00-0203	EA		20" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	788.43	24.40
			<i>For Installation With Adhesive, Deduct</i>	-49.18	
			<i>For Oxidized Finish, Add</i>	103.62	
			<i>For Polished Or Patina Finish, Add</i>	207.25	
10 14 19 00-0204	EA		22" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	926.23	25.76
			<i>For Installation With Adhesive, Deduct</i>	-56.62	
			<i>For Oxidized Finish, Add</i>	123.48	
			<i>For Polished Or Patina Finish, Add</i>	246.96	
10 14 19 00-0205	EA		24" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	1,051.35	27.11
			<i>For Installation With Adhesive, Deduct</i>	-63.41	
			<i>For Oxidized Finish, Add</i>	141.44	
			<i>For Polished Or Patina Finish, Add</i>	282.87	
10 14 19 00-0206	EA		30" High x 3/8" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	1,443.08	32.54
			<i>For Installation With Adhesive, Deduct</i>	-85.17	
			<i>For Oxidized Finish, Add</i>	196.94	
			<i>For Polished Or Patina Finish, Add</i>	393.88	
10 14 19 00-0207			1/2" Deep, Satin Finish, Bronze Characters (10 14 19 00-0178)		
10 14 19 00-0208	EA		2" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	83.40	6.78
			<i>For Installation With Adhesive, Deduct</i>	-6.88	
			<i>For Oxidized Finish, Add</i>	8.44	
			<i>For Polished Or Patina Finish, Add</i>	16.89	
10 14 19 00-0209	EA		4" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	125.65	7.86
			<i>For Installation With Adhesive, Deduct</i>	-9.43	
			<i>For Oxidized Finish, Add</i>	14.13	
			<i>For Polished Or Patina Finish, Add</i>	28.26	
10 14 19 00-0210	EA		6" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	179.73	9.49
			<i>For Installation With Adhesive, Deduct</i>	-12.78	
			<i>For Oxidized Finish, Add</i>	21.27	
			<i>For Polished Or Patina Finish, Add</i>	42.53	
10 14 19 00-0211	EA		8" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	248.40	10.84
			<i>For Installation With Adhesive, Deduct</i>	-16.76	
			<i>For Oxidized Finish, Add</i>	30.75	
			<i>For Polished Or Patina Finish, Add</i>	61.51	
10 14 19 00-0212	EA		10" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	340.46	12.20
			<i>For Installation With Adhesive, Deduct</i>	-21.90	
			<i>For Oxidized Finish, Add</i>	43.75	
			<i>For Polished Or Patina Finish, Add</i>	87.50	
10 14 19 00-0213	EA		12" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	465.12	14.10
			<i>For Installation With Adhesive, Deduct</i>	-28.90	
			<i>For Oxidized Finish, Add</i>	61.31	
			<i>For Polished Or Patina Finish, Add</i>	122.62	
10 14 19 00-0214	EA		14" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	604.71	16.27
			<i>For Installation With Adhesive, Deduct</i>	-36.74	
			<i>For Oxidized Finish, Add</i>	80.95	
			<i>For Polished Or Patina Finish, Add</i>	161.89	
10 14 19 00-0215	EA		16" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	757.42	19.52
			<i>For Installation With Adhesive, Deduct</i>	-45.68	
			<i>For Oxidized Finish, Add</i>	101.90	
			<i>For Polished Or Patina Finish, Add</i>	203.80	
10 14 19 00-0216	EA		18" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs	931.16	21.69
			<i>For Installation With Adhesive, Deduct</i>	-55.24	
			<i>For Oxidized Finish, Add</i>	126.66	
			<i>For Polished Or Patina Finish, Add</i>	253.32	



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0217	EA		20" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs.....	1,116.92	24.40
			<i>For Installation With Adhesive, Deduct</i>	-65.61	
			<i>For Oxidized Finish, Add</i>	152.90	
			<i>For Polished Or Patina Finish, Add</i>	305.79	
10 14 19 00-0218	EA		22" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs.....	1,323.43	25.76
			<i>For Installation With Adhesive, Deduct</i>	-76.48	
			<i>For Oxidized Finish, Add</i>	183.06	
			<i>For Polished Or Patina Finish, Add</i>	366.12	
10 14 19 00-0219	EA		24" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs.....	1,539.76	27.11
			<i>For Installation With Adhesive, Deduct</i>	-87.83	
			<i>For Oxidized Finish, Add</i>	214.70	
			<i>For Polished Or Patina Finish, Add</i>	429.39	
10 14 19 00-0220	EA		30" High x 1/2" Deep, Satin Finish, Bronze Sign Letter/Character, Installed With Studs.....	2,158.25	32.54
			<i>For Installation With Adhesive, Deduct</i>	-120.93	
			<i>For Oxidized Finish, Add</i>	304.22	
			<i>For Polished Or Patina Finish, Add</i>	608.43	
10 14 19 00-0221			Satin Finish, Copper Characters (10 14 19 00-0049)		
10 14 19 00-0222			1/4" Deep, Satin Finish, Copper Characters (10 14 19 00-0221)		
10 14 19 00-0223	EA		2" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	63.56	6.78
			<i>For Installation With Adhesive, Deduct</i>	-5.89	
			<i>For Polished Finish, Add</i>	10.94	
10 14 19 00-0224	EA		4" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	83.53	7.86
			<i>For Installation With Adhesive, Deduct</i>	-7.32	
			<i>For Polished Finish, Add</i>	15.62	
10 14 19 00-0225	EA		6" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	118.68	9.49
			<i>For Installation With Adhesive, Deduct</i>	-9.73	
			<i>For Polished Finish, Add</i>	24.22	
10 14 19 00-0226	EA		8" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	157.95	10.84
			<i>For Installation With Adhesive, Deduct</i>	-12.24	
			<i>For Polished Finish, Add</i>	34.37	
10 14 19 00-0227	EA		10" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	201.13	12.20
			<i>For Installation With Adhesive, Deduct</i>	-14.94	
			<i>For Polished Finish, Add</i>	45.70	
10 14 19 00-0228	EA		12" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	256.90	14.10
			<i>For Installation With Adhesive, Deduct</i>	-18.49	
			<i>For Polished Finish, Add</i>	60.15	
10 14 19 00-0229	EA		14" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	322.85	16.27
			<i>For Installation With Adhesive, Deduct</i>	-22.65	
			<i>For Polished Finish, Add</i>	77.33	
10 14 19 00-0230	EA		16" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	398.37	19.52
			<i>For Installation With Adhesive, Deduct</i>	-27.73	
			<i>For Polished Finish, Add</i>	96.08	
10 14 19 00-0231	EA		18" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	478.65	21.69
			<i>For Installation With Adhesive, Deduct</i>	-32.61	
			<i>For Polished Finish, Add</i>	117.56	
10 14 19 00-0232	EA		20" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	567.61	24.40
			<i>For Installation With Adhesive, Deduct</i>	-38.14	
			<i>For Polished Finish, Add</i>	141.00	
10 14 19 00-0233	EA		22" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	664.19	25.76
			<i>For Installation With Adhesive, Deduct</i>	-43.51	
			<i>For Polished Finish, Add</i>	168.35	
10 14 19 00-0234	EA		24" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	768.53	27.11
			<i>For Installation With Adhesive, Deduct</i>	-49.27	
			<i>For Polished Finish, Add</i>	198.02	
10 14 19 00-0235	EA		30" High x 1/4" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	1,107.23	32.54
			<i>For Installation With Adhesive, Deduct</i>	-68.38	
			<i>For Polished Finish, Add</i>	293.12	
10 14 19 00-0236			3/8" Deep, Satin Finish, Copper Characters (10 14 19 00-0221)		
10 14 19 00-0237	EA		2" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	72.68	6.78
			<i>For Installation With Adhesive, Deduct</i>	-6.35	
			<i>For Polished Finish, Add</i>	13.67	
10 14 19 00-0238	EA		4" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	99.15	7.86
			<i>For Installation With Adhesive, Deduct</i>	-8.10	
			<i>For Polished Finish, Add</i>	20.31	
10 14 19 00-0239	EA		6" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	146.93	9.49
			<i>For Installation With Adhesive, Deduct</i>	-11.14	
			<i>For Polished Finish, Add</i>	32.69	
10 14 19 00-0240	EA		8" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	203.78	10.84
			<i>For Installation With Adhesive, Deduct</i>	-14.53	
			<i>For Polished Finish, Add</i>	48.12	
10 14 19 00-0241	EA		10" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	277.29	12.20
			<i>For Installation With Adhesive, Deduct</i>	-18.74	
			<i>For Polished Finish, Add</i>	68.55	
10 14 19 00-0242	EA		12" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	347.12	14.10
			<i>For Installation With Adhesive, Deduct</i>	-23.00	
			<i>For Polished Finish, Add</i>	87.22	
10 14 19 00-0243	EA		14" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	438.86	16.27
			<i>For Installation With Adhesive, Deduct</i>	-28.45	
			<i>For Polished Finish, Add</i>	112.14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0244	EA		16" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	542.49	19.52
			<i>For Installation With Adhesive, Deduct</i>	-34.93	
			<i>For Polished Finish, Add</i>	139.32	
10 14 19 00-0245	EA		18" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	655.00	21.69
			<i>For Installation With Adhesive, Deduct</i>	-41.43	
			<i>For Polished Finish, Add</i>	170.47	
10 14 19 00-0246	EA		20" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	779.11	24.40
			<i>For Installation With Adhesive, Deduct</i>	-48.72	
			<i>For Polished Finish, Add</i>	204.45	
10 14 19 00-0247	EA		22" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	916.71	25.76
			<i>For Installation With Adhesive, Deduct</i>	-56.14	
			<i>For Polished Finish, Add</i>	244.10	
10 14 19 00-0248	EA		24" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	1,032.57	27.11
			<i>For Installation With Adhesive, Deduct</i>	-62.47	
			<i>For Polished Finish, Add</i>	277.24	
10 14 19 00-0249	EA		30" High x 3/8" Deep, Satin Finish, Copper Sign Letter/Character, Installed With Studs.....	1,449.20	32.54
			<i>For Installation With Adhesive, Deduct</i>	-85.48	
			<i>For Polished Finish, Add</i>	395.72	
10 14 19 00-0250			Satin Finish, Stainless Steel Characters (10 14 19 00-0049)		
10 14 19 00-0251			1/4" Deep, Satin Finish, Stainless Steel Characters (10 14 19 00-0250)		
10 14 19 00-0252	EA		2" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	60.67	6.78
			<i>For Installation With Adhesive, Deduct</i>	-5.74	
			<i>For Polished Finish, Add</i>	10.07	
10 14 19 00-0253	EA		4" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	80.11	7.86
			<i>For Installation With Adhesive, Deduct</i>	-7.15	
			<i>For Polished Finish, Add</i>	14.60	
10 14 19 00-0254	EA		6" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	103.39	9.49
			<i>For Installation With Adhesive, Deduct</i>	-8.97	
			<i>For Polished Finish, Add</i>	19.63	
10 14 19 00-0255	EA		8" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	133.98	10.84
			<i>For Installation With Adhesive, Deduct</i>	-11.04	
			<i>For Polished Finish, Add</i>	27.18	
10 14 19 00-0256	EA		10" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	164.57	12.20
			<i>For Installation With Adhesive, Deduct</i>	-13.11	
			<i>For Polished Finish, Add</i>	34.73	
10 14 19 00-0257	EA		12" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	202.37	14.10
			<i>For Installation With Adhesive, Deduct</i>	-15.76	
			<i>For Polished Finish, Add</i>	43.79	
10 14 19 00-0258	EA		14" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	242.92	16.27
			<i>For Installation With Adhesive, Deduct</i>	-18.65	
			<i>For Polished Finish, Add</i>	53.36	
10 14 19 00-0259	EA		16" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	291.17	19.52
			<i>For Installation With Adhesive, Deduct</i>	-22.37	
			<i>For Polished Finish, Add</i>	63.92	
10 14 19 00-0260	EA		18" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	340.12	21.69
			<i>For Installation With Adhesive, Deduct</i>	-25.68	
			<i>For Polished Finish, Add</i>	76.01	
10 14 19 00-0261	EA		20" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	397.94	24.40
			<i>For Installation With Adhesive, Deduct</i>	-29.66	
			<i>For Polished Finish, Add</i>	90.10	
10 14 19 00-0262	EA		22" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	463.77	25.76
			<i>For Installation With Adhesive, Deduct</i>	-33.49	
			<i>For Polished Finish, Add</i>	108.22	
10 14 19 00-0263	EA		24" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	531.26	27.11
			<i>For Installation With Adhesive, Deduct</i>	-37.41	
			<i>For Polished Finish, Add</i>	126.84	
10 14 19 00-0264	EA		30" High x 1/4" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	730.80	32.54
			<i>For Installation With Adhesive, Deduct</i>	-49.56	
			<i>For Polished Finish, Add</i>	180.20	
10 14 19 00-0265			3/8" Deep, Satin Finish, Stainless Steel Characters (10 14 19 00-0250)		
10 14 19 00-0266	EA		2" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	72.41	6.78
			<i>For Installation With Adhesive, Deduct</i>	-6.33	
			<i>For Polished Finish, Add</i>	13.59	
10 14 19 00-0267	EA		4" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	97.14	7.86
			<i>For Installation With Adhesive, Deduct</i>	-8.00	
			<i>For Polished Finish, Add</i>	19.71	
10 14 19 00-0268	EA		6" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	124.99	9.49
			<i>For Installation With Adhesive, Deduct</i>	-10.05	
			<i>For Polished Finish, Add</i>	26.11	
10 14 19 00-0269	EA		8" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	160.26	10.84
			<i>For Installation With Adhesive, Deduct</i>	-12.35	
			<i>For Polished Finish, Add</i>	35.06	
10 14 19 00-0270	EA		10" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	198.14	12.20
			<i>For Installation With Adhesive, Deduct</i>	-14.79	
			<i>For Polished Finish, Add</i>	44.80	
10 14 19 00-0271	EA		12" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	244.70	14.10
			<i>For Installation With Adhesive, Deduct</i>	-17.88	
			<i>For Polished Finish, Add</i>	56.49	



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 19 00-0272	EA		14" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	294.49	16.27
			<i>For Installation With Adhesive, Deduct</i>	-21.23	
			<i>For Polished Finish, Add</i>	68.83	
10 14 19 00-0273	EA		16" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	352.96	19.52
			<i>For Installation With Adhesive, Deduct</i>	-25.46	
			<i>For Polished Finish, Add</i>	82.46	
10 14 19 00-0274	EA		18" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	411.06	21.69
			<i>For Installation With Adhesive, Deduct</i>	-29.23	
			<i>For Polished Finish, Add</i>	97.29	
10 14 19 00-0275	EA		20" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	482.03	24.40
			<i>For Installation With Adhesive, Deduct</i>	-33.86	
			<i>For Polished Finish, Add</i>	115.33	
10 14 19 00-0276	EA		22" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	543.13	25.76
			<i>For Installation With Adhesive, Deduct</i>	-37.46	
			<i>For Polished Finish, Add</i>	132.03	
10 14 19 00-0277	EA		24" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	624.27	27.11
			<i>For Installation With Adhesive, Deduct</i>	-42.06	
			<i>For Polished Finish, Add</i>	154.75	
10 14 19 00-0278	EA		30" High x 3/8" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	862.95	32.54
			<i>For Installation With Adhesive, Deduct</i>	-56.16	
			<i>For Polished Finish, Add</i>	219.84	
10 14 19 00-0279			1 1/2" Deep, Satin Finish, Stainless Steel Characters <small>(10 14 19 00-0250)</small>		
10 14 19 00-0280	EA		2" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	87.51	6.78
			<i>For Installation With Adhesive, Deduct</i>	-7.09	
			<i>For Polished Finish, Add</i>	18.12	
10 14 19 00-0281	EA		4" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	119.03	7.86
			<i>For Installation With Adhesive, Deduct</i>	-9.10	
			<i>For Polished Finish, Add</i>	26.27	
10 14 19 00-0282	EA		6" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	153.78	9.49
			<i>For Installation With Adhesive, Deduct</i>	-11.49	
			<i>For Polished Finish, Add</i>	34.75	
10 14 19 00-0283	EA		8" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	202.84	10.84
			<i>For Installation With Adhesive, Deduct</i>	-14.48	
			<i>For Polished Finish, Add</i>	47.84	
10 14 19 00-0284	EA		10" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	252.55	12.20
			<i>For Installation With Adhesive, Deduct</i>	-17.51	
			<i>For Polished Finish, Add</i>	61.13	
10 14 19 00-0285	EA		12" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	313.30	14.10
			<i>For Installation With Adhesive, Deduct</i>	-21.31	
			<i>For Polished Finish, Add</i>	77.07	
10 14 19 00-0286	EA		14" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	378.08	16.27
			<i>For Installation With Adhesive, Deduct</i>	-25.41	
			<i>For Polished Finish, Add</i>	93.90	
10 14 19 00-0287	EA		16" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	453.11	19.52
			<i>For Installation With Adhesive, Deduct</i>	-30.46	
			<i>For Polished Finish, Add</i>	112.51	
10 14 19 00-0288	EA		18" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	540.26	21.69
			<i>For Installation With Adhesive, Deduct</i>	-35.69	
			<i>For Polished Finish, Add</i>	136.05	
10 14 19 00-0289	EA		20" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	635.19	24.40
			<i>For Installation With Adhesive, Deduct</i>	-41.52	
			<i>For Polished Finish, Add</i>	161.27	
10 14 19 00-0290	EA		22" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	712.67	25.76
			<i>For Installation With Adhesive, Deduct</i>	-45.94	
			<i>For Polished Finish, Add</i>	182.89	
10 14 19 00-0291	EA		24" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	822.99	27.11
			<i>For Installation With Adhesive, Deduct</i>	-51.99	
			<i>For Polished Finish, Add</i>	214.36	
10 14 19 00-0292	EA		30" High x 1/2" Deep, Satin Finish, Stainless Steel Sign Letter/Character, Installed With Studs.....	1,145.25	32.54
			<i>For Installation With Adhesive, Deduct</i>	-70.28	
			<i>For Polished Finish, Add</i>	304.53	
10 14 23			Panel Signage <small>(10 14)</small>		
10 14 23 11			Panel Signage <small>(10 14 23)</small>		
10 14 23 11-0001			Indoor/Outdoor Signs <small>(10 14 23 11)</small>		
			Note: Office number signs, conference room signs, restroom signs, stairway signs, fire extinguisher marker, ANSI/OSHA safety signs, entry/exit signs, etc.		
10 14 23 11-0002			Surface Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0001)</small>		
10 14 23 11-0003			Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0002)</small>		
			Note: Multi-color with words, symbols and graphics.		
10 14 23 11-0004	EA		Up To 25 Sl, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign.....	29.32	12.15
			<i>For >25 To 50, Deduct</i>	-0.50	
			<i>For >50 To 100, Deduct</i>	-1.25	
			<i>For >100, Deduct</i>	-1.50	
			<i>For Clear Glass Mount, Add</i>	4.01	
			<i>For Glow-In-Dark, Add</i>	10.02	
			<i>For Reflective Finish, Add</i>	11.27	

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 14 23 11-0005	EA	>25 To 50 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	32.90		12.15
		<i>For >25 To 50, Deduct</i>	-0.86		
		<i>For >50 To 100, Deduct</i>	-2.15		
		<i>For >100, Deduct</i>	-2.58		
		<i>For Clear Glass Mount, Add</i>	6.87		
		<i>For Glow-In-Dark, Add</i>	17.18		
		<i>For Reflective Finish, Add</i>	19.33		
10 14 23 11-0006	EA	>50 To 100 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	38.62		12.15
		<i>For >25 To 50, Deduct</i>	-1.43		
		<i>For >50 To 100, Deduct</i>	-3.58		
		<i>For >100, Deduct</i>	-4.29		
		<i>For Clear Glass Mount, Add</i>	11.45		
		<i>For Glow-In-Dark, Add</i>	28.62		
		<i>For Reflective Finish, Add</i>	32.20		
10 14 23 11-0007	EA	>100 To 250 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	45.77		12.15
		<i>For >25 To 50, Deduct</i>	-2.15		
		<i>For >50 To 100, Deduct</i>	-5.37		
		<i>For >100, Deduct</i>	-6.44		
		<i>For Clear Glass Mount, Add</i>	17.17		
		<i>For Glow-In-Dark, Add</i>	42.92		
		<i>For Reflective Finish, Add</i>	48.29		
10 14 23 11-0008	EA	>250 To 500 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	58.65		12.15
		<i>For >25 To 50, Deduct</i>	-3.43		
		<i>For >50 To 100, Deduct</i>	-8.59		
		<i>For >100, Deduct</i>	-10.30		
		<i>For Clear Glass Mount, Add</i>	27.47		
		<i>For Glow-In-Dark, Add</i>	68.68		
		<i>For Reflective Finish, Add</i>	77.27		
10 14 23 11-0009	EA	>500 To 750 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	81.55		12.15
		<i>For >25 To 50, Deduct</i>	-5.72		
		<i>For >50 To 100, Deduct</i>	-14.31		
		<i>For >100, Deduct</i>	-17.17		
		<i>For Clear Glass Mount, Add</i>	45.79		
		<i>For Glow-In-Dark, Add</i>	114.48		
		<i>For Reflective Finish, Add</i>	128.79		
10 14 23 11-0010	EA	>750 To 1,000 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	110.17		12.15
		<i>For >25 To 50, Deduct</i>	-8.59		
		<i>For >50 To 100, Deduct</i>	-21.47		
		<i>For >100, Deduct</i>	-25.76		
		<i>For Clear Glass Mount, Add</i>	68.69		
		<i>For Glow-In-Dark, Add</i>	171.72		
		<i>For Reflective Finish, Add</i>	193.19		
10 14 23 11-0011	SI	>1,000 SI, Adhesive Backed Vinyl, Surface Mount, Indoor/Outdoor Sign	0.12		0.01
		<i>For Clear Glass Mount, Add</i>	0.08		
		<i>For Glow-In-Dark, Add</i>	0.20		
		<i>For Reflective Finish, Add</i>	0.23		
10 14 23 11-0012 Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Signs					
<small>(10 14 23 11-0002)</small>					
Note: Multi-color with words, symbols and graphics. Includes adhesive or fasteners for mounting.					
10 14 23 11-0013	EA	Up To 25 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	30.75		12.15
		<i>For >25 To 50, Deduct</i>	-0.64		
		<i>For >50 To 100, Deduct</i>	-1.61		
		<i>For >100, Deduct</i>	-1.93		
		<i>For Glow-In-Dark, Add</i>	12.88		
		<i>For Reflective Finish, Add</i>	13.85		
10 14 23 11-0014	EA	>25 To 50 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	34.33		12.15
		<i>For >25 To 50, Deduct</i>	-1.00		
		<i>For >50 To 100, Deduct</i>	-2.51		
		<i>For >100, Deduct</i>	-3.01		
		<i>For Glow-In-Dark, Add</i>	20.04		
		<i>For Reflective Finish, Add</i>	21.54		
10 14 23 11-0015	EA	>50 To 100 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	41.48		12.15
		<i>For >25 To 50, Deduct</i>	-1.72		
		<i>For >50 To 100, Deduct</i>	-4.29		
		<i>For >100, Deduct</i>	-5.15		
		<i>For Glow-In-Dark, Add</i>	34.34		
		<i>For Reflective Finish, Add</i>	36.92		
10 14 23 11-0016	EA	>100 To 250 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	48.64		12.15
		<i>For >25 To 50, Deduct</i>	-2.43		
		<i>For >50 To 100, Deduct</i>	-6.08		
		<i>For >100, Deduct</i>	-7.30		
		<i>For Glow-In-Dark, Add</i>	48.66		
		<i>For Reflective Finish, Add</i>	52.31		
10 14 23 11-0017	EA	>250 To 500 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	59.37		12.15
		<i>For >25 To 50, Deduct</i>	-3.51		
		<i>For >50 To 100, Deduct</i>	-8.77		
		<i>For >100, Deduct</i>	-10.52		
		<i>For Glow-In-Dark, Add</i>	70.12		
		<i>For Reflective Finish, Add</i>	75.38		
10 14 23 11-0018	EA	>500 To 750 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	70.10		12.15
		<i>For >25 To 50, Deduct</i>	-4.58		
		<i>For >50 To 100, Deduct</i>	-11.45		
		<i>For >100, Deduct</i>	-13.74		
		<i>For Glow-In-Dark, Add</i>	91.58		
		<i>For Reflective Finish, Add</i>	98.45		



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 23 11-0019	EA		>750 To 1,000 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	81.55	12.15
			<i>For >25 To 50, Deduct</i>	-5.72	
			<i>For >50 To 100, Deduct</i>	-14.31	
			<i>For >100, Deduct</i>	-17.17	
			<i>For Glow-In-Dark, Add</i>	114.48	
			<i>For Reflective Finish, Add</i>	123.07	
10 14 23 11-0020	SI		>1,000 SI, Semi-Rigid Polyvinyl Chloride (PVC), Surface Mount, Indoor/Outdoor Sign	0.08	0.01
			<i>For Glow-In-Dark, Add</i>	0.12	
			<i>For Reflective Finish, Add</i>	0.13	
10 14 23 11-0021 Acrylic, Surface Mount, Indoor/Outdoor Signs With Braille <small>(10 14 23 11-0002)</small>					
Note: Multi-color with words, symbols and graphics. Includes adhesive or fasteners for mounting. Excludes frame.					
10 14 23 11-0022	EA		Up To 25 SI, Acrylic, Surface Mount, Indoor/Outdoor Signs With Braille	41.48	12.15
			<i>For >25 To 50, Deduct</i>	-1.72	
			<i>For >50 To 100, Deduct</i>	-4.29	
			<i>For >100, Deduct</i>	-5.15	
			<i>For Molded Plastic Frame, Add</i>	15.00	
			<i>For Brushed Metal Finish/Faux Metal Finish, Add</i>	23.00	
			<i>For 2" Height Slider Channel For Custom Inserts, Add</i>	35.00	
10 14 23 11-0023	EA		>25 To 50 SI, Acrylic, Surface Mount, Indoor/Outdoor Signs With Braille	45.77	12.15
			<i>For >25 To 50, Deduct</i>	-2.15	
			<i>For >50 To 100, Deduct</i>	-5.37	
			<i>For >100, Deduct</i>	-6.44	
			<i>For Molded Plastic Frame, Add</i>	17.00	
			<i>For Brushed Metal Finish/Faux Metal Finish, Add</i>	28.00	
			<i>For 2" Height Slider Channel For Custom Inserts, Add</i>	35.00	
10 14 23 11-0024	EA		>50 To 75 SI, Acrylic, Surface Mount, Indoor/Outdoor Signs With Braille	52.93	12.15
			<i>For >25 To 50, Deduct</i>	-2.86	
			<i>For >50 To 100, Deduct</i>	-7.16	
			<i>For >100, Deduct</i>	-8.59	
			<i>For Molded Plastic Frame, Add</i>	19.00	
			<i>For Brushed Metal Finish/Faux Metal Finish, Add</i>	31.00	
10 14 23 11-0025	EA		>75 To 100 SI, Acrylic, Surface Mount, Indoor/Outdoor Signs With Braille	59.66	12.15
			<i>For >25 To 50, Deduct</i>	-3.54	
			<i>For >50 To 100, Deduct</i>	-8.84	
			<i>For >100, Deduct</i>	-10.61	
			<i>For Molded Plastic Frame, Add</i>	21.00	
			<i>For Brushed Metal Finish/Faux Metal Finish, Add</i>	35.00	
10 14 23 11-0026	SI		>100 SI, Acrylic, Surface Mount, Indoor/Outdoor Signs With Braille	0.64	0.12
			<i>For Molded Plastic Frame, Add</i>	0.20	
			<i>For Brushed Metal Finish/Faux Metal Finish, Add</i>	0.31	
10 14 23 11-0027 Engraved Steel, Surface Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0002)</small>					
Note: Multi-color with words, symbols and graphics. Includes adhesive or fasteners for mounting. Excludes frame.					
10 14 23 11-0028	EA		Up To 25 SI, Engraved Steel, Surface Mount, Indoor/Outdoor Sign	51.50	12.15
			<i>For >25 To 50, Deduct</i>	-2.72	
			<i>For >50 To 100, Deduct</i>	-6.80	
			<i>For >100, Deduct</i>	-8.16	
			<i>For Molded Plastic Frame, Add</i>	15.00	
10 14 23 11-0029	EA		>25 To 50 SI, Engraved Steel, Surface Mount, Indoor/Outdoor Sign	60.09	12.15
			<i>For >25 To 50, Deduct</i>	-3.58	
			<i>For >50 To 100, Deduct</i>	-8.95	
			<i>For >100, Deduct</i>	-10.73	
			<i>For Molded Plastic Frame, Add</i>	17.00	
10 14 23 11-0030	EA		>50 To 75 SI, Engraved Steel, Surface Mount, Indoor/Outdoor Sign	71.53	12.15
			<i>For >25 To 50, Deduct</i>	-4.72	
			<i>For >50 To 100, Deduct</i>	-11.81	
			<i>For >100, Deduct</i>	-14.17	
			<i>For Molded Plastic Frame, Add</i>	19.00	
10 14 23 11-0031	EA		>75 To 100 SI, Engraved Steel, Surface Mount, Indoor/Outdoor Sign	94.43	12.15
			<i>For >25 To 50, Deduct</i>	-7.01	
			<i>For >50 To 100, Deduct</i>	-17.53	
			<i>For >100, Deduct</i>	-21.04	
			<i>For Molded Plastic Frame, Add</i>	21.00	
10 14 23 11-0032	SI		>100 SI, Engraved Steel, Surface Mount, Indoor/Outdoor Sign	0.94	0.12
			<i>For Molded Plastic Frame, Add</i>	0.20	
10 14 23 11-0033 Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0002)</small>					
Note: Multi-color with words, symbols and graphics. Includes adhesive or fasteners for mounting.					
10 14 23 11-0034	EA		Up To 25 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign	30.03	12.15
			<i>For >25 To 50, Deduct</i>	-0.57	
			<i>For >50 To 100, Deduct</i>	-1.43	
			<i>For >100, Deduct</i>	-1.72	
			<i>For Glow-In-Dark, Add</i>	3.43	
			<i>For Reflective Finish, Add</i>	4.29	
10 14 23 11-0035	EA		>25 To 50 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign	34.33	12.15
			<i>For >25 To 50, Deduct</i>	-1.00	
			<i>For >50 To 100, Deduct</i>	-2.51	
			<i>For >100, Deduct</i>	-3.01	
			<i>For Glow-In-Dark, Add</i>	6.01	
			<i>For Reflective Finish, Add</i>	7.52	

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 14 23 11-0036	EA >50 To 100 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	42.91 -1.86 -4.65 -5.58 11.16 13.95	12.15
10 14 23 11-0037	EA >100 To 250 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	52.93 -2.86 -7.16 -8.59 17.17 21.47	12.15
10 14 23 11-0038	EA >250 To 500 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	82.98 -5.87 -14.67 -17.60 35.20 44.00	12.15
10 14 23 11-0039	EA >500 To 750 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	95.86 -7.16 -17.89 -21.47 42.93 53.66	12.15
10 14 23 11-0040	EA >750 To 1,000 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	113.03 -8.87 -22.18 -26.62 53.23 66.54	12.15
10 14 23 11-0041	SI >1,000 SI, Enamel Coated Aluminum, Surface Mount, Indoor/Outdoor Sign <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	0.12 0.06 0.08	0.01
10 14 23 11-0042	California Title 24, Surface Mount, Signs <small>(10 14 23 11-0002)</small>		
10 14 23 11-0043	California Title 24, Surface Mount, Geometric Restroom Signs <small>(10 14 23 11-0042)</small> Note: Includes 1/4" thick acrylic or PVC construction, color that contrasts with the door color, and with or without the international symbol of accessibility and staff only designation.		
10 14 23 11-0044	EA 1/4" Thick, Equilateral Triangle With 12" Long Edges, California Title 24, Surface Mount, Geometric Male Restroom Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	76.90 -5.26 -7.89 -8.94	12.15
10 14 23 11-0045	EA 1/4" Thick, 12" Diameter, California Title 24, Surface Mount, Geometric Female Restroom Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	76.90 -5.26 -7.89 -8.94	12.15
10 14 23 11-0046	EA 1/4" Thick, 12" Diameter, California Title 24, Surface Mount, Geometric Unisex Restroom Sign Note: Includes contrasting color equilateral triangle with 12" long edges superimposed on the circle. <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	97.93 -7.36 -11.04 -12.52	12.15
10 14 23 11-0047	California Title 24, Surface Mount, Stairwell Signs <small>(10 14 23 11-0042)</small> Note: Includes 1/16" matte finish colored polymer face plate with 1/16" acrylic backer. Includes information on stairway location, roof access availability, floor level number, basement or mezzanine level identification and exit level and direction.		
10 14 23 11-0048	EA 1/8" Thick, 12" x 18", California Title 24, Surface Mount, Stairwell Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	143.01 -11.87 -17.81 -20.18	12.15
10 14 23 11-0049	Ceiling Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0001)</small>		
10 14 23 11-0050	Enamel Coated Aluminum, Ceiling Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0049)</small>		
10 14 23 11-0051	EA Up To 25 SI, Enamel Coated Aluminum, Ceiling Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	41.90 -0.79 -1.97 -2.36 4.72 5.90	17.01
10 14 23 11-0052	EA >25 To 50 SI, Enamel Coated Aluminum, Ceiling Mount, Indoor/Outdoor Sign <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Glow-In-Dark, Add</i> <i>For Reflective Finish, Add</i>	48.34 -1.43 -3.58 -4.29 8.59 10.73	17.01



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 23 11-0053	EA		>50 To 100 SI, Enamel Coated Aluminum, Ceiling Mount, Indoor/Outdoor Sign.....	56.93	17.01
			<i>For >25 To 50, Deduct</i>	-2.29	
			<i>For >50 To 100, Deduct</i>	-5.73	
			<i>For >100, Deduct</i>	-6.87	
			<i>For Glow-In-Dark, Add</i>	13.74	
			<i>For Reflective Finish, Add</i>	17.18	
10 14 23 11-0054	EA		>100 To 150 SI, Enamel Coated Aluminum, Ceiling Mount, Indoor/Outdoor Sign.....	69.81	17.01
			<i>For >25 To 50, Deduct</i>	-3.58	
			<i>For >50 To 100, Deduct</i>	-8.95	
			<i>For >100, Deduct</i>	-10.73	
			<i>For Glow-In-Dark, Add</i>	21.47	
			<i>For Reflective Finish, Add</i>	26.84	
10 14 23 11-0055			90 Degree, Projection Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0001)</small>		
10 14 23 11-0056			Enamel Coated Aluminum, 90 Degree, Projection Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0055)</small>		
10 14 23 11-0057	EA		Up To 25 SI, Enamel Coated Aluminum, 90 Degree, Projection Mount, Indoor/Outdoor Sign	42.62	17.01
			<i>For >25 To 50, Deduct</i>	-0.86	
			<i>For >50 To 100, Deduct</i>	-2.15	
			<i>For >100, Deduct</i>	-2.58	
			<i>For Glow-In-Dark, Add</i>	5.15	
			<i>For Reflective Finish, Add</i>	6.44	
10 14 23 11-0058	EA		>25 To 50 SI, Enamel Coated Aluminum, 90 Degree, Projection Mount, Indoor/Outdoor Sign	49.77	17.01
			<i>For >25 To 50, Deduct</i>	-1.57	
			<i>For >50 To 100, Deduct</i>	-3.94	
			<i>For >100, Deduct</i>	-4.72	
			<i>For Glow-In-Dark, Add</i>	9.44	
			<i>For Reflective Finish, Add</i>	11.81	
10 14 23 11-0059	EA		>50 To 100 SI, Enamel Coated Aluminum, 90 Degree, Projection Mount, Indoor/Outdoor Sign	65.51	17.01
			<i>For >25 To 50, Deduct</i>	-3.15	
			<i>For >50 To 100, Deduct</i>	-7.87	
			<i>For >100, Deduct</i>	-9.44	
			<i>For Glow-In-Dark, Add</i>	18.89	
			<i>For Reflective Finish, Add</i>	23.61	
10 14 23 11-0060	EA		>100 To 150 SI, Enamel Coated Aluminum, 90 Degree, Projection Mount, Indoor/Outdoor Sign	71.24	17.01
			<i>For >25 To 50, Deduct</i>	-3.72	
			<i>For >50 To 100, Deduct</i>	-9.30	
			<i>For >100, Deduct</i>	-11.16	
			<i>For Glow-In-Dark, Add</i>	22.33	
			<i>For Reflective Finish, Add</i>	27.91	
10 14 23 11-0061			Triangle, Projection Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0001)</small>		
10 14 23 11-0062			Enamel Coated Aluminum, Triangle, Projection Mount, Indoor/Outdoor Signs <small>(10 14 23 11-0061)</small>		
10 14 23 11-0063	EA		Up To 25 SI, Enamel Coated Aluminum, Triangle, Projection Mount, Indoor/Outdoor Sign	44.76	17.01
			<i>For >25 To 50, Deduct</i>	-1.07	
			<i>For >50 To 100, Deduct</i>	-2.68	
			<i>For >100, Deduct</i>	-3.22	
			<i>For Glow-In-Dark, Add</i>	6.44	
			<i>For Reflective Finish, Add</i>	8.05	
10 14 23 11-0064	EA		>25 To 50 SI, Enamel Coated Aluminum, Triangle, Projection Mount, Indoor/Outdoor Sign	55.49	17.01
			<i>For >25 To 50, Deduct</i>	-2.15	
			<i>For >50 To 100, Deduct</i>	-5.37	
			<i>For >100, Deduct</i>	-6.44	
			<i>For Glow-In-Dark, Add</i>	12.88	
			<i>For Reflective Finish, Add</i>	16.10	
10 14 23 11-0065	EA		>50 To 100 SI, Enamel Coated Aluminum, Triangle, Projection Mount, Indoor/Outdoor Sign	59.79	17.01
			<i>For >25 To 50, Deduct</i>	-2.58	
			<i>For >50 To 100, Deduct</i>	-6.44	
			<i>For >100, Deduct</i>	-7.73	
			<i>For Glow-In-Dark, Add</i>	15.46	
			<i>For Reflective Finish, Add</i>	19.32	
10 14 23 11-0066	EA		>100 To 150 SI, Enamel Coated Aluminum, Triangle, Projection Mount, Indoor/Outdoor Sign	65.51	17.01
			<i>For >25 To 50, Deduct</i>	-3.15	
			<i>For >50 To 100, Deduct</i>	-7.87	
			<i>For >100, Deduct</i>	-9.44	
			<i>For Glow-In-Dark, Add</i>	18.89	
			<i>For Reflective Finish, Add</i>	23.61	
10 14 23 11-0067			Adhesive Backed Vinyl Characters <small>(10 14 23 11)</small>		
			Note: Includes capital or lower case letters in any font or color. Includes numbers, symbols, punctuation marks, etc. Includes adhesive.		
10 14 23 11-0068	EA		1/2" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character	3.19	0.97
			<i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	0.54	
10 14 23 11-0069	EA		3/4" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character	3.30	1.11
			<i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	0.57	
10 14 23 11-0070	EA		1" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character	3.42	1.26
			<i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	0.60	
10 14 23 11-0071	EA		1-1/2" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character	4.57	1.45
			<i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	0.76	

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 14 23 11-0072	EA		2" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character <i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	4.73 0.80	1.71
10 14 23 11-0073	EA		3" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character <i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	6.69 1.17	1.95
10 14 23 11-0074	EA		4" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character <i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	7.16 1.28	2.19
10 14 23 11-0075	EA		6" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character <i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	9.60 1.77	2.43
10 14 23 11-0076	EA		8" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character <i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	11.52 2.25	2.67
10 14 23 11-0077	EA		10" High, 3 Mil, Adhesive Backed Vinyl Sign Letter/Character <i>For Pressure Sensitive Vinyl Letters, Custom Cut, Add</i>	14.74 2.93	2.92

10 14 23 11-0078 Standoffs For Wall Signage (10 14 23 11)
Note: Excludes signage

10 14 23 11-0079	EA		1/2" Diameter x 1/2" Long, Stainless Steel Standoff	15.07	5.43
10 14 23 11-0080	EA		1/2" Diameter x 3/4" Long, Stainless Steel Standoff	15.62	5.43
10 14 23 11-0081	EA		1/2" Diameter x 1" Long, Stainless Steel Standoff	15.76	5.43
10 14 23 11-0082	EA		5/8" Diameter x 1/2" Long, Stainless Steel Standoff	16.58	5.43
10 14 23 11-0083	EA		5/8" Diameter x 3/4" Long, Stainless Steel Standoff	17.13	5.43
10 14 23 11-0084	EA		5/8" Diameter x 1" Long, Stainless Steel Standoff	18.22	5.43
10 14 23 11-0085	EA		3/4" Diameter x 3/4" Long, Stainless Steel Standoff	17.94	6.50
10 14 23 11-0086	EA		3/4" Diameter x 1" Long, Stainless Steel Standoff	19.44	6.50
10 14 23 11-0087	EA		3/4" Diameter x 1-1/2" Long, Stainless Steel Standoff	20.67	6.50
10 14 23 11-0088	EA		1" Diameter x 3/4" Long, Stainless Steel Standoff	21.76	6.50
10 14 23 11-0089	EA		1" Diameter x 1" Long, Stainless Steel Standoff	23.54	6.50
10 14 23 11-0090	EA		1" Diameter x 1-1/2" Long, Stainless Steel Standoff	25.72	6.50
10 14 23 11-0091	EA		5/8" Diameter x 3/4" Long, Clear Anodized Aluminum Standoff	16.99	5.43
10 14 23 11-0092	EA		5/8" Diameter x 1" Long, Clear Anodized Aluminum Standoff	17.40	5.43
10 14 23 11-0093	EA		3/4" Diameter x 3/4" Long, Clear Anodized Aluminum Standoff	19.17	6.50
10 14 23 11-0094	EA		3/4" Diameter x 1" Long, Clear Anodized Aluminum Standoff	19.58	6.50
10 14 23 11-0095	EA		1" Diameter x 3/4" Long, Clear Anodized Aluminum Standoff	21.21	6.50
10 14 23 11-0096	EA		1" Diameter x 1" Long, Clear Anodized Aluminum Standoff	21.49	6.50

10 14 23 11-0097 Removal And Reinstallation Of Building Signage (10 14 23 11)
Note: Includes storage and cleaning.

10 14 23 11-0098	EA		Removal And Reinstallation Of Building Signage, Exterior Up To 4 SF	189.88	
10 14 23 11-0099	EA		Removal And Reinstallation Of Building Signage, Exterior >4 To 12 SF	218.31	
10 14 23 11-0100	EA		Removal And Reinstallation Of Building Signage, >12 To 20 SF	245.43	
10 14 23 11-0101	EA		Removal And Reinstallation Of Interior Door And Office Signage, Up To 4SF	72.91	

10 14 23 11-0102 Building Sign (10 14 23 11)
Note: Includes 4" numbers painted on. Installed on building.

10 14 23 11-0103	EA		6" x 18" Metal Building Sign With Numbers	192.63	29.16
10 14 23 11-0104	SF		Double Sided, Molding On Two Sides, For Mounting On Aluminum Posts	45.94	7.59
10 14 23 11-0105	SF		Single Sided, Molding On One Side, For Mounting On Structure Up To 20'	34.48	7.05
10 14 23 11-0106	EA		Aluminum Posts, Formed Prefinished, Ribbed, 4" Square, 6' High, 3' Deep	34.46	5.97
10 14 23 11-0107	EA		Aluminum Posts, Formed Prefinished, Ribbed, 4" Square, 8' High, 3' Deep	40.17	6.51
10 14 23 11-0108	EA		Aluminum Posts, Formed Prefinished, Ribbed, 6" Square, 10' High, 3' Deep	44.15	7.05
10 14 23 11-0109	EA		Aluminum Posts, Formed Prefinished, Ribbed, 6" Square, 15' High, 4' Deep	52.74	7.59

10 14 23 11-0110 Custom Signage (10 14 23 11)

10 14 23 11-0111	EA		4' Wide x 4' High x 3" Thick, Aluminum Cabinet, Brushed Satin Finish, Wall Signs (Non-Illuminated) With Wording (A.1 to A.4)	4,263.38	
10 14 23 11-0112	EA		6' Wide x 1' High x 2" Thick, Single Face, Aluminum Cabinet, Brushed Satin Finish, Hanging Signs (Non-Illuminated) With wording (B.1 to B.3)	2,618.68	
10 14 23 11-0113	EA		3'-4" Wide x 2'-3" High, Surface Applied, Vinyl Window Sign With Wording (Sign A)	335.85	
10 14 23 11-0114	EA		4'-1" Wide x 2'-3" High, Surface Applied, Vinyl Window Sign With Wording (Sign B)	337.76	
10 14 23 11-0115	EA		3'-1" Wide x 3'-1" High, Surface Applied, Vinyl Window Sign With Wording (Sign C)	337.76	
10 14 23 11-0116	EA		2'-10" Wide x 1'-6" High, Surface Applied, Vinyl Window Sign With Wording (Sign D1)	332.07	
10 14 23 11-0117	EA		2'-10" Wide x 5" High, Surface Applied, Vinyl Window Sign With Wording (Sign D2)	328.28	
10 14 23 11-0118	EA		8' Wide x 8' High, Surface Applied, Vinyl Graphic With Wording (D)	2,506.50	

10 14 53 Traffic Signage (10 14)

10 14 53 11 Traffic Signage (10 14 53)

10 14 53 11-0001 Traffic Signs (10 14 53 11)

10 14 53 11-0002 ReflectORIZED Stop Signs And Other Traffic Signs (10 14 53 11-0001)
Note: Excludes posts.

10 14 53 11-0003 Aluminum Engineer Grade Stop Signs (10 14 53 11-0002)

10 14 53 11-0004	EA		18" x 18" Aluminum Engineer Grade Stop Sign	74.65	21.87
			<i>For Hi-Intensity Grade, Add</i>	9.27	
			<i>For Diamond Grade, Add</i>	17.61	



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 53 11-0005	EA		18" x 24" Aluminum Engineer Grade Stop Sign..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	86.59 12.12 23.03	23.13
10 14 53 11-0006	EA		24" x 24" Aluminum Engineer Grade Stop Sign..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	93.77 18.52 29.35	24.31
10 14 53 11-0007	EA		30" x 30" Aluminum Engineer Grade Stop Sign..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	108.88 6.94 37.60	25.56
10 14 53 11-0008	EA		36" x 36" Aluminum Engineer Grade Stop Sign..... <i>For Hi-Intensity Grade, Add</i> <i>For Diamond Grade, Add</i>	146.17 20.39 63.96	26.74
10 14 53 11-0009			Steel Engineer Grade Stop Signs (10 14 53 11-0002)		
10 14 53 11-0010	EA		18" x 18" Reflective Steel Stop Sign, Engineering Grade.....	109.28	21.87
10 14 53 11-0011	EA		18" x 24" Reflective Steel Stop Sign, Engineering Grade.....	135.45	23.13
10 14 53 11-0012	EA		24" x 24" Reflective Steel Stop Sign, Engineering Grade.....	143.67	24.31
10 14 53 11-0013	EA		30" x 30" Reflective Steel Stop Sign, Engineering Grade.....	202.26	25.56
10 14 53 11-0014	EA		36" x 36" Reflective Steel Stop Sign, Engineering Grade.....	255.13	26.74
10 14 53 11-0015			Polyethylene Engineer Grade Stop Signs (10 14 53 11-0002)		
10 14 53 11-0016	EA		18" x 18" Reflective Polyethylene Stop Sign, Engineering Grade.....	111.71	21.87
10 14 53 11-0017	EA		18" x 24" Reflective Polyethylene Stop Sign, Engineering Grade.....	141.67	23.13
10 14 53 11-0018	EA		24" x 24" Reflective Polyethylene Stop Sign, Engineering Grade.....	155.91	24.31
10 14 53 11-0019	EA		30" x 30" Reflective Polyethylene Stop Sign, Engineering Grade.....	202.83	25.56
10 14 53 11-0020			Other Reflectorized Traffic Signs (10 14 53 11-0002)		
			Note: Other traffic signs includes reserve, handicap, visitor, no parking, property, speed limit, tow away, ADA, parking time limit, parking exclusive area, school, traffic/caution, etc. Excludes posts.		
10 14 53 11-0021			Aluminum Engineer Grade Traffic Signs (10 14 53 11-0020)		
10 14 53 11-0022	EA		6" x 12" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	46.54 2.30	19.44
10 14 53 11-0023	EA		6" x 18" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	50.37 3.44	19.44
10 14 53 11-0024	EA		9" x 12" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	50.37 3.44	19.44
10 14 53 11-0025	EA		9" x 15" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	53.24 4.31	19.44
10 14 53 11-0026	EA		9" x 18" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	56.11 5.17	19.44
10 14 53 11-0027	EA		9" x 24" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	64.27 6.89	20.66
10 14 53 11-0028	EA		9" x 48" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	87.24 13.78	20.66
10 14 53 11-0029	EA		12" x 12" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	54.20 4.59	19.44
10 14 53 11-0030	EA		12" x 18" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	64.27 6.89	20.66
10 14 53 11-0031	EA		12" x 24" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	71.93 9.19	20.66
10 14 53 11-0032	EA		12" x 30" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	79.58 11.48	20.66
10 14 53 11-0033	EA		12" x 36" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	87.24 13.78	20.66
10 14 53 11-0034	EA		18" x 18" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	75.75 10.33	20.66
10 14 53 11-0035	EA		18" x 24" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	87.24 13.78	20.66
10 14 53 11-0036	EA		18" x 30" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	101.16 17.22	21.87
10 14 53 11-0037	EA		18" x 36" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	112.64 20.67	21.87
10 14 53 11-0038	EA		18" x 48" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	145.32 27.56	26.74
10 14 53 11-0039	EA		18" x 54" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	156.80 31.00	26.74
10 14 53 11-0040	EA		24" x 24" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	104.98 18.37	21.87
10 14 53 11-0041	EA		24" x 30" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	120.29 22.96	21.87
10 14 53 11-0042	EA		24" x 36" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	135.60 27.56	21.87
10 14 53 11-0043	EA		24" x 42" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	160.63 32.15	26.74
10 14 53 11-0044	EA		24" x 48" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	175.94 36.74	26.74
10 14 53 11-0045	EA		24" x 54" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	191.25 41.33	26.74
10 14 53 11-0046	EA		24" x 60" Aluminum Engineer Grade Traffic Sign..... <i>For Hi-Intensity Grade, Add</i>	206.55 45.92	26.74

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 53 11-0047	EA		30" x 30" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	139.43 28.70	21.87
10 14 53 11-0048	EA		30" x 36" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	168.28 34.44	26.74
10 14 53 11-0049	EA		30" x 42" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	187.42 40.19	26.74
10 14 53 11-0050	EA		30" x 48" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	216.27 45.92	31.59
10 14 53 11-0051	EA		30" x 60" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	264.28 57.41	36.46
10 14 53 11-0052	EA		36" x 36" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	191.25 41.33	26.74
10 14 53 11-0053	EA		36" x 42" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	223.93 48.22	31.59
10 14 53 11-0054	EA		36" x 48" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	256.62 55.11	36.46
10 14 53 11-0055	EA		36" x 54" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	279.58 62.00	36.46
10 14 53 11-0056	EA		36" x 60" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	312.27 68.89	41.31
10 14 53 11-0057	EA		36" x 73" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	371.74 83.81	46.18
10 14 53 11-0058	EA		36" x 78" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	390.88 89.56	46.18
10 14 53 11-0059	EA		36" x 108" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	520.27 124.00	53.47
10 14 53 11-0060	EA		42" x 42" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	260.45 56.26	36.46
10 14 53 11-0061	EA		48" x 48" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	327.58 73.48	41.31
10 14 53 11-0062	EA		48" x 54" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	367.91 82.67	46.18
10 14 53 11-0063	EA		48" x 60" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	398.53 91.85	46.18
10 14 53 11-0064	EA		48" x 66" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	443.73 101.04	53.47
10 14 53 11-0065	EA		48" x 72" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	474.34 110.22	53.47
10 14 53 11-0066	EA		48" x 84" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	545.30 128.59	58.33
10 14 53 11-0067	EA		48" x 96" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	606.53 146.96	58.33
10 14 53 11-0068	EA		48" x 102" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	637.15 156.15	58.33
10 14 53 11-0069	EA		48" x 108" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	672.63 165.33	60.76
10 14 53 11-0070	EA		60" x 72" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	575.91 137.78	58.33
10 14 53 11-0071	EA		72" x 144" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	1,257.75 330.66	77.77
10 14 53 11-0072	EA		78" x 96" Aluminum Engineer Grade Traffic Sign <i>For Hi-Intensity Grade, Add</i>	917.56 238.81	60.76
10 14 53 11-0073			Polyethylene Engineer Grade Traffic Signs (10 14 53 11-0020)		
10 14 53 11-0074	EA		6" x 12" Reflective Polyethylene Traffic Sign	78.94	18.28
10 14 53 11-0075	EA		12" x 12" Reflective Polyethylene Traffic Sign	89.58	19.44
10 14 53 11-0076	EA		12" x 18" Reflective Polyethylene Traffic Sign	95.88	20.71
10 14 53 11-0077	EA		18" x 18" Reflective Polyethylene Traffic Sign	115.31	21.87
10 14 53 11-0078	EA		18" x 24" Reflective Polyethylene Traffic Sign	141.67	23.13
10 14 53 11-0079	EA		24" x 24" Reflective Polyethylene Traffic Sign	159.05	23.13
10 14 53 11-0080			Non-Reflectorized Traffic Signs (10 14 53 11-0001)		
			Note: Includes reserved parking, handicap parking, visitor parking, no parking, tow away zones, etc. Excludes posts.		
10 14 53 11-0081			Steel Non-Reflectorized Traffic Signs (10 14 53 11-0080)		
10 14 53 11-0082	EA		6" x 12" Steel Non-Reflectorized Traffic Sign.....	45.51	19.44
10 14 53 11-0083	EA		6" x 18" Steel Non-Reflectorized Traffic Sign.....	48.82	19.44
10 14 53 11-0084	EA		9" x 12" Steel Non-Reflectorized Traffic Sign.....	48.82	19.44
10 14 53 11-0085	EA		9" x 15" Steel Non-Reflectorized Traffic Sign.....	51.30	19.44
10 14 53 11-0086	EA		9" x 18" Steel Non-Reflectorized Traffic Sign.....	53.78	19.44
10 14 53 11-0087	EA		9" x 24" Steel Non-Reflectorized Traffic Sign.....	61.16	20.66
10 14 53 11-0088	EA		9" x 48" Steel Non-Reflectorized Traffic Sign.....	81.01	20.66
10 14 53 11-0089	EA		12" x 12" Steel Non-Reflectorized Traffic Sign.....	52.12	19.44
10 14 53 11-0090	EA		12" x 18" Steel Non-Reflectorized Traffic Sign.....	61.16	20.66
10 14 53 11-0091	EA		12" x 24" Steel Non-Reflectorized Traffic Sign.....	67.78	20.66
10 14 53 11-0092	EA		12" x 30" Steel Non-Reflectorized Traffic Sign.....	74.40	20.66
10 14 53 11-0093	EA		12" x 36" Steel Non-Reflectorized Traffic Sign.....	81.01	20.66
10 14 53 11-0094	EA		18" x 18" Steel Non-Reflectorized Traffic Sign.....	71.09	20.66
10 14 53 11-0095	EA		18" x 24" Steel Non-Reflectorized Traffic Sign.....	81.01	20.66
10 14 53 11-0096	EA		18" x 30" Steel Non-Reflectorized Traffic Sign.....	93.38	21.87

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 14 53 11-0097	EA		18" x 36" Steel Non-ReflectORIZED Traffic Sign.....	103.30	21.87
10 14 53 11-0098	EA		18" x 48" Steel Non-ReflectORIZED Traffic Sign.....	132.87	26.74
10 14 53 11-0099	EA		18" x 54" Steel Non-ReflectORIZED Traffic Sign.....	142.80	26.74
10 14 53 11-0100	EA		24" x 24" Steel Non-ReflectORIZED Traffic Sign.....	96.69	21.87
10 14 53 11-0101	EA		24" x 30" Steel Non-ReflectORIZED Traffic Sign.....	109.92	21.87
10 14 53 11-0102	EA		24" x 36" Steel Non-ReflectORIZED Traffic Sign.....	123.15	21.87
10 14 53 11-0103	EA		24" x 42" Steel Non-ReflectORIZED Traffic Sign.....	146.11	26.74
10 14 53 11-0104	EA		24" x 48" Steel Non-ReflectORIZED Traffic Sign.....	159.34	26.74
10 14 53 11-0105	EA		24" x 54" Steel Non-ReflectORIZED Traffic Sign.....	172.58	26.74
10 14 53 11-0106	EA		24" x 60" Steel Non-ReflectORIZED Traffic Sign.....	185.81	26.74
10 14 53 11-0107	EA		30" x 30" Steel Non-ReflectORIZED Traffic Sign.....	126.46	21.87
10 14 53 11-0108	EA		30" x 36" Steel Non-ReflectORIZED Traffic Sign.....	152.73	26.74
10 14 53 11-0109	EA		30" x 42" Steel Non-ReflectORIZED Traffic Sign.....	169.27	26.74
10 14 53 11-0110	EA		30" x 48" Steel Non-ReflectORIZED Traffic Sign.....	195.53	31.59
10 14 53 11-0111	EA		30" x 60" Steel Non-ReflectORIZED Traffic Sign.....	238.35	36.46
10 14 53 11-0112	EA		36" x 36" Steel Non-ReflectORIZED Traffic Sign.....	172.58	26.74
10 14 53 11-0113	EA		36" x 42" Steel Non-ReflectORIZED Traffic Sign.....	202.15	31.59
10 14 53 11-0114	EA		36" x 48" Steel Non-ReflectORIZED Traffic Sign.....	231.73	36.46
10 14 53 11-0115	EA		36" x 54" Steel Non-ReflectORIZED Traffic Sign.....	251.58	36.46
10 14 53 11-0116	EA		36" x 60" Steel Non-ReflectORIZED Traffic Sign.....	281.15	41.31
10 14 53 11-0117	EA		36" x 73" Steel Non-ReflectORIZED Traffic Sign.....	333.88	46.18
10 14 53 11-0118	EA		36" x 78" Steel Non-ReflectORIZED Traffic Sign.....	350.43	46.18
10 14 53 11-0119	EA		36" x 108" Steel Non-ReflectORIZED Traffic Sign.....	464.26	53.47
10 14 53 11-0120	EA		42" x 42" Steel Non-ReflectORIZED Traffic Sign.....	235.04	36.46
10 14 53 11-0121	EA		48" x 48" Steel Non-ReflectORIZED Traffic Sign.....	294.39	41.31
10 14 53 11-0122	EA		48" x 54" Steel Non-ReflectORIZED Traffic Sign.....	330.57	46.18
10 14 53 11-0123	EA		48" x 60" Steel Non-ReflectORIZED Traffic Sign.....	357.04	46.18
10 14 53 11-0124	EA		48" x 66" Steel Non-ReflectORIZED Traffic Sign.....	398.09	53.47
10 14 53 11-0125	EA		48" x 72" Steel Non-ReflectORIZED Traffic Sign.....	424.56	53.47
10 14 53 11-0126	EA		48" x 84" Steel Non-ReflectORIZED Traffic Sign.....	487.22	58.33
10 14 53 11-0127	EA		48" x 96" Steel Non-ReflectORIZED Traffic Sign.....	540.15	58.33
10 14 53 11-0128	EA		48" x 102" Steel Non-ReflectORIZED Traffic Sign.....	566.62	58.33
10 14 53 11-0129	EA		48" x 108" Steel Non-ReflectORIZED Traffic Sign.....	597.95	60.76
10 14 53 11-0130	EA		60" x 72" Steel Non-ReflectORIZED Traffic Sign.....	513.68	58.33
10 14 53 11-0131	EA		72" x 144" Steel Non-ReflectORIZED Traffic Sign.....	1,108.40	77.77
10 14 53 11-0132	EA		78" x 96" Steel Non-ReflectORIZED Traffic Sign.....	809.70	60.76

10 14 53 11-0133 Aluminum Non-ReflectORIZED Traffic Signs (10 14 53 11-0080)

10 14 53 11-0134	EA		6" x 12" Aluminum Non-ReflectORIZED Traffic Sign.....	45.78	19.44
10 14 53 11-0135	EA		6" x 18" Aluminum Non-ReflectORIZED Traffic Sign.....	49.22	19.44
10 14 53 11-0136	EA		9" x 12" Aluminum Non-ReflectORIZED Traffic Sign.....	49.22	19.44
10 14 53 11-0137	EA		9" x 15" Aluminum Non-ReflectORIZED Traffic Sign.....	51.80	19.44
10 14 53 11-0138	EA		9" x 18" Aluminum Non-ReflectORIZED Traffic Sign.....	54.39	19.44
10 14 53 11-0139	EA		9" x 24" Aluminum Non-ReflectORIZED Traffic Sign.....	61.97	20.66
10 14 53 11-0140	EA		9" x 48" Aluminum Non-ReflectORIZED Traffic Sign.....	82.63	20.66
10 14 53 11-0141	EA		12" x 12" Aluminum Non-ReflectORIZED Traffic Sign.....	52.66	19.44
10 14 53 11-0142	EA		12" x 18" Aluminum Non-ReflectORIZED Traffic Sign.....	61.97	20.66
10 14 53 11-0143	EA		12" x 24" Aluminum Non-ReflectORIZED Traffic Sign.....	68.86	20.66
10 14 53 11-0144	EA		12" x 30" Aluminum Non-ReflectORIZED Traffic Sign.....	75.74	20.66
10 14 53 11-0145	EA		12" x 36" Aluminum Non-ReflectORIZED Traffic Sign.....	82.63	20.66
10 14 53 11-0146	EA		18" x 18" Aluminum Non-ReflectORIZED Traffic Sign.....	72.30	20.66
10 14 53 11-0147	EA		18" x 24" Aluminum Non-ReflectORIZED Traffic Sign.....	82.63	20.66
10 14 53 11-0148	EA		18" x 30" Aluminum Non-ReflectORIZED Traffic Sign.....	95.40	21.87
10 14 53 11-0149	EA		18" x 36" Aluminum Non-ReflectORIZED Traffic Sign.....	105.73	21.87
10 14 53 11-0150	EA		18" x 48" Aluminum Non-ReflectORIZED Traffic Sign.....	136.11	26.74
10 14 53 11-0151	EA		18" x 54" Aluminum Non-ReflectORIZED Traffic Sign.....	146.44	26.74
10 14 53 11-0152	EA		24" x 24" Aluminum Non-ReflectORIZED Traffic Sign.....	98.84	21.87
10 14 53 11-0153	EA		24" x 30" Aluminum Non-ReflectORIZED Traffic Sign.....	112.62	21.87
10 14 53 11-0154	EA		24" x 36" Aluminum Non-ReflectORIZED Traffic Sign.....	126.39	21.87
10 14 53 11-0155	EA		24" x 42" Aluminum Non-ReflectORIZED Traffic Sign.....	149.88	26.74
10 14 53 11-0156	EA		24" x 48" Aluminum Non-ReflectORIZED Traffic Sign.....	163.66	26.74
10 14 53 11-0157	EA		24" x 54" Aluminum Non-ReflectORIZED Traffic Sign.....	177.43	26.74
10 14 53 11-0158	EA		24" x 60" Aluminum Non-ReflectORIZED Traffic Sign.....	191.20	26.74
10 14 53 11-0159	EA		30" x 30" Aluminum Non-ReflectORIZED Traffic Sign.....	129.83	21.87
10 14 53 11-0160	EA		30" x 36" Aluminum Non-ReflectORIZED Traffic Sign.....	156.77	26.74
10 14 53 11-0161	EA		30" x 42" Aluminum Non-ReflectORIZED Traffic Sign.....	173.99	26.74
10 14 53 11-0162	EA		30" x 48" Aluminum Non-ReflectORIZED Traffic Sign.....	200.92	31.59
10 14 53 11-0163	EA		30" x 60" Aluminum Non-ReflectORIZED Traffic Sign.....	245.09	36.46
10 14 53 11-0164	EA		36" x 36" Aluminum Non-ReflectORIZED Traffic Sign.....	177.43	26.74
10 14 53 11-0165	EA		36" x 42" Aluminum Non-ReflectORIZED Traffic Sign.....	207.81	31.59
10 14 53 11-0166	EA		36" x 48" Aluminum Non-ReflectORIZED Traffic Sign.....	238.20	36.46
10 14 53 11-0167	EA		36" x 54" Aluminum Non-ReflectORIZED Traffic Sign.....	258.86	36.46
10 14 53 11-0168	EA		36" x 60" Aluminum Non-ReflectORIZED Traffic Sign.....	289.24	41.31
10 14 53 11-0169	EA		36" x 73" Aluminum Non-ReflectORIZED Traffic Sign.....	343.73	46.18
10 14 53 11-0170	EA		36" x 78" Aluminum Non-ReflectORIZED Traffic Sign.....	360.94	46.18
10 14 53 11-0171	EA		36" x 108" Aluminum Non-ReflectORIZED Traffic Sign.....	478.82	53.47
10 14 53 11-0172	EA		42" x 42" Aluminum Non-ReflectORIZED Traffic Sign.....	241.65	36.46
10 14 53 11-0173	EA		48" x 48" Aluminum Non-ReflectORIZED Traffic Sign.....	303.02	41.31
10 14 53 11-0174	EA		48" x 54" Aluminum Non-ReflectORIZED Traffic Sign.....	340.28	46.18
10 14 53 11-0175	EA		48" x 60" Aluminum Non-ReflectORIZED Traffic Sign.....	367.83	46.18

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 14 53 11-0176	EA	48" x 66" Aluminum Non-Reflectorized Traffic Sign		409.96	53.47
10 14 53 11-0177	EA	48" x 72" Aluminum Non-Reflectorized Traffic Sign		437.50	53.47
10 14 53 11-0178	EA	48" x 84" Aluminum Non-Reflectorized Traffic Sign		502.32	58.33
10 14 53 11-0179	EA	48" x 96" Aluminum Non-Reflectorized Traffic Sign		557.41	58.33
10 14 53 11-0180	EA	48" x 102" Aluminum Non-Reflectorized Traffic Sign		584.96	58.33
10 14 53 11-0181	EA	48" x 108" Aluminum Non-Reflectorized Traffic Sign		617.37	60.76
10 14 53 11-0182	EA	60" x 72" Aluminum Non-Reflectorized Traffic Sign		529.86	58.33
10 14 53 11-0183	EA	72" x 144" Aluminum Non-Reflectorized Traffic Sign		1,147.23	77.77
10 14 53 11-0184	EA	78" x 96" Aluminum Non-Reflectorized Traffic Sign		837.74	60.76
10 14 53 11-0185		Polyethylene Non-Reflectorized Traffic Signs (10 14 53 11-0080)			
10 14 53 11-0186	EA	6" x 12" Non-Reflective Polyethylene Traffic Sign		66.96	18.28
10 14 53 11-0187	EA	12" x 12" Non-Reflective Polyethylene Traffic Sign		73.16	19.44
10 14 53 11-0188	EA	12" x 18" Non-Reflective Polyethylene Traffic Sign		78.75	20.71
10 14 53 11-0189	EA	18" x 18" Non-Reflective Polyethylene Traffic Sign		103.07	21.87
10 14 53 11-0190	EA	18" x 24" Non-Reflective Polyethylene Traffic Sign		110.41	23.13
10 14 53 11-0191	EA	24" x 24" Non-Reflective Polyethylene Traffic Sign		127.82	24.31
10 14 53 11-0192		Signs For Overhead Sign Structures (10 14 53 11-0001)			
		Note: Including horizontal Z-bars.			
10 14 53 11-0193	SF	From 30 To 360 SF Signs For Overhead Sign Structures		25.00	
		For Over 10' High, Add		13.00	
10 14 53 11-0194	VLF	Vertical Sign Hangers For Overhead Sign Structures, Per Hanger		32.50	
		Note: Includes U-bolts, vertical aluminum Z-bars, clip angles and stainless steel hardware.			
10 14 53 11-0195		Flashing Beacon (10 14 53 11-0001)			
10 14 53 11-0196	EA	Flashing Beacon Assembly		1,340.01	195.97
10 14 53 11-0197		Aluminum Street Signs (10 14 53 11-0001)			
		Note: Excludes posts.			
10 14 53 11-0198		Aluminum Engineer Grade Street Signs (10 14 53 11-0197)			
10 14 53 11-0199	EA	6" High, Aluminum Engineer Grade Street Sign		82.74	9.72
		For Hi-Intensity Grade, Add		18.99	
10 14 53 11-0200	EA	8" High, Aluminum Engineer Grade Street Sign		93.91	9.72
		For Hi-Intensity Grade, Add		22.34	
10 14 53 11-0201	EA	9" High, Aluminum Engineer Grade Street Sign		102.23	9.72
		For Hi-Intensity Grade, Add		24.84	
10 14 53 11-0202		Street Sign Accessories (10 14 53 11-0197)			
10 14 53 11-0203	EA	Single Bracket And Post Cap For Street Sign		24.95	4.86
10 14 53 11-0204	EA	Double Bracket And Post Cap For Street Sign		24.95	4.86
10 14 53 11-0205		Sign Posts (10 14 53 11-0001)			
		Note: Excludes sign. See CSI section 32 31 13 13-0001 for auguring of holes and backfill.			
10 14 53 11-0206		U-Channel Sign Posts (10 14 53 11-0205)			
		Note: Excludes digging and concrete.			
10 14 53 11-0207		Baked Enamel U-Channel Sign Posts (10 14 53 11-0206)			
10 14 53 11-0208	EA	3' To 4' Baked Enamel U-Channel Sign Post Base		66.11	19.84
10 14 53 11-0209	EA	6' Baked Enamel U-Channel Sign Post		86.76	24.81
10 14 53 11-0210	EA	7' Baked Enamel U-Channel Sign Post		103.59	29.76
10 14 53 11-0211	EA	8' Baked Enamel U-Channel Sign Post		121.29	34.73
10 14 53 11-0212	EA	10' Baked Enamel U-Channel Sign Post		146.37	42.16
10 14 53 11-0213	EA	12' Baked Enamel U-Channel Sign Post		150.60	42.16
10 14 53 11-0214		Galvanized Steel U-Channel Sign Posts (10 14 53 11-0206)			
10 14 53 11-0215	EA	3' To 4' Galvanized Steel U-Channel Sign Post Base		71.55	19.84
10 14 53 11-0216	EA	6' Galvanized Steel U-Channel Sign Post		95.40	24.81
10 14 53 11-0217	EA	7' Galvanized Steel U-Channel Sign Post		123.14	29.76
10 14 53 11-0218	EA	8' Galvanized Steel U-Channel Sign Post		142.90	34.73
10 14 53 11-0219	EA	10' Galvanized Steel U-Channel Sign Post		162.10	42.16
10 14 53 11-0220	EA	12' Galvanized Steel U-Channel Sign Post		164.29	42.16
10 14 53 11-0221		Fiberglass Or Composite Plastic U-Channel Sign Posts (10 14 53 11-0206)			
10 14 53 11-0222	EA	3' To 4' Fiberglass Or Composite Plastic U-Channel Sign Post Base		64.83	19.84
10 14 53 11-0223	EA	6' Fiberglass Or Composite Plastic U-Channel Sign Post		83.97	24.81
10 14 53 11-0224	EA	7' Fiberglass Or Composite Plastic U-Channel Sign Post		100.22	29.76
10 14 53 11-0225	EA	8' Fiberglass Or Composite Plastic U-Channel Sign Post		117.27	34.73
10 14 53 11-0226	EA	10' Fiberglass Or Composite Plastic U-Channel Sign Post		139.08	42.16
10 14 53 11-0227	EA	12' Fiberglass Or Composite Plastic U-Channel Sign Post		146.28	42.16



Specialties	10	10
Information Specialties	10 10	
Signage	10 14	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
10 14 53 11-0228		Tubular Sign Posts (10 14 53 11-0205) Note: Excludes digging and concrete.		
10 14 53 11-0229		2-3/8" Diameter, Galvanized Steel Tubular Sign Post (10 14 53 11-0228)		
10 14 53 11-0230	EA	6', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post.....	96.30	24.81
10 14 53 11-0231	EA	7', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post.....	114.27	29.76
10 14 53 11-0232	EA	8', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post.....	134.98	34.73
10 14 53 11-0233	EA	10', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post.....	173.92	42.16
10 14 53 11-0234	EA	12', 2-3/8" Diameter, Galvanized Steel Tubular Sign Post.....	188.76	42.16
10 14 53 11-0235		Square Sign Posts (10 14 53 11-0205) Note: Excludes digging and concrete.		
10 14 53 11-0236		Galvanized Steel Square Sign Posts (10 14 53 11-0235)		
10 14 53 11-0237	EA	3' To 4' Galvanized Steel Square Sign Post Base	72.76	19.84
10 14 53 11-0238	EA	6' Galvanized Steel Square Sign Post	115.87	24.81
10 14 53 11-0239	EA	7' Galvanized Steel Square Sign Post	135.88	29.76
10 14 53 11-0240	EA	8' Galvanized Steel Square Sign Post	158.49	34.73
10 14 53 11-0241	EA	10' Galvanized Steel Square Sign Post	193.54	42.16
10 14 53 11-0242	EA	12' Galvanized Steel Square Sign Post	203.90	42.16
10 14 53 11-0243		Standard Driven Street Sign Posts, Square (10 14 53 11-0235)		
10 14 53 11-0244	EA	12' x 2" Square 12 Gauge Galvanized Steel Sign Post With 1'-6" x 2-1/2" Square Sleeve And 2'-6" x 2-1/4" Square Anchor Driven Into Earth.....	243.52	42.16
10 14 53 11-0245		Other Sign Posts And Bases (10 14 53 11-0001) Note: For breakaway post systems, base posts are driven in, sign posts bolted to base post using lap splice hardware kit.		
10 14 53 11-0246		2.5 LB/FT Breakaway Sign Posts And Base Posts (10 14 53 11-0245)		
10 14 53 11-0247		Base Posts, 2.5 LB/LF, For Breakaway Sign Posts (10 14 53 11-0246)		
10 14 53 11-0248	EA	Base Post for 2.5 LB/LF Breakaway Sign Post.....	98.87	24.31
10 14 53 11-0249	EA	Lap Splice Hardware For 2.5 LB/LF Breakaway Sign Post.....	59.98	19.44
10 14 53 11-0250		Breakaway Sign Posts, 2.5 LB/LF (10 14 53 11-0246)		
10 14 53 11-0251	LF	2.5 LB/LF Breakaway Sign Post.....	12.43	2.43
10 14 53 11-0252		4 LB/FT Breakaway Sign Posts And Base Posts (10 14 53 11-0245)		
10 14 53 11-0253		Base Posts, 4 LB/LF, For Breakaway Sign Posts (10 14 53 11-0252)		
10 14 53 11-0254	EA	Base Post For 4 LB/LF Breakaway Sign Post	103.37	29.16
10 14 53 11-0255	EA	Lap Splice Hardware for 4 LB/LF Breakaway Sign Post.....	59.98	19.44
10 14 53 11-0256		Breakaway Sign Posts, 4 LB/LF (10 14 53 11-0252)		
10 14 53 11-0257	LF	4 LB/LF Breakaway Sign Post.....	15.22	2.43
10 14 53 11-0258		Driven Sign Posts (10 14 53 11-0245)		
10 14 53 11-0259		Driven Posts, 2.5 LB/LF (10 14 53 11-0258)		
10 14 53 11-0260	LF	2.5 LB/LF Driven Post.....	13.40	3.40
10 14 53 11-0261		Driven Posts, 4 LB/LF (10 14 53 11-0258)		
10 14 53 11-0262	LF	4 LB/LF Driven Post.....	16.68	3.89
10 14 53 11-0263		Omni-Directional Breakaway System For Sign Posts And Light Poles (10 14 53 11-0245)		
10 14 53 11-0264		Omni-Directional Breakaway Systems For Signs (10 14 53 11-0263) Note: Break-Safe as manufactured by Trampo Industries. Tasks are organized by post type and size. Includes hinges, anchors, all associated parts and drilling.		
10 14 53 11-0265	EA	Omni-Directional Breakaway System For 6" To 8" Wide Flange (Trampo B525).....	1,435.75	
10 14 53 11-0266	EA	Omni-Directional Breakaway System For 10" To 21" Wide Flange (Trampo B650).....	1,529.78	
10 14 53 11-0267	EA	Omni-Directional Breakaway System For Standard I Beam Or W6x9 Flange (Trampo A14 And A16).....	1,048.79	
10 14 53 11-0268	EA	Omni-Directional Breakaway System For 3" To 4.5" Outside Diameter Pipe (Trampo A3 And A4.5).....	918.59	
10 14 53 11-0269	EA	Omni-Directional Breakaway System For Square Tube (Trampo AS3 And AS4).....	1,041.56	
10 14 53 11-0270	EA	Omni-Directional Breakaway System For U-Channels (Trampo AU4 To AU6).....	990.92	
10 14 53 11-0271	EA	Omni-Directional Breakaway System For U-Channels Embedded (Trampo AUX4 To AUX6).....	1,074.10	
10 14 53 11-0272		Omni-Directional Breakaway Systems For Poles (10 14 53 11-0263) Note: Pole-Safe as Manufactured by Trampo Industries. Tasks are organized by bolt size. Includes four couplings, all associated parts, drilling and can be for new or for retro-fitting existing poles.		

10	10	Specialties
	10 10	Information Specialties
	10 14	Signage



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 14 53 11-0273	EA	Omni-Directional Breakaway System For Poles With 5/8" Couplings		486.41	
10 14 53 11-0274	EA	Omni-Directional Breakaway System For Poles With 3/4" Couplings		509.94	
10 14 53 11-0275	EA	Omni-Directional Breakaway System For Poles With 1" Couplings		529.57	
10 14 53 11-0276	EA	Omni-Directional Breakaway System For Poles With 1 1/4" Couplings		804.15	
10 14 53 11-0277	EA	Skirt For Omni-Directional Breakaway System For Poles With Bolt Circle Diameter Of 10" To Less Than 15"		70.61	
10 14 53 11-0278	EA	Skirt For Omni-Directional Breakaway System For Poles With Bolt Circle Diameter Of 15" To 20"		94.15	
10 14 53 11-0279		Sign Post Accessories <small>(10 14 53 11-0001)</small>			
10 14 53 11-0280		Sign Post Brackets <small>(10 14 53 11-0279)</small>			
10 14 53 11-0281	EA	2-3/8" Outside Diameter, Single Side Sign Bracket Set		49.23	7.29
		Note: Includes 2 single side sign post brackets			
10 14 53 11-0282	EA	2-3/8" Outside Diameter, Double Side Sign Bracket Set		65.94	12.15
		Note: Includes 2 double side sign post brackets			
10 14 53 11-0283	EA	4" To 12" Diameter, Buckle Bracket Set		59.56	9.72
		Note: Includes 2 stainless steel straps, 2 brackets and fastener hardware			
10 14 53 11-0284		Sign Post Caps <small>(10 14 53 11-0279)</small>			
10 14 53 11-0285	EA	2-3/8" Diameter, Galvanized, Flat Traffic Sign Post Cap (EC-2).....		22.64	4.86
10 14 53 11-0286		Sign Post Replacement Bolts <small>(10 14 53 11-0279)</small>			
10 14 53 11-0287	EA	Signage Fasteners Replacement.....		15.91	
		Note: Includes two 5/16" x 2" long bolts, two 5/16" nuts And four 5/16" washers			
10 14 53 11-0288		Removal Of Signs <small>(10 14 53 11)</small>			
		Note: Includes structural supports.			
10 14 53 11-0289	EA	>4 To 10 SF Sign Area, Sign Removal		194.43	
10 14 53 11-0290	EA	>10 To 20 SF Sign Area, Sign Removal		466.63	
10 14 53 11-0291	EA	>20 To 40 SF Sign Area, Sign Removal		699.95	
10 14 53 11-0292	EA	>40 To 100 SF Sign Area, Sign Removal		1,137.82	
10 14 53 11-0293		Removal And Reinstallation Of Signs <small>(10 14 53 11)</small>			
		Note: Includes structural supports.			
10 14 53 11-0294	EA	>4 To 10 SF Sign Area, Removal And Reinstallation Of Sign		296.39	
10 14 53 11-0295	EA	>10 To 20 SF Sign Area, Removal And Reinstallation Of Sign		703.34	
10 14 53 11-0296	EA	>20 SF To 40 SF Sign Area, Removal And Reinstallation Of Sign		1,052.81	
10 14 53 11-0297	EA	>40 SF To 100 SF Sign Area, Removal And Reinstallation Of Sign		1,709.42	
10 14 53 11-0298	EA	Removal And Reinstallation Of Street Sign On Post		111.80	
10 14 53 11-0299	EA	Removal And Relocation Of Traffic Light.....		399.25	
		Note: Excludes electrical hookup.			

10 20 Interior Specialties (10)

10 21 Compartments and Cubicles (10 20)

10 21 13 Toilet Compartments (10 21)

10 21 13 13 Metal Toilet Compartments (10 21 13)

10 21 13 13-0001		Enamel Coated Steel Toilet Partitions And Urinal Screens <small>(10 21 13 13)</small>			
		Note: Complete toilet partitions for corner installations. Includes 1" door, 1-1/4" pilaster, 1" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Constructed of galvanized sheet metal, cleaned, primed and finished with oven baked enamel or epoxy coating.			
10 21 13 13-0002		Enamel Coated Steel Toilet Partitions <small>(10 21 13 13-0001)</small>			
		Note: All colors.			
10 21 13 13-0003		Floor Anchored, Enamel Coated Steel, Complete Toilet Partitions <small>(10 21 13 13-0002)</small>			
10 21 13 13-0004	EA	36" x 60", Floor Anchored, Enamel Coated Steel, One Compartment Corner Unit, Complete Toilet Partition.....		1,054.55	122.06
		For >10, Deduct		-81.04	
		For Heavy Gauge Full-Height SS Hinges And Brackets, Add		241.76	
10 21 13 13-0005	EA	60" x 60", Floor Anchored, Enamel Coated Steel, One Compartment Corner Unit, Complete Americans With Disabilities Act Compliant Toilet Partition		1,278.38	132.91
		For Heavy Gauge Full-Height SS Hinges And Brackets, Add		241.76	
10 21 13 13-0006	EA	60" x 78", Floor Anchored, Enamel Coated Steel, One Compartment Corner Unit, Complete Americans With Disabilities Act Compliant Toilet Partition		1,366.08	138.34
		For Heavy Gauge Full-Height SS Hinges And Brackets, Add		241.76	
10 21 13 13-0007		Overhead Braced, Enamel Coated Steel, Complete Toilet Partitions <small>(10 21 13 13-0002)</small>			
		Note: Includes headrail.			
10 21 13 13-0008	EA	36" x 60", Overhead Braced, Enamel Coated Steel, One Compartment Corner Unit, Complete Toilet Partition		1,093.40	149.19
		For >10, Deduct		-79.50	
		For Heavy Gauge Full-Height SS Hinges And Brackets, Add		241.76	



Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
10 21 13 13-0009	EA	60" x 60", Overhead Braced, Enamel Coated Steel, One Compartment Corner Unit, Complete Americans With Disabilities Act Compliant Toilet Partition	1,272.96	160.04
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0010	EA	60" x 78", Overhead Braced, Enamel Coated Steel, One Compartment Corner Unit, Complete Americans With Disabilities Act Compliant Toilet Partition	1,346.39	165.46
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0011		Floor And Ceiling Anchored, Enamel Coated Steel, Complete Toilet Partitions <small>(10 21 13 13-0002)</small>		
		Note: Excludes above ceiling steel.		
10 21 13 13-0012	EA	36" x 60", Floor And Ceiling Anchored, Enamel Coated Steel, One Compartment Corner Unit, Complete Toilet Partition	1,290.47	176.32
		<i>For >10, Deduct</i>	-93.78	
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0013	EA	60" x 60", Floor And Ceiling Anchored, Enamel Coated Steel, One Compartment Corner Unit, Complete Americans With Disabilities Act Compliant Toilet Partition	1,508.31	187.17
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0014	EA	60" x 78", Floor And Ceiling Anchored, Enamel Coated Steel, One Compartment Corner Unit, Complete Americans With Disabilities Act Compliant Toilet Partition	1,585.05	192.59
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0015		Ceiling Hung, Enamel Coated Steel, Complete Toilet Partitions <small>(10 21 13 13-0002)</small>		
		Note: Excludes above ceiling steel.		
10 21 13 13-0016	EA	36" x 60", Ceiling Hung, Enamel Coated Steel, One Compartment Corner Unit, Complete Toilet Partition	1,240.40	203.44
		<i>For >10, Deduct</i>	-83.35	
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0017	EA	60" x 60", Ceiling Hung, Enamel Coated Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	1,495.04	214.29
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0018	EA	60" x 78", Ceiling Hung, Enamel Coated Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	1,580.49	219.72
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
10 21 13 13-0019		Enamel Coated Steel Urinal Screens <small>(10 21 13 13-0001)</small>		
		Note: All colors.		
10 21 13 13-0020		Floor Anchored, Enamel Coated Steel, Urinal Screens <small>(10 21 13 13-0019)</small>		
10 21 13 13-0021	EA	24" x 58" x 1", Floor Anchored, Enamel Coated Steel, Urinal Screen	556.08	75.92
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0022	EA	36" x 58" x 1", Floor Anchored, Enamel Coated Steel, Urinal Screen	616.99	81.34
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0023	EA	48" x 58" x 1", Floor Anchored, Enamel Coated Steel, Urinal Screen	679.80	86.77
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0024		Wall Hung, Enamel Coated Steel, Urinal Screens <small>(10 21 13 13-0019)</small>		
10 21 13 13-0025	EA	18" x 42" x 1", Wall Hung, Enamel Coated Steel, Urinal Screen	311.10	65.07
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0026	EA	24" x 42" x 1", Wall Hung, Enamel Coated Steel, Urinal Screen	335.42	70.50
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0027	EA	30" x 42" x 1", Wall Hung, Enamel Coated Steel, Urinal Screen	353.95	75.92
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0028		Wall Hung, Wedge Shaped, Enamel Coated Steel, Urinal Screens <small>(10 21 13 13-0019)</small>		
10 21 13 13-0029	EA	18" x 30" x 1", Wall Hung, Wedge Shaped, Enamel Coated Steel, Urinal Screen	404.64	70.50
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0030		Wall Hung And Post Supported, Enamel Coated Steel, Urinal Screens <small>(10 21 13 13-0019)</small>		
10 21 13 13-0031	EA	18" x 58" x 1", Wall Hung And Post Supported, Enamel Coated Steel, Urinal Screen	454.77	70.50
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0032	EA	24" x 58" x 1", Wall Hung And Post Supported, Enamel Coated Steel, Urinal Screen	484.86	75.92
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0033	EA	30" x 58" x 1", Wall Hung And Post Supported, Enamel Coated Steel, Urinal Screen	514.96	81.34
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0034		Wall Hung And Overhead Braced, Enamel Coated Steel, Urinal Screens <small>(10 21 13 13-0019)</small>		
10 21 13 13-0035	EA	22" x 58" x 1", Wall Hung And Overhead Braced, Enamel Coated Steel, Urinal Screen	513.73	75.92
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0036	EA	34" x 58" x 1", Wall Hung And Overhead Braced, Enamel Coated Steel, Urinal Screen	551.53	81.34
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0037	EA	46" x 58" x 1", Wall Hung And Overhead Braced, Enamel Coated Steel, Urinal Screen	610.51	86.77
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 13-0038		Enamel Coated Steel Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 13-0001)</small>		
		Note: All colors.		

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 21 13 13-0039	Enamel Coated Steel, Toilet Partition Doors <small>(10 21 13 13-0038)</small>		
10 21 13 13-0040	EA 24" x 58" x 1", Enamel Coated Steel, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	336.00 107.79	21.70
10 21 13 13-0041	EA 26" x 58" x 1", Enamel Coated Steel, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	343.70 107.79	21.70
10 21 13 13-0042	EA 30" x 58" x 1", Enamel Coated Steel, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	364.28 107.79	23.33
10 21 13 13-0043	EA 34" x 58" x 1", Enamel Coated Steel, ADA Compliant Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	398.94 107.79	23.33
10 21 13 13-0044	EA 36" x 58" x 1", Enamel Coated Steel, ADA Compliant Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	406.64 107.79	23.33

10 21 13 13-0045	Enamel Coated Steel, Toilet Partition Panels <small>(10 21 13 13-0038)</small>		
10 21 13 13-0046	EA 6" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	238.35 66.98	32.55
10 21 13 13-0047	EA 12" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	263.03 66.98	35.26
10 21 13 13-0048	EA 18" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	287.70 66.98	37.98
10 21 13 13-0049	EA 24" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	312.38 66.98	40.69
10 21 13 13-0050	EA 30" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	337.06 66.98	43.40
10 21 13 13-0051	EA 36" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	361.72 66.98	46.12
10 21 13 13-0052	EA 42" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	384.47 66.98	48.83
10 21 13 13-0053	EA 48" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	409.16 66.98	51.54
10 21 13 13-0054	EA 55" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	426.12 66.98	54.25
10 21 13 13-0055	EA 58" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Panel Reinforced At ADA Grab Bar, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	435.99 42.00 66.98	55.33
10 21 13 13-0056	EA 60" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Panel Reinforced At ADA Grab Bar, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	448.88 42.00 66.98	56.96
10 21 13 13-0057	EA 70" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Panel Reinforced At ADA Grab Bar, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	490.88 42.00 66.98	59.67
10 21 13 13-0058	EA 78" x 58" x 1", Enamel Coated Steel, Toilet Partition Panel <i>For Panel Reinforced At ADA Grab Bar, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	527.09 42.00 66.98	62.39

10 21 13 13-0059	70" Long, Enamel Coated Steel, Toilet Partition Pilasters <small>(10 21 13 13-0038)</small>		
10 21 13 13-0060	EA Up To 4" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	182.70 66.98	16.28
10 21 13 13-0061	EA 5" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	201.60 66.98	18.98
10 21 13 13-0062	EA 6" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	222.42 66.98	21.70
10 21 13 13-0063	EA 8" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	258.65 66.98	24.41
10 21 13 13-0064	EA 10" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	292.95 66.98	27.12
10 21 13 13-0065	EA 12" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	327.25 66.98	29.84
10 21 13 13-0066	EA 18" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	423.15 66.98	32.55
10 21 13 13-0067	EA 22" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	486.33 66.98	35.26
10 21 13 13-0068	EA 24" x 70" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	522.55 66.98	37.98

10 21 13 13-0069	82" Long, Enamel Coated Steel, Toilet Partition Pilasters <small>(10 21 13 13-0038)</small>		
10 21 13 13-0070	EA Up To 4" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	146.13 66.98	16.28
10 21 13 13-0071	EA 5" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	159.26 66.98	18.98
10 21 13 13-0072	EA 6" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	174.30 66.98	21.70
10 21 13 13-0073	EA 8" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	197.05 66.98	24.41
10 21 13 13-0074	EA 10" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	217.87 66.98	27.12
10 21 13 13-0075	EA 12" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	240.62 66.98	29.84
10 21 13 13-0076	EA 18" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	298.02 66.98	32.55



Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
10 21 13 13-0077	EA	22" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	336.18 66.98	35.26
10 21 13 13-0078	EA	24" x 82" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	358.93 66.98	37.98
10 21 13 13-0079		96" To 120" Long, Enamel Coated Steel, Partition Pilasters (10 21 13 13-0038)		
10 21 13 13-0080	EA	Up To 4" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	203.18 66.98	21.70
10 21 13 13-0081	EA	5" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	222.08 66.98	24.41
10 21 13 13-0082	EA	6" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	242.90 66.98	27.12
10 21 13 13-0083	EA	8" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	279.12 66.98	29.84
10 21 13 13-0084	EA	10" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	313.42 66.98	32.55
10 21 13 13-0085	EA	12" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	347.73 66.98	35.26
10 21 13 13-0086	EA	18" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	443.63 66.98	37.98
10 21 13 13-0087	EA	22" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	506.80 66.98	40.69
10 21 13 13-0088	EA	24" x 96" To 120" x 1-1/4", Enamel Coated Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	543.03 66.98	43.40
10 21 13 14		Stainless-Steel Toilet Compartments (10 21 13)		
10 21 13 14-0001		Stainless Steel Toilet Partitions And Urinal Screens (10 21 13 14) Note: Complete toilet partitions for corner installations. Includes 1" door, 1-1/4" pilaster, 1" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Constructed of type 304 stainless steel. Includes satin finish.		
10 21 13 14-0002		Stainless Steel Toilet Partitions (10 21 13 14-0001)		
10 21 13 14-0003		Floor Anchored, Stainless Steel, Complete Toilet Partitions (10 21 13 14-0002)		
10 21 13 14-0004	EA	36" x 60", Floor Anchored, Stainless Steel, One Compartment Corner Unit, Complete Toilet Partition..... <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	2,459.73 -221.56 241.76 775.46	122.06
10 21 13 14-0005	EA	60" x 60", Floor Anchored, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	2,972.81 241.76 947.44	132.91
10 21 13 14-0006	EA	60" x 78", Floor Anchored, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	3,113.88 241.76 993.02	138.34
10 21 13 14-0007		Overhead Braced, Stainless Steel, Complete Toilet Partitions (10 21 13 14-0002) Note: Includes headrail.		
10 21 13 14-0008	EA	36" x 60", Overhead Braced, Stainless Steel, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	2,073.75 -177.54 241.76 621.38	149.19
10 21 13 14-0009	EA	60" x 60", Overhead Braced, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	2,528.41 241.76 772.92	160.04
10 21 13 14-0010	EA	60" x 78", Overhead Braced, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	2,756.94 241.76 849.10	165.46
10 21 13 14-0011		Floor And Ceiling Anchored, Stainless Steel, Complete Toilet Partitions (10 21 13 14-0002) Note: Excludes above ceiling steel.		
10 21 13 14-0012	EA	36" x 60", Floor And Ceiling Anchored, Stainless Steel, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	2,878.29 -252.57 241.76 883.98	176.32
10 21 13 14-0013	EA	60" x 60", Floor And Ceiling Anchored, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition..... <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	3,087.46 241.76 949.60	187.17
10 21 13 14-0014	EA	60" x 78", Floor And Ceiling Anchored, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition..... <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	3,232.68 241.76 996.63	192.59

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 14-0015			Ceiling Hung, Stainless Steel, Complete Toilet Partitions <small>(10 21 13 14-0002)</small> Note: Excludes above ceiling steel.		
10 21 13 14-0016	EA		36" x 60", Ceiling Hung, Stainless Steel, One Compartment Corner Unit, Complete Toilet Partition.....	2,876.10	203.44
			<i>For >10, Deduct</i>	-246.92	
			<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
			<i>For Diamond Pattern Finish, Add</i>	864.23	
10 21 13 14-0017	EA		60" x 60", Ceiling Hung, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,507.19	214.29
			<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
			<i>For Diamond Pattern Finish, Add</i>	1,077.51	
10 21 13 14-0018	EA		60" x 78", Ceiling Hung, Stainless Steel, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,688.97	219.72
			<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76	
			<i>For Diamond Pattern Finish, Add</i>	1,137.34	
10 21 13 14-0019			Stainless Steel Urinal Screens <small>(10 21 13 14-0001)</small>		
10 21 13 14-0020			Floor Anchored, Stainless Steel, Urinal Screens <small>(10 21 13 14-0019)</small>		
10 21 13 14-0021	EA		24" x 58" x 1", Floor Anchored, Stainless Steel, Urinal Screen.....	805.01	75.92
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	228.61	
10 21 13 14-0022	EA		36" x 58" x 1", Floor Anchored, Stainless Steel, Urinal Screen.....	912.12	81.34
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	262.30	
10 21 13 14-0023	EA		48" x 58" x 1", Floor Anchored, Stainless Steel, Urinal Screen.....	930.84	86.77
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	265.06	
10 21 13 14-0024			Wall Hung, Stainless Steel, Urinal Screens <small>(10 21 13 14-0019)</small>		
10 21 13 14-0025	EA		18" x 42" x 1", Wall Hung, Stainless Steel, Urinal Screen.....	593.54	65.07
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	162.19	
10 21 13 14-0026	EA		24" x 42" x 1", Wall Hung, Stainless Steel, Urinal Screen.....	642.24	70.50
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	175.43	
10 21 13 14-0027	EA		30" x 42" x 1", Wall Hung, Stainless Steel, Urinal Screen.....	701.33	75.92
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	192.33	
10 21 13 14-0028			Wall Hung And Post Supported, Stainless Steel, Urinal Screens <small>(10 21 13 14-0019)</small>		
10 21 13 14-0029	EA		18" x 58" x 1", Wall Hung And Post Supported, Stainless Steel, Urinal Screen.....	970.29	70.50
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	290.26	
10 21 13 14-0030	EA		24" x 58" x 1", Wall Hung And Post Supported, Stainless Steel, Urinal Screen.....	1,016.59	75.92
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	302.66	
10 21 13 14-0031	EA		30" x 58" x 1", Wall Hung And Post Supported, Stainless Steel, Urinal Screen.....	1,062.66	81.34
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	314.99	
10 21 13 14-0032			Wall Hung And Overhead Braced, Stainless Steel, Urinal Screens <small>(10 21 13 14-0019)</small>		
10 21 13 14-0033	EA		22" x 58" x 1", Wall Hung And Overhead Braced, Stainless Steel, Urinal Screen	805.01	75.92
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	228.61	
10 21 13 14-0034	EA		34" x 58" x 1", Wall Hung And Overhead Braced, Stainless Steel, Urinal Screen	912.11	81.34
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	262.30	
10 21 13 14-0035	EA		46" x 58" x 1", Wall Hung And Overhead Braced, Stainless Steel, Urinal Screen	1,023.74	86.77
			<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
			<i>For Diamond Pattern Finish, Add</i>	297.57	
10 21 13 14-0036			Stainless Steel Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 14-0001)</small>		
10 21 13 14-0037			Stainless Steel, Toilet Partition Doors <small>(10 21 13 14-0036)</small>		
10 21 13 14-0038	EA		24" x 58" x 1", Stainless Steel, Toilet Partition Door	537.51	21.70
			<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79	
			<i>For Diamond Pattern Finish, Add</i>	172.94	
10 21 13 14-0039	EA		26" x 58" x 1", Stainless Steel, Toilet Partition Door	615.55	21.70
			<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79	
			<i>For Diamond Pattern Finish, Add</i>	200.25	
10 21 13 14-0040	EA		30" x 58" x 1", Stainless Steel, Toilet Partition Door	631.79	24.41
			<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79	
			<i>For Diamond Pattern Finish, Add</i>	204.04	
10 21 13 14-0041	EA		34" x 58" x 1", Stainless Steel, ADA Compliant Toilet Partition Door.....	654.32	24.41
			<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79	
			<i>For Diamond Pattern Finish, Add</i>	211.92	
10 21 13 14-0042	EA		36" x 58" x 1", Stainless Steel, ADA Compliant Toilet Partition Door.....	660.59	24.41
			<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79	
			<i>For Diamond Pattern Finish, Add</i>	214.12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 14-0043 Stainless Steel, Toilet Partition Panels <small>(10 21 13 14-0036)</small>		
10 21 13 14-0044 EA 6" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	461.58	32.55
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	138.77	
10 21 13 14-0045 EA 12" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	512.81	35.26
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	154.80	
10 21 13 14-0046 EA 18" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	534.06	37.98
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	160.34	
10 21 13 14-0047 EA 24" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	558.32	40.69
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	166.93	
10 21 13 14-0048 EA 30" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	599.32	43.40
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	179.38	
10 21 13 14-0049 EA 36" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	647.07	46.12
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	194.20	
10 21 13 14-0050 EA 42" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	758.10	48.83
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	231.16	
10 21 13 14-0051 EA 48" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	830.46	51.54
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	254.58	
10 21 13 14-0052 EA 55" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	851.73	54.25
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	260.13	
10 21 13 14-0053 EA 58" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	894.41	55.33
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	274.31	
10 21 13 14-0054 EA 60" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	950.50	56.96
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	292.80	
10 21 13 14-0055 EA 70" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	995.93	59.67
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	306.80	
10 21 13 14-0056 EA 78" x 58" x 1", Stainless Steel, Toilet Partition Panel.....	1,093.44	62.39
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	339.03	
10 21 13 14-0057 70" Long, Stainless Steel, Toilet Partition Pilasters <small>(10 21 13 14-0036)</small>		
10 21 13 14-0058 EA Up To 4" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	321.39	16.28
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	101.09	
10 21 13 14-0059 EA 5" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	349.71	18.98
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	109.11	
10 21 13 14-0060 EA 6" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	379.79	21.70
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	117.74	
10 21 13 14-0061 EA 8" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	432.77	24.41
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	134.38	
10 21 13 14-0062 EA 10" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	485.75	27.12
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	151.03	
10 21 13 14-0063 EA 12" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	538.72	29.84
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	167.67	
10 21 13 14-0064 EA 18" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	685.05	32.55
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	216.98	
10 21 13 14-0065 EA 22" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	785.58	35.26
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	250.27	
10 21 13 14-0066 EA 24" x 70" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	838.55	37.98
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	266.91	
10 21 13 14-0067 82" Long, Stainless Steel, Toilet Partition Pilasters <small>(10 21 13 14-0036)</small>		
10 21 13 14-0068 EA Up To 4" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	244.85	16.28
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	74.31	
10 21 13 14-0069 EA 5" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	264.81	18.98
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	79.39	
10 21 13 14-0070 EA 6" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster.....	285.50	21.70
For Heavy Gauge Full-Height SS Brackets, Add	66.98	
For Diamond Pattern Finish, Add	84.74	

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 14-0071	EA		8" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	371.50 66.98 112.93	24.41
10 21 13 14-0072	EA		10" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	419.38 66.98 127.80	27.12
10 21 13 14-0073	EA		12" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	433.61 66.98 130.88	29.84
10 21 13 14-0074	EA		18" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	491.61 66.98 149.28	32.55
10 21 13 14-0075	EA		22" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	554.86 66.98 169.52	35.26
10 21 13 14-0076	EA		24" x 82" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	588.96 66.98 179.55	37.98
10 21 13 14-0077			96" To 120" Long, Stainless Steel, Toilet Partition Pilasters (10 21 13 14-0036)		
10 21 13 14-0078	EA		Up To 4" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	351.61 66.98 107.87	21.70
10 21 13 14-0079	EA		5" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	385.22 66.98 117.74	24.41
10 21 13 14-0080	EA		6" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	417.06 66.98 126.98	27.12
10 21 13 14-0081	EA		8" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	478.84 66.98 146.71	29.84
10 21 13 14-0082	EA		10" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	538.87 66.98 165.82	32.55
10 21 13 14-0083	EA		12" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	598.89 66.98 184.93	35.26
10 21 13 14-0084	EA		18" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	771.63 66.98 243.49	37.98
10 21 13 14-0085	EA		22" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	886.25 66.98 281.70	40.69
10 21 13 14-0086	EA		24" x 96" To 120" x 1-1/4", Stainless Steel, Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Diamond Pattern Finish, Add</i>	948.04 66.98 301.43	43.40
10 21 13 16			Plastic-Laminate-Clad Toilet Compartments (10 21 13)		
10 21 13 16-0001			Laminated Plastic Toilet Partitions And Urinal Screens (10 21 13 16) Note: Complete toilet partitions for corner installations. Includes 1" door, 1" pilaster, 1" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Constructed of a sandwich of high pressure decorative plastic laminate bonded to a solid industrial-grade particle board.		
10 21 13 16-0002			Laminated Plastic Toilet Partitions (10 21 13 16-0001) Note: Includes all standard Bobrick colors.		
10 21 13 16-0003			Floor Anchored, Laminated Plastic, Complete Toilet Partitions (10 21 13 16-0002)		
10 21 13 16-0004	EA		36" x 60", Floor Anchored, Laminated Plastic, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	1,422.89 -117.88 194.19 241.76	122.06
10 21 13 16-0005	EA		60" x 60", Floor Anchored, Laminated Plastic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	1,746.40 194.21 241.76	132.91
10 21 13 16-0006	EA		60" x 78", Floor Anchored, Laminated Plastic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	1,881.20 194.22 241.76	138.34
10 21 13 16-0007			Overhead Braced, Laminated Plastic, Complete Toilet Partitions (10 21 13 16-0002) Note: Includes headrail.		
10 21 13 16-0008	EA		36" x 60", Overhead Braced, Laminated Plastic, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	1,534.68 -123.63 194.23 241.76	149.19



Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 16-0009	EA		60" x 60", Overhead Braced, Laminated Plastic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	1,872.58 194.25 241.76	160.04
10 21 13 16-0010	EA		60" x 78", Overhead Braced, Laminated Plastic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	2,018.16 194.25 241.76	165.46
10 21 13 16-0011			Ceiling Hung, Laminated Plastic, Complete Toilet Partitions <small>(10 21 13 16-0002)</small> Note: Excludes above ceiling steel.		
10 21 13 16-0012	EA		36" x 60", Ceiling Hung, Laminated Plastic, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	2,050.65 -164.38 194.31 241.76	203.44
10 21 13 16-0013	EA		60" x 60", Ceiling Hung, Laminated Plastic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	2,399.61 194.32 241.76	214.29
10 21 13 16-0014	EA		60" x 78", Ceiling Hung, Laminated Plastic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Cast Stainless Steel Hardware, Add</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	2,534.40 194.33 241.76	219.72
10 21 13 16-0015			Laminated Plastic Urinal Screens <small>(10 21 13 16-0001)</small> Note: Includes all standard Bobrick colors.		
10 21 13 16-0016			Floor Anchored, Laminated Plastic, Urinal Screens <small>(10 21 13 16-0015)</small>		
10 21 13 16-0017	EA		24" x 58" x 1", Floor Anchored, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	591.46 66.98	75.92
10 21 13 16-0018	EA		36" x 58" x 1", Floor Anchored, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	645.43 66.98	81.34
10 21 13 16-0019	EA		48" x 58" x 1", Floor Anchored, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	664.73 66.98	86.77
10 21 13 16-0020			Wall Hung, Laminated Plastic, Urinal Screens <small>(10 21 13 16-0015)</small>		
10 21 13 16-0021	EA		18" x 42" x 1", Wall Hung, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	457.37 66.98	65.07
10 21 13 16-0022	EA		24" x 42" x 1", Wall Hung, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	480.54 66.98	70.50
10 21 13 16-0023	EA		30" x 42" x 1", Wall Hung, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	502.58 66.98	75.92
10 21 13 16-0024			Wall Hung And Post Supported, Laminated Plastic, Urinal Screens <small>(10 21 13 16-0015)</small>		
10 21 13 16-0025	EA		18" x 58" x 1", Wall Hung And Post Supported, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	612.35 66.98	70.50
10 21 13 16-0026	EA		24" x 58" x 1", Wall Hung And Post Supported, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	672.36 66.98	75.92
10 21 13 16-0027	EA		30" x 58" x 1", Wall Hung And Post Supported, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	737.55 66.98	81.34
10 21 13 16-0028			Wall Hung And Overhead Braced, Laminated Plastic, Urinal Screens <small>(10 21 13 16-0015)</small>		
10 21 13 16-0029	EA		24" x 58" x 1", Wall Hung And Overhead Braced, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	563.40 66.98	70.50
10 21 13 16-0030	EA		36" x 58" x 1", Wall Hung And Overhead Braced, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	618.60 66.98	75.92
10 21 13 16-0031	EA		48" x 58" x 1", Wall Hung And Overhead Braced, Laminated Plastic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	637.20 66.98	81.34
10 21 13 16-0032			Laminated Plastic Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 16-0001)</small> Note: Includes all standard Bobrick colors.		
10 21 13 16-0033			Laminated Plastic, Toilet Partition Doors <small>(10 21 13 16-0032)</small>		
10 21 13 16-0034	EA		24" x 58" x 1", Laminated Plastic, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	479.18 107.79	21.70
10 21 13 16-0035	EA		26" x 58" x 1", Laminated Plastic, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	521.52 107.79	21.70
10 21 13 16-0036	EA		30" x 58" x 1", Laminated Plastic, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	538.50 107.79	24.41
10 21 13 16-0037	EA		34" x 58" x 1", Laminated Plastic, Americans With Disabilities Act Compliant Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	551.59 107.79	24.41
10 21 13 16-0038	EA		36" x 58" x 1", Laminated Plastic, Americans With Disabilities Act Compliant Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	563.91 107.79	24.41
10 21 13 16-0039			Laminated Plastic, Toilet Partition Panels <small>(10 21 13 16-0032)</small>		

10 Specialties**10 20 Interior Specialties****10 21 Compartments and Cubicles**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 16-0040	EA		6" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	236.73 66.98	32.55
10 21 13 16-0041	EA		12" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	262.12 66.98	35.26
10 21 13 16-0042	EA		18" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	287.49 66.98	37.98
10 21 13 16-0043	EA		24" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	313.90 66.98	40.69
10 21 13 16-0044	EA		30" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	338.27 66.98	43.40
10 21 13 16-0045	EA		36" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	364.77 66.98	46.12
10 21 13 16-0046	EA		42" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	372.54 66.98	48.83
10 21 13 16-0047	EA		48" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	381.79 66.98	51.54
10 21 13 16-0048	EA		55" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	401.87 66.98	54.25
10 21 13 16-0049	EA		58" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	419.01 66.98	55.33
10 21 13 16-0050	EA		60" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	438.07 66.98	56.96
10 21 13 16-0051	EA		70" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	501.24 66.98	59.67
10 21 13 16-0052	EA		78" x 58" x 1", Laminated Plastic, Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	572.87 66.98	62.39
10 21 13 16-0053			69" Long, Laminated Plastic, Toilet Partition Pilasters <small>(10 21 13 16-0032)</small>		
10 21 13 16-0054	EA		Up To 4" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	196.54 13.53 66.98 163.99	16.28
10 21 13 16-0055	EA		5" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	226.61 15.56 66.98 188.63	18.98
10 21 13 16-0056	EA		6" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	232.03 15.56 66.98 188.63	21.70
10 21 13 16-0057	EA		8" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	255.94 17.09 66.98 207.11	24.41
10 21 13 16-0058	EA		10" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	266.75 17.53 66.98 212.50	27.12
10 21 13 16-0059	EA		12" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	289.88 18.99 66.98 230.21	29.84
10 21 13 16-0060	EA		18" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	370.76 25.22 66.98 305.66	32.55
10 21 13 16-0061	EA		22" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	450.10 31.31 66.98 379.57	35.26
10 21 13 16-0062	EA		24" x 69" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	505.57 35.44 66.98 429.62	37.98
10 21 13 16-0063			83" Long, Laminated Plastic, Toilet Partition Pilasters <small>(10 21 13 16-0032)</small>		
10 21 13 16-0064	EA		Up To 4" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	390.57 29.54 66.98 358.02	16.28
10 21 13 16-0065	EA		5" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	431.41 32.46 66.98 393.43	18.98
10 21 13 16-0066	EA		6" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	436.83 32.46 66.98 393.43	21.70
10 21 13 16-0067	EA		8" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Plaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	472.29 34.94 66.98 423.46	24.41

Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21	13 16-0068	EA	10" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	515.44 38.05 66.98 461.19	27.12
10 21	13 16-0069	EA	12" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	550.11 40.46 66.98 490.44	29.84
10 21	13 16-0070	EA	18" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	686.06 51.23 66.98 620.96	32.55
10 21	13 16-0071	EA	22" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	781.94 58.69 66.98 711.41	35.26
10 21	13 16-0072	EA	24" x 83" x 1", Laminated Plastic, Toilet Partition Pilaster <i>For 1-1/4" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For Steel Core Pilaster, Add</i>	801.99 59.90 66.98 726.04	37.98

10 21 13 19 Plastic Toilet Compartments (10 21 13)

10 21	13 19-0001		Recycled Solid Polymer (HDPE) Toilet Partitions And Urinal Screens <small>(10 21 13 19)</small> Note: Complete toilet partitions for corner installations. Includes 1" door, 1" pilaster, 1" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Constructed of high density polyethylene (HDPE). Includes Class B fire rating.		
10 21	13 19-0002		Recycled Solid Plastic (HDPE) Toilet Partitions <small>(10 21 13 19-0001)</small> Note: Includes all standard Columbia Partitions colors.		
10 21	13 19-0003		Overhead Braced, Recycled Solid Plastic (HDPE), Complete Toilet Partitions <small>(10 21 13 19-0002)</small> Note: Includes headrail.		
10 21	13 19-0004	EA	36" x 60", Overhead Braced, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,901.03 -160.27 241.76 993.65	149.19
10 21	13 19-0005	EA	60" x 60", Overhead Braced, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,344.82 241.76 1,255.34	160.04
10 21	13 19-0006	EA	60" x 78", Overhead Braced, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,600.66 241.76 1,407.23	165.46
10 21	13 19-0007		Floor And Ceiling Anchored, Recycled Solid Plastic (HDPE), Complete Toilet Partitions <small>(10 21 13 19-0002)</small> Note: Excludes above ceiling steel.		
10 21	13 19-0008	EA	36" x 60", Floor And Ceiling Anchored, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,894.58 -154.20 241.76 956.01	176.32
10 21	13 19-0009	EA	60" x 60", Floor And Ceiling Anchored, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,377.57 241.76 1,242.01	187.17
10 21	13 19-0010	EA	60" x 78", Floor And Ceiling Anchored, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,633.41 241.76 1,393.90	192.59
10 21	13 19-0011		Ceiling Hung, Recycled Solid Plastic (HDPE), Complete Toilet Partitions <small>(10 21 13 19-0002)</small> Note: Excludes above ceiling steel.		
10 21	13 19-0012	EA	36" x 60", Ceiling Hung, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,983.79 -157.69 241.76 977.68	203.44
10 21	13 19-0013	EA	60" x 60", Ceiling Hung, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,358.89 241.76 1,196.79	214.29
10 21	13 19-0014	EA	60" x 78", Ceiling Hung, Recycled Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,614.71 241.76 1,348.67	219.72

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 21 13 19-0015	Recycled Solid Plastic (HDPE) Urinal Screens <small>(10 21 13 19-0001)</small> Note: Includes all standard Columbia Partitions colors.		
10 21 13 19-0016	Wall Hung, Recycled Solid Plastic (HDPE), Urinal Screens <small>(10 21 13 19-0015)</small>		
10 21 13 19-0017	EA 18" x 42" x 1", Wall Hung, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	437.18 66.98 190.36	65.07
10 21 13 19-0018	EA 24" x 42" x 1", Wall Hung, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	460.12 66.98 197.85	70.50
10 21 13 19-0019	Wall Hung And Post Supported, Recycled Solid Plastic (HDPE), Urinal Screens <small>(10 21 13 19-0015)</small>		
10 21 13 19-0020	EA 18" x 42" x 1", Wall Hung And Post Supported, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	558.32 66.98 258.74	70.50
10 21 13 19-0021	EA 24" x 42" x 1", Wall Hung And Post Supported, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	708.25 66.98 344.97	75.92
10 21 13 19-0022	EA 30" x 42" x 1", Wall Hung And Post Supported, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	787.59 66.98 387.44	81.34
10 21 13 19-0023	Wall Hung And Overhead Braced, Recycled Solid Plastic (HDPE), Urinal Screens <small>(10 21 13 19-0015)</small>		
10 21 13 19-0024	EA 24" x 55" x 1", Wall Hung And Overhead Braced, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	569.17 66.98 258.74	75.92
10 21 13 19-0025	EA 36" x 55" x 1", Wall Hung And Overhead Braced, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	719.09 66.98 344.97	81.34
10 21 13 19-0026	EA 48" x 55" x 1", Wall Hung And Overhead Braced, Recycled Solid Plastic (HDPE), Urinal Screen..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	855.25 66.98 422.67	86.77
10 21 13 19-0027	Recycled Solid Plastic (HDPE) Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 19-0001)</small> Note: Includes all standard Columbia Partitions colors.		
10 21 13 19-0028	Recycled Solid Plastic (HDPE), Toilet Partition Doors <small>(10 21 13 19-0027)</small>		
10 21 13 19-0029	EA 24" x 55" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Door..... <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	455.91 107.79 255.76	21.70
10 21 13 19-0030	EA 26" x 55" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Door..... <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	493.45 107.79 279.03	21.70
10 21 13 19-0031	EA 30" x 55" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Door..... <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	536.15 107.79 302.14	24.41
10 21 13 19-0032	EA 34" x 55" x 1", Recycled Solid Plastic (HDPE), ADA Compliant Toilet Partition Door..... <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	612.12 107.79 349.24	24.41
10 21 13 19-0033	EA 36" x 55" x 1", Recycled Solid Plastic (HDPE), ADA Compliant Toilet Partition Door..... <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	630.10 107.79 360.39	24.41
10 21 13 19-0034	Recycled Solid Plastic (HDPE), Toilet Partition Panels <small>(10 21 13 19-0027)</small>		
10 21 13 19-0035	EA 6" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	156.53 66.98 56.69	32.55
10 21 13 19-0036	EA 12" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	253.40 66.98 113.38	35.26
10 21 13 19-0037	EA 18" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	350.23 66.98 170.05	37.98
10 21 13 19-0038	EA 24" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	409.59 66.98 203.49	40.69
10 21 13 19-0039	EA 30" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	497.08 66.98 254.37	43.40
10 21 13 19-0040	EA 36" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	531.19 66.98 272.16	46.12
10 21 13 19-0041	EA 42" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	596.92 66.98 309.55	48.83

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 19-0042 EA 48" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	673.66 66.98 353.76	51.54
10 21 13 19-0043 EA 55" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	736.19 66.98 389.17	54.25
10 21 13 19-0044 EA 58" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	752.19 66.98 397.74	55.33
10 21 13 19-0045 EA 60" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	777.57 66.98 411.46	56.96
10 21 13 19-0046 EA 70" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	879.81 66.98 471.48	59.67
10 21 13 19-0047 EA 78" x 55" x 1", Recycled Solid Plastic (High Density Polyethylene), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	948.61 66.98 510.78	62.39
10 21 13 19-0048 82" Long, Recycled Solid Plastic (HDPE), Toilet Partition Pilasters <small>(10 21 13 19-0027)</small>		
10 21 13 19-0049 EA Up To 4" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	208.68 66.98 109.20	16.28
10 21 13 19-0050 EA 5" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	231.77 66.98 120.15	18.98
10 21 13 19-0051 EA 6" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	251.76 66.98 129.18	21.70
10 21 13 19-0052 EA 8" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	270.21 66.98 137.26	24.41
10 21 13 19-0053 EA 10" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	303.44 66.98 154.50	27.12
10 21 13 19-0054 EA 12" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	336.65 66.98 171.73	29.84
10 21 13 19-0055 EA 18" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	464.07 66.98 247.36	32.55
10 21 13 19-0056 EA 22" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	524.98 66.98 281.76	35.26
10 21 13 19-0057 EA 24" x 82" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	571.71 66.98 307.37	37.98
10 21 13 19-0058 96" To 120", Recycled Solid Plastic (HDPE), Toilet Partition Pilasters <small>(10 21 13 19-0027)</small>		
10 21 13 19-0059 EA Up To 4" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	254.35 66.98 130.79	21.70
10 21 13 19-0060 EA 5" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	279.86 66.98 143.24	24.41
10 21 13 19-0061 EA 6" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	308.20 66.98 157.45	27.12
10 21 13 19-0062 EA 8" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	349.41 66.98 179.64	29.84
10 21 13 19-0063 EA 10" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	391.03 66.98 202.08	32.55
10 21 13 19-0064 EA 12" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	432.26 66.98 224.27	35.26
10 21 13 19-0065 EA 18" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	555.68 66.98 297.43	37.98
10 21 13 19-0066 EA 22" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	622.17 66.98 335.29	40.69
10 21 13 19-0067 EA 24" x 96" To 120" x 1", Recycled Solid Plastic (HDPE), Toilet Partition Pilaster <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	676.76 66.98 365.77	43.40

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 21 13 19-0068		Anti-microbial Recycled Solid Polymer (HDPE) Toilet Partitions And Urinal Screens <small>(10 21 13 19)</small> Note: Complete toilet partitions for corner installations. Includes 1" door, 1" pilaster, 1" separator panel, trim shoes, and hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and hardware as required. Constructed of high density polyethylene (HDPE). Includes Class B fire rating.			
10 21 13 19-0069		Anti-microbial Recycled Solid Plastic (HDPE) Toilet Partitions <small>(10 21 13 19-0068)</small> Note: Includes all standard Columbia Partitions colors.			
10 21 13 19-0070		Overhead Braced, Anti-microbial Recycled Solid Plastic (HDPE), Complete Toilet Partitions <small>(10 21 13 19-0069)</small> Note: Includes headrail.			
10 21 13 19-0071	EA	36" x 60", Overhead Braced, Anti-microbial Solid Plastic (High Density Polyethylene), One Compartment Corner Unit, Complete Toilet Partition	2,461.96		149.19
		<i>For >10, Deduct</i>	-216.36		
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,341.43		
10 21 13 19-0072	EA	60" x 60", Overhead Braced, Anti-microbial Solid Plastic (High Density Polyethylene), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,053.50		160.04
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,694.72		
10 21 13 19-0073	EA	60" x 78", Overhead Braced, Anti-microbial Solid Plastic (High Density Polyethylene), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,395.08		165.46
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,899.77		
10 21 13 19-0074		Floor And Ceiling Anchored, Anti-microbial Recycled Solid Plastic (HDPE), Complete Toilet Partitions <small>(10 21 13 19-0069)</small> Note: Excludes above ceiling steel.			
10 21 13 19-0075	EA	36" x 60", Floor And Ceiling Anchored, Anti-microbial Solid Plastic (HDPE), One Compartment Corner Unit, Complete Toilet Partition	2,434.26		176.32
		<i>For >10, Deduct</i>	-208.16		
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,290.61		
10 21 13 19-0076	EA	60" x 60", Floor And Ceiling Anchored, Anti-microbial Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,078.69		187.17
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,676.70		
10 21 13 19-0077	EA	60" x 78", Floor And Ceiling Anchored, Anti-microbial Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,420.28		192.59
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,881.76		
10 21 13 19-0078		Ceiling Hung, Anti-microbial Recycled Solid Plastic (HDPE), Complete Toilet Partitions <small>(10 21 13 19-0069)</small> Note: Excludes above ceiling steel.			
10 21 13 19-0079	EA	36" x 60", Ceiling Hung, Anti-microbial Solid Plastic (HDPE), One Compartment Corner Unit, Complete Toilet Partition	2,535.72		203.44
		<i>For >10, Deduct</i>	-212.88		
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,319.88		
10 21 13 19-0080	EA	60" x 60", Ceiling Hung, Anti-microbial Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,034.48		214.29
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,615.65		
10 21 13 19-0081	EA	60" x 78", Ceiling Hung, Anti-microbial Solid Plastic (HDPE), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition	3,376.05		219.72
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
		<i>For NFPA Class A, Add</i>	1,820.70		
10 21 13 19-0082		Anti-microbial Recycled Solid Plastic (HDPE) Urinal Screens <small>(10 21 13 19-0068)</small> Note: Includes all standard Columbia Partitions colors.			
10 21 13 19-0083		Wall Hung, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screens <small>(10 21 13 19-0082)</small>			
10 21 13 19-0084	EA	18" x 42" x 1", Wall Hung, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen	544.62		65.07
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	256.97		
10 21 13 19-0085	EA	24" x 42" x 1", Wall Hung, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen	567.86		70.50
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	264.65		
10 21 13 19-0086		Wall Hung And Post Supported, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screens <small>(10 21 13 19-0082)</small>			
10 21 13 19-0087	EA	18" x 42" x 1", Wall Hung And Post Supported, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen	892.14		70.50
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	465.71		

Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21	13 19-0088	EA	24" x 42" x 1", Wall Hung And Post Supported, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,015.97 66.98 535.76	75.92
10 21	13 19-0089	EA	30" x 42" x 1", Wall Hung And Post Supported, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,083.00 66.98 570.60	81.34
10 21	13 19-0090		Wall Hung And Overhead Braced, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screens <small>(10 21 13 19-0082)</small>		
10 21	13 19-0091	EA	24" x 55" x 1", Wall Hung And Overhead Braced, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	715.21 66.98 349.29	75.92
10 21	13 19-0092	EA	36" x 55" x 1", Wall Hung And Overhead Braced, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	913.83 66.98 465.71	81.34
10 21	13 19-0093	EA	48" x 55" x 1", Wall Hung And Overhead Braced, Anti-microbial Recycled Solid Plastic (HDPE), Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,093.85 66.98 570.60	86.77
10 21	13 19-0094		Anti-microbial Recycled Solid Plastic (HDPE) Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 19-0068)</small> Note: Includes all standard Columbia Partitions colors.		
10 21	13 19-0095		Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Doors <small>(10 21 13 19-0094)</small>		
10 21	13 19-0096	EA	24" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	600.29 107.79 345.27	21.70
10 21	13 19-0097	EA	26" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	650.99 107.79 376.71	21.70
10 21	13 19-0098	EA	30" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	706.71 107.79 407.89	24.41
10 21	13 19-0099	EA	34" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), ADA Compliant Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	809.28 107.79 471.48	24.41
10 21	13 19-0100	EA	36" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), ADA Compliant Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i> <i>For NFPA Class A, Add</i>	833.54 107.79 486.52	24.41
10 21	13 19-0101		Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panels <small>(10 21 13 19-0094)</small>		
10 21	13 19-0102	EA	6" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	188.52 66.98 76.52	32.55
10 21	13 19-0103	EA	12" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	317.40 66.98 153.06	35.26
10 21	13 19-0104	EA	18" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	446.24 66.98 229.58	37.98
10 21	13 19-0105	EA	24" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	524.46 66.98 274.71	40.69
10 21	13 19-0106	EA	30" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	640.67 66.98 343.39	43.40
10 21	13 19-0107	EA	36" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	684.83 66.98 367.42	46.12
10 21	13 19-0108	EA	42" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	771.66 66.98 417.89	48.83
10 21	13 19-0109	EA	48" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	873.38 66.98 477.59	51.54
10 21	13 19-0110	EA	55" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	955.88 66.98 525.38	54.25
10 21	13 19-0111	EA	58" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	976.72 66.98 536.95	55.33
10 21	13 19-0112	EA	60" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,009.83 66.98 555.46	56.96
10 21	13 19-0113	EA	70" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,145.98 66.98 636.50	59.67
10 21	13 19-0114	EA	78" x 55" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Panel <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,236.94 66.98 689.55	62.39

10	10 Specialties
	10 20 Interior Specialties
	10 21 Compartments and Cubicles



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 21 13 19-0115	82" Long, Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilasters <small>(10 21 13 19-0094)</small>		
10 21 13 19-0116	EA Up To 4" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	270.32 66.98 147.42	16.28
10 21 13 19-0117	EA 5" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	299.60 66.98 162.20	18.98
10 21 13 19-0118	EA 6" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	324.68 66.98 174.39	21.70
10 21 13 19-0119	EA 8" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	374.86 66.98 202.14	24.41
10 21 13 19-0120	EA 10" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	421.25 66.98 227.54	27.12
10 21 13 19-0121	EA 12" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	467.58 66.98 252.90	29.84
10 21 13 19-0122	EA 18" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	603.71 66.98 333.94	32.55
10 21 13 19-0123	EA 22" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	684.05 66.98 380.38	35.26
10 21 13 19-0124	EA 24" x 82" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	745.22 66.98 414.95	37.98

10 21 13 19-0125	96" To 120", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilasters <small>(10 21 13 19-0094)</small>		
10 21 13 19-0126	EA Up To 4" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	328.19 66.98 176.57	21.70
10 21 13 19-0127	EA 5" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	360.73 66.98 193.38	24.41
10 21 13 19-0128	EA 6" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	397.09 66.98 212.56	27.12
10 21 13 19-0129	EA 8" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	450.84 66.98 242.53	29.84
10 21 13 19-0130	EA 10" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	505.12 66.98 272.81	32.55
10 21 13 19-0131	EA 12" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	558.86 66.98 302.76	35.26
10 21 13 19-0132	EA 18" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	723.60 66.98 401.54	37.98
10 21 13 19-0133	EA 22" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	811.44 66.98 452.64	40.69
10 21 13 19-0134	EA 24" x 96" To 120" x 1", Anti-microbial Recycled Solid Plastic (HDPE), Toilet Partition Pilaster..... <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	883.23 66.98 493.78	43.40

10 21 13 19-0135	Solid Phenolic Toilet Partitions And Urinal Screens <small>(10 21 13 19)</small> Note: Complete toilet partitions for corner installations. Includes 3/4" door, 3/4" pilaster, 1/2" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Constructed of solid phenolic (resin impregnated kraft paper) core with a high pressure decorative matte surface finish as an integral part of the core material. Includes Class B fire rating.		
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10 21 13 19-0136	Solid Phenolic Toilet Partitions <small>(10 21 13 19-0135)</small> Note: Includes all standard Bobrick colors.		
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10 21 13 19-0137	Floor Anchored, Solid Phenolic, Complete Toilet Partitions <small>(10 21 13 19-0136)</small>		
10 21 13 19-0138	EA 36" x 60", Floor Anchored, Solid Phenolic, One Compartment Corner Unit, Complete Toilet Partition..... <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,183.57 -193.94 241.76 419.49	122.06
10 21 13 19-0139	EA 60" x 60", Floor Anchored, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition..... <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,688.78 241.76 522.11	132.91



Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 19-0140	EA		60" x 78", Floor Anchored, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	3,006.06 241.76 587.00	138.34
10 21 13 19-0141			Overhead Braced, Solid Phenolic, Complete Toilet Partitions <small>(10 21 13 19-0136)</small> Note: Includes headrail.		
10 21 13 19-0142	EA		36" x 60", Overhead Braced, Solid Phenolic, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,419.12 -212.07 241.76 460.27	149.19
10 21 13 19-0143	EA		60" x 60", Overhead Braced, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,944.57 241.76 567.15	160.04
10 21 13 19-0144	EA		60" x 78", Overhead Braced, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	3,277.28 241.76 635.28	165.46
10 21 13 19-0145			Floor And Ceiling Anchored, Solid Phenolic, Complete Toilet Partitions <small>(10 21 13 19-0136)</small> Note: Excludes above ceiling steel.		
10 21 13 19-0146	EA		36" x 60", Floor And Ceiling Anchored, Solid Phenolic, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,489.94 -213.73 241.76 466.47	176.32
10 21 13 19-0147	EA		60" x 60", Floor And Ceiling Anchored, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	3,011.63 241.76 572.55	187.17
10 21 13 19-0148	EA		60" x 78", Floor And Ceiling Anchored, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	3,328.91 241.76 637.44	192.59
10 21 13 19-0149			Ceiling Hung, Solid Phenolic, Complete Toilet Partitions <small>(10 21 13 19-0136)</small> Note: Excludes above ceiling steel.		
10 21 13 19-0150	EA		36" x 60", Ceiling Hung, Solid Phenolic, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,445.27 -203.84 241.76 448.41	203.44
10 21 13 19-0151	EA		60" x 60", Ceiling Hung, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	2,950.13 241.76 550.95	214.29
10 21 13 19-0152	EA		60" x 78", Ceiling Hung, Solid Phenolic, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i> <i>For NFPA Class A, Add</i>	3,267.40 241.76 615.85	219.72
10 21 13 19-0153			Solid Phenolic Urinal Screens <small>(10 21 13 19-0135)</small> Note: Includes all standard Bobrick colors.		
10 21 13 19-0154			Floor Anchored, Solid Phenolic, Urinal Screens <small>(10 21 13 19-0153)</small>		
10 21 13 19-0155	EA		24" x 58" x 1/2", Floor Anchored, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	783.95 66.98 140.34	75.92
10 21 13 19-0156	EA		36" x 58" x 1/2", Floor Anchored, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	887.95 66.98 160.44	81.34
10 21 13 19-0157	EA		48" x 58" x 1/2", Floor Anchored, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	1,068.95 66.98 196.71	86.77
10 21 13 19-0158			Wall Hung, Solid Phenolic, Urinal Screens <small>(10 21 13 19-0153)</small>		
10 21 13 19-0159	EA		18" x 42" x 1/2", Wall Hung, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	495.09 66.98 83.14	65.07
10 21 13 19-0160	EA		24" x 42" x 1/2", Wall Hung, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	575.23 66.98 98.24	70.50
10 21 13 19-0161	EA		30" x 42" x 1/2", Wall Hung, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	694.73 66.98 121.60	75.92
10 21 13 19-0162			Wall Hung And Post Supported, Solid Phenolic, Urinal Screens <small>(10 21 13 19-0153)</small>		
10 21 13 19-0163	EA		18" x 58" x 1/2", Wall Hung And Post Supported, Solid Phenolic, Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	501.19 66.98 82.69	70.50

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 21 13 19-0164	EA	24" x 58" x 1/2", Wall Hung And Post Supported, Solid Phenolic, Urinal Screen.....	632.09		75.92
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	108.44		
10 21 13 19-0165	EA	30" x 58" x 1/2", Wall Hung And Post Supported, Solid Phenolic, Urinal Screen.....	741.66		81.34
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	129.72		
10 21 13 19-0166		Wall Hung And Overhead Braced, Solid Phenolic, Urinal Screens <small>(10 21 13 19-0153)</small>			
10 21 13 19-0167	EA	22" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Phenolic, Urinal Screen	809.53		70.50
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	147.44		
10 21 13 19-0168	EA	36" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Phenolic, Urinal Screen	914.19		75.92
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	167.69		
10 21 13 19-0169	EA	48" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Phenolic, Urinal Screen	1,098.66		81.34
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	204.69		
10 21 13 19-0170		Solid Phenolic Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 19-0135)</small>			
		Note: Includes all standard Bobrick colors.			
10 21 13 19-0171		Solid Phenolic, Toilet Partition Doors <small>(10 21 13 19-0170)</small>			
10 21 13 19-0172	EA	24" x 58" x 3/4", Solid Phenolic, Toilet Partition Door	596.21		21.70
		<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79		
		<i>For NFPA Class A, Add</i>	118.26		
10 21 13 19-0173	EA	26" x 58" x 3/4", Solid Phenolic, Toilet Partition Door	616.99		21.70
		<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79		
		<i>For NFPA Class A, Add</i>	122.62		
10 21 13 19-0174	EA	30" x 58" x 3/4", Solid Phenolic, Toilet Partition Door	675.76		24.41
		<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79		
		<i>For NFPA Class A, Add</i>	134.10		
10 21 13 19-0175	EA	34" x 58" x 3/4", Solid Phenolic, ADA Compliant Toilet Partition Door	729.97		24.41
		<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79		
		<i>For NFPA Class A, Add</i>	145.48		
10 21 13 19-0176	EA	36" x 58" x 3/4", Solid Phenolic, ADA Compliant Toilet Partition Door	785.65		24.41
		<i>For Heavy Gauge Full-Height SS Hinge, Add</i>	107.79		
		<i>For NFPA Class A, Add</i>	157.17		
10 21 13 19-0177		Solid Phenolic, Toilet Partition Panels <small>(10 21 13 19-0170)</small>			
10 21 13 19-0178	EA	6" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	180.31		32.55
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	27.45		
10 21 13 19-0179	EA	12" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	243.30		35.26
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	39.81		
10 21 13 19-0180	EA	18" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	335.08		37.98
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	58.21		
10 21 13 19-0181	EA	24" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	427.85		40.69
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	76.83		
10 21 13 19-0182	EA	30" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	477.81		43.40
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	86.45		
10 21 13 19-0183	EA	36" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	530.31		46.12
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	96.61		
10 21 13 19-0184	EA	42" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	620.61		48.83
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	114.70		
10 21 13 19-0185	EA	48" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	713.63		51.54
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	133.37		
10 21 13 19-0186	EA	55" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	761.40		54.25
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	142.53		
10 21 13 19-0187	EA	58" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	782.81		55.33
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	146.68		
10 21 13 19-0188	EA	60" x 58" x 1/2", Solid Phenolic, Toilet Partitio Panel.....	797.62		56.96
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	149.27		
10 21 13 19-0189	EA	70" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	920.08		59.67
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	174.12		
10 21 13 19-0190	EA	78" x 58" x 1/2", Solid Phenolic, Toilet Partition Panel.....	1,114.89		62.39
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	214.16		
10 21 13 19-0191		69" Long, Solid Phenolic, Toilet Partition Pilasters <small>(10 21 13 19-0170)</small>			

Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21	13	19-0192	EA Up To 4" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	281.24 31.09 66.98 53.85	16.28
10 21	13	19-0193	EA 5" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	323.62 35.71 66.98 61.88	18.98
10 21	13	19-0194	EA 6" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	329.04 35.71 66.98 62.15	21.70
10 21	13	19-0195	EA 8" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	381.44 41.58 66.98 72.29	24.41
10 21	13	19-0196	EA 10" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	429.20 46.87 66.98 81.45	27.12
10 21	13	19-0197	EA 12" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	476.97 52.16 66.98 90.62	29.84
10 21	13	19-0198	EA 16" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	612.52 68.43 66.98 118.21	32.55
10 21	13	19-0199	EA 20" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	754.22 85.46 66.98 147.10	35.26
10 21	13	19-0200	EA 24" x 69" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	791.98 89.50 66.98 154.16	37.98
10 21	13	19-0201	83" Long, Solid Phenolic, Toilet Partition Pilasters (10 21 13 19-0170)		
10 21	13	19-0202	EA Up To 4" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	308.95 34.55 66.98 59.67	16.28
10 21	13	19-0203	EA 5" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	362.12 40.52 66.98 69.97	18.98
10 21	13	19-0204	EA 6" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	367.54 40.52 66.98 70.24	21.70
10 21	13	19-0205	EA 8" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	426.09 47.16 66.98 81.67	24.41
10 21	13	19-0206	EA 10" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	481.56 53.41 66.98 92.45	27.12
10 21	13	19-0207	EA 12" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	537.42 59.72 66.98 103.31	29.84
10 21	13	19-0208	EA 16" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	702.60 79.69 66.98 137.13	32.55
10 21	13	19-0209	EA 20" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	838.55 96.00 66.98 164.81	35.26
10 21	13	19-0210	EA 24" x 83" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	881.69 100.72 66.98 173.00	37.98
10 21	13	19-0211	96" To 120" Long, Solid Phenolic, Toilet Partition Pilasters (10 21 13 19-0170)		
10 21	13	19-0212	EA Up To 4" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i> <i>For NFPA Class A, Add</i>	347.52 38.02 66.98 66.04	21.70

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 21 13 19-0213	EA	5" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	411.46		24.41
		<i>For 1" Pilaster, Add</i>	45.33		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	78.59		
10 21 13 19-0214	EA	6" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	416.88		27.12
		<i>For 1" Pilaster, Add</i>	45.33		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	78.86		
10 21 13 19-0215	EA	8" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	481.59		29.84
		<i>For 1" Pilaster, Add</i>	52.74		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	91.59		
10 21 13 19-0216	EA	10" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	544.76		32.55
		<i>For 1" Pilaster, Add</i>	59.96		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	103.98		
10 21 13 19-0217	EA	12" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	608.71		35.26
		<i>For 1" Pilaster, Add</i>	67.27		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	116.54		
10 21 13 19-0218	EA	16" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	803.53		37.98
		<i>For 1" Pilaster, Add</i>	90.95		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	156.59		
10 21 13 19-0219	EA	20" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	933.69		40.69
		<i>For 1" Pilaster, Add</i>	106.54		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	183.05		
10 21 13 19-0220	EA	24" x 96" To 120" x 3/4", Solid Phenolic, Toilet Partition Pilaster.....	982.23		43.40
		<i>For 1" Pilaster, Add</i>	111.93		
		<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98		
		<i>For NFPA Class A, Add</i>	192.38		
10 21 13 19-0221		Solid Color Reinforced Composite Toilet Partitions And Urinal Screens <small>(10 21 13 19-0221)</small>			
		Note: Complete toilet partitions for corner installations. Includes 3/4" door, 3/4" pilaster, 1/2" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Constructed of solid color reinforced composite core with a high pressure decorative matte surface finish as an integral part of the core material.			
10 21 13 19-0222		Solid Color Reinforced Composite Toilet Partitions <small>(10 21 13 19-0222)</small>			
		Note: Includes all standard Bobrick colors.			
10 21 13 19-0223		Floor Anchored, Solid Color Reinforced Composite, Complete Toilet Partitions <small>(10 21 13 19-0223)</small>			
10 21 13 19-0224	EA	36" x 60", Floor Anchored, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete Toilet Partition.....	2,416.30		122.06
		<i>For >10, Deduct</i>	-217.22		
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0225	EA	60" x 60", Floor Anchored, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition.....	2,979.54		132.91
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0226	EA	60" x 78", Floor Anchored, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition.....	3,333.59		138.34
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0227		Overhead Braced, Solid Color Reinforced Composite, Complete Toilet Partitions <small>(10 21 13 19-0227)</small>			
		Note: Includes headrail.			
10 21 13 19-0228	EA	36" x 60", Overhead Braced, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete Toilet Partition.....	2,673.61		149.19
		<i>For >10, Deduct</i>	-237.52		
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0229	EA	60" x 60", Overhead Braced, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition.....	3,259.51		160.04
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0230	EA	60" x 78", Overhead Braced, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition.....	3,630.84		165.46
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0231		Floor And Ceiling Anchored, Solid Color Reinforced Composite, Complete Toilet Partitions <small>(10 21 13 19-0231)</small>			
		Note: Excludes above ceiling steel.			
10 21 13 19-0232	EA	36" x 60", Floor And Ceiling Anchored, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete Toilet Partition.....	2,746.42		176.32
		<i>For >10, Deduct</i>	-239.38		
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		
10 21 13 19-0233	EA	60" x 60", Floor And Ceiling Anchored, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition.....	3,328.11		187.17
		<i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	241.76		



Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21	13 19-0234	EA	60" x 78", Floor And Ceiling Anchored, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	3,682.16 241.76	192.59
10 21	13 19-0235		Ceiling Hung, Solid Color Reinforced Composite, Complete Toilet Partitions <small>(10 21 13 19-0222)</small> Note: Excludes above ceiling steel.		
10 21	13 19-0236	EA	36" x 60", Ceiling Hung, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i>	2,689.88 -228.30 241.76	203.44
10 21	13 19-0237	EA	60" x 60", Ceiling Hung, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	3,252.71 241.76	214.29
10 21	13 19-0238	EA	60" x 78", Ceiling Hung, Solid Color Reinforced Composite, One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	3,606.75 241.76	219.72
10 21	13 19-0239		Solid Color Reinforced Composite Urinal Screens <small>(10 21 13 19-0221)</small> Note: Includes all standard Bobrick colors.		
10 21	13 19-0240		Floor Anchored, Solid Color Reinforced Composite, Toilet Partition Urinal Screens <small>(10 21 13 19-0239)</small>		
10 21	13 19-0241	EA	24" x 58" x 1/2", Floor Anchored, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	859.80 66.98	75.92
10 21	13 19-0242	EA	36" x 58" x 1/2", Floor Anchored, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	974.98 66.98	81.34
10 21	13 19-0243	EA	48" x 58" x 1/2", Floor Anchored, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,176.40 66.98	86.77
10 21	13 19-0244		Wall Hung, Solid Color Reinforced Composite, Toilet Partition Urinal Screens <small>(10 21 13 19-0239)</small>		
10 21	13 19-0245	EA	18" x 42" x 1/2", Wall Hung, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	538.89 66.98	65.07
10 21	13 19-0246	EA	24" x 42" x 1/2", Wall Hung, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	627.34 66.98	70.50
10 21	13 19-0247	EA	30" x 42" x 1/2", Wall Hung, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	759.88 66.98	75.92
10 21	13 19-0248		Wall Hung And Post Supported, Solid Color Reinforced Composite, Toilet Partition Urinal Screens <small>(10 21 13 19-0239)</small>		
10 21	13 19-0249	EA	18" x 58" x 1/2", Wall Hung And Post Supported, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	544.42 66.98	70.50
10 21	13 19-0250	EA	24" x 58" x 1/2", Wall Hung And Post Supported, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	689.72 66.98	75.92
10 21	13 19-0251	EA	30" x 58" x 1/2", Wall Hung And Post Supported, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	811.14 66.98	81.34
10 21	13 19-0252		Wall Hung And Overhead Braced, Solid Color Reinforced Composite, Toilet Partition Urinal Screens <small>(10 21 13 19-0239)</small>		
10 21	13 19-0253	EA	22" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	889.76 66.98	70.50
10 21	13 19-0254	EA	36" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,005.67 66.98	75.92
10 21	13 19-0255	EA	48" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Color Reinforced Composite, Toilet Partition Urinal Screen <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,210.98 66.98	81.34
10 21	13 19-0256		Solid Color Reinforced Composite Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 19-0221)</small> Note: Includes all standard Bobrick colors. See CSI section 10 21 13 43-0001 for other accessories.		
10 21	13 19-0257		Solid Color Reinforced Composite, Toilet Partition Doors <small>(10 21 13 19-0256)</small>		
10 21	13 19-0258	EA	24" x 58" x 3/4", Solid Color Reinforced Composite, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	662.54 107.79	21.70
10 21	13 19-0259	EA	26" x 58" x 3/4", Solid Color Reinforced Composite, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	685.83 107.79	21.70
10 21	13 19-0260	EA	30" x 58" x 3/4", Solid Color Reinforced Composite, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	751.00 107.79	24.41
10 21	13 19-0261	EA	34" x 58" x 3/4", Solid Color Reinforced Composite, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	811.70 107.79	24.41
10 21	13 19-0262	EA	36" x 58" x 3/4", Solid Color Reinforced Composite, Toilet Partition Door <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	874.07 107.79	24.41

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 21 13 19-0263	Solid Color Reinforced Composite, Toilet Partition Panels <small>(10 21 13 19-0266)</small>		
10 21 13 19-0264	EA 6" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	194.14	32.55
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0265	EA 12" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	264.03	35.26
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0266	EA 18" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	366.17	37.98
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0267	EA 24" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	469.42	40.69
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0268	EA 30" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	524.73	43.40
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0269	EA 36" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	582.88	46.12
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0270	EA 42" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	683.37	48.83
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0271	EA 48" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	786.90	51.54
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0272	EA 55" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	839.74	54.25
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0273	EA 58" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	863.47	55.33
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0274	EA 60" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	879.67	56.96
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0275	EA 70" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	1,016.17	59.67
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0276	EA 78" x 58" x 1/2", Solid Color Reinforced Composite, Toilet Partition Panel.....	1,233.71	62.39
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	

10 21 13 19-0277	69" Long, Solid Color Reinforced Composite, Toilet Partition Pilasters <small>(10 21 13 19-0256)</small>		
10 21 13 19-0278	EA Up To 4" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	311.08	16.28
	<i>For 1" Pilaster, Add</i>	34.82	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0279	EA 5" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	357.90	18.98
	<i>For 1" Pilaster, Add</i>	39.99	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0280	EA 6" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	363.32	21.70
	<i>For 1" Pilaster, Add</i>	39.99	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0281	EA 8" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	421.35	24.41
	<i>For 1" Pilaster, Add</i>	46.57	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0282	EA 10" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	474.20	27.12
	<i>For 1" Pilaster, Add</i>	52.49	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0283	EA 12" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	527.05	29.84
	<i>For 1" Pilaster, Add</i>	58.42	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0284	EA 16" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	678.21	32.55
	<i>For 1" Pilaster, Add</i>	76.64	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0285	EA 20" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	836.27	35.26
	<i>For 1" Pilaster, Add</i>	95.72	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0286	EA 24" x 69" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	877.90	37.98
	<i>For 1" Pilaster, Add</i>	100.24	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	

10 21 13 19-0287	83" Long, Solid Color Reinforced Composite, Toilet Partition Pilasters <small>(10 21 13 19-0256)</small>		
10 21 13 19-0288	EA Up To 4" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	342.12	16.28
	<i>For 1" Pilaster, Add</i>	38.70	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0289	EA 5" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	401.02	18.98
	<i>For 1" Pilaster, Add</i>	45.38	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0290	EA 6" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	406.44	21.70
	<i>For 1" Pilaster, Add</i>	45.38	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0291	EA 8" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	471.36	24.41
	<i>For 1" Pilaster, Add</i>	52.82	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0292	EA 10" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	532.84	27.12
	<i>For 1" Pilaster, Add</i>	59.82	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0293	EA 12" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	594.75	29.84
	<i>For 1" Pilaster, Add</i>	66.89	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	
10 21 13 19-0294	EA 16" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster.....	779.10	32.55
	<i>For 1" Pilaster, Add</i>	89.25	
	<i>For Heavy Gauge Full-Height SS Brackets, Add</i>	66.98	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21	13 19-0295	EA	20" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	930.71 107.52 66.98	35.26
10 21	13 19-0296	EA	24" x 83" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	978.38 112.80 66.98	37.98
10 21	13 19-0297		96" To 120" Long, Solid Color Reinforced Composite, Toilet Partition Pilasters <small>(10 21 13 19-0296)</small>		
10 21	13 19-0298	EA	Up To 4" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	384.01 42.58 66.98	21.70
10 21	13 19-0299	EA	5" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	454.98 50.77 66.98	24.41
10 21	13 19-0300	EA	6" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	460.40 50.77 66.98	27.12
10 21	13 19-0301	EA	8" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	532.22 59.07 66.98	29.84
10 21	13 19-0302	EA	10" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	602.32 67.15 66.98	32.55
10 21	13 19-0303	EA	12" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	673.29 75.35 66.98	35.26
10 21	13 19-0304	EA	16" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	890.84 101.86 66.98	37.98
10 21	13 19-0305	EA	20" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,035.96 119.32 66.98	40.69
10 21	13 19-0306	EA	24" x 96" To 120" x 3/4", Solid Color Reinforced Composite, Toilet Partition Pilaster <i>For 1" Pilaster, Add</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,089.68 125.36 66.98	43.40
10 21	13 19-0307		Solid Polyester (Corian) Toilet Partitions And Urinal Screens <small>(10 21 13 19)</small> Note: Complete toilet partitions for corner installations. Includes 1/2" door (1" at edge), 1" pilaster, 1/2" separator panel, trim shoes, and standard stainless steel hardware as required. For alcove, recessed or configurations other than corner installations use either: (1) the appropriate corner unit and add individual components or (2) individual components. Individual components include trim shoes and standard stainless steel hardware as required. Produced or cast by combining unsaturated polyester resin with a combination of fillers, pigments and catalysts.		
10 21	13 19-0308		Solid Polyester (Corian) Toilet Partitions <small>(10 21 13 19-0307)</small> Note: Small particulate finish.		
10 21	13 19-0309		Floor Anchored, Solid Polyester (Corian), Complete Toilet Partitions <small>(10 21 13 19-0308)</small>		
10 21	13 19-0310	EA	36" x 60", Floor Anchored, Solid Polyester (Corian), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	4,969.76 -472.56 -1,086.89 241.76	122.06
10 21	13 19-0311	EA	60" x 60", Floor Anchored, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	6,007.65 -1,320.62 241.76	132.91
10 21	13 19-0312	EA	60" x 78", Floor Anchored, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	6,665.96 -1,469.53 241.76	138.34
10 21	13 19-0313		Overhead Braced, Solid Polyester (Corian), Complete Toilet Partitions <small>(10 21 13 19-0308)</small>		
10 21	13 19-0314	EA	36" x 60", Overhead Braced, Solid Polyester (Corian), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	5,152.72 -485.44 -1,116.50 241.76	149.19
10 21	13 19-0315	EA	60" x 60", Overhead Braced, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	6,784.26 -1,486.76 241.76	160.04
10 21	13 19-0316	EA	60" x 78", Overhead Braced, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	7,515.07 -1,652.35 241.76	165.46
10 21	13 19-0317		Floor And Ceiling Anchored, Solid Polyester (Corian), Complete Toilet Partitions <small>(10 21 13 19-0308)</small> Note: Excludes above ceiling steel.		

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 19-0318	EA		36" x 60", Floor And Ceiling Anchored, Solid Polyester (Corian), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	5,768.45 -541.58 -1,245.64 241.76	176.32
10 21 13 19-0319	EA		60" x 60", Floor And Ceiling Anchored, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	7,767.50 -1,700.43 241.76	187.17
10 21 13 19-0320	EA		60" x 78", Floor And Ceiling Anchored, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	8,497.75 -1,865.89 241.76	192.59
10 21 13 19-0321			Ceiling Hung, Solid Polyester (Corian), Complete Toilet Partitions <small>(10 21 13 19-0308)</small> Note: Excludes above ceiling steel.		
10 21 13 19-0322	EA		36" x 60", Ceiling Hung, Solid Polyester (Corian), One Compartment Corner Unit, Complete Toilet Partition <i>For >10, Deduct</i> <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	5,815.75 -540.89 -1,244.04 241.76	203.44
10 21 13 19-0323	EA		60" x 60", Ceiling Hung, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	7,447.88 -1,614.43 241.76	214.29
10 21 13 19-0324	EA		60" x 78", Ceiling Hung, Solid Polyester (Corian), One Compartment Corner Unit, Complete ADA Compliant Toilet Partition <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinges And Brackets, Add</i>	8,178.10 -1,779.89 241.76	219.72
10 21 13 19-0325			Solid Polyester (Corian) Urinal Screens <small>(10 21 13 19-0307)</small>		
10 21 13 19-0326			Floor Anchored, Solid Polyester (Corian), Urinal Screens <small>(10 21 13 19-0325)</small>		
10 21 13 19-0327	EA		24" x 58" x 1/2", Floor Anchored, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,353.86 -276.46 66.98	75.92
10 21 13 19-0328	EA		36" x 58" x 1/2", Floor Anchored, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,796.35 -375.74 66.98	81.34
10 21 13 19-0329	EA		48" x 58" x 1/2", Floor Anchored, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,238.85 -475.02 66.98	86.77
10 21 13 19-0330			Wall Hung, Solid Polyester (Corian), Urinal Screens <small>(10 21 13 19-0325)</small>		
10 21 13 19-0331	EA		18" x 42" x 1/2", Wall Hung, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	682.24 -126.98 66.98	65.07
10 21 13 19-0332	EA		24" x 42" x 1/2", Wall Hung, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	877.10 -169.31 66.98	70.50
10 21 13 19-0333	EA		30" x 42" x 1/2", Wall Hung, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,071.99 -211.63 66.98	75.92
10 21 13 19-0334			Wall Hung And Post Supported, Solid Polyester (Corian), Urinal Screens <small>(10 21 13 19-0325)</small>		
10 21 13 19-0335	EA		18" x 58" x 1/2", Wall Hung And Post Supported, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	898.29 -174.18 66.98	70.50
10 21 13 19-0336	EA		24" x 58" x 1/2", Wall Hung And Post Supported, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,124.98 -223.82 66.98	75.92
10 21 13 19-0337	EA		30" x 58" x 1/2", Wall Hung And Post Supported, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,351.63 -273.46 66.98	81.34
10 21 13 19-0338			Wall Hung And Overhead Braced, Solid Polyester (Corian), Urinal Screens <small>(10 21 13 19-0325)</small>		
10 21 13 19-0339	EA		22" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,390.05 -287.28 66.98	70.50
10 21 13 19-0340	EA		34" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,832.56 -386.57 66.98	75.92
10 21 13 19-0341	EA		46" x 58" x 1/2", Wall Hung And Overhead Braced, Solid Polyester (Corian), Urinal Screen <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,275.05 -485.85 66.98	81.34
10 21 13 19-0342			Solid Polyester (Corian) Toilet Partition Doors, Panels And Pilasters <small>(10 21 13 19-0307)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 21 13 19-0343 Solid Polyester (Corian), Toilet Partition Doors <small>(10 21 13 19-0342)</small>		
10 21 13 19-0344 EA 24" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Door <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	1,086.54 -239.92 107.79	21.70
10 21 13 19-0345 EA 26" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Door <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	1,161.09 -257.07 107.79	21.70
10 21 13 19-0346 EA 30" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Door <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	1,324.20 -293.34 107.79	24.41
10 21 13 19-0347 EA 34" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Door <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	1,478.05 -328.72 107.79	24.41
10 21 13 19-0348 EA 36" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Door <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Hinge, Add</i>	1,545.00 -344.12 107.79	24.41
10 21 13 19-0349 Solid Polyester (Corian), Toilet Partition Panels <small>(10 21 13 19-0342)</small>		
10 21 13 19-0350 EA 6" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	280.91 -49.64 66.98	32.55
10 21 13 19-0351 EA 12" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	502.18 -99.28 66.98	35.26
10 21 13 19-0352 EA 18" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	723.41 -148.92 66.98	37.98
10 21 13 19-0353 EA 24" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	944.68 -198.56 66.98	40.69
10 21 13 19-0354 EA 30" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,165.92 -248.20 66.98	43.40
10 21 13 19-0355 EA 36" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,387.15 -297.83 66.98	46.12
10 21 13 19-0356 EA 42" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,608.42 -347.48 66.98	48.83
10 21 13 19-0357 EA 48" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,829.66 -397.11 66.98	51.54
10 21 13 19-0358 EA 55" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,086.87 -455.03 66.98	54.25
10 21 13 19-0359 EA 58" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,196.97 -479.85 66.98	55.33
10 21 13 19-0360 EA 60" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,272.16 -496.39 66.98	56.96
10 21 13 19-0361 EA 70" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,637.28 -579.12 66.98	59.67
10 21 13 19-0362 EA 78" x 58" x 1/2", Solid Polyester (Corian), Toilet Partition Panel..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,930.46 -645.31 66.98	62.39
10 21 13 19-0363 72" Long, Solid Polyester (Corian), Toilet Partition Pilasters <small>(10 21 13 19-0342)</small>		
10 21 13 19-0364 EA Up To 4" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	371.27 -77.91 66.98	16.28
10 21 13 19-0365 EA 5" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	461.38 -97.38 66.98	18.98
10 21 13 19-0366 EA 6" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	551.48 -116.86 66.98	21.70
10 21 13 19-0367 EA 8" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	726.30 -155.82 66.98	24.41
10 21 13 19-0368 EA 10" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	901.08 -194.77 66.98	27.12
10 21 13 19-0369 EA 12" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster..... <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,075.86 -233.72 66.98	29.84
10 21 13 19-0370 EA 18" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,589.37 -350.58 66.98	32.55

10	10	Specialties
	10 20	Interior Specialties
	10 21	Compartments and Cubicles



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 21 13 19-0371	EA		22" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,933.54 -428.49 66.98	35.26
10 21 13 19-0372	EA		24" x 72" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,108.32 -467.45 66.98	37.98

10 21 13 19-0373 82" Long, Solid Polyester (Corian), Toilet Partition Pilasters (10 21 13 19-0342)

10 21 13 19-0374	EA		Up To 4" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	418.31 -88.72 66.98	16.28
10 21 13 19-0375	EA		5" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	520.21 -110.91 66.98	18.98
10 21 13 19-0376	EA		6" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	611.03 -130.55 66.98	21.70
10 21 13 19-0377	EA		8" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	835.09 -180.84 66.98	24.41
10 21 13 19-0378	EA		10" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,018.68 -221.82 66.98	27.12
10 21 13 19-0379	EA		12" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,216.98 -266.18 66.98	29.84
10 21 13 19-0380	EA		18" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,801.08 -399.28 66.98	32.55
10 21 13 19-0381	EA		22" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,192.30 -488.01 66.98	35.26
10 21 13 19-0382	EA		24" x 82" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,390.60 -532.37 66.98	37.98

10 21 13 19-0383 96" To 120" Long, Solid Polyester (Corian), Toilet Partition Pilasters (10 21 13 19-0342)

10 21 13 19-0384	EA		Up To 4" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	551.48 -116.86 66.98	21.70
10 21 13 19-0385	EA		5" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	683.94 -146.08 66.98	24.41
10 21 13 19-0386	EA		6" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	816.40 -175.29 66.98	27.12
10 21 13 19-0387	EA		8" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,075.86 -233.72 66.98	29.84
10 21 13 19-0388	EA		10" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,335.33 -292.15 66.98	32.55
10 21 13 19-0389	EA		12" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	1,594.80 -350.58 66.98	35.26
10 21 13 19-0390	EA		18" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,362.36 -525.87 66.98	37.98
10 21 13 19-0391	EA		22" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	2,875.90 -642.74 66.98	40.69
10 21 13 19-0392	EA		24" x 96" To 120" x 1", Solid Polyester (Corian), Toilet Partition Pilaster <i>For Solid Color Material (No Particulate), Deduct</i> <i>For Heavy Gauge Full-Height SS Brackets, Add</i>	3,135.37 -701.17 66.98	43.40

10 21 13 43 Compartments and Cubicles Common Accessories (10 21 13)

10 21 13 43-0001 Accessories (10 21 13 43)

10 21 13 43-0002	LF		Extruded Aluminum Headrails For Toilet Partitions And Urinal Screens.....	13.96	2.17
10 21 13 43-0003	LF		Stainless Steel Headrails For Toilet Partitions And Urinal Screens	24.20	2.17
10 21 13 43-0004	EA		Replacement Of 1-1/2" x 58" Stainless Steel Wall Posts	116.05	
10 21 13 43-0005	EA		Replacement Of 58" Aluminum Wall U Bracket	73.06	
10 21 13 43-0006	EA		Replacement Of 58" Aluminum Wall Two Ear Bracket	121.85	
10 21 13 43-0007	EA		Replacement Of 54" Stainless Steel Wall U Bracket	88.80	
10 21 13 43-0008	EA		Replacement Of 54" Stainless Steel Wall Two Ear Bracket.....	216.61	
10 21 13 43-0009	EA		Replacement Of 54" Plastic Wall Two Ear Bracket, All Colors.....	188.22	
10 21 13 43-0010	EA		Replacement Of 57-1/2" Stainless Steel Hinge.....	143.89	

10 21 16 Shower and Dressing Compartments (10 21)

Specialties	10	10
Interior Specialties	10 20	
Compartments and Cubicles	10 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 21 16 17 Phenolic-Core Shower and Dressing Compartments (10 21 16)

10 21 16 17-0001 Shower Dividers (10 21 16 17)

10 21 16 17-0002 Solid Phenolic Core Laminated Plastic, Shower Dividers (10 21 16 17-0001)

Note: Cut to height in field. panels 58" high. Posts 1-1/4" square, 304 stainless steel satin finish. 1/2" thick panels.

10 21 16 17-0003	EA	18" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider	1,276.91	135.63
		<i>For 66" High Panels, Add</i>	150.85	
10 21 16 17-0004	EA	24" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider	1,633.85	146.48
		<i>For 66" High Panels, Add</i>	201.13	
10 21 16 17-0005	EA	36" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider	2,145.28	162.75
		<i>For 66" High Panels, Add</i>	272.96	
10 21 16 17-0006	EA	48" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider	2,534.73	189.88
		<i>For 66" High Panels, Add</i>	323.25	
10 21 16 17-0007	EA	57" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider	2,924.21	217.01
		<i>For 66" High Panels, Add</i>	373.53	

10 21 16 17-0008 Solid Phenolic Core Laminated Plastic, Shower Dividers With Headrail And Curtain Track (10 21 16 17-0001)

Note: Cut to height in field. Panels 58" high. Posts 1-1/4" square, 304 stainless steel satin finish. 1/2" thick panels. Includes 3/4" stiles, 85" from floor to top of headrail. Headrail 4" wide. All stainless steel shoes and stainless steel fittings. Leveling devices are chromate treated double zinc plated steel. Overhead braced designed with concealed curtain tracks and hooks in headrail.

10 21 16 17-0009	EA	18" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider With Headrail And Curtain Track	3,190.39	238.38
		<i>For 66" High Panels, Add</i>	454.72	
		<i>For 6" Wide Head Rail, Add</i>	86.18	
		<i>For 8" Wide Head Rail, Add</i>	118.08	
		<i>For 10" Wide Head Rail, Add</i>	145.22	
		<i>For 12" Wide Head Rail, Add</i>	174.74	
		<i>For 18" Wide, 1/2" Thick Bench, Add</i>	132.67	
		<i>For 24" Wide, 1/2" Thick Bench, Add</i>	172.67	
10 21 16 17-0010	EA	24" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider With Headrail And Curtain Track	3,979.23	260.29
		<i>For 66" High Panels, Add</i>	570.85	
		<i>For 6" Wide Head Rail, Add</i>	108.96	
		<i>For 8" Wide Head Rail, Add</i>	148.76	
		<i>For 10" Wide Head Rail, Add</i>	183.34	
		<i>For 12" Wide Head Rail, Add</i>	220.53	
		<i>For 18" Wide, 1/2" Thick Bench, Add</i>	137.07	
		<i>For 24" Wide, 1/2" Thick Bench, Add</i>	177.07	
10 21 16 17-0011	EA	36" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider With Headrail And Curtain Track	5,076.34	276.79
		<i>For 66" High Panels, Add</i>	733.77	
		<i>For 6" Wide Head Rail, Add</i>	141.22	
		<i>For 8" Wide Head Rail, Add</i>	191.98	
		<i>For 10" Wide Head Rail, Add</i>	237.21	
		<i>For 12" Wide Head Rail, Add</i>	285.21	
		<i>For 18" Wide, 1/2" Thick Bench, Add</i>	140.36	
		<i>For 24" Wide, 1/2" Thick Bench, Add</i>	180.36	
10 21 16 17-0012	EA	48" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider With Headrail And Curtain Track	5,408.15	309.66
		<i>For 66" High Panels, Add</i>	780.26	
		<i>For 6" Wide Head Rail, Add</i>	149.86	
		<i>For 8" Wide Head Rail, Add</i>	203.94	
		<i>For 10" Wide Head Rail, Add</i>	251.83	
		<i>For 12" Wide Head Rail, Add</i>	302.81	
		<i>For 18" Wide, 1/2" Thick Bench, Add</i>	146.93	
		<i>For 24" Wide, 1/2" Thick Bench, Add</i>	186.93	
10 21 16 17-0013	EA	57" Wide, Solid Phenolic Core Laminated Plastic, Shower Divider With Headrail And Curtain Track	6,206.81	336.57
		<i>For 66" High Panels, Add</i>	897.37	
		<i>For 6" Wide Head Rail, Add</i>	172.74	
		<i>For 8" Wide Head Rail, Add</i>	234.81	
		<i>For 10" Wide Head Rail, Add</i>	290.15	
		<i>For 12" Wide Head Rail, Add</i>	348.85	
		<i>For 18" Wide, 1/2" Thick Bench, Add</i>	152.31	
		<i>For 24" Wide, 1/2" Thick Bench, Add</i>	192.31	

10 22 Partitions (10 20)

10 22 13 Wire Mesh Partitions (10 22)

10 22 13 00-0001 Wall Panels (10 22 13)

Note: Includes steel frame and posts. Posts bolted to floor.

10 22 13 00-0002	SF	Wire Mesh Wall Panel, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames And Posts	14.82	1.36
		<i>For 5' Wide Panels, Add</i>	0.61	
10 22 13 00-0003	SF	Wire Mesh Wall Panel, 8 Gauge, Diamond Pattern With Vertical And Horizontal Frames And Posts	16.39	1.63
		<i>For 5' Wide Panels, Add</i>	0.66	
10 22 13 00-0004	SF	Wire Mesh Wall Panel, 6 Gauge, Diamond Pattern With Vertical And Horizontal Frames And Posts	25.05	1.90
		<i>For 5' Wide Panels, Add</i>	1.06	

10 22 13 00-0005 Ceiling Panels (10 22 13)

Note: Includes steel frame.

10 22 13 00-0006	SF	Wire Mesh Ceiling Panel, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames And Posts	15.31	1.63
10 22 13 00-0007	SF	Wire Mesh Ceiling Panel, 8 Gauge, Diamond Pattern With Vertical And Horizontal Frames And Posts	16.89	1.90

10	10	Specialties
	10 20	Interior Specialties
	10 22	Partitions



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 22 13 00-0008	SF		Wire Mesh Ceiling Panel, 6 Gauge, Diamond Pattern With Vertical And Horizontal Frames And Posts	18.68	2.17
10 22 13 00-0009			Sliding Doors <small>(10 22 13)</small>		
			Note: Includes padlocks lugs and/or provisions for cylinder lock.		
10 22 13 00-0010	EA		4' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	1,364.91	284.82
			For 8 Gauge, Add	147.77	
			For 6 Gauge, Add	295.55	
10 22 13 00-0011	EA		4' x 10' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	1,435.37	314.66
			For 8 Gauge, Add	152.37	
			For 6 Gauge, Add	304.75	
10 22 13 00-0012	EA		5' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	1,572.98	325.51
			For 8 Gauge, Add	170.85	
			For 6 Gauge, Add	341.69	
10 22 13 00-0013	EA		5' x 10' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	1,716.21	352.63
			For 8 Gauge, Add	186.90	
			For 6 Gauge, Add	373.81	
10 22 13 00-0014	EA		6' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	1,773.07	374.33
			For 8 Gauge, Add	191.09	
			For 6 Gauge, Add	382.19	
10 22 13 00-0015	EA		6' x 10' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	1,953.97	396.04
			For 8 Gauge, Add	213.89	
			For 6 Gauge, Add	427.78	
10 22 13 00-0016	EA		8' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	2,099.92	425.87
			For 8 Gauge, Add	229.81	
			For 6 Gauge, Add	459.63	
10 22 13 00-0017	EA		8' x 10' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	2,288.85	444.86
			For 8 Gauge, Add	254.36	
			For 6 Gauge, Add	508.71	
10 22 13 00-0018	EA		10' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	2,307.86	455.71
			For 8 Gauge, Add	255.04	
			For 6 Gauge, Add	510.07	
10 22 13 00-0019	EA		10' x 10' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Sliding Door, With Cylinder Lock	2,550.82	482.84
			For 8 Gauge, Add	286.06	
			For 6 Gauge, Add	572.11	
10 22 13 00-0020			Swing Doors <small>(10 22 13)</small>		
10 22 13 00-0021			Single Swing Door <small>(10 22 13 00-0020)</small>		
10 22 13 00-0022	EA		3' x 7' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Swing Door, With Cylinder Lock	935.88	168.18
			For 8 Gauge, Add	104.22	
			For 6 Gauge, Add	208.43	
10 22 13 00-0023	EA		3' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Swing Door, With Cylinder Lock	1,007.89	189.88
			For 8 Gauge, Add	113.21	
			For 6 Gauge, Add	226.42	
10 22 13 00-0024	EA		3' x 9' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Swing Door, With Cylinder Lock	1,080.80	200.73
			For 8 Gauge, Add	121.98	
			For 6 Gauge, Add	243.95	
10 22 13 00-0025	EA		4' x 7' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Swing Door, With Cylinder Lock	1,062.14	217.01
			For 8 Gauge, Add	115.92	
			For 6 Gauge, Add	231.84	
10 22 13 00-0026	EA		4' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Swing Door, With Cylinder Lock	1,137.75	227.85
			For 8 Gauge, Add	125.09	
			For 6 Gauge, Add	250.18	
10 22 13 00-0027	EA		4' x 9' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Swing Door, With Cylinder Lock	1,188.70	238.70
			For 8 Gauge, Add	130.56	
			For 6 Gauge, Add	261.13	
10 22 13 00-0028			Double Swing Doors <small>(10 22 13 00-0020)</small>		
10 22 13 00-0029	EA		6' x 7' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Double Swing Door, With Cylinder Lock	1,483.35	271.25
			For 8 Gauge, Add	168.25	
			For 6 Gauge, Add	336.50	
10 22 13 00-0030	EA		6' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Double Swing Door, With Cylinder Lock	1,606.58	287.53
			For 8 Gauge, Add	183.48	
			For 6 Gauge, Add	366.96	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
10 22 13 00-0031 EA 6' x 9' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Double Swing Door, With Cylinder Lock.....	1,729.79	303.80
<i>For 8 Gauge, Add</i>	198.71	
<i>For 6 Gauge, Add</i>	397.41	
10 22 13 00-0032 EA 8 x 7' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Double Swing Door, With Cylinder Lock.....	1,856.87	325.51
<i>For 8 Gauge, Add</i>	213.43	
<i>For 6 Gauge, Add</i>	426.86	
10 22 13 00-0033 EA 8 x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Double Swing Door, With Cylinder Lock.....	2,035.63	341.78
<i>For 8 Gauge, Add</i>	236.99	
<i>For 6 Gauge, Add</i>	473.98	
10 22 13 00-0034 EA 8 x 9' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Double Swing Door, With Cylinder Lock.....	2,212.29	358.06
<i>For 8 Gauge, Add</i>	260.23	
<i>For 6 Gauge, Add</i>	520.47	
10 22 13 00-0035 Dutch Doors <small>(10 22 13)</small>		
Note: Includes padlocks lugs and/or provisions for cylinder lock.		
10 22 13 00-0036 EA 3' x 7' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Dutch Door, With Cylinder Lock.....	1,281.50	168.18
<i>For 8 Gauge, Add</i>	156.06	
<i>For 6 Gauge, Add</i>	312.12	
10 22 13 00-0037 EA 3' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Dutch Door, With Cylinder Lock.....	1,359.67	189.88
<i>For 8 Gauge, Add</i>	165.97	
<i>For 6 Gauge, Add</i>	331.95	
10 22 13 00-0038 EA 3' x 9' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Dutch Door, With Cylinder Lock.....	1,398.40	200.73
<i>For 8 Gauge, Add</i>	169.62	
<i>For 6 Gauge, Add</i>	339.23	
10 22 13 00-0039 EA 3' x 10' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Dutch Door, With Cylinder Lock.....	1,469.68	227.85
<i>For 8 Gauge, Add</i>	174.88	
<i>For 6 Gauge, Add</i>	349.76	
10 22 13 00-0040 EA 4' x 7' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Dutch Door, With Cylinder Lock.....	1,412.76	217.01
<i>For 8 Gauge, Add</i>	168.51	
<i>For 6 Gauge, Add</i>	337.03	
10 22 13 00-0041 EA 4' x 8' Wire Mesh, 10 Gauge, Diamond Pattern With Vertical And Horizontal Frames Dutch Door, With Cylinder Lock.....	1,499.36	227.85
<i>For 8 Gauge, Add</i>	179.33	
<i>For 6 Gauge, Add</i>	358.67	
10 22 19 Demountable Partitions <small>(10 22)</small>		
10 22 19 13 Demountable Metal Partitions <small>(10 22 19)</small>		
10 22 19 13-0001 LF 9' High Demountable Partition, 1.75 System, Aluminum Framed, Vinyl Clad Hardboard, Paper Honeycomb Core, 1.75"/2.5" Thick	163.64	17.26
<i>For >9, Add 20.46</i>		
10 22 19 13-0002 LF 7' High Demountable Partition, 1.75 System, Aluminum Framed, Vinyl Clad Hardboard, Paper Honeycomb Core, 1.75"/2.5" Thick	143.83	13.74
<i>For >9, Add 17.98</i>		
10 22 19 13-0003 LF 5' High Demountable Partition, 1.75 System, Aluminum Framed, Vinyl Clad Hardboard, Paper Honeycomb Core, 1.75"/2.5" Thick	124.04	10.33
<i>For >9, Add 15.51</i>		
10 22 19 13-0004 LF 9' High Demountable Partition, Moveable Steel Wall, Mod System, Unitized Panel, 48" Wide, Backed Enamel.....	164.09	13.74
<i>For >9, Add 20.51</i>		
10 22 19 13-0005 LF 9' High Demountable Partition, Moveable Steel Wall, Mod System, Unitized Panels, 48" Wide, Fabric.....	238.73	14.78
<i>For >9, Add 29.84</i>		
10 22 19 43 Demountable Composite Partitions <small>(10 22 19)</small>		
10 22 19 43-0001 LF Demountable Partition, Mineral Fiber System, Unitized Panel, 9' High, 2-1/4" Thick, Aluminum Frame, Vinyl Clad	253.98	17.26
<i>For >9, Add 31.75</i>		
10 22 19 43-0002 LF Demountable Partition, Mineral Fiber System, Unitized Panel, 9' High, 2-1/4" Thick, Aluminum Frame, Fabric Clad	318.48	18.80
<i>For >9, Add 39.81</i>		
10 22 19 43-0003 SF Partition, Trackless Wall, Cork Finish, Semi-Acoustic, 1-5/8" Thick	53.49	2.58
<i>For Acoustical Partitions, Add</i>	4.84	
10 22 19 43-0004 SF Partition, Trackless Wall, Cork Finish, Semi-Acoustic, 1-5/8" Thick	66.78	4.33
<i>For Acoustical Partitions, Add</i>	5.81	
10 22 19 43-0005 SF Partition, Trackless Wall, Cork Finish, Acoustic, 2" Thick	57.06	2.68
<i>For Acoustical Partitions, Add</i>	5.16	
10 22 19 43-0006 SF Partition, Trackless Wall, Cork Finish, Acoustic, 2" Thick	81.64	3.72
<i>For Acoustical Partitions, Add</i>	7.43	
10 22 19 53 Demountable Gypsum Partitions <small>(10 22 19)</small>		
10 22 19 53-0001 Demountable Gypsum Partitions <small>(10 22 19 53)</small>		
10 22 19 53-0002 LF 9' High Demountable Partition Gypsum System, 2" To 2.5" Steel Standard, 3" To 3-3/4" Thick, Vinyl Clad	97.51	17.26
<i>For >9, Add 12.19</i>		

10	10	Specialties
	10 20	Interior Specialties
	10 22	Partitions



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 22 19 53-0003	LF		9' High Demountable Partition Gypsum System, 2" To 2.5" Steel Standard, 3" To 3-3/4" Thick, Fabric Clad <i>For >9, Add 20.67</i>	165.33	18.80
10 22 19 53-0004	LF		9' High Demountable Partition Gypsum System, 2" To 2.5", Steel Standard, 3" To 3-3/4" Thick, Steel Clad <i>For >9, Add 22.24</i>	177.91	20.67
10 22 19 53-0005	LF		9' High Demountable Partition Gypsum System, Unitized Panel, 2" To 2-1/2" Thick, Vinyl Clad <i>For >9, Add 25.69</i>	205.54	17.26
10 22 19 53-0006	LF		9' High Demountable Partition Gypsum System, Unitized Panel, 2" To 2-1/2" Thick, Fabric Clad <i>For >9, Add 43.04</i>	344.30	18.80

10 22 23 Portable Partitions, Screens, and Panels (10 22)

Note: Includes standard units, standard height glass and glazing. For 25 percent and 50 percent glass 1/4" plate glass is used. For 100 percent glass 1/4" tempered plate is used.

10 22 23 23 Movable Panel Systems (10 22 23)

10 22 23 23-0001

Portable Partitions (10 22 23 23)

10 22 23 23-0002	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 3'-0" Long, 4' High 323.29	8.27
10 22 23 23-0003	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 3'-0" Long, 5' High 344.50	9.19
10 22 23 23-0004	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 3'-0" Long, 6' High 409.53	11.06
10 22 23 23-0005	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 5'-0" Long, 4' High 238.71	4.75
10 22 23 23-0006	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 5'-0" Long, 5' High 253.20	5.47
10 22 23 23-0007	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 5'-0" Long, 6' High 284.47	6.61
10 22 23 23-0008	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Straight, 6'-0" Long, 5' High 242.69	5.06
10 22 23 23-0009	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Curved, 3'-0" Long, 5' High 431.68	9.19
10 22 23 23-0010	LF		Partition, Portable, Divided Panel, Freestanding, Fiber Core, Fabric Face Curved, 3'-0" Long, 6' High 474.11	11.06
10 22 23 23-0011	LF		Partitions, Portable, Economical Panels, Fabric Face, 4'-0" Long, 5' High 251.47	6.30
10 22 23 23-0012	LF		Partitions, Portable, Economical Panels, Fabric Face, 4'-0" Long, 6' High 286.00	7.34
10 22 23 23-0013	LF		Partitions, Portable, Economical Panels, Fabric Face, 5'-0" Long, 5' High 230.59	5.47
10 22 23 23-0014	LF		Partitions, Portable, Economical Panels, Fabric Face, 5'-0" Long, 6' High 258.64	6.61
10 22 23 23-0015	LF		Partitions, Portable, Economical Panels, Fabric Face, 3'-0" Curved, 5' High 383.25	9.19
10 22 23 23-0016	LF		Partitions, Portable, Economical Panels, Fabric Face, 3'-0" Curved, 6' High 432.13	11.06
10 22 23 23-0017	LF		Partitions, Portable, Acoustic Panels, 60 To 90 NRC, 3'-0" Long, 5' High 389.71	9.19
10 22 23 23-0018	LF		Partitions, Portable, Acoustic Panels, 60 To 90 NRC, 3'-0" Long, 6' High 474.11	11.06
10 22 23 23-0019	LF		Partitions, Portable, Acoustic Panels, 60 To 90 NRC, 5'-0" Long, 5' High 301.63	5.47
10 22 23 23-0020	LF		Partitions, Portable, Acoustic Panels, 60 To 90 NRC, 5'-0" Long, 6' High 339.36	6.61
10 22 23 23-0021	LF		Partitions, Portable, Acoustic Panels, 60 To 90 NRC, 6'-0" Long, 5' High 318.57	5.06
10 22 23 23-0022	LF		Partitions, Portable, Acoustic Panels, 60 To 90 NRC, 6'-0" Long, 6' High 380.09	5.99
10 22 23 23-0023	LF		Partitions, Portable, Economical Acoustic Panels, 40 NRC, 4'-0" Long, 5' High 183.66	6.30
10 22 23 23-0024	LF		Partitions, Portable, Economical Acoustic Panels, 40 NRC, 4'-0" Long, 6' High 216.57	7.34
10 22 23 23-0025	LF		Partitions, Portable, Economical Acoustic Panels, 40 NRC, 5'-0" Long, 6' High 195.67	6.61
10 22 23 23-0026	LF		Partitions, Portable, Economical Acoustic Panels, 40 NRC, 6'-0" Long, 5' High 142.59	5.06
10 22 23 23-0027	LF		Partitions, Portable, Metal Chalkboard, 6'-6" High, 1 Side 232.80	6.61
10 22 23 23-0028	LF		Partitions, Portable, Metal Chalkboard, 2 Sides 265.64	6.93
10 22 23 23-0029	LF		Partitions, Portable, Tackboard, Both Sides 213.64	6.71

10 22 23 23-0030 Adjustable Barrier Panel System (Edge Guard) (10 22 23 23)

Note: Panels are opal or transparent. Includes self-leveling floor channel, 1/4" foam gasket to conform to ceiling, edge gaskets, grid clips, and cam locks.

10 22 23 23-0031	EA		4' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4000) 689.51	
10 22 23 23-0032	EA		3' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4001) 654.84	
10 22 23 23-0033	EA		2' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4002) 516.18	
10 22 23 23-0034	EA		2' Wide x 7'-8" To 10' High With High Efficiency Particulate Air (HEPA) Filtered Air Discharge Port, Fire Rated Containment Panel Assembly (Edge Guard 4002.1) 597.07	
10 22 23 23-0035	EA		4' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly With 44" Door (Edge Guard 4003) 1,169.04	
10 22 23 23-0036	EA		7'-8" To 10' High, Hinged Corner Assembly (Edge Guard 4004) 235.47	
10 22 23 23-0037	EA		6" Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4005) 315.87	
10 22 23 23-0038	EA		12" Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly (Edge Guard 4006) 338.98	
10 22 23 23-0039	EA		7'-8" To 10' High, Outside Corner Post (Edge Guard 4007) 195.02	
10 22 23 23-0040	EA		4'-4" Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly With 48" Door (Edge Guard 4008) 1,400.14	
			Note: Includes a hydraulic closer and a lever style lockset standard.	
10 22 23 23-0041	EA		7'-8" To 10' High, "T" Post Corner Assembly (Edge Guard 4009) 195.02	
10 22 23 23-0042	EA		3' Wide x 7'-8" To 10' High, Fire Rated Containment Panel Assembly With 32" Door (Edge Guard 4010) 1,053.49	
			Note: Includes a hydraulic closer and a lever style lockset standard.	
10 22 23 23-0043	EA		Closure Strips (Edge Guard 3003) 14.01	
			Note: To seal panels to existing walls	
10 22 23 23-0044	EA		Digital Differential Pressure Gauge Kit (Edge Guard 3005) 323.19	

10 22 33 Accordion Folding Partitions (10 22)

10 22 33 00-0001 Accordion Doors/Partitions (10 22 33)

Note: Includes top support track and assembled panels.

10 22 33 00-0002	SF		15 STC Rating, Accordion Door/Partition With Standard Vinyl Finish 91.25	5.11
			<i>For <135, Add</i>	18.25
10 22 33 00-0003	SF		20 STC Rating, Accordion Door/Partition With Standard Vinyl Finish 92.63	5.29
			<i>For <135, Add</i>	18.53
10 22 33 00-0004	SF		31 STC Rating, Accordion Door/Partition With Standard Vinyl Finish 97.04	5.45
			<i>For <135, Add</i>	19.41
10 22 33 00-0005	SF		35 STC Rating, Accordion Door/Partition With Standard Vinyl Finish 103.03	5.64
			<i>For <135, Add</i>	20.61



Specialties	10	10
Interior Specialties	10 20	
Partitions	10 22	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 22 33 00-0006	SF		39 STC Rating, Accordion Door/Partition With Standard Vinyl Finish.....	104.79	5.80
			<i>For <135, Add</i>	20.96	
10 22 33 00-0007	SF		40 STC Rating, Accordion Door/Partition With Standard Vinyl Finish.....	106.03	5.97
			<i>For <135, Add</i>	21.21	
10 22 33 00-0008	SF		41 STC Rating, Accordion Door/Partition With Standard Vinyl Finish.....	107.22	6.14
			<i>For <135, Add</i>	21.44	
10 22 33 00-0009	SF		44 STC Rating, Accordion Door/Partition With Standard Vinyl Finish.....	108.68	6.48
			<i>For <135, Add</i>	21.74	
10 22 33 00-0010	SF		47 STC Rating, Accordion Door/Partition With Standard Vinyl Finish.....	115.36	6.48
			<i>For <135, Add</i>	23.07	
10 22 33 00-0011	SF		50 STC Rating, Accordion Door/Partition With Standard Vinyl Finish.....	122.04	6.48
			<i>For <135, Add</i>	24.41	
10 22 43 Sliding Partitions (10 22)					
10 22 43 00-0001			Operable Wall (10 22 43)		
			Note: Includes top support track, assembled panel and frames.		
10 22 43 00-0002	SF		Up To 720 SF, Up To 12' Height Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom		
			Sweep Seals, 47 STC Rating	243.15	21.40
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-11.57	
			<i>For 49 STC, Add</i>	14.68	
			<i>For 52 STC, Add</i>	22.25	
10 22 43 00-0003	SF		>720 To 1,200 SF, Up To 12 High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom		
			Sweep Seals, 47 STC Rating	226.25	17.24
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-11.32	
			<i>For 49 STC, Add</i>	14.37	
			<i>For 52 STC, Add</i>	21.77	
10 22 43 00-0004	SF		>1,200 SF, Up To 12' High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom Sweep		
			Seals, 47 STC Rating	213.76	14.30
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-11.08	
			<i>For 49 STC, Add</i>	14.06	
			<i>For 52 STC, Add</i>	21.31	
10 22 43 00-0005	SF		Up To 1,080 SF, >12' To 18' High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom		
			Sweep Seals, 47 STC Rating	207.66	15.04
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-10.53	
			<i>For 49 STC, Add</i>	13.37	
			<i>For 52 STC, Add</i>	20.26	
10 22 43 00-0006	SF		>1,080 To 1,800 SF, >12' To 18' High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom		
			Sweep Seals, 47 STC Rating	194.66	12.23
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-10.24	
			<i>For 49 STC, Add</i>	12.99	
			<i>For 52 STC, Add</i>	19.69	
10 22 43 00-0007	SF		>1,800 SF, >12' To 18' High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom Sweep		
			Seals, 47 STC Rating	186.94	11.00
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-9.99	
			<i>For 49 STC, Add</i>	12.68	
			<i>For 52 STC, Add</i>	19.21	
10 22 43 00-0008	SF		Up To 1,440 SF, >18' To 22'-3" High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom		
			Sweep Seals, 47 STC Rating	184.63	11.86
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-9.67	
			<i>For 49 STC, Add</i>	12.28	
			<i>For 52 STC, Add</i>	18.60	
10 22 43 00-0009	SF		>1,440 To 2,400 SF, >18' To 22'-3" High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And		
			Bottom Sweep Seals, 47 STC Rating.....	174.67	10.15
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-9.37	
			<i>For 49 STC, Add</i>	11.89	
			<i>For 52 STC, Add</i>	18.01	
10 22 43 00-0010	SF		>2,400 SF, >18' To 22'-3" High Continuously Hinged Electric Operable Wall, Vinyl Finish, Top And Bottom Sweep		
			Seals, 47 STC Rating.....	167.82	9.05
			Note: Includes pocket door, two ADA pass doors, track and hardware.		
			<i>For 43 STC, Deduct</i>	-9.13	
			<i>For 49 STC, Add</i>	11.58	
			<i>For 52 STC, Add</i>	17.55	
10 22 43 00-0011	SF		Up To 160 SF, 10' Height Paired Panel Manual Operable Wall, Vinyl Finish, Top Sweep Seals And Mechanical		
			Bottom Seals, 47 STC Rating.....	184.52	14.30
			Note: Includes pocket door, track and hardware.		
			<i>For 44 STC, Deduct</i>	-9.16	
			<i>For 49 STC, Add</i>	11.63	
			<i>For 52 STC, Add</i>	17.62	
10 22 43 00-0012	SF		>160 To 240 SF, 10' Height Paired Panel Manual Operable Wall, Vinyl Finish, Top Sweep Seals And Mechanical		
			Bottom Seals, 47 STC Rating.....	170.24	10.89
			Note: Includes pocket door, track and hardware.		
			<i>For 44 STC, Deduct</i>	-8.92	
			<i>For 49 STC, Add</i>	11.32	
			<i>For 52 STC, Add</i>	17.15	

10	10	Specialties
	10 20	Interior Specialties
	10 22	Partitions



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 22 43 00-0013	SF >240 SF, 10' Height Paired Panel Manual Operable Wall, Vinyl Finish, Top Sweep Seals And Mechanical Bottom Seals, 47 STC Rating	161.95	9.17
	Note: Includes pocket door, track and hardware.		
	For 44 STC, Deduct	-8.71	
	For 49 STC, Add	11.06	
	For 52 STC, Add	16.76	

10 26 Wall and Door Protection (10 20)

10 26 13 Corner Guards (10 26)

10 26 13 00-0001	Vinyl Corner Guards <small>(10 26 13)</small>		
10 26 13 00-0002	Rigid Vinyl Corner Guards <small>(10 26 13 00-0001)</small>		
10 26 13 00-0003	Surface Mounted, Rigid Vinyl Corner Guards <small>(10 26 13 00-0002)</small>		
10 26 13 00-0004	90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guards <small>(10 26 13 00-0003)</small>		
10 26 13 00-0005	LF 3/4" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard (Pawling CG-34)	7.62	3.25
	For >50 To 100, Deduct	-1.36	
	For >100 To 200, Deduct	-1.90	
	For >200, Deduct	-2.55	
10 26 13 00-0006	LF 1-1/2" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard (Pawling CG-12)	8.15	3.25
	For >50 To 100, Deduct	-1.36	
	For >100 To 200, Deduct	-1.90	
	For >200, Deduct	-2.58	
10 26 13 00-0007	LF 3" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard (Pawling CG-13)	11.10	3.25
	For >50 To 100, Deduct	-1.36	
	For >100 To 200, Deduct	-1.90	
	For >200, Deduct	-2.73	
10 26 13 00-0008	LF 4" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard (Pawling CG-14)	14.79	3.25
	For >50 To 100, Deduct	-1.36	
	For >100 To 200, Deduct	-1.90	
	For >200, Deduct	-2.91	
10 26 13 00-0009	135 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guards <small>(10 26 13 00-0003)</small>		
10 26 13 00-0010	LF 1-1/2" Wing, 135 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard (Pawling CG-1245)	14.12	3.25
	For >50 To 100, Deduct	-1.36	
	For >100 To 200, Deduct	-1.90	
	For >200, Deduct	-2.88	
10 26 13 00-0011	Rigid Vinyl Corner Guards With Aluminum Retainers <small>(10 26 13 00-0001)</small>		
	Note: Includes closure caps.		
10 26 13 00-0012	Surface Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers <small>(10 26 13 00-0011)</small>		
10 26 13 00-0013	90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers <small>(10 26 13 00-0012)</small>		
10 26 13 00-0014	LF 2" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-20)	14.14	4.88
	For >50 To 100, Deduct	-2.03	
	For >100 To 200, Deduct	-2.85	
	For >200, Deduct	-3.96	
	For Recycled Vinyl Retainer, Deduct	-1.20	
10 26 13 00-0015	LF 3" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-10)	15.78	4.88
	For >50 To 100, Deduct	-2.03	
	For >100 To 200, Deduct	-2.85	
	For >200, Deduct	-4.04	
	For Recycled Vinyl Retainer, Deduct	-1.53	
10 26 13 00-0016	LF Bullnose 3" Wing, 90 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-30)	17.42	4.88
	For >50 To 100, Deduct	-2.03	
	For >100 To 200, Deduct	-2.85	
	For >200, Deduct	-4.12	
	For Recycled Vinyl Retainer, Deduct	-1.86	
10 26 13 00-0017	135 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers <small>(10 26 13 00-0012)</small>		
10 26 13 00-0018	LF 3" Wing, 135 Degree Angle, Surface Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-135)	20.49	4.88
	For >50 To 100, Deduct	-2.03	
	For >100 To 200, Deduct	-2.85	
	For >200, Deduct	-4.28	
	For Recycled Vinyl Retainer, Deduct	-2.47	
10 26 13 00-0019	End Wall Protector, Surface Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers <small>(10 26 13 00-0012)</small>		
	Note: Includes two rigid vinyl corner guards with aluminum retainers and a vinyl wall covering filler strip inserted between guards.		



Specialties	10	10
Interior Specialties	10 20	
Wall and Door Protection	10 26	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 26 13 00-0020 LF 2" Wing, End Wall Protector, Surface Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-11) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Recycled Vinyl Retainer, Deduct</i>	29.09 -2.71 -3.79 -5.79 -3.65	6.50
10 26 13 00-0021 Flush Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers (10 26 13 00-0011)		
10 26 13 00-0022 90 Degree Angle, Flush Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers (10 26 13 00-0021)		
10 26 13 00-0023 LF 2" Wing, 90 Degree Angle, Flush Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-72) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Up To 2 HR Fire Rated, Add</i>	18.86 -2.03 -2.85 -4.20 7.51	4.88
10 26 13 00-0024 LF 3" Wing, 90 Degree Angle, Flush Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-7) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Up To 2 HR Fire Rated, Add</i>	22.75 -2.03 -2.85 -4.39 10.23	4.88
10 26 13 00-0025 LF Bullnose 3" Wing, 90 Degree Angle, Flush Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-32) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Up To 2 HR Fire Rated, Add</i>	21.08 -2.03 -2.85 -4.31 9.07	4.88
10 26 13 00-0026 135 Degree Angle, Flush Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers (10 26 13 00-0021)		
10 26 13 00-0027 LF 3" Wing, 135 Degree Angle, Flush Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-75) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Up To 2 HR Fire Rated, Add</i>	24.41 -2.03 -2.85 -4.47 11.40	4.88
10 26 13 00-0028 End Wall Protector, Flush Mounted, Rigid Vinyl Corner Guards With Aluminum Retainers (10 26 13 00-0021) Note: Includes two rigid vinyl corner guards with aluminum retainers and a vinyl wall covering filler strip inserted between guards.		
10 26 13 00-0029 LF 2" Wing, End Wall Protector, Flush Mounted, Rigid Vinyl Corner Guard With Aluminum Retainer (Pawling CG-888) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Up To 2 HR Fire Rated, Add</i>	51.20 -2.71 -3.79 -6.90 28.25	6.50
10 26 13 00-0030 Flexible Vinyl Corner Guards (10 26 13 00-0001) Note: Includes adhesive for installation.		
10 26 13 00-0031 Surface Mounted, Flexible Vinyl Corner Guards (10 26 13 00-0030)		
10 26 13 00-0032 90 Degree Angle, Surface Mounted, Flexible Vinyl Corner Guards (10 26 13 00-0031)		
10 26 13 00-0033 LF 1-3/4" Wing, 90 Degree Angle, Surface Mounted, Flexible Vinyl Corner Guard (Pawling CG-9) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Bolting To Concrete Or Masonry, Add</i>	10.49 -1.36 -1.90 -2.70 2.39	3.25
10 26 13 00-0034 LF 2-1/2" Wing, 90 Degree Angle, Surface Mounted, Flexible Vinyl Corner Guard (Pawling CG-3) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Bolting To Concrete Or Masonry, Add</i>	13.42 -1.36 -1.90 -2.84 2.83	3.25
10 26 13 00-0035 LF 4" Wing, 90 Degree Angle, Surface Mounted, Flexible Vinyl Corner Guard (Pawling CG-15) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Bolting To Concrete Or Masonry, Add</i>	15.79 -1.36 -1.90 -2.96 3.18	3.25
10 26 13 00-0036 Polycarbonate Corner Guards (10 26 13)		
10 26 13 00-0037 Surface Mounted, Polycarbonate Corner Guards (10 26 13 00-0036)		
10 26 13 00-0038 90 Degree Angle, Surface Mounted, Polycarbonate Corner Guards (10 26 13 00-0037)		
10 26 13 00-0039 LF 3/4" Wing, 90 Degree Angle, Surface Mounted, Polycarbonate Corner Guard (Pawling CG-16) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	6.96 -1.36 -1.90 -2.52	3.25

10	10	Specialties
	10 20	Interior Specialties
	10 26	Wall and Door Protection



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 26 13 00-0040	LF 1-1/8" Wing, 90 Degree Angle, Surface Mounted, Polycarbonate Corner Guard (Pawling CG-17) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	8.39 -1.36 -1.90 -2.59	3.25
10 26 13 00-0041	LF 2" Wing, 90 Degree Angle, Surface Mounted, Polycarbonate Corner Guard (Pawling CG-24) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	10.06 -1.36 -1.90 -2.68	3.25
10 26 13 00-0042	LF 2-1/2" Wing, 90 Degree Angle, Surface Mounted, Polycarbonate Corner Guard (Pawling CG-18) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	11.07 -1.36 -1.90 -2.73	3.25
10 26 13 00-0043	LF Bullnose 2-1/2" Wing, 90 Degree Angle, Surface Mounted, Polycarbonate Corner Guard (Pawling CG-23) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	10.70 -1.36 -1.90 -2.71	3.25
10 26 13 00-0044	135 Degree Angle, Surface Mounted, Polycarbonate Corner Guards <small>(10 26 13 00-0037)</small>		
10 26 13 00-0045	LF 2-1/2" Wing, 135 Degree Angle, Surface Mounted, Polycarbonate Corner Guard (Pawling CG-19) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	11.07 -1.36 -1.90 -2.73	3.25
10 26 13 00-0046	Aluminum Corner Guards <small>(10 26 13)</small>		
10 26 13 00-0047	Surface Mounted, Aluminum Corner Guards <small>(10 26 13 00-0046)</small>		
10 26 13 00-0048	90 Degree Angle, Surface Mounted, Aluminum Corner Guards <small>(10 26 13 00-0047)</small>		
10 26 13 00-0049	LF 1" Wing, 90 Degree Angle, Surface Mounted, Aluminum Corner Guard (Pawling CG-400) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	9.87 -1.36 -1.90 -2.67	3.25
10 26 13 00-0050	LF 2" Wing, 90 Degree Angle, Surface Mounted, Aluminum Corner Guard (Pawling CG-401) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	11.80 -1.36 -1.90 -2.76	3.25
10 26 13 00-0051	LF 3" Wing, 90 Degree Angle, Surface Mounted, Aluminum Corner Guard (Pawling CG-402) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	13.00 -1.36 -1.90 -2.82	3.25
10 26 13 00-0052	135 Degree Angle, Surface Mounted, Aluminum Corner Guards <small>(10 26 13 00-0047)</small>		
10 26 13 00-0053	LF 1" Wing, 135 Degree Angle, Surface Mounted, Aluminum Corner Guard (Pawling CG-403) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	9.87 -1.36 -1.90 -2.67	3.25
10 26 13 00-0054	LF 2" Wing, 135 Degree Angle, Surface Mounted, Aluminum Corner Guard (Pawling CG-404) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	11.80 -1.36 -1.90 -2.76	3.25
10 26 13 00-0055	LF 3" Wing, 135 Degree Angle, Surface Mounted, Aluminum Corner Guard (Pawling CG-405) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	13.00 -1.36 -1.90 -2.82	3.25
10 26 13 00-0056	Steel Corner Guards <small>(10 26 13)</small>		
10 26 13 00-0057	Steel Angle Iron, Corner Guards <small>(10 26 13 00-0056)</small>		
10 26 13 00-0058	Surface Mounted, Steel Angle Iron, Corner Guards <small>(10 26 13 00-0057)</small>		
10 26 13 00-0059	90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guards <small>(10 26 13 00-0058)</small>		
10 26 13 00-0060	LF 1" x 1" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	12.77 2.19 -1.63 -2.28 -3.24	3.91
10 26 13 00-0061	LF 2" x 2" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	16.20 3.20 -1.76 -2.47 -3.63	4.23
10 26 13 00-0062	LF 2" x 3" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	17.22 3.47 -1.83 -2.56 -3.79	4.39



Specialties	10	10
Interior Specialties	10 20	
Wall and Door Protection	10 26	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 26 13 00-0063 LF 3" x 3" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	17.61 3.51 -1.90 -2.66 -3.92	4.55
10 26 13 00-0064 LF 3" x 4" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	21.87 4.90 -1.97 -2.75 -4.24	4.72
10 26 13 00-0065 LF 4" x 4" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	26.16 6.31 -2.03 -2.85 -4.56	4.88
10 26 13 00-0066 LF 6" x 6" x 1/4", 90 Degree Angle, Surface Mounted, Steel Angle Iron, Corner Guard <i>For Galvanizing, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	44.47 11.77 -2.71 -3.79 -6.56	6.50
10 26 13 00-0067 Stainless Steel Corner Guards (10 26 13)		
10 26 13 00-0068 Stainless Steel Corner Guards (10 26 13 00-0067) Note: Includes 16 gauge, type 304 stainless steel corner guards with #4 satin finish.		
10 26 13 00-0069 Surface Mounted, Stainless Steel Corner Guards (10 26 13 00-0068)		
10 26 13 00-0070 90 Degree Angle, Surface Mounted, Stainless Steel Corner Guards (10 26 13 00-0069)		
10 26 13 00-0071 LF 1" Wing, 90 Degree Angle, Surface Mounted, Stainless Steel Corner Guard (Pawling CG-520) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	10.97 -1.36 -1.90 -2.72	3.25
10 26 13 00-0072 LF 2" Wing, 90 Degree Angle, Surface Mounted, Stainless Steel Corner Guard (Pawling CG-510) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	12.67 -1.36 -1.90 -2.81	3.25
10 26 13 00-0073 LF 3-1/2" Wing, 90 Degree Angle, Surface Mounted, Stainless Steel Corner Guard (Pawling CG-500) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	17.10 -1.36 -1.90 -3.03	3.25
10 26 13 00-0074 LF Bullnose 3-1/2" Wing, 90 Degree Angle, Surface Mounted, Stainless Steel Corner Guard (Pawling CG-550) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	17.10 -1.36 -1.90 -3.03	3.25
10 26 13 00-0075 135 Degree Angle, Surface Mounted, Stainless Steel Corner Guards (10 26 13 00-0069)		
10 26 13 00-0076 LF 3-1/2" Wing, 135 Degree Angle, Surface Mounted, Stainless Steel Corner Guard (Pawling CG-600) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	17.10 -1.36 -1.90 -3.03	3.25
10 26 13 00-0077 LF Bullnose 3-1/2" Wing, 135 Degree Angle, Surface Mounted, Stainless Steel Corner Guard (Pawling CG-650) <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	17.10 -1.36 -1.90 -3.03	3.25
10 26 13 00-0078 Stainless Steel Angle Iron, Corner Guards (10 26 13 00-0067)		
10 26 13 00-0079 Surface Mounted, Stainless Steel Angle Iron, Corner Guards (10 26 13 00-0078)		
10 26 13 00-0080 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guards (10 26 13 00-0079)		
10 26 13 00-0081 LF 1" x 1" x 1/4", 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guard <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	20.98 -1.63 -2.28 -3.65	3.91
10 26 13 00-0082 LF 2" x 2" x 1/4", 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guard <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	34.50 -1.76 -2.47 -4.55	4.23
10 26 13 00-0083 LF 2" x 3" x 1/4", 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guard <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	47.98 -1.83 -2.56 -5.33	4.39
10 26 13 00-0084 LF 3" x 3" x 1/4", 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guard <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	44.87 -1.90 -2.66 -5.28	4.55
10 26 13 00-0085 LF 3" x 4" x 1/4", 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guard <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	63.83 -1.97 -2.75 -6.34	4.72

10	10	Specialties
	10 20	Interior Specialties
	10 26	Wall and Door Protection



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 26 13 00-0086	LF 4" x 4" x 1/4", 90 Degree Angle, Surface Mounted, Stainless Steel Angle Iron, Corner Guard..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	59.05 -2.03 -2.85 -6.20	4.88
10 26 13 00-0087	Rubber Corner Guards (10 26 13) Note: Includes adhesive for installation.		
10 26 13 00-0088	Natural Rubber Corner Guards (10 26 13 00-0087)		
10 26 13 00-0089	Surface Mounted, Natural Rubber Corner Guards (10 26 13 00-0088)		
10 26 13 00-0090	90 Degree Angle, Surface Mounted, Natural Rubber Corner Guards (10 26 13 00-0089)		
10 26 13 00-0091	LF 4-3/4" Wing, 90 Degree Angle, Surface Mounted, Natural Rubber Corner Guard (Pawling CG-5)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Bolting To Concrete Or Masonry, Add</i>	49.27 -1.36 -1.90 -4.64 8.21	3.25
10 26 13 00-0092	Styrene-Butadiene Rubber (SBR) Corner Guards (10 26 13 00-0087)		
10 26 13 00-0093	Surface Mounted, Styrene-Butadiene Rubber (SBR) Corner Guards (10 26 13 00-0092)		
10 26 13 00-0094	90 Degree Angle, Surface Mounted, Styrene-Butadiene Rubber (SBR) Corner Guards (10 26 13 00-0093)		
10 26 13 00-0095	LF 4-5/8" Wing, 90 Degree Angle, Surface Mounted, Styrene-Butadiene Rubber (SBR) Corner Guard (Pawling CG-2)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Bolting To Concrete Or Masonry, Add</i>	22.27 -1.36 -1.90 -3.29 4.16	3.25
10 26 13 00-0096	Ethylene Propylene Diene Monomer (EPDM) Rubber Corner Guards (10 26 13 00-0087)		
10 26 13 00-0097	Surface Mounted, Ethylene Propylene Diene Monomer (EPDM) Rubber Corner Guards (10 26 13 00-0096)		
10 26 13 00-0098	90 Degree Angle, Surface Mounted, Ethylene Propylene Diene Monomer (EPDM) Rubber Corner Guards (10 26 13 00-0097)		
10 26 13 00-0099	LF 4-5/8" Wing, 90 Degree Angle, Surface Mounted, Ethylene Propylene Diene Monomer (EPDM) Rubber Corner Guard (Pawling CG-2E)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i> <i>For Bolting To Concrete Or Masonry, Add</i>	19.57 -1.36 -1.90 -3.15 3.75	3.25
10 26 16	Bumper Guards (10 26)		
10 26 16 13	Bumper Rails (10 26 16)		
10 26 16 13-0001	Crash Rails (10 26 16 13) Note: Includes end caps.		
10 26 16 13-0002	Polycarbonate Crash Rails (10 26 16 13-0001)		
10 26 16 13-0003	LF 3" High, 5/16" Deep, Polycarbonate Crash Rail (Pawling CR-3)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	12.25 -2.17 -3.04 -4.08	4.34
10 26 16 13-0004	LF 4" High, 5/16" Deep, Polycarbonate Crash Rail (Pawling CR-4)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	13.52 -2.17 -3.04 -4.15	4.34
10 26 16 13-0005	Aluminum Crash Rails (10 26 16 13-0001)		
10 26 16 13-0006	LF 4" High, 3-1/4" Deep, Aluminum Crash Rail (Pawling CRA-100)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	35.59 -2.17 -3.04 -5.25	4.34
10 26 16 13-0007	Stainless Steel Crash Rails (10 26 16 13-0001)		
10 26 16 13-0008	LF 4" High, 3-1/4" Deep, Stainless Steel Crash Rail (Pawling CRS-100)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	62.49 -2.17 -3.04 -6.60	4.34
10 26 16 13-0009	LF 5-1/2" High, 1-1/2" Deep, Stainless Steel Crash Rail (Pawling CRS-200)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	49.04 -2.17 -3.04 -5.92	4.34



Specialties	10	10
Interior Specialties	10 20	
Wall and Door Protection	10 26	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 26 16 13-0010 Wall Guards <small>(10 26 16 13)</small>		
10 26 16 13-0011 Rigid Vinyl Wall Guards With Aluminum Retainers <small>(10 26 16 13-0010)</small> Note: Includes end caps.		
10 26 16 13-0012 LF 1-1/2" High, 1-1/2" Deep, Flat, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-1).....	12.64	3.80
For >50 To 100, Deduct	-1.90	
For >100 To 200, Deduct	-2.66	
For >200, Deduct	-3.67	
10 26 16 13-0013 LF 3" High, 1" Deep, Flat, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-3).....	15.39	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-4.24	
10 26 16 13-0014 LF 4" High, 3/4" Deep, Flat, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-4).....	16.64	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-4.30	
10 26 16 13-0015 LF 5" High, 1-1/16" Deep, Curved, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-5).....	17.32	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-4.34	
10 26 16 13-0016 LF 6" High, 1" Deep, Flat, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-6).....	20.66	4.61
For >50 To 100, Deduct	-2.31	
For >100 To 200, Deduct	-3.23	
For >200, Deduct	-4.72	
10 26 16 13-0017 LF 8" High, 1-1/16" Deep, Curved, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-7).....	20.77	4.61
For >50 To 100, Deduct	-2.31	
For >100 To 200, Deduct	-3.23	
For >200, Deduct	-4.73	
10 26 16 13-0018 LF 7-3/4" High, 1" Deep, Flat, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-8).....	21.37	4.61
For >50 To 100, Deduct	-2.31	
For >100 To 200, Deduct	-3.23	
For >200, Deduct	-4.76	
10 26 16 13-0019 LF 12" High, 2" Deep, Flat, Rigid Vinyl Wall Guard With Aluminum Retainer (Pawling WG-12).....	25.69	4.88
For >50 To 100, Deduct	-2.44	
For >100 To 200, Deduct	-3.42	
For >200, Deduct	-5.19	
10 26 16 13-0020 Rubber Wall Guards <small>(10 26 16 13-0010)</small>		
10 26 16 13-0021 D-Shaped, Rubber Wall Guards <small>(10 26 16 13-0020)</small>		
10 26 16 13-0022 LF 2" High, 1-3/4" Deep, D-Shaped, Rubber Wall Guard (Pawling D-2).....	16.94	3.80
For >50 To 100, Deduct	-1.90	
For >100 To 200, Deduct	-2.66	
For >200, Deduct	-3.88	
10 26 16 13-0023 LF 3" High, 3" Deep, D-Shaped, Rubber Wall Guard (Pawling D-3).....	24.82	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-4.71	
10 26 16 13-0024 LF 4" High, 4-1/4" Deep, D-Shaped, Rubber Wall Guard (Pawling D-4).....	36.46	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-5.30	
10 26 16 13-0025 LF 6" High, 6" Deep, D-Shaped, Rubber Wall Guard (Pawling D-6).....	51.12	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-6.03	
10 26 16 13-0026 Rectangular, Rubber Wall Guards <small>(10 26 16 13-0020)</small>		
10 26 16 13-0027 LF 8" High, 1-1/2" Deep, Rectangular, Rubber Wall Guard (Pawling E-1).....	39.02	4.61
For >50 To 100, Deduct	-2.31	
For >100 To 200, Deduct	-3.23	
For >200, Deduct	-5.64	
10 26 16 13-0028 LF 9" High, 2" Deep, Rectangular, Rubber Wall Guard (Pawling M-2).....	49.18	4.88
For >50 To 100, Deduct	-2.44	
For >100 To 200, Deduct	-3.42	
For >200, Deduct	-6.36	
10 26 16 13-0029 Wing Type, Rubber Wall Guards <small>(10 26 16 13-0020)</small>		
10 26 16 13-0030 LF 6" High, 2" Deep, Wing Type, Rubber Wall Guard (Pawling WT-20).....	63.84	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-6.66	
10 26 16 13-0031 LF 6" High, 3" Deep, Wing Type, Rubber Wall Guard (Pawling WT-30).....	67.87	4.34
For >50 To 100, Deduct	-2.17	
For >100 To 200, Deduct	-3.04	
For >200, Deduct	-6.87	
10 26 16 13-0032 LF 3-7/8" High, 2-1/2" Deep, Wing Type, Rubber Wall Guard (Pawling WT-25).....	31.11	3.80
For >50 To 100, Deduct	-1.90	
For >100 To 200, Deduct	-2.66	
For >200, Deduct	-4.59	

10	10	Specialties
	10 20	Interior Specialties
	10 26	Wall and Door Protection



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 26 16 13-0033	U-Shaped, Rubber Wall Guards <small>(10 26 16 13-0020)</small>		
10 26 16 13-0034	LF 3-1/8" High, 3-7/8" Deep, U-Shaped, Rubber Wall Guard (Pawling U-4).....	53.95	4.61
	For >50 To 100, Deduct	-2.31	
	For >100 To 200, Deduct	-3.23	
	For >200, Deduct	-6.39	
10 26 16 13-0035	LF 4-1/2" High, 3-1/2" Deep, U-Shaped, Rubber Wall Guard (Pawling U-3).....	60.34	4.61
	For >50 To 100, Deduct	-2.31	
	For >100 To 200, Deduct	-3.23	
	For >200, Deduct	-6.71	

10 26 16 13-0036	Accent Rails <small>(10 26 16 13)</small>		
	Note: Includes end caps.		
10 26 16 13-0037	Oval, Rigid Vinyl Accent Rails With Aluminum Retainers <small>(10 26 16 13-0036)</small>		
10 26 16 13-0038	LF 1-1/8" High, 1-1/16" Deep, Oval, Rigid Vinyl Accent Rail With Aluminum Retainer (Pawling EB-25)	14.84	3.80
	For >50 To 100, Deduct	-1.90	
	For >100 To 200, Deduct	-2.66	
	For >200, Deduct	-3.78	
10 26 16 13-0039	LF 2" High, 1-1/8" Deep, Oval, Rigid Vinyl Accent Rail With Aluminum Retainer (Pawling EBR-30).....	14.86	3.80
	For >50 To 100, Deduct	-1.90	
	For >100 To 200, Deduct	-2.66	
	For >200, Deduct	-3.78	
10 26 16 13-0040	LF 2" High, 1-3/4" Deep, Oval, Rigid Vinyl Accent Rail With Aluminum Retainer (Pawling WG-22)	21.06	3.80
	For >50 To 100, Deduct	-1.90	
	For >100 To 200, Deduct	-2.66	
	For >200, Deduct	-4.09	

10 26 16 16 Protective Corridor Handrails (10 26 16)

10 26 16 16-0001	Protective Corridor Handrails <small>(10 26 16 16)</small>		
10 26 16 16-0002	Vinyl/Acrylic Protective Corridor Handrails With Aluminum Retainers <small>(10 26 16 16-0001)</small>		
10 26 16 16-0003	LF 1-1/2" Diameter, Vinyl/Acrylic Protective Corridor Handrail With Aluminum Retainer (Acrovyn HR-6CN)	29.34	8.13
	For >50 To 100, Deduct	-4.07	
	For >100 To 200, Deduct	-5.69	
	For >200, Deduct	-7.98	
10 26 16 16-0004	EA End Cap For 1-1/2" Diameter, Vinyl/Acrylic Protective Corridor Handrail With Aluminum Retainer (Acrovyn).....	25.61	8.13
	For >25 To 50, Deduct	-4.07	
	For >50 To 100, Deduct	-5.69	
	For >100, Deduct	-7.79	
10 26 16 16-0005	LF 5-1/2" High, Vinyl/Acrylic Protective Corridor Handrail With Aluminum Retainer (Acrovyn HRB-4C).....	40.55	8.13
	For >50 To 100, Deduct	-4.07	
	For >100 To 200, Deduct	-5.69	
	For >200, Deduct	-8.54	
10 26 16 16-0006	EA End Cap For 5-1/2" High, Vinyl/Acrylic Protective Corridor Handrail With Aluminum Retainer (Acrovyn).....	33.08	8.13
	For >25 To 50, Deduct	-4.07	
	For >50 To 100, Deduct	-5.69	
	For >100, Deduct	-8.16	
10 26 16 16-0007	LF 6-1/4" High, Vinyl/Acrylic Crash And Handrail With Aluminum Retainer (Acrovyn HRB-10CN).....	42.42	8.13
	For >50 To 100, Deduct	-4.07	
	For >100 To 200, Deduct	-5.69	
	For >200, Deduct	-8.63	
10 26 16 16-0008	EA End Cap For 6-1/4" High, Vinyl/Acrylic Crash And Handrail With Aluminum Retainer (Acrovyn).....	46.15	8.13
	For >25 To 50, Deduct	-4.07	
	For >50 To 100, Deduct	-5.69	
	For >100, Deduct	-8.82	
10 26 16 16-0009	LF 6" High, Vinyl/Acrylic Protective Corridor Handrail With Aluminum Retainer (Acrovyn HR-8CN).....	55.49	8.13
	For >50 To 100, Deduct	-4.07	
	For >100 To 200, Deduct	-5.69	
	For >200, Deduct	-9.28	
10 26 16 16-0010	EA End Cap For 6" High, Vinyl/Acrylic Protective Corridor Handrail With Aluminum Retainer (Acrovyn).....	61.10	8.13
	For >25 To 50, Deduct	-4.07	
	For >50 To 100, Deduct	-5.69	
	For >100, Deduct	-9.56	

10 26 16 16-0011	Stainless Steel Protective Corridor Handrails <small>(10 26 16 16-0001)</small>		
10 26 16 16-0012	LF 5-7/8" High, Stainless Steel Protective Corridor Handrail (Acrovyn P-RS)	74.17	8.13
	For >50 To 100, Deduct	-4.07	
	For >100 To 200, Deduct	-5.69	
	For >200, Deduct	-10.22	
10 26 16 16-0013	EA End Cap For 5-7/8" High, Stainless Steel Protective Corridor Handrail (Acrovyn).....	76.04	8.13
	For >25 To 50, Deduct	-4.07	
	For >50 To 100, Deduct	-5.69	
	For >100, Deduct	-10.31	

10 26 16 16-0014	Hardwood Protective Corridor Handrails <small>(10 26 16 16-0001)</small>		
	Note: Includes end caps.		



Specialties	10	10
Interior Specialties	10 20	
Wall and Door Protection	10 26	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 26 16	16-0015	LF	4" High, Vinyl Protective Corridor Handrail With 1-1/2" Diameter Wood (Pawling BR-400C)	29.72	6.05
			<i>For >50 To 100, Deduct</i>	-3.03	
			<i>For >100 To 200, Deduct</i>	-4.24	
			<i>For >200, Deduct</i>	-6.33	
			<i>For Maple, Add</i>	0.53	
10 26 16	16-0016	LF	5-1/2" Diameter, Hardwood Protective Corridor Handrail With Vinyl Inserts (Pawling BR-5500)	35.54	6.46
			<i>For >50 To 100, Deduct</i>	-3.23	
			<i>For >100 To 200, Deduct</i>	-4.52	
			<i>For >200, Deduct</i>	-6.94	
10 26 16	16-0017	LF	1-1/2" Diameter, Hardwood Protective Corridor Handrail (Pawling BR-1500)	25.95	6.05
			<i>For >50 To 100, Deduct</i>	-3.03	
			<i>For >100 To 200, Deduct</i>	-4.24	
			<i>For >200, Deduct</i>	-6.14	
			<i>For Maple, Add</i>	5.95	
			<i>For Oak, Add</i>	6.64	
10 26 23			Protective Wall Covering (10 26)		
10 26 23 13			Impact Resistant Wall Protection (10 26 23)		
10 26 23 13-0001			Impact Resistant Wall Protection (10 26 23 13)		
			Note: Includes standard trim.		
10 26 23 13-0002	SF		0.030" Rigid Vinyl, Impact Resistant Wall Covering (Pawling WC-30)	8.11	2.71
10 26 23 13-0003	SF		0.040" Rigid Vinyl, Impact Resistant Wall Covering (Pawling WC-40)	8.43	2.71
10 26 23 13-0004	SF		0.060" Rigid Vinyl, Impact Resistant Wall Covering (Pawling WC-60)	10.32	2.71
10 26 23 13-0005			Interior Polyvinyl Chloride (PVC) Soffit System (10 26 23 13)		
			Note: DecoShield Systems, Inc. Concealment system for fire sprinkler piping, plumbing lines, HVAC, cable and conduit.		
10 26 23 13-0006			"L" Design (10 26 23 13-0005)		
10 26 23 13-0007			L-Shield (10 26 23 13-0006)		
10 26 23 13-0008	LF		2.38" Depth L-Shield Cover, Duplex Polyvinyl Chloride (PVC), 1" Shield Size For 3/4" And 1" Pipe	16.41	2.71
10 26 23 13-0009	LF		3" Depth L-Shield Cover, Duplex Polyvinyl Chloride (PVC), 1-1/4" Shield Size For 1-1/4" And 1-1/2" Pipe	18.84	3.80
10 26 23 13-0010	LF		3.75" Depth L-Shield Cover, Duplex Polyvinyl Chloride (PVC), 2" Shield Size For 2" Pipe	24.77	4.88
10 26 23 13-0011	LF		5.75" Depth L-Shield Cover, Duplex Polyvinyl Chloride (PVC), 2-1/2" Shield Size For 2-1/2" Pipe	34.16	5.97
10 26 23 13-0012			"Combo" Hanger (10 26 23 13-0006)		
10 26 23 13-0013	EA		Combination "Combo" Hanger, L-Support, For 3/4" Pipe	17.55	5.43
10 26 23 13-0014	EA		Combination "Combo" Hanger, L-Support, For 1" Pipe	20.25	6.51
10 26 23 13-0015	EA		Combination "Combo" Hanger, L-Support, For 1-1/4" Pipe	23.36	7.59
10 26 23 13-0016	EA		Combination "Combo" Hanger, L-Support, For 1-1/2" Pipe	25.93	8.68
10 26 23 13-0017	EA		Combination "Combo" Hanger, L-Support, For 2" Pipe	29.04	9.77
10 26 23 13-0018			Snap-2 Pipe Hanger (10 26 23 13-0006)		
10 26 23 13-0019	EA		Snap-2 Pipe Hanger, L-Support, For 3/4" Pipe	14.33	5.43
10 26 23 13-0020	EA		Snap-2 Pipe Hanger, L-Support, For 1" Pipe	17.44	6.51
10 26 23 13-0021	EA		Snap-2 Pipe Hanger, L-Support, For 1-1/4" Pipe	20.28	7.59
10 26 23 13-0022	EA		Snap-2 Pipe Hanger, L-Support, For 1-1/2" Pipe	23.66	8.68
10 26 23 13-0023	EA		Snap-2 Pipe Hanger, L-Support, For 2" Pipe	27.16	9.77
10 26 23 13-0024			Coupling (10 26 23 13-0006)		
10 26 23 13-0025	EA		Coupling, L-Shield, 1" Shield Size	9.58	2.71
10 26 23 13-0026	EA		Coupling, L-Shield, 1-1/4" Shield Size	13.89	3.80
10 26 23 13-0027	EA		Coupling, L-Shield, 2" Shield Size	20.08	4.88
10 26 23 13-0028	EA		Coupling, L-Shield, 2-1/2" Shield Size	25.19	5.97
10 26 23 13-0029			Coupling, Reducer (10 26 23 13-0006)		
10 26 23 13-0030	EA		Coupling, Reducing, L-Shield, 1-1/4" x 1" Shield Size	27.94	3.25
10 26 23 13-0031	EA		Coupling, Reducing, L-Shield, 2" x 1" Shield Size	34.38	3.80
10 26 23 13-0032	EA		Coupling, Reducing, L-Shield, 2" x 1-1/4" Shield Size	40.83	4.34
10 26 23 13-0033	EA		Coupling, Reducing, L-Shield, 2-1/2" x 2" Shield Size	161.94	5.43
10 26 23 13-0034			Shield Clips (10 26 23 13-0006)		
10 26 23 13-0035	EA		Shield Clips, L-Support, 1" Shield Size	5.79	1.63
10 26 23 13-0036	EA		Shield Clips, L-Support, 1-1/4" Shield Size	8.64	2.71
10 26 23 13-0037	EA		Shield Clips, L-Support, 2" Shield Size	11.34	3.80
10 26 23 13-0038	EA		Shield Clips, L-Support, 2-1/2" Shield Size	12.72	4.88
10 26 23 13-0039			Wall Flange (10 26 23 13-0006)		
10 26 23 13-0040	EA		Wall Flange, L-Shield, 1" Shield Size	9.31	2.71
10 26 23 13-0041	EA		Wall Flange, L-Shield, 1-1/4" Shield Size	13.35	3.80
10 26 23 13-0042	EA		Wall Flange, L-Shield, 2" Shield Size	19.55	4.88

10	10	Specialties
	10 20	Interior Specialties
	10 26	Wall and Door Protection



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 26 23	13-0043	EA	Wall Flange, L-Shield, 2-1/2" Shield Size	83.80	5.97
10 26 23	13-0044		End Cap <small>(10 26 23 13-0006)</small>		
10 26 23	13-0045	EA	End Cap, L-Shield, 1" Shield Size.....	9.81	1.63
10 26 23	13-0046	EA	End Cap, L-Shield, 1-1/4" Shield Size	12.93	2.71
10 26 23	13-0047	EA	End Cap, L-Shield, 2" Shield Size.....	17.90	3.80
10 26 23	13-0048	EA	End Cap, L-Shield, 2-1/2" Shield Size	85.58	4.88
10 26 23	13-0049		Inside/Outside Corner <small>(10 26 23 13-0006)</small>		
10 26 23	13-0050	EA	Inside/Outside Corner, L-Shield, 1" Shield Size.....	62.15	5.43
10 26 23	13-0051	EA	Inside/Outside Corner, L-Shield, 1-1/4" Shield Size.....	66.87	6.51
10 26 23	13-0052	EA	Inside/Outside Corner, L-Shield, 2" Shield Size.....	80.71	8.14
10 26 23	13-0053	EA	Inside/Outside Corner, L-Shield, 2-1/2" Shield Size.....	142.09	9.77
10 26 23	13-0054		Joiner <small>(10 26 23 13-0006)</small>		
10 26 23	13-0055	LF	Joiner, L-Shield.....	12.76	1.63
10 26 23	13-0056		"U" Design <small>(10 26 23 13-0005)</small>		
10 26 23	13-0057		U-Shield <small>(10 26 23 13-0056)</small>		
10 26 23	13-0058	LF	2.25" Depth U-Shield Cover, Duplex Polyvinyl Chloride (PVC), 1" Shield Size For 3/4" And 1" Pipe	19.90	2.71
10 26 23	13-0059	LF	2.875" Depth U-Shield Cover, Duplex Polyvinyl Chloride (PVC), 1-1/4" Shield Size For 1-1/4" Pipe	24.73	3.80
10 26 23	13-0060	LF	3.68" Depth U-Shield Cover, Duplex Polyvinyl Chloride (PVC), 2" Shield Size For 1-1/2" And 2" Pipe.....	31.60	3.80
10 26 23	13-0061		"Combo" Hanger <small>(10 26 23 13-0056)</small>		
10 26 23	13-0062	EA	Combination "Combo" Hanger, U-Support For 3/4" Pipe.....	15.00	5.43
10 26 23	13-0063	EA	Combination "Combo" Hanger, U-Support For 1" Pipe.....	17.84	6.51
10 26 23	13-0064	EA	Combination "Combo" Hanger, U-Support For 1-1/4" Pipe.....	20.55	7.59
10 26 23	13-0065	EA	Combination "Combo" Hanger, U-Support For 1-1/2" Pipe.....	25.53	8.68
10 26 23	13-0066	EA	Combination "Combo" Hanger, U-Support For 2" Pipe.....	28.91	9.77
10 26 23	13-0067		Snap-2 Pipe Hanger <small>(10 26 23 13-0056)</small>		
10 26 23	13-0068	EA	Snap-2 Pipe Hanger, U-Support, For 3/4" Pipe	14.06	5.43
10 26 23	13-0069	EA	Snap-2 Pipe Hanger, U-Support, For 1" Pipe	17.17	6.51
10 26 23	13-0070	EA	Snap-2 Pipe Hanger, U-Support, For 1-1/4" Pipe	20.95	7.59
10 26 23	13-0071	EA	Snap-2 Pipe Hanger, U-Support, For 1-1/2" Pipe	23.39	8.68
10 26 23	13-0072	EA	Snap-2 Pipe Hanger, U-Support, For 2" Pipe	27.03	9.77
10 26 23	13-0073		Coupling <small>(10 26 23 13-0056)</small>		
10 26 23	13-0074	EA	Coupling, U-Shield, 1" Shield Size.....	11.46	2.71
10 26 23	13-0075	EA	Coupling, U-Shield, 1-1/4" Shield Size.....	14.29	3.80
10 26 23	13-0076	EA	Coupling, U-Shield, 2" Shield Size.....	17.40	4.88
10 26 23	13-0077		Coupling, Reducer <small>(10 26 23 13-0056)</small>		
10 26 23	13-0078	EA	Reducing Coupling, U-Shield, 1-1/4" x 1" Shield Size.....	33.30	3.25
10 26 23	13-0079	EA	Reducing Coupling, U-Shield, 2" x 1" Shield Size	39.74	3.80
10 26 23	13-0080	EA	Reducing Coupling, U-Shield, 2" x 1-1/4" Shield Size.....	42.17	4.34
10 26 23	13-0081		Shield Clips <small>(10 26 23 13-0056)</small>		
10 26 23	13-0082	EA	Shield Clips, U-Support, 1" Shield Size	5.26	1.63
10 26 23	13-0083	EA	Shield Clips, U-Support, 1-1/4" Shield Size	7.71	2.71
10 26 23	13-0084	EA	Shield Clips, U-Support, 2" Shield Size	10.13	3.80
10 26 23	13-0085		Wall Flange <small>(10 26 23 13-0056)</small>		
10 26 23	13-0086	EA	Wall Flange, U-Shield, 1" Shield Size	11.06	2.71
10 26 23	13-0087	EA	Wall Flange, U-Shield, 1-1/4" Shield Size	14.15	3.80
10 26 23	13-0088	EA	Wall Flange, U-Shield, 2" Shield Size	17.27	4.88
10 26 23	13-0089		End Cap <small>(10 26 23 13-0056)</small>		
10 26 23	13-0090	EA	End Cap, U-Shield, 1" Shield Size	10.48	1.63
10 26 23	13-0091	EA	End Cap, U-Shield, 1-1/4" Shield Size.....	14.00	2.71
10 26 23	13-0092	EA	End Cap, U-Shield, 2" Shield Size.....	17.37	3.80
10 26 23	13-0093		Inside/Outside Corner <small>(10 26 23 13-0056)</small>		
10 26 23	13-0094	EA	Inside/Outside Corner, U-Shield, 1" Shield Size	78.36	5.43
10 26 23	13-0095	EA	Inside/Outside Corner, U-Shield, 1-1/4" Shield Size	87.09	6.51
10 26 23	13-0096	EA	Inside/Outside Corner, U-Shield, 2" Shield Size	102.94	8.14



Specialties	10	10
Interior Specialties	10 20	
Wall and Door Protection	10 26	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 26 23 13-0097 Elbow <small>(10 26 23 13-0056)</small>		
10 26 23 13-0098 EA Elbow, U-Shield, 1" Shield Size.....	76.88	5.43
10 26 23 13-0099 EA Elbow, U-Shield, 1-1/4" Shield Size.....	84.41	6.51
10 26 23 13-0100 EA Elbow, U-Shield, 2" Shield Size.....	100.40	8.14
10 26 23 13-0101 Tee <small>(10 26 23 13-0056)</small>		
10 26 23 13-0102 EA Tee, U-Shield, 1" x 1" x 1" Shield Size.....	97.05	8.14
10 26 23 13-0103 EA Tee, U-Shield, 1-1/4" x 1-1/4" x 1-1/4" Shield Size.....	107.80	9.77
10 26 23 13-0104 EA Tee, U-Shield, 2" x 2" x 2" Shield Size.....	125.80	11.93
10 26 23 13-0105 EA Tee, U-Shield, 1-1/4" x 1-1/4" x 1" Shield Size.....	128.27	9.23
10 26 23 13-0106 EA Tee, U-Shield, 2" x 2" x 1-1/4" Shield Size.....	138.11	11.39
10 26 23 13-0107 Cross <small>(10 26 23 13-0056)</small>		
10 26 23 13-0108 EA Cross, U-Shield, 1" Shield Size.....	176.41	10.85
10 26 23 13-0109 EA Cross, U-Shield, 1-1/4" Shield Size.....	197.49	13.02
10 26 23 13-0110 EA Cross, U-Shield, 2" Shield Size.....	239.90	16.28
10 26 23 13-0111 EA Cross, U-Shield, 1-1/4" x 1" Shield Size.....	242.47	11.93
10 26 23 13-0112 EA Cross, U-Shield, 2" x 1-1/4" Shield Size.....	266.38	14.64
10 26 23 13-0113 Transition Fittings (L to U Or U to L) <small>(10 26 23 13-0005)</small>		
10 26 23 13-0114 Coupling Transition <small>(10 26 23 13-0113)</small>		
10 26 23 13-0115 EA Transition Coupling, 1" x 1", LxU or UxL.....	29.81	2.71
10 26 23 13-0116 EA Transition Coupling, 1-1/4" x 1-1/4", LxU or UxL.....	33.58	3.80
10 26 23 13-0117 EA Transition Coupling, 2" x 2", LxU or UxL.....	41.78	4.88
10 26 23 13-0118 EA Transition Coupling, 1" x 1-1/4", LxU or UxL.....	33.70	3.25
10 26 23 13-0119 EA Transition Coupling, 1-1/4" x 2", LxU or UxL.....	41.90	4.34
10 26 23 13-0120 EA Transition Coupling, 2" x 2-1/2", LxU or UxL.....	169.57	5.43
10 26 23 13-0121 Elbow Transition <small>(10 26 23 13-0113)</small>		
10 26 23 13-0122 EA Transition Elbow, 1" x 1" (UxL).....	103.81	5.43
10 26 23 13-0123 EA Transition Elbow, 1-1/4" x 1-1/4" (UxL).....	112.41	6.51
10 26 23 13-0124 EA Transition Elbow, 2" x 2" (UxL).....	131.74	8.14
10 26 23 13-0125 EA Transition Elbow, 1" x 1-1/4" (UxL).....	161.95	5.97
10 26 23 13-0126 EA Transition Elbow, 1-1/4" x 1" (UxL).....	114.26	5.97
10 26 23 13-0127 EA Transition Elbow, 1-1/4" x 2" (UxL).....	170.83	7.59
10 26 23 13-0128 EA Transition Elbow, 2" x 1-1/4" (UxL).....	132.12	7.59
10 26 23 13-0129 EA Transition Elbow, 2" x 2-1/2" (UxL).....	205.42	8.68
10 26 23 13-0130 Tee Transition <small>(10 26 23 13-0113)</small>		
10 26 23 13-0131 EA Transition Tee, 1" x 1" x 1" (LxLxU).....	118.61	8.14
10 26 23 13-0132 EA Transition Tee, 1-1/4" x 1-1/4" x 1-1/4" (LxLxU).....	137.13	9.77
10 26 23 13-0133 EA Transition Tee, 2" x 2" x 2" (LxLxU).....	159.42	11.93
10 26 23 13-0134 EA Transition Tee, 1-1/4" x 1-1/4" x 1" (LxLxU).....	125.19	9.23
10 26 23 13-0135 EA Transition Tee, 1-1/4" x 1-1/4" x 2" (LxLxU).....	197.43	10.30
10 26 23 13-0136 EA Transition Tee, 2" x 2" x 1-1/4" (LxLxU).....	139.31	11.39
10 26 23 13-0137 EA Transition Tee, 2-1/2" x 2-1/2" x 2" (LxLxU).....	190.53	13.57
10 26 23 13-0138 Fittings (L Or U) <small>(10 26 23 13-0005)</small>		
10 26 23 13-0139 Hugger Hangers For Steel Pipe <small>(10 26 23 13-0138)</small>		
10 26 23 13-0140 EA Hugger Hanger, For 1/2" Steel Pipe.....	11.49	4.34
10 26 23 13-0141 EA Hugger Hanger, For 3/4" Steel Pipe.....	14.33	5.43
10 26 23 13-0142 EA Hugger Hanger, For 1" Steel Pipe.....	16.77	6.51
10 26 23 13-0143 EA Hugger Hanger, For 1-1/4" Steel Pipe.....	19.34	7.59
10 26 23 13-0144 EA Hugger Hanger, For 1-1/2" Steel Pipe.....	21.78	8.68
10 26 23 13-0145 EA Hugger Hanger, For 2" Steel Pipe.....	24.49	8.68
10 26 23 13-0146 EA Hugger Hanger, For 2-1/2" Steel Pipe.....	26.92	10.85
10 26 23 13-0147 EA Hugger Hanger, For 3" Steel Pipe.....	34.05	11.93
10 26 23 13-0148 Hugger Hangers For Copper Pipe <small>(10 26 23 13-0138)</small>		
10 26 23 13-0149 EA 1/2" Copper Pipe, Hugger Hanger.....	11.63	4.34
10 26 23 13-0150 EA 3/4" Copper Pipe, Hugger Hanger.....	14.47	5.43
10 26 23 13-0151 EA 1" Copper Pipe, Hugger Hanger.....	16.90	6.51
10 26 23 13-0152 EA 1-1/4" Copper Pipe, Hugger Hanger.....	19.48	7.59
10 26 23 13-0153 EA 1-1/2" Copper Pipe, Hugger Hanger.....	21.91	8.68
10 26 23 13-0154 EA 2" Copper Pipe, Hugger Hanger.....	24.75	9.77
10 26 23 13-0155 EA 2-1/2" Copper Pipe, Hugger Hanger.....	27.19	10.85
10 26 23 13-0156 EA 3" Copper Pipe, Hugger Hanger.....	34.45	11.93

10	10	Specialties
	10 20	Interior Specialties
	10 26	Wall and Door Protection



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 26 23 13-0157			Shield Extension (L Or U) <small>(10 26 23 13-0138)</small>		
10 26 23 13-0158	LF		Shield Extension	15.57	1.63

10 26 23 13-0159			Interior Steel Soffit System <small>(10 26 23 13)</small>		
Note: Concealment system for fire sprinkler piping, plumbing lines, HVAC, cable and conduit. Includes factory painted finish and field touch-up.					
10 26 23 13-0160	SF		24 Gauge Steel, U-Shield (JG Innovations Soffi-Steel)	29.23	4.88
			For 22 Gauge Steel, Add	1.95	
			For 20 Gauge Steel, Add	4.16	
			For 18 Gauge Steel, Add	8.17	
			For 16 Gauge Steel, Add	12.55	
			For Stainless Steel, Add	4.87	
10 26 23 13-0161	EA		U-Shield Wall Flange (JG Innovations Soffi-Steel)	44.86	13.57
			For Stainless Steel, Add	4.44	
10 26 23 13-0162	EA		U-Shield Corner (JG Innovations Soffi-Steel)	116.40	16.28
			For Stainless Steel, Add	20.69	
10 26 23 13-0163	EA		U-Shield End Cap (JG Innovations Soffi-Steel)	35.20	8.14
			For Stainless Steel, Add	4.73	
10 26 23 13-0164	EA		U-Shield Clip (JG Innovations Soffi-Steel)	7.27	3.25
			For Stainless Steel, Add	0.19	
10 26 23 13-0165	SF		24 Gauge Steel, L-Shield (JG Innovations Soffi-Steel)	33.38	4.88
			For 22 Gauge Steel, Add	1.77	
			For 20 Gauge Steel, Add	3.78	
			For 18 Gauge Steel, Add	7.32	
			For 16 Gauge Steel, Add	12.28	
			For Stainless Steel, Add	5.90	
10 26 23 13-0166	EA		L-Shield Wall Flange (JG Innovations Soffi-Steel)	44.86	13.57
			For Stainless Steel, Add	4.44	
10 26 23 13-0167	EA		L-Shield Corner (JG Innovations Soffi-Steel)	116.40	16.28
			For Stainless Steel, Add	20.69	
10 26 23 13-0168	EA		L-Shield End Cap (JG Innovations Soffi-Steel)	30.85	5.97
			For Stainless Steel, Add	4.73	
10 26 23 13-0169	EA		L-Shield Clip (JG Innovations Soffi-Steel)	7.27	3.25
			For Stainless Steel, Add	0.19	

10 26 41 Bullet Resistant Panels (10 26)

10 26 41 00-0001			Laminated Bullet Resistant Fiberglass Panel <small>(10 26 41)</small>		
Note: Material consisting of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into rigid flat sheets.					
10 26 41 00-0002	SF		1/8" Thick Ballistic Resistant Fiberglass Panel, 1.2 LB/SF	21.56	1.54
10 26 41 00-0003	SF		3/16" Thick Ballistic Resistant Fiberglass Panel, 2 LB/SF	29.67	1.64
10 26 41 00-0004	SF		1/4" Thick Ballistic Resistant Fiberglass Panel, 2.4 To 2.6 LB/SF	33.58	1.75
10 26 41 00-0005	SF		5/16" Thick Ballistic Resistant Fiberglass Panel, 3 To 3.6 LB/SF	35.71	1.86
10 26 41 00-0006	SF		3/8" Thick Ballistic Resistant Fiberglass Panel, 3.6 To 3.9 LB/SF	38.69	1.97
10 26 41 00-0007	SF		7/16" Thick Ballistic Resistant Fiberglass Panel, 4 To 4.9 LB/SF	41.66	2.07
10 26 41 00-0008	SF		9/16" Thick Ballistic Resistant Fiberglass Panel, 5.5 To 6.6 LB/SF	70.99	2.51
10 26 41 00-0009	SF		1-1/8" Thick Ballistic Resistant Fiberglass Panel, 11 To 11.7 LB/SF	102.03	3.93
10 26 41 00-0010	SF		1-3/16" Thick Ballistic Resistant Fiberglass Panel, 12 To 13.2 LB/SF	121.44	4.70
10 26 41 00-0011	SF		1-5/16" Thick Ballistic Resistant Fiberglass Panel, 13.4 To 14 LB/SF	146.42	5.13
10 26 41 00-0012	SF		1-7/16" Thick Ballistic Resistant Fiberglass Panel, 15.2 To 16 LB/SF	166.66	5.47

10 28 Toilet, Bath, and Laundry Accessories (10 20)

10 28 13 Toilet Accessories					
10 28 13 13 Commercial Toilet Accessories					
10 28 13 13-0001 Toilet Accessories					
10 28 13 13-0002 Dispensers					
10 28 13 13-0003 Paper Towel Dispensers					
10 28 13 13-0004 Stainless Steel Paper Towel Dispensers					
10 28 13 13-0005	EA		Surface Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick Classic B-262)	109.30	24.40
10 28 13 13-0006	EA		Surface Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick B-2620)	116.93	24.40
10 28 13 13-0007	EA		Surface Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick B-2621)	118.06	24.40
10 28 13 13-0008	EA		Surface Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick Classic B-26212)	120.25	24.40
10 28 13 13-0009	EA		Surface Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick B-263)	180.54	24.40
10 28 13 13-0010	EA		Recessed Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick Classic B-359)	194.50	24.40
10 28 13 13-0011	EA		Surface Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick Contura B-4262)	213.46	24.40
10 28 13 13-0012	EA		Countertop Recessed Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick TrimLine B-526)	221.71	10.84
10 28 13 13-0013	EA		Concealed Cabinet, Recessed Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick B-318)	371.19	24.40
10 28 13 13-0014	EA		Touch Free, Surface Mounted, Stainless Steel Roll Paper Towel Dispenser (Bobrick B-2860)	439.22	24.40
10 28 13 13-0015	EA		Recessed Mounted, Stainless Steel Folded Paper Towel Dispenser (Bobrick B-4369)	472.69	24.40
10 28 13 13-0016	EA		Recessed Automated Touchless Towel Dispenser, Stainless (Georgia-Pacific enMotion® 59466)	268.99	24.40
10 28 13 13-0017	EA		Stainless Steel Mounting Bracket For Wall Mounting enMotion Recessed Automated Touchless Towel Dispenser (Georgia-Pacific enMotion® 59476)	153.28	13.56



Specialties	10	10
Interior Specialties	10 20	
Toilet, Bath, and Laundry Accessories	10 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 28 13	13-0018		Plastic Paper Towel Dispensers (10 28 13 13-0003)		
10 28 13	13-0019	EA	Surface Mounted, Acrylonitrile Butadiene Styrene (ABS) Plastic Folded Paper Towel Dispenser (Bobrick Matrix B-5262).....	83.29	24.40
10 28 13	13-0020	EA	Surface Mounted, Acrylonitrile Butadiene Styrene (ABS) Plastic Roll Paper Towel Dispenser (Bobrick Matrix B-52860).....	170.93	24.40
10 28 13	13-0021	EA	Surface Mounted, Translucent Cover, Acrylonitrile Butadiene Styrene (ABS) Plastic Roll Paper Towel Dispenser (Bobrick B-72860).....	169.75	24.40
10 28 13	13-0022	EA	Surface Mounted, Automated Touchless Towel Dispenser, Translucent Plastic (Georgia-Pacific enMotion® 59462).....	144.55	24.40
10 28 13	13-0023		Aluminum Paper Towel Dispensers (10 28 13 13-0003)		
10 28 13	13-0024	EA	Surface Mounted, Heavy-Duty Aluminum Casting Roll Paper Towel Dispenser (Bobrick B-253).....	90.93	24.40
10 28 13	13-0025		Toilet Tissue Dispensers (10 28 13 13-0002)		
10 28 13	13-0026		Plastic Toilet Tissue Dispensers (10 28 13 13-0025)		
10 28 13	13-0027	EA	Two Roll, Surface Mounted, Acrylonitrile Butadiene Styrene (ABS) Plastic Toilet Tissue Dispenser (Bobrick B-5288).....	83.01	24.40
10 28 13	13-0028	EA	Two Jumbo Roll, Surface Mounted, Acrylonitrile Butadiene Styrene (ABS) Plastic Toilet Tissue Dispenser (Georgia Pacific 58250).....	115.72	24.40
10 28 13	13-0029	EA	Vertical Double Roll, Surface Mounted, Translucent Plastic Steel Coreless Toilet Tissue Dispenser (Georgia-Pacific Compact® 56760).....	71.93	24.40
10 28 13	13-0030	EA	Side By Side Double Roll, Surface Mounted, Translucent Plastic Toilet Tissue Dispenser (Georgia-Pacific Compact® 56784).....	84.94	24.40
10 28 13	13-0031		Cast Aluminum Toilet Tissue Dispensers (10 28 13 13-0025)		
10 28 13	13-0032	EA	Single Roll Without Controlled Delivery, Surface Mounted, Cast Aluminum Toilet Tissue Dispenser (Bobrick B-2730).....	75.10	24.40
10 28 13	13-0033	EA	Single Roll With Controlled Delivery, Surface Mounted, Cast Aluminum Toilet Tissue Dispenser (Bobrick B-273).....	75.66	24.40
10 28 13	13-0034	EA	Two Roll Without Controlled Delivery, Surface Mounted, Cast Aluminum Toilet Tissue Dispenser (Bobrick B-2740).....	79.62	24.40
10 28 13	13-0035	EA	Two Roll With Controlled Delivery, Surface Mounted, Cast Aluminum Toilet Tissue Dispenser (Bobrick B-274).....	86.97	24.40
10 28 13	13-0036	EA	Two Roll Without Controlled Delivery, Surface Mounted, Cast Aluminum Toilet Tissue Dispenser (Bobrick B-27460).....	114.10	24.40
10 28 13	13-0037		Stainless Steel Toilet Tissue Dispensers (10 28 13 13-0025)		
10 28 13	13-0038	EA	Single Roll, Surface Mounted, Vandal Resistant, Stainless Steel Toilet Tissue Dispenser (Bobrick Classic B-264).....	64.07	24.40
10 28 13	13-0039	EA	Double Roll, Surface Mounted, Toilet Tissue Dispenser With Utility Shelf (Bobrick B-540).....	180.84	24.40
10 28 13	13-0040	EA	Single Roll, Surface Mounted, Stainless Steel, Toilet Tissue Dispenser (Bobrick B-543).....	105.77	24.40
10 28 13	13-0041	EA	Single Roll, Recessed Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick B-663).....	100.82	24.40
10 28 13	13-0042	EA	Single Roll, Surface Mounted, Stainless Steel, Bright Polished Finish, Toilet Tissue Dispenser (Bobrick B-685).....	109.44	24.40
10 28 13	13-0043	EA	Double Roll, Surface Mounted, Stainless Steel, Bright Polished Finish, Toilet Tissue Dispenser (Bobrick B-686).....	143.67	27.11
10 28 13	13-0044	EA	Single Roll, Surface Mounted, Stainless Steel, Satin Finish, Toilet Tissue Dispenser (Bobrick B-6857).....	109.44	24.40
10 28 13	13-0045	EA	Double Roll, Surface Mounted, Stainless Steel, Satin Finish, Toilet Tissue Dispenser (Bobrick B-6867).....	143.67	24.40
10 28 13	13-0046	EA	Single Roll, Surface Mounted, Stainless Steel, Satin Finish, Toilet Tissue Dispenser With Hood (Bobrick B-66997).....	154.67	24.40
10 28 13	13-0047	EA	Double Roll, Surface Mounted, Stainless Steel, Satin Finish, Toilet Tissue Dispenser With Hoods (Bobrick B-6999).....	240.99	24.40
10 28 13	13-0048	EA	Double Roll, Surface Mounted, Stainless Steel, Satin Finish, Toilet Tissue Dispenser With Hoods (Bobrick B-6997).....	240.99	24.40
10 28 13	13-0049	EA	Single Jumbo Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick B-2890).....	101.00	24.40
10 28 13	13-0050	EA	Single Fold/Double Fold, Surface Mounted, Stainless Steel Toilet Tissue Cabinet (Bobrick B-272).....	118.34	24.40
10 28 13	13-0051	EA	Two Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick Classic B-265).....	74.52	24.40
10 28 13	13-0052	EA	Two Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick Classic B-2888).....	127.11	24.40
10 28 13	13-0053	EA	Two Roll, Recessed Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick Classic B-3888).....	178.95	24.40
10 28 13	13-0054	EA	Two Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick Contura B-4288).....	187.33	24.40
10 28 13	13-0055	EA	Two Roll, Recessed Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick Contura B-4388).....	237.20	24.40
10 28 13	13-0056	EA	Two Jumbo Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick B-2892).....	219.20	24.40
10 28 13	13-0057	EA	Four Roll, Partition Mounted, Stainless Steel Toilet Tissue Dispenser (Bobrick B-386)..... Note: Mounts centered through toilet partitions.	339.20	24.40
10 28 13	13-0058	EA	Multi-Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser With Shelf (Bobrick B-2840).....	146.34	24.40
10 28 13	13-0059	EA	Vertical Double Roll, Surface Mounted, Stainless Steel Coreless Toilet Tissue Dispenser (Georgia-Pacific Compact® 56782).....	135.28	24.40
10 28 13	13-0060	EA	Side By Side Double Roll, Surface Mounted, Stainless Steel Toilet Tissue Dispenser (Georgia-Pacific Compact® 56796).....	109.05	24.40
10 28 13	13-0061		Soap or Sanitizer Dispensers (10 28 13 13-0002)		
10 28 13	13-0062	EA	20 Fluid Ounce, 4" Spout, Top-Filling Lavatory Mounted, Chrome Plated Soap Dispenser (Bobrick B-8221).....	99.41	24.40
			For 34 Fluid Ounce (B-822), Add	4.69	
10 28 13	13-0063	EA	20 Fluid Ounce, 6" Spout, Top-Filling Lavatory Mounted, Chrome Plated Soap Dispenser (Bobrick B-82216).....	107.89	24.40
			For 34 Fluid Ounce (B-822), Add	4.69	
10 28 13	13-0064	EA	24 Fluid Ounce, Surface Mounted, Translucent Polyethylene Soap Dispenser (Bobrick B-156).....	67.18	24.40
10 28 13	13-0065	EA	24 Fluid Ounce, Surface Mounted, Chrome-Plated, Translucent Polyethylene Soap Dispenser (Bobrick B-155).....	73.11	24.40
10 28 13	13-0066	EA	40 Fluid Ounce, Concealed Surface Mounted, Translucent Soap Dispenser (Bobrick B-40).....	88.30	24.40
10 28 13	13-0067	EA	40 Fluid Ounce, Surface Mounted, Translucent Plastic Soap Dispenser (Bobrick Classic B-42).....	90.75	24.40
10 28 13	13-0068	EA	40 Fluid Ounce, Surface Mounted, Stainless Steel Soap Dispenser (Bobrick Classic B-2111/2112).....	101.10	24.40
10 28 13	13-0069	EA	40 Fluid Ounce, Surface Mounted, Stainless Steel Soap Dispenser (Bobrick Contura B-4112).....	127.96	24.40
10 28 13	13-0070	EA	45 Fluid Ounce, Recessed Mounted, Stainless Steel Soap Dispenser (Bobrick B-306).....	218.25	24.40

10	10	Specialties
	10 20	Interior Specialties
	10 28	Toilet, Bath, and Laundry Accessories



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 28 13 13-0071	EA	50 Fluid Ounce, Recessed Mounted, Stainless Steel Soap Dispenser (Bobrick Contura B-4063)	348.57		24.40
10 28 13 13-0072	EA	800 ml, Lavatory Mounted, Chrome Plated Automatic Soap Dispenser (Bobrick B-826.18) Note: Includes start-up kit.	215.79		24.40
10 28 13 13-0073		Sanitizer Dispensers (10 28 13 13-0002)			
10 28 13 13-0074		Manual Sanitizer Dispensers (10 28 13 13-0073)			
10 28 13 13-0075	EA	1,200 ml, Wall Mounted, Plastic, Manual Operation Liquid Hand Sanitizer Dispenser (Purell 5020-01)	77.54		24.40
10 28 13 13-0076	EA	1,200 ml, Wall Mounted, Plastic, Manual Operation Foam Hand Sanitizer Dispenser (Purell 4510-00)	78.75		24.40
10 28 13 13-0077	EA	1,250 ml, Wall Mounted, Plastic, Manual Operation Gel Hand Sanitizer Dispenser (Purell 8824-06-UV)	78.37		24.40
10 28 13 13-0078		Automatic Sanitizer Dispensers (10 28 13 13-0073)			
10 28 13 13-0079	EA	1,000 ml, Wall Mounted, Plastic, Automatic Operation Liquid Hand Sanitizer Dispenser (Clorox 30242-EA)	72.38		24.40
10 28 13 13-0080	EA	1,200 ml, Wall Mounted, Plastic, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell 6420-01 ES6)	94.99		24.40
10 28 13 13-0081	EA	1,200 ml, Wall Mounted, Plastic, Automatic Operation Gel Hand Sanitizer Dispenser (Purell 6520-01 CS6)	89.35		24.40
10 28 13 13-0082	EA	1,200 ml, Wall Mounted, Plastic, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell 7720-01 ES8)	96.26		24.40
10 28 13 13-0083	EA	1,000/1,200 ml, Wall Mounted, Plastic, Automatic Operation Foam/Gel Hand Sanitizer Dispenser (Georgia-Pacific enMotion® Gen2 Hygiene Series 52058)	111.23		24.40
10 28 13 13-0084	EA	1,200 ml, Wall Mounted, Plastic, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell LTX-12 1920-04)	102.31		24.40
10 28 13 13-0085	EA	1,200 ml, Wall Mounted, Plastic, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell TFX 2785-12)	157.07		24.40
10 28 13 13-0086	EA	1,200 ml, Wall Mounted, Plastic, Automatic Operation Foam Hand Sanitizer Dispenser (Purell TFX 2780-12)	174.26		24.40
10 28 13 13-0087	EA	2,000 ml, Wall Mounted, Plastic, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell 5240-06)	111.94		24.40
10 28 13 13-0088		Automatic Floor Stand Sanitizer Dispensers (10 28 13 13-0073)			
10 28 13 13-0089	EA	Floor Stand For Hand Sanitizer Dispenser (Purell 2423-DS Stand) Note: For use with TFX and LTX 1,200mL dispensers. Excludes hand sanitizer dispensers.	250.59		8.13
10 28 13 13-0090	EA	1,200 ml, Automatic Touch-Free Hand Sanitizer Dispenser With Floor Stand (Purell LTX™ With 2423-DS Stand) For Liquid TFX Dispenser, Add 54.76 For Foam TFX Dispenser, Add 71.95	293.25		8.13
10 28 13 13-0091	EA	1,000 ml, Floor Stand, Metal, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell Elite LTX™ 2456-DS)	572.78		8.13
10 28 13 13-0092	EA	1,200 ml, Floor Stand, ABS Plastic, Automatic Operation Foam/Gel Hand Sanitizer Dispenser (Purell 7308-DS-SLV)	616.07		8.13
10 28 13 13-0093	EA	1,200 ml, Floor Stand, Aluminum and Polypropylene, Automatic Operation Liquid Hand Sanitizer Dispenser (Purell 2454-DS02)	640.27		8.13
10 28 13 13-0094		Facial Tissue Dispensers (10 28 13 13-0002)			
10 28 13 13-0095	EA	Surface Mounted, Stainless Steel Facial Tissue Dispenser (Bobrick B-8397)	114.68		24.40
10 28 13 13-0096	EA	Recessed Mounted, Stainless Steel Facial Tissue Dispenser (Gamco 355)	80.50		24.40
10 28 13 13-0097		Sanitary Toilet Seat Cover Dispensers (10 28 13 13-0002)			
10 28 13 13-0098	EA	Surface Mounted, Acrylonitrile Butadiene Styrene (ABS) Plastic Sanitary Seat-Cover Dispenser (Bobrick Matrix B-5221)	66.04		24.40
10 28 13 13-0099	EA	Surface Mounted, Stainless Steel Sanitary Seat-Cover Dispenser (Bobrick Classic B-221)	88.38		24.40
10 28 13 13-0100	EA	Surface Mounted, Stainless Steel Sanitary Seat-Cover Dispenser (Bobrick Contura B-4221)	158.78		24.40
10 28 13 13-0101	EA	Recessed Mounted, Stainless Steel Sanitary Seat-Cover Dispenser (Bobrick Classic B-301)	166.52		24.40
10 28 13 13-0102	EA	Recessed Mounted, Stainless Steel Sanitary Seat-Cover Dispenser (Bobrick TrimLine B-3013)	330.20		24.40
10 28 13 13-0103		Sanitary Toilet Seat Cover/Toilet Tissue Dispensers (10 28 13 13-0002)			
10 28 13 13-0104	EA	Surface Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser (Bobrick Classic B-3479)	528.12		24.40
10 28 13 13-0105	EA	Recessed Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser (Bobrick B-34745)	320.51		24.40
10 28 13 13-0106		Sanitary Napkin/Tampon Dispensers (10 28 13 13-0002)			
10 28 13 13-0107	EA	Surface Mounted, Stainless Steel Sanitary Napkin/Tampon Vendor (Bobrick B-370639C)	652.39		24.40
10 28 13 13-0108	EA	Surface Mounted, Stainless Steel Sanitary Napkin/Tampon Vendor (Gamco B-282 25)	495.76		24.40
10 28 13 13-0109	EA	Surface Mounted, Stainless Steel Sanitary Napkin/Tampon Vending (Bobrick B-2706)	661.01		24.40
10 28 13 13-0110	EA	Recessed Mounted, Stainless Steel Sanitary Napkin/Tampon Vendor (Bobrick Classic B-352 25)	499.54		24.40
10 28 13 13-0111	EA	Recessed Mounted, Single Coin Operation, Stainless Steel, Sanitary Napkin/Tampon Vendor (Gamco NV-2-4)	438.97		24.40
10 28 13 13-0112	EA	Recessed Mounted, Stainless Steel Sanitary Napkin/Tampon Vendor (Bradley 401-45)	561.97		24.40
10 28 13 13-0113		Toilet Compartment Combination Dispenser/Disposals (10 28 13 13-0002)			
10 28 13 13-0114	EA	Side Wall Recessed Mounted, Stainless Steel Toilet Tissue Dispenser With Sanitary Napkin Disposal (Bobrick B-3094)	457.98		54.23
10 28 13 13-0115	EA	Side Wall Recessed Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser (Bobrick B-3474)	511.87		54.23
10 28 13 13-0116	EA	Side Wall Recessed Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser With Sanitary Napkin Disposal (Bobrick B-35745)	423.73		54.23
10 28 13 13-0117	EA	Side Wall Recessed Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser With Sanitary Napkin Disposal (Bobrick B-3574)	598.39		54.23
10 28 13 13-0118	EA	Partition Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser (Bobrick B-347)	615.06		54.23
10 28 13 13-0119	EA	Partition Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser With Sanitary Napkin Disposal (Bobrick B-357)	708.08		54.23
10 28 13 13-0120	EA	Surface Mounted, Stainless Steel Seat Cover And Toilet Tissue Dispenser With Sanitary Napkin Disposal (Bobrick B-3579)	663.59		54.23



Specialties	10	10
Interior Specialties	10 20	
Toilet, Bath, and Laundry Accessories	10 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 28 13 13-0121	Receptacles <small>(10 28 13 13-0001)</small>		
10 28 13 13-0122	Wall Mounted Waste Receptacles <small>(10 28 13 13-0121)</small>		
10 28 13 13-0123	EA 1-1/2 Gallon, Surface Mounted, Stainless Steel Facial Tissue Waste Receptacle (Gamco WR-3)	101.06	24.40
10 28 13 13-0124	EA 6.4 Gallon, Surface Mounted, Stainless Steel Waste Receptacle (Bobrick B-279)	168.95	24.40
10 28 13 13-0125	EA 12 Gallon, 4" Wall Recess, Stainless Steel Waste Receptacle (Bobrick Classic B-3644)	390.60	54.23
10 28 13 13-0126	EA 12 Gallon, 4" Wall Recess, Stainless Steel Waste Receptacle (Bobrick Contura B-43644)	581.71	54.23
10 28 13 13-0127	EA 20 Gallon, Surface Mounted, Stainless Steel Waste Receptacle (Bobrick B-275)	459.86	54.23

10 28 13 13-0128	Floor-Standing/Counter Waste Receptacles <small>(10 28 13 13-0121)</small>		
10 28 13 13-0129	EA 5-7/8" Inside Diameter, 3-7/8" Deep, Countertop-Mounted, Stainless Steel Waste Chute (Bobrick B-532)	119.62	24.40
10 28 13 13-0130	EA 5-7/16" Inside Diameter, 5" Deep, Countertop-Mounted, Stainless Steel Waste Chute (Bobrick B-529)	172.06	24.40
10 28 13 13-0131	EA 13 Gallon, Open Top, Stainless Steel Floor Standing Waste Receptacle (Bobrick B-2260)	330.29	10.84
10 28 13 13-0132	EA 13 Gallon, Swing-Top, Stainless Steel Floor-Standing Waste Receptacle (Bobrick B-2250)	500.49	10.84
10 28 13 13-0133	EA 18 Gallon, Open Top, Stainless Steel Floor-Standing Waste Receptacle (Bobrick B-2300)	468.77	10.84
10 28 13 13-0134	EA 21 Gallon, Open Top, Stainless Steel Floor Standing Waste Receptacle (Bobrick B-2280)	450.73	10.84

10 28 13 13-0135	Combination Paper Towel Dispenser/ Waste Receptacle <small>(10 28 13 13-0121)</small>		
10 28 13 13-0136	EA 2 Gallon, Recessed Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Classic B-369)	322.75	54.23
10 28 13 13-0137	EA 2.6 Gallon, Recessed Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Contura B-4369)	521.49	54.23
10 28 13 13-0138	EA 2 Gallon, Recess Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Classic B-3944)	513.58	54.23
10 28 13 13-0139	EA 12 Gallon, Recessed Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Classic B-3900)	748.37	54.23
10 28 13 13-0140	EA 12 Gallon, Semi-Recess Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Classic B-3909)	1,031.84	54.23
10 28 13 13-0141	EA 12 Gallon, Recessed Mounted, Stainless Steel Combination Roll Towel Dispenser/Waste Receptacle (Bobrick Classic B-3961)	871.49	54.23
10 28 13 13-0142	EA 12 Gallon, Surface Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Classic B-3949)	670.79	54.23
10 28 13 13-0143	EA 12 Gallon, Surface Mounted, Stainless Steel Combination Roll Towel Dispenser/Waste Receptacle (Bobrick Classic B-39619)	1,089.17	54.23
10 28 13 13-0144	EA 16 Gallon, Semi-Recessed Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Contura B-43944)	1,006.45	59.65
10 28 13 13-0145	EA 18 Gallon, Recessed Mounted, Stainless Steel Combination Folded Paper Towel Dispenser/Waste Receptacle (Bobrick Classic B-3947)	675.11	59.65

10 28 13 13-0146	Sanitary Napkin/Tampon Receptacles <small>(10 28 13 13-0121)</small>		
10 28 13 13-0147	EA Surface Mounted, Stainless Steel Sanitary Napkin/Tampon Disposal (Bobrick Contura B-270)	92.96	27.11
10 28 13 13-0148	EA Surface Mounted, Stainless Steel Sanitary Napkin/Tampon Disposal (Bobrick Classic B-254)	186.21	27.11
10 28 13 13-0149	EA Recessed Mounted, Stainless Steel Sanitary Napkin/Tampon Disposal (Bobrick Classic B-353)	202.65	27.11
10 28 13 13-0150	EA Recessed Mounted, Stainless Steel Sanitary Napkin/Tampon Disposal (Bobrick Classic B-35303)	474.62	27.11
10 28 13 13-0151	EA Partition Mounted, Stainless Steel Sanitary Napkin/Tampon Disposal (Bobrick Classic B-354)	251.27	27.11
10 28 13 13-0152	EA Partition Mounted, Stainless Steel Sanitary Napkin Disposal (Bobrick Contura B-4354)	440.98	27.11

10 28 13 13-0153	Grab Bars <small>(10 28 13 13-0001)</small>		
10 28 13 13-0154	1-1/4" Diameter, Stainless Steel Grab Bars <small>(10 28 13 13-0153)</small>		
	Note: Includes satin finish and concealed mounting with snap flange.		
10 28 13 13-0155	EA 12" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Gamco 125x12)	92.91	21.69
	For Peened Grip, Add	4.95	
10 28 13 13-0156	EA 18" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5806x18)	106.96	21.69
	For Peened Grip, Add	6.21	
10 28 13 13-0157	EA 24" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5806x24)	108.37	21.69
	For Peened Grip, Add	6.34	
10 28 13 13-0158	EA 30" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5806x30)	109.03	21.69
	For Peened Grip, Add	6.40	
10 28 13 13-0159	EA 36" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5806x36)	109.21	21.69
	For Peened Grip, Add	6.41	
10 28 13 13-0160	EA 42" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5806x42)	112.61	21.69
	For Peened Grip, Add	6.72	
10 28 13 13-0161	EA 48" Length, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5806x48)	117.97	21.69
	For Peened Grip, Add	7.20	

10 28 13 13-0162	1-1/4" Diameter, Two Wall, Stainless Steel Grab Bars <small>(10 28 13 13-0153)</small>		
	Note: Includes satin finish and concealed mounting with snap flange.		
10 28 13 13-0163	EA 24" x 36", Two Wall, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-58616)	179.95	21.69
	For Peened Grip, Add	12.29	
10 28 13 13-0164	EA 36" x 54", Two Wall, 1-1/4" Diameter, Stainless Steel Grab Bar (Bobrick B-5837)	183.61	21.69
	For Peened Grip, Add	12.62	

10 Specialties**10 20 Interior Specialties****10 28 Toilet, Bath, and Laundry Accessories**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

10 28 13 13-0165	1-1/2" Diameter, Stainless Steel Grab Bars <small>(10 28 13 13-0153)</small> Note: Includes satin finish and concealed mounting with snap flange.		
10 28 13 13-0166	EA 12" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x12).....	105.78	21.69
	<i>For Peened Grip, Add</i>	6.10	
10 28 13 13-0167	EA 18" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x18).....	106.96	21.69
	<i>For Peened Grip, Add</i>	6.21	
10 28 13 13-0168	EA 24" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x24).....	109.21	21.69
	<i>For Peened Grip, Add</i>	6.41	
10 28 13 13-0169	EA 30" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x30).....	111.48	21.69
	<i>For Peened Grip, Add</i>	6.62	
10 28 13 13-0170	EA 36" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x36).....	114.30	21.69
	<i>For Peened Grip, Add</i>	6.87	
10 28 13 13-0171	EA 42" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x42).....	116.85	21.69
	<i>For Peened Grip, Add</i>	7.10	
10 28 13 13-0172	EA 48" Length, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6806x48).....	123.07	21.69
	<i>For Peened Grip, Add</i>	7.66	
10 28 13 13-0173	1-1/2" Diameter, Two Wall, Stainless Steel Grab Bars <small>(10 28 13 13-0153)</small> Note: Includes satin finish and concealed mounting with snap flange.		
10 28 13 13-0174	EA 16" x 31", Two Wall, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-6861).....	164.67	21.69
	<i>For Peened Grip, Add</i>	10.92	
10 28 13 13-0175	EA 24" x 36", Two Wall, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-68616).....	176.84	21.69
	<i>For Peened Grip, Add</i>	12.01	
10 28 13 13-0176	EA 36" x 54", Two Wall, 1-1/2" Diameter, Stainless Steel Grab Bar (Bobrick B-68137).....	153.93	21.69
	<i>For Peened Grip, Add</i>	9.95	
10 28 13 13-0177	1-1/4" Diameter, Stainless Steel Swing Up Grab Bars <small>(10 28 13 13-0153)</small> Note: Includes satin finish and mounting for swing up.		
10 28 13 13-0178	EA 29" Length, 1-1/4" Diameter, Stainless Steel Swing Up Grab Bar (Bobrick B-4998).....	480.13	21.69
	<i>For Peened Grip, Add</i>	39.80	
10 28 13 13-0179	Shelves <small>(10 28 13 13-0001)</small>		
10 28 13 13-0180	EA 5" Width x 16" Length, Stainless Steel Shelf (Bobrick B-295).....	121.45	24.40
10 28 13 13-0181	EA 5" Width x 18" Length, Stainless Steel Shelf (Bobrick B-295).....	124.85	24.40
10 28 13 13-0182	EA 5" Width x 24" Length, Stainless Steel Shelf (Bobrick B-295).....	140.40	24.40
10 28 13 13-0183	EA 5" Width x 36" Length, Stainless Steel Shelf (Gamco S-5x36).....	144.31	24.40
10 28 13 13-0184	EA 6" Width x 18" Length, Stainless Steel Shelf (Bobrick B-296).....	138.15	24.40
10 28 13 13-0185	EA 6" Width x 24" Length, Stainless Steel Shelf (Gamco S-6x24).....	139.99	24.40
10 28 13 13-0186	EA 8" Width x 18" Length, Stainless Steel Shelf (Bobrick B-298).....	149.16	24.40
10 28 13 13-0187	EA 8" Width x 24" Length, Stainless Steel Shelf (Bobrick B-298).....	162.44	24.40
10 28 13 13-0188	EA 8" Width x 36" Length, Stainless Steel Shelf (Gamco S-8x36).....	190.52	24.40
10 28 13 13-0189	EA 5-3/4" Width x 14-1/2" Length, Folding Stainless Steel Utility Shelf (Bobrick B-287).....	149.44	24.40
10 28 13 13-0190	EA 4-3/4" Width x 24" Length, Stainless Steel Toiletry Shelf (Bobrick B-683).....	152.27	24.40
10 28 13 13-0191	EA 12" Width x 24" Length, Stainless Steel Shelf (Bradley 7512-24).....	215.79	24.40
10 28 13 13-0192	EA 12" Width x 30" Length, Stainless Steel Shelf (Bradley 7512-30).....	230.38	24.40
10 28 13 13-0193	EA 12" Width x 36" Length, Stainless Steel Shelf (Bradley 7512-36).....	252.90	24.40
10 28 13 13-0194	EA 12" Width x 48" Length, Stainless Steel Shelf (Bradley 7512-48).....	314.17	24.40
10 28 13 13-0195	EA 12" Width x 60" Length, Stainless Steel Shelf (Bradley 7512-60).....	425.78	24.40
10 28 13 13-0196	EA 4-1/4" Width x 16-1/2" Length x 6-1/2" Height, Recessed Stainless Steel Shelf (American Specialties 0412).....	183.61	24.40
10 28 13 13-0197	Changing Stations <small>(10 28 13 13-0001)</small>		
10 28 13 13-0198	EA Horizontal, Wall-Mounted, Polyethylene Baby Changing Station (Gamco BCS-1).....	453.09	32.54
10 28 13 13-0199	EA Vertical, Wall-Mounted, Polyethylene Baby Changing Station (Bobrick Koala Care KB101-00).....	480.39	32.54
10 28 13 13-0200	EA Horizontal, Wall-Mounted, Polypropylene Baby Changing Station (Bobrick Koala Care KB200-00).....	395.86	32.54
10 28 13 13-0201	EA Horizontal, Recessed Mounted, Stainless Steel Baby Changing Station (Bobrick Koala Care KB110-SSRE).....	1,932.19	32.54
10 28 13 13-0202	EA Horizontal, Wall-Mounted, Stainless Steel Baby Changing Station (Bobrick Koala Care KB110-SSWM).....	2,261.09	32.54
10 28 13 13-0203	EA Vertical, Recessed Mounted, Stainless Steel Baby Changing Station (Bobrick Koala Care KB111-SSRE).....	1,932.19	32.54
10 28 13 13-0204	EA Vertical, Wall-Mounted, Stainless Steel Baby Changing Station (Bobrick Koala Care KB111-SSWM).....	2,261.09	32.54
10 28 13 13-0205	Folding Shower Seats <small>(10 28 13 13-0001)</small>		
10 28 13 13-0206	EA 33" Width, Wall-Mounted, Reversible, Folding, Stainless Steel Hardware, Solid Phenolic Shower Seat (Bobrick B-5181).....	567.81	43.38
10 28 13 13-0207	EA 33" Width, Wall-Mounted, Foam Padded, Naugahyde® Folding Shower Seat (Bobrick B-517/518).....	745.92	43.38
10 28 13 13-0208	EA 30" Width, Wall-Mounted, Teakwood Folding Shower Seat.....	2,509.05	43.38
10 28 13 13-0209	EA 33-1/2" Width, Wall-Mounted, Stainless Steel, Americans With Disabilities Act Compliant Folding Shower Seat, (Acorn Shower-Ware 1103-31/1103-32).....	3,735.32	
10 28 13 13-0210	Soap/Dish Holders <small>(10 28 13 13-0001)</small>		
10 28 13 13-0211	EA Surface Mounted, Stainless Steel Toothbrush and Tumbler Holder (Gamco 7679).....	61.04	24.40
10 28 13 13-0212	EA Surface Mounted, Stainless Steel Soap Dish (Gamco 7680).....	63.01	24.40
10 28 13 13-0213	EA Recessed Mounted, Stainless Steel Soap Dish (Bobrick B-4380).....	111.95	24.40
10 28 13 13-0214	EA Recessed Mounted, Stainless Steel Soap Dish And Bar (Bobrick B-4390).....	121.85	24.40
10 28 13 13-0215	Shower Curtains/Curtain Rods <small>(10 28 13 13-0001)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 28 13 13-0216 EA Stainless Steel Shower Curtain Hook (Bobrick B-204-1).....	3.04	1.09
10 28 13 13-0217 EA 42" Width x 72" Height, Vinyl Shower Curtain (Bobrick B-204-2)..... Note: Requires 7 curtain hooks.	50.25	10.84
10 28 13 13-0218 EA 70" Width x 72" Height, Vinyl Shower Curtain (Bobrick B-204-3)..... Note: Requires 12 curtain hooks.	52.66	10.84
10 28 13 13-0219 EA 36" Length, 20 Gauge, 1" Diameter, Stainless Steel Shower Rod With Concealed Mounting (Bobrick B-207).....	88.66	24.40
10 28 13 13-0220 EA 48" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod With Concealed Mounting (Bobrick B-207).....	94.89	24.40
10 28 13 13-0221 EA 60" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod With Concealed Mounting (Bobrick B-207).....	102.52	24.40
10 28 13 13-0222 EA 72" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod With Concealed Mounting (Bobrick B-207).....	111.85	24.40
10 28 13 13-0223 EA 36" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod (Bobrick B-6107x36).....	77.92	24.40
10 28 13 13-0224 EA 48" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod (Bobrick B-6107x48).....	85.27	24.40
10 28 13 13-0225 EA 60" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod (Bobrick B-6107x60).....	89.51	24.40
10 28 13 13-0226 EA 72" Length, 20-Gauge, 1" Diameter, Stainless Steel Shower Rod (Bobrick B-6107x72).....	94.89	24.40
10 28 13 13-0227 EA 36" Length, 18-Gauge, 1-1/4" Diameter, Stainless Steel Shower Rod (Bobrick B-6047).....	81.03	24.40
10 28 13 13-0228 EA 48" Length, 18-Gauge, 1-1/4" Diameter, Stainless Steel Shower Rod (Bobrick B-6047).....	87.25	24.40
10 28 13 13-0229 EA 60" Length, 18-Gauge, 1-1/4" Diameter, Stainless Steel Shower Rod (Bobrick B-6047).....	94.59	24.40
10 28 13 13-0230 EA 72" Length, 18-Gauge, 1-1/4" Diameter, Stainless Steel Shower Rod (Bobrick B-6047).....	99.69	24.40
10 28 13 13-0231 Hand Dryers <small>(10 28 13 13-0001)</small>		
10 28 13 13-0232 EA Surface Mounted, Automatic Sensor, One Piece Plastic Cover Hand Dryer (Bobrick CompacDryer B-710).....	536.72	30.62
10 28 13 13-0233 EA Surface Mounted, Automatic Sensor, Cast Aluminum Cover Hand Dryer (Bobrick B-7120-115V).....	578.26	30.62
10 28 13 13-0234 EA Surface Mounted, Automatic Sensor, Cast-Iron Cover Hand Dryer (Bobrick B-7128 230V).....	641.03	30.62
10 28 13 13-0235 EA Recessed Mounted, Automatic Sensor, Cast-Iron Cover Hand Dryer (Bobrick B-750-115/230).....	908.98	30.62
10 28 13 13-0236 EA Surface Mounted, Touch-Button, Cast-Iron Cover Hand Dryer (World Dryer A).....	679.76	30.62
10 28 13 13-0237 EA Surface Mounted, Automatic Sensor, Cast-Iron Cover Hand Dryer (World Dryer A).....	755.46	30.62
10 28 13 13-0238 EA Surface Mounted, Touch-Button, Cast-Iron Cover Hand/Hair Dryer (American Dryer A60).....	2,813.36	30.62
10 28 13 13-0239 EA Surface Mounted, Automatic Sensor, Cast-Iron Cover Hand/Hair Dryer (American Dryer A60T).....	2,931.07	30.62
10 28 13 13-0240 EA Recessed Mounted, Automatic Sensor, Cast-Iron Cover Hand/Hair Dryer (American Dryer A60TR).....	3,056.63	30.62
10 28 13 13-0241 EA Surface Mounted, Automatic Sensor, Cast-Iron Cover Hand Dryer (Excel Xlerator XL-GR).....	855.91	30.62
10 28 13 13-0242 EA Surface Mounted, Automatic Sensor, Acrylonitrile Butadiene Styrene (ABS) Polycarbonate Cover Hand Dryer (Dyson Airblade AB12).....	1,749.29	30.62
10 28 13 13-0243 EA Surface Mounted, Automatic Sensor, Acrylonitrile Butadiene Styrene (ABS) Polycarbonate Cover Hand Dryer (Dyson Airblade AB14).....	2,947.95	30.62
10 28 13 13-0244 EA Surface Mounted, Automatic Sensor, White ABS Cover, CPC Technology, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer CPC9)..... Note: CPC technology kills germs naturally with no chemicals. Electronically adjustable sound and speed.	1,292.58	30.62
10 28 13 13-0245 EA Surface Mounted, Automatic Sensor, White Epoxy Finish Steel Cover, CPC Technology, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer CPC9-M)..... Note: CPC technology kills germs naturally with no chemicals. Electronically adjustable sound and speed.	1,365.09	30.62
10 28 13 13-0246 EA Surface Mounted, Automatic Sensor, Black Graphite Steel Cover, CPC Technology, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer CPC9-BG)..... Note: CPC technology kills germs naturally with no chemicals. Electronically adjustable sound and speed.	1,406.53	30.62
10 28 13 13-0247 EA Surface Mounted, Automatic Sensor, Satin Chrome Finish Steel Cover, CPC Technology, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer CPC9-C)..... Note: CPC technology kills germs naturally with no chemicals. Electronically adjustable sound and speed.	1,447.97	30.62
10 28 13 13-0248 EA Surface Mounted, Automatic Sensor, Stainless Steel Cover, CPC Technology, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer CPC9-SS)..... Note: CPC technology kills germs naturally with no chemicals. Electronically adjustable sound and speed.	1,530.84	30.62
10 28 13 13-0249 EA Surface Mounted, Automatic Sensor, White ABS Cover, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer GXT9)..... Note: Electronically adjustable sound and speed.	1,043.96	30.62
10 28 13 13-0250 EA Surface Mounted, Automatic Sensor, White Epoxy Finish Steel Cover, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer GXT9-M)..... Note: Electronically adjustable sound and speed.	1,116.48	30.62
10 28 13 13-0251 EA Surface Mounted, Automatic Sensor, Black Graphite Steel Cover, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer GXT9-BG)..... Note: Electronically adjustable sound and speed.	1,157.91	30.62
10 28 13 13-0252 EA Surface Mounted, Automatic Sensor, Satin Chrome Finish Steel Cover, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer GXT9-C)..... Note: Electronically adjustable sound and speed.	1,199.35	30.62
10 28 13 13-0253 EA Surface Mounted, Automatic Sensor, Stainless Steel Cover, Dries Hands In 10 To 12 Seconds, Hand Dryer (American Dryer GXT9-SS)..... Note: Electronically adjustable sound and speed.	1,282.22	30.62
10 28 13 13-0254 EA Surface Mounted, Automatic Sensor, White ABS Cover, Dries Hands In 12 To 15 Seconds, Hand Dryer (American Dryer EXT7)..... Note: Electronically adjustable sound and speed.	1,043.96	30.62
10 28 13 13-0255 EA Surface Mounted, Automatic Sensor, White Epoxy Finish Steel Cover, Dries Hands In 12 To 15 Seconds, Hand Dryer (American Dryer EXT7-M)..... Note: Electronically adjustable sound and speed.	1,116.48	30.62
10 28 13 13-0256 EA Surface Mounted, Automatic Sensor, Black Graphite Finish Steel Cover, Dries Hands In 12 To 15 Seconds, Hand Dryer (American Dryer EXT7-BG)..... Note: Electronically adjustable sound and speed.	1,157.91	30.62
10 28 13 13-0257 EA Surface Mounted, Automatic Sensor, Satin Chrome Finish Steel Cover, Dries Hands In 12 To 15 Seconds, Hand Dryer (American Dryer EXT7-C)..... Note: Electronically adjustable sound and speed.	1,199.35	30.62
10 28 13 13-0258 EA Surface Mounted, Stainless Steel Cover, Dries Hands In 12 To 15 Seconds, Hand Dryer (American Dryer EXT7-SS)..... Note: Electronically adjustable sound and speed.	1,282.22	30.62
10 28 13 13-0259 EA Surface Mounted, Automatic Sensor, White ABS Cover, Dries Hands In 25 Seconds, Hand Dryer (American Dryer AD90).....	753.91	30.62
10 28 13 13-0260 EA Surface Mounted, Automatic Sensor, White Epoxy Finish Steel Cover, Dries Hands In 25 Seconds, Hand Dryer (American Dryer AD90-M).....	826.43	30.62

10 Specialties

10 20 Interior Specialties

10 28 Toilet, Bath, and Laundry Accessories



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 28 13	13-0261	EA	Surface Mounted, Automatic Sensor, Black Graphite Finish Steel Cover, Dries Hands In 25 Seconds, Hand Dryer (American Dryer AD90-BG).....	867.86	30.62
10 28 13	13-0262	EA	Surface Mounted, Automatic Sensor, Satin Chrome Finish Steel Cover, Dries Hands In 25 Seconds, Hand Dryer (American Dryer AD90-C).....	909.30	30.62
10 28 13	13-0263	EA	Surface Mounted, Stainless Steel Cover, Dries Hands In 25 Seconds, Hand Dryer (American Dryer AD90-SS).....	992.17	30.62
10 28 13	13-0264	EA	Surface Mounted, Automatic Sensor, White ABS Cover, Stays On For 80 Seconds, Hair Dryer (American Dryer AD90H).....	753.91	30.62
10 28 13	13-0265	EA	Surface Mounted, Automatic Sensor, White Epoxy Finish Steel Cover, Stays On For 80 Seconds, Hair Dryer (American Dryer AD90-MH).....	826.43	30.62
10 28 13	13-0266	EA	Surface Mounted, Automatic Sensor, Black Graphite Finish Steel Cover, Stays On For 80 Seconds, Hair Dryer (American Dryer AD90-BGH).....	867.86	30.62
10 28 13	13-0267	EA	Surface Mounted, Automatic Sensor, Satin Chrome Finish Steel Cover, Stays On For 80 Seconds, Hair Dryer (American Dryer AD90-CH).....	909.30	30.62
10 28 13	13-0268	EA	Surface Mounted, Automatic Sensor, Stainless Steel Cover, Stays On For 80 Seconds, Hair Dryer (American Dryer AD90-SSH).....	992.17	30.62
10 28 13	13-0269	EA	Surface Mounted, Automatic Sensor, ABS Cover, Hand Dryer (American Dryer GX1).....	546.73	30.62
10 28 13	13-0270	EA	Surface Mounted, Automatic Sensor, White Epoxy Finish Steel Cover, Hand Dryer (American Dryer GX1-M).....	619.25	30.62
10 28 13	13-0271	EA	Surface Mounted, Automatic Sensor, Satin Chrome Finish Steel Cover, Hand Dryer (American Dryer GX1-C).....	702.12	30.62
10 28 13 13-0272 Hand Dryers (Excel XLERATOR®) (10 28 13 13-0001)					
Note: With or without noise reduction nozzle options.					
10 28 13	13-0273	EA	Surface Mounted, Automatic Sensor, White Epoxy Painted Finish, Zinc-Die Cast Cover, Hand Dryer (Excel XLERATOR® XL-W).....	1,072.91	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0274	EA	Surface Mounted, Automatic Sensor, White Epoxy Painted Finish, Zinc-Die Cast Cover, Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOR® XL-WH).....	1,512.47	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0275	EA	Surface Mounted, Automatic Sensor, Graphite Textured Painted Finish, Zinc-Die Cast Cover, Hand Dryer (Excel XLERATOR® XL-GR).....	1,259.56	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0276	EA	Surface Mounted, Automatic Sensor, Graphite Textured Painted Finish, Zinc-Die Cast Cover Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel Xlerator XL-GRH).....	1,575.69	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0277	EA	Surface Mounted, Automatic Sensor, Chrome Plated Finish, Zinc-Die Cast Cover, Hand Dryer (Excel XLERATOR® XL-C).....	1,354.40	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0278	EA	Surface Mounted, Automatic Sensor, Chrome Plated Finish, Zinc-Die Cast Cover, Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOR® XL-CH).....	1,670.53	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0279	EA	Surface Mounted, Automatic Sensor, Brushed Finish, Stainless Steel Cover, Hand Dryer (Excel XLERATOR® XL-SB).....	1,354.40	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0280	EA	Surface Mounted, Automatic Sensor, Brushed Finish, Stainless Steel Cover, Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOR® XL-SBH).....	1,670.53	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0281	EA	Surface Mounted, Automatic Sensor, Custom Color Painted Finish, Zinc-Die Cast Cover, Hand Dryer (Excel XLERATOR® XL-SP).....	1,259.56	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0282	EA	Surface Mounted, Automatic Sensor, Custom Color Painted Finish, Zinc-Die Cast Cover, Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOR® XL-SPH).....	1,575.69	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0283	EA	Surface Mounted, Automatic Sensor, White Finish, Polymer Cover (BMC), Hand Dryer (Excel XLERATOR® XL-BW).....	1,133.11	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0284	EA	Surface Mounted, Automatic Sensor, White Finish, Polymer Cover (BMC), Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOR® XL-BWH).....	1,449.24	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0285	EA	Surface Mounted, Automatic Sensor, White Epoxy Painted Finish, Zinc-Die Cast Cover, No Heat Hand Dryer (Excel XLERATORReco® XL-W-ECO).....	1,072.91	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0286	EA	Surface Mounted, Automatic Sensor, White Epoxy Painted Finish, Zinc-Die Cast Cover, No Heat Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATORReco® XL-WH-ECO).....	1,512.47	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0287	EA	Surface Mounted, Automatic Sensor, Graphite Textured Painted Finish, Zinc-Die Cast Cover, No Heat Hand Dryer (Excel XLERATORReco® XL-GR-ECO).....	1,259.56	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0288	EA	Surface Mounted, Automatic Sensor, Graphite Textured Painted Finish, Zinc-Die Cast Cover, No Heat Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATORReco® XL-GRH-ECO).....	1,575.69	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0289	EA	Surface Mounted, Automatic Sensor, Chrome Plated Finish, Zinc-Die Cast Cover, No Heat Hand Dryer (Excel XLERATORReco® XL-C-ECO).....	1,354.40	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0290	EA	Surface Mounted, Automatic Sensor, Chrome Plated Finish, Zinc-Die Cast Cover, No Heat Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATORReco® XL-CH-ECO).....	1,670.53	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0291	EA	Surface Mounted, Automatic Sensor, Brushed Finish, Stainless Steel Cover, No Heat Hand Dryer (Excel XLERATORReco® XL-SB-ECO).....	1,354.40	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0292	EA	Surface Mounted, Automatic Sensor, Brushed Finish, Stainless Steel Cover, No Heat Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATORReco® XL-SBH-ECO).....	1,670.53	30.62
For ADA-Compliant Recess Kit, Add				171.93	
10 28 13	13-0293	EA	Surface Mounted, Automatic Sensor, Custom Color Painted Finish, Zinc-Die Cast Cover, No Heat Hand Dryer (Excel XLERATORReco® XL-SP-ECO).....	1,259.56	30.62
For ADA-Compliant Recess Kit, Add				171.93	



Specialties	10	10
Interior Specialties	10 20	
Toilet, Bath, and Laundry Accessories	10 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 28 13 13-0294	EA		Surface Mounted, Automatic Sensor, Custom Color Painted Finish, Zinc-Die Cast Cover, No Heat Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOReco® XL-SPH-ECO).....	1,575.69	30.62
			<i>For ADA-Compliant Recess Kit, Add</i>	171.93	
10 28 13 13-0295	EA		Surface Mounted, Automatic Sensor, White Finish, Polymer Cover (BMC), No Heat Hand Dryer (Excel XLERATOReco® XL-BW-ECO).....	1,133.11	30.62
			<i>For ADA-Compliant Recess Kit, Add</i>	171.93	
10 28 13 13-0296	EA		Surface Mounted, Automatic Sensor, White Finish, Polymer Cover (BMC), No Heat Hand Dryer With High Efficiency Particulate Air (HEPA) Filtration System (Excel XLERATOReco® XL-BWH-ECO).....	1,449.24	30.62
			<i>For ADA-Compliant Recess Kit, Add</i>	171.93	
10 28 13 13-0297			Additional Accessories <small>(10 28 13 13-0001)</small>		
10 28 13 13-0298			Hooks <small>(10 28 13 13-0297)</small>		
10 28 13 13-0299	EA		Stainless Steel Clothes Hook And Bumper (Bobrick B-212).....	31.02	10.84
10 28 13 13-0300	EA		Single Stainless Steel Robe Hook (Bobrick B-233).....	37.24	10.84
10 28 13 13-0301	EA		Single Stainless Steel Robe Hook (Bobrick B-7671).....	31.58	10.84
10 28 13 13-0302	EA		Double Stainless Steel Robe Hook (Bobrick B-7672).....	34.36	10.84
10 28 13 13-0303	EA		Double Stainless Steel Robe Hook (Bobrick B-672 or B-6727).....	57.59	10.84
10 28 13 13-0304	EA		Single Stainless Steel Robe Hook (Bobrick B-6717).....	51.93	10.84
10 28 13 13-0305			Clotheslines <small>(10 28 13 13-0297)</small>		
10 28 13 13-0306	EA		Surface Mounted, Stainless Steel Retractable Clothesline (Gamco 7636).....	54.22	21.69
10 28 13 13-0307			Towel Bars <small>(10 28 13 13-0297)</small>		
10 28 13 13-0308	EA		18" Length, 3/4" Square, Stainless Steel Towel Bar (Gamco 7673x18).....	66.74	24.40
10 28 13 13-0309	EA		24" Length, 3/4" Square, Stainless Steel Towel Bar (Gamco 7673x24).....	66.96	24.40
10 28 13 13-0310	EA		18" Length, 3/4" Diameter, Stainless Steel Towel Bar (Gamco 7674x18).....	75.25	24.40
10 28 13 13-0311	EA		24" Length, 3/4" Diameter, Stainless Steel Towel Bar (Gamco 7674x24).....	76.04	24.40
10 28 13 13-0312	EA		18" Length, 3/4" Square, Stainless Steel Towel Bar (Bobrick B-673).....	112.41	24.40
10 28 13 13-0313	EA		24" Length, 3/4" Square, Stainless Steel Towel Bar (Bobrick B-673).....	117.21	24.40
10 28 13 13-0314	EA		18" Length, 3/4" Diameter, Stainless Steel Towel Bar (Bobrick B-674).....	116.09	24.40
10 28 13 13-0315	EA		24" Length, 3/4" Diameter, Stainless Steel Towel Bar (Bobrick B-674).....	120.04	24.40
10 28 13 13-0316	EA		18" Length, 1" Diameter, Heavy-Duty, Stainless Steel Towel Bar (Bobrick B-205).....	127.12	24.40
10 28 13 13-0317	EA		24" Length, 1" Diameter, Heavy-Duty, Stainless Steel Towel Bar (Bobrick B-205).....	131.32	24.40
10 28 13 13-0318	EA		18" Length, 1" Diameter, Extra-Heavy-Duty, Stainless Steel Towel Bar/Grab Bar (Bobrick B-530).....	96.30	24.40
10 28 13 13-0319	EA		24" Length, 1" Diameter, Extra-Heavy-Duty, Stainless Steel Towel Bar/Grab Bar (Bobrick B-530).....	99.97	24.40
10 28 13 13-0320			Towel Bar With Shelf <small>(10 28 13 13-0297)</small>		
10 28 13 13-0321	EA		24" Length, Stainless Steel Towel Shelf With Towel Bar (Bobrick B-676).....	219.84	24.40
10 28 13 13-0322			Towel Pins <small>(10 28 13 13-0297)</small>		
10 28 13 13-0323	EA		Stainless Steel Towel Pin (Bobrick B-677).....	55.62	10.84
10 28 13 13-0324			Mirrors <small>(10 28 13 13)</small>		
10 28 13 13-0325			Stainless Steel Channel Frame Glass Mirrors <small>(10 28 13 13-0324)</small>		
10 28 13 13-0326	EA		16" x 24", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Gamco C-16x24).....	120.63	27.11
10 28 13 13-0327	EA		18" x 24", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 1824).....	138.48	27.11
10 28 13 13-0328	EA		18" x 30", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 1830).....	144.66	27.11
			<i>For Tempered Glass (B-1658), Add</i>	51.91	
10 28 13 13-0329	EA		18" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 1836).....	157.33	27.11
			<i>For Tempered Glass (B-1658), Add</i>	60.78	
10 28 13 13-0330	EA		24" x 30", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 2430).....	173.59	27.11
10 28 13 13-0331	EA		24" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 2436).....	180.43	27.11
			<i>For Tempered Glass (B-1658), Add</i>	76.95	
10 28 13 13-0332	EA		24" x 48", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 2448).....	225.30	27.11
10 28 13 13-0333	EA		24" x 60", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 2460).....	262.06	27.11
10 28 13 13-0334	EA		36" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Gamco C-36x36).....	318.23	27.11
10 28 13 13-0335	EA		48" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Bobrick B-165 4836).....	403.53	27.11
10 28 13 13-0336	EA		60" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror (Gamco C-60x36).....	455.36	27.11
10 28 13 13-0337			Stainless Steel Channel Frame Glass Mirror/Shelf Combination <small>(10 28 13 13-0324)</small>		
10 28 13 13-0338	EA		18" x 24", Surface Mounted, Stainless Steel Channel Frame Glass Mirror/Shelf Combination (Bobrick B-166 1824).....	233.76	27.11
10 28 13 13-0339	EA		18" x 30", Surface Mounted, Stainless Steel Channel Frame Glass Mirror/Shelf Combination (Bobrick B-166 1830).....	252.95	27.11
10 28 13 13-0340	EA		18" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror/Shelf Combination (Bobrick B-166 1836).....	265.64	27.11
10 28 13 13-0341	EA		24" x 36", Surface Mounted, Stainless Steel Channel Frame Glass Mirror/Shelf Combination (Bobrick B-166 2436).....	301.41	27.11
10 28 13 13-0342			Stainless Steel Angle Frame Glass Mirrors <small>(10 28 13 13-0324)</small>		
10 28 13 13-0343	EA		18" x 24", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 1824).....	206.73	27.11

10	10	Specialties
	10 20	Interior Specialties
	10 28	Toilet, Bath, and Laundry Accessories



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 28 13 13-0344	EA		18" x 30", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 1830)..... <i>For Tempered Glass (B-2908), Add</i>	227.91 103.89	27.11
10 28 13 13-0345	EA		18" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 1836)..... <i>For Tempered Glass (B-2908), Add</i>	235.06 108.61	27.11
10 28 13 13-0346	EA		24" x 30", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 2430).....	277.34	27.11
10 28 13 13-0347	EA		24" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 2436)..... <i>For Tempered Glass (B-2908), Add</i>	278.97 137.59	27.11
10 28 13 13-0348	EA		24" x 48", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 2448).....	376.86	27.11
10 28 13 13-0349	EA		24" x 60", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 2460).....	445.15	27.11
10 28 13 13-0350	EA		24" x 72", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Bobrick B-290 2472).....	508.91	27.11
10 28 13 13-0351	EA		36" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Gamco A-36x36).....	335.30	27.11
10 28 13 13-0352	EA		48" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Gamco A-48x36).....	411.30	27.11
10 28 13 13-0353	EA		72" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror (Gamco A-72x36).....	636.10	27.11

10 28 13 13-0354 Stainless Steel Angle Frame Glass Mirror/Shelf Combination <small>(10 28 13 13-0324)</small>					
10 28 13 13-0355	EA		18" x 24", Surface Mounted, Stainless Steel Angle Frame Glass Mirror/Shelf Combination (Gamco AS-18x24).....	214.14	27.11
10 28 13 13-0356	EA		18" x 30", Surface Mounted, Stainless Steel Angle Frame Glass Mirror/Shelf Combination (Bobrick B-292-1830).....	433.77	27.11
10 28 13 13-0357	EA		18" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror/Shelf Combination (Bobrick B-292-1836).....	455.25	27.11
10 28 13 13-0358	EA		24" x 36", Surface Mounted, Stainless Steel Angle Frame Glass Mirror/Shelf Combination (Bobrick B-292-2436).....	508.91	27.11

10 28 13 13-0359 Frameless Stainless Steel Mirrors <small>(10 28 13 13-0324)</small>					
10 28 13 13-0360	EA		17-1/2" x 29-1/2", Frameless Stainless Steel Mirror (Bobrick B-1556 1830).....	233.11	27.11
10 28 13 13-0361	EA		23-1/2" x 35-1/2", Frameless Stainless Steel Mirror (Bobrick B-1556 2436).....	304.97	27.11

10 28 13 13-0362 Fixed-Position Tilt, Stainless Steel Frame Glass Mirrors <small>(10 28 13 13-0324)</small>					
10 28 13 13-0363	EA		16" x 30", Surface Mounted, Fixed-Position Tilt, Stainless Steel Frame Glass Mirror (Bobrick B-293 1630).....	321.25	27.11
10 28 13 13-0364	EA		18" x 30", Surface Mounted, Fixed-Position Tilt, Stainless Steel Frame Glass Mirror (Bobrick B-293 1830).....	335.24	27.11
10 28 13 13-0365	EA		18" x 36", Surface Mounted, Fixed-Position Tilt, Stainless Steel Frame Glass Mirror (Bobrick B-293 1836).....	408.41	27.11
10 28 13 13-0366	EA		24" x 36", Surface Mounted, Fixed-Position Tilt, Stainless Steel Frame Glass Mirror (Bobrick B-293 2436).....	505.00	27.11

10 28 13 13-0367 Medicine Cabinets <small>(10 28 13 13)</small>					
10 28 13 13-0368 Metal Medicine Cabinets <small>(10 28 13 13-0367)</small>					
10 28 13 13-0369	EA		20" x 26", Surface Mounted, Aluminum Medicine Cabinet (Kohler K-CB).....	980.08	54.23
10 28 13 13-0370	EA		15-1/2" x 25-7/8", Recessed Mounted, All-Steel Medicine Cabinet (Bobrick B-397)..... Note: Includes three adjustable plastic shelves.	251.37	54.23
10 28 13 13-0371	EA		14-1/8" x 20-1/4", Surface Mounted, All-Steel Medicine Cabinet (Bobrick B-297)..... Note: Includes two fixed shelves with baked white enamel finish.	259.42	54.23
10 28 13 13-0372	EA		15-1/4" x 25-1/2", Recessed Mounted, Stainless Steel Medicine Cabinet (Bobrick B-398)..... Note: Includes four adjustable stainless steel shelves.	566.16	54.23
10 28 13 13-0373	EA		17" x 26-7/8", Surface Mounted, Stainless Steel Medicine Cabinet (Bobrick B-299)..... Note: Includes four adjustable shelves.	776.78	54.23

10 28 13 13-0374 Janitorial Material <small>(10 28 13 13)</small>					
10 28 13 13-0375	EA		Stainless Steel Pail And Ladder Utility Hook (Bobrick B-670).....	51.93	10.84
10 28 13 13-0376	EA		24" Length, Stainless Steel Utility Hook Strip (Bobrick B-232x24).....	135.31	24.40
10 28 13 13-0377	EA		24" Length, 3 Handle Capacity, Stainless Steel Mop And Broom Holder (Bobrick B-223x24).....	130.23	24.40
10 28 13 13-0378	EA		30" Length, 3 Handle Capacity, Stainless Steel Mop And Broom Holder (Gamco MS-1).....	148.13	24.40
10 28 13 13-0379	EA		36" Length, 3 Handle Capacity, Stainless Steel Mop And Broom Holder (Bobrick B-223x36).....	165.84	24.40
10 28 13 13-0380	EA		36" Length, Utility Hook Strip (Gamco HCS-2).....	110.35	24.40
10 28 13 13-0381	EA		36" Length, Stainless Steel Custodian Utility Shelf With Mop And Broom Holders And Rag Hooks (Bobrick B-224x36).....	308.89	24.40
10 28 13 13-0382	EA		34" Length, 3 Handle Capacity, Stainless Steel Mop And Broom Holder With Shelf And Rag Hooks (Bobrick B-239x34).....	445.45	24.40

10 28 13 13-0383 Removal And Reinstallation Of Bathroom Accessories <small>(10 28 13 13)</small>					
10 28 13 13-0384	EA		Removal And Reinstallation Of Bathroom Accessory.....	33.90	

10 28 13 63 Detention Toilet Accessories <small>(10 28 13)</small>					
10 28 13 63-0001 Ligature Resistant, Stainless Steel Grab Bar <small>(10 28 13 63)</small>					
10 28 13 63-0002	EA		18" Length, 1-1/2" Diameter, 18 Gauge, Ligature Resistant, Stainless Steel Security Grab Bar (Bradley SA70-001180).....	200.78	21.69
10 28 13 63-0003	EA		24" Length, 1-1/2" Diameter, 18 Gauge, Ligature Resistant, Stainless Steel Security Grab Bar (Bradley SA70-001240).....	209.84	21.69
10 28 13 63-0004	EA		36" Length, 1-1/2" Diameter, 18 Gauge, Ligature Resistant, Stainless Steel Security Grab Bar (Bradley SA70-001360).....	215.86	21.69
10 28 13 63-0005	EA		42" Length, 1-1/2" Diameter, 18 Gauge, Ligature Resistant, Stainless Steel Security Grab Bar (Bradley SA70-001420).....	238.96	21.69
10 28 13 63-0006	EA		60" Length, 1-1/2" Diameter, 18 Gauge, Ligature Resistant, Stainless Steel Security Grab Bar (Bradley SA70-002600).....	485.41	21.69

10 28 16 Bath Accessories (10 28)



Specialties	10	10
Interior Specialties	10 20	
Toilet, Bath, and Laundry Accessories	10 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 28 16 13 Residential Bath Accessories (10 28 16)

10 28 16 13-0001 Residential Toilet Accessories (10 28 16 13)

10 28 16 13-0002 Residential, Surface Mounted, Porcelain Toilet Accessories (10 28 16 13-0001)

10 28 16 13-0003	EA	Surface Mounted Porcelain Wall Soap Holder.....	56.58	14.64
10 28 16 13-0004	EA	Surface Mounted Porcelain Bath/Shower Soap Dish.....	65.01	14.64
10 28 16 13-0005	EA	Surface Mounted Porcelain 1 Roll Toilet Paper Holder.....	64.33	14.64
10 28 16 13-0006	EA	Surface Mounted Porcelain Toothbrush/Tumbler Holder.....	56.58	14.64
10 28 16 13-0007	EA	Surface Mounted Porcelain Towel Bar Set With Plastic Bar.....	62.50	14.64

10 28 16 13-0008 Residential Medicine Cabinets With Mirrors (10 28 16 13-0001)

10 28 16 13-0009	EA	16" x 20" Recessed Molded Medicine Cabinet With Mirror (Nutone 401ADJ).....	155.90	37.96
10 28 16 13-0010	EA	16" x 22" Recessed Molded Medicine Cabinet With Mirror (Nutone 407ADJ).....	154.78	37.96
10 28 16 13-0011	EA	16" x 26" Recessed Molded Medicine Cabinet With Mirror (Nutone 624).....	203.42	37.96
10 28 16 13-0012	EA	16" x 26" Stainless Trim, Plastic Body Medicine Cabinet With Mirror (Nutone B772193).....	192.14	37.96
10 28 16 13-0013	EA	16" x 22" Recessed Steel Medicine Cabinet With Mirror (Nutone 420BC).....	195.50	37.96
10 28 16 13-0014	EA	16" x 22" Recessed Steel Medicine Cabinet With Mirror (Nutone 421BC).....	208.43	37.96
10 28 16 13-0015	EA	18" x 24" Recessed Steel Medicine Cabinet With Mirror (Nutone 490).....	320.26	37.96
10 28 16 13-0016	EA	16" x 26" Recessed Steel Medicine Cabinet With Mirror (Nutone 458).....	228.37	37.96
10 28 16 13-0017	EA	20" x 30" Recessed Steel Medicine Cabinet With Mirror (Nutone 495).....	368.50	37.96
10 28 16 13-0018	EA	16" x 26" Recessed Steel Medicine Cabinet With Mirror (Nutone 478FS).....	261.19	37.96
10 28 16 13-0019	EA	16-1/8" x 22-1/8" Surface Steel Medicine Cabinet With Mirror (Nutone 472FS).....	247.30	37.96
10 28 16 13-0020	EA	16" x 22" Recessed Steel Medicine Cabinet With Mirror (Nutone 473FS).....	249.68	37.96
10 28 16 13-0021	EA	16" x 26" Recessed Steel Medicine Cabinet With Mirror (Nutone 478FS).....	236.87	37.96
10 28 16 13-0022	EA	14" x 20" Surface Steel Medicine Cabinet With Mirror (Nutone 422SM).....	193.39	37.96
10 28 16 13-0023	EA	16" x 22" Surface Steel Medicine Cabinet With Mirror (Nutone 452SM).....	229.87	37.96
10 28 16 13-0024	EA	16-1/4" x 22-1/4" Molded Steel Medicine Cabinet With Mirror (Nutone 614).....	189.75	37.96
10 28 16 13-0025	EA	20" x 26" Aluminum Medicine Cabinet With Mirror, Kohler K-CB-CLC2026FS.....	354.80	37.96

10 28 16 13-0026 Residential Shower Curtain Rod (10 28 16 13-0001)

Note: Includes end brackets. See CSI section 10 28 13 13-0215 for shower curtain rods.

10 28 16 13-0027 Residential, Recessed, Chrome Plated Toilet Accessories (10 28 16 13-0001)

10 28 16 13-0028	EA	Single Roll, Recessed Mounted, Chrome Plated Toilet Paper Holder.....	139.32	24.40
10 28 16 13-0029	EA	Recessed Mounted, Chrome Plated Soap Dish.....	216.52	24.40
10 28 16 13-0030	EA	Recessed Mounted, Chrome Plated Soap Dish And Bar.....	232.21	24.40
10 28 16 13-0031	EA	Recessed Mounted, Chrome Plated Tumbler Holder.....	145.97	24.40

10 28 16 13-0032 Residential, Surface Mounted, Chrome Plated Toilet Accessories (10 28 16 13-0001)

10 28 16 13-0033	EA	Surface Mounted, Chrome Plated Soap Dish.....	95.24	16.27
10 28 16 13-0034	EA	Surface Mounted, Chrome Plated Single Clothes Hook.....	112.74	16.27
10 28 16 13-0035	EA	Surface Mounted, Chrome Plated Double Clothes Hook.....	112.74	16.27
10 28 16 13-0036	LF	6" Deep, Surface Mounted, Glass Shelf With Chrome Plated Supports.....	249.17	16.27
10 28 16 13-0037	LF	6" Deep, Surface Mounted, Stainless Steel Shelf.....	205.14	16.27
10 28 16 13-0038	EA	18" Length, Surface Mounted, Chrome Plated Towel Bar.....	121.78	21.69
10 28 16 13-0039	EA	24" Length, Surface Mounted, Chrome Plated Towel Bar.....	123.74	21.69
10 28 16 13-0040	EA	Surface Mounted, Chrome Plated Towel Ring.....	90.92	16.27
10 28 16 13-0041	EA	Surface Mounted, Chrome Plated Tumbler And Toothbrush Holder.....	84.39	10.84
10 28 16 13-0042	EA	Single Roll, Surface Mounted, Chrome Plated Toilet Paper Holder.....	95.24	16.27
10 28 16 13-0043	EA	Two Roll, Surface Mounted, Chrome Plated Toilet Paper Holder.....	212.56	16.27
10 28 16 13-0044	EA	Surface Mounted, Chrome Plated Globe Soap Dispenser.....	118.78	16.27
10 28 16 13-0045	EA	Surface Mounted, Chrome Plated Towel Pin.....	126.71	10.84
10 28 16 13-0046	EA	Surface Mounted, Chrome Plated Towel Ladder And Shelf.....	415.13	16.27
10 28 16 13-0047	EA	Surface Mounted, Retractable Chrome Plated Bath/Shower Clothesline.....	196.55	16.27
10 28 16 13-0048	EA	24" Length, Cut To Size Towel Bar, Surface Mounted, Ceramic Base Towel Bar.....	82.22	16.27

10 28 16 13-0049 Residential, Ceramic Toilet Accessories (10 28 16 13-0001)

10 28 16 13-0050	EA	4-1/8" x 4-1/8" x 2-7/8" Deep Ceramic Recessed Soap Dish.....	121.24	22.45
10 28 16 13-0051	EA	6" x 4-1/4" x 3-1/8" Deep Ceramic Recessed Soap Dish.....	144.35	22.45
10 28 16 13-0052	EA	8-1/8" x 15-3/8" x 2-7/8" Deep Ceramic Recessed Soap And Suds.....	253.26	28.20
10 28 16 13-0053	EA	6" x 6" x 3-1/4" Deep Ceramic Recessed Toilet Paper Holder.....	135.10	22.45
10 28 16 13-0054	EA	6" x 6" x 4-7/8" Deep Ceramic Recessed Soap And Cloth Holder With Lip Drain.....	172.08	22.45
10 28 16 13-0055	EA	6-3/8" x 4-3/4" x 1-3/8" Deep Ceramic Semi-Recessed Soap Dish.....	109.68	22.45
10 28 16 13-0056	EA	6-3/8" x 6-3/8" x 1-3/4" Deep Ceramic Semi-Recessed Soap Dish.....	118.00	22.45
10 28 16 13-0057	EA	6-5/8" x 5" x 2-3/8" Deep Ceramic Semi-Recessed Toilet Paper Holder.....	105.06	22.45
10 28 16 13-0058	EA	6-5/8" x 4-7/8" x 2-3/8" Deep Ceramic Semi-Recessed Soap And Cloth Holder.....	111.99	22.45
10 28 16 13-0059	EA	7-1/4" x 3" Ceramic Surface Mounted Corner Shelf.....	108.96	14.64
10 28 16 13-0060	EA	4-1/2" x 2-1/4" Ceramic Surface Mounted Corner Shelf.....	97.32	14.64
10 28 16 13-0061	EA	4" x 6" Ceramic Surface Mounted Toilet Paper Holder.....	74.30	14.64
10 28 16 13-0062	EA	4" x 6" Ceramic Surface Mounted Tub Soap Dish.....	74.90	14.64
10 28 16 13-0063	EA	4-1/4" x 4-1/4" Ceramic Surface Mounted Soap Dish.....	69.63	14.64
10 28 16 13-0064	EA	2-1/8" x 4-1/4" Ceramic Surface Mounted Low Profile Soap Dish.....	62.61	14.64
10 28 16 13-0065	EA	4" x 6" Ceramic Surface Mounted Tub Soap Dish And Cloth Holder.....	80.24	14.64
10 28 16 13-0066	EA	4-1/4" x 4-1/4" Ceramic Surface Mounted Toothbrush/Tumbler Holder.....	69.63	14.64
10 28 16 13-0067	EA	2-1/8" x 4-1/4" Ceramic Surface Mounted Toothbrush/Tumbler Holder.....	62.61	14.64
10 28 16 13-0068	EA	1-1/2" x 4-1/4" Ceramic Surface Mounted Towel Ring.....	73.40	14.64

10	10	Specialties
	10 20	Interior Specialties
	10 28	Toilet, Bath, and Laundry Accessories



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 28 16 13-0069	Residential Medicine Cabinets, Solid Oak <small>(10 28 16 13-0001)</small>		
	Note: Surface or recessed mounted, premium quality.		
10 28 16 13-0070	EA 24" x 30", Unlighted, Solid Oak Medicine Cabinet With Mirror	383.90	54.23
10 28 16 13-0071	EA 24" x 35", Lighted, Solid Oak Medicine Cabinet With Mirror	481.08	54.23
10 28 16 13-0072	EA 30" x 30" Unlighted, Solid Oak Medicine Cabinet With Mirror	405.40	54.23
10 28 16 13-0073	EA 30" x 35", Lighted, Solid Oak Medicine Cabinet With Mirror	510.41	54.23
10 28 16 13-0074	EA 36" x 30", Unlighted, Solid Oak Medicine Cabinet With Mirror	418.96	54.23
10 28 16 13-0075	EA 36" x 35", Lighted, Solid Oak Medicine Cabinet With Mirror	536.18	54.23
10 28 16 13-0076	EA 48" x 30", Unlighted, Solid Oak Medicine Cabinet With Mirror	437.58	54.23
10 28 16 13-0077	EA 48" x 35", Lighted, Solid Oak Medicine Cabinet With Mirror	567.67	54.23

10 28 16 13-0078	Residential Toilet Accessories <small>(10 28 16 13-0001)</small>		
10 28 16 13-0079	EA Surface Mounted Plastic Paper Towel Dispenser	121.01	24.40
10 28 16 13-0080	EA Surface Mounted Plastic Napkin Disposal	105.07	24.40
10 28 16 13-0081	EA 50 Fluid Ounce, Plastic Soap Dispenser For Soaps And Detergent	110.70	
10 28 16 13-0082	EA 50 Fluid Ounce, Plastic Soap Dispenser For Antibacterial Soaps	127.58	24.40
10 28 16 13-0083	EA Multi Roll (2) Plastic Toilet Tissue Dispenser	121.06	24.40
10 28 16 13-0084	EA Single Jumbo Roll Plastic Toilet Tissue Dispenser	148.37	29.83
10 28 16 13-0085	EA Surface Mounted Plastic Toilet Seat Cover Dispenser	79.06	21.69
10 28 16 13-0086	EA 13 Gallon Plastic Waste Door For Countertops	297.04	40.67

10 28 19 Tub and Shower Enclosures (10 28)

10 28 19 16 Shower Doors (10 28 19)

10 28 19 16-0001	Swinging Shower Doors <small>(10 28 19 16)</small>		
10 28 19 16-0002	Framed, Swinging Shower Doors <small>(10 28 19 16-0001)</small>		
10 28 19 16-0003	EA 24-1/4" To 26" Opening, Silver Finish Frame, Tempered Safety Glass, Swinging Shower Door (American Standard AM00801)	557.60	57.41
10 28 19 16-0004	EA 27-1/4" To 29" Opening, Silver Finish Frame, Tempered Safety Glass, Swinging Shower Door (American Standard AM00802)	586.60	28.71
10 28 19 16-0005	EA 29-5/8" To 31-3/8" Opening, Silver Finish Frame, Tempered Safety Glass, Swinging Shower Door (American Standard AM00803)	706.92	28.71
10 28 19 16-0006	EA 33-1/8" To 34-7/8" Opening, Silver Finish Frame, Tempered Safety Glass, Swinging Shower Door (American Standard AM00804)	583.51	28.71
10 28 19 16-0007	EA 35-1/8" To 36-7/8" Opening, Silver Finish Frame, Tempered Safety Glass, Swinging Shower Door (American Standard AM00805)	624.60	28.71

10 28 19 16-0008	Frameless, Swinging Shower Doors <small>(10 28 19 16-0001)</small>		
10 28 19 16-0009	EA 24-9/16" To 25-7/16" Opening, Frameless, Tempered Safety Glass, Swinging Shower Door (American Standard AM0301D)	867.08	28.71
10 28 19 16-0010	EA 31-1/16" To 31-15/16" Opening, Frameless, Tempered Safety Glass, Swinging Shower Door (American Standard AM0302D)	907.29	28.71
10 28 19 16-0011	EA 32-11/16" To 33-9/16" Opening, Frameless, Tempered Safety Glass, Swinging Shower Door (American Standard AM0303D)	945.14	28.71
10 28 19 16-0012	EA 34-3/16" To 35-1/16" Opening, Frameless, Tempered Safety Glass, Swinging Shower Door (American Standard AM0304D)	985.35	28.71
10 28 19 16-0013	EA 35-3/16" To 36-1/16" Opening, Frameless, Tempered Safety Glass, Swinging Shower Door (American Standard AM0305D)	1,024.39	28.71

10 28 19 16-0014 **Sliding Shower Doors** (10 28 19 16)

10 28 19 16-0015	Framed, Sliding Shower Doors <small>(10 28 19 16-0014)</small>		
10 28 19 16-0016	EA 40" To 42" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00735)	943.76	28.71
10 28 19 16-0017	EA 44" To 46" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00745)	862.37	28.71
10 28 19 16-0018	EA 46" To 48" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00775)	884.29	28.71
10 28 19 16-0019	EA 52" To 54" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00729)	907.60	28.71
10 28 19 16-0020	EA 54" To 56" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00794)	920.61	28.71
10 28 19 16-0021	EA 56" To 60" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00795)	939.86	28.71

10 28 19 16-0022	Frameless, Sliding Shower Doors <small>(10 28 19 16-0014)</small>		
10 28 19 16-0023	EA 40" To 44" Opening, 65-1/2" Height, Frameless, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00335)	979.39	28.71
10 28 19 16-0024	EA 44" To 48" Opening, 65-1/2" Height, Frameless, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00345)	1,200.78	28.71
10 28 19 16-0025	EA 56" To 60" Opening, 65-1/2" Height, Frameless, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00394)	1,275.30	28.71
10 28 19 16-0026	EA 40" To 44" Opening, 70" Height, Frameless, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00330)	1,148.89	28.71



Specialties	10	10
Interior Specialties	10 20	
Toilet, Bath, and Laundry Accessories	10 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 28 19 16-0027	EA		44" To 48" Opening, 70" Height, Frameless, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00370)	1,165.21	28.71
10 28 19 16-0028	EA		56" To 60" Opening, 70" Height, Frameless, Tempered Safety Glass, By-Pass Sliding Shower Door (American Standard AM00390)	1,316.85	28.71

10 28 19 19 Tub Doors (10 28 19)

10 28 19 19-0001			Sliding Bathtub Doors <small>(10 28 19 19)</small>		
10 28 19 19-0002			Framed, Sliding Bathtub Doors <small>(10 28 19 19-0001)</small>		
10 28 19 19-0003	EA		52" To 54" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Bathtub Door (American Standard AM00725)	837.90	28.71
10 28 19 19-0004	EA		54" To 56" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Bathtub Door (American Standard AM00749)	847.28	28.71
10 28 19 19-0005	EA		56" To 60" Opening, Silver Finish Frame, Tempered Safety Glass, By-Pass Sliding Bathtub Door (American Standard AM00750)	868.49	28.71

10 30 Fireplaces and Stoves (10)

10 31 Manufactured Fireplaces (10 30)

10 31 13 Manufactured Fireplace Chimneys (10 31)

See CSI section 23 51 00 00-0000 for chimneys.

10 31 16 Manufactured Fireplace Forms (10 31)

10 31 16 00-0001			Prefabricated Fireplaces <small>(10 31 16)</small> Note: Listed by screen width.		
10 31 16 00-0002			Radiant Heat Fireplace Inserts <small>(10 31 16 00-0001)</small> Note: Includes insert, screen, grate and vent connection.		
10 31 16 00-0003	EA		38" Wide Radiant Heat, Open Front Fireplace Insert..... <i>For Circulating Heat Fireplace, Add</i>	1,572.48 57.54	263.11
10 31 16 00-0004	EA		43" Wide Radiant Heat, Open Front Fireplace Insert..... <i>For Circulating Heat Fireplace, Add</i>	1,670.81 62.06	271.25
10 31 16 00-0005	EA		48" Wide Radiant Heat, Open Front Fireplace Insert..... <i>For Circulating Heat Fireplace, Add</i>	1,800.52 67.70	284.82
10 31 16 00-0006			Radiant Heat Natural Gas Fireplace <small>(10 31 16 00-0001)</small> Note: Includes insert, screen, gas logs and vent connection. Units are remote ready.		
10 31 16 00-0007	EA		32" Wide Radiant Heat Natural Gas Fireplace..... <i>For Circulating Heat Fireplace, Add</i> <i>For Remote Ignition, Add</i>	2,075.91 85.23 77.48	263.11
10 31 16 00-0008	EA		36" Wide Radiant Heat Natural Gas Fireplace..... <i>For Circulating Heat Fireplace, Add</i> <i>For Remote Ignition, Add</i>	2,206.88 91.54 83.22	271.25
10 31 16 00-0009			Vent Free Radiant Heat Natural Gas Fireplace <small>(10 31 16 00-0001)</small> Note: Includes insert, screen, and gas logs. Units are remote ready.		
10 31 16 00-0010	EA		26" Wide Vent Free Radiant Heat Natural Gas Fireplace	2,260.99	227.85
			<i>For Circulating Heat Fireplace, Add</i> <i>For Remote Ignition, Add</i>	99.29 90.26	
10 31 16 00-0011	EA		32" Wide Vent Free Radiant Heat Natural Gas Fireplace	2,523.86	244.13
			<i>For Circulating Heat Fireplace, Add</i> <i>For Remote Ignition, Add</i>	111.96 101.78	
10 31 16 00-0012	EA		36" Wide Vent Free Radiant Heat Natural Gas Fireplace	2,814.09	271.25
			<i>For Circulating Heat Fireplace, Add</i> <i>For Remote Ignition, Add</i>	124.94 113.58	
10 31 16 00-0013	EA		42" Wide Vent Free Radiant Heat Natural Gas Fireplace	3,196.73	292.96
			<i>For Circulating Heat Fireplace, Add</i> <i>For Remote Ignition, Add</i>	143.60 130.54	

10 32 Fireplace Specialties (10 30)

10 32 16 Fireplace Inserts (10 32)

10 32 16 00-0001			Gas Log Inserts, Vented <small>(10 32 16)</small> Note: Manual controlled.		
10 32 16 00-0002	EA		15", 4 Log Set Gas Log Insert.....	720.94	114.87
10 32 16 00-0003	EA		18", 6 Log Set Gas Log Insert.....	886.43	114.87
10 32 16 00-0004	EA		21", 6 Log Set Gas Log Insert.....	934.75	114.87
10 32 16 00-0005	EA		24", 6 or 7 Log Set Gas Log Insert	983.07	114.87
10 32 16 00-0006	EA		30", 7 or 8 Log Set Gas Log Insert	1,249.97	114.87
10 32 16 00-0007	EA		36", 8 to 11 Log Set Gas Log Insert.....	1,471.82	114.87

10 32 19 Fireplace Screens (10 32)

10 32 19 00-0001			Screens, Mounted <small>(10 32 19)</small>		
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10	10 Specialties
	10 30 Fireplaces and Stoves
	10 32 Fireplace Specialties



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 32 19 00-0002	EA		Black Powder Coated Steel Screen And Frame Note: Fits Heights between 18" to 27" and widths up to 42".	162.46	
10 32 19 00-0003	EA		Stainless Steel Screen And Frame Note: Fits Heights between 18" to 27" and widths up to 42".	276.52	

10 32 23 Fireplace Doors (10 32)

10 32 23 00-0001 Chimney Dampers / Chimalator (10 32 23)

Note: Stainless steel top sealing damper cap.

10 32 23 00-0002	EA		8" x 8" Stainless Steel Chimalator Top Sealing Damper Cap	436.91	21.16
10 32 23 00-0003	EA		8" x 13" Stainless Steel Chimalator Top Sealing Damper Cap	454.13	22.51
10 32 23 00-0004	EA		8" x 18" Stainless Steel Chimalator Top Sealing Damper Cap	587.25	25.66
10 32 23 00-0005	EA		8" x 20" Stainless Steel Chimalator Top Sealing Damper Cap	627.48	25.66
10 32 23 00-0006	EA		10" x 18" Stainless Steel Chimalator Top Sealing Damper Cap	666.07	32.19
10 32 23 00-0007	EA		12" x 12" Stainless Steel Chimalator Top Sealing Damper Cap	515.57	32.19
10 32 23 00-0008	EA		12" x 16" Stainless Steel Chimalator Top Sealing Damper Cap	645.04	38.61
10 32 23 00-0009	EA		13" x 13" Stainless Steel Chimalator Top Sealing Damper Cap	515.57	32.19
10 32 23 00-0010	EA		13" x 18" Stainless Steel Chimalator Top Sealing Damper Cap	645.04	38.61
10 32 23 00-0011	EA		13" x 21" Stainless Steel Chimalator Top Sealing Damper Cap	816.93	38.61
10 32 23 00-0012	EA		16" x 16" Stainless Steel Chimalator Top Sealing Damper Cap	742.17	54.03
10 32 23 00-0013	EA		16" x 20" Stainless Steel Chimalator Top Sealing Damper Cap	910.40	54.03
10 32 23 00-0014	EA		18" x 18" Stainless Steel Chimalator Top Sealing Damper Cap	774.91	56.84
10 32 23 00-0015	EA		18" x 21" Stainless Steel Chimalator Top Sealing Damper Cap	964.98	56.84
10 32 23 00-0016	EA		20" x 20" Stainless Steel Chimalator Top Sealing Damper Cap	1,036.33	59.99
10 32 23 00-0017	EA		20" x 24" Stainless Steel Chimalator Top Sealing Damper Cap	1,115.57	59.99
10 32 23 00-0018	EA		24" x 24" Stainless Steel Chimalator Top Sealing Damper Cap	1,186.65	63.58

10 40 Safety Specialties (10)

10 41 Emergency Access And Information Cabinets (10 40)

10 41 13 Fire Department Plan Cabinets (10 41)

10 41 13 00-0001 Fire Department Plan Cabinets (Knox) (10 41 13)

10 41 13 00-0002	EA		18" High x 14-1/2" Wide x 5" Deep, Light Gray Finish, Surface Mount, Fire Department Emergency Storage Cabinet (Knox 1300).....	1,700.62	35.24
			<i>For Tamper Switch Connected To Existing Alarm System, Add</i>	40.00	
			<i>For Dual Locks, Add</i>	60.00	
			<i>For Back Key Hook Panel, Add</i>	59.04	
			<i>For Swing Key Hook Panel, Add</i>	158.04	
			<i>For Non-Locking Weather Housing, Add</i>	397.12	
10 41 13 00-0003	EA		18" High x 14-1/2" Wide x 7" Deep, Light Gray Finish, Surface Mount, Fire Department Emergency Storage Cabinet (Knox 1300).....	1,803.92	35.24
			<i>For Tamper Switch Connected To Existing Alarm System, Add</i>	40.00	
			<i>For Dual Locks, Add</i>	60.00	
			<i>For Back Key Hook Panel, Add</i>	59.04	
			<i>For Swing Key Hook Panel, Add</i>	158.04	
			<i>For Second Swing Key Hook Panel, Add</i>	125.04	
			<i>For Non-Locking Weather Housing, Add</i>	397.12	

10 41 16 Emergency Key Cabinets (10 41)

10 41 16 00-0001 Emergency Key Cabinets (Knox) (10 41 16)

10 41 16 00-0002	EA		Elevator/Lobby, Deep Red Finish, Surface Mount, Fire Department Emergency Key Storage Box (Knox 1403).....	843.20	35.24
			<i>For Tamper Switch Connected To Existing Alarm System, Add</i>	40.00	
10 41 16 00-0003	EA		5" High x 4" Wide x 3-3/4" Deep, Black Finish, Surface Mount, Fire Department Emergency Storage Box (Knox-Box 3200).....	739.90	35.24
			<i>For Lift-Off Door, Deduct</i>	-40.00	
			<i>For Aluminum Or Dark Bronze Finish, Add</i>	10.00	
			<i>For Tamper Switch Connected To Existing Alarm System, Add</i>	40.00	
			<i>For Recess Mount, Add</i>	60.20	
			<i>For Cast-In-Place Concrete Recess Mounting, Add</i>	119.00	
10 41 16 00-0004	EA		6" High x 6" Wide x 4-1/2" Deep, Black Finish, Surface Mount, Fire Department Emergency Storage Box (Knox-Vault 4100).....	992.99	35.24
			<i>For Aluminum Or Dark Bronze Finish, Add</i>	10.00	
			<i>For Tamper Switch Connected To Existing Alarm System, Add</i>	40.00	
			<i>For Recess Mount, Add</i>	60.20	
			<i>For Dual Locks, Add</i>	60.00	
			<i>For Cast-In-Place Concrete Recess Mounting, Add</i>	130.00	
10 41 16 00-0005	EA		7" High x 7" Wide x 5" Deep, Black Finish, Surface Mount, Fire Department Emergency Storage Box (Knox-Vault 4400).....	1,057.56	35.24
			<i>For Aluminum Or Dark Bronze Finish, Add</i>	10.00	
			<i>For Tamper Switch Connected To Existing Alarm System, Add</i>	40.00	
			<i>For Recess Mount, Add</i>	60.20	
			<i>For Dual Locks, Add</i>	60.00	
			<i>For Cast-In-Place Concrete Recess Mounting, Add</i>	135.00	

10 44 Fire Protection Specialties (10 40)

10 44 13 Fire Protection Cabinets (10 44)



Specialties	10	10
Safety Specialties	10 40	
Fire Protection Specialties	10 44	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 44 13 00-0001 Fire Extinguisher Cabinets <small>(10 44 13)</small>		
10 44 13 00-0002 Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0001)</small>		
10 44 13 00-0003 Steel Door And Trim, Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0002)</small> Note: Includes powder-coat finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0004 EA 9" x 18" x 5-1/2" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet.....	390.76	44.47
10 44 13 00-0005 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet.....	398.69	44.47
10 44 13 00-0006 EA 10-1/2" x 24" x 6" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet.....	400.27	44.47
10 44 13 00-0007 EA 12" x 27" x 7-3/4" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet.....	449.43	44.47
10 44 13 00-0008 EA 16" x 32" x 7-3/4" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet.....	577.88	44.47
10 44 13 00-0009 EA 20" x 27" x 7-3/4" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet.....	595.33	44.47
10 44 13 00-0010 Aluminum Door And Trim, Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0002)</small> Note: Includes clear anodized finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0011 EA 9" x 18" x 5-1/2" Inside Dimensions, Recessed Aluminum Fire Extinguisher Cabinet.....	369.40	44.47
10 44 13 00-0012 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Recessed Aluminum Fire Extinguisher Cabinet.....	375.52	44.47
10 44 13 00-0013 EA 10-1/2" x 24" x 6" Inside Dimensions, Recessed Aluminum Fire Extinguisher Cabinet.....	385.72	44.47
10 44 13 00-0014 EA 12" x 27" x 7-3/4" Inside Dimensions, Recessed Aluminum Fire Extinguisher Cabinet.....	403.06	44.47
10 44 13 00-0015 EA 16" x 32" x 7-3/4" Inside Dimensions, Recessed Aluminum Fire Extinguisher Cabinet.....	456.71	44.47
10 44 13 00-0016 EA 20" x 27" x 7-3/4" Inside Dimensions, Recessed Aluminum Fire Extinguisher Cabinet.....	473.03	44.47
10 44 13 00-0017 Stainless Steel Door And Trim, Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0002)</small> Note: Includes stainless steel finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0018 EA 9" x 18" x 5-1/2" Inside Dimensions, Recessed Stainless Steel Fire Extinguisher Cabinet.....	524.96	44.47
10 44 13 00-0019 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Recessed Stainless Steel Fire Extinguisher Cabinet.....	538.73	44.47
10 44 13 00-0020 EA 10-1/2" x 24" x 6" Inside Dimensions, Recessed Stainless Steel Fire Extinguisher Cabinet.....	545.62	44.47
10 44 13 00-0021 EA 12" x 27" x 7-3/4" Inside Dimensions, Recessed Stainless Steel Fire Extinguisher Cabinet.....	592.67	44.47
10 44 13 00-0022 EA 16" x 32" x 7-3/4" Inside Dimensions, Recessed Stainless Steel Fire Extinguisher Cabinet.....	687.49	44.47
10 44 13 00-0023 EA 20" x 27" x 7-3/4" Inside Dimensions, Recessed Stainless Steel Fire Extinguisher Cabinet.....	716.18	44.47
10 44 13 00-0024 Bronze Door And Trim, Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0002)</small> Note: Includes satin bronze finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0025 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Recessed Bronze Fire Extinguisher Cabinet.....	1,573.47	44.47
10 44 13 00-0026 EA 10-1/2" x 24" x 6" Inside Dimensions, Recessed Bronze Fire Extinguisher Cabinet.....	1,585.37	44.47
10 44 13 00-0027 EA 12" x 27" x 7-3/4" Inside Dimensions, Recessed Bronze Fire Extinguisher Cabinet.....	1,828.03	44.47
10 44 13 00-0028 Acrylic Bubble Door And Steel Trim, Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0002)</small> Note: Includes 180 degree visibility acrylic bubble door, zinc plated handle and steel tub.		
10 44 13 00-0029 EA 10-1/2" x 24" x 4" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet With Acrylic Bubble Door.....	493.84	44.47
10 44 13 00-0030 EA 14" x 30" x 4" Inside Dimensions, Recessed Steel Fire Extinguisher Cabinet With Acrylic Bubble Door.....	554.10	44.47
10 44 13 00-0031 Semi Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0001)</small>		
10 44 13 00-0032 Steel Door And Trim, Semi Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0031)</small> Note: Includes powder-coat finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0033 EA 9" x 18" x 5-1/2" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet.....	433.57	44.47
10 44 13 00-0034 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet.....	449.43	44.47
10 44 13 00-0035 EA 10-1/2" x 24" x 6" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet.....	451.02	44.47
10 44 13 00-0036 EA 12" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet.....	504.94	44.47
10 44 13 00-0037 EA 16" x 32" x 7-3/4" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet.....	612.77	44.47
10 44 13 00-0038 EA 20" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet.....	630.21	44.47
10 44 13 00-0039 Aluminum Door And Trim, Semi Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0031)</small> Note: Includes clear anodized finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0040 EA 9" x 18" x 5-1/2" Inside Dimensions, Semi Recessed Aluminum Fire Extinguisher Cabinet.....	414.89	44.47
10 44 13 00-0041 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Semi Recessed Aluminum Fire Extinguisher Cabinet.....	430.19	44.47
10 44 13 00-0042 EA 10-1/2" x 24" x 6" Inside Dimensions, Semi Recessed Aluminum Fire Extinguisher Cabinet.....	439.37	44.47
10 44 13 00-0043 EA 12" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Aluminum Fire Extinguisher Cabinet.....	456.71	44.47
10 44 13 00-0044 EA 16" x 32" x 7-3/4" Inside Dimensions, Semi Recessed Aluminum Fire Extinguisher Cabinet.....	516.89	44.47
10 44 13 00-0045 EA 20" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Aluminum Fire Extinguisher Cabinet.....	531.18	44.47
10 44 13 00-0046 Stainless Steel Door And Trim, Semi Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0031)</small> Note: Includes stainless steel finish, full view glass or solid metal door, zinc plated handle and steel tub.		
10 44 13 00-0047 EA 9" x 18" x 5-1/2" Inside Dimensions, Semi Recessed Stainless Steel Fire Extinguisher Cabinet.....	585.36	44.47
10 44 13 00-0048 EA 10-1/2" x 24" x 5-1/2" Inside Dimensions, Semi Recessed Stainless Steel Fire Extinguisher Cabinet.....	601.43	44.47
10 44 13 00-0049 EA 10-1/2" x 24" x 6" Inside Dimensions, Semi Recessed Stainless Steel Fire Extinguisher Cabinet.....	608.31	44.47
10 44 13 00-0050 EA 12" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Stainless Steel Fire Extinguisher Cabinet.....	643.89	44.47
10 44 13 00-0051 EA 16" x 32" x 7-3/4" Inside Dimensions, Semi Recessed Stainless Steel Fire Extinguisher Cabinet.....	732.25	44.47
10 44 13 00-0052 EA 20" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Stainless Steel Fire Extinguisher Cabinet.....	751.76	44.47

10	10	Specialties
	10 40	Safety Specialties
	10 44	Fire Protection Specialties



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 44 13 00-0053		Bronze Door And Trim, Semi Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0031)</small>			
		Note: Includes satin bronze finish, full view glass or solid metal door, zinc plated handle and steel tub.			
10 44 13 00-0054	EA	10-1/2" x 24" x 5-1/2" Inside Dimensions, Semi Recessed Bronze Fire Extinguisher Cabinet.....	1,997.32		44.47
10 44 13 00-0055	EA	10-1/2" x 24" x 6" Inside Dimensions, Semi Recessed Bronze Fire Extinguisher Cabinet.....	2,007.30		44.47
10 44 13 00-0056	EA	12" x 27" x 7-3/4" Inside Dimensions, Semi Recessed Bronze Fire Extinguisher Cabinet.....	2,308.71		44.47
10 44 13 00-0057		Acrylic Bubble Door And Steel Trim, Semi Recessed Fire Extinguisher Cabinets <small>(10 44 13 00-0031)</small>			
		Note: Includes 180 degree visibility acrylic bubble door, zinc plated handle and steel tub.			
10 44 13 00-0058	EA	10-1/2" x 24" x 4" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet With Acrylic Bubble Door	550.92		44.47
10 44 13 00-0059	EA	14" x 30" x 4" Inside Dimensions, Semi Recessed Steel Fire Extinguisher Cabinet With Acrylic Bubble Door	608.01		44.47
10 44 13 00-0060		Surface Mounted Fire Extinguisher Cabinets <small>(10 44 13 00-0001)</small>			
10 44 13 00-0061		Steel Door And Trim, Surface Mount Fire Extinguisher Cabinets <small>(10 44 13 00-0060)</small>			
		Note: Includes powder-coat finish, full view glass or solid metal door, zinc plated handle and steel tub.			
10 44 13 00-0062	EA	12-3/16" x 21-3/16" x 6" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet	420.89		44.47
10 44 13 00-0063	EA	13-11/16" x 27-3/16" x 6-1/2" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet	430.40		44.47
10 44 13 00-0064	EA	15-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet	506.52		44.47
10 44 13 00-0065	EA	19-3/16" x 35-3/16" x 8-1/4" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet	600.08		44.47
10 44 13 00-0066	EA	23-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet	625.46		44.47
10 44 13 00-0067		Aluminum Door And Trim, Surface Mount Fire Extinguisher Cabinets <small>(10 44 13 00-0060)</small>			
		Note: Includes clear anodized finish, full view glass or solid metal door, zinc plated handle and steel tub.			
10 44 13 00-0068	EA	12-3/16" x 21-3/16" x 6" Inside Dimensions, Surface Mount Aluminum Fire Extinguisher Cabinet.....	511.79		44.47
10 44 13 00-0069	EA	13-11/16" x 27-3/16" x 6-1/2" Inside Dimensions, Surface Mount Aluminum Fire Extinguisher Cabinet.....	525.06		44.47
10 44 13 00-0070	EA	15-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Aluminum Fire Extinguisher Cabinet.....	554.64		44.47
10 44 13 00-0071	EA	19-3/16" x 35-3/16" x 8-1/4" Inside Dimensions, Surface Mount Aluminum Fire Extinguisher Cabinet.....	612.78		44.47
10 44 13 00-0072	EA	23-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Aluminum Fire Extinguisher Cabinet.....	637.27		44.47
10 44 13 00-0073		Stainless Steel Door And Trim, Surface Mount Fire Extinguisher Cabinets <small>(10 44 13 00-0060)</small>			
		Note: Includes stainless steel finish, full view glass or solid metal door, zinc plated handle and steel tub.			
10 44 13 00-0074	EA	12-3/16" x 21-3/16" x 6" Inside Dimensions, Surface Mount Stainless Steel Fire Extinguisher Cabinet.....	685.20		44.47
10 44 13 00-0075	EA	13-11/16" x 27-3/16" x 6-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Extinguisher Cabinet.....	707.00		44.47
10 44 13 00-0076	EA	15-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Stainless Steel Fire Extinguisher Cabinet.....	760.94		44.47
10 44 13 00-0077	EA	19-3/16" x 35-3/16" x 8-1/4" Inside Dimensions, Surface Mount Stainless Steel Fire Extinguisher Cabinet.....	865.37		44.47
10 44 13 00-0078	EA	23-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Stainless Steel Fire Extinguisher Cabinet.....	897.50		44.47
10 44 13 00-0079		Bronze Door And Trim, Surface Mount Fire Extinguisher Cabinets <small>(10 44 13 00-0060)</small>			
		Note: Includes satin bronze finish, full view glass or solid metal door, zinc plated handle and steel tub.			
10 44 13 00-0080	EA	13-11/16" x 27-3/16" x 6-1/2" Inside Dimensions, Surface Mount Bronze Fire Extinguisher Cabinet	2,299.30		44.47
10 44 13 00-0081	EA	15-3/16" x 30-3/16" x 8-1/4" Inside Dimensions, Surface Mount Bronze Fire Extinguisher Cabinet	2,598.40		44.47
10 44 13 00-0082		Acrylic Bubble Door And Steel Trim, Surface Mount Fire Extinguisher Cabinets <small>(10 44 13 00-0060)</small>			
		Note: Includes 180 degree visibility acrylic bubble door, zinc plated handle and steel tub.			
10 44 13 00-0083	EA	13-11/16" x 27-3/16" x 4-5/8" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet With Acrylic Bubble Door.....	516.04		44.47
10 44 13 00-0084	EA	17-3/16" x 33-3/16" x 4-5/8" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet With Acrylic Bubble Door.....	585.81		44.47
10 44 13 00-0085	EA	31-3/16" x 33-3/16" x 4-5/8" Inside Dimensions, Surface Mount Steel Fire Extinguisher Cabinet With Acrylic Bubble Door.....	830.02		44.47
10 44 13 00-0086		Fire Extinguisher Cabinet Accessories <small>(10 44 13 00-0001)</small>			
10 44 13 00-0087	EA	Standard Break Glass Cylinder Lock Mechanism.....	39.29		13.56
10 44 13 00-0088	EA	Breaker Bar And Chain For Break Glass Cabinets	35.03		13.56
10 44 13 00-0089	EA	Replacement Of Standard Pull Handle	32.43		
10 44 13 00-0090	EA	Fire Extinguisher Cabinet Battery Operated Alarm	109.01		27.11
10 44 13 00-0091	EA	Fire Rated Option For 10-1/2" x 24" x 5-1/2" Or 6" Cabinets	231.09		
10 44 13 00-0092	EA	Fire Rated Option For 12" x 27" x 7-3/4" Cabinets.....	254.20		
10 44 13 00-0093	EA	Fire Rated Option For 16" x 32" x 7-3/4" Cabinets.....	346.64		
10 44 13 00-0094	EA	Fire Rated Option For 20" x 27" x 7-3/4" Cabinets.....	473.73		
10 44 13 00-0095	EA	Fire Rated Option For 9" x 18" x 5-1/2" Cabinets.....	554.62		
10 44 13 00-0096	EA	Standard Glass With Wire Glass For 9" x 18" x 5-1/2" Cabinets.....	134.03		
10 44 13 00-0097	EA	Standard Glass With Wire Glass For 10-1/2" x 24" x 5-1/2" Or 6" Cabinets	138.65		
10 44 13 00-0098	EA	Standard Glass With Wire Glass For 12" x 27" x 7-3/4" Cabinets.....	184.87		
10 44 13 00-0099	EA	Standard Glass With Wire Glass For 16" x 32" x 7-3/4" Cabinets.....	335.08		
10 44 13 00-0100	EA	Standard Glass With Wire Glass For 20" x 27" x 7-3/4" Cabinets.....	339.70		
10 44 13 00-0101	EA	Standard Glass With Wire Glass For 12-3/16" x 21-3/16" x 6" Cabinets	133.07		
10 44 13 00-0102	EA	Standard Glass With Wire Glass For 13-11/16" x 27-3/16" x 6-1/2" Cabinets	139.73		
10 44 13 00-0103	EA	Standard Glass With Wire Glass For 15-3/16" x 30-3/16" x 8-1/4" Cabinets	188.52		
10 44 13 00-0104	EA	Standard Glass With Wire Glass For 19-3/16" x 35-3/16" x 8-1/4" Cabinets	332.68		



Specialties	10	10
Safety Specialties	10 40	
Fire Protection Specialties	10 44	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
10 44 13 00-0105	EA	Standard Glass With Wire Glass For 23-3/16" x 30-3/16" x 8-1/4" Cabinets	337.12		
10 44 13 00-0106		Fire Hose Cabinets <small>(10 44 13)</small>			
		Note: Excludes hoses, hose rack units, fire extinguishers and valves. See CSI section 21 12 13 00-0001 for fire hoses and nozzles, 21 12 13 00-0015 for fire hose rack units, 21 12 23 00-0014 for fire hose angle valves.			
10 44 13 00-0107		Recessed Fire Hose Cabinets <small>(10 44 13 00-0106)</small>			
10 44 13 00-0108		Steel Door And Trim, Recessed Fire Hose Cabinets <small>(10 44 13 00-0107)</small>			
		Note: Includes baked enamel finish, steel door, trim and box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.			
10 44 13 00-0109	EA	34" x 24" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	679.80	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0110	EA	34" x 26" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	692.09	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0111	EA	38" x 24" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	702.33	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0112	EA	38" x 26" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	712.58	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0113	EA	30" x 30" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	724.86	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0114	EA	38" x 32" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	757.61	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0115	EA	23" x 18" x 8" Inside Dimensions, Recessed Steel Fire Hose Cabinet	767.86	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0116		Aluminum Door And Trim, Recessed Fire Hose Cabinets <small>(10 44 13 00-0107)</small>			
		Note: Includes clear satin anodized finish, aluminum door and trim, baked enamel steel box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.			
10 44 13 00-0117	EA	34" x 24" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	736.55	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0118	EA	30" x 30" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	756.35	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0119	EA	34" x 26" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	758.92	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0120	EA	38" x 24" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	767.15	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0121	EA	38" x 26" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	777.95	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0122	EA	38" x 32" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	808.54	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0123	EA	23" x 18" x 8" Inside Dimensions, Recessed Aluminum Fire Hose Cabinet	839.14	157.69	
		<i>For Solid Aluminum Door, Add</i>	6.50		
10 44 13 00-0124		Stainless Steel Door And Trim, Recessed Fire Hose Cabinets <small>(10 44 13 00-0107)</small>			
		Note: Includes #4 finish, stainless steel door and trim, baked enamel steel box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.			
10 44 13 00-0125	EA	23" x 18" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	971.45	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0126	EA	34" x 24" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	1,073.89	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0127	EA	34" x 26" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	1,083.75	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0128	EA	38" x 24" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	1,115.27	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0129	EA	38" x 26" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	1,125.12	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0130	EA	30" x 30" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	1,176.34	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0131	EA	38" x 32" x 8" Inside Dimensions, Recessed Stainless Steel Fire Hose Cabinet	1,227.57	157.69	
		<i>For Solid Stainless Steel Door, Deduct</i>	-7.70		
10 44 13 00-0132		Semi Recessed Fire Hose Cabinets <small>(10 44 13 00-0106)</small>			
10 44 13 00-0133		Steel Door And Trim, Semi Recessed Fire Hose Cabinets <small>(10 44 13 00-0132)</small>			
		Note: Includes baked enamel finish, steel door, trim and box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.			
10 44 13 00-0134	EA	34" x 24" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	712.58	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0135	EA	34" x 26" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	724.86	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0136	EA	38" x 24" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	735.08	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0137	EA	38" x 26" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	747.37	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0138	EA	30" x 30" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	757.61	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0139	EA	38" x 32" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	790.36	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		
10 44 13 00-0140	EA	23" x 18" x 8" Inside Dimensions, Semi Recessed Steel Fire Hose Cabinet	802.64	157.69	
		<i>For Solid Steel Door, Deduct</i>	-8.60		

10	10	Specialties
	10 40	Safety Specialties
	10 44	Fire Protection Specialties



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 44 13 00-0141	Aluminum Door And Trim, Semi Recessed Fire Hose Cabinets <small>(10 44 13 00-0132)</small>		
	Note: Includes clear satin anodized finish, aluminum door and trim, baked enamel steel box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.		
10 44 13 00-0142	EA 34" x 24" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	756.35	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0143	EA 34" x 26" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	777.95	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0144	EA 30" x 30" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	781.03	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0145	EA 38" x 24" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	786.95	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0146	EA 38" x 26" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	797.74	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0147	EA 38" x 32" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	828.34	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0148	EA 23" x 18" x 8" Inside Dimensions, Semi Recessed Aluminum Fire Hose Cabinet.....	858.94	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	

10 44 13 00-0149	Stainless Steel Door And Trim, Semi Recessed Fire Hose Cabinets <small>(10 44 13 00-0132)</small>		
	Note: Includes #4 finish, 304 stainless steel door and trim, baked enamel steel box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.		
10 44 13 00-0150	EA 23" x 18" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,032.52	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0151	EA 34" x 24" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,144.82	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0152	EA 34" x 26" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,154.67	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0153	EA 38" x 24" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,186.19	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0154	EA 38" x 26" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,196.04	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0155	EA 30" x 30" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,247.27	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0156	EA 38" x 32" x 8" Inside Dimensions, Semi Recessed Stainless Steel Fire Hose Cabinet.....	1,298.49	157.69
	<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	

10 44 13 00-0157	Surface Mount Fire Hose Cabinets <small>(10 44 13 00-0106)</small>		
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10 44 13 00-0158	Steel Door And Trim, Surface Mount Fire Hose Cabinets <small>(10 44 13 00-0157)</small>		
	Note: Includes baked enamel finish, steel door and trim, baked enamel steel box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.		
10 44 13 00-0159	EA 37-1/2" x 27-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	724.86	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	
10 44 13 00-0160	EA 37-1/2" x 29-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	735.08	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	
10 44 13 00-0161	EA 41-1/2" x 27-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	747.37	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	
10 44 13 00-0162	EA 41-1/2" x 29-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	757.61	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	
10 44 13 00-0163	EA 33-1/2" x 33-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	767.86	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	
10 44 13 00-0164	EA 41-1/2" x 35-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	802.64	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	
10 44 13 00-0165	EA 26-1/2" x 21-1/2" x 8-1/2" Inside Dimensions, Surface Mount Steel Fire Hose Cabinet.....	812.89	157.69
	<i>For Solid Steel Door, Deduct</i>	-8.60	

10 44 13 00-0166	Aluminum Door And Trim, Surface Mount Fire Hose Cabinets <small>(10 44 13 00-0157)</small>		
	Note: Includes clear satin anodized finish, aluminum door, trim and box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.		

10 44 13 00-0167	EA 37-1/2" x 27-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	808.54	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0168	EA 33-1/2" x 33-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	828.34	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0169	EA 37-1/2" x 29-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	833.48	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0170	EA 41-1/2" x 27-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	839.14	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0171	EA 41-1/2" x 29-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	848.14	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0172	EA 41-1/2" x 35-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	880.54	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	
10 44 13 00-0173	EA 26-1/2" x 21-1/2" x 8-1/2" Inside Dimensions, Surface Mount Aluminum Fire Hose Cabinet.....	900.34	157.69
	<i>For Solid Aluminum Door, Add</i>	6.50	

10 44 13 00-0174	Stainless Steel Door And Trim, Surface Mount Fire Hose Cabinets <small>(10 44 13 00-0157)</small>		
	Note: Includes #4 finish, 304 stainless steel door, trim and box, full view acrylic door lite, satin finish turn handle, continuous matching hinge and self-adjusting roller catch.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 44 13 00-0175 EA 26-1/2" x 21-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,115.27	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0176 EA 37-1/2" x 27-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,442.32	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0177 EA 41-1/2" x 27-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,525.06	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0178 EA 37-1/2" x 29-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,544.76	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0179 EA 41-1/2" x 29-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,564.47	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0180 EA 33-1/2" x 33-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,647.21	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
10 44 13 00-0181 EA 41-1/2" x 35-1/2" x 8-1/2" Inside Dimensions, Surface Mount Stainless Steel Fire Hose Cabinet.....	1,749.66	157.69
<i>For Solid Stainless Steel Door, Deduct</i>	-7.70	
 10 44 16 Fire Extinguishers (10 44)		
10 44 16 13 Portable Fire Extinguishers (10 44 16)		
Note: Includes filling, certification, bracket, hardware and mounting on wall.		
10 44 16 13-0001 Carbon Dioxide Type, Class BC Portable Fire Extinguisher (10 44 16 13)		
10 44 16 13-0002 EA 2.5 LB Carbon Dioxide, Type BC Portable Fire Extinguisher.....	184.92	14.10
<i>For >5 To 10, Deduct</i>	-5.63	
<i>For >10, Deduct</i>	-11.26	
<i>For Placement In Cabinet, Deduct</i>	-36.15	
10 44 16 13-0003 EA 5 LB Carbon Dioxide, Type BC Portable Fire Extinguisher.....	269.55	16.27
<i>For >5 To 10, Deduct</i>	-9.31	
<i>For >10, Deduct</i>	-18.61	
<i>For Placement In Cabinet, Deduct</i>	-41.72	
10 44 16 13-0004 EA 10 LB Carbon Dioxide, Type BC Portable Fire Extinguisher.....	350.61	20.61
<i>For >5 To 10, Deduct</i>	-12.11	
<i>For >10, Deduct</i>	-24.22	
<i>For Placement In Cabinet, Deduct</i>	-54.23	
10 44 16 13-0005 EA 15 LB Carbon Dioxide, Type BC Portable Fire Extinguisher.....	431.75	26.03
<i>For >5 To 10, Deduct</i>	-14.61	
<i>For >10, Deduct</i>	-29.62	
<i>For Placement In Cabinet, Deduct</i>	-67.79	
10 44 16 13-0006 EA 20 LB Carbon Dioxide, Type BC Portable Fire Extinguisher.....	480.13	26.03
<i>For >5 To 10, Deduct</i>	-17.23	
<i>For >10, Deduct</i>	-34.46	
<i>For Placement In Cabinet, Deduct</i>	-67.79	
10 44 16 13-0007 EA 50 LB Carbon Dioxide, Type BC Wheeled Fire Extinguisher.....	1,536.65	41.21
<i>For >5 To 10, Deduct</i>	-65.99	
<i>For >10, Deduct</i>	-131.97	
10 44 16 13-0008 EA 100 LB Carbon Dioxide, Type BC Wheeled Fire Extinguisher.....	3,007.64	41.21
<i>For >5 To 10, Deduct</i>	-139.54	
<i>For >10, Deduct</i>	-279.07	
 10 44 16 13-0009 Dry Chemical Type, Class ABC Portable Fire Extinguisher (10 44 16 13)		
10 44 16 13-0010 EA 2.6 LB Dry Chemical, Type ABC Portable Fire Extinguisher.....	115.24	14.10
<i>For >5 To 10, Deduct</i>	-2.15	
<i>For >10, Deduct</i>	-4.29	
<i>For Placement In Cabinet, Deduct</i>	-36.15	
10 44 16 13-0011 EA 5 LB Dry Chemical, Type ABC Portable Fire Extinguisher.....	144.33	16.27
<i>For >5 To 10, Deduct</i>	-3.05	
<i>For >10, Deduct</i>	-6.09	
<i>For Placement In Cabinet, Deduct</i>	-41.72	
10 44 16 13-0012 EA 10 LB Dry Chemical, Type ABC Portable Fire Extinguisher.....	205.41	20.61
<i>For >5 To 10, Deduct</i>	-4.85	
<i>For >10, Deduct</i>	-9.70	
<i>For Placement In Cabinet, Deduct</i>	-54.23	
10 44 16 13-0013 EA 20 LB Dry Chemical, Type ABC Portable Fire Extinguisher.....	288.16	26.03
<i>For >5 To 10, Deduct</i>	-7.63	
<i>For >10, Deduct</i>	-15.26	
<i>For Placement In Cabinet, Deduct</i>	-67.79	
10 44 16 13-0014 EA 50 LB Dry Chemical, Type ABC Wheeled Fire Extinguisher.....	1,840.93	41.21
<i>For >5 To 10, Deduct</i>	-81.20	
<i>For >10, Deduct</i>	-162.40	
10 44 16 13-0015 EA 125 LB Dry Chemical, Type ABC Wheeled Fire Extinguisher.....	2,730.37	41.21
<i>For >5 To 10, Deduct</i>	-125.67	
<i>For >10, Deduct</i>	-251.35	
 10 44 16 13-0016 Other Portable Fire Extinguishers (10 44 16 13)		
10 44 16 13-0017 EA 2.5 Gallon Water, Stored Pressure Portable Fire Extinguisher.....	208.34	16.27
Note: Stainless steel.		
<i>For >5 To 10, Deduct</i>	-6.25	
<i>For >10, Deduct</i>	-12.49	
<i>For Placement In Cabinet, Deduct</i>	-41.72	

10	10	Specialties
	10 40	Safety Specialties
	10 44	Fire Protection Specialties



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
10 44 16 13-0018	EA	1.6 Gallon Wet Chemical, Class K Portable Fire Extinguisher.....	315.84		26.03
		Note: Stainless steel.			
		For >5 To 10, Deduct	-9.01		
		For >10, Deduct	-18.03		
		For Placement In Cabinet, Deduct	-67.79		
10 44 16 13-0019	EA	2.5 Gallon Wet Chemical, Class K Portable Fire Extinguisher.....	335.48		26.03
		Note: Stainless steel.			
		For >5 To 10, Deduct	-10.00		
		For >10, Deduct	-19.99		
		For Placement In Cabinet, Deduct	-67.79		
10 44 16 13-0020	EA	30 LB Dry Powder, Class D Portable Fire Extinguisher.....	471.14		26.03
		Note: Yellow steel.			
		For >5 To 10, Deduct	-16.78		
		For >10, Deduct	-33.56		
10 44 16 13-0021		Fire Extinguisher Backboards (10 44 16 13)			
10 44 16 13-0022		Fire Extinguisher Backboards (10 44 16 13-0021)			
		Note: Mounted to any wall. Includes anchors.			
10 44 16 13-0023	EA	Red Painted 1/2" x 12" x 40" Beveled Edge Plywood Fire Extinguisher Backboard.....	119.96		18.59
10 44 16 13-0024	EA	Relocate Fire Extinguisher Wood Backboard, Any Size.....	163.97		
		Note: Includes storage and cleaning.			
10 44 16 13-0025		Inspections And Testing (10 44 16 13)			
10 44 16 13-0026	EA	On Site Fire Extinguisher Annual Inspection (Tag).....	9.00		
10 44 16 13-0027	EA	On Site Fire Extinguisher Hydrotest.....	13.24		
10 44 19		Fire Blankets (10 44)			
10 44 19 00-0001	EA	Vertical Roller Type Fire Blanket Cabinet (JL Industries 1FB).....	527.41		44.47
		Note: Includes a 62" x 84", 3-1/2 pound, processed wool fire blanket.			
10 44 19 00-0002	EA	Drop Type Fire Blanket Cabinet (JL Industries 2FB).....	376.76		44.47
		Note: Includes a 62" x 84", 3-1/2 pound, processed wool fire blanket.			
10 50		Storage Specialties (10)			
10 51		Lockers (10 50)			
10 51 13		Metal Lockers (10 51)			
10 51 13 00-0001		Institutional And Corridor Lockers (10 51 13)			
		Note: Price per frame. Includes baked enamel 24 gauge solid body components and 6" legs. Excludes slope top, base fillers, and locks.			
10 51 13 00-0002		Single Tier Institutional Or Corridor Locker (10 51 13 00-0001)			
		Note: Includes one hat shelf, three single hooks and one double hook.			
10 51 13 00-0003	EA	12" x 12" x 48" Single Tier Institutional Or Corridor Locker.....	278.16		33.62
		For >25 To 50, Deduct	-10.55		
		For >50 To 100, Deduct	-22.10		
		For >100, Deduct	-33.65		
		For 14 Gauge Doors, Add	16.87		
10 51 13 00-0004	EA	12" x 15" x 48" Single Tier Institutional Or Corridor Locker.....	286.51		33.62
		For >25 To 50, Deduct	-10.96		
		For >50 To 100, Deduct	-22.93		
		For >100, Deduct	-34.91		
		For 14 Gauge Doors, Add	17.54		
10 51 13 00-0005	EA	12" x 18" x 48" Single Tier Institutional Or Corridor Locker.....	294.85		33.62
		For >25 To 50, Deduct	-11.38		
		For >50 To 100, Deduct	-23.77		
		For >100, Deduct	-36.16		
		For 14 Gauge Doors, Add	18.21		
10 51 13 00-0006	EA	12" x 12" x 60" Single Tier Institutional Or Corridor Locker.....	262.89		33.62
		For >25 To 50, Deduct	-9.78		
		For >50 To 100, Deduct	-20.57		
		For >100, Deduct	-31.36		
		For 14 Gauge Doors, Add	15.65		
10 51 13 00-0007	EA	12" x 15" x 60" Single Tier Institutional Or Corridor Locker.....	273.26		33.62
		For >25 To 50, Deduct	-10.30		
		For >50 To 100, Deduct	-21.61		
		For >100, Deduct	-32.92		
		For 14 Gauge Doors, Add	16.48		
10 51 13 00-0008	EA	12" x 18" x 60" Single Tier Institutional Or Corridor Locker.....	287.43		33.62
		For >25 To 50, Deduct	-11.01		
		For >50 To 100, Deduct	-23.03		
		For >100, Deduct	-35.04		
		For 14 Gauge Doors, Add	17.61		
10 51 13 00-0009	EA	12" x 12" x 72" Single Tier Institutional Or Corridor Locker.....	286.57		34.70
		For >25 To 50, Deduct	-10.86		
		For >50 To 100, Deduct	-22.76		
		For >100, Deduct	-34.66		
		For 14 Gauge Doors, Add	17.37		



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51	13 00-0010	EA	12" x 15" x 72" Single Tier Institutional Or Corridor Locker.....	295.16	34.70
			<i>For >25 To 50, Deduct</i>	-11.29	
			<i>For >50 To 100, Deduct</i>	-23.62	
			<i>For >100, Deduct</i>	-35.94	
			<i>For 14 Gauge Doors, Add</i>	18.06	
10 51	13 00-0011	EA	12" x 18" x 72" Single Tier Institutional Or Corridor Locker.....	303.54	34.70
			<i>For >25 To 50, Deduct</i>	-11.71	
			<i>For >50 To 100, Deduct</i>	-24.45	
			<i>For >100, Deduct</i>	-37.20	
			<i>For 14 Gauge Doors, Add</i>	18.73	
10 51	13 00-0012	EA	15" x 15" x 72" Single Tier Institutional Or Corridor Locker.....	318.00	34.70
			<i>For >25 To 50, Deduct</i>	-12.43	
			<i>For >50 To 100, Deduct</i>	-25.90	
			<i>For >100, Deduct</i>	-39.37	
			<i>For 14 Gauge Doors, Add</i>	19.89	
10 51	13 00-0013	EA	15" x 18" x 72" Single Tier Institutional Or Corridor Locker.....	332.31	34.70
			<i>For >25 To 50, Deduct</i>	-13.15	
			<i>For >50 To 100, Deduct</i>	-27.33	
			<i>For >100, Deduct</i>	-41.52	
			<i>For 14 Gauge Doors, Add</i>	21.03	
10 51	13 00-0014	EA	18" x 18" x 72" Single Tier Institutional Or Corridor Locker.....	347.47	34.70
			<i>For >25 To 50, Deduct</i>	-13.90	
			<i>For >50 To 100, Deduct</i>	-28.85	
			<i>For >100, Deduct</i>	-43.79	
			<i>For 14 Gauge Doors, Add</i>	22.24	
10 51	13 00-0015	EA	18" x 21" x 72" Single Tier Institutional Or Corridor Locker.....	361.47	34.70
			<i>For >25 To 50, Deduct</i>	-14.60	
			<i>For >50 To 100, Deduct</i>	-30.25	
			<i>For >100, Deduct</i>	-45.89	
			<i>For 14 Gauge Doors, Add</i>	23.36	
10 51	13 00-0016	EA	24" x 24" x 72" Single Tier Institutional Or Corridor Locker.....	489.37	34.70
			<i>For >25 To 50, Deduct</i>	-21.00	
			<i>For >50 To 100, Deduct</i>	-43.04	
			<i>For >100, Deduct</i>	-65.08	
			<i>For 14 Gauge Doors, Add</i>	33.60	
10 51	13 00-0017		Two Tier Institutional Or Corridor Locker <small>(10 51 13 00-0001)</small>		
			Note: Includes three single hooks and one double hook per tier.		
10 51	13 00-0018	EA	12" x 12" x 60" Two Tier Institutional Or Corridor Locker.....	310.76	34.70
			<i>For >25 To 50, Deduct</i>	-12.07	
			<i>For >50 To 100, Deduct</i>	-25.18	
			<i>For >100, Deduct</i>	-38.28	
			<i>For 14 Gauge Doors, Add</i>	26.55	
10 51	13 00-0019	EA	12" x 15" x 60" Two Tier Institutional Or Corridor Locker.....	317.29	34.70
			<i>For >25 To 50, Deduct</i>	-12.39	
			<i>For >50 To 100, Deduct</i>	-25.83	
			<i>For >100, Deduct</i>	-39.26	
			<i>For 14 Gauge Doors, Add</i>	27.27	
10 51	13 00-0020	EA	12" x 18" x 60" Two Tier Institutional Or Corridor Locker.....	323.87	34.70
			<i>For >25 To 50, Deduct</i>	-12.72	
			<i>For >50 To 100, Deduct</i>	-26.49	
			<i>For >100, Deduct</i>	-40.25	
			<i>For 14 Gauge Doors, Add</i>	27.99	
10 51	13 00-0021	EA	12" x 12" x 72" Two Tier Institutional Or Corridor Locker.....	324.93	35.79
			<i>For >25 To 50, Deduct</i>	-12.67	
			<i>For >50 To 100, Deduct</i>	-26.41	
			<i>For >100, Deduct</i>	-40.15	
			<i>For 14 Gauge Doors, Add</i>	27.87	
10 51	13 00-0022	EA	12" x 15" x 72" Two Tier Institutional Or Corridor Locker.....	339.20	35.79
			<i>For >25 To 50, Deduct</i>	-13.38	
			<i>For >50 To 100, Deduct</i>	-27.83	
			<i>For >100, Deduct</i>	-42.29	
			<i>For 14 Gauge Doors, Add</i>	29.44	
10 51	13 00-0023	EA	12" x 18" x 72" Two Tier Institutional Or Corridor Locker.....	347.82	35.79
			<i>For >25 To 50, Deduct</i>	-13.81	
			<i>For >50 To 100, Deduct</i>	-28.70	
			<i>For >100, Deduct</i>	-43.58	
			<i>For 14 Gauge Doors, Add</i>	30.39	
10 51	13 00-0024	EA	15" x 15" x 72" Two Tier Institutional Or Corridor Locker.....	360.18	35.79
			<i>For >25 To 50, Deduct</i>	-14.43	
			<i>For >50 To 100, Deduct</i>	-29.93	
			<i>For >100, Deduct</i>	-45.44	
			<i>For 14 Gauge Doors, Add</i>	31.74	
10 51	13 00-0025	EA	15" x 18" x 72" Two Tier Institutional Or Corridor Locker.....	372.58	35.79
			<i>For >25 To 50, Deduct</i>	-15.05	
			<i>For >50 To 100, Deduct</i>	-31.17	
			<i>For >100, Deduct</i>	-47.30	
			<i>For 14 Gauge Doors, Add</i>	33.11	
10 51	13 00-0026	EA	18" x 18" x 72" Two Tier Institutional Or Corridor Locker.....	428.72	35.79
			<i>For >25 To 50, Deduct</i>	-17.86	
			<i>For >50 To 100, Deduct</i>	-36.79	
			<i>For >100, Deduct</i>	-55.72	
			<i>For 14 Gauge Doors, Add</i>	39.28	

10 Specialties**10 50 Storage Specialties****10 51 Lockers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51 13 00-0027	EA		18" x 21" x 72" Two Tier Institutional Or Corridor Locker	438.92	35.79
			<i>For >25 To 50, Deduct</i>	-18.37	
			<i>For >50 To 100, Deduct</i>	-37.81	
			<i>For >100, Deduct</i>	-57.25	
			<i>For 14 Gauge Doors, Add</i>	40.41	
10 51 13 00-0028			Three Tier Institutional Or Corridor Locker <small>(10 51 13 00-0001)</small>		
			Note: Includes one double hook per tier.		
10 51 13 00-0029	EA		12" x 12" x 72" Three Tier Institutional Or Corridor Locker	364.99	36.88
			<i>For >25 To 50, Deduct</i>	-14.56	
			<i>For >50 To 100, Deduct</i>	-30.23	
			<i>For >100, Deduct</i>	-45.90	
			<i>For 14 Gauge Doors, Add</i>	43.69	
10 51 13 00-0030	EA		12" x 15" x 72" Three Tier Institutional Or Corridor Locker	371.70	36.88
			<i>For >25 To 50, Deduct</i>	-14.90	
			<i>For >50 To 100, Deduct</i>	-30.90	
			<i>For >100, Deduct</i>	-46.91	
			<i>For 14 Gauge Doors, Add</i>	44.69	
10 51 13 00-0031	EA		12" x 18" x 72" Three Tier Institutional Or Corridor Locker	395.53	36.88
			<i>For >25 To 50, Deduct</i>	-16.09	
			<i>For >50 To 100, Deduct</i>	-33.28	
			<i>For >100, Deduct</i>	-50.48	
			<i>For 14 Gauge Doors, Add</i>	48.27	
10 51 13 00-0032	EA		15" x 15" x 72" Three Tier Institutional Or Corridor Locker	418.35	36.88
			<i>For >25 To 50, Deduct</i>	-17.23	
			<i>For >50 To 100, Deduct</i>	-35.57	
			<i>For >100, Deduct</i>	-53.90	
			<i>For 14 Gauge Doors, Add</i>	51.69	
10 51 13 00-0033	EA		15" x 18" x 72" Three Tier Institutional Or Corridor Locker	436.52	36.88
			<i>For >25 To 50, Deduct</i>	-18.14	
			<i>For >50 To 100, Deduct</i>	-37.38	
			<i>For >100, Deduct</i>	-56.63	
			<i>For 14 Gauge Doors, Add</i>	54.42	
10 51 13 00-0034			Four Tier Institutional Or Corridor Locker <small>(10 51 13 00-0001)</small>		
10 51 13 00-0035	EA		12" x 12" x 72" Four Tier Institutional Or Corridor Locker	358.20	37.96
			<i>For >25 To 50, Deduct</i>	-14.11	
			<i>For >50 To 100, Deduct</i>	-29.37	
			<i>For >100, Deduct</i>	-44.62	
10 51 13 00-0036	EA		12" x 15" x 72" Four Tier Institutional Or Corridor Locker	369.90	37.96
			<i>For >25 To 50, Deduct</i>	-14.70	
			<i>For >50 To 100, Deduct</i>	-30.54	
			<i>For >100, Deduct</i>	-46.37	
10 51 13 00-0037	EA		12" x 18" x 72" Four Tier Institutional Or Corridor Locker	388.72	37.96
			<i>For >25 To 50, Deduct</i>	-15.64	
			<i>For >50 To 100, Deduct</i>	-32.42	
			<i>For >100, Deduct</i>	-49.20	
10 51 13 00-0038	EA		15" x 15" x 72" Four Tier Institutional Or Corridor Locker	403.79	37.96
			<i>For >25 To 50, Deduct</i>	-16.39	
			<i>For >50 To 100, Deduct</i>	-33.93	
			<i>For >100, Deduct</i>	-51.46	
10 51 13 00-0039	EA		15" x 18" x 72" Four Tier Institutional Or Corridor Locker	425.48	37.96
			<i>For >25 To 50, Deduct</i>	-17.48	
			<i>For >50 To 100, Deduct</i>	-36.09	
			<i>For >100, Deduct</i>	-54.71	
10 51 13 00-0040			Six Tier Institutional Or Corridor Locker <small>(10 51 13 00-0001)</small>		
10 51 13 00-0041	EA		12" x 12" x 72" Six Tier Institutional Or Corridor Locker	389.81	39.04
			<i>For >25 To 50, Deduct</i>	-15.59	
			<i>For >50 To 100, Deduct</i>	-32.34	
			<i>For >100, Deduct</i>	-49.10	
10 51 13 00-0042	EA		12" x 15" x 72" Six Tier Institutional Or Corridor Locker	398.83	39.04
			<i>For >25 To 50, Deduct</i>	-16.04	
			<i>For >50 To 100, Deduct</i>	-33.25	
			<i>For >100, Deduct</i>	-50.45	
10 51 13 00-0043	EA		12" x 18" x 72" Six Tier Institutional Or Corridor Locker	415.87	39.04
			<i>For >25 To 50, Deduct</i>	-16.89	
			<i>For >50 To 100, Deduct</i>	-34.95	
			<i>For >100, Deduct</i>	-53.01	
10 51 13 00-0044			Locker And Coat Rack Combination <small>(10 51 13 00-0001)</small>		
10 51 13 00-0045	EA		45" x 18" x 12", 4 Person Wall Mount Locker And Coat Rack Combination	722.91	26.03
10 51 13 00-0046	EA		72" x 18" x 78", 16 Person Locker And Coat Rack Combination	1,155.40	54.23
10 51 13 00-0047			Athletic Lockers <small>(10 51 13)</small>		
			Note: Price per frame. Includes baked enamel paint, diamond perforated doors and sides, 16 gauge solid top, bottom, and shelves and 6" legs. Excludes slope top, base fillers, and locks.		
10 51 13 00-0048			Single Tier Athletic Locker <small>(10 51 13 00-0047)</small>		
			Note: Includes one hat shelf, three single hooks and one double hook.		



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51	13 00-0049	EA	12" x 15" x 60" Single Tier Athletic Locker.....	395.00	34.70
			<i>For >25 To 50, Deduct</i>	-16.28	
			<i>For >50 To 100, Deduct</i>	-33.60	
			<i>For >100, Deduct</i>	-50.92	
10 51	13 00-0050	EA	12" x 18" x 60" Single Tier Athletic Locker.....	408.75	34.70
			<i>For >25 To 50, Deduct</i>	-16.97	
			<i>For >50 To 100, Deduct</i>	-34.98	
			<i>For >100, Deduct</i>	-52.98	
10 51	13 00-0051	EA	15" x 15" x 60" Single Tier Athletic Locker.....	417.59	34.70
			<i>For >25 To 50, Deduct</i>	-17.41	
			<i>For >50 To 100, Deduct</i>	-35.86	
			<i>For >100, Deduct</i>	-54.31	
10 51	13 00-0052	EA	15" x 18" x 60" Single Tier Athletic Locker.....	432.26	34.70
			<i>For >25 To 50, Deduct</i>	-18.14	
			<i>For >50 To 100, Deduct</i>	-37.33	
			<i>For >100, Deduct</i>	-56.51	
10 51	13 00-0053	EA	18" x 18" x 60" Single Tier Athletic Locker.....	495.59	34.70
			<i>For >25 To 50, Deduct</i>	-21.31	
			<i>For >50 To 100, Deduct</i>	-43.66	
			<i>For >100, Deduct</i>	-66.01	
10 51	13 00-0054	EA	18" x 21" x 60" Single Tier Athletic Locker.....	545.93	34.70
			<i>For >25 To 50, Deduct</i>	-23.83	
			<i>For >50 To 100, Deduct</i>	-48.69	
			<i>For >100, Deduct</i>	-73.56	
10 51	13 00-0055	EA	18" x 24" x 60" Single Tier Athletic Locker.....	580.37	34.70
			<i>For >25 To 50, Deduct</i>	-25.55	
			<i>For >50 To 100, Deduct</i>	-52.14	
			<i>For >100, Deduct</i>	-78.73	
10 51	13 00-0056	EA	12" x 15" x 72" Single Tier Athletic Locker.....	410.26	34.70
			<i>For >25 To 50, Deduct</i>	-17.04	
			<i>For >50 To 100, Deduct</i>	-35.13	
			<i>For >100, Deduct</i>	-53.21	
10 51	13 00-0057	EA	12" x 18" x 72" Single Tier Athletic Locker.....	435.03	34.70
			<i>For >25 To 50, Deduct</i>	-18.28	
			<i>For >50 To 100, Deduct</i>	-37.60	
			<i>For >100, Deduct</i>	-56.93	
10 51	13 00-0058	EA	15" x 15" x 72" Single Tier Athletic Locker.....	443.73	34.70
			<i>For >25 To 50, Deduct</i>	-18.72	
			<i>For >50 To 100, Deduct</i>	-38.47	
			<i>For >100, Deduct</i>	-58.23	
10 51	13 00-0059	EA	15" x 18" x 72" Single Tier Athletic Locker.....	459.63	34.70
			<i>For >25 To 50, Deduct</i>	-19.51	
			<i>For >50 To 100, Deduct</i>	-40.06	
			<i>For >100, Deduct</i>	-60.62	
10 51	13 00-0060	EA	18" x 18" x 72" Single Tier Athletic Locker.....	498.83	34.70
			<i>For >25 To 50, Deduct</i>	-21.47	
			<i>For >50 To 100, Deduct</i>	-43.98	
			<i>For >100, Deduct</i>	-66.50	
10 51	13 00-0061	EA	18" x 21" x 72" Single Tier Athletic Locker.....	539.92	34.70
			<i>For >25 To 50, Deduct</i>	-23.53	
			<i>For >50 To 100, Deduct</i>	-48.09	
			<i>For >100, Deduct</i>	-72.66	
10 51	13 00-0062		Two Tier Athletic Locker (10 51 13 00-0047)		
			Note: Includes three single hooks and one double hook per tier.		
10 51	13 00-0063	EA	12" x 12" x 60" Two Tier Athletic Locker.....	443.09	35.79
			<i>For >25 To 50, Deduct</i>	-18.58	
			<i>For >50 To 100, Deduct</i>	-38.22	
			<i>For >100, Deduct</i>	-57.87	
10 51	13 00-0064	EA	12" x 15" x 60" Two Tier Athletic Locker.....	457.73	35.79
			<i>For >25 To 50, Deduct</i>	-19.31	
			<i>For >50 To 100, Deduct</i>	-39.69	
			<i>For >100, Deduct</i>	-60.07	
10 51	13 00-0065	EA	12" x 18" x 60" Two Tier Athletic Locker.....	474.20	35.79
			<i>For >25 To 50, Deduct</i>	-20.13	
			<i>For >50 To 100, Deduct</i>	-41.33	
			<i>For >100, Deduct</i>	-62.54	
10 51	13 00-0066	EA	15" x 15" x 60" Two Tier Athletic Locker.....	475.81	35.79
			<i>For >25 To 50, Deduct</i>	-20.21	
			<i>For >50 To 100, Deduct</i>	-41.50	
			<i>For >100, Deduct</i>	-62.78	
10 51	13 00-0067	EA	15" x 18" x 60" Two Tier Athletic Locker.....	479.24	35.79
			<i>For >25 To 50, Deduct</i>	-20.38	
			<i>For >50 To 100, Deduct</i>	-41.84	
			<i>For >100, Deduct</i>	-63.30	
10 51	13 00-0068	EA	18" x 18" x 60" Two Tier Athletic Locker.....	508.18	35.79
			<i>For >25 To 50, Deduct</i>	-21.83	
			<i>For >50 To 100, Deduct</i>	-44.73	
			<i>For >100, Deduct</i>	-67.64	
10 51	13 00-0069	EA	18" x 21" x 60" Two Tier Athletic Locker.....	529.39	35.79
			<i>For >25 To 50, Deduct</i>	-22.89	
			<i>For >50 To 100, Deduct</i>	-46.85	
			<i>For >100, Deduct</i>	-70.82	

10	10 Specialties
	10 50 Storage Specialties
	10 51 Lockers



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
10 51 13 00-0070	EA	18" x 24" x 60" Two Tier Athletic Locker	624.08	35.79
		<i>For >25 To 50, Deduct</i>	-27.62	
		<i>For >50 To 100, Deduct</i>	-56.32	
		<i>For >100, Deduct</i>	-85.02	
10 51 13 00-0071	EA	12" x 12" x 72" Two Tier Athletic Locker	458.94	35.79
		<i>For >25 To 50, Deduct</i>	-19.37	
		<i>For >50 To 100, Deduct</i>	-39.81	
		<i>For >100, Deduct</i>	-60.25	
10 51 13 00-0072	EA	12" x 15" x 72" Two Tier Athletic Locker	473.93	35.79
		<i>For >25 To 50, Deduct</i>	-20.12	
		<i>For >50 To 100, Deduct</i>	-41.31	
		<i>For >100, Deduct</i>	-62.50	
10 51 13 00-0073	EA	12" x 18" x 72" Two Tier Athletic Locker	494.36	35.79
		<i>For >25 To 50, Deduct</i>	-21.14	
		<i>For >50 To 100, Deduct</i>	-43.35	
		<i>For >100, Deduct</i>	-65.56	
10 51 13 00-0074	EA	15" x 15" x 72" Two Tier Athletic Locker	497.46	35.79
		<i>For >25 To 50, Deduct</i>	-21.29	
		<i>For >50 To 100, Deduct</i>	-43.66	
		<i>For >100, Deduct</i>	-66.03	
10 51 13 00-0075	EA	15" x 18" x 72" Two Tier Athletic Locker	514.25	35.79
		<i>For >25 To 50, Deduct</i>	-22.13	
		<i>For >50 To 100, Deduct</i>	-45.34	
		<i>For >100, Deduct</i>	-68.55	
10 51 13 00-0076	EA	18" x 18" x 72" Two Tier Athletic Locker	534.89	35.79
		<i>For >25 To 50, Deduct</i>	-23.17	
		<i>For >50 To 100, Deduct</i>	-47.40	
		<i>For >100, Deduct</i>	-71.64	
10 51 13 00-0077	EA	18" x 21" x 72" Two Tier Athletic Locker	581.19	35.79
		<i>For >25 To 50, Deduct</i>	-25.48	
		<i>For >50 To 100, Deduct</i>	-52.03	
		<i>For >100, Deduct</i>	-78.59	
10 51 13 00-0078		Three Tier Athletic Locker <small>(10 51 13 00-0047)</small>		
		Note: Includes one double hook per tier.		
10 51 13 00-0079	EA	12" x 12" x 60" Three Tier Athletic Locker	480.50	36.88
		<i>For >25 To 50, Deduct</i>	-20.34	
		<i>For >50 To 100, Deduct</i>	-41.78	
		<i>For >100, Deduct</i>	-63.23	
10 51 13 00-0080	EA	12" x 15" x 60" Three Tier Athletic Locker	504.22	36.88
		<i>For >25 To 50, Deduct</i>	-21.52	
		<i>For >50 To 100, Deduct</i>	-44.15	
		<i>For >100, Deduct</i>	-66.78	
10 51 13 00-0081	EA	12" x 18" x 60" Three Tier Athletic Locker	525.20	36.88
		<i>For >25 To 50, Deduct</i>	-22.57	
		<i>For >50 To 100, Deduct</i>	-46.25	
		<i>For >100, Deduct</i>	-69.93	
10 51 13 00-0082	EA	15" x 15" x 60" Three Tier Athletic Locker	539.44	36.88
		<i>For >25 To 50, Deduct</i>	-23.28	
		<i>For >50 To 100, Deduct</i>	-47.68	
		<i>For >100, Deduct</i>	-72.07	
10 51 13 00-0083	EA	15" x 18" x 60" Three Tier Athletic Locker	563.16	36.88
		<i>For >25 To 50, Deduct</i>	-24.47	
		<i>For >50 To 100, Deduct</i>	-50.05	
		<i>For >100, Deduct</i>	-75.62	
10 51 13 00-0084	EA	12" x 12" x 72" Three Tier Athletic Locker	507.53	36.88
		<i>For >25 To 50, Deduct</i>	-21.69	
		<i>For >50 To 100, Deduct</i>	-44.48	
		<i>For >100, Deduct</i>	-67.28	
10 51 13 00-0085	EA	12" x 15" x 72" Three Tier Athletic Locker	528.95	36.88
		<i>For >25 To 50, Deduct</i>	-22.76	
		<i>For >50 To 100, Deduct</i>	-46.63	
		<i>For >100, Deduct</i>	-70.49	
10 51 13 00-0086	EA	12" x 18" x 72" Three Tier Athletic Locker	558.51	36.88
		<i>For >25 To 50, Deduct</i>	-24.24	
		<i>For >50 To 100, Deduct</i>	-49.58	
		<i>For >100, Deduct</i>	-74.93	
10 51 13 00-0087	EA	15" x 15" x 72" Three Tier Athletic Locker	573.64	36.88
		<i>For >25 To 50, Deduct</i>	-24.99	
		<i>For >50 To 100, Deduct</i>	-51.10	
		<i>For >100, Deduct</i>	-77.20	
10 51 13 00-0088	EA	15" x 18" x 72" Three Tier Athletic Locker	596.34	36.88
		<i>For >25 To 50, Deduct</i>	-26.13	
		<i>For >50 To 100, Deduct</i>	-53.37	
		<i>For >100, Deduct</i>	-80.60	
10 51 13 00-0089		Four Tier Athletic Locker <small>(10 51 13 00-0047)</small>		
10 51 13 00-0090	EA	12" x 12" x 60" Four Tier Athletic Locker	442.21	37.96
		<i>For >25 To 50, Deduct</i>	-18.31	
		<i>For >50 To 100, Deduct</i>	-37.77	
		<i>For >100, Deduct</i>	-57.22	



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 51 13 00-0091	EA 12" x 15" x 60" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	471.26 -19.77 -40.67 -61.58	37.96
10 51 13 00-0092	EA 12" x 18" x 60" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	500.32 -21.22 -43.58 -65.94	37.96
10 51 13 00-0093	EA 15" x 15" x 60" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	512.19 -21.81 -44.77 -67.72	37.96
10 51 13 00-0094	EA 15" x 18" x 60" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	559.91 -24.20 -49.54 -74.88	37.96
10 51 13 00-0095	EA 12" x 12" x 72" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	471.77 -19.79 -40.72 -61.66	37.96
10 51 13 00-0096	EA 12" x 15" x 72" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	501.24 -21.27 -43.67 -66.08	37.96
10 51 13 00-0097	EA 12" x 18" x 72" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	530.70 -22.74 -46.62 -70.49	37.96
10 51 13 00-0098	EA 15" x 15" x 72" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	545.80 -23.49 -48.13 -72.76	37.96
10 51 13 00-0099	EA 15" x 18" x 72" Four Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	557.12 -24.06 -49.26 -74.46	37.96
10 51 13 00-0100	Six Tier Athletic Locker (10 51 13 00-0047)		
10 51 13 00-0101	EA 12" x 12" x 72" Six Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	523.50 -22.27 -45.71 -69.15	39.04
10 51 13 00-0102	EA 12" x 15" x 72" Six Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	546.14 -23.40 -47.98 -72.55	39.04
10 51 13 00-0103	EA 12" x 18" x 72" Six Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	568.74 -24.53 -50.24 -75.94	39.04
10 51 13 00-0104	EA 12" x 21" x 72" Six Tier Athletic Locker <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	651.21 -28.66 -58.48 -88.31	39.04
10 51 13 00-0105	Metal Locker Accessories (10 51 13)		
10 51 13 00-0106	Locker Slope Tops (10 51 13 00-0105)		
10 51 13 00-0107	16 Gauge Continuous Sloping Hood (10 51 13 00-0106)		
10 51 13 00-0108	LF 12" Deep, 16 Gauge Continuous Slope Top.....	32.82	4.34
10 51 13 00-0109	LF 15" Deep, 16 Gauge Continuous Slope Top.....	27.66	4.34
10 51 13 00-0110	LF 18" Deep, 16 Gauge Continuous Slope Top.....	38.09	4.34
10 51 13 00-0111	LF 21" Deep, 16 Gauge Continuous Slope Top.....	42.10	4.34
10 51 13 00-0112	LF 24" Deep, 16 Gauge Continuous Slope Top.....	43.98	4.34
10 51 13 00-0113	16 Gauge Slope Top Corner Fillers (10 51 13 00-0106)		
10 51 13 00-0114	EA 12" Deep, 16 Gauge Slope Top Corner Fillers	136.32	4.34
10 51 13 00-0115	EA 15" Deep, 16 Gauge Slope Top Corner Fillers	139.24	4.34
10 51 13 00-0116	EA 18" Deep, 16 Gauge Slope Top Corner Fillers	142.15	4.34
10 51 13 00-0117	EA 21" Deep, 16 Gauge Slope Top Corner Fillers	145.68	4.34
10 51 13 00-0118	EA 24" Deep, 16 Gauge Slope Top Corner Fillers	149.17	4.34
10 51 13 00-0119	20 Gauge Individual Slope Top (10 51 13 00-0106)		
10 51 13 00-0120	EA 12" Wide x 12" Deep 20 Gauge Individual Slope Top.....	28.17	4.34
10 51 13 00-0121	EA 12" Wide x 15" Deep 20 Gauge Individual Slope Top.....	27.98	4.34
10 51 13 00-0122	EA 12" Wide x 18" Deep 20 Gauge Individual Slope Top.....	31.15	4.34
10 51 13 00-0123	EA 15" Wide x 15" Deep 20 Gauge Individual Slope Top.....	31.15	4.34
10 51 13 00-0124	EA 15" Wide x 18" Deep 20 Gauge Individual Slope Top.....	31.91	4.34
10 51 13 00-0125	EA 15" Wide x 21" Deep 20 Gauge Individual Slope Top.....	34.91	4.34

10	10	Specialties
	10 50	Storage Specialties
	10 51	Lockers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	10 51 13 00-0126	EA	18" Wide x 18" Deep 20 Gauge Individual Slope Top.....	34.91	4.34
	10 51 13 00-0127	EA	18" Wide x 21" Deep 20 Gauge Individual Slope Top.....	38.85	4.34
	10 51 13 00-0128	EA	18" Wide x 24" Deep 20 Gauge Individual Slope Top.....	43.55	4.34
	10 51 13 00-0129		Continuous Slope Top End Closures (10 51 13 00-0106)		
	10 51 13 00-0130	PR	12" Deep, Continuous Slope Top End Closures.....	30.04	4.34
	10 51 13 00-0131	PR	15" Deep, Continuous Slope Top End Closures.....	25.51	4.34
	10 51 13 00-0132	PR	18" Deep, Continuous Slope Top End Closures.....	33.78	4.34
	10 51 13 00-0133	PR	21" Deep, Continuous Slope Top End Closures.....	35.66	4.34
	10 51 13 00-0134	PR	24" Deep, Continuous Slope Top End Closures.....	36.95	4.34
	10 51 13 00-0135		Individual Slope Top End Closures (10 51 13 00-0106)		
	10 51 13 00-0136	EA	12" Deep, Individual Slope Top End Closures.....	19.36	4.34
	10 51 13 00-0137	EA	15" Deep, Individual Slope Top End Closures.....	19.95	4.34
	10 51 13 00-0138	EA	18" Deep, Individual Slope Top End Closures.....	21.25	4.34
	10 51 13 00-0139	EA	21" Deep, Individual Slope Top End Closures.....	22.15	4.34
	10 51 13 00-0140	EA	24" Deep, Individual Slope Top End Closures.....	31.40	4.34
	10 51 13 00-0141		Locker Base (10 51 13 00-0105)		
	10 51 13 00-0142		Closed Front Base (10 51 13 00-0141)		
	10 51 13 00-0143	EA	12" Wide, 6" High Closed Front Base.....	20.36	4.34
	10 51 13 00-0144	EA	15" Wide, 6" High Closed Front Base.....	21.34	4.34
	10 51 13 00-0145	EA	18" Wide, 6" High Closed Front Base.....	23.38	4.34
	10 51 13 00-0146	EA	24" Wide, 6" High Closed Front Base.....	24.36	4.34
	10 51 13 00-0147		Closed End Base (10 51 13 00-0141)		
	10 51 13 00-0148	EA	12" Deep, 6" High Closed End Base.....	23.08	4.34
	10 51 13 00-0149	EA	15" Deep, 6" High Closed End Base.....	23.25	4.34
	10 51 13 00-0150	EA	18" Deep, 6" High Closed End Base.....	24.57	4.34
	10 51 13 00-0151	EA	21" Deep, 6" High Closed End Base.....	25.87	4.34
	10 51 13 00-0152	EA	24" Deep, 6" High Closed End Base.....	27.64	4.34
	10 51 13 00-0153		Recessed Continuous Front "Z" Base (10 51 13 00-0141)		
	10 51 13 00-0154	LF	4" High Recessed Continuous Front "Z" Base.....	24.27	3.25
	10 51 13 00-0155		"Z" Base Ends Or Splice (10 51 13 00-0141)		
	10 51 13 00-0156	EA	12" Wide, 4" High Z-Base Ends Or Splice.....	24.13	4.34
	10 51 13 00-0157	EA	15" Wide, 4" High Z-Base Ends Or Splice.....	27.98	4.34
	10 51 13 00-0158	EA	18" Wide, 4" High Z-Base Ends Or Splice.....	31.91	4.34
	10 51 13 00-0159	EA	21" Wide, 4" High Z-Base Ends Or Splice.....	36.04	4.34
	10 51 13 00-0160	EA	24" Wide, 4" High Z-Base Ends Or Splice.....	40.16	4.34
	10 51 13 00-0161		Locker Front Fillers And End Panels (10 51 13 00-0105)		
	10 51 13 00-0162		Locker Front Fillers (10 51 13 00-0161)		
	10 51 13 00-0163	EA	6" Wide x 48" High, 16 Gauge Front Filler.....	31.45	5.43
	10 51 13 00-0164	EA	12" Wide x 48" High, 16 Gauge Front Filler.....	51.11	5.43
	10 51 13 00-0165	EA	6" Wide x 60" High, 16 Gauge Front Filler.....	39.52	5.43
	10 51 13 00-0166	EA	12" Wide x 60" High, 16 Gauge Front Filler.....	61.19	5.43
	10 51 13 00-0167	EA	6" Wide x 66" High, 16 Gauge Front Filler.....	43.05	5.43
	10 51 13 00-0168	EA	12" Wide x 66" High, 16 Gauge Front Filler.....	48.41	5.43
	10 51 13 00-0169	EA	6" Wide x 72" High, 16 Gauge Front Filler.....	47.15	5.43
	10 51 13 00-0170	EA	12" Wide x 72" High, 16 Gauge Front Filler.....	67.04	5.43
	10 51 13 00-0171	EA	6" Wide x 78" High, 16 Gauge Front Filler.....	48.28	5.43
	10 51 13 00-0172	EA	12" Wide x 78" High, 16 Gauge Front Filler.....	56.32	5.43
	10 51 13 00-0173		Locker End Panels (10 51 13 00-0161)		
	10 51 13 00-0174	EA	12" Deep x 48" High, 16 Gauge End Panel.....	52.04	4.34
	10 51 13 00-0175	EA	15" Deep x 48" High, 16 Gauge End Panel.....	63.61	4.34
	10 51 13 00-0176	EA	18" Deep x 48" High, 16 Gauge End Panel.....	74.75	4.34
	10 51 13 00-0177	EA	12" Deep x 60" High, 16 Gauge End Panel.....	61.52	4.34
	10 51 13 00-0178	EA	15" Deep x 60" High, 16 Gauge End Panel.....	69.82	4.34
	10 51 13 00-0179	EA	18" Deep x 60" High, 16 Gauge End Panel.....	82.88	4.34
	10 51 13 00-0180	EA	12" Deep x 72" High, 16 Gauge End Panel.....	72.56	4.34
	10 51 13 00-0181	EA	15" Deep x 72" High, 16 Gauge End Panel.....	82.65	4.34
	10 51 13 00-0182	EA	18" Deep x 72" High, 16 Gauge End Panel.....	96.09	4.34
	10 51 13 00-0183	EA	21" Deep x 72" High, 16 Gauge End Panel.....	110.68	4.34
	10 51 13 00-0184		Locker Recessed Trim (10 51 13 00-0105)		
	10 51 13 00-0185	LF	3" Height, Top Trim For Recessed Lockers.....	10.62	2.16



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51 13 00-0186 EA 3" Height, Inside And Outside Top Corner Trim For Recessed Lockers.....	29.44	4.34
10 51 13 00-0187 EA 60" Height, 3" Wide Side Trim For Recessed Lockers.....	45.01	4.34
10 51 13 00-0188 EA 66" Height, 3" Wide Side Trim For Recessed Lockers.....	46.65	4.34
10 51 13 00-0189 EA 72" Height, 3" Wide Side Trim For Recessed Lockers.....	48.29	4.34
10 51 13 00-0190 EA 78" Height, 3" Wide Side Trim For Recessed Lockers.....	49.72	4.34
10 51 13 00-0191 Locker Interior Accessories (10 51 13 00-0105)		
10 51 13 00-0192 Locker Coat Rods (10 51 13 00-0191)		
10 51 13 00-0193 EA 12" Wide Coat Rod.....	15.75	4.34
10 51 13 00-0194 EA 15" Wide Coat Rod.....	17.27	4.34
10 51 13 00-0195 EA 18" Wide Coat Rod.....	18.63	4.34
10 51 13 00-0196 EA 24" Wide Coat Rod.....	19.83	4.34
10 51 13 00-0197 Locker Hat Shelf (10 51 13 00-0191)		
10 51 13 00-0198 EA 12" Wide Hat Shelf.....	18.96	4.34
10 51 13 00-0199 EA 15" Wide Hat Shelf.....	22.27	4.34
10 51 13 00-0200 EA 18" Wide Hat Shelf.....	23.66	4.34
10 51 13 00-0201 EA 24" Wide Hat Shelf.....	29.17	4.34
10 51 13 00-0202 Locker ADA Compliant Shelf (10 51 13 00-0191)		
10 51 13 00-0203 EA ADA Compliant Shelf For Single Tier Lockers..... Note: Includes an ADA label for locker face.	37.60	5.43
10 51 13 00-0204 Other Interior Locker Accessories (10 51 13 00-0191)		
10 51 13 00-0205 EA 3" x 10" Bent Plate Shoe Rack.....	49.85	4.34
10 51 13 00-0206 EA 8" x 10" Mirror.....	39.56	4.34
10 51 13 00-0207 EA Additional Hook.....	11.25	4.34
10 51 13 00-0208 Locker Locks (10 51 13 00-0105)		
10 51 13 00-0209 EA Built In Combination Lock.....	43.40	4.34
10 51 13 00-0210 Steel Basket Racks Mounted On Concrete Base (10 51 13)		
Note: Includes electroplated baskets with 3/4" x 1" wire mesh sides and bottom with perforated sheet steel front and backs.		
10 51 13 00-0211 EA 9" x 13" x 8" Baskets, 28 Wire Mesh Baskets And Rack.....	2,036.14	81.34
10 51 13 00-0212 EA 12" x 13" x 8" Baskets, 21 Wire Mesh Baskets And Rack.....	1,740.16	81.34
10 51 13 00-0213 All-Welded Steel Lockers (10 51 13)		
10 51 13 00-0214 All-Welded Steel Lockers (10 51 13 00-0213)		
Note: Price per frame. Includes diamond perforated, standard louvered or solid doors and sides. Includes all-welded construction with 16 gauge solid top, bottom, and shelves, 14 gauge doors and 4" legs. Includes electrostatically applied enamel powder coat paint finish. Excludes slope top, base fillers, and locks.		
10 51 13 00-0215 Single Tier, All-Welded Steel Lockers (10 51 13 00-0214)		
Note: Includes one hat shelf, two single hooks and one double hook.		
10 51 13 00-0216 EA 12" x 12" x 48" Single Tier, All-Welded Steel Locker.....	172.24	18.98
For >25 To 50, Deduct	-7.26	
For >50 To 100, Deduct	-14.92	
For >100, Deduct	-22.58	
10 51 13 00-0217 EA 12" x 15" x 48" Single Tier, All-Welded Steel Locker.....	180.80	18.98
For >25 To 50, Deduct	-7.68	
For >50 To 100, Deduct	-15.78	
For >100, Deduct	-23.87	
10 51 13 00-0218 EA 12" x 18" x 48" Single Tier, All-Welded Steel Locker.....	189.05	18.98
For >25 To 50, Deduct	-8.10	
For >50 To 100, Deduct	-16.60	
For >100, Deduct	-25.10	
10 51 13 00-0219 EA 12" x 12" x 60" Single Tier, All-Welded Steel Locker.....	179.31	18.98
For >25 To 50, Deduct	-7.61	
For >50 To 100, Deduct	-15.63	
For >100, Deduct	-23.64	
10 51 13 00-0220 EA 12" x 15" x 60" Single Tier, All-Welded Steel Locker.....	187.56	18.98
For >25 To 50, Deduct	-8.02	
For >50 To 100, Deduct	-16.45	
For >100, Deduct	-24.88	
10 51 13 00-0221 EA 12" x 18" x 60" Single Tier, All-Welded Steel Locker.....	195.80	18.98
For >25 To 50, Deduct	-8.43	
For >50 To 100, Deduct	-17.28	
For >100, Deduct	-26.12	
10 51 13 00-0222 EA 12" x 12" x 72" Single Tier, All-Welded Steel Locker.....	189.66	20.88
For >25 To 50, Deduct	-7.99	
For >50 To 100, Deduct	-16.43	
For >100, Deduct	-24.87	

10 Specialties**10 50 Storage Specialties****10 51 Lockers**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
10 51 13 00-0223	EA	12" x 15" x 72" Single Tier, All-Welded Steel Locker	197.29	20.88
		<i>For >25 To 50, Deduct</i>	-8.37	
		<i>For >50 To 100, Deduct</i>	-17.19	
		<i>For >100, Deduct</i>	-26.01	
10 51 13 00-0224	EA	12" x 18" x 72" Single Tier, All-Welded Steel Locker	205.54	20.88
		<i>For >25 To 50, Deduct</i>	-8.79	
		<i>For >50 To 100, Deduct</i>	-18.02	
		<i>For >100, Deduct</i>	-27.25	
10 51 13 00-0225	EA	15" x 15" x 72" Single Tier, All-Welded Steel Locker	213.25	20.88
		<i>For >25 To 50, Deduct</i>	-9.17	
		<i>For >50 To 100, Deduct</i>	-18.79	
		<i>For >100, Deduct</i>	-28.41	
10 51 13 00-0226	EA	15" x 18" x 72" Single Tier, All-Welded Steel Locker	219.61	20.88
		<i>For >25 To 50, Deduct</i>	-9.49	
		<i>For >50 To 100, Deduct</i>	-19.43	
		<i>For >100, Deduct</i>	-29.36	
10 51 13 00-0227	EA	18" x 18" x 72" Single Tier, All-Welded Steel Locker	228.37	20.88
		<i>For >25 To 50, Deduct</i>	-9.93	
		<i>For >50 To 100, Deduct</i>	-20.30	
		<i>For >100, Deduct</i>	-30.68	
10 51 13 00-0228	EA	18" x 21" x 72" Single Tier, All-Welded Steel Locker	238.23	20.88
		<i>For >25 To 50, Deduct</i>	-10.42	
		<i>For >50 To 100, Deduct</i>	-21.29	
		<i>For >100, Deduct</i>	-32.15	
10 51 13 00-0229	EA	24" x 24" x 72" Single Tier, All-Welded Steel Locker	386.75	20.88
		<i>For >25 To 50, Deduct</i>	-17.85	
		<i>For >50 To 100, Deduct</i>	-36.14	
		<i>For >100, Deduct</i>	-54.43	
10 51 13 00-0230		Two Tier, All-Welded Steel Lockers <small>(10 51 13 00-0214)</small>		
		Note: Includes two single hooks and one double hook per tier.		
10 51 13 00-0231	EA	12" x 12" x 60" Two Tier, All-Welded Steel Locker	206.05	18.98
		<i>For >25 To 50, Deduct</i>	-8.95	
		<i>For >50 To 100, Deduct</i>	-18.30	
		<i>For >100, Deduct</i>	-27.65	
10 51 13 00-0232	EA	12" x 15" x 60" Two Tier, All-Welded Steel Locker	209.83	18.98
		<i>For >25 To 50, Deduct</i>	-9.14	
		<i>For >50 To 100, Deduct</i>	-18.68	
		<i>For >100, Deduct</i>	-28.22	
10 51 13 00-0233	EA	12" x 18" x 60" Two Tier, All-Welded Steel Locker	219.99	18.98
		<i>For >25 To 50, Deduct</i>	-9.64	
		<i>For >50 To 100, Deduct</i>	-19.69	
		<i>For >100, Deduct</i>	-29.75	
10 51 13 00-0234	EA	12" x 12" x 72" Two Tier, All-Welded Steel Locker	215.08	20.88
		<i>For >25 To 50, Deduct</i>	-9.26	
		<i>For >50 To 100, Deduct</i>	-18.97	
		<i>For >100, Deduct</i>	-28.68	
10 51 13 00-0235	EA	12" x 15" x 72" Two Tier, All-Welded Steel Locker	229.09	20.88
		<i>For >25 To 50, Deduct</i>	-9.96	
		<i>For >50 To 100, Deduct</i>	-20.37	
		<i>For >100, Deduct</i>	-30.78	
10 51 13 00-0236	EA	12" x 18" x 72" Two Tier, All-Welded Steel Locker	236.72	20.88
		<i>For >25 To 50, Deduct</i>	-10.34	
		<i>For >50 To 100, Deduct</i>	-21.14	
		<i>For >100, Deduct</i>	-31.93	
10 51 13 00-0237	EA	15" x 15" x 72" Two Tier, All-Welded Steel Locker	247.60	20.88
		<i>For >25 To 50, Deduct</i>	-10.89	
		<i>For >50 To 100, Deduct</i>	-22.22	
		<i>For >100, Deduct</i>	-33.56	
10 51 13 00-0238	EA	15" x 18" x 72" Two Tier, All-Welded Steel Locker	252.72	20.88
		<i>For >25 To 50, Deduct</i>	-11.14	
		<i>For >50 To 100, Deduct</i>	-22.74	
		<i>For >100, Deduct</i>	-34.33	
10 51 13 00-0239	EA	18" x 18" x 72" Two Tier, All-Welded Steel Locker	267.48	20.88
		<i>For >25 To 50, Deduct</i>	-11.88	
		<i>For >50 To 100, Deduct</i>	-24.21	
		<i>For >100, Deduct</i>	-36.54	
10 51 13 00-0240	EA	18" x 21" x 72" Two Tier, All-Welded Steel Locker	278.91	20.88
		<i>For >25 To 50, Deduct</i>	-12.45	
		<i>For >50 To 100, Deduct</i>	-25.36	
		<i>For >100, Deduct</i>	-38.26	
10 51 13 00-0241		Three Tier, All-Welded Steel Lockers <small>(10 51 13 00-0214)</small>		
		Note: Includes two single hooks and one double hook per tier.		
10 51 13 00-0242	EA	12" x 12" x 72" Three Tier, All-Welded Steel Locker	254.53	20.88
		<i>For >25 To 50, Deduct</i>	-11.24	
		<i>For >50 To 100, Deduct</i>	-22.92	
		<i>For >100, Deduct</i>	-34.60	
10 51 13 00-0243	EA	12" x 15" x 72" Three Tier, All-Welded Steel Locker	260.27	20.88
		<i>For >25 To 50, Deduct</i>	-11.52	
		<i>For >50 To 100, Deduct</i>	-23.49	
		<i>For >100, Deduct</i>	-35.46	



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51	13 00-0244	EA	12" x 18" x 72" Three Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	265.96 -11.81 -24.06 -36.31	20.88
10 51	13 00-0245	EA	15" x 15" x 72" Three Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	279.45 -12.48 -25.41 -38.34	20.88
10 51	13 00-0246	EA	15" x 18" x 72" Three Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	281.95 -12.61 -25.66 -38.71	20.88
10 51 13 00-0247 Four Tier, All-Welded Steel Lockers (10 51 13 00-0214)					
10 51	13 00-0248	EA	12" x 12" x 72" Four Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	240.92 -10.55 -21.56 -32.56	20.88
10 51	13 00-0249	EA	12" x 15" x 72" Four Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	246.34 -10.83 -22.10 -33.37	20.88
10 51	13 00-0250	EA	12" x 18" x 72" Four Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	251.72 -11.09 -22.64 -34.18	20.88
10 51	13 00-0251	EA	15" x 15" x 72" Four Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	264.41 -11.73 -23.91 -36.08	20.88
10 51	13 00-0252	EA	15" x 18" x 72" Four Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	266.72 -11.84 -24.14 -36.43	20.88
10 51 13 00-0253 Six Tier, All-Welded Steel Lockers (10 51 13 00-0214)					
10 51	13 00-0254	EA	12" x 12" x 72" Six Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	249.35 -10.98 -22.40 -33.82	20.88
10 51	13 00-0255	EA	12" x 15" x 72" Six Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	257.26 -11.37 -23.19 -35.01	20.88
10 51	13 00-0256	EA	12" x 18" x 72" Six Tier, All-Welded Steel Locker..... <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	263.07 -11.66 -23.77 -35.88	20.88
10 51 13 00-0257 All Welded Locker Accessories (10 51 13 00-0213)					
10 51	13 00-0258	EA	ADA Requirements For All Welded Lockers.....	128.00	
10 51	13 00-0259	EA	Solid Boxed End Panel For 12" Deep All Welded Lockers.....	206.17	4.34
10 51	13 00-0260	EA	Solid Boxed End Panel For 15" Deep All Welded Lockers.....	239.09	4.34
10 51	13 00-0261	EA	Recessed Trim For All Welded Lockers.....	145.22	4.34
10 51	13 00-0262	EA	Built In Combination Lock For All Welded Lockers.....	43.40	4.34
10 51	13 00-0263	EA	Pad Lock For All Welded Lockers.....	39.16	4.34
10 51 26 Plastic Lockers (10 51)					
10 51 26 00-0001 Solid Plastic Lockers (10 51 26)					
Note: Price per frame. High density polyethylene with homogeneous color throughout. Includes 1/2" door, 3/8" sides, tops, bottoms, rears and shelves. Excludes slope top, base, and locks.					
10 51 26 00-0002 Single Tier Solid Plastic Lockers (10 51 26 00-0001)					
Note: Includes one double hook per tier.					
10 51	26 00-0003	EA	12" x 12" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	674.84 -60.76 -93.16	33.62
10 51	26 00-0004	EA	12" x 15" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	687.03 -61.98 -94.99	33.62
10 51	26 00-0005	EA	12" x 18" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	699.22 -63.20 -96.81	33.62
10 51	26 00-0006	EA	15" x 15" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	717.50 -65.03 -99.56	33.62
10 51	26 00-0007	EA	15" x 18" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	698.17 -63.09 -96.66	33.62

10 Specialties
10 50 Storage Specialties
10 51 Lockers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51 26 00-0008	EA		18" x 12" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)	703.30	33.62
			<i>For >50 To 100, Deduct</i>	-63.61	
			<i>For >100, Deduct</i>	-97.43	
10 51 26 00-0009	EA		18" x 15" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)	694.28	33.62
			<i>For >50 To 100, Deduct</i>	-62.70	
			<i>For >100, Deduct</i>	-96.07	
10 51 26 00-0010	EA		18" x 18" x 36" Single Tier Solid Plastic Locker (Tufftec Lockers®)	744.61	33.62
			<i>For >50 To 100, Deduct</i>	-67.74	
			<i>For >100, Deduct</i>	-103.62	
10 51 26 00-0011	EA		12" x 12" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	733.00	33.62
			<i>For >50 To 100, Deduct</i>	-66.58	
			<i>For >100, Deduct</i>	-101.88	
10 51 26 00-0012	EA		12" x 15" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	746.54	33.62
			<i>For >50 To 100, Deduct</i>	-67.93	
			<i>For >100, Deduct</i>	-103.91	
10 51 26 00-0013	EA		12" x 18" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	760.08	33.62
			<i>For >50 To 100, Deduct</i>	-69.28	
			<i>For >100, Deduct</i>	-105.94	
10 51 26 00-0014	EA		15" x 15" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	791.06	33.62
			<i>For >50 To 100, Deduct</i>	-72.38	
			<i>For >100, Deduct</i>	-110.59	
10 51 26 00-0015	EA		15" x 18" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	833.64	33.62
			<i>For >50 To 100, Deduct</i>	-76.64	
			<i>For >100, Deduct</i>	-116.98	
10 51 26 00-0016	EA		18" x 15" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	794.92	33.62
			<i>For >50 To 100, Deduct</i>	-72.77	
			<i>For >100, Deduct</i>	-111.17	
10 51 26 00-0017	EA		18" x 18" x 48" Single Tier Solid Plastic Locker (Tufftec Lockers®)	864.59	33.62
			<i>For >50 To 100, Deduct</i>	-79.74	
			<i>For >100, Deduct</i>	-121.62	
10 51 26 00-0018	EA		12" x 12" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	738.40	33.62
			<i>For >50 To 100, Deduct</i>	-67.12	
			<i>For >100, Deduct</i>	-102.69	
10 51 26 00-0019	EA		12" x 15" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	778.10	33.62
			<i>For >50 To 100, Deduct</i>	-71.09	
			<i>For >100, Deduct</i>	-108.65	
10 51 26 00-0020	EA		12" x 18" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	817.82	33.62
			<i>For >50 To 100, Deduct</i>	-75.06	
			<i>For >100, Deduct</i>	-114.60	
10 51 26 00-0021	EA		15" x 12" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	788.73	33.62
			<i>For >50 To 100, Deduct</i>	-72.15	
			<i>For >100, Deduct</i>	-110.24	
10 51 26 00-0022	EA		15" x 15" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	830.81	33.62
			<i>For >50 To 100, Deduct</i>	-76.36	
			<i>For >100, Deduct</i>	-116.55	
10 51 26 00-0023	EA		15" x 18" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	872.92	33.62
			<i>For >50 To 100, Deduct</i>	-80.57	
			<i>For >100, Deduct</i>	-122.87	
10 51 26 00-0024	EA		18" x 12" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	839.06	33.62
			<i>For >50 To 100, Deduct</i>	-77.18	
			<i>For >100, Deduct</i>	-117.79	
10 51 26 00-0025	EA		18" x 15" x 60" Single Tier Solid Plastic Locker (Tufftec Lockers®)	883.55	33.62
			<i>For >50 To 100, Deduct</i>	-81.63	
			<i>For >100, Deduct</i>	-124.46	
10 51 26 00-0026	EA		12" x 12" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	846.02	34.70
			<i>For >50 To 100, Deduct</i>	-77.66	
			<i>For >100, Deduct</i>	-118.57	
10 51 26 00-0027	EA		12" x 15" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	890.53	34.70
			<i>For >50 To 100, Deduct</i>	-82.11	
			<i>For >100, Deduct</i>	-125.25	
10 51 26 00-0028	EA		12" x 18" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	935.00	34.70
			<i>For >50 To 100, Deduct</i>	-86.56	
			<i>For >100, Deduct</i>	-131.92	
10 51 26 00-0029	EA		15" x 12" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	903.79	34.70
			<i>For >50 To 100, Deduct</i>	-83.44	
			<i>For >100, Deduct</i>	-127.24	
10 51 26 00-0030	EA		15" x 15" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	950.73	34.70
			<i>For >50 To 100, Deduct</i>	-88.13	
			<i>For >100, Deduct</i>	-134.28	
10 51 26 00-0031	EA		15" x 18" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	997.63	34.70
			<i>For >50 To 100, Deduct</i>	-92.82	
			<i>For >100, Deduct</i>	-141.32	
10 51 26 00-0032	EA		18" x 12" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	949.83	34.70
			<i>For >50 To 100, Deduct</i>	-88.04	
			<i>For >100, Deduct</i>	-134.15	
10 51 26 00-0033	EA		18" x 15" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	1,010.88	34.70
			<i>For >50 To 100, Deduct</i>	-94.15	
			<i>For >100, Deduct</i>	-143.30	
10 51 26 00-0034	EA		18" x 18" x 72" Single Tier Solid Plastic Locker (Tufftec Lockers®)	1,060.18	34.70
			<i>For >50 To 100, Deduct</i>	-99.08	
			<i>For >100, Deduct</i>	-150.70	

10 51 26 00-0035 Double Tier Solid Plastic Lockers (10 51 26 00-0001)
 Note: Includes one double hook per tier.



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51 26 00-0036	EA		12" x 12" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	758.39	34.70
			<i>For >50 To 100, Deduct</i>	-68.90	
			<i>For >100, Deduct</i>	-105.43	
10 51 26 00-0037	EA		12" x 15" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	770.00	34.70
			<i>For >50 To 100, Deduct</i>	-70.06	
			<i>For >100, Deduct</i>	-107.17	
10 51 26 00-0038	EA		12" x 18" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	787.41	34.70
			<i>For >50 To 100, Deduct</i>	-71.80	
			<i>For >100, Deduct</i>	-109.78	
10 51 26 00-0039	EA		15" x 12" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	781.62	34.70
			<i>For >50 To 100, Deduct</i>	-71.22	
			<i>For >100, Deduct</i>	-108.91	
10 51 26 00-0040	EA		15" x 15" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	812.59	34.70
			<i>For >50 To 100, Deduct</i>	-74.32	
			<i>For >100, Deduct</i>	-113.56	
10 51 26 00-0041	EA		15" x 18" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	886.12	34.70
			<i>For >50 To 100, Deduct</i>	-81.67	
			<i>For >100, Deduct</i>	-124.59	
10 51 26 00-0042	EA		18" x 12" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	789.37	34.70
			<i>For >50 To 100, Deduct</i>	-72.00	
			<i>For >100, Deduct</i>	-110.08	
10 51 26 00-0043	EA		18" x 15" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	826.82	34.70
			<i>For >50 To 100, Deduct</i>	-75.74	
			<i>For >100, Deduct</i>	-115.69	
10 51 26 00-0044	EA		18" x 18" x 48" Double Tier Solid Plastic Locker (Tufftec Lockers®)	893.87	34.70
			<i>For >50 To 100, Deduct</i>	-82.45	
			<i>For >100, Deduct</i>	-125.75	
10 51 26 00-0045	EA		12" x 12" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	785.03	34.70
			<i>For >50 To 100, Deduct</i>	-71.56	
			<i>For >100, Deduct</i>	-109.43	
10 51 26 00-0046	EA		12" x 15" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	845.65	34.70
			<i>For >50 To 100, Deduct</i>	-77.62	
			<i>For >100, Deduct</i>	-118.52	
10 51 26 00-0047	EA		12" x 18" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	862.97	34.70
			<i>For >50 To 100, Deduct</i>	-79.36	
			<i>For >100, Deduct</i>	-121.12	
10 51 26 00-0048	EA		15" x 12" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	855.78	34.70
			<i>For >50 To 100, Deduct</i>	-78.64	
			<i>For >100, Deduct</i>	-120.04	
10 51 26 00-0049	EA		15" x 15" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	895.96	34.70
			<i>For >50 To 100, Deduct</i>	-82.66	
			<i>For >100, Deduct</i>	-126.06	
10 51 26 00-0050	EA		18" x 12" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	903.81	34.70
			<i>For >50 To 100, Deduct</i>	-83.44	
			<i>For >100, Deduct</i>	-127.24	
10 51 26 00-0051	EA		18" x 15" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	946.29	34.70
			<i>For >50 To 100, Deduct</i>	-87.69	
			<i>For >100, Deduct</i>	-133.61	
10 51 26 00-0052	EA		18" x 18" x 60" Double Tier Solid Plastic Locker (Tufftec Lockers®)	988.77	34.70
			<i>For >50 To 100, Deduct</i>	-91.94	
			<i>For >100, Deduct</i>	-139.99	
10 51 26 00-0053	EA		12" x 12" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	910.56	35.79
			<i>For >50 To 100, Deduct</i>	-83.90	
			<i>For >100, Deduct</i>	-127.99	
10 51 26 00-0054	EA		12" x 15" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	953.04	35.79
			<i>For >50 To 100, Deduct</i>	-88.15	
			<i>For >100, Deduct</i>	-134.37	
10 51 26 00-0055	EA		12" x 18" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	975.17	35.79
			<i>For >50 To 100, Deduct</i>	-90.36	
			<i>For >100, Deduct</i>	-137.69	
10 51 26 00-0056	EA		15" x 12" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	965.71	35.79
			<i>For >50 To 100, Deduct</i>	-89.41	
			<i>For >100, Deduct</i>	-136.27	
10 51 26 00-0057	EA		15" x 15" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	1,010.51	35.79
			<i>For >50 To 100, Deduct</i>	-93.89	
			<i>For >100, Deduct</i>	-142.99	
10 51 26 00-0058	EA		15" x 18" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	1,055.29	35.79
			<i>For >50 To 100, Deduct</i>	-98.37	
			<i>For >100, Deduct</i>	-149.70	
10 51 26 00-0059	EA		18" x 12" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	973.72	35.79
			<i>For >50 To 100, Deduct</i>	-90.21	
			<i>For >100, Deduct</i>	-137.47	
10 51 26 00-0060	EA		18" x 15" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	1,067.93	35.79
			<i>For >50 To 100, Deduct</i>	-99.64	
			<i>For >100, Deduct</i>	-151.60	
10 51 26 00-0061	EA		18" x 18" x 72" Double Tier Solid Plastic Locker (Tufftec Lockers®)	1,114.99	35.79
			<i>For >50 To 100, Deduct</i>	-104.34	
			<i>For >100, Deduct</i>	-158.66	
10 51 26 00-0062			Triple Tier Solid Plastic Lockers <small>(10 51 26 00-0001)</small>		
			Note: Includes one double hook per tier.		
10 51 26 00-0063	EA		12" x 12" x 48" Triple Tier Solid Plastic Locker (Tufftec Lockers®)	746.04	35.79
			<i>For >50 To 100, Deduct</i>	-67.45	
			<i>For >100, Deduct</i>	-103.32	

10 Specialties
10 50 Storage Specialties
10 51 Lockers



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
10 51 26 00-0064	EA 15" x 15" x 48" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	777.91	35.79
	<i>For >50 To 100, Deduct</i>	-70.63	
	<i>For >100, Deduct</i>	-108.10	
10 51 26 00-0065	EA 15" x 18" x 48" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	807.14	35.79
	<i>For >50 To 100, Deduct</i>	-73.56	
	<i>For >100, Deduct</i>	-112.48	
10 51 26 00-0066	EA 12" x 12" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	812.80	35.79
	<i>For >50 To 100, Deduct</i>	-74.12	
	<i>For >100, Deduct</i>	-113.33	
10 51 26 00-0067	EA 12" x 15" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	880.91	35.79
	<i>For >50 To 100, Deduct</i>	-80.93	
	<i>For >100, Deduct</i>	-123.55	
10 51 26 00-0068	EA 12" x 18" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	881.23	35.79
	<i>For >50 To 100, Deduct</i>	-80.97	
	<i>For >100, Deduct</i>	-123.59	
10 51 26 00-0069	EA 15" x 12" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	918.39	35.79
	<i>For >50 To 100, Deduct</i>	-84.68	
	<i>For >100, Deduct</i>	-129.17	
10 51 26 00-0070	EA 15" x 15" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	955.71	35.79
	<i>For >50 To 100, Deduct</i>	-88.41	
	<i>For >100, Deduct</i>	-134.77	
10 51 26 00-0071	EA 15" x 18" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	993.00	35.79
	<i>For >50 To 100, Deduct</i>	-92.14	
	<i>For >100, Deduct</i>	-140.36	
10 51 26 00-0072	EA 18" x 12" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	963.01	35.79
	<i>For >50 To 100, Deduct</i>	-89.14	
	<i>For >100, Deduct</i>	-135.86	
10 51 26 00-0073	EA 18" x 15" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,002.44	35.79
	<i>For >50 To 100, Deduct</i>	-93.09	
	<i>For >100, Deduct</i>	-141.78	
10 51 26 00-0074	EA 18" x 18" x 60" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,041.88	35.79
	<i>For >50 To 100, Deduct</i>	-97.03	
	<i>For >100, Deduct</i>	-147.69	
10 51 26 00-0075	EA 12" x 12" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	969.41	36.88
	<i>For >50 To 100, Deduct</i>	-89.57	
	<i>For >100, Deduct</i>	-136.56	
10 51 26 00-0076	EA 12" x 15" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,008.87	36.88
	<i>For >50 To 100, Deduct</i>	-93.51	
	<i>For >100, Deduct</i>	-142.48	
10 51 26 00-0077	EA 12" x 18" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,036.56	36.88
	<i>For >50 To 100, Deduct</i>	-96.28	
	<i>For >100, Deduct</i>	-146.63	
10 51 26 00-0078	EA 15" x 12" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,020.62	36.88
	<i>For >50 To 100, Deduct</i>	-94.69	
	<i>For >100, Deduct</i>	-144.24	
10 51 26 00-0079	EA 15" x 15" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,033.13	36.88
	<i>For >50 To 100, Deduct</i>	-95.94	
	<i>For >100, Deduct</i>	-146.12	
10 51 26 00-0080	EA 15" x 18" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,078.20	36.88
	<i>For >50 To 100, Deduct</i>	-100.45	
	<i>For >100, Deduct</i>	-152.88	
10 51 26 00-0081	EA 18" x 12" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,002.71	36.88
	<i>For >50 To 100, Deduct</i>	-92.90	
	<i>For >100, Deduct</i>	-141.56	
10 51 26 00-0082	EA 18" x 15" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,094.36	36.88
	<i>For >50 To 100, Deduct</i>	-102.06	
	<i>For >100, Deduct</i>	-155.30	
10 51 26 00-0083	EA 18" x 18" x 72" Triple Tier Solid Plastic Locker (Tufftec Lockers®).....	1,159.24	36.88
	<i>For >50 To 100, Deduct</i>	-108.55	
	<i>For >100, Deduct</i>	-165.04	
10 51 26 00-0084	Four Tier Solid Plastic Lockers (10 51 26 00-0001)		
10 51 26 00-0085	EA 12" x 12" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	869.17	36.88
	<i>For >50 To 100, Deduct</i>	-79.54	
	<i>For >100, Deduct</i>	-121.53	
10 51 26 00-0086	EA 12" x 15" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	895.03	36.88
	<i>For >50 To 100, Deduct</i>	-82.13	
	<i>For >100, Deduct</i>	-125.40	
10 51 26 00-0087	EA 12" x 18" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	942.72	36.88
	<i>For >50 To 100, Deduct</i>	-86.90	
	<i>For >100, Deduct</i>	-132.56	
10 51 26 00-0088	EA 15" x 12" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	936.90	36.88
	<i>For >50 To 100, Deduct</i>	-86.32	
	<i>For >100, Deduct</i>	-131.69	
10 51 26 00-0089	EA 15" x 15" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	998.69	36.88
	<i>For >50 To 100, Deduct</i>	-92.49	
	<i>For >100, Deduct</i>	-140.95	
10 51 26 00-0090	EA 15" x 18" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	1,018.18	36.88
	<i>For >50 To 100, Deduct</i>	-94.44	
	<i>For >100, Deduct</i>	-143.88	
10 51 26 00-0091	EA 18" x 12" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®).....	1,008.50	36.88
	<i>For >50 To 100, Deduct</i>	-93.48	
	<i>For >100, Deduct</i>	-142.43	



Specialties	10	10
Storage Specialties	10 50	
Lockers	10 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51 26 00-0092	EA		18" x 15" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,041.41	36.88
			<i>For >50 To 100, Deduct</i>	-96.77	
			<i>For >100, Deduct</i>	-147.36	
10 51 26 00-0093	EA		18" x 18" x 60" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,136.25	36.88
			<i>For >50 To 100, Deduct</i>	-106.25	
			<i>For >100, Deduct</i>	-161.59	
10 51 26 00-0094	EA		12" x 12" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,002.84	37.96
			<i>For >50 To 100, Deduct</i>	-92.69	
			<i>For >100, Deduct</i>	-141.32	
10 51 26 00-0095	EA		12" x 15" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,048.71	37.96
			<i>For >50 To 100, Deduct</i>	-97.28	
			<i>For >100, Deduct</i>	-148.20	
10 51 26 00-0096	EA		12" x 18" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,054.68	37.96
			<i>For >50 To 100, Deduct</i>	-97.88	
			<i>For >100, Deduct</i>	-149.09	
10 51 26 00-0097	EA		15" x 12" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,112.48	37.96
			<i>For >50 To 100, Deduct</i>	-103.66	
			<i>For >100, Deduct</i>	-157.76	
10 51 26 00-0098	EA		15" x 15" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,059.00	37.96
			<i>For >50 To 100, Deduct</i>	-98.31	
			<i>For >100, Deduct</i>	-149.74	
10 51 26 00-0099	EA		15" x 18" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,107.45	37.96
			<i>For >50 To 100, Deduct</i>	-103.15	
			<i>For >100, Deduct</i>	-157.01	
10 51 26 00-0100	EA		18" x 12" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,057.14	37.96
			<i>For >50 To 100, Deduct</i>	-98.12	
			<i>For >100, Deduct</i>	-149.46	
10 51 26 00-0101	EA		18" x 15" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,115.20	37.96
			<i>For >50 To 100, Deduct</i>	-103.93	
			<i>For >100, Deduct</i>	-158.17	
10 51 26 00-0102	EA		18" x 18" x 72" Four Tier Solid Plastic Locker (Tufftec Lockers®)	1,202.19	37.96
			<i>For >50 To 100, Deduct</i>	-112.63	
			<i>For >100, Deduct</i>	-171.22	
10 51 26 00-0103			Five Tier Solid Plastic Lockers <small>(10 51 26 00-0001)</small>		
10 51 26 00-0104	EA		12" x 12" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	946.59	37.42
			<i>For >50 To 100, Deduct</i>	-87.18	
			<i>For >100, Deduct</i>	-133.01	
10 51 26 00-0105	EA		12" x 15" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	978.62	37.42
			<i>For >50 To 100, Deduct</i>	-90.38	
			<i>For >100, Deduct</i>	-137.81	
10 51 26 00-0106	EA		12" x 18" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,010.65	37.42
			<i>For >50 To 100, Deduct</i>	-93.58	
			<i>For >100, Deduct</i>	-142.62	
10 51 26 00-0107	EA		15" x 12" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	990.26	37.42
			<i>For >50 To 100, Deduct</i>	-91.54	
			<i>For >100, Deduct</i>	-139.56	
10 51 26 00-0108	EA		15" x 15" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,047.63	37.42
			<i>For >50 To 100, Deduct</i>	-97.28	
			<i>For >100, Deduct</i>	-148.16	
10 51 26 00-0109	EA		15" x 18" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,075.40	37.42
			<i>For >50 To 100, Deduct</i>	-100.06	
			<i>For >100, Deduct</i>	-152.33	
10 51 26 00-0110	EA		18" x 12" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,065.72	37.42
			<i>For >50 To 100, Deduct</i>	-99.09	
			<i>For >100, Deduct</i>	-150.88	
10 51 26 00-0111	EA		18" x 15" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,096.69	37.42
			<i>For >50 To 100, Deduct</i>	-102.19	
			<i>For >100, Deduct</i>	-155.52	
10 51 26 00-0112	EA		18" x 18" x 60" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,197.33	37.42
			<i>For >50 To 100, Deduct</i>	-112.25	
			<i>For >100, Deduct</i>	-170.62	
10 51 26 00-0113	EA		12" x 12" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,033.81	38.51
			<i>For >50 To 100, Deduct</i>	-95.68	
			<i>For >100, Deduct</i>	-145.83	
10 51 26 00-0114	EA		12" x 15" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,069.73	38.51
			<i>For >50 To 100, Deduct</i>	-99.27	
			<i>For >100, Deduct</i>	-151.22	
10 51 26 00-0115	EA		12" x 18" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,105.62	38.51
			<i>For >50 To 100, Deduct</i>	-102.86	
			<i>For >100, Deduct</i>	-156.60	
10 51 26 00-0116	EA		15" x 12" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,093.06	38.51
			<i>For >50 To 100, Deduct</i>	-101.61	
			<i>For >100, Deduct</i>	-154.72	
10 51 26 00-0117	EA		15" x 15" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,118.32	38.51
			<i>For >50 To 100, Deduct</i>	-104.13	
			<i>For >100, Deduct</i>	-158.51	
10 51 26 00-0118	EA		15" x 18" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,156.14	38.51
			<i>For >50 To 100, Deduct</i>	-107.91	
			<i>For >100, Deduct</i>	-164.18	
10 51 26 00-0119	EA		18" x 12" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)	1,127.07	38.51
			<i>For >50 To 100, Deduct</i>	-105.01	
			<i>For >100, Deduct</i>	-159.82	

10	10	Specialties
	10 50	Storage Specialties
	10 51	Lockers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 51 26 00-0120	EA		18" x 15" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,170.45 -109.35 -166.33	38.51
10 51 26 00-0121	EA		18" x 18" x 72" Five Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,220.78 -114.38 -173.88	38.51
10 51 26 00-0122			Six Tier Solid Plastic Lockers (10 51 26 00-0001)		
10 51 26 00-0123	EA		15" x 12" x 60" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,094.04 -101.81 -155.00	37.96
10 51 26 00-0124	EA		12" x 12" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,072.80 -99.47 -151.55	39.04
10 51 26 00-0125	EA		12" x 15" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,108.67 -103.06 -156.93	39.04
10 51 26 00-0126	EA		12" x 18" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,132.61 -105.45 -160.52	39.04
10 51 26 00-0127	EA		15" x 12" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,180.43 -110.23 -167.69	39.04
10 51 26 00-0128	EA		15" x 15" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,194.39 -111.63 -169.79	39.04
10 51 26 00-0129	EA		15" x 18" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,204.36 -112.63 -171.28	39.04
10 51 26 00-0130	EA		18" x 12" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,208.33 -113.02 -171.88	39.04
10 51 26 00-0131	EA		18" x 15" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,252.18 -117.41 -178.46	39.04
10 51 26 00-0132	EA		18" x 18" x 72" Six Tier Solid Plastic Locker (Tufftec Lockers®)..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	1,310.00 -123.19 -187.13	39.04
10 51 26 00-0133			Solid Plastic Locker Accessories (10 51 26 00-0001)		
10 51 26 00-0134			Slope Tops For Solid Plastic Lockers (10 51 26 00-0133) Note: Price per frame.		
10 51 26 00-0135	EA		Slope Top For Solid Plastic Lockers (Tufftec Lockers®).....	50.10	
10 51 26 00-0136			Recessed Bases For Solid Plastic Lockers (10 51 26 00-0133) Note: Price per frame.		
10 51 26 00-0137	EA		Recessed Base For Solid Plastic Lockers (Tufftec Lockers®).....	55.26	
10 51 26 00-0138			End Panels For Solid Plastic Lockers (10 51 26 00-0133) Note: Price per frame.		
10 51 26 00-0139	EA		End Panel For Solid Plastic Lockers (Tufftec Lockers®).....	130.32	
10 51 26 00-0140			Venting Options For Solid Plastic Locker Doors (10 51 26 00-0133) Note: Price per frame.		
10 51 26 00-0141	EA		Horizontal Venting Option For Solid Plastic Locker Doors.....	51.76	
10 51 26 00-0142			Filler Panels For Solid Plastic Lockers (10 51 26 00-0133) Note: Full locker height. Width and height cut to size in the field.		
10 51 26 00-0143	EA		Up To 6" Width, Filler Panel For Solid Plastic Lockers (Tufftec Lockers®).....	130.63	
10 51 26 00-0144			Locker Accessories For Solid Plastic Lockers (10 51 26 00-0133)		
10 51 26 00-0145	EA		Built In Hasp For Solid Plastic Lockers..... Note: For removable padlocks. Excludes padlock.	12.93	
10 51 26 00-0146	EA		Built In Combination Lock For Solid Plastic Lockers.....	38.83	
10 51 26 00-0147	EA		Built In Key Lock For Solid Plastic Lockers.....	51.76	
10 51 53			Locker Room Benches (10 51)		
10 51 53 00-0001	LF		9-1/2" Wide Top, 17" To 19" Height, Hardwood Bench With Aluminum Pedestals.....	111.12	5.43
10 51 53 00-0002	LF		9-1/2" Wide Top, 17" To 19" Height, Hardwood Bench With Painted Steel Pedestals.....	88.40	5.43
10 51 53 00-0003	LF		9-1/2" Wide Top, 17" To 19" Height, Plastic Laminated Bench With Steel Pedestals.....	135.81	5.43
10 51 53 00-0004	LF		9-1/2" Wide Top, 17" To 19" Height, Solid Plastic Bench With Steel Pedestals.....	129.72	5.43
10 51 53 00-0005	LF		9-1/2" Wide Top, 17" To 19" Height, Aluminum Bench With Aluminum Pedestals.....	100.45	5.43



Specialties	10	10
Storage Specialties	10 50	
Postal Specialties	10 55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 55 Postal Specialties (10 50)

10 55 23 Mail Boxes (10 55)

10 55 23 26 Commercial Mail Boxes (10 55 23)

10 55 23 26-0001 Commercial Letter Boxes (10 55 23 26)

Note: Includes locks and keys unless provided by the United States Postal Service.

10 55 23 26-0002	EA	15" Wide x 19" High x 7-1/2" Deep, US Postal Service Approved, Surface Mount, Aluminum Letter Box (Salsbury 2240AU)	404.12	16.27
10 55 23 26-0003	EA	15" Wide x 19" High x 6-3/4" Deep, Private Use/Access, Recessed Mount, Aluminum Letter Box (Salsbury 2245AP)	467.82	16.27

10 55 23 26-0004 Commercial Horizontal Mail Boxes (10 55 23 26)

Note: Includes locks and keys unless provided by the United States Postal Service.

10 55 23 26-0005	BOX	5-1/2" Wide x 5-1/2" High x 15-1/2" Deep, Private Use/Access, Wall Mount, Aluminum Horizontal Mail Boxes, Per Box	78.97	16.27
10 55 23 26-0006	BOX	10-3/4" Wide x 5-1/2" High x 15-1/2" Deep, Private Use/Access, Wall Mount, Aluminum Horizontal Mail Boxes, Per Box	169.82	21.69
10 55 23 26-0007	BOX	6-3/8" Wide x 5" High x 17" Deep, US Postal Service Approved, Wall Mount, Aluminum Horizontal Mail Boxes, Per Box	102.62	13.56
10 55 23 26-0008	BOX	12-7/8" Wide x 5" High x 17" Deep, US Postal Service Approved, Wall Mount, Aluminum Horizontal Mail Boxes, Per Box	159.37	21.69

10 55 23 26-0009 Commercial Cluster Mail Boxes (10 55 23 26)

Note: Includes locks and keys unless provided by the United States Postal Service. Includes pedestal. Excludes concrete foundation.

10 55 23 26-0010	EA	13-15/16 Wide" x 24-1/8" High x 15" Deep, Pedestal Mount, Aluminum (NDCBU) Neighborhood Delivery And Collection Mail Box (National Mailboxes H8MNDCBU5)	2,087.52	32.54
10 55 23 26-0011	EA	26-15/16" Wide x 24-1/8" High x 15" Deep, Pedestal Mount, Aluminum (NDCBU) Neighborhood Delivery And Collection Mail Box (National Mailboxes H16MNDCBU8)	2,472.31	43.38
10 55 23 26-0012	EA	30-1/2" Wide x 62" High x 17-7/8" Deep, 8 Tenant Doors, 2 Parcel Lockers, Pedestal Mount, Aluminum And Stainless Steel Construction, (CBU) Cluster Mail Box (AF Florence Vital 1570-8)	3,300.29	43.38
10 55 23 26-0013	EA	30-1/2" Wide x 62" High x 17-7/8" Deep, 12 Tenant Doors, 1 Parcel Locker, Pedestal Mount, Aluminum And Stainless Steel Construction, (CBU) Cluster Mail Box (AF Florence Vital 1570-12)	3,406.45	43.38
10 55 23 26-0014	EA	30-1/2" Wide x 62" High x 17-7/8" Deep, 16 Tenant Doors, 2 Parcel Lockers, Pedestal Mount, Aluminum And Stainless Steel Construction, (CBU) Cluster Mail Box (AF Florence Vital 1570-16)	3,565.70	43.38

10 55 23 26-0015 Commercial 4C Mail Boxes (10 55 23 26)

Note: Includes locks and keys unless provided by the United States Postal Service.

10 55 23 26-0016	EA	31-9/16" Wide x 40-3/4" High x 17" Deep, 9 Doors, Recessed Wall Mount, Aluminum 4C Mail Box (AF Florence 4C11S-09)	1,782.12	43.38
10 55 23 26-0017	EA	31-9/16" Wide x 40-3/4" High x 17" Deep, 15 Doors, 1 Parcel Locker, Recessed Wall Mount, Aluminum 4C Mail Box (AF Florence 4C11D-15)	3,145.62	43.38
10 55 23 26-0018	EA	31-9/16" Wide x 40-3/4" High x 17" Deep, 19 Doors, Recessed Wall Mount, Aluminum 4C Mail Box (AF Florence 4C11D-19)	3,273.02	43.38

10 55 26 Parcel Lockers (10 55)

10 55 26 00-0001 Parcel Lockers (10 55 26)

10 55 26 00-0002	EA	24" x 14" x 15" Deep, Aluminum Pedestal Mounted Parcel Locker	1,550.33	32.54
10 55 26 00-0003	EA	48" x 16" x 18" Deep, Aluminum Pedestal Mounted Parcel Locker	1,842.28	43.38

10 56 Storage Assemblies (10 50)

10 56 13 Metal Storage Shelving (10 56)

10 56 13 13 End-Panel-Support Metal Storage Shelving (10 56 13)

10 56 13 13-0001 Residential Wire Shelving (10 56 13 13)

Note: Includes brackets and hardware.

10 56 13 13-0002	LF	12" Deep, Wire Shelving For Closets	30.88	8.79
10 56 13 13-0003	LF	16" Deep, Wire Shelving For Closets	34.23	8.79
10 56 13 13-0004	LF	20" Deep, Wire Shelving For Closets	37.57	8.79

10 56 16 Fabricated Wood Storage Shelving (10 56)

10 56 16 00-0001 Shelving (10 56 16)

10 56 16 00-0002 Built-In Wood Shelving (10 56 16 00-0001)

Note: Priced by shelf area. Includes hardware and trim.

10 56 16 00-0003	SF	Built-in Wood Storage Shelving Post And Trimmed Plywood	21.81	2.73
		For Each SF Of Lumber Edge Band, Add	0.69	
		For Each SF Of Prefinished Shelves, Add	2.32	

10	10 Specialties
	10 50 Storage Specialties
	10 56 Storage Assemblies



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 56 16 00-0004 SF Built-in Wood Storage Shelving Post And Solid Clear Pine <i>For Each SF Of Lumber Edge Band, Add</i> <i>For Each SF Of Prefinished Shelves, Add</i>	23.51 0.69 2.32	3.28
10 56 16 00-0005 SF Built-in Wood Storage Shelving Closet Shelf Of Pine With Rod <i>For Each SF Of Lumber Edge Band, Add</i> <i>For Each SF Of Prefinished Shelves, Add</i>	23.83 0.69 2.32	5.48
10 56 16 00-0006 Wood Shelving, White Pine, Clear Grade, Wall Mounted <small>(10 56 16 00-0001)</small>		
10 56 16 00-0007 LF 1" x 8" White Pine Clear Grade Wood Shelving.....	17.91	6.56
10 56 16 00-0008 LF 1" x 10" White Pine Clear Grade Wood Shelving.....	19.74	7.01
10 56 16 00-0009 LF 1" x 12" White Pine Clear Grade Wood Shelving.....	21.77	7.55
10 56 16 00-0010 SF Wood Shelving, 2" White Pine Clear Grade.....	28.63	
10 56 16 00-0011 Plywood Shelf With Edge Band <small>(10 56 16 00-0001)</small>		
10 56 16 00-0012 LF 12" Wide, 3/4" Plywood Shelf With Edge Band.....	22.29	6.56
10 56 16 00-0013 LF 24" Wide, 3/4" Plywood Shelf With Edge Band.....	35.31	8.21
10 56 16 00-0014 Adjustable Shelf And Rod <small>(10 56 16 00-0001)</small>		
10 56 16 00-0015 EA 12" Wide Adjustable Shelf, 3' To 6' Long Note: Including Rod	206.85	24.63
10 56 16 00-0016 EA 12" Wide Adjustable Shelf, 5' To 8' Long Note: Including Rod	242.98	32.84
10 56 16 00-0017 Prefinished Wood Shelves With Brackets And Supports <small>(10 56 16 00-0001)</small>		
10 56 16 00-0018 LF Prefinished Wood Shelves, 8" Wide, With Brackets And Supports.....	19.08	6.56
10 56 16 00-0019 LF Prefinished Wood Shelves, 10" Wide, With Brackets And Supports.....	20.79	7.01
10 56 16 00-0020 SF Adjustable 3/4" Plastic Laminated Wood Shelves, Recessed Metal Standards.....	67.07	10.94
10 56 16 00-0021 Wood Shelving, Oak, Clear Grade, Wall Mounted <small>(10 56 16 00-0001)</small>		
10 56 16 00-0022 LF Wood Shelving, 1" X 8" Oak Clear Grade.....	21.79	10.29

10 70 Exterior Specialties (10)

10 73 Protective Covers (10 70)

10 73 13 Awnings (10 73)

10 73 13 13 Metal Awnings (10 73 13)

10 73 13 13-0001 Metal Awnings (10 73 13 13)

Note: Includes metal cover, frame supports and anchoring.

10 73 13 13-0002 SF Clear Weather Resistant Finish, Ribbed Aluminum Window Awnings.....	80.07	9.15
10 73 13 13-0003 SF Baked Enamel Finish, Ribbed Aluminum Window Awning.....	70.80	8.20
10 73 13 13-0004 SF Flat Roofed Steel Awning..... Note: Per SF of covered area	222.85	9.50
10 73 13 13-0005 SF Arched Roofed Steel Awning (Per SF Of Covered Area).....	230.00	10.69

10 73 13 23 Fabric Awnings (10 73 13)

10 73 13 23-0001 Canvas Awnings (10 73 13 23)

Note: Includes minimum 12 oz. canvas, frame supports and anchoring.

10 73 13 23-0002 SF Canvas Awning, Waterproof Fabric Tubular Metal Framing.....	77.27	7.58
10 73 13 23-0003 SF Side Protection Canvas For Walkways (Per SF Of Wall Area).....	44.43	2.45
10 73 13 23-0004 SF Removal And Replacement Of Canvas For Awnings..... Note: Includes removal of existing canvas cover.	27.70	
<i>For 18 Oz. Vinyl Laminated Polyester Cover, Add</i>	0.95	

10 73 16 Canopies (10 73)

10 73 16 13 Metal Canopies (10 73 16)

10 73 16 13-0001 Canopies, Wall Hung, Aluminum Framed And Covered, Prefinished (10 73 16 13)

Note: Includes cover, frame supports and anchoring.

10 73 16 13-0002 EA 8' x 10' Canopy, Aluminum, Wall Hung.....	7,264.31	495.28
10 73 16 13-0003 EA 8' x 20' Canopy, Aluminum, Wall Hung.....	13,524.44	792.64
10 73 16 13-0004 EA 10' x 10' Canopy, Aluminum, Wall Hung.....	8,938.70	619.70
10 73 16 13-0005 EA 10' x 20' Canopy, Aluminum, Wall Hung.....	16,508.30	828.66

10 73 26 Walkway Coverings (10 73)

Note: Pre-engineered includes all framing and steel supports, integral gutter system. Excludes foundations.

10 73 26 13 Metal Walkway Coverings (10 73 26)



Specialties	10	10
Exterior Specialties	10 70	
Protective Covers	10 73	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 73 26 13-0001 Steel Walkway/Parking Covers (10 73 26 13)

Note: Factory applied polyester finish.		
10 73 26 13-0002	SF Flat Roofed Steel Walkway/Parking Cover	109.72
Note: Includes factory applied polyester finish.		
<i>For Snow Load (30 PSF), Add</i> 38.15		
<i>For Wind Load (140 MPH), Add</i> 47.69		
10 73 26 13-0003	SF Arch Roofed Steel Walkway/Parking Cover.....	116.80
Note: Includes factory applied polyester finish.		
<i>For Snow Load (30 PSF), Add</i> 40.54		
<i>For Wind Load (140 MPH), Add</i> 50.67		

10 73 26 13-0004 Aluminum Walkway/Parking Covers (10 73 26 13)

10 73 26 13-0005	SF Flat Roofed Aluminum Walkway/Parking Cover	70.29
Note: Includes factory applied polyester finish.		
<i>For Snow Load (30 PSF), Add</i> 22.38		
<i>For Wind Load (140 MPH), Add</i> 27.97		
10 73 26 13-0006	SF Arch Roofed Aluminum Walkway/Parking Cover.....	76.49
Note: Includes factory applied polyester finish.		
<i>For Snow Load (30 PSF), Add</i> 24.41		
<i>For Wind Load (140 MPH), Add</i> 30.52		

10 75 Flagpoles (10 75)

Note: Metal bases are installed in a concrete base and fully rigged. Heights indicated are from ground to top of installed flag pole. Uninstalled lengths are longer. Includes top ball (color and material similar to pole), cleats and cleat cover, all caulking and sealants, and hoisting into place. Excludes excavation and concrete. See CSI section 10 75 16 00-0012 for bases.

10 75 16 Ground-Set Flagpoles (10 75)

10 75 16 00-0001 Free Standing Tapered Aluminum Flagpoles (10 75 16)

Note: Heavy duty. Excludes base or foundation See CSI section 10 75 16 00-0012 for concrete base.		
10 75 16 00-0002	EA 20' Exposed Height, Tapered Satin Aluminum Flagpole.....	3,310.59
Note: 5" butt diameter, 3" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 570.00		
<i>For Clear Anodized Finish, Add</i> 150.00		
<i>For Bronze Anodized Finish, Add</i> 180.00		
<i>For Black Anodized Finish, Add</i> 230.00		
<i>For Rope Lock Box, Add</i> 96.00		
10 75 16 00-0003	EA 25' Exposed Height, Tapered Satin Aluminum Flagpole.....	3,944.01
Note: 5-1/2" butt diameter, 3-1/2" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 1,100.00		
<i>For Clear Anodized Finish, Add</i> 200.00		
<i>For Bronze Anodized Finish, Add</i> 230.00		
<i>For Black Anodized Finish, Add</i> 320.00		
<i>For Rope Lock Box, Add</i> 96.00		
10 75 16 00-0004	EA 30' Exposed Height, Tapered Satin Aluminum Flagpole.....	4,378.51
Note: 6" butt diameter, 3-1/2" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 1,390.00		
<i>For Clear Anodized Finish, Add</i> 300.00		
<i>For Bronze Anodized Finish, Add</i> 375.00		
<i>For Black Anodized Finish, Add</i> 450.00		
<i>For Rope Lock Box, Add</i> 96.00		
10 75 16 00-0005	EA 35' Exposed Height, Tapered Satin Aluminum Flagpole.....	5,565.79
Note: 7" butt diameter, 3-1/2" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 1,340.00		
<i>For Clear Anodized Finish, Add</i> 290.00		
<i>For Bronze Anodized Finish, Add</i> 360.00		
<i>For Black Anodized Finish, Add</i> 480.00		
<i>For Rope Lock Box, Add</i> 96.00		
10 75 16 00-0006	EA 40' Exposed Height, Tapered Satin Aluminum Flagpole.....	6,885.69
Note: 8" butt diameter, 3-1/2" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 1,490.00		
<i>For Clear Anodized Finish, Add</i> 390.00		
<i>For Bronze Anodized Finish, Add</i> 480.00		
<i>For Black Anodized Finish, Add</i> 660.00		
<i>For Rope Lock Box, Add</i> 96.00		
10 75 16 00-0007	EA 45' Exposed Height, Tapered Satin Aluminum Flagpole.....	7,625.20
Note: 8" butt diameter, 3-1/2" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 1,340.00		
<i>For Clear Anodized Finish, Add</i> 400.00		
<i>For Bronze Anodized Finish, Add</i> 500.00		
<i>For Black Anodized Finish, Add</i> 700.00		
<i>For Rope Lock Box, Add</i> 96.00		
10 75 16 00-0008	EA 50' Exposed Height, Tapered Satin Aluminum Flagpole.....	9,598.05
Note: 10" butt diameter, 4" top diameter and 0.188" wall.		
<i>For Internal Halyard, Winch System, Add</i> 1,380.00		
<i>For Clear Anodized Finish, Add</i> 700.00		
<i>For Bronze Anodized Finish, Add</i> 860.00		
<i>For Black Anodized Finish, Add</i> 1,130.00		
<i>For Rope Lock Box, Add</i> 96.00		

10 Specialties**10 70 Exterior Specialties****10 75 Flagpoles**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 75 16 00-0009	EA		60' Exposed Height, Tapered Satin Aluminum Flagpole..... Note: 12" butt diameter, 4" top diameter and 0.250" wall. <i>For Internal Halyard, Winch System, Add</i> <i>For Clear Anodized Finish, Add</i> <i>For Bronze Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For Rope Lock Box, Add</i>	16,501.08 1,800.00 620.00 820.00 1,160.00 96.00	1,627.29
10 75 16 00-0010	EA		70' Exposed Height, Tapered Satin Aluminum Flagpole..... Note: 12" butt diameter, 4" top diameter and 0.250" wall. <i>For Internal Halyard, Winch System, Add</i> <i>For Clear Anodized Finish, Add</i> <i>For Bronze Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For Rope Lock Box, Add</i>	18,059.67 1,720.00 710.00 950.00 1,360.00 96.00	1,790.01
10 75 16 00-0011	EA		80' Exposed Height, Tapered Satin Aluminum Flagpole..... Note: 12" butt diameter, 4" top diameter and 0.375" wall. <i>For Internal Halyard, Winch System, Add</i> <i>For Clear Anodized Finish, Add</i> <i>For Bronze Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For Rope Lock Box, Add</i>	22,602.13 2,600.00 1,100.00 1,380.00 1,840.00 96.00	1,952.74
10 75 16 00-0012			Flagpole Bases (10 75 16)		
10 75 16 00-0013			Flagpole Concrete Base (10 75 16 00-0012) Note: Includes excavation, forms where necessary, steel casing and reinforcing, metal collar installation, base plate, sand fill, ground spike, concrete and finishing of concrete.		
10 75 16 00-0014	EA		30' Or Less Flagpole, Poured Concrete Foundation.....	1,755.86	
10 75 16 00-0015	EA		35' Flagpole, Poured Concrete Foundation.....	1,815.90	
10 75 16 00-0016	EA		40' Flagpole, Poured Concrete Foundation.....	2,084.85	
10 75 16 00-0017	EA		45' Flagpole, Poured Concrete Foundation.....	2,206.16	
10 75 16 00-0018	EA		50' Flagpole, Poured Concrete Foundation.....	2,647.75	
10 75 16 00-0019	EA		60' Flagpole, Poured Concrete Foundation.....	3,207.68	
10 75 16 00-0020	EA		70' Flagpole, Poured Concrete Foundation.....	3,797.94	
10 75 16 00-0021	EA		80' Flagpole, Poured Concrete Foundation.....	4,416.53	
10 75 16 00-0022	EA		90' To 100' Flagpole, Poured Concrete Foundation.....	5,150.11	
10 75 16 00-0023			Direct Embedded Flagpole Base (10 75 16 00-0012) Note: Augured in place, no concrete required.		
10 75 16 00-0024	EA		20' To 25' Flagpole, Direct Embedded Pole Base.....	766.18	
10 75 16 00-0025	EA		30' To 40' Flagpole, Direct Embedded Pole Base.....	1,099.43	
10 75 16 00-0026	EA		45' To 55' Flagpole, Direct Embedded Pole Base.....	1,228.15	
10 75 16 00-0027	EA		60' To 70' Flagpole, Direct Embedded Pole Base.....	1,382.02	
10 75 16 00-0028			Flagpole Accessories (10 75 16)		
10 75 16 00-0029			Flagpole Tops (10 75 16 00-0028) Note: To be used on renovation of existing flagpole. Do not use in conjunction with installation of new flagpoles.		
10 75 16 00-0030	EA		4" Gold Anodized Aluminum Ball For Top Of Flagpole.....	129.35	46.12
10 75 16 00-0031	EA		5" Gold Anodized Aluminum Ball For Top Of Flagpole.....	141.41	48.83
10 75 16 00-0032	EA		6" Gold Anodized Aluminum Ball For Top Of Flagpole.....	158.78	51.54
10 75 16 00-0033	EA		8" Gold Anodized Aluminum Ball For Top Of Flagpole.....	209.29	54.25
10 75 16 00-0034	EA		10" Gold Anodized Aluminum Ball For Top Of Flagpole.....	278.37	56.96
10 75 16 00-0035	EA		12" Gold Anodized Aluminum Ball For Top Of Flagpole.....	311.65	59.67
10 75 16 00-0036	EA		11-1/4" Aluminum Flying Eagle Mounted On A Spindle For Flagpole Top, Gold Finish.....	283.80	59.67
10 75 16 00-0037	EA		15" Aluminum Flying Eagle Mounted On A Spindle For Flagpole Top, Gold Finish.....	330.58	67.81
10 75 16 00-0038			Flagpole Accessories (10 75 16 00-0028) Note: To be used on renovation of existing flagpole. Do not use in conjunction with installation of new flagpoles.		
10 75 16 00-0039	LF		5/16" Diameter, Nylon Halyard (Rope) With Wire Center For Flagpoles.....	1.40	0.08
10 75 16 00-0040	LF		5/16" Diameter, Solid Braided Multifilament Polypropylene Halyard (Rope) For Flagpoles.....	0.69	0.08
10 75 16 00-0041	LF		5/16" Diameter, Nylon Halyard (Rope) For Flagpoles.....	0.53	0.08
10 75 16 00-0042	LF		3/8" Diameter, Nylon Halyard (Rope) With Wire Center For Flagpoles.....	1.88	0.08
10 75 16 00-0043	EA		Refinish Existing Flagpole Ball.....	390.93	135.57
10 75 16 00-0044	EA		Locking Aluminum Cleat Box For Flagpoles.....	327.19	81.34
10 75 16 00-0045	EA		Aluminum Cleat For Flagpoles.....	27.68	5.43
10 75 16 00-0046	LF		1/8" Diameter, 7x7 Galvanized Wire Rope For Flagpoles.....	0.82	0.11
10 75 23			Wall-Mounted Flagpoles (10 75)		
10 75 23 00-0001			Vertical, Wall/Roof Mounted Tapered Aluminum Flagpoles (10 75 23) Note: Includes aluminum brackets, 3" butt diameter and 0.125" wall.		
10 75 23 00-0002	EA		14' Height, Vertical Wall/Roof Mounted Tapered Aluminum Flagpole..... <i>For Rope Lock Box, Add</i>	2,183.35 96.00	713.72
10 75 23 00-0003	EA		17' Height, Vertical Wall/Roof Mounted Tapered Aluminum Flagpole..... <i>For Rope Lock Box, Add</i>	2,365.88 96.00	785.09
10 75 23 00-0004	EA		20' Height, Vertical Wall/Roof Mounted Tapered Aluminum Flagpole..... <i>For Rope Lock Box, Add</i>	2,561.67 96.00	856.47



Specialties	10	10
Exterior Specialties	10 70	
Flagpoles	10 75	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 75 23 00-0005	EA		25' Height, Vertical Wall/Roof Mounted Tapered Aluminum Flagpole <i>For Rope Lock Box, Add</i>	2,966.52 96.00	999.21
10 75 23 00-0006			Outrigger, Wall Mounted Tapered Aluminum Flagpoles (10 75 23) Note: Includes aluminum base, 3-1/2" butt diameter and 0.125" wall.		
10 75 23 00-0007	EA		10', Wall Mounted, Aluminum Outrigger Flagpole With Bracket <i>For Rope Lock Box, Add</i>	2,929.13 96.00	642.35
10 75 23 00-0008	EA		15', Wall Mounted, Aluminum Outrigger Flagpole With Bracket <i>For Rope Lock Box, Add</i>	3,151.45 96.00	713.72
10 75 23 00-0009	EA		20', Wall Mounted, Aluminum Outrigger Flagpole With Bracket <i>For Rope Lock Box, Add</i>	3,489.98 96.00	856.47

10 80 Other Specialties (10)

10 81 Pest Control Devices (10 80)

10 81 13 Bird Control Devices (10 81)

10 81 13 00-0001 Stainless Steel Spiked Bird Barrier (10 81 13)

Note: Stainless steel spikes with flexible polycarbonate base.					
10 81 13 00-0002	LF		2-1/2" To 3" Wide Stainless Steel Spikes And Polycarbonate Base Bird Deterrent System	10.33	0.87
10 81 13 00-0003	LF		4-1/2" To 5" Wide Stainless Steel Spikes And Polycarbonate Base Bird Deterrent System	12.47	0.87
10 81 13 00-0004	LF		8" Wide Stainless Steel Spikes And Polycarbonate Base Bird Deterrent System	18.48	0.87

10 81 13 00-0005 Polycarbonate Spiked Bird Barrier (10 81 13)

Note: Polycarbonate spikes and base.					
10 81 13 00-0006	LF		3" Wide Polycarbonate Spikes And Base Bird Deterrent System	9.51	0.87
10 81 13 00-0007	LF		5" Wide Polycarbonate Spikes And Base Bird Deterrent System	11.53	0.87
10 81 13 00-0008	LF		8" Wide Polycarbonate Spikes And Base Bird Deterrent System	13.73	0.87

10 81 13 00-0009 Spiked Gutter Or Girder Bird Barrier (10 81 13)

Note: Stainless steel spikes with flexible polycarbonate base mounted to gutter or girder. Includes aluminum clamps.					
10 81 13 00-0010	LF		Stainless Steel Spikes And Polycarbonate Base Bird Deterrent System For Gutter Or Girder Application	11.07	0.87

10 81 13 00-0011 Coil Bird Barrier (10 81 13)

Note: Stainless steel coil.					
10 81 13 00-0012	LF		4" Diameter Stainless Steel Coil Bird Deterrent System	7.63	0.87
10 81 13 00-0013	LF		5" Diameter Stainless Steel Coil Bird Deterrent System	9.09	0.87

10 81 13 00-0014 Spider Bird Barrier (10 81 13)

Note: Stainless steel arms with various bases.					
10 81 13 00-0015	EA		2' Diameter Stainless Steel Spider Bird Deterrent System	129.35	0.87
10 81 13 00-0016	EA		4' Diameter Stainless Steel Spider Bird Deterrent System	192.28	0.87
10 81 13 00-0017	EA		8' Diameter Stainless Steel Spider Bird Deterrent System	243.68	0.87

10 81 13 00-0018 Oriented Flexible Flame Resistant Netting (10 81 13)

Note: Includes stainless steel rings and plastic ties.					
10 81 13 00-0019	SF		1/8" x 1/8" Mesh Flexible Polypropylene Netting	1.16	0.39
Note: To control bird and marine predators.					
10 81 13 00-0020	SF		1/4" x 1/4" Mesh Flexible Polypropylene Netting	1.11	0.39
Note: To control bird and marine predators.					
10 81 13 00-0021	SF		1/2" x 1/2" Mesh Flexible Polypropylene Netting	1.06	0.39
Note: To control bird and marine predators.					
10 81 13 00-0022	SF		3/4" x 3/4" Mesh Flexible Polypropylene Netting	1.02	0.39
Note: To control bird and marine predators.					
10 81 13 00-0023	SF		1" x 1" Mesh Flexible Polypropylene Netting	1.02	0.39
Note: To control bird and marine predators.					
10 81 13 00-0024	SF		1-1/8" x 1-1/8" Mesh Flexible Polypropylene Netting	1.00	0.39
Note: To control bird and marine predators.					
10 81 13 00-0025	SF		2" x 2" Mesh Flexible Polypropylene Netting	0.97	0.39
Note: To control bird and marine predators.					
10 81 13 00-0026	SF		3" x 3" Mesh Flexible Polypropylene Netting	0.97	0.39
Note: To control bird and marine predators.					
10 81 13 00-0027	SF		4" x 4" Mesh Flexible Polypropylene Netting	0.93	0.39
Note: To control bird and marine predators.					
10 81 13 00-0028	SF		5/8" x 3/4" Mesh Flexible Polypropylene Netting	1.04	0.39
Note: To control bird and marine predators.					
10 81 13 00-0029	SF		1-1/4" x 1-1/2" Mesh Flexible Polypropylene Netting	0.98	0.39
Note: To control bird and marine predators.					
10 81 13 00-0030	EA		Poly Clips For Flexible Netting	3.32	

10 81 13 00-0031 Netting Accessories (10 81 13)

10 81 13 00-0032	EA		2' Zipper For Flexible Netting	9.13	
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10	10	Specialties
	10 80	Other Specialties
	10 81	Pest Control Devices



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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10 81 13 00-0033	EA	4' Zipper For Flexible Netting	13.75	
10 81 13 00-0034	EA	6' Zipper For Flexible Netting	16.18	
10 81 13 00-0035	EA	8' Zipper For Flexible Netting	22.99	

10 81 16 Insect Control Devices (10 81)

10 81 16 00-0001		Insect Screening (10 81 16)		
10 81 16 00-0002	CSF	17/14 Mesh Insect Screening With Flat Screen Splines	140.92	

10 86 Security Mirrors And Domes (10 80)

10 86 00 00-0001		Dome Mirrors (10 86)		
		Note: Includes all mounting hardware. Indoor or outdoor applications.		

10 86 00 00-0002		Steel Dome Mirrors (10 86 00 00-0001)		
10 86 00 00-0003	EA	9" Diameter Full-Dome Steel Dome Mirror	309.15	21.70
10 86 00 00-0004	EA	12" Diameter Full-Dome Steel Dome Mirror	364.47	22.78
10 86 00 00-0005	EA	18" Diameter Full-Dome Steel Dome Mirror	421.96	24.96
10 86 00 00-0006	EA	24" Diameter Full-Dome Steel Dome Mirror	564.96	27.12
10 86 00 00-0007	EA	9" Diameter Half-Dome Steel Dome Mirror	221.12	16.28
10 86 00 00-0008	EA	12" Diameter Half-Dome Steel Dome Mirror	255.64	17.36
10 86 00 00-0009	EA	18" Diameter Half-Dome Steel Dome Mirror	299.11	18.98
10 86 00 00-0010	EA	24" Diameter Half-Dome Steel Dome Mirror	417.91	20.62

10 86 00 00-0011 **Plexiglas Dome Mirrors (10 86 00 00-0001)**

10 86 00 00-0012	EA	18" Diameter Full-Dome Plexiglas Dome Mirror	238.25	24.96
10 86 00 00-0013	EA	26" Diameter Full-Dome Plexiglas Dome Mirror	338.49	27.12
10 86 00 00-0014	EA	32" Diameter Full-Dome Plexiglas Dome Mirror	448.86	31.46
10 86 00 00-0015	EA	36" Diameter Full-Dome Plexiglas Dome Mirror	542.75	37.98
10 86 00 00-0016	EA	48" Diameter Full-Dome Plexiglas Dome Mirror	792.53	54.25
10 86 00 00-0017	EA	18" Diameter Half-Dome Plexiglas Dome Mirror	144.97	18.98
10 86 00 00-0018	EA	26" Diameter Half-Dome Plexiglas Dome Mirror	196.75	20.62
10 86 00 00-0019	EA	32" Diameter Half-Dome Plexiglas Dome Mirror	260.11	23.87
10 86 00 00-0020	EA	36" Diameter Half-Dome Plexiglas Dome Mirror	320.95	28.75
10 86 00 00-0021	EA	48" Diameter Half-Dome Plexiglas Dome Mirror	511.21	40.69
10 86 00 00-0022	EA	18" Diameter Quarter-Dome Plexiglas Dome Mirror	92.63	16.28
10 86 00 00-0023	EA	26" Diameter Quarter-Dome Plexiglas Dome Mirror	119.69	17.91
10 86 00 00-0024	EA	32" Diameter Quarter-Dome Plexiglas Dome Mirror	158.23	20.07
10 86 00 00-0025	EA	36" Diameter Quarter-Dome Plexiglas Dome Mirror	197.49	23.87
10 86 00 00-0026	EA	48" Diameter Quarter-Dome Plexiglas Dome Mirror	328.94	33.91

10 86 00 00-0027 **Coated Plexiglas Dome Mirrors (10 86 00 00-0001)**

10 86 00 00-0028	EA	18" Diameter Full-Dome Coated Plexiglas Dome Mirror	285.62	24.96
10 86 00 00-0029	EA	26" Diameter Full-Dome Coated Plexiglas Dome Mirror	444.79	27.12
10 86 00 00-0030	EA	36" Diameter Full-Dome Coated Plexiglas Dome Mirror	755.35	37.98
10 86 00 00-0031	EA	48" Diameter Full-Dome Coated Plexiglas Dome Mirror	1,164.58	54.25
10 86 00 00-0032	EA	18" Diameter Half-Dome Coated Plexiglas Dome Mirror	184.72	18.98
10 86 00 00-0033	EA	26" Diameter Half-Dome Coated Plexiglas Dome Mirror	276.94	20.62
10 86 00 00-0034	EA	36" Diameter Half-Dome Coated Plexiglas Dome Mirror	438.81	28.75
10 86 00 00-0035	EA	48" Diameter Half-Dome Coated Plexiglas Dome Mirror	728.43	40.69
10 86 00 00-0036	EA	18" Diameter Quarter-Dome Coated Plexiglas Dome Mirror	133.54	16.28
10 86 00 00-0037	EA	26" Diameter Quarter-Dome Coated Plexiglas Dome Mirror	188.55	17.91
10 86 00 00-0038	EA	32" Diameter Quarter-Dome Coated Plexiglas Dome Mirror	245.12	20.07
10 86 00 00-0039	EA	36" Diameter Quarter-Dome Coated Plexiglas Dome Mirror	315.80	23.87
10 86 00 00-0040	EA	48" Diameter Quarter-Dome Coated Plexiglas Dome Mirror	495.33	33.91

10 86 00 00-0041 **Circular Convex Security Mirrors (10 86)**

Note: Includes all mounting hardware.

10 86 00 00-0042 **Plexiglas Circular Convex Mirrors (10 86 00 00-0041)**

Note: Indoor models have a tempered hardboard backing. Outdoor models have a waterproof edge and back, rustproof hardware with backed-on enamel finish.

10 86 00 00-0043	EA	12" Diameter Plexiglas Circular Convex Mirrors, Indoor	99.43	17.36
10 86 00 00-0044	EA	18" Diameter Plexiglas Circular Convex Mirrors, Indoor	130.18	18.98
10 86 00 00-0045	EA	26" Diameter Plexiglas Circular Convex Mirrors, Indoor	199.30	20.62
10 86 00 00-0046	EA	30" Diameter Plexiglas Circular Convex Mirrors, Indoor	249.48	23.87
10 86 00 00-0047	EA	36" Diameter Plexiglas Circular Convex Mirrors, Indoor	332.51	28.75
10 86 00 00-0048	EA	48" Diameter Plexiglas Circular Convex Mirrors, Indoor	589.78	40.69
10 86 00 00-0049	EA	18" Diameter Plexiglas Circular Convex Mirrors, Outdoor	169.24	18.98
10 86 00 00-0050	EA	26" Diameter Plexiglas Circular Convex Mirrors, Outdoor	245.51	20.62
10 86 00 00-0051	EA	36" Diameter Plexiglas Circular Convex Mirrors, Outdoor	350.99	28.75
10 86 00 00-0052	EA	48" Diameter Plexiglas Circular Convex Mirrors, Outdoor	645.24	40.69

10 86 00 00-0053 **Coated Plexiglas Circular Convex Mirrors (10 86 00 00-0041)**

Note: Indoor models have a tempered hardboard backing. Outdoor models have a waterproof edge and back, rustproof hardware with backed-on enamel finish.



Specialties	10	10
Other Specialties	10 80	
Security Mirrors And Domes	10 86	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
10 86 00 00-0054	EA		18" Diameter Coated Plexiglas Circular Convex Mirrors, Indoor	205.29	18.98
10 86 00 00-0055	EA		26" Diameter Coated Plexiglas Circular Convex Mirrors, Indoor	325.47	20.62
10 86 00 00-0056	EA		30" Diameter Coated Plexiglas Circular Convex Mirrors, Indoor	438.28	23.87
10 86 00 00-0057	EA		36" Diameter Coated Plexiglas Circular Convex Mirrors, Indoor	547.42	28.75
10 86 00 00-0058	EA		48" Diameter Coated Plexiglas Circular Convex Mirrors, Indoor	795.45	40.69
10 86 00 00-0059	EA		18" Diameter Coated Plexiglas Circular Convex Mirrors, Outdoor.....	247.58	18.98
10 86 00 00-0060	EA		26" Diameter Coated Plexiglas Circular Convex Mirrors, Outdoor.....	385.55	20.62
10 86 00 00-0061	EA		30" Diameter Coated Plexiglas Circular Convex Mirrors, Outdoor.....	537.65	23.87
10 86 00 00-0062	EA		36" Diameter Coated Plexiglas Circular Convex Mirrors, Outdoor.....	607.50	28.75
10 86 00 00-0063	EA		48" Diameter Coated Plexiglas Circular Convex Mirrors, Outdoor.....	964.14	40.69
10 86 00 00-0064			Security Mirrors <small>(10 86)</small>		
10 86 00 00-0065	EA		10" x 14" Framed Stainless Steel Replacement Mirror	138.50	34.29
10 86 00 00-0066	EA		8" x 10" Framed Stainless Steel Mirror With Mounting Plate	92.44	34.29
10 86 00 00-0067	EA		10" x 14" Framed Stainless Steel Mirror With Mounting Plate	99.34	34.29
10 86 00 00-0068	EA		16" x 20" Unframed Stainless Steel Mirror With Mounting Screws	148.81	28.58
10 86 00 00-0069	EA		8" x 10" Framed Stainless Steel Replacement Mirror	92.82	34.29
10 89			Baffle Assembly <small>(10 89)</small>		
10 89 00 00-0001			Baffle Assemblies for RSIP Program <small>(10 89)</small>		
10 89 00 00-0002	EA		Roof Baffle Assembly for Exhaust (Detail BF-01 of RSIP Specifications)..... Note: For Installed assemblies; Includes painting and seals as needed, per specifications.	116.00	
10 89 00 00-0003	EA		Wall Baffle Assembly for Exhaust(Detail BF-02 of RSIP Specifications)	168.00	
10 89 00 00-0004	EA		Modified Ducting Assembly for Exhaust(Detail BF-03 of RSIP Specifications)..... Note: For Installed assemblies; Includes painting and seals as needed, per specifications.	68.00	
10 89 00 00-0005	EA		Attic Baffle for Gable Vent Assembly (Detail BF-10 of RSIP Specifications)	172.00	
10 89 00 00-0006	EA		Attic Baffle for Triangular Gable Vent Assembly (Detail BF-11 of RSIP Specifications)	168.00	
10 89 00 00-0007	EA		Attic Baffle for Dormer Vent Assembly (Detail BF-12 of RSIP Specifications)	155.00	
10 89 00 00-0008	EA		Attic Baffle for Turbine Vent Assembly (Detail BF-13 of RSIP Specifications)..... Note: For Installed assemblies; Includes painting and seals as needed, per specifications.	155.00	
10 89 00 00-0009	EA		Attic Baffle for Roof Vent Assembly (Detail BF-14 of RSIP Specifications)	150.00	
10 89 00 00-0010	EA		Attic Baffle for Coupola Vent Assembly (Detail BF-15 of RSIP Specifications)..... Note: For Installed assemblies; Includes painting and seals as needed, per specifications.	165.00	
10 89 00 00-0011	EA		Baffle for Whole House Fan Assembly (Detail BF-16 of RSIP Specifications)..... Note: For Installed assemblies; Includes painting and seals as needed, per specifications.	354.00	
10 89 00 00-0012	EA		Attic Vent Baffle Assembly (Detail BF-23 of RSIP Specifications)	80.00	
			Note: For Installed assemblies; Includes painting and seals as needed, per specifications.		

END OF SECTION 10

10	10	Specialties
	10 80	Other Specialties
	10 89	Baffle Assembly



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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Equipment	11	
Operation and Maintenance of Equipment	11 01	⇄
Operation and Maintenance of Vehicle and Pedestrian Equipment	11 01 10	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 Equipment

11 01 Operation and Maintenance of Equipment ⁽¹¹⁾

11 01 10 Operation and Maintenance of Vehicle and Pedestrian Equipment ^(11 01)

11 01 10 13 Operation and Maintenance of Parking Equipment ^(11 01 10)

11 01 10 13-0001 Replacement Parking Equipment ^(11 01 10 13)

11 01 10 13-0002	EA	10' Wood Arm Replacement With Bolts	617.32	
11 01 10 13-0003	EA	12' Wood Arm Replacement With Bolts	645.60	
11 01 10 13-0004	EA	14' Wood Arm Replacement With Bolts	677.99	
11 01 10 13-0005	EA	12' Aluminum Arm Replacement With Bolts	900.88	
11 01 10 13-0006	EA	14' Aluminum Arm Replacement With Bolts	931.24	
11 01 10 13-0007	EA	16' Aluminum Arm Replacement With Bolts	1,318.96	
11 01 10 13-0008	EA	18' Aluminum Arm Replacement With Bolts	1,338.55	
11 01 10 13-0009	EA	20' Aluminum Arm Replacement With Bolts	1,375.75	
11 01 10 13-0010	EA	22' Aluminum Arm Replacement With Bolts	1,581.81	
11 01 10 13-0011	EA	24' Aluminum Arm Replacement With Bolts	1,608.17	

11 10 Vehicle and Pedestrian Equipment ⁽¹¹⁾

11 11 Vehicle Service Equipment ^(11 10)

11 11 19 Vehicle Lubrication Equipment ^(11 11)

11 11 19 00-0001 Reels ^(11 11 19)

11 11 19 00-0002	EA	1/4" x 50' Hose, Grease Reel (Alemite 8078-B)	1,139.25	137.78
11 11 19 00-0003	EA	1/2" x 50' Hose, Oil Reel (Alemite 8078-D)	1,110.69	137.78
11 11 19 00-0004	EA	3/8" x 50' Hose, Air Or Water Reel (Alemite 8078-F)	971.51	137.78
11 11 19 00-0005	EA	1/2" x 50' Hose, Air Or Water Reel (Alemite 8078-M)	1,082.69	137.78

11 11 19 00-0006 Air Operated Powered Pumps ^(11 11 19)

Note: Excludes air compressor.

11 11 19 00-0007	EA	1", Oil, Air Operated Diaphragm Pump (Alemite 8323)	1,712.53	183.71
11 11 19 00-0008	EA	1", Antifreeze, Air Operated Diaphragm Pump (Alemite 8325)	1,900.43	183.71
Note: UL listed.				
11 11 19 00-0009	EA	5:1 Air Operated Oil Pump (Alemite 9968)	1,522.25	183.71
11 11 19 00-0010	EA	50:1 High Pressure Grease Pump For 400 LB Drum (Alemite 9979-A)	1,761.26	91.85
Note: Includes pump, drum cover and follower plate.				

11 11 19 00-0011 Pumping Unit Accessories ^(11 11 19)

11 11 19 00-0012	EA	Rigid Extension, Digital Oil Meter (Alemite 3670)	621.94	34.45
11 11 19 00-0013	EA	Flexible Extension, Digital Meter (Alemite 3671)	621.94	34.45
11 11 19 00-0014	EA	Manual, Non-Drip Tip, Flexible, Digital Oil Meter (Alemite 3671-B)	621.94	34.45
11 11 19 00-0015	EA	Grease Control Handle (Alemite 6320-A)	336.85	34.45
11 11 19 00-0016	EA	150 PSI Filter/Regulator (Alemite 7936)	181.68	34.45
11 11 19 00-0017	EA	Z Type Grease Swivel (Alemite B331107)	120.38	11.48
11 11 19 00-0018	EA	Suction Hose Assembly (Parker T605-84)	278.65	45.93
11 11 19 00-0019	EA	Unistrut Reel Brackets	247.27	9.18
11 11 19 00-0020	EA	Large, Diaphragm Pump, Wall Mount Bracket (Alemite 343173)	333.03	34.45

11 11 36 Vehicle Charging Equipment ^(11 11)

11 11 36 13 Commercial Electric Vehicle Charging Unit ^(11 11 36)

11 11 36 13-0001 Electric Vehicle Charging Stations (GE) ^(11 11 36 13)

Note: Available with RFID (Radio Frequency Identification) reader.

11 11 36 13-0002	EA	Single Pedestal Electric Vehicle Charging Station Without RFID (GE EVSN3)	4,272.30	160.11
Note: 208 to 240 volt, 30 amperes, 1 phase.				
11 11 36 13-0003	EA	Double Pedestal Electric Vehicle Charging Station Without RFID (GE EVDN3)	7,577.62	213.48
Note: 208 to 240 volt, 30 amperes, 1 phase.				
11 11 36 13-0004	EA	Single Pedestal Electric Vehicle Charging Station With RFID (GE EVSRN3)	7,901.90	160.11
Note: 208 to 240 volt, 30 amperes, 1 phase.				
11 11 36 13-0005	EA	Double Pedestal Electric Vehicle Charging Station With RFID (GE EVDRN3)	13,488.84	213.48
Note: 208 to 240 volt, 30 amperes, 1 phase.				
11 11 36 13-0006	EA	Single Pole Mounted Electric Vehicle Charging Station Without RFID (GE EVPN3)	3,725.07	80.05
Note: 208 to 240 volt, 30 amperes, 1 phase. Excludes pole.				
11 11 36 13-0007	EA	Single Pole Mounted Electric Vehicle Charging Station With RFID (GE EVPRN3)	7,218.61	80.05
Note: 208 to 240 volt, 30 amperes, 1 phase. Excludes pole.				
11 11 36 13-0008	EA	Single Wall Mounted Electric Vehicle Charging Station Without RFID (GE EVWN3)	3,604.82	106.74
Note: 208 to 240 volt, 30 amperes, 1 phase.				
11 11 36 13-0009	EA	Single Wall Mounted Electric Vehicle Charging Station With RFID (GE EVWRN3)	6,962.26	106.74
Note: 208 to 240 volt, 30 amperes, 1 phase.				

11	11 Equipment
	11 10 Vehicle and Pedestrian Equipment
	11 11 Vehicle Service Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 11 36 13-0010	Electric Vehicle Charging Stations (AeroVironment) <small>(11 11 36 13)</small>				
	Note: Can be configured as Level 1 (16 Amps, 120 VAC) or Level 2 (16 Amps, 240 VAC).				
11 11 36 13-0011	EA		Module Electric Vehicle Charging Station (AeroVironment TurboDock Module).....	2,905.99	53.37
			Note: Includes charging station only. Excludes mounting bracket or pedestal.		
11 11 36 13-0012	EA		Single Wall Mount Electric Vehicle Charging Station (AeroVironment TurboDock Wall Mount)	4,153.77	106.74
			Note: Includes charging station(s) and wall mounting bracket that can hold up to two charging modules.		
11 11 36 13-0013	EA		Dual Wall Mount Electric Vehicle Charging Station (AeroVironment TurboDock Wall Mount).....	6,953.03	133.42
			Note: Includes charging station(s) and wall mounting bracket that can hold up to two charging modules.		
11 11 36 13-0014	EA		Single Pedestal Mount Electric Vehicle Charging Station (AeroVironment TurboDock Pedestal)	4,367.26	160.11
			Note: Includes charging station(s), pedestal and mounting bracket that can hold up to four charging modules.		
11 11 36 13-0015	EA		Dual Pedestal Mount Electric Vehicle Charging Station (AeroVironment TurboDock Pedestal).....	7,166.50	186.79
			Note: Includes charging station(s), pedestal and mounting bracket that can hold up to four charging modules.		
11 11 36 13-0016	EA		Triple Pedestal Mount Electric Vehicle Charging Station (AeroVironment TurboDock Pedestal)	9,965.75	213.48
			Note: Includes charging station(s), pedestal and mounting bracket that can hold up to four charging modules.		
11 11 36 13-0017	EA		Quad Pedestal Mount Electric Vehicle Charging Station (AeroVironment TurboDock Pedestal).....	12,765.00	240.16
			Note: Includes charging station(s), pedestal and mounting bracket that can hold up to four charging modules.		

11 11 36 13-0018	Electric Vehicle Charging Stations (Leviton) <small>(11 11 36 13)</small>				
11 11 36 13-0019	EA		Single Port, Electric Vehicle Charging Station, Gateway (Leviton evr-green® 4000 CPHG1-000).....	5,006.30	106.74
			Note: 208 to 240 volt, 30 amperes, 1 phase.		
			For Bollard Body (Leviton CPMBX-000), Add	3,217.51	
			For Bollard Cap (Leviton CPCAP-B), Add	295.68	
			For Wall Mounting Body (Leviton CPMEEX-000), Add	2,223.74	
			For Wall Mounting Cap (Leviton CPCAP-W), Add	295.68	
			For Cord Management Kit (Leviton CPCBX-000), Add	2,027.79	
11 11 36 13-0020	EA		Single Port, Electric Vehicle Charging Station, Non-Gateway LAN (Leviton evr-green® 4000 CPHD1-000)	3,994.80	106.74
			Note: 208 to 240 volt, 30 amperes, 1 phase.		
			For Bollard Body (Leviton CPMBX-000), Add	3,217.51	
			For Bollard Cap (Leviton CPCAP-B), Add	295.68	
			For Wall Mounting Body (Leviton CPMEEX-000), Add	2,223.74	
			For Wall Mounting Cap (Leviton CPCAP-W), Add	295.68	
			For Cord Management Kit (Leviton CPCBX-000), Add	2,027.79	
11 11 36 13-0021	EA		Dual Port, Electric Vehicle Charging Station, Gateway (Leviton evr-green® 4000 CPHG2-000)	9,833.66	133.42
			Note: 208 to 240 volt, 30 amperes, 1 phase.		
			For Bollard Body (Leviton CPMBX-000), Add	3,217.51	
			For Bollard Cap (Leviton CPCAP-B), Add	295.68	
			For Wall Mounting Body (Leviton CPMEEX-000), Add	2,223.74	
			For Wall Mounting Cap (Leviton CPCAP-W), Add	295.68	
			For Cord Management Kit (Leviton CPCBX-000), Add	2,027.79	
11 11 36 13-0022	EA		Dual Port, Electric Vehicle Charging Station, Gateway (Leviton evr-green® 4000 CPHD2-000).....	8,818.89	133.42
			Note: 208 to 240 volt, 30 amperes, 1 phase.		
			For Bollard Body (Leviton CPMBX-000), Add	3,217.51	
			For Bollard Cap (Leviton CPCAP-B), Add	295.68	
			For Wall Mounting Body (Leviton CPMEEX-000), Add	2,223.74	
			For Wall Mounting Cap (Leviton CPCAP-W), Add	295.68	
			For Cord Management Kit (Leviton CPCBX-000), Add	2,027.79	
11 11 36 13-0023	EA		Bollard Mounting Body For Charging Station (Leviton CPMBX-000).....	3,644.47	160.11
			For Cap, Add	295.68	
11 11 36 13-0024	EA		Wall Mounting Body For Charging Station (Leviton CPMEEX-000)	2,650.70	160.11
			For Cap, Add	295.68	
11 11 36 13-0025	EA		Cord Management Kit For Charging Station (Leviton CPCBX-000).....	2,241.27	106.74
			For Cap, Add	295.68	

11 12 Parking Control Equipment (11 10)

11 12 16	Parking Ticket Dispensers <small>(11 12)</small>				
11 12 16 00-0001	Parking Ticket Dispensers <small>(11 12 16)</small>				
11 12 16 00-0002	EA		Standard Parking Ticket Dispenser With Time/Date Stamp.....	11,628.17	220.46
11 12 16 00-0003	EA		Rate Computing Parking Ticket Dispenser With Printer.....	15,660.66	220.46

11 12 23 Parking Meters (11 12)

11 12 23 00-0001	Parking Meters <small>(11 12 23)</small>				
11 12 23 00-0002	EA		Removal Of Parking Meter For Replacement Or Reinstall Existing Meter.....	228.57	

11 12 26 Parking Fee Collection Equipment (11 12)

11 12 26 13 Parking Fee Coin Collection Equipment (11 12 26)

11 12 26 13-0001	Parking Fee Collection Equipment <small>(11 12 26 13)</small>				
11 12 26 13-0002	EA		Multiple Station Slot Box For Parking Fee Collection.....	2,760.56	74.71

11 12 33 Parking Gates (11 12)

11 12 33 13 Lift Arm Parking Gates (11 12 33)

11 12 33 13-0001	Barrier Parking Gate Operators <small>(11 12 33 13)</small>				
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Equipment	11	
Vehicle and Pedestrian Equipment	11 10	↕
Parking Control Equipment	11 12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 12 33 13-0002	Barrier Parking Gate Operators <small>(11 12 33 13-0001)</small>		
	<small>Note: Includes operator and barrier arm. Excludes access controls and concrete foundation.</small>		
11 12 33 13-0003	EA 12' Plastic Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator (DKS™ DoorKing® 1601-080)	6,378.55	611.40
	<small>For 230/460 Volt AC, Add</small>	322.50	
11 12 33 13-0004	EA 14' Wood Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator (DKS™ DoorKing® 1601-080).....	6,357.95	611.40
	<small>For 230/460 Volt AC, Add</small>	322.50	
11 12 33 13-0005	EA 14' Aluminum Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator (DKS™ DoorKing® 1601-080).....	6,618.96	611.40
	<small>For 230/460 Volt AC, Add</small>	322.50	
11 12 33 13-0006	EA 20' Three Piece Wood Arm, 1 HP, 115 Volt AC, Barrier Parking Gate Operator (DKS™ DoorKing® 1602-080)	9,239.76	611.40
	<small>For 230/460 Volt AC, Add</small>	322.50	
11 12 33 13-0007	EA 14' Wood Arm, 1/3 HP, 115 Volt AC, Barrier Parking Gate Operator With Two Built-In Vehicle Detectors (Federal APD G-90 CD).....	9,563.75	611.40
11 12 33 13-0008	EA 14' Aluminum Arm, 1/3 HP, 115 Volt AC, Barrier Parking Gate Operator With Two Built-In Vehicle Detectors (Federal APD G-90 CD)	9,975.88	611.40

11 12 33 13-0009	Barrier Parking Gate Operators With Tire Shredding Traffic Control Spikes <small>(11 12 33 13-0001)</small>		
	<small>Note: Includes operator, barrier arm and tire shredding traffic control spikes. Excludes access controls and concrete foundation.</small>		
11 12 33 13-0010	EA 14' Wood Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator With 6' Section, Surface Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1603-080)	18,741.82	1,222.79
11 12 33 13-0011	EA 14' Wood Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator With 9' Section, Surface Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1603-080)	21,871.26	1,222.79
11 12 33 13-0012	EA 14' Aluminum Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator With 6' Section, Surface Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1603-080)	18,896.37	1,222.79
11 12 33 13-0013	EA 14' Aluminum Arm, 1/2 HP, 115 Volt AC, Barrier Parking Gate Operator With 9' Section, Surface Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1603-080)	22,025.81	1,222.79

11 12 33 13-0014	Barrier Parking Gate Operator Accessories <small>(11 12 33 13-0001)</small>		
11 12 33 13-0015	EA 12' Plastic Replacement Arm For Barrier Parking Gate Operators	220.33	24.31
11 12 33 13-0016	EA 14' Wood Replacement Arm For Barrier Parking Gate Operators	199.72	24.31
11 12 33 13-0017	EA 14' Aluminum Replacement Arm For Barrier Parking Gate Operators	460.74	24.31
11 12 33 13-0018	EA 20' Three Piece Wood Replacement Arm For Barrier Parking Gate Operators	692.56	24.31
11 12 33 13-0019	EA Folding Wood Replacement Arm For Barrier Parking Gate Operators	632.46	24.31
11 12 33 13-0020	EA Folding Plastic Replacement Arm For Barrier Parking Gate Operators	632.46	24.31
11 12 33 13-0021	EA Folding Aluminum Replacement Arm For Barrier Parking Gate Operators	769.83	24.31
11 12 33 13-0022	EA Heater Kit For Barrier Parking Gate Operators (DKS™ DoorKing® 1601-092)	678.01	145.82
11 12 33 13-0023	EA Fan Kit For Barrier Parking Gate Operators (DKS™ DoorKing® 1601-093)	678.01	145.82
11 12 33 13-0024	EA Single Channel Detector Loop For Barrier Parking Gate Operators (DKS™ DoorKing® 9410-010)	682.83	
11 12 33 13-0025	EA Two Channel Detector Loop For Barrier Parking Gate Operators (Federal APD DLD-10B)	1,745.45	
11 12 33 13-0026	EA 36" Tall, Gooseneck Style, Single Mount, 2" x 2" Steel, Exterior Mounting Post For Gate Operator Access Controls (Federal APD)	1,254.46	48.61
	<small>Note: Includes mounting plate and hardware. Excludes concrete foundation.</small>		

11 12 36	Tire Shredders <small>(11 12)</small>		
11 12 36 00-0001	Tire Shredding Traffic Control Spikes <small>(11 12 36)</small>		
11 12 36 00-0002	Flush Mount, Tire Shredding Traffic Control Spikes <small>(11 12 36 00-0001)</small>		
11 12 36 00-0003	EA 6' Section, Flush Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1610-081)	2,707.08	388.86
11 12 36 00-0004	Surface Mount, Tire Shredding Traffic Control Spikes <small>(11 12 36 00-0001)</small>		
11 12 36 00-0005	EA 3' Section With End Caps, Surface Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1610-088)	4,830.87	194.43
11 12 36 00-0006	EA 3' Add-On Section, Surface Mount, Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1610-087)	3,457.11	194.43
11 12 36 00-0007	Warning Signs And Signals For Tire Shredding Traffic Control Spikes <small>(11 12 36 00-0001)</small>		
11 12 36 00-0008	EA Warning Sign For Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1615)	2,154.94	72.92
	<small>Note: Includes light and mounting post.</small>		
11 12 36 00-0009	EA Traffic Light Assembly For Tire Shredding Traffic Control Spikes (DKS™ DoorKing® 1603)	1,757.08	97.21
	<small>Note: Includes mounting post and hardware.</small>		

11 13 Loading Dock Equipment (11 10)

11 13 13	Loading Dock Bumpers <small>(11 13)</small>		
11 13 13 00-0001	Laminated Rubber Dock Bumpers <small>(11 13 13)</small>		
11 13 13 00-0002	4-1/2" Projection, Laminated Rubber Dock Bumpers <small>(11 13 13 00-0001)</small>		
11 13 13 00-0003	EA 14" x 6", 4-1/2" Projection, Laminated Rubber Dock Bumper	149.92	21.69
11 13 13 00-0004	EA 24" x 6", 4-1/2" Projection, Laminated Rubber Dock Bumper	186.13	21.69
11 13 13 00-0005	EA 36" x 6", 4-1/2" Projection, Laminated Rubber Dock Bumper	237.21	21.69
11 13 13 00-0006	EA 12" x 10", 4-1/2" Projection, Laminated Rubber Dock Bumper	165.35	21.69
11 13 13 00-0007	EA 14" x 10", 4-1/2" Projection, Laminated Rubber Dock Bumper	178.14	21.69
11 13 13 00-0008	EA 18" x 10", 4-1/2" Projection, Laminated Rubber Dock Bumper	201.02	21.69
11 13 13 00-0009	EA 24" x 10", 4-1/2" Projection, Laminated Rubber Dock Bumper	237.21	21.69
11 13 13 00-0010	EA 36" x 10", 4-1/2" Projection, Laminated Rubber Dock Bumper	318.93	21.69

11	11 Equipment
	11 10 Vehicle and Pedestrian Equipment
	11 13 Loading Dock Equipment



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 13 13 00-0011	EA	12" x 12", 4-1/2" Projection, Laminated Rubber Dock Bumper	185.78		21.69
11 13 13 00-0012	EA	12" x 14", 4-1/2" Projection, Laminated Rubber Dock Bumper	201.02		21.69
11 13 13 00-0013	EA	12" x 18", 4-1/2" Projection, Laminated Rubber Dock Bumper	244.48		21.69
11 13 13 00-0014	EA	12" x 24", 4-1/2" Projection, Laminated Rubber Dock Bumper	275.30		21.69
11 13 13 00-0015	EA	12" x 36", 4-1/2" Projection, Laminated Rubber Dock Bumper	375.38		21.69
11 13 13 00-0016	EA	11" x 20", 4-1/2" Projection, Laminated Rubber Dock Bumper	226.47		21.69
11 13 13 00-0017	EA	11" x 24", 4-1/2" Projection, Laminated Rubber Dock Bumper	262.31		21.69
11 13 13 00-0018	EA	11" x 36", 4-1/2" Projection, Laminated Rubber Dock Bumper	338.67		21.69
11 13 13 00-0019		6" Projection, Laminated Rubber Dock Bumpers (11 13 13 00-0001)			
11 13 13 00-0020	EA	12" x 10", 6" Projection, Laminated Rubber Dock Bumper	213.99		21.69
11 13 13 00-0021	EA	14" x 10", 6" Projection, Laminated Rubber Dock Bumper	226.63		21.69
11 13 13 00-0022	EA	18" x 10", 6" Projection, Laminated Rubber Dock Bumper	257.10		21.69
11 13 13 00-0023	EA	24" x 10", 6" Projection, Laminated Rubber Dock Bumper	303.50		21.69
11 13 13 00-0024	EA	36" x 10", 6" Projection, Laminated Rubber Dock Bumper	406.18		21.69
11 13 13 00-0025	EA	12" x 12", 6" Projection, Laminated Rubber Dock Bumper	242.04		21.69
11 13 13 00-0026	EA	14" x 12", 6" Projection, Laminated Rubber Dock Bumper	252.42		21.69
11 13 13 00-0027	EA	18" x 12", 6" Projection, Laminated Rubber Dock Bumper	293.63		21.69
11 13 13 00-0028	EA	24" x 12", 6" Projection, Laminated Rubber Dock Bumper	355.10		21.69
11 13 13 00-0029	EA	36" x 12", 6" Projection, Laminated Rubber Dock Bumper	527.22		21.69
11 13 13 00-0030	EA	11" x 20", 6" Projection, Laminated Rubber Dock Bumper	303.68		21.69
11 13 13 00-0031	EA	11" x 24", 6" Projection, Laminated Rubber Dock Bumper	344.89		21.69
11 13 13 00-0032	EA	11" x 36", 6" Projection, Laminated Rubber Dock Bumper	350.38		21.69
11 13 13 00-0033		Extruded Rubber Dock Bumpers (11 13 13)			
11 13 13 00-0034		1-3/4" Projection, Extruded Rubber Dock Bumpers (11 13 13 00-0033)			
11 13 13 00-0035	EA	12" x 2", 1-3/4" Projection, Extruded Rubber Dock Bumper	78.32		21.69
11 13 13 00-0036	EA	18" x 2", 1-3/4" Projection, Extruded Rubber Dock Bumper	83.41		21.69
11 13 13 00-0037	EA	24" x 2", 1-3/4" Projection, Extruded Rubber Dock Bumper	90.20		21.69
11 13 13 00-0038	EA	36" x 2", 1-3/4" Projection, Extruded Rubber Dock Bumper	96.99		21.69
11 13 13 00-0039		4" Projection, Extruded Rubber Dock Bumpers (11 13 13 00-0033)			
11 13 13 00-0040	EA	12" x 4-1/2", 4" Projection, Extruded Rubber Dock Bumper	104.94		21.69
11 13 13 00-0041	EA	18" x 4-1/2", 4" Projection, Extruded Rubber Dock Bumper	126.34		21.69
11 13 13 00-0042	EA	24" x 4-1/2", 4" Projection, Extruded Rubber Dock Bumper	132.50		21.69
11 13 13 00-0043	EA	36" x 4-1/2", 4" Projection, Extruded Rubber Dock Bumper	146.54		21.69
11 13 13 00-0044		6" Projection, Extruded Rubber Dock Bumpers (11 13 13 00-0033)			
11 13 13 00-0045	EA	12" x 6", 6" Projection, Extruded Rubber Dock Bumper	130.22		21.69
11 13 13 00-0046	EA	18" x 6", 6" Projection, Extruded Rubber Dock Bumper	159.07		21.69
11 13 13 00-0047	EA	24" x 6", 6" Projection, Extruded Rubber Dock Bumper	182.83		21.69
11 13 13 00-0048	EA	36" x 6", 6" Projection, Extruded Rubber Dock Bumper	228.16		21.69
11 13 13 00-0049		Molded Rubber Dock Bumpers (11 13 13)			
11 13 13 00-0050		Rectangular Molded Rubber Dock Bumpers (11 13 13 00-0049)			
11 13 13 00-0051	EA	18" x 8", 2" Projection, Rectangular Molded Rubber Dock Bumper	115.65		21.69
11 13 13 00-0052	EA	10" x 4-1/2", 3" Projection, Rectangular Molded Rubber Dock Bumper	102.55		21.69
11 13 13 00-0053	EA	20" x 4-1/2", 3" Projection, Rectangular Molded Rubber Dock Bumper	132.45		21.69
11 13 13 00-0054	EA	30" x 4-1/2", 3" Projection, Rectangular Molded Rubber Dock Bumper	162.61		21.69
11 13 13 00-0055	EA	24" x 12", 3" Projection, Rectangular Molded Rubber Dock Bumper	169.73		21.69
11 13 13 00-0056	EA	13" x 10", 4" Projection, Rectangular Molded Rubber Dock Bumper	129.02		21.69
11 13 13 00-0057	EA	18" x 10", 4" Projection, Rectangular Molded Rubber Dock Bumper	163.81		21.69
11 13 13 00-0058	EA	30" x 10", 4" Projection, Rectangular Molded Rubber Dock Bumper	235.42		21.69
11 13 13 00-0059	EA	13" x 12", 4" Projection, Rectangular Molded Rubber Dock Bumper	139.43		21.69
11 13 13 00-0060	EA	24" x 12", 4" Projection, Rectangular Molded Rubber Dock Bumper	203.04		21.69
11 13 13 00-0061	EA	18" x 18", 4" Projection, Rectangular Molded Rubber Dock Bumper	202.42		21.69
11 13 13 00-0062	EA	24" x 12", 6" Projection, Rectangular Molded Rubber Dock Bumper	308.06		21.69
11 13 13 00-0063		T And L Shaped Rubber Dock Bumpers (11 13 13 00-0049)			
11 13 13 00-0064	EA	22" x 22", 3" Projection, T Shaped Molded Rubber Dock Bumper	192.62		21.69
11 13 13 00-0065	EA	18" x 18", 4" Projection, L Shaped Molded Rubber Dock Bumper	176.72		21.69
11 13 16		Loading Dock Seals and Shelters (11 13)			
11 13 16 13		Loading Dock Seals (11 13 16)			
11 13 16 13-0001		Vinyl Loading Dock Seals (11 13 16 13)			
11 13 16 13-0002		Standard Vinyl Loading Dock Seals (11 13 16 13-0001)			
11 13 16 13-0003	LF	10" Projection, Standard, Vinyl Loading Dock Seal	96.34		21.69
11 13 16 13-0004	LF	11" Projection, Standard, Vinyl Loading Dock Seal	97.63		21.69
11 13 16 13-0005	LF	12" Projection, Standard, Vinyl Loading Dock Seal	98.93		21.69



Equipment	11
Vehicle and Pedestrian Equipment	11 10
Loading Dock Equipment	11 13

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 13 16 13-0006	LF		13" Projection, Standard, Vinyl Loading Dock Seal	101.53	21.69
11 13 16 13-0007	LF		14" Projection, Standard, Vinyl Loading Dock Seal	104.13	21.69
11 13 16 13-0008	LF		15" Projection, Standard, Vinyl Loading Dock Seal	106.76	21.69
11 13 16 13-0009	LF		16" Projection, Standard, Vinyl Loading Dock Seal	109.39	21.69
11 13 16 13-0010	LF		17" Projection, Standard, Vinyl Loading Dock Seal	112.10	21.69
11 13 16 13-0011	LF		18" Projection, Standard, Vinyl Loading Dock Seal	114.80	21.69
11 13 16 13-0012	LF		19" Projection, Standard, Vinyl Loading Dock Seal	117.40	21.69
11 13 16 13-0013	LF		20" Projection, Standard, Vinyl Loading Dock Seal	120.00	21.69
11 13 16 13-0014	LF		22" Projection, Standard, Vinyl Loading Dock Seal	125.27	21.69
11 13 16 13-0015			8" Exposure Wear Pleats, Vinyl Loading Dock Seals <small>(11 13 16 13-0001)</small>		
11 13 16 13-0016	LF		10" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	111.77	21.69
11 13 16 13-0017	LF		11" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	113.07	21.69
11 13 16 13-0018	LF		12" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	114.37	21.69
11 13 16 13-0019	LF		13" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	117.00	21.69
11 13 16 13-0020	LF		14" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	119.64	21.69
11 13 16 13-0021	LF		15" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	122.24	21.69
11 13 16 13-0022	LF		16" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	124.83	21.69
11 13 16 13-0023	LF		17" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	127.47	21.69
11 13 16 13-0024	LF		18" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	130.10	21.69
11 13 16 13-0025	LF		19" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	132.70	21.69
11 13 16 13-0026	LF		20" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	135.37	21.69
11 13 16 13-0027	LF		22" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal	140.56	21.69
11 13 16 13-0028			4" Exposure Wear Pleats, Vinyl Loading Dock Seals <small>(11 13 16 13-0001)</small>		
11 13 16 13-0029	LF		10" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	120.00	21.69
11 13 16 13-0030	LF		11" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	121.33	21.69
11 13 16 13-0031	LF		12" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	122.67	21.69
11 13 16 13-0032	LF		13" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	125.27	21.69
11 13 16 13-0033	LF		14" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	127.86	21.69
11 13 16 13-0034	LF		15" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	130.50	21.69
11 13 16 13-0035	LF		16" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	133.13	21.69
11 13 16 13-0036	LF		17" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	135.73	21.69
11 13 16 13-0037	LF		18" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	138.32	21.69
11 13 16 13-0038	LF		19" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	140.96	21.69
11 13 16 13-0039	LF		20" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	143.59	21.69
11 13 16 13-0040	LF		22" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal	148.93	21.69
11 13 16 13-0041			Vinyl Loading Dock Seals With Drape Curtain <small>(11 13 16 13)</small>		
11 13 16 13-0042			Standard, Vinyl Loading Dock Seals With Drape Curtain <small>(11 13 16 13-0041)</small>		
11 13 16 13-0043	LF		10" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	89.45	21.69
11 13 16 13-0044	LF		12" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	91.49	21.69
11 13 16 13-0045	LF		14" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	96.01	21.69
11 13 16 13-0046	LF		16" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	100.46	21.69
11 13 16 13-0047	LF		18" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	105.03	21.69
11 13 16 13-0048	LF		20" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	109.49	21.69
11 13 16 13-0049	LF		22" Projection, Standard, Vinyl Loading Dock Seal With Drape Curtain	114.00	21.69
11 13 16 13-0050			8" Exposure Wear Pleats, Vinyl Loading Dock Seals With Drape Curtain <small>(11 13 16 13-0041)</small>		
11 13 16 13-0051	LF		10" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	104.05	21.69
11 13 16 13-0052	LF		12" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	106.16	21.69
11 13 16 13-0053	LF		14" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	110.67	21.69
11 13 16 13-0054	LF		16" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	115.19	21.69
11 13 16 13-0055	LF		18" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	119.64	21.69
11 13 16 13-0056	LF		20" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	124.15	21.69
11 13 16 13-0057	LF		22" Projection, 8" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	128.60	21.69
11 13 16 13-0058			4" Exposure Wear Pleats, Vinyl Loading Dock Seals With Drape Curtain <small>(11 13 16 13-0041)</small>		
11 13 16 13-0059	LF		10" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	111.97	21.69
11 13 16 13-0060	LF		12" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	114.01	21.69
11 13 16 13-0061	LF		14" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	118.59	21.69
11 13 16 13-0062	LF		16" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	123.04	21.69
11 13 16 13-0063	LF		18" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	127.55	21.69
11 13 16 13-0064	LF		20" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	132.01	21.69
11 13 16 13-0065	LF		22" Projection, 4" Exposure Wear Pleats, Vinyl Loading Dock Seal With Drape Curtain	136.58	21.69
11 13 16 23			Loading Dock Shelters <small>(11 13 16)</small>		
11 13 16 23-0001			Retractable Vinyl Loading Dock Shelter <small>(11 13 16 23)</small>		
11 13 16 23-0002	LF		Retractable Vinyl Dock Shelters, Scissor Arms	151.36	27.11

11 Equipment**11 10 Vehicle and Pedestrian Equipment****11 13 Loading Dock Equipment**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 13 16 23-0003			Rigid Loading Dock Shelters (11 13 16 23)		
11 13 16 23-0004	LF		18" Projection, Rigid Loading Dock Shelter.....	112.78	26.03
11 13 16 23-0005	LF		24" Projection, Rigid Loading Dock Shelter.....	117.57	26.03
11 13 16 23-0006	LF		30" Projection, Rigid Loading Dock Shelter.....	122.10	27.11
11 13 16 23-0007	LF		36" Projection, Rigid Loading Dock Shelter.....	125.41	27.11
11 13 19			Stationary Loading Dock Equipment (11 13)		
			Note: Includes all anchor bolts and fasteners.		
11 13 19 13			Loading Dock Levelers (11 13 19)		
11 13 19 13-0001			Hydraulic Dock Levelers (11 13 19 13)		
			Note: Excludes control panel, remote operator, and electrical wiring.		
11 13 19 13-0002			20,000 LB Hydraulic Dock Levelers (11 13 19 13-0001)		
11 13 19 13-0003	EA		6' x 6', 20,000 LB Hydraulic Dock Leveler.....	8,120.41	940.86
11 13 19 13-0004	EA		6' x 8', 20,000 LB Hydraulic Dock Leveler.....	8,687.54	1,045.39
11 13 19 13-0005	EA		6' x 10', 20,000 LB Hydraulic Dock Leveler.....	10,626.41	1,254.47
11 13 19 13-0006	EA		7' x 6', 20,000 LB Hydraulic Dock Leveler.....	8,640.35	1,045.39
11 13 19 13-0007	EA		7' x 8', 20,000 LB Hydraulic Dock Leveler.....	9,384.67	1,149.94
11 13 19 13-0008	EA		7' x 10', 20,000 LB Hydraulic Dock Leveler.....	11,251.23	1,359.02
11 13 19 13-0009			25,000 LB Hydraulic Dock Levelers (11 13 19 13-0001)		
11 13 19 13-0010	EA		6' x 6', 25,000 LB Hydraulic Dock Leveler.....	8,284.58	940.86
11 13 19 13-0011	EA		6' x 8', 25,000 LB Hydraulic Dock Leveler.....	8,856.79	1,045.39
11 13 19 13-0012	EA		6' x 10', 25,000 LB Hydraulic Dock Leveler.....	10,784.98	1,254.47
11 13 19 13-0013	EA		7' x 6', 25,000 LB Hydraulic Dock Leveler.....	8,800.34	1,045.39
11 13 19 13-0014	EA		7' x 8', 25,000 LB Hydraulic Dock Leveler.....	9,532.42	1,149.94
11 13 19 13-0015	EA		7' x 10', 25,000 LB Hydraulic Dock Leveler.....	11,562.27	1,359.02
11 13 19 13-0016			30,000 LB Hydraulic Dock Levelers (11 13 19 13-0001)		
11 13 19 13-0017	EA		6' x 6', 30,000 LB Hydraulic Dock Leveler.....	8,679.66	1,097.67
11 13 19 13-0018	EA		6' x 8', 30,000 LB Hydraulic Dock Leveler.....	9,234.11	1,254.47
11 13 19 13-0019	EA		6' x 10', 30,000 LB Hydraulic Dock Leveler.....	11,242.78	1,463.55
11 13 19 13-0020	EA		7' x 6', 30,000 LB Hydraulic Dock Leveler.....	9,234.11	1,254.47
11 13 19 13-0021	EA		7' x 8', 30,000 LB Hydraulic Dock Leveler.....	9,935.10	1,411.28
11 13 19 13-0022	EA		7' x 10', 30,000 LB Hydraulic Dock Leveler.....	11,943.78	1,515.83
11 13 19 13-0023			35,000 LB Hydraulic Dock Levelers (11 13 19 13-0001)		
11 13 19 13-0024	EA		6' x 6', 35,000 LB Hydraulic Dock Leveler.....	8,982.19	1,149.94
11 13 19 13-0025	EA		6' x 8', 35,000 LB Hydraulic Dock Leveler.....	9,538.19	1,306.75
11 13 19 13-0026	EA		6' x 10', 35,000 LB Hydraulic Dock Leveler.....	10,746.20	1,515.83
11 13 19 13-0027	EA		7' x 6', 35,000 LB Hydraulic Dock Leveler.....	9,538.19	1,306.75
11 13 19 13-0028	EA		7' x 8', 35,000 LB Hydraulic Dock Leveler.....	10,358.87	1,463.55
11 13 19 13-0029	EA		7' x 10', 35,000 LB Hydraulic Dock Leveler.....	12,413.56	1,568.10
11 13 19 13-0030			40,000 LB Hydraulic Dock Levelers (11 13 19 13-0001)		
11 13 19 13-0031	EA		6' x 6', 40,000 LB Hydraulic Dock Leveler.....	9,498.98	1,149.94
11 13 19 13-0032	EA		6' x 8', 40,000 LB Hydraulic Dock Leveler.....	10,054.22	1,306.75
11 13 19 13-0033	EA		6' x 10', 40,000 LB Hydraulic Dock Leveler.....	12,095.08	1,515.83
11 13 19 13-0034	EA		7' x 6', 40,000 LB Hydraulic Dock Leveler.....	10,054.22	1,306.75
11 13 19 13-0035	EA		7' x 8', 40,000 LB Hydraulic Dock Leveler.....	10,875.85	1,463.55
11 13 19 13-0036	EA		7' x 10', 40,000 LB Hydraulic Dock Leveler.....	12,930.20	1,568.10
11 13 19 13-0037			45,000 LB Hydraulic Dock Levelers (11 13 19 13-0001)		
11 13 19 13-0038	EA		6' x 6', 45,000 LB Hydraulic Dock Leveler.....	9,939.83	1,202.20
11 13 19 13-0039	EA		6' x 8', 45,000 LB Hydraulic Dock Leveler.....	10,504.71	1,359.02
11 13 19 13-0040	EA		6' x 10', 45,000 LB Hydraulic Dock Leveler.....	12,534.31	1,568.10
11 13 19 13-0041	EA		7' x 6', 45,000 LB Hydraulic Dock Leveler.....	10,506.29	1,359.02
11 13 19 13-0042	EA		7' x 8', 45,000 LB Hydraulic Dock Leveler.....	11,320.69	1,515.83
11 13 19 13-0043	EA		7' x 10', 45,000 LB Hydraulic Dock Leveler.....	13,360.74	1,620.36
11 13 19 13-0044			Manual Dock Levelers (11 13 19 13)		
11 13 19 13-0045			20,000 LB Manual Dock Levelers (11 13 19 13-0044)		
11 13 19 13-0046	EA		6' x 6', 20,000 LB Manual Dock Leveler.....	6,438.83	940.86
11 13 19 13-0047	EA		6' x 8', 20,000 LB Manual Dock Leveler.....	7,016.59	1,045.39
11 13 19 13-0048	EA		6' x 10', 20,000 LB Manual Dock Leveler.....	8,944.83	1,254.47
11 13 19 13-0049	EA		7' x 6', 20,000 LB Manual Dock Leveler.....	6,960.29	1,045.39
11 13 19 13-0050	EA		7' x 8', 20,000 LB Manual Dock Leveler.....	7,703.09	1,149.94
11 13 19 13-0051	EA		7' x 10', 20,000 LB Manual Dock Leveler.....	9,741.15	1,254.47



Equipment	11	
Vehicle and Pedestrian Equipment	11 10	⇄
Loading Dock Equipment	11 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 13 19 13-0052			40,000 LB Manual Dock Levelers <small>(11 13 19 13-0044)</small>		
11 13 19 13-0053	EA		6' x 6', 40,000 LB Manual Dock Leveler.....	7,966.14	1,045.39
11 13 19 13-0054	EA		6' x 8', 40,000 LB Manual Dock Leveler.....	8,521.38	1,149.94
11 13 19 13-0055	EA		6' x 10', 40,000 LB Manual Dock Leveler.....	9,260.07	1,359.02
11 13 19 13-0056	EA		7' x 6', 40,000 LB Manual Dock Leveler.....	8,521.38	1,149.94
11 13 19 13-0057	EA		7' x 8', 40,000 LB Manual Dock Leveler.....	9,690.55	1,254.47
11 13 19 13-0058	EA		7' x 10', 40,000 LB Manual Dock Leveler.....	11,397.35	1,463.55
11 13 19 13-0059			Edge Of Dock Levelers <small>(11 13 19 13)</small>		
			Note: Mounted on face of dock, single torsion bar counter balance, includes bumpers.		
11 13 19 13-0060			Hydraulic Edge Of Dock Levelers <small>(11 13 19 13-0059)</small>		
			Note: Excludes control panel, remote operator, and electrical wiring.		
11 13 19 13-0061	EA		66" Usable Width, 20,000 LB Edge Of Dock Leveler, Hydraulic (Vestil PE-2066).....	4,570.17	313.62
11 13 19 13-0062	EA		72" Usable Width, 20,000 LB Edge Of Dock Leveler, Hydraulic (Vestil PE-2072).....	4,915.11	313.62
11 13 19 13-0063	EA		66" Usable Width, 25,000 LB Edge Of Dock Leveler, Hydraulic (Vestil PE-2566).....	4,865.19	313.62
11 13 19 13-0064	EA		72" Usable Width, 25,000 LB Edge Of Dock Leveler, Hydraulic (Vestil PE-2572).....	5,338.72	313.62
11 13 19 13-0065	EA		66" Usable Width, 20,000 LB Conventional Trailer, HED Series Edge Of Dock Leveler, Hydraulic (DLM HED6620).....	5,253.15	313.62
11 13 19 13-0066	EA		72" Usable Width, 20,000 LB Conventional Trailer, HED Series Edge Of Dock Leveler, Hydraulic (DLM HED7220).....	5,552.60	313.62
11 13 19 13-0067			Manual Edge Of Dock Levelers <small>(11 13 19 13-0059)</small>		
11 13 19 13-0068	EA		66" Usable Width, 20,000 LB Edge Of Dock Leveler, Manual (Vestil FM-2066).....	2,372.89	313.62
11 13 19 13-0069	EA		72" Usable Width, 20,000 LB Edge Of Dock Leveler, Manual (Vestil FM-2072).....	2,580.69	313.62
11 13 19 13-0070	EA		66" Usable Width, 25,000 LB Edge Of Dock Leveler, Manual (Vestil FM-2566).....	2,644.23	313.62
11 13 19 13-0071	EA		72" Usable Width, 25,000 LB Edge Of Dock Leveler, Manual (Vestil FM-2572).....	2,800.07	313.62
11 13 19 13-0072	EA		66" Usable Width, 25,000 LB Conventional Trailer, Edge of Dock Leveler, Manual (Bluff Manufacturing 25EP66).....	2,857.58	313.62
11 13 19 13-0073	EA		72" Usable Width, 25,000 LB Conventional Trailer, Edge of Dock Leveler, Manual (Bluff Manufacturing 25EP72).....	3,252.78	313.62
11 13 19 13-0074	EA		78" Usable Width, 25,000 LB Conventional Trailer, Edge Of Dock Leveler, Manual (Bluff Manufacturing 25EP78).....	3,543.52	313.62
11 13 19 13-0075	EA		72" Usable Width, 30,000 LB Conventional Trailer, Edge of Dock Leveler, Manual (Bluff Manufacturing 30EP72).....	3,585.30	313.62
11 13 19 13-0076	EA		66" Usable Width, 20,000 LB Refrigerated Truck, Edge of Dock Leveler, Manual (Bluff Manufacturing 20EP66-R).....	3,188.36	313.62
11 13 19 13-0077	EA		78" Usable Width, 30,000 LB Refrigerated Truck, Edge Of Dock Leveler, Manual (Bluff Manufacturing 30EP78-R).....	4,394.85	313.62
11 13 19 13-0078	EA		72" Usable Width, 30,000 LB Refrigerated Truck, Edge Of Dock Leveler, Manual (Bluff Manufacturing 30EP72-R).....	4,135.45	313.62
11 13 19 23			Stationary Loading Dock Lifts <small>(11 13 19)</small>		
11 13 19 23-0001			Top Of Ground, Fixed Platform Lifts <small>(11 13 19 23)</small>		
11 13 19 23-0002	EA		6' x 8', 5,500 LB Top Of Ground, Fixed Platform Lift.....	17,437.89	218.62
11 13 19 23-0003			Pit Mounted, Fixed Platform Lifts <small>(11 13 19 23)</small>		
11 13 19 23-0004	EA		6' x 8', 5,000 LB Fixed Platform Lift, Pit Mounted.....	12,466.12	218.62
11 13 19 23-0005	EA		6' x 8', 8,000 LB Fixed Platform Lift, Pit Mounted.....	22,459.41	327.93
11 13 19 23-0006	EA		7' x 12', 15,000 LB Fixed Platform Lift, Pit Mounted.....	39,364.86	655.87
11 13 19 23-0007	EA		8' x 20', 15,000 LB Fixed Platform Lift, Pit Mounted.....	41,238.79	874.49
11 13 19 26			Loading Dock Truck Lifts <small>(11 13 19)</small>		
11 13 19 26-0001			Hydraulic Truck Lifts <small>(11 13 19 26)</small>		
11 13 19 26-0002	EA		10' x 15', 60,000 LB Platform Truck Lift.....	36,581.26	1,896.37
11 13 19 26-0003	EA		10' x 20', 60,000 LB Platform Truck Lift.....	41,841.73	2,275.65
11 13 19 33			Loading Dock Truck Restraints <small>(11 13 19)</small>		
11 13 19 33-0001			Truck Restraint System <small>(11 13 19 33)</small>		
11 13 19 33-0002	EA		Electrical Operated Loading Dock Ground Mounted Vehicle Restraint (Serco SL60)..... Note: Includes Integrated Control Panel & Automatic Light Communication Package, minimum 32,000 LB restraint capacity and Manufacturer's standard concrete anchor bolts and brackets for ground mounting to concrete apron.	10,046.98	392.02
11 13 19 33-0003	EA		Push Button Rotating Hook Trailer Restraint With Automatic Lights (Kelley Star 4)..... Note: Includes push button controls, warning lights, alarms, minimum 32,000 LB restraint capacity, all mounting plates, bolts, welds, warning signs, gasketed weatherproof box for controls, 120 V UL listed.	10,509.57	392.02
11 13 19 33-0004	EA		Truck Restraint System (Poweramp Powerstop AAL)..... Note: Includes push button controls, warning lights, alarms, 30,000 LB holding force, all mounting plates, bolts, welds, warning signs, gasketed weatherproof box for controls, 120 V UL listed.	8,499.66	392.02
11 13 23			Portable Dock Equipment <small>(11 13)</small>		
11 13 23 23			Portable Dock Platforms <small>(11 13 23)</small>		
11 13 23 23-0001	EA		6' x 6', 5,000 LB Capacity Portable Platform Lift.....	14,633.31	121.52
11 13 26			Loading Dock Lights <small>(11 13)</small>		
11 13 26 00-0001			Communication Lights <small>(11 13 26)</small>		
11 13 26 00-0002	EA		Console Controlled, Dock Communication Light, Stop And Go Red Light Style, 12 Or 24 Volt DC Or 115 Volt AC..... Note: Excludes control console.	392.93	91.86

11	11 Equipment
	11 10 Vehicle and Pedestrian Equipment
	11 13 Loading Dock Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 13 26 00-0003	EA		Toggle Switch Controlled, Dock Communication Light, Stop And Go Red Light Style, With Solid State Flasher, 12 Or 24 Volt DC Or 115 Volt AC	491.68	91.86
11 13 26 00-0004	EA		Dock Guide Light For Truck Backing	212.77	73.49
11 13 26 00-0005			Communication Lights Controls (11 13 26)		
11 13 26 00-0006	EA		Dock Communication Lights Control Console For Up To Two Docks.....	414.25	122.48
11 13 26 00-0007			Loading Dock Lights (11 13 26)		
11 13 26 00-0008			Incandescent Loading Dock Lights (11 13 26 00-0007)		
11 13 26 00-0009	EA		24" Long, Single Arm Loading Dock Light, 300W Incandescent.....	480.92	122.48
11 13 26 00-0010	EA		40" Long, Dual Arm Loading Dock Light, 300W Incandescent.....	426.86	122.48
11 13 26 00-0011	EA		60" Long, Dual Arm Loading Dock Light, 300W Incandescent.....	563.24	122.48
11 13 26 00-0012			Metal Halide Loading Dock Lights (11 13 26 00-0007)		
11 13 26 00-0013	EA		24" Long, Single Arm Loading Dock Light, 100W Metal Halide	667.77	122.48
11 13 26 00-0014	EA		40" Long, Dual Arm Loading Dock Light, 100W Metal Halide.....	731.83	122.48
11 13 26 00-0015	EA		60" Long, Dual Arm Loading Dock Light, 100W Metal Halide.....	783.07	122.48
11 13 26 00-0016			Quartz Halogen Loading Dock Lights (11 13 26 00-0007)		
11 13 26 00-0017	EA		24" Long, Single Arm Loading Dock Light, 500W Quartz Halogen	419.66	122.48
11 13 26 00-0018	EA		40" Long, Dual Arm Loading Dock Light, 500W Quartz Halogen.....	460.19	122.48
11 13 26 00-0019	EA		60" Long, Dual Arm Loading Dock Light, 500W Quartz Halogen.....	494.79	122.48

11 14 Pedestrian Control Equipment (11 10)

11 14 13 Pedestrian Gates (11 14)

11 14 13 16 Rotary Gates (11 14 13)

11 14 13 16-0001			Access Control Indoor Or Outdoor Impenetrability (11 14 13 16)		
11 14 13 16-0002			Mechanical (11 14 13 16-0001)		
11 14 13 16-0003			Galvanized Steel (11 14 13 16-0002)		
11 14 13 16-0004	EA		One-Way, Single 7' High Exit Rotary Gate, 3 Rotor Sections, Galvanized Steel	12,380.81	1,453.62
11 14 13 16-0005	EA		One-Way, Single 7' High Exit Rotary Gate, 4 Rotor Sections, Galvanized Steel	14,017.92	1,453.62
11 14 13 16-0006	EA		One-Way, "Handicapped" 7' High Exit Rotary Gate, 4 Rotor Sections, Galvanized Steel	28,075.90	2,168.74
11 14 13 16-0007	EA		One-Way, Double 7' High Exit Rotary Gate, 3 Or 4 Rotor Sections, Galvanized Steel.....	27,173.08	2,168.74
11 14 13 16-0008			Powder Coated Steel (11 14 13 16-0002)		
11 14 13 16-0009	EA		One-Way, Single 7' High Exit Rotary Gate, 3 Rotor Sections, Powder Coated Steel	14,038.99	1,453.62
11 14 13 16-0010	EA		One-Way, Single 7' High Exit Rotary Gate, 4 Rotor Sections, Powder Coated Steel	15,612.91	1,453.62
11 14 13 16-0011	EA		One-Way, "Handicapped" 7' High Exit Rotary Gate, 3 Rotor Sections, Powder Coated Steel.....	33,224.98	2,168.74
11 14 13 16-0012	EA		One-Way, Double 7' High Exit Rotary Gate, 3 Rotor Sections, Powder Coated Steel.....	29,893.57	2,168.74
11 14 13 16-0013			Anodized Aluminum (11 14 13 16-0002)		
11 14 13 16-0014	EA		One-Way, Single 7' High Exit Rotary Gate, 3 Rotor Sections, Anodized Aluminum With Stainless Steel Arms	14,758.24	1,453.62
11 14 13 16-0015	EA		One-Way, Single 7' High Exit Rotary Gate, 3 Rotor Sections, Complete Anodized Aluminum	25,775.65	1,453.62
11 14 13 16-0016	EA		One-Way, Double 7' High Exit Rotary Gate, 3 Rotor Sections, Anodized Aluminum With Stainless Steel Arms	29,761.16	2,168.74
11 14 13 16-0017	EA		One-Way, Double 7' High Exit Rotary Gate, 3 Rotor Sections, Complete Anodized Aluminum.....	50,513.98	2,168.74
11 14 13 16-0018			Stainless Steel (11 14 13 16-0002)		
11 14 13 16-0019	EA		One-Way, Single 7' High Exit Rotary Gate, 3 Rotor Sections, Stainless Steel	23,470.45	1,453.62
11 14 13 16-0020	EA		One-Way, Single 7' High Exit Rotary Gate, 4 Rotor Sections, Stainless Steel	26,377.53	1,453.62
11 14 13 16-0021	EA		One-Way, "Handicapped" 7' High Exit Rotary Gate, 3 Rotor Sections, Stainless Steel.....	37,705.98	2,168.74
11 14 13 16-0022	EA		One-Way, Double 7' High Exit Rotary Gate, 3 Rotor Sections, Stainless Steel.....	47,155.49	2,168.74
11 14 13 16-0023			Transparent (11 14 13 16-0002)		
11 14 13 16-0024	EA		One-Way, Single 7' High Exit Rotary Gate, 3 Rotor Sections, Transparent.....	46,841.45	1,453.84
11 14 13 16-0025			Mechanical Options (11 14 13 16-0001)		
11 14 13 16-0026	EA		Out-of-Use Lock Option, Add.....	255.80	
11 14 13 16-0027	EA		Heel Protector (Each Heel Protector), Add.....	180.56	
11 14 13 16-0028			Electrical, One-Way (11 14 13 16-0001)		
11 14 13 16-0029			Galvanized Steel (11 14 13 16-0028)		
11 14 13 16-0030	EA		One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Galvanized Steel	13,106.08	1,453.62
11 14 13 16-0031	EA		One-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Galvanized Steel	14,746.20	1,453.62



Equipment	11	
Vehicle and Pedestrian Equipment	11 10	⇄
Pedestrian Control Equipment	11 14	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 14 13 16-0032 EA One-Way, "Handicapped" 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Galvanized Steel.....	30,784.36	2,168.74
11 14 13 16-0033 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Galvanized Steel.....	28,343.73	2,168.74
11 14 13 16-0034 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Galvanized Steel.....	30,784.36	2,168.74
11 14 13 16-0035 Powder Coated Steel (11 14 13 16-0028)		
11 14 13 16-0036 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Powder Coated Steel.....	14,761.25	1,453.62
11 14 13 16-0037 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Powder Coated Steel.....	16,593.97	1,453.62
11 14 13 16-0038 EA One-Way, "Handicapped" 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Powder Coated Steel.....	41,344.34	2,168.74
11 14 13 16-0039 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Powder Coated Steel.....	31,079.28	2,168.74
11 14 13 16-0040 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Powder Coated Steel.....	33,525.92	2,168.74
11 14 13 16-0041 Anodized Aluminum (11 14 13 16-0028)		
11 14 13 16-0042 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	15,062.19	1,453.62
11 14 13 16-0043 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	15,995.10	1,453.62
11 14 13 16-0044 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Complete Anodized Aluminum.....	26,678.47	1,453.62
11 14 13 16-0045 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	31,419.34	2,168.74
11 14 13 16-0046 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	34,997.52	2,168.74
11 14 13 16-0047 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Complete Anodized Aluminum.....	52,075.86	2,168.74
11 14 13 16-0048 Stainless Steel (11 14 13 16-0028)		
11 14 13 16-0049 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Stainless Steel.....	24,990.20	1,453.62
11 14 13 16-0050 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Stainless Steel.....	26,765.74	1,453.62
11 14 13 16-0051 EA One-Way, "Handicapped" 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Stainless Steel.....	43,351.61	2,168.74
11 14 13 16-0052 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Stainless Steel.....	49,475.74	2,168.74
11 14 13 16-0053 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Stainless Steel.....	54,588.71	2,168.74
11 14 13 16-0054 Transparent (11 14 13 16-0028)		
11 14 13 16-0055 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Transparent Arms.....	42,697.51	1,453.84
11 14 13 16-0056 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Transparent Arms.....	45,213.37	1,453.84
11 14 13 16-0057 EA One-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Transparent Panels.....	46,311.80	1,453.84
11 14 13 16-0058 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Transparent Arms.....	76,226.30	2,168.74
11 14 13 16-0059 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Transparent Arms.....	81,071.43	2,168.74
11 14 13 16-0060 Electrical, Two-Way (11 14 13 16-0001)		
11 14 13 16-0061 Galvanized Steel (11 14 13 16-0060)		
11 14 13 16-0062 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Galvanized Steel.....	14,153.35	1,453.62
11 14 13 16-0063 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Galvanized Steel.....	15,841.62	1,453.62
11 14 13 16-0064 EA Two-Way, "Handicapped" 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Galvanized Steel.....	36,538.33	2,168.74
11 14 13 16-0065 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Galvanized Steel.....	30,212.57	2,168.74
11 14 13 16-0066 Powder Coated Steel (11 14 13 16-0060)		
11 14 13 16-0067 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Powder Coated Steel.....	15,679.11	1,453.62
11 14 13 16-0068 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Powder Coated Steel.....	17,617.17	1,453.62
11 14 13 16-0069 EA Two-Way, "Handicapped" 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Powder Coated Steel.....	42,253.18	2,168.74
11 14 13 16-0070 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Powder Coated Steel.....	32,963.16	2,168.74
11 14 13 16-0071 Anodized Aluminum (11 14 13 16-0060)		
11 14 13 16-0072 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	16,094.41	1,453.62
11 14 13 16-0073 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	16,985.19	1,453.62
11 14 13 16-0074 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Complete Anodized Aluminum.....	27,879.22	1,453.62
11 14 13 16-0075 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Anodized Aluminum With Stainless Steel Arms.....	33,522.91	2,168.74
11 14 13 16-0076 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Complete Anodized Aluminum.....	54,028.96	2,168.74
11 14 13 16-0077 Stainless Steel (11 14 13 16-0060)		
11 14 13 16-0078 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Stainless Steel.....	26,007.37	1,453.62
11 14 13 16-0079 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Stainless Steel.....	27,813.01	1,453.62
11 14 13 16-0080 EA Two-Way, "Handicapped" 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Stainless Steel.....	44,097.94	2,168.74
11 14 13 16-0081 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Stainless Steel.....	50,980.44	2,168.74
11 14 13 16-0082 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Stainless Steel.....	56,665.20	2,168.74
11 14 13 16-0083 Transparent (11 14 13 16-0060)		
11 14 13 16-0084 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Transparent Arms.....	43,570.23	1,453.84
11 14 13 16-0085 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Transparent Arms.....	45,935.62	1,453.84

11	11 Equipment
	11 10 Vehicle and Pedestrian Equipment
	11 14 Pedestrian Control Equipment



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 14 13 16-0086 EA Two-Way, Single 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Transparent Panels	47,292.86	1,453.84
11 14 13 16-0087 EA Two-Way, Double 7' High Exit Rotary Gate, Electric, 3 Rotor Sections, Transparent Arms	78,062.03	2,168.74
11 14 13 16-0088 EA One-Way, Double 7' High Exit Rotary Gate, Electric, 4 Rotor Sections, Transparent Arms	82,576.13	2,168.74
11 14 13 16-0089 Electrical Options (11 14 13 16-0001)		
11 14 13 16-0090 EA Additional Set Of Electric Controls, Per Rotor, Add	1,002.13	
11 14 13 16-0091 EA Indicator Lights, Set, Red/Green, Per Controlled Direction, Add	704.20	
11 14 13 16-0092 EA Time-Out-Relay, Per Controlled Direction	231.72	
11 14 13 16-0093 EA Pulse-Relay, Per Controlled Direction	231.72	
11 14 13 16-0094 EA Pushbutton, Per Controlled Direction	183.57	
11 14 13 16-0095 EA Heel Protectors, (Per Heel Protector), Add	180.56	
11 14 13 16-0096 EA Card Reader Mounting Pad, Per Reader	165.52	
11 14 13 16-0097 EA Hydraulic Speed Control (Per Rotor), Add	4,204.13	
11 14 13 16-0098 Relocate Rotary Gate (11 14 13 16-0001)		
11 14 13 16-0099 EA Relocate Rotary Gate	4,269.97	
11 14 13 19 Turnstiles (11 14 13)		
11 14 13 19-0001 Turnstiles (11 14 13 19)		
11 14 13 19-0002 EA 24" Diameter Manual Turnstile, Three Arm, Two Way	2,667.10	409.92
11 14 13 19-0003 EA 24" Diameter Manual Turnstile, Three Arm, Two Way With Counter	3,514.47	409.92
11 14 16 Pedestrian Control Devices (11 14)		
11 14 16 00-0001 Retractable Barrier (11 14 16)		
11 14 16 00-0002 EA Wall Mounted, Retractable Belt Barrier With Receiver; 6-1/2' (WGB269387BK)	99.87	21.87
11 14 16 00-0003 EA Wall Mounted, Retractable Belt Barrier With Receiver; 10' (WGB2093791)	179.65	21.87
11 14 16 00-0004 EA Wall Mounted, Retractable Belt Barrier With Receiver; 15' (WGB2093770)	219.54	21.87
11 14 16 00-0005 EA Wall Mounted, Retractable Belt Barrier With Receiver; 30' (WGB2093771)	359.16	21.87
11 20 Commercial Equipment (11)		
11 21 Retail and Service Equipment (11 20)		
11 21 63 Refrigerated Display Equipment (11 21)		
11 21 63 00-0001 Dairy Products (11 21 63)		
11 21 63 00-0002 Refrigerated Dairy Case (11 21 63 00-0001)		
11 21 63 00-0003 LF Refrigerated Case, Dairy, Multi-Deck	1,977.83	344.60
For Rear Sliding Doors, Add	19.95	
11 21 63 00-0004 Refrigerated Milk Unit (11 21 63 00-0001)		
11 21 63 00-0005 EA 46" x 32" x 49-1/2" Capacity: 12, 13" x 13" x 11" Refrigerated Milk Unit	9,961.97	250.10
11 21 63 00-0006 Refrigerated Ice Cream And Milk Dispenser (11 21 63 00-0001)		
11 21 63 00-0007 EA 63-1/2" x 28-1/2" x 35-3/8" Refrigerated Ice Cream And Milk Dispenser	11,045.56	274.66
11 21 63 00-0008 Ice Cream Dispenser (11 21 63 00-0001)		
11 21 63 00-0009 EA 46" x 28-1/2" x 35-3/8" Refrigerated Ice Cream Dispenser	9,225.14	231.26
11 21 63 00-0010 Drop-In Ice Cream Freezer (11 21 63 00-0001)		
11 21 63 00-0011 EA 27-7/8" x 16-9/16" x 28-1/4" 6 Gallon Drop-In Ice Cream Freezer	2,300.56	57.55
11 21 63 00-0012 EA 30" x 27-7/8" x 28-1/4" 12 Gallon Drop-In Ice Cream Freezer	3,006.30	75.26
11 21 63 00-0013 Ice Cream Cabinets (11 21 63 00-0001)		
11 21 63 00-0014 EA 46" x 32" x 42", 24 Gallon Ice Cream Cabinet	7,205.65	179.87
11 21 63 00-0015 EA 68" x 32" x 42", 48 Gallon Ice Cream Cabinet	10,263.85	259.58
11 21 63 00-0016 Delicatessen Case, Service Deli (11 21 63)		
11 21 63 00-0017 LF Delicatessen Case, Single-Deck	1,985.70	287.17
11 21 63 00-0018 LF Delicatessen Case, Multi-Deck	2,207.51	344.60
11 21 63 00-0019 EA Delicatessen Case, 3 Shelf, 32" x 23" x 23"	2,653.41	76.46
11 21 63 00-0020 Meat Case (11 21 63)		
11 21 63 00-0021 LF Meat Case, Single - Deck	1,432.72	344.60
11 21 63 00-0022 LF Meat Case, Multi - Deck	1,554.04	344.60



Equipment	11	
Commercial Equipment	11 20	⇄
Retail and Service Equipment	11 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 21 63 00-0023 Produce Case <small>(11 21 63)</small>		
11 21 63 00-0024 LF Single Deck Produce Case.....	1,496.40	344.60
11 21 63 00-0025 LF Multi-Deck Produce Case.....	1,655.64	344.60

11 21 63 00-0026 Bottle Coolers <small>(11 21 63)</small>		
11 21 63 00-0027 EA Bottle Cooler, 6' Long.....	5,598.07	1,148.66
11 21 63 00-0028 EA Bottle Cooler, 10' Long.....	8,401.01	1,722.98

11 21 63 00-0029 Cold Pan Units <small>(11 21 63)</small>		
11 21 63 00-0030 EA 5" x 48", Iced, Cold Pan Units.....	3,687.95	91.59
11 21 63 00-0031 EA 5" x 72", Iced, Cold Pan Units.....	5,123.59	128.13
11 21 63 00-0032 EA 8" x 72", Iced, Cold Pan Units.....	6,058.04	151.55
11 21 63 00-0033 EA 5" x 48", Mechanical, Cold Pan Units.....	6,227.63	156.57
11 21 63 00-0034 EA 8" x 48", Mechanical, Cold Pan Units.....	6,778.42	169.02
11 21 63 00-0035 EA 8" x 72", Mechanical, Cold Pan Units.....	8,054.43	199.74

11 21 63 00-0036 Cold Cabinets (Insulated) <small>(11 21 63)</small>		
11 21 63 00-0037 EA 69-3/4" x 32" x 24", Insulated Cold Cabinet.....	3,349.54	79.26

11 22 Banking Equipment (11 20)

11 22 13 Vault Equipment (11 22)

11 22 13 16 Safes (11 22 13)

11 22 13 16-0001 In Room Safes <small>(11 22 13 16)</small>		
11 22 13 16-0002 EA 8-1/8" x 7-3/16" x 10-3/16" Keypad Operated In Room Electronic Safe (SafeDecisions Sentinel 25).....	818.73	10.84
11 22 13 16-0003 EA 8-1/8" x 7-3/16" x 16-5/8" Keypad Operated In Room Electronic Safe (SafeDecisions Sentinel 41).....	765.96	10.84
11 22 13 16-0004 EA 8-1/8" x 7-3/16" x 19-13/16" Keypad Operated In Room Electronic Safe (SafeDecisions Sentinel 49).....	797.63	10.84
11 22 13 16-0005 EA 8-1/8" x 7-3/16" x 10-3/16" Keypad (Lighted) Operated In Room Electronic Safe (SafeDecisions Infinity 25).....	892.62	10.84
<small>Note: Keypad lights up blue and beeps when buttons pushed. Includes light on inside of safe door.</small>		
11 22 13 16-0006 EA 8-1/8" x 7-3/16" x 16-5/8" Keypad (Lighted) Operated In Room Electronic Safe (SafeDecisions Infinity 41).....	924.29	10.84
<small>Note: Keypad lights up blue and beeps when buttons pushed. Includes light on inside of safe door.</small>		
11 22 13 16-0007 EA 8-1/8" x 7-3/16" x 19-13/16" Keypad (Lighted) Operated In Room Electronic Safe (SafeDecisions Infinity 49).....	955.95	10.84
<small>Note: Keypad lights up blue and beeps when buttons pushed. Includes light on inside of safe door.</small>		
11 22 13 16-0008 EA 7-5/8" x 14" x 10-11/16" Keypad Operated In Drawer Electronic Safe (SafeDecisions X-Tra II-XD 27).....	605.76	13.56
<small>Note: Includes security wire.</small>		
11 22 13 16-0009 EA 7-5/8" x 14" x 17-1/2" Keypad Operated In Drawer Electronic Safe (SafeDecisions X-Tra II-XD 43).....	626.87	13.56
<small>Note: Includes security wire.</small>		
11 22 13 16-0010 EA 7-5/8" x 14" x 20-3/16" Keypad Operated In Drawer Electronic Safe (SafeDecisions X-Tra II-XD 50).....	647.98	13.56
<small>Note: Includes security wire.</small>		

11 30 Residential Equipment (11)

11 30 13 Residential Appliances (11 30)

11 30 13 13 Residential Kitchen Appliances (11 30 13)

Note: Includes standard colors. Excludes stainless steel.

11 30 13 13-0001 Ranges With Ovens <small>(11 30 13 13)</small>		
<small>Note: Free standing or slide in.</small>		
11 30 13 13-0002 Electric Ranges With Ovens <small>(11 30 13 13-0001)</small>		
11 30 13 13-0003 EA 20" Electric Range With Oven.....	900.67	97.21
<small>For Stainless Steel, Add</small>		
	176.56	
11 30 13 13-0004 EA 24" Electric Range With Oven.....	941.14	97.21
<small>For Stainless Steel, Add</small>		
	186.68	
11 30 13 13-0005 EA 30" Electric Range With Oven.....	904.63	97.21
<small>For Stainless Steel, Add</small>		
	201.86	
11 30 13 13-0006 EA 30" Free-Standing Electric Range With Oven (Hotpoint® RB525DHWW).....	997.86	97.21
11 30 13 13-0007 Gas Ranges With Ovens <small>(11 30 13 13-0001)</small>		
11 30 13 13-0008 EA 20" Gas Range With Oven.....	1,001.85	97.21
<small>For Stainless Steel, Add</small>		
	201.86	
11 30 13 13-0009 EA 24" Gas Range With Oven (Hot Point model # RGA724EKWH, White).....	1,054.46	97.21
<small>For Stainless Steel, Add</small>		
	215.01	
11 30 13 13-0010 EA 30" Gas Range With Oven (Kenmore Model # 72902 - White).....	1,103.03	97.21
<small>For Stainless Steel, Add</small>		
	227.15	
11 30 13 13-0011 Range Hoods <small>(11 30 13 13)</small>		
11 30 13 13-0012 Venting Range Hoods <small>(11 30 13 13-0011)</small>		

11 Equipment
11 30 Residential Equipment
11 30 13 Residential Appliances



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
11 30 13 13-0013	EA 21" Venting Range Hood (Broan 40000) <i>For Stainless Steel, Add</i>	305.06 23.89	72.92
11 30 13 13-0014	EA 24" Venting Range Hood (Broan 40000) <i>For Stainless Steel, Add</i>	281.40 20.34	72.92
11 30 13 13-0015	EA 30" Venting Range Hood (Broan 40000/42000)..... <i>For Stainless Steel, Add</i>	277.25 19.71	72.92
11 30 13 13-0016	EA 36" Venting Range Hood (Broan 40000/42000)..... <i>For Stainless Steel, Add</i>	281.40 20.34	72.92
11 30 13 13-0017 Non-Ducted Range Hoods (11 30 13 13-0017)			
11 30 13 13-0018	EA 21" Non-Ducted Range Hood (Broan 41000) <i>For Stainless Steel, Add</i>	308.11 24.34	72.92
11 30 13 13-0019	EA 24" Non-Ducted Range Hood (Broan 41000) <i>For Stainless Steel, Add</i>	284.54 20.81	72.92
11 30 13 13-0020	EA 30" Non-Ducted Range Hood (Broan 41000/46000)..... <i>For Stainless Steel, Add</i>	280.37 20.18	72.92
11 30 13 13-0021	EA 36" Non-Ducted Range Hood (Broan 41000/46000)..... <i>For Stainless Steel, Add</i>	284.54 20.81	72.92
11 30 13 13-0022 Microwaves (11 30 13 13)			
11 30 13 13-0023 Countertop Microwaves (11 30 13 13-0022)			
11 30 13 13-0024	EA 1.1 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	190.25 24.89	12.15
11 30 13 13-0025	EA 1.2 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	226.65 30.35	12.15
11 30 13 13-0026	EA 1.3 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	232.72 31.26	12.15
11 30 13 13-0027	EA 1.4 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	285.35 39.16	12.15
11 30 13 13-0028	EA 1.5 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	305.59 42.19	12.15
11 30 13 13-0029	EA 1.6 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	325.83 45.23	12.15
11 30 13 13-0030	EA 1.7 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	346.06 48.26	12.15
11 30 13 13-0031	EA 1.8 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	366.30 51.30	12.15
11 30 13 13-0032	EA 2.0 CF Countertop Microwave Oven..... <i>For Stainless Steel, Add</i>	388.54 54.63	12.15
11 30 13 13-0033 Over-The-Range Microwaves (11 30 13 13-0022)			
11 30 13 13-0034	EA 1.5 CF Over-The Range Microwave <i>For Stainless Steel, Add</i>	663.01 77.58	97.20
11 30 13 13-0035	EA 1.6 CF Over-The Range Microwave <i>For Stainless Steel, Add</i>	750.86 90.76	97.20
11 30 13 13-0036	EA 1.7 CF Over-The Range Microwave <i>For Stainless Steel, Add</i>	779.17 95.01	97.20
11 30 13 13-0037	EA 1.8 CF Over-The Range Microwave <i>For Stainless Steel, Add</i>	991.64 126.88	97.20
11 30 13 13-0038	EA 2.0 CF Over-The Range Microwave <i>For Stainless Steel, Add</i>	791.33 96.83	97.20
11 30 13 13-0039	EA 1.6 CF Over-the-Range Microwave (Hotpoint® RVM5160DHWW).....	505.63	72.91
11 30 13 13-0040 Trash Compactors (11 30 13 13)			
11 30 13 13-0041	EA 15" Built-In Trash Compactor, 4 To 1 Compaction..... <i>For Stainless Steel, Add</i>	1,507.75 236.40	97.21
11 30 13 13-0042 Refrigerators (11 30 13 13)			
11 30 13 13-0043 Top Freezer Refrigerators (11 30 13 13-0042)			
11 30 13 13-0044	EA Up To 10 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	744.74 97.13	48.61
11 30 13 13-0045	EA >10 To 12 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	904.63 121.11	48.61
11 30 13 13-0046	EA >12 To 14 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	1,007.81 136.59	48.61
11 30 13 13-0047	EA >14 To 16 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	1,068.52 145.70	48.61
11 30 13 13-0048	EA >16 To 18 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	1,230.41 169.98	48.61
11 30 13 13-0049	EA >18 To 20 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	1,370.05 190.93	48.61
11 30 13 13-0050	EA >20 To 22 CF Top Freezer Refrigerator <i>For Stainless Steel, Add</i>	1,473.24 206.40	48.61
11 30 13 13-0051	EA 14.6 CF, Top-Freezer Refrigerator (Hotpoint® ENERGY STAR® HPE15BTHWW).....	1,332.82	48.61

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 30 13 13-0052 Side-By-Side Refrigerators <small>(11 30 13 13-0042)</small>		
11 30 13 13-0053 EA Up To 22 CF Side-By-Side Refrigerator <i>For Stainless Steel, Add</i>	1,513.49 212.44	48.61
11 30 13 13-0054 EA >22 To 24 CF Side-By-Side Refrigerator <i>For Stainless Steel, Add</i>	1,877.96 267.11	48.61
11 30 13 13-0055 EA >24 To 26 CF Side-By-Side Refrigerator <i>For Stainless Steel, Add</i>	2,120.79 303.54	48.61
11 30 13 13-0056 Other Refrigerators <small>(11 30 13 13-0042)</small>		
11 30 13 13-0057 EA 1.7 CF Dormitory Sized Refrigerator..... <i>For Stainless Steel, Add</i>	247.13 29.78	24.31
11 30 13 13-0058 EA 4.4 CF Dormitory Sized Refrigerator..... <i>For Stainless Steel, Add</i>	338.19 43.44	24.31
11 30 13 13-0059 Freezers <small>(11 30 13 13)</small>		
11 30 13 13-0060 Upright Freezers <small>(11 30 13 13-0059)</small>		
11 30 13 13-0061 EA Up To 10 CF Upright Freezer <i>For Stainless Steel, Add</i>	702.27 90.76	48.61
11 30 13 13-0062 EA >10 To 12 CF Upright Freezer..... <i>For Stainless Steel, Add</i>	904.63 121.11	48.61
11 30 13 13-0063 EA >12 To 14 CF Upright Freezer..... <i>For Stainless Steel, Add</i>	965.33 130.22	48.61
11 30 13 13-0064 EA >14 To 16 CF Upright Freezer..... <i>For Stainless Steel, Add</i>	1,106.99 151.47	48.61
11 30 13 13-0065 EA >16 To 18 CF Upright Freezer..... <i>For Stainless Steel, Add</i>	1,270.88 176.05	48.61
11 30 13 13-0066 EA >18 To 20 CF Upright Freezer..... <i>For Stainless Steel, Add</i>	1,351.84 188.19	48.61
11 30 13 13-0067 EA >20 To 22 CF Upright Freezer..... <i>For Stainless Steel, Add</i>	1,412.53 197.30	48.61
11 30 13 13-0068 Chest Freezers <small>(11 30 13 13-0059)</small>		
11 30 13 13-0069 EA Up To 8 CF Chest Freezer <i>For Stainless Steel, Add</i>	562.62 69.81	48.61
11 30 13 13-0070 EA >8 To 10 CF Chest Freezer <i>For Stainless Steel, Add</i>	704.27 91.06	48.61
11 30 13 13-0071 EA >10 To 12 CF Chest Freezer <i>For Stainless Steel, Add</i>	754.88 98.65	48.61
11 30 13 13-0072 EA >12 To 14 CF Chest Freezer <i>For Stainless Steel, Add</i>	845.92 112.31	48.61
11 30 13 13-0073 EA >14 To 16 CF Chest Freezer <i>For Stainless Steel, Add</i>	904.63 121.11	48.61
11 30 13 13-0074 EA >16 To 18 CF Chest Freezer <i>For Stainless Steel, Add</i>	1,106.99 151.47	48.61
11 30 13 13-0075 EA >18 To 20 CF Chest Freezer <i>For Stainless Steel, Add</i>	1,370.05 190.93	48.61
11 30 13 13-0076 EA >20 To 22 CF Chest Freezer <i>For Stainless Steel, Add</i>	1,412.53 197.30	48.61
11 30 13 13-0077 Automatic Ice Makers <small>(11 30 13 13)</small>		
11 30 13 13-0078 EA 15" Wide, 50 LB Per Day, Automatic Ice Maker	2,618.70	97.21
11 30 13 13-0079 EA 18" Wide, 50 LB Per Day, Automatic Ice Maker	2,922.24	97.21
11 30 13 13-0080 Built-In Dishwashers <small>(11 30 13 13)</small>		
11 30 13 13-0081 EA 18" Built-In Dishwasher..... <i>For Stainless Steel, Add</i>	1,266.92 160.87	97.21
11 30 13 13-0082 EA 24" Built-In Dishwasher..... <i>For Stainless Steel, Add</i>	841.96 97.13	97.21
11 30 13 13-0083 Removal And Reinstallation Of Kitchen Equipment <small>(11 30 13 13)</small>		
Note: Includes storage, cleaning and final connections.		
11 30 13 13-0084 EA Removal And Reinstallation Of Garbage Disposal	145.82	
11 30 13 13-0085 EA Removal And Reinstallation Of Stove/Range	291.64	
11 30 13 13-0086 EA Removal And Reinstallation Of Dishwasher	311.09	
11 30 13 13-0087 EA Removal And Reinstallation Of Range Hood	145.82	
11 30 13 13-0088 EA Removal And Reinstallation Of Washer And Dryer.....	243.04	
11 30 13 13-0089 Appliance Repair <small>(11 30 13 13)</small>		
Note: Includes removal.		
11 30 13 13-0090 EA 8" Burner Replacement.....	33.61	
11 30 13 13-0091 EA 4" Burner Element Replacement	59.53	
11 30 13 13-0092 EA 8" Burner Element Replacement	68.45	
11 30 13 13-0093 EA Burner Manifold Replacement	229.30	

11	11 Equipment
	11 30 Residential Equipment
	11 30 13 Residential Appliances



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 30 13 13-0094	EA	Burner Switch Replacement	94.26		
11 30 13 13-0095	EA	Burner Tube, 5/8" x 4' Replacement	43.58		
11 30 13 13-0096	EA	Oven Control Replacement.....	113.63		
11 30 13 13-0097	EA	Oven Door Gasket Replacement.....	44.99		
11 30 13 13-0098	EA	Oven Element Replacement.....	106.82		
11 30 13 13-0099	EA	Oven Igniter Replacement	77.05		
11 30 13 13-0100	EA	Oven Knobs Replacement.....	58.95		
11 30 13 13-0101		Accessories (11 30 13 13)			
11 30 13 13-0102	SF	Colored Metal Range Splash Plate	19.50	3.89	
11 30 13 13-0103	SF	Stainless Steel Range Splash Plate	28.92	3.89	
11 30 13 13-0104		Automatic Water Softener (11 30 13 13)			
11 30 13 13-0105	EA	30,000 Grain Capacity, Water Softener (Whirlpool WHES30)	1,305.71	211.47	
11 30 13 13-0106	EA	40,000 Grain Capacity, Water Softener (Whirlpool WHES40)	1,554.29	211.47	
11 30 13 23		Residential Laundry Appliances (11 30 13)			
11 30 13 23-0001		Washing Machines And Dryers (11 30 13 23)			
11 30 13 23-0002		Washing Machines (11 30 13 23-0001)			
11 30 13 23-0003	EA	Up To 3.5 CF, Top Load Washing Machine.....	975.48	97.21	
11 30 13 23-0004	EA	>3.5 To 4 CF, Top Load Washing Machine	1,562.32	97.21	
11 30 13 23-0005	EA	>4 To 5 CF, Top Load Washing Machine	2,068.22	97.21	
11 30 13 23-0006		Dryers (11 30 13 23-0001)			
11 30 13 23-0007		Electric Dryers (11 30 13 23-0006)			
11 30 13 23-0008	EA	Up To 6 CF, Electric Dryer.....	750.88	97.21	
11 30 13 23-0009	EA	>6 To 6.5 CF, Electric Dryer	955.24	97.21	
11 30 13 23-0010	EA	>6.5 To 7 CF, Electric Dryer	1,177.84	97.21	
11 30 13 23-0011	EA	>7 To 7.5 CF, Electric Dryer	1,339.72	97.21	
11 30 13 23-0012		Gas Dryers (11 30 13 23-0006)			
11 30 13 23-0013	EA	Up To 6 CF, Gas Dryer	894.53	97.21	
11 30 13 23-0014	EA	>6 To 6.5 CF, Gas Dryer	1,096.89	97.21	
11 30 13 23-0015	EA	>6.5 To 7 CF, Gas Dryer	1,299.03	97.21	
11 30 13 23-0016	EA	>7 To 7.5 CF, Gas Dryer	1,481.38	97.21	
11 30 13 23-0017		Stacked Washer And Dryers (11 30 13 23-0001)			
11 30 13 23-0018	EA	27" Wide x 75-1/2" High, Stacked Top Load Washing Machine And Electric Dryer (Frigidare GLET 1031FS)	2,171.53	170.13	
11 30 33		Retractable Stairs (11 30)			
11 30 33 00-0001		Disappearing Folding Access Stairs (11 30 33)			
11 30 33 00-0002		250 LB Capacity, Wood Folding Access Stairs (11 30 33 00-0001)			
11 30 33 00-0003	EA	22-1/2" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Wood Folding Access Stairs, 250 LB Capacity	754.03	217.01	
11 30 33 00-0004	EA	22-1/2" x 54" Rough Opening, 8' 9" To 10' 4" Ceiling Height, Wood Folding Access Stairs, 250 LB Capacity	769.41	217.01	
11 30 33 00-0005	EA	25-1/2" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Wood Folding Access Stairs, 250 LB Capacity	769.41	217.01	
11 30 33 00-0006	EA	25-1/2" x 54" Rough Opening, 8' 9" To 10' 4" Ceiling Height, Wood Folding Access Stairs, 250 LB Capacity	784.42	217.01	
11 30 33 00-0007		350 LB Capacity, Wood Folding Access Stairs (11 30 33 00-0001)			
11 30 33 00-0008	EA	22-1/2" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	894.47	217.01	
11 30 33 00-0009	EA	22-1/2" x 54" Rough Opening, 8' 9" To 10' 3" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	925.57	217.01	
11 30 33 00-0010	EA	25-1/2" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	912.79	217.01	
11 30 33 00-0011	EA	25-1/2" x 54" Rough Opening, 8' 9" To 10' 3" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	942.51	217.01	
11 30 33 00-0012	EA	30" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity.....	930.55	217.01	
11 30 33 00-0013	EA	30" x 54" Rough Opening, 8' 9" To 10' 4" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	981.92	217.01	
11 30 33 00-0014		350 LB Capacity, Wood Folding Access Stairs (11 30 33 00-0001)			
Note: 1 x 6 treads, 1 x 5 stringers. Bessler Stairway Company, Model Space Saver.					
11 30 33 00-0015	EA	22-1/2" x 48" Rough Opening, 8' 5" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,148.49	217.01	
11 30 33 00-0016	EA	22-1/2" x 54" Rough Opening, 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,191.79	217.01	
11 30 33 00-0017	EA	22-1/2" x 54" Rough Opening, 10' Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity.....	1,235.10	217.01	
11 30 33 00-0018	EA	22-1/2" x 60" Rough Opening, 9' 3" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,235.10	217.01	
11 30 33 00-0019	EA	22-1/2" x 60" Rough Opening, 10' Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity.....	1,256.75	217.01	
11 30 33 00-0020	EA	25-1/2" x 48" Rough Opening, 8' 5" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,175.62	217.01	
11 30 33 00-0021	EA	25-1/2" x 54" Rough Opening, 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,218.92	217.01	
11 30 33 00-0022	EA	25-1/2" x 54" Rough Opening, 10' Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity.....	1,262.23	217.01	
11 30 33 00-0023	EA	25-1/2" x 60" Rough Opening, 9' 3" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,262.23	217.01	
11 30 33 00-0024	EA	25-1/2" x 60" Rough Opening, 10' Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity.....	1,283.88	217.01	



Equipment	11
Residential Equipment	11 30
Retractable Stairs	11 30 33

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
11 30 33 00-0025	EA	30" x 54" Rough Opening, 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,311.00		217.01
11 30 33 00-0026	EA	30" x 54" Rough Opening, 10' Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,354.30		217.01
11 30 33 00-0027	EA	30" x 60" Rough Opening, 8' 9" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,440.90		217.01
11 30 33 00-0028	EA	30" x 60" Rough Opening, 9' 3" Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,462.56		217.01
11 30 33 00-0029	EA	30" x 60" Rough Opening, 10' Ceiling Height, Wood Folding Access Stairs, 350 LB Capacity	1,484.21		217.01
11 30 33 00-0030	EA	30" x 60" Rough Opening, 10' 6" Ceiling Height, Wood Folding Access Stairs, 350# Capacity	1,505.86		217.01
11 30 33 00-0031		400 LB Capacity, Wood One Piece Pull Down Access Stairs <small>(11 30 33 00-0001)</small>			
		Note: Ladder width 17 1/16", 1x4 treads, 1x4 stringers. Bessler Stairway Company, Model 20.			
11 30 33 00-0032	EA	24" x 48" Rough Opening, 7' 7" To 7' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 400 LB Capacity	1,819.92		217.01
11 30 33 00-0033	EA	24" x 48" Rough Opening, 7' 11" To 8' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 400 LB Capacity	1,884.87		217.01
11 30 33 00-0034	EA	24" x 48" Rough Opening, 8' 5" To 8' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 400 LB Capacity	1,949.83		217.01
11 30 33 00-0035	EA	24" x 48" Rough Opening, 8' 11" To 9' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 400 LB Capacity	1,993.13		217.01
11 30 33 00-0036		600 LB Capacity, Wood One Piece Pull Down Access Stairs <small>(11 30 33 00-0001)</small>			
		Note: Ladder width 17 1/16", 1x6 treads, 1x6 stringers. Bessler Stairway Company, Model 40.			
11 30 33 00-0037	EA	24" x 66" Rough Opening, 7' 7" To 7' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,144.68		217.01
		For Ladder Width 18 7/8" Wide, Add	240.33		
11 30 33 00-0038	EA	24" x 66" Rough Opening, 7' 11" To 8' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,187.99		217.01
		For Ladder Width 18 7/8" Wide, Add	246.82		
11 30 33 00-0039	EA	24" x 66" Rough Opening, 8' 5" To 8' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,209.64		217.01
		For Ladder Width 18 7/8" Wide, Add	250.07		
11 30 33 00-0040	EA	24" x 66" Rough Opening, 8' 11" To 9' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,274.59		217.01
		For Ladder Width 18 7/8" Wide, Add	259.81		
11 30 33 00-0041	EA	24" x 72" Rough Opening, 9' 5" To 9' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,415.45		217.01
		For Ladder Width 18 7/8" Wide, Add	272.80		
11 30 33 00-0042	EA	24" x 72" Rough Opening, 9' 11" To 10' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,523.71		217.01
		For Ladder Width 18 7/8" Wide, Add	289.04		
11 30 33 00-0043	EA	24" x 72" Rough Opening, 10' 5" To 10' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 600 LB Capacity	2,631.96		217.01
		For Ladder Width 18 7/8" Wide, Add	305.28		
11 30 33 00-0044		800 LB Capacity, Wood One Piece Pull Down Access Stairs <small>(11 30 33 00-0001)</small>			
		Note: Ladder width 18 7/8", 1x8 treads, 1x8 stringers. Bessler Stairway Company, Model 100.			
11 30 33 00-0045	EA	30" x 70" Rough Opening, 7' 7" To 7' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,017.63		217.01
11 30 33 00-0046	EA	30" x 70" Rough Opening, 7' 11" To 8' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,060.93		217.01
11 30 33 00-0047	EA	30" x 70" Rough Opening, 8' 5" To 8' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,104.23		217.01
11 30 33 00-0048	EA	30" x 72" Rough Opening, 8' 11" To 9' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,212.49		217.01
11 30 33 00-0049	EA	30" x 76" Rough Opening, 9' 5" To 9' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,331.68		217.01
11 30 33 00-0050	EA	30" x 80" Rough Opening, 9' 11" To 10' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,396.63		217.01
11 30 33 00-0051	EA	30" x 84" Rough Opening, 10' 5" To 10' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,504.89		217.01
11 30 33 00-0052	EA	30" x 87" Rough Opening, 10' 11" To 11' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,710.71		217.01
11 30 33 00-0053	EA	30" x 90" Rough Opening, 11' 5" To 11' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	4,905.56		217.01
11 30 33 00-0054	EA	30" x 93" Rough Opening, 11' 11" To 12' 4" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	5,143.73		217.01
11 30 33 00-0055	EA	30" x 96" Rough Opening, 12' 5" To 12' 10" Ceiling Height, Wood One Piece Pull Down Access Stairs, 800 LB Capacity	5,360.23		217.01
11 30 33 00-0056		300 LB Capacity, Aluminum Folding Access Stairs <small>(11 30 33 00-0001)</small>			
11 30 33 00-0057	EA	22-1/2" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Aluminum Folding Access Stairs, 300 LB Capacity	773.67		217.01
11 30 33 00-0058	EA	22-1/2" x 54" Rough Opening, 8' 9" To 10' 4" Ceiling Height, Aluminum Folding Access Stairs, 300 LB Capacity	805.28		217.01
11 30 33 00-0059	EA	25-1/2" x 54" Rough Opening, 7' To 8' 9" Ceiling Height, Aluminum Folding Access Stairs, 300 LB Capacity	782.47		217.01
11 30 33 00-0060	EA	25-1/2" x 54" Rough Opening, 8' 9" To 10' 4" Ceiling Height, Aluminum Folding Access Stairs, 300 LB Capacity	814.06		217.01
11 30 33 00-0061	EA	25-1/2" x 54" Rough Opening, 10' 5" To 12' Ceiling Height, Aluminum Folding Access Stairs, 300 LB Capacity	990.02		217.01
11 30 33 00-0062		300 LB Capacity, Steel Folding Access Stairs <small>(11 30 33 00-0001)</small>			
11 30 33 00-0063	EA	22-1/2" x 54" Rough Opening, 7' 3" To 8' 4" Ceiling Height, Steel Folding Access Stairs, 300 LB Capacity	850.64		217.01
11 30 33 00-0064	EA	22-1/2" x 54" Rough Opening, 8' 4" To 10' 3" Ceiling Height, Steel Folding Access Stairs, 300 LB Capacity	894.87		217.01

11	11 Equipment
	11 30 Residential Equipment
	11 30 33 Retractable Stairs



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

11 32 Unit Kitchens (11 30)

11 32 13 Metal Unit Kitchens (11 32)

Note: Includes electrical hook-up to outlet, supply line connection to service stops, and drain line and p-trap. Excludes garbage disposer and hood exhaust vent piping.

11 32 13 00-0001	30" Compact Kitchen <small>(11 32 13)</small>		
11 32 13 00-0002	EA 30" Compact Unit Kitchen With Refrigerator, Range And Sink.....	2,462.88	574.09
	<i>For Gas Unit, Add</i>	254.61	
11 32 13 00-0003	EA 30" Compact Unit Kitchen With Refrigerator And Sink.....	2,074.73	401.86
11 32 13 00-0004	EA 30" Compact Unit Kitchen With Refrigerator And Range.....	1,893.00	344.46
11 32 13 00-0005	EA 30" Compact Unit Kitchen Cabinet For Upper Wall Section.....	592.95	162.68
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0006	EA 30" Compact Unit Kitchen Cabinet With Microwave And Hood Combination For Upper Wall Section.....	1,190.84	216.91
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0007	EA 30" Compact Unit Kitchen Stainless Steel Shield For Rear Wall.....	80.57	19.44
11 32 13 00-0008	EA 30" Compact Unit Kitchen Stainless Steel Shield For Side Wall.....	73.16	19.44
11 32 13 00-0009	42" Compact Kitchen <small>(11 32 13)</small>		
11 32 13 00-0010	EA 42" Compact Unit Kitchen With Refrigerator, Range And Sink.....	2,859.54	631.51
	<i>For Gas Unit, Add</i>	302.63	
11 32 13 00-0011	EA 42" Compact Unit Kitchen With Refrigerator And Sink.....	2,567.47	516.68
11 32 13 00-0012	EA 42" Compact Unit Kitchen Cabinet For Upper Wall Section.....	747.82	184.38
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0013	EA 42" Compact Unit Kitchen Cabinet With Microwave And Hood Combination For Upper Wall Section.....	1,379.97	244.02
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0014	EA 42" Compact Unit Kitchen Stainless Steel Shield For Rear Wall.....	95.75	19.44
11 32 13 00-0015	EA 42" Compact Unit Kitchen Stainless Steel Shield For Side Wall.....	81.16	19.44
11 32 13 00-0016	54" Compact Kitchen <small>(11 32 13)</small>		
11 32 13 00-0017	EA 54" Compact Unit Kitchen With Refrigerator, Oven, Range And Sink.....	3,859.56	803.74
	<i>For Gas Unit, Add</i>	418.19	
11 32 13 00-0018	EA 54" Compact Unit Kitchen Cabinet For Upper Wall Section.....	924.38	108.45
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0019	EA 54" Compact Unit Kitchen Cabinet With Microwave And Hood Combination For Upper Wall Section.....	1,534.54	271.14
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0020	EA 54" Compact Unit Kitchen Stainless Steel Shield For Rear Wall.....	110.89	19.44
11 32 13 00-0021	EA 54" Compact Unit Kitchen Stainless Steel Shield For Side Wall.....	84.84	19.44
11 32 13 00-0022	60" Compact Kitchen <small>(11 32 13)</small>		
11 32 13 00-0023	EA 60" Compact Unit Kitchen With Refrigerator, Oven, Range, And Sink.....	4,063.57	861.14
	<i>For Gas Unit, Add</i>	437.31	
11 32 13 00-0024	EA 60" Compact Unit Kitchen Cabinet For Upper Wall Section.....	1,099.73	271.14
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0025	EA 60" Compact Unit Kitchen Stainless Steel Shield For Rear Wall.....	117.14	19.44
11 32 13 00-0026	EA 60" Compact Unit Kitchen Stainless Steel Shield For Side Wall.....	84.84	19.44
11 32 13 00-0027	72" Compact Kitchen <small>(11 32 13)</small>		
11 32 13 00-0028	EA 72" Compact Unit Kitchen With Refrigerator, Oven, Range And Sink.....	4,356.77	918.55
	<i>For Gas Unit, Add</i>	469.81	
11 32 13 00-0029	EA 72" Compact Unit Kitchen Cabinet For Upper Wall Section.....	1,341.97	325.37
	<i>For Range Hood In Upper Section, Add</i>	179.00	
11 32 13 00-0030	EA 72" Compact Unit Kitchen Stainless Steel Shield For Rear Wall.....	136.14	24.31
11 32 13 00-0031	EA 72" Compact Unit Kitchen Stainless Steel Shield For Side Wall.....	89.25	24.31

11 40 Foodservice Equipment (11)

11 41 Foodservice Storage Equipment (11 40)

11 41 13 Refrigerated Food Storage Cases (11 41)

11 41 13 00-0001	Frozen Food Cases <small>(11 41 13)</small>		
11 41 13 00-0002	LF Chest Type Frozen Food Case.....	1,485.15	344.60
11 41 13 00-0003	LF Reach-in Frozen Food Case (Glass Door).....	2,917.37	344.60
11 41 13 00-0004	LF Island Type Frozen Food Case.....	1,737.76	344.60
11 41 13 00-0005	LF Multi-Deck Frozen Food Case.....	2,795.12	344.60
11 41 13 00-0006	Reach-In Refrigeration <small>(11 41 13)</small>		
11 41 13 00-0007	Reach-In Refrigerators <small>(11 41 13 00-0006)</small>		
11 41 13 00-0008	EA Single Section, 24.2 CF, Full Door, Self Contained, Reach-In Refrigerator.....	6,567.31	177.72
11 41 13 00-0009	EA Two Section, 46.0 CF, Full Door, Self Contained, Reach-In Refrigerator.....	8,087.12	224.16
11 41 13 00-0010	EA Three Section, 69.1 CF, Full Door, Self Contained, Reach-In Refrigerator.....	10,826.88	247.64
11 41 13 00-0011	EA Single Section, Glass Door, 24.2 CF, Full Door, Self Contained, Reach-In Refrigerator.....	5,950.53	177.72



Equipment	11	
Foodservice Equipment	11 40	⇐
Foodservice Storage Equipment	11 41	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 41 13 00-0012	EA		Two Section, Glass Door, 46.0 CF, Full Door, Self Contained, Reach-In Refrigerator	7,743.38	224.16
11 41 13 00-0013	EA		Three Section, Glass Door, 61.1 CF, Full Door, Self Contained, Reach-In Refrigerator.....	10,310.91	247.64
11 41 13 00-0014	EA		Single Section, Pass-Thru, 24.2 CF, Full Door, Self Contained, Reach-In Refrigerator	7,904.14	177.72
11 41 13 00-0015	EA		Two Section, Pass-Thru, 46.0 CF, Full Door, Self Contained, Reach-In Refrigerator.....	10,698.98	224.16
11 41 13 00-0016	EA		Single Section, Pass-Thru, Glass Door, 25.6 CF, Full Door, Self Contained, Reach-In Refrigerator.....	8,093.34	177.72
11 41 13 00-0017	EA		Two Section, Pass-Thru, Glass Door, 48.8 CF, Full Door, Self Contained, Reach-In Refrigerator.....	11,669.35	224.16
11 41 13 00-0018			Reach-In Freezers <small>(11 41 13 00-0006)</small>		
11 41 13 00-0019	EA		Single Section, 24.2 CF, Full Door, Self Contained, Reach-In Freezer	7,396.20	177.94
11 41 13 00-0020	EA		Two Section, 46.0 CF, Full Door, Self Contained, Reach-In Freezer.....	9,812.57	223.84
11 41 31			Non-Refrigerated Storage Equipment <small>(11 41)</small>		
11 41 31 00-0001			Wall Cabinets <small>(11 41 31)</small>		
11 41 31 00-0002	EA		48" Wall Cabinet With Sliding Doors..... Note: 15" deep and 24" high.	2,395.79	84.70
11 41 31 00-0003	EA		72" Wall Cabinet With Sliding Doors..... Note: 15" deep and 24" high.	3,161.19	111.81
11 41 31 00-0004	EA		72" Wall Cabinet With Hinged Doors	3,628.40	128.19
11 41 31 00-0005	EA		72" Wall Cabinet With Open Shelves..... Note: 15" deep and 24" high.	2,322.17	81.77
11 41 31 00-0006			Mobile Sheet Pan Truck <small>(11 41 31)</small>		
11 41 31 00-0007	EA		2 Level Mobile Sheet Pan Truck.....	223.68	7.19
11 41 31 00-0008			Pot And Utensil Rack <small>(11 41 31)</small>		
11 41 31 00-0009	EA		70" Bench Type Pot And Utensil Rack.....	652.56	21.93
11 41 31 00-0010	EA		94" Bench Type Pot And Utensil Rack.....	756.31	24.78
11 41 31 00-0011	EA		94" Ceiling Type Pot And Utensil Rack.....	899.15	29.69
11 41 31 00-0012	EA		96" Wall Type Pot And Utensil Rack.....	488.98	16.22
11 41 31 00-0013			Tray And Silverware Cart <small>(11 41 31)</small>		
11 41 31 00-0014	EA		33" x 22-1/2" x 42" Tray And Silverware Cart	2,257.12	74.01
11 41 31 00-0015			Flat Top Utility Units <small>(11 41 31)</small>		
11 41 31 00-0016	EA		79-1/2" x 28-1/2" x 35-3/8" Flat Top Utility Units.....	2,062.25	67.61
11 41 31 00-0017	EA		39" x 28-1/2" x 35-3/8" Flat Top Utility Units	1,538.91	50.59
11 41 33			Foodservice Shelving <small>(11 41)</small>		
11 41 33 00-0001			Shelving/Racks <small>(11 41 33)</small>		
11 41 33 00-0002			Chrome Shelving Units <small>(11 41 33 00-0001)</small>		
11 41 33 00-0003			54" Height, 4 Tier Open Wire Shelves, Chrome Shelving Unit <small>(11 41 33 00-0002)</small>		
11 41 33 00-0004	EA		14" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	363.64	39.16
11 41 33 00-0005	EA		14" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	383.86	39.49
11 41 33 00-0006	EA		14" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	408.95	39.81
11 41 33 00-0007	EA		14" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	424.43	40.14
11 41 33 00-0008	EA		14" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	454.24	40.47
11 41 33 00-0009	EA		14" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	479.42	40.79
11 41 33 00-0010	EA		14" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	499.63	41.11
11 41 33 00-0011	EA		14" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	544.94	41.76
11 41 33 00-0012	EA		18" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	398.29	39.49
11 41 33 00-0013	EA		18" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	413.77	39.81
11 41 33 00-0014	EA		18" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	429.27	40.14
11 41 33 00-0015	EA		18" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	473.61	40.47
11 41 33 00-0016	EA		18" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	503.51	40.79
11 41 33 00-0017	EA		18" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	542.99	41.11
11 41 33 00-0018	EA		18" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	558.38	41.43
11 41 33 00-0019	EA		18" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	613.47	42.08
11 41 33 00-0020	EA		21" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	418.61	39.81
11 41 33 00-0021	EA		21" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	453.27	40.14
11 41 33 00-0022	EA		21" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	478.45	40.47
11 41 33 00-0023	EA		21" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	508.26	40.79
11 41 33 00-0024	EA		21" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	528.56	41.11
11 41 33 00-0025	EA		21" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	577.75	41.43
11 41 33 00-0026	EA		21" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	602.81	41.76
11 41 33 00-0027	EA		21" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	667.47	42.40
11 41 33 00-0028	EA		24" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	463.05	40.14
11 41 33 00-0029	EA		24" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	483.29	40.47
11 41 33 00-0030	EA		24" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	498.67	40.79
11 41 33 00-0031	EA		24" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit	538.25	41.11

11 Equipment
11 40 Foodservice Equipment
11 41 Foodservice Storage Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 41 33 00-0032	EA		24" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	563.32	41.43
11 41 33 00-0033	EA		24" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	612.50	41.76
11 41 33 00-0034	EA		24" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	647.14	42.08
11 41 33 00-0035	EA		24" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	731.15	42.72
11 41 33 00-0036	EA		30" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	618.30	40.47
11 41 33 00-0037	EA		30" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	696.29	40.79
11 41 33 00-0038	EA		30" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	745.55	41.11
11 41 33 00-0039	EA		30" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	857.45	41.43
11 41 33 00-0040	EA		36" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	684.79	41.76
11 41 33 00-0041	EA		36" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	758.16	42.08
11 41 33 00-0042	EA		36" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	850.61	42.40
11 41 33 00-0043	EA		36" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Chrome Shelving Unit.....	1,000.30	43.05
11 41 33 00-0044			63" Height, 4 Tier Open Wire Shelves, Chrome Shelving Unit (11 41 33 00-0002)		
11 41 33 00-0045	EA		14" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	368.39	39.16
11 41 33 00-0046	EA		14" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	388.61	39.49
11 41 33 00-0047	EA		14" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	413.67	39.81
11 41 33 00-0048	EA		14" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	429.18	40.14
11 41 33 00-0049	EA		14" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	458.98	40.47
11 41 33 00-0050	EA		14" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	484.14	40.79
11 41 33 00-0051	EA		14" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	504.37	41.11
11 41 33 00-0052	EA		14" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	549.66	41.76
11 41 33 00-0053	EA		18" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	403.01	39.49
11 41 33 00-0054	EA		18" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	418.51	39.81
11 41 33 00-0055	EA		18" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	434.02	40.14
11 41 33 00-0056	EA		18" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	478.33	40.47
11 41 33 00-0057	EA		18" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	508.26	40.79
11 41 33 00-0058	EA		18" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	547.71	41.11
11 41 33 00-0059	EA		18" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	563.12	41.43
11 41 33 00-0060	EA		18" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	571.35	42.08
11 41 33 00-0061	EA		21" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	423.35	39.81
11 41 33 00-0062	EA		21" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	458.01	40.14
11 41 33 00-0063	EA		21" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	483.17	40.47
11 41 33 00-0064	EA		21" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	512.98	40.79
11 41 33 00-0065	EA		21" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	533.31	41.11
11 41 33 00-0066	EA		21" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	582.47	41.43
11 41 33 00-0067	EA		21" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	607.55	41.76
11 41 33 00-0068	EA		21" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	672.22	42.40
11 41 33 00-0069	EA		24" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	467.79	40.14
11 41 33 00-0070	EA		24" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	488.01	40.47
11 41 33 00-0071	EA		24" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	503.41	40.79
11 41 33 00-0072	EA		24" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	542.99	41.11
11 41 33 00-0073	EA		24" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	568.06	41.43
11 41 33 00-0074	EA		24" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	617.22	41.76
11 41 33 00-0075	EA		24" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	651.86	42.08
11 41 33 00-0076	EA		24" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	735.90	42.72
11 41 33 00-0077	EA		30" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	623.02	40.47
11 41 33 00-0078	EA		30" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	701.03	40.79
11 41 33 00-0079	EA		30" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	750.27	41.11
11 41 33 00-0080	EA		30" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	862.17	41.43
11 41 33 00-0081	EA		36" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	689.51	41.76
11 41 33 00-0082	EA		36" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	762.88	42.08
11 41 33 00-0083	EA		36" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	855.41	42.40
11 41 33 00-0084	EA		36" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Chrome Shelving Unit.....	1,005.02	43.05
11 41 33 00-0085			66" Height, 4 Tier Open Wire Shelves, Chrome Shelving Unit (11 41 33 00-0002)		
11 41 33 00-0086	EA		14" x 24" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	370.86	39.16
11 41 33 00-0087	EA		14" x 30" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	391.08	39.49
11 41 33 00-0088	EA		14" x 36" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	416.14	39.81
11 41 33 00-0089	EA		14" x 42" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	431.65	40.14
11 41 33 00-0090	EA		14" x 48" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	461.45	40.47
11 41 33 00-0091	EA		14" x 54" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	486.61	40.79
11 41 33 00-0092	EA		14" x 60" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	506.84	41.11
11 41 33 00-0093	EA		14" x 72" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	552.13	41.76
11 41 33 00-0094	EA		18" x 24" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	405.51	39.49
11 41 33 00-0095	EA		18" x 30" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	420.98	39.81
11 41 33 00-0096	EA		18" x 36" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	436.49	40.14
11 41 33 00-0097	EA		18" x 42" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	480.82	40.47
11 41 33 00-0098	EA		18" x 48" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	510.73	40.79
11 41 33 00-0099	EA		18" x 54" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	550.18	41.11
11 41 33 00-0100	EA		18" x 60" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	565.59	41.43
11 41 33 00-0101	EA		18" x 72" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	620.68	42.08
11 41 33 00-0102	EA		21" x 24" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	425.82	39.81
11 41 33 00-0103	EA		21" x 30" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	460.48	40.14
11 41 33 00-0104	EA		21" x 36" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	485.64	40.47
11 41 33 00-0105	EA		21" x 42" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	515.45	40.79
11 41 33 00-0106	EA		21" x 48" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	535.78	41.11
11 41 33 00-0107	EA		21" x 54" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	584.94	41.43
11 41 33 00-0108	EA		21" x 60" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	610.03	41.76



Equipment	11	
Foodservice Equipment	11 40	↩
Foodservice Storage Equipment	11 41	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
11 41 33 00-0109	EA 21" x 72" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	674.69	42.40
11 41 33 00-0110	EA 24" x 24" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	470.26	40.14
11 41 33 00-0111	EA 24" x 30" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	490.48	40.47
11 41 33 00-0112	EA 24" x 36" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	505.88	40.79
11 41 33 00-0113	EA 24" x 42" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	545.46	41.11
11 41 33 00-0114	EA 24" x 48" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	570.53	41.43
11 41 33 00-0115	EA 24" x 54" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	619.71	41.76
11 41 33 00-0116	EA 24" x 60" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	654.33	42.08
11 41 33 00-0117	EA 24" x 72" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	738.37	42.72
11 41 33 00-0118	EA 30" x 36" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	625.49	40.47
11 41 33 00-0119	EA 30" x 48" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	703.50	40.79
11 41 33 00-0120	EA 30" x 60" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	752.77	41.11
11 41 33 00-0121	EA 30" x 72" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	864.64	41.43
11 41 33 00-0122	EA 36" x 36" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	691.98	41.76
11 41 33 00-0123	EA 36" x 48" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	765.35	42.08
11 41 33 00-0124	EA 36" x 60" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	857.85	42.40
11 41 33 00-0125	EA 36" x 72" Wide Open Wire Shelf, 66" Height, 4 Shelves, Chrome Shelving Unit.....	1,007.49	43.05
11 41 33 00-0126	74" Height, 4 Tier Open Wire Shelves, Chrome Shelving Unit <small>(11 41 33 00-0002)</small>		
11 41 33 00-0127	EA 14" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	378.05	39.16
11 41 33 00-0128	EA 14" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	398.29	39.49
11 41 33 00-0129	EA 14" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	423.35	39.81
11 41 33 00-0130	EA 14" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	438.86	40.14
11 41 33 00-0131	EA 14" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	468.67	40.47
11 41 33 00-0132	EA 14" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	493.83	40.79
11 41 33 00-0133	EA 14" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	514.06	41.11
11 41 33 00-0134	EA 14" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	559.35	41.76
11 41 33 00-0135	EA 18" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	412.70	39.49
11 41 33 00-0136	EA 18" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	428.20	39.81
11 41 33 00-0137	EA 18" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	443.70	40.14
11 41 33 00-0138	EA 18" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	488.01	40.47
11 41 33 00-0139	EA 18" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	517.92	40.79
11 41 33 00-0140	EA 18" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	557.40	41.11
11 41 33 00-0141	EA 18" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	572.81	41.43
11 41 33 00-0142	EA 18" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	627.87	42.08
11 41 33 00-0143	EA 21" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	433.04	39.81
11 41 33 00-0144	EA 21" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	467.70	40.14
11 41 33 00-0145	EA 21" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	492.86	40.47
11 41 33 00-0146	EA 21" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	522.66	40.79
11 41 33 00-0147	EA 21" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	542.99	41.11
11 41 33 00-0148	EA 21" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	592.15	41.43
11 41 33 00-0149	EA 21" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	617.22	41.76
11 41 33 00-0150	EA 21" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	681.90	42.40
11 41 33 00-0151	EA 24" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	477.48	40.14
11 41 33 00-0152	EA 24" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	497.70	40.47
11 41 33 00-0153	EA 24" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	513.10	40.79
11 41 33 00-0154	EA 24" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	552.65	41.11
11 41 33 00-0155	EA 24" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	577.75	41.43
11 41 33 00-0156	EA 24" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	626.90	41.76
11 41 33 00-0157	EA 24" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	661.55	42.08
11 41 33 00-0158	EA 24" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	745.58	42.72
11 41 33 00-0159	EA 30" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	632.71	40.47
11 41 33 00-0160	EA 30" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	710.72	40.79
11 41 33 00-0161	EA 30" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	759.96	41.11
11 41 33 00-0162	EA 30" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	871.86	41.43
11 41 33 00-0163	EA 36" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	699.20	41.76
11 41 33 00-0164	EA 36" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	772.56	42.08
11 41 33 00-0165	EA 36" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	865.09	42.40
11 41 33 00-0166	EA 36" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Chrome Shelving Unit.....	1,014.71	43.05
11 41 33 00-0167	86" Height, 4 Tier Open Wire Shelves, Chrome Shelving Unit <small>(11 41 33 00-0002)</small>		
11 41 33 00-0168	EA 14" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	397.32	39.16
11 41 33 00-0169	EA 14" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	417.54	39.49
11 41 33 00-0170	EA 14" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	442.60	39.81
11 41 33 00-0171	EA 14" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	458.11	40.14
11 41 33 00-0172	EA 14" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	487.92	40.47
11 41 33 00-0173	EA 14" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	513.10	40.79
11 41 33 00-0174	EA 14" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	533.31	41.11
11 41 33 00-0175	EA 14" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	578.62	41.76
11 41 33 00-0176	EA 18" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	431.97	39.49
11 41 33 00-0177	EA 18" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	447.44	39.81
11 41 33 00-0178	EA 18" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	462.95	40.14
11 41 33 00-0179	EA 18" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	507.29	40.47
11 41 33 00-0180	EA 18" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	537.19	40.79
11 41 33 00-0181	EA 18" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	576.67	41.11
11 41 33 00-0182	EA 18" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	592.06	41.43
11 41 33 00-0183	EA 18" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	647.14	42.08
11 41 33 00-0184	EA 21" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	452.29	39.81
11 41 33 00-0185	EA 21" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit.....	486.95	40.14

11 Equipment
11 40 Foodservice Equipment
11 41 Foodservice Storage Equipment



MINOR TOTAL DIRECT DEMOLITION
 CSI UOM DESCRIPTION UNIT COST UNIT COST

11 41 33 00-0186	EA	21" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	512.13	40.47
11 41 33 00-0187	EA	21" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	541.91	40.79
11 41 33 00-0188	EA	21" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	562.24	41.11
11 41 33 00-0189	EA	21" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	611.43	41.43
11 41 33 00-0190	EA	21" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	636.49	41.76
11 41 33 00-0191	EA	21" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	701.15	42.40
11 41 33 00-0192	EA	24" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	496.73	40.14
11 41 33 00-0193	EA	24" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	516.95	40.47
11 41 33 00-0194	EA	24" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	532.35	40.79
11 41 33 00-0195	EA	24" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	571.93	41.11
11 41 33 00-0196	EA	24" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	597.00	41.43
11 41 33 00-0197	EA	24" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	646.17	41.76
11 41 33 00-0198	EA	24" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	680.80	42.08
11 41 33 00-0199	EA	24" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	764.83	42.72
11 41 33 00-0200	EA	30" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	651.96	40.47
11 41 33 00-0201	EA	30" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	729.97	40.79
11 41 33 00-0202	EA	30" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	779.23	41.11
11 41 33 00-0203	EA	30" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	891.10	41.43
11 41 33 00-0204	EA	36" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	718.45	41.76
11 41 33 00-0205	EA	36" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	791.81	42.08
11 41 33 00-0206	EA	36" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	884.36	42.40
11 41 33 00-0207	EA	36" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Chrome Shelving Unit	1,033.96	43.05

11 41 33 00-0208 96" Height, 4 Tier Open Wire Shelves, Chrome Shelving Unit (11 41 33 00-0002)

11 41 33 00-0209	EA	14" x 24" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	468.45	39.16
11 41 33 00-0210	EA	14" x 30" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	493.48	39.49
11 41 33 00-0211	EA	14" x 36" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	524.58	39.81
11 41 33 00-0212	EA	14" x 42" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	543.71	40.14
11 41 33 00-0213	EA	14" x 48" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	580.73	40.47
11 41 33 00-0214	EA	14" x 54" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	611.96	40.79
11 41 33 00-0215	EA	14" x 60" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	636.98	41.11
11 41 33 00-0216	EA	14" x 72" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	693.13	41.76
11 41 33 00-0217	EA	18" x 24" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	511.51	39.49
11 41 33 00-0218	EA	18" x 30" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	530.63	39.81
11 41 33 00-0219	EA	18" x 36" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	549.75	40.14
11 41 33 00-0220	EA	18" x 42" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	604.92	40.47
11 41 33 00-0221	EA	18" x 48" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	642.07	40.79
11 41 33 00-0222	EA	18" x 54" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	691.18	41.11
11 41 33 00-0223	EA	18" x 60" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	710.16	41.43
11 41 33 00-0224	EA	18" x 72" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	778.53	42.08
11 41 33 00-0225	EA	21" x 24" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	536.69	39.81
11 41 33 00-0226	EA	21" x 30" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	579.76	40.14
11 41 33 00-0227	EA	21" x 36" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	610.99	40.47
11 41 33 00-0228	EA	21" x 42" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	647.98	40.79
11 41 33 00-0229	EA	21" x 48" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	673.16	41.11
11 41 33 00-0230	EA	21" x 54" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	734.38	41.43
11 41 33 00-0231	EA	21" x 60" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	765.48	41.76
11 41 33 00-0232	EA	21" x 72" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	845.82	42.40
11 41 33 00-0233	EA	24" x 24" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	591.99	40.14
11 41 33 00-0234	EA	24" x 30" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	617.03	40.47
11 41 33 00-0235	EA	24" x 36" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	636.02	40.79
11 41 33 00-0236	EA	24" x 42" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	685.26	41.11
11 41 33 00-0237	EA	24" x 48" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	716.35	41.43
11 41 33 00-0238	EA	24" x 54" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	777.56	41.76
11 41 33 00-0239	EA	24" x 60" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	820.62	42.08
11 41 33 00-0240	EA	24" x 72" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	925.18	42.72
11 41 33 00-0241	EA	30" x 36" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	785.79	40.47
11 41 33 00-0242	EA	30" x 48" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	883.05	40.79
11 41 33 00-0243	EA	30" x 60" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	944.37	41.11
11 41 33 00-0244	EA	30" x 72" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	1,084.01	41.43
11 41 33 00-0245	EA	36" x 36" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	867.93	41.76
11 41 33 00-0246	EA	36" x 48" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	959.40	42.08
11 41 33 00-0247	EA	36" x 60" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	1,074.82	42.40
11 41 33 00-0248	EA	36" x 72" Wide Open Wire Shelf, 96" Height, 4 Shelves, Chrome Shelving Unit	1,261.34	43.05

11 41 33 00-0249 Galvanized Shelving Units (11 41 33 00-0001)

11 41 33 00-0250 54" Height, 4 Tier Open Wire Shelves, Galvanized Shelving Unit (11 41 33 00-0249)

11 41 33 00-0251	EA	14" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	412.77	39.16
11 41 33 00-0252	EA	14" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	434.41	39.49
11 41 33 00-0253	EA	14" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	461.32	39.81
11 41 33 00-0254	EA	14" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	482.97	40.14
11 41 33 00-0255	EA	14" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	515.06	40.47
11 41 33 00-0256	EA	14" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	541.86	40.79
11 41 33 00-0257	EA	14" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	568.76	41.11
11 41 33 00-0258	EA	14" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	612.04	41.76
11 41 33 00-0259	EA	18" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	449.92	39.49
11 41 33 00-0260	EA	18" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	466.50	39.81
11 41 33 00-0261	EA	18" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	498.48	40.14



Equipment	11	
Foodservice Equipment	11 40	↩
Foodservice Storage Equipment	11 41	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
11 41 33 00-0262	EA	18" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		535.73	40.47
11 41 33 00-0263	EA	18" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		567.80	40.79
11 41 33 00-0264	EA	18" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		610.09	41.11
11 41 33 00-0265	EA	18" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		642.20	41.43
11 41 33 00-0266	EA	18" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		690.82	42.08
11 41 33 00-0267	EA	21" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		471.66	39.81
11 41 33 00-0268	EA	21" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		514.09	40.14
11 41 33 00-0269	EA	21" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		540.89	40.47
11 41 33 00-0270	EA	21" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		572.98	40.79
11 41 33 00-0271	EA	21" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		594.61	41.11
11 41 33 00-0272	EA	21" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		652.53	41.43
11 41 33 00-0273	EA	21" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		679.44	41.76
11 41 33 00-0274	EA	21" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		759.01	42.40
11 41 33 00-0275	EA	24" x 24" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		524.43	40.14
11 41 33 00-0276	EA	24" x 30" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		546.06	40.47
11 41 33 00-0277	EA	24" x 36" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		562.65	40.79
11 41 33 00-0278	EA	24" x 42" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		604.94	41.11
11 41 33 00-0279	EA	24" x 48" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		652.53	41.43
11 41 33 00-0280	EA	24" x 54" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		705.27	41.76
11 41 33 00-0281	EA	24" x 60" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		747.69	42.08
11 41 33 00-0282	EA	24" x 72" Wide Open Wire Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit.....		842.86	42.72
11 41 33 00-0283		63" Height, 4 Tier Open Wire Shelves, Galvanized Shelving Unit^(11 41 33 00-0249)			
11 41 33 00-0284	EA	14" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		423.11	39.16
11 41 33 00-0285	EA	14" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		444.74	39.49
11 41 33 00-0286	EA	14" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		471.66	39.81
11 41 33 00-0287	EA	14" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		493.30	40.14
11 41 33 00-0288	EA	14" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		525.40	40.47
11 41 33 00-0289	EA	14" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		552.19	40.79
11 41 33 00-0290	EA	14" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		579.09	41.11
11 41 33 00-0291	EA	14" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		622.38	41.76
11 41 33 00-0292	EA	18" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		460.26	39.49
11 41 33 00-0293	EA	18" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		476.84	39.81
11 41 33 00-0294	EA	18" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		508.82	40.14
11 41 33 00-0295	EA	18" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		546.06	40.47
11 41 33 00-0296	EA	18" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		578.13	40.79
11 41 33 00-0297	EA	18" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		620.43	41.11
11 41 33 00-0298	EA	18" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		652.53	41.43
11 41 33 00-0299	EA	18" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		701.08	42.08
11 41 33 00-0300	EA	21" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		481.99	39.81
11 41 33 00-0301	EA	21" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		524.43	40.14
11 41 33 00-0302	EA	21" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		551.22	40.47
11 41 33 00-0303	EA	21" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		583.31	40.79
11 41 33 00-0304	EA	21" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		604.94	41.11
11 41 33 00-0305	EA	21" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		662.86	41.43
11 41 33 00-0306	EA	21" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		689.78	41.76
11 41 33 00-0307	EA	21" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		769.34	42.40
11 41 33 00-0308	EA	24" x 24" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		534.76	40.14
11 41 33 00-0309	EA	24" x 30" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		556.40	40.47
11 41 33 00-0310	EA	24" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		572.98	40.79
11 41 33 00-0311	EA	24" x 42" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		615.27	41.11
11 41 33 00-0312	EA	24" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		662.86	41.43
11 41 33 00-0313	EA	24" x 54" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		715.60	41.76
11 41 33 00-0314	EA	24" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		758.03	42.08
11 41 33 00-0315	EA	24" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit.....		853.20	42.72
11 41 33 00-0316		74" Height, 4 Tier Open Wire Shelves, Galvanized Shelving Unit^(11 41 33 00-0249)			
11 41 33 00-0317	EA	14" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		433.44	39.16
11 41 33 00-0318	EA	14" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		455.08	39.49
11 41 33 00-0319	EA	14" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		481.99	39.81
11 41 33 00-0320	EA	14" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		503.64	40.14
11 41 33 00-0321	EA	14" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		535.73	40.47
11 41 33 00-0322	EA	14" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		562.52	40.79
11 41 33 00-0323	EA	14" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		589.43	41.11
11 41 33 00-0324	EA	14" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		632.71	41.76
11 41 33 00-0325	EA	18" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		470.59	39.49
11 41 33 00-0326	EA	18" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		487.17	39.81
11 41 33 00-0327	EA	18" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		519.15	40.14
11 41 33 00-0328	EA	18" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		556.40	40.47
11 41 33 00-0329	EA	18" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		588.47	40.79
11 41 33 00-0330	EA	18" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		630.76	41.11
11 41 33 00-0331	EA	18" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		662.86	41.43
11 41 33 00-0332	EA	18" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		711.41	42.08
11 41 33 00-0333	EA	21" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		492.32	39.81
11 41 33 00-0334	EA	21" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		534.76	40.14
11 41 33 00-0335	EA	21" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		561.55	40.47
11 41 33 00-0336	EA	21" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		593.65	40.79
11 41 33 00-0337	EA	21" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		615.27	41.11
11 41 33 00-0338	EA	21" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit.....		673.20	41.43

11	Equipment
11 40	Foodservice Equipment
11 41	Foodservice Storage Equipment

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

11 41 33 00-0339	EA	21" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	700.11	41.76
11 41 33 00-0340	EA	21" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	779.67	42.40
11 41 33 00-0341	EA	24" x 24" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	545.09	40.14
11 41 33 00-0342	EA	24" x 30" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	566.73	40.47
11 41 33 00-0343	EA	24" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	583.31	40.79
11 41 33 00-0344	EA	24" x 42" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	625.61	41.11
11 41 33 00-0345	EA	24" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	673.20	41.43
11 41 33 00-0346	EA	24" x 54" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	725.93	41.76
11 41 33 00-0347	EA	24" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	768.36	42.08
11 41 33 00-0348	EA	24" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	863.53	42.72

11 41 33 00-0349 86" Height, 4 Tier Open Wire Shelves, Galvanized Shelving Unit (11 41 33 00-0249)

11 41 33 00-0350	EA	14" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	459.38	39.16
11 41 33 00-0351	EA	14" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	481.02	39.49
11 41 33 00-0352	EA	14" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	507.94	39.81
11 41 33 00-0353	EA	14" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	529.58	40.14
11 41 33 00-0354	EA	14" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	561.68	40.47
11 41 33 00-0355	EA	14" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	588.47	40.79
11 41 33 00-0356	EA	14" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	615.37	41.11
11 41 33 00-0357	EA	14" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	658.65	41.76
11 41 33 00-0358	EA	18" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	496.53	39.49
11 41 33 00-0359	EA	18" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	513.11	39.81
11 41 33 00-0360	EA	18" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	545.09	40.14
11 41 33 00-0361	EA	18" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	582.34	40.47
11 41 33 00-0362	EA	18" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	614.41	40.79
11 41 33 00-0363	EA	18" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	656.70	41.11
11 41 33 00-0364	EA	18" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	688.81	41.43
11 41 33 00-0365	EA	18" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	737.36	42.08
11 41 33 00-0366	EA	21" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	518.27	39.81
11 41 33 00-0367	EA	21" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	560.71	40.14
11 41 33 00-0368	EA	21" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	587.50	40.47
11 41 33 00-0369	EA	21" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	619.59	40.79
11 41 33 00-0370	EA	21" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	641.22	41.11
11 41 33 00-0371	EA	21" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	699.14	41.43
11 41 33 00-0372	EA	21" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	726.06	41.76
11 41 33 00-0373	EA	21" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	805.62	42.40
11 41 33 00-0374	EA	24" x 24" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	571.04	40.14
11 41 33 00-0375	EA	24" x 30" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	592.68	40.47
11 41 33 00-0376	EA	24" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	609.26	40.79
11 41 33 00-0377	EA	24" x 42" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	651.55	41.11
11 41 33 00-0378	EA	24" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	699.14	41.43
11 41 33 00-0379	EA	24" x 54" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	751.88	41.76
11 41 33 00-0380	EA	24" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	794.30	42.08
11 41 33 00-0381	EA	24" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	889.47	42.72

11 41 33 00-0382 54" Height, 4 Tier Solid Shelves, Galvanized Shelving Unit (11 41 33 00-0249)

11 41 33 00-0383	EA	18" x 36" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	793.64	40.14
11 41 33 00-0384	EA	18" x 48" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	873.29	40.79
11 41 33 00-0385	EA	18" x 60" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	978.78	41.43
11 41 33 00-0386	EA	18" x 72" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	1,042.85	42.08
11 41 33 00-0387	EA	24" x 36" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	868.03	40.79
11 41 33 00-0388	EA	24" x 48" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	1,004.63	41.43
11 41 33 00-0389	EA	24" x 60" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	1,110.12	42.08
11 41 33 00-0390	EA	24" x 72" Wide Solid Shelf, 54" Height, 4 Shelves, Galvanized Shelving Unit	1,267.39	42.72

11 41 33 00-0391 63" Height, 4 Tier Solid Shelves, Galvanized Shelving Unit (11 41 33 00-0249)

11 41 33 00-0392	EA	18" x 36" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	803.97	40.14
11 41 33 00-0393	EA	18" x 48" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	883.64	40.79
11 41 33 00-0394	EA	18" x 60" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	989.12	41.43
11 41 33 00-0395	EA	18" x 72" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	1,053.18	42.08
11 41 33 00-0396	EA	24" x 36" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	878.37	40.79
11 41 33 00-0397	EA	24" x 48" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	1,014.96	41.43
11 41 33 00-0398	EA	24" x 60" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	1,120.46	42.08
11 41 33 00-0399	EA	24" x 72" Wide Solid Shelf, 63" Height, 4 Shelves, Galvanized Shelving Unit	1,277.73	42.72

11 41 33 00-0400 74" Height, 4 Tier Solid Shelves, Galvanized Shelving Unit (11 41 33 00-0249)

11 41 33 00-0401	EA	18" x 36" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	814.30	40.14
11 41 33 00-0402	EA	18" x 48" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	893.98	40.79
11 41 33 00-0403	EA	18" x 60" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	999.47	41.43
11 41 33 00-0404	EA	18" x 72" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	1,063.51	42.08
11 41 33 00-0405	EA	24" x 36" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	888.70	40.79
11 41 33 00-0406	EA	24" x 48" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	1,025.30	41.43
11 41 33 00-0407	EA	24" x 60" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	1,130.79	42.08
11 41 33 00-0408	EA	24" x 72" Wide Solid Shelf, 74" Height, 4 Shelves, Galvanized Shelving Unit	1,288.09	42.72

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 41 33 00-0409 86" Height, 4 Tier Solid Shelves, Galvanized Shelving Unit <small>(11 41 33 00-0249)</small>		
11 41 33 00-0410 EA 18" x 36" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	840.25	40.14
11 41 33 00-0411 EA 18" x 48" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	919.90	40.79
11 41 33 00-0412 EA 18" x 60" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	1,025.39	41.43
11 41 33 00-0413 EA 18" x 72" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	1,089.46	42.08
11 41 33 00-0414 EA 24" x 36" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	914.65	40.79
11 41 33 00-0415 EA 24" x 48" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	1,051.24	41.43
11 41 33 00-0416 EA 24" x 60" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	1,156.73	42.08
11 41 33 00-0417 EA 24" x 72" Wide Solid Shelf, 86" Height, 4 Shelves, Galvanized Shelving Unit	1,314.01	42.72
11 41 33 00-0418 Stainless Steel Shelving Unit <small>(11 41 33 00-0001)</small>		
11 41 33 00-0419 63" Height, 4 Tier Open Wire Shelves, Stainless Steel Shelving Unit <small>(11 41 33 00-0418)</small>		
11 41 33 00-0420 EA 18" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,017.68	40.14
11 41 33 00-0421 EA 18" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,188.99	40.79
11 41 33 00-0422 EA 18" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,405.57	41.43
11 41 33 00-0423 EA 18" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,632.42	42.08
11 41 33 00-0424 EA 24" x 36" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,203.37	40.79
11 41 33 00-0425 EA 24" x 48" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,399.92	41.43
11 41 33 00-0426 EA 24" x 60" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,657.67	42.08
11 41 33 00-0427 EA 24" x 72" Wide Open Wire Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,998.26	42.72
11 41 33 00-0428 74" Height, 4 Tier Open Wire Shelves, Stainless Steel Shelving Unit <small>(11 41 33 00-0418)</small>		
11 41 33 00-0429 EA 18" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,053.72	40.14
11 41 33 00-0430 EA 18" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,225.03	40.79
11 41 33 00-0431 EA 18" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,446.74	41.43
11 41 33 00-0432 EA 18" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,668.44	42.08
11 41 33 00-0433 EA 24" x 36" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,239.41	40.79
11 41 33 00-0434 EA 24" x 48" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,435.94	41.43
11 41 33 00-0435 EA 24" x 60" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,693.69	42.08
11 41 33 00-0436 EA 24" x 72" Wide Open Wire Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	2,034.30	42.72
11 41 33 00-0437 86" Height, 4 Tier Open Wire Shelves, Stainless Steel Shelving Unit <small>(11 41 33 00-0418)</small>		
11 41 33 00-0438 EA 18" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,089.74	40.14
11 41 33 00-0439 EA 18" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,261.05	40.79
11 41 33 00-0440 EA 18" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,482.76	41.43
11 41 33 00-0441 EA 18" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,704.48	42.08
11 41 33 00-0442 EA 24" x 36" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,275.43	40.79
11 41 33 00-0443 EA 24" x 48" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,471.98	41.43
11 41 33 00-0444 EA 24" x 60" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,729.73	42.08
11 41 33 00-0445 EA 24" x 72" Wide Open Wire Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	2,070.32	42.72
11 41 33 00-0446 63" Height, 4 Tier Solid Shelves, Stainless Steel Shelving Unit <small>(11 41 33 00-0418)</small>		
11 41 33 00-0447 EA 18" x 36" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,689.46	40.14
11 41 33 00-0448 EA 18" x 48" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	1,869.84	40.79
11 41 33 00-0449 EA 18" x 60" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	2,109.45	41.43
11 41 33 00-0450 EA 18" x 72" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	2,253.99	42.08
11 41 33 00-0451 EA 24" x 36" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	2,027.88	40.79
11 41 33 00-0452 EA 24" x 48" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	2,392.28	41.43
11 41 33 00-0453 EA 24" x 60" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	2,657.93	42.08
11 41 33 00-0454 EA 24" x 72" Wide Solid Shelf, 63" Height, 4 Shelves, Stainless Steel Shelving Unit	3,055.42	42.72
11 41 33 00-0455 74" Height, 4 Tier Solid Shelves, Stainless Steel Shelving Unit <small>(11 41 33 00-0418)</small>		
11 41 33 00-0456 EA 18" x 36" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,741.22	40.14
11 41 33 00-0457 EA 18" x 48" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	1,924.75	40.79
11 41 33 00-0458 EA 18" x 60" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	2,168.60	41.43
11 41 33 00-0459 EA 18" x 72" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	2,315.60	42.08
11 41 33 00-0460 EA 24" x 36" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	2,079.67	40.79
11 41 33 00-0461 EA 24" x 48" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	2,444.05	41.43
11 41 33 00-0462 EA 24" x 60" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	2,712.62	42.08
11 41 33 00-0463 EA 24" x 72" Wide Solid Shelf, 74" Height, 4 Shelves, Stainless Steel Shelving Unit	3,114.58	42.72
11 41 33 00-0464 86" Height, 4 Tier Solid Shelves, Stainless Steel Shelving Unit <small>(11 41 33 00-0418)</small>		
11 41 33 00-0465 EA 18" x 36" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,793.01	40.14
11 41 33 00-0466 EA 18" x 48" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	1,975.53	40.79
11 41 33 00-0467 EA 18" x 60" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	2,218.11	41.43
11 41 33 00-0468 EA 18" x 72" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	2,364.42	42.08
11 41 33 00-0469 EA 24" x 36" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	2,131.44	40.79
11 41 33 00-0470 EA 24" x 48" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	2,495.84	41.43
11 41 33 00-0471 EA 24" x 60" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	2,762.74	42.08
11 41 33 00-0472 EA 24" x 72" Wide Solid Shelf, 86" Height, 4 Shelves, Stainless Steel Shelving Unit	3,162.10	42.72

11	11 Equipment
	11 40 Foodservice Equipment
	11 41 Foodservice Storage Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 41 33 00-0473			Galvanized Steel Dunnage Rack <small>(11 41 33 00-0001)</small>		
11 41 33 00-0474	EA		18" x 24" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	271.48	28.87
11 41 33 00-0475	EA		18" x 30" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	286.04	29.67
11 41 33 00-0476	EA		18" x 36" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	302.64	30.48
11 41 33 00-0477	EA		18" x 48" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	333.38	31.28
11 41 33 00-0478	EA		18" x 60" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	360.07	32.08
11 41 33 00-0479	EA		24" x 24" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	291.70	28.87
11 41 33 00-0480	EA		24" x 30" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	318.40	29.67
11 41 33 00-0481	EA		24" x 36" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	334.99	30.48
11 41 33 00-0482	EA		24" x 48" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	363.71	31.28
11 41 33 00-0483	EA		24" x 60" Open Wire Shelf, 14" Height, Galvanized Dunnage Rack	396.47	32.08
11 41 33 00-0484			Stainless Steel Dunnage Rack <small>(11 41 33 00-0001)</small>		
11 41 33 00-0485	EA		18" x 36" Open Wire Shelf, 14-1/2" Height, Stainless Steel Dunnage Rack	724.09	30.48
11 41 33 00-0486	EA		18" x 48" Open Wire Shelf, 14-1/2" Height, Stainless Steel Dunnage Rack	907.14	31.28
11 41 33 00-0487	EA		18" x 60" Open Wire Shelf, 16-1/4" Height, Stainless Steel Dunnage Rack	1,530.94	32.08
11 41 33 00-0488	EA		24" x 36" Open Wire Shelf, 14-1/2" Height, Stainless Steel Dunnage Rack	791.71	30.48
11 41 33 00-0489	EA		24" x 48" Open Wire Shelf, 14-1/2" Height, Stainless Steel Dunnage Rack	985.44	31.28
11 41 33 00-0490	EA		24" x 60" Open Wire Shelf, 16-1/4" Height, Stainless Steel Dunnage Rack	1,669.14	32.08
11 41 33 00-0491			Mobile Racks <small>(11 41 33 00-0001)</small>		
11 41 33 00-0492	EA		Mobile Rack With Pan Slide.....	1,932.14	48.60
11 41 33 00-0493			Can Racks <small>(11 41 33 00-0001)</small>		
11 41 33 00-0494	EA		27-1/4" Wide x 42" Deep x 81-1/16" High, Aluminum Frame Can Rack	4,055.47	48.60
Note: 156 #10 cans capacity					
11 42 Food Preparation Equipment <small>(11 40)</small>					
11 42 13 Food Preparation Appliances <small>(11 42)</small>					
11 42 13 00-0001			Vertical Cutter Mixers <small>(11 42 13)</small>		
11 42 13 00-0002	EA		Bench Type Mixers, 25 Quart	11,318.17	240.16
11 42 13 00-0003	EA		Bench Type Mixers, 40 Quart	13,081.06	266.85
11 42 13 00-0004	EA		Bench Type Mixers, 80 Quart	16,251.81	384.27
11 42 13 00-0005	EA		Bench Type Mixers, 130 Quart	18,164.31	480.34
11 42 13 00-0006			Choppers <small>(11 42 13)</small>		
11 42 13 00-0007	EA		Choppers, 5 LB.....	2,873.69	213.48
11 42 13 00-0008	EA		Choppers, 16 LB.....	4,213.54	277.53
11 42 13 00-0009	EA		Choppers, 35 LB - 40 LB	8,112.88	341.57
11 42 13 00-0010	EA		Choppers, 35 LB - 40 LB/Min, 2 HP.....	6,726.64	303.46
11 42 13 00-0011	EA		Choppers, 35 LB - 40 LB/Min, 3 HP.....	7,624.44	303.46
11 42 13 00-0012			Stand Model Mixer <small>(11 42 13)</small>		
11 42 13 00-0013	EA		10 Quart, 120 Volt, 3/4 HP, Gear-Driven Commercial Planetary Stand Mixer With Guard (Avantco MX10).....	1,324.38	86.40
11 42 13 00-0014	EA		20 Quart, 120 Volt, 1-1/2 HP, Gear-Driven Commercial Planetary Stand Mixer With Guard (Avantco MX20)	1,653.88	86.40
11 42 13 00-0015	EA		10 Quart, 120 Volt, 1/3 HP, Gear-Driven Commercial Planetary Stand Mixer With Guard (Globe SP10)	4,408.45	86.40
11 42 13 00-0016	EA		20 Quart, 240 Voltage, 1/2 HP, Gear-Driven Commercial Planetary Stand Mixer With Stainless Steel Bowl Guard (Hobart HL-200-1).....	9,361.79	101.40
11 42 13 00-0017			Floor Model Mixer <small>(11 42 13)</small>		
11 42 13 00-0018	EA		30 Quart, 120 Voltage, 1-3/4 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Avantco MX30).....	3,466.09	86.40
11 42 13 00-0019	EA		40 Quart, 240 Voltage, 2 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Avantco MX40).....	4,803.30	96.02
11 42 13 00-0020	EA		60 Quart, 240 Voltage, 2-1/2 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Avantco MX60).....	8,286.97	108.00
11 42 13 00-0021	EA		30 Quart, 240 Voltage, 3/4 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Hobart HL-300-1).....	17,801.12	101.40
11 42 13 00-0022	EA		40 Quart, 240 Voltage, 1-1/2 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Hobart HL-400-1).....	21,856.19	104.07
11 42 13 00-0023	EA		60 Quart, 220-240 Voltage, 2-3/4 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Hobart HL-600-1).....	27,837.93	106.74
11 42 13 00-0024	EA		80 Quart, 220-240 Voltage, 3 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Hobart HL800-1).....	41,111.91	133.42
11 42 13 00-0025	EA		140 Quart, 220-240 Voltage, 5 HP, Gear-Driven Commercial Planetary Floor Mixer With Stainless Steel Bowl Guard (Hobart HL-1400-1).....	52,661.98	170.79
11 42 13 00-0026			Slicers <small>(11 42 13)</small>		
11 42 13 00-0027	EA		1/3 HP, 12" Manual Gravity Feed Meat Slicer (Avantco SL312).....	656.36	27.00
11 42 13 00-0028	EA		1/2 HP, 12" Manual Gravity Feed Meat Slicer (Avantco SL512).....	956.35	27.00



Equipment	11
Foodservice Equipment	11 40
Food Preparation Equipment	11 42

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 42 13 00-0029	EA		1/2 HP, 13" Medium-Duty Manual Gravity Feed Meat Slicer (Avantco SL713MAN).....	1,378.00	27.00
11 42 13 00-0030	EA		1/2 HP, 12" Medium-Duty Automatic Meat Slicer With Manual Use Option (Avantco SL612A).....	2,341.77	27.00
11 42 13 00-0031	EA		3/4 HP, 13" Medium-Duty Automatic Meat Slicer With Manual Use Option (Avantco SL713A).....	2,582.72	27.00
11 42 13 00-0032	EA		1/2 HP, 13" Heavy-Duty Automatic Gravity Feed Meat Slicer (Hobart EDGE13A-11).....	6,829.87	27.00
11 42 13 00-0033			Peelers <small>(11 42 13)</small>		
11 42 13 00-0034	EA		22 Lb, 120 Voltage, Potato Peeler (Sammic PI-10).....	3,692.52	173.45
11 42 13 00-0035	EA		44 Lb, 120 Voltage, Potato Peeler (Sammic PI-20).....	4,264.91	202.27
11 42 13 00-0036	EA		66 Lb, 120 Voltage, Potato Peeler (Sammic PI-30).....	6,611.99	231.31
11 42 13 00-0037	EA		20 Lb, 115 Voltage, Potato Peeler (Hobart 6115).....	5,898.54	173.45
11 42 13 00-0038	EA		40 Lb, 115 Voltage, Potato Peeler (Hobart 6430-1).....	11,951.18	202.27
11 42 13 00-0039	EA		60 Lb, 115 Voltage, Potato Peeler (Hobart 6460-1).....	12,729.45	231.31
11 42 13 00-0040			Proof Boxes <small>(11 42 13)</small>		
11 42 13 00-0041	EA		30-1/2" x 22-1/2", Stainless Steel Proof Box.....	3,540.89	74.01
11 42 13 00-0042	EA		30-1/2" x 45", Stainless Steel Proof Box.....	5,924.88	124.03
11 42 13 00-0043	EA		30-1/2" x 45", Galvanized Proof Box.....	3,333.50	56.30
11 42 13 00-0044			Non-Insulated Heated Proof Cabinet <small>(11 42 13)</small>		
11 42 13 00-0045	EA		Angle Slide 69-3/4", Solid Door Non-Insulated Heated Proof Cabinet.....	2,153.00	70.92
11 42 13 00-0046	EA		Angle Slide 69-3/4", Clear Door Non-Insulated Heated Proof Cabinet.....	2,309.62	75.83
11 42 13 00-0047	EA		Channel Slide 69-3/4", Solid Door Non-Insulated Heated Proof Cabinet.....	2,138.40	70.35
11 42 13 00-0048	EA		Channel Slide 69-3/4", Clear Door Non-Insulated Heated Proof Cabinet.....	2,266.41	74.58
11 42 13 00-0049			Insulated Heated Proof Cabinet <small>(11 42 13)</small>		
11 42 13 00-0050	EA		3 Spacing, 69-3/4" High Solid Door Insulated Heated Proof Cabinet.....	3,506.19	124.08
11 42 13 00-0051	EA		3 Spacing 69-3/4" High Sliding Door Insulated Heated Proof Cabinet.....	3,664.02	129.71
11 42 13 00-0052			Pass-Thru Hot Food Holding Cabinet <small>(11 42 13)</small>		
11 42 13 00-0053	EA		Single Section, Full Door, Pass-Thru Hot Food Holding Cabinet.....	7,530.33	224.16
11 42 13 00-0054	EA		Single Section, Half Door, Pass-Thru Hot Food Holding Cabinet.....	8,012.26	224.16
11 42 13 00-0055	EA		Two Section, Full Door, Pass-Thru Hot Food Holding Cabinet.....	10,233.14	234.82
11 42 13 00-0056	EA		Two Section, Half Door, Pass-Thru Hot Food Holding Cabinet.....	11,217.58	234.82
11 42 16 Food Preparation Surfaces <small>(11 42)</small>					
11 42 16 00-0001			Tables <small>(11 42 16)</small>		
11 42 16 00-0002			Baker's Table <small>(11 42 16 00-0001)</small>		
11 42 16 00-0003	EA		4' Open Base Baker's Table.....	852.33	55.31
11 42 16 00-0004	EA		10' Open Base Baker's Table.....	1,672.85	108.45
11 42 16 00-0005	EA		10' Undershelf Baker's Table.....	2,064.03	133.83
11 42 16 00-0006	EA		10' Three Drawers Baker's Table.....	2,213.78	143.71
11 42 16 00-0007	EA		10' Bins Baker's Table.....	3,257.06	211.49
11 42 16 00-0008	EA		10' Bins And Drawers Baker's Table.....	5,114.49	331.98
11 42 16 00-0009			Preparation Table, Stainless Steel, With Undershelf <small>(11 42 16 00-0001)</small>		
11 42 16 00-0010	EA		30" x 72" Square Edge Stainless Steel Preparation Table With Undershelf.....	1,298.27	29.17
11 42 16 00-0011	EA		30" x 72" Marine Edge Stainless Steel Preparation Table With Undershelf.....	1,398.03	35.03
11 42 16 00-0012	EA		36" x 96" Marine Edge Stainless Steel Preparation Table With Undershelf.....	2,114.79	47.62
11 42 16 00-0013			Preparation Table, Stainless Steel, With Open Front <small>(11 42 16 00-0001)</small>		
11 42 16 00-0014	EA		30" X 72" Round Edge Stainless Steel Preparation Table With Open Front.....	1,367.01	30.69
11 42 16 00-0015	EA		36" X 96" Round Edge Stainless Steel Preparation Table With Open Front.....	1,756.99	39.48
11 42 16 00-0016	EA		36" X 96" Square Edge Stainless Steel Preparation Table With Open Front.....	1,509.24	33.95
11 42 16 00-0017	EA		36" X 96" Marine Edge Stainless Steel Preparation Table With Open Front.....	1,816.64	40.89
11 42 16 00-0018	EA		Roller Utility Drawers Stainless Steel Preparation Table With Open Front.....	366.99	8.24
11 42 16 00-0019			Mobile Tables <small>(11 42 16 00-0001)</small>		
11 42 16 00-0020	EA		21-1/4" x 27-1/2" x 41" Galvanized Mobile Table With Galvanized Top.....	3,196.26	26.13
11 42 16 00-0021	EA		32-1/4" x 27-1/2" x 41" Galvanized Mobile Table With Galvanized Top.....	1,724.32	31.35
11 42 16 00-0022	EA		32-1/4" x 27-1/2" x 41" Stainless Steel Mobile Table With Stainless Steel Top.....	1,564.34	35.24
11 42 16 00-0023			Hot Food Tables, Stainless Steel, Gas Or Electric <small>(11 42 16 00-0001)</small>		
11 42 16 00-0024	EA		32-1/4" x 27-1/2" x 41" Stainless Steel Hot Food Tables.....	2,793.88	62.91
11 42 16 00-0025	EA		32-1/4" x 27-1/2" x 21" Stainless Steel Hot Food Tables.....	2,266.20	50.97
11 42 16 00-0026	EA		Full Size Pan With Cover Stainless Steel Hot Food Tables.....	188.09	4.23
11 42 16 00-0027	EA		Set Of Three 1/3 Size With Cover Stainless Steel Hot Food Tables.....	275.22	6.18
11 42 16 00-0028	EA		58-1/2", 4 Openings Stainless Steel Hot Food Tables.....	5,527.25	115.91
11 42 16 00-0029	EA		114-1/2", 8 Openings Stainless Steel Hot Food Tables.....	10,996.00	231.26

11	11 Equipment
	11 40 Foodservice Equipment
	11 42 Food Preparation Equipment



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 42 16 00-0030	Basic Table <small>(11 42 16 00-0001)</small>		
11 42 16 00-0031	LF Table, Basic.....	292.72	27.02

11 42 16 00-0032	Table With Sink <small>(11 42 16)</small>		
11 42 16 00-0033	LF Table With Sink.....	361.79	44.10

11 42 23 Food Preparation Scullery Sinks (11 42)

11 42 23 00-0001	Stainless Steel Scullery Sinks <small>(11 42 23)</small>		
<small>Note: Excludes faucet. See CSI section 22 42 39 00-0072 for service sink faucets.</small>			
11 42 23 00-0002	EA Stainless Steel Scullery Sink, Single 30" x 24" x 12" Compartment And Drainboard.....	2,562.66	185.04
	<i>For Additional Drain Board, Add</i>	235.12	
11 42 23 00-0003	EA Stainless Steel Scullery Sink, Double 30" x 24" x 12" Compartment And Drainboard.....	3,636.90	211.47
	<i>For Additional Drain Board, Add</i>	337.26	
11 42 23 00-0004	EA Stainless Steel Scullery Sink, Triple 30" x 24" x 12" Compartment And Drainboard.....	4,827.12	211.47
	<i>For Additional Drain Board, Add</i>	450.99	
11 42 23 00-0005	EA Stainless Steel Scullery Sink, Quad 30" x 24" x 12" Compartment And Drainboard.....	6,894.58	211.47
	<i>For Additional Drain Board, Add</i>	647.17	
11 42 23 00-0006	EA Stainless Steel Pot Sink, Double 20" x 20" x 18" Compartment And Drainboard.....	4,261.21	211.47

11 44 Food Cooking Equipment (11 40)

11 44 13 Commercial Ranges (11 44)

11 44 13 00-0001	Range <small>(11 44 13)</small>		
11 44 13 00-0002	EA Heavy Duty Range, With 34" Open Top Oven.....	3,358.82	106.74
11 44 13 00-0003	EA Range With Fry Top.....	3,358.82	106.74
11 44 13 00-0004	EA Steel Finish Fry Top.....	7,194.16	139.21
11 44 13 00-0005	EA Stainless Top Only Fry Top.....	7,191.60	137.62
11 44 13 00-0006	EA Stainless Top And 2 Sides Fry Top.....	8,309.59	160.23
11 44 13 00-0007	EA Gas Range, Vulcan #260L.....	7,486.03	142.75
<small>Note: Six 12" burners, open top sections, porcelain on steel aeration plates and grates. 24" griddle/broiler, two 26-1/4" x 22" x 14-1/2" ovens porcelain on steel liner and aluminized steel construction, nickel plated oven racks.</small>			
11 44 13 00-0008	EA 48" Range With Casters (Vulcan 48C-4B24GN).....	15,095.35	97.21

11 44 16 Commercial Ovens (11 44)

11 44 16 00-0001	Bake Oven <small>(11 44 16)</small>		
11 44 16 00-0002	EA 55", 208 Voltage, 1 Phase, Single Deck Electric Bake Oven (Bakers Pride EB-1-8-3836).....	19,101.07	382.83
11 44 16 00-0003	EA 55", 208 Voltage, 3 Phase, Single Deck Electric Bake Oven (Bakers Pride EB-1-8-3836).....	19,101.07	382.83
11 44 16 00-0004	EA 74", 208 Voltage, 1 Phase, Single Deck Electric Bake Oven (Bakers Pride EB-1-8-5736).....	25,879.19	382.83
11 44 16 00-0005	EA 74", 208 Voltage, 3 Phase, Single Deck Electric Bake Oven (Bakers Pride EB-1-8-5736).....	25,879.19	382.83
11 44 16 00-0006	EA 55", 208 Voltage, 1 Phase, Double Deck Electric Bake Oven (Bakers Pride EB-2-8-3836).....	36,946.16	437.53
11 44 16 00-0007	EA 55", 208 Voltage, 3 Phase, Double Deck Electric Bake Oven (Bakers Pride EB-2-8-3836).....	36,946.16	437.53
11 44 16 00-0008	EA 74", 208 Voltage, 1 Phase, Double Deck Electric Bake Oven (Bakers Pride EB-2-8-7436).....	54,032.77	437.53
11 44 16 00-0009	EA 74", 208 Voltage, 3 Phase, Double Deck Electric Bake Oven (Bakers Pride EB-2-8-7436).....	54,032.77	437.53
11 44 16 00-0010	EA 55", 208 Voltage, 1 Phase, Triple Deck Electric Bake Oven (Bakers Pride EB-3-8-3836).....	58,734.28	546.90
11 44 16 00-0011	EA 55", 208 Voltage, 3 Phase, Triple Deck Electric Bake Oven (Bakers Pride EB-3-8-3836).....	58,734.28	546.90
11 44 16 00-0012	EA 74", 208 Voltage, 1 Phase, Triple Deck Electric Bake Oven (Bakers Pride EB-3-8-7436).....	82,601.32	546.90
11 44 16 00-0013	EA 74", 208 Voltage, 3 Phase, Triple Deck Electric Bake Oven (Bakers Pride EB-3-8-7436).....	82,601.32	546.90

11 44 16 00-0014 Rapid-Cook Countertop Bake Ovens (11 44 16)

11 44 16 00-0015	EA 6,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Digital Control, Stainless Steel Countertop Oven (TurboChef ECS-9500-1).....	11,347.44	24.31
11 44 16 00-0016	EA 800 To 2,200 Watts, 208/240 Volt, Rapid Cook Type, Touchscreen Control, Stainless Steel Classic Countertop Oven (MerryChef E1SM).....	6,729.85	24.31
11 44 16 00-0017	EA 4,700 Watts, 208/240 Volt, 1.2 CF, Rapid Cook Type, Touchscreen Control, Stainless Steel Countertop Oven (MerryChef E3-1330-H).....	5,298.84	24.31
11 44 16 00-0018	EA 800 To 900 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touch Screen Controls, Stainless Steel Countertop High-Speed Oven (TurboChef ECO-9500-1).....	8,084.18	24.31
11 44 16 00-0019	EA 800 To 900 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touch Screen Controls, Stainless Steel Countertop Oven, Black (TurboChef ECO-9500-5).....	8,414.20	24.31
11 44 16 00-0020	EA 800 To 900 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touch Screen Controls, Stainless Steel Countertop Oven, Red (TurboChef ECO-9500-2).....	8,414.20	24.31
11 44 16 00-0021	EA 800 To 900 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven, Blue (TurboChef ECO-9500).....	8,414.20	24.31
11 44 16 00-0022	EA 800 To 900 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven, Green (TurboChef ECO-9500).....	8,414.20	24.31
11 44 16 00-0023	EA 800 To 900 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Digital Controls, Stainless Steel Countertop Oven, White (TurboChef ECO-9500).....	8,414.20	24.31
11 44 16 00-0024	EA 1,600 To 1,700 Watts, 208/240 Volt, 1.05 CF, Rapid Cook Type, Touch Screen Controls, Stainless Steel Countertop Oven (TurboChef NGC-1280-1).....	15,662.38	24.31
11 44 16 00-0025	EA 6,200 Watts, 208/240 Volt, 1.304 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (MerryChef E4S).....	14,520.31	24.31

Equipment	11	
Foodservice Equipment	11 40	↕
Food Cooking Equipment	11 44	

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
11 44 16 00-0026	EA	4,600 Watts, 208/240 Volt, 1.2 CF, Accelerated Cook Type, Digital Controls, Stainless Steel Jetwave Ventless Countertop Oven (Amana JET19V).....	7,751.42	24.31
11 44 16 00-0027	EA	3,200 Watts, 208/240 Volt, 1.2 CF, Accelerated Cook Type, Digital Controls, Stainless Steel Jetwave Countertop Oven (Amana JET14).....	6,334.10	24.31
11 44 16 00-0028	EA	4,600 Watts, 208/240 Volt, 1.2 CF, Accelerated Cook Type, Digital Controls, Stainless Steel Countertop Oven (Amana JET19).....	6,888.70	24.31
11 44 16 00-0029	EA	6,200 Watts, 208/240 Volt, 0.78 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef ENC-9600-601).....	16,484.02	24.31
11 44 16 00-0030	EA	5,700 Watts, 208/240 Volt, 1.38 CF, Accelerated Cook Type, Digital Controls, Stainless Steel Countertop Oven With Teflon® Coating And Touch Screen Display (Amana MXP22TLT).....	14,714.77	24.31
11 44 16 00-0031	EA	1,000 To 2,200 Watts, 208/240 Volt, 0.58 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (MerryChef E2S STANDARD CLASSIC).....	10,288.90	24.31
11 44 16 00-0032	EA	9,500 To 11,500 Watts, 208/240 Volt, 2.2 CF, 1 Phase, Rapid Cook Type, Digital Controls, Stainless Steel Countertop Oven (TurboChef i5).....	20,716.80	24.31
11 44 16 00-0033	EA	9,500 To 11,500 Watts, 208/240 Volt, 2.2 CF, 3 Phase, Rapid Cook Type, Digital Controls, Stainless Steel Countertop Oven (TurboChef i5).....	20,716.80	24.31
11 44 16 00-0034	EA	9,500 To 11,500 Watts, 208/240 Volt, 2.2 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef i5 Touch).....	21,483.66	24.31
11 44 16 00-0035	EA	11,500 Watts, 208/240 Volt, 2.2 CF, 3 Phase, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef i5-9500-414-DL).....	21,483.66	24.31
11 44 16 00-0036	EA	1,000 To 3,000 Watts, 208/240 Volt, 0.61 CF, High-Speed Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (Amana MRX1).....	11,387.15	24.31
11 44 16 00-0037	EA	5,000 Watts, 208/240 Volt, 1.45 CF, Rapid Cook Type, Digital Controls, Stainless Steel Countertop Oven (TurboChef HHB-8603-1).....	11,347.44	24.31
11 44 16 00-0038	EA	6,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef I1-9500-400).....	13,843.83	24.31
11 44 16 00-0039	EA	4,000 To 4,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Countertop Oven (TurboChef I1-9500-104).....	12,058.15	24.31
11 44 16 00-0040	EA	6,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen, Countertop Oven With Panini Press (TurboChef PANINI).....	13,474.10	24.31
11 44 16 00-0041	EA	6,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touch Screen Controls, Stainless Steel Countertop Oven With Panini Press (TurboChef PANINI TOUCH).....	14,130.04	24.31
11 44 16 00-0042	EA	4,000 To 4,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven With Touch Controls (TurboChef SOTA SNGL MAG TOUCH).....	12,510.05	24.31
11 44 16 00-0043	EA	6,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef WATERLESS STEAMER).....	15,210.49	24.31
11 44 16 00-0044	EA	6,200 Watts, 208/240 Volt, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef WATERLESS STEAMER TCH).....	15,888.33	24.31
11 44 16 00-0045	EA	2,000 To 3,000 Watts, 208/240 Volt, 0.61 CF, High-Speed Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (Amana MRX2).....	12,003.37	24.31
11 44 16 00-0046	EA	2,000 To 3,000 Watts, 208/240 Volt, 0.61 CF, High-Speed Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven, Black (Amana MRX1 BLACK).....	11,524.09	24.31
11 44 16 00-0047	EA	2,000 To 3,000 Watts, 208/240 Volt, 0.61 CF, High-Speed Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven, Red (Amana MRX1 RED).....	11,524.09	24.31
11 44 16 00-0048	EA	1,000 To 3,000 Watts, 208/240 Volt, 0.61 CF, High-Speed Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven, Black (Amana MRX2 BLACK).....	12,140.31	24.31
11 44 16 00-0049	EA	1,000 To 3,000 Watts, 208/240 Volt, 0.61 CF, High-Speed Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven, Red (Amana MRX2 RED).....	12,140.31	24.31
11 44 16 00-0050	EA	4,000 To 4,200 Watts, 208/240 Volt, 0.54 CF, Rapid Cook Type, Touchscreen Controls, Powder Coated, Countertop Oven (TurboChef I1-9500-1).....	13,193.37	24.31
11 44 16 00-0051	EA	8,300 To 9,600 Watts, 208/240 Volt, 1.14 CF, 1 Phase, Rapid Cook Type, Digital Controls, Stainless Steel Countertop Oven (TurboChef i3).....	17,679.50	24.31
11 44 16 00-0052	EA	8,600 To 9,900 Watts, 208/240 Volt, 1.14 CF, 3 Phase, Rapid Cook Type, Digital Controls, Stainless Steel Countertop Oven (TurboChef i3).....	17,679.50	24.31
11 44 16 00-0053	EA	8,300 To 9,600 Watts, 208/240 Volt, 1.14 CF, 1 Phase, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef i3 Touch).....	18,418.97	24.31
11 44 16 00-0054	EA	8,600 To 9,900 Watts, 208/240 Volt, 1.14 CF, 3 Phase, Rapid Cook Type, Touchscreen Controls, Stainless Steel Countertop Oven (TurboChef i3 Touch).....	18,418.97	24.31
11 44 16 00-0055	EA	10,720/12,480 Watts, 208/240 Volt, 1.18 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Double Batch Ventless Countertop Oven (TurboChef HDD-9500-1).....	16,571.66	24.31
11 44 16 00-0056	EA	5,616 Watts, 208/240 Volt, 0.99 CF, Rapid Cook Type, Touchscreen Controls, Stainless Steel Single Batch Ventless Countertop Oven (TurboChef HHS-9500-1).....	12,455.27	24.31
11 44 16 00-0057		Combination Ovens ^(11 44 16) Note: Convection, steam and combination modes.		
11 44 16 00-0058	EA	35.4" x 34" x 26.6" Half Size Electric Boilerless Combination Oven.....	24,370.09	186.79
11 44 16 00-0059	EA	35.4" x 45" x 36.8" Full Size Electric Boilerless Combination Oven.....	39,980.20	213.48
11 44 16 00-0060	EA	35.4" x 34" x 36.8" Half Size Electric Boilerless Combination Oven.....	33,028.04	213.48
11 44 16 00-0061	EA	35.4" x 45" x 70.4" Full Size Electric Boilerless Combination Oven.....	79,710.42	266.85
11 44 16 00-0062	EA	35.4" x 34" x 70.4" Half Size Electric Boilerless Combination Oven.....	60,514.93	266.85
11 44 16 00-0063		Broiler, Without Oven ^(11 44 16)		
11 44 16 00-0064	EA	69" x 26" x 39" Broiler Without Oven.....	9,379.63	170.79
11 44 16 00-0065	EA	Conveyor Broiler.....	8,319.38	198.21
11 44 16 00-0066		Oven Stands ^(11 44 16)		
11 44 16 00-0067	EA	Stationary Oven Stand (Rational 60.30.334 US III UltraVent® Stationary Oven Stand).....	1,934.62	
11 44 16 00-0068		Countertop Electric Convection Type Ovens ^(11 44 16)		

11 Equipment
11 40 Foodservice Equipment
11 44 Food Cooking Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 44 16 00-0069	EA		1,440 Watts, 120 Volt, 0.8 CF, 150 To 500 Degrees Fahrenheit Temperature Range, One Glass Door, Quarter Size, Thermostatic Control, Stainless Steel Countertop Electric Convection Oven (Avantco CO-14)	265.39	12.15
11 44 16 00-0070	EA		1,600 Watts, 120 Volt, 1.5 CF, 150 To 500 Degrees Fahrenheit Temperature Range, One Glass Door, Half Size, Thermostatic Control, Stainless Steel Countertop Electric Convection Oven (Avantco CO-16)	429.23	12.15
11 44 16 00-0071	EA		2,800 Watts, 208/240 Volt, 2.3 CF, 150 To 500 Degrees Fahrenheit Temperature Range, One Glass Door, Thermostatic Control, Half Size, Stainless Steel Countertop Electric Convection Oven (Avantco CO-28)	505.53	12.15
11 44 16 00-0072	EA		2,800 Watts, 208/240 Volt, 2.3 CF, 150 To 550 Degrees Fahrenheit Temperature Range, 2.3 CF, One Glass Door, Half Size, Stainless Steel Countertop Electric Convection Oven With Steam Injection (Avantco CO-32)	650.19	12.15
11 44 16 00-0073	EA		3,500 To 4,600 Watts, 208-240 Volt, 4.4 CF, 550 Degrees Fahrenheit, Two Glass Doors, Dial Control, Stainless Steel Full Size Electric Countertop Convection Oven (Avantco CO-38)	1,180.59	12.15
11 44 16 00-0074	EA		3,500 To 4,600 Watts, 208 To 240 Volt, 4.4 CF, 150 To 550 Degrees Fahrenheit Temperature Range, One Glass Door, Dial Control, Full Size, Stainless Steel Countertop Electric Cooky Type Convection Oven With Steam Injection (Avantco CO-46)	1,373.46	12.15
11 44 16 00-0075	EA		1,440 Watts, 120 Volt, 0.8 CF, 500 Degrees Fahrenheit Temperature Range, One Glass Door, Dial Control, Quarter Size, Stainless Steel Countertop Electric Convection Oven (Galaxy COE3Q)	236.46	12.15
11 44 16 00-0076	EA		1,600 Watts, 120 Volt, 1.5 CF, 500 Degrees Fahrenheit, One Glass Door, Half Size, Dial Control, Stainless Steel Countertop Electric Convection Oven (Galaxy COE3H)	390.76	12.15
11 44 16 00-0077	EA		1,700 Watts, 120 Volt, 27-15/16" Length x 23-5/8" Width x 24" Height, 200 To 500 Degrees Fahrenheit Temperature Range, One Glass Door, Half Size, Stainless Steel 4 Pan Electric Countertop Convection Oven (Global Solutions GS1110-17)	1,112.17	12.15
11 44 16 00-0078	EA		1,400 Watts, 120 Volt, 1.19 CF, 150 - 570 Degrees Fahrenheit Temperature Range, One Glass Door, Thermostatic Control, Stainless Steel Half Size Electric Countertop Convection Oven (Vollrath 40703)	1,011.97	12.15
11 44 16 00-0079	EA		2,400 Watts, 230 Volt, 1.9 CF, 150 - 570 Degrees Fahrenheit Temperature Range, One Glass Door, Dial Control, Stainless Steel Half Size Electric Countertop Convection Oven (Vollrath 40701)	1,375.20	12.15
11 44 16 00-0080	EA		5,600 Watts, 230 Volt, 4.27 CF, 150 - 570 Degrees Fahrenheit Temperature Range, 1 Glass Door, Dial Control, Stainless Steel Full Size Electric Countertop Convection Oven (Vollrath 40702)	2,228.96	12.15
11 44 16 00-0081 Electric Convection Type Ovens ^(11 44 16)					
11 44 16 00-0082	EA		11 kW, 240 Volt, Two Glass Doors, 41-1/2" x 38-1/8" x 54-1/8", Single Deck, Stainless Steel Full Size Electric Convection Oven (Cooking Performance Group FEC-100)	4,471.95	48.61
11 44 16 00-0083	EA		22 kW, 240 Volt, 1 Phase, Four Glass Doors, 41-1/2" x 38" x 63-1/2", Double Deck, Stainless Steel Full Size Electric Convection Oven (Cooking Performance Group FEC200DK)	8,869.71	97.21
11 44 16 00-0084	EA		22 kW, 240 Volt, 3 Phase, Four Glass Doors, 41-1/2" x 38" x 63-1/2", Double Deck, Stainless Steel Full Size Electric Convection Oven (Cooking Performance Group FEC200CK)	8,869.71	97.21
11 44 16 00-0085	EA		22 kW, 240 Volt, 3 Phase, Four Glass Doors, 41-1/2" x 38" x 63-1/2", Double Deck, Stainless Steel Full Size Electric Convection Oven (Cooking Performance Group FEC200EK)	8,869.71	97.21
11 44 16 00-0086	EA		22 kW, 208 Volt, 1 Phase, Four Glass Doors, 41-1/2" x 38" x 63-1/2", Double Deck, Stainless Steel Full Size Electric Convection Oven (Cooking Performance Group FEC200BK)	8,869.71	97.21
11 44 16 00-0087	EA		24 kW, 208 Volt, 3 Phase, Four Glass Doors, 40" x 40-1/8" x 68-13/16", Double Deck, Stainless Steel Full Size Electric Convection Oven (Vulcan VC55ED-208/3)	14,637.37	97.21
11 44 16 00-0088	EA		12 kW, 208 Volt, 3 Phase, Two Glass Doors, 40" x 40-1/8" x 54", Single Deck, Stainless Steel Full Size Electric Convection Oven With Legs (Vulcan VC5ED-11D1 208/3)	7,318.68	48.61
11 44 16 00-0089	EA		12 kW, 240 Volt, 1 Phase, Two Glass Doors, 40" x 40-1/8" x 54", Single Deck, Stainless Steel Full Size Electric Convection Oven With Legs (Vulcan VC5ED-12D1 240/1)	7,318.68	48.61
11 44 16 00-0090	EA		12.5 kW, 208 Volt, 3 Phase, Two Glass Doors, 41-1/8" x 40-1/4" x 54-3/4", Single Deck, Stainless Steel Full Size Electric Convection Oven (Vulcan VC4ED-11D1 208/3)	8,032.26	48.61
11 44 16 00-0091	EA		12 kW, 208 Volt, 1 Phase, Two Glass Doors, 40" x 40-1/8" x 54", Single Deck, Stainless Steel Full Size Electric Convection Oven With Legs (Vulcan VC5ED-11D1 208/1)	7,318.68	48.61
11 44 16 00-0092	EA		12 kW, 240 Volt, 3 Phase, Two Glass Doors, 40" x 40-1/8" x 24", Single Deck, Stainless Steel Full Size Electric Convection Oven With Legs (Vulcan VC5ED-12D1 240/3)	7,318.68	48.61
11 44 16 00-0093	EA		25 kW, 208 Volt, 3 Phase, Four Glass Doors, 41-1/8" x 40" x 70", Double Deck, Stainless Steel Full Size Electric Convection Oven (Vulcan VC44ED-208/3)	16,064.53	97.21
11 44 16 00-0094	EA		11 kW, 220/240 Volt, 1 Phase, Two Glass Doors, 36-7/8" x 38-1/4" x 57", Single Deck, Stainless Steel Full Size Electric Convection Oven With Legs (Blodgett SHO-100-E)	6,833.44	48.61
11 44 16 00-0095	EA		22 kW, 208 Volt, 3 Phase, Four Glass Doors, 36-7/8" x 38-1/4" x 70", Double Deck, Stainless Steel Full Size Electric Convection Oven (Blodgett SHO-100-E)	13,666.89	97.21
11 44 16 00-0096	EA		24 kW, 208 Volt, 1 Phase, Four Glass Doors, 40" x 40-1/8" x 68 13/16", Double Deck, Stainless Steel Full Size Electric Convection Oven (Vulcan VC55ED-208/1)	14,637.37	97.21
11 44 16 00-0097	EA		21 kW, 208 Volt, 1 Phase, Four Glass Doors, 46" x 40" x 74-1/2", Double Deck, Stainless Steel Full Size Electric Convection Oven (Bakers Pride BPCV-E2 208/1)	18,517.07	97.21
11 44 16 00-0098 Natural Gas Convection Type Ovens ^(11 44 16)					
11 44 16 00-0099	EA		54,000 BTU, 150 To 550 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Single Deck Full Size Natural Gas Convection Oven With Legs (Cooking Performance Group FGC100N)	5,142.37	48.61
11 44 16 00-0100	EA		108,000 BTU, 150 To 550 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Natural Gas Convection Oven With Legs (Cooking Performance Group FGC200N)	10,199.16	97.21
11 44 16 00-0101	EA		100,000 BTU, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Stainless Steel Double Deck Full Size Natural Gas Convection Oven With Solid State Controls (Vulcan VC44GD-NAT)	17,596.81	97.21
11 44 16 00-0102	EA		100,000 BTU, 150 To 550 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Natural Gas Convection Oven (Vulcan VC55GD)	16,850.69	97.21
11 44 16 00-0103	EA		100,000 BTU, 500 Degrees Fahrenheit, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Natural Gas Convection Oven (Blodgett SHO-100-G)	15,731.49	97.21
11 44 16 00-0104	EA		50,000 BTU, 150 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Single Deck Full Size Natural Gas Convection Oven with Solid State Controls And Legs (Vulcan VC4GD-11D150K)	8,798.40	48.61
11 44 16 00-0105	EA		120,000 BTU, 200 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Bakery Depth Natural Gas Convection Oven With Draft Diverter (Blodgett ZEPHAIRE-200-G)	8,895.62	97.21
11 44 16 00-0106	EA		120,000 BTU, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Standard Depth Full Size Natural Gas Convection Oven With Analog Controls (Garland MCO-GS-20S)	24,595.08	97.21



Equipment	11	
Foodservice Equipment	11 40	↕
Food Cooking Equipment	11 44	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 44 16 00-0107	EA		50,000 BTU, 200 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Single Deck Full Size Natural Gas Convection Oven (Blodgett SHO-100-G).....	7,865.74	48.61
11 44 16 00-0108	EA		100,000 BTU, 200 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Bakery Depth Natural Gas Convection Oven With Draft Diverter (Blodgett ZEPHAIRE-200-G-ES).....	21,568.86	97.21
11 44 16 00-0109	EA		120,000 BTU, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Digital Control, Stainless Steel Double Deck Standard Depth Full Size Natural Gas Convection Oven With Digital Controls (Garland MCO-GS-20).....	32,058.57	97.21
11 44 16 00-0110	EA		120,000 BTU, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Natural Gas Convection Oven (Garland MCO-GS-20-ESS).....	24,595.08	97.21
11 44 16 00-0111	EA		100,000 BTU, 200 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Standard Depth Natural Gas Convection Oven With Draft Diverter (Blodgett ZEPHAIRE-100-G).....	20,142.43	97.21
11 44 16 00-0112	EA		90,000 BTU, 200 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Natural Gas Convection Oven (Blodgett BDO-100-G-ES).....	17,925.99	97.21
11 44 16 00-0113	EA		50,000 BTU, 150 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Single Deck Full Size Natural Gas Convection Oven With Legs (Vulcan VC5GDN).....	8,425.34	48.61
11 44 16 00-0114	EA		36" Wide x 58" Height x 41" Depth, Natural Gas Convection Oven (Vulcan 36C-BN).....	9,393.23	213.48
			<i>For 5" Swivel Plate Casters, Set of 4, Add</i>	635.62	
11 44 16 00-0115			Liquid Propane Convection Type Ovens ^(11 44 16)		
11 44 16 00-0116	EA		108,000 BTU, 45" Length x 38" Width x 68" Height, 150 To 550 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Liquid Propane Convection Oven With Legs (Cooking Performance Group FGC200L).....	10,199.16	97.21
11 44 16 00-0117	EA		100,000 BTU, 41-1/8" Length x 40-1/4" Width x 70" Height, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Liquid Propane Convection Oven With Solid State Controls (Vulcan VC44GD-LP).....	17,596.81	97.21
11 44 16 00-0118	EA		50,000 BTU, 41-1/8" Length x 40-1/4" Width x 54-3/4" Height, 150 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Stainless Steel Single Deck Full Size Liquid Propane Convection Oven With Solid State Controls And Legs (Vulcan VC4GD-21D150K).....	8,798.40	48.61
11 44 16 00-0119	EA		100,000 BTU, 45-1/8" Length x 40-1/4" Width x 70" Height, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Stainless Steel Double Deck Full Size Depth Liquid Propane Convection Oven With Solid State Controls (Vulcan VC66GD-LP).....	33,217.27	97.21
11 44 16 00-0120	EA		100,000 BTU, 36-7/8" Length x 38-1/4" Width x 70" Height, 200 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Liquid Propane Convection Oven (Blodgett SHO-100-G).....	15,731.49	97.21
11 44 16 00-0121	EA		100,000 BTU, 40-1/8" Length x 40-1/8" Width x 68-5/8" Height, 150 - 500 Degrees Fahrenheit Temperature Range, Four Glass Doors, Dial Control, Stainless Steel Double Deck Full Size Liquid Propane Convection Oven (Vulcan VC55GD LP).....	16,850.69	97.21
11 44 16 00-0122	EA		50,000 BTU, 40-1/8" Length x 40" Width x 54-3/4" Height, 150 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Single Deck Full Size Liquid Propane Convection Oven With Legs (Vulcan VC5GDL).....	8,425.34	48.61
11 44 16 00-0123	EA		50,000 BTU, 36-7/8" Length x 38-1/4" Width x 63" Height, 200 - 500 Degrees Fahrenheit Temperature Range, Two Glass Doors, Dial Control, Stainless Steel Single Deck Full Size Liquid Propane Convection Oven (Blodgett SHO-100-G).....	7,865.74	48.61
11 44 16 00-0124			Countertop Pizza Oven ^(11 44 16)		
11 44 16 00-0125	EA		3,700 To 4,800 Watts, 208/240 Volt, Stainless Steel Countertop Pizza Oven, White (TurboChef FIRE WHITE).....	7,714.45	24.31
11 44 16 00-0126			Rotary Deck Pizza Oven ^(11 44 16)		
11 44 16 00-0127	EA		90,000 BTU, 2 Deck, 38.6" Diameter Rotary Deck Pizza Oven (Sierra Range Volare).....	38,189.31	97.21
11 44 16 00-0128			Triple Conveyor Oven ^(11 44 16)		
11 44 16 00-0129	EA		30 kW, 208 Volt, Three Door, Single Belt, Triple Conveyor, FastBake Stainless Steel Impingement Cook Type Oven Package (Lincoln 1180-3/1180-FB3).....	62,396.43	194.43
			Note: 39" Length x 56" Width x 62" Height, 250 To 575 Degrees Fahrenheit Temperature Range		
11 44 16 00-0130	EA		30 kW, 240 Volt, Three Door, Single Belt, Triple Conveyor, FastBake Stainless Steel Impingement Cook Type Oven Package (Lincoln 1180-3/1180-FB3).....	62,396.43	194.43
			Note: 39" Length x 56" Width x 62" Height, 250 To 575 Degrees Fahrenheit Temperature Range		
11 44 16 00-0131	EA		22 kW, 208 Volt, Three Door, Triple Conveyor, Stainless Steel Low Profile FastBake Impingement Cook Type Oven Package (Lincoln 1600-3/1600-FB3).....	132,980.55	194.43
			Note: 60-1/2" Length x 80" Width x 66-3/8" Height, 250 To 600 Degrees Fahrenheit Temperature Range		
11 44 16 00-0132	EA		22 kW, 220 Volt, Three Door, Triple Conveyor, Stainless Steel Low Profile FastBake Impingement Cook Type Oven Package (Lincoln 1600-3/1600-FB3).....	115,361.47	194.43
			Note: 60-1/2" Length x 80" Width x 66-3/8" Height, 250 To 600 Degrees Fahrenheit Temperature Range		
11 44 16 00-0133	EA		22 kW, 240 Volt, Three Door, Triple Conveyor, Stainless Steel Low Profile FastBake Impingement Cook Type Oven Package (Lincoln 1600-3/1600-FB3).....	115,361.47	194.43
			Note: 60-1/2" Length x 80" Width x 66-3/8" Height, 250 To 600 Degrees Fahrenheit Temperature Range		
11 44 16 00-0134	EA		330,000 BTU, Natural Gas, Three Door, Triple Conveyor, Low Profile FastBake Stainless Steel, Impingement Cook Type Oven Package (Lincoln 1600-3/1600-FB3).....	132,980.55	194.43
			Note: 60-1/2" Length x 80" Width x 66-3/8" Height, 250 To 600 Degrees Fahrenheit Temperature Range		
11 44 16 00-0135	EA		330,000 BTU, Liquid Propane, Three Door, Triple Conveyor, Stainless Steel Low Profile FastBake Impingement Cook Type Oven Package (Lincoln 1600-3/1600-FB3).....	132,980.55	194.43
			Note: 60-1/2" Length x 80" Width x 66-3/8" Height, 250 To 600 Degrees Fahrenheit Temperature Range		
11 44 19			Commercial Cooking Equipment ^(11 44)		
11 44 19 00-0001			Drop-In Electric Griddle ^(11 44 19)		
11 44 19 00-0002	EA		24" Wide x 24" Deep, Drop-In Electric Griddle.....	4,279.10	146.77

11	11 Equipment
	11 40 Foodservice Equipment
	11 44 Food Cooking Equipment



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
11 44 19 00-0003	EA	36" Wide x 24" Deep, Drop-In Electric Griddle.....		6,084.85	146.77
11 44 19 00-0004	EA	48" Wide x 24" Deep, Drop-In Electric Griddle.....		6,964.25	160.11
11 44 19 00-0005	EA	60" Wide x 24" Deep, Drop-In Electric Griddle.....		8,332.90	160.11
11 44 19 00-0006	EA	72" Wide x 24" Deep, Drop-In Electric Griddle.....		10,679.84	173.45
11 44 19 00-0007		Countertop Griddle (11 44 19)			
11 44 19 00-0008	EA	16", 120 Voltage, 1750 Watt, Electric Countertop Griddle (Avantco EG16N).....		531.36	139.24
11 44 19 00-0009	EA	24", 208/240 Voltage, 2675 To 3560 Watt, Electric Countertop Griddle (Avantco EG24N).....		663.36	139.24
11 44 19 00-0010	EA	30", 208/240 Voltage, 3375 To 4500 Watt, Electric Countertop Griddle (Avantco EG30N).....		740.36	139.24
11 44 19 00-0011	EA	36", 208/240 Voltage, 7488 To 10080 Watt, Electric Countertop Griddle (Avantco EG36N).....		937.27	139.24
11 44 19 00-0012	EA	24", 220 Voltage, Thermostatic Electric Griddle (Vollrath 40716).....		1,019.22	139.24
11 44 19 00-0013	EA	36", 220 Voltage, Thermostatic Electric Griddle (Vollrath 40717).....		1,313.25	139.24
11 44 19 00-0014		Panini Sandwich Grill (11 44 19)			
11 44 19 00-0015	EA	3,500 Watts, 120 Volt, Double Commercial Panini Sandwich Grill With Smooth Plates (Avantco P85S).....		620.94	97.21
11 44 19 00-0016	EA	1,750 Watts, 120 Volt, Commercial Panini Sandwich Grill With Grooved Plates (Avantco P78).....		481.09	97.21
11 44 19 00-0017	EA	1,750 Watts, 120 Volt, Commercial Panini Sandwich Grill With Smooth Plates (Avantco P70S).....		481.09	97.21
11 44 19 00-0018	EA	1,750 Watts, 120 Volt, Commercial Panini Sandwich Grill With Grooved Top and Smooth Bottom Plates (Avantco P75SG).....		481.09	97.21
11 44 19 00-0019	EA	2,392 Watts, 208 Volt, Panini Perfetto Grooved Top And Bottom Panini Sandwich Grill (Waring WPG150B).....		961.97	97.21
11 44 19 00-0020		Electric Countertop Fryer, With Submerger (11 44 19)			
11 44 19 00-0021	EA	30 LB Capacity, 208-240 Volt, Two Basket, Countertop Deep Fryer (Avantco F202).....		941.25	97.21
11 44 19 00-0022	EA	30 LB Capacity, 208-240 Volt, Four Basket, Commercial Countertop Deep Fryer (Vollrath 40710).....		2,036.78	97.21
11 44 19 00-0023	EA	30 LB Capacity, 240 Volt, Two Basket, Countertop Electric Deep Fryer (Garland E24-31F).....		7,511.03	97.21
11 44 19 00-0024		Electric Floor Fryer, With Submerger (11 44 19)			
11 44 19 00-0025	EA	50 LB Capacity, Single Basket Lift, 208 Volt, Electric Fryer.....		6,754.28	213.48
11 44 19 00-0026	EA	50 LB Capacity, Single Basket Lift, 480 Volt, Electric Fryer.....		7,089.63	213.48
11 44 19 00-0027	EA	85 LB Capacity, Single Basket Lift, 208 Volt, Electric Fryer.....		22,644.05	277.53
11 44 19 00-0028	EA	85 LB Capacity, Single Basket Lift, 480 Volt, Electric Fryer.....		23,194.36	277.53
11 44 19 00-0029		Natural Gas Floor Fryer, With Submerger (11 44 19)			
11 44 19 00-0030	EA	40 LB Capacity, 90,000 BTU, Natural Gas, Two Basket, Stainless Steel Floor Fryer (Avantco FF300).....		1,464.98	155.54
11 44 19 00-0031	EA	50 LB Capacity, 120,000 BTU, Natural Gas, Two Basket, Stainless Steel Floor Fryer (Avantco FF400).....		1,680.74	194.43
11 44 19 00-0032	EA	70 To 100 LB Capacity, 150,000 BTU, Natural Gas, Two Basket, Stainless Steel Tube Floor Fryer (Avantco FF518).....		2,449.06	388.86
11 44 19 00-0033		Steam Jacketed Kettles (11 44 19)			
11 44 19 00-0034	EA	12 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Tabletop Kettle (Cleveland KET-12-T).....		13,571.11	24.31
11 44 19 00-0035	EA	12 Gallon Capacity, 208 Volt, 12 kW, Tilting, Stainless Steel Electric Steam Jacketed Kettle (Vulcan K12ETT-7).....		12,069.02	24.31
11 44 19 00-0036	EA	3 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Tabletop Kettle (Cleveland KET-3-T).....		9,595.83	24.31
11 44 19 00-0037	EA	6 Gallon Capacity, 208 Volt, 7.5 kW, Tilting, Stainless Steel Electric Steam Jacketed Kettle (Vulcan K6ETT-7).....		10,005.00	24.31
11 44 19 00-0038	EA	60 Gallon Capacity, 208 Volt, 18 kW, 3 Phase, Stationary, Stainless Steel 2/3 Steam Jacketed Electric Kettle (Vulcan K60EL).....		35,118.77	24.31
11 44 19 00-0039	EA	150 Gallon Capacity, 240 Volt, 36 kW, 3 Phase, Stationary, Stainless Steel Steam Jacketed Electric Kettle (Vulcan ET150-240/3).....		61,893.18	97.21
11 44 19 00-0040	EA	100 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Mixer Kettle (Cleveland MKE100T 208/2403).....		146,343.43	97.21
11 44 19 00-0041	EA	6 Gallon Capacity, 240 Volt, 24 kW, 3 Phase, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Kettle With Modular Generator Base (Cleveland 24EMK624 240/3).....		32,191.29	97.21
11 44 19 00-0042	EA	6 Gallon Capacity, 208 Volt, 24 kW, 3 Phase, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Kettle With Modular Generator Base (Cleveland 24EMK624 208/3).....		32,191.29	97.21
11 44 19 00-0043	EA	125 Gallon Capacity, 240 Volt, 36 kW, 3 Phase, Stationary, Stainless Steel Steam Jacketed Electric Kettle (Vulcan ET125-240/3).....		58,994.46	97.21
11 44 19 00-0044	EA	20 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Kettle (Cleveland KET-20-T).....		21,522.03	97.21
11 44 19 00-0045	EA	40 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel Full Steam Jacketed Electric Kettle (Cleveland KEL40TSH 208/2403).....		47,475.95	97.21
11 44 19 00-0046	EA	20 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Mixer Kettle (Cleveland MKET20T 208/2403).....		59,429.08	97.21
11 44 19 00-0047	EA	60 Gallon Capacity, 208/240 Volt, Stationary, Stainless Steel Full Steam Jacketed Electric Kettle (Cleveland KEL60SH 208/2403).....		42,287.71	97.21
11 44 19 00-0048	EA	40 Gallon Capacity, 208/240 Volt, Tilting, Stainless Steel 2/3 Steam Jacketed Electric Kettle (Cleveland KEL-40-T).....		39,014.38	97.21
11 44 19 00-0049	EA	40 Gallon Capacity, Tilting, Stainless Steel 2/3 Steam Jacketed Direct Steam Electric Mixer Kettle (Cleveland MKDL40T 208/2403).....		120,409.51	97.21
11 44 19 00-0050	EA	60 Gallon Capacity, Tilting, Stainless Steel 2/3 Steam Jacketed Direct Steam Electric Mixer Kettle (Cleveland MKDL60T 208/2403).....		124,239.32	97.21
11 44 19 00-0051	EA	100 Gallon Capacity, 190,000 BTU, Liquid Propane, Stationary, Stainless Steel 2/3 Steam Jacketed Kettle (Cleveland KGL100 LP).....		57,923.20	194.43
11 44 19 00-0052	EA	60 Gallon Capacity, 100,000 BTU, Liquid Propane, Stationary, Stainless Steel 2/3 Steam Jacketed Kettle (Vulcan K60GL-LP).....		40,390.84	194.43



Equipment	11	
Foodservice Equipment	11 40	↩
Food Cooking Equipment	11 44	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 44 19 00-0053	EA		40 Gallon Capacity, 140,000 BTU, Liquid Propane, Tilting, Stainless Steel Full Steam Jacketed Kettle (Cleveland KGL40TSH LP).....	57,634.05	194.43
11 44 19 00-0054	EA		80 Gallon Capacity, 190,000 BTU, Liquid Propane, Stationary, Stainless Steel 2/3 Steam Jacketed Kettle (Cleveland KGL80 LP).....	47,890.42	194.43
11 44 19 00-0055	EA		40 Gallon Capacity, 100,000 BTU, Liquid Propane, Tilting, Stainless Steel 2/3 Steam Jacketed Kettle (Vulcan K40GLT-LP).....	49,625.29	194.43
11 44 19 00-0056	EA		6 Gallon Capacity, 34,000 BTU, Liquid Propane, Tilting, Stainless Steel 2/3 Steam Jacketed Tabletop Kettle (Cleveland KGT-6-T LP).....	20,883.58	194.43
11 44 19 00-0057	EA		60 Gallon Capacity, 100,000 BTU, Liquid Propane, Tilting, Stainless Steel 2/3 Steam Jacketed Kettle (Vulcan K60GLT-LP).....	60,163.61	194.43
11 44 19 00-0058	EA		125 Gallon Capacity, 135,000 BTU, Liquid Propane, Stationary, Stainless Steel Steam Jacketed Gas Kettle (Vulcan GT125E-LP).....	59,852.65	194.43
11 44 19 00-0059	EA		80 Gallon Capacity, 190,000 BTU, Liquid Propane, Tilting, Stainless Steel 2/3 Steam Jacketed Kettle (Cleveland KGL80T LP).....	66,326.58	194.43
11 44 19 00-0060	EA		60 Gallon Capacity, 190,000 BTU, Liquid Propane, Stationary, Stainless Steel Full Steam Jacketed Kettle (Cleveland KGL60SH LP).....	44,937.14	194.43
11 44 19 00-0061	EA		12 Gallon Capacity, 53,000 BTU, Liquid Propane, Tilting, Stainless Steel 2/3 Steam Jacketed Tabletop Kettle (Cleveland KGT12TGB LP).....	27,402.97	194.43
11 44 19 00-0062	EA		40 Gallon Capacity, 140,000 BTU, Liquid Propane, Tilting, Stainless Steel 2/3 Steam Jacketed Mixer Kettle (Cleveland MKGL40T LP).....	145,661.33	194.43
11 44 19 00-0063	EA		80 Gallon Capacity, 135,000 BTU, Liquid Propane, Stationary, Stainless Steel Steam Jacketed Gas Kettle (Cleveland GL80E-LP).....	48,210.48	194.43
11 44 19 00-0064	EA		60 Gallon Capacity, 100,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Kettle (Vulcan K60GLT-NAT).....	60,163.61	194.43
11 44 19 00-0065	EA		60 Gallon Capacity, 190,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Horizontal Mixer Kettle (Cleveland HAMKGL60T NAT).....	139,802.06	194.43
11 44 19 00-0066	EA		25 Gallon Capacity, 90,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Kettle (Cleveland KGL-25-T NAT).....	45,944.60	194.43
11 44 19 00-0067	EA		100 Gallon Capacity, 190,000 BTU, Natural Gas, Stationary, Stainless Steel 2/3 Steam Jacketed Horizontal Mixer Kettle (Cleveland HAMKGL100 NAT).....	139,421.99	194.43
11 44 19 00-0068	EA		20 Gallon Capacity, 100,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Kettle (Vulcan K20GLT-NAT).....	47,517.62	194.43
11 44 19 00-0069	EA		100 Gallon Capacity, 190,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Horizontal Mixer Kettle (Cleveland HAMKGL100T NAT).....	164,608.49	194.43
11 44 19 00-0070	EA		12 Gallon Capacity, 53,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Tabletop Kettle (Cleveland KGT-12-T NAT).....	24,980.71	194.43
11 44 19 00-0071	EA		80 Gallon Capacity, 190,000 BTU, Natural Gas, Stationary, Stainless Steel 2/3 Steam Jacketed Kettle (Cleveland KGL80 NAT).....	47,890.42	194.43
11 44 19 00-0072	EA		60 Gallon Capacity, 135,000 BTU, Natural Gas, Stationary, Stainless Steel Steam Jacketed Gas Kettle (Cleveland GS60E-NAT).....	47,626.74	194.43
11 44 19 00-0073	EA		40 Gallon Capacity, 140,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Mixer Kettle (Cleveland MKGL40T NAT).....	140,205.77	194.43
11 44 19 00-0074	EA		6 Gallon Capacity, 34,000 BTU, Natural Gas, Tilting, Stainless Steel 2/3 Steam Jacketed Tabletop Kettle (Cleveland KGT-6-T NAT).....	20,883.58	194.43
11 44 19 00-0075	EA		100 Gallon Capacity, 190,000 BTU, Natural Gas, Stationary, Stainless Steel 2/3 Steam Jacketed Kettle (Cleveland KGL100 NAT).....	57,923.20	194.43
11 44 19 00-0076	EA		40 Gallon Capacity, Tilting, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Cleveland KDL-40-T).....	20,014.33	194.43
11 44 19 00-0077	EA		60 Gallon Capacity, Tilting, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Vulcan K60DLT).....	27,115.65	194.43
11 44 19 00-0078	EA		125 Gallon Capacity, Stationary, Stainless Steel Fully Jacketed Direct Steam Kettle (Vulcan ST125).....	47,421.24	194.43
11 44 19 00-0079	EA		200 Gallon Capacity, Stationary, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Cleveland KDL200).....	63,264.19	194.43
11 44 19 00-0080	EA		12 Gallon Capacity, Tilting, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle With Modular Stand (Cleveland SD760K12).....	24,697.02	194.43
11 44 19 00-0081	EA		12 Gallon Capacity, 26" Table, Tilting, Stainless Steel Direct Steam Kettle (Cleveland VEKT26/6).....	17,170.16	194.43
11 44 19 00-0082	EA		40 Gallon Capacity, Stationary Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Vulcan K40DL).....	18,248.54	194.43
11 44 19 00-0083	EA		60 Gallon Capacity, Stationary, Stainless Steel Full Steam Jacketed Direct Steam Kettle (Cleveland KDL60SH).....	28,428.62	194.43
11 44 19 00-0084	EA		60 Gallon Capacity, Stationary, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Vulcan K60DL).....	21,258.20	194.43
11 44 19 00-0085	EA		40 Gallon Capacity, Stationary, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Cleveland KDL40).....	17,231.99	194.43
11 44 19 00-0086	EA		80 Gallon Capacity, Stationary, Stainless Steel Full Steam Jacketed Direct Steam Kettle (Cleveland KDL80F).....	42,885.85	194.43
11 44 19 00-0087	EA		80 oz., Tilting, Stainless Steel 2/3 Steam Jacketed Direct Steam Tabletop Oyster Kettle (Cleveland KDT-1-T).....	9,312.34	194.43
11 44 19 00-0088	EA		40 Gallon Capacity, Stationary, Stainless Steel Full Steam Jacketed Direct Steam Kettle (Cleveland KDL40F).....	30,208.95	194.43
11 44 19 00-0089	EA		12 Gallon Capacity, Tilting, Stainless Steel 2/3 Steam Jacketed Tabletop Direct Steam Kettle (Cleveland KDT-12-T).....	13,027.57	194.43
11 44 19 00-0090	EA		100 Gallon Capacity, Stationary, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Cleveland KDL100).....	32,631.22	194.43
11 44 19 00-0091	EA		60 Gallon Capacity, Stationary, Stainless Steel 2/3 Steam Jacketed Direct Steam Kettle (Cleveland KDL60).....	20,439.86	194.43
11 44 19 00-0092			Kettles, Steam Jacketed (11 44 19)		
11 44 19 00-0093	EA		5 Gallon Kettle, With Stand.....	5,201.72	85.65
11 44 19 00-0094	EA		20 Gallon Kettle With Steam Jacket.....	20,461.00	114.20
11 44 19 00-0095	EA		40 Gallon Kettle With Steam Jacket.....	21,144.96	125.62
11 44 19 00-0096	EA		60 Gallon Kettle With Steam Jacket.....	25,613.27	137.04
11 44 19 00-0097			Steamers, Electric (11 44 19)		
11 44 19 00-0098			Cooking Equipment/ Steamers (11 44 19 00-0097)		
11 44 19 00-0099	EA		3 Pan, Electric Countertop Convection Steamer.....	9,273.60	224.16
11 44 19 00-0100	EA		5 Pan, Electric Countertop Convection Steamer.....	12,215.69	234.82
11 44 19 00-0101	EA		3 Pan, Electric Countertop Boilerless/Connectionless Steamer.....	8,579.95	224.16
11 44 19 00-0102	EA		5 Pan, Electric Countertop Boilerless/Connectionless Steamer.....	12,515.19	234.82
11 44 19 00-0103			Braising Pans (11 44 19)		

11 Equipment
11 40 Foodservice Equipment
11 44 Food Cooking Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 44 19 00-0104	EA		24" x 24", 240 Volt, Tilting Braising Pan.....	11,117.42	199.06
11 44 19 00-0105	EA		24" x 31", 240 Volt, Tilting Braising Pan.....	11,732.17	209.33
11 44 19 00-0106	EA		24" x 41", 240 Volt, Tilting Braising Pan.....	12,495.66	222.92
11 44 19 00-0107	EA		24" x 24", 62,000 BTU/Hour, Tilting Braising Pan.....	14,492.88	259.58
11 44 19 00-0108	EA		24" x 31", 90,000 BTU/Hour, Tilting Braising Pan.....	14,986.88	267.58
11 44 19 00-0109	EA		24" x 41", 120,000 BTU/Hour, Tilting Braising Pan.....	15,570.80	274.66
11 44 19 00-0110			Toasters <small>(11 44 19)</small>		
11 44 19 00-0111	EA		Bun Toaster 3.2 KW.....	2,201.54	42.30
11 44 19 00-0112	EA		Bun Toaster 4.3 KW.....	2,402.72	46.10
11 44 19 00-0113	EA		Pop-Up Toaster, 2 Slot.....	600.55	115.60
11 44 19 00-0114	EA		Conveyor Toaster.....	1,030.42	173.45
11 44 19 00-0115			Microwave Ovens <small>(11 44 19)</small>		
11 44 19 00-0116	EA		120 Volt, 1,000 Watt, 20" Length x 18" Width x 12" Height, Office Series Microwave With Dial Controls (Galaxy MW1000PD).....	222.50	12.15
11 44 19 00-0117	EA		120 Volt, 1,000 Watt, 20" Length x 18" Width x 12" Height, Office Series Microwave With Push Button Controls (Galaxy MW1000PB).....	244.52	12.15
11 44 19 00-0118	EA		120 Volt, 1,000 Watt, 20" Length x 18" Width x 12" Height, Stainless Steel Commercial Microwave With Push Button Controls (Solwave MW1000SS).....	317.93	12.15
11 44 19 00-0119	EA		120 Volt, 1,000 Watt, 2 CF, 22" Length x 18" Width x 13-1/2" Height, Stackable Commercial Microwave With Dial Controls (Solwave MW112D).....	406.02	12.15
11 44 19 00-0120	EA		120 Volt, 1,000 Watt, 2 CF, 22" Length x 18" Width x 13 1/2" Height, Stackable Commercial Microwave With Dial Controls (Solwave MW112T).....	508.79	12.15
11 44 19 00-0121	EA		120 Volt, 1,000 Watt, 16-1/2" Length x 20" Width x 12-1/4" Height, Stainless Steel Commercial Microwave With Dial Controls (Solwave RMS10DS).....	317.93	12.15
11 44 19 00-0122	EA		120 Volt, 1,000 Watt, 16-1/2" Length x 20" Width x 12-1/4" Height, Stainless Steel Commercial Microwaves With Push Button Controls (Amana RMS10TS).....	371.52	12.15
11 44 19 00-0123	EA		120 Volt, 1,000 Watt, 19" Length x 22" Width x 13-3/4" Height, Medium Volume, Stainless Steel Commercial Microwave (Amana RCS10DSE).....	658.56	12.15
11 44 19 00-0124	EA		120 Volt, 1,000 Watt, 19" Length x 22" Width x 13-7/8" Height, Stackable, Commercial Microwave With Push Button Controls (Amana RCS10TS).....	803.91	12.15
11 44 19 00-0125	EA		120 Volt, 1,000 Watt, 21-5/8" Length x 16-1/2" Width x 13-1/2" Height, Stainless Steel, Heavy Duty Commercial Microwave With Push Button Controls (Amana HDC12A2).....	1,689.21	12.15
11 44 19 00-0126	EA		120 Volt, 1,000 Watt, 18-1/8" Length x 20-1/2" Width x 12-1/4" Height, Stainless Steel, Commercial Microwave With Manual Controls (Vollrath 40830).....	464.47	12.15
11 44 19 00-0127	EA		120 Volt, 1,000 Watt, 18-1/8" Length x 20-1/2" Width x 12-1/4" Height, Stainless Steel, Commercial Microwave With Digital Controls (Vollrath 40819).....	633.67	12.15
11 44 19 00-0128	EA		120 Volt, 1,000 Watt, 17" Length x 20" Width x 12-1/4" Height, Stainless Steel, Commercial Microwave With Push Button Controls (Waring WMO90).....	486.78	12.15
11 44 19 00-0129	EA		120 Volt, 1,000 Watt, 16-9/16" Length x 20-1/8" Width x 13" Height, Stainless Steel, Commercial Microwave With Push Button Controls (Panasonic NE-1054F).....	428.06	12.15
11 44 19 00-0130	EA		120 Volt, 1,000 Watt, 16-3/8" Length x 20-1/8" Width x 12" Height, Stainless Steel Microwave With Programmable Memory Pads (Panasonic NE-1064F).....	830.34	12.15
11 44 19 00-0131	EA		120 Volt, 1,000 Watt, 16-9/16" Length x 20-1/8" Width x 13" Height, Stainless Steel Commercial Microwave With Dial Timer (Panasonic NE-1025).....	384.01	12.15
11 44 19 00-0132	EA		120 Volt, 1,200 Watt, 20-5/8" Length x 22-5/8" Width x 14-1/2" Height, Stainless Steel Commercial Microwave With Programmable Menu And Auto Cool Down (Solwave MW1200T).....	800.97	12.15
11 44 19 00-0133	EA		120 Volt, 1,200 Watt, 22-1/4" Length x 16-1/2" Width x 13-1/2" Height, 100 Programmable Menu Items, See-through Door, USB Port, Commercial Heavy Duty Stainless Steel Microwave (Solwave MWHD12).....	889.06	12.15
11 44 19 00-0134	EA		120 Volt, 1,200 Watt, 20" Length x 16-5/8" Width x 13-3/16" Height, 15 Integrated Power Levels, See-through Door, Stainless Steel, Commercial, Medium Duty, Microwave With 90 Programmable Menu Pads (Panasonic NE-12523).....	1,492.48	12.15
11 44 19 00-0135	EA		120 Volt, 1,200 Watt, 20" Length x 16-5/8" Width x 13-3/16" Height, Programmable, 15 Power Levels, Stainless Steel, Commercial, Medium Duty, Microwave With Push Button Controls (Panasonic NE-12521).....	1,385.30	12.15
11 44 19 00-0136	EA		120 Volt, 2,000 Watt, 21" Length x 21-3/4" Width x 14-3/8" Height, 4 Cooking Stages, 5 Power Levels, Stainless Steel, Commercial, Medium Duty, Microwave With Push Button Controls (Amana RFS12TS).....	1,630.49	12.15
11 44 19 00-0137	EA		208/230-240 Volt, 1,700 Watt, 20" Length x 16-5/8" Width x 13-3/16" Height, 3-Stage Cooking, See-through Door, Stainless Steel, Commercial Microwave With LCD Display (Panasonic NE-17521).....	1,527.72	12.15
11 44 19 00-0138	EA		208/230-240 Volt, 1,700 Watt, 20" Length x 16-5/8" Width x 13" Height, LCD Display With Digital Countdown, Stainless Steel, Commercial Microwave With 90 Programmable Memory Pads (Panasonic NE-17523).....	1,715.64	12.15
11 44 19 00-0139	EA		208/230-240 Volt, 2,100 Watt, 20-3/4" Length x 25-9/16" Width x 18-9/16" Height, Sonic Steamer, Stainless Steel, Commercial Microwave With 8 Programmable Memory Pads (Panasonic NE-2180).....	4,629.23	12.15
11 44 19 00-0140	EA		208/230-240 Volt, 3,200 Watt, 20-3/4" Length x 25-9/16" Width x 18-5/8" Height, Sonic Steamer, See-through Door, Stainless Steel, Commercial Microwave With 3-stage Cook (Panasonic NE-3280).....	6,135.57	12.15
11 44 19 00-0141	EA		208/230 Volt, 1,800 Watt, 20-1/4" Length x 21-3/4" Width x 14-1/4" Height, Stainless Steel, Commercial, Medium Duty Microwave With Push Button Controls (Amana RFS18TS).....	1,913.84	12.15
11 44 19 00-0142	EA		208/230 Volt, 2,200 Watt, 23-1/2" Length x 25-5/8" Width x 18-5/8" Height, Stainless Steel, Heavy Duty, 2 Pan Programmable Microwave (Amana AMSO22).....	5,970.40	12.15
11 44 19 00-0143	EA		208/230 Volt, 2,400 Watt, 19-3/16" Length x 13-5/8" Width x 17-5/8" Height, 11 Power Levels, Stainless Steel, Commercial, Heavy Duty Microwave With Push Button Controls (Amana AOC24).....	3,684.46	12.15
11 44 19 00-0144	EA		208/240 Volt, 22-1/4" Length x 16-1/2" Width x 13-1/2" Height, Space Saver, USB Port, Stainless Steel, Commercial, Heavy Duty Microwave (Solwave MWHD18).....	991.83	12.15
11 44 19 00-0145	EA		208/240 Volt, 2,100 Watt, 1.2 CF, 20-5/8" Length x 22-5/8" Width x 14-1/2" Height, Large, Stainless Steel, Stackable, Commercial Microwave With Push Button Controls (Solwave MW2100T).....	1,050.56	12.15
11 44 19 00-0146	EA		208/240 Volt, 2,100 Watt, 22-1/4" Length x 16-1/2" Width x 13-1/2" Height, 15 Power Levels, USB Port, Space Saver, Stainless Steel, Heavy Duty, Commercial Microwave With Push Button Controls (Solwave MWHD21).....	1,123.97	12.15
11 44 19 00-0147	EA		208/240 Volt, 1,700 Watt, 25-1/2" Length x 19-1/4" Width x 18-1/8" Height, See-through Door, Stainless Steel, Commercial, Heavy Duty Microwave With Push Button Controls (Amana RC17S2).....	2,706.66	12.15
11 44 19 00-0148	EA		208/240 Volt, 1,800 Watt, 1.2 CF, 20-5/8" Length x 22-5/8" Width x 14-1/2" Height, Large, Stainless Steel, Commercial Microwave With Push Button Controls (Solwave MW1800T).....	903.74	12.15

Equipment	11	
Foodservice Equipment	11 40	↕
Food Cooking Equipment	11 44	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 44 19 00-0149	EA		208/240 Volt, 1,800 Watt, 21-5/8" Length x 15-1/2" Width x 13-1/2" Height, Stainless Steel, Commercial, Heavy Duty Microwave With Push Button Controls (Amana HDC182).....	1,979.91	12.15
11 44 19 00-0150	EA		208/240 Volt, 1,800 Watt, 31-5/8" Length x 16-1/2" Width x 13-1/3" Height, Stainless Steel Commercial, Heavy Duty Microwave With Push Button Controls, Canadian Use Only (Amana HDC1815).....	1,993.13	12.15
11 44 19 00-0151	EA		208/240 Volt, 1,800 Watt, 20-3/4" Length x 22-3/5" Width x 14-1/2" Height, Stainless Steel, Commercial, Medium Duty Microwave With Push Button Controls (Waring WMO120).....	1,859.52	12.15
11 44 19 00-0152	EA		208/240 Volt, 2,100 Watt, 21-5/8" Length x 15-1/2" Width x 13-1/2" Height, 100 Programmable Menu Items, 11 Integrated Power Levels, Stainless Steel, Commercial, Heavy Duty Microwave (Amana HDC212).....	2,072.41	12.15
11 44 19 00-0153	EA		208/240 Volt, 2,100 Watt, 20" Length x 16-5/8" Width x 13-3/16" Height, 5 Cooking Stages, Half-size Pans, Stainless Steel, Commercial, Heavy Duty Microwave With Push Button Controls (Panasonic NE-21521).....	1,874.20	12.15
11 44 19 00-0154	EA		208/240 Volt, 2,200 Watt, 25-1/2" Length x 19-1/4" Width x 18-1/8" Height, Stainless Steel, Commercial, Heavy Duty Microwave With Push Button Controls (Amana RC22S2).....	3,380.55	12.15
11 44 19 00-0155	EA		208/240 Volt, 2,200 Watt, 25-1/2" Length x 19-1/4" Width x 18-1/8" Height, Stainless Steel, Commercial, Heavy Duty Microwave With Push Button Controls (Amana RC30S2).....	4,437.63	12.15
11 44 19 00-0156			Ceramic Broiler On Storage Base With Doors <small>(11 44 19)</small>		
11 44 19 00-0157	EA		Standard Finish Ceramic Boiler On Storage Base With Doors.....	9,160.39	163.20
11 44 19 00-0158	EA		Stainless Steel Front Ceramic Boiler On Storage Base With Doors.....	9,160.39	163.20
11 44 19 00-0159	EA		Stainless Steel Front And Sides Ceramic Boiler On Storage Base With Doors.....	11,385.00	203.74
11 44 19 00-0160			Gas Countertop Hot Plate <small>(11 44 19)</small>		
11 44 19 00-0161	EA		2 Burners Gas Countertop Hot Plate.....	1,167.85	20.78
11 44 19 00-0162			Food Service Additions <small>(11 44 19)</small>		
11 44 19 00-0163	EA		30" Diameter, Natural Gas, Cooktop With Electric Controls (Affinity 30Ge).....	7,826.11	20.56
11 44 19 00-0164	EA		Heavy Duty Stainless Steel Heated Under Counter Cabinet With Adjustable Thermostat, Digital Indicator, Chrome Plated Reals And Wire Shelves (Alto Shaam 500-S).....	5,141.73	178.26
11 44 19 00-0165	EA		Oven-Combination Heated Holding Cabinet (Alto Shaam CTP20-10).....	50,754.12	
11 44 19 00-0166	EA		1000 Watt, 1.2 CF, 14" Platter Capacity, Programmable, Commercial Grade, Stainless Steel, Microwave-oven (Amana RCS10TS).....	1,026.82	12.64
11 44 19 00-0167	EA		1000 Watts, Programmable Power Level, Commercial Grade, Stainless Steel, Microwave-oven (Amana RMS10TS).....	597.73	12.64
11 44 19 00-0168	EA		48" W x 24-1/2" D x 8" H, Single Deck, Gas Fired, Stainless Steel, Caster Mounted, Pizza Oven (Bakers Pride 3151).....	17,834.93	160.11
11 44 19 00-0169	EA		120 Volt, 14.9 Amperes, 20" W, 6 Gallon Capacity Water Bath, Sparkling And Still Water Dispenser (Blupura/Crystallize BLUBAR COUNTERTOP 80).....	8,438.06	308.48
11 44 19 00-0170	EA		1/3 HP, 120 Volt, 60 Hz, 15 Amperes, Top Opening, Self Contained Refrigerated System (Blupura/Crystallize FONTEMAGNA BRIDGE).....	5,750.41	308.48
11 44 19 00-0171	EA		Broiler Less, Programmable, Stainless Steel, Convotherm Electric Oven-streamer (Cleveland OES-10.20).....	19,942.56	224.16
11 44 19 00-0172	EA		115 VAC, 60 Hz, Forced Air Gas Combustion With Auto Ignition, Stainless Steel Skillet With Spring Assist Cover (Cleveland SGL-30-T1/Sgl-40-T1).....	36,358.93	222.69
11 44 19 00-0173	EA		50 PSI, Water-resistant, Stationary Trileg Tiltng Steam Jacketed Kettle (Cleveland / Groen KDL).....	31,209.95	114.20
11 44 19 00-0174	EA		Top Mounted, Insulated Heated Cabinet With Magnetic Latch Door (Crescor H-137-PWSUA-12C - 12c is discontinued hw-137-pwsua-12d is new model).....	18,896.06	61.24
11 44 19 00-0175	EA		6 Gallon, 1/5 HP, Bottom Mounted, Ice-Cream Dipping Cabinet (Delfield N255).....	5,008.27	259.24
11 44 19 00-0176	EA		3/4" Diameter, 36" Length, Moveable Gas Connector Kit (Dormont 1675KIT).....	282.19	21.15
11 44 19 00-0177	EA		1/4 HP, Stainless Steel, Mechanically Cooled Cold Food Unit (Duke AeroServ 316-25SS-N7).....	9,906.61	287.17
11 44 19 00-0178	EA		20", 3/8" Thick, Stainless Steel, Heavy Duty Mounting, Tempered Glass (English Mfg. M-107).....	13,589.34	12.64
11 44 19 00-0179	EA		1350lb, Stainless Steel, Elevated Ice Storage And Transport System (Follet Corporation ITS1350SG-60).....	19,453.49	170.13
11 44 19 00-0180	EA		Gas Fired Pasta Cooker (Frymaster GPCRB-SC).....	24,359.23	138.19
11 44 19 00-0181	EA		Stainless Steel, Anti-microbial, Vegetable Cutter (Globe A420VH).....	1,074.63	5.83
11 44 19 00-0182	EA		5 kw Tank Heater, 1 HP Self-draining Pump, Electronic Automatic Control, Stainless Steel, Dishwasher (Hobart AM-15T).....	25,729.85	200.94
11 44 19 00-0183	EA		Stainless Steel, Electric Dryer Interlocked With Washer To Start (Hobart Cle (BDELRX-STDDOM)).....	22,548.65	172.23
11 44 19 00-0184	EA		1/2 HP, Medium Duty, Built-in Sharpener With 12" Blade (Hobart Edge 7510).....	3,544.19	153.71
11 44 19 00-0185	EA		20 Quart, Countertop Mounted, Stainless Steel Bowl (Hobart HL200).....	10,879.98	266.85
11 44 19 00-0186	EA		Electronic Control, Stainless Steel Dishwasher (Hobart LXi/LXiH new model is Lxeh).....	17,360.59	200.94
11 44 19 00-0187	EA		27" x 32" x 26-3/4" H, Stainless Steel, Single Shelf Mixer Table (Hobart TABLE-HL2012).....	3,434.68	52.53
11 44 19 00-0188	EA		Remote Air Cooled, Stainless Steel, Ice Maker (Hoshizaki America KM-2100).....	16,454.12	240.16
11 44 19 00-0189	EA		Anti-microbial, Individual Crescent Cube, Stainless Steel, Ice Maker (Hoshizaki America KM-2100/2500S_H3).....	18,063.20	240.16
11 44 19 00-0190	EA		2,400 BTU, 1/3 HP, Air Cooled, Stainless Steel, Leg Mounted, Under Counter Ice Maker (Hoshizaki America F-330BAJ-c).....	7,253.36	213.48
11 44 19 00-0191	EA		24" Wide, Energy Efficient, Stainless Steel, Built-in Dishwasher (Kenmore 14743).....	1,460.24	97.21
11 44 19 00-0192	EA		3.7 CF, 27"W x 29-1/4"D x 39"H, Energy Efficient, Full Size, White Front-loading Washing Machine (Kenmore 41272).....	2,096.18	97.21
11 44 19 00-0193	EA		30" Wide, Slide In, Electric Coil, Black Top, Stainless Steel, Electric Range (Kenmore 46762).....	2,437.37	97.21
11 44 19 00-0194	EA		15.0 CF, Top Freezer Compartment With Self Defrosting, Reversible Door, White Refrigerator (Kenmore 60302).....	972.94	48.61
11 44 19 00-0195	EA		30" Stainless Steel, Vent Less Range Hood (Kenmore 22-51840).....	416.93	72.92
11 44 19 00-0196	EA		22.89 CF, 33" W x 66 1/2" H x 34 3/4" D, Tall Through-the-door Dispenser With Light And Ultra Ice® Stainless Steel Water Filtration System With Indicator Light (Kenmore 46-51313).....	1,666.97	48.61
11 44 19 00-0197	EA		Gas Fired, Adjustable Conveyor Speed, Single Level, Dual Air Return, Stainless Steel, Conveyor Oven (Middleby Marshall PS636G-1).....	31,552.10	160.11
11 44 19 00-0198	EA		Stainless Steel, Gas Fired, Standing Pilot, Conventional Oven (Montague 124-5).....	11,040.06	97.21
11 44 19 00-0199	EA		3/4" Thick, 36" Flat-top, 100,000 BTU, Manual Control, Heavy Duty Range (Montague 136-8).....	16,042.41	146.77
11 44 19 00-0200	EA		3/4" Thick Flat Top, 80,000 BTU, Thermostatic Control, Heavy Duty Range (Montague C36-8T).....	16,116.15	146.77
11 44 19 00-0201	EA		36", 114,000 BTU, Low Profile, Heavy-duty Counter Top With Six Burners (Montague Gas Range V136LB/UFLC-36R).....	37,482.89	106.74
11 44 19 00-0202	EA		24", 140,000 BTU, Gas Fired, Standing Pilot, Stainless Steel, Convection Oven With Four 12" Burners (Montague Legend 124-5).....	11,131.14	142.75

11 Equipment
11 40 Foodservice Equipment
11 44 Food Cooking Equipment



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 44 19 00-0203	EA	36", 110,000 BTU, Gas Fired, Open Top, Standing Pilot, Stainless Steel, Convection Oven With Two Round French Style Hot Tops (Montague Legend 136-9A)	13,694.43		181.45
11 44 19 00-0204	EA	225,000 BTU, Gas fired, Open Top, Standing Pilot, Stainless Steel, Convection Oven With Six Burners (Montague Legend V136-5)	13,694.43		181.45
11 44 19 00-0205	EA	36", 165,000 BTU, Gas Fired, Open Top, Standing Pilot, Stainless Steel, Convection Oven With Four Burners (Montague Legend V136-5A)	13,694.43		181.45
11 44 19 00-0206	EA	63,000 BTU, Gas Fired, Double Deck, Stainless Steel, Convection Oven (Montague Vectaire HX2-63A)	31,166.33		213.48
11 44 19 00-0207	EA	Ultra Continuous Feed Combination Food Processor. (Robot Coupe R 2 N)	2,202.19		238.83
11 44 19 00-0208	EA	Low Noise, Aluminum Alloy, Water Cooled Motor (Salvajor 750)	5,067.46		72.92
11 44 19 00-0209	EA	Low Flow, Backflow Prevention, Stainless Steel, Trough Collector (Salvajor S419)	13,685.62		228.26
11 44 19 00-0210	EA	92 GPH, Electronic Automatic Control, Stainless Steel, Dishwasher (Stero SDR4-PKG)	29,850.94		172.23
11 44 19 00-0211	EA	3-phase, Microprocessor Controlled, Air-cooled, Stainless Steel, Freezer (Taylor C723)	17,641.06		48.61
11 44 19 00-0212	EA	52-1/8"L x 35"D x 83-1/4"H, 1/3 HP, Microprocessor Controlled, Reach-in, Caster Mounted, Refrigerator (Traulsen G2000)	8,386.75		224.16
11 44 19 00-0213	EA	120 VAC, Wet Operation Only, Single Well, Round, Deep Drawn Stainless Steel, Cook'N Hold Built-in Food Warmer With Drain (Wells HW106D)	1,538.58		224.16
11 44 19 00-0214	EA	120 VAC, 3, 4, And 5 Well, Wet Or Dry Operation, Rectangular, Deep Drawn Stainless Steel, Built-in Modular Food Warmer (Wells MOD300DM)	3,767.89		224.16
11 44 19 00-0215	EA	120 VAC, 3, 4, And 5 Well, Wet Or Dry Operation, Rectangular, Deep Drawn Stainless Steel, Built-in Modular Food Warmer (Wells MOD400DM)	5,286.28		224.16
11 44 19 00-0216	EA	120 VAC, 3, 4, And 5 Well, Wet Or Dry Operation, Rectangular, Deep Drawn Stainless Steel, Built-in Modular Food Warmer (Wells MOD500DM)	6,412.63		224.16
11 44 19 00-0217	EA	Adjustable Radiant Flame, Thermostatically Controlled, Hearth Pizza Oven (Woodstone WS-FD-6045-RFG-L-IR-NG)	48,336.19		106.74
11 44 19 00-0218 Other Kettles (11 44 19)					
11 44 19 00-0219	EA	20 QT Trunion Kettle With Stand (Groen TDC/320)	5,176.11		114.20
11 44 19 00-0220	EA	40 QT Trunion Kettle With Stand (Groen TDA/140)	8,150.80		114.20
11 44 19 00-0221 Charbroilers (11 44 19)					
11 44 19 00-0222	EA	80,000 BTU, 26-13/16" Length x 24" Width x 16-5/16" Height, Gas Countertop Lava Briquette Charbroiler (Cooking Performance Group CBL24)	1,055.70		97.21
11 44 19 00-0223	EA	40,000 BTU, 26-13/16" Length x 15" Width x 16-5/16" Height, Gas Countertop Radiant Charbroiler (Cooking Performance Group CBR15)	861.65		129.59
11 44 19 00-0224	EA	70,000 BTU, 27-1/2" Length x 24" Width x 15" Height, Gas Countertop Radiant Charbroiler (Avantco AG24RC)	597.03		97.21
11 44 19 00-0225	EA	80,000 BTU, 26-13/16" Length x 24" Width x 16-5/16" Height, Gas Countertop Radiant Charbroiler (Cooking Performance Group CBR24)	1,099.79		111.12
11 44 19 00-0226	EA	80,000 BTU, 26-13/16" Length x 24" Width x 41-5/16" Height, Radiant Charbroiler With Storage Base (Cooking Performance Group 24CBRSBNL)	1,832.44		111.12
11 44 19 00-0227	EA	105,000 BTU, 27-1/2" Length x 36" Width x 15" Height, Gas Countertop Radiant Charbroiler (Avantco AG36RC)	1,120.54		129.59
11 44 19 00-0228	EA	120,000 BTU, 26-13/16" Length x 36" Width x 16-5/16" Height, Gas Countertop Radiant Charbroiler (Cooking Performance Group CBR36)	1,446.16		129.59
11 44 19 00-0229	EA	120,000 BTU, 32-1/8" Length x 36-3/8" Width x 40-13/16" Height, Gas Radiant Charbroiler With 2 Drawer Refrigerated Chef Base (Cooking Performance Group 36CBRRBNL)	3,468.00		155.54
11 44 19 00-0230	EA	120,000 BTU, 36-3/8" Length x 32-1/8" Width x 24-1/2" Height, Gas Lava Briquette Charbroiler With 2 Drawer Refrigerated Chef Base (Cooking Performance Group 36CBLRBNL)	3,484.28		155.54
11 44 19 00-0231	EA	120,000 BTU, 26-13/16" Length x 36" Width x 41-5/16" Height, Gas Radiant Charbroiler With Cabinet Base (Cooking Performance Group 36CBRSBNL)	2,162.53		129.59
11 44 19 00-0232	EA	140,000 BTU, 32-1/8" Length x 51-7/8" Width x 24-1/2" Height, Heavy-Duty Gas Griddle And Gas Lava Briquette Charbroiler With 2 Drawer Refrigerated Chef Base (Cooking Performance Group 24GTCLBNL)	4,965.86		155.54
11 44 19 00-0233	EA	140,000 BTU, 32-1/8" Length x 51-7/8" Width x 24-1/2" Height, Heavy-Duty Gas Griddle And Gas Radiant Charbroiler With 2 Drawer Refrigerated Chef Base (Cooking Performance Group 24GTCRBNL)	4,949.58		155.54
11 44 19 00-0234	EA	140,000 BTU, 32-1/8" Length x 51-7/8" Width x 24 1/2" Height, Gas Griddle And Gas Radiant Charbroiler With 2 Drawer Refrigerated Chef Base (Cooking Performance Group 24GMCRBNL)	4,656.52		155.54
11 44 19 00-0235	EA	160,000 BTU, 26-13/16" Length x 48" Width x 16-5/16" Height, Gas Countertop Radiant Charbroiler (Cooking Performance Group CBR48)	1,950.22		194.43
11 44 19 00-0236	EA	160,000 BTU, 32-1/8" Length x 51-7/8" Width x 24-1/2" Height, Gas Radiant Charbroiler With 2 Drawer Refrigerated Chef Base (Cooking Performance Group 48CBRRBNL)	3,969.07		194.43
11 44 19 00-0237	EA	200,000 BTU, 30-1/2" Length x 60" Width x 16-3/4" Height, Gas Radiant Charbroiler (Cooking Performance Group CBR60-NG(CPG))	2,422.37		194.43
11 44 19 00-0238	EA	200,000 BTU, 30-1/2" Length x 60" Width x 16-3/4" Height, Gas Radiant Charbroiler With 4 Drawer Refrigerated Chef Base (Cooking Performance Group 60CBRRBNL)	4,945.94		194.43
11 46 Food Dispensing Equipment (11 46)					
11 46 13 Bar Equipment (11 46)					
11 46 13 00-0001 Soft Serve Machines (11 46 13)					
11 46 13 00-0002	EA	Soft Serve Machines, Medium	12,791.84		126.17
11 46 13 00-0003	EA	Soft Serve Machines, Large	21,573.07		154.13
11 46 13 00-0004 Salad Bars (11 46 13)					
11 46 13 00-0005	EA	96" Refrigerated Salad Bar With Light 54" Height	14,034.00		442.54
11 46 13 00-0006	EA	96" Refrigerated Salad Bar Without Light 54" Height	12,863.10		442.54
11 46 13 00-0007	EA	96" Iced Salad Bar Without Light 54" Height	9,062.43		243.14
11 46 13 00-0008	EA	79" Iced Salad Bar Without Light 54" Height	7,165.28		199.74
11 46 13 00-0009	EA	79" Refrigerated Salad Bar Without Light 54" Height	10,887.98		293.04
11 46 13 00-0010	EA	114" Iced Salad Bar 34" Height	12,009.29		259.58



Equipment	11
Foodservice Equipment	11 40
Food Dispensing Equipment	11 46

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 46 13 00-0011	EA		Salad Bar Tray Fixed.....	1,607.49	43.96
11 46 13 00-0012	EA		Salad Bar Tray Hinged.....	1,710.59	43.96
11 46 16 Service Line Equipment (11 46)					
11 46 16 00-0001			Food Warmer Holding Station (11 46 16)		
11 46 16 00-0002	EA		Food Warmer Station And Heat Lamp.....	813.44	15.61
11 46 16 00-0003 Reach-In Food Warmers (11 46 16)					
11 46 16 00-0004	EA		One Drawer, 16 Roll Capacity Food Warmer	1,750.45	33.62
11 46 16 00-0005	EA		Three Drawer, 36 Roll Capacity Food Warmer.....	4,005.77	77.00
11 46 16 00-0006 Countertop Food Warmer (11 46 16)					
11 46 16 00-0007	EA		12" x 20", 1500 Watt, 120 Voltage, Full Size Electric Countertop Food Cooker / Warmer (Avantco W50CKR)	187.04	27.00
11 46 16 00-0008	EA		12" x 20", 1200 Watt, 120 Voltage, Full Size Electric Countertop Food Warmer (Avantco W50)	162.69	27.00
11 46 16 00-0009	EA		12" x 20", 1200 Watt, 120 Voltage, Full Size Electric Countertop Food Warmer / Topping Station With 1 Condiment Pump And (1) 7 Quart Inset With Lid And Ladle (Avantco WK12007PL)	519.71	27.00
11 46 16 00-0010	EA		12" x 20", 1200 Watt, 120 Voltage, Full Size Electric Countertop Food Warmer / Soup Station With 3 Insets, 3 Covers, And 3 (3 Ounce) Ladles (Avantco WK12004X3).....	355.76	27.00
11 46 16 00-0011 Hot Cabinets With Top Wells Electric (11 46 16)					
11 46 16 00-0012	EA		2 Wells, 2 Compartments Hot Cabinet With Top Wells, Electric	9,368.43	163.20
11 46 16 00-0013	EA		3 Wells, 3 Compartments Hot Cabinet With Top Wells, Electric.....	13,384.74	233.89
11 46 16 00-0014 Portable Hot Food Units (11 46 16)					
11 46 16 00-0015	EA		46" Wide x 28" Deep x 34" Height, Three Well, Stainless Steel Hot Food Station (Vollrath Model 37030).....	5,451.52	
11 46 16 00-0016	EA		60" Wide x 28" Deep x 34" Height, Four Well, Stainless Steel Hot Food Station (Vollrath Model 37040).....	6,242.55	
11 46 16 00-0017	EA		74" Wide x 28" Deep x 34" Height, Five Well, Stainless Steel Hot Food Station (Vollrath Model 37050).....	7,055.93	
11 46 16 00-0018 Stationary Hot Food Units (11 46 16)					
11 46 16 00-0019	EA		46" Wide x 29-1/2" Deep x 34" Height, Three Well, Stainless Steel Hot Food Station (Vollrath Model 38203)	1,649.60	33.24
11 46 16 00-0020	EA		61-1/4" Wide x 29-1/2" Deep x 34" Height, Four Well, Stainless Steel Hot Food Station (Vollrath Model 38204)	2,213.66	38.26
11 46 16 00-0021	EA		76" Wide x 29-1/2" Deep x 34" Height, Five Well, Stainless Steel Hot Food Station (Vollrath Model 38205)	2,756.72	49.00
11 46 16 00-0022 Serving Counters (11 46 16)					
11 46 16 00-0023	LF		11" Deep, Tray Slide With 3 Raised Reinforced Ribs And Backing Plate, 316 Stainless Steel Solid Surface, Straight Section	117.69	43.55
11 46 16 00-0024	LF		11" Deep, Tray Slide With 3 Raised Reinforced Ribs And Backing Plate, 316 Stainless Steel Solid Surface, Curved Section	152.32	66.71
11 46 16 00-0025 Drop-In Equipment (11 46 16)					
11 46 16 00-0026	EA		Hot Food Well, Rectangular.....	571.12	138.76
11 46 16 00-0027	EA		Hot Food Well, Circular.....	525.25	138.76
11 46 16 00-0028	EA		Refrigerated Well, 2 Compartment	1,930.17	138.76
11 46 16 00-0029	EA		Refrigerated Well, 3 Compartment	2,192.37	154.13
11 46 16 00-0030	EA		Refrigerated Well, 4 Compartment	2,490.61	173.45
11 46 16 00-0031	EA		Frost Cold Plate.....	2,166.24	154.13
11 46 16 00-0032 Beverage Dispensing (11 46 16)					
11 46 16 00-0033	EA		Coffee Urn, Twin 3 Gallon	3,495.07	205.06
11 46 16 00-0034	EA		Coffee Urn, Twin 6 Gallon	4,977.96	287.05
11 46 16 00-0035	EA		Coffee Brewer, 5 Burner	1,442.23	205.06
11 46 16 00-0036	EA		Hot Chocolate Dispenser.....	1,404.26	168.90
11 46 16 00-0037	EA		Iced Tea Brewer	2,057.96	168.90
11 46 16 00-0038	EA		Juice Dispenser (Concentrate)	1,533.64	308.06
11 46 16 00-0039	EA		Jet Spray Dispenser	2,164.96	308.38
11 46 16 00-0040	EA		Milk Dispenser, Bulk, 2 Flavor	1,810.27	173.45
11 46 16 00-0041	EA		Milk Dispenser, Bulk, 3 Flavor	2,463.97	173.45
11 46 16 00-0042 Dish Dispensers (11 46 16)					
11 46 16 00-0043	EA		Heated Plate Lift; Adjustable Plate Storage And Transport (Adcraft ADC-LR-2)	1,956.23	27.00
11 46 16 00-0044	EA		12" Diameter, Drop-in, Dish Dispenser	725.42	34.70
11 46 16 00-0045	EA		Drop-in, Cup And Glass Dispenser.....	1,243.38	107.90
11 46 16 00-0046	EA		Drop-in, Disposable Cup Dispenser.....	449.99	24.31
11 46 16 00-0047 Tray And Silver Dispensers (11 46 16)					
11 46 16 00-0048	EA		Tray And Silver Dispensers Mobile.....	2,814.78	24.31

11	11 Equipment
	11 40 Foodservice Equipment
	11 46 Food Dispensing Equipment



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 46 16 00-0049		Condiment Dispensers <small>(11 46 16)</small>			
11 46 16 00-0050	EA	Butter Pat Dispenser.....	168.55		30.42
11 46 16 00-0051	EA	Bread Dispenser, Counter Top.....	469.03		30.42
11 46 16 00-0052		Sandwich Rack Warmer <small>(11 46 16)</small>			
11 46 16 00-0053	EA	18 Compartment, 2 Tier Sandwich Rack Warmer.....	3,526.42		124.62
11 46 16 00-0054		Mobile Bread Counter <small>(11 46 16)</small>			
11 46 16 00-0055	EA	Mobile Bread And Roll Counter.....	8,094.30		280.15
11 46 16 00-0056		Open Service Stand <small>(11 46 16)</small>			
11 46 16 00-0057	EA	6' Open Service Stand.....	3,123.74		102.21
11 46 16 00-0058	LF	Each Additional Foot Over 6 Foot Add.....	427.34		13.82
11 46 16 00-0059		Mobile Serving Stand Unit <small>(11 46 16)</small>			
11 46 16 00-0060	EA	36" Mobile Serving Stand Unit.....	2,728.36		97.76
11 46 16 00-0061	EA	96" Mobile Serving Stand Unit.....	4,484.37		146.53
11 46 16 00-0062		Reach-In Heated Cabinets <small>(11 46 16)</small>			
11 46 16 00-0063	EA	Heated Cabinet, Reach-in, 1 Compartment.....	5,516.58		177.94
11 46 16 00-0064	EA	Heated Cabinet, Reach-in, 2 Compartment.....	7,947.95		223.84
11 46 16 00-0065	EA	Heated Cabinet, 1 Compartment, Pass-Through Roll-In.....	5,774.62		177.94
11 46 16 00-0066	EA	Heated Cabinet, Pass-Through, Roll-In 2 Compartment.....	8,322.97		223.84
11 46 16 00-0067		Mobile Heated Cabinets <small>(11 46 16)</small>			
11 46 16 00-0068	EA	Mobile, Heated Cabinet.....	6,199.76		60.75
11 46 16 00-0069		Smoothie Machine <small>(11 46 16)</small>			
11 46 16 00-0070	EA	Smoothie Machines 3-1/2 HP Commercial Blender With Toggle Control And Two 64 Ounce Polycarbonate Containers (Avamix BX2000T2J).....	391.95		27.00
11 46 16 00-0071	EA	Smoothie Machines 3-1/2 HP Commercial Blender With Toggle Control And One 64 Ounce Polycarbonate Container (Avamix BX2000T).....	343.14		27.00
11 46 16 00-0072	EA	Smoothie Machines 3-1/2 HP Commercial Blender With Toggle Control, Adjustable Speed, And Two 64 Ounce Polycarbonate Containers (Avamix BX2000V2J).....	416.98		27.00
11 46 16 00-0073	EA	Smoothie Machines 3-1/2 HP Commercial Blender With Touchpad Control, Adjustable Speed, And Two 64 Ounce Polycarbonate Containers (Avamix BX2100E2J).....	429.50		27.00
11 46 16 00-0074	EA	Smoothie Machines 2 HP Commercial Blender With Toggle Control And 64 Ounce Polycarbonate Container (Avamix BL2T64).....	225.18		27.00
11 46 16 00-0075		Refrigerated Buffet Display Table <small>(11 46 16)</small>			
11 46 16 00-0076	EA	35" Stainless Steel Refrigerated Buffet Display Table, Cooling Serving Stations (Turbo Air JBT-36-N).....	3,412.88		27.00
11 46 16 00-0077	EA	47" Stainless Steel Refrigerated Buffet Display Table, Cooling Serving Stations (Turbo Air JBT-48-N).....	4,522.26		27.00
11 46 16 00-0078	EA	59" Stainless Steel Refrigerated Buffet Display Table, Cooling Serving Stations (Turbo Air JBT-60-N).....	5,225.04		27.00
11 46 16 00-0079	EA	71" Stainless Steel Refrigerated Buffet Display Table, Cooling Serving Stations (Turbo Air JBT-72-N).....	6,119.65		27.00
11 46 16 00-0080		Refrigerated Bakery Display Case <small>(11 46 16)</small>			
11 46 16 00-0081	EA	26-1/2" Length x 36" Width x 48" Height, 36" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Avantco BC36HCW).....	1,960.50		24.31
11 46 16 00-0082	EA	26-1/2" Length x 47-7/8" Width x 48" Height, 48" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, Black (Avantco BC48HCB).....	2,247.41		24.31
11 46 16 00-0083	EA	26-1/2" Length x 59-2/3" Width x 48" Height, 48" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Avantco BC48HCW).....	2,254.31		27.80
11 46 16 00-0084	EA	26-1/2" Length x 59-2/3" Width x 48" Height, 60" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, Black (Avantco BC60HCB).....	2,445.59		27.80
11 46 16 00-0085	EA	26-1/2" Length x 59-2/3" Width x 48" Height, 60" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Avantco BC60HCW).....	2,445.59		27.80
11 46 16 00-0086	EA	26-1/2" Length x 71-1/2" Width x 48" Height, 72" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, Black (Avantco BC72HCB).....	3,132.45		27.80
11 46 16 00-0087	EA	26-1/2" Length x 72-1/2" Width x 48" Height, 72" Curved Glass, 2 Shelves, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Bakery Display Case, White (Avantco 193BC72HCW).....	3,132.45		27.80
11 46 16 00-0088	EA	27-1/2" Length x 35-3/8" Width x 44-3/8" Height, 35-1/2" Square Glass, 2 Shelves, 2 Doors, 36 To 43 Degrees Fahrenheit Temperature Range, Refrigerant R-290, Full Service Two Tier Refrigerated Bakery Display Case, White (Turbo Air TBP3646NV).....	3,942.96		32.37
11 46 16 00-0089	EA	27-1/2" Length x 35-3/8" Width x 44-3/8" Height, 35-1/2" Square Glass, 1 Shelf, 2 Doors, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, Black (Turbo Air TBP3646FN).....	5,009.73		32.37



Equipment	11	
Foodservice Equipment	11 40	↕
Food Dispensing Equipment	11 46	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 46 16 00-0090	EA	27-1/2" Length x 35-3/8" Width x 44-3/8" Height, 35-1/2" Square Glass, 1 Shelf, Two Doors, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case, Black (Turbo Air TBP3646NN).....	3,942.96		32.37
11 46 16 00-0091	EA	27-1/2" Length x 35-3/8" Width x 44-3/8" Height, 35-1/2" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Two Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP3646FW).....	5,009.73		32.37
11 46 16 00-0092	EA	27-1/2" Length x 35-3/8" Width x 52-3/8" Height, 35-1/2" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Three Tier Refrigerated Bakery Display Case, White (Turbo Air TBP3654NW).....	4,176.14		32.37
11 46 16 00-0093	EA	27-1/2" Length x 35-3/8" Width x 52-3/8" Height, 35-1/2" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP3654F).....	4,176.14		32.37
11 46 16 00-0094	EA	27-1/2" Length x 35-3/8" Width x 52-3/8" Height, 35-1/2" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case, Black (Turbo Air TBP3654NN).....	4,176.14		32.37
11 46 16 00-0095	EA	27-1/2" Length x 47-1/4" Width x 44-3/8" Height, 47" Square Glass, 1 Shelf, 2 Doors, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case, Black (Turbo Air TBP4846NN).....	4,437.93		32.37
11 46 16 00-0096	EA	27-1/2" Length x 47-1/4" Width x 44-3/8" Height, 47" Square Glass, 1 Shelf, 2 Doors, R-290 Refrigerant, Two Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP4846FW).....	5,640.87		32.37
11 46 16 00-0097	EA	27-1/2" Length x 47-1/4" Width x 44-3/8" Height, 47" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case, White (Turbo Air TBP4846NW).....	4,437.93		32.37
11 46 16 00-0098	EA	27-1/2" Length x 47-1/4" Width x 44-3/8" Height, 47" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Full Service Two Tier Drop-In Refrigerated Bakery Display Case (Turbo Air TBP4846FD).....	5,312.80		32.37
11 46 16 00-0099	EA	27-1/2" Length x 47-1/4" Width x 44-3/8" Height, 47" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Full Service Two Tier Black Refrigerated Bakery Display Case With Lift-Up Front Glass (Turbo Air TBP4846FN).....	5,640.87		32.37
11 46 16 00-0100	EA	27-1/2" Length x 47-1/4" Width x 52-3/8" Height, 47" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP4854FW).....	5,974.97		32.37
11 46 16 00-0101	EA	27-1/2" Length x 47-1/4" Width x 52-3/8" Height, 47" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case, White (Turbo Air TBP4854NW).....	4,700.34		32.37
11 46 16 00-0102	EA	27-1/2" Length x 47-1/4" Width x 52-3/8" Height, 47" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Drop-In Refrigerated Bakery Display Case (Turbo Air TBP4854FD).....	5,627.32		32.37
11 46 16 00-0103	EA	27-1/2" Length x 47-1/4" Width x 52-3/8" Height, 47" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Black Refrigerated Bakery Display Case With Lift-Up Front Glass (Turbo Air TBP4854FN).....	5,974.97		32.37
11 46 16 00-0104	EA	27-1/2" Length x 47-1/4" Width x 52-3/8" Height, 47" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case, Black (Turbo Air TBP4854NN).....	4,700.34		32.37
11 46 16 00-0105	EA	27-1/2" Length x 59" Width x 44-3/8" Height, 59" Square Glass, 1 Shelf, 2 Doors, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP6046FW).....	6,181.93		32.37
11 46 16 00-0106	EA	27-1/2" Length x 59" Width x 44-3/8" Height, 59" Square Glass, 1 Shelf, 2 Doors, R-290 Refrigerant, Full Service Two Tier Drop-In Refrigerated Bakery Display Case (Turbo Air TBP6046FD).....	5,822.23		32.37
11 46 16 00-0107	EA	27-1/2" Length x 59" Width x 44-3/8" Height, 59" Square Glass, 1 Shelf, 2 Doors, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, Black (Turbo Air TBP6046FN).....	6,181.93		32.37
11 46 16 00-0108	EA	27-1/2" Length x 59" Width x 44-3/8" Height, 59" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case, Black (Turbo Air TBP6046NN).....	6,181.93		32.37
11 46 16 00-0109	EA	27-1/2" Length x 59" Width x 44-3/8" Height, 59" Square Glass, 2 Shelves, 1 Door, R-290 Refrigerant, Full Service Two Tier Refrigerated Bakery Display Case, Black (Turbo Air TBP6054FD).....	6,167.47		32.37
11 46 16 00-0110	EA	27-1/2" Length x 59" Width x 52-3/8" Height, 36" Curved Glass, 2 Shelves, 2 Doors, 36 To 43 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, Black (Avantco 193BC36HCB).....	1,982.57		35.38
11 46 16 00-0111	EA	27-1/2" Length x 59" Width x 52-3/8" Height, 59" Square Glass, 1 Shelf, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP6054FW).....	6,554.71		35.38
11 46 16 00-0112	EA	27-1/2" Length x 59" Width x 52-3/8" Height, 59" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case, White (Turbo Air TBP6054NW).....	5,156.26		35.38
11 46 16 00-0113	EA	27-1/2" Length x 35-3/8" Width x 52-3/8" Height, 35-1/2" Square Glass, 2 Shelves, 2 Doors, R-290 Refrigerant, Full Service Three Tier Refrigerated Bakery Display Case With Lift-Up Front Glass, White (Turbo Air TBP3654FW).....	5,307.07		32.37
11 46 16 00-0114	EA	34-1/4" Length x 36-1/2" Width x 50-1/8" Height, 36" Curved Glass, 2 Shelves, R-290 Refrigerant, Full Service Dry Refrigerated Bakery Display Case, White (Turbo Air TCGB36RWN).....	2,388.55		35.38
11 46 16 00-0115	EA	34-1/4" Length x 36-1/2" Width x 50-1/8" Height, 36" Flat Glass, 2 Shelves, R-290 Refrigerant, Open, Full Service Refrigerated Bakery Display Case, Black (Turbo Air TCGB36FBN).....	6,770.41		35.38
11 46 16 00-0116	EA	34-1/4" Length x 36-1/2" Width x 50-1/8" Height, 36" Flat Glass, 2 Shelves, R-290 Refrigerant, Open, Full Service Refrigerated Bakery Display Case, White (Turbo Air TCGB36FWN).....	6,770.41		35.38
11 46 16 00-0117	EA	34-1/4" Length x 36-1/2" Width x 50-1/8" Height, 36" Curved Glass, 2 Shelves, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Turbo Air TCGB362WN).....	6,770.41		35.38
11 46 16 00-0118	EA	34-1/4" Length x 48-1/2" Width x 50-1/8" Height, 48" Curved Glass, 2 Shelves, R-290 Refrigerant, Full Service Refrigerated Dry Bakery Display Case, White (Turbo Air TCGB48DWN).....	5,458.31		35.38
11 46 16 00-0119	EA	34-1/4" Length x 48-1/2" Width x 50-1/8" Height, 48" Flat Glass, 2 Shelves, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Open, Refrigerated Bakery Display Case, Black (Turbo Air TCGB48FBN).....	8,149.58		35.38
11 46 16 00-0120	EA	34-1/4" Length x 48-1/2" Width x 50-1/8" Height, 48" Flat Glass, 2 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Turbo Air TCGB48FWN).....	8,149.58		35.38
11 46 16 00-0121	EA	34-1/4" Length x 48-1/2" Width x 50-1/8" Height, 48" Curved Glass, 2 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Turbo Air TCGB482WN).....	8,149.58		35.38
11 46 16 00-0122	EA	34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Curved Glass, 2 Shelves, R-290 Refrigerant, Full Service Refrigerated Dry Bakery Display Case, White (Turbo Air TCGB60DWN).....	6,273.21		35.38
11 46 16 00-0123	EA	34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Flat Glass, 2 Shelves, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, Black (Turbo Air TCGB60FBN).....	8,277.62		35.38
11 46 16 00-0124	EA	34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Flat Glass, 2 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Open, Full Service Refrigerated Bakery Display Case, White (Turbo Air TCGB60FWN).....	15,468.04		35.38
11 46 16 00-0125	EA	34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Curved Glass, 4 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Dry Refrigerated Bakery Display Case, White (Turbo Air TCGB602WN).....	15,468.04		35.38
11 46 16 00-0126	EA	34-1/4" Length x 72-1/2" Width x 50-1/8" Height, 72" Curved Glass, 2 Shelves, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Refrigerated Bakery Display Case, White (Turbo Air TCGB722WN).....	8,655.86		38.88

11	11 Equipment
	11 40 Foodservice Equipment
	11 46 Food Dispensing Equipment



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 46 16 00-0127	Dry Bakery Display Case <small>(11 46 16)</small>		
11 46 16 00-0128	EA 26-1/2" Length x 36" Width x 48" Height, 36" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, Black (Avantco BCD36B).....	1,697.42	24.31
11 46 16 00-0129	EA 26-1/2" Length x 36" Width x 48" Height, 36" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, White (Avantco BCD36W).....	1,697.42	24.31
11 46 16 00-0130	EA 26-1/2" Length x 47.8" Width x 48" Height, 48" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, Black (Avantco BCD48B).....	1,880.72	24.31
11 46 16 00-0131	EA 26-1/2" Length x 47.8" Width x 48" Height, 48" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, White (Avantco BCD48W).....	1,880.72	24.31
11 46 16 00-0132	EA 26-1/2" Length x 59-2/3" Width x 48" Height, 60" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, Black (Avantco BCD60B).....	2,162.58	27.80
11 46 16 00-0133	EA 26-1/2" Length x 59-2/3" Width x 48" Height, 60" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, White (Avantco BCD60W).....	2,575.01	27.80
11 46 16 00-0134	EA 26-1/2" Length x 71-1/2" Width x 48" Height, 72" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, Black (Avantco BCD72B).....	2,520.02	27.80
11 46 16 00-0135	EA 26-1/2" Length x 71-1/2" Width x 48" Height, 72" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, White (Avantco BCD72W).....	2,520.02	27.80
11 46 16 00-0136	EA 27-1/2" Length x 36-3/8" Width x 44-3/8" Height, 73-11/16" Curved Glass, 1 Shelf, 2 Doors, Full Service Dry Bakery Display Case, Black (Beverage-Air TBP3646FN).....	5,277.49	32.37
11 46 16 00-0137	EA 27-1/2" Length x 36-3/8" Width x 44-3/8" Height, 73-11/16" Curved Glass, 1 Shelf, 2 Doors, Full Service Dry Bakery Display Case, White (Beverage-Air TBP3646FW).....	10,490.15	32.37
11 46 16 00-0138	EA 34-1/4" Length x 72-1/2" Width x 50-1/8" Height, 72" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, White (Turbo Air TCGB72DWN).....	6,440.99	38.88
11 46 16 00-0139	EA 35-3/4" Length x 37-1/4" Width x 48-9/16" Height, 37-1/4" Curved Glass, 2 Shelves, Full Service Dry Bakery Display Case, White (Beverage-Air CDR3HCWD).....	5,118.86	35.38
11 46 16 00-0140	EA 35-3/4" Length x 36-1/4" Width x 48-9/16" Height, 37-1/4" Curved Glass, 2 Shelves, 2 Doors, Dry Bakery Display Case, Black (Beverage-Air CDR3HCBD).....	5,118.86	35.38
11 46 16 00-0141	EA 35-3/4" Length x 49-1/4" Width x 48-9/16" Height, 49-1/4" Curved Glass, 2 Shelves, 2 Doors, Full Service Dry Bakery Display Case, Black (Beverage-Air CDR4HCBD).....	5,118.86	35.38
11 46 16 00-0142	EA 35-3/4" Length x 49-1/4" Width x 48-9/16" Height, 49-1/4" Curved Glass, 2 Doors, 2 Shelves, Dry Bakery Display Case, White (Beverage-Air CDR4HCWD).....	5,118.86	35.38
11 46 16 00-0143	EA 35-3/4" Length x 60-1/4" Width x 48-9/16" Height, 60-1/4" Curved Glass, 2 Shelves, 2 Doors, Dry Bakery Display Case, Black (Beverage-Air CDR5HCBD).....	5,323.70	35.38
11 46 16 00-0144	EA 35-3/4" Length x 60-1/4" Width x 48-9/16" Height, 60-1/4" Curved Glass, 2 Shelves, 2 Doors, Full Service Dry Bakery Display Case, White (Beverage-Air CDR5HCWD).....	5,323.70	35.38
11 46 16 00-0145	EA 35-3/4" Length x 73-11/16" Width x 48-9/16" Height, 73-11/16" Curved Glass, 2 Shelves, 2 Doors, Full Service Dry Bakery Display Case, Black (Beverage-Air CDR6HCBD).....	5,756.06	38.88
11 46 16 00-0146	EA 35-3/4" Length x 73-11/16" Width x 48-9/16" Height, 73-11/16" Curved Glass, 2 Shelves, 2 Doors, Full Service Dry Bakery Display Case, White (Beverage-Air CDR6HCWD).....	5,756.06	38.88
11 46 16 00-0147	Dual Dry/Refrigerated Bakery Display Case <small>(11 46 16)</small>		
11 46 16 00-0148	EA 34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Flat Glass, 4 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Dual Dry/Refrigerated Bakery Display Case, Black (Turbo Air TCGB60UFCBON).....	16,791.77	35.38
11 46 16 00-0149	EA 34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Flat Glass, 4 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Dual Dry/Refrigerated Bakery Display Case, White (Turbo Air TCGB60UFCOWN).....	16,791.77	35.38
11 46 16 00-0150	EA 34-1/4" Length x 60-1/2" Width x 50-1/8" Height, 60" Curved Glass, 4 Shelves, 33 To 41 Degrees Fahrenheit Temperature Range, Refrigerant R-290, Full Service Dual Dry/Refrigerated Bakery Display Case, White (Turbo Air TCGB60COWN).....	16,791.77	35.38
11 46 16 00-0151	EA 34-1/4" Length x 72-1/2" Width x 50-1/8" Height, 72" Curved Glass, 2 Shelves, 2 Doors, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Dual Dry/Refrigerated Bakery Display Case, White (Turbo Air TCGB72UFCOWN).....	16,798.86	38.88
11 46 16 00-0152	EA 34-1/4" Length x 72-1/2" Width x 50-1/8" Height, 72" Curved Glass, 4 Shelves, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Full Service Dual Dry/Refrigerated Bakery Display Case, White (Turbo Air TCGB72COWN).....	17,243.11	38.88
11 46 16 00-0153	Refrigerated Deli Case <small>(11 46 16)</small>		
11 46 16 00-0154	EA 30" Length x 72-1/2" Width x 41-7/8" Height, 72" Low Profile Curved Glass, 1 Shelf, Sliding Door, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Turbo Air TCDD72LWN).....	8,577.52	129.59
11 46 16 00-0155	EA 30" Length x 72-1/2" Width x 50-1/8" Height, 72" Curved Glass, 2 Shelves, Sliding Door, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Turbo Air TCDD72HWN).....	8,577.52	129.59
11 46 16 00-0156	EA 30" Length x 96-1/2" Width x 41-7/8" Height, 96" Low Profile Curved Glass, 1 Shelf, Sliding Door, 33 To 41 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Turbo Air TCDD96LWN).....	9,822.57	129.59
11 46 16 00-0157	EA 30" Length x 96-1/2" Width x 5-1/8" Height, 96" Curved Glass, 1 Shelf, Sliding Door, 33 To 41 Degree Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Turbo Air TCDD96HWN).....	9,822.57	129.59
11 46 16 00-0158	EA 32-1/2" Length x 36-1/4" Width x 42-7/8" Height, 36" Curved Glass, 4 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, Black (Avantco DLC36HCB).....	2,024.23	77.77
11 46 16 00-0159	EA 32-1/2" Length x 36-1/4" Width x 42-7/8" Height, 36" Curved Glass, 4 Shelves, 2 Doors, Sliding Doors, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Stainless Steel Refrigerated Deli Case (Avantco DLC36HCS).....	2,200.96	77.77
11 46 16 00-0160	EA 32-1/2" Length x 36-1/4" Width x 42-7/8" Height, 36" Curved Glass, 4 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Avantco DLC36HCW).....	2,024.23	77.77
11 46 16 00-0161	EA 32-1/2" Length x 47-1/4" Width x 42-7/8" Height, 47" Curved Glass, 6 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, Black (Avantco DLC47HCB).....	2,295.66	97.21



Equipment	11	
Foodservice Equipment	11 40	↕
Food Dispensing Equipment	11 46	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 46 16 00-0162	EA		32-1/2" Length x 47-1/4" Width x 42-7/8" Height, 47" Curved Glass, 6 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Stainless Steel Refrigerated Deli Case (Avantco DLC47HCS).....	2,490.99	97.21
11 46 16 00-0163	EA		32-1/2" Length x 64-1/3" Width x 42-7/8" Height, 64" Curved Glass, 6 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Avantco DLC64HCW).....	2,695.36	129.59
11 46 16 00-0164	EA		32-1/2" Length x 64-1/4" Width x 42-7/8" Height, 64" Curved Glass, 6 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, Black (Avantco DLC64HCB).....	2,695.36	129.59
11 46 16 00-0165	EA		32-1/2" Length x 64-1/4" Width x 42-7/8" Height, 64" Curved Glass, 6 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Stainless Steel Refrigerated Deli Case (Avantco DLC64HCS).....	3,039.52	129.59
11 46 16 00-0166	EA		32-1/2" Length x 64-1/4" Width x 42-7/8" Height, 47" Curved Glass, 6 Shelves, 2 Doors, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Avantco DLC47HCW).....	2,360.50	129.59
11 46 16 00-0167	EA		32-1/2" Length x 82" Width x 42-7/8" Height, 82" Curved Glass, 9 Shelves, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, Black (Avantco DLC82HCB).....	2,937.20	129.59
11 46 16 00-0168	EA		32-1/2" Length x 82" Width x 42-7/8" Height, 82" Curved Glass, 9 Shelves, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Refrigerated Deli Case, White (Avantco DLC82HCW).....	2,937.20	129.59
11 46 16 00-0169	EA		32-1/2" Length x 82" Width x 42-7/8" Height, 82" Curved Glass, 9 Shelves, Sliding Door, 33 To 40 Degrees Fahrenheit Temperature Range, R-290 Refrigerant, Stainless Steel Refrigerated Deli Case (Avantco DLC82HCS).....	3,225.55	129.59
11 46 19 Soda Fountain Equipment (11 46)					
11 46 19 00-0001 Carbonated Beverage Dispensing (11 46 19)					
11 46 19 00-0002	EA		Carbonated Beverage Dispenser.....	3,869.70	433.69
11 46 19 00-0003	EA		Carbonated Beverage Dispenser With 90 LB Ice	6,135.88	495.59
11 46 19 00-0004	EA		Carbonated Beverage Dispenser With 150 LB Ice	11,277.98	693.81
11 46 19 00-0005 Beverage Chilling Systems (11 46 19)					
11 46 19 00-0006	EA		Beverage Chiller, Small	8,278.70	352.41
11 46 19 00-0007	EA		Beverage Chiller, Large	15,515.58	528.66
11 46 83 Ice Machines (11 46)					
11 46 83 00-0001 Ice Flakers (11 46 83)					
11 46 83 00-0002	EA		300 LB/Day, Ice Flakers	6,247.48	574.32
11 46 83 00-0003	EA		600 LB/Day, Ice Flakers	11,327.23	918.92
11 46 83 00-0004	EA		1,000 LB/Day, Ice Flakers	13,991.74	1,263.52
11 46 83 00-0005	EA		2,000 LB/Day, Ice Flakers	17,109.93	1,378.39
11 46 83 00-0006 Undercounter Ice Machines With Bin (11 46 83)					
11 46 83 00-0007	EA		53 LB/Day, Air Cooled Undercounter Octagonal Cube Ice Machine With 25 LB Capacity Bin (Manitowoc SM-50A 115/60/1)	2,422.68	24.31
11 46 83 00-0008	EA		85 LB/Day, Air Cooled Undercounter Pearl/Nugget Ice Machine With 22 LB Capacity Bin (Ice-O-Matic GEMU090).....	3,895.03	186.79
11 46 83 00-0009	EA		137 LB/Day, Air Cooled Undercounter Half Dice Cube Ice Machine With 90 LB Capacity Bin (Manitowoc UYF0140A).....	2,969.68	186.79
11 46 83 00-0010	EA		100 LB/Day, Undercounter, Air Cooled Ice Machine With 57 LB Capacity Bin (Scotsman CU0920MA)	2,898.91	186.79
11 46 83 00-0011	EA		227 LB/Day, Undercounter, Air Cooled Ice Machine With 80 Lb Capacity Bin (Scotsman UC2024SA)	3,122.62	200.14
11 46 83 00-0012	EA		282 LB/Day, Undercounter, Air Cooled Ice Machine With 80 Lb Capacity Bin (Scotsman UC2724SA)	3,491.71	200.14
11 46 83 00-0013 Ice Cube Maker (11 46 83)					
11 46 83 00-0014	EA		320 LB/Day, Modular Ice Maker Without Bin	4,104.86	200.14
11 46 83 00-0015	EA		451 LB/Day, Modular Ice Maker Without Bin	4,461.08	213.48
11 46 83 00-0016	EA		600 LB/Day, Modular Ice Maker Without Bin	5,110.64	213.48
11 46 83 00-0017	EA		901 LB/Day, Modular Ice Maker Without Bin	7,315.01	226.82
11 46 83 00-0018	EA		1301 LB/Day, Modular Ice Maker Without Bin	8,303.87	226.82
11 46 83 00-0019	EA		1601 LB/Day, Modular Ice Maker Without Bin	10,014.04	240.16
11 46 83 00-0020	EA		1900 LB/Day, Modular Ice Maker Without Bin	11,064.92	240.16
11 46 83 00-0021 Ice Storage Bins (11 46 83)					
11 46 83 00-0022	EA		260 LB Capacity, Stainless Steel Ice Storage Bin	1,649.98	145.82
11 46 83 00-0023	EA		360 LB Capacity, Stainless Steel Ice Storage Bin	1,808.75	145.82
11 46 83 00-0024	EA		550 LB Capacity, Stainless Steel Ice Storage Bin	2,256.44	157.97
11 46 83 00-0025	EA		660 LB Capacity, Stainless Steel Ice Storage Bin	2,432.86	157.97
11 46 83 00-0026	EA		1150 LB Capacity, Stainless Steel Ice Storage Bin	4,662.29	170.13
11 48 Foodservice Cleaning and Disposal Equipment (11 40)					
11 48 13 Commercial Dishwashers (11 48)					
11 48 13 00-0001 Rack Type Dishwasher (11 48 13)					
11 48 13 00-0002	EA		Dishwasher, 1 Tank And 190 To 230 Racks/Hour	21,092.93	975.96
11 48 13 00-0003	EA		Dishwasher, 2 Tanks And 234 To 260 Racks/Hour	34,093.98	1,205.60

11	11 Equipment
	11 40 Foodservice Equipment
	11 48 Foodservice Cleaning and Disposal Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 48 13 00-0004	EA		Dishwasher, 2 Tanks And 265 To 290 Racks/Hour	40,714.53	1,377.83
11 48 13 00-0005			Undercounter Type Dishwasher (11 48 13)		
11 48 13 00-0006	EA		High Speed, Undercounter Commercial Dishwasher (Hobart LX30-H)	6,498.80	200.94
11 48 13 00-0007			Exhaust Hood Dishwasher (11 48 13)		
11 48 13 00-0008	EA		4' x 4' x 2' Dishwasher Exhaust Hood Stainless Steel With Gutter On All Sides.....	2,546.78	228.60
11 48 13 00-0009	EA		4' x 4' x 7' Dishwasher Exhaust Hood Stainless Steel With Gutter On All Sides.....	4,388.31	274.32
11 48 13 00-0010			Dish Tables (11 48 13)		
11 48 13 00-0011	LF		Clean/Soiled Dish Table, Basic.....	296.48	44.10
11 48 13 00-0012	LF		Clean/Soiled Dish Table With Trough	466.47	66.09
11 48 13 00-0013	LF		Clean/Soiled Dish Table, Maximum.....	563.97	88.08
11 48 13 00-0014			Sprays And Hoses (11 48 13)		
11 48 13 00-0015			Sprays, Fillers (11 48 13 00-0014)		
11 48 13 00-0016	EA		Pre-Rinse Spray	454.21	83.71
11 48 13 00-0017	EA		Kettle Fillers	396.87	83.71
11 48 13 00-0018			Hoses (11 48 13 00-0014)		
11 48 13 00-0019	EA		Hose Reel.....	545.05	100.50
11 48 13 00-0020	EA		Wash-Down Hose	430.37	100.50
11 48 13 00-0021	EA		Hose Reel And Spray System With Accessories (Chicago 535NF).....	1,283.62	
11 48 16			Foodservice Disposal Equipment (11 48)		
11 48 16 00-0001			Garbage Disposals (11 48 16)		
			Note: Manual switch.		
11 48 16 00-0002	EA		1/2 HP, 115/208-230 Volt, 1 Phase, Stainless Steel, Garbage Disposal	1,572.81	155.01
11 48 16 00-0003	EA		3/4 HP, 115/208-230 Volt, 1 Phase, Stainless Steel, Garbage Disposal	1,985.28	160.75
11 48 16 00-0004	EA		1 HP, 115/208-230 Volt, 1 Phase, Stainless Steel, Garbage Disposal	2,131.75	166.49
11 48 16 00-0005	EA		1.5 HP, 115/208-230 Volt, 1 Phase, Stainless Steel, Garbage Disposal	2,788.93	172.23
11 48 16 00-0006	EA		2 HP, 115/208-230 Volt, 1 Phase, Stainless Steel, Garbage Disposal	3,041.09	189.45
11 48 16 00-0007	EA		3 HP, 208-230/460 Volt, 3 Phase, Stainless Steel, Garbage Disposal	4,289.84	206.68
11 48 16 00-0008	EA		5 HP, 208-230/460 Volt, 3 Phase, Stainless Steel, Garbage Disposal	5,125.45	229.63
11 48 16 00-0009	EA		7-1/2 HP, 208-230/460 Volt, 3 Phase, Stainless Steel, Garbage Disposal	7,137.92	246.86
11 48 16 00-0010	EA		10 HP, 208-230/460 Volt, 3 Phase, Stainless Steel, Garbage Disposal	9,402.56	258.34
11 48 16 00-0011			Pulper/Extractors (11 48 16)		
11 48 16 00-0012	EA		5 HP, Pulper/Extractor, Close-Coupled.....	6,231.81	239.17

11 50 Educational and Scientific Equipment (11)

11 52 Audio-Visual Equipment (11 50)

11 52 13 Projection Screens (11 52)

11 52 13 13 Fixed Projection Screens (11 52 13)

11 52 13 13-0001 Screens (11 52 13 13)

11 52 13 13-0002 Pull Down Project Screen, Matte White Or Glass Beaded (Da-Lite Model B)

11 52 13 13-0003	EA		40" x 40" Pull Down Projection Screen (Da-Lite B).....	377.86	75.95
			For High Contrast Matte, Add	40.00	
			For Video Spectra Fabric, Add	40.00	
			For High Power Fabric, Add	120.00	
11 52 13 13-0004	EA		50" x 50" Pull Down Projection Screen (Da-Lite B).....	448.57	97.65
			For High Contrast Matte, Add	40.00	
			For Video Spectra Fabric, Add	40.00	
			For High Power Fabric, Add	120.00	
11 52 13 13-0005	EA		60" x 60" Pull Down Projection Screen (Da-Lite B).....	562.69	135.63
			For High Contrast Matte, Add	40.00	
			For Video Spectra Fabric, Add	40.00	
			For High Power Fabric, Add	120.00	
11 52 13 13-0006	EA		70" x 70" Pull Down Projection Screen (Da-Lite B).....	649.70	162.75
			For High Contrast Matte, Add	40.00	
			For Video Spectra Fabric, Add	40.00	
			For High Power Fabric, Add	120.00	
11 52 13 13-0007	EA		84" x 84" Pull Down Projection Screen (Da-Lite B).....	1,008.92	244.13
			For High Contrast Matte, Add	40.00	
			For Video Spectra Fabric, Add	40.00	
			For High Power Fabric, Add	120.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 52 13 13-0008 EA 96" x 96" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,194.16 40.00 40.00 120.00	271.25
11 52 13 13-0009 EA 64" x 84" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	867.87 40.00 40.00 120.00	173.60
11 52 13 13-0010 EA 72" x 96" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	987.42 40.00 40.00 120.00	217.01
11 52 13 13-0011 EA 43" x 57" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	541.39 40.00 40.00 120.00	92.22
11 52 13 13-0012 EA 50" x 67" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	748.33 40.00 40.00 120.00	130.20
11 52 13 13-0013 EA 55" x 77" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	813.62 40.00 40.00 120.00	146.48
11 52 13 13-0014 EA 60" x 80" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	868.07 40.00 40.00 120.00	157.32
11 52 13 13-0015 EA 69" x 92" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	998.66 40.00 40.00 120.00	189.88
11 52 13 13-0016 EA 45" x 80" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	824.66 40.00 40.00 120.00	135.63
11 52 13 13-0017 EA 52" x 92" Pull Down Projection Screen (Da-Lite B)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	933.56 40.00 40.00 120.00	157.32
11 52 13 13-0018 Heavy Duty Pull Down Project Screen, Matte White Or Glass Beaded (Da-Lite Model C) <small>(11 52 13 13-0001)</small>		
11 52 13 13-0019 EA 50" x 50" Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	907.02 40.00 40.00 120.00	97.65
11 52 13 13-0020 EA 60" x 60" Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,053.88 40.00 40.00 120.00	135.63
11 52 13 13-0021 EA 70" x 70" Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,217.02 40.00 40.00 120.00	184.46
11 52 13 13-0022 EA 84" x 84" Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,401.87 40.00 40.00 120.00	244.13
11 52 13 13-0023 EA 6' x 8' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,543.72 40.00 40.00 120.00	249.56
11 52 13 13-0024 EA 8' x 8' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,652.60 40.00 40.00 120.00	271.25
11 52 13 13-0025 EA 7' x 9' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,685.35 40.00 40.00 120.00	271.25
11 52 13 13-0026 EA 9' x 9' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,816.13 40.00 40.00 120.00	287.53
11 52 13 13-0027 EA 8' x 10' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,946.93 40.00 40.00 120.00	303.80
11 52 13 13-0028 EA 10' x 10' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,088.56 40.00 40.00 120.00	325.51

11	11 Equipment
	11 50 Educational and Scientific Equipment
	11 52 Audio-Visual Equipment



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
11 52 13 13-0029	EA 9' x 12' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,350.53 40.00 40.00 120.00	325.51
11 52 13 13-0030	EA 12' x 12' Pull Down Projection Screen (Da-Lite C)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,698.52 40.00 40.00 120.00	434.01
11 52 13 13-0031	Heavy Duty Pull Down Project Screen, Matte White Or Glass Beaded (Da-Lite Model C With CSR) (11 52 13 13-0001) Note: With controlled screen return.		
11 52 13 13-0032	EA 60" x 60" Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,708.80 40.00 40.00 120.00	135.63
11 52 13 13-0033	EA 70" x 70" Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	1,904.69 40.00 40.00 120.00	184.46
11 52 13 13-0034	EA 84" x 84" Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,089.54 40.00 40.00 120.00	244.13
11 52 13 13-0035	EA 6' x 8' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,198.64 40.00 40.00 120.00	249.56
11 52 13 13-0036	EA 8' x 8' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,340.27 40.00 40.00 120.00	271.25
11 52 13 13-0037	EA 7' x 9' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,373.01 40.00 40.00 120.00	271.25
11 52 13 13-0038	EA 9' x 9' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,503.80 40.00 40.00 120.00	287.53
11 52 13 13-0039	EA 8' x 10' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,558.26 40.00 40.00 120.00	298.38
11 52 13 13-0040	EA 10' x 10' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	2,874.46 40.00 40.00 120.00	325.51
11 52 13 13-0041	EA 9' x 12' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	3,169.18 40.00 40.00 120.00	325.51
11 52 13 13-0042	EA 12' x 12' Pull Down Projection Screen With CSR (Controlled Screen Return) (Da-Lite C With CSR)..... <i>For High Contrast Matte, Add</i> <i>For Video Spectra Fabric, Add</i> <i>For High Power Fabric, Add</i>	3,582.66 40.00 40.00 120.00	434.01
11 52 13 13-0043	Electric Project Screen, Matte White Or Glass Beaded (Da-Lite Cosmopolitan Electrol) (11 52 13 13-0001) Note: Heavy-duty screen for exposed installation.		
11 52 13 13-0044	EA 50" x 50" Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	2,489.05	122.06
11 52 13 13-0045	EA 60" x 60" Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	2,542.96	135.63
11 52 13 13-0046	EA 70" x 70" Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	2,648.12	162.75
11 52 13 13-0047	EA 84" x 84" Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,041.25	244.13
11 52 13 13-0048	EA 6' x 8' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,116.41	249.56
11 52 13 13-0049	EA 8' x 8' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,307.13	271.25
11 52 13 13-0050	EA 7' x 9' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,374.11	271.25
11 52 13 13-0051	EA 9' x 9' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,540.67	290.25
11 52 13 13-0052	EA 8' x 10' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,747.29	303.80
11 52 13 13-0053	EA 10' x 10' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,879.08	325.51
11 52 13 13-0054	EA 9' x 12' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	3,999.63	325.51
11 52 13 13-0055	EA 12' x 12' Electric Projection Screen, Wall Or Ceiling Mounted (Da-Lite Cosmopolitan Electrol)	4,425.60	434.01
11 52 13 13-0056	Electric Project Screen, Matte White Or Glass Beaded (Da-Lite Professional Electrol) (11 52 13 13-0001) Note: Heavy-duty screen for exposed or recessed installation without doors.		
11 52 13 13-0057	EA 9' x 12' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol)	6,214.56	325.51
11 52 13 13-0058	EA 12' x 12' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol)	6,693.53	434.01



Equipment	11
Educational and Scientific Equipment	11 50
Audio-Visual Equipment	11 52

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 52 13	13-0059	EA	14' x 14' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	8,308.35	488.26
11 52 13	13-0060	EA	12' x 16' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	8,744.32	542.51
11 52 13	13-0061	EA	16' x 16' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	9,288.79	651.01
11 52 13	13-0062	EA	13.5' x 18' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	10,379.66	705.27
11 52 13	13-0063	EA	18' x 18' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	11,372.31	759.52
11 52 13	13-0064	EA	15' x 20' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	12,027.23	759.52
11 52 13	13-0065	EA	20' x 20' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	12,931.90	868.02
11 52 13	13-0066	EA	11' x 22' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	12,016.96	705.27
11 52 13	13-0067	EA	16.5' x 22' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	12,669.93	868.02
11 52 13	13-0068	EA	22' x 22' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	13,214.40	976.52
11 52 13	13-0069	EA	12' x 24' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	12,780.39	759.52
11 52 13	13-0070	EA	18' x 24' Electric Projection Screen, Ceiling Mounted (Da-Lite Professional Electrol) Note: Heavy-duty screen for exposed or recessed installation without doors.	16,489.00	976.52
11 52 13	13-0071		Electric Project Screen, Matte White Or Glass Beaded (Da-Lite Executive Electrol) ^(11 52 13 13-0001) Note: In-the-ceiling screen with automatically operated door to conceal screen.		
11 52 13	13-0072	EA	50" x 50" Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol) Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,807.68	122.06
11 52 13	13-0073	EA	60" x 60" Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol) Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,933.03	135.63
11 52 13	13-0074	EA	70" x 70" Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol) Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,052.79	162.75
11 52 13	13-0075	EA	84" x 84" Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol) Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,444.76	244.13
11 52 13	13-0076	EA	6' x 8' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,521.11	249.56
11 52 13	13-0077	EA	8' x 8' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,760.98	271.25
11 52 13	13-0078	EA	7' x 9' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,957.45	271.25
11 52 13	13-0079	EA	9' x 9' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	7,093.67	290.25
11 52 13	13-0080	EA	8' x 10' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	7,284.53	303.80
11 52 13	13-0081	EA	10' x 10' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	7,458.90	325.51
11 52 13	13-0082	EA	9' x 12' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	7,524.40	325.51
11 52 13	13-0083	EA	12' x 12' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	8,068.87	434.01
11 52 13	13-0084	EA	10.6' x 14' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	8,647.06	461.14
11 52 13	13-0085	EA	14' x 14' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	9,028.76	488.26
11 52 13	13-0086	EA	12' x 16' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	9,857.68	542.51
11 52 13	13-0087	EA	16' x 16' Electric Projection Screen, Ceiling Mounted (Da-Lite Executive Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	10,238.42	651.01
11 52 13	13-0088		Electric Project Screen, Matte White Or Glass Beaded (Da-Lite Senior Electrol) ^(11 52 13 13-0001) Note: In-the-ceiling screen with automatically operated door to conceal screen.		
11 52 13	13-0089	EA	50" x 50" Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	4,812.20	122.06
11 52 13	13-0090	EA	60" x 60" Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	4,912.29	149.19
11 52 13	13-0091	EA	70" x 70" Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	4,968.89	162.75
11 52 13	13-0092	EA	84" x 84" Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	5,226.61	244.13
11 52 13	13-0093	EA	6' x 8' Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	5,266.94	249.56
11 52 13	13-0094	EA	8' x 8' Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	5,434.76	271.25
11 52 13	13-0095	EA	7' x 9' Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	5,608.32	271.25
11 52 13	13-0096	EA	9' x 9' Electric Projection Screen (Da-Lite Senior Electrol) Note: Heavy duty screen for recessed or exposed installation.	5,878.79	290.25

11	11 Equipment
	11 50 Educational and Scientific Equipment
	11 52 Audio-Visual Equipment



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
11 52 13 13-0097	EA	8' x 10' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,951.77		303.80
11 52 13 13-0098	EA	10' x 10' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	6,135.97		325.51
11 52 13 13-0099	EA	9' x 12' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	6,113.49		379.76
11 52 13 13-0100	EA	12' x 12' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	6,680.44		434.01
11 52 13 13-0101	EA	10'-6" x 14' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	8,365.45		461.14
11 52 13 13-0102	EA	14' x 14' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	8,730.77		488.26
11 52 13 13-0103	EA	12' x 16' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	9,445.08		542.51
11 52 13 13-0104	EA	16' x 16' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	9,799.62		651.01
11 52 13 13-0105	EA	13'-6" x 18' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	10,677.65		705.27
11 52 13 13-0106	EA	18' x 18' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	11,333.01		759.52
11 52 13 13-0107	EA	15' x 20' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	11,811.10		759.52
11 52 13 13-0108	EA	20' x 20' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	13,049.78		868.02
11 52 13 13-0109	EA	50" x 67" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	4,968.89		162.75
11 52 13 13-0110	EA	60" x 80" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,172.36		217.01
11 52 13 13-0111	EA	69" x 92" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,256.08		244.13
11 52 13 13-0112	EA	87" x 116" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,984.51		303.80
11 52 13 13-0113	EA	105" x 140" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	6,385.28		379.76
11 52 13 13-0114	EA	123" x 164" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	7,908.85		488.26
11 52 13 13-0115	EA	141" x 188" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	8,374.73		596.77
11 52 13 13-0116	EA	12' x 24' Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	14,814.35		813.77
11 52 13 13-0117	EA	45" x 80" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,188.73		217.01
11 52 13 13-0118	EA	52" x 92" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,305.20		244.13
11 52 13 13-0119	EA	54" x 96" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,432.71		260.41
11 52 13 13-0120	EA	58" x 104" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,505.59		282.11
11 52 13 13-0121	EA	65" x 116" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	5,827.33		303.80
11 52 13 13-0122	EA	78" x 139" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	6,260.85		379.76
11 52 13 13-0123	EA	92" x 164" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	7,820.43		488.26
11 52 13 13-0124	EA	106" x 188" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	9,026.37		596.77
11 52 13 13-0125	EA	119" x 212" Electric Projection Screen (Da-Lite Senior Electrol)..... Note: Heavy duty screen for recessed or exposed installation.	10,962.54		705.27
11 52 13 13-0126		Electric Project Screen, Matte White Or Glass Beaded (Da-Lite Boardroom Electrol) <small>(11 52 13 13-0001)</small> Note: In-the-ceiling screen with automatically operated door to conceal screen.			
11 52 13 13-0127	EA	50" x 50" Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	4,913.45		122.06
11 52 13 13-0128	EA	60" x 60" Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,004.87		135.63
11 52 13 13-0129	EA	70" x 70" Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,107.35		162.75
11 52 13 13-0130	EA	84" x 84" Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,436.19		244.13
11 52 13 13-0131	EA	6' x 8' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,500.63		249.56
11 52 13 13-0132	EA	8' x 8' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,659.21		271.25
11 52 13 13-0133	EA	7' x 9' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,838.70		271.25
11 52 13 13-0134	EA	9' x 9' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	5,991.87		290.25
11 52 13 13-0135	EA	8' x 10' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,104.72		303.80
11 52 13 13-0136	EA	10' x 10' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol)..... Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,284.74		325.51



Equipment	11	
Educational and Scientific Equipment	11 50	↕
Audio-Visual Equipment	11 52	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 52 13 13-0137	EA	9' x 12' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol) Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,469.58		325.51
11 52 13 13-0138	EA	12' x 12' Electric Projection Screen, Ceiling Mounted (Da-Lite Boardroom Electrol) Note: In-the-ceiling screen with automatically operated door to conceal screen.	6,841.97		434.01
11 52 13 13-0139 Electric Ascending Project Screen, Matte White, Glass Beaded (Da-Lite Ascender Electrol) (11 52 13 13-0001)					
Note: High contrast matte white, video spectrum or high power. Includes a motorized spring assisted scissors mechanism which raises the screen surface from the housing ensuring smooth operation. A trap door housing keeps the screen and lift mechanism hidden until the screen is activated.					
11 52 13 13-0140	EA	60" x 80" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	14,881.98		271.25
11 52 13 13-0141	EA	69" x 92" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	15,907.37		325.51
11 52 13 13-0142	EA	87" x 116" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	18,459.61		488.26
11 52 13 13-0143	EA	105" x 140" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	23,238.59		651.01
11 52 13 13-0144	EA	120" x 160" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	25,747.81		759.52
11 52 13 13-0145	EA	52" x 92" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	15,798.87		271.25
11 52 13 13-0146	EA	58" x 104" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	17,249.96		325.51
11 52 13 13-0147	EA	65" x 116" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	18,242.61		379.76
11 52 13 13-0148	EA	78" x 139" Electric Ascending Projection Screen (Da-Lite Ascender Electrol)..... Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	22,913.07		488.26
11 52 13 13-0149 Electric Rear Projection Screen (Da-Lite DA-View) (11 52 13 13-0001)					
Note: Consists of a single acrylic layer with rear Fensel lens and lenticulated front profile. Un-framed.					
11 52 13 13-0150	EA	60" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	4,643.15		271.25
11 52 13 13-0151	EA	67" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	5,837.11		298.38
11 52 13 13-0152	EA	72" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	6,689.14		325.51
11 52 13 13-0153	EA	84" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	12,099.99		352.63
11 52 13 13-0154	EA	90" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	13,407.91		13,028.15
11 52 13 13-0155	EA	96" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	14,884.05		434.01
11 52 13 13-0156	EA	100" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	19,095.47		488.26
11 52 13 13-0157	EA	120" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	25,814.24		542.51
11 52 13 13-0158	EA	125" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	28,885.96		596.77
11 52 13 13-0159	EA	135" Diagonal Video Format Rigid Rear Projection Screen (Da-Lite DA-View) Note: Includes a motorized spring assisted scissors mechanism and trap door housing.	38,681.91		651.01
11 52 13 13-0160 Screen Accessories (11 52 13 13-0001)					
11 52 13 13-0161 Manual Pull Down Accessories (11 52 13 13-0160)					
11 52 13 13-0162	EA	6" Mounting Bracket (Pair).....	75.22		8.14
11 52 13 13-0163	EA	14" Wall Mounting Bracket (Pair).....	107.97		8.68
11 52 13 13-0164	EA	14-1/2" To 24" Adjustable Wall Mounting Bracket (Pair).....	127.62		9.77
11 52 13 13-0165 Electric Powered Screen Accessories (11 52 13 13-0160)					
11 52 13 13-0166	EA	Single Motor Low Voltage Remote Control System - Infrared	809.74		
11 52 13 13-0167	EA	Single Motor Low Voltage Remote Control System - Radio Frequency.....	1,169.95		
11 52 16 Projectors (11 52)					
11 52 16 26 Video Projectors (11 52 16)					
11 52 16 26-0001 Projectors (11 52 16 26)					
11 52 16 26-0002	EA	2,000 Lumens Output, 800 x 600 Pixels, SVGA Compact 3LCD Panels Projector.....	1,349.74		54.25
11 52 16 26-0003	EA	2,000 Lumens Output, 1024 x 768 Pixels, XGA Compact 3LCD Panels Projector.....	1,566.96		54.25
11 52 16 26-0004	EA	2,000 Lumens Output, 1280 x 800 Pixels, WXGA Compact 3LCD Panels Projector.....	2,078.97		54.25
11 52 16 26-0005	EA	3,000 Lumens Output, 1024 x 768 Pixels, XGA 3LCD Panels Projector.....	3,289.18		54.25
11 52 16 26-0006	EA	3,500 Lumens Output, 1024 x 768 Pixels, XGA 3LCD Panels Projector.....	3,832.22		54.25
11 52 16 26-0007	EA	3,000 Lumens Output, 1366 x 800 Pixels, WXGA 3LCD Panels Projector.....	4,871.76		54.25
11 52 16 26-0008	EA	4,000 Lumens Output, 1024 x 768 Pixels, XGA 3LCD Panels Projector.....	7,757.64		54.25
11 52 16 26-0009	EA	5,200 Lumens Output, 1024 x 768 Pixels, XGA 3LCD Panels Projector.....	10,519.40		54.25
11 52 16 26-0010	EA	6,000 Lumens Output, 1024 x 768 Pixels, XGA 3LCD Panels Projector.....	15,624.00		54.25

11	11 Equipment
	11 50 Educational and Scientific Equipment
	11 52 Audio-Visual Equipment



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 52 16 26-0011	Projector Mounts <small>(11 52 16 26)</small>		
11 52 16 26-0012	Universal Projector Mounts <small>(11 52 16 26-0011)</small>		
	Note: Includes ceiling or wall mounting hardware and hardware for attaching projector. Excludes projector.		
11 52 16 26-0013	EA Flush Ceiling, Universal Projector Mount (Peerless PPF).....	280.19	59.65
11 52 16 26-0014	EA Wall Arm, Universal Projector Mount (Peerless PWA-14).....	472.81	59.65

11 52 16 26-0015	Projector Mount Components <small>(11 52 16 26-0011)</small>		
	Note: Includes ceiling attachment plate, threaded extension column and projector attachment plate. Excludes projector.		
11 52 16 26-0016	Ceiling Attachment Plates For Projector Mounts <small>(11 52 16 26-0015)</small>		
11 52 16 26-0017	EA Finished Ceiling, Attachment Plate For Projector Mounts (Peerless ACC 570).....	100.04	27.11
11 52 16 26-0018	EA Truss Ceiling, Attachment Plate For Projector Mounts (Peerless ACC 557).....	139.57	27.11
11 52 16 26-0019	EA I-Beam Ceiling, Attachment Plate For Projector Mounts (Peerless ACC 558/559).....	198.08	27.11
11 52 16 26-0020	EA Suspended Ceiling, Attachment Plate For Projector Mounts (Peerless CMJ 455).....	244.15	27.11

11 52 16 26-0021	Projector Attachment Plates For Projector Mounts <small>(11 52 16 26-0015)</small>		
11 52 16 26-0022	EA Universal Projector Attachment Plate For Projector Mounts (Peerless PRG-UNV).....	371.17	27.11
11 52 16 26-0023	EA High Security Projector Enclosure For Projector Mounts (Peerless ALB).....	832.00	27.11

11 52 16 26-0024	Threaded Extension Columns For Projector Mounts <small>(11 52 16 26-0015)</small>		
11 52 16 26-0025	Fixed Length, Threaded Extension Column For Projector Mounts <small>(11 52 16 26-0024)</small>		
	Note: Peerless EXT series.		
11 52 16 26-0026	EA 6" Fixed Length, Threaded Extension Column For Projector Mounts.....	62.59	8.13
11 52 16 26-0027	EA 12" Fixed Length, Threaded Extension Column For Projector Mounts.....	82.10	8.13
11 52 16 26-0028	EA 18" Fixed Length, Threaded Extension Column For Projector Mounts.....	89.41	8.13
11 52 16 26-0029	EA 24" Fixed Length, Threaded Extension Column For Projector Mounts.....	94.29	8.13
11 52 16 26-0030	EA 36" Fixed Length, Threaded Extension Column For Projector Mounts.....	111.90	10.84
11 52 16 26-0031	EA 48" Fixed Length, Threaded Extension Column For Projector Mounts.....	136.28	10.84
11 52 16 26-0032	EA 60" Fixed Length, Threaded Extension Column For Projector Mounts.....	175.29	10.84
11 52 16 26-0033	EA 72" Fixed Length, Threaded Extension Column For Projector Mounts.....	202.11	10.84
11 52 16 26-0034	EA 84" Fixed Length, Threaded Extension Column For Projector Mounts.....	236.79	13.56
11 52 16 26-0035	EA 96" Fixed Length, Threaded Extension Column For Projector Mounts.....	270.93	13.56
11 52 16 26-0036	EA 108" Fixed Length, Threaded Extension Column For Projector Mounts.....	300.74	16.27
11 52 16 26-0037	EA 120" Fixed Length, Threaded Extension Column For Projector Mounts.....	315.37	16.27

11 52 16 26-0038	Adjustable Length, Threaded Extension Columns For Projector Mounts <small>(11 52 16 26-0024)</small>		
	Note: Peerless ADJ series. Adjustable at 1" increments.		
11 52 16 26-0039	EA 6" To 9" Adjustable Length, Threaded Extension Column For Projector Mounts.....	129.51	13.56
11 52 16 26-0040	EA 12" To 18" Adjustable Length, Threaded Extension Column For Projector Mounts.....	202.66	13.56
11 52 16 26-0041	EA 18" To 24" Adjustable Length, Threaded Extension Column For Projector Mounts.....	207.53	13.56
11 52 16 26-0042	EA 24" To 36" Adjustable Length, Threaded Extension Column For Projector Mounts.....	214.85	13.56
11 52 16 26-0043	EA 36" To 60" Adjustable Length, Threaded Extension Column For Projector Mounts.....	232.47	16.27
11 52 16 26-0044	EA 48" To 72" Adjustable Length, Threaded Extension Column For Projector Mounts.....	244.66	16.27
11 52 16 26-0045	EA 60" To 84" Adjustable Length, Threaded Extension Column For Projector Mounts.....	271.48	16.27
11 52 16 26-0046	EA 72" To 96" Adjustable Length, Threaded Extension Column For Projector Mounts.....	295.86	16.27
11 52 16 26-0047	EA 84" To 108" Adjustable Length, Threaded Extension Column For Projector Mounts.....	328.10	18.98
11 52 16 26-0048	EA 96" To 120" Adjustable Length, Threaded Extension Column For Projector Mounts.....	352.48	18.98
11 52 16 26-0049	EA 108" To 132" Adjustable Length, Threaded Extension Column For Projector Mounts.....	384.72	21.69
11 52 16 26-0050	EA 120" To 144" Adjustable Length, Threaded Extension Column For Projector Mounts.....	401.79	21.69

11 52 19	Players and Recorders <small>(11 52)</small>		
11 52 19 00-0001	Audio-Visual Equipment <small>(11 52 19)</small>		
	Note: Includes installation of AV components may be subject to further verification of site conditions before engineering sign-off. Custom control software programming (to be verified after client consultation). Project design, integration, training, including manuals and documentation. Shipping and handling. AV project manager site visit travel expenses per trip.		
11 52 19 00-0002	Audio Equipment <small>(11 52 19 00-0001)</small>		
11 52 19 00-0003	EA TOA Condenser Microphone Preamplifier with Remote Mute Capability.....	662.86	
11 52 19 00-0004	EA Passive Stereo Line Combiner, Combines Stereo to Mono.....	185.46	
11 52 19 00-0005	EA Power Supply 24 Voltage, 400 mA for Stereo Line Amplifier.....	63.12	
11 52 19 00-0006	EA TOA 120 Watt Modular Mixer / Amplifier.....	2,935.55	
11 52 19 00-0007	EA Auxiliary Stereo Input Module with internal summing and muting capabilities.....	157.83	
11 52 19 00-0008	EA Rack Mount Kit for Power Amplifier.....	98.64	
11 52 19 00-0009	EA TOA Equalization Module for Wide Dispersion Speaker.....	291.97	
11 52 19 00-0010	EA TOA Wide Dispersion Speaker with transformer for 70 volt operation.....	556.34	
11 52 19 00-0011	AV Microphones <small>(11 52 19 00-0001)</small>		
11 52 19 00-0012	EA Audio-Technica Miniature Cardioid Condenser Gooseneck Microphone.....	1,479.62	



Equipment	11	
Educational and Scientific Equipment	11 50	↑
Audio-Visual Equipment	11 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 52 19 00-0013 Control System <small>(11 52 19 00-0001)</small>		
11 52 19 00-0014 EA Digitally Controlled 3-channel Audio Attenuator.....	2,221.39	
Note: Each channel has controls for volume, tone and mute.		
11 52 19 00-0015 EA Crestron Pro2 Integrated Control System.....	10,601.89	
Note: Includes 8-IR, 8-digital I/Os, 8-relays, 6-RS-232, 3 CNX expansion slots and 1 DPA Ethernet-based communication CNX slot included.		
11 52 19 00-0016 EA IR Emitter Cable	149.95	
11 52 19 00-0017 EA IR/S Control Cable.....	295.93	
11 52 19 00-0018 EA Crestron Isys Compact Video Touchpanel, 5" Diagonal Color Active Matrix Desktop Tilt-case Color Touch Control, 64,000 Colors, 320x234 Pixels	4,999.10	
11 52 19 00-0019 Interfaces <small>(11 52 19 00-0001)</small>		
11 52 19 00-0020 EA Extron RGB 109xi Dedicated VGA/S-VGA/XGA2/VESA interface.....	2,339.74	
11 52 19 00-0021 EA VGA Male/BNC Female Adapter cable.....	161.79	
11 52 19 00-0022 EA Rack Shelf (1RU), holds 2 1RU High 1/2 Rack Units.....	493.21	
11 52 19 00-0023 Display Wall Processors <small>(11 52 19 00-0001)</small>		
11 52 19 00-0024 EA Jupiter Fusion 950 High Performance High-availability Display Wall Graphics Server	92,799.88	
Note: Includes 4 high resolution display channels; 6 RGB inputs; 6 RGB output window processors; 16 Composite Video Inputs, 8 - S-Video Inputs (4 Displayable Concurrently); 1 4U rackmount main chassis; Dual (2) 300W hot-swap power supplies; 1 Intel Pentium III CPU at 1 GHz; 512MB Memory; Single removable 20GB disk drive; 52X CD-ROM drive, 1.44MB floppy drive; 2 10/100 Mb/s RJ-45 Ethernet connectors; Ports: 1 parallel, 2 USB, 1 serial; PS/2 104 keyboard, PS/2 mouse, 1 year limited hardware warranty, 90 days installation assistance via phone and email, Galileo Software, Windows 2000 Professional, Jupiter Multiple Channel Software, ControlPoint Software, X server for Unix Connectivity, 1 Year of software support		
11 52 19 00-0025 Projectors <small>(11 52 19 00-0001)</small>		
11 52 19 00-0026 EA Barco Helios 24/7/365 mission critical performance data Projector, 3 panel LCD, 1,280x1,024, 750 ANSI Lumens, high MTBF, 4,000 hour lamp and 1:27:1 lens for Helios.....	72,914.72	
Note: Includes corner focus to match screen size.		
11 52 19 00-0027 Rack Equipment <small>(11 52 19 00-0001)</small>		
11 52 19 00-0028 EA Power Conditioning and Rack Accessories	1,183.69	
11 52 19 00-0029 EA Stand Alone Rack With Rear Door	4,734.76	
11 52 19 00-0030 Switchers <small>(11 52 19 00-0001)</small>		
11 52 19 00-0031 EA Six-Input, Two-Output 100KHz Stereo Audio Switcher, 1/2 rack width (RS-232 control).....	2,367.38	
11 52 19 00-0032 AV Source Components <small>(11 52 19 00-0001)</small>		
11 52 19 00-0033 EA JVC Professional VCR 4-Head S-VHS Hi-Fi Serial IR control	1,578.25	
11 52 19 00-0034 EA Marantz Professional DVD Player With 500 TVL Res. S-Video Output, Dolby Digital, Rack-Mount (RS-232 control)	2,367.38	
11 52 19 00-0035 EA Tuner for AM/FM (IR Control).....	1,234.96	
11 52 19 00-0036 EA Rack Mount for VCR.....	394.57	
11 52 19 00-0037 EA Rack Mount for Tuner	394.57	
11 52 19 00-0038 Visualizers And Custom Items <small>(11 52 19 00-0001)</small>		
11 52 19 00-0039 EA Canon VC-C4 Visualizer With Rotating Camera Head	12,373.51	
Note: 450+ TV Lines resolution, 8x Zoom lens, built-in switcher with a composite, S-Video, Mic, and sync inputs , Y/C and composite outputs, built-in light base for slides with neg/pos, and RS-232 remote control.		
11 52 19 00-0040 Cables <small>(11 52 19 00-0001)</small>		
11 52 19 00-0041 MLF Low Cap Control (22 AWG pair) And Power (18 AWG pair) in Plenum Cable \$/per 1,000 ft. (2 control And 2 power connectors needed).....	4,024.54	
11 52 19 00-0042 MLF Broadcast Audio Cable (22 gauge/4-conductor).....	489.27	
11 52 19 00-0043 MLF Broadcast Speaker Cable (22 gauge/2-conductor).....	907.48	
11 52 19 00-0044 MLF Mini High Resolution RGBHV Plenum Cable.....	11,836.90	
11 52 19 00-0045 MLF Miscellaneous Cables Connectors And Hardware (to be verified after on site visit)	2,615.95	
11 52 19 00-0046 Mixers <small>(11 52 19 00-0001)</small>		
11 52 19 00-0047 EA Audio Mixer 4 Input Auto Mixer.....	2,584.76	
11 52 19 00-0048 AV Wireless Microphone <small>(11 52 19 00-0001)</small>		
11 52 19 00-0049 EA Wireless Microphone, UHF, Multi Channel with Hand Held Microphone, Rack Mount Kit	2,701.89	
11 52 19 00-0050 EA Wireless Microphone, UHF, Multi Channel with Lavalieri Microphone, Rack Mount Kit	2,815.25	
11 52 19 00-0051 Videoconference Equipment <small>(11 52 19 00-0001)</small>		

11	11 Equipment
	11 50 Educational and Scientific Equipment
	11 52 Audio-Visual Equipment



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
11 52 19 00-0052	EA	Canon Remote Control Color Camera with pan/tilt zoom control via RS-232		5,551.17	
11 52 19 00-0053	EA	Canon Remote Control Color Camera with pan/tilt zoom control via RS-232. LAN Output		6,801.97	
11 52 19 00-0054		Command View Display Wall ^(11 52 19) Note: Includes Installation, Freight, and Shipping. STANDARD FEATURES: Patented "Seamless" Screen Retention System; Heavy Wall Aluminum and Sheet Metal Stackable Structure; Single Element Acrylic Screen (Fresnel Lenticular or Diffusion); Hinged Lower Enclosure Panels for Projector Access; Mobile Universal Projector Cart with Micro Adjustment for Image Fine Tuning (Single and Double High); Durable High Pressure External Panel Finish, per Standard Offerings; PowerTrak Powered Lift Mechanism for Double High, Triple High, and Quad High Screen Matrices where applicable); Horizontal and Vertical Light Baffles Between All Adjacent Screens; Wilsonart Black laminate 1595-60 internal panel finish.			
11 52 19 00-0055		4/3 Ratio Projection Screen ^(11 52 19 00-0054) Note: Command view fresnel lenticular screens.			
11 52 19 00-0056	EA	110" 4/3 Ratio Fresnel Lenticular Projection Screen (88"W x 66"H)		22,615.65	
11 52 19 00-0057		Mirror Assemblies ^(11 52 19 00-0054)			
11 52 19 00-0058	EA	90" to 124" 1st Surface Mirror Assembly		6,636.76	
11 52 19 00-0059		Free Standing System ^(11 52 19 00-0054) Note: Includes projector rack, screen rack, upper, lower, top and rear enclosure panels. Command view single high, free standing modules.			
11 52 19 00-0060	EA	110" Single High Free Standing Module		18,918.71	
11 52 19 00-0061	EA	Shared Posts Credit For Single High Free Standing Module		-2,150.97	
11 52 19 00-0062		Equipment Support Solutions ^(11 52 19 00-0054) Note: Command view projector support solutions.			
11 52 19 00-0063	EA	Single Level Mobile Universal Projector Cart (Folded Optic Applications Only) - One Cart Per Projector		2,284.00	
11 52 19 00-0064		Contractor Furnished Equipment ^(11 52 19)			
11 52 19 00-0065	EA	Cisco Supervisor III Module, pn WS-X5530-E3A		27,084.60	
11 52 19 00-0066	EA	Cisco Uplink Module, pn WS-U5538-FEFX-MMF		9,329.14	
11 52 19 00-0067	EA	Cisco Switch - 36 Ports 10/100 TX, pn WS-X5239-RJ21-RF		13,843.24	

11 60 Entertainment and Recreation Equipment ⁽¹¹⁾

11 68 Play Field Equipment and Structures ^(11 60)

11 68 13 Playground Equipment ^(11 68)

See CSI section 32 31 13 13-0001 for augering holes and fill for posts.

11 68 13 00-0001 Playground Equipment (Playground Boss) ^(11 68 13)

Note: All demolition/ dismantling of the existing playground structure, removal of existing surfacing, removal of existing footings, and removal/ dismantling of existing safety sign (s). All installation of new playground structure, surfacing, footings (per manufacturer's instructions), and safety sign. Includes: All necessary preparation of existing surface for new playground structure to include: grading the area flat, removal of all asphalt, concrete, and other such debris from the site prior to installation. Layout of the actual footprint of the play structure. Surfacing material must be poured in place. Per manufacturers recommendations. Installation and demolition include all necessary equipment and tools. Footings for components that require a footing (vertical post, slide foot, climbers, etc.) are to be 12"x12"x18" Concrete for footings must have a minimum rating of 2,500 PSI and must be mixed per manufacturers recommendations.

11 68 13 00-0002	EA	Playground System "Simon Says" And Safety Sign (Playground Boss PGB-20210)		19,865.53	
		Note: 30'-6" x 25'-6" Area, 8 Play Activities, 30 Child Capacity. Simon Says include an ADA Transfer Station, Sea Creatures Climber, or the Wing Climber. A Crawl Tunnel connects the two Elevated Decks, one with a Right Turn Slide and one with a Double Slide. Ground-level play is encouraged with a Racing Game Panel and Rain Wheel. See CSI section 11 68 13 00-0008 for poured surfacing material.			
11 68 13 00-0003	EA	Playground System "Made In The Shade" And Safety Sign (Playground Boss PGB-20238)		26,745.05	
		Note: 30'-0" x 31'-0" Area, 9 Play Activities, 32 Child Capacity. Made In The Shade includes three different climbers or ADA Transfer Station, the large Square Shade will be protecting them from the sun's rays as they play on the Activity Panels before sliding down the Straight Slide. The Store Panel and Rain Wheel that are both located on the ground are also covered by the Square Shade. See CSI section 11 68 13 00-0008 for poured surfacing material.			
11 68 13 00-0004	EA	Playground System "The Gorilla" And Safety Sign (Playground Boss PGB-20232)		39,670.94	
		Note: 36'-0" x 31'-0" Area, 10 Play Activities, 40 Child Capacity. The gorilla includes an ADA Transfer Station, Rock Climber, Curly Climber, and an Invert Arch Climber, kids will have many options of accessing one of the two Elevated Decks. One of these decks is covered by a Hex Shade and has a Window Panel, along with two separate Straight Slides. The third Straight Slide branches off of the other Elevated Deck. These decks are connected by a Crawl Tunnel, allowing for easy and fun access to the other side. On the ground, kids have the option to rest or take turns playing games on either the Single Seat or Bench Panel. See CSI section 11 68 13 00-0008 for poured surfacing material.			
11 68 13 00-0005	EA	Playground System "Fun Factory" And Safety Sign (Playground Boss PGB-20209)		40,782.12	
		Note: 35'-5" x 34'-4" Area, 9 Play Activities, 48 Child Capacity. The Fun Factory is able to have three slides, a Leaf Climber, Pod Climber, ADA Transfer Station, and various Activity Panels in one modest sized play structure. The majority of the playground is protected by a Hex Shade. See CSI section 11 68 13 00-0008 for poured surfacing material.			

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0006 EA Playground System "Red Rover" And Safety Sign (Playground Boss PGB-20236) .....41,405.24 Note: 43'-0" x 35'-0" Area, 14 Play Activities, 53 Child Capacity. Red Rover includes a shorter deck home to an ADA Transfer Station, Challenge Ladder, and a short Right Turn Slide. An Ocean Wave Climber connects this section to the larger section. Here, kids will find a Single Straight Slide, Double Straight Slide, Tic-Tac-Toe, A Crawl Tunnel, Loop Climber, and and Inverted Arch Climber. See CSI section 11 68 13 00-0008 for poured surfacing material.	41,405.24	
11 68 13 00-0007 EA Playground System "Big Sky" And Safety Sign (Playground Boss PGBNL-32470) .....66,010.74 Note: 49'-1" x 44'-6" Area, 18 Play Activities, 32-45 Child Capacity See CSI section 11 68 13 00-0008 for poured surfacing material.	66,010.74	
11 68 13 00-0008 SF 3" of poured in place rubber surfacing 50/50 blend of blue black and Includes up to 4 sub-base compacted to 95% (Playground Boss) .....41.44 Note: Includes preparation of existing surface for new playground structure, grading the area flat, removal of all asphalt, concrete, and other such debris from the site prior to installation.	41.44	
11 68 13 00-0009 Playground Equipment (Landscape Structures®) (11 68 13) Note: Excludes excavation and concrete footings.		
11 68 13 00-0010 Playground Equipment (Landscape Structures® PlayShaper®) (11 68 13 00-0009) Note: Ages 2 to 5 years.		
11 68 13 00-0011 EA El Slide, 32" Deck (Landscape Structures® PlayShaper® 111323A) 3,002.91	3,002.91	130.23
11 68 13 00-0012 EA SpyroSlide, 56" Height, 48" Deck (Landscape Structures® PlayShaper® 143480A) 7,600.48	7,600.48	488.35
11 68 13 00-0013 EA Tunnel Slide, 40" Deck (Landscape Structures® PlayShaper® 128952A) 3,130.79	3,130.79	130.23
11 68 13 00-0014 EA Double Wave Poly Slide, 48" Deck (Landscape Structures® PlayShaper® 123336A) 3,577.26	3,577.26	195.34
11 68 13 00-0015 EA Double Swirl Slide, 48" Deck (Landscape Structures® PlayShaper® 130798A) 3,038.36	3,038.36	195.34
11 68 13 00-0016 EA Double Poly Slide, 32" Deck (Landscape Structures® PlayShaper® 132155A) 2,409.20	2,409.20	130.23
11 68 13 00-0017 EA Double Poly Slide, 40" To 48" Deck (Landscape Structures® PlayShaper® 132155B) 2,674.09	2,674.09	130.23
11 68 13 00-0018 EA Lava Run Slide, 30" Or 32" Deck (Landscape Structures® PlayShaper® 137967A) 2,052.97	2,052.97	130.23
11 68 13 00-0019 EA 32" Deck, Gemini SlideWinder2 (Landscape Structures® PlayShaper® 133426A) 5,830.11	5,830.11	390.68
11 68 13 00-0020 EA 40" Deck, Gemini SlideWinder2 (Landscape Structures® PlayShaper® 133426B) 6,725.24	6,725.24	390.68
11 68 13 00-0021 EA 48" Deck, Gemini SlideWinder2 (Landscape Structures® PlayShaper® 133426C) 7,245.88	7,245.88	390.68
11 68 13 00-0022 EA Curved Poly Slide, 40" Deck (Landscape Structures® PlayShaper® 123339A) 2,063.20	2,063.20	65.11
11 68 13 00-0023 EA Single Poly Slide, 40" Deck (Landscape Structures® PlayShaper® 133668A) 2,098.64	2,098.64	130.23
11 68 13 00-0024 EA 32" Deck, SlideWinder2 (Landscape Structures® PlayShaper® 132117A) 2,782.61	2,782.61	195.34
11 68 13 00-0025 EA 40" Deck, SlideWinder2 (Landscape Structures® PlayShaper® 132117B) 3,102.30	3,102.30	195.34
11 68 13 00-0026 EA 48" Deck, SlideWinder2 (Landscape Structures® PlayShaper® 132117C) 3,458.52	3,458.52	195.34
11 68 13 00-0027 EA Critter Canyon Climber, 30" Or 32" Deck (Landscape Structures® PlayShaper® 137966A) 1,998.17	1,998.17	130.23
11 68 13 00-0028 EA Thunderhead Climber, 48" Deck-To-Ground (Landscape Structures® PlayShaper® 139911A) 8,348.93	8,348.93	520.90
11 68 13 00-0029 EA Step Deck Climber, 16" Deck (Landscape Structures® PlayShaper® 119981A) 1,166.98	1,166.98	130.23
11 68 13 00-0030 EA Loop Ladder Climber, 40" Or 48" Deck (Landscape Structures® PlayShaper® 111364A) 1,232.00	1,232.00	65.11
11 68 13 00-0031 EA Loop Arch Climber, 32" - 48" Deck (Landscape Structures® PlayShaper® 139262A) 1,859.08	1,859.08	162.78
11 68 13 00-0032 EA 32" Deck, Block Climber (Landscape Structures® PlayShaper® 135547A) 2,882.55	2,882.55	227.90
11 68 13 00-0033 EA 40" Deck, Block Climber (Landscape Structures® PlayShaper® 135547B) 3,366.65	3,366.65	227.90
11 68 13 00-0034 EA 32" - 40" Deck, Cozy Climber (Landscape Structures® PlayShaper® 132023A) 3,139.92	3,139.92	130.23
11 68 13 00-0035 EA 48" Deck, Cozy Climber (Landscape Structures® PlayShaper® 132023B) 3,377.40	3,377.40	130.23
11 68 13 00-0036 EA 1-Step, With Permalene Barriers, Deck Links (Landscape Structures® PlayShaper® 153021A) 1,541.47	1,541.47	130.23
11 68 13 00-0037 EA 2-Steps, With Permalene Barriers, Deck Links (Landscape Structures® PlayShaper® 153021B) 1,797.22	1,797.22	130.23
11 68 13 00-0038 EA 16" Deck, Pod Climber (Landscape Structures® PlayShaper® 135346A) 802.99	802.99	54.26
11 68 13 00-0039 EA 24" Deck, Pod Climber (Landscape Structures® PlayShaper® 135346B) 1,487.21	1,487.21	97.67
11 68 13 00-0040 EA 32" Deck, Pod Climber (Landscape Structures® PlayShaper® 135346C) 2,252.03	2,252.03	249.60
11 68 13 00-0041 EA 40" Deck, Pod Climber (Landscape Structures® PlayShaper® 135346D) 2,653.92	2,653.92	249.60
11 68 13 00-0042 EA 32" Deck, Step Ladder (Landscape Structures® PlayShaper® 111327A) 2,372.66	2,372.66	130.23
11 68 13 00-0043 EA 40" Deck, Step Ladder (Landscape Structures® PlayShaper® 111327B) 5,046.49	5,046.49	130.23
11 68 13 00-0044 EA 48" Deck, Step Ladder (Landscape Structures® PlayShaper® 111327C) 3,514.41	3,514.41	130.23
11 68 13 00-0045 EA 32" Deck, Wiggle Ladder (Landscape Structures® PlayShaper® 123284A) 1,107.86	1,107.86	162.78
11 68 13 00-0046 EA 40" Deck, Wiggle Ladder (Landscape Structures® PlayShaper® 123284B) 1,139.03	1,139.03	162.78
11 68 13 00-0047 EA 48" Deck, Wiggle Ladder (Landscape Structures® PlayShaper® 123284C) 1,193.23	1,193.23	162.78
11 68 13 00-0048 EA Overhead Events Horizontal Ladder, 16" Deck (Landscape Structures® PlayShaper® 129967A) 1,196.01	1,196.01	32.56
11 68 13 00-0049 EA Overhead Events Horizontal Ladder End Panel, Without Posts (Landscape Structures® PlayShaper® 129968A) 437.89	437.89	32.56
11 68 13 00-0050 EA Conical Climber, 40" Deck (Landscape Structures® PlayShaper® 143200A) 4,272.45	4,272.45	227.90
11 68 13 00-0051 EA ABC Climber, 32" - 48" Deck (Landscape Structures® PlayShaper® 152432A) 2,234.69	2,234.69	162.78
11 68 13 00-0052 EA Mini Summit Climber, 40" And 48" Decks (Landscape Structures® PlayShaper® 153077A) 1,361.99	1,361.99	54.26
11 68 13 00-0053 EA Arch Bridge, 42" Long (Landscape Structures® PlayShaper® 111348A) 2,684.31	2,684.31	65.11
11 68 13 00-0054 EA Phase Kit (Landscape Structures® PlayShaper® 116098A) 375.15	375.15	41.02
11 68 13 00-0055 EA Belt Bridge With Permalene Barriers, 42" Long (Landscape Structures® PlayShaper® 131956A) 2,081.46	2,081.46	65.11
11 68 13 00-0056 EA 8" Deck-To-Ground, Ramp Exit Plate (Landscape Structures® PlayShaper® 111413A) 829.56	829.56	97.67
11 68 13 00-0057 EA 16" - 48" Decks To Ground, Ramp Exit Plate (Landscape Structures® PlayShaper® 138405A) 1,579.20	1,579.20	97.67
11 68 13 00-0058 EA Deck-To-Deck Ramp With Permalene Barrier And Handrail, Excludes Posts (Landscape Structures® PlayShaper® 132828A) 5,768.35	5,768.35	260.45
11 68 13 00-0059 EA Deck-To-Ground Ramp With Permalene Barrier And Handrail, Excludes Posts (Landscape Structures® PlayShaper® 132844A) 5,768.35	5,768.35	260.45
11 68 13 00-0060 EA Wire Crawl Tunnel (Landscape Structures® PlayShaper® 118099A) 2,628.42	2,628.42	130.23
11 68 13 00-0061 EA Offset Crawl Tunnel, 8" Deck Height Difference (Landscape Structures® PlayShaper® 139268A) 1,970.77	1,970.77	130.23
11 68 13 00-0062 EA 28" Long, Crawl Tunnels With Entrance Panels (Landscape Structures® PlayShaper® 128953A) 2,017.53	2,017.53	65.11
11 68 13 00-0063 EA 56" Long, Crawl Tunnels With Entrance Panels (Landscape Structures® PlayShaper® 128953B) 2,611.24	2,611.24	65.11
11 68 13 00-0064 EA 90 Degree Curved Crawl Tunnels With Entrance Panels (Landscape Structures® PlayShaper® 115409C) 2,884.17	2,884.17	130.23
11 68 13 00-0065 EA C-Straight Crawl Tunnels With Entrance Panels (Landscape Structures® PlayShaper® 118097A) 4,754.47	4,754.47	260.45
11 68 13 00-0066 EA S-Straight Crawl Tunnels With Entrance Panels (Landscape Structures® PlayShaper® 118097B) 4,754.47	4,754.47	260.45
11 68 13 00-0067 EA C-Inclined Crawl Tunnels With Entrance Panels, 16" Deck Height Difference (Landscape Structures® PlayShaper® 118098A) 4,754.47	4,754.47	260.45
11 68 13 00-0068 EA S-Inclined Crawl Tunnels With Entrance Panels, 16" Deck Height Difference (Landscape Structures® PlayShaper® 118098B) 4,754.47	4,754.47	260.45
11 68 13 00-0069 EA Bubble Panel, Enclosure (Landscape Structures® PlayShaper® 111282A) 912.86	912.86	32.56

11 Equipment**11 60 Entertainment and Recreation Equipment****11 68 Play Field Equipment and Structures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68	13 00-0070	EA	Ball Maze Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 111300A)	1,397.24	21.70
11 68	13 00-0071	EA	Chimes Panel, Enclosure (Landscape Structures® PlayShaper® 113211A)	1,616.46	21.70
11 68	13 00-0072	EA	Braille And Clock Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 123845A)	1,762.60	21.70
11 68	13 00-0073	EA	Driver Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 111288A)	958.53	32.56
11 68	13 00-0074	EA	Finger Maze Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 111289A)	757.86	21.70
11 68	13 00-0075	EA	Gear Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 117147A)	2,210.17	21.70
11 68	13 00-0076	EA	Hole Panel, Enclosure (Landscape Structures® PlayShaper® 111284A)	602.58	21.70
11 68	13 00-0077	EA	House Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 111299A)	711.91	32.56
11 68	13 00-0078	EA	Hourglass Panel, Enclosure (Landscape Structures® PlayShaper® 124333A)	1,881.34	21.70
11 68	13 00-0079	EA	Match 4 Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 127684A)	1,177.74	32.56
11 68	13 00-0080	EA	Image Panel, 176 Play Blocks, Enclosure (Landscape Structures® PlayShaper® 127685A)	1,633.90	65.11
11 68	13 00-0081	EA	Math Panel, Enclosure, Red Discs Only (Landscape Structures® PlayShaper® 111294A)	1,752.92	54.26
11 68	13 00-0082	EA	Sand And Water Panel, Enclosure (Ground Level Only), Tan Dish Only (Landscape Structures® PlayShaper® 111297A)	1,688.16	97.67
11 68	13 00-0083	EA	Mirror Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 111298A)	1,223.69	21.70
11 68	13 00-0084	EA	Periscope Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 118429A)	1,826.26	32.56
11 68	13 00-0085	EA	Pilot Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 119515A)	1,250.81	32.56
11 68	13 00-0086	EA	Slant Window Panel, Enclosure (Landscape Structures® PlayShaper® 111281A)	1,597.36	65.11
11 68	13 00-0087	EA	Storefront Panel, Enclosure (Ground Level Only) (Landscape Structures® PlayShaper® 144984A)	547.50	32.56
11 68	13 00-0088	EA	Spelling Panel, Enclosure, Red Discs Only (Landscape Structures® PlayShaper® 111295A)	1,688.98	54.26
11 68	13 00-0089	EA	Slant Entrance Panel, Enclosure (Ground Level Only) (Landscape Structures® PlayShaper® 111387A)	1,295.68	86.82
11 68	13 00-0090	EA	Space Travel Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 123484A)	1,570.79	21.70
11 68	13 00-0091	EA	Puppet Panel, Enclosure (Landscape Structures® PlayShaper® 111285A)	602.58	21.70
11 68	13 00-0092	EA	Puppet Panel With Window, Enclosure (Landscape Structures® PlayShaper® 111286A)	830.65	32.56
11 68	13 00-0093	EA	Zoo Panel, Enclosure (Landscape Structures® PlayShaper® 111287A)	602.58	21.70
11 68	13 00-0094	EA	Tracing Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayShaper® 111290A)	776.13	21.70
11 68	13 00-0095	EA	Table Panel, Enclosure (Ground Level Only) (Landscape Structures® PlayShaper® 111292A)	1,468.94	97.67
11 68	13 00-0096	EA	Tic-Tac-Toe Panel, Enclosure (Landscape Structures® PlayShaper® 111293A)	1,597.91	32.56
11 68	13 00-0097	EA	Bead And Block Panel Without Handles, Enclosure (Landscape Structures® PlayShaper® 111370A)	1,214.28	32.56
11 68	13 00-0098	EA	2 Benches, 2 End Panels (Ground Level Only) (Landscape Structures® PlayShaper® 116120A)	1,168.35	54.26
11 68	13 00-0099	EA	1 Bench, 2 End Panels (Ground Level Only) (Landscape Structures® PlayShaper® 138185A)	675.11	54.26
11 68	13 00-0100	EA	1 Bench, 1 End Panel (Ground Level Only) (Landscape Structures® PlayShaper® 138299A)	593.17	32.56
11 68	13 00-0101	EA	Balcony Deck, Brown Tenderdeck Only (Landscape Structures® PlayShaper® 139260A)	1,642.49	97.67
11 68	13 00-0102	EA	Balcony Deck With Wheel, Brown Tenderdeck Only (Landscape Structures® PlayShaper® 139260B)	1,907.37	97.67
11 68	13 00-0103	EA	Trail Tracker Reach Panel (2-Color Permalene) (Landscape Structures® PlayShaper® 139264A)	547.78	21.70
11 68	13 00-0104	EA	Navigator Reach Panel (2-Color Permalene) (Landscape Structures® PlayShaper® 139266A)	766.99	21.70
11 68	13 00-0105	EA	Curb, Accessible Reach Panel (Landscape Structures® PlayShaper® 128623A)	158.67	21.70
11 68	13 00-0106	EA	Long Wire Barrier (For 90 Degree Tri-Deck) (Landscape Structures® PlayShaper® 117945A)	885.45	32.56
11 68	13 00-0107	EA	Long Wire Barrier With Wheel (For 90 Degree Tri-Deck) (Landscape Structures® PlayShaper® 117945B)	1,177.48	54.26
11 68	13 00-0108	EA	Short Wire Barrier (Square, Corner And Extension Decks) (Landscape Structures® PlayShaper® 117946A)	675.11	54.26
11 68	13 00-0109	EA	Short Wire Barrier With Wheel (Square, Corner And Extension Decks) (Landscape Structures® PlayShaper® 117946B)	940.00	54.26
11 68	13 00-0110	EA	Chinning Bar Without Post (Landscape Structures® PlayShaper® 139272A)	155.02	21.70
11 68	13 00-0111	EA	Steering Wheel (Landscape Structures® PlayShaper® 111306A)	292.03	21.70
11 68	13 00-0112	EA	Steering Wheel With Infill Panel (Landscape Structures® PlayShaper® 111306B)	392.50	21.70
11 68	13 00-0113	EA	Handloop (Landscape Structures® PlayShaper® 119977A)	228.09	21.70
11 68	13 00-0114	EA	Ground Level, Talk Tubes, Attaches Next To 40" To 48" Deck Only, One Only (Landscape Structures® PlayShaper® 115198A)	620.57	32.56
11 68	13 00-0115	EA	16" Deck, Talk Tubes, One Only (Landscape Structures® PlayShaper® 115198B)	638.84	32.56
11 68	13 00-0116	EA	24" Deck, Talk Tubes, One Only (Landscape Structures® PlayShaper® 115198C)	647.97	32.56
11 68	13 00-0117	EA	32" Deck, Talk Tubes, One Only (Landscape Structures® PlayShaper® 115198D)	666.24	32.56
11 68	13 00-0118	EA	40" Deck, Talk Tubes, One Only (Landscape Structures® PlayShaper® 115198E)	675.37	32.56
11 68	13 00-0119	EA	48" Deck, Talk Tubes, One Only (Landscape Structures® PlayShaper® 115198F)	693.64	32.56
11 68	13 00-0120	EA	Talk Tube Tubing Kit (Landscape Structures® PlayShaper® 111362A)	581.31	195.34
			Note: Order one talk tube tubing kit with two talk tubes (any height listed).		
11 68	13 00-0121	EA	Arch Roof (Landscape Structures® PlayShaper® 111407A)	939.71	65.11
11 68	13 00-0122	EA	Square Poly Roof With Logo Panels (Landscape Structures® PlayShaper® 118110A)	1,760.69	130.23
11 68	13 00-0123	EA	Square Peak Tile Roof With Logo Panels (Landscape Structures® PlayShaper® 129816A)	1,952.50	130.23
11 68	13 00-0124	EA	Super-Square Shingle Roof With Permalene Roof Cap (Landscape Structures® PlayShaper® 130102A)	4,053.32	130.23
11 68	13 00-0125	EA	Super-Square Shingle Roof With Poly Roof Cap (Landscape Structures® PlayShaper® 130102B)	4,710.97	130.23
11 68	13 00-0126	EA	Square Tenderdeck, Brown Only (Landscape Structures® PlayShaper® 111237A)	1,022.20	54.26
11 68	13 00-0127	EA	Square Tenderdeck, Corner, Brown Only (Landscape Structures® PlayShaper® 111238A)	976.53	54.26
11 68	13 00-0128	EA	Square Tenderdeck, Extension, Brown Only (Landscape Structures® PlayShaper® 111239A)	994.80	54.26
11 68	13 00-0129	EA	90 Degree Triangular Tenderdeck, Brown Only (Landscape Structures® PlayShaper® 117495A)	803.25	32.56
11 68	13 00-0130	EA	Transfer Stations With Two Handbars (Landscape Structures® PlayShaper® 126205A)	1,604.32	195.34
11 68	13 00-0131	EA	Transfer Stations With One Handbar (Landscape Structures® PlayShaper® 126205B)	1,467.31	195.34
11 68	13 00-0132	EA	Transfer Stations No Handbars (Landscape Structures® PlayShaper® 126205C)	1,348.57	195.34
11 68	13 00-0133	EA	Curb For 90 Degree Tri-Deck (Landscape Structures® PlayShaper® 139083A)	191.55	21.70
11 68	13 00-0134	EA	8" Rise, Kick Plates, Brown Only (Landscape Structures® PlayShaper® 121948A)	169.63	21.70
11 68	13 00-0135	EA	16" Rise, Kick Plates, Brown Only (Landscape Structures® PlayShaper® 121948B)	246.36	21.70
11 68	13 00-0136	EA	8" Rise, 90 Degree Tri-Deck, Kick Plates, Brown Only (Landscape Structures® PlayShaper® 121949A)	206.17	21.70
11 68	13 00-0137	EA	16" Rise, 90 Degree Tri-Deck, Kick Plates, Brown Only (Landscape Structures® PlayShaper® 121949B)	301.16	21.70
11 68	13 00-0138	EA	To 32" Deck, Curved Transfer Module, Right Or Left Step (Landscape Structures® PlayShaper® 153020A)	3,028.15	260.45
11 68	13 00-0139	EA	To 40" Deck, Curved Transfer Module, Right Or Left Step (Landscape Structures® PlayShaper® 153020B)	3,457.44	260.45
11 68	13 00-0140	EA	To 48" Deck, Curved Transfer Module, Right Or Left Step (Landscape Structures® PlayShaper® 153020C)	3,640.12	260.45
11 68	13 00-0141	EA	56"/SpyroSlide, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399A)	1,825.71	65.11
11 68	13 00-0142	EA	48" Deck, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399B)	1,789.18	65.11
11 68	13 00-0143	EA	40" Deck, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399C)	1,770.91	65.11
11 68	13 00-0144	EA	32" Deck, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399D)	1,743.51	65.11
11 68	13 00-0145	EA	24" Deck, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399E)	1,716.10	65.11
11 68	13 00-0146	EA	16" Deck, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399F)	1,697.84	65.11

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0147 EA 8" Deck, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399G)	1,679.57	65.11
11 68 13 00-0148 EA Ground Level, Arches For Decks And/or Roofs (Landscape Structures® PlayShaper® 111399H)	1,661.30	65.11
11 68 13 00-0149 EA 82"/48" Deck, Flush Mount Posts For Decks (Landscape Structures® PlayShaper® 111398A)	410.49	32.56
11 68 13 00-0150 EA 74"/40" Deck, Flush Mount Posts For Decks (Landscape Structures® PlayShaper® 111398B)	392.22	32.56
11 68 13 00-0151 EA 66"/32" Deck, Flush Mount Posts For Decks (Landscape Structures® PlayShaper® 111398C)	364.82	32.56
11 68 13 00-0152 EA 58"/24" Deck, Flush Mount Posts For Decks (Landscape Structures® PlayShaper® 111398D)	355.68	32.56
11 68 13 00-0153 EA 50"/16" Deck, Flush Mount Posts For Decks (Landscape Structures® PlayShaper® 111398E)	346.55	32.56
11 68 13 00-0154 EA 42"/8" Deck, Flush Mount Posts For Decks (Landscape Structures® PlayShaper® 111398F)	337.41	32.56
11 68 13 00-0155 EA 128"/SpyroSlide/SlideWinder2 Off 48" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397A)	745.72	195.34
11 68 13 00-0156 EA 114"/48" Deck/SlideWinder2 Off 40" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397B)	709.19	195.34
11 68 13 00-0157 EA 106"/40" Deck/SlideWinder2 Off 32" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397C)	700.05	195.34
11 68 13 00-0158 EA 98"/32" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397D)	419.62	32.56
11 68 13 00-0159 EA 90"/24" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397E)	410.49	32.56
11 68 13 00-0160 EA 82"/16" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397F)	392.22	32.56
11 68 13 00-0161 EA 74"/8" Deck, Post For Decks (Landscape Structures® PlayShaper® 111397G)	364.82	32.56
11 68 13 00-0162 EA 69"/Ground Level, Post For Decks (Landscape Structures® PlayShaper® 111397H)	355.68	32.56
11 68 13 00-0163 EA 145"/SpyroSlide, Post For Roofs (Landscape Structures® PlayShaper® 111396A)	483.56	32.56
11 68 13 00-0164 EA 137"/48" Deck, Post For Roofs (Landscape Structures® PlayShaper® 111396B)	474.42	32.56
11 68 13 00-0165 EA 129"/40" Deck, Post For Roofs (Landscape Structures® PlayShaper® 111396C)	447.02	32.56
11 68 13 00-0166 EA 121"/32" Deck, Post For Roofs (Landscape Structures® PlayShaper® 111396D)	437.89	32.56
11 68 13 00-0167 EA 113"/24" Deck, Post For Roofs (Landscape Structures® PlayShaper® 111396E)	428.75	32.56
11 68 13 00-0168 EA 105"/16" Deck, Post For Roofs (Landscape Structures® PlayShaper® 111396F)	410.49	32.56
11 68 13 00-0169 EA 97"/8" Deck, Post For Roofs (Landscape Structures® PlayShaper® 111396G)	392.22	32.56
11 68 13 00-0170 EA 89"/Ground Level, Post For Roofs (Landscape Structures® PlayShaper® 111396H)	364.82	32.56
11 68 13 00-0171 EA Learning Wall Arch For 10" Panel Height, With Logo Panel (For Roof Only) (Landscape Structures® PlayShaper® 115208A)	2,616.93	226.39
11 68 13 00-0172 EA Learning Wall Arch For 1" Panel Height, With Logo Panel (For Roof Only) (Landscape Structures® PlayShaper® 115208B)	2,582.74	223.47
11 68 13 00-0173 EA Learning Wall Arch For 10" Panel Height Without Logo Panel (For Roof Only) (Landscape Structures® PlayShaper® 115208C)	2,103.85	182.08
11 68 13 00-0174 EA Learning Wall Arch For 1" Panel Height Without Logo Panel (For Roof Only) (Landscape Structures® PlayShaper® 115208D)	2,069.57	179.05
11 68 13 00-0175 EA Learning Wall Post For 10" Panel Height (Landscape Structures® PlayShaper® 115201A)	427.59	37.00
11 68 13 00-0176 EA Learning Wall Post For 1" Panel Height (Landscape Structures® PlayShaper® 115201B)	410.49	35.54
11 68 13 00-0177 EA Learning Wall Post For Poly Roof With 10" Panel Height (Landscape Structures® PlayShaper® 115203A)	465.22	40.22
11 68 13 00-0178 EA Learning Wall Post For Poly Roof With 1" Panel Height (Landscape Structures® PlayShaper® 115203B)	444.70	38.46
11 68 13 00-0179 EA The Peak Natural Climber, 40" Deck (Landscape Structures® PlayShaper® 160423A)	8,918.49	325.56
11 68 13 00-0180 EA The Stepper Natural Climbing Stone, 24" Deck (Landscape Structures® PlayShaper® 160424A)	4,746.42	195.34
11 68 13 00-0181 Playground Equipment (Landscape Structures® Independent Pieces) (11 68 13 00-0009)		
11 68 13 00-0182 EA 9-Blocks, Block Climber (Landscape Structures® 117966A)	3,858.25	325.56
11 68 13 00-0183 EA 12-Blocks, Block Climber (Landscape Structures® 117966B)	4,360.62	325.56
11 68 13 00-0184 EA 116-Blocks, Block Climber (Landscape Structures® 117966C)	5,355.14	390.68
11 68 13 00-0185 EA Spider Web Climber, CableCore Climbing Cable (Direct Bury Only) (Landscape Structures® 136159A)	4,014.62	260.45
11 68 13 00-0186 EA 6-Panels, Cascade Climber (Direct Bury Only) (Landscape Structures® 150976A)	6,498.97	434.09
11 68 13 00-0187 EA 4-Panels, Cascade Climber (Direct Bury Only) (Landscape Structures® 150977A)	4,481.53	195.34
11 68 13 00-0188 EA Star Seeker Climber, Net Climber (Direct Bury Only) (Landscape Structures® 148041A)	11,983.17	586.02
11 68 13 00-0189 EA Funnel Climber, Net Climber With 2 Vertical Ladders, (6) Aluminum Posts (Landscape Structures® 144477A)	10,789.87	390.68
11 68 13 00-0190 EA Funnel Climber, Net Climber Without Vertical Ladders, (4) Aluminum Posts (Landscape Structures® 144477B)	7,941.15	325.56
11 68 13 00-0191 EA Funnel Climber, Net Climber With 1 Vertical Ladder, (5) Aluminum Posts (Landscape Structures® 144477C)	9,365.51	358.12
11 68 13 00-0192 EA Funnel Climber, Net Climber With 3 Vertical Ladders, (7) Aluminum Posts (Landscape Structures® 144477D)	12,214.24	423.23
11 68 13 00-0193 EA Funnel Climber, Net Climber With 4 Vertical Ladders, (8) Aluminum Posts (Landscape Structures® 144477E)	13,638.60	455.79
11 68 13 00-0194 EA Funnel Climber, Net Climber With 2 Vertical Ladders, (6) Steel Posts (Landscape Structures® 144477F)	10,515.85	390.68
11 68 13 00-0195 EA Funnel Climber, Net Climber Without Vertical Ladders, (4) Steel Posts (Landscape Structures® 144477G)	7,758.47	325.56
11 68 13 00-0196 EA Funnel Climber, Net Climber With 1 Vertical Ladder, (5) Steel Posts (Landscape Structures® 144477H)	9,137.16	358.12
11 68 13 00-0197 EA Funnel Climber, Net Climber With 3 Vertical Ladders, (7) Steel Posts (Landscape Structures® 144477I)	11,894.55	423.23
11 68 13 00-0198 EA Funnel Climber, Net Climber With 4 Vertical Ladders, (8) Steel Posts (Landscape Structures® 144477J)	13,273.24	455.79
11 68 13 00-0199 EA 8", Pod Climber, One Pod Only (Landscape Structures® 120710A)	437.63	54.26
11 68 13 00-0200 EA 16", Pod Climber, One Pod Only (Landscape Structures® 120711A)	446.76	54.26
11 68 13 00-0201 EA 24", Pod Climber, One Pod Only (Landscape Structures® 120712A)	455.89	54.26
11 68 13 00-0202 EA 30", Pod Climber, One Pod Only (Landscape Structures® 120713A)	465.03	54.26
11 68 13 00-0203 EA Track Ride Curved (Landscape Structures® 118093A)	4,391.28	130.23
11 68 13 00-0204 EA 18' Curved Track Ride, Aluminum Posts, (Direct Bury Only) (Landscape Structures® 121874A)	6,679.57	390.68
11 68 13 00-0205 EA 18' Curved Track Ride, Steel Posts, (Direct Bury Only) (Landscape Structures® 121874B)	6,649.89	390.68
11 68 13 00-0206 EA 10' Straight Track Ride, Aluminum Posts, (Direct Bury Only) (Landscape Structures® 121648A)	5,620.03	390.68
11 68 13 00-0207 EA 10' Straight Track Ride, Steel Posts, (Direct Bury Only) (Landscape Structures® 121648B)	5,254.67	390.68
11 68 13 00-0208 EA 18' Straight Track Ride, Aluminum Posts, (Direct Bury Only) (Landscape Structures® 121875A)	5,848.38	390.68
11 68 13 00-0209 EA 18' Straight Track Ride, Steel Posts, (Direct Bury Only) (Landscape Structures® 121875B)	5,665.70	390.68
11 68 13 00-0210 EA Playstructure Seat, TenderTuff-coated Brown (Landscape Structures® 120818A)	556.09	65.11
11 68 13 00-0211 EA Kids In Motion, Sway Fun Glider, Brown Deck Only (Landscape Structures® 138871A)	20,017.84	781.37
11 68 13 00-0212 EA CoolToppers Shade System, Full Sail, (Direct Bury Only) (Landscape Structures® 136759A)	17,316.79	1,172.04
11 68 13 00-0213 EA CoolToppers Shade System, Single Post, (Direct Bury Only) (Landscape Structures® 154397A)	5,816.64	651.13
11 68 13 00-0214 EA CoolToppers Shade System, Single Post With Cool Mister, (Direct Bury Only) (Landscape Structures® 155071A)	7,101.91	260.45
11 68 13 00-0215 EA CoolToppers Shade System, Single Post With Cool Mister, (Direct Bury Only) (Landscape Structures® 155072A)	11,497.99	651.13
11 68 13 00-0216 EA Turtle Sand Table, (2-Color Permalene), (Direct Bury Only) (Landscape Structures® 116568A)	729.37	86.82
11 68 13 00-0217 EA Straight Crawl Tunnel (Landscape Structures® 100005A)	2,344.17	195.34
11 68 13 00-0218 EA Curved Crawl Tunnel (Landscape Structures® 100005D)	2,974.42	195.34
11 68 13 00-0219 EA 4' Square, SanDirect Buryoxe (Landscape Structures® 120458A)	636.12	195.34
11 68 13 00-0220 EA SanDirect Buryoxe, Play Table Only (Landscape Structures® 120894A)	891.87	195.34
11 68 13 00-0221 EA 8' Square, SanDirect Buryoxe Without Play Table (Landscape Structures® 120458B)	1,281.38	390.68

11 Equipment

11 60 Entertainment and Recreation Equipment

11 68 Play Field Equipment and Structures



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68	13 00-0222	EA	8' Square, SanDirect Buryoxe With Play Table, (Direct Bury Only) (Landscape Structures® 120458C)	1,838.55	390.68
11 68	13 00-0223	EA	8' L-Shaped, SanDirect Buryoxe Without Play Table (Landscape Structures® 120458D)	1,281.38	390.68
11 68	13 00-0224	EA	8' L-Shaped, SanDirect Buryoxe With Play Table, (Direct Bury Only) (Landscape Structures® 120458E)	1,838.55	390.68
11 68	13 00-0225	EA	Splash Circuit Sand And Water Station, Direct Bury (Landscape Structures® 126202A).....	5,745.74	520.90
11 68	13 00-0226	EA	Splash Circuit Sand And Water Station, Surface Mount (Landscape Structures® 126202B).....	5,574.36	390.68
11 68	13 00-0227	EA	Talk Tubes, Complete With (2) 2-3/8" Square Aluminum Posts, Ground Level, (Direct Bury Only) (Landscape Structures® 113931A).....	2,562.31	260.45
11 68	13 00-0228	EA	Clear Paint Panel, Surface Mount (Landscape Structures® 112621A).....	1,031.05	65.11
11 68	13 00-0229	EA	Clear Paint Panel, Direct Bury (Landscape Structures® 112621B)	902.63	97.67
11 68	13 00-0230	EA	Dino Climber, Direct Bury (Landscape Structures® 100122A)	14,879.74	520.90
11 68	13 00-0231	EA	Dino Climber, Surface Mount (Landscape Structures® 100122B).....	15,492.80	455.79
11 68	13 00-0232	EA	Sand Table, (3) Steel Posts, Direct Bury (Landscape Structures® 136233B)	4,149.45	390.68
11 68	13 00-0233	EA	Sand Table, (3) Aluminum Posts, Direct Bury (Landscape Structures® 136233A)	4,249.93	390.68
11 68	13 00-0234	EA	Wiggle Worm Crawl Tunnel With 2-Color Permalene Head (Landscape Structures® 120418A)	5,000.00	325.56
11 68	13 00-0235	EA	Wiggle Worm Crawl Tunnel Without 2-Color Permalene Head (Landscape Structures® 120418B).....	3,512.25	260.45
11 68	13 00-0236	EA	Kids In Motion, Saddle Spinner (Landscape Structures® 152179A).....	1,506.02	65.11
11 68	13 00-0237	EA	Kids In Motion, Log Roll With Aluminum Posts (Landscape Structures® 100027A).....	2,226.52	130.23
11 68	13 00-0238	EA	Kids In Motion, Log Roll, Tan Log Only, (2) Steel Posts (Landscape Structures® 100027B).....	2,135.18	130.23
11 68	13 00-0239	EA	Kids In Motion, Spring Pod Bouncer, Sold Individually Per Pod (Landscape Structures® 120876A)	592.90	54.26
11 68	13 00-0240	EA	Kids In Motion, SpringRing Bouncer, (Brown Ring Only, Avail. for Direct Bury Only) (Landscape Structures® 117961A).....	7,947.03	520.90
11 68	13 00-0241	EA	Kids In Motion, Spring Platform With Handhold, Brown Platform, Tan Handhold* (Landscape Structures® 125059A).....	2,825.02	390.68
11 68	13 00-0242	EA	Kids In Motion, Spring Platform Without Handhold, Brown Platform* (Landscape Structures® 125059B)	2,642.34	390.68
11 68	13 00-0243	EA	Kids In Motion, Spring Platform With Post, Brown Platform, Tan Post* (Landscape Structures® 125059C).....	3,318.26	390.68
11 68	13 00-0244	EA	Kids In Motion, Stand-Up Spinner, (Direct Bury Only) (Landscape Structures® 155077A)	2,209.34	65.11
11 68	13 00-0245	EA	Orbiter Spinner, Steel Post, (Avail. for Direct Bury Only) (Landscape Structures® 153589A)	3,084.03	195.34
11 68	13 00-0246	EA	Orbiter2 Spinner, Steel Post, (Avail. for Direct Bury Only) (Landscape Structures® 154358A)	5,558.26	260.45
11 68	13 00-0247	EA	Orbiter3 Spinner, Steel Post, (Direct Bury Only) (Landscape Structures® 154359A)	8,023.36	325.56
11 68	13 00-0248	EA	Stand-Up Seesaw, Direct Bury (Landscape Structures® 148638A)	3,249.53	130.23
11 68	13 00-0249	EA	Stand-Up Seesaw, Surface Mount (Landscape Structures® 148638B).....	2,801.96	130.23
11 68	13 00-0250	EA	2-Seat Seesaw, Direct Bury, Without Color Options On Permalene (Landscape Structures® 148636A)	3,596.62	130.23
11 68	13 00-0251	EA	2-Seat Seesaw, Surface Mount, Without Color Options On Permalene (Landscape Structures® 148636B).....	3,103.38	130.23
11 68	13 00-0252	EA	4-Seat Seesaw, Direct Bury, Without Color Options On Permalene (Landscape Structures® 148637A).....	4,345.61	130.23
11 68	13 00-0253	EA	4-Seat Seesaw, Surface Mount, Without Color Options On Permalene (Landscape Structures® 148637B).....	3,870.64	130.23
11 68	13 00-0254	EA	Seesaw Back Support, With Seat Strap* (Landscape Structures® 148706A)	410.77	21.70
11 68	13 00-0255	EA	Seesaw Back Support, without Seat Strap (Landscape Structures® 148706B)	337.70	21.70
11 68	13 00-0256	EA	Stationary Cyclus, SuperScoop, (Direct Bury Only) (Landscape Structures® 123831A)	1,540.93	162.78
11 68	13 00-0257	EA	Stationary Cyclus, SuperScoop, Wheelchair-Accessible, Surface Mount (Landscape Structures® 123832A)	1,377.60	97.67
11 68	13 00-0258	EA	Stationary Cyclus, SuperScoop, Wheelchair-Accessible, Direct Bury (Landscape Structures® 123832B).....	1,431.32	162.78
11 68	13 00-0259	EA	Motorcycle TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100013B).....	2,106.69	195.34
11 68	13 00-0260	EA	Motorcycle Back Supports With Seat Strap (Landscape Structures® 123711A).....	328.56	21.70
11 68	13 00-0261	EA	Motorcycle Back Supports Without Seat Strap (Landscape Structures® 123711B).....	273.76	21.70
11 68	13 00-0262	EA	Turtle TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100014B).....	1,778.41	162.78
11 68	13 00-0263	EA	Bird TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100015B).....	1,805.27	195.34
11 68	13 00-0264	EA	Horse TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100015B)	1,787.00	195.34
11 68	13 00-0265	EA	Car TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100017B).....	2,106.69	195.34
11 68	13 00-0266	EA	RhinoDino TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100123B).....	1,760.14	162.78
11 68	13 00-0267	EA	T-Rex TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 100124B)	1,787.00	195.34
11 68	13 00-0268	EA	2-Seat Airplane Rider TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 120871A).....	2,654.20	227.90
11 68	13 00-0269	EA	2-Seat Airplane Rider TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 120871B).....	2,782.61	195.34
11 68	13 00-0270	EA	2-Seat Fire Engine Rider TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 126378A).....	2,407.58	227.90
11 68	13 00-0271	EA	2-Seat Fire Engine Rider TuffRiders, With Coil Spring, Direct Bury (Landscape Structures® 126378B).....	2,526.85	195.34
11 68	13 00-0272	EA	Motorcycle TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100013A).....	1,814.95	162.78
11 68	13 00-0273	EA	Turtle TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100014A).....	1,477.53	130.23
11 68	13 00-0274	EA	Bird TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100015A).....	1,504.39	162.78
11 68	13 00-0275	EA	Horse TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100016A).....	1,486.12	162.78
11 68	13 00-0276	EA	Car TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100017A).....	1,814.95	162.78
11 68	13 00-0277	EA	RhinoDino TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100123A).....	1,468.40	130.23
11 68	13 00-0278	EA	T-Rex TuffRiders, With Coil Spring, Surface Mount (Landscape Structures® 100124A).....	1,486.12	162.78
11 68	13 00-0279	EA	Zebra Whimsy Riders, With Coil Spring, Direct Bury (Landscape Structures® 135534B).....	1,860.62	162.78
11 68	13 00-0280	EA	Sea Horse Whimsy Riders, With Coil Spring, Direct Bury (Landscape Structures® 135535B)	1,988.49	162.78
11 68	13 00-0281	EA	Dolphin Whimsy Riders, With Coil Spring, Direct Bury (Landscape Structures® 135536B)	1,897.15	162.78
11 68	13 00-0282	EA	Zebra Whimsy Riders, With Coil Spring, Surface Mount (Landscape Structures® 135534A)	1,578.01	130.23
11 68	13 00-0283	EA	Sea Horse Whimsy Riders, With Coil Spring, Surface Mount (Landscape Structures® 135535A).....	1,696.75	130.23
11 68	13 00-0284	EA	Dolphin Whimsy Riders, With Coil Spring, Surface Mount (Landscape Structures® 135536A).....	1,614.54	130.23
11 68	13 00-0285	EA	SpyroSlide, Poly, 72" Deck (Landscape Structures® 115366A).....	11,596.29	781.37
11 68	13 00-0286	EA	40" Poly Slide, 40" Deck (Landscape Structures® 100046A).....	6,196.56	325.56
11 68	13 00-0287	EA	Wave Poly Slide, 72" Deck (Landscape Structures® 100046C).....	7,493.58	325.56
11 68	13 00-0288	EA	Fire Engine, Colors As Shown Only, (Direct Bury Only) (Landscape Structures® 148640A)	22,740.22	1,302.27
11 68	13 00-0289	EA	Double Humpty Climber (Direct Bury Only) (Landscape Structures® 100037A)	3,905.01	260.45
11 68	13 00-0290	EA	Single Humpty Climber (Direct Bury Only) (Landscape Structures® 100037B).....	2,143.23	195.34
11 68	13 00-0291	EA	12-Panel, Mobius Climber (Direct Bury Only) (Landscape Structures® 150638A)	42,885.93	2,083.63
11 68	13 00-0292	EA	7-Panel, Mobius Climber (Direct Bury Only) (Landscape Structures® 150637A)	23,631.01	1,562.72
11 68	13 00-0293	EA	6-Panel, Mobius Climber (Direct Bury Only) (Landscape Structures® 150636A)	21,429.71	1,562.72
11 68	13 00-0294	EA	3-Panel, Mobius Climber (Direct Bury Only) (Landscape Structures® 150635A).....	10,230.53	520.90
11 68	13 00-0295	EA	4', Rainbow Climber (Direct Bury Only) (Landscape Structures® 100038A)	1,478.08	97.67
11 68	13 00-0296	EA	6', Rainbow Climber (Direct Bury Only) (Landscape Structures® 100038B).....	1,651.62	97.67
11 68	13 00-0297	EA	Sky Rail Climber, Independent Climber (Direct Bury Only) (Landscape Structures® 146813A).....	5,254.67	390.68
11 68	13 00-0298	EA	4'-High, Vertical Pipe Climber (Direct Bury Only) (Landscape Structures® 100040A).....	1,112.72	97.67
11 68	13 00-0299	EA	6'-High, Vertical Pipe Climber (Direct Bury Only) (Landscape Structures® 100040B).....	1,204.06	97.67

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0300 EA Arch Belt Swing, 2-Place, TenderTuff-coated Chain (Landscape Structures® 100050A)	5,067.99	520.90
11 68 13 00-0301 EA Arch Belt Swing, 2-Place, Uncoated Chain (Landscape Structures® 100050C)	4,914.54	520.90
11 68 13 00-0302 EA Arch Swing, Additional 2 PL Bay, TenderTuff-coated Chain (Landscape Structures® 111579A)	3,190.73	260.45
11 68 13 00-0303 EA Arch Swing, Additional 2 PL Bay, Uncoated Chain (Landscape Structures® 111579C)	3,037.28	260.45
11 68 13 00-0304 EA Single Post Swing, 2-Place, Uncoated Chain (Landscape Structures® 122837A)	2,614.94	390.68
11 68 13 00-0305 EA Single Post Swing, 2-Place, TenderTuff-coated Chain (Landscape Structures® 122837B)	2,768.39	390.68
11 68 13 00-0306 EA Single Post Swing, Additional 2 PL Bay, Uncoated Chain (Landscape Structures® 122838A)	1,878.34	195.34
11 68 13 00-0307 EA Single Post Swing, Additional 2 PL Bay, TenderTuff-coated Chain (Landscape Structures® 122838B)	2,031.79	195.34
11 68 13 00-0308 EA Single Post Swing, 2-Place, Anti-Wrap Hangers, Uncoated Chain (Landscape Structures® 140769A)	3,007.70	390.68
11 68 13 00-0309 EA Single Post Swing, 2-Place, Anti-Wrap Hangers, TenderTuff-coated Chain (Landscape Structures® 140769B)	3,161.15	390.68
11 68 13 00-0310 EA Single Post Swing, Additional 2 PL Bay, Anti-Wrap Hangers, Uncoated Chain (Landscape Structures® 140770A)	2,271.10	195.34
11 68 13 00-0311 EA Single Post Swing, Additional 2 PL Bay, Anti-Wrap Hangers, TenderTuff-coated Chain (Landscape Structures® 140770B)	2,424.55	195.34
11 68 13 00-0312 EA Toddler Swing Add-On, With (1) Full-Bucket Seat, Without Post (Landscape Structures® 151852A)	1,140.66	65.11
11 68 13 00-0313 EA Arch Tire Swing, TenderTuff-coated Chain (Landscape Structures® 120891A)	5,809.67	520.90
11 68 13 00-0314 EA Additional Bay, Arch Tire Swing, TenderTuff-coated Chain (Landscape Structures® 139188A)	4,069.42	260.45
11 68 13 00-0315 EA 4-Post Tire Swing, TenderTuff-coated Chain, (4) Posts With Crossovers, Steel Beam And Posts (Landscape Structures® 120892B)	5,279.90	520.90
11 68 13 00-0316 EA Additional Bay, 4-Post Tire Swing, TenderTuff-coated Chain, (2) Posts With Crossover, Steel Beam And Posts (Landscape Structures® 141458B)	3,411.77	260.45
11 68 13 00-0317 EA Toddler Swing, With (2) Full-Bucket Seats (Landscape Structures® 117962B)	2,626.25	260.45
11 68 13 00-0318 EA Curved Balance Beam (Landscape Structures® 100041A)	1,113.00	86.82
11 68 13 00-0319 EA Drop Shot, (Direct Bury Only) (Landscape Structures® 100042A)	1,970.22	162.78
11 68 13 00-0320 EA Basketball Outfit, 6' Offset, Fan Permalene Backboard, Chain Net (Landscape Structures® 116947A)	4,197.30	260.45
11 68 13 00-0321 EA Basketball Outfit, 6' Offset, Rectangular Permalene Backboard, Chain Net (Landscape Structures® 116947B)	4,690.53	260.45
11 68 13 00-0322 EA Basketball Outfit, 6' Offset, Fan Permalene Backboard, Nylon Net (Landscape Structures® 116947C)	4,188.16	260.45
11 68 13 00-0323 EA Basketball Outfit, 6' Offset, Rectangular Permalene Backboard, Nylon Net (Landscape Structures® 116947D)	4,681.40	260.45
11 68 13 00-0324 EA FitCore Outdoor Fitness Equipment With Aluminum Posts, (Direct Bury Only) (Landscape Structures® 123722A)	20,749.92	2,344.09
11 68 13 00-0325 EA FitCore Outdoor Fitness Equipment With Steel Posts, (Direct Bury Only) (Landscape Structures® 123722B)	20,147.07	2,344.09
11 68 13 00-0326 EA Fitness Cluster With Steel Posts (Landscape Structures® 120874B)	13,026.43	1,562.72
11 68 13 00-0327 EA Fitness Cluster With Aluminum Posts (Landscape Structures® 120874A)	13,282.19	1,562.72
11 68 13 00-0328 EA Aluminum Posts, Climbing Wall (Landscape Structures® 153354A)	2,936.81	260.45
11 68 13 00-0329 EA Steel Posts, Climbing Wall (Landscape Structures® 153354B)	2,845.47	260.45
11 68 13 00-0330 EA 30" Galvanized Stake, TuffTimber Edgers (Landscape Structures® 100626A)	26.38	10.85
11 68 13 00-0331 EA TuffTimber, 4' Length, TuffTimber Edgers, Black Only (Landscape Structures® 119214A)	83.81	10.85
11 68 13 00-0332 EA TuffTimbers Access Wedge, TuffTimber Edgers, Black Only (Landscape Structures® 130799A)	1,059.28	21.70
11 68 13 00-0333 EA Age Appropriate Fitness Sign, Ages 12 And Over (Landscape Structures® 114483A)	584.03	32.56
11 68 13 00-0334 EA Age Appropriate Fitness Sign, Ages 5 to 12 (Landscape Structures® 114484A)	584.03	32.56
11 68 13 00-0335 EA Accessible Playground Sign, With 2-3/8" Post (Landscape Structures® 100103A)	547.50	32.56
11 68 13 00-0336 EA Age Appropriate Sign, With PlayShaper Posts, Optional Name* (Landscape Structures® 100104A)	1,122.94	32.56
11 68 13 00-0337 EA Age Appropriate Sign, With PlayShaper Posts, 2 - 5 Years* (Landscape Structures® 100105A)	949.39	32.56
11 68 13 00-0338 EA Age Appropriate Sign, With PlayShaper Posts, 5 - 12 Years* (Landscape Structures® 100106A)	949.39	32.56
11 68 13 00-0339 EA Flat Molded Seat, Swing Accessories (Excludes Chain) (Landscape Structures® 100052A)	319.43	21.70
11 68 13 00-0340 EA Molded Bucket Seat (Specify Color), Swing Accessories (Excludes Chain) (Landscape Structures® 100054A)	793.57	65.11
11 68 13 00-0341 EA Full-Bucket Seat, Swing Accessories (Excludes Chain) (Landscape Structures® 100055A)	410.49	32.56
11 68 13 00-0342 EA Half-Bucket Seat, Swing Accessories (Excludes Chain) (Landscape Structures® 112228A)	392.22	32.56
11 68 13 00-0343 EA Slash-Proof Belt Seat, Swing Accessories (Landscape Structures® 132385A)	127.61	21.70
11 68 13 00-0344 EA Seat Strap for Molded Bucket Seat, Swing Accessories (Excludes Chain) (Landscape Structures® 111416A)	120.31	21.70
11 68 13 00-0345 LF TuffTurf Geotextile Fabric, (12 1/2" Wide Roll), Order an Additional 20% for Overlap/Waste, per LF (Landscape Structures® 109694A)	10.45	3.25
11 68 13 00-0346 EA TuffTurf Adhesive 10.6 oz. Tube, (Approximate Coverage: 3 Tiles per Tube) (Landscape Structures® 114513A)	13.24	13.24
11 68 13 00-0347 EA Rider, Direct Bury Leg, Concrete, (Direct Bury Only) (Landscape Structures® 115381A)	300.88	32.56
11 68 13 00-0348 EA Mesh SanDirect Buryox Cover, 4' Square (Landscape Structures® 120530A)	100.21	16.28
11 68 13 00-0349 EA Mesh SanDirect Buryox Cover, 8' Square (Landscape Structures® 120530B)	346.55	32.56
11 68 13 00-0350 EA Mesh SanDirect Buryox Cover, 8' L-Shaped (Landscape Structures® 120530C)	291.74	32.56
11 68 13 00-0351 EA 4-Post Tire Swing, TenderTuff-coated Chain, (4) Posts With Crossovers, Steel Beam And Aluminum Posts (Landscape Structures® 120892A)	5,028.49	260.45
11 68 13 00-0352 EA TuffTurf Tiles - 3' x 3' x 1-1/2", Square (Landscape Structures® 122868A)	182.42	16.28
11 68 13 00-0353 EA TuffTurf Tiles - 3' x 3' x 1-1/2", 1-Bevel (Landscape Structures® 122868B)	182.42	16.28
11 68 13 00-0354 EA TuffTurf Tiles - 3' x 3' x 1-1/2", 2-Bevel (Landscape Structures® 122868C)	182.42	16.28
11 68 13 00-0355 EA TuffTurf Tiles - 3' x 3' x 1-1/2", 3-Bevel (Landscape Structures® 122868D)	182.42	16.28
11 68 13 00-0356 EA TuffTurf Tiles - 3' x 3' x 1-1/2", 4-Bevel (Landscape Structures® 122868E)	182.42	16.28
11 68 13 00-0357 EA TuffTurf Tiles - 3' x 3' x 1-1/2", Corner Bevel (Landscape Structures® 122868F)	182.42	16.28
11 68 13 00-0358 EA Rider, 4-Bevel TuffTurf Tile, With Hole, For TuffRiders And Whimsy Riders * (Landscape Structures® 122869A)	191.55	16.28
11 68 13 00-0359 EA 1-Place, Surge Swing, Uncoated Chain (Landscape Structures® 127680A)	2,601.01	130.23
11 68 13 00-0360 EA 1-Place, Surge Swing, TenderTuff-coated Chain (Landscape Structures® 127680B)	2,677.74	130.23
11 68 13 00-0361 EA TuffTurf Adhesive 1 Gallon (Approximate Coverage: 15 Tiles per Gallon) (Landscape Structures® 128036A)	91.34	91.34
11 68 13 00-0362 EA 1-Place, Surge Swing, Anti-Wrap Hangers, Uncoated Chain (Landscape Structures® 139910A)	2,792.83	130.23
11 68 13 00-0363 EA 1-Place, Surge Swing, Anti-Wrap Hangers, TenderTuff-coated Chain (Landscape Structures® 139910B)	2,869.55	130.23
11 68 13 00-0364 EA Additional Bay, 4-Post Tire Swing, TenderTuff-coated Chain, (2) Posts With Crossover, Steel Beam And Aluminum Posts (Landscape Structures® 141458A)	3,394.58	195.34
11 68 13 00-0365 EA The Pinnacle Natural Climber (Landscape Structures® 156065A)	27,507.72	781.37
11 68 13 00-0366 EA The Pointe Natural Climber (Landscape Structures® 156067A)	15,546.52	520.90
11 68 13 00-0367 EA Hemisphere Climber With Single Arch, Independent Climber (Landscape Structures® 156435A)	15,546.52	520.90
11 68 13 00-0368 EA 5000 Series Swing, 8'-High Beam, 2-Place, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157107A)	2,126.05	130.23
11 68 13 00-0369 EA 5000 Series Swing, 8'-High Beam, 2-Place, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157107B)	2,279.50	130.23
11 68 13 00-0370 EA 5000 Series Swing, 8'-High Beam, 2-Place, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157107C)	2,363.53	130.23
11 68 13 00-0371 EA 5000 Series Swing, 8'-High Beam, 2-Place, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157107D)	2,516.98	130.23

11 Equipment

11 60 Entertainment and Recreation Equipment

11 68 Play Field Equipment and Structures

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0372	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157108A).....	1,222.87	65.11
11 68 13 00-0373	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157108B).....	1,376.32	65.11
11 68 13 00-0374	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157108C).....	1,305.07	65.11
11 68 13 00-0375	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157108D).....	1,458.53	65.11
11 68 13 00-0376	EA		5000 Series Swing, 10'-High Beam, 2-Place, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157109A).....	2,217.39	130.23
11 68 13 00-0377	EA		5000 Series Swing, 10'-High Beam, 2-Place, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157109B).....	2,451.22	130.23
11 68 13 00-0378	EA		5000 Series Swing, 10'-High Beam, 2-Place, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157109C).....	2,454.87	130.23
11 68 13 00-0379	EA		5000 Series Swing, 10'-High Beam, 2-Place, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157109D).....	2,688.70	130.23
11 68 13 00-0380	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157110A).....	1,295.94	65.11
11 68 13 00-0381	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157110B).....	1,638.29	130.23
11 68 13 00-0382	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157110C).....	1,378.15	65.11
11 68 13 00-0383	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157110D).....	1,720.50	130.23
11 68 13 00-0384	EA		5000 Series Swing, 8'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157111A).....	2,308.73	130.23
11 68 13 00-0385	EA		5000 Series Swing, 8'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157111B).....	2,462.18	130.23
11 68 13 00-0386	EA		5000 Series Swing, 8'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157111C).....	2,546.21	130.23
11 68 13 00-0387	EA		5000 Series Swing, 8'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157111D).....	2,699.66	130.23
11 68 13 00-0388	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157112A).....	1,396.41	65.11
11 68 13 00-0389	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157112B).....	1,658.39	130.23
11 68 13 00-0390	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157112C).....	1,478.62	65.11
11 68 13 00-0391	EA		5000 Series Swing, Additional 2 PL Bay, 8'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157112D).....	1,740.59	130.23
11 68 13 00-0392	EA		5000 Series Swing, 10'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157113A).....	2,400.07	130.23
11 68 13 00-0393	EA		5000 Series Swing, 10'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157113B).....	2,633.90	130.23
11 68 13 00-0394	EA		5000 Series Swing, 10'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157113C).....	2,637.55	130.23
11 68 13 00-0395	EA		5000 Series Swing, 10'-High Beam, 2-Place, Anti-Wrap Hangers, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157113D).....	2,871.38	130.23
11 68 13 00-0396	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, Uncoated Chain (Landscape Structures® 157114A).....	1,478.62	65.11
11 68 13 00-0397	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Galvanized Legs, TenderTuff-coated Chain (Landscape Structures® 157114B).....	1,820.97	130.23
11 68 13 00-0398	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Legs, Uncoated Chain (Landscape Structures® 157114C).....	1,669.35	130.23
11 68 13 00-0399	EA		5000 Series Swing, Additional 2 PL Bay, 10'-High Beam, Anti-Wrap Hangers, Powdercoated Beam And Legs, TenderTuff-coated Chain (Landscape Structures® 157114D).....	1,903.18	130.23
11 68 13 00-0400	EA		Motorcycle TuffRiders, With Torsion Spring, Surface Mount (Landscape Structures® 157286A).....	2,126.05	130.23
11 68 13 00-0401	EA		Motorcycle TuffRiders, With Torsion Spring, Direct Bury (Landscape Structures® 157286B).....	2,363.53	130.23
11 68 13 00-0402	EA		T-Rex TuffRiders, With Torsion Spring, Surface Mount (Landscape Structures® 157287A).....	1,797.22	130.23
11 68 13 00-0403	EA		T-Rex TuffRiders, With Torsion Spring, Direct Bury (Landscape Structures® 157287B).....	2,043.84	130.23
11 68 13 00-0404	EA		Bird TuffRiders, With Torsion Spring, Surface Mount (Landscape Structures® 157288A).....	1,815.49	130.23
11 68 13 00-0405	EA		Bird TuffRiders, With Torsion Spring, Direct Bury (Landscape Structures® 157288B).....	2,062.11	130.23
11 68 13 00-0406	EA		Horse TuffRiders, With Torsion Spring, Surface Mount (Landscape Structures® 157289A).....	1,797.22	130.23
11 68 13 00-0407	EA		Horse TuffRiders, With Torsion Spring, Direct Bury (Landscape Structures® 157289B).....	2,043.84	130.23
11 68 13 00-0408	EA		Car TuffRiders, With Torsion Spring, Surface Mount (Landscape Structures® 157290A).....	2,126.05	130.23
11 68 13 00-0409	EA		Car TuffRiders, With Torsion Spring, Direct Bury (Landscape Structures® 157290B).....	2,363.53	130.23
11 68 13 00-0410	EA		Zebra Whimsy Riders, With Torsion Spring, Surface Mount (Landscape Structures® 157291A).....	1,952.50	130.23
11 68 13 00-0411	EA		Zebra Whimsy Riders, With Torsion Spring, Direct Bury (Landscape Structures® 157291B).....	2,171.72	130.23
11 68 13 00-0412	EA		Sea Horse Whimsy Riders, With Torsion Spring, Surface Mount (Landscape Structures® 157292A).....	2,062.11	130.23
11 68 13 00-0413	EA		Sea Horse Whimsy Riders, With Torsion Spring, Direct Bury (Landscape Structures® 157292B).....	2,299.59	130.23
11 68 13 00-0414	EA		Dolphin Whimsy Riders, With Torsion Spring, SM (Landscape Structures® 157293A).....	1,979.90	130.23
11 68 13 00-0415	EA		Dolphin Whimsy Riders, With Torsion Spring, Direct Bury (Landscape Structures® 157293B).....	2,208.25	130.23
11 68 13 00-0416	EA		Kids In Motion, Wobble Pod Bouncer, (Direct Bury Only) (Landscape Structures® 158105A).....	2,052.97	130.23
11 68 13 00-0417	EA		Chatter Noodle Kit, (2) Noodle Posts And Tubing, (Direct Bury Only) (Landscape Structures® 158106A).....	2,838.50	130.23
11 68 13 00-0418	EA		8" Pod, Noodle Pod Steps With One E-Pod Step, (Direct Bury Only) (Landscape Structures® 158108A).....	1,396.41	65.11
11 68 13 00-0419	EA		16" Pod, Noodle Pod Steps With One E-Pod Step, (Direct Bury Only) (Landscape Structures® 158108B).....	1,405.55	65.11
11 68 13 00-0420	EA		24" Pod, Noodle Pod Steps With One E-Pod Step, (Direct Bury Only) (Landscape Structures® 158108C).....	1,414.68	65.11
11 68 13 00-0421	EA		Single, Starburst Climber (Direct Bury Only) (Landscape Structures® 158426A).....	2,546.21	130.23
11 68 13 00-0422	EA		Double, Starburst Climber (Direct Bury Only) (Landscape Structures® 158426B).....	4,381.06	195.34
11 68 13 00-0423	EA		Triple, Starburst Climber (Direct Bury Only) (Landscape Structures® 158426C).....	6,617.81	260.45
11 68 13 00-0424	EA		Quadruple, Starburst Climber (Direct Bury Only) (Landscape Structures® 158426D).....	8,251.71	325.56
11 68 13 00-0425	EA		10", Pod Climber, One Pod Only (Landscape Structures® 158997A).....	410.49	32.56
11 68 13 00-0426	EA		20", Pod Climber, One Pod Only (Landscape Structures® 158998A).....	428.75	32.56

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0427 EA CoolToppers Shade System, Super Pyramid, 30' x 30', 13'-9" Entrance Height, (Direct Bury Only) (Landscape Structures® 159873A).....	14,450.44	520.90
11 68 13 00-0428 EA CoolToppers Shade System, Pyramid, 18' x 18', 8' Entrance Height, (Direct Bury Only) (Landscape Structures® 159881A).....	7,640.82	260.45
11 68 13 00-0429 EA CoolToppers Shade System, Pyramid, 18' x 18', 10' Entrance Height, (Direct Bury Only) (Landscape Structures® 159881B).....	7,886.35	325.56
11 68 13 00-0430 EA CoolToppers Shade System, Pyramid, 18' x 18', 12' Entrance Height, (Direct Bury Only) (Landscape Structures® 159881C).....	8,014.22	325.56
11 68 13 00-0431 EA CoolToppers Shade System, Pyramid, 24' x 24', 8' Entrance Height, (Direct Bury Only) (Landscape Structures® 159882A).....	9,749.68	325.56
11 68 13 00-0432 EA CoolToppers Shade System, Pyramid, 24' x 24', 10' Entrance Height, (Direct Bury Only) (Landscape Structures® 159882B).....	9,877.56	325.56
11 68 13 00-0433 EA CoolToppers Shade System, Pyramid, 24' x 24', 12' Entrance Height, (Direct Bury Only) (Landscape Structures® 159882C).....	10,023.70	325.56
11 68 13 00-0434 EA CoolToppers Shade System, Pyramid, 28' x 28', 8' Entrance Height, (Direct Bury Only) (Landscape Structures® 159883A).....	12,388.32	390.68
11 68 13 00-0435 EA CoolToppers Shade System, Pyramid, 28' x 28', 10' Entrance Height, (Direct Bury Only) (Landscape Structures® 159883B).....	12,534.46	390.68
11 68 13 00-0436 EA CoolToppers Shade System, Pyramid, 28' x 28', 12' Entrance Height, (Direct Bury Only) (Landscape Structures® 159883C).....	12,671.47	390.68
11 68 13 00-0437 EA Stationary Cyclor, Pedals Only, With Grab Bar, With Aluminum Posts (Landscape Structures® 160055A).....	2,326.99	130.23
11 68 13 00-0438 EA Stationary Cyclor, Handles Only, With Aluminum Posts (Landscape Structures® 160055B).....	2,007.30	130.23
11 68 13 00-0439 EA Stationary Cyclor, Pedals And Handles, With Aluminum Posts (Landscape Structures® 160055C).....	2,902.44	130.23
11 68 13 00-0440 EA Stationary Cyclor, Handles Only, Accessible, With Aluminum Posts (Landscape Structures® 160055D).....	2,007.30	130.23
11 68 13 00-0441 EA Stationary Cyclor, Pedals Only, With Grab Bar, With Steel Posts (Landscape Structures® 160055E).....	2,272.19	130.23
11 68 13 00-0442 EA Stationary Cyclor, Handles Only, With Steel Posts (Landscape Structures® 160055F).....	1,952.50	130.23
11 68 13 00-0443 EA Stationary Cyclor, Pedals And Handles, With Steel Posts (Landscape Structures® 160055G).....	2,847.63	130.23
11 68 13 00-0444 EA Stationary Cyclor, Handles Only, Accessible, With Steel Posts (Landscape Structures® 160055H).....	1,952.50	130.23
11 68 13 00-0445 EA Single, Gyro Twister Spinner, Aluminum Posts (Landscape Structures® 160315A).....	3,403.72	195.34
11 68 13 00-0446 EA Single, Gyro Twister Spinner, Steel Posts (Landscape Structures® 160315B).....	3,348.91	195.34
11 68 13 00-0447 EA Double, Gyro Twister Spinner, Aluminum Posts (Landscape Structures® 160316A).....	5,841.42	260.45
11 68 13 00-0448 EA Double, Gyro Twister Spinner, Steel Posts (Landscape Structures® 160316B).....	5,786.61	260.45
11 68 13 00-0449 EA The Peak Natural Climber (Landscape Structures® 160418A).....	8,452.65	325.56
11 68 13 00-0450 EA The Stepper Natural Climbing Stone (Landscape Structures® 160419A).....	4,280.58	195.34
11 68 13 00-0451 EA Double Escalator Climber, Independent Climber, Steel Posts, (Direct Bury Only) (Landscape Structures® 160692A).....	10,480.40	325.56
11 68 13 00-0452 EA HealthBeat Outdoor Fitness System, Chest/Back Press, Direct Bury (Landscape Structures® 161309A).....	7,732.16	260.45
11 68 13 00-0453 EA HealthBeat Outdoor Fitness System, Chest/Back Press, Surface Mount (Landscape Structures® 161309B).....	7,330.26	260.45
11 68 13 00-0454 EA HealthBeat Outdoor Fitness System, Squat Press, Direct Bury (Landscape Structures® 161310A).....	7,732.16	260.45
11 68 13 00-0455 EA HealthBeat Outdoor Fitness System, Squat Press, Surface Mount (Landscape Structures® 161310B).....	7,330.26	260.45
11 68 13 00-0456 EA HealthBeat Outdoor Fitness System, Tai Chi Wheels, Direct Bury (Landscape Structures® 161311A).....	4,180.11	195.34
11 68 13 00-0457 EA HealthBeat Outdoor Fitness System, Tai Chi Wheels, Surface Mount (Landscape Structures® 161311B).....	3,769.08	195.34
11 68 13 00-0458 EA HealthBeat Outdoor Fitness System, Cardio Stepper, Direct Bury (Landscape Structures® 161312A).....	9,667.48	325.56
11 68 13 00-0459 EA HealthBeat Outdoor Fitness System, Cardio Stepper, Surface Mount (Landscape Structures® 161312B).....	9,265.58	325.56
11 68 13 00-0460 EA HealthBeat Outdoor Fitness System, Pull-Up/Dip, Direct Bury (Landscape Structures® 161313A).....	3,269.08	195.34
11 68 13 00-0461 EA HealthBeat Outdoor Fitness System, Pull-Up/Dip, Surface Mount (Landscape Structures® 161313B).....	3,367.18	195.34
11 68 13 00-0462 EA HealthBeat Outdoor Fitness System, Ab Crunch/Leg Lift, Direct Bury (Landscape Structures® 161314A).....	3,668.60	195.34
11 68 13 00-0463 EA HealthBeat Outdoor Fitness System, Ab Crunch/Leg Lift, Surface Mount (Landscape Structures® 161314B).....	3,367.18	195.34
11 68 13 00-0464 EA HealthBeat Outdoor Fitness System, Balance Steps, Direct Bury (Landscape Structures® 161315A).....	4,381.06	195.34
11 68 13 00-0465 EA HealthBeat Outdoor Fitness System, Balance Steps, Surface Mount (Landscape Structures® 161315B).....	4,582.00	195.34
11 68 13 00-0466 EA HealthBeat Outdoor Fitness System, Assisted RoWith Push-Up, Direct Bury (Landscape Structures® 161316A).....	3,467.66	195.34
11 68 13 00-0467 EA HealthBeat Outdoor Fitness System, Assisted RoWith Push-Up, Surface Mount (Landscape Structures® 161316B).....	3,367.18	195.34
11 68 13 00-0468 EA HealthBeat Outdoor Fitness System, Plyometrics, Direct Bury (Landscape Structures® 161317A).....	4,381.06	195.34
11 68 13 00-0469 EA HealthBeat Outdoor Fitness System, Plyometrics, Surface Mount (Landscape Structures® 161317B).....	4,582.00	195.34
11 68 13 00-0470 EA HealthBeat Outdoor Fitness System, Welcome Intro Sign, Direct Bury (Landscape Structures® 161437A).....	1,632.81	130.23
11 68 13 00-0471 EA HealthBeat Outdoor Fitness System, Welcome Intro Sign, Surface Mount (Landscape Structures® 161437B).....	1,122.39	65.11
11 68 13 00-0472 EA Global Releaf Sign With Frame (Landscape Structures® 162617A).....	1,003.65	65.11
11 68 13 00-0473 EA Single, Bobble Riders With Coil Spring, Surface Mount (Landscape Structures® 164074A).....	1,295.94	65.11
11 68 13 00-0474 EA Single, Bobble Riders With Coil Spring, Direct Bury (Landscape Structures® 164074B).....	1,651.08	130.23
11 68 13 00-0475 EA Double, Bobble Riders With Coil Spring, Surface Mount (Landscape Structures® 164075A).....	2,500.54	130.23
11 68 13 00-0476 EA Double, Bobble Riders With Coil Spring, Direct Bury (Landscape Structures® 164075B).....	2,683.22	130.23
11 68 13 00-0477 EA 16" Pod, Noodle Pod Steps With Two E-Pod Steps, (Direct Bury Only) (Landscape Structures® 164157A).....	1,915.96	130.23
11 68 13 00-0478 EA 24" Pod, Noodle Pod Steps With Two E-Pod Steps, (Direct Bury Only) (Landscape Structures® 164157B).....	1,934.23	130.23
11 68 13 00-0479 Playground Equipment (Landscape Structures® PlayBooster®) (11 68 13 00-0009)		
11 68 13 00-0480 EA 116" Aluminum Posts, End Vertical Ladder (Landscape Structures® PlayBooster® 111273A).....	1,788.09	130.23
11 68 13 00-0481 EA Log Roll, (1) Aluminum Post, Tan Log Only (Landscape Structures® PlayBooster® 111356A).....	1,915.96	130.23
11 68 13 00-0482 EA Chinning Bar, (1) Aluminum Post (Landscape Structures® PlayBooster® 111357A).....	766.17	65.11
11 68 13 00-0483 EA Turning Bar, (1) Aluminum Post (Landscape Structures® PlayBooster® 111357B).....	729.63	65.11
11 68 13 00-0484 EA 182"/72" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403A).....	584.03	32.56
11 68 13 00-0485 EA 174"/64" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403B).....	574.90	32.56
11 68 13 00-0486 EA 166"/56" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403C).....	547.50	32.56
11 68 13 00-0487 EA 158"/48" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403D).....	538.36	32.56
11 68 13 00-0488 EA 150"/40" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403E).....	510.96	32.56
11 68 13 00-0489 EA 142"/32" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403F).....	501.83	32.56
11 68 13 00-0490 EA 134"/24" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403G).....	483.56	32.56
11 68 13 00-0491 EA 126"/16" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403H).....	474.42	32.56
11 68 13 00-0492 EA 118"/8" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403I).....	447.02	32.56
11 68 13 00-0493 EA 110"/Ground Level, Posts For Roofs (Landscape Structures® PlayBooster® 111403J).....	437.89	32.56
11 68 13 00-0494 EA 148"/72" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404A).....	510.96	32.56

11 Equipment**11 60 Entertainment and Recreation Equipment****11 68 Play Field Equipment and Structures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68	13 00-0495	EA	140"/64" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404B).....	492.69	32.56
11 68	13 00-0496	EA	132"/56" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404C).....	483.56	32.56
11 68	13 00-0497	EA	124"/48" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404D).....	474.42	32.56
11 68	13 00-0498	EA	116"/40" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404E).....	447.02	32.56
11 68	13 00-0499	EA	108"/32" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404F).....	437.89	32.56
11 68	13 00-0500	EA	100"/24" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404G).....	428.75	32.56
11 68	13 00-0501	EA	92"/16" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404H).....	410.49	32.56
11 68	13 00-0502	EA	84"/8" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404I).....	392.22	32.56
11 68	13 00-0503	EA	76"/Ground Level, Posts For Decks (Landscape Structures® PlayBooster® 111404J).....	364.82	32.56
11 68	13 00-0504	EA	106"/72" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405A).....	720.50	65.11
11 68	13 00-0505	EA	98"/64" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405B).....	693.10	65.11
11 68	13 00-0506	EA	90"/56" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405C).....	665.69	65.11
11 68	13 00-0507	EA	82"/48" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405D).....	593.17	32.56
11 68	13 00-0508	EA	74"/40" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405E).....	584.03	32.56
11 68	13 00-0509	EA	66"/32" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405F).....	565.76	32.56
11 68	13 00-0510	EA	58"/24" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405G).....	538.36	32.56
11 68	13 00-0511	EA	50"/16" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405H).....	529.23	32.56
11 68	13 00-0512	EA	42"/8" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 111405I).....	510.96	32.56
11 68	13 00-0513	EA	ClouDirect Buryurst Triple Poly Slide, 64" - 72" Deck (Landscape Structures® PlayBooster® 144414A).....	5,760.03	217.04
11 68	13 00-0514	EA	TurboTwister Tunnel Slide, 96" Deck, Excludes Posts (Landscape Structures® PlayBooster® 123763A).....	7,434.44	586.02
11 68	13 00-0515	EA	Double Poly Slide, 32" Deck (Landscape Structures® PlayBooster® 123331A).....	2,463.46	162.78
11 68	13 00-0516	EA	Double Poly Slide, 40" - 48" Deck (Landscape Structures® PlayBooster® 123331B).....	2,728.35	162.78
11 68	13 00-0517	EA	Double Swoosh Poly Slide, 64" - 72" Deck (Landscape Structures® PlayBooster® 130390A).....	3,166.23	195.34
11 68	13 00-0518	EA	40" Deck, El Slide (Landscape Structures® PlayBooster® 126368A).....	3,860.70	184.49
11 68	13 00-0519	EA	48" Deck, El Slide (Landscape Structures® PlayBooster® 126368B).....	4,399.32	195.34
11 68	13 00-0520	EA	56" Deck, El Slide (Landscape Structures® PlayBooster® 126368C).....	4,655.08	195.34
11 68	13 00-0521	EA	64" Deck, El Slide (Landscape Structures® PlayBooster® 126368D).....	5,211.99	217.04
11 68	13 00-0522	EA	72" Deck, El Slide (Landscape Structures® PlayBooster® 126368E).....	5,458.61	217.04
11 68	13 00-0523	EA	96" Deck, El Slide, Excludes Posts (Landscape Structures® PlayBooster® 126368F).....	7,302.59	282.16
11 68	13 00-0524	EA	Firepole With Permalene® Handholds 32" To 48" Deck (Landscape Structures® PlayBooster® 148426A).....	1,139.57	130.23
11 68	13 00-0525	EA	Firepole With Permalene® Handholds 56" To 72" Deck (Landscape Structures® PlayBooster® 148426B).....	1,166.98	130.23
11 68	13 00-0526	EA	Firepole With SteelX® Handholds 32" To 48" Deck (Landscape Structures® PlayBooster® 148435A).....	1,541.47	130.23
11 68	13 00-0527	EA	Firepole With SteelX® Handholds 56" To 72" Deck (Landscape Structures® PlayBooster® 148435B).....	1,587.14	130.23
11 68	13 00-0528	EA	32" Deck, Gemini SlideWinder2 (Landscape Structures® PlayBooster® 130800A).....	5,830.11	390.68
11 68	13 00-0529	EA	40" Deck, Gemini SlideWinder2 (Landscape Structures® PlayBooster® 130800B).....	6,725.24	390.68
11 68	13 00-0530	EA	48" Deck, Gemini SlideWinder2 (Landscape Structures® PlayBooster® 130800C).....	7,245.88	390.68
11 68	13 00-0531	EA	56" Deck, Gemini SlideWinder2 (Landscape Structures® PlayBooster® 130800D).....	8,559.01	520.90
11 68	13 00-0532	EA	64" Deck, Gemini SlideWinder2 (Landscape Structures® PlayBooster® 130800E).....	8,769.09	520.90
11 68	13 00-0533	EA	72" Deck, Gemini SlideWinder2 (Landscape Structures® PlayBooster® 130800F).....	10,248.80	520.90
11 68	13 00-0534	EA	96" Deck, Gemini SlideWinder2, Excludes Posts (Landscape Structures® PlayBooster® 130800G).....	12,082.57	651.13
11 68	13 00-0535	EA	40" Deck, Rollerslide (Landscape Structures® PlayBooster® 123333A).....	9,531.01	293.01
11 68	13 00-0536	EA	56" Deck, Rollerslide (Landscape Structures® PlayBooster® 123333B).....	11,986.97	358.12
11 68	13 00-0537	EA	Single Poly Slide, 40" - 48" Deck (Landscape Structures® PlayBooster® 123337A).....	2,098.64	130.23
11 68	13 00-0538	EA	32" Deck, SlideWinder2 (Landscape Structures® PlayBooster® 124863A).....	2,782.61	195.34
11 68	13 00-0539	EA	40" Deck, SlideWinder2 (Landscape Structures® PlayBooster® 124863B).....	3,102.30	195.34
11 68	13 00-0540	EA	48" Deck, SlideWinder2 (Landscape Structures® PlayBooster® 124863C).....	3,458.52	195.34
11 68	13 00-0541	EA	56" Deck, SlideWinder2 (Landscape Structures® PlayBooster® 124863D).....	3,923.28	260.45
11 68	13 00-0542	EA	64" Deck, SlideWinder2 (Landscape Structures® PlayBooster® 124863E).....	4,087.69	260.45
11 68	13 00-0543	EA	72" Deck, SlideWinder2 (Landscape Structures® PlayBooster® 124863F).....	4,672.27	260.45
11 68	13 00-0544	EA	96" Deck, SlideWinder2, Excludes Posts (Landscape Structures® PlayBooster® 124863G).....	5,584.58	325.56
11 68	13 00-0545	EA	72" Deck, SpyroSlide (Landscape Structures® PlayBooster® 122033A).....	8,312.93	488.35
11 68	13 00-0546	EA	72" Slide, With Hanger Bracket, 64" Deck, SpyroSlide (Landscape Structures® PlayBooster® 122033B).....	8,633.44	444.94
11 68	13 00-0547	EA	56" Deck, SpyroSlide (Landscape Structures® PlayBooster® 122033C).....	7,545.68	488.35
11 68	13 00-0548	EA	56" Slide, With Hanger Bracket, 48" Deck, SpyroSlide (Landscape Structures® PlayBooster® 122033D).....	7,838.78	444.94
11 68	13 00-0549	EA	32" - 40" Deck, Stainless Steel Slide (Landscape Structures® PlayBooster® 123340A).....	2,984.10	162.78
11 68	13 00-0550	EA	48" - 56" Deck, Stainless Steel Slide (Landscape Structures® PlayBooster® 123340B).....	3,248.98	162.78
11 68	13 00-0551	EA	64" - 72" Deck, Stainless Steel Slide (Landscape Structures® PlayBooster® 123340C).....	4,016.24	162.78
11 68	13 00-0552	EA	32" - 40" Deck, SteelX, Stainless Steel Slide (Landscape Structures® PlayBooster® 139945A).....	3,303.79	162.78
11 68	13 00-0553	EA	48" - 56" Deck, SteelX, Stainless Steel Slide (Landscape Structures® PlayBooster® 139945B).....	3,568.67	162.78
11 68	13 00-0554	EA	64" - 72" Deck, SteelX, Stainless Steel Slide (Landscape Structures® PlayBooster® 139945C).....	4,354.20	162.78
11 68	13 00-0555	EA	32" Deck, Tunnel Slide (Landscape Structures® PlayBooster® 126367A).....	3,367.73	162.78
11 68	13 00-0556	EA	40" Deck, Tunnel Slide (Landscape Structures® PlayBooster® 126367B).....	3,568.67	162.78
11 68	13 00-0557	EA	48" Deck, Tunnel Slide (Landscape Structures® PlayBooster® 126367C).....	4,107.32	184.49
11 68	13 00-0558	EA	56" Deck, Tunnel Slide (Landscape Structures® PlayBooster® 126367D).....	4,344.52	195.34
11 68	13 00-0559	EA	64" Deck, Tunnel Slide (Landscape Structures® PlayBooster® 126367E).....	4,856.02	195.34
11 68	13 00-0560	EA	72" Deck, Tunnel Slide (Landscape Structures® PlayBooster® 126367F).....	5,029.57	195.34
11 68	13 00-0561	EA	96" Deck, Tunnel Slide, Excludes Posts (Landscape Structures® PlayBooster® 126367G).....	6,636.08	260.45
11 68	13 00-0562	EA	Step Deck, 16" - 32" Decks, Brown Only (Landscape Structures® PlayBooster® 111465A).....	1,204.60	65.11
11 68	13 00-0563	EA	Sky Rail Climber, 64" And 72" Decks, (64" Avail. For Direct Bury Only) (Landscape Structures® PlayBooster® 146812A).....	2,126.59	97.67
11 68	13 00-0564	EA	Stepping Block Climber, 32" Deck Height Difference (Landscape Structures® PlayBooster® 130742A).....	4,810.35	195.34
11 68	13 00-0565	EA	32" Deck, Block Climber (Landscape Structures® PlayBooster® 135344A).....	3,101.49	249.60
11 68	13 00-0566	EA	40" Deck, Block Climber (Landscape Structures® PlayBooster® 135344B).....	3,612.99	249.60
11 68	13 00-0567	EA	32" Deck, SteelX, Block Climber (Landscape Structures® PlayBooster® 139491A).....	3,512.52	249.60
11 68	13 00-0568	EA	40" Deck, SteelX, Block Climber (Landscape Structures® PlayBooster® 139491B).....	4,042.29	249.60
11 68	13 00-0569	EA	Fish Net Climber, CableCore Climbing Cable, 16" - 32" Deck (Landscape Structures® PlayBooster® 126194A).....	3,815.03	184.49
11 68	13 00-0570	EA	Wavy Web Climber, 48" - 56" Deck (Landscape Structures® PlayBooster® 126273A).....	3,741.68	195.34
11 68	13 00-0571	EA	Wavy Web Climber, 64" - 72" Deck (Landscape Structures® PlayBooster® 126273B).....	4,015.70	195.34
11 68	13 00-0572	EA	Wavy Web Climber, 48" - 56" Deck, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 126442A).....	4,508.93	195.34
11 68	13 00-0573	EA	Wavy Web Climber, 64" - 72" Deck, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 126442B).....	4,773.82	195.34
11 68	13 00-0574	EA	Circus Ladder, CableCore Climbing Cable, 48" Deck (Landscape Structures® PlayBooster® 126272B).....	1,814.40	195.34

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0575 EA Circus Ladder, CableCore Climbing Cable, 56" - 64" Deck (Landscape Structures® PlayBooster® 126272C).....	1,914.88	195.34
11 68 13 00-0576 EA Circus Ladder, CableCore Climbing Cable, 72" Deck (Landscape Structures® PlayBooster® 126272D).....	2,042.75	195.34
11 68 13 00-0577 EA Circus Ladder, CableCore Climbing Cable, 32" - 40" Deck, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 126441A).....	2,472.05	195.34
11 68 13 00-0578 EA Circus Ladder, CableCore Climbing Cable, 48" Deck, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 126441B).....	2,572.52	195.34
11 68 13 00-0579 EA Circus Ladder, CableCore Climbing Cable, 56" - 64" Deck, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 126441C).....	2,700.40	195.34
11 68 13 00-0580 EA Circus Ladder, CableCore Climbing Cable, 72" Deck, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 126441D).....	2,800.87	195.34
11 68 13 00-0581 EA Spider Web Climber, 16" - 32" Decks (Direct Bury Only) (Landscape Structures® PlayBooster® 136158A).....	4,014.62	260.45
11 68 13 00-0582 EA Chimney Climber, 56" - 64" Deck (Landscape Structures® PlayBooster® 153617A).....	5,165.50	260.45
11 68 13 00-0583 EA Chimney Climber, 72" Deck (Landscape Structures® PlayBooster® 153617B).....	5,841.42	260.45
11 68 13 00-0584 EA Chimney Climb Across, Straight, 72" To 72" Deck Or 64" To 64" Deck (Landscape Structures® PlayBooster® 155042A).....	7,311.99	260.45
11 68 13 00-0585 EA Chimney Climb Across, Straight, 56" To 56" Deck (Landscape Structures® PlayBooster® 155042B).....	6,599.54	260.45
11 68 13 00-0586 EA Chimney Climb Across, Straight, 48" To 48" Deck Or 40" To 40" Deck (Landscape Structures® PlayBooster® 155042C).....	5,841.42	260.45
11 68 13 00-0587 EA Chimney Climb Across, Straight, 32" To 32" Deck (Landscape Structures® PlayBooster® 155042D).....	5,055.89	260.45
11 68 13 00-0588 EA Chimney Climb Across, 24" Difference, 72" To 48" Deck Or 64" To 40" Deck (Landscape Structures® PlayBooster® 155043A).....	7,037.97	260.45
11 68 13 00-0589 EA Chimney Climb Across, 24" Difference, 56" To 32" Deck (Landscape Structures® PlayBooster® 155043B).....	6,599.54	260.45
11 68 13 00-0590 EA Chimney Climb Across, 24" Difference, 48" To 24" Deck (Landscape Structures® PlayBooster® 155043C).....	6,161.11	260.45
11 68 13 00-0591 EA 48" - 56" Deck, Cascade Climber (Direct Bury Only) (Landscape Structures® PlayBooster® 150975A).....	3,102.30	195.34
11 68 13 00-0592 EA 64" - 72" Deck, Cascade Climber (Direct Bury Only) (Landscape Structures® PlayBooster® 150975B).....	4,024.83	195.34
11 68 13 00-0593 EA 24" Deck Height Difference, Catwalk Climber (Landscape Structures® PlayBooster® 128986A).....	2,417.79	162.78
11 68 13 00-0594 EA 48" - 56" Deck, Centipede Climber (Landscape Structures® PlayBooster® 123291A).....	2,070.98	151.93
11 68 13 00-0595 EA 48" - 56" Deck, 90 Degree Tri-Deck, Centipede Climber (Landscape Structures® PlayBooster® 126376A).....	2,783.43	151.93
11 68 13 00-0596 EA 48" - 56" Deck, SteelX, Centipede Climber (Landscape Structures® PlayBooster® 139496A).....	2,463.74	151.93
11 68 13 00-0597 EA 40" Deck, 90 Degree Tri-Deck, Chain Ladder (Landscape Structures® PlayBooster® 153352A).....	2,189.44	162.78
11 68 13 00-0598 EA 48" - 56" Deck, 90 Degree Tri-Deck, Chain Ladder (Landscape Structures® PlayBooster® 153352B).....	2,299.05	162.78
11 68 13 00-0599 EA 64" - 72" Deck, 90 Degree Tri-Deck, Chain Ladder (Landscape Structures® PlayBooster® 153352C).....	2,390.39	162.78
11 68 13 00-0600 EA 40" Deck, Chain Ladder (Landscape Structures® PlayBooster® 153350A).....	1,385.65	162.78
11 68 13 00-0601 EA 48" - 56" Deck, Chain Ladder (Landscape Structures® PlayBooster® 153350B).....	1,458.72	162.78
11 68 13 00-0602 EA 64" - 72" Deck, Chain Ladder (Landscape Structures® PlayBooster® 153350C).....	1,577.46	162.78
11 68 13 00-0603 EA 40" Deck, SteelX, Chain Ladder, Direct Bury (Landscape Structures® PlayBooster® 153351A).....	1,778.41	162.78
11 68 13 00-0604 EA 48" - 56" Deck, SteelX, Chain Ladder, Direct Bury (Landscape Structures® PlayBooster® 153351B).....	1,851.48	162.78
11 68 13 00-0605 EA 64" - 72" Deck, SteelX, Chain Ladder, Direct Bury (Landscape Structures® PlayBooster® 153351C).....	1,951.96	162.78
11 68 13 00-0606 EA 48" Deck, Cliff Climber (Landscape Structures® PlayBooster® 122570A).....	2,390.39	162.78
11 68 13 00-0607 EA 56" Deck, Cliff Climber (Landscape Structures® PlayBooster® 122570B).....	2,408.66	162.78
11 68 13 00-0608 EA 64" Deck, Cliff Climber (Landscape Structures® PlayBooster® 122570C).....	2,837.95	162.78
11 68 13 00-0609 EA 72" Deck, Cliff Climber (Landscape Structures® PlayBooster® 122570D).....	2,856.22	162.78
11 68 13 00-0610 EA 48" Deck, SteelX, Cliff Climber (Landscape Structures® PlayBooster® 139501A).....	2,774.02	162.78
11 68 13 00-0611 EA 56" Deck, SteelX, Cliff Climber (Landscape Structures® PlayBooster® 139501B).....	2,819.69	162.78
11 68 13 00-0612 EA 64" Deck, SteelX, Cliff Climber (Landscape Structures® PlayBooster® 139501C).....	3,248.98	162.78
11 68 13 00-0613 EA 72" Deck, SteelX, Cliff Climber (Landscape Structures® PlayBooster® 139501D).....	3,276.39	162.78
11 68 13 00-0614 EA 72" Deck, Conical Climber (Landscape Structures® PlayBooster® 143199A).....	5,440.07	227.90
11 68 13 00-0615 EA 40" Deck, Conical Climber (Landscape Structures® PlayBooster® 143199B).....	4,453.59	227.90
11 68 13 00-0616 EA 32" - 48" Deck, Corkscrew Climber (Landscape Structures® PlayBooster® 148432A).....	1,559.74	130.23
11 68 13 00-0617 EA 56" - 72" Deck, Corkscrew Climber (Landscape Structures® PlayBooster® 148432B).....	1,760.69	130.23
11 68 13 00-0618 EA 32" - 48" Deck, SteelX, Corkscrew Climber (Landscape Structures® PlayBooster® 148437A).....	1,961.63	130.23
11 68 13 00-0619 EA 56" - 72" Deck, SteelX, Corkscrew Climber (Landscape Structures® PlayBooster® 148437B).....	2,217.39	130.23
11 68 13 00-0620 EA 64" - 72" Deck, Corner Climber (Landscape Structures® PlayBooster® 143198A).....	5,311.10	293.01
11 68 13 00-0621 EA SpaceLink Climber, Net Climber, 72" Deck, (Steel Posts Required, Direct Bury Only) (Landscape Structures® PlayBooster® 145106A).....	7,323.84	97.67
11 68 13 00-0622 EA Manta Ray Climber, Net Climber, 48" Deck, (Steel Posts Required, Direct Bury Only) (Landscape Structures® PlayBooster® 145108A).....	7,257.19	260.45
11 68 13 00-0623 EA Manta Ray Climber, Net Climber, 56" Deck, (Steel Posts Required, Direct Bury Only) (Landscape Structures® PlayBooster® 145108B).....	7,257.19	260.45
11 68 13 00-0624 EA Manta Ray Climber, 64" Deck, (Steel Posts Required, Direct Bury Only) (Landscape Structures® PlayBooster® 145108C).....	7,257.19	260.45
11 68 13 00-0625 EA SpaceLink Climber, Net Climber, 48" Deck, (Steel Posts Required, Direct Bury Only) (Landscape Structures® PlayBooster® 145240A).....	7,323.84	97.67
11 68 13 00-0626 EA Star Seeker Climber, Net Climber, 72" Deck (Attaches To Square Decks Only, Steel Posts Required, Direct Bury Only) (Landscape Structures® PlayBooster® 148039A).....	4,619.63	130.23
11 68 13 00-0627 EA SpaceWalk Climber, Net Climber, Deck-To-Deck, 32" - 48" Deck (Landscape Structures® PlayBooster® 145107A).....	9,460.65	130.23
11 68 13 00-0628 EA Funnel Climber, Net Climber (Landscape Structures® PlayBooster® 145109A).....	5,231.06	162.78
11 68 13 00-0629 EA Funnel Climber, Short Brace, Net Climber (Landscape Structures® PlayBooster® 145248A).....	236.94	32.56
11 68 13 00-0630 EA Funnel Climber, Long Brace, Net Climber (Landscape Structures® PlayBooster® 145249A).....	273.48	32.56
11 68 13 00-0631 EA Funnel Climber, Vertical Ladder, Net Climber (Landscape Structures® PlayBooster® 145250A).....	1,031.60	32.56
11 68 13 00-0632 EA Funnel Climber, Handhold Panels, Net Climber (Landscape Structures® PlayBooster® 145251A).....	364.82	32.56
11 68 13 00-0633 EA 40" Deck, Cozy Climber (Landscape Structures® PlayBooster® 123293A).....	3,248.44	195.34
11 68 13 00-0634 EA 48" Deck, Cozy Climber (Landscape Structures® PlayBooster® 123293B).....	3,485.92	195.34
11 68 13 00-0635 EA 40" Deck, 90 Degree Tri-Deck, Cozy Climber (Landscape Structures® PlayBooster® 126374A).....	3,650.34	195.34
11 68 13 00-0636 EA 48" Deck, 90 Degree Tri-Deck, Cozy Climber (Landscape Structures® PlayBooster® 126374B).....	3,988.29	195.34
11 68 13 00-0637 EA 40" Deck, SteelX, Cozy Climber (Landscape Structures® PlayBooster® 139500A).....	3,650.34	195.34
11 68 13 00-0638 EA 48" Deck, SteelX, Cozy Climber (Landscape Structures® PlayBooster® 139500B).....	3,915.22	195.34
11 68 13 00-0639 EA 1-Step With Barrier, Deck Links (Landscape Structures® PlayBooster® 152907A).....	1,825.17	97.67
11 68 13 00-0640 EA 2-Steps With Barrier, Deck Links (Landscape Structures® PlayBooster® 152907B).....	2,592.42	97.67
11 68 13 00-0641 EA 3-Steps With Barrier, Deck Links (Landscape Structures® PlayBooster® 152907C).....	3,368.81	97.67
11 68 13 00-0642 EA 4-Steps With Barrier, Deck Links (Landscape Structures® PlayBooster® 152907D).....	4,136.07	97.67

11 Equipment
11 60 Entertainment and Recreation Equipment
11 68 Play Field Equipment and Structures



MINOR TOTAL DIRECT DEMOLITION
 CSI UOM DESCRIPTION UNIT COST UNIT COST

11 68 13 00-0643	EA	1-Step With Handrail, Deck Links (Landscape Structures® PlayBooster® 152908A)	1,761.23	97.67
11 68 13 00-0644	EA	2-Steps With Handrail, Deck Links (Landscape Structures® PlayBooster® 152908B)	2,016.98	97.67
11 68 13 00-0645	EA	3-Steps With Handrail, Deck Links (Landscape Structures® PlayBooster® 152908C)	2,281.87	97.67
11 68 13 00-0646	EA	4-Steps With Handrail, Deck Links (Landscape Structures® PlayBooster® 152908D)	2,391.48	97.67
11 68 13 00-0647	EA	1-Step With Handrail, SteelX, Deck Links (Landscape Structures® PlayBooster® 152910A).....	2,108.32	97.67
11 68 13 00-0648	EA	2-Steps With Handrail, SteelX, Deck Links (Landscape Structures® PlayBooster® 152910B).....	2,382.34	97.67
11 68 13 00-0649	EA	3-Steps With Handrail, SteelX, Deck Links (Landscape Structures® PlayBooster® 152910C).....	2,638.09	97.67
11 68 13 00-0650	EA	4-Steps With Handrail, SteelX, Deck Links (Landscape Structures® PlayBooster® 152910D).....	2,893.85	97.67
11 68 13 00-0651	EA	48" To 48" Deck Or 56" To 56" Deck, Double Wave Climber (Landscape Structures® PlayBooster® 122916A)	4,992.50	227.90
11 68 13 00-0652	EA	64" To 64" Deck Or 72" To 72" Deck, Double Wave Climber (Landscape Structures® PlayBooster® 122916B)	5,120.38	227.90
11 68 13 00-0653	EA	48" To 64" Deck Or 56" To 72" Deck, Double Wave Climber (Landscape Structures® PlayBooster® 122916C)	5,047.30	227.90
11 68 13 00-0654	EA	48" To 48" Deck Or 56" To 56" Deck, SteelX, Double Wave Climber (Landscape Structures® PlayBooster® 139488A).....	5,805.43	227.90
11 68 13 00-0655	EA	64" To 64" Deck Or 72" To 72" Deck, SteelX, Double Wave Climber (Landscape Structures® PlayBooster® 139488B).....	5,933.30	227.90
11 68 13 00-0656	EA	48" To 64" Deck Or 56" To 72" Deck, SteelX, Double Wave Climber (Landscape Structures® PlayBooster® 139488C).....	5,878.50	227.90
11 68 13 00-0657	EA	40" - 48" Deck, Loop Arch Climber (Landscape Structures® PlayBooster® 122914A)	1,933.69	162.78
11 68 13 00-0658	EA	56" Deck, Loop Arch Climber (Landscape Structures® PlayBooster® 122914B)	2,125.50	162.78
11 68 13 00-0659	EA	64" - 72" Deck, Loop Arch Climber (Landscape Structures® PlayBooster® 122914C)	2,326.45	162.78
11 68 13 00-0660	EA	40" - 48" Deck, 90 Degree Tri-Deck, Loop Arch Climber (Landscape Structures® PlayBooster® 125688A).....	2,499.45	195.34
11 68 13 00-0661	EA	56" Deck, 90 Degree Tri-Deck, Loop Arch Climber (Landscape Structures® PlayBooster® 125688B).....	2,700.40	195.34
11 68 13 00-0662	EA	64" - 72" Deck, 90 Degree Tri-Deck, Loop Arch Climber (Landscape Structures® PlayBooster® 125688C).....	2,892.21	195.34
11 68 13 00-0663	EA	40" - 48" Deck, SteelX, Loop Arch Climber (Landscape Structures® PlayBooster® 139493A).....	2,335.58	162.78
11 68 13 00-0664	EA	56" Deck, SteelX, Loop Arch Climber (Landscape Structures® PlayBooster® 139493B)	2,518.26	162.78
11 68 13 00-0665	EA	64" - 72" Deck, SteelX, Loop Arch Climber (Landscape Structures® PlayBooster® 139493C)	2,728.35	162.78
11 68 13 00-0666	EA	40" - 48" Deck, Loop Ladder (Landscape Structures® PlayBooster® 128252A).....	1,340.52	130.23
11 68 13 00-0667	EA	40" - 48" Deck, SteelX, Loop Ladder (Landscape Structures® PlayBooster® 139495A)	1,742.42	130.23
11 68 13 00-0668	EA	32" - 48" Deck, Loop Pole (Landscape Structures® PlayBooster® 148434A).....	1,559.74	130.23
11 68 13 00-0669	EA	56" - 72" Deck, Loop Pole (Landscape Structures® PlayBooster® 148434B).....	1,687.61	130.23
11 68 13 00-0670	EA	32" - 48" Deck, SteelX, Loop Pole (Landscape Structures® PlayBooster® 148438A)	1,961.63	130.23
11 68 13 00-0671	EA	56" - 72" Deck, SteelX, Loop Pole (Landscape Structures® PlayBooster® 148438B)	2,071.24	130.23
11 68 13 00-0672	EA	24" Deck Height Difference, Panel Vertical Ladder, Deck-To-Deck Or Deck-To-Ground (Landscape Structures® PlayBooster® 116247A)	1,158.67	86.82
11 68 13 00-0673	EA	32" Deck Height Difference, Panel Vertical Ladder, Deck-To-Deck Or Deck-To-Ground (Landscape Structures® PlayBooster® 116247B).....	1,277.41	86.82
11 68 13 00-0674	EA	40" Deck Height Difference, Panel Vertical Ladder, Deck-To-Deck Or Deck-To-Ground (Landscape Structures® PlayBooster® 116247C).....	1,423.55	86.82
11 68 13 00-0675	EA	48" Deck Height Difference, Panel Vertical Ladder, Deck-To-Deck Or Deck-To-Ground (Landscape Structures® PlayBooster® 116247D).....	1,706.43	97.67
11 68 13 00-0676	EA	56" Deck Height Difference, Panel Vertical Ladder, Deck-To-Deck Or Deck-To-Ground (Landscape Structures® PlayBooster® 116247E).....	1,925.64	97.67
11 68 13 00-0677	EA	64" Deck Height Difference, Panel Vertical Ladder, Deck-To-Deck Or Deck-To-Ground (Landscape Structures® PlayBooster® 116247F).....	2,126.59	97.67
11 68 13 00-0678	EA	72" Deck-To-Ground, Panel Vertical Ladder (Landscape Structures® PlayBooster® 116247G)	2,400.61	97.67
11 68 13 00-0679	EA	48" Deck Height Difference, Single Wave Climber (Landscape Structures® PlayBooster® 122915A)	2,501.08	97.67
11 68 13 00-0680	EA	64" Deck Height Difference, Single Wave Climber (Landscape Structures® PlayBooster® 122915B)	2,592.42	97.67
11 68 13 00-0681	EA	48" Deck Height Difference, SteelX, Single Wave Climber (Landscape Structures® PlayBooster® 139487A).....	2,902.98	97.67
11 68 13 00-0682	EA	64" Deck Height Difference, SteelX, Single Wave Climber (Landscape Structures® PlayBooster® 139487B).....	3,003.45	97.67
11 68 13 00-0683	EA	48" - 56" Deck, Snake Climber (Landscape Structures® PlayBooster® 122913A)	2,472.59	162.78
11 68 13 00-0684	EA	64" - 72" Deck, Snake Climber (Landscape Structures® PlayBooster® 122913B)	2,591.34	162.78
11 68 13 00-0685	EA	48" - 56" Deck, 90 Degree Tri-Deck, Snake Climber (Landscape Structures® PlayBooster® 126375A).....	3,385.45	195.34
11 68 13 00-0686	EA	64" - 72" Deck, 90 Degree Tri-Deck, Snake Climber (Landscape Structures® PlayBooster® 126375B).....	3,531.59	195.34
11 68 13 00-0687	EA	48" - 56" Deck, SteelX, Snake Climber (Landscape Structures® PlayBooster® 139490A).....	2,874.49	162.78
11 68 13 00-0688	EA	64" - 72" Deck, SteelX, Snake Climber (Landscape Structures® PlayBooster® 139490B).....	2,984.10	162.78
11 68 13 00-0689	EA	32" Deck, Spiral Climber (Landscape Structures® PlayBooster® 122533A).....	1,313.12	130.23
11 68 13 00-0690	EA	40" - 48" Deck, Spiral Climber (Landscape Structures® PlayBooster® 122533B)	1,760.69	130.23
11 68 13 00-0691	EA	56" - 64" Deck, Spiral Climber (Landscape Structures® PlayBooster® 122533C).....	2,217.12	151.93
11 68 13 00-0692	EA	72" Deck, Spiral Climber (Landscape Structures® PlayBooster® 122533D).....	2,673.82	151.93
11 68 13 00-0693	EA	32" Deck, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 116246A).....	2,135.18	130.23
11 68 13 00-0694	EA	40" Deck, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 116246B).....	2,272.19	130.23
11 68 13 00-0695	EA	48" - 56" Deck, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 116246C)	2,591.88	130.23
11 68 13 00-0696	EA	64" - 72" Deck, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 116246D).....	2,911.57	130.23
11 68 13 00-0697	EA	32" Deck, SteelX, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 139492A).....	2,546.21	130.23
11 68 13 00-0698	EA	40" Deck, SteelX, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 139492B).....	2,674.09	130.23
11 68 13 00-0699	EA	48" - 56" Deck, SteelX, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 139492C).....	2,993.78	130.23
11 68 13 00-0700	EA	64" - 72" Deck, SteelX, Step Ladder, Direct Bury (Landscape Structures® PlayBooster® 139492D).....	3,322.60	130.23
11 68 13 00-0701	EA	Mini Summit Climber 40" To 48" Decks (Landscape Structures® PlayBooster® 153076A)	1,587.88	195.34
11 68 13 00-0702	EA	64" And 72" Decks, (64" Avail. For Direct Bury Only) (Landscape Structures® PlayBooster® 128608A)	1,870.29	130.23
11 68 13 00-0703	EA	PlayOdyssey 72" Deck (Landscape Structures® PlayBooster® 129453A)	2,051.89	195.34
11 68 13 00-0704	EA	48" Deck-To-Ground, Thunderhead Climber With Aluminum Posts (Landscape Structures® PlayBooster® 139778A).....	8,348.93	520.90
11 68 13 00-0705	EA	48" Deck-To-Ground, Thunderhead Climber With Steel Posts (Landscape Structures® PlayBooster® 139778B).....	8,348.93	520.90
11 68 13 00-0706	EA	48" Deck, Vertical Ascent Climber (Landscape Structures® PlayBooster® 145624A)	1,669.35	130.23
11 68 13 00-0707	EA	56" Deck, Vertical Ascent Climber (Landscape Structures® PlayBooster® 145624B).....	1,669.35	130.23
11 68 13 00-0708	EA	64" Deck, Vertical Ascent Climber (Landscape Structures® PlayBooster® 145624C).....	1,842.89	130.23
11 68 13 00-0709	EA	72" Deck, Vertical Ascent Climber (Landscape Structures® PlayBooster® 145624D).....	1,842.89	130.23
11 68 13 00-0710	EA	24" - 32" Deck, Vertical Ladder (Landscape Structures® PlayBooster® 116249A).....	1,076.18	97.67
11 68 13 00-0711	EA	40" - 48" Deck, Vertical Ladder (Landscape Structures® PlayBooster® 116249B).....	1,158.39	97.67
11 68 13 00-0712	EA	56" Deck, Vertical Ladder (Landscape Structures® PlayBooster® 116249C).....	1,213.19	97.67
11 68 13 00-0713	EA	64" - 72" Deck, Vertical Ladder (Landscape Structures® PlayBooster® 116249D).....	1,286.26	97.67
11 68 13 00-0714	EA	24" - 32" Deck, 90 Degree Tri-Deck, Vertical Ladder (Landscape Structures® PlayBooster® 126372A).....	1,688.16	97.67

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0715 EA 40" - 48" Deck, 90 Degree Tri-Deck, Vertical Ladder (Landscape Structures® PlayBooster® 126372B).....	1,761.23	97.67
11 68 13 00-0716 EA 56" Deck, 90 Degree Tri-Deck, Vertical Ladder (Landscape Structures® PlayBooster® 126372C).....	1,825.17	97.67
11 68 13 00-0717 EA 64" - 72" Deck, 90 Degree Tri-Deck, Vertical Ladder (Landscape Structures® PlayBooster® 126372D).....	1,907.37	97.67
11 68 13 00-0718 EA 24" - 32" Deck, SteelX, Vertical Ladder (Landscape Structures® PlayBooster® 139494A).....	1,468.94	97.67
11 68 13 00-0719 EA 40" - 48" Deck, SteelX, Vertical Ladder (Landscape Structures® PlayBooster® 139494B).....	1,523.75	97.67
11 68 13 00-0720 EA 56" Deck, SteelX, Vertical Ladder (Landscape Structures® PlayBooster® 139494C).....	1,605.95	97.67
11 68 13 00-0721 EA 64" - 72" Deck, SteelX, Vertical Ladder (Landscape Structures® PlayBooster® 139494D).....	1,688.16	97.67
11 68 13 00-0722 EA 56" Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 123284D).....	1,248.64	162.78
11 68 13 00-0723 EA 64" Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 123284E).....	1,294.31	162.78
11 68 13 00-0724 EA 72" Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 123284F).....	1,376.51	162.78
11 68 13 00-0725 EA 32" Deck, 90 Degree Tri-Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 126371A).....	1,741.87	162.78
11 68 13 00-0726 EA 40" Deck, 90 Degree Tri-Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 126371B).....	1,814.95	162.78
11 68 13 00-0727 EA 48" Deck, 90 Degree Tri-Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 126371C).....	1,869.75	162.78
11 68 13 00-0728 EA 56" Deck, 90 Degree Tri-Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 126371D).....	1,933.69	162.78
11 68 13 00-0729 EA 64" Deck, 90 Degree Tri-Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 126371E).....	1,997.63	162.78
11 68 13 00-0730 EA 72" Deck, 90 Degree Tri-Deck, Wiggle Ladder (Landscape Structures® PlayBooster® 126371F).....	2,061.56	162.78
11 68 13 00-0731 EA 32" Deck, SteelX, Wiggle Ladder (Landscape Structures® PlayBooster® 139502A).....	1,458.72	162.78
11 68 13 00-0732 EA 40" Deck, SteelX, Wiggle Ladder (Landscape Structures® PlayBooster® 139502B).....	1,531.79	162.78
11 68 13 00-0733 EA 48" Deck, SteelX, Wiggle Ladder (Landscape Structures® PlayBooster® 139502C).....	1,577.46	162.78
11 68 13 00-0734 EA 56" Deck, SteelX, Wiggle Ladder (Landscape Structures® PlayBooster® 139502D).....	1,623.13	162.78
11 68 13 00-0735 EA 64" Deck, SteelX, Wiggle Ladder (Landscape Structures® PlayBooster® 139502E).....	1,677.94	162.78
11 68 13 00-0736 EA 72" Deck, SteelX, Wiggle Ladder (Landscape Structures® PlayBooster® 139502F).....	1,760.14	162.78
11 68 13 00-0737 EA Overhead Events Air Dancer Overhead Event, Max. 32" Decks (Landscape Structures® PlayBooster® 121952A).....	2,500.54	130.23
11 68 13 00-0738 EA Overhead Events Swing Out Overhead Event, 16" Deck Height Only (Landscape Structures® PlayBooster® 120872A).....	1,761.23	97.67
11 68 13 00-0739 EA Overhead Events Triple Ring Fling Overhead Event, 24" Or 32" Deck-To-Ground (Landscape Structures® PlayBooster® 123824A).....	3,531.59	195.34
11 68 13 00-0740 EA Overhead Events Ring Pull, Brown Rings Only, Intended For Wheelchair Users (Landscape Structures® PlayBooster® 130873A).....	884.91	65.11
11 68 13 00-0741 EA Overhead Events 90 Degree Horizontal Ladder, Max. 32" Decks (Landscape Structures® PlayBooster® 142890A).....	2,500.54	130.23
11 68 13 00-0742 EA Overhead Events Circular Horizontal Ladder, Max. 32" Decks (Landscape Structures® PlayBooster® 142891A).....	4,499.80	195.34
11 68 13 00-0743 EA Overhead Events C-Horizontal Ladder, Max. 32" Decks (Landscape Structures® PlayBooster® 142883A).....	3,568.67	162.78
11 68 13 00-0744 EA Overhead Events Ring-a-Ling Overhead Event, Max. 32" Decks (Landscape Structures® PlayBooster® 126203A).....	3,385.45	195.34
11 68 13 00-0745 EA Overhead Events Wave Net, CableCore Climbing Cable, Max. 32" Decks (Landscape Structures® PlayBooster® 126274A).....	3,787.89	162.78
11 68 13 00-0746 EA Overhead Events Trapeze Horizontal Ladder, 18" Wide, Max. 32" Decks (Landscape Structures® PlayBooster® 111468A).....	2,445.19	162.78
11 68 13 00-0747 EA Overhead Events Inclined Horizontal Ladder, 16" - 32" Decks, 16" Incline (Landscape Structures® PlayBooster® 142889A).....	1,551.69	65.11
11 68 13 00-0748 EA Overhead Events Horizontal Ladder, Max. 32" Decks (Landscape Structures® PlayBooster® 142887A).....	1,515.16	65.11
11 68 13 00-0749 EA Overhead Events Overhead Parallel Bars, Max. 32" Decks (Landscape Structures® PlayBooster® 119430A).....	1,597.36	65.11
11 68 13 00-0750 EA Overhead Events Horizontal Ladder, 84" Module, Max. 16" Decks, 12" Max. Rung Spacing (Landscape Structures® PlayBooster® 139782A).....	1,232.00	65.11
11 68 13 00-0751 EA Overhead Events Wave Horizontal Ladder, Max. 32" Decks (Landscape Structures® PlayBooster® 119613A).....	1,706.97	65.11
11 68 13 00-0752 EA Overhead Events Single Beam Loop Horizontal Ladder, 84" Module, Max. 32" Decks (Landscape Structures® PlayBooster® 119805A).....	1,369.01	65.11
11 68 13 00-0753 EA Overhead Events Single Beam Loop Horizontal Ladder, 123" Module, Max. 32" Decks (Landscape Structures® PlayBooster® 119806A).....	1,743.51	65.11
11 68 13 00-0754 EA Overhead Events S-Horizontal Ladder, Max. 32" Decks (Landscape Structures® PlayBooster® 142884A).....	3,568.67	162.78
11 68 13 00-0755 EA Overhead Events Single S-Parallel Bar, Max. 32" Decks (Landscape Structures® PlayBooster® 119979A).....	1,515.16	65.11
11 68 13 00-0756 EA Overhead Events Wiggle Ring Bridge, Max. 32" Decks (Landscape Structures® PlayBooster® 148639A).....	2,620.91	32.56
11 68 13 00-0757 EA Overhead Events S-Ring Bridge, With (2) 2" Crossovers, Max. 32" Decks, Brown Rings Only (Landscape Structures® PlayBooster® 111467A).....	2,245.33	97.67
11 68 13 00-0758 EA Overhead Events Ring Bridge, With (2) 2" Crossovers, Max. 32" Decks, Brown Rings Only (Landscape Structures® PlayBooster® 111467B).....	1,989.58	97.67
11 68 13 00-0759 EA 116" Steel Posts, End Vertical Ladder (Landscape Structures® PlayBooster® 111273B).....	1,705.88	130.23
11 68 13 00-0760 EA 132" Steel Posts, End Vertical Ladder (For Use With Ring Bridges) (Landscape Structures® PlayBooster® 116208B).....	1,797.22	130.23
11 68 13 00-0761 EA 10' Module, Track Ride Without Supports, With (2) Crossovers, Max. 16" Decks (Landscape Structures® PlayBooster® 111353A).....	3,359.14	130.23
11 68 13 00-0762 EA 18' Module, Track Ride Without Supports, With (2) Crossovers, Max. 16" Decks (Landscape Structures® PlayBooster® 112465A).....	3,779.30	130.23
11 68 13 00-0763 EA 16" - 24" Decks, Spring Across Bridge (Landscape Structures® PlayBooster® 136156A).....	4,799.60	293.01
11 68 13 00-0764 EA 90 Degree, 8" - 72" Decks, Curved Bridge, Bridge Planks Brown Only (Landscape Structures® PlayBooster® 120211A).....	6,105.22	325.56
11 68 13 00-0765 EA C Or S, 8" - 72" Decks, Curved Bridge, Bridge Planks Brown Only (Landscape Structures® PlayBooster® 120689A).....	13,224.32	651.13
11 68 13 00-0766 EA 16" To 32" Deck, Pod Bridge, Direct Bury (Landscape Structures® PlayBooster® 127234A).....	7,245.88	390.68
11 68 13 00-0767 EA 42" Module, Arch Bridge, Permalene Barrier, Bridge Plank (Landscape Structures® PlayBooster® 114665A).....	2,876.12	65.11
11 68 13 00-0768 EA 42" Module, Arch Bridge, SteelX, Bridge Plank (Landscape Structures® PlayBooster® 139383A).....	3,067.94	65.11
11 68 13 00-0769 EA 123" Module, Arch Bridge With Guardrail, Max. 40" Decks (Landscape Structures® PlayBooster® 143677A).....	5,596.42	162.78
11 68 13 00-0770 EA 123" Module, Arch Bridge With Barrier, Max. 72" Decks (Landscape Structures® PlayBooster® 143677B).....	7,213.14	162.78
11 68 13 00-0771 EA 42" Module, Belt Bridge, Permalene Barrier (Landscape Structures® PlayBooster® 114373A).....	2,930.38	97.67
11 68 13 00-0772 EA 84" Module, 24" - 48" Decks, Belt Bridge (Landscape Structures® PlayBooster® 120310A).....	4,425.65	260.45
11 68 13 00-0773 EA 123" Module, 24" - 48" Decks, Belt Bridge (Landscape Structures® PlayBooster® 120624A).....	5,119.83	260.45
11 68 13 00-0774 EA Bridge/Ramp Transition Bracket, Brown Only (Landscape Structures® PlayBooster® 111345A).....	437.89	32.56
11 68 13 00-0775 EA Ramp Exit/Wall Mount Plate, Surface Mount, Brown Only (Landscape Structures® PlayBooster® 111346A).....	656.02	97.67
11 68 13 00-0776 EA Ramp Exit Plate, Direct Bury, Brown Only (Landscape Structures® PlayBooster® 111346B).....	802.16	97.67
11 68 13 00-0777 EA Ramp Berm Exit Plate, Brown Only (Landscape Structures® PlayBooster® 120325A).....	637.75	97.67
11 68 13 00-0778 EA 84" Module, Clatterbridge, Brown Planks Only, With Handrails For 24" - 48" Decks (Landscape Structures® PlayBooster® 143194A).....	4,782.95	195.34

11 Equipment**11 60 Entertainment and Recreation Equipment****11 68 Play Field Equipment and Structures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0779	EA		123" Module, Clatterbridge, Brown Planks Only, With Handrails For 24" - 48" Decks (Landscape Structures® PlayBooster® 143195A).....	6,061.18	227.90
11 68 13 00-0780	EA		84" Module, Clatterbridge, Brown Planks Only, With Barrier For 24" To 72" Decks (Landscape Structures® PlayBooster® 147424A).....	6,874.64	195.34
11 68 13 00-0781	EA		123" Module, Clatterbridge, Brown Planks Only, With Barrier For 24" To 72" Decks (Landscape Structures® PlayBooster® 147425A).....	8,409.15	195.34
11 68 13 00-0782	EA		84" Module, Disc Challenge, Max. 24" Decks, With 2 Handhold Panels (Landscape Structures® PlayBooster® 120873A).....	4,157.51	455.79
11 68 13 00-0783	EA		123" Module, Disc Challenge, Max. 24" Decks, With 2 Handhold Panels (Landscape Structures® PlayBooster® 121416A).....	5,764.00	520.90
11 68 13 00-0784	EA		S-Disc Challenge, 123" Module, Disc Challenge, Max. 24" Decks, With 2 Handhold Panels (Landscape Structures® PlayBooster® 136157A).....	5,764.00	520.90
11 68 13 00-0785	EA		16" Deck Height Difference, Peek And Creep Ramp, Brown Wire Plank Only, With Barriers (Landscape Structures® PlayBooster® 152443A).....	4,291.89	65.11
11 68 13 00-0786	EA		16" Deck Height Difference, Peek And Creep Ramp, Brown Wire Plank Only, With Guardrails (Landscape Structures® PlayBooster® 152444A).....	2,803.05	65.11
11 68 13 00-0787	EA		Wire Crawl Tunnel (Landscape Structures® PlayBooster® 119641A).....	3,220.50	227.90
11 68 13 00-0788	EA		64" Straight, 8" - 72" Decks, Crawl Tunnel (Landscape Structures® PlayBooster® 126204B).....	3,569.22	130.23
11 68 13 00-0789	EA		90 Degree Curved, 8" - 72" Deck, Crawl Tunnel (Landscape Structures® PlayBooster® 142892A).....	4,236.00	130.23
11 68 13 00-0790	EA		32" Straight, 8" - 72" Decks, Crawl Tunnel (Landscape Structures® PlayBooster® 126204A).....	2,728.89	130.23
11 68 13 00-0791	EA		C-Inclined, 16" Deck Height Difference, Crawl Tunnel, 30" Diameter, Permalene Panels, Maximum 48" Decks, Deck-To-Deck Applications (Landscape Structures® PlayBooster® 117088A).....	6,964.90	260.45
11 68 13 00-0792	EA		S-Inclined, 16" Deck Height Difference, Crawl Tunnel, 30" Diameter, Permalene Panels, Maximum 48" Decks, Deck-To-Deck Applications (Landscape Structures® PlayBooster® 117088B).....	6,964.90	260.45
11 68 13 00-0793	EA		C-Straight, Crawl Tunnel, 30" Diameter, Permalene Panels, Maximum 48" Decks, Deck-To-Deck Applications (Landscape Structures® PlayBooster® 117089A).....	6,964.90	260.45
11 68 13 00-0794	EA		S-Straight, Crawl Tunnel, 30" Diameter, Permalene Panels, Maximum 48" Decks, Deck-To-Deck Applications (Landscape Structures® PlayBooster® 117089B).....	6,964.90	260.45
11 68 13 00-0795	EA		24" Deck Height Difference, Offset Crawl Tunnel (Landscape Structures® PlayBooster® 129042A).....	4,453.59	227.90
11 68 13 00-0796	EA		8" Deck Height Difference, Offset Crawl Tunnel (Landscape Structures® PlayBooster® 119930A).....	3,942.09	227.90
11 68 13 00-0797	EA		16" Deck Height Difference, Offset Crawl Tunnel (Landscape Structures® PlayBooster® 122589A).....	4,069.97	227.90
11 68 13 00-0798	EA		Math Panel, Red Discs Only, Enclosure (Landscape Structures® PlayBooster® 115232A).....	2,181.68	86.82
11 68 13 00-0799	EA		Spelling Panel, Red Discs Only, Enclosure (Landscape Structures® PlayBooster® 115233A).....	2,072.07	86.82
11 68 13 00-0800	EA		Gear Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 117146A).....	2,446.82	65.11
11 68 13 00-0801	EA		Hourglass Panel, Enclosure (Landscape Structures® PlayBooster® 123319A).....	1,889.65	65.11
11 68 13 00-0802	EA		Image Panel, 176 Play Blocks, Enclosure (Landscape Structures® PlayBooster® 127681A).....	1,816.32	86.82
11 68 13 00-0803	EA		Slant Window Panel, Enclosure (Landscape Structures® PlayBooster® 115222A).....	1,679.31	86.82
11 68 13 00-0804	EA		Bubble Panel, Enclosure (Landscape Structures® PlayBooster® 115223A).....	1,113.26	65.11
11 68 13 00-0805	EA		Puppet Panel, Enclosure (Landscape Structures® PlayBooster® 115225A).....	820.97	65.11
11 68 13 00-0806	EA		Zoo Panel, Enclosure (Landscape Structures® PlayBooster® 115227A).....	830.11	65.11
11 68 13 00-0807	EA		Ball Maze Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 115236A).....	1,597.36	65.11
11 68 13 00-0808	EA		Match 4 Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 127678A).....	1,295.68	86.82
11 68 13 00-0809	EA		Finger Maze Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 115229A).....	994.52	65.11
11 68 13 00-0810	EA		Tracing Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 115230A).....	994.52	65.11
11 68 13 00-0811	EA		Mirror Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 115234A).....	1,515.16	65.11
11 68 13 00-0812	EA		Pilot Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 119514A).....	1,451.22	65.11
11 68 13 00-0813	EA		Space Travel Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 123483A).....	1,716.10	65.11
11 68 13 00-0814	EA		Braille And Clock Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 123844A).....	2,044.93	65.11
11 68 13 00-0815	EA		Chimes Panel, Enclosure (Landscape Structures® PlayBooster® 115243A).....	1,889.65	65.11
11 68 13 00-0816	EA		Puppet Panel With Window Above Deck, Enclosure (Landscape Structures® PlayBooster® 115226A).....	1,012.79	65.11
11 68 13 00-0817	EA		Balcony Deck, Brown Tenderdeck Only (Landscape Structures® PlayBooster® 111240A).....	1,697.29	97.67
11 68 13 00-0818	EA		Balcony Deck, With Wheel, Brown Tenderdeck Only (Landscape Structures® PlayBooster® 111240B).....	1,953.04	97.67
11 68 13 00-0819	EA		Driver Panel, SteelX, Above Deck (Landscape Structures® PlayBooster® 139382A).....	1,232.00	65.11
11 68 13 00-0820	EA		Driver Panel, SteelX, Below Deck (Landscape Structures® PlayBooster® 139382B).....	1,423.82	65.11
11 68 13 00-0821	EA		Driver Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 115228A).....	1,140.66	65.11
11 68 13 00-0822	EA		Storefront Panel, SteelX, Ground-Level Panel (Landscape Structures® PlayBooster® 139378A).....	957.98	65.11
11 68 13 00-0823	EA		Hole Panel (SteelX®), Ground-Level Panel (Landscape Structures® PlayBooster® 139381A).....	912.31	65.11
11 68 13 00-0824	EA		Slant Entrance Panel, 24" Diameter, Ground-Level Panel (Landscape Structures® PlayBooster® 115242A).....	1,569.15	119.37
11 68 13 00-0825	EA		Sand And Water Panel, Ground-Level Panel, Tan Dish Only (Landscape Structures® PlayBooster® 115257A).....	2,108.32	97.67
11 68 13 00-0826	EA		Table Panel, Ground-Level Panel (Landscape Structures® PlayBooster® 130565A).....	1,432.69	86.82
11 68 13 00-0827	EA		Hole Panel (Permalene®), Ground-Level Panel (Landscape Structures® PlayBooster® 115253A).....	820.97	65.11
11 68 13 00-0828	EA		Storefront Panel, Ground-Level Panel (Landscape Structures® PlayBooster® 115254A).....	848.37	65.11
11 68 13 00-0829	EA		2 Panels, Handhold Panel (Landscape Structures® PlayBooster® 127953A).....	410.49	32.56
11 68 13 00-0830	EA		1 Panel, Handhold Panel (Landscape Structures® PlayBooster® 127953B).....	206.17	21.70
11 68 13 00-0831	EA		House Panel (SteelX®) Above Deck (Landscape Structures® PlayBooster® 139380A).....	1,077.01	54.26
11 68 13 00-0832	EA		House Panel, SteelX, Below Deck (Landscape Structures® PlayBooster® 139380B).....	1,286.81	65.11
11 68 13 00-0833	EA		House Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 115235A).....	930.58	65.11
11 68 13 00-0834	EA		Periscope Panel, SteelX, Above Deck (Landscape Structures® PlayBooster® 139379A).....	2,346.35	65.11
11 68 13 00-0835	EA		Periscope Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 117957A).....	2,044.93	65.11
11 68 13 00-0836	EA		Periscope Panel, SteelX, Below Deck (Landscape Structures® PlayBooster® 139379B).....	2,556.43	65.11
11 68 13 00-0837	EA		Pipe Barrier Above Deck, Without Wheel (Landscape Structures® PlayBooster® 116244A).....	848.37	65.11
11 68 13 00-0838	EA		Pipe Barrier, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 117680A).....	912.05	86.82
11 68 13 00-0839	EA		Pipe Barrier Above Deck, With Wheel (Landscape Structures® PlayBooster® 116244B).....	1,085.86	65.11
11 68 13 00-0840	EA		Pipe Barrier, With Wheel, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 117680B).....	1,167.80	86.82
11 68 13 00-0841	EA		Pipe Barrier, (For TurboTwister Tunnel Slide) (Landscape Structures® PlayBooster® 125921A).....	903.18	65.11
11 68 13 00-0842	EA		Pipe Barrier, With Wheel, (For TurboTwister Tunnel Slide) (Landscape Structures® PlayBooster® 125921B).....	1,158.93	65.11
11 68 13 00-0843	EA		Pipe Guardrail (Landscape Structures® PlayBooster® 116245A).....	729.63	65.11
11 68 13 00-0844	EA		Pipe Guardrail, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 117681A).....	930.32	86.82
11 68 13 00-0845	EA		Wheelchair Accessible Navigator Reach Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 127439A).....	885.45	32.56
11 68 13 00-0846	EA		Wheelchair Accessible Trail Tracker Reach Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 127440A).....	634.73	32.56

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0847 EA Wheelchair Accessible Image Reach Panel, 75 Play Blocks (Landscape Structures® PlayBooster® 129043A).....	1,159.47	32.56
11 68 13 00-0848 EA Wheelchair Accessible Periscope Reach Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 135729A).....	1,963.00	54.26
11 68 13 00-0849 EA Wheelchair Accessible Match 3 Reach Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 135730A).....	1,058.74	54.26
11 68 13 00-0850 EA Wheelchair Accessible Chimes Reach Panel (Landscape Structures® PlayBooster® 135731A).....	1,615.91	54.26
11 68 13 00-0851 EA Recycled Poly Wall (Landscape Structures® PlayBooster® 111267A).....	1,213.73	65.11
11 68 13 00-0852 EA Recycled Poly Wall, With Wheel (Landscape Structures® PlayBooster® 111267B).....	1,478.62	65.11
11 68 13 00-0853 EA Tic-Tac-Toe Panel, SteelX, Above Deck (Landscape Structures® PlayBooster® 139377A).....	2,976.60	65.11
11 68 13 00-0854 EA Tic-Tac-Toe Panel, SteelX, Below Deck (Landscape Structures® PlayBooster® 139377B).....	3,204.68	86.82
11 68 13 00-0855 EA Tic-Tac-Toe Panel, Above Deck, Tan Discs Only (Landscape Structures® PlayBooster® 115231A).....	1,853.11	65.11
11 68 13 00-0856 EA Wire Barrier (Landscape Structures® PlayBooster® 120314A).....	948.59	86.82
11 68 13 00-0857 EA Wire Barrier, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 120315A).....	1,149.53	86.82
11 68 13 00-0858 EA Wire Barrier With Wheel (Landscape Structures® PlayBooster® 120314B).....	1,213.47	86.82
11 68 13 00-0859 EA Wire Barrier With Wheel, 90 Degree Tri-Deck (Landscape Structures® PlayBooster® 120315B).....	1,414.42	86.82
11 68 13 00-0860 EA Wire Barrier, (For TurboTwister Tunnel Slide) (Landscape Structures® PlayBooster® 125921C).....	1,012.79	65.11
11 68 13 00-0861 EA Wire Barrier With Wheel, (For TurboTwister Tunnel Slide) (Landscape Structures® PlayBooster® 125921D).....	1,277.67	65.11
11 68 13 00-0862 EA Loop Seats (Landscape Structures® PlayBooster® 118089A).....	638.84	32.56
11 68 13 00-0863 EA Grab Bar, TenderTuff-coated Brown (Landscape Structures® PlayBooster® 120901A).....	246.36	21.70
11 68 13 00-0864 EA Handhold/Leg Lift, TenderTuff-coated Brown (Landscape Structures® PlayBooster® 120902A).....	273.76	21.70
11 68 13 00-0865 EA Handloop Assembly (Landscape Structures® PlayBooster® 111275A).....	355.42	54.26
11 68 13 00-0866 EA Rail Assembly (Landscape Structures® PlayBooster® 111276A).....	346.29	54.26
11 68 13 00-0867 EA Log Roll, (1) Steel Post, Tan Log Only (Landscape Structures® PlayBooster® 111356B).....	1,843.17	119.37
11 68 13 00-0868 EA Chinning Bar, (1) Steel Post (Landscape Structures® PlayBooster® 111357C).....	793.03	97.67
11 68 13 00-0869 EA Turning Bar, (1) Steel Post (Landscape Structures® PlayBooster® 111357D).....	738.22	97.67
11 68 13 00-0870 EA Parallel Bars, Without Posts (Landscape Structures® PlayBooster® 111361A).....	948.85	65.11
11 68 13 00-0871 EA Orbiter Spinner, (Requires Steel Post, Avail. For Direct Bury Only) (Landscape Structures® PlayBooster® 153590A).....	2,537.62	97.67
11 68 13 00-0872 EA 48" Deck, Talk Tubes For PlayOdyssey Pod, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 129079A).....	894.59	32.56
11 68 13 00-0873 EA 72" Deck, Talk Tubes For PlayOdyssey Pod, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 129079B).....	949.39	32.56
11 68 13 00-0874 EA Ground Level, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363A).....	675.37	32.56
11 68 13 00-0875 EA 16" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363B).....	684.51	32.56
11 68 13 00-0876 EA 24" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363C).....	693.64	32.56
11 68 13 00-0877 EA 32" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363D).....	702.77	32.56
11 68 13 00-0878 EA 40" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363E).....	711.91	32.56
11 68 13 00-0879 EA 48" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363F).....	730.18	32.56
11 68 13 00-0880 EA 56" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363G).....	739.31	32.56
11 68 13 00-0881 EA 64" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363H).....	757.58	32.56
11 68 13 00-0882 EA 72" Deck, Talk Tubes, Deck Mount, One Only (Excludes Posts) (Landscape Structures® PlayBooster® 111363I).....	766.71	32.56
11 68 13 00-0883 EA Arch Roof, (Excludes Arches) (Landscape Structures® PlayBooster® 111256A).....	1,059.00	32.56
11 68 13 00-0884 EA Recycled 2x4 Roof (Landscape Structures® PlayBooster® 111260A).....	3,219.96	260.45
11 68 13 00-0885 EA Recycled Peak Roof (Landscape Structures® PlayBooster® 111408A).....	4,526.12	260.45
11 68 13 00-0886 EA Hex Shingle Roof (Landscape Structures® PlayBooster® 130567A).....	3,714.27	195.34
11 68 13 00-0887 EA Square SteelX Roof (Landscape Structures® PlayBooster® 139375A).....	3,960.89	195.34
11 68 13 00-0888 EA Hex SteelX Roof (Landscape Structures® PlayBooster® 139376A).....	6,170.79	227.90
11 68 13 00-0889 EA Flag Pole With Permalene Flag (For SteelX Hex Roof Or SteelX Square Roof Only) (Landscape Structures® PlayBooster® 139464A).....	383.37	21.70
11 68 13 00-0890 EA Full Sail, CoolToppers Shade System (Direct Bury Only) (Landscape Structures® PlayBooster® 136488A).....	15,286.42	781.37
11 68 13 00-0891 EA Single Post Shade, CoolToppers Shade System (Direct Bury Only) (Landscape Structures® PlayBooster® 154884A).....	5,049.39	651.13
11 68 13 00-0892 EA PlayOdyssey® Octagonal Deck (Direct Bury Only) 48" Deck With Roof, With Center Access (Landscape Structures® PlayBooster® 128980A).....	26,167.63	1,172.04
11 68 13 00-0893 EA PlayOdyssey® Octagonal Deck (Direct Bury Only) 48" Deck Without Roof, With Center Access (Landscape Structures® PlayBooster® 128980B).....	20,440.62	1,172.04
11 68 13 00-0894 EA PlayOdyssey® Octagonal Deck (Direct Bury Only) 48" Deck Without Roof, Without Center Access (Landscape Structures® PlayBooster® 128980C).....	19,335.40	1,172.04
11 68 13 00-0895 EA PlayOdyssey® Octagonal Deck (Direct Bury Only) 72" Deck With Roof, With Center Access (Landscape Structures® PlayBooster® 128980D).....	26,322.91	1,172.04
11 68 13 00-0896 EA PlayOdyssey® Octagonal Deck (Direct Bury Only) 72" Deck Without Roof, With Center Access (Landscape Structures® PlayBooster® 128980E).....	20,595.89	1,172.04
11 68 13 00-0897 EA PlayOdyssey® Octagonal Deck (Direct Bury Only) 72" Deck Without Roof, Without Center Access (Landscape Structures® PlayBooster® 128980F).....	19,499.81	1,172.04
11 68 13 00-0898 EA Square Tenderdeck, Brown Only (Landscape Structures® PlayBooster® 111228A).....	1,341.61	65.11
11 68 13 00-0899 EA Square Tenderdeck, Extension, Brown Only (Landscape Structures® PlayBooster® 111229A).....	1,286.81	65.11
11 68 13 00-0900 EA Square Tenderdeck, Corner, Brown Only (Landscape Structures® PlayBooster® 111230A).....	1,250.27	65.11
11 68 13 00-0901 EA Triangular Tenderdeck, Brown Only (Landscape Structures® PlayBooster® 111231A).....	1,013.33	32.56
11 68 13 00-0902 EA Hexagon Tenderdeck, Brown Only (Landscape Structures® PlayBooster® 111232A).....	3,787.89	162.78
11 68 13 00-0903 EA Triangular Tenderdeck, Extension, Brown Only (Landscape Structures® PlayBooster® 119646A).....	1,003.93	54.26
11 68 13 00-0904 EA 90 Degree Triangular Tenderdeck, Brown Only (Landscape Structures® PlayBooster® 122197A).....	1,077.27	32.56
11 68 13 00-0905 EA Transfer Step, Brown Only (Landscape Structures® PlayBooster® 112471A).....	757.03	65.11
11 68 13 00-0906 EA 24" Rise Kick Panel, 2-Color Permalene, With 2-Clamps (Landscape Structures® PlayBooster® 111525A).....	611.17	54.26
11 68 13 00-0907 EA 32" Rise Kick Panel, 2-Color Permalene, With 2-Clamps (Landscape Structures® PlayBooster® 111525B).....	757.32	54.26
11 68 13 00-0908 EA To 32" Deck, Curved, Right Or Left Step, Curved Transfer Module (Landscape Structures® PlayBooster® 152911A).....	3,293.03	260.45
11 68 13 00-0909 EA To 40" Deck, Curved, Right Or Left Step, Curved Transfer Module (Landscape Structures® PlayBooster® 152911B).....	3,731.46	260.45
11 68 13 00-0910 EA To 48" Deck, Curved, Right Or Left Step, Curved Transfer Module (Landscape Structures® PlayBooster® 152911C).....	3,914.14	260.45

11 Equipment
11 60 Entertainment and Recreation Equipment
11 68 Play Field Equipment and Structures



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
11 68 13 00-0911	EA	To 32" Deck, Curved, Right Or Left Step, SteelX, Curved Transfer Module (Landscape Structures® PlayBooster® 152912A).....	3,640.12		260.45
11 68 13 00-0912	EA	To 40" Deck, Curved, Right Or Left Step, SteelX, Curved Transfer Module (Landscape Structures® PlayBooster® 152912B).....	4,069.42		260.45
11 68 13 00-0913	EA	To 48" Deck, Curved, Right Or Left Step, SteelX, Curved Transfer Module (Landscape Structures® PlayBooster® 152912C).....	4,224.70		260.45
11 68 13 00-0914	EA	Arch For 72" Deck (Landscape Structures® PlayBooster® 111406A).....	1,926.19		65.11
11 68 13 00-0915	EA	Arch For 56" - 64" Deck (Landscape Structures® PlayBooster® 111406B).....	1,862.25		65.11
11 68 13 00-0916	EA	Arch For 40" - 48" Deck (Landscape Structures® PlayBooster® 111406C).....	1,789.18		65.11
11 68 13 00-0917	EA	Arch For 32" Deck (Landscape Structures® PlayBooster® 111406D).....	1,770.91		65.11
11 68 13 00-0918	EA	Arch/Ground Level (Landscape Structures® PlayBooster® 111406E).....	1,652.17		65.11
11 68 13 00-0919	EA	106"/72" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718J).....	638.57		54.26
11 68 13 00-0920	EA	98"/64" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718K).....	620.31		54.26
11 68 13 00-0921	EA	90"/56" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718L).....	611.17		54.26
11 68 13 00-0922	EA	82"/48" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718M).....	602.04		54.26
11 68 13 00-0923	EA	74"/40" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718N).....	592.90		54.26
11 68 13 00-0924	EA	66"/32" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718O).....	574.64		54.26
11 68 13 00-0925	EA	58"/24" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718P).....	565.50		54.26
11 68 13 00-0926	EA	50"/16" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718Q).....	556.37		54.26
11 68 13 00-0927	EA	42"/8" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718R).....	538.10		54.26
11 68 13 00-0928	EA	106"/72" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405J).....	602.04		54.26
11 68 13 00-0929	EA	98"/64" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405K).....	592.90		54.26
11 68 13 00-0930	EA	90"/56" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405L).....	574.64		54.26
11 68 13 00-0931	EA	82"/48" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405M).....	565.50		54.26
11 68 13 00-0932	EA	74"/40" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405N).....	556.37		54.26
11 68 13 00-0933	EA	66"/32" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405O).....	538.10		54.26
11 68 13 00-0934	EA	58"/24" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405P).....	528.97		54.26
11 68 13 00-0935	EA	50"/16" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405Q).....	519.83		54.26
11 68 13 00-0936	EA	42"/8" Deck, Flush Mount Posts For Decks, Square Caps (Landscape Structures® PlayBooster® 111405R).....	510.70		54.26
11 68 13 00-0937	EA	148"/72" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404M).....	474.42		32.56
11 68 13 00-0938	EA	140"/64" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404N).....	786.81		32.56
11 68 13 00-0939	EA	132"/56" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404O).....	437.89		32.56
11 68 13 00-0940	EA	124"/48" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404P).....	428.75		32.56
11 68 13 00-0941	EA	116"/40" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404Q).....	419.62		32.56
11 68 13 00-0942	EA	108"/32" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404R).....	410.49		32.56
11 68 13 00-0943	EA	100"/24" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404S).....	392.22		32.56
11 68 13 00-0944	EA	92"/16" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404T).....	364.82		32.56
11 68 13 00-0945	EA	84"/8" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404U).....	346.55		32.56
11 68 13 00-0946	EA	76"/Ground Level, Posts For Decks (Landscape Structures® PlayBooster® 111404V).....	337.41		32.56
11 68 13 00-0947	EA	156"/80" Deck, Posts For Decks (Landscape Structures® PlayBooster® 111404W).....	538.36		32.56
11 68 13 00-0948	EA	182"/96" Deck (44" Bury), Posts For Decks (Landscape Structures® PlayBooster® 111404Z).....	620.57		32.56
11 68 13 00-0949	EA	182"/72" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403K).....	547.50		32.56
11 68 13 00-0950	EA	174"/64" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403L).....	538.36		32.56
11 68 13 00-0951	EA	166"/56" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403M).....	529.23		32.56
11 68 13 00-0952	EA	158"/48" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403N).....	510.96		32.56
11 68 13 00-0953	EA	150"/40" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403O).....	501.83		32.56
11 68 13 00-0954	EA	142"/32" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403P).....	492.69		32.56
11 68 13 00-0955	EA	134"/24" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403Q).....	483.56		32.56
11 68 13 00-0956	EA	126"/16" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403R).....	474.42		32.56
11 68 13 00-0957	EA	118"/8" Deck, Posts For Roofs (Landscape Structures® PlayBooster® 111403S).....	447.02		32.56
11 68 13 00-0958	EA	110"/Ground Level, Posts For Roofs (Landscape Structures® PlayBooster® 111403T).....	437.89		32.56
11 68 13 00-0959	EA	204"/48" Deck (60" Bury), Posts For CoolToppers, Full Sail (Landscape Structures® PlayBooster® 136689A).....	2,483.17		1,172.04
11 68 13 00-0960	EA	212"/56" Deck (60" Bury), Posts For CoolToppers, Full Sail (Landscape Structures® PlayBooster® 136689B).....	2,492.31		1,172.04
11 68 13 00-0961	EA	220"/64" - 72" Deck (60" Bury), Posts For CoolToppers, Full Sail (Landscape Structures® PlayBooster® 136689C).....	2,510.57		1,172.04
11 68 13 00-0962	EA	264"/64" - 72" Deck (60" Bury), Posts For CoolToppers, Single Post Shade (Landscape Structures® PlayBooster® 154883A).....	2,272.65		651.13
11 68 13 00-0963	EA	248"/48" - 56" Deck (60" Bury), Posts For CoolToppers, Single Post Shade (Landscape Structures® PlayBooster® 154883B).....	2,217.85		651.13
11 68 13 00-0964	EA	232"/32" - 40" Deck (60" Bury), Posts For CoolToppers, Single Post Shade (Landscape Structures® PlayBooster® 154883C).....	2,190.44		651.13
11 68 13 00-0965	EA	220"/16" - 24" Deck (60" Bury), Posts For CoolToppers, Single Post Shade (Landscape Structures® PlayBooster® 154883D).....	2,035.17		651.13
11 68 13 00-0966	EA	200"/Ground Level - 8" Deck (60" Bury), Posts For CoolToppers, Single Post Shade (Landscape Structures® PlayBooster® 154883E).....	1,998.63		651.13
11 68 13 00-0967	EA	Overhead Events Access/Landing Assembly Seat 8" Deck (Landscape Structures® PlayBooster® 141887A).....	725.98		65.11
11 68 13 00-0968	EA	132" Aluminum Posts, End Vertical Ladder (For Use With Ring Bridges) (Landscape Structures® PlayBooster® 116208A).....	1,879.43		130.23
11 68 13 00-0969	EA	Square Poly Roof, Without Logo Panels (Landscape Structures® PlayBooster® 118110B).....	1,623.68		130.23
11 68 13 00-0970	EA	84" Module, Disc Challenge, Max. 40" Decks, With 3 Handhold Panels (Landscape Structures® PlayBooster® 120873B).....	3,919.41		195.34
11 68 13 00-0971	EA	84" Module, Disc Challenge, Max. 40" Decks, With 4 Handhold Panels (Landscape Structures® PlayBooster® 120873C).....	4,097.90		195.34
11 68 13 00-0972	EA	123" Module, Disc Challenge, Max. 40" Decks, With 3 Handhold Panels (Landscape Structures® PlayBooster® 121416B).....	5,530.35		260.45
11 68 13 00-0973	EA	123" Module, Disc Challenge, Max. 40" Decks, With 4 Handhold Panels (Landscape Structures® PlayBooster® 121416C).....	5,165.50		260.45
11 68 13 00-0974	EA	106"/72" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718A).....	729.63		65.11
11 68 13 00-0975	EA	98"/64" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718B).....	702.23		65.11
11 68 13 00-0976	EA	90"/56" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718C).....	674.83		65.11
11 68 13 00-0977	EA	82"/48" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718D).....	665.69		65.11
11 68 13 00-0978	EA	74"/40" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718E).....	593.17		32.56

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-0979	EA			66"/32" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718F).....	574.90	32.56
11 68 13 00-0980	EA			58"/24" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718G).....	547.50	32.56
11 68 13 00-0981	EA			50"/16" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718H).....	538.36	32.56
11 68 13 00-0982	EA			42"/8" Deck, Flush Mount Posts For Decks, Round Caps (Landscape Structures® PlayBooster® 122718I).....	529.23	32.56
11 68 13 00-0983	EA			Square Peak Tile Roof, Without Logo Panels (Landscape Structures® PlayBooster® 129816B).....	1,806.36	130.23
11 68 13 00-0984	EA			32" Decks, Spring Across Bridge With 4 TenderTuff-coated Handloops (Landscape Structures® PlayBooster® 136156B).....	5,897.41	260.45
11 68 13 00-0985	EA			S-Disc Challenge, 123" Module, Disc Challenge, Max. 40" Decks, With 3 Handhold Panels (Landscape Structures® PlayBooster® 136157B).....	5,530.35	260.45
11 68 13 00-0986	EA			S-Disc Challenge, 123" Module, Disc Challenge, Max. 40" Decks, With 4 Handhold Panels (Landscape Structures® PlayBooster® 136157C).....	5,709.61	260.45
11 68 13 00-0987	EA			Hexagon Tenderdeck, With Extension, Brown Only (Landscape Structures® PlayBooster® 154752A).....	5,905.36	260.45
11 68 13 00-0988	EA			The Pinnacle Natural Climber (Landscape Structures® PlayBooster® 156066A).....	27,507.72	781.37
11 68 13 00-0989	EA			The Pointe Natural Climber (Landscape Structures® PlayBooster® 156068A).....	15,546.52	520.90
11 68 13 00-0990	EA			Natural Elements Climber Handholds, Extension Deck And Kick Panel Set, One Set Required Per Associated Deck (Landscape Structures® PlayBooster® 156070A).....	1,369.01	65.11
11 68 13 00-0991	EA			Bridge With Guardrails And Curbs, Bridge Plank Brown Only (Landscape Structures® PlayBooster® 156230A).....	4,874.29	195.34
11 68 13 00-0992	EA			Bridge With Guardrails, Without Curbs, Bridge Plank Brown Only (Landscape Structures® PlayBooster® 156230B).....	4,381.06	195.34
11 68 13 00-0993	EA			Bridge With Barriers, Bridge Plank Brown Only (Landscape Structures® PlayBooster® 156231A).....	5,695.27	260.45
11 68 13 00-0994	EA			Ramp With Guardrails And Curbs, 3-Handrails Per Side (Conforms To ASTM And TUV Standard) (Landscape Structures® PlayBooster® 156232A).....	5,485.19	260.45
11 68 13 00-0995	EA			Ramp With Guardrails, Without Curbs, 3-Handrails Per Side, (Conforms To ASTM And TUV Standard) (Landscape Structures® PlayBooster® 156232B).....	4,892.56	195.34
11 68 13 00-0996	EA			Ramp With Guardrails And Curbs, 2-Handrails Per Side (Conforms To CSA Standard) (Landscape Structures® PlayBooster® 156232C).....	4,655.08	195.34
11 68 13 00-0997	EA			Ramp With Guardrails, Without Curbs, 2-Handrails Per Side, (Conforms To CSA Standard) (Landscape Structures® PlayBooster® 156232D).....	4,161.84	195.34
11 68 13 00-0998	EA			Ramp With Barriers, Ramp Plank Brown Only (Landscape Structures® PlayBooster® 156233A).....	6,727.42	260.45
11 68 13 00-0999	EA			16" Deck, Pod Climber With One Handhold Panel (Landscape Structures® PlayBooster® 156915A).....	729.63	65.11
11 68 13 00-1000	EA			24" Deck, Pod Climber With One Handhold Panel (Landscape Structures® PlayBooster® 156916A).....	1,085.86	65.11
11 68 13 00-1001	EA			24" Deck, Pod Climber With One Handhold Panel, And One Handloop (Landscape Structures® PlayBooster® 156916B).....	1,204.60	65.11
11 68 13 00-1002	EA			32" To 40" Deck, Pod Climber With Two Handhold Panels (Landscape Structures® PlayBooster® 157427A).....	1,815.49	130.23
11 68 13 00-1003	EA			32" To 40" Deck, Pod Climber With Two Handhold Panels, And One Handloop (Landscape Structures® PlayBooster® 157427B).....	1,943.37	130.23
11 68 13 00-1004	EA			32" To 40" Deck, Pod Climber With Two Handhold Panels, And One Handrail (Landscape Structures® PlayBooster® 157427C).....	2,034.71	130.23
11 68 13 00-1005	EA			32" To 40" Deck, Pod Climber With Two Handhold Panels, One Handloop And One Handrail (Landscape Structures® PlayBooster® 157427D).....	2,135.18	130.23
11 68 13 00-1006	EA			Starburst Climber, 64" And 72" Decks, (Direct Bury Only) (Landscape Structures® PlayBooster® 158425A).....	3,065.76	195.34
11 68 13 00-1007	EA			Ring-a-Bell Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 159459A).....	1,943.37	130.23
11 68 13 00-1008	EA			Ring-a-Bell™ Panel For Learning Wall (Landscape Structures® PlayBooster® 159460A).....	1,760.69	130.23
11 68 13 00-1009	EA			Stationary Cycler, Pedal Assembly, With Grab Bar, Without Post (Landscape Structures® PlayBooster® 160054A).....	1,451.22	65.11
11 68 13 00-1010	EA			Stationary Cycler, Handle Assembly, Without Post (Landscape Structures® PlayBooster® 160054B).....	1,131.53	65.11
11 68 13 00-1011	EA			Stationary Cycler, Pedals And Handles, Without Post (Landscape Structures® PlayBooster® 160054C).....	2,135.18	130.23
11 68 13 00-1012	EA			Stationary Cycler, Handle Assembly, Accessible, Without Post (Landscape Structures® PlayBooster® 160054D).....	1,131.53	65.11
11 68 13 00-1013	EA			(1) Aluminum Post Gyro Twister Spinners (Landscape Structures® PlayBooster® 160251A).....	2,920.70	130.23
11 68 13 00-1014	EA			(1) Steel Post Gyro Twister Spinners (Landscape Structures® PlayBooster® 160251B).....	2,893.30	130.23
11 68 13 00-1015	EA			The Peak Natural Climber, 40" Deck (Landscape Structures® PlayBooster® 160420A).....	8,918.49	325.56
11 68 13 00-1016	EA			The Peak Natural Climber Connector, Connects Between 32" Deck And 40" Deck (Landscape Structures® PlayBooster® 160421A).....	9,384.32	325.56
11 68 13 00-1017	EA			The Stepper Natural Climbing Stone, 24" Deck (Landscape Structures® PlayBooster® 160422A).....	4,746.42	195.34
11 68 13 00-1018	EA			64" - 72" Decks, Escalator Climber With Single Barrier With Infill Permalene Panel (Landscape Structures® PlayBooster® 160693A).....	5,576.53	260.45
11 68 13 00-1019	EA			Single Barrier Handhold Panel With Infill, Permalene, Panel Only (Landscape Structures® PlayBooster® 160694A).....	830.11	65.11
11 68 13 00-1020	EA			Single Connector, 64" - 72" Decks, Escalator Climber Without Posts (Landscape Structures® PlayBooster® 160810A).....	4,810.35	195.34
11 68 13 00-1021	EA			Double Connector, 64" - 72" Decks, Escalator Climber Without Posts (Landscape Structures® PlayBooster® 160811A).....	9,503.06	325.56
11 68 13 00-1022	EA			RingTangle Climber, 24" - 48" Decks (Landscape Structures® PlayBooster® 164078A).....	3,065.76	195.34
11 68 13 00-1023	EA			Bongo Panel, Enclosure (2-Color Permalene) (Landscape Structures® PlayBooster® 164092A).....	1,305.07	65.11
11 68 13 00-1024	EA			Bongo Panel For Learning Wall (Landscape Structures® PlayBooster® 164093A).....	1,177.20	65.11
11 68 13 00-1025	EA			Wheelchair Accessible Bongo Reach Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 164094A).....	1,186.33	65.11
11 68 13 00-1026	EA			Rock-n-Ring Panel, Ground Level Panel (2 Color Permalene) (Landscape Structures® PlayBooster® 164145A).....	2,646.68	130.23
11 68 13 00-1027	EA			Rock-n-Ring™ Panel For Learning Wall (Landscape Structures® PlayBooster® 164146A).....	2,107.78	130.23
11 68 13 00-1028	EA			Bongo Reach Panel For Learning Wall (Landscape Structures® PlayBooster® 164147A).....	1,104.13	65.11
11 68 13 00-1029	EA			Wheelchair Accessible Ring-a-Bell Reach Panel, (2-Color Permalene) (Landscape Structures® PlayBooster® 164148A).....	1,286.81	65.11
11 68 13 00-1030	EA			Ring-a-Bell™ Reach Panel For Learning Wall (Landscape Structures® PlayBooster® 164149A).....	1,204.60	65.11
11 68 13 00-1031				Playground Equipment (Landscape Structures® Evos™) <small>(11 68 13 00-0009)</small>		
11 68 13 00-1032	EA			Standard Age-Appropriate Welcome Sign, Ages 5 To 12 (Landscape Structures® Evos™ 158650A).....	1,003.65	65.11
11 68 13 00-1033	EA			Customized Name On Age-Appropriate Welcome Sign, Ages 5 To 12 (Landscape Structures® Evos™ 158651A).....	1,177.20	65.11
11 68 13 00-1034	EA			Slalom Glider (Direct Bury Only) (Landscape Structures® Evos™ 156456A).....	4,499.80	195.34
11 68 13 00-1035	EA			Hang Glider (Direct Bury Only) (Landscape Structures® Evos™ 156465A).....	3,467.66	195.34
11 68 13 00-1036	EA			Helix Net Climber (Direct Bury Only) (Landscape Structures® Evos™ 156449A).....	8,162.81	184.49
11 68 13 00-1037	EA			Crescent Climber (Direct Bury Only) (Landscape Structures® Evos™ 156461A).....	6,307.25	260.45

11 Equipment**11 60 Entertainment and Recreation Equipment****11 68 Play Field Equipment and Structures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 68 13 00-1038	EA		RingTangle Climber With Two E-Pod Steps (Direct Bury Only) (Landscape Structures® Evos™ 156462A)	4,217.19	162.78
11 68 13 00-1039	EA		Web Link Climber (Direct Bury Only) (Landscape Structures® Evos™ 156912A).....	8,710.57	195.34
11 68 13 00-1040	EA		Wobble Pod Bouncer (Direct Bury Only) (Landscape Structures® Evos™ 156452A)	2,052.97	130.23
11 68 13 00-1041	EA		Gyro Twister Spinner (Direct Bury Only) (Landscape Structures® Evos™ 156459A)	2,674.63	97.67
11 68 13 00-1042	EA		E-Pod Step (Landscape Structures® Evos™ 156454A).....	419.90	21.70
11 68 13 00-1043	EA		Cycler With E-Pod Step (Direct Bury Only) (Landscape Structures® Evos™ 156467A)	1,889.65	65.11
11 68 13 00-1044	EA		8" Pod, With One E-Pod Step, Noodle Pod Steps (Direct Bury Only) (Landscape Structures® Evos™ 156959A)	1,369.29	54.26
11 68 13 00-1045	EA		16" Pod, With One E-Pod Step, Noodle Pod Steps (Direct Bury Only) (Landscape Structures® Evos™ 156959B)	1,378.43	54.26
11 68 13 00-1046	EA		24" Pod, With One E-Pod Step, Noodle Pod Steps (Direct Bury Only) (Landscape Structures® Evos™ 156959C)	1,387.56	54.26
11 68 13 00-1047	EA		Swiggle Stix Bridge (Direct Bury Only) (Landscape Structures® Evos™ 156450A)	7,832.09	293.01
11 68 13 00-1048	EA		PodStomper Bridge (Direct Bury Only) (Landscape Structures® Evos™ 156464A)	8,080.33	195.34
11 68 13 00-1049	EA		ArcOver Ladder With Two E-Pod Steps, Overhead Events (Direct Bury Only) (Landscape Structures® Evos™ 156457A).....	3,532.68	130.23
11 68 13 00-1050	EA		Bow Ladder With Four E-Pod Steps, Overhead Events (Landscape Structures® Evos™ 156463A)	3,798.66	65.11
11 68 13 00-1051	EA		2-Arch Mainstructure With Hemisphere Climber And O-Zone Climber (Landscape Structures® Evos™ 156436A).....	33,170.80	781.37
11 68 13 00-1052	EA		3-Arch Mainstructure, Small (Landscape Structures® Evos™ 157106A).....	37,384.19	1,172.04
11 68 13 00-1053	EA		Additional Small Arch For Mainstructure, #3 Only (Landscape Structures® Evos™ 156545A).....	4,222.52	390.68
11 68 13 00-1054	EA		16" Pod, With Two E-Pod Steps, Noodle Pod Steps (Direct Bury Only) (Landscape Structures® Evos™ 164156A)	1,915.96	130.23
11 68 13 00-1055	EA		24" Pod, With Two E-Pod Steps, Noodle Pod Steps (Direct Bury Only) (Landscape Structures® Evos™ 164156B)	1,934.23	130.23
11 68 13 00-1056	EA		Ring-a-Bell Reach Panel (2-Color Permalene) (Landscape Structures® Evos™ 164150A).....	1,286.81	65.11
11 68 13 00-1057	EA		Bongo Reach Panel (2-Color Permalene) (Landscape Structures® Evos™ 164095A).....	1,186.33	65.11
11 68 13 00-1058	EA		Noodle Post, 1 Post Only (Direct Bury Only) (Landscape Structures® Evos™ 161774A).....	1,012.79	65.11
11 68 13 00-1059	EA		Periscope Reach Panel (2-Color Permalene) (Landscape Structures® Evos™ 161775A).....	2,098.64	130.23
11 68 13 00-1060	EA		Match 3 Reach Panel (2-Color Permalene) (Landscape Structures® Evos™ 161776A).....	1,085.86	65.11
11 68 13 00-1061	EA		Chimes Reach Panel (Landscape Structures® Evos™ 161777A).....	1,751.55	130.23
11 68 13 00-1062	EA		Trail Tracker Reach Panel (2-Color Permalene) (Landscape Structures® Evos™ 161778A)	683.96	65.11
11 68 13 00-1063	EA		Navigator Reach Panel (2-Color Permalene) (Landscape Structures® Evos™ 161779A)	939.71	65.11
11 68 13 00-1064	EA		Image Reach Panel, 75 Play Blocks (Landscape Structures® Evos™ 161780A)	1,213.73	65.11
11 68 13 00-1065	EA		Chatter Noodle Talk Tube Kit, Two Noodle Posts And Tubing (Direct Bury Only) (Landscape Structures® Evos™ 156453A).....	2,838.50	130.23
11 68 13 00-1066	EA		Blender Spinner (Direct Bury Only) (Landscape Structures® Evos™ 156460A)	3,467.66	195.34
11 68 13 00-1067	EA		BalanceWinder Climber (Direct Bury Only) (Landscape Structures® Evos™ 160252A)	6,151.97	260.45
11 68 13 00-1068	EA		Overhead Explorer Parallel Bar, With (1) E-Pod Step, Overhead Events (Direct Bury Only) (Landscape Structures® Evos™ 160253A).....	2,527.94	130.23
11 68 13 00-1069	EA		Overhead Trekker Ladder, With (1) E-Pod Step, Overhead Events (Direct Bury Only) (Landscape Structures® Evos™ 160254A).....	2,756.29	130.23
11 68 13 00-1070	EA		3-Arch Mainstructure, Large With Hemisphere Climber And O-Zone Climber (Landscape Structures® Evos™ 160356A).....	37,913.96	1,172.04
11 68 13 00-1071	EA		4-Arch Mainstructure With Hemisphere Climber And O-Zone Climber (Landscape Structures® Evos™ 160357A).....	41,476.22	1,172.04
11 68 13 00-1072	EA		Additional Large Arch For Mainstructure, #4 Only (Landscape Structures® Evos™ 160358A).....	4,408.46	195.34
11 68 13 00-1073	EA		Additional Arches For Mainstructure, #3 And #4 Only (Landscape Structures® Evos™ 160359A).....	8,196.90	325.56
11 68 13 00-1074	EA		Power Lifter Chinning Bar (Landscape Structures® Evos™ 160208A)	1,961.63	130.23
11 68 13 00-1075	EA		Accessible Power Lifter Chinning Bar (Landscape Structures® Evos™ 160209A)	2,464.00	130.23
11 68 13 00-1076	EA		TwirlWind Turning Bar (Landscape Structures® Evos™ 160210A).....	2,464.00	130.23

11 68 13 00-1077 Playground Equipment (Landscape Structures® Weevos™) (11 68 13 00-0009)

11 68 13 00-1078	EA		Safety Sign, Weevos Welcome Sign, Ages 2 to 5, Direct Bury (Landscape Structures® Weevos™ 164529A)	1,003.65	65.11
11 68 13 00-1079	EA		ChitterChatter Noodle™ Talk Tube Kit (Landscape Structures® Weevos™ 164177A).....	2,573.61	130.23

11 68 13 00-1080 Playground Equipment (Landscape Structures® Parts) (11 68 13 00-0009)

11 68 13 00-1081	EA		52-9/16" Long, TenderTuff-Coated Chain, Brown, Full-Bucket Seat (8') (Landscape Structures® 160110A)	107.24	32.56
11 68 13 00-1082	EA		66-15/16" Long, TenderTuff-Coated Chain, Brown, Front Chain for Molded Bucket Seat (8') (Landscape Structures® 160112A).....	112.72	32.56
11 68 13 00-1083	EA		Pivot Block Swing Hardware With Bearing For Molded Bucket Seat (Landscape Structures® 160307A).....	105.41	32.56
11 68 13 00-1084	EA		Play It Safe Label, 2-5 Years (Landscape Structures® 156845A)	12.68	6.52
11 68 13 00-1085	EA		Play It Safe Label, 2-12 Years (Landscape Structures® 156846A)	12.68	6.52
11 68 13 00-1086	EA		Play It Safe Label, 5-12 Years (Landscape Structures® 156847A)	12.68	6.52
11 68 13 00-1087	EA		Play It Safe Label, 8-12 Years (Landscape Structures® 156848A)	12.68	6.52
11 68 13 00-1088	EA		D-Ring with Stainless Steel Bolt Link, Brown TenderTuff-coated Only (Landscape Structures® 130923A)	165.69	32.56
11 68 13 00-1089	EA		(2) Stainless Steel Double Clevis Swing Hardware With Bolts (Landscape Structures® 132634A)	85.64	13.02
11 68 13 00-1090	EA		(2) Stainless Steel Bolt Links Swing Hardware With Bolts For Use With TenderTuff-Coated Chain (Landscape Structures® 132635A).....	52.76	13.02
11 68 13 00-1091	EA		(2) Stainless Steel Bolt Links Swing Hardware With Bolts And Chain Spacers For Use With Uncoated Chain (Landscape Structures® 132672A)	54.58	13.02
11 68 13 00-1092	EA		2-3/8" Pipe, Swing Hangers, Excludes Chain (Landscape Structures® 136065A)	109.35	16.28
11 68 13 00-1093	EA		3-1/2" Pipe, Swing Hangers, Excludes Chain (Landscape Structures® 136066A)	109.35	16.28
11 68 13 00-1094	EA		TenderTuff Repair Kit (Landscape Structures® 138717A)	11.87	
11 68 13 00-1095	EA		Anti-Wrap, 2-3/8" Pipe, Swing Hangers, Excludes Chain (Landscape Structures® 140739A).....	144.06	16.28
11 68 13 00-1096	EA		(2) Aluminum Clevis Swing Hardware For Anti-Wrap Hanger With Bolts (Landscape Structures® 141267A)	91.12	13.02
11 68 13 00-1097	EA		65" Long, TenderTuff-Coated Chain, Brown, Half-Bucket Seat (8') (Landscape Structures® 141730A).....	110.89	32.56
11 68 13 00-1098	EA		43-3/16" Long, TenderTuff-Coated Chain, Brown, Half-Bucket Seat (6") Toddler Swing (Landscape Structures® 141739A).....	100.84	32.56
11 68 13 00-1099	EA		87-13/16" Long, TenderTuff-Coated Chain, Brown, Half-Bucket Seat (10') (Landscape Structures® 141766A).....	136.47	32.56
11 68 13 00-1100	EA		29-7/8" Long, TenderTuff-Coated Chain, Brown, Full-Bucket Seat (6") Toddler Swing (Landscape Structures® 152016A).....	96.28	32.56
11 68 13 00-1101	EA		49-13/16" Long, TenderTuff-Coated Chain, Brown, Tire Swing, Half-Bucket Seat (7") 2" Arch Swing (Landscape Structures® 152048A).....	105.41	32.56
11 68 13 00-1102	EA		67-7/8" Long, TenderTuff-Coated Chain, Brown, Belt Seat (8'), Flat Seat (8') (Landscape Structures® 152050A).....	114.54	32.56
11 68 13 00-1103	EA		76-7/16" Long, TenderTuff-Coated Chain, Brown, Full-Bucket Seat (10') (Landscape Structures® 152051A)	123.68	32.56

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-1104 EA 90-11/16" Long, TenderTuff-Coated Chain, Brown, Belt Seat (10'), Flat Seat (10'), 16" Deck Ascending Chain (Landscape Structures® 152052A).....	141.95	32.56
11 68 13 00-1105 EA 37-1/2" Long, TenderTuff-Coated Chain, Brown, Full-Bucket Seat (7') 2" Arch Swing (Landscape Structures® 152053A).....	99.02	32.56
11 68 13 00-1106 EA 121-1/16" Long, TenderTuff-Coated Chain, Brown, Rear Chain for Molded Bucket Seat (8') (Landscape Structures® 152067A).....	163.87	32.56
11 68 13 00-1107 EA Tire Swing Hanger, Stainless Steel, Excludes Chain, 1997 And Later (Landscape Structures® 121609A).....	811.84	65.11
11 68 13 00-1108 EA Twin Rim Basketball Goal And Chain Net (Landscape Structures® 100080A).....	319.15	32.56
11 68 13 00-1109 EA Twin Rim Basketball Goal And Nylon Net (Landscape Structures® 100081A).....	310.01	32.56
11 68 13 00-1110 EA Nylon Basketball Net (Landscape Structures® 100082A).....	52.72	16.28
11 68 13 00-1111 EA Chain Basketball Net (Landscape Structures® 100083A).....	65.50	16.28
11 68 13 00-1112 EA Basketball Frame Set Only, Moveable (Landscape Structures® 100099A).....	1,451.22	65.11
11 68 13 00-1113 EA Basketball Frame Set Only, Direct Bury (Landscape Structures® 100100A).....	1,204.60	65.11
11 68 13 00-1114 EA Warning Label (Landscape Structures® 115176A).....	0.18	
11 68 13 00-1115 EA PS Spare Parts Kit (Landscape Structures® 107040A).....	62.11	
11 68 13 00-1116 EA PB Spare Parts Kit (Landscape Structures® 107043A).....	135.18	
11 68 13 00-1117 EA Tire With Ring And Hardware, Excludes Chain (Landscape Structures® 107329A).....	793.57	65.11
11 68 13 00-1118 EA 5" Swing Hanger Clamp Assembly, Complete, Excludes Chain (Landscape Structures® 111418A).....	165.69	32.56
11 68 13 00-1119 EA Tire Swing Hanger, Stainless Steel, Excludes Chain, 1996 And Prior (Landscape Structures® 116997A).....	939.71	65.11
11 68 13 00-1120 Playground Equipment (Landscape Structures® Site Furniture)^(11 68 13 00-0009)		
11 68 13 00-1121 EA 60" Recycled Contour Series Bench With Back, Surface Mount (Landscape Structures® 111640A).....	1,569.15	119.37
11 68 13 00-1122 EA 60" Recycled Contour Series Bench Without Back, Surface Mount (Landscape Structures® 111640B).....	811.29	97.67
11 68 13 00-1123 EA 60" Recycled Contour Series Bench With Back, Direct Bury (Landscape Structures® 111640C).....	1,377.34	119.37
11 68 13 00-1124 EA 60" Recycled Contour Series Bench Without Back, Direct Bury (Landscape Structures® 111640D).....	793.03	97.67
11 68 13 00-1125 EA 96" Recycled Contour Series Bench With Back, Surface Mount (Landscape Structures® 111640E).....	2,254.20	119.37
11 68 13 00-1126 EA 96" Recycled Contour Series Bench Without Back, Surface Mount (Landscape Structures® 111640F).....	1,057.91	97.67
11 68 13 00-1127 EA 96" Recycled Contour Series Bench With Back, Direct Bury (Landscape Structures® 111640G).....	1,961.92	119.37
11 68 13 00-1128 EA 96" Recycled Contour Series Bench Without Back, Direct Bury (Landscape Structures® 111640H).....	1,030.51	97.67
11 68 13 00-1129 EA Optional Brown Dome, Litter Receptacle (Landscape Structures® 100095A).....	382.00	97.67
11 68 13 00-1130 EA 32-Gallon Polyethylene Container, Litter Receptacle (Landscape Structures® 141682A).....	232.20	97.67
11 68 13 00-1131 EA Optional Cover for TenderTuff-Coated Litter Receptacle (Landscape Structures® 141686A).....	285.46	86.82
11 68 13 00-1132 EA Litter Receptacle With Recycled Polyethylene Slats and Liner, (Direct Bury Only) (Landscape Structures® 100094A).....	984.84	97.67
11 68 13 00-1133 EA Litter Receptacle With TenderTuff-Coated Panels and Liner, Direct Bury (Landscape Structures® 141685A).....	848.11	86.82
11 68 13 00-1134 EA Litter Receptacle With TenderTuff-Coated Panels and Liner, Surface Mount (Landscape Structures® 141685B).....	848.11	86.82
11 68 13 00-1135 EA Loop Rack, Direct Bury, Powdercoated (Landscape Structures® 100102A).....	510.42	65.11
11 68 13 00-1136 EA Loop Rack, Direct Bury, TenderTuff-Coated (Landscape Structures® 100102B).....	757.03	65.11
11 68 13 00-1137 EA 60" Poly Picnic Table, (2) 60" Seats, Moveable (Landscape Structures® 113139A).....	2,488.15	325.56
11 68 13 00-1138 EA 60" Poly Picnic Table, (1) 60" Seat (2) 14" Seats, Moveable (Landscape Structures® 113139B).....	2,396.81	325.56
11 68 13 00-1139 EA 60" Poly Picnic Table, (4) 14" Seats, Moveable (Landscape Structures® 113139C).....	2,268.94	325.56
11 68 13 00-1140 EA 84" Poly Picnic Table, (2) 60" Seats, Moveable (Landscape Structures® 113139D).....	3,100.13	325.56
11 68 13 00-1141 EA 84" Poly Picnic Table, (1) 60" Seat, (2) 14" Seats, Moveable (Landscape Structures® 113139E).....	2,999.66	325.56
11 68 13 00-1142 EA 84" Poly Picnic Table, (4) 14" Seats, Moveable (Landscape Structures® 113139F).....	2,862.65	325.56
11 68 13 00-1143 EA 60" Poly Picnic Table, (2) 60" Seats, Direct Bury (Landscape Structures® 113139G).....	2,606.89	325.56
11 68 13 00-1144 EA 60" Poly Picnic Table, (1) 60" Seat, (2) 14" Seats, Direct Bury (Landscape Structures® 113139H).....	2,488.15	325.56
11 68 13 00-1145 EA 60" Poly Picnic Table, (4) 14" Seats, Direct Bury (Landscape Structures® 113139I).....	2,360.28	325.56
11 68 13 00-1146 EA 84" Poly Picnic Table, (2) 60" Seats, Direct Bury (Landscape Structures® 113139J).....	3,218.87	325.56
11 68 13 00-1147 EA 84" Poly Picnic Table, (1) 60" Seat, (2) 14" Seats, Direct Bury (Landscape Structures® 113139K).....	3,100.13	325.56
11 68 13 00-1148 EA 84" Poly Picnic Table, (4) 14" Seats, Direct Bury (Landscape Structures® 113139L).....	2,953.99	325.56
11 68 13 00-1149 EA 70" Recycled Polyethylene Bench Without Back, 2 x 4 Recycled Polyethylene Slats, Direct Bury (Landscape Structures® 100088A).....	811.29	97.67
11 68 13 00-1150 EA 70" Recycled Polyethylene Bench Without Back, 2 x 4 Recycled Polyethylene Slats, Surface Mount (Landscape Structures® 100088B).....	893.50	97.67
11 68 13 00-1151 EA 94" Recycled Polyethylene Bench Without Back, 2 x 4 Recycled Polyethylene Slats, Direct Bury (Landscape Structures® 100088C).....	875.23	97.67
11 68 13 00-1152 EA 94" Recycled Polyethylene Bench Without Back, 2 x 4 Recycled Polyethylene Slats, Surface Mount (Landscape Structures® 100088D).....	957.44	97.67
11 68 13 00-1153 EA 70" Recycled Polyethylene Bench With Back, 2 x 4 Recycled Polyethylene Slats, Surface Mount (Landscape Structures® 100088E).....	1,194.92	97.67
11 68 13 00-1154 EA 70" Recycled Polyethylene Bench With Back, 2 x 4 Recycled Polyethylene Slats, Direct Bury (Landscape Structures® 100088F).....	1,112.72	97.67
11 68 13 00-1155 EA 94" Recycled Polyethylene Bench With Back, 2 x 4 Recycled Polyethylene Slats, Surface Mount (Landscape Structures® 100088G).....	1,267.99	97.67
11 68 13 00-1156 EA 94" Recycled Polyethylene Bench With Back, 2 x 4 Recycled Polyethylene Slats, Direct Bury (Landscape Structures® 100088H).....	1,185.79	97.67
11 68 13 00-1157 EA Arm Rest, 1 Only, Fits All Benches With Back (Landscape Structures® 114767A).....	167.80	21.70
11 68 13 00-1158 EA 72", TenderTuff-Coated Steel Bench With Back, Direct Bury (Landscape Structures® 141683A).....	830.11	65.11
11 68 13 00-1159 EA 72", TenderTuff-Coated Steel Bench With Back, Surface Mount (Landscape Structures® 141683B).....	848.37	65.11
11 68 13 00-1160 EA 72", TenderTuff-Coated Steel Bench Without Back, Direct Bury (Landscape Structures® 141683C).....	537.82	65.11
11 68 13 00-1161 EA 72", TenderTuff-Coated Steel Bench Without Back, Surface Mount (Landscape Structures® 141683D).....	565.22	65.11
11 68 13 00-1162 EA 92", TenderTuff-Coated Steel Bench With Back, Direct Bury (Landscape Structures® 141683E).....	848.37	65.11
11 68 13 00-1163 EA 92", TenderTuff-Coated Steel Bench With Back, Surface Mount (Landscape Structures® 141683F).....	884.91	65.11
11 68 13 00-1164 EA 92", TenderTuff-Coated Steel Bench Without Back, Direct Bury (Landscape Structures® 141683G).....	565.22	65.11
11 68 13 00-1165 EA 92", TenderTuff-Coated Steel Bench Without Back, Surface Mount (Landscape Structures® 141683H).....	601.76	65.11
11 68 13 00-1166 EA 72" TenderTuff-Coated Picnic Table, (2) 72" Seats, TenderTuff-Coated Steel, Moveable (Landscape Structures® 141684A).....	1,941.20	260.45
11 68 13 00-1167 EA 72" TenderTuff-Coated Picnic Table, (2) 72" Seats, TenderTuff-Coated Steel, Direct Bury (Landscape Structures® 141684B).....	2,032.54	260.45
11 68 13 00-1168 EA 92" TenderTuff-Coated Picnic Table, (2) 92" Seats, TenderTuff-Coated Steel, Moveable (Landscape Structures® 141684C).....	2,041.67	260.45

11	11 Equipment
	11 60 Entertainment and Recreation Equipment
	11 68 Play Field Equipment and Structures



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
11 68 13 00-1169	EA	92" TenderTuff-Coated Picnic Table, (2) 92" Seats, TenderTuff-Coated Steel, Direct Bury (Landscape Structures® 141684D).....	2,178.68		260.45
11 68 13 00-1170	EA	92" TenderTuff-Coated Picnic Table, (2) 72" Seats, TenderTuff-Coated Steel, Moveable (Landscape Structures® 141684E).....	1,996.00		260.45
11 68 13 00-1171	EA	92" TenderTuff-Coated Picnic Table, (2) 72" Seats, TenderTuff-Coated Steel, Direct Bury (Landscape Structures® 141684F).....	2,105.61		260.45
11 68 13 00-1172	EA	Square Picnic Table With 4 Seats, TenderTuff-Coated Steel, Movable (Landscape Structures® 154345A).....	1,862.53		54.26
11 68 13 00-1173	EA	Square Picnic Table With 3 Seats, TenderTuff-Coated Steel, Movable (Landscape Structures® 154345B).....	1,688.98		54.26
11 68 13 00-1174	EA	Square Picnic Table With 2 Seats, TenderTuff-Coated Steel, Movable (Landscape Structures® 154345C).....	1,542.84		54.26
11 68 13 00-1175	EA	Kish Valley Grill, (Direct Bury Only) (Landscape Structures® 100101A).....	820.97		65.11
11 68 13 00-1176	EA	Loop Rack, Surface Mount, Powdercoated (Landscape Structures® 100102C).....	702.23		65.11
11 68 13 00-1177	EA	Loop Rack, Surface Mount, TenderTuff-Coated (Landscape Structures® 100102D).....	948.85		65.11
11 68 13 00-1178 Playground Equipment (11 68 13)					
11 68 13 00-1179 Ground Socket For Movable Posts (11 68 13 00-1178)					
11 68 13 00-1180	PR	Ground Socket For 2-3/8" Post For Playground Equipment.....	319.87		65.91
11 68 13 00-1181	PR	Ground Socket For 3-1/2" Post For Playground Equipment.....	496.79		65.91
11 68 13 00-1182 See-Saws (11 68 13 00-1178)					
11 68 13 00-1183 Steel See-Saw (11 68 13 00-1182)					
11 68 13 00-1184	EA	2 Unit Steel See-Saw.....	2,718.85		405.63
11 68 13 00-1185	EA	4 Unit Steel See-Saw.....	4,432.33		479.35
11 68 13 00-1186	EA	6 Unit Steel See-Saw.....	6,158.30		585.88
11 68 13 00-1187 14' Long Laminated Beam (11 68 13 00-1182)					
11 68 13 00-1188	EA	Beam Is Supported By Two 12 In x 12 In Stepping Column Posts.....	2,918.78		358.66
11 68 13 00-1189	EA	Beam Is Supported By Two 8 In x 8 In Posts.....	2,014.41		319.50
11 68 13 00-1190 Slides (11 68 13 00-1178)					
11 68 13 00-1191	EA	8' Long x 4' High Slide With Stainless Steel Bed.....	3,261.52		463.82
11 68 13 00-1192	EA	12' Long x 6' High Slide With Stainless Steel Bed.....	4,565.42		659.12
11 68 13 00-1193	EA	16' Long x 8' High Slide With Stainless Steel Bed.....	5,056.06		732.35
11 68 13 00-1194	EA	20' Long x 10' High Slide With Stainless Steel Bed.....	6,363.42		811.25
11 68 13 00-1195	EA	6' High, 360 Degree One Piece Molded Polyethylene Slide.....	23,019.45		1,276.15
11 68 13 00-1196	EA	7' High, 360 Degree Slide, Stainless Steel Bed.....	20,082.94		1,316.48
11 68 13 00-1197	EA	9' High, 360 Degree Slide, Stainless Steel Bed.....	25,303.58		1,383.66
11 68 13 00-1198 Whirlers (11 68 13 00-1178)					
11 68 13 00-1199	EA	8' Diameter Whirler.....	7,352.73		878.83
11 68 13 00-1200	EA	10' Diameter Whirler.....	8,533.30		1,054.59
11 68 13 00-1201 Other Standalone Playground Equipment (11 68 13 00-1178)					
11 68 13 00-1202 Miscellaneous Standalone Playground Equipment (11 68 13 00-1201)					
11 68 13 00-1203	EA	Horizontal Ladder.....	2,356.07		234.79
11 68 13 00-1204	EA	Tether Ball Post.....	398.21		45.89
11 68 13 00-1205	PR	10'-6" Long Multiple Purpose Post.....	606.05		81.14
11 68 13 00-1206	EA	3-Person Fiberglass Golf Tee Shelter Turntable.....	10,126.55		229.27
11 68 13 00-1207	EA	Horizontal Turning Bars, 1 Bar.....	746.88		122.52
11 68 13 00-1208	EA	Horizontal Turning Bars, 2 Bars.....	1,012.06		146.44
11 68 13 00-1209	EA	Horizontal Turning Bars, 3 Bars.....	1,364.86		195.25
11 68 13 00-1210	EA	Horizontal Turning Bars, 5 Bars.....	1,998.46		268.47
11 68 13 00-1211	EA	Top Goal Opening With 4 Exit Holes (One Each Side) And 8' Pole.....	2,119.14		111.78
11 68 13 00-1212	EA	Top Goal Opening With 4 Exit Holes (One Each Side) And 10' Pole.....	2,333.51		120.67
11 68 13 00-1213	EA	Coil Spring With Single Riding Aluminum Saddle Devices.....	2,281.53		129.36
11 68 13 00-1214	EA	"C" Spring With Single Riding Aluminum Saddle Devices.....	2,291.86		111.29
11 68 13 00-1215	EA	Rubber Spring With Single Riding Aluminum Saddle Devices.....	2,821.07		145.75
11 68 13 00-1216	EA	Coil Spring Assembly Only.....	577.33		53.60
11 68 13 00-1217	EA	"C" Spring Assembly Only.....	383.60		35.73
11 68 13 00-1218	EA	Rubber Spring Assembly Only.....	248.43		69.70
11 68 13 00-1219	EA	Footbuck Assembly Only.....	99.69		9.37
11 68 13 00-1220	EA	Two Seat, Two Spring Action Cars (4'-8" x 2'-8").....	2,595.33		134.04
11 68 13 00-1221 Freestanding Panels (11 68 13 00-1201)					
Note: Rotomolded polyethylene.					
11 68 13 00-1222	EA	Tic-Tac-Toe Panel.....	1,105.07		57.40
11 68 13 00-1223	EA	24" Bubble Panel.....	1,655.46		86.01
11 68 13 00-1224	EA	Fire Engine Panel.....	2,429.44		126.23
11 68 13 00-1225	EA	Flat Mirror Panel.....	1,943.56		101.04
11 68 13 00-1226	EA	Wavy Mirror Panel.....	2,876.62		149.57
11 68 13 00-1227	EA	Paint Time Panel.....	1,866.14		97.04
11 68 13 00-1228	EA	Phone Time Panel.....	1,324.37		68.82

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-1229 EA Phone Time With Graphic Panel.....	1,324.37	68.82
11 68 13 00-1230 EA Race Time Panel	2,321.94	120.67
11 68 13 00-1231 EA Rescue 911 Panel	2,356.62	120.67
11 68 13 00-1232 EA Eastern/Central/Western States Panel	1,268.46	65.90
11 68 13 00-1233 EA Career People Panel	1,440.45	74.88
11 68 13 00-1234 EA Solar System Panel	1,440.45	74.88
11 68 13 00-1235 EA Animals Panel.....	1,440.45	74.88
11 68 13 00-1236 Freestanding Panels Uprights (11 68 13 00-1201)		
11 68 13 00-1237 EA 3-1/2" Outside Diameter End Panel Upright	341.76	32.22
11 68 13 00-1238 EA 3-1/2" Outside Diameter 90 Degree Upright	370.25	34.85
11 68 13 00-1239 EA 3-1/2" Outside Diameter 180 Degree Upright	370.25	34.85
11 68 13 00-1240 EA 3-1/2" Outside Diameter "T-Shaped" Upright.....	393.98	37.10
11 68 13 00-1241 Coasters (11 68 13 00-1201)		
11 68 13 00-1242 EA 12' Single Metal Coaster With Four Posts	8,552.67	390.50
11 68 13 00-1243 EA 18' Single Metal Coaster With Four Posts	9,559.89	488.13
11 68 13 00-1244 EA 12' Double Metal Coaster With Four Posts.....	13,838.29	585.75
11 68 13 00-1245 EA 18' Double Metal Coaster With Four Posts.....	15,732.20	732.19
11 68 13 00-1246 Climbers (11 68 13 00-1201)		
11 68 13 00-1247 EA Tower Climber, 3.17" Diameter x 7.25' High.....	1,553.13	260.86
11 68 13 00-1248 EA Arch Climber, 2' x 12' x 4.5' High	1,413.27	319.43
11 68 13 00-1249 EA Arch Climber, 2' x 15' x 5.83' High	1,536.90	260.86
11 68 13 00-1250 EA Arch Climber, 2' x 17' x 6.58' High	1,653.98	319.43
11 68 13 00-1251 EA Rainbow Climber, 2' x 10'-5" x 4' High	1,773.49	260.57
11 68 13 00-1252 EA Rainbow Climber, 2' x 10'-5" x 5' High	1,990.21	260.66
11 68 13 00-1253 EA Rainbow Climber, 2' x 12'-5" x 6' High	2,322.27	260.66
11 68 13 00-1254 EA Rainbow Climber, 2' x 15'-4" x 7' High	2,539.35	260.57
11 68 13 00-1255 EA Double Level Arch Climber, 6' Wide x 12'-6" x 6' High Upper Section / 5' High Lower Section	3,064.61	305.07
11 68 13 00-1256 EA 12' Long Horizontal Ladder Climber	2,497.19	227.81
11 68 13 00-1257 EA 14' Long Horizontal Ladder Climber	2,533.72	227.81
11 68 13 00-1258 EA 16' Long Horizontal Ladder Climber	2,775.58	227.81
11 68 13 00-1259 EA Bell Climber, 7'-5" High With Double Bars	2,604.03	292.88
11 68 13 00-1260 EA 2-Way Climber.....	2,183.80	234.79
11 68 13 00-1261 EA 4-Way Climber	3,496.72	234.79
11 68 13 00-1262 Swings (11 68 13 00-1178)		
11 68 13 00-1263 Two-Leg-End Swings, 2-3/8" Diameter Galvanized Steel Top Rail (11 68 13 00-1262)		
Note: Legs, 1-7/8" diameter, traditional.		
11 68 13 00-1264 EA 8' High Top Rail, One Section Two Seats.....	2,040.33	358.66
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	237.95	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	271.62	
11 68 13 00-1265 EA 8' High Top Rail, Two Sections Four Seats	3,260.70	513.23
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	381.95	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	442.45	
11 68 13 00-1266 EA 8' High Top Rail, Three Sections, Six Seats	4,510.44	755.21
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	527.83	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	609.45	
11 68 13 00-1267 EA 8' High Top Rail, Four Sections, Eight Seats	5,655.48	878.83
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	662.98	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	769.95	
11 68 13 00-1268 EA 10' High Top Rail, One Section Two Seats.....	2,180.23	358.66
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	255.44	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	296.10	
11 68 13 00-1269 EA 10' High Top Rail, Two Section Four Seats	3,403.93	546.63
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	397.41	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	455.30	
11 68 13 00-1270 EA 10' High Top Rail, Three Sections, Six Seats	4,695.47	848.84
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	546.50	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	619.53	
11 68 13 00-1271 EA 10' High Top Rail, Four Sections, Eight Seats	6,227.23	1,025.30
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	727.12	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	833.34	
11 68 13 00-1272 Three-Leg-End Swings, 2-3/8" Diameter Galvanized Steel Top Rail (11 68 13 00-1262)		
Note: Legs, 1-7/8" diameter, traditional.		
11 68 13 00-1273 EA 8' High Top Rail, One Section, Two Seats.....	2,348.14	316.77
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	277.68	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	331.72	
11 68 13 00-1274 EA 8' High Top Rail, Two Sections, Four Seats	3,408.18	459.63
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	403.04	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	481.53	
11 68 13 00-1275 EA 8' High Top Rail, Three Sections, Six Seats	4,546.72	614.69
For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add	537.61	
For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add	642.00	

11 Equipment**11 60 Entertainment and Recreation Equipment****11 68 Play Field Equipment and Structures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-1276	EA		8' High Top Rail, Four Sections, Eight Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	5,687.13 674.27 812.13	732.35
11 68 13 00-1277	EA		10' High Top Rail, One Section, Two Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	2,648.09 313.16 374.17	357.00
11 68 13 00-1278	EA		10' High Top Rail, One Section Three Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	2,767.89 327.95 394.21	378.58
11 68 13 00-1279	EA		10' High Top Rail, Two Sections, Four Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	3,696.63 437.09 521.96	499.76
11 68 13 00-1280	EA		10' High Top Rail, Two Sections, Six Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	4,455.71 529.52 642.52	576.12
11 68 13 00-1281	EA		10' High Top Rail, Three Section, Six Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	4,920.71 581.84 694.90	664.88
11 68 13 00-1282	EA		10' High Top Rail, Three Sections, Nine Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	6,143.71 731.34 892.04	732.64
11 68 13 00-1283	EA		10' High Top Rail, Four Section, Eight Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	6,235.46 735.48 871.45	878.83
11 68 13 00-1284	EA		12' High Top Rail, One Section Three Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	2,896.18 343.55 414.46	387.75
11 68 13 00-1285	EA		12' High Top Rail, Two Sections, Six Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	4,712.51 559.35 676.10	623.87
11 68 13 00-1286	EA		12' High Top Rail, Three Sections, Nine Seats <i>For Extra Heavy Duty, 3-1/2" Outside Diameter Top Pipe With 2-3/8" Outside Diameter Support Pipe, Add</i> <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	6,846.45 806.98 954.01	999.22
11 68 13 00-1287			Swing Accessories <small>(11 68 13 00-1262)</small>		
11 68 13 00-1288	EA		Enclosed Tot Seat With Chain And Hardware <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	698.53 580.71	29.44
11 68 13 00-1289	EA		Bucket Seat With Chain And Hardware <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	580.71 618.58	24.48
11 68 13 00-1290	EA		Belt Seat With Chain And Hardware <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	618.58 610.17	26.13
11 68 13 00-1291	EA		Seat With Chain And Hardware <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	610.17 644.07	25.75
11 68 13 00-1292	EA		Wide Seat With Chain And Hardware <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	644.07 1,923.07	27.20
11 68 13 00-1293	EA		Handi Seat With Chain And Hardware <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	1,923.07 7.98	81.12
11 68 13 00-1294	LF		0.4 LB/LF Replacement Chain <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	7.98 14.83	0.58
11 68 13 00-1295	LF		1 LB/LF Replacement Chain <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	14.83 86.70	1.16
11 68 13 00-1296	EA		Swing Hanger Replacement <i>For Contemporary Design With 2-3/8" Outside Diameter Support Pipe, Add</i>	86.70	6.70
11 68 13 00-1297			Playground Equipment (Play Foundation Inc) <small>(11 68 13)</small> Note: Section includes all demolition/ dismantling of the existing playground structure, removal of existing surfacing, removal of existing footings, and removal/ dismantling of existing safety sign (s). All installation of new playground structure, surfacing, footings (per manufacturer's instructions), and safety sign. Includes: All necessary preparation of existing surface for new playground structure to include grading the area flat, removal of all asphalt, concrete, and other such debris from the site prior to installation. Layout of the actual footprint of the play structure. Surfacing material must be a minimum of three inch (3") thick poured in place. Install per manufacturers recommendations. Certified Playground Installer. Footings for components that require a footing (vertical post, slide foot, climbers, etc.) are to be 12"x12"x18" Concrete for footings must have a minimum rating of 2,500 PSI and must be mixed per manufacturers recommendations.		
11 68 13 00-1298	EA		Furnish & Install 32-45 Child Capacity, 49'-1" x 44'-6" Use Zone, Playground System "Big Sky" And Safety Sign (Play Foundation Inc PGBNL-32470) Note: Includes mobilization. Includes Demo of Existing Play Equipment at 5-12 Play Area & (2) Additional Signs & Place in Dumpsters (Provided by Others). Includes Removal of Footings at Play Equipment. Sign Posts to be Ground Flush with Slab & Filled with Concrete (Qty. 4 Posts)	64,646.00	
11 68 13 00-1299	EA		Furnish & Install 3,310 SF of 3" Uniform Thickness SpectraPour Safety Surfacing Note: Includes mobilization and Recompacting of Base at 5-12 Play Area Adding Aggregate Material as Needed. Wear Layer to be 50% Standard Color / 50% Black Mixed with Standard Aromatic Resin. Standard Colors Include: Red (Terracotta), Green, Blue, Light Blude & Beige. Includes Demo of Existing PIP Surfacing at 2-5 & 5-12 Play Areas & Place in Dumpsters (Provided by Others) (Qty. 3,310 SF)	65,443.00	
11 68 13 00-1300			Playground Equipment (Zoom Recreation) <small>(11 68 13)</small> Note: Section includes all demolition/ dismantling of the existing playground structure, removal of existing surfacing, removal of existing footings, and removal/ dismantling of existing safety sign (s). All installation of new playground structure, surfacing, footings (per manufacturer's instructions), and safety sign. Includes: All necessary preparation of existing surface for new playground structure to include grading the area flat, removal of all asphalt, concrete, and other such debris from the site prior to installation. Layout of the actual footprint of the play structure. Surfacing material must be a minimum of three inch (3") thick poured in place. Install per manufacturers recommendations. Certified Playground Installer. Footings for components that require a footing (vertical post, slide foot, climbers, etc.) are to be 12"x12"x18" Concrete for footings must have a minimum rating of 2,500 PSI and must be mixed per manufacturers recommendations.		
11 68 13 00-1301	EA		Site #1; Provide & install 25-30 Child Capacity, 30' x 34' Use Zone, 18' x 22' Playground Structure And Area Sign (Zoom Recreation PS3-70645) Note: (30'x34') 1380 square feet. Demo existing play structure and surfacing and dispose in provided dumpsters. Recompact existing base. Professional installation of Superior play structure PS3-70645. Install age appropriate sign.	57,159.15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 13 00-1302 EA Site #1 Surfacing; Provide & install 1380 SF of 3" total uniform thickness SpectraPour safety surfacing.	24,892.50	
Note: 3" uniform thickness is certified for a max. fall height of 5'-0". Wear layer to be 50% standard color / 50% black mixed with standard aromatic resin. Standard Colors include: Standard Red (Terracotta); Standard Green; Standard Blue; Light (Sky) Blue; and Beige.		
11 68 13 00-1303 EA Site #2; Provide & install Inclusive Half Yolk Play Panel on 4 In-ground posts.	3,583.48	
11 68 13 00-1304 EA Site #2; Provide & install Inclusive Half Maze Play Panel on 4 In-ground posts.	2,623.58	
11 68 13 00-1305 EA Site #2; Provide & install Tic Tac Toe Panel on 4 In-ground posts.	3,855.48	
11 68 13 00-1306 EA Site #3; Provide & install 22 Child Capacity, 31' x 31' Use Zone, 18' x 18' Playground Structure (Zoom Recreation PS3-32207)	42,455.80	
Note: (30'x30') 900 square feet. Demo existing play structure and PIP surfacing, dispose in provided dumpsters. Recompact existing base. Install Superior Play System No. PS3-32207 and Age appropriate in-ground sign.		
11 68 13 00-1307 EA Site #3 Surfacing; Provide & install 900 square feet of 3" total uniform thickness SpectraPour safety surfacing.	20,217.08	
Note: 3" uniform thickness is certified for a max. fall height of 6'-0". Wear layer to be 50% standard color / 50% black mixed with standard aromatic resin. Standard Colors include: Standard Red (Terracotta); Standard Green; Standard Blue; Light (Sky) Blue; and Beige.		
11 68 13 00-1308 EA Site #4; Provide & install 34 Child Capacity, 30' x 35' Use Zone, 18' x 23' Playground Structure (Zoom Recreation PS3-71103)	71,231.57	
Note: 1540 square feet. Demo existing play structure and PIP surfacing. Dispose in provided dumpsters. Recompact existing base. Install Superior Play System No. PS3-71103 and Age appropriate in-ground sign.		
11 68 13 00-1309 EA Site #4 Surfacing; Provide & install 1570 square feet of 3" total uniform thickness SpectraPour safety surfacing.	26,428.57	
Note: 3" uniform thickness is certified for a max. fall height of 7'-0". Wear layer to be 50% standard color / 50% black mixed with standard aromatic resin. Standard Colors include: Standard Red (Terracotta); Standard Green; Standard Blue; Light (Sky) Blue; and Beige.		
11 68 13 00-1310 EA Site #5; Provide & install in-ground mount, musical instrument - Glockenspiel	3,006.63	
11 68 13 00-1311 EA Site #5; Provide & install in-ground mount, musical instrument - Tuned Drum	6,442.70	
11 68 13 00-1312 EA Site #5; Provide & install in-ground mount, musical instrument - Orange Flower	3,362.94	
11 68 16 Play Structures (11 68)		
11 68 16 00-0001 Playground Shade Structures (11 68 16)		
Note: USA Shade & Fabric Structures, Inc. Excludes custom engineering, architect fees, site survey, fencing, logos, special equipment, earthwork, drilling hole, core drilling and backfill. See CSI section 32 31 13 13-0001 for drilling and backfill of posts in soil.		
11 68 16 00-0002 Free-Form Tri-Sail (11 68 16 00-0001)		
Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0003 EA 18' Single Free-Form Tri-Sail Shade Structure, 10' And 14' Maximum Opening Height, 3 Posts	33,240.59	
11 68 16 00-0004 Playground Shade Cloth (11 68 16)		
11 68 16 00-0005 SF 201-400 sq ft Custom Shade Sail, Alnet's Extrablock Shadecloth	9.89	1.45
Note: Includes custom cutting of material to size, seaming edges and placement of attachment gromets.		
11 68 16 00-0006 LF 1/4" Diameter, Stainless Steel, Cable For Alnet's Extrablock Shadecloth	0.81	0.10
Note: Installation onto existing posts only with new hardware and cables.		
11 68 16 00-0007 EA 1/4" Diameter, Stainless Steel, Clamp For Alnet's Extrablock Shadecloth	11.56	2.91
Note: Installation onto existing posts only with new hardware and cables.		
11 68 16 00-0008 EA 10mm, D Ring Thimble For Alnet's Extrablock Shadecloth	15.15	2.91
Note: Installation onto existing posts only with new hardware and cables.		
11 68 16 00-0009 EA 10mm, Turnbuckle For Alnet's Extrablock Shadecloth	44.16	2.91
Note: Installation onto existing posts only with new hardware and cables.		
11 68 16 00-0010 EA 10mm, Bow Shackle For Alnet's Extrablock Shadecloth	16.71	1.95
Note: Installation onto existing posts only with new hardware and cables.		
11 68 16 00-0011 Playground Shade Structures (Shade Structures, Inc. dba USA Shade & Fabric Structures) (11 68 16)		
Note: Excludes custom engineering, architect fees, site survey, temporary fencing, logos, post pads, special equipment (e.g. cranes for limited site access, hydro-excavation for high soil water table), soil removal from site, core drilling for concrete slab on grade, cutting of pavers or specialty finished surfaces including removal of PlayMatta tiles, alternate footing configuration due to site specific geotechnical report requirements, underground utility scan, moving or re-routing of underground utilities, and hard rock subsurface conditions.		
11 68 16 00-0012 Single Ridge (11 68 16 00-0011)		
Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0013 EA 18' x 18' Single Ridge Shade Structure, 10' Opening Height, 4 Posts	25,472.97	
11 68 16 00-0014 EA 18' x 18' Single Ridge Shade Structure, 12' Opening Height, 4 Posts	26,353.09	
11 68 16 00-0015 EA 18' x 18' Single Ridge Shade Structure, 15' Opening Height, 4 Posts	27,776.16	
11 68 16 00-0016 EA 20' x 20' Single Ridge Shade Structure, 10' Opening Height, 4 Posts	26,419.77	
11 68 16 00-0017 EA 20' x 20' Single Ridge Shade Structure, 12' Opening Height, 4 Posts	27,211.58	
11 68 16 00-0018 EA 20' x 20' Single Ridge Shade Structure, 15' Opening Height, 4 Posts	28,681.01	
11 68 16 00-0019 EA 20' x 30' Single Ridge Shade Structure, 10' Opening Height, 4 Posts	36,351.12	
11 68 16 00-0020 EA 20' x 30' Single Ridge Shade Structure, 12' Opening Height, 4 Posts	37,308.18	
11 68 16 00-0021 EA 20' x 30' Single Ridge Shade Structure, 15' Opening Height, 4 Posts	39,322.81	
11 68 16 00-0022 EA 30' x 30' Single Ridge Shade Structure, 10' Opening Height, 4 Posts	48,176.88	
11 68 16 00-0023 EA 30' x 30' Single Ridge Shade Structure, 12' Opening Height, 4 Posts	49,673.32	
11 68 16 00-0024 EA 30' x 30' Single Ridge Shade Structure, 15' Opening Height, 4 Posts	52,355.71	
11 68 16 00-0025 EA 30' x 40' Single Ridge Shade Structure, 10' Opening Height, 4 Posts	64,124.64	
11 68 16 00-0026 EA 30' x 40' Single Ridge Shade Structure, 12' Opening Height, 4 Posts	66,450.01	
11 68 16 00-0027 EA 30' x 40' Single Ridge Shade Structure, 15' Opening Height, 4 Posts	70,038.30	
11 68 16 00-0028 EA 40' x 40' Single Ridge Shade Structure, 12' Opening Height, 4 Posts	79,484.65	
11 68 16 00-0029 EA 40' x 40' Single Ridge Shade Structure, 15' Opening Height, 4 Posts	83,776.82	

11 Equipment**11 60 Entertainment and Recreation Equipment****11 68 Play Field Equipment and Structures**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 16 00-0030			Double Ridge <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0031	EA		20' x 40' Double Ridge Shade Structure, 10' Opening Height, 6 Posts.....	52,690.82	
11 68 16 00-0032	EA		20' x 40' Double Ridge Shade Structure, 12' Opening Height, 6 Posts.....	54,297.53	
11 68 16 00-0033	EA		20' x 40' Double Ridge Shade Structure, 15' Opening Height, 6 Posts.....	57,229.58	
11 68 16 00-0034	EA		20' x 60' Double Ridge Shade Structure, 10' Opening Height, 6 Posts.....	84,322.95	
11 68 16 00-0035	EA		20' x 60' Double Ridge Shade Structure, 12' Opening Height, 6 Posts.....	88,517.52	
11 68 16 00-0036	EA		20' x 60' Double Ridge Shade Structure, 15' Opening Height, 6 Posts.....	93,297.48	
11 68 16 00-0037	EA		25' x 50 Double Ridge Shade Structure, 10' Opening Height, 6 Posts.....	85,790.38	
11 68 16 00-0038	EA		25' x 50 Double Ridge Shade Structure, 12' Opening Height, 6 Posts.....	88,468.71	
11 68 16 00-0039	EA		25' x 50 Double Ridge Shade Structure, 15' Opening Height, 6 Posts.....	93,246.03	
11 68 16 00-0040	EA		30' x 60' Double Ridge Shade Structure, 10' Opening Height, 6 Posts.....	89,465.36	
11 68 16 00-0041	EA		30' x 60' Double Ridge Shade Structure, 12' Opening Height, 6 Posts.....	92,063.85	
11 68 16 00-0042	EA		30' x 60' Double Ridge Shade Structure, 15' Opening Height, 6 Posts.....	97,035.28	
11 68 16 00-0043	EA		40' x 60' Double Ridge Shade Structure, 10' Opening Height, 6 Posts.....	96,829.10	
11 68 16 00-0044	EA		40' x 60' Double Ridge Shade Structure, 12' Opening Height, 6 Posts.....	96,041.60	
11 68 16 00-0045	EA		40' x 60' Double Ridge Shade Structure, 15' Opening Height, 6 Posts.....	101,227.83	
11 68 16 00-0046			Interconnected Quad Lineal Ridge <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0047	EA		40' x 120' Quad-Lineal Ridge Shade Structure, 10' Opening Height, 10 Posts.....	248,313.60	
11 68 16 00-0048	EA		40' x 120' Quad-Lineal Ridge Shade Structure, 12' Opening Height, 10 Posts.....	260,157.94	
11 68 16 00-0049	EA		40' x 120' Quad-Lineal Ridge Shade Structure, 15' Opening Height, 10 Posts.....	271,893.53	
11 68 16 00-0050			Quad Ridge <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0051	EA		40' x 40' Quad Ridge Shade Structure, 10' Opening Height, 9 Posts.....	79,359.86	
11 68 16 00-0052	EA		40' x 40' Quad Ridge Shade Structure, 12' Opening Height, 9 Posts.....	81,655.51	
11 68 16 00-0053	EA		40' x 40' Quad Ridge Shade Structure, 15' Opening Height, 9 Posts.....	86,063.30	
11 68 16 00-0054	EA		40' x 60' Quad Ridge Shade Structure, 10' Opening Height, 9 Posts.....	116,097.19	
11 68 16 00-0055	EA		40' x 60' Quad Ridge Shade Structure, 12' Opening Height, 9 Posts.....	119,371.61	
11 68 16 00-0056	EA		40' x 60' Quad Ridge Shade Structure, 15' Opening Height, 9 Posts.....	125,817.68	
11 68 16 00-0057	EA		50' x 50' Quad Ridge Shade Structure, 10' Opening Height, 9 Posts.....	159,841.92	
11 68 16 00-0058	EA		50' x 50' Quad Ridge Shade Structure, 12' Opening Height, 9 Posts.....	164,691.28	
11 68 16 00-0059	EA		50' x 50' Quad Ridge Shade Structure, 15' Opening Height, 9 Posts.....	173,584.61	
11 68 16 00-0060	EA		50' x 60' Quad Ridge Shade Structure, 10' Opening Height, 9 Posts.....	162,540.44	
11 68 16 00-0061	EA		50' x 60' Quad Ridge Shade Structure, 12' Opening Height, 9 Posts.....	167,672.07	
11 68 16 00-0062	EA		50' x 60' Quad Ridge Shade Structure, 15' Opening Height, 9 Posts.....	176,726.39	
11 68 16 00-0063	EA		60' x 60' Quad Ridge Shade Structure, 10' Opening Height, 9 Posts.....	170,538.95	
11 68 16 00-0064	EA		60' x 60' Quad Ridge Shade Structure, 12' Opening Height, 9 Posts.....	175,659.22	
11 68 16 00-0065	EA		60' x 60' Quad Ridge Shade Structure, 15' Opening Height, 9 Posts.....	185,144.79	
11 68 16 00-0066			Peak-Roof Triangle <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0067	EA		30' Peak-Roof Triangle Shade Structure, 12' Opening Height, 3 Posts.....	40,082.68	
11 68 16 00-0068	EA		30' Peak-Roof Triangle Shade Structure, 15' Opening Height, 3 Posts.....	41,956.73	
11 68 16 00-0069	EA		40' Peak-Roof Triangle Shade Structure, 12' Opening Height, 3 Posts.....	52,685.30	
11 68 16 00-0070	EA		40' Peak-Roof Triangle Shade Structure, 15' Opening Height, 3 Posts.....	55,149.04	
11 68 16 00-0071			Peak-Roof Hexagon <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0072	EA		40' Peak-Roof Hexagon Shade Structure, 12' Opening Height, 6 Posts.....	81,178.55	
11 68 16 00-0073	EA		40' Peak-Roof Hexagon Shade Structure, 15' Opening Height, 6 Posts.....	84,975.94	
11 68 16 00-0074	EA		60' Peak-Roof Hexagon Shade Structure, 12' Opening Height, 6 Posts.....	142,714.99	
11 68 16 00-0075	EA		60' Peak-Roof Hexagon Shade Structure, 15' Opening Height, 6 Posts.....	149,394.44	
11 68 16 00-0076			Free-Form Hypar-Sail <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®; drilling rig is already included in the pricing.		
11 68 16 00-0077	EA		20' x 20' Single 4-Point Sail Shade Structure, 14' Opening Height, 4 Posts.....	48,624.37	
11 68 16 00-0078	EA		20' x 20' Single 4-Point Sail Shade Structure, 19' Opening Height, 4 Posts.....	70,161.55	
11 68 16 00-0079	EA		30' x 30' Single 4-Point Sail Shade Structure, 14' Opening Height, 4 Posts.....	74,199.43	
11 68 16 00-0080	EA		30' x 30' Single 4-Point Sail Shade Structure, 19' Opening Height, 4 Posts.....	117,000.14	
11 68 16 00-0081			Free-Form Tri-Sail <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®; drilling rig is already included in the pricing.		
11 68 16 00-0082	EA		30' Single Free-form Tri-Sail Shade Structure, 14' Opening Height, 3 Posts.....	51,743.97	
11 68 16 00-0083	EA		30' Single Free-form Tri-Sail Shade Structure, 19' Opening Height, 3 Posts.....	76,341.43	
11 68 16 00-0084			Single Post <small>(11 68 16 00-0011)</small> Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0085	EA		14' x 14' Single Post Peak Shade Structure, 10' Opening Height, 1 Post.....	22,250.43	
11 68 16 00-0086	EA		14' x 14' Single Post Peak Shade Structure, 12' Opening Height, 1 Post.....	22,859.46	



Equipment	11	
Entertainment and Recreation Equipment	11 60	↕
Play Field Equipment and Structures	11 68	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 68 16 00-0087	EA		16' x 16' Single Post Peak Shade Structure, 10' Opening Height, 1 Post.....	26,647.91	
11 68 16 00-0088	EA		16' x 16' Single Post Peak Shade Structure, 12' Opening Height, 1 Post.....	28,086.89	
11 68 16 00-0089	EA		18' x 18' Single Post Peak Shade Structure, 10' Opening Height, 1 Post.....	27,177.45	
11 68 16 00-0090	EA		18' x 18' Single Post Peak Shade Structure, 12' Opening Height, 1 Post.....	28,645.03	
11 68 16 00-0091	EA		20' x 20' Single Post Peak Shade Structure, 10' Opening Height, 1 Post.....	27,683.86	
11 68 16 00-0092	EA		20' x 20' Single Post Peak Shade Structure, 12' Opening Height, 1 Post.....	29,178.79	
11 68 16 00-0093			Single Post Pyramid <small>(11 68 16 00-0011)</small>		
			Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0094	EA		14' x 14' Single Post Peak Pyramid Shade Structure, 10' Opening Height, 1 Post.....	23,142.18	
11 68 16 00-0095	EA		14' x 14' Single Post Peak Pyramid Shade Structure, 12' Opening Height, 1 Post.....	24,431.36	
11 68 16 00-0096			Full Cantilevers <small>(11 68 16 00-0011)</small>		
			Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0097	EA		20' x 30' Full Cantilever Single Shade Structure, 12' Opening Height, 2 Posts.....	63,791.51	
11 68 16 00-0098	EA		20' x 30' Full Cantilever Single Shade Structure, 15' Opening Height, 2 Posts.....	66,775.88	
11 68 16 00-0099	EA		20' x 60' Full Cantilever Joined Shade Structure, 12' Opening Height, 3 Posts.....	94,563.11	
11 68 16 00-0100	EA		20' x 60' Full Cantilever Joined Shade Structure, 15' Opening Height, 3 Posts.....	98,988.11	
11 68 16 00-0101			Tri-Truss Cantilevers <small>(11 68 16 00-0011)</small>		
			Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0102	EA		20' x 30' Tri-Truss Cantilever Single Shade Structure, 10' Opening Height, 2 Posts.....	76,481.59	
11 68 16 00-0103	EA		20' x 30' Tri-Truss Cantilever Single Shade Structure, 15' Opening Height, 2 Posts.....	80,062.39	
11 68 16 00-0104	EA		20' x 60' Tri-Truss Cantilever Joined Shade Structure, 12' Opening Height, 3 Posts.....	98,205.75	
11 68 16 00-0105	EA		20' x 60' Tri-Truss Cantilever Joined Shade Structure, 15' Opening Height, 3 Posts.....	102,800.71	
11 68 16 00-0106			Peak-Roof Multi-Layered <small>(11 68 16 00-0011)</small>		
			Note: Outdoor fabric structure, specified fabric high density polyethylene (HDPE) Colourshade®.		
11 68 16 00-0107	EA		30' x 30' Single Peak-Roof Shade Structure, 10' Opening Height, 4 Posts.....	59,771.14	
11 68 16 00-0108	EA		30' x 30' Single Peak-Roof Shade Structure, 12' Opening Height, 4 Posts.....	63,415.21	
11 68 16 00-0109	EA		30' x 30' Single Peak-Roof Shade Structure, 15' Opening Height, 4 Posts.....	66,395.72	
11 68 16 00-0110	EA		30' x 60' Double Peak- Roof Shade Structure, 10' Opening Height, 6 Posts.....	94,084.95	
11 68 16 00-0111	EA		30' x 60' Double Peak- Roof Shade Structure, 12' Opening Height, 6 Posts.....	98,725.04	
11 68 16 00-0112	EA		30' x 60' Double Peak- Roof Shade Structure, 15' Opening Height, 6 Posts.....	103,593.94	
11 68 16 00-0113	EA		60' x 60' Quad Peak-Roof Shade Structure, 10' Opening Height, 9 Posts.....	160,669.78	
11 68 16 00-0114	EA		60' x 60' Quad Peak-Roof Shade Structure, 12' Opening Height, 9 Posts.....	168,593.69	
11 68 16 00-0115	EA		60' x 60' Quad Peak-Roof Shade Structure, 15' Opening Height, 9 Posts.....	176,908.38	
11 68 23			Exterior Court Athletic Equipment <small>(11 68)</small>		
11 68 23 13			Exterior Basketball Equipment <small>(11 68 23)</small>		
11 68 23 13-0001			Basketball Components <small>(11 68 23 13)</small>		
11 68 23 13-0002	EA		Anti-Whip, Nylon Cord Basketball Net (Porter Athletic 09608-120).....	34.59	9.77
11 68 23 13-0003	EA		Chain Basketball Net (Porter Athletic 00161-000).....	61.14	9.77
11 68 23 13-0004	EA		Heavy Duty Goal Ring (Porter Athletic 00235-000).....	140.18	48.82
11 68 23 13-0005	EA		Goal Ring For Steel Net (Porter Athletic 00251-H00).....	253.35	21.97
11 68 23 13-0006	EA		42" x 72" Rectangular Fully Tempered Glass Basketball Backboard With Steel Frame (Porter Athletic 00204-000).....	1,461.70	41.49
			Note: Includes perimeter and target markings. Excludes pole and goal.		
11 68 23 13-0007	EA		42" x 72" Rectangular 11 Gauge Perforated Steel Basketball Backboard (Porter Athletic 01207-300).....	1,877.94	41.49
			Note: Includes perimeter and target markings. Excludes pole and goal.		
11 68 23 13-0008	EA		54" x 39" Fan Shaped Cast Aluminum Basketball Backboard (Porter Athletic 00234-300).....	957.66	36.61
			Note: Includes perimeter and target markings. Excludes pole and goal.		
11 68 23 13-0009	EA		54" x 39" Fan Shaped Fiberglass Basketball Backboard (Porter Athletic 00267-000).....	1,047.47	36.61
			Note: Includes perimeter and target markings. Excludes pole and goal.		
11 68 23 13-0010			Basketball Systems <small>(11 68 23 13)</small>		
			See CSI section 32 31 13 13-0001 for auguring holes and concrete.		
11 68 23 13-0011	EA		4-1/2" Bent Post Galvanized Steel Pole With 4' Extension, Aluminum Backboard, Double Rim Goal And Steel Net Basketball System (Sportsplay 541-616).....	2,348.96	242.67
11 68 23 13-0012	EA		5-9/16" Bent Post Galvanized Steel Pole With 6' Extension Style, Aluminum Backboard, Double Rim Goal And Nylon Net Basketball System (Porter Athletic 00176-230).....	4,252.64	266.93
			For Fan Shaped Fiberglass Backboard, Deduct	-133.00	
			For 42" x 72" Perforated Steel Backboard, Add	350.00	
11 68 23 13-0013	EA		4-1/2" Galvanized Steel Pole With 4' Extension, Aluminum Backboard, Double Rim Goal And Nylon Net Basketball System (Porter Athletic 00164-230).....	2,714.17	242.67
			For Fan Shaped Fiberglass Backboard, Deduct	-133.00	
			For 42" x 72" Perforated Steel Backboard, Add	350.00	
11 68 23 13-0014	EA		5-9/16" Galvanized Steel Pole With 6' Extension, Aluminum Backboard, Double Rim Goal And Nylon Net Basketball System (Porter Athletic 00166-230).....	4,252.64	266.93
			For Fan Shaped Fiberglass Backboard, Deduct	-133.00	
			For 42" x 72" Perforated Steel Backboard, Add	350.00	
11 68 23 13-0015	EA		Back To Back 6" Galvanized Steel Pole With 5' Extensions, Aluminum Backboards, Double Rim Goals And Nylon Net Double Basketball System (Porter Athletic 195582).....	7,658.92	392.55
			For Fan Shaped Fiberglass Backboard, Deduct	-498.00	
			For 42" x 72" Perforated Steel Backboard, Add	700.00	

11	11	Equipment
	11 60	Entertainment and Recreation Equipment
	11 68	Play Field Equipment and Structures



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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11 68 23 33 Tennis Equipment (11 68 23)

11 68 23 33-0001	Tennis Court Net Posts <small>(11 68 23 33)</small>		
11 68 23 33-0002	PR Round, Powder Coated Steel, Tennis Court Net Posts With External Winder	1,191.41	166.00
11 68 23 33-0003	PR Round, Powder Coated Steel, Tennis Court Net Posts With Internal Brass Winder	1,501.32	166.00
11 68 23 33-0004	PR Square, Powder Coated Steel, Tennis Court Net Posts With Internal Brass Winder	1,552.97	166.00
11 68 23 33-0005	PR Round, Powder Coated Aluminum, Tennis Court Net Posts With External Winder	1,642.29	166.00
11 68 23 33-0006	PR Round, Powder Coated Aluminum, Tennis Court Net Posts With Internal Winder	1,960.32	166.00
11 68 23 33-0007	PR Polyvinyl Chloride (PVC) Ground Sleeves For Tennis Court Net Posts	296.01	
11 68 23 33-0008	PR Galvanized Steel Ground Sleeves For Tennis Court Net Posts	334.62	

11 68 23 33-0009 Tennis Court Nets (11 68 23 33)

11 68 23 33-0010	EA 42' Length, Single Top, Vinyl Headband, Polyethylene Net Body, Tennis Court Net	635.55	164.05
11 68 23 33-0011	EA 42' Length, Double Top, Vinyl Headband, Polyethylene Net Body, Tennis Court Net	697.18	164.05
11 68 23 33-0012	EA 42' Length, Anti-Vandal, Aluminum Coated Flexible Steel Mesh, Tennis Court Net	1,502.85	252.42
11 68 23 33-0013	EA Galvanized Steel Anchor For Tennis Court Net Center Strap	82.55	

11 68 33 Athletic Field Equipment (11 68)

11 68 33 13 Football Field Equipment (11 68 33)

11 68 33 13-0001	Football Goal Posts <small>(11 68 33 13)</small>		
	Note: Includes augering for post(s), set in concrete and backfill.		
11 68 33 13-0002	PR Double Steel Football Goal Posts, "H Shape"	5,814.99	439.31
11 68 33 13-0003	PR Vertical Style Goal Post, Single In Ground Mounting, Steel With 20' Uprights	8,087.82	584.92
11 68 33 13-0004	PR Gooseneck (Offset) Style Goal Post, Single In Ground Mounting, Steel, With 20' Uprights	9,655.94	701.90

11 68 33 23 Soccer and Field Hockey Equipment (11 68 33)

11 68 33 23-0001	Soccer Goal Posts <small>(11 68 33 23)</small>		
	Note: Includes augering for post(s), set in concrete and backfill.		
11 68 33 23-0002	PR Regulation Soccer Goal Posts	4,977.38	292.95
11 68 33 23-0003	PR Combination Football/Soccer Goal Post	5,986.46	439.31

11 68 33 33 Baseball Field Equipment (11 68 33)

11 68 33 33-0001	Bases <small>(11 68 33 33)</small>		
11 68 33 33-0002	SET Bases For Baseball Or Softball	597.87	

11 80 Facility Maintenance and Operation Equipment (11)

11 81 Maintenance Equipment (11 80)

11 81 29 Facility Fall Protection (11 81)

11 81 29 00-0001	Safety And Tie-Back Anchors <small>(11 81 29)</small>		
	Note: One cut sheet charge required per manufacturer order. Excludes flashing and testing by engineer after installation. See CSI section 01 22 20 00-0062 for engineering testing and inspection.		
11 81 29 00-0002	Roof Mounted, Safety And Tie-Back Anchors <small>(11 81 29 00-0001)</small>		
	Note: Includes up to 10" high, 0.216" thick hollow structural section tube, 1018 steel forged pad eye, 8" x 8" x 1/2" base plate and hot-dipped galvanized finish.		
11 81 29 00-0003	EA Up To 10" High, 0.216" Thick, Hollow Structural Section Tube, 1018 Steel Forged Pad Eye, 8" x 8" x 1/2" Base Plate And Hot-Dipped Galvanized Finish, Mechanically Fastened, Roof Mounted, Safety And Tie-Back Anchor (Summit Anchor)	773.40	81.38
	Note: Includes drilling in concrete, anchor bolts and bottom plate or plates.		
	For Stainless Steel Pad Eye, Add	40.00	
	For Foam Insulation Filled HSS Tube, Add	10.00	
11 81 29 00-0004	EA Up To 10" High, 0.216" Thick, Hollow Structural Section Tube, 1018 Steel Forged Pad Eye, 8" x 8" x 1/2" Base Plate And Hot-Dipped Galvanized Finish, Epoxy Fastened, Roof Mounted, Safety And Tie-Back Anchor (Summit Anchor)	660.18	81.38
	Note: Includes drilling in concrete and adhesive anchor systems.		
	For Stainless Steel Pad Eye, Add	40.00	
	For Foam Insulation Filled HSS Tube, Add	10.00	
11 81 29 00-0005	EA Up To 10" High, 0.216" Thick, Hollow Structural Section Tube, 1018 Steel Forged Pad Eye, 8" x 8" x 1/2" Base Plate And Hot-Dipped Galvanized Finish, Welded In Place, Roof Mounted, Safety And Tie-Back Anchor (Summit Anchor)	496.02	83.43
	For Stainless Steel Pad Eye, Add	40.00	
	For Foam Insulation Filled HSS Tube, Add	10.00	
11 81 29 00-0006	Wall Mounted, Safety And Tie-Back Anchor <small>(11 81 29 00-0001)</small>		
	Note: Includes 1018 steel forged pad eye, 10" x 4" x 1/2" base plate and hot-dipped galvanized finish.		
11 81 29 00-0007	EA Steel Forged Pad Eye (1018), 10" x 4" x 1/2" Base Plate And Hot-Dipped Galvanized Finish, Mechanically Fastened, Wall Mounted, Safety And Tie-Back Anchor (Summit Anchor)	544.56	81.38
	Note: Includes drilling in concrete, anchor bolts and bottom plate or plates.		
	For Stainless Steel Pad Eye, Add	40.00	



Equipment	11	
Facility Maintenance and Operation Equipment	11 80	↑
Maintenance Equipment	11 81	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
11 81 29 00-0008	EA		Steel Forged Pad Eye (1018), 10" x 4" x 1/2" Base Plate And Hot-Dipped Galvanized Finish, Epoxy Fastened, Wall Mounted, Safety And Tie-Back Anchor (Summit Anchor).....	489.87	81.38
			Note: Includes drilling in concrete and adhesive anchor systems.		
			<i>For Stainless Steel Pad Eye, Add</i>	40.00	
11 81 29 00-0009	EA		Steel Forged Pad Eye (1018), 10" x 4" x 1/2" Base Plate And Hot-Dipped Galvanized Finish, Welded In Place, Wall Mounted, Safety And Tie-Back Anchor (Summit Anchor).....	435.07	83.43
			<i>For Stainless Steel Pad Eye, Add</i>	40.00	
11 81 29 00-0010			Safety And Tie-Back Anchor Accessories <small>(11 81 29 00-0001)</small>		
11 81 29 00-0011	EA		Mandatory Cut Sheets For Safety And Tie-Back Anchors (Summit Anchor).....	443.30	
			Note: One cut sheet required per order.		
11 81 29 00-0012			Ladder Safety And Fall Protection <small>(11 81 29)</small>		
11 81 29 00-0013	EA		Galvanized Standard Top Bracket With Mounting Hardware (Captial Safety Group-USA Lad-Saf™ 6116280).....	284.20	18.41
11 81 29 00-0014	EA		Galvanized 1x7 Cable, 3/8" 24' Long (Captial Safety Group-USA Lad-Saf™ 6110024).....	42.80	2.68
11 81 29 00-0015	EA		Galvanized 1x7 Cable, 3/8" 30' Long (Captial Safety Group-USA Lad-Saf™ 6110030).....	53.50	6.70
11 81 29 00-0016	EA		Galvanized 1x7 Cable, 3/8" 40' Long (Captial Safety Group-USA Lad-Saf™ 6110040).....	71.33	4.46
11 81 29 00-0017	EA		Galvanized 1x7 Cable, 3/8" 50' Long (Captial Safety Group-USA Lad-Saf™ 6110050).....	89.16	5.58
11 81 29 00-0018	EA		Non-metallic Cable Guide With Mounting Hardware (Captial Safety Group-USA Lad-Saf™ 6110400).....	58.51	4.18
11 81 29 00-0019	EA		Flexible Cable Sleeve (Captial Safety Group-USA Lad-Saf™ 6160054).....	544.88	11.16
11 81 29 00-0020	EA		Galvanized Standard Bottom Bracket (Captial Safety Group-USA Lad-Saf™ 6100090).....	130.97	11.05
11 81 29 00-0021			Fall-Arrest Systems <small>(11 81 29)</small>		
11 81 29 00-0022			Horizontal <small>(11 81 29 00-0021)</small>		
11 81 29 00-0023	LF		Trolley Rail Fall Arrest System.....	676.84	43.72
			Note: Price per LF of trolley rail. Includes engineering, certification, design, fabrication, delivery, installation, training materials, equipment and five year warranty.		
11 81 29 00-0024			Anchor Points <small>(11 81 29 00-0021)</small>		
11 81 29 00-0025	EA		Roof Anchor, 16" x 16" Base With 12" High Post.....	640.82	
			Note: Guardian CD-12 series		
11 81 29 00-0026	EA		Roof Anchor, 12" x 12" Base With 18" High Post.....	751.26	
			Note: Guardian CD-18 series		
11 81 29 00-0027	EA		Bolt On Roof Anchor.....	285.63	
			Note: Guardian CD-1-B series		
11 81 29 00-0028	EA		Fall Arrest Anchor Attachment To 2" x 8" Stud.....	136.96	
			Note: Super Anchor ARS 2x8		
11 81 29 00-0029	EA		Fall Arrest Anchor Attachment To 2" x 12" Stud.....	159.15	
			Note: Super Anchor ARS 2x12		
11 81 29 00-0030			Roofing Safety Tie-Back Anchor, Attached To Wood <small>(11 81 29)</small>		
11 81 29 00-0031	EA		20 Gauge Stainless Steel Anchor And DI Chromeate D-Ring, Roofing Safety Tie Back Anchor, Attached To Wood (SUPER ANCHOR RS-20).....	65.14	
11 90 Other Equipment <small>(11)</small>					
11 97 Security Equipment <small>(11 90)</small>					
11 97 26 Detention Gun Lockers <small>(11 97)</small>					
11 97 26 00-0001			Hinged Door Gun Lock <small>(11 97 26)</small>		
			Note: Two keys per locker with one master.		
11 97 26 00-0002	EA		8 Compartment Pistol Locker, 20-1/8" High x 15-1/8" Wide x 17-1/4" Deep, Double Welded 20 Gauge Steel Body, 10 Gauge Steel Door.....	3,299.23	57.15
11 97 26 00-0003			Hinged-Door Gun Locker <small>(11 97 26)</small>		
			Note: Includes master key for each set of 4 compartments, two keys per compartment.		
11 97 26 00-0004	EA		4 Compartment Pistol Locker, 11-1/4" High x 16-1/4" Wide x 16-3/4" Deep, 16 Gauge, Foam Filled, Painted With Powder Coat Finish.....	1,287.12	40.01
11 97 26 00-0005	EA		8 Compartment Pistol Locker, 11-1/2" High x 32-3/4" Wide x 17-1/4" Deep, 16 Gauge, Foam Filled, Painted With Powder Coat Finish.....	2,931.82	57.15
11 97 26 00-0006	EA		16 Compartment Pistol Locker, 11-1/2" High x 32-3/4" Wide x 17-1/4" Deep, 16 Gauge, Foam Filled, Painted With Powder Coat Finish.....	5,369.72	68.57
11 97 26 00-0007	EA		24 Compartment Pistol Locker, 11-1/2" High x 32-3/4" Wide x 17-1/4" Deep, 16 Gauge, Foam Filled, Painted With Powder Coat Finish.....	7,784.75	68.57
11 98 Detention Equipment <small>(11 90)</small>					
11 98 12 Detention Doors and Frames <small>(11 98)</small>					
11 98 12 00-0001			Metal Detention Doors <small>(11 98 12)</small>		
			Note: Flush type reinforced with stiffeners.		
11 98 12 00-0002			10 Gauge 1-3/4" Metal Detention Door <small>(11 98 12 00-0001)</small>		

11	11 Equipment
	11 90 Other Equipment
	11 98 Detention Equipment



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
11 98 12 00-0003	EA 2' x 6'-8" x 1-3/4" 10 Gauge Metal Detention Door.....	631.33	60.22
11 98 12 00-0004	EA 2'-4" x 6'-8" x 1-3/4" 10 Gauge Metal Detention Door.....	638.63	60.22
11 98 12 00-0005	EA 2'-6" x 6'-8" x 1-3/4" 10 Gauge Metal Detention Door.....	645.93	60.22
11 98 12 00-0006	EA 2'-8" x 6'-8" x 1-3/4" 10 Gauge Metal Detention Door.....	653.22	60.22
11 98 12 00-0007	EA 3' x 6'-8" x 1-3/4" 10 Gauge Metal Detention Door.....	660.52	60.22
11 98 12 00-0008	EA 3'-4" x 6'-8" x 1-3/4" 10 Gauge Metal Detention Door.....	697.01	60.22
11 98 12 00-0009	EA 2' x 7' x 1-3/4" 10 Gauge Metal Detention Door.....	676.72	60.22
11 98 12 00-0010	EA 2'-4" x 7' x 1-3/4" 10 Gauge Metal Detention Door.....	684.30	60.22
11 98 12 00-0011	EA 2'-6" x 7' x 1-3/4" 10 Gauge Metal Detention Door.....	689.08	60.22
11 98 12 00-0012	EA 2'-8" x 7' x 1-3/4" 10 Gauge Metal Detention Door.....	755.52	60.22
11 98 12 00-0013	EA 3' x 7' x 1-3/4" 10 Gauge Metal Detention Door.....	915.91	60.22
11 98 12 00-0014	EA 3'-4" x 7' x 1-3/4" 10 Gauge Metal Detention Door.....	998.41	60.22
11 98 12 00-0015	EA 2' x 7'-2" x 1-3/4" 10 Gauge Metal Detention Door.....	656.87	60.22
11 98 12 00-0016	EA 2'-4" x 7'-2" x 1-3/4" 10 Gauge Metal Detention Door.....	664.16	60.22
11 98 12 00-0017	EA 2'-6" x 7'-2" x 1-3/4" 10 Gauge Metal Detention Door.....	671.47	60.22
11 98 12 00-0018	EA 2'-8" x 7'-2" x 1-3/4" 10 Gauge Metal Detention Door.....	678.76	60.22
11 98 12 00-0019	EA 3' x 7'-2" x 1-3/4" 10 Gauge Metal Detention Door.....	686.06	60.22
11 98 12 00-0020	EA 3'-4" x 7'-2" x 1-3/4" 10 Gauge Metal Detention Door.....	722.54	60.22
11 98 12 00-0021	Pneumatic Door Operators <small>(11 98 12)</small>		
11 98 12 00-0022	EA Pneumatic Detention Cell Entry Door Operator With Hardware Set.....	4,872.52	
11 98 12 00-0023	EA Pneumatic Special Housing Detention Cell Door Operator With Hardware Set.....	5,381.02	
11 98 12 00-0024	EA Pneumatic MS Detention Cell Door Operator With Hardware Set.....	6,919.07	
11 98 12 00-0025	EA Pneumatic Sally Port Detention Door Operator With Hardware Set.....	8,109.72	
11 98 12 00-0026	EA Pneumatic Corridor Detention Door Operator With Hardware Set.....	10,173.73	
11 98 12 00-0027	EA Emergency Release Cabinet With Seven Gallon Storage Tank, Check Valve, Pressure Gauge, Three Way Valves And Four Release Valves.....	5,005.92	

END OF SECTION 11



Furnishings	12	12
Operation and Maintenance of Furnishings	12 01	
Operation and Maintenance of Multiple Seating	12 01 60	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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12 Furnishings

12 01 Operation and Maintenance of Furnishings ⁽¹²⁾

12 01 60 Operation and Maintenance of Multiple Seating ^(12 01)

12 01 60 00-0001	Repair Fixed Auditorium Seating ^(12 01 60)		
12 01 60 00-0002	EA Removal And Replacement Of Hardwood/Plywood Auditorium Seat Part.....	193.41	
12 01 60 00-0003	EA Removal And Replacement Of Auditorium Seat Armrest Part.....	88.72	
12 01 60 00-0004	EA Removal And Replacement Of End Armrest Part.....	125.04	
12 01 60 00-0005	EA Removal And Replacement Of Auditorium Seat Kick Plate Part.....	146.64	
12 01 60 00-0006	EA Removal And Replacement Of Auditorium Seat Long Back Part.....	236.17	
12 01 60 00-0007	EA Removal And Replacement Of Auditorium Seat Center Standard Part.....	188.63	
12 01 60 00-0008	EA Removal And Replacement Of Auditorium Seat Back Bracket Part.....	67.73	
12 01 60 00-0009	EA Removal And Replacement Of Auditorium Seat Bracket Part.....	72.57	
12 01 60 00-0010	EA Secure Seat To Floor.....	69.63	
12 01 60 00-0011	EA Removal And Reinstallation Of Existing Auditorium Seat In Concrete Floor.....	74.15	
	Note: Includes drilling and fasteners.		
	For Epoxy Anchoring, Add	24.81	
	For Expansion Anchor Mounting With Anchor Caps, Add	26.27	
	For Epoxy Anchor Mounting With Anchor Caps, Add	33.93	
12 01 60 00-0012	EA Reupholster Auditorium Seat And Back.....	211.14	
	Note: Includes removal of existing upholstery.		

12 20 Window Treatments ⁽¹²⁾

12 21 Window Blinds ^(12 20)

12 21 13 Horizontal Louver Blinds ^(12 21)

Note: Includes headrail, brackets, cords and all hardware.

12 21 13 13 Metal Horizontal Louver Blinds ^(12 21 13)

12 21 13 13-0001	Aluminum Horizontal Louver Blinds ^(12 21 13 13)		
12 21 13 13-0002	SF 1/2" x 0.006" Slats, Aluminum Horizontal Louver Blinds.....	11.99	0.98
12 21 13 13-0003	SF 1" x 0.006" Slats, Aluminum Horizontal Louver Blinds.....	9.81	0.98
12 21 13 13-0004	SF 1" x 0.008" Slats, Aluminum Horizontal Louver Blinds.....	10.65	0.98
12 21 13 13-0005	SF 2" x 0.008" Slats, Aluminum Horizontal Louver Blinds.....	12.32	0.98

12 21 13 33 Plastic Horizontal Louver Blinds ^(12 21 13)

12 21 13 33-0001	Vinyl Horizontal Louver Blinds ^(12 21 13 33)		
12 21 13 33-0002	SF 1" Slats, Vinyl Horizontal Louver Blinds.....	10.15	0.98
12 21 13 33-0003	SF 2" Slats, Vinyl Horizontal Louver Blinds.....	11.74	0.98

12 21 16 Vertical Louver Blinds ^(12 21)

Note: Includes headrail, brackets, cords and all hardware.

12 21 16 13 Metal Vertical Louver Blinds ^(12 21 16)

12 21 16 13-0001	Aluminum Vertical Louver Blinds ^(12 21 16 13)		
12 21 16 13-0002	SF 3-1/2" x 0.008" Slats, Aluminum Vertical Louver Blinds.....	13.98	2.07

12 21 16 33 Plastic Vertical Louver Blinds ^(12 21 16)

12 21 16 33-0001	Vinyl Vertical Louver Blinds ^(12 21 16 33)		
12 21 16 33-0002	SF 2" Slats, Vinyl Vertical Louver Blinds.....	9.04	2.07
12 21 16 33-0003	SF 3-1/2" Slats, Vinyl Vertical Louver Blinds.....	12.63	2.07

12 22 Curtains and Drapes ^(12 20)

12 22 13 Draperies ^(12 22)

12 22 13 00-0001	Lined Draperies ^(12 22 13)		
	Note: Width dimensions are the panel width at top excluding returns and overlaps.		

12 22 13 00-0002	Up To 48" Wide Lined Draperies ^(12 22 13 00-0001)		
12 22 13 00-0003	EA Up To 39" Long, Up To 48" Wide Lined Draperies.....	451.46	13.57
12 22 13 00-0004	EA >39" To 63" Long, Up To 48" Wide Lined Draperies.....	470.53	13.57
12 22 13 00-0005	EA >63" To 72" Long, Up To 48" Wide Lined Draperies.....	501.53	13.57
12 22 13 00-0006	EA >72" To 81" Long, Up To 48" Wide Lined Draperies.....	513.45	13.57
12 22 13 00-0007	EA >81" To 90" Long, Up To 48" Wide Lined Draperies.....	542.06	13.57
12 22 13 00-0008	EA >90" To 99" Long, Up To 48" Wide Lined Draperies.....	580.20	13.57
12 22 13 00-0009	EA >99" To 108" Long, Up To 48" Wide Lined Draperies.....	604.04	13.57
12 22 13 00-0010	EA >108" To 120" Long, Up To 48" Wide Lined Draperies.....	637.41	13.57

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

12 22 13 00-0011	EA	>120" To 130" Long, Up To 48" Wide Lined Draperies.....	689.86	13.57
12 22 13 00-0012		>48" To 72" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0013	EA	Up To 39" Long, >48" To 72" Wide Lined Draperies.....	656.72	18.44
12 22 13 00-0014	EA	>39" To 63" Long, >48" To 72" Wide Lined Draperies.....	699.63	18.44
12 22 13 00-0015	EA	>63" To 72" Long, >48" To 72" Wide Lined Draperies.....	733.00	18.44
12 22 13 00-0016	EA	>72" To 81" Long, >48" To 72" Wide Lined Draperies.....	761.61	18.44
12 22 13 00-0017	EA	>81" To 90" Long, >48" To 72" Wide Lined Draperies.....	828.36	18.44
12 22 13 00-0018	EA	>90" To 99" Long, >48" To 72" Wide Lined Draperies.....	861.74	18.44
12 22 13 00-0019	EA	>99" To 108" Long, >48" To 72" Wide Lined Draperies.....	890.35	18.44
12 22 13 00-0020	EA	>108" To 120" Long, >48" To 72" Wide Lined Draperies.....	952.33	18.44
12 22 13 00-0021	EA	>120" To 130" Long, >48" To 72" Wide Lined Draperies.....	1,019.08	18.44
12 22 13 00-0022		>72" To 96" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0023	EA	Up To 39" Long, >72" To 96" Wide Lined Draperies.....	871.51	23.33
12 22 13 00-0024	EA	>39" To 63" Long, >72" To 96" Wide Lined Draperies.....	933.49	23.33
12 22 13 00-0025	EA	>63" To 72" Long, >72" To 96" Wide Lined Draperies.....	962.10	23.33
12 22 13 00-0026	EA	>72" To 81" Long, >72" To 96" Wide Lined Draperies.....	1,028.85	23.33
12 22 13 00-0027	EA	>81" To 90" Long, >72" To 96" Wide Lined Draperies.....	1,090.83	23.33
12 22 13 00-0028	EA	>90" To 99" Long, >72" To 96" Wide Lined Draperies.....	1,152.81	23.33
12 22 13 00-0029	EA	>99" To 108" Long, >72" To 96" Wide Lined Draperies.....	1,186.19	23.33
12 22 13 00-0030	EA	>108" To 120" Long, >72" To 96" Wide Lined Draperies.....	1,252.94	23.33
12 22 13 00-0031	EA	>120" To 130" Long, >72" To 96" Wide Lined Draperies.....	1,343.53	23.33
12 22 13 00-0032		>96" To 120" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0033	EA	Up To 39" Long, >96" To 120" Wide Lined Draperies.....	1,100.59	28.21
12 22 13 00-0034	EA	>39" To 63" Long, >96" To 120" Wide Lined Draperies.....	1,162.57	28.21
12 22 13 00-0035	EA	>63" To 72" Long, >96" To 120" Wide Lined Draperies.....	1,195.95	28.21
12 22 13 00-0036	EA	>72" To 81" Long, >96" To 120" Wide Lined Draperies.....	1,291.31	28.21
12 22 13 00-0037	EA	>81" To 90" Long, >96" To 120" Wide Lined Draperies.....	1,353.29	28.21
12 22 13 00-0038	EA	>90" To 99" Long, >96" To 120" Wide Lined Draperies.....	1,420.04	28.21
12 22 13 00-0039	EA	>99" To 108" Long, >96" To 120" Wide Lined Draperies.....	1,491.67	28.21
12 22 13 00-0040	EA	>108" To 120" Long, >96" To 120" Wide Lined Draperies.....	1,582.15	28.21
12 22 13 00-0041	EA	>120" To 130" Long, >96" To 120" Wide Lined Draperies.....	1,629.83	28.21
12 22 13 00-0042		>120" To 144" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0043	EA	Up To 39" Long, >120" To 144" Wide Lined Draperies.....	1,301.08	33.09
12 22 13 00-0044	EA	>39" To 63" Long, >120" To 144" Wide Lined Draperies.....	1,391.67	33.09
12 22 13 00-0045	EA	>63" To 72" Long, >120" To 144" Wide Lined Draperies.....	1,425.04	33.09
12 22 13 00-0046	EA	>72" To 81" Long, >120" To 144" Wide Lined Draperies.....	1,520.40	33.09
12 22 13 00-0047	EA	>81" To 90" Long, >120" To 144" Wide Lined Draperies.....	1,615.76	33.09
12 22 13 00-0048	EA	>90" To 99" Long, >120" To 144" Wide Lined Draperies.....	1,711.12	33.09
12 22 13 00-0049	EA	>99" To 108" Long, >120" To 144" Wide Lined Draperies.....	1,806.47	33.09
12 22 13 00-0050	EA	>108" To 120" Long, >120" To 144" Wide Lined Draperies.....	1,901.83	33.09
12 22 13 00-0051	EA	>120" To 130" Long, >120" To 144" Wide Lined Draperies.....	2,021.03	33.09
12 22 13 00-0052		>144" To 168" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0053	EA	Up To 39" Long, >144" To 168" Wide Lined Draperies.....	1,530.16	37.98
12 22 13 00-0054	EA	>39" To 63" Long, >144" To 168" Wide Lined Draperies.....	1,625.52	37.98
12 22 13 00-0055	EA	>63" To 72" Long, >144" To 168" Wide Lined Draperies.....	1,697.04	37.98
12 22 13 00-0056	EA	>72" To 81" Long, >144" To 168" Wide Lined Draperies.....	1,792.39	37.98
12 22 13 00-0057	EA	>81" To 90" Long, >144" To 168" Wide Lined Draperies.....	1,887.76	37.98
12 22 13 00-0058	EA	>90" To 99" Long, >144" To 168" Wide Lined Draperies.....	2,006.95	37.98
12 22 13 00-0059	EA	>99" To 108" Long, >144" To 168" Wide Lined Draperies.....	2,102.31	37.98
12 22 13 00-0060	EA	>108" To 120" Long, >144" To 168" Wide Lined Draperies.....	2,197.67	37.98
12 22 13 00-0061	EA	>120" To 130" Long, >144" To 168" Wide Lined Draperies.....	2,364.54	37.98
12 22 13 00-0062		>168" To 192" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0063	EA	Up To 39" Long, >168" To 192" Wide Lined Draperies.....	1,730.65	42.85
12 22 13 00-0064	EA	>39" To 63" Long, >168" To 192" Wide Lined Draperies.....	1,849.85	42.85
12 22 13 00-0065	EA	>63" To 72" Long, >168" To 192" Wide Lined Draperies.....	1,921.36	42.85
12 22 13 00-0066	EA	>72" To 81" Long, >168" To 192" Wide Lined Draperies.....	2,040.56	42.85
12 22 13 00-0067	EA	>81" To 90" Long, >168" To 192" Wide Lined Draperies.....	2,135.92	42.85
12 22 13 00-0068	EA	>90" To 99" Long, >168" To 192" Wide Lined Draperies.....	2,255.12	42.85
12 22 13 00-0069	EA	>99" To 108" Long, >168" To 192" Wide Lined Draperies.....	2,445.84	42.85
12 22 13 00-0070	EA	>108" To 120" Long, >168" To 192" Wide Lined Draperies.....	2,517.35	42.85
12 22 13 00-0071	EA	>120" To 130" Long, >168" To 192" Wide Lined Draperies.....	2,684.23	42.85
12 22 13 00-0072		>192" To 216" Wide Lined Draperies (12 22 13 00-0001)		
12 22 13 00-0073	EA	Up To 39" Long, >192" To 216" Wide Lined Draperies.....	1,954.97	47.74
12 22 13 00-0074	EA	>39" To 63" Long, >192" To 216" Wide Lined Draperies.....	2,050.33	47.74
12 22 13 00-0075	EA	>63" To 72" Long, >192" To 216" Wide Lined Draperies.....	2,145.69	47.74
12 22 13 00-0076	EA	>72" To 81" Long, >192" To 216" Wide Lined Draperies.....	2,288.72	47.74



Furnishings	12	12
Window Treatments	12 20	
Curtains and Drapes	12 22	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
12 22 13 00-0077	EA	>81" To 90" Long, >192" To 216" Wide Lined Draperies	2,431.76		47.74
12 22 13 00-0078	EA	>90" To 99" Long, >192" To 216" Wide Lined Draperies	2,574.80		47.74
12 22 13 00-0079	EA	>99" To 108" Long, >192" To 216" Wide Lined Draperies	2,694.00		47.74
12 22 13 00-0080	EA	>108" To 120" Long, >192" To 216" Wide Lined Draperies	2,813.20		47.74
12 22 13 00-0081	EA	>120" To 130" Long, >192" To 216" Wide Lined Draperies	3,027.75		47.74
12 22 13 00-0082		>216" To 240" Wide Lined Draperies (12 22 13 00-0001)			
12 22 13 00-0083	EA	Up To 39" Long, >216" To 240" Wide Lined Draperies.....	2,155.45		52.62
12 22 13 00-0084	EA	>39" To 63" Long, >216" To 240" Wide Lined Draperies.....	2,322.33		52.62
12 22 13 00-0085	EA	>63" To 72" Long, >216" To 240" Wide Lined Draperies.....	2,393.84		52.62
12 22 13 00-0086	EA	>72" To 81" Long, >216" To 240" Wide Lined Draperies.....	2,536.88		52.62
12 22 13 00-0087	EA	>81" To 90" Long, >216" To 240" Wide Lined Draperies.....	2,703.76		52.62
12 22 13 00-0088	EA	>90" To 99" Long, >216" To 240" Wide Lined Draperies.....	2,846.80		52.62
12 22 13 00-0089	EA	>99" To 108" Long, >216" To 240" Wide Lined Draperies.....	2,989.83		52.62
12 22 13 00-0090	EA	>108" To 120" Long, >216" To 240" Wide Lined Draperies.....	3,132.87		52.62
12 22 13 00-0091	EA	>120" To 130" Long, >216" To 240" Wide Lined Draperies.....	3,371.26		52.62
12 22 16		Drapery Track and Accessories (12 22)			
12 22 16 00-0001		Metal Wall Or Ceiling Mount Drapery Tracks (12 22 16)			
12 22 16 00-0002		Basic Traverse Rod (12 22 16 00-0001)			
12 22 16 00-0003	EA	Traverse Rod, 30" To 50" Extension Metal Wall Or Ceiling Mounted Track	147.01		46.43
12 22 16 00-0004	EA	Traverse Rod, 50" To 90" Extension Metal Wall Or Ceiling Mounted Track	175.57		46.43
12 22 16 00-0005	EA	Traverse Rod, 84" To 156" Extension Metal Wall Or Ceiling Mounted Track	210.28		51.59
12 22 16 00-0006	EA	Traverse Rod, 136" To 250" Extension Metal Wall Or Ceiling Mounted Track	299.47		51.59
12 22 16 00-0007	EA	Traverse Rod, 165" To 312" Extension Metal Wall Or Ceiling Mounted Track	308.85		56.75
12 22 16 00-0008		Traverse Rod With Stationary Curtain Rod (12 22 16 00-0001)			
12 22 16 00-0009	EA	Tray And Curtain Rod, 30" To 50" Extension Metal Wall Or Ceiling Mounted Track	174.38		46.43
12 22 16 00-0010	EA	Tray And Curtain Rod, 50" To 90" Extension Metal Wall Or Ceiling Mounted Track	192.82		46.43
12 22 16 00-0011	EA	Tray And Curtain Rod, 84" To 156" Extension Metal Wall Or Ceiling Mounted Track	253.72		51.59
12 22 16 00-0012	EA	Tray And Curtain Rod, 136" To 250" Extension Metal Wall Or Ceiling Mounted Track	291.60		56.75
12 22 16 00-0013		Double Traverse Rod (12 22 16 00-0001)			
12 22 16 00-0014	EA	Double Traverse Rod, 30" To 50" Extension Metal Wall Or Ceiling Mounted Track.....	221.38		46.43
12 22 16 00-0015	EA	Double Traverse Rod, 50" To 90" Extension Metal Wall Or Ceiling Mounted Track.....	277.31		46.43
12 22 16 00-0016	EA	Double Traverse Rod, 84" To 156" Extension Metal Wall Or Ceiling Mounted Track.....	351.59		51.59
12 22 16 00-0017	EA	Double Traverse Rod, 136" To 250" Extension Metal Wall Or Ceiling Mounted Track.....	379.06		56.75
12 22 16 00-0018		Curtain Rods (12 22 16 00-0001)			
12 22 16 00-0019	LF	Standard Metal Curtain Rod, White	12.47		1.95
12 22 16 00-0020		Relocate Drapery And Rod (12 22 16 00-0001)			
12 22 16 00-0021	LF	Relocate Any Type Of Drapery And Any Type Rod..... Note: Includes storage and cleaning.	30.96		
12 24		Window Shades (12 20)			
12 24 13		Roller Window Shades (12 24)			
12 24 13 00-0001		Roller Window Shades (12 24 13)			
12 24 13 00-0002		Vinyl Coated Fiberglass, Roller Window Shades (12 24 13 00-0001)			
		Note: Includes roller, brackets, and stainless steel chain operator.			
12 24 13 00-0003	SF	0% Openness, Blackout, Vinyl Coated Fiberglass, Roller Window Shades.....	15.17		0.65
12 24 13 00-0004	SF	1% To 10% Openness, Vinyl Coated Fiberglass, Roller Window Shades	15.17		0.65
12 24 13 00-0005		Polyvinyl Chloride (PVC) Free, Acrylic Backed Polyester, Roller Window Shades (12 24 13 00-0001)			
		Note: Includes roller, brackets, and stainless steel chain operator.			
12 24 13 00-0006	SF	0% Openness, Blackout, Polyvinyl Chloride (PVC) Free, Acrylic Backed Polyester, Roller Window Shades.....	19.43		0.65
12 24 13 00-0007		Vinyl Coated Polyester, Roller Window Shades (12 24 13 00-0001)			
		Note: Includes roller, brackets, and stainless steel chain operator.			
12 24 13 00-0008	SF	1% To 10% Openness, Vinyl Coated Polyester, Roller Window Shades.....	15.17		0.65
12 25		Window Treatment Operating Hardware (12 20)			
12 25 13		Motorized Drapery Rods (12 25)			

12 Furnishings**12 20 Window Treatments****12 25 Window Treatment Operating Hardware**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

12 25 13 00-0001	Motorized Drapery Track ^(12 25 13)			
12 25 13 00-0002	EA 2' To 4' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,319.46		109.31
12 25 13 00-0003	EA >4' To 5' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,376.18		120.24
12 25 13 00-0004	EA >5' To 6' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,432.89		131.17
12 25 13 00-0005	EA >6' To 7' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,489.59		142.10
12 25 13 00-0006	EA >7' To 8' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,546.30		153.04
12 25 13 00-0007	EA >8' To 9' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,603.01		163.97
12 25 13 00-0008	EA >9' To 10' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,659.72		174.90
12 25 13 00-0009	EA >10' To 11' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,716.43		185.83
12 25 13 00-0010	EA >11' To 12' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,773.14		196.76
12 25 13 00-0011	EA >12' To 13' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,829.84		207.69
12 25 13 00-0012	EA >13' To 14' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,886.56		218.62
12 25 13 00-0013	EA >14' To 15' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,943.27		229.55
12 25 13 00-0014	EA >15' To 16' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	1,999.97		240.49
12 25 13 00-0015	EA >16' To 17' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,056.68		251.42
12 25 13 00-0016	EA >17' To 18' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,113.40		262.35
12 25 13 00-0017	EA >18' To 19' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,170.10		273.28
12 25 13 00-0018	EA >19' To 20' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,226.81		284.21
12 25 13 00-0019	EA >20' To 21' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,283.52		295.14
12 25 13 00-0020	EA >21' To 22' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,340.23		306.07
12 25 13 00-0021	EA >22' To 23' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,396.94		317.00
12 25 13 00-0022	EA >23' To 24' Wide, Motorized Curtain Track (Somfy Glydea 60E).....	2,453.65		327.93

12 30 Casework ⁽¹²⁾**12 31 Manufactured Metal Casework ^(12 30)****12 31 16 Manufactured Metal Sandwich Panel Casework ^(12 31)**

12 31 16 00-0001	34-1/2" High x 24" Deep, Stainless Steel Cabinets ^(12 31 16)			
12 31 16 00-0002	18 Gauge, #4 Finish, 304 Stainless Steel Base Cabinets ^(12 31 16 00-0001)			
12 31 16 00-0003	18" Stainless Steel Base Cabinet ^(12 31 16 00-0002)			
12 31 16 00-0004	EA 18" Stainless Steel Base Cabinet, No Doors Or Drawers.....	2,042.38		247.68
	For 16 Gauge Stainless Steel, Add	332.57		
	For >5 To 9, Deduct	-81.21		
	For >9, Deduct	-162.42		
12 31 16 00-0005	EA 18" Stainless Steel Base Cabinet, With 4 Drawers.....	3,356.24		247.68
	For 16 Gauge Stainless Steel, Add	615.05		
	For >5 To 9, Deduct	-150.19		
	For >9, Deduct	-300.38		
12 31 16 00-0006	EA 18" Stainless Steel Base Cabinet, With 3 Drawers.....	3,108.33		247.68
	For 16 Gauge Stainless Steel, Add	561.75		
	For >5 To 9, Deduct	-137.17		
	For >9, Deduct	-274.35		
12 31 16 00-0007	EA 18" Stainless Steel Base Cabinet, With 2 Drawers.....	2,860.41		247.68
	For 16 Gauge Stainless Steel, Add	508.45		
	For >5 To 9, Deduct	-124.16		
	For >9, Deduct	-248.31		
12 31 16 00-0008	EA 18" Stainless Steel Base Cabinet, With Doors And Drawers.....	2,776.28		247.68
	For 16 Gauge Stainless Steel, Add	490.36		
	For >5 To 9, Deduct	-119.74		
	For >9, Deduct	-239.48		
12 31 16 00-0009	24" Stainless Steel Base Cabinet ^(12 31 16 00-0002)			
12 31 16 00-0010	EA 24" Stainless Steel Base Cabinet, With Doors And Locks.....	2,974.60		267.69
	For 16 Gauge Stainless Steel, Add	524.35		
	For >5 To 9, Deduct	-128.04		
	For >9, Deduct	-256.08		
12 31 16 00-0011	EA 24" Stainless Steel Base Cabinet, With Door, No Locks.....	2,672.09		267.69
	For 16 Gauge Stainless Steel, Add	459.31		
	For >5 To 9, Deduct	-112.16		
	For >9, Deduct	-224.31		
12 31 16 00-0012	EA 24" Stainless Steel Base Cabinet, With Two Doors, No Locks.....	2,738.32		267.69
	For 16 Gauge Stainless Steel, Add	473.55		
	For >5 To 9, Deduct	-115.63		
	For >9, Deduct	-231.27		
12 31 16 00-0013	EA 24" Stainless Steel Base Cabinet, No Doors, 2 Drawers.....	3,046.20		267.69
	For 16 Gauge Stainless Steel, Add	539.74		
	For >5 To 9, Deduct	-131.80		
	For >9, Deduct	-263.59		
12 31 16 00-0014	EA 24" Stainless Steel Base Cabinet, With Doors And Drawers, No Locks.....	3,979.69		267.69
	For 16 Gauge Stainless Steel, Add	740.44		
	For >5 To 9, Deduct	-180.81		
	For >9, Deduct	-361.61		
12 31 16 00-0015	EA 24" Stainless Steel Base Cabinet, With Doors And Drawers, With Locks.....	4,379.75		267.69
	For 16 Gauge Stainless Steel, Add	826.45		
	For >5 To 9, Deduct	-201.81		
	For >9, Deduct	-403.62		



Furnishings	12
Casework	12 30
Manufactured Metal Casework	12 31

12

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
12 31 16 00-0016 30" Stainless Steel Base Cabinet <small>(12 31 16 00-0002)</small>		
12 31 16 00-0017 EA 30" Stainless Steel Base Cabinet, No Doors, No Drawers	2,606.58	282.09
For 16 Gauge Stainless Steel, Add	439.16	
For >5 To 9, Deduct	-107.24	
For >9, Deduct	-214.47	
12 31 16 00-0018 EA 30" Stainless Steel Base Cabinet, With 4 Full Size Drawers	3,820.20	282.09
For 16 Gauge Stainless Steel, Add	700.09	
For >5 To 9, Deduct	-170.95	
For >9, Deduct	-341.90	
12 31 16 00-0019 EA 30" Stainless Steel Base Cabinet, With Doors, Drawers And Locks.....	4,936.27	282.09
For 16 Gauge Stainless Steel, Add	940.04	
For >5 To 9, Deduct	-229.55	
For >9, Deduct	-459.09	
12 31 16 00-0020 EA 30" Stainless Steel Base Cabinet, With Doors And Drawers, No Locks	4,536.20	282.09
For 16 Gauge Stainless Steel, Add	854.03	
For >5 To 9, Deduct	-208.54	
For >9, Deduct	-417.08	
12 31 16 00-0021 EA 30" Stainless Steel Base Cabinet, With Doors And One Full Size Drawer	4,288.29	282.09
For 16 Gauge Stainless Steel, Add	800.73	
For >5 To 9, Deduct	-195.53	
For >9, Deduct	-391.05	
12 31 16 00-0022 EA 30" Stainless Steel Base Cabinet, With Doors, No Locks.....	3,282.31	282.09
For 16 Gauge Stainless Steel, Add	584.44	
For >5 To 9, Deduct	-142.71	
For >9, Deduct	-285.43	
12 31 16 00-0023 EA 30" Stainless Steel Base Cabinet, With Doors And Locks	3,251.88	282.09
For 16 Gauge Stainless Steel, Add	577.90	
For >5 To 9, Deduct	-141.12	
For >9, Deduct	-282.23	
12 31 16 00-0024 36" Stainless Steel Base Cabinet <small>(12 31 16 00-0002)</small>		
12 31 16 00-0025 EA 36" Stainless Steel Base Cabinet, No Doors, No Drawers	2,884.04	293.29
For 16 Gauge Stainless Steel, Add	493.83	
For >5 To 9, Deduct	-120.59	
For >9, Deduct	-241.17	
12 31 16 00-0026 EA 36" Stainless Steel Base Cabinet, With Doors And Locks	3,530.23	293.29
For 16 Gauge Stainless Steel, Add	632.76	
For >5 To 9, Deduct	-154.51	
For >9, Deduct	-309.02	
12 31 16 00-0027 EA 36" Stainless Steel Base Cabinet, With Door, No Lock	3,292.16	293.29
For 16 Gauge Stainless Steel, Add	581.58	
For >5 To 9, Deduct	-142.01	
For >9, Deduct	-284.03	
12 31 16 00-0028 EA 36" Stainless Steel Base Cabinet, With Doors, Drawers And Lock	5,211.04	293.29
For 16 Gauge Stainless Steel, Add	994.14	
For >5 To 9, Deduct	-242.75	
For >9, Deduct	-485.51	
12 31 16 00-0029 EA 36" Stainless Steel Base Cabinet, With Doors, Drawers, No Locks	4,811.87	293.29
For 16 Gauge Stainless Steel, Add	908.31	
For >5 To 9, Deduct	-221.80	
For >9, Deduct	-443.60	
12 31 16 00-0030 42" Stainless Steel Base Cabinet <small>(12 31 16 00-0002)</small>		
12 31 16 00-0031 EA 42" Stainless Steel Base Cabinet, No Doors, No Drawers	3,026.68	311.69
For 16 Gauge Stainless Steel, Add	516.69	
For >5 To 9, Deduct	-126.17	
For >9, Deduct	-252.34	
12 31 16 00-0032 EA 42" Stainless Steel Base Cabinet, With Doors, Drawers And Lock	5,495.98	311.69
For 16 Gauge Stainless Steel, Add	1,047.59	
For >5 To 9, Deduct	-255.81	
For >9, Deduct	-511.62	
12 31 16 00-0033 EA 42" Stainless Steel Base Cabinet, With Doors, Drawers, No Lock	5,095.92	311.69
For 16 Gauge Stainless Steel, Add	961.58	
For >5 To 9, Deduct	-234.80	
For >9, Deduct	-469.61	
12 31 16 00-0034 EA 42" Stainless Steel Base Cabinet, No Doors, 2 Drawers	4,681.53	311.69
For 16 Gauge Stainless Steel, Add	872.49	
For >5 To 9, Deduct	-213.05	
For >9, Deduct	-426.10	
12 31 16 00-0035 EA 42" Stainless Steel Base Cabinet, With Doors, No Lock.....	3,578.00	311.69
For 16 Gauge Stainless Steel, Add	635.23	
For >5 To 9, Deduct	-155.11	
For >9, Deduct	-310.23	
12 31 16 00-0036 EA 42" Stainless Steel Base Cabinet, With Doors And Lock.....	3,812.49	311.69
For 16 Gauge Stainless Steel, Add	685.64	
For >5 To 9, Deduct	-167.42	
For >9, Deduct	-334.85	
12 31 16 00-0037 48" Stainless Steel Base Cabinet <small>(12 31 16 00-0002)</small>		

12 Furnishings**12 30 Casework****12 31 Manufactured Metal Casework**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
12 31 16 00-0038	EA		48" Stainless Steel Base Cabinet, With Doors, Drawers And Lock.....	5,766.08	318.89
			<i>For 16 Gauge Stainless Steel, Add</i>	1,102.68	
			<i>For >5 To 9, Deduct</i>	-269.26	
			<i>For >9, Deduct</i>	-538.52	
12 31 16 00-0039	EA		48" Stainless Steel Base Cabinet, With Doors, Drawers, No Lock	5,366.91	318.89
			<i>For 16 Gauge Stainless Steel, Add</i>	1,016.86	
			<i>For >5 To 9, Deduct</i>	-248.30	
			<i>For >9, Deduct</i>	-496.60	
12 31 16 00-0040	EA		48" Stainless Steel Base Cabinet, No Doors, No Drawers	3,296.78	318.89
			<i>For 16 Gauge Stainless Steel, Add</i>	571.78	
			<i>For >5 To 9, Deduct</i>	-139.62	
			<i>For >9, Deduct</i>	-279.24	
12 31 16 00-0041	EA		48" Stainless Steel Base Cabinet, No Doors, 2 Drawers	4,952.53	318.89
			<i>For 16 Gauge Stainless Steel, Add</i>	927.76	
			<i>For >5 To 9, Deduct</i>	-226.55	
			<i>For >9, Deduct</i>	-453.09	
12 31 16 00-0042	EA		48" Stainless Steel Base Cabinet, With Doors, And Lock.....	4,085.27	318.89
			<i>For 16 Gauge Stainless Steel, Add</i>	741.30	
			<i>For >5 To 9, Deduct</i>	-181.02	
			<i>For >9, Deduct</i>	-362.03	
12 31 16 00-0043	EA		48" Stainless Steel Base Cabinet, With Doors, No Locks.....	4,020.83	318.89
			<i>For 16 Gauge Stainless Steel, Add</i>	727.45	
			<i>For >5 To 9, Deduct</i>	-177.63	
			<i>For >9, Deduct</i>	-355.27	
12 31 16 00-0044			60" Stainless Steel Base Cabinet (12 31 16 00-0002)		
12 31 16 00-0045	EA		24" Deep x 60" Wide Stainless Steel Sink Base Cabinet.....	3,975.16	328.61
			<i>For 16 Gauge Stainless Steel, Add</i>	713.43	
			<i>For >5 To 9, Deduct</i>	-174.21	
			<i>For >9, Deduct</i>	-348.42	
12 31 16 00-0046			18 Gauge, #4 Finish, 304 Stainless Steel Wall Cabinets (12 31 16 00-0001)		
12 31 16 00-0047			12" Wide Stainless Steel Wall Cabinets (12 31 16 00-0046)		
12 31 16 00-0048	EA		12"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks.....	1,606.35	94.30
			<i>For 16 Gauge Stainless Steel, Add</i>	304.81	
			<i>For >5 To 9, Deduct</i>	-74.43	
			<i>For >9, Deduct</i>	-148.86	
12 31 16 00-0049	EA		12"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks.....	1,598.69	100.01
			<i>For 16 Gauge Stainless Steel, Add</i>	300.71	
			<i>For >5 To 9, Deduct</i>	-73.43	
			<i>For >9, Deduct</i>	-146.86	
12 31 16 00-0050			18" Wide Stainless Steel Wall Cabinets (12 31 16 00-0046)		
12 31 16 00-0051	EA		18"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks.....	1,683.35	101.38
			<i>For 16 Gauge Stainless Steel, Add</i>	318.30	
			<i>For >5 To 9, Deduct</i>	-77.72	
			<i>For >9, Deduct</i>	-155.45	
12 31 16 00-0052	EA		18"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors, No Locks.....	1,585.79	101.38
			<i>For 16 Gauge Stainless Steel, Add</i>	297.32	
			<i>For >5 To 9, Deduct</i>	-72.60	
			<i>For >9, Deduct</i>	-145.20	
12 31 16 00-0053	EA		18"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors And Locks.....	1,862.31	110.29
			<i>For 16 Gauge Stainless Steel, Add</i>	352.95	
			<i>For >5 To 9, Deduct</i>	-86.19	
			<i>For >9, Deduct</i>	-172.37	
12 31 16 00-0054	EA		18"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks.....	1,802.35	110.29
			<i>For 16 Gauge Stainless Steel, Add</i>	340.06	
			<i>For >5 To 9, Deduct</i>	-83.04	
			<i>For >9, Deduct</i>	-166.08	
12 31 16 00-0055			24" Wide Stainless Steel Wall Cabinets (12 31 16 00-0046)		
12 31 16 00-0056	EA		24"W x 12"D x 36"H Stainless Steel Wall Cabinet, No Door.....	1,390.74	112.24
			<i>For 16 Gauge Stainless Steel, Add</i>	250.76	
			<i>For >5 To 9, Deduct</i>	-61.23	
			<i>For >9, Deduct</i>	-122.46	
12 31 16 00-0057	EA		24"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors And Locks.....	1,900.89	112.24
			<i>For 16 Gauge Stainless Steel, Add</i>	360.44	
			<i>For >5 To 9, Deduct</i>	-88.02	
			<i>For >9, Deduct</i>	-176.03	
12 31 16 00-0058	EA		24"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks.....	1,804.23	112.24
			<i>For 16 Gauge Stainless Steel, Add</i>	339.66	
			<i>For >5 To 9, Deduct</i>	-82.94	
			<i>For >9, Deduct</i>	-165.88	
12 31 16 00-0059	EA		24"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks.....	1,789.76	104.81
			<i>For 16 Gauge Stainless Steel, Add</i>	339.68	
			<i>For >5 To 9, Deduct</i>	-82.95	
			<i>For >9, Deduct</i>	-165.89	



Furnishings	12	
Casework	12 30	12
Manufactured Metal Casework	12 31	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
12 31 16 00-0060	EA 24"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors, No Locks <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,686.83 317.55 -77.54 -155.08	104.81
12 31 16 00-0061	EA 24"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Glass Door, No Lock..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,169.24 421.27 -102.87 -205.74	104.81
12 31 16 00-0062	EA 24"W x 12"D x 24"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,273.34 228.65 -55.83 -111.67	104.81
12 31 16 00-0063	EA 24"W x 12"D x 18"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,198.62 214.69 -52.42 -104.85	100.01
12 31 16 00-0064	30" Wide Stainless Steel Wall Cabinets (12 31 16 00-0046)		
12 31 16 00-0065	EA 30"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,473.57 480.55 -117.34 -234.69	119.21
12 31 16 00-0066	EA 30"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,239.08 430.14 -105.03 -210.07	119.21
12 31 16 00-0067	EA 30"W x 12"D x 36"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,493.54 269.84 -65.89 -131.78	119.21
12 31 16 00-0068	EA 30"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,353.99 458.91 -112.06 -224.12	109.73
12 31 16 00-0069	EA 30"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors, No Lock <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,119.50 408.50 -99.75 -199.50	109.73
12 31 16 00-0070	EA 30"W x 12"D x 24"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,373.96 248.20 -60.61 -121.22	109.73
12 31 16 00-0071	EA 30"W x 12"D x 18"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,298.91 234.31 -57.22 -114.43	104.58
12 31 16 00-0072	36" Wide Stainless Steel Wall Cabinets (12 31 16 00-0046)		
12 31 16 00-0073	EA 36"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,572.76 500.41 -122.19 -244.39	122.64
12 31 16 00-0074	EA 36"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,332.90 448.84 -109.60 -219.20	122.64
12 31 16 00-0075	EA 36"W x 12"D x 36"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,592.74 289.71 -70.74 -141.48	122.64
12 31 16 00-0076	EA 36"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,452.21 478.98 -116.96 -233.92	112.24
12 31 16 00-0077	EA 36"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors, No Locks <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,218.61 428.75 -104.70 -209.39	112.24
12 31 16 00-0078	EA 36"W x 12"D x 24"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,472.18 268.27 -65.51 -131.02	112.24
12 31 16 00-0079	EA 36"W x 12"D x 18"H Stainless Steel Wall Cabinet, With Doors, No Locks <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,398.81 254.78 -62.21 -124.43	106.87
12 31 16 00-0080	42" Wide Stainless Steel Wall Cabinets (12 31 16 00-0046)		
12 31 16 00-0081	EA 42"W x 12"D x 42"H Stainless Steel Wall Cabinet, With Doors, No Locks <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,688.57 511.75 -124.96 -249.92	154.30

12 Furnishings**12 30 Casework****12 31 Manufactured Metal Casework**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
12 31 16 00-0082	EA 42"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,696.01 517.06 -126.26 -252.52	145.61
12 31 16 00-0083	EA 42"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,457.94 465.87 -113.76 -227.52	145.61
12 31 16 00-0084	EA 42"W x 12"D x 36"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,714.19 305.97 -74.71 -149.43	145.61
12 31 16 00-0085	EA 42"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,546.47 494.91 -120.85 -241.70	122.29
12 31 16 00-0086	EA 42"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors, No Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,310.19 444.11 -108.44 -216.89	122.29
12 31 16 00-0087	EA 42"W x 12"D x 24"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,566.44 284.20 -69.40 -138.80	122.29
12 31 16 00-0088	48" Wide Stainless Steel Wall Cabinets <small>(12 31 16 00-0046)</small>		
12 31 16 00-0089	EA 48"W x 12"D x 42"H Stainless Steel Wall Cabinet, No Doors, No Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,359.65 439.69 -107.37 -214.73	154.30
12 31 16 00-0090	EA 48"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,793.29 536.56 -131.02 -262.04	148.82
12 31 16 00-0091	EA 48"W x 12"D x 36"H Stainless Steel Wall Cabinet, With Doors, No Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,558.80 486.15 -118.71 -237.42	148.82
12 31 16 00-0092	EA 48"W x 12"D x 36"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,813.26 325.85 -79.57 -159.14	148.82
12 31 16 00-0093	EA 48"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors And Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,643.47 515.23 -125.81 -251.63	123.44
12 31 16 00-0094	EA 48"W x 12"D x 24"H Stainless Steel Wall Cabinet, With Doors, No Locks..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	2,409.87 465.01 -113.55 -227.10	123.44
12 31 16 00-0095	EA 48"W x 12"D x 24"H Stainless Steel Wall Cabinet, No Doors..... <i>For 16 Gauge Stainless Steel, Add</i> <i>For >5 To 9, Deduct</i> <i>For >9, Deduct</i>	1,663.44 304.53 -74.36 -148.72	123.44
12 31 16 00-0096	Accessories <small>(12 31 16 00-0001)</small>		
12 31 16 00-0097	Stainless Steel Countertops <small>(12 31 16 00-0096)</small> Note: Includes all finishes, finished ends and all edge types such as straight, bullnose, eased, marine, etc. Excludes sinks.		
12 31 16 00-0098	SF 16 Gauge Stainless Steel Countertop With Backsplash..... <i>For 14 Gauge Stainless Steel, Add</i>	99.89 19.30	6.29
12 31 16 00-0099	SF 16 Gauge Stainless Steel Countertop Without Backsplash..... <i>For 14 Gauge Stainless Steel, Add</i>	91.72 17.49	6.29
12 31 16 00-0100	EA Cutout For Sink And/or Faucet In Stainless Steel Countertop.....	162.68	
12 31 16 00-0101	Stainless Steel Wall Panels <small>(12 31 16 00-0096)</small>		
12 31 16 00-0102	SF 20 Gauge Stainless Steel Wall Panel..... <i>For 18 Gauge Stainless Steel, Add</i> <i>For 16 Gauge Stainless Steel, Add</i>	38.89 5.47 10.54	9.37
12 31 16 00-0103	Pedestal Legs <small>(12 31 16 00-0096)</small>		
12 31 16 00-0104	EA Type #304 Stainless Steel Pedestal Leg.....	351.99	14.29
12 31 16 00-0105	Stainless Steel Slanted Cabinet Top Enclosure <small>(12 31 16 00-0096)</small>		
12 31 16 00-0106	EA Stainless Steel Slanted Cabinet Top Enclosure, 5' Sections.....	382.06	27.12

12 36 Countertops (12 30)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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12 36 23 Plastic Countertops (12 36)

12 36 23 13 Plastic-Laminate-Clad Countertops (12 36 23)

12 36 23 13-0001 Plastic Laminate Countertops (12 36 23 13)

Note: Includes plywood, medium-density fiberboard (MDF), or particleboard substrates, finished ends, and all edge types such as bullnose, ogee, roundover, bevel, etc.

12 36 23 13-0002	SF	Plastic Laminate Countertop Without Backsplash	17.04	
12 36 23 13-0003	SF	Plastic Laminate Countertop With 4" Backsplash	22.67	10.84
12 36 23 13-0004	LF	Plastic Laminate End Splash For Plastic Laminate Countertops	29.97	3.25
12 36 23 13-0005	EA	Cutout For Sink And/or Faucet In Plastic Laminate Countertop	90.38	

12 36 61 Simulated Stone Countertops (12 36)

12 36 61 16 Solid Surfacing Countertops (12 36 61)

12 36 61 16-0001 Solid Surface Countertops (12 36 61 16)

12 36 61 16-0002 Solid Surface Countertops (12 36 61 16-0001)

Note: Includes finished ends and all edge types such as bullnose, ogee, roundover, bevel, etc.
Note: Quantity based on area of backsplash. Excludes backing material such as cement or water resistant gypsum board.

12 36 61 16-0003	SF	1/4" Thick, Solid Color, Solid Surface Backsplash	46.88	
		For Up To 50, Add	15.49	
		For >50 To 100, Add	8.81	
12 36 61 16-0004	SF	1/2" Thick, Solid Color, Solid Surface Countertop Without Backsplash	72.83	10.84
		Note: Quantity based on area of counter, backsplash and apron. Includes drilling holes for fixtures and 1-1/2" drop edge with 1/8" radius edges (when apron not used).		
		For Up To 50, Add	23.65	
		For >50 To 100, Add	13.85	
		For Integral 16-7/16" x 13" x 5-1/4" Depth Lavatory Sink (Corian 810), Add	250.50	
		For Integral 20-7/16" x 14-7/16" x 6-1/8" Depth Lavatory Sink (Corian 815), Add	316.74	
		For Integral 17-3/8" x 10-13/16" x 5-1/2" Depth Lavatory Sink (Corian 816), Add	231.23	
		For Integral 14-3/4" x 10-1/2" x 5-1/2" Depth Lavatory Sink (Corian 820), Add	220.39	
		For Integral 18-7/8" x 13-3/4" x 5-7/8" Depth Lavatory Sink (Corian 830), Add	316.74	
		For Integral 20" x 13-3/8" x 6-1/4" Depth Lavatory Sink (Corian 831), Add	316.74	
		For Integral 19-3/4" x 14-1/4" x 5-7/8" Depth Lavatory Sink (Corian 835), Add	316.74	
		For Integral 17" x 14" x 6" Depth Lavatory Sink (Corian 837), Add	316.74	
		For Up To 1.5 SF Integral Single Basin Kitchen Sink, Add	285.42	
		Note: Single or double bowl.		
		For >1.5 To 2.25 SF Integral Single Basin Kitchen Sink, Add	496.18	
		Note: Single or double bowl.		
		For >2.25 To 3 SF Integral Single Basin Kitchen Sink, Add	664.78	
		Note: Single or double bowl.		
		For >3 SF Integral Single Basin Kitchen Sink, Add	720.18	
		Note: Single or double bowl.		
		For >3 SF Integral Double Basin Kitchen Sink, Add	720.18	
12 36 61 16-0005	SF	1/2" Thick, Solid Color, Solid Surface Countertop With 4" Backsplash	79.33	10.84
		For Up To 50, Add	25.60	
		For >50 To 100, Add	15.15	
		For Integral 16-7/16" x 13" x 5-1/4" Depth Lavatory Sink (Corian 810), Add	250.50	
		For Integral 20-7/16" x 14-7/16" x 6-1/8" Depth Lavatory Sink (Corian 815), Add	316.74	
		For Integral 17-3/8" x 10-13/16" x 5-1/2" Depth Lavatory Sink (Corian 816), Add	231.23	
		For Integral 14-3/4" x 10-1/2" x 5-1/2" Depth Lavatory Sink (Corian 820), Add	220.39	
		For Integral 18-7/8" x 13-3/4" x 5-7/8" Depth Lavatory Sink (Corian 830), Add	316.74	
		For Integral 20" x 13-3/8" x 6-1/4" Depth Lavatory Sink (Corian 831), Add	316.74	
		For Integral 19-3/4" x 14-1/4" x 5-7/8" Depth Lavatory Sink (Corian 835), Add	316.74	
		For Integral 17" x 14" x 6" Depth Lavatory Sink (Corian 837), Add	316.74	
		For Up To 1.5 SF Integral Single Basin Kitchen Sink, Add	285.42	
		Note: Single or double bowl.		
		For >1.5 To 2.25 SF Integral Single Basin Kitchen Sink, Add	496.18	
		Note: Single or double bowl.		
		For >2.25 To 3 SF Integral Single Basin Kitchen Sink, Add	664.78	
		Note: Single or double bowl.		
		For >3 SF Integral Single Basin Kitchen Sink, Add	720.18	
		Note: Single or double bowl.		
		For >3 SF Integral Double Basin Kitchen Sink, Add	720.18	
12 36 61 16-0006	LF	1/2" Thick, Solid Color, Solid Surface End Splash For Solid Surface Countertops	27.19	4.61
12 36 61 16-0007	EA	Cutout For Undercounter Sink In Solid Surface Countertop	162.68	
		Note: Not including integral seamed sinks		

12 36 61 16-0008 Integral Seamless Solid Surface Lavatory (12 36 61 16-0001)

Note: Includes sink cutout and hard seam of lavatory to countertop See CSI section 12 36 61 16-0002 for Solid Surface Countertops.

12 36 61 16-0009	EA	16-1/2" x 13-1/8" x 5-1/2" Depth, Integral Solid Surface Lavatory Sink (Corian 810)	287.38	
12 36 61 16-0010	EA	20-7/16" x 14-7/16" x 6-1/8" Depth, Integral Solid Surface Lavatory Sink (Corian 815)	353.62	
12 36 61 16-0011	EA	17-3/8" x 10-13/16" x 5-1/2" Depth, Integral Solid Surface Lavatory Sink (Corian 816)	268.11	
12 36 61 16-0012	EA	14-3/4" x 10-1/2" x 5-1/2" Depth, Integral Solid Surface Lavatory Sink (Corian 820)	257.27	
12 36 61 16-0013	EA	18-7/8" x 13-3/4" x 5-7/8" Depth, Integral Solid Surface Lavatory Sink (Corian 830)	353.62	
12 36 61 16-0014	EA	20" x 13-3/8" x 6-1/4" Depth, Integral Solid Surface Lavatory Sink (Corian 831)	353.62	
12 36 61 16-0015	EA	19-3/4" x 14-1/4" x 5-7/8" Depth, Integral Solid Surface Lavatory Sink (Corian 835)	353.62	
12 36 61 16-0016	EA	17" x 14" x 6" Depth, Integral Solid Surface Lavatory Sink (Corian 837)	353.62	

12	12	Furnishings
	12 30	Casework
	12 36	Countertops



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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12 36 61 16-0017	Integral Seamless Solid Surface Kitchen Sink <small>(12 36 61 16-0001)</small>		
	<small>Note: Includes sink cutout and hard seam of sink to countertop See CSI section 12 36 61 16-0002 for Solid Surface Countertops.</small>		
12 36 61 16-0018	EA Up To 1.5 SF, Single Basin, Integral Solid Surface Kitchen Sink.....	372.19	
12 36 61 16-0019	EA >1.5 To 2.25 SF, Single Basin, Integral Solid Surface Kitchen Sink	582.95	
12 36 61 16-0020	EA >2.25 To 3.0 SF, Single Basin, Integral Solid Surface Kitchen Sink	751.55	
12 36 61 16-0021	EA >3.0 SF, Single Basin, Integral Solid Surface Kitchen Sink	806.95	
12 36 61 16-0022	EA >3.0 SF, Double Basin, Integral Solid Surface Kitchen Sink	806.95	

12 36 61 19 Quartz Agglomerate Countertops (12 36 61)

12 36 61 19-0001	Quartz Agglomerate Countertops <small>(12 36 61 19)</small>		
	<small>Note: Includes finished ends and all edge types such as bullnose, ogee, roundover, bevel, etc.</small>		
12 36 61 19-0002	SF 3/4" Thick, Quartz Agglomerate Countertop Without Backsplash	111.03	23.86
12 36 61 19-0003	SF 1-1/4" Thick, Quartz Agglomerate Countertop Without Backsplash	136.00	23.86
12 36 61 19-0004	SF 3/4" Thick, Quartz Agglomerate Countertop With Backsplash	123.78	27.77
12 36 61 19-0005	SF 1-1/4" Thick, Quartz Agglomerate Countertop With Backsplash	148.73	27.77
12 36 61 19-0006	LF Quartz Agglomerate Countertop End Splash For Quartz Agglomerate Countertops	19.95	4.61
12 36 61 19-0007	EA Cutout For Sink And/or Faucet In Quartz Agglomerate Countertop	162.68	

12 40 Furnishings and Accessories (12)

12 41 Office Accessories (12 40)

12 41 11 Office Accessories (12 41)

12 41 11 00-0001	Wall Mounted Office Accessories <small>(12 41 11)</small>		
12 41 11 00-0002	EA Manual Pencil Sharpener, Wall Mounted (Bostitch® BOSMPS1BLK)	25.03	3.77
12 41 11 00-0003	EA Wall Mounted Flag	18.37	3.77
12 41 11 00-0004	Desk Edge Mounted Clamps <small>(12 41 11)</small>		
12 41 11 00-0005	EA Aluminum Desk Edge Clamp Mount Bracket For Plexiglass And Acrylic Panels	40.54	
	<small>Note: Adjustable hand screw mounting to fit 3/4" to 2" desk and table tops, clamp adjusts to support 1/8" to 3/8" thick panels.</small>		
	<small>For >10 To 50, Deduct</small>	-9.89	
	<small>For >50, Deduct</small>	-15.83	

12 48 Rugs and Mats (12 40)

12 48 13 Entrance Floor Mats and Frames (12 48)

12 48 13 13 Entrance Floor Mats (12 48 13)

12 48 13 13-0001	Floor Mats <small>(12 48 13 13)</small>		
12 48 13 13-0002	SF 3/8" Thick Solid Recessable Floor Mat	35.34	2.58
	<small>For Colors, Add</small>	6.04	
12 48 13 13-0003	SF 1/2" Thick Solid Recessable Floor Mat	44.63	2.58
	<small>For Colors, Add</small>	7.89	
12 48 13 13-0004	SF 3/8" Thick Perforated Recessable Floor Mat	37.66	2.58
	<small>For Colors, Add</small>	6.50	
12 48 13 13-0005	SF 1/2" Thick Perforated Recessable Floor Mat	46.95	2.58
	<small>For Colors, Add</small>	8.36	

12 48 13 13-0006 Link Mats (12 48 13 13)

	<small>Note: Includes nosing.</small>		
12 48 13 13-0007	SF 3/8" Link Mats, Aluminum	49.55	2.58
12 48 13 13-0008	SF Black Rubber Link Mats With Galvanized Tie Rods	37.08	2.58
12 48 13 13-0009	SF 3/8" Thick, Galvanized Steel Link Mats	23.71	2.58
12 48 13 13-0010	SF Vinyl Link Mats, Color	40.53	2.58
12 48 13 13-0011	LF Rubber Nosing	4.34	1.13

12 48 13 13-0012 Duckboard (12 48 13 13)

12 48 13 13-0013	SF Aluminum Slats	71.50	2.82
12 48 13 13-0014	SF Hardwood Strips On Rubber Base	13.68	2.82
12 48 13 13-0015	SF Assembled With Brass Rods And Vinyl Spacers	14.87	2.82
12 48 13 13-0016	SF Tire Fabric, 3/4" Thick	23.08	2.82
12 48 13 13-0017	SF Vinyl, 36" Wide, Hollow Top And Bottom	21.03	2.82
12 48 13 13-0018	SF Vinyl, 36" Wide, Solid Top And Bottom	33.18	2.82

12 48 13 16 Entrance Floor Mat Frames (12 48 13)

12 48 13 16-0001	Recessed Frames <small>(12 48 13 16)</small>		
12 48 13 16-0002	LF Aluminum Recessed Embedded Frame	29.58	4.34
12 48 13 16-0003	LF Bronze Recessed Embedded Frame	18.81	4.34



Furnishings	12
Furnishings and Accessories	12 40
Rugs and Mats	12 48

12

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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12 50 Furniture ⁽¹²⁾

12 56 Institutional Furniture ^(12 50)

12 56 39 Lecterns ^(12 56)

12 56 39 00-0001	Lectern ^(12 56 39)		
12 56 39 00-0002	EA CON 1500-32 Van Oak Lectern.....	6,170.31	48.60

12 59 Systems Furniture ^(12 50)

12 59 13 Panel-Hung Component System Furniture ^(12 59)

12 59 13 00-0001 Open Office Systems Furniture Components ^(12 59 13)

Note: Excludes electrical wire and wiring devices.

12 59 13 00-0002	EA 34H 24W Fabric Covered Panel - Component Systems Furniture.....	305.58	26.74
	<i>For Tackable Acoustical Barrier Panel, Add</i>	54.92	
	<i>For Acoustical Panel, Add</i>	59.70	
	<i>For Enameled Surface, Deduct</i>	-23.88	
12 59 13 00-0003	EA 34H 30W Fabric Covered Panel - Component Systems Furniture.....	339.62	29.75
	<i>For Tackable Acoustical Barrier Panel, Add</i>	61.04	
	<i>For Acoustical Panel, Add</i>	66.35	
	<i>For Enameled Surface, Deduct</i>	-26.54	
12 59 13 00-0004	EA 34H 36W Fabric Covered Panel - Component Systems Furniture.....	363.15	31.69
	<i>For Tackable Acoustical Barrier Panel, Add</i>	65.27	
	<i>For Acoustical Panel, Add</i>	70.94	
	<i>For Enameled Surface, Deduct</i>	-28.38	
12 59 13 00-0005	EA 34H 48W Fabric Covered Panel - Component Systems Furniture.....	406.91	35.59
	<i>For Tackable Acoustical Barrier Panel, Add</i>	73.14	
	<i>For Acoustical Panel, Add</i>	79.50	
	<i>For Enameled Surface, Deduct</i>	-31.80	
12 59 13 00-0006	EA 42H 24W Fabric Covered Panel - Component Systems Furniture.....	310.44	27.13
	<i>For Tackable Acoustical Barrier Panel, Add</i>	55.80	
	<i>For Acoustical Panel, Add</i>	60.65	
	<i>For Enameled Surface, Deduct</i>	-24.26	
12 59 13 00-0007	EA 42H 30W Fabric Covered Panel - Component Systems Furniture.....	350.95	30.62
	<i>For Tackable Acoustical Barrier Panel, Add</i>	63.08	
	<i>For Acoustical Panel, Add</i>	68.57	
	<i>For Enameled Surface, Deduct</i>	-27.43	
12 59 13 00-0008	EA 42H 36W Fabric Covered Panel - Component Systems Furniture.....	393.11	34.41
	<i>For Tackable Acoustical Barrier Panel, Add</i>	70.66	
	<i>For Acoustical Panel, Add</i>	76.80	
	<i>For Enameled Surface, Deduct</i>	-30.72	
12 59 13 00-0009	EA 42H 48W Fabric Covered Panel - Component Systems Furniture.....	462.02	40.34
	<i>For Tackable Acoustical Barrier Panel, Add</i>	83.04	
	<i>For Acoustical Panel, Add</i>	90.26	
	<i>For Enameled Surface, Deduct</i>	-36.11	
12 59 13 00-0010	EA 62H 12W Fabric Covered Panel - Component Systems Furniture.....	299.09	26.15
	<i>For Tackable Acoustical Barrier Panel, Add</i>	53.76	
	<i>For Acoustical Panel, Add</i>	58.43	
	<i>For Enameled Surface, Deduct</i>	-23.37	
12 59 13 00-0011	EA 62H 24W Fabric Covered Panel - Component Systems Furniture.....	367.99	32.17
	<i>For Tackable Acoustical Barrier Panel, Add</i>	66.14	
	<i>For Acoustical Panel, Add</i>	71.89	
	<i>For Enameled Surface, Deduct</i>	-28.76	
12 59 13 00-0012	EA 62H 36W Fabric Covered Panel - Component Systems Furniture.....	460.42	40.25
	<i>For Tackable Acoustical Barrier Panel, Add</i>	82.75	
	<i>For Acoustical Panel, Add</i>	89.95	
	<i>For Enameled Surface, Deduct</i>	-35.98	
12 59 13 00-0013	EA 62H 48W Fabric Covered Panel - Component Systems Furniture.....	551.17	48.13
	<i>For Tackable Acoustical Barrier Panel, Add</i>	99.07	
	<i>For Acoustical Panel, Add</i>	107.68	
	<i>For Enameled Surface, Deduct</i>	-43.07	
12 59 13 00-0014	EA 34" Draw Rod Panel Connector Hardware	16.69	1.45
12 59 13 00-0015	EA 42" Draw Rod Panel Connector Hardware	16.69	1.45
12 59 13 00-0016	EA 62" Draw Rod Panel Connector Hardware	17.80	1.55
12 59 13 00-0017	EA 34" Two-Way 90 Degree Panel Connector Hardware.....	76.76	6.71
12 59 13 00-0018	EA 42" Two-Way 90 Degree Panel Connector Hardware.....	89.00	7.78
12 59 13 00-0019	EA 62" Two-Way 90 Degree Panel Connector Hardware.....	102.35	8.94
12 59 13 00-0020	EA 34" Three-Way 90 Degree Panel Connector Hardware.....	119.04	10.40
12 59 13 00-0021	EA 42" Three-Way 90 Degree Panel Connector Hardware.....	137.96	12.06
12 59 13 00-0022	EA 62" Three-Way 90 Degree Panel Connector Hardware.....	160.20	14.00
12 59 13 00-0023	EA 34" Four-Way 90 Degree Panel Connector Hardware.....	150.20	13.12
12 59 13 00-0024	EA 42" Four-Way 90 Degree Panel Connector Hardware.....	175.78	15.36
12 59 13 00-0025	EA 62" Four-Way 90 Degree Panel Connector Hardware.....	211.39	18.47
12 59 13 00-0026	EA 34" Panel End Cap Hardware.....	25.59	2.24
12 59 13 00-0027	EA 42" Panel End Cap Hardware.....	28.92	2.53
12 59 13 00-0028	EA 62" Panel End Cap Hardware.....	31.15	2.72
12 59 13 00-0029	EA 28" Variable Height Panel End Filler.....	28.23	2.53
	Note: Field cut to appropriate length.		
12 59 13 00-0030	EA Two-Way Trim Cover For Cable Management Raceway.....	14.52	1.26

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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12 59 13 00-0031	EA		Three-Way Trim Cover For Cable Management Raceway	15.32	1.36
12 59 13 00-0032	EA		Four-Way Trim Cover For Cable Management Raceway	17.73	1.55
12 59 13 00-0033	EA		Finished End Trim Cover For Cable Management Raceway	14.52	1.26
12 59 13 00-0034	EA		12" Cable Management Raceway Assembly	29.84	2.63
			Note: Includes base plate, two side covers, and 2 side cover fillers.		
12 59 13 00-0035	EA		24" Cable Management Raceway Assembly	33.88	2.92
			Note: Includes base plate, two side covers, and 2 side cover fillers.		
12 59 13 00-0036	EA		30" Cable Management Raceway Assembly	34.68	3.01
			Note: Includes base plate, two side covers, and 2 side cover fillers.		
12 59 13 00-0037	EA		36" Cable Management Raceway Assembly	38.72	3.40
			Note: Includes base plate, two side covers, and 2 side cover fillers.		
12 59 13 00-0038	EA		48" Cable Management Raceway Assembly	43.55	3.79
			Note: Includes base plate, two side covers, and 2 side cover fillers.		
12 59 13 00-0039	EA		24" x 36" Radiused Edge Rectangular Hanging Work Surface	234.25	20.42
12 59 13 00-0040	EA		30" x 36" Radiused Edge Rectangular Hanging Work Surface	288.56	25.18
12 59 13 00-0041	EA		24" x 48" Radiused Edge Rectangular Hanging Work Surface	272.35	23.82
12 59 13 00-0042	EA		30" x 48" Radiused Edge Rectangular Hanging Work Surface	340.45	29.75
12 59 13 00-0043	EA		24" x 60" Radiused Edge Rectangular Hanging Work Surface	343.67	30.04
12 59 13 00-0044	EA		30" x 60" Radiused Edge Rectangular Hanging Work Surface	432.86	37.91
12 59 13 00-0045	EA		24" x 72" Radiused Edge Rectangular Hanging Work Surface	417.44	36.46
12 59 13 00-0046	EA		30" x 72" Radiused Edge Rectangular Hanging Work Surface	524.40	45.79
12 59 13 00-0047	EA		30" x 60" Radiused Edge Table	931.56	81.46
12 59 13 00-0048	EA		30" x 72" Radiused Edge Table	1,018.01	89.05
12 59 13 00-0049	EA		14" x 24" Radiused Edge Transaction Surface	111.86	9.82
12 59 13 00-0050	EA		14" x 36" Radiused Edge Transaction Surface	127.24	11.09
12 59 13 00-0051	EA		14" x 48" Radiused Edge Transaction Surface	142.66	12.44
12 59 13 00-0052	EA		14" x 60" Radiused Edge Transaction Surface	177.51	15.55
12 59 13 00-0053	EA		14" x 72" Radiused Edge Transaction Surface	213.17	18.66
12 59 13 00-0054	EA		14" Right Angle Corner Transaction Surface	372.87	32.57
12 59 13 00-0055	EA		Transaction Surface Support	29.54	2.58
12 59 13 00-0056	EA		Plastic Pencil Drawer	32.28	2.53
12 59 13 00-0057	EA		15-1/2" x 24" Hanging Shelf	108.90	9.53
12 59 13 00-0058	EA		15-1/2" x 36" Hanging Shelf	118.56	10.30
12 59 13 00-0059	EA		15-1/2" x 48" Hanging Shelf	126.64	11.09
12 59 13 00-0060	EA		24" Flipper Door - Top And Front Closure	187.92	16.43
			Note: Used with hanging shelf.		
12 59 13 00-0061	EA		36" Flipper Door - Top And Front Closure	219.40	19.25
			Note: Used with hanging shelf.		
12 59 13 00-0062	EA		48" Flipper Door - Top And Front Closure	251.66	21.97
			Note: Used with hanging shelf.		
12 59 13 00-0063	EA		24" Suspended Lateral File, Lockable	648.02	56.33
12 59 13 00-0064	EA		30" Suspended Lateral File, Lockable	684.44	59.50
12 59 13 00-0065	EA		36" Suspended Lateral File, Lockable	722.18	62.78
12 59 13 00-0066	EA		48" Suspended Lateral File, Lockable	789.86	68.66
12 59 13 00-0067	EA		Fully Adjustable Vinyl Keyboard Tray	293.63	25.66
12 59 13 00-0068	EA		Palm Rest For Vinyl Keyboard Tray	45.96	4.08
12 59 13 00-0069	EA		24" x 36" Radiused Edge Corner Work Surface	370.94	32.46
12 59 13 00-0070	EA		File Drawer Organizer	119.39	10.40
12 59 13 00-0071	EA		Suspended Lateral File Converter Bracket	25.81	2.24
12 59 13 00-0072	EA		Utility Task Light	129.05	11.28

12 59 13 00-0073 Disassemble And Store Systems Furniture Components (12 59 13)

12 59 13 00-0074	EA		Disassemble And Store 34H 24W Fabric Covered Panel	33.41	
12 59 13 00-0075	EA		Disassemble And Store 34H 30W Fabric Covered Panel	37.13	
12 59 13 00-0076	EA		Disassemble And Store 34H 36W Fabric Covered Panel	39.70	
12 59 13 00-0077	EA		Disassemble And Store 34H 48W Fabric Covered Panel	44.48	
12 59 13 00-0078	EA		Disassemble And Store 42H 24W Fabric Covered Panel	33.94	
12 59 13 00-0079	EA		Disassemble And Store 42H 30W Fabric Covered Panel	38.36	
12 59 13 00-0080	EA		Disassemble And Store 42H 36W Fabric Covered Panel	42.98	
12 59 13 00-0081	EA		Disassemble And Store 42H 48W Fabric Covered Panel	50.51	
12 59 13 00-0082	EA		Disassemble And Store 62H 12W Fabric Covered Panel	32.70	
12 59 13 00-0083	EA		Disassemble And Store 62H 24W Fabric Covered Panel	40.23	
12 59 13 00-0084	EA		Disassemble And Store 62H 36W Fabric Covered Panel	50.33	
12 59 13 00-0085	EA		Disassemble And Store 62H 48W Fabric Covered Panel	60.27	
12 59 13 00-0086	EA		Disassemble And Store 34" Draw Rod Panel Connector Hardware	1.83	
12 59 13 00-0087	EA		Disassemble And Store 42" Draw Rod Panel Connector Hardware	1.83	
12 59 13 00-0088	EA		Disassemble And Store 62" Draw Rod Panel Connector Hardware	1.95	
12 59 13 00-0089	EA		Disassemble And Store 34" Two-Way 90 Degree Panel Connector Hardware	8.40	
12 59 13 00-0090	EA		Disassemble And Store 42" Two-Way 90 Degree Panel Connector Hardware	9.73	
12 59 13 00-0091	EA		Disassemble And Store 62" Two-Way 90 Degree Panel Connector Hardware	11.19	
12 59 13 00-0092	EA		Disassemble And Store 34" Three-Way 90 Degree Panel Connector Hardware	13.01	
12 59 13 00-0093	EA		Disassemble And Store 42" Three-Way 90 Degree Panel Connector Hardware	15.08	
12 59 13 00-0094	EA		Disassemble And Store 62" Three-Way 90 Degree Panel Connector Hardware	17.52	
12 59 13 00-0095	EA		Disassemble And Store 34" Four-Way 90 Degree Panel Connector Hardware	16.42	
12 59 13 00-0096	EA		Disassemble And Store 42" Four-Way 90 Degree Panel Connector Hardware	19.22	
12 59 13 00-0097	EA		Disassemble And Store 62" Four-Way 90 Degree Panel Connector Hardware	23.11	
12 59 13 00-0098	EA		Disassemble And Store 34" Panel End Cap Hardware	2.80	
12 59 13 00-0099	EA		Disassemble And Store 42" Panel End Cap Hardware	3.16	
12 59 13 00-0100	EA		Disassemble And Store 62" Panel End Cap Hardware	3.40	
12 59 13 00-0101	EA		Disassemble And Store Variable Height Panel End Filler	3.09	
12 59 13 00-0102	EA		Disassemble And Store Two-Way Trim Cover For Cable Management Raceway	1.59	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
12 59 13 00-0103 EA Disassemble And Store Three-Way Trim Cover For Cable Management Raceway.....	1.68	
12 59 13 00-0104 EA Disassemble And Store Four-Way Trim Cover For Cable Management Raceway.....	1.94	
12 59 13 00-0105 EA Disassemble And Store Finished End Trim Cover For Cable Management Raceway.....	1.59	
12 59 13 00-0106 EA Disassemble And Store 12" Cable Management Raceway Assembly.....	3.26	
12 59 13 00-0107 EA Disassemble And Store 24" Cable Management Raceway Assembly.....	3.70	
12 59 13 00-0108 EA Disassemble And Store 30" Cable Management Raceway Assembly.....	3.79	
12 59 13 00-0109 EA Disassemble And Store 36" Cable Management Raceway Assembly.....	4.23	
12 59 13 00-0110 EA Disassemble And Store 48" Cable Management Raceway Assembly.....	4.77	
12 59 13 00-0111 EA Disassemble And Store 24" x 36" Radiused Edge Rectangular Hanging Work Surface.....	25.61	
12 59 13 00-0112 EA Disassemble And Store 30" x 36" Radiused Edge Rectangular Hanging Work Surface.....	31.54	
12 59 13 00-0113 EA Disassemble And Store 24" x 48" Radiused Edge Rectangular Hanging Work Surface.....	29.78	
12 59 13 00-0114 EA Disassemble And Store 30" x 48" Radiused Edge Rectangular Hanging Work Surface.....	37.22	
12 59 13 00-0115 EA Disassemble And Store 24" x 60" Radiused Edge Rectangular Hanging Work Surface.....	37.57	
12 59 13 00-0116 EA Disassemble And Store 30" x 60" Radiused Edge Rectangular Hanging Work Surface.....	47.32	
12 59 13 00-0117 EA Disassemble And Store 24" x 72" Radiused Edge Rectangular Hanging Work Surface.....	45.64	
12 59 13 00-0118 EA Disassemble And Store 30" x 72" Radiused Edge Rectangular Hanging Work Surface.....	57.34	
12 59 13 00-0119 EA Disassemble And Store 30" x 60" Radiused Edge Table.....	88.55	
12 59 13 00-0120 EA Disassemble And Store 30" x 72" Radiused Edge Table.....	111.27	
12 59 13 00-0121 EA Disassemble And Store 14" x 24" Radiused Edge Transaction Surface.....	12.23	
12 59 13 00-0122 EA Disassemble And Store 14" x 36" Radiused Edge Transaction Surface.....	13.91	
12 59 13 00-0123 EA Disassemble And Store 14" x 48" Radiused Edge Transaction Surface.....	15.60	
12 59 13 00-0124 EA Disassemble And Store 14" x 60" Radiused Edge Transaction Surface.....	19.40	
12 59 13 00-0125 EA Disassemble And Store 14" x 72" Radiused Edge Transaction Surface.....	23.31	
12 59 13 00-0126 EA Disassemble And Store 14" Right Angle Corner Transaction Surface.....	40.76	
12 59 13 00-0127 EA Disassemble And Store Transaction Surface Support.....	3.22	
12 59 13 00-0128 EA Disassemble And Store Plastic Pencil Drawer.....	3.18	
12 59 13 00-0129 EA Disassemble And Store 15-1/2" x 24" Hanging Shelf.....	11.91	
12 59 13 00-0130 EA Disassemble And Store 15-1/2" x 36" Hanging Shelf.....	12.96	
12 59 13 00-0131 EA Disassemble And Store 15-1/2" x 48" Hanging Shelf.....	13.84	
12 59 13 00-0132 EA Disassemble And Store 24" Flipper Door And Shelf.....	20.55	
12 59 13 00-0133 EA Disassemble And Store 36" Flipper Door And Shelf.....	23.99	
12 59 13 00-0134 EA Disassemble And Store 48" Flipper Door And Shelf.....	27.51	
12 59 13 00-0135 EA Disassemble And Store 24" Suspended Lateral File.....	70.42	
12 59 13 00-0136 EA Disassemble And Store 30" Suspended Lateral File.....	74.37	
12 59 13 00-0137 EA Disassemble And Store 36" Suspended Lateral File.....	78.47	
12 59 13 00-0138 EA Disassemble And Store 48" Suspended Lateral File.....	85.84	
12 59 13 00-0139 EA Disassemble And Store Fully Adjustable Vinyl Keyboard Tray.....	32.10	
12 59 13 00-0140 EA Disassemble And Store 24" x 36" Radiused Edge Corner Work Surface.....	40.56	
12 59 13 00-0141 EA Disassemble And Store Utility Task Light.....	14.11	
12 59 13 00-0142	Reconfigure Systems Furniture Components <small>(12 59 13)</small>	
12 59 13 00-0143 EA Reconfigure 34H 24W Fabric Covered Panel.....	35.63	
12 59 13 00-0144 EA Reconfigure 34H 30W Fabric Covered Panel.....	39.59	
12 59 13 00-0145 EA Reconfigure 34H 36W Fabric Covered Panel.....	42.33	
12 59 13 00-0146 EA Reconfigure 34H 48W Fabric Covered Panel.....	47.43	
12 59 13 00-0147 EA Reconfigure 42H 24W Fabric Covered Panel.....	36.19	
12 59 13 00-0148 EA Reconfigure 42H 30W Fabric Covered Panel.....	40.91	
12 59 13 00-0149 EA Reconfigure 42H 36W Fabric Covered Panel.....	45.82	
12 59 13 00-0150 EA Reconfigure 42H 48W Fabric Covered Panel.....	53.85	
12 59 13 00-0151 EA Reconfigure 62H 12W Fabric Covered Panel.....	34.86	
12 59 13 00-0152 EA Reconfigure 62H 24W Fabric Covered Panel.....	42.90	
12 59 13 00-0153 EA Reconfigure 62H 36W Fabric Covered Panel.....	53.66	
12 59 13 00-0154 EA Reconfigure 62H 48W Fabric Covered Panel.....	64.25	
12 59 13 00-0155 EA Reconfigure 34" Draw Rod Panel Connector Hardware.....	1.95	
12 59 13 00-0156 EA Reconfigure 42" Draw Rod Panel Connector Hardware.....	1.95	
12 59 13 00-0157 EA Reconfigure 62" Draw Rod Panel Connector Hardware.....	2.08	
12 59 13 00-0158 EA Reconfigure 34" Two-Way 90 Degree Panel Connector Hardware.....	8.95	
12 59 13 00-0159 EA Reconfigure 42" Two-Way 90 Degree Panel Connector Hardware.....	10.37	
12 59 13 00-0160 EA Reconfigure 62" Two-Way 90 Degree Panel Connector Hardware.....	11.93	
12 59 13 00-0161 EA Reconfigure 34" Three-Way 90 Degree Panel Connector Hardware.....	13.87	
12 59 13 00-0162 EA Reconfigure 42" Three-Way 90 Degree Panel Connector Hardware.....	16.08	
12 59 13 00-0163 EA Reconfigure 62" Three-Way 90 Degree Panel Connector Hardware.....	18.67	
12 59 13 00-0164 EA Reconfigure 34" Four-Way 90 Degree Panel Connector Hardware.....	17.51	
12 59 13 00-0165 EA Reconfigure 42" Four-Way 90 Degree Panel Connector Hardware.....	20.49	
12 59 13 00-0166 EA Reconfigure 62" Four-Way 90 Degree Panel Connector Hardware.....	24.64	
12 59 13 00-0167 EA Reconfigure 34" Panel End Cap Hardware.....	2.98	
12 59 13 00-0168 EA Reconfigure 42" Panel End Cap Hardware.....	3.37	
12 59 13 00-0169 EA Reconfigure 62" Panel End Cap Hardware.....	3.63	
12 59 13 00-0170 EA Reconfigure Variable Height Panel End Filler.....	3.29	
12 59 13 00-0171 EA Reconfigure Two-Way Trim Cover For Cable Management Raceway.....	1.70	
12 59 13 00-0172 EA Reconfigure Three-Way Trim Cover For Cable Management Raceway.....	1.79	
12 59 13 00-0173 EA Reconfigure Four-Way Trim Cover For Cable Management Raceway.....	2.07	
12 59 13 00-0174 EA Reconfigure Finished End Trim Cover For Cable Management Raceway.....	1.70	
12 59 13 00-0175 EA Reconfigure 12" Cable Management Raceway Assembly.....	3.48	
12 59 13 00-0176 EA Reconfigure 24" Cable Management Raceway Assembly.....	3.95	
12 59 13 00-0177 EA Reconfigure 30" Cable Management Raceway Assembly.....	4.04	
12 59 13 00-0178 EA Reconfigure 36" Cable Management Raceway Assembly.....	4.51	
12 59 13 00-0179 EA Reconfigure 48" Cable Management Raceway Assembly.....	5.08	
12 59 13 00-0180 EA Reconfigure 24" x 36" Radiused Edge Rectangular Hanging Work Surface.....	27.31	
12 59 13 00-0181 EA Reconfigure 30" x 36" Radiused Edge Rectangular Hanging Work Surface.....	33.63	

12	12	Furnishings
	12 50	Furniture
	12 59	Systems Furniture



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
12 59	13 00-0182	EA	Reconfigure 24" x 48" Radiused Edge Rectangular Hanging Work Surface.....	31.74	
12 59	13 00-0183	EA	Reconfigure 30" x 48" Radiused Edge Rectangular Hanging Work Surface.....	39.68	
12 59	13 00-0184	EA	Reconfigure 24" x 60" Radiused Edge Rectangular Hanging Work Surface.....	40.06	
12 59	13 00-0185	EA	Reconfigure 30" x 60" Radiused Edge Rectangular Hanging Work Surface.....	50.45	
12 59	13 00-0186	EA	Reconfigure 24" x 72" Radiused Edge Rectangular Hanging Work Surface.....	48.66	
12 59	13 00-0187	EA	Reconfigure 30" x 72" Radiused Edge Rectangular Hanging Work Surface.....	61.13	
12 59	13 00-0188	EA	Reconfigure 30" x 60" Radiused Edge Table.....	108.59	
12 59	13 00-0189	EA	Reconfigure 30" x 72" Radiused Edge Table.....	118.67	
12 59	13 00-0190	EA	Reconfigure 14" x 24" Radiused Edge Transaction Surface.....	13.04	
12 59	13 00-0191	EA	Reconfigure 14" x 36" Radiused Edge Transaction Surface.....	14.83	
12 59	13 00-0192	EA	Reconfigure 14" x 48" Radiused Edge Transaction Surface.....	16.63	
12 59	13 00-0193	EA	Reconfigure 14" x 60" Radiused Edge Transaction Surface.....	20.69	
12 59	13 00-0194	EA	Reconfigure 14" x 72" Radiused Edge Transaction Surface.....	24.85	
12 59	13 00-0195	EA	Reconfigure 14" Right Angle Corner Transaction Surface.....	43.46	
12 59	13 00-0196	EA	Reconfigure Transaction Surface Support.....	3.43	
12 59	13 00-0197	EA	Reconfigure 15-1/2" x 24" Hanging Shelf.....	12.69	
12 59	13 00-0198	EA	Reconfigure 15-1/2" x 36" Hanging Shelf.....	13.82	
12 59	13 00-0199	EA	Reconfigure 15-1/2" x 48" Hanging Shelf.....	14.76	
12 59	13 00-0200	EA	Reconfigure 24" Flipper Door And Shelf.....	21.90	
12 59	13 00-0201	EA	Reconfigure 36" Flipper Door And Shelf.....	25.57	
12 59	13 00-0202	EA	Reconfigure 48" Flipper Door And Shelf.....	29.33	
12 59	13 00-0203	EA	Reconfigure 24" Suspended Lateral File.....	75.12	
12 59	13 00-0204	EA	Reconfigure 30" Suspended Lateral File.....	79.34	
12 59	13 00-0205	EA	Reconfigure 36" Suspended Lateral File.....	83.71	
12 59	13 00-0206	EA	Reconfigure 48" Suspended Lateral File.....	91.57	
12 59	13 00-0207	EA	Reconfigure 24" x 36" Radiused Edge Corner Work Surface.....	43.24	

12 60 Multiple Seating ⁽¹²⁾

12 61 Fixed Audience Seating ^(12 60)

12 61 13 Upholstered Audience Seating ^(12 61)

12 61 13 00-0001 Upholstered Audience Seating ^(12 61 13)

12 61	13 00-0002	EA	Upholstered Seat, Upholstered Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating (Irwin Marquee 51.12.00.4).....	607.71	47.17
			Note: Includes Marquee back with polymer rear panel, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, open aisle standards, number 4 steel chair platform, floor mount, and comfort curved polymer arms.		
			<i>For >100 To 249, Deduct</i>	-75.77	
			<i>For >249 To 749, Deduct</i>	-90.93	
			<i>For >749, Deduct</i>	-101.03	
			<i>For Up To 9, Add</i>	823.41	
			<i>For >9 To 24, Add</i>	328.35	
			<i>For Expansion Anchor Mounting With Anchor Caps, Add</i>	26.27	
			<i>For Epoxy Anchor Mounting With Anchor Caps, Add</i>	33.93	
12 61	13 00-0003	EA	Upholstered Seat, Upholstered Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating With Veneer Insert Aisle Panel (Irwin Marquee 51.12.10.4).....	640.39	47.17
			Note: Includes Marquee back with polymer rear panel, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, number 10 aisle panel with veneer insert panel, number 4 steel chair platform, floor mount, and flat solid hardwood arms.		
			<i>For >100 To 249, Deduct</i>	-80.68	
			<i>For >249 To 749, Deduct</i>	-96.81	
			<i>For >749, Deduct</i>	-107.57	
			<i>For Up To 9, Add</i>	822.90	
			<i>For >9 To 24, Add</i>	328.08	
			<i>For Expansion Anchor Mounting With Anchor Caps, Add</i>	26.27	
			<i>For Epoxy Anchor Mounting With Anchor Caps, Add</i>	33.93	
12 61	13 00-0004	EA	Upholstered Seat, Upholstered Back With Veneer Surfaced Rear Panel, Number 4 Chair Platform, Fixed Audience Seating (Irwin Saturn 22.12.00.4).....	788.69	47.17
			Note: Includes Saturn back with veneer surfaced rear panel and exposed fasteners, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, open aisle standards, number 4 steel chair platform, floor mount, and comfort curved polymer arms.		
			<i>For >100 To 249, Deduct</i>	-102.92	
			<i>For >249 To 749, Deduct</i>	-123.51	
			<i>For >749, Deduct</i>	-137.23	
			<i>For Up To 9, Add</i>	823.37	
			<i>For >9 To 24, Add</i>	329.35	
			<i>For Expansion Anchor Mounting With Anchor Caps, Add</i>	26.27	
			<i>For Epoxy Anchor Mounting With Anchor Caps, Add</i>	33.93	
12 61	13 00-0005	EA	Upholstered Seat, Upholstered Back With Veneer Surfaced Rear Panel, Number 4 Chair Platform, Fixed Audience Seating With Veneer Insert Aisle Panel (Irwin Saturn 22.12.10.4).....	821.81	47.17
			Note: Includes Saturn back with veneer surfaced rear panel and exposed fasteners, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, number 10 aisle panel with veneer insert panel, number 4 steel chair platform, floor mount, and comfort curved polymer arms		
			<i>For >100 To 249, Deduct</i>	-107.89	
			<i>For >249 To 749, Deduct</i>	-129.47	
			<i>For >749, Deduct</i>	-143.85	
			<i>For Up To 9, Add</i>	819.96	
			<i>For >9 To 24, Add</i>	330.86	
			<i>For Expansion Anchor Mounting With Anchor Caps, Add</i>	26.27	
			<i>For Epoxy Anchor Mounting With Anchor Caps, Add</i>	33.93	



Furnishings	12	
Multiple Seating	12 60	12
Fixed Audience Seating	12 61	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
12 61 13 00-0006	EA	Upholstered Seat, Upholstered Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating (Irwin Citation 90.12.00.4)	530.01		47.17
		Note: Includes Citation back with polymer rear panel, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, open aisle standards, number 4 steel chair platform, floor mount, and comfort curved polymer arms.			
		For >100 To 249, Deduct	-64.12		
		For >249 To 749, Deduct	-76.94		
		For >749, Deduct	-85.49		
		For Up To 9, Add	825.00		
		For >9 To 24, Add	329.14		
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27		
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93		
12 61 13 00-0007	EA	Upholstered Seat, Upholstered Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating With Laminate Insert Aisle Panel (Irwin Citation 90.12.10.4)	536.54		47.17
		Note: Includes Citation back with polymer rear panel, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, number 10 aisle panel with laminate insert panel, number 4 steel chair platform, floor mount, and comfort curved polymer arms.			
		For >100 To 249, Deduct	-65.10		
		For >249 To 749, Deduct	-78.12		
		For >749, Deduct	-86.80		
		For Up To 9, Add	824.58		
		For >9 To 24, Add	329.83		
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27		
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93		
12 61 13 00-0008	EA	Upholstered Seat, Upholstered Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating With Laminate Surfaced Aisle Panel (Irwin Citation 90.12.86.4)	564.61		47.17
		Note: Includes Citation back with polymer rear panel, upholstered cover over 2" foam, number 12 self rising seat with ergo substrate, number 86 laminate surfaced aisle panel, number 4 steel chair platform, floor mount, and flat solid hardwood arms.			
		For >100 To 249, Deduct	-69.31		
		For >249 To 749, Deduct	-83.17		
		For >749, Deduct	-92.41		
		For Up To 9, Add	822.47		
		For >9 To 24, Add	328.06		
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27		
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93		
12 61 16 Molded-Plastic Audience Seating (12 61)					
12 61 16 00-0001	Molded-Plastic Audience Seating (12 61 16)				
12 61 16 00-0002	EA	Molded Polymer Seat, Molded Polymer Back, Number 30 Chair Platform, Fixed Audience Seating (Irwin Patriot 30.52.00.30)	398.72		47.17
		Note: Includes Patriot back, double wall polymer, number 52 self rising seat torsion spring seat lift, open aisle standards, number 30 steel chair platform, floor mount, and polymer arms.			
		For >100 To 249, Deduct	-44.43		
		For >249 To 749, Deduct	-53.31		
		For >749, Deduct	-59.23		
		For Up To 9, Add	811.51		
		For >9 To 24, Add	325.79		
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27		
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93		
12 61 16 00-0003	EA	Molded Polymer Seat, Molded Polymer Back, Number 30 Chair Platform, Fixed Audience Seating With Laminate Surfaced Aisle Panel (Irwin Patriot 30.52.36.30)	448.10		47.17
		Note: Includes Patriot back, double wall polymer, number 52 self rising seat torsion spring seat lift, number 36 laminate surfaced aisle panel, number 30 steel chair platform, floor mount, and flat laminate surfaced arms.			
		For >100 To 249, Deduct	-51.83		
		For >249 To 749, Deduct	-62.20		
		For >749, Deduct	-69.11		
		For Up To 9, Add	812.04		
		For >9 To 24, Add	324.82		
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27		
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93		
12 61 19 Plywood/Hardwood Audience Seating (12 61)					
12 61 19 00-0001	Plywood/Hardwood Audience Seating (12 61 19)				
12 61 19 00-0002	EA	Veneered Hardwood Seat, Veneered Hardwood Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating (Irwin Crusader 1.14.00.4)	638.45		47.17
		Note: Includes Crusader back, veneer surfaced, number 14 self rising seat, open aisle standards, number 4 steel chair platform, floor mount, and flat solid hardwood arms.			
		For >100 To 249, Deduct	-80.39		
		For >249 To 749, Deduct	-96.46		
		For >749, Deduct	-107.18		
		For Up To 9, Add	852.08		
		For >9 To 24, Add	342.98		
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27		
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93		

12	12	Furnishings
	12 60	Multiple Seating
	12 61	Fixed Audience Seating



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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12 61 19 00-0003	EA	Veneered Hardwood Seat, Veneered Hardwood Back With Polymer Rear Panel, Number 4 Chair Platform, Fixed Audience Seating With Veneer Surfaced Aisle Panel (Irwin Crusader 1.14.86.4)	664.96	47.17
		Note: Includes Crusader back, veneer surfaced, number 14 self rising seat, number 86 veneer surfaced aisle panel, number 4 steel chair platform, floor mount, and flat solid hardwood arms.		
		For >100 To 249, Deduct	-84.36	
		For >249 To 749, Deduct	-101.23	
		For >749, Deduct	-112.48	
		For Up To 9, Add	815.49	
		For >9 To 24, Add	326.20	
		For Expansion Anchor Mounting With Anchor Caps, Add	26.27	
		For Epoxy Anchor Mounting With Anchor Caps, Add	33.93	

12 61 21 Fixed Audience Seating Accessories (12 61)

12 61 21 00-0001 Fixed Audience Seating Accessories (12 61 21)

12 61 21 00-0002	EA	100 Square Inch, Self Storing Writing Tablet For Number 4 Chair Platform, Fixed Audience Seating (Irwin).....	210.38	
		For >100 To 249, Deduct	-30.02	
		For >249 To 749, Deduct	-36.02	
		For >749, Deduct	-40.03	
12 61 21 00-0003	EA	120 Square Inch, Self Storing Writing Tablet For Number 4 Chair Platform, Fixed Audience Seating (Irwin).....	214.23	
		For >100 To 249, Deduct	-30.60	
		For >249 To 749, Deduct	-36.72	
		For >749, Deduct	-40.80	
12 61 21 00-0004	EA	151 Square Inch, Self Storing Writing Tablet For Number 4 Chair Platform, Fixed Audience Seating (Irwin).....	224.27	
		For >100 To 249, Deduct	-32.10	
		For >249 To 749, Deduct	-38.52	
		For >749, Deduct	-42.80	
12 61 21 00-0005	EA	98 Square Inch, Tru-Fold Writing Tablet For Number 30 Chair Platform, Fixed Audience Seating (Irwin)	210.38	
		For >100 To 249, Deduct	-30.02	
		For >249 To 749, Deduct	-36.02	
		For >749, Deduct	-40.03	
12 61 21 00-0006	EA	105 Square Inch, Tru-Fold Writing Tablet For Number 30 Chair Platform, Fixed Audience Seating (Irwin)	225.12	
		For >100 To 249, Deduct	-32.23	
		For >249 To 749, Deduct	-38.68	
		For >749, Deduct	-42.97	
12 61 21 00-0007	EA	Rubber Foot Shrouds For Number 4 Chair Platform (Per Chair), Fixed Audience Seating (Irwin).....	17.25	

12 62 Portable-Audience Seating (12 60)

12 62 23 Portable Bleachers (12 62)

12 62 23 00-0001 Metal Bleachers, Outdoor, Portable (12 62 23)

Note: Average seating is 18".

12 62 23 00-0002 Non-Elevated Portable Aluminum Bleacher (12 62 23 00-0001)

12 62 23 00-0003	SEA	2 To 5 Rows, Non-Elevated Portable Aluminum Bleacher Price Per Seat.....	171.69	4.46
		For Each "Tip and Roll" Set (Includes Two Fixed Wheels), Add To Total Structure	165.00	
		For Each "Flip and Roll" Set (Includes Four Wheels), Add To Total Structure	335.00	

12 62 23 00-0004 Non-Elevated Portable Aluminum Bleacher (12 62 23 00-0001)

Note: Includes side and back fence.

12 62 23 00-0005	SEA	5 Rows, Non-Elevated Portable Aluminum Bleacher.....	227.10	4.46
		Note: Including side and back fence.		
		For Elevated Structure (Includes Additional Front Rail, A Front Walkway With Stairways On Either Side, Double Foot Boards Between Rows), Add	35.00	
12 62 23 00-0006	SEA	6 To 10 Rows, Non-Elevated Portable Aluminum Bleacher.....	259.31	4.68
		Note: Including side and back fence.		
		For Elevated Structure (Includes Additional Front Rail, A Front Walkway With Stairways On Either Side, Double Foot Boards Between Rows), Add	35.00	
12 62 23 00-0007	SEA	11 To 15 Rows, Non-Elevated Portable Aluminum Bleacher.....	270.67	4.91
		Note: Including side and back fence.		
		For Elevated Structure (Includes Additional Front Rail, A Front Walkway With Stairways On Either Side, Double Foot Boards Between Rows), Add	35.00	

12 62 23 00-0008 Non-Elevated Portable Aluminum Bleacher (12 62 23 00-0001)

Note: Includes side and back fence and center aisle with rails.

12 62 23 00-0009	SEA	5 Rows, Non-Elevated Portable Aluminum Bleacher.....	358.07	5.02
		Note: Including side and back fence and center aisle with hand rails.		
		For Elevated Structure (Includes Additional Front Rail, A Front Walkway With Stairways On Either Side, Double Foot Boards Between Rows), Add	35.00	
12 62 23 00-0010	SEA	6 To 10 Rows, Non-Elevated Portable Aluminum Bleacher.....	409.86	5.27
		Note: Including side and back fence and center aisle with hand rails.		
		For Elevated Structure (Includes Additional Front Rail, A Front Walkway With Stairways On Either Side, Double Foot Boards Between Rows), Add	35.00	
12 62 23 00-0011	SEA	11 To 15 Rows, Non-Elevated Portable Aluminum Bleacher.....	444.74	5.58
		Note: Including side and back fence and center aisle with hand rails.		
		For Elevated Structure (Includes Additional Front Rail, A Front Walkway With Stairways On Either Side, Double Foot Boards Between Rows), Add	35.00	



	Furnishings	12	12
	Multiple Seating	12 60	
	Portable-Audience Seating	12 62	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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END OF SECTION 12

12	12	Furnishings
	12 60	Multiple Seating
	12 62	Portable-Audience Seating



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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Special Construction	13	13
Special Structures	13 30	
Fabricated Engineered Structures	13 34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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13 Special Construction

13 30 Special Structures ⁽¹³⁾

13 34 Fabricated Engineered Structures ^(13 30)

13 34 16 Grandstands and Bleachers ^(13 34)

13 34 16 13 Grandstands ^(13 34 16)

13 34 16 13-0001	Permanent Grandstands, Wood Seat, Steel Frame ^(13 34 16 13)		
13 34 16 13-0002	3 To 15 Tiers ^(13 34 16 13-0001)		
13 34 16 13-0003	SEA 3-15 Tier Permanent Grandstand Price Per Seat	85.12	8.92
13 34 16 13-0004	16 To 30 Tiers ^(13 34 16 13-0001)		
13 34 16 13-0005	SEA 16-30 Tier Permanent Grandstand Price Per Seat	130.09	10.04

13 34 23 Fabricated Structures ^(13 34)

13 34 23 13 Portable and Mobile Buildings ^(13 34 23)

13 34 23 13-0001	Prefabricated Signal, Communication Or Electrical Building ^(13 34 23 13)		
	Note: Complete, includes door, roof, lights and wiring, insulation, painted.		
13 34 23 13-0002	SF 15 SF To 29 SF Prefabricated Signal, Communication Or Electrical Building	522.97	
13 34 23 13-0003	SF 30 SF To 49 SF Prefabricated Signal, Communication Or Electrical Building	448.60	
13 34 23 13-0004	SF 50 SF To 79 SF Prefabricated Signal, Communication Or Electrical Building	359.07	
13 34 23 13-0005	SF 80 SF To 99 SF Prefabricated Signal, Communication Or Electrical Building	284.11	
13 34 23 13-0006	SF 100 SF To 144 SF Prefabricated Signal, Communication Or Electrical Building	253.91	
13 34 23 13-0007	Temporary Trailers 1 To 6 Years Life ^(13 34 23 13)		
	Note: Includes cost to set-up, underpin, tie-downs, HVAC unit, lights, outlets, phone jacks, two wooden landings, stairs, and handrails. Trailers shall have a 12' x 12' office area and 6' x 8' bathroom with sink, mirror, and water closet. Minimum of two pedestrian doors and a tinted/insulated 3' x 4' single hung window per 20 SF of wall area. Excludes connection of utilities.		
13 34 23 13-0008	SF Single Trailer Up To 14' x 73'	67.79	
	For Each Delivery And Set-Up (Block And Level), Add	1,492.81	
	For Each Knock-Down And Pick-Up, Add	1,212.81	
	For Each Anchoring Into Asphalt Or Concrete, Add	110.00	
13 34 23 13-0009	SF Modular Trailers, Connected	94.90	
	For Each Anchoring Into Asphalt Or Concrete, Add	110.00	
	For Each Delivery And Set-Up (Block And Level), Add	3,310.08	
	For Each Knock-Down And Pick-Up, Add	2,660.08	
13 34 23 13-0010	EA Add Per Additional Exterior Door With Frame And Hardware	1,016.78	
13 34 23 13-0011	Accessories ^(13 34 23 13)		
13 34 23 13-0012	Skirting ^(13 34 23 13-0011)		
	Note: Includes 2" x 4" wood framing 16" on center.		
13 34 23 13-0013	Vinyl Covered, Exterior Only ^(13 34 23 13-0012)		
13 34 23 13-0014	SF 1'-8" High Vinyl Covered Skirt	5.14	1.86
13 34 23 13-0015	SF 3' High Vinyl Covered Skirt	7.48	3.06
13 34 23 13-0016	Fiberglass, Exterior Only ^(13 34 23 13-0012)		
13 34 23 13-0017	SF 1'-8" High Fiberglass Skirt	9.36	3.50
13 34 23 13-0018	SF 3' High Fiberglass Skirt	10.84	4.26
13 34 23 13-0019	Plywood, Exterior Only ^(13 34 23 13-0012)		
13 34 23 13-0020	SF 1'-8" High 5/8" Plywood Skirt	8.77	3.72
13 34 23 13-0021	SF 3' High 5/8" Plywood Skirt	10.36	4.48
13 34 23 13-0022	Steel, Painted, Exterior Only ^(13 34 23 13-0012)		
13 34 23 13-0023	SF 1'-8" High 26 Gauge Steel Skirt	10.13	3.50
13 34 23 13-0024	SF 3' High 26 Gauge Steel Skirt	11.73	4.26
13 34 23 13-0025	14" x 14" Access Hatch ^(13 34 23 13-0011)		
	Note: Simple design.		
13 34 23 13-0026	EA 14" x 14" Vinyl Covered Access Hatch	256.06	82.09
13 34 23 13-0027	EA 14" x 14" Fiberglass Access Hatch	220.49	82.09
13 34 23 13-0028	EA 14" x 14" Plywood Access Hatch	254.14	82.09
13 34 23 13-0029	EA 14" x 14" 26 Gauge Steel Access Hatch	255.71	82.09

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

13 34 23 13-0030		Aluminum Modular Access Ramp <small>(13 34 23 13-0011)</small>		
Note: Includes picketed guardrails, inside grabrails, legs and hardware.				
13 34 23 13-0031	EA	72" Long x 52-1/4" Wide Ramp Section, Aluminum Modular Access Ramp	3,683.79	27.33
13 34 23 13-0032	EA	60-1/4" Long x 61-3/4" Wide Door Landing Section, Aluminum Modular Access Ramp	3,716.58	35.52
13 34 23 13-0033	EA	60-1/4" Long x 123-1/2" Wide Switchback Landing Section, Aluminum Modular Access Ramp	7,662.18	54.66
13 34 23 13-0034	EA	110-3/4" Long x 72" Wide Switchback Landing Section, Aluminum Modular Access Ramp	8,258.86	54.66
13 34 23 13-0035	EA	60-1/4" Long x 61-3/4" Wide Intermediate Landing Section, Aluminum Modular Access Ramp	3,865.75	35.52
13 34 23 13-0036	EA	71-3/4" Long x 52-1/4" Wide Intermediate Landing Section, Aluminum Modular Access Ramp	3,832.96	27.33
13 34 23 13-0037	EA	84-1/2" Long x 61-3/4" Wide Intermediate Landing Section, Aluminum Modular Access Ramp	5,353.71	35.52
13 34 23 13-0038	EA	30" High x 82" Long x 52-3/8" Wide Step Section, Aluminum Modular Access Ramp	3,793.03	35.52
13 34 23 13-0039	EA	35" High x 96" Long x 52-3/8" Wide Step Section, Aluminum Modular Access Ramp	3,793.03	35.52
13 34 23 13-0040	EA	42" High x 110" Long x 52-3/8" Wide Step Section, Aluminum Modular Access Ramp	4,320.71	35.52
13 34 23 13-0041	EA	49" High x 124" Long x 52-3/8" Wide Step Section, Aluminum Modular Access Ramp	4,844.67	35.52

13 34 23 13-0042		Relocate Portable And Mobile Trailer <small>(13 34 23 13)</small>		
Note: Excludes anchors, skirting, steps, ramps, utility hook-ups and foundation. See CSI section 01 22 16 00-0002 for reimbursable permit fees, 01 22 20 00-0080 for escort vehicle, 13 34 23 13-0012 for skirting.				
13 34 23 13-0043	EA	Prepare, Up To 12' Wide, Single Trailer For Transportation	980.04	
Note: Includes securing interior, mounting tires, and mounting trailer hitch				
13 34 23 13-0044	EA	Separate, 24' Wide Double Trailer And Prepare For Transportation	4,636.36	
Note: Includes separating trailers, securing interior, installing plastic and boards to open side of each (2) trailers, mounting tires, and mounting trailer hitch.				
13 34 23 13-0045	EA	Remove Blocking From 8' Wide x Up To 35' Long Trailer	431.21	
Note: Per trailer				
13 34 23 13-0046	EA	Remove Blocking From 10' Wide x 40' To 50' Long Trailer	548.82	
Note: Per trailer				
13 34 23 13-0047	EA	Remove Blocking From 12' Wide x 45' To 60' Long Trailer	666.43	
Note: Per trailer				
13 34 23 13-0048	EA	Remove Blocking From 24' Wide x 45' To 60' Long Trailer	1,332.85	
Note: Per trailer				
13 34 23 13-0049	MI	Transportation And Delivery Of Trailer	19.19	
See CSI section 01 22 20 00-0081 for escort vehicle service (when required).				
13 34 23 13-0050	EA	Re-connect 24' Wide Double Trailer	9,373.59	
Note: Includes removal of temporary plastic and boards, caulking, installation of flooring, ceiling and roofing seams. Excludes blocking and leveling. See CSI section 13 34 23 13-0053 for blocking and leveling of each section.				
13 34 23 13-0051	EA	Set-Up (Block And Level) Trailer, 8' Wide x Up To 35' Long	539.02	
Note: Per trailer				
13 34 23 13-0052	EA	Set-Up (Block And Level) Trailer, 10' Wide x 40' To 50' Long	686.03	
Note: Per trailer				
13 34 23 13-0053	EA	Set-Up (Block And Level) Trailer, 12' Wide x 45' To 60' Long	833.03	
Note: Per trailer				
13 34 23 13-0054	EA	Set-Up (Block And Level) Trailer, 24' Wide x 45' To 60' Long	1,666.06	
Note: Per trailer				
13 34 23 13-0055	EA	Connection Straps To Anchor	24.51	
Note: Includes straps per each anchor				

13 34 23 14 Fabricated Classroom Buildings (13 34 23)

13 34 23 14-0001		Semi Permanent Modular Transportable Buildings <small>(13 34 23 14)</small>		
13 34 23 14-0002	SF	Portable Classrooms, Complete With Doors, Windows, Fixtures, Toilets And Workroom	101.00	
For Each Anchoring Into Asphalt Or Concrete, Add			110.00	
For Each Delivery And Set-Up (Block And Level), Add			3,310.08	
For Each Knock-Down And Pick-Up, Add			2,660.08	
13 34 23 14-0003	SF	Modular Classroom, Connected, Complete With Doors, Windows, Fixtures, Toilets And Teachers Work Room	103.99	
For Each Anchoring Into Asphalt Or Concrete, Add			110.00	
For Each Delivery And Set-Up (Block And Level), Add			3,310.08	
For Each Knock-Down And Pick-Up, Add			2,660.08	

13 34 23 16 Fabricated Control Booths (13 34 23)

13 34 23 16-0001		Fabricated Parking Attendant Booths <small>(13 34 23 16)</small>		
Note: Excludes foundations and slab.				
13 34 23 16-0002	EA	Parking Booth For Attendant	1,745.56	

13 34 23 29 Fabricated Kiosks (13 34 23)

13 34 23 29-0001		Customer's Assistant Kiosk <small>(13 34 23 29)</small>		
Note: Based on SF of kiosks. Complete kiosk modular enclosure, in-place, structurally independent and self contained. Stainless steel.				
13 34 23 29-0002	CF	Round Kiosk With 1/4" Fiberglass Wall, (Based On 5' Diameter x 8' High)	68.49	
13 34 23 29-0003	CF	Round Kiosk, With 1" Insulated Fiberglass Double Wall, (Based On 5' Diameter x 8' High)	76.98	
13 34 23 29-0004	CF	Rectangular Kiosk, With 1/4" Fiberglass Wall, (Based On 5' x 9' x 7'-6" High)	46.23	
13 34 23 29-0005	CF	Rectangular Kiosk, With 1" Insulated Fiberglass Double Wall	55.57	
Note: Based on 5'x9'x7'-6" high.				
13 34 23 29-0006	CF	Octagonal Kiosk, With 1/4" Fiberglass Wall,	53.11	
Note: Based on 9' wide x 8' high.				
13 34 23 29-0007	CF	Octagonal Kiosk, With 1" Insulated Fiberglass Double Wall	63.33	
Note: Based on 9' wide x 8' high.				

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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13 40 Integrated Construction ⁽¹³⁾

13 48 Sound, Vibration, and Seismic Control ^(13 40)

13 48 63 Fabricated Seismic Control Assemblies ^(13 48)

13 48 63 00-0001	EA	Seismic Bracing Assembly ^(13 48 63)	
13 48 63 00-0002	EA	4-Bolt Deck Anchor Connection For Seismic Brace.....	164.80
		Note: Includes drilling into concrete, bolts, anchor plate, seismic bracket attached with bolt, nut and washer.	
13 48 63 00-0003	EA	2 Cable Seismic Brace With Center Threaded Rod Stiffener	162.11
		Note: Includes seismic bracket, bolts, and cable for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0004	EA	3 Cable Seismic Brace With Center Threaded Rod Stiffener	239.44
		Note: Includes seismic bracket, bolts, and cable for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0005	EA	4 Cable Seismic Brace With Center Threaded Rod Stiffener	308.56
		Note: Includes seismic bracket, bolts, and cable for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0006	EA	2 Channel Seismic Brace With Center Threaded Rod Stiffener	334.28
		Note: Includes seismic bracket, bolts, and channel for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0007	EA	3 Channel Seismic Brace With Center Threaded Rod Stiffener	493.59
		Note: Includes seismic bracket, bolts, and channel for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0008	EA	4 Channel Seismic Brace With Center Threaded Rod Stiffener	652.90
		Note: Includes seismic bracket, bolts, and channel for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0009	EA	2 Rod Seismic Brace With Center Threaded Rod Stiffener	213.36
		Note: Includes seismic bracket, bolts, and rod for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0010	EA	3 Rod Seismic Brace With Center Threaded Rod Stiffener	312.21
		Note: Includes seismic bracket, bolts, and rod for attachment to ceiling anchor. Excludes deck anchors.	
13 48 63 00-0011	EA	4 Rod Seismic Brace With Center Threaded Rod Stiffener	411.07
		Note: Includes seismic bracket, bolts, and rod for attachment to ceiling anchor. Excludes deck anchors.	

13 48 63 00-0012 Seismic Brace Components ^(13 48 63)

13 48 63 00-0013	EA	1/8" Cable Diameter Seismic Cable Brace Swivel Anchor (Mason SCB-1)	33.13
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0014	EA	3/16" Cable Diameter Seismic Cable Brace Swivel Anchor (Mason SCB-2)	46.35
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0015	EA	1/4" Cable Diameter Seismic Cable Brace Swivel Anchor (Mason SCB-3)	62.23
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0016	EA	3/8" Cable Diameter Seismic Cable Brace Swivel Anchor (Mason SCB-4)	86.00
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0017	EA	Seismic Solid Brace Swivel Anchor (Mason SSB-1)	30.97
		Note: To be used with angle or channel.	
13 48 63 00-0018	EA	Seismic Solid Brace Swivel Anchor (Mason SSB-2)	42.61
		Note: To be used with angle or channel.	
13 48 63 00-0019	EA	Seismic Solid Brace Swivel Anchor (Mason SSB-3)	56.74
		Note: To be used with angle or channel.	
13 48 63 00-0020	EA	Seismic Solid Brace Swivel Anchor (Mason SSB-4)	77.52
		Note: To be used with angle or channel.	
13 48 63 00-0021	EA	1/8" Cable Diameter Seismic Cable Brace Hook Anchor (Mason SCBH-1)	38.04
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0022	EA	3/16" Cable Diameter Seismic Cable Brace Hook Anchor (Mason SCBH-2)	50.92
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0023	EA	1/4" Cable Diameter Seismic Cable Brace Hook Anchor (Mason SCBH-3)	71.70
		Note: To be used with 7x19 stranded cable.	
13 48 63 00-0024	EA	1/8" Cable Diameter Seismic Cable Brace Vise Anchor (Mason SCBV-1)	68.38
		Note: Can be used with either SCB or SCBH on the other end. To be used with 7x19 stranded cable.	
13 48 63 00-0025	EA	3/16" Cable Diameter Seismic Cable Brace Vise Anchor (Mason SCBV-2)	97.05
		Note: Can be used with either SCB or SCBH on the other end. To be used with 7x19 stranded cable.	
13 48 63 00-0026	EA	1/4" Cable Diameter Seismic Cable Brace Vise Anchor (Mason SCBV-3)	133.21
		Note: Can be used with either SCB or SCBH on the other end. To be used with 7x19 stranded cable.	
13 48 63 00-0027	EA	Seismic Rod Clamp (Mason SRC-1)	28.56
		Note: To be used on 3/8" through 5/8" rod. 1" x 1" x 1/4" Angle or Stiffener not included.	
13 48 63 00-0028	EA	Seismic Rod Clamp (Mason SRC-1 1/2)	35.21
		Note: To be used on 3/8" through 1" rod. 1-1/2" x 1-1/2" x 1/4" Angle or Stiffener not included.	
13 48 63 00-0029	EA	Seismic Rod Clamp (Mason SRC-2)	44.35
		Note: To be used on 3/8" through 1-1/4" rod. 2" x 2" x 1/4" Angle or Stiffener not included.	

END OF SECTION 13

13	13	Special Construction
	13 40	Integrated Construction
	13 48	Sound, Vibration, and Seismic Control



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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14 Conveying Equipment

14 01 Operation and Maintenance of Conveying Equipment ⁽¹⁴⁾

14 01 20 Operation and Maintenance of Elevators ^(14 01)

14 01 20 71 Elevator Rehabilitation ^(14 01 20)

14 01 20 71-0001 Elevator Maintenance ^(14 01 20 71)

14 01 20 71-0002	EA	Regular Routine Elevator Inspection, Traction Up to 10 floors (Sufficient for Issue of Certificate/Permit)	534.27	
14 01 20 71-0003	EA	Regular Routine Elevator Inspection, Traction Over 10 floors (Sufficient for Issue of Certificate/Permit)	712.36	
14 01 20 71-0004	EA	Regular Routine Elevator Inspection, Hydraulic (Sufficient for Issue of Certificate/Permit)	445.22	
14 01 20 71-0005	EA	Regular Routine Elevator Inspection, Roped Hydraulic (Sufficient for Issue of Certificate/Permit)	445.22	
14 01 20 71-0006	EA	Regular Routine Elevator Inspection, Dumbwaiter/Cart Lifts (Sufficient for Issue of Certificate/Permit)	267.14	
14 01 20 71-0007	HR	Elevator Servicing - Hydraulic, Labor Only	175.18	
14 01 20 71-0008	HR	Elevator Servicing - Traction, Labor Only	218.97	
14 01 20 71-0009	EA	Annual Category 1 Test for Traction Up to 10 floors	1,272.92	
14 01 20 71-0010	EA	Annual Category 1 Test for Traction Over 10 floors	1,591.15	
14 01 20 71-0011	EA	Annual Category 1 Test for Hydraulic Elevator	636.46	
14 01 20 71-0012	EA	Annual Category 1 Test for Roped Hydraulic Elevator	1,432.04	
14 01 20 71-0013	EA	Annual Category 1 Test for Dumbwaiter/Cart Lifts	954.69	
14 01 20 71-0014	EA	Full Load Test for Traction Up to 10 floors	2,227.62	
14 01 20 71-0015	EA	Full Load Test for Traction Over 10 floors	2,545.85	
14 01 20 71-0016	EA	Full Load Test for Hydraulic Elevator	1,909.38	
14 01 20 71-0017	EA	Full Load Test for Roped Hydraulic Elevator	2,386.73	
14 01 20 71-0018	EA	Full Load Test for Dumbwaiter/Cart Lifts	1,272.92	
14 01 20 71-0019	EA	Acceptance Test for Traction Up to 10 floors	2,008.99	
14 01 20 71-0020	EA	Acceptance Test for Traction Over 10 floors	2,260.12	
14 01 20 71-0021	EA	Acceptance Test for Hydraulic Elevator	2,008.99	
14 01 20 71-0022	EA	Acceptance Test for Roped Hydraulic Elevator	2,008.99	
14 01 20 71-0023	EA	Acceptance Test for Dumbwaiter/Cart Lifts	2,008.99	

14 01 20 71-0024 Elevator Modernization ^(14 01 20 71)

14 01 20 71-0025	EA	5" Piston Replacement (Hydraulic) Unit Up To 3 Stories (2,000 LB x 50 FPM)	42,692.34	9,261.21
		Note: Includes replacing existing piston/cylinder, 10 3/4" Sealed PVC, pit channel and buffers.		
		<i>For Union-Guard Cathodic Protection, Add</i>	9,210.00	
		<i>Note: Includes Pump.</i>		
		<i>For An Additional Stop, Add</i>	9,735.22	
		<i>Note: Includes Removal.</i>		
14 01 20 71-0026	EA	6" Piston Replacement (Hydraulic) Unit Up To 3 Stories (2,000 LB x 50 FPM)	46,063.80	11,190.63
		Note: Includes replacing existing piston/cylinder, 10 3/4" Sealed PVC, pit channel and buffers.		
		<i>For Union-Guard Cathodic Protection, Add</i>	9,304.00	
		<i>Note: Includes Pump.</i>		
		<i>For An Additional Stop, Add</i>	10,341.40	
		<i>Note: Includes Removal.</i>		
14 01 20 71-0027	EA	8" Piston Replacement (Hydraulic) Unit Up To 3 Stories (2,000 LB x 50 FPM)	54,610.70	12,734.16
		Note: Includes replacing existing piston/cylinder, 12 3/4" Sealed PVC, pit channel and buffers.		
		<i>For Union-Guard Cathodic Protection, Add</i>	10,808.08	
		<i>Note: Includes Pump.</i>		
		<i>For An Additional Stop, Add</i>	13,289.97	
		<i>Note: Includes Removal.</i>		
14 01 20 71-0028	EA	Removal And Replacement Of Hydraulic Control (Maxton) Valve	5,731.42	
14 01 20 71-0029	EA	5 Gallon Container Of Hydraulic Oil For Elevator Modernization	76.58	
14 01 20 71-0030	EA	55 Gallon Container Of Hydraulic Oil For Elevator Modernization	843.88	
14 01 20 71-0031	SET	Car Roller Guide Assembly, Set Of Four	4,453.73	771.77
		Note: Includes cover plate.		
14 01 20 71-0032	SET	CWT Roller Guide Assembly, Set Of Four	3,783.66	771.77
		Note: Includes cover plate.		
14 01 20 71-0033	EA	8" Wide New Entrance With Frame, Header, Doors, And Hangers - Single Slide Door With Baked Enamel Finish	8,294.89	
		Note: Excludes buildback.		
14 01 20 71-0034	EA	8" Wide New Entrance With Frame, Header, Doors, And Hangers - Single Slide Door With Satin Stainless Finish	9,046.93	
		Note: Excludes buildback.		
14 01 20 71-0035	EA	8" Wide New Entrance With Frame, Header, Doors, And Hangers - Center Opening With Baked Enamel Finish	8,778.08	
		Note: Excludes buildback.		
14 01 20 71-0036	EA	8" Wide New Entrance With Frame, Header, Doors, And Hangers - Center Opening With Satin Stainless Finish	9,530.12	
		Note: Excludes buildback.		
14 01 20 71-0037	SF	Epoxy Aggregate, Elevator Cab Flooring	94.36	22.05
		Note: SF cost not applicable for partial cab flooring.		
14 01 20 71-0038	SF	Aluminum Diamond Plate, Elevator Cab Flooring	81.01	22.05
		Note: SF cost not applicable for partial cab flooring.		
14 01 20 71-0039	SF	1/8" Thick, Vinyl Composition Tile (VCT), Elevator Cab Flooring	14.34	2.89
14 01 20 71-0040	EA	Solid State Starting (Soft Start)	6,436.73	578.83
14 01 20 71-0041	EA	Pump Unit (Tank, Valve, Oil, Motor And Victaulic Fittings)	20,878.37	3,231.78
14 01 20 71-0042	EA	Hoistway Door Hanger Set (Rollers, Eccentrics And Track), Single Speed Side Slide (GAL Manufacturing)	2,580.02	771.77
14 01 20 71-0043	EA	Hoistway Door Closer Set (Spring Closer), Single Speed Side Slide (GAL Manufacturing)	480.53	192.94
14 01 20 71-0044	EA	Hoistway Door Closer Set (Spirator Closer), Single Speed Side Slide (GAL)	470.49	385.89
14 01 20 71-0045	EA	Hoistway Door Interlock Set, Single Speed Side Slide (GAL Manufacturing)	646.97	337.64
14 01 20 71-0046	EA	Hoistway Door Hanger Set (Rollers, Eccentrics And Track), Single Speed Center Opening (GAL Manufacturing)	3,097.66	771.77
14 01 20 71-0047	EA	Hoistway Door Closer Set (Spring Closer), Single Speed Center Opening (GAL Manufacturing)	642.72	356.94

14 Conveying Equipment
14 01 Operation and Maintenance of Conveying Equipment
14 01 20 Operation and Maintenance of Elevators



MINOR TOTAL DIRECT DEMOLITION
 CSI UOM DESCRIPTION UNIT COST UNIT COST

14 01 20 71-0048	EA	Hoistway Door Closer Set (Spirator Closer), Single Speed Center Opening (GAL).....	470.49	385.89
14 01 20 71-0049	EA	Hoistway Door Interlock Set, Single Speed Center Opening (GAL Manufacturing).....	790.11	385.89
14 01 20 71-0050	EA	Fire Service Key Switch Controller	4,026.19	771.77
14 01 20 71-0051	EA	ADA Telephone (Rath Microtech).....	1,264.13	385.89
14 01 20 71-0052	EA	Car Door Operator With ADA Buzzer, Single Speed Side Slide (GAL Manufacturing).....	9,086.45	1,543.53
14 01 20 71-0053	EA	Car Door Operator With ADA Buzzer, Single Speed Center Opening (GAL Manufacturing).....	9,800.89	1,543.53
14 01 20 71-0054	EA	Car Door Safety Edge (Infrared Proximity Type Edge).....	2,851.80	385.89
14 01 20 71-0055	EA	Car Operating Panel (ADA, Fire, Position, Chime).....	9,594.07	1,543.53
14 01 20 71-0056	EA	Car Position LED Indicator And Cover Plate, Stainless Steel.....	2,040.84	385.89
14 01 20 71-0057	EA	Car Traveling Lanterns With Audible Signal	1,778.08	385.89
14 01 20 71-0058	EA	Hoistway Door Jamb Floor Tags (Braille)	260.62	192.94
14 01 20 71-0059	EA	Lobby Vandal Resistant Call Station.....	1,674.68	385.89
14 01 20 71-0060	LF	Traveling Cable (4 - #14 AWG, 69 - #18 AWG, 1 Shielded Pair, 2 Co-Axial)	21.73	
		Note: Excludes Removal and Replacement of Material. See CSI section 14 01 20 71-0061 for Removal and Replacement of Traveling Cable.		
14 01 20 71-0061	EA	Removal And Replacement Of Traveling Cable (4 - #14 AWG, 69 - #18 AWG, 1 Shielded Pair, 2 Co-Axial).....	6,174.14	3,087.07
		Note: Excludes Traveling Cable material. See CSI section 14 01 20 71-0060 for Traveling Cable material.		
14 01 20 71-0062	LF	Governor Cable	1.69	
		Note: Removal and Replacement of Governor Cable is part of Traveling Cable Removal and Replacement.		
14 01 20 71-0063	EA	Elevator Cab Wall Coverings (3,500 Lb. Capacity: 6'-8" x 5'-5" Cab), Plastic Laminate - Hang On Panels.....	6,837.41	771.77
14 01 20 71-0064	EA	Elevator Cab Wall Coverings (3,500 Lb. Capacity: 6'-8" x 5'-5" Cab), Rigid Stainless Steel - Hang On Panels.....	9,845.57	771.77
14 01 20 71-0065	EA	Removal And Replacement Of Governor.....	5,737.08	771.77
14 01 20 71-0066	EA	Removal And Replacement Of Car Station.....	9,142.85	1,543.53
14 01 20 71-0067	EA	Removal And Replacement Of Telephone.....	1,919.09	385.89
14 01 20 71-0068	EA	Removal And Replacement Of Hall Lanterns	1,429.81	385.89
14 01 20 71-0069	EA	Hall Call Buttons, Vandal Resistant	1,147.79	385.89
14 01 20 71-0070	EA	Hall Traveling Lanterns With Audible Signal.....	1,815.69	385.89
14 01 20 71-0071	EA	Add Raised Character (Braille) Signage To Control Panel	214.94	192.94
14 01 20 71-0072	EA	New Microprocessor Based Controller (Non-Proprietary).....	48,555.30	6,174.14
14 01 20 71-0073	EA	New Steel Shell And Canopy (Excludes Plastic Panels), For 5' x 7' Cab.....	28,062.21	6,174.14
14 01 20 71-0074	EA	New Steel Shell, Canopy And Platform (Excludes Plastic Laminate), For 5' x 7' Cab	43,636.85	6,174.14
14 01 20 71-0075	EA	Removal And Replacement Of Elevator/Hoistway Doors (Single Slide Door Arrangement), Baked Enamel	3,556.17	
14 01 20 71-0076	EA	Removal And Replacement Of Elevator/Hoistway Doors (Center Opening Door Arrangement), Baked Enamel	3,762.98	
14 01 20 71-0077	EA	Removal And Replacement Of Elevator/Hoistway Doors (Single Slide Door Arrangement), Stainless Steel	3,990.47	
14 01 20 71-0078	EA	Removal And Replacement Of Elevator/Hoistway Doors (Center Opening Door Arrangement), Stainless Steel.....	4,238.64	
14 01 20 71-0079	EA	Elevator Pit Ladder, Steel	3,349.36	385.89
		Note: Labor cost is for bolting to concrete pit wall.		
14 01 20 71-0080	EA	New Steel Shell, Canopy, Platform, Standard Cab Plastic Laminate, For 5' x 7' Cab.....	54,244.32	6,174.14
14 01 20 71-0081	LF	Removal And Replacement Of Hoisting Cable, 3/8" - Liftpac, Bethlehem Wire Rope Minimum Breaking Strength (Tons): Traction Steel - 4.5, EHS Traction Steel - 5.5.....	141.57	
		Note: Labor cost is for replacement of set of 4 ropes and rise of 40 feet.		
14 01 20 71-0082	LF	Removal And Replacement Of Hoisting Cable, 1/2" - Liftpac, Bethlehem Wire Rope Minimum Breaking Strength (Tons): Traction Steel - 6.0, EHS Traction Steel - 9.7.....	150.92	
		Note: Labor cost is for replacement of set of 4 ropes and rise of 40 feet.		
14 01 20 71-0083	LF	Removal And Replacement Of Hoisting Cable, 5/8" - Liftpac, Bethlehem Wire Rope Minimum Breaking Strength (Tons): Traction Steel - 12.7, EHS Traction Steel - 15.4.....	157.31	
		Note: Labor cost is for replacement of set of 4 ropes and rise of 40 feet.		
14 01 20 71-0084	EA	Hydraulic Leak Detector And Alarm in Elevator Pit (Stancor Oil Minder - 0.5 HP).....	9,888.34	771.77
14 01 20 71-0085	EA	6" Wide Elevator Door Jamb And Header Wrapped With 0.030" Stainless Steel (42" x 84" Opening).....	4,007.39	771.77
		Note: Cladding typically done by metal company.		
14 01 20 71-0086	EA	8" Wide Elevator Door Jamb And Header Wrapped With 0.030" Stainless Steel (42" x 84" Opening).....	4,101.40	771.77
		Note: Cladding typically done by metal company.		
14 01 20 71-0087	EA	10" Wide Elevator Door Jamb And Header Wrapped With 0.030" Stainless Steel (42" x 84" Opening).....	4,195.40	771.77
		Note: Cladding typically done by metal company.		
14 01 20 71-0088	EA	12" Wide Elevator Door Jamb And Header Wrapped With 0.030" Stainless Steel (42" x 84" Opening).....	4,308.21	771.77
		Note: Cladding typically done by metal company.		
14 01 20 71-0089	EA	"Rope Gripper" With Pumping Unit For Use On 4-7/8" Maximum Out to Out Of Cable	8,895.65	771.77
14 01 20 71-0090	EA	"Rope Gripper" With Pumping Unit For Use On 6" Maximum Out to Out Of Cable	8,895.65	771.77
14 01 20 71-0091	EA	"Rope Gripper" With Pumping Unit For Use On 10" Maximum Out to Out Of Cable	12,655.85	771.77
14 01 20 71-0092	EA	"Rope Gripper" With Pumping Unit For Use On 11-1/2" Maximum Out to Out Of Cable	14,535.95	771.77
14 01 20 71-0093	EA	60 Amperes, Elevator Disconnect Switch, 3 Phase, 480 - 120 Volt, Firesafety Interface Relay, Mechanical Interlock	5,069.70	166.71
14 01 20 71-0094	EA	100 Amperes, Elevator Disconnect Switch, 3 Phase, 480 - 120 Volt, Firesafety Interface Relay, Mechanical Interlock.....	5,291.24	200.06
14 01 20 71-0095	EA	200 Amperes, Elevator Disconnect Switch, 3 Phase, 480 - 120 Volt, Firesafety Interface Relay, Mechanical Interlock.....	7,034.65	233.39
14 01 20 71-0096	EA	Aluminum Handrail Spacers With Set Screw	231.99	192.94
14 01 20 71-0097	EA	Bronze Handrail Spacers With Set Screw.....	237.20	192.94
14 01 20 71-0098	LF	1/2" x 2" Round Stainless Steel Elevator Handrail.....	159.41	45.40
14 01 20 71-0099	LF	3/8" x 2" Flat Bar Stainless Steel Elevator Handrail, Brushed Finish	153.28	45.40
14 01 20 71-0100	LF	3/8" x 3" Flat Bar Stainless Steel Elevator Handrail, Brushed Finish	181.94	45.40
14 01 20 71-0101	LF	3/8" x 2" Flat Bar Stainless Steel Elevator Handrail, Mirror Finish	201.34	45.40
14 01 20 71-0102	LF	3/8" x 3" Flat Bar Stainless Steel Elevator Handrail, Mirror Finish	230.22	45.40
14 01 20 71-0103	LF	3/8" x 2" Flat Bar Bronze Steel Elevator Handrail, Brushed Finish	185.55	45.40
14 01 20 71-0104	LF	3/8" x 3" Flat Bar Bronze Steel Elevator Handrail, Brushed Finish	211.04	45.40
14 01 20 71-0105	LF	3/8" x 2" Flat Bar Bronze Steel Elevator Handrail, Mirror Finish	328.02	45.40
14 01 20 71-0106	LF	3/8" x 3" Flat Bar Bronze Steel Elevator Handrail, Mirror Finish	368.48	45.40
14 01 20 71-0107	LF	3/8" x 1-1/2" Diameter Tubular Stainless Steel Elevator Handrail, Brushed Finish.....	152.31	45.40
14 01 20 71-0108	LF	3/8" x 2" Diameter Tubular Stainless Steel Elevator Handrail, Brushed Finish.....	153.87	45.40
14 01 20 71-0109	LF	3/8" x 2-1/2" Diameter Tubular Stainless Steel Elevator Handrail, Brushed Finish.....	196.23	45.40
14 01 20 71-0110	LF	3/8" x 1-1/2" Diameter Tubular Stainless Steel Elevator Handrail, Mirror Finish.....	183.74	45.40
14 01 20 71-0111	LF	3/8" x 2" Diameter Tubular Stainless Steel Elevator Handrail, Mirror Finish.....	197.05	45.40
14 01 20 71-0112	LF	3/8" x 2-1/2" Diameter Tubular Stainless Steel Elevator Handrail, Mirror Finish.....	246.71	45.40

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
14 01 20 71-0113 LF 3/8" x 1-1/2" Diameter Tubular Bronze Steel Elevator Handrail, Brushed Finish	190.06	45.40
14 01 20 71-0114 LF 3/8" x 2" Diameter Tubular Bronze Steel Elevator Handrail, Brushed Finish	194.35	45.40
14 01 20 71-0115 LF 3/8" x 2-1/2" Diameter Tubular Bronze Steel Elevator Handrail, Brushed Finish	324.98	45.40
14 01 20 71-0116 LF 3/8" x 1-1/2" Diameter Tubular Bronze Steel Elevator Handrail, Mirror Finish	213.52	45.40
14 01 20 71-0117 LF 3/8" x 2" Diameter Tubular Bronze Elevator Handrail, Mirror Finish	325.80	45.40
14 01 20 71-0118 LF 3/8" x 2-1/2" Diameter Tubular Bronze Elevator Handrail, Mirror Finish	368.48	45.40

14 01 30 Operation and Maintenance of Escalators and Moving Walks ⁽¹⁴⁾

14 01 30 71 Escalators and Moving Walks Rehabilitation ^(14 01 30)

14 01 30 71-0001 Maintenance ^(14 01 30 71)

14 01 30 71-0002 EA Regular Escalator Inspection (Sufficient For Issue Of Certificate/Permit)	746.83
14 01 30 71-0003 HR Escalator Servicing, Labor Only	175.18
14 01 30 71-0004 EA Acceptance Test Of Escalators And Moving Walks	4,107.57

14 01 30 71-0005 Modernization ^(14 01 30 71)

14 01 30 71-0006 EA Removal And Replacement Of 28" Wide Escalator Stair Tread	1,922.83
14 01 30 71-0007 EA Removal And Replacement Of 36" Wide Escalator Stair Tread	2,061.60
14 01 30 71-0008 EA Removal And Replacement Of 48" Wide Escalator Stair Tread	2,163.88
14 01 30 71-0009 EA Removal And Replacement Of 54" Wide Escalator Stair Tread	2,334.43
14 01 30 71-0010 LF Removal And Replacement Of Sliding Handrail	180.06

14 20 Elevators ⁽¹⁴⁾

Note: Excludes final electrical work or shaft walls.

14 21 Electric Traction Elevators ^(14 20)

14 21 13 Electric Traction Freight Elevators ^(14 21)

14 21 13 00-0001 Electric Traction Freight Elevators ^(14 21 13)

Note: Painted metal shaft doors and steel painted cab. Unit prices based on a shaft of 6 stops (12 feet floor to floor) and 6 openings with power doors.

14 21 13 00-0002 EA Electric Traction Freight Elevator, 4,000 LB x 200 FPM, 6 Stops, 6 Openings	360,115.93
For Each Opening With Bonderized Steel Door, Add	276.94
For Each Opening With Stainless Steel Doors, Add	692.35
For Each Opening With Two Speed Doors, Add	830.82
For Custom Plastic Laminated Cab Interiors, Add	3,672.00
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00
For Stainless Steel Cab Interior, Add	7,344.00
For Elevator With Manual Door, Deduct	-10,000.00
For Class "C-1" Loading, Add	1,529.39
For Class "C-2" Loading, Add	1,836.00
For Class "C-3" Loading, Add	2,511.65
For Removal Of Existing Stop, Add	8,223.37
For Each Additional Stop, Add	33,410.43
For Each Floor < 6 Stops, Deduct	-29,418.79
For Each Additional 50 FPM, Add	5,508.00
For Removal Of Existing Elevator, Add	41,116.87
14 21 13 00-0003 EA Electric Traction Freight Elevator, 5,000 LB x 200 FPM, 6 Stops, 6 Openings	380,734.71
For Each Opening With Bonderized Steel Door, Add	276.94
For Each Opening With Stainless Steel Doors, Add	692.35
For Each Opening With Two Speed Doors, Add	830.82
For Custom Plastic Laminated Cab Interiors, Add	3,672.00
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00
For Stainless Steel Cab Interior, Add	7,344.00
For Elevator With Manual Door, Deduct	-10,000.00
For Class "C-1" Loading, Add	3,058.78
For Class "C-2" Loading, Add	3,672.00
For Class "C-3" Loading, Add	5,089.39
For Removal Of Existing Stop, Add	8,223.37
For Each Additional Stop, Add	33,410.43
For Each Floor < 6 Stops, Deduct	-29,418.79
For Each Additional 50 FPM, Add	5,508.00
For Removal Of Existing Elevator, Add	41,116.87
14 21 13 00-0004 EA Electric Traction Freight Elevator, 6,000 LB x 200 FPM, 6 Stops, 6 Openings	402,923.86
For Elevator With Manual Door, Deduct	-10,000.00
For Class "C-1" Loading, Add	3,058.78
For Class "C-2" Loading, Add	3,672.00
For Class "C-3" Loading, Add	5,089.39
For Custom Plastic Laminated Cab Interiors, Add	4,590.00
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	6,426.00
For Stainless Steel Cab Interior, Add	8,262.00
For Removal Of Existing Stop, Add	8,223.37
For Each Additional Stop, Add	34,328.43
For Each Additional 50 FPM, Add	5,508.00
For Each Opening With Bonderized Steel Door, Add	275.40
For Each Opening With Stainless Steel Doors, Add	550.80
For Each Opening With Two Speed Doors, Add	688.50
For Removal Of Existing Elevator, Add	41,116.87
For Each Floor < 6 Stops, Deduct	-30,418.79

14 Conveying Equipment

14 20 Elevators

14 21 Electric Traction Elevators



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
14 21	13 00-0005	EA	Electric Traction Freight Elevator, 7,000 LB x 200 FPM, 6 Stops, 6 Openings.....	412,589.97	
			<i>For Elevator With Manual Door, Deduct</i>	-10,000.00	
			<i>For Class "C-1" Loading, Add</i>	3,058.78	
			<i>For Class "C-2" Loading, Add</i>	3,672.00	
			<i>For Class "C-3" Loading, Add</i>	5,089.39	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	4,590.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	6,426.00	
			<i>For Stainless Steel Cab Interior, Add</i>	8,262.00	
			<i>For Removal Of Existing Stop, Add</i>	8,223.37	
			<i>For Each Additional Stop, Add</i>	34,328.43	
			<i>For Each Additional 50 FPM, Add</i>	5,508.00	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	275.40	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	550.80	
			<i>For Each Opening With Two Speed Doors, Add</i>	688.50	
			<i>For Removal Of Existing Elevator, Add</i>	41,116.87	
			<i>For Each Floor < 6 Stops, Deduct</i>	-30,418.79	
14 21	13 00-0006	EA	Electric Traction Freight Elevator, 8,000 LB x 200 FPM, 6 Stops, 6 Openings.....	425,395.02	
			<i>For Elevator With Manual Door, Deduct</i>	-10,000.00	
			<i>For Each Additional 50 FPM, Add</i>	13,847.00	
			<i>For Class "C-1" Loading, Add</i>	6,119.39	
			<i>For Class "C-2" Loading, Add</i>	7,344.00	
			<i>For Class "C-3" Loading, Add</i>	10,046.59	
			<i>For Removal Of Existing Stop, Add</i>	8,223.37	
			<i>For Each Additional Stop, Add</i>	34,328.43	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	367.20	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	642.60	
			<i>For Each Opening With Two Speed Doors, Add</i>	780.30	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	5,508.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	7,344.00	
			<i>For Stainless Steel Cab Interior, Add</i>	9,180.00	
			<i>For Removal Of Existing Elevator, Add</i>	41,116.87	
			<i>For Each Floor < 6 Stops, Deduct</i>	-30,418.79	
14 21	13 00-0007	EA	Electric Traction Freight Elevator, 10,000 LB x 200 FPM, 6 Stops, 6 Openings.....	440,027.50	
			<i>For Elevator With Manual Door, Deduct</i>	-10,000.00	
			<i>For Each Additional 50 FPM, Add</i>	13,847.00	
			<i>For Class "C-1" Loading, Add</i>	6,119.39	
			<i>For Class "C-2" Loading, Add</i>	7,344.00	
			<i>For Class "C-3" Loading, Add</i>	10,046.59	
			<i>For Removal Of Existing Stop, Add</i>	8,223.37	
			<i>For Each Additional Stop, Add</i>	34,328.43	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	367.20	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	642.60	
			<i>For Each Opening With Two Speed Doors, Add</i>	780.30	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	5,508.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	7,344.00	
			<i>For Stainless Steel Cab Interior, Add</i>	9,180.00	
			<i>For Removal Of Existing Elevator, Add</i>	41,116.87	
			<i>For Each Floor < 6 Stops, Deduct</i>	-30,418.79	
14 21	13 00-0008	EA	Electric Traction Freight Elevator, 12,000 LB x 200 FPM, 6 Stops, 6 Openings.....	452,456.11	
			<i>For Elevator With Manual Door, Deduct</i>	-10,000.00	
			<i>For Each Additional 50 FPM, Add</i>	13,847.00	
			<i>For Class "C-1" Loading, Add</i>	6,119.39	
			<i>For Class "C-2" Loading, Add</i>	7,344.00	
			<i>For Class "C-3" Loading, Add</i>	10,046.59	
			<i>For Removal Of Existing Stop, Add</i>	8,223.37	
			<i>For Each Additional Stop, Add</i>	34,328.43	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	367.20	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	642.60	
			<i>For Each Opening With Two Speed Doors, Add</i>	780.30	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	5,508.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	7,344.00	
			<i>For Stainless Steel Cab Interior, Add</i>	9,180.00	
			<i>For Removal Of Existing Elevator, Add</i>	41,116.87	
			<i>For Each Floor < 6 Stops, Deduct</i>	-30,418.79	

14 21 23 Electric Traction Passenger Elevators (14 21)

14 21 23 13 Machine Room Electric Traction Passenger Elevators (14 21 23)

14 21 23 13-0001 Electric Traction Passenger Elevators (14 21 23 13)

Note: Baked enamel shaft doors and plastic laminate trimmed cab, allowance of \$7,500. Unit prices based on a shaft of 6 stops (12 feet floor to floor) and 6 openings.

14 21	23 13-0002	EA	Electric Traction Passenger Elevator, 2,000 LB x 200 FPM, 6 Stops, 6 Openings.....	270,438.20	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
			<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
			<i>For Each Additional 50 FPM, Add</i>	5,711.89	
			<i>For Removal Of Existing Stop, Add</i>	4,111.68	
			<i>For Each Additional Stop, Add</i>	33,410.43	
			<i>For Each Floor < 6 Stops, Deduct</i>	-20,279.21	
			<i>For Removal Of Existing Elevator, Add</i>	30,837.66	



Conveying Equipment	14	14
Elevators	14 20	
Electric Traction Elevators	14 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
14 21 23 13-0003 EA Electric Traction Passenger Elevator, 2,500 LB x 200 FPM, 6 Stops, 6 Openings.....	277,547.62	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Custom Plastic Laminated Cab Interiors, Add	3,672.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00	
For Stainless Steel Cab Interior, Add	7,344.00	
For Each Additional 50 FPM, Add	5,711.89	
For Removal Of Existing Stop, Add	4,111.68	
For Each Additional Stop, Add	33,410.43	
For Each Floor < 6 Stops, Deduct	-20,279.21	
For Removal Of Existing Elevator, Add	30,837.66	
14 21 23 13-0004 EA Electric Traction Passenger Elevator, 3,000 LB x 200 FPM, 6 Stops, 6 Openings.....	283,614.02	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Custom Plastic Laminated Cab Interiors, Add	3,672.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00	
For Stainless Steel Cab Interior, Add	7,344.00	
For Each Additional 50 FPM, Add	5,711.89	
For Removal Of Existing Stop, Add	4,111.68	
For Each Additional Stop, Add	33,410.43	
For Each Floor < 6 Stops, Deduct	-20,279.21	
For Removal Of Existing Elevator, Add	30,837.66	
14 21 23 13-0005 EA Electric Traction Passenger Elevator, 3,500 LB x 200 FPM, 6 Stops, 6 Openings.....	288,073.34	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Custom Plastic Laminated Cab Interiors, Add	3,672.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00	
For Stainless Steel Cab Interior, Add	7,344.00	
For Each Additional 50 FPM, Add	5,711.89	
For Removal Of Existing Stop, Add	4,111.68	
For Each Additional Stop, Add	33,410.43	
For Each Floor < 6 Stops, Deduct	-20,279.21	
For Removal Of Existing Elevator, Add	30,837.66	
14 21 23 13-0006 EA Electric Traction Passenger Elevator, 4,000 LB x 200 FPM, 6 Stops, 6 Openings.....	293,770.31	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Custom Plastic Laminated Cab Interiors, Add	3,672.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00	
For Stainless Steel Cab Interior, Add	7,344.00	
For Each Additional 50 FPM, Add	5,711.89	
For Removal Of Existing Stop, Add	4,111.68	
For Each Additional Stop, Add	33,410.43	
For Each Floor < 6 Stops, Deduct	-20,279.21	
For Removal Of Existing Elevator, Add	30,837.66	
14 21 23 13-0007 EA Electric Traction Passenger Elevator, 4,500 LB x 200 FPM, 6 Stops, 6 Openings.....	299,364.23	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Custom Plastic Laminated Cab Interiors, Add	3,672.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00	
For Stainless Steel Cab Interior, Add	7,344.00	
For Each Additional 50 FPM, Add	5,711.89	
For Removal Of Existing Stop, Add	4,111.68	
For Each Additional Stop, Add	33,410.43	
For Each Floor < 6 Stops, Deduct	-20,279.21	
For Removal Of Existing Elevator, Add	30,837.66	
14 21 23 13-0008 EA Electric Traction Passenger Elevator, 5,000 LB x 200 FPM, 6 Stops, 6 Openings.....	305,096.56	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Custom Plastic Laminated Cab Interiors, Add	3,672.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00	
For Stainless Steel Cab Interior, Add	7,344.00	
For Each Additional 50 FPM, Add	5,711.89	
For Removal Of Existing Stop, Add	4,111.68	
For Each Additional Stop, Add	33,410.43	
For Each Floor < 6 Stops, Deduct	-20,279.21	
For Removal Of Existing Elevator, Add	30,837.66	

14 24 Hydraulic Elevators (14 20)

Note: Prices are for a complete operating elevator including all standard controls, hydraulic motor and devices based on unit with cab sized 5' by 8' with galvanized primed shaft door with cab allowances as listed below.

14 24 13 Hydraulic Freight Elevators (14 24)

14 24 13 00-0001 Hydraulic Freight Elevators (14 24 13)

Note: Painted metal shaft doors and steel painted cab. Unit prices based on a shaft of 3 stops (15 feet floor to floor) and 3 openings with power doors.

14 Conveying Equipment

14 20 Elevators

14 24 Hydraulic Elevators



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

14 24 13 00-0002	EA Hydraulic Freight Elevator, 3,000 LB x 50 FPM, 3 Stops, 3 Openings.....	222,832.18
	For Each Additional Stop, Add	25,553.33
	For 2 Stops, Deduct	-15,597.69
	For Each Opening With Bonderized Steel Door, Add	276.94
	For Each Opening With Stainless Steel Doors, Add	692.35
	For Each Opening With Two Speed Doors, Add	830.82
	For Custom Plastic Laminated Cab Interiors, Add	3,672.00
	For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00
	For Stainless Steel Cab Interior, Add	7,344.00
	For Each Additional 50 FPM, Add	2,769.40
	For Elevator With Manual Door, Deduct	-10,000.00
	For Class "C-1" Loading, Add	1,529.39
	For Class "C-2" Loading, Add	1,836.00
	For Class "C-3" Loading, Add	2,511.65
	For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37
	Note: Includes Labor and Equipment.	
	For 12" PVC Liner, Add Per LF	52.88
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For 12" Steel Liner, Add Per LF	82.62
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For Removal Of Existing Stop, Add	8,223.37
	For Removal Of Existing Elevator, Add	20,558.43
14 24 13 00-0003	EA Hydraulic Freight Elevator, 3,500 LB x 50 FPM, 3 Stops, 3 Openings.....	229,910.85
	For Each Additional Stop, Add	25,553.33
	For 2 Stops, Deduct	-15,597.69
	For Each Opening With Bonderized Steel Door, Add	276.94
	For Each Opening With Stainless Steel Doors, Add	692.35
	For Each Opening With Two Speed Doors, Add	830.82
	For Custom Plastic Laminated Cab Interiors, Add	3,672.00
	For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00
	For Stainless Steel Cab Interior, Add	7,344.00
	For Each Additional 50 FPM, Add	2,769.40
	For Elevator With Manual Door, Deduct	-10,000.00
	For Class "C-1" Loading, Add	1,529.39
	For Class "C-2" Loading, Add	1,836.00
	For Class "C-3" Loading, Add	2,511.65
	For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37
	Note: Includes Labor and Equipment.	
	For 12" PVC Liner, Add Per LF	52.88
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For 12" Steel Liner, Add Per LF	82.62
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For Removal Of Existing Stop, Add	8,223.37
	For Removal Of Existing Elevator, Add	20,558.43
14 24 13 00-0004	EA Hydraulic Freight Elevator, 4,000 LB x 50 FPM, 3 Stops, 3 Openings.....	236,599.14
	For Each Additional Stop, Add	25,553.33
	For 2 Stops, Deduct	-15,597.69
	For Each Opening With Bonderized Steel Door, Add	276.94
	For Each Opening With Stainless Steel Doors, Add	692.35
	For Each Opening With Two Speed Doors, Add	830.82
	For Custom Plastic Laminated Cab Interiors, Add	3,672.00
	For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00
	For Stainless Steel Cab Interior, Add	7,344.00
	For Each Additional 50 FPM, Add	2,769.40
	For Elevator With Manual Door, Deduct	-10,000.00
	For Class "C-1" Loading, Add	1,529.39
	For Class "C-2" Loading, Add	1,836.00
	For Class "C-3" Loading, Add	2,511.65
	For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37
	Note: Includes Labor and Equipment.	
	For 12" PVC Liner, Add Per LF	52.88
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For 12" Steel Liner, Add Per LF	82.62
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For Removal Of Existing Stop, Add	8,223.37
	For Removal Of Existing Elevator, Add	20,558.43
14 24 13 00-0005	EA Hydraulic Freight Elevator, 5,000 LB x 50 FPM, 3 Stops, 3 Openings.....	243,079.59
	For Each Opening With Bonderized Steel Door, Add	276.94
	For Each Opening With Stainless Steel Doors, Add	692.35
	For Each Opening With Two Speed Doors, Add	830.82
	For Custom Plastic Laminated Cab Interiors, Add	3,672.00
	For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	5,508.00
	For Stainless Steel Cab Interior, Add	7,344.00
	For Each Additional 50 FPM, Add	2,769.40
	For Elevator With Manual Door, Deduct	-10,000.00
	For Each Additional Stop, Add	26,938.03
	For 2 Stops, Deduct	-16,597.69
	For Class "C-1" Loading, Add	3,058.78
	For Class "C-2" Loading, Add	3,672.00
	For Class "C-3" Loading, Add	5,089.39
	For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37
	Note: Includes Labor and Equipment.	
	For 12" PVC Liner, Add Per LF	52.88
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For 12" Steel Liner, Add Per LF	82.62
	Note: Liner for Hydraulic Elevator Well Hole if necessary.	
	For Removal Of Existing Stop, Add	8,223.37
	For Removal Of Existing Elevator, Add	20,558.43

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
14 24 13 00-0006 EA Hydraulic Freight Elevator, 6,000 LB x 50 FPM, 3 Stops, 3 Openings.....	256,668.58	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Each Opening With Two Speed Doors, Add	830.82	
For Elevator With Manual Door, Deduct	-10,000.00	
For Each Additional Stop, Add	26,938.03	
For 2 Stops, Deduct	-16,597.69	
For Class "C-1" Loading, Add	3,058.78	
For Class "C-2" Loading, Add	3,672.00	
For Class "C-3" Loading, Add	5,089.39	
For Each Additional 50 FPM, Add	13,847.00	
For Custom Plastic Laminated Cab Interiors, Add	4,590.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	6,426.00	
For Stainless Steel Cab Interior, Add	8,262.00	
For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37	
Note: Includes Labor and Equipment.		
For 12" PVC Liner, Add Per LF	52.88	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For 12" Steel Liner, Add Per LF	82.62	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For Removal Of Existing Stop, Add	8,223.37	
For Removal Of Existing Elevator, Add	20,558.43	
14 24 13 00-0007 EA Hydraulic Freight Elevator, 7,000 LB x 50 FPM, 3 Stops, 3 Openings.....	263,186.07	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Each Opening With Two Speed Doors, Add	830.82	
For Elevator With Manual Door, Deduct	-10,000.00	
For Each Additional Stop, Add	26,938.03	
For 2 Stops, Deduct	-16,597.69	
For Class "C-1" Loading, Add	3,058.78	
For Class "C-2" Loading, Add	3,672.00	
For Class "C-3" Loading, Add	5,089.39	
For Each Additional 50 FPM, Add	13,847.00	
For Custom Plastic Laminated Cab Interiors, Add	4,590.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	6,426.00	
For Stainless Steel Cab Interior, Add	8,262.00	
For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37	
Note: Includes Labor and Equipment.		
For 12" PVC Liner, Add Per LF	52.88	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For 12" Steel Liner, Add Per LF	82.62	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For Removal Of Existing Stop, Add	8,223.37	
For Removal Of Existing Elevator, Add	30,837.66	
14 24 13 00-0008 EA Hydraulic Freight Elevator, 8,000 LB x 50 FPM, 3 Stops, 3 Openings.....	273,026.96	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Each Opening With Two Speed Doors, Add	830.82	
For Elevator With Manual Door, Deduct	-10,000.00	
For Each Additional Stop, Add	26,938.03	
For 2 Stops, Deduct	-16,597.69	
For Custom Plastic Laminated Cab Interiors, Add	4,590.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	6,426.00	
For Stainless Steel Cab Interior, Add	8,262.00	
For Each Additional 50 FPM, Add	15,231.70	
For Class "C-1" Loading, Add	7,646.94	
For Class "C-2" Loading, Add	9,180.00	
For Class "C-3" Loading, Add	12,558.24	
For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37	
Note: Includes Labor and Equipment.		
For 12" PVC Liner, Add Per LF	52.88	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For 12" Steel Liner, Add Per LF	82.62	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For Removal Of Existing Stop, Add	8,223.37	
For Removal Of Existing Elevator, Add	30,837.66	
14 24 13 00-0009 EA Hydraulic Freight Elevator, 10,000 LB x 50 FPM, 3 Stops, 3 Openings.....	280,185.19	
For Each Opening With Bonderized Steel Door, Add	276.94	
For Each Opening With Stainless Steel Doors, Add	692.35	
For Each Opening With Two Speed Doors, Add	830.82	
For Elevator With Manual Door, Deduct	-10,000.00	
For Each Additional Stop, Add	26,938.03	
For 2 Stops, Deduct	-16,597.69	
For Custom Plastic Laminated Cab Interiors, Add	4,590.00	
For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add	6,426.00	
For Stainless Steel Cab Interior, Add	8,262.00	
For Well Hole Drilling (12" Diameter Hole), Add Per VLF	297.37	
Note: Includes Labor and Equipment.		
For 12" PVC Liner, Add Per LF	52.88	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For 12" Steel Liner, Add Per LF	82.62	
Note: Liner for Hydraulic Elevator Well Hole if necessary.		
For Removal Of Existing Stop, Add	8,223.37	
For Removal Of Existing Elevator, Add	30,837.66	
For Each Additional 50 FPM, Add	16,616.40	
For Class "C-1" Loading, Add	10,170.52	
For Class "C-2" Loading, Add	12,209.40	
For Class "C-3" Loading, Add	16,702.09	

14 Conveying Equipment**14 20 Elevators****14 24 Hydraulic Elevators**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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14 24 13 00-0010	EA		Hydraulic Freight Elevator, 12,000 LB x 50 FPM, 3 Stops, 3 Openings.....	292,391.58	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Each Opening With Two Speed Doors, Add</i>	830.82	
			<i>For Elevator With Manual Door, Deduct</i>	-10,000.00	
			<i>For Each Additional Stop, Add</i>	26,938.03	
			<i>For 2 Stops, Deduct</i>	-16,597.69	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	4,590.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	6,426.00	
			<i>For Stainless Steel Cab Interior, Add</i>	8,262.00	
			<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
			<i>Note: Includes Labor and Equipment.</i>		
			<i>For 12" PVC Liner, Add Per LF</i>	52.88	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For 12" Steel Liner, Add Per LF</i>	82.62	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For Removal Of Existing Stop, Add</i>	8,223.37	
			<i>For Removal Of Existing Elevator, Add</i>	30,837.66	
			<i>For Each Additional 50 FPM, Add</i>	16,616.40	
			<i>For Class "C-1" Loading, Add</i>	10,170.52	
			<i>For Class "C-2" Loading, Add</i>	12,209.40	
			<i>For Class "C-3" Loading, Add</i>	16,702.09	

14 24 13 00-0011 Hydraulic Elevators Piston Drilling (14 24 13)

14 24 13 00-0012	VLF		Up To 6" Diameter Piston Drilling	94.78	
			<i>Note: Includes casing.</i>		
14 24 13 00-0013	VLF		8" To 10" Diameter Piston Drilling.....	113.27	
			<i>Note: Includes casing.</i>		

14 24 23 Hydraulic Passenger Elevators (14 24)**14 24 23 00-0001 Hydraulic Passenger Elevators (14 24 23)**

Note: Baked enamel shaft doors and plastic laminate trimmed cab, allowance of \$7,500. Unit prices based on a shaft of 3 stops (15 feet floor to floor) and 3 openings.

14 24 23 00-0002	EA		Hydraulic Passenger Elevator, 2,100 LB x 100 FPM, 3 Stops, 3 Openings.....	155,464.95	
			<i>For Each Additional Stop, Add</i>	25,553.33	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
			<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
			<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
			<i>Note: Includes Labor and Equipment.</i>		
			<i>For 12" PVC Liner, Add Per LF</i>	52.88	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For 12" Steel Liner, Add Per LF</i>	82.62	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For Each Additional 50 FPM, Add</i>	5,711.89	
			<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
			<i>For Removal Of Existing Stop, Add</i>	4,111.68	
			<i>For 2 Stops, Deduct</i>	-10,000.00	
14 24 23 00-0003	EA		Hydraulic Passenger Elevator, 2,500 LB x 100 FPM, 3 Stops, 3 Openings.....	158,234.35	
			<i>For Each Additional Stop, Add</i>	25,553.33	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
			<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
			<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
			<i>Note: Includes Labor and Equipment.</i>		
			<i>For 12" PVC Liner, Add Per LF</i>	52.88	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For 12" Steel Liner, Add Per LF</i>	82.62	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For Each Additional 50 FPM, Add</i>	5,711.89	
			<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
			<i>For Removal Of Existing Stop, Add</i>	4,111.68	
			<i>For 2 Stops, Deduct</i>	-10,000.00	
14 24 23 00-0004	EA		Hydraulic Passenger Elevator, 3,000 LB x 100 FPM, 3 Stops, 3 Openings.....	160,138.31	
			<i>For Each Additional Stop, Add</i>	25,553.33	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
			<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
			<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
			<i>Note: Includes Labor and Equipment.</i>		
			<i>For 12" PVC Liner, Add Per LF</i>	52.88	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For 12" Steel Liner, Add Per LF</i>	82.62	
			<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
			<i>For Each Additional 50 FPM, Add</i>	5,711.89	
			<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
			<i>For Removal Of Existing Stop, Add</i>	4,111.68	
			<i>For 2 Stops, Deduct</i>	-10,000.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
14 24 23 00-0005 EA Hydraulic Passenger Elevator, 3,500 LB x 100 FPM, 3 Stops, 3 Openings.....	167,669.23	
<i>For Each Additional Stop, Add</i>	25,553.33	
<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
<i>Note: Includes Labor and Equipment.</i>		
<i>For 12" PVC Liner, Add Per LF</i>	52.88	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For 12" Steel Liner, Add Per LF</i>	82.62	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For Each Additional 50 FPM, Add</i>	5,711.89	
<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
<i>For Removal Of Existing Stop, Add</i>	4,111.68	
<i>For 2 Stops, Deduct</i>	-10,000.00	
14 24 23 00-0006 EA Hydraulic Passenger Elevator, 4,000 LB x 100 FPM, 3 Stops, 3 Openings.....	170,757.31	
<i>For Each Additional Stop, Add</i>	25,553.33	
<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
<i>Note: Includes Labor and Equipment.</i>		
<i>For 12" PVC Liner, Add Per LF</i>	52.88	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For 12" Steel Liner, Add Per LF</i>	82.62	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For Each Additional 50 FPM, Add</i>	5,711.89	
<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
<i>For Removal Of Existing Stop, Add</i>	4,111.68	
<i>For 2 Stops, Deduct</i>	-10,000.00	
14 24 23 00-0007 EA Hydraulic Passenger Elevator, 4,500 LB x 100 FPM, 3 Stops, 3 Openings.....	174,807.56	
<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
<i>For Each Additional Stop, Add</i>	26,938.03	
<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
<i>Note: Includes Labor and Equipment.</i>		
<i>For 12" PVC Liner, Add Per LF</i>	52.88	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For 12" Steel Liner, Add Per LF</i>	82.62	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For Each Additional 50 FPM, Add</i>	5,711.89	
<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
<i>For Removal Of Existing Stop, Add</i>	4,111.68	
<i>For 2 Stops, Deduct</i>	-10,000.00	
14 24 23 00-0008 EA Hydraulic Passenger Elevator, 5,000 LB x 100 FPM, 3 Stops, 3 Openings.....	179,116.67	
<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
<i>For Each Opening With Two Speed Doors, Add</i>	830.82	
<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,672.00	
<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	5,508.00	
<i>For Stainless Steel Cab Interior, Add</i>	7,344.00	
<i>For Each Additional Stop, Add</i>	26,938.03	
<i>For Well Hole Drilling (12" Diameter Hole), Add Per VLF</i>	297.37	
<i>Note: Includes Labor and Equipment.</i>		
<i>For 12" PVC Liner, Add Per LF</i>	52.88	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For 12" Steel Liner, Add Per LF</i>	82.62	
<i>Note: Liner for Hydraulic Elevator Well Hole if necessary.</i>		
<i>For Each Additional 50 FPM, Add</i>	5,711.89	
<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
<i>For Removal Of Existing Stop, Add</i>	4,111.68	
<i>For 2 Stops, Deduct</i>	-10,000.00	
14 24 23 00-0009 Twin Holeless Hydraulic Passenger Elevator <small>(14 24 23)</small>		
<i>Note: Baked enamel shaft doors and plastic laminate trimmed cab, allowance of \$7,500. Unit prices based on a shaft of 2 stops (10 feet floor to floor) and 2 openings.</i>		
14 24 23 00-0010 EA Twin Holeless Hydraulic Passenger Elevator, 2,100 LB x 100 FPM.....	133,630.52	
<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,213.00	
<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	4,590.00	
<i>For Stainless Steel Cab Interior, Add</i>	5,508.00	
<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
<i>For Each Additional Stop, Add</i>	27,095.21	
<i>For An Additional 25 FPM, Add</i>	2,333.22	

14 Conveying Equipment

14 20 Elevators

14 24 Hydraulic Elevators



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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14 24 23 00-0011	EA		Twin Holeless Hydraulic Passenger Elevator, 2,500 LB x 100 FPM.....	138,602.60	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,213.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	4,590.00	
			<i>For Stainless Steel Cab Interior, Add</i>	5,508.00	
			<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
			<i>For Each Additional Stop, Add</i>	27,095.21	
			<i>For An Additional 25 FPM, Add</i>	2,333.22	
14 24 23 00-0012	EA		Twin Holeless Hydraulic Passenger Elevator, 3,000 LB x 100 FPM.....	143,382.74	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,213.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	4,590.00	
			<i>For Stainless Steel Cab Interior, Add</i>	5,508.00	
			<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
			<i>For Each Additional Stop, Add</i>	27,095.21	
			<i>For An Additional 25 FPM, Add</i>	2,333.22	
14 24 23 00-0013	EA		Twin Holeless Hydraulic Passenger Elevator, 3,500 LB x 100 FPM.....	166,089.54	
			<i>For Each Opening With Bonderized Steel Door, Add</i>	276.94	
			<i>For Each Opening With Stainless Steel Doors, Add</i>	692.35	
			<i>For Custom Plastic Laminated Cab Interiors, Add</i>	3,213.00	
			<i>For Custom Half Plastic Laminate And Half Stainless Steel Interior, Add</i>	4,590.00	
			<i>For Stainless Steel Cab Interior, Add</i>	5,508.00	
			<i>For Removal Of Existing Elevator, Add</i>	20,558.43	
			<i>For Each Additional Stop, Add</i>	27,095.21	
			<i>For An Additional 25 FPM, Add</i>	2,333.22	

14 27 Custom Elevator Cabs and Doors (14 20)

14 27 13 Custom Elevator Cab Finishes (14 27)

14 27 13 00-0001 Custom Elevator Cab Finish Options (14 27 13)

Note: Review elevator task modifiers for additional cab finishes.

14 27 13 00-0002	EA		Intercom Service.....	1,486.11	
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14 27 13 00-0003 Custom Elevator Hall Finish Options (14 27 13)

14 27 13 00-0004	EA		Stainless Steel Door, Hall Finishes.....	1,709.52	
14 27 13 00-0005	EA		Stainless Steel Frames, Hall Finishes.....	1,796.45	
14 27 13 00-0006	EA		Hall Lantern, Signal Devices.....	939.79	

14 27 16 Custom Elevator Doors (14 27)

14 27 16 00-0001 Custom Elevator Door Options (14 27 16)

14 27 16 00-0002	EA		Center Opening, 1 Speed Doors.....	3,660.61	
14 27 16 00-0003	EA		Center Opening, 2 Speed Doors.....	4,645.77	
14 27 16 00-0004	EA		Rear Opening Doors (Opposite Front).....	6,413.24	
14 27 16 00-0005	EA		Side Opening, 2 Speed Doors.....	10,093.07	
14 27 16 00-0006	EA		Bi-Parting Doors.....	11,048.82	
14 27 16 00-0007	EA		Power Operated Door And Gate.....	33,011.87	

14 28 Elevator Equipment and Controls (14 20)

14 28 16 Elevator Controls (14 28)

14 28 16 00-0001 Passanger Or Freight Elevator Options (14 28 16)

14 28 16 00-0002	EA		2 Car Group, Elevator Automatic Controls.....	8,982.19	1,170.19
14 28 16 00-0003	EA		3 Car Group, Elevator Automatic Controls.....	13,598.55	1,754.04
14 28 16 00-0004	EA		4 Car Group, Elevator Automatic Controls.....	20,852.36	2,338.70
14 28 16 00-0005	EA		5 Car Group, Elevator Automatic Controls.....	29,179.76	2,968.32
14 28 16 00-0006	EA		6 Car Group, Elevator Automatic Controls.....	40,388.09	3,508.02
14 28 16 00-0007	EA		Duplex Care Selective Collective.....	8,441.07	
14 28 16 00-0008	EA		Automatic Emergency Power Switching.....	5,282.79	
14 28 16 00-0009	EA		Manual Emergency Power Switching.....	933.99	
14 28 16 00-0010	EA		Up To 3, Position Indicator, Signal Devices.....	224.22	
14 28 16 00-0011	EA		>3, Position Indicator, Signal Devices.....	188.58	
14 28 16 00-0012	EA		High Speed Heavy Duty Door Opener.....	3,187.25	
14 28 16 00-0013	EA		Variable Voltage, Overhead Gearless Machine, Minimum.....	55,565.77	
14 28 16 00-0014	EA		Variable Voltage, Overhead Gearless Machine, Average.....	90,744.73	
14 28 16 00-0015	EA		Variable Voltage, Overhead Gearless Machine, Maximum.....	125,766.73	
14 28 16 00-0016	EA		Variable Voltage, Basement Installed Geared Machine, Minimum.....	23,372.69	
14 28 16 00-0017	EA		Variable Voltage, Basement Installed Geared Machine, Average.....	28,704.09	
14 28 16 00-0018	EA		Variable Voltage, Basement Installed Geared Machine, Maximum.....	31,717.49	

14 30 Escalators and Moving Walks (14)

14 31 Escalators (14 30)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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14 31 00 00-0001	Stainless Steel Escalator Construction <small>(14 31)</small>		
	Note: Prices are medians and are based on each moving stairway. Complete, includes all standard accessories and single microprocessor controlled electronic display sign packages, LED.		
14 31 00 00-0002	EA Escalators Stainless Steel, 32" Wide x 12' Floor To Floor Height.....	152,137.37	12,906.95
14 31 00 00-0003	EA Escalators Stainless Steel, 32" Wide x 15' Floor To Floor Height.....	168,501.05	15,253.67
14 31 00 00-0004	EA Escalators Stainless Steel, 32" Wide x 18' Floor To Floor Height.....	183,497.37	17,600.39
14 31 00 00-0005	EA Escalators Stainless Steel, 32" Wide x 22' Floor To Floor Height.....	202,817.43	21,120.47
14 31 00 00-0006	EA Escalators Stainless Steel, 32" Wide x 25' Floor To Floor Height.....	223,958.06	23,467.18
14 31 00 00-0007	EA Escalators Stainless Steel, 36" Wide x 12' Floor To Floor Height.....	160,892.82	13,728.30
14 31 00 00-0008	EA Escalators Stainless Steel, 36" Wide x 15' Floor To Floor Height.....	178,525.72	16,427.03
14 31 00 00-0009	EA Escalators Stainless Steel, 36" Wide x 18' Floor To Floor Height.....	193,503.61	18,773.74
14 31 00 00-0010	EA Escalators Stainless Steel, 36" Wide x 22' Floor To Floor Height.....	218,023.26	23,584.51
14 31 00 00-0011	EA Escalators Stainless Steel, 36" Wide x 25' Floor To Floor Height.....	234,947.25	25,344.56
14 31 00 00-0012	EA Escalators Stainless Steel, 48" Wide x 12' Floor To Floor Height.....	170,029.58	14,549.66
14 31 00 00-0013	EA Escalators Stainless Steel, 48" Wide x 15' Floor To Floor Height.....	189,235.69	17,600.39
14 31 00 00-0014	EA Escalators Stainless Steel, 48" Wide x 18' Floor To Floor Height.....	203,823.27	19,947.10
14 31 00 00-0015	EA Escalators Stainless Steel, 48" Wide x 22' Floor To Floor Height.....	234,265.62	24,875.21
14 31 00 00-0016	EA Escalators Stainless Steel, 48" Wide x 25' Floor To Floor Height.....	248,649.56	27,221.93
14 31 00 00-0017	EA Escalator Fire Shutter Fusible Link.....	22,498.79	469.34

14 32 Moving Walks (14 30)

14 32 00 00-0001	Moving Sidewalks <small>(14 32)</small>		
	Note: Prices are medians. Includes safety rails.		
14 32 00 00-0002	LF Moving Sidewalks, 28" Wide..... <i>For Each LF Of Ramp Or Sloped Sections, Add</i>	1,601.80 252.77	281.61
14 32 00 00-0003	LF Moving Sidewalks, 36" Wide..... <i>For Each LF Of Ramp Or Sloped Sections, Add</i>	2,141.79 359.37	287.47
14 32 00 00-0004	LF Moving Sidewalks, 48" Wide..... <i>For Each LF Of Ramp Or Sloped Sections, Add</i>	2,415.84 411.37	299.21
14 32 00 00-0005	LF Moving Sidewalks, 54" Wide..... <i>For Each LF Of Ramp Or Sloped Sections, Add</i>	2,778.17 477.75	324.56

14 40 Lifts (14)

14 41 People Lifts (14 40)

14 41 16 Endless-Belt People Lifts (14 41)

14 41 16 00-0001	Personnel Lifts Electrically Operated <small>(14 41 16)</small>		
	Note: 1 Or 2 person lift by vertical belt with attached foot platforms average of 36" diameter openings.		
14 41 16 00-0002	EA Personnel Lifts, Electric, 1-2 Person, 3 Stops..... <i>For An Additional Stop, Add</i> <i>For Tinted Plexiglas Enclosure, Weatherproof, Add</i>	28,590.64 816.78 3,430.88	
14 41 16 00-0003	EA Personnel Lifts, Electric, 1-2 Person, 5 Stops..... <i>For An Additional Stop, Add</i> <i>For Tinted Plexiglas Enclosure, Weatherproof, Add</i>	30,075.86 816.78 3,609.10	
14 41 16 00-0004	EA Personnel Lifts, Electric, 1-2 Person, 7 Stops..... <i>For An Additional Stop, Add</i> <i>For Tinted Plexiglas Enclosure, Weatherproof, Add</i>	31,561.09 816.78 3,787.33	

14 41 19 Stairway Chairlifts (14 41)

14 41 19 00-0001	Chair Lift-Stair Climber <small>(14 41 19)</small>		
	Note: Includes landing, rails, lifting device and gates.		
14 41 19 00-0002	EA Chair Lift, Stair Climber Per Story, Single Passenger, Indoor, 300 LB Capacity..... Note: Includes top and bottom call button, safety chair, track, and power unit.	7,614.53	995.78

14 42 Wheelchair Lifts (14 40)

14 42 13 Inclined Wheelchair Lifts (14 42)

14 42 13 00-0001	Inclined Platform Wheelchair Lift-Stair Climber <small>(14 42 13)</small>		
	Note: Includes landing, rails, lifting device and gates.		
14 42 13 00-0002	EA Inclined Wheelchair Lift, Stair Climber Per Story, Single Passenger, Indoor, 300 LB Capacity..... Note: Includes top and bottom call button, safety chair, track, and power unit.	14,290.73	1,493.66

14 42 16 Vertical Wheelchair Lifts (14 42)

14 42 16 00-0001	Wheelchair Lift (Shorty) <small>(14 42 16)</small>		
	Note: 1000 LB capacity. Includes handrails and manual ramp.		
14 42 16 00-0002	EA 36" Vertical Travel Wheelchair Platform Scissor Lift..... <i>For Accordion Safety Skirt, Add</i> <i>For Removable Handrails, Add</i> <i>For Power Operated Ramp, Add</i>	8,861.81 1,002.44 102.16 893.90	697.05

14	14	Conveying Equipment
	14 40	Lifts
	14 42	Wheelchair Lifts



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
14 42 16 00-0003	EA	42" Vertical Travel Wheelchair Platform Scissor Lift.....	10,898.48	871.30
		Note: 1000 LB capacity. Includes handrails and manual ramp.		
		For 2,000 LB Capacity, Add	600.19	
		For 3,000 LB Capacity, Add	1,002.44	
		For 4,000 LB Capacity, Add	1,500.48	
		For Accordion Safety Skirt, Add	1,002.44	
		For Removable Handrails, Add	102.16	
		For Power Operated Ramp, Add	893.90	
14 42 16 00-0004	EA	70" Vertical Travel Wheelchair Platform Scissor Lift.....	12,986.16	1,132.69
		Note: 1000 LB capacity. Includes handrails and manual ramp.		
		For 2,000 LB Capacity, Add	600.19	
		For 3,000 LB Capacity, Add	1,002.44	
		For 4,000 LB Capacity, Add	1,500.48	
		For Accordion Safety Skirt, Add	1,002.44	
		For Removable Handrails, Add	102.16	
		For Power Operated Ramp, Add	893.90	
14 42 16 00-0005	EA	84" Vertical Travel Wheelchair Platform Scissor Lift.....	14,588.65	1,306.95
		Note: 1000 LB capacity. Includes handrails and manual ramp.		
		For 2,000 LB Capacity, Add	600.19	
		For 3,000 LB Capacity, Add	1,002.44	
		For 4,000 LB Capacity, Add	1,500.48	
		For Accordion Safety Skirt, Add	1,002.44	
		For Removable Handrails, Add	102.16	
		For Power Operated Ramp, Add	893.90	
14 42 16 00-0006	EA	18' Travel Wheelchair Incline Lift.....	15,125.36	622.36
		Note: 500 LB capacity, interior installation.		

END OF SECTION 14

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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21 Fire Suppression

21 01 Operation and Maintenance of Fire Suppression ⁽²¹⁾

21 01 10 Operation and Maintenance of Water-Based Fire-Suppression Systems ^(21 01)

See CSI section 23 01 20 00-0000 for purging of pipes and shutdown.

21 01 10 91 Water-Based Fire-Suppression Systems Restoration ^(21 01 10)

21 01 10 91-0001	EA	Relocate Sprinkler Head And Branch Piping ^(21 01 10 91)	
		See CSI section 21 13 13 00-0024 for new wet pipe sprinkler heads (when required).	
21 01 10 91-0002	EA	Relocate 1 Existing Sprinkler Head And Branch Piping.....	568.76
		Note: To adjust or swing existing sprinkler heads to different ceiling grid configuration or location.	
21 01 10 91-0003	EA	Relocate 2 To 4 Existing Sprinkler Heads And Branch Piping.....	341.26
		Note: To adjust or swing existing sprinkler heads to different ceiling grid configuration or location.	
21 01 10 91-0004	EA	Relocate >4 To 10 Existing Sprinkler Heads And Branch Piping.....	136.51
		Note: To adjust or swing existing sprinkler heads to different ceiling grid configuration or location.	
21 01 10 91-0005	EA	Relocate >10 Existing Sprinkler Heads And Branch Piping.....	68.25
		Note: To adjust or swing existing sprinkler heads to different ceiling grid configuration or location.	

21 01 10 91-0006 Purge And Refill System Sprinkler Piping ^(21 01 10 91)

Note: Includes shutting off valve, draining pipe and collection of liquid, refilling with liquid and bleeding of air from system.

21 01 10 91-0007	EA	Up To 100', Up To 1-1/2" Diameter Pipe, Purge Liquid System (For Sprinkler Upgrades).....	377.95
21 01 10 91-0008	EA	>100 To 250', Up To 1-1/2" Diameter Pipe, Purge Liquid System (For Sprinkler Upgrades).....	539.78
21 01 10 91-0009	EA	>250 To 500', Up To 1-1/2" Diameter Pipe, Purge Liquid System (For Sprinkler Upgrades).....	646.76
21 01 10 91-0010	EA	>500 To 1,000', Up To 1-1/2" Diameter Pipe, Purge Liquid System (For Sprinkler Upgrades).....	808.45
21 01 10 91-0011	EA	>1,000 To 2,000', Up To 1-1/2" Diameter Pipe, Purge Liquid System (For Sprinkler Upgrades).....	1,050.99
21 01 10 91-0012	LF	>2,000', Up To 1-1/2" Diameter Pipe, Purge Liquid System (For Sprinkler Upgrades).....	0.52
21 01 10 91-0013	EA	Up To 100', >1-1/2" To 3" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	529.12
21 01 10 91-0014	EA	>100 To 250', >1-1/2" To 3" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	755.70
21 01 10 91-0015	EA	>250 To 500', >1-1/2" To 3" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	905.47
21 01 10 91-0016	EA	>500 To 1,000', >1-1/2" To 3" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,131.83
21 01 10 91-0017	EA	>1,000 To 2,000', >1-1/2" To 3" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,471.39
21 01 10 91-0018	LF	>2,000', >1-1/2" To 3" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	0.74
21 01 10 91-0019	EA	Up To 100', >3" To 6" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	727.54
21 01 10 91-0020	EA	>100 To 250', >3" To 6" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,039.09
21 01 10 91-0021	EA	>250 To 500', >3" To 6" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,245.03
21 01 10 91-0022	EA	>500 To 1,000', >3" To 6" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,556.27
21 01 10 91-0023	EA	>1,000 To 2,000', >3" To 6" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	2,023.16
21 01 10 91-0024	LF	>2,000', >3" To 6" Diameter Branch Piping, Purge Liquid System (For Sprinkler Upgrades).....	1.01
21 01 10 91-0025	EA	Up To 100', >6" To 10" Diameter Main Piping, Purge Liquid System (For Sprinkler Upgrades).....	982.19
21 01 10 91-0026	EA	>100 To 250', >6" To 10" Diameter Main Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,402.76
21 01 10 91-0027	EA	>250 To 500', >6" To 10" Diameter Main Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,489.23
21 01 10 91-0028	EA	>500 To 1,000', >6" To 10" Diameter Main Piping, Purge Liquid System (For Sprinkler Upgrades).....	1,861.52
21 01 10 91-0029	EA	>1,000 To 2,000', >6" To 10" Diameter Main Piping, Purge Liquid System (For Sprinkler Upgrades).....	2,419.99
21 01 10 91-0030	LF	>2,000', >6" To 10" Diameter Main Piping, Purge Liquid System (For Sprinkler Upgrades).....	1.21

21 01 30 Operation and Maintenance of Fire-Suppression Equipment ^(21 01)

21 01 30 91 Fire-Suppression Equipment Restoration ^(21 01 30)

21 01 30 91-0001	EA	Inspection And Recharge ^(21 01 30 91)	
21 01 30 91-0002	EA	Inspection, CO2, Carbon Dioxide.....	244.57
21 01 30 91-0003	LB	Refill/Recharge, CO2, Carbon Dioxide.....	2.91
21 01 30 91-0004	EA	Inspection, Halon 1301.....	244.57
21 01 30 91-0005	LB	Refill/Recharge, Halon 1301.....	69.86
21 01 30 91-0006	EA	Inspection, WC, Wet Chemical.....	147.88
21 01 30 91-0007	GAL	Refill/Recharge, WC, Wet Chemical.....	65.50
21 01 30 91-0008	EA	Inspection, DC, Dry Chemical.....	147.88
21 01 30 91-0009	LB	Refill/Recharge, DC, Dry Chemical.....	5.82
21 01 30 91-0010	EA	Hydrostatic Testing, All Sizes, All Agents.....	45.51
		See CSI section 23 05 93 00-0046 for testing existing piping systems.	
21 01 30 91-0011	EA	Disarm/Arm System.....	79.63

21 05 Common Work Results for Fire Suppression ⁽²¹⁾

21 05 13 Common Motor Requirements for Fire-Suppression Equipment

^(21 05)
Note: New equipment includes motor, unless otherwise stated. For use when replacing existing motor. See CSI section 23 05 13 00-0000 for motor requirements.

21 05 16 Expansion Fittings and Loops for Fire-Suppression Piping ^(21 05)

See CSI section 23 05 16 00-0000 for expansion fittings and loops.

21	21 Fire Suppression
	21 05 Common Work Results for Fire Suppression
	21 05 17 Sleeves and Sleeve Seals for Fire-Suppression Piping



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

21 05 17 Sleeves and Sleeve Seals for Fire-Suppression Piping ^(21 05)

See CSI section 23 05 17 00-0000 for sleeves and sleeve seals.

21 05 19 Meters and Gages for Fire-Suppression Systems ^(21 05)

See CSI section 33 19 00 00-0000 for water utility service metering.

21 05 19 00-0001 Fire Sprinkler System Water Pressure Gauge ^(21 05 19)

21 05 19 00-0002	EA	2" Diameter Dial, 0-200 PSI, Water Pressure Gauge	49.06	13.14
		Note: For fire sprinkler systems		
21 05 19 00-0003	EA	2-1/2" Diameter Dial, 0-300 PSI, Water Pressure Gauge	50.93	13.14
		Note: For fire sprinkler systems		
21 05 19 00-0004	EA	3" Diameter Dial, 0-300 PSI, Water Pressure Gauge	59.67	13.14
		Note: For fire sprinkler systems		
21 05 19 00-0005	EA	3-1/2" Diameter Dial, 0-300 PSI, Water Pressure Gauge	63.26	13.14
		Note: For fire sprinkler systems		
21 05 19 00-0006	EA	4" Diameter Dial, 0-300 PSI, Water Pressure Gauge	66.85	13.14
		Note: For fire sprinkler systems		

21 05 19 00-0007 Fire Service Meter Cast Iron Housing ^(21 05 19)

21 05 19 00-0008	EA	3" Diameter, 0 - 600 GPM Fire Service Meter Flanged, With Cast Iron Housing.....	7,489.35	179.75
		For >10 To 25, Deduct	-374.47	
		For >25, Deduct	-1,100.91	
21 05 19 00-0009	EA	4" Diameter, 0 - 1,000 GPM Fire Service Meter Flanged, With Cast Iron Housing.....	15,301.66	301.33
		For >10 To 25, Deduct	-765.08	
		For >25, Deduct	-2,257.49	
21 05 19 00-0010	EA	6" Diameter, 0 - 2,000 GPM Fire Service Meter Flanged, With Cast Iron Housing.....	20,743.64	451.23
		For >10 To 25, Deduct	-1,037.18	
		For >25, Deduct	-3,054.94	
21 05 19 00-0011	EA	8" Diameter, 0 - 4,000 GPM Fire Service Meter Flanged, With Cast Iron Housing.....	27,060.68	576.57
		For >10 To 25, Deduct	-1,353.03	
		For >25, Deduct	-3,987.48	
21 05 19 00-0012	EA	10" Diameter, 0 - 6,200 GPM Fire Service Meter Flanged, With Cast Iron Housing.....	38,158.70	701.91
		For >10 To 25, Deduct	-1,907.94	
		For >25, Deduct	-5,636.07	

21 05 23 General-Duty Valves for Water-Based Fire-Suppression Piping

^(21 05)
See CSI section 22 05 23 00-0000 for additional valves, 23 05 23 00-0000 for additional valves.

21 05 23 00-0001 TESTanDRAIN® Valve ^(21 05 23)

21 05 23 00-0002	EA	1/4" 3-Way Globe Valve With 1/4" NPT Test Port (AGF 7600).....	238.49	15.14
21 05 23 00-0003	EA	1" Threaded TESTanDRAIN® Valve (AGF 1000).....	269.36	18.30
21 05 23 00-0004	EA	1-1/4" Threaded TESTanDRAIN® Valve (AGF 1000).....	329.33	23.12
21 05 23 00-0005	EA	1-1/2" Threaded TESTanDRAIN® Valve (AGF 1000).....	514.26	26.70
21 05 23 00-0006	EA	2" Threaded TESTanDRAIN® Valve (AGF 1000).....	540.49	31.54
21 05 23 00-0007	EA	1" Threaded TESTanDRAIN® Valve With Relief Valve (AGF 1011).....	378.78	18.30
21 05 23 00-0008	EA	1-1/4" Threaded TESTanDRAIN® Valve With Relief Valve (AGF 1011).....	437.68	23.12
21 05 23 00-0009	EA	1-1/2" Threaded TESTanDRAIN® Valve With Relief Valve (AGF 1011).....	625.91	26.70
21 05 23 00-0010	EA	2" Threaded TESTanDRAIN® Valve With Relief Valve (AGF 1011).....	655.11	31.54

21 05 29 Hangers and Supports for Fire-Suppression Piping and Equipment ^(21 05)

See CSI section 23 05 29 00-0000 for hangers and supports.

21 05 48 Vibration and Seismic Controls for Fire-Suppression Piping and Equipment ^(21 05)

21 05 48 13 Vibration Controls for Fire-Suppression Piping and Equipment ^(21 05 48)

See CSI section 23 05 48 13-0000 for vibration and seismic control.

21 05 53 Identification for Fire-Suppression Piping and Equipment ^(21 05)

See CSI section 23 05 53 00-0000 for identification.

21 07 Fire-Suppression Systems Insulation ⁽²¹⁾

21 07 16 Fire-Suppression Equipment Insulation ^(21 07)

See CSI section 23 07 16 00-0000 for fire-suppression equipment insulation.

21 07 19 Fire-Suppression Piping Insulation ^(21 07)

See CSI section 22 07 19 00-0000 for fire-suppression piping insulation.

21 10 Water-Based Fire-Suppression Systems ⁽²¹⁾

See CSI section 22 11 16 00-0356 for copper pipe, 22 11 16 00-0900 for CPVC pipe, 23 05 23 00-0037 for OS&Y gate valves, 23 21 13 23-0000 for black steel piping.

21 11 Facility Fire-Suppression Water-Service Piping ^(21 10)



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	2
Facility Fire-Suppression Water-Service Piping	21 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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21 11 19 Fire-Department Connections (21 11)

21 11 19 00-0001 Fire Department Connections (21 11 19)

21 11 19 00-0002	EA	4" x 2-1/2" x 2-1/2" Siamese Connection, Polished Brass <i>For Polished Chrome, Add</i>	1,034.99 65.27	338.50
21 11 19 00-0003	EA	6" x 2-1/2" x 2-1/2" Siamese Connection, Polished Brass <i>For Polished Chrome, Add</i>	1,440.60 99.91	423.13
21 11 19 00-0004	EA	4" x 3" x 3" Siamese Connection, Polished Brass <i>For Polished Chrome, Add</i>	1,525.42 126.55	338.50
21 11 19 00-0005	EA	6" x 3" x 3" Siamese Connection, Polished Brass <i>For Polished Chrome, Add</i>	2,016.07 171.84	423.13
21 11 19 00-0006	EA	6" x 2-1/2" x 2-1/2" x 2-1/2" Siamese Connection, Three Way, Polished Brass..... <i>For Polished Chrome, Add</i>	2,156.75 189.43	423.13
21 11 19 00-0007	EA	Sidewalk Type Connection With Plug And Chain, Polished Brass..... <i>For Polished Chrome, Add</i>	1,846.94 146.09	447.82
21 11 19 00-0008	EA	Wall Type Connection With Plug And Chain, Polished Brass..... <i>For Polished Chrome, Add</i>	1,183.38 83.82	338.50

21 11 19 00-0009 Wall Type Indicator Post, Wheel Operated (21 11 19)

See CSI section 33 14 19 00-0001 for adjustable indicator post accessory for ground valves.				
21 11 19 00-0010	EA	Wall Type Indicator Post With Wall Flange For Valve (Victaulic 773).....	2,326.61	301.33

21 12 Fire-Suppression Standpipes (21 10)

See CSI section 23 21 13 23-0000 for black steel pipe.

21 12 13 Fire-Suppression Hoses and Nozzles (21 12)

21 12 13 00-0001 Fire Hose (21 12 13)

21 12 13 00-0002 Fire Hose Without Couplings (21 12 13 00-0001)

21 12 13 00-0003	LF	1-1/2" Linen Fire Hose With 1-1/2" Rubber Lining Without Couplings	2.85	2.28
21 12 13 00-0004	LF	2-1/2" Linen Fire Hose With 1-1/2" Rubber Lining Without Couplings	3.29	2.28
21 12 13 00-0005	LF	2" Linen Fire Hose With 1-1/2" Rubber Lining Without Couplings	3.02	2.28
21 12 13 00-0006	LF	3" Linen Fire Hose With 1-1/2" Rubber Lining Without Couplings	3.51	2.28
21 12 13 00-0007	LF	1-1/2" Cotton Fire Hose, 300 LB Test With 1-1/2" Rubber Lining Without Couplings	3.13	2.28
21 12 13 00-0008	LF	2-1/2" Cotton Fire Hose, 300 LB Test With 1-1/2" Rubber Lining Without Couplings	3.80	2.28
21 12 13 00-0009	LF	1-1/2" Cotton Fire Hose, 400 LB Test With 1-1/2" Rubber Lining Without Couplings	3.21	2.28
21 12 13 00-0010	LF	2-1/2" Cotton Fire Hose, 400 LB Test With 1-1/2" Rubber Lining Without Couplings	3.98	2.28

21 12 13 00-0011 Fire Hose With Aluminum Couplings (21 12 13 00-0001)

21 12 13 00-0012	LF	1-3/4" Polyester Fire Hose With Rubber Lining With Aluminum Couplings.....	8.33	1.25
21 12 13 00-0013	LF	2-1/2" Polyester Fire Hose With Rubber Lining With Aluminum Couplings.....	10.47	1.48
21 12 13 00-0014	LF	3-1/2" Polyester Fire Hose With Rubber Lining With Aluminum Couplings.....	18.15	1.48

21 12 13 00-0015 Fire Hose Accessories (21 12 13 00-0001)

21 12 13 00-0016	EA	Hose Coupling With 1-1/2" Pin Lug.....	274.78	37.54
21 12 13 00-0017	EA	Hose Coupling With 2-1/2" Pin Lug.....	439.57	42.09
21 12 13 00-0018	EA	1-1/2" x 10" Brass Straight Nozzle.....	93.08	29.58
21 12 13 00-0019	EA	2-1/2" x 12" Brass Straight Nozzle.....	182.20	29.58
21 12 13 00-0020	EA	1-1/2" Brass Fog Type Nozzle.....	145.07	29.58
21 12 13 00-0021	EA	2-1/2" Brass Fog Type Nozzle.....	207.64	29.58
21 12 13 00-0022	EA	1-1/2" Brass 100' Hose Rack.....	322.34	125.13
21 12 13 00-0023	EA	2-1/2" Brass 100' Hose Rack.....	444.02	125.13

21 12 23 Fire-Suppression Hose Valves (21 12)

21 12 23 00-0001 Standpipe Valves (21 12 23)

21 12 23 00-0002	EA	2-1/2" Fire Department Valve, Polished Brass With Plug And Chain..... <i>For Polished Chrome, Add</i>	804.80 69.85	223.92
21 12 23 00-0003	EA	2-1/2" x 2-1/2" x 4" Fire Department Valve, Flush, Polished Brass..... <i>For Polished Chrome, Add</i>	1,356.05 152.54	223.81
21 12 23 00-0004	EA	2-1/2" x 2-1/2" x 6" Fire Department Valve, Flush, Polished Brass..... <i>For Polished Chrome, Add</i>	1,769.51 210.39	242.10
21 12 23 00-0005	EA	3" x 3" x 4" Fire Department Valve, Flush, Polished Brass..... <i>For Polished Chrome, Add</i>	2,150.41 271.70	223.81
21 12 23 00-0006	EA	3" x 3" x 6" Fire Department Valve, Flush, Polished Brass..... <i>For Polished Chrome, Add</i>	2,535.09 325.23	242.10
21 12 23 00-0007	EA	2-1/2" x 2-1/2" x 4" Fire Department Valve, Projecting, Polished Brass..... <i>For Polished Chrome, Add</i>	1,271.62 139.88	223.81
21 12 23 00-0008	EA	2-1/2" x 2-1/2" x 6" Fire Department Valve, Projecting, Polished Brass..... <i>For Polished Chrome, Add</i>	1,901.90 230.25	242.10
21 12 23 00-0009	EA	2-1/2" x 2-1/2" x 2-1/2" x 4" Fire Department Valve, Flush, Polished Brass..... <i>For Polished Chrome, Add</i>	2,470.30 254.43	231.06
21 12 23 00-0010	EA	2-1/2" x 2-1/2" x 2-1/2" x 6" Fire Department Valve, Flush, Polished Brass..... <i>For Polished Chrome, Add</i>	3,569.33 381.64	256.71
21 12 23 00-0011	EA	2-1/2" x 2-1/2" x 2-1/2" x 4" Fire Department Valve, Projecting, Polished Brass..... <i>For Polished Chrome, Add</i>	2,660.26 277.22	231.06

21	21	Fire Suppression
	21 10	Water-Based Fire-Suppression Systems
	21 12	Fire-Suppression Standpipes



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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21 12 23 00-0012	EA	2-1/2" x 2-1/2" x 2-1/2" x 6" Fire Department Valve, Projecting, Polished Brass	3,855.53	
		<i>For Polished Chrome, Add</i>	415.98	
21 12 23 00-0013	EA	2-1/2" x 2-1/2" x 2-1/2" x 6" Fire Department Valve, Square, Flush, Polished Brass.....	13,634.35	308.02
		<i>For Polished Chrome, Add</i>	1,316.76	

21 12 23 00-0014 Fire Hose Angle Valves (21 12 23)

21 12 23 00-0015	EA	1-1/2", 300 LB Rated, Cast Brass, Fire Hose Angle Valve	230.49	30.72
21 12 23 00-0016	EA	1-1/2", 300 LB Rated, Polished Brass, Fire Hose Angle Valve	275.54	30.72
21 12 23 00-0017	EA	1-1/2", 300 LB Rated, Rough Chrome Plated, Fire Hose Angle Valve	259.16	30.72
21 12 23 00-0018	EA	1-1/2", 300 LB Rated, Polished Chrome Plated, Fire Hose Angle Valve	304.21	30.72
21 12 23 00-0019	EA	2-1/2", 300 LB Rated, Cast Brass, Fire Hose Angle Valve	410.24	51.19
21 12 23 00-0020	EA	2-1/2", 300 LB Rated, Polished Brass, Fire Hose Angle Valve	475.77	51.19
21 12 23 00-0021	EA	2-1/2", 300 LB Rated, Rough Chrome Plated, Fire Hose Angle Valve	481.23	51.19
21 12 23 00-0022	EA	2-1/2", 300 LB Rated, Polished Chrome Plated, Fire Hose Angle Valve	546.77	51.19

21 12 29 Fire-Suppression Fire Hose Equipment (21 12)

21 12 29 00-0001 Standpipe And Fire Hose Equipment (21 12 29)

21 12 29 00-0002	EA	2-1/2" x 2-1/2" x 2-1/2" x 4" Manifold Roof Type, Vertical, Polished Brass	4,423.65	555.06
21 12 29 00-0003	EA	Water Motor Gong	1,588.06	170.52
21 12 29 00-0004	EA	Fire Riser Flow Switch (National Fire Protection Association 13)	1,550.48	19.84
21 12 29 00-0005	EA	Water Flow Supervisory (Tamper) Switch Mounted On Valve	247.09	33.93

21 12 29 00-0006 Water Flow Detector (21 12 29)

21 12 29 00-0007 Pressure-Type Wazter Flow Detector (21 12 29 00-0006)

21 12 29 00-0008	EA	Pressure-Type Water Flow Detector For Up To 2-1/2" Pipe	393.73	104.42
21 12 29 00-0009	EA	Pressure-Type Water Flow Detector For >2-1/2" To 4" Pipe	571.47	138.36
21 12 29 00-0010	EA	Pressure-Type Water Flow Detector For >4" To 8" Pipe	893.97	156.63

21 12 29 00-0011 Vane-Type Water Flow Detector (21 12 29 00-0006)

21 12 29 00-0012	EA	Vane-Type Water Flow Detector For Up To 2-1/2" Pipe	493.77	104.42
21 12 29 00-0013	EA	Vane-Type Water Flow Detector For >2-1/2" To 4" Pipe	694.03	138.36
21 12 29 00-0014	EA	Vane-Type Water Flow Detector For >4" To 8" Pipe	1,088.27	156.63

21 13 Fire-Suppression Sprinkler Systems (21 10)

21 13 13 Wet-Pipe Sprinkler Systems (21 13)

21 13 13 00-0001 Complete Wet Pipe Sprinkler Systems Assemblies (21 13 13)

Note: Includes all branch line piping (standard weight threaded black steel, less than 2-1/2" diameter pipe, fittings, branch valves, hangers, sprinkler heads, etc) from riser pipe and mains. The coverage of one sprinkler head varies from about 180 SF for light hazard occupancy, about 155 SF for ordinary, 90 to about 130 SF for extra hazard conditions. Excludes outside mains, inside vertical or horizontal pipe mains, greater than 2" diameter. Excludes special alarm valves, gate valves, check valves, flow control devices, water motor gong assembly, Siamese connections, standpipes and fittings, pipe mains and fittings, fire pumps and tanks. Not for use where detail is available. For sprinkler repairs or sprinkler head replacements use specific pipe, fittings, hangers, valves, and sprinkler head components. See CSI section 23 21 13 23-1260 for individual grooved pipe, 23 21 13 23-1328 for individual grooved pipe fittings.

21 13 13 00-0002 Light Hazard, Complete Wet-Pipe Sprinkler System Assemblies (21 13 13 00-0001)

21 13 13 00-0003	EA	Exposed Piping, Light Hazard, Per Head, Complete Wet-Pipe Sprinkler System Assembly	997.90	
		Note: Includes branch pipe and fittings, supports and sprinkler heads.		
		<i>For Copper Pipe, Add</i>	131.45	
		<i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i>	-181.35	
		<i>For Up To 5, Add</i>	435.63	
		<i>For >5 To 10, Add</i>	254.28	
		<i>For >10 To 20, Add</i>	154.49	
		<i>For >20 To 40, Add</i>	68.13	
		<i>For >100 To 150, Deduct</i>	-99.79	
		<i>For >150, Deduct</i>	-199.58	
21 13 13 00-0004	EA	Concealed Piping, Light Hazard, Per Head, Complete Wet-Pipe Sprinkler System Assembly	1,222.00	
		Note: Includes branch pipe and fittings, supports and sprinkler heads with flat or conical escutcheon.		
		<i>For Copper Pipe, Add</i>	156.45	
		<i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i>	-217.55	
		<i>For Up To 5, Add</i>	542.50	
		<i>For >5 To 10, Add</i>	324.95	
		<i>For >10 To 20, Add</i>	202.75	
		<i>For >20 To 40, Add</i>	87.95	
		<i>For >100 To 150, Deduct</i>	-122.20	
		<i>For >150, Deduct</i>	-244.40	
		<i>For Work In Restricted Working Space, Add</i>	161.11	

21 13 13 00-0005 Ordinary Hazard, Complete Wet-Pipe Sprinkler System Assemblies (21 13 13 00-0001)



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0006 EA Exposed Piping, Ordinary Hazard, Per Head, Complete Wet-Pipe Sprinkler System Assembly 973.93 Note: Includes branch pipe and fittings, supports and sprinkler heads.		
<i>For Copper Pipe, Add</i>	128.07	
<i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i>	-176.77	
<i>For Up To 5, Add</i>	425.60	
<i>For >5 To 10, Add</i>	248.83	
<i>For >10 To 20, Add</i>	151.44	
<i>For >20 To 40, Add</i>	66.71	
<i>For >100 To 150, Deduct</i>	-97.39	
<i>For >150, Deduct</i>	-194.79	
21 13 13 00-0007 EA Concealed Piping, Ordinary Hazard, Per Head, Complete Wet-Pipe Sprinkler System Assembly 1,187.98 Note: Includes branch pipe and fittings, supports and sprinkler heads with flat or conical escutcheon.		
<i>For Copper Pipe, Add</i>	151.70	
<i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i>	-211.10	
<i>For Up To 5, Add</i>	528.19	
<i>For >5 To 10, Add</i>	317.09	
<i>For >10 To 20, Add</i>	198.29	
<i>For >20 To 40, Add</i>	85.90	
<i>For >100 To 150, Deduct</i>	-118.80	
<i>For >150, Deduct</i>	-237.60	
<i>For Work In Restricted Working Space, Add</i>	158.99	
21 13 13 00-0008 Extra Hazard, Complete Wet-Pipe Sprinkler System Assemblies (21 13 13 00-0001)		
21 13 13 00-0009 EA Exposed Piping, Extra Hazard, Per Head, Complete Wet-Pipe Sprinkler System Assembly 897.54 Note: Includes branch pipe and fittings, supports and sprinkler heads.		
<i>For Copper Pipe, Add</i>	117.85	
<i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i>	-162.73	
<i>For Up To 5, Add</i>	392.57	
<i>For >5 To 10, Add</i>	229.84	
<i>For >10 To 20, Add</i>	140.09	
<i>For >20 To 40, Add</i>	61.66	
<i>For >100 To 150, Deduct</i>	-89.75	
<i>For >150, Deduct</i>	-179.51	
21 13 13 00-0010 EA Concealed Piping, Extra Hazard, Per Head, Complete Wet-Pipe Sprinkler System Assembly 1,097.34 Note: Includes branch pipe and fittings, supports and sprinkler heads with flat or conical escutcheon.		
<i>For Copper Pipe, Add</i>	139.92	
<i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i>	-194.78	
<i>For Up To 5, Add</i>	488.31	
<i>For >5 To 10, Add</i>	293.52	
<i>For >10 To 20, Add</i>	183.79	
<i>For >20 To 40, Add</i>	79.55	
<i>For >100 To 150, Deduct</i>	-109.73	
<i>For >150, Deduct</i>	-219.47	
<i>For Work In Restricted Working Space, Add</i>	148.11	
21 13 13 00-0011 Wet Pipe Sprinkler Components (21 13 13)		
Note: Excludes hydraulic calculations.		
21 13 13 00-0012 Wet Pipe Alarm Check Valves (21 13 13 00-0011)		
Note: Excludes trim package See CSI section 21 13 13 00-0018 for Wet Pipe Valve Trim.		
21 13 13 00-0013 EA 2-1/2" Wet Pipe Alarm Check Valve 1,982.95	143.58	
21 13 13 00-0014 EA 3" Wet Pipe Alarm Check Valve 2,024.72	164.46	
21 13 13 00-0015 EA 4" Wet Pipe Alarm Check Valve 2,254.45	279.34	
21 13 13 00-0016 EA 6" Wet Pipe Alarm Check Valve 2,166.76	352.43	
21 13 13 00-0017 EA 8" Wet Pipe Alarm Check Valve 3,891.75	446.41	
21 13 13 00-0018 Wet Pipe Valve Trim (21 13 13 00-0011)		
Note: Vertical or Horizontal, closed drain, basic galvanized trim assembly package. Includes gauges, pressure switch, relief valve, drain line, and retard chamber.		
21 13 13 00-0019 EA 2-1/2" Wet Pipe Valve Trim 1,795.49	303.87	
21 13 13 00-0020 EA 3" Wet Pipe Valve Trim 1,900.76	303.87	
21 13 13 00-0021 EA 4" Wet Pipe Valve Trim 2,278.85	416.65	
21 13 13 00-0022 EA 6" Wet Pipe Valve Trim 2,655.63	579.55	
21 13 13 00-0023 EA 8" Wet Pipe Valve Trim 2,885.37	717.38	
21 13 13 00-0024 Wet Pipe Sprinkler Heads (21 13 13 00-0011)		
21 13 13 00-0025 Upright Wet Pipe Sprinkler Heads (21 13 13 00-0024)		
21 13 13 00-0026 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Upright Brass Wet Pipe Sprinkler Head 81.84	12.79	
<i>For >25 To 50, Deduct</i>	-2.56	
<i>For >50 To 100, Deduct</i>	-6.65	
<i>For >100 To 500, Deduct</i>	-11.51	
<i>For >500 To 1,000, Deduct</i>	-23.43	
<i>For >1,000, Deduct</i>	-33.67	
21 13 13 00-0027 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Upright Chrome Wet Pipe Sprinkler Head 84.96	12.79	
<i>For >25 To 50, Deduct</i>	-2.56	
<i>For >50 To 100, Deduct</i>	-6.81	
<i>For >100 To 500, Deduct</i>	-11.90	
<i>For >500 To 1,000, Deduct</i>	-24.00	
<i>For >1,000, Deduct</i>	-34.23	

21 Fire Suppression**21 10 Water-Based Fire-Suppression Systems****21 13 Fire-Suppression Sprinkler Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0028	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	86.95	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.91	
	<i>For >100 To 500, Deduct</i>	-12.15	
	<i>For >500 To 1,000, Deduct</i>	-24.35	
	<i>For >1,000, Deduct</i>	-34.59	
21 13 13 00-0029	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Upright Brass Wet Pipe Sprinkler Head.....	83.41	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.73	
	<i>For >100 To 500, Deduct</i>	-11.71	
	<i>For >500 To 1,000, Deduct</i>	-23.72	
	<i>For >1,000, Deduct</i>	-33.95	
21 13 13 00-0030	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Upright Chrome Wet Pipe Sprinkler Head.....	86.65	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.89	
	<i>For >100 To 500, Deduct</i>	-12.11	
	<i>For >500 To 1,000, Deduct</i>	-24.30	
	<i>For >1,000, Deduct</i>	-34.54	
21 13 13 00-0031	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	88.73	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.00	
	<i>For >100 To 500, Deduct</i>	-12.37	
	<i>For >500 To 1,000, Deduct</i>	-24.67	
	<i>For >1,000, Deduct</i>	-34.91	
21 13 13 00-0032	EA 1/2" NPT Thread, 3/8" Orifice, Quick Response, Upright Brass Wet Pipe Sprinkler Head.....	103.85	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.75	
	<i>For >100 To 500, Deduct</i>	-14.26	
	<i>For >500 To 1,000, Deduct</i>	-27.40	
	<i>For >1,000, Deduct</i>	-37.63	
21 13 13 00-0033	EA 1/2" NPT Thread, 3/8" Orifice, Quick Response, Upright Chrome Wet Pipe Sprinkler Head.....	112.21	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-8.17	
	<i>For >100 To 500, Deduct</i>	-15.31	
	<i>For >500 To 1,000, Deduct</i>	-28.90	
	<i>For >1,000, Deduct</i>	-39.14	
21 13 13 00-0034	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Upright Brass Wet Pipe Sprinkler Head.....	103.85	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.75	
	<i>For >100 To 500, Deduct</i>	-14.26	
	<i>For >500 To 1,000, Deduct</i>	-27.40	
	<i>For >1,000, Deduct</i>	-37.63	
21 13 13 00-0035	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Upright Chrome Wet Pipe Sprinkler Head.....	112.21	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-8.17	
	<i>For >100 To 500, Deduct</i>	-15.31	
	<i>For >500 To 1,000, Deduct</i>	-28.90	
	<i>For >1,000, Deduct</i>	-39.14	
21 13 13 00-0036	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Upright Brass Wet Pipe Sprinkler Head.....	93.02	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.21	
	<i>For >100 To 500, Deduct</i>	-12.91	
	<i>For >500 To 1,000, Deduct</i>	-25.45	
	<i>For >1,000, Deduct</i>	-35.68	
21 13 13 00-0037	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Upright Chrome Wet Pipe Sprinkler Head.....	97.10	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.41	
	<i>For >100 To 500, Deduct</i>	-13.42	
	<i>For >500 To 1,000, Deduct</i>	-26.18	
	<i>For >1,000, Deduct</i>	-36.42	
21 13 13 00-0038	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Upright Brass Wet Pipe Sprinkler Head.....	94.16	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.55	
	<i>For >100 To 500, Deduct</i>	-13.19	
	<i>For >500 To 1,000, Deduct</i>	-26.62	
	<i>For >1,000, Deduct</i>	-37.99	
21 13 13 00-0039	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Upright Chrome Wet Pipe Sprinkler Head.....	98.93	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.79	
	<i>For >100 To 500, Deduct</i>	-13.79	
	<i>For >500 To 1,000, Deduct</i>	-27.48	
	<i>For >1,000, Deduct</i>	-38.85	
21 13 13 00-0040	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	99.90	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.84	
	<i>For >100 To 500, Deduct</i>	-13.91	
	<i>For >500 To 1,000, Deduct</i>	-27.65	
	<i>For >1,000, Deduct</i>	-39.03	
21 13 13 00-0041	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Upright Brass Wet Pipe Sprinkler Head.....	94.16	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.55	
	<i>For >100 To 500, Deduct</i>	-13.19	
	<i>For >500 To 1,000, Deduct</i>	-26.62	
	<i>For >1,000, Deduct</i>	-37.99	



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0042	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Upright Chrome Wet Pipe Sprinkler Head.....	98.93	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-7.79	
			<i>For >100 To 500, Deduct</i>	-13.79	
			<i>For >500 To 1,000, Deduct</i>	-27.48	
			<i>For >1,000, Deduct</i>	-38.85	
21 13 13 00-0043	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	99.90	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-7.84	
			<i>For >100 To 500, Deduct</i>	-13.91	
			<i>For >500 To 1,000, Deduct</i>	-27.65	
			<i>For >1,000, Deduct</i>	-39.03	
21 13 13 00-0044	EA		1/2" NPT Thread, 3/8" Orifice, K=2.8, Upright Brass Wet Pipe Sprinkler Head	90.86	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.10	
			<i>For >100 To 500, Deduct</i>	-12.64	
			<i>For >500 To 1,000, Deduct</i>	-25.06	
			<i>For >1,000, Deduct</i>	-35.30	
21 13 13 00-0045	EA		1/2" NPT Thread, 3/8" Orifice, K=2.8, Upright Chrome Wet Pipe Sprinkler Head.....	93.98	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.26	
			<i>For >100 To 500, Deduct</i>	-13.03	
			<i>For >500 To 1,000, Deduct</i>	-25.62	
			<i>For >1,000, Deduct</i>	-35.86	
21 13 13 00-0046	EA		1/2" NPT Thread, 3/8" Orifice, K=2.8, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	94.58	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.29	
			<i>For >100 To 500, Deduct</i>	-13.10	
			<i>For >500 To 1,000, Deduct</i>	-25.73	
			<i>For >1,000, Deduct</i>	-35.96	
21 13 13 00-0047	EA		1/2" NPT Thread, 7/16" Orifice, K=4.2, Upright Brass Wet Pipe Sprinkler Head	90.86	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.10	
			<i>For >100 To 500, Deduct</i>	-12.64	
			<i>For >500 To 1,000, Deduct</i>	-25.06	
			<i>For >1,000, Deduct</i>	-35.30	
21 13 13 00-0048	EA		1/2" NPT Thread, 7/16" Orifice, K=4.2, Upright Chrome Wet Pipe Sprinkler Head.....	93.98	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.26	
			<i>For >100 To 500, Deduct</i>	-13.03	
			<i>For >500 To 1,000, Deduct</i>	-25.62	
			<i>For >1,000, Deduct</i>	-35.86	
21 13 13 00-0049	EA		1/2" NPT Thread, 7/16" Orifice, K=4.2, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	94.58	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.29	
			<i>For >100 To 500, Deduct</i>	-13.10	
			<i>For >500 To 1,000, Deduct</i>	-25.73	
			<i>For >1,000, Deduct</i>	-35.96	
21 13 13 00-0050	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, Combustible Concealed Space, Upright Brass Wet Pipe Sprinkler Head	94.57	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.29	
			<i>For >100 To 500, Deduct</i>	-13.10	
			<i>For >500 To 1,000, Deduct</i>	-25.72	
			<i>For >1,000, Deduct</i>	-35.96	
21 13 13 00-0051	EA		3/4" NPT Thread, K=14.0, Extended Coverage, Upright Brass Wet Pipe Sprinkler Head	127.64	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-9.23	
			<i>For >100 To 500, Deduct</i>	-17.38	
			<i>For >500 To 1,000, Deduct</i>	-32.64	
			<i>For >1,000, Deduct</i>	-44.02	
21 13 13 00-0052	EA		3/4" NPT Thread, K=14.0, Extended Coverage, Upright Chrome Wet Pipe Sprinkler Head.....	131.23	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-9.41	
			<i>For >100 To 500, Deduct</i>	-17.83	
			<i>For >500 To 1,000, Deduct</i>	-33.29	
			<i>For >1,000, Deduct</i>	-44.67	
21 13 13 00-0053	EA		3/4" NPT Thread, K=14.0, Extended Coverage, Upright White Polyester Coated Wet Pipe Sprinkler Head.....	131.23	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-9.41	
			<i>For >100 To 500, Deduct</i>	-17.83	
			<i>For >500 To 1,000, Deduct</i>	-33.29	
			<i>For >1,000, Deduct</i>	-44.67	
21 13 13 00-0054	EA		3/4" NPT Thread, K=11.2, Extended Coverage, Upright Brass Wet Pipe Sprinkler Head	103.42	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.02	
			<i>For >100 To 500, Deduct</i>	-14.35	
			<i>For >500 To 1,000, Deduct</i>	-28.29	
			<i>For >1,000, Deduct</i>	-39.66	
21 13 13 00-0055	EA		3/4" NPT Thread, K=11.2, Extended Coverage, Upright Chrome Wet Pipe Sprinkler Head.....	105.88	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.14	
			<i>For >100 To 500, Deduct</i>	-14.66	
			<i>For >500 To 1,000, Deduct</i>	-28.73	
			<i>For >1,000, Deduct</i>	-40.10	

21 Fire Suppression
21 10 Water-Based Fire-Suppression Systems
21 13 Fire-Suppression Sprinkler Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0056	EA 3/4" NPT Thread, K=11.2, Extended Coverage, Upright White Polyester Coated Wet Pipe Sprinkler Head	105.88	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-8.14	
	<i>For >100 To 500, Deduct</i>	-14.66	
	<i>For >500 To 1,000, Deduct</i>	-28.73	
	<i>For >1,000, Deduct</i>	-40.10	
21 13 13 00-0057	EA 1/2" NPT Thread, K=5.6, Quick Response, Upright Stainless Steel Wet Pipe Sprinkler Head	306.97	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-17.91	
	<i>For >100 To 500, Deduct</i>	-39.65	
	<i>For >500 To 1,000, Deduct</i>	-63.96	
	<i>For >1,000, Deduct</i>	-74.19	
21 13 13 00-0058	EA 3/4" NPT Thread, K=8.0, Quick Response, Upright Stainless Steel Wet Pipe Sprinkler Head	338.01	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-19.74	
	<i>For >100 To 500, Deduct</i>	-43.67	
	<i>For >500 To 1,000, Deduct</i>	-70.51	
	<i>For >1,000, Deduct</i>	-81.89	
21 13 13 00-0059	EA 1/2" NPT Thread, K=5.6, High Temperature (400 To 500 Degree), Upright Brass Wet Pipe Sprinkler Head	163.19	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-10.72	
	<i>For >100 To 500, Deduct</i>	-21.68	
	<i>For >500 To 1,000, Deduct</i>	-38.08	
	<i>For >1,000, Deduct</i>	-48.31	
21 13 13 00-0060	EA 1/2" NPT Thread, K=5.6, High Temperature (400 To 500 Degree), Upright Chrome Wet Pipe Sprinkler Head	200.65	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-12.59	
	<i>For >100 To 500, Deduct</i>	-26.36	
	<i>For >500 To 1,000, Deduct</i>	-44.82	
	<i>For >1,000, Deduct</i>	-55.06	
21 13 13 00-0061	EA 1/2" NPT Thread, K=5.6, High Temperature (650 Degree), Upright Brass Wet Pipe Sprinkler Head	357.30	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-20.42	
	<i>For >100 To 500, Deduct</i>	-45.94	
	<i>For >500 To 1,000, Deduct</i>	-73.02	
	<i>For >1,000, Deduct</i>	-83.25	
21 13 13 00-0062	EA 1/2" NPT Thread, K=5.6, High Temperature (650 Degree), Upright Chrome Wet Pipe Sprinkler Head	454.92	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-25.31	
	<i>For >100 To 500, Deduct</i>	-58.14	
	<i>For >500 To 1,000, Deduct</i>	-90.59	
	<i>For >1,000, Deduct</i>	-100.83	
21 13 13 00-0063	EA 3/4" NPT Thread, K=8.0, High Temperature (400 To 500 Degree), Upright Brass Wet Pipe Sprinkler Head	206.34	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-13.16	
	<i>For >100 To 500, Deduct</i>	-27.21	
	<i>For >500 To 1,000, Deduct</i>	-46.81	
	<i>For >1,000, Deduct</i>	-58.19	
21 13 13 00-0064	EA 3/4" NPT Thread, K=8.0, High Temperature (400 To 500 Degree), Upright Chrome Wet Pipe Sprinkler Head	207.47	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-13.22	
	<i>For >100 To 500, Deduct</i>	-27.36	
	<i>For >500 To 1,000, Deduct</i>	-47.01	
	<i>For >1,000, Deduct</i>	-58.39	
21 13 13 00-0065	Conventional Wet Pipe Sprinkler Heads <small>(21 13 13 00-0024)</small>		
21 13 13 00-0066	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Conventional Brass Wet Pipe Sprinkler Head	81.84	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.65	
	<i>For >100 To 500, Deduct</i>	-11.51	
	<i>For >500 To 1,000, Deduct</i>	-23.43	
	<i>For >1,000, Deduct</i>	-33.67	
21 13 13 00-0067	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Conventional Chrome Wet Pipe Sprinkler Head	84.96	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.81	
	<i>For >100 To 500, Deduct</i>	-11.90	
	<i>For >500 To 1,000, Deduct</i>	-24.00	
	<i>For >1,000, Deduct</i>	-34.23	
21 13 13 00-0068	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Conventional White Polyester Coated Wet Pipe Sprinkler Head	86.95	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.91	
	<i>For >100 To 500, Deduct</i>	-12.15	
	<i>For >500 To 1,000, Deduct</i>	-24.35	
	<i>For >1,000, Deduct</i>	-34.59	
21 13 13 00-0069	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Conventional Brass Wet Pipe Sprinkler Head	95.27	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.61	
	<i>For >100 To 500, Deduct</i>	-13.33	
	<i>For >500 To 1,000, Deduct</i>	-26.82	
	<i>For >1,000, Deduct</i>	-38.19	



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0070	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Conventional Chrome Wet Pipe Sprinkler Head	98.93	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.79	
	<i>For >100 To 500, Deduct</i>	-13.79	
	<i>For >500 To 1,000, Deduct</i>	-27.48	
	<i>For >1,000, Deduct</i>	-38.85	
21 13 13 00-0071	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Conventional White Polyester Coated Wet Pipe Sprinkler Head	99.50	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.82	
	<i>For >100 To 500, Deduct</i>	-13.86	
	<i>For >500 To 1,000, Deduct</i>	-27.58	
	<i>For >1,000, Deduct</i>	-38.96	
21 13 13 00-0072	EA 1/2" NPT Thread, K=5.6, Quick Response, Conventional Stainless Steel Wet Pipe Sprinkler Head	306.97	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-17.91	
	<i>For >100 To 500, Deduct</i>	-39.65	
	<i>For >500 To 1,000, Deduct</i>	-63.96	
	<i>For >1,000, Deduct</i>	-74.19	
21 13 13 00-0073	Pendant Wet Pipe Sprinkler Heads <small>(21 13 13 00-0024)</small>		
	See CSI section 21 13 13 00-0209 for escutcheon for recessed pendant sprinkler head.		
21 13 13 00-0074	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Pendant Brass Wet Pipe Sprinkler Head	81.84	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.65	
	<i>For >100 To 500, Deduct</i>	-11.51	
	<i>For >500 To 1,000, Deduct</i>	-23.43	
	<i>For >1,000, Deduct</i>	-33.67	
21 13 13 00-0075	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Pendant Chrome Wet Pipe Sprinkler Head	84.96	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.81	
	<i>For >100 To 500, Deduct</i>	-11.90	
	<i>For >500 To 1,000, Deduct</i>	-24.00	
	<i>For >1,000, Deduct</i>	-34.23	
21 13 13 00-0076	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Pendant White Polyester Coated Wet Pipe Sprinkler Head	86.95	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-6.91	
	<i>For >100 To 500, Deduct</i>	-12.15	
	<i>For >500 To 1,000, Deduct</i>	-24.35	
	<i>For >1,000, Deduct</i>	-34.59	
21 13 13 00-0077	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Pendant Brass Wet Pipe Sprinkler Head	94.16	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.55	
	<i>For >100 To 500, Deduct</i>	-13.19	
	<i>For >500 To 1,000, Deduct</i>	-26.62	
	<i>For >1,000, Deduct</i>	-37.99	
21 13 13 00-0078	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Pendant Chrome Wet Pipe Sprinkler Head	98.93	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.79	
	<i>For >100 To 500, Deduct</i>	-13.79	
	<i>For >500 To 1,000, Deduct</i>	-27.48	
	<i>For >1,000, Deduct</i>	-38.85	
21 13 13 00-0079	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Pendant White Polyester Coated Wet Pipe Sprinkler Head	99.90	14.21
	<i>For >25 To 50, Deduct</i>	-2.84	
	<i>For >50 To 100, Deduct</i>	-7.84	
	<i>For >100 To 500, Deduct</i>	-13.91	
	<i>For >500 To 1,000, Deduct</i>	-27.65	
	<i>For >1,000, Deduct</i>	-39.03	
21 13 13 00-0080	EA 1/2" NPT Thread, 3/8" Orifice, K=2.8, Pendant Brass Wet Pipe Sprinkler Head	90.86	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.10	
	<i>For >100 To 500, Deduct</i>	-12.64	
	<i>For >500 To 1,000, Deduct</i>	-25.06	
	<i>For >1,000, Deduct</i>	-35.30	
21 13 13 00-0081	EA 1/2" NPT Thread, 3/8" Orifice, K=2.8, Pendant Chrome Wet Pipe Sprinkler Head	93.98	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.26	
	<i>For >100 To 500, Deduct</i>	-13.03	
	<i>For >500 To 1,000, Deduct</i>	-25.62	
	<i>For >1,000, Deduct</i>	-35.86	
21 13 13 00-0082	EA 1/2" NPT Thread, 3/8" Orifice, K=2.8, Pendant White Polyester Coated Wet Pipe Sprinkler Head	94.58	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.29	
	<i>For >100 To 500, Deduct</i>	-13.10	
	<i>For >500 To 1,000, Deduct</i>	-25.73	
	<i>For >1,000, Deduct</i>	-35.96	
21 13 13 00-0083	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Pendant Brass Wet Pipe Sprinkler Head	90.86	12.79
	<i>For >25 To 50, Deduct</i>	-2.56	
	<i>For >50 To 100, Deduct</i>	-7.10	
	<i>For >100 To 500, Deduct</i>	-12.64	
	<i>For >500 To 1,000, Deduct</i>	-25.06	
	<i>For >1,000, Deduct</i>	-35.30	

21 Fire Suppression**21 10 Water-Based Fire-Suppression Systems****21 13 Fire-Suppression Sprinkler Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0084	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Pendent Chrome Wet Pipe Sprinkler Head.....	93.98	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-7.26	
	For>100 To 500, Deduct	-13.03	
	For>500 To 1,000, Deduct	-25.62	
	For>1,000, Deduct	-35.86	
21 13 13 00-0085	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	94.58	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-7.29	
	For>100 To 500, Deduct	-13.10	
	For>500 To 1,000, Deduct	-25.73	
	For>1,000, Deduct	-35.96	
21 13 13 00-0086	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Pendent Brass Wet Pipe Sprinkler Head, Low Lead.....	90.86	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-7.10	
	For>100 To 500, Deduct	-12.64	
	For>500 To 1,000, Deduct	-25.06	
	For>1,000, Deduct	-35.30	
21 13 13 00-0087	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Pendent Chrome Wet Pipe Sprinkler Head, Low Lead.....	93.98	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-7.26	
	For>100 To 500, Deduct	-13.03	
	For>500 To 1,000, Deduct	-25.62	
	For>1,000, Deduct	-35.86	
21 13 13 00-0088	EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Pendent White Polyester Coated Wet Pipe Sprinkler Head, Low Lead.....	94.58	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-7.29	
	For>100 To 500, Deduct	-13.10	
	For>500 To 1,000, Deduct	-25.73	
	For>1,000, Deduct	-35.96	
21 13 13 00-0089	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Pendent Brass Wet Pipe Sprinkler Head, Low Lead.....	81.84	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-6.65	
	For>100 To 500, Deduct	-11.51	
	For>500 To 1,000, Deduct	-23.43	
	For>1,000, Deduct	-33.67	
21 13 13 00-0090	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Pendent Chrome Wet Pipe Sprinkler Head, Low Lead.....	84.96	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-6.81	
	For>100 To 500, Deduct	-11.90	
	For>500 To 1,000, Deduct	-24.00	
	For>1,000, Deduct	-34.23	
21 13 13 00-0091	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Pendent White Polyester Coated Wet Pipe Sprinkler Head, Low Lead.....	86.95	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-6.91	
	For>100 To 500, Deduct	-12.15	
	For>500 To 1,000, Deduct	-24.35	
	For>1,000, Deduct	-34.59	
21 13 13 00-0092	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Pendent Brass Wet Pipe Sprinkler Head.....	83.41	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-6.73	
	For>100 To 500, Deduct	-11.71	
	For>500 To 1,000, Deduct	-23.72	
	For>1,000, Deduct	-33.95	
21 13 13 00-0093	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Pendent Chrome Wet Pipe Sprinkler Head.....	85.62	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-6.84	
	For>100 To 500, Deduct	-11.98	
	For>500 To 1,000, Deduct	-24.11	
	For>1,000, Deduct	-34.35	
21 13 13 00-0094	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	87.64	12.79
	For>25 To 50, Deduct	-2.56	
	For>50 To 100, Deduct	-6.94	
	For>100 To 500, Deduct	-12.23	
	For>500 To 1,000, Deduct	-24.48	
	For>1,000, Deduct	-34.72	
21 13 13 00-0095	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Pendent Brass Wet Pipe Sprinkler Head.....	97.11	14.21
	For>25 To 50, Deduct	-2.84	
	For>50 To 100, Deduct	-7.70	
	For>100 To 500, Deduct	-13.56	
	For>500 To 1,000, Deduct	-27.15	
	For>1,000, Deduct	-38.53	
21 13 13 00-0096	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Pendent Chrome Wet Pipe Sprinkler Head.....	101.16	14.21
	For>25 To 50, Deduct	-2.84	
	For>50 To 100, Deduct	-7.90	
	For>100 To 500, Deduct	-14.07	
	For>500 To 1,000, Deduct	-27.88	
	For>1,000, Deduct	-39.25	
21 13 13 00-0097	EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	101.16	14.21
	For>25 To 50, Deduct	-2.84	
	For>50 To 100, Deduct	-7.90	
	For>100 To 500, Deduct	-14.07	
	For>500 To 1,000, Deduct	-27.88	
	For>1,000, Deduct	-39.25	



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0098	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Pendent Brass Wet Pipe Sprinkler Head	93.02	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.21	
		<i>For >100 To 500, Deduct</i>	-12.91	
		<i>For >500 To 1,000, Deduct</i>	-25.45	
		<i>For >1,000, Deduct</i>	-35.68	
21 13 13 00-0099	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Pendent Chrome Wet Pipe Sprinkler Head.....	97.10	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.41	
		<i>For >100 To 500, Deduct</i>	-13.42	
		<i>For >500 To 1,000, Deduct</i>	-26.18	
		<i>For >1,000, Deduct</i>	-36.42	
21 13 13 00-0100	EA	1/2" NPT Thread, 3/8" Orifice, K=2.8, Quick Response, Pendent Brass Wet Pipe Sprinkler Head	103.22	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.72	
		<i>For >100 To 500, Deduct</i>	-14.18	
		<i>For >500 To 1,000, Deduct</i>	-27.28	
		<i>For >1,000, Deduct</i>	-37.52	
21 13 13 00-0101	EA	1/2" NPT Thread, 3/8" Orifice, K=2.8, Quick Response, Pendent Chrome Wet Pipe Sprinkler Head.....	109.92	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-8.06	
		<i>For >100 To 500, Deduct</i>	-15.02	
		<i>For >500 To 1,000, Deduct</i>	-28.49	
		<i>For >1,000, Deduct</i>	-38.73	
21 13 13 00-0102	EA	1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Pendent Brass Wet Pipe Sprinkler Head	103.22	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.72	
		<i>For >100 To 500, Deduct</i>	-14.18	
		<i>For >500 To 1,000, Deduct</i>	-27.28	
		<i>For >1,000, Deduct</i>	-37.52	
21 13 13 00-0103	EA	1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Pendent Chrome Wet Pipe Sprinkler Head.....	109.92	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-8.06	
		<i>For >100 To 500, Deduct</i>	-15.02	
		<i>For >500 To 1,000, Deduct</i>	-28.49	
		<i>For >1,000, Deduct</i>	-38.73	
21 13 13 00-0104	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Pendent Brass Wet Pipe Sprinkler Head.....	87.73	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-6.95	
		<i>For >100 To 500, Deduct</i>	-12.25	
		<i>For >500 To 1,000, Deduct</i>	-24.49	
		<i>For >1,000, Deduct</i>	-34.73	
21 13 13 00-0105	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Pendent Chrome Wet Pipe Sprinkler Head	91.25	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.12	
		<i>For >100 To 500, Deduct</i>	-12.69	
		<i>For >500 To 1,000, Deduct</i>	-25.13	
		<i>For >1,000, Deduct</i>	-35.37	
21 13 13 00-0106	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	93.08	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.21	
		<i>For >100 To 500, Deduct</i>	-12.91	
		<i>For >500 To 1,000, Deduct</i>	-25.46	
		<i>For >1,000, Deduct</i>	-35.69	
21 13 13 00-0107	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Pendent Brass Wet Pipe Sprinkler Head.....	95.64	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-7.63	
		<i>For >100 To 500, Deduct</i>	-13.38	
		<i>For >500 To 1,000, Deduct</i>	-26.88	
		<i>For >1,000, Deduct</i>	-38.26	
21 13 13 00-0108	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Pendent Chrome Wet Pipe Sprinkler Head.....	99.11	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-7.80	
		<i>For >100 To 500, Deduct</i>	-13.81	
		<i>For >500 To 1,000, Deduct</i>	-27.51	
		<i>For >1,000, Deduct</i>	-38.89	
21 13 13 00-0109	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Pendent White Polyester Coated Wet Pipe Sprinkler Head	102.47	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-7.97	
		<i>For >100 To 500, Deduct</i>	-14.23	
		<i>For >500 To 1,000, Deduct</i>	-28.11	
		<i>For >1,000, Deduct</i>	-39.49	
21 13 13 00-0110	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Extended Coverage, Pendent Brass Wet Pipe Sprinkler Head.....	89.72	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.05	
		<i>For >100 To 500, Deduct</i>	-12.49	
		<i>For >500 To 1,000, Deduct</i>	-24.85	
		<i>For >1,000, Deduct</i>	-35.09	

21 Fire Suppression**21 10 Water-Based Fire-Suppression Systems****21 13 Fire-Suppression Sprinkler Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0111	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Extended Coverage, Pendent Chrome Wet Pipe Sprinkler Head.....	93.16	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.22	
			<i>For >100 To 500, Deduct</i>	-12.92	
			<i>For >500 To 1,000, Deduct</i>	-25.47	
			<i>For >1,000, Deduct</i>	-35.71	
21 13 13 00-0112	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Extended Coverage, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	95.04	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-7.31	
			<i>For >100 To 500, Deduct</i>	-13.16	
			<i>For >500 To 1,000, Deduct</i>	-25.81	
			<i>For >1,000, Deduct</i>	-36.05	
21 13 13 00-0113	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Extended Coverage, Pendent Brass Wet Pipe Sprinkler Head.....	97.11	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-7.70	
			<i>For >100 To 500, Deduct</i>	-13.56	
			<i>For >500 To 1,000, Deduct</i>	-27.15	
			<i>For >1,000, Deduct</i>	-38.53	
21 13 13 00-0114	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Extended Coverage, Pendent Chrome Wet Pipe Sprinkler Head.....	100.73	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-7.88	
			<i>For >100 To 500, Deduct</i>	-14.01	
			<i>For >500 To 1,000, Deduct</i>	-27.80	
			<i>For >1,000, Deduct</i>	-39.18	
21 13 13 00-0115	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Extended Coverage, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	104.22	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.06	
			<i>For >100 To 500, Deduct</i>	-14.45	
			<i>For >500 To 1,000, Deduct</i>	-28.43	
			<i>For >1,000, Deduct</i>	-39.81	
21 13 13 00-0116	EA		1/2" NPT Thread, 1/2" Orifice, Decorative Pendent Chrome Wet Pipe Sprinkler Head.....	144.45	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-9.78	
			<i>For >100 To 500, Deduct</i>	-19.34	
			<i>For >500 To 1,000, Deduct</i>	-34.70	
			<i>For >1,000, Deduct</i>	-44.94	
21 13 13 00-0117	EA		1/2" NPT Thread, 1/2" Orifice, Decorative Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	144.45	12.79
			<i>For >25 To 50, Deduct</i>	-2.56	
			<i>For >50 To 100, Deduct</i>	-9.78	
			<i>For >100 To 500, Deduct</i>	-19.34	
			<i>For >500 To 1,000, Deduct</i>	-34.70	
			<i>For >1,000, Deduct</i>	-44.94	
21 13 13 00-0118	EA		3/4" NPT Thread, K=14.0, Extended Coverage, Pendent Brass Wet Pipe Sprinkler Head.....	107.02	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.20	
			<i>For >100 To 500, Deduct</i>	-14.80	
			<i>For >500 To 1,000, Deduct</i>	-28.93	
			<i>For >1,000, Deduct</i>	-40.31	
21 13 13 00-0119	EA		3/4" NPT Thread, K=14.0, Extended Coverage, Pendent Chrome Wet Pipe Sprinkler Head.....	109.66	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.33	
			<i>For >100 To 500, Deduct</i>	-15.13	
			<i>For >500 To 1,000, Deduct</i>	-29.41	
			<i>For >1,000, Deduct</i>	-40.78	
21 13 13 00-0120	EA		3/4" NPT Thread, K=14.0, Extended Coverage, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	109.66	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.33	
			<i>For >100 To 500, Deduct</i>	-15.13	
			<i>For >500 To 1,000, Deduct</i>	-29.41	
			<i>For >1,000, Deduct</i>	-40.78	
21 13 13 00-0121	EA		3/4" NPT Thread, K=11.2, Extended Coverage, Pendent Brass Wet Pipe Sprinkler Head.....	103.42	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.02	
			<i>For >100 To 500, Deduct</i>	-14.35	
			<i>For >500 To 1,000, Deduct</i>	-28.29	
			<i>For >1,000, Deduct</i>	-39.66	
21 13 13 00-0122	EA		3/4" NPT Thread, K=11.2, Extended Coverage, Pendent Chrome Wet Pipe Sprinkler Head.....	105.88	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.14	
			<i>For >100 To 500, Deduct</i>	-14.66	
			<i>For >500 To 1,000, Deduct</i>	-28.73	
			<i>For >1,000, Deduct</i>	-40.10	
21 13 13 00-0123	EA		3/4" NPT Thread, K=11.2, Extended Coverage, Pendent White Polyester Coated Wet Pipe Sprinkler Head.....	105.88	14.21
			<i>For >25 To 50, Deduct</i>	-2.84	
			<i>For >50 To 100, Deduct</i>	-8.14	
			<i>For >100 To 500, Deduct</i>	-14.66	
			<i>For >500 To 1,000, Deduct</i>	-28.73	
			<i>For >1,000, Deduct</i>	-40.10	



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0124	EA 1/2" NPT Thread, K=5.6, Quick Response, Pendent Stainless Steel Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	306.97 -2.56 -17.91 -39.65 -63.96 -74.19	12.79
21 13 13 00-0125	EA 3/4" NPT Thread, K=8.0, Quick Response, Pendent Stainless Steel Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	338.01 -2.84 -19.74 -43.67 -70.51 -81.89	14.21
21 13 13 00-0126	EA 1/2" NPT Thread, K=5.6, High Temperature (400 To 500 Degree), Pendent Brass Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	163.19 -2.56 -10.72 -21.68 -38.08 -48.31	12.79
21 13 13 00-0127	EA 1/2" NPT Thread, K=5.6, High Temperature (400 To 500 Degree), Pendent Chrome Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	200.65 -2.56 -12.59 -26.36 -44.82 -55.06	12.79
21 13 13 00-0128	EA 1/2" NPT Thread, K=5.6, High Temperature (650 Degree), Pendent Brass Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	357.30 -2.56 -20.42 -45.94 -73.02 -83.25	12.79
21 13 13 00-0129	EA 1/2" NPT Thread, K=5.6, High Temperature (650 Degree), Pendent Chrome Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	454.92 -2.56 -25.31 -58.14 -90.59 -100.83	12.79
21 13 13 00-0130	EA 3/4" NPT Thread, K=8.0, High Temperature (400 To 500 Degree), Pendent Brass Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	206.34 -2.84 -13.16 -27.21 -46.81 -58.19	14.21
21 13 13 00-0131	EA 3/4" NPT Thread, K=8.0, High Temperature (400 To 500 Degree), Pendent Chrome Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	207.47 -2.84 -13.22 -27.36 -47.01 -58.39	14.21
21 13 13 00-0132	Sidewall Wet Pipe Sprinkler Heads <small>(21 13 13 00-0024)</small>		
21 13 13 00-0133	Horizontal Sidewall Wet-Pipe Sprinkler Heads <small>(21 13 13 00-0132)</small>		
21 13 13 00-0134	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Horizontal Sidewall Brass Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	86.51 -2.56 -6.89 -12.09 -24.27 -34.51	12.79
21 13 13 00-0135	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	89.01 -2.56 -7.01 -12.41 -24.72 -34.96	12.79
21 13 13 00-0136	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Horizontal Sidewall White Polyester Coated Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	92.96 -2.56 -7.21 -12.90 -25.44 -35.67	12.79
21 13 13 00-0137	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Horizontal Sidewall Brass Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	87.92 -2.56 -6.96 -12.27 -24.53 -34.77	12.79
21 13 13 00-0138	EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	90.47 -2.56 -7.08 -12.59 -24.99 -35.22	12.79

21 Fire Suppression**21 10 Water-Based Fire-Suppression Systems****21 13 Fire-Suppression Sprinkler Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0139	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Horizontal Sidewall White Wet Pipe Sprinkler Head	94.50	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.28	
		<i>For >100 To 500, Deduct</i>	-13.09	
		<i>For >500 To 1,000, Deduct</i>	-25.71	
		<i>For >1,000, Deduct</i>	-35.95	
21 13 13 00-0140	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Horizontal Sidewall Brass Wet Pipe Sprinkler Head	97.10	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.41	
		<i>For >100 To 500, Deduct</i>	-13.42	
		<i>For >500 To 1,000, Deduct</i>	-26.18	
		<i>For >1,000, Deduct</i>	-36.42	
21 13 13 00-0141	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	101.17	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.62	
		<i>For >100 To 500, Deduct</i>	-13.93	
		<i>For >500 To 1,000, Deduct</i>	-26.91	
		<i>For >1,000, Deduct</i>	-37.15	
21 13 13 00-0142	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Horizontal Sidewall Brass Wet Pipe Sprinkler Head	104.86	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-8.09	
		<i>For >100 To 500, Deduct</i>	-14.53	
		<i>For >500 To 1,000, Deduct</i>	-28.54	
		<i>For >1,000, Deduct</i>	-39.92	
21 13 13 00-0143	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	110.96	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-8.39	
		<i>For >100 To 500, Deduct</i>	-15.29	
		<i>For >500 To 1,000, Deduct</i>	-29.64	
		<i>For >1,000, Deduct</i>	-41.02	
21 13 13 00-0144	EA	1/2" NPT Thread, 3/8" Orifice, K=2.8, Quick Response, Horizontal Sidewall Brass Wet Pipe Sprinkler Head	105.88	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.85	
		<i>For >100 To 500, Deduct</i>	-14.51	
		<i>For >500 To 1,000, Deduct</i>	-27.76	
		<i>For >1,000, Deduct</i>	-38.00	
21 13 13 00-0145	EA	1/2" NPT Thread, 3/8" Orifice, K=2.8, Quick Response, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	109.92	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-8.06	
		<i>For >100 To 500, Deduct</i>	-15.02	
		<i>For >500 To 1,000, Deduct</i>	-28.49	
		<i>For >1,000, Deduct</i>	-38.73	
21 13 13 00-0146	EA	1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Horizontal Sidewall Brass Wet Pipe Sprinkler Head	105.88	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.85	
		<i>For >100 To 500, Deduct</i>	-14.51	
		<i>For >500 To 1,000, Deduct</i>	-27.76	
		<i>For >1,000, Deduct</i>	-38.00	
21 13 13 00-0147	EA	1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	109.92	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-8.06	
		<i>For >100 To 500, Deduct</i>	-15.02	
		<i>For >500 To 1,000, Deduct</i>	-28.49	
		<i>For >1,000, Deduct</i>	-38.73	
21 13 13 00-0148	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Horizontal Sidewall Brass Wet Pipe Sprinkler Head	84.38	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-6.78	
		<i>For >100 To 500, Deduct</i>	-11.83	
		<i>For >500 To 1,000, Deduct</i>	-23.89	
		<i>For >1,000, Deduct</i>	-34.13	
21 13 13 00-0149	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	86.45	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-6.88	
		<i>For >100 To 500, Deduct</i>	-12.09	
		<i>For >500 To 1,000, Deduct</i>	-24.26	
		<i>For >1,000, Deduct</i>	-34.50	
21 13 13 00-0150	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Horizontal Sidewall White Wet Pipe Sprinkler Head	89.02	12.79
		<i>For >25 To 50, Deduct</i>	-2.56	
		<i>For >50 To 100, Deduct</i>	-7.01	
		<i>For >100 To 500, Deduct</i>	-12.41	
		<i>For >500 To 1,000, Deduct</i>	-24.73	
		<i>For >1,000, Deduct</i>	-34.96	
21 13 13 00-0151	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Horizontal Sidewall Brass Wet Pipe Sprinkler Head	92.49	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-7.47	
		<i>For >100 To 500, Deduct</i>	-12.98	
		<i>For >500 To 1,000, Deduct</i>	-26.32	
		<i>For >1,000, Deduct</i>	-37.69	
21 13 13 00-0152	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	94.71	14.21
		<i>For >25 To 50, Deduct</i>	-2.84	
		<i>For >50 To 100, Deduct</i>	-7.58	
		<i>For >100 To 500, Deduct</i>	-13.26	
		<i>For >500 To 1,000, Deduct</i>	-26.72	
		<i>For >1,000, Deduct</i>	-38.09	



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
21 13 13 00-0153	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Horizontal Sidewall White Wet Pipe Sprinkler Head.....	97.10		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.70		
		<i>For >100 To 500, Deduct</i>	-13.56		
		<i>For >500 To 1,000, Deduct</i>	-27.15		
		<i>For >1,000, Deduct</i>	-38.52		
21 13 13 00-0154	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Extended Coverage, Horizontal Sidewall Brass Wet Pipe Sprinkler Head.....	94.25		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.56		
		<i>For >100 To 500, Deduct</i>	-13.20		
		<i>For >500 To 1,000, Deduct</i>	-26.63		
		<i>For >1,000, Deduct</i>	-38.01		
21 13 13 00-0155	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Extended Coverage, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head.....	96.55		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.67		
		<i>For >100 To 500, Deduct</i>	-13.49		
		<i>For >500 To 1,000, Deduct</i>	-27.05		
		<i>For >1,000, Deduct</i>	-38.42		
21 13 13 00-0156	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, 300 PSI Rated, Extended Coverage, Horizontal Sidewall White Wet Pipe Sprinkler Head.....	99.04		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.80		
		<i>For >100 To 500, Deduct</i>	-13.80		
		<i>For >500 To 1,000, Deduct</i>	-27.50		
		<i>For >1,000, Deduct</i>	-38.87		
21 13 13 00-0157	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Extended Coverage, Horizontal Sidewall Brass Wet Pipe Sprinkler Head.....	99.08		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.80		
		<i>For >100 To 500, Deduct</i>	-13.81		
		<i>For >500 To 1,000, Deduct</i>	-27.50		
		<i>For >1,000, Deduct</i>	-38.88		
21 13 13 00-0158	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Extended Coverage, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head.....	102.47		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.97		
		<i>For >100 To 500, Deduct</i>	-14.23		
		<i>For >500 To 1,000, Deduct</i>	-28.11		
		<i>For >1,000, Deduct</i>	-39.49		
21 13 13 00-0159	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Extended Coverage, Horizontal Sidewall White Wet Pipe Sprinkler Head.....	102.47		14.21
		<i>For >25 To 50, Deduct</i>	-2.84		
		<i>For >50 To 100, Deduct</i>	-7.97		
		<i>For >100 To 500, Deduct</i>	-14.23		
		<i>For >500 To 1,000, Deduct</i>	-28.11		
		<i>For >1,000, Deduct</i>	-39.49		
21 13 13 00-0160	EA	1/2" NPT Thread, 1/2" Orifice, Decorative Horizontal Sidewall Chrome Wet Pipe Sprinkler Head.....	166.97		12.79
		<i>For >25 To 50, Deduct</i>	-2.56		
		<i>For >50 To 100, Deduct</i>	-10.91		
		<i>For >100 To 500, Deduct</i>	-22.15		
		<i>For >500 To 1,000, Deduct</i>	-38.76		
		<i>For >1,000, Deduct</i>	-48.99		
21 13 13 00-0161	EA	1/2" NPT Thread, 1/2" Orifice, Decorative Horizontal Sidewall White Wet Pipe Sprinkler Head.....	166.97		12.79
		<i>For >25 To 50, Deduct</i>	-2.56		
		<i>For >50 To 100, Deduct</i>	-10.91		
		<i>For >100 To 500, Deduct</i>	-22.15		
		<i>For >500 To 1,000, Deduct</i>	-38.76		
		<i>For >1,000, Deduct</i>	-48.99		
21 13 13 00-0162	EA	1/2" NPT Thread, K=5.6, High Temperature (360 Degree), Horizontal Sidewall Brass Wet Pipe Sprinkler Head.....	85.24		12.79
		<i>For >25 To 50, Deduct</i>	-2.56		
		<i>For >50 To 100, Deduct</i>	-6.82		
		<i>For >100 To 500, Deduct</i>	-11.93		
		<i>For >500 To 1,000, Deduct</i>	-24.05		
		<i>For >1,000, Deduct</i>	-34.28		
21 13 13 00-0163	EA	1/2" NPT Thread, K=5.6, High Temperature (360 Degree), Horizontal Sidewall Chrome Wet Pipe Sprinkler Head.....	85.24		12.79
		<i>For >25 To 50, Deduct</i>	-2.56		
		<i>For >50 To 100, Deduct</i>	-6.82		
		<i>For >100 To 500, Deduct</i>	-11.93		
		<i>For >500 To 1,000, Deduct</i>	-24.05		
		<i>For >1,000, Deduct</i>	-34.28		
21 13 13 00-0164	EA	1/2" NPT Thread, K=5.6, High Temperature (360 Degree), Horizontal Sidewall White Wet Pipe Sprinkler Head.....	85.24		12.79
		<i>For >25 To 50, Deduct</i>	-2.56		
		<i>For >50 To 100, Deduct</i>	-6.82		
		<i>For >100 To 500, Deduct</i>	-11.93		
		<i>For >500 To 1,000, Deduct</i>	-24.05		
		<i>For >1,000, Deduct</i>	-34.28		
21 13 13 00-0165		Vertical Sidewall Wet-Pipe Sprinkler Heads (21 13 13 00-0132)			
21 13 13 00-0166	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Vertical Sidewall Brass Wet Pipe Sprinkler Head.....	89.75		12.79
		<i>For >25 To 50, Deduct</i>	-2.56		
		<i>For >50 To 100, Deduct</i>	-7.05		
		<i>For >100 To 500, Deduct</i>	-12.50		
		<i>For >500 To 1,000, Deduct</i>	-24.86		
		<i>For >1,000, Deduct</i>	-35.10		

21	21	Fire Suppression
	21 10	Water-Based Fire-Suppression Systems
	21 13	Fire-Suppression Sprinkler Systems



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0167 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Vertical Sidewall Chrome Wet Pipe Sprinkler Head.....	92.87	12.79
For>25 To 50, Deduct	-2.56	
For>50 To 100, Deduct	-7.20	
For>100 To 500, Deduct	-12.89	
For>500 To 1,000, Deduct	-25.42	
For>1,000, Deduct	-35.66	
21 13 13 00-0168 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Vertical Sidewall White Wet Pipe Sprinkler Head.....	94.21	12.79
For>25 To 50, Deduct	-2.56	
For>50 To 100, Deduct	-7.27	
For>100 To 500, Deduct	-13.06	
For>500 To 1,000, Deduct	-25.66	
For>1,000, Deduct	-35.90	
21 13 13 00-0169 Concealed Wet Pipe Sprinkler Heads (21 13 13 00-0024)		
21 13 13 00-0170 Concealed Pendant Wet-Pipe Sprinkler Heads (21 13 13 00-0169)		
21 13 13 00-0171 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Concealed Pendent Brass Wet Pipe Sprinkler Head, Low Lead.....	129.58	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-9.89	
For>100 To 500, Deduct	-17.90	
For>500 To 1,000, Deduct	-34.93	
For>1,000, Deduct	-48.58	
21 13 13 00-0172 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	92.97	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-8.06	
For>100 To 500, Deduct	-13.33	
For>500 To 1,000, Deduct	-28.34	
For>1,000, Deduct	-41.99	
21 13 13 00-0173 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	94.31	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-8.13	
For>100 To 500, Deduct	-13.50	
For>500 To 1,000, Deduct	-28.58	
For>1,000, Deduct	-42.23	
21 13 13 00-0174 EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	118.15	18.49
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.70	
For>50 To 100, Deduct	-9.60	
For>100 To 500, Deduct	-16.62	
For>500 To 1,000, Deduct	-33.84	
For>1,000, Deduct	-48.62	
21 13 13 00-0175 EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	112.46	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-9.04	
For>100 To 500, Deduct	-15.76	
For>500 To 1,000, Deduct	-31.85	
For>1,000, Deduct	-45.50	
21 13 13 00-0176 EA 1/2" NPT Thread, 3/8" Orifice, K=2.8, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	112.46	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-9.04	
For>100 To 500, Deduct	-15.76	
For>500 To 1,000, Deduct	-31.85	
For>1,000, Deduct	-45.50	
21 13 13 00-0177 EA 3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	118.15	18.49
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.70	
For>50 To 100, Deduct	-9.60	
For>100 To 500, Deduct	-16.62	
For>500 To 1,000, Deduct	-33.84	
For>1,000, Deduct	-48.62	
21 13 13 00-0178 EA 1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	103.89	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-8.61	
For>100 To 500, Deduct	-14.69	
For>500 To 1,000, Deduct	-30.30	
For>1,000, Deduct	-43.95	
21 13 13 00-0179 EA 1/2" NPT Thread, 7/16" Orifice, K=4.2, Quick Response, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	112.46	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-9.04	
For>100 To 500, Deduct	-15.76	
For>500 To 1,000, Deduct	-31.85	
For>1,000, Deduct	-45.50	
21 13 13 00-0180 EA 1/2" NPT Thread, 3/8" Orifice, K=2.8, Quick Response, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	112.46	17.07
Note: Excludes coverplate		
For>25 To 50, Deduct	-3.41	
For>50 To 100, Deduct	-9.04	
For>100 To 500, Deduct	-15.76	
For>500 To 1,000, Deduct	-31.85	
For>1,000, Deduct	-45.50	



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0181	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Quick Response, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	105.92	17.07
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.41	
			For >50 To 100, Deduct	-8.71	
			For >100 To 500, Deduct	-14.95	
			For >500 To 1,000, Deduct	-30.67	
			For >1,000, Deduct	-44.32	
21 13 13 00-0182	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Adjustable Concealed Pendent Brass Wet Pipe Sprinkler Head.....	174.88	19.91
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.98	
			For >50 To 100, Deduct	-12.73	
			For >100 To 500, Deduct	-23.85	
			For >500 To 1,000, Deduct	-45.02	
			For >1,000, Deduct	-60.94	
21 13 13 00-0183	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, Extended Coverage, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	99.63	17.07
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.41	
			For >50 To 100, Deduct	-8.39	
			For >100 To 500, Deduct	-14.16	
			For >500 To 1,000, Deduct	-29.54	
			For >1,000, Deduct	-43.19	
21 13 13 00-0184	EA		3/4" NPT Thread, 17/32" Orifice, K=5.6, Extended Coverage, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	104.76	18.49
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.70	
			For >50 To 100, Deduct	-8.94	
			For >100 To 500, Deduct	-14.94	
			For >500 To 1,000, Deduct	-31.43	
			For >1,000, Deduct	-46.21	
21 13 13 00-0185	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, 300 PSI Rated, Extended Coverage, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	100.83	17.07
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.41	
			For >50 To 100, Deduct	-8.45	
			For >100 To 500, Deduct	-14.31	
			For >500 To 1,000, Deduct	-29.75	
			For >1,000, Deduct	-43.40	
21 13 13 00-0186	EA		3/4" NPT Thread, 17/32" Orifice, K=5.6, 300 PSI Rated, Extended Coverage, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	106.52	18.49
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.70	
			For >50 To 100, Deduct	-9.02	
			For >100 To 500, Deduct	-15.16	
			For >500 To 1,000, Deduct	-31.74	
			For >1,000, Deduct	-46.53	
21 13 13 00-0187	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Extended Coverage, Concealed Pendent Brass Wet Pipe Sprinkler Head.....	118.71	18.49
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.70	
			For >50 To 100, Deduct	-9.63	
			For >100 To 500, Deduct	-16.69	
			For >500 To 1,000, Deduct	-33.94	
			For >1,000, Deduct	-48.73	
21 13 13 00-0188	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, Concealed Pendent Non-Ferrous Sprinkler Head With Escutcheon And Adjustable Chrome Coverplate.....	202.66	19.91
			For >25 To 50, Deduct	-3.98	
			For >50 To 100, Deduct	-14.11	
			For >100 To 500, Deduct	-27.32	
			For >500 To 1,000, Deduct	-50.02	
			For >1,000, Deduct	-65.94	
21 13 13 00-0189	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, Concealed Pendent Non-Ferrous Sprinkler Head With Escutcheon And Adjustable White Coverplate.....	202.66	19.91
			For >25 To 50, Deduct	-3.98	
			For >50 To 100, Deduct	-14.11	
			For >100 To 500, Deduct	-27.32	
			For >500 To 1,000, Deduct	-50.02	
			For >1,000, Deduct	-65.94	
21 13 13 00-0190			Concealed Horizontal Side Wall Wet-Pipe Sprinkler Heads (21 13 13 00-0189)		
21 13 13 00-0191	EA		1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Concealed Horizontal Sidewall Brass Wet Pipe Sprinkler Head.....	139.76	17.07
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.41	
			For >50 To 100, Deduct	-10.40	
			For >100 To 500, Deduct	-19.18	
			For >500 To 1,000, Deduct	-36.76	
			For >1,000, Deduct	-50.41	
21 13 13 00-0192	EA		3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Concealed Horizontal Sidewall Brass Wet Pipe Sprinkler Head.....	157.37	18.49
			Note: Excludes coverplate		
			For >25 To 50, Deduct	-3.70	
			For >50 To 100, Deduct	-11.57	
			For >100 To 500, Deduct	-21.52	
			For >500 To 1,000, Deduct	-40.90	
			For >1,000, Deduct	-55.68	

21 Fire Suppression**21 10 Water-Based Fire-Suppression Systems****21 13 Fire-Suppression Sprinkler Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0193	EA	1/2" NPT Thread, 1/2" Orifice, K=5.6, Quick Response, Extended Coverage, Concealed Horizontal Sidewall Brass Wet Pipe Sprinkler Head	109.99	17.07
		Note: Excludes coverplate		
		For >25 To 50, Deduct	-3.41	
		For >50 To 100, Deduct	-8.91	
		For >100 To 500, Deduct	-15.46	
		For >500 To 1,000, Deduct	-31.40	
		For >1,000, Deduct	-45.05	
21 13 13 00-0194	EA	3/4" NPT Thread, 17/32" Orifice, K=8.0, Quick Response, Extended Coverage, Concealed Horizontal Sidewall Brass Wet Pipe Sprinkler Head	111.15	18.49
		Note: Excludes coverplate		
		For >25 To 50, Deduct	-3.70	
		For >50 To 100, Deduct	-9.25	
		For >100 To 500, Deduct	-15.74	
		For >500 To 1,000, Deduct	-32.58	
		For >1,000, Deduct	-47.36	
21 13 13 00-0195		Institutional Tamper Resistant Wet Pipe Sprinkler Heads (21 13 13 00-0024)		
21 13 13 00-0196	EA	1/2" NPT Thread, K=5.6, Institutional Tamper Resistant, Pendant Chrome Wet Pipe Sprinkler Head	333.85	14.21
		Note: Complete assembly including escutcheon, spacers, retaining flange, and centering grommet.		
		For >25 To 50, Deduct	-2.84	
		For >50 To 100, Deduct	-19.54	
		For >100 To 500, Deduct	-43.15	
		For >500 To 1,000, Deduct	-69.76	
		For >1,000, Deduct	-81.14	
21 13 13 00-0197	EA	1/2" NPT Thread, K=5.6, Institutional Tamper Resistant, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	325.85	14.21
		Note: Complete assembly including escutcheon, spacers, retaining flange, and centering grommet.		
		For >25 To 50, Deduct	-2.84	
		For >50 To 100, Deduct	-19.14	
		For >100 To 500, Deduct	-42.15	
		For >500 To 1,000, Deduct	-68.32	
		For >1,000, Deduct	-79.70	
21 13 13 00-0198	EA	1/2" NPT Thread, K=5.6, Quick Response, Institutional Tamper Resistant, Pendant Chrome Wet Pipe Sprinkler Head	141.57	14.21
		For >25 To 50, Deduct	-2.84	
		For >50 To 100, Deduct	-9.92	
		For >100 To 500, Deduct	-19.12	
		For >500 To 1,000, Deduct	-35.15	
		For >1,000, Deduct	-46.53	
21 13 13 00-0199	EA	1/2" NPT Thread, K=5.6, Quick Response, Institutional Tamper Resistant, Horizontal Sidewall Chrome Wet Pipe Sprinkler Head	158.17	14.21
		For >25 To 50, Deduct	-2.84	
		For >50 To 100, Deduct	-10.75	
		For >100 To 500, Deduct	-21.19	
		For >500 To 1,000, Deduct	-38.14	
		For >1,000, Deduct	-49.52	
21 13 13 00-0200		Wet Pipe Sprinkler Head Accessories (21 13 13 00-0011)		
21 13 13 00-0201		Sprinkler Adjustable Steel Drop Nipple (21 13 13 00-0200)		
21 13 13 00-0202	EA	1" Male NPT x 1/2" Female NPT x 4.125" Minimum Length To 5.125" Maximum Length, Adjustable Steel Drop Nipple (Anvil M1.150)	55.98	14.41
		For >25 To 50, Deduct	-1.20	
		For >50 To 100, Deduct	-4.00	
		For >100 To 500, Deduct	-7.60	
		For >500 To 1,000, Deduct	-14.16	
		For >1,000, Deduct	-18.96	
21 13 13 00-0203	EA	1" Male NPT x 1/2" Female NPT x 6.125" Minimum Length To 9.125" Maximum Length, Adjustable Steel Drop Nipple (Anvil M3.150)	55.98	14.41
		For >25 To 50, Deduct	-1.20	
		For >50 To 100, Deduct	-4.00	
		For >100 To 500, Deduct	-7.60	
		For >500 To 1,000, Deduct	-14.16	
		For >1,000, Deduct	-18.96	
21 13 13 00-0204	EA	1" Male NPT x 1/2" Female NPT x 7.875" Minimum Length To 10.875" Maximum Length, Adjustable Steel Drop Nipple (Anvil ME3.150)	56.63	14.41
		For >25 To 50, Deduct	-1.20	
		For >50 To 100, Deduct	-4.03	
		For >100 To 500, Deduct	-7.68	
		For >500 To 1,000, Deduct	-14.28	
		For >1,000, Deduct	-19.08	
21 13 13 00-0205	EA	1" Female NPT x 1/2" Female NPT x 3.5" Minimum Length To 4.5" Maximum Length, Adjustable Steel Drop Nipple (Anvil F1.150)	49.90	14.41
		For >25 To 50, Deduct	-1.20	
		For >50 To 100, Deduct	-3.70	
		For >100 To 500, Deduct	-6.84	
		For >500 To 1,000, Deduct	-13.07	
		For >1,000, Deduct	-17.87	



Fire Suppression	21	2
Water-Based Fire-Suppression Systems	21 10	
Fire-Suppression Sprinkler Systems	21 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0206	EA		1" Female NPT x 1/2" Female NPT x 4.5" Minimum Length To 6.5" Maximum Length, Adjustable Steel Drop Nipple (Anvil F2.150).....	49.90	14.41
			<i>For >25 To 50, Deduct</i>	-1.20	
			<i>For >50 To 100, Deduct</i>	-3.70	
			<i>For >100 To 500, Deduct</i>	-6.84	
			<i>For >500 To 1,000, Deduct</i>	-13.07	
			<i>For >1,000, Deduct</i>	-17.87	
21 13 13 00-0207	EA		1" Female NPT x 1/2" Female NPT x 5.5" Minimum Length To 8.5" Maximum Length, Adjustable Steel Drop Nipple (Anvil F3.150).....	49.90	14.41
			<i>For >25 To 50, Deduct</i>	-1.20	
			<i>For >50 To 100, Deduct</i>	-3.70	
			<i>For >100 To 500, Deduct</i>	-6.84	
			<i>For >500 To 1,000, Deduct</i>	-13.07	
			<i>For >1,000, Deduct</i>	-17.87	
21 13 13 00-0208	EA		1" Female NPT x 3/4" Female NPT x 7.35" Minimum Length To 10.35" Maximum Length, Adjustable Steel Drop Nipple (Anvil F3.175).....	55.76	15.67
			<i>For >25 To 50, Deduct</i>	-1.31	
			<i>For >50 To 100, Deduct</i>	-4.09	
			<i>For >100 To 500, Deduct</i>	-7.62	
			<i>For >500 To 1,000, Deduct</i>	-14.48	
			<i>For >1,000, Deduct</i>	-19.70	
21 13 13 00-0209 Sprinkler Head Escutcheon (21 13 13 00-0200)					
21 13 13 00-0210	EA		2-7/8" Diameter x 1-1/8" Depth, Two Piece, 1/2" NPT, Brass Sprinkler Head Recessed Escutcheon.....	21.63	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.51	
			<i>For >100 To 500, Deduct</i>	-2.92	
			<i>For >500 To 1,000, Deduct</i>	-5.34	
			<i>For >1,000, Deduct</i>	-7.05	
21 13 13 00-0211	EA		2-7/8" Diameter x 1-1/8" Depth, Two Piece, 1/2" NPT, Chrome Sprinkler Head Recessed Escutcheon.....	15.02	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.18	
			<i>For >100 To 500, Deduct</i>	-2.09	
			<i>For >500 To 1,000, Deduct</i>	-4.15	
			<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0212	EA		2-7/8" Diameter x 1-1/8" Depth, Two Piece, 1/2" NPT, White Sprinkler Head Recessed Escutcheon.....	15.02	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.18	
			<i>For >100 To 500, Deduct</i>	-2.09	
			<i>For >500 To 1,000, Deduct</i>	-4.15	
			<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0213	EA		2-7/8" Diameter x 1-1/8" Depth, Two Piece, 3/4" NPT, Brass Sprinkler Head Recessed Escutcheon.....	21.63	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.51	
			<i>For >100 To 500, Deduct</i>	-2.92	
			<i>For >500 To 1,000, Deduct</i>	-5.34	
			<i>For >1,000, Deduct</i>	-7.05	
21 13 13 00-0214	EA		2-7/8" Diameter x 1-1/8" Depth, Two Piece, 3/4" NPT, Chrome Sprinkler Head Recessed Escutcheon.....	15.02	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.18	
			<i>For >100 To 500, Deduct</i>	-2.09	
			<i>For >500 To 1,000, Deduct</i>	-4.15	
			<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0215	EA		2-7/8" Diameter x 1-1/8" Depth, Two Piece, 3/4" NPT, White Sprinkler Head Recessed Escutcheon.....	15.02	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.18	
			<i>For >100 To 500, Deduct</i>	-2.09	
			<i>For >500 To 1,000, Deduct</i>	-4.15	
			<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0216	EA		2-7/8" Diameter x 7/8" Depth, Two Piece, 1/2" NPT, Brass Sprinkler Head Recessed Escutcheon.....	20.43	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.45	
			<i>For >100 To 500, Deduct</i>	-2.77	
			<i>For >500 To 1,000, Deduct</i>	-5.13	
			<i>For >1,000, Deduct</i>	-6.83	
21 13 13 00-0217	EA		2-7/8" Diameter x 7/8" Depth, Two Piece, 1/2" NPT, Chrome Sprinkler Head Recessed Escutcheon.....	15.02	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.18	
			<i>For >100 To 500, Deduct</i>	-2.09	
			<i>For >500 To 1,000, Deduct</i>	-4.15	
			<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0218	EA		2-7/8" Diameter x 7/8" Depth, Two Piece, 1/2" NPT, White Sprinkler Head Recessed Escutcheon.....	15.02	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.18	
			<i>For >100 To 500, Deduct</i>	-2.09	
			<i>For >500 To 1,000, Deduct</i>	-4.15	
			<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0219	EA		2-7/8" Diameter x 7/8" Depth, Two Piece, 3/4" NPT, Brass Sprinkler Head Recessed Escutcheon.....	20.43	5.12
			<i>For >25 To 50, Deduct</i>	-0.43	
			<i>For >50 To 100, Deduct</i>	-1.45	
			<i>For >100 To 500, Deduct</i>	-2.77	
			<i>For >500 To 1,000, Deduct</i>	-5.13	
			<i>For >1,000, Deduct</i>	-6.83	

21 Fire Suppression**21 10 Water-Based Fire-Suppression Systems****21 13 Fire-Suppression Sprinkler Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0220	EA	2-7/8" Diameter x 7/8" Depth, Two Piece, 3/4" NPT, Chrome Sprinkler Head Recessed Escutcheon	15.02	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.18	
		<i>For >100 To 500, Deduct</i>	-2.09	
		<i>For >500 To 1,000, Deduct</i>	-4.15	
		<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0221	EA	2-7/8" Diameter x 7/8" Depth, Two Piece, 3/4" NPT, White Sprinkler Head Recessed Escutcheon	15.02	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.18	
		<i>For >100 To 500, Deduct</i>	-2.09	
		<i>For >500 To 1,000, Deduct</i>	-4.15	
		<i>For >1,000, Deduct</i>	-5.86	
21 13 13 00-0222	EA	3-7/32" Diameter x 15/16" Depth, Two Piece, 1/2" NPT, Push-On/Thread-Off Chrome Sprinkler Head Recessed Escutcheon	21.03	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.48	
		<i>For >100 To 500, Deduct</i>	-2.84	
		<i>For >500 To 1,000, Deduct</i>	-5.24	
		<i>For >1,000, Deduct</i>	-6.94	
21 13 13 00-0223	EA	3-7/32" Diameter x 15/16" Depth, Two Piece, 1/2" NPT, Push-On/Thread-Off White Sprinkler Head Recessed Escutcheon	21.03	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.48	
		<i>For >100 To 500, Deduct</i>	-2.84	
		<i>For >500 To 1,000, Deduct</i>	-5.24	
		<i>For >1,000, Deduct</i>	-6.94	
21 13 13 00-0224	EA	2-7/8" Diameter x 11/16" Depth, One Piece, 1/2" NPT, Brass Sprinkler Head Escutcheon	8.34	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.70	
		<i>For >100 To 500, Deduct</i>	-1.18	
		<i>For >500 To 1,000, Deduct</i>	-2.47	
		<i>For >1,000, Deduct</i>	-3.61	
21 13 13 00-0225	EA	2-7/8" Diameter x 11/16" Depth, One Piece, 1/2" NPT, Chrome Sprinkler Head Escutcheon	7.51	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.66	
		<i>For >100 To 500, Deduct</i>	-1.08	
		<i>For >500 To 1,000, Deduct</i>	-2.32	
		<i>For >1,000, Deduct</i>	-3.46	
21 13 13 00-0226	EA	2-7/8" Diameter x 11/16" Depth, One Piece, 1/2" NPT, White Sprinkler Head Escutcheon	7.73	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.67	
		<i>For >100 To 500, Deduct</i>	-1.11	
		<i>For >500 To 1,000, Deduct</i>	-2.36	
		<i>For >1,000, Deduct</i>	-3.50	
21 13 13 00-0227	EA	2-7/8" Diameter x 11/16" Depth, One Piece, 3/4" NPT, Brass Sprinkler Head Escutcheon	8.49	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.71	
		<i>For >100 To 500, Deduct</i>	-1.20	
		<i>For >500 To 1,000, Deduct</i>	-2.50	
		<i>For >1,000, Deduct</i>	-3.63	
21 13 13 00-0228	EA	2-7/8" Diameter x 11/16" Depth, One Piece, 3/4" NPT, Chrome Sprinkler Head Escutcheon	7.66	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.67	
		<i>For >100 To 500, Deduct</i>	-1.10	
		<i>For >500 To 1,000, Deduct</i>	-2.35	
		<i>For >1,000, Deduct</i>	-3.48	
21 13 13 00-0229	EA	2-7/8" Diameter x 11/16" Depth, One Piece, 3/4" NPT, White Sprinkler Head Escutcheon	7.66	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.67	
		<i>For >100 To 500, Deduct</i>	-1.10	
		<i>For >500 To 1,000, Deduct</i>	-2.35	
		<i>For >1,000, Deduct</i>	-3.48	
21 13 13 00-0230	EA	2-7/8" Diameter x 1/8" Depth, One Piece, 1/2" NPT, Bright Brass Sprinkler Head Escutcheon	9.35	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.75	
		<i>For >100 To 500, Deduct</i>	-1.31	
		<i>For >500 To 1,000, Deduct</i>	-2.65	
		<i>For >1,000, Deduct</i>	-3.79	
21 13 13 00-0231	EA	2-7/8" Diameter x 1/8" Depth, One Piece, 1/2" NPT, Chrome Sprinkler Head Escutcheon	7.63	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.67	
		<i>For >100 To 500, Deduct</i>	-1.10	
		<i>For >500 To 1,000, Deduct</i>	-2.34	
		<i>For >1,000, Deduct</i>	-3.48	
21 13 13 00-0232	EA	2-7/8" Diameter x 1/8" Depth, One Piece, 1/2" NPT, White Sprinkler Head Escutcheon	7.63	3.76
		<i>For >25 To 50, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.67	
		<i>For >100 To 500, Deduct</i>	-1.10	
		<i>For >500 To 1,000, Deduct</i>	-2.34	
		<i>For >1,000, Deduct</i>	-3.48	
21 13 13 00-0233	EA	3-1/2" Diameter x 2" Minimum To 3" Maximum Depth, Two Piece, 1/2" NPT, Brass Sprinkler Head Telescoping Escutcheon	12.58	5.26
		<i>For >25 To 50, Deduct</i>	-0.40	
		<i>For >50 To 100, Deduct</i>	-1.03	
		<i>For >100 To 500, Deduct</i>	-1.77	
		<i>For >500 To 1,000, Deduct</i>	-3.62	
		<i>For >1,000, Deduct</i>	-5.21	



Fire Suppression	21	21
Water-Based Fire-Suppression Systems	21 10	
Fire-Suppression Sprinkler Systems	21 13	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0234	EA	3-1/2" Diameter x 2" Minimum To 3" Maximum Depth, Two Piece, 1/2" NPT, Chrome Sprinkler Head Telescoping Escutcheon.....	12.12	5.26
		<i>For >25 To 50, Deduct</i>	-0.40	
		<i>For >50 To 100, Deduct</i>	-1.00	
		<i>For >100 To 500, Deduct</i>	-1.71	
		<i>For >500 To 1,000, Deduct</i>	-3.53	
		<i>For >1,000, Deduct</i>	-5.13	
21 13 13 00-0235	EA	3-1/2" Diameter x 2" Minimum To 3" Maximum Depth, Two Piece, 1/2" NPT, White Sprinkler Head Telescoping Escutcheon.....	12.27	5.26
		<i>For >25 To 50, Deduct</i>	-0.40	
		<i>For >50 To 100, Deduct</i>	-1.01	
		<i>For >100 To 500, Deduct</i>	-1.73	
		<i>For >500 To 1,000, Deduct</i>	-3.56	
		<i>For >1,000, Deduct</i>	-5.15	
21 13 13 00-0236	EA	3-1/2" Diameter x 2" Minimum To 3" Maximum Depth, Two Piece, 3/4" NPT, Brass Sprinkler Head Telescoping Escutcheon.....	12.73	5.26
		<i>For >25 To 50, Deduct</i>	-0.40	
		<i>For >50 To 100, Deduct</i>	-1.03	
		<i>For >100 To 500, Deduct</i>	-1.79	
		<i>For >500 To 1,000, Deduct</i>	-3.64	
		<i>For >1,000, Deduct</i>	-5.24	
21 13 13 00-0237	EA	3-1/2" Diameter x 2" Minimum To 3" Maximum Depth, Two Piece, 3/4" NPT, Chrome Sprinkler Head Telescoping Escutcheon.....	12.27	5.26
		<i>For >25 To 50, Deduct</i>	-0.40	
		<i>For >50 To 100, Deduct</i>	-1.01	
		<i>For >100 To 500, Deduct</i>	-1.73	
		<i>For >500 To 1,000, Deduct</i>	-3.56	
		<i>For >1,000, Deduct</i>	-5.15	
21 13 13 00-0238	EA	3-1/2" Diameter x 2" Minimum To 3" Maximum Depth, Two Piece, 3/4" NPT, White Sprinkler Head Telescoping Escutcheon.....	12.58	5.26
		<i>For >25 To 50, Deduct</i>	-0.40	
		<i>For >50 To 100, Deduct</i>	-1.03	
		<i>For >100 To 500, Deduct</i>	-1.77	
		<i>For >500 To 1,000, Deduct</i>	-3.62	
		<i>For >1,000, Deduct</i>	-5.21	
21 13 13 00-0239	EA	Flat Chrome Sprinkler Head Escutcheon For Decorative Pendent Sprinkler Head	26.48	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.75	
		<i>For >100 To 500, Deduct</i>	-3.52	
		<i>For >500 To 1,000, Deduct</i>	-6.22	
		<i>For >1,000, Deduct</i>	-7.92	
21 13 13 00-0240	EA	Flat White Sprinkler Head Escutcheon For Decorative Pendent Sprinkler Head	26.48	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.75	
		<i>For >100 To 500, Deduct</i>	-3.52	
		<i>For >500 To 1,000, Deduct</i>	-6.22	
		<i>For >1,000, Deduct</i>	-7.92	
21 13 13 00-0241	EA	Conical Chrome Sprinkler Head Escutcheon For Decorative Pendent Sprinkler Head	26.48	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.75	
		<i>For >100 To 500, Deduct</i>	-3.52	
		<i>For >500 To 1,000, Deduct</i>	-6.22	
		<i>For >1,000, Deduct</i>	-7.92	
21 13 13 00-0242	EA	Conical White Sprinkler Head Escutcheon For Decorative Pendent Sprinkler Head	26.48	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.75	
		<i>For >100 To 500, Deduct</i>	-3.52	
		<i>For >500 To 1,000, Deduct</i>	-6.22	
		<i>For >1,000, Deduct</i>	-7.92	
21 13 13 00-0243	EA	Chrome Sprinkler Head Escutcheon For Decorative Horizontal Sidewall Sprinkler Head	26.48	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.75	
		<i>For >100 To 500, Deduct</i>	-3.52	
		<i>For >500 To 1,000, Deduct</i>	-6.22	
		<i>For >1,000, Deduct</i>	-7.92	
21 13 13 00-0244	EA	White Sprinkler Head Escutcheon For Decorative Horizontal Sidewall Sprinkler Head.....	26.48	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.75	
		<i>For >100 To 500, Deduct</i>	-3.52	
		<i>For >500 To 1,000, Deduct</i>	-6.22	
		<i>For >1,000, Deduct</i>	-7.92	
21 13 13 00-0245	EA	2-Piece Chrome Sprinkler Head Escutcheon For Decorative Pendent Sprinkler Head	30.58	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-1.96	
		<i>For >100 To 500, Deduct</i>	-4.04	
		<i>For >500 To 1,000, Deduct</i>	-6.95	
		<i>For >1,000, Deduct</i>	-8.66	
21 13 13 00-0246	EA	2-Piece White Sprinkler Head Escutcheon For Decorative Pendent Sprinkler Head.....	31.54	5.12
		<i>For >25 To 50, Deduct</i>	-0.43	
		<i>For >50 To 100, Deduct</i>	-2.00	
		<i>For >100 To 500, Deduct</i>	-4.16	
		<i>For >500 To 1,000, Deduct</i>	-7.13	
		<i>For >1,000, Deduct</i>	-8.83	

21 13 13 00-0247 Coverplate For Sprinkler Heads (21 13 13 00-0200)

21 Fire Suppression
21 10 Water-Based Fire-Suppression Systems
21 13 Fire-Suppression Sprinkler Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0248	EA Chrome Coverplate For Concealed Pendent Sprinkler Head	63.03	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-3.64	
	<i>For>100 To 500, Deduct</i>	-8.12	
	<i>For>500 To 1,000, Deduct</i>	-12.99	
	<i>For>1,000, Deduct</i>	-14.92	
21 13 13 00-0249	EA White Coverplate For Concealed Pendent Sprinkler Head	30.47	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.01	
	<i>For>100 To 500, Deduct</i>	-4.05	
	<i>For>500 To 1,000, Deduct</i>	-7.13	
	<i>For>1,000, Deduct</i>	-9.06	
21 13 13 00-0250	EA Specialty Coverplate For Concealed Pendent Sprinkler Head	44.59	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.71	
	<i>For>100 To 500, Deduct</i>	-5.82	
	<i>For>500 To 1,000, Deduct</i>	-9.67	
	<i>For>1,000, Deduct</i>	-11.60	
21 13 13 00-0251	EA Brass Coverplate For Concealed Sidewall Sprinkler Head	40.92	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.53	
	<i>For>100 To 500, Deduct</i>	-5.36	
	<i>For>500 To 1,000, Deduct</i>	-9.01	
	<i>For>1,000, Deduct</i>	-10.94	
21 13 13 00-0252	EA Chrome Coverplate For Concealed Sidewall Sprinkler Head	32.61	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.11	
	<i>For>100 To 500, Deduct</i>	-4.32	
	<i>For>500 To 1,000, Deduct</i>	-7.51	
	<i>For>1,000, Deduct</i>	-9.45	
21 13 13 00-0253	EA White Coverplate For Concealed Sidewall Sprinkler Head	32.61	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.11	
	<i>For>100 To 500, Deduct</i>	-4.32	
	<i>For>500 To 1,000, Deduct</i>	-7.51	
	<i>For>1,000, Deduct</i>	-9.45	
21 13 13 00-0254	EA Off-White Coverplate For Concealed Sidewall Sprinkler Head	40.92	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.53	
	<i>For>100 To 500, Deduct</i>	-5.36	
	<i>For>500 To 1,000, Deduct</i>	-9.01	
	<i>For>1,000, Deduct</i>	-10.94	
21 13 13 00-0255	EA Black Painted Coverplate For Concealed Sidewall Sprinkler Head	40.92	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.53	
	<i>For>100 To 500, Deduct</i>	-5.36	
	<i>For>500 To 1,000, Deduct</i>	-9.01	
	<i>For>1,000, Deduct</i>	-10.94	
21 13 13 00-0256	EA Black Plated Coverplate For Concealed Sidewall Sprinkler Head	47.51	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.86	
	<i>For>100 To 500, Deduct</i>	-6.18	
	<i>For>500 To 1,000, Deduct</i>	-10.20	
	<i>For>1,000, Deduct</i>	-12.13	
21 13 13 00-0257	EA Bright Brass Coverplate For Concealed Sidewall Sprinkler Head	47.51	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.86	
	<i>For>100 To 500, Deduct</i>	-6.18	
	<i>For>500 To 1,000, Deduct</i>	-10.20	
	<i>For>1,000, Deduct</i>	-12.13	
21 13 13 00-0258	EA Satin Chrome Coverplate For Concealed Sidewall Sprinkler Head	47.51	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.86	
	<i>For>100 To 500, Deduct</i>	-6.18	
	<i>For>500 To 1,000, Deduct</i>	-10.20	
	<i>For>1,000, Deduct</i>	-12.13	
21 13 13 00-0259	EA Specialty Coverplate For Concealed Sidewall Sprinkler Head	40.96	5.80
	<i>For>25 To 50, Deduct</i>	-0.48	
	<i>For>50 To 100, Deduct</i>	-2.53	
	<i>For>100 To 500, Deduct</i>	-5.36	
	<i>For>500 To 1,000, Deduct</i>	-9.02	
	<i>For>1,000, Deduct</i>	-10.95	
21 13 13 00-0260	EA White Coverplate For Quick Release Concealed Sidewall Sprinkler Head	70.06	6.82
	<i>For>25 To 50, Deduct</i>	-0.57	
	<i>For>50 To 100, Deduct</i>	-4.07	
	<i>For>100 To 500, Deduct</i>	-9.04	
	<i>For>500 To 1,000, Deduct</i>	-14.54	
	<i>For>1,000, Deduct</i>	-16.82	

21 13 13 00-0261 Sprinkler Escutcheon Extension Tube (21 13 13 00-0200)



Fire Suppression	21	21
Water-Based Fire-Suppression Systems	21 10	
Fire-Suppression Sprinkler Systems	21 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 13 00-0262	EA		2.18" Diameter x 4" Long Stainless Steel With Chrome Or White Finish, Escutcheon Extension Tube Note: For use with 2 piece escutcheons <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	16.01 -0.28 -1.09 -2.14 -3.85 -4.99	3.42
21 13 13 00-0263	EA		2.18" Diameter x 6" Long Stainless Steel With Chrome Or White Finish, Escutcheon Extension Tube Note: For use with 2 piece escutcheons <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	20.88 -0.30 -1.34 -2.76 -4.77 -5.97	3.59
21 13 13 00-0264	EA		2.18" Diameter x 8" Long Stainless Steel With Chrome Or White Finish, Escutcheon Extension Tube Note: For use with 2 piece escutcheons <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	26.33 -0.31 -1.63 -3.45 -5.80 -7.06	3.76
21 13 13 00-0265	EA		2.18" Diameter x 10" Long Stainless Steel With Chrome Or White Finish, Escutcheon Extension Tube Note: For use with 2 piece escutcheons <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	31.19 -0.33 -1.89 -4.06 -6.73 -8.03	3.93
21 13 13 00-0266			Sprinkler Head Guards <small>(21 13 13 00-0200)</small>		
21 13 13 00-0267	EA		Universal Sprinkler Head Guard, C-1 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	23.64 -0.85 -2.04 -3.38 -7.16 -10.57	10.24
21 13 13 00-0268	EA		Dry Pendent Sprinkler Head Guard, C-2 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	26.18 -0.85 -2.16 -3.70 -7.61 -11.03	10.24
21 13 13 00-0269	EA		Upright Sprinkler Head Guard With Water Shield, C-3 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	30.52 -0.85 -2.38 -4.24 -8.40 -11.81	10.24
21 13 13 00-0270	EA		Pendent Sprinkler Head Guard With Water Shield, C-5 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	35.87 -0.85 -2.65 -4.91 -9.36 -12.77	10.24
21 13 13 00-0271	EA		Universal Sprinkler Head Guard, D-1 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	26.08 -0.85 -2.16 -3.69 -7.60 -11.01	10.24
21 13 13 00-0272	EA		Upright Sprinkler Head Guard With Water Shield, D-3 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	27.73 -0.85 -2.24 -3.89 -7.89 -11.31	10.24
21 13 13 00-0273	EA		Pendent Sprinkler Head Guard With Large Water Shield, D-4 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	40.00 -0.85 -2.85 -5.43 -10.10 -13.52	10.24
21 13 13 00-0274	EA		Pendent Sprinkler Head Guard With Small Water Shield, D-5 <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000, Deduct</i>	37.54 -0.85 -2.73 -5.12 -9.66 -13.07	10.24
21 13 13 00-0275			Flexible Sprinkler Piping <small>(21 13 13 00-0011)</small> Note: 1" Diameter stainless steel flexible pipe with either 1/2" or 3/4" outlet.		

21	Fire Suppression
21 10	Water-Based Fire-Suppression Systems
21 13	Fire-Suppression Sprinkler Systems

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 13 00-0276	EA 2' Long, 3/4" Stainless Steel Flexible Sprinkler Piping	77.14	17.63
	Note: Includes ceiling mounting bracket.		
	For >25 To 50, Deduct	-1.78	
	For >50 To 100, Deduct	-5.63	
	For >100 To 500, Deduct	-10.53	
	For >500 To 1,000, Deduct	-19.93	
	For >1,000, Deduct	-27.04	
21 13 13 00-0277	EA 3' Long, 3/4" Stainless Steel Flexible Sprinkler Piping	85.35	18.20
	Note: Includes ceiling mounting bracket.		
	For >25 To 50, Deduct	-1.87	
	For >50 To 100, Deduct	-6.14	
	For >100 To 500, Deduct	-11.60	
	For >500 To 1,000, Deduct	-21.72	
	For >1,000, Deduct	-29.21	
21 13 13 00-0278	EA 4' Long, 3/4" Stainless Steel Flexible Sprinkler Piping	93.74	19.34
	Note: Includes ceiling mounting bracket.		
	For >25 To 50, Deduct	-1.98	
	For >50 To 100, Deduct	-6.66	
	For >100 To 500, Deduct	-12.71	
	For >500 To 1,000, Deduct	-23.59	
	For >1,000, Deduct	-31.49	
21 13 13 00-0279	EA 5' Long, 3/4" Stainless Steel Flexible Sprinkler Piping	102.40	20.47
	Note: Includes ceiling mounting bracket.		
	For >25 To 50, Deduct	-2.09	
	For >50 To 100, Deduct	-7.21	
	For >100 To 500, Deduct	-13.85	
	For >500 To 1,000, Deduct	-25.54	
	For >1,000, Deduct	-33.91	
21 13 13 00-0280	EA 6' Long, 3/4" Stainless Steel Flexible Sprinkler Piping	111.34	22.75
	Note: Includes ceiling mounting bracket.		
	For >25 To 50, Deduct	-2.22	
	For >50 To 100, Deduct	-7.79	
	For >100 To 500, Deduct	-15.03	
	For >500 To 1,000, Deduct	-27.60	
	For >1,000, Deduct	-36.48	
21 13 13 00-0281	Sprinkler Emergency Cabinets <small>(21 13 13 00-0011)</small>		
21 13 13 00-0282	EA 3 Capacity Emergency Sprinkler Cabinet, A4	136.06	
21 13 13 00-0283	EA 6 Capacity Emergency Sprinkler Cabinet, A4	141.74	
21 13 13 00-0284	EA 12 Capacity Emergency Sprinkler Cabinet, A4	154.08	
21 13 13 00-0285	EA 12 Capacity Emergency Sprinkler Cabinet, A3	513.61	
21 13 13 00-0286	EA Sprinkler Wrench, RC1	261.88	
21 13 13 00-0287	EA Sprinkler Wrench, FC	260.87	
21 13 13 00-0288	EA Sprinkler Wrench, W2	86.62	
21 13 16	Dry-Pipe Sprinkler Systems <small>(21 13)</small>		
21 13 16 00-0001	Complete Dry Pipe Sprinkler Systems Assembly <small>(21 13 16)</small>		
	Note: Includes all branch line piping (standard weight threaded black steel, less than 2-1/2" diameter pipe, fittings, branch valves, hangers, sprinkler heads, etc. From riser pipe and mains. Excludes outside mains, inside vertical or horizontal pipe mains, greater than 2" diameter. The coverage of one sprinkler head varies from about 180 SF for light hazard occupancy, about 155 SF for ordinary, 90 to about 130 SF for extra hazard conditions. Excludes special alarm valves, gate valves, check valves, flow control devices, water motor gong assembly, Siamese connections, standpipes and fittings, pipe mains and fittings, fire pumps and tanks. Not for use where detail is available. For sprinkler repairs or sprinkler head replacements use specific pipe, fittings, hangers, valves, and sprinkler head components. See CSI section 23 21 13 23-1260 for individual grooved pipe, 23 21 13 23-1328 for individual grooved pipe fittings.		
21 13 16 00-0002	Light Hazard, Dry-Pipe Sprinkler System Assemblies <small>(21 13 16 00-0001)</small>		
21 13 16 00-0003	EA Exposed Piping, Light Hazard, Per Head, Dry-Pipe Sprinkler System Assembly	1,120.97	
	Note: Includes branch pipe and fittings, supports and sprinkler heads.		
	For Up To 5, Add	488.32	
	For >5 To 10, Add	211.91	
	For >10 To 20, Add	171.99	
	For >20 To 40, Add	76.01	
	For >100 To 150, Deduct	-112.10	
	For >150, Deduct	-224.19	
	For Copper Pipe, Add	148.18	
	For Polyvinyl Chloride (PVC) Pipe, Deduct	-204.23	
21 13 16 00-0004	EA Concealed Piping, Light Hazard, Per Head, Dry-Pipe Sprinkler System Assembly	1,317.34	
	Note: Includes branch pipe and fittings, supports and sprinkler heads with flat or conical escutcheon.		
	For Up To 5, Add	581.10	
	For >5 To 10, Add	267.13	
	For >10 To 20, Add	212.97	
	For >20 To 40, Add	92.95	
	For >100 To 150, Deduct	-131.73	
	For >150, Deduct	-263.47	
	For Copper Pipe, Add	170.52	
	For Polyvinyl Chloride (PVC) Pipe, Deduct	-236.39	
	For Work In Restricted Working Space, Add	162.48	
21 13 16 00-0005	Ordinary Hazard, Dry-Pipe Sprinkler System Assemblies <small>(21 13 16 00-0001)</small>		



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 16 00-0006	EA Exposed Piping, Ordinary Hazard, Per Head, Dry-Pipe Sprinkler System Assembly 1,081.65 Note: Includes branch pipe and fittings, supports and sprinkler heads. <i>For Up To 5, Add</i> 472.09 <i>For >5 To 10, Add</i> 206.74 <i>For >10 To 20, Add</i> 167.31 <i>For >20 To 40, Add</i> 73.80 <i>For >100 To 150, Deduct</i> -108.17 <i>For >150, Deduct</i> -216.33 <i>For Copper Pipe, Add</i> 142.53 <i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i> -196.62		
21 13 16 00-0007	EA Concealed Piping, Ordinary Hazard, Per Head, Dry-Pipe Sprinkler System Assembly 1,273.94 Note: Includes branch pipe and fittings, supports and sprinkler heads with flat or conical escutcheon. <i>For Up To 5, Add</i> 563.08 <i>For >5 To 10, Add</i> 261.16 <i>For >10 To 20, Add</i> 207.65 <i>For >20 To 40, Add</i> 90.45 <i>For >100 To 150, Deduct</i> -127.39 <i>For >150, Deduct</i> -254.79 <i>For Copper Pipe, Add</i> 164.34 <i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i> -228.03 <i>For Work In Restricted Working Space, Add</i> 160.52		
21 13 16 00-0008	Extra Hazard, Dry-Pipe Sprinkler System Assemblies (21 13 16 00-0001)		
21 13 16 00-0009	EA Exposed Piping, Extra Hazard, Per Head, Dry-Pipe Sprinkler System Assembly 1,018.70 Note: Includes branch pipe and fittings, supports and sprinkler heads. <i>For Up To 5, Add</i> 444.22 <i>For >5 To 10, Add</i> 193.73 <i>For >10 To 20, Add</i> 156.98 <i>For >20 To 40, Add</i> 69.31 <i>For >100 To 150, Deduct</i> -101.87 <i>For >150, Deduct</i> -203.74 <i>For Copper Pipe, Add</i> 134.43 <i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i> -185.37		
21 13 16 00-0010	EA Concealed Piping, Extra Hazard, Per Head, Dry-Pipe Sprinkler System Assembly 1,185.50 Note: Includes branch pipe and fittings, supports and sprinkler heads with flat or conical escutcheon. <i>For Up To 5, Add</i> 524.04 <i>For >5 To 10, Add</i> 243.15 <i>For >10 To 20, Add</i> 193.31 <i>For >20 To 40, Add</i> 84.19 <i>For >100 To 150, Deduct</i> -118.55 <i>For >150, Deduct</i> -237.10 <i>For Copper Pipe, Add</i> 152.91 <i>For Polyvinyl Chloride (PVC) Pipe, Deduct</i> -212.18 <i>For Work In Restricted Working Space, Add</i> 149.51		
21 13 16 00-0011	Dry-Pipe Sprinkler System Compressors (21 13 16 00-0001)		
21 13 16 00-0012	EA Dry System Air Compressor, 3/4 HP With Alarm Valve Flange With Gauge 2,582.96		322.74
21 13 16 00-0013	EA Dry System Air Compressor, 1 HP With Alarm Valve Flange With Gauge 2,698.64		322.74
21 13 16 00-0014	EA Dry System Air Compressor, 1-1/2 HP With Alarm Valve Flange With Gauge 2,796.24		322.74
21 13 16 00-0015	EA Dry System Air Compressor, 2 HP With Alarm Valve Flange With Gauge 3,175.79		322.74
21 13 16 00-0016	Dry Pipe Sprinkler System Components (21 13 16)		
21 13 16 00-0017	Dry Pipe Valves (21 13 16 00-0016) Note: Excludes trim package See CSI section 21 13 16 00-0022 for Dry Pipe Valve Trim.		
21 13 16 00-0018	EA 2-1/2" Dry Pipe Valve 4,188.49		143.58
21 13 16 00-0019	EA 3" Dry Pipe Valve 4,662.28		164.46
21 13 16 00-0020	EA 4" Dry Pipe Valve 5,177.67		279.34
21 13 16 00-0021	EA 6" Dry Pipe Valve 6,566.44		352.43
21 13 16 00-0022	Dry Pipe Valve Trim (21 13 16 00-0016) Note: Includes gauges, pressure switch, air supply and drain lines.		
21 13 16 00-0023	EA 2-1/2" Dry Pipe Valve Trim 2,095.19		303.87
21 13 16 00-0024	EA 3" Dry Pipe Valve Trim 2,095.19		303.87
21 13 16 00-0025	EA 4" Dry Pipe Valve Trim 2,399.17		416.65
21 13 16 00-0026	EA 6" Dry Pipe Valve Trim 2,670.67		579.55
21 13 16 00-0027	Recessed Pendent Dry Pipe Sprinkler Heads, Quick Response (21 13 16 00-0016)		
21 13 16 00-0028	EA 3-1/2" To 5-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head 242.08 <i>For >25 To 50, Deduct</i> -3.41 <i>For >50 To 100, Deduct</i> -15.52 <i>For >100 To 500, Deduct</i> -31.97 <i>For >500 To 1,000, Deduct</i> -55.18 <i>For >1,000, Deduct</i> -68.83		22.53

21 Fire Suppression
21 10 Water-Based Fire-Suppression Systems
21 13 Fire-Suppression Sprinkler Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 16 00-0029	EA		6" To 8-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	252.09	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-16.02	
			<i>For >100 To 500, Deduct</i>	-33.22	
			<i>For >500 To 1,000, Deduct</i>	-56.98	
			<i>For >1,000, Deduct</i>	-70.63	
21 13 16 00-0030	EA		9" To 11-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	262.11	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-16.52	
			<i>For >100 To 500, Deduct</i>	-34.47	
			<i>For >500 To 1,000, Deduct</i>	-58.78	
			<i>For >1,000, Deduct</i>	-72.43	
21 13 16 00-0031	EA		12" To 14-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	272.15	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-17.02	
			<i>For >100 To 500, Deduct</i>	-35.73	
			<i>For >500 To 1,000, Deduct</i>	-60.59	
			<i>For >1,000, Deduct</i>	-74.24	
21 13 16 00-0032	EA		15" To 17-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	282.17	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-17.52	
			<i>For >100 To 500, Deduct</i>	-36.98	
			<i>For >500 To 1,000, Deduct</i>	-62.39	
			<i>For >1,000, Deduct</i>	-76.04	
21 13 16 00-0033	EA		18" To 20-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	292.19	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-18.02	
			<i>For >100 To 500, Deduct</i>	-38.23	
			<i>For >500 To 1,000, Deduct</i>	-64.20	
			<i>For >1,000, Deduct</i>	-77.85	
21 13 16 00-0034	EA		21" To 23-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	302.20	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-18.52	
			<i>For >100 To 500, Deduct</i>	-39.48	
			<i>For >500 To 1,000, Deduct</i>	-66.00	
			<i>For >1,000, Deduct</i>	-79.65	
21 13 16 00-0035	EA		24" To 26-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	312.24	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-19.02	
			<i>For >100 To 500, Deduct</i>	-40.74	
			<i>For >500 To 1,000, Deduct</i>	-67.81	
			<i>For >1,000, Deduct</i>	-81.46	
21 13 16 00-0036	EA		27" To 29-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	322.25	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-19.53	
			<i>For >100 To 500, Deduct</i>	-41.99	
			<i>For >500 To 1,000, Deduct</i>	-69.61	
			<i>For >1,000, Deduct</i>	-83.26	
21 13 16 00-0037	EA		30" To 32-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	332.27	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-20.03	
			<i>For >100 To 500, Deduct</i>	-43.24	
			<i>For >500 To 1,000, Deduct</i>	-71.41	
			<i>For >1,000, Deduct</i>	-85.06	
21 13 16 00-0038	EA		33" To 35-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	342.31	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-20.53	
			<i>For >100 To 500, Deduct</i>	-44.50	
			<i>For >500 To 1,000, Deduct</i>	-73.22	
			<i>For >1,000, Deduct</i>	-86.87	
21 13 16 00-0039	EA		36" To 38-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	352.33	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-21.03	
			<i>For >100 To 500, Deduct</i>	-45.75	
			<i>For >500 To 1,000, Deduct</i>	-75.02	
			<i>For >1,000, Deduct</i>	-88.67	
21 13 16 00-0040	EA		39" To 41-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	362.37	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-21.53	
			<i>For >100 To 500, Deduct</i>	-47.00	
			<i>For >500 To 1,000, Deduct</i>	-76.83	
			<i>For >1,000, Deduct</i>	-90.48	
21 13 16 00-0041	EA		42" To 44-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	372.37	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-22.03	
			<i>For >100 To 500, Deduct</i>	-48.25	
			<i>For >500 To 1,000, Deduct</i>	-78.63	
			<i>For >1,000, Deduct</i>	-92.28	
21 13 16 00-0042	EA		45" To 48" Length, 1/2" Orifice, 1" NPT Thread Chrome Recessed Pendent Dry Pipe Sprinkler Head.....	382.40	22.53
			<i>For >25 To 50, Deduct</i>	-3.41	
			<i>For >50 To 100, Deduct</i>	-22.53	
			<i>For >100 To 500, Deduct</i>	-49.51	
			<i>For >500 To 1,000, Deduct</i>	-80.43	
			<i>For >1,000, Deduct</i>	-94.08	



Fire Suppression	21	2
Water-Based Fire-Suppression Systems	21 10	
Fire-Suppression Sprinkler Systems	21 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 16 00-0043 Sidewall Dry Pipe Sprinkler Heads, Quick Response <small>(21 13 16 00-0016)</small>		
21 13 16 00-0044 EA 3-1/2" To 5-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	239.66	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-15.40	
For >100 To 500, Deduct	-31.66	
For >500 To 1,000, Deduct	-54.74	
For >1,000, Deduct	-68.39	
21 13 16 00-0045 EA 6" To 8-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	249.70	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-15.90	
For >100 To 500, Deduct	-32.92	
For >500 To 1,000, Deduct	-56.55	
For >1,000, Deduct	-70.20	
21 13 16 00-0046 EA 9" To 11-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	259.74	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-16.40	
For >100 To 500, Deduct	-34.17	
For >500 To 1,000, Deduct	-58.36	
For >1,000, Deduct	-72.01	
21 13 16 00-0047 EA 12" To 14-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	269.73	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-16.90	
For >100 To 500, Deduct	-35.42	
For >500 To 1,000, Deduct	-60.15	
For >1,000, Deduct	-73.80	
21 13 16 00-0048 EA 15" To 17-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	279.76	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-17.40	
For >100 To 500, Deduct	-36.68	
For >500 To 1,000, Deduct	-61.96	
For >1,000, Deduct	-75.61	
21 13 16 00-0049 EA 18" To 20-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	289.77	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-17.90	
For >100 To 500, Deduct	-37.93	
For >500 To 1,000, Deduct	-63.76	
For >1,000, Deduct	-77.41	
21 13 16 00-0050 EA 21" To 23-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	299.82	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-18.40	
For >100 To 500, Deduct	-39.18	
For >500 To 1,000, Deduct	-65.57	
For >1,000, Deduct	-79.22	
21 13 16 00-0051 EA 24" To 26-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	309.84	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-18.90	
For >100 To 500, Deduct	-40.44	
For >500 To 1,000, Deduct	-67.37	
For >1,000, Deduct	-81.02	
21 13 16 00-0052 EA 27" To 29-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	319.84	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-19.40	
For >100 To 500, Deduct	-41.69	
For >500 To 1,000, Deduct	-69.17	
For >1,000, Deduct	-82.82	
21 13 16 00-0053 EA 30" To 32-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	329.86	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-19.91	
For >100 To 500, Deduct	-42.94	
For >500 To 1,000, Deduct	-70.98	
For >1,000, Deduct	-84.63	
21 13 16 00-0054 EA 33" To 35-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	339.90	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-20.41	
For >100 To 500, Deduct	-44.19	
For >500 To 1,000, Deduct	-72.78	
For >1,000, Deduct	-86.43	
21 13 16 00-0055 EA 36" To 38-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	349.91	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-20.91	
For >100 To 500, Deduct	-45.45	
For >500 To 1,000, Deduct	-74.59	
For >1,000, Deduct	-88.24	
21 13 16 00-0056 EA 39" To 41-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	380.00	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-22.41	
For >100 To 500, Deduct	-49.21	
For >500 To 1,000, Deduct	-80.00	
For >1,000, Deduct	-93.65	
21 13 16 00-0057 EA 42" To 44-3/4" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head	390.02	22.53
For >25 To 50, Deduct	-3.41	
For >50 To 100, Deduct	-22.91	
For >100 To 500, Deduct	-50.46	
For >500 To 1,000, Deduct	-81.81	
For >1,000, Deduct	-95.46	

21	21	Fire Suppression
	21 10	Water-Based Fire-Suppression Systems
	21 13	Fire-Suppression Sprinkler Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
21 13 16 00-0058	EA 45" To 48" Length, 1/2" Orifice, 1" NPT Thread Chrome Sidewall Dry Pipe Sprinkler Head.....	394.02	22.53
	<i>For >25 To 50, Deduct</i>	-3.41	
	<i>For >50 To 100, Deduct</i>	-23.11	
	<i>For >100 To 500, Deduct</i>	-50.96	
	<i>For >500 To 1,000, Deduct</i>	-82.53	
	<i>For >1,000, Deduct</i>	-96.18	
21 13 19 Preaction Sprinkler Systems (21 13)			
21 13 19 00-0001	Complete Preaction Sprinkler Systems Assemblies (21 13 19) Note: Includes all branch line piping (standard weight threaded black steel, less than 2-1/2" diameter pipe, fittings, branch valves, hangers, sprinkler heads, etc. From riser pipe and mains. Excludes outside mains, inside vertical or horizontal pipe mains, greater than 2" diameter. The coverage of one sprinkler head varies from about 180 SF for light hazard occupancy, about 155 SF for ordinary, 90 to about 130 SF for extra hazard conditions. Excludes special alarm valves, gate valves, check valves, flow control devices, water motor gong assembly, Siamese connections, standpipes and fittings, pipe mains and fittings, fire pumps and tanks. Not for use where detail is available. For sprinkler repairs or sprinkler head replacements use specific pipe, fittings, hangers, valves, and sprinkler head components. See CSI section 23 21 13 23-1260 for individual grooved pipe, 23 21 13 23-1328 for individual grooved pipe fittings.		
21 13 19 00-0002	Ordinary Hazard, Preaction Sprinkler System Assemblies (21 13 19 00-0001)		
21 13 19 00-0003	EA Exposed Piping, Ordinary Hazard, Per Head, Preaction Sprinkler System Assembly	985.81	
	Note: Includes branch pipe and fittings, supports and sprinkler heads.		
	<i>For Up To 5, Add</i>	433.75	
	<i>For >5 To 10, Add</i>	256.31	
	<i>For >10 To 20, Add</i>	157.73	
	<i>For >20 To 40, Add</i>	69.01	
	<i>For >100 To 150, Deduct</i>	-98.58	
	<i>For >150, Deduct</i>	-197.16	
21 13 19 00-0004	Extra Hazard, Preaction Sprinkler System Assemblies (21 13 19 00-0001)		
21 13 19 00-0005	EA Exposed Piping, Extra Hazard, Per Head, Preaction Sprinkler System Assembly	917.37	
	Note: Includes branch pipe and fittings, supports and sprinkler heads.		
	<i>For Up To 5, Add</i>	403.69	
	<i>For >5 To 10, Add</i>	238.59	
	<i>For >10 To 20, Add</i>	146.85	
	<i>For >20 To 40, Add</i>	64.24	
	<i>For >100 To 150, Deduct</i>	-91.74	
	<i>For >150, Deduct</i>	-183.47	
21 13 26 Deluge Fire-Suppression Sprinkler Systems (21 13)			
21 13 26 00-0001	Deluge Fire-Suppression Sprinkler Systems Equipment (21 13 26)		
21 13 26 00-0002	Deluge Valves With Required Trim And Release Equipment (21 13 26 00-0001)		
21 13 26 00-0003	EA 3" Deluge Valve With Trim And Release Equipment	10,138.68	632.01
21 13 26 00-0004	EA 4" Deluge Valve With Trim And Release Equipment	11,639.04	710.95
21 13 26 00-0005	EA 6" Deluge Valve With Trim And Release Equipment	14,280.99	1,034.13
21 13 39 Foam-Water Systems (21 13)			
21 13 39 00-0001	Foam Control Valves And Monitors (21 13 39)		
21 13 39 00-0002	Control Valves (21 13 39 00-0001)		
21 13 39 00-0003	EA 3" Foam Control Valve.....	4,483.96	632.01
21 13 39 00-0004	Supply Valves (21 13 39 00-0001)		
21 13 39 00-0005	EA 2-1/2" Foam Supply Valve	3,926.39	710.95
21 13 39 00-0006	Proportioners (21 13 39 00-0001)		
21 13 39 00-0007	EA 8" Foam Proportioner.....	2,868.89	1,034.13
21 13 39 00-0008	Monitors (21 13 39 00-0001)		
21 13 39 00-0009	EA Oscillating Foam Monitor	5,080.31	142.19
21 13 41 Fire-Suppression Sprinkler Piping (21 13)			
	See CSI section 23 21 13 23-0001 for threaded black steel piping, 23 21 13 23-0360 for welded black steel piping, 23 21 13 23-0679 for flanged black steel pipe fittings, 23 21 13 23-1260 for grooved pipe, 23 21 13 23-1328 for grooved pipe fittings, 33 14 13 13-0001 for ductile iron pipe and fittings.		
21 13 41 00-0001	Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe (21 13 41) Note: SDR 13.5		
21 13 41 00-0002	Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe (21 13 41 00-0001)		
21 13 41 00-0003	LF 3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe	6.01	1.82
	<i>For Work In Restricted Working Space, Add</i>	1.37	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 41 00-0004 LF 1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe <i>For Work In Restricted Working Space, Add</i>	7.14 1.47	1.93
21 13 41 00-0005 LF 1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe <i>For Work In Restricted Working Space, Add</i>	8.87 1.61	2.17
21 13 41 00-0006 LF 1-1/2" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe <i>For Work In Restricted Working Space, Add</i>	10.79 1.77	2.39
21 13 41 00-0007 LF 2" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe <i>For Work In Restricted Working Space, Add</i>	13.75 1.98	2.62
21 13 41 00-0008 LF 2-1/2" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe <i>For Work In Restricted Working Space, Add</i>	18.65 2.25	2.96
21 13 41 00-0009 LF 3" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Fire Sprinkler Pipe <i>For Work In Restricted Working Space, Add</i>	25.85 2.66	3.53
21 13 41 00-0010 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbows, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>		
21 13 41 00-0011 EA 3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	29.20 8.19	10.92
21 13 41 00-0012 EA 1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	38.37 10.27	13.65
21 13 41 00-0013 EA 1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	48.00 12.83	17.07
21 13 41 00-0014 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	54.71 14.20	18.88
21 13 41 00-0015 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	61.99 15.83	21.16
21 13 41 00-0016 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	77.76 18.02	24.00
21 13 41 00-0017 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	95.06 21.29	28.44
21 13 41 00-0018 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbows, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>		
21 13 41 00-0019 EA 3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	29.87 8.19	10.92
21 13 41 00-0020 EA 1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	37.30 10.27	13.65
21 13 41 00-0021 EA 1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	47.19 12.83	17.07
21 13 41 00-0022 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	53.42 14.20	18.88
21 13 41 00-0023 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	60.37 15.83	21.16
21 13 41 00-0024 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	73.69 18.02	24.00
21 13 41 00-0025 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	90.58 21.29	28.44
21 13 41 00-0026 Chlorinated Polyvinyl Chloride (CPVC) Tees, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>		
21 13 41 00-0027 EA 3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	43.52 12.29	16.38
21 13 41 00-0028 EA 1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	56.50 15.43	20.59
21 13 41 00-0029 EA 1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	71.80 19.25	25.71
21 13 41 00-0030 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	82.24 21.29	28.44
21 13 41 00-0031 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	95.86 23.75	31.62
21 13 41 00-0032 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	117.21 27.03	36.06
21 13 41 00-0033 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	138.48 31.94	42.54
21 13 41 00-0034 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tees, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>		
21 13 41 00-0035 EA 1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	52.22 14.37	19.22
21 13 41 00-0036 EA 1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	67.77 17.95	24.00
21 13 41 00-0037 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	75.83 19.86	26.51
21 13 41 00-0038 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	89.27 22.18	29.58
21 13 41 00-0039 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	105.14 25.22	33.67
21 13 41 00-0040 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Tee, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	123.76 29.83	39.70

21	21	Fire Suppression
	21 10	Water-Based Fire-Suppression Systems
	21 13	Fire-Suppression Sprinkler Systems



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
21 13 41 00-0041		Chlorinated Polyvinyl Chloride (CPVC) Crosses, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>			
21 13 41 00-0042	EA	3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Cross, Fire Sprinkler Piping	58.67		21.84
		<i>For Work In Restricted Working Space, Add</i>	16.38		
21 13 41 00-0043	EA	1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Cross, Fire Sprinkler Piping	73.55		27.41
		<i>For Work In Restricted Working Space, Add</i>	20.54		
21 13 41 00-0044	EA	1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Cross, Fire Sprinkler Piping	92.59		34.24
		<i>For Work In Restricted Working Space, Add</i>	25.66		
21 13 41 00-0045	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross, Fire Sprinkler Piping	104.26		37.88
		<i>For Work In Restricted Working Space, Add</i>	28.39		
21 13 41 00-0046	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross, Fire Sprinkler Piping	121.42		42.20
		<i>For Work In Restricted Working Space, Add</i>	31.67		
21 13 41 00-0047	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross, Fire Sprinkler Piping	154.70		48.00
		<i>For Work In Restricted Working Space, Add</i>	36.04		
21 13 41 00-0048		Chlorinated Polyvinyl Chloride (CPVC) Couplings, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>			
21 13 41 00-0049	EA	1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	20.02		7.28
		<i>For Work In Restricted Working Space, Add</i>	5.46		
21 13 41 00-0050	EA	1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	26.83		9.78
		<i>For Work In Restricted Working Space, Add</i>	7.34		
21 13 41 00-0051	EA	1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	35.54		12.85
		<i>For Work In Restricted Working Space, Add</i>	9.62		
21 13 41 00-0052	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	40.43		14.21
		<i>For Work In Restricted Working Space, Add</i>	10.65		
21 13 41 00-0053	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	46.28		15.82
		<i>For Work In Restricted Working Space, Add</i>	11.87		
21 13 41 00-0054	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	55.29		17.97
		<i>For Work In Restricted Working Space, Add</i>	13.51		
21 13 41 00-0055	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Coupling, Fire Sprinkler Piping	66.60		21.28
		<i>For Work In Restricted Working Space, Add</i>	15.97		
21 13 41 00-0056		Chlorinated Polyvinyl Chloride (CPVC) Caps, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>			
21 13 41 00-0057	EA	3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	10.19		3.64
		<i>For Work In Restricted Working Space, Add</i>	2.73		
21 13 41 00-0058	EA	1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	16.24		5.91
		<i>For Work In Restricted Working Space, Add</i>	4.40		
21 13 41 00-0059	EA	1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	18.55		6.37
		<i>For Work In Restricted Working Space, Add</i>	4.81		
21 13 41 00-0060	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	21.20		7.05
		<i>For Work In Restricted Working Space, Add</i>	5.32		
21 13 41 00-0061	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	25.02		7.96
		<i>For Work In Restricted Working Space, Add</i>	5.94		
21 13 41 00-0062	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	30.06		8.99
		<i>For Work In Restricted Working Space, Add</i>	6.76		
21 13 41 00-0063	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap, Fire Sprinkler Piping	38.83		10.69
		<i>For Work In Restricted Working Space, Add</i>	7.99		
21 13 41 00-0064		Chlorinated Polyvinyl Chloride (CPVC) Reducer Bushing, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>			
21 13 41 00-0065	EA	1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing Bushing, Fire Sprinkler Piping	28.38		10.81
		<i>For Work In Restricted Working Space, Add</i>	8.09		
21 13 41 00-0066	EA	1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing Bushing, Fire Sprinkler Piping	37.57		14.10
		<i>For Work In Restricted Working Space, Add</i>	10.58		
21 13 41 00-0067	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Bushing, Fire Sprinkler Piping	41.53		15.58
		<i>For Work In Restricted Working Space, Add</i>	11.71		
21 13 41 00-0068	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Bushing, Fire Sprinkler Piping	47.24		17.41
		<i>For Work In Restricted Working Space, Add</i>	13.07		
21 13 41 00-0069	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Bushing, Fire Sprinkler Piping	55.90		19.80
		<i>For Work In Restricted Working Space, Add</i>	14.88		
21 13 41 00-0070	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Bushing, Fire Sprinkler Piping	68.08		23.43
		<i>For Work In Restricted Working Space, Add</i>	17.57		
21 13 41 00-0071		Chlorinated Polyvinyl Chloride (CPVC) Spigot Style Reducing Adapter, Male Slip x Female Pipe Thread, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>			
21 13 41 00-0072	EA	3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Spigot Style Reducing Adapter, Male Slip X Female Pipe Thread, Fire Sprinkler Piping	24.76		7.96
		<i>For Work In Restricted Working Space, Add</i>	6.01		
21 13 41 00-0073	EA	1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Spigot Style Reducing Adapter, Male Slip X Female Pipe Thread, Fire Sprinkler Piping	31.98		10.81
		<i>For Work In Restricted Working Space, Add</i>	8.09		
21 13 41 00-0074		Chlorinated Polyvinyl Chloride (CPVC) Reducing Adapter, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <small>(21 13 41 00-0001)</small>			
21 13 41 00-0075	EA	3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing Adapter, Female Slip x Female Pipe Thread, Fire Sprinkler Piping	24.76		7.96
		<i>For Work In Restricted Working Space, Add</i>	6.01		



Fire Suppression	21	
Water-Based Fire-Suppression Systems	21 10	12
Fire-Suppression Sprinkler Systems	21 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 13 41 00-0076	EA		1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing Adapter, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	31.98 8.09	10.81
21 13 41 00-0077			Chlorinated Polyvinyl Chloride (CPVC) Reducing 90 Degree Elbow Adapter, Female Slip x Female Pipe Thread, Fire Sprinkler Piping (21 13 41 00-0001)		
21 13 41 00-0078	EA		3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing 90 Degree Elbow Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	28.98 7.37	9.78
21 13 41 00-0079	EA		1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing 90 Degree Elbow Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	37.01 9.25	12.28
21 13 41 00-0080	EA		1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Reducing 90 Degree Elbow Adapter With 3/4" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	38.36 9.25	12.28
21 13 41 00-0081			Chlorinated Polyvinyl Chloride (CPVC) Straight Tee Adapter, Female Slip x Female Pipe Thread, Fire Sprinkler Piping (21 13 41 00-0001)		
21 13 41 00-0082	EA		3/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Straight Tee Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	47.65 12.29	16.38
21 13 41 00-0083	EA		1" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Straight Tee Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	58.67 15.43	20.59
21 13 41 00-0084	EA		1-1/4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) Straight Tee Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	76.22 19.25	25.71
21 13 41 00-0085	EA		1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Straight Tee Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	86.92 21.29	28.44
21 13 41 00-0086	EA		2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Straight Tee Adapter With 1/2" FPT, Female Slip x Female Pipe Thread, Fire Sprinkler Piping <i>For Work In Restricted Working Space, Add</i>	101.55 23.75	31.62

21 20 Fire-Extinguishing Systems (21)

21 21 Carbon-Dioxide Fire-Extinguishing Systems (21 20)

21 21 16 Carbon-Dioxide Fire-Extinguishing Equipment (21 21)

21 21 16 00-0001 Carbon Dioxide Cylinders (21 21 16)

21 21 16 00-0002	EA	Carbon Dioxide Simplex Cylinder, 75 LB.....	5,082.09	232.62
21 21 16 00-0003	EA	Carbon Dioxide Duplex Cylinder, 75 LB (Each).....	10,164.18	465.22
21 21 16 00-0004	EA	Carbon Dioxide Cylinder, Heat/Ion Detector, With Bracket.....	544.31	129.82
21 21 16 00-0005	EA	Carbon Dioxide Cylinder, Dispersion Nozzle.....	267.19	42.50
21 21 16 00-0006	LF	Carbon Dioxide Cylinder, 1/2" Rubber Tubing.....	53.90	17.23

21 22 Clean-Agent Fire-Extinguishing Systems (21 20)

21 22 16 Clean-Agent Fire-Extinguishing Equipment (21 22)

21 22 16 00-0001 Ansul Fire Control Systems (21 22 16)

21 22 16 00-0002 Sapphire® Fire Suppression Systems (21 22 16 00-0001)

Note: ANSUL® SAPPHIRE® fire suppression systems use 3M™ Novec™ 1230 fire protection fluid for total flooding applications.

21 22 16 00-0003 Cylinders, Sapphire® Fire Suppression Systems (21 22 16 00-0002)

21 22 16 00-0004	EA	20 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570635)..... Note: 10 to 21 LB tank capacity. Excludes Sapphire agent.	1,608.57	79.30
21 22 16 00-0005	EA	40 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570636)..... Note: 20 to 46 LB tank capacity. Excludes Sapphire agent.	1,834.62	79.30
21 22 16 00-0006	EA	80 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570637)..... Note: 41 to 80 LB tank capacity. Excludes Sapphire agent.	1,864.34	79.30
21 22 16 00-0007	EA	140 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570638)..... Note: 58 to 138 LB tank capacity. Excludes Sapphire agent.	2,646.72	105.73
21 22 16 00-0008	EA	280 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570639)..... Note: 116 to 280 LB tank capacity. Excludes Sapphire agent.	2,796.15	105.73
21 22 16 00-0009	EA	390 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570640)..... Note: 161 to 388 LB tank capacity. Excludes Sapphire agent.	2,987.85	132.17
21 22 16 00-0010	EA	450 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570641)..... Note: 194 to 459 LB tank capacity. Excludes Sapphire agent.	3,170.06	132.17
21 22 16 00-0011	EA	850 LB, Empty Tank And Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570586)..... Note: 375 to 851 LB tank capacity. Excludes Sapphire agent.	4,783.77	158.60
21 22 16 00-0012	LB	Sapphire Agent, Fire Protection Fluid, Factory Filled (Novec 1230)..... Note: Add to empty tank cost.	40.37	158.60

21 22 16 00-0013 Nozzles, Sapphire® Fire Suppression Systems (21 22 16 00-0002)

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 22 16 00-0014	EA		1/2" Drilled Brass Nozzle, 180 Degree, Sapphire® Fire Suppression System (Ansul 570515).....	153.70	13.22
21 22 16 00-0015	EA		3/4" Drilled Brass Nozzle, 180 Degree, Sapphire® Fire Suppression System (Ansul 570516).....	157.55	13.22
21 22 16 00-0016	EA		1" Drilled Brass Nozzle, 180 Degree, Sapphire® Fire Suppression System (Ansul 570517).....	167.20	13.22
21 22 16 00-0017	EA		1-1/4" Drilled Brass Nozzle, 180 Degree, Sapphire® Fire Suppression System (Ansul 570518).....	173.95	13.22
21 22 16 00-0018	EA		1-1/2" Drilled Brass Nozzle, 180 Degree, Sapphire® Fire Suppression System (Ansul 570519).....	183.59	13.22
21 22 16 00-0019	EA		2" Drilled Brass Nozzle, 180 Degree, Sapphire® Fire Suppression System (Ansul 570520).....	212.50	13.22
21 22 16 00-0020	EA		1/2" Drilled Brass Nozzle, 360 Degree, Sapphire® Fire Suppression System (Ansul 570602).....	153.70	13.22
21 22 16 00-0021	EA		3/4" Drilled Brass Nozzle, 360 Degree, Sapphire® Fire Suppression System (Ansul 570603).....	157.55	13.22
21 22 16 00-0022	EA		1" Drilled Brass Nozzle, 360 Degree, Sapphire® Fire Suppression System (Ansul 570604).....	167.20	13.22
21 22 16 00-0023	EA		1-1/4" Drilled Brass Nozzle, 360 Degree, Sapphire® Fire Suppression System (Ansul 570605).....	173.95	13.22
21 22 16 00-0024	EA		1-1/2" Drilled Brass Nozzle, 360 Degree, Sapphire® Fire Suppression System (Ansul 570606).....	183.59	13.22
21 22 16 00-0025	EA		2" Drilled Brass Nozzle, 360 Degree, Sapphire® Fire Suppression System (Ansul 570607).....	212.50	13.22
21 22 16 00-0026			Actuation Attachments, Sapphire® Fire Suppression System (21 22 16 00-0002)		
21 22 16 00-0027	EA		7/16-20 To 1/4" NPT, Male Actuation Elbow, Sapphire® Fire Suppression System (Ansul 31810).....	13.88	3.97
21 22 16 00-0028	EA		7/16-20 To 1/4" NPT, Male Actuation Tee, Sapphire® Fire Suppression System (Ansul 31811).....	15.54	3.97
21 22 16 00-0029	EA		1/4" NPT To 7/16-20, Male Actuation Connector, Sapphire® Fire Suppression System (Ansul 32338).....	21.22	9.25
21 22 16 00-0030	EA		16" Actuation Hose, Sapphire® Fire Suppression System (Ansul 73597).....	49.87	11.84
21 22 16 00-0031	EA		32" Actuation Hose, Sapphire® Fire Suppression System (Ansul 415142).....	73.81	11.84
21 22 16 00-0032	EA		42" Actuation Hose, Sapphire® Fire Suppression System (Ansul 430815).....	89.07	11.84
21 22 16 00-0033	EA		24", Stainless Steel, Swivel, Braided Actuation Hose, Sapphire® Fire Suppression System (Ansul 32336).....	44.36	11.84
21 22 16 00-0034	EA		Pneumatic Actuator Shipping Assembly, Sapphire® Fire Suppression System (Ansul 570537).....	308.84	105.73
21 22 16 00-0035	EA		Local Manual Actuator, Sapphire® Fire Suppression System (Ansul 570549).....	297.42	79.30
21 22 16 00-0036	EA		Electric Actuator Shipping Assembly, Sapphire® Fire Suppression System (Ansul 570537).....	667.48	105.73
21 22 16 00-0037			Nameplates, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0038	EA		Warning Plate For Use Outside Room, Sapphire® Fire Suppression Systems (Ansul 570580).....	49.58	13.22
21 22 16 00-0039	EA		Warning Plate for Use Inside Room, Sapphire® Fire Suppression Systems (Ansul 570581).....	53.93	13.22
21 22 16 00-0040			Cylinder Bracketing, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0041	EA		Tank Bracket Assembly For 20 LB, 40 LB, 50 LB, 80 LB And 90 LB Tanks, Sapphire® Fire Suppression Systems (Ansul 570085).....	152.57	39.65
21 22 16 00-0042	EA		Tank Bracket Assembly For 140 LB, 280 LB, 390 LB And 450 LB Tanks, Sapphire® Fire Suppression Systems (Ansul 570085).....	161.25	39.65
21 22 16 00-0043	EA		Tank Bracket Assembly For 850 LB Tanks, Sapphire® Fire Suppression Systems (Ansul 570336).....	172.34	39.65
21 22 16 00-0044			Check Valves, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0045	EA		1" Manifold Check Valve, Sapphire® Fire Suppression Systems (Ansul 570566).....	410.81	42.08
21 22 16 00-0046	EA		2" Manifold Check Valve, Sapphire® Fire Suppression Systems (Ansul 570568).....	577.31	72.21
21 22 16 00-0047			Discharge Hose, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0048	EA		1" Flexible Discharge Hose, Sapphire® Fire Suppression Systems (Ansul 570539).....	129.03	26.44
21 22 16 00-0049	EA		2" Flexible Discharge Hose, Sapphire® Fire Suppression Systems (Ansul 570538).....	483.82	26.44
21 22 16 00-0050	EA		3" Flexible Discharge Hose, Sapphire® Fire Suppression Systems (Ansul 69990).....	407.65	26.44
21 22 16 00-0051	EA		3" Discharge Hose And Check Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 69841).....	1,780.99	105.73
21 22 16 00-0052			Swivel Adaptors, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0053	EA		1" Single-Tank Swivel Adaptor, Sapphire® Fire Suppression Systems (Ansul 570557).....	46.31	18.51
21 22 16 00-0054	EA		2" Single-Tank Swivel Adaptor, Sapphire® Fire Suppression Systems (Ansul 570558).....	82.35	18.51
21 22 16 00-0055	EA		3" Flare To 3" Grooved, Single-Tank Swivel Adaptor, Sapphire® Fire Suppression Systems (Ansul 69471).....	228.90	13.22
21 22 16 00-0056	EA		3" Flare To 3" NPT, Single-Tank Swivel Adaptor, Sapphire® Fire Suppression Systems (Ansul 69470).....	295.85	13.22
21 22 16 00-0057			Pressure Switches, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0058	EA		Cylinder Low Pressure Switch, Sapphire® Fire Suppression Systems (Ansul 570585).....	169.84	52.87
21 22 16 00-0059	EA		Pressure Trip, Sapphire® Fire Suppression Systems (Ansul 5156).....	170.71	22.20
21 22 16 00-0060	EA		Weather Proof, DPST Pressure Switch, Sapphire® Fire Suppression Systems (Ansul 46250).....	525.35	92.51
21 22 16 00-0061			Level Indicators, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0062	EA		Liquid Level Indicator For 280 LB Tanks, Sapphire® Fire Suppression Systems (Ansul 570277).....	613.51	18.51
21 22 16 00-0063	EA		Liquid Level Indicator For 390 LB And 850 LB Tanks, Sapphire® Fire Suppression Systems (Ansul 570278).....	642.45	18.51
21 22 16 00-0064	EA		Liquid Level Indicator For 450 LB Tanks, Sapphire® Fire Suppression Systems (Ansul 570589).....	688.19	26.44
21 22 16 00-0065			Inspection/Maintenance Devices, Sapphire® Fire Suppression Systems (21 22 16 00-0002)		
21 22 16 00-0066	EA		Master Tank Pilot Port Male Adaptor, Sapphire® Fire Suppression Systems (Ansul 570342).....	47.14	15.86
21 22 16 00-0067	EA		Cylinder Valve Pressure Gauge, Sapphire® Fire Suppression Systems (Ansul 570642).....	59.07	18.51
21 22 16 00-0068	EA		Recharge Top Adaptor Assembly, Sapphire® Fire Suppression Systems (Ansul 570579).....	197.35	79.30
21 22 16 00-0069	EA		1" Recharge Fill Adaptor Assembly, Sapphire® Fire Suppression Systems (Ansul 570576).....	230.42	79.30
21 22 16 00-0070	EA		2" Recharge Fill Adaptor Assembly, Sapphire® Fire Suppression Systems (Ansul 570592).....	257.90	79.30
21 22 16 00-0071	EA		3" Recharge Fill Adaptor Assembly, Sapphire® Fire Suppression Systems (Ansul 69891).....	346.59	79.30



Fire Suppression	21	2
Fire-Extinguishing Systems	21 20	
Clean-Agent Fire-Extinguishing Systems	21 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 22 16 00-0072 Replacement Parts, Sapphire® Fire Suppression Systems <small>(21 22 16 00-0002)</small>		
21 22 16 00-0073 EA O-Ring Kit, Sapphire® Fire Suppression Systems (Ansul 570559).....	56.16	21.15
21 22 16 00-0074 EA Recoil Cap, Sapphire® Fire Suppression Systems (Ansul 570553).....	92.47	13.22
21 22 16 00-0075 EA Burst Disc Assembly, Sapphire® Fire Suppression Systems (Ansul 570053).....	124.71	26.44
21 22 16 00-0076 EA Bonnet Assembly, Sapphire® Fire Suppression Systems (Ansul 570543).....	329.09	105.73
21 22 16 00-0077 EA Piston Assembly, Sapphire® Fire Suppression Systems (Ansul 570551).....	497.80	105.73
21 22 16 00-0078 EA 1" Valve Assembly, Sapphire® Fire Suppression Systems (Ansul 570535).....	1,680.71	105.73
21 22 16 00-0079 Inergen® Fire Suppression System <small>(21 22 16 00-0001)</small>		
21 22 16 00-0080 Actuation Attachments, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0081 EA Flexible Discharge Bend For CV90 And CV98 (200 Bar), Inergen® Fire Suppression System (Ansul 427082).....	180.61	26.19
21 22 16 00-0082 EA Metron Protractor Replacement Cartridges, Inergen® Fire Suppression System (Ansul 423958).....	210.00	28.15
21 22 16 00-0083 EA Electric Actuator, Lever, CV98, Inergen® Fire Suppression System (Ansul 423309).....	375.72	50.94
21 22 16 00-0084 EA Electric Actuator For CV90 Valve, Inergen® Fire Suppression System (Ansul 426876).....	755.61	116.02
21 22 16 00-0085 Check Valves, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0086 EA 2" Bronze Check Valve, Weld Neck Flange, Inergen® Fire Suppression System (Ansul 840794).....	1,819.86	153.12
21 22 16 00-0087 Components, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0088 EA 1/2" Manifold Relief Valve, Inergen® Fire Suppression System (Ansul 418378).....	53.66	8.03
21 22 16 00-0089 EA Pressure Operated Siren, Inergen® Fire Suppression System (Ansul 419700).....	631.00	86.04
21 22 16 00-0090 EA 30 Second Pneumatic Time Delay, Inergen® Fire Suppression System (Ansul 54169).....	1,964.27	269.19
21 22 16 00-0091 EA 60 Second Time Delay, Inergen® Fire Suppression System (Ansul 426170).....	1,872.17	274.24
21 22 16 00-0092 Cylinders, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
Note: Includes CV98 valve. Factory filled with Inergen agent.		
21 22 16 00-0093 EA 200 CF Cylinder, Standard Paint, Inergen® Fire Suppression System (Ansul 426147).....	1,638.04	246.36
21 22 16 00-0094 EA 250 CF Cylinder, Standard Paint, Inergen® Fire Suppression System (Ansul 426148).....	1,858.16	279.12
21 22 16 00-0095 EA 350 CF Cylinder, Standard Paint, Inergen® Fire Suppression System (Ansul 426620).....	2,658.83	361.71
21 22 16 00-0096 EA 435 CF Cylinder, Standard Paint, Inergen® Fire Suppression System (Ansul 426150).....	2,661.05	442.00
21 22 16 00-0097 EA 250 CF Cylinder, Corrosion Resistant Paint, Inergen® Fire Suppression System (Ansul 426257).....	1,922.09	311.23
21 22 16 00-0098 EA 350 CF Cylinder, Corrosion Resistant Paint, Inergen® Fire Suppression System (Ansul 426621).....	2,723.24	393.93
21 22 16 00-0099 EA 435 CF Cylinder, Corrosion Resistant Paint, Inergen® Fire Suppression System (Ansul 426259).....	2,811.04	474.97
21 22 16 00-0100 Inspection/Maintenance Devices, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0101 EA CV90 Fill Adaptor To CV98 Valve, Conversion Adapter, Inergen® Fire Suppression System (Ansul 423657).....	61.83	8.96
21 22 16 00-0102 EA CV98 To CV90 Conversion Adapter, Cylinder Test Gauge, Inergen® Fire Suppression System (Ansul 426181).....	61.83	8.96
21 22 16 00-0103 EA CV90 Pressure Test Assembly Venting Kit, Inergen® Fire Suppression System (Ansul 426954).....	74.57	9.95
21 22 16 00-0104 EA Pressure Test Gauge, Inergen® Fire Suppression System (Ansul 423923).....	1,178.11	170.96
21 22 16 00-0105 Multiple Cylinder Bracketing, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0106 EA 13" Carriage Bolt With Nut, Multiple Cylinder Bracketing, Inergen® Fire Suppression System (Ansul 418502).....	19.84	2.62
Note: For single row 435 cubic foot cylinders.		
21 22 16 00-0107 EA 27" Carriage Bolt With Nut, Multiple Cylinder Bracketing, Inergen® Fire Suppression System (Ansul 418503).....	28.16	3.74
Note: For double row 435 cubic foot cylinders.		
21 22 16 00-0108 Nameplates, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0109 EA Warning Plate, Nameplate, Inside Room With Alarm, Inergen® Fire Suppression System (Ansul 416265).....	21.88	2.93
21 22 16 00-0110 EA Warning Plate, Nameplate, Outside Room Without Alarm, Inergen® Fire Suppression System (Ansul 416266).....	20.22	2.93
21 22 16 00-0111 Nozzle Deflector Shields, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0112 EA 1/2" Nozzle Deflector Shield, Inergen® Fire Suppression System (Ansul 417708).....	87.90	12.62
21 22 16 00-0113 EA 3/4" Nozzle Deflector Shield, Inergen® Fire Suppression System (Ansul 417711).....	92.23	13.21
21 22 16 00-0114 EA 1" Nozzle Deflector Shield, Inergen® Fire Suppression System (Ansul 417714).....	107.17	15.26
21 22 16 00-0115 EA 1-1/4" Nozzle Deflector Shield, Inergen® Fire Suppression System (Ansul 417717).....	119.46	17.23
21 22 16 00-0116 EA 1-1/2" Nozzle Deflector Shield, Inergen® Fire Suppression System (Ansul 417720).....	137.03	19.81
21 22 16 00-0117 Nozzles, Inergen® Fire Suppression System <small>(21 22 16 00-0079)</small>		
21 22 16 00-0118 EA 1/4" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417908).....	134.63	19.52
21 22 16 00-0119 EA 3/8" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417723).....	139.67	20.10
21 22 16 00-0120 EA 1/2" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417362).....	128.83	18.61
21 22 16 00-0121 EA 3/4" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417363).....	131.95	20.10
21 22 16 00-0122 EA 1" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417364).....	153.17	22.11
21 22 16 00-0123 EA 1-1/4" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417365).....	163.76	23.55
21 22 16 00-0124 EA 1-1/2" NPT Nozzle, 360 Degree, Inergen® Fire Suppression System (Ansul 417366).....	176.28	25.27
21 22 16 00-0125 EA 2" NPT Nozzle, Inergen® Fire Suppression System (Ansul 426155).....	303.44	44.22
21 22 16 00-0126 EA 2-1/2" NPT Nozzle, Inergen® Fire Suppression System (Ansul 426156).....	401.21	58.00

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 22 16 00-0127	EA		3" NPT Nozzle, Inergen® Fire Suppression System (Ansul 426137)	437.38	63.75
21 22 16 00-0128	EA		1/4" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426138).....	156.78	22.96
21 22 16 00-0129	EA		3/8" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426139).....	184.95	26.88
21 22 16 00-0130	EA		1/2" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426140).....	152.19	22.11
21 22 16 00-0131	EA		3/4" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426141).....	162.57	23.43
21 22 16 00-0132	EA		1" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426142)	164.00	23.55
21 22 16 00-0133	EA		1-1/4" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426143)	197.97	28.60
21 22 16 00-0134	EA		1-1/2" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426157)	213.37	31.01
21 22 16 00-0135	EA		2" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426144)	327.53	47.59
21 22 16 00-0136	EA		2-1/2" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426145)	382.42	55.71
21 22 16 00-0137	EA		3" NPT Nozzle, 180 Degree Sidewall, Inergen® Fire Suppression System (Ansul 426146)	419.04	60.87
21 22 16 00-0138			Pressure Reducers, Inergen® Fire Suppression System (21 22 16 00-0079)		
21 22 16 00-0139	EA		1/2" NPT, Orifice Union, Pressure Reducer, Inergen® Fire Suppression System (Ansul 416677)	176.28	25.27
21 22 16 00-0140	EA		3/4" NPT, Orifice Union, Pressure Reducer, Inergen® Fire Suppression System (Ansul 416678)	216.28	31.47
21 22 16 00-0141	EA		1" NPT, Orifice Union, Pressure Reducer, Inergen® Fire Suppression System (Ansul 416679)	232.64	33.89
21 22 16 00-0142	EA		1-1/4" NPT, Orifice Union, Pressure Reducer, Inergen® Fire Suppression System (Ansul 416680).....	327.53	47.59
21 22 16 00-0143	EA		1-1/2" NPT, Orifice Union, Pressure Reducer, Inergen® Fire Suppression System (Ansul 416681).....	357.87	52.15
21 22 16 00-0144	EA		2" NPT, Orifice Union, Pressure Reducer, Inergen® Fire Suppression System (Ansul 416682).....	420.48	60.87
21 22 16 00-0145	EA		2-1/2" NPT, Orifice Nipple, Pressure Reducer, Inergen® Fire Suppression System (Ansul 417057)	488.87	71.38
21 22 16 00-0146	EA		3" NPT, Orifice Nipple, Pressure Reducer, Inergen® Fire Suppression System (Ansul 417058)	577.97	84.43
21 22 16 00-0147	EA		2-1/2" NPT, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426823)	737.16	166.56
21 22 16 00-0148	EA		3" NPT, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426824)	949.12	195.28
21 22 16 00-0149	EA		4" NPT, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426825)	1,214.28	327.37
21 22 16 00-0150	EA		2-1/2" Slip-On, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426847)	718.84	166.56
21 22 16 00-0151	EA		3" Slip-On, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426848).....	795.69	116.33
21 22 16 00-0152	EA		4" Slip-On, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426849).....	1,214.28	327.37
21 22 16 00-0153	EA		2-1/2" Weld Neck, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426853)	734.26	166.56
21 22 16 00-0154	EA		3" Weld Neck, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426854)	827.00	120.89
21 22 16 00-0155	EA		4" Weld Neck, Orifice Flanged, Pressure Reducer, Inergen® Fire Suppression System (Ansul 426855)	1,191.14	327.37
21 22 16 00-0156			Pressure Switches, Inergen® Fire Suppression System (21 22 16 00-0079)		
21 22 16 00-0157	EA		3PST, Pressure Switch, Inergen® Fire Suppression System (Ansul 842344)	828.05	126.93
21 22 16 00-0158			Releasing Device Equipment, Inergen® Fire Suppression System (21 22 16 00-0079)		
21 22 16 00-0159	EA		12 Or 24 Volt DC, Assembly, Automan II-C Releasing Device Equipment, Inergen® Fire Suppression System (Ansul 17728)	1,357.77	196.91
21 22 16 00-0160	EA		24 Volt DC, Explosion Proof Automan II-C Releasing Device Equipment, Inergen® Fire Suppression System (Ansul 31492)	1,932.48	262.39
21 22 16 00-0161	EA		120 Volt AC, Explosion Proof Automan II-C Releasing Device Equipment, Inergen® Fire Suppression System (Ansul 32525)	2,048.61	266.91
21 22 16 00-0162	EA		Cocking Lever For Automan II-C Releasing Device Equipment, Inergen® Fire Suppression System (Ansul 26310).....	95.85	13.57
21 22 16 00-0163	EA		LT-30-R Nitrogen Cartridge, Releasing Device Equipment, Inergen® Fire Suppression System (Ansul 5373).....	114.60	17.98
21 22 16 00-0164	EA		Remote Actuator Booster With N2 Cartridge, Releasing Device Equipment, Inergen® Fire Suppression System (Ansul 28939)	1,097.29	140.48
21 22 16 00-0165			Replacement Orifice Plates, Inergen® Fire Suppression System (21 22 16 00-0079)		
21 22 16 00-0166	EA		1/2" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 418095)	119.96	13.34
21 22 16 00-0167	EA		3/4" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 418096)	125.73	14.05
21 22 16 00-0168	EA		1" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 418097).....	132.00	14.28
21 22 16 00-0169	EA		1-1/4" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 418098).....	141.64	14.76
21 22 16 00-0170	EA		1-1/2" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 418099).....	147.41	16.19
21 22 16 00-0171	EA		2" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 418100).....	148.13	17.50
21 22 16 00-0172	EA		2-1/2" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 426984).....	325.10	46.90
21 22 16 00-0173	EA		3" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 426985).....	328.00	47.39
21 22 16 00-0174	EA		4" Replacement Orifice Plate, Inergen® Fire Suppression System (Ansul 426986).....	420.48	60.71
21 22 16 00-0175			Single Cylinder Bracketing, Inergen® Fire Suppression System (21 22 16 00-0079)		
21 22 16 00-0176	EA		Strap For 435 CF Cylinder, Single Cylinder Bracketing, Inergen® Fire Suppression System (Ansul 427704)	153.17	22.11
21 22 16 00-0177	EA		Channel For 435 CF Cylinder, Single Cylinder Bracketing, Inergen® Fire Suppression System (Ansul 427705)	210.38	50.54
			Note: Includes saddle, padding and fasteners.		
21 22 16 00-0178			Single Mating Flanges, Flanged Manifold Orifices, Inergen® Fire Suppression System (21 22 16 00-0079)		
21 22 16 00-0179	EA		2-1/2" Threaded, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426856)	398.53	32.68
			Note: Includes gasket and fasteners.		
21 22 16 00-0180	EA		3" Threaded, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426857)	335.71	48.80
			Note: Includes gasket and fasteners.		
21 22 16 00-0181	EA		4" Threaded, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426858)	680.23	327.37
			Note: Includes gasket and fasteners.		



Fire Suppression	21	2
Fire-Extinguishing Systems	21 20	
Clean-Agent Fire-Extinguishing Systems	21 22	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
21 22 16 00-0182	EA	2-1/2" Slip-On, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426859)		210.48	30.52
		Note: Includes gasket and fasteners.			
21 22 16 00-0183	EA	3" Slip-On, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426860)		247.08	35.61
		Note: Includes gasket and fasteners.			
21 22 16 00-0184	EA	4" Slip-On, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426861)		675.36	327.37
		Note: Includes gasket and fasteners.			
21 22 16 00-0185	EA	2-1/2" Weld Neck, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426862)		219.15	31.96
		Note: Includes gasket and fasteners.			
21 22 16 00-0186	EA	3" Weld Neck, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426863)		256.73	37.25
		Note: Includes gasket and fasteners.			
21 22 16 00-0187	EA	4" Weld Neck, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426864)		699.46	327.37
		Note: Includes gasket and fasteners.			
21 22 16 00-0188	EA	2-1/2" Flange Gasket, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426828)		42.83	2.43
		Note: Includes a stainless steel inner ring and a carbon steel outer ring.			
21 22 16 00-0189	EA	3" Flange Gasket, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426829)		43.31	2.67
		Note: Includes a stainless steel inner ring and a carbon steel outer ring.			
21 22 16 00-0190	EA	4" Flange Gasket, Single Mating Flange, Flanged Manifold Orifices, Inergen® Fire Suppression System (Ansul 426830)		46.66	3.16
		Note: Includes a stainless steel inner ring and a carbon steel outer ring.			
21 22 16 00-0191		Upright And Feet, Cylinder Bracketing, Inergen® Fire Suppression System			
		<small>(21 22 16 00-0079)</small>			
21 22 16 00-0192	EA	Center Upright Foot, Inergen® Fire Suppression System (Ansul 418508)		26.83	3.88
21 22 16 00-0193	EA	Double Row, Back-To-Back Rows, Weigh Rail Support, Inergen® Fire Suppression System (Ansul 423027)		220.60	29.53
21 22 16 00-0194	EA	85" High, Cylinder Bracketing For 425 CF And LC100 Cylinders, Inergen® Fire Suppression System (Ansul 426592)		164.71	29.53
		Note: Includes upright, left, right and center.			
21 22 16 00-0195		Autopulse® Fire Detection And Control Equipment	<small>(21 22 16 00-0001)</small>		
21 22 16 00-0196		Accessory Switches, Autopulse® Fire Detection And Control Equipment	<small>(21 22 16 00-0001)</small>		
		<small>16 00-0195</small>			
21 22 16 00-0197	EA	Abort, Flush Mount Switch, Autopulse® Fire Detection And Control Equipment (Ansul 76495)		172.91	25.48
21 22 16 00-0198	EA	Abort, Surface Mount Switch, Autopulse® Fire Detection And Control Equipment (Ansul 76494)		196.52	29.05
21 22 16 00-0199	EA	Main/Reserve, Flush Mount Switch, Autopulse® Fire Detection And Control Equipment (Ansul 76497)		249.97	36.91
21 22 16 00-0200	EA	Main/Reserve, Surface Mount Switch, Autopulse® Fire Detection And Control Equipment (Ansul 76496)		269.24	39.76
21 22 16 00-0201	EA	Maintenance, Flush Mount Switch, Autopulse® Fire Detection And Control Equipment (Ansul 76499)		337.14	50.01
21 22 16 00-0202	EA	Maintenance, Surface Mount Switch, Autopulse® Fire Detection And Control Equipment (Ansul 76498)		358.83	53.10
21 22 16 00-0203	EA	Explosion Proof, Abort Switch, Autopulse® Fire Detection And Control Equipment (Ansul 65956)		687.80	102.39
21 22 16 00-0204	EA	Single Gang, Surface Mount Back Box For Accessory Switches, Autopulse® Fire Detection And Control Equipment (Ansul 76490)		55.36	7.62
21 22 16 00-0205		Alarm Devices, Autopulse® Fire Detection And Control Equipment	<small>(21 22 16 00-0195)</small>		
21 22 16 00-0206	EA	Selectable Candela Strobe, Alarm Devices, Autopulse® Fire Detection And Control Equipment (Ansul 429698)		149.79	22.14
21 22 16 00-0207	EA	Sync Module, Alarm Devices, Autopulse® Fire Detection And Control Equipment (Ansul 429699)		219.64	32.39
21 22 16 00-0208	EA	Back Box Extender Adapter, Alarm Devices, Autopulse® Fire Detection And Control Equipment (Ansul 429702)		20.04	2.95
21 22 16 00-0209		Annunciators, Autopulse® Fire Detection And Control Equipment	<small>(21 22 16 00-0195)</small>		
21 22 16 00-0210	EA	80 Character LCD, Annunciator, LCD-80, Autopulse® Fire Detection And Control Equipment (Ansul 417492)		1,725.94	256.92
21 22 16 00-0211	EA	16 Zone Alarm/Trouble, Annunciator Control Module, ACM-16AT, Autopulse® Fire Detection And Control Equipment (Ansul 417496)		1,446.84	215.24
21 22 16 00-0212	EA	16 Zone Alarm/Trouble, Annunciator Expander Module, AEM-16AT, Autopulse® Fire Detection And Control Equipment (Ansul 417497)		1,123.17	167.15
21 22 16 00-0213	EA	32 Zone, Alarm Annunciator Expander Module, AEM-32A, Autopulse® Fire Detection And Control Equipment (Ansul 417500)		978.22	145.48
21 22 16 00-0214	EA	Annunciator Lamp Driver Control Module, LDM-32, Autopulse® Fire Detection And Control Equipment (Ansul 417501)		978.22	145.48
21 22 16 00-0215	EA	Annunciator Lamp Driver Expander Module, LDM-E32, Autopulse® Fire Detection And Control Equipment (Ansul 417502)		783.63	116.43
21 22 16 00-0216	EA	Annunciator Lamp Driver Relay Module, LDM-R32, Autopulse® Fire Detection And Control Equipment (Ansul 417650)		1,446.84	215.24
21 22 16 00-0217	EA	24", Annunciator Lamp Driver Cable, LDM-CBL24, Autopulse® Fire Detection And Control Equipment (Ansul 417651)		294.28	43.57
21 22 16 00-0218	EA	48", Annunciator Lamp Driver Cable, LDM-CBL48, Autopulse® Fire Detection And Control Equipment (Ansul 417652)		368.94	54.76
21 22 16 00-0219	EA	8 Relay, Annunciator Control Module, ACM-8R, Autopulse® Fire Detection And Control Equipment (Ansul 417653)		739.80	110.00
21 22 16 00-0220	EA	Key Switch, AKS-1 Annunciator Accessory, Autopulse® Fire Detection And Control Equipment (Ansul 417660)		124.99	18.45
21 22 16 00-0221	EA	Low Profile Annunciator Chassis, CHS-4L, Autopulse® Fire Detection And Control Equipment (Ansul 418576)		170.01	25.48
		Note: For up to 4 LDM modules.			
21 22 16 00-0222	EA	Flush, Single Annunciator Back Box, ABF-1, Autopulse® Fire Detection And Control Equipment (Ansul 417657)		294.29	43.57

21	21	Fire Suppression
	21 20	Fire-Extinguishing Systems
	21 22	Clean-Agent Fire-Extinguishing Systems



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
21 22 16 00-0223		Autopulse IQ-396X Cabinets/Accessories, Autopulse® Fire Detection And Control Equipment <small>(21 22 16 00-0195)</small>			
21 22 16 00-0224	EA	CHS-4 Chassis, IQ-396X Cabinets/Accessories, Autopulse® Fire Detection And Control Equipment (Ansul 419586)	228.77		35.48
21 22 16 00-0225	EA	REL 47K, In Line Supervisory Device, IQ-396X Cabinets/Accessories, Autopulse® Fire Detection And Control Equipment (Ansul 419639)	14.16		2.43
21 22 16 00-0226	EA	REL 4.7K, In Line Supervisory Device, IQ-396X Cabinets/Accessories, Autopulse® Fire Detection And Control Equipment (Ansul 419640)	98.52		2.95
21 22 16 00-0227	EA	REL 2.2K, In Line Supervisory Device, IQ-396X Cabinets/Accessories, Autopulse® Fire Detection And Control Equipment (Ansul 407765)	15.32		2.95
21 22 16 00-0228		Autopulse IQ-396X Modules, Autopulse® Fire Detection And Control Equipment <small>(21 22 16 00-0195)</small>			
21 22 16 00-0229	EA	Indicating Circuit Expander, IQ-396X Modules, ICE-4, Autopulse® Fire Detection And Control Equipment (Ansul 419564)	508.59		79.53
21 22 16 00-0230	EA	Control Relay Expander, IQ-396X Modules, CRE-4, Autopulse® Fire Detection And Control Equipment (Ansul 419566)	304.87		47.39
21 22 16 00-0231		Batteries And Power Supplies, Autopulse® Fire Detection And Control Equipment <small>(21 22 16 00-0195)</small>			
21 22 16 00-0232	EA	7 Ampere Hours, 24 Volt DC, Battery Pack, Autopulse® Fire Detection And Control Equipment (Ansul 417692)	224.52		30.47
21 22 16 00-0233	EA	12 Ampere Hours, 24 Volt DC, Battery Pack, Autopulse® Fire Detection And Control Equipment (Ansul 417693)	469.58		64.52
21 22 16 00-0234	EA	18 Ampere Hours, 24 Volt DC, Battery Pack, Autopulse® Fire Detection And Control Equipment (Ansul 417694)	529.93		73.09
21 22 16 00-0235	EA	25 Ampere Hours, 24 Volt DC, Battery Pack, Autopulse® Fire Detection And Control Equipment (Ansul 417695)	692.32		89.05
21 22 16 00-0236	EA	55 Ampere Hours, 24 Volt DC, Battery Pack, Autopulse® Fire Detection And Control Equipment (Ansul 417997)	1,116.67		154.53
21 22 16 00-0237	EA	BB-17, Red Battery Box, Autopulse® Fire Detection And Control Equipment (Ansul 418578)	167.13		24.53
21 22 16 00-0238	EA	BB-25, Grey Cabinet, Autopulse® Fire Detection And Control Equipment (Ansul 428079)	298.62		44.28
		Note: Holds six XP5 modules or 25AH battery pack.			
21 22 16 00-0239	EA	BB-55, Red Battery Box, Autopulse® Fire Detection And Control Equipment (Ansul 419410)	607.35		90.24
		Note: For mounting in BB-55 battery box.			
21 22 16 00-0240	EA	Battery Charger, CHG-120, Autopulse® Fire Detection And Control Equipment (Ansul 426207)	1,765.68		262.87
		Note: For mounting in BB-55 battery box.			
21 22 16 00-0241	EA	120 Volt AC, FCPS-24F, Red Remote Power Supply, Autopulse® Fire Detection And Control Equipment (Ansul 418563)	1,291.26		192.15
21 22 16 00-0242		Intelligent Addressable Devices, Autopulse® Fire Detection And Control Equipment <small>(21 22 16 00-0195)</small>			
21 22 16 00-0243	EA	Monitor Module, Intelligent Addressable Devices, FMM-1, Autopulse® Fire Detection And Control Equipment (Ansul 428097)	136.06		20.36
21 22 16 00-0244	EA	Mini Monitor Module, Intelligent Addressable Devices, FMM-101, Autopulse® Fire Detection And Control Equipment (Ansul 428098)	127.14		20.24
21 22 16 00-0245	EA	Isolator Module, Intelligent Addressable Devices, ISO-X, Autopulse® Fire Detection And Control Equipment (Ansul 417480)	172.41		29.05
21 22 16 00-0246	EA	2-Wire Detector Monitor Module, Intelligent Addressable Devices, FZM-1, Autopulse® Fire Detection And Control Equipment (Ansul 428100)	255.76		37.86
21 22 16 00-0247	EA	NAC Control Module, Intelligent Addressable Devices, FCM-1, Autopulse® Fire Detection And Control Equipment (Ansul 428101)	198.91		30.71
21 22 16 00-0248	EA	Control Relay Module, Intelligent Addressable Devices, FRM-1, Autopulse® Fire Detection And Control Equipment (Ansul 428102)	186.87		29.53
21 22 16 00-0249	EA	Flangeless, Analog Addressable Detector Base, Intelligent Addressable Devices, B501, Autopulse® Fire Detection And Control Equipment (Ansul 417487)	29.77		4.71
21 22 16 00-0250	EA	Analog Addressable Detector Base With Isolator, Intelligent Addressable Devices, B224BI, Autopulse® Fire Detection And Control Equipment (Ansul 426125)	109.81		16.67
21 22 16 00-0251	EA	Harsh Detector, Analog Addressable Detector Base, Intelligent Addressable Devices, B710HD, Autopulse® Fire Detection And Control Equipment (Ansul 427066)	109.81		16.19
21 22 16 00-0252	EA	HPX-751 Detector Filter Cover, Intelligent Addressable Devices, FR-FTX, Autopulse® Fire Detection And Control Equipment (Ansul 427067)	39.37		13.34
21 22 16 00-0253	EA	Low Profile Trim Ring, Intelligent Addressable Devices, F110, Autopulse® Fire Detection And Control Equipment (Ansul 428138)	10.10		1.48
		Note: Converts BX501 to low profile base.			
21 22 16 00-0254	EA	Relay Base, Intelligent Addressable Devices, B224RB, Autopulse® Fire Detection And Control Equipment (Ansul 423945)	105.71		15.59
21 22 16 00-0255	EA	EOL Power Supervision Relay, Intelligent Addressable Devices, Autopulse® Fire Detection And Control Equipment (Ansul 417699)	61.93		9.19
21 22 16 00-0256	EA	XP5 Modules Cabinet, Intelligent Addressable Devices, BB-XP, Autopulse® Fire Detection And Control Equipment (Ansul 428078)	167.60		24.29
21 22 16 00-0257	EA	BB-25 Chassis, Intelligent Addressable Devices, CHS-6, Autopulse® Fire Detection And Control Equipment (Ansul 428080)	87.66		12.85
21 22 16 00-0258		Manual Pull Stations, Autopulse® Fire Detection And Control Equipment <small>(21 22 16 00-0195)</small>			
21 22 16 00-0259	EA	Break Rod Package For Manual Pull Stations, Autopulse® Fire Detection And Control Equipment (Ansul 428661)	25.22		3.46
21 22 16 00-0260	EA	Key Pull Station For Manual Pull Stations, Autopulse® Fire Detection And Control Equipment (Ansul 418336)	15.63		1.90
21 22 16 00-0261		Transmitter/Relay Modules, Autopulse® Fire Detection And Control Equipment <small>(21 22 16 00-0195)</small>			



Fire Suppression	21	2
Fire-Extinguishing Systems	21 20	
Clean-Agent Fire-Extinguishing Systems	21 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 22 16 00-0262 EA Transmitter Module, 4XTM, Autopulse® Fire Detection And Control Equipment (Ansul 417470) 219.64	219.64	32.39
Note: Includes municipal box and remote station connection.		
21 22 16 00-0263 EA Relay/Transmitter Module With 8 Form C Relay Contacts, RTM-8, Autopulse® Fire Detection And Control Equipment (Ansul 417471) 660.36	660.36	93.10
21 22 16 00-0264 EA Universal Digital Alarm COM/XMTR Module, UDACT, Autopulse® Fire Detection And Control Equipment (Ansul 419411) 1,260.94	1,260.94	187.63
21 22 16 00-0265 EA Ferrite Core For Transmitter/Relay Modules, Autopulse® Fire Detection And Control Equipment (Ansul 419635) 33.62	33.62	4.86
21 22 16 00-0266 Vesda® Aspirating Smoke Detection System (21 22 16 00-0001)		
21 22 16 00-0267 Batteries And Power Supplies, Vesda® Aspirating Smoke Detection System (21 22 16 00-0266)		
21 22 16 00-0268 EA Transformer Only, VSP-TRAN-120, Vesda® Aspirating Smoke Detection System (Ansul 430482)..... 170.85	170.85	22.86
21 22 16 00-0269 EA Battery Cabinet, VBC-001, Vesda® Aspirating Smoke Detection System (Ansul 430379) 409.94	409.94	34.46
21 22 16 00-0270 EA 120 Volt AC, Single Zone Power Supply With Housing, VPS-100US-120, Vesda® Aspirating Smoke Detection System (Ansul 430374) 950.33	950.33	133.33
21 22 16 00-0271 EA 220 Volt AC, Single Zone Power Supply With Housing, VPS-100US-220, Vesda® Aspirating Smoke Detection System (Ansul 430375) 950.33	950.33	133.33
21 22 16 00-0272 EA 120 Volt AC, Multi Zone Power Supply, VPS-300US-120, Vesda® Aspirating Smoke Detection System (Ansul 430376) 1,427.87	1,427.87	200.01
Note: Includes housing and battery cab.		
21 22 16 00-0273 EA 220 Volt AC, Multi Zone Power Supply, VPS-300US-220, Vesda® Aspirating Smoke Detection System (Ansul 430377) 1,427.87	1,427.87	200.01
Note: Includes housing and battery cab.		
21 22 16 00-0274 EA 48 Volt DC, Multi Zone Power Supply With Housing, VPS-400US-48, Vesda® Aspirating Smoke Detection System (Ansul 430378) 2,085.19	2,085.19	254.77
21 22 16 00-0275 Blank Plates, Vesda® Aspirating Smoke Detection System (21 22 16 00-0266)		
21 22 16 00-0276 EA Blank Plate Without VESDA Logo, VSP-300, Vesda® Aspirating Smoke Detection System (Ansul 430459) 30.65	30.65	4.28
21 22 16 00-0277 EA Blank Plate With VESDA Logo, VSP-000, Vesda® Aspirating Smoke Detection System (Ansul 430458) 46.17	46.17	4.28
21 22 16 00-0278 EA Blank Plate, EMC Painted Without Logo, VSP-200, Vesda® Aspirating Smoke Detection System (Ansul 430484) 67.05	67.05	8.10
21 22 16 00-0279 EA Single Blank Plate, VRE-001, Vesda® Aspirating Smoke Detection System (Ansul 430446) 104.37	104.37	9.05
21 22 16 00-0280 EA Double Blank Plate, VRE-002, Vesda® Aspirating Smoke Detection System (Ansul 430447) 131.38	131.38	18.09
21 22 16 00-0281 EA Blank Plate Without FOK LED's And Logo, VSP-100, Vesda® Aspirating Smoke Detection System (Ansul 430480) 243.16	243.16	22.86
21 22 16 00-0282 Detectors, Vesda® Aspirating Smoke Detection System (21 22 16 00-0266)		
21 22 16 00-0283 EA LaserPLUS, Detector Only, Enclosure, VLP-000, Vesda® Aspirating Smoke Detection System (Ansul 430350)..... 7,179.27	7,179.27	1,119.08
Note: Includes 3 blank plates.		
21 22 16 00-0284 EA LaserPLUS Detector, VLP-012, Vesda® Aspirating Smoke Detection System (Ansul 430354) 9,159.05	9,159.05	1,380.99
Note: Includes centrally mounted LCD programmer module and standard display.		
21 22 16 00-0285 EA LaserPLUS Detector, VLP-010, Vesda® Aspirating Smoke Detection System (Ansul 430356) 8,282.10	8,282.10	1,261.94
Note: Includes centrally mounted LCD programmer.		
21 22 16 00-0286 EA 7-Relay Version, LaserSCANNER Detector Only, VLS-200, Vesda® Aspirating Smoke Detection System (Ansul 430357) 11,514.42	11,514.42	1,666.72
21 22 16 00-0287 EA 12-Relay Version, LaserSCANNER Detector Only, VLS-300, Vesda® Aspirating Smoke Detection System (Ansul 430358) 12,122.90	12,122.90	1,761.97
21 22 16 00-0288 EA 7-Relay Version, LaserSCANNER Detector Only, VLS-600, Vesda® Aspirating Smoke Detection System (Ansul 430359) 11,641.23	11,641.23	1,690.53
Note: Includes 1 fire alarm (any SCT) and OK/FOK LEDs.		
21 22 16 00-0289 EA 12-Relay Version, LaserSCANNER Detector Only, VLS-700, Vesda® Aspirating Smoke Detection System (Ansul 430360) 12,294.58	12,294.58	1,785.77
Note: Includes 1 fire alarm (any SCT) and OK/FOK LED.		
21 22 16 00-0290 EA 7-Relay, LaserSCANNER Detector Only, VLS-204, Vesda® Aspirating Smoke Detection System (Ansul 430361) 12,646.29	12,646.29	1,857.20
Note: Includes 2 blank plates and scan display module at far right.		
21 22 16 00-0291 EA 12-Relay, LaserSCANNER Detector, VLS-304, Vesda® Aspirating Smoke Detection System (Ansul 430363) 13,195.31	13,195.31	1,952.45
Note: Includes 2 blank plates and scanner display.		
21 22 16 00-0292 EA 7-Relay, LaserSCANNER Detector, VLS-214, Vesda® Aspirating Smoke Detection System (Ansul 430365) 13,869.36	13,869.36	2,047.68
Note: Includes centrally mounted programmer module.		
21 22 16 00-0293 EA 12-Relay, LaserSCANNER Detector, VLS-314, Vesda® Aspirating Smoke Detection System (Ansul 430367) 14,461.76	14,461.76	2,142.93
Note: Includes centrally mounted LCD programmer module and scanner display module.		
21 22 16 00-0294 EA 12-Relay, LaserSCANNER Detector, VLS-310, Vesda® Aspirating Smoke Detection System (Ansul 430369) 13,589.95	13,589.95	1,952.45
Note: Includes centrally mounted LCD programmer.		
21 22 16 00-0295 Displays, Vesda® Aspirating Smoke Detection System (21 22 16 00-0266)		
21 22 16 00-0296 EA VRT-200 Display, Standard Version, Vesda® Aspirating Smoke Detection System (Ansul 430381) 2,182.24	2,182.24	261.91
Note: Includes a remote termination card and 7 relays.		
21 22 16 00-0297 EA VRT-400 Display, Scanner Version, Vesda® Aspirating Smoke Detection System (Ansul 430385) 2,192.86	2,192.86	261.91
Note: Includes a remote termination card and 7 relays.		
21 22 16 00-0298 EA VRT-600 Display, Standard Version, Vesda® Aspirating Smoke Detection System (Ansul 430383) 1,976.32	1,976.32	238.10
Note: Includes a remote termination card without relays.		
21 22 16 00-0299 EA VRT-700 Display, Scanner Version, Vesda® Aspirating Smoke Detection System (Ansul 430387) 1,988.65	1,988.65	238.10
Note: Includes a remote termination card.		
21 22 16 00-0300 EA VRT-800 Display, Scanner Version, Vesda® Aspirating Smoke Detection System (Ansul 430389) 2,457.89	2,457.89	285.73
Note: Includes a remote termination card and 12 relays.		
21 22 16 00-0301 EA VRT-K00 Display, Compact Version Without Relays, Vesda® Aspirating Smoke Detection System (Ansul 430391) 2,088.83	2,088.83	247.63
21 22 16 00-0302 EA VRT-J00 Display, Compact Version With 7 Relays, Vesda® Aspirating Smoke Detection System (Ansul 430393) 2,286.70	2,286.70	278.10

21 Fire Suppression**21 20 Fire-Extinguishing Systems****21 22 Clean-Agent Fire-Extinguishing Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 22 16 00-0303			Intelligent Addressable Devices, Vesda® Aspirating Smoke Detection System <small>(21 22 16 00-0266)</small>		
21 22 16 00-0304	EA		LaserCOMPACT (VN), VESDAnet Version Plus Relay Output, VLC-505, Vesda® Aspirating Smoke Detection System (Ansul 430370)	5,490.89	785.74
21 22 16 00-0305	EA		LaserCOMPACT (RO), Relay Only Version, VLC-500, Vesda® Aspirating Smoke Detection System (Ansul 430372)	4,521.68	628.59
21 22 16 00-0306	EA		Programmer With Remote Termination Card, VRT-100, Vesda® Aspirating Smoke Detection System (Ansul 430380)	1,599.13	238.10
21 22 16 00-0307	EA		VESDAnet Socket, VRT-300, Vesda® Aspirating Smoke Detection System (Ansul 430395)	1,150.78	154.77
21 22 16 00-0308	EA		System Relay Module, VRT-S07, Vesda® Aspirating Smoke Detection System (Ansul 430399)	1,603.14	208.58
21 22 16 00-0309	EA		PC-Link High-Level Interface, VHX-0200, Vesda® Aspirating Smoke Detection System (Ansul 430442).....	2,387.64	257.15
			Note: Interface connects PC and LaserPLUS system.		
21 22 16 00-0310	EA		Modem Cable, PC-HLI To Modem Connection, VHX-00090, Vesda® Aspirating Smoke Detection System (Ansul 430443)	302.38	38.57
21 22 16 00-0311	EA		Hand-Held Programmer, VHH-1000, Vesda® Aspirating Smoke Detection System (Ansul 430444)	2,021.42	238.10
21 22 16 00-0312	EA		Programmer Module, VSP-001, Vesda® Aspirating Smoke Detection System (Ansul 430460)	1,444.58	197.62
21 22 16 00-0313	EA		VESDAnet Socket Kit, VSP-003, Vesda® Aspirating Smoke Detection System (Ansul 430463)	1,134.46	152.38
21 22 16 00-0314	EA		Standard Display Module, VSP-002, Vesda® Aspirating Smoke Detection System (Ansul 430461)	1,446.89	197.62
21 22 16 00-0315	EA		Scanner Display Module, VSP-004, Vesda® Aspirating Smoke Detection System (Ansul 430464).....	1,444.58	197.62
21 22 16 00-0316	EA		Remote Display Module, Compact (VN), VSP-502, Vesda® Aspirating Smoke Detection System (Ansul 430487)	1,428.11	185.72
21 22 16 00-0317	EA		Filter Cartridge, VSP-005, Vesda® Aspirating Smoke Detection System (Ansul 430466).....	170.03	16.67
21 22 16 00-0318	EA		Detector Chassis Assembly, VSP-006, Vesda® Aspirating Smoke Detection System (Ansul 430467).....	6,900.64	914.32
21 22 16 00-0319	EA		Scanner Chassis Assembly, VSP-009, Vesda® Aspirating Smoke Detection System (Ansul 430470).....	12,024.59	1,600.05
21 22 16 00-0320	EA		Aspirator For LaserPLUS And Laser Scanner, VSP-015, Vesda® Aspirating Smoke Detection System (Ansul 430475)	939.48	119.05
21 22 16 00-0321	EA		Filter Cover, VSP-019, Vesda® Aspirating Smoke Detection System (Ansul 430477)	21.37	2.38
21 22 16 00-0322	EA		Cover Screws, 17606, Vesda® Aspirating Smoke Detection System (Ansul 430478).....	12.03	0.47
21 22 16 00-0323	EA		US Power Supply Circuit Board Only, VSP-100, Vesda® Aspirating Smoke Detection System (Ansul 430481)	517.66	69.05
21 22 16 00-0324	EA		Relay Processor Module (DRP), VSP-102, Vesda® Aspirating Smoke Detection System (Ansul 430483).....	627.15	83.81
21 22 16 00-0325	EA		Aspirator, LaserCOMPACT, VSP-501, Vesda® Aspirating Smoke Detection System (Ansul 430486)	905.35	121.44
21 22 16 00-0326	EA		RO-Cable For LaserCOMPACT Relay Only, (RO) Version, VSP-509, Vesda® Aspirating Smoke Detection System (Ansul 430488)	133.41	18.09
21 22 16 00-0327	EA		Miniature Sampling Point, E700-SP, Vesda® Aspirating Smoke Detection System (Ansul 430502).....	20.87	3.81
21 22 16 00-0328			Labels And Decals, Vesda® Aspirating Smoke Detection System <small>(21 22 16 00-0266)</small>		
21 22 16 00-0329	EA		Sampling Point Labels, Roll Of 35, E700-SP-DCL-PIPE, Vesda® Aspirating Smoke Detection System (Ansul 430509)	18.94	2.86
21 22 16 00-0330	EA		Round Point Label, Roll Of 50, E700-SP-DCL-PNT, Vesda® Aspirating Smoke Detection System (Ansul 430505)	19.90	3.33
21 22 16 00-0331	EA		Red, Round, Miniature Sampling Point Label, Sheet Of 12, E700-SPLR, Vesda® Aspirating Smoke Detection System (Ansul 430506)	30.65	4.28
21 22 16 00-0332	EA		Grey, Round, Miniature Sampling Point Label, Sheet Of 12, E700-SPLG, Vesda® Aspirating Smoke Detection System (Ansul 430507)	30.69	4.28
21 22 16 00-0333	EA		Sampling Point Decal, Wrap-Around Style, Roll Of 200, E700-SP-DCL, Vesda® Aspirating Smoke Detection System (Ansul 430508)	111.28	16.19
21 22 16 00-0334			Mounting Hardware, Vesda® Aspirating Smoke Detection System <small>(21 22 16 00-0266)</small>		
21 22 16 00-0335	EA		Remote Mounting Single Box With Escutcheon Only, VKT-000, Vesda® Aspirating Smoke Detection System (Ansul 430456)	274.62	34.29
21 22 16 00-0336	EA		Recessed Mounting Kit For Remote Single Boxes, VSP-012, Vesda® Aspirating Smoke Detection System (Ansul 430472)	369.97	45.71
21 22 16 00-0337	EA		Recessed Mounting Kit For VLP Or VLS Detector, VSP-011, Vesda® Aspirating Smoke Detection System (Ansul 430471)	378.63	50.01
21 22 16 00-0338	EA		Remote 19 Sub Rack With 4 Blank Plates, VSR-0000, Vesda® Aspirating Smoke Detection System (Ansul 430457)	919.18	71.43
21 22 16 00-0339	EA		Sub Rack Enclosure, VRE-100, Vesda® Aspirating Smoke Detection System (Ansul 430445).....	1,354.70	157.15
21 22 16 00-0340			Pipe And Fittings, Vesda® Aspirating Smoke Detection System <small>(21 22 16 00-0266)</small>		
21 22 16 00-0341	LF		3/4", Orange Chlorinated Polyvinyl Chloride (CPVC) Pipe, Vesda® Aspirating Smoke Detection System (Ansul 430491)	5.98	1.82
21 22 16 00-0342	EA		3/4", End Cap, Chlorinated Polyvinyl Chloride (CPVC) Socket Weld, Vesda® Aspirating Smoke Detection System (Ansul 430497)	10.29	3.64
21 22 16 00-0343	EA		3/4", 45 Degree Elbow, Chlorinated Polyvinyl Chloride (CPVC) Socket Weld, Vesda® Aspirating Smoke Detection System (Ansul 430494)	28.47	10.92
21 22 16 00-0344	EA		3/4", 90 Degree Elbow, Chlorinated Polyvinyl Chloride (CPVC) Socket Weld, Vesda® Aspirating Smoke Detection System (Ansul 430493)	29.34	10.92
21 22 16 00-0345	EA		3/4", Coupling, Chlorinated Polyvinyl Chloride (CPVC) Socket Weld, Vesda® Aspirating Smoke Detection System (Ansul 430495)	20.18	7.28
21 22 16 00-0346	EA		3/4", Union, Chlorinated Polyvinyl Chloride (CPVC) Socket Weld, Vesda® Aspirating Smoke Detection System (Ansul 430496)	32.37	10.92
21 22 16 00-0347	EA		3/4", Tee, Chlorinated Polyvinyl Chloride (CPVC) Socket Weld, Vesda® Aspirating Smoke Detection System (Ansul 430498)	43.67	16.38
21 22 16 00-0348	EA		3/4" x 1/2" FPT, Tee, Chlorinated Polyvinyl Chloride (CPVC), Vesda® Aspirating Smoke Detection System (Ansul 430499)	54.39	19.22
21 22 16 00-0349	LF		1/2" OD x 3/8" ID, Black Polyethylene Tubing, Vesda® Aspirating Smoke Detection System (Ansul 430500)	5.02	1.72
21 22 16 00-0350	EA		Pipe Adapters, Metric-To-Imperial, VSP-021, Vesda® Aspirating Smoke Detection System (Ansul 430479).....	19.96	5.24
21 22 16 00-0351	EA		Capillary Kit, 1 Male 1/2" TH x 1/2" OD, 1 Female 1/2" OD, Plastic, E700-CAP KIT, Vesda® Aspirating Smoke Detection System (Ansul 430503)	24.26	3.81



Fire Suppression	21	
Fire-Extinguishing Systems	21 20	2
Clean-Agent Fire-Extinguishing Systems	21 22	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
21 22 16 00-0352	EA	Capillary Kit, 1 Male 1/2" TH x 1/2" OD, 1 Female 1/2" OD, Brass, Vesda® Aspirating Smoke Detection System (Ansl 430504)	34.78		5.24
21 22 16 00-0353 Remote Termination And Relay Cards, Vesda® Aspirating Smoke Detection System (21 22 16 00-0266)					
21 22 16 00-0354	EA	VRT-500, Remote Termination And Relay Proc Card With Blank Plates, Vesda® Aspirating Smoke Detection System (Ansl 430396)	1,584.76		182.87
Note: Remote box includes 7 relays for VLP/VLC.					
21 22 16 00-0355	EA	VN, Compact Termination Card, VSP-515, Vesda® Aspirating Smoke Detection System (Ansl 430490)	1,616.42		210.49
21 22 16 00-0356	EA	12-Relay, Remote Termination Card, VSP-208, Vesda® Aspirating Smoke Detection System (Ansl 430485)	978.45		128.58
21 22 16 00-0357	EA	RO, Compact Termination Card, VSP-510, Vesda® Aspirating Smoke Detection System (Ansl 430489)	1,117.93		145.24
21 22 16 00-0358	EA	VRT-501, Remote Termination And Relay Proc Card With Blank Plates, Vesda® Aspirating Smoke Detection System (Ansl 430397)	1,584.76		182.87
Note: Remote box includes 7 relays for VLS.					
21 22 16 00-0359	EA	VRT-900 Remote Termination And Relay Proc Card With Blank Plates, Vesda® Aspirating Smoke Detection System (Ansl 430398)	1,911.94		210.49
Note: Remote box includes 12 relays for VLS.					
21 22 16 00-0360	EA	Remote Termination Card Without Relay, VSP-007, Vesda® Aspirating Smoke Detection System (Ansl 430468)	542.58		64.76
21 22 16 00-0361	EA	Remote Termination Card (RTC7), VSP-008, Vesda® Aspirating Smoke Detection System (Ansl 430469)	816.16		99.05
21 22 16 00-0362	EA	7-Relay, Head Termination Card, VSP-014, Vesda® Aspirating Smoke Detection System (Ansl 430474)	1,537.93		204.77
21 22 16 00-0363	EA	12-Relay, Head Termination Card, VSP-016, Vesda® Aspirating Smoke Detection System (Ansl 430476)	2,256.15		300.01
21 22 16 00-0364 Preferred® Low Pressure CO2 System (21 22 16 00-0001)					
21 22 16 00-0365 Manual Pull Stations, Preferred® Low Pressure CO2 System (21 22 16 00-0364)					
21 22 16 00-0366	EA	Addressable, DPST, Dual Action Pull Station, Preferred® Low Pressure CO2 System (Ansl 428658)	121.81		16.67
Note: Excludes FMM-101.					
21 22 16 00-0367	EA	Weatherproof Backbox For Manual Pull Stations, Preferred® Low Pressure CO2 System (Ansl 428659)	91.11		12.38
21 22 16 00-0368 Industrial Fire Control System (21 22 16 00-0001)					
21 22 16 00-0369 Alarm Devices, Industrial Fire Control System (21 22 16 00-0368)					
21 22 16 00-0370	EA	Explosion Proof Alarm Horn, Alarm Devices, Industrial Fire Control System (Ansl 65947)	2,950.03		439.30
21 22 16 00-0371	EA	6", 115 Volt AC Alarm Bell For Release Systems, Alarm Devices, Industrial Fire Control System (Ansl 24751)	90.09		10.09
21 22 16 00-0372	EA	24 Volt AC, Multitone Horn, Alarm Devices, Industrial Fire Control System (Ansl 429697)	89.11		13.10
21 22 16 00-0373	EA	Weatherproof Surface Back Box For Horn And Strobe, Alarm Devices, Industrial Fire Control System (Ansl 429700)	53.08		7.86
21 22 16 00-0374	EA	Semi-Flush Plate, Alarm Devices, Industrial Fire Control System (Ansl 429701)	21.69		3.19
21 22 16 00-0375 Manual Pull Stations, Industrial Fire Control System (21 22 16 00-0368)					
21 22 16 00-0376	EA	SPST, Dual Action Pull Station, Industrial Fire Control System (Ansl 428655)	100.66		13.81
21 22 16 00-0377	EA	DPST, Dual Action Pull Station, Industrial Fire Control System (Ansl 428656)	141.93		19.52
21 22 16 00-0378	EA	Explosion Proof, DPDT, Dual Action Pull Station, Industrial Fire Control System (Ansl 428657)	1,108.13		153.34
21 22 16 00-0379	EA	Surface Mounted Backbox For Manual Pull Stations, Industrial Fire Control System (Ansl 428660)	32.22		4.43
21 22 16 00-0380	EA	Extra Pull Station Labels For Manual Pull Stations, Industrial Fire Control System (Ansl 428654)	14.44		1.97
21 22 16 00-0381 Marine Fire Control System (21 22 16 00-0001)					
21 22 16 00-0382 Alarm Devices, Marine Fire Control System (21 22 16 00-0381)					
21 22 16 00-0383	EA	Weatherproof Surface Mount Back Box For Alarm Accessories, Alarm Devices, Marine Fire Control System (Ansl 24747)	58.38		8.00
21 22 16 00-0384	EA	6", 24 Volt DC, Alarm Bell, Alarm Devices, Marine Fire Control System (Ansl 417805)	107.62		15.47
21 22 16 00-0385	EA	10", 24 Volt DC, Alarm Bell, Alarm Devices, Marine Fire Control System (Ansl 417806)	107.62		15.47
21 22 16 00-0386 FM200 System Equipment (21 22 16)					
21 22 16 00-0387	EA	26 LB Cylinder, Filled, For FM200 Fire Protection system	3,619.87		114.87
21 22 16 00-0388	EA	44 LB Cylinder, Filled, For FM200 Fire Protection system	5,194.13		131.52
21 22 16 00-0389	EA	63 LB Cylinder, Filled, For FM200 Fire Protection system	6,165.80		155.07
21 22 16 00-0390	EA	101 LB Cylinder, Filled, For FM200 Fire Protection system	8,175.13		183.78
21 22 16 00-0391	EA	196 LB Cylinder, Filled, For FM200 Fire Protection system	12,787.25		229.73
21 22 16 00-0392	EA	Electro/Mechanical Release, For FM200 Fire Protection system	767.66		229.73
21 22 16 00-0393	EA	Manual Pull Station, For FM200 Fire Protection system	268.32		76.39
21 22 16 00-0394	EA	Pneumatic Damper Release, For FM200 Fire Protection system	333.17		57.43
21 22 16 00-0395	EA	FM200 Gas	28.02		
21 22 16 00-0396	EA	Master Cylinder, For FM200 Fire Protection system	5,925.70		61.80
21 22 16 00-0397	EA	Shuttle Check Valve, For FM200 Fire Protection system	839.54		86.38
21 22 16 00-0398	EA	Flex Head Cylinder, For FM200 Fire Protection system	835.65		92.59
21 22 16 00-0399	EA	Nozzles, For FM200 Fire Protection system	206.75		32.74
21 22 16 00-0400	EA	Cylinder Support, For FM200 Fire Protection system	238.77		61.80
21 22 16 00-0401	EA	Solenoid Valve, For FM200 Fire Protection system	1,086.76		92.59
21 22 16 00-0402	EA	Battery Back-Up, For FM200 Fire Protection system	792.99		244.20
21 22 16 00-0403	EA	Control Panel, Single Zone, For FM200 Fire Protection system	4,256.23		458.77
21 22 16 00-0404	EA	Control Panel, Multi Zone, For FM200 Fire Protection system	6,871.10		918.58
21 22 16 00-0405	EA	Smoke Or Heat Detector, For FM200 Fire Protection system	333.82		92.59
21 22 16 00-0406	EA	Annunciator, For FM200 Fire Protection system	3,450.36		347.70

21 Fire Suppression**21 20 Fire-Extinguishing Systems****21 22 Clean-Agent Fire-Extinguishing Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

21 22 16 00-0407	EA	Pressure Switch, For FM200 Fire Protection system.....	363.44	92.59
21 22 16 00-0408	EA	Alarm Horn, For FM200 Fire Protection system.....	330.96	92.59
21 22 16 00-0409	EA	Testing, For FM200 Fire Protection system.....	1,548.02	
21 22 16 00-0410	EA	Abort Switch, For FM200 Fire Protection system.....	231.85	43.07

21 23 Wet-Chemical Fire-Extinguishing Systems (21 20)**21 23 16 Wet-Chemical Fire-Extinguishing Equipment (21 23)**

21 23 16 00-0001		Kidde Fire Systems (21 23 16) Note: Kidde or equal.		
21 23 16 00-0002		Cylinders And Hardware (21 23 16 00-0001)		
21 23 16 00-0003	EA	125 Cylinder And Valve Assembly With 1.25 Gallon Of Wet Agent.....	915.37	95.16
21 23 16 00-0004	EA	260 Cylinder And Valve Assembly With 2.6 Gallon Of Wet Agent.....	1,052.09	118.52
21 23 16 00-0005	EA	400S And M Cylinder And Valve Assembly With 4 Gallon Of Wet Agent.....	1,289.23	146.23
21 23 16 00-0006	EA	600 And L Cylinder And Valve Assembly With 6 Gallon Of Wet Agent.....	1,522.44	173.51
21 23 16 00-0007	EA	Discharge Adapter Kit (One Required Per Cylinder).....	51.29	4.97
21 23 16 00-0008	EA	System Valve Actuator.....	184.33	19.78
21 23 16 00-0009	EA	Vent Plug.....	34.59	4.02
21 23 16 00-0010	EA	Gauge Shield.....	93.66	10.58
21 23 16 00-0011	EA	125 Cylinder Wall Mounting Bracket.....	95.01	10.58
21 23 16 00-0012	EA	260 Cylinder Wall Mounting Bracket.....	100.71	11.20
21 23 16 00-0013	EA	400S And M Cylinder Wall Mounting Bracket.....	191.43	21.15
21 23 16 00-0014	EA	600 And 400M Cylinder Shelf Bracket.....	188.27	24.00
21 23 16 00-0015	EA	600 And 400M Cylinder Floor Mounting Kit.....	278.08	24.06
21 23 16 00-0016	EA	125 And 260 Cylinder Replacement Bracket Strap.....	37.51	
21 23 16 00-0017	EA	400 And 600 Cylinder Replacement Bracket Strap.....	39.59	
21 23 16 00-0018		Nozzles And Accessories (21 23 16 00-0001)		
21 23 16 00-0019	EA	ADP, F, GRW Or R Nozzle.....	85.21	9.73
21 23 16 00-0020	EA	LPF Or DM Nozzle.....	92.59	9.73
21 23 16 00-0021	EA	LPR Nozzle.....	107.80	9.73
21 23 16 00-0022	EA	3/8" Swivel Adapter For Nozzles.....	63.91	6.87
21 23 16 00-0023	EA	Removal And Replacement Of Nozzle Seals.....	10.08	
21 23 16 00-0024	EA	Chrome Nozzle Disc Cap.....	6.20	0.63
21 23 16 00-0025	EA	LPR Nozzle Disc Cap.....	35.92	9.67
21 23 16 00-0026		Control Systems (21 23 16 00-0001)		
21 23 16 00-0027	EA	XV Control System..... Note: Includes (1) SVA, (1) system cartridge, (1) test cartridge, (1) EMT connector kit, (1) SPDT microswitch kit, and (1) SPDT microswitch kit.	1,185.57	63.44
21 23 16 00-0028	EA	7-1/2" High Pressure Hose (Required for cylinder mounted XV Control System).....	99.88	10.58
21 23 16 00-0029	EA	24" High Pressure Hose.....	118.52	10.58
21 23 16 00-0030	EA	60" High Pressure Hose.....	159.96	10.58
21 23 16 00-0031	EA	XV Solenoid Kit (Electric Actuator), 24 Volt DC.....	230.82	21.15
21 23 16 00-0032	EA	XV Microswitch Kit, SPDT.....	75.82	9.94
21 23 16 00-0033	EA	XV Microswitch Kit, SPDT, Terminal Type, For Alarm/Release.....	82.03	9.94
21 23 16 00-0034	EA	EMT Connector Kit (EMT Connector And O-Ring).....	32.43	7.93
21 23 16 00-0035	EA	KRS-50 Control Box Assembly..... Note: Includes (1) SVA, (2) CO2 cartridges, (2) set screws, (1) grommet, (1) cover label, and (1) exhaust fan caution label.	666.19	40.97
21 23 16 00-0036	EA	SPDT Microswitch For KRS-50.....	89.26	9.94
21 23 16 00-0037	EA	DPDT Microswitch For KRS-50.....	161.48	17.24
21 23 16 00-0038	EA	SPDT Pressure Switch (Fire Department Tie-In).....	495.92	55.30
21 23 16 00-0039		Mechanical Actuation Components (21 23 16 00-0001)		
21 23 16 00-0040	EA	Universal Detector Link Housing Kit, Mechanical Actuation Systems..... Note: Includes (1) bracket (11-3/4"), (2) "S" hook, and (2) cable crimp sleeves.	56.82	15.86
21 23 16 00-0041	EA	XV Low Profile Link Detector Housing Kit..... Note: Includes (1) bracket, (2) 1/2" EMT connectors, (4) cable crimp sleeves, and (1) S hook.	85.59	15.86
21 23 16 00-0042	EA	XV Or KRS-50 Remote Manual Release, Combination Pull-To-Trip/Release-To-Trip.....	236.62	10.58
21 23 16 00-0043	EA	XV Remote Manual Release, Pull-To-Trip.....	180.68	10.58
21 23 16 00-0044	EA	Corner Pulley, Mechanical Actuation Systems.....	24.90	2.85
21 23 16 00-0045	EA	Double Tee Pulley, Mechanical Actuation Systems.....	343.44	17.45
21 23 16 00-0046	EA	In-Line Tee Pulley, Mechanical Actuation Systems.....	41.72	4.65
21 23 16 00-0047	EA	Corner Pulley / Quik-Seal Adapter Combination.....	95.52	5.29
21 23 16 00-0048	LF	1/16" Cable, Mechanical Actuation Systems.....	2.58	1.06
21 23 16 00-0049	EA	Cable Clamp.....	13.49	0.52
21 23 16 00-0050	EA	Cable Crimp Sleeve, Mechanical Actuation Systems.....	1.65	0.42
21 23 16 00-0051	EA	"S" Hook, Mechanical Actuation Systems.....	1.59	0.42
21 23 16 00-0052	EA	1/2" EMT x 3/8" NPT Adapter, Mechanical Actuation Systems.....	89.01	9.83
21 23 16 00-0053		Mechanical Detection Links (21 23 16 00-0001)		
21 23 16 00-0054	EA	KGS Standard Response Link.....	19.14	5.29
21 23 16 00-0055	EA	KGS Rapid Response Link.....	27.71	5.29



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 23 16 00-0056 EA KFA Type "A" Fusible Link.....	23.87	5.29
21 23 16 00-0057 EA KML Type "ML" Fusible Link.....	25.08	5.29
21 23 16 00-0058 EA 500 Degree, KML Type "ML" Fusible Link.....	37.51	5.29
21 23 16 00-0059 Gas Valves (21 23 16 00-0001)		
21 23 16 00-0060 EA 3/4" NPT Mechanical Cable Operated Gas Shut-off Valve.....	401.51	22.84
21 23 16 00-0061 EA 1" NPT Mechanical Cable Operated Gas Shut-off Valve.....	437.23	28.13
21 23 16 00-0062 EA 1-1/4" NPT Mechanical Cable Operated Gas Shut-off Valve.....	502.31	35.52
21 23 16 00-0063 EA 1-1/2" NPT Mechanical Cable Operated Gas Shut-off Valve.....	551.30	40.92
21 23 16 00-0064 EA 2" NPT Mechanical Cable Operated Gas Shut-off Valve.....	595.70	48.32
21 23 16 00-0065 EA 2-1/2" NPT Mechanical Cable Operated Gas Shut-off Valve.....	987.29	70.63
21 23 16 00-0066 EA 3" NPT Mechanical Cable Operated Gas Shut-off Valve.....	1,102.62	81.73
21 23 16 00-0067 EA Pneumatic Release (Single Unit).....	456.09	25.80
21 23 16 00-0068 EA Removal And Replacement Of Cable Block And Set Screw Assembly For Gas Valve.....	61.44	
21 23 16 00-0069 EA 1/2" Electric Solenoid Gas Shut-off Valve.....	418.99	21.26
21 23 16 00-0070 EA 3/4" Electric Solenoid Gas Shut-off Valve.....	422.18	22.84
21 23 16 00-0071 EA 1" Electric Solenoid Gas Shut-off Valve.....	651.34	28.13
21 23 16 00-0072 EA 1-1/4" Electric Solenoid Gas Shut-off Valve.....	689.84	35.52
21 23 16 00-0073 EA 1-1/2" Electric Solenoid Gas Shut-off Valve.....	791.98	40.92
21 23 16 00-0074 EA 2" Electric Solenoid Gas Shut-off Valve.....	1,018.01	48.32
21 23 16 00-0075 EA 2-1/2" Electric Solenoid Gas Shut-off Valve.....	1,682.77	70.63
21 23 16 00-0076 EA 3" Electric Solenoid Gas Shut-off Valve.....	2,114.09	81.73
21 23 16 00-0077 EA Manual Reset Relay.....	574.33	106.26
21 23 16 00-0078 Liquid Tight Sealing Adapters (21 23 16 00-0001)		
21 23 16 00-0079 EA 3/8" Tubing, Compression Seal Adapter.....	45.79	4.44
21 23 16 00-0080 EA 1/2" Tubing, 1/4" Pipe, Compression Seal Adapter.....	45.10	4.87
21 23 16 00-0081 EA 5/8" Tubing, 3/8" Pipe, Compression Seal Adapter.....	52.94	5.81
21 23 16 00-0082 EA 3/4" Tubing, 1/2" Pipe, Compression Seal Adapter.....	61.12	6.24
21 23 16 00-0083 EA 1/2" Electrical Metallic Tubing (EMT), Compression Seal Adapter.....	52.94	5.81
21 23 16 00-0084 EA 3/8" NPT Female, Quik-Seal Adapter.....	45.10	4.87
21 23 16 00-0085 EA 1/2" NPT Female, Quik-Seal Adapter.....	45.10	4.87
21 23 16 00-0086 EA 3/4" NPT Female, Quik-Seal Adapter.....	74.05	8.25
21 23 16 00-0087 EA 1" NPT Female, Quik-Seal Adapter.....	98.58	10.89
21 23 16 00-0088 EA Quik-Patch For Hole Patching Up To 1-1/8" Diameter.....	45.10	
21 23 16 00-0089 Pressure Operated Releasing Systems (21 23 16 00-0001)		
21 23 16 00-0090 EA KRS-100 Nitrogen Cylinder.....	328.13	31.94
21 23 16 00-0091 EA KRS-100 Actuator Assembly.....	293.98	32.57
21 23 16 00-0092 EA KRS-100 Mounting Bracket.....	231.56	8.04
21 23 16 00-0093 EA KRS-700S Nitrogen Cylinder.....	844.18	92.09
21 23 16 00-0094 EA KRS-700 Mounting Bracket.....	179.69	19.67
21 23 16 00-0095 EA KRS-700S Discharge Adapter Kit.....	272.53	19.67
21 23 16 00-0096 EA Check Valve, Pressure Operated Releasing Systems.....	270.04	13.95
21 23 16 00-0097 EA Vent Check, Pressure Operated Releasing Systems.....	82.82	8.89
21 23 16 00-0098 EA Removal And Replacement Of Receiver Gasket For KRS-100 Actuator Assembly.....	10.93	
21 23 16 00-0099 EA 3 Pole, Double Throw Pressure Switch.....	676.64	74.02
21 23 16 00-0100 Pyro-Chem Kitchen Fire Suppression Systems (21 23 16)		
21 23 16 00-0101 Cylinders, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
21 23 16 00-0102 EA 3.0 Gallon Agent Cylinder With Valve, Kitchen Fire Suppression Systems (Pyro-Chem 551194).....	875.03	75.07
21 23 16 00-0103 EA 4.6 Gallon Agent Cylinder With Valve, Kitchen Fire Suppression Systems (Pyro-Chem 551193).....	1,260.42	108.17
21 23 16 00-0104 EA 6.0 Gallon Agent Cylinder With Valve, Kitchen Fire Suppression Systems (Pyro-Chem 551196).....	1,654.62	147.92
21 23 16 00-0105 EA Cylinder Mounting Bracket, Kitchen Fire Suppression Systems (Pyro-Chem 550053).....	179.11	17.66
21 23 16 00-0106 EA Enclosure With Mechanical Control Unit, Kitchen Fire Suppression Systems (Pyro-Chem 551208).....	1,179.25	115.46
21 23 16 00-0107 EA Enclosure For Secondary Cylinders, Kitchen Fire Suppression Systems (Pyro-Chem 550966).....	720.01	70.42
21 23 16 00-0108 Fusible Links, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
21 23 16 00-0109 EA 165 Fahrenheit, Fusible Link, Kitchen Fire Suppression Systems (Pyro-Chem 551522).....	23.25	2.33
21 23 16 00-0110 EA 212 Fahrenheit, Fusible Link, Kitchen Fire Suppression Systems (Pyro-Chem 551523).....	23.25	2.33
21 23 16 00-0111 EA 280 Fahrenheit, Fusible Link, Kitchen Fire Suppression Systems (Pyro-Chem 551524).....	23.81	2.33
21 23 16 00-0112 EA 360 Fahrenheit, Fusible Link, Kitchen Fire Suppression Systems (Pyro-Chem 551525).....	23.25	2.33
21 23 16 00-0113 EA 450 Fahrenheit, Fusible Link, Kitchen Fire Suppression Systems (Pyro-Chem 551526).....	23.25	2.33
21 23 16 00-0114 EA 500 Fahrenheit, Fusible Link, Kitchen Fire Suppression Systems (Pyro-Chem 551527).....	25.30	2.33
21 23 16 00-0115 EA Fusible Link Kit With 10" Bracket, Kitchen Fire Suppression Systems (Pyro-Chem 550131).....	40.28	3.91
21 23 16 00-0116 EA Fusible Link Kit With 8" Bracket, Kitchen Fire Suppression Systems (Pyro-Chem 550132).....	52.27	5.18
21 23 16 00-0117 EA Fusible Link Hanger, Kitchen Fire Suppression Systems (Pyro-Chem 550876).....	62.20	26.75
21 23 16 00-0118 EA 225 To 600 Fahrenheit, Electrical Thermal Detector, Kitchen Fire Suppression Systems (Pyro-Chem 13970-6).....	502.07	59.53
21 23 16 00-0119 Gas Valves, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
21 23 16 00-0120 EA 3/4" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 550593).....	421.77	22.84
21 23 16 00-0121 EA 1" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 550594).....	480.22	28.13
21 23 16 00-0122 EA 1-1/4" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 550595).....	517.87	35.52

21	21	Fire Suppression
	21 20	Fire-Extinguishing Systems
	21 23	Wet-Chemical Fire-Extinguishing Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	21 23 16 00-0123	EA	1-1/2" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 550596).....	569.52	40.81
	21 23 16 00-0124	EA	2" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 551049).....	655.03	48.22
	21 23 16 00-0125	EA	2-1/2" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 550185).....	1,529.43	70.52
	21 23 16 00-0126	EA	3" Mechanical Gas Valve, Direct Cable Hookup, Kitchen Fire Suppression Systems (Pyro-Chem 550186).....	1,631.46	81.62
	21 23 16 00-0127	EA	3/4" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550358).....	330.55	22.84
	21 23 16 00-0128	EA	1" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550359).....	564.59	28.13
	21 23 16 00-0129	EA	1-1/4" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550360).....	588.54	35.52
	21 23 16 00-0130	EA	1-1/2" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550361).....	669.83	40.81
	21 23 16 00-0131	EA	2" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550362).....	928.63	48.22
	21 23 16 00-0132	EA	2-1/2" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550363).....	1,798.44	70.52
	21 23 16 00-0133	EA	3" Electrical Gas Valve, Kitchen Fire Suppression Systems (Pyro-Chem 17643).....	1,895.95	81.62
	21 23 16 00-0134		Nozzles, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0135	EA	Nozzle, Kitchen Fire Suppression Systems (Pyro-Chem).....	83.39	7.83
	21 23 16 00-0136	EA	Swivel Nozzle, Kitchen Fire Suppression Systems (Pyro-Chem).....	118.54	9.94
	21 23 16 00-0137	EA	Stainless Steel Nozzle, Kitchen Fire Suppression Systems (Pyro-Chem).....	460.43	9.94
	21 23 16 00-0138		Actuating Cylinders/Cartridges, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0139	EA	Carbon Dioxide Actuation Cartridge, Kitchen Fire Suppression Systems (Pyro-Chem 551059).....	30.77	3.06
	21 23 16 00-0140	EA	PAC-10, Pneumatic Actuating Cylinder, Kitchen Fire Suppression Systems (Pyro-Chem 550104).....	1,008.01	99.28
	21 23 16 00-0141	EA	PAC-200, Pneumatic Actuating Cylinder, Kitchen Fire Suppression Systems (Pyro-Chem 550690).....	1,284.43	126.99
	21 23 16 00-0142		Circuit Monitors, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0143	EA	24 Volt DC, System Circuit Monitor/Gas Valve Reset Relay, Kitchen Fire Suppression Systems (Pyro-Chem 550303).....	658.93	65.03
	21 23 16 00-0144	EA	120 Volt AC, System Circuit Monitor/Gas Valve Reset Relay, Kitchen Fire Suppression Systems (Pyro-Chem 550302).....	795.08	78.35
	21 23 16 00-0145		Control Heads, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0146	EA	Mechanical Control Head, No Local Action, Kitchen Fire Suppression Systems (Pyro-Chem 551203).....	727.00	71.69
	21 23 16 00-0147	EA	Mechanical Control Head With Local Action, Kitchen Fire Suppression Systems (Pyro-Chem 551200).....	758.75	74.96
	21 23 16 00-0148	EA	24 Volt DC, Electrical Control Head With Local Actuation, Kitchen Fire Suppression Systems (Pyro-Chem 551201).....	988.38	97.49
	21 23 16 00-0149	EA	120 Volt AC Electrical Control Head With Local Actuation, Kitchen Fire Suppression Systems (Pyro-Chem 551202).....	1,133.80	112.08
	21 23 16 00-0150	EA	Control Head Mounting Bracket, Kitchen Fire Suppression Systems (Pyro-Chem 550853).....	92.09	9.10
	21 23 16 00-0151		Corner Pulleys/Tees, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0152	EA	Set Screw Type, Corner Pulley, Kitchen Fire Suppression Systems (Pyro-Chem 415670).....	23.10	1.48
	21 23 16 00-0153	EA	Compression Type, Corner Pulley, Kitchen Fire Suppression Systems (Pyro-Chem 423250).....	23.78	1.90
	21 23 16 00-0154	EA	Tee Pulley, Kitchen Fire Suppression Systems (Pyro-Chem 550166).....	73.84	7.29
	21 23 16 00-0155	EA	Removal And Replacement Of Screw For Corner Pulley, Kitchen Fire Suppression Systems (Pyro-Chem 550272).....	0.93	
	21 23 16 00-0156		Switches, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0157	EA	SPDT Switch, Kitchen Fire Suppression Systems (Pyro-Chem 550227).....	80.31	7.93
	21 23 16 00-0158	EA	DPDT Switch, Kitchen Fire Suppression Systems (Pyro-Chem 550237).....	160.86	15.76
	21 23 16 00-0159	EA	Four Pole Double Throw Switch, Kitchen Fire Suppression Systems (Pyro-Chem 550978).....	340.42	33.41
	21 23 16 00-0160		Wire Rope/Accessories, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0161	LF	1/16" Diameter Stainless Steel Wire Rope, Kitchen Fire Suppression Systems (Pyro-Chem 15821).....	1.63	0.31
	21 23 16 00-0162	EA	Crimps For 1/16" Diameter Stainless Steel Wire Rope, Kitchen Fire Suppression Systems (Pyro-Chem 550122).....	0.95	0.31
	21 23 16 00-0163	EA	High Temperature Stainless Steel Crimps, Kitchen Fire Suppression Systems (Pyro-Chem 551551).....	4.00	0.42
	21 23 16 00-0164	EA	"S" Hooks, Kitchen Fire Suppression Systems (Pyro-Chem 550121).....	0.67	
	21 23 16 00-0165		Replacement Parts, Kitchen Fire Suppression Systems (21 23 16 00-0100)		
	21 23 16 00-0166	EA	Wet Valve Rebuilding Kit, Kitchen Fire Suppression Systems (Pyro-Chem 550698).....	76.29	7.62
	21 23 16 00-0167	EA	Wet Valve Cap With Schrader Valve, Kitchen Fire Suppression Systems (Pyro-Chem 550831).....	79.65	7.93
	21 23 16 00-0168	EA	Wet Spring, Kitchen Fire Suppression Systems (Pyro-Chem 550705).....	9.33	0.95
	21 23 16 00-0169	EA	225 psi, Wet Gauge, Kitchen Fire Suppression Systems (Pyro-Chem 551236).....	109.59	10.37
	21 23 16 00-0170	EA	Wet Valve O-ring, Kitchen Fire Suppression Systems (Pyro-Chem 550716).....	15.35	1.48
	21 23 16 00-0171	EA	Wet Piston, Kitchen Fire Suppression Systems (Pyro-Chem 550707).....	21.36	2.12
	21 23 16 00-0172	EA	Wet Piston O-Ring, Kitchen Fire Suppression Systems (Pyro-Chem 550715).....	9.33	0.95
	21 23 16 00-0173	EA	Wet Nozzle Cap, Kitchen Fire Suppression Systems (Pyro-Chem 551528).....	13.14	1.27
	21 23 16 00-0174	EA	Wet Nozzle Strainer, Kitchen Fire Suppression Systems (Pyro-Chem 551529).....	12.85	1.27
	21 23 16 00-0175	EA	Wet Nozzle Cap O-Ring, Kitchen Fire Suppression Systems (Pyro-Chem 551530).....	3.67	0.31
	21 23 16 00-0176	EA	Removal And Replacement Of Teflon Washer For Control Head Actuator, Kitchen Fire Suppression Systems (Pyro-Chem 550257).....	6.23	
	21 23 16 00-0177	EA	O-Ring Lubrication, Kitchen Fire Suppression Systems (Pyro-Chem 550063).....	118.98	
	21 23 16 00-0178	EA	3.0 Gallon Empty Test Tank, Kitchen Fire Suppression Systems (Pyro-Chem 551024).....	811.73	
	21 23 16 00-0179	EA	4.6 Gallon Empty Test Tank, Kitchen Fire Suppression Systems (Pyro-Chem 550902).....	1,053.20	
	21 23 16 00-0180	EA	6.0 Gallon Empty Test Tank, Kitchen Fire Suppression Systems (Pyro-Chem 550901).....	1,216.12	



Fire Suppression	21	
Fire-Extinguishing Systems	21 20	2
Wet-Chemical Fire-Extinguishing Systems	21 23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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21 23 16 00-0181	Accessories, Kitchen Fire Suppression Systems <small>(21 23 16 00-0100)</small>		
21 23 16 00-0182	EA 3/8" Quickseal Adapter, Kitchen Fire Suppression Systems (Pyro-Chem 550857)	37.37	3.60
21 23 16 00-0183	EA 1/2" Quickseal Adapter, Kitchen Fire Suppression Systems (Pyro-Chem 550859)	38.71	3.81
21 23 16 00-0184	EA Wet Valve Tool, Kitchen Fire Suppression Systems (Pyro-Chem 550788)	74.54	7.29
21 23 16 00-0185	EA Recharge Adapter Kit, Kitchen Fire Suppression Systems (Pyro-Chem 551240)	105.47	
21 23 16 00-0186	EA 3.0 Gallon Of Wet Chemical For Recharge, Kitchen Fire Suppression Systems (Pyro-Chem 551188).....	226.72	

21 23 16 00-0187	Pull Stations/Accessories, Kitchen Fire Suppression Systems <small>(21 23 16 00-0100)</small>		
21 23 16 00-0188	EA Mechanical, Remote Pull Station, Kitchen Fire Suppression Systems (Pyro-Chem 551074)	150.58	14.91
21 23 16 00-0189	EA Electric, Remote Pull Station, Kitchen Fire Suppression Systems (Pyro-Chem 551166)	160.47	20.93
21 23 16 00-0190	EA Trim Ring For Flush Mounting Remote Pull Station, Kitchen Fire Suppression Systems (Pyro-Chem 550088).....	40.28	3.91
21 23 16 00-0191	EA Glass Rods For Pull Stations, Kitchen Fire Suppression Systems (Pyro-Chem 428661)	5.30	1.37

21 23 16 00-0192	Asco Gas Valve Control Panels <small>(21 23 16)</small>		
21 23 16 00-0193	EA Relay Control Panel For AC Solenoid Valves (Asco 108D90C).....	2,514.69	232.62
21 23 16 00-0194	EA Relay Control Panel For DC Solenoid Valves (Asco 108D10C)	2,599.77	232.62
21 23 16 00-0195	EA Master Control Station For Relay Control Panel For DC Solenoid Valves (Asco 216C89).....	850.00	52.87
21 23 16 00-0196	EA Emergency Stop Station For Relay Control Panel (Asco 173A19)	794.42	52.87

21 24 Dry-Chemical Fire-Extinguishing Systems (21 20)

21 24 16 Dry-Chemical Fire-Extinguishing Equipment (21 24)

21 24 16 00-0001	Amerex KP Restaurant Fire Suppression Systems <small>(21 24 16)</small>		
Note: Amerex or equal.			
21 24 16 00-0002	EA 3.75 Gallon, Charged, Agent Cylinder Assembly With Discharge Valve.....	573.03	82.05
21 24 16 00-0003	EA 6 Gallon, Charged, Agent Cylinder Assembly With Discharge Valve.....	797.45	103.45
21 24 16 00-0004	EA Recharge - KP Liquid Agent (3.75 Gallon).....	189.40	
21 24 16 00-0005	EA Recharge - KP Liquid Agent (6 Gallon).....	332.93	
21 24 16 00-0006	EA 3.75 Gallon, Bracket Assembly Agent Cylinder With Distribution Hose Assembly And Distribution Outlet.....	132.57	17.22
21 24 16 00-0007	EA 6 Gallon, Bracket Assembly Agent Cylinder	77.23	9.99
21 24 16 00-0008	EA 6 Gallon, 3/4 NPT, Agent Cylinder Discharge Adapter Kit	33.50	
21 24 16 00-0009	EA 6 Gallon, Pneumatic Actuator, Agent Cylinder.....	132.57	17.22
21 24 16 00-0010	EA MRM Actuator (Less N2 Cylinder And Enclosure).....	332.93	43.17
21 24 16 00-0011	EA Painted Steel, MRM Enclosure	177.44	22.97
21 24 16 00-0012	EA Stainless Steel, MRM Enclosure.....	215.83	22.97
21 24 16 00-0013	EA Stainless Steel, Single Cylinder System Cabinet.....	528.32	68.54
21 24 16 00-0014	EA N2 - 1/4" x 16" Actuation Hose	39.87	5.17
21 24 16 00-0015	EA 10 CU. Inch, Nitrogen Cylinder	177.44	22.97
Note: Use For 1-10 Agent Cylinders			
21 24 16 00-0016	EA Vent Check	31.91	4.13
21 24 16 00-0017	EA Detector	23.92	3.10
Note: Includes bracket, linkage and conduit fittings.			
21 24 16 00-0018	EA 280 To 450 Degree F, Fusible Link	8.97	1.15
21 24 16 00-0019	EA Test Link	2.99	
21 24 16 00-0020	EA Corner Pulley.....	12.35	1.61
21 24 16 00-0021	EA 1/16", 500 Foot Spool, Cable	199.36	25.84
21 24 16 00-0022	EA Pulley Tee.....	89.71	11.60
21 24 16 00-0023	EA Manual Pull Station (Standard).....	79.73	10.33
21 24 16 00-0024	EA Manual Pull Station, Adapter Kit (Recess Standard Pull Station)	37.41	4.82
21 24 16 00-0025	EA Manual Pull Station (Oversized)	88.92	11.48
21 24 16 00-0026	EA Conduit Offset.....	17.74	2.30
21 24 16 00-0027	EA 3/8" Pipe Thread, Seal (Quick-Seal).....	24.44	3.21
21 24 16 00-0028	EA 1/2" Pipe Thread, Seal (Quick-Seal)	19.94	2.64
21 24 16 00-0029	EA 3/8" Pipe Compression Seal	33.29	4.36
21 24 16 00-0030	EA 1/2" Pipe Compression Seal.....	33.29	4.36
21 24 16 00-0031	EA Cap, Nozzle Blow-Off (Standard).....	9.63	2.98
21 24 16 00-0032	EA Cap, Nozzle Blow-Off (High Temperature)	22.18	2.98
21 24 16 00-0033	EA 2 Flow Points, Fryer/Griddle Nozzle	39.87	5.17
21 24 16 00-0034	EA 1 Flow Point Each, Appliance, Plenum Nozzle	39.87	5.17
21 24 16 00-0035	EA Nozzle - Solid Fuel Charbroiler - 1 To 1-1/2 Flow Points Each.....	39.87	5.17
21 24 16 00-0036	EA 1/2 Flow Points Each, Upright Charbroiler Nozzle	39.87	5.17
21 24 16 00-0037	EA 2 Flow Points Each, Duct (Only) Nozzle	39.87	5.17
21 24 16 00-0038	EA 2 Flow Points Each, Four Burner Range Nozzle.....	57.33	7.46
21 24 16 00-0039	EA 3/4" Or 1" Mechanical Gas Valve.....	316.30	30.43
21 24 16 00-0040	EA 1-1/4" Or 1-1/2" Mechanical Gas Valve	373.39	44.20
21 24 16 00-0041	EA 2" Mechanical Gas Valve.....	464.78	52.24
21 24 16 00-0042	EA Manual Reset Relay (Required With Every Electric Gas Valve)	502.38	65.10
21 24 16 00-0043	EA SPDT Microswitch With 18" Leads	26.44	3.44
21 24 16 00-0044	EA Kit Gas Valve Actuator For Use With ASCO Mechanical Gas Valve	42.67	5.51
21 24 16 00-0045	EA Gas Valve Trip Assembly	89.71	11.60

21 24 16 00-0046	Range Guard Fire Suppression Systems <small>(21 24 16)</small>		
Note: Range Guard or equal.			
21 24 16 00-0047	EA 1-1/4 Gallon Charged Cylinder With Valve	608.54	88.71

21 Fire Suppression**21 20 Fire-Extinguishing Systems****21 24 Dry-Chemical Fire-Extinguishing Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

21 24 16 00-0048	EA	2-1/2 Gallon Charged Cylinder With Valve	759.62	110.71
21 24 16 00-0049	EA	4 Gallon Charged Cylinder With Valve.....	937.80	136.71
21 24 16 00-0050	EA	6 Gallon Charged Cylinder With Valve.....	1,113.90	162.30
21 24 16 00-0051	EA	Vent Plug	25.57	3.70
21 24 16 00-0052	EA	Discharge Adapter Kit.....	32.93	
21 24 16 00-0053	EA	1-1/4 Gallon Wall Bracket	67.73	9.83
21 24 16 00-0054	EA	2-1/2 Gallon Wall Bracket	71.69	10.47
21 24 16 00-0055	EA	4 Gallon Wall Bracket	135.39	19.78
21 24 16 00-0056	EA	6 Gallon Wall Bracket	150.05	21.89
21 24 16 00-0057	EA	Mechanical Control Head, No Microswitch	529.34	77.19
21 24 16 00-0058	EA	Mechanical Control Head, 1 Microswitch	552.26	80.46
21 24 16 00-0059	EA	Mechanical Control Head, 2 Microswitches	633.54	92.30
21 24 16 00-0060	EA	Tandem Control Head.....	481.41	70.21
21 24 16 00-0061	EA	Electric Control Head, 120 Volt AC / 24 Volt DC.....	814.84	118.74
21 24 16 00-0062	EA	Mechanical Control Box.....	362.62	52.87
21 24 16 00-0063	EA	Tandem Control Box.....	362.62	52.87
21 24 16 00-0064	EA	Mechanical Control Box Adapter	106.29	15.54
21 24 16 00-0065	EA	A+ Control head With 1 Pressure Operated Actuator	319.41	46.52
21 24 16 00-0066	EA	Pressure Operated Actuator	131.29	19.14
21 24 16 00-0067	EA	BMCS-1 Nitrogen Cylinder.....	212.57	30.98
21 24 16 00-0068	EA	BMCS-1 Actuator Assembly	216.74	31.61
21 24 16 00-0069	EA	BMCS-1 Mounting Bracket	53.13	7.72
21 24 16 00-0070	EA	BMCS-7 Nitrogen Cylinder.....	613.35	89.34
21 24 16 00-0071	EA	BMCS-7 Mounting Bracket	131.29	19.14
21 24 16 00-0072	EA	BMCS-7 Discharge Adapter Kit	131.29	19.14
21 24 16 00-0073	EA	Check Valve.....	111.07	22.73
21 24 16 00-0074	EA	Vent Check For Use With BMCS Systems	59.39	8.67
21 24 16 00-0075	EA	Check Valve, (Schrader Flare Fitting) For Pressure Operated Actuator	25.85	3.77
21 24 16 00-0076	EA	Removal And Replacement Of Receiver Gasket For BMCS-Actuator Assembly	6.80	
21 24 16 00-0077	EA	Pneumatic Control Head For Slave Cylinders.....	135.46	19.78
21 24 16 00-0078	EA	Nozzles; ADP, F, R And GRW	62.10	9.10
21 24 16 00-0079	EA	Nozzles; DM And LPF.....	69.19	10.04
21 24 16 00-0080	EA	Swivel Adapter.....	43.76	6.35
21 24 16 00-0081	EA	Corner Pulley	18.76	2.75
21 24 16 00-0082	LF	1/16" Stainless Steel Cable	0.84	0.31
21 24 16 00-0083	EA	Cable Crimp Sleeve.....	1.02	0.31
21 24 16 00-0084	EA	"S" Hook	0.79	0.21
21 24 16 00-0085	EA	Electrical Metallic Tubing (EMT) Adapter, 1/2" Electrical Metallic Tubing (EMT) x 3/8" NPT	64.58	9.41
21 24 16 00-0086	EA	Cable Clamp	5.76	0.85
21 24 16 00-0087	EA	Nico Sleeves - 1/16" Cable	0.80	0.21
21 24 16 00-0088	EA	3/8" Cable Anchor.....	68.25	9.94
21 24 16 00-0089	EA	1/2" Cable Anchor.....	68.25	9.94
21 24 16 00-0090	EA	Mechanical Remote Manual Release (Pull Cable).....	110.40	16.07
21 24 16 00-0091	EA	Tee Pulley, Use For Mechanical Pull And Gas Valve	117.81	17.13
21 24 16 00-0092	EA	Surface Remote Manual Release, End-of-line.....	138.02	20.09
21 24 16 00-0093	EA	Surface Remote Manual Release, In line Conservation Kit	43.25	6.35
21 24 16 00-0094	EA	Surface Remote Manual Release, In line And End Of Line	181.21	26.32
21 24 16 00-0095	EA	Recessed Remote Manual Release, End-of-line	138.02	20.09
21 24 16 00-0096	EA	Recessed Remote Manual Release, In Line Kit.....	164.54	24.00
21 24 16 00-0097	EA	Pulley Tee, Remote In Line Only	29.58	4.33
21 24 16 00-0098	EA	Fusible Link Housing Kit With 1 - Bracket, 2 - 1/2" Electrical Metallic Tubing (EMT) Connector, 1 - "S" Hook, 8 - Cable Crimp Sleeve	32.84	4.76
21 24 16 00-0099	EA	Fusible Link 165F To 360F	10.75	1.58
21 24 16 00-0100	EA	Fusible Link 500F	16.88	1.58
21 24 16 00-0101	EA	Standard Detector With 1 - 360F link, 2 - "S" Hooks, 2 - Crimp Sleeves	32.84	4.76
21 24 16 00-0102	EA	Standard Detector Kit With 1 - Large Bracket, 2 - "S" Hooks, 2 - Cable Crimp Sleeve	24.35	4.76
21 24 16 00-0103	EA	Quartzoid Link 400 F.....	177.04	25.80
21 24 16 00-0104	EA	Quartzoid Link 500 F.....	177.04	25.80
21 24 16 00-0105	EA	SPDT Micro Switch For Use With A Plus Control Box	63.45	9.20
21 24 16 00-0106	EA	DPDT Micro Switch For Use With A Plus Control Box	110.39	16.07
21 24 16 00-0107	EA	SPDT Micro Switch For Use With A Mechanical Control Box.....	65.61	9.52
21 24 16 00-0108	EA	DPDT Micro Switch For Use With A Mechanical Control Box.....	113.71	16.60
21 24 16 00-0109	EA	SPDT Micro Switch For Use With PRCB	83.31	12.16
21 24 16 00-0110	EA	DPDT Micro Switch For Use With PRCB	120.18	17.45
21 24 16 00-0111	EA	Pressure Switch, SPDT (Fire Dept. Tie In)	352.01	51.28
21 24 16 00-0112	EA	Circuit Monitor 12 Or 24 Volt DC	158.30	23.05
21 24 16 00-0113	EA	Circuit Monitor 120 Volt AC	158.30	23.05
21 24 16 00-0114	EA	Electric Manual Pull Station	115.60	16.81
21 24 16 00-0115	EA	6", 24 Volt DC, Motor Bell	64.57	9.41
21 24 16 00-0116	EA	10", 115 Volt AC Motor Bell	91.65	13.32
21 24 16 00-0117	EA	Fuse, 1.2 For ECH.....	7.43	1.06
21 24 16 00-0118	EA	Indicator Lamp 12 Or 24 Volt DC.....	32.84	4.76
21 24 16 00-0119	EA	Indicator Lamp 120 Volt AC.....	32.84	4.76
21 24 16 00-0120	EA	B-10 Manual Station Dual Action, SPDT.....	120.80	17.55
21 24 16 00-0121	EA	B-11 Manual Station Dual Action, DPDT.....	133.30	19.45
21 24 16 00-0122	EA	Break Rods For B10/B11 Manual Pull Station	3.63	1.37
21 24 16 00-0123	EA	Spare Key For B10/B11 Manual Stations	16.66	2.43
21 24 16 00-0124	EA	MT-24-LSM-VAR Multitone Signal With 15/75cd Strobe, 24 Volt, Flush Grill	179.12	26.11
21 24 16 00-0125	EA	Suppression Abort Station	189.54	27.59
21 24 16 00-0126	EA	Suppression Abort Station With Surface Mount Back Box.....	220.78	32.15
21 24 16 00-0127	EA	Surface Mount Back Box	72.90	10.58



Fire Suppression	21	21
Fire-Extinguishing Systems	21 20	
Dry-Chemical Fire-Extinguishing Systems	21 24	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
21 24 16 00-0128	EA		Single Hazard Control Unit, 120 Volt AC IP.....	1,353.85	196.98
21 24 16 00-0129	EA		Single Hazard Control Unit, 240 Volt AC IP.....	1,353.85	196.98
21 24 16 00-0130	EA		1 Lead Acid Battery; 24 Volt DC, 1.2 A.H.....	112.48	16.39
21 24 16 00-0131	EA		Accessory Kit - End-of-line Resistors (10K Ohms, 1/2 W).....	4.35	0.74
21 24 16 00-0132	EA		Spare Scorpio Circuit Board.....	978.87	
21 24 16 00-0133	EA		Extra Scorpio Key.....	16.66	
21 24 16 00-0134	EA		Extra Scorpio Manual.....	10.41	
21 24 16 00-0135	EA		Compression Seal Adapter 3/8" Pipe.....	28.32	4.12
21 24 16 00-0136	EA		Compression Seal Adapter 1/2" Tubing/ 1/4" Pipe.....	30.75	4.44
21 24 16 00-0137	EA		Compression Seal Adapter 5/8" Tubing/ 3/8" Pipe.....	37.00	5.39
21 24 16 00-0138	EA		Compression Seal Adapter 3/4" Tubing/ 1/2" Pipe.....	39.57	5.71
21 24 16 00-0139	EA		Quik Seal Adapter 3/8" NPT Female.....	30.75	4.44
21 24 16 00-0140	EA		Quik Seal Adapter 1/2" NPT Female.....	30.75	4.44
21 24 16 00-0141	EA		Quik Seal Adapter 3/4" NPT Female.....	52.61	7.72
21 24 16 00-0142	EA		Quik Seal Adapter 1" NPT Female.....	69.77	10.15
21 24 16 00-0143	EA		Quik Patch (Up To 1-1/8" Diameter).....	30.75	4.44
21 24 16 00-0144	EA		1-1/4 Gallon Karbaloy Charge.....	68.45	
21 24 16 00-0145	EA		2-1/2 Gallon Karbaloy Charge.....	117.67	
21 24 16 00-0146	EA		4 Gallon Karbaloy Charge.....	177.86	
21 24 16 00-0147	EA		6 Gallon Karbaloy Charge.....	260.26	
21 24 16 00-0148	EA		Inlet Flushing Adapter.....	51.03	7.40
21 24 16 00-0149	EA		1/2" Flushing Adapter (Outlet).....	51.03	7.40
21 24 16 00-0150	EA		1/8" Flushing Adapter (Outlet).....	51.03	7.40
21 24 16 00-0151	EA		1/4" Flushing Adapter (Outlet).....	51.03	7.40
21 24 16 00-0152	EA		3/8" Flushing Adapter (Outlet).....	51.03	7.40
21 24 16 00-0153	EA		Recharge Adapter (Old Style Cylinder Valve Assembly Only).....	70.81	
21 24 16 00-0154	EA		Instruction Label (In Case Of Fire) - MCB.....	5.69	
21 24 16 00-0155	EA		Caution Sign (Turn On Fan).....	6.80	
21 24 16 00-0156	EA		Inspection Label (Authorized installers only).....	4.81	
21 24 16 00-0157	EA		Label, Warning, A+ Control Box.....	3.48	
21 24 16 00-0158	EA		Wet Chemical System Kits, RG-1.25G Kit; #23315.....	895.57	130.37
21 24 16 00-0159	EA		Wet Chemical System Kits, RG-2.5G Kit; #23316.....	1,045.54	152.15
21 24 16 00-0160	EA		Wet Chemical System Kits, RG-4GS Kit; #23317.....	1,301.75	189.48
21 24 16 00-0161	EA		Wet Chemical System Kits, RG-4GT Kit; #23318.....	1,301.75	189.48
21 24 16 00-0162	EA		Wet Chemical System Kits, RG-6G Kit; #23319.....	1,637.06	238.22
21 24 16 00-0163	EA		Wet Chemical System Kits, RG Mechanical Control HD (MCH) Kit; #23320.....	775.82	112.92
21 24 16 00-0164	EA		Wet Chemical System Kits, RG Mechanical Control Box (MCB) Kit; #23321.....	728.96	106.05
21 24 16 00-0165	EA		Wet Chemical System Kits, A Plus Control Box Kit; #23322.....	589.42	85.75
21 24 16 00-0166	EA		Wet Chemical System Kits, Valve Rebuild Kit; #23210.....	1,020.53	148.56
21 24 16 00-0167	EA		Wet Chemical System Kits, BMCS-1 Package; #23208.....	935.13	136.07

21 30 Fire Pumps (21)

21 31 Centrifugal Fire Pumps (21 30)

21 31 13 Electric-Drive, Centrifugal Fire Pumps (21 31)

21 31 13 00-0001 Electric-Drive Fire Pumps (21 31 13)

Note: Includes fire pump, motor, motor starter, alarm panel, automatic transfer switch, and controller.

21 31 13 00-0002	EA	20 HP Electric Fire Pump.....	60,193.96	2,102.48
		<i>For Duplex Pumping System, Add</i>	<i>58,091.49</i>	
21 31 13 00-0003	EA	30 HP Electric Fire Pump.....	70,281.10	2,365.28
		<i>For Duplex Pumping System, Add</i>	<i>68,091.02</i>	
21 31 13 00-0004	EA	40 HP Electric Fire Pump.....	95,949.44	2,628.10
		<i>For Duplex Pumping System, Add</i>	<i>93,516.02</i>	
21 31 13 00-0005	EA	50 HP Electric Fire Pump.....	118,644.92	3,065.56
		<i>For Duplex Pumping System, Add</i>	<i>115,579.36</i>	
21 31 13 00-0006	EA	75 HP Electric Fire Pump.....	132,462.87	3,344.25
		<i>For Duplex Pumping System, Add</i>	<i>129,118.62</i>	

21 31 16 Diesel-Drive, Centrifugal Fire Pumps (21 31)

21 31 16 00-0001 Diesel-Drive Fire Pumps (21 31 16)

Note: Pumps shall be stand alone units meeting NFPA-20 specs. Includes fire pump, motor, motor starter, alarm panel, and controller.

21 31 16 00-0002	EA	30 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	89,019.70	2,508.19
21 31 16 00-0003	EA	40 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	100,713.71	2,786.88
21 31 16 00-0004	EA	50 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	105,786.54	3,065.56
21 31 16 00-0005	EA	75 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	120,419.56	3,344.25
21 31 16 00-0006	EA	150 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	127,727.66	3,901.63
21 31 16 00-0007	EA	175 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	137,276.40	5,016.37
21 31 16 00-0008	EA	200 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	148,976.02	5,573.75
21 31 16 00-0009	EA	250 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	170,355.27	6,354.07
21 31 16 00-0010	EA	300 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	204,239.23	6,855.72
21 31 16 00-0011	EA	350 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	239,690.22	7,803.25
21 31 16 00-0012	EA	400 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	284,721.16	8,360.63
21 31 16 00-0013	EA	500 HP Diesel Driven Fire Pump, NFPA-20 Specific.....	320,743.45	8,918.01

21 34 Fire Pump Accessories (21 30)

21	21	Fire Suppression
	21 30	Fire Pumps
	21 34	Fire Pump Accessories



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
21 34 13		Pressure Maintenance Pumps <small>(21 34)</small>		
21 34 13 00-0001		Jockey Pumps <small>(21 34 13)</small>		
		Note: Includes pump and controller.		
21 34 13 00-0002	EA	Up To 3 HP, 1" Pipe Connection, Jockey Pump And Controller	6,178.90	557.38

END OF SECTION 21



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 Plumbing

Note: Where required, mechanical equipment excludes electrical connection unless title states otherwise.

22 01 Operation and Maintenance of Plumbing ⁽²²⁾

22 01 10 Operation and Maintenance of Plumbing Piping and Pumps ^(22 01)

See CSI section 23 01 20 00-0000 for purging of pipes and shutdown.

22 01 10 61 Plumbing Piping Repairs ^(22 01 10)

22 01 10 61-0001 Pipe Repair Clamps ^(22 01 10 61)

22 01 10 61-0002	EA	1/2" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	44.80
22 01 10 61-0003	EA	3/4" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	46.55
22 01 10 61-0004	EA	1" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	51.17
22 01 10 61-0005	EA	1-1/4" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	54.54
22 01 10 61-0006	EA	1-1/2" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	59.00
22 01 10 61-0007	EA	2" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	75.15
22 01 10 61-0008	EA	2-1/2" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	95.16
22 01 10 61-0009	EA	3" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	110.22
22 01 10 61-0010	EA	4" Diameter x 3" Stainless Steel Pipe Repair Clamp, Single Bolt Note: Includes neoprene gasket	126.24
22 01 10 61-0011	EA	1/2" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	71.06
22 01 10 61-0012	EA	3/4" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	74.80
22 01 10 61-0013	EA	1" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	82.81
22 01 10 61-0014	EA	1-1/4" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	91.00
22 01 10 61-0015	EA	1-1/2" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	100.25
22 01 10 61-0016	EA	2" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	129.42
22 01 10 61-0017	EA	2-1/2" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	156.30
22 01 10 61-0018	EA	3" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	177.51
22 01 10 61-0019	EA	4" Diameter x 6" Stainless Steel Pipe Repair Clamp, Double Bolt Note: Includes neoprene gasket	201.12
22 01 10 61-0020	EA	1/2" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	101.28
22 01 10 61-0021	EA	3/4" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	105.23
22 01 10 61-0022	EA	1" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	116.26
22 01 10 61-0023	EA	1-1/4" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	127.51
22 01 10 61-0024	EA	1-1/2" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	143.95
22 01 10 61-0025	EA	2" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	175.74
22 01 10 61-0026	EA	2-1/2" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	205.33
22 01 10 61-0027	EA	3" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	247.14
22 01 10 61-0028	EA	4" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	304.89
22 01 10 61-0029	EA	5" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	312.46
22 01 10 61-0030	EA	6" Diameter x 9" Stainless Steel Pipe Repair Clamp, Three Bolt Note: Includes Buna rubber gasket	335.01

22 01 40 Operation and Maintenance of Plumbing Fixtures ^(22 01)

22 01 40 81 Plumbing Fixtures Replacement ^(22 01 40)

22 01 40 81-0001 Removal And Replacement Of Fixture And/or Trim ^(22 01 40 81)

Note: Includes removal of existing item(s) and installation of new item(s).

22 01 40 81-0002	EA	Removal And Replacement Of 3/8" To 1/2" Compression Shut-off Valve With 15" Polybutylene Supply Tube	59.58
22 01 40 81-0003	EA	Removal And Replacement Of 3/8" Compression x 1/2" FIP, Braided Stainless Steel, Supply Lines To Sink/Lavatory	22.81
22 01 40 81-0004	EA	Removal And Replacement Of Chrome Supply Lines To Sink/Lavatory, Pair	28.97

22 Plumbing**22 01 Operation and Maintenance of Plumbing****22 01 40 Operation and Maintenance of Plumbing Fixtures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 01 40 81-0005	EA		Removal And Replacement Of Single Bowl Sink/Lavatory Drain Line.....	40.45	
22 01 40 81-0006	EA		Removal And Replacement Of Double Bowl Sink/Lavatory Drain Line.....	62.86	
22 01 40 81-0007	EA		Removal And Replacement Of Shower Head, Polished Chrome.....	40.89	
22 01 40 81-0008	EA		Removal And Replacement Of Shower Arm.....	42.84	
22 01 40 81-0009	EA		Removal And Replacement Of Shower Head.....	51.57	
22 01 40 81-0010	EA		Removal And Replacement Of Shower Knob.....	39.62	
22 01 40 81-0011	EA		Removal And Replacement Of Shower and Tub Control Trim.....	116.61	
			Note: Excludes balancing valve.		
22 01 40 81-0012	EA		Removal And Replacement Of Sink Basket Strainer.....	32.64	
22 01 40 81-0013	EA		Removal And Replacement Of 1-1/2" Sink Drain Without Stopper.....	17.24	
22 01 40 81-0014	EA		Removal And Replacement Of 4-1/2" Sink Drain Without Stopper.....	18.14	
22 01 40 81-0015	EA		Removal And Replacement Of 1-1/2" Sink Drain With Stopper.....	17.24	
22 01 40 81-0016	EA		Removal And Replacement Of 1" Sink Rubber Stopper.....	8.92	
22 01 40 81-0017	EA		Removal And Replacement Of Sink Tailpiece Extension, 1-1/2" x 8".....	26.73	
22 01 40 81-0018	EA		Removal And Replacement Of Sink Trap, Adjustable, 1-1/2".....	45.26	
22 01 40 81-0019	EA		Removal And Replacement Of Lavatory Pop-Up Rod.....	33.36	
22 01 40 81-0020	EA		Removal And Replacement Of Lavatory Pop-up Drain Stopper.....	32.42	
22 01 40 81-0021	EA		Removal And Replacement Of Faucet Handle.....	36.81	
22 01 40 81-0022	EA		Removal And Replacement Of Faucet O-Ring.....	27.12	
22 01 40 81-0023	EA		Removal And Replacement Of 1-1/2" Faucet Hole Cover.....	20.57	
22 01 40 81-0024	EA		Removal And Replacement Of Toilet Ballcock.....	38.16	
22 01 40 81-0025	EA		Removal And Replacement Of Toilet Bowl Ring, Flat Wax.....	7.29	
			Note: Excludes removal of toilet.		
22 01 40 81-0026	EA		Removal And Replacement Of Toilet Tank.....	151.75	
22 01 40 81-0027	EA		Removal And Replacement Of 10" Toilet Bowl.....	190.27	
22 01 40 81-0028	EA		Removal And Replacement Of 10", Low-Flush Watersaver, Toilet Bowl.....	204.68	
22 01 40 81-0029	EA		Removal And Replacement Of 12" Toilet Bowl.....	218.59	
22 01 40 81-0030	EA		Removal And Replacement Of 18", Elongated, Toilet Bowl.....	195.12	
22 01 40 81-0031	EA		Removal And Replacement Of Toilet Closet Bolt, 5/16" x 3" With Nuts And Washers.....	23.55	
22 01 40 81-0032	EA		Removal And Replacement Of Toilet Flapper With Chain.....	17.53	
22 01 40 81-0033	EA		Removal And Replacement Of Toilet Flush Tank Lever.....	18.86	
22 01 40 81-0034	EA		Removal And Replacement Of Elongated Toilet Seat With Lid.....	100.16	
22 01 40 81-0035	EA		Removal And Replacement Of Elongated Toilet Seat Without Lid.....	109.82	
22 01 40 81-0036	EA		Removal And Replacement Of Handicap Toilet Seat, Complete With Rails.....	147.15	
22 01 40 81-0037	EA		Removal And Replacement Of Diverter Tub Spout.....	63.95	
22 01 40 81-0038	EA		Removal And Replacement Of Tub Spout.....	44.29	
22 01 40 81-0039	EA		Removal And Replacement Of 2" Tub Stopper.....	10.71	
22 01 40 81-0040	EA		Removal And Replacement Of Tub Waste/Overflow.....	73.93	
22 01 40 81-0041	EA		Removal And Replacement Of Tub Stem Bonnet Assembly.....	37.89	
22 01 40 81-0042	EA		Removal And Replacement Of Faucet Bonnet.....	41.82	
22 01 40 81-0043	EA		Removal And Replacement Of Faucet Diverter Stem.....	26.23	
22 01 40 81-0044	EA		Removal And Replacement Of Faucet Diverter Stem And Bonnet.....	34.82	
22 01 40 81-0045	EA		Removal And Replacement Of Faucet Spout.....	39.57	
22 01 40 81-0046	EA		Removal And Replacement Of Faucet Stem.....	29.08	
22 01 40 81-0047	EA		Removal And Replacement Of Plastic, Chrome Plated Drinking Fountain Bubbler Valve With Flexible Bubbler Guard.....	228.77	
22 01 40 81-0048	EA		Removal And Replacement Of Brass, Chrome Plated Drinking Fountain Bubbler Valve.....	289.01	
22 01 40 81-0049	EA		Removal And Replacement Of Stainless Steel (Lead Free) Drinking Fountain Pushbutton Bubbler Valve.....	173.39	

22 05 Common Work Results for Plumbing ⁽²²⁾**22 05 13 Common Motor Requirements for Plumbing Equipment** ^(22 05)

Note: New equipment includes motor, unless otherwise stated. For use when replacing existing motor. See CSI section 23 05 13 00-0000 for motor requirements.

22 05 16 Expansion Fittings and Loops for Plumbing Piping ^(22 05)

See CSI section 23 05 16 00-0000 for expansion fittings and loops.

22 05 17 Sleeves and Sleeve Seals for Plumbing Piping ^(22 05)

See CSI section 23 05 17 00-0000 for sleeves and sleeve seals.

22 05 19 Meters and Gages for Plumbing Piping ^(22 05)

See CSI section 23 05 19 00-0000 for gages, 33 19 00 00-0000 for water utility service metering.

22 05 23 General-Duty Valves for Plumbing Piping ^(22 05)

See CSI section 23 05 23 00-0000 for additional valves.

22 05 23 00-0001 Gate Valves ^(22 05 23)**22 05 23 00-0002 Class 125 Brazed Or Soldered Bronze Gate Valves** ^(22 05 23 00-0001)

Note: 125 psi steam, basic rating. 200 psi cold working pressure. (Milwaukee Valve 105)

22 05 23 00-0003	EA		1/4" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve.....	93.58	11.48
			For 150 LB Rating, Add	6.02	
			For 200 LB Rating, Add	9.02	
			For Work In Restricted Working Space, Add	10.03	
22 05 23 00-0004	EA		3/8" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve.....	95.34	11.48
			For 150 LB Rating, Add	6.02	
			For 200 LB Rating, Add	9.02	
			For Work In Restricted Working Space, Add	10.56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 05 23 00-0005 EA 1/2" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	97.54 6.05 9.08 11.11	11.48
22 05 23 00-0006 EA 3/4" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	114.94 6.50 9.75 14.98	12.63
22 05 23 00-0007 EA 1" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	140.08 7.97 11.95 18.13	14.35
22 05 23 00-0008 EA 1-1/4" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	206.60 13.01 19.51 22.97	15.28
22 05 23 00-0009 EA 1-1/2" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	229.66 14.13 21.20 26.50	17.68
22 05 23 00-0010 EA 2" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	275.62 17.12 25.69 31.31	20.89
22 05 23 00-0011 EA 2-1/2" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Chain Operated Type, Add</i>	637.69 49.67 74.51 42.29 223.52	28.23
22 05 23 00-0012 EA 3" Diameter, 125 LB Brazed Or Soldered Bronze Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	748.79 58.61 87.92 48.80	32.78
22 05 23 00-0013 Class 125 Brazed Or Soldered Bronze Lead Free Gate Valves <small>(22 05 23 00-0001)</small> Note: 125 psi steam, basic rating. 200 psi cold working pressure. (Milwaukee Valve UP105, Nibco T113-LF)		
22 05 23 00-0014 EA 1 1/4" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	113.62 8.02 12.03 10.03	11.48
22 05 23 00-0015 EA 3/8" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	115.21 8.00 12.00 10.56	11.48
22 05 23 00-0016 EA 1/2" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	134.58 9.75 14.63 11.11	11.48
22 05 23 00-0017 EA 3/4" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	151.98 10.21 15.31 14.98	12.63
22 05 23 00-0018 EA 1" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	182.34 12.19 18.29 18.13	14.35
22 05 23 00-0019 EA 1-1/4" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	264.40 18.79 28.18 22.97	15.28
22 05 23 00-0020 EA 1-1/2" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	302.36 21.40 32.11 26.50	17.68
22 05 23 00-0021 EA 2" Diameter, 125 LB Brazed Or Soldered Bronze Lead Free Gate Valve <i>For 150 LB Rating, Add</i> <i>For 200 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	387.95 28.36 42.54 31.31	20.89
22 05 23 00-0022 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valves <small>(22 05 23 00-0001)</small> Note: 200 psi cold working pressure.		
22 05 23 00-0023 EA 1/2" Diameter, 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valve <i>For Work In Restricted Working Space, Add</i>	131.75 7.75	11.48
22 05 23 00-0024 EA 3/4" Diameter, 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valve <i>For Work In Restricted Working Space, Add</i>	148.34 8.83	12.63
22 05 23 00-0025 EA 1" Diameter, 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valve <i>For Work In Restricted Working Space, Add</i>	195.31 10.55	14.35
22 05 23 00-0026 EA 1-1/4" Diameter, 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valve <i>For Work In Restricted Working Space, Add</i>	267.23 11.63	15.28
22 05 23 00-0027 EA 1-1/2" Diameter, 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valve <i>For Work In Restricted Working Space, Add</i>	309.98 12.92	17.68
22 05 23 00-0028 EA 2" Diameter, 200 PSI, Non-Rising Stem, Crimped Bronze Gate Valve <i>For Work In Restricted Working Space, Add</i>	427.44 15.50	20.89

22 Plumbing**22 05 Common Work Results for Plumbing****22 05 23 General-Duty Valves for Plumbing Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 05 23 00-0029	Ball Valves (22 05 23)		
22 05 23 00-0030	Crimped Bronze, Ball Valves (22 05 23 00-0029)		
22 05 23 00-0031	Crimped Bronze, 250 PSI, Ball Valves (22 05 23 00-0030)		
	Note: Nibco®		
22 05 23 00-0032	EA 1/2" Crimped Bronze, 250 PSI, Ball Valve <i>For Work In Restricted Working Space, Add</i>	89.81 7.75	11.48
22 05 23 00-0033	EA 3/4" Crimped Bronze, 250 PSI, Ball Valve <i>For Work In Restricted Working Space, Add</i>	116.59 8.83	12.63
22 05 23 00-0034	EA 1" Crimped Bronze, 250 PSI, Ball Valve <i>For Work In Restricted Working Space, Add</i>	149.90 10.55	14.35
22 05 23 00-0035	EA 1-1/4" Crimped Bronze, 250 PSI, Ball Valve <i>For Work In Restricted Working Space, Add</i>	243.97 11.63	15.28
22 05 23 00-0036	EA 1-1/2" Crimped Bronze, 250 PSI, Ball Valve <i>For Work In Restricted Working Space, Add</i>	323.27 12.92	17.68
22 05 23 00-0037	EA 2" Crimped Bronze, 250 PSI, Ball Valve <i>For Work In Restricted Working Space, Add</i>	488.52 15.50	20.89
22 05 23 00-0038	Crimped Bronze, 200 PSI, Full Port Ball Valves (22 05 23 00-0030)		
22 05 23 00-0039	EA 1/2" Crimped Bronze, 200 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	54.07 7.75	11.48
22 05 23 00-0040	EA 3/4" Crimped Bronze, 200 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	69.10 8.83	12.63
22 05 23 00-0041	EA 1" Crimped Bronze, 200 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	84.00 10.55	14.35
22 05 23 00-0042	EA 1-1/4" Crimped Bronze, 200 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	118.12 11.63	15.28
22 05 23 00-0043	EA 1-1/2" Crimped Bronze, 200 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	152.95 12.92	17.68
22 05 23 00-0044	EA 2" Crimped Bronze, 200 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	227.19 15.50	20.89
22 05 23 00-0045	Crimped Bronze, 250 PSI, Full Port Ball Valves (22 05 23 00-0030)		
22 05 23 00-0046	EA 1/2" Crimped Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	62.47 7.75	11.48
22 05 23 00-0047	EA 3/4" Crimped Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	75.21 8.83	12.63
22 05 23 00-0048	EA 1" Crimped Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	93.77 10.55	14.35
22 05 23 00-0049	EA 1-1/4" Crimped Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	148.64 11.63	15.28
22 05 23 00-0050	EA 1-1/2" Crimped Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	218.58 12.92	17.68
22 05 23 00-0051	EA 2" Crimped Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	303.50 15.50	20.89
22 05 23 00-0052	Crimped x Threaded Bronze, 250 PSI, Full Port Ball Valves (22 05 23 00-0030)		
22 05 23 00-0053	EA 1/2" Crimped x Threaded Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	60.18 7.75	11.48
22 05 23 00-0054	EA 3/4" Crimped x Threaded Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	73.07 8.83	12.63
22 05 23 00-0055	EA 1" Crimped x Threaded Bronze, 250 PSI, Full Port, Lever Ball Valve <i>For Work In Restricted Working Space, Add</i>	88.88 10.55	14.35
22 05 23 00-0056	Check Valves (22 05 23)		
22 05 23 00-0057	Crimped Bronze, 200 PSI, Y-Pattern, Swing Check Valves (22 05 23 00-0056)		
	Note: Nibco®		
22 05 23 00-0058	EA 1/2" Crimped Bronze, 200 PSI, Y-Pattern Check Valve <i>For Work In Restricted Working Space, Add</i>	173.66 7.75	11.48
22 05 23 00-0059	EA 3/4" Crimped Bronze, 200 PSI, Y-Pattern Check Valve <i>For Work In Restricted Working Space, Add</i>	221.38 8.83	12.63
22 05 23 00-0060	EA 1" Crimped Bronze, 200 PSI, Y-Pattern Check Valve <i>For Work In Restricted Working Space, Add</i>	306.54 10.55	14.35
22 05 23 00-0061	EA 1-1/4" Crimped Bronze, 200 PSI, Y-Pattern Check Valve <i>For Work In Restricted Working Space, Add</i>	409.41 11.63	15.28
22 05 23 00-0062	EA 1-1/2" Crimped Bronze, 200 PSI, Y-Pattern Check Valve <i>For Work In Restricted Working Space, Add</i>	488.74 12.92	17.68
22 05 23 00-0063	EA 2" Crimped Bronze, 200 PSI, Y-Pattern Check Valve <i>For Work In Restricted Working Space, Add</i>	700.34 15.50	20.89
22 05 23 00-0064	Crimped Bronze, 250 PSI, In-Line, Check Valves (22 05 23 00-0056)		
22 05 23 00-0065	EA 1/2" Crimped Bronze, 250 PSI, In-Line Check Valve <i>For Work In Restricted Working Space, Add</i>	47.63 7.75	11.48

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 05 23 00-0066 EA 3/4" Crimped Bronze, 200 PSI, In-Line Check Valve..... <i>For Work In Restricted Working Space, Add</i>	57.31 8.83	12.63
22 05 23 00-0067 EA 1" Crimped Bronze, 200 PSI, In-Line Check Valve..... <i>For Work In Restricted Working Space, Add</i>	67.30 10.55	14.35
22 05 23 00-0068 EA 1-1/4" Crimped Bronze, 200 PSI, In-Line Check Valve..... <i>For Work In Restricted Working Space, Add</i>	85.22 11.63	15.28
22 05 23 00-0069 EA 1-1/2" Crimped Bronze, 200 PSI, In-Line Check Valve..... <i>For Work In Restricted Working Space, Add</i>	109.04 12.92	17.68
22 05 23 00-0070 EA 2" Crimped Bronze, 200 PSI, In-Line Check Valve..... <i>For Work In Restricted Working Space, Add</i>	171.74 15.50	20.89
22 05 23 00-0071 Butterfly Valves <small>(22 05 23)</small>		
22 05 23 00-0072 Crimped Ductile Iron, 200 PSI, Handle Butterfly Valve <small>(22 05 23 00-0071)</small>		
22 05 23 00-0073 EA 2-1/2" Crimped Ductile Iron, 200 PSI, Handle Butterfly Valve..... <i>For Work In Restricted Working Space, Add</i>	1,309.36 18.08	30.66
22 05 23 00-0074 EA 3" Crimped Ductile Iron, 200 PSI, Handle Butterfly Valve..... <i>For Work In Restricted Working Space, Add</i>	1,416.93 21.53	35.60
22 05 23 00-0075 EA 4" Crimped Ductile Iron, 200 PSI, Handle Butterfly Valve..... <i>For Work In Restricted Working Space, Add</i>	1,770.83 28.42	40.19
22 05 29 Hangers and Supports for Plumbing Piping and Equipment <small>(22 05)</small>		
<small>See CSI section 23 05 29 00-0000 for hangers and supports.</small>		
22 05 48 Vibration and Seismic Controls for Plumbing Piping and Equipment <small>(22 05)</small>		
22 05 48 13 Vibration Controls for Plumbing Piping and Equipment <small>(22 05 48)</small>		
<small>See CSI section 23 05 48 13-0000 for vibration and seismic control.</small>		
22 05 53 Identification for Plumbing Piping and Equipment <small>(22 05)</small>		
<small>See CSI section 23 05 53 00-0000 for identification.</small>		
22 05 76 Facility Drainage Piping Cleanouts <small>(22 05)</small>		
22 05 76 00-0001 Cast Iron Cleanout With Plug And Cover <small>(22 05 76)</small>		
<small>Note: For floor installation.</small>		
22 05 76 00-0002 Cast Iron Cleanout With Plug And Round Or Square Cover <small>(22 05 76 00-0001)</small>		
22 05 76 00-0003 EA 2" Floor Cleanout, Round Or Square Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover..... <i>For Vandal Proof, Add</i> <i>For Galvanized Ferrule, Add</i> <i>For Carpet Marker, Add</i> <i>For Satin Bronze Top, Deduct</i> <i>For Carpet Flange, Add</i> <i>For Wide Flange, Add</i>	701.30 19.50 45.00 16.00 -24.00 58.50 97.00	61.08
22 05 76 00-0004 EA 3" Floor Cleanout, Round Or Square Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover..... <i>For Vandal Proof, Add</i> <i>For Galvanized Ferrule, Add</i> <i>For Carpet Marker, Add</i> <i>For Satin Bronze Top, Deduct</i> <i>For Carpet Flange, Add</i> <i>For Wide Flange, Add</i>	756.32 19.50 45.00 16.00 -24.00 58.50 97.00	76.59
22 05 76 00-0005 EA 4" Floor Cleanout, Round Or Square Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover..... <i>For Vandal Proof, Add</i> <i>For Galvanized Ferrule, Add</i> <i>For Carpet Marker, Add</i> <i>For Satin Bronze Top, Deduct</i> <i>For Carpet Flange, Add</i> <i>For Wide Flange, Add</i>	944.80 19.50 45.00 16.00 -24.00 58.50 97.00	92.55
22 05 76 00-0006 EA 5" Floor Cleanout, Round Or Square Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover..... <i>For Vandal Proof, Add</i> <i>For Galvanized Ferrule, Add</i> <i>For Carpet Marker, Add</i> <i>For Satin Bronze Top, Deduct</i> <i>For Carpet Flange, Add</i> <i>For Wide Flange, Add</i>	1,360.22 19.50 45.00 16.00 -24.00 58.50 97.00	103.56
22 05 76 00-0007 EA 6" Floor Cleanout, Round Or Square Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover..... <i>For Vandal Proof, Add</i> <i>For Galvanized Ferrule, Add</i> <i>For Carpet Marker, Add</i> <i>For Satin Bronze Top, Deduct</i> <i>For Carpet Flange, Add</i> <i>For Wide Flange, Add</i>	1,676.49 19.50 45.00 16.00 -24.00 58.50 97.00	112.17
22 05 76 00-0008 Cast Iron Heavy Duty Cleanout With Plug And Round Cover <small>(22 05 76 00-0001)</small>		

22 Plumbing**22 05 Common Work Results for Plumbing****22 05 76 Facility Drainage Piping Cleanouts**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 05 76 00-0009	EA		2" Heavy Duty Floor Cleanout, Round Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover.....	809.57	61.08
			<i>For Vandal Proof, Add</i>	19.50	
			<i>For Galvanized Ferrule, Add</i>	45.00	
			<i>For Carpet Marker, Add</i>	16.00	
			<i>For Satin Bronze Top, Deduct</i>	-24.00	
			<i>For Carpet Flange, Add</i>	58.50	
			<i>For Wide Flange, Add</i>	97.00	
22 05 76 00-0010	EA		3" Heavy Duty Floor Cleanout, Round Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover.....	866.31	76.59
			<i>For Vandal Proof, Add</i>	19.50	
			<i>For Galvanized Ferrule, Add</i>	45.00	
			<i>For Carpet Marker, Add</i>	16.00	
			<i>For Satin Bronze Top, Deduct</i>	-24.00	
			<i>For Carpet Flange, Add</i>	58.50	
			<i>For Wide Flange, Add</i>	97.00	
22 05 76 00-0011	EA		4" Heavy Duty Floor Cleanout, Round Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover.....	1,054.79	92.55
			<i>For Vandal Proof, Add</i>	19.50	
			<i>For Galvanized Ferrule, Add</i>	45.00	
			<i>For Carpet Marker, Add</i>	16.00	
			<i>For Satin Bronze Top, Deduct</i>	-24.00	
			<i>For Carpet Flange, Add</i>	58.50	
			<i>For Wide Flange, Add</i>	97.00	
22 05 76 00-0012	EA		5" Heavy Duty Floor Cleanout, Round Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover.....	1,470.21	103.56
			<i>For Vandal Proof, Add</i>	19.50	
			<i>For Galvanized Ferrule, Add</i>	45.00	
			<i>For Carpet Marker, Add</i>	16.00	
			<i>For Satin Bronze Top, Deduct</i>	-24.00	
			<i>For Carpet Flange, Add</i>	58.50	
			<i>For Wide Flange, Add</i>	97.00	
22 05 76 00-0013	EA		6" Heavy Duty Floor Cleanout, Round Top, Cast Iron With Cast Bronze Screw Plug And Nickel Bronze Cover.....	1,786.48	112.17
			<i>For Vandal Proof, Add</i>	19.50	
			<i>For Galvanized Ferrule, Add</i>	45.00	
			<i>For Carpet Marker, Add</i>	16.00	
			<i>For Satin Bronze Top, Deduct</i>	-24.00	
			<i>For Carpet Flange, Add</i>	58.50	
			<i>For Wide Flange, Add</i>	97.00	
22 05 76 00-0014			Wall Cover For Cleanout <small>(22 05 76)</small>		
			Note: Cover and screw only.		
22 05 76 00-0015			Round Access Cover, Bronze Polished Top <small>(22 05 76 00-0014)</small>		
			Note: Cover and screw only.		
22 05 76 00-0016	EA		4-1/4" Diameter Wall Cover For Cleanout, Screwed.....	103.58	19.17
			<i>For Stainless Steel, Add</i>	9.00	
			<i>For Vandal Proof Screws, Add</i>	19.50	
22 05 76 00-0017	EA		5-1/2" Diameter Wall Cover For Cleanout, Screwed.....	111.24	22.97
			<i>For Stainless Steel, Add</i>	9.00	
			<i>For Vandal Proof Screws, Add</i>	19.50	
22 05 76 00-0018	EA		7" Diameter Wall Cover For Cleanout, Screwed.....	142.75	25.84
			<i>For Stainless Steel, Add</i>	9.00	
			<i>For Vandal Proof Screws, Add</i>	19.50	
22 05 76 00-0019	EA		9-1/4" Diameter Wall Cover For Cleanout, Screwed.....	244.74	28.71
			<i>For Stainless Steel, Add</i>	9.00	
			<i>For Vandal Proof Screws, Add</i>	19.50	
22 05 76 00-0020	EA		11-1/4" Diameter Wall Cover For Cleanout, Screwed.....	370.78	31.58
			<i>For Stainless Steel, Add</i>	9.00	
			<i>For Vandal Proof Screws, Add</i>	19.50	
22 05 76 00-0021			Square Wall Access Panel, Bronze Polished Top <small>(22 05 76 00-0014)</small>		
			Note: Cover and screw only.		
22 05 76 00-0022	EA		7" x 7" Bronze Wall Or Floor Access Cover.....	562.18	19.17
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	
22 05 76 00-0023	EA		9" x 9" Bronze Wall Or Floor Access Cover.....	811.50	20.09
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	
22 05 76 00-0024	EA		10" x 10" Bronze Wall Or Floor Access Cover.....	867.15	21.24
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	
22 05 76 00-0025	EA		14" x 14" Bronze Wall Or Floor Access Cover.....	969.91	24.12
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	
22 05 76 00-0026			Secured Square Wall Access Panel, Bronze Polished Top <small>(22 05 76 00-0014)</small>		
			Note: Cover and screw only.		
22 05 76 00-0027	EA		6" x 6" Bronze Secured Wall Access Panel.....	572.20	19.17
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	
22 05 76 00-0028	EA		8" x 8" Bronze Secured Wall Access Panel.....	826.25	20.09
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	
22 05 76 00-0029	EA		10" x 10" Bronze Secured Wall Access Panel.....	882.93	21.24
			<i>For Vandal Proof Screws, Add</i>	19.50	
			<i>For Nickel Bronze, Add</i>	22.50	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 05 76 00-0030 EA 12" x 12" Bronze Secured Wall Access Panel <i>For Vandal Proof Screws, Add</i> <i>For Nickel Bronze, Add</i>	987.54 19.50 22.50	24.12
22 05 76 00-0031 Secure Square Hinged Access Panel, Bronze Polished Top, Scoriated (22 05 76 00-0014) Note: Cover and screw only.		
22 05 76 00-0032 EA 6" x 6" Bronze Secured Hinged Access Panel, Scoriated..... <i>For Vandal Proof Screws, Add</i> <i>For Nickel Bronze, Add</i>	554.90 19.50 22.50	19.17
22 05 76 00-0033 EA 8" x 8" Bronze Secured Hinged Access Panel, Scoriated..... <i>For Vandal Proof Screws, Add</i> <i>For Nickel Bronze, Add</i>	769.40 19.50 22.50	20.09
22 05 76 00-0034 EA 10" x 10" Bronze Secured Hinged Access Panel, Scoriated..... <i>For Vandal Proof Screws, Add</i> <i>For Nickel Bronze, Add</i>	1,093.04 19.50 22.50	21.24
22 05 76 00-0035 EA 12" x 12" Bronze Secured Hinged Access Panel, Scoriated..... <i>For Vandal Proof Screws, Add</i> <i>For Nickel Bronze, Add</i>	1,323.72 19.50 22.50	24.12
22 05 76 00-0036 Cast Iron Cleanout Tee (22 05 76)		
22 05 76 00-0037 Cast Iron Cleanout Tee And Round Access Cover (22 05 76 00-0036) Note: Satin smooth secured cover.		
22 05 76 00-0038 EA 2" Cleanout Tee With Bronze Screw Plug And Round Polished Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	506.66 18.00 45.00	61.08
22 05 76 00-0039 EA 3" Cleanout Tee With Bronze Screw Plug And Round Polished Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	577.62 18.00 45.00	76.47
22 05 76 00-0040 EA 4" Cleanout Tee With Bronze Screw Plug And Round Polished Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	755.59 18.00 45.00	92.55
22 05 76 00-0041 EA 6" Cleanout Tee With Bronze Screw Plug And Round Polished Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	1,826.13 18.00 45.00	112.17
22 05 76 00-0042 Cast Iron Cleanout Tee And Square Access Cover (22 05 76 00-0036) Note: Satin smooth secured cover.		
22 05 76 00-0043 EA 2" Cleanout Tee With Cast Bronze Screw Plug And Square Nickel Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	891.18 18.00 45.00	61.08
22 05 76 00-0044 EA 3" Cleanout Tee With Cast Bronze Screw Plug And Square Nickel Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	962.15 18.00 45.00	76.47
22 05 76 00-0045 EA 4" Cleanout Tee With Cast Bronze Screw Plug And Square Nickel Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	1,114.60 18.00 45.00	92.55
22 05 76 00-0046 EA 6" Cleanout Tee With Cast Bronze Screw Plug And Square Nickel Bronze Cover..... <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	2,345.51 18.00 45.00	112.17
22 05 76 00-0047 Cast Iron Cleanout Tee With Brass Plug (22 05 76 00-0036)		
22 05 76 00-0048 EA 2" Cleanout Tee With Cast Bronze Screw Plug	415.27	49.94
22 05 76 00-0049 EA 3" Cleanout Tee With Cast Bronze Screw Plug	464.56	54.54
22 05 76 00-0050 EA 4" Cleanout Tee With Cast Bronze Screw Plug	619.32	71.77
22 05 76 00-0051 EA 5" Cleanout Tee With Cast Bronze Screw Plug	935.58	84.97
22 05 76 00-0052 EA 6" Cleanout Tee With Cast Bronze Screw Plug	1,604.63	100.46
22 05 76 00-0053 Removable Cleanout Plug (22 05 76)		
22 05 76 00-0054 Threaded Bronze Plugs (22 05 76 00-0053)		
22 05 76 00-0055 EA 1-1/4", 1-1/2" Or 2" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	80.28 9.50	14.35
22 05 76 00-0056 EA 2-1/2" Threaded Bronze Plug	96.62	15.62
22 05 76 00-0057 EA 3" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	167.87 9.50	17.22
22 05 76 00-0058 EA 3-1/2" Threaded Bronze Plug	187.66	20.09
22 05 76 00-0059 EA 4" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	212.12 9.50	22.97
22 05 76 00-0060 EA 5" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	299.75 9.50	25.84
22 05 76 00-0061 EA 6" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	443.53 9.50	28.71
22 05 76 00-0062 EA 8" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	753.33 9.50	31.58

22 Plumbing
22 05 Common Work Results for Plumbing
22 05 76 Facility Drainage Piping Cleanouts



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 05 76 00-0063	EA 10" Threaded Bronze Plug..... <i>For Plug Tapped For Center Screw, Add</i>	1,086.60 9.50	34.45
22 05 76 00-0064	Threaded Brass Plugs (22 05 76 00-0053)		
22 05 76 00-0065	EA 1-1/2" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	32.17 9.50	14.35
22 05 76 00-0066	EA 2" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	32.78 9.50	14.35
22 05 76 00-0067	EA 2-1/2" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	35.76 9.50	15.62
22 05 76 00-0068	EA 3" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	40.52 9.50	17.22
22 05 76 00-0069	EA 3-1/2" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	47.89 9.50	20.09
22 05 76 00-0070	EA 4" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	56.36 9.50	22.96
22 05 76 00-0071	EA 4-1/2" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	60.58 9.50	24.19
22 05 76 00-0072	EA 5" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	65.17 9.50	25.84
22 05 76 00-0073	EA 6" Threaded Brass Plug, Raised Head..... <i>For Plug Tapped For Center Screw, Add</i>	85.54 9.50	28.70
22 05 76 00-0074	EA 1-1/2" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	31.70 9.50	14.35
22 05 76 00-0075	EA 2" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	32.37 9.50	14.35
22 05 76 00-0076	EA 2-1/2" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	37.07 9.50	15.62
22 05 76 00-0077	EA 3" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	40.71 9.50	17.22
22 05 76 00-0078	EA 3-1/2" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	47.33 9.50	20.09
22 05 76 00-0079	EA 4" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	55.47 9.50	22.97
22 05 76 00-0080	EA 5" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	64.69 9.50	25.84
22 05 76 00-0081	EA 6" Threaded Brass Plug, Countersunk Head..... <i>For Plug Tapped For Center Screw, Add</i>	77.69 9.50	28.71

22 07 Plumbing Insulation (22)

22 07 16 Plumbing Equipment Insulation (22 07)

22 07 16 00-0001	Lavatory Insulation (22 07 16)		
22 07 16 00-0002	EA Neoprene Insulation Kit For Under Lavatories.....	359.40	24.20
22 07 16 00-0003	Water Heater Insulation (22 07 16)		
22 07 16 00-0004	EA 3" Thick, 48" x 75" Fiberglass Insulation Blanket For Water Heaters.....	101.60	24.20

22 07 19 Plumbing Piping Insulation (22 07)

22 07 19 00-0001	Fiberglass (Glass Fiber) Pipe Insulation (22 07 19) Note: Includes factory applied All Service Jacket (ASJ), Self Sealing Lap (SSL) longitudinal seam, butt strip seals, and adhesive. Excludes insulation for fittings (a location requiring purchase of an insulation fitting or cutting and fitting straight sections, excludes couplings, plugs, etc.). For fittings/valves up to 3" add 2 LF for each fitting/valve or 3 LF for each flanged/grooved joint. For fittings/valves >3" add 3 LF for each fitting/valve or 4 LF for each flanged/grooved joint.		
22 07 19 00-0002	1" Thick Fiberglass Pipe Insulation (22 07 19 00-0001)		
22 07 19 00-0003	LF 1/2" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ)..... <i>For Work In Restricted Working Space, Add</i> <i>For Single Layer Of Felt Finish, Add</i>	11.15 2.65 0.24	3.22
22 07 19 00-0004	LF 3/4" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ)..... <i>For Work In Restricted Working Space, Add</i> <i>For Single Layer Of Felt Finish, Add</i>	11.48 2.65 0.28	3.22
22 07 19 00-0005	LF 1" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ)..... <i>For Work In Restricted Working Space, Add</i> <i>For Single Layer Of Felt Finish, Add</i>	11.66 2.69 0.28	3.22
22 07 19 00-0006	LF 1-1/4" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ)..... <i>For Work In Restricted Working Space, Add</i> <i>For Single Layer Of Felt Finish, Add</i>	12.13 2.73 0.32	3.33
22 07 19 00-0007	LF 1-1/2" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ)..... <i>For Work In Restricted Working Space, Add</i> <i>For Single Layer Of Felt Finish, Add</i>	12.49 2.77 0.34	3.33
22 07 19 00-0008	LF 2" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ)..... <i>For Work In Restricted Working Space, Add</i> <i>For Single Layer Of Felt Finish, Add</i>	13.05 2.84 0.37	3.45

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0009 LF 2-1/2" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	13.80	3.66
<i>For Work In Restricted Working Space, Add</i>	2.96	
<i>For Single Layer Of Felt Finish, Add</i>	0.41	
22 07 19 00-0010 LF 3" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	14.56	3.77
<i>For Work In Restricted Working Space, Add</i>	3.03	
<i>For Single Layer Of Felt Finish, Add</i>	0.47	
22 07 19 00-0011 LF 4" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	16.62	3.98
<i>For Work In Restricted Working Space, Add</i>	3.26	
<i>For Single Layer Of Felt Finish, Add</i>	0.60	
22 07 19 00-0012 LF 6" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	19.30	4.62
<i>For Work In Restricted Working Space, Add</i>	3.68	
<i>For Single Layer Of Felt Finish, Add</i>	0.74	
22 07 19 00-0013 LF 8" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	24.11	5.17
<i>For Work In Restricted Working Space, Add</i>	4.22	
<i>For Single Layer Of Felt Finish, Add</i>	1.05	
22 07 19 00-0014 LF 10" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	28.34	6.14
<i>For Work In Restricted Working Space, Add</i>	4.99	
<i>For Single Layer Of Felt Finish, Add</i>	1.23	
22 07 19 00-0015 LF 12" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	32.50	6.99
<i>For Work In Restricted Working Space, Add</i>	5.76	
<i>For Single Layer Of Felt Finish, Add</i>	1.40	
22 07 19 00-0016 LF 14" Diameter Pipe, 1" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	35.28	7.64
<i>For Work In Restricted Working Space, Add</i>	5.96	
<i>For Single Layer Of Felt Finish, Add</i>	1.62	
22 07 19 00-0017 1-1/2" Thick Fiberglass Pipe Insulation (22 07 19 00-0001)		
22 07 19 00-0018 LF 1/2" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	13.89	3.32
<i>For Work In Restricted Working Space, Add</i>	2.76	
<i>For Single Layer Of Felt Finish, Add</i>	0.49	
22 07 19 00-0019 LF 3/4" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	14.10	3.32
<i>For Work In Restricted Working Space, Add</i>	2.76	
<i>For Single Layer Of Felt Finish, Add</i>	0.51	
22 07 19 00-0020 LF 1" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	14.89	3.52
<i>For Work In Restricted Working Space, Add</i>	2.93	
<i>For Single Layer Of Felt Finish, Add</i>	0.54	
22 07 19 00-0021 LF 1-1/4" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	15.47	3.60
<i>For Work In Restricted Working Space, Add</i>	2.98	
<i>For Single Layer Of Felt Finish, Add</i>	0.58	
22 07 19 00-0022 LF 1-1/2" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	15.95	3.66
<i>For Work In Restricted Working Space, Add</i>	3.04	
<i>For Single Layer Of Felt Finish, Add</i>	0.61	
22 07 19 00-0023 LF 2" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	17.03	3.85
<i>For Work In Restricted Working Space, Add</i>	3.20	
<i>For Single Layer Of Felt Finish, Add</i>	0.67	
22 07 19 00-0024 LF 2-1/2" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	17.85	3.92
<i>For Work In Restricted Working Space, Add</i>	3.26	
<i>For Single Layer Of Felt Finish, Add</i>	0.73	
22 07 19 00-0025 LF 3" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	18.43	4.06
<i>For Work In Restricted Working Space, Add</i>	3.37	
<i>For Single Layer Of Felt Finish, Add</i>	0.76	
22 07 19 00-0026 LF 4" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	20.39	4.39
<i>For Work In Restricted Working Space, Add</i>	3.64	
<i>For Single Layer Of Felt Finish, Add</i>	0.87	
22 07 19 00-0027 LF 6" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	23.59	5.12
<i>For Work In Restricted Working Space, Add</i>	4.25	
<i>For Single Layer Of Felt Finish, Add</i>	0.99	
22 07 19 00-0028 LF 8" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	26.75	5.40
<i>For Work In Restricted Working Space, Add</i>	4.49	
<i>For Single Layer Of Felt Finish, Add</i>	1.24	
22 07 19 00-0029 LF 10" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	32.78	6.47
<i>For Work In Restricted Working Space, Add</i>	5.37	
<i>For Single Layer Of Felt Finish, Add</i>	1.56	
22 07 19 00-0030 LF 12" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	37.04	7.53
<i>For Work In Restricted Working Space, Add</i>	6.26	
<i>For Single Layer Of Felt Finish, Add</i>	1.70	
22 07 19 00-0031 LF 14" Diameter Pipe, 1-1/2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	41.60	8.25
<i>For Work In Restricted Working Space, Add</i>	6.86	
<i>For Single Layer Of Felt Finish, Add</i>	1.97	
22 07 19 00-0032 2" Thick Fiberglass Pipe Insulation (22 07 19 00-0001)		
22 07 19 00-0033 LF 1/2" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	17.45	3.66
<i>For Work In Restricted Working Space, Add</i>	3.03	
<i>For Single Layer Of Felt Finish, Add</i>	0.77	
22 07 19 00-0034 LF 3/4" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	17.70	3.66
<i>For Work In Restricted Working Space, Add</i>	3.03	
<i>For Single Layer Of Felt Finish, Add</i>	0.80	
22 07 19 00-0035 LF 1" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	18.36	3.77
<i>For Work In Restricted Working Space, Add</i>	3.08	
<i>For Single Layer Of Felt Finish, Add</i>	0.85	
22 07 19 00-0036 LF 1-1/4" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	18.95	3.77
<i>For Work In Restricted Working Space, Add</i>	3.11	
<i>For Single Layer Of Felt Finish, Add</i>	0.90	

22 Plumbing
22 07 Plumbing Insulation
22 07 19 Plumbing Piping Insulation



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0037	LF		1-1/2" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	19.56	3.87
			<i>For Work In Restricted Working Space, Add</i>	3.15	
			<i>For Single Layer Of Felt Finish, Add</i>	0.95	
22 07 19 00-0038	LF		2" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	20.30	3.98
			<i>For Work In Restricted Working Space, Add</i>	3.26	
			<i>For Single Layer Of Felt Finish, Add</i>	0.99	
22 07 19 00-0039	LF		2-1/2" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	21.39	4.09
			<i>For Work In Restricted Working Space, Add</i>	3.38	
			<i>For Single Layer Of Felt Finish, Add</i>	1.06	
22 07 19 00-0040	LF		3" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	22.57	4.30
			<i>For Work In Restricted Working Space, Add</i>	3.50	
			<i>For Single Layer Of Felt Finish, Add</i>	1.15	
22 07 19 00-0041	LF		4" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	24.79	4.51
			<i>For Work In Restricted Working Space, Add</i>	3.69	
			<i>For Single Layer Of Felt Finish, Add</i>	1.31	
22 07 19 00-0042	LF		6" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	29.27	5.30
			<i>For Work In Restricted Working Space, Add</i>	4.43	
			<i>For Single Layer Of Felt Finish, Add</i>	1.52	
22 07 19 00-0043	LF		8" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	33.51	5.60
			<i>For Work In Restricted Working Space, Add</i>	4.67	
			<i>For Single Layer Of Felt Finish, Add</i>	1.88	
22 07 19 00-0044	LF		10" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	40.10	6.70
			<i>For Work In Restricted Working Space, Add</i>	5.59	
			<i>For Single Layer Of Felt Finish, Add</i>	2.25	
22 07 19 00-0045	LF		12" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	45.89	8.04
			<i>For Work In Restricted Working Space, Add</i>	6.69	
			<i>For Single Layer Of Felt Finish, Add</i>	2.48	
22 07 19 00-0046	LF		14" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	57.79	8.76
			<i>For Work In Restricted Working Space, Add</i>	9.34	
			<i>For Single Layer Of Felt Finish, Add</i>	2.80	
22 07 19 00-0047	LF		16" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	61.49	10.28
			<i>For Work In Restricted Working Space, Add</i>	9.34	
			<i>For Single Layer Of Felt Finish, Add</i>	3.19	
22 07 19 00-0048	LF		18" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	68.76	10.79
			<i>For Work In Restricted Working Space, Add</i>	9.80	
			<i>For Single Layer Of Felt Finish, Add</i>	3.79	
22 07 19 00-0049	LF		20" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	77.84	12.33
			<i>For Work In Restricted Working Space, Add</i>	11.21	
			<i>For Single Layer Of Felt Finish, Add</i>	4.25	
22 07 19 00-0050	LF		24" Diameter Pipe, 2" Thick, Fiberglass Insulation With All Service Jacket (ASJ).....	90.01	14.90
			<i>For Work In Restricted Working Space, Add</i>	13.54	
			<i>For Single Layer Of Felt Finish, Add</i>	4.71	
22 07 19 00-0051			Foamglas (Cellular Glass) Pipe Insulation, Rigid, Closed Cell <small>(22 07 19)</small> Note: Includes adhesive. Excludes fittings (a location requiring purchase of an insulation fitting or cutting and fitting straight sections, excludes couplings, plugs, etc.). For fittings/valves up to 3" add 2 LF for each fitting/valve or 3 LF for each flanged/grooved joint. For fittings/valves >3" add 3 LF for each fitting/valve or 4 LF for each flanged/grooved joint.		
22 07 19 00-0052			1" Thick Foamglas Pipe Insulation <small>(22 07 19 00-0051)</small>		
22 07 19 00-0053	LF		1/2" Diameter Pipe, 1" Thick Foamglas Insulation.....	18.96	5.25
			<i>For Work In Restricted Working Space, Add</i>	4.77	
22 07 19 00-0054	LF		3/4" Diameter Pipe, 1" Thick Foamglas Insulation.....	19.74	5.25
			<i>For Work In Restricted Working Space, Add</i>	4.77	
22 07 19 00-0055	LF		1" Diameter Pipe, 1" Thick Foamglas Insulation.....	20.76	5.33
			<i>For Work In Restricted Working Space, Add</i>	4.84	
22 07 19 00-0056	LF		1-1/4" Diameter Pipe, 1" Thick Foamglas Insulation.....	21.25	5.40
			<i>For Work In Restricted Working Space, Add</i>	4.91	
22 07 19 00-0057	LF		1-1/2" Diameter Pipe, 1" Thick Foamglas Insulation.....	22.01	5.47
			<i>For Work In Restricted Working Space, Add</i>	4.98	
22 07 19 00-0058	LF		2" Diameter Pipe, 1" Thick Foamglas Insulation.....	23.46	5.62
			<i>For Work In Restricted Working Space, Add</i>	5.12	
22 07 19 00-0059	LF		2-1/2" Diameter Pipe, 1" Thick Foamglas Insulation.....	25.27	5.86
			<i>For Work In Restricted Working Space, Add</i>	5.33	
22 07 19 00-0060	LF		3" Diameter Pipe, 1" Thick Foamglas Insulation.....	27.25	6.01
			<i>For Work In Restricted Working Space, Add</i>	5.47	
22 07 19 00-0061	LF		4" Diameter Pipe, 1" Thick Foamglas Insulation.....	31.50	6.47
			<i>For Work In Restricted Working Space, Add</i>	5.88	
22 07 19 00-0062	LF		6" Diameter Pipe, 1" Thick Foamglas Insulation.....	40.11	7.29
			<i>For Work In Restricted Working Space, Add</i>	6.63	
22 07 19 00-0063			1-1/2" Thick Foamglas Pipe Insulation <small>(22 07 19 00-0051)</small>		
22 07 19 00-0064	LF		1/2" Diameter Pipe, 1-1/2" Thick Foamglas Insulation.....	22.47	5.82
			<i>For Work In Restricted Working Space, Add</i>	5.12	
22 07 19 00-0065	LF		3/4" Diameter Pipe, 1-1/2" Thick Foamglas Insulation.....	22.96	5.82
			<i>For Work In Restricted Working Space, Add</i>	5.12	
22 07 19 00-0066	LF		1" Diameter Pipe, 1-1/2" Thick Foamglas Insulation.....	23.69	5.89
			<i>For Work In Restricted Working Space, Add</i>	5.19	
22 07 19 00-0067	LF		1-1/4" Diameter Pipe, 1-1/2" Thick Foamglas Insulation.....	24.26	5.97
			<i>For Work In Restricted Working Space, Add</i>	5.25	
22 07 19 00-0068	LF		1-1/2" Diameter Pipe, 1-1/2" Thick Foamglas Insulation.....	24.81	6.05
			<i>For Work In Restricted Working Space, Add</i>	5.33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0069 LF 2" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	26.90 5.50	6.25
22 07 19 00-0070 LF 2-1/2" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	30.48 5.71	6.49
22 07 19 00-0071 LF 3" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	33.65 5.88	6.68
22 07 19 00-0072 LF 4" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	38.13 6.26	7.11
22 07 19 00-0073 LF 6" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	44.91 7.09	8.06
22 07 19 00-0074 LF 8" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	50.23 7.90	8.99
22 07 19 00-0075 LF 10" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	60.95 9.11	10.36
22 07 19 00-0076 LF 12" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	72.31 11.33	12.87
22 07 19 00-0077 LF 14" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	80.35 12.31	13.54
22 07 19 00-0078 LF 16" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	88.45 13.75	15.12
22 07 19 00-0079 LF 18" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	100.21 16.26	17.89
22 07 19 00-0080 LF 20" Diameter Pipe, 1-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	111.96 18.01	19.81
22 07 19 00-0081 LF 24" Diameter Pipe, 1-1/2" Thick Fiberglass Insulation <i>For Work In Restricted Working Space, Add</i>	139.90 19.95	21.94
22 07 19 00-0082 2" Thick Foamglas Pipe Insulation <small>(22 07 19 00-0051)</small>		
22 07 19 00-0083 LF 1/2" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	25.28 5.47	6.01
22 07 19 00-0084 LF 3/4" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	26.04 5.47	6.01
22 07 19 00-0085 LF 1" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	27.01 5.53	6.07
22 07 19 00-0086 LF 1-1/4" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	28.45 5.60	6.17
22 07 19 00-0087 LF 1-1/2" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	29.89 5.67	6.24
22 07 19 00-0088 LF 2" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	33.43 5.88	6.47
22 07 19 00-0089 LF 2-1/2" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	35.07 6.09	6.70
22 07 19 00-0090 LF 3" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	37.64 6.29	6.92
22 07 19 00-0091 LF 4" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	42.40 6.64	7.30
22 07 19 00-0092 LF 6" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	50.74 7.54	8.29
22 07 19 00-0093 LF 8" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	56.49 8.41	9.25
22 07 19 00-0094 LF 10" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	68.78 9.70	10.66
22 07 19 00-0095 LF 12" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	85.20 12.05	13.25
22 07 19 00-0096 LF 14" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	91.00 13.15	14.47
22 07 19 00-0097 LF 16" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	107.50 16.81	18.49
22 07 19 00-0098 LF 18" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	117.24 17.64	19.41
22 07 19 00-0099 LF 20" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	129.66 20.17	22.19
22 07 19 00-0100 LF 24" Diameter Pipe, 2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	162.71 24.38	26.81
22 07 19 00-0101 2-1/2" Thick Foamglas Pipe Insulation <small>(22 07 19 00-0051)</small>		
22 07 19 00-0102 LF 1/2" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	30.74 5.93	6.52
22 07 19 00-0103 LF 3/4" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	32.03 5.92	6.51
22 07 19 00-0104 LF 1" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	33.66 6.02	6.62
22 07 19 00-0105 LF 1-1/4" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	35.11 6.06	6.67
22 07 19 00-0106 LF 1-1/2" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	36.58 6.11	6.72
22 07 19 00-0107 LF 2" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	39.23 6.36	6.99
22 07 19 00-0108 LF 2-1/2" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	41.75 6.58	7.24
22 07 19 00-0109 LF 3" Diameter Pipe, 2-1/2" Thick Foamglas Insulation <i>For Work In Restricted Working Space, Add</i>	45.37 6.81	7.49

22 Plumbing**22 07 Plumbing Insulation****22 07 19 Plumbing Piping Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0110	LF		4" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	50.89	7.90
			<i>For Work In Restricted Working Space, Add</i>	7.18	
22 07 19 00-0111	LF		6" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	60.87	8.99
			<i>For Work In Restricted Working Space, Add</i>	8.16	
22 07 19 00-0112	LF		8" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	67.83	10.01
			<i>For Work In Restricted Working Space, Add</i>	9.10	
22 07 19 00-0113	LF		10" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	77.38	11.54
			<i>For Work In Restricted Working Space, Add</i>	10.49	
22 07 19 00-0114	LF		12" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	96.36	14.35
			<i>For Work In Restricted Working Space, Add</i>	13.04	
22 07 19 00-0115	LF		14" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	100.42	15.67
			<i>For Work In Restricted Working Space, Add</i>	14.24	
22 07 19 00-0116	LF		16" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	118.28	20.02
			<i>For Work In Restricted Working Space, Add</i>	18.20	
22 07 19 00-0117	LF		18" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	128.68	21.01
			<i>For Work In Restricted Working Space, Add</i>	19.11	
22 07 19 00-0118	LF		20" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	147.97	24.02
			<i>For Work In Restricted Working Space, Add</i>	21.84	
22 07 19 00-0119	LF		24" Diameter Pipe, 2-1/2" Thick Foamglas Insulation	185.40	29.03
			<i>For Work In Restricted Working Space, Add</i>	26.39	
22 07 19 00-0120			3" Thick Foamglas Pipe Insulation (22 07 19 00-0051)		
22 07 19 00-0121	LF		1/2" Diameter Pipe, 3" Thick Foamglas Insulation	37.22	6.93
			<i>For Work In Restricted Working Space, Add</i>	6.30	
22 07 19 00-0122	LF		3/4" Diameter Pipe, 3" Thick Foamglas Insulation	38.00	6.93
			<i>For Work In Restricted Working Space, Add</i>	6.30	
22 07 19 00-0123	LF		1" Diameter Pipe, 3" Thick Foamglas Insulation	39.12	7.04
			<i>For Work In Restricted Working Space, Add</i>	6.40	
22 07 19 00-0124	LF		1-1/4" Diameter Pipe, 3" Thick Foamglas Insulation	40.05	7.09
			<i>For Work In Restricted Working Space, Add</i>	6.45	
22 07 19 00-0125	LF		1-1/2" Diameter Pipe, 3" Thick Foamglas Insulation	41.02	7.15
			<i>For Work In Restricted Working Space, Add</i>	6.50	
22 07 19 00-0126	LF		2" Diameter Pipe, 3" Thick Foamglas Insulation	44.11	7.44
			<i>For Work In Restricted Working Space, Add</i>	6.77	
22 07 19 00-0127	LF		2-1/2" Diameter Pipe, 3" Thick Foamglas Insulation	47.07	7.71
			<i>For Work In Restricted Working Space, Add</i>	7.00	
22 07 19 00-0128	LF		3" Diameter Pipe, 3" Thick Foamglas Insulation	53.56	7.97
			<i>For Work In Restricted Working Space, Add</i>	7.25	
22 07 19 00-0129	LF		4" Diameter Pipe, 3" Thick Foamglas Insulation	61.19	8.40
			<i>For Work In Restricted Working Space, Add</i>	7.64	
22 07 19 00-0130	LF		6" Diameter Pipe, 3" Thick Foamglas Insulation	66.97	9.55
			<i>For Work In Restricted Working Space, Add</i>	8.68	
22 07 19 00-0131	LF		8" Diameter Pipe, 3" Thick Foamglas Insulation	75.66	10.65
			<i>For Work In Restricted Working Space, Add</i>	9.68	
22 07 19 00-0132	LF		10" Diameter Pipe, 3" Thick Foamglas Insulation	90.31	12.28
			<i>For Work In Restricted Working Space, Add</i>	11.16	
22 07 19 00-0133	LF		12" Diameter Pipe, 3" Thick Foamglas Insulation	104.79	15.26
			<i>For Work In Restricted Working Space, Add</i>	13.88	
22 07 19 00-0134	LF		14" Diameter Pipe, 3" Thick Foamglas Insulation	112.16	16.66
			<i>For Work In Restricted Working Space, Add</i>	15.15	
22 07 19 00-0135	LF		16" Diameter Pipe, 3" Thick Foamglas Insulation	133.75	21.30
			<i>For Work In Restricted Working Space, Add</i>	19.36	
22 07 19 00-0136	LF		18" Diameter Pipe, 3" Thick Foamglas Insulation	143.23	22.36
			<i>For Work In Restricted Working Space, Add</i>	20.33	
22 07 19 00-0137	LF		20" Diameter Pipe, 3" Thick Foamglas Insulation	167.93	25.56
			<i>For Work In Restricted Working Space, Add</i>	23.24	
22 07 19 00-0138	LF		24" Diameter Pipe, 3" Thick Foamglas Insulation	205.33	30.89
			<i>For Work In Restricted Working Space, Add</i>	28.07	
22 07 19 00-0139			3-1/2" Thick Foamglas Pipe Insulation (22 07 19 00-0051)		
22 07 19 00-0140	LF		1/2" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	44.82	8.40
			<i>For Work In Restricted Working Space, Add</i>	7.64	
22 07 19 00-0141	LF		3/4" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	45.80	8.40
			<i>For Work In Restricted Working Space, Add</i>	7.64	
22 07 19 00-0142	LF		1" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	46.95	8.45
			<i>For Work In Restricted Working Space, Add</i>	7.69	
22 07 19 00-0143	LF		1-1/4" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	48.09	8.51
			<i>For Work In Restricted Working Space, Add</i>	7.74	
22 07 19 00-0144	LF		1-1/2" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	49.40	8.61
			<i>For Work In Restricted Working Space, Add</i>	7.83	
22 07 19 00-0145	LF		2" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	54.43	8.92
			<i>For Work In Restricted Working Space, Add</i>	8.10	
22 07 19 00-0146	LF		2-1/2" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	59.50	9.23
			<i>For Work In Restricted Working Space, Add</i>	8.39	
22 07 19 00-0147	LF		3" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	62.87	9.55
			<i>For Work In Restricted Working Space, Add</i>	8.68	
22 07 19 00-0148	LF		4" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	67.36	10.10
			<i>For Work In Restricted Working Space, Add</i>	9.18	
22 07 19 00-0149	LF		6" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	77.56	11.46
			<i>For Work In Restricted Working Space, Add</i>	10.42	
22 07 19 00-0150	LF		8" Diameter Pipe, 3-1/2" Thick Foamglas Insulation	88.23	12.76
			<i>For Work In Restricted Working Space, Add</i>	11.61	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0151 LF 10" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	105.60 13.40	14.74
22 07 19 00-0152 LF 12" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	124.66 16.65	18.31
22 07 19 00-0153 LF 14" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	129.91 18.18	20.00
22 07 19 00-0154 LF 16" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	155.50 23.24	25.56
22 07 19 00-0155 LF 18" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	171.09 24.40	26.84
22 07 19 00-0156 LF 20" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	194.77 27.90	30.69
22 07 19 00-0157 LF 24" Diameter Pipe, 3-1/2" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	239.27 33.69	37.05
22 07 19 00-0158 4" Thick Foamglas Pipe Insulation (22 07 19 00-0051)		
22 07 19 00-0159 LF 1/2" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	54.57 9.38	10.33
22 07 19 00-0160 LF 3/4" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	55.83 9.38	10.33
22 07 19 00-0161 LF 1" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	57.63 9.55	10.50
22 07 19 00-0162 LF 1-1/4" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	59.27 9.66	10.63
22 07 19 00-0163 LF 1-1/2" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	61.54 9.96	10.96
22 07 19 00-0164 LF 2" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	66.57 10.27	11.29
22 07 19 00-0165 LF 2-1/2" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	71.08 10.43	11.47
22 07 19 00-0166 LF 3" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	74.65 10.82	11.90
22 07 19 00-0167 LF 4" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	81.54 12.06	13.27
22 07 19 00-0168 LF 6" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	94.50 12.95	14.24
22 07 19 00-0169 LF 8" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	106.80 14.04	15.44
22 07 19 00-0170 LF 10" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	122.20 16.68	18.36
22 07 19 00-0171 LF 12" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	142.55 20.72	22.80
22 07 19 00-0172 LF 14" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	154.99 22.64	24.89
22 07 19 00-0173 LF 16" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	183.58 28.94	31.82
22 07 19 00-0174 LF 18" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	204.60 30.32	33.36
22 07 19 00-0175 LF 20" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	229.22 34.71	38.17
22 07 19 00-0176 LF 24" Diameter Pipe, 4" Thick Foamglas Insulation..... <i>For Work In Restricted Working Space, Add</i>	291.11 41.93	46.12
22 07 19 00-0177 Flexible Polyethylene Tubing Closed Cell Foam Insulation (22 07 19) Note: UV resistant standard temperature (-90 Degree F To +212 Degree F). For elbow fittings/valves add 1 LF for each fitting/valve, for tee fittings add 2 LF for each fitting.		
22 07 19 00-0178 3/8" Wall Flexible Polyethylene Tubing Foam Insulation (22 07 19 00-0177)		
22 07 19 00-0179 LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	6.96 1.94	3.21
22 07 19 00-0180 LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	6.97 1.94	3.21
22 07 19 00-0181 LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	7.26 2.00	3.33
22 07 19 00-0182 LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	7.56 2.07	3.45
22 07 19 00-0183 LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	7.87 2.10	3.51
22 07 19 00-0184 LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	8.23 2.14	3.56
22 07 19 00-0185 LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	8.38 2.15	3.56
22 07 19 00-0186 LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	8.80 2.15	3.56
22 07 19 00-0187 LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	9.62 2.22	3.67
22 07 19 00-0188 LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	9.97 2.25	3.74
22 07 19 00-0189 1/2" Wall Flexible Polyethylene Tubing Foam Insulation (22 07 19 00-0177)		

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 07 19 00-0190	LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	7.75	3.51
	<i>For Work In Restricted Working Space, Add</i>	2.10	
22 07 19 00-0191	LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	7.84	3.51
	<i>For Work In Restricted Working Space, Add</i>	2.12	
22 07 19 00-0192	LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	7.99	3.56
	<i>For Work In Restricted Working Space, Add</i>	2.14	
22 07 19 00-0193	LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	8.16	3.59
	<i>For Work In Restricted Working Space, Add</i>	2.15	
22 07 19 00-0194	LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	8.61	3.67
	<i>For Work In Restricted Working Space, Add</i>	2.20	
22 07 19 00-0195	LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	8.99	3.74
	<i>For Work In Restricted Working Space, Add</i>	2.24	
22 07 19 00-0196	LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	9.44	3.79
	<i>For Work In Restricted Working Space, Add</i>	2.27	
22 07 19 00-0197	LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	9.98	3.84
	<i>For Work In Restricted Working Space, Add</i>	2.30	
22 07 19 00-0198	LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	10.92	3.96
	<i>For Work In Restricted Working Space, Add</i>	2.37	
22 07 19 00-0199	LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	11.91	4.01
	<i>For Work In Restricted Working Space, Add</i>	2.41	
22 07 19 00-0200	LF 3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	12.84	4.07
	<i>For Work In Restricted Working Space, Add</i>	2.44	
22 07 19 00-0201	LF 4" I.D. (4-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	13.40	4.12
	<i>For Work In Restricted Working Space, Add</i>	2.48	
22 07 19 00-0202	3/4" Wall Flexible Polyethylene Tubing Foam Insulation <small>(22 07 19 00-0177)</small>		
22 07 19 00-0203	LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	8.69	3.79
	<i>For Work In Restricted Working Space, Add</i>	2.27	
22 07 19 00-0204	LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	8.79	3.84
	<i>For Work In Restricted Working Space, Add</i>	2.30	
22 07 19 00-0205	LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	9.42	3.96
	<i>For Work In Restricted Working Space, Add</i>	2.37	
22 07 19 00-0206	LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	9.69	4.01
	<i>For Work In Restricted Working Space, Add</i>	2.41	
22 07 19 00-0207	LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	10.47	4.12
	<i>For Work In Restricted Working Space, Add</i>	2.48	
22 07 19 00-0208	LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	11.29	4.18
	<i>For Work In Restricted Working Space, Add</i>	2.51	
22 07 19 00-0209	LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	11.66	4.20
	<i>For Work In Restricted Working Space, Add</i>	2.52	
22 07 19 00-0210	LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	13.18	4.24
	<i>For Work In Restricted Working Space, Add</i>	2.54	
22 07 19 00-0211	LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	15.28	4.34
	<i>For Work In Restricted Working Space, Add</i>	2.61	
22 07 19 00-0212	LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	15.38	4.41
	<i>For Work In Restricted Working Space, Add</i>	2.64	
22 07 19 00-0213	LF 3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	16.89	4.46
	<i>For Work In Restricted Working Space, Add</i>	2.68	
22 07 19 00-0214	LF 4" I.D. (4-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	17.52	4.51
	<i>For Work In Restricted Working Space, Add</i>	2.71	
22 07 19 00-0215	1" Wall Flexible Polyethylene Tubing Foam Insulation <small>(22 07 19 00-0177)</small>		
22 07 19 00-0216	LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	9.94	4.18
	<i>For Work In Restricted Working Space, Add</i>	2.51	
22 07 19 00-0217	LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	10.21	4.24
	<i>For Work In Restricted Working Space, Add</i>	2.54	
22 07 19 00-0218	LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	11.12	4.34
	<i>For Work In Restricted Working Space, Add</i>	2.61	
22 07 19 00-0219	LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	11.38	4.41
	<i>For Work In Restricted Working Space, Add</i>	2.64	
22 07 19 00-0220	LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	12.76	4.51
	<i>For Work In Restricted Working Space, Add</i>	2.71	
22 07 19 00-0221	LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	13.42	4.63
	<i>For Work In Restricted Working Space, Add</i>	2.78	
22 07 19 00-0222	LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	13.69	4.69
	<i>For Work In Restricted Working Space, Add</i>	2.81	
22 07 19 00-0223	LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	15.04	4.74
	<i>For Work In Restricted Working Space, Add</i>	2.85	
22 07 19 00-0224	LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	15.97	4.87
	<i>For Work In Restricted Working Space, Add</i>	2.91	
22 07 19 00-0225	LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 1" Wall Polyethylene Tubing Flexible Closed Cell Foam Insulation	16.80	4.92
	<i>For Work In Restricted Working Space, Add</i>	2.95	
22 07 19 00-0226	Flexible Elastomeric Tubing Closed Cell Foam Insulation <small>(22 07 19)</small>		
	Note: For elbow fittings/valves add 1 LF for each fitting/valve, for tee fittings add 2 LF for each fitting.		
22 07 19 00-0227	3/8" Wall Flexible Elastomeric Tubing Foam Insulation <small>(22 07 19 00-0226)</small>		
22 07 19 00-0228	LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	7.26	3.21
	<i>For Work In Restricted Working Space, Add</i>	1.94	
22 07 19 00-0229	LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	7.40	3.21
	<i>For Work In Restricted Working Space, Add</i>	1.94	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0230 LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	7.70	3.33
<i>For Work In Restricted Working Space, Add</i>	2.00	
22 07 19 00-0231 LF 5/8" I.D. (3/4" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	7.89	3.38
<i>For Work In Restricted Working Space, Add</i>	2.03	
22 07 19 00-0232 LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	8.07	3.45
<i>For Work In Restricted Working Space, Add</i>	2.07	
22 07 19 00-0233 LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	8.34	3.51
<i>For Work In Restricted Working Space, Add</i>	2.10	
22 07 19 00-0234 LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	8.58	3.56
<i>For Work In Restricted Working Space, Add</i>	2.14	
22 07 19 00-0235 LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	8.83	3.56
<i>For Work In Restricted Working Space, Add</i>	2.15	
22 07 19 00-0236 LF 1-1/2" IPS (1-7/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.04	3.56
<i>For Work In Restricted Working Space, Add</i>	2.15	
22 07 19 00-0237 LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.27	3.62
<i>For Work In Restricted Working Space, Add</i>	2.17	
22 07 19 00-0238 LF 2" IPS (2-3/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.57	3.67
<i>For Work In Restricted Working Space, Add</i>	2.20	
22 07 19 00-0239 LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.85	3.67
<i>For Work In Restricted Working Space, Add</i>	2.22	
22 07 19 00-0240 LF 2-1/2" IPS (2-7/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	10.04	3.74
<i>For Work In Restricted Working Space, Add</i>	2.24	
22 07 19 00-0241 LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	10.32	3.74
<i>For Work In Restricted Working Space, Add</i>	2.25	
22 07 19 00-0242 LF 3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	10.95	3.79
<i>For Work In Restricted Working Space, Add</i>	2.27	
22 07 19 00-0243 LF 4" I.D. (4-1/8" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	11.66	3.84
<i>For Work In Restricted Working Space, Add</i>	2.30	
22 07 19 00-0244 LF 4" IPS (4-1/2" O.D.) Diameter Pipe, 3/8" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	12.48	3.86
<i>For Work In Restricted Working Space, Add</i>	2.32	
22 07 19 00-0245 1/2" Wall Flexible Elastomeric Tubing Foam Insulation (22 07 19 00-0226)		
22 07 19 00-0246 LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	8.24	3.51
<i>For Work In Restricted Working Space, Add</i>	2.10	
22 07 19 00-0247 LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	8.36	3.51
<i>For Work In Restricted Working Space, Add</i>	2.12	
22 07 19 00-0248 LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	8.50	3.56
<i>For Work In Restricted Working Space, Add</i>	2.14	
22 07 19 00-0249 LF 5/8" I.D. (3/4" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	8.70	3.56
<i>For Work In Restricted Working Space, Add</i>	2.15	
22 07 19 00-0250 LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	8.85	3.56
<i>For Work In Restricted Working Space, Add</i>	2.15	
22 07 19 00-0251 LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.23	3.67
<i>For Work In Restricted Working Space, Add</i>	2.20	
22 07 19 00-0252 LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.59	3.74
<i>For Work In Restricted Working Space, Add</i>	2.24	
22 07 19 00-0253 LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	9.92	3.79
<i>For Work In Restricted Working Space, Add</i>	2.27	
22 07 19 00-0254 LF 1-1/2" IPS (1-7/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	10.25	3.82
<i>For Work In Restricted Working Space, Add</i>	2.29	
22 07 19 00-0255 LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	10.51	3.84
<i>For Work In Restricted Working Space, Add</i>	2.30	
22 07 19 00-0256 LF 2" IPS (2-3/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	11.56	3.91
<i>For Work In Restricted Working Space, Add</i>	2.34	
22 07 19 00-0257 LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	12.18	3.96
<i>For Work In Restricted Working Space, Add</i>	2.37	
22 07 19 00-0258 LF 2-1/2" IPS (2-7/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	12.64	3.99
<i>For Work In Restricted Working Space, Add</i>	2.39	
22 07 19 00-0259 LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	13.04	4.01
<i>For Work In Restricted Working Space, Add</i>	2.41	
22 07 19 00-0260 LF 3" IPS (3-1/2" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	13.33	4.04
<i>For Work In Restricted Working Space, Add</i>	2.42	
22 07 19 00-0261 LF 3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	13.57	4.07
<i>For Work In Restricted Working Space, Add</i>	2.44	
22 07 19 00-0262 LF 4" I.D. (4-1/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	14.76	4.12
<i>For Work In Restricted Working Space, Add</i>	2.48	
22 07 19 00-0263 LF 4" IPS (4-1/2" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	15.04	4.15
<i>For Work In Restricted Working Space, Add</i>	2.49	
22 07 19 00-0264 LF 5" I.D. (5-9/16" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	16.22	4.18
<i>For Work In Restricted Working Space, Add</i>	2.51	
22 07 19 00-0265 LF 6" IPS (6-5/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	17.57	4.29
<i>For Work In Restricted Working Space, Add</i>	2.57	
22 07 19 00-0266 LF 8" IPS (8-5/8" O.D.) Diameter Pipe, 1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	19.09	4.41
<i>For Work In Restricted Working Space, Add</i>	2.64	
22 07 19 00-0267 3/4" Wall Flexible Elastomeric Tubing Foam Insulation (22 07 19 00-0226)		
22 07 19 00-0268 LF 1/4" I.D. (3/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	9.56	3.79
<i>For Work In Restricted Working Space, Add</i>	2.27	
22 07 19 00-0269 LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	9.84	3.84
<i>For Work In Restricted Working Space, Add</i>	2.30	
22 07 19 00-0270 LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	10.26	3.96
<i>For Work In Restricted Working Space, Add</i>	2.37	

22 Plumbing**22 07 Plumbing Insulation****22 07 19 Plumbing Piping Insulation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 07 19 00-0271	LF	5/8" I.D. (3/4" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	10.51	3.99
		<i>For Work In Restricted Working Space, Add</i>	2.39	
22 07 19 00-0272	LF	3/4" I.D. (7/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	10.63	4.01
		<i>For Work In Restricted Working Space, Add</i>	2.41	
22 07 19 00-0273	LF	1" I.D. (1-1/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	11.25	4.12
		<i>For Work In Restricted Working Space, Add</i>	2.48	
22 07 19 00-0274	LF	1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	11.76	4.18
		<i>For Work In Restricted Working Space, Add</i>	2.51	
22 07 19 00-0275	LF	1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	12.26	4.24
		<i>For Work In Restricted Working Space, Add</i>	2.54	
22 07 19 00-0276	LF	1-1/2" IPS (1-7/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	12.40	4.24
		<i>For Work In Restricted Working Space, Add</i>	2.54	
22 07 19 00-0277	LF	2" I.D. (2-1/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	12.60	4.27
		<i>For Work In Restricted Working Space, Add</i>	2.56	
22 07 19 00-0278	LF	2" IPS (2-3/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	13.21	4.29
		<i>For Work In Restricted Working Space, Add</i>	2.58	
22 07 19 00-0279	LF	2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	13.53	4.34
		<i>For Work In Restricted Working Space, Add</i>	2.61	
22 07 19 00-0280	LF	2-1/2" IPS (2-7/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	14.23	4.38
		<i>For Work In Restricted Working Space, Add</i>	2.63	
22 07 19 00-0281	LF	3" I.D. (3-1/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	14.70	4.41
		<i>For Work In Restricted Working Space, Add</i>	2.64	
22 07 19 00-0282	LF	3" IPS (3-1/2" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	15.44	4.44
		<i>For Work In Restricted Working Space, Add</i>	2.66	
22 07 19 00-0283	LF	3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	15.72	4.46
		<i>For Work In Restricted Working Space, Add</i>	2.68	
22 07 19 00-0284	LF	4" I.D. (4-1/8" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	16.83	4.51
		<i>For Work In Restricted Working Space, Add</i>	2.71	
22 07 19 00-0285	LF	4" IPS (4-1/2" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	17.71	4.55
		<i>For Work In Restricted Working Space, Add</i>	2.73	
22 07 19 00-0286	LF	5" IPS (5-9/16" O.D.) Diameter Pipe, 3/4" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	19.21	4.57
		<i>For Work In Restricted Working Space, Add</i>	2.75	
22 07 19 00-0287	LF	6" IPS (6-5/8" O.D.) Diameter Pipe, 3/4" Flexible Elastomeric Tubing Closed Cell Foam Insulation	20.77	4.63
		<i>For Work In Restricted Working Space, Add</i>	2.78	
22 07 19 00-0288	LF	8" IPS (8-5/8" O.D.) Diameter Pipe, 3/4" Flexible Elastomeric Tubing Closed Cell Foam Insulation	22.67	4.74
		<i>For Work In Restricted Working Space, Add</i>	2.85	

22 07 19 00-0289 1" Wall Flexible Elastomeric Tubing Foam Insulation (22 07 19 00-0226)

22 07 19 00-0290	LF	1/4" I.D. (3/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	11.27	4.17
		<i>For Work In Restricted Working Space, Add</i>	2.51	
22 07 19 00-0291	LF	3/8" I.D. (1/2" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	11.62	4.24
		<i>For Work In Restricted Working Space, Add</i>	2.54	
22 07 19 00-0292	LF	1/2" I.D. (5/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	12.06	4.34
		<i>For Work In Restricted Working Space, Add</i>	2.61	
22 07 19 00-0293	LF	5/8" I.D. (3/4" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	12.45	4.38
		<i>For Work In Restricted Working Space, Add</i>	2.63	
22 07 19 00-0294	LF	3/4" I.D. (7/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation.....	12.78	4.41
		<i>For Work In Restricted Working Space, Add</i>	2.64	
22 07 19 00-0295	LF	1" I.D. (1-1/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	13.37	4.51
		<i>For Work In Restricted Working Space, Add</i>	2.71	
22 07 19 00-0296	LF	1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	14.28	4.63
		<i>For Work In Restricted Working Space, Add</i>	2.78	
22 07 19 00-0297	LF	1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	14.75	4.63
		<i>For Work In Restricted Working Space, Add</i>	2.81	
22 07 19 00-0298	LF	1-1/2" IPS (1-7/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	15.37	4.69
		<i>For Work In Restricted Working Space, Add</i>	2.83	
22 07 19 00-0299	LF	2" I.D. (2-1/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	15.61	4.74
		<i>For Work In Restricted Working Space, Add</i>	2.85	
22 07 19 00-0300	LF	2" IPS (2-3/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	16.97	4.81
		<i>For Work In Restricted Working Space, Add</i>	2.88	
22 07 19 00-0301	LF	2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	18.03	4.87
		<i>For Work In Restricted Working Space, Add</i>	2.91	
22 07 19 00-0302	LF	2-1/2" IPS (2-7/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	19.39	4.90
		<i>For Work In Restricted Working Space, Add</i>	2.93	
22 07 19 00-0303	LF	3" I.D. (3-1/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	19.78	4.92
		<i>For Work In Restricted Working Space, Add</i>	2.95	
22 07 19 00-0304	LF	3" IPS (3-1/2" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	20.49	4.95
		<i>For Work In Restricted Working Space, Add</i>	2.96	
22 07 19 00-0305	LF	3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	20.83	4.97
		<i>For Work In Restricted Working Space, Add</i>	2.98	
22 07 19 00-0306	LF	4" I.D. (4-1/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	23.42	5.09
		<i>For Work In Restricted Working Space, Add</i>	3.05	
22 07 19 00-0307	LF	4" IPS (4-1/2" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	25.17	5.14
		<i>For Work In Restricted Working Space, Add</i>	3.09	
22 07 19 00-0308	LF	5" IPS (5-9/16" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	27.75	5.20
		<i>For Work In Restricted Working Space, Add</i>	3.12	
22 07 19 00-0309	LF	6" IPS (6-5/8" O.D.) Diameter Pipe, 1" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	30.49	5.31
		<i>For Work In Restricted Working Space, Add</i>	3.19	

22 07 19 00-0310 1-1/2" Wall Flexible Elastomeric Tubing Foam Insulation (22 07 19 00-0226)

22 07 19 00-0311	LF	3/8" I.D. (1/2" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation	17.62	4.67
		<i>For Work In Restricted Working Space, Add</i>	2.81	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0312 LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	18.07 2.87	4.78
22 07 19 00-0313 LF 5/8" I.D. (3/4" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	18.47 2.89	4.81
22 07 19 00-0314 LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	18.87 2.90	4.86
22 07 19 00-0315 LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	19.40 2.97	4.96
22 07 19 00-0316 LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	20.29 3.08	5.14
22 07 19 00-0317 LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	21.56 3.11	5.07
22 07 19 00-0318 LF 1-1/2" IPS (1-7/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	22.67 3.15	5.19
22 07 19 00-0319 LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	23.35 3.19	5.31
22 07 19 00-0320 LF 2" IPS (2-3/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	25.48 3.22	5.38
22 07 19 00-0321 LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	27.49 3.25	5.44
22 07 19 00-0322 LF 2-1/2" IPS (2-7/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	28.45 3.27	5.46
22 07 19 00-0323 LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	29.39 3.29	5.47
22 07 19 00-0324 LF 3" IPS (3-1/2" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	30.49 3.30	5.51
22 07 19 00-0325 LF 3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	31.19 3.32	5.53
22 07 19 00-0326 LF 4" I.D. (4-1/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	34.96 3.43	5.73
22 07 19 00-0327 LF 4" IPS (4-1/2" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	36.98 3.49	5.82
22 07 19 00-0328 LF 5" IPS (5-9/16" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	41.89 3.54	5.90
22 07 19 00-0329 LF 6" IPS (6-5/8" O.D.) Diameter Pipe, 1-1/2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	46.76 3.65	6.08
22 07 19 00-0330 2" Wall Flexible Elastomeric Tubing Foam Insulation <small>(22 07 19 00-0226)</small>		
22 07 19 00-0331 LF 3/8" I.D. (1/2" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	25.90 3.10	5.17
22 07 19 00-0332 LF 1/2" I.D. (5/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	26.94 3.16	5.24
22 07 19 00-0333 LF 5/8" I.D. (3/4" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	28.78 3.18	5.28
22 07 19 00-0334 LF 3/4" I.D. (7/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	29.40 3.19	5.33
22 07 19 00-0335 LF 1" I.D. (1-1/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	30.93 3.25	5.43
22 07 19 00-0336 LF 1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	32.79 3.41	5.69
22 07 19 00-0337 LF 1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	33.90 3.43	5.55
22 07 19 00-0338 LF 1-1/2" IPS (1-7/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	35.89 3.50	5.74
22 07 19 00-0339 LF 2" I.D. (2-1/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	37.80 3.57	5.93
22 07 19 00-0340 LF 2" IPS (2-3/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	39.08 3.60	6.01
22 07 19 00-0341 LF 2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	41.71 3.63	6.08
22 07 19 00-0342 LF 2-1/2" IPS (2-7/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	42.03 3.65	6.09
22 07 19 00-0343 LF 3" I.D. (3-1/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	44.49 3.67	6.10
22 07 19 00-0344 LF 3" IPS (3-1/2" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	46.21 3.68	6.14
22 07 19 00-0345 LF 3-1/2" I.D. (3-5/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	48.04 3.70	6.17
22 07 19 00-0346 LF 4" I.D. (4-1/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	54.08 3.86	6.46
22 07 19 00-0347 LF 4" IPS (4-1/2" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	57.60 3.95	6.58
22 07 19 00-0348 LF 5" IPS (5-9/16" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	58.63 4.03	6.71
22 07 19 00-0349 LF 6" IPS (6-5/8" O.D.) Diameter Pipe, 2" Wall Flexible Elastomeric Tubing Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	65.93 4.19	6.98
22 07 19 00-0350 Flexible Polyolefin Tubing Closed Cell Foam Insulation <small>(22 07 19)</small>		
Note: UV stabilized, work temperature (-110 degree F to +210 degree F) 0 water vapor transmission. For elbow fittings/valves add 1 LF for each fitting/valve, for tee fittings add 2 LF for each fitting.		
22 07 19 00-0351 3/8" Wall Flexible Polyolefin Tubing Foam Insulation <small>(22 07 19 00-0350)</small>		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0352	LF	1/4" I.D. (3/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	6.98	3.21
		<i>For Work In Restricted Working Space, Add</i>		1.94	
22 07 19 00-0353	LF	3/8" I.D. (1/2" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	7.06	3.21
		<i>For Work In Restricted Working Space, Add</i>		1.94	
22 07 19 00-0354	LF	1/2" I.D. (5/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	7.32	3.33
		<i>For Work In Restricted Working Space, Add</i>		2.00	
22 07 19 00-0355	LF	3/4" I.D. (7/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	7.64	3.45
		<i>For Work In Restricted Working Space, Add</i>		2.07	
22 07 19 00-0356	LF	1" I.D. (1-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	7.84	3.51
		<i>For Work In Restricted Working Space, Add</i>		2.10	
22 07 19 00-0357	LF	1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.20	3.56
		<i>For Work In Restricted Working Space, Add</i>		2.14	
22 07 19 00-0358	LF	1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.48	3.56
		<i>For Work In Restricted Working Space, Add</i>		2.15	
22 07 19 00-0359	LF	2" I.D. (2-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.68	3.67
		<i>For Work In Restricted Working Space, Add</i>		2.15	
22 07 19 00-0360	LF	2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	9.57	3.67
		<i>For Work In Restricted Working Space, Add</i>		2.22	
22 07 19 00-0361	LF	3" I.D. (3-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	10.35	3.74
		<i>For Work In Restricted Working Space, Add</i>		2.25	
22 07 19 00-0362	LF	4" I.D. (4-1/8" O.D.) Diameter Pipe, 3/8" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	12.38	3.84
		<i>For Work In Restricted Working Space, Add</i>		2.30	
22 07 19 00-0363		1/2" Wall Flexible Polyolefin Tubing Foam Insulation <small>(22 07 19 00-0350)</small>			
22 07 19 00-0364	LF	1/4" I.D. (3/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	7.82	3.51
		<i>For Work In Restricted Working Space, Add</i>		2.10	
22 07 19 00-0365	LF	3/8" I.D. (1/2" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	7.89	3.51
		<i>For Work In Restricted Working Space, Add</i>		2.12	
22 07 19 00-0366	LF	1/2" I.D. (5/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.06	3.56
		<i>For Work In Restricted Working Space, Add</i>		2.14	
22 07 19 00-0367	LF	3/4" I.D. (7/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.28	3.56
		<i>For Work In Restricted Working Space, Add</i>		2.15	
22 07 19 00-0368	LF	1" I.D. (1-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.55	3.67
		<i>For Work In Restricted Working Space, Add</i>		2.20	
22 07 19 00-0369	LF	1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.95	3.74
		<i>For Work In Restricted Working Space, Add</i>		2.24	
22 07 19 00-0370	LF	1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	9.39	3.79
		<i>For Work In Restricted Working Space, Add</i>		2.27	
22 07 19 00-0371	LF	2" I.D. (2-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	9.80	3.84
		<i>For Work In Restricted Working Space, Add</i>		2.30	
22 07 19 00-0372	LF	2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	10.75	3.96
		<i>For Work In Restricted Working Space, Add</i>		2.37	
22 07 19 00-0373	LF	3" I.D. (3-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	11.60	4.01
		<i>For Work In Restricted Working Space, Add</i>		2.41	
22 07 19 00-0374	LF	4" I.D. (4-1/8" O.D.) Diameter Pipe, 1/2" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	13.19	4.12
		<i>For Work In Restricted Working Space, Add</i>		2.48	
22 07 19 00-0375		3/4" Wall Flexible Polyolefin Tubing Foam Insulation <small>(22 07 19 00-0350)</small>			
22 07 19 00-0376	LF	1/4" I.D. (3/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	8.81	3.79
		<i>For Work In Restricted Working Space, Add</i>		2.27	
22 07 19 00-0377	LF	3/8" I.D. (1/2" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	9.10	3.84
		<i>For Work In Restricted Working Space, Add</i>		2.30	
22 07 19 00-0378	LF	1/2" I.D. (5/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	9.48	3.96
		<i>For Work In Restricted Working Space, Add</i>		2.37	
22 07 19 00-0379	LF	3/4" I.D. (7/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	10.06	4.01
		<i>For Work In Restricted Working Space, Add</i>		2.41	
22 07 19 00-0380	LF	1" I.D. (1-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	10.59	4.12
		<i>For Work In Restricted Working Space, Add</i>		2.48	
22 07 19 00-0381	LF	1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	11.52	4.18
		<i>For Work In Restricted Working Space, Add</i>		2.51	
22 07 19 00-0382	LF	1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	12.12	4.18
		<i>For Work In Restricted Working Space, Add</i>		2.52	
22 07 19 00-0383	LF	2" I.D. (2-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	12.81	4.24
		<i>For Work In Restricted Working Space, Add</i>		2.54	
22 07 19 00-0384	LF	2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	14.15	4.34
		<i>For Work In Restricted Working Space, Add</i>		2.61	
22 07 19 00-0385	LF	3" I.D. (3-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	15.36	4.41
		<i>For Work In Restricted Working Space, Add</i>		2.64	
22 07 19 00-0386	LF	4" I.D. (4-1/8" O.D.) Diameter Pipe, 3/4" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	17.70	4.51
		<i>For Work In Restricted Working Space, Add</i>		2.71	
22 07 19 00-0387		1" Wall Flexible Polyolefin Tubing Foam Insulation <small>(22 07 19 00-0350)</small>			
22 07 19 00-0388	LF	1/4" I.D. (3/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	10.51	4.18
		<i>For Work In Restricted Working Space, Add</i>		2.51	
22 07 19 00-0389	LF	3/8" I.D. (1/2" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	10.66	4.24
		<i>For Work In Restricted Working Space, Add</i>		2.54	
22 07 19 00-0390	LF	1/2" I.D. (5/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	11.04	4.34
		<i>For Work In Restricted Working Space, Add</i>		2.61	
22 07 19 00-0391	LF	3/4" I.D. (7/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation	.....	11.86	4.41
		<i>For Work In Restricted Working Space, Add</i>		2.64	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0392	LF			1" I.D. (1-1/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	12.56 2.71	4.51
22 07 19 00-0393	LF			1-1/4" I.D. (1-3/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	13.26 2.78	4.63
22 07 19 00-0394	LF			1-1/2" I.D. (1-5/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	13.95 2.81	4.63
22 07 19 00-0395	LF			2" I.D. (2-1/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	15.49 2.85	4.74
22 07 19 00-0396	LF			2-1/2" I.D. (2-5/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation <i>For Work In Restricted Working Space, Add</i>	17.55 2.91	4.87
22 07 19 00-0397	LF			3" I.D. (3-1/8" O.D.) Diameter Pipe, 1" Wall Polyolefin Tubing Flexible Closed Cell Foam Insulation..... <i>For Work In Restricted Working Space, Add</i>	19.02 2.95	4.92
22 07 19 00-0398				Insulation Protective Jacketing (22 07 19) Note: Jacketing only and to be added to insulation prices when required.		
22 07 19 00-0399				Aluminum Insulation Protective Jacketing With Bands (22 07 19 00-0398)		
22 07 19 00-0400				Aluminum Roll, Insulation Protective Jacketing With Bands (22 07 19 00-0399)		
22 07 19 00-0401	SF			0.006" Aluminum Insulation Jacket With Bands.....	16.38	6.88
22 07 19 00-0402	SF			0.010" Aluminum Insulation Jacket With Bands.....	16.72	6.88
22 07 19 00-0403	SF			0.016" Aluminum Insulation Jacket With Bands.....	17.05	6.88
22 07 19 00-0404	SF			0.020" Aluminum Insulation Jacket With Bands.....	17.35	6.88
22 07 19 00-0405	SF			0.024" Aluminum Insulation Jacket With Bands.....	17.62	6.88
22 07 19 00-0406				16 Mil, Aluminum Insulation Protective Jacketing With Polykraft Moisture Barrier And Bands (22 07 19 00-0399)		
22 07 19 00-0407	LF			1/2" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	8.56 0.01 0.02	1.95
22 07 19 00-0408	LF			3/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	8.96 0.01 0.02	2.00
22 07 19 00-0409	LF			1" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	9.36 0.01 0.03	2.05
22 07 19 00-0410	LF			1-1/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	9.77 0.01 0.03	2.10
22 07 19 00-0411	LF			1-1/2" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.12 0.02 0.04	2.13
22 07 19 00-0412	LF			1-3/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.45 0.02 0.05	2.17
22 07 19 00-0413	LF			2" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.85 0.02 0.05	2.21
22 07 19 00-0414	LF			2-1/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	11.26 0.02 0.06	2.26
22 07 19 00-0415	LF			2-1/2" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	11.70 0.02 0.06	2.30
22 07 19 00-0416	LF			2-3/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.07 0.03 0.07	2.34
22 07 19 00-0417	LF			3" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.51 0.03 0.07	2.39
22 07 19 00-0418	LF			3-1/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.95 0.03 0.08	2.45
22 07 19 00-0419	LF			3-1/2" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.39 0.03 0.08	2.50
22 07 19 00-0420	LF			3-3/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.79 0.04 0.09	2.55
22 07 19 00-0421	LF			4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.25 0.04 0.10	2.61
22 07 19 00-0422	LF			4-1/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.73 0.04 0.10	2.67
22 07 19 00-0423	LF			4-1/2" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.24 0.04 0.11	2.74
22 07 19 00-0424	LF			4-3/4" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.67 0.05 0.11	2.79

22 Plumbing**22 07 Plumbing Insulation****22 07 19 Plumbing Piping Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0425	LF		5" ID, 0.016" Aluminum Insulation Jacketing	16.18	2.87
			<i>For Stucco Embossed, Add</i>	0.05	
			<i>For Corrugated, Add</i>	0.12	
22 07 19 00-0426	LF		5-1/4" ID, 0.016" Aluminum Insulation Jacketing	16.72	2.95
			<i>For Stucco Embossed, Add</i>	0.05	
			<i>For Corrugated, Add</i>	0.12	
22 07 19 00-0427	LF		5-1/2" ID, 0.016" Aluminum Insulation Jacketing	17.19	3.01
			<i>For Stucco Embossed, Add</i>	0.05	
			<i>For Corrugated, Add</i>	0.13	
22 07 19 00-0428	LF		5-3/4" ID, 0.016" Aluminum Insulation Jacketing	17.77	3.09
			<i>For Stucco Embossed, Add</i>	0.05	
			<i>For Corrugated, Add</i>	0.13	
22 07 19 00-0429	LF		6" ID, 0.016" Aluminum Insulation Jacketing	18.35	3.18
			<i>For Stucco Embossed, Add</i>	0.06	
			<i>For Corrugated, Add</i>	0.14	
22 07 19 00-0430	LF		6-1/4" ID, 0.016" Aluminum Insulation Jacketing	18.76	3.23
			<i>For Stucco Embossed, Add</i>	0.06	
			<i>For Corrugated, Add</i>	0.15	
22 07 19 00-0431	LF		6-1/2" ID, 0.016" Aluminum Insulation Jacketing	19.18	3.28
			<i>For Stucco Embossed, Add</i>	0.06	
			<i>For Corrugated, Add</i>	0.15	
22 07 19 00-0432	LF		7" ID, 0.016" Aluminum Insulation Jacketing	19.90	3.36
			<i>For Stucco Embossed, Add</i>	0.06	
			<i>For Corrugated, Add</i>	0.16	
22 07 19 00-0433	LF		7-1/4" ID, 0.016" Aluminum Insulation Jacketing	20.43	3.45
			<i>For Stucco Embossed, Add</i>	0.07	
			<i>For Corrugated, Add</i>	0.17	
22 07 19 00-0434	LF		7-1/2" ID, 0.016" Aluminum Insulation Jacketing	20.87	3.50
			<i>For Stucco Embossed, Add</i>	0.07	
			<i>For Corrugated, Add</i>	0.17	
22 07 19 00-0435	LF		8" ID, 0.016" Aluminum Insulation Jacketing	21.54	3.56
			<i>For Stucco Embossed, Add</i>	0.07	
			<i>For Corrugated, Add</i>	0.18	
22 07 19 00-0436	LF		8-1/2" ID, 0.016" Aluminum Insulation Jacketing	22.22	3.62
			<i>For Stucco Embossed, Add</i>	0.08	
			<i>For Corrugated, Add</i>	0.19	
22 07 19 00-0437	LF		9" ID, 0.016" Aluminum Insulation Jacketing	23.02	3.71
			<i>For Stucco Embossed, Add</i>	0.08	
			<i>For Corrugated, Add</i>	0.20	
22 07 19 00-0438	LF		9-1/2" ID, 0.016" Aluminum Insulation Jacketing	23.74	3.78
			<i>For Stucco Embossed, Add</i>	0.09	
			<i>For Corrugated, Add</i>	0.22	
22 07 19 00-0439	LF		10" ID, 0.016" Aluminum Insulation Jacketing	24.43	3.84
			<i>For Stucco Embossed, Add</i>	0.09	
			<i>For Corrugated, Add</i>	0.23	
22 07 19 00-0440	LF		10-1/2" ID, 0.016" Aluminum Insulation Jacketing	25.16	3.91
			<i>For Stucco Embossed, Add</i>	0.10	
			<i>For Corrugated, Add</i>	0.24	
22 07 19 00-0441	LF		11" ID, 0.0106 Aluminum Insulation Jacketing	26.03	4.02
			<i>For Stucco Embossed, Add</i>	0.10	
			<i>For Corrugated, Add</i>	0.25	
22 07 19 00-0442	LF		11-1/2" ID, 0.016" Aluminum Insulation Jacketing	26.79	4.10
			<i>For Stucco Embossed, Add</i>	0.10	
			<i>For Corrugated, Add</i>	0.26	
22 07 19 00-0443	LF		12" ID, 0.016" Aluminum Insulation Jacketing	27.54	4.18
			<i>For Stucco Embossed, Add</i>	0.11	
			<i>For Corrugated, Add</i>	0.27	
22 07 19 00-0444	LF		12-1/2" ID, 0.016" Aluminum Insulation Jacketing	28.48	4.30
			<i>For Stucco Embossed, Add</i>	0.11	
			<i>For Corrugated, Add</i>	0.28	
22 07 19 00-0445	LF		13" ID, 0.016" Aluminum Insulation Jacketing	29.09	4.34
			<i>For Stucco Embossed, Add</i>	0.12	
			<i>For Corrugated, Add</i>	0.29	
22 07 19 00-0446	LF		14" ID, 0.016" Aluminum Insulation Jacketing	30.16	4.39
			<i>For Stucco Embossed, Add</i>	0.13	
			<i>For Corrugated, Add</i>	0.32	
22 07 19 00-0447	LF		15" ID, 0.016" Aluminum Insulation Jacketing	31.39	4.48
			<i>For Stucco Embossed, Add</i>	0.13	
			<i>For Corrugated, Add</i>	0.34	
22 07 19 00-0448	LF		16" ID, 0.016" Aluminum Insulation Jacketing	32.47	4.53
			<i>For Stucco Embossed, Add</i>	0.14	
			<i>For Corrugated, Add</i>	0.36	
22 07 19 00-0449	LF		17" ID, 0.016" Aluminum Insulation Jacketing	33.73	4.62
			<i>For Stucco Embossed, Add</i>	0.15	
			<i>For Corrugated, Add</i>	0.38	
22 07 19 00-0450	LF		18" ID, 0.016" Aluminum Insulation Jacketing	34.53	4.67
			<i>For Stucco Embossed, Add</i>	0.16	
			<i>For Corrugated, Add</i>	0.40	
22 07 19 00-0451	LF		19" ID, 0.016" Aluminum Insulation Jacketing	36.10	4.79
			<i>For Stucco Embossed, Add</i>	0.17	
			<i>For Corrugated, Add</i>	0.42	
22 07 19 00-0452	LF		20" ID, 0.016" Aluminum Insulation Jacketing	37.22	4.84
			<i>For Stucco Embossed, Add</i>	0.18	
			<i>For Corrugated, Add</i>	0.45	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0453 LF 21" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	38.53 0.19 0.47	4.95
22 07 19 00-0454 LF 22" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	39.63 0.20 0.49	5.01
22 07 19 00-0455 LF 23" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	40.99 0.21 0.51	5.12
22 07 19 00-0456 LF 24" ID, 0.016" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	42.10 0.21 0.53	5.19
22 07 19 00-0457 20 Mil, Aluminum Insulation Protective Jacketing With Polykraft Moisture Barrier And Bands (22 07 19 00-0399)		
22 07 19 00-0458 LF 1/2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	9.53 0.01 0.02	2.16
22 07 19 00-0459 LF 3/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.00 0.01 0.03	2.21
22 07 19 00-0460 LF 1" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.50 0.01 0.04	2.26
22 07 19 00-0461 LF 1-1/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.99 0.02 0.04	2.31
22 07 19 00-0462 LF 1-1/2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	11.40 0.02 0.05	2.35
22 07 19 00-0463 LF 1-3/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	11.81 0.02 0.06	2.38
22 07 19 00-0464 LF 2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.29 0.03 0.06	2.43
22 07 19 00-0465 LF 2-1/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.77 0.03 0.07	2.48
22 07 19 00-0466 LF 2-1/2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.28 0.03 0.08	2.53
22 07 19 00-0467 LF 2-3/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.73 0.03 0.09	2.57
22 07 19 00-0468 LF 3" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.27 0.04 0.09	2.63
22 07 19 00-0469 LF 3-1/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.78 0.04 0.10	2.69
22 07 19 00-0470 LF 3-1/2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.31 0.04 0.11	2.75
22 07 19 00-0471 LF 3-3/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.78 0.05 0.11	2.80
22 07 19 00-0472 LF 4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	16.32 0.05 0.12	2.87
22 07 19 00-0473 LF 4-1/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	16.89 0.05 0.13	2.94
22 07 19 00-0474 LF 4-1/2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.50 0.05 0.14	3.01
22 07 19 00-0475 LF 4-3/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	18.00 0.06 0.14	3.07
22 07 19 00-0476 LF 5" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	18.61 0.06 0.15	3.15
22 07 19 00-0477 LF 5-1/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	19.23 0.06 0.16	3.24
22 07 19 00-0478 LF 5-1/2" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	19.78 0.07 0.16	3.31
22 07 19 00-0479 LF 5-3/4" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	20.47 0.07 0.17	3.41
22 07 19 00-0480 LF 6" ID, 0.020" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	21.14 0.07 0.18	3.51

22 Plumbing
22 07 Plumbing Insulation
22 07 19 Plumbing Piping Insulation



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0481	LF		6-1/4" ID, 0.020" Aluminum Insulation Jacketing	21.63	3.56
			<i>For Stucco Embossed, Add</i>	0.07	
			<i>For Corrugated, Add</i>	0.19	
22 07 19 00-0482	LF		6-1/2" ID, 0.020" Aluminum Insulation Jacketing	22.13	3.62
			<i>For Stucco Embossed, Add</i>	0.08	
			<i>For Corrugated, Add</i>	0.19	
22 07 19 00-0483	LF		7" ID, 0.020" Aluminum Insulation Jacketing	22.98	3.70
			<i>For Stucco Embossed, Add</i>	0.08	
			<i>For Corrugated, Add</i>	0.20	
22 07 19 00-0484	LF		7-1/4" ID, 0.020" Aluminum Insulation Jacketing	23.60	3.79
			<i>For Stucco Embossed, Add</i>	0.08	
			<i>For Corrugated, Add</i>	0.21	
22 07 19 00-0485	LF		7-1/2" ID, 0.020" Aluminum Insulation Jacketing	24.13	3.85
			<i>For Stucco Embossed, Add</i>	0.09	
			<i>For Corrugated, Add</i>	0.22	
22 07 19 00-0486	LF		8" ID, 0.020" Aluminum Insulation Jacketing	24.95	3.92
			<i>For Stucco Embossed, Add</i>	0.09	
			<i>For Corrugated, Add</i>	0.23	
22 07 19 00-0487	LF		8-1/2" ID, 0.020" Aluminum Insulation Jacketing	25.75	3.98
			<i>For Stucco Embossed, Add</i>	0.10	
			<i>For Corrugated, Add</i>	0.25	
22 07 19 00-0488	LF		9" ID, 0.020" Aluminum Insulation Jacketing	26.71	4.08
			<i>For Stucco Embossed, Add</i>	0.10	
			<i>For Corrugated, Add</i>	0.26	
22 07 19 00-0489	LF		9-1/2" ID, 0.020" Aluminum Insulation Jacketing	27.57	4.15
			<i>For Stucco Embossed, Add</i>	0.11	
			<i>For Corrugated, Add</i>	0.27	
22 07 19 00-0490	LF		10" ID, 0.020" Aluminum Insulation Jacketing	28.42	4.22
			<i>For Stucco Embossed, Add</i>	0.12	
			<i>For Corrugated, Add</i>	0.29	
22 07 19 00-0491	LF		10-1/2" ID, 0.020" Aluminum Insulation Jacketing	29.28	4.30
			<i>For Stucco Embossed, Add</i>	0.12	
			<i>For Corrugated, Add</i>	0.30	
22 07 19 00-0492	LF		11" ID, 0.0106 Aluminum Insulation Jacketing	30.31	4.42
			<i>For Stucco Embossed, Add</i>	0.13	
			<i>For Corrugated, Add</i>	0.32	
22 07 19 00-0493	LF		11-1/2" ID, 0.020" Aluminum Insulation Jacketing	31.24	4.50
			<i>For Stucco Embossed, Add</i>	0.13	
			<i>For Corrugated, Add</i>	0.33	
22 07 19 00-0494	LF		12" ID, 0.020" Aluminum Insulation Jacketing	32.14	4.59
			<i>For Stucco Embossed, Add</i>	0.14	
			<i>For Corrugated, Add</i>	0.34	
22 07 19 00-0495	LF		12-1/2" ID, 0.020" Aluminum Insulation Jacketing	33.24	4.73
			<i>For Stucco Embossed, Add</i>	0.14	
			<i>For Corrugated, Add</i>	0.36	
22 07 19 00-0496	LF		13" ID, 0.020" Aluminum Insulation Jacketing	33.98	4.79
			<i>For Stucco Embossed, Add</i>	0.15	
			<i>For Corrugated, Add</i>	0.37	
22 07 19 00-0497	LF		14" ID, 0.020" Aluminum Insulation Jacketing	35.32	4.83
			<i>For Stucco Embossed, Add</i>	0.16	
			<i>For Corrugated, Add</i>	0.40	
22 07 19 00-0498	LF		15" ID, 0.020" Aluminum Insulation Jacketing	36.83	4.93
			<i>For Stucco Embossed, Add</i>	0.17	
			<i>For Corrugated, Add</i>	0.43	
22 07 19 00-0499	LF		16" ID, 0.020" Aluminum Insulation Jacketing	38.16	4.99
			<i>For Stucco Embossed, Add</i>	0.18	
			<i>For Corrugated, Add</i>	0.46	
22 07 19 00-0500	LF		17" ID, 0.020" Aluminum Insulation Jacketing	39.69	5.09
			<i>For Stucco Embossed, Add</i>	0.19	
			<i>For Corrugated, Add</i>	0.48	
22 07 19 00-0501	LF		18" ID, 0.020" Aluminum Insulation Jacketing	40.67	5.15
			<i>For Stucco Embossed, Add</i>	0.20	
			<i>For Corrugated, Add</i>	0.50	
22 07 19 00-0502	LF		19" ID, 0.020" Aluminum Insulation Jacketing	42.60	5.26
			<i>For Stucco Embossed, Add</i>	0.22	
			<i>For Corrugated, Add</i>	0.54	
22 07 19 00-0503	LF		20" ID, 0.020" Aluminum Insulation Jacketing	43.98	5.32
			<i>For Stucco Embossed, Add</i>	0.23	
			<i>For Corrugated, Add</i>	0.57	
22 07 19 00-0504	LF		21" ID, 0.020" Aluminum Insulation Jacketing	45.56	5.44
			<i>For Stucco Embossed, Add</i>	0.24	
			<i>For Corrugated, Add</i>	0.60	
22 07 19 00-0505	LF		22" ID, 0.020" Aluminum Insulation Jacketing	46.91	5.50
			<i>For Stucco Embossed, Add</i>	0.25	
			<i>For Corrugated, Add</i>	0.62	
22 07 19 00-0506	LF		23" ID, 0.020" Aluminum Insulation Jacketing	48.58	5.63
			<i>For Stucco Embossed, Add</i>	0.26	
			<i>For Corrugated, Add</i>	0.65	
22 07 19 00-0507	LF		24" ID, 0.020" Aluminum Insulation Jacketing	49.95	5.70
			<i>For Stucco Embossed, Add</i>	0.27	
			<i>For Corrugated, Add</i>	0.68	

22 07 19 00-0508 24 Mil, Aluminum Insulation Protective Jacketing With Polykraft Moisture Barrier And Bands (22 07 19 00-0399)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0509 LF 1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	10.50 0.01 0.03	2.35
22 07 19 00-0510 LF 3/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	11.05 0.01 0.04	2.40
22 07 19 00-0511 LF 1" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	11.60 0.02 0.04	2.46
22 07 19 00-0512 LF 1-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.17 0.02 0.05	2.52
22 07 19 00-0513 LF 1-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	12.66 0.02 0.06	2.56
22 07 19 00-0514 LF 1-3/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.14 0.03 0.07	2.60
22 07 19 00-0515 LF 2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.68 0.03 0.08	2.65
22 07 19 00-0516 LF 2-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.23 0.03 0.09	2.70
22 07 19 00-0517 LF 2-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.83 0.04 0.09	2.76
22 07 19 00-0518 LF 2-3/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.34 0.04 0.10	2.81
22 07 19 00-0519 LF 3" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.96 0.04 0.11	2.87
22 07 19 00-0520 LF 3-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	16.56 0.05 0.12	2.93
22 07 19 00-0521 LF 3-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.16 0.05 0.13	3.00
22 07 19 00-0522 LF 3-3/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.70 0.05 0.14	3.05
22 07 19 00-0523 LF 4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	18.32 0.06 0.15	3.13
22 07 19 00-0524 LF 4-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	18.95 0.06 0.15	3.20
22 07 19 00-0525 LF 4-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	19.66 0.07 0.16	3.28
22 07 19 00-0526 LF 4-3/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	20.24 0.07 0.17	3.35
22 07 19 00-0527 LF 5" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	20.93 0.07 0.18	3.45
22 07 19 00-0528 LF 5-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	21.63 0.07 0.19	3.54
22 07 19 00-0529 LF 5-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	22.27 0.08 0.20	3.61
22 07 19 00-0530 LF 5-3/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	23.05 0.08 0.20	3.72
22 07 19 00-0531 LF 6" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	23.82 0.09 0.21	3.83
22 07 19 00-0532 LF 6-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	24.37 0.09 0.22	3.88
22 07 19 00-0533 LF 6-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	24.95 0.09 0.23	3.94
22 07 19 00-0534 LF 7" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	25.94 0.10 0.25	4.03
22 07 19 00-0535 LF 7-1/4" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	26.65 0.10 0.25	4.13
22 07 19 00-0536 LF 7-1/2" ID, 0.024" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	27.25 0.10 0.26	4.20

22 Plumbing**22 07 Plumbing Insulation****22 07 19 Plumbing Piping Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0537	LF		8" ID, 0.024" Aluminum Insulation Jacketing	28.21	4.27
			<i>For Stucco Embossed, Add</i>	0.11	
			<i>For Corrugated, Add</i>	0.28	
22 07 19 00-0538	LF		8-1/2" ID, 0.024" Aluminum Insulation Jacketing	29.13	4.34
			<i>For Stucco Embossed, Add</i>	0.12	
			<i>For Corrugated, Add</i>	0.29	
22 07 19 00-0539	LF		9" ID, 0.024" Aluminum Insulation Jacketing	30.23	4.45
			<i>For Stucco Embossed, Add</i>	0.12	
			<i>For Corrugated, Add</i>	0.31	
22 07 19 00-0540	LF		9-1/2" ID, 0.024" Aluminum Insulation Jacketing	31.24	4.53
			<i>For Stucco Embossed, Add</i>	0.13	
			<i>For Corrugated, Add</i>	0.33	
22 07 19 00-0541	LF		10" ID, 0.024" Aluminum Insulation Jacketing	32.23	4.61
			<i>For Stucco Embossed, Add</i>	0.14	
			<i>For Corrugated, Add</i>	0.34	
22 07 19 00-0542	LF		10-1/2" ID, 0.024" Aluminum Insulation Jacketing	33.23	4.69
			<i>For Stucco Embossed, Add</i>	0.14	
			<i>For Corrugated, Add</i>	0.36	
22 07 19 00-0543	LF		11" ID, 0.0106 Aluminum Insulation Jacketing	34.41	4.83
			<i>For Stucco Embossed, Add</i>	0.15	
			<i>For Corrugated, Add</i>	0.38	
22 07 19 00-0544	LF		11-1/2" ID, 0.024" Aluminum Insulation Jacketing	35.47	4.92
			<i>For Stucco Embossed, Add</i>	0.16	
			<i>For Corrugated, Add</i>	0.40	
22 07 19 00-0545	LF		12" ID, 0.024" Aluminum Insulation Jacketing	36.52	5.02
			<i>For Stucco Embossed, Add</i>	0.16	
			<i>For Corrugated, Add</i>	0.41	
22 07 19 00-0546	LF		12-1/2" ID, 0.024" Aluminum Insulation Jacketing	37.78	5.17
			<i>For Stucco Embossed, Add</i>	0.17	
			<i>For Corrugated, Add</i>	0.43	
22 07 19 00-0547	LF		13" ID, 0.024" Aluminum Insulation Jacketing	38.65	5.22
			<i>For Stucco Embossed, Add</i>	0.18	
			<i>For Corrugated, Add</i>	0.44	
22 07 19 00-0548	LF		14" ID, 0.024" Aluminum Insulation Jacketing	40.22	5.27
			<i>For Stucco Embossed, Add</i>	0.19	
			<i>For Corrugated, Add</i>	0.48	
22 07 19 00-0549	LF		15" ID, 0.024" Aluminum Insulation Jacketing	41.98	5.38
			<i>For Stucco Embossed, Add</i>	0.20	
			<i>For Corrugated, Add</i>	0.51	
22 07 19 00-0550	LF		16" ID, 0.024" Aluminum Insulation Jacketing	43.56	5.43
			<i>For Stucco Embossed, Add</i>	0.22	
			<i>For Corrugated, Add</i>	0.55	
22 07 19 00-0551	LF		17" ID, 0.024" Aluminum Insulation Jacketing	45.34	5.55
			<i>For Stucco Embossed, Add</i>	0.23	
			<i>For Corrugated, Add</i>	0.58	
22 07 19 00-0552	LF		18" ID, 0.024" Aluminum Insulation Jacketing	46.49	5.61
			<i>For Stucco Embossed, Add</i>	0.24	
			<i>For Corrugated, Add</i>	0.60	
22 07 19 00-0553	LF		19" ID, 0.024" Aluminum Insulation Jacketing	48.76	5.73
			<i>For Stucco Embossed, Add</i>	0.26	
			<i>For Corrugated, Add</i>	0.65	
22 07 19 00-0554	LF		20" ID, 0.024" Aluminum Insulation Jacketing	50.38	5.80
			<i>For Stucco Embossed, Add</i>	0.27	
			<i>For Corrugated, Add</i>	0.68	
22 07 19 00-0555	LF		21" ID, 0.024" Aluminum Insulation Jacketing	52.22	5.93
			<i>For Stucco Embossed, Add</i>	0.28	
			<i>For Corrugated, Add</i>	0.71	
22 07 19 00-0556	LF		22" ID, 0.024" Aluminum Insulation Jacketing	53.83	6.00
			<i>For Stucco Embossed, Add</i>	0.30	
			<i>For Corrugated, Add</i>	0.75	
22 07 19 00-0557	LF		23" ID, 0.024" Aluminum Insulation Jacketing	55.76	6.15
			<i>For Stucco Embossed, Add</i>	0.31	
			<i>For Corrugated, Add</i>	0.78	
22 07 19 00-0558	LF		24" ID, 0.024" Aluminum Insulation Jacketing	57.36	6.22
			<i>For Stucco Embossed, Add</i>	0.32	
			<i>For Corrugated, Add</i>	0.81	
22 07 19 00-0559			32 Mil, Aluminum Insulation Protective Jacketing With Polykraft Moisture Barrier And Bands (22 07 19 00-0399)		
22 07 19 00-0560	LF		1/2" ID, 0.032" Aluminum Insulation Jacketing	11.90	2.60
			<i>For Stucco Embossed, Add</i>	0.01	
			<i>For Corrugated, Add</i>	0.04	
22 07 19 00-0561	LF		3/4" ID, 0.032" Aluminum Insulation Jacketing	12.58	2.66
			<i>For Stucco Embossed, Add</i>	0.02	
			<i>For Corrugated, Add</i>	0.05	
22 07 19 00-0562	LF		1" ID, 0.032" Aluminum Insulation Jacketing	13.28	2.72
			<i>For Stucco Embossed, Add</i>	0.02	
			<i>For Corrugated, Add</i>	0.06	
22 07 19 00-0563	LF		1-1/4" ID, 0.032" Aluminum Insulation Jacketing	13.98	2.79
			<i>For Stucco Embossed, Add</i>	0.03	
			<i>For Corrugated, Add</i>	0.07	
22 07 19 00-0564	LF		1-1/2" ID, 0.032" Aluminum Insulation Jacketing	14.59	2.83
			<i>For Stucco Embossed, Add</i>	0.03	
			<i>For Corrugated, Add</i>	0.08	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0565 LF 1-3/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.20 0.04 0.09	2.87
22 07 19 00-0566 LF 2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.88 0.04 0.10	2.93
22 07 19 00-0567 LF 2-1/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	16.58 0.05 0.11	2.99
22 07 19 00-0568 LF 2-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.32 0.05 0.13	3.06
22 07 19 00-0569 LF 2-3/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.97 0.06 0.14	3.11
22 07 19 00-0570 LF 3" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	18.73 0.06 0.15	3.18
22 07 19 00-0571 LF 3-1/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	19.47 0.06 0.16	3.25
22 07 19 00-0572 LF 3-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	20.22 0.07 0.17	3.32
22 07 19 00-0573 LF 3-3/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	20.89 0.07 0.18	3.38
22 07 19 00-0574 LF 4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	21.66 0.08 0.19	3.47
22 07 19 00-0575 LF 4-1/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	22.44 0.08 0.21	3.56
22 07 19 00-0576 LF 4-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	23.31 0.09 0.22	3.65
22 07 19 00-0577 LF 4-3/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	24.03 0.09 0.23	3.72
22 07 19 00-0578 LF 5" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	24.87 0.10 0.24	3.82
22 07 19 00-0579 LF 5-1/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	25.74 0.10 0.25	3.92
22 07 19 00-0580 LF 5-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	26.51 0.11 0.26	4.00
22 07 19 00-0581 LF 5-3/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	27.47 0.11 0.28	4.12
22 07 19 00-0582 LF 6" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	28.39 0.11 0.29	4.24
22 07 19 00-0583 LF 6-1/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	29.09 0.12 0.30	4.30
22 07 19 00-0584 LF 6-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	29.80 0.12 0.31	4.37
22 07 19 00-0585 LF 7" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	31.03 0.13 0.33	4.47
22 07 19 00-0586 LF 7-1/4" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	31.90 0.14 0.34	4.57
22 07 19 00-0587 LF 7-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	32.64 0.14 0.35	4.65
22 07 19 00-0588 LF 8" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	33.85 0.15 0.37	4.73
22 07 19 00-0589 LF 8-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	35.03 0.16 0.40	4.81
22 07 19 00-0590 LF 9" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	36.43 0.17 0.42	4.94
22 07 19 00-0591 LF 9-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	37.71 0.18 0.44	5.02
22 07 19 00-0592 LF 10" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	38.95 0.19 0.46	5.11

22 Plumbing
22 07 Plumbing Insulation
22 07 19 Plumbing Piping Insulation



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 07 19 00-0593	LF 10-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	40.20 0.19 0.48	5.20
22 07 19 00-0594	LF 11" ID, 0.0106 Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	41.67 0.20 0.51	5.35
22 07 19 00-0595	LF 11-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	43.02 0.21 0.53	5.45
22 07 19 00-0596	LF 12" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	44.32 0.22 0.55	5.56
22 07 19 00-0597	LF 12-1/2" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	45.88 0.23 0.57	5.72
22 07 19 00-0598	LF 13" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	46.99 0.24 0.60	5.78
22 07 19 00-0599	LF 14" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	49.05 0.26 0.64	5.84
22 07 19 00-0600	LF 15" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	51.31 0.27 0.69	5.96
22 07 19 00-0601	LF 16" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	53.39 0.29 0.73	6.02
22 07 19 00-0602	LF 17" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	55.66 0.31 0.78	6.16
22 07 19 00-0603	LF 18" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	57.15 0.32 0.81	6.22
22 07 19 00-0604	LF 19" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	60.09 0.35 0.87	6.36
22 07 19 00-0605	LF 20" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	62.19 0.36 0.91	6.43
22 07 19 00-0606	LF 21" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	64.55 0.38 0.96	6.58
22 07 19 00-0607	LF 22" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	66.62 0.40 1.00	6.66
22 07 19 00-0608	LF 23" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	69.08 0.42 1.05	6.81
22 07 19 00-0609	LF 24" ID, 0.032" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	71.18 0.44 1.09	6.89
22 07 19 00-0610	40 Mil, Aluminum Insulation Protective Jacketing With Polykraft Moisture Barrier And Bands <small>(22 07 19 00-0399)</small>		
22 07 19 00-0611	LF 1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	13.84 0.02 0.05	2.99
22 07 19 00-0612	LF 3/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	14.68 0.02 0.06	3.06
22 07 19 00-0613	LF 1" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	15.52 0.03 0.07	3.13
22 07 19 00-0614	LF 1-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	16.38 0.04 0.09	3.21
22 07 19 00-0615	LF 1-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.13 0.04 0.10	3.26
22 07 19 00-0616	LF 1-3/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	17.88 0.05 0.12	3.30
22 07 19 00-0617	LF 2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	18.70 0.05 0.13	3.37
22 07 19 00-0618	LF 2-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	19.55 0.06 0.14	3.45
22 07 19 00-0619	LF 2-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	20.46 0.06 0.16	3.52
22 07 19 00-0620	LF 2-3/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	21.25 0.07 0.17	3.58

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0621 LF 3" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	22.19 0.08 0.19	3.66
22 07 19 00-0622 LF 3-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	23.07 0.08 0.20	3.74
22 07 19 00-0623 LF 3-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	23.98 0.09 0.22	3.83
22 07 19 00-0624 LF 3-3/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	24.80 0.09 0.23	3.90
22 07 19 00-0625 LF 4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	25.74 0.10 0.24	3.99
22 07 19 00-0626 LF 4-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	26.69 0.10 0.26	4.09
22 07 19 00-0627 LF 4-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	27.73 0.11 0.27	4.19
22 07 19 00-0628 LF 4-3/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	28.61 0.12 0.29	4.27
22 07 19 00-0629 LF 5" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	29.63 0.12 0.30	4.39
22 07 19 00-0630 LF 5-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	30.65 0.13 0.32	4.51
22 07 19 00-0631 LF 5-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	31.59 0.13 0.33	4.60
22 07 19 00-0632 LF 5-3/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	32.74 0.14 0.35	4.73
22 07 19 00-0633 LF 6" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	33.85 0.14 0.36	4.88
22 07 19 00-0634 LF 6-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	34.71 0.15 0.37	4.95
22 07 19 00-0635 LF 6-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	35.56 0.15 0.39	5.03
22 07 19 00-0636 LF 7" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	37.07 0.17 0.41	5.15
22 07 19 00-0637 LF 7-1/4" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	38.13 0.17 0.43	5.27
22 07 19 00-0638 LF 7-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	39.02 0.18 0.44	5.35
22 07 19 00-0639 LF 8" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	40.50 0.19 0.47	5.44
22 07 19 00-0640 LF 8-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	41.95 0.20 0.50	5.53
22 07 19 00-0641 LF 9" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	43.64 0.21 0.52	5.67
22 07 19 00-0642 LF 9-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	45.22 0.22 0.55	5.77
22 07 19 00-0643 LF 10" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	46.74 0.23 0.58	5.87
22 07 19 00-0644 LF 10-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	48.28 0.24 0.61	5.98
22 07 19 00-0645 LF 11" ID, 0.0106 Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	50.06 0.25 0.64	6.16
22 07 19 00-0646 LF 11-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	51.70 0.27 0.67	6.27
22 07 19 00-0647 LF 12" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	53.31 0.28 0.69	6.39
22 07 19 00-0648 LF 12-1/2" ID, 0.040" Aluminum Insulation Jacketing <i>For Stucco Embossed, Add</i> <i>For Corrugated, Add</i>	55.18 0.29 0.72	6.58

22 Plumbing
22 07 Plumbing Insulation
22 07 19 Plumbing Piping Insulation



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0649	LF		13" ID, 0.040" Aluminum Insulation Jacketing	56.55	6.65
			<i>For Stucco Embossed, Add</i>	0.30	
			<i>For Corrugated, Add</i>	0.75	
22 07 19 00-0650	LF		14" ID, 0.040" Aluminum Insulation Jacketing	59.11	6.72
			<i>For Stucco Embossed, Add</i>	0.32	
			<i>For Corrugated, Add</i>	0.81	
22 07 19 00-0651	LF		15" ID, 0.040" Aluminum Insulation Jacketing	61.89	6.86
			<i>For Stucco Embossed, Add</i>	0.34	
			<i>For Corrugated, Add</i>	0.86	
22 07 19 00-0652	LF		16" ID, 0.040" Aluminum Insulation Jacketing	64.46	6.93
			<i>For Stucco Embossed, Add</i>	0.37	
			<i>For Corrugated, Add</i>	0.92	
22 07 19 00-0653	LF		17" ID, 0.040" Aluminum Insulation Jacketing	67.29	7.08
			<i>For Stucco Embossed, Add</i>	0.39	
			<i>For Corrugated, Add</i>	0.97	
22 07 19 00-0654	LF		18" ID, 0.040" Aluminum Insulation Jacketing	69.11	7.15
			<i>For Stucco Embossed, Add</i>	0.40	
			<i>For Corrugated, Add</i>	1.01	
22 07 19 00-0655	LF		19" ID, 0.040" Aluminum Insulation Jacketing	72.74	7.31
			<i>For Stucco Embossed, Add</i>	0.43	
			<i>For Corrugated, Add</i>	1.09	
22 07 19 00-0656	LF		20" ID, 0.040" Aluminum Insulation Jacketing	75.35	7.39
			<i>For Stucco Embossed, Add</i>	0.46	
			<i>For Corrugated, Add</i>	1.14	
22 07 19 00-0657	LF		21" ID, 0.040" Aluminum Insulation Jacketing	78.24	7.57
			<i>For Stucco Embossed, Add</i>	0.48	
			<i>For Corrugated, Add</i>	1.20	
22 07 19 00-0658	LF		22" ID, 0.040" Aluminum Insulation Jacketing	80.82	7.66
			<i>For Stucco Embossed, Add</i>	0.50	
			<i>For Corrugated, Add</i>	1.26	
22 07 19 00-0659	LF		23" ID, 0.040" Aluminum Insulation Jacketing	83.84	7.84
			<i>For Stucco Embossed, Add</i>	0.52	
			<i>For Corrugated, Add</i>	1.31	
22 07 19 00-0660	LF		24" ID, 0.040" Aluminum Insulation Jacketing	86.43	7.93
			<i>For Stucco Embossed, Add</i>	0.55	
			<i>For Corrugated, Add</i>	1.37	

22 07 19 00-0661 Aluminum Insulation Protective Jacketing For Fittings (22 07 19 00-0399)

22 07 19 00-0662	EA		1-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	23.29	3.07
22 07 19 00-0663	EA		1-3/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	23.74	3.18
22 07 19 00-0664	EA		2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	27.08	3.31
22 07 19 00-0665	EA		2-1/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	27.29	3.36
22 07 19 00-0666	EA		2-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	27.50	3.42
22 07 19 00-0667	EA		2-3/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	27.83	3.50
22 07 19 00-0668	EA		3" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	29.36	3.59
22 07 19 00-0669	EA		3-1/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	29.72	3.68
22 07 19 00-0670	EA		3-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	32.71	3.74
22 07 19 00-0671	EA		3-3/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	33.43	3.81
22 07 19 00-0672	EA		4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	34.69	3.91
22 07 19 00-0673	EA		4-1/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	35.52	3.98
22 07 19 00-0674	EA		4-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	35.82	4.06
22 07 19 00-0675	EA		4-3/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	36.13	4.14
22 07 19 00-0676	EA		5" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	38.95	4.22
22 07 19 00-0677	EA		5-1/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	42.67	4.30
22 07 19 00-0678	EA		5-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	49.46	4.43
22 07 19 00-0679	EA		5-3/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	49.83	4.53
22 07 19 00-0680	EA		6" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	45.77	4.67
22 07 19 00-0681	EA		6-1/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	46.18	4.79
22 07 19 00-0682	EA		6-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	52.37	4.95
22 07 19 00-0683	EA		7" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	59.80	5.06
22 07 19 00-0684	EA		7-1/4" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	60.04	5.12
22 07 19 00-0685	EA		7-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	78.88	5.19
22 07 19 00-0686	EA		8" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	64.34	5.25
22 07 19 00-0687	EA		8-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	101.64	5.38
22 07 19 00-0688	EA		9" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	102.18	5.52
22 07 19 00-0689	EA		9-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	81.29	5.59
22 07 19 00-0690	EA		10" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	81.59	5.66
22 07 19 00-0691	EA		10-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	83.16	5.73
22 07 19 00-0692	EA		11" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	83.47	5.81
22 07 19 00-0693	EA		11-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	92.36	5.97
22 07 19 00-0694	EA		12" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	92.69	6.06
22 07 19 00-0695	EA		12-1/2" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	146.77	6.24
22 07 19 00-0696	EA		13" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	147.14	6.33
22 07 19 00-0697	EA		14" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	189.45	6.52
22 07 19 00-0698	EA		15" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	197.69	6.72
22 07 19 00-0699	EA		16" ID, Aluminum 90 Degree LR Elbow Insulation Jacketing	213.64	6.83
22 07 19 00-0700	EA		2-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	25.09	3.42
22 07 19 00-0701	EA		2-3/4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	25.42	3.50
22 07 19 00-0702	EA		3" ID, Aluminum 45 Degree Elbow Insulation Jacketing	27.27	3.59
22 07 19 00-0703	EA		3-1/4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	27.63	3.68
22 07 19 00-0704	EA		3-1/2" ID Aluminum 45 Degree Elbow Insulation Jacketing	29.70	3.74
22 07 19 00-0705	EA		3-3/4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	29.96	3.81

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
22 07 19 00-0706 EA 4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	30.63	3.91
22 07 19 00-0707 EA 4-1/4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	33.03	3.98
22 07 19 00-0708 EA 4-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	33.33	4.06
22 07 19 00-0709 EA 4-3/4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	33.64	4.14
22 07 19 00-0710 EA 5" ID, Aluminum 45 Degree Elbow Insulation Jacketing	36.94	4.22
22 07 19 00-0711 EA 5-1/4" ID, Aluminum 45 Degree Elbow Insulation Jacketing	37.28	4.30
22 07 19 00-0712 EA 5-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	38.79	4.43
22 07 19 00-0713 EA 6" ID, Aluminum 45 Degree Elbow Insulation Jacketing	39.76	4.67
22 07 19 00-0714 EA 6-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	48.85	4.95
22 07 19 00-0715 EA 7" ID, Aluminum 45 Degree Elbow Insulation Jacketing	49.31	5.06
22 07 19 00-0716 EA 7-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	50.06	5.19
22 07 19 00-0717 EA 8" ID, Aluminum 45 Degree Elbow Insulation Jacketing	50.31	5.25
22 07 19 00-0718 EA 8-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	58.00	5.38
22 07 19 00-0719 EA 9" ID, Aluminum 45 Degree Elbow Insulation Jacketing	58.54	5.52
22 07 19 00-0720 EA 9-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	73.00	5.59
22 07 19 00-0721 EA 10" ID, Aluminum 45 Degree Elbow Insulation Jacketing	73.30	5.66
22 07 19 00-0722 EA 10-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	70.32	5.73
22 07 19 00-0723 EA 11" ID, Aluminum 45 Degree Elbow Insulation Jacketing	70.63	5.81
22 07 19 00-0724 EA 11-1/2" ID, Aluminum 45 Degree Elbow Insulation Jacketing	80.82	5.97
22 07 19 00-0725 EA 12" ID, Aluminum 45 Degree Elbow Insulation Jacketing	81.15	6.06
22 07 19 00-0726 EA 13" ID, Aluminum 45 Degree Elbow Insulation Jacketing	92.10	6.33
22 07 19 00-0727 EA 14" ID, Aluminum 45 Degree Elbow Insulation Jacketing	108.03	6.52
22 07 19 00-0728 EA 15" ID, Aluminum 45 Degree Elbow Insulation Jacketing	153.16	6.72
22 07 19 00-0729 EA 16" ID, Aluminum 45 Degree Elbow Insulation Jacketing	164.21	6.83
22 07 19 00-0730 EA 17" ID, Aluminum 45 Degree Elbow Insulation Jacketing	161.42	6.94
22 07 19 00-0731 EA 18" ID, Aluminum 45 Degree Elbow Insulation Jacketing	180.69	7.05
22 07 19 00-0732 EA 19" ID, Aluminum 45 Degree Elbow Insulation Jacketing	214.92	7.17
22 07 19 00-0733 EA 20" ID, Aluminum 45 Degree Elbow Insulation Jacketing	209.29	7.29
22 07 19 00-0734 EA 21" ID, Aluminum 45 Degree Elbow Insulation Jacketing	224.12	7.41
22 07 19 00-0735 EA 2-1/2" ID, Aluminum Tee Insulation Jacketing	98.05	4.89
22 07 19 00-0736 EA 2-3/4" ID, Aluminum Tee Insulation Jacketing	98.52	5.01
22 07 19 00-0737 EA 3" ID, Aluminum Tee Insulation Jacketing	109.17	5.12
22 07 19 00-0738 EA 3-1/4" ID, Aluminum Tee Insulation Jacketing	109.66	5.25
22 07 19 00-0739 EA 3-1/2" ID Aluminum Tee Insulation Jacketing	114.45	5.38
22 07 19 00-0740 EA 4" ID, Aluminum Tee Insulation Jacketing	115.99	5.52
22 07 19 00-0741 EA 4-1/4" ID, Aluminum Tee Insulation Jacketing	122.00	5.66
22 07 19 00-0742 EA 4-1/2" ID, Aluminum Tee Insulation Jacketing	121.80	5.81
22 07 19 00-0743 EA 4-3/4" ID, Aluminum Tee Insulation Jacketing	122.45	5.97
22 07 19 00-0744 EA 5" ID, Aluminum Tee Insulation Jacketing	126.81	6.15
22 07 19 00-0745 EA 5-1/4" ID, Aluminum Tee Insulation Jacketing	127.53	6.33
22 07 19 00-0746 EA 5-1/2" ID, Aluminum Tee Insulation Jacketing	132.82	6.52
22 07 19 00-0747 EA 6" ID, Aluminum Tee Insulation Jacketing	133.64	6.72
22 07 19 00-0748 EA 6-1/2" ID, Aluminum Tee Insulation Jacketing	145.94	7.17
22 07 19 00-0749 EA 7" ID, Aluminum Tee Insulation Jacketing	146.93	7.41
22 07 19 00-0750 EA 7-1/2" ID, Aluminum Tee Insulation Jacketing	161.13	7.69
22 07 19 00-0751 EA 8" ID, Aluminum Tee Insulation Jacketing	162.26	7.97
22 07 19 00-0752 EA 8-1/2" ID, Aluminum Tee Insulation Jacketing	166.92	8.27
22 07 19 00-0753 EA 9" ID, Aluminum Tee Insulation Jacketing	168.25	8.60
22 07 19 00-0754 EA 9-1/2" ID, Aluminum Tee Insulation Jacketing	134.45	8.78
22 07 19 00-0755 EA 10" ID, Aluminum Tee Insulation Jacketing	135.17	8.97
22 07 19 00-0756 EA 10-1/2" ID, Aluminum Tee Insulation Jacketing	142.42	9.16
22 07 19 00-0757 EA 11" ID, Aluminum Tee Insulation Jacketing	143.22	9.35
22 07 19 00-0758 EA 11-1/2" ID, Aluminum Tee Insulation Jacketing	149.81	9.56
22 07 19 00-0759 EA 12" ID, Aluminum Tee Insulation Jacketing	150.69	9.78
22 07 19 00-0760 EA 13" ID, Aluminum Tee Insulation Jacketing	157.14	10.00
22 07 19 00-0761 EA 14" ID, Aluminum Tee Insulation Jacketing	163.84	10.25
22 07 19 00-0762 EA 15" ID, Aluminum Tee Insulation Jacketing	174.86	10.50
22 07 19 00-0763 EA 16" ID, Aluminum Tee Insulation Jacketing	179.25	10.76
22 07 19 00-0764 EA 17" ID, Aluminum Tee Insulation Jacketing	200.74	11.03
22 07 19 00-0765 EA 18" ID, Aluminum Tee Insulation Jacketing	208.00	11.32
22 07 19 00-0766 EA 19" ID, Aluminum Tee Insulation Jacketing	226.44	11.63
22 07 19 00-0767 EA 20" ID, Aluminum Tee Insulation Jacketing	231.67	11.95
22 07 19 00-0768 EA 22" ID, Aluminum Tee Insulation Jacketing	283.06	12.29
22 07 19 00-0769 EA 23" ID, Aluminum Tee Insulation Jacketing	291.01	12.65
22 07 19 00-0770 EA 24" ID, Aluminum Tee Insulation Jacketing	302.17	13.88
22 07 19 00-0771	Stainless Steel Insulation Protective Jacketing With Bands <small>(22 07 19 00-0398)</small>	
22 07 19 00-0772	Type 304 Stainless Steel Roll, Insulation Protective Jacketing With Bands <small>(22 07 19 00-0771)</small>	
22 07 19 00-0773	SF 0.010" Stainless Steel Insulation Jacket With Bands	20.77 8.07
22 07 19 00-0774	SF 0.016" Stainless Steel Insulation Jacket With Bands	25.63 9.68
22 07 19 00-0775	10 Mil, Type 304 Stainless Steel, Insulation Protective Jacketing With Moisture Barrier And Bands <small>(22 07 19 00-0771)</small>	
22 07 19 00-0776	LF 2-1/2" ID, 0.010" Stainless Steel Insulation Jacketing	11.05 1.72
22 07 19 00-0777	LF 2-3/4" ID, 0.010" Stainless Steel Insulation Jacketing	11.56 1.75
22 07 19 00-0778	LF 3" ID, 0.010" Stainless Steel Insulation Jacketing	12.08 1.79
22 07 19 00-0779	LF 3-1/4" ID, 0.010" Stainless Steel Insulation Jacketing	12.61 1.83



MINOR TOTAL DIRECT DEMOLITION
 CSI UOM DESCRIPTION UNIT COST UNIT COST

22 07 19 00-0780	LF	3-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	13.15	1.87
22 07 19 00-0781	LF	3-3/4" ID, 0.010" Stainless Steel Insulation Jacketing.....	13.68	1.91
22 07 19 00-0782	LF	4" ID, 0.010" Stainless Steel Insulation Jacketing.....	14.23	1.95
22 07 19 00-0783	LF	4-1/4" ID, 0.010" Stainless Steel Insulation Jacketing.....	14.78	2.00
22 07 19 00-0784	LF	4-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	15.33	2.05
22 07 19 00-0785	LF	5" ID, 0.010" Stainless Steel Insulation Jacketing.....	16.49	2.16
22 07 19 00-0786	LF	5-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	17.68	2.27
22 07 19 00-0787	LF	6" ID, 0.010" Stainless Steel Insulation Jacketing.....	18.92	2.39
22 07 19 00-0788	LF	6-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	19.93	2.46
22 07 19 00-0789	LF	7" ID, 0.010" Stainless Steel Insulation Jacketing.....	20.97	2.53
22 07 19 00-0790	LF	7-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	22.09	2.62
22 07 19 00-0791	LF	8" ID, 0.010" Stainless Steel Insulation Jacketing.....	23.01	2.67
22 07 19 00-0792	LF	8-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	23.95	2.72
22 07 19 00-0793	LF	9" ID, 0.010" Stainless Steel Insulation Jacketing.....	24.91	2.78
22 07 19 00-0794	LF	9-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	25.87	2.83
22 07 19 00-0795	LF	10" ID, 0.010" Stainless Steel Insulation Jacketing.....	26.85	2.89
22 07 19 00-0796	LF	10-1/2" ID, 0.010" Stainless Steel Insulation Jacketing.....	27.83	2.95
22 07 19 00-0797	LF	11" ID, 0.010" Stainless Steel Insulation Jacketing.....	28.82	3.01
22 07 19 00-0798	LF	12" ID, 0.010" Stainless Steel Insulation Jacketing.....	30.81	3.14
22 07 19 00-0799	LF	13" ID, 0.010" Stainless Steel Insulation Jacketing.....	32.78	3.26
22 07 19 00-0800	LF	14" ID, 0.010" Stainless Steel Insulation Jacketing.....	34.45	3.31

22 07 19 00-0801 16 Mil, Type 304 Stainless Steel, Insulation Protective Jacketing With Moisture Barrier And Bands (22 07 19 00-0771)

22 07 19 00-0802	LF	2-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	15.21	2.29
22 07 19 00-0803	LF	2-3/4" ID, 0.016" Stainless Steel Insulation Jacketing.....	15.92	2.34
22 07 19 00-0804	LF	3" ID, 0.016" Stainless Steel Insulation Jacketing.....	16.66	2.39
22 07 19 00-0805	LF	3-1/4" ID, 0.016" Stainless Steel Insulation Jacketing.....	17.41	2.44
22 07 19 00-0806	LF	3-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	18.16	2.49
22 07 19 00-0807	LF	3-3/4" ID, 0.016" Stainless Steel Insulation Jacketing.....	18.91	2.54
22 07 19 00-0808	LF	4" ID, 0.016" Stainless Steel Insulation Jacketing.....	19.69	2.60
22 07 19 00-0809	LF	4-1/4" ID, 0.016" Stainless Steel Insulation Jacketing.....	20.46	2.66
22 07 19 00-0810	LF	4-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	21.25	2.72
22 07 19 00-0811	LF	5" ID, 0.016" Stainless Steel Insulation Jacketing.....	22.88	2.86
22 07 19 00-0812	LF	5-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	24.55	3.01
22 07 19 00-0813	LF	6" ID, 0.016" Stainless Steel Insulation Jacketing.....	26.28	3.18
22 07 19 00-0814	LF	6-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	27.72	3.27
22 07 19 00-0815	LF	7" ID, 0.016" Stainless Steel Insulation Jacketing.....	29.20	3.36
22 07 19 00-0816	LF	7-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	30.75	3.49
22 07 19 00-0817	LF	8" ID, 0.016" Stainless Steel Insulation Jacketing.....	32.08	3.56
22 07 19 00-0818	LF	8-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	33.43	3.63
22 07 19 00-0819	LF	9" ID, 0.016" Stainless Steel Insulation Jacketing.....	34.80	3.69
22 07 19 00-0820	LF	9-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	36.16	3.77
22 07 19 00-0821	LF	10" ID, 0.016" Stainless Steel Insulation Jacketing.....	37.53	3.84
22 07 19 00-0822	LF	10-1/2" ID, 0.016" Stainless Steel Insulation Jacketing.....	38.94	3.92
22 07 19 00-0823	LF	11" ID, 0.0106 Stainless Steel Insulation Jacketing.....	40.33	4.00
22 07 19 00-0824	LF	12" ID, 0.016" Stainless Steel Insulation Jacketing.....	43.17	4.18
22 07 19 00-0825	LF	13" ID, 0.016" Stainless Steel Insulation Jacketing.....	45.96	4.33
22 07 19 00-0826	LF	14" ID, 0.016" Stainless Steel Insulation Jacketing.....	48.37	4.40

22 07 19 00-0827 Type 316 Stainless Steel Insulation Protective Jacketing For Fittings (22 07 19 00-0771)

22 07 19 00-0828	EA	2-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	32.09	3.42
22 07 19 00-0829	EA	2-3/4" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	32.42	3.50
22 07 19 00-0830	EA	3" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	33.62	3.59
22 07 19 00-0831	EA	3-1/4" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	33.98	3.68
22 07 19 00-0832	EA	3-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	35.21	3.74
22 07 19 00-0833	EA	3-3/4" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	36.62	3.81
22 07 19 00-0834	EA	4" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	39.16	3.91
22 07 19 00-0835	EA	4-1/4" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	47.19	3.98
22 07 19 00-0836	EA	4-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	47.49	4.06
22 07 19 00-0837	EA	5" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	48.84	4.22
22 07 19 00-0838	EA	5-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	65.40	4.43
22 07 19 00-0839	EA	6" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	71.03	4.67
22 07 19 00-0840	EA	6-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	91.80	4.95
22 07 19 00-0841	EA	7" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	92.26	5.06
22 07 19 00-0842	EA	7-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	104.81	5.19
22 07 19 00-0843	EA	8" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	105.60	5.38
22 07 19 00-0844	EA	8-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	108.46	5.38
22 07 19 00-0845	EA	9" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	154.30	5.52
22 07 19 00-0846	EA	9-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	152.29	5.59
22 07 19 00-0847	EA	10" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	152.59	5.66
22 07 19 00-0848	EA	10-1/2" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	178.42	5.73
22 07 19 00-0849	EA	11" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	171.67	5.81
22 07 19 00-0850	EA	12" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	192.73	6.06
22 07 19 00-0851	EA	13" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	258.75	6.33
22 07 19 00-0852	EA	14" ID, Stainless Steel 90 Degree LR Elbow Insulation Jacketing.....	261.09	6.52
22 07 19 00-0853	EA	2-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing.....	29.02	3.42
22 07 19 00-0854	EA	2-3/4" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing.....	29.35	3.50

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-0855 EA 3" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	30.87	3.59
22 07 19 00-0856 EA 3-1/4" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	31.23	3.68
22 07 19 00-0857 EA 3-1/2" ID Stainless Steel 45 Degree Elbow Insulation Jacketing	31.70	3.74
22 07 19 00-0858 EA 3-3/4" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	31.96	3.81
22 07 19 00-0859 EA 4" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	37.16	3.91
22 07 19 00-0860 EA 4-1/4" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	46.13	3.98
22 07 19 00-0861 EA 4-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	46.43	4.06
22 07 19 00-0862 EA 4-3/4" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	46.74	4.14
22 07 19 00-0863 EA 5" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	47.58	4.22
22 07 19 00-0864 EA 5-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	48.45	4.43
22 07 19 00-0865 EA 6" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	55.13	4.67
22 07 19 00-0866 EA 6-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	56.21	4.95
22 07 19 00-0867 EA 7" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	81.88	5.06
22 07 19 00-0868 EA 7-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	83.63	5.19
22 07 19 00-0869 EA 8" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	83.88	5.25
22 07 19 00-0870 EA 8-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	95.12	5.38
22 07 19 00-0871 EA 9" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	95.66	5.52
22 07 19 00-0872 EA 9-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	108.76	5.59
22 07 19 00-0873 EA 10" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	109.06	5.66
22 07 19 00-0874 EA 10-1/2" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	126.80	5.73
22 07 19 00-0875 EA 11" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	127.11	5.81
22 07 19 00-0876 EA 12" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	137.02	6.06
22 07 19 00-0877 EA 13" ID, Stainless Steel 45 Degree Elbow Insulation Jacketing	158.02	6.33
22 07 19 00-0878 Polyvinyl Chloride (PVC) Insulation Protective Jacketing (22 07 19 00-0398)		
22 07 19 00-0879 20 Mil Polyvinyl Chloride (PVC) Insulation Protective Jacketing (22 07 19 00-0878)		
22 07 19 00-0880 LF 1-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	7.71	1.59
22 07 19 00-0881 LF 2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	8.39	1.65
22 07 19 00-0882 LF 2-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	8.98	1.72
22 07 19 00-0883 LF 3" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	9.71	1.79
22 07 19 00-0884 LF 3-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	10.37	1.87
22 07 19 00-0885 LF 4" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	11.09	1.95
22 07 19 00-0886 LF 4-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	11.85	2.05
22 07 19 00-0887 LF 5" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	12.58	2.16
22 07 19 00-0888 LF 5-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	13.43	2.27
22 07 19 00-0889 LF 6" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	14.32	2.39
22 07 19 00-0890 LF 6-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	14.97	2.46
22 07 19 00-0891 LF 7" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	15.59	2.53
22 07 19 00-0892 LF 7-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	16.42	2.62
22 07 19 00-0893 LF 8" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	16.94	2.67
22 07 19 00-0894 LF 8-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	17.52	2.72
22 07 19 00-0895 LF 9" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	18.12	2.78
22 07 19 00-0896 LF 9-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	18.73	2.83
22 07 19 00-0897 LF 10" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	19.30	2.89
22 07 19 00-0898 LF 10-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	19.92	2.95
22 07 19 00-0899 LF 11" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	20.55	3.01
22 07 19 00-0900 LF 11-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	21.19	3.07
22 07 19 00-0901 LF 12" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	21.79	3.14
22 07 19 00-0902 LF 12-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	22.52	3.21
22 07 19 00-0903 LF 13" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	23.05	3.26
22 07 19 00-0904 LF 13-1/2" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	23.43	3.26
22 07 19 00-0905 LF 14" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	24.02	3.31
22 07 19 00-0906 LF 15" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	25.01	3.36
22 07 19 00-0907 LF 16" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	25.93	3.42
22 07 19 00-0908 LF 17" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	26.93	3.47
22 07 19 00-0909 LF 18" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	27.92	3.53
22 07 19 00-0910 LF 19" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	28.89	3.59
22 07 19 00-0911 LF 20" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	29.91	3.65
22 07 19 00-0912 LF 21" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	30.87	3.71
22 07 19 00-0913 LF 22" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	31.91	3.78
22 07 19 00-0914 LF 23" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	32.89	3.84
22 07 19 00-0915 LF 24" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	33.95	3.91
22 07 19 00-0916 LF 25" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	35.02	3.98
22 07 19 00-0917 LF 26" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	36.03	4.06
22 07 19 00-0918 LF 27" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	37.12	4.14
22 07 19 00-0919 LF 28" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	38.16	4.22
22 07 19 00-0920 LF 29" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	39.27	4.30
22 07 19 00-0921 LF 30" ID, 0.02" Polyvinyl Chloride (PVC) Insulation Jacketing	40.40	4.39
22 07 19 00-0922 30 Mil Polyvinyl Chloride (PVC) Insulation Protective Jacketing (22 07 19 00-0878)		
22 07 19 00-0923 LF 2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	9.22	1.65
22 07 19 00-0924 LF 2-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	10.03	1.72
22 07 19 00-0925 LF 3" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	10.93	1.79
22 07 19 00-0926 LF 3-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	11.75	1.87
22 07 19 00-0927 LF 4" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	12.64	1.95
22 07 19 00-0928 LF 4-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	13.56	2.05
22 07 19 00-0929 LF 5" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	14.52	2.16
22 07 19 00-0930 LF 5-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	15.53	2.27

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 07 19 00-0931	LF	6" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	16.58	2.39
22 07 19 00-0932	LF	6-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	17.40	2.46
22 07 19 00-0933	LF	7" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	18.25	2.53
22 07 19 00-0934	LF	7-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	19.24	2.62
22 07 19 00-0935	LF	8" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	19.98	2.67
22 07 19 00-0936	LF	8-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	20.73	2.72
22 07 19 00-0937	LF	9" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	21.49	2.78
22 07 19 00-0938	LF	9-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	22.27	2.83
22 07 19 00-0939	LF	10" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	23.06	2.89
22 07 19 00-0940	LF	10-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	23.84	2.95
22 07 19 00-0941	LF	11" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	24.65	3.01
22 07 19 00-0942	LF	11-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	25.45	3.07
22 07 19 00-0943	LF	12" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	26.27	3.14
22 07 19 00-0944	LF	12-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	27.16	3.21
22 07 19 00-0945	LF	13" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	27.91	3.26
22 07 19 00-0946	LF	13-1/2" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	28.47	3.26
22 07 19 00-0947	LF	14" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	29.22	3.31
22 07 19 00-0948	LF	15" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	30.53	3.36
22 07 19 00-0949	LF	16" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	31.85	3.42
22 07 19 00-0950	LF	17" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	33.18	3.47
22 07 19 00-0951	LF	18" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	34.56	3.53
22 07 19 00-0952	LF	19" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	35.91	3.59
22 07 19 00-0953	LF	20" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	37.26	3.65
22 07 19 00-0954	LF	21" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	38.62	3.71
22 07 19 00-0955	LF	22" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	39.98	3.78
22 07 19 00-0956	LF	23" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	41.35	3.84
22 07 19 00-0957	LF	24" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	42.74	3.91
22 07 19 00-0958	LF	25" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	44.19	3.98
22 07 19 00-0959	LF	26" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	45.60	4.06
22 07 19 00-0960	LF	27" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	47.02	4.14
22 07 19 00-0961	LF	28" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	48.44	4.22
22 07 19 00-0962	LF	29" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	49.89	4.30
22 07 19 00-0963	LF	30" ID, 0.03" Polyvinyl Chloride (PVC) Insulation Jacketing	51.34	4.39

22 07 19 00-0964 Polyvinyl Chloride (PVC) Insulation Protective Jacketing For Fittings (22 07 19 00-0978)

22 07 19 00-0965	EA	1-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	15.78	3.18
22 07 19 00-0966	EA	2" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	17.00	3.31
22 07 19 00-0967	EA	2-1/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	17.65	3.36
22 07 19 00-0968	EA	2-1/2" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	18.30	3.42
22 07 19 00-0969	EA	2-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	19.02	3.50
22 07 19 00-0970	EA	3" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	19.66	3.59
22 07 19 00-0971	EA	3-3/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	20.87	3.71
22 07 19 00-0972	EA	3-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	21.98	3.81
22 07 19 00-0973	EA	4-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	24.16	3.91
22 07 19 00-0974	EA	4-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	26.67	4.10
22 07 19 00-0975	EA	5-1/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	29.21	4.30
22 07 19 00-0976	EA	5-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	33.92	4.53
22 07 19 00-0977	EA	6-1/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	45.49	4.79
22 07 19 00-0978	EA	6-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	47.55	4.95
22 07 19 00-0979	EA	7-1/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	55.03	5.06
22 07 19 00-0980	EA	7-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	57.22	5.19
22 07 19 00-0981	EA	8-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	68.46	5.38
22 07 19 00-0982	EA	9-3/4" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	85.05	5.59
22 07 19 00-0983	EA	10-7/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	93.26	5.81
22 07 19 00-0984	EA	11-7/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	104.47	6.06
22 07 19 00-0985	EA	12-7/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	126.60	6.33
22 07 19 00-0986	EA	14-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	141.85	6.52
22 07 19 00-0987	EA	15-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	151.29	6.72
22 07 19 00-0988	EA	16-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	163.11	6.83
22 07 19 00-0989	EA	17-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	178.42	6.94
22 07 19 00-0990	EA	18-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	222.57	7.05
22 07 19 00-0991	EA	19-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	292.53	7.17
22 07 19 00-0992	EA	20-1/8" ID, Polyvinyl Chloride (PVC) 90 Degree Elbow Insulation Jacketing	368.27	7.29
22 07 19 00-0993	EA	1-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	15.78	3.18
22 07 19 00-0994	EA	2" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	17.00	3.31
22 07 19 00-0995	EA	2-1/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	17.65	3.36
22 07 19 00-0996	EA	2-1/2" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	18.30	3.42
22 07 19 00-0997	EA	2-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	19.02	3.50
22 07 19 00-0998	EA	3" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	19.66	3.59
22 07 19 00-0999	EA	3-3/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	20.87	3.71
22 07 19 00-1000	EA	3-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	21.98	3.81
22 07 19 00-1001	EA	4-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	24.16	3.91
22 07 19 00-1002	EA	4-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	26.67	4.10
22 07 19 00-1003	EA	5-1/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	29.21	4.30
22 07 19 00-1004	EA	5-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	33.92	4.53
22 07 19 00-1005	EA	6-1/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	45.49	4.79
22 07 19 00-1006	EA	6-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	47.55	4.95
22 07 19 00-1007	EA	7-1/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	55.03	5.06
22 07 19 00-1008	EA	7-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	57.22	5.19
22 07 19 00-1009	EA	8-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing	68.46	5.38

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-1010 EA 9-3/4" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	85.05	5.59
22 07 19 00-1011 EA 10-7/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	93.20	5.81
22 07 19 00-1012 EA 11-7/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	101.37	6.06
22 07 19 00-1013 EA 12-7/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	111.40	6.33
22 07 19 00-1014 EA 14-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	124.43	6.52
22 07 19 00-1015 EA 15-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	132.44	6.72
22 07 19 00-1016 EA 16-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	147.85	6.83
22 07 19 00-1017 EA 17-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	163.49	6.94
22 07 19 00-1018 EA 18-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	194.09	7.05
22 07 19 00-1019 EA 19-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	254.93	7.17
22 07 19 00-1020 EA 20-1/8" ID, Polyvinyl Chloride (PVC) 45 Degree Elbow Insulation Jacketing.....	285.44	7.29
22 07 19 00-1021 EA 1-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	23.68	4.48
22 07 19 00-1022 EA 2" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	24.82	4.57
22 07 19 00-1023 EA 2-1/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	25.99	4.72
22 07 19 00-1024 EA 2-1/2" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	27.29	4.89
22 07 19 00-1025 EA 2-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	28.76	5.06
22 07 19 00-1026 EA 3" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	30.21	5.25
22 07 19 00-1027 EA 3-3/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	32.41	5.45
22 07 19 00-1028 EA 3-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	34.70	5.66
22 07 19 00-1029 EA 4-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	37.84	5.89
22 07 19 00-1030 EA 4-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	42.34	6.15
22 07 19 00-1031 EA 5-1/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	47.03	6.42
22 07 19 00-1032 EA 5-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	55.68	6.83
22 07 19 00-1033 EA 6-1/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	65.95	7.17
22 07 19 00-1034 EA 6-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	75.28	7.29
22 07 19 00-1035 EA 7-1/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	104.72	7.55
22 07 19 00-1036 EA 7-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	113.59	7.97
22 07 19 00-1037 EA 8-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	132.50	8.27
22 07 19 00-1038 EA 9-3/4" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	151.64	8.60
22 07 19 00-1039 EA 10-7/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	154.45	8.97
22 07 19 00-1040 EA 11-7/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	168.38	9.16
22 07 19 00-1041 EA 12-7/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	182.34	9.35
22 07 19 00-1042 EA 14-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	196.43	9.56
22 07 19 00-1043 EA 15-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	210.41	9.78
22 07 19 00-1044 EA 16-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	224.53	10.00
22 07 19 00-1045 EA 17-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	238.53	10.25
22 07 19 00-1046 EA 18-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	259.44	10.50
22 07 19 00-1047 EA 19-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	280.28	10.76
22 07 19 00-1048 EA 20-1/8" ID, Polyvinyl Chloride (PVC) Tee Insulation Jacketing.....	305.55	11.03
22 07 19 00-1049 EA 3/4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	36.34	3.07
22 07 19 00-1050 EA 1" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	36.34	3.07
22 07 19 00-1051 EA 1-1/4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	43.21	3.18
22 07 19 00-1052 EA 1-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	43.21	3.18
22 07 19 00-1053 EA 2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	61.29	3.31
22 07 19 00-1054 EA 2-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	67.13	3.45
22 07 19 00-1055 EA 3" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	74.12	3.59
22 07 19 00-1056 EA 3-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	84.14	3.74
22 07 19 00-1057 EA 4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	92.73	3.91
22 07 19 00-1058 EA 5" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	113.03	4.30
22 07 19 00-1059 EA 6" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	160.66	4.79
22 07 19 00-1060 EA 8" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	175.67	5.38
22 07 19 00-1061 EA 10" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	220.17	5.73
22 07 19 00-1062 EA 12" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	308.95	6.33
22 07 19 00-1063 EA 14" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	310.62	6.62
22 07 19 00-1064 EA 16" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	413.75	6.83
22 07 19 00-1065 EA 18" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 90 Degree Elbow Insulation Jacketing.....	559.68	7.05
22 07 19 00-1066 EA 3/4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	33.69	3.07
22 07 19 00-1067 EA 1" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	33.69	3.07
22 07 19 00-1068 EA 1-1/4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	40.00	3.18
22 07 19 00-1069 EA 1-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	40.00	3.18
22 07 19 00-1070 EA 2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	56.04	3.31
22 07 19 00-1071 EA 2-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	61.27	3.45
22 07 19 00-1072 EA 3" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	67.71	3.59
22 07 19 00-1073 EA 3-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	71.26	3.74
22 07 19 00-1074 EA 4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	84.21	3.91
22 07 19 00-1075 EA 5" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	102.47	4.30
22 07 19 00-1076 EA 6" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	145.13	4.79
22 07 19 00-1077 EA 8" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	158.64	5.38
22 07 19 00-1078 EA 10" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	198.50	5.73
22 07 19 00-1079 EA 12" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	277.93	6.33
22 07 19 00-1080 EA 14" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	355.07	6.62
22 07 19 00-1081 EA 16" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	425.42	6.83
22 07 19 00-1082 EA 18" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover 45 Degree Elbow Insulation Jacketing.....	498.08	7.05
22 07 19 00-1083 EA 3/4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	49.86	4.62
22 07 19 00-1084 EA 1" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	49.86	4.62
22 07 19 00-1085 EA 1-1/4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	58.71	4.79
22 07 19 00-1086 EA 1-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	58.71	4.79
22 07 19 00-1087 EA 2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	82.21	4.95
22 07 19 00-1088 EA 2-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	89.94	5.12
22 07 19 00-1089 EA 3" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	99.20	5.38
22 07 19 00-1090 EA 3-1/2" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing.....	124.68	5.59



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 07 19 00-1091	EA		4" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	124.09	5.89
22 07 19 00-1092	EA		5" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	136.44	6.42
22 07 19 00-1093	EA		6" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	192.51	7.17
22 07 19 00-1094	EA		8" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	209.46	7.97
22 07 19 00-1095	EA		10" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	290.86	8.60
22 07 19 00-1096	EA		12" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	406.05	9.35
22 07 19 00-1097	EA		14" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	485.28	10.00
22 07 19 00-1098	EA		16" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	575.09	10.25
22 07 19 00-1099	EA		18" ID, Polyvinyl Chloride (PVC) Mechanical Grooved Fitting Cover Tee Insulation Jacketing	630.39	10.50

22 07 19 00-1100 Insulation Foam Rubber (22 07 19)

22 07 19 00-1101 Covering 4x6 Sheet (22 07 19 00-1100)

22 07 19 00-1102	SF		1" Thick Foam Rubber Sheet Insulation	23.00	7.64
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22 10 Plumbing Piping (22)

Note: The demolition price for only the length of pipe (LF) shall be used for lengths (LF) of pipe removal which exclude the fittings, valves, and insulation. The demolition price for individual fittings, valves, and insulation shall not be used in conjunction with pipe (LF) demolition tasks.

22 11 Facility Water Distribution (22 10)

22 11 16 Domestic Water Piping (22 11)

Note: The demolition price for only the length of pipe (LF) shall be used for lengths (LF) of pipe removal which exclude the fittings, valves, and insulation. The demolition price for individual fittings, valves, and insulation shall not be used in conjunction with pipe (LF) demolition tasks. See CSI section 23 21 13 00-0000 for black steel piping and fitting.

22 11 16 00-0001 Galvanized Steel Pipe Assemblies (22 11 16)

Note: (ASTM A-53) Threaded and coupled. Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Includes cutting and threading to length where necessary. Not for use where detail is available.

22 11 16 00-0002	LF		1/2" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	20.27	4.23
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	4.21	
			<i>For ASTM 120, Deduct</i>	-0.94	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	5.61	
22 11 16 00-0003	LF		3/4" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	22.45	4.54
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	4.45	
			<i>For ASTM 120, Deduct</i>	-1.14	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	6.39	
22 11 16 00-0004	LF		1" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	25.81	4.97
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	4.76	
			<i>For ASTM 120, Deduct</i>	-1.49	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	7.65	
22 11 16 00-0005	LF		1-1/4" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	30.99	5.18
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	5.05	
			<i>For ASTM 120, Deduct</i>	-2.12	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	9.74	
22 11 16 00-0006	LF		1-1/2" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	33.57	6.14
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	5.27	
			<i>For ASTM 120, Deduct</i>	-2.40	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	10.71	
22 11 16 00-0007	LF		2" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	40.78	7.40
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	6.00	
			<i>For ASTM 120, Deduct</i>	-3.12	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	13.35	
22 11 16 00-0008	LF		2-1/2" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	59.88	8.77
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	7.03	
			<i>For ASTM 120, Deduct</i>	-5.47	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	21.09	
22 11 16 00-0009	LF		3" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly	74.54	11.74
			Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Work In Restricted Working Space, Add</i>	8.52	
			<i>For ASTM 120, Deduct</i>	-6.92	
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	26.45	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0010 LF 4" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly 113.87		13.75
Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
For Work In Restricted Working Space, Add	9.64	
For ASTM 120, Deduct	-12.26	
For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add	43.21	
22 11 16 00-0011 LF 5" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly 207.41		17.58
Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
For Work In Restricted Working Space, Add	11.65	
For ASTM 120, Deduct	-25.29	
For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add	83.63	
22 11 16 00-0012 LF 6" Schedule 40 Threaded Galvanized Steel Pipe With 150 LB Malleable Iron Fitting Assembly 234.62		20.79
Note: Includes all hangers and all galvanized malleable iron fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
For Work In Restricted Working Space, Add	13.23	
For ASTM 120, Deduct	-28.58	
For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add	94.55	
22 11 16 00-0013 Galvanized Steel Pipe And Threaded Fittings <small>(22 11 16)</small>		
Note: (ASTM A-53) Threaded and coupled, schedule 40. Excludes hangers, elbow, tee, or reducer fittings.		
22 11 16 00-0014 Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe <small>(22 11 16 00-0013)</small>		
Note: ASTM A-53. Welded pipe has a weld bead on the inside. Includes coupling. Includes cutting and threading to length where necessary.		
22 11 16 00-0015 LF 1/2" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 9.84		4.23
For Work In Restricted Working Space, Add	1.92	
For Schedule 80 Pipe, Add	2.29	
For ASTM 120, Deduct	-0.51	
22 11 16 00-0016 LF 3/4" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 11.35		4.54
For Work In Restricted Working Space, Add	2.05	
For Schedule 80 Pipe, Add	2.86	
For ASTM 120, Deduct	-0.68	
22 11 16 00-0017 LF 1" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 14.12		4.97
For Work In Restricted Working Space, Add	2.22	
For Schedule 80 Pipe, Add	3.97	
For ASTM 120, Deduct	-1.01	
22 11 16 00-0018 LF 1-1/4" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 16.94		5.18
For Work In Restricted Working Space, Add	2.35	
For Schedule 80 Pipe, Add	5.16	
For ASTM 120, Deduct	-1.37	
22 11 16 00-0019 LF 1-1/2" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 20.10		6.14
For Work In Restricted Working Space, Add	2.76	
For Schedule 80 Pipe, Add	6.15	
For ASTM 120, Deduct	-1.64	
22 11 16 00-0020 LF 2" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 25.76		7.40
For Work In Restricted Working Space, Add	3.34	
For Schedule 80 Pipe, Add	8.14	
For ASTM 120, Deduct	-2.19	
22 11 16 00-0021 LF 2-1/2" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 36.43		8.77
For Work In Restricted Working Space, Add	3.97	
For Schedule 80 Pipe, Add	12.46	
For ASTM 120, Deduct	-3.48	
22 11 16 00-0022 LF 3" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 48.01		11.74
For Work In Restricted Working Space, Add	5.29	
For Schedule 80 Pipe, Add	16.35	
For ASTM 120, Deduct	-4.56	
22 11 16 00-0023 LF 4" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 63.94		13.75
For Work In Restricted Working Space, Add	6.20	
For Schedule 80 Pipe, Add	22.83	
For ASTM 120, Deduct	-6.49	
22 11 16 00-0024 LF 5" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 84.34		17.58
For Work In Restricted Working Space, Add	7.90	
For Schedule 80 Pipe, Add	30.48	
For ASTM 120, Deduct	-8.70	
22 11 16 00-0025 LF 6" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 106.39		20.79
For Work In Restricted Working Space, Add	9.34	
For Schedule 80 Pipe, Add	39.24	
For ASTM 120, Deduct	-11.29	
22 11 16 00-0026 LF 8" Schedule 40, Continuous Weld, Threaded And Coupled, Galvanized Steel Pipe 118.91		25.12
For Work In Restricted Working Space, Add	11.28	
For Schedule 80 Pipe, Add	42.79	
For ASTM 120, Deduct	-12.20	
22 11 16 00-0027 Seamless, Threaded And Coupled, Galvanized Steel Pipe <small>(22 11 16 00-0013)</small>		
Note: ASTM A-53. Includes coupling. Includes cutting and threading to length where necessary.		
22 11 16 00-0028 LF 1/2" Schedule 40, Seamless, Threaded Galvanized Steel Pipe 15.82		4.23
For Work In Restricted Working Space, Add	1.92	
For Schedule 80 Pipe, Add	5.16	
For ASTM 120, Deduct	-1.41	
22 11 16 00-0029 LF 3/4" Schedule 40, Seamless, Threaded Galvanized Steel Pipe 18.09		4.54
For Work In Restricted Working Space, Add	2.05	
For Schedule 80 Pipe, Add	6.09	
For ASTM 120, Deduct	-1.69	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0030	LF		1" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	20.50	4.97
			<i>For Work In Restricted Working Space, Add</i>	2.22	
			<i>For Schedule 80 Pipe, Add</i>	7.03	
			<i>For ASTM 120, Deduct</i>	-1.97	
22 11 16 00-0031	LF		1-1/4" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	24.30	5.18
			<i>For Work In Restricted Working Space, Add</i>	2.35	
			<i>For Schedule 80 Pipe, Add</i>	8.69	
			<i>For ASTM 120, Deduct</i>	-2.47	
22 11 16 00-0032	LF		1-1/2" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	28.01	6.14
			<i>For Work In Restricted Working Space, Add</i>	2.76	
			<i>For Schedule 80 Pipe, Add</i>	9.95	
			<i>For ASTM 120, Deduct</i>	-2.82	
22 11 16 00-0033	LF		2" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	32.56	7.40
			<i>For Work In Restricted Working Space, Add</i>	3.34	
			<i>For Schedule 80 Pipe, Add</i>	11.40	
			<i>For ASTM 120, Deduct</i>	-3.21	
22 11 16 00-0034	LF		2-1/2" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	49.08	8.77
			<i>For Work In Restricted Working Space, Add</i>	3.97	
			<i>For Schedule 80 Pipe, Add</i>	18.53	
			<i>For ASTM 120, Deduct</i>	-5.38	
22 11 16 00-0035	LF		3" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	61.47	11.74
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Pipe, Add</i>	22.81	
			<i>For ASTM 120, Deduct</i>	-6.58	
22 11 16 00-0036	LF		4" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	83.37	13.75
			<i>For Work In Restricted Working Space, Add</i>	6.20	
			<i>For Schedule 80 Pipe, Add</i>	32.16	
			<i>For ASTM 120, Deduct</i>	-9.40	
22 11 16 00-0037	LF		5" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	108.14	17.58
			<i>For Work In Restricted Working Space, Add</i>	7.90	
			<i>For Schedule 80 Pipe, Add</i>	41.91	
			<i>For ASTM 120, Deduct</i>	-12.27	
22 11 16 00-0038	LF		6" Schedule 40, Seamless, Threaded Galvanized Steel Pipe	135.80	20.79
			<i>For Work In Restricted Working Space, Add</i>	9.34	
			<i>For Schedule 80 Pipe, Add</i>	53.35	
			<i>For ASTM 120, Deduct</i>	-15.70	
22 11 16 00-0039			Galvanized Malleable Iron 90 Degree Elbows <small>(22 11 16 00-0013)</small>		
22 11 16 00-0040	EA		1/2", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	33.27	18.82
			<i>For 300 LB Rating, Add</i>	18.93	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For ASTM 120, Deduct</i>	-0.76	
22 11 16 00-0041	EA		3/4", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	37.79	21.05
			<i>For 300 LB Rating, Add</i>	23.08	
			<i>For Work In Restricted Working Space, Add</i>	9.47	
			<i>For ASTM 120, Deduct</i>	-0.93	
22 11 16 00-0042	EA		1", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	46.78	23.47
			<i>For 300 LB Rating, Add</i>	41.35	
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For ASTM 120, Deduct</i>	-1.73	
22 11 16 00-0043	EA		1-1/4", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	58.12	26.65
			<i>For 300 LB Rating, Add</i>	64.38	
			<i>For Work In Restricted Working Space, Add</i>	11.97	
			<i>For ASTM 120, Deduct</i>	-2.73	
22 11 16 00-0044	EA		1-1/2", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	68.78	30.03
			<i>For 300 LB Rating, Add</i>	83.59	
			<i>For Work In Restricted Working Space, Add</i>	13.50	
			<i>For ASTM 120, Deduct</i>	-3.57	
22 11 16 00-0045	EA		2", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	96.12	38.17
			<i>For 300 LB Rating, Add</i>	135.93	
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For ASTM 120, Deduct</i>	-5.85	
22 11 16 00-0046	EA		2-1/2", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	186.56	56.46
			<i>For 300 LB Rating, Add</i>	351.81	
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For ASTM 120, Deduct</i>	-15.30	
22 11 16 00-0047	EA		3", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	279.43	74.23
			<i>For 300 LB Rating, Add</i>	578.32	
			<i>For Work In Restricted Working Space, Add</i>	33.39	
			<i>For ASTM 120, Deduct</i>	-25.22	
22 11 16 00-0048	EA		4", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	417.18	80.45
			<i>For 300 LB Rating, Add</i>	1,015.47	
			<i>For Work In Restricted Working Space, Add</i>	36.19	
			<i>For ASTM 120, Deduct</i>	-44.48	
22 11 16 00-0049	EA		5", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	1,406.47	83.96
			<i>For 300 LB Rating, Add</i>	4,361.56	
			<i>For Work In Restricted Working Space, Add</i>	37.76	
			<i>For ASTM 120, Deduct</i>	-192.09	
22 11 16 00-0050	EA		6", 150 LB, Galvanized Malleable Iron 90 Degree Elbow	1,312.18	87.79
			<i>For 300 LB Rating, Add</i>	4,021.83	
			<i>For Work In Restricted Working Space, Add</i>	39.48	
			<i>For ASTM 120, Deduct</i>	-177.09	



	Plumbing	22
	Plumbing Piping	22 10
	Facility Water Distribution	22 11

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0051	EA 8", 150 LB, Galvanized Malleable Iron 90 Degree Elbow <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	1,561.81 4,850.80 41.26 -213.64	91.74
22 11 16 00-0052	Galvanized Malleable Iron Reducing 90 Degree Elbows (22 11 16 00-0013)		
22 11 16 00-0053	EA 3/4" x 1/2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	40.71 -1.62 8.96	19.88
22 11 16 00-0054	EA 1" x 3/4", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	47.29 -2.08 10.02	22.30
22 11 16 00-0055	EA 1" x 1/2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	46.46 -2.21 9.52	21.15
22 11 16 00-0056	EA 1-1/4" x 1", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	60.88 -3.50 11.27	25.05
22 11 16 00-0057	EA 1-1/4" x 3/4", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	63.72 -4.20 10.72	23.79
22 11 16 00-0058	EA 1-1/4" x 1/2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	63.71 -4.45 10.21	22.73
22 11 16 00-0059	EA 1-1/2" x 1-1/4", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	79.69 -5.59 12.73	28.34
22 11 16 00-0060	EA 1-1/2" x 1", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	77.37 -5.59 12.04	26.75
22 11 16 00-0061	EA 1-1/2" x 3/4", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	75.52 -5.59 11.48	25.48
22 11 16 00-0062	EA 2" x 1-1/2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	94.59 -6.53 15.32	34.04
22 11 16 00-0063	EA 2" x 1-1/4", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	98.41 -7.48 14.56	32.36
22 11 16 00-0064	EA 2" x 1", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	97.95 -7.76 13.86	30.77
22 11 16 00-0065	EA 2" x 3/4", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	83.63 -5.89 13.31	29.61
22 11 16 00-0066	EA 2-1/2" x 2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	218.37 -22.13 21.26	47.26
22 11 16 00-0067	EA 2-1/2" x 1-1/2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	229.13 -24.65 19.44	43.25
22 11 16 00-0068	EA 3" x 2-1/2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	366.02 -40.21 29.38	65.34
22 11 16 00-0069	EA 3" x 2", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	317.07 -34.93 25.27	56.14
22 11 16 00-0070	EA 4" x 3", 150 LB, Galvanized Malleable Iron Reducing 90 Degree Elbow <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	721.39 -91.00 34.43	76.52
22 11 16 00-0071	Galvanized Malleable Iron 45 Degree Elbow (22 11 16 00-0013)		
22 11 16 00-0072	EA 1/2", 150 LB, Galvanized Malleable Iron 45 Degree Elbow <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	34.91 24.51 8.46 -1.01	18.82
22 11 16 00-0073	EA 3/4", 150 LB, Galvanized Malleable Iron 45 Degree Elbow <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	41.22 34.74 9.47 -1.45	21.05
22 11 16 00-0074	EA 1", 150 LB, Galvanized Malleable Iron 45 Degree Elbow <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	46.14 39.17 10.57 -1.64	23.47
22 11 16 00-0075	EA 1-1/4", 150 LB, Galvanized Malleable Iron 45 Degree Elbow <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	60.25 71.62 11.97 -3.05	26.65
22 11 16 00-0076	EA 1-1/2", 150 LB, Galvanized Malleable Iron 45 Degree Elbow <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	68.91 84.03 13.50 -3.59	30.03

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0077	EA		2", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	92.54	38.17
			<i>For 300 LB Rating, Add</i>	123.76	
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For ASTM 120, Deduct</i>	-5.31	
22 11 16 00-0078	EA		2-1/2", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	207.72	56.46
			<i>For 300 LB Rating, Add</i>	423.75	
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For ASTM 120, Deduct</i>	-18.47	
22 11 16 00-0079	EA		3", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	290.40	74.23
			<i>For 300 LB Rating, Add</i>	615.62	
			<i>For Work In Restricted Working Space, Add</i>	33.39	
			<i>For ASTM 120, Deduct</i>	-26.87	
22 11 16 00-0080	EA		4", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	420.90	80.45
			<i>For 300 LB Rating, Add</i>	1,028.12	
			<i>For Work In Restricted Working Space, Add</i>	36.19	
			<i>For ASTM 120, Deduct</i>	-45.04	
22 11 16 00-0081	EA		5", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	1,339.16	83.96
			<i>For 300 LB Rating, Add</i>	4,132.70	
			<i>For Work In Restricted Working Space, Add</i>	37.76	
			<i>For ASTM 120, Deduct</i>	-181.99	
22 11 16 00-0082	EA		6", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	1,594.55	87.79
			<i>For 300 LB Rating, Add</i>	4,981.89	
			<i>For Work In Restricted Working Space, Add</i>	39.48	
			<i>For ASTM 120, Deduct</i>	-219.44	
22 11 16 00-0083	EA		8", 150 LB, Galvanized Malleable Iron 45 Degree Elbow	1,899.95	91.74
			<i>For 300 LB Rating, Add</i>	6,000.48	
			<i>For Work In Restricted Working Space, Add</i>	41.26	
			<i>For ASTM 120, Deduct</i>	-264.36	
22 11 16 00-0084			Galvanized Malleable Iron Tees (22 11 16 00-0013)		
22 11 16 00-0085	EA		1/2", 150 LB, Galvanized Malleable Iron Tee.....	41.81	23.47
			<i>For 300 LB Rating, Add</i>	24.45	
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For ASTM 120, Deduct</i>	-0.99	
22 11 16 00-0086	EA		3/4", 150 LB, Galvanized Malleable Iron Tee.....	51.50	27.17
			<i>For 300 LB Rating, Add</i>	39.26	
			<i>For Work In Restricted Working Space, Add</i>	12.20	
			<i>For ASTM 120, Deduct</i>	-1.62	
22 11 16 00-0087	EA		1", 150 LB, Galvanized Malleable Iron Tee.....	65.57	32.04
			<i>For 300 LB Rating, Add</i>	62.42	
			<i>For Work In Restricted Working Space, Add</i>	14.42	
			<i>For ASTM 120, Deduct</i>	-2.63	
22 11 16 00-0088	EA		1-1/4", 150 LB, Galvanized Malleable Iron Tee.....	84.95	38.17
			<i>For 300 LB Rating, Add</i>	97.95	
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For ASTM 120, Deduct</i>	-4.17	
22 11 16 00-0089	EA		1-1/2", 150 LB, Galvanized Malleable Iron Tee.....	102.76	45.47
			<i>For 300 LB Rating, Add</i>	121.56	
			<i>For Work In Restricted Working Space, Add</i>	20.46	
			<i>For ASTM 120, Deduct</i>	-5.18	
22 11 16 00-0090	EA		2", 150 LB, Galvanized Malleable Iron Tee.....	140.74	56.46
			<i>For 300 LB Rating, Add</i>	196.02	
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For ASTM 120, Deduct</i>	-8.42	
22 11 16 00-0091	EA		2-1/2", 150 LB, Galvanized Malleable Iron Tee.....	250.05	61.32
			<i>For 300 LB Rating, Add</i>	543.09	
			<i>For Work In Restricted Working Space, Add</i>	27.58	
			<i>For ASTM 120, Deduct</i>	-23.72	
22 11 16 00-0092	EA		3", 150 LB, Galvanized Malleable Iron Tee.....	296.71	74.23
			<i>For 300 LB Rating, Add</i>	637.07	
			<i>For Work In Restricted Working Space, Add</i>	33.39	
			<i>For ASTM 120, Deduct</i>	-27.81	
22 11 16 00-0093	EA		4", 150 LB, Galvanized Malleable Iron Tee.....	591.02	101.65
			<i>For 300 LB Rating, Add</i>	1,500.49	
			<i>For Work In Restricted Working Space, Add</i>	45.72	
			<i>For ASTM 120, Deduct</i>	-65.79	
22 11 16 00-0094	EA		5", 150 LB, Galvanized Malleable Iron Tee.....	1,559.73	120.68
			<i>For 300 LB Rating, Add</i>	4,698.68	
			<i>For Work In Restricted Working Space, Add</i>	54.29	
			<i>For ASTM 120, Deduct</i>	-206.82	
22 11 16 00-0095	EA		6", 150 LB, Galvanized Malleable Iron Tee.....	1,770.66	137.94
			<i>For 300 LB Rating, Add</i>	5,329.50	
			<i>For Work In Restricted Working Space, Add</i>	62.04	
			<i>For ASTM 120, Deduct</i>	-234.58	
22 11 16 00-0096	EA		8", 150 LB, Galvanized Malleable Iron Tee.....	2,106.32	163.80
			<i>For 300 LB Rating, Add</i>	6,332.57	
			<i>For Work In Restricted Working Space, Add</i>	74.45	
			<i>For ASTM 120, Deduct</i>	-278.72	
22 11 16 00-0097			Galvanized Malleable Iron Reducing Tee (22 11 16 00-0013)		

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0098	EA	1/2"		150 LB, Galvanized Malleable Iron Reducing Tee.....	50.51	23.47
				<i>For 300 LB Rating, Add</i>	54.03	
				<i>For Work In Restricted Working Space, Add</i>	10.57	
				<i>For ASTM 120, Deduct</i>	-2.29	
22 11 16 00-0099	EA	3/4"		150 LB, Galvanized Malleable Iron Reducing Tee.....	55.73	27.17
				<i>For 300 LB Rating, Add</i>	53.64	
				<i>For Work In Restricted Working Space, Add</i>	12.20	
				<i>For ASTM 120, Deduct</i>	-2.26	
22 11 16 00-0100	EA	1"		150 LB, Galvanized Malleable Iron Reducing Tee.....	69.22	32.04
				<i>For 300 LB Rating, Add</i>	74.83	
				<i>For Work In Restricted Working Space, Add</i>	14.42	
				<i>For ASTM 120, Deduct</i>	-3.17	
22 11 16 00-0101	EA	1-1/4"		150 LB, Galvanized Malleable Iron Reducing Tee	89.96	38.17
				<i>For 300 LB Rating, Add</i>	114.98	
				<i>For Work In Restricted Working Space, Add</i>	17.15	
				<i>For ASTM 120, Deduct</i>	-4.92	
22 11 16 00-0102	EA	1-1/2"		150 LB, Galvanized Malleable Iron Reducing Tee	108.73	45.47
				<i>For 300 LB Rating, Add</i>	141.86	
				<i>For Work In Restricted Working Space, Add</i>	20.46	
				<i>For ASTM 120, Deduct</i>	-6.08	
22 11 16 00-0103	EA	2"		150 LB, Galvanized Malleable Iron Reducing Tee.....	143.75	56.46
				<i>For 300 LB Rating, Add</i>	206.25	
				<i>For Work In Restricted Working Space, Add</i>	25.37	
				<i>For ASTM 120, Deduct</i>	-8.88	
22 11 16 00-0104	EA	2-1/2"		150 LB, Galvanized Malleable Iron Reducing Tee	301.20	61.53
				<i>For 300 LB Rating, Add</i>	716.03	
				<i>For Work In Restricted Working Space, Add</i>	27.67	
				<i>For ASTM 120, Deduct</i>	-31.35	
22 11 16 00-0105	EA	3"		150 LB, Galvanized Malleable Iron Reducing Tee.....	384.07	75.39
				<i>For 300 LB Rating, Add</i>	928.25	
				<i>For Work In Restricted Working Space, Add</i>	33.92	
				<i>For ASTM 120, Deduct</i>	-40.65	
22 11 16 00-0106	EA	4"		150 LB, Galvanized Malleable Iron Reducing Tee.....	938.04	101.65
				<i>For 300 LB Rating, Add</i>	2,680.35	
				<i>For Work In Restricted Working Space, Add</i>	45.72	
				<i>For ASTM 120, Deduct</i>	-117.85	
22 11 16 00-0107	EA	5"		150 LB, Galvanized Malleable Iron Reducing Tee.....	2,002.69	120.68
				<i>For 300 LB Rating, Add</i>	6,204.74	
				<i>For Work In Restricted Working Space, Add</i>	54.29	
				<i>For ASTM 120, Deduct</i>	-273.26	
22 11 16 00-0108	EA	6"		150 LB, Galvanized Malleable Iron Reducing Tee.....	2,273.73	137.94
				<i>For 300 LB Rating, Add</i>	7,039.94	
				<i>For Work In Restricted Working Space, Add</i>	62.04	
				<i>For ASTM 120, Deduct</i>	-310.04	
22 11 16 00-0109	EA	8"		150 LB, Galvanized Malleable Iron Reducing Tee.....	2,730.01	158.40
				<i>For 300 LB Rating, Add</i>	8,487.68	
				<i>For Work In Restricted Working Space, Add</i>	71.35	
				<i>For ASTM 120, Deduct</i>	-373.83	
22 11 16 00-0110				Galvanized Malleable Iron Couplings (22 11 16 00-0013)		
22 11 16 00-0111	EA	1/2"		150 LB, Galvanized Malleable Iron Coupling.....	38.83	18.82
				<i>For 300 LB Rating, Add</i>	37.83	
				<i>For Work In Restricted Working Space, Add</i>	8.46	
				<i>For ASTM 120, Deduct</i>	-1.59	
22 11 16 00-0112	EA	3/4"		150 LB, Galvanized Malleable Iron Coupling.....	43.81	21.05
				<i>For 300 LB Rating, Add</i>	43.54	
				<i>For Work In Restricted Working Space, Add</i>	9.47	
				<i>For ASTM 120, Deduct</i>	-1.84	
22 11 16 00-0113	EA	1"		150 LB, Galvanized Malleable Iron Coupling.....	55.31	23.47
				<i>For 300 LB Rating, Add</i>	70.35	
				<i>For Work In Restricted Working Space, Add</i>	10.57	
				<i>For ASTM 120, Deduct</i>	-3.01	
22 11 16 00-0114	EA	1-1/4"		150 LB, Galvanized Malleable Iron Coupling	68.20	26.65
				<i>For 300 LB Rating, Add</i>	98.65	
				<i>For Work In Restricted Working Space, Add</i>	11.97	
				<i>For ASTM 120, Deduct</i>	-4.25	
22 11 16 00-0115	EA	1-1/2"		150 LB, Galvanized Malleable Iron Coupling	77.16	30.03
				<i>For 300 LB Rating, Add</i>	112.08	
				<i>For Work In Restricted Working Space, Add</i>	13.50	
				<i>For ASTM 120, Deduct</i>	-4.83	
22 11 16 00-0116	EA	2"		150 LB, Galvanized Malleable Iron Coupling.....	104.19	38.17
				<i>For 300 LB Rating, Add</i>	163.37	
				<i>For Work In Restricted Working Space, Add</i>	17.15	
				<i>For ASTM 120, Deduct</i>	-7.06	
22 11 16 00-0117	EA	2-1/2"		150 LB, Galvanized Malleable Iron Coupling	228.57	56.46
				<i>For 300 LB Rating, Add</i>	494.64	
				<i>For Work In Restricted Working Space, Add</i>	25.37	
				<i>For ASTM 120, Deduct</i>	-21.60	
22 11 16 00-0118	EA	3"		150 LB, Galvanized Malleable Iron Coupling.....	303.75	74.23
				<i>For 300 LB Rating, Add</i>	661.01	
				<i>For Work In Restricted Working Space, Add</i>	33.39	
				<i>For ASTM 120, Deduct</i>	-28.87	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0119	EA		4", 150 LB, Galvanized Malleable Iron Coupling.....	529.36	80.45
			<i>For 300 LB Rating, Add</i>	1,396.89	
			<i>For Work In Restricted Working Space, Add</i>	36.19	
			<i>For ASTM 120, Deduct</i>	-61.31	
22 11 16 00-0120	EA		5", 150 LB, Galvanized Malleable Iron Coupling.....	1,276.76	83.96
			<i>For 300 LB Rating, Add</i>	3,920.54	
			<i>For Work In Restricted Working Space, Add</i>	37.76	
			<i>For ASTM 120, Deduct</i>	-172.63	
22 11 16 00-0121	EA		6", 150 LB, Galvanized Malleable Iron Coupling.....	1,442.77	87.79
			<i>For 300 LB Rating, Add</i>	4,465.84	
			<i>For Work In Restricted Working Space, Add</i>	39.48	
			<i>For ASTM 120, Deduct</i>	-196.67	
22 11 16 00-0122	EA		8", 150 LB, Galvanized Malleable Iron Coupling.....	1,717.75	91.74
			<i>For 300 LB Rating, Add</i>	5,381.00	
			<i>For Work In Restricted Working Space, Add</i>	41.26	
			<i>For ASTM 120, Deduct</i>	-237.03	
22 11 16 00-0123			Galvanized Malleable Iron Reducing Couplings (22 11 16 00-0013)		
22 11 16 00-0124	EA		1/2", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	41.09	18.82
			<i>For 300 LB Rating, Add</i>	45.52	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For ASTM 120, Deduct</i>	-1.93	
22 11 16 00-0125	EA		3/4", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	45.34	21.05
			<i>For 300 LB Rating, Add</i>	48.75	
			<i>For Work In Restricted Working Space, Add</i>	9.47	
			<i>For ASTM 120, Deduct</i>	-2.07	
22 11 16 00-0126	EA		1", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	58.22	23.47
			<i>For 300 LB Rating, Add</i>	80.25	
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For ASTM 120, Deduct</i>	-3.45	
22 11 16 00-0127	EA		1-1/4", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	69.59	26.65
			<i>For 300 LB Rating, Add</i>	103.37	
			<i>For Work In Restricted Working Space, Add</i>	11.97	
			<i>For ASTM 120, Deduct</i>	-4.46	
22 11 16 00-0128	EA		1-1/2", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	83.30	30.03
			<i>For 300 LB Rating, Add</i>	132.95	
			<i>For Work In Restricted Working Space, Add</i>	13.50	
			<i>For ASTM 120, Deduct</i>	-5.75	
22 11 16 00-0129	EA		2", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	109.40	38.17
			<i>For 300 LB Rating, Add</i>	181.08	
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For ASTM 120, Deduct</i>	-7.84	
22 11 16 00-0130	EA		2-1/2", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	230.39	56.46
			<i>For 300 LB Rating, Add</i>	500.83	
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For ASTM 120, Deduct</i>	-21.87	
22 11 16 00-0131	EA		3", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	298.29	74.23
			<i>For 300 LB Rating, Add</i>	642.44	
			<i>For Work In Restricted Working Space, Add</i>	33.39	
			<i>For ASTM 120, Deduct</i>	-28.05	
22 11 16 00-0132	EA		4", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	539.89	80.45
			<i>For 300 LB Rating, Add</i>	1,432.69	
			<i>For Work In Restricted Working Space, Add</i>	36.19	
			<i>For ASTM 120, Deduct</i>	-62.89	
22 11 16 00-0133	EA		5", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	1,337.34	83.96
			<i>For 300 LB Rating, Add</i>	4,126.52	
			<i>For Work In Restricted Working Space, Add</i>	37.76	
			<i>For ASTM 120, Deduct</i>	-181.72	
22 11 16 00-0134	EA		6", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	1,511.77	87.79
			<i>For 300 LB Rating, Add</i>	4,700.44	
			<i>For Work In Restricted Working Space, Add</i>	39.48	
			<i>For ASTM 120, Deduct</i>	-207.02	
22 11 16 00-0135	EA		8", 150 LB, Galvanized Malleable Iron Reducing Coupling.....	1,801.54	91.74
			<i>For 300 LB Rating, Add</i>	5,665.89	
			<i>For Work In Restricted Working Space, Add</i>	41.26	
			<i>For ASTM 120, Deduct</i>	-249.60	
22 11 16 00-0136			Galvanized Malleable Iron Caps (22 11 16 00-0013)		
22 11 16 00-0137	EA		1/2", 150 LB, Galvanized Malleable Iron Cap.....	15.89	8.77
			<i>For 300 LB Rating, Add</i>	9.87	
			<i>For Work In Restricted Working Space, Add</i>	3.97	
			<i>For ASTM 120, Deduct</i>	-0.40	
22 11 16 00-0138	EA		3/4", 150 LB, Galvanized Malleable Iron Cap.....	17.78	9.41
			<i>For 300 LB Rating, Add</i>	13.39	
			<i>For Work In Restricted Working Space, Add</i>	4.23	
			<i>For ASTM 120, Deduct</i>	-0.55	
22 11 16 00-0139	EA		1", 150 LB, Galvanized Malleable Iron Cap.....	20.85	10.89
			<i>For 300 LB Rating, Add</i>	16.55	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For ASTM 120, Deduct</i>	-0.69	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0140	EA	1-1/4"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	23.08 21.49 5.12 -0.90	11.41
22 11 16 00-0141	EA	1-1/2"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	22.70 20.20 5.12 -0.85	11.41
22 11 16 00-0142	EA	2"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	34.81 42.40 6.82 -1.81	15.12
22 11 16 00-0143	EA	2-1/2"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	55.30 93.83 8.46 -4.07	18.82
22 11 16 00-0144	EA	3"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	72.68 133.18 10.23 -5.79	22.73
22 11 16 00-0145	EA	4"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	113.49 247.69 12.41 -10.82	27.61
22 11 16 00-0146	EA	5"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	291.10 817.06 15.51 -35.91	34.54
22 11 16 00-0147	EA	6"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	363.32 1,029.54 18.48 -45.26	41.05
22 11 16 00-0148	EA	8"		150 LB, Galvanized Malleable Iron Cap <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For ASTM 120, Deduct</i>	459.79 1,333.59 20.63 -58.65	45.87
22 11 16 00-0149				Galvanized Malleable Iron FIP Threaded, Unions <small>(22 11 16 00-0013)</small>		
22 11 16 00-0150	EA	1/2"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	57.19 10.57	23.47
22 11 16 00-0151	EA	3/4"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	65.90 12.20	27.17
22 11 16 00-0152	EA	1"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	81.10 14.42	32.04
22 11 16 00-0153	EA	1-1/4"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	104.91 17.15	38.17
22 11 16 00-0154	EA	1-1/2"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	126.08 20.46	45.47
22 11 16 00-0155	EA	2"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	151.11 25.37	56.46
22 11 16 00-0156	EA	2-1/2"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	355.97 37.46	83.21
22 11 16 00-0157	EA	3"		150 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	487.75 49.29	109.44
22 11 16 00-0158	EA	1/2"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	79.88 10.57	23.47
22 11 16 00-0159	EA	3/4"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	81.22 12.20	27.17
22 11 16 00-0160	EA	1"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	98.34 14.42	32.04
22 11 16 00-0161	EA	1-1/4"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	133.31 17.15	38.17
22 11 16 00-0162	EA	1-1/2"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	155.90 20.47	45.47
22 11 16 00-0163	EA	2"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	208.40 25.37	56.46
22 11 16 00-0164	EA	2-1/2"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	450.59 37.46	83.21
22 11 16 00-0165	EA	3"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	664.05 49.29	109.44
22 11 16 00-0166	EA	4"		250 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	962.02 53.43	118.71
22 11 16 00-0167	EA	1/2"		300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	86.11 10.57	23.47
22 11 16 00-0168	EA	3/4"		300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	95.82 12.20	27.17
22 11 16 00-0169	EA	1"		300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	121.23 14.42	32.04
22 11 16 00-0170	EA	1-1/4"		300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	159.19 17.15	38.17
22 11 16 00-0171	EA	1-1/2"		300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	191.08 20.47	45.47
22 11 16 00-0172	EA	2"		300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	232.05 25.37	56.46

22 Plumbing
22 10 Plumbing Piping
22 11 Facility Water Distribution



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0173	EA 2-1/2", 300 LB, Galvanized Malleable Iron Union <i>For Work In Restricted Working Space, Add</i>	536.22 37.46	83.21
22 11 16 00-0174	EA 3", 300 LB, Galvanized Malleable Iron Union..... <i>For Work In Restricted Working Space, Add</i>	860.00 49.29	109.44
22 11 16 00-0175	EA 4", 300 LB, Galvanized Malleable Iron Union..... <i>For Work In Restricted Working Space, Add</i>	1,922.93 53.43	118.71
22 11 16 00-0176 Galvanized Steel Nipples <small>(22 11 16 00-0013)</small>			
Note: ASTM A-53.			
22 11 16 00-0177	EA 3/8" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	17.92 -0.42 4.53 3.21	10.04
22 11 16 00-0178	EA 1/2" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	17.38 -0.34 4.53 2.60	10.04
22 11 16 00-0179	EA 3/4" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	17.87 -0.42 4.53 3.16	10.04
22 11 16 00-0180	EA 1" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	20.07 -0.57 4.88 4.33	10.89
22 11 16 00-0181	EA 1-1/4" x Close, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	22.71 -0.76 5.29 5.80	11.74
22 11 16 00-0182	EA 1-1/2" x Close, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	23.59 -0.90 5.29 6.81	11.74
22 11 16 00-0183	EA 2" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	31.16 -1.26 6.82 9.60	15.12
22 11 16 00-0184	EA 2-1/2" x Close, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	53.27 -3.76 8.46 28.58	18.82
22 11 16 00-0185	EA 3" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	64.15 -4.51 10.23 34.25	22.73
22 11 16 00-0186	EA 4" x Close, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	86.40 -6.75 12.41 51.33	27.61
22 11 16 00-0187	EA 3/8" x 1-1/2" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	18.33 -0.48 4.53 3.68	10.04
22 11 16 00-0188	EA 1/2" x 1-1/2" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	17.50 -0.36 4.53 2.74	10.04
22 11 16 00-0189	EA 3/4" x 1-1/2" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	18.11 -0.45 4.53 3.43	10.04
22 11 16 00-0190	EA 3/8" x 2" Long, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	18.33 -0.48 4.53 3.68	10.04
22 11 16 00-0191	EA 1/2" x 2" Long, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	17.50 -0.36 4.53 2.74	10.04
22 11 16 00-0192	EA 3/4" x 2" Long, Schedule 40 Galvanized Steel Nipple..... <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	18.11 -0.45 4.53 3.43	10.04
22 11 16 00-0193	EA 1" x 2" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	20.75 -0.67 4.88 5.11	10.89
22 11 16 00-0194	EA 1-1/4" x 2" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	23.08 -0.82 5.29 6.22	11.74
22 11 16 00-0195	EA 1-1/2" x 2" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	24.04 -0.96 5.29 7.32	11.74



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	Plumbing Piping 22 10
	Facility Water Distribution 22 11

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0196	EA		3/8" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	19.41	10.04
			<i>For ASTM 120, Deduct</i>	-0.65	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	4.91	
22 11 16 00-0197	EA		1/2" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	17.92	10.04
			<i>For ASTM 120, Deduct</i>	-0.42	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	3.21	
22 11 16 00-0198	EA		3/4" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	18.43	10.04
			<i>For ASTM 120, Deduct</i>	-0.50	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	3.80	
22 11 16 00-0199	EA		1" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	21.12	10.89
			<i>For ASTM 120, Deduct</i>	-0.73	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	5.53	
22 11 16 00-0200	EA		1-1/4" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	23.62	11.74
			<i>For ASTM 120, Deduct</i>	-0.90	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	6.84	
22 11 16 00-0201	EA		1-1/2" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	24.77	11.74
			<i>For ASTM 120, Deduct</i>	-1.07	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	8.15	
22 11 16 00-0202	EA		2" x 2-1/2" Long, Schedule 40 Galvanized Steel Nipple	32.22	15.12
			<i>For ASTM 120, Deduct</i>	-1.42	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	10.81	
22 11 16 00-0203	EA		3/8" x 3" Long, Schedule 40 Galvanized Steel Nipple	19.41	10.04
			<i>For ASTM 120, Deduct</i>	-0.65	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	4.91	
22 11 16 00-0204	EA		1/2" x 3" Long, Schedule 40 Galvanized Steel Nipple	17.92	10.04
			<i>For ASTM 120, Deduct</i>	-0.42	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	3.21	
22 11 16 00-0205	EA		3/4" x 3" Long, Schedule 40 Galvanized Steel Nipple	18.43	10.04
			<i>For ASTM 120, Deduct</i>	-0.50	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	3.80	
22 11 16 00-0206	EA		1" x 3" Long, Schedule 40 Galvanized Steel Nipple	21.12	10.89
			<i>For ASTM 120, Deduct</i>	-0.73	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	5.53	
22 11 16 00-0207	EA		1-1/4" x 3" Long, Schedule 40 Galvanized Steel Nipple	23.62	11.74
			<i>For ASTM 120, Deduct</i>	-0.90	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	6.84	
22 11 16 00-0208	EA		1-1/2" x 3" Long, Schedule 40 Galvanized Steel Nipple	24.77	11.74
			<i>For ASTM 120, Deduct</i>	-1.07	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	8.15	
22 11 16 00-0209	EA		2" x 3" Long, Schedule 40 Galvanized Steel Nipple	32.22	15.12
			<i>For ASTM 120, Deduct</i>	-1.42	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	10.81	
22 11 16 00-0210	EA		2-1/2" x 3" Long, Schedule 40 Galvanized Steel Nipple	54.23	18.82
			<i>For ASTM 120, Deduct</i>	-3.90	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For Schedule 80 Nipples, Add</i>	29.67	
22 11 16 00-0211	EA		3" x 3" Long, Schedule 40 Galvanized Steel Nipple	68.29	22.73
			<i>For ASTM 120, Deduct</i>	-5.13	
			<i>For Work In Restricted Working Space, Add</i>	10.23	
			<i>For Schedule 80 Nipples, Add</i>	38.97	
22 11 16 00-0212	EA		3/8" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	20.22	10.04
			<i>For ASTM 120, Deduct</i>	-0.77	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	5.84	
22 11 16 00-0213	EA		1/2" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	18.58	10.04
			<i>For ASTM 120, Deduct</i>	-0.52	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	3.97	
22 11 16 00-0214	EA		3/4" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	19.41	10.04
			<i>For ASTM 120, Deduct</i>	-0.65	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	4.91	
22 11 16 00-0215	EA		1" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	22.10	10.89
			<i>For ASTM 120, Deduct</i>	-0.87	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	6.65	
22 11 16 00-0216	EA		1-1/4" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	24.77	11.74
			<i>For ASTM 120, Deduct</i>	-1.07	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	8.15	

22 Plumbing
22 10 Plumbing Piping
22 11 Facility Water Distribution



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0217	EA		1-1/2" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	26.66	11.74
			<i>For ASTM 120, Deduct</i>	-1.36	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	10.31	
22 11 16 00-0218	EA		2" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	34.25	15.12
			<i>For ASTM 120, Deduct</i>	-1.73	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	13.12	
22 11 16 00-0219	EA		2-1/2" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	58.42	18.82
			<i>For ASTM 120, Deduct</i>	-4.53	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For Schedule 80 Nipples, Add</i>	34.45	
22 11 16 00-0220	EA		3" x 3-1/2" Long, Schedule 40 Galvanized Steel Nipple	74.22	22.73
			<i>For ASTM 120, Deduct</i>	-6.02	
			<i>For Work In Restricted Working Space, Add</i>	10.23	
			<i>For Schedule 80 Nipples, Add</i>	45.73	
22 11 16 00-0221	EA		3/8" x 4" Long, Schedule 40 Galvanized Steel Nipple	20.22	10.04
			<i>For ASTM 120, Deduct</i>	-0.77	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	5.84	
22 11 16 00-0222	EA		1/2" x 4" Long, Schedule 40 Galvanized Steel Nipple	18.58	10.04
			<i>For ASTM 120, Deduct</i>	-0.52	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	3.97	
22 11 16 00-0223	EA		3/4" x 4" Long, Schedule 40 Galvanized Steel Nipple	20.22	10.04
			<i>For ASTM 120, Deduct</i>	-0.77	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	5.84	
22 11 16 00-0224	EA		1" x 4" Long, Schedule 40 Galvanized Steel Nipple	22.10	10.89
			<i>For ASTM 120, Deduct</i>	-0.87	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	6.65	
22 11 16 00-0225	EA		1-1/4" x 4" Long, Schedule 40 Galvanized Steel Nipple	24.77	11.74
			<i>For ASTM 120, Deduct</i>	-1.07	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	8.15	
22 11 16 00-0226	EA		1-1/2" x 4" Long, Schedule 40 Galvanized Steel Nipple	26.66	11.74
			<i>For ASTM 120, Deduct</i>	-1.36	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	10.31	
22 11 16 00-0227	EA		2" x 4" Long, Schedule 40 Galvanized Steel Nipple	34.35	15.12
			<i>For ASTM 120, Deduct</i>	-1.74	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	13.24	
22 11 16 00-0228	EA		2-1/2" x 4" Long, Schedule 40 Galvanized Steel Nipple	58.42	18.82
			<i>For ASTM 120, Deduct</i>	-4.53	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For Schedule 80 Nipples, Add</i>	34.45	
22 11 16 00-0229	EA		3" x 4" Long, Schedule 40 Galvanized Steel Nipple	74.22	22.73
			<i>For ASTM 120, Deduct</i>	-6.02	
			<i>For Work In Restricted Working Space, Add</i>	10.23	
			<i>For Schedule 80 Nipples, Add</i>	45.73	
22 11 16 00-0230	EA		4" x 4" Long, Schedule 40 Galvanized Steel Nipple	95.21	27.61
			<i>For ASTM 120, Deduct</i>	-8.08	
			<i>For Work In Restricted Working Space, Add</i>	12.41	
			<i>For Schedule 80 Nipples, Add</i>	61.38	
22 11 16 00-0231	EA		3/8" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	22.15	10.04
			<i>For ASTM 120, Deduct</i>	-1.06	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	8.04	
22 11 16 00-0232	EA		1/2" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	19.29	10.04
			<i>For ASTM 120, Deduct</i>	-0.63	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	4.78	
22 11 16 00-0233	EA		3/4" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	20.24	10.04
			<i>For ASTM 120, Deduct</i>	-0.77	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	5.86	
22 11 16 00-0234	EA		1" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	23.42	10.89
			<i>For ASTM 120, Deduct</i>	-1.07	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	8.15	
22 11 16 00-0235	EA		1-1/4" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	26.46	11.74
			<i>For ASTM 120, Deduct</i>	-1.33	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	10.08	
22 11 16 00-0236	EA		1-1/2" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	28.54	11.74
			<i>For ASTM 120, Deduct</i>	-1.64	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	12.45	
22 11 16 00-0237	EA		2" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	37.43	15.12
			<i>For ASTM 120, Deduct</i>	-2.20	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	16.75	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0238 EA 2-1/2" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	61.89	18.82
<i>For ASTM 120, Deduct</i>	-5.05	
<i>For Work In Restricted Working Space, Add</i>	8.46	
<i>For Schedule 80 Nipples, Add</i>	38.41	
22 11 16 00-0239 EA 3" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	80.85	22.73
<i>For ASTM 120, Deduct</i>	-7.01	
<i>For Work In Restricted Working Space, Add</i>	10.23	
<i>For Schedule 80 Nipples, Add</i>	53.28	
22 11 16 00-0240 EA 4" x 4-1/2" Long, Schedule 40 Galvanized Steel Nipple	101.75	27.61
<i>For ASTM 120, Deduct</i>	-9.06	
<i>For Work In Restricted Working Space, Add</i>	12.41	
<i>For Schedule 80 Nipples, Add</i>	68.83	
22 11 16 00-0241 EA 3/8" x 5" Long, Schedule 40 Galvanized Steel Nipple	22.15	10.04
<i>For ASTM 120, Deduct</i>	-1.06	
<i>For Work In Restricted Working Space, Add</i>	4.53	
<i>For Schedule 80 Nipples, Add</i>	8.04	
22 11 16 00-0242 EA 1/2" x 5" Long, Schedule 40 Galvanized Steel Nipple	19.29	10.04
<i>For ASTM 120, Deduct</i>	-0.63	
<i>For Work In Restricted Working Space, Add</i>	4.53	
<i>For Schedule 80 Nipples, Add</i>	4.78	
22 11 16 00-0243 EA 3/4" x 5" Long, Schedule 40 Galvanized Steel Nipple	20.24	10.04
<i>For ASTM 120, Deduct</i>	-0.77	
<i>For Work In Restricted Working Space, Add</i>	4.53	
<i>For Schedule 80 Nipples, Add</i>	5.86	
22 11 16 00-0244 EA 1" x 5" Long, Schedule 40 Galvanized Steel Nipple	23.42	10.89
<i>For ASTM 120, Deduct</i>	-1.07	
<i>For Work In Restricted Working Space, Add</i>	4.88	
<i>For Schedule 80 Nipples, Add</i>	8.15	
22 11 16 00-0245 EA 1-1/4" x 5" Long, Schedule 40 Galvanized Steel Nipple	26.46	11.74
<i>For ASTM 120, Deduct</i>	-1.33	
<i>For Work In Restricted Working Space, Add</i>	5.29	
<i>For Schedule 80 Nipples, Add</i>	10.08	
22 11 16 00-0246 EA 1-1/2" x 5" Long, Schedule 40 Galvanized Steel Nipple	28.54	11.74
<i>For ASTM 120, Deduct</i>	-1.64	
<i>For Work In Restricted Working Space, Add</i>	5.29	
<i>For Schedule 80 Nipples, Add</i>	12.45	
22 11 16 00-0247 EA 2" x 5" Long, Schedule 40 Galvanized Steel Nipple	37.43	15.12
<i>For ASTM 120, Deduct</i>	-2.20	
<i>For Work In Restricted Working Space, Add</i>	6.82	
<i>For Schedule 80 Nipples, Add</i>	16.75	
22 11 16 00-0248 EA 2-1/2" x 5" Long, Schedule 40 Galvanized Steel Nipple	61.89	18.82
<i>For ASTM 120, Deduct</i>	-5.05	
<i>For Work In Restricted Working Space, Add</i>	8.46	
<i>For Schedule 80 Nipples, Add</i>	38.41	
22 11 16 00-0249 EA 3" x 5" Long, Schedule 40 Galvanized Steel Nipple	80.85	22.73
<i>For ASTM 120, Deduct</i>	-7.01	
<i>For Work In Restricted Working Space, Add</i>	10.23	
<i>For Schedule 80 Nipples, Add</i>	53.28	
22 11 16 00-0250 EA 4" x 5" Long, Schedule 40 Galvanized Steel Nipple	101.75	27.61
<i>For ASTM 120, Deduct</i>	-9.06	
<i>For Work In Restricted Working Space, Add</i>	12.41	
<i>For Schedule 80 Nipples, Add</i>	68.83	
22 11 16 00-0251 EA 3/8" x 6" Long, Schedule 40 Galvanized Steel Nipple	22.94	10.04
<i>For ASTM 120, Deduct</i>	-1.18	
<i>For Work In Restricted Working Space, Add</i>	4.53	
<i>For Schedule 80 Nipples, Add</i>	8.94	
22 11 16 00-0252 EA 1/2" x 6" Long, Schedule 40 Galvanized Steel Nipple	19.85	10.04
<i>For ASTM 120, Deduct</i>	-0.71	
<i>For Work In Restricted Working Space, Add</i>	4.53	
<i>For Schedule 80 Nipples, Add</i>	5.42	
22 11 16 00-0253 EA 3/4" x 6" Long, Schedule 40 Galvanized Steel Nipple	21.27	10.04
<i>For ASTM 120, Deduct</i>	-0.93	
<i>For Work In Restricted Working Space, Add</i>	4.53	
<i>For Schedule 80 Nipples, Add</i>	7.03	
22 11 16 00-0254 EA 1" x 6" Long, Schedule 40 Galvanized Steel Nipple	24.37	10.89
<i>For ASTM 120, Deduct</i>	-1.22	
<i>For Work In Restricted Working Space, Add</i>	4.88	
<i>For Schedule 80 Nipples, Add</i>	9.23	
22 11 16 00-0255 EA 1-1/4" x 6" Long, Schedule 40 Galvanized Steel Nipple	27.88	11.74
<i>For ASTM 120, Deduct</i>	-1.54	
<i>For Work In Restricted Working Space, Add</i>	5.29	
<i>For Schedule 80 Nipples, Add</i>	11.70	
22 11 16 00-0256 EA 1-1/2" x 6" Long, Schedule 40 Galvanized Steel Nipple	29.91	11.74
<i>For ASTM 120, Deduct</i>	-1.84	
<i>For Work In Restricted Working Space, Add</i>	5.29	
<i>For Schedule 80 Nipples, Add</i>	14.01	
22 11 16 00-0257 EA 2" x 6" Long, Schedule 40 Galvanized Steel Nipple	39.81	15.12
<i>For ASTM 120, Deduct</i>	-2.56	
<i>For Work In Restricted Working Space, Add</i>	6.82	
<i>For Schedule 80 Nipples, Add</i>	19.46	
22 11 16 00-0258 EA 2-1/2" x 6" Long, Schedule 40 Galvanized Steel Nipple	65.22	18.82
<i>For ASTM 120, Deduct</i>	-5.55	
<i>For Work In Restricted Working Space, Add</i>	8.46	
<i>For Schedule 80 Nipples, Add</i>	42.20	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0259	EA		3" x 6" Long, Schedule 40 Galvanized Steel Nipple	83.55	22.73
			<i>For ASTM 120, Deduct</i>	-7.42	
			<i>For Work In Restricted Working Space, Add</i>	10.23	
			<i>For Schedule 80 Nipples, Add</i>	56.36	
22 11 16 00-0260	EA		4" x 6" Long, Schedule 40 Galvanized Steel Nipple	108.12	27.61
			<i>For ASTM 120, Deduct</i>	-10.01	
			<i>For Work In Restricted Working Space, Add</i>	12.41	
			<i>For Schedule 80 Nipples, Add</i>	76.10	
22 11 16 00-0261	EA		3/8" x 8" Long, Schedule 40 Galvanized Steel Nipple.....	46.42	10.04
			<i>For ASTM 120, Deduct</i>	-4.70	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	35.70	
22 11 16 00-0262	EA		1/2" x 8" Long, Schedule 40 Galvanized Steel Nipple.....	23.47	10.04
			<i>For ASTM 120, Deduct</i>	-1.26	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	9.54	
22 11 16 00-0263	EA		3/4" x 8" Long, Schedule 40 Galvanized Steel Nipple.....	25.80	10.04
			<i>For ASTM 120, Deduct</i>	-1.61	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	12.20	
22 11 16 00-0264	EA		1" x 8" Long, Schedule 40 Galvanized Steel Nipple	29.83	10.89
			<i>For ASTM 120, Deduct</i>	-2.03	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	15.46	
22 11 16 00-0265	EA		1-1/4" x 8" Long, Schedule 40 Galvanized Steel Nipple	34.25	11.74
			<i>For ASTM 120, Deduct</i>	-2.49	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	18.96	
22 11 16 00-0266	EA		1-1/2" x 8" Long, Schedule 40 Galvanized Steel Nipple	36.69	11.74
			<i>For ASTM 120, Deduct</i>	-2.86	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	21.74	
22 11 16 00-0267	EA		2" x 8" Long, Schedule 40 Galvanized Steel Nipple	50.56	15.12
			<i>For ASTM 120, Deduct</i>	-4.17	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	31.71	
22 11 16 00-0268	EA		2-1/2" x 8" Long, Schedule 40 Galvanized Steel Nipple	75.85	18.82
			<i>For ASTM 120, Deduct</i>	-7.15	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For Schedule 80 Nipples, Add</i>	54.32	
22 11 16 00-0269	EA		3" x 8" Long, Schedule 40 Galvanized Steel Nipple	100.71	22.73
			<i>For ASTM 120, Deduct</i>	-9.99	
			<i>For Work In Restricted Working Space, Add</i>	10.23	
			<i>For Schedule 80 Nipples, Add</i>	75.92	
22 11 16 00-0270	EA		4" x 8" Long, Schedule 40 Galvanized Steel Nipple	121.02	27.61
			<i>For ASTM 120, Deduct</i>	-11.95	
			<i>For Work In Restricted Working Space, Add</i>	12.41	
			<i>For Schedule 80 Nipples, Add</i>	90.80	
22 11 16 00-0271	EA		3/8" x 10" Long, Schedule 40 Galvanized Steel Nipple.....	30.04	10.04
			<i>For ASTM 120, Deduct</i>	-2.24	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	17.03	
22 11 16 00-0272	EA		1/2" x 10" Long, Schedule 40 Galvanized Steel Nipple.....	25.04	10.04
			<i>For ASTM 120, Deduct</i>	-1.49	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	11.33	
22 11 16 00-0273	EA		3/4" x 10" Long, Schedule 40 Galvanized Steel Nipple.....	26.98	10.04
			<i>For ASTM 120, Deduct</i>	-1.78	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
			<i>For Schedule 80 Nipples, Add</i>	13.54	
22 11 16 00-0274	EA		1" x 10" Long, Schedule 40 Galvanized Steel Nipple.....	31.77	10.89
			<i>For ASTM 120, Deduct</i>	-2.33	
			<i>For Work In Restricted Working Space, Add</i>	4.88	
			<i>For Schedule 80 Nipples, Add</i>	17.67	
22 11 16 00-0275	EA		1-1/4" x 10" Long, Schedule 40 Galvanized Steel Nipple	37.50	11.74
			<i>For ASTM 120, Deduct</i>	-2.98	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	22.66	
22 11 16 00-0276	EA		1-1/2" x 10" Long, Schedule 40 Galvanized Steel Nipple	39.85	11.74
			<i>For ASTM 120, Deduct</i>	-3.33	
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Nipples, Add</i>	25.34	
22 11 16 00-0277	EA		2" x 10" Long, Schedule 40 Galvanized Steel Nipple.....	55.28	15.12
			<i>For ASTM 120, Deduct</i>	-4.88	
			<i>For Work In Restricted Working Space, Add</i>	6.82	
			<i>For Schedule 80 Nipples, Add</i>	37.10	
22 11 16 00-0278	EA		2-1/2" x 10" Long, Schedule 40 Galvanized Steel Nipple	82.51	18.82
			<i>For ASTM 120, Deduct</i>	-8.15	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For Schedule 80 Nipples, Add</i>	61.91	
22 11 16 00-0279	EA		3" x 10" Long, Schedule 40 Galvanized Steel Nipple.....	110.09	22.73
			<i>For ASTM 120, Deduct</i>	-11.40	
			<i>For Work In Restricted Working Space, Add</i>	10.23	
			<i>For Schedule 80 Nipples, Add</i>	86.62	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	22 11 16 00-0280	EA		4" x 10" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	133.68 -13.85 12.41 105.23	27.61
	22 11 16 00-0281	EA		3/8" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	31.65 -2.48 4.53 18.87	10.04
	22 11 16 00-0282	EA		1/2" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	26.41 -1.70 4.53 12.89	10.04
	22 11 16 00-0283	EA		3/4" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	28.42 -2.00 4.53 15.18	10.04
	22 11 16 00-0284	EA		1" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	34.32 -2.71 4.88 20.58	10.89
	22 11 16 00-0285	EA		1-1/4" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	41.49 -3.58 5.29 27.21	11.74
	22 11 16 00-0286	EA		1-1/2" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	43.06 -3.82 5.29 29.00	11.74
	22 11 16 00-0287	EA		2" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	60.08 -5.60 6.82 42.57	15.12
	22 11 16 00-0288	EA		2-1/2" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	88.97 -9.12 8.46 69.28	18.82
	22 11 16 00-0289	EA		3" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	119.54 -12.81 10.23 97.39	22.73
	22 11 16 00-0290	EA		4" x 12" Long, Schedule 40 Galvanized Steel Nipple <i>For ASTM 120, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Nipples, Add</i>	146.46 -15.76 12.41 119.80	27.61
22 11 16 00-0291	Galvanized Malleable Iron Square Head Plugs (22 11 16 00-0013)					
	22 11 16 00-0292	EA		1/2", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	18.15 24.03 3.38	7.51
	22 11 16 00-0293	EA		3/4", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	19.49 24.12 3.79	8.46
	22 11 16 00-0294	EA		1", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	21.63 26.48 4.23	9.41
	22 11 16 00-0295	EA		1-1/4", 150 LB, Galvanized Malleable Iron Square Head Plug <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	27.55 40.36 4.79	10.68
	22 11 16 00-0296	EA		1-1/2", 150 LB, Galvanized Malleable Iron Square Head Plug <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	33.60 54.15 5.40	11.95
	22 11 16 00-0297	EA		2", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	42.71 68.86 6.86	15.22
	22 11 16 00-0298	EA		2-1/2", 150 LB, Galvanized Malleable Iron Square Head Plug <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	72.55 133.68 10.15	22.52
	22 11 16 00-0299	EA		3", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	99.47 189.47 13.36	29.71
	22 11 16 00-0300	EA		4", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	162.32 390.70 14.48	32.16
	22 11 16 00-0301	EA		5", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	259.63 714.54 15.11	33.60
	22 11 16 00-0302	EA		6", 150 LB, Galvanized Malleable Iron Square Head Plug..... <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	278.88 772.34 15.80	35.05
22 11 16 00-0303	Galvanized Malleable Iron Bushing (22 11 16 00-0013)					
	22 11 16 00-0304	EA		3/4" x 1/2", 150 LB, Galvanized Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	42.15 8.96	19.88

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 11 16 00-0305	EA	1" x 1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	46.40 9.52	21.15
22 11 16 00-0306	EA	1" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	47.31 10.02	22.30
22 11 16 00-0307	EA	1-1/4" x 1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	54.60 10.21	22.73
22 11 16 00-0308	EA	1-1/4" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	54.42 10.72	23.79
22 11 16 00-0309	EA	1-1/4" x 1"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	56.27 11.27	25.05
22 11 16 00-0310	EA	1-1/2" x 1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	63.76 10.98	24.42
22 11 16 00-0311	EA	1-1/2" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	65.44 11.48	25.48
22 11 16 00-0312	EA	1-1/2" x 1"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	64.62 12.04	26.75
22 11 16 00-0313	EA	1-1/2" x 1-1/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	65.05 12.73	28.34
22 11 16 00-0314	EA	2" x 1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	76.61 12.80	28.44
22 11 16 00-0315	EA	2" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	75.93 13.31	29.61
22 11 16 00-0316	EA	2" x 1"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	76.04 13.86	30.77
22 11 16 00-0317	EA	2" x 1-1/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	78.37 14.56	32.36
22 11 16 00-0318	EA	2" x 1-1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	77.25 15.32	34.04
22 11 16 00-0319	EA	2-1/2" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	107.18 17.42	38.70
22 11 16 00-0320	EA	2-1/2" x 1"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	109.02 17.98	39.97
22 11 16 00-0321	EA	2-1/2" x 1-1/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	111.35 18.68	41.45
22 11 16 00-0322	EA	2-1/2" x 1-1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	112.99 19.44	43.25
22 11 16 00-0323	EA	2-1/2" x 2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	113.57 21.26	47.26
22 11 16 00-0324	EA	3" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	136.25 21.43	47.58
22 11 16 00-0325	EA	3" x 1"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	138.08 21.98	48.85
22 11 16 00-0326	EA	3" x 1-1/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	140.41 22.68	50.43
22 11 16 00-0327	EA	3" x 1-1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	141.69 23.45	52.12
22 11 16 00-0328	EA	3" x 2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	141.84 25.27	56.14
22 11 16 00-0329	EA	3" x 2-1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	158.90 29.38	65.34
22 11 16 00-0330	EA	4" x 3/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	211.60 22.73	50.46
22 11 16 00-0331	EA	4" x 1"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	213.39 23.27	51.70
22 11 16 00-0332	EA	4" x 1-1/4"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	215.67 23.95	53.25
22 11 16 00-0333	EA	4" x 1-1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	218.16 24.70	54.91
22 11 16 00-0334	EA	4" x 2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	208.11 26.48	58.84
22 11 16 00-0335	EA	4" x 2-1/2"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	237.52 30.50	67.83
22 11 16 00-0336	EA	4" x 3"	150 LB, Galvanized Malleable Iron Bushing <i>For Work In Restricted Working Space, Add</i>	241.61 34.43	76.52

22 11 16 00-0337 Galvanized Malleable Iron Floor Flange (22 11 16 00-0013)

Note: Excludes fasteners to floor or wall. See CSI section 05 05 19 00-0001 for anchors.

22 11 16 00-0338	EA	1/2"	150 LB, Galvanized Malleable Iron Floor Flange	65.80	38.64
22 11 16 00-0339	EA	3/4"	150 LB, Galvanized Malleable Iron Floor Flange	71.92	42.29
22 11 16 00-0340	EA	1"	150 LB, Galvanized Malleable Iron Floor Flange	82.70	47.79
22 11 16 00-0341	EA	1-1/4"	150 LB, Galvanized Malleable Iron Floor Flange	85.98	49.49
22 11 16 00-0342	EA	1-1/2"	150 LB, Galvanized Malleable Iron Floor Flange	93.57	53.82
22 11 16 00-0343	EA	2"	150 LB, Galvanized Malleable Iron Floor Flange	100.99	56.14

22 11 16 00-0344 Galvanized Cast Iron Flanges (22 11 16 00-0013)

Note: Excludes bolt and gasket sets See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.

22 11 16 00-0345	EA	3/4"	125 LB, Galvanized Cast Iron Flange <i>For Work In Restricted Working Space, Add</i>	129.56 19.03	42.29
22 11 16 00-0346	EA	1"	125 LB, Galvanized Cast Iron Flange <i>For Work In Restricted Working Space, Add</i>	122.87 21.50	47.79
22 11 16 00-0347	EA	1-1/4"	125 LB, Galvanized Cast Iron Flange <i>For Work In Restricted Working Space, Add</i>	101.25 22.26	49.49

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0348 EA 1-1/2", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	120.68 24.22	53.82
22 11 16 00-0349 EA 2", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	137.11 25.27	56.14
22 11 16 00-0350 EA 2-1/2", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	159.29 29.23	65.03
22 11 16 00-0351 EA 3", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	290.69 37.09	82.47
22 11 16 00-0352 EA 4", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	392.94 49.62	110.34
22 11 16 00-0353 EA 5", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	554.12 59.07	131.33
22 11 16 00-0354 EA 6", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	608.00 67.86	150.87
22 11 16 00-0355 EA 8", 125 LB, Galvanized Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	557.03 77.56	172.43
22 11 16 00-0356 Copper Pipe And Fittings <small>(22 11 16)</small> Note: Excludes hangers. See CSI section 22 11 16 00-0887 for pipe with fittings assembly.		
22 11 16 00-0357 Copper Tube/Pipe <small>(22 11 16 00-0356)</small> Note: Pipe based on inside diameter size. Excludes hangers and fittings (couplers, tees, elbows, etc).		
22 11 16 00-0358 Hard Drawn Type L Copper Tube/Pipe <small>(22 11 16 00-0357)</small>		
22 11 16 00-0359 LF 1/4" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	5.42 0.58 -0.16 1.16 0.12	2.59
22 11 16 00-0360 LF 3/8" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	6.30 0.69 -0.23 1.21 0.18	2.69
22 11 16 00-0361 LF 1/2" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	6.91 0.76 -0.27 1.26 0.22	2.80
22 11 16 00-0362 LF 3/4" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	8.84 0.99 -0.44 1.34 0.35	2.97
22 11 16 00-0363 LF 1" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	11.35 1.29 -0.63 1.50 0.51	3.34
22 11 16 00-0364 LF 1-1/4" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	16.19 1.84 -0.87 2.24 0.70	4.97
22 11 16 00-0365 LF 1-1/2" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	19.56 2.24 -1.13 2.49 0.90	5.55
22 11 16 00-0366 LF 2" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	28.04 3.25 -1.78 3.08 1.42	6.85
22 11 16 00-0367 LF 2-1/2" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	49.86 5.63 -2.57 7.25 2.06	8.05
22 11 16 00-0368 LF 3" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	62.71 7.13 -3.43 8.53 2.74	9.48
22 11 16 00-0369 LF 4" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	93.17 10.84 -6.11 9.62 4.89	10.70
22 11 16 00-0370 LF 5" Hard Drawn Type L Copper Tube/Pipe <i>For Up To 20, Add</i> <i>For >200, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Medical/Oxygen Service Tubing, Add</i>	144.74 17.17 -10.79 11.06 8.63	12.29

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0371	LF 6" Hard Drawn Type L Copper Tube/Pipe	199.04	19.04
	For Up To 20, Add	23.45	
	For >200, Deduct	-14.20	
	For Work In Restricted Working Space, Add	17.13	
	For Medical/Oxygen Service Tubing, Add	11.36	
22 11 16 00-0372	LF 8" Hard Drawn Type L Copper Tube/Pipe	330.99	21.17
	For Up To 20, Add	39.79	
	For >200, Deduct	-26.75	
	For Work In Restricted Working Space, Add	19.04	
	For Medical/Oxygen Service Tubing, Add	21.40	
22 11 16 00-0373	Hard Drawn Type K Copper Tube/Pipe (22 11 16 00-0357)		
22 11 16 00-0374	LF 1/4" Hard Drawn Type K Copper Tube/Pipe	5.90	2.78
	For Up To 20, Add	0.63	
	For >200, Deduct	-0.17	
	For Work In Restricted Working Space, Add	1.25	
	For Medical/Oxygen Service Tubing, Add	0.14	
22 11 16 00-0375	LF 3/8" Hard Drawn Type K Copper Tube/Pipe	7.88	2.89
	For Up To 20, Add	0.87	
	For >200, Deduct	-0.31	
	For Work In Restricted Working Space, Add	1.43	
	For Medical/Oxygen Service Tubing, Add	0.25	
22 11 16 00-0376	LF 1/2" Hard Drawn Type K Copper Tube/Pipe	8.31	3.01
	For Up To 20, Add	0.92	
	For >200, Deduct	-0.37	
	For Work In Restricted Working Space, Add	1.39	
	For Medical/Oxygen Service Tubing, Add	0.29	
22 11 16 00-0377	LF 3/4" Hard Drawn Type K Copper Tube/Pipe	11.99	3.19
	For Up To 20, Add	1.36	
	For >200, Deduct	-0.66	
	For Work In Restricted Working Space, Add	1.61	
	For Medical/Oxygen Service Tubing, Add	0.53	
22 11 16 00-0378	LF 1" Hard Drawn Type K Copper Tube/Pipe	14.50	3.59
	For Up To 20, Add	1.67	
	For >200, Deduct	-0.88	
	For Work In Restricted Working Space, Add	1.72	
	For Medical/Oxygen Service Tubing, Add	0.70	
22 11 16 00-0379	LF 1-1/4" Hard Drawn Type K Copper Tube/Pipe	19.05	5.34
	For Up To 20, Add	2.18	
	For >200, Deduct	-1.09	
	For Work In Restricted Working Space, Add	2.43	
	For Medical/Oxygen Service Tubing, Add	0.88	
22 11 16 00-0380	LF 1-1/2" Hard Drawn Type K Copper Tube/Pipe	23.12	5.96
	For Up To 20, Add	2.66	
	For >200, Deduct	-1.40	
	For Work In Restricted Working Space, Add	2.73	
	For Medical/Oxygen Service Tubing, Add	1.12	
22 11 16 00-0381	LF 2" Hard Drawn Type K Copper Tube/Pipe	32.70	7.36
	For Up To 20, Add	3.81	
	For >200, Deduct	-2.15	
	For Work In Restricted Working Space, Add	3.35	
	For Medical/Oxygen Service Tubing, Add	1.72	
22 11 16 00-0382	LF 2-1/2" Hard Drawn Type K Copper Tube/Pipe	56.37	8.65
	For Up To 20, Add	6.44	
	For >200, Deduct	-3.21	
	For Work In Restricted Working Space, Add	7.28	
	For Medical/Oxygen Service Tubing, Add	2.57	
22 11 16 00-0383	LF 3" Hard Drawn Type K Copper Tube/Pipe	75.14	10.20
	For Up To 20, Add	8.61	
	For >200, Deduct	-4.39	
	For Work In Restricted Working Space, Add	9.38	
	For Medical/Oxygen Service Tubing, Add	3.51	
22 11 16 00-0384	LF 4" Hard Drawn Type K Copper Tube/Pipe	113.63	11.50
	For Up To 20, Add	13.32	
	For >200, Deduct	-7.82	
	For Work In Restricted Working Space, Add	10.64	
	For Medical/Oxygen Service Tubing, Add	6.25	
22 11 16 00-0385	LF 5" Hard Drawn Type K Copper Tube/Pipe	185.11	13.21
	For Up To 20, Add	22.09	
	For >200, Deduct	-14.33	
	For Work In Restricted Working Space, Add	12.55	
	For Medical/Oxygen Service Tubing, Add	11.46	
22 11 16 00-0386	LF 6" Hard Drawn Type K Copper Tube/Pipe	273.02	20.47
	For Up To 20, Add	32.44	
	For >200, Deduct	-20.56	
	For Work In Restricted Working Space, Add	20.24	
	For Medical/Oxygen Service Tubing, Add	16.45	
22 11 16 00-0387	LF 8" Hard Drawn Type K Copper Tube/Pipe	459.27	22.76
	For Up To 20, Add	55.55	
	For >200, Deduct	-38.49	
	For Work In Restricted Working Space, Add	22.30	
	For Medical/Oxygen Service Tubing, Add	30.80	
22 11 16 00-0388	Hard Drawn Type M Copper Tube/Pipe (22 11 16 00-0357)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0389 LF 3/8" Hard Drawn Type M Copper Tube/Pipe	5.25	2.43
For Up To 20, Add	0.57	
For >200, Deduct	-0.18	
For Work In Restricted Working Space, Add	1.05	
22 11 16 00-0390 LF 1/2" Hard Drawn Type M Copper Tube/Pipe	5.58	2.53
For Up To 20, Add	0.61	
For >200, Deduct	-0.20	
For Work In Restricted Working Space, Add	1.08	
22 11 16 00-0391 LF 3/4" Hard Drawn Type M Copper Tube/Pipe	7.05	2.68
For Up To 20, Add	0.79	
For >200, Deduct	-0.32	
For Work In Restricted Working Space, Add	1.15	
22 11 16 00-0392 LF 1" Hard Drawn Type M Copper Tube/Pipe	9.24	3.01
For Up To 20, Add	1.05	
For >200, Deduct	-0.50	
For Work In Restricted Working Space, Add	1.29	
22 11 16 00-0393 LF 1-1/4" Hard Drawn Type M Copper Tube/Pipe	13.81	4.48
For Up To 20, Add	1.56	
For >200, Deduct	-0.72	
For Work In Restricted Working Space, Add	1.98	
22 11 16 00-0394 LF 1-1/2" Hard Drawn Type M Copper Tube/Pipe	17.52	4.99
For Up To 20, Add	2.00	
For >200, Deduct	-0.99	
For Work In Restricted Working Space, Add	2.27	
22 11 16 00-0395 LF 2" Hard Drawn Type M Copper Tube/Pipe	25.05	6.15
For Up To 20, Add	2.90	
For >200, Deduct	-1.57	
For Work In Restricted Working Space, Add	2.82	
22 11 16 00-0396 LF 2-1/2" Hard Drawn Type M Copper Tube/Pipe	45.55	7.24
For Up To 20, Add	5.12	
For >200, Deduct	-2.27	
For Work In Restricted Working Space, Add	6.85	
22 11 16 00-0397 LF 3" Hard Drawn Type M Copper Tube/Pipe	55.85	8.53
For Up To 20, Add	6.34	
For >200, Deduct	-3.02	
For Work In Restricted Working Space, Add	7.70	
22 11 16 00-0398 LF 4" Hard Drawn Type M Copper Tube/Pipe	86.48	9.63
For Up To 20, Add	10.06	
For >200, Deduct	-5.66	
For Work In Restricted Working Space, Add	8.98	
22 11 16 00-0399 LF 5" Hard Drawn Type M Copper Tube/Pipe	144.34	11.06
For Up To 20, Add	17.18	
For >200, Deduct	-10.98	
For Work In Restricted Working Space, Add	10.37	
22 11 16 00-0400 LF 6" Hard Drawn Type M Copper Tube/Pipe	200.18	17.14
For Up To 20, Add	23.68	
For >200, Deduct	-14.67	
For Work In Restricted Working Space, Add	16.06	
22 11 16 00-0401 LF 8" Hard Drawn Type M Copper Tube/Pipe	336.79	19.05
For Up To 20, Add	40.63	
For >200, Deduct	-27.79	
For Work In Restricted Working Space, Add	17.66	
22 11 16 00-0402 Soft Drawn Type L Copper Tube (22 11 16 00-0357)		
22 11 16 00-0403 LF 1/4" Soft Drawn Type L Copper Tube	5.86	2.59
For Up To 20, Add	0.64	
For >200, Deduct	-0.20	
For Work In Restricted Working Space, Add	1.16	
22 11 16 00-0404 LF 3/8" Soft Drawn Type L Copper Tube	7.14	2.69
For Up To 20, Add	0.79	
For >200, Deduct	-0.31	
For Work In Restricted Working Space, Add	1.21	
22 11 16 00-0405 LF 1/2" Soft Drawn Type L Copper Tube	8.37	2.80
For Up To 20, Add	0.94	
For >200, Deduct	-0.42	
For Work In Restricted Working Space, Add	1.26	
22 11 16 00-0406 LF 5/8" Soft Drawn Type L Copper Tube	9.67	2.89
For Up To 20, Add	1.10	
For >200, Deduct	-0.53	
For Work In Restricted Working Space, Add	1.30	
22 11 16 00-0407 LF 3/4" Soft Drawn Type L Copper Tube	10.83	2.97
For Up To 20, Add	1.24	
For >200, Deduct	-0.64	
For Work In Restricted Working Space, Add	1.34	
22 11 16 00-0408 LF 1" Soft Drawn Type L Copper Tube	13.83	3.34
For Up To 20, Add	1.60	
For >200, Deduct	-0.88	
For Work In Restricted Working Space, Add	1.50	
22 11 16 00-0409 LF 1-1/4" Soft Drawn Type L Copper Tube	19.05	4.97
For Up To 20, Add	2.20	
For >200, Deduct	-1.16	
For Work In Restricted Working Space, Add	2.24	

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0410	LF		1-1/2" Soft Drawn Type L Copper Tube.....	24.04	5.55
			<i>For Up To 20, Add</i>	2.80	
			<i>For >200, Deduct</i>	-1.57	
			<i>For Work In Restricted Working Space, Add</i>	2.49	
22 11 16 00-0411	LF		2" Soft Drawn Type L Copper Tube.....	35.26	6.85
			<i>For Up To 20, Add</i>	4.15	
			<i>For >200, Deduct</i>	-2.50	
			<i>For Work In Restricted Working Space, Add</i>	3.08	
22 11 16 00-0412			Soft Drawn Type K Copper Tube (22 11 16 00-0357)		
22 11 16 00-0413	LF		1/4" Soft Drawn Type K Copper Tube.....	6.07	2.59
			<i>For Up To 20, Add</i>	0.66	
			<i>For >200, Deduct</i>	-0.22	
			<i>For Work In Restricted Working Space, Add</i>	1.16	
22 11 16 00-0414	LF		3/8" Soft Drawn Type K Copper Tube.....	7.79	2.69
			<i>For Up To 20, Add</i>	0.87	
			<i>For >200, Deduct</i>	-0.38	
			<i>For Work In Restricted Working Space, Add</i>	1.21	
22 11 16 00-0415	LF		1/2" Soft Drawn Type K Copper Tube.....	8.90	2.80
			<i>For Up To 20, Add</i>	1.01	
			<i>For >200, Deduct</i>	-0.47	
			<i>For Work In Restricted Working Space, Add</i>	1.26	
22 11 16 00-0416	LF		5/8" Soft Drawn Type K Copper Tube.....	9.93	2.89
			<i>For Up To 20, Add</i>	1.13	
			<i>For >200, Deduct</i>	-0.56	
			<i>For Work In Restricted Working Space, Add</i>	1.30	
22 11 16 00-0417	LF		3/4" Soft Drawn Type K Copper Tube.....	13.14	2.97
			<i>For Up To 20, Add</i>	1.53	
			<i>For >200, Deduct</i>	-0.87	
			<i>For Work In Restricted Working Space, Add</i>	1.34	
22 11 16 00-0418	LF		1" Soft Drawn Type K Copper Tube.....	16.54	3.34
			<i>For Up To 20, Add</i>	1.94	
			<i>For >200, Deduct</i>	-1.15	
			<i>For Work In Restricted Working Space, Add</i>	1.50	
22 11 16 00-0419	LF		1-1/4" Soft Drawn Type K Copper Tube.....	21.04	4.97
			<i>For Up To 20, Add</i>	2.44	
			<i>For >200, Deduct</i>	-1.36	
			<i>For Work In Restricted Working Space, Add</i>	2.24	
22 11 16 00-0420	LF		1-1/2" Soft Drawn Type K Copper Tube.....	27.19	5.55
			<i>For Up To 20, Add</i>	3.19	
			<i>For >200, Deduct</i>	-1.89	
			<i>For Work In Restricted Working Space, Add</i>	2.49	
22 11 16 00-0421	LF		2" Soft Drawn Type K Copper Tube.....	39.60	6.85
			<i>For Up To 20, Add</i>	4.69	
			<i>For >200, Deduct</i>	-2.94	
			<i>For Work In Restricted Working Space, Add</i>	3.08	
22 11 16 00-0422	LF		2-1/2" Soft Drawn Type K Copper Tube.....	56.32	8.21
			<i>For Up To 20, Add</i>	6.73	
			<i>For >200, Deduct</i>	-4.40	
			<i>For Work In Restricted Working Space, Add</i>	3.69	
22 11 16 00-0423	LF		3" Soft Drawn Type K Copper Tube.....	75.76	9.69
			<i>For Up To 20, Add</i>	9.11	
			<i>For >200, Deduct</i>	-6.12	
			<i>For Work In Restricted Working Space, Add</i>	4.36	
22 11 16 00-0424			Copper And Brass Fittings (22 11 16 00-0356)		
			Note: All fittings are based on 95/5 solder.		
22 11 16 00-0425			90 Degree Copper Elbows (22 11 16 00-0424)		
22 11 16 00-0426	EA		1/4" 90 Degree Copper Elbow.....	27.77	15.32
			<i>For Street Fitting, Add</i>	1.92	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	3.45	
			<i>For Work In Restricted Working Space, Add</i>	6.89	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-2.54	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	3.69	
22 11 16 00-0427	EA		3/8" 90 Degree Copper Elbow.....	32.64	18.37
			<i>For Street Fitting, Add</i>	2.03	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.13	
			<i>For Work In Restricted Working Space, Add</i>	8.27	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.01	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	4.39	
22 11 16 00-0428	EA		1/2" 90 Degree Copper Elbow.....	39.54	25.26
			<i>For Street Fitting, Add</i>	0.66	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.68	
			<i>For Work In Restricted Working Space, Add</i>	11.37	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.87	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.77	
22 11 16 00-0429	EA		3/4" 90 Degree Copper Elbow.....	50.77	31.46
			<i>For Street Fitting, Add</i>	1.48	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.89	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	7.25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0430 EA 1" 90 Degree Copper Elbow	65.32	37.55
For Street Fitting, Add	3.62	
For Brazed Fittings Instead Of 95/5 Solder, Add	8.44	
For Work In Restricted Working Space, Add	16.88	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-6.08	
For Silver Solder Instead Of 95/5 Solder, Add	8.89	
22 11 16 00-0431 EA 1-1/4" 90 Degree Copper Elbow	74.39	40.65
For Street Fitting, Add	5.42	
For Brazed Fittings Instead Of 95/5 Solder, Add	9.13	
For Work In Restricted Working Space, Add	18.26	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-6.76	
For Silver Solder Instead Of 95/5 Solder, Add	9.80	
22 11 16 00-0432 EA 1-1/2" 90 Degree Copper Elbow	87.78	44.44
For Street Fitting, Add	8.47	
For Brazed Fittings Instead Of 95/5 Solder, Add	9.99	
For Work In Restricted Working Space, Add	19.98	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-7.72	
For Silver Solder Instead Of 95/5 Solder, Add	11.05	
22 11 16 00-0433 EA 2" 90 Degree Copper Elbow	113.23	49.83
For Street Fitting, Add	15.44	
For Brazed Fittings Instead Of 95/5 Solder, Add	11.19	
For Work In Restricted Working Space, Add	22.39	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-9.39	
For Silver Solder Instead Of 95/5 Solder, Add	13.12	
22 11 16 00-0434 EA 2-1/2" 90 Degree Copper Elbow	167.17	50.75
For Brazed Fittings Instead Of 95/5 Solder, Add	11.42	
For Work In Restricted Working Space, Add	22.84	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-12.17	
For Silver Solder Instead Of 95/5 Solder, Add	15.97	
22 11 16 00-0435 EA 3" 90 Degree Copper Elbow	219.32	60.69
For Brazed Fittings Instead Of 95/5 Solder, Add	13.64	
For Work In Restricted Working Space, Add	27.28	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-15.51	
For Silver Solder Instead Of 95/5 Solder, Add	20.06	
22 11 16 00-0436 EA 4" 90 Degree Copper Elbow	440.51	86.07
For Brazed Fittings Instead Of 95/5 Solder, Add	19.35	
For Work In Restricted Working Space, Add	38.70	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-28.48	
For Silver Solder Instead Of 95/5 Solder, Add	34.92	
22 11 16 00-0437 EA 5" 90 Degree Copper Elbow	1,481.60	117.79
For Brazed Fittings Instead Of 95/5 Solder, Add	26.49	
For Work In Restricted Working Space, Add	52.97	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-82.91	
For Silver Solder Instead Of 95/5 Solder, Add	91.74	
22 11 16 00-0438 EA 6" 90 Degree Copper Elbow	1,996.64	171.40
For Brazed Fittings Instead Of 95/5 Solder, Add	38.54	
For Work In Restricted Working Space, Add	77.08	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-112.68	
For Silver Solder Instead Of 95/5 Solder, Add	125.53	
22 11 16 00-0439 EA 8" 90 Degree Copper Elbow	6,778.63	228.49
For Brazed Fittings Instead Of 95/5 Solder, Add	51.39	
For Work In Restricted Working Space, Add	102.77	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-356.06	
For Silver Solder Instead Of 95/5 Solder, Add	373.19	
22 11 16 00-0440 90 Degree Brass Elbows <small>(22 11 16 00-0424)</small>		
22 11 16 00-0441 EA 1/2" Drop Ear 90 Degree Brass Elbow.....	48.23	25.26
For Brazed Fittings Instead Of 95/5 Solder, Add	5.68	
For Work In Restricted Working Space, Add	11.37	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-4.31	
For Silver Solder Instead Of 95/5 Solder, Add	6.20	
22 11 16 00-0442 EA 3/4" Drop Ear 90 Degree Brass Elbow.....	77.21	31.46
For Brazed Fittings Instead Of 95/5 Solder, Add	7.06	
For Work In Restricted Working Space, Add	14.12	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-6.21	
For Silver Solder Instead Of 95/5 Solder, Add	8.57	
22 11 16 00-0443 EA 1/2" Flanged Sink 90 Degree Brass Elbow	56.73	25.26
For Brazed Fittings Instead Of 95/5 Solder, Add	5.68	
For Work In Restricted Working Space, Add	11.37	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-4.73	
For Silver Solder Instead Of 95/5 Solder, Add	6.63	
22 11 16 00-0444 EA 3/8" Drop Ear 90 Degree Brass Elbow, Solder X Threaded.....	43.02	18.37
For Brazed Fittings Instead Of 95/5 Solder, Add	4.13	
For Work In Restricted Working Space, Add	8.27	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-3.53	
For Silver Solder Instead Of 95/5 Solder, Add	4.91	
22 11 16 00-0445 EA 1/2" Drop Ear 90 Degree Brass Elbow, Solder X Threaded.....	48.96	25.26
For Brazed Fittings Instead Of 95/5 Solder, Add	5.68	
For Work In Restricted Working Space, Add	11.37	
For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct	-4.34	
For Silver Solder Instead Of 95/5 Solder, Add	6.24	

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0446	EA		3/4" Drop Ear 90 Degree Brass Elbow, Solder X Threaded.....	66.55	31.46
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.68	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	8.03	
22 11 16 00-0447	EA		1" Drop Ear 90 Degree Brass Elbow, Solder X Threaded.....	118.46	37.55
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.44	
			<i>For Work In Restricted Working Space, Add</i>	16.88	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-8.74	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	11.55	
22 11 16 00-0448			Reducing 90 Degree Copper Elbows (22 11 16 00-0424)		
22 11 16 00-0449	EA		1/2" Reducing 90 Degree Copper Elbow	51.24	25.26
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.68	
			<i>For Work In Restricted Working Space, Add</i>	11.37	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.46	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.35	
22 11 16 00-0450	EA		3/4" Reducing 90 Degree Copper Elbow	56.54	31.46
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.18	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	7.53	
22 11 16 00-0451	EA		1" Reducing 90 Degree Copper Elbow	73.64	37.55
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.44	
			<i>For Work In Restricted Working Space, Add</i>	16.88	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.50	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	9.31	
22 11 16 00-0452	EA		1-1/4" Reducing 90 Degree Copper Elbow	105.12	40.65
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.13	
			<i>For Work In Restricted Working Space, Add</i>	18.26	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-8.30	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	11.34	
22 11 16 00-0453	EA		1-1/2" Reducing 90 Degree Copper Elbow	124.78	44.44
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.99	
			<i>For Work In Restricted Working Space, Add</i>	19.98	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-9.57	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	12.90	
22 11 16 00-0454	EA		2" Reducing 90 Degree Copper Elbow	152.93	49.83
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	11.19	
			<i>For Work In Restricted Working Space, Add</i>	22.39	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-11.38	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	15.11	
22 11 16 00-0455			45 Degree Copper Elbows (22 11 16 00-0424)		
22 11 16 00-0456	EA		1/4" 45 Degree Copper Elbow	31.93	15.32
			<i>For Street Fitting, Add</i>	3.58	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	3.45	
			<i>For Work In Restricted Working Space, Add</i>	6.89	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-2.75	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	3.89	
22 11 16 00-0457	EA		3/8" 45 Degree Copper Elbow	35.24	18.37
			<i>For Street Fitting, Add</i>	3.07	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.13	
			<i>For Work In Restricted Working Space, Add</i>	8.27	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.14	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	4.52	
22 11 16 00-0458	EA		1/2" 45 Degree Copper Elbow	40.91	25.26
			<i>For Street Fitting, Add</i>	1.21	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.68	
			<i>For Work In Restricted Working Space, Add</i>	11.37	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.94	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.83	
22 11 16 00-0459	EA		3/4" 45 Degree Copper Elbow	52.24	31.46
			<i>For Street Fitting, Add</i>	2.07	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.97	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	7.32	
22 11 16 00-0460	EA		1" 45 Degree Copper Elbow	69.16	37.55
			<i>For Street Fitting, Add</i>	5.16	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.44	
			<i>For Work In Restricted Working Space, Add</i>	16.88	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.27	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	9.08	
22 11 16 00-0461	EA		1-1/4" 45 Degree Copper Elbow	78.32	40.65
			<i>For Street Fitting, Add</i>	6.99	
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.13	
			<i>For Work In Restricted Working Space, Add</i>	18.26	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.96	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	10.00	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0462	EA	1-1/2"		45 Degree Copper Elbow .....88.05		44.44
				<i>For Street Fitting, Add</i>	8.58	
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.99	
				<i>For Work In Restricted Working Space, Add</i>	19.98	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-7.73	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	11.06	
22 11 16 00-0463	EA	2"		45 Degree Copper Elbow .....110.40		49.83
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	11.19	
				<i>For Work In Restricted Working Space, Add</i>	22.39	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-9.25	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	12.98	
22 11 16 00-0464	EA	2-1/2"		45 Degree Copper Elbow .....166.07		50.75
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	11.42	
				<i>For Work In Restricted Working Space, Add</i>	22.84	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-12.11	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	15.92	
22 11 16 00-0465	EA	3"		45 Degree Copper Elbow .....224.38		60.69
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	13.64	
				<i>For Work In Restricted Working Space, Add</i>	27.28	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-15.77	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	20.31	
22 11 16 00-0466	EA	4"		45 Degree Copper Elbow .....413.55		86.07
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	19.35	
				<i>For Work In Restricted Working Space, Add</i>	38.70	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-27.13	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	33.58	
22 11 16 00-0467	EA	5"		45 Degree Copper Elbow .....1,278.62		117.79
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	26.49	
				<i>For Work In Restricted Working Space, Add</i>	52.97	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-72.76	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	81.59	
22 11 16 00-0468	EA	6"		45 Degree Copper Elbow .....1,993.67		171.40
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	38.54	
				<i>For Work In Restricted Working Space, Add</i>	77.08	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-112.53	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	125.38	
22 11 16 00-0469	EA	8"		45 Degree Copper Elbow .....6,243.95		228.49
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	51.39	
				<i>For Work In Restricted Working Space, Add</i>	102.77	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-329.33	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	346.46	
22 11 16 00-0470 Straight Copper And Brass Tees (22 11 16 00-0424)						
22 11 16 00-0471	EA	1/4"		Straight Copper Tee .....44.51		22.97
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.17	
				<i>For Work In Restricted Working Space, Add</i>	10.34	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.95	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.67	
22 11 16 00-0472	EA	3/8"		Straight Copper Tee .....49.44		27.56
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	6.20	
				<i>For Work In Restricted Working Space, Add</i>	12.40	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.54	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.61	
22 11 16 00-0473	EA	1/2"		Straight Copper Tee .....60.25		38.34
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.61	
				<i>For Work In Restricted Working Space, Add</i>	17.22	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.88	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	8.75	
22 11 16 00-0474	EA	3/4"		Straight Copper Tee .....77.96		47.54
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	10.68	
				<i>For Work In Restricted Working Space, Add</i>	21.36	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-7.46	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	11.02	
22 11 16 00-0475	EA	1"		Straight Copper Tee .....105.32		56.72
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	12.75	
				<i>For Work In Restricted Working Space, Add</i>	25.49	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-9.51	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	13.76	
22 11 16 00-0476	EA	1-1/4"		Straight Copper Tee .....120.21		61.31
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	13.78	
				<i>For Work In Restricted Working Space, Add</i>	27.56	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-10.60	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	15.20	
22 11 16 00-0477	EA	1-1/2"		Straight Copper Tee .....142.79		66.60
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	14.98	
				<i>For Work In Restricted Working Space, Add</i>	29.97	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-12.13	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	17.13	
22 11 16 00-0478	EA	2"		Straight Copper Tee .....180.72		75.09
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	16.88	
				<i>For Work In Restricted Working Space, Add</i>	33.76	
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-14.66	
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	20.29	

22 Plumbing
22 10 Plumbing Piping
22 11 Facility Water Distribution



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0479	EA 2-1/2" Straight Copper Tee	276.47	76.13
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	17.13	
	<i>For Work In Restricted Working Space, Add</i>	34.26	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-19.53	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	25.24	
22 11 16 00-0480	EA 3" Straight Copper Tee	385.38	91.67
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	20.62	
	<i>For Work In Restricted Working Space, Add</i>	41.24	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-26.14	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	33.01	
22 11 16 00-0481	EA 4" Straight Copper Tee	792.47	128.36
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	28.86	
	<i>For Work In Restricted Working Space, Add</i>	57.73	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-49.25	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	58.87	
22 11 16 00-0482	EA 5" Straight Copper Tee	2,224.78	175.63
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	39.49	
	<i>For Work In Restricted Working Space, Add</i>	78.98	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-124.40	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	137.57	
22 11 16 00-0483	EA 6" Straight Copper Tee	3,067.29	257.46
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	57.89	
	<i>For Work In Restricted Working Space, Add</i>	115.78	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-172.66	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	191.96	
22 11 16 00-0484	EA 8" Straight Copper Tee	10,857.09	342.79
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	77.08	
	<i>For Work In Restricted Working Space, Add</i>	154.16	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-568.55	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	594.24	
22 11 16 00-0485	EA 1/2" Cast Bronze Drop Ear Tee	74.84	38.34
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.61	
	<i>For Work In Restricted Working Space, Add</i>	17.22	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.61	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	9.48	
22 11 16 00-0486	Reducing Copper Tees <small>(22 11 16 00-0424)</small>		
22 11 16 00-0487	EA 3/8" Reducing Copper Tee	52.75	24.46
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.51	
	<i>For Work In Restricted Working Space, Add</i>	11.02	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.47	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.31	
22 11 16 00-0488	EA 1/2" Reducing Copper Tee	65.76	34.45
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.75	
	<i>For Work In Restricted Working Space, Add</i>	15.50	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.87	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	8.46	
22 11 16 00-0489	EA 3/4" Reducing Copper Tee	73.78	44.44
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.99	
	<i>For Work In Restricted Working Space, Add</i>	19.98	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-7.02	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	10.35	
22 11 16 00-0490	EA 1" Reducing Copper Tee	103.19	53.62
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	12.06	
	<i>For Work In Restricted Working Space, Add</i>	24.11	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-9.18	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	13.20	
22 11 16 00-0491	EA 1-1/4" Reducing Copper Tee	121.88	58.21
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	13.09	
	<i>For Work In Restricted Working Space, Add</i>	26.18	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-10.46	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	14.82	
22 11 16 00-0492	EA 1-1/2" Reducing Copper Tee	144.24	63.61
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	14.30	
	<i>For Work In Restricted Working Space, Add</i>	28.59	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-11.98	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	16.74	
22 11 16 00-0493	EA 2" Reducing Copper Tee	177.53	71.19
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	16.02	
	<i>For Work In Restricted Working Space, Add</i>	32.03	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-14.22	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	19.55	
22 11 16 00-0494	EA 2-1/2" Reducing Copper Tee	287.73	73.38
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	16.49	
	<i>For Work In Restricted Working Space, Add</i>	32.99	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-19.88	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	25.38	
22 11 16 00-0495	EA 3" Reducing Copper Tee	418.81	84.58
	<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	19.03	
	<i>For Work In Restricted Working Space, Add</i>	38.06	
	<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-27.28	
	<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	33.63	



	Plumbing	22
	Plumbing Piping	22 10
	Facility Water Distribution	22 11

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0496	EA 4" Reducing Copper Tee <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	771.05 23.47 46.95 -46.38 54.20	104.36
22 11 16 00-0497	Copper Couplings (22 11 16 00-0424)		
22 11 16 00-0498	EA 1/4" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	23.93 3.45 6.89 -2.35 3.49	15.32
22 11 16 00-0499	EA 3/8" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	28.84 4.13 8.27 -2.82 4.20	18.37
22 11 16 00-0500	EA 1/2" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	38.94 5.68 11.37 -3.84 5.74	25.26
22 11 16 00-0501	EA 3/4" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	49.22 7.06 14.12 -4.81 7.17	31.46
22 11 16 00-0502	EA 1" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	60.51 8.44 16.88 -5.84 8.65	37.55
22 11 16 00-0503	EA 1-1/4" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	68.35 9.13 18.26 -6.46 9.50	40.65
22 11 16 00-0504	EA 1-1/2" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	76.52 9.99 19.98 -7.16 10.49	44.44
22 11 16 00-0505	EA 2" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	91.14 11.19 22.39 -8.29 12.02	49.37
22 11 16 00-0506	EA 2-1/2" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	112.72 10.79 21.57 -9.23 12.83	48.00
22 11 16 00-0507	EA 3" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	142.26 13.01 26.01 -11.45 15.78	58.15
22 11 16 00-0508	EA 4" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	238.71 17.45 34.89 -17.75 23.57	78.24
22 11 16 00-0509	EA 5" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	413.68 23.79 47.58 -28.61 36.54	142.74
22 11 16 00-0510	EA 6" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	654.15 34.89 69.79 -44.34 55.97	155.11
22 11 16 00-0511	EA 8" Copper Coupling..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	1,675.16 46.31 92.62 -99.20 114.63	205.65
22 11 16 00-0512	Reducing Copper Couplings (22 11 16 00-0424)		
22 11 16 00-0513	EA 3/8" Reducing Copper Coupling <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	25.07 3.45 6.89 -2.40 3.55	15.28

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 11 16 00-0514	EA	1/2"	Reducing Copper Coupling.....	34.93	21.82
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.91	
			<i>For Work In Restricted Working Space, Add</i>	9.82	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.38	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.02	
22 11 16 00-0515	EA	3/4"	Reducing Copper Coupling.....	46.28	28.36
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	6.37	
			<i>For Work In Restricted Working Space, Add</i>	12.74	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.44	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.56	
22 11 16 00-0516	EA	1"	Reducing Copper Coupling.....	58.53	34.45
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.75	
			<i>For Work In Restricted Working Space, Add</i>	15.50	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.51	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	8.09	
22 11 16 00-0517	EA	1-1/4"	Reducing Copper Coupling.....	68.11	39.04
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.78	
			<i>For Work In Restricted Working Space, Add</i>	17.57	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.33	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	9.26	
22 11 16 00-0518	EA	1-1/2"	Reducing Copper Coupling.....	79.54	42.48
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.56	
			<i>For Work In Restricted Working Space, Add</i>	19.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-7.16	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	10.35	
22 11 16 00-0519	EA	2"	Reducing Copper Coupling.....	95.09	47.07
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	10.59	
			<i>For Work In Restricted Working Space, Add</i>	21.19	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-8.29	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	11.82	
22 11 16 00-0520	EA	2-1/2"	Reducing Copper Coupling.....	132.98	48.32
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	10.86	
			<i>For Work In Restricted Working Space, Add</i>	21.73	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-10.27	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	13.89	
22 11 16 00-0521	EA	3"	Reducing Copper Coupling.....	158.40	56.03
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	12.53	
			<i>For Work In Restricted Working Space, Add</i>	25.06	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-12.10	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	16.27	
22 11 16 00-0522	EA	4"	Reducing Copper Coupling.....	258.59	73.38
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	16.49	
			<i>For Work In Restricted Working Space, Add</i>	32.99	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-18.43	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	23.93	
22 11 16 00-0523	EA	5"	Reducing Copper Coupling.....	734.54	102.24
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	23.00	
			<i>For Work In Restricted Working Space, Add</i>	45.99	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-44.39	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	52.06	
22 11 16 00-0524	EA	6"	Reducing Copper Coupling.....	1,106.24	137.45
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	30.93	
			<i>For Work In Restricted Working Space, Add</i>	61.85	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-65.62	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	75.93	
22 11 16 00-0525	EA	8"	Reducing Copper Coupling.....	2,208.33	200.29
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	45.04	
			<i>For Work In Restricted Working Space, Add</i>	90.09	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-125.43	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	140.45	

22 11 16 00-0526 Male Copper Adapters (22 11 16 00-0424)

22 11 16 00-0527	EA	1/4"	Male Copper Adapter.....	39.94	14.92
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	3.45	
			<i>For Work In Restricted Working Space, Add</i>	6.89	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.15	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	4.29	
22 11 16 00-0528	EA	3/8"	Male Copper Adapter.....	36.02	18.37
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.13	
			<i>For Work In Restricted Working Space, Add</i>	8.27	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.18	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	4.56	
22 11 16 00-0529	EA	1/2"	Male Copper Adapter.....	37.88	22.97
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.17	
			<i>For Work In Restricted Working Space, Add</i>	10.34	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.62	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.34	
22 11 16 00-0530	EA	3/4"	Male Copper Adapter.....	48.29	28.71
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	6.37	
			<i>For Work In Restricted Working Space, Add</i>	12.74	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.54	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.66	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0531	EA			1" Male Copper Adapter 64.14		33.30
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 7.41		
				<i>For Work In Restricted Working Space, Add</i> 14.81		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -5.68		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 8.14		
22 11 16 00-0532	EA			1-1/4" Male Copper Adapter 78.91		37.89
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 8.61		
				<i>For Work In Restricted Working Space, Add</i> 17.22		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -6.82		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 9.69		
22 11 16 00-0533	EA			1-1/2" Male Copper Adapter 90.60		43.63
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 9.82		
				<i>For Work In Restricted Working Space, Add</i> 19.64		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -7.80		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 11.08		
22 11 16 00-0534	EA			2" Male Copper Adapter 126.40		55.68
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 12.57		
				<i>For Work In Restricted Working Space, Add</i> 25.15		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -10.51		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 14.70		
22 11 16 00-0535	EA			2-1/2" Male Copper Adapter 270.81		72.34
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 16.19		
				<i>For Work In Restricted Working Space, Add</i> 32.38		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -18.94		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 24.33		
22 11 16 00-0536	EA			3" Male Copper Adapter 359.44		96.48
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 21.57		
				<i>For Work In Restricted Working Space, Add</i> 43.14		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -25.16		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 32.35		
22 11 16 00-0537	EA			4" Male Copper Adapter 547.86		135.34
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 30.45		
				<i>For Work In Restricted Working Space, Add</i> 60.90		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -37.54		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 47.69		
22 11 16 00-0538				Female Copper Adapters <small>(22 11 16 00-0424)</small>		
22 11 16 00-0539	EA			1/4" Female Copper Adapter 33.81		14.92
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 3.45		
				<i>For Work In Restricted Working Space, Add</i> 6.89		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -2.84		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 3.99		
22 11 16 00-0540	EA			3/8" Female Copper Adapter 38.90		18.37
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 4.13		
				<i>For Work In Restricted Working Space, Add</i> 8.27		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -3.32		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 4.70		
22 11 16 00-0541	EA			1/2" Female Copper Adapter 39.94		22.97
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 5.17		
				<i>For Work In Restricted Working Space, Add</i> 10.34		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -3.72		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 5.44		
22 11 16 00-0542	EA			3/4" Female Copper Adapter 49.98		28.71
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 6.37		
				<i>For Work In Restricted Working Space, Add</i> 12.74		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -4.62		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 6.75		
22 11 16 00-0543	EA			1" Female Copper Adapter 66.52		33.30
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 7.41		
				<i>For Work In Restricted Working Space, Add</i> 14.81		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -5.79		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 8.26		
22 11 16 00-0544	EA			1-1/4" Female Copper Adapter 82.56		37.89
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 8.61		
				<i>For Work In Restricted Working Space, Add</i> 17.22		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -7.00		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 9.87		
22 11 16 00-0545	EA			1-1/2" Female Copper Adapter 104.83		43.63
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 9.82		
				<i>For Work In Restricted Working Space, Add</i> 19.64		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -8.51		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 11.79		
22 11 16 00-0546	EA			2" Female Copper Adapter 137.24		55.68
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 12.57		
				<i>For Work In Restricted Working Space, Add</i> 25.15		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -11.05		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 15.24		
22 11 16 00-0547	EA			2-1/2" Female Copper Adapter 329.22		66.61
				<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> 14.91		
				<i>For Work In Restricted Working Space, Add</i> 29.82		
				<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> -21.43		
				<i>For Silver Solder Instead Of 95/5 Solder, Add</i> 26.40		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	22 11 16 00-0548	EA	3" Female Copper Adapter	530.95	96.48
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	21.57	
			<i>For Work In Restricted Working Space, Add</i>	43.14	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-33.74	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	40.93	
	22 11 16 00-0549		Wrot Copper, Solder Union (22 11 16 00-0424)		
	22 11 16 00-0550	EA	1/4" Wrot Copper, Solder Union.....	40.36	18.37
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.13	
			<i>For Work In Restricted Working Space, Add</i>	8.27	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.40	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	4.77	
	22 11 16 00-0551	EA	3/8" Wrot Copper, Solder Union.....	46.48	22.16
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.00	
			<i>For Work In Restricted Working Space, Add</i>	9.99	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.99	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.65	
	22 11 16 00-0552	EA	1/2" Wrot Copper, Solder Union.....	49.49	27.56
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	6.20	
			<i>For Work In Restricted Working Space, Add</i>	12.40	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.54	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.61	
	22 11 16 00-0553	EA	3/4" Wrot Copper, Solder Union.....	57.09	31.46
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.21	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	7.56	
	22 11 16 00-0554	EA	1" Wrot Copper, Solder Union.....	73.48	37.55
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.44	
			<i>For Work In Restricted Working Space, Add</i>	16.88	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.49	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	9.30	
	22 11 16 00-0555	EA	1-1/4" Wrot Copper, Solder Union	86.94	41.34
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.30	
			<i>For Work In Restricted Working Space, Add</i>	18.60	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-7.45	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	10.55	
	22 11 16 00-0556	EA	1-1/2" Wrot Copper, Solder Union	104.06	45.93
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	10.34	
			<i>For Work In Restricted Working Space, Add</i>	20.67	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-8.65	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	12.09	
	22 11 16 00-0557	EA	2" Wrot Copper, Solder Union.....	142.61	55.11
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	12.40	
			<i>For Work In Restricted Working Space, Add</i>	24.80	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-11.26	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	15.40	
	22 11 16 00-0558	EA	2-1/2" Wrot Copper, Solder Union	254.39	60.69
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	13.64	
			<i>For Work In Restricted Working Space, Add</i>	27.28	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-17.27	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	21.81	
	22 11 16 00-0559	EA	3" Wrot Copper, Solder Union.....	551.97	86.07
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	19.35	
			<i>For Work In Restricted Working Space, Add</i>	38.70	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-34.05	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	40.50	
	22 11 16 00-0560		Cast Bronze, Solder Union (22 11 16 00-0424)		
	22 11 16 00-0561	EA	1/4" Cast Bronze, Solder Union	45.07	18.37
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.13	
			<i>For Work In Restricted Working Space, Add</i>	8.27	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.63	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.01	
	22 11 16 00-0562	EA	3/8" Cast Bronze, Solder Union	50.94	22.16
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	5.00	
			<i>For Work In Restricted Working Space, Add</i>	9.99	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.21	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	5.88	
	22 11 16 00-0563	EA	1/2" Cast Bronze, Solder Union.....	50.73	27.56
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	6.20	
			<i>For Work In Restricted Working Space, Add</i>	12.40	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.60	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.67	
	22 11 16 00-0564	EA	3/4" Cast Bronze, Solder Union	58.84	31.46
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.30	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	7.65	
	22 11 16 00-0565	EA	1" Cast Bronze, Solder Union	76.52	37.55
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.44	
			<i>For Work In Restricted Working Space, Add</i>	16.88	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.64	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	9.45	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0566 EA 1-1/4" Cast Bronze, Solder Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	95.25 9.30 18.60 -7.86 10.96	41.34
22 11 16 00-0567 EA 1-1/2" Cast Bronze, Solder Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	112.74 10.34 20.67 -9.08 12.53	45.93
22 11 16 00-0568 EA 2" Cast Bronze, Solder Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	157.38 12.40 24.80 -12.00 16.14	55.11
22 11 16 00-0569 EA 2-1/2" Cast Bronze, Solder Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	254.38 13.64 27.28 -17.27 21.81	60.69
22 11 16 00-0570 EA 3" Cast Bronze, Solder Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	551.97 19.35 38.70 -34.05 40.50	86.07
22 11 16 00-0571 Cast Bronze, Solder X Female Threaded Union (22 11 16 00-0424)		
22 11 16 00-0572 EA 1/4" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	51.45 4.13 8.27 -3.95 5.33	18.37
22 11 16 00-0573 EA 3/8" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	58.02 5.00 9.99 -4.57 6.23	22.16
22 11 16 00-0574 EA 1/2" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	60.97 6.20 12.40 -5.12 7.18	27.56
22 11 16 00-0575 EA 3/4" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	73.83 7.06 14.12 -6.05 8.40	31.46
22 11 16 00-0576 EA 1" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	111.92 8.44 16.88 -8.41 11.22	37.55
22 11 16 00-0577 EA 1-1/4" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	165.73 9.30 18.60 -11.39 14.49	41.34
22 11 16 00-0578 EA 1-1/2" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	200.31 10.34 20.67 -13.46 16.91	45.93
22 11 16 00-0579 EA 2" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	305.11 12.40 24.80 -19.39 23.52	55.11
22 11 16 00-0580 EA 2-1/2" Cast Bronze, Solder X Female Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	512.60 13.64 27.28 -30.18 34.72	60.69
22 11 16 00-0581 Cast Bronze, Solder X Male Threaded Union (22 11 16 00-0424)		
22 11 16 00-0582 EA 1/4" Cast Bronze, Solder X Male Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	45.76 4.13 8.27 -3.67 5.04	18.37
22 11 16 00-0583 EA 3/8" Cast Bronze, Solder X Male Threaded Union..... <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	54.54 5.00 9.99 -4.39 6.06	22.16

22 Plumbing
22 10 Plumbing Piping
22 11 Facility Water Distribution



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0584	EA		1/2" Cast Bronze, Solder X Male Threaded Union.....	56.84	27.56
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	6.20	
			<i>For Work In Restricted Working Space, Add</i>	12.40	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-4.91	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	6.98	
22 11 16 00-0585	EA		3/4" Cast Bronze, Solder X Male Threaded Union.....	70.33	31.46
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	7.06	
			<i>For Work In Restricted Working Space, Add</i>	14.12	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-5.87	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	8.22	
22 11 16 00-0586	EA		1" Cast Bronze, Solder X Male Threaded Union.....	113.52	37.55
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	8.44	
			<i>For Work In Restricted Working Space, Add</i>	16.88	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-8.49	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	11.30	
22 11 16 00-0587	EA		1-1/4" Cast Bronze, Solder X Male Threaded Union.....	133.03	41.34
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	9.30	
			<i>For Work In Restricted Working Space, Add</i>	18.60	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-9.75	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	12.85	
22 11 16 00-0588	EA		1-1/2" Cast Bronze, Solder X Male Threaded Union.....	143.51	45.93
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	10.34	
			<i>For Work In Restricted Working Space, Add</i>	20.67	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-10.62	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	14.07	
22 11 16 00-0589	EA		2" Cast Bronze, Solder X Male Threaded Union.....	197.27	55.11
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	12.40	
			<i>For Work In Restricted Working Space, Add</i>	24.80	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-14.00	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	18.13	
22 11 16 00-0590	EA		2-1/2" Cast Bronze, Solder X Male Threaded Union.....	426.77	60.69
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	13.64	
			<i>For Work In Restricted Working Space, Add</i>	27.28	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-25.89	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	30.43	
22 11 16 00-0591			Copper Caps (22 11 16 00-0424)		
22 11 16 00-0592	EA		1/4" Copper Cap	9.04	5.05
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	1.14	
			<i>For Work In Restricted Working Space, Add</i>	2.27	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-0.83	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	1.21	
22 11 16 00-0593	EA		3/8" Copper Cap	11.42	5.97
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	1.36	
			<i>For Work In Restricted Working Space, Add</i>	2.73	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-1.03	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	1.48	
22 11 16 00-0594	EA		1/2" Copper Cap	13.70	8.27
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	1.88	
			<i>For Work In Restricted Working Space, Add</i>	3.75	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-1.31	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	1.94	
22 11 16 00-0595	EA		3/4" Copper Cap	17.78	10.22
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	2.33	
			<i>For Work In Restricted Working Space, Add</i>	4.66	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-1.67	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	2.44	
22 11 16 00-0596	EA		1" Copper Cap	23.83	12.28
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	2.79	
			<i>For Work In Restricted Working Space, Add</i>	5.57	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-2.12	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	3.05	
22 11 16 00-0597	EA		1-1/4" Copper Cap	27.12	13.20
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	3.01	
			<i>For Work In Restricted Working Space, Add</i>	6.02	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-2.36	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	3.36	
22 11 16 00-0598	EA		1-1/2" Copper Cap	32.21	14.47
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	3.30	
			<i>For Work In Restricted Working Space, Add</i>	6.59	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-2.71	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	3.81	
22 11 16 00-0599	EA		2" Copper Cap	41.61	15.01
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	3.40	
			<i>For Work In Restricted Working Space, Add</i>	6.80	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-3.21	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	4.35	
22 11 16 00-0600	EA		2-1/2" Copper Cap	94.86	17.55
			<i>For Brazed Fittings Instead Of 95/5 Solder, Add</i>	4.00	
			<i>For Work In Restricted Working Space, Add</i>	8.00	
			<i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i>	-6.08	
			<i>For Silver Solder Instead Of 95/5 Solder, Add</i>	7.41	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0601	EA		3" Copper Cap <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	131.80 5.12 10.23 -8.30 10.00	22.52
22 11 16 00-0602	EA		4" Copper Cap <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	235.99 7.74 15.48 -14.38 16.96	34.04
22 11 16 00-0603	EA		5" Cast Bronze Cap <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	1,375.58 11.92 23.84 -72.75 76.73	52.45
22 11 16 00-0604	EA		6" Cast Bronze Cap <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	2,697.96 17.34 34.69 -140.68 146.46	76.34
22 11 16 00-0605	EA		8" Cast Bronze Cap <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	3,431.54 23.12 46.25 -179.29 186.99	101.71
22 11 16 00-0606 Copper Crosses (22 11 16 00-0424)					
22 11 16 00-0607	EA		1/2" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	88.66 10.47 20.94 -7.92 11.41	46.52
22 11 16 00-0608	EA		3/4" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	123.37 13.01 26.01 -10.50 14.84	57.84
22 11 16 00-0609	EA		1" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	165.90 15.54 31.08 -13.48 18.66	69.04
22 11 16 00-0610	EA		1-1/4" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	201.61 16.81 33.62 -15.68 21.29	74.75
22 11 16 00-0611	EA		1-1/2" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	250.25 18.40 36.80 -18.65 24.78	81.73
22 11 16 00-0612	EA		2" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	378.52 20.62 41.24 -25.80 32.67	91.67
22 11 16 00-0613	EA		2-1/2" Copper Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	707.94 22.84 45.68 -43.01 50.62	101.50
22 11 16 00-0614 Cast Bronze Crosses (22 11 16 00-0424)					
22 11 16 00-0615	EA		3/8" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	75.90 7.61 15.23 -6.33 8.87	33.83
22 11 16 00-0616	EA		1/2" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	92.43 10.47 20.94 -8.11 11.60	46.52
22 11 16 00-0617	EA		3/4" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	130.70 13.01 26.01 -10.87 15.21	57.84
22 11 16 00-0618	EA		1" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	178.34 15.54 31.08 -14.10 19.28	69.04

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0619	EA		1-1/4" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	219.51 16.81 33.62 -16.58 22.18	74.75
22 11 16 00-0620	EA		1-1/2" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	275.77 18.40 36.80 -19.92 26.05	81.73
22 11 16 00-0621	EA		2" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	485.38 20.62 41.24 -31.14 38.01	91.67
22 11 16 00-0622	EA		2-1/2" Cast Bronze Cross <i>For Brazed Fittings Instead Of 95/5 Solder, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i>	819.08 22.84 45.68 -48.57 56.18	101.50
22 11 16 00-0623			Flexible Corrugated Copper Supply Line (22 11 16 00-0424)		
22 11 16 00-0624	EA		3/4" Threaded x 3/4" Solder x 18" Long, Flexible Corrugated Copper Supply Line	77.40	31.46
22 11 16 00-0625	EA		3/4" Threaded x 3/4" Solder x 24" Long, Flexible Corrugated Copper Supply Line	81.05	31.46
22 11 16 00-0626	EA		3/4" Threaded x 3/4" Threaded x 12" Long, Flexible Corrugated Copper Supply Line	70.84	31.46
22 11 16 00-0627	EA		3/4" Threaded x 3/4" Threaded x 15" Long, Flexible Corrugated Copper Supply Line	74.97	31.46
22 11 16 00-0628	EA		3/4" Threaded x 3/4" Threaded x 18" Long, Flexible Corrugated Copper Supply Line	78.62	31.46
22 11 16 00-0629	EA		3/4" Threaded x 3/4" Threaded x 24" Long, Flexible Corrugated Copper Supply Line	81.05	31.46
22 11 16 00-0630			Crimped Copper Fittings (22 11 16 00-0356) Note: Viega ProPress type. Includes factory installed ethylene propylene diene monomer (EPDM) sealing elements.		
22 11 16 00-0631			Crimped Copper 90 Degree Elbows (22 11 16 00-0630)		
22 11 16 00-0632	EA		1/2" Crimped Copper 90 Degree Elbow	26.67	13.78
22 11 16 00-0633	EA		3/4" Crimped Copper 90 Degree Elbow	33.74	15.73
22 11 16 00-0634	EA		1" Crimped Copper 90 Degree Elbow	48.55	18.72
22 11 16 00-0635	EA		1-1/4" Crimped Copper 90 Degree Elbow	72.24	20.66
22 11 16 00-0636	EA		1-1/2" Crimped Copper 90 Degree Elbow	112.53	22.97
22 11 16 00-0637	EA		2" Crimped Copper 90 Degree Elbow	149.86	27.56
22 11 16 00-0638	EA		2-1/2" Crimped Copper 90 Degree Elbow	363.43	32.15
22 11 16 00-0639	EA		3" Crimped Copper 90 Degree Elbow	453.98	38.23
22 11 16 00-0640	EA		4" Crimped Copper 90 Degree Elbow	566.42	50.52
22 11 16 00-0641			Crimped Copper 45 Degree Elbows (22 11 16 00-0630)		
22 11 16 00-0642	EA		1/2" Crimped Copper 45 Degree Elbow	27.67	13.78
22 11 16 00-0643	EA		3/4" Crimped Copper 45 Degree Elbow	32.14	15.73
22 11 16 00-0644	EA		1" Crimped Copper 45 Degree Elbow	55.77	18.72
22 11 16 00-0645	EA		1-1/4" Crimped Copper 45 Degree Elbow	70.64	20.66
22 11 16 00-0646	EA		1-1/2" Crimped Copper 45 Degree Elbow	98.72	22.97
22 11 16 00-0647	EA		2" Crimped Copper 45 Degree Elbow	131.24	27.56
22 11 16 00-0648	EA		2-1/2" Crimped Copper 45 Degree Elbow	256.44	32.15
22 11 16 00-0649	EA		3" Crimped Copper 45 Degree Elbow	354.89	38.23
22 11 16 00-0650	EA		4" Crimped Copper 45 Degree Elbow	488.92	50.52
22 11 16 00-0651			Crimped Copper Straight Tees (22 11 16 00-0630)		
22 11 16 00-0652	EA		1/2" Crimped Copper Straight Tee	40.20	20.66
22 11 16 00-0653	EA		3/4" Crimped Copper Straight Tee	56.97	27.21
22 11 16 00-0654	EA		1" Crimped Copper Straight Tee	74.58	30.20
22 11 16 00-0655	EA		1-1/4" Crimped Copper Straight Tee	95.95	31.00
22 11 16 00-0656	EA		1-1/2" Crimped Copper Straight Tee	148.91	35.25
22 11 16 00-0657	EA		2" Crimped Copper Straight Tee	180.72	41.34
22 11 16 00-0658	EA		2-1/2" Crimped Copper Straight Tee	461.78	48.22
22 11 16 00-0659	EA		3" Crimped Copper Straight Tee	572.90	57.41
22 11 16 00-0660	EA		4" Crimped Copper Straight Tee	796.72	75.78
22 11 16 00-0661			Crimped Copper Reducing Tees (22 11 16 00-0630)		
22 11 16 00-0662	EA		3/4" Crimped Copper Reducing Tee	54.52	19.64
22 11 16 00-0663	EA		1" Crimped Copper Reducing Tee	83.15	25.84
22 11 16 00-0664	EA		1-1/4" Crimped Copper Reducing Tee	88.30	28.71
22 11 16 00-0665	EA		1-1/2" Crimped Copper Reducing Tee	129.50	29.50
22 11 16 00-0666	EA		2" Crimped Copper Reducing Tee	158.10	33.41
22 11 16 00-0667	EA		2-1/2" Crimped Copper Reducing Tee	514.89	37.89
22 11 16 00-0668	EA		3" Crimped Copper Reducing Tee	628.94	45.93
22 11 16 00-0669	EA		4" Crimped Copper Reducing Tee	729.02	61.20

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0670	Crimped Copper Couplings (22 11 16 00-0630)	
22 11 16 00-0671 EA	1/2" Crimped Copper Coupling	26.07 13.78
22 11 16 00-0672 EA	3/4" Crimped Copper Coupling	31.75 15.73
22 11 16 00-0673 EA	1" Crimped Copper Coupling	44.73 18.72
22 11 16 00-0674 EA	1-1/4" Crimped Copper Coupling	51.63 20.66
22 11 16 00-0675 EA	1-1/2" Crimped Copper Coupling	72.89 22.97
22 11 16 00-0676 EA	2" Crimped Copper Coupling	90.40 27.56
22 11 16 00-0677 EA	2-1/2" Crimped Copper Coupling	205.21 32.15
22 11 16 00-0678 EA	3" Crimped Copper Coupling	257.34 38.23
22 11 16 00-0679 EA	4" Crimped Copper Coupling	353.40 50.52
22 11 16 00-0680	Crimped Copper Reducing Couplings (22 11 16 00-0630)	
22 11 16 00-0681 EA	3/4" Crimped Copper Reducing Coupling	44.27 13.09
22 11 16 00-0682 EA	1" Crimped Copper Reducing Coupling	50.63 14.92
22 11 16 00-0683 EA	1-1/4" Crimped Copper Reducing Coupling	67.80 17.79
22 11 16 00-0684 EA	1-1/2" Crimped Copper Reducing Coupling	89.96 19.64
22 11 16 00-0685 EA	2" Crimped Copper Reducing Coupling	100.80 21.82
22 11 16 00-0686 EA	2-1/2" Crimped Copper FTG x C Reducing Coupling	224.50 26.06
22 11 16 00-0687 EA	3" Crimped Copper FTG x C Reducing Coupling	282.48 30.66
22 11 16 00-0688 EA	4" Crimped Copper FTG x C Reducing Coupling	366.04 40.53
22 11 16 00-0689	Crimped Copper Male Adapters (22 11 16 00-0630)	
22 11 16 00-0690 EA	1/2" Crimped Copper Male Adapter	27.28 13.78
22 11 16 00-0691 EA	3/4" Crimped Copper Male Adapter	35.54 15.73
22 11 16 00-0692 EA	1" Crimped Copper Male Adapter	50.15 18.72
22 11 16 00-0693 EA	1-1/4" Crimped Copper Male Adapter	79.24 20.66
22 11 16 00-0694 EA	1-1/2" Crimped Copper Male Adapter	102.12 22.97
22 11 16 00-0695 EA	2" Crimped Copper Male Adapter	171.67 27.56
22 11 16 00-0696 EA	2-1/2" Crimped Copper Male Adapter	363.43 32.15
22 11 16 00-0697 EA	3" Crimped Copper Male Adapter	453.98 38.23
22 11 16 00-0698 EA	4" Crimped Copper Male Adapter	534.82 50.52
22 11 16 00-0699	Crimped Copper Female Adapters (22 11 16 00-0630)	
22 11 16 00-0700 EA	1/2" Crimped Copper Female Adapter	28.66 13.78
22 11 16 00-0701 EA	3/4" Crimped Copper Female Adapter	36.56 15.73
22 11 16 00-0702 EA	1" Crimped Copper Female Adapter	52.16 18.72
22 11 16 00-0703 EA	1-1/4" Crimped Copper Female Adapter	85.26 20.66
22 11 16 00-0704 EA	1-1/2" Crimped Copper Female Adapter	113.34 22.97
22 11 16 00-0705 EA	2" Crimped Copper Female Adapter	175.28 27.56
22 11 16 00-0706	Crimped Copper Caps (22 11 16 00-0630)	
22 11 16 00-0707 EA	1/2" Crimped Copper Cap	21.94 6.89
22 11 16 00-0708 EA	3/4" Crimped Copper Cap	31.66 8.04
22 11 16 00-0709 EA	1" Crimped Copper Cap	44.01 9.18
22 11 16 00-0710 EA	1-1/4" Crimped Copper Cap	49.73 10.33
22 11 16 00-0711 EA	1-1/2" Crimped Copper Cap	70.85 11.82
22 11 16 00-0712 EA	2" Crimped Copper Cap	85.12 13.78
22 11 16 00-0713 EA	2-1/2" Crimped Copper Cap	230.22 16.07
22 11 16 00-0714 EA	3" Crimped Copper Cap	289.56 19.17
22 11 16 00-0715 EA	4" Crimped Copper Cap	385.48 25.26
22 11 16 00-0716	C x F NPT Crimped Bronze Unions (22 11 16 00-0630)	
22 11 16 00-0717 EA	1/2" C x F NPT Crimped Bronze Union	62.18 18.72
22 11 16 00-0718 EA	3/4" C x F NPT Crimped Bronze Union	78.20 23.08
22 11 16 00-0719 EA	1" C x F NPT Crimped Bronze Union	113.94 27.67
22 11 16 00-0720 EA	1-1/4" C x F NPT Crimped Bronze Union	139.69 31.92
22 11 16 00-0721 EA	1-1/2" C x F NPT Crimped Bronze Union	191.00 31.24
22 11 16 00-0722 EA	2" C x F NPT Crimped Bronze Union	258.74 45.24
22 11 16 00-0723	C x C Crimped Bronze Unions (22 11 16 00-0630)	
22 11 16 00-0724 EA	1/2" C x C Bronze Crimped Union	63.10 13.78
22 11 16 00-0725 EA	3/4" C x C Bronze Crimped Union	79.19 15.73
22 11 16 00-0726 EA	1" C x C Bronze Crimped Union	117.01 18.72
22 11 16 00-0727 EA	1-1/4" C x C Bronze Crimped Union	157.93 20.66
22 11 16 00-0728 EA	1-1/2" C x C Bronze Crimped Union	206.82 22.97
22 11 16 00-0729 EA	2" C x C Bronze Crimped Union	322.83 27.56
22 11 16 00-0730	C x Flange Crimped Bronze Flange (22 11 16 00-0630)	
22 11 16 00-0731 EA	2-1/2" C x Flange Crimped Bronze Flange	650.94 32.15
22 11 16 00-0732 EA	3" C x Flange Crimped Bronze Flange	706.14 38.23
22 11 16 00-0733 EA	4" C x Flange Crimped Bronze Flange	802.01 50.52

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 11 16 00-0734	Field Installed FKM Seals <small>(22 11 16 00-0630)</small>		
	Note: For vacuum systems. Includes removing factory installed ethylene propylene diene monomer (EPDM) seal and installing FKM seal.		
22 11 16 00-0735	EA 1/2" Field Installed FKM Seal.....	8.57	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0736	EA 3/4" Field Installed FKM Seal.....	11.23	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0737	EA 1" Field Installed FKM Seal.....	12.90	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0738	EA 1-1/4" Field Installed FKM Seal.....	14.97	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0739	EA 1-1/2" Field Installed FKM Seal.....	22.52	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0740	EA 2" Field Installed FKM Seal.....	24.74	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0741	EA 2-1/2" Field Installed FKM Seal.....	39.48	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0742	EA 3" Field Installed FKM Seal.....	44.97	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0743	EA 4" Field Installed FKM Seal.....	61.77	
	Note: To be used in conjunction with fittings.		
22 11 16 00-0744	Cut And Prepare Existing In-Place Copper Pipe <small>(22 11 16 00-0356)</small>		
22 11 16 00-0745	EA Up To 1/2", Cut And Prepare Existing In Place Copper Pipe.....	11.48	
22 11 16 00-0746	EA 3/4", Cut And Prepare Existing In Place Copper Pipe.....	12.41	
22 11 16 00-0747	EA 1", Cut And Prepare Existing In Place Copper Pipe.....	13.95	
22 11 16 00-0748	EA 1-1/4", Cut And Prepare Existing In Place Copper Pipe.....	14.64	
22 11 16 00-0749	EA 1-1/2", Cut And Prepare Existing In Place Copper Pipe.....	15.50	
22 11 16 00-0750	EA 2", Cut And Prepare Existing In Place Copper Pipe.....	17.06	
22 11 16 00-0751	EA 2-1/2", Cut And Prepare Existing In Place Copper Pipe.....	18.38	
22 11 16 00-0752	EA 3", Cut And Prepare Existing In Place Copper Pipe.....	21.70	
22 11 16 00-0753	EA 4", Cut And Prepare Existing In Place Copper Pipe.....	29.28	
22 11 16 00-0754	EA 6", Cut And Prepare Existing In Place Copper Pipe.....	41.84	
22 11 16 00-0755	EA 8", Cut And Prepare Existing In Place Copper Pipe.....	55.80	
22 11 16 00-0756	Sweat Brass Companion Flanges <small>(22 11 16 00-0356)</small>		
	Note: Excludes bolt and gasket sets See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.		
22 11 16 00-0757	EA 1" Sweat Brass Companion Flange.....	78.49	17.66
22 11 16 00-0758	EA 1-1/4" Sweat Brass Companion Flange.....	85.60	19.45
22 11 16 00-0759	EA 1-1/2" Sweat Brass Companion Flange.....	125.95	21.15
22 11 16 00-0760	EA 2" Sweat Brass Companion Flange.....	171.16	23.47
22 11 16 00-0761	EA 2-1/2" Sweat Brass Companion Flange.....	252.65	28.23
22 11 16 00-0762	EA 3" Sweat Brass Companion Flange.....	273.21	37.00
22 11 16 00-0763	EA 4" Sweat Brass Companion Flange.....	369.87	44.10
22 11 16 00-0764	EA 5" Sweat Brass Companion Flange.....	696.21	53.62
22 11 16 00-0765	EA 6" Sweat Brass Companion Flange.....	781.20	77.92
22 11 16 00-0766	EA 8" Copper Companion Flange.....	1,896.49	111.14
22 11 16 00-0767	Brass Compression Fittings <small>(22 11 16 00-0356)</small>		
22 11 16 00-0768	Brass Compression Unions <small>(22 11 16 00-0767)</small>		
22 11 16 00-0769	EA 1/4" Brass Compression Union.....	19.69	12.40
22 11 16 00-0770	EA 3/8" Brass Compression Union.....	19.99	12.40
22 11 16 00-0771	EA 1/2" Brass Compression Union.....	20.90	12.40
22 11 16 00-0772	EA 5/8" Brass Compression Union.....	21.33	12.40
22 11 16 00-0773	EA 3/4" Brass Compression Union.....	29.94	12.40
22 11 16 00-0774	EA 3/8" x 1/4" Brass Compression Union.....	20.20	12.40
22 11 16 00-0775	EA 1/2" x 3/8" Brass Compression Union.....	20.97	12.40
22 11 16 00-0776	EA 5/8" x 3/8" Brass Compression Union.....	21.51	12.40
22 11 16 00-0777	EA 5/8" x 1/2" Brass Compression Union.....	22.37	12.40
22 11 16 00-0778	Brass Compression Union Elbows <small>(22 11 16 00-0767)</small>		
22 11 16 00-0779	EA 1/4" Brass Compression Union Elbow.....	20.90	12.40
22 11 16 00-0780	EA 3/8" Brass Compression Union Elbow.....	21.39	12.40
22 11 16 00-0781	EA 1/2" Brass Compression Union Elbow.....	22.47	12.40
22 11 16 00-0782	EA 5/8" Brass Compression Union Elbow.....	24.14	12.40
22 11 16 00-0783	EA 3/4" Brass Compression Union Elbow.....	30.67	12.40
22 11 16 00-0784	EA 3/8" x 1/4" Brass Compression Union Elbow.....	21.39	12.40
22 11 16 00-0785	EA 1/2" x 3/8" Brass Compression Union Elbow.....	22.47	12.40
22 11 16 00-0786	EA 5/8" x 3/8" Brass Compression Union Elbow.....	22.77	12.40
22 11 16 00-0787	EA 5/8" x 1/2" Brass Compression Union Elbow.....	27.67	12.40
22 11 16 00-0788	Brass Compression Union Tees <small>(22 11 16 00-0767)</small>		
22 11 16 00-0789	EA 1/4" Brass Compression Union Tee.....	21.27	12.40

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0790 EA 3/8" Brass Compression Union Tee.....	22.29	12.40
22 11 16 00-0791 EA 1/2" Brass Compression Union Tee.....	23.37	12.40
22 11 16 00-0792 EA 5/8" Brass Compression Union Tee.....	26.78	12.40
22 11 16 00-0793 EA 3/4" Brass Compression Union Tee.....	38.56	12.40
22 11 16 00-0794 EA 3/8" x 3/8" x 1/4" Brass Compression Union Tee.....	23.01	12.40
22 11 16 00-0795 EA 1/2" x 1/2" x 3/8" Brass Compression Union Tee.....	28.54	12.40
22 11 16 00-0796 EA 5/8" x 5/8" x 3/8" Brass Compression Union Tee.....	28.01	12.40
22 11 16 00-0797 EA 5/8" x 5/8" x 1/2" Brass Compression Union Tee.....	28.63	12.40
22 11 16 00-0798 Brass Compression Male Connectors (22 11 16 00-0767)		
22 11 16 00-0799 EA 1/4" Brass Compression Male Connector.....	19.48	12.40
22 11 16 00-0800 EA 3/8" Brass Compression Male Connector.....	19.87	12.40
22 11 16 00-0801 EA 1/2" Brass Compression Male Connector.....	20.55	12.40
22 11 16 00-0802 EA 5/8" Brass Compression Male Connector.....	21.57	12.40
22 11 16 00-0803 EA 3/4" Brass Compression Male Connector.....	26.53	12.28
22 11 16 00-0804 Brass Compression Female Connectors (22 11 16 00-0767)		
22 11 16 00-0805 EA 1/4" Brass Compression Female Connector.....	19.91	12.40
22 11 16 00-0806 EA 3/8" Brass Compression Female Connector.....	20.42	12.40
22 11 16 00-0807 EA 1/2" Brass Compression Female Connector.....	21.29	12.40
22 11 16 00-0808 EA 5/8" Brass Compression Female Connector.....	21.88	12.40
22 11 16 00-0809 EA 3/4" Brass Compression Female Connector.....	34.51	12.17
22 11 16 00-0810 Dielectric Fittings (22 11 16 00-0356)		
22 11 16 00-0811 Copper x Female Iron Pipe Thread Dielectric Unions (22 11 16 00-0810)		
22 11 16 00-0812 EA 1/2" Copper x Female Iron Pipe Thread Dielectric Union.....	48.98	27.56
22 11 16 00-0813 EA 3/4" Copper x Female Iron Pipe Thread Dielectric Union.....	54.71	31.46
22 11 16 00-0814 EA 1" Copper x Female Iron Pipe Thread Dielectric Union.....	65.11	34.58
22 11 16 00-0815 EA 1-1/4" Copper x Female Iron Pipe Thread Dielectric Union.....	78.89	38.06
22 11 16 00-0816 EA 1-1/2" Copper x Female Iron Pipe Thread Dielectric Union.....	95.40	42.29
22 11 16 00-0817 EA 2" Copper x Female Iron Pipe Thread Dielectric Union.....	121.17	50.75
22 11 16 00-0818 Female Brass Thread x Iron Pipe Thread Dielectric Unions (22 11 16 00-0810)		
22 11 16 00-0819 EA 1/2" Female Brass Thread x Iron Pipe Thread Dielectric Union.....	53.81	27.56
22 11 16 00-0820 EA 3/4" Female Brass Thread x Iron Pipe Thread Dielectric Union.....	62.67	31.46
22 11 16 00-0821 EA 1" Female Brass Thread x Iron Pipe Thread Dielectric Union.....	75.60	34.58
22 11 16 00-0822 EA 1-1/4" Female Brass Thread x Iron Pipe Thread Dielectric Union.....	92.80	38.06
22 11 16 00-0823 EA 1-1/2" Female Brass Thread x Iron Pipe Thread Dielectric Union.....	112.61	42.29
22 11 16 00-0824 EA 2" Female Brass Thread x Iron Pipe Thread Dielectric Union.....	141.35	50.75
22 11 16 00-0825 Female Iron Pipe Thread x Iron Pipe Thread Dielectric Unions (22 11 16 00-0810)		
22 11 16 00-0826 EA 1/2" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Union.....	50.75	27.56
22 11 16 00-0827 EA 3/4" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Union.....	57.62	31.46
22 11 16 00-0828 EA 1" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Union.....	65.88	34.58
22 11 16 00-0829 EA 1-1/4" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Union.....	76.20	38.06
22 11 16 00-0830 EA 1-1/2" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Union.....	92.73	42.29
22 11 16 00-0831 EA 2" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Union.....	119.03	50.75
22 11 16 00-0832 Copper x Female Iron Pipe Thread Dielectric Flanges (22 11 16 00-0810)		
22 11 16 00-0833 EA 2-1/2" Copper x Female Iron Pipe Thread Dielectric Flange.....	294.97	130.47
22 11 16 00-0834 EA 3" Copper x Female Iron Pipe Thread Dielectric Flange.....	369.28	164.31
22 11 16 00-0835 EA 4" Copper x Female Iron Pipe Thread Dielectric Flange.....	520.66	223.62
22 11 16 00-0836 Copper x Female Iron Pipe Thread x Iron Pipe Thread Dielectric Flanges (22 11 16 00-0810)		
22 11 16 00-0837 EA 2-1/2" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Flange.....	296.97	130.47
22 11 16 00-0838 EA 3" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Flange.....	385.12	164.31
22 11 16 00-0839 EA 4" Female Iron Pipe Thread x Iron Pipe Thread Dielectric Flange.....	703.31	223.62
22 11 16 00-0840 Brass Push-Fit Fittings (22 11 16)		
22 11 16 00-0841 EA 1/4" x 1/4" Brass Push-Fit Coupling..... Note: (Sharkbite)	25.38	11.48
22 11 16 00-0842 EA 3/8" x 3/8" Brass Push-Fit Coupling..... Note: (Sharkbite)	31.80	12.25
22 11 16 00-0843 EA 1/2" x 1/2" Brass Push-Fit Coupling..... Note: (Sharkbite)	32.80	13.78
22 11 16 00-0844 EA 5/8" x 5/8" Brass Push-Fit Coupling..... Note: (Sharkbite)	37.92	14.70
22 11 16 00-0845 EA 3/4" x 3/4" Brass Push-Fit Coupling..... Note: (Sharkbite)	38.56	15.70
22 11 16 00-0846 EA 1" x 1" Brass Push-Fit Coupling..... Note: (Sharkbite)	54.66	18.75

22 Plumbing**22 10 Plumbing Piping****22 11 Facility Water Distribution**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0847	EA	1/2" x 3/8" Brass Push-Fit Reducing Coupling Note: (Sharkbite)	32.29	13.01
22 11 16 00-0848	EA	3/4" x 5/8" Brass Push-Fit Reducing Coupling Note: (Sharkbite)	37.52	14.24
22 11 16 00-0849	EA	1" x 3/4" Brass Push-Fit Reducing Coupling Note: (Sharkbite)	56.46	17.22
22 11 16 00-0850	EA	1/4" x 1/4" Brass Push-Fit Elbow Note: (Sharkbite)	26.57	11.48
22 11 16 00-0851	EA	3/8" x 3/8" Brass Push-Fit Elbow Note: (Sharkbite)	36.83	12.25
22 11 16 00-0852	EA	1/2" x 1/2" Brass Push-Fit Elbow Note: (Sharkbite)	33.44	13.78
22 11 16 00-0853	EA	5/8" x 5/8" Brass Push-Fit Elbow Note: (Sharkbite)	40.84	14.70
22 11 16 00-0854	EA	3/4" x 3/4" Brass Push-Fit Elbow Note: (Sharkbite)	37.72	15.70
22 11 16 00-0855	EA	1" x 1" Brass Push-Fit Elbow Note: (Sharkbite)	55.31	18.75
22 11 16 00-0856	EA	1/2" x 3/8" Brass Push-Fit Reducing Elbow Note: (Sharkbite)	31.76	13.01
22 11 16 00-0857	EA	3/4" x 1/2" Brass Push-Fit Reducing Elbow Note: (Sharkbite)	35.43	14.24
22 11 16 00-0858	EA	1" x 3/4" Brass Push-Fit Reducing Elbow Note: (Sharkbite)	70.85	17.22
22 11 16 00-0859	EA	1/4" x 1/4" x 1/4" Brass Push-Fit Tee Note: (Sharkbite)	40.34	17.22
22 11 16 00-0860	EA	3/8" x 3/8" x 3/8" Brass Push-Fit Tee Note: (Sharkbite)	51.58	18.37
22 11 16 00-0861	EA	1/2" x 1/2" x 1/2" Brass Push-Fit Tee Note: (Sharkbite)	46.68	20.66
22 11 16 00-0862	EA	5/8" x 5/8" x 5/8" Brass Push-Fit Tee Note: (Sharkbite)	60.03	22.04
22 11 16 00-0863	EA	3/4" x 3/4" x 3/4" Brass Push-Fit Tee Note: (Sharkbite)	54.53	23.54
22 11 16 00-0864	EA	1" x 1" x 1" Brass Push-Fit Tee Note: (Sharkbite)	75.13	28.13
22 11 16 00-0865	EA	1/2" x 1/2" x 1/4" Brass Push-Fit Reducing Tee Note: (Sharkbite)	52.91	19.51
22 11 16 00-0866	EA	1/2" x 1/2" x 3/8" Brass Push-Fit Reducing Tee Note: (Sharkbite)	53.17	19.90
22 11 16 00-0867	EA	3/4" x 3/4" x 1/2" Brass Push-Fit Reducing Tee Note: (Sharkbite)	52.67	22.59
22 11 16 00-0868	EA	1" x 1" x 3/4" Brass Push-Fit Reducing Tee Note: (Sharkbite)	72.99	26.60
22 11 16 00-0869	EA	1/4" x 1/2" Brass Push-Fit Pipe To FNPT Connector Note: (Sharkbite)	30.37	12.63
22 11 16 00-0870	EA	3/8" x 1/2" Brass Push-Fit Pipe To FNPT Connector Note: (Sharkbite)	29.93	13.01
22 11 16 00-0871	EA	1/2" x 1/2" Brass Push-Fit Pipe To FNPT Connector Note: (Sharkbite)	29.45	13.78
22 11 16 00-0872	EA	3/4" x 3/4" Brass Push-Fit Pipe To FNPT Connector Note: (Sharkbite)	33.75	15.70
22 11 16 00-0873	EA	1" x 1" Brass Push-Fit Pipe To FNPT Connector Note: (Sharkbite)	47.90	18.75
22 11 16 00-0874	EA	1/4" x 1/2" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	26.33	12.63
22 11 16 00-0875	EA	3/8" x 1/2" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	29.93	13.01
22 11 16 00-0876	EA	1/2" x 1/2" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	29.53	13.78
22 11 16 00-0877	EA	3/4" x 3/4" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	33.38	15.70
22 11 16 00-0878	EA	5/8" x 3/4" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	36.54	15.19
22 11 16 00-0879	EA	1" x 3/4" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	43.99	17.22
22 11 16 00-0880	EA	1" x 1" Brass Push-Fit Pipe To MNPT Connector Note: (Sharkbite)	48.65	18.75
22 11 16 00-0881	EA	1/2" Brass Push-Fit Ball Valve Note: (Sharkbite)	43.41	13.78
22 11 16 00-0882	EA	3/4" Brass Push-Fit Ball Valve Note: (Sharkbite)	50.83	15.70
22 11 16 00-0883	EA	1" Brass Push-Fit Ball Valve Note: (Sharkbite)	67.43	18.75
22 11 16 00-0884	EA	1/2" Brass Push-Fit Check Valve Note: (Sharkbite)	46.66	13.78
22 11 16 00-0885	EA	3/4" Brass Push-Fit Check Valve Note: (Sharkbite)	56.30	15.70
22 11 16 00-0886	EA	1" Brass Push-Fit Check Valve Note: (Sharkbite)	95.92	18.75

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0887		Copper Pipe With Fittings And Hangers Assemblies <small>(22 11 16)</small> Note: Includes hangers and all coupling, elbow, tee and reducer fittings. All fittings are based on 95/5 solder. All hangers are complete assemblies installed in accordance with MSS SP 58 and 69. Excludes insulation. Not for use where detail is available.		
22 11 16 00-0888	LF	1/2" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	24.12 1.79 -1.46 3.00 0.72 -2.10 5.39	3.21
22 11 16 00-0889	LF	3/4" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	27.79 2.11 -1.71 3.42 0.81 -2.41 6.11	4.13
22 11 16 00-0890	LF	1" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	30.87 2.52 -2.00 3.68 0.85 -2.61 6.40	4.93
22 11 16 00-0891	LF	1-1/4" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	35.41 -1.33 3.20 -2.48 3.99 0.89 -2.88 6.65	5.74
22 11 16 00-0892	LF	1-1/2" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	39.59 -1.60 3.73 -2.86 4.34 0.95 -3.16 7.09	6.55
22 11 16 00-0893	LF	2" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	50.45 -2.33 5.14 -3.88 5.24 1.09 -3.88 8.16	8.16
22 11 16 00-0894	LF	2-1/2" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	64.51 -3.53 7.33 -5.41 6.14 1.17 -4.68 8.75	9.83
22 11 16 00-0895	LF	3" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	80.26 -4.87 9.75 -7.10 7.17 1.26 -5.59 9.48	11.41

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 11 16 00-0896	LF		4" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	128.74 -8.79 16.96 -12.18 10.52 1.63 -8.48 12.26	15.12
22 11 16 00-0897	LF		5" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	246.55 -19.41 35.95 -25.39 17.57 2.10 -14.95 15.73	18.82
22 11 16 00-0898	LF		6" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	323.62 -25.70 47.49 -33.51 22.84 2.66 -19.51 19.98	22.73
22 11 16 00-0899	LF		8" Inside Diameter, Type L, Copper Pipe/Tubing With Fittings Assembly..... Note: Includes all hangers and couplings, elbow, tee, reducer fittings. All hangers are complete assemblies. Not for use where detail is available. <i>For Drain-Waste-Vent (DWV) Tubing Instead Of Type L, Deduct</i> <i>For Type K Tubing Instead Of Type L, Add</i> <i>For Type M Tubing Instead Of Type L, Deduct</i> <i>For Silver Solder Instead Of 95/5 Solder, Add</i> <i>For For Brazed Fittings, Add</i> <i>For 60/40 Or 50/50 Solder Where Applicable Instead Of 95/5 Solder, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	775.56 -69.28 124.13 -86.44 47.06 3.31 -42.92 24.83	27.17
22 11 16 00-0900			Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe And Fittings ^(22 11 16) Note: Socket weld.		
22 11 16 00-0901			Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe And Fittings ^(22 11 16 00-0900)		
22 11 16 00-0902			Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pipe ^(22 11 16 00-0901)		
22 11 16 00-0903	LF		1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	7.07	1.69
			<i>For Work In Restricted Working Space, Add</i>	1.27	
22 11 16 00-0904	LF		3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	8.32	1.77
			<i>For Work In Restricted Working Space, Add</i>	1.33	
22 11 16 00-0905	LF		1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	10.48	1.91
			<i>For Work In Restricted Working Space, Add</i>	1.43	
22 11 16 00-0906	LF		1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	13.09	2.09
			<i>For Work In Restricted Working Space, Add</i>	1.57	
22 11 16 00-0907	LF		1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	15.30	2.31
			<i>For Work In Restricted Working Space, Add</i>	1.73	
22 11 16 00-0908	LF		2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	19.64	2.58
			<i>For Work In Restricted Working Space, Add</i>	1.93	
22 11 16 00-0909	LF		2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	27.51	2.93
			<i>For Work In Restricted Working Space, Add</i>	2.20	
22 11 16 00-0910	LF		3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	35.63	3.47
			<i>For Work In Restricted Working Space, Add</i>	2.60	
22 11 16 00-0911	LF		4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	50.21	4.26
			<i>For Work In Restricted Working Space, Add</i>	3.20	
22 11 16 00-0912	LF		6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	90.06	5.41
			<i>For Work In Restricted Working Space, Add</i>	4.06	
22 11 16 00-0913	LF		8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Pressure Pipe	130.63	7.10
			<i>For Work In Restricted Working Space, Add</i>	5.33	
22 11 16 00-0914			Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbows ^(22 11 16 00-0901)		
22 11 16 00-0915	EA		1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow	24.53	8.04
			<i>For Work In Restricted Working Space, Add</i>	6.03	
22 11 16 00-0916	EA		3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow	32.28	10.15
			<i>For Work In Restricted Working Space, Add</i>	7.61	
22 11 16 00-0917	EA		1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow	42.73	12.68
			<i>For Work In Restricted Working Space, Add</i>	9.55	
22 11 16 00-0918	EA		1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow	60.76	15.86
			<i>For Work In Restricted Working Space, Add</i>	11.93	
22 11 16 00-0919	EA		1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow	67.70	17.55
			<i>For Work In Restricted Working Space, Add</i>	13.19	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0920 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	81.03 14.72	17.55
22 11 16 00-0921 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	139.11 16.75	22.30
22 11 16 00-0922 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	156.48 19.79	26.44
22 11 16 00-0923 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	232.12 24.36	32.46
22 11 16 00-0924 EA 6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	292.37 30.96	41.23
22 11 16 00-0925 EA 8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	598.33 40.60	54.14
22 11 16 00-0926 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbows (22 11 16 00-0901)		
22 11 16 00-0927 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	26.74 6.03	8.04
22 11 16 00-0928 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	34.93 7.61	10.15
22 11 16 00-0929 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	47.04 9.55	12.68
22 11 16 00-0930 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	66.43 11.93	15.86
22 11 16 00-0931 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	74.60 13.19	17.55
22 11 16 00-0932 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	83.38 14.72	19.67
22 11 16 00-0933 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	140.59 16.75	22.30
22 11 16 00-0934 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	156.29 19.79	26.44
22 11 16 00-0935 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	205.08 24.36	32.46
22 11 16 00-0936 EA 6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	343.06 30.96	41.23
22 11 16 00-0937 EA 8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	634.25 40.60	54.14
22 11 16 00-0938 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tees (22 11 16 00-0901)		
22 11 16 00-0939 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	38.20 9.04	12.05
22 11 16 00-0940 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	50.94 11.42	15.22
22 11 16 00-0941 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	63.62 14.34	19.14
22 11 16 00-0942 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	93.02 17.89	23.90
22 11 16 00-0943 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	104.24 19.79	26.44
22 11 16 00-0944 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	130.65 22.08	29.40
22 11 16 00-0945 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	177.48 25.12	33.52
22 11 16 00-0946 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	200.97 29.69	39.54
22 11 16 00-0947 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	242.30 36.54	48.74
22 11 16 00-0948 EA 6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	390.23 46.44	61.96
22 11 16 00-0949 EA 8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Tee <i>For Work In Restricted Working Space, Add</i>	877.04 60.90	81.20
22 11 16 00-0950 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Crosses (22 11 16 00-0901)		
22 11 16 00-0951 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	47.13 12.05	16.07
22 11 16 00-0952 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	61.84 15.23	20.30
22 11 16 00-0953 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	77.29 19.10	25.48
22 11 16 00-0954 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	108.27 23.85	31.82
22 11 16 00-0955 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	120.92 26.39	35.21
22 11 16 00-0956 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	147.27 29.44	39.23
22 11 16 00-0957 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	192.39 33.50	44.62
22 11 16 00-0958 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	219.80 39.59	52.76
22 11 16 00-0959 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	266.19 48.72	64.92

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 11 16 00-0960	EA	6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	409.18 61.92	82.58
22 11 16 00-0961	EA	8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cross <i>For Work In Restricted Working Space, Add</i>	851.24 81.20	108.27
22 11 16 00-0962 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld Reducing Inserts <small>(22 11 16 00-0901)</small>				
22 11 16 00-0963	EA	3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	21.26 5.58	7.40
22 11 16 00-0964	EA	1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	30.22 7.52	10.04
22 11 16 00-0965	EA	1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	56.43 9.83	13.11
22 11 16 00-0966	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	64.18 10.88	14.49
22 11 16 00-0967	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	77.15 12.15	16.18
22 11 16 00-0968	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	82.75 13.83	18.40
22 11 16 00-0969	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	101.39 16.34	21.78
22 11 16 00-0970	EA	4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	142.25 20.11	26.75
22 11 16 00-0971	EA	6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	245.35 25.54	34.04
22 11 16 00-0972	EA	8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Reducing Insert <i>For Work In Restricted Working Space, Add</i>	593.73 33.50	44.62
22 11 16 00-0973 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Thread Reducing Inserts <small>(22 11 16 00-0901)</small>				
22 11 16 00-0974	EA	1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	30.59 3.97	5.29
22 11 16 00-0975	EA	3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	37.34 5.58	7.40
22 11 16 00-0976	EA	1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	45.13 7.52	10.04
22 11 16 00-0977	EA	1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	55.14 9.83	13.11
22 11 16 00-0978	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	66.09 10.88	14.49
22 11 16 00-0979	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	86.64 12.15	16.18
22 11 16 00-0980	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	144.73 13.83	18.40
22 11 16 00-0981	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	312.06 16.34	21.78
22 11 16 00-0982	EA	4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Or Male Threaded Reducing Insert <i>For Work In Restricted Working Space, Add</i>	473.04 20.11	26.75
22 11 16 00-0983 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <small>(22 11 16 00-0901)</small>				
22 11 16 00-0984	EA	1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	19.87 3.97	5.29
22 11 16 00-0985	EA	3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	27.60 5.58	7.40
22 11 16 00-0986	EA	1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	40.20 7.52	10.04
22 11 16 00-0987	EA	1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	55.14 9.83	13.11
22 11 16 00-0988	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	66.52 10.88	14.49
22 11 16 00-0989	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	81.40 12.15	16.18
22 11 16 00-0990	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	123.54 13.83	18.40
22 11 16 00-0991	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	148.08 16.34	21.78
22 11 16 00-0992	EA	4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Male Thread Male Adapters <i>For Work In Restricted Working Space, Add</i>	225.34 20.11	26.75
22 11 16 00-0993 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <small>(22 11 16 00-0901)</small>				

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-0994 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	22.40 3.97	5.29
22 11 16 00-0995 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	28.41 5.58	7.40
22 11 16 00-0996 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	40.41 7.52	10.04
22 11 16 00-0997 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	55.88 9.83	13.11
22 11 16 00-0998 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	63.13 10.88	14.49
22 11 16 00-0999 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	78.63 12.15	16.18
22 11 16 00-1000 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	125.14 13.83	18.40
22 11 16 00-1001 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	176.05 16.34	21.78
22 11 16 00-1002 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Socket Weld x Female Thread Female Adapters <i>For Work In Restricted Working Space, Add</i>	272.90 20.11	26.75
22 11 16 00-1003 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings (22 11 16 00-0901)		
22 11 16 00-1004 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	17.72 3.62	4.87
22 11 16 00-1005 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	24.92 5.07	6.77
22 11 16 00-1006 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	33.51 6.82	9.10
22 11 16 00-1007 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	45.90 8.95	11.95
22 11 16 00-1008 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	53.26 9.90	13.22
22 11 16 00-1009 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	60.32 11.04	14.70
22 11 16 00-1010 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	98.30 12.56	16.70
22 11 16 00-1011 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	106.47 14.85	19.78
22 11 16 00-1012 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	135.56 18.27	24.32
22 11 16 00-1013 EA 6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	224.69 23.22	30.98
22 11 16 00-1014 EA 8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Couplings..... <i>For Work In Restricted Working Space, Add</i>	399.96 30.45	40.60
22 11 16 00-1015 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions (22 11 16 00-0901)		
22 11 16 00-1016 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	38.64 4.35	5.81
22 11 16 00-1017 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	45.62 6.09	8.14
22 11 16 00-1018 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	53.40 8.18	10.89
22 11 16 00-1019 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	97.15 10.72	14.28
22 11 16 00-1020 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	102.07 11.86	15.86
22 11 16 00-1021 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	147.94 13.26	17.66
22 11 16 00-1022 EA 2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	265.33 15.07	20.09
22 11 16 00-1023 EA 3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	384.49 17.83	23.79
22 11 16 00-1024 EA 4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	625.68 21.92	29.19
22 11 16 00-1025 EA 6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	839.19 27.85	37.11
22 11 16 00-1026 EA 8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Unions <i>For Work In Restricted Working Space, Add</i>	1,033.50 36.54	48.74
22 11 16 00-1027 Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Caps (22 11 16 00-0901)		
22 11 16 00-1028 EA 1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap..... <i>For Work In Restricted Working Space, Add</i>	16.48 2.26	4.97
22 11 16 00-1029 EA 3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap..... <i>For Work In Restricted Working Space, Add</i>	22.21 2.86	6.24
22 11 16 00-1030 EA 1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap..... <i>For Work In Restricted Working Space, Add</i>	34.36 3.58	7.83
22 11 16 00-1031 EA 1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap..... <i>For Work In Restricted Working Space, Add</i>	39.49 4.47	5.92
22 11 16 00-1032 EA 1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap..... <i>For Work In Restricted Working Space, Add</i>	41.56 4.95	6.56
22 11 16 00-1033 EA 2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap..... <i>For Work In Restricted Working Space, Add</i>	58.77 5.52	7.40

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	22 11 16 00-1034	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap <i>For Work In Restricted Working Space, Add</i>	93.62 6.28	8.35
	22 11 16 00-1035	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap <i>For Work In Restricted Working Space, Add</i>	99.09 7.42	9.94
	22 11 16 00-1036	EA	4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap <i>For Work In Restricted Working Space, Add</i>	155.87 9.14	12.16
	22 11 16 00-1037	EA	6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap <i>For Work In Restricted Working Space, Add</i>	350.77 11.61	15.43
	22 11 16 00-1038	EA	8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) Cap <i>For Work In Restricted Working Space, Add</i>	451.46 15.23	20.30
22 11 16 00-1039			Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <small>(22 11 16 00-0901)</small>		
	22 11 16 00-1040	EA	1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	31.18 2.89	3.81
	22 11 16 00-1041	EA	3/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	36.63 4.06	5.39
	22 11 16 00-1042	EA	1" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	43.93 5.45	7.29
	22 11 16 00-1043	EA	1-1/4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	50.39 7.17	9.52
	22 11 16 00-1044	EA	1-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	53.54 7.93	10.58
	22 11 16 00-1045	EA	2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	65.44 8.82	11.74
	22 11 16 00-1046	EA	2-1/2" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	89.77 10.06	13.43
	22 11 16 00-1047	EA	3" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	100.89 11.86	15.86
	22 11 16 00-1048	EA	4" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	126.48 14.62	19.45
	22 11 16 00-1049	EA	6" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	184.17 18.59	24.74
	22 11 16 00-1050	EA	8" Schedule 80 Chlorinated Polyvinyl Chloride (CPVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	356.92 24.36	32.46
22 11 16 00-1051			Cross-Linked Polyethylene Tubing, ASTM F877 <small>(22 11 16)</small> Note: Aboveground, domestic water usage.		
22 11 16 00-1052			Cross-Linked Polyethylene Tubing <small>(22 11 16 00-1051)</small>		
	22 11 16 00-1053	LF	3/8" Cross-Linked Polyethylene (PEX , XPE or XLPE) Tubing <i>For Work In Restricted Working Space, Add</i>	5.59 1.00	
	22 11 16 00-1054	LF	1/2" Cross-Linked Polyethylene (PEX , XPE or XLPE) Tubing <i>For Work In Restricted Working Space, Add</i>	6.12 1.08	
	22 11 16 00-1055	LF	3/4" Cross-Linked Polyethylene (PEX , XPE or XLPE) Tubing <i>For Work In Restricted Working Space, Add</i>	8.50 1.16	
	22 11 16 00-1056	LF	1" Cross-Linked Polyethylene (PEX , XPE or XLPE) Tubing <i>For Work In Restricted Working Space, Add</i>	12.03 1.23	
22 11 16 00-1057			Cross-Linked Polyethylene Forged Brass PEX Fittings <small>(22 11 16 00-1051)</small> Note: Aboveground, domestic water usage.		
22 11 16 00-1058			Male Adapters <small>(22 11 16 00-1057)</small>		
	22 11 16 00-1059	EA	3/8" x 1/2", (PE x Threaded) Forged Brass Male Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	23.49 5.17	
	22 11 16 00-1060	EA	1/2" x 1/2", (PE x Threaded) Forged Brass Male Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	25.37 5.51	
	22 11 16 00-1061	EA	1/2" x 3/4", (PE x Threaded) Forged Brass Male Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	27.97 5.85	
	22 11 16 00-1062	EA	3/4" x 3/4", (PE x Threaded) Forged Brass Male Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	29.12 6.20	
	22 11 16 00-1063	EA	3/4" x 1/2", (PE x Threaded) Forged Brass Male Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	27.97 5.85	
	22 11 16 00-1064	EA	1" x 1", (PE x Threaded) Forged Brass Male Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	37.88 6.89	
22 11 16 00-1065			Female Adapters <small>(22 11 16 00-1057)</small>		
	22 11 16 00-1066	EA	1/2" x 1/2", (PE x Threaded) Forged Brass Female Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	26.10 5.51	
	22 11 16 00-1067	EA	1/2" x 3/4", (PE x Threaded) Forged Brass Female Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	29.98 5.85	
	22 11 16 00-1068	EA	3/4" x 3/4", (PE x Threaded) Forged Brass Female Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	31.13 6.20	
	22 11 16 00-1069	EA	3/4" x 1/2", (PE x Threaded) Forged Brass Female Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	29.98 5.85	
	22 11 16 00-1070	EA	1" x 1", (PE x Threaded) Forged Brass Female Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	38.79 6.89	
22 11 16 00-1071			Tube Adapters <small>(22 11 16 00-1057)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 16 00-1072 EA 3/8" x 1/2" Forged Brass Tube Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	20.51 5.17	
22 11 16 00-1073 EA 1/2" Forged Brass Tube Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	21.66 5.51	
22 11 16 00-1074 EA 3/4" Forged Brass Tube Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	26.74 6.20	
22 11 16 00-1075 EA 1" Forged Brass Tube Adapter For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	36.00 6.89	
22 11 16 00-1076 Plugs <small>(22 11 16 00-1057)</small>		
22 11 16 00-1077 EA 3/8" Forged Brass Plug For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	10.60 2.41	
22 11 16 00-1078 EA 1/2" Forged Brass Plug For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	11.74 2.75	
22 11 16 00-1079 EA 3/4" Forged Brass Plug For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	13.62 3.10	
22 11 16 00-1080 EA 1" Forged Brass Plug For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	17.56 3.44	
22 11 16 00-1081 Tees <small>(22 11 16 00-1057)</small>		
22 11 16 00-1082 EA 3/8" Forged Brass Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	29.47 7.24	
22 11 16 00-1083 EA 1/2" Forged Brass Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	32.91 8.27	
22 11 16 00-1084 EA 3/4" Forged Brass Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	40.01 9.30	
22 11 16 00-1085 EA 1" Forged Brass Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	53.75 10.34	
22 11 16 00-1086 EA 1/2" Forged Brass Reducing Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	31.76 7.92	
22 11 16 00-1087 EA 3/4" Forged Brass Reducing Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	37.72 8.61	
22 11 16 00-1088 EA 1" Forged Brass Reducing Tee For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	48.84 9.30	
22 11 16 00-1089 Couplings <small>(22 11 16 00-1057)</small>		
22 11 16 00-1090 EA 3/8" Forged Brass Coupling For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	18.81 4.82	
22 11 16 00-1091 EA 1/2" Forged Brass Coupling For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	21.30 5.51	
22 11 16 00-1092 EA 3/4" Forged Brass Coupling For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	24.50 6.20	
22 11 16 00-1093 EA 1" Forged Brass Coupling For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	31.07 6.89	
22 11 16 00-1094 EA 3/4" x 1/2" Forged Brass Reducing Coupling For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	23.35 5.85	
22 11 16 00-1095 EA 1" x 3/4" Forged Brass Reducing Coupling For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	29.92 6.55	
22 11 16 00-1096 Fitting Reducers <small>(22 11 16 00-1057)</small>		
22 11 16 00-1097 EA 3/8" x 1/2" Forged Brass Fitting Reducer For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	21.06 5.17	
22 11 16 00-1098 EA 1/2" Forged Brass Fitting Reducer For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	22.21 5.51	
22 11 16 00-1099 EA 3/4" Forged Brass Fitting Reducer For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	27.84 6.20	
22 11 16 00-1100 EA 1" Forged Brass Fitting Reducer For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	42.27 6.89	
22 11 16 00-1101 90 Degree Elbows <small>(22 11 16 00-1057)</small>		
22 11 16 00-1102 EA 3/8" Forged Brass 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	20.46 4.82	
22 11 16 00-1103 EA 1/2" Forged Brass 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	22.76 5.51	
22 11 16 00-1104 EA 3/4" Forged Brass 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	27.84 6.20	
22 11 16 00-1105 EA 3/4" x 1/2" Forged Brass 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	26.69 5.85	
22 11 16 00-1106 EA 1/2" Drop 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	34.19 5.51	
22 11 16 00-1107 EA 3/4" Forged Brass Drop 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	38.13 6.20	
22 11 16 00-1108 EA 3/4" x 1/2" Forged Brass Drop 90 Degree Elbow For PEX Tubing <i>For Work In Restricted Working Space, Add</i>	36.98 5.85	
22 11 19 Domestic Water Piping Specialties <small>(22 11)</small>		

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 11 19 00-0001		Rubber Hose And Clamps (22 11 19)		
22 11 19 00-0002		General Purpose Hose (22 11 19 00-0001)		
		Note: For medium pressure (up to 200/250 psi) applications requiring excellent resistance to air, oil and heat.		
22 11 19 00-0003	LF	3/8" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	8.82	2.28
22 11 19 00-0004	LF	1/2" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	10.58	2.28
22 11 19 00-0005	LF	5/8" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	13.27	2.28
22 11 19 00-0006	LF	3/4" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	13.41	2.28
22 11 19 00-0007	LF	1" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	18.86	3.43
22 11 19 00-0008	LF	1-1/4" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	32.43	3.43
22 11 19 00-0009	LF	1-1/2" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	35.20	4.57
22 11 19 00-0010	LF	2" Inside Diameter Ethylene Propylene Diene Monomer (EPDM) Rubber Hose And Clamp.....	69.65	4.57
22 11 19 00-0011		Reinforced EPDM Water Hose Assembly (22 11 19 00-0001)		
		Note: Includes male/female camlock, 150 psi, synthetic fiber with steel wire helix reinforcement.		
22 11 19 00-0012	LF	1-1/2" Inside Diameter, Ethylene Propylene Diene Monomer (EPDM) Rubber Hose, Male/Female Camlocks, Synthetic Fiber With Steel Wire Helix Reinforcement.....	93.65	4.57
22 11 19 00-0013	LF	2" Inside Diameter, Ethylene Propylene Diene Monomer (EPDM) Rubber Hose, Male/Female Camlocks, Synthetic Fiber With Steel Wire Helix Reinforcement.....	110.73	4.57
22 11 19 00-0014	LF	3" Inside Diameter, Ethylene Propylene Diene Monomer (EPDM) Rubber Hose, Male/Female Camlocks, Synthetic Fiber With Steel Wire Helix Reinforcement.....	155.80	5.61
22 11 19 00-0015	LF	4" Inside Diameter, Ethylene Propylene Diene Monomer (EPDM) Rubber Hose, Male/Female Camlocks, Synthetic Fiber With Steel Wire Helix Reinforcement.....	219.55	7.59
22 11 19 00-0016		Chemical Resistant Rubber Hoses (22 11 19 00-0001)		
22 11 19 00-0017	EA	50' x 6" Brown Gum Rubber, Chemical Resistant Flexible Hose.....	1,184.74	275.85
22 11 19 00-0018	EA	50' x 6" Nitrile Rubber, Low pH Resistance, Flexible Hose.....	1,599.49	275.85
22 11 19 00-0019		Water Pump Hose (22 11 19 00-0001)		
22 11 19 00-0020	EA	2" Inside Diameter, 20' Rubber Discharge Hose.....	762.23	69.78
22 11 19 00-0021	EA	2" Inside Diameter, 20' Rubber Intake Hose.....	810.40	69.78
22 11 19 00-0022		Barbed Hose x Threaded Male Pipe, Steel Coupling (22 11 19 00-0001)		
22 11 19 00-0023	EA	3/8" Inside Diameter Barbed Hose x 1/2" Threaded Male Pipe, Steel Coupling.....	28.67	9.59
22 11 19 00-0024	EA	1/2" Inside Diameter Barbed Hose x 1/2" Threaded Male Pipe, Steel Coupling.....	30.40	10.28
22 11 19 00-0025	EA	5/8" Inside Diameter Barbed Hose x 3/4" Threaded Male Pipe, Steel Coupling.....	32.56	10.97
22 11 19 00-0026	EA	3/4" Inside Diameter Barbed Hose x 3/4" Threaded Male Pipe, Steel Coupling.....	37.10	12.33
22 11 19 00-0027	EA	1" Inside Diameter Barbed Hose x 1" Threaded Male Pipe, Steel Coupling.....	44.27	15.08
22 11 19 00-0028	EA	1-1/4" Inside Diameter Barbed Hose x 1-1/4" Threaded Male Pipe, Steel Coupling.....	52.43	18.04
22 11 19 00-0029	EA	1-1/2" Inside Diameter Barbed Hose x 1-1/2" Threaded Male Pipe, Steel Coupling.....	67.52	23.75
22 11 19 00-0030	EA	2" Inside Diameter Barbed Hose x 2" Threaded Male Pipe, Steel Coupling.....	85.03	29.69
22 11 19 00-0031		Worm-Drive Hose Clamp (22 11 19 00-0001)		
22 11 19 00-0032	EA	3/8" To 1" Diameter Worm Drive Hose Clamp.....	13.07	3.43
22 11 19 00-0033	EA	1/2" To 1-1/6" Diameter Worm Drive Hose Clamp.....	13.78	3.43
22 11 19 00-0034	EA	5/8" To 1-1/2" Diameter Worm Drive Hose Clamp.....	14.53	3.43
22 11 19 00-0035	EA	3/4" To 2" Diameter Worm Drive Hose Clamp.....	15.43	3.43
22 11 19 00-0036	EA	1" To 2-1/2" Diameter Worm Drive Hose Clamp.....	16.45	3.43
22 11 19 00-0037	EA	1-1/4" To 2-3/4" Diameter Worm Drive Hose Clamp.....	17.92	4.57
22 11 19 00-0038	EA	1-1/2" To 3" Diameter Worm Drive Hose Clamp.....	19.28	4.57
22 11 19 00-0039		Trap Primer And Accessories (22 11 19)		
22 11 19 00-0040		Trap Primer (22 11 19 00-0039)		
22 11 19 00-0041	EA	1/2" Inlet/Outlet, Flow Through Automatic Trap Primer (JR Smith 2699).....	324.81	17.22
22 11 19 00-0042	EA	1/2" Inlet/Outlet, Automatic Trap Primer, Up To Two Floor Drains (PPP PR-500).....	198.80	11.48
22 11 19 00-0043	EA	1/2" Inlet/Outlet, Automatic Trap Primer, Up To Four Floor Drains (PPP PO-500).....	192.37	11.48
22 11 19 00-0044		Trap Primer Distribution Unit (22 11 19 00-0039)		
22 11 19 00-0045	EA	Molded Plastic Four Opening Trap Primer Distribution Unit (PPP DU-U).....	160.87	22.97
		Note: Can be used for two, three or four drains.		
22 11 19 00-0046	EA	Copper Four Opening Trap Primer Distribution Unit (PPP DU-4).....	178.18	22.97
		Note: Can be used for two, three or four drains.		
22 11 19 00-0047		Trap Primer Manifold (22 11 19 00-0039)		
22 11 19 00-0048	EA	Two Outlet Trap Primer Manifold.....	259.93	30.88
22 11 19 00-0049	EA	Four Outlet Trap Primer Manifold.....	396.03	35.13
22 11 19 00-0050	EA	Six Outlet Trap Primer Manifold.....	529.44	37.20
22 11 19 00-0051	EA	Eight Outlet Trap Primer Manifold.....	666.81	43.63
22 11 19 00-0052		Sewage Air Release Valves (22 11 19)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0053 Cast Iron, Sewage Air Release Valves <small>(22 11 19 00-0052)</small>		
<i>Note: Stainless steel float.</i>		
22 11 19 00-0054 EA 2" x 1/2" NPT, Cast Iron, Sewage Air Release Valve (Apco 400).....	953.18	41.93
<i>For Back Flush Attachment, Add</i>		
	<i>650.00</i>	
22 11 19 00-0055 EA 3" x 1/2" NPT, Cast Iron, Sewage Air Release Valve (Apco 400).....	1,169.88	70.07
<i>For Back Flush Attachment, Add</i>		
	<i>650.00</i>	
22 11 19 00-0056 EA 4" x 1/2" NPT, Cast Iron, Sewage Air Release Valve (Apco 400).....	1,483.48	88.45
<i>For Back Flush Attachment, Add</i>		
	<i>650.00</i>	
22 11 19 00-0057 Cast Iron, Sewage Air Vacuum Valves <small>(22 11 19 00-0052)</small>		
<i>Note: Stainless steel float.</i>		
22 11 19 00-0058 EA 2" x 1" NPT, Cast Iron, Sewage Air Vacuum Valve (Apco 401).....	973.88	41.93
<i>For Back Flush Attachment, Add</i>		
	<i>650.00</i>	
22 11 19 00-0059 EA 2" x 2" NPT, Cast Iron, Sewage Air Vacuum Valve (Apco 402).....	1,910.48	41.93
<i>For Back Flush Attachment, Add</i>		
	<i>650.00</i>	
22 11 19 00-0060 EA 3" x 2" NPT, Cast Iron, Sewage Air Vacuum Valve (Apco 403).....	2,292.76	70.07
<i>For Back Flush Attachment, Add</i>		
	<i>650.00</i>	
22 11 19 00-0061 EA 4" NPT x 4" With Hood, Cast Iron, Sewage Air Vacuum Valve (Apco 404).....	3,395.49	88.45
22 11 19 00-0062 Cast Iron, Sewage Combination Air Valves <small>(22 11 19 00-0052)</small>		
<i>Note: Stainless steel float.</i>		
22 11 19 00-0063 EA 2" x 1" NPT, Sewage Combination Air Valve (Apco 443)	2,081.25	41.93
22 11 19 00-0064 EA 2" x 2" NPT, Sewage Combination Air Valve (Apco 445)	2,870.37	41.93
22 11 19 00-0065 EA 3" x 3" NPT, Sewage Combination Air Valve (Apco 447)	3,358.73	70.07
22 11 19 00-0066 EA 4" x 4" NPT, Sewage Combination Air Valve (Apco 449)	4,107.00	88.45
22 11 19 00-0067 Brass, Anti Siphon Vacuum Breakers <small>(22 11 19)</small>		
<i>Note: Watts 288A</i>		
22 11 19 00-0068 EA 1/2" Brass, Anti Siphon Vacuum Breaker	112.20	28.71
22 11 19 00-0069 EA 3/4" Brass, Anti Siphon Vacuum Breaker	129.20	32.15
22 11 19 00-0070 EA 1" Brass, Anti Siphon Vacuum Breaker	272.54	36.74
22 11 19 00-0071 EA 1-1/4" Brass, Anti Siphon Vacuum Breaker	437.77	42.48
22 11 19 00-0072 EA 1-1/2" Brass, Anti Siphon Vacuum Breaker	523.19	47.07
22 11 19 00-0073 EA 2" Brass, Anti Siphon Vacuum Breaker	769.07	57.41
22 11 19 00-0074 EA 2-1/2" Brass, Anti Siphon Vacuum Breaker	2,037.67	71.77
22 11 19 00-0075 Anti Siphon Pressure Vacuum Breakers <small>(22 11 19)</small>		
<i>Note: Watts 800M4QT</i>		
22 11 19 00-0076 EA 1/2" Anti Siphon Pressure Type Vacuum Breaker	344.28	28.71
22 11 19 00-0077 EA 3/4" Anti Siphon Pressure Type Vacuum Breaker	299.17	32.15
22 11 19 00-0078 EA 1" Anti Siphon Pressure Type Vacuum Breaker	430.39	36.74
22 11 19 00-0079 EA 1-1/4" Anti Siphon Pressure Type Vacuum Breaker	785.06	42.48
22 11 19 00-0080 EA 1-1/2" Anti Siphon Pressure Type Vacuum Breaker	956.58	47.07
22 11 19 00-0081 EA 2" Anti Siphon Pressure Type Vacuum Breaker	963.21	57.41
22 11 19 00-0082 Bellows Type Water Hammer Arrestors <small>(22 11 19)</small>		
22 11 19 00-0083 EA Up To 11 Fixture Unit Capacity, 3/4" Nipple, Stainless Steel, Hydrotrol Water Hammer Arrestor (Jay R. Smith® 5005)	166.52	13.73
22 11 19 00-0084 EA >11 To 32 Fixture Unit Capacity, 1" Nipple, Stainless Steel, Hydrotrol Water Hammer Arrestor (Jay R. Smith® 5010)	316.70	16.61
22 11 19 00-0085 EA >32 To 60 Fixture Unit Capacity, 1" Nipple, Stainless Steel, Hydrotrol Water Hammer Arrestor (Jay R. Smith® 5020)	456.53	16.61
22 11 19 00-0086 EA >60 To 113 Fixture Unit Capacity, 1" Nipple, Stainless Steel, Hydrotrol Water Hammer Arrestor (Jay R. Smith® 5030)	1,094.86	16.61
22 11 19 00-0087 EA >113 To 154 Fixture Unit Capacity, 1" Nipple, Stainless Steel, Hydrotrol Water Hammer Arrestor (Jay R. Smith® 5040)	1,228.04	16.61
22 11 19 00-0088 EA >154 To 330 Fixture Unit Capacity, 1" Nipple, Stainless Steel, Hydrotrol Water Hammer Arrestor (Jay R. Smith® 5050)	1,501.85	16.61
22 11 19 00-0089 Piston Type Water Hammer Arrestors <small>(22 11 19)</small>		
22 11 19 00-0090 Threaded Piston Type Water Hammer Arrestors <small>(22 11 19 00-0089)</small>		
22 11 19 00-0091 EA Up To 11 Fixture Unit Capacity, 1/2" M.P.T Brass Connection, Copper Body, Piston Type Water Hammer Arrestor (MI Fab MWH-A)	192.75	7.65
22 11 19 00-0092 EA >11 To 32 Fixture Unit Capacity, 3/4" M.P.T Brass Connection, Copper Body, Piston Type Water Hammer Arrestor (MI Fab MWH-B).....	372.54	8.83
22 11 19 00-0093 EA >32 To 60 Fixture Unit Capacity, 1" M.P.T Brass Connection, Copper Body, Piston Type Water Hammer Arrestor (MI Fab MWH-C).....	555.04	9.57
22 11 19 00-0094 EA >60 To 113 Fixture Unit Capacity, 1-1/4" M.P.T Brass Connection, Copper Body, Piston Type Water Hammer Arrestor (MI Fab MWH-D)	1,369.87	12.35
22 11 19 00-0095 EA >113 To 154 Fixture Unit Capacity, 1-1/2" M.P.T Brass Connection, Copper Body, Piston Type Water Hammer Arrestor (MI Fab MWH-E).....	1,668.33	15.31
22 11 19 00-0096 EA >154 To 330 Fixture Unit Capacity, 2" M.P.T Brass Connection, Copper Body, Piston Type Water Hammer Arrestor (MI Fab MWH-F).....	1,898.75	16.61

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 11 19 00-0097	Escutcheons (22 11 19)		
22 11 19 00-0098	Brass Escutcheons (22 11 19 00-0097)		
22 11 19 00-0099	Shallow Brass Escutcheons (22 11 19 00-0098)		
22 11 19 00-0100	EA 3/8" IPS, Antique Or Polished Brass Shallow Escutcheon.....	13.26	2.87
22 11 19 00-0101	EA 1/2" IPS, Antique Or Polished Brass Shallow Escutcheon.....	14.31	2.87
22 11 19 00-0102	Deep Bell Brass Escutcheons (22 11 19 00-0098)		
22 11 19 00-0103	EA 3/8" IPS, Antique Or Polished Deep Bell Brass Escutcheon.....	15.68	3.21
22 11 19 00-0104	EA 1/2" IPS, Antique Or Polished Deep Bell Brass Escutcheon.....	15.72	3.21
22 11 19 00-0105	Chrome Plated Brass Escutcheons With Setscrew (22 11 19 00-0098)		
22 11 19 00-0106	EA 3/8" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	22.88	2.87
22 11 19 00-0107	EA 1/2" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	23.12	2.87
22 11 19 00-0108	EA 5/8" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	23.49	2.87
22 11 19 00-0109	EA 3/4" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	24.80	2.87
22 11 19 00-0110	EA 7/8" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	25.17	3.44
22 11 19 00-0111	EA 1" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	26.46	3.44
22 11 19 00-0112	EA 1-1/4" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	27.39	3.79
22 11 19 00-0113	EA 1-1/2" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	28.63	4.02
22 11 19 00-0114	EA 2" IPS, Chrome Plated Brass Escutcheon With Setscrew.....	41.26	4.59
22 11 19 00-0115	Plastic Escutcheons (22 11 19 00-0097)		
22 11 19 00-0116	Split-Ring White Plastic Escutcheons (22 11 19 00-0115)		
22 11 19 00-0117	EA 3/8" IPS, Split-Ring White Plastic Escutcheon.....	7.16	2.85
22 11 19 00-0118	EA 1/2" IPS, Split-Ring White Plastic Escutcheon.....	7.16	2.85
22 11 19 00-0119	EA 3/4" IPS, Split-Ring White Plastic Escutcheon.....	8.41	3.19
22 11 19 00-0120	EA 1" IPS, Split-Ring White Plastic Escutcheon.....	9.11	3.43
22 11 19 00-0121	EA 1-1/4" IPS, Split-Ring White Plastic Escutcheon.....	9.81	3.77
22 11 19 00-0122	EA 1-1/2" IPS, Split-Ring White Plastic Escutcheon.....	10.47	4.00
22 11 19 00-0123	EA 2" IPS, Split-Ring White Plastic Escutcheon.....	11.78	4.57
22 11 19 00-0124	EA 2-1/2" IPS, Split-Ring White Plastic Escutcheon.....	15.38	4.91
22 11 19 00-0125	EA 3" IPS, Split-Ring White Plastic Escutcheon.....	19.01	5.14
22 11 19 00-0126	EA 4" IPS, Split-Ring White Plastic Escutcheon.....	23.19	5.71
22 11 19 00-0127	Chrome Plate Plastic Escutcheons (22 11 19 00-0115)		
22 11 19 00-0128	EA 1/2" IPS, Chrome Plate Plastic Escutcheon.....	9.65	2.85
22 11 19 00-0129	EA 3/4" IPS, Chrome Plate Plastic Escutcheon.....	10.54	3.19
22 11 19 00-0130	EA 1" IPS, Chrome Plate Plastic Escutcheon.....	11.86	3.43
22 11 19 00-0131	EA 1-1/4" IPS, Chrome Plate Plastic Escutcheon.....	13.18	3.77
22 11 19 00-0132	EA 1-1/2" IPS, Chrome Plate Plastic Escutcheon.....	13.86	4.00
22 11 19 00-0133	EA 2" IPS, Chrome Plate Plastic Escutcheon.....	17.56	4.57
22 11 19 00-0134	EA 2-1/2" IPS, Chrome Plate Plastic Escutcheon.....	25.80	4.91
22 11 19 00-0135	EA 3" IPS, Chrome Plate Plastic Escutcheon.....	26.69	5.14
22 11 19 00-0136	EA 4" IPS, Chrome Plate Plastic Escutcheon.....	28.47	5.71
22 11 19 00-0137	Stainless Steel Escutcheons (22 11 19 00-0097)		
22 11 19 00-0138	Shallow Stainless Steel Escutcheons (22 11 19 00-0137)		
22 11 19 00-0139	EA 3/8" IPS, Shallow Stainless Steel Escutcheon.....	18.47	2.87
22 11 19 00-0140	EA 1/2" IPS, Shallow Stainless Steel Escutcheon.....	18.47	2.87
22 11 19 00-0141	EA 3/4" IPS, Shallow Stainless Steel Escutcheon.....	26.45	3.21
22 11 19 00-0142	Chrome Plated Steel Escutcheons (22 11 19 00-0097)		
22 11 19 00-0143	Split-Ring Chrome Plated Steel Escutcheons (22 11 19 00-0142)		
22 11 19 00-0144	EA 1/2" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	6.46	2.85
22 11 19 00-0145	EA 3/4" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	7.03	3.19
22 11 19 00-0146	EA 1" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	7.75	3.43
22 11 19 00-0147	EA 1-1/4" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	8.32	3.77
22 11 19 00-0148	EA 1-1/2" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	8.90	4.00
22 11 19 00-0149	EA 2" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	10.25	4.57
22 11 19 00-0150	EA 2-1/2" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	15.85	4.91
22 11 19 00-0151	EA 3" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	16.85	5.14
22 11 19 00-0152	EA 3-1/2" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	20.93	5.48
22 11 19 00-0153	EA 4" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	18.35	5.71
22 11 19 00-0154	EA 5" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	23.89	6.28
22 11 19 00-0155	EA 6" IPS, Split-Ring Chrome Plated Steel Escutcheon.....	27.95	6.85
22 11 19 00-0156	Split-Ring/Springs Chrome Plated Steel Escutcheons (22 11 19 00-0142)		
22 11 19 00-0157	EA 3/8" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon.....	10.68	2.85



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0158 EA 1/2" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	10.68	2.85
22 11 19 00-0159 EA 3/4" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	11.41	3.19
22 11 19 00-0160 EA 1" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	12.17	3.43
22 11 19 00-0161 EA 1-1/4" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	13.65	3.77
22 11 19 00-0162 EA 1-1/2" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	14.44	4.00
22 11 19 00-0163 EA 2" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	17.15	4.57
22 11 19 00-0164 EA 2-1/2" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	19.80	4.91
22 11 19 00-0165 EA 3" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	24.36	5.14
22 11 19 00-0166 EA 3-1/2" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	30.11	5.48
22 11 19 00-0167 EA 4" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	30.52	5.71
22 11 19 00-0168 EA 5" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	51.04	6.28
22 11 19 00-0169 EA 6" IPS, Split-Ring/Springs Chrome Plated Steel Escutcheon	53.22	6.85
22 11 19 00-0170 Deep Bell Chrome Plated Steel Escutcheons (22 11 19 00-0142)		
22 11 19 00-0171 EA 3/8" IPS, Deep Bell Chrome Plated Steel Escutcheon	7.96	3.21
22 11 19 00-0172 EA 1/2" IPS, Deep Bell Chrome Plated Steel Escutcheon	7.84	3.21
22 11 19 00-0173 EA 3/4" IPS, Deep Bell Chrome Plated Steel Escutcheon	7.58	3.21
22 11 19 00-0174 EA 1" IPS, Deep Bell Chrome Plated Steel Escutcheon	8.46	3.44
22 11 19 00-0175 EA 1-1/4" IPS, Deep Bell Chrome Plated Steel Escutcheon	9.19	3.79
22 11 19 00-0176 EA 1-1/2" IPS, Deep Bell Chrome Plated Steel Escutcheon	10.13	4.02
22 11 19 00-0177 Shallow Chrome Plated Steel Escutcheons (22 11 19 00-0142)		
22 11 19 00-0178 EA 3/8" IPS, Shallow Chrome Plated Steel Escutcheon	7.09	2.87
22 11 19 00-0179 EA 1/2" IPS, Shallow Chrome Plated Steel Escutcheon	7.09	2.87
22 11 19 00-0180 EA 3/4" IPS, Shallow Chrome Plated Steel Escutcheon	7.21	2.87
22 11 19 00-0181 EA 1" IPS, Shallow Chrome Plated Steel Escutcheon	7.72	3.44
22 11 19 00-0182 EA 1-1/4" IPS, Shallow Chrome Plated Steel Escutcheon	8.35	3.79
22 11 19 00-0183 EA 1-1/2" IPS, Shallow Chrome Plated Steel Escutcheon	9.28	4.02
22 11 19 00-0184 EA 2" IPS, Shallow Chrome Plated Steel Escutcheon	10.51	4.59
22 11 19 00-0185 Wall Hydrants (22 11 19)		
Note: Female inlet connection, 3/4" hose thread outlet.		
22 11 19 00-0186 Cast Bronze, Non-Freeze, Stainless Steel Box, Integral Vacuum Breaker		
Wall Hydrants (22 11 19 00-0185)		
Note: 3/4" HPT outlet. 3/4" NPT female and 1" NPT male inlet connection. Includes wall clamp.		
22 11 19 00-0187 EA 6" Thick Wall, Cast Bronze, Non-Freeze, Stainless Steel Box, Integral Vacuum Breaker Wall Hydrant.....	1,170.41	28.71
For 1" NPT Outlet, Add	146.82	
For Cast Bronze Box, Add	62.29	
22 11 19 00-0188 EA 12" Thick Wall, Cast Bronze, Non-Freeze, Stainless Steel Box, Integral Vacuum Breaker Wall Hydrant.....	1,226.26	34.45
For 1" NPT Outlet, Add	146.82	
For Cast Bronze Box, Add	62.29	
22 11 19 00-0189 EA 18" Thick Wall, Cast Bronze, Non-Freeze, Stainless Steel Box, Integral Vacuum Breaker Wall Hydrant.....	1,249.77	41.45
For 1" NPT Outlet, Add	146.82	
For Cast Bronze Box, Add	62.29	
22 11 19 00-0190 Cast Bronze, Stainless Steel Box, Integral Vacuum Breaker Wall Hydrants		
(22 11 19 00-0185)		
Note: 3/4" HPT outlet. 3/4" NPT female and 1" NPT male inlet connection. Includes wall clamp.		
22 11 19 00-0191 EA Cast Bronze, Stainless Steel Box, Integral Vacuum Breaker Wall Hydrant	1,128.09	48.22
For 1" NPT Outlet, Add	146.82	
For Cast Bronze Box, Add	62.29	
22 11 19 00-0192 Cast Bronze Non-Freezing Wall Hydrant (22 11 19 00-0185)		
Note: 3/4" HPT outlet. 3/4" NPT female and 1" NPT male inlet connection. Includes wall clamp.		
22 11 19 00-0193 EA 3" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant.....	587.77	35.60
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0194 EA 4" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant	745.49	35.60
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0195 EA 6" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant	745.49	35.60
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0196 EA 8" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant	745.49	35.60
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0197 EA 10" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant.....	782.20	71.77
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0198 EA 12" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant.....	782.20	71.77
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0199 EA 18" Thick Wall, Cast Bronze, Non-Freeze, Nikaloy Face, Integral Vacuum Breaker Wall Hydrant.....	892.00	71.77
For 1" NPT Outlet, Add	146.82	
22 11 19 00-0200 Stainless Steel Box Type Wall Hydrants (22 11 19 00-0185)		
Note: With 3/4" NPT female and 3/4" NPT male inlet connection.		
22 11 19 00-0201 EA Recessed Stainless Steel Hose Box With Wall Flange Less Door (Acorn 8140).....	558.40	28.71
22 11 19 00-0202 EA Recessed Stainless Steel Hose Box With Vacuum Breaker, Wall Flange Less Door (Acorn 8141)	613.42	28.71
22 11 19 00-0203 EA Recessed Stainless Steel Hose Box With Wall Flange And Door (Acorn 8150).....	620.93	28.71
22 11 19 00-0204 EA Recessed Stainless Steel Hose Box With Vacuum Breaker, Wall Flange And Door (Acorn 8151)	703.47	28.71

22 Plumbing**22 10 Plumbing Piping****22 11 Facility Water Distribution**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0205 EA Recessed Stainless Steel Hose Box With Wall Flange Less Door (Acorn 8145).....	1,000.24	40.19
Note: Includes hot and cold hose connections.		
22 11 19 00-0206 EA Recessed Stainless Steel Hose Box With Vacuum Breaker, Wall Flange Less Door (Acorn 8146).....	1,032.75	40.19
Note: Includes hot and cold hose connections.		
22 11 19 00-0207 EA Recessed Stainless Steel Hose Box With Wall Flange And Door (Acorn 8155).....	1,032.75	40.19
Note: Includes hot and cold hose connections.		
22 11 19 00-0208 EA Recessed Stainless Steel Hose Box With Vacuum Breaker, Wall Flange And Door (Acorn 8156).....	1,110.29	40.19
Note: Includes hot and cold hose connections.		
22 11 19 00-0209 Washer Boxes And Dryer Outlets (22 11 19)		
22 11 19 00-0210 Dryer Vent Kit (22 11 19 00-0209)		
Note: Includes 4" flexible tubing plastic hood clamps and tailpipe.		
22 11 19 00-0211 EA Dryer Vent Kit With Hood, 4" x 5' Flexible Vent And Clamps.....	80.85	14.92
22 11 19 00-0212 Washer Boxes And Dryer Vents (22 11 19 00-0209)		
Note: Includes 1/2" supply valves and mounting brackets.		
22 11 19 00-0213 EA 2" Washing Machine Outlet Box, Plastic, Two 1/2" Supply Valves.....	283.62	22.97
22 11 19 00-0214 Ice Maker Outlet Box (22 11 19)		
Note: Includes one 1/2" quarter turn ball valve and connections wall mount.		
22 11 19 00-0215 EA Plastic Ice Maker Outlet Box, 1/2" Quarter Turn Ball Valve, Wall Mount.....	151.97	22.97
22 11 19 00-0216 EA Plastic Ice Maker Outlet Box, 1/2" Quarter Turn Ball Valve With Water Hammer Arrestor, Wall Mount.....	154.92	22.97
22 11 19 00-0217 EA Steel Ice Maker Outlet Box, 1/2" Quarter Turn Ball Valve, Wall Mount.....	231.82	22.97
22 11 19 00-0218 Tempering Controllers For Potable Hot Water (22 11 19)		
22 11 19 00-0219 Point-Of-Use Thermostatic Mixing Valves (Bradley) (22 11 19 00-0218)		
Note: Point-of-Use Water Tempering Valves: ASSE 1016, or 1070, with piston-control mechanism, positive shutoff of hot water when cold water supply is lost, bronze body and cap with replaceable corrosion-resistant components, including stainless steel piston and liner.		
22 11 19 00-0220 EA 1/2" Inlets, 1/2" Outlet Sink/Faucet Point-Of-Use Thermostatic Mixing Valve (Bradley S59-2007).....	573.16	27.79
22 11 19 00-0221 EA 1/2" Inlets, 1/2" Outlet Point-Of-Use Thermostatic Mixing Valve (Bradley S59-4004).....	140.01	27.79
22 11 19 00-0222 EA 1/2" Inlets, 1/2" Outlet Point-Of-Use Thermostatic Mixing Valve (Bradley S59-4008).....	321.54	27.79
22 11 19 00-0223 EA 3/4" Inlets, 3/4" Outlet Point-Of-Use Thermostatic Mixing Valve (Bradley S59-4016).....	366.91	37.44
22 11 19 00-0224 Thermostatic Mixing Valves (Bradley) (22 11 19 00-0218)		
Note: Standard Thermostatic, Water Mixing Valves: ASSE 1017, liquid-filled motor and piston control mechanism with positive shutoff of hot water when coldwater supply is lost. Water flow is shut off in event of thermostat failure. Bronze valve body and cap with replaceable corrosion-resistant components, including stainless steel piston and liner. Equipped with integral check stops and removable strainers.		
22 11 19 00-0225 EA 3/4" Inlets, 3/4" Outlet, 25 GPM Thermostatic Mixing Valve (Bradley S59-2025).....	1,570.74	40.09
22 11 19 00-0226 EA 3/4" Inlets, 1" Outlet, 45 GPM Thermostatic Mixing Valve (Bradley S59-2045).....	1,761.30	49.37
22 11 19 00-0227 EA 1" Inlets, 1-1/4" Outlet, 80 GPM Thermostatic Mixing Valve (Bradley S59-2080).....	2,118.21	57.43
22 11 19 00-0228 EA 1-1/4" Inlets, 1-1/2" Outlet, 130 GPM Thermostatic Mixing Valve (Bradley S59-2130).....	2,751.50	60.36
22 11 19 00-0229 EA 2" Inlets, 2" Outlet, 220 GPM Thermostatic Mixing Valve (Bradley S59-2200).....	3,695.13	78.31
22 11 19 00-0230 High Low Temperature Thermostatic Mixing Valves (Bradley) (22 11 19 00-0218)		
Note: High Low Temperature Thermostatic Mixing Valves: ASSE 1017, liquid-filled thermal motor and piston control mechanism with positive shutoff of hot water when cold water supply is lost, and allowing restricted cold flow in event of loss or interruption of hot water supply. Flow is shut off in the event of thermostat failure. Equipped with integral check stops, thermometer, and removable strainers.		
22 11 19 00-0231 EA 3/4" Inlets, 1" Outlet, 45 GPM High-Low Thermostatic Mixing Valve (Bradley S59-3045).....	4,020.60	61.74
22 11 19 00-0232 EA 1" Inlets, 1-1/4" Outlet, 80 GPM High-Low Thermostatic Mixing Valve (Bradley S59-3080).....	5,236.47	71.79
22 11 19 00-0233 EA 1-1/4" Inlets, 1-1/2" Outlet, 130 GPM High-Low Thermostatic Mixing Valve (Bradley S59-3130).....	6,110.36	75.45
22 11 19 00-0234 EA 2" Inlets, 2" Outlet, 220 GPM High-Low Thermostatic Mixing Valve (Bradley S59-3200).....	6,763.61	97.89
22 11 19 00-0235 Thermostatic Mixing Valves (Leonard) (22 11 19 00-0218)		
Note: Thermostatic Water Mixing Valve with Integral combination checkstops with strainers, 125 PSI (8.6 BAR) maximum operating pressure, Copper encapsulated thermostatic assembly with Teflon coated brass shuttle, Locking temperature regulating handle, Top or bottom supply/outlet connections, Integral circulation port connection		
22 11 19 00-0236 EA 3/4" In x 3/4" Out Thermostatic Mixing Valve (Leonard LV-981-RF).....	1,136.21	40.09
Note: For hot water or two pipe low pressure steam.		
22 11 19 00-0237 EA 1" In x 1-1/4" Out Thermostatic Mixing Valve (Leonard LV-982-RF).....	1,336.85	49.37
Note: For hot water or two pipe low pressure steam.		
22 11 19 00-0238 EA 1-1/4" In x 1-1/4" Out Thermostatic Mixing Valve (Leonard LV-983-RF).....	1,644.29	57.43
Note: For hot water or two pipe low pressure steam.		
22 11 19 00-0239 EA 1-1/4" In x 1-1/2" Out Thermostatic Mixing Valve (Leonard LV-984-RF).....	2,014.29	60.36
Note: For hot water or two pipe low pressure steam.		
22 11 19 00-0240 EA 2" In x 2" Out Thermostatic Mixing Valve (Leonard LV-985-RF).....	2,996.98	78.31
Note: For hot water or two pipe low pressure steam.		
22 11 19 00-0241 Water Mixing/Self Operating Temperature Regulator (22 11 19 00-0218)		
Note: Includes high rate spring, temperature adjustment screw, temperature dial and remote bulb with 8' capillary tube.		



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				22 11 19 00-0242 EA 3/4" Valve Size, Water Mixing/Self Operating Temperature Regulator (Powers #11 Type WM Regulator).....	3,252.45	57.41
				22 11 19 00-0243 EA 1" Valve Size, Water Mixing/Self Operating Temperature Regulator (Powers #11 Type WM Regulator).....	3,442.26	72.34
				22 11 19 00-0244 EA 1-1/4" Valve Size, Water Mixing/Self Operating Temperature Regulator (Powers #11 Type WM Regulator).....	3,788.60	87.26
				22 11 19 00-0245 EA 1-1/2" Valve Size, Water Mixing/Self Operating Temperature Regulator (Powers #11 Type WM Regulator).....	4,167.99	102.18
				22 11 19 00-0246 EA 2" Valve Size, Water Mixing/Self Operating Temperature Regulator (Powers #11 Type WM Regulator).....	4,961.27	134.34
				22 11 19 00-0247 EA 2-1/2" Valve Size, Water Mixing/Self Operating Temperature Regulator (Powers #11 Type WM Regulator).....	5,864.51	153.21
				22 11 19 00-0248 Thermostatic Mixing Valves (Holby) (22 11 19 00-0218)		
				22 11 19 00-0249 EA 2-1/2" Thermostatic Mixing Valve (Holby HOLBY2500).....	5,360.46	78.34
				22 11 19 00-0250 Backflow Preventer Valves (22 11 19)		
				22 11 19 00-0251 Double Check Valve Backflow Preventer Assemblies (22 11 19 00-0250)		
				22 11 19 00-0252 Threaded Double Check Valve Assemblies (22 11 19 00-0251)		
				22 11 19 00-0253 Double Check Valve Assemblies With Quarter Turn Shut-Offs (22 11 19 00-0252)		
				Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, and two epoxy coated bronze body check valves (Watts 007 QT or 719 QT series).		
				22 11 19 00-0254 EA 1/2" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 007 QT or 719 QT series)	473.16	30.77
				For Owner Furnished Material, Deduct	-396.23	
				For Work In Restricted Working Space, Add	23.08	
				22 11 19 00-0255 EA 3/4" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 007 QT or 719 QT Series).....	556.38	43.63
				For Owner Furnished Material, Deduct	-447.30	
				For Work In Restricted Working Space, Add	32.72	
				22 11 19 00-0256 EA 1" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 007 QT or 719 QT Series).....	640.69	53.28
				For Owner Furnished Material, Deduct	-507.50	
				For Work In Restricted Working Space, Add	39.96	
				22 11 19 00-0257 EA 1-1/4" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 007 QT or 719 QT Series).....	900.61	62.00
				For Owner Furnished Material, Deduct	-745.60	
				For Work In Restricted Working Space, Add	46.50	
				22 11 19 00-0258 EA 1-1/2" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 007 QT or 719 QT Series).....	1,116.97	71.19
				For Owner Furnished Material, Deduct	-940.15	
				For Work In Restricted Working Space, Add	53.05	
				22 11 19 00-0259 EA 2" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 007 QT or 719 QT Series).....	1,283.66	91.85
				For Owner Furnished Material, Deduct	-1,054.03	
				For Work In Restricted Working Space, Add	68.89	
				22 11 19 00-0260 Double Check Valve Assemblies With Quarter Turn Shut-Offs And Strainer (22 11 19 00-0252)		
				Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, two epoxy coated bronze body check valves, and bronze strainer (Watts 007 QT-S or 719 QT-S series).		
				22 11 19 00-0261 EA 1/2" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs And Strainer (Watts 007 QT-S or 719 QT-S).....	586.54	30.77
				For Owner Furnished Material, Deduct	-509.61	
				For Work In Restricted Working Space, Add	23.08	
				22 11 19 00-0262 EA 3/4" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs And Strainer (Watts 007 QT-S or 719 QT-S).....	722.44	43.63
				For Owner Furnished Material, Deduct	-613.36	
				For Work In Restricted Working Space, Add	32.72	
				22 11 19 00-0263 EA 1" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs And Strainer (Watts 007 QT-S or 719 QT-S).....	844.27	53.28
				For Owner Furnished Material, Deduct	-711.08	
				For Work In Restricted Working Space, Add	39.96	
				22 11 19 00-0264 EA 1-1/4" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs And Strainer (Watts 007 QT-S or 719 QT-S).....	1,190.68	62.00
				For Owner Furnished Material, Deduct	-1,035.67	
				For Work In Restricted Working Space, Add	46.50	
				22 11 19 00-0265 EA 1-1/2" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs And Strainer (Watts 007 QT-S or 719 QT-S).....	1,458.62	71.19
				For Owner Furnished Material, Deduct	-1,281.80	
				For Work In Restricted Working Space, Add	53.05	
				22 11 19 00-0266 EA 2" Threaded Double Check Valve Assembly With Quarter Turn Shut-offs And Strainer (Watts 007 QT-S or 719 QT-S).....	1,755.34	91.85
				For Owner Furnished Material, Deduct	-1,525.71	
				For Work In Restricted Working Space, Add	68.89	
				22 11 19 00-0267 Flanged Double Check Valve Assemblies (22 11 19 00-0251)		
				22 11 19 00-0268 Double Check Valve Assemblies With Non-Rising Stem Shut-Offs (22 11 19 00-0267)		
				Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, and two epoxy coated iron body check valves (Watts LF007 NRS series).		
				22 11 19 00-0269 EA 2-1/2" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF007 NRS)	6,470.85	253.76
				For Owner Furnished Material, Deduct	-6,132.50	
				For Work In Restricted Working Space, Add	101.51	
				22 11 19 00-0270 EA 3" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF007 NRS)	7,109.48	285.48
				For Owner Furnished Material, Deduct	-6,734.13	
				For Work In Restricted Working Space, Add	112.61	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0271 Double Check Valve Assemblies With Outside Stem And Yoke Shut-Offs ^(22 11 19 00-0267) Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and two epoxy coated iron body check valves (Watts LF007 OSY series).		
EA 2-1/2" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF007 OSY).....	7,094.18	253.76
<i>For Owner Furnished Material, Deduct</i>	-6,755.83	
<i>For Work In Restricted Working Space, Add</i>	101.51	
EA 3" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 007 OSY).....	8,148.36	285.48
<i>For Owner Furnished Material, Deduct</i>	-7,773.01	
<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0274 Double Check Valve Assemblies With Non-Rising Stem Shut-Offs ^(22 11 19 00-0267) Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, and two epoxy coated iron body check valves (Watts LF709 NRS series).		
EA 2-1/2" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF709 NRS series).....	6,515.80	253.76
<i>For Owner Furnished Material, Deduct</i>	-6,177.47	
<i>For Work In Restricted Working Space, Add</i>	101.50	
EA 3" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF709 NRS series).....	4,954.75	285.48
<i>For Owner Furnished Material, Deduct</i>	-4,579.38	
<i>For Work In Restricted Working Space, Add</i>	112.61	
EA 4" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF709 NRS series).....	7,759.81	422.93
<i>For Owner Furnished Material, Deduct</i>	-7,196.20	
<i>For Work In Restricted Working Space, Add</i>	169.08	
EA 6" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF709 NRS Series).....	11,792.71	641.12
<i>For Owner Furnished Material, Deduct</i>	-10,634.56	
<i>For Work In Restricted Working Space, Add</i>	347.45	
EA 8" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF709 NRS Series).....	27,027.00	961.69
<i>For Owner Furnished Material, Deduct</i>	-25,289.49	
<i>For Work In Restricted Working Space, Add</i>	521.25	
EA 10" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts LF709 NRS Series).....	34,728.96	1,137.47
<i>For Owner Furnished Material, Deduct</i>	-32,660.82	
<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0281 Double Check Valve Assemblies With Non-Rising Stem Shut-Offs And Strainer ^(22 11 19 00-0267) Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, two epoxy coated iron body check valves, and iron body strainer (Watts 709 NRS-S series).		
EA 4" Flanged Double Check Valve Assembly With NRS Shut-offs And Strainer (Watts LF709 NRS-S-FDA Series).....	9,076.19	422.93
<i>For Owner Furnished Material, Deduct</i>	-8,512.63	
<i>For Work In Restricted Working Space, Add</i>	169.07	
EA 6" Flanged Double Check Valve Assembly With NRS Shut-offs And Strainer (Watts LF709 NRS-S-FDA Series).....	15,100.88	641.12
<i>For Owner Furnished Material, Deduct</i>	-13,942.73	
<i>For Work In Restricted Working Space, Add</i>	347.45	
EA 10" Flanged Double Check Valve Assembly With NRS Shut-offs And Strainer (Watts LF709 NRS-S-FDA Series).....	40,372.69	1,137.47
<i>For Owner Furnished Material, Deduct</i>	-38,304.55	
<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0285 Double Check Valve Assemblies With Outside Stem And Yoke Shut-Offs ^(22 11 19 00-0267) Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and two epoxy coated iron body check valves (Watts LF709 OSY series).		
EA 2-1/2" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF709 OSY Series).....	6,923.60	253.76
<i>For Owner Furnished Material, Deduct</i>	-6,585.27	
<i>For Work In Restricted Working Space, Add</i>	101.50	
EA 3" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF709 OSY series).....	7,607.21	285.48
<i>For Owner Furnished Material, Deduct</i>	-7,231.86	
<i>For Work In Restricted Working Space, Add</i>	112.61	
EA 4" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF709 OSY Series).....	8,237.33	422.93
<i>For Owner Furnished Material, Deduct</i>	-7,673.77	
<i>For Work In Restricted Working Space, Add</i>	169.07	
EA 6" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF709 OSY Series).....	13,823.21	641.12
<i>For Owner Furnished Material, Deduct</i>	-12,665.06	
<i>For Work In Restricted Working Space, Add</i>	347.45	
EA 8" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF709 OSY Series).....	28,713.02	961.69
<i>For Owner Furnished Material, Deduct</i>	-26,975.78	
<i>For Work In Restricted Working Space, Add</i>	521.17	
EA 10" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts LF709 OSY Series).....	36,904.77	1,137.47
<i>For Owner Furnished Material, Deduct</i>	-34,836.63	
<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0292 Double Check Valve Assemblies With Outside Stem And Yoke Shut-Offs ^(22 11 19 00-0267) Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and single stainless steel housing and sleeve for two check valves (Watts 757 OSY series).		
EA 2-1/2" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 757 OSY Series).....	4,106.37	253.76
<i>For Owner Furnished Material, Deduct</i>	-3,768.04	
<i>For Work In Restricted Working Space, Add</i>	101.50	
EA 3" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 757 OSY Series).....	4,520.41	285.48
<i>For Owner Furnished Material, Deduct</i>	-4,145.06	
<i>For Work In Restricted Working Space, Add</i>	112.61	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				22 11 19 00-0295 EA 4" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 757 OSY Series).....	5,085.64	422.93
				<i>For Owner Furnished Material, Deduct</i>	-4,522.08	
				<i>For Work In Restricted Working Space, Add</i>	169.07	
				22 11 19 00-0296 EA 6" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 757 OSY Series).....	8,229.06	641.12
				<i>For Owner Furnished Material, Deduct</i>	-7,070.91	
				<i>For Work In Restricted Working Space, Add</i>	347.45	
				22 11 19 00-0297 EA 8" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 757 OSY Series).....	15,717.02	961.69
				<i>For Owner Furnished Material, Deduct</i>	-13,979.78	
				<i>For Work In Restricted Working Space, Add</i>	521.17	
				22 11 19 00-0298 EA 10" Flanged Double Check Valve Assembly With Outside Stem And Yoke Shut-offs (Watts 757 OSY Series).....	17,027.50	1,137.47
				<i>For Owner Furnished Material, Deduct</i>	-14,959.36	
				<i>For Work In Restricted Working Space, Add</i>	620.44	
				22 11 19 00-0299 N-Pattern Double Check Valve Assemblies With Outside Stem And Yoke Shut-Offs <small>(22 11 19 00-0267)</small>		
				Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and single stainless steel housing and sleeve for two check valves (Watts 757N OSY series).		
				22 11 19 00-0300 EA 2-1/2" N-Pattern Flanged Double Check Valve Assembly With Outside Stem And Yoke Shutoffs (Watts 757N OSY Series).....	5,443.35	253.76
				<i>For Owner Furnished Material, Deduct</i>	-5,105.02	
				<i>For Work In Restricted Working Space, Add</i>	101.50	
				22 11 19 00-0301 EA 3" N-Pattern Flanged Double Check Valve Assembly With Outside Stem And Yoke Shutoffs (Watts 757N OSY Series).....	5,857.39	285.48
				<i>For Owner Furnished Material, Deduct</i>	-5,482.04	
				<i>For Work In Restricted Working Space, Add</i>	112.61	
				22 11 19 00-0302 EA 4" N-Pattern Flanged Double Check Valve Assembly With Outside Stem And Yoke Shutoffs (Watts 757 OSY Series).....	7,319.78	422.93
				<i>For Owner Furnished Material, Deduct</i>	-6,756.22	
				<i>For Work In Restricted Working Space, Add</i>	169.07	
				22 11 19 00-0303 EA 6" N-Pattern Flanged Double Check Valve Assembly With Outside Stem And Yoke Shutoffs (Watts 757N OSY Series).....	11,969.11	641.12
				<i>For Owner Furnished Material, Deduct</i>	-10,810.96	
				<i>For Work In Restricted Working Space, Add</i>	347.45	
				22 11 19 00-0304 EA 8" N-Pattern Flanged Double Check Valve Assembly With Outside Stem And Yoke Shutoffs (Watts 757N OSY Series).....	21,260.16	961.69
				<i>For Owner Furnished Material, Deduct</i>	-19,522.92	
				<i>For Work In Restricted Working Space, Add</i>	521.17	
				22 11 19 00-0305 EA 10" N-Pattern Flanged Double Check Valve Assembly With Outside Stem And Yoke Shutoffs (Watts 757N OSY Series).....	25,299.24	1,137.47
				<i>For Owner Furnished Material, Deduct</i>	-23,231.10	
				<i>For Work In Restricted Working Space, Add</i>	620.44	
				22 11 19 00-0306 Double Check Valve Assemblies With Non-Rising Stem Shut-Off Valves <small>(22 11 19 00-0267)</small>		
				Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, and single stainless steel housing and sleeve for two check valves (Watts 757 NRS series).		
				22 11 19 00-0307 EA 2-1/2" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts 757 NRS Series).....	3,840.45	253.76
				<i>For Owner Furnished Material, Deduct</i>	-3,502.12	
				<i>For Work In Restricted Working Space, Add</i>	101.50	
				22 11 19 00-0308 EA 3" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts 757 NRS Series).....	4,266.58	285.48
				<i>For Owner Furnished Material, Deduct</i>	-3,891.23	
				<i>For Work In Restricted Working Space, Add</i>	112.61	
				22 11 19 00-0309 EA 4" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts 757 NRS Series).....	4,843.75	422.93
				<i>For Owner Furnished Material, Deduct</i>	-4,280.19	
				<i>For Work In Restricted Working Space, Add</i>	169.07	
				22 11 19 00-0310 EA 6" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts 757 NRS Series).....	8,039.04	641.12
				<i>For Owner Furnished Material, Deduct</i>	-6,880.89	
				<i>For Work In Restricted Working Space, Add</i>	347.45	
				22 11 19 00-0311 EA 8" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts 757 NRS series).....	15,533.90	961.69
				<i>For Owner Furnished Material, Deduct</i>	-13,796.66	
				<i>For Work In Restricted Working Space, Add</i>	521.17	
				22 11 19 00-0312 EA 10" Flanged Double Check Valve Assembly With NRS Shut-offs (Watts 757 NRS series).....	17,538.80	1,137.47
				<i>For Owner Furnished Material, Deduct</i>	-15,470.66	
				<i>For Work In Restricted Working Space, Add</i>	620.44	
				22 11 19 00-0313 N-Pattern Double Check Valve Assemblies With Non-Rising Stem Shut-Offs <small>(22 11 19 00-0267)</small>		
				Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, and single stainless steel housing and sleeve for two check valves (Watts 757N NRS series).		
				22 11 19 00-0314 EA 2-1/2" N-Pattern Flanged Double Check Valve Assembly With NRS Shutoffs (Watts 757 NRS series).....	5,065.32	253.76
				<i>For Owner Furnished Material, Deduct</i>	-4,726.99	
				<i>For Work In Restricted Working Space, Add</i>	101.50	
				22 11 19 00-0315 EA 3" N-Pattern Flanged Double Check Valve Assembly With NRS Shutoffs (Watts 757 NRS series).....	5,479.36	285.48
				<i>For Owner Furnished Material, Deduct</i>	-5,104.01	
				<i>For Work In Restricted Working Space, Add</i>	112.61	
				22 11 19 00-0316 EA 4" N-Pattern Flanged Double Check Valve Assembly With NRS Shutoffs (Watts 757 NRS series).....	6,942.22	422.93
				<i>For Owner Furnished Material, Deduct</i>	-6,378.66	
				<i>For Work In Restricted Working Space, Add</i>	169.07	
				22 11 19 00-0317 EA 6" N-Pattern Flanged Double Check Valve Assembly With NRS Shutoffs (Watts 757 NRS series).....	11,566.97	641.12
				<i>For Owner Furnished Material, Deduct</i>	-10,408.82	
				<i>For Work In Restricted Working Space, Add</i>	347.45	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0318	EA		8" N-Pattern Flanged Double Check Valve Assembly With NRS Shutoffs (Watts 757 NRS series).....	20,651.48	961.69
			<i>For Owner Furnished Material, Deduct</i>	-18,914.24	
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0319	EA		10" N-Pattern Flanged Double Check Valve Assembly With NRS Shutoffs (Watts 757 NRS series).....	24,688.79	1,137.47
			<i>For Owner Furnished Material, Deduct</i>	-22,620.65	
			<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0320			Double Check Valve Assemblies With Butterfly Shut-Off Valves (22 11 19 00-0267)		
			Note: Includes ball type test cocks, two resilient seated iron body butterfly valves, and single stainless steel housing and sleeve for two check valves (Watts 757 BFG series).		
22 11 19 00-0321	EA		2-1/2" Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	4,469.36	253.76
			<i>For Owner Furnished Material, Deduct</i>	-4,131.03	
			<i>For Work In Restricted Working Space, Add</i>	101.50	
22 11 19 00-0322	EA		3" Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	4,883.40	285.48
			<i>For Owner Furnished Material, Deduct</i>	-4,508.05	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0323	EA		4" Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	5,448.63	422.93
			<i>For Owner Furnished Material, Deduct</i>	-4,885.07	
			<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0324	EA		6" Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	8,601.20	641.12
			<i>For Owner Furnished Material, Deduct</i>	-7,443.05	
			<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0325	EA		8" Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	16,089.16	961.69
			<i>For Owner Furnished Material, Deduct</i>	-14,351.92	
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0326			N-Pattern Double Check Valve Assemblies With Butterfly Shut-Offs (22 11 19 00-0267)		
			Note: Includes ball type test cocks, two resilient seated iron body butterfly valves, and single stainless steel housing and sleeve for two check valves (Watts 757N BFG series).		
22 11 19 00-0327	EA		2-1/2" N-Pattern Flanged Double Check Assembly With Butterfly Valves (Watts 757 BFG series).....	5,806.34	253.76
			<i>For Owner Furnished Material, Deduct</i>	-5,468.01	
			<i>For Work In Restricted Working Space, Add</i>	101.50	
22 11 19 00-0328	EA		3" N-Pattern Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	6,220.38	285.48
			<i>For Owner Furnished Material, Deduct</i>	-5,845.03	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0329	EA		4" N-Pattern Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	7,682.77	422.93
			<i>For Owner Furnished Material, Deduct</i>	-7,119.21	
			<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0330	EA		6" N-Pattern Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	12,341.33	641.12
			<i>For Owner Furnished Material, Deduct</i>	-11,183.18	
			<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0331	EA		8" N-Pattern Flanged Double Check Valve Assembly With Butterfly Valves (Watts 757 BFG series).....	16,089.16	961.69
			<i>For Owner Furnished Material, Deduct</i>	-14,351.92	
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0332			Grooved Double Check Valve Assemblies (22 11 19 00-0251)		
22 11 19 00-0333			Double Check Valve Assemblies With Quarter Turn Shut-Offs (22 11 19 00-0332)		
			Note: Includes ball type test cocks, two quarter turn (QT) resilient seated iron body ball valves, and single stainless steel housing and sleeve for two check valves (Watts 757 QT series).		
22 11 19 00-0334	EA		2-1/2" Grooved Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 757 QT series).....	3,840.45	135.34
			<i>For Owner Furnished Material, Deduct</i>	-3,502.12	
			<i>For Work In Restricted Working Space, Add</i>	101.50	
22 11 19 00-0335	EA		3" Grooved Double Check Valve Assembly With Quarter Turn Shut-offs (Watts 757 QT series).....	4,266.58	150.14
			<i>For Owner Furnished Material, Deduct</i>	-3,891.23	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0336			N-Patten Double Check Valve Assemblies With Quarter Turn Shut-Offs (22 11 19 00-0332)		
			Note: Includes ball type test cocks, two quarter turn (QT) resilient seated iron body ball valves, and single stainless steel housing and sleeve for two check valves (Watts 757N QT series).		
22 11 19 00-0337	EA		2-1/2" N-Pattern Grooved Double Check Valve Assembly With QT Shutoffs (Watts 757 QT series).....	5,065.32	135.34
			<i>For Owner Furnished Material, Deduct</i>	-4,726.99	
			<i>For Work In Restricted Working Space, Add</i>	101.50	
22 11 19 00-0338	EA		3" N-Pattern Grooved Double Check Valve Assembly With QT Shutoffs (Watts 757 QT series).....	5,479.36	150.14
			<i>For Owner Furnished Material, Deduct</i>	-5,104.01	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0339			Reduced Pressure Zone Backflow Preventer Assemblies (22 11 19 00-0250)		
22 11 19 00-0340			Threaded Reduced Pressure Zone Assemblies (22 11 19 00-0339)		
22 11 19 00-0341			Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs (22 11 19 00-0340)		
			Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, and captured spring assemblies (Watts 009 QT series).		
22 11 19 00-0342	EA		1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009 QT series).....	527.44	26.63
			<i>For Owner Furnished Material, Deduct</i>	-460.84	
			<i>For Work In Restricted Working Space, Add</i>	19.98	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0343	EA			3/8" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009 QT series).....	556.71	29.39
				<i>For Owner Furnished Material, Deduct</i>	-483.22	
				<i>For Work In Restricted Working Space, Add</i>	22.05	
22 11 19 00-0344	EA			1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009 QT series).....	649.35	30.77
				<i>For Owner Furnished Material, Deduct</i>	-572.42	
				<i>For Work In Restricted Working Space, Add</i>	23.08	
22 11 19 00-0345	EA			3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M3 QT series).....	871.43	43.63
				<i>For Owner Furnished Material, Deduct</i>	-762.35	
				<i>For Work In Restricted Working Space, Add</i>	32.72	
22 11 19 00-0346	EA			1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series).....	1,033.51	53.28
				<i>For Owner Furnished Material, Deduct</i>	-900.32	
				<i>For Work In Restricted Working Space, Add</i>	39.96	
22 11 19 00-0347	EA			1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series).....	1,567.34	62.00
				<i>For Owner Furnished Material, Deduct</i>	-1,412.33	
				<i>For Work In Restricted Working Space, Add</i>	46.50	
22 11 19 00-0348	EA			1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series).....	1,655.58	71.19
				<i>For Owner Furnished Material, Deduct</i>	-1,478.76	
				<i>For Work In Restricted Working Space, Add</i>	53.05	
22 11 19 00-0349	EA			2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series).....	1,984.41	91.85
				<i>For Owner Furnished Material, Deduct</i>	-1,754.78	
				<i>For Work In Restricted Working Space, Add</i>	68.89	
22 11 19 00-0350				Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs And Strainer <small>(22 11 19 00-0340)</small>		
				Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, bronze strainer, and captured spring assemblies (Watts 009 QT-S series).		
22 11 19 00-0351	EA			1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	583.23	26.63
				<i>For Owner Furnished Material, Deduct</i>	-516.63	
				<i>For Work In Restricted Working Space, Add</i>	19.98	
22 11 19 00-0352	EA			3/8" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	615.51	29.39
				<i>For Owner Furnished Material, Deduct</i>	-542.02	
				<i>For Work In Restricted Working Space, Add</i>	22.05	
22 11 19 00-0353	EA			1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	729.92	43.63
				<i>For Owner Furnished Material, Deduct</i>	-652.99	
				<i>For Work In Restricted Working Space, Add</i>	23.08	
22 11 19 00-0354	EA			3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	998.06	43.63
				<i>For Owner Furnished Material, Deduct</i>	-888.98	
				<i>For Work In Restricted Working Space, Add</i>	32.72	
22 11 19 00-0355	EA			1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	1,191.84	53.28
				<i>For Owner Furnished Material, Deduct</i>	-1,058.65	
				<i>For Work In Restricted Working Space, Add</i>	39.96	
22 11 19 00-0356	EA			1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	1,783.27	62.00
				<i>For Owner Furnished Material, Deduct</i>	-1,628.26	
				<i>For Work In Restricted Working Space, Add</i>	46.50	
22 11 19 00-0357	EA			1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	1,960.30	71.19
				<i>For Owner Furnished Material, Deduct</i>	-1,783.48	
				<i>For Work In Restricted Working Space, Add</i>	53.05	
22 11 19 00-0358	EA			2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 009 QT-S series).....	2,358.26	91.85
				<i>For Owner Furnished Material, Deduct</i>	-2,128.63	
				<i>For Work In Restricted Working Space, Add</i>	68.89	
22 11 19 00-0359				Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs <small>(22 11 19 00-0340)</small>		
				Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, and captured spring assemblies (Watts 919 QT series).		
22 11 19 00-0360	EA			3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 919 QT series).....	871.43	43.63
				<i>For Owner Furnished Material, Deduct</i>	-762.35	
				<i>For Work In Restricted Working Space, Add</i>	32.72	
22 11 19 00-0361	EA			1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 919 QT series).....	1,033.51	53.28
				<i>For Owner Furnished Material, Deduct</i>	-900.32	
				<i>For Work In Restricted Working Space, Add</i>	39.96	
22 11 19 00-0362	EA			1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 919 QT series).....	1,567.34	62.00
				<i>For Owner Furnished Material, Deduct</i>	-1,412.33	
				<i>For Work In Restricted Working Space, Add</i>	46.50	
22 11 19 00-0363	EA			1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 919 QT series).....	1,655.58	71.19
				<i>For Owner Furnished Material, Deduct</i>	-1,478.76	
				<i>For Work In Restricted Working Space, Add</i>	53.05	
22 11 19 00-0364	EA			2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 919 QT series).....	1,984.41	91.85
				<i>For Owner Furnished Material, Deduct</i>	-1,754.78	
				<i>For Work In Restricted Working Space, Add</i>	68.89	



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 11 19 00-0365	Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs And Strainer <small>(22 11 19 00-0340)</small>		
	Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, bronze strainer, and captured spring assemblies (Watts 919 QT-S series).		
22 11 19 00-0366	EA 3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 919QT-S series).....	998.06	43.63
	<i>For Owner Furnished Material, Deduct</i>	-888.98	
	<i>For Work In Restricted Working Space, Add</i>	32.72	
22 11 19 00-0367	EA 1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 919QT-S series).....	1,191.84	53.28
	<i>For Owner Furnished Material, Deduct</i>	-1,058.65	
	<i>For Work In Restricted Working Space, Add</i>	39.96	
22 11 19 00-0368	EA 1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 919QT-S series).....	1,783.27	62.00
	<i>For Owner Furnished Material, Deduct</i>	-1,628.26	
	<i>For Work In Restricted Working Space, Add</i>	46.50	
22 11 19 00-0369	EA 1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 919QT-S series).....	1,960.30	71.19
	<i>For Owner Furnished Material, Deduct</i>	-1,783.48	
	<i>For Work In Restricted Working Space, Add</i>	53.05	
22 11 19 00-0370	EA 2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts 919QT-S series).....	2,358.26	91.85
	<i>For Owner Furnished Material, Deduct</i>	-2,128.63	
	<i>For Work In Restricted Working Space, Add</i>	68.89	
22 11 19 00-0371	Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs <small>(22 11 19 00-0340)</small>		
	Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, and captured spring assemblies (Watts 909 QT series).		
22 11 19 00-0372	EA 3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts LF909QT).....	1,811.93	43.63
	<i>For Owner Furnished Material, Deduct</i>	-1,702.85	
	<i>For Work In Restricted Working Space, Add</i>	32.72	
22 11 19 00-0373	EA 1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts LF909QT).....	2,144.22	53.28
	<i>For Owner Furnished Material, Deduct</i>	-2,011.03	
	<i>For Work In Restricted Working Space, Add</i>	39.96	
22 11 19 00-0374	EA 1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts LF909M1QT).....	3,305.57	62.00
	<i>For Owner Furnished Material, Deduct</i>	-3,150.56	
	<i>For Work In Restricted Working Space, Add</i>	46.50	
22 11 19 00-0375	EA 1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts LF909M1QT).....	3,572.49	71.19
	<i>For Owner Furnished Material, Deduct</i>	-3,395.67	
	<i>For Work In Restricted Working Space, Add</i>	53.05	
22 11 19 00-0376	EA 2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 909M1QT).....	4,141.31	91.85
	<i>For Owner Furnished Material, Deduct</i>	-3,911.68	
	<i>For Work In Restricted Working Space, Add</i>	68.89	
22 11 19 00-0377	Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs And Strainer <small>(22 11 19 00-0340)</small>		
	Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, bronze strainer, and captured spring assemblies (Watts LF909 QT-S series).		
22 11 19 00-0378	EA 3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts LF909QT-S).....	2,444.91	43.63
	<i>For Owner Furnished Material, Deduct</i>	-2,335.83	
	<i>For Work In Restricted Working Space, Add</i>	32.72	
22 11 19 00-0379	EA 1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts LF909QT-S).....	2,905.91	53.28
	<i>For Owner Furnished Material, Deduct</i>	-2,772.72	
	<i>For Work In Restricted Working Space, Add</i>	39.96	
22 11 19 00-0380	EA 1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts LF909M1QT-S).....	4,436.21	62.00
	<i>For Owner Furnished Material, Deduct</i>	-4,281.20	
	<i>For Work In Restricted Working Space, Add</i>	46.50	
22 11 19 00-0381	EA 1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts LF909M1QT-S).....	4,845.04	71.19
	<i>For Owner Furnished Material, Deduct</i>	-4,668.22	
	<i>For Work In Restricted Working Space, Add</i>	53.05	
22 11 19 00-0382	EA 2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs And Strainer (Watts LF909M1QT-S).....	5,752.71	91.85
	<i>For Owner Furnished Material, Deduct</i>	-5,523.08	
	<i>For Work In Restricted Working Space, Add</i>	68.89	
22 11 19 00-0383	Flanged Reduced Pressure Zone Assemblies <small>(22 11 19 00-0339)</small>		
22 11 19 00-0384	Reduced Pressure Zone Assemblies With Non-Rising Stem Shut-Offs <small>(22 11 19 00-0383)</small>		
	Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, and captured spring assemblies (Watts LF009 NRS series).		
22 11 19 00-0385	EA 2-1/2" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF009 NRS series).....	5,948.31	253.76
	<i>For Owner Furnished Material, Deduct</i>	-5,609.96	
	<i>For Work In Restricted Working Space, Add</i>	101.51	
22 11 19 00-0386	EA 3" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF009 NRS series).....	6,703.23	285.48
	<i>For Owner Furnished Material, Deduct</i>	-6,327.88	
	<i>For Work In Restricted Working Space, Add</i>	112.61	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0387 Reduced Pressure Zone Assemblies With Non-Rising Stem Shut-Off And Strainer <small>(22 11 19 00-0383)</small> Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, iron body strainer, and captured spring assemblies (Watts LF009 NRS-S-FDA series).		
22 11 19 00-0388 EA 2-1/2" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF009 NRS-S-FDA series).....	7,098.84	253.76
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-6,760.49 101.51	
22 11 19 00-0389 EA 3" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF009 NRS-S-FDA series).....	8,039.82	285.48
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-7,664.47 112.61	
22 11 19 00-0390 Reduced Pressure Zone Assemblies With Outside Stem And Yoke Shut-Offs <small>(22 11 19 00-0383)</small> Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and captured spring assemblies (Watts LF009 OSY series).		
22 11 19 00-0391 EA 2-1/2" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF009 OSY series).....	6,388.67	253.76
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-6,050.32 101.51	
22 11 19 00-0392 EA 3" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF009 OSY series).....	7,435.10	285.48
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-7,059.75 112.61	
22 11 19 00-0393 Reduced Pressure Zone Assemblies With Outside Stem And Yoke Shut-Offs And Strainer <small>(22 11 19 00-0383)</small> Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and captured spring assemblies. (Watts LF009 OSY-S-FDA Series)		
22 11 19 00-0394 EA 2-1/2" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs And Strainer (Watts LF009 OSY-S-FDA series).....	7,098.84	253.76
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-6,760.49 101.51	
22 11 19 00-0395 EA 3" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs And Strainer (Watts LF009 OSY-S-FDA series).....	8,039.82	285.48
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-7,664.47 112.61	
22 11 19 00-0396 Reduced Pressure Zone Assemblies With Quarter Turn Shut-Offs <small>(22 11 19 00-0383)</small> Note: Includes ball type test cocks, two quarter turn (QT) resilient seated iron body ball valves, and captured spring assemblies (Watts LF009 QT-FDA series).		
22 11 19 00-0397 EA 2-1/2" Flanged Reduced Pressure Zone Assembly With QT Shut-offs (Watts LF009 QT-FDA series).....	7,884.97	253.76
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-7,546.62 101.51	
22 11 19 00-0398 EA 3" Flanged Reduced Pressure Zone Assembly With QT Shut-offs (Watts LF009 QT-FDA series).....	9,126.77	285.48
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-8,751.42 112.61	
22 11 19 00-0399 Reduced Pressure Zone Assemblies With Non-Rising Stem Shut-Offs <small>(22 11 19 00-0383)</small> Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, and captured spring assemblies (Watts LF909 NRS series).		
22 11 19 00-0400 EA 2-1/2" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF909 NRS series).....	10,244.92	253.76
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-9,906.59 101.50	
22 11 19 00-0401 EA 3" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF909 NRS series).....	11,640.26	285.48
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-11,264.89 112.61	
22 11 19 00-0402 EA 4" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF909 NRS series).....	14,645.89	422.93
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-14,082.28 169.08	
22 11 19 00-0403 EA 6" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF909 NRS series).....	22,082.61	641.12
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-20,461.09 486.46	
22 11 19 00-0404 EA 8" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF909M1 NRS series).....	36,650.66	961.69
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-34,218.37 729.69	
22 11 19 00-0405 EA 10" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs (Watts LF909M1 NRS series).....	47,389.60	1,137.47
<i>For Owner Furnished Material, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	-45,321.46 620.44	
22 11 19 00-0406 Reduced Pressure Zone Assemblies With Non-Rising Stem Shut-Off And Epoxy Coated Strainer <small>(22 11 19 00-0383)</small> Note: Includes ball type test cocks, two non-rising stem (NRS) resilient seated iron body gate valves, iron body strainer, and captured spring assemblies (Watts LF909 NRS-S-FDA series).		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0407	EA		2-1/2" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF909 NRS-S-FDA series).....	11,043.47	253.76
			<i>For Owner Furnished Material, Deduct</i>	-10,705.14	
			<i>For Work In Restricted Working Space, Add</i>	101.50	
22 11 19 00-0408	EA		3" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF909 NRS-S-FDA series).....	12,480.65	285.48
			<i>For Owner Furnished Material, Deduct</i>	-12,105.30	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0409	EA		4" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF909 NRS-S-FDA series).....	15,934.36	422.93
			<i>For Owner Furnished Material, Deduct</i>	-15,370.80	
			<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0410	EA		6" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF909 NRS-S-FDA series).....	24,044.56	641.12
			<i>For Owner Furnished Material, Deduct</i>	-22,886.41	
			<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0411	EA		8" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF909 NRS-S-FDA series).....	38,949.91	961.69
			<i>For Owner Furnished Material, Deduct</i>	-37,212.67	
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0412	EA		10" Flanged Reduced Pressure Zone Assembly With NRS Shut-offs And Strainer (Watts LF909 NRS-S-FDA series).....	52,887.11	1,137.47
			<i>For Owner Furnished Material, Deduct</i>	-50,818.97	
			<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0413			Reduced Pressure Zone Assemblies With Outside Stem And Yoke Shut-Offs (22 11 19 00-0383) Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, and captured spring assemblies (Watts LF909 OSY series).		
22 11 19 00-0414	EA		2-1/2" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF909 OSY series).....	10,902.36	253.76
			<i>For Owner Furnished Material, Deduct</i>	-10,564.03	
			<i>For Work In Restricted Working Space, Add</i>	101.50	
22 11 19 00-0415	EA		3" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF909 OSY series)....	12,393.84	285.48
			<i>For Owner Furnished Material, Deduct</i>	-12,018.47	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0416	EA		4" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF909 OSY series)....	15,582.43	422.93
			<i>For Owner Furnished Material, Deduct</i>	-15,018.82	
			<i>For Work In Restricted Working Space, Add</i>	169.08	
22 11 19 00-0417	EA		6" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF909 OSY series)....	22,984.49	641.12
			<i>For Owner Furnished Material, Deduct</i>	-21,826.34	
			<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0418	EA		8" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF909M1 OSY series).....	38,237.89	961.69
			<i>For Owner Furnished Material, Deduct</i>	-36,500.65	
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0419	EA		10" Flanged Reduced Pressure Zone Assembly With Outside Stem And Yoke Shut-offs (Watts LF909M1 OSY series).....	50,409.33	1,137.47
			<i>For Owner Furnished Material, Deduct</i>	-48,341.19	
			<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0420			Double Check Detector Assemblies (22 11 19 00-0250)		
22 11 19 00-0421			Flanged Double Check Detector Assemblies With Meter (22 11 19 00-0420)		
22 11 19 00-0422			Double Check Detector Assembly With Outside Stem And Yoke Shut-Offs And Meter (22 11 19 00-0421) Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, two epoxy coated iron body check valves, and meter (Watts 709 DCDA OSY series).		
22 11 19 00-0423	EA		3" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 007 DCDA OSY series).....	8,163.94	285.48
			<i>For Owner Furnished Material, Deduct</i>	-7,788.59	
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0424	EA		4" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 007 DCDA OSY series).....	8,532.87	422.93
			<i>For Owner Furnished Material, Deduct</i>	-7,969.31	
			<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0425	EA		6" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 007 DCDA OSY series).....	11,506.58	641.12
			<i>For Owner Furnished Material, Deduct</i>	-10,348.43	
			<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0426	EA		8" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 007 DCDA OSY series).....	20,442.62	961.69
			<i>For Owner Furnished Material, Deduct</i>	-18,705.38	
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0427	EA		10" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 007 DCDA OSY series).....	27,632.08	1,137.47
			<i>For Owner Furnished Material, Deduct</i>	-25,563.94	
			<i>For Work In Restricted Working Space, Add</i>	620.44	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0428				Double Check Detector Assembly With Outside Stem And Yoke Shut-Offs And Meter <small>(22 11 19 00-0421)</small> Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, single stainless steel housing and sleeve for two check valves, and meter (Watts 757 DCDA OSY series).		
22 11 19 00-0429	EA			2-1/2" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 757 DCDA OSY series).....	6,108.41	253.76
				<i>For Owner Furnished Material, Deduct</i>	-5,770.06	
				<i>For Work In Restricted Working Space, Add</i>	101.51	
22 11 19 00-0430	EA			3" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 757 DCDA OSY series).....	6,522.04	285.48
				<i>For Owner Furnished Material, Deduct</i>	-6,146.69	
				<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0431	EA			4" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 757 DCDA OSY series).....	7,096.19	422.93
				<i>For Owner Furnished Material, Deduct</i>	-6,532.63	
				<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0432	EA			6" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 757 DCDA OSY series).....	9,640.70	641.12
				<i>For Owner Furnished Material, Deduct</i>	-8,482.55	
				<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0433	EA			8" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 757 DCDA OSY series).....	17,070.21	961.69
				<i>For Owner Furnished Material, Deduct</i>	-15,332.97	
				<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0434	EA			10" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs And Meter (Watts 757 DCDA OSY series).....	20,128.33	1,137.47
				<i>For Owner Furnished Material, Deduct</i>	-18,060.19	
				<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0435				Double Check Detector Assembly With Butterfly Valves And Meter <small>(22 11 19 00-0421)</small> Note: Includes ball type test cocks, two resilient seated iron body butterfly valves, single stainless steel housing and sleeve for two check valves, and meter (Watts 757 DCDA BFG series).		
22 11 19 00-0436	EA			2-1/2" Flanged Double Check Detector Assembly With Butterfly Valves And Meter (Watts 757 DCDA BFG series).....	6,471.47	253.76
				<i>For Owner Furnished Material, Deduct</i>	-6,133.12	
				<i>For Work In Restricted Working Space, Add</i>	101.51	
22 11 19 00-0437	EA			3" Flanged Double Check Detector Assembly With Butterfly Valves And Meter (Watts 757 DCDA BFG series).....	6,885.11	285.48
				<i>For Owner Furnished Material, Deduct</i>	-6,509.76	
				<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0438	EA			4" Flanged Double Check Detector Assembly With Butterfly Valves And Meter (Watts 757 DCDA BFG series).....	7,459.18	422.93
				<i>For Owner Furnished Material, Deduct</i>	-6,895.62	
				<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0439	EA			6" Flanged Double Check Detector Assembly With Butterfly Valves And Meter (Watts 757 DCDA BFG series).....	10,012.83	641.12
				<i>For Owner Furnished Material, Deduct</i>	-8,854.68	
				<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0440	EA			8" Flanged Double Check Detector Assembly With Butterfly Valves And Meter (Watts 757 DCDA BFG series).....	16,623.72	961.69
				<i>For Owner Furnished Material, Deduct</i>	-14,886.48	
				<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0441				Flanged Double Check Detector Assemblies Without Meter <small>(22 11 19 00-0420)</small>		
22 11 19 00-0442				Double Check Detector Assembly With Outside Stem And Yoke Shut-Offs Less Meter <small>(22 11 19 00-0441)</small> Note: Includes ball type test cocks, two outside stem and yoke resilient seated iron body gate valves, single stainless steel housing and sleeve for two check valves (Watts 757 DCDA OSY LM series).		
22 11 19 00-0443	EA			2-1/2" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs Less Meter (Watts 757 DCDA OSY LM series).....	5,993.77	253.76
				<i>For Work In Restricted Working Space, Add</i>	101.51	
22 11 19 00-0444	EA			3" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs Less Meter (Watts 757 DCDA OSY LM series).....	6,407.45	285.48
				<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0445	EA			4" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs Less Meter (Watts 757 DCDA OSY LM series).....	6,981.60	422.93
				<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0446	EA			6" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs Less Meter (Watts 757 DCDA OSY LM series).....	9,526.11	641.12
				<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0447	EA			8" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs Less Meter (Watts 757 DCDA OSY LM series).....	16,955.70	961.69
				<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0448	EA			10" Flanged Double Check Detector Assembly With Outside Stem And Yoke Shut-offs Less Meter (Watts 757 DCDA OSY LM series).....	20,013.66	1,137.47
				<i>For Work In Restricted Working Space, Add</i>	620.44	
22 11 19 00-0449				Double Check Detector Assembly With Butterfly Valves Less Meter <small>(22 11 19 00-0441)</small> Note: Includes ball type test cocks, two butterfly resilient seated iron body butterfly valves, single stainless steel housing and sleeve for two check valves (Watts 757 DCDA BFG LM series).		
22 11 19 00-0450	EA			2-1/2" Flanged Double Check Detector Assembly With Butterfly Valves Less Meter (Watts 757 DCDA BFG LM series).....	6,356.81	253.76
				<i>For Work In Restricted Working Space, Add</i>	101.51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 19 00-0451	EA		3" Flanged Double Check Detector Assembly With Butterfly Valves Less Meter (Watts 757 DCDA BFG LM series).....	6,770.44	285.48
			<i>For Work In Restricted Working Space, Add</i>	112.61	
22 11 19 00-0452	EA		4" Flanged Double Check Detector Assembly With Butterfly Valves Less Meter (Watts 757 DCDA BFG LM series).....	7,344.59	422.93
			<i>For Work In Restricted Working Space, Add</i>	169.07	
22 11 19 00-0453	EA		6" Flanged Double Check Detector Assembly With Butterfly Valves Less Meter (Watts 757 DCDA BFG LM series).....	9,898.17	641.12
			<i>For Work In Restricted Working Space, Add</i>	347.45	
22 11 19 00-0454	EA		8" Flanged Double Check Detector Assembly With Butterfly Valves Less Meter (Watts 757 DCDA BFG LM series).....	17,327.83	961.69
			<i>For Work In Restricted Working Space, Add</i>	521.17	
22 11 19 00-0455			Backflow Preventer Accessories (22 11 19 00-0250)		
22 11 19 00-0456			Air Gap (22 11 19 00-0455)		
22 11 19 00-0457	EA		Up To 1" Diameter Air Gap For Backflow Preventer.....	134.15	14.35
22 11 19 00-0458	EA		1-1/4" To 2" Diameter Air Gap For Backflow Preventer.....	165.17	17.22
22 11 19 00-0459	EA		2-1/2" To 3" Diameter Air Gap For Backflow Preventer.....	312.02	22.97
22 11 19 00-0460	EA		4" To 6" Diameter Air Gap For Backflow Preventer.....	618.23	40.19
22 11 19 00-0461	EA		8" To 10" Diameter Air Gap For Backflow Preventer.....	652.68	57.41
22 11 19 00-0462			Brass Test Cocks (22 11 19 00-0455)		
22 11 19 00-0463	EA		1/8" Or 1/4" Brass Test Cock.....	54.62	5.74
22 11 19 00-0464			Backflow Valve Enclosures (22 11 19 00-0250)		
22 11 19 00-0465			Flip-Top, Insulated Fiberglass Valve Enclosures (22 11 19 00-0464)		
			Note: Dimensions listed are inside dimensions. Includes anchor kit. Excludes concrete pad.		
22 11 19 00-0466	EA		19" Length x 11" Width x 22" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	1,377.65	103.33
			<i>For Heated Enclosure, Add</i>	167.90	
22 11 19 00-0467	EA		27" Length x 13" Width x 23" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	1,690.84	103.33
			<i>For Heated Enclosure, Add</i>	214.88	
22 11 19 00-0468	EA		27" Length x 13" Width x 35" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	2,138.82	95.16
			<i>For Heated Enclosure, Add</i>	285.14	
22 11 19 00-0469	EA		33" Length x 21" Width x 25" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	2,226.29	126.88
			<i>For Heated Enclosure, Add</i>	286.36	
22 11 19 00-0470	EA		39" Length x 13" Width x 28" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	2,332.50	126.88
			<i>For Heated Enclosure, Add</i>	302.30	
22 11 19 00-0471	EA		47" Length x 13" Width x 28" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	2,746.46	126.88
			<i>For Heated Enclosure, Add</i>	364.39	
22 11 19 00-0472	EA		39" Length x 13" Width x 36" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	2,757.35	126.88
			<i>For Heated Enclosure, Add</i>	366.02	
22 11 19 00-0473	EA		47" Length x 13" Width x 36" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	3,462.70	126.88
			<i>For Heated Enclosure, Add</i>	471.83	
22 11 19 00-0474	EA		70" Length x 26" Width x 45" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	7,962.37	190.31
			<i>For Heated Enclosure, Add</i>	1,122.99	
22 11 19 00-0475	EA		83" Length x 26" Width x 45" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	11,521.83	190.31
			<i>For Heated Enclosure, Add</i>	1,656.90	
22 11 19 00-0476	EA		70" Length x 26" Width x 55" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	10,949.92	190.31
			<i>For Heated Enclosure, Add</i>	1,571.12	
22 11 19 00-0477	EA		83" Length x 26" Width x 55" Height, Flip-Top, Insulated Fiberglass Valve Enclosure.....	13,183.41	222.04
			<i>For Heated Enclosure, Add</i>	1,894.25	
22 11 19 00-0478			One-Piece Drop Over, Insulated Fiberglass Valve Enclosures (22 11 19 00-0464)		
			Note: Dimensions listed are inside dimensions. Includes anchor kit. Excludes concrete pad.		
22 11 19 00-0479	EA		20" Length x 6-1/2" Width x 22" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	726.77	27.56
			<i>For Heated Enclosure, Add</i>	136.17	
22 11 19 00-0480	EA		27" Length x 14" Width x 26" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	1,015.45	27.56
			<i>For Heated Enclosure, Add</i>	193.90	
22 11 19 00-0481	EA		38-1/2" Length x 12" Width x 28" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	1,278.70	25.38
			<i>For Heated Enclosure, Add</i>	247.28	
22 11 19 00-0482	EA		47" Length x 13" Width x 28" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	1,937.76	25.38
			<i>For Heated Enclosure, Add</i>	379.09	
22 11 19 00-0483	EA		70" Length x 26" Width x 45" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	5,024.96	47.58
			<i>For Heated Enclosure, Add</i>	989.13	
22 11 19 00-0484	EA		83" Length x 26" Width x 45" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	6,868.69	47.58
			<i>For Heated Enclosure, Add</i>	1,357.88	
22 11 19 00-0485	EA		45" Length x 35" Width x 35" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	4,567.43	47.58
			<i>For Heated Enclosure, Add</i>	897.63	
22 11 19 00-0486	EA		53" Length x 44" Width x 44" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	5,172.02	47.58
			<i>For Heated Enclosure, Add</i>	1,018.54	
22 11 19 00-0487	EA		61" Length x 52" Width x 50" Height, One-Piece Drop Over, Insulated Fiberglass Valve Enclosure.....	8,105.10	47.58
			<i>For Heated Enclosure, Add</i>	1,605.16	
22 11 19 00-0488			Lift-Off Lightweight Backflow Valve Enclosures With Recessed Locksheild Brackets (22 11 19 00-0464)		
			Note: 1-1/2", 0.095" wall tubular steel framework with 1" x 1" x 1/8" angle iron, 1/2" #13 gauge diamond pattern rolled expanded metal, all welded construction. Excludes concrete pad.		
22 11 19 00-0489	EA		22" Length x 10" Width x 24" Height, Backflow Preventer Caged Enclosures.....	882.47	103.33
			Note: BP-1		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
22 11 19 00-0490 EA 30" Length x 10" Width x 24" Height, Backflow Preventer Caged Enclosures Note: BP-2	990.09	126.88
22 11 19 00-0491 EA 40" Length x 10" Width x 24" Height, Backflow Preventer Caged Enclosures Note: BP-3	1,068.10	126.88
22 11 19 00-0492 EA 46" Length x 10" Width x 30" Height, Backflow Preventer Caged Enclosures Note: BP-4	1,290.45	126.88
22 11 19 00-0493 Sectional, Insulated Aluminum Valve Enclosures (22 11 19 00-0464) Note: Dimensions listed are inside dimensions. Includes anchor kit. Excludes concrete pad.		
22 11 19 00-0494 EA 70" Length x 26" Width x 55" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	10,312.65 1,475.53 826.65 1,479.27	190.31
22 11 19 00-0495 EA 83" Length x 26" Width x 55" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	11,366.60 1,633.62 826.65 1,479.27	190.31
22 11 19 00-0496 EA 53" Length x 33" Width x 44" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	8,090.37 1,142.19 826.65 1,479.27	190.31
22 11 19 00-0497 EA 53" Length x 44" Width x 44" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	8,869.26 1,259.02 826.65 1,479.27	190.31
22 11 19 00-0498 EA 90" Length x 32" Width x 50-1/2" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	10,326.91 1,453.88 826.65 1,479.27	253.76
22 11 19 00-0499 EA 102" Length x 32" Width x 50-1/2" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	11,574.22 1,640.97 826.65 1,479.27	253.76
22 11 19 00-0500 EA 90" Length x 32" Width x 57-1/2" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	11,574.22 1,640.97 826.65 1,479.27	253.76
22 11 19 00-0501 EA 102" Length x 32" Width x 57-1/2" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	12,783.40 1,822.35 826.65 1,479.27	253.76
22 11 19 00-0502 EA 62" Length x 39" Width x 46" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	9,604.89 1,357.47 826.65 1,479.27	222.04
22 11 19 00-0503 EA 62" Length x 53" Width x 46" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	11,244.69 1,591.54 826.65 1,479.27	253.76
22 11 19 00-0504 EA 105" Length x 36" Width x 53" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	13,131.99 1,874.64 826.65 1,479.27	253.76
22 11 19 00-0505 EA 125" Length x 36" Width x 53" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	14,413.50 2,060.92 826.65 1,479.27	269.62
22 11 19 00-0506 EA 105" Length x 36" Width x 64" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	14,726.69 2,107.90 826.65 1,479.27	269.62
22 11 19 00-0507 EA 125" Length x 36" Width x 64" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	16,324.11 2,341.56 826.65 1,479.27	285.48
22 11 19 00-0508 EA 105" Length x 36" Width x 80" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	16,947.77 2,435.11 826.65 1,479.27	285.48
22 11 19 00-0509 EA 72" Length x 45" Width x 52" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	12,314.98 1,752.09 826.65 1,479.27	253.76
22 11 19 00-0510 EA 72" Length x 45" Width x 60" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	13,123.82 1,873.41 826.65 1,479.27	253.76
22 11 19 00-0511 EA 72" Length x 65" Width x 52" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	14,846.52 2,125.87 826.65 1,479.27	269.62
22 11 19 00-0512 EA 72" Length x 65" Width x 60" Height, Sectional, Insulated Aluminum Valve Enclosure <i>For Heated Enclosure, Add</i> <i>For One 24" Fluorescent Light Fixture, Add</i> <i>For Two 24" Fluorescent Light Fixture, Add</i>	17,985.38 2,590.75 826.65 1,479.27	285.48

22 Plumbing**22 10 Plumbing Piping****22 11 Facility Water Distribution**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 11 19 00-0513	EA	118" Length x 40" Width x 58" Height, Sectional, Insulated Aluminum Valve Enclosure	15,700.46	285.48
		<i>For Heated Enclosure, Add</i>	2,248.01	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0514	EA	142" Length x 40" Width x 58" Height, Sectional, Insulated Aluminum Valve Enclosure	18,858.38	301.33
		<i>For Heated Enclosure, Add</i>	2,715.75	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0515	EA	118" Length x 40" Width x 74" Height, Sectional, Insulated Aluminum Valve Enclosure	18,234.73	301.33
		<i>For Heated Enclosure, Add</i>	2,622.21	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0516	EA	142" Length x 40" Width x 74" Height, Sectional, Insulated Aluminum Valve Enclosure	21,114.85	317.20
		<i>For Heated Enclosure, Add</i>	3,048.28	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0517	EA	142" Length x 42" Width x 65" Height, Sectional, Insulated Aluminum Valve Enclosure	19,521.67	317.20
		<i>For Heated Enclosure, Add</i>	2,809.30	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0518	EA	172" Length x 42" Width x 65" Height, Sectional, Insulated Aluminum Valve Enclosure	22,772.20	333.06
		<i>For Heated Enclosure, Add</i>	3,290.93	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0519	EA	142" Length x 42" Width x 85" Height, Sectional, Insulated Aluminum Valve Enclosure	22,811.85	348.92
		<i>For Heated Enclosure, Add</i>	3,290.93	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0520	EA	172" Length x 42" Width x 85" Height, Sectional, Insulated Aluminum Valve Enclosure	27,031.89	364.78
		<i>For Heated Enclosure, Add</i>	3,917.99	
		<i>For One 24" Fluorescent Light Fixture, Add</i>	826.65	
		<i>For Two 24" Fluorescent Light Fixture, Add</i>	1,479.27	
22 11 19 00-0521		Faucets (Hose Bibbs) <small>(22 11 19)</small>		
22 11 19 00-0522		Bronze Garden Hose Valves (Hose Bibbs), Screwed Ends <small>(22 11 19 00-0521)</small>		
22 11 19 00-0523	EA	1/2", 125 LB Bronze Garden Hose Valves (Hose Bibbs), Screwed Ends	63.05	11.48
22 11 19 00-0524	EA	3/4", 125 LB Bronze Garden Hose Valves (Hose Bibbs), Screwed Ends	72.71	12.63
22 11 19 00-0525	EA	3/4" Screwed Ends Vacuum Breaker (Mueller 108-904NL)	18.96	8.61
22 11 19 00-0526		Chrome Plated Brass Hose Valves, Screwed Ends <small>(22 11 19 00-0521)</small>		
22 11 19 00-0527	EA	3/4" Hose Valve With Screwed Ends (Chicago Faucets #387-CP)	219.21	35.13
22 11 19 00-0528		Antisiphon Freezeless Wall Faucet (Woodford 19CP) <small>(22 11 19 00-0521)</small>		
22 11 19 00-0529	EA	4" Long, 1/2" Antisiphon Freezeless Wall Faucet	136.76	28.71
22 11 19 00-0530	EA	6" Long, 1/2" Antisiphon Freezeless Wall Faucet	148.25	31.81
22 11 19 00-0531	EA	8" Long, 1/2" Antisiphon Freezeless Wall Faucet	156.85	33.64
22 11 19 00-0532	EA	10" Long, 1/2" Antisiphon Freezeless Wall Faucet	165.46	36.05
22 11 19 00-0533	EA	12" Long, 1/2" Antisiphon Freezeless Wall Faucet	174.18	38.23
22 11 19 00-0534		Keyed, Recessed Valve Boxes <small>(22 11 19)</small>		
22 11 19 00-0535	EA	8" x 8" x 4" Painted Steel, Keyed, Recessed Valve Box	352.43	34.26
22 11 19 00-0536	EA	8" x 8" x 6" Painted Steel, Keyed, Recessed Valve Box	393.00	34.26
22 11 19 00-0537	EA	8" x 8" x 8" Painted Steel, Keyed, Recessed Valve Box	453.84	34.26
22 11 19 00-0538	EA	12" x 12" x 4" Painted Steel, Keyed, Recessed Valve Box	436.12	45.68
22 11 19 00-0539	EA	12" x 12" x 6" Painted Steel, Keyed, Recessed Valve Box	496.96	45.68
22 11 19 00-0540	EA	12" x 12" x 8" Painted Steel, Keyed, Recessed Valve Box	515.21	45.68
22 11 19 00-0541	EA	8" x 8" x 4" Stainless Steel, Keyed, Recessed Valve Box	417.33	34.26
22 11 19 00-0542	EA	8" x 8" x 6" Stainless Steel, Keyed, Recessed Valve Box	506.57	34.26
22 11 19 00-0543	EA	8" x 8" x 8" Stainless Steel, Keyed, Recessed Valve Box	585.67	34.26
22 11 19 00-0544	EA	12" x 12" x 4" Stainless Steel, Keyed, Recessed Valve Box	549.69	45.68
22 11 19 00-0545	EA	12" x 12" x 6" Stainless Steel, Keyed, Recessed Valve Box	628.79	45.68
22 11 19 00-0546	EA	12" x 12" x 8" Stainless Steel, Keyed, Recessed Valve Box	659.21	45.68
22 11 23		Domestic Water Pumps <small>(22 11)</small>		
22 11 23 13		Domestic Water Packaged Booster Pumps <small>(22 11 23)</small>		
		Note: Includes motor starter and controls.		
22 11 23 13-0001		Simplex Domestic Water Packaged Booster Pumps And Tank <small>(22 11 23 13)</small>		
22 11 23 13-0002	EA	1 HP Simplex Domestic Water Packaged Booster Pump And Tank	16,167.10	338.35
22 11 23 13-0003	EA	1.5 HP Simplex Domestic Water Packaged Booster Pump And Tank	16,691.78	454.66
22 11 23 13-0004	EA	2 HP Simplex Domestic Water Packaged Booster Pump And Tank	17,333.42	570.95
22 11 23 13-0005	EA	3 HP Simplex Domestic Water Packaged Booster Pump And Tank	17,916.57	687.26
22 11 23 13-0006	EA	5 HP Simplex Domestic Water Packaged Booster Pump And Tank	19,786.24	803.57
22 11 23 13-0007	EA	7.5 HP Simplex Domestic Water Packaged Booster Pump And Tank	21,948.31	919.88
22 11 23 13-0008	EA	10 HP Simplex Domestic Water Packaged Booster Pump And Tank	23,408.63	1,036.19



Plumbing	22	22
Plumbing Piping	22 10	
Facility Water Distribution	22 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 23 13-0009 Duplex Domestic Water Packaged Booster Pumps And Hydrocumulator ^(22 11 23 13)		
22 11 23 13-0010 EA 100 GPM Duplex Domestic Water Packaged Booster Pumps And Hydrocumulator Tank	43,022.67	1,372.64
22 11 23 13-0011 EA 200 GPM Duplex Domestic Water Packaged Booster Pumps And Hydrocumulator Tank	52,035.16	1,458.44
22 11 23 13-0012 EA 300 GPM Duplex Domestic Water Packaged Booster Pumps And Hydrocumulator Tank	61,084.93	1,544.22
22 11 23 13-0013 Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator ^(22 11 23 13)		
22 11 23 13-0014 EA 200 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	57,020.41	1,458.44
22 11 23 13-0015 EA 300 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	71,294.46	1,544.22
22 11 23 13-0016 EA 500 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	88,839.92	1,715.80
22 11 23 13-0017 EA 750 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	112,866.93	1,887.39
22 11 23 13-0018 EA 1,000 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	136,893.96	2,058.96
22 11 23 13-0019 EA 1,750 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	159,569.70	2,316.34
22 11 23 13-0020 EA 2,500 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	182,245.44	2,573.70
22 11 23 13-0021 EA 3,750 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	204,921.18	2,831.07
22 11 23 13-0022 EA 5,000 GPM Triplex Domestic Water Packaged Booster Pumps And Hydrocumulator.....	227,811.40	3,174.24
22 11 23 13-0023 Variable Speed Duplex Domestic Water Pressure Booster Skid ^(22 11 23 13)		
Note: AB1953 compliant, UL listed and labeled. Includes stainless steel headers with check, isolation, thermal relief valves, and start up support. The standard control package is integrated in a NEMA 1 enclosure and is outfitted with an individual VFD's which are controlled through a HOA and internally programmed PID logic for system control.		
22 11 23 13-0024 EA 40 GPM At 40 To 70 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-1).....	41,725.75	1,540.92
22 11 23 13-0025 EA 40 GPM At 80 To 120 PSI, 80 GPM At 50 To 90 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-2).....	43,669.98	1,540.92
22 11 23 13-0026 EA 80 GPM At 80 PSI, 120 GPM At 40 To 90 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-3).....	46,448.06	1,540.92
22 11 23 13-0027 EA 80 GPM At 130 To 150 PSI, 120 GPM At 100 To 150 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-4)	50,452.62	1,540.92
22 11 23 13-0028 EA 160 GPM At 40 To 50 PSI, 200 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-5)	47,539.56	1,637.23
22 11 23 13-0029 EA 160 GPM At 60 To 80 PSI, 200 GPM At 60 To 70 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-6)	51,035.38	1,637.23
22 11 23 13-0030 EA 160 GPM At 90 To 110 PSI, 200 GPM At 80 To 100 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-7)	55,783.02	1,637.23
22 11 23 13-0031 EA 160 To 200 GPM At 120 To 150 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-8).....	59,641.92	1,637.23
22 11 23 13-0032 EA 240 To 280 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-9).....	51,970.67	1,733.53
22 11 23 13-0033 EA 280 To 320 GPM At 60 To 70 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-10).....	55,422.15	1,733.53
22 11 23 13-0034 EA 240 To 320 GPM At 90 To 120 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-11).....	63,139.97	1,733.53
22 11 23 13-0035 EA 240 To 320 GPM At 130 To 150 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-12).....	76,093.06	1,733.53
22 11 23 13-0036 EA 360 To 400 GPM At 40 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-13).....	54,936.62	1,733.53
22 11 23 13-0037 EA 360 To 400 GPM At 50 To 80 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-14).....	61,976.81	1,733.53
22 11 23 13-0038 EA 360 To 400 GPM At 90 To 110 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-15).....	77,473.66	1,733.53
22 11 23 13-0039 EA 360 To 400 GPM At 120 To 140 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-16).....	77,026.12	1,733.53
22 11 23 13-0040 EA 440 To 480 GPM At 150 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-17).....	91,934.24	1,926.15
22 11 23 13-0041 EA 440 To 480 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-18).....	62,907.99	1,926.15
22 11 23 13-0042 EA 440 To 480 GPM At 60 To 90 PSI, 520 To 600 GPM At 40 To 80 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-19).....	77,020.02	1,926.15
22 11 23 13-0043 EA 440 To 480 GPM At 100 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-20).....	76,574.60	1,926.15
22 11 23 13-0044 EA 440 To 600 GPM At 100 To 120 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-21).....	92,626.65	1,926.15
22 11 23 13-0045 EA 440 To 600 GPM At 130 To 150 PSI, NEMA 1, Variable Speed Duplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV2-22).....	112,261.06	1,926.15
22 11 23 13-0046 EA 60 GPM At 40 To 70 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-1).....	52,939.38	1,540.92
22 11 23 13-0047 Variable Speed Triplex Domestic Water Pressure Booster Skid ^(22 11 23 13)		
Note: AB1953 compliant, UL listed and labeled. Includes stainless steel headers with check, isolation, thermal relief valves, and start up support. The standard control package is integrated in a NEMA 1 enclosure and is outfitted with an individual VFD's which are controlled through a HOA and internally programmed PID logic for system control.		
22 11 23 13-0048 EA 60 GPM At 80 To 130 PSI, 120 GPM At 50 To 90 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-2).....	52,939.38	1,540.92
22 11 23 13-0049 EA 120 GPM At 100 To 120 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-3).....	59,310.38	1,540.92
22 11 23 13-0050 EA 60 GPM At 140 To 150 PSI, 120 GPM At 130 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-4).....	64,807.42	1,540.92

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 23	13-0051	EA	180 GPM At 40 To 90 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-5).....	59,551.15	1,637.23
22 11 23	13-0052	EA	180 GPM At 100 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-6).....	65,010.20	1,637.23
22 11 23	13-0053	EA	240 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-7).....	60,826.19	1,637.23
22 11 23	13-0054	EA	240 GPM At 60 To 80 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-8).....	65,518.95	1,637.23
22 11 23	13-0055	EA	240 GPM At 90 To 110 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-9).....	71,972.27	1,637.23
22 11 23	13-0056	EA	240 GPM At 120 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-10).....	77,321.55	1,637.23
22 11 23	13-0057	EA	300 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-11).....	61,375.17	1,733.53
22 11 23	13-0058	EA	300 GPM At 60 To 70 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-12).....	66,067.92	1,733.53
22 11 23	13-0059	EA	300 GPM At 80 To 100 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-13).....	72,519.14	1,733.53
22 11 23	13-0060	EA	300 GPM At 110 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-14).....	77,868.41	1,733.53
22 11 23	13-0061	EA	360 GPM At 40 To 60 PSI, 420 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-15).....	66,652.67	1,733.53
22 11 23	13-0062	EA	360 GPM At 70 To 80 PSI, 420 GPM At 60 To 70 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-16).....	71,159.66	1,733.53
22 11 23	13-0063	EA	360 GPM At 90 To 130 PSI, 420 GPM At 80 To 120 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-17).....	82,295.18	1,733.53
22 11 23	13-0064	EA	360 GPM At 140 To 150 PSI, 420 GPM At 130 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-18).....	100,466.67	1,733.53
22 11 23	13-0065	EA	480 GPM At 40 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-19).....	68,054.61	1,926.15
22 11 23	13-0066	EA	480 GPM At 50 To 70 PSI, 520 To 600 GPM At 40 To 80 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-20).....	72,563.70	1,926.15
22 11 23	13-0067	EA	480 GPM At 80 To 110 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-21).....	83,699.23	1,926.15
22 11 23	13-0068	EA	480 GPM At 120 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-22).....	101,868.60	1,926.15
22 11 23	13-0069	EA	540 GPM At 40 PSI, 600 GPM At 40 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-23).....	71,833.30	1,926.15
22 11 23	13-0070	EA	540 GPM At 50 To 90 PSI, 600 GPM At 50 To 80 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-24).....	81,953.43	1,926.15
22 11 23	13-0071	EA	540 GPM At 100 To 110 PSI, 600 GPM At 90 To 110 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-25).....	103,937.38	1,926.15
22 11 23	13-0072	EA	540 GPM At 120 To 130 PSI, 600 GPM At 120 To 130 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-26).....	106,067.38	1,926.15
22 11 23	13-0073	EA	540 GPM At 140 To 150 PSI, 600 GPM At 140 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-27).....	131,587.26	1,926.15
22 11 23	13-0074	EA	660 GPM At 40 To 50 PSI, 720 GPM At 40 To 50 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-28).....	81,356.46	2,311.38
22 11 23	13-0075	EA	660 GPM At 60 To 90 PSI, 720,780,840,900 GPM At 60 To 80 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-29).....	98,035.47	2,311.38
22 11 23	13-0076	EA	660, 720, 780 GPM At 100 PSI, 840 To 900 GPM At 90 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-30).....	104,360.03	2,311.38
22 11 23	13-0077	EA	660, 720, 780, 840, 900 GPM At 110 To 120 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-31).....	126,054.78	2,311.38
22 11 23	13-0078	EA	660, 720, 780, 840, 900 GPM At 130 To 150 PSI, NEMA 1, Variable Speed Triplex Domestic Water Pressure Booster Skid (FlowTherm Systems FMV3-32).....	156,413.07	2,311.38

22 11 23 23 Domestic-Water In-Line Pumps (22 11 23)

22 11 23	23-0001	Bronze In-Line Centrifugal Domestic Water Booster Pumps (22 11 23 23)			
		Note: ODP motor.			
22 11 23	23-0002	EA	1/12 HP, 3/4" To 1-1/2" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PL30B).....	1,119.93	190.31
22 11 23	23-0003	EA	1/6 HP, 3/4" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PL36B).....	1,151.01	190.31
22 11 23	23-0004	EA	1/6 HP, 1" To 1-1/4" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PL45B).....	1,205.84	194.02
22 11 23	23-0005	EA	1/6 HP, 1-1/2" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PL50B).....	1,331.76	201.95
22 11 23	23-0006	EA	1/6 HP, 2" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PL75B).....	2,424.06	209.47
22 11 23	23-0007	EA	1/6 HP, 2" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G 2AB).....	2,589.19	209.47
22 11 23	23-0008	EA	1/4 HP, 2-1/2" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G 2-1/2AB).....	3,889.71	230.63
22 11 23	23-0009	EA	1/4 HP, 3" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G LD3 AB).....	4,053.09	253.37
22 11 23	23-0010	EA	1/3 HP, 3" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G HD3 AB).....	4,913.85	278.76
22 11 23	23-0011	EA	1/2 HP, 3" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PDB35S).....	5,017.02	306.79
22 11 23	23-0012	EA	3/4 HP, 3" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PDB37S).....	5,486.26	336.94
22 11 23	23-0013	EA	1 HP, 3" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PDB38S).....	7,889.34	370.80
22 11 23	23-0014	EA	1-1/2 HP, 3" Flanges, Bronze In-Line Centrifugal Domestic Water Booster Pump (B&G PDB40S).....	9,097.41	388.78

22 11 23 23-0015 Cast Iron In-Line Centrifugal Domestic Water Booster Pumps (22 11 23 23)

22 11 23	23-0016	Cast Iron In-Line Centrifugal Domestic Water Booster Pumps (22 11 23 23)			
		Note: ODP motor.			
22 11 23	23-0016	EA	1/12 HP, 3/4" To 1-1/2" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PL30).....	1,168.35	190.31
22 11 23	23-0017	EA	1/6 HP, 3/4" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PL36).....	1,985.66	190.31
22 11 23	23-0018	EA	1/6 HP, 1" To 1-1/4" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PL45).....	1,993.31	194.02
22 11 23	23-0019	EA	1/6 HP, 1-1/4" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PL45).....	2,027.58	198.25
22 11 23	23-0020	EA	1/6 HP, 1-1/2" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PL50).....	2,034.97	201.95

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 11 23 23-0021 EA 1/6 HP, 2" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PL75).....	2,072.45	209.47
22 11 23 23-0022 EA 1/4 HP, 2-1/2" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G 2-1/2).....	2,539.45	230.63
22 11 23 23-0023 EA 1/3 HP, 3" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G HD30).....	3,280.97	278.76
22 11 23 23-0024 EA 1/2 HP, 3" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PD35S).....	3,453.47	306.79
22 11 23 23-0025 EA 3/4 HP, 3" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PD37S).....	4,036.29	336.94
22 11 23 23-0026 EA 1 HP, 3" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PD38S).....	5,467.89	370.80
22 11 23 23-0027 EA 1-1/2 HP, 3" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G PD40S).....	6,403.62	388.78
22 11 23 23-0028 EA 2 HP, 4" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G 80, 4x4x7, BF).....	5,734.32	408.36
22 11 23 23-0029 EA 3 HP, 4" Flanges, Cast Iron In-Line Centrifugal Domestic Water Booster Pump (B&G 80, 4x4x7, BF).....	6,161.78	448.87

22 12 Facility Potable-Water Storage Tanks (22 10)

22 12 23 Facility Indoor Potable-Water Storage Tanks (22 12)

22 12 23 13 Facility Steel, Indoor Potable-Water Storage Pressure Tanks (22 12 23)

22 12 23 13-0001 Insulated Glass Lined Storage Tank (A.O. Smith TJ, TJV And TJH) <small>(22 12 23 13)</small>		
22 12 23 13-0002 EA 80 Gallon ASME Rated Tank, 150PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJ-80A).....	2,671.65	422.93
22 12 23 13-0003 EA 119 Gallon 150 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-120M).....	3,308.70	528.66
22 12 23 13-0004 EA 140 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-140A).....	6,199.51	581.53
22 12 23 13-0005 EA 200 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-200A).....	6,858.01	634.40
22 12 23 13-0006 EA 250 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-250A).....	13,757.44	687.26
22 12 23 13-0007 EA 350 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-350A).....	11,819.58	740.13
22 12 23 13-0008 EA 400 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-400A).....	20,401.63	792.99
22 12 23 13-0009 EA 500 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-500A).....	18,773.73	845.86
22 12 23 13-0010 EA 750 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-750A).....	20,399.58	898.73
22 12 23 13-0011 EA 1,000 Gallon ASME Rated Tank, 125 PSI, Jacketed, Insulated, Glass Lined Water Heater Storage Tank (TJV-1000A).....	24,333.88	951.59

22 12 23 13-0012 Uninsulated Glass Lined Storage Tank (A.O. Smith T) (22 12 23 13)

22 12 23 13-0013 EA 80 Gallon 150 PSI, Uninsulated, Glass Lined Water Storage Tank (T-80S).....	2,271.97	422.93
22 12 23 13-0014 EA 120 Gallon 150 PSA, Uninsulated, Glass Lined Water Storage Tank (T-120S).....	4,434.43	528.66
22 12 23 13-0015 EA 140 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-140A).....	5,563.85	581.53
22 12 23 13-0016 EA 200 Gallon 150 PSI, Uninsulated, Glass Lined Water Storage Tank (T-200S).....	6,897.35	634.40
22 12 23 13-0017 EA 200 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-200A).....	5,835.34	634.40
22 12 23 13-0018 EA 250 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-250A).....	9,093.71	687.26
22 12 23 13-0019 EA 325 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-325A).....	9,842.73	740.13
22 12 23 13-0020 EA 350 Gallon 150 PSI, Uninsulated, Glass Lined Water Storage Tank (T-350S).....	9,360.27	740.13
22 12 23 13-0021 EA 350 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-350A).....	8,525.71	740.13
22 12 23 13-0022 EA 400 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-400A).....	11,717.45	792.99
22 12 23 13-0023 EA 500 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-500A).....	12,714.62	845.86
22 12 23 13-0024 EA 750 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-750A).....	14,781.21	898.73
22 12 23 13-0025 EA 1,000 Gallon ASME Rated Tank, 125 PSI, Uninsulated, Glass Lined Water Storage Tank (T-1000A).....	27,907.39	951.59

22 12 23 26 Facility Plastic, Indoor Potable-Water Storage Non-Pressure Tanks (22 12 23)

22 12 23 26-0001 Horizontal Non-Pressurized Polyethylene Tanks <small>(22 12 23 26)</small>		
Note: Excludes excavation and backfill.		
22 12 23 26-0002 EA 100 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	721.31	237.90
For Saddle Assembly, Add	808.75	
22 12 23 26-0003 EA 150 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	845.07	277.55
For Saddle Assembly, Add	808.75	
22 12 23 26-0004 EA 200 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	1,004.29	317.20
For Saddle Assembly, Add	929.28	
22 12 23 26-0005 EA 300 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	1,227.32	356.85
For Saddle Assembly, Add	1,399.59	
22 12 23 26-0006 EA 335 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	1,476.34	396.50
For Two Tie Down Bands, Add	461.94	
22 12 23 26-0007 EA 535 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	1,918.42	550.96
For Two Tie Down Bands, Add	495.02	
22 12 23 26-0008 EA 1,035 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	2,885.21	642.80
For Three Tie Down Bands, Add	848.88	
22 12 23 26-0009 EA 1,335 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	4,181.81	734.62
For Three Tie Down Bands, Add	855.97	
22 12 23 26-0010 EA 1,635 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	5,228.31	826.44
For Four Tie Down Bands, Add	1,160.20	
22 12 23 26-0011 EA 2,035 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	6,129.37	918.28
For Four Tie Down Bands, Add	1,642.32	
22 12 23 26-0012 EA 2,635 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	8,791.33	1,010.10
For Four Tie Down Bands, Add	2,171.71	
22 12 23 26-0013 EA 3,135 Gallon Horizontal Non-Pressurized Polyethylene Tank.....	10,189.98	1,101.92
For Four Tie Down Bands, Add	2,351.33	

22 Plumbing
22 10 Plumbing Piping
22 12 Facility Potable-Water Storage Tanks



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 12 23 26-0014	EA	4,035 Gallon Horizontal Non-Pressurized Polyethylene Tank <i>For Four Tie Down Bands, Add</i>	14,648.00 2,663.29	1,469.24
22 12 23 26-0015	EA	5,025 Gallon Horizontal Non-Pressurized Polyethylene Tank <i>For Five Tie Down Bands, Add</i>	18,991.62 4,191.73	1,469.24
22 12 23 26-0016		Vertical Non-Pressurized Polyethylene Tanks <small>(22 12 23 26)</small>		
22 12 23 26-0017	EA	100 Gallon Vertical Non-Pressurized Polyethylene Tank.....	779.77	317.20
22 12 23 26-0018	EA	160 Gallon Vertical Non-Pressurized Polyethylene Tank.....	945.65	337.03
22 12 23 26-0019	EA	210 Gallon Vertical Non-Pressurized Polyethylene Tank.....	1,040.62	356.85
22 12 23 26-0020	EA	300 Gallon Vertical Non-Pressurized Polyethylene Tank.....	1,266.00	396.50
22 12 23 26-0021	EA	405 Gallon Vertical Non-Pressurized Polyethylene Tank.....	1,440.28	475.80
22 12 23 26-0022	EA	500 Gallon Vertical Non-Pressurized Polyethylene Tank.....	1,701.99	555.10
22 12 23 26-0023	EA	800 Gallon Vertical Non-Pressurized Polyethylene Tank.....	2,406.93	734.62
22 12 23 26-0024	EA	1,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	3,119.75	918.28
22 12 23 26-0025	EA	2,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	4,205.98	1,101.92
22 12 23 26-0026	EA	3,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	5,514.35	1,285.58
22 12 23 26-0027	EA	4,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	8,153.30	1,469.24
22 12 23 26-0028	EA	5,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	11,071.13	1,652.90
22 12 23 26-0029	EA	6,250 Gallon Vertical Non-Pressurized Polyethylene Tank.....	12,554.39	1,836.54
22 12 23 26-0030	EA	7,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	13,834.41	2,020.20
22 12 23 26-0031	EA	8,000 Gallon Vertical Non-Pressurized Polyethylene Tank.....	15,951.06	2,203.86
22 12 23 26-0032	EA	9,150 Gallon Vertical Non-Pressurized Polyethylene Tank.....	18,027.53	2,387.52
22 12 23 26-0033	EA	10,500 Gallon Vertical Non-Pressurized Polyethylene Tank.....	22,349.18	2,571.16
22 12 23 26-0034	EA	12,500 Gallon Vertical Non-Pressurized Polyethylene Tank.....	26,903.89	2,938.48
22 13 Facility Sanitary Sewerage <small>(22 10)</small>				
22 13 13 Facility Sanitary Sewers <small>(22 13)</small>				
22 13 13 00-0001		Fixture Rough-In <small>(22 13 13)</small>		
		Note: Excludes fixture. Not for use when individual component details are available, on remodeling work where partial pipe and fittings are installed or on residential projects. For use on commercial restrooms with multiple toilets, urinals and lavatories. Includes waste and vent pipe and fittings and domestic water supply pipe and fittings. Waste piping is included from fixture outlet tee to floor, vent piping is included from outlet tee within the wall to the ceiling and domestic water supply from ceiling to fixture and stub out with caps. Based on vertical floor to floor of 12'. Use detailed tasks (i.e. individual pipe and fittings, insulation, hangers, etc.) instead of rough-in assembly where possible.		
22 13 13 00-0002		Single Fixture Rough-In, Cast Iron Waste And Vent Pipe <small>(22 13 13 00-0001)</small>		
		Note: Single fixtures have one fixture to one pipe riser. Includes cast iron waste and vent pipe and fittings and copper domestic water supply pipe and fittings.		
22 13 13 00-0003	EA	Floor Mounted Water Closet, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and flush valve.	1,185.65	
22 13 13 00-0004	EA	Wall Mounted Water Closet, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.	1,643.24	
22 13 13 00-0005	EA	Tank Type Floor Mounted Water Closet, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture.	1,066.62	
22 13 13 00-0006	EA	Wall Mounted Urinal, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe..... Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.	704.78	
22 13 13 00-0007	EA	Wall Mounted Lavatory, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.	831.86	
22 13 13 00-0008	EA	Countertop Kitchen Sink, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	1,042.96	
22 13 13 00-0009	EA	Bathbub, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	1,124.83	
22 13 13 00-0010	EA	Free Standing Water Cooler, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture.	677.11	
22 13 13 00-0011	EA	Floor Mounted Service Sink, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	1,066.62	
22 13 13 00-0012	EA	Wall Mounted Service Sink, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.	1,087.33	
22 13 13 00-0013	EA	Shower, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe..... Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, shower head and faucet.	1,034.45	
22 13 13 00-0014	EA	Bidet, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe..... Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	1,185.65	
22 13 13 00-0015	EA	Floor Mounted Circular Wash Fountain, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture.	1,864.88	
22 13 13 00-0016	EA	Bathbub/Shower, Single Fixture Rough-In, Cast Iron Waste And Vent Pipe Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, shower head and faucet.	1,151.30	
22 13 13 00-0017		Double Fixture Rough-In, Cast Iron Waste And Vent Pipe <small>(22 13 13 00-0001)</small>		
		Note: Double fixtures have two "back-to-back" waste connections to one riser. Includes cast iron waste and vent pipe and fittings and copper domestic water supply pipe and fittings.		
22 13 13 00-0018	EA	Floor Mounted Water Closet, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe..... Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and flush valve.	1,568.50	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 13 00-0019	EA		Wall Mounted Water Closet, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe.....2,202.07 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.		
22 13 13 00-0020	EA		Tank Type Floor Mounted Water Closet, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe..... 1,352.06 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture.		
22 13 13 00-0021	EA		Wall Mounted Urinal, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe.....857.90 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.		
22 13 13 00-0022	EA		Wall Mounted Lavatory, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe..... 1,126.49 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.		
22 13 13 00-0023	EA		Countertop Kitchen Sink, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe.....1,197.91 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0024	EA		Free Standing Water Cooler, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe..... 805.36 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture.		
22 13 13 00-0025	EA		Floor Mounted Service Sink, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe 1,362.62 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0026	EA		Wall Mounted Service Sink, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe.....1,154.04 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.		
22 13 13 00-0027	EA		Shower, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe 1,127.64 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, shower heads and faucets.		
22 13 13 00-0028	EA		Bidet, Double Fixture Rough-In, Cast Iron Waste And Vent Pipe .....1,568.50 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucets.		
22 13 13 00-0029			Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe (22 13 13 00-0001) Note: Gang fixtures include multiple fixtures to one pipe riser. Includes cast iron waste and vent pipe and fittings and copper domestic water supply pipe and fittings.		
22 13 13 00-0030	EA		Floor Mounted Water Closet, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe 783.76 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and flush valve.		
22 13 13 00-0031	EA		Wall Mounted Water Closet, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe .....1,101.04 Note: Includes cast iron waste pipe and vent and copper domestic supply. Excludes fixture, carrier and flush valve.		
22 13 13 00-0032	EA		Tank Type Floor Mounted Water Closet, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe 676.55 Note: Includes cast iron waste pipe and vent and copper domestic supply. Excludes fixture.		
22 13 13 00-0033	EA		Wall Mounted Urinal, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe.....429.48 Note: Includes cast iron waste pipe and vent and copper domestic supply. Excludes fixture, carrier and flush valve.		
22 13 13 00-0034	EA		Wall Mounted Lavatory, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe 563.27 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.		
22 13 13 00-0035	EA		Countertop Kitchen Sink, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe .....598.94 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0036	EA		Free Standing Water Cooler, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe 429.11 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture.		
22 13 13 00-0037	EA		Rough-in Service Sink, Floor Mounted, Gang Mounted Fixture Including Cast Iron Waste Pipe And Vent And Copper Domestic Supply, Not Including Fixture Or Faucet..... 680.79 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0038	EA		Wall Mounted Service Sink, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe 577.02 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.		
22 13 13 00-0039	EA		Shower, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe.....564.32 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture, shower heads and faucets.		
22 13 13 00-0040	EA		Bidet, Gang Fixture Rough-In, Cast Iron Waste And Vent Pipe.....776.34 Note: Includes cast iron waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0041			Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe (22 13 13 00-0001) Note: Single fixtures have one fixture to one pipe riser. Includes PVC waste and vent pipe and fittings and copper domestic water supply pipe and fittings.		
22 13 13 00-0042	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Floor Mounted, Water Closet 685.83 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and flush valve.		
22 13 13 00-0043	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Wall Mounted, Water Closet.....819.33 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.		
22 13 13 00-0044	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Tank Type, Floor Mounted, Water Closet 640.09 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture.		
22 13 13 00-0045	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Wall Mounted, Urinal.....397.42 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.		
22 13 13 00-0046	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Wall Mounted, Lavatory.....466.89 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.		
22 13 13 00-0047	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Countertop, Kitchen Sink.....618.03 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0048	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Bathtub.....639.00 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.		
22 13 13 00-0049	EA		Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Free Standing, Water Cooler.....389.44 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 13 00-0050 EA Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe, Floor Mounted, Service Sink .....640.09 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	640.09	
22 13 13 00-0051 EA Wall Mounted Service Sink, Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....671.47 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.	671.47	
22 13 13 00-0052 EA Shower, Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....625.11 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, shower head and faucet.	625.11	
22 13 13 00-0053 EA Bidet, Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....685.70 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	685.70	
22 13 13 00-0054 EA Floor Mounted Circular Wash Fountain, Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....1,065.34 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture.	1,065.34	
22 13 13 00-0055 EA Bathtub/Shower, Single Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....662.12 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, shower head and faucet.	662.12	
22 13 13 00-0056 Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe^(22 13 00-0001) Note: Double fixtures have two "back-to-back" waste connections to one riser. Includes PVC waste and vent pipe and fittings and copper domestic water supply pipe and fittings.		
22 13 13 00-0057 EA Floor Mounted Water Closet, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....858.36 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and flush valve.	858.36	
22 13 13 00-0058 EA Wall Mounted Water Closet, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....1,077.53 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.	1,077.53	
22 13 13 00-0059 EA Tank Type Floor Mounted Water Closet, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....744.09 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixtures.	744.09	
22 13 13 00-0060 EA Wall Mounted Urinal, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....456.08 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.	456.08	
22 13 13 00-0061 EA Wall Mounted Lavatory, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....644.73 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixtures, carrier and faucets.	644.73	
22 13 13 00-0062 EA Countertop Kitchen Sink, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....677.38 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixtures and faucets.	677.38	
22 13 13 00-0063 EA Free Standing Water Cooler, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....438.57 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixtures.	438.57	
22 13 13 00-0064 EA Floor Mounted Service Sink, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....753.49 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	753.49	
22 13 13 00-0065 EA Wall Mounted Service Sink, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....697.03 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.	697.03	
22 13 13 00-0066 EA Shower, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....673.44 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, shower head and faucet.	673.44	
22 13 13 00-0067 EA Bidet, Double Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....858.36 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	858.36	
22 13 13 00-0068 Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe^(22 13 00-0001) Note: Gang fixtures include multiple fixtures to one pipe riser. Includes PVC waste and vent pipe and fittings and copper domestic water supply pipe and fittings.		
22 13 13 00-0069 EA Floor Mounted Water Closet, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....428.75 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and flush valve.	428.75	
22 13 13 00-0070 EA Wall Mounted Water Closet, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....538.25 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.	538.25	
22 13 13 00-0071 EA Tank Type Floor Mounted Water Closet, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....372.36 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture.	372.36	
22 13 13 00-0072 EA Wall Mounted Urinal, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....228.09 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and flush valve.	228.09	
22 13 13 00-0073 EA Wall Mounted Lavatory, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....322.34 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.	322.34	
22 13 13 00-0074 EA Countertop Kitchen Sink, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....338.44 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	338.44	
22 13 13 00-0075 EA Free Standing Water Cooler, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....219.27 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture.	219.27	
22 13 13 00-0076 EA Floor Mounted Service Sink, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....376.65 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	376.65	
22 13 13 00-0077 EA Wall Mounted Service Sink, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....348.55 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, carrier and faucet.	348.55	



Plumbing	22	22
Plumbing Piping	22 10	
Facility Sanitary Sewerage	22 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 13 00-0078	EA		Shower, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....337.17 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture, shower head and faucet.	337.17	
22 13 13 00-0079	EA		Bidet, Gang Fixture Rough-In, Polyvinyl Chloride (PVC) Waste And Vent Pipe .....421.74 Note: Includes polyvinyl chloride (PVC) waste and vent pipe and copper domestic supply. Excludes fixture and faucet.	421.74	
22 13 16 Sanitary Waste and Vent Piping (22 13)					
22 13 16 00-0001 Cast Iron Soil Pipe Assemblies (22 13 16)					
22 13 16 00-0002 Underground Bell And Spigot Cast Iron Soil Pipe Assemblies (22 13 16 00-0001)					
Note: Includes fittings and gaskets. Fittings are assumed every 10'. Excludes excavation, backfill and compaction. Not for use where detail is available.					
22 13 16 00-0003	LF		2" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....38.48 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	38.48	6.66
<i>For Work In Restricted Working Space, Add</i>				4.89	
22 13 16 00-0004	LF		3" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....55.33 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	55.33	10.04
<i>For Work In Restricted Working Space, Add</i>				6.63	
22 13 16 00-0005	LF		4" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....71.86 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	71.86	12.79
<i>For Work In Restricted Working Space, Add</i>				8.53	
22 13 16 00-0006	LF		5" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....86.25 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	86.25	16.13
<i>For Work In Restricted Working Space, Add</i>				9.08	
22 13 16 00-0007	LF		6" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....101.78 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	101.78	17.58
<i>For Work In Restricted Working Space, Add</i>				10.08	
22 13 16 00-0008	LF		8" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....162.88 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	162.88	24.92
<i>For Work In Restricted Working Space, Add</i>				14.11	
22 13 16 00-0009	LF		10" Underground Bell And Spigot Cast Iron Soil Pipe Assembly .....243.28 Note: Includes all fittings and gaskets. Excludes earthwork excavation, backfill and compaction. Not for use where detail is available.	243.28	24.92
<i>For Work In Restricted Working Space, Add</i>				15.97	
22 13 16 00-0010 Aboveground No Hub Cast Iron Soil Pipe Assemblies (22 13 16 00-0001)					
Note: Includes fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.					
22 13 16 00-0011	LF		1-1/2" Aboveground No Hub Cast Iron Soil Pipe Assembly .....34.33 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	34.33	6.35
<i>For Work In Restricted Working Space, Add</i>				5.57	
22 13 16 00-0012	LF		2" Aboveground No Hub Cast Iron Soil Pipe Assembly .....36.27 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	36.27	6.77
<i>For Work In Restricted Working Space, Add</i>				5.98	
22 13 16 00-0013	LF		3" Aboveground No Hub Cast Iron Soil Pipe Assembly .....46.74 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	46.74	9.83
<i>For Work In Restricted Working Space, Add</i>				7.34	
22 13 16 00-0014	LF		4" Aboveground No Hub Cast Iron Soil Pipe Assembly .....55.81 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	55.81	12.79
<i>For Work In Restricted Working Space, Add</i>				8.78	
22 13 16 00-0015	LF		5" Aboveground No Hub Cast Iron Soil Pipe Assembly .....74.43 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	74.43	15.82
<i>For Work In Restricted Working Space, Add</i>				10.74	
22 13 16 00-0016	LF		6" Aboveground No Hub Cast Iron Soil Pipe Assembly .....84.86 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	84.86	17.27
<i>For Work In Restricted Working Space, Add</i>				11.70	
22 13 16 00-0017	LF		8" Aboveground No Hub Cast Iron Soil Pipe Assembly .....134.33 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.	134.33	24.71
<i>For Work In Restricted Working Space, Add</i>				16.08	
22 13 16 00-0018	LF		10" Aboveground No Hub Cast Iron Soil Pipe Assembly .....192.95 Note: Includes all fittings, couplings and hangers. Fittings are assumed every 20'. Not for use where detail is available.	192.95	28.08
<i>For Work In Restricted Working Space, Add</i>				18.69	
22 13 16 00-0019 Bell And Spigot Cast Iron Soil Pipe And Fittings (22 13 16)					
Note: Service weight. ASTM A74 and CISPI 301 (Fitting Requirements).					



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0020			Bell And Spigot Cast Iron Pipe <small>(22 13 16 00-0019)</small> Note: Excludes excavation, hangers, gaskets, and fittings.		
22 13 16 00-0021	LF		2" Bell And Spigot Cast Iron Pipe .....27.84		6.66
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	0.50	
			<i>For Extra Heavy Pipe, Add</i>	7.46	
			<i>For Work In Restricted Working Space, Add</i>	3.02	
22 13 16 00-0022	LF		3" Bell And Spigot Cast Iron Pipe .....40.57		10.04
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	0.76	
			<i>For Extra Heavy Pipe, Add</i>	10.70	
			<i>For Work In Restricted Working Space, Add</i>	4.53	
22 13 16 00-0023	LF		4" Bell And Spigot Cast Iron Pipe .....52.33		12.79
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	0.96	
			<i>For Extra Heavy Pipe, Add</i>	13.91	
			<i>For Work In Restricted Working Space, Add</i>	5.77	
22 13 16 00-0024	LF		5" Bell And Spigot Cast Iron Pipe .....70.86		16.13
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	1.21	
			<i>For Extra Heavy Pipe, Add</i>	19.63	
			<i>For Work In Restricted Working Space, Add</i>	7.24	
22 13 16 00-0025	LF		6" Bell And Spigot Cast Iron Pipe .....83.23		17.58
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	1.32	
			<i>For Extra Heavy Pipe, Add</i>	23.90	
			<i>For Work In Restricted Working Space, Add</i>	7.90	
22 13 16 00-0026	LF		8" Bell And Spigot Cast Iron Pipe .....125.89		24.92
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	1.87	
			<i>For Extra Heavy Pipe, Add</i>	37.17	
			<i>For Work In Restricted Working Space, Add</i>	11.21	
22 13 16 00-0027	LF		10" (25 cm) Cast Iron Pipe .....189.42		28.08
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	2.10	
			<i>For Extra Heavy Pipe, Add</i>	61.89	
			<i>For Work In Restricted Working Space, Add</i>	12.62	
22 13 16 00-0028	LF		12" (31 cm) Cast Iron Pipe .....270.14		37.43
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	2.80	
			<i>For Extra Heavy Pipe, Add</i>	89.91	
			<i>For Work In Restricted Working Space, Add</i>	16.82	
22 13 16 00-0029			Bell And Spigot Cast Iron Fittings <small>(22 13 16 00-0019)</small>		
22 13 16 00-0030			Bell And Spigot Cast Iron Long Sweeps <small>(22 13 16 00-0029)</small>		
22 13 16 00-0031	EA		2" Bell And Spigot Cast Iron Long Sweep .....111.09		30.34
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	2.27	
			<i>For Work In Restricted Working Space, Add</i>	13.64	
			<i>For Extra Heavy Fittings, Add</i>	22.96	
22 13 16 00-0032	EA		3" Bell And Spigot Cast Iron Long Sweep .....190.27		38.17
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	2.86	
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For Extra Heavy Fittings, Add</i>	46.59	
22 13 16 00-0033	EA		4" Bell And Spigot Cast Iron Long Sweep .....253.51		50.75
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	3.80	
			<i>For Work In Restricted Working Space, Add</i>	22.82	
			<i>For Extra Heavy Fittings, Add</i>	62.10	
22 13 16 00-0034	EA		6" Bell And Spigot Cast Iron Long Sweep .....401.04		68.24
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	5.11	
			<i>For Work In Restricted Working Space, Add</i>	30.69	
			<i>For Extra Heavy Fittings, Add</i>	104.56	
22 13 16 00-0035	EA		8" Bell And Spigot Cast Iron Long Sweep .....797.75		87.70
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	6.57	
			<i>For Work In Restricted Working Space, Add</i>	39.43	
			<i>For Extra Heavy Fittings, Add</i>	233.21	
22 13 16 00-0036	EA		10" Bell And Spigot Cast Iron Long Sweep .....1,092.43		107.88
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	8.09	
			<i>For Work In Restricted Working Space, Add</i>	48.53	
			<i>For Extra Heavy Fittings, Add</i>	325.73	
22 13 16 00-0037	EA		12" Bell And Spigot Cast Iron Long Sweep .....1,676.75		150.58
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	11.29	
			<i>For Work In Restricted Working Space, Add</i>	67.73	
			<i>For Extra Heavy Fittings, Add</i>	507.84	
22 13 16 00-0038			Bell And Spigot Cast Iron Short Sweeps <small>(22 13 16 00-0029)</small>		
22 13 16 00-0039	EA		2" Bell And Spigot Cast Iron Short Sweep .....93.77		30.34
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	2.27	
			<i>For Work In Restricted Working Space, Add</i>	13.64	
			<i>For Extra Heavy Fittings, Add</i>	16.90	
22 13 16 00-0040	EA		3" Bell And Spigot Cast Iron Short Sweep .....161.20		38.17
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	2.86	
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For Extra Heavy Fittings, Add</i>	36.42	
22 13 16 00-0041	EA		4" Bell And Spigot Cast Iron Short Sweep .....220.82		50.75
			<i>For Above Ground Cast Iron Pipe Installation, Add</i>	3.80	
			<i>For Work In Restricted Working Space, Add</i>	22.82	
			<i>For Extra Heavy Fittings, Add</i>	50.66	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0042	EA			5" Bell And Spigot Cast Iron Short Sweep <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	337.22 4.35 26.08 87.60	58.01
22 13 16 00-0043	EA			6" Bell And Spigot Cast Iron Short Sweep <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	407.27 5.11 30.69 106.74	68.24
22 13 16 00-0044	EA			8" Bell And Spigot Cast Iron Short Sweep <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	672.46 6.57 39.43 189.36	87.70
22 13 16 00-0045	EA			10" Bell And Spigot Cast Iron Short Sweep <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	985.53 8.09 48.53 288.32	107.88
22 13 16 00-0046	EA			12" Bell And Spigot Cast Iron Short Sweep <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,636.89 11.29 67.73 493.89	150.58
22 13 16 00-0047				Bell And Spigot Cast Iron 1/4 Bends (22 13 16 00-0029)		
22 13 16 00-0048	EA			2" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	83.94 2.27 13.61 13.50	30.24
22 13 16 00-0049	EA			3" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	128.14 2.55 15.32 26.97	34.04
22 13 16 00-0050	EA			4" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	183.66 3.40 20.39 40.49	45.35
22 13 16 00-0051	EA			5" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	232.99 3.88 23.29 54.38	51.81
22 13 16 00-0052	EA			6" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	280.25 4.65 27.93 65.51	62.04
22 13 16 00-0053	EA			8" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	585.48 6.05 36.31 162.55	80.75
22 13 16 00-0054	EA			10" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	865.49 7.35 44.07 251.50	98.00
22 13 16 00-0055	EA			12" Bell And Spigot Cast Iron 1/4 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,142.37 8.67 52.04 339.12	115.67
22 13 16 00-0056				Bell And Spigot Cast Iron 1/8 Bends (22 13 16 00-0029)		
22 13 16 00-0057	EA			2" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	76.27 2.27 13.64 10.78	30.34
22 13 16 00-0058	EA			3" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	120.69 2.86 17.15 22.24	38.17
22 13 16 00-0059	EA			4" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	172.47 3.80 22.82 33.74	50.75
22 13 16 00-0060	EA			5" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	218.71 4.86 29.15 42.54	64.84
22 13 16 00-0061	EA			6" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	253.17 5.42 32.53 50.66	72.28
22 13 16 00-0062	EA			8" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	507.21 7.25 43.51 126.76	96.74

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0063	EA 10" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	710.93 8.95 53.69 186.18	119.35
22 13 16 00-0064	EA 12" Bell And Spigot Cast Iron 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,152.45 11.60 69.60 322.16	154.78
22 13 16 00-0065	Bell And Spigot Cast Iron Wyes (22 13 16 00-0029)		
22 13 16 00-0066	EA 2" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	131.29 5.08 30.50 10.37	67.77
22 13 16 00-0067	EA 3" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	166.78 5.57 33.39 19.42	74.23
22 13 16 00-0068	EA 4" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	219.63 7.29 43.74 25.84	97.28
22 13 16 00-0069	EA 5" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	290.35 8.37 50.20 43.06	111.58
22 13 16 00-0070	EA 6" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	365.00 9.92 59.49 58.34	132.25
22 13 16 00-0071	EA 8" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	673.62 13.24 79.46 143.06	176.65
22 13 16 00-0072	EA 10" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	949.21 15.02 90.13 227.07	200.41
22 13 16 00-0073	EA 12" Bell And Spigot Cast Iron Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,409.48 18.29 109.72 365.31	243.95
22 13 16 00-0074	Bell And Spigot Cast Iron Reducing Wyes (22 13 16 00-0029)		
22 13 16 00-0075	EA 3" x 2" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	212.77 5.31 31.87 37.29	70.84
22 13 16 00-0076	EA 4" x 2" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	258.78 6.57 39.39 44.61	87.55
22 13 16 00-0077	EA 4" x 3" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	289.83 6.73 40.40 54.31	89.76
22 13 16 00-0078	EA 6" x 2" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	436.21 8.88 53.27 90.52	118.50
22 13 16 00-0079	EA 6" x 3" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	447.59 9.05 54.29 93.32	120.68
22 13 16 00-0080	EA 6" x 4" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	468.28 9.65 57.91 96.34	128.75
22 13 16 00-0081	EA 8" x 2" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	692.66 10.65 63.89 167.89	142.06
22 13 16 00-0082	EA 8" x 3" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	724.43 10.85 65.11 177.59	144.79
22 13 16 00-0083	EA 8" x 4" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	741.52 11.37 68.21 179.96	151.63

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0084 EA 8" x 6" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	877.32 12.65 75.88 218.54	168.67
22 13 16 00-0085 EA 10" x 3" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,087.34 11.85 71.09 297.63	158.04
22 13 16 00-0086 EA 10" x 4" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,131.05 12.37 74.22 309.27	164.98
22 13 16 00-0087 EA 10" x 6" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,237.17 13.67 82.04 337.29	182.44
22 13 16 00-0088 EA 10" x 8" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,641.08 14.50 87.02 472.85	193.48
22 13 16 00-0089 EA 12" x 4" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,689.73 14.50 87.02 489.88	193.48
22 13 16 00-0090 EA 12" x 6" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,757.74 15.72 94.31 505.18	209.67
22 13 16 00-0091 EA 12" x 8" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	2,066.99 16.49 98.96 607.99	220.08
22 13 16 00-0092 EA 12" x 10" Bell And Spigot Cast Iron Reducing Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	2,517.12 16.99 101.92 762.08	226.60
22 13 16 00-0093 Bell And Spigot Cast Iron Combination Wye And 1/8 Bends (22 13 16 00-0029)		
22 13 16 00-0094 EA 2" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	143.97 5.08 30.50 14.81	67.77
22 13 16 00-0095 EA 3" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	174.60 5.57 33.39 22.16	74.23
22 13 16 00-0096 EA 4" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	233.24 7.29 43.74 30.60	97.28
22 13 16 00-0097 EA 5" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	333.88 8.77 52.63 55.45	117.06
22 13 16 00-0098 EA 6" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	418.25 10.88 65.29 70.22	145.18
22 13 16 00-0099 EA 8" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	773.52 14.26 85.55 170.93	190.22
22 13 16 00-0100 EA 10" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,118.96 18.69 112.16 260.78	249.42
22 13 16 00-0101 EA 12" Bell And Spigot Cast Iron Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,501.74 24.03 144.21 357.37	320.61
22 13 16 00-0102 Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bends (22 13 16 00-0029)		
22 13 16 00-0103 EA 3" x 2" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	153.72 5.31 31.87 16.62	70.84
22 13 16 00-0104 EA 4" x 2" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	218.51 6.57 39.39 30.52	87.55

22 Plumbing
22 10 Plumbing Piping
22 13 Facility Sanitary Sewerage



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0105	EA 4" x 3" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	236.69 6.73 40.40 35.71	89.76
22 13 16 00-0106	EA 6" x 2" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	360.00 8.88 53.27 63.85	118.50
22 13 16 00-0107	EA 6" x 3" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	375.24 9.05 54.29 68.00	120.68
22 13 16 00-0108	EA 6" x 4" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	397.69 9.65 57.91 71.63	128.75
22 13 16 00-0109	EA 8" x 2" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	551.11 10.65 63.89 118.35	142.06
22 13 16 00-0110	EA 8" x 4" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	565.49 11.37 68.21 118.35	151.63
22 13 16 00-0111	EA 8" x 6" Bell And Spigot Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	717.12 12.65 75.88 162.47	168.67
22 13 16 00-0112	Bell And Spigot Cast Iron Double Wyes <small>(22 13 16 00-0029)</small>		
22 13 16 00-0113	EA 2" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	238.54 6.08 36.46 40.95	81.10
22 13 16 00-0114	EA 3" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	349.67 7.66 45.97 68.75	102.24
22 13 16 00-0115	EA 4" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	475.95 9.70 58.18 98.71	129.31
22 13 16 00-0116	EA 6" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	930.28 15.23 91.40 218.97	203.19
22 13 16 00-0117	EA 8" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,880.78 17.90 107.39 532.99	238.79
22 13 16 00-0118	EA 10" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	2,498.53 20.03 120.17 734.28	267.18
22 13 16 00-0119	EA 12" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,715.75 24.03 144.21 432.27	320.61
22 13 16 00-0120	EA 15" Bell And Spigot Cast Iron Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	4,908.06 25.24 151.42 1,541.16	336.49
22 13 16 00-0121	Bell And Spigot Cast Iron Reducing Double Wyes <small>(22 13 16 00-0029)</small>		
22 13 16 00-0122	EA 3" x 2" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	212.84 7.19 43.14 24.16	95.90
22 13 16 00-0123	EA 4" x 2" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	247.54 8.26 49.56 28.82	110.17
22 13 16 00-0124	EA 4" x 3" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	268.71 8.67 52.00 33.38	115.56
22 13 16 00-0125	EA 6" x 2" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	353.65 10.56 63.38 49.83	140.95

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0126 EA 6" x 3" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	375.25 10.97 65.80 54.57	146.32
22 13 16 00-0127 EA 6" x 4" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	432.81 11.96 71.76 67.76	159.56
22 13 16 00-0128 EA 8" x 4" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	705.67 13.79 82.74 150.45	184.01
22 13 16 00-0129 EA 8" x 6" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	766.47 16.33 97.97 153.97	217.76
22 13 16 00-0130 EA 10" x 4" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	751.63 14.76 88.55 159.76	196.84
22 13 16 00-0131 EA 10" x 6" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	875.76 17.34 104.03 185.15	231.22
22 13 16 00-0132 EA 10" x 8" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,083.27 18.90 113.37 246.88	252.04
22 13 16 00-0133 EA 12" x 6" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,106.42 19.33 115.97 251.94	257.83
22 13 16 00-0134 EA 12" x 8" Bell And Spigot Cast Iron Reducing Double Wye <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,420.44 21.03 126.18 349.94	280.54
22 13 16 00-0135 Bell And Spigot Cast Iron Double Combination Wye And 1/8 Bends (22 13 16 00-0029)		
22 13 16 00-0136 EA 2" Bell And Spigot Cast Iron Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	196.60 6.08 36.46 26.27	81.10
22 13 16 00-0137 EA 3" Bell And Spigot Cast Iron Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	264.89 8.13 48.80 35.78	108.48
22 13 16 00-0138 EA 4" Bell And Spigot Cast Iron Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	347.17 10.17 61.00 50.34	135.65
22 13 16 00-0139 EA 6" Bell And Spigot Cast Iron Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	786.42 17.02 102.14 156.08	227.09
22 13 16 00-0140 Bell And Spigot Cast Iron Reducing Double Combination Wye And 1/8 Bends (22 13 16 00-0029)		
22 13 16 00-0141 EA 3" x 2" Bell And Spigot Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	264.45 7.29 43.74 41.53	97.28
22 13 16 00-0142 EA 4" x 2" Bell And Spigot Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	314.70 8.26 49.56 52.32	110.17
22 13 16 00-0143 EA 4" x 3" Bell And Spigot Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	353.48 9.19 55.15 59.38	122.65
22 13 16 00-0144 EA 6" x 4" Bell And Spigot Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	730.05 12.70 76.19 166.62	169.38
22 13 16 00-0145 Bell And Spigot Cast Iron Sanitary Tees (22 13 16 00-0029)		
22 13 16 00-0146 EA 2" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	160.26 5.09 30.53 20.48	67.88

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0147	EA		3" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	182.73 5.57 33.39 25.00	74.23
22 13 16 00-0148	EA		4" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	298.96 6.82 40.92 56.90	90.93
22 13 16 00-0149	EA		5" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	444.21 7.74 46.44 101.29	103.20
22 13 16 00-0150	EA		6" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	532.90 9.28 55.68 121.56	123.78
22 13 16 00-0151	EA		8" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,156.42 12.10 72.60 320.05	161.41
22 13 16 00-0152	EA		10" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,743.46 14.76 88.55 506.91	196.84
22 13 16 00-0153	EA		12" Bell And Spigot Cast Iron Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	2,609.11 17.34 104.03 791.83	231.22
22 13 16 00-0154			Bell And Spigot Cast Iron Reducing Sanitary Tees (22 13 16 00-0029)		
22 13 16 00-0155	EA		3" x 2" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	218.31 5.31 31.87 39.22	70.84
22 13 16 00-0156	EA		4" x 2" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	258.63 6.22 37.32 46.98	83.00
22 13 16 00-0157	EA		4" x 3" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	271.56 6.22 37.32 51.51	83.00
22 13 16 00-0158	EA		6" x 2" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	418.96 8.88 53.27 84.48	118.50
22 13 16 00-0159	EA		6" x 3" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	436.51 9.05 54.29 89.44	120.68
22 13 16 00-0160	EA		6" x 4" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	473.82 9.65 57.91 98.28	128.75
22 13 16 00-0161	EA		8" x 4" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	814.80 11.37 68.21 205.61	151.63
22 13 16 00-0162	EA		8" x 6" Bell And Spigot Cast Iron Reducing Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	1,025.72 12.65 75.88 270.48	168.67
22 13 16 00-0163			Bell And Spigot Cast Iron Vent Tees (22 13 16 00-0029)		
22 13 16 00-0164	EA		2" Bell And Spigot Cast Iron Vent Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	135.85 5.08 30.50 11.96	67.77
22 13 16 00-0165	EA		3" Bell And Spigot Cast Iron Vent Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	170.78 5.57 33.39 20.82	74.23
22 13 16 00-0166	EA		4" Bell And Spigot Cast Iron Vent Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	226.40 7.29 43.74 28.21	97.28
22 13 16 00-0167	EA		5" Bell And Spigot Cast Iron Vent Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	295.70 8.77 52.63 42.09	117.06

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0168 EA 6" Bell And Spigot Cast Iron Vent Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	372.56 10.88 65.29 54.23	145.18
22 13 16 00-0169 EA 8" Bell And Spigot Cast Iron Vent Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	645.69 14.26 85.55 126.19	190.22
22 13 16 00-0170 Bell And Spigot Cast Iron Tapped Sanitary Tees (22 13 16 00-0029)		
22 13 16 00-0171 EA 2" Bell And Spigot Cast Iron Tapped Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	139.85 5.08 30.50 13.36	67.77
22 13 16 00-0172 EA 3" Bell And Spigot Cast Iron Tapped Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	154.47 5.57 33.39 15.11	74.23
22 13 16 00-0173 EA 4" Bell And Spigot Cast Iron Tapped Sanitary Tee <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	199.00 7.29 43.74 18.62	97.28
22 13 16 00-0174 Bell And Spigot Cast Iron Tapped Sanitary Crosses (22 13 16 00-0029)		
22 13 16 00-0175 EA 2" Bell And Spigot Cast Iron Tapped Sanitary Cross <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	142.37 5.08 30.50 14.25	67.77
22 13 16 00-0176 EA 3" Bell And Spigot Cast Iron Tapped Sanitary Cross <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	159.27 5.57 33.39 16.79	74.23
22 13 16 00-0177 EA 4" Bell And Spigot Cast Iron Tapped Sanitary Cross <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	211.07 7.29 43.74 22.84	97.28
22 13 16 00-0178 Bell And Spigot Cast Iron Reducers (22 13 16 00-0029)		
22 13 16 00-0179 EA 3" x 2" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	78.76 2.86 17.15 7.56	38.17
22 13 16 00-0180 EA 4" x 2" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	98.13 3.78 22.66 7.91	50.33
22 13 16 00-0181 EA 4" x 3" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	105.44 3.80 22.82 10.28	50.75
22 13 16 00-0182 EA 6" x 2" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	136.67 4.70 28.20 14.93	62.67
22 13 16 00-0183 EA 6" x 3" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	143.21 4.76 28.57 16.79	63.50
22 13 16 00-0184 EA 6" x 4" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	147.90 4.86 29.15 17.76	64.84
22 13 16 00-0185 EA 8" x 2" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	193.83 5.01 30.05 32.78	66.80
22 13 16 00-0186 EA 8" x 3" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	217.44 6.14 36.84 33.12	81.91
22 13 16 00-0187 EA 8" x 4" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	223.17 6.30 37.80 34.01	84.01
22 13 16 00-0188 EA 8" x 6" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	230.39 6.57 39.43 34.64	87.70
22 13 16 00-0189 EA 10" x 4" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	289.21 7.38 44.27 49.57	98.42

22 Plumbing**22 10 Plumbing Piping****22 13 Facility Sanitary Sewerage**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0190	EA 10" x 6" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	304.98 7.75 46.51 52.48	103.37
22 13 16 00-0191	EA 10" x 8" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	325.26 8.09 48.53 57.22	107.88
22 13 16 00-0192	EA 12" x 4" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	406.47 8.76 52.58 80.93	116.93
22 13 16 00-0193	EA 12" x 6" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	452.46 10.26 61.55 86.55	136.80
22 13 16 00-0194	EA 12" x 8" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	488.29 11.68 70.10 89.12	155.83
22 13 16 00-0195	EA 12" x 10" Bell And Spigot Cast Iron Reducer <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	533.76 13.46 80.73 92.63	179.49
22 13 16 00-0196	Bell And Spigot Cast Iron P-Traps (22 13 16 00-0029)		
22 13 16 00-0197	EA 2" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	82.43 2.27 13.64 12.93	30.34
22 13 16 00-0198	EA 3" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	110.91 2.86 17.15 18.82	38.17
22 13 16 00-0199	EA 4" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	151.38 3.80 22.82 26.36	50.75
22 13 16 00-0200	EA 5" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	248.40 4.35 26.08 56.51	58.01
22 13 16 00-0201	EA 6" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	334.81 5.11 30.69 81.38	68.24
22 13 16 00-0202	EA 8" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	752.13 6.57 39.43 217.25	87.70
22 13 16 00-0203	EA 10" Bell And Spigot Cast Iron P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	832.35 8.09 48.53 234.70	107.88
22 13 16 00-0204	Bell And Spigot Cast Iron Deep Seal P-Traps (22 13 16 00-0029)		
22 13 16 00-0205	EA 2" Bell And Spigot Cast Iron Deep Seal P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	96.47 2.27 13.64 17.85	30.34
22 13 16 00-0206	EA 3" Bell And Spigot Cast Iron Deep Seal P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	138.49 2.86 17.15 28.47	38.17
22 13 16 00-0207	EA 4" Bell And Spigot Cast Iron Deep Seal P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	202.67 3.80 22.82 44.31	50.75
22 13 16 00-0208	EA 5" Bell And Spigot Cast Iron Deep Seal P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	339.71 4.86 29.15 84.89	64.84
22 13 16 00-0209	EA 6" Bell And Spigot Cast Iron Deep Seal P-Trap <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Extra Heavy Fittings, Add</i>	360.03 5.42 32.53 88.06	72.28
22 13 16 00-0210	Bell And Spigot Cast Iron Running Traps With Single Vent (22 13 16 00-0029)		
22 13 16 00-0211	EA 3" x 3" Bell And Spigot Cast Iron Running Trap With Single Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	221.66 5.57 33.39	73.27

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0212 EA 4" x 4" Bell And Spigot Cast Iron Running Trap With Single Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	296.02 7.29 43.74	96.32
22 13 16 00-0213 EA 5" x 4" Bell And Spigot Cast Iron Running Trap With Single Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	409.42 8.51 51.07	112.61
22 13 16 00-0214 EA 6" x 4" Bell And Spigot Cast Iron Running Trap With Single Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	836.89 9.65 57.91	127.61
22 13 16 00-0215 EA 8" x 4" Bell And Spigot Cast Iron Running Trap With Single Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,783.50 11.37 68.21	149.94
22 13 16 00-0216 EA 8" x 6" Bell And Spigot Cast Iron Running Trap With Single Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	3,013.17 12.65 75.88	167.30
22 13 16 00-0217 Bell And Spigot Cast Running Traps With Double Vent (22 13 16 00-0029)		
22 13 16 00-0218 EA 3" x 3" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	282.18 7.66 45.97	101.19
22 13 16 00-0219 EA 4" x 4" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	387.34 9.70 58.18	127.72
22 13 16 00-0220 EA 6" x 4" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	930.62 11.96 71.76	157.69
22 13 16 00-0221 EA 6" x 6" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,078.26 14.46 86.78	190.89
22 13 16 00-0222 EA 8" x 4" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,994.94 13.79 82.74	181.80
22 13 16 00-0223 EA 8" x 6" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	3,284.06 16.33 97.97	215.88
22 13 16 00-0224 EA 10" x 8" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,373.55 18.90 113.37	249.10
22 13 16 00-0225 EA 12" x 10" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	6,062.07 21.82 130.89	288.00
22 13 16 00-0226 EA 15" x 12" Bell And Spigot Cast Iron Running Trap With Double Vent <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	11,835.36 25.25 151.48	333.12
22 13 16 00-0227 Bell And Spigot Cast Iron Scission Joint Fittings (22 13 16 00-0029)		
22 13 16 00-0228 EA 2" Bell And Spigot Cast Iron Scission Joint Fitting <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	177.24 2.27 13.61	
22 13 16 00-0229 EA 3" Bell And Spigot Cast Iron Scission Joint Fitting <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	246.08 2.55 15.29	
22 13 16 00-0230 EA 4" Bell And Spigot Cast Iron Scission Joint Fitting <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	282.85 3.41 20.48	
22 13 16 00-0231 EA 5" Bell And Spigot Cast Iron Scission Joint Fitting <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	350.00 3.97 23.79	
22 13 16 00-0232 EA 6" Bell And Spigot Cast Iron Scission Joint Fitting <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	425.10 4.79 28.74	
22 13 16 00-0233 EA 8" Bell And Spigot Cast Iron Scission Joint Fitting <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	813.61 6.05 36.32	
22 13 16 00-0234 Cut And Prepare Existing In-Place Cast Iron Pipe (22 13 16 00-0019)		
Note: For use when connecting pipe to an existing in-place system.		
22 13 16 00-0235 EA 2", Cut And Prepare Existing In-Place Cast Iron Pipe <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	12.63 0.63 3.79	
22 13 16 00-0236 EA 3", Cut And Prepare Existing In-Place Cast Iron Pipe <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	13.78 0.69 4.13	
22 13 16 00-0237 EA 4", Cut And Prepare Existing In-Place Cast Iron Pipe <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	17.22 0.86 5.17	
22 13 16 00-0238 EA 6", Cut And Prepare Existing In-Place Cast Iron Pipe <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	20.66 1.03 6.20	
22 13 16 00-0239 EA 8", Cut And Prepare Existing In-Place Cast Iron Pipe <i>For Above Ground Cast Iron Pipe Installation, Add</i> <i>For Work In Restricted Working Space, Add</i>	27.56 1.38 8.27	

22 Plumbing**22 10 Plumbing Piping****22 13 Facility Sanitary Sewerage**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 13 16 00-0240	EA	10", Cut And Prepare Existing In-Place Cast Iron Pipe.....	32.15	
		<i>For Above Ground Cast Iron Pipe Installation, Add</i>	1.61	
		<i>For Work In Restricted Working Space, Add</i>	9.65	
22 13 16 00-0241	EA	12", Cut And Prepare Existing In-Place Cast Iron Pipe.....	37.89	
		<i>For Above Ground Cast Iron Pipe Installation, Add</i>	1.89	
		<i>For Work In Restricted Working Space, Add</i>	11.37	
22 13 16 00-0242		Joint Material (22 13 16 00-0019)		
		Note: Labor costs are included in the installation costs for fittings.		
22 13 16 00-0243	LB	Lead (1 LB/Diameter Inch) Joint Material.....	7.77	
22 13 16 00-0244	LB	Oakum (1/8 LB/Diameter Inch) Joint Material.....	15.65	
22 13 16 00-0245	EA	2" Dual Tite Rubber Gasket.....	3.17	
22 13 16 00-0246	EA	3" Dual Tite Rubber Gasket.....	4.34	
22 13 16 00-0247	EA	4" Dual Tite Rubber Gasket.....	5.40	
22 13 16 00-0248	EA	6" Dual Tite Rubber Gasket.....	8.95	
22 13 16 00-0249	EA	8" Dual Tite Rubber Gasket.....	19.74	
22 13 16 00-0250	EA	10" Dual Tite Rubber Gasket.....	30.28	
22 13 16 00-0251	EA	12" Dual Tite Rubber Gasket.....	38.57	
22 13 16 00-0252		No Hub Cast Iron Soil Pipe And Fittings (22 13 16)		
		Note: Service Weight. Excludes hangers.		
22 13 16 00-0253		No Hub Cast Iron Pipe (22 13 16 00-0252)		
		Note: Excludes couplings.		
22 13 16 00-0254	LF	1-1/2" No Hub Cast Iron Pipe.....	19.11	6.35
		<i>For Work In Restricted Working Space, Add</i>	2.86	
		<i>For Below Ground Installation, Add</i>	0.48	
22 13 16 00-0255	LF	2" No Hub Cast Iron Pipe.....	20.28	6.77
		<i>For Work In Restricted Working Space, Add</i>	3.07	
		<i>For Below Ground Installation, Add</i>	0.51	
22 13 16 00-0256	LF	3" No Hub Cast Iron Pipe.....	28.71	9.83
		<i>For Work In Restricted Working Space, Add</i>	4.44	
		<i>For Below Ground Installation, Add</i>	0.74	
22 13 16 00-0257	LF	4" No Hub Cast Iron Pipe.....	37.25	12.79
		<i>For Work In Restricted Working Space, Add</i>	5.77	
		<i>For Below Ground Installation, Add</i>	0.96	
22 13 16 00-0258	LF	5" No Hub Cast Iron Pipe.....	48.84	15.82
		<i>For Work In Restricted Working Space, Add</i>	7.12	
		<i>For Below Ground Installation, Add</i>	1.19	
22 13 16 00-0259	LF	6" No Hub Cast Iron Pipe.....	56.91	17.27
		<i>For Work In Restricted Working Space, Add</i>	7.76	
		<i>For Below Ground Installation, Add</i>	1.29	
22 13 16 00-0260	LF	8" No Hub Cast Iron Pipe.....	86.72	24.71
		<i>For Work In Restricted Working Space, Add</i>	11.09	
		<i>For Below Ground Installation, Add</i>	1.85	
22 13 16 00-0261	LF	10" No Hub Cast Iron Pipe.....	124.53	28.08
		<i>For Work In Restricted Working Space, Add</i>	12.62	
		<i>For Below Ground Installation, Add</i>	2.10	
22 13 16 00-0262		No Hub Cast Iron Fittings (22 13 16 00-0252)		
22 13 16 00-0263		No Hub Cast Iron Long Sweeps (22 13 16 00-0262)		
22 13 16 00-0264	EA	1-1/2" No Hub Cast Iron Long Sweep.....	69.26	28.76
		<i>For Work In Restricted Working Space, Add</i>	12.95	
		<i>For Below Ground Installation, Add</i>	2.16	
22 13 16 00-0265	EA	2" No Hub Cast Iron Long Sweep.....	71.75	30.03
		<i>For Work In Restricted Working Space, Add</i>	13.50	
		<i>For Below Ground Installation, Add</i>	2.25	
22 13 16 00-0266	EA	3" No Hub Cast Iron Long Sweep.....	85.11	34.36
		<i>For Work In Restricted Working Space, Add</i>	15.47	
		<i>For Below Ground Installation, Add</i>	2.58	
22 13 16 00-0267	EA	4" No Hub Cast Iron Long Sweep.....	118.19	45.47
		<i>For Work In Restricted Working Space, Add</i>	20.46	
		<i>For Below Ground Installation, Add</i>	3.41	
22 13 16 00-0268	EA	5" No Hub Cast Iron Long Sweep.....	170.28	52.22
		<i>For Work In Restricted Working Space, Add</i>	23.48	
		<i>For Below Ground Installation, Add</i>	3.91	
22 13 16 00-0269	EA	6" No Hub Cast Iron Long Sweep.....	201.86	62.25
		<i>For Work In Restricted Working Space, Add</i>	28.02	
		<i>For Below Ground Installation, Add</i>	4.67	
22 13 16 00-0270	EA	8" No Hub Cast Iron Long Sweep.....	416.72	80.13
		<i>For Work In Restricted Working Space, Add</i>	36.05	
		<i>For Below Ground Installation, Add</i>	6.01	
22 13 16 00-0271		No Hub Cast Iron Reducing Long Sweeps (22 13 16 00-0262)		
22 13 16 00-0272	EA	3" x 2" No Hub Cast Iron Reducing Long Sweep.....	112.74	34.36
		<i>For Work In Restricted Working Space, Add</i>	15.47	
		<i>For Below Ground Installation, Add</i>	2.58	
22 13 16 00-0273	EA	4" x 3" No Hub Cast Iron Reducing Long Sweep.....	170.83	45.47
		<i>For Work In Restricted Working Space, Add</i>	20.46	
		<i>For Below Ground Installation, Add</i>	3.41	

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0274 No Hub Cast Iron Short Sweeps (22 13 16 00-0262)				
22 13 16 00-0275	EA	2" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	66.19 13.50 2.25	30.03
22 13 16 00-0276	EA	3" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	80.71 15.47 2.58	34.36
22 13 16 00-0277	EA	4" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	115.88 20.46 3.41	45.47
22 13 16 00-0278	EA	5" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	171.15 23.48 3.91	52.22
22 13 16 00-0279	EA	6" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	188.38 28.02 4.67	62.25
22 13 16 00-0280	EA	8" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	375.97 36.05 6.01	80.13
22 13 16 00-0281	EA	10" No Hub Cast Iron Short Sweep <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	618.18 50.47 8.41	112.20
22 13 16 00-0282 No Hub Cast Iron 1/4 Bends (22 13 16 00-0262)				
22 13 16 00-0283	EA	1-1/2" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	59.60 12.95 2.16	28.76
22 13 16 00-0284	EA	2" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	62.37 13.50 2.25	30.03
22 13 16 00-0285	EA	3" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	74.51 15.47 2.58	34.36
22 13 16 00-0286	EA	4" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	102.18 20.46 3.41	45.47
22 13 16 00-0287	EA	5" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	154.13 23.48 3.91	52.22
22 13 16 00-0288	EA	6" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	177.49 28.02 4.67	62.25
22 13 16 00-0289	EA	8" No Hub Cast Iron 1/4 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	344.24 36.05 6.01	80.13
22 13 16 00-0290 No Hub Cast Iron 1/8 Bends (22 13 16 00-0262)				
22 13 16 00-0291	EA	1-1/2" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	56.07 12.95 2.16	28.76
22 13 16 00-0292	EA	2" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	58.19 13.50 2.25	30.03
22 13 16 00-0293	EA	3" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	70.40 15.47 2.58	34.36
22 13 16 00-0294	EA	4" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	92.95 20.46 3.41	45.47
22 13 16 00-0295	EA	6" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	157.16 30.21 5.03	67.14
22 13 16 00-0296	EA	8" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	282.46 39.65 6.61	88.18
22 13 16 00-0297	EA	10" No Hub Cast Iron 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	446.16 48.80 8.13	108.48
22 13 16 00-0298 No Hub Cast Iron Wyes (22 13 16 00-0262)				
22 13 16 00-0299	EA	1-1/2" No Hub Cast Iron Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	90.71 20.33 3.39	45.25
22 13 16 00-0300	EA	2" No Hub Cast Iron Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	115.16 27.58 4.60	61.32
22 13 16 00-0301	EA	3" No Hub Cast Iron Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	132.42 30.21 5.03	67.14

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0302	EA		4" No Hub Cast Iron Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	183.66 39.65 6.61	88.18
22 13 16 00-0303	EA		5" No Hub Cast Iron Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	263.81 45.72 7.62	101.65
22 13 16 00-0304	EA		6" No Hub Cast Iron Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	313.01 54.29 9.05	120.68
22 13 16 00-0305	EA		8" No Hub Cast Iron Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	550.60 72.11 12.02	160.36
22 13 16 00-0306	EA		10" No Hub Cast Iron Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	938.82 80.12 13.35	178.12
22 13 16 00-0307			No Hub Cast Iron Reducing Wyes (22 13 16 00-0262)		
22 13 16 00-0308	EA		3" x 1-1/2" No Hub Cast Iron Reducing Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	112.77 26.33 4.39	58.57
22 13 16 00-0309	EA		3" x 2" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	125.71 30.21 5.03	67.14
22 13 16 00-0310	EA		4" x 2" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	143.32 33.39 5.57	74.23
22 13 16 00-0311	EA		4" x 3" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	166.57 37.10 6.18	82.47
22 13 16 00-0312	EA		6" x 2" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	225.19 46.20 7.70	102.68
22 13 16 00-0313	EA		6" x 3" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	241.13 48.26 8.04	107.33
22 13 16 00-0314	EA		6" x 4" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	275.92 56.40 9.40	125.43
22 13 16 00-0315	EA		8" x 4" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	366.66 56.71 9.45	126.07
22 13 16 00-0316	EA		8" x 6" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	427.08 62.31 10.39	138.59
22 13 16 00-0317	EA		10" x 4" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	685.95 66.41 11.07	147.64
22 13 16 00-0318	EA		10" x 6" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	723.03 71.09 11.85	158.04
22 13 16 00-0319	EA		10" x 8" No Hub Cast Iron Reducing Wye..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	836.71 75.90 12.65	168.77
22 13 16 00-0320			No Hub Cast Iron Combination Wye And 1/8 Bends (22 13 16 00-0262)		
22 13 16 00-0321	EA		1-1/2" No Hub Cast Iron Combination Wye And 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	102.12 23.67 3.95	52.66
22 13 16 00-0322	EA		2" No Hub Cast Iron Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	116.10 27.58 4.60	61.32
22 13 16 00-0323	EA		3" No Hub Cast Iron Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	139.49 30.21 5.03	67.14
22 13 16 00-0324	EA		4" No Hub Cast Iron Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	203.64 39.65 6.61	88.18
22 13 16 00-0325	EA		6" No Hub Cast Iron Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	383.26 61.00 10.17	135.65
22 13 16 00-0326	EA		8" No Hub Cast Iron Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	712.39 78.28 13.05	174.03
22 13 16 00-0327	EA		10" No Hub Cast Iron Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	833.81 94.63 15.77	210.41
22 13 16 00-0328			No Hub Cast Iron Reducing Combination Wye And 1/8 Bends (22 13 16 00-0262)		
22 13 16 00-0329	EA		2" x 1-1/2" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	117.25 27.58 4.60	61.32

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0330 EA 3" x 2" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	129.25 30.21 5.03	67.14
22 13 16 00-0331 EA 4" x 2" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	150.39 33.39 5.57	74.23
22 13 16 00-0332 EA 4" x 3" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	173.42 37.10 6.18	82.47
22 13 16 00-0333 EA 6" x 2" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	245.74 46.20 7.70	102.68
22 13 16 00-0334 EA 6" x 3" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	277.04 48.26 8.04	107.33
22 13 16 00-0335 EA 6" x 4" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	307.36 56.40 9.40	125.43
22 13 16 00-0336 EA 8" x 4" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	425.43 56.71 9.45	126.07
22 13 16 00-0337 EA 8" x 6" No Hub Cast Iron Reducing Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	561.44 62.31 10.39	138.59
22 13 16 00-0338 No Hub Cast Iron Double Wyes (22 13 16 00-0262)		
22 13 16 00-0339 EA 2" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	146.68 34.29 5.72	76.23
22 13 16 00-0340 EA 3" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	198.84 41.74 6.96	92.84
22 13 16 00-0341 EA 4" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	275.02 45.64 7.61	101.50
22 13 16 00-0342 EA 6" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	439.72 68.39 11.40	152.12
22 13 16 00-0343 EA 8" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	879.31 91.77 15.30	203.99
22 13 16 00-0344 No Hub Cast Iron Reducing Double Wyes (22 13 16 00-0262)		
22 13 16 00-0345 EA 3" x 2" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	177.82 37.99 6.33	84.48
22 13 16 00-0346 EA 4" x 2" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	214.64 43.75 7.29	97.28
22 13 16 00-0347 EA 4" x 3" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	236.59 47.70 7.95	106.05
22 13 16 00-0348 EA 6" x 4" No Hub Cast Iron Double Wye <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	372.77 60.32 10.05	134.12
22 13 16 00-0349 No Hub Cast Iron Double Combination Wye And 1/8 Bends (22 13 16 00-0262)		
22 13 16 00-0350 EA 2" No Hub Cast Iron Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	194.07 41.19 6.87	91.57
22 13 16 00-0351 EA 3" No Hub Cast Iron Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	240.04 45.64 7.61	101.50
22 13 16 00-0352 EA 4" No Hub Cast Iron Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	369.29 60.42 10.07	134.38
22 13 16 00-0353 EA 6" No Hub Cast Iron Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	506.99 93.29 15.55	207.45
22 13 16 00-0354 No Hub Cast Iron Reducing Double Combination Wye And 1/8 Bends (22 13 16 00-0262)		
22 13 16 00-0355 EA 3" x 2" No Hub Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	183.98 35.44 5.91	78.77
22 13 16 00-0356 EA 4" x 2" No Hub Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	213.18 41.19 6.87	91.57
22 13 16 00-0357 EA 4" x 3" No Hub Cast Iron Reducing Double Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	260.25 44.99 7.50	100.03

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0358	No Hub Cast Iron Sanitary Tees (22 13 16 00-0262)		
22 13 16 00-0359	EA 1-1/2" No Hub Cast Iron Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	88.27 19.95 3.33	44.31
22 13 16 00-0360	EA 2" No Hub Cast Iron Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	116.32 27.58 4.60	61.32
22 13 16 00-0361	EA 3" No Hub Cast Iron Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	129.82 30.21 5.03	67.14
22 13 16 00-0362	EA 4" No Hub Cast Iron Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	177.75 39.65 6.61	88.18
22 13 16 00-0363	EA 5" No Hub Cast Iron Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	265.04 45.72 7.62	101.65
22 13 16 00-0364	EA 6" No Hub Cast Iron Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	312.14 54.29 9.05	120.68
22 13 16 00-0365	EA 8" No Hub Cast Iron Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	623.51 72.11 12.02	160.36
22 13 16 00-0366	No Hub Cast Iron Reducing Sanitary Tees (22 13 16 00-0262)		
22 13 16 00-0367	EA 2" x 1-1/2" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	99.36 22.49 3.75	50.01
22 13 16 00-0368	EA 3" x 1-1/2" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	114.79 26.33 4.39	58.57
22 13 16 00-0369	EA 3" x 2" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	118.98 27.58 4.60	61.32
22 13 16 00-0370	EA 3" x 4" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	146.89 27.58 4.60	61.32
22 13 16 00-0371	EA 4" x 2" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	159.08 37.32 6.22	83.00
22 13 16 00-0372	EA 4" x 3" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	165.86 37.32 6.22	83.00
22 13 16 00-0373	EA 5" x 2" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	225.33 43.43 7.24	96.58
22 13 16 00-0374	EA 5" x 3" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	234.77 43.43 7.24	96.58
22 13 16 00-0375	EA 5" x 4" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	235.93 43.43 7.24	96.58
22 13 16 00-0376	EA 6" x 4" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	244.64 45.24 7.54	100.62
22 13 16 00-0377	EA 8" x 6" No Hub Cast Iron Reducing Sanitary Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	488.21 60.81 10.14	135.23
22 13 16 00-0378	No Hub Cast Iron Sanitary Tapped Tees (22 13 16 00-0262)		
22 13 16 00-0379	EA 2" x 1-1/2 Or 1-1/4" No Hub Cast Iron Sanitary Tapped Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	69.44 13.50 2.25	30.03
22 13 16 00-0380	EA 3" x 1-1/2 Or 1-1/4" No Hub Cast Iron Sanitary Tapped Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	80.93 15.47 2.58	34.36
22 13 16 00-0381	EA 4" x 1-1/2 Or 1-1/4" No Hub Cast Iron Sanitary Tapped Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	98.21 20.46 3.41	45.47
22 13 16 00-0382	No Hub Cast Iron Cleanout Tees (22 13 16 00-0262)		
22 13 16 00-0383	EA 2" No Hub Cast Iron Cleanout Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	65.18 13.50 2.25	30.03
22 13 16 00-0384	EA 3" No Hub Cast Iron Cleanout Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	84.03 15.47 2.58	34.36
22 13 16 00-0385	EA 4" No Hub Cast Iron Cleanout Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	125.25 20.46 3.41	45.47



	Plumbing 22	
	Plumbing Piping 22 10	22
	Facility Sanitary Sewerage 22 13	

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0386	EA	6" No Hub Cast Iron Cleanout Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	211.97 30.21 5.03	67.14
22 13 16 00-0387		No Hub Cast Iron Two-Way Cleanout Tees (22 13 16 00-0262)		
22 13 16 00-0388	EA	4" No Hub Cast Iron Single Two-Way Cleanout Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	295.06 39.65 6.61	88.18
22 13 16 00-0389	EA	4" No Hub Cast Iron Double Two-Way Cleanout Tee <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	352.14 60.27 10.04	133.96
22 13 16 00-0390		No Hub Cast Iron Cleanout Plugs (22 13 16 00-0262)		
22 13 16 00-0391	EA	2" No Hub Cast Iron Cleanout Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	53.57 13.50 2.25	30.03
22 13 16 00-0392	EA	3" No Hub Cast Iron Cleanout Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	65.07 15.47 2.58	34.36
22 13 16 00-0393	EA	4" No Hub Cast Iron Cleanout Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	93.81 20.46 3.41	45.47
22 13 16 00-0394	EA	6" No Hub Cast Iron Cleanout Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	148.50 30.21 5.03	67.14
22 13 16 00-0395	EA	8" No Hub Cast Iron Cleanout Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	197.87 39.65 6.61	88.18
22 13 16 00-0396		No Hub Cast Iron Sanitary Crosses (22 13 16 00-0262)		
22 13 16 00-0397	EA	1-1/2" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	118.28 26.66 4.44	59.21
22 13 16 00-0398	EA	2" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	128.72 27.58 4.60	61.32
22 13 16 00-0399	EA	3" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	158.60 30.21 5.03	67.14
22 13 16 00-0400	EA	4" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	240.99 39.65 6.61	88.18
22 13 16 00-0401		No Hub Cast Iron Reducing Sanitary Crosses (22 13 16 00-0262)		
22 13 16 00-0402	EA	3" x 2" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	170.18 35.43 5.91	78.77
22 13 16 00-0403	EA	4" x 2" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	195.15 36.48 6.08	81.10
22 13 16 00-0404	EA	4" x 3" No Hub Cast Iron Sanitary Cross <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	215.68 38.07 6.35	84.70
22 13 16 00-0405		No Hub Cast Iron Reducers (22 13 16 00-0262)		
22 13 16 00-0406	EA	3" x 2" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	104.27 27.58 4.60	61.32
22 13 16 00-0407	EA	4" x 2" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	143.21 37.32 6.22	83.00
22 13 16 00-0408	EA	4" x 3" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	143.79 37.32 6.22	83.00
22 13 16 00-0409	EA	5" x 2" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	172.39 43.43 7.24	96.58
22 13 16 00-0410	EA	5" x 3" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	176.21 43.43 7.24	96.58
22 13 16 00-0411	EA	5" x 4" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	177.73 43.43 7.24	96.58
22 13 16 00-0412	EA	6" x 3" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	208.53 48.26 8.04	107.33
22 13 16 00-0413	EA	6" x 4" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	209.11 48.26 8.04	107.33

22 Plumbing**22 10 Plumbing Piping****22 13 Facility Sanitary Sewerage**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0414	EA 6" x 5" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	210.84 48.26 8.04	107.33
22 13 16 00-0415	EA 8" x 2" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	287.86 67.30 11.22	149.63
22 13 16 00-0416	EA 8" x 3" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	292.25 67.30 11.22	149.63
22 13 16 00-0417	EA 8" x 4" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	299.32 67.30 11.22	149.63
22 13 16 00-0418	EA 8" x 5" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	306.68 67.30 11.22	149.63
22 13 16 00-0419	EA 8" x 6" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	307.54 67.30 11.22	149.63
22 13 16 00-0420	EA 10" x 4" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	373.04 70.98 11.83	157.83
22 13 16 00-0421	EA 10" x 6" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	400.00 74.13 12.36	164.77
22 13 16 00-0422	EA 10" x 8" No Hub Cast Iron Reducer <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	451.32 80.44 13.41	178.86
22 13 16 00-0423 No Hub Cast Iron Blind Plugs (22 13 16 00-0262)			
22 13 16 00-0424	EA 1-1/2" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	28.65 6.47 1.08	14.39
22 13 16 00-0425	EA 2" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	29.28 6.75 1.13	15.01
22 13 16 00-0426	EA 3" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	37.83 7.74 1.29	17.24
22 13 16 00-0427	EA 4" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	50.23 10.22 1.70	22.73
22 13 16 00-0428	EA 5" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	69.81 11.94 1.99	26.58
22 13 16 00-0429	EA 6" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	77.03 14.02 2.34	31.12
22 13 16 00-0430	EA 8" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	155.60 18.01 3.00	40.06
22 13 16 00-0431	EA 10" No Hub Cast Iron Blind Plug <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	202.04 19.40 3.23	43.11
22 13 16 00-0432 No Hub Cast Iron P-Traps (22 13 16 00-0262)			
22 13 16 00-0433	EA 2" No Hub Cast Iron P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	70.01 13.50 2.25	30.03
22 13 16 00-0434	EA 3" No Hub Cast Iron P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	108.62 15.47 2.58	34.36
22 13 16 00-0435	EA 4" No Hub Cast Iron P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	167.30 20.46 3.41	45.47
22 13 16 00-0436	EA 5" No Hub Cast Iron P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	305.61 23.66 3.94	52.64
22 13 16 00-0437	EA 6" No Hub Cast Iron P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	321.05 28.23 4.71	62.77
22 13 16 00-0438 No Hub Cast Iron Deep Seal P-Traps (22 13 16 00-0262)			
22 13 16 00-0439	EA 2" No Hub Cast Iron Deep Seal P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	116.86 17.15 2.86	38.17
22 13 16 00-0440	EA 3" No Hub Cast Iron Deep Seal P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	171.34 22.82 3.80	50.75
22 13 16 00-0441	EA 4" No Hub Cast Iron Deep Seal P-Trap <i>For Work In Restricted Working Space, Add</i> <i>For Below Ground Installation, Add</i>	253.33 30.13 5.02	67.03

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				22 13 16 00-0442 No Hub Cast Iron Closet Flanges (22 13 16 00-0262)		
				22 13 16 00-0443 EA 4" No Hub Cast Iron Closet Flange.....	107.87	45.47
				<i>For Work In Restricted Working Space, Add</i>	20.46	
				<i>For Below Ground Installation, Add</i>	3.41	
				22 13 16 00-0444 EA 4" x 2-1/2" No Hub Cast Iron Offset Closet Flange.....	116.11	45.47
				<i>For Work In Restricted Working Space, Add</i>	20.46	
				<i>For Below Ground Installation, Add</i>	3.41	
				22 13 16 00-0445 No Hub Cast Iron Closet Bends (22 13 16 00-0262)		
				22 13 16 00-0446 EA 4" x 16" No Hub Cast Iron Closet Bend.....	223.48	45.47
				<i>For Work In Restricted Working Space, Add</i>	20.46	
				<i>For Below Ground Installation, Add</i>	3.41	
				22 13 16 00-0447 No Hub Cast Iron Threaded Adapter (22 13 16 00-0262)		
				22 13 16 00-0448 EA 1-1/4" No Hub Cast Iron Threaded Adapter.....	78.64	38.17
				<i>For Work In Restricted Working Space, Add</i>	17.15	
				<i>For Below Ground Installation, Add</i>	2.86	
				22 13 16 00-0449 EA 1-1/2" No Hub Cast Iron Threaded Adapter.....	85.28	38.17
				<i>For Work In Restricted Working Space, Add</i>	17.15	
				<i>For Below Ground Installation, Add</i>	2.86	
				22 13 16 00-0450 No Hub Couplings (22 13 16 00-0262)		
				Note: Includes stainless steel shield/clamps assembly with elastomeric gasket, ASTM C 564. (Fernco NH). Labor costs are included in the installation costs for fittings.		
				22 13 16 00-0451 EA 1-1/2" No Hub Coupling.....	10.35	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	1.35	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	2.79	
				22 13 16 00-0452 EA 2" No Hub Coupling.....	10.35	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	1.35	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	2.79	
				22 13 16 00-0453 EA 3" No Hub Coupling.....	12.29	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	1.60	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	3.32	
				22 13 16 00-0454 EA 4" No Hub Coupling.....	14.59	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	1.90	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	3.94	
				22 13 16 00-0455 EA 5" No Hub Coupling.....	33.73	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	4.38	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	9.11	
				22 13 16 00-0456 EA 6" No Hub Coupling.....	37.07	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	4.82	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	10.01	
				22 13 16 00-0457 EA 8" No Hub Coupling.....	69.83	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	9.08	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	18.85	
				22 13 16 00-0458 EA 10" No Hub Coupling.....	96.20	
				<i>For Medium Duty (Fernco MD-2000), Add</i>	12.51	
				<i>For Heavy Duty (Fernco HD-4000), Add</i>	25.97	
				22 13 16 00-0459 EA 2" x 1-1/2" No Hub Reducing Coupling.....	12.29	
				22 13 16 00-0460 EA 3" x 2" No Hub Reducing Coupling.....	19.06	
				22 13 16 00-0461 EA 4" x 2" No Hub Reducing Coupling.....	26.59	
				22 13 16 00-0462 EA 4" x 3" No Hub Reducing Coupling.....	22.65	
				22 13 16 00-0463 Cast Iron Mechanical Joint Couplings With Neoprene Gasket And Bolts (22 13 16 00-0262)		
				Note: For underground connections. Labor costs are included in the installation costs for fittings. See CSI section 22 13 16 00-0854 for additional FERNCO couplings.		
				22 13 16 00-0464 EA 1-1/2" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	47.51	
				22 13 16 00-0465 EA 2" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	49.04	
				22 13 16 00-0466 EA 3" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	51.49	
				22 13 16 00-0467 EA 4" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	60.07	
				22 13 16 00-0468 EA 5" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	113.40	
				22 13 16 00-0469 EA 6" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	155.70	
				22 13 16 00-0470 EA 8" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	272.78	
				22 13 16 00-0471 EA 10" Cast Iron Mechanical Joint Coupling With Neoprene Gasket And Bolts.....	416.84	
				22 13 16 00-0472 Cut And Prepare Existing Pipe In-Place (22 13 16 00-0262)		
				Note: For use when connecting pipe to an existing in-place system.		
				22 13 16 00-0473 EA Cut And Prepare 1-1/2" Cast Iron Pipe, No Hub.....	10.33	
				<i>For Work In Restricted Working Space, Add</i>	3.10	
				22 13 16 00-0474 EA Cut And Prepare 2" Cast Iron Pipe, No Hub.....	12.63	
				<i>For Work In Restricted Working Space, Add</i>	3.79	
				22 13 16 00-0475 EA Cut And Prepare 3" Cast Iron Pipe, No Hub.....	13.78	
				<i>For Work In Restricted Working Space, Add</i>	4.13	
				22 13 16 00-0476 EA Cut And Prepare 4" Cast Iron Pipe, No Hub.....	17.22	
				<i>For Work In Restricted Working Space, Add</i>	5.17	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 13 16 00-0477	EA		Cut And Prepare 6" Cast Iron Pipe, No Hub <i>For Work In Restricted Working Space, Add</i>	20.66 6.20	
22 13 16 00-0478	EA		Cut And Prepare 8" Cast Iron Pipe, No Hub <i>For Work In Restricted Working Space, Add</i>	27.56 8.27	
22 13 16 00-0479	EA		Cut And Prepare 10" Cast Iron Pipe, No Hub <i>For Work In Restricted Working Space, Add</i>	32.15 9.65	
22 13 16 00-0480			Copper Drain-Waste-Vent (DWV) Pipe ^(22 13 16) See CSI section 22 11 16 00-0424 for copper and brass fittings.		
22 13 16 00-0481	LF		1-1/4" Hard Drawn DWV Copper Tube/Pipe	17.08	4.97
22 13 16 00-0482	LF		1-1/2" Hard Drawn DWV Copper Tube/Pipe	20.40	5.55
22 13 16 00-0483	LF		2" Hard Drawn DWV Copper Tube/Pipe	26.29	6.85
22 13 16 00-0484	LF		3" Hard Drawn DWV Copper Tube/Pipe	56.39	9.48
22 13 16 00-0485	LF		4" Hard Drawn DWV Copper Tube/Pipe	79.05	10.70
22 13 16 00-0486	LF		5" Hard Drawn DWV Copper Tube/Pipe	156.37	12.29
22 13 16 00-0487	LF		6" Hard Drawn DWV Copper Tube/Pipe	222.85	19.04
22 13 16 00-0488			Polyvinyl Chloride (PVC) Drain-Waste-Vent (DWV) Pipe And Fittings ^(22 13 16) Note: Aboveground installation. See CSI section 33 31 11 00-0018 for underground installation.		
22 13 16 00-0489			Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assemblies ^(22 13 16 00-0488)		
22 13 16 00-0490			Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assemblies ^(22 13 16 00-0489) Note: Includes all fittings. Fittings are assumed every 20'. Excludes excavation, backfill and compaction. Not for use where detail is available. Not for use where detail is available.		
22 13 16 00-0491	LF		1-1/2" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	13.50 2.48	
22 13 16 00-0492	LF		2" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	16.29 3.01	
22 13 16 00-0493	LF		3" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	27.38 4.26	
22 13 16 00-0494	LF		4" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	35.81 4.70	
22 13 16 00-0495	LF		6" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	65.10 6.05	
22 13 16 00-0496	LF		8" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	93.84 8.08	
22 13 16 00-0497	LF		10" Underground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	137.02 10.77	
22 13 16 00-0498			Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assemblies ^(22 13 16 00-0489) Note: Includes all hangers and couplings, elbow, tee and reducer fittings. All hangers are complete assemblies installed in accordance with uniform plumbing code. Not for use where detail is available.		
22 13 16 00-0499	LF		1-1/2" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	27.24 5.09	4.44
22 13 16 00-0500	LF		2" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	30.63 5.66	5.29
22 13 16 00-0501	LF		3" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	44.54 7.03	7.62
22 13 16 00-0502	LF		4" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	56.48 7.68	8.25
22 13 16 00-0503	LF		6" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	88.95 9.84	10.58
22 13 16 00-0504	LF		8" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly..... <i>For Work In Restricted Working Space, Add</i>	118.99 11.27	14.06



Plumbing	22	22
Plumbing Piping	22 10	
Facility Sanitary Sewerage	22 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0505	LF		10" Aboveground Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe Assembly Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i>	167.74 14.69	18.82
22 13 16 00-0506			Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe (22 13 16 00-0488) Note: Excludes fittings or hangers.		
22 13 16 00-0507			Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe (ASTM D-2665) (22 13 16 00-0506) Note: Excludes fittings or hangers.		
22 13 16 00-0508	LF		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	10.48 1.98	4.44
22 13 16 00-0509	LF		2" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	12.98 2.38	5.29
22 13 16 00-0510	LF		3" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	21.52 3.41	7.62
22 13 16 00-0511	LF		4" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	26.66 3.70	8.25
22 13 16 00-0512	LF		6" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	41.03 4.65	10.34
22 13 16 00-0513	LF		8" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	59.44 6.20	13.75
22 13 16 00-0514	LF		10" Schedule 40 Polyvinyl Chloride (PVC) DWV Pipe..... <i>For Work In Restricted Working Space, Add</i>	86.95 8.27	18.41
22 13 16 00-0515			Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe (ASTM F-891) (22 13 16 00-0506) Note: Excludes fittings or hangers.		
22 13 16 00-0516	LF		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	9.32 1.98	4.44
22 13 16 00-0517	LF		2" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	11.62 2.38	5.29
22 13 16 00-0518	LF		3" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	18.93 3.41	7.62
22 13 16 00-0519	LF		4" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	23.22 3.70	8.25
22 13 16 00-0520	LF		6" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	34.62 4.65	10.34
22 13 16 00-0521	LF		8" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	50.43 6.20	13.75
22 13 16 00-0522	LF		10" Schedule 40 Polyvinyl Chloride (PVC) DWV "Foam-Core" Pipe..... <i>For Work In Restricted Working Space, Add</i>	77.15 8.27	18.41
22 13 16 00-0523			Polyvinyl Chloride (PVC) DWV Fittings (ASTM D-2665) (22 13 16 00-0488)		
22 13 16 00-0524			Polyvinyl Chloride (PVC) DWV 1/4 Bends (22 13 16 00-0523)		
22 13 16 00-0525	EA		1-1/2" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	34.05 7.93	17.66
22 13 16 00-0526	EA		2" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	43.49 10.15	22.52
22 13 16 00-0527	EA		3" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	75.48 13.64	30.24
22 13 16 00-0528	EA		4" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	116.56 15.86	35.21
22 13 16 00-0529	EA		6" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	156.27 20.62	45.78
22 13 16 00-0530	EA		8" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	216.34 27.75	61.65
22 13 16 00-0531	EA		10" Polyvinyl Chloride (PVC) DWV 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	298.56 37.01	82.16
22 13 16 00-0532			Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends (22 13 16 00-0523)		
22 13 16 00-0533	EA		1-1/2" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	55.43 7.93	17.66
22 13 16 00-0534	EA		2" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	55.79 10.15	22.52
22 13 16 00-0535	EA		3" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	107.11 13.64	30.24
22 13 16 00-0536	EA		4" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	174.54 15.86	35.21
22 13 16 00-0537	EA		6" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	244.28 20.62	45.78
22 13 16 00-0538	EA		8" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	309.16 27.75	61.65
22 13 16 00-0539	EA		10" Polyvinyl Chloride (PVC) DWV Long Sweep 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	395.92 37.01	82.16
22 13 16 00-0540			Polyvinyl Chloride (PVC) DWV 1/8 Bends (22 13 16 00-0523)		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0541	EA		1-1/2" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	35.81 7.93	17.66
22 13 16 00-0542	EA		2" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	43.35 10.15	22.52
22 13 16 00-0543	EA		3" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	72.85 13.64	30.24
22 13 16 00-0544	EA		4" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	103.67 15.86	35.21
22 13 16 00-0545	EA		6" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	423.47 20.62	45.78
22 13 16 00-0546	EA		8" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	680.11 27.75	61.65
22 13 16 00-0547	EA		10" Polyvinyl Chloride (PVC) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	774.33 37.01	82.16
22 13 16 00-0548			Polyvinyl Chloride (PVC) DWV Sanitary Tees (22 13 16 00-0523)		
22 13 16 00-0549	EA		1-1/2" Polyvinyl Chloride (PVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	53.27 11.90	26.44
22 13 16 00-0550	EA		2" Polyvinyl Chloride (PVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	70.22 15.23	33.83
22 13 16 00-0551	EA		3" Polyvinyl Chloride (PVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	120.02 20.46	45.47
22 13 16 00-0552	EA		4" Polyvinyl Chloride (PVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	178.13 23.79	52.87
22 13 16 00-0553	EA		6" Polyvinyl Chloride (PVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	677.92 30.93	68.62
22 13 16 00-0554	EA		8" Polyvinyl Chloride (PVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	881.88 41.63	92.41
22 13 16 00-0555			Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees (22 13 16 00-0523)		
22 13 16 00-0556	EA		2" x 1-1/2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	67.95 13.01	28.86
22 13 16 00-0557	EA		2" x 1-1/2" x 2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	81.02 14.12	31.30
22 13 16 00-0558	EA		2" x 2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	66.52 14.12	31.30
22 13 16 00-0559	EA		3" x 3" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	98.36 17.60	39.12
22 13 16 00-0560	EA		3" x 3" x 2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	100.15 18.71	41.56
22 13 16 00-0561	EA		4" x 4" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	119.38 19.83	43.98
22 13 16 00-0562	EA		4" x 4" x 2" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	203.75 20.94	46.52
22 13 16 00-0563	EA		4" x 4" x 3" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	257.73 22.68	50.33
22 13 16 00-0564	EA		6" x 6" x 4" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	651.07 28.55	63.34
22 13 16 00-0565	EA		8" x 8" x 4" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	2,054.01 35.69	79.19
22 13 16 00-0566	EA		8" x 8" x 6" Polyvinyl Chloride (PVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	2,124.34 38.06	84.48
22 13 16 00-0567			Polyvinyl Chloride (PVC) DWV Double Sanitary Tees (22 13 16 00-0523)		
22 13 16 00-0568	EA		1-1/2" Polyvinyl Chloride (PVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	93.86 15.86	35.21
22 13 16 00-0569	EA		2" Polyvinyl Chloride (PVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	127.70 20.30	45.04
22 13 16 00-0570	EA		3" Polyvinyl Chloride (PVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	259.30 27.28	60.59
22 13 16 00-0571	EA		4" Polyvinyl Chloride (PVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	376.44 31.72	70.42
22 13 16 00-0572			Polyvinyl Chloride (PVC) DWV Reducing Double Sanitary Tees (22 13 16 00-0523)		
22 13 16 00-0573	EA		2" x 2" x 1-1/2" x 1-1/2 Polyvinyl Chloride (PVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	114.52 18.08	40.18
22 13 16 00-0574	EA		3" x 3" x 1-1/2" x 1-1/2 Polyvinyl Chloride (PVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	199.34 21.57	47.89
22 13 16 00-0575	EA		3" x 3" x 2" x 2" Polyvinyl Chloride (PVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	230.31 23.79	52.87
22 13 16 00-0576	EA		4" x 4" x 2" x 2" Polyvinyl Chloride (PVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	419.25 26.01	57.73
22 13 16 00-0577	EA		4" x 4" x 3" x 3" Polyvinyl Chloride (PVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	440.02 29.50	65.45
22 13 16 00-0578			Polyvinyl Chloride (PVC) DWV Reducers (22 13 16 00-0523)		
22 13 16 00-0579	EA		2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	45.36 9.04	20.09

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0580	EA			3" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	84.56 10.79	23.90
22 13 16 00-0581	EA			3" x 2" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	80.35 11.90	26.44
22 13 16 00-0582	EA			4" x 2" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	123.87 13.01	28.86
22 13 16 00-0583	EA			4" x 3" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	133.34 14.75	32.78
22 13 16 00-0584	EA			6" x 3" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	482.40 17.13	38.06
22 13 16 00-0585	EA			6" x 4" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	402.37 18.24	40.50
22 13 16 00-0586	EA			8" x 4" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	1,009.94 21.81	48.43
22 13 16 00-0587	EA			8" x 6" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	851.77 24.19	53.72
22 13 16 00-0588	EA			10" x 6" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	1,145.63 28.81	63.97
22 13 16 00-0589	EA			10" x 8" Polyvinyl Chloride (PVC) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	895.34 32.38	71.90
22 13 16 00-0590				Polyvinyl Chloride (PVC) DWV P-Traps (22 13 16 00-0523)		
22 13 16 00-0591	EA			1-1/2" Polyvinyl Chloride (PVC) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	66.30 11.90	26.44
22 13 16 00-0592	EA			2" Polyvinyl Chloride (PVC) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	87.06 15.23	33.83
22 13 16 00-0593	EA			3" Polyvinyl Chloride (PVC) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	249.00 20.46	45.47
22 13 16 00-0594	EA			4" Polyvinyl Chloride (PVC) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	509.88 23.79	52.87
22 13 16 00-0595	EA			6" Polyvinyl Chloride (PVC) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	864.41 30.93	68.62
22 13 16 00-0596				Polyvinyl Chloride (PVC) DWV Closet Flanges (22 13 16 00-0523)		
22 13 16 00-0597	EA			4" Polyvinyl Chloride (PVC) DWV Closet Flanges <i>For Work In Restricted Working Space, Add</i>	103.97 15.86	35.21
22 13 16 00-0598	EA			4" x 3" Polyvinyl Chloride (PVC) DWV Closet Flanges <i>For Work In Restricted Working Space, Add</i>	84.88 14.75	32.78
22 13 16 00-0599				Polyvinyl Chloride (PVC) DWV Wyes (22 13 16 00-0523)		
22 13 16 00-0600	EA			1-1/2" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	66.88 11.90	26.44
22 13 16 00-0601	EA			2" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	78.13 15.23	33.83
22 13 16 00-0602	EA			3" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	130.12 20.46	45.47
22 13 16 00-0603	EA			4" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	194.67 23.79	52.87
22 13 16 00-0604	EA			6" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	615.84 30.93	68.62
22 13 16 00-0605	EA			8" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	763.96 41.63	92.41
22 13 16 00-0606	EA			10" Polyvinyl Chloride (PVC) DWV Wyes <i>For Work In Restricted Working Space, Add</i>	1,005.40 55.51	123.18
22 13 16 00-0607				Polyvinyl Chloride (PVC) DWV Reducing Wyes (22 13 16 00-0523)		
22 13 16 00-0608	EA			2" x 1-1/2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	91.96 13.01	28.86
22 13 16 00-0609	EA			2" x 2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	95.22 14.12	31.30
22 13 16 00-0610	EA			3" x 3" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	134.35 17.60	39.12
22 13 16 00-0611	EA			3" x 3" x 2" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	110.26 18.71	41.56
22 13 16 00-0612	EA			4" x 4" x 1-1/2" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	186.23 19.83	43.98
22 13 16 00-0613	EA			4" x 4" x 2" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	162.47 20.94	46.52
22 13 16 00-0614	EA			4" x 4" x 3" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	183.79 22.68	50.33
22 13 16 00-0615	EA			6" x 6" x 3" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	556.60 27.44	60.90
22 13 16 00-0616	EA			6" x 6" x 4" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	690.07 28.55	63.34
22 13 16 00-0617	EA			8" x 8" x 4" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	654.78 35.69	79.19
22 13 16 00-0618	EA			8" x 8" x 6" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	827.99 38.06	84.48

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0619	EA		10" x 10" x 4" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	753.49 44.94	99.71
22 13 16 00-0620	EA		10" x 10" x 6" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	940.96 47.31	105.00
22 13 16 00-0621	EA		10" x 10" x 8" Polyvinyl Chloride (PVC) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	1,096.23 50.88	112.92
22 13 16 00-0622			Polyvinyl Chloride (PVC) DWV Double Wyes (22 13 16 00-0523)		
22 13 16 00-0623	EA		1-1/2" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	110.85 15.86	35.21
22 13 16 00-0624	EA		2" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	142.19 20.30	45.04
22 13 16 00-0625	EA		3" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	283.46 27.28	60.59
22 13 16 00-0626	EA		4" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	496.05 31.72	70.42
22 13 16 00-0627	EA		6" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	1,021.43 41.24	91.57
22 13 16 00-0628	EA		8" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	1,182.69 55.51	123.28
22 13 16 00-0629	EA		10" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	1,836.43 74.01	164.31
22 13 16 00-0630			Polyvinyl Chloride (PVC) DWV Reducing Double Wyes (22 13 16 00-0523)		
22 13 16 00-0631	EA		2" x 2" x 1-1/2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	128.34 18.08	40.18
22 13 16 00-0632	EA		3" x 3" x 1-1/2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	240.83 21.57	47.89
22 13 16 00-0633	EA		3" x 3" x 2" x 2" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	222.63 23.79	52.87
22 13 16 00-0634	EA		4" x 4" x 2" x 2" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	320.68 26.01	57.73
22 13 16 00-0635	EA		4" x 4" x 3" x 3" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	407.41 29.50	65.45
22 13 16 00-0636	EA		6" x 6" x 4" x 4" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	629.22 36.48	80.99
22 13 16 00-0637	EA		8" x 8" x 4" x 4" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	736.47 43.61	96.85
22 13 16 00-0638	EA		8" x 8" x 6" x 6" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	938.35 48.37	107.42
22 13 16 00-0639	EA		10" x 10" x 4" x 4" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	991.16 52.86	117.37
22 13 16 00-0640	EA		10" x 10" x 6" x 6" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	1,288.47 57.62	127.93
22 13 16 00-0641	EA		10" x 10" x 8" x 8" Polyvinyl Chloride (PVC) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	1,558.84 64.76	143.80
22 13 16 00-0642			Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends (22 13 16 00-0523)		
22 13 16 00-0643	EA		1-1/2" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	83.87 11.90	26.44
22 13 16 00-0644	EA		2" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	104.63 15.23	33.83
22 13 16 00-0645	EA		3" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	209.76 20.46	45.47
22 13 16 00-0646	EA		4" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	373.28 23.79	52.87
22 13 16 00-0647			Polyvinyl Chloride (PVC) DWV Reducing Combination Wye And 1/8 Bends (22 13 16 00-0523)		
22 13 16 00-0648	EA		2" x 2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	158.61 14.12	31.30
22 13 16 00-0649	EA		3" x 3" x 1-1/2" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	252.50 17.60	39.12
22 13 16 00-0650	EA		3" x 3" x 2" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	183.52 18.71	41.56
22 13 16 00-0651	EA		4" x 4" x 2" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	339.28 20.94	46.52
22 13 16 00-0652	EA		4" x 4" x 3" Polyvinyl Chloride (PVC) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	367.49 22.68	50.33
22 13 16 00-0653			Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends (22 13 16 00-0523)		
22 13 16 00-0654	EA		1-1/2" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	124.02 15.86	35.21
22 13 16 00-0655	EA		2" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	143.66 20.30	45.04
22 13 16 00-0656	EA		3" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	222.99 27.28	60.59



Plumbing	22	22
Plumbing Piping	22 10	
Facility Sanitary Sewerage	22 13	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 16 00-0657	EA 4" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	801.46 31.72	70.42
22 13 16 00-0658	EA 6" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	2,663.30 41.24	91.57
22 13 16 00-0659	Polyvinyl Chloride (PVC) DWV Reducing Double Combination Wye And 1/8 Bends (22 13 16 00-0523)		
22 13 16 00-0660	EA 2" x 2" x 1-1/2" x 1-1/2" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	293.08 18.08	40.18
22 13 16 00-0661	EA 3" x 3" x 2" x 2" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	473.75 23.79	52.87
22 13 16 00-0662	EA 4" x 4" x 2" x 2" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	821.83 26.01	57.73
22 13 16 00-0663	EA 4" x 4" x 3" x 3" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	741.70 29.50	65.45
22 13 16 00-0664	EA 6" x 6" x 4" x 4" Polyvinyl Chloride (PVC) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	1,771.74 36.48	80.99
22 13 16 00-0665	Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug (22 13 16 00-0523)		
22 13 16 00-0666	EA 2" Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	180.35 15.23	33.83
22 13 16 00-0667	EA 3" Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	315.78 20.46	45.47
22 13 16 00-0668	EA 4" Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	509.96 23.79	52.87
22 13 16 00-0669	EA 6" Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	1,354.47 30.93	68.62
22 13 16 00-0670	EA 8" Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	1,696.81 41.63	92.41
22 13 16 00-0671	EA 10" Polyvinyl Chloride (PVC) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	2,251.63 55.51	123.18
22 13 16 00-0672	Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug (22 13 16 00-0523)		
22 13 16 00-0673	EA 1-1/2" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	48.84 7.93	17.66
22 13 16 00-0674	EA 2" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	69.99 10.15	22.52
22 13 16 00-0675	EA 3" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	101.11 13.64	30.24
22 13 16 00-0676	EA 4" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	183.61 15.86	35.21
22 13 16 00-0677	EA 6" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	427.58 20.62	45.78
22 13 16 00-0678	EA 8" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	967.53 27.75	61.65
22 13 16 00-0679	EA 10" Polyvinyl Chloride (PVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	1,787.85 36.98	82.16
22 13 16 00-0680	Polyvinyl Chloride (PVC) Couplings (22 13 16 00-0523)		
22 13 16 00-0681	EA 1-1/2" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	33.08 7.93	17.66
22 13 16 00-0682	EA 2" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	41.30 10.15	22.52
22 13 16 00-0683	EA 3" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	64.55 13.64	30.24
22 13 16 00-0684	EA 4" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	84.23 15.86	35.21
22 13 16 00-0685	EA 6" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	241.81 20.62	45.78
22 13 16 00-0686	EA 8" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	592.50 27.75	61.65
22 13 16 00-0687	EA 10" Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	898.15 37.01	82.16
22 13 16 00-0688	Polyvinyl Chloride (PVC) Male Adapters (22 13 16 00-0523)		
22 13 16 00-0689	EA 1-1/2" Polyvinyl Chloride (PVC) Male Adapters	19.94	8.77
22 13 16 00-0690	EA 2" Polyvinyl Chloride (PVC) Male Adapters	33.44	11.31
22 13 16 00-0691	EA 3" Polyvinyl Chloride (PVC) Male Adapters	68.56	15.12
22 13 16 00-0692	EA 4" Polyvinyl Chloride (PVC) Male Adapters	131.48	17.66
22 13 16 00-0693	Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe (22 13 16 00-0488)		
	Note: In place piping.		
22 13 16 00-0694	EA 1-1/2", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe	7.75	
22 13 16 00-0695	EA 2", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe	8.53	
22 13 16 00-0696	EA 3", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe	10.85	
22 13 16 00-0697	EA 4", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe	14.64	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 13 16 00-0698	EA	6", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe.....	20.92	
22 13 16 00-0699	EA	8", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe.....	27.90	
22 13 16 00-0700	EA	10", Cut And Prepare Existing Polyvinyl Chloride (PVC) DWV Pipe.....	34.11	
22 13 16 00-0701		Acrylonitrile Butadiene Styrene (ABS) Drain-Waste-Vent (DWV) Pipe And Fittings <small>(22 13 16)</small>		
		Note: Aboveground installation.		
22 13 16 00-0702		Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV Pipe Assemblies <small>(22 13 16 00-0701)</small>		
		Note: Includes all hangers and couplings, elbow, tee and reducer fittings. All hangers are complete assemblies installed in accordance with uniform plumbing code. Not for use where detail is available.		
22 13 16 00-0703	LF	1-1/2" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV Pipe Assembly	28.39	4.44
		Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Work In Restricted Working Space, Add</i>	6.08	
22 13 16 00-0704	LF	2" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV Pipe Assembly	31.58	5.29
		Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Work In Restricted Working Space, Add</i>	6.74	
22 13 16 00-0705	LF	3" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV Pipe Assembly	44.42	7.62
		Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Work In Restricted Working Space, Add</i>	8.37	
22 13 16 00-0706	LF	4" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV Pipe Assembly	51.72	8.25
		Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Work In Restricted Working Space, Add</i>	9.29	
22 13 16 00-0707	LF	6" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV Pipe Assembly	91.18	10.58
		Note: Includes all fittings, couplings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Work In Restricted Working Space, Add</i>	12.36	
22 13 16 00-0708		Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV "Foam-Core" Pipe (ASTM F-628) <small>(22 13 16 00-0701)</small>		
		Note: Excludes fittings or hangers.		
22 13 16 00-0709	LF	1-1/2" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV "Foam-Core" Pipe	10.03	4.44
		<i>For Work In Restricted Working Space, Add</i>	1.98	
22 13 16 00-0710	LF	2" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV "Foam-Core" Pipe	12.52	5.29
		<i>For Work In Restricted Working Space, Add</i>	2.38	
22 13 16 00-0711	LF	3" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV "Foam-Core" Pipe	20.86	7.62
		<i>For Work In Restricted Working Space, Add</i>	3.41	
22 13 16 00-0712	LF	4" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV "Foam-Core" Pipe	25.91	8.25
		<i>For Work In Restricted Working Space, Add</i>	3.70	
22 13 16 00-0713	LF	6" Schedule 40 Acrylonitrile Butadiene Styrene (ABS) DWV "Foam-Core" Pipe	43.16	10.34
		<i>For Work In Restricted Working Space, Add</i>	4.65	
22 13 16 00-0714		Acrylonitrile Butadiene Styrene (ABS) DWV Fittings (ASTM D-2661) <small>(22 13 16 00-0701)</small>		
22 13 16 00-0715		Acrylonitrile Butadiene Styrene (ABS) DWV 1/4 Bends <small>(22 13 16 00-0714)</small>		
22 13 16 00-0716	EA	1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV 1/4 Bends.....	40.98	17.66
		<i>For Work In Restricted Working Space, Add</i>	7.93	
22 13 16 00-0717	EA	2" Acrylonitrile Butadiene Styrene (ABS) DWV 1/4 Bends.....	54.57	22.52
		<i>For Work In Restricted Working Space, Add</i>	10.15	
22 13 16 00-0718	EA	3" Acrylonitrile Butadiene Styrene (ABS) DWV 1/4 Bends.....	109.48	30.24
		<i>For Work In Restricted Working Space, Add</i>	13.64	
22 13 16 00-0719	EA	4" Acrylonitrile Butadiene Styrene (ABS) DWV 1/4 Bends.....	178.29	35.21
		<i>For Work In Restricted Working Space, Add</i>	15.86	
22 13 16 00-0720	EA	6" Acrylonitrile Butadiene Styrene (ABS) DWV 1/4 Bends.....	536.84	45.78
		<i>For Work In Restricted Working Space, Add</i>	20.62	
22 13 16 00-0721		Acrylonitrile Butadiene Styrene (ABS) DWV Long Sweep 1/4 Bends <small>(22 13 16 00-0714)</small>		
22 13 16 00-0722	EA	1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Long Sweep 1/4 Bends.....	61.09	17.66
		<i>For Work In Restricted Working Space, Add</i>	7.93	
22 13 16 00-0723	EA	2" Acrylonitrile Butadiene Styrene (ABS) DWV Long Sweep 1/4 Bends.....	74.23	22.52
		<i>For Work In Restricted Working Space, Add</i>	10.15	
22 13 16 00-0724	EA	3" Acrylonitrile Butadiene Styrene (ABS) DWV Long Sweep 1/4 Bends.....	158.28	30.24
		<i>For Work In Restricted Working Space, Add</i>	13.64	
22 13 16 00-0725	EA	4" Acrylonitrile Butadiene Styrene (ABS) DWV Long Sweep 1/4 Bends.....	275.38	35.21
		<i>For Work In Restricted Working Space, Add</i>	15.86	
22 13 16 00-0726		Acrylonitrile Butadiene Styrene (ABS) DWV 1/8 Bends <small>(22 13 16 00-0714)</small>		
22 13 16 00-0727	EA	1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV 1/8 Bends.....	43.71	17.66
		<i>For Work In Restricted Working Space, Add</i>	7.93	
22 13 16 00-0728	EA	2" Acrylonitrile Butadiene Styrene (ABS) DWV 1/8 Bends.....	52.67	22.52
		<i>For Work In Restricted Working Space, Add</i>	10.15	
22 13 16 00-0729	EA	3" Acrylonitrile Butadiene Styrene (ABS) DWV 1/8 Bends.....	99.47	30.24
		<i>For Work In Restricted Working Space, Add</i>	13.64	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0730 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	159.82 15.86	35.21
22 13 16 00-0731 EA 6" Acrylonitrile Butadiene Styrene (ABS) DWV 1/8 Bends..... <i>For Work In Restricted Working Space, Add</i>	556.33 20.62	45.78
22 13 16 00-0732 Acrylonitrile Butadiene Styrene (ABS) DWV Sanitary Tees (22 13 16 00-0714)		
22 13 16 00-0733 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	64.41 11.90	26.44
22 13 16 00-0734 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	87.97 15.23	33.83
22 13 16 00-0735 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	163.04 20.46	45.47
22 13 16 00-0736 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	261.54 23.79	52.87
22 13 16 00-0737 EA 6" Acrylonitrile Butadiene Styrene (ABS) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	1,090.93 30.93	68.62
22 13 16 00-0738 Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees (22 13 16 00-0714)		
22 13 16 00-0739 EA 2" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	82.84 13.01	28.86
22 13 16 00-0740 EA 2" x 1-1/2" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	102.50 14.12	31.30
22 13 16 00-0741 EA 2" x 2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	82.73 14.12	31.30
22 13 16 00-0742 EA 3" x 3" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	131.13 17.60	39.12
22 13 16 00-0743 EA 3" x 3" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	135.49 18.71	41.56
22 13 16 00-0744 EA 4" x 4" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	328.76 19.83	43.98
22 13 16 00-0745 EA 4" x 4" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	314.98 20.94	46.52
22 13 16 00-0746 EA 4" x 4" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	363.12 22.68	50.33
22 13 16 00-0747 EA 6" x 6" x 4" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	1,199.62 28.55	63.34
22 13 16 00-0748 Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees (22 13 16 00-0714)		
22 13 16 00-0749 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	128.10 15.86	35.21
22 13 16 00-0750 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	177.43 20.30	45.04
22 13 16 00-0751 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	399.25 27.28	60.59
22 13 16 00-0752 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	599.89 31.72	70.42
22 13 16 00-0753 Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Double Sanitary Tees (22 13 16 00-0714)		
22 13 16 00-0754 EA 2" x 2" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	145.59 18.08	40.18
22 13 16 00-0755 EA 3" x 3" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	229.04 21.57	47.89
22 13 16 00-0756 EA 3" x 3" x 2" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	265.23 23.79	52.87
22 13 16 00-0757 EA 4" x 4" x 2" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	494.29 25.44	56.46
22 13 16 00-0758 EA 4" x 4" x 3" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Double Sanitary Tees <i>For Work In Restricted Working Space, Add</i>	516.98 28.85	64.01
22 13 16 00-0759 Acrylonitrile Butadiene Styrene (ABS) DWV Wyes (22 13 16 00-0714)		
22 13 16 00-0760 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Wyes..... <i>For Work In Restricted Working Space, Add</i>	89.51 11.90	26.44
22 13 16 00-0761 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Wyes..... <i>For Work In Restricted Working Space, Add</i>	101.94 15.23	33.83
22 13 16 00-0762 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Wyes..... <i>For Work In Restricted Working Space, Add</i>	181.49 20.46	45.47
22 13 16 00-0763 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Wyes..... <i>For Work In Restricted Working Space, Add</i>	290.38 23.79	52.87
22 13 16 00-0764 EA 6" Acrylonitrile Butadiene Styrene (ABS) DWV Wyes..... <i>For Work In Restricted Working Space, Add</i>	877.64 30.93	68.62
22 13 16 00-0765 Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes (22 13 16 00-0714)		
22 13 16 00-0766 EA 2" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	132.31 13.01	28.86

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0767	EA		2" x 2" X 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	135.10 14.12	31.30
22 13 16 00-0768	EA		3" x 3" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	150.43 18.71	41.56
22 13 16 00-0769	EA		4" x 4" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	239.39 20.94	46.52
22 13 16 00-0770	EA		4" x 4" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	273.74 22.68	50.33
22 13 16 00-0771	EA		6" x 6" x 4" Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Wyes <i>For Work In Restricted Working Space, Add</i>	735.09 28.55	63.34
22 13 16 00-0772			Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <small>(22 13 16 00-0714)</small>		
22 13 16 00-0773	EA		1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	158.91 15.86	35.21
22 13 16 00-0774	EA		2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	204.07 20.30	45.04
22 13 16 00-0775	EA		3" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	443.55 27.28	60.59
22 13 16 00-0776	EA		4" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	820.04 31.72	70.42
22 13 16 00-0777			Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Double Wyes <small>(22 13 16 00-0714)</small>		
22 13 16 00-0778	EA		2" x 2" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	184.84 18.08	40.18
22 13 16 00-0779	EA		3" x 3" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	320.63 21.57	47.89
22 13 16 00-0780	EA		3" x 3" x 2" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	341.09 23.79	52.87
22 13 16 00-0781	EA		4" x 4" x 2" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	514.97 26.01	57.73
22 13 16 00-0782	EA		4" x 4" x 3" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Double Wyes <i>For Work In Restricted Working Space, Add</i>	664.04 29.50	65.45
22 13 16 00-0783			Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bend <small>(22 13 16 00-0714)</small>		
22 13 16 00-0784	EA		1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	119.29 11.90	26.44
22 13 16 00-0785	EA		2" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	154.25 15.23	33.83
22 13 16 00-0786	EA		3" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	238.73 20.46	45.47
22 13 16 00-0787	EA		4" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	412.33 23.27	51.70
22 13 16 00-0788			Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Combination Wye And 1/8 Bend <small>(22 13 16 00-0714)</small>		
22 13 16 00-0789	EA		2" x 2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	130.87 14.12	31.30
22 13 16 00-0790	EA		3" x 3" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	257.15 17.60	39.12
22 13 16 00-0791	EA		3" x 3" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	186.41 18.71	41.56
22 13 16 00-0792	EA		4" x 4" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	346.06 20.94	46.52
22 13 16 00-0793	EA		4" x 4" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	374.76 22.68	50.33
22 13 16 00-0794			Acrylonitrile Butadiene Styrene (ABS) DWV Double Combination Wye And 1/8 Bend <small>(22 13 16 00-0714)</small>		
22 13 16 00-0795	EA		2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	255.05 20.30	45.04
22 13 16 00-0796	EA		3" Acrylonitrile Butadiene Styrene (ABS) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	523.10 27.28	60.59
22 13 16 00-0797			Acrylonitrile Butadiene Styrene (ABS) DWV Reducing Double Combination Wye And 1/8 Bend <small>(22 13 16 00-0714)</small>		
22 13 16 00-0798	EA		2" x 2" x 1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	211.05 18.08	40.18
22 13 16 00-0799	EA		3" x 3" x 2" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Double Combination Wye And 1/8 Bends <i>For Work In Restricted Working Space, Add</i>	504.10 23.79	52.87
22 13 16 00-0800			Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Tees With Plug <small>(22 13 16 00-0714)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0801 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	133.32 11.90	26.44
22 13 16 00-0802 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	168.28 15.23	33.83
22 13 16 00-0803 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	270.08 20.46	45.47
22 13 16 00-0804 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Tees With Plug <i>For Work In Restricted Working Space, Add</i>	456.69 23.79	52.87
22 13 16 00-0805 Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Adapters With Plug⁽²²⁾ <small>13 16 00-0714)</small>		
22 13 16 00-0806 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	58.55 7.93	17.66
22 13 16 00-0807 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	85.66 10.15	22.52
22 13 16 00-0808 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	125.11 13.64	30.24
22 13 16 00-0809 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	240.37 15.86	35.21
22 13 16 00-0810 EA 6" Acrylonitrile Butadiene Styrene (ABS) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	583.48 20.62	45.78
22 13 16 00-0811 Acrylonitrile Butadiene Styrene (ABS) DWV Couplings^(22 13 16 00-0714)		
22 13 16 00-0812 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Couplings <i>For Work In Restricted Working Space, Add</i>	37.51 7.93	17.66
22 13 16 00-0813 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Couplings <i>For Work In Restricted Working Space, Add</i>	45.50 10.15	22.52
22 13 16 00-0814 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Couplings <i>For Work In Restricted Working Space, Add</i>	77.22 13.64	30.24
22 13 16 00-0815 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Couplings <i>For Work In Restricted Working Space, Add</i>	105.21 15.86	35.21
22 13 16 00-0816 EA 6" Acrylonitrile Butadiene Styrene (ABS) DWV Couplings <i>For Work In Restricted Working Space, Add</i>	327.44 20.62	45.78
22 13 16 00-0817 Acrylonitrile Butadiene Styrene (ABS) DWV Reducers^(22 13 16 00-0714)		
22 13 16 00-0818 EA 2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	58.19 9.04	20.09
22 13 16 00-0819 EA 3" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	124.91 10.79	23.90
22 13 16 00-0820 EA 3" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	114.24 11.90	26.44
22 13 16 00-0821 EA 4" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	190.48 13.01	28.86
22 13 16 00-0822 EA 4" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Reducers <i>For Work In Restricted Working Space, Add</i>	203.10 14.75	32.78
22 13 16 00-0823 Acrylonitrile Butadiene Styrene (ABS) DWV P-Traps^(22 13 16 00-0714)		
22 13 16 00-0824 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	94.05 11.90	26.44
22 13 16 00-0825 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	138.80 15.23	33.83
22 13 16 00-0826 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	471.49 20.46	45.47
22 13 16 00-0827 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV P-Traps <i>For Work In Restricted Working Space, Add</i>	905.55 23.79	52.87
22 13 16 00-0828 Acrylonitrile Butadiene Styrene (ABS) DWV Closet Flanges^(22 13 16 00-0714)		
22 13 16 00-0829 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Closet Flanges <i>For Work In Restricted Working Space, Add</i>	128.82 15.86	35.21
22 13 16 00-0830 EA 4" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Closet Flanges <i>For Work In Restricted Working Space, Add</i>	120.40 14.75	32.78
22 13 16 00-0831 Acrylonitrile Butadiene Styrene (ABS) DWV Male Adapters^(22 13 16 00-0714)		
22 13 16 00-0832 EA 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Male Adapters <i>For Work In Restricted Working Space, Add</i>	27.34 3.97	8.77
22 13 16 00-0833 EA 2" Acrylonitrile Butadiene Styrene (ABS) DWV Male Adapters <i>For Work In Restricted Working Space, Add</i>	41.95 5.07	11.31
22 13 16 00-0834 EA 3" Acrylonitrile Butadiene Styrene (ABS) DWV Male Adapters <i>For Work In Restricted Working Space, Add</i>	95.66 6.82	15.12
22 13 16 00-0835 EA 4" Acrylonitrile Butadiene Styrene (ABS) DWV Male Adapters <i>For Work In Restricted Working Space, Add</i>	187.78 7.93	17.66
22 13 16 00-0836 Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushings^(22 13 16 00-0714)		
22 13 16 00-0837 EA 2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushing <i>For Work In Restricted Working Space, Add</i>	41.80 9.04	20.09

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0838	EA		3" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushing..... <i>For Work In Restricted Working Space, Add</i>	98.90 10.79	23.90
22 13 16 00-0839	EA		3" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushing..... <i>For Work In Restricted Working Space, Add</i>	79.65 11.90	26.44
22 13 16 00-0840	EA		4" x 2" Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushing..... <i>For Work In Restricted Working Space, Add</i>	188.46 13.01	28.86
22 13 16 00-0841	EA		4" x 3" Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushing..... <i>For Work In Restricted Working Space, Add</i>	133.25 14.75	32.78
22 13 16 00-0842	EA		6" x 4" Acrylonitrile Butadiene Styrene (ABS) DWV Flush Bushing..... <i>For Work In Restricted Working Space, Add</i>	389.19 17.84	39.60
22 13 16 00-0843			Acrylonitrile Butadiene Styrene (ABS) To Polyvinyl Chloride (PVC) Flexible Couplings <small>(22 13 16 00-0714)</small>		
22 13 16 00-0844	EA		1-1/2" x 1-1/2" Acrylonitrile Butadiene Styrene (ABS) To Polyvinyl Chloride (PVC) Flexible Coupling..... <i>For Work In Restricted Working Space, Add</i>	136.25 7.93	17.66
22 13 16 00-0845	EA		2" x 2" Acrylonitrile Butadiene Styrene (ABS) To Polyvinyl Chloride (PVC) Flexible Coupling..... <i>For Work In Restricted Working Space, Add</i>	150.96 10.15	22.52
22 13 16 00-0846	EA		3" x 3" Acrylonitrile Butadiene Styrene (ABS) To Polyvinyl Chloride (PVC) Flexible Coupling..... <i>For Work In Restricted Working Space, Add</i>	169.92 13.64	30.24
22 13 16 00-0847	EA		4" x 4" Acrylonitrile Butadiene Styrene (ABS) To Polyvinyl Chloride (PVC) Flexible Coupling..... <i>For Work In Restricted Working Space, Add</i>	184.64 15.86	35.21
22 13 16 00-0848			Cut And Prepare Existing Acrylonitrile Butadiene Styrene (ABS) DWV Pipe <small>(22 13 16 00-0701)</small> Note: In place piping.		
22 13 16 00-0849	EA		1-1/2", Cut And Prepare Existing Acrylonitrile Butadiene Styrene (ABS) DWV Pipe.....	7.75	
22 13 16 00-0850	EA		2", Cut And Prepare Existing Acrylonitrile Butadiene Styrene (ABS) DWV Pipe.....	8.53	
22 13 16 00-0851	EA		3", Cut And Prepare Existing Acrylonitrile Butadiene Styrene (ABS) DWV Pipe.....	10.85	
22 13 16 00-0852	EA		4", Cut And Prepare Existing Acrylonitrile Butadiene Styrene (ABS) DWV Pipe.....	14.64	
22 13 16 00-0853	EA		6", Cut And Prepare Existing Acrylonitrile Butadiene Styrene (ABS) DWV Pipe.....	20.92	
22 13 16 00-0854			Elastomeric Flexible Pipe Couplings <small>(22 13 16)</small>		
22 13 16 00-0855			Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Couplings <small>(22 13 16 00-0854)</small> Note: For cast iron or plastic to cast iron or plastic pipe (Cast Iron/Plastic To Cast Iron/Plastic). Includes stainless steel clamps.		
22 13 16 00-0856	EA		1-1/4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-125).....	13.38	4.59
22 13 16 00-0857	EA		1-1/2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-150).....	14.42	4.88
22 13 16 00-0858	EA		2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-22).....	15.16	5.17
22 13 16 00-0859	EA		3" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-33).....	17.44	5.46
22 13 16 00-0860	EA		4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-44).....	19.65	5.74
22 13 16 00-0861	EA		5" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-55).....	24.86	6.03
22 13 16 00-0862	EA		6" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-66).....	30.11	6.31
22 13 16 00-0863	EA		8" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-88).....	40.67	6.89
22 13 16 00-0864	EA		10" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-1010).....	53.45	8.04
22 13 16 00-0865			Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Couplings <small>(22 13 16 00-0854)</small> Note: For cast iron or plastic to cast iron or plastic pipe (Cast Iron/Plastic To Cast Iron/Plastic). Includes stainless steel clamps.		
22 13 16 00-0866	EA		1-1/2" x 1-1/4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-150/125).....	14.25	4.88
22 13 16 00-0867	EA		2" x 1-1/2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-215).....	15.44	5.17
22 13 16 00-0868	EA		3" x 1-1/2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-315).....	18.79	5.46
22 13 16 00-0869	EA		3" x 2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-32).....	16.95	5.46
22 13 16 00-0870	EA		4" x 1-1/2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-415).....	22.97	5.74
22 13 16 00-0871	EA		4" x 2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-42).....	22.03	5.74
22 13 16 00-0872	EA		4" x 3" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-43).....	20.28	5.74
22 13 16 00-0873	EA		5" x 3" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-53).....	28.96	6.03
22 13 16 00-0874	EA		5" x 4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-54).....	26.29	6.03
22 13 16 00-0875	EA		6" x 3" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-63).....	35.63	6.31
22 13 16 00-0876	EA		6" x 4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-64).....	31.63	6.31
22 13 16 00-0877	EA		6" x 5" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-65).....	32.75	6.31
22 13 16 00-0878	EA		8" x 4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-84).....	64.12	11.48
22 13 16 00-0879	EA		8" x 6" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-86).....	53.03	11.48
22 13 16 00-0880	EA		10" x 8" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Reducing Pipe Coupling (Fernco 1056-10-8).....	66.78	12.92
22 13 16 00-0881			Elastomeric Flexible Pipe Caps (Fernco QC) <small>(22 13 16)</small> Note: For cast iron, steel, copper or plastic pipe. Includes stainless steel clamp.		
22 13 16 00-0882	EA		1-1/2" Elastomeric Flexible Pipe Cap (Fernco QC-101).....	50.39	31.00
22 13 16 00-0883	EA		2" Elastomeric Flexible Pipe Cap (Fernco QC-102).....	54.02	32.96
22 13 16 00-0884	EA		3" Elastomeric Flexible Pipe Cap (Fernco QC-103).....	62.52	37.77
22 13 16 00-0885	EA		4" Elastomeric Flexible Pipe Cap (Fernco QC-104).....	82.51	49.94
22 13 16 00-0886	EA		5" Elastomeric Flexible Pipe Cap (Fernco QC-105).....	98.88	59.70
22 13 16 00-0887	EA		6" Elastomeric Flexible Pipe Cap (Fernco QC-106).....	114.07	68.90
22 13 16 00-0888	EA		8" Elastomeric Flexible Pipe Cap (Fernco QC-108).....	152.60	87.26



Plumbing	22	22
Plumbing Piping	22 10	
Facility Sanitary Sewerage	22 13	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 16 00-0889	EA		10" Elastomeric Flexible Pipe Cap (Fernco QC-110).....	186.82	97.59
22 13 16 00-0890	EA		12" Elastomeric Flexible Pipe Cap (Fernco QC-112).....	235.15	108.51
22 13 16 00-0891			Cast Iron Vent Stack Flashing Sleeves With Caulking Recess (Josam 26450 Series) (22 13 16)		
22 13 16 00-0892	EA		1-1/2" Cast Iron Vent Stack Flashing Sleeves With Caulking Recess	97.40	23.79
22 13 16 00-0893	EA		2" Cast Iron Vent Stack Flashing Sleeves With Caulking Recess	102.69	26.44
22 13 16 00-0894	EA		3" Cast Iron Vent Stack Flashing Sleeves With Caulking Recess	154.14	34.36
22 13 16 00-0895	EA		4" Cast Iron Vent Stack Flashing Sleeves With Caulking Recess	180.74	39.65
22 13 16 00-0896	EA		5" Cast Iron Vent Stack Flashing Sleeves With Caulking Recess	210.86	44.93
22 13 16 00-0897	EA		6" Cast Iron Vent Stack Flashing Sleeves With Caulking Recess	356.66	50.22
22 13 16 00-0898			Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess (Josam 26440 Series) (22 13 16)		
22 13 16 00-0899	EA		1-1/2" Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess	203.09	23.79
22 13 16 00-0900	EA		2" Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess	208.38	26.44
22 13 16 00-0901	EA		3" Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess	247.49	34.36
22 13 16 00-0902	EA		4" Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess	309.89	39.65
22 13 16 00-0903	EA		5" Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess	424.13	44.93
22 13 16 00-0904	EA		6" Cast Iron Vent Stack Flashing Sleeves With Counterflashing Recess	434.70	50.22
22 13 16 00-0905			Cast Iron Vandal Proof Hooded Vent Cap (Josam 26700 Series) (22 13 16)		
			Note: Includes counterflashing collar, deep protective hood and recessed securing screws.		
22 13 16 00-0906	EA		1-1/2" Cast Iron Vandal Proof Hooded Vent Cap.....	388.96	23.79
22 13 16 00-0907	EA		2" Cast Iron Vandal Proof Hooded Vent Cap.....	394.25	26.44
22 13 16 00-0908	EA		3" Cast Iron Vandal Proof Hooded Vent Cap.....	452.78	34.36
22 13 16 00-0909	EA		4" Cast Iron Vandal Proof Hooded Vent Cap.....	509.58	39.65
22 13 16 00-0910	EA		5" Cast Iron Vandal Proof Hooded Vent Cap.....	594.84	44.93
22 13 16 00-0911	EA		6" Cast Iron Vandal Proof Hooded Vent Cap.....	649.86	50.22
22 13 19			Sanitary Waste Piping Specialties (22 13)		
22 13 19 13			Sanitary Drains (22 13 19)		
22 13 19 13-0001			Round Top Floor Drains (22 13 19 13)		
22 13 19 13-0002	EA		Bronze Top, 6" Round Top Floor Drain With 1-1/2" Outlet	800.77	113.66
			For Vandal Proof Screws, Add	11.00	
			For Sediment Bucket, Add	22.50	
			For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0003	EA		Bronze Top, 6" Round Top Floor Drain With 2" Outlet.....	879.53	127.41
			For Vandal Proof Screws, Add	11.00	
			For Sediment Bucket, Add	22.50	
			For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0004	EA		Bronze Top, 6" Round Top Floor Drain With 3" Outlet.....	855.43	140.94
			For Vandal Proof Screws, Add	11.00	
			For Sediment Bucket, Add	22.50	
			For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0005	EA		Bronze Top, 6" Round Top Floor Drain With 4" Outlet.....	884.46	155.54
			For Vandal Proof Screws, Add	11.00	
			For Sediment Bucket, Add	22.50	
			For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0006	EA		Cast Iron Top, 9" Round Top Floor Drain With 2" Outlet	801.83	127.41
			For Nikaloy Dome Grate, Add	178.50	
			For Ductile Iron Grate, Add	48.00	
			For Bronze Dome Grate, Add	143.00	
			For Vandal Proof Screws, Add	30.50	
			For Galvanized Extension Collar, Each 3", Add	117.50	
			For Cast Iron Dome Grate, Add	17.00	
			For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
			For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0007	EA		Cast Iron Top, 9" Round Top Floor Drain With 3" Outlet	829.00	140.94
			For Nikaloy Dome Grate, Add	178.50	
			For Ductile Iron Grate, Add	48.00	
			For Bronze Dome Grate, Add	143.00	
			For Vandal Proof Screws, Add	30.50	
			For Galvanized Extension Collar, Each 3", Add	117.50	
			For Cast Iron Dome Grate, Add	17.00	
			For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
			For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0008	EA		Cast Iron Top, 9" Round Top Floor Drain With 4" Outlet	858.03	155.54
			For Nikaloy Dome Grate, Add	178.50	
			For Ductile Iron Grate, Add	48.00	
			For Bronze Dome Grate, Add	143.00	
			For Vandal Proof Screws, Add	30.50	
			For Galvanized Extension Collar, Each 3", Add	117.50	
			For Cast Iron Dome Grate, Add	17.00	
			For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
			For Galvanized Cast Iron Parts, Add	87.50	

22 Plumbing
22 10 Plumbing Piping
22 13 Facility Sanitary Sewerage



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 13 19 13-0009	EA Nikaloy Top, 9" Round Top Floor Drain With 2" Outlet	1,346.24	127.41
	For Nikaloy Dome Grate, Add	178.50	
	For Ductile Iron Grate, Add	48.00	
	For Bronze Dome Grate, Add	143.00	
	For Vandal Proof Screws, Add	30.50	
	For Galvanized Extension Collar, Each 3", Add	117.50	
	For Cast Iron Dome Grate, Add	17.00	
	For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
	For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0010	EA Nikaloy Top, 9" Round Top Floor Drain With 3" Outlet	1,373.41	140.94
	For Nikaloy Dome Grate, Add	178.50	
	For Ductile Iron Grate, Add	48.00	
	For Bronze Dome Grate, Add	143.00	
	For Vandal Proof Screws, Add	30.50	
	For Galvanized Extension Collar, Each 3", Add	117.50	
	For Cast Iron Dome Grate, Add	17.00	
	For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
	For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0011	EA Nikaloy Top, 9" Round Top Floor Drain With 4" Outlet	1,402.44	155.54
	For Nikaloy Dome Grate, Add	178.50	
	For Ductile Iron Grate, Add	48.00	
	For Bronze Dome Grate, Add	143.00	
	For Vandal Proof Screws, Add	30.50	
	For Galvanized Extension Collar, Each 3", Add	117.50	
	For Cast Iron Dome Grate, Add	17.00	
	For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
	For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0012	EA Bronze Top, 9" Round Top Floor Drain With 2" Outlet.....	1,266.95	127.41
	For Nikaloy Dome Grate, Add	178.50	
	For Ductile Iron Grate, Add	48.00	
	For Bronze Dome Grate, Add	143.00	
	For Vandal Proof Screws, Add	30.50	
	For Galvanized Extension Collar, Each 3", Add	117.50	
	For Cast Iron Dome Grate, Add	17.00	
	For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
	For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0013	EA Bronze Top, 9" Round Top Floor Drain With 3" Outlet.....	1,293.97	140.94
	For Nikaloy Dome Grate, Add	178.50	
	For Ductile Iron Grate, Add	48.00	
	For Bronze Dome Grate, Add	143.00	
	For Vandal Proof Screws, Add	30.50	
	For Galvanized Extension Collar, Each 3", Add	117.50	
	For Cast Iron Dome Grate, Add	17.00	
	For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
	For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0014	EA Bronze Top, 9" Round Top Floor Drain With 4" Outlet.....	1,323.15	155.54
	For Nikaloy Dome Grate, Add	178.50	
	For Ductile Iron Grate, Add	48.00	
	For Bronze Dome Grate, Add	143.00	
	For Vandal Proof Screws, Add	30.50	
	For Galvanized Extension Collar, Each 3", Add	117.50	
	For Cast Iron Dome Grate, Add	17.00	
	For Cast Iron Extension Collar, Each 3" (76 mm), Add	57.50	
	For Galvanized Cast Iron Parts, Add	87.50	
22 13 19 13-0015	EA Cast Iron Top, 12-5/8" Round Top Floor Drain With 2" Outlet	1,393.69	127.30
	For Galvanized Extension Collar, Each 2", Add	102.50	
	For Galvanized Cast Iron Parts, Add	132.00	
	For Nikaloy Dome Grate, Add	255.00	
	For Vandal Proof Screws, Add	30.50	
	For Cast Iron Dome Grate, Add	28.00	
	For Ductile Iron Grate, Add	53.00	
	For Cast Iron Extension Collar, Each 2", Add	51.00	
	For Primer Tap, Add	33.50	
	For Chained Grate, Add	48.50	
22 13 19 13-0016	EA Cast Iron Top, 12-5/8" Round Top Floor Drain With 3" Outlet	1,420.83	140.94
	For Galvanized Extension Collar, Each 2", Add	102.50	
	For Galvanized Cast Iron Parts, Add	132.00	
	For Nikaloy Dome Grate, Add	255.00	
	For Vandal Proof Screws, Add	30.50	
	For Cast Iron Dome Grate, Add	28.00	
	For Ductile Iron Grate, Add	53.00	
	For Cast Iron Extension Collar, Each 2", Add	51.00	
	For Primer Tap, Add	33.50	
	For Chained Grate, Add	48.50	
22 13 19 13-0017	EA Cast Iron Top, 12-5/8" Round Top Floor Drain With 4" Outlet	1,450.01	155.54
	For Galvanized Extension Collar, Each 2", Add	102.50	
	For Galvanized Cast Iron Parts, Add	132.00	
	For Nikaloy Dome Grate, Add	255.00	
	For Vandal Proof Screws, Add	30.50	
	For Cast Iron Dome Grate, Add	28.00	
	For Ductile Iron Grate, Add	53.00	
	For Cast Iron Extension Collar, Each 2", Add	51.00	
	For Primer Tap, Add	33.50	
	For Chained Grate, Add	48.50	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 19 13-0018 EA Nikaloy Top, 12-5/8" Round Top Floor Drain With 2" Outlet	2,207.65	127.30
For Galvanized Extension Collar, Each 2", Add	102.50	
For Galvanized Cast Iron Parts, Add	132.00	
For Nikaloy Dome Grate, Add	255.00	
For Vandal Proof Screws, Add	30.50	
For Cast Iron Dome Grate, Add	28.00	
For Ductile Iron Grate, Add	53.00	
For Cast Iron Extension Collar, Each 2", Add	51.00	
For Primer Tap, Add	33.50	
For Chained Grate, Add	48.50	
22 13 19 13-0019 EA Nikaloy Top, 12-5/8" Round Top Floor Drain With 3" Outlet	2,234.79	140.94
For Galvanized Extension Collar, Each 2", Add	102.50	
For Galvanized Cast Iron Parts, Add	132.00	
For Nikaloy Dome Grate, Add	255.00	
For Vandal Proof Screws, Add	30.50	
For Cast Iron Dome Grate, Add	28.00	
For Ductile Iron Grate, Add	53.00	
For Cast Iron Extension Collar, Each 2", Add	51.00	
For Primer Tap, Add	33.50	
For Chained Grate, Add	48.50	
22 13 19 13-0020 EA Nikaloy Top, 12-5/8" Round Top Floor Drain With 4" Outlet	2,263.97	155.54
For Galvanized Extension Collar, Each 2", Add	102.50	
For Galvanized Cast Iron Parts, Add	132.00	
For Nikaloy Dome Grate, Add	255.00	
For Vandal Proof Screws, Add	30.50	
For Cast Iron Dome Grate, Add	28.00	
For Ductile Iron Grate, Add	53.00	
For Cast Iron Extension Collar, Each 2", Add	51.00	
For Primer Tap, Add	33.50	
For Chained Grate, Add	48.50	
22 13 19 13-0021 EA Bronze Top, 12-5/8" Round Top Floor Drain With 2" Outlet	2,099.30	127.30
For Galvanized Extension Collar, Each 2", Add	102.50	
For Galvanized Cast Iron Parts, Add	132.00	
For Nikaloy Dome Grate, Add	255.00	
For Vandal Proof Screws, Add	30.50	
For Cast Iron Dome Grate, Add	28.00	
For Ductile Iron Grate, Add	53.00	
For Cast Iron Extension Collar, Each 2", Add	51.00	
For Primer Tap, Add	33.50	
For Chained Grate, Add	48.50	
22 13 19 13-0022 EA Bronze Top, 12-5/8" Round Top Floor Drain With 3" Outlet	2,126.44	140.94
For Galvanized Extension Collar, Each 2", Add	102.50	
For Galvanized Cast Iron Parts, Add	132.00	
For Nikaloy Dome Grate, Add	255.00	
For Vandal Proof Screws, Add	30.50	
For Cast Iron Dome Grate, Add	28.00	
For Ductile Iron Grate, Add	53.00	
For Cast Iron Extension Collar, Each 2", Add	51.00	
For Primer Tap, Add	33.50	
For Chained Grate, Add	48.50	
22 13 19 13-0023 EA Bronze Top, 12-5/8" Round Top Floor Drain With 4" Outlet	2,155.62	155.54
For Galvanized Extension Collar, Each 2", Add	102.50	
For Galvanized Cast Iron Parts, Add	132.00	
For Nikaloy Dome Grate, Add	255.00	
For Vandal Proof Screws, Add	30.50	
For Cast Iron Dome Grate, Add	28.00	
For Ductile Iron Grate, Add	53.00	
For Cast Iron Extension Collar, Each 2", Add	51.00	
For Primer Tap, Add	33.50	
For Chained Grate, Add	48.50	
22 13 19 13-0024 Square Or Rectangular Top Drains (22 13 19 13)		
22 13 19 13-0025 EA 5" x 5" Floor Drain With 2" Bottom Outlet, Nikaloy Top	952.35	127.30
For Vandal Proof Screws, Add	11.00	
For Sediment Bucket, Add	22.50	
For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0026 EA 5" x 5" Floor Drain With 3" Bottom Outlet, Nikaloy Top	979.79	141.05
For Vandal Proof Screws, Add	11.00	
For Sediment Bucket, Add	22.50	
For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0027 EA 5" x 5" Floor Drain With 4" Bottom Outlet, Nikaloy Top	1,008.67	155.54
For Vandal Proof Screws, Add	11.00	
For Sediment Bucket, Add	22.50	
For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0028 EA 6" x 6" Floor Drain With 2" Bottom Outlet, Nikaloy Top	1,031.63	127.30
For Vandal Proof Screws, Add	11.00	
For Sediment Bucket, Add	22.50	
For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0029 EA 6" x 6" Floor Drain With 3" Bottom Outlet, Nikaloy Top	1,059.07	141.05
For Vandal Proof Screws, Add	11.00	
For Sediment Bucket, Add	22.50	
For Galvanized Cast Iron Parts, Add	105.00	
22 13 19 13-0030 EA 6" x 6" Floor Drain With 4" Bottom Outlet, Nikaloy Top	1,087.95	155.54
For Vandal Proof Screws, Add	11.00	
For Sediment Bucket, Add	22.50	
For Galvanized Cast Iron Parts, Add	105.00	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 13 19 13-0031	EA		8" x 8" Floor Drain With 2" Bottom Outlet, Nikaloy Top.....	1,380.47	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0032	EA		8" x 8" Floor Drain With 3" Bottom Outlet, Nikaloy Top.....	1,407.91	141.05
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0033	EA		8" x 8" Floor Drain With 4" Bottom Outlet, Nikaloy Top.....	1,436.79	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0034	EA		5" x 5" Floor Drain With 2" Bottom Outlet, Bronze Top.....	894.21	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0035	EA		5" x 5" Floor Drain With 3" Bottom Outlet, Bronze Top.....	921.65	141.05
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0036	EA		5" x 5" Floor Drain With 4" Bottom Outlet, Bronze Top.....	950.53	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0037	EA		6" x 6" Floor Drain With 2" Bottom Outlet, Bronze Top.....	994.63	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0038	EA		6" x 6" Floor Drain With 3" Bottom Outlet, Bronze Top.....	1,022.07	141.05
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0039	EA		6" x 6" Floor Drain With 4" Bottom Outlet, Bronze Top.....	1,050.95	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0040	EA		8" x 8" Floor Drain With 2" Bottom Outlet, Bronze Top.....	1,277.40	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0041	EA		8" x 8" Floor Drain With 3" Bottom Outlet, Bronze Top.....	1,304.84	141.05
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0042	EA		8" x 8" Floor Drain With 4" Bottom Outlet, Bronze Top.....	1,333.72	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
22 13 19 13-0043	EA		12" x 12" Can Wash Drain With 3" Bottom Outlet, Cast Iron Top.....	3,345.05	141.05
			<i>For Galvanized Cast Iron Parts, Add</i>	318.00	
			<i>For No-Hub Side Outlet, Add</i>	76.00	
			<i>For Chained Grate, Add</i>	48.50	
22 13 19 13-0044	EA		12" x 12" Can Wash Drain With 4" Bottom Outlet, Cast Iron Top.....	3,373.93	155.54
			<i>For Galvanized Cast Iron Parts, Add</i>	318.00	
			<i>For No-Hub Side Outlet, Add</i>	76.00	
			<i>For Chained Grate, Add</i>	48.50	
22 13 19 13-0045	EA		12" x 12" Can Wash Drain With 3" Bottom Outlet, Nikaloy Top.....	4,206.58	141.05
			<i>For Galvanized Cast Iron Parts, Add</i>	318.00	
			<i>For No-Hub Side Outlet, Add</i>	76.00	
			<i>For Chained Grate, Add</i>	48.50	
22 13 19 13-0046	EA		12" x 12" Can Wash Drain With 4" Bottom Outlet, Nikaloy Top.....	4,235.46	155.54
			<i>For Galvanized Cast Iron Parts, Add</i>	318.00	
			<i>For No-Hub Side Outlet, Add</i>	76.00	
			<i>For Chained Grate, Add</i>	48.50	
22 13 19 13-0047	EA		12" x 12" Can Wash Drain With 3" Bottom Outlet, Bronze Top.....	4,103.52	141.05
			<i>For Galvanized Cast Iron Parts, Add</i>	318.00	
			<i>For No-Hub Side Outlet, Add</i>	76.00	
			<i>For Chained Grate, Add</i>	48.50	
22 13 19 13-0048	EA		12" x 12" Can Wash Drain With 4" Bottom Outlet, Bronze Top.....	4,132.40	155.54
			<i>For Galvanized Cast Iron Parts, Add</i>	318.00	
			<i>For No-Hub Side Outlet, Add</i>	76.00	
			<i>For Chained Grate, Add</i>	48.50	
22 13 19 13-0049	EA		5" x 9" Floor Drain With 2" Bottom Outlet, Nikaloy Top.....	1,401.61	127.30
			<i>For Rough Bronze Body, Add</i>	120.94	
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
22 13 19 13-0050	EA		5" x 9" Floor Drain With 3" Bottom Outlet, Nikaloy Top.....	1,429.05	141.05
			<i>For Rough Bronze Body, Add</i>	120.94	
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	
22 13 19 13-0051	EA		5" x 9" Floor Drain With 4" Bottom Outlet, Nikaloy Top.....	1,457.93	155.54
			<i>For Rough Bronze Body, Add</i>	120.94	
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Sediment Bucket, Add</i>	22.50	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 19 13-0052 EA 5" x 13" Floor Drain With 2" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,811.24 120.94 11.00 22.50	127.30
22 13 19 13-0053 EA 5" x 13" Floor Drain With 3" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,838.68 120.94 11.00 22.50	141.05
22 13 19 13-0054 EA 5" x 13" Floor Drain With 4" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,867.56 120.94 11.00 22.50	155.54
22 13 19 13-0055 EA 5" x 16-3/4" Floor Drain With 2" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,906.38 120.94 11.00 22.50	127.30
22 13 19 13-0056 EA 5" x 16-5/8" Floor Drain With 3" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,933.82 120.94 11.00 22.50	141.05
22 13 19 13-0057 EA 5" x 16-3/4" Floor Drain With 4" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,962.70 120.94 11.00 22.50	155.54
22 13 19 13-0058 EA 5" x 21" Floor Drain With 2" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	2,643.71 120.94 11.00 22.50	127.30
22 13 19 13-0059 EA 5" x 21" Floor Drain With 3" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	2,671.15 120.94 11.00 22.50	141.05
22 13 19 13-0060 EA 5" x 21" Floor Drain With 4" Bottom Outlet, Nikaloy Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	2,700.03 120.94 11.00 22.50	155.54
22 13 19 13-0061 EA 5" x 9" Floor Drain With 2" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,317.05 120.94 11.00 22.50	127.30
22 13 19 13-0062 EA 5" x 9" Floor Drain With 3" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,344.49 120.94 11.00 22.50	141.05
22 13 19 13-0063 EA 5" x 9" Floor Drain With 4" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,373.37 120.94 11.00 22.50	155.54
22 13 19 13-0064 EA 5" x 13" Floor Drain With 2" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,665.89 120.94 11.00 22.50	127.30
22 13 19 13-0065 EA 5" x 13" Floor Drain With 3" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,693.33 120.94 11.00 22.50	141.05
22 13 19 13-0066 EA 5" x 13" Floor Drain With 4" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,722.21 120.94 11.00 22.50	155.54
22 13 19 13-0067 EA 5" x 16-3/4" Floor Drain With 2" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,761.03 120.94 11.00 22.50	127.30
22 13 19 13-0068 EA 5" x 16-5/8" Floor Drain With 3" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,788.47 120.94 11.00 22.50	141.05
22 13 19 13-0069 EA 5" x 16-3/4" Floor Drain With 4" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	1,817.35 120.94 11.00 22.50	155.54
22 13 19 13-0070 EA 5" x 21" Floor Drain With 2" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	2,360.93 120.94 11.00 22.50	127.30
22 13 19 13-0071 EA 5" x 21" Floor Drain With 3" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	2,388.37 120.94 11.00 22.50	141.05
22 13 19 13-0072 EA 5" x 21" Floor Drain With 4" Bottom Outlet, Bronze Top..... <i>For Rough Bronze Body, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Sediment Bucket, Add</i>	2,417.25 120.94 11.00 22.50	155.54



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 13 19 13-0073 Funnel Type Floor Drains (22 13 19 13)

22 13 19 13-0074	EA		7" Diameter Floor Drain With 4" Round Funnel With 1-1/2" Outlet, Bronze Top	1,324.12	113.66
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0075	EA		7" Diameter Floor Drain With 4" Round Funnel With 2" Outlet, Bronze Top	1,351.40	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0076	EA		7" Diameter Floor Drain With 4" Round Funnel With 3" Outlet, Bronze Top	1,378.54	140.94
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0077	EA		7" Diameter Floor Drain With 4" Round Funnel With 4" Outlet, Bronze Top	1,407.72	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0078	EA		7" Diameter Floor Drain With 9" x 3-1/2" Oval Funnel With 2" Outlet, Nikaloy Top	1,946.02	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Primer Tap, Add</i>	15.10	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0079	EA		7" Diameter Floor Drain With 9" x 3-1/2" Oval Funnel With 3" Outlet, Nikaloy Top	1,973.16	140.94
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Primer Tap, Add</i>	15.10	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0080	EA		7" Diameter Floor Drain With 9" x 3-1/2" Oval Funnel With 4" Outlet, Nikaloy Top	2,002.34	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Primer Tap, Add</i>	15.10	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0081	EA		7" Diameter Floor Drain With 9" x 3-1/2" Oval Funnel With 2" Outlet, Bronze Top	1,842.95	127.30
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Primer Tap, Add</i>	15.10	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0082	EA		7" Diameter Floor Drain With 9" x 3-1/2" Oval Funnel With 3" Outlet, Bronze Top	1,870.09	140.94
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Primer Tap, Add</i>	15.10	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	
22 13 19 13-0083	EA		7" Diameter Floor Drain With 9" x 3-1/2" Oval Funnel With 4" Outlet, Bronze Top	1,899.27	155.54
			<i>For Vandal Proof Screws, Add</i>	11.00	
			<i>For Primer Tap, Add</i>	15.10	
			<i>For Galvanized Cast Iron Parts, Add</i>	105.00	
			<i>For Satin Finish Bronze Top, Deduct</i>	-19.50	

22 13 19 13-0084 Floor Drain With Sediment Bucket Bottom Outlet (22 13 19 13)

22 13 19 13-0085	EA		12-5/8" Round Floor Drain With Sediment Bucket, 2" Bottom Outlet, Satin Bronze Top, Without Trap	2,835.68	113.66
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	247.00	
			<i>For Primer Tap, Add</i>	33.50	
22 13 19 13-0086	EA		12-5/8" Round Floor Drain With Sediment Bucket, 3" Bottom Outlet, Satin Bronze Top, Without Trap	2,863.05	127.30
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	247.00	
			<i>For Primer Tap, Add</i>	33.50	
22 13 19 13-0087	EA		12-5/8" Round Floor Drain With Sediment Bucket, 4" Bottom Outlet, Satin Bronze Top, Without Trap	2,890.19	140.94
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	247.00	
			<i>For Primer Tap, Add</i>	33.50	
22 13 19 13-0088	EA		12-5/8" Round Floor Drain With Sediment Bucket, 5" Bottom Outlet, Satin Bronze Top, Without Trap	2,919.37	155.54
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	247.00	
			<i>For Primer Tap, Add</i>	33.50	
22 13 19 13-0089	EA		12-5/8" Round Floor Drain With Sediment Bucket, 6" Bottom Outlet, Satin Bronze Top, Without Trap	2,949.47	170.55
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	247.00	
			<i>For Primer Tap, Add</i>	33.50	
22 13 19 13-0090	EA		12" x 12" Floor Drain With Sediment Bucket, 2" Bottom Outlet, Nikaloy Top, Heavy Duty Loose-Set Cast Iron Grate	3,063.90	127.30
			<i>For Vandal Proof Screws, Add</i>	29.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	273.75	
			<i>For Aluminum Bucket, Add</i>	77.50	
			<i>For Primer Tap, Add</i>	31.00	
22 13 19 13-0091	EA		12" x 12" Floor Drain With Sediment Bucket, 3" Bottom Outlet, Nikaloy Top, Heavy Duty Loose-Set Cast Iron Grate	3,091.34	141.05
			<i>For Vandal Proof Screws, Add</i>	29.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	273.75	
			<i>For Aluminum Bucket, Add</i>	77.50	
			<i>For Primer Tap, Add</i>	31.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 19 13-0092 EA 12" x 12" Floor Drain With Sediment Bucket, 4" Bottom Outlet, Nikaloy Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	3,120.22 29.50 273.75 77.50 31.00	155.54
22 13 19 13-0093 EA 12" x 12" Floor Drain With Sediment Bucket, 6" Bottom Outlet, Nikaloy Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	3,150.32 29.50 273.75 77.50 31.00	170.55
22 13 19 13-0094 EA 12" x 12" Floor Drain With Sediment Bucket, 2" Bottom Outlet, Cast Iron Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	1,872.02 29.50 273.75 77.50 31.00	127.30
22 13 19 13-0095 EA 12" x 12" Floor Drain With Sediment Bucket, 3" Bottom Outlet, Cast Iron Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	1,899.46 29.50 273.75 77.50 31.00	141.05
22 13 19 13-0096 EA 12" x 12" Floor Drain With Sediment Bucket, 4" Bottom Outlet, Cast Iron Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	1,928.34 29.50 273.75 77.50 31.00	155.54
22 13 19 13-0097 EA 12" x 12" Floor Drain With Sediment Bucket, 6" Bottom Outlet, Cast Iron Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	1,958.44 29.50 273.75 77.50 31.00	170.55
22 13 19 13-0098 EA 12" x 12" Floor Drain With Sediment Bucket, 2" Bottom Outlet, Bronze Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	2,857.77 29.50 273.75 77.50 31.00	127.30
22 13 19 13-0099 EA 12" x 12" Floor Drain With Sediment Bucket, 3" Bottom Outlet, Bronze Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	2,885.21 29.50 273.75 77.50 31.00	141.05
22 13 19 13-0100 EA 12" x 12" Floor Drain With Sediment Bucket, 4" Bottom Outlet, Bronze Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	2,914.09 29.50 273.75 77.50 31.00	155.54
22 13 19 13-0101 EA 12" x 12" Floor Drain With Sediment Bucket, 6" Bottom Outlet, Bronze Top, Heavy Duty Loose-Set Cast Iron Grate <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Aluminum Bucket, Add</i> <i>For Primer Tap, Add</i>	2,944.19 29.50 273.75 77.50 31.00	170.55
22 13 19 13-0102 Other Drains <small>(22 13 19 13)</small>		
22 13 19 13-0103 Shower Drains <small>(22 13 19 13-0102)</small>		
22 13 19 13-0104 EA 4-1/4" Stainless Steel Shower Drain Strainer Note: Includes two 2-5/8" screws.	51.25	11.48
22 13 19 13-0105 EA 4-1/4" Brass Shower Drain Strainer Note: Includes two 2-5/8" screws.	57.20	11.48
22 13 19 13-0106 EA 4" Brass Shower Drain For Polyvinyl Chloride (PVC) Pipe Note: Fits over 2" polyvinyl chloride (PVC) pipe or inside 3" polyvinyl chloride (PVC) pipe.	117.50	22.97
22 13 19 13-0107 EA 4" Chrome Finish, Threaded Brass Shower Drain And Gasket Note: For 2" pipe. Kohler K-9132.	151.69	22.97
22 13 19 13-0108 Acid Resistant Floor Drains <small>(22 13 19 13-0102)</small>		
22 13 19 13-0109 EA 9" Diameter Floor Drain With 2" Bottom Outlet, Acid Resistant Top <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Primer Tap, Add</i>	1,334.60 30.50 87.50 33.50	113.66
22 13 19 13-0110 EA 9" Diameter Floor Drain With 3" Bottom Outlet, Acid Resistant Top <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Primer Tap, Add</i>	1,361.97 30.50 87.50 33.50	127.30

22 Plumbing**22 10 Plumbing Piping****22 13 Facility Sanitary Sewerage**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 13 19 13-0111	EA	9" Diameter Floor Drain With 4" Bottom Outlet, Acid Resistant Top	1,389.11	140.94
		<i>For Vandal Proof Screws, Add</i>	30.50	
		<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
		<i>For Primer Tap, Add</i>	33.50	
22 13 19 13-0112		Rotary And Lever Drains (22 13 19 13-0102)		
22 13 19 13-0113	EA	1-1/2" Drain, 3" Sink Opening Lever Drain.....	268.61	76.66
22 13 19 13-0114	EA	2" Drain, 3" Sink Opening Lever Drain.....	284.46	84.58
22 13 19 13-0115	EA	1-1/2" Drain, 3-1/2" Sink Opening Lever Drain	268.61	76.66
22 13 19 13-0116	EA	2" Drain, 3-1/2" Sink Opening Lever Drain.....	284.46	84.58
22 13 19 13-0117	EA	1-1/2" Drain, 3" Sink Opening Twist Drain	268.61	76.66
22 13 19 13-0118	EA	2" Drain, 3" Sink Opening Twist Drain	284.46	84.58
22 13 19 13-0119	EA	1-1/2" Drain, 3-1/2" Sink Opening Twist Drain	268.61	76.66
22 13 19 13-0120	EA	2" Drain, 3-1/2" Sink Opening Twist Drain	284.46	84.58
22 13 19 13-0121	EA	1-1/2" To 2" Drain, 3-1/2" Sink Opening Rotary Twist Drain (Fisher 16100).....	373.41	84.58
22 13 19 13-0122		Floor Receptor (22 13 19 13)		
22 13 19 13-0123		9" Diameter Round Shallow Receptor (22 13 19 13-0122)		
		Note: With slotted medium duty grate, aluminum secondary strainer and white acid resisting coated interior and top.		
22 13 19 13-0124	EA	9" Diameter x 3" Shallow Cast Iron Floor Receptor, 2" Drain Connection	1,639.63	127.41
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	97.00	
		<i>For Full Grate With 2" (50 mm) Square Center Opening, Add</i>	36.00	
		<i>For Flange With Seepage Holes, Add</i>	58.50	
		<i>For White Acid Resistant Bucket, Add</i>	47.00	
		<i>For Trap Primer Connection, Add</i>	38.00	
		<i>For Vandal Proof Secured Grate, Add</i>	33.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	62.50	
22 13 19 13-0125	EA	9" Diameter x 3" Shallow Cast Iron Floor Receptor, 3" Drain Connection	1,667.20	141.15
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	97.00	
		<i>For Full Grate With 2" (50 mm) Square Center Opening, Add</i>	36.00	
		<i>For Flange With Seepage Holes, Add</i>	58.50	
		<i>For White Acid Resistant Bucket, Add</i>	47.00	
		<i>For Trap Primer Connection, Add</i>	38.00	
		<i>For Vandal Proof Secured Grate, Add</i>	33.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	62.50	
22 13 19 13-0126	EA	9" Diameter x 3" Shallow Cast Iron Floor Receptor, 4" Drain Connection	1,695.78	155.54
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	97.00	
		<i>For Full Grate With 2" (50 mm) Square Center Opening, Add</i>	36.00	
		<i>For Flange With Seepage Holes, Add</i>	58.50	
		<i>For White Acid Resistant Bucket, Add</i>	47.00	
		<i>For Trap Primer Connection, Add</i>	38.00	
		<i>For Vandal Proof Secured Grate, Add</i>	33.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	62.50	
22 13 19 13-0127		Square Top Floor Receptors (22 13 19 13-0122)		
		Note: With acid resistant coating.		
22 13 19 13-0128	EA	8" x 8" Floor Drain With 1-1/2" Bottom Outlet, Acid Resistant Top	1,939.88	113.66
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	69.00	
		<i>For Trap Primer Connection, Add</i>	39.50	
		<i>For Full Grate With 2" Square Center Opening, Add</i>	36.00	
		<i>For Vandal Proof Secured Grate, Add</i>	15.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	97.00	
		<i>For White Acid Resistant Bucket, Add</i>	88.00	
		<i>For Flange With Seepage Holes, Add</i>	37.50	
22 13 19 13-0129	EA	8" x 8" Floor Drain With 2" Bottom Outlet, Acid Resistant Top.....	1,967.28	127.41
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	69.00	
		<i>For Trap Primer Connection, Add</i>	39.50	
		<i>For Full Grate With 2" Square Center Opening, Add</i>	36.00	
		<i>For Vandal Proof Secured Grate, Add</i>	15.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	97.00	
		<i>For White Acid Resistant Bucket, Add</i>	88.00	
		<i>For Flange With Seepage Holes, Add</i>	37.50	
22 13 19 13-0130	EA	8" x 8" Floor Drain With 3" Bottom Outlet, Acid Resistant Top.....	1,994.30	140.94
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	69.00	
		<i>For Trap Primer Connection, Add</i>	39.50	
		<i>For Full Grate With 2" Square Center Opening, Add</i>	36.00	
		<i>For Vandal Proof Secured Grate, Add</i>	15.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	97.00	
		<i>For White Acid Resistant Bucket, Add</i>	88.00	
		<i>For Flange With Seepage Holes, Add</i>	37.50	
22 13 19 13-0131	EA	8" x 8" Floor Drain With 4" Bottom Outlet, Acid Resistant Top.....	2,023.48	155.54
		<i>For Flange With Seepage Holes And Clamp Collar, Add</i>	69.00	
		<i>For Trap Primer Connection, Add</i>	39.50	
		<i>For Full Grate With 2" Square Center Opening, Add</i>	36.00	
		<i>For Vandal Proof Secured Grate, Add</i>	15.50	
		<i>For Stainless Steel Liner For Bucket, Add</i>	97.00	
		<i>For White Acid Resistant Bucket, Add</i>	88.00	
		<i>For Flange With Seepage Holes, Add</i>	37.50	



Plumbing	22	22
Plumbing Piping	22 10	
Facility Sanitary Sewerage	22 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 19 13-0132 Floor Drain Accessories <small>(22 13 19 13)</small>		
22 13 19 13-0133 EA 3" Trap Guard Floor Drain Insert (ProVent TG3H)..... Note: Prevents emission of sewer gases.	110.88	13.22
22 13 19 13-0134 EA 2" Trap Guard Drain Insert For Cast Iron Or Polyvinyl Chloride (PVC) Pipe (ProVent TG22) Note: Prevents emission of sewer gases.	89.77	13.22
22 13 19 13-0135 EA 3" Trap Guard Drain Insert For Cast Iron Or Polyvinyl Chloride (PVC) Pipe (ProVent TG33) Note: Prevents emission of sewer gases.	98.21	13.22
22 13 19 13-0136 EA 3" Trap Guard Drain Insert For 4" Cast Iron Or Polyvinyl Chloride (PVC) Pipe (ProVent TG34IP)..... Note: Prevents emission of sewer gases.	119.32	13.22
22 13 19 13-0137 EA 3" Trap Guard Drain Insert For 4" Hub (ProVent TG34TP)..... Note: Prevents emission of sewer gases.	106.66	13.22
22 13 19 13-0138 EA 2" Quad Close Trap Seal, For Drain Body Or Strainer Throat (JRSmith 2692-02) Note: Prevents emission of sewer gases.	153.34	13.22
22 13 19 13-0139 EA 3" Quad Close Trap Seal, For Drain Body Or Strainer Throat (JRSmith 2692-03) Note: Prevents emission of sewer gases.	170.33	13.22
22 13 19 13-0140 EA 4" Quad Close Trap Seal, For Drain Body Or Strainer Throat (JRSmith 2692-04) Note: Prevents emission of sewer gases.	212.49	13.22
22 13 19 26 Grease Removal Devices <small>(22 13 19)</small>		
22 13 19 26-0001 Manual Cleaning Epoxy Coated Steel Grease Interceptor <small>(22 13 19 26)</small> Note: Includes internal air relief, visible double wall trap, removable baffle, gasketed non-skid cover bearing PDI seal of approval and flow control fitting.		
22 13 19 26-0002 Standard Manual Cleaning Epoxy Coated Steel Grease Interceptor <small>(22 13 19 26-0001)</small> Note: Josam 60100H/60210A, Smith 8100/8400, Wade 5100, or Zurn Z1173/Z1170 series.		
22 13 19 26-0003 EA 7 GPM, 14 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60102H.	1,299.02	79.30
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	1,317.00	
22 13 19 26-0004 EA 10 GPM, 20 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60103H.	1,515.82	178.43
<i>For Flange And Clamp Device, Add</i>	379.11	
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	1,391.87	
22 13 19 26-0005 EA 15 GPM, 30 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60104H.	2,156.41	198.25
<i>For Flange And Clamp Device, Add</i>	392.33	
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	1,520.17	
22 13 19 26-0006 EA 20 GPM, 40 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60105H.	2,606.64	218.07
<i>For Flange And Clamp Device, Add</i>	405.55	
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	1,643.04	
22 13 19 26-0007 EA 25 GPM, 50 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60106H.	2,919.00	237.90
<i>For Flange And Clamp Device, Add</i>	449.16	
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	1,711.18	
22 13 19 26-0008 EA 35 GPM, 70 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60107H.	3,586.02	277.55
<i>For Flange And Clamp Device, Add</i>	486.79	
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	1,883.31	
22 13 19 26-0009 EA 50 GPM, 100 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60108H.	4,681.94	317.20
<i>For Flange And Clamp Device, Add</i>	554.19	
<i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	2,008.40	
22 13 19 26-0010 EA 75 GPM, 150 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60109H.	9,228.70	356.85
<i>For Flange And Clamp Device, Add</i>	781.90	
22 13 19 26-0011 EA 100 GPM, 200 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60110H.	10,448.94	451.44
<i>For Flange And Clamp Device, Add</i>	908.97	
22 13 19 26-0012 EA 150 GPM, 300 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60213A.	12,880.88	722.31
<i>For Flange And Clamp Device, Add</i>	1,249.54	
22 13 19 26-0013 EA 200 GPM, 400 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60214A.	18,493.00	902.88
<i>For Flange And Clamp Device, Add</i>	1,499.20	
22 13 19 26-0014 EA 250 GPM, 500 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60215A.	21,570.44	1,083.46
<i>For Flange And Clamp Device, Add</i>	1,932.55	
22 13 19 26-0015 EA 350 GPM, 700 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60216A.	28,037.44	1,264.03
<i>For Flange And Clamp Device, Add</i>	2,290.70	
22 13 19 26-0016 EA 500 GPM, 1,000 LB Capacity Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60217A.	36,286.37	1,444.61
<i>For Flange And Clamp Device, Add</i>	2,684.36	
22 13 19 26-0017 Low Profile Manual Cleaning Epoxy Coated Steel Grease Interceptor <small>(22 13 19 26-0001)</small> Note: Josam 60110A, Smith 8100, Wade 5100LR, or Zurn Z1171 series.		
22 13 19 26-0018 EA 20 GPM, 40 LB Capacity Low Profile Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60115A.	3,762.02	218.07
22 13 19 26-0019 EA 35 GPM, 70 LB Capacity Low Profile Manual Cleaning Epoxy Coated Steel Grease Interceptor Note: Josam 60117A.	4,839.87	277.55



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	22 13 19 26-0020	EA	50 GPM, 100 LB Capacity Low Profile Manual Cleaning Epoxy Coated Steel Grease Interceptor..... Note: Smith 8150.	7,996.37	317.20
22 13 19 26-0021			Semi Automatic Cleaning Epoxy Coated Steel Grease Interceptor (22 13 19 26) Note: Includes internal air relief, visible double wall trap, removable baffle, gasketed non-skid cover bearing PDI seal of approval, grease recovery cone, flexible hose, grease draw off valve and flow control fitting.		
22 13 19 26-0022			Standard Semi Automatic Cleaning Epoxy Coated Steel Grease Interceptor (22 13 19 26-0021) Note: Josam 60100-SA, Smith 8300GTX, Wade 5100JCX, or Zurn Z1173-TD series.		
	22 13 19 26-0023	EA	7 GPM, 14 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60102-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	3,309.27 1,317.00	79.30
	22 13 19 26-0024	EA	10 GPM, 20 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60103-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	3,892.23 1,391.87	178.43
	22 13 19 26-0025	EA	15 GPM, 30 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60104-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	4,157.91 1,520.17	198.25
	22 13 19 26-0026	EA	20 GPM, 40 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60105-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	5,076.42 1,643.04	218.07
	22 13 19 26-0027	EA	25 GPM, 50 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60106-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	6,121.83 1,711.18	237.90
	22 13 19 26-0028	EA	35 GPM, 70 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60107-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	6,327.14 1,883.31	277.55
	22 13 19 26-0029	EA	50 GPM, 100 LB Capacity Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60108-SA. <i>For Steel Enclosure Cabinet With Non-Skid Cover, Add</i>	7,222.47 2,008.40	317.20
22 13 19 26-0030			Low Profile Semi Automatic Cleaning Epoxy Coated Steel Grease Interceptor (22 13 19 26-0021) Note: Josam 60115A-SA, Smith 8100GTX, or Zurn Z1171-TD series.		
	22 13 19 26-0031	EA	35 GPM, 70 LB Capacity Low Profile Semi Automatic Epoxy Coated Steel Grease Interceptor Note: Josam 60115A-SA.	8,509.52	277.55
22 13 19 26-0032			Automatic Cleaning Stainless Steel Grease Interceptor (22 13 19 26) Note: Includes stainless steel screen basket, plastic grease container with lid and control box with digital timer (Lowe Engineering 20 Greasestopper).		
	22 13 19 26-0033	EA	20 GPM, 69 LB Capacity Automatic Cleaning Stainless Steel Grease Interceptor Note: Includes stainless steel screen basket, plastic grease container with lid and control box with digital timer (Lowe Engineering 20 Greasestopper).	7,236.57	218.07
	22 13 19 26-0034	EA	25 GPM, 91 LB Capacity Automatic Cleaning Stainless Steel Grease Interceptor Note: Includes stainless steel screen basket, plastic grease container with lid and control box with digital timer (Lowe Engineering 25 Greasestopper).	8,420.52	237.90
	22 13 19 26-0035	EA	35 GPM, 70 LB Capacity, 110 Volt, Automatic Cleaning Stainless Steel Grease Trap/Removal Device (Guardian GGX35)	7,208.88	277.55
22 13 19 26-0036			Precast Concrete Grease Interceptor (22 13 19 26) Note: Includes two access manholes, cast iron non-skid surface, lift hole, frame and cover for heavy-traffic.		
	22 13 19 26-0037	EA	1,000 Gallon Pre-Cast Grease Interceptor.....	5,530.70	413.83
	22 13 19 26-0038	EA	1,250 Gallon Pre-Cast Grease Interceptor.....	6,326.63	413.83
	22 13 19 26-0039	EA	1,500 Gallon Pre-Cast Grease Interceptor.....	7,180.68	473.11
	22 13 19 26-0040	EA	2,000 Gallon Pre-Cast Grease Interceptor.....	8,174.09	668.15
	22 13 19 26-0041	EA	2,500 Gallon Pre-Cast Grease Interceptor.....	9,206.51	898.94
	22 13 19 26-0042	EA	4,000 Gallon Pre-Cast Grease Interceptor.....	13,805.36	1,182.71
	22 13 19 26-0043	EA	5,000 Gallon Pre-Cast Grease Interceptor.....	17,732.50	1,939.46
22 13 19 26-0044			Coated Steel Manual Oil Interceptor (22 13 19 26) Note: Includes internal air relief, and flow control fitting.		
	22 13 19 26-0045	EA	10 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	10,766.86	301.97
	22 13 19 26-0046	EA	15 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	14,659.95	358.81
	22 13 19 26-0047	EA	20 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	17,733.06	441.48
	22 13 19 26-0048	EA	25 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	19,257.80	478.22
	22 13 19 26-0049	EA	35 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	23,295.09	521.85
	22 13 19 26-0050	EA	50 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	31,074.78	574.09
	22 13 19 26-0051	EA	75 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	53,152.18	660.83
	22 13 19 26-0052	EA	100 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	57,822.28	813.09
	22 13 19 26-0053	EA	150 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	71,368.92	881.29
	22 13 19 26-0054	EA	200 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	100,458.10	1,057.33
	22 13 19 26-0055	EA	250 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	116,151.29	1,136.63
	22 13 19 26-0056	EA	350 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	146,621.41	1,355.50
	22 13 19 26-0057	EA	400 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	178,742.74	1,110.73
	22 13 19 26-0058	EA	500 GPM, Oil Interceptor, Coated Steel, Manual Draw-Off.....	211,721.06	1,321.67
22 13 19 33			Backwater Valves (22 13 19)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 19 33-0001 Cast Iron Body Terminal Backwater Valves <small>(22 13 19 33)</small>		
22 13 19 33-0002 EA 2" Cast Iron Body Terminal Backwater Valve	586.54	30.34
22 13 19 33-0003 EA 3" Cast Iron Body Terminal Backwater Valve	598.16	38.17
22 13 19 33-0004 EA 4" Cast Iron Body Terminal Backwater Valve	864.83	50.75
22 13 19 33-0005 EA 6" Cast Iron Body Terminal Backwater Valve	2,362.42	72.28
22 13 19 33-0006 EA 8" Cast Iron Body Terminal Backwater Valve	2,885.95	95.13
22 13 19 33-0007 EA 10" Cast Iron Body Terminal Backwater Valve	8,421.23	117.36
22 13 19 33-0008 EA 12" Cast Iron Body Terminal Backwater Valve	9,531.17	152.22
22 13 19 33-0009 Cast Iron Backwater Sewer Line Valve <small>(22 13 19 33)</small>		
Note: Offset type with bronze swing check assembly, threaded bronze cover, and bell and spigot connections.		
22 13 19 33-0010 EA 2" Backwater Sewer Valve, Cast Iron, Offset Type With Bronze Swing Check Assembly	1,441.48	72.34
22 13 19 33-0011 EA 3" Backwater Sewer Valve, Cast Iron, Offset Type With Bronze Swing Check Assembly	2,209.79	87.76
22 13 19 33-0012 EA 4" Backwater Sewer Valve, Cast Iron, Offset Type With Bronze Swing Check Assembly	2,730.59	113.14
22 13 19 33-0013 EA 6" Backwater Sewer Valve, Cast Iron, Offset Type With Bronze Swing Check Assembly	3,859.21	131.33
22 13 19 33-0014 EA 8" Backwater Sewer Valve, Cast Iron, Offset Type With Bronze Swing Check Assembly	5,364.86	155.62
22 13 19 33-0015 Cast Iron, Straight Through Shear Gate, Swing Check Backwater Valve <small>(22 13 19 33)</small>		
Note: Offset type with bronze, manually operated shear gate, non-rising stem, and bell and spigot connections.		
22 13 19 33-0016 EA 3" Cast Iron Body, Straight Through Shear Gate, Swing Check Backwater Valve	3,984.08	114.51
22 13 19 33-0017 EA 4" Cast Iron Body, Straight Through Shear Gate, Swing Check Backwater Valve	4,040.75	152.25
22 13 19 33-0018 EA 5" Cast Iron Body, Straight Through Shear Gate, Swing Check Backwater Valve	5,905.74	194.51
22 13 19 33-0019 EA 6" Cast Iron Body, Straight Through Shear Gate, Swing Check Backwater Valve	5,939.55	216.84
22 13 19 33-0020 Polyvinyl Chloride (PVC) Backwater Sewer Line Valve <small>(22 13 19 33)</small>		
Note: Oatey.		
22 13 19 33-0021 EA 3" Polyvinyl Chloride (PVC) Backwater Sewer Valve (Oatey 43900)	139.78	38.17
22 13 19 33-0022 EA 4" Polyvinyl Chloride (PVC) Backwater Sewer Valve (Oatey 43904)	167.16	50.75
22 13 19 33-0023 EA 6" Polyvinyl Chloride (PVC) Backwater Sewer Valve (Oatey 43908)	496.54	72.28
22 13 19 33-0024 Polyvinyl Chloride (PVC) Extendable Backwater Valves <small>(22 13 19 33)</small>		
22 13 19 33-0025 EA 3" Polyvinyl Chloride (PVC) Extendable Backwater Sewer Valve (Rectorseal Clean Check)	330.32	76.34
Note: Includes valve body, flapper assembly and collar.		
22 13 19 33-0026 EA 4" Polyvinyl Chloride (PVC) Extendable Backwater Sewer Valve (Rectorseal Clean Check)	439.86	101.50
Note: Includes valve body, flapper assembly and collar.		
22 13 19 33-0027 EA 6" Polyvinyl Chloride (PVC) Extendable Backwater Sewer Valve (Rectorseal Clean Check)	767.44	144.56
Note: Includes valve body, flapper assembly and collar.		
22 13 19 36 Air-Admittance Valves <small>(22 13 19)</small>		
22 13 19 36-0001 Acrylonitrile Butadiene Styrene (ABS) And Polyvinyl Chloride (PVC) Automatic Drain Vent <small>(22 13 19 36)</small>		
22 13 19 36-0002 EA 1-1/4", 1-1/2" And 2" Acrylonitrile Butadiene Styrene (ABS) Or Polyvinyl Chloride (PVC) Automatic Drain Vent, Mini Vent	270.57	14.80
22 13 19 36-0003 EA 2", 3" And 4" Acrylonitrile Butadiene Styrene (ABS) Or Polyvinyl Chloride (PVC) Automatic Drain Vent, Maxi Vent	324.43	14.80
22 13 23 Sanitary Waste Interceptors <small>(22 13)</small>		
22 13 23 00-0001 Sediment Bucket Solids Interceptors <small>(22 13 23)</small>		
22 13 23 00-0002 EA 1-1/2" Or 2" Top Access, 15 GPM, Composite With Removable PVC Sediment Bucket Solids Interceptor (Zurn 1180)	1,280.62	149.72
Note: Replaces P-Trap. Recovers all types of solids from precious metal particles, plaster, clay or similar materials.		
22 13 23 00-0003 EA 1-1/2" Or 2" Bottom Access, 15 GPM, Composite With Removable PVC Sediment Bucket Solids Interceptor (Zurn 1184)	1,282.23	149.72
Note: Replaces P-Trap. Recovers all types of solids from precious metal particles, plaster, clay or similar materials.		
22 13 23 00-0004 EA 1-1/2" Or 2" Top Access, Acid Resistant Coated Steel (Inside And Outside), Aluminum Cover, Removable Stainless Steel Sediment Bucket Solids Interceptor (Jay R. Smith 8714 ARIO)	1,805.39	149.72
Note: On floor mount. Replaces P-Trap. Recovers all types of solids from precious metal particles, plaster, clay or similar materials.		
22 13 23 00-0005 EA 1-1/2" Or 2" Bottom Access, 15 GPM, Acid Resistant Coated Cast Iron, Aluminum Strainer, Removable Stainless Steel Screens, Sediment Bucket Solids Interceptor (Jay R. Smith 8730-ARIO)	1,805.39	149.72
Note: Replaces P-Trap. Recovers all types of solids from precious metal particles, plaster, clay or similar materials.		
22 13 23 00-0006 EA 1-1/2" Or 2" Top Access, Acid Resistant Coated Cast Aluminum (Inside And Outside) Removable Stainless Steel Screen, Sediment Bucket Solids Interceptor (Josam 61030)	1,923.82	149.72
Note: Replaces P-Trap. Recovers all types of solids from precious metal particles, plaster, clay or similar materials.		
22 13 23 00-0007 Solid Interceptors, Cast Iron With Internal Deep Seal Trap <small>(22 13 23)</small>		
22 13 23 00-0008 EA 1-1/2" Inlet Cast Iron Solid Interceptor, Painted Enamel	324.96	51.21
For Stainless Steel Bucket, Add		175.00



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 23 00-0009	EA		2" Inlet Cast Iron Solid Interceptor, Painted Enamel <i>For Stainless Steel Bucket, Add</i>	331.51 175.00	54.54
22 13 23 00-0010			Sediment Strainers <small>(22 13 23)</small>		
22 13 23 00-0011	EA		2" Strainer, Pump Suction Side.....	175.83	69.78
22 13 29			Sanitary Sewerage Pumps <small>(22 13)</small>		
			Note: Includes extra set of gaskets, bearings and seals.		
22 13 29 13			Wet-Pit-Mounted, Vertical Sewerage Pumps <small>(22 13 29)</small>		
22 13 29 13-0001			Vertical Column, Flanged Discharge, Non-Clog Sump Or Drainage Pumps (Crane-DEMING Series 4500) <small>(22 13 29 13)</small>		
			Note: Mounted on steel support plate. Excludes float and float switch, and sump cover See CSI section 22 13 29 13-0030 for float and float switch, 22 13 29 13-0034 for sump cover.		
22 13 29 13-0002			1-1/2" Solids 1,750 RPM Vertical Sump Or Drainage Pumps <small>(22 13 29 13-0001)</small>		
22 13 29 13-0003	EA		1/2 HP, Up To 75 GPM Sump Or Drainage Pump, Vertical Non-Clog, 2-1/2" Discharge Pipe, 1,750 RPM	7,881.39	1,268.37
22 13 29 13-0004	EA		3/4 HP, Up To 125 GPM Sump Or Drainage Pump, Vertical Non-Clog, 2-1/2" Discharge Pipe, 1,750 RPM	8,209.91	1,268.37
22 13 29 13-0005	EA		1 HP, Up To 150 GPM Sump Or Drainage Pump, Vertical Non-Clog, 2-1/2" Discharge Pipe, 1,750 RPM	8,538.41	1,268.37
22 13 29 13-0006	EA		1-1/2 HP, Up To 150 GPM Sump Or Drainage Pump, Vertical Non-Clog, 2-1/2" Discharge Pipe, 1,750 RPM	8,851.76	1,268.37
22 13 29 13-0007			2" Solids 1,750 RPM Vertical Sump Or Drainage Pumps <small>(22 13 29 13-0001)</small>		
22 13 29 13-0008	EA		3/4 HP, Up To 75 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	8,791.11	1,268.37
22 13 29 13-0009	EA		1 HP, Up To 100 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	8,917.47	1,268.37
22 13 29 13-0010	EA		2 HP, Up To 200 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	9,005.91	1,268.37
22 13 29 13-0011	EA		3 HP, Up To 300 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	9,612.39	1,268.37
22 13 29 13-0012	EA		5 HP, Up To 400 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	10,206.23	1,268.37
22 13 29 13-0013	EA		7-1/2 HP, Up To 500 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	11,115.95	1,268.37
22 13 29 13-0014	EA		10 HP, Up To 600 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	12,025.67	1,268.37
22 13 29 13-0015	EA		15 HP, Up To 600 GPM Sump Or Drainage Pump, Vertical Non-Clog, 3" Discharge Pipe, 1,750 RPM	13,774.50	1,687.92
22 13 29 13-0016			3" Solids 1,750 RPM Vertical Sump Or Drainage Pumps <small>(22 13 29 13-0001)</small>		
22 13 29 13-0017	EA		2 HP, Up To 300 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	9,424.21	1,268.37
22 13 29 13-0018	EA		3 HP, Up To 400 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	9,424.21	1,268.37
22 13 29 13-0019	EA		5 HP, Up To 500 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	9,643.12	1,268.37
22 13 29 13-0020	EA		7-1/2 HP, Up To 700 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	11,341.66	1,268.37
22 13 29 13-0021	EA		10 HP, Up To 800 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	11,639.62	1,268.37
22 13 29 13-0022	EA		15 HP, Up To 900 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	13,879.32	1,687.92
22 13 29 13-0023	EA		20 HP, Up To 900 GPM Sump Or Drainage Pump, Vertical Non-Clog, 4" Discharge Pipe, 1,750 RPM	14,637.42	1,687.92
22 13 29 13-0024			Extra Column Assemblies Addition, 5' Or Less <small>(22 13 29 13-0001)</small>		
22 13 29 13-0025	EA		2-1/2" Diameter x 5' Long Extra Column Assembly For vertical sewage pumps	544.22	
22 13 29 13-0026	EA		3" Diameter x 5' Long Extra Column Assembly For vertical sewage pumps	653.44	
22 13 29 13-0027	EA		4" Diameter x 5' Long Extra Column Assembly For vertical sewage pumps	730.37	
22 13 29 13-0028	EA		5" Diameter x 5' Long Extra Column Assembly For vertical sewage pumps	743.67	
22 13 29 13-0029	EA		6" Diameter x 5' Long Extra Column Assembly For vertical sewage pumps	834.84	
22 13 29 13-0030			Float Switches <small>(22 13 29 13-0001)</small>		
			Note: Copper coated floats, brass rods and stops and switch brackets.		
22 13 29 13-0031	EA		Float Switch Copper Coated Float, Add, General Purpose For vertical sewage pumps	489.13	
22 13 29 13-0032	EA		Float Switch Copper Coated Float, Add, Weather Proof For vertical sewage pumps	513.82	
22 13 29 13-0033	EA		Float Switch Copper Coated Float, Add, Explosion Proof For vertical sewage pumps	525.22	
22 13 29 13-0034			Square Or Round Steel Sump Covers <small>(22 13 29 13-0001)</small>		
22 13 29 13-0035	EA		24" Steel Sump Covers, Square Or Round	963.78	42.29
22 13 29 13-0036	EA		30" Steel Sump Covers, Square Or Round	1,066.75	47.58
22 13 29 13-0037	EA		36" Steel Sump Covers, Square Or Round	1,481.80	63.44
22 13 29 13-0038	EA		40" Steel Sump Covers, Square Or Round	2,161.21	74.02
22 13 29 13-0039	EA		42" Steel Sump Covers, Square Or Round	2,318.67	76.66
22 13 29 13-0040	EA		48" Steel Sump Covers, Square Or Round	2,480.74	79.30
22 13 29 13-0041	EA		54" Steel Sump Covers, Square Or Round	3,163.63	95.16
22 13 29 13-0042	EA		60" Steel Sump Covers, Square Or Round	4,299.68	105.73
22 13 29 13-0043	EA		72" Steel Sump Covers, Square Or Round	5,452.75	132.17
22 13 29 13-0044	EA		84" Steel Sump Covers, Square Or Round	6,944.99	145.38
22 13 29 16			Submersible Sewerage Pumps <small>(22 13 29)</small>		
22 13 29 16-0001			Submersible Sewerage Pumps With Vortex Impeller <small>(22 13 29 16)</small>		
22 13 29 16-0002			Submersible Single Seal Sewage Pumps With Cast Iron Vortex Impeller <small>(22 13 29 16-0001)</small>		
			Note: Includes 25' cord.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 29 16-0003 EA 1/2 HP Manual Submersible Single Seal Sewage Pump, 115 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,533.63	76.93
22 13 29 16-0004 EA 1/2 HP Automatic Submersible Single Seal Sewage Pump, 115 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,636.47	76.93
22 13 29 16-0005 EA 1/2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,604.83	76.93
22 13 29 16-0006 EA 1/2 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,756.45	76.93
22 13 29 16-0007 EA 1/2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,756.45	76.93
22 13 29 16-0008 EA 1 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,853.43	96.16
22 13 29 16-0009 EA 1 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,987.91	96.16
22 13 29 16-0010 EA 1 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Impeller	2,005.06	96.16
22 13 29 16-0011 Submersible Single Seal Sewage Pumps With Bronze Vortex Impeller <small>(22 13 29 16-0001)</small>		
<small>Note: Includes 20' cord.</small>		
22 13 29 16-0012 EA 1/2 HP Manual Submersible Single Seal Sewage Pump, 115 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,562.63	76.93
22 13 29 16-0013 EA 1/2 HP Automatic Submersible Single Seal Sewage Pump, 115 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,710.31	76.93
22 13 29 16-0014 EA 1/2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,640.43	76.93
22 13 29 16-0015 EA 1/2 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,782.82	76.93
22 13 29 16-0016 EA 1/2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,910.72	76.93
22 13 29 16-0017 EA 1 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,771.68	96.16
22 13 29 16-0018 EA 1 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,924.63	96.16
22 13 29 16-0019 EA 1 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,923.31	96.16
22 13 29 16-0020 EA 1-1/2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,190.47	155.01
22 13 29 16-0021 EA 1-1/2 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,319.68	155.01
22 13 29 16-0022 EA 1-1/2 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,342.10	155.01
22 13 29 16-0023 EA 2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,335.61	189.45
22 13 29 16-0024 EA 2 HP Automatic Submersible Single Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,483.28	189.45
22 13 29 16-0025 EA 2 HP Manual Submersible Single Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,487.23	189.45
22 13 29 16-0026 Submersible Double Seal Sewage Pumps With Bronze Vortex Impeller <small>(22 13 29 16-0001)</small>		
<small>Note: Includes 20' cord.</small>		
22 13 29 16-0027 EA 1/2 HP Manual Submersible Double Seal Sewage Pump, 115 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	1,857.98	76.93
22 13 29 16-0028 EA 1/2 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,108.49	76.93
22 13 29 16-0029 EA 1 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron And Bronze Impeller	2,052.52	96.16
22 13 29 16-0030 EA 1 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron And Bronze Impeller	2,204.15	96.16
22 13 29 16-0031 EA 1-1/2 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,492.41	155.01
22 13 29 16-0032 EA 1-1/2 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,644.03	155.01
22 13 29 16-0033 EA 2 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 1 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,638.86	189.45
22 13 29 16-0034 EA 2 HP Manual Submersible Double Seal Sewage Pump, 230 Volt, 3 Phase, 2" To 3" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Bronze Impeller	2,790.49	189.45
22 13 29 16-0035 Submersible Sewage Pumps With Semi-Open Impeller <small>(22 13 29 16)</small>		
<small>Note: Includes 25' of cord with pump.</small>		
22 13 29 16-0036 EA 1 HP Manual Submersible Sewage Pump, 230 Volt, 3 Phase, 3" To 4" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	4,556.82	96.16
22 13 29 16-0037 EA 1.5 HP Manual Submersible Sewage Pump, 230 Volt, 3 Phase, 3" To 4" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	4,872.05	164.16
22 13 29 16-0038 EA 2 HP Manual Submersible Sewage Pump, 230 Volt, 3 Phase, 3" To 4" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	5,213.47	200.64
22 13 29 16-0039 EA 3 HP Manual Submersible Sewage Pump, 230 Volt, 3 Phase, 3" To 4" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	5,448.56	243.19
22 13 29 16-0040 EA 5 HP Manual Submersible Sewage Pump, 230 Volt, 3 Phase, 3" To 4" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	6,112.54	285.76

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 13 29 16-0041	EA	7.5 HP Manual Submersible Sewage Pump, 230 Volt, 3 Phase, 3" To 4" Flanged Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	6,826.71	328.32
22 13 29 16-0042		Submersible Sewage Pumps, Explosion Proof <small>(22 13 29 16)</small>		
		Note: Includes 25' of cord with pump.		
22 13 29 16-0043	EA	1 HP Explosion Proof Manual Sewage Pump, 230 Volt, 1 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,173.20	344.60
22 13 29 16-0044	EA	1 HP Explosion Proof Manual Sewage Pump, 230 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	6,613.83	344.60
22 13 29 16-0045	EA	1 HP Explosion Proof Manual Sewage Pump, 460 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	6,613.83	344.60
22 13 29 16-0046	EA	1.5 HP Explosion Proof Manual Sewage Pump, 230 Volt, 1 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,510.14	459.46
22 13 29 16-0047	EA	1.5 HP Explosion Proof Manual Sewage Pump, 230 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	6,950.77	459.46
22 13 29 16-0048	EA	1.5 HP Explosion Proof Manual Sewage Pump, 460 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	6,950.77	459.46
22 13 29 16-0049	EA	2 HP Explosion Proof Manual Sewage Pump, 230 Volt, 1 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,962.46	574.32
22 13 29 16-0050	EA	2 HP Explosion Proof Manual Sewage Pump, 230 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,403.09	574.32
22 13 29 16-0051	EA	2 HP Explosion Proof Manual Sewage Pump, 460 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,403.09	574.32
22 13 29 16-0052	EA	3 HP Explosion Proof Manual Sewage Pump, 230 Volt, 1 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	8,306.39	689.19
22 13 29 16-0053	EA	3 HP Explosion Proof Manual Sewage Pump, 230 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,747.02	689.19
22 13 29 16-0054	EA	3 HP Explosion Proof Manual Sewage Pump, 460 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	7,747.02	689.19
22 13 29 16-0055	EA	5 HP Explosion Proof Manual Sewage Pump, 230 Volt, 1 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	9,171.23	804.06
22 13 29 16-0056	EA	5 HP Explosion Proof Manual Sewage Pump, 230 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	8,611.86	804.06
22 13 29 16-0057	EA	5 HP Explosion Proof Manual Sewage Pump, 460 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	8,611.86	804.06
22 13 29 16-0058	EA	7.5 HP Explosion Proof Manual Sewage Pump, 230 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	9,489.54	918.92
22 13 29 16-0059	EA	7.5 HP Explosion Proof Manual Sewage Pump, 460 Volt, 3 Phase, 1750 RPM, 3" Vertical Or 4" Horizontal Flanged Discharge, Epoxy-Coated Cast Iron Housing And Impeller	9,489.54	918.92
22 13 29 16-0060		Submersible Sewage Pump Accessories <small>(22 13 29 16)</small>		
22 13 29 16-0061	EA	Simplex Plug In Pump Control Panel with Alarm Float Only, 115 Volt, 1 Phase, 0-15 Amperes Range, Indoor/Outdoor, NEMA 4X Enclosure For Submersible Sewage Pump.....	754.08	91.71
		Note: Includes alarm horn, warning light and alarm float switch.		
22 13 29 16-0062	EA	Simplex Plug In Pump Control Panel with Alarm Float Only, 230 Volt, 1 Phase, 0-15 Amperes Range, Indoor/Outdoor, NEMA 4X Enclosure For Submersible Sewage Pump.....	779.28	91.71
		Note: Includes alarm horn, warning light, and alarm float switch.		
22 13 29 16-0063	EA	Simplex Control Panel With 3 Floats, 115/208/230 Volt, 1 Phase, 0-20 Amperes Range, Indoor/Outdoor, NEMA 4X Enclosure For Submersible Sewage Pump	1,544.60	122.28
		Note: Includes alarm horn, warning light, HOA switch and three 20' control float switches.		
22 13 29 16-0064	EA	Simplex Control Panel 208/230/460 Volt, 3 Phase, 1-23 Amperes Range, Indoor/Outdoor, NEMA 4X Enclosure For Submersible Sewage Pump	2,189.59	122.28
		Note: Includes alarm horn and warning light. Control float switches not included.		
22 13 29 16-0065	EA	Simplex Intrinsically Safe Control Panel, 230 Volt, 1 Phase, Indoor/Outdoor 4X Enclosure For Submersible Sewage Pumps With Explosion Proof Motors	4,521.01	122.28
		Note: Includes alarm horn and warning light. Control float switches not included.		
22 13 29 16-0066	EA	Simplex Intrinsically Safe Control Panel, 200/230/460 Volt, 3 Phase, Indoor/Outdoor 4X Enclosure For Submersible Sewage Pumps With Explosion Proof Motors.....	4,729.99	122.28
		Note: Includes alarm horn and warning light. Control float switches not included.		
22 13 29 16-0067	EA	Duplex Intrinsically Safe Control Panel, 230 Volt, 1 Phase, Indoor/Outdoor 4X Enclosure For Submersible Sewage Pumps With Explosion Proof Motors	7,559.46	152.84
		Note: Includes alarm horn and warning light. Control float switches not included.		
22 13 29 16-0068	EA	Duplex Intrinsically Safe Control Panel, 200/230/460 Volt, 3 Phase, Indoor/Outdoor 4X Enclosure For Submersible Sewage Pumps With Explosion Proof Motors.....	6,370.57	152.84
		Note: Includes alarm horn and warning light. Control float switches not included.		
22 13 29 16-0069	EA	Electrical Alternator Duplex Control Panel with 3 Floats, 115 Volt, 1 Phase, 7-20 Amperes Range, Indoor NEMA 1 Enclosure For Submersible Sewage Pumps	1,710.31	152.84
		Note: Includes alarm horn, warning light, and three 20' float switches.		
22 13 29 16-0070	EA	Electrical Alternator Duplex Control Panel With 3 Floats, 115 Volt, 1 Phase, 7-20 Amperes Range, Indoor NEMA 4X Enclosure For Submersible Sewage Pumps	1,886.67	152.84
		Note: Includes alarm horn, warning light, and three 20' float switches.		
22 13 29 16-0071	EA	Electrical Alternator Duplex Control Panel With 3 Floats, 115/200/230 Volt, 1 Phase, 0-20 Amperes, Indoor NEMA 1 Enclosure For Submersible Sewage Pumps	1,809.83	152.84
		Note: Includes alarm horn, warning light, and three 20' float switches.		
22 13 29 16-0072	EA	Electrical Alternator Duplex Control Panel With 3 Floats, 115/200/230 Volt, 1 Phase, 0-30 Amperes Range, Indoor NEMA 4X Enclosure For Submersible Sewage Pumps.....	1,968.77	152.84
		Note: Includes alarm horn, warning light, and three 20' float switches.		
22 13 29 16-0073	EA	Electrical Alternator Duplex Control Panel, 200/230/460 Volt, 3 Phase, 1-25 Amperes Range, Indoor/Outdoor NEMA 4X Enclosure For Submersible Sewage Pumps.....	3,388.41	152.84
		Note: Includes alarm horn and warning light. Float switches not included..		
22 13 29 16-0074	EA	Alarm System, 115 Volt, Indoor/Outdoor 4X Enclosure	627.44	61.14
		Note: Includes alarm horn, warning light and 15' tethered float.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 13 29 16-0075 EA Variable Level (Clamp Type) Float Switch With 15' Cord Note: Not for use with Intrinsically Safe Control Systems.	116.57	30.57
22 13 29 16-0076 EA Variable Level (Clamp Type) Float Switch With 15' Cord For Intrinsically Safe Control Systems Only	131.43	30.57
22 13 29 16-0077 EA Variable Level (Adjustable Weight Type) Float Switch With 25' Cord Note: Not for use with Intrinsically Safe Control Systems.	150.43	30.57
22 13 29 16-0078 EA Variable Level (Adjustable Weight Type) Float Switch With 25' Cord For Intrinsically Safe Control Systems Only	147.38	30.57
22 13 29 16-0079 EA Float Switch Tree With (3) 15' Floats Note: Not for use with Intrinsically Safe Control Systems.	458.24	30.57
22 13 29 16-0080 EA Float Switch Tree And (3) Floats With 15' Cords For Intrinsically Safe Control Systems Only	467.72	30.57
22 13 29 16-0081 EA Float Switch Tree And (4) Floats With 15' Cords Note: Not for use with Intrinsically Safe Control Systems.	510.66	30.57
22 13 29 16-0082 EA Float Switch Tree And (4) Floats With 15' Cords For Intrinsically Safe Control Systems Only	532.58	30.57
22 13 29 16-0083 EA Float Switch Tree Note: Tree only.	242.20	30.57
22 13 29 16-0084 EA Adjustable Weight For Float Switch	63.78	15.28
22 13 29 16-0085 EA Rail And Disconnect System, Stainless Steel, For 2" Horizontal Discharge Note: Lifting equipment not included.	1,289.20	91.71
22 13 29 16-0086 EA Rail And Disconnect System, Stainless Steel, For 3" Horizontal Discharge Note: Lifting equipment not included.	2,024.31	122.28
22 13 29 16-0087 EA Rail And Disconnect System, Stainless Steel, For 4" Horizontal Discharge Note: Lifting equipment not included.	2,645.05	152.84
22 13 29 16-0088 EA Rail And Disconnect System, Stainless Steel Non-Sparking, For 3" Horizontal Discharge	2,588.13	91.71
22 13 29 16-0089 EA Rail And Disconnect System, Stainless Steel Non-Sparking, For 4" Horizontal Discharge	3,656.12	91.71
22 13 29 16-0090 EA Intermediate Guide Rail Bracket, Stainless Steel, For 2" Rail System	366.04	61.14
22 13 29 16-0091 EA Intermediate Guide Rail Bracket, Stainless Steel, For 3" Rail Systems	649.55	76.43
22 13 29 16-0092 EA Intermediate Guide Rail Bracket, Stainless Steel, For 4" Rail Systems	648.67	91.71
22 13 29 16-0093 EA 12" Stainless Steel Lifting Cable	180.40	30.57
22 13 29 16-0094 EA Disconnect Fitting For 2" Horizontal Discharge Note: Used for shallow systems where guide rails are not necessary.	361.27	30.57

22 13 29 33 Sewerage Pump Basins and Pits (22 13 29)

22 13 29 33-0001 Sewage Sump Pump Basin (22 13 29 33)		
22 13 29 33-0002 High Density Polyethylene (HDPE) Basin (22 13 29 33-0001)		
22 13 29 33-0003 EA 18" Diameter x 24" High, High Density Polyethylene (HDPE) Basin And Lid With Inlet And Hub	153.48	
22 13 29 33-0004 EA 18" Diameter x 30" High, High Density Polyethylene (HDPE) Basin And Lid With Inlet And Hub	199.81	
22 13 29 33-0005 EA 24" Diameter x 30" High, High Density Polyethylene (HDPE) Basin And Lid With Inlet And Hub	463.73	
22 13 29 33-0006 EA 24" Diameter x 36" High, High Density Polyethylene (HDPE) Basin And Lid With Inlet And Hub	653.76	
22 13 29 33-0007 EA 30" Diameter x 36" High, High Density Polyethylene (HDPE) Basin And Lid With Inlet And Hub	843.78	
22 13 29 33-0008 EA 36" Diameter x 36" High, High Density Polyethylene (HDPE) Basin And Lid With Inlet And Hub	982.48	
22 13 29 33-0009 Fiberglass Basin (22 13 29 33-0001)		
22 13 29 33-0010 EA 18" Diameter x 30" High Fiberglass Basin And Lid With Inlet And Hub	394.84	
22 13 29 33-0011 EA 24" Diameter x 30" High Fiberglass Basin And Lid With Inlet And Hub	809.98	
22 13 29 33-0012 EA 30" Diameter x 36" High Fiberglass Basin And Lid With Inlet And Hub	1,459.74	
22 13 29 33-0013 EA 36" Diameter x 36" High Fiberglass Basin And Lid With Inlet And Hub	1,967.57	
22 13 29 33-0014 EA 36" Diameter x 48" High Fiberglass Basin And Lid With Inlet And Hub	2,268.05	
22 13 29 33-0015 EA 36" Diameter x 60" High Fiberglass Basin And Lid With Inlet And Hub	2,395.32	
22 13 29 33-0016 EA 36" Diameter x 72" High Fiberglass Basin And Lid With Inlet And Hub	2,815.34	
22 13 29 33-0017 EA 48" Diameter x 48" High Fiberglass Basin And Lid With Inlet And Hub	3,269.92	

22 14 Facility Storm Drainage (22 10)

22 14 13 Facility Storm Drainage Piping (22 14) See CSI section 22 13 16 00-0000 for storm drainage piping.		
22 14 26 Facility Storm Drains (22 14)		
22 14 26 13 Roof Drains (22 14 26)		
22 14 26 13-0001 Cast Iron Roof Drains (22 14 26 13)		
22 14 26 13-0002 Cast Iron Roof Drains With Large Polypropylene Dome (22 14 26 13-0001) Note: Dome free area is 124 square inches.		
22 14 26 13-0003 EA 15" Diameter Cast Iron Roof Drain With 2" Outlet, 124 Square Inch Free Area Polypropylene Dome	962.27	176.26
For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add	357.00	
For Bronze Dome, Add	448.80	
For Deck Clamp Assembly, Add	130.00	
For Galvanized Iron Parts, Add	518.00	
For Drain Receiver, Add	147.00	
22 14 26 13-0004 EA 15" Diameter Cast Iron Roof Drain With 3" Outlet, 124 Square Inch Free Area Polypropylene Dome	1,050.38	211.47
For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add	357.00	
For Bronze Dome, Add	448.80	
For Deck Clamp Assembly, Add	130.00	
For Galvanized Iron Parts, Add	518.00	
For Drain Receiver, Add	147.00	

22 Plumbing**22 10 Plumbing Piping****22 14 Facility Storm Drainage**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 14 26	13-0005	EA	15" Diameter Cast Iron Roof Drain With 4" Outlet, 124 Square Inch Free Area Polypropylene Dome	1,138.49	264.33
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Bronze Dome, Add</i>	448.80	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
			<i>For Drain Receiver, Add</i>	147.00	
22 14 26	13-0006	EA	15" Diameter Cast Iron Roof Drain With 5" Outlet, 124 Square Inch Free Area Polypropylene Dome	1,532.62	317.20
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Bronze Dome, Add</i>	448.80	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
			<i>For Drain Receiver, Add</i>	147.00	
22 14 26	13-0007	EA	15" Diameter Cast Iron Roof Drain With 6" Outlet, 124 Square Inch Free Area Polypropylene Dome	1,576.67	352.41
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Bronze Dome, Add</i>	448.80	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
			<i>For Drain Receiver, Add</i>	147.00	
22 14 26	13-0008	EA	15" Diameter Cast Iron Roof Drain With 8" Outlet, 124 Square Inch Free Area Polypropylene Dome	1,871.87	370.06
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Bronze Dome, Add</i>	448.80	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
			<i>For Drain Receiver, Add</i>	147.00	
22 14 26	13-0009	EA	15" Diameter Cast Iron Roof Drain With 10" Outlet, 124 Square Inch Free Area Polypropylene Dome	2,552.12	383.28
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Bronze Dome, Add</i>	448.80	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
			<i>For Drain Receiver, Add</i>	147.00	
22 14 26	13-0010		Cast Iron Roof Drains With Expansion Joint <small>(22 14 26 13-0001)</small>		
			Note: With polypropylene dome. Dome free area is 124 square inches.		
22 14 26	13-0011	EA	15" Diameter Cast Iron Roof Drain With Expansion Joint, 2" Outlet, Polypropylene Dome	1,505.61	176.26
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
22 14 26	13-0012	EA	15" Diameter Cast Iron Roof Drain With Expansion Joint, 3" Outlet, Polypropylene Dome	1,631.67	211.47
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
22 14 26	13-0013	EA	15" Diameter Cast Iron Roof Drain With Expansion Joint, 4" Outlet, Polypropylene Dome	1,793.69	264.33
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
22 14 26	13-0014	EA	15" Diameter Cast Iron Roof Drain With Expansion Joint, 5" Outlet, Polypropylene Dome	2,485.45	317.20
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
22 14 26	13-0015	EA	15" Diameter Cast Iron Roof Drain With Expansion Joint, 6" Outlet, Polypropylene Dome	2,667.33	352.41
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
			<i>For Galvanized Iron Parts, Add</i>	518.00	
22 14 26	13-0016		Cast Iron Roof Drains With Flat Bronze Promenade Top <small>(22 14 26 13-0001)</small>		
22 14 26	13-0017	EA	14" x 14" Cast Iron Roof Drain With 2" Outlet, Bronze Promenade Top	2,093.93	176.26
			<i>For Galvanized Iron Parts, Add</i>	197.00	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
22 14 26	13-0018	EA	14" x 14" Cast Iron Roof Drain With 3" Outlet, Bronze Promenade Top	2,182.04	211.47
			<i>For Galvanized Iron Parts, Add</i>	197.00	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
22 14 26	13-0019	EA	14" x 14" Cast Iron Roof Drain With 4" Outlet, Bronze Promenade Top	2,270.15	264.33
			<i>For Galvanized Iron Parts, Add</i>	197.00	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	
22 14 26	13-0020	EA	14" x 14" Cast Iron Roof Drain With 5" Outlet, Bronze Promenade Top	2,647.51	317.20
			<i>For Galvanized Iron Parts, Add</i>	197.00	
			<i>For Deck Clamp Assembly, Add</i>	130.00	
			<i>For Drain Receiver, Add</i>	147.00	
			<i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	357.00	



Plumbing	22	22
Plumbing Piping	22 10	
Facility Storm Drainage	22 14	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 14 26 13-0021 EA 14" x 14" Cast Iron Roof Drain With 6" Outlet, Bronze Promenade Top..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	2,691.56 197.00 130.00 147.00 357.00	352.41
22 14 26 13-0022 Cast Iron Scupper Drain With L-Shaped Bronze Grate (22 14 26 13-0001)		
22 14 26 13-0023 EA Cast Iron Scupper Drain With 2" Outlet, L-Shaped Bronze Grate..... <i>For Vandal Proof Grate, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	1,360.65 33.00 128.00	70.52
22 14 26 13-0024 EA Cast Iron Scupper Drain With 3" Outlet, L-Shaped Bronze Grate..... <i>For Vandal Proof Grate, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	1,395.89 33.00 128.00	88.08
22 14 26 13-0025 EA Cast Iron Scupper Drain With 4" Outlet, L-Shaped Bronze Grate..... <i>For Vandal Proof Grate, Add</i> <i>For Galvanized Cast Iron Parts, Add</i>	1,411.91 33.00 128.00	96.11
22 14 26 13-0026 EA Cast Iron Scupper Drain With 5" Outlet, L-Shaped Bronze Grate..... <i>For Galvanized Iron Parts, Add</i> <i>For Vandal Proof Grate, Add</i>	1,987.88 258.00 33.00	127.41
22 14 26 13-0027 EA Cast Iron Scupper Drain With 6" Outlet, L-Shaped Bronze Grate..... <i>For Galvanized Iron Parts, Add</i> <i>For Vandal Proof Grate, Add</i>	2,044.08 258.00 33.00	155.54
22 14 26 13-0028 Cast Iron Roof Drain With Flat Cast Iron Grate (22 14 26 13-0001)		
22 14 26 13-0029 EA 9" x 9" Cast Iron Roof Drain With 2" Outlet, Cast Iron Promenade Top..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,058.67 144.00 80.40 93.60	176.26
22 14 26 13-0030 EA 9" x 9" Cast Iron Roof Drain With 3" Outlet, Cast Iron Promenade Top..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,146.78 144.00 80.40 93.60	211.47
22 14 26 13-0031 EA 9" x 9" Cast Iron Roof Drain With 4" Outlet, Cast Iron Promenade Top..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,234.89 144.00 80.40 93.60	264.33
22 14 26 13-0032 Cast Iron Roof Drains With Large Cast Iron Dome (22 14 26 13-0001)		
22 14 26 13-0033 EA 15" Diameter Cast Iron Roof Drain With 2" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,142.50 518.00 130.00 147.00 357.00	176.26
22 14 26 13-0034 EA 15" Diameter Cast Iron Roof Drain With 3" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,230.61 518.00 130.00 147.00 357.00	211.47
22 14 26 13-0035 EA 15" Diameter Cast Iron Roof Drain With 4" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,318.72 518.00 130.00 147.00 357.00	264.33
22 14 26 13-0036 EA 15" Diameter Cast Iron Roof Drain With 5" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,712.85 518.00 130.00 147.00 357.00	317.20
22 14 26 13-0037 EA 15" Diameter Cast Iron Roof Drain With 6" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,756.90 518.00 130.00 147.00 357.00	352.41
22 14 26 13-0038 EA 15" Diameter Cast Iron Roof Drain With 8" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	2,052.10 518.00 130.00 147.00 357.00	370.06
22 14 26 13-0039 EA 15" Diameter Cast Iron Roof Drain With 10" Outlet, Cast Iron Dome <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	2,732.35 518.00 130.00 147.00 357.00	383.28
22 14 26 13-0040 Aluminum Roof Drains (22 14 26 13)		
22 14 26 13-0041 Aluminum Dome Roof Drains (22 14 26 13-0040)		

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 14 26 13-0042	EA 15" Diameter Roof Drain With 2" Outlet, Aluminum Dome..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,173.93 518.00 130.00 147.00 357.00	176.26
22 14 26 13-0043	EA 15" Diameter Roof Drain With 3" Outlet, Aluminum Dome..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,262.04 518.00 130.00 147.00 357.00	211.47
22 14 26 13-0044	EA 15" Diameter Roof Drain With 4" Outlet, Aluminum Dome..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,350.15 518.00 130.00 147.00 357.00	264.33
22 14 26 13-0045	EA 15" Diameter Roof Drain With 6" Outlet, Aluminum Dome..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	1,788.33 518.00 130.00 147.00 357.00	352.09
22 14 26 13-0046	EA 15" Diameter Roof Drain With 8" Outlet, Aluminum Dome..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	2,083.74 518.00 130.00 147.00 357.00	370.06
22 14 26 13-0047	EA 15" Diameter Roof Drain With 10" Outlet, Aluminum Dome..... <i>For Galvanized Iron Parts, Add</i> <i>For Deck Clamp Assembly, Add</i> <i>For Drain Receiver, Add</i> <i>For 4" (10 cm) Fixed Extension Collar, Cast Iron, Add</i>	2,763.78 518.00 130.00 147.00 357.00	383.28
22 14 26 13-0048	Retrofit Roof Drains (22 14 26 13)		
22 14 26 13-0049	Retrofit Copolymer Roof Drains With Copolymer Strainer Dome (22 14 26 13-0048)		
22 14 26 13-0050	EA Copolymer Retrofit 3" Roof Drains, With Copolymer Dome.....	831.77	211.47
22 14 26 13-0051	EA Copolymer Retrofit 4" Roof Drains, With Copolymer Dome.....	934.93	264.33
22 14 26 13-0052	EA Copolymer Retrofit 5" Roof Drains, With Copolymer Dome.....	1,127.29	317.20
22 14 26 13-0053	EA Copolymer Retrofit 6" Roof Drains, With Copolymer Dome.....	1,231.52	352.09
22 14 26 13-0054	Retrofit Copolymer Roof Drains With Cast Aluminum Strainer Dome (22 14 26 13-0048)		
22 14 26 13-0055	EA Copolymer Retrofit Drain, 3", With Cast Aluminum Dome.....	967.19	211.47
22 14 26 13-0056	EA Copolymer Retrofit Drain, 4", With Cast Aluminum Dome.....	1,064.33	264.33
22 14 26 13-0057	EA Copolymer Retrofit Drain, 5", With Cast Aluminum Dome.....	1,265.72	317.20
22 14 26 13-0058	EA Copolymer Retrofit Drain, 6", With Cast Aluminum Dome.....	1,327.83	352.09
22 14 26 13-0059	Retrofit Roof Aluminum Drains With Cast Aluminum Strainer Dome (22 14 26 13-0048)		
22 14 26 13-0060	EA Aluminum Retrofit 3" Roof Drains, With Cast Aluminum Dome..... <i>For Copolymer Strainer Dome, Deduct</i>	837.79 -24.00	211.47
22 14 26 13-0061	EA Aluminum Retrofit 4" Roof Drains, With Cast Aluminum Dome..... <i>For Copolymer Strainer Dome, Deduct</i>	940.95 -24.00	264.33
22 14 26 13-0062	EA Aluminum Retrofit 5" Roof Drains, With Cast Aluminum Dome..... <i>For Copolymer Strainer Dome, Deduct</i>	1,133.31 -24.00	317.20
22 14 26 13-0063	EA Aluminum Retrofit 6" Roof Drains, With Cast Aluminum Dome..... <i>For Copolymer Strainer Dome, Deduct</i>	1,189.39 -24.00	352.09
22 14 26 13-0064	Bronze Downspout Nozzles (22 14 26 13)		
22 14 26 13-0065	EA 2" Outlet, Bronze Roof Drain Downspout Nozzle.....	505.85	105.73
22 14 26 13-0066	EA 3" Outlet, Bronze Roof Drain Downspout Nozzle.....	505.85	105.73
22 14 26 13-0067	EA 4" Outlet, Bronze Roof Drain Downspout Nozzle.....	505.85	105.73
22 14 26 13-0068	EA 5" Outlet, Bronze Roof Drain Downspout Nozzle.....	794.35	132.17
22 14 26 13-0069	EA 6" Outlet, Bronze Roof Drain Downspout Nozzle.....	794.35	132.17
22 14 26 13-0070	EA 8" Outlet, Bronze Roof Drain Downspout Nozzle.....	1,041.11	132.17
22 14 26 16	Facility Area Drains (22 14 26)		
22 14 26 16-0001	Area Drain (22 14 26 16)		
22 14 26 16-0002	EA 12" x 12" Floor Drain With 2" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer..... <i>For Ductile Iron Grate, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Primer Tap, Add</i>	3,063.90 123.50 29.50 152.25 36.00	127.30
22 14 26 16-0003	EA 12" x 12" Floor Drain With 3" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer..... <i>For Ductile Iron Grate, Add</i> <i>For Vandal Proof Screws, Add</i> <i>For Galvanized Cast Iron Parts, Add</i> <i>For Primer Tap, Add</i>	3,091.34 123.50 29.50 152.25 36.00	141.05

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 14 26 16-0004	EA			12" x 12" Floor Drain With 4" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	3,120.22	155.54
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0005	EA			12" x 12" Floor Drain With 6" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	3,150.32	170.55
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0006	EA			12" x 12" Floor Drain With 2" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	1,872.02	127.30
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0007	EA			12" x 12" Floor Drain With 3" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	1,899.46	141.05
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0008	EA			12" x 12" Floor Drain With 4" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	1,928.34	155.54
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0009	EA			12" x 12" Floor Drain With 6" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	1,958.44	170.55
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0010	EA			12" x 12" Floor Drain With 2" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	2,857.77	127.30
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0011	EA			12" x 12" Floor Drain With 3" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	2,885.21	141.05
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0012	EA			12" x 12" Floor Drain With 4" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	2,914.09	155.54
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0013	EA			12" x 12" Floor Drain With 6" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	2,944.19	170.55
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Vandal Proof Screws, Add</i>	29.50	
				<i>For Galvanized Cast Iron Parts, Add</i>	152.25	
				<i>For Primer Tap, Add</i>	36.00	
22 14 26 16-0014	EA			16" x 16" Floor Drain With 2" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	6,214.06	127.30
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Primer Tap, Add</i>	36.00	
				<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0015	EA			16" x 16" Floor Drain With 3" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	6,241.50	141.05
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Primer Tap, Add</i>	36.00	
				<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0016	EA			16" x 16" Floor Drain With 4" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	6,270.38	155.54
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Primer Tap, Add</i>	36.00	
				<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0017	EA			16" x 16" Floor Drain With 6" Bottom Outlet, Nikaloy Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	6,300.48	170.55
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Primer Tap, Add</i>	36.00	
				<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0018	EA			16" x 16" Floor Drain With 2" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	3,016.33	127.30
				<i>For Ductile Iron Grate, Add</i>	123.50	
				<i>For Primer Tap, Add</i>	36.00	
				<i>For Galvanized Cast Iron Parts, Add</i>	258.50	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 14 26 16-0019	EA		16" x 16" Floor Drain With 3" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	3,043.77	141.05
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0020	EA		16" x 16" Floor Drain With 4" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	3,072.65	155.54
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0021	EA		16" x 16" Floor Drain With 6" Bottom Outlet, Cast Iron Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	3,102.75	170.55
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0022	EA		16" x 16" Floor Drain With 2" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	5,889.00	127.30
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0023	EA		16" x 16" Floor Drain With 3" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	5,916.44	141.05
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0024	EA		16" x 16" Floor Drain With 4" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	5,945.32	155.54
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0025	EA		16" x 16" Floor Drain With 6" Bottom Outlet, Bronze Top, Medium Duty Loose-Set Cast Iron Grate And Secondary Strainer.....	5,975.42	170.55
			<i>For Ductile Iron Grate, Add</i>	123.50	
			<i>For Primer Tap, Add</i>	36.00	
			<i>For Galvanized Cast Iron Parts, Add</i>	258.50	
22 14 26 16-0026	EA		9" Diameter Floor Drain With 2" Bottom Outlet, Nikaloy Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	1,346.12	127.30
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0027	EA		9" Diameter Floor Drain With 3" Bottom Outlet, Nikaloy Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	1,373.56	141.05
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0028	EA		9" Diameter Floor Drain With 4" Bottom Outlet, Nikaloy Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	1,402.44	155.54
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0029	EA		9" Diameter Floor Drain With 2" Bottom Outlet, Cast Iron Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	801.71	127.30
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0030	EA		9" Diameter Floor Drain With 3" Bottom Outlet, Cast Iron Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	829.15	141.05
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0031	EA		9" Diameter Floor Drain With 4" Bottom Outlet, Cast Iron Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	858.03	155.54
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0032	EA		9" Diameter Floor Drain With 2" Bottom Outlet, Bronze Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	1,266.83	127.30
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0033	EA		9" Diameter Floor Drain With 3" Bottom Outlet, Bronze Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	1,294.27	141.05
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0034	EA		9" Diameter Floor Drain With 4" Bottom Outlet, Bronze Top, Medium Duty Anti-Tilting Grate And Perimeter Drainage Slots.....	1,323.15	155.54
			<i>For Vandal Proof Grate, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	87.50	
22 14 26 16-0035	EA		12-7/8" x 10-7/8" Floor Drain With 2" Side Outlet, Nikaloy Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer.....	4,128.93	127.30
			<i>For Ductile Iron Grate, Add</i>	126.00	
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0036	EA		12-7/8" x 10-7/8" Floor Drain With 3" Side Outlet, Nikaloy Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer.....	4,156.37	141.05
			<i>For Ductile Iron Grate, Add</i>	126.00	
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0037	EA		12-7/8" x 10-7/8" Floor Drain With 4" Side Outlet, Nikaloy Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer.....	4,185.25	155.54
			<i>For Ductile Iron Grate, Add</i>	126.00	
			<i>For Vandal Proof Screws, Add</i>	30.50	
			<i>For Galvanized Cast Iron Parts, Add</i>	307.50	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 14 26 16-0038 EA 12-7/8" x 10-7/8" Floor Drain With 2" Side Outlet, Cast Iron Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer	2,672.78	127.30
<i>For Ductile Iron Grate, Add</i>	126.00	
<i>For Vandal Proof Screws, Add</i>	30.50	
<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0039 EA 12-7/8" x 10-7/8" Floor Drain With 3" Side Outlet, Cast Iron Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer	2,700.22	141.05
<i>For Ductile Iron Grate, Add</i>	126.00	
<i>For Vandal Proof Screws, Add</i>	30.50	
<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0040 EA 12-7/8" x 10-7/8" Floor Drain With 4" Side Outlet, Cast Iron Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer	2,729.10	155.54
<i>For Ductile Iron Grate, Add</i>	126.00	
<i>For Vandal Proof Screws, Add</i>	30.50	
<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0041 EA 12-7/8" x 10-7/8" Floor Drain With 2" Side Outlet, Bronze Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer	3,875.23	127.30
<i>For Ductile Iron Grate, Add</i>	126.00	
<i>For Vandal Proof Screws, Add</i>	30.50	
<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0042 EA 12-7/8" x 10-7/8" Floor Drain With 3" Side Outlet, Bronze Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer	3,902.67	141.05
<i>For Ductile Iron Grate, Add</i>	126.00	
<i>For Vandal Proof Screws, Add</i>	30.50	
<i>For Galvanized Cast Iron Parts, Add</i>	307.50	
22 14 26 16-0043 EA 12-7/8" x 10-7/8" Floor Drain With 4" Side Outlet, Bronze Top, Heavy Duty Hinged Grate And Removable Medium-Deep Sediment Strainer	3,931.55	155.54
<i>For Ductile Iron Grate, Add</i>	126.00	
<i>For Vandal Proof Screws, Add</i>	30.50	
<i>For Galvanized Cast Iron Parts, Add</i>	307.50	

22 14 26 19 Facility Trench Drains (22 14 26)

22 14 26 19-0001 Trench Drain (22 14 26 19) Note: Each section is 39.4" in length.		
22 14 26 19-0002 EA 6" Wide Trench Drain x 9" Outlet Section With 2" Bottom Outlet, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,103.90	127.30
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0003 EA 6" Wide Trench Drain x 9" Outlet Section With 3" Bottom Outlet, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,131.34	141.05
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0004 EA 6" Wide Trench Drain x 9" Outlet Section With 4" Bottom Outlet, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,160.22	155.54
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0005 EA 6" Wide Trench Drain x 9" Outlet Section With 2" Bottom Outlet, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	665.30	127.30
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0006 EA 6" Wide Trench Drain x 9" Outlet Section With 3" Bottom Outlet, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	692.74	141.05
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0007 EA 6" Wide Trench Drain x 9" Outlet Section With 4" Bottom Outlet, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	721.62	155.54
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0008 EA 6" Wide Trench Drain x 9" Outlet Section With 2" Bottom Outlet, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,044.14	127.30
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0009 EA 6" Wide Trench Drain x 9" Outlet Section With 3" Bottom Outlet, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,071.58	141.05
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0010 EA 6" Wide Trench Drain x 9" Outlet Section With 4" Bottom Outlet, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,100.46	155.54
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	
22 14 26 19-0011 EA 6" Wide Trench Drain x 15" Extension Section, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	976.04	63.44
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	66.00	
<i>For Galvanized Cast Iron Parts, Add</i>	98.25	

22 Plumbing

22 10 Plumbing Piping

22 14 Facility Storm Drainage



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
22 14 26 19-0012	EA	6" Wide Trench Drain x 15" Extension Section, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	537.44		63.44
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	66.00		
		<i>For Galvanized Cast Iron Parts, Add</i>	98.25		
22 14 26 19-0013	EA	6" Wide Trench Drain x 15" Extension Section, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	916.28		63.44
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	66.00		
		<i>For Galvanized Cast Iron Parts, Add</i>	98.25		
22 14 26 19-0014	EA	12" Wide Trench Drain x 15" Outlet Section With 3" Bottom Outlet, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,760.35		127.30
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0015	EA	12" Wide Trench Drain x 15" Outlet Section With 4" Bottom Outlet, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,787.79		141.05
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0016	EA	12" Wide Trench Drain x 15" Outlet Section With 6" Bottom Outlet, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,816.67		155.54
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0017	EA	12" Wide Trench Drain x 15" Outlet Section With 3" Bottom Outlet, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,217.65		127.30
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0018	EA	12" Wide Trench Drain x 15" Outlet Section With 4" Bottom Outlet, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,245.09		141.05
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0019	EA	12" Wide Trench Drain x 15" Outlet Section With 6" Bottom Outlet, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,273.97		155.54
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0020	EA	12" Wide Trench Drain x 15" Outlet Section With 3" Bottom Outlet, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,686.13		127.30
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0021	EA	12" Wide Trench Drain x 15" Outlet Section With 4" Bottom Outlet, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,713.57		141.05
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		
22 14 26 19-0022	EA	12" Wide Trench Drain x 15" Outlet Section With 6" Bottom Outlet, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots.....	1,742.45		155.54
		<i>For Vandal Proof Screws, Add</i>	48.50		
		<i>For Ductile Iron Grate, Add</i>	181.50		
		<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50		
		<i>For Sediment Bucket, Add</i>	116.00		
		<i>For Galvanized Sediment Bucket, Add</i>	188.50		
		<i>For Galvanized Cast Iron Parts, Add</i>	131.50		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 14 26 19-0023 EA 12" Wide Trench Drain x 15" Outlet Section With 3" Bottom Outlet, Galvanized Top And Body, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,471.16	127.30
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
<i>For Sediment Bucket, Add</i>	116.00	
<i>For Galvanized Sediment Bucket, Add</i>	188.50	
<i>For Galvanized Cast Iron Parts, Add</i>	131.50	
22 14 26 19-0024 EA 12" Wide Trench Drain x 15" Outlet Section With 4" Bottom Outlet, Galvanized Top And Body, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,498.60	141.05
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
<i>For Sediment Bucket, Add</i>	116.00	
<i>For Galvanized Sediment Bucket, Add</i>	188.50	
<i>For Galvanized Cast Iron Parts, Add</i>	131.50	
22 14 26 19-0025 EA 12" Wide Trench Drain x 15" Outlet Section With 6" Bottom Outlet, Galvanized Top And Body, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,527.48	155.54
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
<i>For Sediment Bucket, Add</i>	116.00	
<i>For Galvanized Sediment Bucket, Add</i>	188.50	
<i>For Galvanized Cast Iron Parts, Add</i>	131.50	
22 14 26 19-0026 EA 12" Wide Trench Drain x 15" Extension Section, Nikaloy Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,632.47	63.44
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
22 14 26 19-0027 EA 12" Wide Trench Drain x 15" Extension Section, Cast Iron Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,089.77	63.44
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
22 14 26 19-0028 EA 12" Wide Trench Drain x 15" Extension Section, Bronze Top, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,558.25	63.44
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
22 14 26 19-0029 EA 12" Wide Trench Drain x 15" Extension Section, Galvanized Top And Body, Heavy Duty Body Sections, Heavy Duty Loose Set Grate With Perimeter Drainage Slots	1,343.28	63.44
<i>For Vandal Proof Screws, Add</i>	48.50	
<i>For Ductile Iron Grate, Add</i>	181.50	
<i>For Convex Grate On Cast Iron Or Ductile Price, Add</i>	38.50	
22 14 29 Sump Pumps (22 14) See CSI section 22 11 16 00-0000 for pipe extensions into well.		
22 14 29 13 Wet-Pit-Mounted, Vertical Sump Pumps (22 14 29)		
22 14 29 13-0001 Vertical Mounted Sump Pumps (22 14 29 13) Note: Supplied with 1750 RPM premium efficient motor with drip cover, float switch assembly, steel support mounting plate and 5' column sections.		
22 14 29 13-0002 EA 1 HP Vertical Mounted Cast Iron Sump Pump, 1-1/2" Discharge, Single Stage, 25 GPM 40' Head	6,527.45	306.79
<i>For Explosion Proof Motor, Add</i>	295.95	
22 14 29 13-0003 EA 1-1/2 HP Vertical Mounted Cast Iron Sump Pump, 2" Discharge, Single Stage, 75 GPM 40' Head	6,882.56	371.32
<i>For Explosion Proof Motor, Add</i>	329.01	
22 14 29 13-0004 EA 2 HP Vertical Mounted Cast Iron Sump Pump, 2-1/2" Discharge, Single Stage, 100 GPM 40' Head	7,855.61	441.15
<i>For Explosion Proof Motor, Add</i>	425.03	
22 14 29 13-0005 EA 3 HP Vertical Mounted Cast Iron Sump Pump, 3" Discharge, Single Stage, 150 GPM 40' Head	8,351.60	542.71
<i>For Explosion Proof Motor, Add</i>	481.71	
22 14 29 13-0006 EA 5 HP Vertical Mounted Cast Iron Sump Pump, 3" Discharge, Single Stage, 200 GPM 40' Head	8,812.66	588.20
<i>For Explosion Proof Motor, Add</i>	703.67	
22 14 29 13-0007 EA 10 HP Vertical Mounted Cast Iron Sump Pump, 4" Discharge, Single Stage, 300 GPM 70' Head	10,447.02	705.62
<i>For Explosion Proof Motor, Add</i>	798.12	
22 14 29 13-0008 EA 15 HP Vertical Mounted Cast Iron Sump Pump, 5" Discharge, Single Stage, 500 GPM 70' Head	12,261.10	730.74
<i>For Explosion Proof Motor, Add</i>	1,308.16	
22 14 29 13-0009 EA 20 HP Vertical Mounted Cast Iron Sump Pump, 6" Discharge, Single Stage, 800 GPM 70' Head	14,882.66	921.71
<i>For Explosion Proof Motor, Add</i>	1,736.34	
22 14 29 13-0010 EA 30 HP Vertical Mounted Cast Iron Sump Pump, 6" Discharge, Single Stage, 1,000 GPM 70' Head	16,042.23	1,074.95
<i>For Explosion Proof Motor, Add</i>	2,251.11	
22 14 29 13-0011 EA 50 HP Vertical Mounted Cast Iron Sump Pump, 8" Discharge, Single Stage, 1,600 GPM 70' Head	21,592.05	1,290.40
<i>For Explosion Proof Motor, Add</i>	2,932.73	
22 14 29 13-0012 EA 60 HP Vertical Mounted Cast Iron Sump Pump, 8" Discharge, Single Stage, 2,000 GPM 70' Head	30,044.60	1,433.26
<i>For Explosion Proof Motor, Add</i>	4,648.61	
22 14 29 13-0013 Extra Column Assemblies (22 14 29 13)		
22 14 29 13-0014 EA 1-1/2" Diameter x 5' Long Extra Column Assembly	1,044.88	
22 14 29 13-0015 EA 2" Diameter x 5' Long Extra Column Assembly	1,143.34	
22 14 29 13-0016 EA 2-1/2" Diameter x 5' Long Extra Column Assembly	1,251.08	
22 14 29 13-0017 EA 3" Diameter x 5' Long Extra Column Assembly	1,502.17	
22 14 29 13-0018 EA 4" Diameter x 5' Long Extra Column Assembly	1,679.03	
22 14 29 13-0019 EA 5" Diameter x 5' Long Extra Column Assembly	1,709.60	
22 14 29 13-0020 EA 6" Diameter x 5' Long Extra Column Assembly	1,919.20	

MINOR
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TOTAL DIRECT DEMOLITION
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22 14 29 13-0021	EA	8" Diameter x 5' Long Extra Column Assembly	2,100.06	
22 14 29 13-0022		Support Plate <small>(22 14 29 13)</small>		
22 14 29 13-0023	EA	24" Steel Support Plate, Round Or Square.....	963.78	42.29
22 14 29 13-0024	EA	30" Steel Support Plate, Round Or Square.....	1,066.75	47.58
22 14 29 13-0025	EA	36" Steel Support Plate, Round Or Square.....	1,481.80	63.44
22 14 29 13-0026	EA	40" Steel Support Plate, Round Or Square.....	2,161.21	74.02
22 14 29 13-0027	EA	42" Steel Support Plate, Round Or Square.....	2,318.67	76.66
22 14 29 13-0028	EA	48" Steel Support Plate, Round Or Square.....	2,480.64	79.30
22 14 29 13-0029	EA	54" Steel Support Plate, Round Or Square.....	3,163.63	95.16
22 14 29 13-0030	EA	60" Steel Support Plate, Round Or Square.....	4,299.68	105.73
22 14 29 13-0031	EA	72" Steel Support Plate, Round Or Square.....	5,745.06	132.17
22 14 29 13-0032	EA	84" Steel Support Plate, Round Or Square.....	6,944.99	145.38
22 14 29 16		Submersible Sump Pumps <small>(22 14 29)</small>		
22 14 29 16-0001		Submersible Sump Pump With Vortex Impeller <small>(22 14 29 16)</small>		
22 14 29 16-0002		Submersible Sump Pump With Cast Iron Vortex Impeller <small>(22 14 29 16-0001)</small>		
22 14 29 16-0003	EA	1/3 HP Manual Submersible Sump Pump, 115 Volt Or 230 Volt, 1 Phase, 1-1/2" Threaded Discharge, Epoxy-Coated Cast Steel Housing And Impeller	515.45	68.90
22 14 29 16-0004	EA	1/3 HP Automatic Submersible Sump Pump, 115 Volt Or 230 Volt, 1 Phase, 1-1/2" Threaded Discharge, Epoxy-Coated Cast Steel Housing And Impeller	573.50	68.90
22 14 29 16-0005	EA	1/2 HP Manual Submersible Sump Pump, 115 Volt Or 230 Volt, 1 Phase, 1-1/2" Threaded Discharge, Epoxy-Coated Cast Steel Housing And Impeller	912.89	72.91
22 14 29 16-0006	EA	1/2 HP Automatic Submersible Sump Pump, 115 Volt Or 230 Volt, 1 Phase, 1-1/2" Threaded Discharge, Epoxy-Coated Cast Steel Housing And Impeller	1,004.75	72.91
22 14 29 16-0007		Submersible Sump Pump With Bronze Vortex Impeller <small>(22 14 29 16-0001)</small>		
		Note: Includes 20' of cord with pump.		
22 14 29 16-0008	EA	1/2 HP Manual Submersible Sump Pump, 115 Volt Or 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	1,553.39	72.91
22 14 29 16-0009	EA	1/2 HP Automatic Submersible Sump Pump, 115 Volt Or 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	1,691.82	72.91
22 14 29 16-0010	EA	1 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	1,776.03	80.37
22 14 29 16-0011	EA	1 HP Automatic Submersible Sump Pump, 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	1,924.03	80.37
22 14 29 16-0012	EA	1-1/2 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	1,977.61	91.85
22 14 29 16-0013	EA	1-1/2 HP Automatic Submersible Sump Pump, 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	2,123.06	91.85
22 14 29 16-0014	EA	2 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	2,121.78	109.08
22 14 29 16-0015	EA	2 HP Automatic Submersible Sump Pump, 230 Volt, 1 Phase, 1-1/2" Threaded or 2" To 3" Flanged Discharge, Epoxy-Coated Cast Steel Housing And Bronze Impeller	2,248.10	109.08
22 14 29 16-0016		Submersible Sump Pump With Semi-Open Impeller <small>(22 14 29 16)</small>		
		Note: Includes 20' of cord with pump.		
22 14 29 16-0017	EA	1/3 HP Manual Submersible Sump Pump, 115 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	1,236.46	68.90
22 14 29 16-0018	EA	1/3 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	1,277.16	68.90
22 14 29 16-0019	EA	1/2 HP Manual Submersible Sump Pump, 115 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	1,597.80	72.91
22 14 29 16-0020	EA	1/2 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	1,626.40	72.91
22 14 29 16-0021	EA	3/4 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	1,953.63	76.93
22 14 29 16-0022	EA	3/4 HP Manual Submersible Sump Pump, 230 Volt, 3 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	1,953.63	76.93
22 14 29 16-0023	EA	1 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	2,066.34	80.37
22 14 29 16-0024	EA	1 HP Manual Submersible Sump Pump, 230 Volt, 3 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	2,066.34	80.37
22 14 29 16-0025	EA	1-1/2 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	2,358.22	91.85
22 14 29 16-0026	EA	1-1/2 HP Manual Submersible Sump Pump, 230 Volt, 3 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	2,358.22	91.85
22 14 29 16-0027	EA	2 HP Manual Submersible Sump Pump, 230 Volt, 1 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	2,743.01	109.08
22 14 29 16-0028	EA	2 HP Manual Submersible Sump Pump, 230 Volt, 3 Phase, 2" Threaded Discharge, Epoxy-Coated Cast Iron Housing And Semi-Open Impeller	2,693.50	109.08

22 14 29 19 **Sump-Pump Basins and Pits** (22 14 29)
See CSI section 22 13 29 33-0000 for basins and pits.

22 15 **General Service Compressed-Air Systems** (22 10)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 15 13 General Service Compressed-Air Piping (22 15)

See CSI section 22 11 16 00-0013 for threaded galvanized steel pipe, 23 21 13 23-0001 for threaded black steel pipe.

22 15 13 00-0001	Quick Disconnect, Air-Service <small>(22 15 13)</small>		
22 15 13 00-0002	Combination Steel And Brass <small>(22 15 13 00-0001)</small>		
22 15 13 00-0003	EA 1/2" Combination Steel And Brass Disconnect Valve, Single Seated With Arm Ball And Bracket.....	55.36	16.07
22 15 13 00-0004	EA 3/4" Combination Steel And Brass Disconnect Valve, Single Seated With Arm Ball And Bracket.....	61.76	19.51

22 15 13 00-0005 Refrigerated Air Dryers With Ambient Air Filters (22 15 13)

Note: 120 Voltage, 1 Phase

22 15 13 00-0006	EA 3 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	823.84	91.59
22 15 13 00-0007	EA 5 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	945.03	94.15
22 15 13 00-0008	EA 7.5 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	1,117.23	96.69
22 15 13 00-0009	EA 10 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	1,259.48	101.77
22 15 13 00-0010	EA 15 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	1,645.64	114.49
22 15 13 00-0011	EA 20 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	1,860.58	130.27
22 15 13 00-0012	EA 25 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	2,086.73	147.57
22 15 13 00-0013	EA 30 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	2,454.95	165.38
22 15 13 00-0014	EA 40 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	2,845.30	193.38
22 15 13 00-0015	EA 50 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	3,209.48	206.60
22 15 13 00-0016	EA 60 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	3,775.40	228.99
22 15 13 00-0017	EA 75 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	4,345.45	254.43
	<i>For 230 Voltage, Add</i>	<i>1,150.97</i>	
22 15 13 00-0018	EA 85 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	4,695.52	279.88
	<i>For 230 Voltage, Add</i>	<i>1,240.73</i>	
22 15 13 00-0019	EA 100 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	5,054.45	310.41
	<i>For 230 Voltage, Add</i>	<i>1,330.49</i>	
22 15 13 00-0020	EA 125 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	5,466.06	330.77
	<i>For 230 Voltage, Add</i>	<i>1,441.36</i>	
22 15 13 00-0021	EA 175 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	5,781.88	343.49
	<i>For 230 Voltage, Add</i>	<i>1,528.47</i>	
22 15 13 00-0022	EA 200 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	10,083.89	356.21
	<i>For 230 Voltage, Add</i>	<i>2,811.44</i>	
22 15 13 00-0023	EA 250 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	10,839.69	368.93
	<i>For 230 Voltage, Add</i>	<i>3,030.55</i>	
22 15 13 00-0024	EA 300 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	11,574.38	381.66
	<i>For 230 Voltage, Add</i>	<i>3,243.32</i>	
22 15 13 00-0025	EA 400 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	13,763.54	407.10
	<i>For 230 Voltage, Add</i>	<i>3,884.80</i>	
22 15 13 00-0026	EA 500 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	15,598.51	508.87
	<i>For 230 Voltage, Add</i>	<i>4,374.23</i>	
22 15 13 00-0027	EA 600 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	22,216.90	610.64
	<i>For 230 Voltage, Add</i>	<i>6,298.68</i>	
22 15 13 00-0028	EA 800 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	30,199.20	712.42
	<i>For 230 Voltage, Add</i>	<i>8,632.31</i>	
22 15 13 00-0029	EA 1,000 SCFM Capacity Refrigerated Air Dryers With Ambient Air Filters.....	33,808.16	814.20
	<i>For 230 Voltage, Add</i>	<i>9,653.93</i>	

22 15 13 00-0030 Oil And Water Separator For Air Compressor (22 15 13)

22 15 13 00-0031	EA 0-60 SCFM Oil/Water Separator.....	749.35	36.76
22 15 13 00-0032	EA 85 SCFM Oil/Water Separator.....	1,004.82	43.07
22 15 13 00-0033	EA 190 SCFM Oil/Water Separator.....	1,174.69	48.82
22 15 13 00-0034	EA 245 SCFM Oil/Water Separator.....	1,475.27	57.43
22 15 13 00-0035	EA 320 SCFM Oil/Water Separator.....	1,753.43	68.92
22 15 13 00-0036	EA 700 SCFM Oil/Water Separator.....	3,534.19	143.58

22 15 13 00-0037 Heavy Duty Industrial Pressure Regulator (22 15 13)

22 15 13 00-0038	EA 3/8" Pressure Regulator, Max 300 PSI Input, 2-125 PSI Output.....	126.19	30.53
22 15 13 00-0039	EA 1/2" Pressure Regulator, Max 300 PSI Input, 2-125 PSI Output.....	176.45	40.71
22 15 13 00-0040	EA 3/4" Pressure Regulator, Max 300 PSI Input, 2-125 PSI Output.....	303.81	50.89
22 15 13 00-0041	EA 1" Pressure Regulator, Max 300 PSI Input, 2-125 PSI Output.....	379.34	76.33
22 15 13 00-0042	EA 1-1/4" Pressure Regulator, Max 300 PSI Input, 2-125 PSI Output.....	532.44	89.05
22 15 13 00-0043	EA 1-1/2" Pressure Regulator, Max 300 PSI Input, 2-125 PSI Output.....	557.88	101.77

22 15 13 00-0044 Combination Air System; Filter Regulator Lubricator (22 15 13)

22 15 13 00-0045	EA 3/8" Filter Regulator Lubricator, Max 150 PSI Input, 150 CFM, 40 Micron Filter.....	482.37	91.59
22 15 13 00-0046	EA 1/2" Filter Regulator Lubricator, Max 150 PSI Input, 150 CFM, 40 Micron Filter.....	596.22	122.13

22 15 13 00-0047 Heatless Desiccant Air Dryers (22 15 13)

22 15 13 00-0048	EA 5 SCFM Heatless Desiccant Air Dryer.....	2,898.20	91.59
22 15 13 00-0049	EA 10 SCFM Heatless Desiccant Air Dryer.....	3,485.75	101.77
22 15 13 00-0050	EA 15 SCFM Heatless Desiccant Air Dryer.....	3,518.43	111.95
22 15 13 00-0051	EA 20 SCFM Heatless Desiccant Air Dryer.....	4,018.92	127.22
22 15 13 00-0052	EA 30 SCFM Heatless Desiccant Air Dryer.....	5,539.27	152.66
22 15 13 00-0053	EA 50 SCFM Heatless Desiccant Air Dryer.....	5,463.29	203.54

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 15 13 00-0054	EA		85 SCFM Heatless Desiccant Air Dryer	7,340.80	254.43
22 15 13 00-0055	EA		100 SCFM Heatless Desiccant Air Dryer	7,785.40	305.33
22 15 13 00-0056	EA		125 SCFM Heatless Desiccant Air Dryer	8,912.15	356.21
22 15 13 00-0057	EA		175 SCFM Heatless Desiccant Air Dryer	10,234.06	407.10
22 15 13 00-0058	EA		200 SCFM Heatless Desiccant Air Dryer	10,994.92	457.99
22 15 13 00-0059	EA		300 SCFM Heatless Desiccant Air Dryer	13,451.43	508.87
22 15 13 00-0060	EA		400 SCFM Heatless Desiccant Air Dryer	14,936.19	610.64
22 15 13 00-0061	EA		500 SCFM Heatless Desiccant Air Dryer	17,262.18	712.42
22 15 13 00-0062	EA		600 SCFM Heatless Desiccant Air Dryer	19,919.03	814.20
22 15 13 00-0063 Air Cooled Aftercoolers (22 15 13)					
22 15 13 00-0064	EA		20 SCFM Air-Cooled Aftercooler	725.61	63.61
22 15 13 00-0065	EA		35 SCFM Air-Cooled Aftercooler	981.57	76.33
22 15 13 00-0066	EA		43 SCFM Air-Cooled Aftercooler	1,077.41	89.05
22 15 13 00-0067	EA		70 SCFM Air-Cooled Aftercooler	1,317.56	101.77
22 15 13 00-0068	EA		125 SCFM Air-Cooled Aftercooler	1,839.29	114.49
22 15 13 00-0069	EA		185 SCFM Air-Cooled Aftercooler	2,065.37	127.22
22 15 13 00-0070	EA		260 SCFM Air-Cooled Aftercooler	4,012.38	152.66
22 15 13 00-0071	EA		365 SCFM Air-Cooled Aftercooler	4,192.09	178.10
22 15 13 00-0072	EA		560 SCFM Air-Cooled Aftercooler	4,370.39	203.54
22 15 13 00-0073	EA		650 SCFM Air-Cooled Aftercooler	5,126.65	228.99
22 15 13 00-0074	EA		750 SCFM Air-Cooled Aftercooler	5,604.13	254.43
22 15 13 00-0075	EA		900 SCFM Air-Cooled Aftercooler	6,427.97	279.88
22 15 13 00-0076	EA		1,100 SCFM Air-Cooled Aftercooler	8,259.87	305.33
22 15 13 00-0077	EA		1,460 SCFM Air-Cooled Aftercooler	9,450.47	330.77
22 15 13 00-0078	EA		1,800 SCFM Air-Cooled Aftercooler	9,756.55	356.21
22 15 13 00-0079	EA		2,500 SCFM Air-Cooled Aftercooler	10,462.12	381.66
22 15 13 00-0080 Compressed Air Coalescing Filters (22 15 13)					
22 15 13 00-0081 1.0 Micron Filter Rated Compressed Air Coalescing Filters (22 15 13 00-0080)					
22 15 13 00-0082	EA		10 SCFM, 3/8", Coalescing Filter, 1.0 Micron Filter Rating	250.66	37.33
22 15 13 00-0083	EA		20 SCFM, 3/8", Coalescing Filter, 1.0 Micron Filter Rating	299.94	37.33
22 15 13 00-0084	EA		50 SCFM, 1/2", Coalescing Filter, 1.0 Micron Filter Rating	327.26	43.07
22 15 13 00-0085	EA		75 SCFM, 3/4", Coalescing Filter, 1.0 Micron Filter Rating	376.84	49.39
22 15 13 00-0086	EA		100 SCFM, 3/4", Coalescing Filter, 1.0 Micron Filter Rating	439.98	54.56
22 15 13 00-0087	EA		140 SCFM, 1", Coalescing Filter, 1.0 Micron Filter Rating	498.15	66.05
22 15 13 00-0088	EA		175 SCFM, 1-1/4" Coalescing Filter, 1.0 Micron Filter Rating	525.02	71.79
22 15 13 00-0089	EA		250 SCFM, 1-1/2" Coalescing Filter, 1.0 Micron Filter Rating	650.99	86.15
22 15 13 00-0090	EA		280 SCFM, 2" Coalescing Filter, 1.0 Micron Filter Rating	835.14	114.87
22 15 13 00-0091	EA		350 SCFM, 2" Coalescing Filter, 1.0 Micron Filter Rating	955.37	129.22
22 15 13 00-0092 0.01 Micron Filter Rated Compressed Air Coalescing Filters (22 15 13 00-0080)					
22 15 13 00-0093	EA		16 SCFM, 3/8" Coalescing Filter, 0.01 Micron Filter Rating	306.98	37.33
22 15 13 00-0094	EA		30 SCFM, 1/2" Coalescing Filter, 0.01 Micron Filter Rating	332.52	43.07
22 15 13 00-0095	EA		60 SCFM, 3/4" Coalescing Filter, 0.01 Micron Filter Rating	381.77	49.39
22 15 13 00-0096	EA		100 SCFM, 1" Coalescing Filter, 0.01 Micron Filter Rating	449.85	48.82
22 15 13 00-0097	EA		140 SCFM, 1-1/4" Coalescing Filter, 0.01 Micron Filter Rating	509.41	66.05
22 15 13 00-0098	EA		180 SCFM, 1-1/4" Coalescing Filter, 0.01 Micron Filter Rating	578.28	71.79
22 15 13 00-0099	EA		250 SCFM, 1-1/2" Coalescing Filter, 0.01 Micron Filter Rating	663.66	86.15
22 15 13 00-0100	EA		280 SCFM, 2" Coalescing Filter, 0.01 Micron Filter Rating	856.25	114.87
22 15 13 00-0101	EA		350 SCFM, 2" Coalescing Filter, 0.01 Micron Filter Rating	983.53	129.22
22 15 13 00-0102 Compressed Air Storage Tanks (22 15 13)					
22 15 13 00-0103 Horizontal Compressed Air Storage Tanks (22 15 13 00-0102)					
22 15 13 00-0104	EA		12 Gallon Horizontal Compressed Air Storage Tank, ASME	409.23	81.42
22 15 13 00-0105	EA		15 Gallon Horizontal Compressed Air Storage Tank, ASME	735.30	89.05
22 15 13 00-0106	EA		20 Gallon Horizontal Compressed Air Storage Tank, ASME	779.28	93.63
22 15 13 00-0107	EA		30 Gallon Horizontal Compressed Air Storage Tank, ASME	889.94	101.77
22 15 13 00-0108	EA		60 Gallon Horizontal Compressed Air Storage Tank, ASME	1,160.39	137.39
22 15 13 00-0109	EA		80 Gallon Horizontal Compressed Air Storage Tank, ASME	1,404.75	152.66
22 15 13 00-0110	EA		120 Gallon Horizontal Compressed Air Storage Tank, ASME	2,122.19	178.10
22 15 13 00-0111	EA		200 Gallon Horizontal Compressed Air Storage Tank, ASME	3,183.00	203.54
22 15 13 00-0112	EA		240 Gallon Horizontal Compressed Air Storage Tank, ASME	3,551.84	216.27
22 15 13 00-0113	EA		325 Gallon Horizontal Compressed Air Storage Tank, ASME	5,159.35	228.99
22 15 13 00-0114	EA		400 Gallon Horizontal Compressed Air Storage Tank, ASME	6,807.67	267.16
22 15 13 00-0115	EA		660 Gallon Horizontal Compressed Air Storage Tank, ASME	9,812.48	318.05
22 15 13 00-0116 Vertical Compressed Air Storage Tanks (22 15 13 00-0102)					
22 15 13 00-0117	EA		10 Gallon Vertical Compressed Air Storage Tank, ASME	685.22	81.42
22 15 13 00-0118	EA		15 Gallon Vertical Compressed Air Storage Tank, ASME	717.89	89.05
22 15 13 00-0119	EA		20 Gallon Vertical Compressed Air Storage Tank, ASME	779.28	93.63
22 15 13 00-0120	EA		30 Gallon Vertical Compressed Air Storage Tank, ASME	924.42	101.77
22 15 13 00-0121	EA		60 Gallon Vertical Compressed Air Storage Tank, ASME	1,263.82	137.39
22 15 13 00-0122	EA		80 Gallon Vertical Compressed Air Storage Tank, ASME	1,454.55	152.66



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 15 13 00-0123	EA			120 Gallon Vertical Compressed Air Storage Tank, ASME	2,013.88	178.10
22 15 13 00-0124	EA			200 Gallon Vertical Compressed Air Storage Tank, ASME	2,959.77	203.54
22 15 13 00-0125	EA			240 Gallon Vertical Compressed Air Storage Tank, ASME	3,267.30	216.27
22 15 13 00-0126	EA			325 Gallon Vertical Compressed Air Storage Tank, ASME	4,462.87	228.99
22 15 13 00-0127	EA			400 Gallon Vertical Compressed Air Storage Tank, ASME	5,726.72	267.16
22 15 13 00-0128	EA			500 Gallon Vertical Compressed Air Storage Tank, ASME	7,484.03	292.61
22 15 13 00-0129	EA			660 Gallon Vertical Compressed Air Storage Tank, ASME	12,484.62	330.77

22 15 19 General Service Packaged Air Compressors and Receivers (22 15)
 Note: Includes V-belt drive, receiver, motor, starter mounted and wired. Excludes piping, pressure reducing valve station, or air dryer.

22 15 19 13 General Service Packaged Reciprocating Air Compressors (22 15 19)

22 15 19 13-0001 Single Stage Compressor (22 15 19 13)

Note: Includes receiver, reciprocating air cooled, 140 PSIG working pressure, splash lubricated, tank mounted.

22 15 19 13-0002	EA	1/2 HP 1-Stage Air Compressor, 1.5 ACFM Air Cooled With 30 Gallon Receiver, 140 PSIG Working Pressure	3,046.89	361.10
22 15 19 13-0003	EA	3/4 HP 1-Stage Air Compressor, 2.0 ACFM Air Cooled With 30 Gallon Receiver, 140 PSIG Working Pressure	3,179.73	416.76
22 15 19 13-0004	EA	1 HP 1-Stage Air Compressor, 2.5 ACFM Air Cooled With 30 Gallon Receiver, 140 PSIG Working Pressure	3,627.02	492.19
22 15 19 13-0005	EA	2 HP 1-Stage Air Compressor, Air Cooled With 30 Gallon Receiver, 140 PSIG Working Pressure	4,133.79	543.07
22 15 19 13-0006	EA	3 HP 1-Stage Air Compressor, Air Cooled With 30 Gallon Receiver, 140 PSIG Working Pressure	5,064.99	573.60
22 15 19 13-0007	EA	3 HP 1-Stage Air Compressor, Air Cooled With 60 Gallon Receiver, 140 PSIG Working Pressure	5,413.51	593.96
22 15 19 13-0008	EA	5 HP 1-Stage Air Compressor, Air Cooled With 60 Gallon Receiver, 140 PSIG Working Pressure	6,078.00	678.83
22 15 19 13-0009	EA	5 HP 1-Stage Air Compressor, Air Cooled With 80 Gallon Receiver, 140 PSIG Working Pressure	6,520.05	719.55
22 15 19 13-0010	EA	7.5 HP 1-Stage Air Compressor, Air Cooled With 80 Gallon Receiver, 140 PSIG Working Pressure	7,827.44	814.60

22 15 19 13-0011 Two Stage Compressor (22 15 19 13)

Note: With receiver, reciprocating air cooled, discharge pressure 80-200 PSIG, receiver capacity as noted, splash lubricated, tank mounted.

22 15 19 13-0012	EA	1-1/2 HP 2-Stage Air Compressor, 60 Gallon Receiver, 5.0 ACFM, 80-200 PSIG Discharge Pressure	5,831.01	634.66
22 15 19 13-0013	EA	2 HP 2-Stage Air Compressor, 60 Gallon Receiver, 7.0 ACFM, 80-200 PSIG Discharge Pressure	6,253.72	746.72
22 15 19 13-0014	EA	3 HP 2-Stage Air Compressor, 60 Gallon Receiver, 12 ACFM, 80-200 PSIG Discharge Pressure	6,533.60	814.60
22 15 19 13-0015	EA	5 HP 2-Stage Air Compressor, 80 Gallon Receiver, 15 ACFM, 80-200 PSIG Discharge Pressure	7,445.60	1,086.13
22 15 19 13-0016	EA	5 HP 2-Stage Air Compressor, 120 Gallon Receiver, 16.5 ACFM, 80-200 PSI Max Discharge Pressure	8,034.95	1,086.13
22 15 19 13-0017	EA	5 HP 2-Stage Air Compressor, 80 Gallon Receiver, 19.8 ACFM, 80-200 PSIG Discharge Pressure	8,608.89	1,357.67
22 15 19 13-0018	EA	7.5 HP 2-Stage Air Compressor, 120 Gallon Receiver, 25.6 ACFM, 80-200 PSI Max Discharge Pressure	9,143.42	1,357.67
22 15 19 13-0019	EA	10 HP 2-Stage Air Compressor, 80 Gallon Receiver, 35.0 ACFM, 80-200 PSI Max Discharge Pressure	11,727.38	1,679.27
22 15 19 13-0020	EA	10 HP 2-Stage Air Compressor, 120 Gallon Receiver, 38 ACFM, 80-200 PSIG Discharge Pressure	12,577.02	1,730.16
22 15 19 13-0021	EA	15 HP 2-Stage Air Compressor, 120 Gallon Receiver, 50 ACFM, 80-200 PSIG Discharge Pressure	13,587.93	2,022.05
22 15 19 13-0022	EA	20 HP 2-Stage Air Compressor, 120 Gallon Receiver, 70 ACFM, 80-200 PSIG Discharge Pressure	20,555.97	2,288.91
22 15 19 13-0023	EA	25 HP 2-Stage Air Compressor, 120 Gallon Receiver, 84.4 ACFM, 175 PSI Max Discharge Pressure	22,069.19	2,586.38
22 15 19 13-0024	EA	30 HP 2-Stage Air Compressor, 120 Gallon Receiver, 97.2 ACFM, 175 PSI Max Discharge Pressure	24,601.20	2,858.53
22 15 19 13-0025	EA	30 HP 2-Stage Air Compressor, 250 Gallon Receiver, 101 ACFM, 175 PSI Max Discharge Pressure	26,761.04	3,132.82

22 15 19 19 General Service Packaged Rotary-Screw Air Compressors (22 15 19)

22 15 19 19-0001 Rotary Screw Air Compressor, Base Mounted Without Receiver (22 15 19 19)

Note: Oil flooded.

22 15 19 19-0002	EA	3 HP, 8.5 SCFM, Rotary Screw Air Compressor With Enclosure, 150 PSIG Max Discharge Pressure, Lubricated	9,980.27	916.62
22 15 19 19-0003	EA	5 HP, 16.6 SCFM, Rotary Screw Air Compressor With Enclosure, 150 PSIG Max Discharge Pressure, Lubricated	11,111.33	1,222.16
22 15 19 19-0004	EA	7.5 HP, 27 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	14,251.67	1,532.31
22 15 19 19-0005	EA	10 HP, 37 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	16,456.76	1,952.71
22 15 19 19-0006	EA	15 HP, 56 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	18,826.80	2,297.30
22 15 19 19-0007	EA	20 HP, 79 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	22,869.02	2,584.47
22 15 19 19-0008	EA	25 HP, 114 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	25,055.43	2,871.64
22 15 19 19-0009	EA	30 HP, 137 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	30,172.22	3,216.23
22 15 19 19-0010	EA	40 HP, 183 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	33,178.48	3,445.96
22 15 19 19-0011	EA	50 HP, 214 SCFM, Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	37,264.77	3,713.60
22 15 19 19-0012	EA	60 HP, 256 SCFM Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	48,568.62	4,020.30
22 15 19 19-0013	EA	75 HP, 320 SCFM Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	53,918.61	4,250.02
22 15 19 19-0014	EA	100 HP, 494 SCFM Rotary Screw Air Compressor With Enclosure, 100 PSIG Max Discharge Pressure, Lubricated	86,847.35	4,594.62
22 15 19 19-0015	EA	125 HP, 592 SCFM Rotary Screw Air Compressor With Enclosure, 100 PSIG Max Discharge Pressure, Lubricated	108,457.46	4,967.93
22 15 19 19-0016	EA	150 HP, 695 SCFM Rotary Screw Air Compressor With Enclosure, 100 PSIG Max Discharge Pressure, Lubricated	126,046.56	5,346.98
22 15 19 19-0017	EA	220 HP, 996 SCFM Rotary Screw Air Compressor With Enclosure, 100 PSIG Max Discharge Pressure, Lubricated	164,178.93	5,743.28
22 15 19 19-0018	EA	250 HP, 1,000 SCFM Rotary Screw Air Compressor With Enclosure, 125 PSIG Max Discharge Pressure, Lubricated	186,588.74	6,110.84

22 15 19 19-0019 Rotary Screw Air Compressor, Base Mounted With Receiver (22 15 19 19)

Note: Includes receiver, motor, starter mounted and wired. Excludes piping, pressure reducing valve station, or air dryer.

22 15 19 19-0020	EA	5 HP, 18.5 SCFM, 80 Gallon Receiver, Rotary Screw Air Compressor, 150 PSIG Max Discharge Pressure, Lubricated	12,446.29	1,222.16
22 15 19 19-0021	EA	5 HP, 18.5 SCFM, 120 Gallon Receiver, Rotary Screw Air Compressor, 150 PSIG Max Discharge Pressure, Lubricated	13,235.76	1,222.16

22 Plumbing**22 10 Plumbing Piping****22 15 General Service Compressed-Air Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 15 19 19-0022	EA		7.5 HP, 28 SCFM, 80 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	14,879.41	1,532.31
22 15 19 19-0023	EA		7.5 HP, 28 SCFM, 120 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	15,742.89	1,532.31
22 15 19 19-0024	EA		10 HP, 38 SCFM, 80 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	16,802.15	1,952.71
22 15 19 19-0025	EA		10 HP, 38 SCFM, 120 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	17,714.97	1,952.71
22 15 19 19-0026	EA		15 HP, 55 SCFM, 80 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	19,111.89	2,297.30
22 15 19 19-0027	EA		15 HP, 55 SCFM, 120 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	20,098.72	2,297.30
22 15 19 19-0028	EA		20 HP, 75 SCFM, 120 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	33,263.65	2,584.47
22 15 19 19-0029	EA		25 HP, 102 SCFM, 120 gallon receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	35,820.12	2,871.64
22 15 19 19-0030	EA		30 HP, 125 SCFM, 120 Gallon Receiver, Rotary Screw Air Compressor, 125 PSIG Max Discharge Pressure, Lubricated.....	38,129.92	3,216.23

22 30 Plumbing Equipment ⁽²²⁾**22 31 Domestic Water Softeners** ^(22 30)**22 31 13 Residential Domestic Water Softeners** ^(22 31)

See CSI section 11 30 13 13-0104 for residential water softener.

22 31 16 Commercial Domestic Water Softeners ^(22 31)**22 31 16 00-0001 Commercial Water Softeners (Watts Pure Water)** ^(22 31 16)**22 31 16 00-0002 Commercial Water Softeners (Watts Pure Water)** ^(22 31 16 00-0001)**22 31 16 00-0003 1" Pipe Connection, Commercial Water Softeners (Watts Pure Water)** ^(22 31 16 00-0002)

Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and fully automatic metered demand control valve.

22 31 16 00-0004	EA		30,000 Grain Capacity, 1" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10111A11).....	5,121.01	290.77
22 31 16 00-0005	EA		45,000 Grain Capacity, 1" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10111B11).....	5,352.79	303.98
22 31 16 00-0006	EA		60,000 Grain Capacity, 1" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10111C11).....	5,783.27	317.20
22 31 16 00-0007	EA		90,000 Grain Capacity, 1" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10111D11).....	6,675.20	330.42
22 31 16 00-0008	EA		120,000 Grain Capacity, 1" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10111E11).....	7,118.93	343.64

22 31 16 00-0009 1-1/2" Pipe Connection, Commercial Water Softeners (Watts Pure Water) ^(22 31 16 00-0002)

Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and fully automatic metered demand control valve.

22 31 16 00-0010	EA		60,000 Grain Capacity, 1-1/2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS15121C11).....	7,732.86	317.20
22 31 16 00-0011	EA		90,000 Grain Capacity, 1-1/2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS15121D11).....	8,134.64	330.42
22 31 16 00-0012	EA		120,000 Grain Capacity, 1-1/2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS15121E11).....	8,580.57	343.64
22 31 16 00-0013	EA		150,000 Grain Capacity, 1-1/2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS15121F11).....	10,223.21	356.85
22 31 16 00-0014	EA		210,000 Grain Capacity, 1-1/2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS15121G11).....	11,377.89	370.06
22 31 16 00-0015	EA		300,000 Grain Capacity, 1-1/2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS15121H11).....	13,888.24	383.28

22 31 16 00-0016 2" Pipe Connection, Commercial Water Softeners (Watts Pure Water) ^(22 31 16 00-0002)

Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and fully automatic metered demand control valve.

22 31 16 00-0017	EA		90,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131D11).....	11,821.87	330.42
22 31 16 00-0018	EA		120,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131E11).....	12,252.34	343.64
22 31 16 00-0019	EA		150,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131F11).....	13,899.40	356.85
22 31 16 00-0020	EA		210,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131G11).....	15,054.08	370.06
22 31 16 00-0021	EA		300,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131H11).....	17,701.32	383.28
22 31 16 00-0022	EA		450,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131I11).....	23,404.31	396.50
22 31 16 00-0023	EA		600,000 Grain Capacity, 2" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131J11).....	27,407.20	409.71

		MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 31 16 00-0024			3" Pipe Connection, Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0002)</small> Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and fully automatic metered demand control valve.		
	22 31 16 00-0025	EA	300,000 Grain Capacity, 3" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151H11)	28,793.91	383.28
	22 31 16 00-0026	EA	450,000 Grain Capacity, 3" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151I11)	33,289.17	396.50
	22 31 16 00-0027	EA	600,000 Grain Capacity, 3" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151J11)	37,239.07	409.71
	22 31 16 00-0028	EA	900,000 Grain Capacity, 3" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151K11)	46,933.98	422.93
	22 31 16 00-0029	EA	1050,000 Grain Capacity, 3" Pipe Connection, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151L11)	51,985.65	436.15
22 31 16 00-0030			Duplex Alternating (Two Valves), Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0001)</small>		
22 31 16 00-0031			2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0030)</small> Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and two fully automatic metered demand control valves.		
	22 31 16 00-0032	EA	90,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131D21)	19,427.38	495.63
	22 31 16 00-0033	EA	120,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131E21)	20,290.59	515.44
	22 31 16 00-0034	EA	150,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131F21)	23,132.09	535.27
	22 31 16 00-0035	EA	210,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131G21)	25,306.80	555.10
	22 31 16 00-0036	EA	300,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131H21)	30,945.73	574.92
	22 31 16 00-0037	EA	450,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131I21)	41,084.41	594.75
	22 31 16 00-0038	EA	600,000 Grain Capacity, 2" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS20131J21)	48,401.35	614.58
22 31 16 00-0039			3" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0030)</small> Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and two fully automatic metered demand control valves.		
	22 31 16 00-0040	EA	300,000 Grain Capacity, 3" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151H21)	52,945.45	574.92
	22 31 16 00-0041	EA	450,000 Grain Capacity, 3" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151I21)	60,858.54	594.75
	22 31 16 00-0042	EA	600,000 Grain Capacity, 3" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151J21)	68,420.56	614.58
	22 31 16 00-0043	EA	900,000 Grain Capacity, 3" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151K21)	87,137.02	634.40
	22 31 16 00-0044	EA	1,050,000 Grain Capacity, 3" Pipe Connection, Duplex Alternating (Two Valves), Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS30151L21)	97,317.64	654.22
22 31 16 00-0045			Twin Alternating, Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0001)</small>		
22 31 16 00-0046			1" Pipe Connection, Twin Alternating, Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0045)</small> Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and fully automatic metered demand control valve.		
	22 31 16 00-0047	EA	30,000 Grain Capacity, 1" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161A21)	6,705.62	436.15
	22 31 16 00-0048	EA	45,000 Grain Capacity, 1" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161B21)	7,155.95	455.98
	22 31 16 00-0049	EA	60,000 Grain Capacity, 1" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161C21)	7,816.01	475.80
	22 31 16 00-0050	EA	90,000 Grain Capacity, 1" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161D21)	9,418.88	495.63
	22 31 16 00-0051	EA	120,000 Grain Capacity, 1" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161E21)	10,434.43	515.44
22 31 16 00-0052			1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softeners (Watts Pure Water) <small>(22 31 16 00-0045)</small> Note: Includes corrosion resistant NSF Certified fiberglass mineral and brine tanks and fully automatic metered demand control valve.		
	22 31 16 00-0053	EA	60,000 Grain Capacity, 1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161A21)	13,320.36	475.80
	22 31 16 00-0054	EA	90,000 Grain Capacity, 1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161B21)	14,048.89	495.63

22 Plumbing
22 30 Plumbing Equipment
22 31 Domestic Water Softeners



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 31 16 00-0055	EA		120,000 Grain Capacity, 1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161C21)	15,130.68	515.44
22 31 16 00-0056	EA		150,000 Grain Capacity, 1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161D21)	17,347.34	535.27
22 31 16 00-0057	EA		210,000 Grain Capacity, 1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161E21)	19,597.11	555.10
22 31 16 00-0058	EA		300,000 Grain Capacity, 1-1/2" Pipe Connection, Twin Alternating, Commercial Water Softener With Fiberglass Tanks (Watts Pure Water PWS10T161E21)	24,597.96	574.92

22 32 Domestic Water Filtration Equipment (22 30)

22 32 16 Domestic-Water Freestanding Cartridge Filters (22 32)

22 32 16 00-0001			Commercial Water Filters Housings <small>(22 32 16)</small>		
22 32 16 00-0002			Commercial Multi-Cartridge Stainless Steel Water Filter Housings <small>(22 32 16 00-0001)</small>		
22 32 16 00-0003			Commercial Multi-Cartridge Stainless Steel Water Filter Housings <small>(22 32 16 00-0002)</small>		
22 32 16 00-0004	EA		25 GPM Max Flow Rate, 4 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS4X1)	2,636.44	186.65
22 32 16 00-0005	EA		30 GPM Max Flow Rate, 5 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS5X1)	2,685.02	201.02
22 32 16 00-0006	EA		60 GPM Max Flow Rate, 4 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS4X2)	2,857.25	215.37
22 32 16 00-0007	EA		90 GPM Max Flow Rate, 4 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS4X3)	3,166.37	229.73
22 32 16 00-0008	EA		120 GPM Max Flow Rate, 4 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS4X4)	3,259.11	244.09
22 32 16 00-0009	EA		150 GPM Max Flow Rate, 5 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS5X4)	3,963.45	258.45
22 32 16 00-0010	EA		250 GPM Max Flow Rate, 12 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS12X3)	11,291.56	272.80
22 32 16 00-0011	EA		300 GPM Max Flow Rate, 12 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS12X4)	13,146.22	287.17
22 32 16 00-0012	EA		500 GPM Max Flow Rate, 22 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS22X3)	16,712.02	301.52
22 32 16 00-0013	EA		600 GPM Max Flow Rate, 22 Cartridge, Commercial Multi-Cartridge Stainless Steel Water Filter Housing (Watts Pure Water PWHS22X4)	18,544.62	315.88

22 32 16 00-0014 Commercial Water Filter Cartridges (22 32 16 00-0002)

22 32 16 00-0015			(Depth) Water Filter Cartridges <small>(22 32 16 00-0014)</small>		
22 32 16 00-0016	EA		50 Micron, 10" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB10M50)	12.87	2.30
22 32 16 00-0017	EA		20 Micron, 10" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB10M20)	12.87	2.30
22 32 16 00-0018	EA		10 Micron, 10" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB10M10)	12.87	2.30
22 32 16 00-0019	EA		5 Micron, 10" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB10M5)	10.66	2.30
22 32 16 00-0020	EA		1 Micron, 10" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB10M1)	13.42	2.30
22 32 16 00-0021	EA		50 Micron, 20" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB20M50)	13.42	2.30
22 32 16 00-0022	EA		20 Micron, 20" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB20M20)	14.53	2.30
22 32 16 00-0023	EA		5 Micron, 20" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Big Pure Water PWMB20M5)	18.39	2.30
22 32 16 00-0024	EA		1 Micron, 20" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB20M1)	14.53	2.30
22 32 16 00-0025	EA		50 Micron, 30" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB30M50)	17.29	2.30
22 32 16 00-0026	EA		20 Micron, 30" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB30M20)	17.29	2.30
22 32 16 00-0027	EA		5 Micron, 30" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB30M5)	17.29	2.30
22 32 16 00-0028	EA		1 Micron, 30" Depth, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB30M1)	18.94	2.30
22 32 16 00-0029	EA		50 Micron, 40" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB40M50)	25.01	2.30
22 32 16 00-0030	EA		20 Micron, 40" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB40M20)	22.81	2.30
22 32 16 00-0031	EA		5 Micron, 40" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB40M5)	22.81	2.30
22 32 16 00-0032	EA		1 Micron, 40" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Pure Water PWMB40M1)	25.01	2.30

22 32 16 00-0033 Pleated Water Filter Cartridges (22 32 16 00-0014)

22 32 16 00-0034	EA		50 Micron, 9-3/4" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL10M50)	23.36	2.30
22 32 16 00-0035	EA		20 Micron, 9-3/4" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL10M20)	23.36	2.30
22 32 16 00-0036	EA		5 Micron, 9-3/4" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL10M5)	23.91	2.30
22 32 16 00-0037	EA		1 Micron, 9-3/4" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL10M1)	25.57	2.30
22 32 16 00-0038	EA		1 Micron Absolute, 9-3/4" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL10M1AB)	38.81	2.30
22 32 16 00-0039	EA		50 Micron, 20" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL20M50)	37.16	2.30
22 32 16 00-0040	EA		20 Micron, 20" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL20M20)	37.16	2.30
22 32 16 00-0041	EA		5 Micron, 20" Length, Pleated Water Filter Cartridge (Watts Big Pure Water PWPL20M5)	37.16	2.30
22 32 16 00-0042	EA		1 Micron, 20" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL20M1)	49.30	2.30
22 32 16 00-0043	EA		1 Micron Absolute, 20" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL20M1AB)	70.28	2.30
22 32 16 00-0044	EA		50 Micron, 40" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL40M50)	58.68	2.30
22 32 16 00-0045	EA		20 Micron, 40" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL40M20)	81.87	2.30
22 32 16 00-0046	EA		5 Micron, 40" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL40M5)	85.18	2.30
22 32 16 00-0047	EA		1 Micron, 40" Length, Pleated Water Filter Cartridge (Watts Pure Water PWPL40M1)	96.22	2.30

22 32 16 00-0048 Commercial Non-Metallic Water Filter Housings (22 32 16 00-0001)

22 32 16 00-0049 Commercial Non-Metallic Water Filter Housings (22 32 16 00-0048)



Plumbing	22	22
Plumbing Equipment	22 30	
Domestic Water Filtration Equipment	22 32	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 32 16 00-0050	EA		150 GPM Max Flow Rate, 1 Cartridge, Commercial Non-Metallic Water Filter Housing (Watts Big Bubba® PWWJCHSG).....	2,067.88	172.30
22 32 16 00-0051			Commercial Water Filter Cartridges (22 32 16 00-0048)		
22 32 16 00-0052			Carbon Water Filter Cartridges (22 32 16 00-0051)		
22 32 16 00-0053	EA		Activated 26-1/4" Length, Carbon Water Filter Cartridge (Watts Big Bubba® PWWJCAC5).....	692.36	2.30
22 32 16 00-0054			(Depth) Water Filter Cartridges (22 32 16 00-0051)		
22 32 16 00-0055	EA		50 Micron, 26-1/4" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Big Bubba® PWWJCMB50).....	143.14	2.30
22 32 16 00-0056	EA		20 Micron, 26-1/4" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Big Bubba® PWWJCMB20).....	142.03	2.30
22 32 16 00-0057	EA		5 Micron, 26-1/4" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Big Bubba® PWWJCMB5).....	142.03	2.30
22 32 16 00-0058	EA		1 Micron, 26-1/4" Length, Melt Blown (Depth) Water Filter Cartridge (Watts Big Bubba® PWWJCMB1).....	163.01	2.30
22 32 16 00-0059			Pleated Water Filter Cartridges (22 32 16 00-0051)		
22 32 16 00-0060	EA		150 Micron, 26-1/4" Length, Pleated Water Filter Cartridge (Watts Big Bubba® PWWJCM150).....	379.94	2.30
22 32 16 00-0061	EA		50 Micron, 26-1/4" Length, Pleated Water Filter Cartridge (Watts Big Bubba® PWWJCP50).....	356.75	2.30
22 32 16 00-0062	EA		20 Micron, 26-1/4" Length, Pleated Water Filter Cartridge (Watts Big Bubba® PWWJCP20).....	388.77	2.30
22 32 16 00-0063	EA		5 Micron, 26-1/4" Length, Pleated Water Filter Cartridge (Watts Big Bubba® PWWJCP5).....	407.54	2.30
22 32 16 00-0064	EA		1 Micron, 26-1/4" Length, Pleated Water Filter Cartridge (Watts Big Bubba® PWWJCP1).....	434.03	2.30
22 32 16 00-0065	EA		1 Absolute, 26-1/4" Length, Pleated Water Filter Cartridge (Watts Big Bubba® PWWJCP1AB).....	470.46	2.30
22 33 Electric Domestic Water Heaters (22 30)					
22 33 13 Instantaneous Electric Domestic Water Heaters (22 33)					
22 33 13 13 Flow-Control, Instantaneous Electric Domestic Water Heaters (22 33 13)					
22 33 13 13-0001 Flow Controlled, Instantaneous, Tankless, Electric Domestic Water Heaters (22 33 13 13)					
22 33 13 13-0002	EA		3 To 10 KW Flow Controlled, Instantaneous, Tankless, Electric Domestic Water Heater (Eemax EX3012, EX48, EX65, EX75, EX95).....	532.39	57.41
22 33 13 13-0003	EA		7.2 KW, 0.75 GPM, Instantaneous, Tankless, Electric Domestic Water Heater (Bosch RP7P).....	610.75	57.41
22 33 13 16 Thermostat-Control, Instantaneous Electric Domestic Water Heaters (22 33 13)					
22 33 13 16-0001 Thermostat Controlled, Instantaneous, Tankless, Electric Domestic Water Heaters (22 33 13 16)					
			Note: Temperature rise decreases with increased flow rate.		
22 33 13 16-0002	EA		3 To 10 KW Thermostat-Control, Instantaneous, Tankless, Electric Domestic Water Heater (Eemax EX3012T, EX48T, EX65T, EX75T, EX95T, EX012240T).....	705.55	86.11
22 33 13 16-0003	EA		12 KW, 2.0 GPM, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Bosch PowerStar AE12).....	767.28	114.82
22 33 13 16-0004	EA		17.25 KW, 2.3 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Bosch PowerStar AE115).....	1,298.20	200.94
22 33 13 16-0005	EA		26.85 KW, 4.0 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Bosch PowerStar AE125).....	1,983.00	229.63
22 33 13 16-0006	EA		12 KW, 1.6 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Stiebel Eltron Tempra 12 Plus).....	1,438.33	114.82
22 33 13 16-0007	EA		14.4 KW, 2.3 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Stiebel Eltron Tempra 15 Plus).....	1,963.05	172.23
22 33 13 16-0008	EA		19.2 KW, 2.8 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Stiebel Eltron Tempra 20 Plus).....	2,157.05	229.63
22 33 13 16-0009	EA		24 KW, 3.3 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Stiebel Eltron Tempra 24 Plus).....	2,240.89	229.63
22 33 13 16-0010	EA		28.8 KW, 4.5 GPM At 45 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Stiebel Eltron Tempra 29 Plus).....	2,320.07	229.63
22 33 13 16-0011	EA		36 KW, 4.5 GPM At 55 Degree Rise, Indoor Mount, Instantaneous, Tankless, Electric Domestic Water Heater (Stiebel Eltron Tempra 36 Plus).....	2,436.52	229.63
22 33 30 Residential, Electric Domestic Water Heaters (22 33)					
22 33 30 13 Residential, Small-Capacity Electric Domestic Water Heaters (22 33 30)					
22 33 30 13-0001 Small-Capacity, Electric Domestic Water Heaters (A.O. Smith ProMax) (22 33 30 13)					
			Note: Includes glass lined tank, drain valve and temperature and pressure relief valve. Excludes electrical connections.		
22 33 30 13-0002	EA		2 Gallon, Small-Capacity, Electric Domestic Water Heater.....	976.38	180.84
22 33 30 13-0003	EA		10 Gallon, Small-Capacity, Electric Domestic Water Heater.....	1,204.28	192.32
22 33 30 13-0004	EA		20 Gallon, Small-Capacity, Electric Domestic Water Heater.....	1,426.45	200.94
22 33 30 16 Residential, Storage Electric Domestic Water Heaters (22 33 30)					
22 33 30 16-0001 Electric Domestic Water Heaters (A.O. Smith ProMax) (22 33 30 16)					
			Note: Includes glass lined tank, drain valve and temperature and pressure relief valve. Excludes electrical connections.		

22 Plumbing**22 30 Plumbing Equipment****22 33 Electric Domestic Water Heaters**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 33 30 16-0002	EA	30 Gallon, Electric Domestic Water Heater.....	1,526.61	200.94
22 33 30 16-0003	EA	40 Gallon, Electric Domestic Water Heater.....	1,432.81	206.68
22 33 30 16-0004	EA	50 Gallon, Electric Domestic Water Heater.....	1,408.43	212.42
22 33 30 16-0005	EA	55 Gallon, Electric Domestic Water Heater.....	1,576.20	215.29
22 33 30 16-0006	EA	66 Gallon, Electric Domestic Water Heater.....	2,306.91	221.02
22 33 30 16-0007	EA	80 Gallon, Electric Domestic Water Heater.....	2,349.75	229.63
22 33 30 16-0008	EA	120 Gallon, Electric Domestic Water Heater.....	3,137.13	243.99

22 33 30 16-0009 Low-Boy, Electric Domestic Water Heaters (A.O. Smith ProMax) (22 33 30 16)

Note: Includes glass lined tank, drain valve and temperature and pressure relief valve. Excludes electrical connections.

22 33 30 16-0010	EA	30 Gallon, Low-Boy, Electric Domestic Water Heater.....	1,641.64	200.94
22 33 30 16-0011	EA	40 Gallon, Low-Boy, Electric Domestic Water Heater.....	1,560.90	206.68
22 33 30 16-0012	EA	50 Gallon, Low-Boy, Electric Domestic Water Heater.....	1,654.36	212.42

22 33 30 16-0013 High Efficiency, Electric Domestic Water Heaters (A.O. Smith Conservationist) (22 33 30 16)

Note: Includes .95 energy factor glass lined tank, drain valve and temperature and pressure relief valve. Excludes electrical connections.

22 33 30 16-0014	EA	40 Gallon, High Efficiency, Electric Domestic Water Heater.....	1,695.27	206.68
22 33 30 16-0015	EA	50 Gallon, High Efficiency, Electric Domestic Water Heater.....	1,854.18	212.42
22 33 30 16-0016	EA	66 Gallon, High Efficiency, Electric Domestic Water Heater.....	2,288.84	221.02
22 33 30 16-0017	EA	80 Gallon, High Efficiency, Electric Domestic Water Heater.....	2,490.52	229.63

22 33 30 16-0018 Water Heater Accessories (22 33 30 16)

22 33 30 16-0019	EA	2 Gallon, Expansion Pressure Tank For Water Heaters.....	130.69	11.48
22 33 30 16-0020	EA	4.4 Gallon, Expansion Pressure Tank For Water Heaters.....	154.72	11.48
22 33 30 16-0021	EA	7.6 Gallon, Expansion Pressure Tank For Water Heaters.....	303.20	11.48
22 33 30 16-0022	EA	14 Gallon, Expansion Pressure Tank For Water Heaters.....	407.70	11.48
22 33 30 16-0023	EA	20" Diameter, 2-1/2" Deep, Aluminum Water Heater Drain Pan.....	75.04	8.61
22 33 30 16-0024	EA	22" Diameter, 2-1/2" Deep, Aluminum Water Heater Drain Pan.....	82.01	8.61
22 33 30 16-0025	EA	24" Diameter, 2-1/2" Deep, Aluminum Water Heater Drain Pan.....	86.65	8.61
22 33 30 16-0026	EA	26" Diameter, 2-1/2" Deep, Aluminum Water Heater Drain Pan.....	102.91	8.61
22 33 30 16-0027	EA	22" Diameter, 2-1/2" Deep, Polyethylene Water Heater Drain Pan.....	40.09	8.61
22 33 30 16-0028	EA	24" Diameter, 2-1/2" Deep, Polyethylene Water Heater Drain Pan.....	43.81	8.61
22 33 30 16-0029	EA	26" Diameter, 2-1/2" Deep, Polyethylene Water Heater Drain Pan.....	49.03	8.61
22 33 30 16-0030	EA	28" Diameter, 2-1/2" Deep, Polyethylene Water Heater Drain Pan.....	55.75	8.61
22 33 30 16-0031	EA	Earthquake Straps For Up To 80 Gallon Water Heater.....	60.93	11.48

22 33 30 23 Residential, Collector-To-Tank, Solar-Electric Domestic Water Heaters (22 33 30)**22 33 30 23-0001 Solar Electric Domestic Water Heaters (A.O. Smith CIRREX) (22 33 30 23)**

Note: Includes glass lined tank, drain valve and temperature and pressure relief valve. Excludes electrical connections.

22 33 30 23-0002	EA	80 Gallon, Solar Electric Domestic Water Heater.....	3,887.42	229.63
22 33 30 23-0003	EA	120 Gallon, Solar Electric Domestic Water Heater.....	4,665.10	243.99

22 33 33 Light-Commercial Electric Domestic Water Heaters (22 33)**22 33 33 00-0001 Water Heater Accessories (22 33 33)**

22 33 33 00-0002	EA	Up To 80 Gallon Water Heater Strap.....	48.80	
Note: Includes (4) Straps (4) J-Clips (4) Lag Bolts (2) 3/8" Carriage Bolts (2) 3/8" Hex Nuts				
22 33 33 00-0003	EA	>80 To 120 Gallon Water Heater Strap.....	71.62	
Note: Includes (4) Straps (4) J-Clips (4) Lag Bolts (2) 3/8" Carriage Bolts (2) 3/8" Hex Nuts				

22 33 33 00-0004 Removal And Reinstallation Of Water Heater (22 33 33)

Note: Includes storage and cleaning.

22 33 33 00-0005	EA	Removal And Reinstallation Of Water Heater Electric, Up To 82 Gallon.....	382.73	
22 33 33 00-0006	EA	Removal And Reinstallation Of Water Heater Electric, 83 Gallon To 200 Gallon.....	1,148.19	

22 33 36 Commercial Domestic Water Electric Booster Heaters (22 33)**22 33 36 16 Commercial Storage Electric Domestic Water Heaters (22 33 36)****22 33 36 16-0001 Commercial Storage Electric Domestic Water Heaters (22 33 36 16)**

22 33 36 16-0002	EA	150 Gallon, 15 KW, 480 Voltage, Commercial Electric Water Heater.....	41,249.97	770.46
22 33 36 16-0003	EA	150 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	43,287.13	770.46
22 33 36 16-0004	EA	150 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	45,324.30	770.46
22 33 36 16-0005	EA	150 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	47,361.46	770.46
22 33 36 16-0006	EA	150 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	51,435.79	770.46
22 33 36 16-0007	EA	150 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	55,510.12	770.46
22 33 36 16-0008	EA	150 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	58,769.59	770.46
22 33 36 16-0009	EA	200 Gallon, 15 KW, 480 Voltage, Commercial Electric Water Heater.....	43,932.88	905.29
22 33 36 16-0010	EA	200 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	45,985.72	905.29
22 33 36 16-0011	EA	200 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	48,038.56	905.29

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 33 36 16-0012 EA 200 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	50,091.40	905.29
22 33 36 16-0013 EA 200 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	54,197.06	905.29
22 33 36 16-0014 EA 200 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	58,302.73	905.29
22 33 36 16-0015 EA 200 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	61,587.27	905.29
22 33 36 16-0016 EA 200 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	66,514.07	905.29
22 33 36 16-0017 EA 250 Gallon, 15 KW, 480 Voltage, Commercial Electric Water Heater.....	45,609.30	1,030.49
22 33 36 16-0018 EA 250 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	47,632.53	1,030.49
22 33 36 16-0019 EA 250 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	49,655.77	1,030.49
22 33 36 16-0020 EA 250 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	51,679.00	1,030.49
22 33 36 16-0021 EA 250 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	55,725.48	1,030.49
22 33 36 16-0022 EA 250 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	59,771.95	1,030.49
22 33 36 16-0023 EA 250 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	63,818.42	1,030.49
22 33 36 16-0024 EA 250 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	68,674.19	1,030.49
22 33 36 16-0025 EA 250 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	73,529.95	1,030.49
22 33 36 16-0026 EA 300 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	50,305.23	1,184.58
22 33 36 16-0027 EA 300 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	52,341.42	1,184.58
22 33 36 16-0028 EA 300 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	54,377.60	1,184.58
22 33 36 16-0029 EA 300 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	58,449.97	1,184.58
22 33 36 16-0030 EA 300 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	62,522.34	1,184.58
22 33 36 16-0031 EA 300 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	65,760.24	1,184.58
22 33 36 16-0032 EA 300 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	72,024.54	1,184.58
22 33 36 16-0033 EA 300 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	76,911.39	1,184.58
22 33 36 16-0034 EA 300 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	79,354.81	1,184.58
22 33 36 16-0035 EA 300 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	81,798.23	1,184.58
22 33 36 16-0036 EA 300 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	84,241.66	1,184.58
22 33 36 16-0037 EA 350 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	55,829.73	1,396.46
22 33 36 16-0038 EA 350 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	57,737.85	1,396.46
22 33 36 16-0039 EA 350 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	59,645.96	1,396.46
22 33 36 16-0040 EA 350 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	63,462.20	1,396.46
22 33 36 16-0041 EA 350 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	67,278.44	1,396.46
22 33 36 16-0042 EA 350 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	70,331.43	1,396.46
22 33 36 16-0043 EA 350 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	74,910.91	1,396.46
22 33 36 16-0044 EA 350 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	79,490.40	1,396.46
22 33 36 16-0045 EA 350 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	81,780.14	1,396.46
22 33 36 16-0046 EA 350 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	84,069.88	1,396.46
22 33 36 16-0047 EA 350 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	86,359.62	1,396.46
22 33 36 16-0048 EA 350 Gallon, 297 KW, 480 Voltage, Commercial Electric Water Heater.....	89,794.24	1,396.46
22 33 36 16-0049 EA 400 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	61,219.40	1,540.92
22 33 36 16-0050 EA 400 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	63,576.92	1,540.92
22 33 36 16-0051 EA 400 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	65,934.45	1,540.92
22 33 36 16-0052 EA 400 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	70,649.49	1,540.92
22 33 36 16-0053 EA 400 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	75,364.55	1,540.92
22 33 36 16-0054 EA 400 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	79,136.59	1,540.92
22 33 36 16-0055 EA 400 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	84,794.66	1,540.92
22 33 36 16-0056 EA 400 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	90,452.71	1,540.92
22 33 36 16-0057 EA 400 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	93,281.74	1,540.92
22 33 36 16-0058 EA 400 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	96,110.77	1,540.92
22 33 36 16-0059 EA 400 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	98,939.81	1,540.92
22 33 36 16-0060 EA 400 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	104,597.87	1,540.92
22 33 36 16-0061 EA 400 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	107,426.89	1,540.92
22 33 36 16-0062 EA 500 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	71,477.04	1,733.53
22 33 36 16-0063 EA 500 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	73,989.50	1,733.53
22 33 36 16-0064 EA 500 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	76,501.97	1,733.53
22 33 36 16-0065 EA 500 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	81,526.90	1,733.53
22 33 36 16-0066 EA 500 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	86,551.83	1,733.53
22 33 36 16-0067 EA 500 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	90,571.77	1,733.53
22 33 36 16-0068 EA 500 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	96,601.69	1,733.53
22 33 36 16-0069 EA 500 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	102,631.61	1,733.53
22 33 36 16-0070 EA 500 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	105,646.57	1,733.53
22 33 36 16-0071 EA 500 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	108,661.52	1,733.53
22 33 36 16-0072 EA 500 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	111,676.48	1,733.53
22 33 36 16-0073 EA 500 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	117,706.40	1,733.53
22 33 36 16-0074 EA 500 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	120,721.36	1,733.53
22 33 36 16-0075 EA 500 Gallon, 360 KW, 480 Voltage, Commercial Electric Water Heater.....	126,751.28	1,733.53
22 33 36 16-0076 EA 500 Gallon, 396 KW, 480 Voltage, Commercial Electric Water Heater.....	132,781.18	1,733.53
22 33 36 16-0077 EA 600 Gallon, 30 KW, 480 Voltage, Commercial Electric Water Heater.....	83,928.56	1,926.15
22 33 36 16-0078 EA 600 Gallon, 45 KW, 480 Voltage, Commercial Electric Water Heater.....	86,849.74	1,926.15
22 33 36 16-0079 EA 600 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	89,770.93	1,926.15
22 33 36 16-0080 EA 600 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	95,613.29	1,926.15
22 33 36 16-0081 EA 600 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	101,455.67	1,926.15
22 33 36 16-0082 EA 600 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	106,129.57	1,926.15
22 33 36 16-0083 EA 600 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	112,159.48	1,926.15
22 33 36 16-0084 EA 600 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	119,170.32	1,926.15
22 33 36 16-0085 EA 600 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	122,675.75	1,926.15
22 33 36 16-0086 EA 600 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	126,181.17	1,926.15
22 33 36 16-0087 EA 600 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	129,686.60	1,926.15
22 33 36 16-0088 EA 600 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	137,678.37	1,926.15
22 33 36 16-0089 EA 600 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	144,689.21	1,926.15
22 33 36 16-0090 EA 600 Gallon, 360 KW, 480 Voltage, Commercial Electric Water Heater.....	148,194.64	1,926.15
22 33 36 16-0091 EA 600 Gallon, 396 KW, 480 Voltage, Commercial Electric Water Heater.....	155,205.48	1,926.15
22 33 36 16-0092 EA 800 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	96,736.89	2,571.41

22 Plumbing**22 30 Plumbing Equipment****22 33 Electric Domestic Water Heaters**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 33 36 16-0093	EA		800 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	102,689.77	2,571.41
22 33 36 16-0094	EA		800 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	108,642.65	2,571.41
22 33 36 16-0095	EA		800 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	113,404.95	2,571.41
22 33 36 16-0096	EA		800 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	120,548.41	2,571.41
22 33 36 16-0097	EA		800 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	127,691.86	2,571.41
22 33 36 16-0098	EA		800 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	131,263.59	2,571.41
22 33 36 16-0099	EA		800 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	134,835.32	2,571.41
22 33 36 16-0100	EA		800 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	138,407.04	2,571.41
22 33 36 16-0101	EA		800 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	145,550.50	2,571.41
22 33 36 16-0102	EA		800 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	152,693.96	2,571.41
22 33 36 16-0103	EA		800 Gallon, 360 KW, 480 Voltage, Commercial Electric Water Heater.....	156,265.68	2,571.41
22 33 36 16-0104	EA		800 Gallon, 396 KW, 480 Voltage, Commercial Electric Water Heater.....	163,409.14	2,571.41
22 33 36 16-0105	EA		1000 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	113,228.77	3,303.35
22 33 36 16-0106	EA		1000 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	118,325.51	3,303.35
22 33 36 16-0107	EA		1000 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	123,422.24	3,303.35
22 33 36 16-0108	EA		1000 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	127,496.63	3,303.35
22 33 36 16-0109	EA		1000 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	133,615.71	3,303.35
22 33 36 16-0110	EA		1000 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	139,731.80	3,303.35
22 33 36 16-0111	EA		1000 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	142,789.83	3,303.35
22 33 36 16-0112	EA		1000 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	145,847.88	3,303.35
22 33 36 16-0113	EA		1000 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	148,905.91	3,303.35
22 33 36 16-0114	EA		1000 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	155,022.00	3,303.35
22 33 36 16-0115	EA		1000 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	161,138.08	3,303.35
22 33 36 16-0116	EA		1000 Gallon, 360 KW, 480 Voltage, Commercial Electric Water Heater.....	164,196.11	3,303.35
22 33 36 16-0117	EA		1000 Gallon, 396 KW, 480 Voltage, Commercial Electric Water Heater.....	170,312.19	3,303.35
22 33 36 16-0118	EA		1250 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	125,614.14	3,852.30
22 33 36 16-0119	EA		1250 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	130,297.52	3,852.30
22 33 36 16-0120	EA		1250 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	134,980.89	3,852.30
22 33 36 16-0121	EA		1250 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	138,727.60	3,852.30
22 33 36 16-0122	EA		1250 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	144,347.65	3,852.30
22 33 36 16-0123	EA		1250 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	149,967.70	3,852.30
22 33 36 16-0124	EA		1250 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	152,777.73	3,852.30
22 33 36 16-0125	EA		1250 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	155,587.76	3,852.30
22 33 36 16-0126	EA		1250 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	158,397.79	3,852.30
22 33 36 16-0127	EA		1250 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	164,017.84	3,852.30
22 33 36 16-0128	EA		1250 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	169,637.89	3,852.30
22 33 36 16-0129	EA		1250 Gallon, 360 KW, 480 Voltage, Commercial Electric Water Heater.....	172,447.91	3,852.30
22 33 36 16-0130	EA		1250 Gallon, 396 KW, 480 Voltage, Commercial Electric Water Heater.....	178,067.97	3,852.30
22 33 36 16-0131	EA		1250 Gallon, 432 KW, 480 Voltage, Commercial Electric Water Heater.....	183,688.02	3,852.30
22 33 36 16-0132	EA		1500 Gallon, 60 KW, 480 Voltage, Commercial Electric Water Heater.....	137,778.88	4,622.76
22 33 36 16-0133	EA		1500 Gallon, 90 KW, 480 Voltage, Commercial Electric Water Heater.....	142,303.74	4,622.76
22 33 36 16-0134	EA		1500 Gallon, 120 KW, 480 Voltage, Commercial Electric Water Heater.....	146,828.59	4,622.76
22 33 36 16-0135	EA		1500 Gallon, 144 KW, 480 Voltage, Commercial Electric Water Heater.....	150,448.48	4,622.76
22 33 36 16-0136	EA		1500 Gallon, 180 KW, 480 Voltage, Commercial Electric Water Heater.....	155,878.31	4,622.76
22 33 36 16-0137	EA		1500 Gallon, 216 KW, 480 Voltage, Commercial Electric Water Heater.....	161,308.13	4,622.76
22 33 36 16-0138	EA		1500 Gallon, 234 KW, 480 Voltage, Commercial Electric Water Heater.....	164,023.05	4,622.76
22 33 36 16-0139	EA		1500 Gallon, 252 KW, 480 Voltage, Commercial Electric Water Heater.....	166,737.96	4,622.76
22 33 36 16-0140	EA		1500 Gallon, 270 KW, 480 Voltage, Commercial Electric Water Heater.....	169,452.88	4,622.76
22 33 36 16-0141	EA		1500 Gallon, 306 KW, 480 Voltage, Commercial Electric Water Heater.....	174,882.70	4,622.76
22 33 36 16-0142	EA		1500 Gallon, 324 KW, 480 Voltage, Commercial Electric Water Heater.....	180,312.53	4,622.76
22 33 36 16-0143	EA		1500 Gallon, 360 KW, 480 Voltage, Commercial Electric Water Heater.....	183,027.45	4,622.76
22 33 36 16-0144	EA		1500 Gallon, 396 KW, 480 Voltage, Commercial Electric Water Heater.....	188,457.28	4,622.76
22 33 36 16-0145	EA		1500 Gallon, 432 KW, 480 Voltage, Commercial Electric Water Heater.....	193,887.10	4,622.76

22 34 Fuel-Fired Domestic Water Heaters (22 30)**22 34 13 Instantaneous, Tankless, Gas Domestic Water Heaters (22 34)**

22 34 13 00-0001			Instantaneous, Tankless, Gas Domestic Water Heaters (22 34 13)		
22 34 13 00-0002			Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heaters (22 34 13 00-0001)		
			Note: Includes vent connection. Excludes vent.		
22 34 13 00-0003	EA		4.2 GPM, Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-42PVN).....	2,153.90	229.63
22 34 13 00-0004	EA		5.3 GPM, Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-53PVN).....	2,337.18	232.50
22 34 13 00-0005	EA		5.3 GPM, Direct Vent, Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-53DVN).....	2,574.61	238.25
22 34 13 00-0006	EA		6.6 GPM, Direct Vent, Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-66DVN).....	3,021.59	243.99
22 34 13 00-0007	EA		7.4 GPM, Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-74PVN).....	3,683.21	258.34
22 34 13 00-0008	EA		7.4 GPM, Direct Vent, Indoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-74DVN).....	3,763.90	258.34

22 34 13 00-0009 Outdoor Mount, Instantaneous, Tankless, Gas Domestic Water Heaters (22 34 13 00-0001)

22 34 13 00-0010	EA		5.3 GPM, Outdoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-53XN).....	2,331.44	229.63
22 34 13 00-0011	EA		7.4 GPM, Outdoor Mount, Instantaneous, Tankless, Gas Domestic Water Heater (Rheem RTG-74XN).....	3,683.21	258.34

22 34 30 Residential Gas Domestic Water Heaters (22 34)



Plumbing	22	22
Plumbing Equipment	22 30	
Fuel-Fired Domestic Water Heaters	22 34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 34 30 13 Residential, Atmospheric, Gas Domestic Water Heaters (22 34 30)

22 34 30 13-0001	Atmospheric, Gas Domestic Water Heaters (A.O. Smith ProMax) (22 34 30 13)		
	Note: Includes glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.		
22 34 30 13-0002	EA 30 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith GCV-30)	1,594.73	221.02
22 34 30 13-0003	EA 40 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith GCV-40)	1,562.67	226.76
22 34 30 13-0004	EA 50 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith GCVX-50)	2,104.44	232.50
22 34 30 13-0005	EA 65 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith GCV-65)	2,282.56	238.25
22 34 30 13-0006	EA 75 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith FCG-75)	2,498.86	243.99
22 34 30 13-0007	EA 100 Gallon, Atmospheric, Gas Domestic Water Heater (A. O. Smith FCG-100)	3,734.29	258.34

22 34 30 16 Residential, Direct-Vent, Gas Domestic Water Heaters (22 34 30)

22 34 30 16-0001	Direct-Vent, Gas Domestic Water Heaters (A.O. Smith ProMax) (22 34 30 16)		
	Note: Includes glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.		
22 34 30 16-0002	EA 40 Gallon, Direct-Vent, Gas Domestic Water Heater (A. O. Smith GDV-40)	2,983.56	226.76
22 34 30 16-0003	EA 50 Gallon, Direct-Vent, Gas Domestic Water Heater (A. O. Smith GDV-50)	3,410.95	232.50
22 34 30 16-0004	EA 75 Gallon, Direct-Vent, Gas Domestic Water Heater (A. O. Smith GDV-75)	4,460.60	238.25

22 34 30 19 Residential, Power-Vent, Gas Domestic Water Heaters (22 34 30)

22 34 30 19-0001	Power-Vent, Gas Domestic Water Heaters (A.O. Smith ProMax) (22 34 30 19)		
	Note: Includes glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.		
22 34 30 19-0002	EA 40 Gallon, Power-Vent, Gas Domestic Water Heater (A. O. Smith GPVH-40)	2,702.66	226.76
22 34 30 19-0003	EA 50 Gallon, Power-Vent, Gas Domestic Water Heater (A. O. Smith GPVH-50)	2,816.62	232.50

22 34 36 Commercial Gas Domestic Water Heaters (22 34)

22 34 36 13 Commercial, Atmospheric, Gas Domestic Water Heaters (22 34 36)

22 34 36 13-0001	Gas Fired Commercial Water Heaters (A.O. Smith BTR) (22 34 36 13)		
	Note: Includes automatic flue damper, glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.		
22 34 36 13-0002	EA 120 MBH Input, 71 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-120)	6,783.83	344.46
22 34 36 13-0003	EA 154 MBH Input, 81 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-154)	7,236.44	401.86
22 34 36 13-0004	EA 180 MBH Input, 81 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-180)	8,959.37	459.28
22 34 36 13-0005	EA 199 MBH Input, 81 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-199)	7,740.43	459.28
22 34 36 13-0006	EA 199 MBH Input, 100 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-200)	8,909.58	459.28
22 34 36 13-0007	EA 199 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-200A)	11,897.71	505.21
22 34 36 13-0008	EA 250 MBH Input, 100 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-250)	8,617.47	516.68
22 34 36 13-0009	EA 250 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-250A)	12,812.01	568.35
22 34 36 13-0010	EA 251 MBH Input, 65 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-251)	8,752.55	516.68
22 34 36 13-0011	EA 251 MBH Input, 65 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-251A)	12,216.98	568.35
22 34 36 13-0012	EA 275 MBH Input, 100 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-275)	9,689.78	631.51
22 34 36 13-0013	EA 275 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-275A)	13,354.09	694.65
22 34 36 13-0014	EA 305 MBH Input, 65 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-305)	10,912.00	631.51
22 34 36 13-0015	EA 305 MBH Input, 65 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-305A)	13,434.50	694.65
22 34 36 13-0016	EA 365 MBH Input, 85 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-365)	10,544.44	688.91
22 34 36 13-0017	EA 365 MBH Input, 85 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-365A)	14,831.26	757.81
22 34 36 13-0018	EA 390 MBH Input, 100 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-400)	13,423.02	688.91
22 34 36 13-0019	EA 390 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-400A)	17,597.33	757.81
22 34 36 13-0020	EA 500 MBH Input, 85 Gallon, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-500)	17,526.12	746.32
22 34 36 13-0021	EA 150 MBH Input, 32 Gallon, Booster Type, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-151)	8,748.07	401.86
22 34 36 13-0022	EA 150 MBH Input, 32 Gallon, ASME Rated Tank, Booster Type, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-151A)	10,500.95	442.05
22 34 36 13-0023	EA 199 MBH Input, 32 Gallon, Booster Type, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-201)	9,088.02	459.28
22 34 36 13-0024	EA 199 MBH Input, 32 Gallon, ASME Rated Tank, Booster Type, 80% Efficiency, Gas Fired Commercial Water Heater (A.O. Smith BTR-201A)	10,900.64	505.21
22 34 36 13-0025	EA Sidewall Power Vent System For BTR-120 through BTR-200	2,182.19	287.05
22 34 36 13-0026	EA Sidewall Power Vent System For BTR-250 through BTR-500	2,391.25	287.05

22 34 36 13-0027 Removal And Reinstallation Of Water Heater (22 34 36 13)

	Note: Includes storage and cleaning.		
22 34 36 13-0028	EA Removal And Reinstallation Of Water Heater Gas Fired, Up To 86 Gallon	521.90	
22 34 36 13-0029	EA Removal And Reinstallation Of Water Heater Gas Fired, 87 Gallon To 200 Gallon	1,380.03	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 34 36 19 Commercial, Power-Vent, Gas Domestic Water Heaters (22 34 36)

CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 34 36 19-0001		Induced Draft Blower Gas Fired Commercial Water Heaters (A.O. Smith BTN) (22 34 36 19) Note: Includes glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.		
22 34 36 19-0002	EA	90 MBH Input, 98 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-100)	5,513.37	344.46
22 34 36 19-0003	EA	120 MBH Input, 71 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-120)	7,909.56	344.46
22 34 36 19-0004	EA	154 MBH Input, 81 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-154)	9,648.65	401.86
22 34 36 19-0005	EA	180 MBH Input, 99 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-180) ...	10,036.85	459.28
22 34 36 19-0006	EA	199 MBH Input, 99 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-199) ...	10,085.10	459.28
22 34 36 19-0007	EA	199 MBH Input, 100 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-200)	10,310.24	459.28
22 34 36 19-0008	EA	199 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-200A)	12,106.77	505.21
22 34 36 19-0009	EA	250 MBH Input, 100 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-250)	11,373.89	516.68
22 34 36 19-0010	EA	250 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-250A)	14,002.06	568.35
22 34 36 19-0011	EA	275 MBH Input, 100 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-275)	11,909.07	631.51
22 34 36 19-0012	EA	275 MBH Input, 100 Gallon, ASME Rated Tank, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-275A)	14,608.47	694.65
22 34 36 19-0013	EA	310 MBH Input, 85 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-310) ...	12,166.38	631.51
22 34 36 19-0014	EA	310 MBH Input, 85 Gallon, ASME Rated Tank, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-310A)	14,769.29	694.65
22 34 36 19-0015	EA	366 MBH Input, 85 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-366) ...	13,648.16	688.91
22 34 36 19-0016	EA	366 MBH Input, 85 Gallon, ASME Rated Tank, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-366A)	16,053.48	757.81
22 34 36 19-0017	EA	390 MBH Input, 85 Gallon, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-400) ...	16,558.97	688.91
22 34 36 19-0018	EA	390 MBH Input, 85 Gallon, ASME Rated Tank, 80% Efficiency, Induced Draft Blower, Gas Fired Commercial Water Heater (BTN-400A)	19,109.02	757.81

22 34 36 19-0019 Condensing Gas Fired Commercial Water Heaters (A.O. Smith BTX And BTH) (22 34 36 19)

Note: Includes glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.

22 34 36 19-0020	EA	76 MBH Input, 50 Gallon, 90% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTX-80)	4,258.99	344.46
22 34 36 19-0021	EA	100 MBH Input, 50 Gallon, 90% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTX-100)	5,738.51	344.46
22 34 36 19-0022	EA	120 MBH Input, 60 Gallon, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-120)	6,960.73	344.46
22 34 36 19-0023	EA	120 MBH Input, 60 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-120A)	10,053.01	378.90
22 34 36 19-0024	EA	150 MBH Input, 100 Gallon, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-150)	10,291.92	401.86
22 34 36 19-0025	EA	150 MBH Input, 100 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-150A)	12,993.63	442.05
22 34 36 19-0026	EA	199 MBH Input, 100 Gallon, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-199)	10,438.90	459.28
22 34 36 19-0027	EA	199 MBH Input, 100 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-199A)	13,377.23	505.21
22 34 36 19-0028	EA	250 MBH Input, 100 Gallon, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-250)	12,065.40	516.68
22 34 36 19-0029	EA	250 MBH Input, 100 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-250A)	14,693.58	568.35
22 34 36 19-0030	EA	300 MBH Input, 119 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-300A)	19,240.03	694.65
22 34 36 19-0031	EA	399.9 MBH Input, 119 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-400A)	20,218.66	757.81
22 34 36 19-0032	EA	499.9 MBH Input, 119 Gallon, ASME Rated Tank, 95% Efficiency, Power-Vent, Condensing Gas Fired Commercial Water Heater (BTH-500A)	23,271.85	820.95

22 34 36 19-0033 Gas Fired Commercial Water Heaters (Rheem-Ruud) (22 34 36 19)

Note: Includes automatic flue damper, glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.

22 34 36 19-0034	EA	199 MBH Input, 100 Gallon, Universal Gas Fired Commercial Water Heater (Rheem-Ruud G100-200)	11,074.85	459.28
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22 34 36 23 Commercial, High-Efficiency, Gas Domestic Water Heaters (22 34 36)

22 34 36 23-0001 Gas Fired Domestic Hot Water Skid Package (Laars Mighty Therm) (22 34 36 23)

Note: Includes (2) Laars Mighty Therm boilers, (2) B&G boiler primary pumps (one per boiler), T&P valve, circuit setter, storage tank (sized for 10 minutes buffer based on 50 degree city water supply, and operating set point for the tank at 130 degrees storage), and all necessary accessories for system monitoring such as gauges and thermometers. UL listed and labeled. Excludes piping insulation or seismic calculations.

22 34 36 23-0002	EA	400 MBH x 2, Gas Fired Domestic Hot Water Skid Package (FlowTherm Systems FTDW-400)	94,998.95	1,540.92
22 34 36 23-0003	EA	1,000 MBH x 2, Gas Fired Domestic Hot Water Skid Package (FlowTherm Systems FTDW-1000)	114,979.68	1,637.23
22 34 36 23-0004	EA	2,000 MBH x 2, Gas Fired Domestic Hot Water Skid Package (FlowTherm Systems FTDW-2000)	139,838.93	1,733.53
22 34 36 23-0005	EA	3,000 MBH x 2, Gas Fired Domestic Hot Water Skid Package (FlowTherm Systems FTDW-3000)	167,296.81	1,829.84



Plumbing	22	22
Plumbing Equipment	22 30	
Fuel-Fired Domestic Water Heaters	22 34	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 34 36 23-0006	EA		4,000 MBH x 2, Gas Fired Domestic Hot Water Skid Package (FlowTherm Systems FTDW-4000)	175,350.40	1,926.15
22 34 36 23-0007			Gas Fired Volume Water Heater (Laars Mighty Therm) <small>(22 34 36 23)</small>		
22 34 36 23-0008	EA		200 MBH Gas Fired Volume Water Heater (Laars MT2V0200)	11,656.58	846.33
22 34 36 23-0009	EA		300 MBH Gas Fired Volume Water Heater (Laars MT2V0300)	12,636.57	952.12
22 34 36 23-0010	EA		400 MBH Gas Fired Volume Water Heater (Laars MT2V0400)	14,613.43	1,163.71
22 34 36 23-0011	EA		500 MBH Gas Fired Volume Water Heater (Laars MT2V0500)	21,424.00	1,269.50
22 34 36 23-0012	EA		750 MBH Gas Fired Volume Water Heater (Laars MT2V0750)	23,538.08	1,481.08
22 34 36 23-0013	EA		1,000 MBH Gas Fired Volume Water Heater (Laars MT2V1000)	26,925.08	1,692.66
22 34 36 23-0014	EA		1,250 MBH Gas Fired Volume Water Heater (Laars MT2V1250)	29,733.68	1,904.25
22 34 36 23-0015	EA		1,500 MBH Gas Fired Volume Water Heater (Laars MT2V1500)	35,596.89	2,115.83
22 34 36 23-0016	EA		1,750 MBH Gas Fired Volume Water Heater (Laars MT2V1750)	36,929.42	2,221.61
22 34 36 23-0017	EA		2,000 MBH Gas Fired Volume Water Heater (Laars MT2V2000)	39,634.09	2,327.41
22 34 36 26			Commercial, Coil-Type, Finned-Tube, Gas Domestic Water Heaters <small>(22 34 36)</small>		
22 34 36 26-0001			Laars Rheos+ 90% Efficient, Gas Fired, Copper Fin Tube Condensing Water Heaters <small>(22 34 36 26)</small>		
22 34 36 26-0002	EA		1,200 MBH 90% Efficient, Gas Fired, Copper Fin Tube Condensing Water Heater (Laars Rheos+)	36,478.21	1,608.03
22 34 36 26-0003	EA		1,600 MBH 90% Efficient, Gas Fired, Copper Fin Tube Condensing Water Heater (Laars Rheos+)	51,618.76	1,777.29
22 34 36 26-0004	EA		2,000 MBH 90% Efficient, Gas Fired, Copper Fin Tube Condensing Water Heater (Laars Rheos+)	56,023.93	1,861.93
22 34 36 26-0005	EA		2,400 MBH 90% Efficient, Gas Fired, Copper Fin Tube Condensing Water Heater (Laars Rheos+)	60,677.31	2,031.19
22 34 36 26-0006			Laars Rheos 86% Efficient Gas Fired, Copper Fin Tube LoNox Water Heaters <small>(22 34 36 26)</small>		
22 34 36 26-0007	EA		1,200 MBH 86% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Rheos)	32,314.87	1,608.03
22 34 36 26-0008	EA		1,600 MBH 86% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Rheos)	35,699.35	1,777.29
22 34 36 26-0009	EA		2,000 MBH 86% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Rheos)	39,042.59	1,861.93
22 34 36 26-0010	EA		2,400 MBH 86% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Rheos)	42,417.51	2,031.19
22 34 36 26-0011			Laars Pennant 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heaters <small>(22 34 36 26)</small>		
22 34 36 26-0012	EA		200 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	8,232.85	761.70
22 34 36 26-0013	EA		300 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	9,055.79	846.33
22 34 36 26-0014	EA		400 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	10,631.63	1,015.59
22 34 36 26-0015	EA		500 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	15,063.17	1,057.92
22 34 36 26-0016	EA		750 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	16,576.04	1,269.50
22 34 36 26-0017	EA		1,000 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	20,450.71	1,523.40
22 34 36 26-0018	EA		1,250 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	23,270.15	1,608.03
22 34 36 26-0019	EA		1,500 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	25,802.14	1,734.98
22 34 36 26-0020	EA		1,750 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	28,178.98	1,819.61
22 34 36 26-0021	EA		2,000 MBH 85% Efficient, Gas Fired, Copper Fin Tube LoNox Water Heater (Laars Pennant)	30,260.56	1,861.93
22 34 36 26-0022			Patterson Kelley Thermific Sealed Combustion, Gas Fired, Copper Fin Tube Water Heaters <small>(22 34 36 26)</small>		
22 34 36 26-0023	EA		700 MBH 85% Efficient, Sealed Combustion, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Thermific)	23,559.63	1,269.50
22 34 36 26-0024	EA		1,000 MBH 85% Efficient, Sealed Combustion, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Thermific)	25,964.47	1,523.40
22 34 36 26-0025	EA		1,500 MBH 85% Efficient, Sealed Combustion, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Thermific)	31,093.09	1,734.98
22 34 36 26-0026	EA		1,700 MBH 85% Efficient, Sealed Combustion, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Thermific)	32,047.38	1,819.61
22 34 36 26-0027	EA		2,000 MBH 85% Efficient, Sealed Combustion, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Thermific)	33,527.55	1,861.93
22 34 36 26-0028			Patterson Kelley Modufire Forced Draft, Water, Gas Fired, Copper Fin Tube Water Heaters <small>(22 34 36 26)</small>		
22 34 36 26-0029	EA		1,000 MBH 85% Efficient, Forced Draft, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Modufire)	28,335.75	1,523.40
22 34 36 26-0030	EA		1,500 MBH 85% Efficient, Forced Draft, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Modufire)	34,239.64	1,734.98
22 34 36 26-0031	EA		2,000 MBH 85% Efficient, Forced Draft, Gas Fired, Copper Fin Tube Water Heater (Patterson Kelley Modufire)	36,342.70	1,861.93
22 34 46			Oil-Fired Domestic Water Heaters <small>(22 34)</small>		
22 34 46 11			Standard-capacity, Oil-Fired Domestic Water Heaters <small>(22 34 46)</small>		
22 34 46 11-0001			Oil-Fired Domestic Water Heaters (Bock) <small>(22 34 46 11)</small>		
			Note: Includes burner, glass lined tank, drain valve, temperature and pressure relief valve and vent connection. Excludes vent.		
22 34 46 11-0002	EA		60 MBH, 20 Gallon, Oil-Fired Domestic Water Heater (Bock 20E)	2,232.02	176.82
22 34 46 11-0003	EA		104 MBH, 32 Gallon, Oil-Fired Domestic Water Heater (Bock 32E)	2,200.58	176.82
22 34 46 11-0004	EA		104 MBH, 33 Gallon, Oil-Fired Domestic Water Heater (Bock 33ES)	2,301.59	176.82
22 34 46 11-0005	EA		125 MBH, 40 Gallon, Oil-Fired Domestic Water Heater (Bock 40E)	2,433.45	181.41

22 Plumbing**22 30 Plumbing Equipment****22 34 Fuel-Fired Domestic Water Heaters**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 34 46 11-0006	EA	140 MBH, 50 Gallon, Oil-Fired Domestic Water Heater (Bock 50ES)	3,121.51	186.00
22 34 46 11-0007	EA	152 MBH, 50 Gallon, Oil-Fired Domestic Water Heater (Bock 51E)	2,622.02	186.00

22 35 Domestic Water Heat Exchangers (22 30)**22 35 23 Circulating, Domestic Water Heat Exchangers (22 35)****22 35 23 13 Circulating, Compact Domestic Water Heat Exchangers (22 35 23)****22 35 23 13-0001 Steam Driven Water Heaters (22 35 23 13)****22 35 23 13-0002 Constant Flow (22 35 23 13-0001)**

22 35 23 13-0003	EA	30 GPM, 700 LB/Hour Steam Water Heater, Constant Flow	6,476.11	574.09
22 35 23 13-0004	EA	90 GPM, 1,250 LB/Hour Steam Water Heater, Constant Flow	8,088.59	703.49
22 35 23 13-0005	EA	140 GPM, 2,500 LB/Hour Steam Water Heater, Constant Flow	10,364.71	920.05
22 35 23 13-0006	EA	230 GPM, 5,000 LB/Hour Steam Water Heater, Constant Flow	14,025.14	1,281.49
22 35 23 13-0007	EA	500 GPM, 7,500 LB/Hour Steam Water Heater, Constant Flow	20,694.62	2,110.60
22 35 23 13-0008	EA	900 GPM, 10,000 LB/Hour Steam Water Heater, Constant Flow	22,553.44	2,392.02
22 35 23 13-0009	EA	1,400 GPM, 15,000 LB/Hour Steam Water Heater, Constant Flow	29,596.55	2,760.01
22 35 23 13-0010	EA	2,400 GPM, 20,000 LB/Hour Steam Water Heater, Constant Flow	35,611.34	3,261.89

22 35 23 13-0011 Variable Flow (22 35 23 13-0001)

22 35 23 13-0012	EA	30 GPM, 700 LB/Hour Steam Water Heater, Variable Flow	9,755.74	1,119.48
22 35 23 13-0013	EA	90 GPM, 1,250 LB/Hour Steam Water Heater, Variable Flow	11,056.85	1,366.92
22 35 23 13-0014	EA	140 GPM, 2,500 LB/Hour Steam Water Heater, Variable Flow	14,104.49	1,767.52
22 35 23 13-0015	EA	230 GPM, 5,000 LB/Hour Steam Water Heater, Variable Flow	18,496.68	2,466.08
22 35 23 13-0016	EA	500 GPM, 7,500 LB/Hour Steam Water Heater, Variable Flow	27,601.77	4,124.29
22 35 23 13-0017	EA	900 GPM, 10,000 LB/Hour Steam Water Heater, Variable Flow	33,592.18	4,541.90
22 35 23 13-0018	EA	1,400 GPM, 15,000 LB/Hour Steam Water Heater, Variable Flow	38,912.53	5,315.65
22 35 23 13-0019	EA	2,400 GPM, 20,000 LB/Hour Steam Water Heater, Variable Flow	49,276.63	6,350.63

22 40 Plumbing Fixtures (22)

Note: The following Energy Policy Act Flow Rates Requirements superseded flow rates standards listed in section. Plumbing fixtures and trim should not exceed the maximum flow rates set forth in The Energy Policy Act 92. lavatory faucets - 2.5 gal/min, lavatory replacement aerators - 2.5 gal/min, kitchen faucets - 2.5 gal/min, kitchen replacement aerators - 2.5 gal/min, metering faucets - 0.25 gal/cycle, gravity tank-type toilets - 1.6 gal/flush, flushometer tank toilets - 1.6 gal/flush, electromechanical hydraulic toilets - 1.6 gal/flush, blowdown toilets - 3.5 gal/flush, urinals - 1.0 gal/flush.

22 41 Residential Plumbing Fixtures (22 40)**22 41 13 Residential Water Closets, Urinals, and Bidets (22 41)****22 41 13 13 Residential Water Closets (22 41 13)****22 41 13 13-0001 Residential Toilets (22 41 13 13)**

See CSI section 22 42 13 13-0001 for additional water closets.				
22 41 13 13-0002	EA	2 Piece Tank Type, Gravity Flush System, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (Kohler Wellworth® K-3978)	537.47	109.96
Note: Includes seat, wax ring, escutcheon, supply valve and line.				
22 41 13 13-0003	EA	Water Closet, Kohler K-3423, White With K-9404 Trip Lever	611.51	186.81
Note: Includes seat, wax ring, escutcheon, supply valve and line.				
22 41 13 13-0004	EA	2 Piece Tank Type, Gravity Flush System, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (Kohler Highline® K-3999)	779.55	109.96
Note: Includes seat, wax ring, escutcheon, supply valve and line.				
22 41 13 13-0005	EA	Round Front Toilet Seat, White (Kohler K-4716-T)	65.83	17.91

22 41 16 Residential Lavatories and Sinks (22 41)**22 41 16 13 Residential Lavatories (22 41 16)****22 41 16 13-0001 Residential Wall Hung Lavatory (22 41 16 13)**

See CSI section 22 42 16 13-0002 for wall hung lavatories.

22 41 16 13-0002 Residential Counter Top Lavatory (22 41 16 13)

See CSI section 22 42 16 13-0010 for additional countertop lavatories.

22 41 16 13-0003	EA	20" x 18" Oval Vitreous China Single Hole Countertop Lavatory, Self Rimming (Kohler K-2196-1N)	609.40	85.64
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22 41 16 13-0004 Residential Culture Marble Lavatory Vanity Top (22 41 16 13)

Note: Includes splash. Single sink, center or offset. Bowl is either oval, shell shape or rectangular. See CSI section 22 42 16 13-0028 for vanity top.

22 41 16 16 Residential Sinks (22 41 16)**22 41 16 16-0001 Residential Kitchen Sinks (22 41 16 16)**

Note: Includes strainer.

22 41 16 16-0002	EA	25" x 22" x 6" Stainless Steel Kitchen Sink, Single Bowl, 22 Gauge (Elkay K125224)	630.00	99.39
22 41 16 16-0003	EA	33" x 21" x 6-1/2" Stainless Steel Kitchen Sink, Double Bowl, 20 Gauge (Elkay D233213)	715.25	113.14
22 41 16 16-0004	EA	33" x 21" x 10-1/8" Stainless Steel Kitchen Sink, Double Bowl, 18 Gauge (Elkay DLR33224)	1,985.01	113.14



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 41 19 Residential Bathtubs (22 41)		
22 41 19 00-0001 Residential Bathtubs (22 41 19)		
See CSI section 22 42 19 00-0001 for additional tubs.		
22 41 19 00-0002 EA 5' Bathtub, American Standard Princeton Series.....	1,131.47	293.94
22 41 19 00-0003 EA 60" x 30" x 14" Bathtub, Kohler K-715 or K-716	1,226.43	293.94
22 41 26 Residential Disposers (22 41)		
22 41 26 00-0001 Disposals (22 41 26)		
22 41 26 00-0002 EA 1/3 HP Insulated Garbage Disposal.....	285.45	72.92
22 41 26 00-0003 EA 1/2 HP Insulated Garbage Disposal.....	325.92	72.92
22 41 26 00-0004 EA 3/4 HP Insulated Garbage Disposal.....	427.10	72.92
22 41 26 00-0005 EA 1 HP Insulated Garbage Disposal.....	528.28	72.92
22 41 39 Residential Faucets, Supplies, and Trim (22 41)		
22 41 39 00-0001 Residential Kitchen Faucets (22 41 39)		
22 41 39 00-0002 EA Chrome Single Handle Kitchen Faucet (Delta 100LF-WF)	202.70	52.87
22 41 39 00-0003 EA Chrome Single Handle Kitchen Faucet With Spray (Delta 400LF-WF).....	234.55	52.87
22 41 39 00-0004 EA Chrome Single Handle Kitchen Faucet With Integrated Spray (Delta 300LF-WF).....	234.55	52.87
22 41 39 00-0005 EA Chrome Two Handle Kitchen Faucet, Three Hole Installation 8"Center (Delta 2102LF-LHP+H215).....	225.76	52.87
22 41 39 00-0006 EA Chrome Two Handle Kitchen Faucet With Spray, Three Hole Installation, 8" Center (Delta 2402LF-LHP+H215)	242.87	52.87
22 41 39 00-0007 EA Kitchen Faucet, Polished Chrome (Kohler K-15251-B).....	177.84	52.87
22 41 39 00-0008 EA Kitchen Faucet, Polished Chrome (Kohler K-15171-P).....	218.50	52.87
22 41 39 00-0009 EA Kitchen Faucet, Polished Chrome (Delta 2100).....	173.46	52.87
22 41 39 00-0010 Residential Lavatory Faucets (22 41 39)		
22 41 39 00-0011 EA Chrome, Single Acrylic Handle, Bath Faucet (Delta 502-DST)	185.65	38.06
For Faucet With Brass Pop-Up, Add	11.00	
22 41 39 00-0012 EA Chrome, Single Lever Handle, Lavatory Faucet (Delta 500-WF).....	185.65	38.06
For Faucet With Brass Pop-Up, Add	11.00	
22 41 39 00-0013 EA Chrome, Two Handle, Bath Faucet With Acrylic Handles (Delta 2502LF)	133.26	38.06
For Faucet With Brass Pop-Up, Add	16.50	
For Faucet With Plastic Pop-Up, Add	14.00	
22 41 39 00-0014 EA Chrome, Two Handle, Lavatory Faucet, (Kohler K-15240-4).....	169.93	38.06
22 41 39 00-0015 EA Chrome, Two Handle, Lavatory Faucet (Delta 2522LF-MPU)	175.23	38.06
22 41 39 00-0016 EA Chrome, Single Handle, Lavatory Faucet (Kohler K-15182-P).....	219.19	38.06
22 41 39 00-0017 Residential Bath And Shower Faucets (22 41 39)		
22 41 39 00-0018 EA Single Lever Handle, Chrome Shower Only, Pressure Balanced/Anti-Scald Valve (American Standard T675.501).....	241.89	45.89
For Faucet With Polished Nickel Or Brass Finish, Add	25.00	
22 41 39 00-0019 EA Single Lever Handle, Chrome Bath And Shower, Pressure Balanced/Anti-Scald Valve (American Standard T675.502)	285.46	45.89
For Faucet With Polished Nickel Or Brass Finish, Add	25.00	
22 41 39 00-0020 EA Two-Knob Handle Chrome Shower And Tub Filler, Ceramic Valving (American Standard Cadet 3275).....	222.90	45.89
For Faucet With Polished Nickel Or Brass Finish, Add	75.00	
For Faucet With Lever Handles, Add	8.10	
22 41 39 00-0021 EA Three-Knob Handle Chrome Shower And Tub Filler, Ceramic Valving (American Standard Cadet 3375).....	246.36	45.89
For Faucet With Polished Nickel Or Brass Finish, Add	75.00	
For Faucet With Lever Handles, Add	8.10	
22 41 39 00-0022 EA Hand Shower With Hose And 25" Slide Bar (American Standard 1662.602).....	275.26	28.71
22 41 39 00-0023 EA Wall Mount, Hand Shower With Hose (Delta 55011)	228.60	28.71
22 41 39 00-0024 EA Pressure Balancing Shower Valve (Kohler K-304-K).....	221.61	49.83
22 41 39 00-0025 EA Pressure Balancing Shower Valve (Symmons BP-46-2-X).....	243.21	49.83
22 41 39 00-0026 EA Pressure Balancing Shower Valve (Moen 62370)	226.42	49.83
22 41 39 00-0027 EA Shower And Tub Control Set, Single Control With Balancing Valve (Moen L2353).....	280.41	49.83
22 41 39 00-0028 EA Shower And Tub Control Set, Single Control With Balancing Valve (Moen L2363).....	309.61	49.83
22 41 39 00-0029 EA Shower And Tub Control Set, 2 Knobs With Balancing Valve (Pfister 07-312).....	220.31	49.83
22 41 39 00-0030 EA Shower And Tub Control Set, 3 Knobs With Balancing Valve (Pfister 01-312).....	260.72	49.83
22 41 39 00-0031 EA Single Control Trim Kit (Symmons BPM46-2-LR-TRM)	177.75	49.83
22 41 39 00-0032 EA Single Control Trim Kit (Symmons BP-46-2-STK-TRM)	149.78	49.83
22 41 39 00-0033 EA Brass Shower Head (EZ Flo 15013 Or 15015)	61.45	11.48
22 41 39 00-0034 EA Wall Mount, Hand Shower Unit With Hose (Delta Faucet 62001 DS).....	313.40	28.71
22 41 39 00-0035 Residential Laundry Faucets (22 41 39)		
22 41 39 00-0036 EA Stream Straightener Nozzle Chrome Laundry Faucet, Lever Handles, 4" Center (Delta 2123LF)	159.74	33.75
22 41 39 00-0037 Residential Laundry/Wash Basin Faucets (22 41 39)		
22 41 39 00-0038 EA Hose Thread Spout Chrome Laundry Faucet, Lever Handles, 4" Center (Delta 2121LF)	161.06	33.75
22 41 39 00-0039 EA Hose Thread Spout With Vacuum Breaker Chrome Laundry Faucet, Lever Handles, 4" Center (Delta 2121LF+RP12503)	230.77	37.20
22 41 39 00-0040 Residential Washer Box (22 41 39)		

22 Plumbing**22 40 Plumbing Fixtures****22 41 Residential Plumbing Fixtures**

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 41 39 00-0041	EA	Washer Box With Supply Lines And Valve	237.57	86.18
22 41 39 00-0042		Other Residential Faucets (22 41 39)		
22 41 39 00-0043	EA	Sillcock, Compact, Brass, IPS Or Copper To Hose	43.08	8.61
22 41 39 00-0044		Residential Fixture Components And/or Trim Replacement (22 41 39)		
		See CSI section 22 01 40 81-0001 for fixture trim accessories.		
22 41 39 00-0045	EA	Elongated Toilet Seat, White (Kohler K-4712-T)	75.59	17.91
22 41 39 00-0046	EA	Removal And Replacement Of Vitreous China Toilet Tank And Lid	189.96	
22 41 39 00-0047	EA	Removal And Replacement Of Ball Cock Assembly	79.42	
22 41 39 00-0048	EA	Removal And Replacement Of Wax Ring Seal	12.92	
		Note: Excludes removal of toilet		
22 41 39 00-0049	EA	Aerator, 2.2 GPM, Polished Chrome Vandal Resistant Spray, Non-Aerated (Kohler K-18034)	33.02	5.74
22 41 39 00-0050	EA	Aerator, Polished Chrome Vandal Resistant, 2.2 GPM (Kohler K-18033)	28.23	5.74
22 41 39 00-0051	EA	Aerator, NEOPERL 1.5 GPM, Chrome Plated	13.66	5.74
22 41 39 00-0052	EA	Aerator, NEOPERL 2.2 GPM, Chrome Plated	13.66	5.74

22 42 Commercial Plumbing Fixtures (22 42)

Note: Prices are for commercial grade unless otherwise indicated. Includes final connection and all associated trim (seat, supply stop and line, wax seal, valve). Excludes rough-in within the wall and carrier.

22 42 13 Commercial Water Closets, Urinals, and Bidets (22 42)**22 42 13 13 Commercial Water Closets (22 42 13)**

22 42 13 13-0001		Vitreous China Water Closets (22 42 13 13)		
		Note: With a 2" ball pass.		
22 42 13 13-0002		Floor Mounted Elongated Vitreous China Water Closets (22 42 13 13-0001)		
		Note: Includes wax seal and toilet seat. Excludes flush valve.		
22 42 13 13-0003	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (American Standard Madera™)	653.92	109.96
22 42 13 13-0004	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Wall Outlet, Elongated Vitreous China Water Closet (American Standard Priolo™)	769.18	109.96
22 42 13 13-0005	EA	2 Piece Tank Type, Pressure Assisted, Siphon Jet, Floor Mounted, Wall Outlet, Elongated Vitreous China Water Closet (American Standard Yorkville™)	979.17	109.96
22 42 13 13-0006	EA	2 Piece Tank Type, Pressure Assisted, Siphon Jet, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (American Standard Cadet®)	881.79	109.96
22 42 13 13-0007	EA	1 Piece Tank Type, Siphon Jet, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (American Standard Compact Cadet®)	826.81	109.96
22 42 13 13-0008	EA	2 Piece Tank Type, Pressure Assisted, Siphon Jet, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet With Concealed Trapway (American Standard Cadet® 3 FloWise® RIGHT HEIGHT®)	830.59	109.96
22 42 13 13-0009	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (Kohler® Wellcomme™)	645.48	109.96
22 42 13 13-0010	EA	1.28 GPF Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Elongated Vitreous China Water Closet (Toto® CT705E)	687.92	109.96
22 42 13 13-0011		Wall Hung Elongated Vitreous China Water Closets (22 42 13 13-0001)		
		Note: Includes wax seal and toilet seat. Excludes flush valve.		
22 42 13 13-0012	EA	Flush Valve Type, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard AFWall®)	754.71	135.34
22 42 13 13-0013	EA	Flush Valve Type, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard AFWall® ADA Retrofit)	922.52	135.34
22 42 13 13-0014	EA	2 Piece Tank Type, Pressure Assisted, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Glenwall™)	1,150.39	135.34
22 42 13 13-0015	EA	Flush Valve Type, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Kohler® Kingston™)	757.63	135.34
22 42 13 13-0016	EA	Flush Valve Type, Blow Out, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Kohler® Stratton™)	1,119.39	135.34
22 42 13 13-0017	EA	Flush Valve Type, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Toto® CT708E Or CT708EV)	831.57	135.34
22 42 13 13-0018	EA	Flush Valve Type, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Zurn Z5615-BWL)	716.48	135.34
22 42 13 13-0019	EA	Flush Valve Type, Siphon Jet, Wall Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Sloan ST-2459)	749.83	135.34
22 42 13 13-0020		Floor Mounted Elongated Handicapped Water Closets (22 42 13 13-0001)		
		Note: Includes wax seal and toilet seat. Excludes flush valve.		
22 42 13 13-0021	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Madera™ ADA)	662.24	109.96
22 42 13 13-0022	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Colorado Right Height®)	676.82	109.96
22 42 13 13-0023	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Right Width™ Right Height®)	741.07	109.96
22 42 13 13-0024	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Huron)	820.56	109.96
22 42 13 13-0025	EA	Flush Valve Type, Siphon Jet, Floor Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Priolo® ADA)	817.25	109.96

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 13 13-0026 EA 2 Piece Tank Type, Pressure Assisted, Siphon Jet, Floor Mounted, Back Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Yorkville™ ADA)	1,070.95	109.96
22 42 13 13-0027 EA 2 Piece Tank Type, Pressure Assisted, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (American Standard Cadet Right Height™ ADA)	911.97	109.96
22 42 13 13-0028 EA Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Toto® CT705ELN)	727.70	109.96
22 42 13 13-0029 EA 2 Piece Tank Type, High Efficiency Water Closet Floor Mounted, Elongated, (Sterling 402077) With Open-Front Seat (Kohler K-4650)	830.36	109.96
22 42 13 13-0030 EA 2 Piece Tank Type, Pressure Assisted, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Kohler Highline™ ADA K-3519)	931.94	109.96
22 42 13 13-0031 EA 2 Piece Tank Type, Dual-Flush 1.1 And 1.6 GPF, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Vortens Vienna ELX-DF 3113-3436)	739.00	109.96
22 42 13 13-0032 EA 2 Piece Tank Type, High Efficiency Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Niagara Stealth™)	721.13	109.96
22 42 13 13-0033 EA Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Water Closet (Zurn HET Z5667-BWL)	694.26	109.96
22 42 13 13-0034 Stainless Steel Water Closets (22 42 13 13)		
22 42 13 13-0035 EA Wall Hung Water Closet, Stainless Steel With Hinged Seat, Siphon Jet (Acorn 2105-T-1-HS)	3,157.45	237.90
22 42 13 13-0036 EA Floor Mounted Water Closet, Stainless Steel With Hinged Seat, Siphon Jet (Acorn 2120-T-3-HS)	3,323.65	237.90
22 42 13 13-0037 Water Closet Carriers (22 42 13 13)		
22 42 13 13-0038 Pipe Grip Adaptor Type, Water Closet Carriers (22 42 13 13-0037)		
Note: Includes coated cast iron construction, plated hardware and adjustable feet. Excludes waste piping and fittings.		
22 42 13 13-0039 EA Pipe Grip Adaptor Type, Water Closet Carrier	578.25	55.83
22 42 13 13-0040 No-Hub, Water Closet Carriers (22 42 13 13-0037)		
Note: Includes coated cast iron construction, ABS extension with integral test cap, plated hardware and neoprene fixture gasket. Includes buttress feet or pylon feet and anchor foot.		
22 42 13 13-0041 EA Vertical Close With Offset, No-Hub, Single Water Closet Carrier	897.34	55.83
<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>		
<i>For Positioning Frame, Add</i>		
<i>For Supply Pipe Support, Add</i>		
<i>For Vandal Proof Trim, Add</i>		
<i>For Auxiliary Inlet, Add</i>		
<i>For Special Duty 500 LB Carrier, Add</i>		
22 42 13 13-0042 EA Vertical Close On Stack, No-Hub, Single Water Closet Carrier	897.34	55.83
<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>		
<i>For Positioning Frame, Add</i>		
<i>For Supply Pipe Support, Add</i>		
<i>For Vandal Proof Trim, Add</i>		
<i>For Auxiliary Inlet, Add</i>		
<i>For Special Duty 500 LB Carrier, Add</i>		
22 42 13 13-0043 EA Horizontal Adjustable, No-Hub, Single Water Closet Carrier	980.32	55.83
<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>		
<i>For Positioning Frame, Add</i>		
<i>For Supply Pipe Support, Add</i>		
<i>For Vandal Proof Trim, Add</i>		
<i>For Auxiliary Inlet, Add</i>		
<i>For Horizontal No Hub Cast Long Barrel, Add</i>		
<i>For Carrier For Wide Chase Installations, Add</i>		
<i>For Special Duty 1,000 LB Carrier, Add</i>		
22 42 13 13-0044 EA Vertical Adjustable On Stack, No-Hub, Single Water Closet Carrier	1,086.68	55.83
<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>		
<i>For Positioning Frame, Add</i>		
<i>For Supply Pipe Support, Add</i>		
<i>For Vandal Proof Trim, Add</i>		
<i>For 4" Branch, Add</i>		
<i>For Auxiliary Inlet, Add</i>		
<i>For Carrier For Wide Chase Installations, Add</i>		
<i>For Double 4" Branches, Add</i>		
<i>For Special Duty 1,000 LB Carrier, Add</i>		
22 42 13 13-0045 EA Vertical Close With Offset, No-Hub, Double Water Closet (Back To Back) Carrier	1,494.41	81.94
<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>		
<i>For Positioning Frame, Add</i>		
<i>For Supply Pipe Support, Add</i>		
<i>For Vandal Proof Trim, Add</i>		
<i>For Auxiliary Inlet, Add</i>		
<i>For Special Duty 500 LB Carrier, Add</i>		
22 42 13 13-0046 EA Vertical Close On Stack, No-Hub, Double Water Closet (Back To Back) Carrier	1,536.50	81.94
<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>		
<i>For Positioning Frame, Add</i>		
<i>For Supply Pipe Support, Add</i>		
<i>For Vandal Proof Trim, Add</i>		
<i>For Auxiliary Inlet, Add</i>		
<i>For Special Duty 500 LB Carrier, Add</i>		

22 Plumbing**22 40 Plumbing Fixtures****22 42 Commercial Plumbing Fixtures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 13 13-0047	EA		Vertical Adjustable On Stack, No-Hub, Double Water Closet (Back To Back) Carrier	1,871.94	81.94
			<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>	-156.59	
			<i>For Positioning Frame, Add</i>	109.01	
			<i>For Supply Pipe Support, Add</i>	111.35	
			<i>For Vandal Proof Trim, Add</i>	133.26	
			<i>For 4" Branch, Add</i>	181.48	
			<i>For Auxiliary Inlet, Add</i>	235.54	
			<i>For Double 4" Branches, Add</i>	364.10	
			<i>For Carrier For Wide Chase Installations, Add</i>	642.33	
			<i>For Special Duty 1,000 LB Carrier, Add</i>	743.37	
22 42 13 13-0048	EA		Horizontal Adjustable, No-Hub, Double Water Closet (Back To Back) Carrier	1,762.07	81.94
			<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>	-156.59	
			<i>For Positioning Frame, Add</i>	109.01	
			<i>For Supply Pipe Support, Add</i>	111.35	
			<i>For Vandal Proof Trim, Add</i>	133.26	
			<i>For Horizontal No Hub Cast Long Barrel, Add</i>	234.07	
			<i>For Carrier For Wide Chase Installations, Add</i>	642.33	
			<i>For Special Duty 1,000 LB Carrier, Add</i>	743.37	
22 42 13 13-0049			Hub And Spigot, Water Closet Carriers <small>(22 42 13 13-0037)</small>		
			Note: Includes coated cast iron construction, ABS extension with integral test cap, plated hardware and neoprene fixture gasket. Includes buttress feet or pylon feet and anchor foot.		
22 42 13 13-0050	EA		Vertical Close With Offset, Hub And Spigot, Single Water Closet Carrier	1,043.47	55.83
			<i>For Positioning Frame, Add</i>	50.54	
			<i>For Supply Pipe Support, Add</i>	51.71	
			<i>For Vandal Proof Trim, Add</i>	66.63	
			<i>For Hanger Type Closet Adapter, Add</i>	167.14	
			<i>For Auxiliary Inlet, Add</i>	219.68	
22 42 13 13-0051	EA		Vertical Close On Stack, Hub And Spigot, Single Water Closet Carrier	897.34	55.83
			<i>For Positioning Frame, Add</i>	50.54	
			<i>For Supply Pipe Support, Add</i>	51.71	
			<i>For Vandal Proof Trim, Add</i>	66.63	
			<i>For Auxiliary Inlet, Add</i>	219.68	
			<i>For Special Duty 500 LB Carrier, Add</i>	371.68	
22 42 13 13-0052	EA		Vertical Adjustable On Stack, Hub And Spigot, Single Water Closet Carrier	1,126.42	55.83
			<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>	-78.30	
			<i>For Positioning Frame, Add</i>	50.54	
			<i>For Supply Pipe Support, Add</i>	51.71	
			<i>For Vandal Proof Trim, Add</i>	66.63	
			<i>For 4" Branch, Add</i>	173.55	
			<i>For Auxiliary Inlet, Add</i>	219.68	
			<i>For Carrier For Wide Chase Installations, Add</i>	297.37	
			<i>For Double 4" Branches, Add</i>	348.24	
			<i>For Special Duty 1,000 LB Carrier, Add</i>	371.69	
22 42 13 13-0053	EA		Vertical Close With Offset, Hub And Spigot, Double Water Closet (Back To Back) Carrier	1,744.45	81.94
			<i>For Positioning Frame, Add</i>	109.01	
			<i>For Supply Pipe Support, Add</i>	111.35	
			<i>For Vandal Proof Trim, Add</i>	133.26	
			<i>For Auxiliary Inlet, Add</i>	235.54	
			<i>For Hanger Type Closet Adapter, Add</i>	334.28	
22 42 13 13-0054	EA		Vertical Adjustable On Stack, Hub And Spigot, Double Water Closet (Back To Back) Carrier	1,911.68	81.94
			<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>	-156.59	
			<i>For Positioning Frame, Add</i>	109.01	
			<i>For Supply Pipe Support, Add</i>	111.35	
			<i>For Vandal Proof Trim, Add</i>	133.26	
			<i>For 4" Branch, Add</i>	181.48	
			<i>For Auxiliary Inlet, Add</i>	235.54	
			<i>For Double 4" Branches, Add</i>	364.10	
			<i>For Carrier For Wide Chase Installations, Add</i>	642.33	
			<i>For Special Duty 1,000 LB Carrier, Add</i>	743.37	
22 42 13 13-0055			Floor Mount Polyvinyl Chloride (PVC) Adaptor Type, Water Closet Carriers <small>(22 42 13 13-0037)</small>		
			Note: Includes coated cast iron construction, plastic fitting adaptor with extension and plated hardware.		
22 42 13 13-0056	EA		Vertical On Stack, Floor Mount Polyvinyl Chloride (PVC) Adaptor Type, Single Water Closet Carrier	692.79	55.83
			<i>For Positioning Frame, Add</i>	50.54	
			<i>For Supply Pipe Support, Add</i>	51.71	
			<i>For Vandal Proof Trim, Add</i>	66.63	
			<i>For Hanger Type Closet Adapter, Add</i>	167.14	
22 42 13 13-0057			Institutional Water Closet Carriers <small>(22 42 13 13-0037)</small>		
			Note: Includes coated cast iron construction, ABS extension with integral test cap, buttress feet, plated hardware and neoprene fixture gasket.		
22 42 13 13-0058	EA		Vertical On Stack, No-Hub, 90 Degree Institutional, Double Waste Fitting With Vent And Carrier, Water Closet Carrier	2,454.01	81.94
			<i>For Carrier For Floor Mounted, Back Outlet China Bowls, Deduct</i>	-156.59	
			<i>For Positioning Frame, Add</i>	109.01	
			<i>For Supply Pipe Support, Add</i>	111.35	
			<i>For Vandal Proof Trim, Add</i>	133.26	
			<i>For Auxiliary Inlet, Add</i>	235.54	



Plumbing	22	22
Plumbing Fixtures	22 40	
Commercial Plumbing Fixtures	22 42	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 13 13-0059 Removal And Reinstallation Of Fixtures And Trim <small>(22 42 13 13)</small>		
<i>Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.</i>		
22 42 13 13-0060 EA Removal And Reinstallation Of Wall Hung Water Closet With Tank.....	483.23	
22 42 13 13-0061 EA Removal And Reinstallation Of Wall Hung Water Closet With Flush Valve	483.23	
22 42 13 13-0062 EA Removal And Reinstallation Of Floor Mount Water Closet With Tank	371.61	
22 42 13 13-0063 EA Removal And Reinstallation Of Floor Mount Water Closet With Flush Valve	371.61	
 22 42 13 16 Commercial Urinals <small>(22 42 13)</small>		
22 42 13 16-0001 Vitreous China Urinals <small>(22 42 13 16)</small>		
<i>Note: Excludes flush valve unless indicated otherwise.</i>		
22 42 13 16-0002 Wall Hung Urinals <small>(22 42 13 16-0001)</small>		
22 42 13 16-0003 EA Wall Hung Washout, Vitreous China Urinal (American Standard Maybrook™).....	585.17	113.14
22 42 13 16-0004 EA Wall Hung, Washout, Vitreous China Urinal With Top Spud (American Standard Washbrook®).....	710.86	113.14
22 42 13 16-0005 EA Wall Hung, Washout, Vitreous China Urinal With Back Spud (American Standard Washbrook®).....	737.14	113.14
22 42 13 16-0006 EA Wall Hung, Blowout, Vitreous China Urinal (American Standard Lynbrook™).....	775.75	113.14
22 42 13 16-0007 EA Wall Hung Siphon Jet, Vitreous China Urinal (American Standard Trimbrook™).....	708.81	113.14
22 42 13 16-0008 EA Wall Hung, Siphon Jet, Vitreous China Urinal (American Standard Allbrook™).....	602.70	113.14
22 42 13 16-0009 EA Wall Hung, Washout, Vitreous China Urinal (Toto® UT447E Or UT447EV).....	727.27	113.14
22 42 13 16-0010 EA Wall Hung, Washout, Vitreous China Urinal (Toto® UT104E Or UT104EV).....	625.70	113.14
22 42 13 16-0011 EA Wall Hung, Washout, Vitreous China Urinal (Zum Z5798).....	675.06	113.14
22 42 13 16-0012 EA Wall Hung, Washout, 0.125 To 0.5 GPF, HEU, Vitreous China Urinal (Sloan SU-1009-A).....	618.44	113.14
22 42 13 16-0013 EA Wall Hung, Washout, 1.0 GPF, HEU, Vitreous China Urinal (Sloan SU-1006-A).....	616.29	113.14
 22 42 13 16-0014 Floor Mounted Urinals <small>(22 42 13 16-0001)</small>		
22 42 13 16-0015 EA Washout, Floor Mounted, Vitreous China Urinal (American Standard Stallbrook™).....	978.14	142.74
22 42 13 16-0016 EA Washout, Floor Mounted, Vitreous China Urinal (Kohler® Branham™).....	1,088.58	142.74
22 42 13 16-0017 EA Floor Mounted Urinal Seam Cover For 21" Centers (Kohler® K-4931).....	310.68	26.44
22 42 13 16-0018 EA Floor Mounted Urinal Seam Cover For 24" Centers (Kohler® K-4932).....	352.65	26.44
 22 42 13 16-0019 Waterfree Urinals <small>(22 42 13 16-0001)</small>		
22 42 13 16-0020 EA Waterfree, Wall Hung, Vitreous China Urinal (American Standard Large FloWise® Flush-Free).....	642.06	79.30
<i>For >1, Deduct</i>		
<i>For Colored Fixtures, Add</i>		
	-43.06	
	66.90	
22 42 13 16-0021 EA Waterfree, Wall Hung, Vitreous China Urinal (SLOAN WES-1000).....	1,212.46	79.30
<i>For >1, Deduct</i>		
<i>For Colored Fixtures, Add</i>		
	-108.09	
	66.90	
22 42 13 16-0022 EA Waterfree, Wall Hung, Vitreous China Urinal (Falcon F-2000).....	1,044.07	79.30
<i>For >1, Deduct</i>		
<i>For Colored Fixtures, Add</i>		
	-88.89	
	66.90	
22 42 13 16-0023 EA Waterfree, Wall Hung, Vitreous China Urinal (Falcon F-4000).....	800.46	79.30
<i>For >1, Deduct</i>		
<i>For Colored Fixtures, Add</i>		
	-61.12	
	66.90	
22 42 13 16-0024 EA Waterfree, Wall Hung, Vitreous China Urinal (Falcon F-5000).....	800.46	79.30
<i>For >1, Deduct</i>		
<i>For Colored Fixtures, Add</i>		
	-61.12	
	66.90	
22 42 13 16-0025 EA Waterfree, Wall Hung, Vitreous China Urinal (Falcon F-7000).....	992.03	79.30
<i>For >1, Deduct</i>		
<i>For Colored Fixtures, Add</i>		
	-82.96	
	66.90	
22 42 13 16-0026 EA Waterfree, Wall Hung, Stainless Steel Urinal (Falcon F-9000).....	1,503.85	79.30
<i>For >1, Deduct</i>		
	-141.31	
 22 42 13 16-0027 Stainless Steel Urinals <small>(22 42 13 16)</small>		
22 42 13 16-0028 EA Wall Hung Urinal, Stainless Steel, Blowout Jet (Acorn 2160-T-1).....	3,250.94	237.90
22 42 13 16-0029 EA 5' Wall Hung Trough Urinal, Stainless Steel With Strainer And Washdown Pipe (Elkay EU6014C).....	4,210.24	290.77
 22 42 13 16-0030 Urinal Carriers <small>(22 42 13 16)</small>		
22 42 13 16-0031 Floor Mounted, Urinal Carriers <small>(22 42 13 16-0030)</small>		
<i>Note: Includes adjustable supporting rods, structural uprights and welded feet.</i>		
22 42 13 16-0032 EA Floor Mounted Hanger Plate Type, Single Urinal Carrier.....	581.55	40.18
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>		
	24.54	
22 42 13 16-0033 EA Floor Mounted Bearing Plate Type, Single Urinal Carrier.....	549.26	40.18
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>		
	24.54	
 22 42 13 16-0034 Wall Mounted, Urinal Carriers <small>(22 42 13 16-0030)</small>		
<i>Note: Includes wall plate and adjustable supporting rods.</i>		
22 42 13 16-0035 EA Wall Mounted Hanger Plate Type, Single Urinal Carrier.....	227.84	40.18
<i>For Up To 6-1/2" Extension Sleeves And Hardware, Add</i>		
	24.54	
 22 42 13 16-0036 Removal And Reinstallation Of Fixtures And Trim <small>(22 42 13 16)</small>		
<i>Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.</i>		
22 42 13 16-0037 EA Removal And Reinstallation Of Wall Hung Urinal With Flush Valve	481.68	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 42 16 Commercial Lavatories and Sinks (22 42)

22 42 16 13 Commercial Lavatories (22 42 16)

22 42 16 13-0001

Lavatories (22 42 16 13)

Note: Includes trap, drain and supply valves. Excludes faucets.

22 42 16 13-0002

Wall Hung Lavatories (22 42 16 13-0001)

22 42 16 13-0003	EA	19" x 17" Porcelain Enameled Cast Iron Wall Hung Lavatory (American Standard Regalyn™)	604.76	70.84
22 42 16 13-0004	EA	20" x 18" Porcelain Enameled Cast Iron Wall Hung Lavatory (American Standard Regalyn™)	631.56	70.84
22 42 16 13-0005	EA	22" x 19" Porcelain Enameled Cast Iron Wall Hung Lavatory (Kohler® Hampton™)	781.70	70.84
22 42 16 13-0006	EA	18" x 16" Vitreous China Wall Hung Lavatory (American Standard Penlyn™)	555.88	70.84
22 42 16 13-0007	EA	19" x 17" Vitreous China Wall Hung Lavatory (American Standard Declyn™)	480.99	70.84
22 42 16 13-0008	EA	20" x 18" Vitreous China Wall Hung Lavatory (Kohler® Soho®)	604.32	70.84
22 42 16 13-0009	EA	27" x 20" Wheelchair Accessible, Vitreous China Wall Hung Lavatory (American Standard Wheel Chair Users)	709.61	70.84

22 42 16 13-0010

Countertop Lavatories (22 42 16 13-0001)

22 42 16 13-0011	EA	20" x 18" Oval Vitreous China Countertop Lavatory (Kohler® Pennington®)	572.65	85.64
22 42 16 13-0012	EA	21" x 18" Vitreous China Countertop Lavatory (American Standard Cadet™ Oval)	584.92	85.64
22 42 16 13-0013	EA	19" x 16" Enameled Cast Iron Countertop Lavatory (Kohler® Farmington™)	619.04	85.64
22 42 16 13-0014	EA	19" x 16" Enameled Cast Iron Countertop Lavatory (Kohler® Ellington™)	655.45	85.64
22 42 16 13-0015	EA	24" x 18" Enameled Cast Iron Countertop Lavatory (Kohler® Thoreau®)	854.96	92.51

22 42 16 13-0016

Undermount Lavatories (22 42 16 13-0001)

22 42 16 13-0017	EA	15" x 12" Vitreous China Undermount Lavatory (American Standard Ovalyn™)	534.32	85.64
22 42 16 13-0018	EA	17" x 14" Vitreous China Undermount Lavatory (American Standard Ovalyn™)	507.04	85.64
22 42 16 13-0019	EA	19" x 16" Vitreous China Undermount Lavatory (American Standard Ovalyn™)	507.04	85.64
22 42 16 13-0020	EA	21" x 17" Vitreous China Undermount Lavatory (American Standard Ovalyn™)	540.20	85.64
22 42 16 13-0021	EA	15" x 12" Oval Vitreous China Undermount Lavatory (Kohler® Caxton®)	522.32	85.64
22 42 16 13-0022	EA	17" x 14" Oval Vitreous China Undermount Lavatory (Kohler® Caxton®)	517.30	85.64
22 42 16 13-0023	EA	19" x 15" Oval Vitreous China Undermount Lavatory (Kohler® Caxton®)	522.42	85.64
22 42 16 13-0024	EA	18" x 12" Rectangular Vitreous China Undermount Lavatory (Kohler® Ladena®)	635.34	85.64
22 42 16 13-0025	EA	21" x 14" Rectangular Vitreous China Undermount Lavatory (Kohler® Ladena®)	635.34	85.64

22 42 16 13-0026

Pedestal Lavatories (22 42 16 13-0001)

22 42 16 13-0027	EA	19" x 24" x 35" High Vitreous China Pedestal Sink (American Standard Cadet™)	691.54	203.53
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22 42 16 13-0028

Cultured Marble Vanity Tops (22 42 16 13-0001)

Note: Includes predrilled holes for faucet.

22 42 16 13-0029	EA	25" x 19" Cultured Marble Vanity Top With Integrated Backsplash And Sink	409.78	79.30
22 42 16 13-0030	EA	31" x 19" Cultured Marble Vanity Top With Integrated Backsplash And Sink	461.43	84.58
22 42 16 13-0031	EA	37" x 19" Cultured Marble Vanity Top With Integrated Backsplash And Sink	554.73	89.87
22 42 16 13-0032	EA	49" x 19" Cultured Marble Vanity Top With Integrated Backsplash And Sink	758.89	95.16
22 42 16 13-0033	EA	25" x 22" Cultured Marble Vanity Top With Integrated Backsplash And Sink	440.04	79.30
22 42 16 13-0034	EA	31" x 22" Cultured Marble Vanity Top With Integrated Backsplash And Sink	469.95	84.58
22 42 16 13-0035	EA	37" x 22" Cultured Marble Vanity Top With Integrated Backsplash And Sink	605.08	89.87
22 42 16 13-0036	EA	43" x 22" Cultured Marble Vanity Top With Integrated Backsplash And Sink	658.85	92.51
22 42 16 13-0037	EA	49" x 22" Cultured Marble Vanity Top With Integrated Backsplash And Sink	737.60	95.16

22 42 16 13-0038

Quartz Vanity Tops (22 42 16 13-0001)

Note: Includes predrilled holes for faucet.

22 42 16 13-0039	EA	25" x 22" Quartz Vanity Top With Integrated Backsplash And Sink	805.98	79.30
22 42 16 13-0040	EA	31" x 22" Quartz Vanity Top With Integrated Backsplash And Sink	839.75	84.58
22 42 16 13-0041	EA	37" x 22" Quartz Vanity Top With Integrated Backsplash And Sink	960.68	89.87
22 42 16 13-0042	EA	43" x 22" Quartz Vanity Top With Integrated Backsplash And Sink	967.55	92.51
22 42 16 13-0043	EA	49" x 22" Quartz Vanity Top With Integrated Backsplash And Sink	1,053.00	95.16
22 42 16 13-0044	EA	61" x 22" Quartz Vanity Top With Integrated Backsplash And Two Sinks	1,399.13	100.44
22 42 16 13-0045	EA	73" x 22" Quartz Vanity Top With Integrated Backsplash And Two Sinks	1,645.92	105.72
22 42 16 13-0046	EA	22" End Splash For Quartz Vanity Tops	44.29	

22 42 16 13-0047

Solid Surface Vanity Tops (22 42 16 13-0001)

Note: Includes predrilled holes for faucet.

22 42 16 13-0048	EA	25" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	681.00	79.30
22 42 16 13-0049	EA	31" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	761.01	84.58
22 42 16 13-0050	EA	37" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	851.73	89.87
22 42 16 13-0051	EA	43" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	934.47	92.51
22 42 16 13-0052	EA	49" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	1,010.14	95.16
22 42 16 13-0053	EA	55" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	1,109.82	97.80
22 42 16 13-0054	EA	61" x 22" Solid Surface Vanity Top With Integrated Backsplash And Sink	1,232.11	100.44
22 42 16 13-0055	EA	61" x 22" Solid Surface Vanity Top With Integrated Backsplash And Two Sinks	1,262.46	100.44
22 42 16 13-0056	EA	73" x 22" Solid Surface Vanity Top With Integrated Backsplash And Two Sinks	1,360.28	105.72
22 42 16 13-0057	EA	22" End Splash For Solid Surface Vanity Tops	65.60	



Plumbing	22	22
Plumbing Fixtures	22 40	
Commercial Plumbing Fixtures	22 42	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 16 13-0058 Solid Surface Multi-Station Lavatory Systems <small>(22 42 16 13-0001)</small>		
<small>Note: ADA compliant. Includes integral faucets.</small>		
22 42 16 13-0059 EA 2 Station, Solid Surface Multi-Station Lavatory System With Integral Sprayheads And Infrared Controls (Bradley MG-2)	6,790.44	152.88
<i>For Integral Liquid Soap Dispenser, Add</i>	171.00	
<i>For Integral Photovoltaic Power Panels, Add</i>	563.00	
22 42 16 13-0060 EA 3 Station, Solid Surface Multi-Station Lavatory System With Integral Sprayheads And Infrared Controls (Bradley MG-3)	9,973.38	152.88
<i>For Integral Liquid Soap Dispenser, Add</i>	171.00	
<i>For Integral Photovoltaic Power Panels, Add</i>	657.00	
22 42 16 13-0061 EA 12" Length, Solid Surface Countertop Extension (Bradley MG-EXT-12)	453.15	50.96
22 42 16 13-0062 EA 18" Length, Solid Surface Countertop Extension (Bradley MG-EXT-18)	564.20	50.96
22 42 16 13-0063 EA 36" Length, Solid Surface Countertop Extension (Bradley MG-EXT-36)	1,129.79	50.96
22 42 16 13-0064 Stainless Steel Lavatories <small>(22 42 16 13-0001)</small>		
22 42 16 13-0065 EA 18" x 15" Wall Mounted Lavatory, Stainless Steel (Acorn 1950-1)	1,698.45	185.04
22 42 16 13-0066 Lavatory Carriers <small>(22 42 16 13)</small>		
22 42 16 13-0067 Floor Mounted, Lavatory Carriers <small>(22 42 16 13-0066)</small>		
22 42 16 13-0068 Floor Mounted Plate Type, Lavatory Carriers <small>(22 42 16 13-0067)</small>		
<small>Note: Includes adjustable supporting rods, structural uprights and welded feet.</small>		
22 42 16 13-0069 EA Floor Mounted Hanger Plate Type, Single Lavatory Carrier	581.55	40.18
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>	24.54	
<i>For Valve Plate For Attaching To Upright, Add</i>	87.07	
<i>For Corner Carrier, Add</i>	169.46	
22 42 16 13-0070 EA Floor Mounted Bearing Plate Type, Single Lavatory Carrier	549.26	40.18
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>	24.54	
<i>For Valve Plate For Attaching To Upright, Add</i>	87.07	
22 42 16 13-0071 EA Floor Mounted Hanger Plate Type, Double Lavatory (Back To Back) Carrier	627.57	40.18
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>	49.08	
<i>For Valve Plate For Attaching To Upright, Add</i>	174.12	
22 42 16 13-0072 EA Floor Mounted Bearing Plate Type, Double Lavatory (Back To Back) Carrier	717.57	40.18
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>	49.08	
<i>For Valve Plate For Attaching To Upright, Add</i>	174.12	
22 42 16 13-0073 Floor Mounted, Lavatory Carriers With Arms <small>(22 42 16 13-0067)</small>		
<small>Note: Includes leveling and securing screws, structural uprights and welded feet.</small>		
22 42 16 13-0074 EA Floor Mounted, Single Lavatory Carrier With Concealed Arms	750.05	47.58
<i>For Up To 6-1/2" Extension Sleeves And Hardware, Add</i>	24.54	
<i>For Concealed Arm Carrier For Wheelchair Lavatory, Add</i>	33.90	
<i>For Valve Plate For Attaching To Upright, Add</i>	89.18	
<i>For 2" Chrome Plated Escutcheons, Add</i>	82.98	
<i>For 4" Or 6" Chrome Plated Escutcheons, Add</i>	150.77	
22 42 16 13-0075 EA Floor Mounted, Single Lavatory Carrier With Exposed Acid Resistant White Coated Arms	863.78	47.58
<i>For Up To 4-1/2" Extension Sleeves And Hardware, Add</i>	24.54	
<i>For Vandal Proof Trim, Add</i>	66.63	
<i>For Valve Plate For Attaching To Upright, Add</i>	89.18	
<i>For Heavy Duty Carrier, Add</i>	85.32	
22 42 16 13-0076 EA Floor Mounted, Double Lavatory (Back To Back) Carrier With Concealed Arms	1,006.86	47.58
<i>For Up To 6-1/2" Extension Sleeves And Hardware, Add</i>	49.08	
<i>For Concealed Arm Carrier For Wheelchair Lavatory, Add</i>	67.80	
<i>For Valve Plate For Attaching To Upright, Add</i>	178.35	
<i>For 2" Chrome Plated Escutcheons, Add</i>	165.97	
<i>For 4" Or 6" Chrome Plated Escutcheons, Add</i>	301.55	
22 42 16 13-0077 EA Floor Mounted, Double Lavatory (Back To Back) Carrier With Exposed Acid Resistant White Coated Arms	1,274.04	47.58
<i>For Up To 4-1/2" Extension Sleeves And Hardware, Add</i>	49.08	
<i>For Vandal Proof Trim, Add</i>	133.26	
<i>For Valve Plate For Attaching To Upright, Add</i>	178.35	
<i>For Heavy Duty Carrier, Add</i>	170.64	
22 42 16 13-0078 Wall Mounted, Lavatory Carriers <small>(22 42 16 13-0066)</small>		
22 42 16 13-0079 Wall Mounted Plate Type, Lavatory Carriers <small>(22 42 16 13-0078)</small>		
<small>Note: Includes wall plate and adjustable supporting rods.</small>		
22 42 16 13-0080 EA Wall Mounted Hanger Plate Type, Single Lavatory Carrier	227.84	40.18
<i>For Double Plate Carrier, Add</i>	67.48	
22 42 16 13-0081 Wall Mounted Plate Type, Lavatory Carriers With Arms <small>(22 42 16 13-0078)</small>		
<small>Note: Includes wall plate and leveling and securing screws.</small>		
22 42 16 13-0082 EA Wall Mounted Fixed Steel Plate Type, Single Lavatory Carrier With Concealed Arms	376.40	47.58
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>	24.54	
<i>For 2" Chrome Plated Escutcheons, Add</i>	82.98	
22 42 16 13-0083 EA Wall Mounted Adjustable Plate Type, Single Lavatory Carrier With Concealed Arms	441.85	47.58
<i>For Movable Mounting Brackets, Deduct</i>	-63.12	
<i>For Up To 4" Extension Sleeves And Hardware, Add</i>	24.54	
<i>For 2" Chrome Plated Escutcheons, Add</i>	82.98	
<i>For 4" Or 6" Chrome Plated Escutcheons, Add</i>	150.77	

22 Plumbing**22 40 Plumbing Fixtures****22 42 Commercial Plumbing Fixtures**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 42 16 13-0084	EA	Wall Mounted Adjustable Plate Type, Single Lavatory Carrier With Exposed Acid Resistant White Coated Arms.....	644.05	47.58
		<i>For Up To 4-1/2" Extension Sleeves And Hardware, Add</i>	24.54	
		<i>For Vandal Proof Trim, Add</i>	66.63	
22 42 16 13-0085		Removal And Reinstallation Of Lavatory And Trim (22 42 16 13)		
		Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.		
22 42 16 13-0086	EA	Removal And Reinstallation Of Wall Hung Lavatory With Faucet.....	310.98	
22 42 16 16		Commercial Sinks (22 42 16)		
22 42 16 16-0001		Sinks (22 42 16 16)		
		Note: Includes drain, trap and supply valves. Excludes faucets.		
22 42 16 16-0002		Kitchen Sinks (22 42 16 16-0001)		
22 42 16 16-0003	EA	25" x 22" x 8-3/4" Enameled Cast Iron Kitchen Sink, Single Bowl (Kohler® Mayfield®).....	737.49	99.39
22 42 16 16-0004	EA	22" x 33" x 9-5/8" Enameled Cast Iron Kitchen Sink, Double Bowl (Kohler® Brookfield®).....	947.25	113.14
22 42 16 16-0005	EA	15" x 17" x 7-1/4" Stainless Steel Kitchen Sink, Single Bowl, 20 Gauge (Elkay PSR1517).....	913.78	97.28
		<i>For 18 Gauge, Add</i>	258.64	
22 42 16 16-0006	EA	17" x 22" x 7-1/4" Stainless Steel Kitchen Sink, Single Bowl, 20 Gauge (Elkay PSR1722).....	936.52	97.28
		<i>For 18 Gauge, Add</i>	270.01	
22 42 16 16-0007	EA	22" x 22" x 7-1/4" Stainless Steel Kitchen Sink, Single Bowl, 20 Gauge (Elkay PSR2222).....	987.69	97.28
		<i>For 18 Gauge, Add</i>	295.60	
22 42 16 16-0008	EA	25" x 22" x 7-1/2" Stainless Steel Kitchen Sink, Single Bowl, 20 Gauge (Elkay PSR2522).....	1,034.48	99.39
		<i>For 18 Gauge, Add</i>	312.65	
22 42 16 16-0009	EA	31" x 22" x 7-1/4" Stainless Steel Kitchen Sink, Single Bowl, 20 Gauge (Elkay PSR3122).....	1,298.45	113.14
		<i>For 18 Gauge, Add</i>	424.45	
22 42 16 16-0010	EA	33" x 21" x 7-1/2" Stainless Steel Kitchen Sink, Double Bowl, 20 Gauge (Elkay PSR3321).....	1,325.90	113.14
		<i>For 18 Gauge, Add</i>	437.99	
22 42 16 16-0011	EA	15" x 17" x 10" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay DLR151710).....	1,282.35	97.28
22 42 16 16-0012	EA	17" x 22" x 10" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay DLR172210).....	1,307.93	97.28
22 42 16 16-0013	EA	22" x 22" x 10" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay DLR222210).....	1,372.36	97.28
22 42 16 16-0014	EA	25" x 22" x 10" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay DLR252210).....	1,459.89	99.39
22 42 16 16-0015	EA	31" x 22" x 11-1/2" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay DLR312210).....	1,761.76	113.14
22 42 16 16-0016	EA	33" x 22" x 8" Stainless Steel Kitchen Sink, Double Bowl, 20 Gauge (Elkay LR3322).....	2,182.75	113.14
		<i>For 18 Gauge, Add</i>	866.41	
22 42 16 16-0017		Undermount Kitchen Sinks (22 42 16 16-0001)		
22 42 16 16-0018	EA	21" x 15" x 7-1/2" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay ELU2115) With Strainer (Elkay LK99).....	1,145.84	97.28
22 42 16 16-0019	EA	21" x 15" x 10" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay ELU211510) With Strainer (Elkay LK99).....	1,143.07	97.28
22 42 16 16-0020	EA	21" x 15" x 7-1/2" Stainless Steel Kitchen Sink With Cutting Board, Single Bowl, 18 Gauge (Elkay ELUH2115) With Strainer (Elkay LK99).....	1,155.31	97.28
22 42 16 16-0021	EA	21" x 15" x 10" Stainless Steel Kitchen Sink With Cutting Board, Single Bowl, 18 Gauge (Elkay ELUH211510) With Strainer (Elkay LK99).....	1,219.74	97.28
22 42 16 16-0022	EA	21" x 15-3/4" x 4-3/8" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay ELUHAD2115) With Strainer (Elkay LK99).....	1,179.00	97.28
		Note: Available in 4-1/2", 5, or 5-1/2" depths.		
22 42 16 16-0023	EA	25" x 20-1/2" x 7-7/8" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay ELUHF2520) With Strainer (Elkay LK99).....	1,344.13	97.28
22 42 16 16-0024	EA	32" x 20-1/2" x 7-7/8" Stainless Steel Kitchen Sink, Single Bowl, 18 Gauge (Elkay ELUHF3320) With Strainer (Elkay LK99).....	1,591.02	97.28
22 42 16 16-0025	EA	21" x 18" x 5-1/2" Deep, Single Compartment Stainless Steel Sink, Undermount, 18 Gauge (Just Manufacturing Co. US-ADA-1821-A).....	940.53	97.28
22 42 16 16-0026	EA	32" x 18" x 5-1/2" Deep, Two Compartment Stainless Steel Sink, Undermount, 18 Gauge (Just Manufacturing Co. UD-ADA-1832-A).....	1,217.75	97.28
22 42 16 16-0027		Multi-Station Wash Sink, Wall Mounted (22 42 16 16-0001)		
		Note: Includes concealed wall hanger, soap dish(s), strainer, supply lines and P-Trap. Excludes faucets.		
22 42 16 16-0028	EA	36" Wide, 2 Station Enameled Cast Iron Multi-Station Wash Sink (Kohler® Brockway™).....	1,943.99	171.82
		Note: Excludes faucets.		
22 42 16 16-0029	EA	48" Wide, 2 Station Enameled Cast Iron Multi-Station Wash Sink (Kohler® Brockway™).....	2,567.84	185.04
		Note: Excludes faucets.		
22 42 16 16-0030	EA	60" Wide, 3 Station Enameled Cast Iron Multi-Station Wash Sink (Kohler® Brockway™).....	2,940.74	198.25
		Note: Excludes faucets.		
22 42 16 16-0031	EA	48" Wide, 2 Station Stainless Steel Multi-Station Wash Sink (Bradley 6951).....	2,343.35	132.17
		Note: Excludes faucets.		
22 42 16 16-0032	EA	62" Wide, 3 Station Stainless Steel Multi-Station Wash Sink (Bradley 6951).....	2,599.00	145.38
		Note: Excludes faucets.		
22 42 16 16-0033	EA	80" Wide, 4 Station Stainless Steel Multi-Station Wash Sink (Bradley 6951).....	2,849.57	158.60
		Note: Excludes faucets.		
22 42 16 16-0034	EA	102" Wide, 5 Station Stainless Steel Multi-Station Wash Sink (Bradley 6951).....	3,159.66	178.43
		Note: Excludes faucets.		
22 42 16 16-0035	EA	27" Diameter, 2 Person, Stainless Steel, Sensor Operated Compact Wash Fountain.....	3,020.81	290.77
		Note: Includes sensor operated spray heads.		
22 42 16 16-0036		Utility Or Laundry Sinks (22 42 16 16-0001)		
22 42 16 16-0037	EA	23" x 21" Molded Stone Single Laundry Sink, Floor Mounted With Enamel Steel Legs (Fiat Products FL-1).....	678.96	113.14



Plumbing	22	22
Plumbing Fixtures	22 40	
Commercial Plumbing Fixtures	22 42	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 16 16-0038	EA		40" x 24" Molded Stone Double Laundry Sink, Floor Mounted With Enamel Steel Legs (Fiat Products FLTD-II).....	776.64	113.14
22 42 16 16-0039	EA		22" x 17" Molded Stone Single Laundry Sink, Drop-In (Fiat Products DL1).....	677.03	113.14
22 42 16 16-0040	EA		24" x 21" Enameled Cast Iron Single Laundry Sink, Floor Mounted With Metal Stand (Eljer 222-2210).....	1,022.25	113.14
22 42 16 16-0041	EA		48" x 21" Enameled Cast Iron Double Laundry Sink, Floor Mounted With Metal Stand (Eljer 222-2220).....	1,439.60	126.88
22 42 16 16-0042			Refinish Sink/Lavatory (22 42 16 16-0001)		
22 42 16 16-0043	EA		Refinish Sink/Lavatory.....	244.22	
22 42 16 16-0044			Service Sinks (22 42 16 16-0001)		
22 42 16 16-0045	EA		22" x 18" Enameled Cast Iron Wall Mount Service Sink With Stainless Steel Rim Guard, Trap Standard (American Standard Lakewell™).....	1,078.00	170.23
22 42 16 16-0046	EA		24" x 20" Enameled Cast Iron Wall Mount Service Sink With Stainless Steel Rim Guard, Trap Standard (American Standard Akron™).....	1,131.28	170.23
22 42 16 16-0047	EA		28" x 28" Enameled Cast Iron Floor Type Corner Service Sink With Removable Vinyl Coated Rim Guard (American Standard Florwell™).....	1,393.20	225.21
22 42 16 16-0048	EA		12" x 12" x 10" Cast Iron Floor Sink With Dome Strainer And Full Grate (Zurn FD2377-PO3-F).....	589.16	158.60
22 42 16 16-0049	EA		24" x 24" x 10" Plastic Composite Mop Service Sink With Combination Dome Strainer And Stainless Steel Lint Basket (Fiat Products MSB2424).....	674.22	158.60
22 42 16 16-0050	EA		36" x 24" x 10" Plastic Composite Mop Service Sink With Combination Dome Strainer And Stainless Steel Lint Basket (Fiat Products MSB3624).....	742.44	190.31
22 42 16 16-0051	EA		24" x 24" x 10" Molded Stone Mop Service Sink With Strainer (Swanstone MS-2424-010).....	607.67	158.60
22 42 16 16-0052	EA		36" x 24" x 10" Molded Stone Mop Service Sink With Strainer (Swanstone MS-2436-010).....	691.21	190.31
22 42 16 16-0053	EA		24" x 24" x 12" Terrazzo Mop Service Sink With Strainer (Acorn TSH-24).....	978.37	158.60
22 42 16 16-0054	EA		36" x 24" x 12" Terrazzo Mop Service Sink With Strainer (Acorn TSH-3624).....	1,208.32	190.31
22 42 16 16-0055			Stainless Steel Sink And Drainboard (22 42 16 16-0001)		
22 42 16 16-0056	EA		Stainless Steel Sink With One 24" x 24" x 14" Depth Compartment And Drainboard, 14 Gauge Stainless Steel With Tubular Adjustable Legs (Advance Tabco 94-41-24-24L).....	4,433.52	264.33
22 42 16 16-0057			Sink Carriers (22 42 16 16)		
22 42 16 16-0058			Floor Mounted, Sink Carriers (22 42 16 16-0057)		
			Note: With support plates, adjustable coupling with 4" piping connection, mounting studs, structural uprights, welded feet and chrome plated trim.		
22 42 16 16-0059	EA		Floor Mounted Heavy Duty Support Plate Type, Single Sink Carrier With 4" Adjustable Coupling.....	855.20	40.18
			For Vandal Proof Trim, Add	66.63	
			For Valve Plate For Attaching To Upright, Add	87.07	
22 42 16 16-0060	EA		Floor Mounted Heavy Duty Support Plate Type, Single Sink Carrier With 4" Adjustable Coupling And 4" x 2" Waste Fitting.....	1,133.66	40.18
			For Vandal Proof Trim, Add	66.63	
			For Auxiliary Vent, Add	198.12	
22 42 16 16-0061	EA		Floor Mounted Heavy Duty Support Plate Type, Single Sink Carrier With Exposed Acid Resistant White Coated Arms.....	1,418.86	40.18
			For Up To 4" Extension Sleeves And Hardware, Add	50.26	
			For Vandal Proof Trim, Add	66.63	
22 42 16 16-0062			Removal And Reinstallation Of Sink And Trim (22 42 16 16)		
			Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.		
22 42 16 16-0063	EA		Removal And Reinstallation Of Wall Hung Service Sink With Faucet.....	426.35	
22 42 16 16-0064			Portable Sinks (22 42 16 16)		
22 42 16 16-0065	EA		62" Height x 30" Width x 27-3/8" Deep, Portable Hand Sink, Cold Water (Crown Verity CV-PHS-5C).....	2,249.85	
			Note: Includes polyethylene construction, (1) 18" wide x 13" front-to-back x 6" deep bowl, lockable access door, (1) 5 gallon (20 liter) removable fresh water tank, (1) 7.5 gallon (30 liter) removable waste water tank, hands free mechanical foot pump, backsplash with soap and towel dispensers, ability to connect directly to city water and drain hookups.		
22 42 19 Commercial Bathtubs (22 42)					
22 42 19 00-0001			Recessed Alcove Bathtubs (22 42 19)		
22 42 19 00-0002			Porcelain Enameled Cast Iron, Recessed Alcove Bathtubs (22 42 19 00-0001)		
22 42 19 00-0003	EA		54" x 30-1/4" x 14", Porcelain Enameled Cast Iron, Recessed Alcove Bathtub (Kohler® Seaforth™).....	1,495.34	293.94
22 42 19 00-0004	EA		60" x 32" x 16-1/4", Porcelain Enameled Cast Iron, Recessed Alcove Bathtub (Kohler® Mendota®).....	1,285.54	293.94
22 42 19 00-0005	EA		60" x 32" x 16-1/4", Porcelain Enameled Cast Iron, Recessed Alcove Bathtub (Kohler® Dynamic®).....	1,500.61	293.94
22 42 19 00-0006	EA		66" x 32" x 17", Porcelain Enameled Cast Iron, Recessed Alcove Bathtub (Kohler® Bellwether®).....	1,922.56	293.94
22 42 19 00-0007			Porcelain Enameled Steel, Recessed Alcove Bathtubs (22 42 19 00-0001)		
22 42 19 00-0008	EA		60" x 30" x 14-1/4", Porcelain Enameled Steel, Recessed Alcove Bathtub (American Standard New Salem®).....	679.44	293.94
22 42 19 00-0009	EA		60" x 30" x 16-5/8", Porcelain Enameled Steel, Recessed Alcove Bathtub (American Standard New Solar®).....	694.46	293.94
22 42 19 00-0010			Porcelain Finished Metal Alloy, Recessed Alcove Bathtubs (22 42 19 00-0001)		
22 42 19 00-0011	EA		60" x 32" x 17-3/4", Porcelain Finished Metal Alloy, Recessed Alcove Bathtub (American Standard Cambridge™).....	990.23	293.94

MINOR
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TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 42 19 00-0012	Acrylic, Recessed Alcove Bathtubs (22 42 19 00-0001)		
22 42 19 00-0013	EA 60" x 32" x 19", Acrylic, Recessed Alcove Bathtub (Kohler® Archer®)	1,018.64	293.94
22 42 19 00-0014	EA 60" x 36" x 20", Acrylic, Recessed Alcove Bathtub (Kohler® Mariposa®)	1,200.28	293.94
22 42 19 00-0015	EA 66" x 36" x 20", Acrylic, Recessed Alcove Bathtub (Kohler® Mariposa®)	1,223.74	293.94
22 42 19 00-0016	EA 72" x 36" x 20", Acrylic, Recessed Alcove Bathtub (Kohler® Mariposa®)	1,209.32	293.94
22 42 19 00-0017	EA 72" x 42" x 21", Acrylic, Recessed Alcove Bathtub (Kohler® Windward®)	1,261.19	293.94
22 42 19 00-0018	Bathtub Refinishing (22 42 19 00-0001)		
22 42 19 00-0019	EA Refinish Porcelain Finished Bathtub With Acrylic Urethane Enamel.....	628.11	
22 42 19 00-0020	Tub And Shower Combinations (22 42 19)		
22 42 19 00-0021	Acrylic Tub And Shower Combination (22 42 19 00-0020)		
22 42 19 00-0022	EA 1 Piece, 60" x 32" x 72" Acrylic Tub And Shower (Delta 226032).....	1,282.58	110.07
	For 2 Piece Enclosure, Deduct	-278.60	
22 42 19 00-0023	Fiberglass Tub And Shower Combination (22 42 19 00-0020)		
22 42 19 00-0024	EA 1 Piece 60" x 32" x 72" Fiberglass Tub And Shower (Aquatic 2603-SG).....	855.00	110.07
22 42 19 00-0025	EA 2 Piece 60" x 30" x 72" Fiberglass Tub And Shower (Aquatic 2603-2P).....	674.74	73.38
22 42 19 00-0026	EA 4 Piece 60" x 32" x 75-1/2" Fiberglass Tub And Shower (Aquatic 26030-4P).....	1,352.46	166.14
22 42 19 00-0027	EA 3 Piece Tub/Shower Surrounds, 32" x 72" Side Walls, 48" x 72" Back, (Swanstone SK-324872).....	3,464.81	341.93
	For 2 Piece Enclosure, Deduct	-718.87	
22 42 23	Commercial Showers (22 42)		
22 42 23 00-0001	Shower Enclosures (22 42 23)		
	Note: Includes precast concrete receptors. Excludes plumbing hook-up and door or curtain.		
22 42 23 00-0002	Powder Coated Or Baked Enamel Steel Shower Enclosure (22 42 23 00-0001)		
22 42 23 00-0003	EA 32" x 32" x 82" Baked Enamel Steel Shower Enclosure (General Partitions)	1,727.62	170.54
22 42 23 00-0004	EA 36" x 36" x 82" Baked Enamel Steel Shower Enclosure (General Partitions)	1,727.62	170.54
22 42 23 00-0005	EA 40" x 40" x 82" Baked Enamel Steel Shower Enclosure (General Partitions)	2,615.01	170.54
22 42 23 00-0006	EA 40" x 48" x 82" Handicapped, Baked Enamel Steel Shower Enclosure (General Partitions)	2,878.45	170.54
22 42 23 00-0007	Solid Plastic Core High Density Polymer (HDP) Shower Enclosure (22 42 23 00-0001)		
22 42 23 00-0008	EA 32" x 32" x 82" Single Opening Solid Plastic Shower Enclosure (General Partitions).....	2,850.72	170.54
22 42 23 00-0009	EA 36" x 36" x 82" Single Opening Solid Plastic Shower Enclosure (General Partitions).....	2,850.72	170.54
22 42 23 00-0010	EA 40" x 40" x 82" Single Opening Solid Plastic Shower Enclosure (General Partitions).....	4,098.60	170.54
22 42 23 00-0011	EA 40" x 48" x 82" Handicapped, Solid Plastic Shower Enclosure (General Partitions).....	4,583.89	170.54
22 42 23 00-0012	Composite Fiberglass Shower Enclosure, 4 Piece Knock-Down (22 42 23 00-0001)		
22 42 23 00-0013	EA 32" x 32" x 76" Composite Shower Enclosure, 4 Piece (Aquatic 3232CS)	1,444.91	170.54
22 42 23 00-0014	EA 36" x 36" x 76" Composite Shower Enclosure, 4 Piece (Aquatic 3636CS)	1,486.57	170.54
22 42 23 00-0015	EA 34" x 48" x 76" Composite Shower Enclosure, 4 Piece (Aquatic 4834CS)	1,526.83	170.54
22 42 23 00-0016	EA 30" x 60" x 76" Composite Shower Enclosure, 4 Piece (Aquatic 6030CSL)	1,608.74	170.54
22 42 23 00-0017	EA 34" x 60" x 76" Composite Shower Enclosure, 4 Piece (Aquatic 6034CS)	1,717.28	170.54
22 42 23 00-0018	1 Piece Shower Units (22 42 23)		
22 42 23 00-0019	EA 1 Piece, 32" x 32" x 73" Fiberglass Shower With Drain (Swanstone FS03232).....	1,240.38	110.07
22 42 23 00-0020	EA 1 Piece, 36" x 36" x 73" Fiberglass Shower With Drain (Swanstone FS03636).....	1,390.77	110.07
22 42 23 00-0021	Personnel Type Shower Receptors (22 42 23)		
22 42 23 00-0022	Acrylic Shower Receptors (22 42 23 00-0021)		
22 42 23 00-0023	EA 36" x 36" Acrylic Shower Receptor	460.16	43.06
22 42 23 00-0024	EA 42" x 42" Acrylic Shower Receptor	486.57	43.06
22 42 23 00-0025	EA 48" x 48" Acrylic Shower Receptor	539.30	43.06
22 42 23 00-0026	EA 60" x 60" Acrylic Shower Receptor	655.93	51.67
22 42 23 00-0027	EA 48" x 32" Acrylic Shower Receptor	461.40	43.06
22 42 23 00-0028	EA 48" x 36" Acrylic Shower Receptor	496.13	43.06
22 42 23 00-0029	EA 48" x 42" Acrylic Shower Receptor	560.74	43.06
22 42 23 00-0030	EA 60" x 32" Acrylic Shower Receptor	623.06	51.67
22 42 23 00-0031	EA 60" x 36" Acrylic Shower Receptor	627.53	51.67
22 42 23 00-0032	EA 60" x 42" Acrylic Shower Receptor	631.63	51.67
22 42 23 00-0033	EA 60" x 48" Acrylic Shower Receptor	695.83	51.67
22 42 23 00-0034	EA 36" x 36" Acrylic Corner Shower Receptor	671.83	43.06
22 42 23 00-0035	EA 42" x 42" Acrylic Corner Shower Receptor	771.50	43.06
22 42 23 00-0036	Molded Stone Shower Receptors (22 42 23 00-0021)		
22 42 23 00-0037	EA 32" x 32" Molded Stone Shower Receptor (Fiat 32WL).....	306.60	43.06

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 23 00-0038 EA 34" x 34" Molded Stone Shower Receptor (Fiat 34WL)	321.50	43.06
22 42 23 00-0039 EA 36" x 36" Molded Stone Shower Receptor (Fiat 36WL)	323.16	43.06
22 42 23 00-0040 EA 42" x 42" Molded Stone Shower Receptor (Fiat 4242WL)	396.83	43.06
22 42 23 00-0041 EA 42" x 34" Molded Stone Shower Receptor (Fiat 42WL)	352.13	43.06
22 42 23 00-0042 EA 48" x 32" Molded Stone Shower Receptor (Fiat 4832WL)	372.83	43.06
22 42 23 00-0043 EA 48" x 34" Molded Stone Shower Receptor (Fiat 48WL)	375.31	43.06
22 42 23 00-0044 EA 54" x 34" Molded Stone Shower Receptor (Fiat 54WL)	434.65	51.67
22 42 23 00-0045 EA 60" x 34" Molded Stone Shower Receptor (Fiat 60WL)	450.38	51.67
22 42 23 00-0046 EA 36" x 36" Molded Stone Corner Shower Receptor (Fiat 36WLC)	356.27	43.06
22 42 23 00-0047 EA 38" x 38" Molded Stone Corner Shower Receptor (Fiat 38WLC)	365.38	43.06
22 42 23 00-0048 Precast Terrazzo Shower Receptors (22 42 23 00-0021)		
22 42 23 00-0049 EA 30" x 30" Precast Terrazzo Shower Receptor.....	576.47	43.06
22 42 23 00-0050 EA 32" x 32" Precast Terrazzo Shower Receptor.....	598.82	43.06
22 42 23 00-0051 EA 34" x 34" Precast Terrazzo Shower Receptor.....	619.52	43.06
22 42 23 00-0052 EA 36" x 36" Precast Terrazzo Shower Receptor.....	622.00	43.06
22 42 23 00-0053 EA 40" x 40" Precast Terrazzo Shower Receptor.....	680.78	43.06
22 42 23 00-0054 EA 42" x 42" Precast Terrazzo Shower Receptor.....	710.58	43.06
22 42 23 00-0055 EA 48" x 48" Precast Terrazzo Shower Receptor.....	998.66	43.06
22 42 23 00-0056 EA 36" x 32" Precast Terrazzo Shower Receptor.....	614.55	43.06
22 42 23 00-0057 EA 42" x 32" Precast Terrazzo Shower Receptor.....	626.42	43.06
22 42 23 00-0058 EA 42" x 34" Precast Terrazzo Shower Receptor.....	647.66	43.06
22 42 23 00-0059 EA 42" x 36" Precast Terrazzo Shower Receptor.....	674.15	43.06
22 42 23 00-0060 EA 32" x 48" Precast Terrazzo Shower Receptor.....	676.64	43.06
22 42 23 00-0061 EA 48" x 34" Precast Terrazzo Shower Receptor.....	710.58	43.06
22 42 23 00-0062 EA 54" x 32" Precast Terrazzo Shower Receptor.....	744.52	43.06
22 42 23 00-0063 EA 60" x 30" Precast Terrazzo Shower Receptor.....	1,006.37	51.67
22 42 23 00-0064 EA 60" x 32" Precast Terrazzo Shower Receptor.....	1,100.30	51.67
22 42 23 00-0065 EA 60" x 34" Precast Terrazzo Shower Receptor.....	1,104.91	51.67
22 42 23 00-0066 EA 60" x 36" Precast Terrazzo Shower Receptor.....	1,109.49	51.67
22 42 23 00-0067 EA 32" x 32" Precast Terrazzo Corner Shower Receptor.....	625.31	43.06
22 42 23 00-0068 EA 34" x 34" Precast Terrazzo Corner Shower Receptor.....	626.42	43.06
22 42 23 00-0069 EA 36" x 36" Precast Terrazzo Corner Shower Receptor.....	628.62	43.06
22 42 23 00-0070 EA 40" x 40" Precast Terrazzo Corner Shower Receptor.....	753.62	43.06
22 42 23 00-0071 EA 36" x 36", ADA Wheelchair Accessible, Precast Terrazzo Shower Receptor	1,370.35	43.06
22 42 23 00-0072 EA 60" x 30", ADA Wheelchair Accessible, Precast Terrazzo Shower Receptor	1,525.72	51.67
22 42 23 00-0073 EA 60" x 36", ADA Wheelchair Accessible, Precast Terrazzo Shower Receptor	1,590.29	51.67
22 42 23 00-0074 Shower Receptors Accessories (22 42 23 00-0021)		
22 42 23 00-0075 SF Polyvinyl Chloride (PVC) Shower Pan Liner	3.85	
22 42 23 00-0076 Removal And Reinstallation Of Fixtures And Trim (22 42 23)		
Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.		
22 42 23 00-0077 EA Removal And Reinstallation Of Shower Head	51.67	
22 42 26 Commercial Disposers (22 42)		
See CSI section 22 41 26 00-0001 for disposals.		
22 42 33 Wash Fountains (22 42)		
22 42 33 00-0001 Circular Wash Fountain, Deep Bowl (22 42 33)		
Note: Includes trim and trap. 2" IPS waste outlets foot control/hand control operated.		
22 42 33 00-0002 EA 36" Stainless Steel Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2705F-A-LSD)	9,289.82	178.37
<i>For Metal Soap Dispenser, Add</i>		100.00
<i>For Stainless Steel Pedestal Panels, Add</i>		100.00
22 42 33 00-0003 EA 36" Bradstone® Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2805F-A-LSD)	4,984.13	178.37
<i>For Metal Soap Dispenser, Add</i>		100.00
<i>For Stainless Steel Pedestal Panels, Add</i>		100.00
22 42 33 00-0004 EA 36" Terreon® Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley TDB3105AIRLSDE)	8,613.57	178.37
<i>For Metal Soap Dispenser, Add</i>		100.00
<i>For Stainless Steel Pedestal Panels, Add</i>		100.00
22 42 33 00-0005 EA 54" Stainless Steel Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2708F-A-LSD)	11,843.01	203.84
<i>For Metal Soap Dispenser, Add</i>		100.00
<i>For Stainless Steel Pedestal Panels, Add</i>		100.00
22 42 33 00-0006 EA 54" Bradstone® Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2808F-A-LSD)	5,750.31	203.84
<i>For Metal Soap Dispenser, Add</i>		100.00
<i>For Stainless Steel Pedestal Panels, Add</i>		100.00
22 42 33 00-0007 EA 54" Terreon® Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley TDB3108AIRLSDE)	10,318.59	203.84
<i>For Metal Soap Dispenser, Add</i>		100.00
<i>For Stainless Steel Pedestal Panels, Add</i>		100.00

22 Plumbing**22 40 Plumbing Fixtures****22 42 Commercial Plumbing Fixtures**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 33 00-0008			Semi-Circular Wash Fountain, Deep Bowl (22 42 33) Note: Includes trim and trap. 2" IPS waste outlets foot control/hand control operated.		
22 42 33 00-0009	EA		36" Stainless Steel Semi-Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2703F-A-LSD).....	8,105.63	152.88
			<i>For Metal Soap Dispenser, Add</i>	100.00	
			<i>For Stainless Steel Pedestal Panels, Add</i>	100.00	
22 42 33 00-0010	EA		36" Bradstone® Semi-Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2803F-A-LSD).....	4,548.35	152.88
			<i>For Metal Soap Dispenser, Add</i>	100.00	
			<i>For Stainless Steel Pedestal Panels, Add</i>	100.00	
22 42 33 00-0011	EA		36" Terreon® Semi-Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley TDB3103AIRLSDE).....	6,534.70	152.88
			<i>For Metal Soap Dispenser, Add</i>	100.00	
			<i>For Stainless Steel Pedestal Panels, Add</i>	100.00	
22 42 33 00-0012	EA		54" Stainless Steel Semi-Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2704F-A-LSD).....	9,947.17	178.37
			<i>For Metal Soap Dispenser, Add</i>	100.00	
			<i>For Stainless Steel Pedestal Panels, Add</i>	100.00	
22 42 33 00-0013	EA		54" Bradstone® Semi-Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley WF2804F-A-LSD).....	5,486.98	178.37
			<i>For Metal Soap Dispenser, Add</i>	100.00	
			<i>For Stainless Steel Pedestal Panels, Add</i>	100.00	
22 42 33 00-0014	EA		54" Terreon® Semi-Circular Wash Fountain Including Trim, Trap, 2" IPS Outlet And Foot/Hand Controls (Bradley TDB3104AIRLSDE).....	7,772.80	178.37
			<i>For Metal Soap Dispenser, Add</i>	100.00	
			<i>For Stainless Steel Pedestal Panels, Add</i>	100.00	
22 42 39			Commercial Faucets, Supplies, and Trim (22 42)		
22 42 39 00-0001			Kitchen Faucets (22 42 39)		
22 42 39 00-0002	EA		Top Cast Kitchen Faucet, Single Handle, Chrome Finish (Delta 140-DST).....	218.97	52.87
22 42 39 00-0003	EA		Top Cast Kitchen Faucet With Spray, Single Handle, Chrome Finish (Delta 440-DST).....	248.16	52.87
22 42 39 00-0004	EA		Top Cast Kitchen Faucet, Single Handle, Stainless Steel Finish (Delta 140-SS-DST).....	205.84	52.87
22 42 39 00-0005	EA		Top Cast Kitchen Faucet With Spray, Single Handle, Stainless Steel Finish (Delta 440 -SS-DST).....	232.38	52.87
22 42 39 00-0006	EA		Top Cast Kitchen Faucet, Two Handle, Chrome Finish, 8" Center, Lever Handles (Delta 2102LF-LHP+H24).....	203.55	52.87
22 42 39 00-0007	EA		Top Cast Kitchen Faucet With Spray, Two Handle, Chrome Finish, 8" Center, Lever Handles (Delta 2402LF-LHP+H24).....	224.11	52.87
22 42 39 00-0008	EA		Top Cast Kitchen Faucet, Two Handle, Chrome Finish, Center Gooseneck Faucet, Lever Handles (Delta 21987LF).....	293.44	52.87
22 42 39 00-0009	EA		Top Cast Kitchen Faucet With Spray, Two Handle, Chrome Finish, Center Gooseneck Faucet, Lever Handles (Delta 21996LF).....	206.45	52.87
22 42 39 00-0010	EA		Bottom Mount Kitchen Faucet, Single Handle, Chrome Finish (Delta 101LF-WF).....	198.66	52.87
22 42 39 00-0011	EA		Bottom Mount Kitchen Faucet With Spray, Single Handle, Chrome Finish (Delta 175LF-WF).....	236.72	52.87
22 42 39 00-0012	EA		Bottom Mount Kitchen Faucet, Two Handle, Chrome Finish, Gooseneck Faucet, Lever Handles (Delta 2274-LHP+H24).....	413.03	52.87
22 42 39 00-0013	EA		Bottom Mount Kitchen Faucet With Spray, Two Handle, Chrome Finish, Gooseneck Faucet, Lever Handles (Delta 2276-LHP+H24).....	453.90	52.87
22 42 39 00-0014	EA		Deck Mount Sink Faucet, 8" Center Set, Lever Handles (Chicago Faucet 1100 ABCP).....	426.42	57.41
22 42 39 00-0015	EA		Deck Mount Sink Faucet, 8" Center Set, 4" Wristblade Handles (Chicago Faucet 1100-GN2AE3-317CP).....	424.43	57.41
22 42 39 00-0016	EA		Deck Mount Gooseneck Sink Faucet, 4" Center Set, Blade Handles (Chicago Faucet 802-317CP).....	314.44	57.41
22 42 39 00-0017	EA		Chrome Single Handle Kitchen Faucet With Integrated Spray (Elkay LKGT1041CR).....	739.24	52.87
22 42 39 00-0018	EA		Brushed Nickel Single Handle Kitchen Faucet With Integrated Spray (Elkay LKGT1041NK).....	937.59	52.87
22 42 39 00-0019	EA		Oil Rubbed Bronze Single Handle Kitchen Faucet With Integrated Spray (Elkay LKGT1041RB).....	1,003.71	52.87
22 42 39 00-0020	EA		Chrome Single Handle Kitchen Faucet With Integrated Spray, 1.5 GPM Aerator (Elkay LKLFGT1041CR).....	739.24	52.87
22 42 39 00-0021	EA		Brushed Nickel Single Handle Kitchen Faucet With Integrated Spray, 1.5 GPM Aerator (Elkay LKLFGT1041NK).....	937.59	52.87
22 42 39 00-0022	EA		Oil Rubbed Bronze Single Handle Kitchen Faucet With Integrated Spray, 1.5 GPM Aerator (Elkay LKLFGT1041RB).....	1,003.71	52.87
22 42 39 00-0023	EA		Kitchen Faucet, Single Handle, Chrome Finish (Moen 7425).....	238.55	52.87
22 42 39 00-0024			Lavatory Faucets (22 42 39)		
22 42 39 00-0025	EA		Single Handle Centerset Lavatory Faucet, Polished Chrome Finish (Delta Lahara 538-MPU-DST).....	270.10	38.06
22 42 39 00-0026	EA		4" Centerset Lavatory Faucet With Chrome Lever Handle (Delta 501LF-WF).....	185.65	38.06
22 42 39 00-0027	EA		4" Classic Style Centerset Lavatory Faucet With Chrome Lever Handles (Delta 2523LF-MPU).....	231.85	38.06
22 42 39 00-0028	EA		4" Centerset Lavatory Faucet With Chrome Lever Handles (Delta 2529LF-HDM).....	254.88	38.06
22 42 39 00-0029	EA		Classic Style Widespread Lavatory Faucet With Chrome Lever Handles (Delta 3530LF-MPU).....	314.38	38.06
22 42 39 00-0030	EA		Widespread Lavatory Gooseneck Faucet With Chrome Lever Handles (Delta 3579LF-WFHDF).....	367.22	38.06
22 42 39 00-0031	EA		Self Closing/Metered Faucet, Brass, Single Hole, Push Handle (Delta 86T104).....	221.91	38.06
22 42 39 00-0032	EA		Self Closing/Metered Faucet, Double Hole, Push Handles (American Standard 1340.225.002).....	340.85	38.06
22 42 39 00-0033	EA		Single Inlet, Push Handle Metering Faucet, ADA (Chicago Faucet 333-665).....	244.01	38.06
22 42 39 00-0034	EA		3" Reach, 4-Arm Handle Single Basin Faucet (T&S Brass 0710).....	249.80	38.06
22 42 39 00-0035	EA		3" Reach, Push Handle Self-Closing Valve, Single Basin Metering Faucet (T&S Brass 0712).....	302.87	38.06
22 42 39 00-0036	EA		4" Reach, Push Handle Self-Closing Valve, Single Basin Metering Faucet (T&S Brass 0805).....	296.59	38.06
22 42 39 00-0037	EA		4" Classic Style Centerset Lavatory Faucet With Chrome Lever Handles (Zurn Z81104).....	241.24	38.06
22 42 39 00-0038			Bath And Shower Faucets (22 42 39)		
22 42 39 00-0039			Bath And Shower Faucets With Valve Body (22 42 39 00-0038)		
22 42 39 00-0040	EA		Single Lever Handle, Chrome Tub Filler, Pressure-Balance (American Standard T480 500).....	248.60	45.89
22 42 39 00-0041	EA		Single Lever Handle, Chrome Shower Only, Pressure-Balance (American Standard T480.501).....	292.17	45.89
22 42 39 00-0042	EA		Single Lever Handle, Chrome Shower And Tub Filler, Pressure-Balance (American Standard T480.502).....	320.10	45.89

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 39 00-0043 EA Two Lever Handle, Chrome Tub Filler (American Standard Colony Soft 3275.505).....	229.60	45.89
<i>For Faucet With Metal Cross Handles, Add</i>	45.75	
22 42 39 00-0044 EA Two Lever Handle, Chrome Shower Only (American Standard Colony Soft 3275.501).....	240.78	45.89
<i>For Faucet With Metal Cross Handles, Add</i>	45.75	
22 42 39 00-0045 EA Two Lever Handle, Chrome Shower And Tub Filler (American Standard Colony Soft 3275.502).....	273.17	45.89
<i>For Faucet With Metal Cross Handles, Add</i>	45.75	
22 42 39 00-0046 EA Three Lever Handle, Chrome Shower And Tub Filler (American Standard Colony Soft 3375.502).....	310.04	45.89
<i>For Faucet With Metal Cross Handles, Add</i>	45.75	
22 42 39 00-0047 Shower Valves And Trim (22 42 39)		
See CSI section 22 41 39 00-0017 for residential shower valves and heads.		
22 42 39 00-0048 EA Removable Hand Held Shower With Hose Wall Hook And Inline Vacuum Breaker (Powers 141-318 with 141-319).....	398.92	71.37
22 42 39 00-0049 EA Concealed Thermostatic/Pressure Balancing Control Valve With Chrome Plated Shower Head (Chicago Faucet 2502-600CP).....	910.25	71.37
22 42 39 00-0050 EA Concealed Pressure Balancing Control Valve With Chrome Plated Shower Head (Chicago Faucet 1762-ISCP).....	628.57	71.37
22 42 39 00-0051 EA Senior Institutional Shower Head (Symmons® 4-150).....	241.61	45.89
22 42 39 00-0052 EA Universal Institutional Shower Head (Symmons® 4-151).....	407.96	45.89
22 42 39 00-0053 EA Fre-Flo Institutional Shower Head (Symmons® 4-295).....	285.41	45.89
22 42 39 00-0054 EA Fre-Flo Institutional Shower Head With Short Arm (Symmons® 4-385).....	213.68	45.89
22 42 39 00-0055 EA Wall Mounted Shower Valve And Slide Bar, Single Lever Concealed Mixer (Symmons® 96-300-B30-V-X).....	912.60	68.73
22 42 39 00-0056 EA Wall Mounted Shower Valve, Tub Faucet, And Slide Bar, Single Lever Concealed Mixer (Symmons® 96-400-B30-V-X).....	744.98	79.30
22 42 39 00-0057 EA Wall Mounted Shower Valve, Slide Bar And Head, Single Lever Concealed Mixer (Symmons® 96-500-B30-V-X).....	987.74	79.30
22 42 39 00-0058 EA Wall Mounted Shower Valve, Tub Faucet, Slide Bar And Head, Single Lever Concealed Mixer (Symmons® 96-600-B30-V-X).....	1,395.16	84.58
22 42 39 00-0059 EA Stainless Steel Shower System With Thru-Wall Exposed Piping Covering, Adjustable Shower Head, Soap Dish, Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-801S/1-802S).....	1,267.32	71.37
<i>For Hand Spray, Hose And Wall Hooks, Add</i>	106.44	
<i>For Recessed Soap Dish, Add</i>	108.12	
<i>For Hand Spray, Hose And 30" Slide Bar, Add</i>	165.51	
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0060 EA Stainless Steel Corner Shower System With Thru-Wall Exposed Piping Covering, Adjustable Shower Head, Soap Dish, Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-807).....	1,509.75	71.37
<i>For Hand Spray, Hose And Wall Hooks, Add</i>	106.44	
<i>For Recessed Soap Dish, Add</i>	108.12	
<i>For Hand Spray, Hose And 30" Slide Bar, Add</i>	165.51	
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0061 EA Stainless Steel Institutional Shower System With Thru-Wall Exposed Piping Covering, Vandal Resistant Adjustable Shower Head, Soap Dish, Sloped Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-901S).....	1,022.94	71.37
<i>For Hand Spray, Hose And Wall Hooks, Add</i>	19.32	
<i>For Hand Spray, Hose And 30" Slide Bar, Add</i>	78.39	
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0062 EA Stainless Steel Institutional Shower System With Flat Wall Recessed Piping Covering, Vandal Resistant Adjustable Shower Head, Soap Dish And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-911RS).....	1,552.37	71.37
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0063 EA Stainless Steel Double Outlet Institutional Shower System With Thru-Ceiling Exposed Piping Covering, Vandal Resistant Adjustable Shower Head, Soap Dish, Sloped Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-902S-FS).....	1,666.49	71.37
<i>For Hand Spray, Hose And 30" Slide Bar, Add</i>	59.07	
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0064 EA Stainless Steel Institutional Triple Shower System With Thru-Wall Exposed Piping Covering, Vandal Resistant Adjustable Shower Heads, Sloped Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-931).....	3,087.93	71.37
<i>For Recessed Soap Dish, Add</i>	83.94	
<i>For Pressure Balance And Metering Combination, Add</i>	227.79	
22 42 39 00-0065 EA Stainless Steel Institutional Double Shower System With Thru-Wall Exposed Piping Covering, Vandal Resistant Adjustable Shower Heads, Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-921).....	2,695.41	71.37
<i>For Recessed Soap Dish, Add</i>	83.94	
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0066 EA Stainless Steel Tub And Shower System With Thru-Wall Exposed Piping Covering, Adjustable Shower Head, Sloped Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-941-231).....	1,345.06	71.37
22 42 39 00-0067 EA Stainless Steel Double Outlet Institutional Shower System With Flat Wall Recessed Piping Covering, Vandal Resistant Adjustable Shower Head, Hand Spray, Hose, Wall Hooks, Soap Dish And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-912RS-FS).....	2,073.25	71.37
<i>For Hand Spray, Hose And 30" Slide Bar, Add</i>	59.07	
<i>For Pressure Balance And Metering Combination, Add</i>	291.63	
22 42 39 00-0068 EA Stainless Steel Single Supply Institutional Shower System With Thru-Wall Exposed Piping Covering, Vandal Resistant Adjustable Shower Head, Soap Dish, Sloped Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-901S-60).....	1,343.23	71.37
22 42 39 00-0069 EA Stainless Steel Single Supply Single Outlet Institutional Shower System With Thru-Wall Exposed Piping Covering, Vandal Resistant Adjustable Shower Head, Soap Dish, Sloped Metal Top Cap And Thermostatic/Pressure Balancing Control Valve (Symmons® Hydapipe® 1-901S-22-FS).....	1,339.21	71.37
<i>For Hand Spray, Hose And 30" Slide Bar, Add</i>	59.07	
22 42 39 00-0070 EA Single Lever Handle, Chrome, Pressure-Balance, Shower System (Symmons SafetyMix 1-100-X-3/4).....	989.36	63.44
22 42 39 00-0071 EA Single Lever Handle, Chrome, Pressure-Balance, Shower Valve (Symmons SafetyMix 4-500).....	765.91	45.89
22 42 39 00-0072 Service Sink Faucets (22 42 39)		
22 42 39 00-0073 EA 4-5/8" Spout With Vacuum Breaker, Wall Mount Service Sink Faucet With Lever Handles (Kohler® Kinlock™).....	537.04	88.02
22 42 39 00-0074 EA 3" Spout, Wall Mount, Service Sink Faucet With Lever Handles (American Standard 8340.235).....	381.30	88.02

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 39 00-0075	EA		3" Spout With Vacuum Breaker, Wall Mount Service Sink Faucet With Lever Handles (American Standard 8340.243).....	411.46	88.02
22 42 39 00-0076	EA		6" Spout With Vacuum Breaker And Top Brace, Wall Mount Service Sink Faucet, Lever Handles (American Standard 8344.012).....	427.11	88.02
22 42 39 00-0077	EA		7-1/4" Spout With Bottom Fork Brace, Stops In Integral Arm, Wall Mount Service Sink Faucet With Wrist Blade Handles (American Standard 8355.101).....	557.06	123.39
22 42 39 00-0078	EA		7-1/4" Spout With Vacuum Break And Bottom Fork Brace, Stops In Integral Arm, Wall Mount Service Sink Faucet With Wrist Blade Handles (American Standard 8355.110).....	623.71	140.63
22 42 39 00-0079	EA		11" Spout With Bottom Fork Brace, Stops In Integral Arm, Wall Mount Service Sink Faucet With Wrist Blade Handles (American Standard 8345.115).....	722.02	140.63
22 42 39 00-0080	EA		44" Flexible Stainless Steel Hose With Insulated Handle, 23" Riser, Pre-Rinse Faucet (Chicago Faucet 923-XKCB).....	870.38	140.63
22 42 39 00-0081			Laboratory Faucets And Fittings (22 42 39)		
22 42 39 00-0082	EA		Cold Faucet, Single Deck Mount, Gooseneck Spout With Serrated Nozzle Outlet, Laboratory Faucet (Chicago Faucet 927).....	217.80	37.43
22 42 39 00-0083	EA		Single Deck Mount, Gooseneck Spout With Serrated Nozzle Outlet, Hot And Cold, Laboratory Faucet (Chicago Faucet 929).....	357.38	52.87
22 42 39 00-0084	EA		Single Deck Mount, Gooseneck Spout With Serrated Nozzle Outlet, Hot And Cold, Laboratory Faucet With Vacuum Breaker (Chicago Faucet 930).....	464.89	52.87
22 42 39 00-0085	EA		Cold Wall Mount, Gooseneck Spout With Aerator, Laboratory Faucet (Chicago Faucet 933).....	284.07	49.37
22 42 39 00-0086	EA		6" Spout With Aerator, Wall Mount, Hot And Cold, Laboratory Faucet (Chicago Faucet 940).....	385.64	70.42
22 42 39 00-0087	EA		6" Spout With Aerator And Vacuum Breaker, Wall Mount, Hot And Cold, Laboratory Faucet (Chicago Faucet 940-VBE7-CP).....	525.81	70.42
22 42 39 00-0088	EA		Dual Deck Mount, Gooseneck Spout With Serrated Nozzle Outlet, Hot And Cold, Laboratory Faucet (Chicago Faucet 946).....	421.01	52.87
22 42 39 00-0089	EA		Gooseneck Spout With Aerator, Wall Mount, Hot And Cold, Laboratory Faucet (Chicago Faucet 942).....	411.11	70.42
22 42 39 00-0090	EA		Single Control, Single Hole Deck Mount Sink Faucet (Chicago Faucet 350-CP).....	269.87	40.65
22 42 39 00-0091	EA		Dual Control, Single Hole Deck Mount Sink Faucet (Chicago Faucet 50-CP).....	380.19	57.41
22 42 39 00-0092	EA		4" Center Set, Deck Mount, Lavatory Faucet With Blade Handles (Chicago Faucet 802).....	291.35	57.41
22 42 39 00-0093	EA		4" Center Set, Deck Mount, Gooseneck Sink Faucet With Blade Handles (Chicago Faucet 895-317ABCP).....	357.29	57.41
22 42 39 00-0094	EA		Gas Ball Valve, Removable Nozzle, With Index Button (Chicago Faucet 909-AGVCP).....	90.85	35.31
22 42 39 00-0095	EA		Dual Service Lab Fitting, Two Gas And One Water Outlet (Chicago Faucet 1332-CP).....	584.11	63.44
22 42 39 00-0096	EA		Dual Service Lab Fitting With Wristblade Handle, Two Gas And One Water Outlet (Chicago Faucet 1332-317CP).....	753.46	63.44
22 42 39 00-0097	EA		Dual Service Lab Fitting With Metal Cross Handle, Inline Vacuum Breaker, Two Gas And One Water Outlet (Chicago Faucet 1332-E22E7-204CP).....	907.74	63.44
22 42 39 00-0098	EA		Dual Service Lab Fitting With Plastic Cross Handle, Two Gas And One Water Outlet (Chicago Faucet 1332-E22E7CP).....	801.79	63.44
22 42 39 00-0099	EA		Dual Service Lab Fitting With Chemical Resistant Coating And Plastic Cross Handle, Two Gas And One Water Outlet (Chicago Faucet 1332-E22E7SAM).....	956.28	63.44
22 42 39 00-0100	EA		Single, Deck Mounted Laboratory Ball Valve Assembly (Watersaver L4100-131WSA).....	158.00	34.89
22 42 39 00-0101	EA		90 Degree Double, Deck Mounted Laboratory Ball Valve Assembly (Watersaver L4100-132AWSA).....	222.19	41.87
22 42 39 00-0102	EA		180 Degree Double, Deck Mounted Laboratory Ball Valve Assembly (Watersaver L4100-132SWSA).....	222.19	41.87
22 42 39 00-0103	EA		Three Way, Deck Mounted Laboratory Ball Valve Assembly (Watersaver L4100-133WSA).....	286.39	48.85
22 42 39 00-0104	EA		Four Way, Deck Mounted Laboratory Ball Valve Assembly (Watersaver L4100-134WSA).....	350.57	55.83
22 42 39 00-0105			Gooseneck Faucets With Independent Eyewash (22 42 39)		
22 42 39 00-0106	EA		Two Handle Widespread Valves, Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-CA).....	891.91	39.65
22 42 39 00-0107	EA		Single Lever Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-CA-SL).....	967.68	37.00
22 42 39 00-0108	EA		8" Stem, Two Handle Widespread Valves, Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-CA-8).....	1,250.24	39.65
22 42 39 00-0109	EA		Serrated Tip With Vacuum Breaker, Two Handle Widespread Valves, Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-ST).....	1,320.78	39.65
22 42 39 00-0110	EA		Thermostatic Mixing Valve Kit For The SEF-1800 (Speakman SEF-TW).....	1,607.29	26.44
22 42 39 00-0111	EA		Foot Pedal Activation, Two Handle Widespread Valves, Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-FP).....	1,932.83	66.09
22 42 39 00-0112	EA		Thermostatic Mixing Valve Kit, Two Handle Widespread Valves, Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-CA-TW).....	2,702.35	66.09
22 42 39 00-0113	EA		8" Stem, Thermostatic Mixing Valve Kit, Two Handle Widespread Valves, Gooseneck Faucet With Independent Eyewash (Speakman SEF-1800-CA-8TW).....	2,792.12	66.09
22 42 39 00-0114	EA		Adjustable Aerated Outlet Heads, Gooseneck Faucet Mounted Eyewash (WaterSaver EW101).....	315.71	40.19
22 42 39 00-0115	EA		Gooseneck Faucet Mounted Eyewash With Faucet Control Valve (WaterSaver EW200).....	348.15	40.19
22 42 39 00-0116	EA		Gooseneck Faucet Mounted Eyewash With Faucet Control Valve (WaterSaver EW201).....	376.48	40.19
22 42 39 00-0117	EA		6 Gallon Capacity, Tempering Valve (WaterSaver AP3600).....	1,685.75	26.44
22 42 39 00-0118			Bubblers And Glass Fillers (22 42 39)		
22 42 39 00-0119	EA		Self-Closing Bubbler Faucet, Metering Handle (Chicago Faucet 748-665CP).....	387.61	37.43
22 42 39 00-0120	EA		Wall Mount Glass Filler, 1/2" Flanged Female Inlet (Chicago Faucet 313-CP).....	343.54	49.37
22 42 39 00-0121	EA		7" Overall Outlet Height, Deck Mount Glass Filler, 1/2" Flanged Female Inlet (Chicago Faucet 709-CP).....	382.26	37.43
22 42 39 00-0122	EA		Wall Mount, Push Button Single Glass Filler (Chicago Faucet 324-CP).....	232.55	53.62
22 42 39 00-0123	EA		Deck Mount, Lever Handle Drinking Faucet (Haws 5054LF).....	454.10	40.65
22 42 39 00-0124	EA		Push Button Bubbler, 1/2" OD (Haws 5017LF).....	460.24	40.65
22 42 39 00-0125	EA		Push Button Bubbler, 3/8" NPT (Haws 5010-6427).....	382.60	40.65
22 42 39 00-0126			Automatic Electronic Sensor Faucets (22 42 39)		
22 42 39 00-0127	EA		Electronic Lavatory Faucet (American Standard 6055.205.002).....	706.40	88.18
			<i>For Faucet With Temperature Control, Add</i>	40.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 39 00-0128 EA Electronic Lavatory Gooseneck Faucet (American Standard 6055.105.002) <i>For Faucet With Temperature Control, Add</i>	713.10 40.00	88.18
22 42 39 00-0129 EA Electronic Gooseneck Faucet (Chicago Faucet 116.103.AB.1)	958.63	95.76
22 42 39 00-0130 EA Electronic Lavatory Faucet (Chicago Faucet 116.112.AB.1)	1,000.48	88.18
22 42 39 00-0131 EA Electronic Soap Dispenser And Faucet Combination (Sloan Optima ESD-30880).....	1,489.44	95.76
22 42 39 00-0132 EA Electronic Soap Dispenser And Faucet Combination (Sloan Optima ESD-30880-BDT)	1,867.16	95.76
22 42 39 00-0133 EA Electronic Soap Dispenser And Faucet Combination (Sloan Optima ESD-35187).....	1,743.30	95.76
22 42 39 00-0134 EA Solar Powered, Electronic Lavatory Faucet With Integral Mixing Valve (Sloan Solis EAF-275-ISM).....	1,214.59	88.18
22 42 39 00-0135 EA Deck Mount, AC Power, Electronic Lavatory Faucet (T&S Brass EC1100)	1,038.07	88.18
22 42 39 00-0136 EA Wall Mount, AC Power, Electronic Lavatory Faucet (T&S Brass EC1101).....	1,097.15	88.18
22 42 39 00-0137 EA Deck Mount, AC Power, Spout Version, Electronic Lavatory Faucet (T&S Brass EC1102)	949.45	88.18
22 42 39 00-0138 EA Deck Mount, DC Power, Electronic Lavatory Faucet (T&S Brass EC2100).....	1,097.15	88.18
22 42 39 00-0139 EA Deck Mount, DC Power, Spout Version, Electronic Lavatory Faucet (T&S Brass EC2102)	957.68	88.18
22 42 39 00-0140 EA Deck Mount, AC Power, Electronic Lavatory Gooseneck Faucet (T&S Brass EC3100).....	957.68	88.18
22 42 39 00-0141 EA Wall Mount, AC Power, Electronic Lavatory Gooseneck Faucet (T&S Brass EC3101).....	1,079.15	88.18
22 42 39 00-0142 EA Deck Mount, AC Power, Spout Version, Electronic Lavatory Faucet (T&S Brass EC3102)	914.16	88.18
22 42 39 00-0143 EA 4" Deck Mount, AC Power, Spout Version, Electronic Lavatory Faucet (T&S Brass EC3103)	876.90	88.18
22 42 39 00-0144 EA Self-Generating EcoPower System, Single Supply Sensor Faucet, Standard Spout (Toto "Eco-Power" TEL3GKCN-60)	1,456.03	88.18
22 42 39 00-0145 Other Trim <small>(22 42 39)</small>		
22 42 39 00-0146 EA Faucet Aerator, Male Thread 13/16" Male, 2 GPM (Delta RP330)	19.78	5.74
22 42 39 00-0147 EA 1-1/2" Pop-up Tailpiece (Chicago Faucet 226-ACP)	136.07	17.22
22 42 39 00-0148 EA 1-1/4" Grid Strainer Tailpiece (Chicago Faucet 327-XCP)	53.57	14.35
22 42 39 00-0149 EA 1-1/2" Grid Strainer Tailpiece (Chicago Faucet 327-X1-1/2TPCP).....	122.66	14.35
22 42 39 00-0150 EA Lavatory Drainline Guard And Shutoff Covers (IPS Truebro Lav Guard 102).....	63.85	15.86
22 42 39 00-0151 EA Soft Lavatory Drainline Guard And Shutoff Covers (IPS Truebro Soft-Guard Plus)	66.72	15.86
22 42 39 00-0152 EA Lavatory Protective Enclosure (IPS Truebro Lav Shield).....	165.20	15.86
22 42 39 00-0153 EA 36" Wide, Undersink Protective Enclosure (IPS Truebro Basin Guard).....	202.12	15.86
22 42 39 00-0154 EA 42" Wide, Undersink Protective Enclosure (IPS Truebro Basin Guard).....	228.94	15.86
22 42 39 00-0155 EA Type 304 Stainless Steel Sink Drain And 3-1/2" Removable Conical Basket Strainer With Chrome Plated Brass 1- 1/2" x 4" Tailpiece (Elkay LK35)	93.53	14.35
22 42 39 00-0156 EA Type 304 Stainless Steel Sink Drain And 3-1/2" Removable Conical Basket Strainer With Type 304 Stainless Steel 1-1/2" x 4" Tailpiece (Elkay LK35).....	129.14	14.35
22 42 39 00-0157 EA Type 304 Stainless Steel Sink Drain And 3-1/2" Removable Conical Basket Strainer With Type 316 Stainless Steel 1-1/2" x 4" Tailpiece (Elkay LK35).....	192.20	14.35
22 42 39 00-0158 EA 1/2" NPT x 3/8" Compression Chrome, Quarter Turn Angle Stop (SharkBite 23036).....	39.44	11.10
22 42 39 00-0159 EA 1/2" NPT x 3/8" Compression Chrome, Quarter Turn Straight Stop (SharkBite 23037).....	39.44	11.10
22 42 39 00-0160 EA 1/2" NPT x 3/8" Compression Chrome, Quarter Turn Dual Angle Stop (SharkBite 25558)	55.15	11.10
22 42 39 00-0161 PR Pair of 16" Long, 3/8" OD x 1/2" IPS, Stainless Steel Braided Sink Supply Line	37.15	12.20
22 42 39 00-0162 EA 12" Long, 3/8" OD x 7/8" BC, Stainless Steel Braided Toilet Supply Line.....	23.18	7.18
22 42 39 00-0163 EA 12" Long, 1/2" OD x 7/8" BC, Stainless Steel Braided Toilet Supply Line.....	23.89	7.18
22 42 39 00-0164 Removal And Reinstallation Of Fixtures And Trim <small>(22 42 39)</small>		
Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.		
22 42 39 00-0165 EA Removal And Reinstallation Of Faucet.....	91.85	
22 42 43 Flushometers <small>(22 42)</small>		
22 42 43 00-0001 Water Closet Flush Valves <small>(22 42 43)</small>		
22 42 43 00-0002 EA Exposed Manual Water Closet Flush Valve (Sloan Regal-115XL)	322.04	36.06
22 42 43 00-0003 EA Exposed Manual Water Closet Flush Valve (Sloan Regal-113-1.6).....	311.64	36.06
22 42 43 00-0004 EA Exposed Manual Water Closet Flush Valve (Sloan Regal-110 Or 111).....	363.89	36.06
22 42 43 00-0005 EA Back Spud, Concealed Manual Water Closet Flush Valve (Sloan Royal-140).....	502.65	36.06
22 42 43 00-0006 EA Top Spud, Concealed Manual Water Closet Flush Valve (Sloan Royal-142).....	561.37	36.06
22 42 43 00-0007 EA Exposed Infrared Water Closet Flush Valve (Sloan Royal 115-1.6 ES-S).....	1,043.47	36.06
22 42 43 00-0008 EA Concealed Infrared Water Closet Flush Valve, Back Spud (Sloan Royal-140 ES-S).....	1,039.97	36.06
22 42 43 00-0009 EA Concealed Infrared Water Closet Flush Valve, Top Spud (Sloan Royal-153-1.6-ES-S)	1,099.20	36.06
22 42 43 00-0010 EA Exposed Battery Powered Water Closet Flush Valve (Sloan G2 Optima Plus 8113)	1,019.67	36.06
22 42 43 00-0011 EA Dual Flush Water Closet Flush Valve (Sloan Uppercut WES-115).....	442.74	36.06
Note: "Green". 1.6 Gallons or 1.1 Gallons per flush. Includes instructional placards on proper operation.		
22 42 43 00-0012 EA Exposed Battery Powered Water Closet Flush Valve (Sloan G2 Optima Plus 8110)	816.35	36.06
22 42 43 00-0013 EA Side Mount Battery Powered Water Closet/Urinal Automatic Flush Retrofit Converters (Sloan Optima EBV-89A)	440.44	36.06
22 42 43 00-0014 EA Side Mount Battery Powered Water Closet/Urinal Automatic Flush Retrofit Converters (Technical Concepts 40118X).....	438.29	36.06
22 42 43 00-0015 EA Slide Over Handle Battery Powered Water Closet/Urinal Automatic Flush Retrofit Converters (Sloan Optima Smooth EBV-200A)	447.18	31.72
22 42 43 00-0016 EA Slide Over Handle Battery Powered Water Closet/Urinal Automatic Flush Retrofit Converters (Technical Concepts 40180X).....	487.10	31.72
22 42 43 00-0017 EA 1.28 GPF, Exposed Infrared Water Closet Flush Valve (Toto EcoPower TET1LN).....	1,058.78	36.06
22 42 43 00-0018 EA Exposed Infrared Water Closet Flush Valve (1-1/2" V.B.) 1.28 GPF (Toto EcoPower TET1LN32)	1,162.00	36.06
22 42 43 00-0019 EA 1.28 GPF, Back Spud, Concealed Infrared Water Closet Flush Valve (Toto EcoPower TET2LN31 Or TET3LN31)	1,478.69	36.06
22 42 43 00-0020 EA 1.28 GPF, Top Spud, Concealed Infrared Water Closet Flush Valve (Toto EcoPower TET2LN32 Or TET3LN32)	1,478.69	36.06
22 42 43 00-0021 EA Exposed Infrared Water Closet Flush Valve (Zum ZEMS6000AV-HET-IS).....	955.83	36.06
22 42 43 00-0022 EA Exposed Infrared Water Closet Flush Valve (Zum ZTS6200EV).....	947.65	36.06
22 42 43 00-0023 EA Slide Over Handle AC Powered Water Closet/Urinal Automatic Flush Retrofit Converters (Sloan EL-600-A)	469.58	31.72
22 42 43 00-0024 EA 6 Volt DC, 120 Volt AC Hardwired Power Transformer (Sloan EL-451)	145.98	6.12
22 42 43 00-0025 EA Exposed Solar/Battery Powered Water Closet Flush Valve (Sloan Solis 8111-1.28)	553.56	36.06
22 42 43 00-0026 EA Exposed Manual Water Closet Flush Valve (Zum Z6000AV-HET).....	347.45	36.06

22	Plumbing
22 40	Plumbing Fixtures
22 42	Commercial Plumbing Fixtures

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 42 43 00-0027 EA Exposed Battery Powered Water Closet Flush Valve (Zurn ZER6000AV-HET).....	969.13	36.06
22 42 43 00-0028 Urinal Flush Valves (22 42 43)		
22 42 43 00-0029 EA 3/4" Top Spud, Exposed Manual Urinal Flush Valve (Sloan Regal 186 XL).....	274.15	36.06
Note: 0.5, 1.0 or 1.5 GPF.		
22 42 43 00-0030 EA 1-1/4" Top Spud, Exposed Manual Urinal Flush Valve (Sloan Regal 180).....	296.28	36.06
Note: 1.0, 1.5 or 3.5 GPF.		
22 42 43 00-0031 EA Back Spud, Concealed Manual Urinal Flush Valve (Sloan Royal 195).....	402.06	36.06
Note: 1.0 or 1.5 GPF.		
22 42 43 00-0032 EA Top Spud, Concealed Manual Urinal Flush Valve (Sloan Royal 197).....	489.20	36.06
Note: 1.0 or 1.5 GPF.		
22 42 43 00-0033 EA Exposed Infrared Urinal Flush Valve (Sloan Royal 186-ES-S).....	776.45	36.06
Note: 1.0 or 1.5 GPF.		
22 42 43 00-0034 EA Back Spud, Concealed Infrared Urinal Flush Valve (Sloan Royal 195-WB-ES-S).....	1,047.61	36.06
Note: 0.5, 1.0 or 1.5 GPF.		
22 42 43 00-0035 EA Top Spud, Concealed Infrared Urinal Flush Valve (Sloan Royal 197-WB-ES-S).....	1,176.75	36.06
Note: 0.5, 1.0 or 1.5 GPF.		
22 42 43 00-0036 EA Top Spud, Exposed Battery Powered Urinal Flush Valve (Sloan G2 Opt+8186-1).....	763.49	36.06
Note: 1.0 GPF.		
22 42 43 00-0037 EA Exposed Infrared Urinal Flush Valve (3/4" V.B.) (Toto EcoPower TEU1LN12).....	1,155.35	36.06
Note: 0.5 GPF.		
22 42 43 00-0038 EA Top Spud, Exposed Solar/Battery Powered Urinal Flush Valve (Sloan Solis 8186-0.13).....	500.70	36.06
Note: 0.13 GPF.		
22 42 43 00-0039 EA 3/4" Top Spud, Exposed Manual Urinal Flush Valve (Zurn Z6003AV-ULF).....	315.71	36.06
Note: 0.125 GPF.		
22 42 43 00-0040 EA Top Spud, Exposed Battery Powered Urinal Flush Valve (Zurn ZTR6203-ULF).....	824.36	36.06
Note: 0.125 GPF.		
22 42 43 00-0041 EA Exposed Infrared Urinal Flush Valve (Zurn ZEMS6003AV-ULF-IS).....	827.26	36.06
Note: 0.125 GPF.		
22 42 43 00-0042 Removal And Reinstallation Of Fixtures And Trim (22 42 43)		
Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.		
22 42 43 00-0043 EA Removal And Reinstallation Of Flush Valve.....	143.52	
22 42 43 00-0044 Plumbing Control Transformers (22 42 43)		
22 42 43 00-0045 EA 6 Volt DC, 120 Volt AC Plug In Style Power Transformer (Zurn P6000-PC6).....	66.10	
22 42 46 Chemical Toilets (22 42)		
Note: Includes toilet, urinal, holding tank, and ventilation system. Building to be priced separately.		
22 42 46 00-0001 Standard Chemical Toilets (22 42 46)		
22 42 46 00-0002 Small Tank Chemical Toilets (22 42 46 00-0001)		
22 42 46 00-0003 EA Chemical Toilet, Small Tank 7,000 Uses/Year.....	4,394.14	1,057.33
For Extra Urinal, Add	143.36	
22 42 46 00-0004 Medium Tank Chemical Toilets (22 42 46 00-0001)		
22 42 46 00-0005 EA Chemical Toilet, Medium Tank 13,000 Uses/Year.....	5,221.71	1,259.29
For Extra Urinal, Add	169.73	
22 42 46 00-0006 Large Tank Chemical Toilets (22 42 46 00-0001)		
22 42 46 00-0007 EA Chemical Toilet, Large Tank 28,000 Uses/Year.....	6,302.49	1,428.45
For Extra Urinal, Add	230.61	
22 43 Healthcare Plumbing Fixtures (22 40)		
22 43 13 Healthcare Water Closets (22 43)		
22 43 13 00-0001 Healthcare Water Closets (22 43 13)		
22 43 13 00-0002 EA Flush Valve Type, Siphon Jet, Floor Mounted, Wall Outlet, Handicap Accessible, Elongated Vitreous China Healthcare Water Closet With Bedpan Holding Rim (American Standard Priolo® ADA).....	831.16	109.96
22 43 13 00-0003 EA Flush Valve Type, Siphon Jet, Floor Mounted, Floor Outlet, Handicap Accessible, Elongated Vitreous China Healthcare Water Closet With Bedpan Holding Rim (American Standard Madera™ ADA).....	676.15	109.96
22 43 16 Healthcare Sinks (22 43)		
22 43 16 00-0001 Healthcare Sinks (22 43 16)		
Note: Includes trap, drain and supply valves. Excludes faucets and flush valves.		
22 43 16 00-0002 EA 25" x 21", Wall Mounted, Blow Out Flushing Rim, Vitreous China Clinic Service Sink (American Standard).....	1,239.94	70.84
For Stainless Steel Rim Guards (Three Sides), Add	108.61	
22 43 16 00-0003 EA 29" x 20", Floor Mounted, Siphon Jet Flushing Rim, Vitreous China Clinic Service Sink (American Standard).....	1,334.98	203.53
For Stainless Steel Rim Guards (Three Sides), Add	108.61	
For Pedestal Base, Add	497.95	
22 43 16 00-0004 EA 28" x 22", Wall Mounted, Vitreous China Surgeon's Scrub Sink (American Standard).....	1,192.13	70.84
For Painted Bracket Supports, Add	175.74	



	Plumbing	22
	Plumbing Fixtures	22 40
	Healthcare Plumbing Fixtures	22 43

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
22 43 16 00-0005	EA	20" x 17", Wall Mounted, Vitreous China Intensive Care Unit Sink (American Standard).....		1,048.69	70.84
22 43 39 Healthcare Faucets (22 43)					
22 43 39 00-0001 Medical Faucet Spouts (22 43 39)					
22 43 39 00-0002	EA	Deck Mounted, Rigid Gooseneck Medical Lavatory Spout (American Standard 7522).....		100.97	15.86
22 43 39 00-0003 Electronic Proximity Medical Faucets (22 43 39)					
22 43 39 00-0004	EA	DC Or Plug-In AC Powered, Single Inlet, Electronic Proximity Medical Lavatory Faucet (American Standard Selectronic™ ICU).....		575.61	77.61
		<i>For Hard Wired AC Powered, Add</i>		24.73	
22 43 39 00-0005 Foot And Knee Faucet Controls (22 43 39)					
22 43 39 00-0006	EA	Single Supply Metering Pedal Valve (Chicago Faucet 628)		431.14	141.05
22 43 39 00-0007	EA	Double Supply Metering Pedal Valve (Chicago Faucet 625)		508.23	141.05
22 43 39 00-0008	EA	Knee Actuated Metering Mixing Valve (Chicago Faucet 745-VOCP)		1,102.40	141.05
22 43 39 00-0009	EA	Double Knee Actuated Metering Mixing Valve (American Standard 7676).....		670.06	141.05
22 43 39 00-0010 Centerset Medical Faucets (22 43 39)					
22 43 39 00-0011	EA	Rigid Gooseneck Centerset Medical Lavatory Faucet, 8" Centers 6" Wrist Action Handles, Adjustable Centers (T&S B-0865-04)		601.59	77.61
22 43 39 00-0012	EA	Swivel Gooseneck Centerset Medical Lavatory Faucet, 8" Centers, 6" Wrist Action Handles, Adjustable Centers (T&S B-0866-04)		608.58	77.61
22 43 39 00-0013	EA	Swivel Gooseneck Centerset Medical Lavatory Faucet With Aerator 8" Centers, 6" Wrist Action Handles, Adjustable Centers (T&S B-0867-04)		607.87	77.61
22 43 39 00-0014	EA	Surgical Sink Rigid Gooseneck Faucets, 8" Centers, 6" Wrist Action Handles (T&S B-0322-04).....		541.55	77.61
22 43 39 00-0015	EA	Surgical Sink Rigid Gooseneck Faucets With Stream Regulator Outlet, 8" Centers, 6" Wrist Action Handles (T&S B-0323-04).....		517.81	77.61
22 43 39 00-0016 Bedpan Washers (22 43 39)					
22 43 39 00-0017	EA	Self Closing Pedal Valve Bed Pan Washer, With Volume Control, Vacuum Breaker, Wall Hook Hose Connection, Polyvinyl Chloride Hose (T&S B-0675).....		1,434.45	141.05
22 43 39 00-0018	EA	Pedal Valve Bed Panwasher With Volume Control Valve, Vacuum Breaker, Wall Hook Hose Connection, Extended Spray Polyvinyl Chloride Hose (T&S B-0676)		1,361.35	141.05
22 43 39 00-0019	EA	Self Closing Single Pedal Valve Bedpan Washer With Volume Control, Vacuum Breaker, Wall Hook Hose Connection Polyvinyl Chloride Hose (T&S B-0685).....		1,339.69	141.05
22 43 39 00-0020	EA	Single Pedal Valve Bedpan Washer With Volume Control, Vacuum Breaker, Wall Hook Hose Connection, Polyvinyl Chloride Hose, Extended Spray (T&S B-0686)		1,318.63	141.05
22 43 43 Healthcare Plumbing Fixture Flushometers (22 43)					
22 43 43 00-0001 Healthcare Plumbing Fixture Flushometers (22 43 43)					
22 43 43 00-0002	EA	Exposed Manual Service Sink Flush Valve (Sloan Royal-117).....		230.25	36.06
22 43 43 00-0003	EA	Exposed Manual Water Closet Flush Valve With Bedpan Washer (Sloan Slimline BPW).....		509.27	36.06
22 43 46 Healthcare Patient Care Units (22 43)					
22 43 46 00-0001 Patient Care Units (22 43 46)					
22 43 46 00-0002	EA	47" Swivel Toilet Modular Sink And Water Closet Patient Care Unit (Willoughby WH-1700-AQCT-WB-BWSEV)		19,777.01	211.47
		<i>For SDB Single Temperature Dialysis Box, Add</i>		1,450.35	
		<i>For DDB Dual Temperature Dialysis Box, Add</i>		1,540.44	
		<i>For BWSEV Bedpan Washer With Elevated Valve, Add</i>		1,113.49	
		<i>For LOCK Flush Valve Lockout Device, Add</i>		817.51	
22 43 46 00-0003	EA	31" Swing Front Cabinet Modular Sink And Water Closet Patient Care Unit (Willoughby WH-2600-SST-DC- AQCT-WB)		15,576.96	185.04
		<i>For SDB Single Temperature Dialysis Box, Add</i>		1,450.35	
		<i>For DDB Dual Temperature Dialysis Box, Add</i>		1,540.44	
		<i>For BWSEV Bedpan Washer With Elevated Valve, Add</i>		1,113.49	
		<i>For LOCK Flush Valve Lockout Device, Add</i>		817.51	
22 43 46 00-0004 Patient Care Plumbing Accessories (22 43 46)					
22 43 46 00-0005	EA	One Valve Supply Recessed Stainless Steel Dialysis Box With Locking Door (Bradley 7920)		1,887.06	28.71
22 43 46 00-0006	EA	Two Valve Supply Recessed Stainless Steel Dialysis Box With Locking Door (Bradley 7919)		2,079.39	28.71
22 45 Emergency Plumbing Fixtures (22 45)					
22 45 13 Emergency Showers (22 45)					
22 45 13 00-0001		Emergency Drench Showers (22 45 13)			
22 45 13 00-0002		Emergency Drench Showers (Haws) (22 45 13 00-0001)			
		Note: Includes one pull rod.			

22 Plumbing**22 40 Plumbing Fixtures****22 45 Emergency Plumbing Fixtures**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 45 13 00-0003	EA		Horizontal Or Vertical Mounted, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead (Haws 8122).....	697.52	185.04
22 45 13 00-0004	EA		Horizontal Or Vertical Mounted, Emergency Drench Shower With Axion® MSR Stainless Steel Showerhead (Haws 8123).....	799.14	185.04
22 45 13 00-0005	EA		Horizontal Mounted, Barrier-Free, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead (Haws 8122HWC).....	855.60	185.04
22 45 13 00-0006	EA		Horizontal Or Vertical Mounted, Corrosion Resistant, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead (Haws 8130).....	1,024.98	185.04
22 45 13 00-0007	EA		Horizontal Mounted, All Stainless Steel, Corrosion Resistant, Emergency Drench Shower With Axion® MSR Stainless Steel Showerhead (Haws 8133H).....	1,375.02	185.04
22 45 13 00-0008	EA		Floor Mounted, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead (Haws 8100).....	1,089.14	211.47
22 45 13 00-0009	EA		Wall Mounted, Freeze Protected, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Stainless Steel Push Flag (Haws 8111FP).....	1,192.82	237.90
22 45 13 00-0010	EA		Flush To Ceiling, Emergency Drench Shower With Axion® MSR Stainless Steel Showerhead (Haws 8169).....	1,085.55	237.90
22 45 13 00-0011	EA		Concealed Ceiling Supply, Emergency Drench Shower With Axion® MSR Stainless Steel Showerhead (Haws 8163).....	1,108.14	237.90
22 45 13 00-0012	EA		Flush To Ceiling, Emergency Drench Shower With Axion® MSR Stainless Steel Showerhead And Pull Down Lever Ball Valve Mounted In A Recessed Stainless Steel Cabinet (Haws 8164).....	1,531.57	237.90
22 45 13 00-0013			Emergency Drench Showers (Speakman) (22 45 13 00-0001)		
			Note: Includes one pull rod.		
22 45 13 00-0014	EA		Vertical Mounted, Lifesaver® Emergency Drench Shower With Plastic Showerhead (Speakman SE-220).....	617.33	185.04
22 45 13 00-0015	EA		Horizontal Mounted, Lifesaver® Emergency Drench Shower With Plastic Showerhead (Speakman SE-227).....	635.80	185.04
22 45 13 00-0016	EA		Floor Mounted, Lifesaver® Emergency Drench Shower With Plastic Showerhead (Speakman SE-253).....	998.53	211.47
22 45 13 00-0017			Emergency Drench Showers (WaterSaver) (22 45 13 00-0001)		
			Note: Includes one pull rod.		
22 45 13 00-0018	EA		Emergency Shower, Vertically Mounted (WaterSaver ES635).....	843.03	185.04
22 45 13 00-0019	EA		Emergency Shower, Horizontally Mounted (WaterSaver ES643).....	863.72	185.04
22 45 13 00-0020	EA		All-Stainless Steel, Emergency Shower, Horizontally Mounted (WaterSaver ES691).....	1,876.62	185.04
22 45 13 00-0021	EA		Emergency Shower, Recess Mounted (WaterSaver ES629).....	1,345.45	237.90
22 45 13 00-0022	EA		Emergency Shower, Semi-Concealed (WaterSaver ES658).....	1,813.43	237.90
22 45 16 Eyewash Equipment (22 45)					
22 45 16 00-0001			Emergency Eyewash Equipment (22 45 16)		
22 45 16 00-0002			Emergency Eyewash Equipment (Haws) (22 45 16 00-0001)		
22 45 16 00-0003	EA		Faucet Mounted, Stainless Steel Emergency Eyewash (Haws Axion® eyePOD® 7620).....	304.16	5.29
22 45 16 00-0004	EA		Wall Mounted, Freeze Protected, Emergency Eye Wash With Soft-Flo Heads And Stainless Steel Bowl (Haws 7433FP).....	1,441.24	237.90
22 45 16 00-0005			Emergency Eyewash Equipment (WaterSaver) (22 45 16 00-0001)		
22 45 16 00-0006	EA		Auto Flow, Right Hand Mounting, Emergency Eye Wash, Deck Mounted (WaterSaver EW805).....	851.02	52.87
22 45 16 00-0007	EA		Auto Flow, Left Hand Mounting, Emergency Eye Wash, Deck Mounted (WaterSaver EW805LH).....	851.02	52.87
22 45 16 00-0008	EA		Right Hand Mounting, Emergency Eye Wash, Deck Mounted (WaterSaver EW806).....	866.69	52.87
22 45 16 00-0009	EA		Left Hand Mounting, Emergency Eye Wash, Deck Mounted (WaterSaver EW806LH).....	866.69	52.87
22 45 16 00-0010	EA		Stainless Steel Bowl, Emergency Eye Wash, Deck Mounted (WaterSaver EW822).....	1,154.39	52.87
22 45 16 00-0011	EA		Swing-Down, Auto Flow, Emergency Eye Wash, Wall Mounted (WaterSaver EW848).....	1,316.47	52.87
22 45 16 00-0012	EA		Swing-Down, Auto Flow, Emergency Eye Wash, Deck Mounted (WaterSaver EW849).....	1,316.47	52.87
22 45 16 00-0013	EA		Right Hand Mounting, All-Stainless Steel, Emergency Eye Wash, Deck Mounted (WaterSaver EW893).....	2,446.87	52.87
22 45 16 00-0014	EA		Left Hand Mounting, All-Stainless Steel, Emergency Eye Wash, Deck Mounted (WaterSaver EW893LH).....	2,446.87	52.87
22 45 16 00-0015	EA		Right Hand Mounting, Auto Flow, All-Stainless Steel, Emergency Eye Wash, Deck Mounted (WaterSaver EW895).....	2,560.91	52.87
22 45 16 00-0016	EA		Left Hand Mounting, Auto Flow, All-Stainless Steel, Emergency Eye Wash, Deck Mounted (WaterSaver EW895LH).....	2,560.91	52.87
22 45 16 00-0017	EA		Swing-Down, Auto Flow, All-Stainless Steel, Emergency Eye Wash, Wall Mounted (WaterSaver EW898).....	3,161.04	52.87
22 45 16 00-0018	EA		Swing-Down, Auto Flow, All-Stainless Steel, Emergency Eye Wash, Deck Mounted (WaterSaver EW899).....	3,161.04	52.87
22 45 16 00-0019	EA		Ball Valve With Flag Handle, Emergency Eye Wash, Recess Deck Mounted (WaterSaver EW808).....	1,552.61	185.04
22 45 16 00-0020	EA		Push-Down Valve, Emergency Eye Wash, Recess Deck Mounted (WaterSaver EW810).....	1,530.49	185.04
22 45 16 00-0021	EA		Stainless Steel Bowl, Emergency Eye Wash, Wall Mounted (WaterSaver EW814).....	1,094.50	185.04
22 45 16 00-0022	EA		Stainless Steel Bowl And Cover, Emergency Eye Wash, Wall Mounted (WaterSaver EW814BC).....	1,554.28	185.04
22 45 16 00-0023	EA		Plastic Bowl, Emergency Eye Wash, Wall Mounted (WaterSaver EW814P).....	930.34	185.04
22 45 23 Personal Eyewash Equipment (22 45)					
22 45 23 00-0001			Portable Eyewash Equipment (22 45 23)		
22 45 23 00-0002			Portable Eyewash Equipment (Bradley) (22 45 23 00-0001)		
22 45 23 00-0003	EA		Wall Mounted, Portable Gravity Fed Eyewash Unit With Clear Tank (Bradley S19-921).....	304.12	15.86
22 45 23 00-0004	EA		Wall Mounted, Portable Gravity Fed Eyewash Unit With Insulated Heater Jacket (Bradley S19-921H).....	1,595.32	15.86
22 45 23 00-0005	EA		5 Gallon Portable Pressurized Tank With Eyewash Only (Bradley S19-671).....	727.80	
22 45 23 00-0006	EA		5 Gallon Portable Pressurized Tank With Eyewash And 8' Drench Hose For Facewash (Bradley S19-672).....	868.20	
22 45 26 Eye/Face Wash Equipment (22 45)					
22 45 26 00-0001			Emergency Eye/Face Wash Equipment (22 45 26)		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 45 26 00-0002			Emergency Eye/Face Wash Equipment (Haws) (22 45 26 00-0001)		
22 45 26 00-0003	EA		Unmounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 7460).....	755.52	132.17
			Note: Excludes p-trap and tailpiece.		
22 45 26 00-0004	EA		Wall Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly Without Receptor (Haws 7324).....	759.62	185.04
22 45 26 00-0005	EA		Wall Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Plastic Bowl (Haws 7260B-7270B).....	742.69	185.04
			Note: Excludes p-trap and tailpiece.		
22 45 26 00-0006	EA		Wall Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Plastic Bowl (Haws 7260BT-7270BT).....	809.31	185.04
			Note: Excludes p-trap and tailpiece.		
22 45 26 00-0007	EA		Wall Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 7360B-7460B).....	816.08	185.04
			Note: Excludes p-trap and tailpiece.		
22 45 26 00-0008	EA		Wall Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 7360BT-7460BT).....	896.25	185.04
			Note: Excludes p-trap and tailpiece.		
22 45 26 00-0009	EA		Wall Mounted, Barrier-Free, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 7360BTWC).....	1,216.94	185.04
22 45 26 00-0010	EA		Wall Mounted, All Stainless Steel, Corrosion Resistant, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl And Dust Cover (Haws 7778B).....	2,289.65	185.04
22 45 26 00-0011	EA		Pedestal Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Plastic Bowl (Haws 7261-7271).....	931.06	211.47
22 45 26 00-0012	EA		Pedestal Mounted, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 7361-7461).....	1,060.91	211.47
22 45 26 00-0013	EA		Pedestal Mounted, All Stainless Steel, Corrosion Resistant, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 7777).....	2,370.75	211.47
22 45 26 00-0014	EA		Sink Mounted, Swing-Away, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly (Haws 7611).....	630.79	52.87
22 45 26 00-0015	EA		Right Side Sink Mounted, Swing-Away, Emergency Eye/Face Wash With Stainless Steel Axion® MSR Wash Head Assembly (Haws 7612).....	608.21	52.87
22 45 26 00-0016	EA		Left Side Sink Mounted, Swing-Away, Emergency Eye/Face Wash With Stainless Steel Axion® MSR Wash Head Assembly (Haws 7612LH).....	636.44	52.87
22 45 26 00-0017	EA		Wall Or Deck Mounted, Barrier-Free, Swing-Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly (Haws 7610).....	800.17	52.87
22 45 26 00-0018	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Cabinet (Haws 7655WCC).....	1,951.41	264.33
22 45 26 00-0019	EA		Surface Wall Mounted, Wheelchair Accessible, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Cabinet (Haws 7655WCSM).....	2,359.46	211.47
22 45 26 00-0020	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Cabinet And Drain Pan (Haws 7656WCC).....	2,425.67	264.33
22 45 26 00-0021	EA		Surface Wall Mounted, Wheelchair Accessible, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Cabinet And Drain Pan (Haws 7656WCSM).....	2,845.00	211.47
22 45 26 00-0022			Emergency Eye/Face Wash Equipment (Speakman) (22 45 26 00-0001)		
22 45 26 00-0023	EA		Wall Mounted, Lifesaver® Emergency Eye/Face Wash And Plastic Bowl (Speakman SE-495).....	694.28	185.04
22 45 26 00-0024	EA		Floor Mounted, DuraJade™ Finish, Lifesaver® Emergency Eye/Face Wash And Plastic Bowl (Speakman SE-496).....	850.78	211.47
22 45 26 00-0025			Emergency Eye/Face Wash Equipment (WaterSaver) (22 45 26 00-0001)		
22 45 26 00-0026	EA		Wide Area, Emergency Eye/Face Wash With Stainless Steel Bowl, Wall Mounted (WaterSaver FE724).....	1,383.03	185.04
22 45 26 00-0027	EA		Wide Area, Emergency Eye/Face Wash With Stainless Steel Bowl And Cover, Wall Mounted (WaterSaver FE724BC).....	1,842.82	185.04
22 45 26 00-0028	EA		Wide Area, Push-Down Valve, Emergency Eye/Face Wash, Recess Deck Mounted (WaterSaver FE727).....	1,784.37	185.04
22 45 26 00-0029	EA		Push-Down Valve, Emergency Eye/Face Wash, Recess Deck Mounted (WaterSaver FE765).....	1,644.89	185.04
22 45 26 00-0030	EA		Auto Flow, Right Hand Mounting, Emergency Eye/Face Wash, Deck Mounted (WaterSaver FE774).....	896.65	52.87
22 45 26 00-0031	EA		Auto Flow, Left Hand Mounting, Emergency Eye/Face Wash, Deck Mounted (WaterSaver FE774LH).....	896.65	52.87
22 45 26 00-0032	EA		Right Hand Mounting, Emergency Eye/Face Wash, Deck Mounted (WaterSaver FE775).....	869.44	52.87
22 45 26 00-0033	EA		Left Hand Mounting, Emergency Eye/Face Wash, Deck Mounted (WaterSaver FE775LH).....	869.44	52.87
22 45 26 00-0034	EA		Swing-Down, Auto Flow, Emergency Eye/Face Wash, Wall Mounted (WaterSaver FE778).....	1,336.92	52.87
22 45 26 00-0035	EA		Swing-Down, Auto Flow, Emergency Eye/Face Wash, Deck Mounted (WaterSaver FE779).....	1,336.92	52.87
22 45 26 00-0036			Emergency Eye/Face Wash Equipment (Guardian) (22 45 26 00-0001)		
			Note: Includes one pull rod.		
22 45 26 00-0037	EA		All-Stainless Steel Handicapped Accessible Safety Station With WideArea™ Eye/Face Wash (Guardian GBF1994).....	5,559.92	185.04
22 45 29			Hand-Held Emergency Drench Hoses (22 45)		
22 45 29 00-0001			Hand-Held Emergency Eye/Face/Body Wash With Hose (22 45 29)		
22 45 29 00-0002			Hand-Held Emergency Eye/Face/Body Wash With Hose (Haws) (22 45 29 00-0001)		
22 45 29 00-0003	EA		Counter Mounted, Hand-Held Emergency Eye/Face/Body Wash With Axion® MSR Wash Head Assembly And 8' Hose (Haws 8904).....	674.17	66.09
22 45 29 00-0004	EA		Wall Mounted, Hand-Held Emergency Eye/Face/Body Wash With Axion® MSR Wash Head Assembly And 12' Recoil Hose (Haws 8905).....	775.80	66.09



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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22 45 29 00-0005 Hand-Held Emergency Eye/Face/Body Wash With Hose (WaterSaver) (22 45 29 00-0001)

22 45 29 00-0006	EA		Emergency Drench Hose Unit, Deck Mounted (WaterSaver EW1020).....	680.51	66.09
22 45 29 00-0007	EA		Emergency Drench Hose Unit, Wall Mounted (WaterSaver EW1025).....	625.90	66.09
22 45 29 00-0008	EA		Emergency Eye Wash Drench Hose Unit, Wall Mounted (WaterSaver EW1014)	947.19	66.09
22 45 29 00-0009	EA		Emergency Eye Wash Drench Hose Unit, Deck Mounted (WaterSaver EW1022)	886.42	66.09
22 45 29 00-0010	EA		Emergency Eye Wash Drench Hose Unit, Wall Mounted (WaterSaver EW1026)	908.18	66.09
22 45 29 00-0011	EA		Ball Valve With Flag Handle, Emergency Eye Wash Drench Hose Unit, Deck Mounted (WaterSaver EW1028)	1,194.69	66.09
22 45 29 00-0012	EA		Ball Valve With Flag Handle And Vacuum Breaker, Emergency Eye Wash Drench Hose Unit, Deck Mounted (WaterSaver EW1028VB).....	1,385.24	66.09
22 45 29 00-0013	EA		Emergency Eye Wash Drench Hose Unit, 45 Degree Panel Mounted (WaterSaver EW1041).....	1,320.62	66.09

22 45 33 Combination Emergency Fixture Units (22 45)

22 45 33 00-0001 Emergency Shower With Eye/Face Wash (22 45 33)

22 45 33 00-0002 Emergency Shower With Eye/Face Wash (Haws) (22 45 33 00-0001)

22 45 33 00-0003	EA		Floor Mounted, All Stainless Steel, Corrosion Resistant, Emergency Drench Shower With Axion® MSR Stainless Steel Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 8330)	3,990.08	343.64
22 45 33 00-0004	EA		Floor Mounted, Freeze Protected, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eyewash With Soft-Flo Heads And Stainless Steel Bowl (Haws 8300FP).....	2,702.83	343.64
22 45 33 00-0005	EA		Floor Mounted, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 8300-8309).....	1,884.18	343.64
22 45 33 00-0006	EA		Floor Mounted, Freeze Protected, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eyewash With Soft-Flo Heads And Stainless Steel Bowl (Haws 8300.158)	2,996.41	343.64
22 45 33 00-0007	EA		Floor Mounted, Corrosion Resistant, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 8300CRP-8309CRP)	2,200.35	343.64
22 45 33 00-0008	EA		Floor Mounted, Barrier-Free, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Stainless Steel Bowl (Haws 8309WC).....	2,070.49	343.64
22 45 33 00-0009	EA		Floor Mounted, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly (Haws 8317)	1,771.26	343.64
22 45 33 00-0010	EA		Floor Mounted, Corrosion Resistant, PVC Plastic, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Plastic Bowl (Haws 8336)	2,894.79	343.64
22 45 33 00-0011	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly With Stainless Steel Cabinet And Ceiling Mounted Axion® MSR Stainless Steel Showerhead (Haws 8355WCC).....	3,171.43	343.64
22 45 33 00-0012	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly With Stainless Steel Cabinet And Wall Mounted Axion® MSR Stainless Steel Showerhead (Haws 8355WCW).....	3,233.54	343.64
22 45 33 00-0013	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly With Stainless Steel Cabinet And Drain Pan And Ceiling Mounted Axion® MSR Stainless Steel Showerhead (Haws 8356WCC).....	3,611.81	343.64
22 45 33 00-0014	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly With Stainless Steel Cabinet And Drain Pan, Daylight Drain And Wall Mounted Axion® MSR Stainless Steel Showerhead (Haws 8356WCDD).....	3,832.00	343.64
22 45 33 00-0015	EA		Recessed Wall Mounted, Barrier-Free, Pull Down, Emergency Eye/Face Wash With Axion® MSR Wash Head Assembly With Stainless Steel Cabinet And Drain Pan And Wall Mounted Axion® MSR Stainless Steel Showerhead (Haws 8356WCW).....	3,769.89	343.64
22 45 33 00-0016	EA		Floor Mounted, 120 Volt AC Cable Heated, Freeze Protected, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly (Haws 8317CTFP).....	5,633.02	343.64
22 45 33 00-0017	EA		Floor Mounted, 220 Volt AC Cable Heated, Freeze Protected, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly (Haws 8317CTFP.220V).....	5,937.90	343.64
22 45 33 00-0018	EA		Floor Mounted, C1D1 Rated, 120 Volt AC Cable Heated, Freeze Protected, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly (Haws 8317CTFPC1D1).....	12,543.54	343.64
22 45 33 00-0019	EA		Floor Mounted, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Plastic Bowl (Haws 8320-8325)	1,771.26	343.64
22 45 33 00-0020	EA		Floor Mounted, Corrosion Resistant, Emergency Drench Shower With Axion® MSR ABS Plastic Showerhead And Eye/Face Wash With Axion® MSR Wash Head Assembly And Plastic Bowl (Haws 8320CRP)	2,002.74	343.64

22 45 33 00-0021 Emergency Shower With Eye/Face Wash (Speakman) (22 45 33 00-0001)

22 45 33 00-0022	EA		Floor Mounted, Emergency Drench Shower With Plastic Showerhead And Eye/Face Wash With Plastic Bowl (Speakman SE-690).....	1,685.46	343.64
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22 45 33 00-0023 Emergency Shower With Eye/Face Wash (WaterSaver) (22 45 33 00-0001)

22 45 33 00-0024	EA		All-Stainless Steel, Wide Area, Emergency Shower With Eye/Face Wash Station, Floor Mounted (WaterSaver SS994).....	6,268.20	287.05
22 45 33 00-0025	EA		Polished Chrome Construction, Wide Area, Emergency Shower With Eye/Face Wash Station, Floor Mounted (WaterSaver SS909PCC).....	6,406.77	287.05
22 45 33 00-0026	EA		Emergency Shower With Eye Wash Station And Stainless Steel Bowl, Floor Mounted (WaterSaver SS902)	2,501.55	287.05
22 45 33 00-0027	EA		Emergency Shower With Eye Wash Station And Plastic Bowl, Floor Mounted (WaterSaver SS902P)	2,285.96	287.05
22 45 33 00-0028	EA		Emergency Shower With Eye Wash Station And Stainless Steel Bowl And Cover, Floor Mounted (WaterSaver SS902BC).....	2,961.34	287.05

22 45 36 Emergency Fixture Water-Tempering Equipment (22 45)

22 45 36 00-0001 Emergency Fixture Water-Tempering Equipment (22 45 36)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 45 36 00-0002 Emergency Fixture Water-Tempering Equipment (Haws) <small>(22 45 36 00-0001)</small>		
22 45 36 00-0003 EA 10 GPM, 1/2" Inlet, 1/2" Outlet, Brass Thermostatic Mixing/Tempering Valve (Haws 9201EW).....	713.69	66.09
22 45 36 00-0004 EA 12 GPM, 1/2" Inlet, 3/4" Outlet, Brass Thermostatic Mixing/Tempering Valve (Haws 9201EFE).....	1,046.80	66.09
22 45 36 00-0005 EA 31 GPM, 1-1/4" Inlet, 1-1/4" Outlet, Brass Thermostatic Mixing/Tempering Valve (Haws 9201E).....	1,537.99	66.09
22 45 36 00-0006 EA 78 GPM, 1-1/4" Inlet, 1-1/4" Outlet, Brass Thermostatic Mixing/Tempering Valve (Haws 9202E).....	1,814.63	66.09
22 45 36 00-0007 EA 31 GPM, 1" Inlet, 1-1/4" Outlet, Secondary High Temperature Limit Valve, Lead Free, Brass Thermostatic Mixing/Tempering Valve (Haws 9201H).....	2,571.18	66.09
22 45 36 00-0008 EA 12 GPM, 1/2" Inlet, 3/4" Outlet, Secondary High Temperature Limit Valve, Brass Thermostatic Mixing/Tempering Valve (Haws TWBS.EWE).....	2,712.32	66.09
22 45 36 00-0009 EA 74 GPM, 1-1/4" Inlet, 1-1/4" Outlet, Secondary High Temperature Limit Valve, Lead Free, Brass Thermostatic Mixing/Tempering Valve (Haws TWBS.SHE).....	4,558.52	66.09
22 45 36 00-0010 EA 78 GPM, 2" Inlet, 2" Outlet, Secondary High Temperature Limit Valve, Lead Free, Brass Thermostatic Mixing/Tempering Valve (Haws TWBS.HF).....	5,478.79	66.09
22 45 36 00-0011 EA 1/2" Inlet, 1/2" Outlet, Brass Scald Protection Bleed Valve (Haws SP157B).....	798.38	66.09
22 45 39 Emergency Plumbing Fixture Accessories <small>(22 45)</small>		
22 45 39 00-0001 Emergency Plumbing Fixture Accessories <small>(22 45 39)</small>		
22 45 39 00-0002 Emergency Plumbing Fixture Accessories (Haws) <small>(22 45 39 00-0001)</small>		
22 45 39 00-0003 EA Pedestal Mounted, Powder Coated Aluminum Foot Control Assembly For Hands Free Activation Of Emergency Plumbing Fixtures (Haws SP220).....	183.44	21.15
22 45 39 00-0004 EA Wall Mounted, Powder Coated Aluminum Foot Control Assembly For Hands Free Activation Of Emergency Plumbing Fixtures (Haws SP220W).....	256.83	21.15
22 45 39 00-0005 EA Pedestal Mounted, Stainless Steel Foot Control Assembly For Hands Free Activation Of Emergency Plumbing Fixtures (Haws SP220SS).....	268.12	21.15
22 45 39 00-0006 EA Axion® MSR Stainless Steel Showerhead For Emergency Drench Showers (Haws SP829SS).....	298.15	7.93
22 45 39 00-0007 EA Stainless Steel Dust Cover For Emergency Eye/Face Wash Bowls (Haws 9102).....	304.16	5.29
22 45 39 00-0008 EA 3-Sided ABS Plastic Safety Sign For Emergency Combination Shower And Eyewash Units (Haws 9020).....	331.67	10.58
22 45 39 00-0009 EA Emergency Body Spray Kit With 8' Hose And ABS Plastic Head For Emergency Plumbing Fixtures (Haws 8901RFK).....	582.04	79.30
22 45 39 00-0010 EA Class 1, Div. 1, Group B, C And D, Indicator Light For Emergency Plumbing Fixtures (Haws 8317IDLTEXP).....	604.20	36.74
22 45 39 00-0011 EA Vapor Tight And Gasketed, Green Area Light For Emergency Plumbing Fixtures (Haws 8317LT).....	897.78	36.74
22 45 39 00-0012 EA Privacy Curtain For Horizontal Emergency Drench Shower Or Combination Emergency Drench Shower And Eyewash Units (Haws 9037).....	1,046.80	79.30
22 45 39 00-0013 EA Class 1, Div. 1, Group B, C And D, White Area Light For Emergency Plumbing Fixtures (Haws 8317LTEXP).....	1,998.72	36.74
22 45 39 00-0014 EA 1/2" Supply, Emergency Alarm And Light System For Emergency Plumbing Fixtures (Haws 9001.5).....	2,221.00	122.48
22 45 39 00-0015 EA 1-1/4" Supply, Emergency Alarm And Light System For Emergency Plumbing Fixtures (Haws 9001).....	2,266.16	122.48
22 45 39 00-0016 EA 1-1/4" Supply, Class 1, Division 2, Groups B, C, And D Emergency Alarm And Light System For Emergency Plumbing Fixtures (Haws 9001EXP).....	4,197.05	122.48
22 45 39 00-0017 EA 1-1/4" Supply, 90 db, Class 1, Division 1, Groups C And D, Emergency Alarm And Light System For Emergency Plumbing Fixtures (Haws 9001EXP1D1).....	7,979.76	122.48
22 45 39 00-0018 Emergency Plumbing Fixture Accessories (Speakman) <small>(22 45 39 00-0001)</small>		
22 45 39 00-0019 EA Privacy Curtain For Emergency Showers.....	1,094.57	79.31
	Note: Curtain includes stainless steel curtain rod and mounting accessories.	
22 45 39 00-0020 Emergency Plumbing Fixture Accessories (WaterSaver) <small>(22 45 39 00-0001)</small>		
22 45 39 00-0021 EA Hand And Foot Control For Emergency Eyewash Equipment (WaterSaver HFC).....	180.35	17.22
22 46 Security Plumbing Fixtures <small>(22 40)</small>		
22 46 13 Security Water Closets and Urinals <small>(22 46)</small>		
22 46 13 13 Security Water Closets <small>(22 46 13)</small>		
22 46 13 13-0001 Security Water Closets <small>(22 46 13 13)</small>		
22 46 13 13-0002 EA Security Water Closet, Integral Seat, Back Supply And Flush Valve, Wall Hung, Wall Outlet, Cast Aluminum (Acorn 1675).....	2,753.30	264.33
	<i>For Angled Toilet, Add</i>	
	26.43	
	<i>For Offset Toilet, Add</i>	
	248.90	
22 46 13 13-0003 EA Security Water Closet, Integral Seat, Back Supply And Flush Valve, Floor Mount, Wall Outlet, Cast Aluminum (Acorn 1684).....	3,326.34	264.33
	<i>For Angled Toilet, Add</i>	
	26.43	
	<i>For Offset Toilet, Add</i>	
	306.20	
22 46 13 13-0004 EA Security Water Closet, Integral Seat, Back Supply And Flush Valve, Floor Mount, Floor Outlet, Cast Aluminum (Acorn 1695).....	3,376.55	264.33
	<i>For Angled Toilet, Add</i>	
	26.43	
	<i>For Offset Toilet, Add</i>	
	311.22	
22 46 13 13-0005 EA Recessed Tissue Holder For Security Water Closet, Stainless Steel (Acorn 1840).....	311.66	52.87
22 46 13 16 Security Urinals <small>(22 46 13)</small>		
22 46 13 16-0001 Security Urinals <small>(22 46 13 16)</small>		
22 46 13 16-0002 EA Security Urinal, Back Supply And Flush, Wall Hung, Stainless Steel (Acorn 1700).....	3,250.98	237.90
22 46 13 16-0003 EA Security Urinal, Back Supply And Flush, Stall, Stainless Steel (Acorn 1720).....	5,511.39	338.03

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 46 13 19 Security Combination Toilet and Lavatory (22 46 13)

22 46 13 19-0001 Security Combination Toilet - Lavatory (22 46 13 19)

22 46 13 19-0002	EA	15" Wide Combination Security Water Closet And Lavatory Unit, Soap And Paper Holders, Seat, Wall Mounted, Stainless Steel (Acorn 1415)	4,980.19	327.77
		<i>For 15" Mirror/Shelf Module, Add</i>	877.78	
		<i>For Angled Toilet, Add</i>	32.78	
		<i>For Intercom Option, Add</i>	140.56	
		<i>For AC Duplex Outlet Option, Add</i>	95.56	
		<i>For 15" Wide Light/Ventilation Module, Add</i>	831.67	
		<i>For Offset Toilet, Add</i>	465.24	
22 46 13 19-0003	EA	18" Wide Combination Security Water Closet And Lavatory Unit, Soap And Paper Holders, Seat, Wall Mounted, Stainless Steel (Acorn 1418)	5,131.35	343.64
		<i>For Angled Toilet, Add</i>	34.36	
		<i>For 18" Wide Light/Ventilation Module, Add</i>	856.18	
		<i>For Intercom Option, Add</i>	143.73	
		<i>For AC Duplex Outlet Option, Add</i>	98.73	
		<i>For Offset Toilet, Add</i>	478.77	
		<i>For 18" Mirror/Shelf Module, Add</i>	918.63	
22 46 13 19-0004	EA	20" Wide Combination Security Water Closet And Lavatory Unit, Soap And Paper Holders, Seat, Wall Mounted, Stainless Steel (Acorn 1420)	5,246.18	359.49
		<i>For 20" Mirror/Shelf Module, Add</i>	969.50	
		<i>For Angled Toilet, Add</i>	35.95	
		<i>For Intercom Option, Add</i>	146.90	
		<i>For 20" Wide Light/Ventilation Module, Add</i>	890.70	
		<i>For AC Duplex Outlet Option, Add</i>	101.90	
		<i>For Offset Toilet, Add</i>	488.67	
22 46 13 19-0005	EA	26" Wide Combination Security Water Closet And Lavatory Unit, Soap And Paper Holders, Seat, Wall Mounted, Stainless Steel (Acorn 1426)	5,613.75	375.35
		<i>For 26" Wide Light/Ventilation Module, Add</i>	920.21	
		<i>For Angled Toilet, Add</i>	37.54	
		<i>For 26" Mirror/Shelf Module, Add</i>	1,010.35	
		<i>For Intercom Option, Add</i>	150.07	
		<i>For AC Duplex Outlet Option, Add</i>	105.07	
		<i>For Offset Toilet, Add</i>	523.84	
22 46 13 19-0006	EA	28" Wide Combination Security Water Closet And Lavatory Unit, Soap And Paper Holders, Seat, Floor Mounted, Stainless Steel (Acorn 1428)	9,033.52	391.21
		<i>For Angled Toilet, Add</i>	39.12	
		<i>For 28" Wide Light/Ventilation Module, Add</i>	949.73	
		<i>For Intercom Option, Add</i>	153.24	
		<i>For AC Duplex Outlet Option, Add</i>	108.24	
		<i>For Offset Toilet, Add</i>	864.23	
		<i>For 28" Mirror/Shelf Module, Add</i>	1,046.22	

22 46 16 Security Lavatories and Sinks (22 46)

22 46 16 13 Security Lavatories (22 46 16)

22 46 16 13-0001 Security Lavatories (22 46 16 13)

22 46 16 13-0002	EA	20" Security Lavatory, Wall Hung, Push Button Filler Valve, Rectangular Bowl, Stainless Steel (Acorn 1650)	1,984.04	185.04
		<i>For Shelf, Add</i>	90.51	
22 46 16 13-0003	EA	18" Security Lavatory, Wall Hung, Push Button Filler Valve, Oval Bowl, Stainless Steel (Acorn 1655)	2,017.28	185.04
		<i>For Shelf, Add</i>	90.51	
22 46 16 13-0004	EA	13" Security Lavatory, Wall Hung, Push Button Filler Valve, Oval Bowl, Corner Mount, Stainless Steel (Acorn 1660)	2,297.97	185.04
		<i>For Shelf, Add</i>	90.51	
22 46 16 13-0005	EA	18" Security Lavatory, Wall Hung, Push Button Filler Valve, Multi Sided Bowl, Stainless Steel (Acorn 1656)	2,017.28	185.04
		<i>For Shelf, Add</i>	90.51	

22 46 16 16 Security Sinks (22 46 16)

22 46 16 16-0001 Security Sinks (22 46 16 16)

22 46 16 16-0002	EA	22" x 16" x 10" Security Service Sink, With Soap Dish, Stainless Steel (Acorn 1642)	4,260.62	281.78
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22 46 16 16-0003 Security Mop Sink (22 46 16 16)

22 46 16 16-0004	EA	24" x 24" x 10" Stainless Steel Mop Sink With Strainer (ACORN 1630)	4,092.92	158.60
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22 46 19 Security Showers (22 46)

22 46 19 00-0001 Security Showers (22 46 19)

22 46 19 00-0002	EA	30" Security Shower, Stainless Steel, Knock-Down (Acorn 1730-3M-KD)	11,092.90	422.93
22 46 19 00-0003	EA	32" Security Shower, Stainless Steel, Knock-Down (Acorn 1732-3M-KD)	11,494.54	422.93
22 46 19 00-0004	EA	36" Security Shower, Stainless Steel, Knock-Down (Acorn 1736-3M-KD)	11,907.91	422.93
22 46 19 00-0005	EA	36" ADA Security Shower, Stainless Steel, Front Access (Acorn 1736-ADA-3M-FA)	15,144.52	422.93
22 46 19 00-0006	EA	Security Shower Package For Built-in, Hot And Cold Faucets, Mixing Valve, Rectangular Soap Dish, Stainless Steel (Acorn 1741)	721.34	141.15
22 46 19 00-0007	EA	Security Shower Head With Mixing Valves And Piping Assembly In Wall (Acorn 1743)	522.89	74.02

22 46 43 Security Plumbing Fixture Flushometers (22 46)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 46 43 00-0001 EA Concealed Manual Water Closet Flush Valve, With Pushbutton Control (Sloan 601 AFD ESM)	767.15	36.06
Note: Anti-flood device (AFD), solenoid operated with module plug 24V (ESM).		
22 46 43 00-0002 EA Concealed Manual Urinal Flush Valve, 1-1/2" Backinlet, With Pushbutton Control (Sloan 609 ESM)	766.26	36.06
Note: Solenoid operated with module plug 24V (ESM).		
22 46 43 00-0003 EA Concealed Manual Urinal Flush Valve, 3/4" Backinlet, With Pushbutton Control (Sloan 613 ESM)	740.22	36.06
Note: Solenoid operated with module plug 24V (ESM).		
22 46 56 Security Drinking Fountains (22 46)		
22 46 56 00-0001 Security Drinking Fountain (22 46 56)		
Note: Includes air control valve, bubbler with mouthguard and mounting bracket.		
22 46 56 00-0002 EA Wall Mounted Security Drinking Fountain, Stainless Steel (Acorn 1670-1-BP-3-FA)	2,242.68	211.47
22 46 56 00-0003 EA Wall Mounted Security ADA Drinking Fountain, Stainless Steel (Acorn 1672-1-ADA-BP-3-FA)	2,258.71	211.47
22 47 Drinking Fountains and Water Coolers (22 40)		
22 47 13 Drinking Fountains (22 47)		
22 47 13 00-0001 Indoor Drinking Fountains (22 47 13)		
22 47 13 00-0002 Face Mounted Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0003 EA Stainless Steel, Standard Length, Semi-Circular Indoor Drinking Fountain With Bubbler, 180 Degree Push Bar (Halsey-Taylor OVL-II-S)	1,751.78	171.82
22 47 13 00-0004 EA Stainless Steel, Standard Length, Semi-Circular With Back Panel Indoor Drinking Fountain With Bubbler, 180 Degree Push Bar (Halsey-Taylor OVL-II-SBP)	2,542.34	185.04
22 47 13 00-0005 EA Stainless Steel, Extended Length, Semi-Circular Indoor Drinking Fountain With Bubbler, 180 Degree Push Bar (Halsey-Taylor OVL-II-E)	2,301.06	171.82
22 47 13 00-0006 EA Stainless Steel, Extended Length, Semi-Circular With Back Panel Indoor Drinking Fountain With Bubbler, 180 Degree Push Bar (Halsey-Taylor OVL-II-EBP)	2,740.17	185.04
22 47 13 00-0007 EA Stainless Steel, Standard Length, Rectangle Indoor/Outdoor Drinking Fountain With Bubbler, Rounded Corners (Halsey-Taylor HRF)	1,181.74	171.82
22 47 13 00-0008 EA Stainless Steel, Standard Length, Rectangle With Back Panel Indoor/Outdoor Drinking Fountain With Bubbler, Rounded Corners With Back Panel (Halsey-Taylor HRF)	1,410.30	185.04
22 47 13 00-0009 EA Stainless Steel, Extended Length, Rectangle Indoor/Outdoor Drinking Fountain With Bubbler, Rounded Corners (Halsey-Taylor HRF)	1,333.71	171.82
22 47 13 00-0010 EA Stainless Steel, Extended Length, Rectangle With Back Panel Indoor/Outdoor Drinking Fountain With Bubbler, Rounded Corners (Halsey-Taylor HRF)	1,615.69	185.04
22 47 13 00-0011 Wall Mounted Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0012 EA Stainless Steel Wall-Mounted Rectangle Indoor Drinking Fountain With Bubbler, Backsplash, Front And Side Push Bars (Halsey-Taylor 5701)	1,217.70	185.04
22 47 13 00-0013 EA Stainless Steel Wall-Mounted Rectangle Indoor Drinking Fountain/Bottle Filling Station With Bubbler, Backsplash, Front And Side Push Bars (Halsey-Taylor HTHB-HAC8WF)	1,854.22	185.04
22 47 13 00-0014 EA Bi-Level, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountains (Halsey-Taylor HTHB-HAC8BLWF)	2,350.79	237.90
22 47 13 00-0015 EA Bi-Level, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountains (Elkay VRCGRN8WSK)	3,467.81	237.90
22 47 13 00-0016 EA Bi-Level, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountains (Elkay EZSTL8WSLK)	2,980.55	237.90
22 47 13 00-0017 EA Bi-Level, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountains (Elkay LZSTL8WSSP)	2,712.03	237.90
22 47 13 00-0018 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay LVRC8WSK)	3,060.44	185.04
22 47 13 00-0019 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Non-Filtered Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay VRC8WSK)	2,956.02	185.04
22 47 13 00-0020 EA Stainless Steel Wall-Mounted Indoor Hands-Free Filtered Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay LVRC8WSK)	2,828.41	185.04
22 47 13 00-0021 EA Stainless Steel Wall-Mounted Indoor Hands-Free Non-Filtered Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay VRC8WSK)	2,712.39	185.04
22 47 13 00-0022 EA Stainless Steel Wall-Mounted High-Efficiency Indoor Chilled Hands-Free Filtered Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay LVRCGRN8WSK)	2,468.76	185.04
22 47 13 00-0023 EA Stainless Steel Wall-Mounted High-Efficiency Indoor Chilled Hands-Free Non-Filtered Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay VRCGRN8WSK)	2,364.35	185.04
22 47 13 00-0024 EA Stainless Steel Wall-Mounted High-Efficiency Indoor Chilled Hands-Free Filtered Bottle Filling Station With Drinking Fountain (Elkay LZSG8WSSK)	2,248.33	185.04
22 47 13 00-0025 EA Stainless Steel Wall-Mounted Indoor Chilled Filtered Bottle Filling Station With Hands-Free Touchless Sensor Drinking Fountain (Elkay LZOG8WSSK)	2,248.33	185.04
22 47 13 00-0026 EA Stainless Steel Wall-Mounted Indoor Chilled Non-Filtered Bottle Filling Station With Hands-Free Fountain (Elkay EZOG8WSSK)	2,143.92	185.04
22 47 13 00-0027 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Bottle Filling Station With Drinking Fountain (Elkay EZSG8WSSK)	2,143.92	185.04
22 47 13 00-0028 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Filtered Bottle Filling Station With Drinking Fountain (Elkay LMABF8WSSK)	2,097.52	185.04
22 47 13 00-0029 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Filtered Bottle Filling Station With Vandal-Resistant Drinking Fountain (Elkay LZS8WSVRSK)	2,097.52	185.04
22 47 13 00-0030 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Non-Filtered Bottle Filling Station With Drinking Fountain (Elkay EMABF8WSSK)	1,993.10	185.04
22 47 13 00-0031 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Filtered Bottle Filling Station With Drinking Fountain (Elkay LZS8WSSK)	1,935.10	185.04
22 47 13 00-0032 EA Stainless Steel Wall-Mounted Indoor Chilled Hands-Free Filtered Bottle Filling Station With Drinking Fountain (Elkay LZS8WSSP)	1,853.89	185.04

22 Plumbing**22 40 Plumbing Fixtures****22 47 Drinking Fountains and Water Coolers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 47 13 00-0033	EA		Stainless Steel Wall-Mounted Indoor Hands-Free Filtered Bottle Filling Station With Drinking Fountain (Elkay LZSDWSSK).....	1,819.08	185.04
22 47 13 00-0034	EA		Stainless Steel Wall-Mounted Indoor Hands-Free Non-Filtered Bottle Filling Station With Drinking Fountain (Elkay EMABFDWSLK).....	1,703.07	185.04
22 47 13 00-0035	EA		Vinyl Clad Cabinet, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountain (Elkay EMABF8WSLK).....	1,935.10	185.04
22 47 13 00-0036	EA		Vinyl Clad Cabinet, Non-Chilled, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountain (Elkay EMABFDWSLK).....	1,703.07	185.04
22 47 13 00-0037	EA		Vinyl Clad Cabinet, Stainless Steel Wall-Mounted Indoor Bottle Filling Station With Drinking Fountain (Elkay LZS8WSLK).....	1,805.33	185.04
22 47 13 00-0038	EA		Vinyl Clad Cabinet, Stainless Steel Wall-Mounted Indoor, Bottle Filling Station With Drinking Fountain (Elkay LZS8WSLP).....	1,807.48	185.04
22 47 13 00-0039	EA		Surface Mounted, Stainless Steel, Filtered Non-Refrigerated, Bottle Filling Station Kit (Elkay LZWSSM).....	1,492.92	132.17
22 47 13 00-0040	EA		Wall Mounted, Non-Filtered Non-Refrigerated, Retrofit Bottle Filling Station Kit (Elkay EMABFWS-RF).....	1,121.68	132.17
22 47 13 00-0041			Semi-Recessed Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0042	EA		Stainless Steel Semi-Recessed Indoor Drinking Fountain With Bubblers (Halsey-Taylor 5801).....	1,628.75	198.25
22 47 13 00-0043	EA		Stainless Steel Semi-Recessed Indoor Drinking Fountain With Bubblers And Cuspidor (Halsey-Taylor 5801C).....	3,462.83	198.25
22 47 13 00-0044			Fully Recessed Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0045	EA		Stainless Steel Fully-Recessed, With Bubblers, Indoor Drinking Fountain (Halsey-Taylor 8880, Haws 2400).....	1,742.07	211.47
22 47 13 00-0046	EA		Stainless Steel Fully-Recessed, With Bubblers And Cuspidor, Indoor Drinking Fountain (Halsey-Taylor 8800 With 10245, Haws 2403).....	3,149.15	211.47
22 47 13 00-0047			Countertop Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0048	EA		Stainless Steel Countertop Circular Indoor Drinking Fountain Basin With Pushbutton Bubblers (Halsey-Taylor 10000).....	729.47	132.17
22 47 13 00-0049	EA		Stainless Steel Countertop Rectangular Indoor Drinking Fountain Basin With Pushbutton Bubblers (Halsey-Taylor 6000).....	702.98	132.17
22 47 13 00-0050	EA		Stainless Steel Countertop Oval Indoor Drinking Fountain Basin With Pushbutton Bubblers (Halsey-Taylor 6028).....	848.14	132.17
22 47 13 00-0051			Bowl And Bracket Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0052	EA		Stainless Steel, Bowl And Bracket With Pushbutton Bubblers, Indoor Drinking Fountain (Halsey-Taylor 2501A).....	619.28	132.17
22 47 13 00-0053	EA		Stainless Steel, Bowl And Bracket, Self Closing Lever Handle Stop, Indoor Drinking Fountain (Halsey-Taylor 4540).....	742.33	132.17
22 47 13 00-0054			Multi-Station Indoor Drinking Fountain (22 47 13 00-0001)		
22 47 13 00-0055	EA		Two Station, Stainless Steel, Indoor Drinking Fountains With Bubblers And Built In Backsplash, With Bottom Cover Plate (Halsey-Taylor 7020).....	3,270.99	211.47
22 47 13 00-0056	EA		Three Station, Stainless Steel, Indoor Drinking Fountains With Bubblers And Built In Backsplash, With Bottom Cover Plate (Halsey-Taylor 7030).....	4,105.87	211.47
22 47 13 00-0057	EA		Two Station, Marble, Face-Mounted Indoor Drinking Fountain With Bubblers (Halsey-Taylor 7120).....	3,121.48	211.47
22 47 13 00-0058	EA		Two Station, White Enameled Iron Indoor Drinking Fountains With Bubblers (Haws 1430).....	2,637.38	211.47
22 47 13 00-0059	EA		Three Station, White Enameled Iron Indoor Drinking Fountains With Bubblers (Haws 1435).....	3,313.38	211.47
22 47 13 00-0060	EA		Bi-Level, Stainless Steel, Indoor Drinking Fountain With Bubblers And Back Panel (Halsey-Taylor HRFSEBP, Haws 1119.14 With 6700.4).....	2,898.88	269.75
22 47 13 00-0061	EA		Two Station, Cast Aluminum Indoor Drinking Fountains With Bubblers (Haws 1441).....	5,407.80	211.47
22 47 13 00-0062	EA		Three Station, Cast Aluminum Indoor Drinking Fountains With Bubblers (Haws 1408).....	5,311.75	211.47
22 47 13 00-0063			Outdoor Drinking Fountains (22 47 13)		
22 47 13 00-0064			Face Mounted Outdoor Drinking Fountains (22 47 13 00-0063)		
22 47 13 00-0065	EA		Stainless Steel Freeze Resistant Face Mounted Outdoor Drinking Fountain With Bubblers (Halsey-Taylor HRFSE-FR).....	1,524.69	211.47
22 47 13 00-0066	EA		Stainless Steel Freeze Resistant Face Mounted, With Back Panel, Outdoor Drinking Fountain With Bubblers (Halsey-Taylor HRFSEBP-FR).....	1,668.56	211.47
22 47 13 00-0067	EA		Stone Aggregate Weather Resistant Face Mounted Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4592).....	1,606.09	211.47
22 47 13 00-0068	EA		Stone Aggregate Freeze Resistant Face Mounted Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4592-FR).....	2,342.49	211.47
22 47 13 00-0069			Free Standing Outdoor Drinking Fountains (22 47 13 00-0063)		
22 47 13 00-0070	EA		Steel Pedestal Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4715).....	2,866.92	198.25
22 47 13 00-0071	EA		Steel Pedestal Freeze Resistant Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4715-FR).....	4,015.06	198.25
22 47 13 00-0072	EA		Steel Barrier-Free Pedestal Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4710).....	2,863.11	198.25
22 47 13 00-0073	EA		Steel Barrier-Free Pedestal Freeze Resistant Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4710-FR).....	3,941.73	198.25
22 47 13 00-0074	EA		Steel Barrier-Free Bi-level Pedestal Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4720).....	4,248.80	211.47
22 47 13 00-0075	EA		Steel Barrier-Free Bi-level Pedestal Freeze Resistant Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4720-FR).....	4,325.47	211.47
22 47 13 00-0076	EA		Stone Aggregate Pedestal Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4591).....	1,625.07	198.25
22 47 13 00-0077	EA		Stone Aggregate Barrier-Free Pedestal Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4590).....	2,783.63	198.25
22 47 13 00-0078	EA		Stone Aggregate Barrier-Free Pedestal Freeze Resistant Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4590-FR).....	3,931.77	198.25
22 47 13 00-0079	EA		Stone Aggregate Barrier-Free Bi-level Pedestal Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4595).....	4,624.57	211.47



Plumbing	22	22
Plumbing Fixtures	22 40	
Drinking Fountains and Water Coolers	22 47	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
22 47 13 00-0080	EA	Stone Aggregate Barrier-Free Bi-level Pedestal Freeze Resistant Outdoor Drinking Fountain With Bubblers (Halsey-Taylor 4595-FR).....	6,477.88		211.47
22 47 16 Pressure Water Coolers (22 47)					
22 47 16 00-0001 Indoor Water Coolers (22 47 16)					
22 47 16 00-0002 Face Mounted Indoor Water Coolers (22 47 16 00-0001)					
22 47 16 00-0003	EA	Stainless Steel, Semi-Circular Water Cooler With Bubblers, Face-Mounted, Extended Length, 180 Degree Push Bar, 7.5 GPH (Halsey-Taylor OVL-II ER-Q).....	3,286.18		211.47
22 47 16 00-0004	EA	Stainless Steel, Semi-Circular Water Cooler, Electronic Sensor, Face-Mounted, Extended Length, With Bubblers, 7.5 GPH (Halsey-Taylor OVL-II EREE-Q).....	3,506.72		211.47
22 47 16 00-0005 Wall Mounted Indoor Water Coolers (22 47 16 00-0001)					
22 47 16 00-0006	EA	Stainless Steel Wall-Mounted Compact Water Cooler, 4 GPH, With Bubblers, (Halsey-Taylor SW4A-Q).....	1,577.70		211.47
22 47 16 00-0007	EA	Stainless Steel Wall-Mounted Compact Water Cooler, 8 GPH, With Bubblers (Halsey-Taylor SW8A-Q).....	1,634.49		211.47
22 47 16 00-0008	EA	Stainless Steel Wall-Mounted Compact Water Cooler, 14 GPH, With Bubblers (Halsey-Taylor SW14A-Q).....	1,812.43		211.47
22 47 16 00-0009	EA	Stainless Steel Wall-Mounted Vandal Resistant Compact Water Cooler With Bubblers, 8 GPH (Halsey-Taylor SW8A-VR-Q-SS).....	1,880.58		211.47
22 47 16 00-0010	EA	Stainless Steel Wall-Mounted Vandal Resistant Barrier Free Water Cooler With Bubblers, 8 GPH (Halsey-Taylor HVR8-CHILD ADA).....	1,399.75		211.47
22 47 16 00-0011	EA	Stainless Steel Wall-Mounted Barrier Free Water Cooler With Bubblers, Front And Side Pushbar, 8 GPH (Halsey-Taylor WC8AFS-Q-SS).....	1,617.45		211.47
22 47 16 00-0012	EA	Stainless Steel Wall-Mounted Barrier Free Water Cooler With Bubblers, Front And Side Pushbar, 8 GPH (Halsey-Taylor HAC8FS-Q Child SS).....	1,277.65		211.47
22 47 16 00-0013	EA	Stainless Steel, Wall Mounted, Barrier Free, Bi-Level Indoor Water Cooler With Bubblers, 8 GPH (Halsey-Taylor HAC8FSBL-Q-SS).....	2,137.49		317.20
22 47 16 00-0014 Simulated Recessed Indoor Water Coolers (22 47 16 00-0001)					
22 47 16 00-0015	EA	Stainless Steel Simulated Recessed Water Cooler With Bubblers, 8 GPH (Halsey-Taylor RWM8A-Q).....	1,876.63		211.47
22 47 16 00-0016 Fully Recessed Indoor Water Coolers (22 47 16 00-0001)					
22 47 16 00-0017	EA	Stainless Steel Fully-Recessed Water Cooler With Bubblers, 8 GPH (Halsey-Taylor RC8A-Q).....	3,624.86		237.90
22 47 16 00-0018	EA	Stainless Steel Fully-Recessed Water Cooler With Bubblers And Cup Dispenser, 8 GPH (Halsey-Taylor RC8AQ + 14762).....	4,421.51		237.90
22 47 16 00-0019	EA	Stainless Steel Fully-Recessed Water Cooler With Bubblers And Cup Dispenser And Glass Filler, 8 GPH (Halsey-Taylor RC8A-Q-14700).....	5,170.62		237.90
22 47 16 00-0020 Free Standing Indoor Water Coolers (22 47 16 00-0001)					
22 47 16 00-0021	EA	Stainless Steel, Free-Standing Indoor Water Cooler, 4 GPH, With Bubblers (Halsey-Taylor SCWT4A-Q).....	1,518.20		185.04
22 47 16 00-0022	EA	Stainless Steel, Free-Standing Indoor Water Cooler, 8 GPH, With Bubblers (Halsey-Taylor SCWT8A-Q).....	1,628.94		185.04
22 47 16 00-0023	EA	Stainless Steel, Free-Standing Indoor Water Cooler, 14 GPH, With Bubblers (Halsey-Taylor SCWT14A-Q).....	1,845.70		185.04
22 47 16 00-0024	EA	Stainless Steel, Free-Standing Vandal Resistant Water Cooler With Bubblers, 14 GPH (Halsey-Taylor SCWT14A-VR-Q).....	2,051.10		185.04
22 47 16 00-0025 Bottled Water Coolers (22 47 16 00-0001)					
22 47 16 00-0026	EA	Free-Standing Bottled Water Cooler With Chilled Or Room Temperature Water.....	530.75		105.73
22 47 16 00-0027	EA	Free-Standing Bottled Water Cooler With Chilled Or Hot Water.....	632.46		105.73
22 47 16 00-0028 Multi-Station Indoor Water Coolers (22 47 16 00-0001)					
22 47 16 00-0029	EA	Stainless Steel, Wall Mounted, Two Station, Semi-Circular Indoor Water Cooler With Bubblers, 180 Degree Push Bars, 7.5 GPH (Halsey-Taylor OVL-II SER-Q).....	4,344.10		317.20
22 47 16 00-0030	EA	Stainless Steel, Wall Mounted, Two Station, Electronic Sensor Semi Circular Indoor Water Cooler With Bubblers, 180 Degree Push Bars, 7.5 GPH (Halsey-Taylor OVL-II-SEREE-Q).....	4,981.79		317.20
22 47 16 00-0031	EA	Stainless Steel, Wall Mounted, Barrier Free, Bi-Level, Vandal Resistant Indoor Water Cooler With Bubblers, 8 GPH (Halsey-Taylor HVR8BL-CHILD ADA-SS).....	2,314.49		317.20
22 47 16 00-0032 Outdoor Water Coolers (22 47 16)					
22 47 16 00-0033 Wall Mounted Outdoor Water Coolers (22 47 16 00-0032)					
22 47 16 00-0034	EA	Stainless Steel, Wall Mounted, Barrier Free, Vandal Resistant, Frost Resistant Outdoor Water Cooler With Bubblers, 8 GPH (Halsey-Taylor HVR8FR-CHILD ADA-SS).....	1,625.85		132.17
22 47 16 00-0035	EA	Stainless Steel, Wall Mounted, Barrier Free, Bi-Level, Vandal Resistant Outdoor Water Cooler With Bubblers, 8 GPH (Halsey-Taylor HVR8BLFR-CHILD ADA-SS).....	2,785.88		132.17
22 47 16 00-0036 Free Standing Outdoor Water Coolers (22 47 16 00-0032)					
22 47 16 00-0037	EA	Stainless Steel Free-Standing Outdoor Water Cooler With Bubblers, 14 GPH (Halsey-Taylor HOF14A-Q).....	2,680.45		198.25
22 47 16 00-0038	EA	Stainless Steel Free-Standing Frost Resistant Outdoor Water Cooler With Bubblers, 14 GPH (Halsey-Taylor HOF14A-FR-Q).....	3,210.51		198.25

22 Plumbing**22 40 Plumbing Fixtures****22 47 Drinking Fountains and Water Coolers**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 47 16 00-0039	Removal And Reinstallation Of Fixtures And Trim (22 47 16)		
	Note: Includes storage, cleaning and supply materials for reconnecting pipe to fixture.		
22 47 16 00-0040	EA Removal And Reinstallation Of Wall Hung Water Cooler.....	513.98	
22 47 16 00-0041	EA Removal And Reinstallation Of Floor Mount Water Cooler.....	114.82	
22 47 19	Water-Station Water Coolers (22 47)		
22 47 19 00-0001	Bottle Filler (22 47 19)		
22 47 19 00-0002	EA Outdoor Tubular Bottle Filling Station, Surface Mount (Elkay LK4410BF).....	3,971.81	211.47
	For Stainless Steel Carrier, Add	205.00	
22 47 19 00-0003	EA Outdoor Tubular Bottle Filling Station, Surface Mount, Freeze Resistant (Elkay LK4410BFFRK).....	4,893.99	211.47
	For Stainless Steel Carrier, Add	205.00	
22 47 19 00-0004	EA Tri-level Outdoor Tubular Bottle Filling Station With Single Bottle Filler And Two Drinking Fountain Basins, Surface Mount (Elkay LK4430BF1).....	6,279.74	237.90
	For Stainless Steel Carrier, Add	205.00	
22 47 19 00-0005	EA Tri-level Outdoor Tubular Bottle Filling Station With Two Bottle Fillers And Single Drinking Fountain Basin, Surface Mount (Elkay LK4430BF2).....	6,783.99	237.90
	For Stainless Steel Carrier, Add	205.00	
22 47 19 00-0006	EA Tri-level Outdoor Tubular Bottle Filling Station With Three Bottle Fillers, Surface Mount (Elkay LK4430BF3).....	7,288.23	237.90
	For Stainless Steel Carrier, Add	205.00	
22 47 23	Remote Water Coolers (22 47)		
22 47 23 00-0001	Remote Chillers (22 47 23)		
22 47 23 00-0002	EA 1.5 GPH Remote Chiller (Halsey-Taylor SJ1-Q).....	935.92	71.37
22 47 23 00-0003	EA 5 GPH Remote Chiller (Halsey-Taylor SJ5-Q).....	1,419.38	79.30
22 47 23 00-0004	EA 8 GPH Remote Chiller (Halsey-Taylor SJ8-Q).....	1,222.43	92.51
22 47 23 00-0005	EA 10 GPH Remote Chiller (Halsey-Taylor SJ10-Q).....	1,571.63	105.73
22 47 23 00-0006	EA 19 GPH Remote Chiller (Halsey-Taylor SJ19-Q).....	2,461.10	158.60
22 47 23 00-0007	EA 30 GPH Remote Chiller (Halsey-Taylor SJ30-Q).....	2,668.30	171.82
22 47 26	Fixture Carriers (22 47)		
22 47 26 00-0001	Water Cooler Carriers (22 47 26)		
22 47 26 00-0002	Floor Mounted, Water Cooler Carriers (22 47 26 00-0001)		
	Note: Includes adjustable supporting rods, structural uprights and welded feet.		
22 47 26 00-0003	EA Floor Mounted Hanger Plate Type, Single Water Cooler Carrier.....	581.55	40.18
	For Up To 4" Extension Sleeves And Hardware, Add	24.54	
	For Bi-Level Carrier, Add	279.92	
22 47 26 00-0004	EA Floor Mounted Bearing Plate Type, Single Water Cooler Carrier.....	549.26	40.18
	For Up To 4" Extension Sleeves And Hardware, Add	24.54	
	For Bi-Level Carrier, Add	279.92	
22 50	Pool and Fountain Plumbing Systems (22)		
22 51	Swimming Pool Plumbing Systems (22 50)		
22 51 13	Swimming Pool Piping (22 51)		
22 51 13 00-0001	Swimming Pool Gutters (22 51 13)		
22 51 13 00-0002	LF Swimming Pool Gutters, Stainless.....	271.55	23.79
22 51 13 00-0003	Pool Drains (22 51 13)		
22 51 13 00-0004	Cast Iron Pool Drain With Bottom Outlet (22 51 13 00-0003)		
	Note: Large square top and 24" loose set round super-flo grate.		
22 51 13 00-0005	EA Cast Iron Pool Drain, 4" - 8" Bottom Outlet, Large Square Top And 24" Super-Flo Grate.....	2,835.12	66.61
	For Galvanized Top, Add	276.40	
	For Polished Bronze Top, Add	769.60	
	For Vandal Proof Construction, Add	57.20	
	For Chromium Plated Top, Add	805.00	
22 51 13 00-0006	Cast Iron Pool Drain With Waterproof Flange (22 51 13 00-0003)		
	Note: Bottom outlet 14" square top and loose set square flange.		
22 51 13 00-0007	EA Cast Iron Pool Drain, 2" - 4" Bottom Outlet With Waterproof Flange And 14" Square Top.....	798.05	66.61
	For Galvanized Top, Add	38.10	
	For Supplementary Strainer, Add	7.00	
	For Ground Screw, Add	18.30	
	For Hinge Grate, Add	28.60	
	For Clamp Device, Add	13.80	
	For Vandal Proof Construction, Add	17.10	
	For Polished Bronze Top, Add	133.50	
	For Threaded Outlet, Add	9.50	
	For Chromium Plated Top, Add	146.90	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 51 13 00-0008 Pool Supply Fittings (22 51 13)		
22 51 13 00-0009 Cast Iron Pool Supply Fittings (22 51 13 00-0008)		
Note: Includes polished bronze head and anchor flange and adjustable V-ported valve insert and threaded inlet.		
22 51 13 00-0010 EA Cast Iron Pool Fitting For 2" Pipe	1,031.66	118.95
For Grounding Screw, Add	18.30	
For Galvanized Head, Add	26.30	
For Vandal Proof Construction, Add	11.50	
22 51 13 00-0011 EA Cast Iron Pool Fitting For 3" Pipe	1,031.66	118.95
For Grounding Screw, Add	18.30	
For Galvanized Head, Add	26.30	
For Vandal Proof Construction, Add	11.50	
For Chromium Plated Head, Add	11.50	
22 51 16 Swimming Pool Pumps (22 51)		
22 51 16 00-0001 Variable Speed Pool Pumps (22 51 16)		
22 51 16 00-0002 EA 3 HP, Variable Speed Pool Pump With Vacuum Release (Pentair INTELLIFLO VS+SVRS 11017)	2,721.62	449.37
22 51 16 00-0003 EA Variable Speed Pool Pump (Hayward EcoStar SVRS SP3400VSP)	2,980.31	449.37
22 51 16 00-0004 EA Variable Speed Pool Pump With Vacuum Release (Hayward EcoStar SVRS SP3400VSPVR)	3,327.53	449.37
22 51 16 00-0005 Electric Powered Portable Vacuum Cleaner Pump (22 51 16)		
Note: Includes 75' of 3 wire electric safety cord.		
22 51 16 00-0006 EA 1 HP Electric Portable Vacuum Cleaner Pump With 75' Of 3-Wire Safety Cord	367.95	52.87
22 51 16 00-0007 EA 1-1/2 HP Electric Portable Vacuum Cleaner Pump With 75' Of 3-Wire Safety Cord	640.79	52.87
22 51 16 00-0008 Gasoline Driven Portable Vacuum Cleaner Pump (22 51 16)		
22 51 16 00-0009 EA 3 HP Gasoline Driven Portable Vacuum Cleaner Pump	2,454.65	52.87
22 51 19 Swimming Pool Water Treatment Equipment (22 51)		
22 51 19 00-0001 Condensing Pool Water Heater (22 51 19)		
22 51 19 00-0002 EA 372 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN400)	40,280.12	757.81
22 51 19 00-0003 EA 467 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN501)	43,869.49	909.36
22 51 19 00-0004 EA 567 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN601)	48,109.50	985.15
22 51 19 00-0005 EA 660 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN701)	59,124.24	1,060.93
22 51 19 00-0006 EA 773 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN801)	61,321.85	1,136.70
22 51 19 00-0007 EA 967 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN1015)	93,009.22	1,364.05
22 51 19 00-0008 EA 1,257 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN1320)	119,234.24	1,439.83
22 51 19 00-0009 EA 1,450 MBH, 97% Efficient, Gas Fired, Indirect, Condensing Pool Water Heater (Lochinvar XPN1520)	124,033.97	1,553.50
22 51 19 00-0010 Non-Condensing Pool Water Heater (22 51 19)		
22 51 19 00-0011 EA 500 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN0502)	21,599.56	985.15
22 51 19 00-0012 EA 650 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN0652)	23,018.22	1,060.93
22 51 19 00-0013 EA 750 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN0752)	25,079.67	1,136.70
22 51 19 00-0014 EA 990 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN0992)	33,163.95	1,364.05
22 51 19 00-0015 EA 1,260 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN1262)	38,452.08	1,439.83
22 51 19 00-0016 EA 1,440 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN1442)	41,046.33	1,553.50
22 51 19 00-0017 EA 1,800 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN1802)	40,655.33	1,629.28
22 51 19 00-0018 EA 2,070 MBH, 89% Efficient, Gas Fired, Copper Finned Tube, Non-Condensing Pool Water Heater (Lochinvar CPN2072)	52,763.28	1,667.17
22 51 19 00-0019 Swimming Pool Heaters (22 51 19)		
Note: Excludes wiring, external piping, base or pad. Commercial pools.		
22 51 19 00-0020 Electric Pool Heaters (22 51 19 00-0019)		
22 51 19 00-0021 EA 12 KW Heater (1 Degree/Hour), For 4,800 Gallon Pool	4,328.04	211.47
22 51 19 00-0022 EA 18 KW Heater (1 Degree/Hour), For 7,200 Gallon Pool	4,838.35	227.33
22 51 19 00-0023 EA 24 KW Heater (1 Degree/Hour), For 9,600 Gallon Pool	5,373.72	264.33
22 51 19 00-0024 EA 30 KW Heater (1 Degree/Hour), For 12,000 Gallon Pool	5,683.48	317.20
22 51 19 00-0025 EA 36 KW Heater (1 Degree/Hour), For 14,400 Gallon Pool	6,239.95	444.08
22 51 19 00-0026 EA 60 KW Heater (1 Degree/Hour), For 24,000 Gallon Pool	7,135.47	634.40
22 51 19 00-0027 Gas Fired Pool Heaters (22 51 19 00-0019)		
22 51 19 00-0028 EA 120 MBH Output Gas Fired Pool Heater	5,962.05	1,030.48
22 51 19 00-0029 EA 180 MBH Output Gas Fired Pool Heater	6,771.65	1,177.69
22 51 19 00-0030 EA 240 MBH Output Gas Fired Pool Heater	7,652.02	1,324.90
22 51 19 00-0031 EA 300 MBH Output Gas Fired Pool Heater	8,799.71	1,619.32

22 Plumbing**22 50 Pool and Fountain Plumbing Systems****22 51 Swimming Pool Plumbing Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 51 19 00-0032	EA	360 MBH Output Gas Fired Pool Heater.....	9,060.31	1,708.88
22 51 19 00-0033	EA	400 MBH Output Gas Fired Pool Heater.....	10,631.04	2,096.90
22 51 19 00-0034	EA	500 MBH Output Gas Fired Pool Heater.....	16,776.80	2,419.50
22 51 19 00-0035	EA	600 MBH Output Gas Fired Pool Heater.....	19,462.56	2,661.46
22 51 19 00-0036	EA	750 MBH Output Gas Fired Pool Heater.....	21,953.20	2,903.40
22 51 19 00-0037	EA	1,000 MBH Output Gas Fired Pool Heater.....	28,166.17	3,427.62

22 51 19 00-0038 Surge Tanks (22 51 19)

Note: Includes 100 GPM vertical pump with 2 HP motor and electronic float switch. Prices are for 1' To 5' sump depth for pump.

22 51 19 00-0039	EA	1,000 Gallon Surge Tank, With 2 HP Motor With 100 GPM Vertical Pump And Electric Float Switch.....	22,916.91	841.79
22 51 19 00-0040	EA	1,500 Gallon Surge Tank, With 2 HP Motor With 100 GPM Vertical Pump And Electric Float Switch.....	25,778.39	841.79
22 51 19 00-0041	EA	2,000 Gallon Surge Tank, With 2 HP Motor With 100 GPM Vertical Pump And Electric Float Switch.....	31,040.92	1,077.44
22 51 19 00-0042	EA	5,000 Gallon Surge Tank, With 2 HP Motor With 100 GPM Vertical Pump And Electric Float Switch.....	40,796.81	1,738.87

22 51 19 00-0043 Diatomite Type Filter System (22 51 19)

22 51 19 00-0044	EA	35,000 Gallon Filter System, Diatomite.....	14,696.10	3,009.61
22 51 19 00-0045	EA	45,000 Gallon Filter System, Diatomite.....	17,521.13	3,611.53

22 51 19 00-0046 Silver Recovery System, X-Ray Film Processing (22 51 19)

22 51 19 00-0047	EA	20 Gallon/Day Capacity, Silver Recovery System.....	1,999.35	358.81
22 51 19 00-0048	EA	40 Gallon/Day Capacity, Silver Recovery System.....	2,937.67	478.45

22 51 19 00-0049 Inline Water Filter (22 51 19)

Note: 3/8" NPT threaded inlet and outlet, 125 PSI, includes one filter cartridge.

22 51 19 00-0050	EA	2 GPM Water Filter, 100 Degree Temperature, 8" x 5" Diameter, Plastic Body.....	262.07	105.73
22 51 19 00-0051	EA	6 GPM Water Filter, 250 Degree Temperature, 12" x 5" Diameter, Stainless Steel Body.....	479.69	158.60

22 51 19 00-0052 Swimming Pool Chlorinators (22 51 19)

22 51 19 00-0053	EA	Swimming Pool Chlorinator, 50-100 PPD, Direct Cylinder Mounted Gas Chlorinator.....	1,124.93	151.20
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22 51 19 00-0054 Ultra-Violet Pool Treatment Lights (22 51 19)**22 51 19 00-0055 Stainless Steel Ultra-Violet Pool Treatment Lights** (22 51 19 00-0054)

Note: Delta ELP Amalgam Series

22 51 19 00-0056	EA	3" Flanged, 79 GPM, 2 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	15,676.03	329.67
22 51 19 00-0057	EA	3" Flanged, 116 GPM, 3 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	16,576.49	329.67
22 51 19 00-0058	EA	3" Flanged, 158 GPM, 4 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	17,348.32	329.67
22 51 19 00-0059	EA	4" Flanged, 254 GPM, 5 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	17,895.55	349.11
22 51 19 00-0060	EA	4" Flanged, 295 GPM, 6 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	18,278.04	349.11
22 51 19 00-0061	EA	4" Flanged, 329 GPM, 7 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	21,751.19	349.11
22 51 19 00-0062	EA	6" Flanged, 396 GPM, 6 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	25,644.95	626.93
22 51 19 00-0063	EA	6" Flanged, 440 GPM, 2 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	38,072.43	626.93
22 51 19 00-0064	EA	6" Flanged, 650 GPM, 3 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	41,806.02	626.93
22 51 19 00-0065	EA	8" Flanged, 695 GPM, 3 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	44,820.05	752.11
22 51 19 00-0066	EA	8" Flanged, 920 GPM, 4 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	48,145.74	752.11
22 51 19 00-0067	EA	8" Flanged, 1140 GPM, 5 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	50,467.48	752.11
22 51 19 00-0068	EA	8" Flanged, 1260 GPM, 5 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	52,977.45	752.11
22 51 19 00-0069	EA	10" Flanged, 1510 GPM, 6 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	56,897.08	854.91
22 51 19 00-0070	EA	10" Flanged, 1760 GPM, 7 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	61,289.54	854.91
22 51 19 00-0071	EA	10" Flanged, 2010 GPM, 8 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	65,681.97	854.91
22 51 19 00-0072	EA	10" Flanged, 2520 GPM, 10 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	71,015.66	854.91

22 51 19 00-0073 HDPE Ultra-Violet Pool Treatment Lights (22 51 19 00-0054)

Note: Delta EL Series

22 51 19 00-0074	EA	3" Flanged, 116 GPM, 3 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With HDPE Housing.....	7,785.35	329.67
22 51 19 00-0075	EA	3" Flanged, 158 GPM, 4 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With HDPE Housing.....	8,663.81	329.67
22 51 19 00-0076	EA	4" Flanged, 254 GPM, 5 Lamp, 240 Volt, Ultra-Violet Pool Treatment Light With HDPE Housing.....	9,571.61	349.11

22 51 19 00-0077 In-Line, Stainless Steel Ultra-Violet Pool Treatment Lights (22 51 19 00-0054)

Note: Delta EM Series

22 51 19 00-0078	EA	3" Flanged, 100 GPM, 1 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	30,375.04	329.67
22 51 19 00-0079	EA	3" Flanged, 170 GPM, 1 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	30,688.76	329.67
22 51 19 00-0080	EA	6" Flanged, 300 GPM, 1 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	32,719.95	626.93
22 51 19 00-0081	EA	6" Flanged, 600 GPM, 1 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	41,467.16	626.93
22 51 19 00-0082	EA	8" Flanged, 1300 GPM, 1 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	57,871.88	752.11
22 51 19 00-0083	EA	10" Flanged, 2000 GPM, 2 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	65,305.49	854.91
22 51 19 00-0084	EA	12" Flanged, 3000 GPM, 3 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	76,981.99	1,106.29
22 51 19 00-0085	EA	12" Flanged, 4000 GPM, 4 Lamp, 240 Volt, In-Line Ultra-Violet Pool Treatment Light With Stainless Steel Housing.....	86,394.35	1,106.29

22 51 23 Swimming Pool Equipment Controls (22 51)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 51 23 00-0001 Pool Pump Variable Frequency Drive <small>(22 51 23)</small>		
<small>Note: Pentair Acu Drive XS</small>		
22 51 23 00-0002 EA 3 HP, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-2303-N01).....	4,589.43	235.15
22 51 23 00-0003 EA 5 HP, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-2303-N01).....	4,927.77	264.55
22 51 23 00-0004 EA 7-1/2 HP, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-2303-N01).....	5,902.20	330.69
22 51 23 00-0005 EA 10 HP, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-2303-N01).....	6,276.88	394.62
22 51 23 00-0006 EA 15 HP, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-2303-N01).....	6,718.37	459.29
22 51 23 00-0007 EA 20 HP, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-2303-N01).....	7,614.42	524.70
22 51 23 00-0008 EA 3 HP, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-4603-N01).....	4,595.22	235.15
22 51 23 00-0009 EA 5 HP, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-4603-N01).....	4,844.83	264.55
22 51 23 00-0010 EA 7-1/2 HP, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-4603-N01).....	5,223.19	330.69
22 51 23 00-0011 EA 10 HP, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-4603-N01).....	5,617.16	394.62
22 51 23 00-0012 EA 15 HP, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-4603-N01).....	6,623.85	459.29
22 51 23 00-0013 EA 20 HP, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-4603-N01).....	7,357.86	524.70
22 51 23 00-0014 EA 3 HP, Fused Bypass, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-2303-N01FB).....	5,928.16	235.15
22 51 23 00-0015 EA 5 HP, Fused Bypass, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-2303-N01FB).....	6,816.26	264.55
22 51 23 00-0016 EA 7-1/2 HP, Fused Bypass, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-2303-N01FB).....	7,576.57	330.69
22 51 23 00-0017 EA 10 HP, Fused Bypass, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-2303-N01FB).....	8,169.23	394.62
22 51 23 00-0018 EA 15 HP, Fused Bypass, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-2303-N01FB).....	9,617.66	459.29
22 51 23 00-0019 EA 20 HP, Fused Bypass, 230 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-2303-N01FB).....	10,843.56	524.70
22 51 23 00-0020 EA 3 HP, Fused Bypass, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-4603-N01FB).....	6,366.04	235.15
22 51 23 00-0021 EA 5 HP, Fused Bypass, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-4603-N01FB).....	6,619.89	264.55
22 51 23 00-0022 EA 7-1/2 HP, Fused Bypass, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-4603-N01FB).....	6,992.08	330.69
22 51 23 00-0023 EA 10 HP, Fused Bypass, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-4603-N01FB).....	7,387.98	394.62
22 51 23 00-0024 EA 15 HP, Fused Bypass, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-4603-N01FB).....	8,431.33	459.29
22 51 23 00-0025 EA 20 HP, Fused Bypass, 460 Volt AC, NEMA 1, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-4603-N01FB).....	9,225.13	524.70
22 51 23 00-0026 EA 1/2 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD005-2303-N12).....	4,367.29	235.15
22 51 23 00-0027 EA 3/4 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD007-2303-N12).....	4,440.01	235.15
22 51 23 00-0028 EA 1 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD010-2303-N12).....	4,484.94	235.15
22 51 23 00-0029 EA 1-1/2 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD015-2303-N12).....	4,605.98	235.15
22 51 23 00-0030 EA 2 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD020-2303-N12).....	4,788.83	235.15
22 51 23 00-0031 EA 3 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-2303-N12).....	4,930.67	235.15
22 51 23 00-0032 EA 5 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-2303-N12).....	5,278.66	264.55
22 51 23 00-0033 EA 7-1/2 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-2303-N12).....	6,293.55	330.69
22 51 23 00-0034 EA 10 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-2303-N12).....	6,732.06	394.62
22 51 23 00-0035 EA 15 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-2303-N12).....	7,187.14	459.29
22 51 23 00-0036 EA 20 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-2303-N12).....	8,165.94	524.70
22 51 23 00-0037 EA 25 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD250-2303-N12).....	10,725.75	654.03
22 51 23 00-0038 EA 30 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD300-2303-N12).....	11,840.12	720.17
22 51 23 00-0039 EA 40 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD400-2303-N12).....	14,005.01	786.30
22 51 23 00-0040 EA 50 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD500-2303-N12).....	16,295.06	918.58
22 51 23 00-0041 EA 60 HP, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD600-2303-N12).....	17,850.44	984.72
22 51 23 00-0042 EA 1/2 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD005-4603-N12).....	4,457.91	235.15

22 Plumbing**22 50 Pool and Fountain Plumbing Systems****22 51 Swimming Pool Plumbing Systems**

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 51 23 00-0043	EA	3/4 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD007-4603-N12).....	4,551.84	235.15
22 51 23 00-0044	EA	1 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD010-4603-N12).....	4,670.01	235.15
22 51 23 00-0045	EA	1-1/2 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD015-4603-N12).....	4,771.59	235.15
22 51 23 00-0046	EA	2 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD020-4603-N12).....	4,875.10	235.15
22 51 23 00-0047	EA	3 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-4603-N12).....	4,984.34	235.15
22 51 23 00-0048	EA	5 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-4603-N12).....	5,242.24	264.55
22 51 23 00-0049	EA	7-1/2 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-4603-N12).....	5,624.63	330.69
22 51 23 00-0050	EA	10 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-4603-N12).....	6,028.27	394.62
22 51 23 00-0051	EA	15 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-4603-N12).....	7,326.30	459.29
22 51 23 00-0052	EA	20 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-4603-N12).....	8,077.38	524.70
22 51 23 00-0053	EA	25 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD250-4603-N12).....	8,902.21	654.03
22 51 23 00-0054	EA	30 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD300-4603-N12).....	10,069.32	720.17
22 51 23 00-0055	EA	40 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD400-4603-N12).....	11,368.37	786.30
22 51 23 00-0056	EA	50 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD500-4603-N12).....	13,932.21	918.58
22 51 23 00-0057	EA	60 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD600-4603-N12).....	15,306.73	984.72
22 51 23 00-0058	EA	75 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD750-4603-N12).....	17,164.88	1,050.86
22 51 23 00-0059	EA	100 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC10-4603-N12).....	20,338.47	1,113.32
22 51 23 00-0060	EA	125 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC13-4603-N12).....	23,456.55	1,175.78
22 51 23 00-0061	EA	150 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC15-4603-N12).....	25,441.38	1,315.40
22 51 23 00-0062	EA	200 HP, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC20-4603-N12).....	29,701.71	1,440.33
22 51 23 00-0063	EA	1/2 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD005-2303-N12FB).....	6,306.05	235.15
22 51 23 00-0064	EA	3/4 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD007-2303-N12FB).....	6,378.77	235.15
22 51 23 00-0065	EA	1 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD010-2303-N12FB).....	6,423.70	235.15
22 51 23 00-0066	EA	1-1/2 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD015-2303-N12FB).....	6,544.75	235.15
22 51 23 00-0067	EA	2 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD020-2303-N12FB).....	6,727.60	235.15
22 51 23 00-0068	EA	3 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-2303-N12FB).....	6,869.43	235.15
22 51 23 00-0069	EA	5 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-2303-N12FB).....	7,217.42	264.55
22 51 23 00-0070	EA	7-1/2 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-2303-N12FB).....	8,012.83	330.69
22 51 23 00-0071	EA	10 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-2303-N12FB).....	8,675.51	394.62
22 51 23 00-0072	EA	15 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-2303-N12FB).....	10,162.80	459.29
22 51 23 00-0073	EA	20 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-2303-N12FB).....	11,485.11	524.70
22 51 23 00-0074	EA	25 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD250-2303-N12FB).....	13,519.21	654.03
22 51 23 00-0075	EA	30 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD300-2303-N12FB).....	14,883.74	720.17
22 51 23 00-0076	EA	40 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD400-2303-N12FB).....	19,016.05	786.30
22 51 23 00-0077	EA	50 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD500-2303-N12FB).....	25,075.91	918.58
22 51 23 00-0078	EA	60 HP, Fused Bypass, 230 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD600-2303-N12FB).....	27,559.47	984.72
22 51 23 00-0079	EA	1/2 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD005-4603-N12FB).....	6,278.54	235.15
22 51 23 00-0080	EA	3/4 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD007-4603-N12FB).....	6,372.45	235.15
22 51 23 00-0081	EA	1 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD010-4603-N12FB).....	6,490.64	235.15
22 51 23 00-0082	EA	1-1/2 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD015-4603-N12FB).....	6,592.22	235.15
22 51 23 00-0083	EA	2 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD020-4603-N12FB).....	6,695.71	235.15
22 51 23 00-0084	EA	3 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD030-4603-N12FB).....	6,804.97	235.15



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 51 23 00-0085 EA 5 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD050-4603-N12FB).....	7,062.87	264.55
22 51 23 00-0086 EA 7-1/2 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD075-4603-N12FB).....	7,443.29	330.69
22 51 23 00-0087 EA 10 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD100-4603-N12FB).....	7,846.93	394.62
22 51 23 00-0088 EA 15 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD150-4603-N12FB).....	9,184.45	459.29
22 51 23 00-0089 EA 20 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD200-4603-N12FB).....	9,996.63	524.70
22 51 23 00-0090 EA 25 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD250-4603-N12FB).....	10,951.56	654.03
22 51 23 00-0091 EA 30 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD300-4603-N12FB).....	12,343.07	720.17
22 51 23 00-0092 EA 40 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD400-4603-N12FB).....	14,617.77	786.30
22 51 23 00-0093 EA 50 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD500-4603-N12FB).....	16,820.06	918.58
22 51 23 00-0094 EA 60 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD600-4603-N12FB).....	18,726.79	984.72
22 51 23 00-0095 EA 75 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS AD750-4603-N12FB).....	21,747.84	1,050.86
22 51 23 00-0096 EA 100 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC10-4603-N12FB).....	28,685.70	1,113.32
22 51 23 00-0097 EA 125 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC13-4603-N12FB).....	31,734.93	1,175.78
22 51 23 00-0098 EA 150 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC15-4603-N12FB).....	39,873.04	1,315.40
22 51 23 00-0099 EA 200 HP, Fused Bypass, 460 Volt AC, NEMA 12, 3 Phase, Pool Pump Variable Frequency Drive (Pentair Acu Drive XS ADC20-4603-N12FB).....	46,853.47	1,440.33
22 51 23 00-0100 EA 380+ Volt AC, Up To 10 HP, 260 Volt AC, Up To 3 HP, 3 Year Extended Warranty (Pentair AD-EWW136).....	430.71	
22 51 23 00-0101 EA 380+ Volt AC, 15 To 40 HP, 260 Volt AC, 5 To 25 HP, 3 Year Extended Warranty (Pentair AD-EWW236).....	687.30	
22 51 23 00-0102 EA 380+ Volt AC, Up To 10 HP, 260 Volt AC, Up To 3 HP, 6 Year Extended Warranty (Pentair AD-EWW172).....	760.60	
22 51 23 00-0103 EA 380+ Volt AC, 15 To 40 HP, 260 Volt AC, 5 To 25 HP, 6 Year Extended Warranty (Pentair AD-EWW272).....	1,292.12	
22 51 23 00-0104 EA 380+ Volt AC, 50 To 125 HP, 260 Volt AC, 30 To 60 HP, 6 Year Extended Warranty (Pentair AD-EWW372).....	2,465.11	
22 51 23 00-0105 EA 3" Clamp On Saddle Flow Sensor Kit, Integral 4 To 20 mA Output Signal (Pentair 97014-4203KIT).....	1,537.92	
22 51 23 00-0106 EA 4" Clamp On Saddle Flow Sensor Kit, Integral 4 To 20 mA Output Signal (Pentair 97014-4204KIT).....	1,607.82	
22 51 23 00-0107 EA 6" Clamp On Saddle Flow Sensor Kit, Integral 4 To 20 mA Output Signal (Pentair 97016-4206KIT).....	1,754.33	
22 51 23 00-0108 EA 8" Clamp On Saddle Flow Sensor Kit, Integral 4 To 20 mA Output Signal (Pentair 97016-4208KIT).....	1,881.31	
22 51 23 00-0109 EA 3" Clamp On Saddle Flow Sensor Kit, Wall Mounted Display/Transmitter, 4 To 20 mA Output Signal (Pentair 97014BL-03KIT).....	2,202.69	
22 51 23 00-0110 EA 4" Clamp On Saddle Flow Sensor Kit, Wall Mounted Display/Transmitter, 4 To 20 mA Output Signal (Pentair 97014BL-04KIT).....	2,268.32	
22 51 23 00-0111 EA 6" Clamp On Saddle Flow Sensor Kit, Wall Mounted Display/Transmitter, 4 To 20 mA Output Signal (Pentair 97016BL-06KIT).....	2,408.06	
22 51 23 00-0112 EA 8" Clamp On Saddle Flow Sensor Kit, Wall Mounted Display/Transmitter, 4 To 20 mA Output Signal (Pentair 97016BL-08KIT).....	2,531.06	
22 51 23 00-0113 EA 10" Clamp On Saddle Flow Sensor Kit, Wall Mounted Display/Transmitter, 4 To 20 mA Output Signal (Pentair 97020BL-10KIT).....	3,025.94	
22 51 23 00-0114 EA 12" Clamp On Saddle Flow Sensor Kit, Wall Mounted Display/Transmitter, 4 To 20 mA Output Signal (Pentair 97020BL-12KIT).....	3,037.42	
22 51 23 00-0115 Eco-Flow-E Aquatic Variable Frequency Drive And Options (22 51 23)		
22 51 23 00-0116 Eco-Flow-E Aquatic Variable Frequency Drive (22 51 23 00-0115)		
22 51 23 00-0117 EA 2 HP, 480 Volt, 3 Phase, 4 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-04-12-4).....	3,958.68	195.97
<i>For Bypass Panel, Add</i>	<i>898.52</i>	
22 51 23 00-0118 EA 3 HP, 480 Volt, 3 Phase, 6 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-06-12-4).....	3,962.48	195.97
<i>For Bypass Panel, Add</i>	<i>898.52</i>	
22 51 23 00-0119 EA 5 HP, 480 Volt, 3 Phase, 8 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-08-12-4).....	4,031.73	220.46
<i>For Bypass Panel, Add</i>	<i>898.52</i>	
22 51 23 00-0120 EA 7-1/2 HP, 480 Volt, 3 Phase, 12 Amperes, Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-12-12-4).....	4,183.76	275.58
<i>For Bypass Panel, Add</i>	<i>898.52</i>	
22 51 23 00-0121 EA 10 HP, 480 Volt, 3 Phase, 16 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-16-12-4).....	4,524.63	328.85
<i>For Bypass Panel, Add</i>	<i>898.52</i>	
22 51 23 00-0122 EA 15 HP, 480 Volt, 3 Phase, 24 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-24-12-4).....	5,035.19	382.75
<i>For Bypass Panel, Add</i>	<i>1,060.87</i>	
22 51 23 00-0123 EA 20 HP, 480 Volt, 3 Phase, 30 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-30-12-4).....	5,934.56	437.24
<i>For Bypass Panel, Add</i>	<i>1,060.87</i>	
22 51 23 00-0124 EA 25 HP, 480 Volt, 3 Phase, 39 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-39-12-4).....	6,176.55	547.47
<i>For Bypass Panel, Add</i>	<i>1,060.87</i>	
22 51 23 00-0125 EA 30 HP, 480 Volt, 3 Phase, 45 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-45-12-4).....	7,388.76	601.98
<i>For Bypass Panel, Add</i>	<i>1,060.87</i>	

22 Plumbing**22 50 Pool and Fountain Plumbing Systems****22 51 Swimming Pool Plumbing Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

22 51 23 00-0126	EA	40 HP, 480 Volt, 3 Phase, 61 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-61-12-4)	7,619.40	655.87
		<i>For Bypass Panel, Add</i>	1,291.60	
22 51 23 00-0127	EA	1/2 HP, 208/230 Volt, 1 Phase (1 HP, 208/230 Volt, 3 Phase) 8 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-08-12-2)	3,937.14	195.97
		<i>For Bypass Panel, Add</i>	898.52	
22 51 23 00-0128	EA	1 HP, 208/230 Volt, 1 Phase (2 HP, 208/230 Volt, 3 Phase) 12 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-12-12-2)	3,942.21	195.97
		<i>For Bypass Panel, Add</i>	898.52	
22 51 23 00-0129	EA	1-1/2 HP, 208/230 Volt, 1 Phase (3 HP, 208/230 Volt, 3 Phase) 16 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-16-12-2)	3,966.28	195.97
		<i>For Bypass Panel, Add</i>	898.52	
22 51 23 00-0130	EA	5 HP, 208/230 Volt, 1 Phase, 24 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-24-12-2)	4,052.00	220.46
		<i>For Bypass Panel, Add</i>	1,060.87	
22 51 23 00-0131	EA	3 HP, 208/230 Volt, 1 Phase (7-1/2 HP, 208/230 Volt, 3 Phase) 32 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-32-12-2)	4,401.61	275.58
		<i>For Bypass Panel, Add</i>	1,060.87	
22 51 23 00-0132	EA	5 HP, 208/230 Volt, 1 Phase (10 HP, 208/230 Volt, 3 Phase) 46 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-46-12-2)	4,907.14	328.85
		<i>For Bypass Panel, Add</i>	1,060.87	
22 51 23 00-0133	EA	7-1/2 HP, 208/230 Volt, 1 Phase (15 HP, 208/230 Volt, 3 Phase) 60 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-60-12-2)	5,814.15	382.75
		<i>For Bypass Panel, Add</i>	1,291.60	
22 51 23 00-0134	EA	10 HP, 208/230 Volt, 1 Phase (20 HP, 208/230 Volt, 3 Phase) 74 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-74-12-2)	5,947.22	437.24
		<i>For Bypass Panel, Add</i>	1,291.60	
22 51 23 00-0135	EA	25 HP, 208/230 Volt, 1 Phase, 88 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-88-12-2)	7,262.03	547.47
		<i>For Bypass Panel, Add</i>	1,755.40	
22 51 23 00-0136	EA	15 HP, 208/230 Volt, 1 Phase (30 HP, 208/230 Volt, 3 Phase) 124 Amperes Maximum, NEMA 12, Eco-Flow-E Aquatic Variable Frequency Drive (H2Flow EF-E-124-12-2)	7,495.15	601.98
		<i>For Bypass Panel, Add</i>	2,419.32	

22 51 23 00-0137 Eco-Flow-E Aquatic Variable Frequency Drive Options (22 51 23 00-0115)

22 51 23 00-0138	EA	0 To 30 PSI, 1/4" NPT Male Thread, 4 To 20 mA Output, 10' Cable, Pressure Sensor (H2Flow PS-30)	543.68	91.86
22 51 23 00-0139	EA	0 To 100 PSI, 1/4" NPT Male Thread, 4 To 20 mA Output, 10' Cable, Pressure Sensor (H2Flow PS-100)	543.68	91.86
22 51 23 00-0140	EA	Lightning Arrestor (H2Flow LA)	575.92	61.24
22 51 23 00-0141	EA	2 HP, 480 Volt, (3/4 HP, 208/230 Volt) Load Reactor (TCI V1K4A00)	647.89	27.55
22 51 23 00-0142	EA	3 HP, 480 Volt, (1 To 1-1/2 HP, 208/230 Volt) Load Reactor (TCI V1K6A00)	669.21	30.62
22 51 23 00-0143	EA	5 HP, 480 Volt, (2 HP, 208/230 Volt) Load Reactor (TCI V1K8A00)	685.47	33.68
22 51 23 00-0144	EA	7-1/2 HP, 480 Volt, (3 HP, 208/230 Volt) Load Reactor (TCI V1K12A00)	715.66	36.74
22 51 23 00-0145	EA	10 HP, 480 Volt, (5 HP, 208/230 Volt) Load Reactor (TCI V1K16A00)	729.38	39.80
22 51 23 00-0146	EA	15 HP, 480 Volt, (7-1/2 HP, 208/230 Volt) Load Reactor (TCI V1K25A00)	952.09	42.86
22 51 23 00-0147	EA	20 HP, 480 Volt, Load Reactor (TCI V1K27A00)	992.41	45.92
22 51 23 00-0148	EA	25 HP, 480 Volt, (10 HP, 208/230 Volt) Load Reactor (TCI V1K35A00)	1,036.53	48.99
22 51 23 00-0149	EA	30 HP, 480 Volt, (15 HP, 208/230 Volt) Load Reactor (TCI V1K45A00)	1,079.39	52.05
22 51 23 00-0150	EA	40 HP, 480 Volt, (20 HP, 208/230 Volt) Load Reactor (TCI V1K55A00)	1,117.18	55.12
22 51 23 00-0151	EA	25 To 30 HP, 208/230 Volt, Load Reactor (TCI V1K80A00)	1,536.21	58.18
22 51 23 00-0152	EA	1 HP, 208/230 Volt, Line Reactor (TCI KDRA25L)	196.77	30.62
22 51 23 00-0153	EA	2 HP, 208/230 Volt, Line Reactor (TCI KDRA27L)	210.50	33.68
22 51 23 00-0154	EA	3 HP, 208/230 Volt, Line Reactor (TCI KDRA28L)	235.61	36.74
22 51 23 00-0155	EA	5 HP, 208/230 Volt, Line Reactor (TCI KDRB22L)	310.13	39.80
22 51 23 00-0156	EA	7-1/2 HP, 208/230 Volt, Line Reactor (TCI KDRB23L)	347.93	42.86
22 51 23 00-0157	EA	10 HP, 208/230 Volt, Line Reactor (TCI KDRD25L)	360.38	45.92
22 51 23 00-0158	EA	15 HP, 208/230 Volt, Line Reactor (TCI KDRD24L)	372.83	48.99
22 51 23 00-0159	EA	20 HP, 208/230 Volt, Line Reactor (TCI KDRD26L)	395.43	52.05
22 51 23 00-0160	EA	25 HP, 208/230 Volt, Line Reactor (TCI KDRC22L)	500.34	55.12
22 51 23 00-0161	EA	30 HP, 208/230 Volt, Line Reactor (TCI KDRF24L)	514.06	58.18
22 51 23 00-0162	EA	1 HP, 480 Volt, Line Reactor (TCI KDRA8L)	198.03	30.62
22 51 23 00-0163	EA	2 HP, 480 Volt, Line Reactor (TCI KDRA1L)	218.10	33.68
22 51 23 00-0164	EA	3 HP, 480 Volt, Line Reactor (TCI KDRA2L)	239.41	36.74
22 51 23 00-0165	EA	5 HP, 480 Volt, Line Reactor (TCI KDRA3L)	251.87	39.80
22 51 23 00-0166	EA	7-1/2 HP, 480 Volt, Line Reactor (TCI KDRA4L)	263.06	42.86
22 51 23 00-0167	EA	10 HP, 480 Volt, Line Reactor (TCI KDRA5L)	329.98	45.92
22 51 23 00-0168	EA	15 HP, 480 Volt, Line Reactor (TCI KDRB2L)	343.70	48.99
22 51 23 00-0169	EA	20 HP, 480 Volt, Line Reactor (TCI KDRB1L)	361.23	52.05
22 51 23 00-0170	EA	25 HP, 480 Volt, Line Reactor (TCI KDRD1L)	373.68	55.12
22 51 23 00-0171	EA	30 HP, 480 Volt, Line Reactor (TCI KDRD2L)	450.73	58.18
22 51 23 00-0172	EA	40 HP, 480 Volt, Line Reactor (TCI KDRC1L)	491.06	61.24
22 51 23 00-0173	EA	Models 04 To 30, 304 SS Metric To English Conduit Adaptor Kit	80.39	
22 51 23 00-0174	EA	Models 32 To 46, 304 SS Metric To English Conduit Adaptor Kit	109.48	
22 51 23 00-0175	EA	Models 60 To 74, 304 SS Metric To English Conduit Adaptor Kit	136.03	

22 51 23 00-0176 Pool Flow Meters (22 51 23)

22 51 23 00-0177	EA	20 To 110 GPM, 1-1/2" Retrofit Kit FlowVis For Existing Jandy Or Praher Valve Flow Meter (H2Flow FVJ-R-15)	141.59	21.15
22 51 23 00-0178	EA	20 To 110 GPM, 2" x 2-1/2" Retrofit Kit FlowVis For Existing Jandy® Or Praher Valve Flow Meter (H2Flow FVJ-R)	141.59	21.15
22 51 23 00-0179	EA	20 To 110 GPM, 1-1/2" Complete FlowVis Including Valve Body Flow Meter (H2Flow FV-C-15)	220.15	39.65
22 51 23 00-0180	EA	20 To 110 GPM, 2" x 2-1/2" Complete FlowVis Including Valve Body Flow Meter (H2Flow FV-C)	183.88	42.29

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 51 23 00-0181 Paddlewheel Flow Sensors <small>(22 51 23)</small>		
22 51 23 00-0182 EA 1/2" To 4" Pipe, Polypropylene Body, Black Polyvinylidene Fluoride (PVDF) Rotor, Paddlewheel Flow Sensor (Signet 3-2536-P0).....	964.80	70.73
<i>Note: Includes 25' of cable (extendable to 200').</i>		
22 51 23 00-0183 EA 1/2" To 4" Pipe, Polypropylene Body, Pulse/Flow Switch DCR Output Paddlewheel Flow Sensor (Signet 3-2537-1C-PO).....	1,280.18	70.73
22 51 23 00-0184 EA 1/2" To 4" Pipe, Polypropylene Body, Pulse/Flow Switch SSR Output Paddlewheel Flow Sensor (Signet 3-2537-2C-PO).....	1,280.18	70.73
22 51 23 00-0185 EA 1/2" To 4" Pipe, Polypropylene Body, Digital Output Paddlewheel Flow Sensor (Signet 3-2537-5C-PO).....	1,329.58	70.73
22 51 23 00-0186 EA 1/2" To 4" Pipe, Polypropylene Body, 4 To 20 mA Output Paddlewheel Flow Sensor (Signet 3-2537-6C-PO).....	1,382.78	70.73
22 51 23 00-0187 EA 1/2" To 4" Pipe, Polyvinylidene Fluoride (PVDF) Body, Pulse/Flow Switch DCR Output Paddlewheel Flow Sensor (Signet 3-2537-1C-TO).....	1,483.47	70.73
22 51 23 00-0188 EA 1/2" To 4" Pipe, Polyvinylidene Fluoride (PVDF) Body, Pulse/Flow Switch SSR Output Paddlewheel Flow Sensor (Signet 3-2537-2C-TO).....	1,483.47	70.73
22 51 23 00-0189 EA 1/2" To 4" Pipe, Polyvinylidene Fluoride (PVDF) Body, Digital Output Paddlewheel Flow Sensor (Signet 3-2537-5C-TO).....	1,546.17	70.73
22 51 23 00-0190 EA 1/2" To 4" Pipe, Polyvinylidene Fluoride (PVDF) Body, 4 To 20 mA Output Paddlewheel Flow Sensor (Signet 3-2537-6C-TO).....	1,606.97	70.73
22 51 23 00-0191 EA >4" To 8" Pipe, Polypropylene Body, Black Polyvinylidene Fluoride (PVDF) Rotor, Paddlewheel Flow Sensor (Signet 3-2536-P1).....	1,008.50	70.73
<i>Note: Includes 25' of cable (extendable to 200').</i>		
22 51 23 00-0192 EA >4" To 8" Pipe, Polypropylene Body, Pulse/Flow Switch DCR Output Paddlewheel Flow Sensor (Signet 3-2537-1C-P1).....	1,329.58	70.73
22 51 23 00-0193 EA >4" To 8" Pipe, Polypropylene Body, Pulse/Flow Switch SSR Output Paddlewheel Flow Sensor (Signet 3-2537-2C-P1).....	1,329.58	70.73
22 51 23 00-0194 EA >4" To 8" Pipe, Polypropylene Body, Digital Output Paddlewheel Flow Sensor (Signet 3-2537-5C-P1).....	1,382.78	70.73
22 51 23 00-0195 EA >4" To 8" Pipe, Polypropylene Body, 4 To 20 mA Output Paddlewheel Flow Sensor (Signet 3-2537-6C-P1).....	1,432.18	70.73
22 51 23 00-0196 EA >8" Pipe, Polypropylene Body, Black Polyvinylidene Fluoride (PVDF) Rotor, Paddlewheel Flow Sensor (Signet 3-2536-P2).....	1,048.40	70.73
<i>Note: Includes 25' of cable (extendable to 200').</i>		
22 51 23 00-0197 EA 2" Pipe, Polyvinyl Chloride (PVC) Saddle Clamp For Flow Transducers (Signet PV8S020).....	323.19	
22 51 23 00-0198 EA 4" Pipe, Polyvinyl Chloride (PVC) Saddle Clamp For Flow Transducers (Signet PV8S040).....	446.77	
22 51 23 00-0199 EA 6" Pipe, Polyvinyl Chloride (PVC) Saddle Clamp For Flow Transducers (Signet PV8S060).....	549.44	
22 51 23 00-0200 EA 8" Pipe, Polyvinyl Chloride (PVC) Saddle Clamp For Flow Transducers (Signet PV8S080).....	674.92	
22 51 23 00-0201 EA 10" Pipe, Polyvinyl Chloride (PVC) Saddle Clamp For Flow Transducers (Signet PV8S100).....	893.49	
22 51 23 00-0202 EA 12" Pipe, Polyvinyl Chloride (PVC) Saddle Clamp For Flow Transducers (Signet PV8S120).....	904.97	
22 51 23 00-0203 EA 24 Volt DC, Power Supply 7.5 Watt, 300 mA (Signet 7300-7524).....	318.37	19.59
22 51 23 00-0204 EA 24 Volt DC, Power Supply 15 Watt, 600 mA (Signet 7300-1524).....	438.06	19.59
22 51 23 00-0205 EA 24 Volt DC, 30 Watt, 1.3 Amperes, Power Supply (Signet 7300-3024).....	540.66	19.59
22 51 23 00-0206 EA 24 Volt DC, 50 Watt, 2.1 Amperes, Power Supply (Signet 7300-5024).....	685.05	19.59
22 51 23 00-0207 EA 24 Volt DC, 100 Watt, 4.2 Amperes, Power Supply (Signet 7300-1024).....	951.04	19.59

22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities (22)

22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities (22 60)

22 66 53 Laboratory Chemical-Waste and Vent Piping (22 66)

22 66 53 00-0001	Polypropylene Acid Resistant Drain-Waste-Vent (DWV) Pipe And Fittings <small>(22 66 53)</small>		
22 66 53 00-0002	Schedule 40 Polypropylene Acid Resistant DWV Pipe And Fused Fittings <small>(22 66 53 00-0001)</small>		
22 66 53 00-0003	Schedule 40 Polypropylene Acid Resistant DWV Pipe <small>(22 66 53 00-0002)</small>		
22 66 53 00-0004	LF 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Pipe.....	13.95	6.02
	<i>For Work In Restricted Working Space, Add</i>	2.72	
	<i>For Fire Retardant Thermoplastic Pipe (Proxylene), Add</i>	2.17	
	<i>For Schedule 80, Add</i>	2.53	
22 66 53 00-0005	LF 2" Schedule 40 Polypropylene Acid Resistant DWV Pipe.....	16.81	6.77
	<i>For Work In Restricted Working Space, Add</i>	3.07	
	<i>For Fire Retardant Thermoplastic Pipe (Proxylene), Add</i>	2.93	
	<i>For Schedule 80, Add</i>	3.43	
22 66 53 00-0006	LF 3" Schedule 40 Polypropylene Acid Resistant DWV Pipe.....	26.68	9.83
	<i>For Work In Restricted Working Space, Add</i>	4.44	
	<i>For Fire Retardant Thermoplastic Pipe (Proxylene), Add</i>	5.29	
	<i>For Schedule 80, Add</i>	6.18	
22 66 53 00-0007	LF 4" Schedule 40 Polypropylene Acid Resistant DWV Pipe.....	36.10	12.79
	<i>For Work In Restricted Working Space, Add</i>	5.77	
	<i>For Fire Retardant Thermoplastic Pipe (Proxylene), Add</i>	7.51	
	<i>For Schedule 80, Add</i>	8.78	
22 66 53 00-0008	LF 6" Schedule 40 Polypropylene Acid Resistant DWV Pipe.....	58.64	18.82
	<i>For Work In Restricted Working Space, Add</i>	8.46	
	<i>For Fire Retardant Thermoplastic Pipe (Proxylene), Add</i>	13.55	
	<i>For Schedule 80, Add</i>	15.83	
22 66 53 00-0009	Schedule 40 Polypropylene Acid Resistant DWV Fused 1/4 Bends <small>(22 66 53 00-0002)</small>		

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities****22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 66 53 00-0010	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/4 Bend..... <i>For Work In Restricted Working Space, Add</i>	53.76 10.23	22.73
22 66 53 00-0011	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/4 Bend..... <i>For Work In Restricted Working Space, Add</i>	69.39 13.50	30.03
22 66 53 00-0012	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/4 Bend..... <i>For Work In Restricted Working Space, Add</i>	93.00 15.47	34.36
22 66 53 00-0013	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/4 Bend..... <i>For Work In Restricted Working Space, Add</i>	134.15 20.46	45.47
22 66 53 00-0014	EA	6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/4 Bend..... <i>For Work In Restricted Working Space, Add</i>	262.75 30.21	67.14
22 66 53 00-0015		Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/8 Bends (22 66 53 00-0002)		
22 66 53 00-0016	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	53.42 10.23	22.73
22 66 53 00-0017	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	68.50 13.50	30.03
22 66 53 00-0018	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	94.70 15.47	34.36
22 66 53 00-0019	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	117.11 20.46	45.47
22 66 53 00-0020	EA	6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	236.34 30.21	67.14
22 66 53 00-0021		Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Tees (22 66 53 00-0002)		
22 66 53 00-0022	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	97.32 21.88	48.64
22 66 53 00-0023	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	121.17 27.58	61.32
22 66 53 00-0024	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	159.17 30.21	67.14
22 66 53 00-0025	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	219.75 39.65	88.18
22 66 53 00-0026	EA	6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	385.64 63.44	141.05
22 66 53 00-0027		Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tees (22 66 53 00-0002)		
22 66 53 00-0028	EA	2" x 2" x 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	121.13 27.58	61.32
22 66 53 00-0029	EA	3" x 3" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	155.09 30.21	67.14
22 66 53 00-0030	EA	3" x 3" x 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	151.46 30.21	67.14
22 66 53 00-0031	EA	4" x 4" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	210.44 39.65	88.18
22 66 53 00-0032	EA	4" x 4" x 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	213.95 39.65	88.18
22 66 53 00-0033	EA	6" x 6" x 4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	359.72 63.44	141.05
22 66 53 00-0034		Schedule 40 Polypropylene Acid Resistant DWV Fuseal Cleanout Tees With Plug (22 66 53 00-0002)		
22 66 53 00-0035	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Cleanout Tee With Plug..... <i>For Work In Restricted Working Space, Add</i>	109.23 21.88	48.64
22 66 53 00-0036	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Cleanout Tee With Plug..... <i>For Work In Restricted Working Space, Add</i>	124.05 27.58	61.32
22 66 53 00-0037	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Cleanout Tee With Plug..... <i>For Work In Restricted Working Space, Add</i>	167.99 30.21	67.14
22 66 53 00-0038	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Cleanout Tee With Plug..... <i>For Work In Restricted Working Space, Add</i>	223.81 39.65	88.18
22 66 53 00-0039	EA	6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Cleanout Tee With Plug..... <i>For Work In Restricted Working Space, Add</i>	335.38 63.44	141.05
22 66 53 00-0040		Schedule 40 Polypropylene Acid Resistant DWV Fuseal Wyes (22 66 53 00-0002)		
22 66 53 00-0041	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Wye..... <i>For Work In Restricted Working Space, Add</i>	104.01 21.88	48.64
22 66 53 00-0042	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Wye..... <i>For Work In Restricted Working Space, Add</i>	127.37 27.58	61.32
22 66 53 00-0043	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Wye..... <i>For Work In Restricted Working Space, Add</i>	162.86 30.21	67.14
22 66 53 00-0044	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Wye..... <i>For Work In Restricted Working Space, Add</i>	222.81 39.65	88.18
22 66 53 00-0045	EA	6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Wye..... <i>For Work In Restricted Working Space, Add</i>	441.56 63.44	141.05



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 53 00-0046 Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wyes <small>(22 66 53 00-0002)</small>		
22 66 53 00-0047 EA 2" x 2" x 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	135.55 27.58	61.32
22 66 53 00-0048 EA 3" x 3" x 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	158.66 30.21	67.14
22 66 53 00-0049 EA 3" x 3" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	158.66 30.21	67.14
22 66 53 00-0050 EA 4" x 4" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	219.18 39.65	88.18
22 66 53 00-0051 EA 4" x 4" x 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	219.18 39.65	88.18
22 66 53 00-0052 EA 6" x 6" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	393.39 63.44	141.05
22 66 53 00-0053 EA 6" x 6" x 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	396.21 63.44	141.05
22 66 53 00-0054 EA 6" x 6" x 4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Reducing Wye..... <i>For Work In Restricted Working Space, Add</i>	360.91 63.44	141.05
22 66 53 00-0055 Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Crosses <small>(22 66 53 00-0002)</small>		
22 66 53 00-0056 EA 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Cross <i>For Work In Restricted Working Space, Add</i>	129.40 27.35	60.80
22 66 53 00-0057 EA 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Cross..... <i>For Work In Restricted Working Space, Add</i>	160.75 34.48	76.66
22 66 53 00-0058 EA 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Cross..... <i>For Work In Restricted Working Space, Add</i>	217.55 37.76	83.95
22 66 53 00-0059 EA 4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Cross..... <i>For Work In Restricted Working Space, Add</i>	302.50 49.56	110.17
22 66 53 00-0060 EA 6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Sanitary Cross..... <i>For Work In Restricted Working Space, Add</i>	537.36 79.30	176.26
22 66 53 00-0061 Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bends <small>(22 66 53 00-0002)</small>		
22 66 53 00-0062 EA 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	95.14 21.88	48.64
22 66 53 00-0063 EA 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i>	124.40 27.58	61.32
22 66 53 00-0064 EA 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i>	142.23 30.21	67.14
22 66 53 00-0065 EA 4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i>	196.77 39.65	88.18
22 66 53 00-0066 EA 2" x 2" x 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	114.74 27.58	61.32
22 66 53 00-0067 EA 3" x 3" x 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend..... <i>For Work In Restricted Working Space, Add</i>	138.34 30.21	67.14
22 66 53 00-0068 EA 3" x 3" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i>	139.90 30.21	67.14
22 66 53 00-0069 EA 4" x 4" x 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i>	190.99 39.65	88.18
22 66 53 00-0070 EA 4" x 4" x 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Combination Wye And 1/8 Bend <i>For Work In Restricted Working Space, Add</i>	191.98 39.65	88.18
22 66 53 00-0071 Schedule 40 Polypropylene Acid Resistant DWV Fuseal P-Traps <small>(22 66 53 00-0002)</small>		
22 66 53 00-0072 EA 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal P-Trap..... <i>For Work In Restricted Working Space, Add</i>	112.45 25.37	56.46
22 66 53 00-0073 EA 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal P-Trap <i>For Work In Restricted Working Space, Add</i>	149.64 33.39	74.23
22 66 53 00-0074 EA 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal P-Trap <i>For Work In Restricted Working Space, Add</i>	226.48 45.32	100.76
22 66 53 00-0075 EA 4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal P-Trap <i>For Work In Restricted Working Space, Add</i>	318.99 57.67	128.26
22 66 53 00-0076 Schedule 40 Polypropylene Acid Resistant DWV Fuseal Hub Adapters <small>(22 66 53 00-0002)</small>		
22 66 53 00-0077 EA 1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Hub Adapter..... <i>For Work In Restricted Working Space, Add</i>	52.83 10.23	22.73
22 66 53 00-0078 EA 2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Hub Adapter <i>For Work In Restricted Working Space, Add</i>	64.50 13.50	30.03
22 66 53 00-0079 EA 3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Hub Adapter <i>For Work In Restricted Working Space, Add</i>	75.72 15.47	34.36
22 66 53 00-0080 EA 4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Hub Adapter <i>For Work In Restricted Working Space, Add</i>	103.00 20.46	45.47
22 66 53 00-0081 EA 6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Hub Adapter <i>For Work In Restricted Working Space, Add</i>	152.80 30.21	67.14
22 66 53 00-0082 Schedule 40 Polypropylene Acid Resistant DWV Fuseal Mechanical Joint Adapters <small>(22 66 53 00-0002)</small>		

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities****22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 66 53 00-0083	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Mechanical Joint Adapter..... <i>For Work In Restricted Working Space, Add</i>	50.48 10.23	22.73
22 66 53 00-0084	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Mechanical Joint Adapter..... <i>For Work In Restricted Working Space, Add</i>	66.27 13.50	30.03
22 66 53 00-0085	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Mechanical Joint Adapter..... <i>For Work In Restricted Working Space, Add</i>	78.98 15.47	34.36
22 66 53 00-0086	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Mechanical Joint Adapter..... <i>For Work In Restricted Working Space, Add</i>	106.20 20.46	45.47
22 66 53 00-0087		Schedule 40 Polypropylene Acid Resistant DWV Fuseal Couplings <small>(22 66 53 00-0002)</small>		
22 66 53 00-0088	EA	1-1/2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Coupling..... <i>For Work In Restricted Working Space, Add</i>	47.56 10.23	22.73
22 66 53 00-0089	EA	2" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Coupling..... <i>For Work In Restricted Working Space, Add</i>	61.03 13.50	30.03
22 66 53 00-0090	EA	3" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Coupling..... <i>For Work In Restricted Working Space, Add</i>	71.05 15.47	34.36
22 66 53 00-0091	EA	4" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Coupling..... <i>For Work In Restricted Working Space, Add</i>	93.95 20.46	45.47
22 66 53 00-0092	EA	6" Schedule 40 Polypropylene Acid Resistant DWV Fuseal Coupling..... <i>For Work In Restricted Working Space, Add</i>	138.11 30.21	67.14
22 66 53 00-0093		Bell And Spigot High Silicon Iron Alloy Acid Resistant Drain-Waste-Vent (DWV) Pipe And Fittings <small>(22 66 53)</small>		
		Note: Acid resistant. ASTM A518.		
22 66 53 00-0094		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe <small>(22 66 53 00-0093)</small>		
22 66 53 00-0095	LF	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	134.06	9.41
22 66 53 00-0096	LF	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	189.41	11.74
22 66 53 00-0097	LF	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	258.91	13.53
22 66 53 00-0098	LF	6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	427.54	19.65
22 66 53 00-0099	LF	8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	757.69	26.18
22 66 53 00-0100	LF	10" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	1,345.78	33.02
22 66 53 00-0101	LF	12" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe.....	2,405.95	44.48
22 66 53 00-0102		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Fittings <small>(22 66 53 00-0093)</small>		
22 66 53 00-0103		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Long Sweeps <small>(22 66 53 00-0102)</small>		
22 66 53 00-0104	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Long Sweep.....	515.01	80.14
22 66 53 00-0105	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Long Sweep.....	681.34	88.18
22 66 53 00-0106	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Long Sweep.....	1,125.00	105.52
22 66 53 00-0107	EA	6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Long Sweep.....	1,696.85	129.77
22 66 53 00-0108	EA	8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Long Sweep.....	3,934.08	210.40
22 66 53 00-0109		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bends <small>(22 66 53 00-0102)</small>		
22 66 53 00-0110	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	283.54	80.14
22 66 53 00-0111	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	377.25	88.18
22 66 53 00-0112	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	475.98	105.52
22 66 53 00-0113	EA	6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	1,338.30	129.77
22 66 53 00-0114	EA	8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	3,070.38	210.40
22 66 53 00-0115	EA	10" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	4,688.17	262.14
22 66 53 00-0116	EA	12" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	6,915.27	315.24
22 66 53 00-0117		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bends <small>(22 66 53 00-0102)</small>		
22 66 53 00-0118	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	283.54	80.14
22 66 53 00-0119	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	377.25	88.18
22 66 53 00-0120	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	475.98	105.52
22 66 53 00-0121	EA	6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	966.14	129.77
22 66 53 00-0122	EA	8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	2,589.29	210.40
22 66 53 00-0123	EA	10" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	3,803.83	262.14
22 66 53 00-0124	EA	12" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	5,418.21	315.24
22 66 53 00-0125		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/16 Bends <small>(22 66 53 00-0102)</small>		
22 66 53 00-0126	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend.....	283.54	80.14
22 66 53 00-0127	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend.....	377.25	88.18
22 66 53 00-0128	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend.....	475.73	105.42
22 66 53 00-0129		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Short Sweeps <small>(22 66 53 00-0102)</small>		
22 66 53 00-0130	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Short Sweep.....	401.54	80.14
22 66 53 00-0131	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Short Sweep.....	735.80	88.18
22 66 53 00-0132	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Short Sweep.....	820.91	105.52



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 53 00-0133	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tees ^(22 66 53 00-0102)	
22 66 53 00-0134 EA 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tee.....	397.67	119.91
22 66 53 00-0135 EA 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tee.....	507.89	132.91
22 66 53 00-0136 EA 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tee.....	719.06	158.70
22 66 53 00-0137 EA 6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tee.....	1,245.50	195.02
22 66 53 00-0138 EA 8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tee.....	3,927.47	315.87
22 66 53 00-0139 EA 10" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Tee.....	5,599.50	394.43
22 66 53 00-0140	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tees ^(22 66 53 00-0102)	
22 66 53 00-0141 EA 2" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	372.05	114.93
22 66 53 00-0142 EA 3" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	439.19	123.39
22 66 53 00-0143 EA 3" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	495.57	127.72
22 66 53 00-0144 EA 4" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	570.02	141.05
22 66 53 00-0145 EA 4" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	613.06	145.48
22 66 53 00-0146 EA 4" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	678.41	149.83
22 66 53 00-0147 EA 6" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	866.50	168.76
22 66 53 00-0148 EA 6" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	967.58	173.11
22 66 53 00-0149 EA 6" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Sanitary Tee.....	1,088.42	181.06
22 66 53 00-0150	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Tees ^(22 66 53 00-0102)	
22 66 53 00-0151 EA 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Tee.....	461.15	119.91
22 66 53 00-0152 EA 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Tee.....	561.84	132.59
22 66 53 00-0153 EA 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Tee.....	778.02	158.70
22 66 53 00-0154	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Tees ^(22 66 53 00-0102)	
22 66 53 00-0155 EA 2" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Tee.....	435.55	114.93
22 66 53 00-0156 EA 3" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Tee.....	550.93	128.36
22 66 53 00-0157 EA 4" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Tee.....	668.14	145.91
22 66 53 00-0158 EA 4" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Tee.....	719.92	150.25
22 66 53 00-0159	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Wyes ^(22 66 53 00-0102)	
22 66 53 00-0160 EA 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Wye.....	393.35	120.12
22 66 53 00-0161 EA 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Wye.....	557.82	132.91
22 66 53 00-0162 EA 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Wye.....	718.87	158.60
22 66 53 00-0163 EA 6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Wye.....	1,253.45	194.30
22 66 53 00-0164 EA 8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Wye.....	4,952.71	315.56
22 66 53 00-0165	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wyes ^(22 66 53 00-0102)	
22 66 53 00-0166 EA 2" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	408.32	114.93
22 66 53 00-0167 EA 3" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	439.14	123.39
22 66 53 00-0168 EA 3" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	464.92	128.47
22 66 53 00-0169 EA 4" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	520.09	141.05
22 66 53 00-0170 EA 4" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	540.69	145.70
22 66 53 00-0171 EA 4" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	660.91	150.25
22 66 53 00-0172 EA 6" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	915.97	168.96
22 66 53 00-0173 EA 6" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	1,099.20	173.11
22 66 53 00-0174 EA 6" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	1,147.42	181.06
22 66 53 00-0175 EA 8" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	2,882.46	254.57
22 66 53 00-0176 EA 8" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	3,117.45	262.98
22 66 53 00-0177 EA 8" x 6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	3,831.95	276.44
22 66 53 00-0178	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bends ^(22 66 53 00-0102)	
22 66 53 00-0179 EA 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend.....	479.25	119.91
22 66 53 00-0180 EA 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend.....	575.45	132.59
22 66 53 00-0181 EA 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend.....	868.79	158.70
22 66 53 00-0182 EA 6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend.....	1,371.82	194.51
22 66 53 00-0183	Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bends ^(22 66 53 00-0102)	
22 66 53 00-0184 EA 2" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	390.16	114.93
22 66 53 00-0185 EA 3" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	457.30	123.39
22 66 53 00-0186 EA 3" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	510.08	128.36
22 66 53 00-0187 EA 4" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	551.86	141.05
22 66 53 00-0188 EA 4" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	645.45	145.91
22 66 53 00-0189 EA 4" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	738.01	150.14
22 66 53 00-0190 EA 6" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend.....	974.90	168.96

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities****22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 66 53 00-0191	EA	6" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	1,230.89	173.21
22 66 53 00-0192	EA	6" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	1,352.10	181.37
22 66 53 00-0193		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducers (22 66 53 00-0102)		
22 66 53 00-0194	EA	2" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer	240.24	75.50
22 66 53 00-0195	EA	3" x 1-1/2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer	264.71	79.72
22 66 53 00-0196	EA	3" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	298.30	83.95
22 66 53 00-0197	EA	4" x 2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	498.11	93.05
22 66 53 00-0198	EA	4" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	522.62	97.38
22 66 53 00-0199	EA	6" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	570.84	108.27
22 66 53 00-0200	EA	6" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	751.16	116.54
22 66 53 00-0201	EA	8" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	1,094.35	157.83
22 66 53 00-0202	EA	8" x 6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Reducer.....	1,164.34	171.19
22 66 53 00-0203		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Increaseers (22 66 53 00-0102)		
22 66 53 00-0204	EA	2" x 3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Increaser	654.65	176.26
22 66 53 00-0205	EA	2" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Increaser	890.65	176.26
22 66 53 00-0206	EA	3" x 4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Increaser	911.83	176.26
22 66 53 00-0207	EA	4" x 6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Sanitary Increaser	1,020.01	241.45
22 66 53 00-0208		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV P-Traps (22 66 53 00-0102)		
22 66 53 00-0209	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV P-Trap	782.78	80.14
22 66 53 00-0210	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV P-Trap	949.11	88.18
22 66 53 00-0211	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV P-Trap	1,156.77	105.52
22 66 53 00-0212	EA	6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV P-Trap	3,503.21	129.77
22 66 53 00-0213		Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Double Hubs (22 66 53 00-0102)		
22 66 53 00-0214	EA	2" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Double Hub	369.77	80.14
22 66 53 00-0215	EA	3" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Double Hub	472.56	88.18
22 66 53 00-0216	EA	4" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Double Hub	657.52	105.52
22 66 53 00-0217	EA	6" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Double Hub	856.46	129.77
22 66 53 00-0218	EA	8" Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Double Hub	1,696.62	181.06
22 66 53 00-0219		Joint Material For Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe And Fittings (22 66 53 00-0093)		
Note: Labor costs for installation of lead and oakum are included in the installation costs for fittings.				
22 66 53 00-0220	LB	Lead (1 LB/Diameter Inch) Joint Material For Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe And Fittings.....	7.77	
22 66 53 00-0221	LB	Seal-Tite Packing (1/8 LB/Diameter Inch) Joint Material For Bell And Spigot High Silicon Iron Alloy Acid Resistant DWV Pipe And Fittings	83.21	
22 66 53 00-0222		Mechanical Joint High Silicon Iron Alloy Acid Resistant Drain-Waste-Vent (DWV) Pipe And Fittings (22 66 53)		
Note: ASTM A518.				
22 66 53 00-0223		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe (22 66 53 00-0222)		
22 66 53 00-0224	LF	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe.....	106.57	7.08
22 66 53 00-0225	LF	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe.....	121.36	7.83
22 66 53 00-0226	LF	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe	167.84	9.83
22 66 53 00-0227	LF	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe	212.22	11.41
22 66 53 00-0228		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Fittings (22 66 53 00-0222)		
22 66 53 00-0229		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Long Sweeps (22 66 53 00-0228)		
22 66 53 00-0230	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Long Sweep	379.21	56.14
22 66 53 00-0231	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Long Sweep	408.32	63.44
22 66 53 00-0232	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Long Sweep	567.83	70.00
22 66 53 00-0233	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Long Sweep	685.14	84.58
22 66 53 00-0234		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/4 Bends (22 66 53 00-0228)		
22 66 53 00-0235	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	202.20	56.14
22 66 53 00-0236	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	243.95	62.80
22 66 53 00-0237	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	318.57	70.21
22 66 53 00-0238	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend.....	420.94	83.95
22 66 53 00-0239	EA	2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/4 Bend	238.71	59.32



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 53 00-0240				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/8 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0241	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend	202.20	56.14
22 66 53 00-0242	EA			2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	243.95	62.80
22 66 53 00-0243	EA			3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	318.57	70.21
22 66 53 00-0244	EA			4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/8 Bend.....	420.94	83.95
22 66 53 00-0245				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/6 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0246	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/6 Bend	243.05	56.14
22 66 53 00-0247	EA			2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/6 Bend.....	307.49	62.80
22 66 53 00-0248	EA			3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/6 Bend.....	486.50	70.21
22 66 53 00-0249	EA			4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/6 Bend.....	543.48	83.95
22 66 53 00-0250				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/16 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0251	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend	233.97	56.14
22 66 53 00-0252	EA			2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend.....	280.26	62.80
22 66 53 00-0253	EA			3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend.....	445.65	70.21
22 66 53 00-0254	EA			4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV 1/16 Bend.....	502.63	83.95
22 66 53 00-0255				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Branch 1/4 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0256	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Branch 1/4 Bend.....	353.60	84.48
22 66 53 00-0257				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Straight Tees <small>(22 66 53 00-0228)</small>		
22 66 53 00-0258	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Straight Tee	280.98	84.48
22 66 53 00-0259	EA			2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Straight Tee	351.43	95.16
22 66 53 00-0260	EA			3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Straight Tee	472.15	106.05
22 66 53 00-0261	EA			4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Straight Tee	730.40	126.99
22 66 53 00-0262				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Reducing Tees <small>(22 66 53 00-0228)</small>		
22 66 53 00-0263	EA			2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Reducing Tee	327.92	91.57
22 66 53 00-0264	EA			3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Reducing Tee	406.70	98.76
22 66 53 00-0265	EA			3" x 2" Mechanical Joint High Silicon Iron Alloy Sanitary Reducing Tee.....	434.63	102.24
22 66 53 00-0266	EA			4" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Reducing Tee	464.10	112.81
22 66 53 00-0267	EA			4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Reducing Tee.....	514.32	115.99
22 66 53 00-0268	EA			4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Reducing Tee.....	560.45	119.48
22 66 53 00-0269				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Wyes <small>(22 66 53 00-0228)</small>		
22 66 53 00-0270	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Wye.....	281.39	84.80
22 66 53 00-0271	EA			2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Wye.....	333.28	95.16
22 66 53 00-0272	EA			3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Wye.....	454.00	106.05
22 66 53 00-0273	EA			4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Wye.....	730.40	126.99
22 66 53 00-0274				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wyes <small>(22 66 53 00-0228)</small>		
22 66 53 00-0275	EA			2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wye	315.02	92.09
22 66 53 00-0276	EA			3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wye	393.06	98.65
22 66 53 00-0277	EA			3" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	412.40	102.56
22 66 53 00-0278	EA			4" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wye	464.60	113.14
22 66 53 00-0279	EA			4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	515.28	116.62
22 66 53 00-0280	EA			4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Wye.....	547.28	119.79
22 66 53 00-0281				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wyes <small>(22 66 53 00-0228)</small>		
22 66 53 00-0282	EA			1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	428.00	112.92
22 66 53 00-0283	EA			2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	553.56	127.09
22 66 53 00-0284	EA			3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	719.12	140.63
22 66 53 00-0285	EA			4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	943.34	169.07
22 66 53 00-0286	EA			2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	474.35	119.58
22 66 53 00-0287	EA			3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	534.82	126.67
22 66 53 00-0288	EA			3" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	645.23	133.65
22 66 53 00-0289	EA			4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	712.04	148.02
22 66 53 00-0290	EA			4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Wye	868.52	155.54
22 66 53 00-0291				Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Crosses <small>(22 66 53 00-0228)</small>		

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities****22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
22 66 53 00-0292	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross	482.40	112.92
22 66 53 00-0293	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross.....	571.46	126.88
22 66 53 00-0294	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross.....	838.32	141.36
22 66 53 00-0295	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross.....	1,184.16	169.28
22 66 53 00-0296	EA	2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross	519.67	119.58
22 66 53 00-0297	EA	3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross	693.63	126.67
22 66 53 00-0298	EA	3" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross.....	731.38	133.65
22 66 53 00-0299	EA	4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross.....	780.06	147.92
22 66 53 00-0300	EA	4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Sanitary Cross.....	1,008.39	154.90
22 66 53 00-0301		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination		
		Wye And 1/8 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0302	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend	316.86	84.16
22 66 53 00-0303	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend	369.59	95.16
22 66 53 00-0304	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend	454.00	106.05
22 66 53 00-0305	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Wye And 1/8 Bend	780.33	126.99
22 66 53 00-0306		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing		
		Combination Wye And 1/8 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0307	EA	2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	350.69	91.67
22 66 53 00-0308	EA	3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	393.48	98.97
22 66 53 00-0309	EA	3" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	430.55	102.56
22 66 53 00-0310	EA	4" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	596.22	113.14
22 66 53 00-0311	EA	4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	610.59	116.62
22 66 53 00-0312	EA	4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Combination Wye And 1/8 Bend	687.97	119.79
22 66 53 00-0313		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double		
		Combination Wye And 1/8 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0314	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Combination Wye And 1/8 Bend.....	513.93	112.71
22 66 53 00-0315	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Combination Wye And 1/8 Bend.....	653.06	126.78
22 66 53 00-0316	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Combination Wye And 1/8 Bend.....	960.10	140.94
22 66 53 00-0317	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Double Combination Wye And 1/8 Bend.....	1,152.93	169.59
22 66 53 00-0318		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing		
		Double Combination Wye And 1/8 Bends <small>(22 66 53 00-0228)</small>		
22 66 53 00-0319	EA	2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Double Combination Wye And 1/8 Bend	560.52	119.58
22 66 53 00-0320	EA	3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Double Combination Wye And 1/8 Bend	679.99	126.56
22 66 53 00-0321	EA	3" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Double Combination Wye And 1/8 Bend	708.69	133.65
22 66 53 00-0322	EA	4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Double Combination Wye And 1/8 Bend	789.13	147.92
22 66 53 00-0323	EA	4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducing Double Combination Wye And 1/8 Bend	1,008.39	154.90
22 66 53 00-0324		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducers-		
		Increases <small>(22 66 53 00-0228)</small>		
22 66 53 00-0325	EA	2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducer-Increaser	239.60	59.95
22 66 53 00-0326	EA	3" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducer-Increaser	272.12	63.44
22 66 53 00-0327	EA	3" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducer-Increaser	319.74	74.02
22 66 53 00-0328	EA	4" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducer-Increaser	386.81	70.31
22 66 53 00-0329	EA	4" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducer-Increaser	410.24	73.80
22 66 53 00-0330	EA	4" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Reducer-Increaser	433.66	77.29
22 66 53 00-0331		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination		
		Cleanout And Test Tees <small>(22 66 53 00-0228)</small>		
22 66 53 00-0332	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Cleanout And Test Tee	223.78	49.37
22 66 53 00-0333	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Cleanout And Test Tee	260.72	55.83
22 66 53 00-0334	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Cleanout And Test Tee	308.04	63.23
22 66 53 00-0335	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Combination Cleanout And Test Tee	578.38	76.98
22 66 53 00-0336		Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe Plugs <small>(22 66 53 00-0228)</small>		
22 66 53 00-0337	EA	1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe Plug.....	96.56	28.13
22 66 53 00-0338	EA	2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe Plug.....	115.17	31.40
22 66 53 00-0339	EA	3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe Plug.....	125.25	35.10
22 66 53 00-0340	EA	4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe Plug.....	162.81	41.98



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 53 00-0341	Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV P-Traps <small>(22 66 53 00-0228)</small>	
22 66 53 00-0342 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV P-Trap.....	424.10	55.83
22 66 53 00-0343 EA 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV P-Trap.....	434.57	62.80
22 66 53 00-0344 EA 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV P-Trap.....	540.96	70.21
22 66 53 00-0345 EA 4" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV P-Trap.....	693.25	83.95
22 66 53 00-0346 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Running Acid Resistant DWV P-Trap.....	598.28	60.05
22 66 53 00-0347 EA 2" Mechanical Joint High Silicon Iron Alloy Running Acid Resistant DWV P-Trap.....	831.26	67.03
22 66 53 00-0348 EA 3" Mechanical Joint High Silicon Iron Alloy Running Acid Resistant DWV P-Trap.....	1,009.57	74.02
22 66 53 00-0349 EA 4" Mechanical Joint High Silicon Iron Alloy Running Acid Resistant DWV P-Trap.....	1,257.72	88.18
22 66 53 00-0350	Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Centrifugal Drum Traps <small>(22 66 53 00-0228)</small>	
22 66 53 00-0351 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Centrifugal Drum P-Trap.....	808.11	63.76
22 66 53 00-0352 EA 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Centrifugal Drum P-Trap.....	1,290.31	70.52
22 66 53 00-0353 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Centrifugal Drum S-Trap.....	844.03	63.44
22 66 53 00-0354 EA 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Centrifugal Drum S-Trap.....	1,290.31	70.52
22 66 53 00-0355	Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Traps <small>(22 66 53 00-0228)</small>	
22 66 53 00-0356 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Short P-Trap.....	748.72	63.44
22 66 53 00-0357 EA 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Short P-Trap.....	881.84	70.52
22 66 53 00-0358 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Long P-Trap.....	871.26	63.44
22 66 53 00-0359 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Long S-Trap.....	1,948.41	70.52
22 66 53 00-0360 EA 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Swivel Type Long S-Trap.....	1,145.08	70.52
22 66 53 00-0361	Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Return Bends <small>(22 66 53 00-0228)</small>	
22 66 53 00-0362 EA 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Return Bend.....	297.89	56.46
22 66 53 00-0363 EA 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Return Bend.....	394.71	63.44
22 66 53 00-0364	Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Threaded Adapters <small>(22 66 53 00-0228)</small>	
22 66 53 00-0365 EA 1-1/2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Threaded Adapter.....	145.14	42.29
22 66 53 00-0366 EA 1-1/2" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Threaded Adapter.....	282.04	45.89
22 66 53 00-0367 EA 2" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Threaded Adapter.....	197.31	52.87
22 66 53 00-0368	Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter <small>(22 66 53 00-0228)</small>	
22 66 53 00-0369 EA 1-1/2" x 1-1/2" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	280.88	60.16
22 66 53 00-0370 EA 1-1/2" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	308.42	63.44
22 66 53 00-0371 EA 1-1/2" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	345.47	66.93
22 66 53 00-0372 EA 1-1/2" x 4" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	369.39	73.80
22 66 53 00-0373 EA 2" x 2" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	345.52	67.03
22 66 53 00-0374 EA 2" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	364.38	70.52
22 66 53 00-0375 EA 2" x 4" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	392.81	77.29
22 66 53 00-0376 EA 3" x 3" Mechanical Joint High Silicon Iron Alloy Acid Resistant Hub To Mechanical Joint Adapter.....	451.41	74.02
22 66 53 00-0377 EA 4" x 4" Mechanical Joint High Silicon Iron Alloy Hub To Mechanical Joint Adapter.....	558.80	88.18
22 66 53 00-0378	Mechanical Joint Couplings For Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe And Fittings <small>(22 66 53 00-0228)</small>	
22 66 53 00-0379 EA 1-1/2" Mechanical Joint Couplings For Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe And Fitting.....	108.93	127.08
22 66 53 00-0380 EA 2" Mechanical Joint Couplings For Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe And Fitting.....	136.16	149.77
22 66 53 00-0381 EA 3" Mechanical Joint Couplings For Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe And Fitting.....	127.08	
22 66 53 00-0382 EA 4" Mechanical Joint Couplings For Mechanical Joint High Silicon Iron Alloy Acid Resistant DWV Pipe And Fitting.....	149.77	
22 66 53 00-0383	Mechanical Joint High Silicon Iron Alloy Acid Resistant Sink Fittings <small>(22 66 53 00-0228)</small>	
22 66 53 00-0384 EA Mechanical Joint High Silicon Iron Alloy Acid Resistant Sink Outlet.....	791.16	28.23
22 66 53 00-0385 EA Mechanical Joint High Silicon Iron Alloy Acid Resistant Stopper.....	298.00	14.06
22 66 53 00-0386 EA Mechanical Joint High Silicon Iron Alloy Acid Resistant Sink Overflow.....	561.24	14.06
22 66 53 00-0387	Mechanical Joint High Silicon Iron Alloy Acid Resistant Floor Drains With Stainless Steel Strainer Plates <small>(22 66 53 00-0228)</small>	
22 66 53 00-0388 EA Mechanical Joint High Silicon Iron Alloy Acid Resistant Floor Drain With Stainless Steel Strainer.....	2,816.62	141.05
22 66 53 00-0389 EA Mechanical Joint High Silicon Iron Alloy Acid Resistant Sediment Basin Floor Drain With Stainless Steel Strainer.....	3,489.82	148.13
22 66 53 00-0390 EA Stainless Steel Funnel Attachment For Mechanical Joint High Silicon Iron Alloy Acid Resistant Floor Drain.....	2,390.28	14.06

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities**

22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities

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22 66 53 00-0391	Chlorinated Polyvinyl Chloride (CPVC) Drain-Waste-Vent (DWV) Pipe And Fittings (ASTM F2618) <small>(22 66 53)</small>		
22 66 53 00-0392	Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe <small>(22 66 53 00-0391)</small> Note: Excludes fittings or hangers.		
22 66 53 00-0393	LF 1-1/2" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe	18.12	4.44
22 66 53 00-0394	LF 2" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe	23.47	5.29
22 66 53 00-0395	LF 3" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe	39.45	7.62
22 66 53 00-0396	LF 4" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe	52.16	8.25
22 66 53 00-0397	LF 6" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe	87.41	10.34
22 66 53 00-0398	LF 8" Schedule 40 Chlorinated Polyvinyl Chloride (CPVC) DWV Pipe	203.53	13.75
22 66 53 00-0399	Chlorinated Polyvinyl Chloride (CPVC) DWV Fittings <small>(22 66 53 00-0391)</small>		
22 66 53 00-0400	Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0401	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends	70.50	17.66
	Note: 0.125		
	<i>For Work In Restricted Working Space, Add</i>	7.93	
22 66 53 00-0402	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends	88.56	22.52
	Note: 0.16		
	<i>For Work In Restricted Working Space, Add</i>	10.15	
22 66 53 00-0403	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends	138.42	30.24
	Note: 0.215		
	<i>For Work In Restricted Working Space, Add</i>	13.64	
22 66 53 00-0404	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends	200.74	35.21
	Note: 0.25		
	<i>For Work In Restricted Working Space, Add</i>	15.86	
22 66 53 00-0405	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends	451.40	45.78
	Note: 0.325		
	<i>For Work In Restricted Working Space, Add</i>	20.62	
22 66 53 00-0406	EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/4 Bends	625.89	61.65
	Note: 0.438		
	<i>For Work In Restricted Working Space, Add</i>	27.75	
22 66 53 00-0407	Chlorinated Polyvinyl Chloride (CPVC) DWV Long Sweep 1/4 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0408	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Long Sweep 1/4 Bends	72.02	17.66
	<i>For Work In Restricted Working Space, Add</i>	7.93	
22 66 53 00-0409	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Long Sweep 1/4 Bends	95.96	22.52
	<i>For Work In Restricted Working Space, Add</i>	10.15	
22 66 53 00-0410	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Long Sweep 1/4 Bends	151.78	30.24
	<i>For Work In Restricted Working Space, Add</i>	13.64	
22 66 53 00-0411	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Long Sweep 1/4 Bends	205.64	35.21
	<i>For Work In Restricted Working Space, Add</i>	15.86	
22 66 53 00-0412	Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0413	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends	69.73	17.66
	<i>For Work In Restricted Working Space, Add</i>	7.93	
22 66 53 00-0414	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends	86.56	22.52
	<i>For Work In Restricted Working Space, Add</i>	10.15	
22 66 53 00-0415	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends	142.25	30.24
	<i>For Work In Restricted Working Space, Add</i>	13.64	
22 66 53 00-0416	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends	162.55	35.21
	<i>For Work In Restricted Working Space, Add</i>	15.86	
22 66 53 00-0417	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends	389.07	45.78
	<i>For Work In Restricted Working Space, Add</i>	20.62	
22 66 53 00-0418	EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/8 Bends	554.41	61.65
	<i>For Work In Restricted Working Space, Add</i>	27.75	
22 66 53 00-0419	Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0420	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends	70.59	17.66
	<i>For Work In Restricted Working Space, Add</i>	7.93	
22 66 53 00-0421	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends	86.49	22.52
	<i>For Work In Restricted Working Space, Add</i>	10.15	
22 66 53 00-0422	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends	140.66	30.24
	<i>For Work In Restricted Working Space, Add</i>	13.64	
22 66 53 00-0423	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends	174.99	35.21
	<i>For Work In Restricted Working Space, Add</i>	15.86	
22 66 53 00-0424	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends	312.91	45.78
	<i>For Work In Restricted Working Space, Add</i>	20.62	
22 66 53 00-0425	EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV 1/16 Bends	344.29	61.65
	<i>For Work In Restricted Working Space, Add</i>	27.75	
22 66 53 00-0426	Chlorinated Polyvinyl Chloride (CPVC) DWV Double 1/4 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0427	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double 1/4 Bends	429.39	45.47
	<i>For Work In Restricted Working Space, Add</i>	20.46	
22 66 53 00-0428	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double 1/4 Bends	333.28	33.83
	<i>For Work In Restricted Working Space, Add</i>	15.23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 53 00-0429 EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double 1/4 Bends..... <i>For Work In Restricted Working Space, Add</i>	201.30 11.90	26.44
22 66 53 00-0430 Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees <small>(22 66 53 00-0399)</small>		
22 66 53 00-0431 EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	94.38 11.90	26.44
22 66 53 00-0432 EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	116.31 15.23	33.83
22 66 53 00-0433 EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	199.39 20.46	45.47
22 66 53 00-0434 EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	275.82 23.79	52.87
22 66 53 00-0435 EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	758.13 30.93	68.62
22 66 53 00-0436 EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	1,051.55 41.63	92.41
22 66 53 00-0437 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees <small>(22 66 53 00-0399)</small>		
22 66 53 00-0438 EA 2" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	108.78 13.01	28.86
22 66 53 00-0439 EA 2" x 1-1/2" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	115.45 14.12	31.30
22 66 53 00-0440 EA 2" x 2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	112.48 14.12	31.30
22 66 53 00-0441 EA 3" x 3" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	172.56 17.60	39.12
22 66 53 00-0442 EA 3" x 3" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	184.81 18.71	41.56
22 66 53 00-0443 EA 4" x 4" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	245.38 20.94	46.52
22 66 53 00-0444 EA 4" x 4" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	259.05 22.68	50.33
22 66 53 00-0445 EA 6" x 6" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	553.85 28.55	63.34
22 66 53 00-0446 EA 8" x 8" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	1,315.09 35.69	79.19
22 66 53 00-0447 Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tees <small>(22 66 53 00-0399)</small>		
22 66 53 00-0448 EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	135.33 15.86	35.21
22 66 53 00-0449 EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	164.91 20.30	45.04
22 66 53 00-0450 EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	220.97 27.28	60.59
22 66 53 00-0451 EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tees..... <i>For Work In Restricted Working Space, Add</i>	279.28 31.72	70.42
22 66 53 00-0452 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Double Sanitary Tees <small>(22 66 53 00-0399)</small>		
22 66 53 00-0453 EA 2" x 2" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	168.88 18.08	40.18
22 66 53 00-0454 EA 3" x 3" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	201.73 21.57	47.89
22 66 53 00-0455 EA 3" x 3" x 2" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	262.06 23.79	52.87
22 66 53 00-0456 EA 4" x 4" x 2" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	227.74 26.01	57.73
22 66 53 00-0457 EA 4" x 4" x 3" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Sanitary Tee..... <i>For Work In Restricted Working Space, Add</i>	254.06 29.50	65.45
22 66 53 00-0458 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers <small>(22 66 53 00-0399)</small>		
22 66 53 00-0459 EA 2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	97.48 9.04	20.09
22 66 53 00-0460 EA 3" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	107.05 10.79	23.90
22 66 53 00-0461 EA 3" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	181.87 11.90	26.44
22 66 53 00-0462 EA 4" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	199.63 13.01	28.86
22 66 53 00-0463 EA 4" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	219.68 14.75	32.78
22 66 53 00-0464 EA 6" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	301.61 17.13	38.06
22 66 53 00-0465 EA 6" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducers..... <i>For Work In Restricted Working Space, Add</i>	349.15 18.24	40.50

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities****22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities**MINOR
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22 66 53 00-0466 Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushings (22 66 53 00-0399)				
22 66 53 00-0467	EA	2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	66.83	20.09
		<i>For Work In Restricted Working Space, Add</i>	9.04	
22 66 53 00-0468	EA	3" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	74.73	23.90
		<i>For Work In Restricted Working Space, Add</i>	10.79	
22 66 53 00-0469	EA	3" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	81.94	26.44
		<i>For Work In Restricted Working Space, Add</i>	11.90	
22 66 53 00-0470	EA	4" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	137.20	28.86
		<i>For Work In Restricted Working Space, Add</i>	13.01	
22 66 53 00-0471	EA	4" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	145.19	32.78
		<i>For Work In Restricted Working Space, Add</i>	14.75	
22 66 53 00-0472	EA	6" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	233.25	38.06
		<i>For Work In Restricted Working Space, Add</i>	17.13	
22 66 53 00-0473	EA	6" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	228.80	40.50
		<i>For Work In Restricted Working Space, Add</i>	18.24	
22 66 53 00-0474	EA	8" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	683.36	48.43
		<i>For Work In Restricted Working Space, Add</i>	21.83	
22 66 53 00-0475	EA	8" x 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Flush Bushing	717.71	53.72
		<i>For Work In Restricted Working Space, Add</i>	24.20	
22 66 53 00-0476 Chlorinated Polyvinyl Chloride (CPVC) DWV P-Traps (22 66 53 00-0399)				
22 66 53 00-0477	EA	1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV P-Traps	125.57	26.44
		<i>For Work In Restricted Working Space, Add</i>	11.90	
22 66 53 00-0478	EA	2" Chlorinated Polyvinyl Chloride (CPVC) DWV P-Traps	170.63	33.83
		<i>For Work In Restricted Working Space, Add</i>	15.23	
22 66 53 00-0479	EA	3" Chlorinated Polyvinyl Chloride (CPVC) DWV P-Traps	285.80	45.47
		<i>For Work In Restricted Working Space, Add</i>	20.46	
22 66 53 00-0480	EA	4" Chlorinated Polyvinyl Chloride (CPVC) DWV P-Traps	466.09	52.87
		<i>For Work In Restricted Working Space, Add</i>	23.79	
22 66 53 00-0481 Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes (22 66 53 00-0399)				
22 66 53 00-0482	EA	1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes	95.44	26.44
		<i>For Work In Restricted Working Space, Add</i>	11.90	
22 66 53 00-0483	EA	2" Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes	129.01	33.83
		<i>For Work In Restricted Working Space, Add</i>	15.23	
22 66 53 00-0484	EA	3" Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes	207.69	45.47
		<i>For Work In Restricted Working Space, Add</i>	20.46	
22 66 53 00-0485	EA	4" Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes	282.62	52.87
		<i>For Work In Restricted Working Space, Add</i>	23.79	
22 66 53 00-0486	EA	6" Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes	619.24	68.62
		<i>For Work In Restricted Working Space, Add</i>	30.93	
22 66 53 00-0487	EA	8" Chlorinated Polyvinyl Chloride (CPVC) DWV Wyes	700.59	92.41
		<i>For Work In Restricted Working Space, Add</i>	41.63	
22 66 53 00-0488 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes (22 66 53 00-0399)				
22 66 53 00-0489	EA	2" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	104.34	28.86
		<i>For Work In Restricted Working Space, Add</i>	13.01	
22 66 53 00-0490	EA	2" x 2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	125.31	31.30
		<i>For Work In Restricted Working Space, Add</i>	14.12	
22 66 53 00-0491	EA	3" x 3" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	178.79	39.12
		<i>For Work In Restricted Working Space, Add</i>	17.60	
22 66 53 00-0492	EA	3" x 3" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	192.40	41.56
		<i>For Work In Restricted Working Space, Add</i>	18.71	
22 66 53 00-0493	EA	4" x 4" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	195.16	43.98
		<i>For Work In Restricted Working Space, Add</i>	19.83	
22 66 53 00-0494	EA	4" x 4" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	256.93	46.52
		<i>For Work In Restricted Working Space, Add</i>	20.94	
22 66 53 00-0495	EA	4" x 4" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	270.77	50.33
		<i>For Work In Restricted Working Space, Add</i>	22.68	
22 66 53 00-0496	EA	6" x 6" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	430.34	63.34
		<i>For Work In Restricted Working Space, Add</i>	28.55	
22 66 53 00-0497	EA	8" x 8" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	509.39	79.19
		<i>For Work In Restricted Working Space, Add</i>	35.69	
22 66 53 00-0498	EA	8" x 8" x 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Wyes	561.41	84.48
		<i>For Work In Restricted Working Space, Add</i>	38.06	
22 66 53 00-0499 Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes (22 66 53 00-0399)				
22 66 53 00-0500	EA	1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes	157.55	35.21
		<i>For Work In Restricted Working Space, Add</i>	15.86	
22 66 53 00-0501	EA	2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes	178.34	45.04
		<i>For Work In Restricted Working Space, Add</i>	20.30	
22 66 53 00-0502	EA	3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes	290.99	60.59
		<i>For Work In Restricted Working Space, Add</i>	27.28	
22 66 53 00-0503	EA	4" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes	562.11	70.42
		<i>For Work In Restricted Working Space, Add</i>	31.72	
22 66 53 00-0504	EA	6" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes	931.10	91.57
		<i>For Work In Restricted Working Space, Add</i>	41.24	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 53 00-0505 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Double Wyes <small>(22 66 53 00-0399)</small>		
22 66 53 00-0506 EA 2" x 2" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes.....	226.32	40.18
For Work In Restricted Working Space, Add	18.08	
22 66 53 00-0507 EA 3" x 3" x 2" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes.....	283.63	52.87
For Work In Restricted Working Space, Add	23.79	
22 66 53 00-0508 EA 4" x 4" x 3" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes.....	502.62	65.45
For Work In Restricted Working Space, Add	29.50	
22 66 53 00-0509 EA 6" x 6" x 4" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Wyes.....	753.35	80.99
For Work In Restricted Working Space, Add	36.48	
22 66 53 00-0510 Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0511 EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	112.49	26.44
For Work In Restricted Working Space, Add	11.90	
22 66 53 00-0512 EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	147.94	33.83
For Work In Restricted Working Space, Add	15.23	
22 66 53 00-0513 EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	223.35	45.47
For Work In Restricted Working Space, Add	20.46	
22 66 53 00-0514 EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	299.68	52.87
For Work In Restricted Working Space, Add	23.79	
22 66 53 00-0515 EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	698.75	68.62
For Work In Restricted Working Space, Add	30.93	
22 66 53 00-0516 EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	1,234.77	92.41
For Work In Restricted Working Space, Add	41.63	
22 66 53 00-0517 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Combination Wye And 1/8 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0518 EA 2" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	103.94	28.86
For Work In Restricted Working Space, Add	13.01	
22 66 53 00-0519 EA 2" x 2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	134.56	31.30
For Work In Restricted Working Space, Add	14.12	
22 66 53 00-0520 EA 3" x 3" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	187.75	39.12
For Work In Restricted Working Space, Add	17.60	
22 66 53 00-0521 EA 3" x 3" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	202.19	41.56
For Work In Restricted Working Space, Add	18.71	
22 66 53 00-0522 EA 4" x 4" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	263.39	46.52
For Work In Restricted Working Space, Add	20.94	
22 66 53 00-0523 EA 4" x 4" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	278.72	50.33
For Work In Restricted Working Space, Add	22.68	
22 66 53 00-0524 EA 6" x 6" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	542.33	60.90
For Work In Restricted Working Space, Add	27.44	
22 66 53 00-0525 EA 6" x 6" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Combination Wye And 1/8 Bends	563.39	63.34
For Work In Restricted Working Space, Add	28.55	
22 66 53 00-0526 Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0527 EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	171.14	35.21
For Work In Restricted Working Space, Add	15.86	
22 66 53 00-0528 EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	259.81	45.04
For Work In Restricted Working Space, Add	20.30	
22 66 53 00-0529 EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	421.16	60.59
For Work In Restricted Working Space, Add	27.28	
22 66 53 00-0530 EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	731.50	70.42
For Work In Restricted Working Space, Add	31.72	
22 66 53 00-0531 EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	1,009.41	91.57
For Work In Restricted Working Space, Add	41.24	
22 66 53 00-0532 Chlorinated Polyvinyl Chloride (CPVC) DWV Reducing Double Combination Wye And 1/8 Bends <small>(22 66 53 00-0399)</small>		
22 66 53 00-0533 EA 2" x 2" x 1-1/2" x 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	226.34	40.18
For Work In Restricted Working Space, Add	18.08	
22 66 53 00-0534 EA 3" x 3" x 2" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	356.14	52.87
For Work In Restricted Working Space, Add	23.79	
22 66 53 00-0535 EA 4" x 4" x 2" x 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	433.38	57.73
For Work In Restricted Working Space, Add	26.01	
22 66 53 00-0536 EA 4" x 4" x 3" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	445.02	65.45
For Work In Restricted Working Space, Add	29.50	
22 66 53 00-0537 EA 6" x 6" x 3" x 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	566.98	76.02
For Work In Restricted Working Space, Add	34.26	
22 66 53 00-0538 EA 6" x 6" x 4" x 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Double Combination Wye And 1/8 Bends	638.31	80.99
For Work In Restricted Working Space, Add	36.48	
22 66 53 00-0539 Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Tees With Plug <small>(22 66 53 00-0399)</small>		
22 66 53 00-0540 EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Tees.....	104.83	26.44
For Work In Restricted Working Space, Add	11.90	

22 Plumbing**22 60 Gas and Vacuum Systems for Laboratory and Healthcare Facilities****22 66 Chemical-Waste Systems for Laboratory and Healthcare Facilities**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
22 66 53 00-0541	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Tees <i>For Work In Restricted Working Space, Add</i>	122.75 15.23	33.83
22 66 53 00-0542	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Tees <i>For Work In Restricted Working Space, Add</i>	219.16 20.46	45.47
22 66 53 00-0543	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Tees <i>For Work In Restricted Working Space, Add</i>	284.90 23.79	52.87
22 66 53 00-0544	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Tees <i>For Work In Restricted Working Space, Add</i>	658.35 30.93	68.62
22 66 53 00-0545	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Plug <i>For Work In Restricted Working Space, Add</i>	23.07 3.97	8.77
22 66 53 00-0546	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Plug <i>For Work In Restricted Working Space, Add</i>	27.69 5.07	11.20
22 66 53 00-0547	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Plug <i>For Work In Restricted Working Space, Add</i>	41.56 6.82	15.12
22 66 53 00-0548	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Plug <i>For Work In Restricted Working Space, Add</i>	47.55 7.93	17.55
22 66 53 00-0549	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Plug <i>For Work In Restricted Working Space, Add</i>	83.61 10.31	22.84
22 66 53 00-0550	Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <small>(22 66 53 00-0399)</small>		
22 66 53 00-0551	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	54.94 7.93	17.66
22 66 53 00-0552	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	67.43 10.15	22.52
22 66 53 00-0553	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	107.47 13.64	30.24
22 66 53 00-0554	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	159.52 15.86	35.21
22 66 53 00-0555	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	253.22 20.62	45.78
22 66 53 00-0556	EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV Cleanout Adapters With Plug <i>For Work In Restricted Working Space, Add</i>	459.77 27.79	61.65
22 66 53 00-0557	Chlorinated Polyvinyl Chloride (CPVC) Couplings <small>(22 66 53 00-0399)</small>		
22 66 53 00-0558	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	60.86 7.93	17.66
22 66 53 00-0559	EA 2" Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	76.79 10.15	22.52
22 66 53 00-0560	EA 3" Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	100.44 13.64	30.24
22 66 53 00-0561	EA 4" Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	131.08 15.86	35.21
22 66 53 00-0562	EA 6" Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	192.70 20.62	45.78
22 66 53 00-0563	EA 8" Chlorinated Polyvinyl Chloride (CPVC) Couplings <i>For Work In Restricted Working Space, Add</i>	426.94 27.79	61.65
22 66 53 00-0564	Chlorinated Polyvinyl Chloride (CPVC) Female Adapters <small>(22 66 53 00-0399)</small>		
22 66 53 00-0565	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) Female Adapters	40.30	8.77
22 66 53 00-0566	EA 2" Chlorinated Polyvinyl Chloride (CPVC) Female Adapters	53.79	11.31
22 66 53 00-0567	EA 3" Chlorinated Polyvinyl Chloride (CPVC) Female Adapters	83.59	15.12
22 66 53 00-0568	EA 4" Chlorinated Polyvinyl Chloride (CPVC) Female Adapters	143.43	17.66
22 66 53 00-0569	EA 6" Chlorinated Polyvinyl Chloride (CPVC) Female Adapters	230.34	22.84
22 66 53 00-0570	Chlorinated Polyvinyl Chloride (CPVC) Male Adapters <small>(22 66 53 00-0399)</small>		
22 66 53 00-0571	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) Male Adapters	45.64	8.77
22 66 53 00-0572	EA 2" Chlorinated Polyvinyl Chloride (CPVC) Male Adapters	65.57	11.31
22 66 53 00-0573	EA 3" Chlorinated Polyvinyl Chloride (CPVC) Male Adapters	76.01	15.12
22 66 53 00-0574	EA 4" Chlorinated Polyvinyl Chloride (CPVC) Male Adapters	137.53	17.66
22 66 53 00-0575	EA 6" Chlorinated Polyvinyl Chloride (CPVC) Male Adapters	184.31	22.84
22 66 53 00-0576	Chlorinated Polyvinyl Chloride (CPVC) Caps <small>(22 66 53 00-0399)</small>		
22 66 53 00-0577	EA 1-1/2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cap	39.98	8.77
22 66 53 00-0578	EA 2" Chlorinated Polyvinyl Chloride (CPVC) DWV Cap	48.94	11.31
22 66 53 00-0579	EA 3" Chlorinated Polyvinyl Chloride (CPVC) DWV Cap	78.08	15.12
22 66 53 00-0580	EA 4" Chlorinated Polyvinyl Chloride (CPVC) DWV Cap	139.27	17.66
22 66 53 00-0581	EA 6" Chlorinated Polyvinyl Chloride (CPVC) DWV Cap	177.35	22.84
22 66 53 00-0582	EA 8" Chlorinated Polyvinyl Chloride (CPVC) DWV Cap	282.10	30.88
22 66 83	Chemical-Waste Tanks <small>(22 66)</small>		
22 66 83 16	Chemical-Waste Neutralization Tanks <small>(22 66 83)</small>		
22 66 83 16-0001	Acid Neutralization Tank <small>(22 66 83 16)</small>		
22 66 83 16-0002	Polyethylene Acid Neutralization Tank <small>(22 66 83 16-0001)</small>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
22 66 83 16-0003 EA 5 Gallon Capacity Polyethylene Acid Neutralization Tank	559.35	215.29
22 66 83 16-0004 EA 15 Gallon Capacity Polyethylene Acid Neutralization Tank	1,025.84	298.53
22 66 83 16-0005 EA 30 Gallon Capacity Polyethylene Acid Neutralization Tank	1,268.43	430.57
22 66 83 16-0006 EA 55 Gallon Capacity Polyethylene Acid Neutralization Tank	1,625.78	574.09
22 66 83 16-0007 EA 100 Gallon Capacity Polyethylene Acid Neutralization Tank	2,093.92	688.91
22 66 83 16-0008 EA 150 Gallon Capacity Polyethylene Acid Neutralization Tank	2,874.94	861.14
22 66 83 16-0009 EA 200 Gallon Capacity Polyethylene Acid Neutralization Tank	3,307.21	1,076.43
22 66 83 16-0010 EA 275 Gallon Capacity Polyethylene Acid Neutralization Tank	4,308.99	1,291.71
22 66 83 16-0011 EA 350 Gallon Capacity Polyethylene Acid Neutralization Tank	4,880.36	1,550.05
22 66 83 16-0012 Polypropylene Acid Neutralization Tank <small>(22 66 83 16-0001)</small>		
22 66 83 16-0013 EA 5 Gallon Capacity Polypropylene Acid Neutralization Tank	940.54	215.29
22 66 83 16-0014 EA 15 Gallon Capacity Polypropylene Acid Neutralization Tank	1,629.41	298.53
22 66 83 16-0015 EA 30 Gallon Capacity Polypropylene Acid Neutralization Tank	2,632.56	430.57
22 66 83 16-0016 EA 55 Gallon Capacity Polypropylene Acid Neutralization Tank	3,468.80	574.09
22 66 83 16-0017 EA 100 Gallon Capacity Polypropylene Acid Neutralization Tank	4,394.34	688.91
22 66 83 16-0018 EA 150 Gallon Capacity Polypropylene Acid Neutralization Tank	4,930.69	861.14
22 66 83 16-0019 EA 200 Gallon Capacity Polypropylene Acid Neutralization Tank	5,353.89	1,076.43
22 66 83 16-0020 EA 275 Gallon Capacity Polypropylene Acid Neutralization Tank	7,882.76	1,291.71
22 66 83 16-0021 EA 350 Gallon Capacity Polypropylene Acid Neutralization Tank	8,501.76	1,550.05
22 66 83 16-0022 Chemical Dilution Trap <small>(22 66 83 16)</small>		
22 66 83 16-0023 EA 1 Gallon Capacity Polyethylene Under Bench Chemical Dilution Trap	516.20	71.77
Note: 1-1/2" top inlet and side outlet with anti siphon.		
22 66 83 16-0024 EA 1-1/2 Gallon Capacity Polyethylene Under Bench Chemical Dilution Trap	533.17	71.77
Note: 1-1/2" top inlet and side outlet with anti siphon.		
22 66 83 16-0025 EA 2 Gallon Capacity Polyethylene Under Bench Chemical Dilution Trap	550.13	71.77
Note: 1-1/2" top inlet and side outlet with anti siphon.		
22 66 83 16-0026 EA 5 Gallon Capacity Polyethylene Under Bench Chemical Dilution Trap	601.29	86.11
Note: 1-1/2" top inlet and side outlet with anti siphon.		

END OF SECTION 22

22	22	Plumbing
	22 60	Gas and Vacuum Systems for Laboratory and Healthcare Facilities
	22 66	Chemical-Waste Systems for Laboratory and Healthcare Facilities



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 Heating, Ventilating, and Air-Conditioning (HVAC)

Note: Where required, mechanical equipment excludes electrical connection unless title states otherwise. HVAC equipment shall conform to California Title 24.

23 01 Operation and Maintenance of HVAC Systems ⁽²³⁾

23 01 10 Operation and Maintenance of Facility Fuel Systems ^(23 01)

23 01 10 91 Facility Fuel Systems Restoration ^(23 01 10)

23 01 10 91-0001 AQMD Permit Costs ^(23 01 10 91)	
23 01 10 91-0002	EA Processing Fee - 5 To 20 Million 9,774.11
23 01 10 91-0003	EA Processing Fee - 5 To 20 Million, Duplicate (Same Model Number) 4,887.05
23 01 10 91-0004	EA Permit To Operate - 5 To 20 Million, (Annual Fee) 1,935.53
23 01 10 91-0005	EA Processing Fee - 2 To 5 Million 3,796.18
23 01 10 91-0006	EA Processing Fee - 2 To 5 Million, Duplicate (Same Model Number) 1,898.09
23 01 10 91-0007	EA Permit To Operate - 2 To 5 Million, (Annual Fee) 575.13

23 01 10 91-0008 Purge Gas Systems ^(23 01 10 91)	
Note: Includes collection and refilling/bleeding of system. For natural gas, flammable gases and other gases that should not be released inside the building. See CSI section 23 01 60 71-0001 for refrigerant.	
23 01 10 91-0009	EA Up To 100', Up To 1-1/2" Diameter Pipe, Purge Gas Systems 530.49
23 01 10 91-0010	EA >100' To 250', Up To 1-1/2" Diameter Pipe, Purge Gas Systems 757.86
23 01 10 91-0011	EA >250' To 500', Up To 1-1/2" Diameter Pipe, Purge Gas Systems 796.17
23 01 10 91-0012	EA >500' To 1,000', Up To 1-1/2" Diameter Pipe, Purge Gas Systems 878.64
23 01 10 91-0013	EA >1,000' To 2,000', Up To 1-1/2" Diameter Pipe, Purge Gas Systems 1,591.56
23 01 10 91-0014	EA Up To 100', >1-1/2" To 4" Diameter Pipe, Purge Gas Systems 713.80
23 01 10 91-0015	EA >100' To 250', >1-1/2" To 4" Diameter Pipe, Purge Gas Systems 1,026.51
23 01 10 91-0016	EA >250' To 500', >1-1/2" To 4" Diameter Pipe, Purge Gas Systems 1,088.65
23 01 10 91-0017	EA >500' To 1,000', >1-1/2" To 4" Diameter Pipe, Purge Gas Systems 1,433.04
23 01 10 91-0018	EA >1,000' To 2,000', >1-1/2" To 4" Diameter Pipe, Purge Gas Systems 2,221.96
23 01 10 91-0019	EA Up To 100', >4" To 10" Diameter Pipe, Purge Gas Systems 849.85
23 01 10 91-0020	EA >100' To 250', >4" To 10" Diameter Pipe, Purge Gas Systems 1,256.04
23 01 10 91-0021	EA >250' To 500', >4" To 10" Diameter Pipe, Purge Gas Systems 2,890.64
23 01 10 91-0022	EA >500' To 1,000', >4" To 10" Diameter Pipe, Purge Gas Systems 4,526.14
23 01 10 91-0023	EA >1,000' To 2,000', >4" To 10" Diameter Pipe, Purge Gas Systems 8,512.01

23 01 20 Operation and Maintenance of HVAC Piping and Pumps ^(23 01)

23 01 20 91 HVAC Piping and Pumps Restoration ^(23 01 20)

23 01 20 91-0001 Lock Out/Tag Out System ^(23 01 20 91)	
23 01 20 91-0002	EA Up To 1", Lock Out/Tag Out Valve 28.70
Note: Excludes tag or padlock See CSI section 23 01 20 91-0007 for padlock, 23 01 20 91-0008 for tag(s).	
23 01 20 91-0003	EA >1" To 3", Lock Out/Tag Out Valve 34.45
Note: Excludes tag or padlock See CSI section 23 01 20 91-0007 for padlock, 23 01 20 91-0008 for tag(s).	
23 01 20 91-0004	EA >3" To 6", Lock Out/Tag Out Valve 40.19
Note: Excludes tag or padlock See CSI section 23 01 20 91-0007 for padlock, 23 01 20 91-0008 for tag(s).	
23 01 20 91-0005	EA >6" To 10", Lock Out/Tag Out Valve 45.93
Note: Excludes tag or padlock See CSI section 23 01 20 91-0007 for padlock, 23 01 20 91-0008 for tag(s).	
23 01 20 91-0006	EA >10" To 14", Lock Out/Tag Out Valve 57.41
Note: Excludes tag or padlock See CSI section 23 01 20 91-0007 for padlock, 23 01 20 91-0008 for tag(s).	
23 01 20 91-0007	EA Lock Out Padlock 11.48
23 01 20 91-0008	EA Lock Out Tags 4.94

23 01 20 91-0009 Freeze Pipe Using CO2 Kit ^(23 01 20 91)	
Note: For use on chilled water or cold water piping systems. Excludes cutting existing pipe, and installation of valve or fittings.	
23 01 20 91-0010	EA Up To 2" Freeze Pipe Using CO2 Kit 366.95

23 01 20 91-0011 Pipe Freezing ^(23 01 20 91)	
Note: For use on any water piping systems. Excludes excavation, cutting existing pipe, and installation of valve or fittings.	
23 01 20 91-0012	EA Up To 1" Pipe Freezing, First Location 682.52
Note: Includes freezing on each side of valve or fitting.	
23 01 20 91-0013	EA Up To 1" Pipe Freezing, Each Additional Location After First 356.35
Note: Includes freezing on each side of valve or fitting.	
23 01 20 91-0014	EA >1" To 1-1/2" Pipe Freezing, First Location 825.79
Note: Includes freezing on each side of valve or fitting.	
23 01 20 91-0015	EA >1" To 1-1/2" Pipe Freezing, Each Additional Location After First 410.90
Note: Includes freezing on each side of valve or fitting.	
23 01 20 91-0016	EA >1-1/2" To 2" Pipe Freezing, First Location 1,138.23
Note: Includes freezing on each side of valve or fitting.	
23 01 20 91-0017	EA >1-1/2" To 2" Pipe Freezing, Each Additional Location After First 465.61
Note: Includes freezing on each side of valve or fitting.	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 01 Operation and Maintenance of HVAC Systems****23 01 20 Operation and Maintenance of HVAC Piping and Pumps**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 01 20 91-0018	EA	>2" To 3" Pipe Freezing, First Location Note: Includes freezing on each side of valve or fitting.	1,298.41	
23 01 20 91-0019	EA	>2" To 3" Pipe Freezing, Each Additional Location After First Note: Includes freezing on each side of valve or fitting.	548.89	
23 01 20 91-0020	EA	>3" To 4" Pipe Freezing, First Location Note: Includes freezing on each side of valve or fitting.	1,904.21	
23 01 20 91-0021	EA	>3" To 4" Pipe Freezing, Each Additional Location After First Note: Includes freezing on each side of valve or fitting.	633.33	
23 01 20 91-0022	EA	>4" To 6" Pipe Freezing, First Location Note: Includes freezing on each side of valve or fitting.	3,933.85	
23 01 20 91-0023	EA	>4" To 6" Pipe Freezing, Each Additional Location After First Note: Includes freezing on each side of valve or fitting.	836.08	
23 01 20 91-0024	EA	>6" To 8" Pipe Freezing, First Location Note: Includes freezing on each side of valve or fitting.	5,233.31	
23 01 20 91-0025	EA	>6" To 8" Pipe Freezing, Each Additional Location After First Note: Includes freezing on each side of valve or fitting.	1,232.23	
23 01 20 91-0026	EA	>8" To 10" Pipe Freezing, First Location Note: Includes freezing on each side of valve or fitting.	7,222.44	
23 01 20 91-0027	EA	>8" To 10" Pipe Freezing, Each Additional Location After First Note: Includes freezing on each side of valve or fitting.	1,683.46	
23 01 20 91-0028	EA	>10" To 12" Pipe Freezing, First Location Note: Includes freezing on each side of valve or fitting.	9,299.96	
23 01 20 91-0029	EA	>10" To 12" Pipe Freezing, Each Additional Location After First Note: Includes freezing on each side of valve or fitting.	2,189.28	
23 01 20 91-0030		Water/Chlorine Pipe Disinfection/Flush/Testing (23 01 20 91) Note: For existing piping when required. Water/chlorine solution per specification entitled "Water Distribution".		
23 01 20 91-0031	LF	Up To 1", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.14 <i>For >500 To 2000, Deduct</i> -0.36 <i>For >2000, Deduct</i> -0.52	1.94	
23 01 20 91-0032	LF	>1" To 2", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.19 <i>For >500 To 2000, Deduct</i> -0.48 <i>For >2000, Deduct</i> -0.70	2.69	
23 01 20 91-0033	LF	>2" To 3", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.29 <i>For >500 To 2000, Deduct</i> -0.72 <i>For >2000, Deduct</i> -1.04	4.16	
23 01 20 91-0034	LF	4", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.38 <i>For >500 To 2000, Deduct</i> -0.96 <i>For >2000, Deduct</i> -1.39	5.80	
23 01 20 91-0035	LF	6", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.46 <i>For >500 To 2000, Deduct</i> -1.15 <i>For >2000, Deduct</i> -1.66	7.20	
23 01 20 91-0036	LF	8", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.57 <i>For >500 To 2000, Deduct</i> -1.44 <i>For >2000, Deduct</i> -2.08	9.14	
23 01 20 91-0037	LF	10", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.77 <i>For >500 To 2000, Deduct</i> -1.91 <i>For >2000, Deduct</i> -2.78	11.99	
23 01 20 91-0038	LF	12", Water/Chlorine Pipe Disinfection/Flush/Testing <i>For >250 To 500, Deduct</i> -0.92 <i>For >500 To 2000, Deduct</i> -2.30 <i>For >2000, Deduct</i> -3.33	14.39	
23 01 20 91-0039		Shut Down Existing Piping System (23 01 20 91)		
23 01 20 91-0040	EA	Shut Down Existing Interior Piping System Note: Includes lock out/tag out and average line tracing. Use when valves are greater than 25' from work. When the shut-off valves for multiple lines are located with a 10' radius, the quantity used shall be one.	241.47	
23 01 20 91-0041		Purge Liquid Systems (23 01 20 91) Note: Includes collection of liquid, refilling with liquid and bleeding of air from system.		
23 01 20 91-0042	EA	Up To 50', Up To 3/4" Diameter Pipe, Purge Liquid System 181.49	181.49	
23 01 20 91-0043	EA	>50' To 100', Up To 3/4" Diameter Pipe, Purge Liquid System 226.86	226.86	
23 01 20 91-0044	EA	>100 To 250', Up To 3/4" Diameter Pipe, Purge Liquid System 323.80	323.80	
23 01 20 91-0045	EA	>250 To 500', Up To 3/4" Diameter Pipe, Purge Liquid System 388.01	388.01	
23 01 20 91-0046	EA	>500 To 1,000', Up To 3/4" Diameter Pipe, Purge Liquid System 485.02	485.02	
23 01 20 91-0047	EA	>1,000 To 2,000', Up To 3/4" Diameter Pipe, Purge Liquid System 630.53	630.53	
23 01 20 91-0048	LF	>2,000', Up To 3/4" Diameter Pipe, Purge Liquid System 0.31	0.31	
23 01 20 91-0049	EA	Up To 100', >3/4" To 1-1/2" Diameter Pipe, Purge Liquid System 377.95	377.95	
23 01 20 91-0050	EA	>100 To 250', >3/4" To 1-1/2" Diameter Pipe, Purge Liquid System 539.78	539.78	
23 01 20 91-0051	EA	>250 To 500', >3/4" To 1-1/2" Diameter Pipe, Purge Liquid System 646.76	646.76	
23 01 20 91-0052	EA	>500 To 1,000', >3/4" To 1-1/2" Diameter Pipe, Purge Liquid System 808.45	808.45	
23 01 20 91-0053	EA	>1,000 To 2,000', >3/4" To 1-1/2" Diameter Pipe, Purge Liquid System 1,050.99	1,050.99	
23 01 20 91-0054	LF	>2,000', >3/4" To 1-1/2" Diameter Pipe, Purge Liquid System 0.52	0.52	
23 01 20 91-0055	EA	Up To 100', >1-1/2" To 3" Diameter Pipe, Purge Liquid System 529.12	529.12	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 01 20 91-0056	EA	>100 To 250', >1-1/2" To 3" Diameter Pipe, Purge Liquid System	755.70	
23 01 20 91-0057	EA	>250 To 500', >1-1/2" To 3" Diameter Pipe, Purge Liquid System	905.47	
23 01 20 91-0058	EA	>500 To 1,000', >1-1/2" To 3" Diameter Pipe, Purge Liquid System	1,131.83	
23 01 20 91-0059	EA	>1,000 To 2,000', >1-1/2" To 3" Diameter Pipe, Purge Liquid System	1,471.39	
23 01 20 91-0060	LF	>2,000', >1-1/2" To 3" Diameter Pipe, Purge Liquid System	0.74	
23 01 20 91-0061	EA	Up To 100', >3" To 6" Diameter Pipe, Purge Liquid System	727.54	
23 01 20 91-0062	EA	>100 To 250', >3" To 6" Diameter Pipe, Purge Liquid System	1,039.09	
23 01 20 91-0063	EA	>250 To 500', >3" To 6" Diameter Pipe, Purge Liquid System	1,103.13	
23 01 20 91-0064	EA	>500 To 1,000', >3" To 6" Diameter Pipe, Purge Liquid System	1,378.91	
23 01 20 91-0065	EA	>1,000 To 2,000', >3" To 6" Diameter Pipe, Purge Liquid System	1,792.58	
23 01 20 91-0066	LF	>2,000', >3" To 6" Diameter Pipe, Purge Liquid System	0.90	
23 01 20 91-0067	EA	Up To 100', >6" To 10" Diameter Pipe, Purge Liquid System	982.19	
23 01 20 91-0068	EA	>100 To 250', >6" To 10" Diameter Pipe, Purge Liquid System	1,402.76	
23 01 20 91-0069	EA	>250 To 500', >6" To 10" Diameter Pipe, Purge Liquid System	1,489.23	
23 01 20 91-0070	EA	>500 To 1,000', >6" To 10" Diameter Pipe, Purge Liquid System	1,861.52	
23 01 20 91-0071	EA	>1,000 To 2,000', >6" To 10" Diameter Pipe, Purge Liquid System	2,419.99	
23 01 20 91-0072	LF	>2,000', >6" To 10" Diameter Pipe, Purge Liquid System	1.21	

23 01 20 91-0073 Add-A-Valve Emergency Shut Off Device (23 01 20 91)

23 01 20 91-0074	EA	1/2" Add-A-Valve Emergency Shut Off Device (Jomar 800-103ADD)	390.14	
23 01 20 91-0075	EA	3/4" Add-A-Valve Emergency Shut Off Device (Jomar 800-104ADD)	491.60	
23 01 20 91-0076	EA	1" Add-A-Valve Emergency Shut Off Device (Jomar 800-105ADD)	682.88	
23 01 20 91-0077	EA	1-1/4" Add-A-Valve Emergency Shut Off Device (Jomar 800-106ADD)	1,048.24	
23 01 20 91-0078	EA	1-1/2" Add-A-Valve Emergency Shut Off Device (Jomar 800-107ADD)	1,295.35	
23 01 20 91-0079	EA	2" Add-A-Valve Emergency Shut Off Device (Jomar 800-108ADD)	1,960.76	

23 01 30 Operation and Maintenance of HVAC Air Distribution (23 01)

23 01 30 51 HVAC Air-Distribution System Cleaning (23 01 30)

23 01 30 51-0001 Cleaning Of Ductwork And HVAC Equipment (23 01 30 51)

23 01 30 51-0002	LF	Up To 2 SF Cross Section, Clean Supply/Return Ductwork	3.78			
Note: Includes sealing registers, grilles, diffusers as required. Excludes cleaning of registers, grilles, diffusers, or other devices.						
<i>For Exhaust Ductwork, Add</i>					0.95	
23 01 30 51-0003	LF	>2 SF To 4 SF Cross Section, Clean Supply/Return Ductwork	4.75			
Note: Includes sealing registers, grilles, diffusers as required. Excludes cleaning of registers, grilles, diffusers, or other devices.						
<i>For Exhaust Ductwork, Add</i>					1.19	
23 01 30 51-0004	LF	>4 SF To 8 SF Cross Section, Clean Supply/Return Ductwork	6.37			
Note: Includes sealing registers, grilles, diffusers as required. Excludes cleaning of registers, grilles, diffusers, or other devices.						
<i>For Exhaust Ductwork, Add</i>					1.59	
23 01 30 51-0005	LF	>8 SF Cross Section, Clean Supply/Return Ductwork	9.03			
Note: Includes sealing registers, grilles, diffusers as required. Excludes cleaning of registers, grilles, diffusers, or other devices.						
<i>For Exhaust Ductwork, Add</i>					2.26	
23 01 30 51-0006	SF	Clean Duct Dampers	12.73			
23 01 30 51-0007	SF	Clean Duct Fire Dampers	25.45			
23 01 30 51-0008	SF	Clean Louver	10.19			
23 01 30 51-0009	EA	Clean Turning Vane Set	30.55			
23 01 30 51-0010	EA	Clean Grille/Diffuser/Register	30.55			
Note: Includes removal and reinstallation.						
23 01 30 51-0011	LF	Clean Linear Diffuser	7.64			
Note: Includes removal and reinstallation.						
23 01 30 51-0012	EA	Cut Access For Cleaning Duct And Install Duct Insulated Access Doors	105.83			
<i>For Stainless Steel, Add</i>					74.44	
23 01 30 51-0013	EA	Clean Variable Air Volume (VAV) Unit	91.64			
23 01 30 51-0014	EA	Clean Fan Powered Induction Unit (PIU) Unit	122.20			
23 01 30 51-0015	EA	Clean Fan Coil Unit (FCU)	122.20			
23 01 30 51-0016	EA	Clean Packaged Terminal Air Conditioning Unit	122.20			
23 01 30 51-0017	EA	Clean Supply Or Return Fan	244.39			
23 01 30 51-0018	EA	Clean Exhaust Fan	213.85			
23 01 30 51-0019	EA	Clean Duct Coil	183.30			
23 01 30 51-0020	SF	Clean Air Handling Unit Interior Housing With High Efficiency Particulate Air (HEPA) Vacuum	6.11			
Note: Excluding fan and coils.						
23 01 30 51-0021	EA	Clean Air Handling Unit Fan	244.39			
23 01 30 51-0022	EA	Clean Air Handling Unit Coil	366.60			
23 01 30 51-0023	SF	Clean Equipment Surfaces, Rust Reform And Prime	3.36			
23 01 30 51-0024	SF	Clean Interior Equipment Surfaces, Rust Reform And Prime	3.97			
23 01 30 51-0025	SF	High Efficiency Particulate Air (HEPA) Vacuuming Of Walls, Ceilings And Floors In Mechanical Rooms	0.73			
23 01 30 51-0026	EA	Cleaning Of Ductwork Minimum Set-up Charge	883.37			
Note: For projects where the total charges are less than the minimum set-up charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.						
23 01 30 51-0027	SF	Apply Anti-microbial Agent To Ductwork And Surfaces After Cleaning	0.55			

23 01 30 61 HVAC Air-Distribution Duct Repair (23 01 30)

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 01 Operation and Maintenance of HVAC Systems****23 01 30 Operation and Maintenance of HVAC Air Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 01 30 61-0001		Repair And Seal Ductwork <small>(23 01 30 61)</small>	
		Note: Includes removal of existing insulation, repair/seal ductwork with Duct Sealer and installation of insulation. Excludes new ductwork.	
23 01 30 61-0002	SF	Repair And Sealing Of Ductwork	2.29
		Note: Clean, apply sealant and tape	
23 01 30 61-0003		Rework Sheet Metal Ductwork <small>(23 01 30 61)</small>	
		Note: Includes removal of existing ductwork and installation of ductwork. Excludes new ductwork.	
23 01 30 61-0004	LF	Up To 1 SF Cross Section, Rework Existing Ductwork	32.48
23 01 30 61-0005	LF	>1 To 2 SF Cross Section, Rework Existing Ductwork	63.34
23 01 30 61-0006	LF	>2 To 4 SF Cross Section, Rework Existing Ductwork	83.69
23 01 30 61-0007	LF	>4 To 6 SF Cross Section, Rework Existing Ductwork	104.81
23 01 30 61-0008	LF	>6 To 8 SF Cross Section, Rework Existing Ductwork	146.17
23 01 30 61-0009	LF	>8 To 10 SF Cross Section, Rework Existing Ductwork	170.53
23 01 30 61-0010	LF	>10 To 12 SF Cross Section, Rework Existing Ductwork	194.89
23 01 30 61-0011	LF	>12 To 14 SF Cross Section, Rework Existing Ductwork	219.26

23 01 50 Operation and Maintenance of Central Heating Equipment (23 01)**23 01 50 61 Central Heating Equipment Repair** (23 01 50)

23 01 50 61-0001		Boiler Repairs <small>(23 01 50 61)</small>	
23 01 50 61-0002		Setup And Maintenance <small>(23 01 50 61-0001)</small>	
23 01 50 61-0003	EA	Set-up Charge For Boiler Fire Side Maintenance	2,547.41
		Note: Includes removing/relocating doors, plates, portals, and burners required to access fireside.	
23 01 50 61-0004	EA	Close-up Charge For Boiler Fire Side Maintenance	2,784.43
		Note: Includes replacement of doors, plates, portals, burners, adhesive, rope, wool, and seals.	
		<i>For Burner Seals, Add</i>	654.74
		<i>Note: Used when burner must be removed from door for maintenance.</i>	
23 01 50 61-0005	EA	Setup Charge For Boiler Water Side Maintenance	3,396.54
		Note: Includes closing valves, draining, and positioning equipment needed for tube replacement.	
23 01 50 61-0006	EA	Up To 100 HP, Hydrostatic Test - Boiler Maintenance	1,698.27
		Note: Includes close-up charge for water side maintenance, blanking off supply, return, and relief valves for test and reconnection after test.	
23 01 50 61-0007	EA	>100 HP, Hydrostatic Test - Boiler Maintenance	3,396.54
		Note: Includes close-up charge for water side maintenance, blanking off supply, return, and relief valves for test and reconnection after test.	
23 01 50 61-0008	EA	Removal And Replacement Of Handhole	106.14
23 01 50 61-0009	EA	Removal And Replacement Of Manhole	318.43
23 01 50 61-0010	SF	Sheet Metal Jacket Patch	12.37

23 01 50 61-0011 Boiler Tube Replacement (23 01 50 61-0001)

23 01 50 61-0012	EA	Removal Of Up To 2" Boiler Tube	254.73
23 01 50 61-0013	EA	Removal Of >2" To 3" Boiler Tube	318.43
23 01 50 61-0014	EA	Removal Of >3" To 4" Boiler Tube	445.79
23 01 50 61-0015	LF	Place 1-1/2" Boiler Tube Into Position For Termination	19.62
		Note: Includes black steel tube, fasteners and accessories.	
23 01 50 61-0016	LF	Place 2" Boiler Tube Into Position For Termination	23.16
		Note: Includes black steel tube, fasteners and accessories.	
23 01 50 61-0017	LF	Place 2-1/2" Boiler Tube Into Position For Termination	26.75
		Note: Includes black steel tube, fasteners and accessories.	
23 01 50 61-0018	LF	Place 3" Boiler Tube Into Position For Termination	40.54
		Note: Includes black steel tube, fasteners and accessories.	
23 01 50 61-0019	LF	Place 3-1/2" Boiler Tube Into Position For Termination	48.14
		Note: Includes black steel tube, fasteners and accessories.	
23 01 50 61-0020	LF	Place 4" Boiler Tube Into Position For Termination	63.11
		Note: Includes black steel tube, fasteners and accessories.	
23 01 50 61-0021	EA	1-1/2" Rolled Boiler Tube Termination (2 Per New Tube)	31.84
23 01 50 61-0022	EA	2" Rolled Boiler Tube Termination (2 Per New Tube)	47.76
23 01 50 61-0023	EA	2-1/2" Rolled Boiler Tube Termination (2 Per New Tube)	63.69
23 01 50 61-0024	EA	3" Rolled Boiler Tube Termination (2 Per New Tube)	79.60
23 01 50 61-0025	EA	3-1/2" Rolled Boiler Tube Termination (2 Per New Tube)	95.53
23 01 50 61-0026	EA	4" Rolled Boiler Tube Termination (2 Per New Tube)	111.45
23 01 50 61-0027	EA	1-1/2" Welded Boiler Tube Termination (2 Per New Tube)	95.53
23 01 50 61-0028	EA	2" Welded Boiler Tube Termination (2 Per New Tube)	127.37
23 01 50 61-0029	EA	2-1/2" Welded Boiler Tube Termination (2 Per New Tube)	159.21
23 01 50 61-0030	EA	3" Welded Boiler Tube Termination (2 Per New Tube)	191.06
23 01 50 61-0031	EA	3-1/2" Welded Boiler Tube Termination (2 Per New Tube)	222.89
23 01 50 61-0032	EA	4" Welded Boiler Tube Termination (2 Per New Tube)	254.73
23 01 50 61-0033	EA	Plug Boiler Tube Hole Where Boiler Tube Is Not Replaced	391.81

23 01 50 61-0034 Cast Iron Boiler Section Replacement (23 01 50 61-0001)

23 01 50 61-0035	EA	Removal And Replacement Of Front Section Of Weil McLain Model 80 Cast Iron Boiler	2,848.94
23 01 50 61-0036	EA	Removal And Replacement Of Rear Section Of Weil McLain Model 80 Cast Iron Boiler	1,968.71
23 01 50 61-0037	EA	Removal And Replacement Of Inside Section Of Weil McLain Model 80 Cast Iron Boiler	2,457.09
23 01 50 61-0038	EA	Removal And Replacement Of Front Section Of Weil McLain Model 88 Cast Iron Boiler	5,259.26
23 01 50 61-0039	EA	Removal And Replacement Of Rear Section Of Weil McLain Model 88 Cast Iron Boiler	3,893.82



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 01 50 61-0040	EA			Removal And Replacement Of Inside Section Of Weil McLain Model 88 Cast Iron Boiler	4,509.77	
23 01 50 61-0041	EA			Removal And Replacement Of Front Section Of Weil McLain Model 94 Cast Iron Boiler.....	8,549.06	
23 01 50 61-0042	EA			Removal And Replacement Of Rear Section Of Weil McLain Model 94 Cast Iron Boiler	6,676.47	
23 01 50 61-0043	EA			Removal And Replacement Of Inside Section Of Weil McLain Model 94 Cast Iron Boiler	7,125.02	
23 01 50 61-0044				Cast Iron Grate Replacement <small>(23 01 50 61-0001)</small>		
23 01 50 61-0045	SF			Removal And Replacement Of Cast Iron Boiler Grates, Prepared From Casting Mold	144.63	
				Note: Includes support, linkages and removal of existing.		
23 01 50 61-0046	EA			Prepare Cast Iron Boiler Grate Mold.....	2,168.43	
				Note: Includes preparing unique size mold for grate casting. Mold to be used for multiple castings.		
23 01 50 61-0047				Replacement Or Conversion Of Boiler Burners <small>(23 01 50 61-0001)</small>		
				Note: Includes mounting plate, mechanical and electrical labor for installation of burners.		
23 01 50 61-0048	EA			700 MBH Max Input Burner With 2" Boiler Connection, Screwed.....	10,643.16	1,127.06
				<i>For 12 PPM Burner, Add</i>	1,760.47	
23 01 50 61-0049	EA			2,100 MBH Max Input Burner With 2-1/2" Boiler Connection, Screwed.....	15,390.63	1,395.39
				<i>For 12 PPM Burner, Add</i>	2,622.31	
23 01 50 61-0050	EA			2,800 MBH Max Input Burner With 3" Boiler Connection, Screwed.....	18,173.01	1,690.47
				<i>For 12 PPM Burner, Add</i>	3,082.36	
23 01 50 61-0051	EA			3,800 MBH Max Input Burner With 4" Boiler Connection, Flanged.....	21,462.55	1,819.39
				<i>For 12 PPM Burner, Add</i>	3,698.18	
23 01 50 61-0052				Video Inspection Of Boiler Tubing <small>(23 01 50 61-0001)</small>		
23 01 50 61-0053	EA			Initial Set Up For Boiler Tubing Video Camera Inspection.....	498.23	
23 01 50 61-0054	LF			Boiler Tubing Inspection	0.61	
23 01 50 61-0055				Boiler And Chiller Water Treatment <small>(23 01 50 61)</small>		
				Note: 3 LB chemical per 50 gallon system water.		
23 01 50 61-0056	LB			Boil Out Boiler And System With Caustic Soda	1.69	
				Note: Includes disposal after treatment.		
23 01 50 61-0057	LB			Boil Out Boiler And System With Trisodium Phosphate.....	2.54	
				Note: Includes disposal after treatment.		
23 01 50 61-0058	GAL			Corrosion Resistant Chemical Treatment, Based On Gallons Of Chemical Required.....	158.67	

23 01 60 Operation and Maintenance of Central Cooling Equipment (23 01)

23 01 60 61 Central Cooling Equipment Repair (23 01 60)

23 01 60 61-0001				Cooling Tower Repairs <small>(23 01 60 61)</small>		
23 01 60 61-0002	EA			Replace 6' Diameter 4 Blade, Cooling Tower Fan Blade.....	3,501.21	
23 01 60 61-0003	EA			Replace 6' Diameter 5 Blade, Cooling Tower Fan Blade.....	4,131.54	
23 01 60 61-0004	EA			Replace 6' Diameter 6 Blade, Cooling Tower Fan Blade.....	4,757.24	
23 01 60 61-0005	EA			Replace 6' Diameter 7 Blade, Cooling Tower Fan Blade.....	5,624.51	
23 01 60 61-0006	EA			Replace 6' Diameter 8 Blade, Cooling Tower Fan Blade.....	6,201.92	
23 01 60 61-0007	EA			Replace 8' Diameter 4 Blade, Cooling Tower Fan Blade.....	3,862.37	
23 01 60 61-0008	EA			Replace 8' Diameter 5 Blade, Cooling Tower Fan Blade.....	4,304.03	
23 01 60 61-0009	EA			Replace 8' Diameter 6 Blade, Cooling Tower Fan Blade.....	5,063.17	
23 01 60 61-0010	EA			Replace 8' Diameter 7 Blade, Cooling Tower Fan Blade.....	5,776.31	
23 01 60 61-0011	EA			Replace 8' Diameter 8 Blade, Cooling Tower Fan Blade.....	6,367.53	
23 01 60 61-0012	EA			Replace Individual Cooling Tower Fan Blade For 6' Diameter Fan	961.56	
23 01 60 61-0013	EA			Replace Individual Cooling Tower Fan Blade For 8' Diameter Fan	997.44	
23 01 60 61-0014	EA			Replace Individual Cooling Tower Fan Blade For 10' Diameter Fan	1,065.55	
23 01 60 61-0015	EA			Replace Individual Cooling Tower Fan Blade For 12' Diameter Fan	1,241.75	
23 01 60 61-0016	EA			Replace Individual Cooling Tower Fan Blade For 14' Diameter Fan	1,539.88	
23 01 60 61-0017	EA			Replace Individual Cooling Tower Fan Blade For 16' Diameter Fan	2,084.16	
23 01 60 61-0018	EA			Replace Individual Cooling Tower Fan Blade For 18' Diameter Fan	2,191.36	
23 01 60 61-0019	EA			Replace Individual Cooling Tower Fan Blade For 20' Diameter Fan	2,352.17	
23 01 60 61-0020	EA			Replace Counterflow Nozzle (1/2" - 2" NPT Thread).....	40.41	
23 01 60 61-0021	EA			Replace 6' Polyvinyl Chloride (PVC) Splash Fill	24.02	

23 01 60 71 Refrigerant Recovery/Recycling (23 01 60)

23 01 60 71-0001				Refrigerant Recovery, Reclaim And Recycling <small>(23 01 60 71)</small>		
23 01 60 71-0002	LB			Recovery Of Refrigerant.....	12.14	
23 01 60 71-0003	LB			Recovery And Recharging Of Refrigerant	22.78	
				Note: Includes cleaning refrigerant gas prior to recharging.		
23 01 60 71-0004	LB			Recharging Of Refrigerant.....	10.23	
				Note: Excludes refrigerant filling at time of installation of HVAC or Condenser units.		

23 05 Common Work Results for HVAC (23)

23 05 13 Common Motor Requirements for HVAC Equipment (23 05)

Note: New equipment includes motor, unless otherwise stated. For use when replacing existing motor.

MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT	DEMOLITION
				UNIT COST	UNIT COST
23 05 13 00-0001			Premium Efficient, Motors ^(23 05 13) Note: New equipment includes motor, unless otherwise stated. For use when replacing existing motor. Excludes installation.		
23 05 13 00-0002			Premium Efficient, Open Drip Proof Motors ^(23 05 13 00-0001) Note: NEMA premium efficiency, open drip proof, three phase AC motors.		
23 05 13 00-0003			Steel Frame, Premium Efficient, Open Drip Proof Motors ^(23 05 13 00-0002)		
23 05 13 00-0004	EA		1 HP, 3,600 RPM, 56 NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	725.71	
23 05 13 00-0005	EA		1 HP, 1,800 RPM, 143T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	821.73	
23 05 13 00-0006	EA		1 HP, 1,200 RPM, 145T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	963.41	
23 05 13 00-0007	EA		1-1/2 HP, 3,600 RPM, 143T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	809.14	
23 05 13 00-0008	EA		1-1/2 HP, 1,800 RPM, 145T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	859.51	
23 05 13 00-0009	EA		1-1/2 HP, 1,200 RPM, 182T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,127.13	
23 05 13 00-0010	EA		2 HP, 3,600 RPM, 145T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	950.82	
23 05 13 00-0011	EA		2 HP, 1,800 RPM, 145T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	920.91	
23 05 13 00-0012	EA		2 HP, 1,200 RPM, 184T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,152.31	
23 05 13 00-0013	EA		3 HP, 3,600 RPM, 182T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	963.41	
23 05 13 00-0014	EA		3 HP, 1,800 RPM, 182T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	993.32	
23 05 13 00-0015	EA		3 HP, 1,200 RPM, 213T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,467.15	
23 05 13 00-0016	EA		5 HP, 3,600 RPM, 184T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,051.57	
23 05 13 00-0017	EA		5 HP, 1,800 RPM, 184T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,087.77	
23 05 13 00-0018	EA		5 HP, 1,200 RPM, 215T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,922.10	
23 05 13 00-0019	EA		7-1/2 HP, 3,600 RPM, 213T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,668.65	
23 05 13 00-0020	EA		7-1/2 HP, 1,800 RPM, 213T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,599.39	
23 05 13 00-0021	EA		7-1/2 HP, 1,200 RPM, 254T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	2,304.63	
23 05 13 00-0022	EA		10 HP, 3,600 RPM, 215T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,907.93	
23 05 13 00-0023	EA		10 HP, 1,800 RPM, 215T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	1,936.27	
23 05 13 00-0024	EA		10 HP, 1,200 RPM, 256T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	2,998.85	
23 05 13 00-0025	EA		15 HP, 3,600 RPM, 254T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	2,710.77	
23 05 13 00-0026	EA		15 HP, 1,800 RPM, 254T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	2,742.26	
23 05 13 00-0027	EA		15 HP, 1,200 RPM, 284T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	4,044.12	
23 05 13 00-0028	EA		20 HP, 3,600 RPM, 256T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	3,184.61	
23 05 13 00-0029	EA		20 HP, 1,800 RPM, 256T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	3,442.78	
23 05 13 00-0030	EA		20 HP, 1,200 RPM, 286T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	4,922.52	
23 05 13 00-0031	EA		25 HP, 3,600 RPM, 284TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	3,823.73	
23 05 13 00-0032	EA		25 HP, 1,800 RPM, 284T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	4,196.82	
23 05 13 00-0033	EA		25 HP, 1,200 RPM, 324T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	5,945.75	
23 05 13 00-0034	EA		30 HP, 3,600 RPM, 286TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	4,511.66	
23 05 13 00-0035	EA		30 HP, 1,800 RPM, 286T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	4,588.79	
23 05 13 00-0036	EA		30 HP, 1,200 RPM, 326T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	6,202.35	
23 05 13 00-0037	EA		40 HP, 3,600 RPM, 324TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	5,813.52	
23 05 13 00-0038	EA		40 HP, 1,800 RPM, 324T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	5,986.68	
23 05 13 00-0039	EA		50 HP, 3,600 RPM, 326TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	6,331.43	
23 05 13 00-0040	EA		50 HP, 1,800 RPM, 326T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	6,606.92	
23 05 13 00-0041	EA		60 HP, 3,600 RPM, 364TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	8,011.10	
23 05 13 00-0042	EA		60 HP, 1,800 RPM, 364T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	8,318.07	
23 05 13 00-0043	EA		75 HP, 3,600 RPM, 365TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	10,509.36	
23 05 13 00-0044	EA		75 HP, 1,800 RPM, 365T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	10,210.26	
23 05 13 00-0045	EA		100 HP, 3,600 RPM, 365TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	11,233.49	
23 05 13 00-0046	EA		100 HP, 1,800 RPM, 404T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	11,878.91	
23 05 13 00-0047	EA		125 HP, 3,600 RPM, 404TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	14,098.54	
23 05 13 00-0048	EA		125 HP, 1,800 RPM, 405T NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	14,572.37	
23 05 13 00-0049	EA		150 HP, 3,600 RPM, 405TS NEMA Steel Frame, Premium Efficient, Open Drip Proof Motor	17,391.76	
23 05 13 00-0050			Cast Iron Frame, Premium Efficient, Open Drip Proof Motors ^(23 05 13 00-0002)		
23 05 13 00-0051	EA		40 HP, 1,200 RPM, 364T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	8,835.98	
23 05 13 00-0052	EA		50 HP, 1,200 RPM, 365T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	10,696.69	
23 05 13 00-0053	EA		60 HP, 1,200 RPM, 404T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	13,580.62	
23 05 13 00-0054	EA		75 HP, 1,200 RPM, 405T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	15,120.19	
23 05 13 00-0055	EA		100 HP, 1,200 RPM, 444T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	16,642.44	
23 05 13 00-0056	EA		125 HP, 1,200 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	17,972.64	
23 05 13 00-0057	EA		150 HP, 1,800 RPM, 444T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	16,187.50	
23 05 13 00-0058	EA		150 HP, 1,200 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	21,166.69	
23 05 13 00-0059	EA		200 HP, 3,600 RPM, 444TS NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	19,708.98	
23 05 13 00-0060	EA		200 HP, 1,800 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	20,228.47	
23 05 13 00-0061	EA		200 HP, 1,200 RPM, 447T NEMA Cast Iron Frame, Premium Efficient, Open Drip Proof Motor	27,823.98	
23 05 13 00-0062			Premium Efficient, TEFC Motors ^(23 05 13 00-0001) Note: NEMA premium efficiency, totally enclosed fan cooled, three phase AC motors.		
23 05 13 00-0063			Steel Frame, Premium Efficient, TEFC Motors ^(23 05 13 00-0062)		
23 05 13 00-0064	EA		1 HP, 3,600 RPM, 56 NEMA Steel Frame, Premium Efficient, TEFC Motor	848.49	
23 05 13 00-0065	EA		1 HP, 1,800 RPM, 143T NEMA Steel Frame, Premium Efficient, TEFC Motor	935.07	
23 05 13 00-0066	EA		1 HP, 1,200 RPM, 145T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,112.96	
23 05 13 00-0067	EA		1-1/2 HP, 3,600 RPM, 143T NEMA Steel Frame, Premium Efficient, TEFC Motor	961.84	
23 05 13 00-0068	EA		1-1/2 HP, 1,800 RPM, 145T NEMA Steel Frame, Premium Efficient, TEFC Motor	971.28	
23 05 13 00-0069	EA		2 HP, 3,600 RPM, 145T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,053.14	
23 05 13 00-0070	EA		2 HP, 1,800 RPM, 145T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,007.49	
23 05 13 00-0071	EA		3 HP, 3,600 RPM, 182T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,168.06	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 13 00-0072	EA 3 HP, 1,800 RPM, 182T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,112.96	
23 05 13 00-0073	EA 3 HP, 1,200 RPM, 213T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,786.72	
23 05 13 00-0074	EA 5 HP, 3,600 RPM, 184T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,295.57	
23 05 13 00-0075	EA 5 HP, 1,800 RPM, 184T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,218.43	
23 05 13 00-0076	EA 5 HP, 1,200 RPM, 215T NEMA Steel Frame, Premium Efficient, TEFC Motor	2,018.12	
23 05 13 00-0077	EA 7-1/2 HP, 3,600 RPM, 213T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,940.99	
23 05 13 00-0078	EA 7-1/2 HP, 1,800 RPM, 213T NEMA Steel Frame, Premium Efficient, TEFC Motor	1,756.81	
23 05 13 00-0079	EA 10 HP, 3,600 RPM, 215T NEMA Steel Frame, Premium Efficient, TEFC Motor.....	1,967.75	
23 05 13 00-0080	EA 10 HP, 1,800 RPM, 215T NEMA Steel Frame, Premium Efficient, TEFC Motor.....	1,983.49	
23 05 13 00-0081	Cast Iron Frame, Premium Efficient, TEFC Motors (23 05 13 00-0062)		
23 05 13 00-0082	EA 1 HP, 1,800 RPM, 143T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,210.56	
23 05 13 00-0083	EA 1 HP, 1,200 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,355.39	
23 05 13 00-0084	EA 1-1/2 HP, 3,600 RPM, 143T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,278.25	
23 05 13 00-0085	EA 1-1/2 HP, 1,800 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,254.64	
23 05 13 00-0086	EA 1-1/2 HP, 1,200 RPM, 182T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,613.56	
23 05 13 00-0087	EA 2 HP, 3,600 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,344.37	
23 05 13 00-0088	EA 2 HP, 1,800 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,314.46	
23 05 13 00-0089	EA 2 HP, 1,200 RPM, 184T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,638.74	
23 05 13 00-0090	EA 3 HP, 3,600 RPM, 182T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,451.41	
23 05 13 00-0091	EA 3 HP, 1,800 RPM, 182T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,492.34	
23 05 13 00-0092	EA 3 HP, 1,200 RPM, 213T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	2,041.74	
23 05 13 00-0093	EA 5 HP, 3,600 RPM, 184T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,786.72	
23 05 13 00-0094	EA 5 HP, 1,800 RPM, 184T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,493.92	
23 05 13 00-0095	EA 5 HP, 1,200 RPM, 215T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	2,369.17	
23 05 13 00-0096	EA 7-1/2 HP, 3,600 RPM, 213T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	2,068.50	
23 05 13 00-0097	EA 7-1/2 HP, 1,800 RPM, 213T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	1,992.94	
23 05 13 00-0098	EA 7-1/2 HP, 1,200 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	3,378.23	
23 05 13 00-0099	EA 10 HP, 3,600 RPM, 215T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	2,424.27	
23 05 13 00-0100	EA 10 HP, 1,800 RPM, 215T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	2,235.36	
23 05 13 00-0101	EA 10 HP, 1,200 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	3,856.79	
23 05 13 00-0102	EA 15 HP, 3,600 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	3,340.45	
23 05 13 00-0103	EA 15 HP, 1,800 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	3,057.10	
23 05 13 00-0104	EA 15 HP, 1,200 RPM, 284T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	5,144.49	
23 05 13 00-0105	EA 20 HP, 3,600 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	3,666.31	
23 05 13 00-0106	EA 20 HP, 1,800 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	3,707.24	
23 05 13 00-0107	EA 20 HP, 1,200 RPM, 286T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	6,849.34	
23 05 13 00-0108	EA 25 HP, 3,600 RPM, 284TS NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	4,783.99	
23 05 13 00-0109	EA 25 HP, 1,800 RPM, 284T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	4,848.54	
23 05 13 00-0110	EA 25 HP, 1,200 RPM, 324T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	7,749.79	
23 05 13 00-0111	EA 30 HP, 3,600 RPM, 286TS NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	5,684.44	
23 05 13 00-0112	EA 30 HP, 1,800 RPM, 286T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	5,752.13	
23 05 13 00-0113	EA 30 HP, 1,200 RPM, 326T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	8,952.48	
23 05 13 00-0114	EA 40 HP, 3,600 RPM, 324TS NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	7,792.29	
23 05 13 00-0115	EA 40 HP, 1,800 RPM, 324T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	7,521.53	
23 05 13 00-0116	EA 40 HP, 1,200 RPM, 364T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	11,156.36	
23 05 13 00-0117	EA 50 HP, 3,600 RPM, 326TS NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	8,524.29	
23 05 13 00-0118	EA 50 HP, 1,800 RPM, 326T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	8,220.47	
23 05 13 00-0119	EA 50 HP, 1,200 RPM, 365T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	13,481.45	
23 05 13 00-0120	EA 60 HP, 3,600 RPM, 364TS NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	11,974.94	
23 05 13 00-0121	EA 60 HP, 1,800 RPM, 364T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	11,828.54	
23 05 13 00-0122	EA 60 HP, 1,200 RPM, 404T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	16,363.81	
23 05 13 00-0123	EA 75 HP, 3,600 RPM, 365TS NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	13,931.67	
23 05 13 00-0124	EA 75 HP, 1,800 RPM, 365T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	13,830.92	
23 05 13 00-0125	EA 75 HP, 1,200 RPM, 405T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	19,055.69	
23 05 13 00-0126	EA 100 HP, 1,800 RPM, 405T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	17,176.10	
23 05 13 00-0127	EA 125 HP, 1,800 RPM, 444T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	21,264.29	
23 05 13 00-0128	EA 150 HP, 1,800 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	24,459.92	
23 05 13 00-0129	EA 200 HP, 1,800 RPM, 447T NEMA Cast Iron Frame, Premium Efficient, TEFC Motor	30,740.98	
23 05 13 00-0130	Premium Efficient, Severe Duty Motors (23 05 13 00-0001)		
Note: NEMA premium efficiency, TEFC enclosure severe duty, three phase AC motors.			
23 05 13 00-0131	EA 1 HP, 3,600 RPM, 143T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,257.79	
23 05 13 00-0132	EA 1 HP, 1,800 RPM, 143T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,382.15	
23 05 13 00-0133	EA 1 HP, 1,200 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,526.97	
23 05 13 00-0134	EA 1 HP, 900 RPM, L182T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	2,145.63	
23 05 13 00-0135	EA 1-1/2 HP, 3,600 RPM, 143T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,430.95	
23 05 13 00-0136	EA 1-1/2 HP, 1,800 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,408.91	
23 05 13 00-0137	EA 1-1/2 HP, 1,200 RPM, 182T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,786.72	
23 05 13 00-0138	EA 1-1/2 HP, 900 RPM, L184T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	2,669.84	
23 05 13 00-0139	EA 2 HP, 3,600 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,497.06	
23 05 13 00-0140	EA 2 HP, 1,800 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,470.30	
23 05 13 00-0141	EA 2 HP, 1,200 RPM, L184T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,810.33	
23 05 13 00-0142	EA 2 HP, 900 RPM, L213T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	3,367.21	
23 05 13 00-0143	EA 3 HP, 3,600 RPM, 182T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,770.98	
23 05 13 00-0144	EA 3 HP, 1,800 RPM, 182T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	1,860.70	
23 05 13 00-0145	EA 3 HP, 1,200 RPM, 213T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	2,613.17	
23 05 13 00-0146	EA 3 HP, 900 RPM, L215T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	3,652.14	
23 05 13 00-0147	EA 5 HP, 3,600 RPM, 184T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor	2,178.69	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 13 Common Motor Requirements for HVAC Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 13 00-0148	EA	5 HP, 1,800 RPM, L184T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	1,893.76	
23 05 13 00-0149	EA	5 HP, 1,200 RPM, L215T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	2,647.80	
23 05 13 00-0150	EA	5 HP, 900 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	5,813.52	
23 05 13 00-0151	EA	7-1/2 HP, 3,600 RPM, 213T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	2,843.01	
23 05 13 00-0152	EA	7-1/2 HP, 1,800 RPM, L213T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	2,384.91	
23 05 13 00-0153	EA	7-1/2 HP, 1,200 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	3,789.10	
23 05 13 00-0154	EA	7-1/2 HP, 900 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	6,647.85	
23 05 13 00-0155	EA	10 HP, 3,600 RPM, 215T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	3,027.19	
23 05 13 00-0156	EA	10 HP, 1,800 RPM, L215T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	2,855.60	
23 05 13 00-0157	EA	10 HP, 1,200 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	4,922.52	
23 05 13 00-0158	EA	10 HP, 900 RPM, 284T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	7,754.51	
23 05 13 00-0159	EA	15 HP, 3,600 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	3,872.53	
23 05 13 00-0160	EA	15 HP, 1,800 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	3,637.98	
23 05 13 00-0161	EA	15 HP, 1,200 RPM, 284T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	5,643.51	
23 05 13 00-0162	EA	15 HP, 900 RPM, 286T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	10,351.94	
23 05 13 00-0163	EA	20 HP, 3,600 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	4,517.95	
23 05 13 00-0164	EA	20 HP, 1,800 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	3,902.44	
23 05 13 00-0165	EA	20 HP, 1,200 RPM, 286T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	7,667.93	
23 05 13 00-0166	EA	20 HP, 900 RPM, 324T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	11,801.78	
23 05 13 00-0167	EA	25 HP, 3,600 RPM, 284TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	5,429.42	
23 05 13 00-0168	EA	25 HP, 1,800 RPM, 284T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	5,106.70	
23 05 13 00-0169	EA	25 HP, 1,200 RPM, 324T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	8,012.68	
23 05 13 00-0170	EA	30 HP, 3,600 RPM, 286TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	6,619.51	
23 05 13 00-0171	EA	30 HP, 1,800 RPM, 286T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	6,063.82	
23 05 13 00-0172	EA	30 HP, 1,200 RPM, 326T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	10,329.90	
23 05 13 00-0173	EA	40 HP, 3,600 RPM, 324TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	9,094.15	
23 05 13 00-0174	EA	40 HP, 1,800 RPM, 324T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	7,933.97	
23 05 13 00-0175	EA	40 HP, 1,200 RPM, 364T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	12,875.38	
23 05 13 00-0176	EA	50 HP, 3,600 RPM, 326TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	9,530.21	
23 05 13 00-0177	EA	50 HP, 1,800 RPM, 326T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	9,312.97	
23 05 13 00-0178	EA	50 HP, 1,200 RPM, 365T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	13,714.43	
23 05 13 00-0179	EA	60 HP, 3,600 RPM, 364TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	13,830.92	
23 05 13 00-0180	EA	60 HP, 1,800 RPM, 364T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	12,481.83	
23 05 13 00-0181	EA	60 HP, 1,200 RPM, 404T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	18,732.98	
23 05 13 00-0182	EA	75 HP, 3,600 RPM, 365TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	15,461.79	
23 05 13 00-0183	EA	75 HP, 1,800 RPM, 365T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	14,584.96	
23 05 13 00-0184	EA	75 HP, 1,200 RPM, 405T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	22,799.14	
23 05 13 00-0185	EA	100 HP, 3,600 RPM, 405TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	19,435.07	
23 05 13 00-0186	EA	100 HP, 1,800 RPM, 405T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	19,145.42	
23 05 13 00-0187	EA	100 HP, 1,200 RPM, 444T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	25,077.01	
23 05 13 00-0188	EA	125 HP, 3,600 RPM, 444TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	22,836.92	
23 05 13 00-0189	EA	125 HP, 1,800 RPM, 444T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	22,633.85	
23 05 13 00-0190	EA	125 HP, 1,200 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	28,329.30	
23 05 13 00-0191	EA	150 HP, 3,600 RPM, 445TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	26,772.42	
23 05 13 00-0192	EA	150 HP, 1,800 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	26,515.82	
23 05 13 00-0193	EA	150 HP, 1,200 RPM, 447T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	31,940.52	
23 05 13 00-0194	EA	200 HP, 3,600 RPM, 447TS NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	31,702.81	
23 05 13 00-0195	EA	200 HP, 1,800 RPM, 447T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	31,898.01	
23 05 13 00-0196	EA	200 HP, 1,200 RPM, 449T NEMA Cast Iron Frame, Premium Efficient, Severe Duty Motor.....	41,839.09	

23 05 13 00-0197 Premium Efficient, Explosion Proof Motors (23 05 13 00-0001)

Note: NEMA premium efficiency, explosion proof, three phase AC motors.

23 05 13 00-0198	EA	1 HP, 1,800 RPM, 143T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	1,678.10	
23 05 13 00-0199	EA	1-1/2 HP, 1,800 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	1,737.92	
23 05 13 00-0200	EA	2 HP, 1,800 RPM, 145T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	1,895.34	
23 05 13 00-0201	EA	3 HP, 1,800 RPM, L182T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	2,342.41	
23 05 13 00-0202	EA	5 HP, 1,800 RPM, L184T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	2,597.43	
23 05 13 00-0203	EA	7-1/2 HP, 1,800 RPM, 213T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	3,579.73	
23 05 13 00-0204	EA	10 HP, 1,800 RPM, L215T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	3,653.72	
23 05 13 00-0205	EA	15 HP, 1,800 RPM, 254T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	4,946.14	
23 05 13 00-0206	EA	20 HP, 1,800 RPM, 256T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	5,638.78	
23 05 13 00-0207	EA	25 HP, 1,800 RPM, 284T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	7,408.19	
23 05 13 00-0208	EA	30 HP, 1,800 RPM, 286T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	8,314.92	
23 05 13 00-0209	EA	40 HP, 1,800 RPM, 324T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	10,873.00	
23 05 13 00-0210	EA	50 HP, 1,800 RPM, 326T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	12,245.70	
23 05 13 00-0211	EA	60 HP, 1,800 RPM, 364T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	17,130.44	
23 05 13 00-0212	EA	75 HP, 1,800 RPM, 365T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	20,110.40	
23 05 13 00-0213	EA	100 HP, 1,800 RPM, 405T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	24,497.70	
23 05 13 00-0214	EA	125 HP, 1,800 RPM, 444T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	32,019.23	
23 05 13 00-0215	EA	150 HP, 1,800 RPM, 445T NEMA Cast Iron Frame, Premium Efficient, Explosion Proof Motor.....	36,534.03	

23 05 13 00-0216 Motor Mounting (23 05 13)

Note: Includes handling and motor installation on mounting base. Excludes mounting base.

23 05 13 00-0217	EA	1/2 HP Motor Mounting.....	192.26	97.82
23 05 13 00-0218	EA	3/4 HP Motor Mounting.....	221.53	122.28
23 05 13 00-0219	EA	1 HP Motor Mounting.....	236.98	122.28
23 05 13 00-0220	EA	1-1/2 HP Motor Mounting.....	254.75	122.28
23 05 13 00-0221	EA	2 HP Motor Mounting.....	275.40	146.73
23 05 13 00-0222	EA	3 HP Motor Mounting.....	318.44	146.73

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 13 00-0223 EA 5 HP Motor Mounting.....	377.41	244.56
23 05 13 00-0224 EA 7-1/2 HP Motor Mounting.....	485.23	244.56
23 05 13 00-0225 EA 10 HP Motor Mounting.....	636.88	427.98
23 05 13 00-0226 EA 15 HP Motor Mounting.....	783.84	427.98
23 05 13 00-0227 EA 20 HP Motor Mounting.....	926.36	611.40
23 05 13 00-0228 EA 25 HP Motor Mounting.....	1,050.51	611.40
23 05 13 00-0229 EA 30 HP Motor Mounting.....	1,273.74	611.40
23 05 13 00-0230 EA 40 HP Motor Mounting.....	1,435.20	917.09
23 05 13 00-0231 EA 50 HP Motor Mounting.....	1,592.18	917.09
23 05 13 00-0232 EA 75 HP Motor Mounting.....	1,922.63	1,345.07
23 05 13 00-0233 EA 100 HP Motor Mounting.....	2,315.89	1,345.07
23 05 13 00-0234 EA 125 HP Motor Mounting.....	2,830.54	1,834.19
23 05 13 00-0235 EA 150 HP Motor Mounting.....	3,287.07	1,834.19
23 05 13 00-0236 EA 200 HP Motor Mounting.....	3,774.05	2,201.02

23 05 16 Expansion Fittings and Loops for HVAC Piping (23 05)

23 05 16 00-0001 Stainless Steel Bellows Type Expansion Joints (23 05 16)
Note: Includes internal sleeves and external covers.

23 05 16 00-0002 Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joints (23 05 16 00-0001)
Note: Carbon steel ends. Includes internal sleeves and external covers.

23 05 16 00-0003 EA 1/2" Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	262.35	92.59
For 300 LB Rating, Add	19.27	
23 05 16 00-0004 EA 3/4" Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	293.13	104.41
For 300 LB Rating, Add	21.11	
23 05 16 00-0005 EA 1" Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	349.42	119.69
For 300 LB Rating, Add	27.53	
23 05 16 00-0006 EA 1-1/4" Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	399.03	133.59
For 300 LB Rating, Add	33.04	
23 05 16 00-0007 EA 1-1/2" Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	433.91	143.58
For 300 LB Rating, Add	36.69	
23 05 16 00-0008 EA 2" Threaded, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	491.93	168.96
For 300 LB Rating, Add	38.52	

23 05 16 00-0009 Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joints (23 05 16 00-0001)
Note: Carbon steel ends. Includes internal sleeves and external covers.

23 05 16 00-0010 EA 1-1/4" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	555.23	92.56
For 300 LB Rating, Add	110.06	
23 05 16 00-0011 EA 1-1/2" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	608.22	111.08
For 300 LB Rating, Add	117.26	
23 05 16 00-0012 EA 2" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	645.43	141.02
For 300 LB Rating, Add	117.28	
23 05 16 00-0013 EA 2-1/2" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	696.20	153.40
For 300 LB Rating, Add	125.97	
23 05 16 00-0014 EA 3" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	769.56	179.85
For 300 LB Rating, Add	136.12	
23 05 16 00-0015 EA 4" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	965.14	301.50
For 300 LB Rating, Add	146.83	
23 05 16 00-0016 EA 5" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,287.23	329.75
For 300 LB Rating, Add	218.92	
23 05 16 00-0017 EA 6" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,209.56	366.39
For 300 LB Rating, Add	187.49	
23 05 16 00-0018 EA 8" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,553.63	468.16
For 300 LB Rating, Add	243.02	
23 05 16 00-0019 EA 10" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,969.83	569.94
For 300 LB Rating, Add	314.35	
23 05 16 00-0020 EA 12" Flanged, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	2,570.13	431.72
For 300 LB Rating, Add	426.39	

23 05 16 00-0021 Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joints (23 05 16 00-0001)
Note: Carbon steel ends. Includes internal sleeves and external covers.

23 05 16 00-0022 EA 1-1/4" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	607.41	126.95
For 300 LB Rating, Add	88.40	
23 05 16 00-0023 EA 1-1/2" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	632.75	128.00
For 300 LB Rating, Add	94.18	
23 05 16 00-0024 EA 2" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	641.52	132.24
For 300 LB Rating, Add	94.20	
23 05 16 00-0025 EA 2-1/2" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	693.43	144.19
For 300 LB Rating, Add	101.18	
23 05 16 00-0026 EA 3" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	777.73	169.58
For 300 LB Rating, Add	109.56	
23 05 16 00-0027 EA 4" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,146.41	337.69
For 300 LB Rating, Add	117.93	
23 05 16 00-0028 EA 5" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,390.99	344.71
For 300 LB Rating, Add	175.83	
23 05 16 00-0029 EA 6" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,365.10	381.66
For 300 LB Rating, Add	150.59	
23 05 16 00-0030 EA 8" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	1,651.68	436.10
For 300 LB Rating, Add	195.19	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 16 Expansion Fittings and Loops for HVAC Piping**MINOR
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23 05 16 00-0031	EA	10" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	2,076.43	534.31
		<i>For 300 LB Rating, Add</i>	252.49	
23 05 16 00-0032	EA	12" Butt Weld, 150 LB, Stainless Steel Bellows Type Expansion Joint.....	2,665.19	647.69
		<i>For 300 LB Rating, Add</i>	342.47	

23 05 17 Sleeves and Sleeve Seals for HVAC Piping (23 05)

23 05 17 00-0001		Wall Seals And Sleeves (23 05 17)		
		Note: Up to 12" walls. Excludes drilling hole.		
23 05 17 00-0002		Ductile Iron Wall Sleeve (23 05 17 00-0001)		
		Note: Includes rubber gasket seal.		
23 05 17 00-0003	EA	3" Ductile Iron Wall Sleeve With Rubber Gasket Seal	128.13	50.33
23 05 17 00-0004	EA	4" Ductile Iron Wall Sleeve With Rubber Gasket Seal	159.23	58.78
23 05 17 00-0005	EA	6" Ductile Iron Wall Sleeve With Rubber Gasket Seal	195.11	70.52
23 05 17 00-0006	EA	8" Ductile Iron Wall Sleeve With Rubber Gasket Seal	275.17	105.73
23 05 17 00-0007	EA	10" Ductile Iron Wall Sleeve With Rubber Gasket Seal	352.22	140.94
23 05 17 00-0008	EA	12" Ductile Iron Wall Sleeve With Rubber Gasket Seal	433.40	176.26

23 05 17 00-0009		Steel Pipe Sleeves (23 05 17 00-0001)		
		Note: Includes link seals 12" length.		
23 05 17 00-0010	EA	2" Steel Pipe Sleeve With Link Seals	152.31	51.08
23 05 17 00-0011	EA	2-1/2" Steel Pipe Sleeve With Link Seals	192.50	55.37
23 05 17 00-0012	EA	3" Steel Pipe Sleeve With Link Seals	230.24	59.65
23 05 17 00-0013	EA	4" Steel Pipe Sleeve With Link Seals	287.56	71.56
23 05 17 00-0014	EA	6" Steel Pipe Sleeve With Link Seals	425.99	89.38
23 05 17 00-0015	EA	10" Steel Pipe Sleeve With Link Seals	1,096.20	107.29
23 05 17 00-0016	EA	13-1/4" Inside Diameter Steel Pipe Sleeve With Link Seals	1,328.04	134.12
23 05 17 00-0017	EA	17-1/4" Inside Diameter Steel Pipe Sleeve With Link Seals	1,831.85	165.02
23 05 17 00-0018	EA	23-1/4" Inside Diameter Steel Pipe Sleeve With Link Seals	2,611.96	214.60
23 05 17 00-0019	EA	29-1/4" Inside Diameter Steel Pipe Sleeve With Link Seals	3,872.38	268.24

23 05 19 Meters and Gages for HVAC Piping (23 05)

See CSI section 33 19 00 00-0000 for water utility service metering.

23 05 19 00-0001		Thermometers (23 05 19)		
23 05 19 00-0002		Dial Type, Bi-Metal, 4" To 9" Stem, Steel Case, Brass Stem, Thermometers (23 05 19 00-0001)		
		Note: Various ranges.		
23 05 19 00-0003	EA	2" Diameter Dial, Bi-Metal, 4" To 9" Stem, Steel Case, Brass Stem, Thermometer	110.19	36.76
23 05 19 00-0004	EA	2-1/2" Diameter Dial, Bi-Metal, 4" To 9" Stem, Steel Case, Brass Stem, Thermometer	128.55	36.76
23 05 19 00-0005	EA	3-1/2" Diameter Dial, Bi-Metal, 4" To 9" Stem, Steel Case, Brass Stem, Thermometer	128.55	36.76

23 05 19 00-0006		Liquid Filled Industrial Union Connection Type Thermometers (23 05 19 00-0001)		
		Note: Various ranges.		
23 05 19 00-0007	EA	7" Scale, Angle Stem, Liquid Filled Industrial Union Connection Type Thermometer	146.91	36.76
23 05 19 00-0008	EA	9" Scale, Angle Stem, Liquid Filled Industrial Union Connection Type Thermometer	146.91	36.76
23 05 19 00-0009	EA	12" Scale, Angle Stem, Liquid Filled Industrial Union Connection Type Thermometer	185.31	36.76
23 05 19 00-0010	EA	7" Scale, Straight Stem, Liquid Filled Industrial Union Connection Type Thermometer	151.92	36.76
23 05 19 00-0011	EA	9" Scale, Straight Stem, Liquid Filled Industrial Union Connection Type Thermometer	160.27	36.76
23 05 19 00-0012	EA	12" Scale, Straight Stem, Liquid Filled Industrial Union Connection Type Thermometer	190.32	36.76

23 05 19 00-0013		Liquid Filled Industrial Separable Socket Type Thermometers (23 05 19 00-0001)		
		Note: Various ranges. Socket connection for thermowell.		
23 05 19 00-0014	EA	7" Scale, Angle Stem, Liquid Filled Industrial Separable Socket Type Thermometer	146.91	36.76
23 05 19 00-0015	EA	9" Scale, Angle Stem, Liquid Filled Industrial Separable Socket Type Thermometer	146.91	36.76
23 05 19 00-0016	EA	12" Scale, Angle Stem, Liquid Filled Industrial Separable Socket Type Thermometer	185.31	36.76
23 05 19 00-0017	EA	7" Scale, Straight Stem, Liquid Filled Industrial Separable Socket Type Thermometer	168.62	36.76
23 05 19 00-0018	EA	9" Scale, Straight Stem, Liquid Filled Industrial Separable Socket Type Thermometer	185.31	36.76
23 05 19 00-0019	EA	12" Scale, Straight Stem, Liquid Filled Industrial Separable Socket Type Thermometer	189.57	36.76

23 05 19 00-0020		1" NPT, 304 Stainless Steel Thermowells (23 05 19 00-0001)		
23 05 19 00-0021	EA	4" Long, 1" NPT, 304 Stainless Steel Thermowell	189.76	68.92
23 05 19 00-0022	EA	8" Long, 1" NPT, 304 Stainless Steel Thermowell	189.67	68.92

23 05 19 00-0023		Pressure Gauges (23 05 19)		
23 05 19 00-0024		Steel Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauges (23 05 19 00-0023)		
23 05 19 00-0025	EA	2" Diameter Dial, Steel Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge	39.40	14.35
23 05 19 00-0026	EA	4" Diameter Dial, Steel Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge	49.25	14.35

23 05 19 00-0027		Aluminum Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauges (23 05 19 00-0023)		
23 05 19 00-0028	EA	3-1/2" Diameter Dial, Aluminum Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge	317.31	14.35



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 19 00-0029 EA 4-1/2" Diameter Dial, Aluminum Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge.....	317.31	14.35
23 05 19 00-0030 EA 6" Diameter Dial, Aluminum Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge.....	415.32	14.35
23 05 19 00-0031 EA 8-1/2" Diameter Dial, Aluminum Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge.....	992.49	14.35
23 05 19 00-0032 Brass Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauges (23 05 19 00-0023)		
Note: Liquid filled.		
23 05 19 00-0033 EA 2-1/2" Diameter Dial, Brass Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge	146.18	14.35
23 05 19 00-0034 EA 4" Diameter Dial, Brass Case, 0 To 60 PSI Or 0 To 100 PSI, Pressure Gauge.....	334.02	14.35
23 05 19 00-0035 Steel Case, 0 To 10K PSI High Pressure, Pressure Gauges (23 05 19 00-0023)		
23 05 19 00-0036 EA 4-1/2" Diameter Dial, Steel Case, 0 To 10K PSI High Pressure, Pressure Gauge	327.55	14.35
23 05 19 00-0037 EA 6-1/2" Diameter Dial, Steel Case, 0 To 10K PSI High Pressure, Pressure Gauge	327.55	14.35
23 05 19 00-0038 EA 8-1/2" Diameter Dial, Steel Case, 0 To 10K PSI High Pressure, Pressure Gauge	327.55	14.35
23 05 19 00-0039 Gauge Accessories (23 05 19 00-0023)		
23 05 19 00-0040 EA Pete's Plug (Valve Cock For Removable Pressure Gauge Or Thermometer)	93.54	11.48
23 05 19 00-0041 EA 1/4" Snubber Valve	56.58	11.48
23 05 19 00-0042 EA 1/4" Female Pipe Thread, Brass Gauge Cock	35.43	17.23
23 05 19 00-0043 EA 1/4" Male Pipe Thread, Brass Gauge Cock	30.28	17.23
23 05 19 00-0044 EA 1/4" Pressure Pigtail Steam Siphon.....	48.69	17.23
23 05 19 00-0045 EA 1/4" x 3" Long Black Steel Nipple	8.91	5.74
23 05 19 00-0046 EA 1/4" Steel Thread-O-Let.....	66.27	28.72
23 05 19 00-0047 EA 1/4", 300 LB, Black Steel Union.....	90.87	11.48
23 05 19 00-0048 EA 1/4" Black Steel Coupling	25.49	11.48
23 05 19 00-0049 EA 1/4", 300 LB, Black Steel Plug.....	14.36	6.89
23 05 19 00-0050 EA 1/4", 150 LB, Black Steel Cap.....	15.19	6.89
23 05 19 00-0051 LF 1/4" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	11.22	3.79
23 05 19 00-0052 LF 1/4" Schedule 80, Plain End, Black Steel Pipe	11.23	3.79
23 05 19 00-0053 LF 1/4" Schedule 40, Threaded And Coupled, Galvanized Steel Pipe	9.38	
23 05 19 00-0054 EA 1/4" Threaded, 800 LB, Forged Steel, Ball Valve	114.92	
23 05 19 00-0055 Valve Lock Covers (23 05 19)		
23 05 19 00-0056 EA Valve Lock Cover.....	87.67	17.58
23 05 19 00-0057 Sight Flow Indicator (23 05 19)		
23 05 19 00-0058 Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (23 05 19 00-0057)		
23 05 19 00-0059 EA 1/4" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	171.95	16.72
23 05 19 00-0060 EA 3/8" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	179.58	17.59
23 05 19 00-0061 EA 1/2" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	194.34	18.49
23 05 19 00-0062 EA 3/4" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	216.61	24.91
23 05 19 00-0063 EA 1" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	258.82	30.20
23 05 19 00-0064 EA 1-1/4" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	292.55	38.23
23 05 19 00-0065 EA 1-1/2" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	417.01	44.20
23 05 19 00-0066 EA 2" Threaded, Single Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-100)	461.25	52.24
23 05 19 00-0067 Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (23 05 19 00-0057)		
23 05 19 00-0068 EA 1/4" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300)	224.78	16.72
23 05 19 00-0069 EA 3/8" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300)	231.23	17.59
23 05 19 00-0070 EA 1/2" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300)	249.52	18.49
23 05 19 00-0071 EA 3/4" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300)	263.57	24.91
23 05 19 00-0072 EA 1" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300)	278.78	30.20
23 05 19 00-0073 EA 1-1/4" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300).....	300.76	38.23
23 05 19 00-0074 EA 1-1/2" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300).....	576.66	44.20
23 05 19 00-0075 EA 2" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Bronze Body, Sight Flow Indicator (Dwyer SFI-300)	616.20	52.24

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 19 Meters and Gages for HVAC Piping**MINOR
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23 05 19 00-0076	Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator <small>(23 05 19 00-0057)</small>		
23 05 19 00-0077	EA	1/4" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	326.91 16.72
23 05 19 00-0078	EA	3/8" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	345.10 17.59
23 05 19 00-0079	EA	1/2" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	375.12 18.49
23 05 19 00-0080	EA	3/4" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	406.79 24.91
23 05 19 00-0081	EA	1" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	466.60 30.20
23 05 19 00-0082	EA	1-1/4" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	492.11 38.23
23 05 19 00-0083	EA	1-1/2" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	999.27 44.20
23 05 19 00-0084	EA	2" Threaded, Double Window, Acrylonitrile Butadiene Styrene (ABS) Plastic Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-300SS)	1,050.54 52.24
23 05 19 00-0085	Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicators <small>(23 05 19 00-0057)</small>		
23 05 19 00-0086	EA	1/4" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	221.25 16.72
23 05 19 00-0087	EA	3/8" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	230.06 17.59
23 05 19 00-0088	EA	1/2" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	243.65 18.49
23 05 19 00-0089	EA	3/4" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	262.40 24.91
23 05 19 00-0090	EA	1" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	277.60 30.20
23 05 19 00-0091	EA	1-1/4" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	300.76 38.23
23 05 19 00-0092	EA	1-1/2" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	569.62 44.20
23 05 19 00-0093	EA	2" Threaded, Double Window, 304SS Flapper, Bronze Body, Sight Flow Indicator (Dwyer SFI-360)	606.81 52.24
23 05 19 00-0094	Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicators <small>(23 05 19 00-0057)</small>		
23 05 19 00-0095	EA	1/4" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	324.56 16.72
23 05 19 00-0096	EA	3/8" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	349.80 17.59
23 05 19 00-0097	EA	1/2" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	382.17 18.49
23 05 19 00-0098	EA	3/4" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	406.79 24.91
23 05 19 00-0099	EA	1" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	466.60 30.20
23 05 19 00-0100	EA	1-1/4" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	496.81 38.23
23 05 19 00-0101	EA	1-1/2" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	999.27 44.20
23 05 19 00-0102	EA	2" Threaded, Double Window, 304SS Flapper, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-360SS)	1,050.54 52.24
23 05 19 00-0103	Threaded, Tube Style, Without Impeller, Cast Iron Body, Sight Flow Indicators <small>(23 05 19 00-0057)</small>		
23 05 19 00-0104	EA	1" Threaded, Tube Style, Without Impeller, Cast Iron Body, Sight Flow Indicator (Dwyer SFI-400)	475.99 30.20
23 05 19 00-0105	EA	1-1/4" Threaded, Tube Style, Without Impeller, Cast Iron Body, Sight Flow Indicator (Dwyer SFI-400)	534.37 38.23
23 05 19 00-0106	EA	1-1/2" Threaded, Tube Style, Without Impeller, Cast Iron Body, Sight Flow Indicator (Dwyer SFI-400)	607.18 44.20
23 05 19 00-0107	EA	2" Threaded, Tube Style, Without Impeller, Cast Iron Body, Sight Flow Indicator (Dwyer SFI-400)	681.94 52.24
23 05 19 00-0108	Flanged, Double Window, 316SS Flapper, Carbon Steel Body, Sight Flow Indicators <small>(23 05 19 00-0057)</small>		
23 05 19 00-0109	EA	1-1/2" Flanged, Double Window, 316SS Flapper, Carbon Steel Body, Sight Flow Indicator (Dwyer SFI-360FCS)	1,046.18 120.56
23 05 19 00-0110	EA	2" Flanged, Double Window, 316SS Flapper, Carbon Steel Body, Sight Flow Indicator (Dwyer SFI-360FCS)	1,166.28 153.06
23 05 19 00-0111	EA	3" Flanged, Double Window, 316SS Flapper, Carbon Steel Body, Sight Flow Indicator (Dwyer SFI-360FCS)	1,723.44 179.75
23 05 19 00-0112	EA	4" Flanged, Double Window, 316SS Flapper, Carbon Steel Body, Sight Flow Indicator (Dwyer SFI-360FCS)	2,596.88 301.33
23 05 19 00-0113	EA	6" Flanged, Double Window, 316SS Flapper, Carbon Steel Body, Sight Flow Indicator (Dwyer SFI-360FCS)	4,228.76 372.27
23 05 19 00-0114	Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicators <small>(23 05 19 00-0057)</small>		
23 05 19 00-0115	EA	1" Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-400F)	803.27 86.11
23 05 19 00-0116	EA	1-1/4" Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-400F)	948.88 100.46
23 05 19 00-0117	EA	1-1/2" Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-400F)	1,022.11 120.56
23 05 19 00-0118	EA	2" Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-400F)	1,280.74 153.06
23 05 19 00-0119	EA	3" Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-400F)	1,863.72 179.75
23 05 19 00-0120	EA	4" Flanged, Tube Style, Without Impeller, Stainless Steel Body, Sight Flow Indicator (Dwyer SFI-400F)	2,748.90 301.33
23 05 19 00-0121	Venturi Flowmeters <small>(23 05 19)</small>		
23 05 19 00-0122	Threaded, Brass, Venturi Flowmeters <small>(23 05 19 00-0121)</small>		
23 05 19 00-0123	EA	3/4" Threaded, Brass, Venturi Flowmeter	312.13 78.11
		<i>For Portable Venturi Flow Meter, Add</i>	995.00
23 05 19 00-0124	EA	1" Threaded, Brass, Venturi Flowmeter	344.20 93.73
		<i>For Portable Venturi Flow Meter, Add</i>	995.00

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 19 00-0125 EA 1-1/4" Threaded, Brass, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i>	379.57 995.00	104.18
23 05 19 00-0126 EA 1-1/2" Threaded, Brass, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i>	427.82 995.00	117.17
23 05 19 00-0127 EA 2" Threaded, Brass, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i>	509.71 995.00	133.94
23 05 19 00-0128 EA 2-1/2" Threaded, Brass, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i>	699.71 995.00	187.80
23 05 19 00-0129 But Weld, Carbon Steel, Venturi Flowmeters (23 05 19 00-0121)		
23 05 19 00-0130 EA 3" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	2,623.21 995.00 805.46	160.94
23 05 19 00-0131 EA 4" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	3,684.82 995.00 1,154.49	193.13
23 05 19 00-0132 EA 5" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	4,855.33 995.00 1,530.38	241.41
23 05 19 00-0133 EA 6" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	5,706.68 995.00 1,772.02	321.89
23 05 19 00-0134 EA 8" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	8,520.29 995.00 2,711.72	386.27
23 05 19 00-0135 EA 10" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	14,236.58 995.00 4,644.82	482.83
23 05 19 00-0136 EA 12" Butt Weld, Carbon Steel, Venturi Flowmeter..... <i>For Portable Venturi Flow Meter, Add</i> <i>For Flanged Ends, Add</i>	21,490.84 995.00 7,034.36	696.34
23 05 19 00-0137 Turbine Flowmeter (23 05 19)		
23 05 19 00-0138 EA Saddle Mount Turbine Flowmeter.....	1,911.88	86.15
23 05 19 00-0139 Water Flow Switches (23 05 19)		
23 05 19 00-0140 EA Flexible Paddle, Single Switch, Brass Body, Water Flow Switch (Taco IFS01BF-1).....	292.23	33.85
23 05 19 00-0141 EA Rigid Paddle, Single Switch, Brass Body, Water Flow Switch (Taco IFS01BR-1).....	302.97	33.85
23 05 19 00-0142 EA Flexible Paddle, Double Switch, Brass Body, Water Flow Switch (Taco IFS02BF-1).....	393.64	33.85
23 05 19 00-0143 EA Rigid Paddle, Double Switch, Brass Body, Water Flow Switch (Taco IFS02BR-1).....	407.37	33.85
23 05 19 00-0144 EA Flexible Paddle, High Current Single Switch, Brass Body, Water Flow Switch (Taco IFSH1BF-1).....	316.70	33.85
23 05 19 00-0145 EA Rigid Paddle, High Current Single Switch, Brass Body, Water Flow Switch (Taco IFSH1BR-1).....	329.22	33.85
23 05 19 00-0146 EA Flexible Paddle, High Current Double Switch, Brass Body, Water Flow Switch (Taco IFSH2BF-1).....	418.11	33.85
23 05 19 00-0147 EA Rigid Paddle, High Current Double Switch, Brass Body, Water Flow Switch (Taco IFSH2BR-1).....	430.63	33.85
23 05 19 00-0148 EA Flexible Paddle, Single Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFS01SF-1).....	833.86	33.85
23 05 19 00-0149 EA Rigid Paddle, Single Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFS01SR-1).....	845.99	33.85
23 05 19 00-0150 EA Flexible Paddle, Double Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFS02SF-1).....	961.25	33.85
23 05 19 00-0151 EA Rigid Paddle, Double Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFS02SR-1).....	977.94	33.85
23 05 19 00-0152 EA Flexible Paddle, High Current Single Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFSH1SF-1).....	862.67	33.85
23 05 19 00-0153 EA Rigid Paddle, High Current Single Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFSH1SR-1).....	879.35	33.85
23 05 19 00-0154 EA Flexible Paddle, High Current Double Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFSH2SF-1).....	990.07	33.85
23 05 19 00-0155 EA Rigid Paddle, High Current Double Switch, 316 Stainless Steel Body, Water Flow Switch (Taco IFSH2SR-1).....	1,008.27	33.85
23 05 23 General-Duty Valves For HVAC Piping (23 05)		
Note: Flanged valves exclude bolt and gasket sets. See CSI section 22 05 23 00-0000 for additional valves, 23 21 13 23-0619 for bolt and gasket sets.		
23 05 23 00-0001 Gate Valves (23 05 23)		
23 05 23 00-0002 Class 125 Threaded, Bronze Gate Valves (23 05 23 00-0001)		
Note: 125 psi steam, basic rating, 200 psi cold working pressure.		
23 05 23 00-0003 EA 1/4" Diameter, 125 LB, Threaded Bronze Gate Valve..... <i>For 250 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 200 LB Rating, Add</i> <i>For 300 LB Rating, Add</i>	65.41 8.00 3.20 10.03 4.80 11.19	11.48
23 05 23 00-0004 EA 3/8" Diameter, 125 LB, Threaded Bronze Gate Valve..... <i>For 250 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 200 LB Rating, Add</i> <i>For 300 LB Rating, Add</i>	67.17 8.00 3.20 10.56 4.80 11.19	11.48
23 05 23 00-0005 EA 1/2" Diameter, 125 LB, Threaded Bronze Gate Valve..... <i>For 250 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 200 LB Rating, Add</i> <i>For 300 LB Rating, Add</i>	69.02 8.00 3.20 11.11 4.80 11.19	11.48

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 23 00-0006	EA 3/4" Diameter, 125 LB, Threaded Bronze Gate Valve	88.08	12.63
	For 250 LB Rating, Add	9.54	
	For 150 LB Rating, Add	3.82	
	For Work In Restricted Working Space, Add	14.98	
	For 200 LB Rating, Add	5.72	
	For 300 LB Rating, Add	13.36	
23 05 23 00-0007	EA 1" Diameter, 125 LB, Threaded Bronze Gate Valve	118.08	14.35
	For 250 LB Rating, Add	14.41	
	For 150 LB Rating, Add	5.77	
	For Work In Restricted Working Space, Add	18.13	
	For 200 LB Rating, Add	8.65	
	For 300 LB Rating, Add	20.18	
23 05 23 00-0008	EA 1-1/4" Diameter, 125 LB, Threaded Bronze Gate Valve	154.28	15.28
	For 250 LB Rating, Add	19.43	
	For 150 LB Rating, Add	7.77	
	For Work In Restricted Working Space, Add	22.97	
	For 200 LB Rating, Add	11.66	
	For 300 LB Rating, Add	27.21	
23 05 23 00-0009	EA 1-1/2" Diameter, 125 LB, Threaded Bronze Gate Valve	186.27	17.68
	For 250 LB Rating, Add	24.49	
	For 150 LB Rating, Add	9.80	
	For Work In Restricted Working Space, Add	26.50	
	For 200 LB Rating, Add	14.69	
	For 300 LB Rating, Add	34.28	
23 05 23 00-0010	EA 2" Diameter, 125 LB, Threaded Bronze Gate Valve	238.21	20.89
	For 250 LB Rating, Add	33.46	
	For 150 LB Rating, Add	13.38	
	For Work In Restricted Working Space, Add	31.31	
	For 200 LB Rating, Add	20.07	
	For 300 LB Rating, Add	46.84	
23 05 23 00-0011	EA 2-1/2" Diameter, 125 LB, Threaded Bronze Gate Valve	522.66	28.23
	For Chain Operated Type, Add	171.76	
	For 250 LB Rating, Add	95.42	
	For 150 LB Rating, Add	38.17	
	For Work In Restricted Working Space, Add	42.29	
	For 200 LB Rating, Add	57.25	
	For 300 LB Rating, Add	133.59	
23 05 23 00-0012	EA 3" Diameter, 125 LB, Threaded Bronze Gate Valve	618.92	32.78
	For Chain Operated Type, Add	205.31	
	For 250 LB Rating, Add	114.06	
	For 150 LB Rating, Add	45.63	
	For Work In Restricted Working Space, Add	48.80	
	For 200 LB Rating, Add	68.44	
	For 300 LB Rating, Add	159.69	
23 05 23 00-0013	EA 4" Diameter, 125 LB, Threaded Bronze Gate Valve	1,271.94	37.00
	For Chain Operated Type, Add	489.11	
	For 250 LB Rating, Add	271.73	
	For 150 LB Rating, Add	108.69	
	For Work In Restricted Working Space, Add	55.51	
	For 200 LB Rating, Add	163.04	
	For 300 LB Rating, Add	380.42	
23 05 23 00-0014	Class 125 Non-Rising Stem, Threaded, Cast Iron Body, Bronze Trim Gate Valves <small>(23 05 23 00-0001)</small>		
	Note: 125 psi steam, basic rating. 200 psi cold working pressure.		
23 05 23 00-0015	EA 1-1/2" Diameter, Class 125 Non-Rising Stem, Threaded, Cast Iron Body, Bronze Trim Gate Valve	277.23	17.68
	For 250 LB Rating, Add	66.12	
	For Work In Restricted Working Space, Add	26.50	
	For Chain Operated Type, Add	66.12	
	For 150 LB Rating, Add	37.78	
23 05 23 00-0016	EA 2" Diameter, Class 125 Non-Rising Stem, Threaded, Cast Iron Body, Bronze Trim Gate Valve	423.60	20.89
	For 250 LB Rating, Add	111.73	
	For Work In Restricted Working Space, Add	31.31	
	For Chain Operated Type, Add	111.73	
	For 150 LB Rating, Add	63.84	
23 05 23 00-0017	EA 2-1/2" Diameter, Class 125 Non-Rising Stem, Threaded, Cast Iron Body, Bronze Trim Gate Valve	621.08	28.23
	For 250 LB Rating, Add	168.04	
	For Work In Restricted Working Space, Add	42.29	
	For Chain Operated Type, Add	168.04	
	For 150 LB Rating, Add	96.02	
23 05 23 00-0018	EA 3" Diameter, Class 125 Non-Rising Stem, Threaded, Cast Iron Body, Bronze Trim Gate Valve	792.59	32.78
	For 250 LB Rating, Add	220.47	
	For Work In Restricted Working Space, Add	48.80	
	For Chain Operated Type, Add	220.47	
	For 150 LB Rating, Add	125.98	
23 05 23 00-0019	EA 4" Diameter, Class 125 Non-Rising Stem, Threaded, Cast Iron Body, Bronze Trim Gate Valve	1,880.71	37.00
	For 250 LB Rating, Add	593.49	
	For Work In Restricted Working Space, Add	55.51	
	For Chain Operated Type, Add	593.49	
	For 150 LB Rating, Add	339.14	



	MINOR	UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0020		Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valves <small>(23 05 23 00-0001)</small> Note: 125 psi steam, basic rating, 200 psi cold working pressure.		
23 05 23 00-0021	EA	1-1/2" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	607.24 228.08 132.29 531.70 45.32 228.08	120.56
23 05 23 00-0022	EA	2" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	668.44 238.54 138.35 572.76 57.41 238.54	153.06
23 05 23 00-0023	EA	2-1/2" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	764.64 286.20 166.00 668.52 57.67 286.20	153.31
23 05 23 00-0024	EA	3" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	940.42 357.73 207.48 827.94 67.49 357.73	179.75
23 05 23 00-0025	EA	4" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	1,331.62 477.00 276.66 1,142.81 113.29 477.00	301.33
23 05 23 00-0026	EA	5" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	1,658.25 620.05 359.63 1,449.17 125.45 620.05	335.04
23 05 23 00-0027	EA	6" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	1,993.10 763.05 442.57 1,759.60 140.10 763.05	372.27
23 05 23 00-0028	EA	8" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	3,118.88 1,264.00 733.12 2,823.44 177.27 1,264.00	475.68
23 05 23 00-0029	EA	10" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	4,062.46 1,669.31 968.20 3,700.54 217.15 1,669.31	579.08
23 05 23 00-0030	EA	12" Diameter, Class 125 Non-Rising Stem, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, ASTM A182, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 250 LB Rating, Add</i>	5,647.10 2,384.86 1,383.22 5,208.41 263.22 2,384.86	703.16
23 05 23 00-0031		Class 125 Outside Stem And Yoke, Threaded, Cast Iron Body, Bronze Trim Gate Valves <small>(23 05 23 00-0001)</small> Note: 125 psi steam, basic rating, 200 psi cold working pressure.		
23 05 23 00-0032	EA	1-1/2" Diameter, 125 LB Outside Stem And Yoke, Threaded, Cast Iron Body, Bronze Trim Gate Valve <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 250 LB Rating, Add</i>	551.40 26.50 231.54 347.31	17.68
23 05 23 00-0033	EA	2" Diameter, 125 LB Outside Stem And Yoke, Threaded, Cast Iron Body, Bronze Trim Gate Valve <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 250 LB Rating, Add</i>	703.02 31.31 299.32 448.98	20.89
23 05 23 00-0034	EA	2-1/2" Diameter, 125 LB Outside Stem And Yoke, Threaded, Cast Iron Body, Bronze Trim Gate Valve <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 250 LB Rating, Add</i>	816.02 42.29 337.52 506.28	28.23
23 05 23 00-0035	EA	3" Diameter, 125 LB Outside Stem And Yoke, Threaded, Cast Iron Body, Bronze Trim Gate Valve <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 250 LB Rating, Add</i>	907.51 48.80 372.42 558.63	32.78

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 05 Common Work Results for HVAC

23 05 23 General-Duty Valves For HVAC Piping



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 23 00-0036	EA 4" Diameter, 125 LB Outside Stem And Yoke, Threaded, Cast Iron Body, Bronze Trim Gate Valve..... <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 250 LB Rating, Add</i>	1,213.55 55.51 514.26 771.39	37.00
23 05 23 00-0037	Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valves <small>(23 05 23 00-0001)</small> Note: 125 psi steam, basic rating. 200 psi cold working pressure for up to 12". 100 psi steam, basic rating. 150 psi cold working pressure for >12" to 24". 50 psi steam, basic rating. 150 psi cold working pressure for >24".		
23 05 23 00-0038	EA 1-1/2" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	808.67 427.43 45.32 203.85 98.64 328.80	120.56
23 05 23 00-0039	EA 2" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	868.49 440.13 57.41 209.91 101.57 338.57	153.06
23 05 23 00-0040	EA 2-1/2" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	891.47 454.50 57.67 216.76 104.88 349.62	153.31
23 05 23 00-0041	EA 3" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	994.30 500.07 67.49 238.50 115.40 384.67	179.75
23 05 23 00-0042	EA 4" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	1,310.63 606.46 113.29 289.23 139.95 466.51	301.33
23 05 23 00-0043	EA 5" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	1,719.91 846.14 125.45 403.54 195.26 650.88	335.04
23 05 23 00-0044	EA 6" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	1,953.65 966.32 140.10 460.86 223.00 743.33	372.27
23 05 23 00-0045	EA 8" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	3,105.22 1,634.31 177.27 779.44 377.15 1,257.17	475.68
23 05 23 00-0046	EA 10" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	4,593.38 2,515.20 217.15 1,199.56 580.43 1,934.77	579.08
23 05 23 00-0047	EA 12" Diameter, Class 125 Outside Stem And Yoke, Flanged, Cast Iron Body, Bronze Trim Gate Valve <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 175 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For Chain Operated Type, Add</i>	5,781.71 3,187.81 263.22 1,520.34 735.65 2,452.16	703.16
23 05 23 00-0048	Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valves <small>(23 05 23 00-0001)</small> Note: 800 psig at 850 degrees F.		
23 05 23 00-0049	EA 1/4" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve..... <i>For Work In Restricted Working Space, Add</i>	166.14 10.03	11.48
23 05 23 00-0050	EA 1/2" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve..... <i>For Work In Restricted Working Space, Add</i>	169.75 11.11	11.48
23 05 23 00-0051	EA 3/4" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve..... <i>For Work In Restricted Working Space, Add</i>	200.44 14.98	12.63

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0052 EA 1" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve 243.32	243.32	14.35
For Work In Restricted Working Space, Add	18.13	
23 05 23 00-0053 EA 1-1/4" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve 371.63	371.63	15.28
For Work In Restricted Working Space, Add	22.97	
23 05 23 00-0054 EA 1-1/2" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve 439.53	439.53	17.68
For Work In Restricted Working Space, Add	26.50	
23 05 23 00-0055 EA 2" Diameter, Class 800 Outside Stem And Yoke, Threaded, Forged Steel, Chrome Trim, Bolted Bonnet Gate Valve 552.69	552.69	20.89
For Work In Restricted Working Space, Add	31.31	
23 05 23 00-0056 Ball Valves (23 05 23)		
23 05 23 00-0057 Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valves (23 05 23 00-0056)		
Note: 125 LB WSP.		
23 05 23 00-0058 EA 1/2" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 51.38	51.38	11.48
For Full Port, Add	6.45	
For Work In Restricted Working Space, Add	11.11	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0059 EA 3/4" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 71.98	71.98	12.63
For Full Port, Add	9.93	
For Work In Restricted Working Space, Add	14.98	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0060 EA 1" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 90.21	90.21	14.35
For Full Port, Add	13.40	
For Work In Restricted Working Space, Add	18.13	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0061 EA 1-1/4" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 126.55	126.55	15.28
For Full Port, Add	22.50	
For Work In Restricted Working Space, Add	22.97	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0062 EA 1-1/2" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 152.18	152.18	17.68
For Full Port, Add	28.74	
For Work In Restricted Working Space, Add	26.50	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0063 EA 2" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 184.37	184.37	20.89
For Full Port, Add	36.00	
For Work In Restricted Working Space, Add	31.31	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0064 EA 2-1/2" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 518.47	518.47	28.23
For Full Port, Add	169.87	
For Work In Restricted Working Space, Add	42.29	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0065 EA 3" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 598.22	598.22	32.78
For Full Port, Add	196.00	
For Work In Restricted Working Space, Add	48.80	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0066 EA 4" Threaded Or Sweated, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve 778.84	778.84	37.00
For Full Port, Add	267.21	
For Work In Restricted Working Space, Add	55.51	
For Extension Stems And Sleeves On Insulated Pipe, Add	2.63	
23 05 23 00-0067 Screwed, 150 LB, Full Port, Carbon Steel Ball Valves (23 05 23 00-0066)		
23 05 23 00-0068 EA 1/4" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 60.88	60.88	11.48
For Work In Restricted Working Space, Add	10.03	
23 05 23 00-0069 EA 1/2" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 66.84	66.84	11.48
For Work In Restricted Working Space, Add	11.11	
23 05 23 00-0070 EA 3/4" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 93.02	93.02	12.63
For Work In Restricted Working Space, Add	14.98	
23 05 23 00-0071 EA 1" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 118.38	118.38	14.35
For Work In Restricted Working Space, Add	18.13	
23 05 23 00-0072 EA 1-1/4" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 175.60	175.60	15.28
For Work In Restricted Working Space, Add	22.97	
23 05 23 00-0073 EA 1-1/2" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 213.80	213.80	17.68
For Work In Restricted Working Space, Add	26.50	
23 05 23 00-0074 EA 2" Screwed, 150 LB, Full Port, Carbon Steel Ball Valve 277.15	277.15	20.89
For Work In Restricted Working Space, Add	31.31	
23 05 23 00-0075 Flanged, 150 LB, Full Port, Carbon Steel Ball Valves (23 05 23 00-0074)		
23 05 23 00-0076 EA 1-1/2" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve 493.58	493.58	120.56
For Chain Operated Type, Add	171.25	
For 150 LB Rating, Add	99.33	
For 300 LB Rating, ASTM A182, Add	418.04	
For Work In Restricted Working Space, Add	45.32	
For Work In Restricted Working Space, Add	45.32	
For 250 LB Rating, Add	171.25	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 23 00-0077	EA 2" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve	616.26	153.06
	<i>For Chain Operated Type, Add</i>	212.45	
	<i>For 150 LB Rating, Add</i>	123.22	
	<i>For 300 LB Rating, ASTM A182, Add</i>	520.58	
	<i>For Work In Restricted Working Space, Add</i>	57.41	
	<i>For Work In Restricted Working Space, Add</i>	57.41	
	<i>For 250 LB Rating, Add</i>	212.45	
23 05 23 00-0078	EA 2-1/2" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve	968.42	153.31
	<i>For Chain Operated Type, Add</i>	388.09	
	<i>For 150 LB Rating, Add</i>	225.09	
	<i>For 300 LB Rating, ASTM A182, Add</i>	872.30	
	<i>For Work In Restricted Working Space, Add</i>	57.67	
	<i>For Work In Restricted Working Space, Add</i>	57.67	
	<i>For 250 LB Rating, Add</i>	388.09	
23 05 23 00-0079	EA 3" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve	1,064.17	179.75
	<i>For Chain Operated Type, Add</i>	419.61	
	<i>For 150 LB Rating, Add</i>	243.37	
	<i>For 300 LB Rating, ASTM A182, Add</i>	951.69	
	<i>For Work In Restricted Working Space, Add</i>	67.49	
	<i>For Work In Restricted Working Space, Add</i>	67.49	
	<i>For 250 LB Rating, Add</i>	419.61	
23 05 23 00-0080	EA 4" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve	1,556.37	301.33
	<i>For Work In Restricted Working Space, Add</i>	113.29	
23 05 23 00-0081	EA 6" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve	3,663.00	372.27
	<i>For Work In Restricted Working Space, Add</i>	140.10	
23 05 23 00-0082	EA 8" Flanged, 150 LB, Full Port, Carbon Steel Ball Valve	6,261.51	475.68
	<i>For Work In Restricted Working Space, Add</i>	177.27	
23 05 23 00-0083	Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valves <small>(23 05 23 00-0056)</small>		
23 05 23 00-0084	EA 1/2" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	48.43	11.48
	<i>For True Union Socket Or Thread Type, Add</i>	6.50	
	<i>For Work In Restricted Working Space, Add</i>	11.11	
23 05 23 00-0085	EA 3/4" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	63.03	12.63
	<i>For True Union Socket Or Thread Type, Add</i>	7.86	
	<i>For Work In Restricted Working Space, Add</i>	14.98	
23 05 23 00-0086	EA 1" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	78.69	14.35
	<i>For True Union Socket Or Thread Type, Add</i>	10.48	
	<i>For Work In Restricted Working Space, Add</i>	18.13	
23 05 23 00-0087	EA 1-1/4" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	100.53	15.28
	<i>For True Union Socket Or Thread Type, Add</i>	13.61	
	<i>For Work In Restricted Working Space, Add</i>	22.97	
23 05 23 00-0088	EA 1-1/2" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	130.05	17.68
	<i>For True Union Socket Or Thread Type, Add</i>	21.33	
	<i>For Work In Restricted Working Space, Add</i>	26.50	
23 05 23 00-0089	EA 2" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	157.56	20.89
	<i>For True Union Socket Or Thread Type, Add</i>	26.75	
	<i>For Work In Restricted Working Space, Add</i>	31.31	
23 05 23 00-0090	EA 2-1/2" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	255.40	28.23
	<i>For True Union Socket Or Thread Type, Add</i>	53.17	
	<i>For Work In Restricted Working Space, Add</i>	42.29	
23 05 23 00-0091	EA 3" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	357.23	32.78
	<i>For True Union Socket Or Thread Type, Add</i>	86.36	
	<i>For Work In Restricted Working Space, Add</i>	48.80	
23 05 23 00-0092	EA 4" Socket, 150 PSI, Polyvinyl Chloride (PVC), Ball Valve	557.03	37.00
	<i>For True Union Socket Or Thread Type, Add</i>	158.51	
	<i>For Work In Restricted Working Space, Add</i>	55.51	
23 05 23 00-0093	Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valves <small>(23 05 23 00-0056)</small>		
23 05 23 00-0094	EA 1/4" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	93.30	17.22
	<i>For Full Port, Add</i>	19.41	
	<i>For Work In Restricted Working Space, Add</i>	15.05	
23 05 23 00-0095	EA 3/8" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	95.93	17.22
	<i>For Full Port, Add</i>	19.41	
	<i>For Work In Restricted Working Space, Add</i>	15.84	
23 05 23 00-0096	EA 1/2" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	98.69	17.22
	<i>For Full Port, Add</i>	19.41	
	<i>For Work In Restricted Working Space, Add</i>	16.67	
23 05 23 00-0097	EA 3/4" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	120.62	18.94
	<i>For Full Port, Add</i>	20.58	
	<i>For Work In Restricted Working Space, Add</i>	22.46	
23 05 23 00-0098	EA 1" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	158.41	21.53
	<i>For Full Port, Add</i>	30.49	
	<i>For Work In Restricted Working Space, Add</i>	27.20	
23 05 23 00-0099	EA 1-1/4" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	207.56	22.91
	<i>For Full Port, Add</i>	41.73	
	<i>For Work In Restricted Working Space, Add</i>	34.45	
23 05 23 00-0100	EA 1-1/2" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	255.78	26.52
	<i>For Full Port, Add</i>	55.49	
	<i>For Work In Restricted Working Space, Add</i>	39.74	
23 05 23 00-0101	EA 2" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve	357.24	31.35
	<i>For Full Port, Add</i>	90.30	
	<i>For Work In Restricted Working Space, Add</i>	46.97	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0102 EA 2-1/2" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve <i>For Full Port, Add</i> <i>For Work In Restricted Working Space, Add</i>	698.45 <i>219.14</i> <i>63.44</i>	42.34
23 05 23 00-0103 EA 3" Threaded Or Sweated, 3-Way, 125 LB, Regular Port, Carbon Steel Trim, Brass Body, Ball Valve <i>For Full Port, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,017.30 <i>347.98</i> <i>73.20</i>	49.16
23 05 23 00-0104 Wye Strainer, Union With Two Pressure Ports, Ball Valves <small>(23 05 23 00-0056)</small>		
23 05 23 00-0105 EA 1/2" Diameter, Wye Strainer, Union With Two Pressure Ports, Ball Valve.....	172.76	11.48
23 05 23 00-0106 EA 3/4" Diameter, Wye Strainer, Union With Two Pressure Ports, Ball Valve.....	221.56	14.92
23 05 23 00-0107 EA 1" Diameter, Wye Strainer, Union With Two Pressure Ports, Ball Valve.....	285.64	18.37
23 05 23 00-0108 EA 1-1/4" Diameter, Wye Strainer, Union With Two Pressure Ports, Ball Valve	389.99	25.26
23 05 23 00-0109 EA 1-1/2" Diameter, Wye Strainer, Union With Two Pressure Ports, Ball Valve	487.94	29.39
23 05 23 00-0110 EA 2" Diameter, Wye Strainer, Union With Two Pressure Ports, Ball Valve.....	644.29	34.45
23 05 23 00-0111 Plastic Ball Valves <small>(23 05 23 00-0056)</small> Note: Threaded or socket.		
23 05 23 00-0112 Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valves <small>(23 05 23 00-0111)</small>		
23 05 23 00-0113 EA 3/8" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346)	72.51	11.48
23 05 23 00-0114 EA 1/2" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346).....	75.72	11.48
23 05 23 00-0115 EA 3/4" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346)	95.82	12.63
23 05 23 00-0116 EA 1" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346).....	124.70	14.35
23 05 23 00-0117 EA 1-1/4" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346).....	148.24	15.28
23 05 23 00-0118 EA 1-1/2" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346).....	179.66	17.68
23 05 23 00-0119 EA 2" Ethylene Propylene Diene Monomer (EPDM) Liner And Seals, Polyvinyl Chloride (PVC) Ball Valve (George Fisher Type 346).....	218.92	20.89
23 05 23 00-0120 Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valves <small>(23 05 23 00-0111)</small>		
23 05 23 00-0121 EA 3/8" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	109.01	11.48
23 05 23 00-0122 EA 1/2" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	110.56	11.48
23 05 23 00-0123 EA 3/4" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	138.95	12.63
23 05 23 00-0124 EA 1" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	171.57	14.35
23 05 23 00-0125 EA 1-1/4" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	259.02	15.28
23 05 23 00-0126 EA 1-1/2" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	287.38	17.68
23 05 23 00-0127 EA 2" Viton Liner And Seals, Chlorinated Polyvinyl Chloride (CPVC) Ball Valve (George Fisher Type 346).....	344.91	20.89
23 05 23 00-0128 Viton Liner And Seals, Polypropylene (PP) Ball Valves <small>(23 05 23 00-0111)</small>		
23 05 23 00-0129 EA 3/8" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	121.45	11.48
23 05 23 00-0130 EA 1/2" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	131.29	11.48
23 05 23 00-0131 EA 3/4" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	150.56	12.63
23 05 23 00-0132 EA 1" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	184.84	14.35
23 05 23 00-0133 EA 1-1/4" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	232.48	15.28
23 05 23 00-0134 EA 1-1/2" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	279.08	17.68
23 05 23 00-0135 EA 2" Viton Liner And Seals, Polypropylene (PP) Ball Valve (George Fisher Type 346)	361.49	20.89
23 05 23 00-0136 Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valves <small>(23 05 23 00-0111)</small>		
23 05 23 00-0137 EA 3/8" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	244.20	11.48
23 05 23 00-0138 EA 1/2" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	260.68	11.48
23 05 23 00-0139 EA 3/4" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	309.80	12.63
23 05 23 00-0140 EA 1" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	362.33	14.35
23 05 23 00-0141 EA 1-1/4" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	441.49	15.28
23 05 23 00-0142 EA 1-1/2" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	486.43	17.68
23 05 23 00-0143 EA 2" Viton Liner And Seals, Polyvinylidene Fluoride (PVDF) Ball Valve (George Fisher Type 346)	560.55	20.89
23 05 23 00-0144 Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valves <small>(23 05 23 00-0111)</small>		
23 05 23 00-0145 EA 1/2" Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valve (Hayward QIC Compact)	49.43	11.48
23 05 23 00-0146 EA 3/4" Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valve (Hayward QIC Compact)	66.21	12.63
23 05 23 00-0147 EA 1" Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valve (Hayward QIC Compact)	80.34	14.35
23 05 23 00-0148 EA 1-1/4" Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valve (Hayward QIC Compact)	111.72	15.28
23 05 23 00-0149 EA 1-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valve (Hayward QIC Compact)	123.49	17.68

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0150 EA 2" Ethylene Propylene Diene Monomer (EPDM) Seals And Teflon Seats, Polyvinyl Chloride (PVC) Ball Valve (Hayward QIC Compact)	150.74	20.89
23 05 23 00-0151 Plastic, True Union, Ball Valves (23 05 23 00-0056)		
23 05 23 00-0152 Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valves (23 05 23 00-0151)		
Note: Socket or NPT connectors.		
23 05 23 00-0153 EA 3/8" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	118.13	11.48
23 05 23 00-0154 EA 1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	123.00	11.48
23 05 23 00-0155 EA 3/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	148.90	12.63
23 05 23 00-0156 EA 1" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	183.18	14.35
23 05 23 00-0157 EA 1-1/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	220.87	15.28
23 05 23 00-0158 EA 1-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	254.20	17.68
23 05 23 00-0159 EA 2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Vertical Ball Valve (George Fisher Type 343)	311.73	20.89
23 05 23 00-0160 Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valves (23 05 23 00-0151)		
Note: Socket or NPT connectors.		
23 05 23 00-0161 EA 3/8" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	119.79	11.48
23 05 23 00-0162 EA 1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	139.59	11.48
23 05 23 00-0163 EA 3/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	150.56	12.63
23 05 23 00-0164 EA 1" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	183.18	14.35
23 05 23 00-0165 EA 1-1/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	217.55	15.28
23 05 23 00-0166 EA 1-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	252.54	17.68
23 05 23 00-0167 EA 2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC) Or Chlorinated Polyvinyl Chloride (CPVC), True Union, Horizontal Ball Valve (George Fisher Type 343)	311.73	20.89
23 05 23 00-0168 Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valves (23 05 23 00-0151)		
Note: Socket or NPT connectors.		
23 05 23 00-0169 EA 1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	64.94	11.48
23 05 23 00-0170 EA 3/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	83.38	12.63
23 05 23 00-0171 EA 1" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	100.24	14.35
23 05 23 00-0172 EA 1-1/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	132.12	15.28
23 05 23 00-0173 EA 1-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	154.67	17.68
23 05 23 00-0174 EA 2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	212.20	20.89
23 05 23 00-0175 EA 2-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	296.91	28.23
23 05 23 00-0176 EA 3" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	375.00	32.78
23 05 23 00-0177 EA 4" Ethylene Propylene Diene Monomer (EPDM) Seals, Polyvinyl Chloride (PVC), True Union, Ball Valve (George Fisher Type 560)	533.38	37.00
23 05 23 00-0178 Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valves (23 05 23 00-0151)		
Note: Socket or NPT connectors.		
23 05 23 00-0179 EA 1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	76.55	11.48
23 05 23 00-0180 EA 3/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	99.96	12.63
23 05 23 00-0181 EA 1" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	123.46	14.35
23 05 23 00-0182 EA 1-1/4" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	172.76	15.28

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0183 EA 1-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	189.51	17.68
23 05 23 00-0184 EA 2" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	243.72	20.89
23 05 23 00-0185 EA 2-1/2" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	422.98	28.23
23 05 23 00-0186 EA 3" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	494.43	32.78
23 05 23 00-0187 EA 4" Ethylene Propylene Diene Monomer (EPDM) Seals, Chlorinated Polyvinyl Chloride (CPVC), True Union, Ball Valve (George Fisher Type 560)	765.61	37.00
23 05 23 00-0188 Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valves <small>(23 05 23 00-0151)</small>		
23 05 23 00-0189 Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valves <small>(23 05 23 00-0188)</small>		
23 05 23 00-0190 EA 1/4" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	62.87	11.48
23 05 23 00-0191 EA 3/8" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	64.63	11.48
23 05 23 00-0192 EA 1/2" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	66.18	11.48
23 05 23 00-0193 EA 3/4" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	84.37	12.63
23 05 23 00-0194 EA 1" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	103.32	14.35
23 05 23 00-0195 EA 1-1/4" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	126.02	15.28
23 05 23 00-0196 EA 1-1/2" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	151.68	17.68
23 05 23 00-0197 EA 2" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	193.96	20.89
23 05 23 00-0198 EA 2-1/2" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	362.43	28.23
23 05 23 00-0199 EA 3" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	403.20	32.78
23 05 23 00-0200 EA 4" Socket, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	559.09	37.00
23 05 23 00-0201 Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valves <small>(23 05 23 00-0188)</small>		
23 05 23 00-0202 EA 1/4" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	62.87	11.48
23 05 23 00-0203 EA 3/8" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	64.63	11.48
23 05 23 00-0204 EA 1/2" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	66.18	11.48
23 05 23 00-0205 EA 3/4" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	84.37	12.63
23 05 23 00-0206 EA 1" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	103.32	14.35
23 05 23 00-0207 EA 1-1/4" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	126.02	15.28
23 05 23 00-0208 EA 1-1/2" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	151.68	17.68
23 05 23 00-0209 EA 2" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	193.96	20.89
23 05 23 00-0210 EA 2-1/2" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	362.43	28.23
23 05 23 00-0211 EA 3" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	403.20	32.78
23 05 23 00-0212 EA 4" Threaded, Viton Seal, Polyvinyl Chloride (PVC), True Union, Ball Valve	559.09	37.00
23 05 23 00-0213 Three Piece Ball Valves <small>(23 05 23 00-0056)</small>		
23 05 23 00-0214 Threaded Or Sweated, Bronze Body, Three Piece Ball Valves <small>(23 05 23 00-0213)</small>		
23 05 23 00-0215 EA 1/4" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	99.52	11.48
<i>For Work In Restricted Working Space, Add</i>	10.03	
23 05 23 00-0216 EA 3/8" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	101.28	11.48
<i>For Work In Restricted Working Space, Add</i>	10.56	
23 05 23 00-0217 EA 1/2" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	113.65	11.48
<i>For Work In Restricted Working Space, Add</i>	11.11	
23 05 23 00-0218 EA 3/4" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	143.93	12.63
<i>For Work In Restricted Working Space, Add</i>	14.98	
23 05 23 00-0219 EA 1" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	183.90	14.35
<i>For Work In Restricted Working Space, Add</i>	18.13	
23 05 23 00-0220 EA 1-1/4" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	254.03	15.28
<i>For Work In Restricted Working Space, Add</i>	22.97	
23 05 23 00-0221 EA 1-1/2" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	318.09	17.68
<i>For Work In Restricted Working Space, Add</i>	26.50	
23 05 23 00-0222 EA 2" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	520.69	20.89
<i>For Work In Restricted Working Space, Add</i>	31.31	
23 05 23 00-0223 EA 2-1/2" Threaded Or Sweated, Bronze Body, Three Piece Ball Valve	1,121.00	29.97
<i>For Work In Restricted Working Space, Add</i>	45.92	
23 05 23 00-0224 Threaded, Carbon Steel Body, Three Piece Ball Valves <small>(23 05 23 00-0213)</small>		
23 05 23 00-0225 EA 1/4" Threaded, Carbon Steel Body, Three Piece Ball Valve	115.47	11.48
<i>For Work In Restricted Working Space, Add</i>	10.03	
23 05 23 00-0226 EA 3/8" Threaded, Carbon Steel Body, Three Piece Ball Valve	126.47	11.48
<i>For Work In Restricted Working Space, Add</i>	10.56	
23 05 23 00-0227 EA 1/2" Threaded, Carbon Steel Body, Three Piece Ball Valve	134.21	11.48
<i>For Work In Restricted Working Space, Add</i>	11.11	
23 05 23 00-0228 EA 3/4" Threaded, Carbon Steel Body, Three Piece Ball Valve	214.22	12.63
<i>For Work In Restricted Working Space, Add</i>	14.98	
23 05 23 00-0229 EA 1" Threaded, Carbon Steel Body, Three Piece Ball Valve	273.73	14.35
<i>For Work In Restricted Working Space, Add</i>	18.13	
23 05 23 00-0230 EA 1-1/4" Threaded, Carbon Steel Body, Three Piece Ball Valve	414.59	15.28
<i>For Work In Restricted Working Space, Add</i>	22.97	
23 05 23 00-0231 EA 1-1/2" Threaded, Carbon Steel Body, Three Piece Ball Valve	527.60	17.68
<i>For Work In Restricted Working Space, Add</i>	26.50	
23 05 23 00-0232 EA 2" Threaded, Carbon Steel Body, Three Piece Ball Valve	686.20	20.89
<i>For Work In Restricted Working Space, Add</i>	31.31	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 05 Common Work Results for HVAC

23 05 23 General-Duty Valves For HVAC Piping



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0233			Threaded, Stainless Steel Body, Three Piece Ball Valves <small>(23 05 23 00-0213)</small>		
23 05 23 00-0234	EA		1/4" Threaded, Stainless Steel Body, Three Piece Ball Valve .....298.70		11.48
			<i>For Work In Restricted Working Space, Add</i> .....10.03		
23 05 23 00-0235	EA		3/8" Threaded, Stainless Steel Body, Three Piece Ball Valve .....320.22		11.48
			<i>For Work In Restricted Working Space, Add</i> .....10.56		
23 05 23 00-0236	EA		1/2" Threaded, Stainless Steel Body, Three Piece Ball Valve .....337.53		11.48
			<i>For Work In Restricted Working Space, Add</i> .....11.11		
23 05 23 00-0237	EA		3/4" Threaded, Stainless Steel Body, Three Piece Ball Valve .....489.75		12.63
			<i>For Work In Restricted Working Space, Add</i> .....14.98		
23 05 23 00-0238	EA		1" Threaded, Stainless Steel Body, Three Piece Ball Valve .....597.09		14.35
			<i>For Work In Restricted Working Space, Add</i> .....18.13		
23 05 23 00-0239	EA		1-1/4" Threaded, Stainless Steel Body, Three Piece Ball Valve .....697.21		15.28
			<i>For Work In Restricted Working Space, Add</i> .....22.97		
23 05 23 00-0240	EA		1-1/2" Threaded, Stainless Steel Body, Three Piece Ball Valve .....933.95		17.68
			<i>For Work In Restricted Working Space, Add</i> .....26.50		
23 05 23 00-0241	EA		2" Threaded, Stainless Steel Body, Three Piece Ball Valve .....1,215.74		20.89
			<i>For Work In Restricted Working Space, Add</i> .....31.31		
23 05 23 00-0242	EA		3" Threaded, Stainless Steel Body, Three Piece Ball Valve .....3,198.71		35.60
			<i>For Work In Restricted Working Space, Add</i> .....53.00		
23 05 23 00-0243			Globe Valves <small>(23 05 23)</small>		
23 05 23 00-0244			Threaded Or Sweated, 125 LB, Bronze Body, Globe Valves <small>(23 05 23 00-0243)</small>		
23 05 23 00-0245	EA		1/8" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....73.45		11.48
			<i>For 300 LB Rating, Add</i> .....20.03		
			<i>For 200 LB Rating, Add</i> .....13.84		
			<i>For 250 LB Rating, Add</i> .....16.38		
			<i>For 150 LB Rating, Add</i> .....11.29		
			<i>For Work In Restricted Working Space, Add</i> .....11.11		
23 05 23 00-0246	EA		1/4" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....69.84		11.48
			<i>For 300 LB Rating, Add</i> .....20.03		
			<i>For 200 LB Rating, Add</i> .....13.84		
			<i>For 250 LB Rating, Add</i> .....16.38		
			<i>For 150 LB Rating, Add</i> .....11.29		
			<i>For Work In Restricted Working Space, Add</i> .....10.03		
23 05 23 00-0247	EA		3/8" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....89.54		11.48
			<i>For 300 LB Rating, Add</i> .....29.89		
			<i>For 200 LB Rating, Add</i> .....20.65		
			<i>For 250 LB Rating, Add</i> .....24.46		
			<i>For 150 LB Rating, Add</i> .....16.85		
			<i>For Work In Restricted Working Space, Add</i> .....10.56		
23 05 23 00-0248	EA		1/2" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....91.39		11.48
			<i>For 300 LB Rating, Add</i> .....29.89		
			<i>For 200 LB Rating, Add</i> .....20.65		
			<i>For 250 LB Rating, Add</i> .....24.46		
			<i>For 600 LB Rating, Forged Steel, Bolted Bonnet, Socket Weld, Add</i> .....74.60		
			<i>For 150 LB Rating, Add</i> .....16.85		
			<i>For Work In Restricted Working Space, Add</i> .....11.11		
23 05 23 00-0249	EA		3/4" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....108.83		12.05
			<i>For 300 LB Rating, Add</i> .....32.40		
			<i>For 200 LB Rating, Add</i> .....22.39		
			<i>For 250 LB Rating, Add</i> .....26.51		
			<i>For 600 LB Rating, Forged Steel, Bolted Bonnet, Socket Weld, Add</i> .....84.77		
			<i>For 150 LB Rating, Add</i> .....18.26		
			<i>For Work In Restricted Working Space, Add</i> .....14.98		
23 05 23 00-0250	EA		1" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....140.05		12.05
			<i>For 300 LB Rating, Add</i> .....43.79		
			<i>For 200 LB Rating, Add</i> .....30.26		
			<i>For 250 LB Rating, Add</i> .....35.83		
			<i>For 600 LB Rating, Forged Steel, Bolted Bonnet, Socket Weld, Add</i> .....111.75		
			<i>For 150 LB Rating, Add</i> .....24.68		
			<i>For Work In Restricted Working Space, Add</i> .....18.13		
23 05 23 00-0251	EA		1-1/4" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....214.06		15.28
			<i>For 300 LB Rating, Add</i> .....75.63		
			<i>For 200 LB Rating, Add</i> .....52.25		
			<i>For 250 LB Rating, Add</i> .....61.88		
			<i>For 600 LB Rating, Forged Steel, Bolted Bonnet, Socket Weld, Add</i> .....181.88		
			<i>For 150 LB Rating, Add</i> .....42.63		
			<i>For Work In Restricted Working Space, Add</i> .....22.97		
23 05 23 00-0252	EA		1-1/2" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....284.85		17.68
			<i>For 300 LB Rating, Add</i> .....108.09		
			<i>For 200 LB Rating, Add</i> .....74.68		
			<i>For 250 LB Rating, Add</i> .....88.44		
			<i>For 600 LB Rating, Forged Steel, Bolted Bonnet, Socket Weld, Add</i> .....251.51		
			<i>For 150 LB Rating, Add</i> .....60.92		
			<i>For Work In Restricted Working Space, Add</i> .....26.50		
23 05 23 00-0253	EA		2" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve .....335.42		20.89
			<i>For 300 LB Rating, Add</i> .....127.07		
			<i>For 200 LB Rating, Add</i> .....87.80		
			<i>For 250 LB Rating, Add</i> .....103.97		
			<i>For 600 LB Rating, Forged Steel, Bolted Bonnet, Socket Weld, Add</i> .....295.90		
			<i>For 150 LB Rating, Add</i> .....71.62		
			<i>For Work In Restricted Working Space, Add</i> .....31.31		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0254 EA 2-1/2" Threaded Or Sweated, 125 LB, Bronze Body, Globe Valve	373.91	28.23
<i>For 300 LB Rating, Add</i>	128.11	
<i>For 200 LB Rating, Add</i>	88.51	
<i>For 250 LB Rating, Add</i>	104.82	
<i>For 150 LB Rating, Add</i>	72.21	
<i>For Work In Restricted Working Space, Add</i>	42.29	
23 05 23 00-0255 EA 3" Globe Valve, Bronze, Threaded Or Soldered, 125 LB	684.54	32.78
<i>For 300 LB Rating, Add</i>	287.03	
<i>For 200 LB Rating, Add</i>	198.31	
<i>For 250 LB Rating, Add</i>	234.84	
<i>For 150 LB Rating, Add</i>	161.78	
<i>For Work In Restricted Working Space, Add</i>	48.80	
23 05 23 00-0256 Threaded, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valves <small>(23 05 23 00-0243)</small>		
23 05 23 00-0257 EA 2" Threaded, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	510.30	20.89
<i>For 300 LB Rating, Add</i>	223.26	
<i>For Chain Operated Type, Add</i>	338.94	
<i>For 200 LB Rating, Add</i>	154.25	
<i>For 250 LB Rating, Add</i>	182.66	
<i>For 150 LB Rating, Add</i>	125.84	
<i>For Work In Restricted Working Space, Add</i>	31.31	
23 05 23 00-0258 EA 2-1/2" Threaded, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	633.00	28.23
<i>For 300 LB Rating, Add</i>	270.61	
<i>For Chain Operated Type, Add</i>	410.84	
<i>For 200 LB Rating, Add</i>	186.97	
<i>For 250 LB Rating, Add</i>	221.41	
<i>For 150 LB Rating, Add</i>	152.53	
<i>For Work In Restricted Working Space, Add</i>	42.29	
23 05 23 00-0259 EA 3" Threaded, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	753.09	32.78
<i>For 300 LB Rating, Add</i>	324.73	
<i>For Chain Operated Type, Add</i>	493.00	
<i>For 200 LB Rating, Add</i>	224.36	
<i>For 250 LB Rating, Add</i>	265.69	
<i>For 150 LB Rating, Add</i>	183.03	
<i>For Work In Restricted Working Space, Add</i>	48.80	
23 05 23 00-0260 EA 4" Threaded, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	972.21	37.00
<i>For 300 LB Rating, Add</i>	432.98	
<i>For Chain Operated Type, Add</i>	657.34	
<i>For 200 LB Rating, Add</i>	299.15	
<i>For 250 LB Rating, Add</i>	354.25	
<i>For 150 LB Rating, Add</i>	244.04	
<i>For Work In Restricted Working Space, Add</i>	55.49	
23 05 23 00-0261 Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valves <small>(23 05 23 00-0243)</small>		
23 05 23 00-0262 EA 2" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	582.16	153.06
<i>For Chain Operated Type, Add</i>	195.40	
<i>For 150 LB Rating, Add</i>	121.15	
<i>For 250 LB Rating, Add</i>	175.86	
<i>For Work In Restricted Working Space, Add</i>	57.41	
23 05 23 00-0263 EA 2-1/2" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	668.65	153.31
<i>For Chain Operated Type, Add</i>	238.21	
<i>For 150 LB Rating, Add</i>	147.69	
<i>For 250 LB Rating, Add</i>	214.38	
<i>For Work In Restricted Working Space, Add</i>	57.67	
23 05 23 00-0264 EA 3" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	796.65	179.75
<i>For Chain Operated Type, Add</i>	285.85	
<i>For 150 LB Rating, Add</i>	177.22	
<i>For 250 LB Rating, Add</i>	257.26	
<i>For Work In Restricted Working Space, Add</i>	67.49	
23 05 23 00-0265 EA 4" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	1,139.87	301.33
<i>For Chain Operated Type, Add</i>	381.13	
<i>For 150 LB Rating, Add</i>	236.30	
<i>For 250 LB Rating, Add</i>	343.01	
<i>For Work In Restricted Working Space, Add</i>	113.29	
23 05 23 00-0266 EA 5" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	1,478.17	335.04
<i>For Chain Operated Type, Add</i>	530.01	
<i>For 150 LB Rating, Add</i>	328.60	
<i>For 250 LB Rating, Add</i>	477.00	
<i>For Work In Restricted Working Space, Add</i>	125.45	
23 05 23 00-0267 EA 6" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	1,806.90	372.27
<i>For Chain Operated Type, Add</i>	669.95	
<i>For 150 LB Rating, Add</i>	415.37	
<i>For 250 LB Rating, Add</i>	602.96	
<i>For Work In Restricted Working Space, Add</i>	140.10	
23 05 23 00-0268 EA 8" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve	2,651.36	475.68
<i>For Chain Operated Type, Add</i>	1,030.24	
<i>For 150 LB Rating, Add</i>	638.75	
<i>For 250 LB Rating, Add</i>	927.21	
<i>For Work In Restricted Working Space, Add</i>	177.27	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0269	EA		10" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	3,862.18 1,569.17 972.89 1,412.25 217.15	579.08
23 05 23 00-0270	EA		12" Flanged, 125 LB, Outside Stem And Yoke, Iron Body, Globe Valve <i>For Chain Operated Type, Add</i> <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	6,815.99 2,969.30 1,840.97 2,672.37 263.22	703.16
23 05 23 00-0271 Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valves (23 05 23 00-0243)					
23 05 23 00-0272	EA		1/8" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	64.62 10.48 8.55 15.17 11.11	11.48
23 05 23 00-0273	EA		1/4" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	61.01 10.48 8.55 15.17 10.03	11.48
23 05 23 00-0274	EA		3/8" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	62.77 10.48 8.55 15.17 10.56	11.48
23 05 23 00-0275	EA		1/2" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	66.46 11.18 9.12 16.18 11.11	11.48
23 05 23 00-0276	EA		3/4" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	90.71 15.50 12.64 22.43 14.98	12.05
23 05 23 00-0277	EA		1" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	113.96 20.34 16.59 29.44 18.13	12.05
23 05 23 00-0278	EA		1-1/4" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	156.07 30.22 24.65 43.74 22.97	15.28
23 05 23 00-0279	EA		1-1/2" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	181.03 35.23 28.74 50.99 26.50	17.68
23 05 23 00-0280	EA		2" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	244.02 53.06 43.29 76.80 31.31	20.89
23 05 23 00-0281	EA		2-1/2" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	404.99 95.72 78.09 138.54 45.93	30.66
23 05 23 00-0282	EA		3" Threaded Or Sweated, 125 LB, Bronze Body, Angle Globe Valve <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i> <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	603.23 162.10 132.24 234.62 53.00	35.60
23 05 23 00-0283 Flanged, 125 LB, Iron Body, Angle Globe Valves (23 05 23 00-0243)					
23 05 23 00-0284	EA		2" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,196.83 603.28 392.13 57.41	153.06
23 05 23 00-0285	EA		2-1/2" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,381.38 713.48 463.76 57.67	153.31
23 05 23 00-0286	EA		3" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,626.27 840.79 546.51 67.49	179.75



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0287 EA 4" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,379.10 1,200.89 780.58 113.29	301.33
23 05 23 00-0288 EA 5" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,005.18 2,152.21 1,398.94 125.45	335.04
23 05 23 00-0289 EA 6" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,054.02 2,152.21 1,398.94 140.10	372.27
23 05 23 00-0290 EA 8" Flanged, 125 LB, Iron Body, Angle Globe Valve <i>For 250 LB Rating, Add</i> <i>For Chain Operated Type, Add</i> <i>For Work In Restricted Working Space, Add</i>	7,611.41 4,212.31 2,738.00 177.27	475.68
23 05 23 00-0291 Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valves (23 05 23 00-0243) Note: 800 PSIG at 850 degrees F.		
23 05 23 00-0292 EA 1/4" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	209.84 10.03	18.60
23 05 23 00-0293 EA 1/2" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	213.45 11.11	18.60
23 05 23 00-0294 EA 3/4" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	250.61 14.98	25.03
23 05 23 00-0295 EA 1" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	309.67 18.13	30.20
23 05 23 00-0296 EA 1-1/4" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	503.82 22.97	38.23
23 05 23 00-0297 EA 1-1/2" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	604.61 26.50	44.20
23 05 23 00-0298 EA 2" Class 800 Outside Stem And Yoke, Threaded, Chrome Trim, Bolted Bonnet, Forged Steel, Globe Valve <i>For Work In Restricted Working Space, Add</i>	769.57 31.31	52.24
23 05 23 00-0299 Triple Duty Valves (23 05 23) Note: Valves function as a shut-off, check valve and calibrated balancing valve.		
23 05 23 00-0300 Straight Pattern, Triple Duty Valves (23 05 23 00-0299) Note: Bell & Gossett 3DX and 3DS-S Series.		
23 05 23 00-0301 EA 1" Threaded, Straight Pattern, Triple Duty Valve	306.26	12.05
23 05 23 00-0302 EA 1-1/4" Threaded, Straight Pattern, Triple Duty Valve	354.81	15.28
23 05 23 00-0303 EA 1-1/2" Threaded, Straight Pattern, Triple Duty Valve	385.19	17.68
23 05 23 00-0304 EA 2" Flanged, Straight Pattern, Triple Duty Valve	988.54	153.06
23 05 23 00-0305 EA 2-1/2" Flanged, Straight Pattern, Triple Duty Valve	1,124.67	153.31
23 05 23 00-0306 EA 3" Flanged, Straight Pattern, Triple Duty Valve	1,231.61	179.75
23 05 23 00-0307 EA 4" Flanged, Straight Pattern, Triple Duty Valve	2,520.82	301.33
23 05 23 00-0308 EA 5" Flanged, Straight Pattern Triple Duty Valve	2,946.39	335.04
23 05 23 00-0309 EA 6" Flanged, Straight Pattern, Triple Duty Valve	3,918.39	372.27
23 05 23 00-0310 EA 8" Flanged, Straight Pattern, Triple Duty Valve	5,276.24	475.68
23 05 23 00-0311 EA 10" Flanged, Straight Pattern, Triple Duty Valve	8,461.63	579.08
23 05 23 00-0312 Flanged, Angle Pattern, Triple Duty Valves (23 05 23 00-0299) Note: Bell & Gossett 3D-S Series.		
23 05 23 00-0313 EA 2" Flanged, Angle Pattern, Triple Duty Valve	975.34	153.06
23 05 23 00-0314 EA 2-1/2" Flanged, Angle Pattern, Triple Duty Valve	1,096.84	153.31
23 05 23 00-0315 EA 3" Flanged, Angle Pattern, Triple Duty Valve	1,208.42	179.75
23 05 23 00-0316 EA 4" Flanged, Angle Pattern, Triple Duty Valve	2,460.51	301.33
23 05 23 00-0317 EA 5" Flanged, Angle Pattern, Triple Duty Valve	2,872.17	335.04
23 05 23 00-0318 EA 6" Flanged, Angle Pattern, Triple Duty Valve	3,222.54	372.27
23 05 23 00-0319 EA 8" Flanged, Angle Pattern, Triple Duty Valve	4,946.87	475.68
23 05 23 00-0320 EA 10" Flanged, Angle Pattern, Triple Duty Valve	6,610.68	579.08
23 05 23 00-0321 Balanced, Straight Pattern, Triple Duty Valves (23 05 23 00-0299) Note: Bell & Gossett 3DS-B Series.		
23 05 23 00-0322 EA 3" Flanged, Balanced, Straight Pattern, Triple Duty Valve	1,129.56	179.75
23 05 23 00-0323 EA 4" Flanged, Balanced, Straight Pattern, Triple Duty Valve	2,251.76	301.33
23 05 23 00-0324 EA 5" Flanged, Balanced, Straight Pattern, Triple Duty Valve	2,635.58	335.04
23 05 23 00-0325 EA 6" Flanged, Balanced, Straight Pattern, Triple Duty Valve	3,496.24	372.27
23 05 23 00-0326 EA 8" Flanged, Balanced, Straight Pattern, Triple Duty Valve	4,701.01	475.68
23 05 23 00-0327 EA 10" Flanged, Balanced, Straight Pattern, Triple Duty Valve	7,501.36	579.08
23 05 23 00-0328 EA 12" Flanged, Balanced, Straight Pattern, Triple Duty Valve	11,287.40	703.16
23 05 23 00-0329 EA 14" Flanged, Balanced, Straight Pattern, Triple Duty Valve	13,718.72	827.25
23 05 23 00-0330 EA 16" Flanged, Balanced, Straight Pattern, Triple Duty Valve	17,184.57	909.98
23 05 23 00-0331 Grooved Straight Pattern, Triple Duty Valves (23 05 23 00-0299) Note: Bell & Gossett 3DS-G Series.		
23 05 23 00-0332 EA 2" Grooved, Straight Pattern, Triple Duty Valve	1,062.48	28.36

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 23 00-0333	EA	2-1/2" Grooved, Straight Pattern, Triple Duty Valve.....	1,266.48	33.83
23 05 23 00-0334	EA	3" Grooved, Straight Pattern, Triple Duty Valve.....	1,474.51	36.69
23 05 23 00-0335	EA	4" Grooved, Straight Pattern, Triple Duty Valve.....	2,448.80	39.54
23 05 23 00-0336	EA	5" Grooved, Straight Pattern, Triple Duty Valve.....	2,838.77	52.74
23 05 23 00-0337	EA	6" Grooved, Straight Pattern Triple Duty Valve.....	3,784.67	67.63
23 05 23 00-0338	EA	8" Grooved, Straight Pattern Triple Duty Valve.....	5,147.57	85.83
23 05 23 00-0339	EA	10" Grooved, Straight Pattern Triple Duty Valve.....	8,123.78	96.17
23 05 23 00-0340	EA	12" Grooved, Straight Pattern Triple Duty Valve.....	12,899.10	117.26

23 05 23 00-0341 Plug Valves (23 05 23)**23 05 23 00-0342 Plug Valves, Lubricated, Semisteel Screwed, Wrench Operated (23 05 23 00-0341)**

Note: Includes wrench.

23 05 23 00-0343	EA	1/2" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	295.08	11.48
23 05 23 00-0344	EA	3/4" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	307.96	12.63
23 05 23 00-0345	EA	1" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	389.56	14.35
23 05 23 00-0346	EA	1-1/4" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	466.24	15.28
23 05 23 00-0347	EA	1-1/2" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	512.24	17.68
23 05 23 00-0348	EA	2" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	604.65	20.89
23 05 23 00-0349	EA	2-1/2" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	907.19	28.23
23 05 23 00-0350	EA	3" Diameter Plug Valve, Semi-Steel, Screwed Lubricated, 200 PSI, Wrench Operated, With Wrench.....	1,110.56	32.78

23 05 23 00-0351 Plug Valves, Lubricated, Semisteel Flanged (23 05 23 00-0341)

Note: Wrench operated for 4", gear operated for 6" and 10".

23 05 23 00-0352	EA	2" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	608.69	153.06
23 05 23 00-0353	EA	2-1/2" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	741.96	153.31
23 05 23 00-0354	EA	3" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	915.71	179.75
23 05 23 00-0355	EA	4" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	1,313.01	301.33
23 05 23 00-0356	EA	6" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	2,962.33	372.27
23 05 23 00-0357	EA	8" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	5,086.52	475.68
23 05 23 00-0358	EA	10" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	8,215.60	579.08
23 05 23 00-0359	EA	12" Diameter Plug Valve, Semi-Steel, Flanged, 175 PSI, Wrench Operated, With Wrench.....	12,248.86	703.16

23 05 23 00-0360 Plug Valves, Forged Steel, Screwed (23 05 23 00-0341)

23 05 23 00-0361	EA	1/2" Plug Valve, 1,500 LB, Forged Steel, Screwed.....	1,140.76	11.48
23 05 23 00-0362	EA	3/4" Plug Valve, 1,500 LB, Forged Steel, Screwed.....	1,347.56	12.63
23 05 23 00-0363	EA	1" Plug Valve, 1,500 LB, Forged Steel, Screwed.....	1,523.27	14.35
23 05 23 00-0364	EA	1-1/4" Plug Valve, 1,500 LB, Forged Steel, Screwed.....	1,827.49	15.28
23 05 23 00-0365	EA	1-1/2" Plug Valve, 1,500 LB, Forged Steel, Screwed.....	2,128.16	17.68
23 05 23 00-0366	EA	2" Plug Valve, 1,500 LB, Forged Steel, Screwed.....	2,800.22	20.89

23 05 23 00-0367 Plug Valves, Eccentric, Cast Iron Flanged (23 05 23 00-0341)

23 05 23 00-0368	EA	4" Diameter Plug Valve, Eccentric, Cast Iron, Flanged, 175 PSI.....	1,166.00	301.33
23 05 23 00-0369	EA	6" Diameter Plug Valve, Eccentric, Cast Iron, Flanged, 175 PSI.....	1,818.87	372.27
23 05 23 00-0370	EA	8" Diameter Plug Valve, Eccentric, Cast Iron, Flanged, 175 PSI.....	2,475.25	475.68
23 05 23 00-0371	EA	10" Diameter Plug Valve, Eccentric, Cast Iron, Flanged, 175 PSI.....	3,512.89	579.08
23 05 23 00-0372	EA	12" Diameter Plug Valve, Eccentric, Cast Iron, Flanged, 175 PSI.....	4,537.51	703.16

23 05 23 00-0373 Foot Valves (23 05 23)**23 05 23 00-0374 Single Poppet Foot Valves, Metal To Metal Seat Construction (23 05 23 00-0373)**

23 05 23 00-0375	EA	1" Single Poppet Foot Valve, Metal To Metal Seat Construction.....	95.61	28.72
23 05 23 00-0376	EA	1-1/4" Single Poppet Foot Valve, Metal To Metal Seat Construction.....	108.80	32.16
23 05 23 00-0377	EA	1-1/2" Single Poppet Foot Valve, Metal To Metal Seat Construction.....	139.86	36.76
23 05 23 00-0378	EA	2" Single Poppet Foot Valve, Metal To Metal Seat Construction.....	184.51	41.35
23 05 23 00-0379	EA	2-1/2" Single Poppet Foot Valve, Metal To Metal Seat Construction.....	422.70	67.77
23 05 23 00-0380	EA	3" Single Poppet Foot Valve, Metal To Metal Seat Construction.....	540.79	82.70

23 05 23 00-0381 Double Poppet Foot Valves, Metal To Metal Seat Construction (23 05 23 00-0373)

23 05 23 00-0382	EA	1" Double Poppet Foot Valve, Metal To Metal Seat Construction.....	95.61	28.72
23 05 23 00-0383	EA	1-1/4" Double Poppet Foot Valve, Metal To Metal Seat Construction.....	206.91	32.16
23 05 23 00-0384	EA	1-1/2" Double Poppet Foot Valve, Metal To Metal Seat Construction.....	196.46	36.76
23 05 23 00-0385	EA	2" Double Poppet Foot Valve, Metal To Metal Seat Construction.....	267.48	41.35
23 05 23 00-0386	EA	3" Double Poppet Foot Valve, Metal To Metal Seat Construction.....	525.58	67.77
23 05 23 00-0387	EA	4" Double Poppet Foot Valve, Metal To Metal Seat Construction.....	715.35	81.56

23 05 23 00-0388 Float Valves (23 05 23)**23 05 23 00-0389 Float Valve Assembly For Maintaining Liquid Level In Tanks (23 05 23 00-0388)****23 05 23 00-0390 Single Seat, Bronze Construction (23 05 23 00-0388)**

Note: For storage tanks, reservoirs, cooling towers and filtration plants.

23 05 23 00-0391	EA	Inlet Size 1/2", Maximum PSI 100, Single Seat Float Valve.....	225.59	24.12
23 05 23 00-0392	EA	Inlet Size 3/4", Maximum PSI 100, Single Seat Float Valve.....	258.51	28.71
23 05 23 00-0393	EA	Inlet Size 1", Maximum PSI 100, Single Seat Float Valve.....	335.95	31.00



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0394 EA Inlet Size 1-1/4", Maximum PSI 90, Single Seat Float Valve	561.54	39.04
23 05 23 00-0395 EA Inlet Size 1-1/2", Maximum PSI 90, Single Seat Float Valve	573.02	44.78
23 05 23 00-0396 Double Seat, Bronze Construction (23 05 23 00-0389)		
Note: For hot or cold water or oil to open tanks.		
23 05 23 00-0397 EA Pipe Size 1/2" Maximum PSI 150, Double Seat Float Valve.....	1,218.63	24.12
23 05 23 00-0398 EA Pipe Size 3/4" Maximum PSI 150, Double Seat Float Valve.....	1,227.82	28.71
23 05 23 00-0399 EA Pipe Size 1" Maximum PSI 150, Double Seat Float Valve.....	1,417.47	31.00
23 05 23 00-0400 EA Pipe Size 1-1/4" Maximum PSI 150, Double Seat Float Valve	1,566.55	39.04
23 05 23 00-0401 EA Pipe Size 1-1/2" Maximum PSI 150, Double Seat Float Valve	1,790.83	44.78
23 05 23 00-0402 EA Pipe Size 2" Maximum PSI 150, Double Seat Float Valve.....	2,349.56	52.81
23 05 23 00-0403 EA Pipe Size 2-1/2" Maximum PSI 150, Double Seat Float Valve	2,731.50	70.84
23 05 23 00-0404 EA Pipe Size 3" Maximum PSI 150, Double Seat Float Valve.....	3,285.70	81.41
23 05 23 00-0405 Float Valve Single Seated Balanced For Air Oil Or Water (23 05 23 00-0388)		
Note: Includes arm, ball and bracket.		
23 05 23 00-0406 Brass Body Threaded Ends (23 05 23 00-0405)		
23 05 23 00-0407 EA 1/2" Brass Body, Threaded Ends, Float Valve, Single Seated With Arm Ball And Bracket.....	237.06	31.11
23 05 23 00-0408 EA 3/4" Brass Body, Threaded Ends, Float Valve, Single Seated With Arm Ball And Bracket.....	268.05	34.56
23 05 23 00-0409 EA 1" Brass Body, Threaded Ends, Float Valve, Single Seated With Arm Ball And Bracket.....	332.31	38.23
23 05 23 00-0410 EA 1-1/4" Brass Body, Threaded Ends, Float Valve, Single Seated With Arm Ball And Bracket	531.13	61.78
23 05 23 00-0411 EA 1-1/2" Brass Body, Threaded Ends, Float Valve, Single Seated With Arm Ball And Bracket	555.92	70.39
23 05 23 00-0412 EA 2" Brass Body, Threaded Ends, Float Valve, Single Seated With Arm Ball And Bracket.....	625.41	87.26
23 05 23 00-0413 Cast Iron Body Flanged (23 05 23 00-0405)		
23 05 23 00-0414 EA 2-1/2" Cast Iron Body, Flanged, Float Valve, Single Seated With Arm Ball And Bracket.....	7,671.70	153.31
23 05 23 00-0415 EA 3" Cast Iron Body, Flanged, Float Valve, Single Seated With Arm Ball And Bracket.....	9,276.54	179.75
23 05 23 00-0416 Float Operated Valves (23 05 23 00-0388)		
23 05 23 00-0417 For Condensate Receivers Tanks And Vessels (23 05 23 00-0416)		
Note: Cast iron body, self-contained, float in-line mount.		
23 05 23 00-0418 EA 1" Inlet, Float Operated Valve, Single Seated With Arm Ball And Bracket.....	852.56	53.96
23 05 23 00-0419 For Condensate Receivers Tanks And Vessels (23 05 23 00-0416)		
Note: Cast iron body, external float tank mount, flanged.		
23 05 23 00-0420 EA 3/4" Inlet, Float Operated Valve, Single Seated With Arm Ball And Bracket.....	1,071.23	100.44
23 05 23 00-0421 Needle Valves (23 05 23)		
23 05 23 00-0422 Bronze Needle Valve (23 05 23 00-0421)		
Note: For heating and cooling applications.		
23 05 23 00-0423 EA 1/4" Needle Valve, Bronze	117.27	11.48
23 05 23 00-0424 EA 3/8" Needle Valve, Bronze	130.85	11.48
23 05 23 00-0425 EA 1/2" Needle Valve, Bronze	143.18	11.48
23 05 23 00-0426 EA 3/4" Needle Valve, Bronze	217.56	12.63
23 05 23 00-0427 EA 1" Needle Valve, Bronze	333.88	14.35
23 05 23 00-0428 Eccentric Valves With Taps (23 05 23)		
23 05 23 00-0429 Screwed Eccentric Valves With Taps (23 05 23 00-0428)		
23 05 23 00-0430 EA 1/2" Diameter Eccentric Valves With Taps, Screwed.....	533.21	11.48
23 05 23 00-0431 EA 3/4" Diameter Eccentric Valves With Taps, Screwed.....	553.72	12.63
23 05 23 00-0432 EA 1" Diameter Eccentric Valves With Taps, Screwed	701.63	14.35
23 05 23 00-0433 EA 1-1/4" Diameter Eccentric Valves With Taps, Screwed	847.52	15.28
23 05 23 00-0434 EA 1-1/2" Diameter Eccentric Valves With Taps, Screwed	920.36	17.68
23 05 23 00-0435 EA 2" Diameter Eccentric Valves With Taps, Screwed	1,081.45	20.89
23 05 23 00-0436 EA 2-1/2" Diameter Eccentric Valves With Taps, Screwed	1,652.39	28.23
23 05 23 00-0437 EA 3" Diameter Eccentric Valves With Taps, Screwed	2,017.58	32.78
23 05 23 00-0438 Flanged Eccentric Valves With Taps (23 05 23 00-0428)		
23 05 23 00-0439 EA 2-1/2" Diameter Eccentric Valves With Taps, Flanged	1,986.08	153.31
23 05 23 00-0440 EA 3" Diameter Eccentric Valves With Taps, Flanged.....	2,362.30	179.75
23 05 23 00-0441 EA 4" Diameter Eccentric Valves With Taps, Flanged.....	3,087.46	301.33
23 05 23 00-0442 EA 5" Diameter Eccentric Valves With Taps, Flanged.....	4,234.84	335.04
23 05 23 00-0443 EA 6" Diameter Eccentric Valves With Taps, Flanged.....	5,428.68	372.27
23 05 23 00-0444 EA 8" Diameter Eccentric Valves With Taps, Flanged.....	9,560.09	475.68
23 05 23 00-0445 EA 10" Diameter Eccentric Valves With Taps, Flanged.....	13,509.72	579.08
23 05 23 00-0446 EA 12" Diameter Eccentric Valves With Taps, Flanged.....	23,586.64	703.16
23 05 23 00-0447 Earthquake-Sensitive Gas Shut-Off Valve (23 05 23)		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 05 23 00-0448		0.5 PSI Threaded Earthquake Gas Shutoff Valves (23 05 23 00-0447)		
23 05 23 00-0449	EA	3/4" Diameter Threaded, 0.5 PSI Earthquake Gas Shutoff Valve	164.28	12.63
23 05 23 00-0450	EA	1" Diameter Threaded, 0.5 PSI Earthquake Gas Shutoff Valve	186.33	14.35
23 05 23 00-0451		7 PSI Threaded Earthquake Gas Shutoff Valves (23 05 23 00-0447)		
23 05 23 00-0452	EA	1-1/4" Diameter Threaded, 7 PSI Earthquake Gas Shutoff Valve	218.19	15.28
23 05 23 00-0453	EA	1-1/2" Diameter Threaded, 7 PSI Earthquake Gas Shutoff Valve	292.91	17.68
23 05 23 00-0454		60 PSI Threaded Earthquake Gas Shutoff Valves (23 05 23 00-0447)		
23 05 23 00-0455	EA	3/4" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	202.05	12.63
23 05 23 00-0456	EA	1" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	212.56	14.35
23 05 23 00-0457	EA	1-1/4" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	239.18	15.28
23 05 23 00-0458	EA	1-1/2" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	324.39	17.68
23 05 23 00-0459	EA	2" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	733.90	20.89
23 05 23 00-0460	EA	2-1/2" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	874.92	28.13
23 05 23 00-0461	EA	3" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	1,133.18	32.78
23 05 23 00-0462	EA	4" Diameter Threaded, 60 PSI Earthquake Gas Shutoff Valve	1,312.94	37.00
23 05 23 00-0463		60 PSI Flanged Earthquake Gas Shutoff Valves (23 05 23 00-0447)		
23 05 23 00-0464	EA	2" Flanged, 60 PSI Earthquake Gas Shutoff Valve	1,030.72	153.06
23 05 23 00-0465	EA	3" Flanged, 60 PSI Earthquake Gas Shutoff Valve	1,268.91	179.75
23 05 23 00-0466	EA	4" Flanged, 60 PSI Earthquake Gas Shutoff Valve	1,794.04	301.33
23 05 23 00-0467	EA	6" Flanged, 60 PSI Earthquake Gas Shutoff Valve	2,932.62	372.27
23 05 23 00-0468	EA	8" Flanged, 60 PSI Earthquake Gas Shutoff Valve	7,830.37	475.68
23 05 23 00-0469		Emergency Shut-Off Valve With Fusible Link (23 05 23)		
23 05 23 00-0470		Threaded, Fusible Brass Gate Valves (Morrison Bros. 939) (23 05 23 00-0469)		
Note: Brass globe/gate valve used to shut off product flow in the event of a fire. Fusible element in the handwheel automatically closes the valve when in contact with 165° F.				
23 05 23 00-0471	EA	1/4" Diameter Threaded, Fusible Brass Gate Valve (Morrison Bros. 939 Series)	83.36	18.49
For Work In Restricted Working Space, Add			10.03	
23 05 23 00-0472	EA	3/8" Diameter Threaded, Fusible Brass Gate Valve (Morrison Bros. 939 Series)	85.16	19.51
For Work In Restricted Working Space, Add			10.57	
23 05 23 00-0473	EA	1/2" Diameter Threaded, Fusible Brass Gate Valve (Morrison Bros. 939 Series)	139.78	18.49
For Work In Restricted Working Space, Add			11.11	
23 05 23 00-0474	EA	3/4" Diameter Threaded, Fusible Brass Gate Valve (Morrison Bros. 939 Series)	278.06	24.91
For Work In Restricted Working Space, Add			14.98	
23 05 23 00-0475	EA	1" Diameter Threaded, Fusible Brass Gate Valve (Morrison Bros. 939 Series)	707.22	30.20
For Work In Restricted Working Space, Add			18.13	
23 05 23 00-0476		Threaded, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI) (23 05 23 00-0469)		
Note: Ductile iron body, cap, seat and swing arm. Viton® encapsulated Teflon® o-ring, Teflon® gasket, and stainless steel spring.				
23 05 23 00-0477	EA	1-1/2" Diameter Threaded, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI)	535.07	17.68
23 05 23 00-0478	EA	2" Diameter Threaded, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI)	576.33	20.89
23 05 23 00-0479	EA	3" Diameter Threaded, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI)	969.29	32.78
23 05 23 00-0480		Flanged, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI) (23 05 23 00-0469)		
Note: Ductile iron body, cap, seat and swing arm. Viton® encapsulated Teflon® o-ring, Teflon® gasket, and stainless steel spring.				
23 05 23 00-0481	EA	2" Diameter Flanged, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI)	672.82	153.06
23 05 23 00-0482	EA	3" Diameter Flanged, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI)	1,087.82	179.75
23 05 23 00-0483	EA	4" Diameter Flanged, Ductile Iron Emergency Gas Shutoff Valves (Morrison Bros. 346-DI)	2,475.49	301.33
23 05 23 00-0484		Check Valves (23 05 23)		
23 05 23 00-0485		Iron Body Wafer Type Check Valve (23 05 23 00-0484)		
23 05 23 00-0486		Single Disk Type (23 05 23 00-0485)		
23 05 23 00-0487	EA	2" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB	474.94	153.12
For 300 LB Rating, Add			85.05	
For 300 LB Rating, Cast Steel, Weld End, Wedge, Add			165.86	
For 200 LB Rating, Add			70.88	
For 150 LB Rating, Add			59.54	
23 05 23 00-0488	EA	2-1/2" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB	563.78	153.40
For 300 LB Rating, Add			111.43	
For 300 LB Rating, Cast Steel, Weld End, Wedge, Add			205.62	
For 200 LB Rating, Add			92.86	
For 150 LB Rating, Add			78.00	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0489 EA 3" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	694.58 140.85 256.29 117.38 98.60	179.85
23 05 23 00-0490 EA 4" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	1,013.73 190.77 361.72 158.98 133.54	301.50
23 05 23 00-0491 EA 6" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	1,524.99 298.81 554.01 249.01 209.17	423.17
23 05 23 00-0492 EA 8" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	2,134.64 458.56 809.06 382.14 320.99	486.64
23 05 23 00-0493 EA 10" Check Valve, Single Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	3,187.34 732.41 1,247.81 610.35 512.69	592.43
23 05 23 00-0494 Twin Disc Type <small>(23 05 23 00-0485)</small>		
23 05 23 00-0495 EA 2" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	648.33 137.07 243.89 114.22 95.95	153.12
23 05 23 00-0496 EA 2-1/2" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	740.66 164.50 285.21 137.08 115.15	153.40
23 05 23 00-0497 EA 3" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	864.84 191.93 332.91 159.94 134.35	179.85
23 05 23 00-0498 EA 4" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	1,190.28 243.74 441.17 203.11 170.61	301.50
23 05 23 00-0499 EA 6" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	1,839.05 393.03 695.34 327.53 275.12	423.17
23 05 23 00-0500 EA 8" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	2,605.27 600.23 1,021.24 500.19 420.16	486.64
23 05 23 00-0501 EA 10" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	3,909.41 950.57 1,574.03 792.15 665.40	581.85
23 05 23 00-0502 EA 12" Check Valve, Twin Disc Type, Iron Body Wafer Type, 125 LB <i>For 300 LB Rating, Add</i> <i>For 300 LB Rating, Cast Steel, Weld End, Wedge, Add</i> <i>For 200 LB Rating, Add</i> <i>For 150 LB Rating, Add</i>	5,141.75 1,273.56 2,089.65 1,061.30 891.49	719.38
23 05 23 00-0503 Lift Check Valves <small>(23 05 23 00-0484)</small>		
23 05 23 00-0504 Bronze Body, Threaded, Vertical Lift Check Valves <small>(23 05 23 00-0503)</small> Note: Watts #600 series.		
23 05 23 00-0505 EA 3/8" Lift Check Valve, Bronze, Threaded	120.65	11.48
23 05 23 00-0506 EA 1/2" Lift Check Valve, Bronze, Threaded	127.67	11.48
23 05 23 00-0507 EA 3/4" Lift Check Valve, Bronze, Threaded	162.80	12.05
23 05 23 00-0508 EA 1" Lift Check Valve, Bronze, Threaded	214.48	12.05
23 05 23 00-0509 EA 1-1/4" Lift Check Valve, Bronze, Threaded	297.36	15.28
23 05 23 00-0510 EA 1-1/2" Lift Check Valve, Bronze, Threaded	361.73	17.68
23 05 23 00-0511 EA 2" Lift Check Valve, Bronze, Threaded	515.47	20.89
23 05 23 00-0512 Bronze Body, Threaded, 300 LB, Lift Check Valves <small>(23 05 23 00-0503)</small> Note: Crane 366E.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 23 00-0513	EA	1/2" Lift Check Valve, Bronze, Threaded, 300 LB.....	746.90	11.48
23 05 23 00-0514	EA	3/4" Lift Check Valve, Bronze, Threaded, 300 LB.....	907.27	12.05
23 05 23 00-0515	EA	1" Lift Check Valve, Bronze, Threaded, 300 LB.....	1,627.68	12.05
23 05 23 00-0516	EA	1-1/4" Lift Check Valve, Bronze, Threaded, 300 LB.....	2,169.28	15.28
23 05 23 00-0517	EA	1-1/2" Lift Check Valve, Bronze, Threaded, 300 LB.....	2,356.23	17.68
23 05 23 00-0518	EA	2" Lift Check Valve, Bronze, Threaded, 300 LB.....	3,026.79	20.89

23 05 23 00-0519 Iron Body, Flanged, 125 LB Vertical Lift Check Valves (23 05 23 00-0503)
Note: Mueller 105MAP.

23 05 23 00-0520	EA	2" Lift Check Valve, Iron Body, Flanged, 125 LB.....	1,091.22	153.06
23 05 23 00-0521	EA	2-1/2" Lift Check Valve, Iron Body, Flanged, 125 LB.....	1,636.37	153.31
23 05 23 00-0522	EA	3" Lift Check Valve, Iron Body, Flanged, 125 LB.....	1,782.06	179.75
23 05 23 00-0523	EA	4" Lift Check Valve, Iron Body, Flanged, 125 LB.....	2,470.13	301.33
23 05 23 00-0524	EA	5" Lift Check Valve, Iron Body, Flanged, 125 LB.....	3,109.94	335.04
23 05 23 00-0525	EA	6" Lift Check Valve, Iron Body, Flanged, 125 LB.....	3,839.09	372.27
23 05 23 00-0526	EA	8" Lift Check Valve, Iron Body, Flanged, 125 LB.....	6,762.82	475.68
23 05 23 00-0527	EA	10" Lift Check Valve, Iron Body, Flanged, 125 LB.....	8,494.62	579.08
23 05 23 00-0528	EA	12" Lift Check Valve, Iron Body, Flanged, 125 LB.....	13,805.77	703.16
23 05 23 00-0529	EA	14" Lift Check Valve, Iron Body, Flanged, 125 LB.....	18,867.85	1,002.73
23 05 23 00-0530	EA	16" Lift Check Valve, Iron Body, Flanged, 125 LB.....	20,908.86	1,103.01

23 05 23 00-0531 Bronze Body Swing Check Valves (23 05 23 00-0484)**23 05 23 00-0532 Bronze Body, Threaded, Brazed Or Soldered Installation, 125 LB, Swing Check Valves (23 05 23 00-0531)**

23 05 23 00-0533	EA	1/8" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	81.91	11.48
		<i>For 300 LB Rating, Add</i>	17.50	
		<i>For Work In Restricted Working Space, Add</i>	11.11	
23 05 23 00-0534	EA	1/4" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	78.30	11.48
		<i>For 300 LB Rating, Add</i>	17.50	
		<i>For Work In Restricted Working Space, Add</i>	10.03	
23 05 23 00-0535	EA	3/8" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	80.06	11.48
		<i>For 300 LB Rating, Add</i>	17.50	
		<i>For Work In Restricted Working Space, Add</i>	10.56	
23 05 23 00-0536	EA	1/2" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	83.66	11.48
		<i>For 300 LB Rating, Add</i>	18.18	
		<i>For Work In Restricted Working Space, Add</i>	11.11	
23 05 23 00-0537	EA	3/4" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	106.41	12.05
		<i>For 300 LB Rating, Add</i>	22.03	
		<i>For Work In Restricted Working Space, Add</i>	14.98	
23 05 23 00-0538	EA	1" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	137.14	12.05
		<i>For 300 LB Rating, Add</i>	29.92	
		<i>For Work In Restricted Working Space, Add</i>	18.13	
23 05 23 00-0539	EA	1-1/4" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	184.22	15.28
		<i>For 300 LB Rating, Add</i>	41.99	
		<i>For Work In Restricted Working Space, Add</i>	22.97	
23 05 23 00-0540	EA	1-1/2" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	239.10	17.68
		<i>For 300 LB Rating, Add</i>	58.80	
		<i>For Work In Restricted Working Space, Add</i>	26.50	
23 05 23 00-0541	EA	2" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	298.24	20.89
		<i>For 300 LB Rating, Add</i>	75.61	
		<i>For Work In Restricted Working Space, Add</i>	31.31	
23 05 23 00-0542	EA	2-1/2" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	586.63	28.23
		<i>For 300 LB Rating, Add</i>	173.80	
		<i>For Work In Restricted Working Space, Add</i>	42.29	
23 05 23 00-0543	EA	3" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	796.49	32.78
		<i>For 300 LB Rating, Add</i>	247.19	
		<i>For Work In Restricted Working Space, Add</i>	48.80	
23 05 23 00-0544	EA	4" Swing Check Valve, Bronze, Threaded, Brazed Or Soldered, 125 LB.....	902.27	37.00
		<i>For 300 LB Rating, Add</i>	279.72	
		<i>For Work In Restricted Working Space, Add</i>	55.51	

23 05 23 00-0545 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves (23 05 23 00-0484)

23 05 23 00-0546	EA	1" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves.....	520.03	86.11
		<i>For 150 LB Rating, Add</i>	279.96	
		<i>For 250 LB Rating, Add</i>	535.22	
		<i>For Work In Restricted Working Space, Add</i>	32.50	
23 05 23 00-0547	EA	1-1/4" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves.....	578.38	100.46
		<i>For 150 LB Rating, Add</i>	308.43	
		<i>For 250 LB Rating, Add</i>	589.65	
		<i>For Work In Restricted Working Space, Add</i>	37.44	
23 05 23 00-0548	EA	1-1/2" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves.....	643.04	120.56
		<i>For 150 LB Rating, Add</i>	334.53	
		<i>For 250 LB Rating, Add</i>	639.55	
		<i>For Work In Restricted Working Space, Add</i>	45.32	
23 05 23 00-0549	EA	2" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves.....	802.37	153.06
		<i>For 150 LB Rating, Add</i>	415.49	
		<i>For 250 LB Rating, Add</i>	794.31	
		<i>For Work In Restricted Working Space, Add</i>	57.41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0550 EA 2-1/2" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	905.32 484.89 927.00 57.67	153.31
23 05 23 00-0551 EA 3" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	999.87 526.94 1,007.38 67.49	179.75
23 05 23 00-0552 EA 4" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,575.19 814.35 1,556.84 113.29	301.33
23 05 23 00-0553 EA 5" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,176.43 1,195.62 2,285.75 125.45	335.04
23 05 23 00-0554 EA 6" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,505.63 1,386.27 2,650.22 140.10	372.27
23 05 23 00-0555 EA 8" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	5,680.60 3,461.00 6,616.62 177.27	475.68
23 05 23 00-0556 EA 10" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	7,652.02 4,711.16 9,006.63 217.15	579.08
23 05 23 00-0557 EA 12" 125 LB Flanged, Iron Body, Bronze Trim, Swing Check Valves..... <i>For 150 LB Rating, Add</i> <i>For 250 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	11,681.56 7,346.84 14,045.42 263.22	703.16
23 05 23 00-0558 Plastic Check Valve <small>(23 05 23 00-0484)</small>		
23 05 23 00-0559 Polyvinyl Chloride (PVC) Check Valve <small>(23 05 23 00-0558)</small>		
23 05 23 00-0560 Polyvinyl Chloride (PVC) "Y" Check Valve <small>(23 05 23 00-0559)</small>		
23 05 23 00-0561 EA 1/2" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	95.06	11.48
23 05 23 00-0562 EA 3/4" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	112.22	12.63
23 05 23 00-0563 EA 1" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	128.81	14.35
23 05 23 00-0564 EA 1-1/4" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	184.04	15.28
23 05 23 00-0565 EA 1-1/2" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	204.77	17.68
23 05 23 00-0566 EA 2" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	337.55	19.24
23 05 23 00-0567 EA 2-1/2" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	428.62	28.23
23 05 23 00-0568 EA 3" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	469.22	32.78
23 05 23 00-0569 EA 4" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Threaded Or Socket.....	686.65	37.00
23 05 23 00-0570 EA 3" Polyvinyl Chloride (PVC) "Y" Type Check Valve, Flanged.....	654.92	179.75
23 05 23 00-0571 Polyvinyl Chloride (PVC) True Union Ball Check Valve <small>(23 05 23 00-0559)</small>		
23 05 23 00-0572 Valves <small>(23 05 23 00-0571)</small>		
23 05 23 00-0573 EA 1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	71.87	11.48
23 05 23 00-0574 EA 3/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	89.73	12.63
23 05 23 00-0575 EA 1" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	110.19	14.35
23 05 23 00-0576 EA 1-1/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	142.90	15.28
23 05 23 00-0577 EA 1-1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	167.94	17.68
23 05 23 00-0578 EA 2" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	248.70	20.89
23 05 23 00-0579 EA 3" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	408.05	28.23
23 05 23 00-0580 EA 4" Polyvinyl Chloride (PVC) True Union Ball Check Valve.....	698.46	32.78
23 05 23 00-0581 Foot Valve Screen <small>(23 05 23 00-0571)</small>		
Note: For use with PVC true union ball check valves above.		
23 05 23 00-0582 EA 1/2" Foot Valve Screen Option.....	59.16	
23 05 23 00-0583 EA 3/4" Foot Valve Screen Option.....	70.74	
23 05 23 00-0584 EA 1" Foot Valve Screen Option.....	81.97	
23 05 23 00-0585 EA 1-1/4" Foot Valve Screen Option.....	123.75	
23 05 23 00-0586 EA 1-1/2" Foot Valve Screen Option.....	136.92	
23 05 23 00-0587 EA 2" Foot Valve Screen Option.....	148.15	
23 05 23 00-0588 EA 2-1/2" Foot Valve Screen Option.....	176.76	
23 05 23 00-0589 EA 3" Foot Valve Screen Option.....	205.38	
23 05 23 00-0590 EA 4" Foot Valve Screen Option.....	249.26	
23 05 23 00-0591 Hayward "True Check" With VITON Seals <small>(23 05 23 00-0571)</small>		
23 05 23 00-0592 EA 1/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	64.95	11.48
23 05 23 00-0593 EA 3/8" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	66.71	11.48
23 05 23 00-0594 EA 1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	72.70	11.48
23 05 23 00-0595 EA 3/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	89.65	12.63
23 05 23 00-0596 EA 1" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	111.36	14.35

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0597	EA		1-1/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	142.82	15.28
23 05 23 00-0598	EA		1-1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	172.92	17.68
23 05 23 00-0599	EA		2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	217.18	20.89
23 05 23 00-0600	EA		2-1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	403.07	28.23
23 05 23 00-0601	EA		3" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	441.35	32.78
23 05 23 00-0602	EA		4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	700.09	37.00
23 05 23 00-0603			Hayward "True Check" With Ethylene Propylene Diene Monomer (EPDM)		
			Seals <small>(23 05 23 00-0571)</small>		
23 05 23 00-0604	EA		1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	68.56	11.48
23 05 23 00-0605	EA		3/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	85.58	12.63
23 05 23 00-0606	EA		1" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	105.72	14.35
23 05 23 00-0607	EA		1-1/4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	136.68	15.28
23 05 23 00-0608	EA		1-1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	161.64	17.68
23 05 23 00-0609	EA		2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	207.23	20.89
23 05 23 00-0610	EA		2-1/2" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	388.14	28.23
23 05 23 00-0611	EA		3" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	428.91	32.78
23 05 23 00-0612	EA		4" Polyvinyl Chloride (PVC) True Union Ball Check Valve, Socket Or Threaded.....	681.01	37.00
23 05 23 00-0613			Polyvinyl Chloride (PVC) Check Valve, Ethylene Propylene Diene Monomer (EPDM) Housing, Flanged <small>(23 05 23 00-0559)</small>		
23 05 23 00-0614	EA		1" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	343.75	68.90
23 05 23 00-0615	EA		1-1/4" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	374.33	80.37
23 05 23 00-0616	EA		1-1/2" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	410.83	100.46
23 05 23 00-0617	EA		2" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	500.57	126.30
23 05 23 00-0618	EA		2-1/2" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	604.43	126.95
23 05 23 00-0619	EA		3" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	826.70	148.10
23 05 23 00-0620	EA		4" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	1,140.80	251.25
23 05 23 00-0621	EA		6" Thermoplastic Check Valve, Polyvinyl Chloride (PVC) With Ethylene Propylene Diene Monomer (EPDM) Housing.....	1,873.81	423.17
23 05 23 00-0622			Swing Check Valves, 150 LB Polyvinyl Chloride (PVC) Socket Weld End Connections <small>(23 05 23 00-0558)</small>		
23 05 23 00-0623	EA		1/2" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	83.63	11.48
			<i>For Work In Restricted Working Space, Add</i>	11.11	
23 05 23 00-0624	EA		3/4" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	96.51	12.63
			<i>For Work In Restricted Working Space, Add</i>	14.98	
23 05 23 00-0625	EA		1" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	108.85	14.35
			<i>For Work In Restricted Working Space, Add</i>	18.13	
23 05 23 00-0626	EA		1-1/4" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	126.98	15.28
			<i>For Work In Restricted Working Space, Add</i>	22.97	
23 05 23 00-0627	EA		1-1/2" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	141.67	17.68
			<i>For Work In Restricted Working Space, Add</i>	26.50	
23 05 23 00-0628	EA		2" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	187.32	20.89
			<i>For Work In Restricted Working Space, Add</i>	31.31	
23 05 23 00-0629	EA		2-1/2" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	259.06	28.23
			<i>For Work In Restricted Working Space, Add</i>	42.29	
23 05 23 00-0630	EA		3" Check Valve, Duplex Polyvinyl Chloride (PVC), Socket Weld, 150 LB.....	315.90	32.78
			<i>For Work In Restricted Working Space, Add</i>	48.80	
23 05 23 00-0631			Polyvinyl Chloride (PVC) Body, Swing Check Valves <small>(23 05 23 00-0558)</small>		
23 05 23 00-0632			Polyvinyl Chloride (PVC) Body, Swing Check Valves With Ethylene Propylene Diene Monomer (EPDM) Seals <small>(23 05 23 00-0631)</small>		
23 05 23 00-0633	EA		3" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals.....	651.62	148.02
			<i>For Work In Restricted Working Space, Add</i>	56.64	
23 05 23 00-0634	EA		4" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals.....	828.53	251.11
			<i>For Work In Restricted Working Space, Add</i>	93.29	
23 05 23 00-0635	EA		6" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals.....	1,336.47	310.22
			<i>For Work In Restricted Working Space, Add</i>	127.74	
23 05 23 00-0636	EA		8" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals.....	1,784.39	392.94
			<i>For Work In Restricted Working Space, Add</i>	144.77	
23 05 23 00-0637			Polyvinyl Chloride (PVC) Body, Swing Check Valves With Viton Seals <small>(23 05 23 00-0631)</small>		
23 05 23 00-0638	EA		3" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals.....	771.05	148.02
			<i>For Work In Restricted Working Space, Add</i>	56.64	
23 05 23 00-0639	EA		4" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals.....	1,092.27	251.11
			<i>For Work In Restricted Working Space, Add</i>	93.29	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0640 EA 6" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals <i>For Work In Restricted Working Space, Add</i>	1,586.29 127.74	310.22
23 05 23 00-0641 EA 8" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals <i>For Work In Restricted Working Space, Add</i>	2,082.97 144.77	392.94
23 05 23 00-0642 Polyvinyl Chloride (PVC) Body, Swing Check Valves With Ethylene Propylene Diene Monomer (EPDM) Seals And Counter Weights <small>(23 05 23 00-0631)</small>		
23 05 23 00-0643 EA 3" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals And Counter weights <i>For Work In Restricted Working Space, Add</i>	802.57 56.64	148.02
23 05 23 00-0644 EA 4" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals And Counter weights <i>For Work In Restricted Working Space, Add</i>	1,094.76 93.29	251.11
23 05 23 00-0645 EA 6" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals And Counter weights <i>For Work In Restricted Working Space, Add</i>	1,475.81 127.74	310.22
23 05 23 00-0646 EA 8" Polyvinyl Chloride (PVC) Swing Check Valve, With Ethylene Propylene Diene Monomer (EPDM) Seals And Counter weights <i>For Work In Restricted Working Space, Add</i>	1,899.18 144.77	392.94
23 05 23 00-0647 Polyvinyl Chloride (PVC) Body, Swing Check Valves With Viton Seals And Counter Weights <small>(23 05 23 00-0631)</small>		
23 05 23 00-0648 EA 3" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals And Counter Weights <i>For Work In Restricted Working Space, Add</i>	902.09 56.64	148.02
23 05 23 00-0649 EA 4" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals And Counter Weights <i>For Work In Restricted Working Space, Add</i>	1,239.91 93.29	251.11
23 05 23 00-0650 EA 6" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals And Counter Weights <i>For Work In Restricted Working Space, Add</i>	1,683.16 127.74	310.22
23 05 23 00-0651 EA 8" Polyvinyl Chloride (PVC) Swing Check Valve, With Viton Seals And Counter Weights <i>For Work In Restricted Working Space, Add</i>	2,148.00 144.77	392.94
23 05 23 00-0652 Diaphragm Valves <small>(23 05 23)</small>		
23 05 23 00-0653 Polytetrafluoroethylene (PTFE) Or Viton Lined, Threaded Cast Iron Diaphragm Valves <small>(23 05 23 00-0652)</small>		
23 05 23 00-0654 EA 1/2" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	284.36 56.64	34.36
23 05 23 00-0655 EA 3/4" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	365.61 93.29	38.06
23 05 23 00-0656 EA 1" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	395.39 127.74	47.05
23 05 23 00-0657 EA 1-1/2" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	628.46 127.74	70.31
23 05 23 00-0658 EA 2" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	1,017.15 144.77	84.58
23 05 23 00-0659 Polytetrafluoroethylene (PTFE) Or Viton Lined, Flanged Cast Iron Diaphragm Valves <small>(23 05 23 00-0652)</small>		
23 05 23 00-0660 EA 1/2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	375.06 56.64	55.11
23 05 23 00-0661 EA 3/4" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	438.87 93.29	57.41
23 05 23 00-0662 EA 1" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	515.29 127.74	86.11
23 05 23 00-0663 EA 1-1/2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	784.12 127.74	120.56
23 05 23 00-0664 EA 2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	1,263.69 127.74	153.06
23 05 23 00-0665 EA 2-1/2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	1,631.20 127.74	153.31
23 05 23 00-0666 EA 3" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	2,030.47 127.74	179.75
23 05 23 00-0667 EA 4" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	2,856.16 127.74	301.33
23 05 23 00-0668 EA 6" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	6,019.83 127.74	372.27
23 05 23 00-0669 EA 8" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Polytetrafluoroethylene (PTFE) or Viton Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	9,396.32 144.77	475.68
23 05 23 00-0670 Ethylene Propylene Diene Monomer (EPDM) Lined, Threaded Cast Iron Diaphragm Valves <small>(23 05 23 00-0652)</small>		
23 05 23 00-0671 EA 1/2" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	172.09 56.64	34.36
23 05 23 00-0672 EA 3/4" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	226.73 93.29	38.06
23 05 23 00-0673 EA 1" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated <i>For Work In Restricted Working Space, Add</i>	256.51 127.74	47.05

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0674	EA		1-1/2" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	439.34	70.31
23 05 23 00-0675	EA		2" Diaphragm Valve, Cast Iron, 150 LB, Threaded, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	576.88	84.58
23 05 23 00-0676			Ethylene Propylene Diene Monomer (EPDM) Lined, Flanged Cast Iron Diaphragm Valves <small>(23 05 23 00-0652)</small>		
23 05 23 00-0677	EA		1/2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	246.54	55.11
23 05 23 00-0678	EA		3/4" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	287.09	57.41
23 05 23 00-0679	EA		1" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	363.49	86.11
23 05 23 00-0680	EA		1-1/2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	577.43	120.56
23 05 23 00-0681	EA		2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	782.42	153.06
23 05 23 00-0682	EA		2-1/2" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	962.86	153.31
23 05 23 00-0683	EA		3" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	1,174.56	179.75
23 05 23 00-0684	EA		4" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	1,847.23	301.33
23 05 23 00-0685	EA		6" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	3,759.47	372.27
23 05 23 00-0686	EA		8" Diaphragm Valve, Cast Iron, 150 LB, Flanged, Ethylene Propylene Diene Monomer (EPDM) Lined, Hand Wheel Operated	5,811.19	475.68
23 05 23 00-0687			125 LB, Hand Wheel Operated, Flanged Cast Iron Diaphragm Valves <small>(23 05 23 00-0652)</small>		
23 05 23 00-0688	EA		1" Diaphragm Valve, Cast Iron, 125 LB, Flanged	469.57	86.11
23 05 23 00-0689	EA		1-1/2" Diaphragm Valve, Cast Iron, 125 LB, Flanged	767.33	120.56
23 05 23 00-0690	EA		2" Diaphragm Valve, Cast Iron, 125 LB, Flanged	1,036.03	153.06
23 05 23 00-0691	EA		2-1/2" Diaphragm Valve, Cast Iron, 125 LB, Flanged	1,509.70	153.31
23 05 23 00-0692	EA		3" Diaphragm Valve, Cast Iron, 125 LB, Flanged	1,664.59	179.75
23 05 23 00-0693	EA		4" Diaphragm Valve, Cast Iron, 125 LB, Flanged	2,603.48	301.33
23 05 23 00-0694	EA		6" Diaphragm Valve, Cast Iron, 125 LB, Flanged	5,301.20	372.27
23 05 23 00-0695	EA		8" Diaphragm Valve, Cast Iron, 125 LB, Flanged	11,119.83	475.68
23 05 23 00-0696			Solenoid Valves <small>(23 05 23)</small>		
23 05 23 00-0697			Bronze Body Solenoid Valves, 150 PSI Maximum Water Pressure <small>(23 05 23 00-0696)</small>		
23 05 23 00-0698	EA		1/4" Solenoid Valve, Bronze, 150 PSI, Water	135.34	11.48
23 05 23 00-0699	EA		1/2" Solenoid Valve, Bronze, 150 PSI, Water	157.20	11.48
23 05 23 00-0700	EA		3/4" Solenoid Valve, Bronze, 150 PSI, Water	201.03	12.63
23 05 23 00-0701	EA		1" Solenoid Valve, Bronze, 150 PSI, Water	297.11	14.35
23 05 23 00-0702	EA		1-1/2" Solenoid Valve, Bronze, 150 PSI, Water	525.26	17.68
23 05 23 00-0703	EA		2" Solenoid Valve, Bronze, 150 PSI, Water	824.78	20.89
23 05 23 00-0704	EA		2-1/2" Solenoid Valve, Bronze, 150 PSI, Water	1,123.48	28.23
23 05 23 00-0705	EA		3" Solenoid Valve, Bronze, 150 PSI, Water	1,632.63	32.78
23 05 23 00-0706			Flow Control Valves And Meters <small>(23 05 23)</small>		
23 05 23 00-0707			Conditioned Water Balancing Valves <small>(23 05 23 00-0706)</small>		
Note: Working pressures up to 300 PSIG. Iron and bronze body construction (combination balancing, flow measuring and shut-off). Excludes portable read-out meter.					
23 05 23 00-0708	EA		1/2" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	171.92	58.58
23 05 23 00-0709	EA		3/4" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	205.54	78.11
23 05 23 00-0710	EA		1" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	1,355.70	89.25
23 05 23 00-0711	EA		1-1/4" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	1,458.67	110.28
23 05 23 00-0712	EA		1-1/2" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	1,561.90	117.17
23 05 23 00-0713	EA		2" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	1,670.19	133.94
23 05 23 00-0714	EA		2-1/2" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	2,966.08	233.17
23 05 23 00-0715	EA		3" NPT Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	2,856.68	266.49
23 05 23 00-0716	EA		3" Flanged Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	2,574.56	179.85
23 05 23 00-0717	EA		4" Flanged Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	3,574.47	301.50
23 05 23 00-0718	EA		6" Flanged Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	5,573.97	380.85
23 05 23 00-0719	EA		8" Flanged Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	7,519.70	486.64
23 05 23 00-0720	EA		10" Flanged Flow Control Valve, Iron And Bronze, Water Balancing Valve With Pressures Up To 300 PSIG	10,737.97	592.43
23 05 23 00-0721			Balancing Valves <small>(23 05 23)</small>		
23 05 23 00-0722			Balancing Valves With Lever <small>(23 05 23 00-0721)</small>		
Note: DeZurik PEC eccentric, non-lubricated plug valves, cast iron high temperature faced plug, nickel seats, buna vee packing, bronze bearings with integral gage taps and schrader fittings for metering connections.					
23 05 23 00-0723	EA		1/2" Threaded Balancing Valve With Lever	341.18	36.18
23 05 23 00-0724	EA		3/4" Threaded Balancing Valve With Lever	372.02	47.67
23 05 23 00-0725	EA		1" Threaded Balancing Valve With Lever	562.54	54.56



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 23 00-0726 EA 1-1/4" Threaded Balancing Valve With Lever	606.01	67.77
23 05 23 00-0727 EA 1-1/2" Threaded Balancing Valve With Lever	636.44	71.79
23 05 23 00-0728 EA 2" Threaded Balancing Valve With Lever	781.22	82.13
23 05 23 00-0729 EA 2-1/2" Flanged Balancing Valve With Lever.....	1,047.54	153.40
23 05 23 00-0730 EA 3" Flanged Balancing Valve With Lever.....	1,052.09	179.85
23 05 23 00-0731 EA 4" Flanged Balancing Valve With Lever.....	1,317.61	301.50
23 05 23 00-0732 EA 5" Flanged Balancing Valve With Lever.....	3,910.21	342.77
23 05 23 00-0733 EA 6" Flanged Balancing Valve With Lever.....	1,934.43	380.85
23 05 23 00-0734 EA 8" Flanged Balancing Valve With Lever.....	2,558.22	486.64
23 05 23 00-0735 Balancing Valves With Nut <small>(23 05 23 00-0721)</small>		
<small>Note: DeZurik PEC eccentric, non-lubricated plug valves, cast iron high temperature faced plug, nickel seats, buna vee packing, bronze bearings with integral gage taps and schrader fittings for metering connections.</small>		
23 05 23 00-0736 EA 4" Flanged Balancing Valve With Nut	1,317.61	301.50
23 05 23 00-0737 EA 5" Flanged Balancing Valve With Nut	3,910.21	342.77
23 05 23 00-0738 EA 6" Flanged Balancing Valve With Nut	1,934.43	380.85
23 05 23 00-0739 EA 8" Flanged Balancing Valve With Nut	2,558.22	486.64
23 05 23 00-0740 Balancing Valves With Hand Wheel <small>(23 05 23 00-0721)</small>		
<small>Note: DeZurik PEC eccentric, non-lubricated plug valves, cast iron high temperature faced plug, nickel seats, buna vee packing, bronze bearings with integral gage taps and schrader fittings for metering connections.</small>		
23 05 23 00-0741 EA 4" Flanged Balancing Valve With Hand Wheel	1,792.72	301.50
23 05 23 00-0742 EA 5" Flanged Balancing Valve With Hand Wheel	4,412.47	342.77
23 05 23 00-0743 EA 6" Flanged Balancing Valve With Hand Wheel	2,437.73	380.85
23 05 23 00-0744 EA 8" Flanged Balancing Valve With Hand Wheel	3,451.01	486.64
23 05 23 00-0745 EA 10" Flanged Balancing Valve With Hand Wheel.....	5,306.83	592.43
23 05 23 00-0746 EA 12" Flanged Balancing Valve With Hand Wheel.....	6,953.02	481.27
23 05 23 00-0747 EA 14" Flanged Balancing Valve With Hand Wheel.....	9,088.99	907.42
23 05 23 00-0748 Balancing Valves With Chain Wheel <small>(23 05 23 00-0721)</small>		
<small>Note: DeZurik PEC eccentric, non-lubricated plug valves, cast iron high temperature faced plug, nickel seats, buna vee packing, bronze bearings with integral gage taps and schrader fittings for metering connections.</small>		
23 05 23 00-0749 EA 4" Flanged Balancing Valve With Chain Wheel	2,065.26	301.50
23 05 23 00-0750 EA 5" Flanged Balancing Valve With Chain Wheel	4,680.83	342.77
23 05 23 00-0751 EA 6" Flanged Balancing Valve With Chain Wheel	2,705.05	380.85
23 05 23 00-0752 EA 8" Flanged Balancing Valve With Chain Wheel	3,779.93	486.64
23 05 23 00-0753 EA 10" Flanged Balancing Valve With Chain Wheel	5,626.35	592.43
23 05 23 00-0754 EA 12" Flanged Balancing Valve With Chain Wheel	7,549.53	480.93
23 05 23 00-0755 EA 14" Flanged Balancing Valve With Chain Wheel	9,628.84	907.42
23 05 23 00-0756 Calibrated Balancing Valves <small>(23 05 23 00-0721)</small>		
<small>Note: Bell & Gossett CB Series.</small>		
23 05 23 00-0757 EA 1/2" Brazed Or Soldered Calibrated Balancing Valve (CB-1/2S).....	142.41	11.48
23 05 23 00-0758 EA 3/4" Brazed Or Soldered Calibrated Balancing Valve (CB-3/4S).....	167.12	12.63
23 05 23 00-0759 EA 1" Brazed Or Soldered Calibrated Balancing Valve (CB-1S).....	188.91	14.35
23 05 23 00-0760 EA 1-1/4" Brazed Or Soldered Calibrated Balancing Valve (CB-1-1/4S).....	264.39	15.28
23 05 23 00-0761 EA 1-1/2" Brazed Or Soldered Calibrated Balancing Valve (CB-1-1/2S).....	310.41	17.69
23 05 23 00-0762 EA 2" Brazed Or Soldered Calibrated Balancing Valve (CB-2S).....	416.91	20.90
23 05 23 00-0763 EA 1" Threaded Calibrated Balancing Valve (CB-1).....	217.22	14.35
23 05 23 00-0764 EA 1-1/4" Threaded Calibrated Balancing Valve (CB-1-1/4).....	296.11	15.28
23 05 23 00-0765 EA 1-1/2" Threaded Calibrated Balancing Valve (CB-1-1/2).....	331.44	17.69
23 05 23 00-0766 EA 2" Threaded Calibrated Balancing Valve (CB-2).....	446.47	20.90
23 05 23 00-0767 EA 2-1/2" Threaded Calibrated Balancing Valve (CB-2-1/2).....	628.70	30.67
23 05 23 00-0768 EA 3" Threaded Calibrated Balancing Valve (CB-3).....	1,098.12	35.61
23 05 23 00-0769 EA 2-1/2" Flanged Calibrated Balancing Valve (CB-2-1/2F).....	1,035.38	166.56
23 05 23 00-0770 EA 3" Flanged Calibrated Balancing Valve (CB-3F).....	1,801.51	195.28
23 05 23 00-0771 EA 4" Flanged Calibrated Balancing Valve (CB-4F).....	2,702.95	327.37
23 05 23 00-0772 EA 5" Flanged Calibrated Balancing Valve (CB-5F).....	3,731.92	372.17
23 05 23 00-0773 EA 6" Flanged Calibrated Balancing Valve (CB-6F).....	4,728.84	413.52
23 05 23 00-0774 EA 8" Flanged Calibrated Balancing Valve (CB-8F).....	7,489.93	528.38
23 05 23 00-0775 EA 10" Flanged Calibrated Balancing Valve (CB-10F).....	12,298.07	635.19
23 05 23 00-0776 EA 12" Flanged Calibrated Balancing Valve (CB-12F).....	26,006.10	771.30
23 05 23 00-0777 EA 4" Grooved Calibrated Balancing Valve (CB-4G).....	3,110.60	39.54
23 05 23 00-0778 EA 5" Grooved Calibrated Balancing Valve (CB-5G).....	3,610.63	52.74
23 05 23 00-0779 EA 6" Grooved Calibrated Balancing Valve (CB-6G).....	4,779.13	67.63
23 05 23 00-0780 EA 8" Grooved Calibrated Balancing Valve (CB-8G).....	8,963.88	85.83
23 05 23 00-0781 EA 10" Grooved Calibrated Balancing Valve (CB-10G).....	14,306.88	96.17
23 05 23 00-0782 EA 12" Grooved Calibrated Balancing Valve (CB-12G).....	29,496.49	117.26
23 05 23 00-0783 Butterfly Valves <small>(23 05 23)</small>		
23 05 23 00-0784 Cast Iron Body, Iron Disc, 150 PSI, Wafer Type, Butterfly Valves <small>(23 05 23 00-0783)</small>		
<small>Note: With on-off handle</small>		
23 05 23 00-0785 EA 2" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	428.98	153.06
<small>For 200 PSI, Add</small>	<small>114.06</small>	
<small>For Work In Restricted Working Space, Add</small>	<small>57.41</small>	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 23 General-Duty Valves For HVAC Piping**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 23 00-0786	EA 2-1/2" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	443.67	153.31
	<i>For 200 PSI, Add</i>	120.69	
	<i>For Work In Restricted Working Space, Add</i>	57.67	
23 05 23 00-0787	EA 3" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	495.73	179.75
	<i>For 200 PSI, Add</i>	129.97	
	<i>For Work In Restricted Working Space, Add</i>	67.49	
23 05 23 00-0788	EA 4" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	717.47	301.33
	<i>For 200 PSI, Add</i>	163.13	
	<i>For Work In Restricted Working Space, Add</i>	113.29	
23 05 23 00-0789	EA 5" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	950.52	372.27
	<i>For 200 PSI, Add</i>	232.09	
	<i>For Work In Restricted Working Space, Add</i>	140.10	
23 05 23 00-0790	EA 6" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	1,108.31	413.63
	<i>For 200 PSI, Add</i>	283.81	
	<i>For Work In Restricted Working Space, Add</i>	155.11	
23 05 23 00-0791	EA 8" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	1,480.58	475.68
	<i>For 200 PSI, Add</i>	427.05	
	<i>For Work In Restricted Working Space, Add</i>	177.27	
23 05 23 00-0792	EA 10" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	2,447.95	579.08
	<i>For 200 PSI, Add</i>	827.57	
	<i>For Work In Restricted Working Space, Add</i>	217.15	
23 05 23 00-0793	EA 12" Butterfly Valve, Cast Iron, With Iron Disc, On Off Handle, 150 PSI Wafer Type.....	3,073.97	703.16
	<i>For 200 PSI, Add</i>	1,054.36	
	<i>For Work In Restricted Working Space, Add</i>	263.22	
23 05 23 00-0794	Cast Iron Body, Bronze Disc, Gear Operated, 200 LB, Lug Type, Butterfly Valves <small>(23 05 23 00-0783)</small>		
23 05 23 00-0795	EA 2" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	843.43	153.06
	<i>For Work In Restricted Working Space, Add</i>	57.41	
23 05 23 00-0796	EA 2-1/2" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	849.83	153.31
	<i>For Work In Restricted Working Space, Add</i>	57.67	
23 05 23 00-0797	EA 3" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	915.71	179.75
	<i>For Work In Restricted Working Space, Add</i>	67.49	
23 05 23 00-0798	EA 4" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	1,156.79	301.33
	<i>For Work In Restricted Working Space, Add</i>	113.29	
23 05 23 00-0799	EA 5" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	1,436.81	372.27
	<i>For Work In Restricted Working Space, Add</i>	140.10	
23 05 23 00-0800	EA 6" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	1,591.68	413.63
	<i>For Work In Restricted Working Space, Add</i>	155.11	
23 05 23 00-0801	EA 8" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	1,983.44	475.68
	<i>For Work In Restricted Working Space, Add</i>	177.27	
23 05 23 00-0802	EA 10" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	2,522.55	579.08
	<i>For Work In Restricted Working Space, Add</i>	217.15	
23 05 23 00-0803	EA 12" Butterfly Valve, Cast Iron, With Bronze Disc Gear Operated, 200 PSI.....	3,491.19	703.16
	<i>For Work In Restricted Working Space, Add</i>	263.22	
23 05 29 Hangers and Supports for HVAC Piping and Equipment <small>(23 05)</small>			
23 05 29 00-0001	Hangers And Supports <small>(23 05 29)</small>		
23 05 29 00-0002	Clevis Hangers <small>(23 05 29 00-0001)</small>		
23 05 29 00-0003	Steel Clevis Hanger (Cooper B-Line B3100) <small>(23 05 29 00-0002)</small>		
	Note: Type 1.		
23 05 29 00-0004	EA 1/2" Steel Clevis Hanger (Cooper B-Line B3100).....	20.99	9.52
	<i>For Work In Restricted Working Space, Add</i>	5.71	
23 05 29 00-0005	EA 3/4" Steel Clevis Hanger (Cooper B-Line B3100).....	23.11	10.58
	<i>For Work In Restricted Working Space, Add</i>	6.35	
23 05 29 00-0006	EA 1" Steel Clevis Hanger (Cooper B-Line B3100).....	24.29	10.58
	<i>For Work In Restricted Working Space, Add</i>	6.68	
23 05 29 00-0007	EA 1-1/4" Steel Clevis Hanger (Cooper B-Line B3100).....	25.20	11.44
	<i>For Work In Restricted Working Space, Add</i>	6.86	
23 05 29 00-0008	EA 1-1/2" Steel Clevis Hanger (Cooper B-Line B3100).....	25.46	11.44
	<i>For Work In Restricted Working Space, Add</i>	6.86	
23 05 29 00-0009	EA 2" Steel Clevis Hanger (Cooper B-Line B3100).....	26.58	11.63
	<i>For Work In Restricted Working Space, Add</i>	7.05	
23 05 29 00-0010	EA 2-1/2" Steel Clevis Hanger (Cooper B-Line B3100).....	29.19	12.05
	<i>For Work In Restricted Working Space, Add</i>	7.25	
23 05 29 00-0011	EA 3" Steel Clevis Hanger (Cooper B-Line B3100).....	31.17	12.68
	<i>For Work In Restricted Working Space, Add</i>	7.46	
23 05 29 00-0012	EA 3-1/2" Steel Clevis Hanger (Cooper B-Line B3100).....	32.58	13.93
	<i>For Work In Restricted Working Space, Add</i>	7.96	
23 05 29 00-0013	EA 4" Steel Clevis Hanger (Cooper B-Line B3100).....	35.79	14.80
	<i>For Work In Restricted Working Space, Add</i>	8.46	
23 05 29 00-0014	EA 5" Steel Clevis Hanger (Cooper B-Line B3100).....	45.92	17.71
	<i>For Work In Restricted Working Space, Add</i>	10.63	
23 05 29 00-0015	EA 6" Steel Clevis Hanger (Cooper B-Line B3100).....	55.26	21.15
	<i>For Work In Restricted Working Space, Add</i>	12.69	
23 05 29 00-0016	EA 8" Steel Clevis Hanger (Cooper B-Line B3100).....	74.35	26.44
	<i>For Work In Restricted Working Space, Add</i>	15.86	
23 05 29 00-0017	EA 10" Steel Clevis Hanger (Cooper B-Line B3100).....	108.77	35.95
	<i>For Work In Restricted Working Space, Add</i>	21.15	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0018 EA 12" Steel Clevis Hanger (Cooper B-Line B3100) <i>For Work In Restricted Working Space, Add</i>	127.53 23.79	39.65
23 05 29 00-0019 Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <small>(23 05 29 00-0002)</small>		
23 05 29 00-0020 EA 1/2" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	26.18 5.71	9.52
23 05 29 00-0021 EA 3/4" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	28.30 6.35	10.58
23 05 29 00-0022 EA 1" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	29.59 6.68	10.58
23 05 29 00-0023 EA 1-1/4" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	30.62 6.66	11.44
23 05 29 00-0024 EA 1-1/2" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	31.28 6.86	11.44
23 05 29 00-0025 EA 2" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	32.08 7.05	11.63
23 05 29 00-0026 EA 2-1/2" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	35.90 7.25	12.05
23 05 29 00-0027 EA 3" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	37.66 7.46	12.68
23 05 29 00-0028 EA 3-1/2" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	42.24 8.46	14.80
23 05 29 00-0029 EA 4" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	46.62 8.46	14.80
23 05 29 00-0030 EA 5" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	76.46 10.63	17.71
23 05 29 00-0031 EA 6" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	94.75 12.69	21.15
23 05 29 00-0032 EA 8" Steel Clevis Hanger, Plastic Coated (Cooper B-Line B3100C) <i>For Work In Restricted Working Space, Add</i>	112.85 15.86	26.44
23 05 29 00-0033 Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <small>(23 05 29 00-0002)</small>		
23 05 29 00-0034 EA 1/2" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	20.80 5.71	9.52
23 05 29 00-0035 EA 3/4" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	22.96 6.35	10.58
23 05 29 00-0036 EA 1" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	24.25 6.68	10.58
23 05 29 00-0037 EA 1-1/4" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	24.91 6.86	11.44
23 05 29 00-0038 EA 1-1/2" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	25.06 6.86	11.44
23 05 29 00-0039 EA 2" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	25.77 7.05	11.63
23 05 29 00-0040 EA 2-1/2" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	28.12 7.25	12.05
23 05 29 00-0041 EA 3" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	29.36 7.46	12.68
23 05 29 00-0042 EA 3-1/2" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	33.10 8.46	14.80
23 05 29 00-0043 EA 4" Steel Clevis Hanger, Light Duty (Cooper B-Line B3104) <i>For Work In Restricted Working Space, Add</i>	34.13 8.46	14.80
23 05 29 00-0044 Extended Steel Clevis Hanger (Cooper B-Line B3108) <small>(23 05 29 00-0002)</small>		
23 05 29 00-0045 EA 3/4" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	29.44 6.35	10.58
23 05 29 00-0046 EA 1" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	30.63 6.68	10.58
23 05 29 00-0047 EA 1-1/4" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	31.25 6.86	11.44
23 05 29 00-0048 EA 1-1/2" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	32.28 6.86	11.44
23 05 29 00-0049 EA 2" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	34.62 7.05	11.63
23 05 29 00-0050 EA 2-1/2" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	37.11 7.25	12.05
23 05 29 00-0051 EA 3" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	38.94 7.46	12.68
23 05 29 00-0052 EA 4" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	46.77 8.46	14.80
23 05 29 00-0053 EA 5" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	59.00 10.63	17.71
23 05 29 00-0054 EA 6" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	72.80 12.69	21.15
23 05 29 00-0055 EA 8" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	103.12 15.86	26.44
23 05 29 00-0056 EA 10" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	144.80 21.15	35.95
23 05 29 00-0057 EA 12" Steel Extended Clevis Hanger (Cooper B-Line B3108) <i>For Work In Restricted Working Space, Add</i>	162.64 23.79	39.65

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0058			Steel Clevis Hanger, Flat Top (Cooper B-Line B3109) (23 05 29 00-0002)		
23 05 29 00-0059	EA		2" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	35.83	11.63
			<i>For Work In Restricted Working Space, Add</i>	7.05	
23 05 29 00-0060	EA		2-1/2" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	38.25	12.05
			<i>For Work In Restricted Working Space, Add</i>	7.25	
23 05 29 00-0061	EA		3" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	40.24	12.68
			<i>For Work In Restricted Working Space, Add</i>	7.46	
23 05 29 00-0062	EA		3-1/2" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	44.56	14.80
			<i>For Work In Restricted Working Space, Add</i>	8.46	
23 05 29 00-0063	EA		4" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	47.14	14.80
			<i>For Work In Restricted Working Space, Add</i>	8.46	
23 05 29 00-0064	EA		5" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	58.52	17.71
			<i>For Work In Restricted Working Space, Add</i>	10.63	
23 05 29 00-0065	EA		6" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	68.30	21.15
			<i>For Work In Restricted Working Space, Add</i>	12.69	
23 05 29 00-0066	EA		8" Steel Clevis Hanger, Flat Top (Cooper B-Line B3109).....	90.67	26.44
			<i>For Work In Restricted Working Space, Add</i>	15.86	
23 05 29 00-0067			Adjustable Hangers (23 05 29 00-0001)		
23 05 29 00-0068			Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690) (23 05 29 00-0067)		
			Note: Type 5.		
23 05 29 00-0069	EA		1/2" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	19.18	8.34
			<i>For Work In Restricted Working Space, Add</i>	5.00	
23 05 29 00-0070	EA		3/4" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	21.01	9.25
			<i>For Work In Restricted Working Space, Add</i>	5.55	
23 05 29 00-0071	EA		1" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	23.03	10.28
			<i>For Work In Restricted Working Space, Add</i>	6.17	
23 05 29 00-0072	EA		1-1/4" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	25.42	11.42
			<i>For Work In Restricted Working Space, Add</i>	6.85	
23 05 29 00-0073	EA		1-1/2" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	26.72	11.99
			<i>For Work In Restricted Working Space, Add</i>	7.20	
23 05 29 00-0074	EA		2" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	28.62	12.57
			<i>For Work In Restricted Working Space, Add</i>	7.54	
23 05 29 00-0075	EA		2-1/2" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	32.98	13.14
			<i>For Work In Restricted Working Space, Add</i>	7.88	
23 05 29 00-0076	EA		3" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	34.45	13.70
			<i>For Work In Restricted Working Space, Add</i>	8.22	
23 05 29 00-0077	EA		4" Steel J-Hanger Hanger With Bolt (Cooper B-Line B3690).....	41.08	15.42
			<i>For Work In Restricted Working Space, Add</i>	9.25	
23 05 29 00-0078			Adjustable Swivel Steel Ring (Cooper B-Line B3170) (23 05 29 00-0067)		
			Note: Type 10.		
23 05 29 00-0079	EA		1/2" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	22.29	10.58
			<i>For 316 Stainless Steel, Add</i>	9.69	
			<i>For Work In Restricted Working Space, Add</i>	6.35	
			<i>For 304 Stainless Steel, Add</i>	7.52	
23 05 29 00-0080	EA		3/4" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	23.51	10.58
			<i>For 316 Stainless Steel, Add</i>	10.63	
			<i>For Work In Restricted Working Space, Add</i>	6.68	
			<i>For 304 Stainless Steel, Add</i>	8.25	
23 05 29 00-0081	EA		1" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	24.74	11.63
			<i>For 316 Stainless Steel, Add</i>	10.63	
			<i>For Work In Restricted Working Space, Add</i>	7.05	
			<i>For 304 Stainless Steel, Add</i>	8.25	
23 05 29 00-0082	EA		1-1/4" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	26.27	12.68
			<i>For 316 Stainless Steel, Add</i>	11.90	
			<i>For Work In Restricted Working Space, Add</i>	7.46	
			<i>For 304 Stainless Steel, Add</i>	9.24	
23 05 29 00-0083	EA		1-1/2" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	29.60	14.80
			<i>For 316 Stainless Steel, Add</i>	11.90	
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For 304 Stainless Steel, Add</i>	9.24	
23 05 29 00-0084	EA		2" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	31.68	14.80
			<i>For 316 Stainless Steel, Add</i>	12.50	
			<i>For Work In Restricted Working Space, Add</i>	9.06	
			<i>For 304 Stainless Steel, Add</i>	9.70	
23 05 29 00-0085	EA		2-1/2" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	34.93	15.86
			<i>For 316 Stainless Steel, Add</i>	20.40	
			<i>For Work In Restricted Working Space, Add</i>	9.76	
			<i>For 304 Stainless Steel, Add</i>	15.84	
23 05 29 00-0086	EA		3" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	37.75	17.97
			<i>For 316 Stainless Steel, Add</i>	21.34	
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For 304 Stainless Steel, Add</i>	16.57	
23 05 29 00-0087	EA		3-1/2" Adjustable Swivel Steel Ring (Cooper B-Line B3170).....	41.95	19.29
			<i>For 316 Stainless Steel, Add</i>	28.56	
			<i>For Work In Restricted Working Space, Add</i>	11.58	
			<i>For 304 Stainless Steel, Add</i>	22.18	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0088 EA 4" Adjustable Swivel Steel Ring (Cooper B-Line B3170) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	45.65 28.56 12.69 22.18	21.15
23 05 29 00-0089 EA 5" Adjustable Swivel Steel Ring (Cooper B-Line B3170) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	54.55 59.25 14.27 46.00	23.79
23 05 29 00-0090 EA 6" Adjustable Swivel Steel Ring (Cooper B-Line B3170) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	59.94 60.10 15.86 46.66	26.44
23 05 29 00-0091 EA 8" Adjustable Swivel Steel Ring (Cooper B-Line B3170) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	71.84 71.40 19.03 55.44	31.72
23 05 29 00-0092 Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) (23 05 29 00-0067)		
23 05 29 00-0093 EA 1/2" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	24.72 30.35 6.35 23.56	10.58
23 05 29 00-0094 EA 3/4" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	25.83 30.35 6.68 23.56	10.58
23 05 29 00-0095 EA 1" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	27.06 30.35 7.05 23.56	11.63
23 05 29 00-0096 EA 1-1/4" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	28.44 30.35 7.46 23.56	12.68
23 05 29 00-0097 EA 1-1/2" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	32.07 32.90 8.46 25.54	14.80
23 05 29 00-0098 EA 2" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	34.08 32.90 9.06 25.54	14.80
23 05 29 00-0099 EA 2-1/2" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	42.68 86.28 9.76 66.99	15.86
23 05 29 00-0100 EA 3" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	47.81 106.85 10.57 82.96	17.97
23 05 29 00-0101 EA 3-1/2" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	52.15 115.26 11.58 89.50	19.29
23 05 29 00-0102 EA 4" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	58.80 140.34 12.69 108.97	21.15
23 05 29 00-0103 EA 5" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	64.32 142.29 14.27 110.48	23.79
23 05 29 00-0104 EA 6" Copper Tubing Adjustable Swivel Ring (Cooper B-Line B3170CT) <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	77.10 205.96 15.86 159.92	26.44
23 05 29 00-0105 Roller Hangers (23 05 29 00-0001)		
23 05 29 00-0106 Single Pipe Roll (Cooper B-Line B3114) (23 05 29 00-0105) Note: Excludes rod and nuts. Type 41.		
23 05 29 00-0107 EA 2" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	33.17 5.08	8.47
23 05 29 00-0108 EA 2-1/2" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	36.50 5.71	9.53
23 05 29 00-0109 EA 3" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	40.64 6.67	11.11
23 05 29 00-0110 EA 3-1/2" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	46.76 7.62	12.69

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0111	EA		4" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	64.57 8.57	14.28
23 05 29 00-0112	EA		5" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	57.68 9.52	15.87
23 05 29 00-0113	EA		6" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	71.75 11.42	19.04
23 05 29 00-0114	EA		8" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	96.67 13.33	22.22
23 05 29 00-0115	EA		10" Single Pipe Roll (Cooper B-Line B3114) Note: Excludes rod and nuts. <i>For Work In Restricted Working Space, Add</i>	114.61 15.87	26.45
23 05 29 00-0116			Adjustable Clevis Roller Hanger (Cooper B-Line B3110) <small>(23 05 29 00-0105)</small> Note: Type 43.		
23 05 29 00-0117	EA		2" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	49.46 176.29 8.62 136.88	14.93
23 05 29 00-0118	EA		2-1/2" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	51.52 176.29 9.23 136.88	15.39
23 05 29 00-0119	EA		3" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	55.96 196.69 9.85 152.72	16.08
23 05 29 00-0120	EA		3-1/2" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	65.26 261.80 10.34 203.28	17.23
23 05 29 00-0121	EA		4" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	69.09 261.80 11.49 203.28	19.52
23 05 29 00-0122	EA		5" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	78.00 305.66 12.61 237.34	21.02
23 05 29 00-0123	EA		6" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	90.60 379.53 13.79 294.69	22.98
23 05 29 00-0124	EA		8" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	124.26 568.06 17.23 441.08	28.72
23 05 29 00-0125	EA		10" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	156.20 676.77 22.97 525.49	39.06
23 05 29 00-0126	EA		12" Steel Clevis Roller Hanger (Cooper B-Line B3110)..... <i>For 316 Stainless Steel, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For 304 Stainless Steel, Add</i>	203.20 994.93 25.85 772.53	43.07
23 05 29 00-0127			Roller Chair (Cooper B-Line B3120) <small>(23 05 29 00-0105)</small>		
23 05 29 00-0128	EA		2" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	48.10 8.62	14.93
23 05 29 00-0129	EA		2-1/2" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	51.82 9.23	15.39
23 05 29 00-0130	EA		3" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	54.34 9.85	16.08
23 05 29 00-0131	EA		3-1/2" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	61.87 10.34	17.23
23 05 29 00-0132	EA		4" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	68.94 11.49	19.52
23 05 29 00-0133	EA		5" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	75.35 12.61	21.02
23 05 29 00-0134	EA		6" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	92.34 13.79	22.98
23 05 29 00-0135	EA		8" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	120.14 17.23	28.72
23 05 29 00-0136	EA		10" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	155.24 22.97	39.06
23 05 29 00-0137	EA		12" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	200.69 25.85	43.07
23 05 29 00-0138	EA		14" Steel Roller Chair (Cooper B-Line B3120)..... <i>For Work In Restricted Working Space, Add</i>	218.92 29.63	49.39

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0139 EA 16" Steel Roller Chair (Cooper B-Line B3120).....	264.01	57.43
For Work In Restricted Working Space, Add	34.46	
23 05 29 00-0140 EA 18" Steel Roller Chair (Cooper B-Line B3120).....	355.94	71.79
For Work In Restricted Working Space, Add	43.07	
23 05 29 00-0141 EA 20" Steel Roller Chair (Cooper B-Line B3120).....	440.48	86.15
For Work In Restricted Working Space, Add	51.69	
23 05 29 00-0142 Adjustable Roller Support (Cooper B-Line B3122) <small>(23 05 29 00-0105)</small>		
23 05 29 00-0143 EA 2" Steel Adjustable Roller Support (Cooper B-Line B3122).....	54.48	14.93
For Work In Restricted Working Space, Add	8.62	
23 05 29 00-0144 EA 2-1/2" Steel Adjustable Roller Support (Cooper B-Line B3122).....	61.25	15.39
For Work In Restricted Working Space, Add	9.23	
23 05 29 00-0145 EA 3" Steel Adjustable Roller Support (Cooper B-Line B3122).....	64.40	16.08
For Work In Restricted Working Space, Add	9.85	
23 05 29 00-0146 EA 3-1/2" Steel Adjustable Roller Support (Cooper B-Line B3122).....	68.03	17.23
For Work In Restricted Working Space, Add	10.34	
23 05 29 00-0147 EA 4" Steel Adjustable Roller Support (Cooper B-Line B3122).....	81.84	19.52
For Work In Restricted Working Space, Add	11.49	
23 05 29 00-0148 EA 5" Steel Adjustable Roller Support (Cooper B-Line B3122).....	92.81	21.02
For Work In Restricted Working Space, Add	12.61	
23 05 29 00-0149 EA 6" Steel Adjustable Roller Support (Cooper B-Line B3122).....	108.11	22.98
For Work In Restricted Working Space, Add	13.79	
23 05 29 00-0150 EA 8" Steel Adjustable Roller Support (Cooper B-Line B3122).....	152.60	28.72
For Work In Restricted Working Space, Add	17.23	
23 05 29 00-0151 EA 10" Steel Adjustable Roller Support (Cooper B-Line B3122).....	190.24	39.06
For Work In Restricted Working Space, Add	22.97	
23 05 29 00-0152 EA 12" Steel Adjustable Roller Support (Cooper B-Line B3122).....	220.07	43.07
For Work In Restricted Working Space, Add	25.85	
23 05 29 00-0153 EA 14" Steel Adjustable Roller Support (Cooper B-Line B3122).....	311.69	49.39
For Work In Restricted Working Space, Add	29.63	
23 05 29 00-0154 EA 16" Steel Adjustable Roller Support (Cooper B-Line B3122).....	373.72	57.43
For Work In Restricted Working Space, Add	34.46	
23 05 29 00-0155 EA 18" Steel Adjustable Roller Support (Cooper B-Line B3122).....	424.21	71.79
For Work In Restricted Working Space, Add	43.07	
23 05 29 00-0156 Adjustable Double Roller Support (Cooper B-Line B3122A) <small>(23 05 29 00-0105)</small>		
23 05 29 00-0157 EA 2" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	54.84	14.93
For Work In Restricted Working Space, Add	8.62	
23 05 29 00-0158 EA 2-1/2" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	61.58	15.39
For Work In Restricted Working Space, Add	9.23	
23 05 29 00-0159 EA 3" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	64.95	16.08
For Work In Restricted Working Space, Add	9.85	
23 05 29 00-0160 EA 3-1/2" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	67.54	17.23
For Work In Restricted Working Space, Add	10.34	
23 05 29 00-0161 EA 4" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	85.56	19.52
For Work In Restricted Working Space, Add	11.49	
23 05 29 00-0162 EA 5" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	97.20	21.02
For Work In Restricted Working Space, Add	12.61	
23 05 29 00-0163 EA 6" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	113.34	22.98
For Work In Restricted Working Space, Add	13.79	
23 05 29 00-0164 EA 8" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	160.70	28.72
For Work In Restricted Working Space, Add	17.23	
23 05 29 00-0165 EA 10" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	199.97	39.06
For Work In Restricted Working Space, Add	22.97	
23 05 29 00-0166 EA 12" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	231.45	43.07
For Work In Restricted Working Space, Add	25.85	
23 05 29 00-0167 EA 14" Steel Adjustable Double Roller Support (Cooper B-Line B3122A).....	329.89	49.39
For Work In Restricted Working Space, Add	29.63	
23 05 29 00-0168 Pipe And Riser Clamps <small>(23 05 29 00-0001)</small>		
Note: Includes bolts and weldless eye nuts.		
23 05 29 00-0169 Steel Pipe Clamp (Cooper B-Line B3140) <small>(23 05 29 00-0168)</small>		
Note: Type 4.		
23 05 29 00-0170 EA 1/2" Steel Pipe Clamp (Cooper B-Line B3140).....	18.53	6.85
For Work In Restricted Working Space, Add	4.11	
23 05 29 00-0171 EA 3/4" Steel Pipe Clamp (Cooper B-Line B3140).....	18.76	6.97
For Work In Restricted Working Space, Add	4.18	
23 05 29 00-0172 EA 1" Steel Pipe Clamp (Cooper B-Line B3140).....	19.02	7.08
For Work In Restricted Working Space, Add	4.25	
23 05 29 00-0173 EA 1-1/4" Steel Pipe Clamp (Cooper B-Line B3140).....	20.73	7.19
For Work In Restricted Working Space, Add	4.32	
23 05 29 00-0174 EA 1-1/2" Steel Pipe Clamp (Cooper B-Line B3140).....	20.95	7.31
For Work In Restricted Working Space, Add	4.38	
23 05 29 00-0175 EA 2" Steel Pipe Clamp (Cooper B-Line B3140).....	22.29	7.42
For Work In Restricted Working Space, Add	4.46	
23 05 29 00-0176 EA 2-1/2" Steel Pipe Clamp (Cooper B-Line B3140).....	23.19	7.65
For Work In Restricted Working Space, Add	4.59	
23 05 29 00-0177 EA 3" Steel Pipe Clamp (Cooper B-Line B3140).....	24.57	7.88
For Work In Restricted Working Space, Add	4.73	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 29 00-0178	EA 3-1/2" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	28.44 4.80	8.00
23 05 29 00-0179	EA 4" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	33.01 6.17	10.28
23 05 29 00-0180	EA 5" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	47.30 8.22	13.70
23 05 29 00-0181	EA 6" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	64.77 10.28	17.13
23 05 29 00-0182	EA 8" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	76.22 11.99	19.99
23 05 29 00-0183	EA 10" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	111.04 13.70	22.84
23 05 29 00-0184	EA 12" Steel Pipe Clamp (Cooper B-Line B3140)..... <i>For Work In Restricted Working Space, Add</i>	151.34 15.08	25.12
23 05 29 00-0185	Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142) (23 05 29 00-0168)		
23 05 29 00-0186	EA 3" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	37.87 4.41	7.40
23 05 29 00-0187	EA 4" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	49.76 4.41	7.40
23 05 29 00-0188	EA 5" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	54.63 4.60	7.66
23 05 29 00-0189	EA 6" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	87.29 4.79	7.93
23 05 29 00-0190	EA 8" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	94.97 5.07	8.46
23 05 29 00-0191	EA 10" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	162.68 5.06	8.46
23 05 29 00-0192	EA 12" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	263.31 5.70	9.52
23 05 29 00-0193	EA 14" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	334.09 6.35	10.58
23 05 29 00-0194	EA 16" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	363.26 7.61	12.68
23 05 29 00-0195	EA 18" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	1,129.75 8.88	14.80
23 05 29 00-0196	EA 20" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	1,298.61 9.52	15.86
23 05 29 00-0197	EA 24" Two Bolt Steel Heavy Duty Pipe Clamp (Cooper B-Line B3142)..... <i>For Work In Restricted Working Space, Add</i>	1,663.39 10.15	16.91
23 05 29 00-0198	Steel Riser Clamp (Cooper B-Line B3373) (23 05 29 00-0168)		
	Note: Type 8.		
23 05 29 00-0199	EA 1/2" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	18.72 3.80	6.35
23 05 29 00-0200	EA 3/4" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	19.50 3.87	6.45
23 05 29 00-0201	EA 1" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	19.78 3.93	6.56
23 05 29 00-0202	EA 1-1/4" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	21.39 4.00	6.66
23 05 29 00-0203	EA 1-1/2" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	22.23 4.06	6.77
23 05 29 00-0204	EA 2" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	22.77 4.12	6.87
23 05 29 00-0205	EA 2-1/2" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	23.74 4.25	7.08
23 05 29 00-0206	EA 3" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	25.17 4.38	7.29
23 05 29 00-0207	EA 3-1/2" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	27.66 4.44	7.40
23 05 29 00-0208	EA 4" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	33.59 5.71	9.52
23 05 29 00-0209	EA 5" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	43.43 7.61	12.68
23 05 29 00-0210	EA 6" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	55.08 9.52	15.86
23 05 29 00-0211	EA 8" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	75.24 11.10	18.51
23 05 29 00-0212	EA 10" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	98.88 12.69	21.15
23 05 29 00-0213	EA 12" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	119.61 13.96	23.26
23 05 29 00-0214	EA 14" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	160.73 15.23	25.38
23 05 29 00-0215	EA 16" Steel Riser Clamp (Cooper B-Line B3373)..... <i>For Work In Restricted Working Space, Add</i>	306.03 16.50	27.49
23 05 29 00-0216	Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C) (23 05 29 00-0168)		
23 05 29 00-0217	EA 1/2" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)..... <i>For Work In Restricted Working Space, Add</i>	33.09 3.80	6.35

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0218 EA 3/4" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	33.61	6.45
For Work In Restricted Working Space, Add	3.87	
23 05 29 00-0219 EA 1" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	34.99	6.56
For Work In Restricted Working Space, Add	3.93	
23 05 29 00-0220 EA 1-1/4" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	37.41	6.66
For Work In Restricted Working Space, Add	4.00	
23 05 29 00-0221 EA 1-1/2" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	42.27	6.77
For Work In Restricted Working Space, Add	4.06	
23 05 29 00-0222 EA 2" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	44.91	6.87
For Work In Restricted Working Space, Add	4.12	
23 05 29 00-0223 EA 2-1/2" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	48.61	7.08
For Work In Restricted Working Space, Add	4.25	
23 05 29 00-0224 EA 3" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	53.42	7.29
For Work In Restricted Working Space, Add	4.38	
23 05 29 00-0225 EA 4" Steel Riser Clamp, Plastic Coated (Cooper B-Line B3373C)	72.34	9.52
For Work In Restricted Working Space, Add	5.71	
23 05 29 00-0226 Two Bolt Steel Underground Clamp (Cooper B-Line B3132) (23 05 29 00-0168)		
Note: Type 42		
23 05 29 00-0227 EA 4" Two Bolt Steel Underground Clamp (Cooper B-Line B3132)	74.60	7.40
For Work In Restricted Working Space, Add	4.41	
23 05 29 00-0228 EA 6" Two Bolt Steel Underground Clamp (Cooper B-Line B3132)	79.18	7.93
For Work In Restricted Working Space, Add	4.79	
23 05 29 00-0229 EA 8" Two Bolt Steel Underground Clamp (Cooper B-Line B3132)	86.95	8.46
For Work In Restricted Working Space, Add	5.07	
23 05 29 00-0230 EA 10" Two Bolt Steel Underground Clamp (Cooper B-Line B3132)	92.83	8.46
For Work In Restricted Working Space, Add	5.06	
23 05 29 00-0231 EA 12" Two Bolt Steel Underground Clamp (Cooper B-Line B3132)	112.32	9.52
For Work In Restricted Working Space, Add	5.70	
23 05 29 00-0232 Four Bolt Steel Underground Clamp (Cooper B-Line B3134) (23 05 29 00-0168)		
23 05 29 00-0233 EA 4" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	68.85	7.40
For Work In Restricted Working Space, Add	4.41	
23 05 29 00-0234 EA 6" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	74.24	7.93
For Work In Restricted Working Space, Add	4.79	
23 05 29 00-0235 EA 8" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	129.86	8.46
For Work In Restricted Working Space, Add	5.07	
23 05 29 00-0236 EA 10" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	144.41	8.46
For Work In Restricted Working Space, Add	5.06	
23 05 29 00-0237 EA 12" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	207.42	9.52
For Work In Restricted Working Space, Add	5.70	
23 05 29 00-0238 EA 14" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	318.14	10.58
For Work In Restricted Working Space, Add	6.35	
23 05 29 00-0239 EA 16" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	426.78	12.68
For Work In Restricted Working Space, Add	7.61	
23 05 29 00-0240 EA 18" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	507.97	14.80
For Work In Restricted Working Space, Add	8.88	
23 05 29 00-0241 EA 20" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	742.66	15.86
For Work In Restricted Working Space, Add	9.52	
23 05 29 00-0242 EA 24" Four Bolt Steel Underground Clamp (Cooper B-Line B3134)	1,016.59	16.91
For Work In Restricted Working Space, Add	10.15	
23 05 29 00-0243 Split Pipe Clamps And Rings (23 05 29 00-0001)		
23 05 29 00-0244 Adjustable Split Ring Swivel Hanger (Cooper B-Line B3171) (23 05 29 00-0243)		
Note: Type 6.		
23 05 29 00-0245 EA 3/4" Adjustable Swivel Ring (Cooper B-Line B3171)	31.03	9.70
For Work In Restricted Working Space, Add	5.83	
23 05 29 00-0246 EA 1" Adjustable Swivel Ring (Cooper B-Line B3171)	32.86	10.28
For Work In Restricted Working Space, Add	6.17	
23 05 29 00-0247 EA 1-1/4" Adjustable Swivel Ring (Cooper B-Line B3171)	35.73	11.42
For Work In Restricted Working Space, Add	6.85	
23 05 29 00-0248 EA 1-1/2" Adjustable Swivel Ring (Cooper B-Line B3171)	38.51	11.99
For Work In Restricted Working Space, Add	7.20	
23 05 29 00-0249 EA 2" Adjustable Swivel Ring (Cooper B-Line B3171)	41.59	12.57
For Work In Restricted Working Space, Add	7.54	
23 05 29 00-0250 EA 2-1/2" Adjustable Swivel Ring (Cooper B-Line B3171)	51.36	13.14
For Work In Restricted Working Space, Add	7.88	
23 05 29 00-0251 EA 3" Adjustable Swivel Ring (Cooper B-Line B3171)	56.37	13.70
For Work In Restricted Working Space, Add	8.22	
23 05 29 00-0252 EA 4" Adjustable Swivel Ring (Cooper B-Line B3171)	75.02	15.42
For Work In Restricted Working Space, Add	9.25	
23 05 29 00-0253 EA 5" Adjustable Swivel Ring (Cooper B-Line B3171)	95.39	19.42
For Work In Restricted Working Space, Add	11.65	
23 05 29 00-0254 EA 6" Adjustable Swivel Ring (Cooper B-Line B3171)	127.54	22.84
For Work In Restricted Working Space, Add	13.70	
23 05 29 00-0255 Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198R) (23 05 29 00-0243)		
Note: Type 11.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 05 29 00-0256	EA		1/2" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	20.16	8.04
			<i>For Work In Restricted Working Space, Add</i>	4.92	
23 05 29 00-0257	EA		3/4" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	21.27	8.04
			<i>For Work In Restricted Working Space, Add</i>	5.14	
23 05 29 00-0258	EA		1" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	23.40	10.33
			<i>For Work In Restricted Working Space, Add</i>	5.74	
23 05 29 00-0259	EA		1-1/4" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	25.45	10.33
			<i>For Work In Restricted Working Space, Add</i>	6.04	
23 05 29 00-0260	EA		1-1/2" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	28.43	10.33
			<i>For Work In Restricted Working Space, Add</i>	6.26	
23 05 29 00-0261	EA		2" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	33.25	11.48
			<i>For Work In Restricted Working Space, Add</i>	6.89	
23 05 29 00-0262	EA		2-1/2" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	44.44	11.48
			<i>For Work In Restricted Working Space, Add</i>	7.18	
23 05 29 00-0263	EA		3" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	49.42	12.63
			<i>For Work In Restricted Working Space, Add</i>	7.49	
23 05 29 00-0264	EA		4" Extension Split Pipe Clamp, Malleable Iron (Cooper B-Line B3198H).....	52.61	13.78
			<i>For Work In Restricted Working Space, Add</i>	8.20	

23 05 29 00-0265 Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H) (23 05 29 00-0243)

Note: Type 12.

23 05 29 00-0266	EA		1/2" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	20.16	8.04
			<i>For Work In Restricted Working Space, Add</i>	4.92	
23 05 29 00-0267	EA		3/4" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	21.27	8.61
			<i>For Work In Restricted Working Space, Add</i>	5.14	
23 05 29 00-0268	EA		1" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	23.40	9.76
			<i>For Work In Restricted Working Space, Add</i>	5.74	
23 05 29 00-0269	EA		1-1/4" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	25.45	10.33
			<i>For Work In Restricted Working Space, Add</i>	6.04	
23 05 29 00-0270	EA		1-1/2" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	28.43	10.33
			<i>For Work In Restricted Working Space, Add</i>	6.26	
23 05 29 00-0271	EA		2" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	33.25	11.48
			<i>For Work In Restricted Working Space, Add</i>	6.89	
23 05 29 00-0272	EA		2-1/2" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	44.44	12.05
			<i>For Work In Restricted Working Space, Add</i>	7.18	
23 05 29 00-0273	EA		3" Hinged Extension Split Pipe Clamp (Cooper B-Line B3198H).....	49.42	12.63
			<i>For Work In Restricted Working Space, Add</i>	7.49	

23 05 29 00-0274 Pipe Straps (23 05 29 00-0001)**23 05 29 00-0275 Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B-3180) (23 05 29 00-0274)**

23 05 29 00-0276	EA		1/2" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	13.70	5.74
			<i>For Work In Restricted Working Space, Add</i>	3.44	
23 05 29 00-0277	EA		3/4" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	14.30	6.89
			<i>For Work In Restricted Working Space, Add</i>	3.62	
23 05 29 00-0278	EA		1" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	14.98	6.89
			<i>For Work In Restricted Working Space, Add</i>	3.83	
23 05 29 00-0279	EA		1-1/4" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	15.83	6.89
			<i>For Work In Restricted Working Space, Add</i>	4.05	
23 05 29 00-0280	EA		1-1/2" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	16.75	8.04
			<i>For Work In Restricted Working Space, Add</i>	4.31	
23 05 29 00-0281	EA		2" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	19.26	8.04
			<i>For Work In Restricted Working Space, Add</i>	4.59	
23 05 29 00-0282	EA		2-1/2" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	23.54	8.04
			<i>For Work In Restricted Working Space, Add</i>	4.92	
23 05 29 00-0283	EA		3" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	30.16	8.04
			<i>For Work In Restricted Working Space, Add</i>	5.30	
23 05 29 00-0284	EA		4" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	35.72	10.33
			<i>For Work In Restricted Working Space, Add</i>	6.20	
23 05 29 00-0285	EA		6" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	43.72	11.48
			<i>For Work In Restricted Working Space, Add</i>	6.89	
23 05 29 00-0286	EA		8" Standard Two Hole Pipe Strap, Galvanized Steel (Cooper B-Line B3180)	54.49	12.63
			<i>For Work In Restricted Working Space, Add</i>	7.58	

23 05 29 00-0287 Two Hole Copper-Clad Pipe Straps (23 05 29 00-0274)

23 05 29 00-0288	EA		1/2" Two Hole Copper-Clad Pipe Strap	6.38	
			<i>For Work In Restricted Working Space, Add</i>	1.72	
23 05 29 00-0289	EA		3/4" Two Hole Copper-Clad Pipe Strap	6.78	
			<i>For Work In Restricted Working Space, Add</i>	1.81	
23 05 29 00-0290	EA		1" Two Hole Copper-Clad Pipe Strap	7.62	
			<i>For Work In Restricted Working Space, Add</i>	1.89	
23 05 29 00-0291	EA		1-1/4" Two Hole Copper-Clad Pipe Strap	8.51	
			<i>For Work In Restricted Working Space, Add</i>	1.98	
23 05 29 00-0292	EA		1-1/2" Two Hole Copper-Clad Pipe Strap	9.15	
			<i>For Work In Restricted Working Space, Add</i>	2.07	
23 05 29 00-0293	EA		2" Two Hole Copper-Clad Pipe Strap	9.93	
			<i>For Work In Restricted Working Space, Add</i>	2.24	

23 05 29 00-0294 One Hole Galvanized Steel Pipe Straps (23 05 29 00-0274)



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0295	EA			1/2" One Hole Galvanized Steel Pipe Strap (Anvil 185D).....	2.90	
				<i>For Work In Restricted Working Space, Add</i>	0.57	
23 05 29 00-0296	EA			3/4" One Hole Galvanized Steel Pipe Strap (Anvil 185D).....	3.45	
				<i>For Work In Restricted Working Space, Add</i>	0.62	
23 05 29 00-0297	EA			1" One Hole Galvanized Steel Pipe Strap (Anvil 185D).....	3.71	
				<i>For Work In Restricted Working Space, Add</i>	0.66	
23 05 29 00-0298	EA			1-1/4" Galvanized Steel Strap, 1 Hole	4.00	
				<i>For Work In Restricted Working Space, Add</i>	0.72	
23 05 29 00-0299	EA			1-1/2" Galvanized Steel Strap, 1 Hole	4.28	
				<i>For Work In Restricted Working Space, Add</i>	0.78	
23 05 29 00-0300	EA			2" Galvanized Steel Strap, 1 Hole	4.78	
				<i>For Work In Restricted Working Space, Add</i>	0.86	
23 05 29 00-0301				Pipe and Equipment Support Brackets (23 05 29 00-0001)		
23 05 29 00-0302				Pipe and Equipment Supports, Light Duty Welded Steel Bracket (Cooper B-Line B3068) (23 05 29 00-0301)		
				Note: Up to 750# load.		
23 05 29 00-0303	EA			9" x 9" Light Duty Welded Steel Bracket, Wall Mounted (Cooper B-Line B3068)	124.97	12.68
				<i>For Galvanized, Add</i>	19.92	
				<i>For Work In Restricted Working Space, Add</i>	7.61	
23 05 29 00-0304	EA			13" x 13" Light Duty Welded Steel Bracket, Wall Mounted (Cooper B-Line B3068)	126.79	12.68
				<i>For Galvanized, Add</i>	20.28	
				<i>For Work In Restricted Working Space, Add</i>	7.61	
23 05 29 00-0305	EA			19" x 19" Light Duty Welded Steel Bracket, Wall Mounted (Cooper B-Line B3068)	134.00	12.68
				<i>For Galvanized, Add</i>	21.72	
				<i>For Work In Restricted Working Space, Add</i>	7.61	
23 05 29 00-0306				Pipe and Equipment Supports, Medium Duty Welded Steel Bracket (Cooper B-Line B3066) (23 05 29 00-0301)		
				Note: Up to 1500# load.		
23 05 29 00-0307	EA			12" Wide x 18" Deep Medium Duty Welded Steel Bracket, Wall Mounted (Cooper B-Line B3066).....	300.95	12.68
				<i>For Galvanized, Add</i>	55.11	
				<i>For Work In Restricted Working Space, Add</i>	7.61	
23 05 29 00-0308	EA			18" Wide x 24" Deep Medium Duty Welded Steel Bracket, Wall Mounted (Cooper B-Line B3066).....	352.75	12.68
				<i>For Galvanized, Add</i>	65.47	
				<i>For Work In Restricted Working Space, Add</i>	7.61	
23 05 29 00-0309	EA			24" Wide x 30" Deep Medium Duty Welded Steel Bracket, Wall Mounted (Cooper B-Line B3066).....	458.39	12.68
				<i>For Galvanized, Add</i>	86.60	
				<i>For Work In Restricted Working Space, Add</i>	7.61	
23 05 29 00-0310				Pipe Alignment Guide (23 05 29 00-0001)		
23 05 29 00-0311				Pipe Alignment Guide, 1" Insulation (23 05 29 00-0310)		
23 05 29 00-0312	EA			1/2" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-1/2).....	557.09	20.09
23 05 29 00-0313	EA			3/4" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-3/4).....	558.14	20.62
23 05 29 00-0314	EA			1" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-1).....	559.20	21.15
23 05 29 00-0315	EA			1-1/4" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-1-1/4).....	560.26	21.68
23 05 29 00-0316	EA			1-1/2" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-1-1/2).....	611.67	22.20
23 05 29 00-0317	EA			2" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-2).....	623.73	24.32
23 05 29 00-0318	EA			2-1/2" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-2-1/2).....	625.31	25.12
23 05 29 00-0319	EA			3" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-3).....	626.90	25.90
23 05 29 00-0320	EA			4" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-4).....	663.48	27.49
23 05 29 00-0321	EA			5" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-5).....	773.09	34.89
23 05 29 00-0322	EA			6" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-6).....	787.88	42.29
23 05 29 00-0323	EA			8" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-8).....	886.86	52.87
23 05 29 00-0324	EA			10" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-10).....	1,647.40	63.44
23 05 29 00-0325	EA			12" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-12).....	2,509.85	84.58
23 05 29 00-0326	EA			14" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-14).....	3,088.17	105.73
23 05 29 00-0327	EA			16" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-16).....	3,717.72	118.42
23 05 29 00-0328	EA			18" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-18).....	4,008.88	132.17
23 05 29 00-0329	EA			20" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-20).....	4,258.12	151.20
23 05 29 00-0330	EA			24" Diameter Pipe Alignment Guide, 1" Insulation (Cooper B-Line B3281-24).....	5,372.18	158.60
23 05 29 00-0331				Pipe Alignment Guide, 1-1/2" Insulation (23 05 29 00-0310)		
23 05 29 00-0332	EA			1/2" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-1/2).....	558.14	20.62
23 05 29 00-0333	EA			3/4" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-3/4).....	609.55	21.15
23 05 29 00-0334	EA			1" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-1).....	610.61	21.68
23 05 29 00-0335	EA			1-1/4" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-1-1/4).....	611.67	22.20
23 05 29 00-0336	EA			1-1/2" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-1-1/2).....	612.73	22.73
23 05 29 00-0337	EA			2" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-2).....	624.79	24.84
23 05 29 00-0338	EA			2-1/2" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-2-1/2).....	626.37	25.64
23 05 29 00-0339	EA			3" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-3).....	661.36	26.44
23 05 29 00-0340	EA			4" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-4).....	664.52	28.02
23 05 29 00-0341	EA			5" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-5).....	774.67	35.68
23 05 29 00-0342	EA			6" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-6).....	790.00	43.35
23 05 29 00-0343	EA			8" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-8).....	889.51	54.19
23 05 29 00-0344	EA			10" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-10).....	1,650.57	65.03

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 29 00-0345	EA	12" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-12).....	2,514.08	86.70
23 05 29 00-0346	EA	14" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-14).....	3,093.45	108.38
23 05 29 00-0347	EA	16" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-16).....	3,724.07	121.60
23 05 29 00-0348	EA	18" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-18).....	4,015.23	135.34
23 05 29 00-0349	EA	20" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-20).....	4,265.53	154.90
23 05 29 00-0350	EA	24" Diameter Pipe Alignment Guide, 1-1/2" Insulation (Cooper B-Line B3282-24).....	5,380.11	162.56

23 05 29 00-0351 Pipe Alignment Guide, 2" Insulation (23 05 29 00-0310)

23 05 29 00-0352	EA	1/2" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-1/2).....	609.55	21.15
23 05 29 00-0353	EA	3/4" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-3/4).....	618.44	21.68
23 05 29 00-0354	EA	1" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-1).....	619.50	22.20
23 05 29 00-0355	EA	1-1/4" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-1-1/4).....	620.56	22.73
23 05 29 00-0356	EA	1-1/2" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-1-1/2).....	621.61	23.26
23 05 29 00-0357	EA	2" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-2).....	659.24	25.38
23 05 29 00-0358	EA	2-1/2" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-2-1/2).....	661.36	26.44
23 05 29 00-0359	EA	3" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-3).....	662.68	27.09
23 05 29 00-0360	EA	4" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-4).....	760.39	28.55
23 05 29 00-0361	EA	5" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-5).....	776.26	36.48
23 05 29 00-0362	EA	6" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-6).....	869.95	44.41
23 05 29 00-0363	EA	8" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-8).....	978.34	55.51
23 05 29 00-0364	EA	10" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-10).....	1,653.74	66.61
23 05 29 00-0365	EA	12" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-12).....	2,518.31	88.82
23 05 29 00-0366	EA	14" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-14).....	3,098.74	111.02
23 05 29 00-0367	EA	16" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-16).....	3,730.17	124.65
23 05 29 00-0368	EA	18" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-18).....	4,022.10	138.77
23 05 29 00-0369	EA	20" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-20).....	4,272.93	158.60
23 05 29 00-0370	EA	24" Diameter Pipe Alignment Guide, 2" Insulation (Cooper B-Line B3283-24).....	5,388.04	166.53

23 05 29 00-0371 Pipe Alignment Guide, 2-1/2" Insulation (23 05 29 00-0310)

23 05 29 00-0372	EA	1/2" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-1/2).....	618.44	21.68
23 05 29 00-0373	EA	3/4" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-3/4).....	652.90	22.20
23 05 29 00-0374	EA	1" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-1).....	653.96	22.73
23 05 29 00-0375	EA	1-1/4" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-1-1/4).....	655.01	23.26
23 05 29 00-0376	EA	1-1/2" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-1-1/2).....	656.07	23.79
23 05 29 00-0377	EA	2" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-2).....	660.30	25.90
23 05 29 00-0378	EA	2-1/2" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-2-1/2).....	662.68	27.09
23 05 29 00-0379	EA	3" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-3).....	758.81	27.75
23 05 29 00-0380	EA	4" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-4).....	761.45	29.07
23 05 29 00-0381	EA	5" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-5).....	855.15	37.00
23 05 29 00-0382	EA	6" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-6).....	872.06	45.47
23 05 29 00-0383	EA	8" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-8).....	1,634.18	56.83
23 05 29 00-0384	EA	10" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-10).....	2,477.08	68.19
23 05 29 00-0385	EA	12" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-12).....	3,058.56	90.93
23 05 29 00-0386	EA	14" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-14).....	3,104.56	113.66
23 05 29 00-0387	EA	16" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-16).....	3,736.76	127.93
23 05 29 00-0388	EA	18" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-18).....	4,028.97	142.21
23 05 29 00-0389	EA	20" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-20).....	4,280.86	162.56
23 05 29 00-0390	EA	24" Diameter Pipe Alignment Guide, 2-1/2" Insulation (Cooper B-Line B3284-24).....	5,396.50	170.76

23 05 29 00-0391 Pipe Alignment Guide, 3" Insulation (23 05 29 00-0310)

23 05 29 00-0392	EA	1/2" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-1/2).....	652.90	22.20
23 05 29 00-0393	EA	3/4" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-3/4).....	653.96	22.73
23 05 29 00-0394	EA	1" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-1).....	655.01	23.26
23 05 29 00-0395	EA	1-1/4" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-1-1/4).....	656.07	23.79
23 05 29 00-0396	EA	1-1/2" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-1-1/2).....	657.13	24.32
23 05 29 00-0397	EA	2" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-2).....	756.17	26.44
23 05 29 00-0398	EA	2-1/2" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-2-1/2).....	758.81	27.75
23 05 29 00-0399	EA	3" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-3).....	760.39	28.55
23 05 29 00-0400	EA	4" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-4).....	840.76	29.82
23 05 29 00-0401	EA	5" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-5).....	857.26	38.06
23 05 29 00-0402	EA	6" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-6).....	960.37	46.52
23 05 29 00-0403	EA	8" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-8).....	1,636.83	58.15
23 05 29 00-0404	EA	10" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-10).....	2,480.25	69.79
23 05 29 00-0405	EA	12" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-12).....	3,062.79	93.05
23 05 29 00-0406	EA	14" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-14).....	3,109.85	116.31
23 05 29 00-0407	EA	16" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-16).....	3,743.10	131.11
23 05 29 00-0408	EA	18" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-18).....	4,035.32	145.38
23 05 29 00-0409	EA	20" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-20).....	4,288.79	166.53
23 05 29 00-0410	EA	24" Diameter Pipe Alignment Guide, 3" Insulation (Cooper B-Line B3285-24).....	5,404.95	174.99

23 05 29 00-0411 Pipe Alignment Guide, 3-1/2" Insulation (23 05 29 00-0310)

23 05 29 00-0412	EA	1/2" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-1/2).....	653.96	22.73
23 05 29 00-0413	EA	3/4" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-3/4).....	749.82	23.26
23 05 29 00-0414	EA	1" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-1).....	750.88	23.79
23 05 29 00-0415	EA	1-1/4" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-1-1/4).....	751.94	24.32
23 05 29 00-0416	EA	1-1/2" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-1-1/2).....	753.00	24.84

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0417	EA			2" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-2).....	757.49	27.09
23 05 29 00-0418	EA			2-1/2" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-2-1/2)	760.18	28.44
23 05 29 00-0419	EA			3" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-3).....	839.65	29.27
23 05 29 00-0420	EA			4" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-4).....	842.45	30.67
23 05 29 00-0421	EA			5" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-5).....	945.56	39.12
23 05 29 00-0422	EA			6" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-6).....	1,615.68	47.58
23 05 29 00-0423	EA			8" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-8).....	2,459.63	59.48
23 05 29 00-0424	EA			10" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-10).....	3,020.29	71.53
23 05 29 00-0425	EA			12" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-12).....	3,671.19	95.16
23 05 29 00-0426	EA			14" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-14).....	3,719.31	119.21
23 05 29 00-0427	EA			16" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-16).....	4,025.54	134.28
23 05 29 00-0428	EA			18" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-18).....	4,253.90	149.08
23 05 29 00-0429	EA			20" Diameter Pipe Alignment Guide, 3-1/2" Insulation (Cooper B-Line B3286-20).....	5,395.44	170.23
23 05 29 00-0430 Pipe Alignment Guide, 4" Insulation (23 05 29 00-0310)						
23 05 29 00-0431	EA			1/2" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-1/2).....	749.82	23.26
23 05 29 00-0432	EA			3/4" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-3/4).....	750.88	23.79
23 05 29 00-0433	EA			1" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-1).....	751.94	24.32
23 05 29 00-0434	EA			1-1/4" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-1-1/4).....	753.00	24.84
23 05 29 00-0435	EA			1-1/2" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-1-1/2).....	754.05	25.38
23 05 29 00-0436	EA			2" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-2).....	836.64	27.75
23 05 29 00-0437	EA			2-1/2" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-2-1/2).....	839.28	29.07
23 05 29 00-0438	EA			3" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-3).....	841.08	29.97
23 05 29 00-0439	EA			4" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-4).....	930.23	31.45
23 05 29 00-0440	EA			5" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-5).....	1,600.87	40.18
23 05 29 00-0441	EA			6" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-6).....	1,617.80	48.64
23 05 29 00-0442	EA			8" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-8).....	2,462.28	60.80
23 05 29 00-0443	EA			10" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-10).....	3,024.19	73.48
23 05 29 00-0444	EA			12" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-12).....	3,675.96	97.54
23 05 29 00-0445	EA			14" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-14).....	3,987.74	121.60
23 05 29 00-0446	EA			16" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-16).....	4,230.64	137.45
23 05 29 00-0447	EA			18" Diameter Pipe Alignment Guide, 4" Insulation (Cooper B-Line B3287-18).....	5,361.60	153.31
23 05 29 00-0448 Sway Bracing For No Hub Pipe (23 05 29 00-0001)						
23 05 29 00-0449	EA			1-1/2" Sway Bracing	154.63	13.95
				<i>For Work In Restricted Working Space, Add</i>	8.35	
23 05 29 00-0450	EA			2" Sway Bracing	159.19	14.70
				<i>For Work In Restricted Working Space, Add</i>	8.81	
23 05 29 00-0451	EA			3" Sway Bracing	164.77	15.54
				<i>For Work In Restricted Working Space, Add</i>	9.33	
23 05 29 00-0452	EA			4" Sway Bracing	187.03	17.66
				<i>For Work In Restricted Working Space, Add</i>	10.57	
23 05 29 00-0453	EA			6" Sway Bracing	274.22	26.44
				<i>For Work In Restricted Working Space, Add</i>	15.86	
23 05 29 00-0454	EA			8" Sway Bracing	302.47	32.99
				<i>For Work In Restricted Working Space, Add</i>	19.83	
23 05 29 00-0455	EA			10" Sway Bracing	338.63	44.10
				<i>For Work In Restricted Working Space, Add</i>	26.43	
23 05 29 00-0456 Pipe Stand With Adjustable Saddle (Cooper B-Line B3088T-18 Base, B3093 Adjustable Pipe Saddle) (23 05 29 00-0001)						
				Note: Heights listed is total for base and adjustable saddle		
23 05 29 00-0457	EA			23" to 28" High Pipe Stand With Adjustable Saddle For 1-1/4" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	333.03	10.58
				<i>For Work In Restricted Working Space, Add</i>	6.35	
23 05 29 00-0458	EA			24" to 29" High Pipe Stand With Adjustable Saddle For 1-1/2" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	340.51	11.63
				<i>For Work In Restricted Working Space, Add</i>	6.98	
23 05 29 00-0459	EA			24" to 29" High Pipe Stand With Adjustable Saddle For 2" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	683.52	13.22
				<i>For Work In Restricted Working Space, Add</i>	7.93	
23 05 29 00-0460	EA			24" to 29" High Pipe Stand With Adjustable Saddle For 2-1/2" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	832.08	14.80
				<i>For Work In Restricted Working Space, Add</i>	8.88	
23 05 29 00-0461	EA			24" to 29" High Pipe Stand With Adjustable Saddle For 3" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	842.61	16.39
				<i>For Work In Restricted Working Space, Add</i>	9.83	
23 05 29 00-0462	EA			25" to 29" High Pipe Stand With Adjustable Saddle For 3-1/2" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	927.72	18.51
				<i>For Work In Restricted Working Space, Add</i>	11.10	
23 05 29 00-0463	EA			25" to 30" High Pipe Stand With Adjustable Saddle For 4" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	1,105.27	20.09
				<i>For Work In Restricted Working Space, Add</i>	12.05	
23 05 29 00-0464	EA			25" to 30" High Pipe Stand With Adjustable Saddle For 5" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	1,118.13	21.68
				<i>For Work In Restricted Working Space, Add</i>	13.01	
23 05 29 00-0465	EA			26" to 31" High Pipe Stand With Adjustable Saddle For 6" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle).....	1,134.57	23.79
				<i>For Work In Restricted Working Space, Add</i>	14.27	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
23 05 29 00-0466	EA	28" to 33" High Pipe Stand With Adjustable Saddle For 8" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	1,181.90	25.90	
		<i>For Work In Restricted Working Space, Add</i>	15.54		
23 05 29 00-0467	EA	29" to 34" High Pipe Stand With Adjustable Saddle For 10" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	1,267.08	28.55	
		<i>For Work In Restricted Working Space, Add</i>	17.13		
23 05 29 00-0468	EA	30" to 35" High Pipe Stand With Adjustable Saddle For 12" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	1,304.86	31.72	
		<i>For Work In Restricted Working Space, Add</i>	19.03		
23 05 29 00-0469	EA	32" to 37" High Pipe Stand With Adjustable Saddle For 14" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	1,590.43	34.89	
		<i>For Work In Restricted Working Space, Add</i>	20.94		
23 05 29 00-0470	EA	33" to 38" High Pipe Stand With Adjustable Saddle For 16" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	1,736.42	39.12	
		<i>For Work In Restricted Working Space, Add</i>	23.47		
23 05 29 00-0471	EA	35" to 40" High Pipe Stand With Adjustable Saddle For 18" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	2,450.77	43.35	
		<i>For Work In Restricted Working Space, Add</i>	26.01		
23 05 29 00-0472	EA	36" to 41" High Pipe Stand With Adjustable Saddle For 20" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	3,028.98	47.58	
		<i>For Work In Restricted Working Space, Add</i>	28.55		
23 05 29 00-0473	EA	39" to 44" High Pipe Stand With Adjustable Saddle For 24" Pipe (Cooper B-Line B3088T-18 Base, With B3093 Adjustable Pipe Saddle)	3,644.34	51.81	
		<i>For Work In Restricted Working Space, Add</i>	31.08		
23 05 29 00-0474		Channel Mounted Cushion Clamp <small>(23 05 29 00-0001)</small>			
		Note: Includes fastening into channel.			
23 05 29 00-0475	EA	1/2" Channel Mounted Cushion Clamp For 3/8" Pipe (Cooper B-Line BVT050)	13.05	4.76	
23 05 29 00-0476	EA	5/8" Channel Mounted Cushion Clamp For 1/2" Pipe (Cooper B-Line BVT062)	13.75	5.29	
23 05 29 00-0477	EA	7/8" Channel Mounted Cushion Clamp For 3/4" Pipe (Cooper B-Line BVT087)	15.29	5.55	
23 05 29 00-0478	EA	1-1/8" Channel Mounted Cushion Clamp For 1" Pipe (Cooper B-Line BVT112)	16.40	5.81	
23 05 29 00-0479	EA	1-3/8" Channel Mounted Cushion Clamp For 1-1/4" Pipe (Cooper B-Line BVT137)	18.34	6.35	
23 05 29 00-0480	EA	1-5/8" Channel Mounted Cushion Clamp For 1-1/2" Pipe (Cooper B-Line BVT162)	20.62	6.61	
23 05 29 00-0481	EA	2-1/8" Channel Mounted Cushion Clamp For 2" Pipe (Cooper B-Line BVT212)	26.38	6.87	
23 05 29 00-0482	EA	2-5/8" Channel Mounted Cushion Clamp For 2-1/2" Pipe (Cooper B-Line BVT262)	29.22	7.40	
23 05 29 00-0483	EA	3-1/8" Channel Mounted Cushion Clamp For 3" Pipe (Cooper B-Line BVT312)	36.06	8.46	
23 05 29 00-0484	EA	4-1/8" Channel Mounted Cushion Clamp For 4" Pipe (Cooper B-Line BVT412)	55.43	9.52	
23 05 29 00-0485		Galvanized Steel Cushion Tube Clamp (KMC) <small>(23 05 29 00-0001)</small>			
		Note: Excludes fastening bolt and drilling if necessary.			
23 05 29 00-0486	EA	1/2" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 3/8" Pipe	4.01		
		Note: 19/32" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0487	EA	1/2" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 3/8" Pipe	4.15		
		Note: 23/32" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0488	EA	5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 1/2" Pipe	4.24		
		Note: 23/32" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0489	EA	5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 1/2" Pipe	4.46		
		Note: 27/32" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0490	EA	7/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 3/4" Pipe	4.19		
		Note: 27/32" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0491	EA	7/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 3/4" Pipe	4.60		
		Note: 31/32" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0492	EA	1-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 1" Pipe	4.35		
		Note: 31/32" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0493	EA	1-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 1" Pipe	4.84		
		Note: 1-1/32" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0494	EA	1-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 1" Pipe	4.87		
		Note: 1-5/32" Center To Center Length, 17/32" Hole Diameter For Screw			
23 05 29 00-0495	EA	1-3/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 1-1/4" Pipe	4.57		
		Note: 1-3/32" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0496	EA	1-3/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 1-1/4" Pipe	4.80		
		Note: 1-7/32" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0497	EA	1-3/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 1-1/4" Pipe	5.50		
		Note: 1-11/16" Center To Center Length, 17/32" Hole Diameter For Screw			
23 05 29 00-0498	EA	1-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 1-1/2" Pipe	4.82		
		Note: 1-5/16" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0499	EA	1-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 1-1/2" Pipe	5.27		
		Note: 1-9/16" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0500	EA	1-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 1-1/2" Pipe	6.02		
		Note: 1-13/16" Center To Center Length, 17/32" Hole Diameter For Screw			
23 05 29 00-0501	EA	2-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 2" Pipe	6.08		
		Note: 1-7/16" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0502	EA	2-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 2" Pipe	6.49		
		Note: 1-9/16" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0503	EA	2-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 2" Pipe	7.30		
		Note: 1-11/16" Center To Center Length, 17/32" Hole Diameter For Screw			
23 05 29 00-0504	EA	2-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 2-1/2" Pipe	7.55		
		Note: 1-11/16" Center To Center Length, 9/32" Hole Diameter For Screw			
23 05 29 00-0505	EA	2-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 2-1/2" Pipe	8.76		
		Note: 1-13/16" Center To Center Length, 13/32" Hole Diameter For Screw			
23 05 29 00-0506	EA	2-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 2-1/2" Pipe	8.85		
		Note: 1-15/16" Center To Center Length, 17/32" Hole Diameter For Screw			

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0507 EA 3-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 3" Pipe .....7.79 Note: 1-15/16" Center To Center Length, 9/32" Hole Diameter For Screw	7.79	
23 05 29 00-0508 EA 3-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 3" Pipe .....8.76 Note: 2-1/16" Center To Center Length, 13/32" Hole Diameter For Screw	8.76	
23 05 29 00-0509 EA 3-1/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 3" Pipe .....9.35 Note: 2-3/16" Center To Center Length, 17/32" Hole Diameter For Screw	9.35	
23 05 29 00-0510 EA 3-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 3-1/2" Pipe .....8.11 Note: 2-3/16" Center To Center Length, 9/32" Hole Diameter For Screw	8.11	
23 05 29 00-0511 EA 3-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 3-1/2" Pipe .....8.70 Note: 2-5/16" Center To Center Length, 13/32" Hole Diameter For Screw	8.70	
23 05 29 00-0512 EA 3-5/8" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 3-1/2" Pipe .....10.97 Note: 2-7/16" Center To Center Length, 17/32" Hole Diameter For Screw	10.97	
23 05 29 00-0513 EA 4" Vinyl Coated Galvanized Cushion Tube Clamp, 1/2" Width For 4" Pipe .....8.04 Note: 2-7/16" Center To Center Length, 9/32" Hole Diameter For Screw	8.04	
23 05 29 00-0514 EA 4" Vinyl Coated Galvanized Cushion Tube Clamp, 3/4" Width For 4" Pipe .....8.90 Note: 2-9/16" Center To Center Length, 13/32" Hole Diameter For Screw	8.90	
23 05 29 00-0515 EA 4" Vinyl Coated Galvanized Cushion Tube Clamp, 1" Width For 4" Pipe .....11.46 Note: 2-11/16" Center To Center Length, 17/32" Hole Diameter For Screw	11.46	
23 05 29 00-0516 Rooftop Pipe Supports (23 05 29 00-0001) Note: Excludes pipe/conduit clamps and straps.		
23 05 29 00-0517 Rooftop Support Base (23 05 29 00-0516)		
23 05 29 00-0518 EA 4" x 6" x 4.8" Rooftop Support Base (Cooper B-Line Dura-Blok DBM) .....42.48	42.48	8.61
23 05 29 00-0519 EA 4" x 6" x 9.6" Rooftop Support Base (Cooper B-Line Dura-Blok DBP) .....59.41	59.41	11.48
23 05 29 00-0520 Rooftop Support Base With 14 Gauge Galvanized Channel (23 05 29 00-0516)		
23 05 29 00-0521 EA 5" x 6" x 4.8" Rooftop Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB5) .....48.77	48.77	8.61
23 05 29 00-0522 EA 5" x 6" x 9.6" Rooftop Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB10) .....69.63	69.63	11.48
23 05 29 00-0523 EA 5" x 6" x 20.2" Rooftop Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB20) .....131.48	131.48	14.35
23 05 29 00-0524 EA 5" x 6" x 30.8" Rooftop Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB30) .....182.83	182.83	17.22
23 05 29 00-0525 EA 5" x 6" x 41.4" Rooftop Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB40) .....254.78	254.78	20.09
23 05 29 00-0526 EA 5" x 6" x 52" Rooftop Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB48) .....267.94	267.94	22.97
23 05 29 00-0527 Rooftop Support Base With 12 Gauge Galvanized Channel (23 05 29 00-0516)		
23 05 29 00-0528 EA 6-7/16" x 6" x 9.6" Rooftop Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB610) .....86.33	86.33	11.48
23 05 29 00-0529 EA 6-7/16" x 6" x 20.2" Support Base With 14 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB620) .....138.93	138.93	14.35
23 05 29 00-0530 EA 6-7/16" x 6" x 30.8" Rooftop Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB630) .....185.81	185.81	17.22
23 05 29 00-0531 EA 6-7/16" x 6" x 41.4" Rooftop Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB640) .....254.94	254.94	20.09
23 05 29 00-0532 EA 6-7/16" x 6" x 52" Rooftop Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB648) .....289.10	289.10	17.22
23 05 29 00-0533 Rooftop Bridge Support Base With 12 Gauge Galvanized Channel (23 05 29 00-0516)		
23 05 29 00-0534 EA 5-5/8" x 6" x 28" Rooftop Bridge Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB10-28) .....145.44	145.44	17.22
23 05 29 00-0535 EA 5-5/8" x 6" x 36" Rooftop Bridge Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB10-36) .....165.44	165.44	20.09
23 05 29 00-0536 EA 5-5/8" x 6" x 42" Rooftop Bridge Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB10-42) .....171.12	171.12	22.97
23 05 29 00-0537 EA 5-5/8" x 6" x 50" Rooftop Bridge Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB10-50) .....187.01	187.01	25.84
23 05 29 00-0538 EA 5-5/8" x 6" x 60" Rooftop Bridge Support Base With 12 Gauge Galvanized Channel (Cooper B-Line Dura-Blok DB10-60) .....241.19	241.19	28.71
23 05 29 00-0539 Rooftop Pipe Support Base And Rod (23 05 29 00-0516)		
23 05 29 00-0540 EA 9.69" To 11.19" Height Rooftop Pipe Support Base And Rod (Cooper B-Line Dura-Blok DBM-1/2CT) .....106.10	106.10	11.48
23 05 29 00-0541 EA 9.84" To 11.34" Height Rooftop Pipe Support Base And Rod (Cooper B-Line Dura-Blok DBM-3/4CT) .....106.10	106.10	11.48
23 05 29 00-0542 EA 9.95" To 11.45" Height Rooftop Pipe Support Base And Rod (Cooper B-Line Dura-Blok DBM-1CT) .....106.73	106.73	11.48
23 05 29 00-0543 EA 10.13" To 11.63" Height Rooftop Pipe Support Base And Rod (Cooper B-Line Dura-Blok DBM-1-1/4CT) .....113.11	113.11	14.35
23 05 29 00-0544 EA 10.28" To 11.78" Height Rooftop Pipe Support Base And Rod (Cooper B-Line Dura-Blok DBM-1-1/2CT) .....108.54	108.54	14.35
23 05 29 00-0545 EA 10.53" To 12.03" Height Rooftop Pipe Support Base And Rod (Cooper B-Line Dura-Blok DBM-2CT) .....114.40	114.40	14.35
23 05 29 00-0546 Rooftop Support Base With 14 Gauge Galvanized Channel And Fixed Height Roller Assembly (23 05 29 00-0516)		
23 05 29 00-0547 EA 7.09" x 6" x 9.6" Rooftop Support Base With 14 Gauge Galvanized Channel And Fixed Height Roller Assembly (Cooper B-Line Dura-Blok DBR2-3 1/2) .....136.02	136.02	11.48
23 05 29 00-0548 EA 7.09" x 6" x 9.6" Rooftop Support Base With 14 Gauge Galvanized Channel And Fixed Height Roller Assembly (Cooper B-Line Dura-Blok DBR4-6) .....152.43	152.43	11.48
23 05 29 00-0549 EA 8.34" x 6" x 20.2" Rooftop Support Base With 14 Gauge Galvanized Channel And Fixed Height Roller Assembly (Cooper B-Line Dura-Blok DBR8-10) .....200.11	200.11	14.35
23 05 29 00-0550 EA 9.38" x 6" x 20.2" Rooftop Support Base With 14 Gauge Galvanized Channel And Fixed Height Roller Assembly (Cooper B-Line Dura-Blok DBR12-14) .....267.17	267.17	14.35
23 05 29 00-0551 EA 9.78" x 6" x 20.2" Rooftop Support Base With 14 Gauge Galvanized Channel And Fixed Height Roller Assembly (Cooper B-Line Dura-Blok DBR16-20) .....366.77	366.77	14.35

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0552			Rooftop Support Base And Adjustable Height Roller Assembly (23 05 29 00-0516) Note: Includes base, two zinc all threaded rod risers and pipe roller.		
23 05 29 00-0553	EA		Up To 12" Height, 6" x 9.6" Rooftop Support Base And Adjustable Height Roller Assembly (Cooper B-Line Dura-Blok DBR10-12).....	168.17	17.22
23 05 29 00-0554			Rooftop Support Base And Adjustable Height Channel Assembly (23 05 29 00-0516) Note: Includes base, two zinc all threaded rod and 14 gauge slotted channel.		
23 05 29 00-0555	EA		Up To 8" Height, 6" x 9.6" Rooftop Support Base And Adjustable Height Channel Assembly (Cooper B-Line Dura-Blok DBE10-8).....	108.84	14.35
23 05 29 00-0556	EA		Up To 12" Height, 6" x 9.6" Rooftop Support Base And Adjustable Height Channel Assembly (Cooper B-Line Dura-Blok DBE10-12).....	149.42	17.22
23 05 29 00-0557	EA		Up To 16" Height, 6" x 9.6" Rooftop Support Base And Adjustable Height Channel Assembly (Cooper B-Line Dura-Blok DBE10-16).....	166.21	20.09
23 05 29 00-0558			Rooftop Support Bases With Channel Support And Risers Assembly (23 05 29 00-0516) Note: Includes two support bases, two 12 gauge galvanized channel risers and one 12 gauge galvanized channel support. Dimensions are "overall" (height x width x length).		
23 05 29 00-0559	EA		23" x 25-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2318DS).....	413.16	22.97
23 05 29 00-0560	EA		29" x 25-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2918DS).....	417.88	22.97
23 05 29 00-0561	EA		41" x 25-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB4118DS).....	434.44	22.97
23 05 29 00-0562	EA		53" x 25-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB5318DS).....	472.45	22.97
23 05 29 00-0563	EA		23" x 31-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2324DS).....	404.74	22.97
23 05 29 00-0564	EA		29" x 31-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2924DS).....	420.58	22.97
23 05 29 00-0565	EA		41" x 31-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB4124DS).....	437.14	22.97
23 05 29 00-0566	EA		53" x 31-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB5324DS).....	475.13	22.97
23 05 29 00-0567	EA		23" x 43-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2336DS).....	423.57	22.97
23 05 29 00-0568	EA		29" x 43-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2936DS).....	429.10	22.97
23 05 29 00-0569	EA		41" x 43-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB4136DS).....	445.33	22.97
23 05 29 00-0570	EA		53" x 43-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB5336DS).....	483.50	22.97
23 05 29 00-0571	EA		23" x 55-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2348DS).....	442.81	22.97
23 05 29 00-0572	EA		29" x 55-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB2948DS).....	447.85	22.97
23 05 29 00-0573	EA		41" x 55-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB4148DS).....	464.09	22.97
23 05 29 00-0574	EA		53" x 55-5/8" x 20.2" Rooftop Support Bases With Channel Support And Risers Assembly (Cooper B-Line Dura-Blok DB5348DS).....	502.25	22.97
23 05 29 00-0575			Threaded Rod, Accessories And Attachments (23 05 29)		
23 05 29 00-0576			Threaded Rod And Rod Accessories (23 05 29 00-0575)		
23 05 29 00-0577			Threaded Rod (23 05 29 00-0576) Note: Fully threaded.		
23 05 29 00-0578	LF		3/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod.....	5.15	0.72
			For Galvanized, Add	1.48	
			For Zinc Plated, Add	1.06	
			For Work In Restricted Working Space, Add	0.43	
23 05 29 00-0579	LF		1/2" Diameter, Plain Finish Steel, Low Carbon Threaded Rod.....	7.43	0.77
			For Galvanized, Add	2.36	
			For Zinc Plated, Add	1.68	
			For Work In Restricted Working Space, Add	0.46	
23 05 29 00-0580	LF		5/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod.....	10.72	0.80
			For Galvanized, Add	3.66	
			For Zinc Plated, Add	2.60	
			For Work In Restricted Working Space, Add	0.47	
23 05 29 00-0581	LF		3/4" Diameter, Plain Finish Steel, Low Carbon Threaded Rod.....	18.23	0.82
			For Galvanized, Add	6.64	
			For Zinc Plated, Add	4.73	
			For Work In Restricted Working Space, Add	0.49	
23 05 29 00-0582	LF		7/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod.....	19.93	0.85
			For Galvanized, Add	7.30	
			For Zinc Plated, Add	5.20	
			For Work In Restricted Working Space, Add	0.51	
23 05 29 00-0583	LF		1" Diameter, Plain Finish Steel, Low Carbon Threaded Rod.....	27.52	0.96
			For Galvanized, Add	10.24	
			For Zinc Plated, Add	7.30	
			For Work In Restricted Working Space, Add	0.57	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0584 LF 1-1/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	34.43	1.06
For Galvanized, Add	12.92	
For Zinc Plated, Add	9.21	
For Work In Restricted Working Space, Add	0.64	
23 05 29 00-0585 Rod Couplings (23 05 29 00-0576)		
23 05 29 00-0586 EA 3/8" Diameter, Threaded Rod Coupling Nut	8.87	
For Work In Restricted Working Space, Add	2.12	
23 05 29 00-0587 EA 1/2" Diameter, Threaded Rod Coupling Nut	10.10	
For Work In Restricted Working Space, Add	2.35	
23 05 29 00-0588 EA 5/8" Diameter, Threaded Rod Coupling Nut	12.85	
For Work In Restricted Working Space, Add	2.65	
23 05 29 00-0589 EA 3/4" Diameter, Threaded Rod Coupling Nut	15.92	
For Work In Restricted Working Space, Add	2.89	
23 05 29 00-0590 EA 7/8" Diameter, Threaded Rod Coupling Nut	24.14	
For Work In Restricted Working Space, Add	3.17	
23 05 29 00-0591 EA 1" Diameter, Threaded Rod Coupling Nut	28.65	
For Work In Restricted Working Space, Add	3.73	
23 05 29 00-0592 EA 1-1/8" Diameter, Threaded Rod Coupling Nut	57.01	
For Work In Restricted Working Space, Add	4.23	
23 05 29 00-0593 Flat Washers (23 05 29 00-0576)		
Note: Zinc plated.		
23 05 29 00-0594 EA 3/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	0.64	0.23
For Galvanized, Add	0.04	
For Work In Restricted Working Space, Add	0.14	
23 05 29 00-0595 EA 1/2" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	0.88	0.23
For Galvanized, Add	0.09	
For Work In Restricted Working Space, Add	0.16	
23 05 29 00-0596 EA 5/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	1.29	0.34
For Galvanized, Add	0.17	
For Work In Restricted Working Space, Add	0.19	
23 05 29 00-0597 EA 3/4" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	1.77	0.34
For Galvanized, Add	0.24	
For Work In Restricted Working Space, Add	0.25	
23 05 29 00-0598 EA 7/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	2.09	0.46
For Galvanized, Add	0.28	
For Work In Restricted Working Space, Add	0.29	
23 05 29 00-0599 EA 1" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	2.46	0.46
For Galvanized, Add	0.35	
For Work In Restricted Working Space, Add	0.32	
23 05 29 00-0600 EA 1-1/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	2.77	0.57
For Galvanized, Add	0.39	
For Work In Restricted Working Space, Add	0.36	
23 05 29 00-0601 Hex Nuts (23 05 29 00-0576)		
Note: Grade 2 and zinc plated.		
23 05 29 00-0602 EA 3/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.78	0.29
For Galvanized, Add	0.03	
For Work In Restricted Working Space, Add	0.20	
23 05 29 00-0603 EA 1/2" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.01	0.29
For Galvanized, Add	0.07	
For Work In Restricted Working Space, Add	0.22	
23 05 29 00-0604 EA 5/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.42	0.29
For Galvanized, Add	0.17	
For Work In Restricted Working Space, Add	0.23	
23 05 29 00-0605 EA 3/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.69	0.57
For Galvanized, Add	0.22	
For Work In Restricted Working Space, Add	0.24	
23 05 29 00-0606 EA 7/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	2.53	0.57
For Galvanized, Add	0.42	
For Work In Restricted Working Space, Add	0.26	
23 05 29 00-0607 EA 1" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	3.23	0.57
For Galvanized, Add	0.57	
For Work In Restricted Working Space, Add	0.29	
23 05 29 00-0608 EA 1-1/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	5.37	0.57
For Galvanized, Add	1.08	
For Work In Restricted Working Space, Add	0.32	
23 05 29 00-0609 Turnbuckle (Cooper B-Line B3202) (23 05 29 00-0576)		
Note: Type 13.		
23 05 29 00-0610 EA 3/8" Turnbuckle (Cooper B-Line B3202)	27.69	5.74
For Work In Restricted Working Space, Add	3.44	
23 05 29 00-0611 EA 1/2" Turnbuckle (Cooper B-Line B3202)	32.92	6.31
For Work In Restricted Working Space, Add	3.83	
23 05 29 00-0612 EA 5/8" Turnbuckle (Cooper B-Line B3202)	35.42	6.89
For Work In Restricted Working Space, Add	4.31	
23 05 29 00-0613 EA 3/4" Turnbuckle (Cooper B-Line B3202)	44.63	8.04
For Work In Restricted Working Space, Add	4.92	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 05 29 00-0614	EA	7/8" Turnbuckle (Cooper B-Line B3202).....	57.82	8.61
		<i>For Work In Restricted Working Space, Add</i>	5.74	
23 05 29 00-0615	EA	1" Turnbuckle (Cooper B-Line B3202).....	71.81	9.19
		<i>For Work In Restricted Working Space, Add</i>	6.89	
23 05 29 00-0616	EA	1-1/8" Turnbuckle (Cooper B-Line B3202).....	99.70	10.34
		<i>For Work In Restricted Working Space, Add</i>	8.62	
23 05 29 00-0617		Swivel Turnbuckle (Cooper B-Line B3224) (23 05 29 00-0576)		
		Note: Type 15.		
23 05 29 00-0618	EA	3/8" Swivel Turnbuckle (Cooper B-Line B3224).....	17.45	5.74
		<i>For Work In Restricted Working Space, Add</i>	3.44	
23 05 29 00-0619	EA	1/2" Swivel Turnbuckle (Cooper B-Line B3224).....	20.20	6.43
		<i>For Work In Restricted Working Space, Add</i>	3.83	
23 05 29 00-0620	EA	5/8" Swivel Turnbuckle (Cooper B-Line B3224).....	26.84	7.12
		<i>For Work In Restricted Working Space, Add</i>	4.31	
23 05 29 00-0621	EA	3/4" Swivel Turnbuckle (Cooper B-Line B3224).....	32.47	8.16
		<i>For Work In Restricted Working Space, Add</i>	4.92	
23 05 29 00-0622		Forged Steel Clevis (Cooper B-Line B3201) (23 05 29 00-0576)		
		Note: Type 14.		
23 05 29 00-0623	EA	3-9/16" Forged Steel Clevis With Pin, 3/8" To 5/8" Rod Size (Cooper B-Line B3201).....	92.70	10.58
		<i>For Work In Restricted Working Space, Add</i>	6.35	
23 05 29 00-0624	EA	4" Forged Steel Clevis With Pin, 3/4" To 7/8" Rod Size (Cooper B-Line B3201).....	136.95	11.10
		<i>For Work In Restricted Working Space, Add</i>	6.68	
23 05 29 00-0625	EA	5-1/16" Forged Steel Clevis With Pin, 1" Rod Size (Cooper B-Line B3201).....	148.13	11.63
		<i>For Work In Restricted Working Space, Add</i>	7.05	
23 05 29 00-0626	EA	5-1/16" Forged Steel Clevis With Pin, 1-1/8" Rod Size (Cooper B-Line B3201).....	154.24	12.68
		<i>For Work In Restricted Working Space, Add</i>	7.46	
23 05 29 00-0627	EA	5-1/16" Forged Steel Clevis With Pin, 1-1/4" Rod Size (Cooper B-Line B3201).....	162.30	14.28
		<i>For Work In Restricted Working Space, Add</i>	8.46	
23 05 29 00-0628	EA	6" Forged Steel Clevis With Pin, 1-1/2" Rod Size (Cooper B-Line B3201).....	270.68	18.51
		<i>For Work In Restricted Working Space, Add</i>	11.10	
23 05 29 00-0629	EA	5-15/16" Forged Steel Clevis With Pin, 1-3/4" Rod Size (Cooper B-Line B3201).....	293.74	21.15
		<i>For Work In Restricted Working Space, Add</i>	12.69	
23 05 29 00-0630	EA	7" Forged Steel Clevis With Pin, 2" Rod Size (Cooper B-Line B3201).....	346.21	26.44
		<i>For Work In Restricted Working Space, Add</i>	15.86	
23 05 29 00-0631		Welded Eye Rod (Cooper B-Line B3211) (23 05 29 00-0576)		
23 05 29 00-0632	EA	3/8" Diameter x 8" Length Shank, Welded Eye Rod.....	27.52	6.20
		<i>For Work In Restricted Working Space, Add</i>	3.73	
23 05 29 00-0633	EA	3/8" Diameter x 10" Length Shank, Welded Eye Rod.....	28.41	6.31
		<i>For Work In Restricted Working Space, Add</i>	3.80	
23 05 29 00-0634	EA	3/8" Diameter x 12" Length Shank, Welded Eye Rod.....	29.29	6.43
		<i>For Work In Restricted Working Space, Add</i>	3.88	
23 05 29 00-0635	EA	3/8" Diameter x 14" Length Shank, Welded Eye Rod.....	29.53	6.55
		<i>For Work In Restricted Working Space, Add</i>	3.95	
23 05 29 00-0636	EA	3/8" Diameter x 18" Length Shank, Welded Eye Rod.....	31.31	6.78
		<i>For Work In Restricted Working Space, Add</i>	4.09	
23 05 29 00-0637	EA	3/8" Diameter x 24" Length Shank, Welded Eye Rod.....	33.35	7.23
		<i>For Work In Restricted Working Space, Add</i>	4.31	
23 05 29 00-0638	EA	3/8" Diameter x 30" Length Shank, Welded Eye Rod.....	34.71	7.58
		<i>For Work In Restricted Working Space, Add</i>	4.52	
23 05 29 00-0639	EA	3/8" Diameter x 36" Length Shank, Welded Eye Rod.....	37.41	7.92
		<i>For Work In Restricted Working Space, Add</i>	4.74	
23 05 29 00-0640	EA	3/8" Diameter x 42" Length Shank, Welded Eye Rod.....	39.43	8.27
		<i>For Work In Restricted Working Space, Add</i>	4.95	
23 05 29 00-0641	EA	3/8" Diameter x 48" Length Shank, Welded Eye Rod.....	41.46	8.61
		<i>For Work In Restricted Working Space, Add</i>	5.17	
23 05 29 00-0642	EA	1/2" Diameter x 8" Length Shank, Welded Eye Rod.....	36.69	6.89
		<i>For Work In Restricted Working Space, Add</i>	4.13	
23 05 29 00-0643	EA	1/2" Diameter x 10" Length Shank, Welded Eye Rod.....	37.58	7.01
		<i>For Work In Restricted Working Space, Add</i>	4.21	
23 05 29 00-0644	EA	1/2" Diameter x 12" Length Shank, Welded Eye Rod.....	38.51	7.12
		<i>For Work In Restricted Working Space, Add</i>	4.28	
23 05 29 00-0645	EA	1/2" Diameter x 14" Length Shank, Welded Eye Rod.....	39.42	7.23
		<i>For Work In Restricted Working Space, Add</i>	4.36	
23 05 29 00-0646	EA	1/2" Diameter x 18" Length Shank, Welded Eye Rod.....	41.24	7.46
		<i>For Work In Restricted Working Space, Add</i>	4.52	
23 05 29 00-0647	EA	1/2" Diameter x 24" Length Shank, Welded Eye Rod.....	44.62	7.93
		<i>For Work In Restricted Working Space, Add</i>	4.74	
23 05 29 00-0648	EA	1/2" Diameter x 30" Length Shank, Welded Eye Rod.....	47.35	8.27
		<i>For Work In Restricted Working Space, Add</i>	4.97	
23 05 29 00-0649	EA	1/2" Diameter x 36" Length Shank, Welded Eye Rod.....	50.74	8.61
		<i>For Work In Restricted Working Space, Add</i>	5.20	
23 05 29 00-0650	EA	1/2" Diameter x 42" Length Shank, Welded Eye Rod.....	53.44	9.08
		<i>For Work In Restricted Working Space, Add</i>	5.43	
23 05 29 00-0651	EA	1/2" Diameter x 48" Length Shank, Welded Eye Rod.....	56.19	9.42
		<i>For Work In Restricted Working Space, Add</i>	5.66	
23 05 29 00-0652	EA	5/8" Diameter x 8" Length Shank, Welded Eye Rod.....	49.46	7.70
		<i>For Work In Restricted Working Space, Add</i>	4.62	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0653 EA 5/8" Diameter x 10" Length Shank, Welded Eye Rod.....	51.01	7.81
For Work In Restricted Working Space, Add	4.70	
23 05 29 00-0654 EA 5/8" Diameter x 12" Length Shank, Welded Eye Rod.....	52.62	7.93
For Work In Restricted Working Space, Add	4.79	
23 05 29 00-0655 EA 5/8" Diameter x 14" Length Shank, Welded Eye Rod.....	53.54	8.16
For Work In Restricted Working Space, Add	4.86	
23 05 29 00-0656 EA 5/8" Diameter x 18" Length Shank, Welded Eye Rod.....	56.02	8.38
For Work In Restricted Working Space, Add	5.02	
23 05 29 00-0657 EA 5/8" Diameter x 24" Length Shank, Welded Eye Rod.....	60.09	8.73
For Work In Restricted Working Space, Add	5.26	
23 05 29 00-0658 EA 5/8" Diameter x 30" Length Shank, Welded Eye Rod.....	64.15	9.19
For Work In Restricted Working Space, Add	5.50	
23 05 29 00-0659 EA 5/8" Diameter x 36" Length Shank, Welded Eye Rod.....	67.55	9.53
For Work In Restricted Working Space, Add	5.73	
23 05 29 00-0660 EA 5/8" Diameter x 42" Length Shank, Welded Eye Rod.....	71.63	9.99
For Work In Restricted Working Space, Add	5.97	
23 05 29 00-0661 EA 5/8" Diameter x 48" Length Shank, Welded Eye Rod.....	75.68	10.34
For Work In Restricted Working Space, Add	6.21	
23 05 29 00-0662 EA 3/4" Diameter x 8" Length Shank, Welded Eye Rod.....	60.72	8.73
For Work In Restricted Working Space, Add	5.26	
23 05 29 00-0663 EA 3/4" Diameter x 10" Length Shank, Welded Eye Rod.....	62.96	8.84
For Work In Restricted Working Space, Add	5.33	
23 05 29 00-0664 EA 3/4" Diameter x 12" Length Shank, Welded Eye Rod.....	64.53	9.08
For Work In Restricted Working Space, Add	5.42	
23 05 29 00-0665 EA 3/4" Diameter x 14" Length Shank, Welded Eye Rod.....	66.77	9.19
For Work In Restricted Working Space, Add	5.50	
23 05 29 00-0666 EA 3/4" Diameter x 18" Length Shank, Welded Eye Rod.....	70.59	9.42
For Work In Restricted Working Space, Add	5.66	
23 05 29 00-0667 EA 3/4" Diameter x 24" Length Shank, Welded Eye Rod.....	75.97	9.88
For Work In Restricted Working Space, Add	5.90	
23 05 29 00-0668 EA 3/4" Diameter x 30" Length Shank, Welded Eye Rod.....	81.37	10.22
For Work In Restricted Working Space, Add	6.15	
23 05 29 00-0669 EA 3/4" Diameter x 36" Length Shank, Welded Eye Rod.....	87.44	10.68
For Work In Restricted Working Space, Add	6.40	
23 05 29 00-0670 EA 3/4" Diameter x 42" Length Shank, Welded Eye Rod.....	93.46	11.03
For Work In Restricted Working Space, Add	6.64	
23 05 29 00-0671 EA 3/4" Diameter x 48" Length Shank, Welded Eye Rod.....	98.87	11.48
For Work In Restricted Working Space, Add	6.89	
23 05 29 00-0672 EA 7/8" Diameter x 8" Length Shank, Welded Eye Rod.....	72.68	10.10
For Work In Restricted Working Space, Add	6.10	
23 05 29 00-0673 EA 7/8" Diameter x 10" Length Shank, Welded Eye Rod.....	75.57	10.34
For Work In Restricted Working Space, Add	6.18	
23 05 29 00-0674 EA 7/8" Diameter x 12" Length Shank, Welded Eye Rod.....	77.83	10.46
For Work In Restricted Working Space, Add	6.26	
23 05 29 00-0675 EA 7/8" Diameter x 14" Length Shank, Welded Eye Rod.....	80.08	10.57
For Work In Restricted Working Space, Add	6.35	
23 05 29 00-0676 EA 7/8" Diameter x 18" Length Shank, Welded Eye Rod.....	84.58	10.91
For Work In Restricted Working Space, Add	6.52	
23 05 29 00-0677 EA 7/8" Diameter x 24" Length Shank, Welded Eye Rod.....	91.97	11.25
For Work In Restricted Working Space, Add	6.77	
23 05 29 00-0678 EA 7/8" Diameter x 30" Length Shank, Welded Eye Rod.....	98.70	11.72
For Work In Restricted Working Space, Add	7.03	
23 05 29 00-0679 EA 7/8" Diameter x 36" Length Shank, Welded Eye Rod.....	106.10	12.18
For Work In Restricted Working Space, Add	7.29	
23 05 29 00-0680 EA 7/8" Diameter x 42" Length Shank, Welded Eye Rod.....	112.84	12.52
For Work In Restricted Working Space, Add	7.54	
23 05 29 00-0681 EA 7/8" Diameter x 48" Length Shank, Welded Eye Rod.....	119.58	12.97
For Work In Restricted Working Space, Add	7.79	
23 05 29 00-0682 EA 1" Diameter x 8" Length Shank, Welded Eye Rod.....	91.02	12.18
For Work In Restricted Working Space, Add	7.28	
23 05 29 00-0683 EA 1" Diameter x 10" Length Shank, Welded Eye Rod.....	93.96	12.29
For Work In Restricted Working Space, Add	7.37	
23 05 29 00-0684 EA 1" Diameter x 12" Length Shank, Welded Eye Rod.....	96.90	12.40
For Work In Restricted Working Space, Add	7.47	
23 05 29 00-0685 EA 1" Diameter x 14" Length Shank, Welded Eye Rod.....	99.83	12.63
For Work In Restricted Working Space, Add	7.56	
23 05 29 00-0686 EA 1" Diameter x 18" Length Shank, Welded Eye Rod.....	105.69	12.97
For Work In Restricted Working Space, Add	7.76	
23 05 29 00-0687 EA 1" Diameter x 24" Length Shank, Welded Eye Rod.....	114.51	13.44
For Work In Restricted Working Space, Add	8.04	
23 05 29 00-0688 EA 1" Diameter x 30" Length Shank, Welded Eye Rod.....	123.34	13.90
For Work In Restricted Working Space, Add	8.33	
23 05 29 00-0689 EA 1" Diameter x 36" Length Shank, Welded Eye Rod.....	132.77	14.35
For Work In Restricted Working Space, Add	8.62	
23 05 29 00-0690 EA 1" Diameter x 42" Length Shank, Welded Eye Rod.....	141.58	14.82
For Work In Restricted Working Space, Add	8.90	
23 05 29 00-0691 EA 1" Diameter x 48" Length Shank, Welded Eye Rod.....	150.41	15.28
For Work In Restricted Working Space, Add	9.19	
23 05 29 00-0692 Welded Linked Eye Rod (Cooper B-Line B3211X) (23 05 29 00-0576)		
23 05 29 00-0693 EA 3/8" Diameter x 16" Length Shank, Linked Welded Eye Rod.....	57.39	8.38
For Work In Restricted Working Space, Add	5.06	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0694	EA		3/8" Diameter x 20" Length Shank, Linked Welded Eye Rod.....	58.94	8.61
			<i>For Work In Restricted Working Space, Add</i>	5.20	
23 05 29 00-0695	EA		3/8" Diameter x 24" Length Shank, Linked Welded Eye Rod.....	60.49	8.95
			<i>For Work In Restricted Working Space, Add</i>	5.34	
23 05 29 00-0696	EA		3/8" Diameter x 30" Length Shank, Linked Welded Eye Rod.....	61.22	9.30
			<i>For Work In Restricted Working Space, Add</i>	5.56	
23 05 29 00-0697	EA		3/8" Diameter x 36" Length Shank, Linked Welded Eye Rod.....	64.09	9.65
			<i>For Work In Restricted Working Space, Add</i>	5.77	
23 05 29 00-0698	EA		3/8" Diameter x 48" Length Shank, Linked Welded Eye Rod.....	67.74	10.33
			<i>For Work In Restricted Working Space, Add</i>	6.20	
23 05 29 00-0699	EA		3/8" Diameter x 60" Length Shank, Linked Welded Eye Rod.....	70.25	11.03
			<i>For Work In Restricted Working Space, Add</i>	6.63	
23 05 29 00-0700	EA		3/8" Diameter x 72" Length Shank, Linked Welded Eye Rod.....	74.98	11.82
			<i>For Work In Restricted Working Space, Add</i>	7.06	
23 05 29 00-0701	EA		1/2" Diameter x 16" Length Shank, Linked Welded Eye Rod.....	74.12	9.31
			<i>For Work In Restricted Working Space, Add</i>	5.58	
23 05 29 00-0702	EA		1/2" Diameter x 20" Length Shank, Linked Welded Eye Rod.....	75.71	9.53
			<i>For Work In Restricted Working Space, Add</i>	5.74	
23 05 29 00-0703	EA		1/2" Diameter x 24" Length Shank, Linked Welded Eye Rod.....	77.35	9.76
			<i>For Work In Restricted Working Space, Add</i>	5.89	
23 05 29 00-0704	EA		1/2" Diameter x 30" Length Shank, Linked Welded Eye Rod.....	79.20	10.22
			<i>For Work In Restricted Working Space, Add</i>	6.12	
23 05 29 00-0705	EA		1/2" Diameter x 36" Length Shank, Linked Welded Eye Rod.....	82.11	10.57
			<i>For Work In Restricted Working Space, Add</i>	6.35	
23 05 29 00-0706	EA		1/2" Diameter x 48" Length Shank, Linked Welded Eye Rod.....	88.02	11.37
			<i>For Work In Restricted Working Space, Add</i>	6.81	
23 05 29 00-0707	EA		1/2" Diameter x 60" Length Shank, Linked Welded Eye Rod.....	92.84	12.06
			<i>For Work In Restricted Working Space, Add</i>	7.27	
23 05 29 00-0708	EA		1/2" Diameter x 72" Length Shank, Linked Welded Eye Rod.....	98.73	12.86
			<i>For Work In Restricted Working Space, Add</i>	7.72	
23 05 29 00-0709	EA		5/8" Diameter x 16" Length Shank, Linked Welded Eye Rod.....	99.16	10.34
			<i>For Work In Restricted Working Space, Add</i>	6.23	
23 05 29 00-0710	EA		5/8" Diameter x 20" Length Shank, Linked Welded Eye Rod.....	101.84	10.68
			<i>For Work In Restricted Working Space, Add</i>	6.39	
23 05 29 00-0711	EA		5/8" Diameter x 24" Length Shank, Linked Welded Eye Rod.....	104.58	10.91
			<i>For Work In Restricted Working Space, Add</i>	6.55	
23 05 29 00-0712	EA		5/8" Diameter x 30" Length Shank, Linked Welded Eye Rod.....	106.46	11.37
			<i>For Work In Restricted Working Space, Add</i>	6.79	
23 05 29 00-0713	EA		5/8" Diameter x 36" Length Shank, Linked Welded Eye Rod.....	110.52	11.72
			<i>For Work In Restricted Working Space, Add</i>	7.03	
23 05 29 00-0714	EA		5/8" Diameter x 48" Length Shank, Linked Welded Eye Rod.....	117.56	12.52
			<i>For Work In Restricted Working Space, Add</i>	7.50	
23 05 29 00-0715	EA		5/8" Diameter x 60" Length Shank, Linked Welded Eye Rod.....	124.59	13.33
			<i>For Work In Restricted Working Space, Add</i>	7.98	
23 05 29 00-0716	EA		5/8" Diameter x 72" Length Shank, Linked Welded Eye Rod.....	130.54	14.13
			<i>For Work In Restricted Working Space, Add</i>	8.45	
23 05 29 00-0717	EA		3/4" Diameter x 16" Length Shank, Linked Welded Eye Rod.....	125.33	11.72
			<i>For Work In Restricted Working Space, Add</i>	7.06	
23 05 29 00-0718	EA		3/4" Diameter x 20" Length Shank, Linked Welded Eye Rod.....	129.20	12.06
			<i>For Work In Restricted Working Space, Add</i>	7.22	
23 05 29 00-0719	EA		3/4" Diameter x 24" Length Shank, Linked Welded Eye Rod.....	131.90	12.29
			<i>For Work In Restricted Working Space, Add</i>	7.39	
23 05 29 00-0720	EA		3/4" Diameter x 30" Length Shank, Linked Welded Eye Rod.....	135.99	12.75
			<i>For Work In Restricted Working Space, Add</i>	7.63	
23 05 29 00-0721	EA		3/4" Diameter x 36" Length Shank, Linked Welded Eye Rod.....	142.26	13.10
			<i>For Work In Restricted Working Space, Add</i>	7.88	
23 05 29 00-0722	EA		3/4" Diameter x 48" Length Shank, Linked Welded Eye Rod.....	151.49	13.90
			<i>For Work In Restricted Working Space, Add</i>	8.36	
23 05 29 00-0723	EA		3/4" Diameter x 60" Length Shank, Linked Welded Eye Rod.....	160.77	14.71
			<i>For Work In Restricted Working Space, Add</i>	8.85	
23 05 29 00-0724	EA		3/4" Diameter x 72" Length Shank, Linked Welded Eye Rod.....	171.14	15.62
			<i>For Work In Restricted Working Space, Add</i>	9.34	
23 05 29 00-0725	EA		7/8" Diameter x 16" Length Shank, Linked Welded Eye Rod.....	150.54	13.56
			<i>For Work In Restricted Working Space, Add</i>	8.16	
23 05 29 00-0726	EA		7/8" Diameter x 20" Length Shank, Linked Welded Eye Rod.....	155.47	13.90
			<i>For Work In Restricted Working Space, Add</i>	8.33	
23 05 29 00-0727	EA		7/8" Diameter x 24" Length Shank, Linked Welded Eye Rod.....	159.32	14.13
			<i>For Work In Restricted Working Space, Add</i>	8.50	
23 05 29 00-0728	EA		7/8" Diameter x 30" Length Shank, Linked Welded Eye Rod.....	163.42	14.59
			<i>For Work In Restricted Working Space, Add</i>	8.75	
23 05 29 00-0729	EA		7/8" Diameter x 36" Length Shank, Linked Welded Eye Rod.....	170.86	15.05
			<i>For Work In Restricted Working Space, Add</i>	9.01	
23 05 29 00-0730	EA		7/8" Diameter x 48" Length Shank, Linked Welded Eye Rod.....	183.45	15.86
			<i>For Work In Restricted Working Space, Add</i>	9.52	
23 05 29 00-0731	EA		7/8" Diameter x 60" Length Shank, Linked Welded Eye Rod.....	194.95	16.77
			<i>For Work In Restricted Working Space, Add</i>	10.03	
23 05 29 00-0732	EA		7/8" Diameter x 72" Length Shank, Linked Welded Eye Rod.....	207.56	17.58
			<i>For Work In Restricted Working Space, Add</i>	10.54	
23 05 29 00-0733	EA		1" Diameter x 16" Length Shank, Linked Welded Eye Rod.....	191.73	16.20
			<i>For Work In Restricted Working Space, Add</i>	9.73	
23 05 29 00-0734	EA		1" Diameter x 20" Length Shank, Linked Welded Eye Rod.....	196.74	16.54
			<i>For Work In Restricted Working Space, Add</i>	9.92	
23 05 29 00-0735	EA		1" Diameter x 24" Length Shank, Linked Welded Eye Rod.....	201.74	16.88
			<i>For Work In Restricted Working Space, Add</i>	10.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0736 EA 1" Diameter x 30" Length Shank, Linked Welded Eye Rod <i>For Work In Restricted Working Space, Add</i>	207.07 10.40	17.35
23 05 29 00-0737 EA 1" Diameter x 36" Length Shank, Linked Welded Eye Rod <i>For Work In Restricted Working Space, Add</i>	216.71 10.68	17.80
23 05 29 00-0738 EA 1" Diameter x 48" Length Shank, Linked Welded Eye Rod <i>For Work In Restricted Working Space, Add</i>	231.74 11.26	18.73
23 05 29 00-0739 EA 1" Diameter x 60" Length Shank, Linked Welded Eye Rod <i>For Work In Restricted Working Space, Add</i>	246.78 11.84	19.75
23 05 29 00-0740 EA 1" Diameter x 72" Length Shank, Linked Welded Eye Rod <i>For Work In Restricted Working Space, Add</i>	262.80 12.41	20.67
23 05 29 00-0741 Attachments <small>(23 05 29 00-0575)</small>		
23 05 29 00-0742 Welded Beam Attachments (B-Line B-3083) <small>(23 05 29 00-0741)</small>		
<small>Note: Type 22.</small>		
23 05 29 00-0743 EA 3/8" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	49.19 6.44	10.73
23 05 29 00-0744 EA 1/2" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	52.50 6.78	11.27
23 05 29 00-0745 EA 5/8" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	55.91 7.15	11.91
23 05 29 00-0746 EA 3/4" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	71.68 7.57	12.66
23 05 29 00-0747 EA 7/8" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	86.26 8.05	13.41
23 05 29 00-0748 EA 1" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	121.40 9.20	15.35
23 05 29 00-0749 EA 1-1/8" Rod Size, Welded Beam Attachment With Pin (B-Line B-3083) <i>For Work In Restricted Working Space, Add</i>	172.68 9.66	16.09
23 05 29 00-0750 C-Clamp Style Beam Clamps (B-Line B-3034) <small>(23 05 29 00-0741)</small>		
<small>Note: Type 23. Top or bottom flange mount.</small>		
23 05 29 00-0751 EA 3/8" Rod Size, C-Clamp Style Beam Clamp (B-Line B-3034) <i>For Work In Restricted Working Space, Add</i>	17.74 4.31	5.86
23 05 29 00-0752 EA 1/2" Rod Size, C-Clamp Style Beam Clamp (B-Line B-3034) <i>For Work In Restricted Working Space, Add</i>	21.18 4.59	7.46
23 05 29 00-0753 EA 5/8" Rod Size, C-Clamp Style Beam Clamp (B-Line B-3034) <i>For Work In Restricted Working Space, Add</i>	24.05 4.92	8.04
23 05 29 00-0754 EA 3/4" Rod Size, C-Clamp Style Beam Clamp (B-Line B-3034) <i>For Work In Restricted Working Space, Add</i>	30.92 5.30	8.61
23 05 29 00-0755 EA 7/8" Rod Size, C-Clamp Style Beam Clamp (B-Line B-3034) <i>For Work In Restricted Working Space, Add</i>	44.88 5.74	9.19
23 05 29 00-0756 Bottom Mount I-Beam Clamps (B-Line B-3055) <small>(23 05 29 00-0741)</small>		
<small>Note: Type 21. For attaching threaded rod centered under beam flanges.</small>		
23 05 29 00-0757 EA 3/8" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp (B-Line B-3055) <i>For Work In Restricted Working Space, Add</i>	48.91 5.74	8.04
23 05 29 00-0758 EA 1/2" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp (B-Line B-3055) <i>For Work In Restricted Working Space, Add</i>	71.91 6.26	10.34
23 05 29 00-0759 EA 5/8" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp (B-Line B-3055) <i>For Work In Restricted Working Space, Add</i>	102.77 6.89	11.48
23 05 29 00-0760 EA 3/4" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp (B-Line B-3055) <i>For Work In Restricted Working Space, Add</i>	123.01 7.66	12.63
23 05 29 00-0761 EA 1" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp (B-Line B-3055) <i>For Work In Restricted Working Space, Add</i>	297.88 8.62	13.78
23 05 29 00-0762 Steel U-Bolts (B-Line B-3188) <small>(23 05 29 00-0741)</small>		
<small>Note: Type 24. Includes plate and nuts.</small>		
23 05 29 00-0763 EA 1/2" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	14.46 3.44	2.87
23 05 29 00-0764 EA 3/4" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	15.69 3.62	3.44
23 05 29 00-0765 EA 1" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	16.89 3.83	3.44
23 05 29 00-0766 EA 1-1/4" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	19.20 4.05	3.44
23 05 29 00-0767 EA 1-1/2" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	19.83 4.31	4.02
23 05 29 00-0768 EA 2" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	21.23 4.59	4.02
23 05 29 00-0769 EA 2-1/2" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	30.58 4.92	4.02
23 05 29 00-0770 EA 3" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	33.71 5.30	4.59
23 05 29 00-0771 EA 4" Pipe Size, Steel U-Bolt (B-Line B-3188) <i>For Work In Restricted Working Space, Add</i>	40.73 5.74	5.17
23 05 29 00-0772 Copper Standoff Brackets With Flange <small>(23 05 29 00-0741)</small>		
<small>Note: Installed in wood, concrete, concrete block or steel.</small>		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 05 29 00-0773	EA Clamp Size 1/2", Copper Standoff Brackets With Flange <i>For Work In Restricted Working Space, Add</i>	34.68 9.85	16.43
23 05 29 00-0774	EA Clamp Size 3/4", Copper Standoff Brackets With Flange <i>For Work In Restricted Working Space, Add</i>	34.79 9.85	16.43
23 05 29 00-0775	EA Clamp Size 1", Copper Standoff Brackets With Flange <i>For Work In Restricted Working Space, Add</i>	34.90 9.85	16.43
23 05 29 00-0776	EA Clamp Size 1 1/4", Copper Standoff Brackets With Flange <i>For Work In Restricted Working Space, Add</i>	37.11 10.44	17.46
23 05 29 00-0777	EA Clamp Size 1 1/2", Copper Standoff Brackets With Flange <i>For Work In Restricted Working Space, Add</i>	37.33 10.44	17.46
23 05 29 00-0778	Malleable Iron Eye Sockets (B-Line B-3222) (23 05 29 00-0741) Note: Type 16.		
23 05 29 00-0779	EA 3/8" Rod Size, Malleable Iron Eye Socket <i>For Work In Restricted Working Space, Add</i>	11.00 1.05	1.72
23 05 29 00-0780	EA 1/2" Rod Size, Malleable Iron Eye Socket <i>For Work In Restricted Working Space, Add</i>	14.01 1.38	2.30
23 05 29 00-0781	EA 5/8" Rod Size, Malleable Iron Eye Socket <i>For Work In Restricted Working Space, Add</i>	23.98 1.39	2.30
23 05 29 00-0782	EA 3/4" Rod Size, Malleable Iron Eye Socket <i>For Work In Restricted Working Space, Add</i>	33.74 1.38	2.30
23 05 29 00-0783	EA 7/8" Rod Size, Malleable Iron Eye Socket <i>For Work In Restricted Working Space, Add</i>	36.46 1.72	2.87
23 05 29 00-0784	Steel Weldless Eye Nuts (B-Line B-3200) (23 05 29 00-0741) Note: Type 17.		
23 05 29 00-0785	EA 3/8" Rod Size, Steel Weldless Eye Nut <i>For Work In Restricted Working Space, Add</i>	35.56 1.05	1.72
23 05 29 00-0786	EA 1/2" Rod Size, Steel Weldless Eye Nut <i>For Work In Restricted Working Space, Add</i>	36.66 1.38	2.30
23 05 29 00-0787	EA 5/8" Rod Size, Steel Weldless Eye Nut <i>For Work In Restricted Working Space, Add</i>	36.71 1.39	2.30
23 05 29 00-0788	EA 3/4" Rod Size, Steel Weldless Eye Nut <i>For Work In Restricted Working Space, Add</i>	36.66 1.38	2.30
23 05 29 00-0789	EA 7/8" Rod Size, Steel Weldless Eye Nut <i>For Work In Restricted Working Space, Add</i>	71.35 1.55	2.53
23 05 29 00-0790	EA 1" Rod Size, Steel Weldless Eye Nut <i>For Work In Restricted Working Space, Add</i>	71.92 1.72	2.87
23 05 29 00-0791	Top Mount I-Beam Clamps (B-Line B-3042) (23 05 29 00-0741) Note: For attaching threaded rod to either side of an I-beam.		
23 05 29 00-0792	EA 3/8" Rod Size, Up To 6" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	24.35 3.22	5.36
23 05 29 00-0793	EA 1/2" Rod Size, Up To 6" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	29.25 3.55	5.90
23 05 29 00-0794	EA 5/8" Rod Size, Up To 6" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	35.41 3.90	6.44
23 05 29 00-0795	EA 3/4" Rod Size, Up To 6" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	48.55 4.10	6.97
23 05 29 00-0796	EA 7/8" Rod Size, Up To 6" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	74.37 4.83	8.05
23 05 29 00-0797	EA 3/8" Rod Size, >6" To 8" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	25.61 3.22	5.36
23 05 29 00-0798	EA 1/2" Rod Size, >6" To 8" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	31.04 3.55	5.90
23 05 29 00-0799	EA 5/8" Rod Size, >6" To 8" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	35.41 3.90	6.44
23 05 29 00-0800	EA 3/4" Rod Size, >6" To 8" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	53.25 4.10	6.97
23 05 29 00-0801	EA 7/8" Rod Size, >6" To 8" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	82.40 4.83	8.05
23 05 29 00-0802	EA 3/8" Rod Size, >8" To 12" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	28.55 3.22	5.36
23 05 29 00-0803	EA 1/2" Rod Size, >8" To 12" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	34.35 3.55	5.90
23 05 29 00-0804	EA 5/8" Rod Size, >8" To 12" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	43.15 3.90	6.44
23 05 29 00-0805	EA 3/4" Rod Size, >8" To 12" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	62.04 4.10	6.97
23 05 29 00-0806	EA 7/8" Rod Size, >8" To 12" Flange Width, Top Mount I-Beam Clamp <i>For Work In Restricted Working Space, Add</i>	99.58 4.83	8.05
23 05 29 00-0807	Side Beam Brackets (B-Line B-3062) (23 05 29 00-0741) Note: Type 34.		
23 05 29 00-0808	EA 3/8" Rod Size, Side Beam Bracket <i>For Work In Restricted Working Space, Add</i>	19.83 4.31	7.46
23 05 29 00-0809	EA 1/2" Rod Size, Side Beam Bracket <i>For Work In Restricted Working Space, Add</i>	23.45 4.59	7.46
23 05 29 00-0810	EA 5/8" Rod Size, Side Beam Bracket <i>For Work In Restricted Working Space, Add</i>	30.29 4.92	8.04



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0811 EA 3/4" Rod Size, Side Beam Bracket <i>For Work In Restricted Working Space, Add</i>	53.56 5.30	8.61
23 05 29 00-0812 EA 7/8" Rod Size, Side Beam Bracket <i>For Work In Restricted Working Space, Add</i>	62.67 5.74	9.76
23 05 29 00-0813 Hex Lag Bolts (23 05 29 00-0741) Note: Also known as coach screws.		
23 05 29 00-0814 EA 3/8" x 3-1/2" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	3.65 0.72	
23 05 29 00-0815 EA 3/8" x 4" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	3.32 0.74	
23 05 29 00-0816 EA 3/8" x 6" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	3.79 0.77	
23 05 29 00-0817 EA 3/8" x 8" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	4.65 0.80	
23 05 29 00-0818 EA 3/8" x 10" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	4.97 0.83	
23 05 29 00-0819 EA 3/8" x 12" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	7.90 0.86	
23 05 29 00-0820 EA 1/2" x 3-1/2" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	5.28 0.86	
23 05 29 00-0821 EA 1/2" x 4" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	4.62 0.90	
23 05 29 00-0822 EA 1/2" x 6" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	5.46 0.94	
23 05 29 00-0823 EA 1/2" x 8" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	6.40 0.98	
23 05 29 00-0824 EA 1/2" x 10" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	7.64 1.02	
23 05 29 00-0825 EA 1/2" x 12" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	8.21 1.07	
23 05 29 00-0826 EA 5/8" x 4" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	7.88 0.96	
23 05 29 00-0827 EA 3/4" x 5" Long, Hex Lag Bolt <i>For Work In Restricted Working Space, Add</i>	9.57 0.98	
23 05 29 00-0828 Hanger Strap (23 05 29 00-0575)		
23 05 29 00-0829 LF 3/4" Wide x 0.025" Thick Galvanized Hanger Strap.....	5.57	
23 05 29 00-0830 Shields And Saddles (23 05 29)		
23 05 29 00-0831 Insulation Protection Shield (23 05 29 00-0830) Note: Type 40.		
23 05 29 00-0832 Insulation Protection Shield (Cooper B-Line B3151) (23 05 29 00-0831)		
23 05 29 00-0833 EA 1-1/2" Outside Diameter, 18 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	15.92 2.76	2.76
23 05 29 00-0834 EA 2" Outside Diameter, 18 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	16.16 2.79	2.79
23 05 29 00-0835 EA 2-1/2" Outside Diameter, 18 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	16.55 2.83	2.83
23 05 29 00-0836 EA 3" Outside Diameter, 18 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	17.31 2.86	2.86
23 05 29 00-0837 EA 4" Outside Diameter, 18 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	19.13 2.93	2.93
23 05 29 00-0838 EA 6" Outside Diameter, 18 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	23.28 3.00	3.00
23 05 29 00-0839 EA 8" Outside Diameter, 16 Gauge Insulation Protection Shield, 18" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	27.03 3.07	3.06
23 05 29 00-0840 EA 10" Outside Diameter, 16 Gauge Insulation Protection Shield, 18" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	32.98 3.14	3.13
23 05 29 00-0841 EA 12" Outside Diameter, 14 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	42.25 3.17	3.17
23 05 29 00-0842 EA 14" Outside Diameter, 14 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	45.99 3.20	3.20
23 05 29 00-0843 EA 16" Outside Diameter, 14 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	63.18 3.24	3.24
23 05 29 00-0844 EA 18" Outside Diameter, 14 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	70.94 3.27	3.27
23 05 29 00-0845 EA 20" Outside Diameter, 12 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	131.31 3.31	3.30
23 05 29 00-0846 EA 24" Outside Diameter, 12 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	142.70 3.38	3.37
23 05 29 00-0847 EA 30" Outside Diameter, 12 Gauge Insulation Protection Shield, 24" Length (Cooper B-Line B3151)..... <i>For Work In Restricted Working Space, Add</i>	172.40 3.44	3.45
23 05 29 00-0848 Insulation Protection Shield (Cooper B-Line B3154) (23 05 29 00-0831)		
23 05 29 00-0849 EA 1-1/2" Outside Diameter, 18 Gauge Insulation Protection Shield, 8" Length (Cooper B-Line B3154)..... <i>For Work In Restricted Working Space, Add</i>	14.07 2.76	2.76

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0850	EA		2" Outside Diameter, 18 Gauge Insulation Protection Shield, 8" Length (Cooper B-Line B3154).....	14.28	2.79
			<i>For Work In Restricted Working Space, Add</i>	2.79	
23 05 29 00-0851	EA		2-1/2" Outside Diameter, 18 Gauge Insulation Protection Shield, 8" Length (Cooper B-Line B3154).....	14.59	2.83
			<i>For Work In Restricted Working Space, Add</i>	2.83	
23 05 29 00-0852	EA		3" Outside Diameter, 18 Gauge Insulation Protection Shield, 8" Length (Cooper B-Line B3154).....	15.17	2.86
			<i>For Work In Restricted Working Space, Add</i>	2.86	
23 05 29 00-0853	EA		4" Outside Diameter, 18 Gauge Insulation Protection Shield, 8" Length (Cooper B-Line B3154).....	16.55	2.93
			<i>For Work In Restricted Working Space, Add</i>	2.93	
23 05 29 00-0854	EA		6" Outside Diameter, 18 Gauge Insulation Protection Shield, 8" Length (Cooper B-Line B3154).....	19.63	3.00
			<i>For Work In Restricted Working Space, Add</i>	3.00	
23 05 29 00-0855	EA		8" Outside Diameter, 16 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3154).....	21.08	3.06
			<i>For Work In Restricted Working Space, Add</i>	3.07	
23 05 29 00-0856	EA		10" Outside Diameter, 16 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3154).....	26.79	3.13
			<i>For Work In Restricted Working Space, Add</i>	3.14	
23 05 29 00-0857	EA		12" Outside Diameter, 14 Gauge Insulation Protection Shield, 12" Length (Cooper B-Line B3154).....	32.08	3.17
			<i>For Work In Restricted Working Space, Add</i>	3.17	
23 05 29 00-0858			Pipe Covering Protection Saddle <small>(23 05 29 00-0830)</small>		
			Note: Sizes are pipe sizes.		
23 05 29 00-0859			Saddle, For 1" Insulation (Cooper B-Line B3160) <small>(23 05 29 00-0858)</small>		
23 05 29 00-0860	EA		3/4" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	24.42	3.80
			<i>For Work In Restricted Working Space, Add</i>	3.80	
23 05 29 00-0861	EA		1" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	24.53	3.83
			<i>For Work In Restricted Working Space, Add</i>	3.83	
23 05 29 00-0862	EA		1-1/4" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	24.63	3.86
			<i>For Work In Restricted Working Space, Add</i>	3.86	
23 05 29 00-0863	EA		1-1/2" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	25.85	3.93
			<i>For Work In Restricted Working Space, Add</i>	3.93	
23 05 29 00-0864	EA		2" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	25.96	3.96
			<i>For Work In Restricted Working Space, Add</i>	3.96	
23 05 29 00-0865	EA		2-1/2" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	26.81	4.03
			<i>For Work In Restricted Working Space, Add</i>	4.02	
23 05 29 00-0866	EA		3" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	29.81	4.09
			<i>For Work In Restricted Working Space, Add</i>	4.09	
23 05 29 00-0867	EA		4" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	33.44	4.15
			<i>For Work In Restricted Working Space, Add</i>	4.15	
23 05 29 00-0868	EA		6" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	37.59	4.28
			<i>For Work In Restricted Working Space, Add</i>	4.28	
23 05 29 00-0869	EA		8" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	45.73	4.44
			<i>For Work In Restricted Working Space, Add</i>	4.44	
23 05 29 00-0870	EA		10" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	51.10	4.51
			<i>For Work In Restricted Working Space, Add</i>	4.51	
23 05 29 00-0871	EA		12" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	60.56	4.51
			<i>For Work In Restricted Working Space, Add</i>	4.61	
23 05 29 00-0872	EA		14" Pipe Saddle, For 1" Insulation (Cooper B-Line B3160).....	66.11	4.67
			<i>For Work In Restricted Working Space, Add</i>	4.67	
23 05 29 00-0873			Saddle, For 1-1/2" Insulation (Cooper B-Line B3161) <small>(23 05 29 00-0858)</small>		
23 05 29 00-0874	EA		3/4" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	27.55	3.80
			<i>For Work In Restricted Working Space, Add</i>	3.80	
23 05 29 00-0875	EA		1" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	27.66	3.83
			<i>For Work In Restricted Working Space, Add</i>	3.83	
23 05 29 00-0876	EA		1-1/4" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	27.76	3.86
			<i>For Work In Restricted Working Space, Add</i>	3.86	
23 05 29 00-0877	EA		1-1/2" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	28.77	3.93
			<i>For Work In Restricted Working Space, Add</i>	3.93	
23 05 29 00-0878	EA		2" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	31.05	3.96
			<i>For Work In Restricted Working Space, Add</i>	3.96	
23 05 29 00-0879	EA		2-1/2" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	33.44	4.03
			<i>For Work In Restricted Working Space, Add</i>	4.02	
23 05 29 00-0880	EA		3" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	34.01	4.09
			<i>For Work In Restricted Working Space, Add</i>	4.09	
23 05 29 00-0881	EA		4" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	38.61	4.09
			<i>For Work In Restricted Working Space, Add</i>	4.15	
23 05 29 00-0882	EA		6" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	43.44	4.28
			<i>For Work In Restricted Working Space, Add</i>	4.28	
23 05 29 00-0883	EA		8" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	51.47	4.44
			<i>For Work In Restricted Working Space, Add</i>	4.44	
23 05 29 00-0884	EA		10" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	57.89	4.51
			<i>For Work In Restricted Working Space, Add</i>	4.51	
23 05 29 00-0885	EA		12" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	68.93	4.60
			<i>For Work In Restricted Working Space, Add</i>	4.61	
23 05 29 00-0886	EA		14" Pipe Saddle, For 1-1/2" Insulation (Cooper B-Line B3161).....	75.50	4.67
			<i>For Work In Restricted Working Space, Add</i>	4.67	
23 05 29 00-0887			Saddle, For 2" Insulation (Cooper B-Line B3162) <small>(23 05 29 00-0858)</small>		
23 05 29 00-0888	EA		3/4" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162).....	29.48	3.99
			<i>For Work In Restricted Working Space, Add</i>	3.99	
23 05 29 00-0889	EA		1" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162).....	29.59	4.03
			<i>For Work In Restricted Working Space, Add</i>	4.02	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 29 00-0890 EA 1-1/4" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	31.17	4.06
<i>For Work In Restricted Working Space, Add</i>	4.06	
23 05 29 00-0891 EA 1-1/2" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	32.11	4.12
<i>For Work In Restricted Working Space, Add</i>	4.12	
23 05 29 00-0892 EA 2" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	32.95	4.15
<i>For Work In Restricted Working Space, Add</i>	4.15	
23 05 29 00-0893 EA 2-1/2" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	33.17	4.23
<i>For Work In Restricted Working Space, Add</i>	4.22	
23 05 29 00-0894 EA 3" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	35.07	4.29
<i>For Work In Restricted Working Space, Add</i>	4.28	
23 05 29 00-0895 EA 4" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	36.97	4.36
<i>For Work In Restricted Working Space, Add</i>	4.35	
23 05 29 00-0896 EA 6" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	47.19	4.50
<i>For Work In Restricted Working Space, Add</i>	4.51	
23 05 29 00-0897 EA 8" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	53.53	4.67
<i>For Work In Restricted Working Space, Add</i>	4.67	
23 05 29 00-0898 EA 10" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	56.20	4.73
<i>For Work In Restricted Working Space, Add</i>	4.73	
23 05 29 00-0899 EA 12" Pipe Saddle, For 2" Insulation (Cooper B-Line B3162)	75.94	4.83
<i>For Work In Restricted Working Space, Add</i>	4.83	
23 05 29 00-0900 Saddle, For 2-1/2" Insulation (Cooper B-Line B3163) (23 05 29 00-0858)		
23 05 29 00-0901 EA 1-1/4" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	33.06	4.15
<i>For Work In Restricted Working Space, Add</i>	4.15	
23 05 29 00-0902 EA 1-1/2" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	34.92	4.21
<i>For Work In Restricted Working Space, Add</i>	4.22	
23 05 29 00-0903 EA 2" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	35.85	4.26
<i>For Work In Restricted Working Space, Add</i>	4.25	
23 05 29 00-0904 EA 2-1/2" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	36.88	4.32
<i>For Work In Restricted Working Space, Add</i>	4.31	
23 05 29 00-0905 EA 3" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	37.21	4.40
<i>For Work In Restricted Working Space, Add</i>	4.41	
23 05 29 00-0906 EA 4" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	43.32	4.47
<i>For Work In Restricted Working Space, Add</i>	4.48	
23 05 29 00-0907 EA 6" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	49.65	4.60
<i>For Work In Restricted Working Space, Add</i>	4.61	
23 05 29 00-0908 EA 8" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	57.88	4.77
<i>For Work In Restricted Working Space, Add</i>	4.76	
23 05 29 00-0909 EA 10" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	62.07	4.85
<i>For Work In Restricted Working Space, Add</i>	4.86	
23 05 29 00-0910 EA 12" Pipe Saddle, For 2-1/2" Insulation (Cooper B-Line B3163)	77.91	4.95
<i>For Work In Restricted Working Space, Add</i>	4.96	
23 05 29 00-0911 Adjustable Pipe Saddle Support (Cooper B-Line B3096) (23 05 29 00-0830)		
23 05 29 00-0912 EA 2" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	94.81	14.35
23 05 29 00-0913 EA 3" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	100.46	16.65
23 05 29 00-0914 EA 4" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	122.11	18.95
23 05 29 00-0915 EA 5" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	127.31	20.67
23 05 29 00-0916 EA 6" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	141.26	22.98
23 05 29 00-0917 EA 8" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	160.55	28.72
23 05 29 00-0918 EA 10" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	209.95	38.48
23 05 29 00-0919 EA 12" Adjustable Pipe Saddle Support (Cooper B-Line B3096)	259.29	57.43
23 05 29 00-0920 Pipe Stanchion Support (Cooper B-Line B3090) (23 05 29 00-0830)		
23 05 29 00-0921 EA 2-1/2" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	117.40	14.35
23 05 29 00-0922 EA 3" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	121.50	16.65
23 05 29 00-0923 EA 3-1/2" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	130.19	17.80
23 05 29 00-0924 EA 4" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	132.87	18.95
23 05 29 00-0925 EA 5" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	139.68	20.67
23 05 29 00-0926 EA 6" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	148.08	22.98
23 05 29 00-0927 EA 8" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	188.04	28.72
23 05 29 00-0928 EA 10" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	253.68	38.48
23 05 29 00-0929 EA 12" Pipe Stanchion Support With U-Bolt (Cooper B-Line B3090)	331.69	57.43
23 05 29 00-0930 Pipe Saddle Support (Cooper B-Line B3095) (23 05 29 00-0830)		
23 05 29 00-0931 EA 2-1/2" Pipe Saddle Support (Cooper B-Line B3095)	60.15	14.35
23 05 29 00-0932 EA 3" Pipe Saddle Support (Cooper B-Line B3095)	64.25	16.65
23 05 29 00-0933 EA 3-1/2" Pipe Saddle Support (Cooper B-Line B3095)	96.99	17.80
23 05 29 00-0934 EA 4" Pipe Saddle Support (Cooper B-Line B3095)	99.67	18.95
23 05 29 00-0935 EA 5" Pipe Saddle Support (Cooper B-Line B3095)	109.58	20.67
23 05 29 00-0936 EA 6" Pipe Saddle Support (Cooper B-Line B3095)	121.48	22.98
23 05 29 00-0937 EA 8" Pipe Saddle Support (Cooper B-Line B3095)	139.29	28.72
23 05 29 00-0938 EA 10" Pipe Saddle Support (Cooper B-Line B3095)	162.42	38.48
23 05 29 00-0939 EA 12" Pipe Saddle Support (Cooper B-Line B3095)	205.03	57.43

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 29 00-0940	360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate ^(23 05 29 00-0940)		
	<small>29 00-0830</small>		
	Note: Insert is for use as isolated protective insulation at hangers.		
23 05 29 00-0941	1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate ^(23 05 29 00-0940)		
23 05 29 00-0942	EA 1/2" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	16.02	6.99
23 05 29 00-0943	EA 3/4" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	16.34	6.99
23 05 29 00-0944	EA 1" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	16.43	6.99
23 05 29 00-0945	EA 1-1/4" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	16.75	6.99
23 05 29 00-0946	EA 1-1/2" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	17.91	7.42
23 05 29 00-0947	EA 2" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	18.72	7.64
23 05 29 00-0948	EA 2-1/2" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	19.68	7.96
23 05 29 00-0949	EA 3" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	20.72	8.28
23 05 29 00-0950	EA 4" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	22.60	8.60
23 05 29 00-0951	EA 6" Diameter Pipe, 1" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	24.37	7.42
23 05 29 00-0952	1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate ^(23 05 29 00-0940)		
23 05 29 00-0953	EA 1/2" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	13.90	5.27
23 05 29 00-0954	EA 3/4" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	15.50	5.27
23 05 29 00-0955	EA 1" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	15.86	5.38
23 05 29 00-0956	EA 1-1/4" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	16.42	5.49
23 05 29 00-0957	EA 1-1/2" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	16.94	5.49
23 05 29 00-0958	EA 2" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	17.86	5.70
23 05 29 00-0959	EA 2-1/2" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	18.91	5.91
23 05 29 00-0960	EA 3" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	19.44	6.02
23 05 29 00-0961	EA 4" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	21.44	6.56
23 05 29 00-0962	EA 6" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	31.57	11.29
23 05 29 00-0963	EA 8" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	28.98	8.50
23 05 29 00-0964	EA 10" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	35.16	10.00
23 05 29 00-0965	EA 12" Diameter Pipe, 1-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	39.88	11.50
23 05 29 00-0966	2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate ^(23 05 29 00-0940)		
23 05 29 00-0967	EA 1/2" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	19.62	6.02
23 05 29 00-0968	EA 3/4" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	19.88	6.02
23 05 29 00-0969	EA 1" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	20.58	6.14
23 05 29 00-0970	EA 1-1/4" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	21.20	6.24
23 05 29 00-0971	EA 1-1/2" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	21.84	6.35
23 05 29 00-0972	EA 2" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	22.69	6.56
23 05 29 00-0973	EA 2-1/2" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	23.92	6.78
23 05 29 00-0974	EA 3" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	25.08	6.99
23 05 29 00-0975	EA 4" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	27.67	7.42
23 05 29 00-0976	EA 6" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	31.67	8.39
23 05 29 00-0977	EA 8" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	48.93	14.31
23 05 29 00-0978	EA 10" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	53.34	16.56
23 05 29 00-0979	EA 12" Diameter Pipe, 2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	61.46	19.57
23 05 29 00-0980	2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate ^(23 05 29 00-0940)		
23 05 29 00-0981	EA 1/2" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	22.46	6.99
23 05 29 00-0982	EA 3/4" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	22.75	6.99
23 05 29 00-0983	EA 1" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	23.61	7.10
23 05 29 00-0984	EA 1-1/4" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	24.25	7.20
23 05 29 00-0985	EA 1-1/2" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	24.91	7.20
23 05 29 00-0986	EA 2" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	25.93	7.53
23 05 29 00-0987	EA 2-1/2" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	27.34	7.75
23 05 29 00-0988	EA 3" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	28.65	8.07
23 05 29 00-0989	EA 4" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	31.57	8.50
23 05 29 00-0990	EA 6" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	36.18	9.68
23 05 29 00-0991	EA 8" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	47.80	10.76
23 05 29 00-0992	EA 10" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	56.97	12.37
23 05 29 00-0993	EA 12" Diameter Pipe, 2-1/2" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	65.08	15.38
23 05 29 00-0994	3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate ^(23 05 29 00-0940)		
23 05 29 00-0995	EA 1/2" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	48.17	7.20
23 05 29 00-0996	EA 3/4" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	57.35	7.53
23 05 29 00-0997	EA 1" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	59.67	7.53
23 05 29 00-0998	EA 1-1/4" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	61.14	7.75
23 05 29 00-0999	EA 1-1/2" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	62.87	7.96
23 05 29 00-1000	EA 2" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	64.82	8.07
23 05 29 00-1001	EA 2-1/2" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	68.27	8.28
23 05 29 00-1002	EA 3" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	71.28	8.82



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				23 05 29 00-1003 EA 4" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	78.65	9.15
				23 05 29 00-1004 EA 6" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	89.99	11.18
				23 05 29 00-1005 EA 8" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	116.80	12.26
				23 05 29 00-1006 EA 10" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	139.01	12.91
				23 05 29 00-1007 EA 12" Diameter Pipe, 3" Thick 360 Degree Thermal Hanger Shield, Pre-Insulated With Calcium Silicate.....	159.36	16.67
23 05 29 00-1008				Equipment Housekeeping Pads <small>(23 05 29)</small> See CSI section 03 31 13 00-0089 for Concrete Equipment Pads.		
23 05 29 00-1009				Molded Plastic Condenser Pad <small>(23 05 29 00-1008)</small>		
				23 05 29 00-1010 EA 30" Round Molded Plastic Pad	164.23	14.35
				23 05 29 00-1011 EA 30" Octagon Molded Plastic Pad	173.14	14.35
				23 05 29 00-1012 EA 30" x 30" Molded Plastic Pad.....	164.23	14.35
				23 05 29 00-1013 EA 36" x 36" Molded Plastic Pad.....	217.64	14.35
				23 05 29 00-1014 EA 36" x 48" Molded Plastic Pad.....	317.56	14.35
23 05 29 00-1015				Inertia Base <small>(23 05 29 00-1008)</small> Note: Includes spring isolators.		
				23 05 29 00-1016 EA Up To 12 SF Inertia Base, 8" Thick With Spring Base	4,213.82	
				23 05 29 00-1017 EA >12 To 16 SF Inertia Base, 8" Thick With Spring Base	5,099.01	
				23 05 29 00-1018 EA >16 To 20 SF Inertia Base, 8" Thick With Spring Base	5,841.07	
				23 05 29 00-1019 EA >20 To 24 SF Inertia Base, 8" Thick With Spring Base	6,678.56	
23 05 29 00-1020				Hanger Assemblies <small>(23 05 29)</small> Note: Includes hanger, rod, nuts, washers, clamps, upper attachment, etc. Not for use where detail is available.		
				23 05 29 00-1021 EA 1/2" Standard Duty Clevis Pipe Hanger Assembly	55.35	17.86
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	11.49	
				23 05 29 00-1022 EA 3/4" Standard Duty Clevis Pipe Hanger Assembly	57.47	18.92
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	12.13	
				23 05 29 00-1023 EA 1" Standard Duty Clevis Pipe Hanger Assembly	59.26	20.07
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	12.64	
				23 05 29 00-1024 EA 1-1/4" Standard Duty Clevis Pipe Hanger Assembly	60.17	20.10
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	12.83	
				23 05 29 00-1025 EA 1-1/2" Standard Duty Clevis Pipe Hanger Assembly	60.43	20.10
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	12.83	
				23 05 29 00-1026 EA 2" Standard Duty Clevis Pipe Hanger Assembly	61.56	20.26
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	13.01	
				23 05 29 00-1027 EA 2-1/2" Standard Duty Clevis Pipe Hanger Assembly	74.14	21.74
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	13.29	
				23 05 29 00-1028 EA 3" Standard Duty Clevis Pipe Hanger Assembly	76.11	22.37
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	13.49	
				23 05 29 00-1029 EA 4" Standard Duty Clevis Pipe Hanger Assembly	94.95	25.25
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	14.90	
				23 05 29 00-1030 EA 6" Standard Duty Clevis Pipe Hanger Assembly	144.95	32.63
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	19.58	
				23 05 29 00-1031 EA 8" Standard Duty Clevis Pipe Hanger Assembly	163.91	37.85
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	22.71	
				23 05 29 00-1032 EA 10" Standard Duty Clevis Pipe Hanger Assembly	219.33	48.08
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	28.49	
				23 05 29 00-1033 EA 12" Standard Duty Clevis Pipe Hanger Assembly	237.98	51.74
				Note: Includes hanger, rod, nuts, washers and clamp.		
				<i>For Work In Restricted Working Space, Add</i>	31.10	
23 05 29 00-1034				Steel Shapes For Hanger Devices <small>(23 05 29)</small>		
23 05 29 00-1035				Angle Iron For Hanger Devices <small>(23 05 29 00-1034)</small>		
				23 05 29 00-1036 LF 1/2" x 1/2" x 1/8" Angle Iron For Hanger Devices	2.78	1.67
				23 05 29 00-1037 LF 3/4" x 3/4" x 1/8" Angle Iron For Hanger Devices	3.66	2.09
				23 05 29 00-1038 LF 1" x 1" x 1/8" Angle Iron For Hanger Devices	4.53	2.50
				23 05 29 00-1039 LF 1-1/4" x 1-1/4" x 3/16" Angle Iron For Hanger Devices	6.34	3.11
				23 05 29 00-1040 LF 1-1/2" x 1-1/2" x 3/16" Angle Iron For Hanger Devices	7.12	3.34
				23 05 29 00-1041 LF 2" x 2" x 1/4" Angle Iron For Hanger Devices	9.74	3.75
				23 05 29 00-1042 LF 2-1/2" x 2-1/2" x 1/4" Angle Iron For Hanger Devices	12.16	4.56
				23 05 29 00-1043 LF 3" x 2" x 3/8" Angle Iron For Hanger Devices	15.90	5.35
				23 05 29 00-1044 LF 3" x 3" x 3/8" Angle Iron For Hanger Devices	19.03	6.25

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 29 Hangers and Supports for HVAC Piping and Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 29 00-1045		Channels For Hanger Devices (23 05 29 00-1034)		
23 05 29 00-1046	LF	C2 x 1.78, 2" Wide Channels For Hanger Devices	8.37	4.32
23 05 29 00-1047	LF	C3 x 4.1, 3" Wide Channels For Hanger Devices	14.38	6.20
23 05 29 00-1048	LF	C4 x 5.4, 4" Wide Channels For Hanger Devices	17.98	7.45
23 05 29 00-1049	LF	C5 x 6.7 - 5" Wide Channels For Hanger Devices	21.57	8.69
23 05 29 00-1050	LF	C6 x 8.2 - 6" Wide Channels For Hanger Devices	26.12	10.43
23 05 29 00-1051	LF	C7 x 9.8 - 7" Wide Channels For Hanger Devices	31.15	12.43
23 05 29 00-1052	LF	C8 x 11.5 - 8" Wide Channels For Hanger Devices	35.35	13.67
23 05 29 00-1053		Structural Bar Tees For Hanger Devices (23 05 29 00-1034)		
23 05 29 00-1054	LF	3/4" x 3/4" x 1/8" Structural Bar Tee For Hanger Devices	9.23	6.08
23 05 29 00-1055	LF	1" x 1" x 1/8" Structural Bar Tee For Hanger Devices	11.12	7.18
23 05 29 00-1056	LF	1-1/2" x 1-1/2" x 1/4" Structural Bar Tee For Hanger Devices	16.01	8.28
23 05 29 00-1057	LF	2" x 2" x 1/4" Structural Bar Tee For Hanger Devices	20.62	11.05
23 05 29 00-1058	LF	2-1/2" x 2-1/2" x 3/8" Structural Bar Tee For Hanger Devices	28.35	13.25
23 05 29 00-1059	LF	3" x 3" x 3/8" Structural Bar Tee For Hanger Devices	35.53	17.11
23 05 29 00-1060		Structural Zees For Hanger Devices (23 05 29 00-1034)		
23 05 29 00-1061	LF	1-1/4" x 1-3/4" x 1-3/4" Structural Zee For Hanger Devices	16.03	8.28
23 05 29 00-1062	LF	2-11/16" x 3" x 2-11/16" Structural Zee For Hanger Devices	19.37	8.28
23 05 29 00-1063	LF	3-1/16" x 4" x 3-1/16" Structural Zee For Hanger Devices	28.41	8.28
23 05 29 00-1064	LF	3-1/4" x 5" x 3-1/4" Structural Zee For Hanger Devices	36.00	8.28
23 05 29 00-1065	LF	3-1/2" x 6" x 3-1/2" Structural Zee For Hanger Devices	43.96	8.28
23 05 29 00-1066		Junior I-beams For Hanger Devices (23 05 29 00-1034)		
23 05 29 00-1067	LF	3" I-beam (Junior) For Hanger Devices	19.85	12.15
23 05 29 00-1068	LF	4" I-beam (Junior) For Hanger Devices	22.87	13.25
23 05 29 00-1069	LF	5" I-beam (Junior) For Hanger Devices	26.45	14.36
23 05 29 00-1070	LF	6" I-beam (Junior) For Hanger Devices	28.93	16.01
23 05 29 00-1071	LF	7" I-beam (Junior) For Hanger Devices	34.48	17.11
23 05 29 00-1072	LF	8" I-beam (Junior) For Hanger Devices	37.36	18.23

23 05 48 Vibration and Seismic Controls for HVAC (23 05)**23 05 48 13 Vibration Controls for HVAC (23 05 48)**

23 05 48 13-0001		Unhoused Stable Steel Spring Isolators (23 05 48 13)		
Note: Includes leveling adjustment, cast top, base plate and pad. For use with floor mounted equipment only.				
23 05 48 13-0002	EA	60 LB Unhoused Steel Spring Isolator	103.23	32.15
23 05 48 13-0003	EA	115 LB Unhoused Steel Spring Isolator	109.55	32.15
23 05 48 13-0004	EA	1,130 LB Unhoused Steel Spring Isolator	130.49	32.15

23 05 48 13-0005		Housed Stable Steel Spring Isolators (23 05 48 13)		
Note: Includes leveling adjustment, top plate, base plate and pad. For use with floor mounted equipment only. Mason Industries, Inc.				
23 05 48 13-0006	EA	To 770 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 1" Deflection	322.57	32.15
23 05 48 13-0007	EA	To 1,040 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 1" Deflection	362.38	32.15
23 05 48 13-0008	EA	To 1,600 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 1" Deflection	382.29	32.15
23 05 48 13-0009	EA	To 2,250 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 1" Deflection	461.91	32.15
23 05 48 13-0010	EA	To 3,250 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 1" Deflection	481.82	32.15
23 05 48 13-0011	EA	To 730 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 2" Deflection	357.40	32.15
23 05 48 13-0012	EA	To 930 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 2" Deflection	392.24	32.15
23 05 48 13-0013	EA	To 1,440 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 2" Deflection	417.12	32.15
23 05 48 13-0014	EA	To 1,860 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 2" Deflection	531.58	32.15
23 05 48 13-0015	EA	To 2,880 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 2" Deflection	576.37	32.15
23 05 48 13-0016	EA	To 3,720 LB Housed Hot Dipped Galvanized Steel Spring Isolator, 2" Deflection	680.88	32.15

23 05 48 13-0017		Vibration Isolators (23 05 48 13)		
23 05 48 13-0018		Spring And Rubber Hanger For 1" Deflection (23 05 48 13-0017)		
23 05 48 13-0019	EA	50 To 500 LB Rated Spring And Rubber Hanger For Vibration Isolation With 3/4" Max Rod Size	134.04	20.67
23 05 48 13-0020	EA	600 To 1,000 LB Rated Spring And Rubber Hanger For Vibration Isolation With 7/8" Max Rod Size	279.67	22.98

23 05 48 13-0021		Rubber-In-Shear Isolator Hanger (23 05 48 13-0017)		
23 05 48 13-0022	EA	45-340 LB Rubber In Shear Hanger 0.38" Deflection With <1/2" Rod Size	75.14	17.23
23 05 48 13-0023	EA	130-700 LB Rubber In Shear Hanger 0.43" Deflection With <3/4" Rod Size	97.21	20.67

23 05 48 13-0024		Spring Hanger For 1" Deflection (23 05 48 13-0017)		
23 05 48 13-0025	EA	50 To 1,000 LB Rubber In Shear Hanger For 1" Deflection With <3/4" Rod Size	85.35	20.67

23 05 48 13-0026		Rubber-In-Shear Vibration Isolator (23 05 48 13-0017)		
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 48 13-0027 EA 45 To 340 LB Rubber In Shear Vibration Isolation With 0.38" Deflection	157.11	39.06
23 05 48 13-0028 EA 130 To 700 LB Rubber In Shear Vibration Isolation With 0.43" Deflection	213.00	39.06
23 05 48 13-0029 EA 550 To 1,920 LB Rubber In Shear Vibration Isolation With 0.48" Deflection	404.80	39.06
23 05 48 13-0030 Two-Piece Spring Type Vibration Isolator <small>(23 05 48 13-0017)</small>		
<small>Note: For equipment support aluminum construction 1/2" adjusting and leveling bolt 1" deflection.</small>		
23 05 48 13-0031 EA 50 To 1,000 LB Rated Load 2-Piece Isolator Spring Type Vibration Isolator.....	133.56	39.06
23 05 48 13-0032 EA >1,000 To 1,600 LB Rated Load 2-Piece Isolator Spring Type Vibration Isolator.....	137.72	39.06
23 05 48 13-0033 Open Double Spring Type Vibration Isolator <small>(23 05 48 13-0017)</small>		
<small>Note: For equipment support 1" deflection neoprene pad and 5/8" stud bolt.</small>		
23 05 48 13-0034 EA 150 To 450 LB Rated Load Open Isolator, Double Spring Type Vibration Isolator	102.71	19.52
23 05 48 13-0035 EA 500 To 1,000 LB Rated Load Open Isolator, Double Spring Type Vibration Isolator	102.71	19.52
23 05 48 13-0036 EA 1,100 To 1,600 LB Rated Load Open Isolator, Double Spring Type Vibration Isolator	116.59	19.52
23 05 48 13-0037 EA 1,700 To 2,400 LB Rated Load Open Isolator, Double Spring Type Vibration Isolator	116.59	19.52
23 05 48 13-0038 EA 2,500 To 3,400 LB Rated Load Open Isolator, Double Spring Type Vibration Isolator	179.39	19.52
23 05 48 13-0039 Isolation Pads <small>(23 05 48 13-0017)</small>		
23 05 48 13-0040 Laminated Neoprene And Cork Isolation Pad <small>(23 05 48 13-0039)</small>		
23 05 48 13-0041 EA 2" x 2", 1" Thick Laminated Neoprene And Cork Isolation Pad.....	6.86	2.87
23 05 48 13-0042 EA 3" x 3", 1" Thick Laminated Neoprene And Cork Isolation Pad.....	8.67	2.98
23 05 48 13-0043 EA 4" x 4", 1" Thick Laminated Neoprene And Cork Isolation Pad.....	10.76	3.10
23 05 48 13-0044 EA 12" x 12", 1" Thick Laminated Neoprene And Cork Isolation Pad.....	41.04	3.56
23 05 48 13-0045 EA 18" x 18", 1" Thick Laminated Neoprene And Cork Isolation Pad.....	78.04	4.02
23 05 48 13-0046 Neoprene And Steel Plate Isolation Pad <small>(23 05 48 13-0039)</small>		
23 05 48 13-0047 EA 6" x 4", 5/8" Thick Steel Plate And Ribbed Neoprene Isolation Pad	208.06	2.87
23 05 48 13-0048 EA 6" x 4", 7/8" Thick Steel Plate And Ribbed Neoprene Isolation Pad	230.48	2.87
23 05 48 13-0049 Neoprene Isolation Pad <small>(23 05 48 13-0039)</small>		
23 05 48 13-0050 EA 2" x 2", 3/8" Thick Ribbed Neoprene Isolation Pad.....	6.43	2.87
23 05 48 13-0051 EA 3" x 3", 3/8" Thick Ribbed Neoprene Isolation Pad.....	7.28	2.87
23 05 48 13-0052 EA 4" x 4", 3/8" Thick Ribbed Neoprene Isolation Pad.....	8.64	2.87
23 05 48 13-0053 EA 12" x 12", 3/8" Thick Ribbed Neoprene Isolation Pad.....	40.38	3.45
23 05 48 13-0054 EA 18" x 18", 3/8" Thick Ribbed Neoprene Isolation Pad.....	73.38	4.02
23 05 48 13-0055 Threaded Flexible Bronze Hose Connectors <small>(23 05 48 13)</small>		
<small>Note: Includes hex threaded nipple ends.</small>		
23 05 48 13-0056 EA 3/8" Diameter x 9" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	72.92	18.37
23 05 48 13-0057 EA 1/2" Diameter x 10" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	85.81	25.27
23 05 48 13-0058 EA 3/4" Diameter x 11" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	105.28	31.02
23 05 48 13-0059 EA 1" Diameter x 12" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	122.60	36.76
23 05 48 13-0060 EA 1-1/4" Diameter x 12" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	140.66	48.24
23 05 48 13-0061 EA 1-1/2" Diameter x 14" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	158.49	51.34
23 05 48 13-0062 EA 2" Diameter x 14" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	211.85	60.87
23 05 48 13-0063 EA 2-1/2" Diameter x 16" Flexible Hose Connection, For Vibration Isolation, Bronze Hose With Hex Threaded Nipple Ends	291.67	94.88
23 05 48 13-0064 Weld End Flexible Hose Connectors <small>(23 05 48 13)</small>		
23 05 48 13-0065 EA 1/2" Diameter x 10" Flexible Hose Connection, Weld Ends.....	271.45	65.93
23 05 48 13-0066 EA 3/4" Diameter x 10" Flexible Hose Connection, Weld Ends.....	317.95	72.37
23 05 48 13-0067 EA 1" Diameter x 10" Flexible Hose Connection, Weld Ends.....	359.53	76.62
23 05 48 13-0068 EA 1-1/4" Diameter x 11" Flexible Hose Connection, Weld Ends.....	401.69	87.30
23 05 48 13-0069 EA 1-1/2" Diameter x 12" Flexible Hose Connection, Weld Ends.....	456.56	94.19
23 05 48 13-0070 EA 2" Diameter x 14" Flexible Hose Connection, Weld Ends.....	572.36	122.56
23 05 48 13-0071 EA 2-1/2" Diameter x 16" Flexible Hose Connection, Weld Ends.....	868.67	137.84
23 05 48 13-0072 EA 3" Diameter x 16" Flexible Hose Connection, Weld Ends.....	1,075.90	155.07
23 05 48 13-0073 EA 4" Diameter x 18" Flexible Hose Connection, Weld Ends.....	1,485.39	229.73
23 05 48 13-0074 Flanged Flexible Hose Connectors <small>(23 05 48 13)</small>		
23 05 48 13-0075 Flanged Flexible Molded Rubber Hose Connectors <small>(23 05 48 13-0074)</small>		
<small>Note: With helical wire reinforcement 150 PSI.</small>		
23 05 48 13-0076 EA 1-1/2" Diameter x 12" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI.....	221.35	86.15
23 05 48 13-0077 EA 2" Diameter x 12" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI.....	239.68	95.68

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 48 Vibration and Seismic Controls for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 05 48 13-0078	EA		2-1/2" Diameter x 12" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	392.51	191.14
23 05 48 13-0079	EA		3" Diameter x 12" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	545.23	284.30
23 05 48 13-0080	EA		4" Diameter x 12" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	709.96	367.00
23 05 48 13-0081	EA		6" Diameter x 18" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	896.28	381.66
23 05 48 13-0082	EA		8" Diameter x 24" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	1,087.53	435.90
23 05 48 13-0083	EA		10" Diameter x 24" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	1,405.09	518.75
23 05 48 13-0084	EA		12" Diameter x 24" Molded Rubber Connectors With Helical Wire Reinforcement 150 PSI	3,444.73	648.81

23 05 48 13-0085 Flanged Flexible Corrugated Stainless Steel Hose Connectors (23 05 48 13-0074)

Note: With braided metal wire.

23 05 48 13-0086	EA		1/2" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	173.16	78.34
23 05 48 13-0087	EA		1" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	170.48	107.75
23 05 48 13-0088	EA		1-1/2" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	322.95	143.58
23 05 48 13-0089	EA		2" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	421.26	215.37
23 05 48 13-0090	EA		2-1/2" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	453.43	236.97
23 05 48 13-0091	EA		3" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	527.73	286.94
23 05 48 13-0092	EA		4" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	675.71	367.34
23 05 48 13-0093	EA		4" Diameter x 30" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	1,213.67	506.79
23 05 48 13-0094	EA		4" Diameter x 36" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	1,389.94	594.09
23 05 48 13-0095	EA		6" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	928.95	457.07
23 05 48 13-0096	EA		6" Diameter x 36" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	1,756.06	572.48
23 05 48 13-0097	EA		8" Diameter x 12" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	1,507.09	610.64
23 05 48 13-0098	EA		10" Diameter x 13" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	1,772.87	706.11
23 05 48 13-0099	EA		12" Diameter x 14" Metal Wire Braid Connector, Over Corrugated Stainless Steel, 150 PSI For Vibration Isolation	2,270.70	763.31

23 05 48 13-0100 Flanged Flexible Molded Teflon Connectors (23 05 48 13-0074)

Note: 150 PSI.

23 05 48 13-0101	EA		2-1/2" Diameter x 3-3/16" Molded Teflon Connectors With Stainless Steel Flanges, 150 PSI, For Vibration Isolation	948.84	166.56
23 05 48 13-0102	EA		3" Diameter x 3-5/8" Molded Teflon Connectors With Stainless Steel Flanges, 150 PSI, For Vibration Isolation	1,064.77	195.28
23 05 48 13-0103	EA		4" Diameter x 3-5/8" Molded Teflon Connectors With Stainless Steel Flanges, 150 PSI, For Vibration Isolation	1,615.86	328.19
23 05 48 13-0104	EA		6" Diameter x 4" Molded Teflon Connectors With Stainless Steel Flanges, 150 PSI, For Vibration Isolation	1,963.93	381.66
23 05 48 13-0105	EA		8" Diameter x 6" Molded Teflon Connectors With Stainless Steel Flanges, 150 PSI, For Vibration Isolation	2,577.08	468.16

23 05 48 13-0106 Flexible Hose Connectors Braided Metal Hose Type (23 05 48 13)**23 05 48 13-0107 Braided Metal Hose Type Flexible Bronze Hose Connectors (23 05 48 13-0106)**

Note: MPT connection.

23 05 48 13-0108	EA		1/2" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	37.36	2.30
23 05 48 13-0109	EA		1/2" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	44.61	2.30
23 05 48 13-0110	EA		1/2" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	49.69	2.98
23 05 48 13-0111	EA		1/2" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	60.37	2.98
23 05 48 13-0112	EA		3/4" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	49.98	2.76
23 05 48 13-0113	EA		3/4" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	60.33	2.76
23 05 48 13-0114	EA		3/4" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	69.08	3.55
23 05 48 13-0115	EA		3/4" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	85.19	3.55
23 05 48 13-0116	EA		1" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	68.15	3.21
23 05 48 13-0117	EA		1" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	74.50	3.21
23 05 48 13-0118	EA		1" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	88.57	4.25
23 05 48 13-0119	EA		1" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	112.13	4.25
23 05 48 13-0120	EA		1" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	135.51	4.25
23 05 48 13-0121	EA		1" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	158.97	4.25
23 05 48 13-0122	EA		1-1/4" Or 1-1/2" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	97.04	4.12
23 05 48 13-0123	EA		1-1/4" Or 1-1/2" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	106.92	4.12
23 05 48 13-0124	EA		1-1/4" Or 1-1/2" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	137.06	4.12
23 05 48 13-0125	EA		1-1/4" Or 1-1/2" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	190.53	5.50
23 05 48 13-0126	EA		1-1/4" Or 1-1/2" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	220.90	5.50
23 05 48 13-0127	EA		1-1/4" Or 1-1/2" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	261.31	5.50
23 05 48 13-0128	EA		2" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	132.77	4.97
23 05 48 13-0129	EA		2" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	153.44	4.97
23 05 48 13-0130	EA		2" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	193.46	4.97
23 05 48 13-0131	EA		2" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	258.02	6.66
23 05 48 13-0132	EA		2" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	319.02	6.66
23 05 48 13-0133	EA		2" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	379.96	6.66
23 05 48 13-0134	EA		2-1/2" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	184.26	6.24
23 05 48 13-0135	EA		2-1/2" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	209.71	5.92
23 05 48 13-0136	EA		2-1/2" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	235.42	5.92
23 05 48 13-0137	EA		2-1/2" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	290.37	7.93
23 05 48 13-0138	EA		2-1/2" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	342.08	7.93
23 05 48 13-0139	EA		2" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	392.17	7.93
23 05 48 13-0140	EA		3" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	290.40	7.93
23 05 48 13-0141	EA		3" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	324.74	7.93
23 05 48 13-0142	EA		3" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	1,670.01	7.93
23 05 48 13-0143	EA		3" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	2,008.79	10.58
23 05 48 13-0144	EA		3" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	502.72	10.58
23 05 48 13-0145	EA		3" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	570.30	10.58
23 05 48 13-0146	EA		4" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection	530.98	9.31

		MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 48 13-0147	EA				4" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection.....	571.10	9.31
23 05 48 13-0148	EA				4" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection.....	611.23	9.31
23 05 48 13-0149	EA				4" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection.....	699.02	12.41
23 05 48 13-0150	EA				4" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection.....	778.97	12.41
23 05 48 13-0151	EA				4" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, MPT Connection.....	860.63	12.41
23 05 48 13-0152					Braided Stainless Steel Flexible Hose Connectors <small>(23 05 48 13-0106)</small>		
Note: Over braided carbon steel connection.							
23 05 48 13-0153	EA				2" Diameter x 12" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	158.11	5.04
23 05 48 13-0154	EA				2" Diameter x 18" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	190.94	5.04
23 05 48 13-0155	EA				2" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	223.16	5.04
23 05 48 13-0156	EA				2" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	292.09	6.76
23 05 48 13-0157	EA				2" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	357.39	6.76
23 05 48 13-0158	EA				2" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	422.62	6.76
23 05 48 13-0159	EA				2-1/2" Or 3" Diameter x 12" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	179.24	5.92
23 05 48 13-0160	EA				2-1/2" Or 3" Diameter x 18" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	213.55	5.92
23 05 48 13-0161	EA				2-1/2" Or 3" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	248.02	5.92
23 05 48 13-0162	EA				2-1/2" Or 3" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	321.33	7.93
23 05 48 13-0163	EA				2-1/2" Or 3" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	389.99	7.93
23 05 48 13-0164	EA				2-1/2" Or 3" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	457.70	7.93
23 05 48 13-0165	EA				4" Diameter x 12" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	190.35	7.93
23 05 48 13-0166	EA				4" Diameter x 18" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	229.66	8.14
23 05 48 13-0167	LF				4" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	269.53	7.93
23 05 48 13-0168	EA				4" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	356.96	10.58
23 05 48 13-0169	EA				4" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	436.27	10.58
23 05 48 13-0170	EA				4" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	517.83	10.58
23 05 48 13-0171	EA				6" Diameter x 18" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	383.81	15.45
23 05 48 13-0172	EA				6" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	565.61	15.56
23 05 48 13-0173	EA				6" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	758.49	20.50
23 05 48 13-0174	EA				6" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	940.36	20.50
23 05 48 13-0175	EA				6" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,122.18	20.50
23 05 48 13-0176	EA				8" Diameter x 18" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	665.19	18.99
23 05 48 13-0177	EA				8" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	802.73	18.99
23 05 48 13-0178	EA				8" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,088.17	24.68
23 05 48 13-0179	EA				8" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,361.03	24.68
23 05 48 13-0180	EA				8" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,633.81	24.68
23 05 48 13-0181	EA				10" Diameter x 18" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	713.00	23.73
23 05 48 13-0182	EA				10" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,056.87	23.73
23 05 48 13-0183	EA				10" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,415.45	30.90
23 05 48 13-0184	EA				10" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,760.53	30.90
23 05 48 13-0185	EA				10" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	2,104.14	30.90
23 05 48 13-0186	EA				12" Diameter x 24" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,412.23	28.69
23 05 48 13-0187	EA				12" Diameter x 36" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	1,841.37	28.69
23 05 48 13-0188	EA				12" Diameter x 48" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	2,303.99	38.61
23 05 48 13-0189	EA				12" Diameter x 60" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded.....	2,736.90	38.61

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 48 Vibration and Seismic Controls for HVAC**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 05 48 13-0190	EA	12" Diameter x 72" Long, Flexible Hose Connectors, Braided Stainless Steel Over Braided Carbon Steel Connection, Welded	3,171.83	38.61
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23 05 48 13-0191 Braided Metal Hose Type Flexible Bronze Hose Connectors (23 05 48 13-0106)

Note: Flanged end connection (carbon steel ends).

23 05 48 13-0192	EA	2" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	740.25	4.97
23 05 48 13-0193	EA	2" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,220.54	140.94
23 05 48 13-0194	EA	2" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,536.22	140.94
23 05 48 13-0195	EA	2" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,851.91	140.94
23 05 48 13-0196	EA	2" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,167.72	140.94
23 05 48 13-0197	EA	2-1/2" Or 3" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,051.47	179.75
23 05 48 13-0198	EA	2-1/2" Or 3" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,384.13	179.75
23 05 48 13-0199	EA	2-1/2" Or 3" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,716.91	179.75
23 05 48 13-0200	EA	2-1/2" Or 3" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,049.82	179.75
23 05 48 13-0201	EA	2-1/2" Or 3" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,376.90	179.75
23 05 48 13-0202	EA	4" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,395.79	301.33
23 05 48 13-0203	EA	4" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	1,784.08	302.09
23 05 48 13-0204	EA	4" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,178.69	301.33
23 05 48 13-0205	EA	4" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,619.88	301.33
23 05 48 13-0206	EA	4" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,957.00	301.33
23 05 48 13-0207	EA	6" Diameter x 12" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	2,273.61	386.27
23 05 48 13-0208	EA	6" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	3,153.39	386.27
23 05 48 13-0209	EA	6" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	4,033.67	387.65
23 05 48 13-0210	EA	6" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	4,913.58	386.27
23 05 48 13-0211	EA	6" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	5,793.36	386.27
23 05 48 13-0212	EA	8" Diameter x 18" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	4,000.68	485.19
23 05 48 13-0213	EA	8" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	4,666.24	485.19
23 05 48 13-0214	EA	8" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	5,985.85	485.19
23 05 48 13-0215	EA	8" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	7,305.96	485.19
23 05 48 13-0216	EA	8" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	8,625.45	485.19
23 05 48 13-0217	EA	10" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	6,794.34	590.67
23 05 48 13-0218	EA	10" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	8,452.56	590.67
23 05 48 13-0219	EA	10" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	10,121.93	590.67
23 05 48 13-0220	EA	10" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	11,787.70	590.67
23 05 48 13-0221	EA	10" Diameter x 72" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	13,133.95	590.67
23 05 48 13-0222	EA	12" Diameter x 24" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	9,330.87	717.24
23 05 48 13-0223	EA	12" Diameter x 36" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	11,435.11	717.24
23 05 48 13-0224	EA	12" Diameter x 48" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	13,539.23	717.24
23 05 48 13-0225	EA	12" Diameter x 60" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	15,643.34	717.24
23 05 48 13-0226	EA	12" Diameter x 72" Long, Flexible Hose Connectors, Braided Metal Hose, Bronze, Flanged End Connection (Carbon Steel Ends)	17,747.58	717.24

23 05 53 Identification for HVAC Piping and Equipment (23 05)23 05 53 00-0001 Systems Identification (23 05 53)23 05 53 00-0002 Pipe Marker Snap-On Type Plastic (23 05 53 00-0001)

Note: Outside diameters of insulation where necessary.



	MINOR	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 05 53 00-0003	EA	1/2" Outside Diameter Snap-On Plastic Marker.....	21.92	
23 05 53 00-0004	EA	3/4" Outside Diameter Snap-On Plastic Marker.....	22.21	
23 05 53 00-0005	EA	1" Outside Diameter Snap-On Plastic Marker.....	22.36	
23 05 53 00-0006	EA	1-1/4" Outside Diameter Snap-On Plastic Marker.....	22.69	
23 05 53 00-0007	EA	1-1/2" Outside Diameter Snap-On Plastic Marker.....	26.62	
23 05 53 00-0008	EA	2" Outside Diameter Snap-On Plastic Marker.....	27.14	
23 05 53 00-0009	EA	2-1/2" Outside Diameter Snap-On Plastic Marker.....	44.20	
23 05 53 00-0010	EA	3" Outside Diameter Snap-On Plastic Marker.....	44.61	
23 05 53 00-0011	EA	3-1/2" Outside Diameter Snap-On Plastic Marker.....	45.05	
23 05 53 00-0012	EA	4" Outside Diameter Snap-On Plastic Marker.....	45.29	
23 05 53 00-0013	EA	4-1/2" Outside Diameter Snap-On Plastic Marker.....	45.53	
23 05 53 00-0014	EA	5" Outside Diameter Snap-On Plastic Marker.....	45.78	
23 05 53 00-0015	EA	6" Outside Diameter Snap-On Plastic Marker.....	48.02	
23 05 53 00-0016	EA	7" Outside Diameter Snap-On Plastic Marker.....	48.30	
23 05 53 00-0017	EA	8" Outside Diameter Snap-On Plastic Marker.....	60.01	
23 05 53 00-0018	EA	10" Outside Diameter Snap-On Plastic Marker.....	61.88	
23 05 53 00-0019	EA	12" Outside Diameter Snap-On Plastic Marker.....	71.15	
23 05 53 00-0020	EA	14" Outside Diameter Snap-On Plastic Marker.....	81.64	

23 05 53 00-0021 Pipe Markers Pressure-Sensitive (23 05 53 00-0001)

Note: Outside diameter includes insulation where necessary.

23 05 53 00-0022	EA	1/2" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	13.66	
23 05 53 00-0023	EA	3/4" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	14.23	
23 05 53 00-0024	EA	1" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	15.39	
23 05 53 00-0025	EA	1-1/4" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	15.61	
23 05 53 00-0026	EA	1-1/2" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	16.75	
23 05 53 00-0027	EA	2" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	17.09	
23 05 53 00-0028	EA	2-1/2" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	19.43	
23 05 53 00-0029	EA	3" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	19.89	
23 05 53 00-0030	EA	3-1/2" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	20.23	
23 05 53 00-0031	EA	4" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	20.58	
23 05 53 00-0032	EA	4-1/2" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	21.30	
23 05 53 00-0033	EA	5" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	22.07	
23 05 53 00-0034	EA	6" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	22.75	
23 05 53 00-0035	EA	7" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	23.41	
23 05 53 00-0036	EA	8" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	26.00	
23 05 53 00-0037	EA	10" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	27.26	
23 05 53 00-0038	EA	12" Outside Diameter Press-Sensitive Marker Stick-on With Arrow Tape Over Insulation.....	31.94	

23 05 53 00-0039 Valve Identification Tag (23 05 53 00-0001)

Note: Includes beaded chain and/or "S" hook.

23 05 53 00-0040	EA	2" Diameter Identification Tag, Brass.....	12.02	
23 05 53 00-0041	EA	1-1/2" Diameter Identification Tag, Plastic.....	11.27	
23 05 53 00-0042	EA	1-1/2" Diameter Identification Tag, Brass.....	11.04	

23 05 66 Anti-Microbial Ultraviolet Emitters for HVAC Ducts and Equipment (23 05)

23 05 66 00-0001 Double Ended Ultraviolet HVAC Microbial Control Fixtures (23 05 66)

23 05 66 00-0002	EA	18" Double Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire DE-181-VO).....	1,037.16	81.56
Note: Includes tube.				
23 05 66 00-0003	EA	24" Double Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire DE-241-VO).....	1,082.65	85.60
Note: Includes tube.				
23 05 66 00-0004	EA	30" Double Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire DE-301-VO).....	1,085.24	89.27
Note: Includes tube.				
23 05 66 00-0005	EA	36" Double Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire DE-361-VO).....	1,135.95	93.79
Note: Includes tube.				
23 05 66 00-0006	EA	42" Double Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire DE-421-VO).....	1,229.68	97.82
Note: Includes tube.				
23 05 66 00-0007	EA	62" Double Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire DE-621-VO).....	1,127.41	100.88
Note: Includes tube.				

23 05 66 00-0008 Single Ended Ultraviolet HVAC Microbial Control Fixtures (23 05 66)

23 05 66 00-0009	EA	12" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-121-VO).....	867.84	56.49
Note: Includes tube.				
23 05 66 00-0010	EA	16" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-161-VO).....	879.20	61.14
Note: Includes tube.				
23 05 66 00-0011	EA	20" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-201-VO).....	901.06	64.81
Note: Includes tube.				
23 05 66 00-0012	EA	24" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-241-VO).....	911.68	69.70
Note: Includes tube.				
23 05 66 00-0013	EA	30" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-301-VO).....	934.29	73.37
Note: Includes tube.				
23 05 66 00-0014	EA	36" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-361-VO).....	950.90	77.04
Note: Includes tube.				
23 05 66 00-0015	EA	42" Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SE-421-VO).....	972.77	81.93
Note: Includes tube.				

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 66 Anti-Microbial Ultraviolet Emitters for HVAC Ducts and Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 66 00-0016	EA		12" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-121-VO) Note: Includes tube.	990.12	56.49
23 05 66 00-0017	EA		16" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-161-VO) Note: Includes tube.	1,001.48	61.14
23 05 66 00-0018	EA		20" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-201-VO) Note: Includes tube.	1,023.34	64.81
23 05 66 00-0019	EA		24" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-241-VO) Note: Includes tube.	1,033.96	69.70
23 05 66 00-0020	EA		30" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-301-VO) Note: Includes tube.	1,056.57	73.37
23 05 66 00-0021	EA		36" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-361-VO) Note: Includes tube.	1,073.18	77.04
23 05 66 00-0022	EA		42" NEMA 4X Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire SEN-421-VO) Note: Includes tube.	1,095.05	81.93
23 05 66 00-0023	EA		16" Residential Type Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire RSE-161-VO) Note: Includes tube.	687.79	61.14
23 05 66 00-0024	EA		20" Residential Type Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire RSE-201-VO) Note: Includes tube.	709.65	64.81
23 05 66 00-0025	EA		24" Residential Type Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire RSE-241-VO) Note: Includes tube.	720.27	69.70
23 05 66 00-0026	EA		30" Residential Type Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire RSE-301-VO) Note: Includes tube.	742.88	73.37
23 05 66 00-0027	EA		36" Residential Type Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire RSE-361-VO) Note: Includes tube.	759.49	77.04
23 05 66 00-0028	EA		42" Residential Type Single Ended Ultraviolet HVAC Microbial Control Fixture (Steril-Aire RSE-421-VO) Note: Includes tube.	781.36	81.93
23 05 66 00-0029			Fan Coil Unit Ultraviolet Microbial Control Fixtures (23 05 66)		
23 05 66 00-0030	EA		16" Fan Coil Unit Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	635.41	78.26
23 05 66 00-0031	EA		20" Fan Coil Unit Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	649.13	81.93
23 05 66 00-0032	EA		24" Fan Coil Unit Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	662.83	85.60
23 05 66 00-0033	EA		30" Fan Coil Unit Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	681.46	89.27
23 05 66 00-0034	EA		36" Fan Coil Unit Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	705.72	93.79
23 05 66 00-0035	EA		42" Fan Coil Unit Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	727.02	97.82
23 05 66 00-0036			Ultraviolet HVAC Microbial Control Replacement Parts (23 05 66)		
23 05 66 00-0037	EA		18" Double Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTD-16-VO) Note: Includes tube.	167.98	
23 05 66 00-0038	EA		24" Double Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTD-22-VO) Note: Includes tube.	176.65	
23 05 66 00-0039	EA		30" Double Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTD-28-VO) Note: Includes tube.	201.08	
23 05 66 00-0040	EA		36" Double Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTD-34-VO) Note: Includes tube.	232.55	
23 05 66 00-0041	EA		42" Double Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTD-40-VO) Note: Includes tube.	264.71	
23 05 66 00-0042	EA		62" Double Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTD-60-VO) Note: Includes tube.	261.29	
23 05 66 00-0043	EA		12" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-12-VO) Note: Includes tube.	121.40	
23 05 66 00-0044	EA		16" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-16-VO) Note: Includes tube.	127.87	
23 05 66 00-0045	EA		20" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-20-VO) Note: Includes tube.	144.84	
23 05 66 00-0046	EA		24" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-24-VO) Note: Includes tube.	150.57	
23 05 66 00-0047	EA		30" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-30-VO) Note: Includes tube.	168.29	
23 05 66 00-0048	EA		36" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-36-VO) Note: Includes tube.	180.01	
23 05 66 00-0049	EA		42" Single Ended Ultraviolet HVAC Microbial Control Tube Replacement (Steril-Aire GTS-42-VO) Note: Includes tube.	196.99	
23 05 66 00-0050	EA		Removal And Replacement Of Power Supply For Ultraviolet Microbial Control Fixture (Steril-Aire) Note: Includes tube.	494.32	
23 05 66 00-0051			Ultraviolet HVAC Microbial Control Mounting Accessories (23 05 66)		
23 05 66 00-0052	EA		Two Spring Clip, 61" Emitter Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 11006610) Note: Includes 61" emitter, power supply, wires and connectors.	696.77	
23 05 66 00-0053	EA		Two Spring Clip, 61" Sleeved Emitter Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 11006620) Note: Includes 61" emitter, power supply, wires and connectors.	893.97	
23 05 66 00-0054	EA		Two Spring Clip, Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-1) Note: Includes power supply, wires and connectors. Excludes emitter.	402.88	
23 05 66 00-0055	EA		Two Short Hook Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-2) Note: Includes power supply, wires and connectors. Excludes emitter.	427.03	
23 05 66 00-0056	EA		Flat Plate For Metal, Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-3) Note: Includes power supply, wires and connectors. Excludes emitter.	555.72	
23 05 66 00-0057	EA		Flat Plate For Plastic, Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-4) Note: Includes power supply, wires and connectors. Excludes emitter.	343.73	
23 05 66 00-0058	EA		Insert Lamp Holder, Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-5) Note: Includes power supply, wires and connectors. Excludes emitter.	373.42	
23 05 66 00-0059	EA		16" U-Bracket, Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-6) Note: Includes power supply, wires and connectors. Excludes emitter.	485.00	
23 05 66 00-0060	EA		12" U-Bracket, Air Handler Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 10000166-7) Note: Includes power supply, wires and connectors. Excludes emitter.	478.15	
23 05 66 00-0061	LF		30 x 30 mm Framing Structure For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000101) Note: Includes power supply, wires and connectors. Excludes emitter.	17.97	
23 05 66 00-0062	EA		Vertical Support Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000111) Note: Includes power supply, wires and connectors. Excludes emitter.	60.34	
23 05 66 00-0063	EA		Joint Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000112) Note: Includes power supply, wires and connectors. Excludes emitter.	20.50	
23 05 66 00-0064	EA		Emitter Mounting Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000113) Note: Includes power supply, wires and connectors. Excludes emitter.	19.30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 66 00-0065 EA Foundation Bracket FB 8WA For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000104)	55.45	
23 05 66 00-0066 EA Slider Assembly Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000114).....	67.16	
23 05 66 00-0067 EA Splice Kit For Horizontal Rows For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000108)	59.54	
23 05 66 00-0068 EA Gusset Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000115)	48.12	
23 05 66 00-0069 EA ISO "A" Bracket Hanger For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 15000109).....	45.40	
23 05 66 00-0070 EA DE Boot Kit UV Resistant For 1 DE Fixture For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 90000223)	24.09	
23 05 66 00-0071 EA DE Wiring Kit For Up To 65" (DE Bank Install) For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 90000603)	51.17	
23 05 66 00-0072 EA Cleaning Kit For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 90000100)	24.19	
23 05 66 00-0073 EA 480 To 220 Volt AC / 180 VA Step-Down Transformer For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 90000503)	97.65	
23 05 66 00-0074 EA Interlock Switch (16 Amps At 125 Volt, 10 Amperes At 250 Volt Maximum Ampacity) For Ultraviolet HVAC Microbial Control Tube (Steril-Aire 90000120).....	102.76	
23 05 66 00-0075 Ultraviolet Duct Disinfection Unit (eLEDLights) (23 05 66)		
23 05 66 00-0076 EA Two 12" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD2L120V12-P1).....	1,431.05	113.11
23 05 66 00-0077 EA Two 18" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD2L120V18-P1)	1,601.14	119.22
23 05 66 00-0078 EA Two 24" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD2L120V24-P1)	1,661.03	128.39
23 05 66 00-0079 EA Two 30" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD2L120V30-P1)	1,737.54	137.56
23 05 66 00-0080 EA Two 36" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD2L120V36-P1)	1,789.12	146.73
23 05 66 00-0081 EA Two 48" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD2L120V48-P1)	2,158.65	152.84
23 05 66 00-0082 EA Four 18" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD4L120V18-P1)	2,164.51	119.22
23 05 66 00-0083 EA Four 24" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD4L120V24-P1)	2,249.32	128.39
23 05 66 00-0084 EA Four 30" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD4L120V30-P1)	2,600.04	137.56
23 05 66 00-0085 EA Four 36" Lamps, Duct Mounted, UVC Air Duct Disinfection Unit (eLEDLights UVAD4L120V36-P1)	2,701.47	146.73
23 05 66 00-0086 Ultraviolet Germicidal Airborne Duct System (Fresh-Aire UV) (23 05 66)		
Note: Includes 2 Year Warranty		
23 05 66 00-0087 EA Two 18" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-218D-HO)	1,364.38	119.22
23 05 66 00-0088 EA Four 18" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-218Q-HO)	2,362.67	119.22
23 05 66 00-0089 EA Six 18" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-218H-HO)	3,362.31	119.22
23 05 66 00-0090 EA Two 24" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-224D-HO)	1,398.84	128.39
23 05 66 00-0091 EA Four 24" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-224Q-HO)	2,410.57	128.39
23 05 66 00-0092 EA Six 24" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-224H-HO)	3,423.65	128.39
23 05 66 00-0093 EA Two 32" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-232D-HO)	1,430.63	137.56
23 05 66 00-0094 EA Four 32" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-232Q-HO)	2,458.48	137.56
23 05 66 00-0095 EA Six 32" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-232H-HO)	3,484.99	137.56
23 05 66 00-0096 EA Two 46" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-246D-HO)	1,583.46	152.84
23 05 66 00-0097 EA Four 46" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-246Q-HO)	2,709.40	152.84
23 05 66 00-0098 EA Six 46" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-246H-HO)	3,835.34	152.84
23 05 66 00-0099 EA Two 60" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-260D-HO)	1,859.91	168.14
23 05 66 00-0100 EA Four 60" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-260Q-HO)	3,233.07	168.14
23 05 66 00-0101 EA Six 60" Lamps, Duct Mounted, High Output Airborne Disinfection System (Fresh-Aire UV TUVC-ADS-260H-HO)	4,604.89	168.14
23 05 93 Testing, Adjusting, and Balancing for HVAC (23 05)		
Note: Includes all necessary testing, startup, and checkout. Use these tasks for testing, startup, and checkout of existing systems or for third party testing and report when required.		
23 05 93 00-0001 Heating And Ventilating Equipment (23 05 93)		
23 05 93 00-0002 EA Balancing Centrifugal Fans.....	488.80	
For Testing Of Unit Without Balancing, Deduct		-244.40
23 05 93 00-0003 EA Balancing Heating And Ventilating Units	610.75	
For Testing Of Unit Without Balancing, Deduct		-305.38
23 05 93 00-0004 EA Balancing In Line Fan	549.89	
For Testing Of Unit Without Balancing, Deduct		-274.95
23 05 93 00-0005 EA Balancing Propeller And Wall Fan	122.20	
For Testing Of Unit Without Balancing, Deduct		-61.10
23 05 93 00-0006 EA Balancing Roof Exhaust Fan	366.57	
For Testing Of Unit Without Balancing, Deduct		-183.29
23 05 93 00-0007 EA Balancing Wall Fan	91.63	
For Testing Of Unit Without Balancing, Deduct		-45.82
23 05 93 00-0008 EA Balancing Fan Section Exhaust.....	488.01	
For Testing Of Unit Without Balancing, Deduct		-244.01
23 05 93 00-0009 Air Conditioning Equipment (23 05 93)		
23 05 93 00-0010 EA Balancing Constant Volume Air Handling Unit.....	846.33	
For Testing Of Unit Without Balancing, Deduct		-423.17
23 05 93 00-0011 EA Balancing Package A/C Unit.....	317.38	
For Testing Of Unit Without Balancing, Deduct		-158.69
23 05 93 00-0012 EA Balancing Rooftop Heat And Cool Unit.....	423.17	
For Testing Of Unit Without Balancing, Deduct		-211.59
23 05 93 00-0013 EA Balancing Variable Volume Air Handling Unit.....	1,481.08	
For Testing Of Unit Without Balancing, Deduct		-740.54
23 05 93 00-0014 Registers, Diffusers, Terminal Air Units And Dampers (23 05 93)		
23 05 93 00-0015 EA Balancing HVAC Duct System, Ceiling Height To 12' Supply, Return, Exhaust, Register And Diffuser	91.64	
For Testing Of Unit Without Balancing, Deduct		-45.82

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 93 Testing, Adjusting, and Balancing for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 05 93 00-0016	EA		Balancing HVAC Duct System, Ceiling Height >12' Supply, Return, Exhaust, Register And Diffuser	152.75	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-76.38	
23 05 93 00-0017	EA		Balancing HVAC Duct System, Floor Height Supply, Return, Exhaust, Register And Diffuser	79.42	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-39.71	
23 05 93 00-0018	EA		Balance Variable Air Volume Box	86.06	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-43.03	
23 05 93 00-0019	EA		Balance Constant Volume Box	86.06	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-43.03	
23 05 93 00-0020	EA		Balance Fan Powered Box	97.76	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-48.88	
23 05 93 00-0021	EA		Balance Lab Fume Hood	397.16	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-198.58	
23 05 93 00-0022	EA		Balance General Hood	305.50	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-152.75	
23 05 93 00-0023	EA		Balance Induction Unit	183.31	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-91.66	
23 05 93 00-0024	EA		Balance Moduline - Master	73.30	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-36.65	
23 05 93 00-0025	EA		Balance Moduline - Slave	36.66	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-18.33	
23 05 93 00-0026	EA		Balance Dampers	34.04	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-17.02	
23 05 93 00-0027	EA		Balance Regenerators	488.01	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-244.01	

23 05 93 00-0028 Water Balancing Of Components (23 05 93)

23 05 93 00-0029	EA		Water Balance, Air Cool Condenser	581.91	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-290.96	
23 05 93 00-0030	EA		Water Balance, Cabinet Heater	74.06	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-37.03	
23 05 93 00-0031	EA		Water Balance, Chiller, Air Cooled	634.70	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-317.35	
23 05 93 00-0032	EA		Water Balance, Chiller, Water Cooled	846.33	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-423.17	
23 05 93 00-0033	EA		Water Balance, Cooling Tower	423.17	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-211.59	
23 05 93 00-0034	EA		Water Balance, Fan Coil And Vent	105.86	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-52.93	
23 05 93 00-0035	EA		Water Balance, Fin Tube And Radiant Panel	105.79	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-52.90	
23 05 93 00-0036	EA		Water Balance, Main And Duct Re-Heat Coil	116.37	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-58.19	
23 05 93 00-0037	EA		Water Balance, Pumps	317.39	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-158.70	
23 05 93 00-0038	EA		Water Balance, Unit Heater	74.06	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-37.03	
23 05 93 00-0039	EA		Water Balancing, Converter	317.50	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-158.75	
23 05 93 00-0040	EA		Water Balancing, Cocks And Valves	52.89	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-26.45	
23 05 93 00-0041	EA		Water Balance, Convactor	63.47	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-31.74	
23 05 93 00-0042	EA		Water Balancing, Backflow Preventer Or Reduced Pressure Zone Valves	79.35	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-39.68	
23 05 93 00-0043	EA		Water Balance, Boiler, Up To 500 MBH	687.64	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-343.82	
23 05 93 00-0044	EA		>500 To 1,000 MBH, Water Balance, Boiler	1,269.50	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-634.75	
23 05 93 00-0045	EA		>1,000 MBH, Water Balance, Boiler	2,327.41	
			<i>For Testing Of Unit Without Balancing, Deduct</i>	-1,163.71	

23 05 93 00-0046 Non-Destructive Testing (23 05 93)**23 05 93 00-0047 X-Ray Welds, Non-Destructive Testing (23 05 93 00-0046)****23 05 93 00-0048 Minimum Charge For X-Ray Welds (23 05 93 00-0047)**

23 05 93 00-0049	EA		X-Ray Welds Minimum Set-Up Charge	874.49	
			Note: For projects where the total charges are less than the minimum set-up charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.		

23 05 93 00-0050 Piping, X-Ray Welds, Non-Destructive Testing (23 05 93 00-0047)

23 05 93 00-0051	EA		Up To 3/4" Piping, X-Ray Welds, Non-Destructive Testing	89.14	
23 05 93 00-0052	EA		1" Piping, X-Ray Welds, Non-Destructive Testing	101.35	
23 05 93 00-0053	EA		1-1/4" - 1-1/2" Piping, X-Ray Welds, Non-Destructive Testing	113.56	
23 05 93 00-0054	EA		2" Piping, X-Ray Welds, Non-Destructive Testing	120.05	
23 05 93 00-0055	EA		3" Piping, X-Ray Welds, Non-Destructive Testing	126.51	
23 05 93 00-0056	EA		4" Piping, X-Ray Welds, Non-Destructive Testing	133.71	
23 05 93 00-0057	EA		6" Piping, X-Ray Welds, Non-Destructive Testing	146.64	
23 05 93 00-0058	EA		8" Piping, X-Ray Welds, Non-Destructive Testing	159.59	
23 05 93 00-0059	EA		10" Piping, X-Ray Welds, Non-Destructive Testing	166.79	
23 05 93 00-0060	EA		12" Piping, X-Ray Welds, Non-Destructive Testing	173.99	



	MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 05 93 00-0061	Liquid Penetration Of Welds, Non-Destructive Testing <small>(23 05 93 00-0046)</small>		
23 05 93 00-0062	Piping, Liquid Penetration Of Welds, Non-Destructive Testing <small>(23 05 93 00-0061)</small>		
23 05 93 00-0063	EA Up To 3/4" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	117.86	
23 05 93 00-0064	EA 1" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	123.61	
23 05 93 00-0065	EA 1-1/4" - 1-1/2" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	129.35	
23 05 93 00-0066	EA 2" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	132.22	
23 05 93 00-0067	EA 3" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	136.53	
23 05 93 00-0068	EA 4" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	140.84	
23 05 93 00-0069	EA 6" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	149.45	
23 05 93 00-0070	EA 8" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	158.06	
23 05 93 00-0071	EA 10" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	166.68	
23 05 93 00-0072	EA 12" Piping, Liquid Penetration Of Welds, Non-Destructive Testing.....	175.30	

23 05 93 00-0073	Hydrostatic Testing <small>(23 05 93 00-0046)</small>		
	Note: Includes flushing and restoring of system.		
23 05 93 00-0074	Piping, Hydrostatic Testing <small>(23 05 93 00-0073)</small>		
23 05 93 00-0075	EA Up To 100', Up To 1-1/2" Piping, Hydrostatic Testing.....	755.70	
23 05 93 00-0076	EA >100' To 250', Up To 1-1/2" Piping, Hydrostatic Testing.....	1,079.56	
23 05 93 00-0077	EA >250' To 500', Up To 1-1/2" Piping, Hydrostatic Testing.....	1,293.52	
23 05 93 00-0078	EA >500' To 1,000', Up To 1-1/2" Piping, Hydrostatic Testing.....	1,722.99	
23 05 93 00-0079	EA >1,000' To 2,000', Up To 1-1/2" Piping, Hydrostatic Testing.....	2,610.58	
23 05 93 00-0080	EA Up To 100', >1-1/2" To 4" Piping, Hydrostatic Testing.....	1,004.77	
23 05 93 00-0081	EA >100' To 250', >1-1/2" To 4" Piping, Hydrostatic Testing.....	1,435.81	
23 05 93 00-0082	EA >250' To 500', >1-1/2" To 4" Piping, Hydrostatic Testing.....	1,709.31	
23 05 93 00-0083	EA >500' To 1,000', >1-1/2" To 4" Piping, Hydrostatic Testing.....	2,239.86	
23 05 93 00-0084	EA >1,000' To 2,000', >1-1/2" To 4" Piping, Hydrostatic Testing.....	3,388.52	
23 05 93 00-0085	EA Up To 100', >4" To 10" Piping, Hydrostatic Testing.....	1,309.47	
23 05 93 00-0086	EA >100' To 250', >4" To 10" Piping, Hydrostatic Testing.....	1,866.57	
23 05 93 00-0087	EA >250' To 500', >4" To 10" Piping, Hydrostatic Testing.....	1,969.33	
23 05 93 00-0088	EA >500' To 1,000', >4" To 10" Piping, Hydrostatic Testing.....	2,579.98	
23 05 93 00-0089	EA >1,000' To 2,000', >4" To 10" Piping, Hydrostatic Testing.....	3,903.02	
23 05 93 00-0090	EA Up To 100', >10" To 14" Piping, Hydrostatic Testing.....	1,700.01	
23 05 93 00-0091	EA >100' To 250', >10" To 14" Piping, Hydrostatic Testing.....	2,423.65	
23 05 93 00-0092	EA >250' To 500', >10" To 14" Piping, Hydrostatic Testing.....	2,560.63	
23 05 93 00-0093	EA >500' To 1,000', >10" To 14" Piping, Hydrostatic Testing.....	3,358.54	
23 05 93 00-0094	EA >1,000' To 2,000', >10" To 14" Piping, Hydrostatic Testing.....	5,088.71	

23 05 93 00-0095	Pneumatic Testing <small>(23 05 93 00-0046)</small>		
	Note: Includes soaping joints flushing and restoring of system. Can be used for gas or smoke test.		
23 05 93 00-0096	Piping, Pneumatic Testing <small>(23 05 93 00-0095)</small>		
23 05 93 00-0097	EA Up To 100', Up To 1-1/2" Piping, Pneumatic Testing.....	859.89	
	Note: Includes soaping joints.		
23 05 93 00-0098	EA >100' To 250', Up To 1-1/2" Piping, Pneumatic Testing.....	1,226.77	
	Note: Includes soaping joints.		
23 05 93 00-0099	EA >250' To 500', Up To 1-1/2" Piping, Pneumatic Testing.....	1,325.71	
	Note: Includes soaping joints.		
23 05 93 00-0100	EA >500' To 1,000', Up To 1-1/2" Piping, Pneumatic Testing.....	1,698.76	
	Note: Includes soaping joints.		
23 05 93 00-0101	EA >1,000' To 2,000', Up To 1-1/2" Piping, Pneumatic Testing.....	2,658.06	
	Note: Includes soaping joints.		
23 05 93 00-0102	EA Up To 100', >1-1/2" To 4" Piping, Pneumatic Testing.....	1,122.01	
	Note: Includes soaping joints.		
23 05 93 00-0103	EA >100' To 250', >1-1/2" To 4" Piping, Pneumatic Testing.....	1,592.95	
	Note: Includes soaping joints.		
23 05 93 00-0104	EA >250' To 500', >1-1/2" To 4" Piping, Pneumatic Testing.....	1,723.24	
	Note: Includes soaping joints.		
23 05 93 00-0105	EA >500' To 1,000', >1-1/2" To 4" Piping, Pneumatic Testing.....	2,208.74	
	Note: Includes soaping joints.		
23 05 93 00-0106	EA >1,000' To 2,000', >1-1/2" To 4" Piping, Pneumatic Testing.....	3,454.75	
	Note: Includes soaping joints.		
23 05 93 00-0107	EA Up To 100', >4" To 10" Piping, Pneumatic Testing.....	1,351.31	
	Note: Includes soaping joints.		
23 05 93 00-0108	EA >100' To 250', >4" To 10" Piping, Pneumatic Testing.....	1,906.72	
	Note: Includes soaping joints.		
23 05 93 00-0109	EA >250' To 500', >4" To 10" Piping, Pneumatic Testing.....	2,157.47	
	Note: Includes soaping joints.		
23 05 93 00-0110	EA >500' To 1,000', >4" To 10" Piping, Pneumatic Testing.....	2,757.79	
	Note: Includes soaping joints.		
23 05 93 00-0111	EA >1,000' To 2,000', >4" To 10" Piping, Pneumatic Testing.....	4,319.76	
	Note: Includes soaping joints.		
23 05 93 00-0112	EA Up To 100', >10" To 14" Piping, Pneumatic Testing.....	1,759.60	
	Note: Includes soaping joints.		
23 05 93 00-0113	EA >100' To 250', >10" To 14" Piping, Pneumatic Testing.....	2,478.97	
	Note: Includes soaping joints.		
23 05 93 00-0114	EA >250' To 500', >10" To 14" Piping, Pneumatic Testing.....	2,805.71	
	Note: Includes soaping joints.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 05 Common Work Results for HVAC****23 05 93 Testing, Adjusting, and Balancing for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 05 93 00-0115	EA		>500' To 1,000', >10" To 14" Piping, Pneumatic Testing Note: Includes soaping joints.	3,586.14	
23 05 93 00-0116	EA		>1,000' To 2,000', >10" To 14" Piping, Pneumatic Testing Note: Includes soaping joints.	5,625.33	
23 05 93 00-0117			EPA Testing Of Sludge (23 05 93)		
23 05 93 00-0118	EA		Flashpoint And Lead Test For Lead.....	1,023.87	
23 05 93 00-0119	EA		Air Test/Combustion Gas Level.....	99.18	
23 05 93 00-0120	EA		Toxicity Test For Heavy Metals.....	1,572.19	
23 05 93 00-0121	EA		Aboveground Tank Water Settlement Test Including Water.....	1,192.05	

23 07 HVAC Insulation (23)**23 07 13 Duct Insulation (23 07)**

Note: Based on SF surface area of duct to receive insulation.

23 07 13 00-0001			FSK Fiber Glass Duct Wrap Insulation (23 07 13) Note: Foil-scrim kraft (FSK) facing lapped and joints sealed vapor tight.		
23 07 13 00-0002			Type 75 (0.75 LB/CF) FSK Fiber Glass Duct Wrap Insulation (23 07 13 00-0001)		
23 07 13 00-0003	SF		1-1/2" Thick, Type 75 (0.75 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	4.49	2.16
23 07 13 00-0004	SF		2" Thick, Type 75 (0.75 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	5.07	3.22
23 07 13 00-0005	SF		3" Thick, Type 75 (0.75 LB/CF) FSK Fiber Glass Duct Wrap Insulation..... <i>For Plain Blanket, With No Facing, Deduct</i> -0.61 <i>For Work In Restricted Working Space, Add</i> 1.35	6.01	3.77
23 07 13 00-0006	SF		4" Thick, Type 75 (0.75 LB/CF) FSK Fiber Glass Duct Wrap Insulation..... <i>For Plain Blanket, With No Facing, Deduct</i> -0.96 <i>For Work In Restricted Working Space, Add</i> 1.45	7.25	4.09
23 07 13 00-0007			Type 100 (1.0 LB/CF) FSK Fiber Glass Duct Wrap Insulation (23 07 13 00-0001)		
23 07 13 00-0008	SF		1" Thick, Type 100 (1.0 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	4.72	3.22
23 07 13 00-0009	SF		1-1/2" Thick, Type 100 (1.0 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	5.52	3.77
23 07 13 00-0010	SF		2" Thick, Type 100 (1.0 LB/CF) Fiber Glass FSK Duct Wrap Insulation.....	6.51	4.30
23 07 13 00-0011			Type 150 (1.5 LB/CF) FSK Fiber Glass Duct Wrap Insulation (23 07 13 00-0001)		
23 07 13 00-0012	SF		1" Thick, Type 150 (1.5 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	6.24	4.30
23 07 13 00-0013	SF		1-1/2" Thick, Type 150 (1.5 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	8.27	4.84
23 07 13 00-0014	SF		2" Thick, Type 150 (1.5 LB/CF) FSK Fiber Glass Duct Wrap Insulation.....	9.66	5.38
23 07 13 00-0015			3 LB/CF FSK Rigid Fiber Glass Board Insulation (23 07 13) Note: Foil-scrim kraft (FSK) facing, sealed vapor tight and attached to ducts with mechanical fasteners.		
23 07 13 00-0016	SF		1" Thick, 3 LB/CF FSK Rigid Fiber Glass Board Insulation..... <i>For Non-Metallic Weatherproof Paste, 2 LB, Add</i> 14.34 <i>For Finishing Cement 1/2" Thick Over 1" Wire Mesh, Add</i> 17.41 <i>For 8 Oz Canvas On Duct, Applied Over Deadening Felt And Finished, Add</i> 23.41	10.25	5.99
23 07 13 00-0017	SF		1-1/2" Thick, 3 LB/CF FSK Rigid Fiber Glass Board Insulation..... <i>For Non-Metallic Weatherproof Paste, 2 LB, Add</i> 17.98 <i>For Finishing Cement 1/2" Thick Over 1" Wire Mesh, Add</i> 21.96 <i>For 8 Oz Canvas On Duct, Applied Over Deadening Felt And Finished, Add</i> 29.02	13.24	7.29
23 07 13 00-0018	SF		2" Thick, 3 LB/CF FSK Rigid Fiber Glass Board Insulation..... <i>For Non-Metallic Weatherproof Paste, 2 LB, Add</i> 22.11 <i>For Finishing Cement 1/2" Thick Over 1" Wire Mesh, Add</i> 27.09 <i>For 8 Oz Canvas On Duct, Applied Over Deadening Felt And Finished, Add</i> 35.43	16.57	8.80
23 07 13 00-0019			4.253 LB/CF FSK Rigid Fiber Glass Board Insulation (23 07 13) Note: Foil-scrim kraft (FSK) facing, sealed vapor tight and attached to ducts with mechanical fastener.		
23 07 13 00-0020	SF		1" Thick, 4.253 LB/CF FSK Rigid Fiber Glass Board Insulation.....	11.53	6.60
23 07 13 00-0021	SF		1-1/2" Thick, 4.253 LB/CF FSK Rigid Fiber Glass Board Insulation.....	15.08	8.02
23 07 13 00-0022	SF		2" Thick, 4.253 LB/CF FSK Rigid Fiber Glass Board Insulation.....	19.46	9.69
23 07 13 00-0023			Sheet Flexible Elastomeric Insulation (23 07 13)		
23 07 13 00-0024	SF		3/8" Thick, Sheet Flexible Elastomeric Insulation.....	8.89	2.90
23 07 13 00-0025	SF		1/2" Thick, Sheet Flexible Elastomeric Insulation.....	9.51	3.06
23 07 13 00-0026	SF		3/4" Thick, Sheet Flexible Elastomeric Insulation.....	12.52	3.22
23 07 13 00-0027	SF		1" Thick, Sheet Flexible Elastomeric Insulation.....	14.45	3.38
23 07 13 00-0028	SF		1-1/2" Thick, Sheet Flexible Elastomeric Insulation.....	20.08	3.71
23 07 13 00-0029	SF		2" Thick, Sheet Flexible Elastomeric Insulation.....	23.77	4.03
23 07 13 00-0030			Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation (23 07 13) Note: Jacketing is a 3-ply laminate consisting of a PVC core, 0.012" thick aluminum foil jacketing and UV-protective Mylar film.		
23 07 13 00-0031	SF		1/2" Thick, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation.....	13.25	3.06
23 07 13 00-0032	SF		3/4" Thick, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation.....	14.58	3.22
23 07 13 00-0033	SF		1" Thick, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation.....	16.25	3.38



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 07 13 00-0034 SF 1-1/2" Thick, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation.....	25.46	3.71
23 07 13 00-0035 SF 2" Thick, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation.....	30.19	4.03
23 07 13 00-0036 Adhesive Backed, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation <small>(23 07 13)</small>		
<small>Note: Jacketing is a 3-ply laminate consisting of a PVC core, 0.012" thick aluminum foil jacketing and UV-protective Mylar film.</small>		
23 07 13 00-0037 SF 1/2" Thick, Adhesive Backed, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation	15.91	3.06
23 07 13 00-0038 SF 3/4" Thick, Adhesive Backed, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation	17.24	3.22
23 07 13 00-0039 SF 1" Thick, Adhesive Backed, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation	19.38	3.38
23 07 13 00-0040 SF 1-1/2" Thick, Adhesive Backed, Aluminum Foil/Mylar Film, Multi-Layer Sheet Elastomeric Insulation	28.55	3.71
23 07 16 HVAC Equipment Insulation <small>(23 07)</small>		
23 07 16 00-0001 Calcium Silicate Block Insulation <small>(23 07 16)</small>		
23 07 16 00-0002 SF 1" Thick, Calcium Silicate Block Insulation	18.07	7.20
<i>For Work In Restricted Working Space, Add</i>	4.32	
23 07 16 00-0003 SF 1-1/2" Thick, Calcium Silicate Block Insulation	21.72	8.11
<i>For Work In Restricted Working Space, Add</i>	4.86	
23 07 16 00-0004 SF 2" Thick, Calcium Silicate Block Insulation	26.10	9.34
23 07 16 00-0005 SF 2-1/2" Thick, Calcium Silicate Block Insulation	31.13	10.97
<i>For Work In Restricted Working Space, Add</i>	6.59	
23 07 16 00-0006 SF 3" Thick, Calcium Silicate Block Insulation	38.03	13.51
<i>For Work In Restricted Working Space, Add</i>	8.10	
23 07 19 HVAC Piping Insulation <small>(23 07)</small>		
<small>See CSI section 22 07 19 00-0000 for pipe insulation.</small>		
23 07 19 00-0001 Calcium Silicate Pipe Insulation <small>(23 07 19)</small>		
<small>Note: Includes adhesive. Excludes fittings (a location requiring purchase of an insulation fitting or cutting and fitting straight sections, excludes couplings, plugs, etc.). For fittings/valves up to 3" add 2 LF for each fitting/valve or 3 LF for each flanged/grooved joint. For fittings/valves >3" add 3 LF for each fitting/valve or 4 LF for each flanged/grooved joint. See CSI section 22 07 19 00-0398 for protective jacketing.</small>		
23 07 19 00-0002 1" Thick, Calcium Silicate Pipe Insulation <small>(23 07 19 00-0001)</small>		
23 07 19 00-0003 LF 1/2" Diameter Pipe, 1" Thick Calcium Silicate Insulation	12.96	3.54
<i>For Work In Restricted Working Space, Add</i>	2.65	
23 07 19 00-0004 LF 3/4" Diameter Pipe, 1" Thick Calcium Silicate Insulation	12.96	3.54
<i>For Work In Restricted Working Space, Add</i>	2.65	
23 07 19 00-0005 LF 1" Diameter Pipe, 1" Thick Calcium Silicate Insulation	12.91	3.59
<i>For Work In Restricted Working Space, Add</i>	2.69	
23 07 19 00-0006 LF 1-1/4" Diameter Pipe, 1" Thick Calcium Silicate Insulation	13.10	3.64
<i>For Work In Restricted Working Space, Add</i>	2.73	
23 07 19 00-0007 LF 1-1/2" Diameter Pipe, 1" Thick Calcium Silicate Insulation	13.27	3.69
<i>For Work In Restricted Working Space, Add</i>	2.77	
23 07 19 00-0008 LF 2" Diameter Pipe, 1" Thick Calcium Silicate Insulation	14.15	3.79
<i>For Work In Restricted Working Space, Add</i>	2.84	
23 07 19 00-0009 LF 2-1/2" Diameter Pipe, 1" Thick Calcium Silicate Insulation	14.79	3.95
<i>For Work In Restricted Working Space, Add</i>	2.96	
23 07 19 00-0010 LF 3" Diameter Pipe, 1" Thick Calcium Silicate Insulation	15.41	4.05
<i>For Work In Restricted Working Space, Add</i>	3.03	
23 07 19 00-0011 LF 4" Diameter Pipe, 1" Thick Calcium Silicate Insulation	17.51	4.35
<i>For Work In Restricted Working Space, Add</i>	3.26	
23 07 19 00-0012 LF 6" Diameter Pipe, 1" Thick Calcium Silicate Insulation	19.53	4.92
<i>For Work In Restricted Working Space, Add</i>	3.68	
23 07 19 00-0013 1-1/2" Thick, Calcium Silicate Pipe Insulation <small>(23 07 19 00-0001)</small>		
23 07 19 00-0014 LF 1/2" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	13.56	3.69
<i>For Work In Restricted Working Space, Add</i>	2.76	
23 07 19 00-0015 LF 3/4" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	13.63	3.69
<i>For Work In Restricted Working Space, Add</i>	2.76	
23 07 19 00-0016 LF 1" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	14.58	3.90
<i>For Work In Restricted Working Space, Add</i>	2.93	
23 07 19 00-0017 LF 1-1/4" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation.....	15.14	3.98
<i>For Work In Restricted Working Space, Add</i>	2.98	
23 07 19 00-0018 LF 1-1/2" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation.....	15.71	4.05
<i>For Work In Restricted Working Space, Add</i>	3.04	
23 07 19 00-0019 LF 2" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	16.83	4.27
<i>For Work In Restricted Working Space, Add</i>	3.20	
23 07 19 00-0020 LF 2-1/2" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation.....	17.58	4.34
<i>For Work In Restricted Working Space, Add</i>	3.26	
23 07 19 00-0021 LF 3" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	18.25	4.49
<i>For Work In Restricted Working Space, Add</i>	3.37	
23 07 19 00-0022 LF 4" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	20.27	4.86
<i>For Work In Restricted Working Space, Add</i>	3.64	
23 07 19 00-0023 LF 6" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	23.52	5.67
<i>For Work In Restricted Working Space, Add</i>	4.25	
23 07 19 00-0024 LF 8" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	27.36	5.98
<i>For Work In Restricted Working Space, Add</i>	4.49	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 07 HVAC Insulation****23 07 19 HVAC Piping Insulation**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 07 19 00-0025	LF	10" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	34.32	7.16
		<i>For Work In Restricted Working Space, Add</i>	5.37	
23 07 19 00-0026	LF	12" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	40.32	8.34
		<i>For Work In Restricted Working Space, Add</i>	6.26	
23 07 19 00-0027	LF	14" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	44.86	9.15
		<i>For Work In Restricted Working Space, Add</i>	6.86	
23 07 19 00-0028	LF	16" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	53.72	11.64
		<i>For Work In Restricted Working Space, Add</i>	8.73	
23 07 19 00-0029	LF	18" Diameter Pipe, 1-1/2" Thick Calcium Silicate Insulation	57.77	12.22
		<i>For Work In Restricted Working Space, Add</i>	9.16	
23 07 19 00-0030		2" Thick, Calcium Silicate Pipe Insulation (23 07 19 00-0001)		
23 07 19 00-0031	LF	1/2" Diameter Pipe, 2" Thick Calcium Silicate Insulation	16.99	4.05
		<i>For Work In Restricted Working Space, Add</i>	3.03	
23 07 19 00-0032	LF	3/4" Diameter Pipe, 2" Thick Calcium Silicate Insulation	17.36	4.05
		<i>For Work In Restricted Working Space, Add</i>	3.03	
23 07 19 00-0033	LF	1" Diameter Pipe, 2" Thick Calcium Silicate Insulation	17.89	4.10
		<i>For Work In Restricted Working Space, Add</i>	3.08	
23 07 19 00-0034	LF	1-1/4" Diameter Pipe, 2" Thick Calcium Silicate Insulation	18.57	4.15
		<i>For Work In Restricted Working Space, Add</i>	3.17	
23 07 19 00-0035	LF	1-1/2" Diameter Pipe, 2" Thick Calcium Silicate Insulation	19.04	4.20
		<i>For Work In Restricted Working Space, Add</i>	3.15	
23 07 19 00-0036	LF	2" Diameter Pipe, 2" Thick Calcium Silicate Insulation	19.84	4.35
		<i>For Work In Restricted Working Space, Add</i>	3.26	
23 07 19 00-0037	LF	2-1/2" Diameter Pipe, 2" Thick Calcium Silicate Insulation	22.06	4.50
		<i>For Work In Restricted Working Space, Add</i>	3.38	
23 07 19 00-0038	LF	3" Diameter Pipe, 2" Thick Calcium Silicate Insulation	22.48	4.66
		<i>For Work In Restricted Working Space, Add</i>	3.50	
23 07 19 00-0039	LF	4" Diameter Pipe, 2" Thick Calcium Silicate Insulation	24.81	4.92
		<i>For Work In Restricted Working Space, Add</i>	3.69	
23 07 19 00-0040	LF	6" Diameter Pipe, 2" Thick Calcium Silicate Insulation	30.36	5.90
		<i>For Work In Restricted Working Space, Add</i>	4.43	
23 07 19 00-0041	LF	8" Diameter Pipe, 2" Thick Calcium Silicate Insulation	34.16	6.23
		<i>For Work In Restricted Working Space, Add</i>	4.67	
23 07 19 00-0042	LF	10" Diameter Pipe, 2" Thick Calcium Silicate Insulation	41.99	7.45
		<i>For Work In Restricted Working Space, Add</i>	5.59	
23 07 19 00-0043	LF	12" Diameter Pipe, 2" Thick Calcium Silicate Insulation	48.27	8.93
		<i>For Work In Restricted Working Space, Add</i>	6.69	
23 07 19 00-0044	LF	14" Diameter Pipe, 2" Thick Calcium Silicate Insulation	59.67	12.45
		<i>For Work In Restricted Working Space, Add</i>	9.34	
23 07 19 00-0045	LF	16" Diameter Pipe, 2" Thick Calcium Silicate Insulation	62.59	12.45
		<i>For Work In Restricted Working Space, Add</i>	9.34	
23 07 19 00-0046	LF	18" Diameter Pipe, 2" Thick Calcium Silicate Insulation	67.00	13.08
		<i>For Work In Restricted Working Space, Add</i>	9.80	
23 07 19 00-0047	LF	20" Diameter Pipe, 2" Thick Calcium Silicate Insulation	79.62	14.94
		<i>For Work In Restricted Working Space, Add</i>	11.21	
23 07 19 00-0048	LF	24" Diameter Pipe, 2" Thick Calcium Silicate Insulation	92.96	18.05
		<i>For Work In Restricted Working Space, Add</i>	13.54	
23 07 19 00-0049		2-1/2" Thick, Calcium Silicate Pipe Insulation (23 07 19 00-0001)		
23 07 19 00-0050	LF	1/2" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	20.32	4.66
		<i>For Work In Restricted Working Space, Add</i>	3.50	
23 07 19 00-0051	LF	3/4" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	20.71	4.66
		<i>For Work In Restricted Working Space, Add</i>	3.50	
23 07 19 00-0052	LF	1" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	21.07	4.74
		<i>For Work In Restricted Working Space, Add</i>	3.56	
23 07 19 00-0053	LF	1-1/4" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	21.27	4.78
		<i>For Work In Restricted Working Space, Add</i>	3.59	
23 07 19 00-0054	LF	1-1/2" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	21.78	4.82
		<i>For Work In Restricted Working Space, Add</i>	3.61	
23 07 19 00-0055	LF	2" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	22.70	5.02
		<i>For Work In Restricted Working Space, Add</i>	3.76	
23 07 19 00-0056	LF	2-1/2" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	25.36	5.19
		<i>For Work In Restricted Working Space, Add</i>	3.89	
23 07 19 00-0057	LF	3" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	25.82	5.37
		<i>For Work In Restricted Working Space, Add</i>	4.03	
23 07 19 00-0058	LF	4" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	29.62	5.66
		<i>For Work In Restricted Working Space, Add</i>	4.25	
23 07 19 00-0059	LF	6" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	36.66	6.43
		<i>For Work In Restricted Working Space, Add</i>	4.82	
23 07 19 00-0060	LF	8" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	41.78	7.17
		<i>For Work In Restricted Working Space, Add</i>	5.38	
23 07 19 00-0061	LF	10" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	49.79	8.27
		<i>For Work In Restricted Working Space, Add</i>	6.20	
23 07 19 00-0062	LF	12" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	58.18	10.28
		<i>For Work In Restricted Working Space, Add</i>	7.71	
23 07 19 00-0063	LF	14" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	64.31	11.22
		<i>For Work In Restricted Working Space, Add</i>	8.42	
23 07 19 00-0064	LF	16" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	78.32	14.35
		<i>For Work In Restricted Working Space, Add</i>	10.76	
23 07 19 00-0065	LF	18" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation	82.69	15.06
		<i>For Work In Restricted Working Space, Add</i>	11.30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 07 19 00-0066 LF 20" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	95.83 12.91	17.22
23 07 19 00-0067 LF 24" Diameter Pipe, 2-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	112.80 15.60	20.79
23 07 19 00-0068 3" Thick, Calcium Silicate Pipe Insulation <small>(23 07 19 00-0001)</small>		
23 07 19 00-0069 LF 1/2" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	25.38 3.87	5.17
23 07 19 00-0070 LF 3/4" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	25.46 3.87	5.17
23 07 19 00-0071 LF 1" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	25.69 3.92	5.22
23 07 19 00-0072 LF 1-1/4" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	25.96 3.94	5.25
23 07 19 00-0073 LF 1-1/2" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	26.21 3.98	5.31
23 07 19 00-0074 LF 2" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	27.10 4.13	5.51
23 07 19 00-0075 LF 2-1/2" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	29.92 4.27	5.69
23 07 19 00-0076 LF 3" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	30.56 4.43	5.90
23 07 19 00-0077 LF 4" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	35.76 4.67	6.23
23 07 19 00-0078 LF 6" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	42.31 5.30	7.07
23 07 19 00-0079 LF 8" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	49.05 5.91	7.88
23 07 19 00-0080 LF 10" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	58.16 6.82	9.10
23 07 19 00-0081 LF 12" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	67.45 8.48	11.30
23 07 19 00-0082 LF 14" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	74.80 9.26	12.34
23 07 19 00-0083 LF 16" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	87.99 11.83	15.78
23 07 19 00-0084 LF 18" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	94.72 12.42	16.56
23 07 19 00-0085 LF 20" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	110.76 14.21	18.94
23 07 19 00-0086 LF 24" Diameter Pipe, 3" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	131.17 17.16	22.88
23 07 19 00-0087 3-1/2" Thick, Calcium Silicate Pipe Insulation <small>(23 07 19 00-0001)</small>		
23 07 19 00-0088 LF 1/2" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	32.03 4.25	5.66
23 07 19 00-0089 LF 3/4" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	33.16 4.25	5.66
23 07 19 00-0090 LF 1" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	33.25 4.27	5.69
23 07 19 00-0091 LF 1-1/4" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	33.35 4.30	5.73
23 07 19 00-0092 LF 1-1/2" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	34.36 4.36	5.80
23 07 19 00-0093 LF 2" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	36.40 4.50	6.00
23 07 19 00-0094 LF 2-1/2" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	39.42 4.66	6.22
23 07 19 00-0095 LF 3" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	40.82 4.82	6.44
23 07 19 00-0096 LF 4" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	46.32 5.10	6.80
23 07 19 00-0097 LF 6" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	51.72 5.79	7.72
23 07 19 00-0098 LF 8" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	62.72 6.45	8.59
23 07 19 00-0099 LF 10" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	76.04 7.44	9.92
23 07 19 00-0100 LF 12" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	92.16 9.25	12.33
23 07 19 00-0101 LF 14" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	97.26 10.10	13.47
23 07 19 00-0102 LF 16" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	113.92 12.91	17.21
23 07 19 00-0103 LF 18" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	130.28 13.55	18.07
23 07 19 00-0104 LF 20" Diameter Pipe, 3-1/2" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	140.98 15.50	20.67
23 07 19 00-0105 4" Thick, Calcium Silicate Pipe Insulation <small>(23 07 19 00-0001)</small>		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 07 HVAC Insulation****23 07 19 HVAC Piping Insulation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 07 19 00-0106	LF		1/2" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	39.73 4.72	6.29
23 07 19 00-0107	LF		3/4" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	39.77 4.72	6.29
23 07 19 00-0108	LF		1" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	40.04 4.80	6.40
23 07 19 00-0109	LF		1-1/4" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	41.10 4.85	6.47
23 07 19 00-0110	LF		1-1/2" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	43.47 5.00	6.67
23 07 19 00-0111	LF		2" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	44.40 5.16	6.88
23 07 19 00-0112	LF		2-1/2" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	48.31 5.24	6.98
23 07 19 00-0113	LF		3" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	49.72 5.43	7.24
23 07 19 00-0114	LF		4" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	56.24 5.73	7.65
23 07 19 00-0115	LF		6" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	65.01 6.51	8.67
23 07 19 00-0116	LF		8" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	77.23 7.25	9.67
23 07 19 00-0117	LF		10" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	88.94 8.38	11.17
23 07 19 00-0118	LF		12" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	101.67 10.41	13.87
23 07 19 00-0119	LF		14" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	108.28 11.37	15.16
23 07 19 00-0120	LF		16" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	128.69 14.54	19.38
23 07 19 00-0121	LF		18" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	136.76 15.23	20.31
23 07 19 00-0122	LF		20" Diameter Pipe, 4" Thick Calcium Silicate Insulation <i>For Work In Restricted Working Space, Add</i>	151.62 17.43	23.24

23 07 19 00-0123 Weather-Protective Coating For Calcium Silicate Pipe Insulation (23 07 19 00-0001)

23 07 19 00-0124	SF		1/4" Thick (Two 1/8" Coats), Weatherproof Coating Over Glass Cloth Mesh (Insulokote ET) <i>For Work In Restricted Working Space, Add</i>	5.69 1.00	
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23 08 Commissioning of HVAC (23)

See CSI section 23 05 93 00-0000 for testing and balancing.

23 09 Instrumentation and Control for HVAC (23)**23 09 23 Direct-Digital Control System for HVAC (23 09)****23 09 23 11 Control Valves (23 09 23)****23 09 23 11-0001 Valves With Actuator (23 09 23 11)**

23 09 23 11-0002	EA		1/2" 2-Way Bronze Globe Valve With Actuator (Belimo G215+NV24-MFT US)	817.95	14.82
23 09 23 11-0003	EA		3/4" 2-Way Bronze Globe Valve With Actuator (Belimo G220+NV24-MFT US)	843.65	19.98
23 09 23 11-0004	EA		1" 2-Way Bronze Globe Valve With Actuator (Belimo B225+NV24-MFT US)	922.22	24.19
23 09 23 11-0005	EA		1-1/4" 2-Way Bronze Globe Valve With Actuator (Belimo B232+NV24-MFT US)	1,004.29	30.63
23 09 23 11-0006	EA		1-1/2" 2-Way Bronze Globe Valve With Actuator (Belimo G240+NV24-MFT US)	1,143.76	35.34
23 09 23 11-0007	EA		2" 2-Way Bronze Globe Valve With Actuator (Belimo G250+NV24-MFT US)	1,291.77	41.76
23 09 23 11-0008	EA		2-1/2" 2-Way Bronze Globe Valve With Actuator (Belimo G665+GMX24-MFTX1)	2,413.26	83.54
23 09 23 11-0009	EA		3" 2-Way Bronze Globe Valve With Actuator (Belimo G680+GMX24-MFTX1)	2,612.66	97.75
23 09 23 11-0010	EA		4" 2-Way Bronze Globe Valve With Actuator (Belimo G6100C+GMX24-MFTX1)	3,520.89	143.58
23 09 23 11-0011	EA		5" 2-Way Bronze Globe Valve With Actuator (Belimo G6125C+GMX24-MFTX1)	5,180.80	207.50
23 09 23 11-0012	EA		6" 2-Way Bronze Globe Valve With Actuator (Belimo G6150C+GMX24-MFTX1)	5,738.55	229.73
23 09 23 11-0013	EA		1/2" 3-Way Bronze Globe Valve With Actuator (Belimo G315+NV24-MFT US)	876.93	22.23
23 09 23 11-0014	EA		3/4" 3-Way Bronze Globe Valve With Actuator (Belimo G320+NV24-MFT US)	900.51	29.97
23 09 23 11-0015	EA		1" 3-Way Bronze Globe Valve With Actuator (Belimo G325+NV24-MFT US)	973.72	36.27
23 09 23 11-0016	EA		1-1/4" 3-Way Bronze Globe Valve With Actuator (Belimo G332+NV24-MFT US)	1,076.66	45.95
23 09 23 11-0017	EA		1-1/2" 3-Way Bronze Globe Valve With Actuator (Belimo G340+NV24-MFT US)	1,385.82	53.02
23 09 23 11-0018	EA		2" 3-Way Bronze Globe Valve With Actuator (Belimo G350+NV24-MFT US)	1,535.45	62.65
23 09 23 11-0019	EA		2-1/2" 3-Way Bronze Globe Valve With Actuator (Belimo G6125C+GMX24-MFTX1)	2,704.95	125.31
23 09 23 11-0020	EA		3" 3-Way Bronze Globe Valve With Actuator (Belimo G780+GMX24-MFTX1)	2,968.93	146.64
23 09 23 11-0021	EA		4" 3-Way Bronze Globe Valve With Actuator (Belimo G7100+2*GMX24-MFTX1)	4,319.47	215.37
23 09 23 11-0022	EA		5" 3-Way Bronze Globe Valve With Actuator (Belimo G7125+2*GMX24-MFTX1)	6,265.80	311.25
23 09 23 11-0023	EA		6" 3-Way Bronze Globe Valve With Actuator (Belimo G7150+2*GMX24-MFTX1)	6,966.24	344.60
23 09 23 11-0024	EA		1/2" Two Way Brass Zone Valve With Actuator (Belimo ZONE215N-35+ZONE24NC)	133.89	14.82
23 09 23 11-0025	EA		3/4" Two Way Brass Zone Valve With Actuator (Belimo ZONE220N-50+ZONE24NC)	157.65	19.98
23 09 23 11-0026	EA		1" Two Way Brass Zone Valve With Actuator (Belimo ZONE225N-80+ZONE24NC)	198.72	24.19
23 09 23 11-0027	EA		1/2" Two Way Brass Zone Valve With Actuator (Belimo ZONE315N-35+ZONE24NC)	163.30	22.23
23 09 23 11-0028	EA		3/4" Two Way Brass Zone Valve With Actuator (Belimo ZONE320N-50+ZONE24NC)	190.40	29.97
23 09 23 11-0029	EA		1" Two Way Brass Zone Valve With Actuator (Belimo ZONE325N-80+ZONE24NC)	238.26	36.27
23 09 23 11-0030	EA		1/2" 2-Way Brass Ball Valve With Actuator (Belimo B215B+LRB24-3)	223.97	14.82
23 09 23 11-0031	EA		3/4" 2-Way Brass Ball Valve With Actuator (Belimo B220B+LRB24-3)	265.24	19.98
23 09 23 11-0032	EA		1" 2-Way Brass Ball Valve With Actuator (Belimo B225+LRB24-3)	301.53	24.19

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 11-0033 EA 1-1/4" 2-Way Brass Ball Valve With Actuator (Belimo B232+ARB24-3).....	392.42	30.63
23 09 23 11-0034 EA 1-1/2" 2-Way Brass Ball Valve With Actuator (Belimo B240+ARB24-3).....	405.48	35.34
23 09 23 11-0035 EA 2" 2-Way Brass Ball Valve With Actuator (Belimo B250+ARB24-3).....	516.95	41.76
23 09 23 11-0036 EA 2-1/2" 2-Way Brass Ball Valve With Actuator (Belimo B265+ARB24-3).....	1,111.24	83.54
23 09 23 11-0037 EA 3" 2-Way Brass Ball Valve With Actuator (Belimo B280+ARB24-3).....	1,304.73	97.75
23 09 23 11-0038 EA 1/2" 3-Way Brass Ball Valve With Actuator (Belimo B315B+LRB24-3).....	270.89	22.23
23 09 23 11-0039 EA 3/4" 3-Way Brass Ball Valve With Actuator (Belimo B320B+LRB24-3).....	312.76	29.97
23 09 23 11-0040 EA 1" 3-Way Brass Ball Valve With Actuator (Belimo B325+LRB24-3).....	403.94	36.27
23 09 23 11-0041 EA 1-1/4" 3-Way Brass Ball Valve With Actuator (Belimo B331+ARB24-3).....	573.80	45.95
23 09 23 11-0042 EA 1-1/2" 3-Way Brass Ball Valve With Actuator (Belimo B341+ARB24-3).....	604.35	53.02
23 09 23 11-0043 EA 2" 3-Way Brass Ball Valve With Actuator (Belimo B352+ARB24-3).....	801.85	62.65
23 09 23 11-0044 EA 2" 2-Way Butterfly Valve With Actuator (Belimo F650HD+AMB24-3X1).....	681.67	76.58
23 09 23 11-0045 EA 2-1/2" 2-Way Butterfly Valve With Actuator (Belimo F665HD+AMB24-3X1).....	683.90	83.54
23 09 23 11-0046 EA 3" 2-Way Butterfly Valve With Actuator (Belimo F680HD+GMB24-3X1).....	900.58	97.75
23 09 23 11-0047 EA 4" 2-Way Butterfly Valve With Actuator (Belimo F6100HD+2"GMB24-3X1).....	1,373.24	164.10
23 09 23 11-0048 EA 5" 2-Way Butterfly Valve With Actuator (Belimo F6125HD+SY2-24).....	2,779.92	207.50
23 09 23 11-0049 EA 6" 2-Way Butterfly Valve With Actuator (Belimo F6150HD+SY3-24).....	2,931.53	229.73
23 09 23 11-0050 EA 8" 2-Way Butterfly Valve With Actuator (Belimo F6200HD+SY4-24).....	3,993.97	262.55
23 09 23 11-0051 EA 10" 2-Way Butterfly Valve With Actuator (Belimo F6250HD+SY4-24).....	4,900.32	321.63
23 09 23 11-0052 EA 12" 2-Way Butterfly Valve With Actuator (Belimo F6300HS+SY4-24).....	6,057.08	389.85
23 09 23 11-0053 EA 14" 2-Way Butterfly Valve With Actuator (Belimo F6350HD+SY5-24).....	6,727.44	459.46
23 09 23 11-0054 EA 16" 2-Way Butterfly Valve With Actuator (Belimo F6400HD+SY6-110).....	8,910.07	505.41
23 09 23 11-0055 EA 18" 2-Way Butterfly Valve With Actuator (Belimo F6450HD+SY8-110).....	10,805.38	561.46
23 09 23 11-0056 EA 2" 3-Way Butterfly Valve With Actuator (Belimo F750HD+AMB24-3X1).....	1,207.63	114.87
23 09 23 11-0057 EA 2-1/2" 3-Way Butterfly Valve With Actuator (Belimo F765HD+GMB24-3X1).....	1,423.87	125.31
23 09 23 11-0058 EA 3" 3-Way Butterfly Valve With Actuator (Belimo F780HD+2"GMB24-3X1).....	1,758.87	146.64
23 09 23 11-0059 EA 4" 3-Way Butterfly Valve With Actuator (Belimo F7100HD+2"GMB24-3X1).....	2,248.70	246.14
23 09 23 11-0060 EA 5" 3-Way Butterfly Valve With Actuator (Belimo F7125HD+SY3-24).....	4,631.38	311.25
23 09 23 11-0061 EA 6" 3-Way Butterfly Valve With Actuator (Belimo F7150HD+SY3-24).....	4,792.10	344.60
23 09 23 11-0062 EA 8" 3-Way Butterfly Valve With Actuator (Belimo F7200HD+SY4-24).....	6,046.47	393.87
23 09 23 11-0063 EA 10" 3-Way Butterfly Valve With Actuator (Belimo F7250HD+SY4-24).....	8,008.90	482.43
23 09 23 11-0064 EA 12" 3-Way Butterfly Valve With Actuator (Belimo F7300HD+SY5-24).....	9,735.00	584.77
23 09 23 11-0065 EA 14" 3-Way Butterfly Valve With Actuator (Belimo F7350HD+SY6-110).....	15,222.25	689.19
23 09 23 11-0066 EA 16" 3-Way Butterfly Valve With Actuator (Belimo F7400HD+SY7-110).....	16,975.03	758.11
23 09 23 11-0067 EA 18" 3-Way Butterfly Valve With Actuator (Belimo F7450HD+SY8-110).....	26,170.58	842.20
23 09 23 11-0068 Valve Actuators (23 09 23 11)		
23 09 23 11-0069 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, Terminal Strip, 90 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-3-T).....	450.43	94.90
23 09 23 11-0070 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, 95 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-3).....	457.49	94.90
23 09 23 11-0071 EA 24 Volt AC/DC Power Supply, 2-10 Volt DC Control Input, Terminal Strip, 90 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-SR-T).....	575.05	94.90
23 09 23 11-0072 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, Auxiliary Switch, 90 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-3-S).....	516.16	94.90
23 09 23 11-0073 EA 24 Volt AC/DC Power Supply, 2-10 Volt DC Control Input, 90 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-SR).....	526.47	94.90
23 09 23 11-0074 EA 24 Volt AC/DC Power Supply, Proportional/Multi-Function Control Input, 150 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-MFT).....	594.16	94.90
23 09 23 11-0075 EA 24 Volt AC/DC Power Supply, On/Off Control Input, 2.5 Seconds Run Time, 35 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRQX24-1).....	734.49	94.90
23 09 23 11-0076 EA 24 Volt AC/DC Power Supply, 0-135 Ohms Control Input, 150 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX24-MFT95).....	750.76	94.90
23 09 23 11-0077 EA 24 Volt AC/DC Power Supply, Proportional/Multi-Function Control Input, 2.5 Seconds Run Time, 35 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRQX24-MFT).....	789.97	94.90
23 09 23 11-0078 EA 120 Volt AC Power Supply, On/Off/Floating Point Control Input, 90 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX120-3).....	558.43	94.90
23 09 23 11-0079 EA 120 Volt AC Power Supply, 2-10 Volt DC Control Input, 90 Seconds Run Time, 45 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo LRX120-SR).....	640.72	94.90
23 09 23 11-0080 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, Terminal Strip, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-3-T).....	560.62	94.90
23 09 23 11-0081 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-3).....	570.95	94.90
23 09 23 11-0082 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARB24-3-5-14).....	574.82	94.90
23 09 23 11-0083 EA 24 Volt AC/DC Power Supply, On/Off/Floating Point Control Input, Auxiliary Switch, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-3-S).....	645.07	94.90
23 09 23 11-0084 EA 24 Volt AC/DC Power Supply, 2-10 Volt DC Control Input, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-SR-T).....	675.37	94.90
23 09 23 11-0085 EA 24 Volt AC/DC Power Supply, 2-10 Volt DC Control Input, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-SR).....	691.47	94.90
23 09 23 11-0086 EA 24 Volt AC/DC Power Supply, Proportional/Multi-Function Control Input, Variable Run Time (90 To 350 Seconds), 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-MFT).....	688.27	94.90
23 09 23 11-0087 EA 24 Volt AC/DC Power Supply, Phasecut Control Input, 95 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-PC).....	698.57	94.90
23 09 23 11-0088 EA 24 Volt AC/DC Power Supply, 0-135 Ohms Control Input, 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-MFT95).....	697.92	94.90
23 09 23 11-0089 EA 24 Volt AC/DC Power Supply, 2-10 Volt DC Control Input, NEMA 4X, 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-SR-T N4).....	764.77	94.90
23 09 23 11-0090 EA 24 Volt AC/DC Power Supply, Proportional/Multi-Function Control Input, NEMA 4X, Variable Run Time (75 To 350 Seconds), 160 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX24-MFT-T N4).....	933.85	94.90

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23	11-0091	EA	100-240 Volt AC Power Supply, On/Off/Floating Point Control Input, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX120-3).....	610.26	94.90
23 09 23	11-0092	EA	100-240 Volt AC Power Supply, 2-10 Volt DC Control Input, 300, 150, Or 90 Seconds Run Time, 180 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo ARX120-SR).....	734.04	94.90
23 09 23	11-0093	EA	24 Volt AC/DC Power Supply, On/Off Control Input, 15 Seconds Run Time, 801 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY2-24).....	1,704.75	94.90
23 09 23	11-0094	EA	24 Volt AC/DC Power Supply, On/Off Control Input, 22 Seconds Run Time, 1,335 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY3-24).....	1,916.16	94.90
23 09 23	11-0095	EA	24 Volt AC/DC Power Supply, On/Off Control Input, 16 Seconds Run Time, 3,560 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY4-24).....	2,307.41	94.90
23 09 23	11-0096	EA	24 Volt AC/DC Power Supply, On/Off Control Input, 22 Seconds Run Time, 4,450 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY5-24).....	2,618.74	94.90
23 09 23	11-0097	EA	120 Volt AC Power Supply, On/Off Control Input, 28 Seconds Run Time, 5,785 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY6-110).....	3,106.68	94.90
23 09 23	11-0098	EA	120 Volt AC Power Supply, On/Off Control Input, 46 Seconds Run Time, 8,900 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY7-110).....	3,666.18	94.90
23 09 23	11-0099	EA	120 Volt AC Power Supply, On/Off Control Input, 46 Seconds Run Time, 13,350 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY8-110).....	4,952.74	94.90
23 09 23	11-0100	EA	120 Volt AC Power Supply, On/Off Control Input, 58 Seconds Run Time, 17,800 IN-LB, Direct Coupled, Non-Spring Return, Valve Actuator (Belimo SY9-110).....	6,054.30	94.90

23 09 23 12 Control Dampers (23 09 23)**23 09 23 12-0001 Rectangular Galvanized Volume Control Dampers (23 09 23 12)**

Note: Excludes actuators.

23 09 23	12-0002	EA	8" x 8" Low Leakage Volume Control Damper (Johnson Controls VOPSN-008X008).....	210.84	37.89
23 09 23	12-0003	EA	10" x 10" Low Leakage Volume Control Damper (Johnson Controls VOPSN-010X010).....	237.90	41.55
23 09 23	12-0004	EA	12" x 12" Low Leakage Volume Control Damper (Johnson Controls VOPSN-012X012).....	266.13	45.83
23 09 23	12-0005	EA	14" x 14" Low Leakage Volume Control Damper (Johnson Controls VOPSN-014X014).....	307.55	53.77
23 09 23	12-0006	EA	16" x 16" Low Leakage Volume Control Damper (Johnson Controls VOPSN-016X016).....	347.74	61.10
23 09 23	12-0007	EA	18" x 18" Low Leakage Volume Control Damper (Johnson Controls VOPSN-018X018).....	350.24	68.74
23 09 23	12-0008	EA	20" x 20" Low Leakage Volume Control Damper (Johnson Controls VOPSN-020X020).....	431.51	76.38
23 09 23	12-0009	EA	24" x 24" Low Leakage Volume Control Damper (Johnson Controls VOPSN-024X024).....	515.24	91.64
23 09 23	12-0010	EA	32" x 32" Low Leakage Volume Control Damper (Johnson Controls VOPSN-032X032).....	663.89	106.92
23 09 23	12-0011	EA	48" x 48" Low Leakage Volume Control Damper (Johnson Controls VOPSN-048X048).....	993.37	122.20
23 09 23	12-0012	EA	60" x 60" Low Leakage Volume Control Damper (Johnson Controls VOPSN-060X060).....	1,839.94	137.47
23 09 23	12-0013	EA	72" x 72" Low Leakage Volume Control Damper (Johnson Controls VOPSN-072X072).....	2,341.81	152.75

23 09 23 12-0014 Round Galvanized Control Dampers (23 09 23 12)

Note: Excludes actuators.

23 09 23	12-0015	EA	6" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG06).....	203.62	42.77
23 09 23	12-0016	EA	8" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG08).....	209.84	45.83
23 09 23	12-0017	EA	10" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG10).....	219.30	45.83
23 09 23	12-0018	EA	12" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG12).....	243.24	51.94
23 09 23	12-0019	EA	14" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG14).....	278.34	51.94
23 09 23	12-0020	EA	16" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG16).....	300.93	61.10
23 09 23	12-0021	EA	18" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG18).....	404.66	64.31
23 09 23	12-0022	EA	20" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG20).....	423.23	66.66
23 09 23	12-0023	EA	22" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG22).....	448.83	71.87
23 09 23	12-0024	EA	24" Diameter Round Low Leakage Volume Control Damper (Johnson Controls RCG24).....	474.96	77.07

23 09 23 12-0025 Remote Damper Control (23 09 23 12)

23 09 23	12-0026	EA	Remote Cable Control Concealed Ceiling Regulator For Damper (Young Regulator Co. 270-301B).....	296.68	
			<i>For Each 10' Flexible Casing And Wire, Add</i>	41.36	
23 09 23	12-0027	EA	Remote Cable Control Concealed Ceiling Regulator For Damper (Young Regulator Co. 270-275B).....	288.21	
			<i>For Each 10' Flexible Casing And Wire, Add</i>	41.36	

23 09 23 12-0028 Control Damper Actuators (23 09 23 12)

23 09 23	12-0029	EA	44 IN-LB, 24 Volt AC, 4-20mA, 2-10 Volt DC, Proportional Control, Non-Spring Return Direct Coupled Control Damper Actuator (Belimo LMB24-SR).....	527.98	100.96
23 09 23	12-0030	EA	90 IN-LB, 24 Volt AC/DC, 4-20mA, 2-10 Volt DC, Proportional Control, Non-Spring Return Direct Coupled Control Damper Actuator (Belimo NMB24-SR).....	572.44	100.96
23 09 23	12-0031	EA	90 IN-LB, 2 Position, 24 To 240 Volt AC Spring Return Direct Coupled Control Damper Actuator (Belimo NFBUP).....	645.28	100.96
23 09 23	12-0032	EA	175 IN-LB, 24 Volt AC, 4-20mA, 2-10 Volt DC, Proportional Control, Non-Spring Return Direct Coupled Control Damper Actuator (Belimo AMB24-SR).....	680.08	100.96
23 09 23	12-0033	EA	90 IN-LB, 24 Volt AC, 4-20mA, 2-10 Volt DC, Proportional Control, Spring Return Direct Coupled Control Damper Actuator (Belimo NFB24-SR).....	700.73	100.96
23 09 23	12-0034	EA	360 IN-LB, 24 Volt AC, 4-20mA, 2-10 Volt DC, Proportional Control, Non-Spring Return Direct Coupled Control Damper Actuator (Belimo GMB24-SR).....	781.94	100.96

23 09 23 13 Energy Meters (23 09 23)**23 09 23 13-0001 Surge Protectors (23 09 23 13)**

23 09 23	13-0002	EA	Surge Protector, T100's, Summit, BCU, UPCM, PCM, TCM (Transtector TR2255).....	354.82	9.80
23 09 23	13-0003	EA	Surge Protector, 1AC Outlet (Transtector TR2251).....	267.66	9.80
23 09 23	13-0004	EA	Surge Protector, 2 AC Outlets (Transtector TR2254).....	417.63	9.80
23 09 23	13-0005	EA	Surge Protector, DB-15 Connection (Transtector TR2259-DLP15).....	225.10	9.80



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 13-0006 EA Surge Protector, DB-25 Connection (Transtector TR2259-DLP25)	225.10	9.80
23 09 23 13-0007 EA Surge Protector, DB-9 Connection (Transtector TR2259-DLP9)	225.10	9.80
23 09 23 13-0008 EA Surge Protector, Individual Wire Connection (Transtector TR2258)	326.45	9.80
23 09 23 13-0009 EA Surge Protector, Trane Communication Links (Transtector TR2257)	200.78	9.80
23 09 23 14 Flow Instruments (23 09 23)		
23 09 23 14-0001 Water Flow Meters (23 09 23 14)		
23 09 23 14-0002 EA Insertion Electromagnetic Water Flow Meter (Onicon F-3500)	5,299.73	101.50
Note: Excludes pipe fittings.		
23 09 23 14-0003 Air Flow Monitoring Stations (23 09 23 14)		
23 09 23 14-0004 EA Analog Transmitter, 2 Point, 3 Sensor Air Flow Monitoring Station (Ebtron GTA116)	4,164.82	117.31
Note: 10' cable, 36" x 24" typical duct size.		
23 09 23 14-0005 EA Analog Transmitter, 3 Point, 4 Sensor Air Flow Monitoring Station (Ebtron GTA116)	5,984.84	117.31
Note: 10' cable, 48" x 36" typical duct size.		
23 09 23 14-0006 EA Analog Transmitter, 4 Point, 4 Sensor Air Flow Monitoring Station (Ebtron GTA116)	7,451.25	117.31
Note: 10' cable, 60" x 48" typical duct size.		
23 09 23 16 Gas Instruments (23 09 23)		
23 09 23 16-0001 Gas Sensors (23 09 23 16)		
23 09 23 16-0002 EA 6-1/4" x 6-1/8" CO2 Sensor, 0-2,000 ppm (Kele WCO-1B)	2,202.63	58.79
23 09 23 16-0003 EA Wall Mounted CO2 Sensor, 0-2,000 ppm With LCD Display (Kele CD-AW-LCD)	971.76	39.19
23 09 23 16-0004 EA CO Monitor/Transmitter, 0 To 250 ppm (Kele GMT-CO-S2)	1,749.45	58.79
Note: Solid state sensor.		
23 09 23 16-0005 EA CO2 Transmitter, Duct Mount, No Display, 0-10 Volt DC Out, 24 Volt AC/Volt DC, 0-10 Or 4-20mA, 0-2,000 ppm Range With CD-AD Duct Probe Assembly (CDE CD-AD-LCD; CD-AD)	946.44	70.55
23 09 23 19 Moisture Instruments (23 09 23)		
23 09 23 19-0001 Relative Humidity Sensors (23 09 23 19)		
23 09 23 19-0002 EA 3% Duct Mounted RH Sensor (Kele HD30K)	587.12	70.55
23 09 23 19-0003 EA 10K Ohm Thermistor 3% Duct Mounted RH Sensor (Kele HD30K-T3)	603.31	70.55
23 09 23 19-0004 EA 3% RH Outdoor Air Sensor (Kele HO30K)	681.49	97.98
23 09 23 19-0005 EA 2% Surface Mounted RH Transmitter (Kele HW20K)	533.47	39.19
23 09 23 21 Motion Instruments (23 09 23)		
23 09 23 21-0001 Peco Motion Sensors (23 09 23 21)		
23 09 23 21-0002 EA Ceiling Mount Passive Infrared, 24 Volt, Slave Motion Sensor (Peco SA200-001)	194.26	27.55
23 09 23 21-0003 EA Wall/Ceiling Mount Passive Infrared, 24 Volt, Slave Motion Sensor (Peco SB200-001)	190.40	27.55
23 09 23 21-0004 EA Wall/Ceiling Passive Infrared, 24 Volt, Master Motion Sensor (Peco SD200-001)	255.19	27.55
23 09 23 21-0005 EA Wall/Ceiling Mount, Passive Infrared, 24 Volt, Master Time Sensor (Peco SD200-002)	226.60	27.55
23 09 23 21-0006 EA Door Switch Occupancy Sensor (Peco SE200-001)	69.47	27.55
23 09 23 21-0007 EA Window Switch Occupancy Sensor (Peco SE200-002)	64.15	27.55
23 09 23 21-0008 EA Power Pack And Controller (Peco SF200-001)	118.94	27.55
23 09 23 23 Pressure Instruments (23 09 23)		
23 09 23 23-0001 Pressure Sensors (23 09 23 23)		
23 09 23 23-0002 EA 0 To 0.5" W.C., Differential Pressure Transmitters With NEMA 1 Case (Kele T30-005)	784.01	82.74
23 09 23 23-0003 EA 0 To 5" W.C., Differential Pressure Transmitters With NEMA 1 Case (Kele T30-050)	697.04	82.74
23 09 23 23-0004 EA 0.05 To 12" W.C., Adjustable Differential Pressure Switches (Kele AFS-222)	276.23	82.74
23 09 23 23-0005 EA 0.05 To 2" W.C., Adjustable Differential Pressure Switches (Kele AFS-262)	286.33	82.74
23 09 23 23-0006 EA 0.4 To 2" W.C., Manual Reset Adjustable Differential Pressure Switches (Kele AFS-460)	306.11	82.74
23 09 23 23-0007 EA 0.05 To 12" W.C., 1/8" NPT, Adjustable Differential Pressure Switches (Kele AFS-145)	283.40	82.74
23 09 23 23-0008 EA 0 To 100 psid, Bypass Valve Assembly Option, Water Differential Pressure Transmitter (Kele 360C-P210D-BVA)	2,902.18	82.74
Note: Excludes pipe fittings.		
23 09 23 23-0009 EA 0 To 60 psid, Bypass Valve Assembly Option, Water Differential Pressure Transmitter (Kele 360C-P160D-BVA)	2,902.18	82.74
Note: Excludes pipe fittings.		
23 09 23 23-0010 EA Magnahelic Gauge	752.80	50.58
23 09 23 27 Temperature Instruments (23 09 23)		
23 09 23 27-0001 Air Temperature Sensors (23 09 23 27)		
23 09 23 27-0002 EA 10K Ohm Thermistor Duct Temperature Sensor (Kele ST-D24)	214.17	70.55
23 09 23 27-0003 EA 10K Ohm Thermistor Duct Temperature Sensor, 1/2" LB Conduit Fitting (Kele ST-D24-XCO)	301.14	70.55
23 09 23 27-0004 EA 10K Ohm Thermistor Duct Temperature Sensor With Greenfield Fitting (Kele ST-D24-XG)	224.17	70.55
23 09 23 27-0005 EA 10K Ohm Thermistor Duct Temperature Sensor With Handibox Housing (Kele ST-D24-XH)	234.43	70.55
23 09 23 27-0006 EA 10K Ohm Thermistor Duct Temperature Sensor With Handibox Housing, 18" Probe (Kele ST-D24-XH-XL18)	237.85	70.55
23 09 23 27-0007 EA 10K Ohm Thermistor Duct Temperature Sensor With Handibox Housing, 6" Probe (Kele ST-D24-XH-XL6)	234.47	70.55
23 09 23 27-0008 EA 10K Ohm Thermistor Duct Temperature Sensor With Non-Metallic Handibox Housing (Kele ST-D24-XHP)	236.29	70.55
23 09 23 27-0009 EA 10K Ohm Thermistor Duct Temperature Sensor With 4" Probe (Kele ST-D24-XL4)	253.57	70.55
23 09 23 27-0010 EA 10K Ohm Thermistor Duct Temperature Sensor With Weatherproof Housing (Kele ST-D24-XW)	268.66	70.55

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
23 09 23 27-0011	EA	10K Ohm Thermistor Outdoor Air Temperature Sensor (Kele ST-O24)	324.90		97.98
23 09 23 27-0012	EA	10K Ohm Thermistor Outdoor Air Temperature Sensor With 25' Lead (Kele ST-O24-XC25).....	336.52		97.98
23 09 23 27-0013	EA	Delta Style Surface Mounted 10K Ohm Thermistor Room Temperature Sensor (Kele BA/10K3-R-N-DF).....	147.11		39.19
23 09 23 27-0014	EA	Delta Style Surface Mounted AD592 Room Temperature Sensor (Kele BA/592-10K-R)	151.38		39.19
23 09 23 27-0015	EA	Stainless Steel Plate 1K Ohm Room Temperature Sensor (Kele BA/1K8-SP).....	140.16		39.19
23 09 23 27-0016		Water Temperature Sensors (23 09 23 27)			
23 09 23 27-0017	EA	5" Immersion 20K Ohm Water Temp Sensor (Honeywell C7041D2001).....	172.79		75.81
23 09 23 27-0018	EA	Strap-On 20K Ohm Water Temp Sensor (Honeywell C7041K2005)	391.30		75.81
23 09 23 27-0019		Peco Thermostats (23 09 23 27)			
23 09 23 27-0020	EA	3 Heating Stage, 2 Cooling Stage Programmable Thermostat With Humidification/Dehumidification Control (Peco T12532-IAQ).....	406.89		18.37
23 09 23 27-0021	EA	3 Heating Stage, 2 Cooling Stage Programmable Thermostat (Peco T12532-001)	362.57		18.37
23 09 23 53		Proprietary Control Systems (23 09 23)			
23 09 23 53-0001		EMCS General Costs (23 09 23 53)			
23 09 23 53-0002		EMCS System Design Services (23 09 23 53-0001)			
		Note: Hourly labor rates for use with Site Inspection, Project Management, Engineering, Design, Programming, Training and Technical Support.			
23 09 23 53-0003	HR	EMCS Site Inspection Of Existing Facilities	303.13		
23 09 23 53-0004	HR	EMCS Engineering Project Management	303.13		
23 09 23 53-0005	HR	EMCS System Engineering, Schematic Design And Layout.....	321.50		
23 09 23 53-0006	HR	EMCS System Software Programming And Graphics Programming.....	321.50		
23 09 23 53-0007	HR	EMCS Graphics Picture Creation	206.75		
23 09 23 53-0008	HR	EMCS System Controls Training	303.13		
23 09 23 53-0009	HR	EMCS On Site System Diagnostics Field Technician	303.13		
23 09 23 53-0010	HR	EMCS Remote Technical Support Using Phone Or Internet.....	252.67		
23 09 23 53-0011	HR	EMCS Travel Time (All Personnel)	261.86		
23 09 23 53-0012		Field Tests, Checkout And Commissioning (23 09 23 53-0001)			
		Note: A point is defined as any transmitter, switch, actuator, sensor or device (starter, VFD, controller, fan, electric coil, actuator, valve, etc.) that is monitored or controlled by the EMCS system. Most devices count as 1 point. Actuators, valves and thermostats count as 2 points.			
23 09 23 53-0013	PNT	EMCS Field Test.....	160.81		
		Note: Priced per point.			
23 09 23 53-0014	PNT	EMCS Field Checkout And Startup.....	160.81		
		Note: Priced per point.			
23 09 23 53-0015	PNT	EMCS Field Commissioning	160.81		
		Note: Priced per point.			
23 09 23 53-0016	EA	EMCS Field Balance Support	137.78		
		Note: Priced per controller.			
23 09 23 53-0017		EMCS System Engineering/Submittal Design And Layout (23 09 23 53-0001)			
		Note: A point is defined as any transmitter, switch, actuator, sensor or device (starter, VFD, controller, fan, electric coil, actuator, valve, etc.) that is monitored or controlled by the EMCS system. Most devices count as 1 point. Actuators, valves and thermostats count as 2 points.			
23 09 23 53-0018	PNT	EMCS System Engineering/Submittal Design And Layout	53.64		
		Note: Priced per point.			
23 09 23 53-0019		Alerton Controls (23 09 23 53)			
23 09 23 53-0020	EA	50 Devices, 1 WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-SMALL).....	9,798.11		
23 09 23 53-0021	EA	150 Devices, 1 WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-MEDIUM)	12,593.61		
23 09 23 53-0022	EA	Dashboard Option, 150 Devices, 1 WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-D-MEDIUM).....	31,901.94		
23 09 23 53-0023	EA	Unlimited Devices, 1 WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-LARGE).....	23,926.76		
23 09 23 53-0024	EA	Dashboard Option, Unlimited Devices, 1 WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-D-LARGE).....	61,703.91		
23 09 23 53-0025	EA	Unlimited Devices, SQL Derver Interface, Unlimited WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-ENTERPRISE)	48,657.36		
23 09 23 53-0026	EA	Dashboard Option, Unlimited Devices, SQL Derver Interface, Unlimited WEBtalk VM, Alerton Building Suite 3 (Alerton ABS-3-D-ENTERPRISE).....	74,296.28		
23 09 23 53-0027	EA	Alerton Building Suite Tech License (Alerton ABS-3-TECH)	2,060.86		
23 09 23 53-0028	EA	Enterprise Edition With SQL Server Support, Envision for BACTalk v2.6 (Alerton ENV-BT-2.6-ENT1).....	28,174.59		
23 09 23 53-0029	EA	Unlimited Controllers, Unlimited Workstation, Envision for BACTalk v2.6 (Alerton ENV-BT-2.6-LRG).....	20,606.56		
23 09 23 53-0030	EA	150 Controllers, 3 Workstation, Envision for BACTalk v2.6 (Alerton ENV-BT-2.6-MED)	12,534.86		
23 09 23 53-0031	EA	50 Controllers, 1 Workstation, Envision for BACTalk v2.6 (Alerton ENV-BT-2.6-SM)	7,737.14		
23 09 23 53-0032	EA	10 Controllers, 1 Workstation, Envision for BACTalk v2.6 (Alerton ENV-BT-2.6-XS)	2,985.01		
23 09 23 53-0033	EA	1 Ethernet, 1 MS/TP, BACTalk Control Module (Alerton 715000100).....	5,331.40		293.95
23 09 23 53-0034	EA	Foreign Protocol Converter For P1 Systems, BACTalk Control Module (Alerton BCM-FPCS)	7,871.34		391.93
23 09 23 53-0035	EA	Modbus Gateway, BACTalk Control Module (Alerton BCM-MDBS).....	7,768.92		391.93
23 09 23 53-0036	EA	V.90/56K Modem, BACTalk Control Module (Alerton BCM-MDM).....	2,854.89		293.95
23 09 23 53-0037	EA	1 MS/TP, BACTalk Control Module (Alerton 715000300).....	3,455.13		293.95
23 09 23 53-0038	EA	Power Supply, BACTalk Control Module (Alerton BCM-PWS).....	2,670.19		293.95
23 09 23 53-0039	EA	1 TUX Trunk, BACTalk Control Module (Alerton BCM-TUX)	3,317.46		293.95
23 09 23 53-0040	EA	Web Server And Configurator CD, BACTalk Control Module (Alerton BCM-WEB).....	7,824.69		293.95

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0041	EA		BACtalk Field Level Gateway For Modbus (Alerton FLG-MODBUS).....	3,600.84	391.93
23 09 23 53-0042	EA		EXP BACnet Controller (Alerton VLX)	7,911.05	783.85
23 09 23 53-0043	EA		VLX BACnet High Performance Controller (Alerton VLX-PLATINUM).....	9,224.87	783.85
23 09 23 53-0044	EA		Multiple Segment MS/TP Repeater (Alerton MSTP-REP)	1,216.28	87.28
23 09 23 53-0045	EA		4 Inputs, 2 Flow Transducers, 4 Ground-Switching Binary Triac Outputs, Dual-Duct VAV Controller (Alerton VAV-DD).....	2,330.21	293.95
23 09 23 53-0046	EA		4 Inputs, 2 Flow Transducers, 3 Binary Triac Outputs, 4 Ground-Switching Binary Triac Outputs, Dual-Duct VAV Controller (Alerton VAV-DD7).....	2,468.73	293.95
23 09 23 53-0047	EA		4 Inputs, 1 Flow Transducers, 3 Hot-Switching Binary Triac Outputs, 2 Ground-Switching Binary Triac Outputs, Single-Duct VAV Controller (Alerton VAV-SD).....	1,990.22	293.95
23 09 23 53-0048	EA		4 Universal Inputs, 5 Binary Outputs, 2 Analog Outputs, Single-Duct VAV Controller (Alerton VAV-SD2A).....	2,183.31	293.95
23 09 23 53-0049	EA		5 Universal Inputs, 6 Binary Outputs, Integral Honeywell Actuator, Single-Duct VAV Controller (Alerton VAVIH-SD)	2,174.91	293.95
23 09 23 53-0050	EA		11 Inputs, 8 Binary Triac Outputs, 8 Analog Outputs, BACtalk Field Controller For Central Plant Systems (Alerton VLC-1188).....	3,283.04	293.95
23 09 23 53-0051	EA		16 Inputs, BACtalk Field Controller (Alerton VLC-1600).....	2,519.94	293.95
23 09 23 53-0052	EA		16 Inputs, 16 Binary Triac Outputs, BACtalk Field Controller (Alerton VLC-16160).....	3,781.35	391.93
23 09 23 53-0053	EA		4 Universal Inputs, 4 Binary Outputs, 4 Analog Outputs, Field Controller (Alerton VLC-444).....	1,674.09	195.97
23 09 23 53-0054	EA		5 Inputs, 5 Binary Outputs, BACtalk Field Controller (Alerton VLC-550).....	1,618.67	195.97
23 09 23 53-0055	EA		6 Inputs, 2 Binary Triac Outputs, 3 Isolated Relay Outputs, BACtalk Field Controller (Alerton VLC-651R).....	2,195.89	293.95
23 09 23 53-0056	EA		6 Inputs, 3 Binary Triac Outputs, 3 Isolated Relay Outputs, BACtalk Field Controller (Alerton VLC-660R).....	2,195.89	293.95
23 09 23 53-0057	EA		8 Inputs, 5 Binary Triac Outputs, 3 Analog Outputs, BACtalk Field Controller (Alerton VLC-853).....	2,643.34	293.95
23 09 23 53-0058	EA		16 Universal Inputs, 8 Binary Outputs, 8 Analog Outputs, Field Controller (Alerton VLCA-1688).....	5,251.30	391.93
23 09 23 53-0059	EA		2 Fixed Inputs, 3 Universal Inputs, 6 Binary Outputs, 2 Analog Outputs, VisualLogic Display Controller (Alerton VLD-362).....	2,275.64	293.95
23 09 23 53-0060	EA		Wireless Door Contact Sensor (Alerton AL-OC-DS).....	154.68	11.02
23 09 23 53-0061	EA		One-Speed BACtalk Microset Wall Sensor (Alerton MS-1010-BT).....	252.40	11.02
23 09 23 53-0062	EA		One-Speed BACtalk Microset Wall Sensor With RH Sensor (Alerton MS-1010H-BT).....	648.63	11.02
23 09 23 53-0063	EA		Three-Speed BACtalk Microset Wall Sensor (Alerton MS-1030-BT).....	648.63	11.02
23 09 23 53-0064	EA		Three-Speed BACtalk Microset Wall Sensor With RH Sensor (Alerton MS-1030H-BT).....	504.26	11.02
23 09 23 53-0065	EA		BACnet-Compliant Wall Sensor (Alerton TS-1050-BT).....	168.46	11.02
23 09 23 53-0066	EA		Wireless Temperature And Humidity Sensor (Alerton WTS-1000-KIT).....	684.74	11.02
23 09 23 53-0067	EA		Wireless Temperature And Humidity Sensor With Temperature Adjustment Knob And Manual Override (Alerton WTS-1050-KIT).....	768.70	11.02
23 09 23 53-0068	EA		10 12-Bit Inputs, 12 Binary Triac Outputs Expansion Module (Alerton EXP-10-12-0).....	3,274.65	293.95
23 09 23 53-0069	EA		10 12-Bit Inputs, 4 Binary Triac Outputs Expansion Module (Alerton EXP-10-4-8).....	3,481.15	293.95
23 09 23 53-0070	EA		22 12-Bit Inputs Expansion Module (Alerton EXP-22-0-0).....	3,303.19	293.95
23 09 23 53-0071	EA		50 Devices, Ascent Compass 1 Software, Small License (Alerton Compass-1-SM).....	10,616.83	
23 09 23 53-0072	EA		Global Controller Base Unit (Alerton ACM).....	5,788.25	293.95
23 09 23 53-0073	EA		External Battery Pack For ACM (Alerton ACM-BATT).....	1,257.26	163.51
23 09 23 53-0074	EA		Licenses The ACM For Capacity Of 32 Directly Connected Devices (Alerton ACM032).....	1,040.11	
23 09 23 53-0075	EA		Microset 4 Wall Sensor (Alerton MS4-THC).....	1,190.17	11.02
23 09 23 53-0076			Automated Logic Controls (23 09 23 53)		
23 09 23 53-0077	EA		0 Digital Outputs, 8 Universal Inputs, 0 Analog Outputs Standalone Control Module (Automated Logic M0100).....	3,691.59	293.95
23 09 23 53-0078	EA		0 Digital Outputs, 32 Universal Inputs, 0 Analog Outputs Standalone Control Module (Automated Logic M0320).....	8,254.71	881.84
23 09 23 53-0079	EA		2 Digital Outputs, 2 Universal Inputs, 0 Analog Outputs Standalone Control Module (Automated Logic M220nx).....	2,546.48	293.95
23 09 23 53-0080	EA		4 Digital Outputs, 10 Universal Inputs, 6 Analog Outputs Standalone Control Module (Automated Logic M4106nx).....	5,377.88	391.93
23 09 23 53-0081	EA		8 Digital Outputs, 10 Universal Inputs, 2 Analog Outputs Standalone Control Module (Automated Logic M8102nx).....	5,292.42	391.93
23 09 23 53-0082	EA		16 Digital Outputs, 16 Universal Inputs, 0 Analog Outputs Standalone Control Module (Automated Logic M16160).....	8,533.89	783.85
23 09 23 53-0083	EA		8 Digital Outputs, 8 Universal Inputs, 0 Analog Outputs Standalone Control Module (Automated Logic M880nx).....	4,736.96	391.93
23 09 23 53-0084	EA		0 Digital Outputs, 32 Universal Inputs, 0 Analog Outputs Expander Control Module (Automated Logic MX0320).....	4,751.24	293.95
23 09 23 53-0085	EA		16 Digital Outputs, 16 Universal Inputs, 0 Analog Outputs Expander Control Module (Automated Logic MX16160).....	8,021.16	783.85
23 09 23 53-0086	EA		No Display, Interior Wall Mounted, Standalone Controller For Heat Pumps, Fan Coil Units And Other Packaged HVAC Equipment (Automated Logic RC642).....	1,925.40	195.97
23 09 23 53-0087	EA		With Display, Interior Wall Mounted, Standalone Controller For Heat Pumps, Fan Coil Units And Other Packaged HVAC Equipment (Automated Logic RC642D).....	2,058.67	195.97
23 09 23 53-0088	EA		3 Digital Outputs, 4 Universal Inputs, 1 Analog Outputs Controller For Pressure Independent VAV Applications (Automated Logic ZN341+).....	2,785.08	195.97
23 09 23 53-0089	EA		1 Digital Outputs, 4 Universal Inputs, 1 Analog Outputs Controller For Pressure Independent VAV Applications (Automated Logic ZN141+).....	2,688.94	195.97
23 09 23 53-0090	EA		Air Flow Sensor And Damper Actuator Accessory For ZN341V+ Or ZN141V+ (Automated Logic ZASF).....	2,324.29	293.95
23 09 23 53-0091	EA		Unlimited Points, Front End Software For Building Control (Automated Logic WC).....	14,134.19	
23 09 23 53-0092	EA		500 Point, Front End Software For Building Control (Automated Logic WC500).....	8,921.37	
23 09 23 53-0093	EA		Enterprise Integration Option, Front End Software For Building Control (Automated Logic WC-ENTERPRISE).....	11,661.82	
23 09 23 53-0094			Cypress EnviroSystems Controls (23 09 23 53)		
23 09 23 53-0095			Wireless Pneumatic Thermostat (23 09 23 53-0094)		
			Note: Wireless pneumatic thermostats, hub and repeaters must be installed by installers certified by the manufacturer.		
23 09 23 53-0096	EA		Two-Pipe Direct Acting Wireless Pneumatic Thermostat (Cypress EnviroSystems WPT-LoRa-T2DP).....	551.27	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-28.38	
			For >200, Deduct	-56.71	
23 09 23 53-0097	EA		Two-Pipe Reverse Acting Wireless Pneumatic Thermostat (Cypress EnviroSystems WPT-LoRa-T2RP).....	551.27	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-28.38	
			For >200, Deduct	-56.71	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0098	EA		Single-Pipe Direct Acting Wireless Pneumatic Thermostat (Cypress Envirosystems WPT-LoRa-T1DP).....	551.27	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-28.38	
			For >200, Deduct	-56.71	
23 09 23 53-0099	EA		Single-Pipe Indirect Acting Wireless Pneumatic Thermostat (Cypress Envirosystems WPT-LoRa-T1RP)	551.27	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-28.38	
			For >200, Deduct	-56.71	
23 09 23 53-0100	EA		Two-Pipe Direct Acting Deadband Wireless Pneumatic Thermostat (Cypress Envirosystems WPT-LoRa-T2DP-DB)	627.29	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-32.61	
			For >200, Deduct	-65.16	
23 09 23 53-0101	EA		Two-Pipe Reverse Acting Deadband Wireless Pneumatic Thermostat (Cypress Envirosystems WPT-LoRa-T2RP-DB)	627.29	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-32.61	
			For >200, Deduct	-65.16	
23 09 23 53-0102	EA		Single-Pipe Direct Acting Deadband Wireless Pneumatic Thermostat (Cypress Envirosystems WPT-800-T1DP-DB)	627.29	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-32.61	
			For >200, Deduct	-65.16	
23 09 23 53-0103	EA		Single-Pipe Indirect Acting Deadband Wireless Pneumatic Thermostat (Cypress Envirosystems WPT-LoRa-T1RP-DB)	627.29	12.25
			Note: One for every thermostat to be retrofitted.		
			For >50 To 200, Deduct	-32.61	
			For >200, Deduct	-65.16	
23 09 23 53-0104	EA		Wireless Pneumatic Thermostat Blank Cover (Cypress Envirosystems WPT-800-MCOV)	44.85	12.25
			Note: Optional cover.		
			For >50 To 200, Deduct	-1.81	
			For >200, Deduct	-3.62	
23 09 23 53-0105	EA		Green Box Controller (Cypress Envirosystems GBC-830-COM)	4,961.26	12.25
			Note: One unit for up to 100 thermostats.		
			For 2, Deduct	-248.61	
			For >2, Deduct	-496.77	
23 09 23 53-0106	EA		WPT USB Hub (Cypress Envirosystems WPT-800-HUSB)	478.75	12.25
			Note: One unit for up to 100 thermostats.		
			For 2, Deduct	-25.94	
			For >2, Deduct	-51.83	
23 09 23 53-0107	EA		WPT Repeater (Cypress Envirosystems WPT-800-RWAL)	831.79	12.25
			Note: One unit for up to 15 thermostats.		
			For >5 To 10, Deduct	-42.84	
			For >10, Deduct	-85.61	
23 09 23 53-0108	EA		24 Volt, WPT Repeater (Cypress Envirosystems WPT-800-RWAL24V)	1,018.53	12.25
			Note: One unit for up to 15 thermostats.		
			For >5 To 10, Deduct	-49.82	
			For >10, Deduct	-99.55	
23 09 23 53-0109			Delta Controls (23 09 23 53)		
23 09 23 53-0110			Software (23 09 23 53-0109)		
			Note: Excludes programming, set-up and commissioning of application.		
23 09 23 53-0111	EA		Orca Software Unlimited Points License (Delta Controls DOW333-USB).....	2,494.90	
23 09 23 53-0112	EA		Orca Graphics Module, Delta Controls Orca View With Graphics Creation Capabilities (Delta Controls DOW333-L-USB).....	4,226.04	
23 09 23 53-0113	EA		Orca Historical Module, Delta Controls Historian Package With Unlimited Archiving Trend Logs (Delta Controls DHS330-HL-USB).....	9,156.42	
23 09 23 53-0114	EA		Web Server Unlimited Points License, Delta Controls Web Server Front End (Delta Controls DWS330-L-USB).....	14,468.68	
23 09 23 53-0115	EA		Web Server Limited Points (Maximum I/O 2500) License, Delta Controls Web Server Front End (Delta Controls DWS330-M-USB)	7,425.28	
23 09 23 53-0116	EA		Web Server Limited Points (Maximum I/O 250) License, Delta Controls Web Server Front End (Delta Controls DWS330-S-USB)	2,494.90	
23 09 23 53-0117	EA		100 User Energy Portal, Data Collection Controller, Web PC Server Program License (Delta Controls EP-2.01)	6,016.60	
23 09 23 53-0118	EA		1,000 User Energy Portal, Data Collection Controller, Web PC Server Program License (Delta Controls EP-2.02)	7,425.28	
23 09 23 53-0119	EA		KW Meter With H8163-2400-4-3 Series, With 3, 2,400 Amperes CT's And BACnet MS/TP Interface (Delta Controls H8186-CB)	2,617.02	122.48
23 09 23 53-0120	EA		Delta Controls Touch Screen (Delta Controls DHMI-7-I)	2,866.35	
23 09 23 53-0121			EMCS Central Equipment And Controllers (23 09 23 53-0109)		
23 09 23 53-0122	EA		Fully Programmable, Native BACnet Building Controller (Delta Controls DSC-1616E + DFM1616)	8,965.87	489.91
			Note: Includes 32 Universal Inputs/32 Analog Or Binary Outputs HOA's, Twisted-Pair Ethernet Port, BACnet IP, BACnet Over Ethernet, Main LAN RS-485 BACnet MS/TP (Maximum Of 99 Devices), SubLAN (Net2) BACnet MS/TP (Maximum 99 Devices) Or Delta LINKnet At 76,800 BPS, Serial RS-232 BACnet PTP, Real-Time Clock With Lithium Battery And SRAM Backup		
23 09 23 53-0123	EA		Fully Programmable, Native BACnet Building Controller, 16 Universal Inputs/16 Analog Or Binary Outputs HOA'S, Twisted-Pair Ethernet Port, BACnet IP, BACnet Over Ethernet, Main LAN RS-485 BACnet MS/TP (Maximum Of 99 Devices), Sublan (Net2) BACnet MS/TP (Maximum 99 Devices) Or Delta LINKnet At 76,800 BPS (Maximum 12 Devices On LINKnet, With 2 DFM Devices) Serial RS-232 BACnet PTP, Real-Time Clock With Lithium Battery And SRAM Backup (Delta Controls DSC-1616E).....	6,711.98	489.91
23 09 23 53-0124	EA		Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 11 Universal Inputs, 4 Analog Output Or 6 Binary (Triac) Outputs (Delta Controls DAC-1146)	4,834.91	489.91

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0125 EA Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 11 Universal Inputs, 8 Analog Or Binary Outputs (Delta Controls DAC-1180).....	4,834.91	489.91
23 09 23 53-0126 EA Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 11 Universal Inputs, 4 Analog Output Or 6 Binary (Triac) Outputs (Delta Controls DAC-1146)	4,834.91	489.91
23 09 23 53-0127 EA Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 6 Universal Inputs, 3 Binary (Triac) Outputs And 3 Analog Outputs (Delta Controls DAC-633 R3).....	4,491.65	489.91
23 09 23 53-0128 EA VAV Controllers Are Native BACnet Application Controllers That Are Fully Programmable, Communicate On A RS-485 LAN Using The MS/TP BACnet Protocol, 3 Universal Inputs, 4 Binary Outputs, Actuator Position Feedback, Supports 4 BACstat Network Sensors On LINKnet For Room Sensing And Control Or 2 Delta Field Modules On LINKnet For I/O Expansion (Delta Controls DVC-304AF)	1,603.16	244.95
23 09 23 53-0129 EA Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 4 Binary Triac Outputs (24 Volt AC), 3 Binary Relay Outputs For Fan Speed Control, 240 Volt AC, 1 HP (60 LRA/10 FLA) LED Status Indication Of Each Output (Delta Controls DFC-304R3-240)	1,451.73	244.95
23 09 23 53-0130 EA Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 6 Universal Inputs, 3 Binary (Triac) Outputs And 3 Analog Outputs (Delta Controls DAC-633 R3).....	1,552.20	244.95
23 09 23 53-0131 EA Fully Programmable, Native BACnet Advanced Application Controller That Communicates On A RS-485 LAN Using The BACnet MS/TP Protocol, 4 Binary Triac Outputs (24 Volt AC), 3 Binary Relay Outputs For Fan Speed Control, 240 Volt AC, 1 HP (60 LRA/10 FLA) LED Status Indication Of Each Output (Delta Controls DFC-304R3-240)	1,451.73	244.95
23 09 23 53-0132 EA Remotely Expandable I/O To Delta's BACnet Controllers, 16 Universal Inputs, 16 Analog Outputs (Delta Controls DFM-1616)	3,478.66	306.19
23 09 23 53-0133 EA Remotely Expandable I/O To Delta's BACnet Controllers, 4 Universal Inputs, 4 Analog Outputs (Delta Controls DFM-440)	859.16	122.48
23 09 23 53-0134 EA Remotely Expandable I/O To Delta's BACnet™ Controllers, 4 Universal Inputs, 4 Binary Triac Outputs (Delta Controls DFM-404).....	923.01	122.48
23 09 23 53-0135 EA Remotely Expandable I/O To Delta's BACnet™ Controllers, 16 Universal Inputs (Delta Controls DFM-1600)	1,088.60	122.48
23 09 23 53-0136 Network, VAV And Special Sensors (23 09 23 53-0109)		
23 09 23 53-0137 EA BACnet MS/TP VAV Network Room Temperature Sensor With LCD Display (Delta Controls DNS-24)	288.05	39.19
23 09 23 53-0138 EA BACnet MS/TP VAV Network Temperature And Humidity Sensor With LCD Display (Delta Controls DNS-H24).....	391.97	44.09
23 09 23 53-0139 EA Programmable BACnet MS/TP Thermostat With 8 Button Keypad And LCD Display For DX Unit, Fan Coils And RTU (Delta Controls DAC-T305-G2B).....	776.96	18.37
23 09 23 53-0140 Honeywell Controls (23 09 23 53)		
23 09 23 53-0141 EMCS Central Equipment And Controllers (23 09 23 53-0140)		
23 09 23 53-0142 EMCS Network Area Controllers (BACnet Or Lon) (23 09 23 53-0141)		
Note: Includes loading software, software license, loading data base and mounting on wall.		
23 09 23 53-0143 EA Network Area Java Controller Supporting 126 Devices (Honeywell WC2003B2004).....	12,506.32	597.07
Note: Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 1 minimum RS-232 serial ports, 1 minimum RS-485 electrically isolated ports, 1 LonWorks port (supports 126 devices), and web user interface software.		
23 09 23 53-0144 EA Network Area Java Controller Supporting 27 Devices (Honeywell WC2003B1022).....	8,479.81	597.07
Note: Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 1 RS-232 port, 1 RS-485 port, 1 LonWorks port with driver, Lon tunnel service, BACnet driver, wind river VxWorks OS with Jeode java virtual machine, Niagara control engine and web user interface software (supports 27 device).		
23 09 23 53-0145 EA Network Area Java Controller Supporting 10 Devices (Honeywell WEB-201).....	6,438.59	597.07
Note: Includes 128 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, 1 RS-232 serial port, 1 RS-485 serial port, NDIO port, 2 communication card option slots, BACnet IP Client, and BACnet MS/TP. Supports up to 10 devices.		
23 09 23 53-0146 EA Network Area Java Controller Supporting 10 Devices (Honeywell WEB-201-EZ).....	8,062.93	597.07
Note: Includes 128 MB RAM / 64 MB Flash, 2 10/100 Mb ethernet ports, 1 RS-232 serial port, 1 RS-485 serial port, NDIO port, 2 communication card option slots, BACnet IP Client, and BACnet MS/TP. Includes WEB user interface and Enterprise connectivity pack.		
23 09 23 53-0147 EA Niagara Network Area Java Controller Supporting 10 Devices (Honeywell WEB-201-LN).....	6,382.67	597.07
Note: Includes 128 MB RAM / 64 MB Flash, 2 10/100 Mb ethernet ports, factory installed LON card, NDIO port and MODBus TCP driver. Excludes RS232 and RS485 communications. Includes Niagara network ethernet communication between stations.		
23 09 23 53-0148 EA Web UI Network Area Java Controller Supporting 10 Devices (Honeywell WEB-201-LU).....	6,382.67	597.07
Note: Includes 128 MB RAM / 64 MB Flash, 2 10/100 Mb ethernet ports, factory installed LON card, NDIO port and MODBus TCP driver. Excludes RS232 and RS485.		
23 09 23 53-0149 EA 16 Point BACnet IP Network Area Java Controller (Honeywell WEB-216-B)	6,944.45	597.07
Note: Includes 16 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.		
23 09 23 53-0150 EA 16 Point Web UI And BACnet IP Network Area Java Controller (Honeywell WEB-216-BU).....	7,534.19	597.07
Note: Includes 16 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.		
23 09 23 53-0151 EA 16 Point Niagara Network Area Java Controller (Honeywell WEB-216-N)	6,944.45	597.07
Note: Includes 16 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.		
23 09 23 53-0152 EA 16 Point Web UI And Niagara Network Area Java Controller (Honeywell WEB-216-NU).....	7,534.19	597.07
Note: Includes 16 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0153	EA		34 Point BACnet IP Network Area Java Controller (Honeywell WEB-234-B)..... Note: Includes 34 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.	7,539.28	597.07
23 09 23 53-0154	EA		34 Point Web UI and BACnet IP Network Area Java Controller (Honeywell WEB-234-BU.)..... Note: Includes 34 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this.	8,129.02	597.07
23 09 23 53-0155	EA		34 Point Niagara Network Area Java Controller (Honeywell WEB-216-N)..... Note: Includes 34 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.	7,539.28	597.07
23 09 23 53-0156	EA		34 Point Web UI and Niagara Network Area Java Controller (Honeywell WEB-216-NU)..... Note: Includes 34 IO point equipment controller consisting of a controller, one IO-16 module and BACnet IP client communications. Includes 64 MB RAM / 64 MB Flash, 2 10/100 MB ethernet ports, NDIO port and 2 communication card option slots. Excludes RS232 and RS485. The LON card is not an option on this controller.	8,129.02	597.07
23 09 23 53-0157	EA		Network Area Java Controller Supporting 27 Devices (Controller Only) (Honeywell WEB-403-AX)..... Note: Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 1 RS-485 port, 1 RS-232 port, 1 LonWorks FTT 10 port, 6 universal inputs (analog or contact/pulse input), 4 form C (SPDT) relay outputs. Excludes UI service and Enterprise connectivity service.	8,034.96	597.07
23 09 23 53-0158	EA		Unrestricted Network Area Java Controller Supporting 27 Devices (Controller Only)..... Note: Unrestricted limit on connected devices. Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 1 RS-485 port, 1 LonWorks FTT 10 port, 6 universal inputs (analog or contact/pulse input), 4 form C (SPDT) relay outputs. Excludes UI service and Enterprise connectivity service. Honeywell WEB-403-EXP-AX. As with other WEBS controllers, capacity is limited by the characteristics of the application including size and complexity.	10,005.01	597.07
23 09 23 53-0159	EA		Easy Pack Network Area Java Controller Supporting 27 Devices (Honeywell WEB-403-EZ)..... Note: Includes controller plus User Interface Station Pack and Enterprise Connectivity Station Pack bundled as an "easy-order" bundle. Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 1 RS-485 port, 1 RS-232 port, 1 LonWorks FTT 10 port, 6 universal inputs (analog or contact/pulse input), 4 form C (SPDT) relay outputs. Excludes UI service and Enterprise connectivity service.	10,612.54	597.07
23 09 23 53-0160	EA		Expanded Easy Pack Network Area Java Controller Supporting 27 Devices (Honeywell WEB-403-EXP-EZ)..... Note: Unrestricted limit on connected devices. Includes controller plus User Interface Station Pack and Enterprise Connectivity Station Pack bundled as an "easy-order" bundle. Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 1 RS-485 port, 1 RS-232 port, 1 LonWorks FTT 10 port, 6 universal inputs (analog or contact/pulse input), 4 form C (SPDT) relay outputs. Excludes UI service and Enterprise connectivity service. As with other WEBS controllers, capacity is limited by the characteristics of the application including size and complexity.	12,582.58	597.07
23 09 23 53-0161	EA		Network Area Java Controller Supporting 124 Devices (Controller Only) (Honeywell WEB-545-AX)..... Note: Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 4 RS-485 port, 2 RS-232 port, 1 LonWorks port. As with other WEBS controllers, capacity is limited by the characteristics of the application. Unit is supplied with a steel, wall mountable enclosure, and 120 volt power supply. Excludes UI service and Enterprise connectivity service.	10,640.50	597.07
23 09 23 53-0162	EA		Easy Pack Network Area Java Controller Supporting 124 Devices (Honeywell WEB-545-EZ)..... Note: Includes 128 MB RAM / 32 MB Flash, 10/100 MB ethernet port, 4 RS-485 port, 2 RS-232 port, 1 LonWorks port. As with other JACEs, capacity is limited by the characteristics of the application. Unit is supplied with a steel, wall mountable enclosure, and 120 volt power supply. Includes WEB-545-AX plus User Interface Station Pack (UI-SP-5XX) and Enterprise Connectivity Station Pack (EC-SP-5XX) bundled as an "easy-order" bundle.	14,395.02	597.07
23 09 23 53-0163			EMCS Network Interfaces (23 09 23 53-0141) Note: Includes installation, start-up and tech labor.		
23 09 23 53-0164	EA		Serial LonTalk Adapter For LonWorks Bus And A PC (Honeywell Q7760A2001)..... Note: For desktop computer.	1,817.44	165.35
23 09 23 53-0165	EA		Serial LonTalk Card For LonWorks Bus And A PC (Honeywell Q7752B2009)..... Note: For laptop computer.	1,544.18	110.23
23 09 23 53-0166	EA		FTT-10 To FTT-10 Router (Honeywell Q7751A2010).....	1,967.94	206.75
23 09 23 53-0167	EA		4FTT-10 To TP/FTT-1250 Multi Port Router (Honeywell Q7751J2002).....	3,024.14	298.60
23 09 23 53-0168	EA		Two Way Lon Repeater (Honeywell Q7740A1008).....	1,552.32	298.60
23 09 23 53-0169	EA		FTT Termination Module For Network Bus (Honeywell 209541B).....	110.89	36.74
23 09 23 53-0170			DDC Application Specific Controller Assemblies (23 09 23 53-0141) Note: Includes submittal generation, installation, field test, checkout and start-up. Includes control enclosure, transformer, terminal strip and ancillary devices. (For example, fan coil unit include valves, actuators with controller and thermostat; VAVs include controller, thermostat and hot water valve if VAV has reheat coil). Excludes graphics and database generation. Excludes discharge air sensor.		
23 09 23 53-0171	EA		Up To 10 Factory Installed Cooling Only Or Electric Reheat VAV Or FPB Controller Assemblies.....	2,870.05	675.19
23 09 23 53-0172	EA		>10 Factory Installed Cooling Only Or Electric Reheat VAV Or FPB Controller Assemblies.....	2,410.76	399.62
23 09 23 53-0173	EA		Up To 10 Field Installed Cooling Only Or Electric Reheat VAV Or FPB Controller Assemblies.....	3,062.95	790.93
23 09 23 53-0174	EA		>10 Field Installed Cooling Only Or Electric Reheat VAV Or FPB Controller Assemblies.....	2,603.67	515.36
23 09 23 53-0175	EA		Up To 10 Factory Installed Steam Or Hot Water Heating VAV Or FPB Controller Assemblies.....	3,388.47	826.80
23 09 23 53-0176	EA		>10 Factory Installed Steam Or Hot Water Heating VAV Or FPB Controller Assemblies.....	3,043.94	619.49
23 09 23 53-0177	EA		Up To 10 Field Installed Steam Or Hot Water Heating VAV Or FPB Controller Assemblies.....	3,595.13	950.81
23 09 23 53-0178	EA		>10 Field Installed Steam Or Hot Water Heating VAV Or FPB Controller Assemblies.....	3,223.00	727.64
23 09 23 53-0179	EA		Up To 10 Factory Installed Application Specific Heat Pump Or Gas Heat With DX Cooling Controller Assemblies.....	2,534.97	675.10
23 09 23 53-0180	EA		>10 Factory Installed Application Specific Heat Pump Or Gas Heat With DX Cooling Controller Assemblies.....	2,075.68	399.62
23 09 23 53-0181	EA		Up To 10 Field Installed Application Specific Heat Pump Or Gas Heat With DX Cooling Controller Assemblies.....	2,787.64	826.80
23 09 23 53-0182	EA		>10 Field Installed Application Specific Heat Pump Or Gas Heat With DX Cooling Controller Assemblies.....	2,328.23	551.15
23 09 23 53-0183	EA		Up To 10 Factory Installed Application Specific Fan Coil Unit Controller Assemblies.....	3,399.13	686.21
23 09 23 53-0184	EA		>10 Factory Installed Application Specific Fan Coil Unit Controller Assemblies.....	2,930.66	560.94
23 09 23 53-0185	EA		Up To 10 Field Installed Application Specific Fan Coil Unit Controller Assemblies.....	3,651.79	950.79
23 09 23 53-0186	EA		>10 Field Installed Application Specific Fan Coil Unit Controller Assemblies.....	3,183.20	631.98
23 09 23 53-0187	EA		Up To 10 Factory Installed Application Specific Unit Ventilator Controller Assemblies.....	4,307.17	950.79
23 09 23 53-0188	EA		>10 Factory Installed Application Specific Unit Ventilator Controller Assemblies.....	3,889.27	607.49

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 09 23 53-0243	EA	WEBS Energy Suite (WES) Base Software (Honeywell WES-BASE-AX).....	6,739.08	
		Note: Includes license for 10 points of E ² Profiler and 2 licensed meters of Cost Profiler. Limit of one WES-BASE per WEBStation-AX Supervisor. Additional E ² Profiler point requirements or Cost Profiler meter requirements may use one or any combination of point/meter bundles. One WES-BASE required per WES project.		
23 09 23 53-0244	EA	Perpetual License One Meter Point Bundle Of A Cost Profiler Meter And Two E ² Profiler Points (Honeywell WES-CP-AX).....	835.31	
		Note: Can be combined with the required single instance of VES-BASE as well as with any combination of other EP points and CP meters.		
23 09 23 53-0245	EA	Perpetual License For One Point Of E ² Profiler (Honeywell WES-E2-AX).....	536.62	
		Note: Can be combined with the required single instance of VES-BASE as well as with any number of other EP Points and Cost Profiler meters.		
23 09 23 53-0246	EA	Perpetual License For An Unlimited Bundle Of E2 Points And CP Meters.....	36,739.65	
		Note: Sold on a per server basis. Purchase of this product must be accompanied by VES-M1-ENT-AX maintenance. The first year price of maintenance is included with VES-ENT-AX.		
23 09 23 53-0247	EA	Annual Maintenance For Enterprise WEBS-AX Energy Suite (Honeywell WES-M1-ENT-AX).....	33,505.16	
		Note: The first year cost of VES-M1-ENT-AX is included with VES-ENT-AX. After the first year VES-M1-ENT-AX maintenance fee will be invoiced annually.		
23 09 23 53-0248	EA	Standard WEBStation-AX Supervisor Bundled With WES-BASE-AX (Honeywell WES-S-AX).....	12,768.42	
23 09 23 53-0249	EA	Small WEBStation-AX Supervisor Bundled With WES-BASE-AX (Honeywell WES-S-AX-SBS).....	9,527.38	
23 09 23 53-0250	EA	Add 500 Modbus TCP Points To WEBStation With WS-OSD Option (Honeywell WS-MTCP-500).....	2,754.25	
23 09 23 53-0251	EA	Add 500 OPC Points To WEBStation With WS-OSD Option (Honeywell WS-OPC-500).....	2,754.25	
23 09 23 53-0252	EA	Vykon Oracle Driver For Support Of Oracle Database (Honeywell WS-ORCL).....	19,064.92	
		Note: Excludes Oracle.		
23 09 23 53-0253	EA	Open System Driver Option (Honeywell WS-SNMP-500).....	2,541.99	
		Note: Adds 25 points each of BACnet IP, OPC (client), Modbus TCP and SNMP to a standard WEBStation. Can be purchased with the WS or added later. Web Supervisor required to purchase this option.		
23 09 23 53-0254	EA	Add 500 SNMP Points To WEBStation With WS-OSD Option (Honeywell WS-SNMP-500).....	2,754.25	
23 09 23 53-0255	EA	WEBStation Software WS-1 And First Copy Of WEBPro Software (Honeywell ZW2000A1003).....	7,202.73	
		Note: For a single Honeywell WEB NP controller. Excludes software keys for the additional nodes.		
23 09 23 53-0256	EA	WEBStation Additional Node (Honeywell ZW2000B1002).....	2,754.25	
23 09 23 53-0257	EA	WEBStation Software And 20 Pack Of Node Software Keys (Honeywell ZW2000C1001).....	46,180.33	
23 09 23 53-0258	EA	WEBStation Software And 50 Pack Of Node Software Keys (Honeywell ZW2000D1000).....	84,733.42	
23 09 23 53-0259	EA	WEBStation Software And 100 Pack Of Node Software Keys (Honeywell ZW2000E1009).....	148,283.17	
23 09 23 53-0260	EA	Master WEBStation Software For Monitoring Multiple WEBStations (Honeywell ZW2000F1008).....	7,625.97	
23 09 23 53-0261	EA	Additional Master WEBStation Software Licenses (Honeywell ZW2000G1007).....	3,812.98	
23 09 23 53-0262	EA	Additional Copies Of Workplace Pro WP-1 (Web Pro) (Honeywell ZW2001A1001).....	2,975.66	
23 09 23 53-0263	EA	Upgrade Existing NAC To Provide Unrestricted Connected Device Limit (Honeywell WC2003B1055).....	3,285.44	
		Note: As with other WEBS, capacity is limited by the characteristics of the application including size and complexity.		
23 09 23 53-0264		Initial Database Generation (23 09 23 53-0235)		
23 09 23 53-0265	PNT	Database Generation For Central Plant.....	82.18	
23 09 23 53-0266	PNT	Database Generation For Programmable Controller.....	82.18	
		Note: For VAV AHU, large CV AHU, or heat exchanger, etc.		
23 09 23 53-0267	EA	Database Generation For Application Specific Controller.....	82.18	
		Note: Price per each VAV box, fan coil unit, unit ventilator or small CV AHU. Task used for the first piece of each equipment.		
23 09 23 53-0268	EA	Replication Of Database Generation For Application Specific Controller.....	57.20	
		Note: Price per copy made.		
23 09 23 53-0269	EA	Database Generation For Remote IO Modules, Sensors, Etcetera.....	57.20	
23 09 23 53-0270		Application Software Programs (23 09 23 53-0235)		
23 09 23 53-0271	EA	Basic Application Program Package.....	3,429.35	
		Note: One per project. Includes program inputs, command priorities, alarms, trends for analog and digital points, energy totalization, schedules, calendars, special events, occupied and unoccupied setpoints, ventilation and recirculation modes, hot water reset program, chilled water reset program, condenser water reset program, and fail-over logic.		
23 09 23 53-0272	EA	Optimum Start/Stop Program.....	114.64	
		Note: Priced per controller requiring optimum start programming.		
23 09 23 53-0273	EA	Duty Cycling Program.....	54.14	
23 09 23 53-0274	EA	Hot Deck/Cold Deck Reset Application Program.....	5,891.51	
23 09 23 53-0275	EA	Boiler Optimization Program.....	7,720.45	
23 09 23 53-0276	EA	Chiller Optimization Program.....	10,458.13	
23 09 23 53-0277	EA	Lighting Control Program.....	5,046.70	
23 09 23 53-0278	EA	Demand Limiting Program.....	100.55	
		Note: Priced per controller requiring optimum start programming.		
23 09 23 53-0279	EA	Email Alarm Server Configuration.....	3,893.31	
23 09 23 53-0280		Color Graphics Generation (23 09 23 53-0235)		
		Note: Priced per page.		
23 09 23 53-0281	EA	Single Site Home Page Graphics Page With HTML Navigation Code.....	2,054.93	
23 09 23 53-0282	EA	Multi Site Home Page Graphics Page With HTML Navigation Code.....	3,648.46	
23 09 23 53-0283	EA	Color Graphics Page For Central Plant.....	933.64	
23 09 23 53-0284	EA	Color Graphics Page For Building Floor Plan.....	862.12	
23 09 23 53-0285	EA	Replication Of Color Graphics Page For Central Plant.....	468.35	
23 09 23 53-0286	EA	Color Graphics Page For Programmable Controller.....	1,050.37	
		Note: For VAV AHU, large CV AHU, or heat exchanger, etc.		
23 09 23 53-0287	EA	Replication Of Color Graphics Page For Programmable Controller.....	224.62	
		Note: Priced per copy made.		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0288 EA Color Graphics Page For Application Specific Controller.....	971.49	
Note: Price per each VAV box, fan coil unit, unit ventilator or small CV AHU. Task used for the first piece of each equipment.		
23 09 23 53-0289 EA Replication Of Color Graphics Page For Application Specific Cont.....	97.12	
Note: Priced per copy made.		
23 09 23 53-0290		
Sensors, Actuators And Control Devices (23 09 23 53-0140)		
Note: Includes installation, startup, checkout and miscellaneous parts for installation. Excludes conduit, wire and cable. Excludes engineering and programming labor. Each device is considered one control point. No engineering or programming time required for replacement parts.		
23 09 23 53-0291		
Special Sensors (23 09 23 53-0290)		
23 09 23 53-0292 EA Dewpoint Sensor (Honeywell C7232B1014).....	2,242.65	75.81
23 09 23 53-0293 EA Enthalpy Sensor -25 To 125 F.....	2,340.87	75.81
23 09 23 53-0294 EA Outdoor Mounted Temperature And Humidity Transmitter (Honeywell H7635C1002).....	1,037.18	151.63
23 09 23 53-0295 EA Freezestat (Honeywell L482A1004).....	708.95	252.67
23 09 23 53-0296 EA Wall Mounted Occupancy Sensor.....	515.13	75.81
23 09 23 53-0297 EA Ceiling Mounted Occupancy Sensor.....	406.86	75.81
23 09 23 53-0298 EA I/P Positioner With Gauge.....	479.59	75.81
23 09 23 53-0299 EA Non-Communicating Duct Mounted Smoke Detector With Sampling Tube.....	573.86	75.81
23 09 23 53-0300 EA EP Transducer.....	479.59	50.58
23 09 23 53-0301 EA Electric Heat Sequencer.....	758.60	101.04
23 09 23 53-0302		
Meters (23 09 23 53-0290)		
23 09 23 53-0303 EA 208 - 480 Volt, Up To 2,400 Amperes, KW/KWh Meter/Current Transformer.....	4,893.78	606.27
23 09 23 53-0304 EA 208 - 480 Volt, Up To 2,400 Amperes, KW/KWh Meter/Current Transformer With LON interface.....	7,087.28	707.31
23 09 23 53-0305 EA 1 To 300 Amperes, Current Transformer For KW Meter.....	1,690.04	252.67
23 09 23 53-0306 EA 300 To 800 Amperes, Current Transformer For KW Meter.....	1,943.09	252.67
23 09 23 53-0307 EA 800 To 2,400 Amperes, Current Transformer For KW Meter.....	2,428.38	252.67
23 09 23 53-0308		
Direct Coupled Actuators (23 09 23 53-0290)		
23 09 23 53-0309 EA 44 IN-LB, 2 Position, 120 Volt AC Spring Return Direct Coupled Damper Actuator (Honeywell MS4105A1002).....	664.73	100.81
23 09 23 53-0310 EA 88 IN-LB, 2 Position, 120 Volt AC Spring Return Direct Coupled Damper Actuator (Honeywell MS4110A1200).....	736.02	100.81
23 09 23 53-0311 EA 175 IN-LB, 2 Position, 120 Volt AC Spring Return Direct Coupled Damper Actuator (Honeywell MS4120A1209).....	858.59	100.81
23 09 23 53-0312 EA 44 IN-LB, 2 Position, 24 Volt AC Spring Return Direct Coupled Damper Actuator (Honeywell MS8105A1008).....	623.01	100.81
23 09 23 53-0313 EA 88 IN-LB, 2 Position, 24 Volt AC Spring Return Direct Coupled Damper Actuator (Honeywell MS8110A1206).....	699.68	100.81
23 09 23 53-0314 EA 175 IN-LB, 2 Position, 24 Volt AC Spring Return Direct Coupled Damper Actuator (Honeywell MS8120A1205).....	775.60	100.81
23 09 23 53-0315 EA 44 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC Or Floating Control, Spring Return Direct Coupled Damper Actuator.....	703.87	100.81
23 09 23 53-0316 EA 88 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC Or Floating Control, Spring Return Direct Coupled Damper Actuator (Honeywell MS7510A2206).....	813.19	100.81
23 09 23 53-0317 EA 175 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC Or Floating Control, Spring Return Direct Coupled Damper Actuator (Honeywell MS7520A2205).....	931.19	100.81
23 09 23 53-0318 EA 44 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC Or Floating Control, Non- Spring Return Direct Coupled Damper Actuator (Honeywell MN7505A2209).....	566.14	100.81
23 09 23 53-0319 EA 88 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC Or Floating Control, Non- Spring Return Direct Coupled Damper Actuator (Honeywell MN7510A2209).....	624.35	100.81
23 09 23 53-0320 EA 175 IN-LB, 24 Volt AC, 4-20 mA, Floating Control, Non-Spring Return Direct Coupled Damper Actuator (Honeywell MN6120A1200).....	741.29	100.81
23 09 23 53-0321 EA 175 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC, Non-Spring Return Direct Coupled Damper Actuator (Honeywell MN7220A2007).....	796.34	100.81
23 09 23 53-0322 EA 300 IN-LB, 24 Volt AC, 4-20 mA, Floating Control, Non-Spring Return Direct Coupled Damper Actuator (Honeywell MN6134A10030).....	795.65	100.81
23 09 23 53-0323 EA 300 IN-LB, 24 Volt AC, 4-20mA, 0-10 Volt DC, Non-Spring Return Direct Coupled Damper Actuator (Honeywell MN7234A2008).....	946.61	100.81
23 09 23 53-0324 EA Pneumatic Spring Return Damper Actuator Without Positive Positioner (Honeywell MP909E1018).....	589.99	100.81
23 09 23 53-0325 EA Pneumatic Spring Return Damper Actuator With Positive Positioner (Honeywell MP909H1368).....	1,043.45	100.81
23 09 23 53-0326 EA Foot Mount Kit With Damper Linkage And Connectors For Direct Coupled Actuator.....	440.92	100.81
23 09 23 53-0327 EA Direct Coupled Damper Actuator Enclosure For Outdoor Use.....	677.00	100.81
23 09 23 53-0328		
Thermostats (23 09 23 53-0140)		
23 09 23 53-0329		
Electric And Electronic Thermostats (23 09 23 53-0328)		
Note: Includes installation, startup and checkout labor. Excludes engineering and programming labor. Each thermostat counts as one control point.		
23 09 23 53-0330 EA Line Voltage 120 Volt, Heat/Cool Thermostat (Honeywell T651A3018).....	224.75	18.37
23 09 23 53-0331 EA Electronic Non-Programmable Heat/Cool Heat Pump Or Conventional Unit Thermostat (Honeywell TH5320).....	242.81	18.37
23 09 23 53-0332 EA Electronic Programmable Heating/Cooling Heat Pump Or Conventional Unit Thermostat (Honeywell TH6110).....	222.74	18.37
23 09 23 53-0333 EA Electronic Programmable Two Heating/Two Cooling Heat Pump Or Conventional Unit Thermostat (Honeywell TH6220).....	250.24	18.37
23 09 23 53-0334 EA Electronic Programmable Three Heating/Two Cooling Heat Pump Or Conventional Unit Thermostat (Honeywell TH6320).....	270.91	18.37
23 09 23 53-0335 EA Electronic Programmable Two Heating/Two Cooling Heat Pump Or Conventional Unit Thermostat (Honeywell TH8321).....	403.39	18.37
23 09 23 53-0336 EA Humidity Control Electronic Programmable Heat/Cool Heat Pump Or Conventional Unit Thermostat (Honeywell T7351F).....	592.06	18.37
23 09 23 53-0337 EA Lon Communicating Humidity Control Programmable Heat/Cool Heat Pump Or Conventional Unit Thermostat (Honeywell T7350H).....	965.15	18.37
23 09 23 53-0338 EA Modulating Lon Communicating Humidity Control Programmable Heat/Cool Heat Pump Or Conventional Unit Thermostat (Honeywell T7350M).....	1,029.97	18.37

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 09 23 53-0339	Pneumatic Thermostats <small>(23 09 23 53-0328)</small> Note: Includes installation, startup and checkout labor. Excludes engineering and programming labor. Each thermostat counts as two control point.		
23 09 23 53-0340	EA Pneumatic Thermostat (Honeywell TP970B2182).....	316.72	18.37
23 09 23 53-0341	Thermostats Guards <small>(23 09 23 53-0328)</small>		
23 09 23 53-0342	EA 9-3/4" x 7-1/4" x 3-3/8" Universal Thermostat Guard (Honeywell TG512A1009).....	75.78	18.37
23 09 23 53-0343	EA 7-1/2" x 6-1/2" x 2-15/16" Universal Thermostat Guard (Honeywell TG511).....	90.83	18.37
23 09 23 53-0344	EA 5-7/8" x 5-7/8" x 2-1/2" Deep Universal Thermostat Guard (Honeywell TG510).....	85.41	18.37
23 09 23 53-0345	Johnson Controls <small>(23 09 23 53)</small>		
23 09 23 53-0346	Software <small>(23 09 23 53-0345)</small> Note: Excludes programming, set-up and commissioning of application.		
23 09 23 53-0347	EA 5 Concurrent User Application And Data Server (Johnson Controls MS-ADS05U-0).....	20,404.99	
23 09 23 53-0348	EA 10 Concurrent User External Application And Data Server (Johnson Controls MS-ADX10U-0).....	24,135.87	
23 09 23 53-0349	EA N2 Controllers Commissioning And Download Software (Johnson Controls MW-MTOOL-0).....	1,170.70	
23 09 23 53-0350	EA N2 Controllers Download Cable Kit (Johnson Controls AS-CBLPRO-2).....	1,785.56	
23 09 23 53-0351	EA BACnet FEU Controllers Commissioning And Download Software (Johnson Controls MS-CCTSWO-0).....	3,180.36	
23 09 23 53-0352	EA BACnet Controllers Download Bluetooth Converter (Johnson Controls MS-BTCVT-0).....	1,181.11	
23 09 23 53-0353	EA New User FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Software (Johnson Controls LP-FXTPRO-0).....	1,174.14	
23 09 23 53-0354	EA Upgrade FX Tools Pro CD-Rom (FX Builder, FX Builder Express, FX CommPro N2, FX CommPro LON, FX CommPro BACnet) Software (Johnson Controls LP-FXTPRO-6).....	413.59	
23 09 23 53-0355	Supervisory Controllers <small>(23 09 23 53-0345)</small>		
23 09 23 53-0356	EA NAE With 1 RS-485, Support For 50 Devices (Either N2 Or BACnet MS/TP) Supervisory Controllers (Johnson Controls MS-NAE3510-2).....	8,732.21	489.91
23 09 23 53-0357	EA NAE With 1 RS-485, Support For 100 Devices (Either N2 Or BACnet MS/TP) Supervisory Controllers (Johnson Controls MS-NAE4511-2).....	13,652.59	489.91
23 09 23 53-0358	EA NAE With 2 RS-485, Support For 200 Devices (N2 Or BACnet MS/TP) Supervisory Controllers (Johnson Controls MS-NAE5511-1).....	18,583.88	489.91
23 09 23 53-0359	EA NCE, 33 Points, Network Control Engine, 32 N2 Device Support Supervisory Controllers (Johnson Controls MS-NCE2510-0).....	6,836.90	489.91
23 09 23 53-0360	Controllers <small>(23 09 23 53-0345)</small>		
23 09 23 53-0361	EA 10 Point Field Equipment Controller With 2 UI, 1 BI, 3 BO, 4 CO, 24 Volt AC And Sensor Actuator Bus With Mounting Base (Johnson Controls MS-FEU1610-0).....	1,012.78	122.48
23 09 23 53-0362	EA 10 Point Field Equipment Controller With 2 UI, 1 BI, 3 BO, 4 CO, 24 Volt AC And Sensor Actuator Bus, Mounting Base And Integral Display (Johnson Controls MS-FEU1620-0).....	1,340.86	244.95
23 09 23 53-0363	EA 17 Point Field Equipment Controller With 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 Volt AC, Sensor Actuator Bus And Mounting Base (Johnson Controls MS-FEU2610-0).....	1,732.77	244.95
23 09 23 53-0364	EA 17 Point Field Equipment Controller With 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 Volt AC, Sensor Actuator Bus And Integral Display (Johnson Controls MS-FEU2620-0).....	2,060.85	244.95
23 09 23 53-0365	EA BACnet MS/TP 4-Point I/O Module With 4 BI, Field Controller Bus And Sensor Actuator Bus Support (Johnson Controls MS-IOM1710-0).....	824.55	122.48
23 09 23 53-0366	EA BACnet MS/TP 6 Point I/O Module With 2 UI, 2 UO, 2 BO, Field Controller Bus And Sensor Actuator Bus Support (Johnson Controls MS-IOM2710-0).....	908.21	122.48
23 09 23 53-0367	EA BACnet MS/TP 12 Point I/O Module With 4 UI, 4 UO, 4 BO, Field Controller Bus And Sensor Actuator Bus Support (Johnson Controls MS-IOM3710-0).....	1,033.70	122.48
23 09 23 53-0368	EA 17 Point I/O Module With 6 UI, 2 BI, 3 BO, 2 AO, 4 CO, 24 Volt AC And Sensor Actuator Bus With Mounting Base (Johnson Controls MS-IQU4710-0).....	1,050.43	122.48
23 09 23 53-0369	EA BACnet MS/TP Rooftop Controller For Stand-Alone And Networked Zoning Systems (Johnson Controls TEC2664Z-2).....	2,146.21	244.95
23 09 23 53-0370	EA 32-bit, Integrated VAV Controller/Actuator/DPT, 3 UI, 3 BO, and 2 CO; 24 Volt AC; Field Controller Bus And Sensor Actuator Bus (Johnson Controls MS-VMA1630-0).....	1,028.01	122.48
23 09 23 53-0371	EA 32-bit, Integrated VAV Controller/Actuator/Pressure Sensor - DPT, 3 UI and 3 BO, 2 CO, 24 Volt AC, and Sensor Actuator Bus (Johnson Controls MS-VMA1930-0).....	1,505.13	122.48
	Note: Includes 6-pin Sensor Port for use with TE-7xx Series Non-Communicating Sensors and two Ethernet Ports for BACnet/IP Communications		
23 09 23 53-0372	Master FX Controllers <small>(23 09 23 53-0345)</small>		
23 09 23 53-0373	EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, No Communication Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X00-000C).....	2,721.78	244.95
23 09 23 53-0374	EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, N2 Open Communication Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X01-000C).....	2,920.03	244.95
23 09 23 53-0375	EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, LON Communication Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X02-000C).....	3,018.55	244.95
23 09 23 53-0376	EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, RS-232 Communication Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X03-000C).....	2,958.68	244.95
23 09 23 53-0377	EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, BACnet Communications Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X04-000C).....	2,865.11	244.95
23 09 23 53-0378	EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, N2 Communication Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X11-000C).....	2,880.11	244.95
23 09 23 53-0379	EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, BACnet Communications Card Without Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X14-000C).....	2,865.11	244.95

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0380 EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, No Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X50-000C).....	2,920.25	244.95
23 09 23 53-0381 EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, N2 Open Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X51-000C).....	3,091.46	244.95
23 09 23 53-0382 EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, LON Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X52-000C).....	3,205.61	244.95
23 09 23 53-0383 EA 6 AI, 8 DI, 4 AO, 9 DO, 9 Relays, RS-232 Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X53-000C).....	3,148.53	244.95
23 09 23 53-0384 EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, BACnet Communications Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X54-000C).....	3,031.70	244.95
23 09 23 53-0385 EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, No Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X60-000C).....	2,920.25	244.95
23 09 23 53-0386 EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, N2 Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X61-000C).....	3,091.46	244.95
23 09 23 53-0387 EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, LON Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X62-000C).....	3,205.61	244.95
23 09 23 53-0388 EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, RS-232 Communication Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X63-000C).....	3,148.53	244.95
23 09 23 53-0389 EA 6 AI, 8 DI, 4 AO, 9 DO, 4 Relays, 5 Triac, BACnet Communications Card With Integral Display, Extended Temperature Range Master Controllers (Johnson Controls LP-FX16X64-000C).....	3,031.70	244.95
23 09 23 53-0390 EA N2 Open Communication Card For FX16 (Johnson Controls LP-NET151-010C).....	324.71	61.24
23 09 23 53-0391 EA LON Communication Card For FX15 and FX16 (Johnson Controls LP-NET152-010C).....	465.17	61.24
23 09 23 53-0392 EA RS-232 Communication Card For FX16 (Johnson Controls LP-NET163-000C).....	364.13	61.24
23 09 23 53-0393 EA BACnet Communications Card For FX16 (Johnson Controls LP-NET164-000C).....	324.71	61.24
23 09 23 53-0394 EA Remote Medium User Interface For FX16 (Johnson Controls LP-DIS60P20-0C).....	900.24	61.24
23 09 23 53-0395 EA Facility Explorer Extension I/O Module (Johnson Controls LP-XT91D00-000C).....	827.99	61.24
23 09 23 53-0396 EA 5 UI, 4 BI, 3 AO, 6 Relay DO Expansion I/O Module (Johnson Controls LP-XM07X01-000C).....	844.91	61.24
23 09 23 53-0397 EA 5 UI, 4 BI, 3 AO, 2 Triac DO, 4 Relay DO Expansion I/O Module (Johnson Controls LP-XM07X11-000C).....	844.91	61.24
23 09 23 53-0398 EA 5 UI, 4 BI, 3 AO, 6 Relay DO (Manual Overrides For 2 AO And 4 Relay DO) Expansion I/O Module (Johnson Controls LP-XM07X51-000C).....	929.41	61.24
23 09 23 53-0399 EA 5 UI, 4 BI, 3 AO, 2 Triac DO, 4 Relay DO (Manual Overrides For 2 AO, 2 Triac DO, And 2 Relay DO) Expansion I/O Module (Johnson Controls LP-XM07X61-000C).....	929.41	61.24
23 09 23 53-0400 EA 6 UI, 12 BI, 4 AO, 9 Relay DO Expansion I/O Module (Johnson Controls LP-XM14X01-000C).....	1,172.36	61.24
23 09 23 53-0401 EA 6 UI, 12 BI, 4 AO, 4 Triac DO Expansion I/O Module (Johnson Controls LP-XM14X11-000C).....	1,172.36	61.24
23 09 23 53-0402 EA 6 UI, 12 BI, 4 AO, 9 Relay DO (Manual Overrides For 3 AO And 7 Relay DO) Expansion I/O Module (Johnson Controls LP-XM14X51-000C).....	1,309.68	61.24
23 09 23 53-0403 EA 6 UI, 12 BI, 4 AO, 4 Triac DO, 5 Relay DO (Manual Overrides For 3 AO, 2 Triac DO, And 5 Relay DO) Expansion I/O Module (Johnson Controls LP-XM14X61-000C).....	1,309.68	61.24
23 09 23 53-0404 VAV, Network And Special Sensors (23 09 23 53-0345)		
23 09 23 53-0405 EA 3" x 4-1/2", Surface Or Box Mounted, LCD RH Display, 3% RH Accuracy, Occupancy Override, Adjustable Temperature Setpoint BACnet Temperature And Humidity Sensor (Johnson Controls NS-BHR7001-0).....	619.35	39.19
23 09 23 53-0406 EA 3" x 4-1/2", Surface Or Box Mounted, Addressing Switch BACnet Temperature Sensor (Johnson Controls NS-BTN7003-0).....	204.50	39.19
23 09 23 53-0407 EA 3" x 4-1/2", Surface Or Box Mounted, 3% RH Accuracy, BACnet Temperature And Humidity Sensor (Johnson Controls NS-BHN7001-0).....	478.41	39.19
23 09 23 53-0408 EA 3" x 4-1/2", Surface Or Box Mounted, LCD Display, 2% RH Accuracy, Occupancy Override, Adjustable Temperature Setpoint Addressing Switch BACnet Temperature And Humidity Sensor (Johnson Controls NS-BPB7003-0).....	717.63	39.19
23 09 23 53-0409 EA 3" x 4-1/2", Surface Or Box Mounted, LCD Display, Occupancy Override, Adjustable Temperature Setpoint, BACnet Temperature Sensor (Johnson Controls NS-BTB7001-0).....	235.56	39.19
23 09 23 53-0410 EA 3" x 4-1/2", Surface Or Box Mounted CO2 Sensor, 0 To 2,000 ppm (Johnson Controls NS-BCN7004-0).....	650.18	39.19
23 09 23 53-0411 Sensors - Hard Wired Type (23 09 23 53-0345)		
23 09 23 53-0412 EA Duct Mount Temperature Sensor, Platinum RT, With Handi-Box (Johnson Controls TFDRC00).....	195.11	70.55
23 09 23 53-0413 EA Well Insertion Temperature Sensor, With Stainless 4-1/2" Well (Johnson Controls TIGB1C0).....	168.98	39.19
23 09 23 53-0414 EA BACnet MS/TP Networked, Single Stage Thermostat (Johnson Controls TEC2601-2).....	481.16	18.37
23 09 23 53-0415 EA BACnet MS/TP Networked Two Outputs, Dehumidification Capability And Three Speed Fan Control Thermostat (Johnson Controls TEC2616-2).....	652.85	18.37
23 09 23 53-0416 EA BACnet MS/TP Networked Thermostats With Two Outputs (Johnson Controls TEC2627VVT-2).....	482.11	18.37
23 09 23 53-0417 EA BACnet MS/TP Zone Controller For Proportional Zone Damper, On/Off Or Proportional Reheat Control (Johnson Controls TEC2647Z-2).....	634.86	39.19
23 09 23 53-0418 EA BACnet Zone Controller With Occupancy Sensor For Proportional Zone Damper, On/Off Or Proportional Reheat Control (Johnson Controls TEC2647Z-2+PIR).....	783.45	39.19
23 09 23 53-0419 Melink Intelli-Hood IH3 Controls (23 09 23 53)		
23 09 23 53-0420 Kitchen Ventilation Controllers (23 09 23 53-0419)		
23 09 23 53-0421 EA Fully Programmable Kitchen Ventilation Controller (Melink Intelli-Hood 2SYS-3001).....	10,168.42	489.91
23 09 23 53-0422 EA Graphical User Interface (Melink Intelli-Hood 2KPD-3001).....	1,943.71	101.04

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0423	EA		Hood Controller (Melink Intelli-Hood 2SEN-3001) Note: 6 point field I/O device, RS-485 communication protocol, supports up to 4 field temperature sensors and 1 optic sensor system.	3,143.86	407.85
23 09 23 53-0424			Kitchen Ventilation Sensors (23 09 23 53-0419)		
23 09 23 53-0425	EA		Duct Mount Stainless Steel RTD (Melink Intelli-Hood 2SEN-3005-Q) Note: Includes UL listed mounting compression fitting, stainless steel probe protection sleeve, RJ-45 communication connector.	570.22	70.55
23 09 23 53-0426	EA		Optic Sensor System For Detection Of Cooking Effluent (Melink Intelli-Hood 2SEN-3004-28) Note: Includes air purge unit, infrared emitter/receiver with stainless steel housings. Auto-calibration, 0.2 second response time, conformal-coated circuit boards, purge pipe assembly complete with UL listed compression fittings, communication interface cables and blower box assembly.	4,917.74	391.93
23 09 23 53-0427			Siemens Controls (23 09 23 53)		
23 09 23 53-0428	EA		Concealed Temperature Set Point Adjustment, Electric Line Voltage Heating/Cooling Thermostat (Siemens 134-1083)	463.79	18.37
23 09 23 53-0429	EA		Exposed Temperature Set Point Adjustment, Electric Line Voltage Heating/Cooling Thermostat (Siemens 134-1085)	326.25	18.37
23 09 23 53-0430	EA		SPST/Manual Reset, 1" To 12" Set Point Range, Differential Static Pressure Airflow Switch (Siemens 141-0575).....	332.68	82.74
23 09 23 53-0431	EA		-0.5" To 0.5" WG, Low Differential Pressure Transmitter (Siemens 141-0591)	508.58	82.74
23 09 23 53-0432	EA		Spring Clip Mounting Kit For Thermostat (Siemens 182-685).....	78.67	12.25
23 09 23 53-0433	EA		Two Position, Pneumatic Circuit, RL243 Switching Relay (Siemens 243-0001)	262.88	122.48
23 09 23 53-0434	EA		3/4" Two Way, Normally Closed, 6.3 Cv, FxF, Brass Trim, Floating, Spring Return Actuator, Globe Valve And Actuator Assembly (Siemens 260-02012)	426.19	19.98
23 09 23 53-0435	EA		1" Three Way, 10 Cv, FxF, Stainless Steel Trim. Floating, Spring Return Actuator, Globe Valve And Actuator Assembly (Siemens 266-02079).....	751.44	36.27
23 09 23 53-0436	EA		1" Three Way, 10 Cv, FxF, Brass Trim, 0 To 10 Volt DC, 4 To 20 mA Electronic Spring Return Actuator, Globe Valve And Actuator Assembly (Siemens 274-03203)	1,522.73	36.27
23 09 23 53-0437	EA		1-1/4" Two Way, 16 Cv, FxF, Stainless Steel Trim, 0 To 10 Volt DC Electronic Spring Return Actuator, Globe Valve And Actuator Assembly (Siemens 298-03006)	1,283.80	45.95
23 09 23 53-0438	EA		36" Rigid Probe, 4 To 20 mA, 20 To 120 Degree F Range, Duct Averaging Sensor (Siemens 535-490-36).....	334.24	70.55
23 09 23 53-0439	EA		-58 To 122 Degree F Range, Outside Air Temperature Sensor (Siemens 536-768)	282.67	39.19
23 09 23 53-0440	EA		Unit Conditioner Controller With Secure Mode (Siemens 540-110C)	618.97	57.81
23 09 23 53-0441	EA		9-Pin, Female To RJ-11 Cable (Siemens 540-143)	112.85	6.12
23 09 23 53-0442	EA		Terminal Box Controller, Electronic Output, For Trane (Siemens 540-800).....	999.16	117.58
23 09 23 53-0443	EA		MMI Extension Cable (Siemens 545-712)	182.72	6.12
23 09 23 53-0444	EA		Remote Pressure Transmitter (Siemens 547-003)	1,497.30	39.19
23 09 23 53-0445	EA		Cooling Only, GDE, BACnet Actuating Terminal Equipment Controller (Siemens 550-400).....	916.87	29.39
23 09 23 53-0446	EA		BACnet Unit Conditioner Fan Coil Controller (Siemens 550-433).....	793.11	78.39
23 09 23 53-0447	EA		Door Lock And Key Assembly (Siemens 567-225)	43.36	24.49
23 09 23 53-0448	EA		Insight Advanced Software Package (Siemens 571-010-381-USB)	15,208.31	
			Note: Includes one user license and one sentinel key.		
23 09 23 53-0449	EA		BACnet Client Option For Insight Advanced Software Package (Siemens 571-188).....	529.97	
23 09 23 53-0450	EA		Soft Controller Option For Insight Advanced Software Package (Siemens 571-620)	3,341.69	
23 09 23 53-0451	EA		1" Steam, Normally Open, 10 Cv, Stainless Steel Trim, Class 250 Globe Valve (Siemens 599-03059).....	500.38	12.06
23 09 23 53-0452	EA		2" Steam, Normally Open, 40 Cv, Stainless Steel Trim, Class 250 Globe Valve (Siemens 599-03062).....	1,055.55	20.90
23 09 23 53-0453	EA		Firefinder XLS Driver, Modular Equipment Controller With RS-485 BLN, 8 DI, 8 DO, 8 AI, 8 AO, Point Expansion Support, HOA-Ready (Siemens 986-83481C).....	9,989.47	48.99
23 09 23 53-0454	EA		SiPass Driver, Modular Equipment Controller With RS-485 ALN, 8 DI, 8 DO, 8 AI, 8 AO, Point Expansion Support, Modem With HOA (Siemens 986-83482F)	11,770.12	48.99
23 09 23 53-0455	EA		7" x 13-7/16" x 3-3/4" Weather Shield (Siemens ASK75.3U).....	182.14	18.37
23 09 23 53-0456	EA		Two Position, 24 Volt AC/Volt DC, Standard Cabling, Dual Auxillary Switches, Electronic Damper Actuator With Spring Return (Siemens GMA126.1U).....	452.95	48.88
23 09 23 53-0457	EA		Modulating, 0 To 10 Volt DC, 24 Volt AC/Volt DC, Standard Cabling, Electronic Damper Actuator With Spring Return (Siemens GMA161.1U).....	483.83	48.88
23 09 23 53-0458	EA		License To Enable 4 TX-I/O Modules On The Island Bus And FLN Support On Models PXC36-E.A And PXC36-PE.A (Siemens LSM-36.A)	4,420.08	
23 09 23 53-0459	EA		License To Enable FLN Support On PXC-16 or PXC-24 "F" Models (Siemens LSM-FLN)	892.53	
23 09 23 53-0460	EA		License To Enable FLN Support On Models PXC36-E.A And PXC36-PE.A (Siemens LSM-FLN36.A)	2,872.53	
23 09 23 53-0461	EA		License To Enable BACnet Field Panel Web Server (PXC-36) Or Web Services (PXC-16/24) (Siemens LSM-FPWEB).....	2,056.33	
23 09 23 53-0462	EA		License To Enable 4 TX-I/O Modules On The Island Bus On Models PXC36-E.A And PXC36-PE.A (Siemens LSM-IB36.A)	1,767.72	
23 09 23 53-0463	EA		License To Enable SNMP Agent License To Enable SNMP Agent (Siemens LSM-SNMP)	5,226.18	
23 09 23 53-0464	EA		16-Switch HOA Upgrade Kit (Siemens PXA16-M).....	830.81	2.45
23 09 23 53-0465	EA		16-Switch HOA Upgrade Kit (Extended Temp. UL 916) With HMI Cable (Siemens PXA16-MR)	927.25	9.80
23 09 23 53-0466	EA		8-Switch HOA Upgrade Kit (Siemens PXA8-M).....	469.69	2.45
23 09 23 53-0467	EA		18" NEMA Type 1 Enclosure (Utility Cabinet) (Siemens PXA-ENC18).....	460.99	68.59
23 09 23 53-0468	EA		19" NEMA Type 1 Enclosure (Utility Cabinet) (Siemens PXA-ENC19).....	807.60	68.59
23 09 23 53-0469	EA		34" NEMA Type 1 Enclosure (Utility Cabinet) (Siemens PXA-ENC34).....	1,134.03	78.39
23 09 23 53-0470	EA		Serial Cable Required For HOA Or PXM10T/S Connection To Non-Rooftop Variants Of The 16-Point And 24-Point Compact Series (Siemens PXA-HMI.CABLEP5).....	41.20	12.25
23 09 23 53-0471	EA		115 Volt, 24 Volt AC, 50/60 Hertz, 192 VA PX Series Service Box (Siemens PXA-SB115V192VA).....	818.32	30.62
23 09 23 53-0472	EA		115 Volt, 24 Volt AC, 50/60 Hertz, 384 VA PX Series Service Box (Siemens PXA-SB115V384VA).....	1,314.32	30.62
23 09 23 53-0473	EA		230 Volt, 24 Volt AC, 50/60 Hertz, 192 VA PX Series Service Box (Siemens PXA-SB230V192VA).....	1,001.06	30.62
23 09 23 53-0474	EA		230 Volt, 24 Volt AC, 50/60 Hertz, 384 VA PX Series Service Box (Siemens PXA-SB230V384VA).....	1,523.18	30.62
23 09 23 53-0475	EA		PXC Modular, BACnet/IP Or MS/TP ALN, P1 Or MS/TP FLN, PXX-485.3 Is Also Required As The Connection To The FLN Devices (Siemens PXC00-E96.A).....	4,458.61	61.24
23 09 23 53-0476	EA		PXC Modular Series For BACnet Networks, TX-I/O Module, 96 Node (Siemens PXC100-E96.A).....	5,767.95	61.24
23 09 23 53-0477	EA		Peer To Peer, TX-I/O, 96 Node, APOGEE Automation System, Programmable Controller - Modular (Siemens PXC100-PE96.A).....	6,571.82	61.24

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0478 EA 16 Point, BACnet/IP ALN Compact Programmable Controller (Siemens PXC16.2-E.A)	1,805.14	61.24
23 09 23 53-0479 EA 16 Point, BACnet/IP ALN, P1 Or MS/TP FLN Compact Programmable Controller (Siemens PXC16.2-EF.A)	2,159.22	61.24
23 09 23 53-0480 EA 16 Point, MS/TP ALN Compact Programmable Controller (Siemens PXC16.2-M.A)	1,924.61	61.24
23 09 23 53-0481 EA 24 Point, BACnet/IP ALN Compact Programmable Controller (Siemens PXC24.2-E.A)	2,633.94	61.24
23 09 23 53-0482 EA 24 Point, BACnet/IP ALN, P1 Or MS/TP FLN Compact Programmable Controller (Siemens PXC24.2-EF.A)	2,878.43	61.24
23 09 23 53-0483 EA 24 Point, BACnet/IP ALN, Rooftop Compact Programmable Controller (Siemens PXC24.2-ER.A)	2,817.77	61.24
23 09 23 53-0484 EA 24 Point, BACnet/IP ALN, Rooftop, P1 Or MS/TP FLN Compact Programmable Controller (Siemens PXC24.2-ERF.A)	3,036.83	61.24
23 09 23 53-0485 EA 24 Point, MS/TP ALN Compact Programmable Controller (Siemens PXC24.2-M.A)	2,812.25	61.24
23 09 23 53-0486 EA 24 Point, MS/TP ALN, Rooftop Compact Programmable Controller (Siemens PXC24.2-MR.A)	3,035.34	61.24
23 09 23 53-0487 EA 36 Point, BACnet/IP Or MS/TP ALN Compact Programmable Controller (Siemens PXC36-E.A)	3,913.54	61.24
23 09 23 53-0488 EA 36 Point, BACnet/IP Or MS/TP ALN, Island Bus, P1 Or MS/TP FLN Compact Programmable Controller (Siemens PXC36-EF.A)	7,812.91	61.24
23 09 23 53-0489 EA License To Enable The Island Bus On PXC00-E96.A And PXC00-PE96.A (Siemens PXF-TXIO.A)	1,326.06	
23 09 23 53-0490 EA Controller Mounted Operator Display Module With Point Monitor And Optional Blue Backlight (Siemens PXM10S)	526.60	30.62
23 09 23 53-0491 EA Controller Mounted Operator Display Module (Siemens PXM10T)	383.41	30.62
23 09 23 53-0492 EA Provides FLN Support For The PXC Modular (Siemens PXX-485.3)	873.88	24.49
Note: Includes Three RS-485 P1 FLN Connections Or One MS/TP FLN Connection, Maximum Of 96 Devices Supported		
23 09 23 53-0493 EA Full Feature With Display, Override And Temperature Setpoint Adjustment, Room Temperature Sensor, 10K Ohm Type III Thermistor (Siemens QAA22SS.FWSN)	295.90	30.62
23 09 23 53-0494 EA Digital Temperature Room Unit for TEC, Sensing, Setpoint, Override, Display, No Logo (Siemens QAA2280.FWNC)	287.94	39.19
23 09 23 53-0495 EA 4" Platinum, 1,000 Ohm, 385 Alpha Probe, Immersion Temperature Sensor (Siemens QAE2012.010)	143.15	30.62
23 09 23 53-0496 EA 8" Platinum, 1,000 Ohm, 385 Alpha Probe, Duct Temperature Sensor (Siemens QAM2012.020)	106.54	30.62
23 09 23 53-0497 EA 24" Flexible Averaging Probe (Siemens QAM2012.750)	315.23	61.24
23 09 23 53-0498 EA 2 Meter Flexible Duct Temperature Sensor With Four Mounting Clamps (Siemens QAM2120.200)	201.32	45.92
23 09 23 53-0499 EA 10 HP, 240 Volt, NEMA 2 Variable Frequency Drive (Siemens SED2-7.5/22X)	3,551.11	394.62
23 09 23 53-0500 EA Two Sets, Address Keys 1 - 12, Accessory For TX-I/O Module (Siemens TXA1.K12)	37.45	12.25
23 09 23 53-0501 EA Labels For HOA And TX-I/O Modules (Siemens TXA1.LLT-P100)	0.87	
23 09 23 53-0502 EA 16 Digital Input Module (Siemens TXM1.16D)	656.64	12.25
23 09 23 53-0503 EA 6 Digital Output Relay Points, Manual Override, Digital Output Module (Siemens TXM1.6R-M)	994.47	12.25
23 09 23 53-0504 EA 8 Universal Points, Local Override/Identification, Digital Output Module (Siemens TXM1.8X-ML)	1,597.36	24.49
23 09 23 53-0505 EA 1.2 A, 4A Fuse, Power Supply (Siemens TXS1.12F4)	487.99	7.35
23 09 23 53-0506 Trane Controls (23 09 23 53)		
23 09 23 53-0507 Software (23 09 23 53-0506)		
Note: Excludes programming, set-up and commissioning of application.		
23 09 23 53-0508 EA Summit + Building Management Package (Trane 40201152)	7,548.62	
23 09 23 53-0509 EA Summit Current Version Software (Trane 40201111)	4,259.73	
23 09 23 53-0510 EA Summit Customer Upgrade Package, Currently V10-V16 To V17 (Trane 40201113)	1,030.93	
23 09 23 53-0511 EA Rover Service Software And Hardware, Complete Kit (Trane X1365150001)	4,233.92	
23 09 23 53-0512 EA Tracer SC With -X1365152401 - BACnet (2 Pack) (Trane BMSC000AAA011000)	11,714.77	
23 09 23 53-0513 EMCS Central Equipment And Controllers (23 09 23 53-0506)		
23 09 23 53-0514 EA Summit BTMX Operator Display Upgrade (Trane 40201224)	6,454.57	489.91
23 09 23 53-0515 EA Summit BTMX Retrofit Kit For BMTS And BMTW BCU (Trane 49500531)	14,821.43	489.91
23 09 23 53-0516 EA Summit BTMX Retrofit Kit For Tracer 100 (Trane 49500532)	14,821.43	489.91
23 09 23 53-0517 EA Summit BTMX, 120 Volt, (Trane BMTX-001-A-A-B0-00)	13,004.69	489.91
23 09 23 53-0518 EA Summit BTMX, 120 Volt, With Display (Trane BMTX-001-A-A-B0-10)	15,117.00	489.91
23 09 23 53-0519 EA Summit CCP Upgrade ROM Kit (Trane 40201095)	227.64	30.62
23 09 23 53-0520 EA Summit Comm5 Repeater (Trane 49500457)	1,755.11	244.95
23 09 23 53-0521 EA AHU Controller MP580/581 E Board Only (Trane 40201157)	2,995.87	306.19
23 09 23 53-0522 EA AHU Controller MP581 120 Volt AC With Enclosure And Display (Trane BMTM000AAC01)	3,847.20	367.43
23 09 23 53-0523 EA AHU Controller MP581 120 Volt AC With Enclosure, No Display (Trane BMTM000AAC00)	3,007.71	367.43
23 09 23 53-0524 EA AHU Controller MP581 Operator Door Display (Trane 40201156)	2,534.08	367.43
23 09 23 53-0525 EA AHU Controller MP581 Portable, Rugged, With Case (Trane 49500491)	2,531.41	367.43
23 09 23 53-0526 EA Controller MP503 I/O Module With Metal Enclosure (Trane 49500590)	1,147.56	122.48
23 09 23 53-0527 EA Controller MP503 I/O Module With Plastic Cover (Trane 49500490)	1,043.20	122.48
23 09 23 53-0528 EA Controller MP581 EX2 Expansion Module With Metal Enclosure (Trane 49500500)	1,877.80	244.95
23 09 23 53-0529 EA Controller MP581 EX2 Expansion Module With Plastic Cover (Trane 49500499)	1,791.26	244.95
23 09 23 53-0530 EA 2 Position, FCU Controller ZN511 Zone With Metal Enclosure (Trane 49500569)	1,004.98	122.48
23 09 23 53-0531 EA 2 Position, FCU Controller ZN511 Zone With Plastic Cover (Trane 4950-0469)	879.33	122.48
23 09 23 53-0532 EA 4 Position, FCU Controller ZN517 Zone With Metal Enclosure (Trane 49500596)	1,314.18	122.48
23 09 23 53-0533 EA 4 Position, FCU Controller ZN517 Zone With Plastic Cover (Trane 49500496)	1,189.20	122.48
23 09 23 53-0534 EA Modulating FCU Controller ZN520 Zone With Plastic Cover (Trane 4950049)	1,016.17	122.48
23 09 23 53-0535 EA Modulating FCU Controller ZN520 Zone With Plastic Cover (Trane 49500496)	968.16	122.48
23 09 23 53-0536 EA Modulating Tri ST FCU Controller ZN521 Zone With Metal Cover (Trane 49500570)	1,115.53	122.48
23 09 23 53-0537 EA Modulating Tri ST FCU Controller ZN521 Zone With Plastic Cover (Trane 49500470)	1,016.17	122.48
23 09 23 53-0538 EA DDC VAV Retrofit Kit (Trane VRTODD01)	1,404.95	244.95
23 09 23 53-0539 EA DDC VAV Retrofit Kit With Belimo Actuator (Trane VRTODD01BLMO)	1,528.54	244.95
23 09 23 53-0540 Network, VAV And Special Sensors (23 09 23 53-0506)		
23 09 23 53-0541 EA Digital Display Zone Sensor (Trane X13790464010)	240.36	39.19
23 09 23 53-0542 EA Single Setpoint Wall Mounted Zone Temperature Sensor (Trane X13511529010)	159.42	39.19
23 09 23 53-0543 EA Wall Mounted Zone Temperature-Only Sensor (Trane X13511528010)	145.76	39.19
23 09 23 53-0544 EA Ceiling Mount Zone Occupancy Sensor (Trane X13790421-01)	296.49	44.09
23 09 23 53-0545 EA Zone LCD O/C Setpoint, 3 Speed Fan (Trane 41901121)	178.08	39.19

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 23 Direct-Digital Control System for HVAC**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 09 23 53-0546	EA		Zone Sensor LCD O/C Setpoint (Trane 41901120).....	178.08	39.19
23 09 23 53-0547	EA		Duct CO2 Sensor, 0 To 2,000 ppm (Trane X13790423010).....	625.94	70.55
23 09 23 53-0548	EA		Room CO2 Sensor, 0 To 2,000 ppm (Trane X13790422010).....	574.85	39.19
23 09 23 53-0549	EA		Transformer 120/24 40 VA (Trane X13550284010).....	138.94	39.19
23 09 23 53-0550	EA		Transformer 24 Volt AC Wall Plug-In (Trane 35803005).....	134.06	39.19
23 09 23 53-0551	EA		Transformer UL Listed 120 Volt AC, 40 VA (Trane 35812022).....	126.26	39.19
23 09 23 53-0552	EA		Controller UC400 VAV Kit With Enclosure, And Belimo (Trane 5189454010).....	1,578.85	244.95
23 09 23 53-0553	EA		Controller UC400 VAV Kit With Enclosure, No Actuator (Trane 5189456010).....	1,512.18	244.95
23 09 23 53-0554	EA		Controller UC400 XM32 Module (4 Relay) (Trane X13651563010).....	1,373.05	244.95
23 09 23 53-0555	EA		Controller UC400 XM70 (8UI,6UI/AO,4R,1P) (Trane X13651568010).....	2,456.35	367.43
23 09 23 53-0556	EA		Controller UC400 XM30 I/O Module (4 UI/AO) (Trane X13651537010).....	1,373.05	244.95
23 09 23 53-0557	EA		Controller UC210 VAV With Belimo Actuator (Trane BMUC210AAA0B00011).....	1,443.62	244.95
23 09 23 53-0558	EA		Controller UC210 VAV Without Actuator (Trane BMUC210AAA0100011).....	1,449.11	244.95
23 09 23 53-0559	EA		Controller Optional Metal Enclosure, UC210 (Trane 501898).....	521.74	243.92
23 09 23 53-0560	EA		Controller UC400 PM014 24 Volt AC To 1.4 Amperes, 24 Volt DC (Trane X1365153801).....	756.61	243.92
23 09 23 53-0561	EA		Controller Tracer UC600 Controller (Trane BMUC600AAA0100011).....	2,751.84	367.43
23 09 23 53-0562	EA		Controller UC600 Tracer TD7 Display (Trane X13651571010).....	2,644.57	367.43
23 09 23 53-0563	EA		Controller UC600 TD7 Mounting Bracket (Trane X05010511010).....	163.32	48.81
23 09 23 53-0564	EA		Controller UC400 13" DIN Rail Enclosure, 120 Volt (Trane X13651559010).....	592.54	48.81
23 09 23 53-0565	EA		SC 24" DIN Rail Enclosure, 120 Volt (Trane X13651552010).....	2,818.15	367.43
23 09 23 53-0566	EA		BACnet Term (2 Pack) (Trane X1365152401).....	259.02	87.81
23 09 23 53-0567	EA		Tracer ES Add License (Trane X40250125010).....	3,377.58	
23 09 23 53-0568	EA		Kit - Tracer TU For Controls (Trane X4509151201).....	5,181.70	489.91
23 09 23 53-0569	EA		Kit - Tracer TU Complete (Trane X4509151301).....	6,816.14	489.91
23 09 23 53-0570	EA		Tracer TU Adapter Wired/Wireless (Trane X13651529010).....	672.50	87.81
23 09 23 53-0571	EA		Sensor Wireless Zone Sensor, Fahrenheit (Trane X13790492010).....	384.82	87.81
23 09 23 53-0572	EA		Sensor Wireless Display Sensor (Trane X13790822010).....	435.53	87.81
23 09 23 53-0573	EA		Sensor Wireless Receiver, 100mW (Trane X13790854010).....	389.69	87.81
23 09 23 53-0574	EA		Sensor Wireless Comm Interface (WCI) Indoor, 100mW (Trane X13790901010).....	529.99	87.81
23 09 23 53-0575	EA		Sensor Wireless Comm Interface (WCI) Outdoor, 100mW (Trane X13790941010).....	577.76	87.81

23 09 23 53-0576 Control Sensors, Meters, Relays, Power Supplies, Valves, Dampers And Actuators (23 09 23 53)**23 09 23 53-0577 Room Pressure Monitoring** (23 09 23 53-0576)

23 09 23 53-0578	EA		Hospital Room Pressure Monitor With Digital Interface Monitor, Through Wall Sensor Transformer And Plenum Rated Cable (TSI 8640-PM).....	3,442.37	61.10
23 09 23 53-0579	EA		Hospital Room Pressure Controller With Digital Interface Monitor, Through Wall Sensor Transformer And Plenum Rated Cable (TSI 8630-PC).....	5,559.35	61.10
			Note: Excludes dampers and actuators.		
23 09 23 53-0580	EA		Hospital Room Pressure Status Remote Visual Display (TSI 8694-4).....	433.66	36.66
23 09 23 53-0581	EA		Hospital Room Pressure Status Remote Negative/Neutral Key Switch (TSI 8694-7).....	501.22	36.66

23 09 23 53-0582 Current Switches And Current Sensors (23 09 23 53-0576)

23 09 23 53-0583	EA		Up To 20 Amperes, 0 To 5 Volt DC, Current Sensor (Senva C-1203).....	148.69	39.19
23 09 23 53-0584	EA		Up To 20 Amperes, 4-20mA, Current Sensor (Senva C-1205).....	154.54	39.19
23 09 23 53-0585	EA		0.5 To 135 Amperes Range, Split Core, VFD Current Switch (Senva C-2350VFD-L).....	240.36	39.19
23 09 23 53-0586	EA		0.15 To 100 Amperes Range, Split Core, Current Switch With NC Command Relay (Senva C-2300 And CR4-24).....	140.89	39.19
23 09 23 53-0587	EA		0 To 50/100/200 Amperes (Selectable), 4-20mA, 0 To 5 Volt DC, Split Core, DC Current Sensor (Veris H970HCA).....	439.30	39.19
23 09 23 53-0588	EA		0 To 20/40/80 Amperes (Selectable), 0-20mA, 0 To 5 Volt DC, Split Core, DC Current Sensor (Veris H970LCC).....	279.12	39.19
23 09 23 53-0589	EA		1 To 135 Amperes, N.O. Contact, 1 Ampere At 110 Volt, Current Switch (Veris H709).....	212.25	39.19
23 09 23 53-0590	EA		0 To 10/20/40 Amperes, 4-20mA Analog Output, Solid Core, Loop Powered, Current Switch (Veris H721).....	212.25	39.19
23 09 23 53-0591	EA		Energy Meter H8163 Series, With BACnet Output (Veris H8186-CB-BAC).....	5,758.81	195.97
23 09 23 53-0592	EA		100 Amperes, Modbus RTU, Power Transducer (Veris H8035-0100-2).....	1,464.63	39.19
			Note: 3 phase networked transducer.		
23 09 23 53-0593	EA		2,400 Amperes, Three Current Switches, Pulse Output, Phase Loss Alarm Output, Energy Meter (Veris H8163-2400-4-3).....	2,227.82	39.19
23 09 23 53-0594	EA		Up To 20 Amperes, 0-5 Volt DC, Current Transducer (Kele 4CTV).....	227.95	39.19
23 09 23 53-0595	EA		Solid Core Fixed Setpoint Digital Output Current Switch (Veris H-800).....	337.08	104.11
23 09 23 53-0596	EA		Split Core Fixed Setpoint Digital Output Current Switch (Veris H-900).....	337.55	104.11
23 09 23 53-0597	EA		Solid Core Adjustable Setpoint Digital Output Current Sensor (Veris H-708).....	360.95	104.11
23 09 23 53-0598	EA		Split Core Adjustable Setpoint Digital Output Current Sensor (Veris H-908).....	366.80	104.11
23 09 23 53-0599	EA		Solid And Split Core Adjustable Setpoint Digital Output VFD Current Switch (Veris H-904).....	399.96	104.11
23 09 23 53-0600	EA		Toggle Switch.....	137.31	48.99
23 09 23 53-0601	EA		Maintained Pushbutton Switch.....	146.87	48.99
23 09 23 53-0602	EA		Manual Time Switch.....	236.95	48.99
23 09 23 53-0603	EA		Emergency Stop Switch.....	398.03	48.99
23 09 23 53-0604	EA		Float Switch.....	380.61	48.99
23 09 23 53-0605	EA		Break Glass Switch.....	1,257.77	48.99
23 09 23 53-0606	EA		Boiler E-Stop Switch.....	765.46	48.99

23 09 23 53-0607 Relays (23 09 23 53-0576)

23 09 23 53-0608	EA		DPDT, 24 Volt AC, Blade, Standard Relay (Kele RH2B-UAC24V).....	122.36	39.19
23 09 23 53-0609	EA		SPDT, 24 Volt AC/Volt DC, 120 Volt AC Multi-Voltage Relay Module (Kele PAM-1).....	134.36	39.19
23 09 23 53-0610	EA		SPDT, 24 Volt AC/Volt DC, 120 Volt AC Power Relay (Kele RIB2401B).....	190.47	48.99
			Note: Box type.		
23 09 23 53-0611	EA		Motor Starter Interface, 300msec Pulse (Kele PIL-2).....	241.96	39.19
23 09 23 53-0612	EA		DP Relay Socket, DIN Rail Mounted (Kele SH2B-05).....	113.66	39.19



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 09 23 53-0613 EA SP Relay Socket, DIN Rail Mounted (Kele SH1B-05).....	111.91	39.19
23 09 23 53-0614 EA SPDT, 24 Volt AC, Blade, Standard Relay (Kele RH1B-UAC24V).....	122.36	39.19
23 09 23 53-0615 EA DPDT, 24 Volt AC, Blade, Indicator Light Relay (Kele RH2B-ULAC24V).....	127.84	39.19
23 09 23 53-0616 EA SPDT, 24 Volt AC, Blade, Indicator Light Relay (Kele RH1B-ULAC24V).....	129.34	39.19
23 09 23 53-0617 EA SPDT Pilot Relay, Universal (Kele RIBU1C).....	139.94	48.99
Note: Box type.		
23 09 23 53-0618 EA SPST Pilot Relay With HOA Switch (Kele RIBU1S).....	188.89	48.99
Note: Box type.		
23 09 23 53-0619 EA SPDT 3 Phase Line Voltage Monitor, .1-5 Minute Delay On Break Timer (ICM400).....	339.87	48.99
23 09 23 53-0620 EA SPDT 3-Phase Line Voltage Monitor, 0-10 Minute Delay On Break Timer (ICM450).....	337.71	48.99
23 09 23 53-0621 Transformers (23 09 23 53-0576)		
23 09 23 53-0622 EA 50 VA, 120/240/277/480-24 Volt AC, CB Foot And Single Hub Control Transformer (Veris X050CBA).....	147.40	39.19
23 09 23 53-0623 EA 75 VA, 120-24 Volt AC, CB Foot And Dual Hub Control Transformer (Veris X075CAB).....	161.02	39.19
23 09 23 53-0624 EA 75 VA, 120/208/240/480-24 Volt AC, CB Foot And Single Hub Control Transformer (Veris X075CBA).....	161.02	39.19
23 09 23 53-0625 EA 100 VA, 120-24 Volt AC, CB Foot And Dual Hub Control Transformer (Veris X100CAB).....	173.34	39.19
23 09 23 53-0626 EA 100 VA, 120/240/277/480-24 Volt AC, CB Foot And Single Hub Control Transformer (Veris X100CBA).....	180.93	39.19
23 09 23 53-0627 Power Supplies (23 09 23 53-0576)		
23 09 23 53-0628 EA Solid Core Current Operated Switch, Terminals, Adjustable Trip, 0.5-150A, SPST (Kele RIBXKTA).....	224.00	39.19
23 09 23 53-0629 EA AC/DC Power Supply, 1.2 Amperes At 24 Volt Output (Kele DCPA-1.2).....	261.77	39.19
23 09 23 53-0630 EA DC Power Supply, 5 Volt DC And 24 Volt DC Output (Kele DCP-524).....	244.75	39.19
23 09 23 53-0631 EA DC Power Supply, 24 Volt DC, DIN Rail Mounted (Kele DCP-250-D).....	252.80	39.19
23 09 23 53-0632 EA DC Power Supply, 24 Volt DC, Hub Mounted (Kele DCP-250-H).....	245.63	39.19
23 09 23 53-0633 EA DC Power Supply, 24 Volt DC, Panel Mounted (Kele DCP-250-P).....	257.64	39.19
23 09 23 53-0634 EA DC Power Supply, 24 Volt AC In To Custom DC Out, At 1.5 Amperes (Kele DCP-1.5-W-C).....	191.52	39.19
23 09 43 Pneumatic Control System For HVAC (23 09)		
23 09 43 00-0001 Pneumatic Tubing For HVAC Instrumentation and Control Devices (23 09 43)		
23 09 43 00-0002 Polyurethane Pneumatic Tubing (23 09 43 00-0001)		
23 09 43 00-0003 LF 1/4" Outside Diameter x 1/32" Thick Wall Polyurethane Pneumatic Tubing.....	2.46	0.95
23 09 43 00-0004 LF 5/32" Outside Diameter x 1/16" Thick Wall Polyurethane Pneumatic Tubing.....	3.14	0.98
23 09 43 00-0005 LF 3/8" Outside Diameter x 1/16" Thick Wall Polyurethane Pneumatic Tubing.....	4.13	1.01
23 09 43 00-0006 LF 1/2" Outside Diameter x 1/16" Thick Wall Polyurethane Pneumatic Tubing.....	5.25	1.04
23 09 43 00-0007 Fire Resistant Polyethylene Pneumatic Tubing (23 09 43 00-0001)		
23 09 43 00-0008 LF 1/4" Outside Diameter x .040" Thick Wall Fire Resistant Polyethylene Pneumatic Tubing.....	2.18	0.95
23 09 43 00-0009 LF 5/32" Outside Diameter x .030" Thick Wall Fire Resistant Polyethylene Pneumatic Tubing.....	2.35	0.98
23 09 43 00-0010 LF 3/8" Outside Diameter x .062" Thick Wall Fire Resistant Polyethylene Pneumatic Tubing.....	2.70	1.01
23 09 43 00-0011 LF 1/2" Outside Diameter x .062" Thick Wall Fire Resistant Polyethylene Pneumatic Tubing.....	3.38	1.04
23 09 43 00-0012 Nylon Pneumatic Tubing (23 09 43 00-0001)		
23 09 43 00-0013 LF 1/8" Outside Diameter x .016" Thick Wall Nylon Pneumatic Tubing.....	2.60	0.92
23 09 43 00-0014 LF 1/4" Outside Diameter x .035" Thick Wall Nylon Pneumatic Tubing.....	3.47	0.95
23 09 43 00-0015 LF 3/8" Outside Diameter x .050" Thick Wall Nylon Pneumatic Tubing.....	5.29	1.01
23 09 43 00-0016 LF 1/2" Outside Diameter x .062" Thick Wall Nylon Pneumatic Tubing.....	6.80	1.04
23 09 43 00-0017 Flexible Vinyl Pneumatic Tubing (23 09 43 00-0001)		
23 09 43 00-0018 LF 1/4" Outside Diameter Flexible Vinyl Pneumatic Tubing.....	2.54	0.95
23 09 43 00-0019 LF 3/8" Outside Diameter Flexible Vinyl Pneumatic Tubing.....	4.16	1.01
23 09 43 00-0020 LF 1/2" Outside Diameter Flexible Vinyl Pneumatic Tubing.....	5.02	1.04
23 09 43 00-0021 LF 5/8" Outside Diameter Flexible Vinyl Pneumatic Tubing.....	6.14	1.06
23 09 43 00-0022 LF 3/4" Outside Diameter Flexible Vinyl Pneumatic Tubing.....	6.96	1.09
23 09 43 00-0023 LF 1" Outside Diameter Flexible Vinyl Pneumatic Tubing.....	9.57	1.12
23 09 43 00-0024 Braided Vinyl Pneumatic Tubing (23 09 43 00-0001)		
23 09 43 00-0025 LF 5/8" Outside Diameter Braided Vinyl Pneumatic Tubing.....	3.46	1.06
23 09 43 00-0026 LF 3/4" Outside Diameter Braided Vinyl Pneumatic Tubing.....	4.04	1.09
23 09 43 00-0027 LF 1" Outside Diameter Braided Vinyl Pneumatic Tubing.....	5.07	1.12
23 09 43 00-0028 Copper Pneumatic Tubing (23 09 43 00-0001)		
23 09 43 00-0029 LF 1/4" Outside Diameter Copper Pneumatic Tubing.....	5.27	2.05
23 09 43 00-0030 LF 3/8" Outside Diameter Copper Pneumatic Tubing.....	6.43	2.36
23 09 43 00-0031 LF 1/2" Outside Diameter Copper Pneumatic Tubing.....	7.46	2.71
23 09 43 00-0032 LF 5/8" Outside Diameter Copper Pneumatic Tubing.....	9.23	3.12
23 09 43 00-0033 LF 3/4" Outside Diameter Copper Pneumatic Tubing.....	10.50	3.59
23 09 43 00-0034 Brass Couplings (23 09 43 00-0001)		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 09 Instrumentation and Control for HVAC****23 09 43 Pneumatic Control System For HVAC**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 09 43 00-0035	Straight Brass Couplings (23 09 43 00-0034)			
	Note: Barb x Barb			
23 09 43 00-0036	EA	1/4" x 1/4" Straight Brass Coupling	11.15	5.17
23 09 43 00-0037	EA	3/8" x 1/4" Straight Brass Coupling	11.29	5.17
23 09 43 00-0038	EA	3/8" x 3/8" Straight Brass Coupling	11.42	5.17
23 09 43 00-0039	Elbow Brass Couplings (23 09 43 00-0034)			
	Note: Barb x Barb			
23 09 43 00-0040	EA	1/4" x 1/4" Elbow Brass Coupling	11.90	5.17
23 09 43 00-0041	EA	3/8" x 3/8" Elbow Brass Coupling	12.35	5.17
23 09 43 00-0042	Tee Brass Couplings (23 09 43 00-0034)			
	Note: Barb x Barb			
23 09 43 00-0043	EA	1/4" x 1/4" x 1/4" Tee Brass Coupling	18.14	8.04
23 09 43 00-0044	EA	3/8" x 3/8" x 1/4" Tee Brass Coupling	20.91	8.61
23 09 43 00-0045	EA	3/8" x 3/8" x 3/8" Tee Brass Coupling	20.43	8.61

23 10 Facility Fuel Systems (23)**23 11 Facility Fuel Piping** (23 10)**23 11 23 Facility Natural-Gas Piping** (23 11)

See CSI section 23 21 13 23-0001 for threaded black steel pipe, 33 52 16 00-0000 for underground MDPE and HDPE pipe.

23 11 23 00-0001	Corrugated Stainless Steel Tubing (CSST), Flexible Gas Piping (23 11 23)			
23 11 23 00-0002	Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe (23 11 23 00-0001)			
	Note: Includes UV resistant polyethylene jacket. Excludes fittings and pipe hangers.			
23 11 23 00-0003	LF	3/8" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	6.27	2.01
23 11 23 00-0004	LF	1/2" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	6.90	2.18
23 11 23 00-0005	LF	3/4" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	8.29	2.36
23 11 23 00-0006	LF	1" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	10.48	2.50
23 11 23 00-0007	LF	1-1/4" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	12.37	2.62
23 11 23 00-0008	LF	1-1/2" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	18.86	2.73
23 11 23 00-0009	LF	2" Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	25.59	2.91
23 11 23 00-0010	Fittings And Accessories For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe (23 11 23 00-0001)			
23 11 23 00-0011	Male Adaptors For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe (23 11 23 00-0010)			
23 11 23 00-0012	EA	3/8" x 1/2", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	29.90	
23 11 23 00-0013	EA	3/8" x 3/8", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	29.90	
23 11 23 00-0014	EA	1/2" x 3/8", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	32.05	
23 11 23 00-0015	EA	1/2" x 1/2", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	32.05	
23 11 23 00-0016	EA	3/4" x 3/4", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	38.61	
23 11 23 00-0017	EA	1" x 3/4", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	53.30	
23 11 23 00-0018	EA	1" x 1", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	53.30	
23 11 23 00-0019	EA	1-1/4" x 1-1/4", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	90.89	
23 11 23 00-0020	EA	1-1/2" x 1-1/2", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	166.78	
23 11 23 00-0021	EA	2" x 2", (CSST x Threaded) Male Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	270.39	
23 11 23 00-0022	Female Adaptors For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe (23 11 23 00-0010)			
23 11 23 00-0023	EA	3/8" x 1/2", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	28.94	
23 11 23 00-0024	EA	1/2" x 1/2", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	32.05	
23 11 23 00-0025	EA	1/2" x 3/8", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	32.05	
23 11 23 00-0026	EA	3/4" x 3/4", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	38.61	
23 11 23 00-0027	EA	1" x 3/4", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	50.94	
23 11 23 00-0028	EA	1" x 1", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	50.94	
23 11 23 00-0029	EA	1" x 1", (CSST x Threaded) Female Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	50.94	
23 11 23 00-0030	Reducing Adaptors For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe (23 11 23 00-0010)			
23 11 23 00-0031	EA	3/4" x 1/2", (CSST x Threaded) Reducing Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	39.18	
23 11 23 00-0032	EA	1" x 3/4", (CSST x Threaded) Reducing Adaptor For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	51.80	



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 11 23 00-0033	Couplings For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0034	EA 3/8" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	40.35	
23 11 23 00-0035	EA 1/2" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	44.78	
23 11 23 00-0036	EA 3/4" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	56.32	
23 11 23 00-0037	EA 1" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	80.92	
23 11 23 00-0038	EA 1-1/4" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	151.95	
23 11 23 00-0039	EA 1-1/2" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	297.11	
23 11 23 00-0040	EA 2" Coupling For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	493.72	

23 11 23 00-0041	Tees For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0042	EA 1/2" Tee For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	55.74	
23 11 23 00-0043	EA 3/4" Tee For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	90.14	
23 11 23 00-0044	EA 1" Tee For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	143.22	
23 11 23 00-0045	EA 1-1/4" Tee For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	246.98	
23 11 23 00-0046	EA 1-1/2" Tee For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	295.58	
23 11 23 00-0047	EA 2" Tee For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	305.03	

23 11 23 00-0048	Indoor Termination Fittings For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0049	EA 3/8" x 1/2", (CSST x Threaded) Indoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	36.17	
23 11 23 00-0050	EA 1/2" x 1/2", (CSST x Threaded) Indoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	37.37	
23 11 23 00-0051	EA 3/4" x 3/4", (CSST x Threaded) Indoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	40.67	
23 11 23 00-0052	EA 1" x 3/4", (CSST x Threaded) Indoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	54.87	
23 11 23 00-0053	EA 1" x 1", (CSST x Threaded) Indoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	55.68	

23 11 23 00-0054	Outdoor Termination Fittings For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0055	EA 3/8" x 1/2", (CSST x Threaded) Outdoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	39.91	
23 11 23 00-0056	EA 1/2" x 1/2", (CSST x Threaded) Outdoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	40.96	
23 11 23 00-0057	EA 3/4" x 3/4", (CSST x Threaded) Outdoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	48.29	
23 11 23 00-0058	EA 1" x 3/4", (CSST x Threaded) Outdoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	57.00	
23 11 23 00-0059	EA 1" x 1", (CSST x Threaded) Outdoor Termination Fitting For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	57.00	

23 11 23 00-0060	Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0061	EA 3/8" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	61.89	
23 11 23 00-0062	EA 1/2" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	63.46	
23 11 23 00-0063	EA 3/4" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	66.61	
23 11 23 00-0064	EA 1" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	106.87	
23 11 23 00-0065	EA 1-1/4" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	110.98	
23 11 23 00-0066	EA 1-1/2" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	160.85	
23 11 23 00-0067	EA 2" Indoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	200.47	

23 11 23 00-0068	Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0069	EA 3/8" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	65.52	
23 11 23 00-0070	EA 1/2" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	67.03	
23 11 23 00-0071	EA 3/4" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	74.09	
23 11 23 00-0072	EA 1" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	135.46	
23 11 23 00-0073	EA 1-1/4" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	139.80	
23 11 23 00-0074	EA 1-1/2" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	192.99	
23 11 23 00-0075	EA 2" Outdoor Floor Flange Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe.....	244.00	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 11 Facility Fuel Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
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23 11 23 00-0076	Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0077	EA	1/2" Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	38.22
23 11 23 00-0078	EA	3/4" Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	41.29
23 11 23 00-0079	EA	1" Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	63.09
23 11 23 00-0080	EA	1-1/4" Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	97.49
23 11 23 00-0081	EA	1-1/2" Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	190.09
23 11 23 00-0082	EA	2" Indoor Bracket Termination Assembly For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	303.09
23 11 23 00-0083	Stub-Outs For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
	Note: Includes mounting plate.		
23 11 23 00-0084	EA	1/2" Appliance Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	32.95
23 11 23 00-0085	EA	3/4" Appliance Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	35.94
23 11 23 00-0086	EA	1/2" Fireplace Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	32.99
23 11 23 00-0087	EA	1/2" Meter Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	33.10
23 11 23 00-0088	EA	3/4" Meter Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	34.49
23 11 23 00-0089	EA	1" Meter Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	41.10
23 11 23 00-0090	EA	1-1/4" Meter Stub-Out For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	49.57
23 11 23 00-0091	Flush Mount Gas Valve Kits For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
	Note: Includes flush fitting plastic valve box and 90 degree brass shut-off valve.		
23 11 23 00-0092	EA	1/2" x 1/2", (CSST x Threaded) Flush Mount Gas Valve Kit For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	93.34
23 11 23 00-0093	EA	3/4" x 3/4", (CSST x Threaded) Flush Mount Gas Valve Kit For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	105.61
23 11 23 00-0094	Shut-Off Valves For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0095	EA	3/8" x 1/2", (CSST x Threaded) Shut-Off Valve For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	66.64
23 11 23 00-0096	EA	1/2" x 1/2", (CSST x Threaded) Shut-Off Valve For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	21.99
23 11 23 00-0097	EA	3/4" x 3/4", (CSST x Threaded) Shut-Off Valve For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	95.15
23 11 23 00-0098	EA	1" x 3/4", (CSST x Threaded) Shut-Off Valve For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	118.82
23 11 23 00-0099	Manifolds For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
	Note: Includes mounting hardware.		
23 11 23 00-0100	EA	1/2" Inlet, Three 1/2" Outlets, Manifold For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	81.92
23 11 23 00-0101	EA	3/4" Inlet, Three 1/2" Outlets, Manifold For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	92.83
23 11 23 00-0102	EA	1/2" Inlet, Four 1/2" Outlets, Manifold For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	77.49
23 11 23 00-0103	EA	3/4" Inlet, Four 1/2" Outlets, Manifold For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	96.71
23 11 23 00-0104	EA	2" x 1-1/2" Inlet, Four 1" Outlets, Manifold For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	182.89
23 11 23 00-0105	Pressure Regulators For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe <small>(23 11 23 00-0010)</small>		
23 11 23 00-0106	EA	1/2" Port, 250 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	86.75
23 11 23 00-0107	EA	1/2" Port, 355 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	86.75
23 11 23 00-0108	EA	1/2" Port, 425 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	122.53
23 11 23 00-0109	EA	3/4" Port, 550 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	131.34
23 11 23 00-0110	EA	3/4" Port, 810 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	131.34
23 11 23 00-0111	EA	1" Port, 550 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	148.96
23 11 23 00-0112	EA	1-1/4" Port, 1,000 MBTU Pressure Regulator For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	224.05
23 11 23 00-0113	EA	1/2" Port, 200 MBTU Pressure Regulator With Over Pressure Protection Device For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	116.20
23 11 23 00-0114	EA	3/4" Port, 425 MBTU Pressure Regulator With Over Pressure Protection Device For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	293.35
23 11 23 00-0115	EA	1-1/4" Port, 900 MBTU Pressure Regulator With Over Pressure Protection Device For Corrugated Stainless Steel Tubing (CSST), Flexible Gas Pipe	715.77
23 11 23 00-0116	Polymer Coated Stainless Steel, Flexible Gas Appliance Connectors (Brass Craft) <small>(23 11 23)</small>		
23 11 23 00-0117	3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0118	EA	12" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-12)	47.04
23 11 23 00-0119	EA	18" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-18)	51.78
23 11 23 00-0120	EA	24" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-24)	56.31
23 11 23 00-0121	EA	30" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-30)	59.15

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 11 23 00-0122 EA 36" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-36).....	62.77	17.97
23 11 23 00-0123 EA 48" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-48).....	71.03	19.03
23 11 23 00-0124 EA 60" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-60).....	78.52	19.03
23 11 23 00-0125 EA 72" Length, 3/4" MIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC11-72).....	85.93	20.09
23 11 23 00-0126 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0127 EA 12" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-12).....	47.04	15.86
23 11 23 00-0128 EA 18" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-18).....	51.78	16.91
23 11 23 00-0129 EA 24" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-24).....	56.31	16.91
23 11 23 00-0130 EA 30" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-30).....	59.15	17.97
23 11 23 00-0131 EA 36" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-36).....	62.77	17.97
23 11 23 00-0132 EA 48" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-48).....	71.03	19.03
23 11 23 00-0133 EA 60" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-60).....	78.52	19.03
23 11 23 00-0134 EA 72" Length, 3/4" MIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC14-72).....	85.93	20.09
23 11 23 00-0135 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0136 EA 12" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-12).....	47.04	15.86
23 11 23 00-0137 EA 18" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-18).....	51.78	16.91
23 11 23 00-0138 EA 24" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-24).....	56.31	16.91
23 11 23 00-0139 EA 30" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-30).....	59.15	17.97
23 11 23 00-0140 EA 36" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-36).....	62.77	17.97
23 11 23 00-0141 EA 48" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-48).....	71.03	19.03
23 11 23 00-0142 EA 60" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-60).....	78.52	19.03
23 11 23 00-0143 EA 72" Length, 3/4" MIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC15-72).....	85.93	20.09
23 11 23 00-0144 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0145 EA 12" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-12).....	47.04	15.86
23 11 23 00-0146 EA 18" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-18).....	51.78	16.91
23 11 23 00-0147 EA 24" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-24).....	67.95	16.91
23 11 23 00-0148 EA 30" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-30).....	59.15	17.97
23 11 23 00-0149 EA 36" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-36).....	62.77	17.97
23 11 23 00-0150 EA 48" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-48).....	71.03	19.03
23 11 23 00-0151 EA 60" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-60).....	78.52	19.03
23 11 23 00-0152 EA 72" Length, 3/4" FIP x 3/4" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC21-72).....	85.93	20.09
23 11 23 00-0153 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0154 EA 12" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-12).....	51.53	15.86
23 11 23 00-0155 EA 18" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-18).....	57.36	16.91
23 11 23 00-0156 EA 24" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-24).....	56.31	16.91
23 11 23 00-0157 EA 30" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-30).....	66.26	17.97
23 11 23 00-0158 EA 36" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-36).....	62.77	17.97

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 11 Facility Fuel Piping**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 11 23 00-0159	EA	48" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-48).....	71.03	19.03
23 11 23 00-0160	EA	60" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-60).....	78.52	19.03
23 11 23 00-0161	EA	72" Length, 3/4" FIP x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC22-72).....	85.93	20.09
23 11 23 00-0162		3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) (23 11 23 00-0116)		
23 11 23 00-0163	EA	12" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-12).....	47.04	15.86
23 11 23 00-0164	EA	24" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-24).....	62.90	16.91
23 11 23 00-0165	EA	30" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-30).....	59.15	17.97
23 11 23 00-0166	EA	36" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-36).....	62.77	17.97
23 11 23 00-0167	EA	48" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-48).....	71.03	19.03
23 11 23 00-0168	EA	60" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-60).....	90.38	19.03
23 11 23 00-0169	EA	72" Length, 3/4" FIP Elbow x 3/4" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC23-72).....	85.93	20.09
23 11 23 00-0170		3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) (23 11 23 00-0116)		
23 11 23 00-0171	EA	12" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-12).....	47.04	15.86
23 11 23 00-0172	EA	18" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-18).....	51.78	16.91
23 11 23 00-0173	EA	24" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-24).....	56.31	16.91
23 11 23 00-0174	EA	30" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-30).....	59.15	17.97
23 11 23 00-0175	EA	36" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-36).....	62.77	17.97
23 11 23 00-0176	EA	48" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-48).....	71.03	19.03
23 11 23 00-0177	EA	60" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-60).....	78.52	19.03
23 11 23 00-0178	EA	72" Length, 3/4" FIP x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC24-72).....	85.93	20.09
23 11 23 00-0179		3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) (23 11 23 00-0116)		
23 11 23 00-0180	EA	12" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-12).....	47.04	15.86
23 11 23 00-0181	EA	18" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-18).....	51.78	16.91
23 11 23 00-0182	EA	24" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-24).....	56.31	16.91
23 11 23 00-0183	EA	30" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-30).....	59.15	17.97
23 11 23 00-0184	EA	36" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-36).....	62.77	17.97
23 11 23 00-0185	EA	48" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-48).....	71.03	19.03
23 11 23 00-0186	EA	60" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-60).....	78.52	19.03
23 11 23 00-0187	EA	72" Length, 3/4" FIP x 1/2" FIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC25-72).....	85.93	20.09
23 11 23 00-0188		3/4" FIP Elbow x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) (23 11 23 00-0116)		
23 11 23 00-0189	EA	18" Length, 3/4" FIP Elbow x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC34-18).....	57.36	16.91
23 11 23 00-0190	EA	24" Length, 3/4" FIP Elbow x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC34-24).....	56.31	16.91
23 11 23 00-0191	EA	30" Length, 3/4" FIP Elbow x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC34-30).....	66.26	17.97
23 11 23 00-0192	EA	36" Length, 3/4" FIP Elbow x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC34-36).....	70.64	17.97
23 11 23 00-0193	EA	48" Length, 3/4" FIP Elbow x 1/2" MIP, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC34-48).....	81.01	19.03

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 11 Facility Fuel Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 11 23 00-0230			3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0231	EA		12" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-12).....	73.59	21.15
23 11 23 00-0232	EA		18" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-18).....	78.30	22.20
23 11 23 00-0233	EA		24" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-24).....	82.84	22.20
23 11 23 00-0234	EA		30" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-30).....	85.65	23.26
23 11 23 00-0235	EA		36" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-36).....	89.42	23.26
23 11 23 00-0236	EA		48" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-48).....	97.19	24.32
23 11 23 00-0237	EA		60" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-60).....	105.32	24.32
23 11 23 00-0238	EA		72" Length, 3/4" FIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2J-72).....	112.75	25.38
23 11 23 00-0239			3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0240	EA		12" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-12).....	73.59	21.15
23 11 23 00-0241	EA		18" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-18).....	78.30	22.20
23 11 23 00-0242	EA		24" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-24).....	82.84	22.20
23 11 23 00-0243	EA		30" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-30).....	85.65	23.26
23 11 23 00-0244	EA		36" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-36).....	89.42	23.26
23 11 23 00-0245	EA		48" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-48).....	97.19	24.32
23 11 23 00-0246	EA		60" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-60).....	105.32	24.32
23 11 23 00-0247	EA		72" Length, 3/4" MIP x 3/4" FIP Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-72).....	112.75	25.38
23 11 23 00-0248			3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0249	EA		12" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-12).....	86.58	21.15
23 11 23 00-0250	EA		18" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-18).....	91.29	22.20
23 11 23 00-0251	EA		24" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-24).....	95.83	22.20
23 11 23 00-0252	EA		30" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-30).....	98.64	23.26
23 11 23 00-0253	EA		36" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-36).....	102.43	23.26
23 11 23 00-0254	EA		48" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-48).....	110.18	24.32
23 11 23 00-0255	EA		60" Length, 3/4" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4J-60).....	118.32	24.32
23 11 23 00-0256			3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0257	EA		12" Length, 3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2P-12).....	86.58	21.15
23 11 23 00-0258	EA		18" Length, 3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2P-18).....	91.29	22.20
23 11 23 00-0259	EA		24" Length, 3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2P-24).....	95.83	22.20
23 11 23 00-0260	EA		36" Length, 3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2P-36).....	102.43	23.26
23 11 23 00-0261	EA		48" Length, 3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2P-48).....	110.18	24.32
23 11 23 00-0262	EA		60" Length, 3/4" FIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC2P-60).....	118.32	24.32
23 11 23 00-0263			1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0264	EA		12" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-12).....	86.58	21.15
23 11 23 00-0265	EA		18" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-18).....	91.29	22.20

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 11 23 00-0266 EA 24" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-24).....	95.83	22.20
23 11 23 00-0267 EA 30" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-30).....	98.64	23.26
23 11 23 00-0268 EA 36" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-36).....	102.43	23.26
23 11 23 00-0269 EA 48" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-48).....	110.18	24.32
23 11 23 00-0270 EA 60" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-60).....	118.32	24.32
23 11 23 00-0271 EA 72" Length, 1/2" MIP x 3/4" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4P-72).....	125.74	25.38
23 11 23 00-0272 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0273 EA 12" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-12).....	70.17	21.15
23 11 23 00-0274 EA 18" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-18).....	74.90	22.20
23 11 23 00-0275 EA 24" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-24).....	79.46	22.20
23 11 23 00-0276 EA 30" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-30).....	82.24	23.26
23 11 23 00-0277 EA 36" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-36).....	86.01	23.26
23 11 23 00-0278 EA 48" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-48).....	93.76	24.32
23 11 23 00-0279 EA 72" Length, 1/2" MIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC4K-72).....	109.29	25.38
23 11 23 00-0280 1/2" FIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft) <small>(23 11 23 00-0116)</small>		
23 11 23 00-0281 EA 18" Length, 1/2" FIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC5K-18).....	84.14	22.20
23 11 23 00-0282 EA 24" Length, 1/2" FIP x 1/2" FIP Angle Ball Valve, 1/2" Diameter, Polymer Coated Stainless Steel, Flexible Gas Appliance Connector (Brass Craft CSSC5K-24).....	89.72	22.20
23 11 23 00-0283 Quarter-Turn, Gas Ball Valve <small>(23 11 23)</small>		
23 11 23 00-0284 EA 3/8" FIP x FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top™ T-3000 102-102).....	42.64	11.25
23 11 23 00-0285 EA 1/2" FIP x FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-103).....	42.67	11.48
23 11 23 00-0286 EA 3/4" FIP x FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-104).....	61.62	12.63
23 11 23 00-0287 EA 3/8" Flare x 1/2" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-112).....	42.25	11.25
23 11 23 00-0288 EA 1/2" Flare x 1/2" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-113).....	44.54	11.48
23 11 23 00-0289 EA 1/2" Flare x 3/4" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-118).....	50.04	11.48
23 11 23 00-0290 EA 5/8" Flare x 1/2" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-121).....	54.13	12.05
23 11 23 00-0291 EA 5/8" (7/8" -14) Flare x 3/4" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-114).....	56.93	12.05
23 11 23 00-0292 EA 5/8" (15/16" -16) Flare x 3/4" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-115).....	56.93	12.05
23 11 23 00-0293 EA 3/8" Flare x Flare, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-312).....	44.34	11.25
23 11 23 00-0294 EA 1/2" Flare x Flare, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-313).....	46.63	11.48
23 11 23 00-0295 EA 5/8" Flare x Flare, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-314).....	58.40	12.05
23 11 23 00-0296 EA 1/2" FIP x 1/8" Texas Pattern, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-413).....	46.91	11.48
23 11 23 00-0297 EA 3/4" FIP x 1/8" Texas Pattern, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-414).....	63.20	12.63
23 11 23 00-0298 EA 3/8" (9/16" -24) Flare x 1/2" FIP, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3000 102-119).....	44.23	11.25
23 11 23 00-0299 EA 3/8" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-612).....	41.97	11.25
23 11 23 00-0300 EA 1/2" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-613).....	42.66	11.48
23 11 23 00-0301 EA 3/4" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-614).....	58.60	12.63
23 11 23 00-0302 EA 1" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-615).....	79.89	14.35
23 11 23 00-0303 EA 1-1/4" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-616).....	115.12	14.92
23 11 23 00-0304 EA 1-1/2" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-617).....	136.99	17.22
23 11 23 00-0305 EA 2" T-Handle, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3001 102-618).....	169.38	20.66
23 11 23 00-0306 EA 1/2" Flathead, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3002 102-713).....	43.87	11.48
23 11 23 00-0307 EA 3/4" Flathead, 175 PSI, Forged Brass, Quarter-Turn, Gas Ball Valve (Legend Blue Top T-3002 102-714).....	58.23	12.63
23 11 23 00-0308 Gas Stops <small>(23 11 23)</small>		
23 11 23 00-0309 Brass/Bronze Gas Stops <small>(23 11 23 00-0308)</small>		
Note: Flat or square head		
23 11 23 00-0310 EA 3/8" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	54.03	11.48
23 11 23 00-0311 EA 1/2" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	53.90	11.48
23 11 23 00-0312 EA 3/4" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	70.62	12.63
23 11 23 00-0313 EA 1" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	100.29	14.35
23 11 23 00-0314 EA 1-1/4" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	133.82	15.28
23 11 23 00-0315 EA 1-1/2" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	169.44	17.68

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 11 Facility Fuel Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 11 23 00-0316	EA	2" Threaded, Flat Head, Bronze Gas Valve (A.Y. McDonald 10596).....	236.87	20.89
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23 11 23 00-0317 Iron Body Gas Stops (23 11 23 00-0308)

23 11 23 00-0318	EA	1/2" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	73.98	11.48
23 11 23 00-0319	EA	3/4" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	90.37	12.63
23 11 23 00-0320	EA	1" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	112.20	14.35
23 11 23 00-0321	EA	1-1/4" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	145.39	15.28
23 11 23 00-0322	EA	1-1/2" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	183.98	17.68
23 11 23 00-0323	EA	2" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	240.17	20.89
23 11 23 00-0324	EA	2-1/2" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	472.33	28.23
23 11 23 00-0325	EA	3" Threaded, Bronze Flat Head Plug, Iron Body Gas Valve (A.Y. McDonald 10685B).....	636.67	32.78

23 11 23 00-0326 Bronze Body Solenoid Valves, 150 PSI Gas (23 11 23)

23 11 23 00-0327	EA	1/4" Solenoid Valve, Bronze, 150 PSI, Gas.....	195.77	11.48
23 11 23 00-0328	EA	1/2" Solenoid Valve, Bronze, 150 PSI, Gas.....	228.46	11.48
23 11 23 00-0329	EA	3/4" Solenoid Valve, Bronze, 150 PSI, Gas.....	290.64	12.63
23 11 23 00-0330	EA	1" Solenoid Valve, Bronze, 150 PSI, Gas.....	437.47	14.35
23 11 23 00-0331	EA	1-1/2" Solenoid Valve, Bronze, 150 PSI, Gas.....	784.39	17.68
23 11 23 00-0332	EA	2" Solenoid Valve, Bronze, 150 PSI, Gas.....	1,339.79	20.89
23 11 23 00-0333	EA	2-1/2" Solenoid Valve, Bronze, 150 PSI, Gas.....	1,658.65	28.23
23 11 23 00-0334	EA	3" Solenoid Valve, Bronze, 150 PSI, Gas.....	2,504.40	32.78

23 12 Facility Fuel Pumps (23 12)**23 12 13 Facility Fuel-Oil Pumps (23 12)****23 12 13 00-0001 Cast Iron Internal Gear Rotary Pump (23 12 13)**

Note: Heavy duty type with relief valve, 1150 RPM drip-proof motor, common base plate. For viscosity to 20 centipoise; diesel oil, and light oil.

23 12 13 00-0002 10 GPM 1" Discharge (23 12 13 00-0001)

23 12 13 00-0003	EA	10 GPM Cast Iron Rotary Pump, 20 PSI 1/2 HP With 1" Discharge.....	1,471.67	306.79
23 12 13 00-0004	EA	10 GPM Cast Iron Rotary Pump, 40 PSI 3/4 HP With 1" Discharge.....	1,546.65	371.32
23 12 13 00-0005	EA	10 GPM Cast Iron Rotary Pump, 60 PSI 1 HP With 1" Discharge.....	1,695.14	441.15

23 12 13 00-0006 25 GPM 1-1/4" Discharge (23 12 13 00-0001)

23 12 13 00-0007	EA	25 GPM Cast Iron Rotary Pump, 20 PSI 1 HP With 1-1/4" Discharge.....	1,591.78	306.79
23 12 13 00-0008	EA	25 GPM Cast Iron Rotary Pump, 40 PSI 1.5 HP With 1-1/4" Discharge.....	1,677.28	371.32
23 12 13 00-0009	EA	25 GPM Cast Iron Rotary Pump, 60 PSI 2 HP With 1-1/4" Discharge.....	1,762.60	441.15

23 12 13 00-0010 Pump, Fuel Oil, 2 Stage 3450 RPM 100 PSI (23 12 13)

23 12 13 00-0011	EA	1/4 HP Pump Fuel Oil/Diesel.....	1,108.67	171.91
23 12 13 00-0012	EA	1/3 HP Pump Fuel Oil/Diesel.....	1,301.73	192.54
23 12 13 00-0013	EA	1/2 HP Pump Fuel Oil/Diesel.....	1,424.22	215.81
23 12 13 00-0014	EA	3/4 HP Pump Fuel Oil/Diesel.....	1,555.18	243.32
23 12 13 00-0015	EA	1 HP Pump Fuel Oil/Diesel.....	2,174.54	270.83
23 12 13 00-0016	EA	1-1/2 HP Pump Fuel Oil/Diesel.....	2,654.48	303.09
23 12 13 00-0017	EA	2 HP Pump Fuel Oil/Diesel.....	2,942.36	339.59
23 12 13 00-0018	EA	3 HP Pump Fuel Oil/Diesel.....	3,581.34	379.79
23 12 13 00-0019	EA	5 HP Pump Fuel Oil/Diesel.....	4,217.62	425.81
23 12 13 00-0020	EA	7.5 HP Pump Fuel Oil/Diesel.....	4,722.36	477.65
23 12 13 00-0021	EA	10 HP Pump Fuel Oil/Diesel.....	5,294.56	535.41

23 12 23 Facility Natural-Gas Pumps (23 12)**23 12 23 00-0001 Natural Gas Booster Pump (23 12 23)**

23 12 23 00-0002	EA	Natural Gas Booster Pump, 3/4" Outlet Size.....	1,205.21	158.69
23 12 23 00-0003	EA	Natural Gas Booster Pump, 1" Outlet Size.....	1,431.46	177.20
23 12 23 00-0004	EA	Natural Gas Booster Pump, 1-1/4" Outlet Size.....	1,607.40	185.14
23 12 23 00-0005	EA	Natural Gas Booster Pump, 1-1/2" Outlet Size.....	1,827.00	193.07
23 12 23 00-0006	EA	Natural Gas Booster Pump, 2" Outlet Size.....	2,070.47	198.36

23 13 Facility Fuel-Storage Tanks (23 13)**23 13 13 Facility Underground Fuel-Oil, Storage Tanks (23 13)****23 13 13 13 Double-Wall Steel, Underground Fuel-Oil, Storage Tanks (23 13 13)****23 13 13 13-0001 Coated Underground Double Wall Storage Tanks (23 13 13 13)**

Note: Includes setting in place with hold down bars and manway and 4" NPT connections as follows: up to 1000 gallon, 4 each: all others 6 each. Excludes excavation, pad, plastic lining, pumps and piping.

23 13 13 13-0002	EA	250 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars.....	16,775.73	743.26
23 13 13 13-0003	EA	550 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars.....	18,131.00	743.26
23 13 13 13-0004	EA	1,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars.....	26,215.87	929.02
23 13 13 13-0005	EA	2,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars.....	35,844.02	1,814.58

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 13 13 13-0006	EA		3,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	57,133.57	2,332.91
23 13 13 13-0007	EA		4,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	63,639.86	2,679.42
23 13 13 13-0008	EA		5,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	68,628.07	3,542.75
23 13 13 13-0009	EA		6,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	70,951.91	3,803.75
23 13 13 13-0010	EA		8,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	86,611.06	4,493.65
23 13 13 13-0011	EA		10,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	100,310.03	5,183.10
23 13 13 13-0012	EA		12,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	128,420.00	5,699.81
23 13 13 13-0013	EA		14,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	152,221.32	6,920.48
23 13 13 13-0014	EA		15,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	157,212.94	7,344.42
23 13 13 13-0015	EA		20,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	192,613.40	11,649.78
23 13 13 13-0016	EA		25,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	236,627.83	15,106.91
23 13 13 13-0017	EA		30,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	278,857.80	17,285.06
23 13 13 13-0018	EA		40,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	359,047.98	18,581.44
23 13 13 13-0019	EA		48,000 Gallon Underground Double Wall Steel Storage Tank, Coated, In Place With Hold Down Bars	487,082.35	19,057.93

23 13 13 23 Glass-Fiber-Reinforced-Plastic, Underground Fuel-Oil, Storage Tanks (23 13 13)

23 13 13 23-0001 Underground Fiberglass Storage Tanks (23 13 13 23)

23 13 13 23-0002 Single Wall Fiberglass Underground Storage Tanks (23 13 13 23-0001)

Note: Includes setting in place with hold down bars, fittings, bumper pads, flow channels, monitoring fitting, tank bottom deflector gauge plates, manway, anchor straps and 4" NPT tank mounted fitting connections as follows: 550 gallon or 1,000 gallon, 4 each: all others 6 each. Excludes excavation and backfill.

23 13 13 23-0003	EA		550 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	4,318.99	743.26
23 13 13 23-0004	EA		1,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	5,425.64	929.02
23 13 13 23-0005	EA		2,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	7,054.13	1,149.46
23 13 13 23-0006	EA		2,500 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	8,003.64	1,400.09
23 13 13 23-0007	EA		3,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	8,949.46	1,642.08
23 13 13 23-0008	EA		4,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	10,874.59	2,160.63
23 13 13 23-0009	EA		5,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	12,907.68	3,284.17
23 13 13 23-0010	EA		6,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	14,565.10	4,148.42
23 13 13 23-0011	EA		8,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	17,497.03	4,666.96
23 13 13 23-0012	EA		10,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	19,672.64	5,531.22
23 13 13 23-0013	EA		12,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	25,390.62	6,568.32
23 13 13 23-0014	EA		15,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	31,201.46	8,210.40
23 13 13 23-0015	EA		20,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	39,347.13	10,976.01
23 13 13 23-0016	EA		25,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	58,994.27	13,655.20
23 13 13 23-0017	EA		30,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	72,343.32	16,420.81
23 13 13 23-0018	EA		40,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	103,232.51	23,766.96
23 13 13 23-0019	EA		50,000 Gallon Single Wall Fiberglass Tank Including Fittings And Anchor Straps	147,261.45	30,248.85

23 13 13 23-0020 Double Wall Fiberglass Underground Storage Tanks (23 13 13 23-0001)

Note: Includes setting in place with hold down bars, fittings, bumper pads, flow channels, monitoring fitting, tank bottom deflector gauge plates, manway, anchor straps and 4" NPT tank mounted fitting connections as follows: 550 gallon or 1,000 gallon, 4 each: all others 6 each. Excludes excavation and backfill.

23 13 13 23-0021	EA		550 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	8,380.53	743.26
23 13 13 23-0022	EA		1,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	11,049.36	929.02
23 13 13 23-0023	EA		2,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	13,247.25	1,123.52
23 13 13 23-0024	EA		3,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	17,210.81	1,642.19
23 13 13 23-0025	EA		4,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	19,308.05	2,160.63
23 13 13 23-0026	EA		5,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	22,178.76	3,284.17
23 13 13 23-0027	EA		6,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	24,662.30	4,148.42
23 13 13 23-0028	EA		8,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	30,348.02	4,666.96
23 13 13 23-0029	EA		10,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	32,523.64	5,531.22
23 13 13 23-0030	EA		12,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	39,389.02	6,568.32
23 13 13 23-0031	EA		15,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	54,207.03	8,210.40
23 13 13 23-0032	EA		20,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	67,114.45	10,976.01
23 13 13 23-0033	EA		30,000 Gallon Double Wall Fiberglass Tank Including Fittings And Anchor Straps	103,782.36	16,420.81

23 13 13 23-0034 Underground Storage Tank Pump Enclosures (23 13 13 23)

23 13 13 23-0035	EA		Secondary Containment Collar	4,219.37	
23 13 13 23-0036	EA		Turbine Enclosure With Lid 4' Long x 42" Diameter	4,219.37	
23 13 13 23-0037	EA		Fitting Kit For Turbine Enclosure	843.87	
23 13 13 23-0038	EA		Grommet Kits For Plumbing And Electrical	1,687.75	
23 13 13 23-0039	EA		Turbine Electrical Coupling Kit	2,109.68	

23 13 23 Facility Aboveground Fuel-Oil, Storage Tanks (23 13)

23 13 23 13 Vertical, Steel, Aboveground Fuel-Oil, Storage Tanks (23 13 23)

23 13 23 13-0001 Vertical Rectangular Double Wall Steel Fuel Day Tank (23 13 23 13)

Note: Includes day tank with standard equipment, pump, pump control, level control, backup level control, level alarms, alarm outputs.

23 13 23 13-0002	EA		10 Gallon Double Wall Steel Day Tank (Tramont TRX)	1,177.75	137.84
			Note: Includes rust-inhibitor coated interior and gray painted exterior.		
23 13 23 13-0003	EA		15 Gallon Double Wall Steel Day Tank (Tramont TRX)	1,264.67	144.73
			Note: Includes rust-inhibitor coated interior and gray painted exterior.		
23 13 23 13-0004	EA		25 Gallon Double Wall Steel Day Tank (Tramont TRX)	1,372.76	155.07
			Note: Includes rust-inhibitor coated interior and gray painted exterior.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 13 Facility Fuel-Storage Tanks**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 13 23 13-0005 EA 50 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	1,576.84	165.41
23 13 23 13-0006 EA 60 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	1,758.06	172.30
23 13 23 13-0007 EA 75 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	2,072.63	206.76
23 13 23 13-0008 EA 100 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	2,788.36	241.22
23 13 23 13-0009 EA 150 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	3,528.10	275.67
23 13 23 13-0010 EA 200 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	4,524.97	310.13
23 13 23 13-0011 EA 275 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	5,043.55	344.60
23 13 23 13-0012 EA 300 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	5,772.15	413.52
23 13 23 13-0013 EA 350 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	6,466.46	482.43
23 13 23 13-0014 EA 400 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	7,181.33	551.36
23 13 23 13-0015 EA 450 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	7,969.07	585.82
23 13 23 13-0016 EA 500 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	8,761.94	620.27
23 13 23 13-0017 EA 550 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	9,662.82	654.73
23 13 23 13-0018 EA 600 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	10,450.56	689.19
23 13 23 13-0019 EA 700 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	11,640.31	827.03
23 13 23 13-0020 EA 800 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	12,555.76	895.95
23 13 23 13-0021 EA 900 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	13,781.51	1,033.79
23 13 23 13-0022 EA 1,000 Gallon Double Wall Steel Day Tank (Tramont TRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	15,012.40	1,171.63
23 13 23 13-0023 EA 10 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	1,428.04	137.84
23 13 23 13-0024 EA 15 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	1,516.67	144.73
23 13 23 13-0025 EA 25 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	1,624.76	155.07
23 13 23 13-0026 EA 50 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	1,827.13	165.41
23 13 23 13-0027 EA 60 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	2,008.35	172.30
23 13 23 13-0028 EA 75 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	2,324.64	206.76
23 13 23 13-0029 EA 100 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	3,064.37	241.22
23 13 23 13-0030 EA 150 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	3,804.11	275.67
23 13 23 13-0031 EA 200 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	4,800.98	310.13
23 13 23 13-0032 EA 275 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	5,319.56	344.60
23 13 23 13-0033 EA 300 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	6,048.15	413.52
23 13 23 13-0034 EA 350 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	6,742.46	482.43
23 13 23 13-0035 EA 400 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	7,457.34	551.36
23 13 23 13-0036 EA 450 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	8,245.08	585.82
23 13 23 13-0037 EA 500 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	9,037.95	620.27
23 13 23 13-0038 EA 550 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	9,940.54	654.73
23 13 23 13-0039 EA 600 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	10,728.28	689.19
23 13 23 13-0040 EA 700 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	11,916.31	827.03
23 13 23 13-0041 EA 800 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	12,831.76	895.95
23 13 23 13-0042 EA 900 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	14,057.51	1,033.79
23 13 23 13-0043 EA 1,000 Gallon Double Wall Steel Day Tank (Tramont UTRX)..... Note: Includes rust-inhibitor coated interior and gray painted exterior.	15,288.41	1,171.63
23 13 23 13-0044 EA 10 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE)..... Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	2,376.06	137.84
23 13 23 13-0045 EA 15 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE)..... Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	2,454.41	144.73
23 13 23 13-0046 EA 25 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE)..... Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	2,524.78	155.07



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23	13	23	13-0047	EA 50 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	2,795.72	165.41
23	13	23	13-0048	EA 60 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	2,898.08	172.30
23	13	23	13-0049	EA 75 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	3,202.37	206.76
23	13	23	13-0050	EA 100 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	3,854.67	241.22
23	13	23	13-0051	EA 150 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	4,865.27	275.67
23	13	23	13-0052	EA 200 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	5,471.27	310.13
23	13	23	13-0053	EA 275 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	7,152.17	344.60
23	13	23	13-0054	EA 300 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	8,083.05	413.52
23	13	23	13-0055	EA 350 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	8,643.65	482.43
23	13	23	13-0056	EA 400 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	9,406.52	551.36
23	13	23	13-0057	EA 450 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	10,158.26	585.82
23	13	23	13-0058	EA 500 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	11,149.99	620.27
23	13	23	13-0059	EA 550 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	11,562.29	654.73
23	13	23	13-0060	EA 600 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	11,931.73	689.19
23	13	23	13-0061	EA 700 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	13,647.78	827.03
23	13	23	13-0062	EA 800 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	15,312.38	895.95
23	13	23	13-0063	EA 900 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	17,131.29	1,033.79
23	13	23	13-0064	EA 1,000 Gallon Double Wall Steel Day Tank With Pump (Tramont TRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	18,979.34	1,171.63
23	13	23	13-0065	EA 10 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	3,507.51	137.84
23	13	23	13-0066	EA 15 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	3,585.86	144.73
23	13	23	13-0067	EA 25 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	3,656.23	155.07
23	13	23	13-0068	EA 50 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	3,927.17	165.41
23	13	23	13-0069	EA 60 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	4,029.53	172.30
23	13	23	13-0070	EA 75 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	4,333.82	206.76
23	13	23	13-0071	EA 100 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	4,986.12	241.22
23	13	23	13-0072	EA 150 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	5,996.72	275.67
23	13	23	13-0073	EA 200 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	6,678.16	310.13
23	13	23	13-0074	EA 275 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	7,889.32	344.60
23	13	23	13-0075	EA 300 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	8,820.21	413.52
23	13	23	13-0076	EA 350 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	9,382.52	482.43
23	13	23	13-0077	EA 400 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	10,143.68	551.36
23	13	23	13-0078	EA 450 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	10,897.13	585.82
23	13	23	13-0079	EA 500 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	11,887.15	620.27
23	13	23	13-0080	EA 550 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	12,299.44	654.73
23	13	23	13-0081	EA 600 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	12,668.89	689.19
23	13	23	13-0082	EA 700 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	14,384.94	827.03
23	13	23	13-0083	EA 800 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	16,051.26	895.95
23	13	23	13-0084	EA 900 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	17,868.45	1,033.79
23	13	23	13-0085	EA 1,000 Gallon Double Wall Steel Day Tank With Pump (Tramont UTRE) Note: Includes pump, motor control float switch, rust-inhibitor coated interior and gray painted exterior.	19,716.49	1,171.63
23	13	23	13-0086	EA 10 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	4,140.09	137.84
23	13	23	13-0087	EA 15 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	4,227.01	144.73

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 13 Facility Fuel-Storage Tanks**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 13 23 13-0088 EA 25 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	4,299.10	155.07
23 13 23 13-0089 EA 50 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	4,578.61	165.41
23 13 23 13-0090 EA 60 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	4,728.97	172.30
23 13 23 13-0091 EA 75 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,005.84	206.76
23 13 23 13-0092 EA 100 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,683.85	241.22
23 13 23 13-0093 EA 150 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	6,742.45	275.67
23 13 23 13-0094 EA 200 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	7,370.74	310.13
23 13 23 13-0095 EA 275 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	9,116.78	344.60
23 13 23 13-0096 EA 300 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	10,095.66	413.52
23 13 23 13-0097 EA 350 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	10,603.11	482.43
23 13 23 13-0098 EA 400 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	11,468.85	551.36
23 13 23 13-0099 EA 450 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	12,378.30	585.82
23 13 23 13-0100 EA 500 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	13,292.89	620.27
23 13 23 13-0101 EA 550 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	13,754.90	654.73
23 13 23 13-0102 EA 600 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	14,098.63	689.19
23 13 23 13-0103 EA 700 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	15,891.82	827.03
23 13 23 13-0104 EA 800 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	17,637.00	895.95
23 13 23 13-0105 EA 900 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	19,536.48	1,033.79
23 13 23 13-0106 EA 1,000 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont TRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	21,461.67	1,171.63
23 13 23 13-0107 EA 10 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,271.55	137.84
23 13 23 13-0108 EA 15 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,358.47	144.73
23 13 23 13-0109 EA 25 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,430.55	155.07
23 13 23 13-0110 EA 50 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,710.06	165.41
23 13 23 13-0111 EA 60 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	5,860.42	172.30
23 13 23 13-0112 EA 75 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	6,133.86	206.76
23 13 23 13-0113 EA 100 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	6,815.30	241.22
23 13 23 13-0114 EA 150 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	7,873.90	275.67
23 13 23 13-0115 EA 200 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS)..... Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	8,502.19	310.13



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 13 23 13-0116 EA 275 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	9,853.93	344.60
23 13 23 13-0117 EA 300 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	10,832.82	413.52
23 13 23 13-0118 EA 350 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	11,511.70	482.43
23 13 23 13-0119 EA 400 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	12,206.00	551.36
23 13 23 13-0120 EA 450 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	13,115.46	585.82
23 13 23 13-0121 EA 500 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	14,030.05	620.27
23 13 23 13-0122 EA 550 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	14,492.06	654.73
23 13 23 13-0123 EA 600 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	14,837.51	689.19
23 13 23 13-0124 EA 700 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	16,628.98	827.03
23 13 23 13-0125 EA 800 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	18,374.16	895.95
23 13 23 13-0126 EA 900 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	20,273.64	1,033.79
23 13 23 13-0127 EA 1,000 Gallon Double Wall Steel Day Tank With Pump And Control Module (Tramont UTRS) Note: Includes pump, motor control float switch, electronic control module, rust-inhibitor coated interior and gray painted exterior.	22,198.83	1,171.63
23 13 23 13-0128 EA 150% Containment Double Wall Open Top Basin For 10 Gallon Tank.....	1,166.57	137.84
23 13 23 13-0129 EA 150% Containment Double Wall Open Top Basin For 15 Gallon Tank.....	1,264.05	144.73
23 13 23 13-0130 EA 150% Containment Double Wall Open Top Basin For 25 Gallon Tank.....	1,371.80	155.07
23 13 23 13-0131 EA 150% Containment Double Wall Open Top Basin For 50 Gallon Tank.....	1,567.79	165.41
23 13 23 13-0132 EA 150% Containment Double Wall Open Top Basin For 60 Gallon Tank.....	2,083.91	172.30
23 13 23 13-0133 EA 150% Containment Double Wall Open Top Basin For 75 Gallon Tank.....	2,141.34	206.76
23 13 23 13-0134 EA 150% Containment Double Wall Open Top Basin For 100 Gallon Tank.....	2,692.09	241.22
23 13 23 13-0135 EA 150% Containment Double Wall Open Top Basin For 150 Gallon Tank.....	3,331.09	275.67
23 13 23 13-0136 EA 150% Containment Double Wall Open Top Basin For 200 Gallon Tank.....	4,375.14	310.13
23 13 23 13-0137 EA 150% Containment Double Wall Open Top Basin For 275 Gallon Tank.....	5,496.13	344.60
23 13 23 13-0138 EA 150% Containment Double Wall Open Top Basin For 300 Gallon Tank.....	6,597.63	413.52
23 13 23 13-0139 EA 150% Containment Double Wall Open Top Basin For 350 Gallon Tank.....	7,090.40	482.43
23 13 23 13-0140 EA 150% Containment Double Wall Open Top Basin For 400 Gallon Tank.....	7,585.43	551.36
23 13 23 13-0141 EA 150% Containment Double Wall Open Top Basin For 450 Gallon Tank.....	8,328.53	585.82
23 13 23 13-0142 EA 150% Containment Double Wall Open Top Basin For 500 Gallon Tank.....	9,073.88	620.27
23 13 23 13-0143 EA 150% Containment Double Wall Open Top Basin For 550 Gallon Tank.....	9,721.95	654.73
23 13 23 13-0144 EA 150% Containment Double Wall Open Top Basin For 600 Gallon Tank.....	10,376.78	689.19
23 13 23 13-0145 EA 150% Containment Double Wall Open Top Basin For 700 Gallon Tank.....	11,742.48	827.03
23 13 23 13-0146 EA 150% Containment Double Wall Open Top Basin For 800 Gallon Tank.....	13,034.05	895.95
23 13 23 13-0147 EA 150% Containment Double Wall Open Top Basin For 900 Gallon Tank.....	14,476.70	1,033.79
23 13 23 13-0148 EA 150% Containment Double Wall Open Top Basin For 1,000 Gallon Tank.....	15,869.56	1,171.63
23 13 23 13-0149 EA 200% Containment Double Wall Open Top Basin For 10 Gallon Tank.....	1,230.11	144.73
23 13 23 13-0150 EA 200% Containment Double Wall Open Top Basin For 15 Gallon Tank.....	1,338.11	155.07
23 13 23 13-0151 EA 200% Containment Double Wall Open Top Basin For 25 Gallon Tank.....	1,450.87	165.41
23 13 23 13-0152 EA 200% Containment Double Wall Open Top Basin For 50 Gallon Tank.....	1,651.07	172.30
23 13 23 13-0153 EA 200% Containment Double Wall Open Top Basin For 60 Gallon Tank.....	2,241.16	206.76
23 13 23 13-0154 EA 200% Containment Double Wall Open Top Basin For 75 Gallon Tank.....	2,298.59	241.22
23 13 23 13-0155 EA 200% Containment Double Wall Open Top Basin For 100 Gallon Tank.....	2,876.75	275.67
23 13 23 13-0156 EA 200% Containment Double Wall Open Top Basin For 150 Gallon Tank.....	3,548.05	310.13
23 13 23 13-0157 EA 200% Containment Double Wall Open Top Basin For 200 Gallon Tank.....	4,646.92	344.60
23 13 23 13-0158 EA 200% Containment Double Wall Open Top Basin For 275 Gallon Tank.....	5,827.01	379.06
23 13 23 13-0159 EA 200% Containment Double Wall Open Top Basin For 300 Gallon Tank.....	6,983.30	447.97
23 13 23 13-0160 EA 200% Containment Double Wall Open Top Basin For 350 Gallon Tank.....	7,497.07	516.89
23 13 23 13-0161 EA 200% Containment Double Wall Open Top Basin For 400 Gallon Tank.....	8,013.23	585.82
23 13 23 13-0162 EA 200% Containment Double Wall Open Top Basin For 450 Gallon Tank.....	8,794.41	620.27
23 13 23 13-0163 EA 200% Containment Double Wall Open Top Basin For 500 Gallon Tank.....	9,577.98	654.73
23 13 23 13-0164 EA 200% Containment Double Wall Open Top Basin For 550 Gallon Tank.....	10,258.87	689.19
23 13 23 13-0165 EA 200% Containment Double Wall Open Top Basin For 600 Gallon Tank.....	11,004.31	758.12
23 13 23 13-0166 EA 200% Containment Double Wall Open Top Basin For 700 Gallon Tank.....	12,433.13	895.95
23 13 23 13-0167 EA 200% Containment Double Wall Open Top Basin For 800 Gallon Tank.....	13,904.94	1,033.79
23 13 23 13-0168 EA 200% Containment Double Wall Open Top Basin For 900 Gallon Tank.....	15,414.97	1,171.63
23 13 23 13-0169 EA 200% Containment Double Wall Open Top Basin For 1,000 Gallon Tank.....	16,872.46	1,309.46
23 13 23 13-0170 EA 150% Containment Double Wall Sealed Top Basin For 10 Gallon Tank.....	1,345.34	137.84
23 13 23 13-0171 EA 150% Containment Double Wall Sealed Top Basin For 15 Gallon Tank.....	1,465.45	144.73
23 13 23 13-0172 EA 150% Containment Double Wall Sealed Top Basin For 25 Gallon Tank.....	1,586.77	155.07
23 13 23 13-0173 EA 150% Containment Double Wall Sealed Top Basin For 50 Gallon Tank.....	1,828.02	165.41
23 13 23 13-0174 EA 150% Containment Double Wall Sealed Top Basin For 60 Gallon Tank.....	2,441.45	172.30

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 10 Facility Fuel Systems****23 13 Facility Fuel-Storage Tanks**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 13 23 13-0175	EA	150%	Containment Double Wall Sealed Top Basin For 75 Gallon Tank	2,498.88	206.76
23 13 23 13-0176	EA	150%	Containment Double Wall Sealed Top Basin For 100 Gallon Tank	3,131.09	241.22
23 13 23 13-0177	EA	150%	Containment Double Wall Sealed Top Basin For 150 Gallon Tank	3,876.45	275.67
23 13 23 13-0178	EA	150%	Containment Double Wall Sealed Top Basin For 200 Gallon Tank	5,105.44	310.13
23 13 23 13-0179	EA	150%	Containment Double Wall Sealed Top Basin For 275 Gallon Tank	6,482.76	344.60
23 13 23 13-0180	EA	150%	Containment Double Wall Sealed Top Basin For 300 Gallon Tank	7,785.65	413.52
23 13 23 13-0181	EA	150%	Containment Double Wall Sealed Top Basin For 350 Gallon Tank	8,348.58	482.43
23 13 23 13-0182	EA	150%	Containment Double Wall Sealed Top Basin For 400 Gallon Tank	8,916.02	551.36
23 13 23 13-0183	EA	150%	Containment Double Wall Sealed Top Basin For 450 Gallon Tank	9,801.68	585.82
23 13 23 13-0184	EA	150%	Containment Double Wall Sealed Top Basin For 500 Gallon Tank	10,689.59	620.27
23 13 23 13-0185	EA	150%	Containment Double Wall Sealed Top Basin For 550 Gallon Tank	11,444.00	654.73
23 13 23 13-0186	EA	150%	Containment Double Wall Sealed Top Basin For 600 Gallon Tank	12,216.52	689.19
23 13 23 13-0187	EA	150%	Containment Double Wall Sealed Top Basin For 700 Gallon Tank	13,819.83	827.03
23 13 23 13-0188	EA	150%	Containment Double Wall Sealed Top Basin For 800 Gallon Tank	15,351.26	895.95
23 13 23 13-0189	EA	150%	Containment Double Wall Sealed Top Basin For 900 Gallon Tank	17,031.51	1,033.79
23 13 23 13-0190	EA	150%	Containment Double Wall Sealed Top Basin For 1,000 Gallon Tank	18,661.98	1,171.63
23 13 23 13-0191	EA	200%	Containment Double Wall Sealed Top Basin For 10 Gallon Tank	1,418.81	144.73
23 13 23 13-0192	EA	200%	Containment Double Wall Sealed Top Basin For 15 Gallon Tank	1,550.69	155.07
23 13 23 13-0193	EA	200%	Containment Double Wall Sealed Top Basin For 25 Gallon Tank	1,677.79	165.41
23 13 23 13-0194	EA	200%	Containment Double Wall Sealed Top Basin For 50 Gallon Tank	1,925.76	172.30
23 13 23 13-0195	EA	200%	Containment Double Wall Sealed Top Basin For 60 Gallon Tank	2,618.57	206.76
23 13 23 13-0196	EA	200%	Containment Double Wall Sealed Top Basin For 75 Gallon Tank	2,676.00	241.22
23 13 23 13-0197	EA	200%	Containment Double Wall Sealed Top Basin For 100 Gallon Tank	3,340.14	275.67
23 13 23 13-0198	EA	200%	Containment Double Wall Sealed Top Basin For 150 Gallon Tank	4,123.71	310.13
23 13 23 13-0199	EA	200%	Containment Double Wall Sealed Top Basin For 200 Gallon Tank	5,417.79	344.60
23 13 23 13-0200	EA	200%	Containment Double Wall Sealed Top Basin For 275 Gallon Tank	6,868.44	379.06
23 13 23 13-0201	EA	200%	Containment Double Wall Sealed Top Basin For 300 Gallon Tank	8,237.33	447.97
23 13 23 13-0202	EA	200%	Containment Double Wall Sealed Top Basin For 350 Gallon Tank	8,825.15	516.89
23 13 23 13-0203	EA	200%	Containment Double Wall Sealed Top Basin For 400 Gallon Tank	9,417.74	585.82
23 13 23 13-0204	EA	200%	Containment Double Wall Sealed Top Basin For 450 Gallon Tank	10,349.40	620.27
23 13 23 13-0205	EA	200%	Containment Double Wall Sealed Top Basin For 500 Gallon Tank	11,283.46	654.73
23 13 23 13-0206	EA	200%	Containment Double Wall Sealed Top Basin For 550 Gallon Tank	12,076.59	689.19
23 13 23 13-0207	EA	200%	Containment Double Wall Sealed Top Basin For 600 Gallon Tank	12,946.26	758.12
23 13 23 13-0208	EA	200%	Containment Double Wall Sealed Top Basin For 700 Gallon Tank	14,625.88	895.95
23 13 23 13-0209	EA	200%	Containment Double Wall Sealed Top Basin For 800 Gallon Tank	16,350.88	1,033.79
23 13 23 13-0210	EA	200%	Containment Double Wall Sealed Top Basin For 900 Gallon Tank	18,111.72	1,171.63
23 13 23 13-0211	EA	200%	Containment Double Wall Sealed Top Basin For 1,000 Gallon Tank	19,820.01	1,309.46

23 13 23 16 Horizontal, Steel, Aboveground Fuel-Oil, Storage Tanks (23 13 23)**23 13 23 16-0001****Single Wall Aboveground Storage Tanks (23 13 23 16)**

Note: Includes cradles, supports, coating, fittings, and 4" NPT connections as follows: up to 1000 gallon, 4 each; all others 6 each. Excludes pumps, piping, pad, foundation excavation and backfill.

23 13 23 16-0002	EA	300	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	5,081.19	749.15
23 13 23 16-0003	EA	550	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	6,107.94	906.86
23 13 23 16-0004	EA	1,000	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	8,256.17	1,262.69
23 13 23 16-0005	EA	1,500	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	10,677.42	1,578.35
23 13 23 16-0006	EA	2,000	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	12,801.63	2,123.64
23 13 23 16-0007	EA	3,000	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	19,386.99	2,186.10
23 13 23 16-0008	EA	5,000	Gallon, Steel Storage Tank, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	28,224.61	2,702.81
23 13 23 16-0009	EA	8,000	Gallon, Steel Storage Tank, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	38,809.83	3,096.91
23 13 23 16-0010	EA	10,000	Gallon, Steel Storage Tank, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	46,281.91	3,378.42
23 13 23 16-0011	EA	12,000	Gallon, Steel Storage Tank, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	53,741.80	3,716.29
23 13 23 16-0012	EA	15,000	Gallon, Steel Storage Tank, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	59,491.25	4,129.17
23 13 23 16-0013	EA	20,000	Gallon, Steel Storage Tank, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	74,297.56	5,308.93
23 13 23 16-0014	EA	30,000	Gallon, Steel Storage Tank, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	101,580.15	6,193.81

23 13 23 16-0015**Double Wall Aboveground Storage Tanks (23 13 23 16)**

Note: Includes cradles, supports, coating, fittings, and 4" NPT connections as follows: up to 1000 gallon, 4 each; all others 6 each. Excludes pumps, piping, pad, foundation excavation and backfill.

23 13 23 16-0016	EA	300	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	8,082.63	934.78
23 13 23 16-0017	EA	550	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	9,711.71	1,131.20
23 13 23 16-0018	EA	1,000	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	12,946.43	1,578.35
23 13 23 16-0019	EA	1,500	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	16,986.72	1,972.94
23 13 23 16-0020	EA	2,000	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	21,826.85	2,654.52
23 13 23 16-0021	EA	3,000	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	31,170.06	2,732.53
23 13 23 16-0022	EA	5,000	Gallon, Steel Storage Tank, Double Wall, With 3/16" Shell, Aboveground With Supports, Coating And Fittings	45,646.20	3,366.21
23 13 23 16-0023	EA	8,000	Gallon, Steel Storage Tank, Double Wall, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	63,155.62	3,871.16
23 13 23 16-0024	EA	10,000	Gallon, Steel Storage Tank, Double Wall, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	75,501.46	4,223.08
23 13 23 16-0025	EA	12,000	Gallon, Steel Storage Tank, Double Wall, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	87,793.50	4,645.30
23 13 23 16-0026	EA	15,000	Gallon, Steel Storage Tank, Double Wall, With 1/4" Shell, Aboveground With Supports, Coating And Fittings	97,176.83	5,161.55



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 13 23 16-0027	EA			20,000 Gallon, Steel Storage Tank, Double Wall, With 1/4" Shell, Aboveground With Supports, Coating And Fittings.....	121,272.31	6,636.19
23 13 23 16-0028	EA			30,000 Gallon, Steel Storage Tank, Double Wall, With 1/4" Shell, Aboveground With Supports, Coating And Fittings.....	166,435.11	7,742.20
23 13 23 16-0029 Horizontal Rectangular Double Wall Aboveground Fuel Day Tanks (23 13 23 16)						
Note: Includes solenoid valve. Excludes piping and concrete pad.						
23 13 23 16-0030	EA			550 Gallon, Double Wall, Aboveground Horizontal Fuel Storage Tank	15,780.40	1,131.20
23 13 23 16-0031	EA			750 Gallon, Double Wall, Aboveground Horizontal Fuel Storage Tank	16,687.33	1,302.14
23 13 23 16-0032	EA			1,000 Gallon, Double Wall, Aboveground Horizontal Fuel Storage Tank	18,745.10	1,578.35
23 13 23 16-0033	EA			1,500 Gallon, Double Wall, Aboveground Horizontal Fuel Storage Tank	22,423.56	1,972.94
23 13 23 16-0034	EA			2,000 Gallon, Double Wall, Aboveground Horizontal Fuel Storage Tank	28,695.41	2,654.52
Note: Includes 2" solenoid valve.						
23 13 23 26 Concrete-Vaulted, Steel, Aboveground Fuel-Oil, Storage Tanks (23 13 23)						
23 13 23 26-0001 Aboveground Concrete Vaulted Storage Tanks (23 13 23 26)						
Note: Includes setting in place with stand, NPT openings for an emergency vent, regular vent, gauge, fill with an internal 5 gallon minimum overfill containment, supply and return and leak detection. All tanks that are 2000 gallon and larger shall have a ladder for access. Excludes excavation, pad, pumps and piping.						
23 13 23 26-0002	EA			500 Gallon Concrete Vaulted Storage Tank	36,504.01	1,607.39
For Low Profile Tanks, Add					13,704.46	
23 13 23 26-0003	EA			1,000 Gallon Concrete Vaulted Storage Tank	46,055.59	1,814.58
For Low Profile Tanks, Add					17,409.44	
23 13 23 26-0004	EA			2,000 Gallon Concrete Vaulted Storage Tank	82,119.88	2,160.63
For Low Profile Tanks, Add					31,642.02	
23 13 23 26-0005	EA			4,000 Gallon Concrete Vaulted Storage Tank	129,596.23	4,752.35
23 13 23 26-0006	EA			5,000 Gallon Concrete Vaulted Storage Tank	148,167.26	5,190.36
23 13 23 26-0007	EA			6,000 Gallon Concrete Vaulted Storage Tank	166,829.03	5,605.20
23 13 23 26-0008	EA			8,000 Gallon Concrete Vaulted Storage Tank	185,468.29	6,082.38
23 13 23 26-0009	EA			10,000 Gallon Concrete Vaulted Storage Tank	204,100.14	6,474.41
23 13 33 Facility Fuel-Oil, Storage Tank Accessories (23 13)						
23 13 33 00-0001 EPA Requirements (23 13 33)						
23 13 33 00-0002	EA			Fill Pipe Spill Containment Manhole (5 Gallon)	2,510.32	
23 13 33 00-0003	EA			Over-Fill Prevention Valve	1,420.20	
23 13 33 00-0004	EA			Tank Manway With Cover, Fiberglass	5,191.34	
23 13 33 00-0005	EA			Tank Manway With Cover, Steel.....	6,474.21	
23 13 33 00-0006	EA			Vent Fill Alarm (Whistle Vent).....	229.88	
23 13 33 00-0007	EA			Reservoir Sensor, Liquid Level	754.26	
23 13 33 00-0008	EA			Manhole Spill Containment.....	2,776.38	268.09
23 13 33 00-0009	EA			Fill Adapter, 4"	480.66	178.77
23 13 33 00-0010	EA			Fill Cap, 4"	340.61	67.03
23 13 33 00-0011	EA			2" Vent Cap	194.23	44.72
23 13 33 00-0012	EA			4" x 2" Extractor Fitting	856.14	67.03
23 13 33 00-0013	EA			Float Vent Valve	408.33	134.05
23 13 33 00-0014	EA			Vapor Hose Adapter	760.49	89.33
23 13 33 00-0015	EA			Dust Cap.....	304.05	48.79
23 13 33 00-0016	EA			1" Double Poppet Foot Valve.....	466.58	76.57
23 13 33 00-0017	EA			10' Wood Gage Stick	43.31	
23 13 33 00-0018	EA			1-1/4" Tank Filled Breather, NPT.....	313.19	
23 13 33 00-0019	EA			1-1/2" Tank Filled Breather, Bayonet.....	440.57	
23 13 33 00-0020	EA			2" Cast Iron Combination Fill Cap And Vent.....	93.09	
23 13 33 00-0021	EA			3" Cast Iron Combination Fill Cap And Vent.....	128.19	
23 13 33 00-0022	EA			4" Cast Iron Combination Fill Cap And Vent.....	206.14	
23 13 33 00-0023	EA			Pressure And Vacuum Control Vent.....	2,120.14	
23 13 33 00-0024	EA			1/4 HP Fuel/Diesel Pump Set.....	1,886.83	
23 13 33 00-0025	EA			1/3 HP Fuel/Diesel Pump Set.....	2,235.08	
23 13 33 00-0026	EA			1/2 HP Fuel/Diesel Pump Set.....	2,434.39	
23 13 33 00-0027	EA			3/4 HP Fuel/Diesel Pump Set.....	2,667.13	
23 13 33 00-0028	EA			1 HP Fuel/Diesel Pump Set.....	3,837.49	
23 13 33 00-0029	EA			1-1/2 HP Fuel/Diesel Pump Set.....	4,747.05	
23 13 33 00-0030	EA			2 HP Fuel/Diesel Pump Set.....	5,254.39	
23 13 33 00-0031	EA			3 HP Fuel/Diesel Pump Set.....	6,467.97	
23 13 33 00-0032	EA			5 HP Fuel/Diesel Pump Set.....	7,663.25	
23 13 33 00-0033	EA			7.5 HP Fuel/Diesel Pump Set.....	8,577.91	
23 13 33 00-0034	EA			10 HP Fuel/Diesel Pump Set.....	9,911.64	
23 13 33 00-0035 Tank Bulkhead Fittings (23 13 33)						
23 13 33 00-0036 Tank Bulkhead Fittings (23 13 33 00-0035)						
23 13 33 00-0037 Polyvinyl Chloride (PVC) Tank Bulkhead Fittings, Socket x Threaded Connection (23 13 33 00-0036)						
23 13 33 00-0038	EA			1/2" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	66.54	
23 13 33 00-0039	EA			3/4" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	74.58	
23 13 33 00-0040	EA			1" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	82.05	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 10 Facility Fuel Systems

23 13 Facility Fuel-Storage Tanks



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 13 33 00-0041	EA		1-1/4" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	101.56	
23 13 33 00-0042	EA		1-1/2" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	103.85	
23 13 33 00-0043	EA		2" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	142.04	
23 13 33 00-0044	EA		3" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	237.02	
23 13 33 00-0045	EA		4" Polyvinyl Chloride (PVC) Bulkhead Fitting, Socket x Thread.....	432.98	
23 13 33 00-0046			Polyvinyl Chloride (PVC) Tank Bulkhead Fittings, Thread x Threaded Connection <small>(23 13 33 00-0036)</small>		
23 13 33 00-0047	EA		1/2" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	80.11	
23 13 33 00-0048	EA		3/4" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	88.09	
23 13 33 00-0049	EA		1" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	96.11	
23 13 33 00-0050	EA		1-1/4" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	123.39	
23 13 33 00-0051	EA		1-1/2" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	131.42	
23 13 33 00-0052	EA		2" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	167.02	
23 13 33 00-0053	EA		3" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	270.33	
23 13 33 00-0054	EA		4" Polyvinyl Chloride (PVC) Bulkhead Fitting, Thread x Thread.....	480.29	
23 13 33 00-0055			Chlorinated Polyvinyl Chloride (CPVC) Tank Bulkhead Fittings, Socket x Threaded Connection <small>(23 13 33 00-0036)</small>		
23 13 33 00-0056	EA		1/2" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	83.20	
23 13 33 00-0057	EA		3/4" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	96.97	
23 13 33 00-0058	EA		1" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	110.17	
23 13 33 00-0059	EA		1-1/2" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	144.93	
23 13 33 00-0060	EA		2" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	195.09	
23 13 33 00-0061	EA		3" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	315.60	
23 13 33 00-0062	EA		4" Chlorinated Polyvinyl Chloride (CPVC) Bulkhead Fitting, Socket x Thread.....	508.42	
23 13 33 00-0063			Polypropylene Tank Bulkhead Fitting Thread x Threaded Connection <small>(23 13 33 00-0036)</small>		
23 13 33 00-0064	EA		1/2" Polypropylene Bulkhead Fitting, Thread x Thread.....	100.40	
23 13 33 00-0065	EA		3/4" Polypropylene Bulkhead Fitting, Thread x Thread.....	119.85	
23 13 33 00-0066	EA		1" Polypropylene Bulkhead Fitting, Thread x Thread.....	150.21	
23 13 33 00-0067	EA		1-1/4" Polypropylene Bulkhead Fitting, Thread x Thread.....	185.82	
23 13 33 00-0068	EA		1-1/2" Polypropylene Bulkhead Fitting, Thread x Thread.....	188.11	
23 13 33 00-0069	EA		2" Polypropylene Bulkhead Fitting, Thread x Thread.....	277.81	
23 13 33 00-0070	EA		3" Polypropylene Bulkhead Fitting, Thread x Thread.....	515.33	
23 13 33 00-0071	EA		4" Polypropylene Bulkhead Fitting, Thread x Thread.....	940.20	
23 13 33 00-0072			Polyethylene Tank Bulkhead Fittings Thread x Threaded Connection <small>(23 13 33 00-0036)</small>		
23 13 33 00-0073	EA		3/4" Polyethylene Bulkhead Fitting, Thread x Thread.....	84.45	
23 13 33 00-0074	EA		1" Polyethylene Bulkhead Fitting, Thread x Thread.....	112.60	
23 13 33 00-0075	EA		1-1/4" Polyethylene Bulkhead Fitting, Thread x Thread.....	114.90	
23 13 33 00-0076	EA		1-1/2" Polyethylene Bulkhead Fitting, Thread x Thread.....	117.19	
23 13 33 00-0077	EA		2" Polyethylene Bulkhead Fitting, Thread x Thread.....	171.16	
23 13 33 00-0078	EA		3" Polyethylene Bulkhead Fitting, Thread x Thread.....	220.54	
23 13 33 00-0079			TFE Teflon Tank Bulkhead Fittings, Thread x Threaded Connection <small>(23 13 33 00-0036)</small>		
23 13 33 00-0080	EA		1/8" TFE Teflon Bulkhead Fitting, Thread x Thread.....	430.36	
23 13 33 00-0081	EA		1/4" TFE Teflon Bulkhead Fitting, Thread x Thread.....	492.09	
23 13 33 00-0082	EA		3/8" TFE Teflon Bulkhead Fitting, Thread x Thread.....	607.61	
23 13 33 00-0083	EA		1/2" TFE Teflon Bulkhead Fitting, Thread x Thread.....	702.24	
23 13 33 00-0084	EA		3/4" TFE Teflon Bulkhead Fitting, Thread x Thread.....	809.92	
23 13 33 00-0085	EA		1" TFE Teflon Bulkhead Fitting, Thread x Thread.....	1,023.30	
23 13 33 00-0086	EA		1-1/2" TFE Teflon Bulkhead Fitting, Thread x Thread.....	1,331.85	
23 13 33 00-0087	EA		2" TFE Teflon Bulkhead Fitting, Thread x Thread.....	1,472.23	
23 13 33 00-0088			Self-Aligning Bulkhead Fittings <small>(23 13 33 00-0035)</small>		
23 13 33 00-0089	EA		3/4" Self-Aligning Polyvinyl Chloride (PVC) Bulkhead Fitting.....	435.71	
23 13 33 00-0090	EA		1" Self-Aligning Polyvinyl Chloride (PVC) Bulkhead Fitting.....	434.53	
23 13 33 00-0091	EA		1-1/2" Self-Aligning Polyvinyl Chloride (PVC) Bulkhead Fitting.....	640.01	
23 13 33 00-0092	EA		2" Self-Aligning Polyvinyl Chloride (PVC) Bulkhead Fitting.....	652.07	
23 13 33 00-0093	EA		3" Self-Aligning Polyvinyl Chloride (PVC) Bulkhead Fitting.....	886.91	

23 20 HVAC Piping and Pumps (23)

Note: The demolition price for only the length of pipe (LF) shall be used for lengths (LF) of pipe removal which exclude the fittings, valves, and insulation. The demolition price for individual fittings, valves, and insulation shall not be used in conjunction with pipe (LF) demolition tasks.

23 21 Hydronic Piping and Pumps (23 21)

23 21 13 Hydronic Piping (23 21)

Note: The demolition price for only the length of pipe (LF) shall be used for lengths (LF) of pipe removal which exclude the



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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fittings, valves, and insulation. The demolition price for individual fittings, valves, and insulation shall not be used in conjunction with pipe (LF) demolition tasks.

23 21 13 23 Aboveground Hydronic Piping (23 21 13)

23 21 13 23-0001 Threaded Black Steel Pipe (23 21 13 23)

23 21 13 23-0002 Threaded Black Steel Pipe Assemblies (23 21 13 23-0001)

Note: ASTM A-53 pipe and A-105 fittings. Threaded and coupled. Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available. Includes cutting and threading to length where necessary.

23 21 13 23-0003	LF	1/2"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	22.98	4.23
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	5.94	
			<i>For Work In Restricted Working Space, Add</i>	4.37	
23 21 13 23-0004	LF	3/4"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	25.54	4.54
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	6.76	
			<i>For Work In Restricted Working Space, Add</i>	4.57	
23 21 13 23-0005	LF	1"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	28.83	4.97
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	7.81	
			<i>For Work In Restricted Working Space, Add</i>	4.82	
23 21 13 23-0006	LF	1-1/4"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	35.36	5.18
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	9.96	
			<i>For Work In Restricted Working Space, Add</i>	5.20	
23 21 13 23-0007	LF	1-1/2"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	38.19	6.14
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	10.94	
			<i>For Work In Restricted Working Space, Add</i>	5.27	
23 21 13 23-0008	LF	2"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	46.24	7.40
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	13.48	
			<i>For Work In Restricted Working Space, Add</i>	5.94	
23 21 13 23-0009	LF	2-1/2"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	68.47	8.77
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	20.72	
			<i>For Work In Restricted Working Space, Add</i>	7.37	
23 21 13 23-0010	LF	3"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	87.57	11.74
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	26.71	
			<i>For Work In Restricted Working Space, Add</i>	9.02	
23 21 13 23-0011	LF	4"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	126.20	13.75
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	40.13	
			<i>For Work In Restricted Working Space, Add</i>	9.93	
23 21 13 23-0012	LF	5"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	196.55	17.58
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	64.44	
			<i>For Work In Restricted Working Space, Add</i>	11.84	
23 21 13 23-0013	LF	6"	Schedule 40 Threaded Black Steel Pipe With 150 LB Malleable Iron Fitting Assembly	238.78	20.79
			Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.		
			<i>For Schedule 80 Pipe With 300 LB Malleable Iron Fittings, Add</i>	78.81	
			<i>For Work In Restricted Working Space, Add</i>	13.41	

23 21 13 23-0014 Threaded Black Steel Pipe And Fittings (23 21 13 23-0001)

Note: ASTM A-53 pipe and A-105 fittings. Threaded and coupled, schedule 40. Excludes hangers, elbow, tee, or reducer fittings.

23 21 13 23-0015 Threaded And Coupled, Black Steel Piping (23 21 13 23-0014)

Note: ASTM A-53. Includes coupling. Includes cutting and threading to length where necessary.

23 21 13 23-0016	LF	3/8"	Schedule 40, Threaded And Coupled, Black Steel Pipe	8.70	2.64
			<i>For Work In Restricted Working Space, Add</i>	1.60	
			<i>For Schedule 80 Pipe, Add</i>	2.05	
23 21 13 23-0017	LF	1/2"	Schedule 40, Threaded And Coupled, Black Steel Pipe	12.02	4.23
			<i>For Work In Restricted Working Space, Add</i>	1.92	
			<i>For Schedule 80 Pipe, Add</i>	3.17	
23 21 13 23-0018	LF	3/4"	Schedule 40, Threaded And Coupled, Black Steel Pipe	14.08	4.54
			<i>For Work In Restricted Working Space, Add</i>	2.05	
			<i>For Schedule 80 Pipe, Add</i>	3.95	
23 21 13 23-0019	LF	1"	Schedule 40, Threaded And Coupled, Black Steel Pipe	17.08	4.97
			<i>For Work In Restricted Working Space, Add</i>	2.22	
			<i>For Schedule 80 Pipe, Add</i>	5.10	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 20 HVAC Piping and Pumps

23 21 Hydronic Piping and Pumps



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0020	LF		1-1/4" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	20.79	5.18
			<i>For Work In Restricted Working Space, Add</i>	2.35	
			<i>For Schedule 80 Pipe, Add</i>	6.62	
23 21 13 23-0021	LF		1-1/2" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	24.71	6.14
			<i>For Work In Restricted Working Space, Add</i>	2.76	
			<i>For Schedule 80 Pipe, Add</i>	7.90	
23 21 13 23-0022	LF		2" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	31.44	7.40
			<i>For Work In Restricted Working Space, Add</i>	3.34	
			<i>For Schedule 80 Pipe, Add</i>	10.25	
23 21 13 23-0023	LF		2-1/2" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	45.29	8.77
			<i>For Work In Restricted Working Space, Add</i>	3.97	
			<i>For Schedule 80 Pipe, Add</i>	15.75	
23 21 13 23-0024	LF		3" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	59.64	11.74
			<i>For Work In Restricted Working Space, Add</i>	5.29	
			<i>For Schedule 80 Pipe, Add</i>	20.67	
23 21 13 23-0025	LF		4" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	83.47	13.75
			<i>For Work In Restricted Working Space, Add</i>	6.20	
			<i>For Schedule 80 Pipe, Add</i>	30.32	
23 21 13 23-0026	LF		5" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	109.76	17.58
			<i>For Work In Restricted Working Space, Add</i>	7.90	
			<i>For Schedule 80 Pipe, Add</i>	40.18	
23 21 13 23-0027	LF		6" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	141.17	20.79
			<i>For Work In Restricted Working Space, Add</i>	9.34	
			<i>For Schedule 80 Pipe, Add</i>	52.63	
23 21 13 23-0028	LF		8" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	200.83	25.12
			<i>For Work In Restricted Working Space, Add</i>	11.28	
			<i>For Schedule 80 Pipe, Add</i>	77.21	
23 21 13 23-0029	LF		10" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	276.98	30.61
			<i>For Work In Restricted Working Space, Add</i>	13.79	
			<i>For Schedule 80 Pipe, Add</i>	108.56	
23 21 13 23-0030	LF		12" Schedule 40, Threaded And Coupled, Black Steel Pipe.....	370.94	40.23
			<i>For Work In Restricted Working Space, Add</i>	18.10	
			<i>For Schedule 80 Pipe, Add</i>	145.81	
23 21 13 23-0031			Black Malleable Iron 90 Degree Elbows <small>(23 21 13 23-0014)</small>		
23 21 13 23-0032	EA		3/8", 150 LB, Black Malleable Iron 90 Degree Elbow.....	30.66	15.65
			<i>For Work In Restricted Working Space, Add</i>	7.05	
			<i>For 300 LB Rating, Add</i>	18.62	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.11	
23 21 13 23-0033	EA		1/2", 150 LB, Black Malleable Iron 90 Degree Elbow.....	33.17	18.82
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For 300 LB Rating, Add</i>	13.62	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.08	
23 21 13 23-0034	EA		3/4", 150 LB, Black Malleable Iron 90 Degree Elbow.....	37.55	21.05
			<i>For Work In Restricted Working Space, Add</i>	9.47	
			<i>For 300 LB Rating, Add</i>	16.27	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.10	
23 21 13 23-0035	EA		1", 150 LB, Black Malleable Iron 90 Degree Elbow.....	45.65	23.47
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For 300 LB Rating, Add</i>	27.10	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.17	
23 21 13 23-0036	EA		1-1/4", 150 LB, Black Malleable Iron 90 Degree Elbow.....	57.05	26.65
			<i>For Work In Restricted Working Space, Add</i>	11.97	
			<i>For 300 LB Rating, Add</i>	43.58	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.27	
23 21 13 23-0037	EA		1-1/2", 150 LB, Black Malleable Iron 90 Degree Elbow.....	67.57	30.03
			<i>For Work In Restricted Working Space, Add</i>	13.50	
			<i>For 300 LB Rating, Add</i>	56.89	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.36	
23 21 13 23-0038	EA		2", 150 LB, Black Malleable Iron 90 Degree Elbow.....	96.09	38.17
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For 300 LB Rating, Add</i>	96.89	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.62	
23 21 13 23-0039	EA		2-1/2", 150 LB, Black Malleable Iron 90 Degree Elbow.....	171.33	56.46
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For 300 LB Rating, Add</i>	213.27	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	1.39	
23 21 13 23-0040	EA		3", 150 LB, Black Malleable Iron 90 Degree Elbow.....	238.24	74.23
			<i>For Work In Restricted Working Space, Add</i>	33.39	
			<i>For 300 LB Rating, Add</i>	311.33	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	2.03	
23 21 13 23-0041	EA		4", 150 LB, Black Malleable Iron 90 Degree Elbow.....	393.30	80.45
			<i>For Work In Restricted Working Space, Add</i>	36.19	
			<i>For 300 LB Rating, Add</i>	661.62	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	4.36	
23 21 13 23-0042	EA		5", 150 LB, Black Malleable Iron 90 Degree Elbow.....	922.61	83.96
			<i>For Work In Restricted Working Space, Add</i>	37.76	
			<i>For 300 LB Rating, Add</i>	1,919.70	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	12.75	
23 21 13 23-0043	EA		6", 150 LB, Black Malleable Iron 90 Degree Elbow.....	1,051.94	87.79
			<i>For Work In Restricted Working Space, Add</i>	39.48	
			<i>For 300 LB Rating, Add</i>	2,216.69	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	14.73	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0044 Black Malleable Iron Reducing 90 Degree Elbows (23 21 13 23-0014)		
23 21 13 23-0045 EA 1/2" x 3/8", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	35.30	17.24
For Work In Restricted Working Space, Add	7.75	
For 300 LB Rating, Add	24.25	
For Standard Weight Cast Iron Fittings, Add	0.15	
23 21 13 23-0046 EA 3/4" x 1/2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	39.62	19.88
For Work In Restricted Working Space, Add	8.96	
For 300 LB Rating, Add	25.17	
For Standard Weight Cast Iron Fittings, Add	0.16	
23 21 13 23-0047 EA 3/4" x 3/8", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	41.14	18.40
For Work In Restricted Working Space, Add	8.26	
For 300 LB Rating, Add	34.32	
For Standard Weight Cast Iron Fittings, Add	0.22	
23 21 13 23-0048 EA 1" x 3/4", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	45.91	22.30
For Work In Restricted Working Space, Add	10.02	
For 300 LB Rating, Add	32.03	
For Standard Weight Cast Iron Fittings, Add	0.20	
23 21 13 23-0049 EA 1" x 1/2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	45.22	21.15
For Work In Restricted Working Space, Add	9.52	
For 300 LB Rating, Add	34.30	
For Standard Weight Cast Iron Fittings, Add	0.22	
23 21 13 23-0050 EA 1" x 3/8", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	55.94	19.56
For Work In Restricted Working Space, Add	8.81	
For 300 LB Rating, Add	65.51	
For Standard Weight Cast Iron Fittings, Add	0.42	
23 21 13 23-0051 EA 1-1/4" x 1", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	58.59	25.05
For Work In Restricted Working Space, Add	11.27	
For 300 LB Rating, Add	52.70	
For Standard Weight Cast Iron Fittings, Add	0.34	
23 21 13 23-0052 EA 1-1/4" x 3/4", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	59.18	23.79
For Work In Restricted Working Space, Add	10.72	
For 300 LB Rating, Add	58.45	
For Standard Weight Cast Iron Fittings, Add	0.38	
23 21 13 23-0053 EA 1-1/4" x 1/2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	61.44	22.73
For Work In Restricted Working Space, Add	10.21	
For 300 LB Rating, Add	67.80	
For Standard Weight Cast Iron Fittings, Add	0.44	
23 21 13 23-0054 EA 1-1/2" x 1-1/4", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	72.09	28.34
For Work In Restricted Working Space, Add	12.73	
For 300 LB Rating, Add	73.71	
For Standard Weight Cast Iron Fittings, Add	0.47	
23 21 13 23-0055 EA 1-1/2" x 1", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	69.77	26.75
For Work In Restricted Working Space, Add	12.04	
For 300 LB Rating, Add	73.57	
For Standard Weight Cast Iron Fittings, Add	0.47	
23 21 13 23-0056 EA 1-1/2" x 3/4", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	72.21	25.48
For Work In Restricted Working Space, Add	11.48	
For 300 LB Rating, Add	83.75	
For Standard Weight Cast Iron Fittings, Add	0.54	
23 21 13 23-0057 EA 2" x 1-1/2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	94.03	34.04
For Work In Restricted Working Space, Add	15.32	
For 300 LB Rating, Add	106.17	
For Standard Weight Cast Iron Fittings, Add	0.69	
23 21 13 23-0058 EA 2" x 1-1/4", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	97.35	32.36
For Work In Restricted Working Space, Add	14.56	
For 300 LB Rating, Add	120.10	
For Standard Weight Cast Iron Fittings, Add	0.78	
23 21 13 23-0059 EA 2" x 1", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	95.02	30.77
For Work In Restricted Working Space, Add	13.86	
For 300 LB Rating, Add	119.96	
For Standard Weight Cast Iron Fittings, Add	0.78	
23 21 13 23-0060 EA 2" x 3/4", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	96.13	29.61
For Work In Restricted Working Space, Add	13.31	
For 300 LB Rating, Add	126.91	
For Standard Weight Cast Iron Fittings, Add	0.83	
23 21 13 23-0061 EA 2-1/2" x 2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	188.78	47.26
For Work In Restricted Working Space, Add	21.26	
For 300 LB Rating, Add	287.24	
For Standard Weight Cast Iron Fittings, Add	1.89	
23 21 13 23-0062 EA 2-1/2" x 1-1/2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	189.65	43.25
For Work In Restricted Working Space, Add	19.44	
For 300 LB Rating, Add	303.53	
For Standard Weight Cast Iron Fittings, Add	2.00	
23 21 13 23-0063 EA 3" x 2-1/2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	318.60	65.34
For Work In Restricted Working Space, Add	29.38	
For 300 LB Rating, Add	535.46	
For Standard Weight Cast Iron Fittings, Add	3.53	
23 21 13 23-0064 EA 3" x 2", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	274.85	56.14
For Work In Restricted Working Space, Add	25.27	
For 300 LB Rating, Add	462.54	
For Standard Weight Cast Iron Fittings, Add	3.05	
23 21 13 23-0065 EA 4" x 3", 150 LB, Black Malleable Iron Reducing 90 Degree Elbow	491.87	76.52
For Work In Restricted Working Space, Add	34.43	
For 300 LB Rating, Add	911.97	
For Standard Weight Cast Iron Fittings, Add	6.03	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13	23-0066		Black Malleable Iron 45 Degree Elbows <small>(23 21 13 23-0014)</small>		
	23 21 13 23-0067	EA	3/8", 150 LB, Black Malleable Iron 45 Degree Elbow.....	34.29	15.65
			<i>For Work In Restricted Working Space, Add</i>	7.05	
			<i>For 300 LB Rating, Add</i>	27.33	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.17	
	23 21 13 23-0068	EA	1/2", 150 LB, Black Malleable Iron 45 Degree Elbow.....	36.41	18.82
			<i>For Work In Restricted Working Space, Add</i>	8.46	
			<i>For 300 LB Rating, Add</i>	21.40	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.13	
	23 21 13 23-0069	EA	3/4", 150 LB, Black Malleable Iron 45 Degree Elbow.....	41.71	21.05
			<i>For Work In Restricted Working Space, Add</i>	9.47	
			<i>For 300 LB Rating, Add</i>	26.25	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.16	
	23 21 13 23-0070	EA	1", 150 LB, Black Malleable Iron 45 Degree Elbow.....	48.01	23.47
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For 300 LB Rating, Add</i>	32.76	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.20	
	23 21 13 23-0071	EA	1-1/4", 150 LB, Black Malleable Iron 45 Degree Elbow	62.49	26.65
			<i>For Work In Restricted Working Space, Add</i>	11.97	
			<i>For 300 LB Rating, Add</i>	56.63	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.36	
	23 21 13 23-0072	EA	1-1/2", 150 LB, Black Malleable Iron 45 Degree Elbow	72.95	30.03
			<i>For Work In Restricted Working Space, Add</i>	13.50	
			<i>For 300 LB Rating, Add</i>	69.80	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.45	
	23 21 13 23-0073	EA	2", 150 LB, Black Malleable Iron 45 Degree Elbow.....	99.43	38.17
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For 300 LB Rating, Add</i>	104.90	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.68	
	23 21 13 23-0074	EA	2-1/2", 150 LB, Black Malleable Iron 45 Degree Elbow	206.90	56.46
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For 300 LB Rating, Add</i>	298.64	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	1.96	
	23 21 13 23-0075	EA	3", 150 LB, Black Malleable Iron 45 Degree Elbow.....	270.18	74.23
			<i>For Work In Restricted Working Space, Add</i>	33.39	
			<i>For 300 LB Rating, Add</i>	387.99	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	2.54	
	23 21 13 23-0076	EA	4", 150 LB, Black Malleable Iron 45 Degree Elbow.....	432.20	80.45
			<i>For Work In Restricted Working Space, Add</i>	36.19	
			<i>For 300 LB Rating, Add</i>	754.98	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	4.98	
	23 21 13 23-0077	EA	5", 150 LB, Black Malleable Iron 45 Degree Elbow.....	1,356.56	83.96
			<i>For Work In Restricted Working Space, Add</i>	37.76	
			<i>For 300 LB Rating, Add</i>	2,961.18	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	19.69	
	23 21 13 23-0078	EA	6", 150 LB, Black Malleable Iron 45 Degree Elbow.....	1,390.74	87.79
			<i>For Work In Restricted Working Space, Add</i>	39.48	
			<i>For 300 LB Rating, Add</i>	3,029.81	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	20.15	
23 21 13	23-0079		Black Malleable Iron Tees <small>(23 21 13 23-0014)</small>		
	23 21 13 23-0080	EA	3/8", 150 LB, Black Malleable Iron Tee.....	39.78	19.35
			<i>For Work In Restricted Working Space, Add</i>	8.81	
			<i>For 300 LB Rating, Add</i>	26.75	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.17	
	23 21 13 23-0081	EA	1/2", 150 LB, Black Malleable Iron Tee.....	41.89	23.47
			<i>For Work In Restricted Working Space, Add</i>	10.57	
			<i>For 300 LB Rating, Add</i>	18.07	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.11	
	23 21 13 23-0082	EA	3/4", 150 LB, Black Malleable Iron Tee.....	50.20	27.17
			<i>For Work In Restricted Working Space, Add</i>	12.20	
			<i>For 300 LB Rating, Add</i>	25.31	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.15	
	23 21 13 23-0083	EA	1", 150 LB, Black Malleable Iron Tee.....	64.39	32.04
			<i>For Work In Restricted Working Space, Add</i>	14.42	
			<i>For 300 LB Rating, Add</i>	42.08	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.26	
	23 21 13 23-0084	EA	1-1/4", 150 LB, Black Malleable Iron Tee.....	83.58	38.17
			<i>For Work In Restricted Working Space, Add</i>	17.15	
			<i>For 300 LB Rating, Add</i>	66.86	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.42	
	23 21 13 23-0085	EA	1-1/2", 150 LB, Black Malleable Iron Tee.....	101.08	45.47
			<i>For Work In Restricted Working Space, Add</i>	20.46	
			<i>For 300 LB Rating, Add</i>	82.98	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.53	
	23 21 13 23-0086	EA	2", 150 LB, Black Malleable Iron Tee.....	140.61	56.46
			<i>For Work In Restricted Working Space, Add</i>	25.37	
			<i>For 300 LB Rating, Add</i>	139.55	
			<i>For Standard Weight Cast Iron Fittings, Add</i>	0.90	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0087 EA 2-1/2", 150 LB, Black Malleable Iron Tee.....	232.09	74.23
<i>For Work In Restricted Working Space, Add</i>	33.39	
<i>For 300 LB Rating, Add</i>	296.57	
<i>For Standard Weight Cast Iron Fittings, Add</i>	1.93	
23 21 13 23-0088 EA 3", 150 LB, Black Malleable Iron Tee.....	310.09	88.18
<i>For Work In Restricted Working Space, Add</i>	39.65	
<i>For 300 LB Rating, Add</i>	434.94	
<i>For Standard Weight Cast Iron Fittings, Add</i>	2.85	
23 21 13 23-0089 EA 4", 150 LB, Black Malleable Iron Tee.....	582.44	101.65
<i>For Work In Restricted Working Space, Add</i>	45.72	
<i>For 300 LB Rating, Add</i>	1,041.26	
<i>For Standard Weight Cast Iron Fittings, Add</i>	6.88	
23 21 13 23-0090 EA 5", 150 LB, Black Malleable Iron Tee.....	1,484.15	120.68
<i>For Work In Restricted Working Space, Add</i>	54.29	
<i>For 300 LB Rating, Add</i>	3,138.51	
<i>For Standard Weight Cast Iron Fittings, Add</i>	20.85	
23 21 13 23-0091 EA 6", 150 LB, Black Malleable Iron Tee.....	1,605.37	137.94
<i>For Work In Restricted Working Space, Add</i>	62.04	
<i>For 300 LB Rating, Add</i>	3,368.95	
<i>For Standard Weight Cast Iron Fittings, Add</i>	22.38	
23 21 13 23-0092 Black Malleable Iron Reducing Tees <small>(23 21 13 23-0014)</small>		
23 21 13 23-0093 EA 1/2", 150 LB, Black Malleable Iron Reducing Tee.....	46.54	23.47
<i>For Work In Restricted Working Space, Add</i>	10.57	
<i>For 300 LB Rating, Add</i>	29.23	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.18	
23 21 13 23-0094 EA 3/4", 150 LB, Black Malleable Iron Reducing Tee.....	55.41	27.17
<i>For Work In Restricted Working Space, Add</i>	12.20	
<i>For 300 LB Rating, Add</i>	37.82	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.24	
23 21 13 23-0095 EA 1", 150 LB, Black Malleable Iron Reducing Tee.....	66.66	32.04
<i>For Work In Restricted Working Space, Add</i>	14.42	
<i>For 300 LB Rating, Add</i>	47.52	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.30	
23 21 13 23-0096 EA 1-1/4", 150 LB, Black Malleable Iron Reducing Tee.....	93.71	38.17
<i>For Work In Restricted Working Space, Add</i>	17.15	
<i>For 300 LB Rating, Add</i>	91.17	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.58	
23 21 13 23-0097 EA 1-1/2", 150 LB, Black Malleable Iron Reducing Tee.....	108.72	45.47
<i>For Work In Restricted Working Space, Add</i>	20.46	
<i>For 300 LB Rating, Add</i>	101.32	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.65	
23 21 13 23-0098 EA 2", 150 LB, Black Malleable Iron Reducing Tee.....	143.39	56.46
<i>For Work In Restricted Working Space, Add</i>	25.37	
<i>For 300 LB Rating, Add</i>	146.22	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.94	
23 21 13 23-0099 EA 2-1/2", 150 LB, Black Malleable Iron Reducing Tee.....	294.53	74.23
<i>For Work In Restricted Working Space, Add</i>	33.39	
<i>For 300 LB Rating, Add</i>	446.43	
<i>For Standard Weight Cast Iron Fittings, Add</i>	2.93	
23 21 13 23-0100 EA 3", 150 LB, Black Malleable Iron Reducing Tee.....	342.04	88.18
<i>For Work In Restricted Working Space, Add</i>	39.65	
<i>For 300 LB Rating, Add</i>	511.62	
<i>For Standard Weight Cast Iron Fittings, Add</i>	3.36	
23 21 13 23-0101 EA 4", 150 LB, Black Malleable Iron Reducing Tee.....	661.37	101.65
<i>For Work In Restricted Working Space, Add</i>	45.72	
<i>For 300 LB Rating, Add</i>	1,230.70	
<i>For Standard Weight Cast Iron Fittings, Add</i>	8.14	
23 21 13 23-0102 EA 5", 150 LB, Black Malleable Iron Reducing Tee.....	1,361.51	120.68
<i>For Work In Restricted Working Space, Add</i>	54.29	
<i>For 300 LB Rating, Add</i>	2,844.18	
<i>For Standard Weight Cast Iron Fittings, Add</i>	18.89	
23 21 13 23-0103 EA 6", 150 LB, Black Malleable Iron Reducing Tee.....	1,545.83	137.94
<i>For Work In Restricted Working Space, Add</i>	62.04	
<i>For 300 LB Rating, Add</i>	3,226.06	
<i>For Standard Weight Cast Iron Fittings, Add</i>	21.42	
23 21 13 23-0104 Black Malleable Iron Couplings <small>(23 21 13 23-0014)</small>		
23 21 13 23-0105 EA 3/8", 150 LB, Black Malleable Iron Coupling.....	32.41	15.65
<i>For Work In Restricted Working Space, Add</i>	7.05	
<i>For 300 LB Rating, Add</i>	22.82	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.14	
23 21 13 23-0106 EA 1/2", 150 LB, Black Malleable Iron Coupling.....	35.07	18.82
<i>For Work In Restricted Working Space, Add</i>	8.46	
<i>For 300 LB Rating, Add</i>	18.18	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.11	
23 21 13 23-0107 EA 3/4", 150 LB, Black Malleable Iron Coupling.....	39.60	21.05
<i>For Work In Restricted Working Space, Add</i>	9.47	
<i>For 300 LB Rating, Add</i>	21.19	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.13	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 21 13 23-0108	EA	1", 150 LB, Black Malleable Iron Coupling	47.28	23.47
		<i>For Work In Restricted Working Space, Add</i>	10.57	
		<i>For 300 LB Rating, Add</i>	31.01	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.19	
23 21 13 23-0109	EA	1-1/4", 150 LB, Black Malleable Iron Coupling	55.49	26.65
		<i>For Work In Restricted Working Space, Add</i>	11.97	
		<i>For 300 LB Rating, Add</i>	39.83	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.25	
23 21 13 23-0110	EA	1-1/2", 150 LB, Black Malleable Iron Coupling	66.06	30.03
		<i>For Work In Restricted Working Space, Add</i>	13.50	
		<i>For 300 LB Rating, Add</i>	53.27	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.34	
23 21 13 23-0111	EA	2", 150 LB, Black Malleable Iron Coupling	88.39	38.17
		<i>For Work In Restricted Working Space, Add</i>	17.15	
		<i>For 300 LB Rating, Add</i>	78.41	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.50	
23 21 13 23-0112	EA	2-1/2", 150 LB, Black Malleable Iron Coupling	170.77	56.46
		<i>For Work In Restricted Working Space, Add</i>	25.37	
		<i>For 300 LB Rating, Add</i>	211.93	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	1.38	
23 21 13 23-0113	EA	3", 150 LB, Black Malleable Iron Coupling	227.83	74.23
		<i>For Work In Restricted Working Space, Add</i>	33.39	
		<i>For 300 LB Rating, Add</i>	286.35	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	1.86	
23 21 13 23-0114	EA	4", 150 LB, Black Malleable Iron Coupling	355.32	80.45
		<i>For Work In Restricted Working Space, Add</i>	36.19	
		<i>For 300 LB Rating, Add</i>	570.47	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	3.75	
23 21 13 23-0115	EA	5", 150 LB, Black Malleable Iron Coupling	786.70	83.96
		<i>For Work In Restricted Working Space, Add</i>	37.76	
		<i>For 300 LB Rating, Add</i>	1,593.52	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	10.57	
23 21 13 23-0116	EA	6", 150 LB, Black Malleable Iron Coupling	884.44	87.79
		<i>For Work In Restricted Working Space, Add</i>	39.48	
		<i>For 300 LB Rating, Add</i>	1,814.69	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	12.05	
23 21 13 23-0117		Black Malleable Iron Reducing Couplings <small>(23 21 13 23-0114)</small>		
23 21 13 23-0118	EA	1/2", 150 LB, Black Malleable Iron Reducing Coupling	36.73	18.82
		<i>For Work In Restricted Working Space, Add</i>	8.46	
		<i>For 300 LB Rating, Add</i>	22.16	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.14	
23 21 13 23-0119	EA	3/4", 150 LB, Black Malleable Iron Reducing Coupling	40.59	21.05
		<i>For Work In Restricted Working Space, Add</i>	9.47	
		<i>For 300 LB Rating, Add</i>	23.57	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.14	
23 21 13 23-0120	EA	1", 150 LB, Black Malleable Iron Reducing Coupling	49.29	23.47
		<i>For Work In Restricted Working Space, Add</i>	10.57	
		<i>For 300 LB Rating, Add</i>	35.83	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.22	
23 21 13 23-0121	EA	1-1/4", 150 LB, Black Malleable Iron Reducing Coupling	57.97	26.65
		<i>For Work In Restricted Working Space, Add</i>	11.97	
		<i>For 300 LB Rating, Add</i>	45.79	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.29	
23 21 13 23-0122	EA	1-1/2", 150 LB, Black Malleable Iron Reducing Coupling	67.83	30.03
		<i>For Work In Restricted Working Space, Add</i>	13.50	
		<i>For 300 LB Rating, Add</i>	57.52	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.37	
23 21 13 23-0123	EA	2", 150 LB, Black Malleable Iron Reducing Coupling	90.25	38.17
		<i>For Work In Restricted Working Space, Add</i>	17.15	
		<i>For 300 LB Rating, Add</i>	82.87	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	0.53	
23 21 13 23-0124	EA	2-1/2", 150 LB, Black Malleable Iron Reducing Coupling	182.40	56.46
		<i>For Work In Restricted Working Space, Add</i>	25.37	
		<i>For 300 LB Rating, Add</i>	239.84	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	1.57	
23 21 13 23-0125	EA	3", 150 LB, Black Malleable Iron Reducing Coupling	230.21	74.23
		<i>For Work In Restricted Working Space, Add</i>	33.39	
		<i>For 300 LB Rating, Add</i>	292.06	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	1.90	
23 21 13 23-0126	EA	4", 150 LB, Black Malleable Iron Reducing Coupling	358.99	80.45
		<i>For Work In Restricted Working Space, Add</i>	36.19	
		<i>For 300 LB Rating, Add</i>	579.28	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	3.81	
23 21 13 23-0127	EA	5", 150 LB, Black Malleable Iron Reducing Coupling	661.61	83.96
		<i>For Work In Restricted Working Space, Add</i>	37.76	
		<i>For 300 LB Rating, Add</i>	1,293.30	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	8.57	
23 21 13 23-0128	EA	6", 150 LB, Black Malleable Iron Reducing Coupling	819.70	87.79
		<i>For Work In Restricted Working Space, Add</i>	39.48	
		<i>For 300 LB Rating, Add</i>	1,659.31	
		<i>For Standard Weight Cast Iron Fittings, Add</i>	11.01	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0129 Black Malleable Iron Caps <small>(23 21 13 23-0014)</small>		
23 21 13 23-0130 EA 1/2", 150 LB, Black Malleable Iron Cap	17.71	8.35
<i>For Work In Restricted Working Space, Add</i>	3.80	
<i>For 300 LB Rating, Add</i>	12.83	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.08	
23 21 13 23-0131 EA 3/4", 150 LB, Black Malleable Iron Cap	20.99	9.41
<i>For Work In Restricted Working Space, Add</i>	4.26	
<i>For 300 LB Rating, Add</i>	17.15	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.11	
23 21 13 23-0132 EA 1", 150 LB, Black Malleable Iron Cap	24.09	10.47
<i>For Work In Restricted Working Space, Add</i>	4.76	
<i>For 300 LB Rating, Add</i>	20.70	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.13	
23 21 13 23-0133 EA 1-1/4", 150 LB, Black Malleable Iron Cap	28.78	11.84
<i>For Work In Restricted Working Space, Add</i>	5.39	
<i>For 300 LB Rating, Add</i>	27.07	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.17	
23 21 13 23-0134 EA 1-1/2", 150 LB, Black Malleable Iron Cap	35.14	13.32
<i>For Work In Restricted Working Space, Add</i>	6.08	
<i>For 300 LB Rating, Add</i>	36.95	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.24	
23 21 13 23-0135 EA 2", 150 LB, Black Malleable Iron Cap	47.45	17.03
<i>For Work In Restricted Working Space, Add</i>	7.71	
<i>For 300 LB Rating, Add</i>	53.72	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.35	
23 21 13 23-0136 EA 2-1/2", 150 LB, Black Malleable Iron Cap	87.95	25.17
<i>For Work In Restricted Working Space, Add</i>	11.42	
<i>For 300 LB Rating, Add</i>	122.02	
<i>For Standard Weight Cast Iron Fittings, Add</i>	0.80	
23 21 13 23-0137 EA 3", 150 LB, Black Malleable Iron Cap	123.66	33.09
<i>For Work In Restricted Working Space, Add</i>	15.03	
<i>For 300 LB Rating, Add</i>	179.57	
<i>For Standard Weight Cast Iron Fittings, Add</i>	1.18	
23 21 13 23-0138 EA 4", 150 LB, Black Malleable Iron Cap	180.44	35.88
<i>For Work In Restricted Working Space, Add</i>	16.29	
<i>For 300 LB Rating, Add</i>	306.02	
<i>For Standard Weight Cast Iron Fittings, Add</i>	2.02	
23 21 13 23-0139 EA 5", 150 LB, Black Malleable Iron Cap	357.32	37.43
<i>For Work In Restricted Working Space, Add</i>	17.00	
<i>For 300 LB Rating, Add</i>	725.01	
<i>For Standard Weight Cast Iron Fittings, Add</i>	4.81	
23 21 13 23-0140 EA 6", 150 LB, Black Malleable Iron Cap	610.38	39.09
<i>For Work In Restricted Working Space, Add</i>	17.77	
<i>For 300 LB Rating, Add</i>	1,326.34	
<i>For Standard Weight Cast Iron Fittings, Add</i>	8.82	
23 21 13 23-0141 Black Malleable Iron Unions <small>(23 21 13 23-0014)</small>		
23 21 13 23-0142 EA 3/8", 150 LB, Black Malleable Iron Union	47.58	15.65
<i>For Work In Restricted Working Space, Add</i>	7.05	
23 21 13 23-0143 EA 1/2", 150 LB, Black Malleable Iron Union	57.04	23.47
<i>For Work In Restricted Working Space, Add</i>	10.57	
23 21 13 23-0144 EA 3/4", 150 LB, Black Malleable Iron Union	65.73	27.17
<i>For Work In Restricted Working Space, Add</i>	12.20	
23 21 13 23-0145 EA 1", 150 LB, Black Malleable Iron Union	80.73	32.04
<i>For Work In Restricted Working Space, Add</i>	14.42	
23 21 13 23-0146 EA 1-1/4", 150 LB, Black Malleable Iron Union	104.00	38.17
<i>For Work In Restricted Working Space, Add</i>	17.15	
23 21 13 23-0147 EA 1-1/2", 150 LB, Black Malleable Iron Union	126.62	45.47
<i>For Work In Restricted Working Space, Add</i>	20.46	
23 21 13 23-0148 EA 2", 150 LB, Black Malleable Iron Union	152.51	56.46
<i>For Work In Restricted Working Space, Add</i>	25.37	
23 21 13 23-0149 EA 2-1/2", 150 LB, Black Malleable Iron Union	327.23	83.21
<i>For Work In Restricted Working Space, Add</i>	37.46	
23 21 13 23-0150 EA 3", 150 LB, Black Malleable Iron Union	407.92	109.44
<i>For Work In Restricted Working Space, Add</i>	49.29	
23 21 13 23-0151 EA 3/8", 250 LB, Black Malleable Iron Union	55.32	15.65
<i>For Work In Restricted Working Space, Add</i>	7.05	
23 21 13 23-0152 EA 1/2", 250 LB, Black Malleable Iron Union	71.76	23.47
<i>For Work In Restricted Working Space, Add</i>	10.57	
23 21 13 23-0153 EA 3/4", 250 LB, Black Malleable Iron Union	76.59	27.17
<i>For Work In Restricted Working Space, Add</i>	12.20	
23 21 13 23-0154 EA 1", 250 LB, Black Malleable Iron Union	92.13	32.04
<i>For Work In Restricted Working Space, Add</i>	14.42	
23 21 13 23-0155 EA 1-1/4", 250 LB, Black Malleable Iron Union	131.11	38.17
<i>For Work In Restricted Working Space, Add</i>	17.15	
23 21 13 23-0156 EA 1-1/2", 250 LB, Black Malleable Iron Union	153.37	45.47
<i>For Work In Restricted Working Space, Add</i>	20.47	
23 21 13 23-0157 EA 2", 250 LB, Black Malleable Iron Union	193.81	56.46
<i>For Work In Restricted Working Space, Add</i>	25.37	
23 21 13 23-0158 EA 2-1/2", 250 LB, Black Malleable Iron Union	467.26	83.21
<i>For Work In Restricted Working Space, Add</i>	37.46	
23 21 13 23-0159 EA 3", 250 LB, Black Malleable Iron Union	565.01	109.44
<i>For Work In Restricted Working Space, Add</i>	49.29	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-0160	EA	4", 250 LB, Black Malleable Iron Union.....	888.35		118.71
		<i>For Work In Restricted Working Space, Add</i>	53.43		
23 21 13 23-0161	EA	3/8", 300 LB, Black Malleable Iron Union.....	75.15		15.65
		<i>For Work In Restricted Working Space, Add</i>	7.05		
23 21 13 23-0162	EA	1/2", 300 LB, Black Malleable Iron Union.....	77.03		23.47
		<i>For Work In Restricted Working Space, Add</i>	10.57		
23 21 13 23-0163	EA	3/4", 300 LB, Black Malleable Iron Union.....	86.94		27.17
		<i>For Work In Restricted Working Space, Add</i>	12.20		
23 21 13 23-0164	EA	1", 300 LB, Black Malleable Iron Union.....	108.47		32.04
		<i>For Work In Restricted Working Space, Add</i>	14.42		
23 21 13 23-0165	EA	1-1/4", 300 LB, Black Malleable Iron Union.....	155.70		38.17
		<i>For Work In Restricted Working Space, Add</i>	17.15		
23 21 13 23-0166	EA	1-1/2", 300 LB, Black Malleable Iron Union.....	171.42		45.47
		<i>For Work In Restricted Working Space, Add</i>	20.47		
23 21 13 23-0167	EA	2", 300 LB, Black Malleable Iron Union.....	212.41		56.46
		<i>For Work In Restricted Working Space, Add</i>	25.37		
23 21 13 23-0168	EA	2-1/2", 300 LB, Black Malleable Iron Union.....	537.01		83.21
		<i>For Work In Restricted Working Space, Add</i>	37.46		
23 21 13 23-0169	EA	3", 300 LB, Black Malleable Iron Union.....	697.48		109.44
		<i>For Work In Restricted Working Space, Add</i>	49.29		
23 21 13 23-0170	EA	4", 300 LB, Black Malleable Iron Union.....	1,870.34		118.71
		<i>For Work In Restricted Working Space, Add</i>	53.43		
23 21 13 23-0171		Black Steel Nipples <small>(23 21 13 23-0014)</small>			
23 21 13 23-0172	EA	3/8" x Close, Schedule 40 Black Steel Nipple.....	20.61		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.76		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0173	EA	1/2" x Close, Schedule 40 Black Steel Nipple.....	19.75		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.33		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0174	EA	3/4" x Close, Schedule 40 Black Steel Nipple.....	20.44		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.67		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0175	EA	1" x Close, Schedule 40 Black Steel Nipple.....	24.02		10.89
		<i>For Schedule 80 Nipples, Add</i>	3.88		
		<i>For Work In Restricted Working Space, Add</i>	4.88		
23 21 13 23-0176	EA	1-1/4" x Close, Schedule 40 Black Steel Nipple.....	27.44		11.74
		<i>For Schedule 80 Nipples, Add</i>	4.91		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0177	EA	1-1/2" x Close, Schedule 40 Black Steel Nipple.....	29.85		11.74
		<i>For Schedule 80 Nipples, Add</i>	6.12		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0178	EA	2" x Close, Schedule 40 Black Steel Nipple.....	39.39		15.12
		<i>For Schedule 80 Nipples, Add</i>	8.33		
		<i>For Work In Restricted Working Space, Add</i>	6.82		
23 21 13 23-0179	EA	2-1/2" x Close, Schedule 40 Black Steel Nipple.....	80.34		18.82
		<i>For Schedule 80 Nipples, Add</i>	26.07		
		<i>For Work In Restricted Working Space, Add</i>	8.46		
23 21 13 23-0180	EA	3" x Close, Schedule 40 Black Steel Nipple.....	96.07		22.73
		<i>For Schedule 80 Nipples, Add</i>	30.98		
		<i>For Work In Restricted Working Space, Add</i>	10.23		
23 21 13 23-0181	EA	4" x Close, Schedule 40 Black Steel Nipple.....	134.69		27.61
		<i>For Schedule 80 Nipples, Add</i>	46.66		
		<i>For Work In Restricted Working Space, Add</i>	12.41		
23 21 13 23-0182	EA	3/8" x 1-1/2" Long, Schedule 40 Black Steel Nipple.....	21.36		10.04
		<i>For Schedule 80 Nipples, Add</i>	3.13		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0183	EA	1/2" x 1-1/2" Long, Schedule 40 Black Steel Nipple.....	19.75		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.33		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0184	EA	3/4" x 1-1/2" Long, Schedule 40 Black Steel Nipple.....	20.84		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.87		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0185	EA	3/8" x 2" Long, Schedule 40 Black Steel Nipple.....	21.36		10.04
		<i>For Schedule 80 Nipples, Add</i>	3.13		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0186	EA	1/2" x 2" Long, Schedule 40 Black Steel Nipple.....	19.75		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.33		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0187	EA	3/4" x 2" Long, Schedule 40 Black Steel Nipple.....	20.84		10.04
		<i>For Schedule 80 Nipples, Add</i>	2.87		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0188	EA	1" x 2" Long, Schedule 40 Black Steel Nipple.....	24.77		10.89
		<i>For Schedule 80 Nipples, Add</i>	4.25		
		<i>For Work In Restricted Working Space, Add</i>	4.88		
23 21 13 23-0189	EA	1-1/4" x 2" Long, Schedule 40 Black Steel Nipple.....	28.76		11.74
		<i>For Schedule 80 Nipples, Add</i>	5.57		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0190	EA	1-1/2" x 2" Long, Schedule 40 Black Steel Nipple.....	30.83		11.74
		<i>For Schedule 80 Nipples, Add</i>	6.61		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0191	EA	3/8" x 2-1/2" Long, Schedule 40 Black Steel Nipple.....	23.14		10.04
		<i>For Schedule 80 Nipples, Add</i>	4.02		
		<i>For Work In Restricted Working Space, Add</i>	4.53		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0192 EA 1/2" x 2-1/2" Long, Schedule 40 Black Steel Nipple	20.61	10.04
<i>For Schedule 80 Nipples, Add</i>	2.76	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0193 EA 3/4" x 2-1/2" Long, Schedule 40 Black Steel Nipple	21.59	10.04
<i>For Schedule 80 Nipples, Add</i>	3.25	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0194 EA 1" x 2-1/2" Long, Schedule 40 Black Steel Nipple	25.29	10.89
<i>For Schedule 80 Nipples, Add</i>	4.51	
<i>For Work In Restricted Working Space, Add</i>	4.88	
23 21 13 23-0195 EA 1-1/4" x 2-1/2" Long, Schedule 40 Black Steel Nipple	29.45	11.74
<i>For Schedule 80 Nipples, Add</i>	5.92	
<i>For Work In Restricted Working Space, Add</i>	5.29	
23 21 13 23-0196 EA 1-1/2" x 2-1/2" Long, Schedule 40 Black Steel Nipple	32.38	11.74
<i>For Schedule 80 Nipples, Add</i>	7.38	
<i>For Work In Restricted Working Space, Add</i>	5.29	
23 21 13 23-0197 EA 2" x 2-1/2" Long, Schedule 40 Black Steel Nipple	41.86	15.12
<i>For Schedule 80 Nipples, Add</i>	9.56	
<i>For Work In Restricted Working Space, Add</i>	6.82	
23 21 13 23-0198 EA 3/8" x 3" Long, Schedule 40 Black Steel Nipple.....	23.14	10.04
<i>For Schedule 80 Nipples, Add</i>	4.02	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0199 EA 1/2" x 3" Long, Schedule 40 Black Steel Nipple.....	20.61	10.04
<i>For Schedule 80 Nipples, Add</i>	2.76	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0200 EA 3/4" x 3" Long, Schedule 40 Black Steel Nipple.....	21.59	10.04
<i>For Schedule 80 Nipples, Add</i>	3.25	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0201 EA 1" x 3" Long, Schedule 40 Black Steel Nipple.....	25.29	10.89
<i>For Schedule 80 Nipples, Add</i>	4.51	
<i>For Work In Restricted Working Space, Add</i>	4.88	
23 21 13 23-0202 EA 1-1/4" x 3" Long, Schedule 40 Black Steel Nipple	29.45	11.74
<i>For Schedule 80 Nipples, Add</i>	5.92	
<i>For Work In Restricted Working Space, Add</i>	5.29	
23 21 13 23-0203 EA 1-1/2" x 3" Long, Schedule 40 Black Steel Nipple	32.38	11.74
<i>For Schedule 80 Nipples, Add</i>	7.38	
<i>For Work In Restricted Working Space, Add</i>	5.29	
23 21 13 23-0204 EA 2" x 3" Long, Schedule 40 Black Steel Nipple.....	41.86	15.12
<i>For Schedule 80 Nipples, Add</i>	9.56	
<i>For Work In Restricted Working Space, Add</i>	6.82	
23 21 13 23-0205 EA 2-1/2" x 3" Long, Schedule 40 Black Steel Nipple	81.72	18.82
<i>For Schedule 80 Nipples, Add</i>	26.76	
<i>For Work In Restricted Working Space, Add</i>	8.46	
23 21 13 23-0206 EA 3" x 3" Long, Schedule 40 Black Steel Nipple.....	101.47	22.73
<i>For Schedule 80 Nipples, Add</i>	33.68	
<i>For Work In Restricted Working Space, Add</i>	10.23	
23 21 13 23-0207 EA 3/8" x 3-1/2" Long, Schedule 40 Black Steel Nipple	24.58	10.04
<i>For Schedule 80 Nipples, Add</i>	4.74	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0208 EA 1/2" x 3-1/2" Long, Schedule 40 Black Steel Nipple	21.70	10.04
<i>For Schedule 80 Nipples, Add</i>	3.30	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0209 EA 3/4" x 3-1/2" Long, Schedule 40 Black Steel Nipple	23.14	10.04
<i>For Schedule 80 Nipples, Add</i>	4.02	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0210 EA 1" x 3-1/2" Long, Schedule 40 Black Steel Nipple	27.41	10.89
<i>For Schedule 80 Nipples, Add</i>	5.57	
<i>For Work In Restricted Working Space, Add</i>	4.88	
23 21 13 23-0211 EA 1-1/4" x 3-1/2" Long, Schedule 40 Black Steel Nipple	31.63	11.74
<i>For Schedule 80 Nipples, Add</i>	7.01	
<i>For Work In Restricted Working Space, Add</i>	5.29	
23 21 13 23-0212 EA 1-1/2" x 3-1/2" Long, Schedule 40 Black Steel Nipple	34.16	11.74
<i>For Schedule 80 Nipples, Add</i>	8.27	
<i>For Work In Restricted Working Space, Add</i>	5.29	
23 21 13 23-0213 EA 2" x 3-1/2" Long, Schedule 40 Black Steel Nipple	45.88	15.12
<i>For Schedule 80 Nipples, Add</i>	11.57	
<i>For Work In Restricted Working Space, Add</i>	6.82	
23 21 13 23-0214 EA 2-1/2" x 3-1/2" Long, Schedule 40 Black Steel Nipple	91.14	18.82
<i>For Schedule 80 Nipples, Add</i>	31.47	
<i>For Work In Restricted Working Space, Add</i>	8.46	
23 21 13 23-0215 EA 3" x 3-1/2" Long, Schedule 40 Black Steel Nipple	113.87	22.73
<i>For Schedule 80 Nipples, Add</i>	39.88	
<i>For Work In Restricted Working Space, Add</i>	10.23	
23 21 13 23-0216 EA 3/8" x 4" Long, Schedule 40 Black Steel Nipple.....	24.58	10.04
<i>For Schedule 80 Nipples, Add</i>	4.74	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0217 EA 1/2" x 4" Long, Schedule 40 Black Steel Nipple.....	21.70	10.04
<i>For Schedule 80 Nipples, Add</i>	3.30	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0218 EA 3/4" x 4" Long, Schedule 40 Black Steel Nipple.....	23.14	10.04
<i>For Schedule 80 Nipples, Add</i>	4.02	
<i>For Work In Restricted Working Space, Add</i>	4.53	
23 21 13 23-0219 EA 1" x 4" Long, Schedule 40 Black Steel Nipple.....	27.41	10.89
<i>For Schedule 80 Nipples, Add</i>	5.57	
<i>For Work In Restricted Working Space, Add</i>	4.88	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-0220	EA	1-1/4" x 4" Long, Schedule 40 Black Steel Nipple	31.63		11.74
		<i>For Schedule 80 Nipples, Add</i>	7.01		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0221	EA	1-1/2" x 4" Long, Schedule 40 Black Steel Nipple	34.16		11.74
		<i>For Schedule 80 Nipples, Add</i>	8.27		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0222	EA	2" x 4" Long, Schedule 40 Black Steel Nipple	45.88		15.12
		<i>For Schedule 80 Nipples, Add</i>	11.57		
		<i>For Work In Restricted Working Space, Add</i>	6.82		
23 21 13 23-0223	EA	2-1/2" x 4" Long, Schedule 40 Black Steel Nipple	91.14		18.82
		<i>For Schedule 80 Nipples, Add</i>	31.47		
		<i>For Work In Restricted Working Space, Add</i>	8.46		
23 21 13 23-0224	EA	3" x 4" Long, Schedule 40 Black Steel Nipple	113.87		22.73
		<i>For Schedule 80 Nipples, Add</i>	39.88		
		<i>For Work In Restricted Working Space, Add</i>	10.23		
23 21 13 23-0225	EA	4" x 4" Long, Schedule 40 Black Steel Nipple	149.33		27.61
		<i>For Schedule 80 Nipples, Add</i>	53.98		
		<i>For Work In Restricted Working Space, Add</i>	12.41		
23 21 13 23-0226	EA	3/8" x 4-1/2" Long, Schedule 40 Black Steel Nipple	28.77		10.04
		<i>For Schedule 80 Nipples, Add</i>	6.84		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0227	EA	1/2" x 4-1/2" Long, Schedule 40 Black Steel Nipple	22.85		10.04
		<i>For Schedule 80 Nipples, Add</i>	3.88		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0228	EA	3/4" x 4-1/2" Long, Schedule 40 Black Steel Nipple	25.21		10.04
		<i>For Schedule 80 Nipples, Add</i>	5.06		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0229	EA	1" x 4-1/2" Long, Schedule 40 Black Steel Nipple	29.48		10.89
		<i>For Schedule 80 Nipples, Add</i>	6.61		
		<i>For Work In Restricted Working Space, Add</i>	4.88		
23 21 13 23-0230	EA	1-1/4" x 4-1/2" Long, Schedule 40 Black Steel Nipple	34.39		11.74
		<i>For Schedule 80 Nipples, Add</i>	8.39		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0231	EA	1-1/2" x 4-1/2" Long, Schedule 40 Black Steel Nipple	37.83		11.74
		<i>For Schedule 80 Nipples, Add</i>	10.11		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0232	EA	2" x 4-1/2" Long, Schedule 40 Black Steel Nipple	49.39		15.12
		<i>For Schedule 80 Nipples, Add</i>	13.33		
		<i>For Work In Restricted Working Space, Add</i>	6.82		
23 21 13 23-0233	EA	2-1/2" x 4-1/2" Long, Schedule 40 Black Steel Nipple	97.34		18.82
		<i>For Schedule 80 Nipples, Add</i>	34.57		
		<i>For Work In Restricted Working Space, Add</i>	8.46		
23 21 13 23-0234	EA	3" x 4-1/2" Long, Schedule 40 Black Steel Nipple	122.08		22.73
		<i>For Schedule 80 Nipples, Add</i>	43.99		
		<i>For Work In Restricted Working Space, Add</i>	10.23		
23 21 13 23-0235	EA	4" x 4-1/2" Long, Schedule 40 Black Steel Nipple	164.72		27.61
		<i>For Schedule 80 Nipples, Add</i>	61.68		
		<i>For Work In Restricted Working Space, Add</i>	12.41		
23 21 13 23-0236	EA	3/8" x 5" Long, Schedule 40 Black Steel Nipple	28.77		10.04
		<i>For Schedule 80 Nipples, Add</i>	6.84		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0237	EA	1/2" x 5" Long, Schedule 40 Black Steel Nipple	22.85		10.04
		<i>For Schedule 80 Nipples, Add</i>	3.88		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0238	EA	3/4" x 5" Long, Schedule 40 Black Steel Nipple	25.21		10.04
		<i>For Schedule 80 Nipples, Add</i>	5.06		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0239	EA	1" x 5" Long, Schedule 40 Black Steel Nipple	29.48		10.89
		<i>For Schedule 80 Nipples, Add</i>	6.61		
		<i>For Work In Restricted Working Space, Add</i>	4.88		
23 21 13 23-0240	EA	1-1/4" x 5" Long, Schedule 40 Black Steel Nipple	34.39		11.74
		<i>For Schedule 80 Nipples, Add</i>	8.39		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0241	EA	1-1/2" x 5" Long, Schedule 40 Black Steel Nipple	37.83		11.74
		<i>For Schedule 80 Nipples, Add</i>	10.11		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0242	EA	2" x 5" Long, Schedule 40 Black Steel Nipple	49.39		15.12
		<i>For Schedule 80 Nipples, Add</i>	13.33		
		<i>For Work In Restricted Working Space, Add</i>	6.82		
23 21 13 23-0243	EA	2-1/2" x 5" Long, Schedule 40 Black Steel Nipple	97.34		18.82
		<i>For Schedule 80 Nipples, Add</i>	34.57		
		<i>For Work In Restricted Working Space, Add</i>	8.46		
23 21 13 23-0244	EA	3" x 5" Long, Schedule 40 Black Steel Nipple	122.08		22.73
		<i>For Schedule 80 Nipples, Add</i>	43.99		
		<i>For Work In Restricted Working Space, Add</i>	10.23		
23 21 13 23-0245	EA	4" x 5" Long, Schedule 40 Black Steel Nipple	164.72		27.61
		<i>For Schedule 80 Nipples, Add</i>	61.68		
		<i>For Work In Restricted Working Space, Add</i>	12.41		
23 21 13 23-0246	EA	3/8" x 6" Long, Schedule 40 Black Steel Nipple	30.32		10.04
		<i>For Schedule 80 Nipples, Add</i>	7.61		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0247	EA	1/2" x 6" Long, Schedule 40 Black Steel Nipple	23.77		10.04
		<i>For Schedule 80 Nipples, Add</i>	4.34		
		<i>For Work In Restricted Working Space, Add</i>	4.53		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0248 EA 3/4" x 6" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	26.58 5.74 4.53	10.04
23 21 13 23-0249 EA 1" x 6" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	31.89 7.81 4.88	10.89
23 21 13 23-0250 EA 1-1/4" x 6" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	37.49 9.94 5.29	11.74
23 21 13 23-0251 EA 1-1/2" x 6" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	40.82 11.60 5.29	11.74
23 21 13 23-0252 EA 2" x 6" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	53.98 15.62 6.82	15.12
23 21 13 23-0253 EA 2-1/2" x 6" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	100.27 36.04 8.46	18.82
23 21 13 23-0254 EA 3" x 6" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	129.72 47.81 10.23	22.73
23 21 13 23-0255 EA 4" x 6" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	173.22 65.93 12.41	27.61
23 21 13 23-0256 EA 3/8" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	41.80 13.35 4.53	10.04
23 21 13 23-0257 EA 1/2" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	30.72 7.81 4.53	10.04
23 21 13 23-0258 EA 3/4" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	34.22 9.56 4.53	10.04
23 21 13 23-0259 EA 1" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	41.82 12.78 4.88	10.89
23 21 13 23-0260 EA 1-1/4" x 8" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	49.72 16.05 5.29	11.74
23 21 13 23-0261 EA 1-1/2" x 8" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	54.43 18.41 5.29	11.74
23 21 13 23-0262 EA 2" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	75.11 26.19 6.82	15.12
23 21 13 23-0263 EA 2-1/2" x 8" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	119.91 45.86 8.46	18.82
23 21 13 23-0264 EA 3" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	163.09 64.49 10.23	22.73
23 21 13 23-0265 EA 4" x 8" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	193.55 76.09 12.41	27.61
23 21 13 23-0266 EA 3/8" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	45.08 14.99 4.53	10.04
23 21 13 23-0267 EA 1/2" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	33.88 9.39 4.53	10.04
23 21 13 23-0268 EA 3/4" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	37.32 11.11 4.53	10.04
23 21 13 23-0269 EA 1" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	46.13 14.93 4.88	10.89
23 21 13 23-0270 EA 1-1/4" x 10" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	56.09 19.24 5.29	11.74
23 21 13 23-0271 EA 1-1/2" x 10" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	60.69 21.54 5.29	11.74
23 21 13 23-0272 EA 2" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	84.30 30.78 6.82	15.12
23 21 13 23-0273 EA 2-1/2" x 10" Long, Schedule 40 Black Steel Nipple <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	131.22 51.51 8.46	18.82
23 21 13 23-0274 EA 3" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	178.99 72.44 10.23	22.73
23 21 13 23-0275 EA 4" x 10" Long, Schedule 40 Black Steel Nipple..... <i>For Schedule 80 Nipples, Add</i> <i>For Work In Restricted Working Space, Add</i>	214.68 86.66 12.41	27.61

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-0276	EA	3/8" x 12" Long, Schedule 40 Black Steel Nipple.....	49.21		10.04
		<i>For Schedule 80 Nipples, Add</i>	17.06		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0277	EA	1/2" x 12" Long, Schedule 40 Black Steel Nipple.....	37.38		10.04
		<i>For Schedule 80 Nipples, Add</i>	11.14		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0278	EA	3/4" x 12" Long, Schedule 40 Black Steel Nipple.....	39.79		10.04
		<i>For Schedule 80 Nipples, Add</i>	12.35		
		<i>For Work In Restricted Working Space, Add</i>	4.53		
23 21 13 23-0279	EA	1" x 12" Long, Schedule 40 Black Steel Nipple.....	50.55		10.89
		<i>For Schedule 80 Nipples, Add</i>	17.14		
		<i>For Work In Restricted Working Space, Add</i>	4.88		
23 21 13 23-0280	EA	1-1/4" x 12" Long, Schedule 40 Black Steel Nipple	61.26		11.74
		<i>For Schedule 80 Nipples, Add</i>	21.82		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0281	EA	1-1/2" x 12" Long, Schedule 40 Black Steel Nipple	67.24		11.74
		<i>For Schedule 80 Nipples, Add</i>	24.81		
		<i>For Work In Restricted Working Space, Add</i>	5.29		
23 21 13 23-0282	EA	2" x 12" Long, Schedule 40 Black Steel Nipple.....	93.60		15.12
		<i>For Schedule 80 Nipples, Add</i>	35.43		
		<i>For Work In Restricted Working Space, Add</i>	6.82		
23 21 13 23-0283	EA	2-1/2" x 12" Long, Schedule 40 Black Steel Nipple	142.82		18.82
		<i>For Schedule 80 Nipples, Add</i>	57.31		
		<i>For Work In Restricted Working Space, Add</i>	8.46		
23 21 13 23-0284	EA	3" x 12" Long, Schedule 40 Black Steel Nipple.....	194.90		22.73
		<i>For Schedule 80 Nipples, Add</i>	80.40		
		<i>For Work In Restricted Working Space, Add</i>	10.23		
23 21 13 23-0285	EA	4" x 12" Long, Schedule 40 Black Steel Nipple.....	244.54		27.61
		<i>For Schedule 80 Nipples, Add</i>	101.59		
		<i>For Work In Restricted Working Space, Add</i>	12.41		
23 21 13 23-0286		Black Malleable Iron Bushing (23 21 13 23-0014)			
23 21 13 23-0287	EA	1/2" x 3/8", 150 LB, Black Malleable Iron Bushing.....	33.47		17.24
		<i>For Work In Restricted Working Space, Add</i>	7.75		
23 21 13 23-0288	EA	3/4" x 3/8", 150 LB, Black Malleable Iron Bushing.....	38.76		18.51
		<i>For Work In Restricted Working Space, Add</i>	8.33		
23 21 13 23-0289	EA	3/4" x 1/2", 150 LB, Black Malleable Iron Bushing.....	40.88		19.88
		<i>For Work In Restricted Working Space, Add</i>	8.96		
23 21 13 23-0290	EA	1" x 3/8", 150 LB, Black Malleable Iron Bushing.....	44.78		19.78
		<i>For Work In Restricted Working Space, Add</i>	8.88		
23 21 13 23-0291	EA	1" x 1/2", 150 LB, Black Malleable Iron Bushing.....	43.06		21.15
		<i>For Work In Restricted Working Space, Add</i>	9.52		
23 21 13 23-0292	EA	1" x 3/4", 150 LB, Black Malleable Iron Bushing.....	44.74		22.30
		<i>For Work In Restricted Working Space, Add</i>	10.02		
23 21 13 23-0293	EA	1-1/4" x 3/8", 150 LB, Black Malleable Iron Bushing.....	48.95		21.26
		<i>For Work In Restricted Working Space, Add</i>	9.58		
23 21 13 23-0294	EA	1-1/4" x 1/2", 150 LB, Black Malleable Iron Bushing.....	50.29		22.73
		<i>For Work In Restricted Working Space, Add</i>	10.21		
23 21 13 23-0295	EA	1-1/4" x 3/4", 150 LB, Black Malleable Iron Bushing.....	50.35		23.79
		<i>For Work In Restricted Working Space, Add</i>	10.72		
23 21 13 23-0296	EA	1-1/4" x 1", 150 LB, Black Malleable Iron Bushing.....	52.20		25.05
		<i>For Work In Restricted Working Space, Add</i>	11.27		
23 21 13 23-0297	EA	1-1/2" x 3/8", 150 LB, Black Malleable Iron Bushing.....	56.92		23.05
		<i>For Work In Restricted Working Space, Add</i>	10.34		
23 21 13 23-0298	EA	1-1/2" x 1/2", 150 LB, Black Malleable Iron Bushing.....	55.09		24.42
		<i>For Work In Restricted Working Space, Add</i>	10.98		
23 21 13 23-0299	EA	1-1/2" x 3/4", 150 LB, Black Malleable Iron Bushing.....	56.77		25.48
		<i>For Work In Restricted Working Space, Add</i>	11.48		
23 21 13 23-0300	EA	1-1/2" x 1", 150 LB, Black Malleable Iron Bushing.....	56.37		26.75
		<i>For Work In Restricted Working Space, Add</i>	12.04		
23 21 13 23-0301	EA	1-1/2" x 1-1/4", 150 LB, Black Malleable Iron Bushing.....	61.00		28.34
		<i>For Work In Restricted Working Space, Add</i>	12.73		
23 21 13 23-0302	EA	2" x 3/8", 150 LB, Black Malleable Iron Bushing.....	72.26		27.07
		<i>For Work In Restricted Working Space, Add</i>	12.17		
23 21 13 23-0303	EA	2" x 1/2", 150 LB, Black Malleable Iron Bushing.....	70.62		28.44
		<i>For Work In Restricted Working Space, Add</i>	12.80		
23 21 13 23-0304	EA	2" x 3/4", 150 LB, Black Malleable Iron Bushing.....	68.00		29.61
		<i>For Work In Restricted Working Space, Add</i>	13.31		
23 21 13 23-0305	EA	2" x 1", 150 LB, Black Malleable Iron Bushing.....	68.34		30.77
		<i>For Work In Restricted Working Space, Add</i>	13.86		
23 21 13 23-0306	EA	2" x 1-1/4", 150 LB, Black Malleable Iron Bushing.....	70.67		32.36
		<i>For Work In Restricted Working Space, Add</i>	14.56		
23 21 13 23-0307	EA	2" x 1-1/2", 150 LB, Black Malleable Iron Bushing.....	75.72		34.04
		<i>For Work In Restricted Working Space, Add</i>	15.32		
23 21 13 23-0308	EA	2-1/2" x 3/4", 150 LB, Black Malleable Iron Bushing.....	98.33		38.70
		<i>For Work In Restricted Working Space, Add</i>	17.42		
23 21 13 23-0309	EA	2-1/2" x 1", 150 LB, Black Malleable Iron Bushing.....	100.17		39.97
		<i>For Work In Restricted Working Space, Add</i>	17.98		
23 21 13 23-0310	EA	2-1/2" x 1-1/4", 150 LB, Black Malleable Iron Bushing.....	102.50		41.45
		<i>For Work In Restricted Working Space, Add</i>	18.68		
23 21 13 23-0311	EA	2-1/2" x 1-1/2", 150 LB, Black Malleable Iron Bushing.....	102.29		43.25
		<i>For Work In Restricted Working Space, Add</i>	19.44		
23 21 13 23-0312	EA	2-1/2" x 2", 150 LB, Black Malleable Iron Bushing.....	108.06		47.26
		<i>For Work In Restricted Working Space, Add</i>	21.26		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0313 EA 3" x 3/4", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	127.10 21.43	47.58
23 21 13 23-0314 EA 3" x 1", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	128.93 21.98	48.85
23 21 13 23-0315 EA 3" x 1-1/4", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	131.26 22.68	50.43
23 21 13 23-0316 EA 3" x 1-1/2", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	132.73 23.45	52.12
23 21 13 23-0317 EA 3" x 2", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	135.24 25.27	56.14
23 21 13 23-0318 EA 3" x 2-1/2", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	149.71 29.38	65.34
23 21 13 23-0319 EA 4" x 3/4", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	182.52 22.73	50.46
23 21 13 23-0320 EA 4" x 1", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	184.31 23.27	51.70
23 21 13 23-0321 EA 4" x 1-1/4", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	186.59 23.95	53.25
23 21 13 23-0322 EA 4" x 1-1/2", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	189.08 24.70	54.91
23 21 13 23-0323 EA 4" x 2", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	189.29 26.48	58.84
23 21 13 23-0324 EA 4" x 2-1/2", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	202.70 30.50	67.83
23 21 13 23-0325 EA 4" x 3", 150 LB, Black Malleable Iron Bushing..... <i>For Work In Restricted Working Space, Add</i>	215.77 34.43	76.52
 23 21 13 23-0326 Black Malleable Iron Square Head Plugs (23 21 13 23-0014)		
23 21 13 23-0327 EA 3/8", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	15.23 2.82	6.24
23 21 13 23-0328 EA 1/2", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	17.50 3.38	7.51
23 21 13 23-0329 EA 3/4", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	18.84 3.79	8.46
23 21 13 23-0330 EA 1", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	21.91 4.23	9.41
23 21 13 23-0331 EA 1-1/4", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	25.81 4.79	10.68
23 21 13 23-0332 EA 1-1/2", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	31.73 5.40	11.95
23 21 13 23-0333 EA 2", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	42.39 6.86	15.22
23 21 13 23-0334 EA 2-1/2", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	69.37 10.15	22.52
23 21 13 23-0335 EA 3", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	93.32 13.36	29.71
23 21 13 23-0336 EA 4", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	150.61 14.48	32.16
23 21 13 23-0337 EA 5", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	270.19 15.11	33.60
23 21 13 23-0338 EA 6", 150 LB, Black Malleable Iron Square Head Plug..... <i>For Work In Restricted Working Space, Add</i>	324.93 15.80	35.05
 23 21 13 23-0339 125 LB Black Cast Iron Screwed Flanges (23 21 13 23-0014)		
Note: Excludes bolt and gasket sets See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.		
23 21 13 23-0340 EA 3/4", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	174.87 19.03	42.29
23 21 13 23-0341 EA 1", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	142.55 21.50	47.79
23 21 13 23-0342 EA 1-1/4", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	158.98 22.26	49.49
23 21 13 23-0343 EA 1-1/2", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	159.07 24.22	53.82
23 21 13 23-0344 EA 2", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	162.43 25.28	56.14
23 21 13 23-0345 EA 2-1/2", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	188.90 29.23	65.03
23 21 13 23-0346 EA 3", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	241.49 37.10	82.47
23 21 13 23-0347 EA 4", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	324.26 49.64	110.34
23 21 13 23-0348 EA 5", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	421.29 59.09	131.43
23 21 13 23-0349 EA 6", 125 LB, Black Cast Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	480.02 67.86	150.87
 23 21 13 23-0350 150 LB, Black Malleable Iron Flanges (23 21 13 23-0014)		
Note: Excludes bolt and gasket sets See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.		
23 21 13 23-0351 EA 1/2", 150 LB, Black Malleable Iron Flange..... <i>For Work In Restricted Working Space, Add</i>	82.58 17.38	38.59

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 20 HVAC Piping and Pumps

23 21 Hydronic Piping and Pumps



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0352	EA		3/4", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	90.00 19.03	42.29
23 21 13 23-0353	EA		1", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	106.18 21.50	47.79
23 21 13 23-0354	EA		1-1/4", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	111.09 22.26	49.49
23 21 13 23-0355	EA		1-1/2", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	120.97 24.22	53.82
23 21 13 23-0356	EA		2", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	136.72 25.27	56.14
23 21 13 23-0357	EA		2-1/2", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	179.75 29.23	65.03
23 21 13 23-0358	EA		3", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	227.67 37.09	82.47
23 21 13 23-0359	EA		4", 150 LB, Black Malleable Iron Flange <i>For Work In Restricted Working Space, Add</i>	342.13 49.62	110.34
23 21 13 23-0360 Welded Black Steel Pipe (23 21 13 23)					
23 21 13 23-0361 Welded Plain End Black Steel Pipe Assemblies (23 21 13 23-0360)					
Note: ASTM A-53 pipe and A-234 WPB fittings. Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available.					
23 21 13 23-0362	LF		3/4" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	30.25 5.88	8.05
23 21 13 23-0363	LF		1" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	34.40 6.59	8.59
23 21 13 23-0364	LF		1-1/4" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	42.97 7.56	9.12
23 21 13 23-0365	LF		1-1/2" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	47.85 7.91	9.12
23 21 13 23-0366	LF		2" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	55.07 9.15	9.12
23 21 13 23-0367	LF		2-1/2" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	63.73 10.61	9.12
23 21 13 23-0368	LF		3" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	80.47 11.19	8.90
23 21 13 23-0369	LF		4" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	113.72 14.14	11.39
23 21 13 23-0370	LF		6" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	165.24 16.28	16.98
23 21 13 23-0371	LF		8" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	249.74 24.15	21.10
23 21 13 23-0372	LF		10" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	340.02 28.80	26.37
23 21 13 23-0373	LF		12" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	435.56 33.28	31.85
23 21 13 23-0374	LF		14" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	448.83 37.13	41.56
23 21 13 23-0375	LF		16" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	516.09 41.49	52.74
23 21 13 23-0376	LF		18" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... <i>For Work In Restricted Working Space, Add</i>	672.37 45.52	65.29

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0377 LF 20" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i>	831.70 52.11	80.69
23 21 13 23-0378 LF 24" Schedule 40 Welded Plain End Black Steel Pipe And Fitting Assembly..... Note: Includes all hangers and all fittings (couplings, elbows, tees and reducer fittings). All hangers are complete assemblies. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i>	1,040.45 57.29	91.45
23 21 13 23-0379 Welded Black Steel Pipe And Fittings <small>(23 21 13 23-0360)</small> Note: ASTM A-53 pipe and A-234 WPB fittings. Excludes hangers or fittings.		
23 21 13 23-0380 Welded Plain End (A-53) Black Steel Piping <small>(23 21 13 23-0379)</small>		
23 21 13 23-0381 LF 3/4" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 80 Pipe, Add</i> <i>For Work In Restricted Working Space, Add</i>	14.93 2.56 2.58	4.29
23 21 13 23-0382 LF 1" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 80 Pipe, Add</i> <i>For Work In Restricted Working Space, Add</i>	19.16 3.30 3.22	5.37
23 21 13 23-0383 LF 1-1/4" Schedule 40, Welded Plain End Black Steel Pipe..... <i>For Schedule 80 Pipe, Add</i> <i>For Work In Restricted Working Space, Add</i>	25.24 4.40 3.86	6.44
23 21 13 23-0384 LF 1-1/2" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 80 Pipe, Add</i> <i>For Work In Restricted Working Space, Add</i>	31.45 5.54 4.51	7.51
23 21 13 23-0385 LF 2" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 80 Pipe, Add</i> <i>For Work In Restricted Working Space, Add</i>	37.47 6.60 5.34	8.90
23 21 13 23-0386 LF 2-1/2" Schedule 40, Welded Plain End Black Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	43.10 6.05 11.56	10.09
23 21 13 23-0387 LF 3" Schedule 40, Welded Plain End Black Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	58.07 6.50 16.53	10.84
23 21 13 23-0388 LF 4" Schedule 40, Welded Plain End Black Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	85.17 8.05 25.11	13.41
23 21 13 23-0389 LF 6" Schedule 40, Welded Plain End Black Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	131.05 9.98 40.05	21.72
23 21 13 23-0390 LF 8" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 30 Pipe, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	192.78 -34.02 13.61 59.54	22.67
23 21 13 23-0391 LF 10" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 30 Pipe, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	263.31 -47.20 16.39 82.60	27.32
23 21 13 23-0392 LF 12" Schedule 40, Welded Plain End Black Steel Pipe <i>For Schedule 30 Pipe, Deduct</i> <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 Pipe, Add</i>	341.98 -61.79 19.81 108.14	33.01
23 21 13 23-0393 Welded Plain End (A-106) Seamless Carbon Steel Piping <small>(23 21 13 23-0379)</small>		
23 21 13 23-0394 LF 1/4" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe..... <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	10.96 1.80 2.73	3.01
23 21 13 23-0395 LF 1/2" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe..... <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	11.08 1.96 2.66	3.32
23 21 13 23-0396 LF 3/4" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe..... <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	14.00 2.58 3.29	4.29
23 21 13 23-0397 LF 1" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe..... <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	17.16 3.22 3.99	5.37
23 21 13 23-0398 LF 1-1/4" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	21.68 3.86 5.19	6.44
23 21 13 23-0399 LF 1-1/2" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	25.32 4.51 6.06	7.51
23 21 13 23-0400 LF 2" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe..... <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	30.09 5.34 7.22	8.90
23 21 13 23-0401 LF 2-1/2" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	39.81 6.05 14.02	10.09
23 21 13 23-0402 LF 3" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe..... <i>For Work In Restricted Working Space, Add</i> <i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	45.71 6.50 16.71	10.84

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-0403	LF	4" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	56.83		13.41
		<i>For Work In Restricted Working Space, Add</i>	8.05		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	20.82		
23 21 13 23-0404	LF	6" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	89.15		21.79
		<i>For Work In Restricted Working Space, Add</i>	9.98		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	36.28		
23 21 13 23-0405	LF	8" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	129.46		22.67
		<i>For Work In Restricted Working Space, Add</i>	13.61		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	53.90		
23 21 13 23-0406	LF	10" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	174.58		27.32
		<i>For Work In Restricted Working Space, Add</i>	16.39		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	75.36		
23 21 13 23-0407	LF	12" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	212.88		33.01
		<i>For Work In Restricted Working Space, Add</i>	19.81		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	92.14		
23 21 13 23-0408	LF	14" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	250.21		34.81
		<i>For Work In Restricted Working Space, Add</i>	20.88		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	111.58		
23 21 13 23-0409	LF	16" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	289.22		37.44
		<i>For Work In Restricted Working Space, Add</i>	22.47		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	131.26		
23 21 13 23-0410	LF	18" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	351.40		40.51
		<i>For Work In Restricted Working Space, Add</i>	24.30		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	163.57		
23 21 13 23-0411	LF	20" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	423.50		48.52
		<i>For Work In Restricted Working Space, Add</i>	29.11		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	197.37		
23 21 13 23-0412	LF	24" Schedule 40, Welded Plain End (A-106) Seamless, Carbon Steel Pipe.....	534.55		55.79
		<i>For Work In Restricted Working Space, Add</i>	33.48		
		<i>For Schedule 80 (A-106) Carbon Steel Pipe, Add</i>	253.59		
23 21 13 23-0413		Welded Plain End Black Steel 90 Degree Elbows <small>(23 21 13 23-0379)</small>			
23 21 13 23-0414	EA	3/4" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	122.65		66.87
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	26.27		
		<i>For Work In Restricted Working Space, Add</i>	30.06		
23 21 13 23-0415	EA	1" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	127.90		70.35
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	27.30		
		<i>For Work In Restricted Working Space, Add</i>	31.64		
23 21 13 23-0416	EA	1-1/4" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	142.66		80.16
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	30.17		
		<i>For Work In Restricted Working Space, Add</i>	36.07		
23 21 13 23-0417	EA	1-1/2" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	152.16		86.49
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	32.03		
		<i>For Work In Restricted Working Space, Add</i>	38.92		
23 21 13 23-0418	EA	2" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	191.17		112.54
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	39.63		
		<i>For Work In Restricted Working Space, Add</i>	50.62		
23 21 13 23-0419	EA	2-1/2" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	240.83		140.70
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	50.10		
		<i>For Work In Restricted Working Space, Add</i>	63.27		
23 21 13 23-0420	EA	3" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	253.17		145.07
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	53.12		
		<i>For Work In Restricted Working Space, Add</i>	65.22		
23 21 13 23-0421	EA	4" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	434.92		250.64
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	91.02		
		<i>For Work In Restricted Working Space, Add</i>	112.74		
23 21 13 23-0422	EA	6" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	765.60		413.62
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	164.56		
		<i>For Work In Restricted Working Space, Add</i>	186.06		
23 21 13 23-0423	EA	8" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	1,126.85		571.58
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	248.07		
		<i>For Work In Restricted Working Space, Add</i>	257.10		
23 21 13 23-0424	EA	10" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	1,474.87		653.32
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	339.62		
		<i>For Work In Restricted Working Space, Add</i>	293.83		
23 21 13 23-0425	EA	12" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	1,999.91		854.78
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	465.42		
		<i>For Work In Restricted Working Space, Add</i>	384.45		
23 21 13 23-0426		Welded Plain End Black Steel Reducing 90 Degree Elbows <small>(23 21 13 23-0379)</small>			
23 21 13 23-0427	EA	4" x 3" 90 Standard Weight, Welded Plain End Black Steel Reducing 90 Degree Elbow	619.72		251.07
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	146.39		
		<i>For Work In Restricted Working Space, Add</i>	112.94		
23 21 13 23-0428	EA	6" x 4" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	1,088.94		408.90
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	262.30		
		<i>For Work In Restricted Working Space, Add</i>	183.94		
23 21 13 23-0429	EA	6" x 3" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	1,170.52		408.90
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	286.78		
		<i>For Work In Restricted Working Space, Add</i>	183.94		
23 21 13 23-0430	EA	8" x 6" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow	1,860.72		571.58
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	468.23		
		<i>For Work In Restricted Working Space, Add</i>	257.10		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0431 EA 8" x 4" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,055.24 526.59 257.10	571.58
23 21 13 23-0432 EA 10" x 8" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,583.79 672.30 293.83	653.32
23 21 13 23-0433 EA 10" x 6" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,583.79 672.30 293.83	653.32
23 21 13 23-0434 EA 12" x 10" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,284.64 1,148.27 391.77	871.03
23 21 13 23-0435 EA 12" x 8" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,284.64 1,148.27 391.77	871.03
23 21 13 23-0436 EA 12" x 6" Standard Weight, Welded Plain End Black Steel 90 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,813.75 1,307.01 391.77	871.03
23 21 13 23-0437 Welded Plain End Black Steel 45 Degree Elbows <small>(23 21 13 23-0379)</small>		
23 21 13 23-0438 EA 3/4" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	109.01 23.13 27.36	60.84
23 21 13 23-0439 EA 1" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	112.23 23.75 28.33	62.99
23 21 13 23-0440 EA 1-1/4" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	126.18 26.48 32.51	72.32
23 21 13 23-0441 EA 1-1/2" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	134.76 28.15 35.09	78.00
23 21 13 23-0442 EA 2" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	169.10 34.84 45.39	100.86
23 21 13 23-0443 EA 2-1/2" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	210.65 43.25 56.98	126.72
23 21 13 23-0444 EA 3" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	243.49 50.22 65.21	144.96
23 21 13 23-0445 EA 4" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	418.85 86.21 112.70	250.53
23 21 13 23-0446 EA 6" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	725.65 152.65 185.85	413.19
23 21 13 23-0447 EA 8" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,054.02 226.22 257.10	571.58
23 21 13 23-0448 EA 10" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,341.18 299.51 293.83	653.32
23 21 13 23-0449 EA 12" Standard Weight, Welded Plain End Black Steel 45 Degree Elbow <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,803.66 406.79 383.73	853.20
23 21 13 23-0450 Welded Plain End Black Steel Tee <small>(23 21 13 23-0379)</small>		
23 21 13 23-0451 EA 3/4" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	225.46 49.61 51.50	114.48
23 21 13 23-0452 EA 1" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	225.41 49.60 51.49	114.48
23 21 13 23-0453 EA 1-1/4" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	255.76 56.68 57.28	127.36
23 21 13 23-0454 EA 1-1/2" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	279.44 61.30 64.38	143.14
23 21 13 23-0455 EA 2" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	343.84 73.07 85.95	191.09
23 21 13 23-0456 EA 2-1/2" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	393.15 84.15 96.57	214.70
23 21 13 23-0457 EA 3" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	469.43 99.82 117.17	260.72
23 21 13 23-0458 EA 4" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	674.43 143.03 169.41	376.72

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0459 EA 6" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,132.71 241.85 279.90	622.32
23 21 13 23-0460 EA 8" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,675.66 365.58 391.77	871.03
23 21 13 23-0461 EA 10" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,143.52 483.08 457.06	1,016.16
23 21 13 23-0462 EA 12" Standard Weight, Welded Plain End Black Steel Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,901.78 664.86 587.65	1,306.53
23 21 13 23-0463 Welded Plain End Black Steel Reducing Tees (23 21 13 23-0379)		
23 21 13 23-0464 EA 3/4" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	220.10 48.57 49.89	110.94
23 21 13 23-0465 EA 1" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	225.41 49.60 51.49	114.48
23 21 13 23-0466 EA 1-1/4" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	252.32 55.65 57.28	127.36
23 21 13 23-0467 EA 1-1/2" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	276.00 60.27 64.38	143.14
23 21 13 23-0468 EA 2" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	351.56 75.38 85.97	191.09
23 21 13 23-0469 EA 2-1/2" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	393.26 84.17 96.60	214.81
23 21 13 23-0470 EA 3" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	469.79 99.93 117.17	260.72
23 21 13 23-0471 EA 4" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	674.94 143.19 169.41	376.72
23 21 13 23-0472 EA 6" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,133.58 242.11 279.90	622.32
23 21 13 23-0473 EA 8" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,677.33 366.08 391.77	871.03
23 21 13 23-0474 EA 10" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,146.35 483.93 457.06	1,016.16
23 21 13 23-0475 EA 12" Standard Weight, Welded Plain End Black Steel Reducing Tee <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,906.06 666.14 587.65	1,306.53
23 21 13 23-0476 Welded Plain End Black Steel Eccentric Reducers (23 21 13 23-0379)		
23 21 13 23-0477 EA 1" x 3/4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	150.44 34.15 31.38	69.77
23 21 13 23-0478 EA 1-1/4" x 1" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	160.63 36.14 34.44	76.56
23 21 13 23-0479 EA 1-1/4" x 3/4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	157.95 35.61 33.63	74.78
23 21 13 23-0480 EA 1-1/2" x 1-1/4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	172.97 38.54 38.14	84.79
23 21 13 23-0481 EA 1-1/2" x 1" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	165.45 37.08 35.88	79.78
23 21 13 23-0482 EA 1-1/2" x 3/4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	162.78 36.56 35.08	78.00
23 21 13 23-0483 EA 2" x 1-1/2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	179.58 37.93 45.54	101.24
23 21 13 23-0484 EA 2" x 1-1/4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	191.95 42.15 44.09	98.02
23 21 13 23-0485 EA 2" x 1" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	184.45 40.69 41.84	93.02
23 21 13 23-0486 EA 2-1/2" x 2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	225.31 47.32 57.93	128.80



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0487 EA 2-1/2" x 1-1/2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	211.01 45.11 51.98	115.55
23 21 13 23-0488 EA 2-1/2" x 1-1/4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	236.73 53.33 50.53	112.34
23 21 13 23-0489 EA 3" x 2-1/2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	252.03 52.85 65.03	144.53
23 21 13 23-0490 EA 3" x 2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	254.52 53.60 65.03	144.53
23 21 13 23-0491 EA 3" x 1-1/2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	259.80 55.18 65.03	144.53
23 21 13 23-0492 EA 4" x 3" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	422.58 87.24 112.94	251.07
23 21 13 23-0493 EA 4" x 2-1/2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	425.07 87.99 112.94	251.07
23 21 13 23-0494 EA 4" x 2" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	432.57 90.24 112.94	251.07
23 21 13 23-0495 EA 6" x 4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	708.09 148.05 183.94	408.90
23 21 13 23-0496 EA 6" x 3" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	761.96 164.21 183.94	408.90
23 21 13 23-0497 EA 8" x 6" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,054.09 218.26 279.91	622.32
23 21 13 23-0498 EA 8" x 4" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,154.33 248.33 279.91	622.32
23 21 13 23-0499 EA 10" x 8" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,231.52 256.80 321.89	715.66
23 21 13 23-0500 EA 10" x 6" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,352.03 292.95 321.89	715.66
23 21 13 23-0501 EA 10" x 4" Standard Weight, Welded Plain End Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Concentric Reducers, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	1,510.58 340.51 -140.04 321.89	715.66
23 21 13 23-0502 EA 12" x 10" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,550.82 328.39 391.02	869.33
23 21 13 23-0503 EA 12" x 8" Standard Weight, Welded Plain End, Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,691.61 370.62 391.02	869.33
23 21 13 23-0504 EA 12" x 6" Standard Weight, Welded Plain End Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Concentric Reducers, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	1,929.59 442.02 -200.37 391.03	869.33
23 21 13 23-0505 EA 12" x 4" Standard Weight, Welded Plain End Black Steel Eccentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Concentric Reducers, Deduct</i> <i>For Work In Restricted Working Space, Add</i>	1,546.84 327.19 -77.89 391.03	869.33
23 21 13 23-0506 Welded Plain End Black Steel Concentric Reducers (23 21 13 23-0379)		
23 21 13 23-0507 EA 1" x 3/4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	138.44 30.55 31.38	69.77
23 21 13 23-0508 EA 1-1/4" x 1" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	148.63 32.54 34.44	76.56
23 21 13 23-0509 EA 1-1/4" x 3/4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	145.95 32.01 33.63	74.78
23 21 13 23-0510 EA 1-1/2" x 1-1/4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	160.97 34.94 38.14	84.79
23 21 13 23-0511 EA 1-1/2" x 1" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	153.45 33.48 35.88	79.78
23 21 13 23-0512 EA 1-1/2" x 3/4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	150.78 32.96 35.08	78.00
23 21 13 23-0513 EA 2" x 1-1/2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer <i>For Schedule 80 Or Extra Heavy Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	173.47 36.10 45.54	101.24

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-0514	EA	2" x 1-1/4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	168.63		98.02
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	35.16		
		<i>For Work In Restricted Working Space, Add</i>	44.09		
23 21 13 23-0515	EA	2" x 1" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	169.46		93.02
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	36.19		
		<i>For Work In Restricted Working Space, Add</i>	41.84		
23 21 13 23-0516	EA	2-1/2" x 2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	220.87		128.80
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	45.99		
		<i>For Work In Restricted Working Space, Add</i>	57.93		
23 21 13 23-0517	EA	2-1/2" x 1-1/2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	208.52		115.55
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	44.36		
		<i>For Work In Restricted Working Space, Add</i>	51.98		
23 21 13 23-0518	EA	2-1/2" x 1-1/4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	215.62		112.34
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	47.00		
		<i>For Work In Restricted Working Space, Add</i>	50.53		
23 21 13 23-0519	EA	3" x 2-1/2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	239.25		144.53
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	49.02		
		<i>For Work In Restricted Working Space, Add</i>	65.03		
23 21 13 23-0520	EA	3" x 2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	240.92		144.53
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	49.52		
		<i>For Work In Restricted Working Space, Add</i>	65.03		
23 21 13 23-0521	EA	3" x 1-1/2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	244.53		144.53
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	50.60		
		<i>For Work In Restricted Working Space, Add</i>	65.03		
23 21 13 23-0522	EA	4" x 3" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	405.36		251.07
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	82.08		
		<i>For Work In Restricted Working Space, Add</i>	112.94		
23 21 13 23-0523	EA	4" x 2-1/2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	411.75		251.07
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	83.99		
		<i>For Work In Restricted Working Space, Add</i>	112.94		
23 21 13 23-0524	EA	4" x 2" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	411.75		251.07
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	83.99		
		<i>For Work In Restricted Working Space, Add</i>	112.94		
23 21 13 23-0525	EA	6" x 4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	673.67		408.90
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	137.72		
		<i>For Work In Restricted Working Space, Add</i>	183.94		
23 21 13 23-0526	EA	6" x 3" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	686.43		408.90
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	141.55		
		<i>For Work In Restricted Working Space, Add</i>	183.94		
23 21 13 23-0527	EA	6" x 6" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,012.44		622.32
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	205.76		
		<i>For Work In Restricted Working Space, Add</i>	279.91		
23 21 13 23-0528	EA	8" x 4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,035.21		622.32
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	212.60		
		<i>For Work In Restricted Working Space, Add</i>	279.91		
23 21 13 23-0529	EA	10" x 8" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,227.07		715.66
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	255.46		
		<i>For Work In Restricted Working Space, Add</i>	321.89		
23 21 13 23-0530	EA	10" x 6" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,217.63		715.66
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	252.63		
		<i>For Work In Restricted Working Space, Add</i>	321.89		
23 21 13 23-0531	EA	10" x 4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,336.48		715.66
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	288.28		
		<i>For Work In Restricted Working Space, Add</i>	321.89		
23 21 13 23-0532	EA	12" x 10" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,493.90		869.33
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	311.31		
		<i>For Work In Restricted Working Space, Add</i>	391.02		
23 21 13 23-0533	EA	12" x 8" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,522.44		869.33
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	319.87		
		<i>For Work In Restricted Working Space, Add</i>	391.02		
23 21 13 23-0534	EA	12" x 6" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,532.77		869.33
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	322.97		
		<i>For Work In Restricted Working Space, Add</i>	391.02		
23 21 13 23-0535	EA	12" x 4" Standard Weight, Welded Plain End, Black Steel Concentric Reducer.....	1,835.72		869.33
		<i>For Schedule 80 Or Extra Heavy Fittings, Add</i>	413.86		
		<i>For Work In Restricted Working Space, Add</i>	391.02		
23 21 13 23-0536	Welded Plain End Black Steel Caps <small>(23 21 13 23-0379)</small>				
23 21 13 23-0537	EA	1" Standard Weight, Welded Plain End Black Steel Cap.....	65.05		35.83
		<i>For Schedule 80 Fittings, Add</i>	12.81		
		<i>For Work In Restricted Working Space, Add</i>	16.10		
23 21 13 23-0538	EA	1-1/4" Standard Weight, Welded Plain End Black Steel Cap.....	71.12		39.38
		<i>For Schedule 80 Fittings, Add</i>	13.96		
		<i>For Work In Restricted Working Space, Add</i>	17.70		
23 21 13 23-0539	EA	1-1/2" Standard Weight, Welded Plain End Black Steel Cap.....	73.98		40.77
		<i>For Schedule 80 Fittings, Add</i>	14.55		
		<i>For Work In Restricted Working Space, Add</i>	18.35		
23 21 13 23-0540	EA	2" Standard Weight, Welded Plain End Black Steel Cap.....	91.81		52.25
		<i>For Schedule 80 Fittings, Add</i>	17.75		
		<i>For Work In Restricted Working Space, Add</i>	23.50		
23 21 13 23-0541	EA	2-1/2" Standard Weight, Welded Plain End Black Steel Cap.....	108.53		62.99
		<i>For Schedule 80 Fittings, Add</i>	20.76		
		<i>For Work In Restricted Working Space, Add</i>	28.33		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0542 EA 3" Standard Weight, Welded Plain End Black Steel Cap <i>For Schedule 80 Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	127.45 24.62 32.68	72.64
23 21 13 23-0543 EA 4" Standard Weight, Welded Plain End Black Steel Cap <i>For Schedule 80 Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	212.89 40.34 56.47	125.53
23 21 13 23-0544 EA 6" Standard Weight, Welded Plain End Black Steel Cap <i>For Schedule 80 Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	357.81 68.47 93.30	207.40
23 21 13 23-0545 EA 8" Standard Weight, Welded Plain End Black Steel Cap <i>For Schedule 80 Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	506.14 97.36 130.77	290.77
23 21 13 23-0546 EA 10" Standard Weight, Welded Plain End Black Steel Cap <i>For Schedule 80 Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	673.51 133.27 165.07	367.06
23 21 13 23-0547 EA 12" Standard Weight, Welded Plain End Black Steel Cap <i>For Schedule 80 Fittings, Add</i> <i>For Work In Restricted Working Space, Add</i>	791.88 157.84 191.33	425.39
23 21 13 23-0548 150 LB, Welded Plain End Black Steel Neck Flanges (23 21 13 23-0379) Note: Excludes bolt and gasket sets See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.		
23 21 13 23-0549 EA 2", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	159.89 39.76 36.39	80.90
23 21 13 23-0550 EA 2-1/2", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	189.96 42.91 45.41	100.96
23 21 13 23-0551 EA 3", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	211.70 45.22 51.92	115.45
23 21 13 23-0552 EA 4", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	277.53 58.44 68.49	152.26
23 21 13 23-0553 EA 6", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	421.88 89.37 103.84	230.90
23 21 13 23-0554 EA 8", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	489.23 121.96 111.18	247.24
23 21 13 23-0555 EA 10", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	638.15 170.14 139.44	310.00
23 21 13 23-0556 EA 12", 150 LB, Welded Plain End Black Steel Neck Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	780.13 232.30 158.21	351.76
23 21 13 23-0557 150 LB, Welded Black Steel Slip-On Flanges (23 21 13 23-0379) Note: Excludes bolt and gasket sets See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.		
23 21 13 23-0558 EA 2", 150 LB, Welded Black Steel Slip-On Flanges <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	123.14 28.97 34.05	80.90
23 21 13 23-0559 EA 2-1/2", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	152.15 35.41 43.10	100.96
23 21 13 23-0560 EA 3", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	179.65 41.85 50.79	115.45
23 21 13 23-0561 EA 4", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	237.19 54.72 68.46	152.26
23 21 13 23-0562 EA 6", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	352.56 80.47 104.05	230.90
23 21 13 23-0563 EA 8", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	465.80 101.26 150.89	247.24
23 21 13 23-0564 EA 10", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	643.35 126.57 243.60	310.00
23 21 13 23-0565 EA 12", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	855.69 151.89 367.62	351.76
23 21 13 23-0566 EA 14", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	1,101.15 177.20 521.45	425.39
23 21 13 23-0567 EA 16", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	1,341.27 196.19 687.25	494.37
23 21 13 23-0568 EA 18", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	1,487.89 215.17 768.90	554.27

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 21 13 23-0569	EA	20", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	1,656.48 234.16 870.32	703.53
23 21 13 23-0570	EA	24", 150 LB, Welded Black Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i> <i>For 300 LB Rating, Add</i>	1,891.31 272.13 981.04	762.17
23 21 13 23-0571		150 LB, Forged Steel Blind Flanges (23 21 13 23-0379)		
23 21 13 23-0572	EA	2", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	79.21 23.45 60.89 17.23	28.72
23 21 13 23-0573	EA	2-1/2", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	104.24 35.49 95.11 20.68	34.46
23 21 13 23-0574	EA	3", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	128.43 38.88 101.48 27.57	45.95
23 21 13 23-0575	EA	4", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	165.23 52.35 138.09 34.46	57.43
23 21 13 23-0576	EA	6", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	225.64 76.73 205.57 44.80	74.67
23 21 13 23-0577	EA	8", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	293.36 114.94 316.39 51.69	86.15
23 21 13 23-0578	EA	10", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	443.16 210.83 598.37 62.03	103.37
23 21 13 23-0579	EA	12", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For 600 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	575.82 293.01 839.22 72.37	120.61
23 21 13 23-0580	EA	14", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	964.58 580.07 82.70	137.84
23 21 13 23-0581	EA	16", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,036.29 613.49 93.04	155.07
23 21 13 23-0582	EA	18", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,167.76 670.76 113.72	189.52
23 21 13 23-0583	EA	20", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,493.39 907.32 124.06	206.76
23 21 13 23-0584	EA	24", 150 LB, Forged Steel Blind Flange <i>For 300 LB Rating, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,028.45 1,287.47 144.73	241.22
23 21 13 23-0585		3,000 LB, Forge Steel Thread-O-Lets (23 21 13 23-0379)		
23 21 13 23-0586	EA	1/2", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	74.51 20.28	
23 21 13 23-0587	EA	3/4", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	78.93 21.25	
23 21 13 23-0588	EA	1", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	84.21 22.53	
23 21 13 23-0589	EA	1-1/4", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	93.37 24.14	
23 21 13 23-0590	EA	1-1/2", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	104.75 27.36	
23 21 13 23-0591	EA	2", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	135.34 35.76	
23 21 13 23-0592	EA	2-1/2", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	211.83 45.98	
23 21 13 23-0593	EA	3", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	292.05 64.38	
23 21 13 23-0594	EA	4", 3,000 LB, Forge Steel Thread-O-Let <i>For Work In Restricted Working Space, Add</i>	389.28 80.47	
23 21 13 23-0595		3,000 LB, Forge Steel Weld-O-Lets (23 21 13 23-0379)		
23 21 13 23-0596	EA	1/2", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	95.27 23.40	
23 21 13 23-0597	EA	3/4", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	102.04 24.53	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0598 EA 1", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	108.57 25.75	
23 21 13 23-0599 EA 1-1/4", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	127.63 28.61	
23 21 13 23-0600 EA 1-1/2", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	141.15 32.19	
23 21 13 23-0601 EA 2", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	188.70 42.91	
23 21 13 23-0602 EA 2-1/2", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	317.99 51.50	
23 21 13 23-0603 EA 3", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	418.89 67.60	
23 21 13 23-0604 EA 4", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	588.69 85.85	
23 21 13 23-0605 EA 6", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	830.46 128.75	
23 21 13 23-0606 EA 8", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	1,331.50 171.66	
23 21 13 23-0607 EA 10", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	1,739.84 198.09	
23 21 13 23-0608 EA 12", 3,000 LB, Forge Steel Weld-O-Let <i>For Work In Restricted Working Space, Add</i>	2,830.85 234.11	
 23 21 13 23-0609 3,000 LB, Forge Steel Sock-O-Lets <small>(23 21 13 23-0379)</small>		
23 21 13 23-0610 EA 1/2", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	109.71 27.97	
23 21 13 23-0611 EA 3/4", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	117.08 29.32	
23 21 13 23-0612 EA 1", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	125.32 31.09	
23 21 13 23-0613 EA 1-1/4", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	141.81 33.32	
23 21 13 23-0614 EA 1-1/2", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	158.14 37.76	
23 21 13 23-0615 EA 2", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	204.79 49.34	
23 21 13 23-0616 EA 2-1/2", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	350.98 63.44	
23 21 13 23-0617 EA 3", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	480.70 88.84	
23 21 13 23-0618 EA 4", 3,000 LB, Forge Steel Sock-O-Let <i>For Work In Restricted Working Space, Add</i>	658.61 111.05	
 23 21 13 23-0619 Class 150 Flange, Steel Bolt And Gasket Sets <small>(23 21 13 23-0379)</small>		
Note: Used between weld neck or slip-on flanges and valves, or equipment with bolt connections, or between two bolted valves. Flanged equipment, flanged fittings and flanged valves exclude bolt and gasket sets.		
23 21 13 23-0620 EA 3/4" To 1-1/2" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and four (4) 1/2" diameter bolts with washers and nut.	16.02	
<i>For Zinc Plated, Add</i>	4.49	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	11.21	
<i>For Hot Dip Galvanized, Add</i>	6.41	
23 21 13 23-0621 EA 2" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and four (4) 5/8" diameter bolts with washers and nut.	20.33	
<i>For Zinc Plated, Add</i>	5.69	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	14.23	
<i>For Hot Dip Galvanized, Add</i>	8.13	
23 21 13 23-0622 EA 2-1/2" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and four (4) 5/8" diameter bolts with washers and nut.	20.56	
<i>For Zinc Plated, Add</i>	5.76	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	14.39	
<i>For Hot Dip Galvanized, Add</i>	8.22	
23 21 13 23-0623 EA 3" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and four (4) 5/8" diameter bolts with washers and nut.	20.66	
<i>For Zinc Plated, Add</i>	5.78	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	14.46	
<i>For Hot Dip Galvanized, Add</i>	8.26	
23 21 13 23-0624 EA 4" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and eight (8) 5/8" diameter bolts with washers and nut.	47.10	
<i>For Zinc Plated, Add</i>	13.19	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	32.97	
<i>For Hot Dip Galvanized, Add</i>	18.84	
23 21 13 23-0625 EA 5" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.	65.90	
<i>For Zinc Plated, Add</i>	18.45	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	46.13	
<i>For Hot Dip Galvanized, Add</i>	26.36	
23 21 13 23-0626 EA 6" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.	72.76	
<i>For Zinc Plated, Add</i>	20.37	
<i>For Advanced Fluoropolymer (Blue Coating), Add</i>	50.93	
<i>For Hot Dip Galvanized, Add</i>	29.10	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
23 21 13 23-0627	EA	8" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set.....	80.12		
		Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.			
		For Zinc Plated, Add	22.43		
		For Advanced Fluoropolymer (Blue Coating), Add	56.08		
		For Hot Dip Galvanized, Add	32.05		
23 21 13 23-0628	EA	10" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set.....	175.76		
		Note: Includes rubber gasket, and twelve (12) 7/8" diameter bolts with washers and nut.			
		For Zinc Plated, Add	49.21		
		For Advanced Fluoropolymer (Blue Coating), Add	123.03		
		For Hot Dip Galvanized, Add	70.30		
23 21 13 23-0629	EA	12" Pipe Diameter, Class 150 Steel Flange, Bolt And Gasket Set.....	180.05		
		Note: Includes rubber gasket, and twelve (12) 7/8" diameter bolts with washers and nut.			
		For Zinc Plated, Add	50.41		
		For Advanced Fluoropolymer (Blue Coating), Add	126.04		
		For Hot Dip Galvanized, Add	72.02		
23 21 13 23-0630		Class 300 Flange, Steel Bolt And Gasket Sets (23 21 13 23-0379)			
		Note: Used between weld neck or slip-on flanges and valves, or equipment with bolt connections, or between two bolted valves. Flanged equipment, flanged fittings and flanged valves exclude bolt and gasket sets.			
23 21 13 23-0631	EA	3/4" To 1-1/2" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	25.72		
		Note: Includes rubber gasket, and four (4) 5/8" diameter bolts with washers and nut.			
		For Zinc Plated, Add	7.20		
		For Advanced Fluoropolymer (Blue Coating), Add	18.00		
		For Hot Dip Galvanized, Add	10.29		
23 21 13 23-0632	EA	2" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	47.13		
		Note: Includes rubber gasket, and eight (8) 5/8" diameter bolts with washers and nut.			
		For Zinc Plated, Add	13.20		
		For Advanced Fluoropolymer (Blue Coating), Add	32.99		
		For Hot Dip Galvanized, Add	18.85		
23 21 13 23-0633	EA	2-1/2" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	73.32		
		Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.			
		For Zinc Plated, Add	20.53		
		For Advanced Fluoropolymer (Blue Coating), Add	51.32		
		For Hot Dip Galvanized, Add	29.33		
23 21 13 23-0634	EA	3" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	79.66		
		Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.			
		For Zinc Plated, Add	22.30		
		For Advanced Fluoropolymer (Blue Coating), Add	55.76		
		For Hot Dip Galvanized, Add	31.86		
23 21 13 23-0635	EA	4" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	84.23		
		Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.			
		For Zinc Plated, Add	23.58		
		For Advanced Fluoropolymer (Blue Coating), Add	58.96		
		For Hot Dip Galvanized, Add	33.69		
23 21 13 23-0636	EA	5" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	93.05		
		Note: Includes rubber gasket, and eight (8) 3/4" diameter bolts with washers and nut.			
		For Zinc Plated, Add	26.05		
		For Advanced Fluoropolymer (Blue Coating), Add	65.14		
		For Hot Dip Galvanized, Add	37.22		
23 21 13 23-0637	EA	6" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	131.40		
		Note: Includes rubber gasket, and twelve (12) 3/4" diameter bolts with washers and nut.			
		For Zinc Plated, Add	36.79		
		For Advanced Fluoropolymer (Blue Coating), Add	91.98		
		For Hot Dip Galvanized, Add	52.56		
23 21 13 23-0638	EA	8" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	203.07		
		Note: Includes rubber gasket, and twelve (12) 7/8" diameter bolts with washers and nut.			
		For Zinc Plated, Add	56.86		
		For Advanced Fluoropolymer (Blue Coating), Add	142.15		
		For Hot Dip Galvanized, Add	81.23		
23 21 13 23-0639	EA	10" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	366.90		
		Note: Includes rubber gasket, and sixteen (16) 1" diameter bolts with washers and nut.			
		For Zinc Plated, Add	102.73		
		For Advanced Fluoropolymer (Blue Coating), Add	256.83		
		For Hot Dip Galvanized, Add	146.76		
23 21 13 23-0640	EA	12" Pipe Diameter, Class 300 Steel Flange, Bolt And Gasket Set.....	526.84		
		Note: Includes rubber gasket, and sixteen (16) 1-1/8" diameter bolts with washers and nut.			
		For Zinc Plated, Add	147.52		
		For Advanced Fluoropolymer (Blue Coating), Add	368.79		
		For Hot Dip Galvanized, Add	210.74		
23 21 13 23-0641		150 LB, Rubber Flange Gasket Replacement (23 21 13 23-0379)			
		Note: Includes unbolting, removal of old gaskets, new 150 LB rubber gasket and rebolting.			
23 21 13 23-0642	EA	1/2", 150 LB, Rubber Flange Gasket Replacement.....	32.35		
		For 300 LB Rating Gasket Set, Add	0.21		
		For 150 LB Rating Teflon Gasket Set, Add	4.72		
		For Work In Restricted Working Space, Add	9.52		
		For 300 LB Rating Teflon Gasket Set, Add	5.43		
23 21 13 23-0643	EA	3/4", 150 LB, Rubber Flange Gasket Replacement.....	34.66		
		For 300 LB Rating Gasket Set, Add	0.28		
		For 150 LB Rating Teflon Gasket Set, Add	6.26		
		For Work In Restricted Working Space, Add	10.16		
		For 300 LB Rating Teflon Gasket Set, Add	7.21		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0644 EA 1", 150 LB, Rubber Flange Gasket Replacement	38.44	
<i>For 300 LB Rating Gasket Set, Add</i>	0.50	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	10.98	
<i>For Work In Restricted Working Space, Add</i>	11.11	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	12.64	
23 21 13 23-0645 EA 1-1/4", 150 LB, Rubber Flange Gasket Replacement	41.82	
<i>For 300 LB Rating Gasket Set, Add</i>	0.57	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	12.52	
<i>For Work In Restricted Working Space, Add</i>	12.06	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	14.42	
23 21 13 23-0646 EA 1-1/2", 150 LB, Rubber Flange Gasket Replacement	46.46	
<i>For 300 LB Rating Gasket Set, Add</i>	0.71	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	15.69	
<i>For Work In Restricted Working Space, Add</i>	13.33	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	18.07	
23 21 13 23-0647 EA 2", 150 LB, Rubber Flange Gasket Replacement	51.51	
<i>For 300 LB Rating Gasket Set, Add</i>	0.99	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	21.95	
<i>For Work In Restricted Working Space, Add</i>	14.60	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	25.28	
23 21 13 23-0648 EA 2-1/2", 150 LB, Rubber Flange Gasket Replacement	60.97	
<i>For 300 LB Rating Gasket Set, Add</i>	1.35	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	29.76	
<i>For Work In Restricted Working Space, Add</i>	17.14	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	34.27	
23 21 13 23-0649 EA 3", 150 LB, Rubber Flange Gasket Replacement	64.76	
<i>For 300 LB Rating Gasket Set, Add</i>	1.56	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	34.48	
<i>For Work In Restricted Working Space, Add</i>	18.09	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	39.69	
23 21 13 23-0650 EA 4", 150 LB, Rubber Flange Gasket Replacement	86.65	
<i>For 300 LB Rating Gasket Set, Add</i>	2.56	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	56.43	
<i>For Work In Restricted Working Space, Add</i>	23.81	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	64.97	
23 21 13 23-0651 EA 5", 150 LB, Rubber Flange Gasket Replacement	100.15	
<i>For 300 LB Rating Gasket Set, Add</i>	2.84	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	62.69	
<i>For Work In Restricted Working Space, Add</i>	27.61	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	72.18	
23 21 13 23-0652 EA 6", 150 LB, Rubber Flange Gasket Replacement	115.28	
<i>For 300 LB Rating Gasket Set, Add</i>	3.69	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	81.47	
<i>For Work In Restricted Working Space, Add</i>	31.42	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	93.81	
23 21 13 23-0653 EA 8", 150 LB, Rubber Flange Gasket Replacement	142.36	
<i>For 300 LB Rating Gasket Set, Add</i>	5.39	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	119.04	
<i>For Work In Restricted Working Space, Add</i>	38.09	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	137.06	
23 21 13 23-0654 EA 10", 150 LB, Rubber Flange Gasket Replacement	157.30	
<i>For 300 LB Rating Gasket Set, Add</i>	7.66	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	169.21	
<i>For Work In Restricted Working Space, Add</i>	40.62	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	194.82	
23 21 13 23-0655 EA 12", 150 LB, Rubber Flange Gasket Replacement	181.36	
<i>For 300 LB Rating Gasket Set, Add</i>	9.79	
<i>For 150 LB Rating Teflon Gasket Set, Add</i>	216.13	
<i>For Work In Restricted Working Space, Add</i>	46.02	
<i>For 300 LB Rating Teflon Gasket Set, Add</i>	248.84	
23 21 13 23-0656 Cut And Prepare For Welding Existing In-Place Black Steel Pipe <small>(23 21 13 23-0379)</small>		
<i>Note: For use when connecting pipe to an existing in-place system.</i>		
23 21 13 23-0657 EA 1/2", Cut And Prepare For Welding Existing In Place Black Steel Pipe	22.97	
<i>For Work In Restricted Working Space, Add</i>	6.89	
23 21 13 23-0658 EA 3/4", Cut And Prepare For Welding Existing In Place Black Steel Pipe	24.80	
<i>For Work In Restricted Working Space, Add</i>	7.44	
23 21 13 23-0659 EA 1", Cut And Prepare For Welding Existing In Place Black Steel Pipe	27.90	
<i>For Work In Restricted Working Space, Add</i>	8.37	
23 21 13 23-0660 EA 1-1/4", Cut And Prepare For Welding Existing In Place Black Steel Pipe	29.28	
<i>For Work In Restricted Working Space, Add</i>	8.78	
23 21 13 23-0661 EA 1-1/2", Cut And Prepare For Welding Existing In Place Black Steel Pipe	30.99	
<i>For Work In Restricted Working Space, Add</i>	9.30	
23 21 13 23-0662 EA 2", Cut And Prepare For Welding Existing In Place Black Steel Pipe	33.29	
<i>For Work In Restricted Working Space, Add</i>	9.99	
23 21 13 23-0663 EA 2-1/2", Cut And Prepare For Welding Existing In Place Black Steel Pipe	35.60	
<i>For Work In Restricted Working Space, Add</i>	10.68	
23 21 13 23-0664 EA 3", Cut And Prepare For Welding Existing In Place Black Steel Pipe	39.04	
<i>For Work In Restricted Working Space, Add</i>	11.71	
23 21 13 23-0665 EA 4", Cut And Prepare For Welding Existing In Place Black Steel Pipe	42.48	
<i>For Work In Restricted Working Space, Add</i>	12.74	
23 21 13 23-0666 EA 6", Cut And Prepare For Welding Existing In Place Black Steel Pipe	45.93	
<i>For Work In Restricted Working Space, Add</i>	13.78	
23 21 13 23-0667 EA 8", Cut And Prepare For Welding Existing In Place Black Steel Pipe	49.37	
<i>For Work In Restricted Working Space, Add</i>	14.81	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 21 13 23-0668	EA	10", Cut And Prepare For Welding Existing In Place Black Steel Pipe	53.96	
		<i>For Work In Restricted Working Space, Add</i>	16.19	
23 21 13 23-0669	EA	12", Cut And Prepare For Welding Existing In Place Black Steel Pipe	58.56	
		<i>For Work In Restricted Working Space, Add</i>	17.57	
23 21 13 23-0670		Welded Plain End Electric Resistance Black Steel Pipe <small>(23 21 13 23-0379)</small>		
		Note: ASTM A-135.		
23 21 13 23-0671	LF	2" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	32.67	11.80
		<i>For Work In Restricted Working Space, Add</i>	5.79	
23 21 13 23-0672	LF	2-1/2" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	39.82	12.87
		<i>For Work In Restricted Working Space, Add</i>	5.79	
23 21 13 23-0673	LF	3" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	44.22	12.66
		<i>For Work In Restricted Working Space, Add</i>	5.68	
23 21 13 23-0674	LF	4" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	54.66	16.09
		<i>For Work In Restricted Working Space, Add</i>	7.24	
23 21 13 23-0675	LF	6" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	94.85	23.82
		<i>For Work In Restricted Working Space, Add</i>	10.71	
23 21 13 23-0676	LF	8.322" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	126.74	28.80
		<i>For Work In Restricted Working Space, Add</i>	12.98	
23 21 13 23-0677	LF	10.365" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	177.84	35.86
		<i>For Work In Restricted Working Space, Add</i>	16.14	
23 21 13 23-0678	LF	12.375" Electric Resistance Weld Black Pipe, Plain End Schedule 40 ASTM A-135, Not Including Hangers Or Fittings.....	216.53	43.25
		<i>For Work In Restricted Working Space, Add</i>	19.45	
23 21 13 23-0679		Flanged Steel Fittings <small>(23 21 13 23)</small>		
		See CSI section 23 21 13 23-0380 for steel pipe, 23 21 13 23-0548 for welded neck flange ends.		
23 21 13 23-0680		Flanged Steel Fittings, Standard Weight <small>(23 21 13 23-0679)</small>		
		Note: Flanged equipment, flanged fittings and flanged valves exclude bolt and gasket sets. See CSI section 23 21 13 23-0619 for Class 150 steel bolt and gasket set.		
23 21 13 23-0681		Flanged Steel, 90 Degree Elbows <small>(23 21 13 23-0680)</small>		
23 21 13 23-0682	EA	2" Standard Weight, Flanged Steel, 90 Degree Elbow	352.10	49.37
		<i>For Galvanized Fittings, Add</i>	222.46	
		<i>For Extra Heavy Weight Fittings, Add</i>	333.70	
23 21 13 23-0683	EA	2-1/2" Standard Weight, Flanged Steel, 90 Degree Elbow	392.69	54.99
		<i>For Galvanized Fittings, Add</i>	248.18	
		<i>For Extra Heavy Weight Fittings, Add</i>	372.26	
23 21 13 23-0684	EA	3" Standard Weight, Flanged Steel, 90 Degree Elbow	392.77	60.69
		<i>For Galvanized Fittings, Add</i>	241.47	
		<i>For Extra Heavy Weight Fittings, Add</i>	362.21	
23 21 13 23-0685	EA	4" Standard Weight, Flanged Steel, 90 Degree Elbow	495.61	70.52
		<i>For Galvanized Fittings, Add</i>	311.90	
		<i>For Extra Heavy Weight Fittings, Add</i>	467.86	
23 21 13 23-0686	EA	5" Standard Weight, Flanged Steel, 90 Degree Elbow	684.37	78.98
		<i>For Galvanized Fittings, Add</i>	452.76	
		<i>For Extra Heavy Weight Fittings, Add</i>	679.14	
23 21 13 23-0687	EA	6" Standard Weight, Flanged Steel, 90 Degree Elbow	727.16	91.67
		<i>For Galvanized Fittings, Add</i>	471.77	
		<i>For Extra Heavy Weight Fittings, Add</i>	707.65	
23 21 13 23-0688	EA	8" Standard Weight, Flanged Steel, 90 Degree Elbow	916.20	101.50
		<i>For Galvanized Fittings, Add</i>	611.16	
		<i>For Extra Heavy Weight Fittings, Add</i>	916.74	
23 21 13 23-0689		Flanged Steel, Reducing 90 Degree Elbows <small>(23 21 13 23-0680)</small>		
23 21 13 23-0690	EA	2-1/2" x 2" Standard Weight, Flanged Steel, Reducing 90 Degree Elbow	640.00	52.24
		<i>For Galvanized Fittings, Add</i>	449.41	
		<i>For Extra Heavy Weight Fittings, Add</i>	674.11	
23 21 13 23-0691	EA	3" x 2-1/2" Standard Weight, Flanged Steel, Reducing 90 Degree Elbow	668.02	57.84
		<i>For Galvanized Fittings, Add</i>	465.06	
		<i>For Extra Heavy Weight Fittings, Add</i>	697.58	
23 21 13 23-0692	EA	4" x 3" Standard Weight, Flanged Steel, Reducing 90 Degree Elbow	829.17	65.55
		<i>For Galvanized Fittings, Add</i>	584.67	
		<i>For Extra Heavy Weight Fittings, Add</i>	877.01	
23 21 13 23-0693	EA	5" x 3" Standard Weight, Flanged Steel, Reducing 90 Degree Elbow	1,021.37	69.79
		<i>For Galvanized Fittings, Add</i>	733.36	
		<i>For Extra Heavy Weight Fittings, Add</i>	1,100.04	
23 21 13 23-0694	EA	6" x 4" Standard Weight, Flanged Steel, Reducing 90 Degree Elbow	1,164.07	81.10
		<i>For Galvanized Fittings, Add</i>	833.98	
		<i>For Extra Heavy Weight Fittings, Add</i>	1,250.96	
23 21 13 23-0695	EA	8" x 6" Standard Weight, Flanged Steel, Reducing 90 Degree Elbow	1,616.33	96.64
		<i>For Galvanized Fittings, Add</i>	1,177.18	
		<i>For Extra Heavy Weight Fittings, Add</i>	1,765.76	
23 21 13 23-0696		Flanged Steel, 45 Degree Elbows <small>(23 21 13 23-0680)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0697 EA 2" Standard Weight, Flanged Steel, 45 Degree Elbow	452.72	49.37
For Galvanized Fittings, Add	302.96	
For Extra Heavy Weight Fittings, Add	454.44	
23 21 13 23-0698 EA 2-1/2" Standard Weight, Flanged Steel, 45 Degree Elbow	473.74	54.99
For Galvanized Fittings, Add	313.02	
For Extra Heavy Weight Fittings, Add	469.52	
23 21 13 23-0699 EA 3" Standard Weight, Flanged Steel, 45 Degree Elbow	493.38	60.69
For Galvanized Fittings, Add	321.96	
For Extra Heavy Weight Fittings, Add	482.94	
23 21 13 23-0700 EA 4" Standard Weight, Flanged Steel, 45 Degree Elbow	612.99	70.52
For Galvanized Fittings, Add	405.81	
For Extra Heavy Weight Fittings, Add	608.71	
23 21 13 23-0701 EA 5" Standard Weight, Flanged Steel, 45 Degree Elbow	874.42	78.98
For Galvanized Fittings, Add	604.80	
For Extra Heavy Weight Fittings, Add	907.20	
23 21 13 23-0702 EA 6" Standard Weight, Flanged Steel, 45 Degree Elbow	858.51	91.67
For Galvanized Fittings, Add	576.85	
For Extra Heavy Weight Fittings, Add	865.27	
23 21 13 23-0703 EA 8" Standard Weight, Flanged Steel, 45 Degree Elbow	1,009.75	101.50
For Galvanized Fittings, Add	686.00	
For Extra Heavy Weight Fittings, Add	1,029.00	
23 21 13 23-0704 Flanged Steel, Tees (23 21 13 23-0680)		
23 21 13 23-0705 EA 2" Standard Weight, Flanged Steel, Tee	456.18	74.02
For Galvanized Fittings, Add	276.13	
For Extra Heavy Weight Fittings, Add	414.19	
23 21 13 23-0706 EA 2-1/2" Standard Weight, Flanged Steel, Tee	583.45	82.47
For Galvanized Fittings, Add	367.80	
For Extra Heavy Weight Fittings, Add	551.70	
23 21 13 23-0707 EA 3" Standard Weight, Flanged Steel, Tee	538.86	90.93
For Galvanized Fittings, Add	321.97	
For Extra Heavy Weight Fittings, Add	482.95	
23 21 13 23-0708 EA 4" Standard Weight, Flanged Steel, Tee	759.47	105.84
For Galvanized Fittings, Add	480.70	
For Extra Heavy Weight Fittings, Add	721.04	
23 21 13 23-0709 EA 5" Standard Weight, Flanged Steel, Tee	1,111.62	118.52
For Galvanized Fittings, Add	747.19	
For Extra Heavy Weight Fittings, Add	1,120.79	
23 21 13 23-0710 EA 6" Standard Weight, Flanged Steel, Tee	1,353.63	137.56
For Galvanized Fittings, Add	917.97	
For Extra Heavy Weight Fittings, Add	1,376.95	
23 21 13 23-0711 EA 8" Standard Weight, Flanged Steel, Tee	1,501.81	159.34
For Galvanized Fittings, Add	1,010.29	
For Extra Heavy Weight Fittings, Add	1,515.43	
23 21 13 23-0712 Flanged Steel, Reducing Tees (23 21 13 23-0680)		
23 21 13 23-0713 EA 2-1/2" Standard Weight, Flanged Steel, Reducing Tee	705.00	79.72
For Galvanized Fittings, Add	468.42	
For Extra Heavy Weight Fittings, Add	702.62	
23 21 13 23-0714 EA 3" Standard Weight, Flanged Steel, Reducing Tee	812.71	88.18
For Galvanized Fittings, Add	544.43	
For Extra Heavy Weight Fittings, Add	816.65	
23 21 13 23-0715 EA 4" Standard Weight, Flanged Steel, Reducing Tee	1,376.64	100.86
For Galvanized Fittings, Add	980.35	
For Extra Heavy Weight Fittings, Add	1,470.53	
23 21 13 23-0716 EA 5" Standard Weight, Flanged Steel, Reducing Tee	1,490.27	114.29
For Galvanized Fittings, Add	1,055.19	
For Extra Heavy Weight Fittings, Add	1,582.79	
23 21 13 23-0717 EA 6" Standard Weight, Flanged Steel, Reducing Tee	1,868.00	131.22
For Galvanized Fittings, Add	1,337.07	
For Extra Heavy Weight Fittings, Add	2,005.61	
23 21 13 23-0718 EA 8" Standard Weight, Flanged Steel, Reducing Tee	2,325.48	147.39
For Galvanized Fittings, Add	1,683.60	
For Extra Heavy Weight Fittings, Add	2,525.40	
23 21 13 23-0719 Flanged Steel, Concentric Reducers (23 21 13 23-0680)		
23 21 13 23-0720 EA 3" x 2-1/2" Standard Weight, Flanged Steel, Concentric Reducer	659.64	57.84
For Galvanized Fittings, Add	458.35	
For Extra Heavy Weight Fittings, Add	687.53	
23 21 13 23-0721 EA 4" x 3" Standard Weight, Flanged Steel, Concentric Reducer	749.52	65.55
For Galvanized Fittings, Add	520.95	
For Extra Heavy Weight Fittings, Add	781.43	
23 21 13 23-0722 EA 5" x 4" Standard Weight, Flanged Steel, Concentric Reducer	1,102.84	74.75
For Galvanized Fittings, Add	792.61	
For Extra Heavy Weight Fittings, Add	1,188.91	
23 21 13 23-0723 EA 6" x 4" Standard Weight, Flanged Steel, Concentric Reducer	1,215.77	81.10
For Galvanized Fittings, Add	875.34	
For Extra Heavy Weight Fittings, Add	1,313.00	
23 21 13 23-0724 EA 8" x 6" Standard Weight, Flanged Steel, Concentric Reducer	1,424.89	96.64
For Galvanized Fittings, Add	1,024.02	
For Extra Heavy Weight Fittings, Add	1,536.04	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13	23-0725		Flanged Steel, Eccentric Reducers (23 21 13 23-0680)		
23 21 13	23-0726	EA	4" x 3" Standard Weight, Flanged Steel, Eccentric Reducer.....	714.31	65.55
			<i>For Galvanized Fittings, Add</i>	492.78	
			<i>For Extra Heavy Weight Fittings, Add</i>	739.18	
23 21 13	23-0727	EA	5" x 4" Standard Weight, Flanged Steel, Eccentric Reducer.....	965.06	74.75
			<i>For Galvanized Fittings, Add</i>	682.38	
			<i>For Extra Heavy Weight Fittings, Add</i>	1,023.58	
23 21 13	23-0728		Plain End Couplings And Fittings (23 21 13 23)		
			Note: For use on standard weight steel pipe (Schedule 40), but may be used on lightwall steel or other metallic pipe such as aluminum or stainless steel.		
23 21 13	23-0729		Plain End Piping System Couplings (23 21 13 23-0728)		
23 21 13	23-0730		Plainlock Plain End Piping System Couplings (23 21 13 23-0729)		
			Note: Ductile iron body with gasket, bolts and nuts.		
23 21 13	23-0731	EA	1" Plainlock Plain End Piping System Coupling.....	183.86	6.35
			<i>For Galvanized Fittings, Add</i>	34.87	
23 21 13	23-0732	EA	1-1/2" Plainlock Plain End Piping System Coupling.....	187.56	8.77
			<i>For Galvanized Fittings, Add</i>	34.87	
23 21 13	23-0733	EA	2" Plainlock Plain End Piping System Coupling.....	191.85	11.63
			<i>For Galvanized Fittings, Add</i>	34.87	
23 21 13	23-0734	EA	2-1/2" Plainlock Plain End Piping System Coupling.....	195.50	14.06
			<i>For Galvanized Fittings, Add</i>	34.87	
23 21 13	23-0735	EA	3" Plainlock Plain End Piping System Coupling.....	231.14	16.91
			<i>For Galvanized Fittings, Add</i>	41.15	
23 21 13	23-0736	EA	4" Plainlock Plain End Piping System Coupling.....	318.92	22.52
			<i>For Galvanized Fittings, Add</i>	57.02	
23 21 13	23-0737	EA	6" Plainlock Plain End Piping System Coupling.....	536.37	36.69
			<i>For Galvanized Fittings, Add</i>	96.28	
23 21 13	23-0738		Roust-A-Bout Plain End Piping System Couplings (23 21 13 23-0729)		
			Note: Ductile iron body with gasket, bolts and nuts.		
23 21 13	23-0739	EA	1-1/2" Roust-A-Bout Plain End Piping System Coupling.....	221.43	8.77
			<i>For Galvanized Fittings, Add</i>	52.05	
23 21 13	23-0740	EA	2" Roust-A-Bout Plain End Piping System Coupling.....	225.72	11.63
			<i>For Galvanized Fittings, Add</i>	52.05	
23 21 13	23-0741	EA	2-1/2" Roust-A-Bout Plain End Piping System Coupling.....	229.38	14.16
			<i>For Galvanized Fittings, Add</i>	52.05	
23 21 13	23-0742	EA	3" Roust-A-Bout Plain End Piping System Coupling.....	333.79	16.91
			<i>For Galvanized Fittings, Add</i>	77.11	
23 21 13	23-0743	EA	3-1/2" Roust-A-Bout Plain End Piping System Coupling.....	386.55	19.78
			<i>For Galvanized Fittings, Add</i>	89.23	
23 21 13	23-0744	EA	4" Roust-A-Bout Plain End Piping System Coupling.....	390.74	22.52
			<i>For Galvanized Fittings, Add</i>	89.23	
23 21 13	23-0745	EA	5" Roust-A-Bout Plain End Piping System Coupling.....	552.24	28.23
			<i>For Galvanized Fittings, Add</i>	127.48	
23 21 13	23-0746	EA	6" Roust-A-Bout Plain End Piping System Coupling.....	677.79	36.69
			<i>For Galvanized Fittings, Add</i>	155.70	
23 21 13	23-0747	EA	8" Roust-A-Bout Plain End Piping System Coupling.....	1,169.93	43.77
			<i>For Galvanized Fittings, Add</i>	276.08	
23 21 13	23-0748	EA	10" Roust-A-Bout Plain End Piping System Coupling.....	1,514.44	51.81
			<i>For Galvanized Fittings, Add</i>	359.18	
23 21 13	23-0749	EA	12" Roust-A-Bout Plain End Piping System Coupling.....	1,894.77	61.32
			<i>For Galvanized Fittings, Add</i>	450.70	
23 21 13	23-0750	EA	14" Roust-A-Bout Plain End Piping System Coupling.....	2,661.61	67.77
			<i>For Galvanized Fittings, Add</i>	639.99	
23 21 13	23-0751	EA	16" Roust-A-Bout Plain End Piping System Coupling.....	3,620.57	76.66
			<i>For Galvanized Fittings, Add</i>	876.41	
23 21 13	23-0752		Plain End Piping System Fittings (23 21 13 23-0728)		
			Note: Cast ductile iron bodies.		
23 21 13	23-0753		Plain End Piping System, 90 Degree Elbows (23 21 13 23-0752)		
23 21 13	23-0754	EA	1" Plain End Piping System, 90 Degree Elbow.....	181.86	11.53
			<i>For Galvanized Fittings, Add</i>	32.92	
23 21 13	23-0755	EA	1-1/2" Plain End Piping System, 90 Degree Elbow.....	190.75	17.45
			<i>For Galvanized Fittings, Add</i>	32.92	
23 21 13	23-0756	EA	2" Plain End Piping System, 90 Degree Elbow.....	199.14	23.05
			<i>For Galvanized Fittings, Add</i>	32.92	
23 21 13	23-0757	EA	2-1/2" Plain End Piping System, 90 Degree Elbow.....	206.67	28.13
			<i>For Galvanized Fittings, Add</i>	32.92	
23 21 13	23-0758	EA	3" Plain End Piping System, 90 Degree Elbow.....	248.71	34.04
			<i>For Galvanized Fittings, Add</i>	39.54	
23 21 13	23-0759	EA	4" Plain End Piping System, 90 Degree Elbow.....	355.55	44.83
			<i>For Galvanized Fittings, Add</i>	57.66	
23 21 13	23-0760	EA	5" Plain End Piping System, 90 Degree Elbow.....	1,082.04	56.14
			<i>For Galvanized Fittings, Add</i>	199.57	
23 21 13	23-0761	EA	6" Plain End Piping System, 90 Degree Elbow.....	903.61	73.48
			<i>For Galvanized Fittings, Add</i>	158.69	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
23 21 13 23-0762 EA 8" Plain End Piping System, 90 Degree Elbow	1,806.73	87.23
For Galvanized Fittings, Add	335.17	
23 21 13 23-0763 EA 10" Plain End Piping System, 90 Degree Elbow	2,259.11	101.92
For Galvanized Fittings, Add	421.26	
23 21 13 23-0764 EA 12" Plain End Piping System, 90 Degree Elbow	2,865.39	122.44
For Galvanized Fittings, Add	536.36	
23 21 13 23-0765 Plain End Piping System, 45 Degree Elbows (23 21 13 23-0752)		
23 21 13 23-0766 EA 1" Plain End Piping System, 45 Degree Elbow	181.86	11.53
For Galvanized Fittings, Add	32.92	
23 21 13 23-0767 EA 1-1/2" Plain End Piping System, 45 Degree Elbow	190.75	17.45
For Galvanized Fittings, Add	32.92	
23 21 13 23-0768 EA 2" Plain End Piping System, 45 Degree Elbow	199.14	23.05
For Galvanized Fittings, Add	32.92	
23 21 13 23-0769 EA 2-1/2" Plain End Piping System, 45 Degree Elbow	206.67	28.13
For Galvanized Fittings, Add	32.92	
23 21 13 23-0770 EA 3" Plain End Piping System, 45 Degree Elbow	248.71	34.04
For Galvanized Fittings, Add	39.54	
23 21 13 23-0771 EA 4" Plain End Piping System, 45 Degree Elbow	355.55	44.83
For Galvanized Fittings, Add	57.66	
23 21 13 23-0772 EA 5" Plain End Piping System, 45 Degree Elbow	1,082.04	56.14
For Galvanized Fittings, Add	199.57	
23 21 13 23-0773 EA 6" Plain End Piping System, 45 Degree Elbow	906.66	73.48
For Galvanized Fittings, Add	159.30	
23 21 13 23-0774 EA 8" Plain End Piping System, 45 Degree Elbow	1,051.70	87.23
For Galvanized Fittings, Add	184.17	
23 21 13 23-0775 EA 10" Plain End Piping System, 45 Degree Elbow	1,437.88	101.92
For Galvanized Fittings, Add	257.02	
23 21 13 23-0776 EA 12" Plain End Piping System, 45 Degree Elbow	1,843.73	122.44
For Galvanized Fittings, Add	332.03	
23 21 13 23-0777 Plain End Piping System, Tees (23 21 13 23-0752)		
23 21 13 23-0778 EA 1" Plain End Piping System, Tee	247.80	17.45
For Galvanized Fittings, Add	44.33	
23 21 13 23-0779 EA 1-1/2" Plain End Piping System, Tee	260.91	26.22
For Galvanized Fittings, Add	44.33	
23 21 13 23-0780 EA 2" Plain End Piping System, Tee	272.47	33.94
For Galvanized Fittings, Add	44.33	
23 21 13 23-0781 EA 2-1/2" Plain End Piping System, Tee	283.97	41.56
For Galvanized Fittings, Add	44.33	
23 21 13 23-0782 EA 3" Plain End Piping System, Tee	395.56	51.07
For Galvanized Fittings, Add	63.79	
23 21 13 23-0783 EA 4" Plain End Piping System, Tee	542.56	66.09
For Galvanized Fittings, Add	88.71	
23 21 13 23-0784 EA 5" Plain End Piping System, Tee	1,103.95	86.39
For Galvanized Fittings, Add	194.87	
23 21 13 23-0785 EA 6" Plain End Piping System, Tee	1,364.73	108.17
For Galvanized Fittings, Add	240.51	
23 21 13 23-0786 EA 8" Plain End Piping System, Tee	1,863.53	131.53
For Galvanized Fittings, Add	333.25	
23 21 13 23-0787 EA 10" Plain End Piping System, Tee	2,774.40	153.31
For Galvanized Fittings, Add	508.91	
23 21 13 23-0788 EA 12" Plain End Piping System, Tee	3,717.53	183.66
For Galvanized Fittings, Add	688.44	
23 21 13 23-0789 Plain End Piping System, Reducing Tees (23 21 13 23-0752)		
23 21 13 23-0790 EA 1-1/2" Plain End Piping System, Reducing Tee	480.21	28.13
For Galvanized Fittings, Add	87.61	
23 21 13 23-0791 EA 2" Plain End Piping System, Reducing Tee	488.91	33.94
For Galvanized Fittings, Add	87.61	
23 21 13 23-0792 EA 2-1/2" Plain End Piping System, Reducing Tee	500.41	41.56
For Galvanized Fittings, Add	87.61	
23 21 13 23-0793 EA 3" Plain End Piping System, Reducing Tee	514.69	51.07
For Galvanized Fittings, Add	87.61	
23 21 13 23-0794 EA 4" Plain End Piping System, Reducing Tee	745.74	66.09
For Galvanized Fittings, Add	129.35	
23 21 13 23-0795 EA 6" Plain End Piping System, Reducing Tee	1,260.40	108.17
For Galvanized Fittings, Add	219.65	
23 21 13 23-0796 EA 8" Plain End Piping System, Reducing Tee	1,643.58	131.53
For Galvanized Fittings, Add	289.26	
23 21 13 23-0797 EA 10" Plain End Piping System, Reducing Tee	2,459.57	153.31
For Galvanized Fittings, Add	445.94	
23 21 13 23-0798 EA 12" Plain End Piping System, Reducing Tee	3,627.44	183.66
For Galvanized Fittings, Add	670.42	
23 21 13 23-0799 Plain End Piping System, Wyes (23 21 13 23-0752)		
23 21 13 23-0800 EA 2" Plain End Piping System, Wye	700.02	33.94
For Galvanized Fittings, Add	129.84	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 21	13 23-0801	EA	2-1/2" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	711.52 129.84	41.56
23 21	13 23-0802	EA	3" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	806.33 145.94	51.07
23 21	13 23-0803	EA	4" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	1,182.13 216.63	66.09
23 21	13 23-0804	EA	5" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	1,447.61 263.61	86.39
23 21	13 23-0805	EA	6" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	1,977.15 363.00	108.17
23 21	13 23-0806	EA	8" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	2,547.79 470.10	131.53
23 21	13 23-0807	EA	10" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	3,696.00 693.23	153.31
23 21	13 23-0808	EA	12" Plain End Piping System, Wye <i>For Galvanized Fittings, Add</i>	5,618.69 1,068.67	183.66

23 21 13 23-0809 Plain End Piping System, Laterals (23 21 13 23-0752)

23 21	13 23-0810	EA	2" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	745.93 139.02	33.94
23 21	13 23-0811	EA	2-1/2" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	757.43 139.02	41.56
23 21	13 23-0812	EA	3" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	851.94 155.06	51.07
23 21	13 23-0813	EA	4" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	1,269.23 234.05	66.09
23 21	13 23-0814	EA	5" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	1,655.05 305.09	86.39
23 21	13 23-0815	EA	6" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	2,110.61 389.69	108.17
23 21	13 23-0816	EA	8" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	3,038.03 568.15	131.53
23 21	13 23-0817	EA	10" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	4,239.93 802.01	153.31
23 21	13 23-0818	EA	12" Plain End Piping System, Lateral <i>For Galvanized Fittings, Add</i>	5,699.53 1,084.84	183.66

23 21 13 23-0819 Plain End Piping System, Crosses (23 21 13 23-0752)

23 21	13 23-0820	EA	2" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	830.90 94.34	50.86
23 21	13 23-0821	EA	2-1/2" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	848.13 94.34	62.28
23 21	13 23-0822	EA	3" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	990.31 109.42	76.66
23 21	13 23-0823	EA	4" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	1,351.07 150.32	99.07
23 21	13 23-0824	EA	5" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	1,902.41 213.51	129.63
23 21	13 23-0825	EA	6" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	2,497.85 281.92	161.77
23 21	13 23-0826	EA	8" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	3,187.09 361.67	195.93
23 21	13 23-0827	EA	10" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	4,564.92 527.70	229.02
23 21	13 23-0828	EA	12" Plain End Piping System, Cross <i>For Galvanized Fittings, Add</i>	6,500.27 760.91	275.54

23 21 13 23-0829 Plain End Piping System, Adapter Nipples (23 21 13 23-0752)

Note: Plain to threaded, plain to beveled or plain to grooved.

23 21	13 23-0830	EA	1" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	78.79 17.32	6.35
23 21	13 23-0831	EA	1-1/2" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	84.40 17.80	8.77
23 21	13 23-0832	EA	2" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	88.57 17.80	11.63
23 21	13 23-0833	EA	2-1/2" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	104.54 20.85	14.06
23 21	13 23-0834	EA	3" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	128.43 25.76	16.91
23 21	13 23-0835	EA	4" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	206.15 43.08	22.52
23 21	13 23-0836	EA	6" Plain End Piping System, Adapter Nipple <i>For Galvanized Fittings, Add</i>	508.31 116.51	28.23

23 21 13 23-0837 Plain End Piping System, Reducing (Swaged) Nipples (23 21 13 23-0752)

23 21	13 23-0838	EA	1-1/2" x 1" Plain End Piping System, Reducing (Swaged) Nipple <i>For Galvanized Fittings, Add</i>	255.55 58.21	15.12
23 21	13 23-0839	EA	2" x 1" Plain End Piping System, Reducing (Swaged) Nipple <i>For Galvanized Fittings, Add</i>	259.79 58.21	17.97



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0840 EA 2" x 1-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	264.06 58.21	20.83
23 21 13 23-0841 EA 2-1/2" x 1" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	263.03 58.21	20.20
23 21 13 23-0842 EA 2-1/2" x 1-1/2" Plain End Piping System, Reducing (Swaged) Nipple <i>For Galvanized Fittings, Add</i>	267.19 58.21	22.94
23 21 13 23-0843 EA 2-1/2" x 2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	271.40 58.21	25.69
23 21 13 23-0844 EA 3" x 1" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	318.38 70.89	23.26
23 21 13 23-0845 EA 3" x 1-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	322.13 70.89	25.69
23 21 13 23-0846 EA 3" x 2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	260.93 54.52	28.55
23 21 13 23-0847 EA 3" x 2-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	269.11 54.52	34.04
23 21 13 23-0848 EA 3-1/2" x 3" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	315.73 65.19	36.69
23 21 13 23-0849 EA 4" x 1" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	442.06 99.68	28.86
23 21 13 23-0850 EA 4" x 1-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	445.77 99.68	31.40
23 21 13 23-0851 EA 4" x 2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	353.26 75.48	34.25
23 21 13 23-0852 EA 4" x 2-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	356.89 75.48	36.69
23 21 13 23-0853 EA 4" x 3" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	361.20 75.48	39.54
23 21 13 23-0854 EA 4" x 3-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	365.32 75.48	42.29
23 21 13 23-0855 EA 5" x 2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,170.11 277.58	39.86
23 21 13 23-0856 EA 5" x 3" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	924.61 214.25	45.04
23 21 13 23-0857 EA 5" x 4" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	781.40 176.31	50.86
23 21 13 23-0858 EA 6" x 1" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	2,180.09 528.90	43.04
23 21 13 23-0859 EA 6" x 1-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	2,183.73 528.90	45.47
23 21 13 23-0860 EA 6" x 2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,637.19 391.19	48.32
23 21 13 23-0861 EA 6" x 2-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,640.94 391.19	50.86
23 21 13 23-0862 EA 6" x 3" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,094.44 253.53	53.61
23 21 13 23-0863 EA 6" x 3-1/2" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,098.28 253.53	56.14
23 21 13 23-0864 EA 6" x 4" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	857.79 192.27	59.21
23 21 13 23-0865 EA 6" x 5" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	978.99 220.45	64.82
23 21 13 23-0866 EA 8" x 3" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,313.85 305.75	60.59
23 21 13 23-0867 EA 8" x 4" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,322.38 305.75	66.30
23 21 13 23-0868 EA 8" x 5" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,499.21 347.83	72.00
23 21 13 23-0869 EA 8" x 6" Plain End Piping System, Reducing (Swaged) Nipple..... <i>For Galvanized Fittings, Add</i>	1,680.27 389.89	80.46
23 21 13 23-0870 Plain End Piping System, Bull Plugs (23 21 13 23-0752)		
23 21 13 23-0871 EA 1" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	367.36 107.35	6.35
23 21 13 23-0872 EA 1-1/2" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	371.06 107.35	8.77
23 21 13 23-0873 EA 2" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	375.23 107.35	11.63
23 21 13 23-0874 EA 2-1/2" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	378.99 107.35	14.06
23 21 13 23-0875 EA 3" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	549.93 157.37	16.91
23 21 13 23-0876 EA 4" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	711.38 203.27	22.52
23 21 13 23-0877 EA 5" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	1,239.66 359.21	28.23
23 21 13 23-0878 EA 6" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	1,651.99 479.10	36.69
23 21 13 23-0879 EA 8" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	3,067.98 900.73	43.67
23 21 13 23-0880 EA 10" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	5,527.05 1,635.13	51.07

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 21 13 23-0881	EA	12" Plain End Piping System, Bull Plug <i>For Galvanized Fittings, Add</i>	8,473.76 2,514.54	61.32
23 21 13 23-0882		Carbon Steel Piping Systems (23 21 13 23)		
23 21 13 23-0883		Class 3,000 LB Carbon Steel Socket Weld Fittings (23 21 13 23-0882) Note: ASTM A105		
23 21 13 23-0884		90 Degree Elbows, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0885	EA	1/2" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	50.29	20.93
23 21 13 23-0886	EA	3/4" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	56.74	23.36
23 21 13 23-0887	EA	1" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	79.11	26.11
23 21 13 23-0888	EA	1-1/4" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	118.83	29.61
23 21 13 23-0889	EA	1-1/2" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	136.67	33.31
23 21 13 23-0890	EA	2" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	190.81	42.40
23 21 13 23-0891	EA	2-1/2" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	416.98	62.70
23 21 13 23-0892	EA	3" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	605.79	82.47
23 21 13 23-0893	EA	4" 90 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	1,157.91	89.45
23 21 13 23-0894		45 Degree Elbows, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0895	EA	1/2" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	58.65	20.93
23 21 13 23-0896	EA	3/4" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	69.38	23.36
23 21 13 23-0897	EA	1" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	83.00	26.11
23 21 13 23-0898	EA	1-1/4" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	123.76	29.61
23 21 13 23-0899	EA	1-1/2" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	148.46	33.31
23 21 13 23-0900	EA	2" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	190.56	42.40
23 21 13 23-0901	EA	2-1/2" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	489.14	62.70
23 21 13 23-0902	EA	3" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	666.85	82.47
23 21 13 23-0903	EA	4" 45 Degree Elbow, Carbon Steel, Socket Weld, 3,000 LB	1,131.49	89.45
23 21 13 23-0904		Straight Tees, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0905	EA	1/2" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	60.71	26.11
23 21 13 23-0906	EA	3/4" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	76.30	30.13
23 21 13 23-0907	EA	1" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	108.45	35.63
23 21 13 23-0908	EA	1-1/4" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	153.26	42.40
23 21 13 23-0909	EA	1-1/2" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	187.09	50.54
23 21 13 23-0910	EA	2" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	255.55	62.70
23 21 13 23-0911	EA	2-1/2" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	512.63	82.47
23 21 13 23-0912	EA	3" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	730.89	97.91
23 21 13 23-0913	EA	4" Tee, Straight, Carbon Steel, Socket Weld, 3,000 LB	1,541.46	112.92
23 21 13 23-0914		Reducing Tees, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0915	EA	1/2" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	63.00	26.11
23 21 13 23-0916	EA	3/4" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	78.66	30.13
23 21 13 23-0917	EA	1" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	111.28	35.63
23 21 13 23-0918	EA	1-1/4" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	159.97	42.40
23 21 13 23-0919	EA	1-1/2" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	194.96	50.54
23 21 13 23-0920	EA	2" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	267.62	62.70
23 21 13 23-0921	EA	2-1/2" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	541.31	82.47
23 21 13 23-0922	EA	3" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	772.20	97.91
23 21 13 23-0923	EA	4" Tee, Reducing, Carbon Steel, Socket Weld, 3,000 LB	1,394.47	112.92
23 21 13 23-0924		Straight Couplings, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0925	EA	1/2" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	39.99	20.93
23 21 13 23-0926	EA	3/4" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	45.33	23.36
23 21 13 23-0927	EA	1" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	54.89	26.11
23 21 13 23-0928	EA	1-1/4" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	64.17	29.61
23 21 13 23-0929	EA	1-1/2" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	76.66	33.31
23 21 13 23-0930	EA	2" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	102.48	42.40
23 21 13 23-0931	EA	2-1/2" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	192.01	62.70
23 21 13 23-0932	EA	3" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	258.84	82.47
23 21 13 23-0933	EA	4" Coupling, Straight, Carbon Steel, Socket Weld, 3,000 LB	403.73	89.45
23 21 13 23-0934		Reducing Couplings, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0935	EA	1/2" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	44.66	20.93
23 21 13 23-0936	EA	3/4" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	50.44	23.36
23 21 13 23-0937	EA	1" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	63.08	26.11
23 21 13 23-0938	EA	1-1/4" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	74.06	29.61
23 21 13 23-0939	EA	1-1/2" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	91.33	33.31
23 21 13 23-0940	EA	2" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	118.16	42.40
23 21 13 23-0941	EA	2-1/2" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	226.54	62.70
23 21 13 23-0942	EA	3" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	328.30	82.47
23 21 13 23-0943	EA	4" Coupling, Reducing, Carbon Steel, Socket Weld, 3,000 LB	548.11	89.45

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-0944 Caps, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0945 EA 1/2" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	28.38	9.83
23 21 13 23-0946 EA 3/4" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	33.61	10.47
23 21 13 23-0947 EA 1" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	39.79	12.05
23 21 13 23-0948 EA 1-1/4" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	47.91	13.11
23 21 13 23-0949 EA 1-1/2" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	58.30	13.11
23 21 13 23-0950 EA 2" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	75.79	16.81
23 21 13 23-0951 EA 2-1/2" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	150.31	20.93
23 21 13 23-0952 EA 3" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	225.34	25.27
23 21 13 23-0953 EA 4" Cap, Carbon Steel, Socket Weld, 3,000 LB.....	338.21	30.61
23 21 13 23-0954 Black Cast Iron Square Head Plug (23 21 13 23-0883)		
23 21 13 23-0955 EA 1/2" Square Head Plug, Black, Cast Iron.....	15.42	8.35
23 21 13 23-0956 EA 3/4" Square Head Plug, Black, Cast Iron.....	19.86	8.35
23 21 13 23-0957 EA 1" Square Head Plug, Black, Cast Iron.....	27.20	12.68
23 21 13 23-0958 EA 1-1/4" Square Head Plug, Black, Cast Iron.....	28.09	12.68
23 21 13 23-0959 EA 1-1/2" Square Head Plug, Black, Cast Iron.....	31.77	12.68
23 21 13 23-0960 EA 2" Square Head Plug, Black, Cast Iron.....	41.89	16.81
23 21 13 23-0961 EA 2-1/2" Square Head Plug, Black, Cast Iron.....	55.44	20.93
23 21 13 23-0962 EA 3" Square Head Plug, Black, Cast Iron.....	76.60	25.27
23 21 13 23-0963 EA 4" Square Head Plug, Black, Cast Iron.....	91.38	30.61
23 21 13 23-0964 Unions, 3,000 LB Carbon Steel Socket Weld (23 21 13 23-0883)		
23 21 13 23-0965 EA 1/2" Union, Carbon Steel, Socket Weld, 3,000 LB.....	87.70	26.11
23 21 13 23-0966 EA 3/4" Union, Carbon Steel, Socket Weld, 3,000 LB.....	94.99	30.13
23 21 13 23-0967 EA 1" Union, Carbon Steel, Socket Weld, 3,000 LB.....	126.20	35.63
23 21 13 23-0968 EA 1-1/4" Union, Carbon Steel, Socket Weld, 3,000 LB.....	163.98	42.40
23 21 13 23-0969 EA 1-1/2" Union, Carbon Steel, Socket Weld, 3,000 LB.....	198.41	50.54
23 21 13 23-0970 EA 2" Union, Carbon Steel, Socket Weld, 3,000 LB.....	248.95	62.70
23 21 13 23-0971 EA 2-1/2" Union, Carbon Steel, Socket Weld, 3,000 LB.....	498.95	68.09
23 21 13 23-0972 EA 3" Union, Carbon Steel, Socket Weld, 3,000 LB.....	686.07	82.47
23 21 13 23-0973 Class 6,000 LB Carbon Steel Socket Weld Fittings (23 21 13 23-0882)		
Note: ASTM A105		
23 21 13 23-0974 90 Degree Elbow, 6,000 LB Carbon Steel Socket Weld (23 21 13 23-0973)		
23 21 13 23-0975 EA 1/2" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	60.36	20.93
23 21 13 23-0976 EA 3/4" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	68.24	23.36
23 21 13 23-0977 EA 1" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	100.33	26.11
23 21 13 23-0978 EA 1-1/4" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	158.39	29.61
23 21 13 23-0979 EA 1-1/2" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	182.70	33.31
23 21 13 23-0980 EA 2" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	258.42	42.40
23 21 13 23-0981 EA 2-1/2" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	588.53	62.70
23 21 13 23-0982 EA 3" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	861.85	82.47
23 21 13 23-0983 EA 4" 90 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	1,701.68	89.45
23 21 13 23-0984 45 Degree Elbow, 6,000 LB Carbon Steel Socket Weld (23 21 13 23-0973)		
23 21 13 23-0985 EA 1/2" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	74.11	20.93
23 21 13 23-0986 EA 3/4" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	88.80	23.36
23 21 13 23-0987 EA 1" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	107.82	26.11
23 21 13 23-0988 EA 1-1/4" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	168.72	29.61
23 21 13 23-0989 EA 1-1/2" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	204.22	33.31
23 21 13 23-0990 EA 2" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	262.50	42.40
23 21 13 23-0991 EA 2-1/2" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	712.89	62.70
23 21 13 23-0992 EA 3" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	974.40	82.47
23 21 13 23-0993 EA 4" 45 Degree Elbow, Carbon Steel, Socket Weld, 6,000 LB.....	1,696.24	89.45
23 21 13 23-0994 Straight Tees, 6,000 LB Carbon Steel Socket Weld (23 21 13 23-0973)		
23 21 13 23-0995 EA 1/2" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	80.66	26.11
23 21 13 23-0996 EA 3/4" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	105.12	30.13
23 21 13 23-0997 EA 1" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	159.44	35.63
23 21 13 23-0998 EA 1-1/4" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	236.40	42.40
23 21 13 23-0999 EA 1-1/2" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	290.18	50.54
23 21 13 23-1000 EA 2" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	405.20	62.70
23 21 13 23-1001 EA 2-1/2" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	872.88	82.47
23 21 13 23-1002 EA 3" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	1,271.83	97.91
23 21 13 23-1003 EA 4" Tee, Straight, Carbon Steel, Socket Weld, 6,000 LB.....	2,812.34	112.92
23 21 13 23-1004 Reducing Tees, 6,000 LB Carbon Steel Socket Weld (23 21 13 23-0973)		
23 21 13 23-1005 EA 1/2" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB.....	63.00	26.11
23 21 13 23-1006 EA 3/4" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB.....	78.66	30.13
23 21 13 23-1007 EA 1" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB.....	111.28	35.63
23 21 13 23-1008 EA 1-1/4" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB.....	159.97	42.40
23 21 13 23-1009 EA 1-1/2" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB.....	194.96	50.54

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
23 21 13 23-1010	EA	2" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB	267.62		62.70
23 21 13 23-1011	EA	2-1/2" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB	541.31		82.47
23 21 13 23-1012	EA	3" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB	772.20		97.91
23 21 13 23-1013	EA	4" Tee, Reducing, Carbon Steel, Socket Weld, 6,000 LB	1,394.47		112.92
23 21 13 23-1014		Straight Couplings, 6,000 LB Carbon Steel Socket Weld <small>(23 21 13 23-0973)</small>			
23 21 13 23-1015	EA	1/2" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	44.18		20.93
23 21 13 23-1016	EA	3/4" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	50.29		23.36
23 21 13 23-1017	EA	1" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	62.50		26.11
23 21 13 23-1018	EA	1-1/4" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	73.76		29.61
23 21 13 23-1019	EA	1-1/2" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	89.56		33.31
23 21 13 23-1020	EA	2" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	121.33		42.40
23 21 13 23-1021	EA	2-1/2" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	239.41		62.70
23 21 13 23-1022	EA	3" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	324.22		82.47
23 21 13 23-1023	EA	4" Coupling, Straight, Carbon Steel, Socket Weld, 6,000 LB	534.15		89.45
23 21 13 23-1024		Reducing Couplings, 6,000 LB Carbon Steel Socket Weld <small>(23 21 13 23-0973)</small>			
23 21 13 23-1025	EA	1/2" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	51.05		20.93
23 21 13 23-1026	EA	3/4" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	57.82		23.36
23 21 13 23-1027	EA	1" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	74.56		26.11
23 21 13 23-1028	EA	1-1/4" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	88.33		29.61
23 21 13 23-1029	EA	1-1/2" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	111.17		33.31
23 21 13 23-1030	EA	2" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	144.40		42.40
23 21 13 23-1031	EA	2-1/2" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	290.16		62.70
23 21 13 23-1032	EA	3" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	426.53		82.47
23 21 13 23-1033	EA	4" Coupling, Reducing, Carbon Steel, Socket Weld, 6,000 LB	746.86		89.45
23 21 13 23-1034		Caps, 6,000 LB Carbon Steel Socket Weld <small>(23 21 13 23-0973)</small>			
23 21 13 23-1035	EA	1/2" Cap, Carbon Steel, Socket Weld, 6,000 LB	37.57		9.83
23 21 13 23-1036	EA	3/4" Cap, Carbon Steel, Socket Weld, 6,000 LB	45.65		10.47
23 21 13 23-1037	EA	1" Cap, Carbon Steel, Socket Weld, 6,000 LB	54.36		12.05
23 21 13 23-1038	EA	1-1/4" Cap, Carbon Steel, Socket Weld, 6,000 LB	66.92		13.11
23 21 13 23-1039	EA	1-1/2" Cap, Carbon Steel, Socket Weld, 6,000 LB	84.28		13.11
23 21 13 23-1040	EA	2" Cap, Carbon Steel, Socket Weld, 6,000 LB	109.69		16.81
23 21 13 23-1041	EA	2-1/2" Cap, Carbon Steel, Socket Weld, 6,000 LB	230.15		20.93
23 21 13 23-1042	EA	3" Cap, Carbon Steel, Socket Weld, 6,000 LB	351.13		25.27
23 21 13 23-1043	EA	4" Cap, Carbon Steel, Socket Weld, 6,000 LB	534.35		30.61
23 21 13 23-1044		Black Cast Iron Square Head Plug <small>(23 21 13 23-0973)</small>			
23 21 13 23-1045	EA	1/2" Square Head Plug, Black Cast Iron	15.43		8.35
23 21 13 23-1046	EA	3/4" Square Head Plug, Black Cast Iron	19.89		8.35
23 21 13 23-1047	EA	1" Square Head Plug, Black Cast Iron	27.24		12.68
23 21 13 23-1048	EA	1-1/4" Square Head Plug, Black Cast Iron	28.13		12.68
23 21 13 23-1049	EA	1-1/2" Square Head Plug, Black Cast Iron	31.83		12.68
23 21 13 23-1050	EA	2" Square Head Plug, Black Cast Iron	41.97		16.81
23 21 13 23-1051	EA	2-1/2" Square Head Plug, Black Cast Iron	55.56		20.93
23 21 13 23-1052	EA	3" Square Head Plug, Black Cast Iron	76.79		25.27
23 21 13 23-1053	EA	4" Square Head Plug, Black Cast Iron	91.61		30.61
23 21 13 23-1054		Unions, 6,000 LB Carbon Steel Socket Weld <small>(23 21 13 23-0973)</small>			
23 21 13 23-1055	EA	1/2" Union, Carbon Steel, Socket Weld, 6,000 LB	117.38		26.11
23 21 13 23-1056	EA	3/4" Union, Carbon Steel, Socket Weld, 6,000 LB	125.45		30.13
23 21 13 23-1057	EA	1" Union, Carbon Steel, Socket Weld, 6,000 LB	170.72		35.63
23 21 13 23-1058	EA	1-1/4" Union, Carbon Steel, Socket Weld, 6,000 LB	225.42		42.40
23 21 13 23-1059	EA	1-1/2" Union, Carbon Steel, Socket Weld, 6,000 LB	273.39		50.54
23 21 13 23-1060	EA	2" Union, Carbon Steel, Socket Weld, 6,000 LB	343.72		62.70
23 21 13 23-1061	EA	2-1/2" Union, Carbon Steel, Socket Weld, 6,000 LB	741.59		68.09
23 21 13 23-1062	EA	3" Union, Carbon Steel, Socket Weld, 6,000 LB	1,029.99		82.47
23 21 13 23-1063		Carbon Steel, Seamless Piping System <small>(23 21 13 23-0882)</small>			
Note: ASTM A106 Excludes hangers or fittings. Demolition Note applies to all pipe demolition.					
23 21 13 23-1064		Schedule 40, Carbon Steel, Seamless Piping <small>(23 21 13 23-1063)</small>			
Note: ASTM A106 Excludes hangers, elbow, tee, or reducer fittings.					
23 21 13 23-1065	LF	1/4" Schedule 40, Threaded (A-106) Seamless, Carbon Steel Pipe	12.44		3.91
		<i>For Schedule 80, Add</i>	2.37		
23 21 13 23-1066	LF	1/2" Schedule 40, Threaded (A-106) Seamless, Carbon Steel Pipe	12.42		4.23
		<i>For Schedule 160, Add</i>	9.02		
		<i>For Schedule 80, Add</i>	2.16		
23 21 13 23-1067	LF	3/4" Schedule 40, Threaded (A-106) Seamless, Carbon Steel Pipe	14.18		4.54
		<i>For Schedule 160, Add</i>	11.04		
		<i>For Schedule 80, Add</i>	2.65		
23 21 13 23-1068	LF	1" Schedule 40, Threaded (A-106) Seamless, Carbon Steel Pipe	14.97		4.97
		<i>For Schedule 160, Add</i>	11.37		
		<i>For Schedule 80, Add</i>	2.73		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1069 LF 1-1/2" Schedule 40, Threaded (A-106) Seamless, Carbon Steel Pipe <i>For Schedule 160, Add</i> <i>For Schedule 80, Add</i>	21.49 18.44 4.42	6.14
23 21 13 23-1070 LF 2" Schedule 40, Threaded (A-106) Seamless, Carbon Steel Pipe..... <i>For Schedule 160, Add</i> <i>For Schedule 80, Add</i>	25.84 22.07 5.30	7.40
23 21 13 23-1071 90 Degree Elbows, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1072 EA 1/4" 90 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	36.13	16.07
23 21 13 23-1073 EA 1/2" 90 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	44.61	18.82
23 21 13 23-1074 EA 3/4" 90 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	49.78	21.05
23 21 13 23-1075 EA 1" 90 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	58.19	23.47
23 21 13 23-1076 EA 1-1/2" 90 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	104.25	30.03
23 21 13 23-1077 EA 2" 90 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	131.94	38.17
23 21 13 23-1078 EA 1/4" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	39.94	16.07
23 21 13 23-1079 EA 1/2" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	46.04	18.82
23 21 13 23-1080 EA 3/4" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	54.48	21.05
23 21 13 23-1081 EA 1" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	68.44	23.47
23 21 13 23-1082 EA 1-1/2" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	128.72	30.03
23 21 13 23-1083 EA 2" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	158.98	38.17
23 21 13 23-1084 EA 1/2" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	59.35	18.82
23 21 13 23-1085 EA 3/4" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	71.25	21.05
23 21 13 23-1086 EA 1" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	86.06	23.47
23 21 13 23-1087 EA 1-1/2" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	178.23	30.03
23 21 13 23-1088 EA 2" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	290.29	38.17
23 21 13 23-1089 45 Degree Elbows, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1090 EA 1/4" 45 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	43.80	16.07
23 21 13 23-1091 EA 1/2" 45 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	47.68	18.82
23 21 13 23-1092 EA 3/4" 45 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	53.75	21.05
23 21 13 23-1093 EA 1" 45 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	61.21	23.47
23 21 13 23-1094 EA 1-1/2" 45 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	94.48	30.03
23 21 13 23-1095 EA 2" 45 Degree Elbow, 2,000 LB, Screwed Carbon Steel.....	147.01	38.17
23 21 13 23-1096 EA 1/4" 45 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	44.41	16.07
23 21 13 23-1097 EA 1/2" 45 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	51.17	18.82
23 21 13 23-1098 EA 3/4" 45 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	57.77	21.05
23 21 13 23-1099 EA 1" 45 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	71.67	23.47
23 21 13 23-1100 EA 1-1/2" 45 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	124.94	30.03
23 21 13 23-1101 EA 2" 45 Degree Elbow, 3,000 LB, Screwed Carbon Steel.....	167.42	38.17
23 21 13 23-1102 EA 1/2" 45 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	68.55	18.82
23 21 13 23-1103 EA 3/4" 45 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	87.85	21.05
23 21 13 23-1104 EA 1" 45 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	92.29	23.47
23 21 13 23-1105 EA 1-1/2" 45 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	213.54	30.03
23 21 13 23-1106 EA 2" 45 Degree Elbow, 6,000 LB, Screwed Carbon Steel.....	292.62	38.17
23 21 13 23-1107 Straight Tees, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1108 EA 1/4" Tee, Straight, 2,000 LB, Screwed Carbon Steel.....	48.56	22.30
23 21 13 23-1109 EA 1/2" Tee, Straight, 2,000 LB, Screwed Carbon Steel.....	56.50	23.47
23 21 13 23-1110 EA 3/4" Tee, Straight, 2,000 LB, Screwed Carbon Steel.....	69.66	27.17
23 21 13 23-1111 EA 1" Tee, Straight, 2,000 LB, Screwed Carbon Steel.....	87.70	32.04
23 21 13 23-1112 EA 1-1/2" Tee, Straight, 2,000 LB, Screwed Carbon Steel.....	151.58	45.47
23 21 13 23-1113 EA 2" Tee, Straight, 2,000 LB, Screwed Carbon Steel.....	187.93	56.46
23 21 13 23-1114 EA 1/4" Tee, Straight, 3,000 LB, Screwed Carbon Steel.....	51.81	22.30
23 21 13 23-1115 EA 1/2" Tee, Straight, 3,000 LB, Screwed Carbon Steel.....	58.62	23.47
23 21 13 23-1116 EA 3/4" Tee, Straight, 3,000 LB, Screwed Carbon Steel.....	76.74	27.17
23 21 13 23-1117 EA 1" Tee, Straight, 3,000 LB, Screwed Carbon Steel.....	93.76	32.04
23 21 13 23-1118 EA 1-1/2" Tee, Straight, 3,000 LB, Screwed Carbon Steel.....	172.58	45.47
23 21 13 23-1119 EA 2" Tee, Straight, 3,000 LB, Screwed Carbon Steel.....	222.67	56.46
23 21 13 23-1120 EA 1/2" Tee, Straight, 6,000 LB, Screwed Carbon Steel.....	74.60	23.47
23 21 13 23-1121 EA 3/4" Tee, Straight, 6,000 LB, Screwed Carbon Steel.....	93.91	27.17
23 21 13 23-1122 EA 1" Tee, Straight, 6,000 LB, Screwed Carbon Steel.....	136.21	32.04
23 21 13 23-1123 EA 1-1/2" Tee, Straight, 6,000 LB, Screwed Carbon Steel.....	220.81	45.47
23 21 13 23-1124 EA 2" Tee, Straight, 6,000 LB, Screwed Carbon Steel.....	376.41	56.46
23 21 13 23-1125 Straight Couplings, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1126 EA 1/4" Coupling, Straight, 3,000 LB, Screwed Carbon Steel.....	30.95	16.07
23 21 13 23-1127 EA 1/2" Coupling, Straight, 3,000 LB, Screwed Carbon Steel.....	34.83	18.82
23 21 13 23-1128 EA 3/4" Coupling, Straight, 3,000 LB, Screwed Carbon Steel.....	40.69	21.05
23 21 13 23-1129 EA 1" Coupling, Straight, 3,000 LB, Screwed Carbon Steel.....	48.98	23.47
23 21 13 23-1130 EA 1-1/2" Coupling, Straight, 3,000 LB, Screwed Carbon Steel.....	79.57	30.03
23 21 13 23-1131 EA 2" Coupling, Straight, 3,000 LB, Screwed Carbon Steel.....	100.93	38.17
23 21 13 23-1132 EA 1/4" Coupling, Straight, 6,000 LB, Screwed Carbon Steel.....	40.54	16.07
23 21 13 23-1133 EA 1/2" Coupling, Straight, 6,000 LB, Screwed Carbon Steel.....	40.90	18.82
23 21 13 23-1134 EA 3/4" Coupling, Straight, 6,000 LB, Screwed Carbon Steel.....	45.35	21.05
23 21 13 23-1135 EA 1" Coupling, Straight, 6,000 LB, Screwed Carbon Steel.....	55.19	23.47
23 21 13 23-1136 EA 1-1/2" Coupling, Straight, 6,000 LB, Screwed Carbon Steel.....	89.05	30.03
23 21 13 23-1137 EA 2" Coupling, Straight, 6,000 LB, Screwed Carbon Steel.....	135.58	38.17

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1138			Reducing Couplings, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1139	EA		1/4" Coupling, Reducing, 3,000 LB, Screwed Carbon Steel	32.29	17.13
23 21 13 23-1140	EA		1/2" Coupling, Reducing, 3,000 LB, Screwed Carbon Steel	37.97	18.82
23 21 13 23-1141	EA		3/4" Coupling, Reducing, 3,000 LB, Screwed Carbon Steel	45.50	21.05
23 21 13 23-1142	EA		1" Coupling, Reducing, 3,000 LB, Screwed Carbon Steel	55.64	23.47
23 21 13 23-1143	EA		1-1/2" Coupling, Reducing, 3,000 LB, Screwed Carbon Steel	81.30	30.03
23 21 13 23-1144	EA		2" Coupling, Reducing, 3,000 LB, Screwed Carbon Steel	110.27	38.17
23 21 13 23-1145	EA		1/2" Coupling, Reducing, 6,000 LB, Screwed Carbon Steel	160.73	18.82
23 21 13 23-1146	EA		3/4" Coupling, Reducing, 6,000 LB, Screwed Carbon Steel	164.09	21.05
23 21 13 23-1147	EA		1" Coupling, Reducing, 6,000 LB, Screwed Carbon Steel	193.88	23.47
23 21 13 23-1148	EA		1-1/2" Coupling, Reducing, 6,000 LB, Screwed Carbon Steel	285.76	30.03
23 21 13 23-1149	EA		2" Coupling, Reducing, 6,000 LB, Screwed Carbon Steel	419.75	38.17
23 21 13 23-1150			Caps, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1151	EA		1/4" Cap, 3,000 LB, Screwed Carbon Steel	16.46	7.19
23 21 13 23-1152	EA		1/2" Cap, 3,000 LB, Screwed Carbon Steel	18.79	8.35
23 21 13 23-1153	EA		3/4" Cap, 3,000 LB, Screwed Carbon Steel	22.76	9.41
23 21 13 23-1154	EA		1" Cap, 3,000 LB, Screwed Carbon Steel	28.99	10.47
23 21 13 23-1155	EA		1-1/2" Cap, 3,000 LB, Screwed Carbon Steel	41.22	13.32
23 21 13 23-1156	EA		2" Cap, 3,000 LB, Screwed Carbon Steel	58.34	17.03
23 21 13 23-1157	EA		1/4" Cap, 6,000 LB, Screwed Carbon Steel	27.97	7.19
23 21 13 23-1158	EA		1/2" Cap, 6,000 LB, Screwed Carbon Steel	26.16	8.35
23 21 13 23-1159	EA		3/4" Cap, 6,000 LB, Screwed Carbon Steel	34.77	9.41
23 21 13 23-1160	EA		1" Cap, 6,000 LB, Screwed Carbon Steel	37.76	10.47
23 21 13 23-1161	EA		1-1/2" Cap, 6,000 LB, Screwed Carbon Steel	76.97	13.32
23 21 13 23-1162	EA		2" Cap, 6,000 LB, Screwed Carbon Steel	93.15	17.03
23 21 13 23-1163			Nipples, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1164	EA		1/4" Nipple, 2" Long, Screwed Carbon Steel	19.34	9.62
23 21 13 23-1165	EA		1/2" Nipple, 2" Long, Screwed Carbon Steel	19.47	10.04
23 21 13 23-1166	EA		3/4" Nipple, 2" Long, Screwed Carbon Steel	19.18	10.04
23 21 13 23-1167	EA		1" Nipple, 2" Long, Screwed Carbon Steel	22.09	10.89
23 21 13 23-1168	EA		1-1/2" Nipple, 2" Long, Screwed Carbon Steel	26.41	11.74
23 21 13 23-1169	EA		2" Nipple, 2" Long, Screwed Carbon Steel	29.36	15.12
23 21 13 23-1170	EA		1/4" Nipple, 4" Long, Screwed Carbon Steel	21.54	9.62
23 21 13 23-1171	EA		1/2" Nipple, 4" Long, Screwed Carbon Steel	21.21	10.04
23 21 13 23-1172	EA		3/4" Nipple, 4" Long, Screwed Carbon Steel	21.15	10.04
23 21 13 23-1173	EA		1" Nipple, 4" Long, Screwed Carbon Steel	24.75	10.89
23 21 13 23-1174	EA		1-1/2" Nipple, 4" Long, Screwed Carbon Steel	31.15	11.74
23 21 13 23-1175	EA		2" Nipple, 4" Long, Screwed Carbon Steel	36.29	15.12
23 21 13 23-1176	EA		1/4" Nipple, 6" Long, Screwed Carbon Steel	26.79	9.62
23 21 13 23-1177	EA		1/2" Nipple, 6" Long, Screwed Carbon Steel	23.98	10.04
23 21 13 23-1178	EA		3/4" Nipple, 6" Long, Screwed Carbon Steel	24.23	10.04
23 21 13 23-1179	EA		1" Nipple, 6" Long, Screwed Carbon Steel	28.57	10.89
23 21 13 23-1180	EA		1-1/2" Nipple, 6" Long, Screwed Carbon Steel	37.62	11.74
23 21 13 23-1181	EA		2" Nipple, 6" Long, Screwed Carbon Steel	42.03	15.12
23 21 13 23-1182			Unions, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1183	EA		1/4" Union, 3,000 LB, Screwed Carbon Steel	39.50	23.36
23 21 13 23-1184	EA		1/2" Union, 3,000 LB, Screwed Carbon Steel	39.00	23.47
23 21 13 23-1185	EA		3/4" Union, 3,000 LB, Screwed Carbon Steel	44.53	27.17
23 21 13 23-1186	EA		1" Union, 3,000 LB, Screwed Carbon Steel	53.70	32.04
23 21 13 23-1187	EA		1-1/2" Union, 3,000 LB, Screwed Carbon Steel	77.70	45.47
23 21 13 23-1188	EA		2" Union, 3,000 LB, Screwed Carbon Steel	96.58	56.46
23 21 13 23-1189	EA		1/4" Union, 6,000 LB, Screwed Carbon Steel	90.41	23.36
23 21 13 23-1190	EA		1/2" Union, 6,000 LB, Screwed Carbon Steel	100.54	23.47
23 21 13 23-1191	EA		3/4" Union, 6,000 LB, Screwed Carbon Steel	119.07	27.17
23 21 13 23-1192	EA		1" Union, 6,000 LB, Screwed Carbon Steel	145.56	32.04
23 21 13 23-1193	EA		1-1/2" Union, 6,000 LB, Screwed Carbon Steel	265.54	45.47
23 21 13 23-1194	EA		2" Union, 6,000 LB, Screwed Carbon Steel	327.75	56.46
23 21 13 23-1195			Weld Neck Flanges, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1196	EA		1/2" Flange, 150 LB, Screwed Carbon Steel	92.60	43.67
23 21 13 23-1197	EA		3/4" Flange, 150 LB, Screwed Carbon Steel	96.64	45.78
23 21 13 23-1198	EA		1" Flange, 150 LB, Screwed Carbon Steel	99.61	47.79
23 21 13 23-1199	EA		1-1/2" Flange, 150 LB, Screwed Carbon Steel	109.63	53.82
23 21 13 23-1200	EA		2" Flange, 150 LB, Screwed Carbon Steel	113.14	56.14
23 21 13 23-1201	EA		1/2" Flange, 300 LB, Screwed Carbon Steel	94.31	43.67
			<i>For Blind Flange, Deduct</i>	-31.97	
			<i>For Ring Type Joint, Add</i>	28.79	
23 21 13 23-1202	EA		3/4" Flange, 300 LB, Screwed Carbon Steel	98.46	45.78
			<i>For Blind Flange, Deduct</i>	-33.43	
			<i>For Ring Type Joint, Add</i>	29.76	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1203 EA 1" Flange, 300 LB, Screwed Carbon Steel	102.37	47.79
<i>For Blind Flange, Deduct</i>	-34.81	
<i>For Ring Type Joint, Add</i>	30.70	
23 21 13 23-1204 EA 1-1/2" Flange, 300 LB, Screwed Carbon Steel	116.25	53.82
<i>For Blind Flange, Deduct</i>	-39.39	
<i>For Ring Type Joint, Add</i>	35.53	
23 21 13 23-1205 EA 2" Flange, 300 LB, Screwed Carbon Steel	119.76	56.14
<i>For Blind Flange, Deduct</i>	-40.80	
<i>For Ring Type Joint, Add</i>	35.53	
23 21 13 23-1206 EA 1/2" Flange, 600 LB, Screwed Carbon Steel	105.64	43.67
<i>For Blind Flange, Deduct</i>	-34.23	
<i>For Ring Type Joint, Add</i>	40.12	
23 21 13 23-1207 EA 3/4" Flange, 600 LB, Screwed Carbon Steel	108.82	45.78
<i>For Blind Flange, Deduct</i>	-35.50	
<i>For Ring Type Joint, Add</i>	40.12	
23 21 13 23-1208 EA 1" Flange, 600 LB, Screwed Carbon Steel	113.62	47.79
<i>For Blind Flange, Deduct</i>	-37.06	
<i>For Ring Type Joint, Add</i>	41.95	
23 21 13 23-1209 EA 1-1/2" Flange, 600 LB, Screwed Carbon Steel	130.17	53.82
<i>For Blind Flange, Deduct</i>	-42.18	
<i>For Ring Type Joint, Add</i>	49.45	
23 21 13 23-1210 EA 2" Flange, 600 LB, Screwed Carbon Steel	130.26	56.14
<i>For Blind Flange, Deduct</i>	-42.90	
<i>For Ring Type Joint, Add</i>	46.03	
23 21 13 23-1211 Square Head Plugs, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1212 EA 1/4" Square Head Plug, Screwed Carbon Steel	6.99	2.96
23 21 13 23-1213 EA 1/2" Square Head Plug, Screwed Carbon Steel	8.36	3.49
23 21 13 23-1214 EA 3/4" Square Head Plug, Screwed Carbon Steel	9.85	4.02
23 21 13 23-1215 EA 1" Square Head Plug, Screwed Carbon Steel	14.30	5.92
23 21 13 23-1216 EA 1-1/2" Square Head Plug, Screwed Carbon Steel	20.98	5.92
23 21 13 23-1217 EA 2" Square Head Plug, Screwed Carbon Steel	31.73	7.72
23 21 13 23-1218 Hex Head Plugs, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1219 EA 1/4" Hex Head Plug, Screwed Carbon Steel	6.33	2.96
23 21 13 23-1220 EA 1/2" Hex Head Plug, Screwed Carbon Steel	7.74	3.49
23 21 13 23-1221 EA 3/4" Hex Head Plug, Screwed Carbon Steel	9.45	4.02
23 21 13 23-1222 EA 1" Hex Head Plug, Screwed Carbon Steel	13.95	5.92
23 21 13 23-1223 EA 1-1/2" Hex Head Plug, Screwed Carbon Steel	19.51	5.92
23 21 13 23-1224 EA 2" Hex Head Plug, Screwed Carbon Steel	32.77	7.72
23 21 13 23-1225 Round Head Plugs, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1226 EA 1/4" Round Head Plug, Screwed Carbon Steel	8.49	2.96
23 21 13 23-1227 EA 1/2" Round Head Plug, Screwed Carbon Steel	8.45	3.49
23 21 13 23-1228 EA 3/4" Round Head Plug, Screwed Carbon Steel	9.57	4.02
23 21 13 23-1229 EA 1" Round Head Plug, Screwed Carbon Steel	14.54	5.92
23 21 13 23-1230 EA 1-1/2" Round Head Plug, Screwed Carbon Steel	22.84	5.92
23 21 13 23-1231 EA 2" Round Head Plug, Screwed Carbon Steel	32.37	7.72
23 21 13 23-1232 Hexagon Bushings, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1233 EA 1/4" Hex Bushing, Screwed Carbon Steel	6.83	2.96
23 21 13 23-1234 EA 1/2" Hex Bushing, Screwed Carbon Steel	7.72	3.49
23 21 13 23-1235 EA 3/4" Hex Bushing, Screwed Carbon Steel	9.28	4.02
23 21 13 23-1236 EA 1" Hex Bushing, Screwed Carbon Steel	14.42	5.92
23 21 13 23-1237 EA 1-1/2" Hex Bushing, Screwed Carbon Steel	19.39	5.92
23 21 13 23-1238 EA 2" Hex Bushing, Screwed Carbon Steel	31.23	7.72
23 21 13 23-1239 90 Degree Street Elbows, Screwed Carbon Steel <small>(23 21 13 23-1063)</small>		
23 21 13 23-1240 EA 1/4" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel	48.31	16.07
23 21 13 23-1241 EA 1/2" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel	54.17	18.82
23 21 13 23-1242 EA 3/4" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel	64.95	21.05
23 21 13 23-1243 EA 1" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel	77.95	23.47
23 21 13 23-1244 EA 1-1/2" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel	136.40	30.03
23 21 13 23-1245 EA 2" 90 Degree Elbow, 3,000 LB, Screwed Carbon Steel	187.70	38.17
23 21 13 23-1246 EA 1/2" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel	88.96	18.82
23 21 13 23-1247 EA 3/4" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel	135.69	21.05
23 21 13 23-1248 EA 1" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel	196.33	23.47
23 21 13 23-1249 EA 1-1/2" 90 Degree Elbow, 6,000 LB, Screwed Carbon Steel	462.04	30.03
23 21 13 23-1250 Screwed Carbon Steel Laterals <small>(23 21 13 23-1063)</small>		
23 21 13 23-1251 EA 1/2" Lateral, Straight, 3,000 LB, Screwed Carbon Steel	274.89	23.47
23 21 13 23-1252 EA 3/4" Lateral, Straight, 3,000 LB, Screwed Carbon Steel	332.43	27.17
23 21 13 23-1253 EA 1" Lateral, Straight, 3,000 LB, Screwed Carbon Steel	408.59	32.04
23 21 13 23-1254 EA 1-1/2" Lateral, Straight, 3,000 LB, Screwed Carbon Steel	518.36	45.47
23 21 13 23-1255 EA 2" Lateral, Straight, 3,000 LB, Screwed Carbon Steel	647.28	56.46

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-1256	EA	1/2" Lateral, Straight, 3,000 LB, Screwed Carbon Steel		356.17	23.47
23 21 13 23-1257	EA	3/4" Lateral, Straight, 6,000 LB, Screwed Carbon Steel		453.30	27.17
23 21 13 23-1258	EA	1" Lateral, Straight, 6,000 LB, Screwed Carbon Steel		537.83	32.04
23 21 13 23-1259	EA	1-1/2" Lateral, Straight, 6,000 LB, Screwed Carbon Steel		755.97	45.47
23 21 13 23-1260		Grooved-Joint Pipe <small>(23 21 13 23)</small>			
		Note: Includes grooving of pipe. Excludes hangers, elbow, tee, reducer fitting or couplings.			
23 21 13 23-1261		Schedule 10 Black Grooved Pipe <small>(23 21 13 23-1260)</small>			
23 21 13 23-1262	LF	2" Black Schedule 10 Grooved Pipe		37.72	13.43
23 21 13 23-1263	LF	2-1/2" Black Schedule 10 Grooved Pipe		50.48	18.40
23 21 13 23-1264	LF	3" Black Schedule 10 Grooved Pipe		57.00	20.41
23 21 13 23-1265	LF	3-1/2" Black Schedule 10 Grooved Pipe		65.57	21.15
23 21 13 23-1266	LF	4" Black Schedule 10 Grooved Pipe		69.07	22.94
23 21 13 23-1267	LF	5" Black Schedule 10 Grooved Pipe		103.07	28.13
23 21 13 23-1268	LF	6" Black Schedule 10 Grooved Pipe		128.08	39.97
23 21 13 23-1269	LF	8" Black Schedule 10 Grooved Pipe		187.60	44.83
23 21 13 23-1270	LF	10" Black Schedule 10 Grooved Pipe		237.96	54.03
23 21 13 23-1271	LF	12" Black Schedule 10 Grooved Pipe		275.91	61.22
23 21 13 23-1272		Schedule 40 Black Grooved Pipe <small>(23 21 13 23-1260)</small>			
23 21 13 23-1273	LF	3/4" Black Schedule 40 Grooved Pipe		22.52	8.14
23 21 13 23-1274	LF	1" Black Schedule 40 Grooved Pipe		25.46	9.20
23 21 13 23-1275	LF	1-1/4" Black Schedule 40 Grooved Pipe		29.55	9.94
23 21 13 23-1276	LF	1-1/2" Black Schedule 40 Grooved Pipe		33.62	11.31
23 21 13 23-1277	LF	2" Black Schedule 40 Grooved Pipe		42.19	14.38
23 21 13 23-1278	LF	2-1/2" Black Schedule 40 Grooved Pipe		59.21	19.67
23 21 13 23-1279	LF	3" Black Schedule 40 Grooved Pipe		70.90	22.42
23 21 13 23-1280	LF	4" Black Schedule 40 Grooved Pipe		90.35	24.95
23 21 13 23-1281	LF	5" Black Schedule 40 Grooved Pipe		129.56	30.34
23 21 13 23-1282	LF	6" Black Schedule 40 Grooved Pipe		170.54	43.77
23 21 13 23-1283	LF	8" Black Schedule 40 Grooved Pipe		237.29	49.59
23 21 13 23-1284	LF	10" Black Schedule 40 Grooved Pipe		338.95	59.21
23 21 13 23-1285	LF	12" Black Schedule 40 Grooved Pipe		401.55	67.98
23 21 13 23-1286		Schedule 80 Black Grooved Pipe <small>(23 21 13 23-1260)</small>			
23 21 13 23-1287	LF	3/4" Black Schedule 80 Grooved Pipe		24.71	8.89
23 21 13 23-1288	LF	1" Black Schedule 80 Grooved Pipe		27.95	9.41
23 21 13 23-1289	LF	1-1/4" Black Schedule 80 Grooved Pipe		33.60	10.47
23 21 13 23-1290	LF	1-1/2" Black Schedule 80 Grooved Pipe		38.47	11.74
23 21 13 23-1291	LF	2" Black Schedule 80 Grooved Pipe		49.83	15.12
23 21 13 23-1292	LF	2-1/2" Black Schedule 80 Grooved Pipe		70.91	20.83
23 21 13 23-1293	LF	3" Black Schedule 80 Grooved Pipe		86.39	23.36
23 21 13 23-1294	LF	4" Black Schedule 80 Grooved Pipe		113.51	25.48
23 21 13 23-1295	LF	5" Black Schedule 80 Grooved Pipe		182.31	32.04
23 21 13 23-1296	LF	6" Black Schedule 80 Grooved Pipe		231.98	45.89
23 21 13 23-1297	LF	8" Black Schedule 80 Grooved Pipe		368.11	52.45
23 21 13 23-1298	LF	10" Black Schedule 80 Grooved Pipe		460.70	63.34
23 21 13 23-1299	LF	12" Black Schedule 80 Grooved Pipe		472.59	76.56
23 21 13 23-1300		Schedule 40 Galvanized Grooved Pipe <small>(23 21 13 23-1260)</small>			
23 21 13 23-1301	LF	3/4" Galvanized Schedule 40 Grooved Pipe		20.26	8.14
23 21 13 23-1302	LF	1" Galvanized Schedule 40 Grooved Pipe		23.61	9.20
23 21 13 23-1303	LF	1-1/4" Galvanized Schedule 40 Grooved Pipe		26.46	9.94
23 21 13 23-1304	LF	1-1/2" Galvanized Schedule 40 Grooved Pipe		30.12	11.31
23 21 13 23-1305	LF	2" Galvanized Schedule 40 Grooved Pipe		38.04	14.38
23 21 13 23-1306	LF	2-1/2" Galvanized Schedule 40 Grooved Pipe		53.53	19.67
23 21 13 23-1307	LF	3" Galvanized Schedule 40 Grooved Pipe		64.04	22.42
23 21 13 23-1308	LF	4" Galvanized Schedule 40 Grooved Pipe		80.56	24.95
23 21 13 23-1309	LF	5" Galvanized Schedule 40 Grooved Pipe		115.73	30.34
23 21 13 23-1310	LF	6" Galvanized Schedule 40 Grooved Pipe		154.53	43.77
23 21 13 23-1311	LF	8" Galvanized Schedule 40 Grooved Pipe		209.83	49.59
23 21 13 23-1312	LF	10" Galvanized Schedule 40 Grooved Pipe		301.61	59.21
23 21 13 23-1313	LF	12" Galvanized Schedule 40 Grooved Pipe		357.32	67.98
23 21 13 23-1314		Schedule 80 Galvanized Grooved Pipe <small>(23 21 13 23-1260)</small>			
23 21 13 23-1315	LF	3/4" Galvanized Schedule 80 Grooved Pipe		21.67	8.89
23 21 13 23-1316	LF	1" Galvanized Schedule 80 Grooved Pipe		29.39	9.41
23 21 13 23-1317	LF	1-1/4" Galvanized Schedule 80 Grooved Pipe		29.22	10.47
23 21 13 23-1318	LF	1-1/2" Galvanized Schedule 80 Grooved Pipe		38.84	12.47
23 21 13 23-1319	LF	2" Galvanized Schedule 80 Grooved Pipe		43.39	15.12
23 21 13 23-1320	LF	2-1/2" Galvanized Schedule 80 Grooved Pipe		61.79	20.83
23 21 13 23-1321	LF	3" Galvanized Schedule 80 Grooved Pipe		75.19	23.36
23 21 13 23-1322	LF	4" Galvanized Schedule 80 Grooved Pipe		96.77	25.48
23 21 13 23-1323	LF	5" Galvanized Schedule 80 Grooved Pipe		149.14	32.04
23 21 13 23-1324	LF	6" Galvanized Schedule 80 Grooved Pipe		190.99	45.89



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1325	LF			8" Galvanized Schedule 80 Grooved Pipe.....	294.31	52.45
23 21 13 23-1326	LF			10" Galvanized Schedule 80 Grooved Pipe.....	349.80	63.34
23 21 13 23-1327	LF			12" Galvanized Schedule 80 Grooved Pipe.....	380.13	76.56
23 21 13 23-1328				Painted Grooved-Joint Pipe Fittings (23 21 13 23)		
				Note: Couplings are not included with fittings.		
23 21 13 23-1329				Grooved Elbows (23 21 13 23-1328)		
23 21 13 23-1330				90 Degree Grooved Elbows (23 21 13 23-1329)		
				Note: Victaulic No. 10		
23 21 13 23-1331	EA			3/4", Ductile Iron, Grooved 90 Degree Elbow	95.65	11.53
				For Galvanized Fittings, Add	25.86	
23 21 13 23-1332	EA			1", Ductile Iron, Grooved 90 Degree Elbow	95.65	11.53
				For Galvanized Fittings, Add	25.86	
23 21 13 23-1333	EA			1-1/4", Ductile Iron, Grooved 90 Degree Elbow	99.97	14.38
				For Galvanized Fittings, Add	25.86	
23 21 13 23-1334	EA			1-1/2", Ductile Iron, Grooved 90 Degree Elbow	104.54	17.45
				For Galvanized Fittings, Add	25.86	
23 21 13 23-1335	EA			2", Ductile Iron, Grooved 90 Degree Elbow	112.93	23.05
				For Galvanized Fittings, Add	25.86	
23 21 13 23-1336	EA			2-1/2", Ductile Iron, Grooved 90 Degree Elbow	120.46	28.13
				For Galvanized Fittings, Add	25.86	
23 21 13 23-1337	EA			3", Ductile Iron, Grooved 90 Degree Elbow	190.25	34.04
				For Galvanized Fittings, Add	45.95	
23 21 13 23-1338	EA			4", Ductile Iron, Grooved 90 Degree Elbow	219.00	44.93
				For Galvanized Fittings, Add	50.04	
23 21 13 23-1339	EA			5", Ductile Iron, Grooved 90 Degree Elbow	453.32	56.14
				For Galvanized Fittings, Add	121.82	
23 21 13 23-1340	EA			6", Ductile Iron, Grooved 90 Degree Elbow	539.14	73.48
				For Galvanized Fittings, Add	141.57	
23 21 13 23-1341	EA			8", Ductile Iron, Grooved 90 Degree Elbow	1,034.02	87.45
				For Galvanized Fittings, Add	297.96	
23 21 13 23-1342	EA			10", Ductile Iron, Grooved 90 Degree Elbow	1,559.70	102.03
				For Galvanized Fittings, Add	464.22	
23 21 13 23-1343	EA			12", Ductile Iron, Grooved 90 Degree Elbow	2,438.33	122.44
				For Galvanized Fittings, Add	744.07	
23 21 13 23-1344				45 Degree Grooved Elbows (23 21 13 23-1329)		
				Note: Victaulic No. 11		
23 21 13 23-1345	EA			3/4", Ductile Iron, Grooved 45 Degree Elbow	95.60	11.53
				For Galvanized Fittings, Add	18.80	
23 21 13 23-1346	EA			1", Ductile Iron, Grooved 45 Degree Elbow	95.60	11.53
				For Galvanized Fittings, Add	18.80	
23 21 13 23-1347	EA			1-1/4", Ductile Iron, Grooved 45 Degree Elbow	99.92	14.38
				For Galvanized Fittings, Add	18.80	
23 21 13 23-1348	EA			1-1/2", Ductile Iron, Grooved 45 Degree Elbow	104.49	17.45
				For Galvanized Fittings, Add	18.80	
23 21 13 23-1349	EA			2", Ductile Iron, Grooved 45 Degree Elbow	112.88	23.05
				For Galvanized Fittings, Add	18.80	
23 21 13 23-1350	EA			2-1/2", Ductile Iron, Grooved 45 Degree Elbow	120.41	28.13
				For Galvanized Fittings, Add	18.80	
23 21 13 23-1351	EA			3", Ductile Iron, Grooved 45 Degree Elbow	190.20	34.04
				For Galvanized Fittings, Add	33.40	
23 21 13 23-1352	EA			4", Ductile Iron, Grooved 45 Degree Elbow	219.00	44.93
				For Galvanized Fittings, Add	36.40	
23 21 13 23-1353	EA			5", Ductile Iron, Grooved 45 Degree Elbow	453.32	56.14
				For Galvanized Fittings, Add	88.59	
23 21 13 23-1354	EA			6", Ductile Iron, Grooved 45 Degree Elbow	539.14	73.48
				For Galvanized Fittings, Add	102.96	
23 21 13 23-1355	EA			8", Ductile Iron, Grooved 45 Degree Elbow	1,034.02	87.45
				For Galvanized Fittings, Add	216.70	
23 21 13 23-1356	EA			10", Ductile Iron, Grooved 45 Degree Elbow	1,559.70	102.03
				For Galvanized Fittings, Add	337.62	
23 21 13 23-1357	EA			12", Ductile Iron, Grooved 45 Degree Elbow	2,438.33	122.44
				For Galvanized Fittings, Add	541.14	
23 21 13 23-1358				22-1/2 Degree Grooved Elbows (23 21 13 23-1329)		
				Note: Victaulic No. 12		
23 21 13 23-1359	EA			1", Ductile Iron, Grooved 22-1/2 Degree Elbow	100.76	11.53
				For Galvanized Fittings, Add	20.04	
23 21 13 23-1360	EA			1-1/4", Ductile Iron, Grooved 22-1/2 Degree Elbow	105.08	14.38
				For Galvanized Fittings, Add	20.04	
23 21 13 23-1361	EA			1-1/2", Ductile Iron, Grooved 22-1/2 Degree Elbow	109.65	17.45
				For Galvanized Fittings, Add	20.04	
23 21 13 23-1362	EA			2", Ductile Iron, Grooved 22-1/2 Degree Elbow	118.04	23.05
				For Galvanized Fittings, Add	20.04	
23 21 13 23-1363	EA			2-1/2", Ductile Iron, Grooved 22-1/2 Degree Elbow	125.57	28.13
				For Galvanized Fittings, Add	20.04	
23 21 13 23-1364	EA			3", Ductile Iron, Grooved 22-1/2 Degree Elbow	173.11	34.04
				For Galvanized Fittings, Add	29.30	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1365	EA		4", Ductile Iron, Grooved 22-1/2 Degree Elbow	231.06	44.93
			<i>For Galvanized Fittings, Add</i>	39.29	
23 21 13 23-1366	EA		5", Ductile Iron, Grooved 22-1/2 Degree Elbow	591.87	56.14
			<i>For Galvanized Fittings, Add</i>	121.85	
23 21 13 23-1367	EA		6", Ductile Iron, Grooved 22-1/2 Degree Elbow	573.93	73.48
			<i>For Galvanized Fittings, Add</i>	111.31	
23 21 13 23-1368	EA		8", Ductile Iron, Grooved 22-1/2 Degree Elbow	1,101.52	87.45
			<i>For Galvanized Fittings, Add</i>	232.90	
23 21 13 23-1369	EA		10", Steel, Grooved 22-1/2 Degree Elbow	1,485.22	102.03
			<i>For Galvanized Fittings, Add</i>	319.74	
23 21 13 23-1370	EA		12", Steel, Grooved 22-1/2 Degree Elbow	1,984.65	122.44
			<i>For Galvanized Fittings, Add</i>	432.26	
23 21 13 23-1371			11-1/4 Degree Grooved Elbows (23 21 13 23-1329)		
			Note: Victaulic No. 13		
23 21 13 23-1372	EA		1", Ductile Iron, Grooved 11-1/4 Degree Elbow	100.76	11.53
			<i>For Galvanized Fittings, Add</i>	20.04	
23 21 13 23-1373	EA		1-1/4", Ductile Iron, Grooved 11-1/4 Degree Elbow	105.08	14.38
			<i>For Galvanized Fittings, Add</i>	20.04	
23 21 13 23-1374	EA		1-1/2", Ductile Iron, Grooved 11-1/4 Degree Elbow	109.65	17.45
			<i>For Galvanized Fittings, Add</i>	20.04	
23 21 13 23-1375	EA		2", Ductile Iron, Grooved 11-1/4 Degree Elbow	118.04	23.05
			<i>For Galvanized Fittings, Add</i>	20.04	
23 21 13 23-1376	EA		2-1/2", Ductile Iron, Grooved 11-1/4 Degree Elbow	125.57	28.13
			<i>For Galvanized Fittings, Add</i>	20.04	
23 21 13 23-1377	EA		3", Ductile Iron, Grooved 11-1/4 Degree Elbow	173.11	34.04
			<i>For Galvanized Fittings, Add</i>	29.30	
23 21 13 23-1378	EA		4", Ductile Iron, Grooved 11-1/4 Degree Elbow	231.05	44.93
			<i>For Galvanized Fittings, Add</i>	39.29	
23 21 13 23-1379	EA		5", Ductile Iron, Grooved 11-1/4 Degree Elbow	591.84	56.14
			<i>For Galvanized Fittings, Add</i>	121.84	
23 21 13 23-1380	EA		6", Ductile Iron, Grooved 11-1/4 Degree Elbow	573.91	73.48
			<i>For Galvanized Fittings, Add</i>	111.30	
23 21 13 23-1381	EA		8", Ductile Iron, Grooved 11-1/4 Degree Elbow	1,101.46	87.45
			<i>For Galvanized Fittings, Add</i>	232.88	
23 21 13 23-1382	EA		10", Steel, Grooved 11-1/4 Degree Elbow	1,485.14	102.03
			<i>For Galvanized Fittings, Add</i>	319.72	
23 21 13 23-1383	EA		12", Steel, Grooved 11-1/4 Degree Elbow	1,984.55	122.44
			<i>For Galvanized Fittings, Add</i>	432.24	
23 21 13 23-1384			90 Degree Grooved Long Radius Elbows (23 21 13 23-1329)		
			Note: Victaulic No. 100		
23 21 13 23-1385	EA		2", Ductile Iron, Grooved 90 Degree Long Radius Elbow	213.74	23.05
			<i>For Galvanized Fittings, Add</i>	43.00	
23 21 13 23-1386	EA		2-1/2", Ductile Iron, Grooved 90 Degree Long Radius Elbow	562.00	28.13
			<i>For Galvanized Fittings, Add</i>	124.78	
23 21 13 23-1387	EA		3", Ductile Iron, Grooved 90 Degree Long Radius Elbow	230.20	34.04
			<i>For Galvanized Fittings, Add</i>	43.00	
23 21 13 23-1388	EA		4", Ductile Iron, Grooved 90 Degree Long Radius Elbow	335.76	44.93
			<i>For Galvanized Fittings, Add</i>	64.42	
23 21 13 23-1389	EA		5", Ductile Iron, Grooved 90 Degree Long Radius Elbow	1,459.93	56.14
			<i>For Galvanized Fittings, Add</i>	330.18	
23 21 13 23-1390	EA		6", Ductile Iron, Grooved 90 Degree Long Radius Elbow	895.34	73.48
			<i>For Galvanized Fittings, Add</i>	188.45	
23 21 13 23-1391	EA		8", Ductile Iron, Grooved, 90 Degree Long Radius Elbow	2,014.55	87.45
			<i>For Galvanized Fittings, Add</i>	452.02	
23 21 13 23-1392	EA		10", Ductile Iron, Grooved 90 Degree Long Radius Elbow	4,058.11	102.03
			<i>For Galvanized Fittings, Add</i>	937.23	
23 21 13 23-1393	EA		12", Ductile Iron, Grooved 90 Degree Long Radius Elbow	4,840.44	122.44
			<i>For Galvanized Fittings, Add</i>	1,117.65	
23 21 13 23-1394			Grooved Tees, Wyes And Crosses (23 21 13 23-1328)		
23 21 13 23-1395			Grooved Tees (23 21 13 23-1394)		
			Note: Victaulic No. 20		
23 21 13 23-1396	EA		3/4", Ductile Iron, Grooved Tee.....	142.49	15.12
			<i>For Galvanized Fittings, Add</i>	35.93	
23 21 13 23-1397	EA		1", Ductile Iron, Grooved Tee.....	145.93	17.45
			<i>For Galvanized Fittings, Add</i>	35.93	
23 21 13 23-1398	EA		1-1/4", Ductile Iron, Grooved Tee	151.76	21.36
			<i>For Galvanized Fittings, Add</i>	35.93	
23 21 13 23-1399	EA		1-1/2", Ductile Iron, Grooved Tee	159.03	26.22
			<i>For Galvanized Fittings, Add</i>	35.93	
23 21 13 23-1400	EA		2", Ductile Iron, Grooved Tee.....	170.58	33.94
			<i>For Galvanized Fittings, Add</i>	35.93	
23 21 13 23-1401	EA		2-1/2", Ductile Iron, Grooved Tee	182.12	41.56
			<i>For Galvanized Fittings, Add</i>	35.93	
23 21 13 23-1402	EA		3", Ductile Iron, Grooved Tee.....	244.29	51.07
			<i>For Galvanized Fittings, Add</i>	50.33	
23 21 13 23-1403	EA		4", Ductile Iron, Grooved Tee.....	356.38	66.09
			<i>For Galvanized Fittings, Add</i>	77.20	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1404 EA 5", Ductile Iron, Grooved Tee	733.28	86.39
For Galvanized Fittings, Add	181.13	
23 21 13 23-1405 EA 6", Ductile Iron, Grooved Tee	859.76	108.06
For Galvanized Fittings, Add	209.34	
23 21 13 23-1406 EA 8", Ductile Iron, Grooved Tee	1,720.91	131.22
For Galvanized Fittings, Add	457.27	
23 21 13 23-1407 EA 10", Ductile Iron, Grooved Tee	2,951.31	153.00
For Galvanized Fittings, Add	816.56	
23 21 13 23-1408 EA 12", Ductile Iron, Grooved Tee	4,085.94	183.66
For Galvanized Fittings, Add	1,143.18	
23 21 13 23-1409 Grooved Wyes (90 Degree True Wye) (23 21 13 23-1394)		
Note: Victaulic No. 33		
23 21 13 23-1410 EA 1", Steel, Grooved Wye	531.48	17.45
For Galvanized Fittings, Add	80.85	
23 21 13 23-1411 EA 1-1/4", Steel, Grooved Wye	537.31	21.36
For Galvanized Fittings, Add	80.85	
23 21 13 23-1412 EA 1-1/2", Steel, Grooved Wye	544.58	26.22
For Galvanized Fittings, Add	80.85	
23 21 13 23-1413 EA 2", Steel, Grooved Wye	556.13	33.94
For Galvanized Fittings, Add	80.85	
23 21 13 23-1414 EA 2-1/2", Steel, Grooved Wye	567.67	41.56
For Galvanized Fittings, Add	80.85	
23 21 13 23-1415 EA 3", Steel, Grooved Wye	680.54	51.07
For Galvanized Fittings, Add	96.64	
23 21 13 23-1416 EA 4", Steel, Grooved Wye	890.19	66.09
For Galvanized Fittings, Add	126.58	
23 21 13 23-1417 EA 5", Steel, Grooved Wye	1,263.53	86.39
For Galvanized Fittings, Add	181.44	
23 21 13 23-1418 EA 6", Steel, Grooved Wye	1,565.06	108.06
For Galvanized Fittings, Add	224.49	
23 21 13 23-1419 EA 8", Steel, Grooved Wye	2,217.51	131.22
For Galvanized Fittings, Add	323.33	
23 21 13 23-1420 EA 10", Steel, Grooved Wye	3,717.39	153.00
For Galvanized Fittings, Add	558.07	
23 21 13 23-1421 EA 12", Steel, Grooved Wye	4,128.70	183.66
For Galvanized Fittings, Add	616.54	
23 21 13 23-1422 Grooved Reducing Tees (23 21 13 23-1394)		
Note: Victaulic No. 25		
23 21 13 23-1423 EA 1", Steel, Grooved Reducing Tee	257.25	17.45
For Galvanized Fittings, Add	46.22	
23 21 13 23-1424 EA 1-1/4", Steel, Grooved Reducing Tee	270.34	21.36
For Galvanized Fittings, Add	47.67	
23 21 13 23-1425 EA 1-1/2", Steel, Grooved Reducing Tee	283.55	26.22
For Galvanized Fittings, Add	48.86	
23 21 13 23-1426 EA 2", Steel, Grooved Reducing Tee	336.80	33.94
For Galvanized Fittings, Add	57.20	
23 21 13 23-1427 EA 2-1/2", Steel, Grooved Reducing Tee	377.76	41.56
For Galvanized Fittings, Add	63.08	
23 21 13 23-1428 EA 3", Steel, Grooved Reducing Tee	421.75	51.07
For Galvanized Fittings, Add	69.05	
23 21 13 23-1429 EA 4", Steel, Grooved Reducing Tee	564.63	66.09
For Galvanized Fittings, Add	93.12	
23 21 13 23-1430 EA 5", Steel, Grooved Reducing Tee	744.30	86.39
For Galvanized Fittings, Add	122.96	
23 21 13 23-1431 EA 6", Steel, Grooved Reducing Tee	1,026.81	108.06
For Galvanized Fittings, Add	172.97	
23 21 13 23-1432 EA 8", Steel, Grooved Reducing Tee	1,623.65	131.22
For Galvanized Fittings, Add	285.40	
23 21 13 23-1433 EA 10", Steel, Grooved Reducing Tee	2,333.12	153.00
For Galvanized Fittings, Add	420.73	
23 21 13 23-1434 EA 12", Steel, Grooved Reducing Tee	3,378.59	183.66
For Galvanized Fittings, Add	620.65	
23 21 13 23-1435 Grooved 45 Degree Lateral Wyes (23 21 13 23-1394)		
Note: Victaulic No. 30		
23 21 13 23-1436 EA 3/4", Steel, Grooved, 45 Degree Lateral Wye.....	501.26	15.12
For Galvanized Fittings, Add	86.14	
23 21 13 23-1437 EA 1", Steel, Grooved, 45 Degree Lateral Wye.....	504.70	17.45
For Galvanized Fittings, Add	86.14	
23 21 13 23-1438 EA 1-1/4", Steel, Grooved, 45 Degree Lateral Wye.....	510.53	21.36
For Galvanized Fittings, Add	86.14	
23 21 13 23-1439 EA 1-1/2", Steel, Grooved, 45 Degree Lateral Wye.....	517.80	26.22
For Galvanized Fittings, Add	86.14	
23 21 13 23-1440 EA 2", Steel, Grooved, 45 Degree Lateral Wye.....	529.35	33.94
For Galvanized Fittings, Add	86.14	
23 21 13 23-1441 EA 2-1/2", Steel, Grooved, 45 Degree Lateral Wye.....	540.89	41.56
For Galvanized Fittings, Add	86.14	
23 21 13 23-1442 EA 3", Steel, Grooved, 45 Degree Lateral Wye.....	489.93	51.07
For Galvanized Fittings, Add	74.41	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21	13 23-1443	EA	3-1/2", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	788.64 126.07	58.89
23 21	13 23-1444	EA	4", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	914.34 146.75	66.09
23 21	13 23-1445	EA	5", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	1,321.05 214.48	86.39
23 21	13 23-1446	EA	6", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	2,081.74 345.56	108.06
23 21	13 23-1447	EA	8", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	2,961.84 497.73	131.22
23 21	13 23-1448	EA	10", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	4,132.43 702.54	153.00
23 21	13 23-1449	EA	12", Steel, Grooved, 45 Degree Lateral Wye..... <i>For Galvanized Fittings, Add</i>	4,994.22 849.40	183.66
23 21 13 23-1450 Grooved 45 Degree Lateral Reducing Wyes (23 21 13 23-1394)					
Note: Victaulic No. 30R					
23 21	13 23-1451	EA	3", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	489.93 53.74	51.07
23 21	13 23-1452	EA	4", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	914.34 105.99	66.09
23 21	13 23-1453	EA	5", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	1,321.05 154.90	86.39
23 21	13 23-1454	EA	6", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	1,701.43 200.13	108.06
23 21	13 23-1455	EA	8", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	2,419.03 288.91	131.22
23 21	13 23-1456	EA	10", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	2,951.21 353.83	153.00
23 21	13 23-1457	EA	12", Steel, Grooved 45 Degree Lateral Reducing Wye..... <i>For Galvanized Fittings, Add</i>	3,582.95 429.99	183.66
23 21 13 23-1458 Mechanical-T Outlet (23 21 13 23-1394)					
Note: Includes making opening in pipe. Grooved or treaded branch outlets. Victaulic Styles 920 or 921.					
23 21	13 23-1459	EA	2" x 3/4" Mechanical-T Outlet With Threaded Branch Outlet..... <i>For Galvanized Fittings, Add</i>	155.71 19.74	38.06
23 21	13 23-1460	EA	2" x 1" Mechanical-T Outlet With Threaded Branch Outlet..... <i>For Galvanized Fittings, Add</i>	155.71 19.74	38.06
23 21	13 23-1461	EA	2" x 1-1/4" Mechanical-T Outlet With Threaded Branch Outlet..... <i>For Galvanized Fittings, Add</i>	168.13 22.82	38.06
23 21	13 23-1462	EA	2" x 1-1/2" Mechanical-T Outlet With Threaded Branch Outlet.....	168.13	38.06
23 21	13 23-1463	EA	2-1/2" x 3/4" Mechanical-T Outlet With Threaded Branch Outlet.....	165.22	42.83
23 21	13 23-1464	EA	2-1/2" x 1" Mechanical-T Outlet With Threaded Branch Outlet.....	165.22	42.83
23 21	13 23-1465	EA	2-1/2" x 1-1/4" Mechanical-T Outlet With Threaded Branch Outlet.....	198.02	42.83
23 21	13 23-1466	EA	3" x 3/4" Mechanical-T Outlet With Threaded Branch Outlet.....	186.80	47.58
23 21	13 23-1467	EA	3" x 1" Mechanical-T Outlet With Threaded Branch Outlet.....	186.80	47.58
23 21	13 23-1468	EA	3" x 1-1/4" Mechanical-T Outlet With Threaded Branch Outlet.....	213.21	47.58
23 21	13 23-1469	EA	3" x 1-1/2" Mechanical-T Outlet With Threaded Branch Outlet.....	213.21	47.58
23 21	13 23-1470	EA	3" x 2" Mechanical-T Outlet With Threaded Branch Outlet.....	231.29	47.58
23 21	13 23-1471	EA	4" x 3/4" Mechanical-T Outlet With Threaded Branch Outlet.....	243.72	63.44
23 21	13 23-1472	EA	4" x 1" Mechanical-T Outlet With Threaded Branch Outlet.....	243.72	63.44
23 21	13 23-1473	EA	4" x 1-1/4" Mechanical-T Outlet With Threaded Branch Outlet.....	264.34	63.44
23 21	13 23-1474	EA	4" x 1-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	270.13	63.44
23 21	13 23-1475	EA	4" x 2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	270.13	63.44
23 21	13 23-1476	EA	4" x 2-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	275.91	63.44
23 21	13 23-1477	EA	4" x 3" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	287.01	63.44
23 21	13 23-1478	EA	5" x 1-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	350.38	87.23
23 21	13 23-1479	EA	5" x 2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	350.38	87.23
23 21	13 23-1480	EA	5" x 2-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	360.39	87.23
23 21	13 23-1481	EA	5" x 3" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	372.93	87.23
23 21	13 23-1482	EA	6" x 1-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	402.06	111.02
23 21	13 23-1483	EA	6" x 2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	402.06	111.02
23 21	13 23-1484	EA	6" x 2-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	416.77	111.02
23 21	13 23-1485	EA	6" x 3" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	429.19	111.02
23 21	13 23-1486	EA	6" x 4" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	451.26	111.02
23 21	13 23-1487	EA	8" x 2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	612.51	146.96
23 21	13 23-1488	EA	8" x 2-1/2" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	612.51	146.96
23 21	13 23-1489	EA	8" x 3" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	630.23	146.96
23 21	13 23-1490	EA	8" x 4" Mechanical-T Outlet With Threaded Or Grooved Outlet.....	640.72	146.96
23 21 13 23-1491 Installation-Ready™ Grooved Fittings (23 21 13 23-1328)					
23 21 13 23-1492 Installation-Ready™ 90 Degree Grooved Elbows (23 21 13 23-1491)					
Note: Victaulic No. 101					
23 21	13 23-1493	EA	1-1/4" Ductile Iron, Grooved, Installation-Ready™ 90 Degree Elbow..... <i>For Galvanized Fittings, Add</i>	263.38 81.68	10.47
23 21	13 23-1494	EA	1-1/2" Ductile Iron, Grooved, Installation-Ready™ 90 Degree Elbow..... <i>For Galvanized Fittings, Add</i>	273.83 84.08	12.56
			<i>For Galvanized Fittings, Add</i>	65.23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1495 EA 2" Ductile Iron, Grooved, Installation-Ready™ 90 Degree Elbow <i>For Galvanized Fittings, Add</i>	282.00 84.68	16.74
23 21 13 23-1496 EA 2-1/2" Ductile Iron, Grooved, Installation-Ready™ 90 Degree Elbow <i>For Galvanized Fittings, Add</i>	341.12 102.10	20.93
23 21 13 23-1497 Installation-Ready™ 45 Degree Grooved Elbows (23 21 13 23-1491) Note: Victaulic No. 103		
23 21 13 23-1498 EA 1-1/4" Ductile Iron, Grooved, Installation-Ready™ 45 Degree Elbow <i>For Galvanized Fittings, Add</i>	263.38 59.40	10.47
23 21 13 23-1499 EA 1-1/2" Ductile Iron, Grooved, Installation-Ready™ 45 Degree Elbow <i>For Galvanized Fittings, Add</i>	273.83 61.15	12.56
23 21 13 23-1500 EA 2" Ductile Iron, Grooved, Installation-Ready™ 45 Degree Elbow <i>For Galvanized Fittings, Add</i>	282.00 61.59	16.74
23 21 13 23-1501 EA 2-1/2" Ductile Iron, Grooved, Installation-Ready™ 45 Degree Elbow <i>For Galvanized Fittings, Add</i>	341.12 74.26	20.93
23 21 13 23-1502 Installation-Ready™ Grooved Tees (23 21 13 23-1491) Note: Victaulic No. 102		
23 21 13 23-1503 EA 1-1/4" Ductile Iron, Grooved, Installation-Ready™ Tee <i>For Galvanized Fittings, Add</i>	403.35 114.66	13.95
23 21 13 23-1504 EA 1-1/2" Ductile Iron, Grooved, Installation-Ready™ Tee <i>For Galvanized Fittings, Add</i>	420.32 118.48	16.74
23 21 13 23-1505 EA 2" Ductile Iron, Grooved, Installation-Ready™ Tee <i>For Galvanized Fittings, Add</i>	434.23 120.12	22.33
23 21 13 23-1506 EA 2-1/2" Ductile Iron, Grooved, Installation-Ready™ Tee <i>For Galvanized Fittings, Add</i>	504.56 138.68	27.92
23 21 13 23-1507 Grooved Fittings (23 21 13 23-1328)		
23 21 13 23-1508 Flanged Adapter Nipple, Grooved (23 21 13 23-1507) Note: Victaulic No. 41 and 45		
23 21 13 23-1509 EA 1" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	355.80 50.52	12.68
23 21 13 23-1510 EA 1-1/4" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	357.92 50.52	14.06
23 21 13 23-1511 EA 1-1/2" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	363.21 50.52	17.66
23 21 13 23-1512 EA 2" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	374.33 50.52	25.05
23 21 13 23-1513 EA 2-1/2" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	382.28 50.52	30.34
23 21 13 23-1514 EA 3" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	485.23 64.64	36.27
23 21 13 23-1515 EA 4" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	587.11 77.09	48.85
23 21 13 23-1516 EA 5" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	822.96 110.15	59.11
23 21 13 23-1517 EA 6" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	957.56 125.68	79.83
23 21 13 23-1518 EA 8" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	1,318.48 173.48	108.06
23 21 13 23-1519 EA 10" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	2,083.93 283.09	131.22
23 21 13 23-1520 EA 12" Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150 <i>For 300 LB Rating, Add</i>	2,809.93 387.07	153.00
23 21 13 23-1521 Grooved Concentric Reducers (23 21 13 23-1507) Note: Victaulic No. 50		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-1522	EA	1-1/4" x 3/4", Grooved Concentric Reducer	378.23		12.68
		<i>For Galvanized Fittings, Add</i>	15.80		
23 21 13 23-1523	EA	1-1/4" x 1", Grooved Concentric Reducer	395.48		13.43
		<i>For Galvanized Fittings, Add</i>	16.52		
23 21 13 23-1524	EA	1-1/2" x 3/4", Grooved Concentric Reducer	445.64		14.49
		<i>For Galvanized Fittings, Add</i>	50.96		
23 21 13 23-1525	EA	1-1/2" x 1", Grooved Concentric Reducer	113.52		15.12
		<i>For Galvanized Fittings, Add</i>	10.91		
23 21 13 23-1526	EA	1-1/2" x 1-1/4", Grooved Concentric Reducer	375.19		15.86
		<i>For Galvanized Fittings, Add</i>	42.24		
23 21 13 23-1527	EA	2" x 3/4", Grooved Concentric Reducer	116.69		17.24
		<i>For Galvanized Fittings, Add</i>	10.91		
23 21 13 23-1528	EA	2" x 1", Grooved Concentric Reducer	117.75		17.97
		<i>For Galvanized Fittings, Add</i>	10.91		
23 21 13 23-1529	EA	2" x 1-1/4", Grooved Concentric Reducer	127.92		18.72
		<i>For Galvanized Fittings, Add</i>	12.01		
23 21 13 23-1530	EA	2" x 1-1/2", Grooved Concentric Reducer	122.04		20.83
		<i>For Galvanized Fittings, Add</i>	10.91		
23 21 13 23-1531	EA	2-1/2" x 3/4", Grooved Concentric Reducer	768.08		19.45
		<i>For Galvanized Fittings, Add</i>	88.82		
23 21 13 23-1532	EA	2-1/2" x 1", Grooved Concentric Reducer	609.85		20.20
		<i>For Galvanized Fittings, Add</i>	69.67		
23 21 13 23-1533	EA	2-1/2" x 1-1/4", Grooved Concentric Reducer	555.96		20.83
		<i>For Galvanized Fittings, Add</i>	63.07		
23 21 13 23-1534	EA	2-1/2" x 1-1/2", Grooved Concentric Reducer	125.15		22.94
		<i>For Galvanized Fittings, Add</i>	10.91		
23 21 13 23-1535	EA	2-1/2" x 2", Grooved Concentric Reducer	129.37		25.69
		<i>For Galvanized Fittings, Add</i>	10.91		
23 21 13 23-1536	EA	3" x 3/4", Grooved Concentric Reducer	777.58		22.63
		<i>For Galvanized Fittings, Add</i>	113.04		
23 21 13 23-1537	EA	3" x 1", Grooved Concentric Reducer	135.11		23.26
		<i>For Galvanized Fittings, Add</i>	15.24		
23 21 13 23-1538	EA	3" x 1-1/4", Grooved Concentric Reducer	611.96		24.00
		<i>For Galvanized Fittings, Add</i>	87.56		
23 21 13 23-1539	EA	3" x 1-1/2", Grooved Concentric Reducer	573.84		25.69
		<i>For Galvanized Fittings, Add</i>	81.36		
23 21 13 23-1540	EA	3" x 2", Grooved Concentric Reducer	122.46		28.55
		<i>For Galvanized Fittings, Add</i>	12.11		
23 21 13 23-1541	EA	3" x 2-1/2", Grooved Concentric Reducer	160.76		34.04
		<i>For Galvanized Fittings, Add</i>	16.68		
23 21 13 23-1542	EA	3-1/2" x 3", Grooved Concentric Reducer	171.91		36.69
		<i>For Galvanized Fittings, Add</i>	17.77		
23 21 13 23-1543	EA	4" x 1", Grooved Concentric Reducer	163.88		28.86
		<i>For Galvanized Fittings, Add</i>	20.67		
23 21 13 23-1544	EA	4" x 1-1/4", Grooved Concentric Reducer	997.28		29.61
		<i>For Galvanized Fittings, Add</i>	163.42		
23 21 13 23-1545	EA	4" x 1-1/2", Grooved Concentric Reducer	775.53		31.40
		<i>For Galvanized Fittings, Add</i>	124.93		
23 21 13 23-1546	EA	4" x 2", Grooved Concentric Reducer	157.31		34.25
		<i>For Galvanized Fittings, Add</i>	18.18		
23 21 13 23-1547	EA	4" x 2-1/2", Grooved Concentric Reducer	187.88		36.69
		<i>For Galvanized Fittings, Add</i>	22.79		
23 21 13 23-1548	EA	4" x 3", Grooved Concentric Reducer	192.11		39.54
		<i>For Galvanized Fittings, Add</i>	22.79		
23 21 13 23-1549	EA	4" x 3-1/2", Grooved Concentric Reducer	196.34		42.29
		<i>For Galvanized Fittings, Add</i>	22.79		
23 21 13 23-1550	EA	5" x 2", Grooved Concentric Reducer	1,400.72		39.86
		<i>For Galvanized Fittings, Add</i>	229.98		
23 21 13 23-1551	EA	5" x 2-1/2", Grooved Concentric Reducer	1,103.87		42.29
		<i>For Galvanized Fittings, Add</i>	178.43		
23 21 13 23-1552	EA	5" x 3", Grooved Concentric Reducer	223.22		45.14
		<i>For Galvanized Fittings, Add</i>	26.68		
23 21 13 23-1553	EA	5" x 4", Grooved Concentric Reducer	261.91		50.75
		<i>For Galvanized Fittings, Add</i>	31.86		
23 21 13 23-1554	EA	6" x 1", Grooved Concentric Reducer	311.57		43.04
		<i>For Galvanized Fittings, Add</i>	46.10		
23 21 13 23-1555	EA	6" x 1-1/2", Grooved Concentric Reducer	1,478.12		45.47
		<i>For Galvanized Fittings, Add</i>	263.09		
23 21 13 23-1556	EA	6" x 2", Grooved Concentric Reducer	319.48		48.32
		<i>For Galvanized Fittings, Add</i>	46.10		
23 21 13 23-1557	EA	6" x 2-1/2", Grooved Concentric Reducer	1,494.10		50.75
		<i>For Galvanized Fittings, Add</i>	264.59		
23 21 13 23-1558	EA	6" x 3", Grooved Concentric Reducer	327.43		53.61
		<i>For Galvanized Fittings, Add</i>	46.10		
23 21 13 23-1559	EA	6" x 4", Grooved Concentric Reducer	303.99		59.21
		<i>For Galvanized Fittings, Add</i>	40.15		
23 21 13 23-1560	EA	6" x 5", Grooved Concentric Reducer	415.59		64.92
		<i>For Galvanized Fittings, Add</i>	59.39		
23 21 13 23-1561	EA	8" x 3", Grooved Concentric Reducer	532.40		60.69
		<i>For Galvanized Fittings, Add</i>	82.38		
23 21 13 23-1562	EA	8" x 4", Grooved Concentric Reducer	540.84		66.30
		<i>For Galvanized Fittings, Add</i>	82.38		
23 21 13 23-1563	EA	8" x 5", Grooved Concentric Reducer	549.32		71.90
		<i>For Galvanized Fittings, Add</i>	82.38		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1564 EA 8" x 6", Grooved Concentric Reducer	683.49	80.35
For Galvanized Fittings, Add	105.05	
23 21 13 23-1565 EA 10" x 4", Grooved Concentric Reducer	1,161.60	73.69
For Galvanized Fittings, Add	196.13	
23 21 13 23-1566 EA 10" x 5", Grooved Concentric Reducer	2,435.94	79.30
For Galvanized Fittings, Add	432.35	
23 21 13 23-1567 EA 10" x 6", Grooved Concentric Reducer	1,281.08	87.76
For Galvanized Fittings, Add	214.49	
23 21 13 23-1568 EA 10" x 8", Grooved Concentric Reducer	1,291.63	94.84
For Galvanized Fittings, Add	214.49	
23 21 13 23-1569 EA 12" x 4", Grooved Concentric Reducer	3,605.30	83.95
For Galvanized Fittings, Add	521.92	
23 21 13 23-1570 EA 12" x 6", Grooved Concentric Reducer	1,517.88	98.01
For Galvanized Fittings, Add	205.64	
23 21 13 23-1571 EA 12" x 8", Grooved Concentric Reducer	2,216.90	105.10
For Galvanized Fittings, Add	308.91	
23 21 13 23-1572 EA 12" x 10", Grooved Concentric Reducer	2,228.06	112.50
For Galvanized Fittings, Add	308.91	
23 21 13 23-1573 Grooved Eccentric Reducers (23 21 13 23-1507)		
Note: Victaulic No. 51		
23 21 13 23-1574 EA 1-1/2" x 3/4", Grooved Eccentric Reducer	460.27	14.49
For Galvanized Fittings, Add	52.72	
23 21 13 23-1575 EA 1-1/2" x 1", Grooved Eccentric Reducer	418.63	15.12
For Galvanized Fittings, Add	47.59	
23 21 13 23-1576 EA 1-1/2" x 1-1/4", Grooved Eccentric Reducer	411.05	15.86
For Galvanized Fittings, Add	46.55	
23 21 13 23-1577 EA 2" x 3/4", Grooved Eccentric Reducer	878.14	17.24
For Galvanized Fittings, Add	102.44	
23 21 13 23-1578 EA 2" x 1", Grooved Eccentric Reducer	464.12	17.97
For Galvanized Fittings, Add	52.55	
23 21 13 23-1579 EA 2" x 1-1/4", Grooved Eccentric Reducer	507.27	18.72
For Galvanized Fittings, Add	57.61	
23 21 13 23-1580 EA 2" x 1-1/2", Grooved Eccentric Reducer	432.43	20.83
For Galvanized Fittings, Add	48.22	
23 21 13 23-1581 EA 2-1/2" x 3/4", Grooved Eccentric Reducer	1,141.67	19.45
For Galvanized Fittings, Add	133.72	
23 21 13 23-1582 EA 2-1/2" x 1", Grooved Eccentric Reducer	1,066.67	20.20
For Galvanized Fittings, Add	124.58	
23 21 13 23-1583 EA 2-1/2" x 1-1/4", Grooved Eccentric Reducer	633.19	20.83
For Galvanized Fittings, Add	72.35	
23 21 13 23-1584 EA 2-1/2" x 1-1/2", Grooved Eccentric Reducer	511.33	22.94
For Galvanized Fittings, Add	57.33	
23 21 13 23-1585 EA 2-1/2" x 2", Grooved Eccentric Reducer	230.71	25.69
For Galvanized Fittings, Add	23.09	
23 21 13 23-1586 EA 3" x 1", Grooved Eccentric Reducer	1,146.63	23.26
For Galvanized Fittings, Add	133.64	
23 21 13 23-1587 EA 3" x 1-1/4", Grooved Eccentric Reducer	1,042.40	24.00
For Galvanized Fittings, Add	120.98	
23 21 13 23-1588 EA 3" x 1-1/2", Grooved Eccentric Reducer	590.27	25.69
For Galvanized Fittings, Add	66.31	
23 21 13 23-1589 EA 3" x 2", Grooved Eccentric Reducer	263.62	28.55
For Galvanized Fittings, Add	26.54	
23 21 13 23-1590 EA 3" x 2-1/2", Grooved Eccentric Reducer	271.82	34.04
For Galvanized Fittings, Add	26.54	
23 21 13 23-1591 EA 3-1/2" x 3", Grooved Eccentric Reducer	1,276.50	36.69
For Galvanized Fittings, Add	146.83	
23 21 13 23-1592 EA 4" x 1", Grooved Eccentric Reducer	2,296.89	28.86
For Galvanized Fittings, Add	386.48	
23 21 13 23-1593 EA 4" x 1-1/2", Grooved Eccentric Reducer	1,409.98	31.40
For Galvanized Fittings, Add	233.74	
23 21 13 23-1594 EA 4" x 2", Grooved Eccentric Reducer	321.26	34.25
For Galvanized Fittings, Add	46.30	
23 21 13 23-1595 EA 4" x 2-1/2", Grooved Eccentric Reducer	324.96	36.69
For Galvanized Fittings, Add	46.30	
23 21 13 23-1596 EA 4" x 3", Grooved Eccentric Reducer	329.19	39.54
For Galvanized Fittings, Add	46.30	
23 21 13 23-1597 EA 5" x 2", Grooved Eccentric Reducer	1,562.63	39.86
For Galvanized Fittings, Add	257.74	
23 21 13 23-1598 EA 5" x 2-1/2", Grooved Eccentric Reducer	1,343.85	42.29
For Galvanized Fittings, Add	219.59	
23 21 13 23-1599 EA 5" x 3", Grooved Eccentric Reducer	1,304.42	45.14
For Galvanized Fittings, Add	212.10	
23 21 13 23-1600 EA 5" x 4", Grooved Eccentric Reducer	443.84	50.75
For Galvanized Fittings, Add	63.06	
23 21 13 23-1601 EA 6" x 1", Grooved Eccentric Reducer	2,400.80	43.04
For Galvanized Fittings, Add	435.95	
23 21 13 23-1602 EA 6" x 2", Grooved Eccentric Reducer	2,203.03	48.32
For Galvanized Fittings, Add	397.57	
23 21 13 23-1603 EA 6" x 2-1/2", Grooved Eccentric Reducer	2,613.19	50.75
For Galvanized Fittings, Add	473.42	
23 21 13 23-1604 EA 6" x 3", Grooved Eccentric Reducer	569.94	53.61
For Galvanized Fittings, Add	91.35	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21	13 23-1605	EA	6" x 4", Grooved Eccentric Reducer.....	517.35	59.21
			<i>For Galvanized Fittings, Add</i>	79.96	
23 21	13 23-1606	EA	6" x 5", Grooved Eccentric Reducer.....	611.32	64.92
			<i>For Galvanized Fittings, Add</i>	95.92	
23 21	13 23-1607	EA	8" x 3", Grooved Eccentric Reducer.....	2,566.47	60.69
			<i>For Galvanized Fittings, Add</i>	461.94	
23 21	13 23-1608	EA	8" x 4", Grooved Eccentric Reducer.....	2,262.84	66.30
			<i>For Galvanized Fittings, Add</i>	403.70	
23 21	13 23-1609	EA	8" x 5", Grooved Eccentric Reducer.....	2,122.12	71.90
			<i>For Galvanized Fittings, Add</i>	375.86	
23 21	13 23-1610	EA	8" x 6", Grooved Eccentric Reducer.....	989.44	80.35
			<i>For Galvanized Fittings, Add</i>	162.14	
23 21	13 23-1611	EA	10" x 4", Grooved Eccentric Reducer.....	4,080.53	73.69
			<i>For Galvanized Fittings, Add</i>	740.81	
23 21	13 23-1612	EA	10" x 5", Grooved Eccentric Reducer.....	3,859.31	79.30
			<i>For Galvanized Fittings, Add</i>	697.95	
23 21	13 23-1613	EA	10" x 6", Grooved Eccentric Reducer.....	2,952.22	87.76
			<i>For Galvanized Fittings, Add</i>	526.32	
23 21	13 23-1614	EA	10" x 8", Grooved Eccentric Reducer.....	2,529.45	94.84
			<i>For Galvanized Fittings, Add</i>	445.46	
23 21	13 23-1615	EA	12" x 4", Grooved Eccentric Reducer.....	4,162.63	83.95
			<i>For Galvanized Fittings, Add</i>	609.16	
23 21	13 23-1616	EA	12" x 6", Grooved Eccentric Reducer.....	3,914.98	98.01
			<i>For Galvanized Fittings, Add</i>	568.60	
23 21	13 23-1617	EA	12" x 8", Grooved Eccentric Reducer.....	3,829.16	105.10
			<i>For Galvanized Fittings, Add</i>	554.05	
23 21	13 23-1618	EA	12" x 10", Grooved Eccentric Reducer.....	3,457.37	112.50
			<i>For Galvanized Fittings, Add</i>	496.26	
23 21	13 23-1619		Grooved, Close Nipple <small>(23 21 13 23-1507)</small>		
			Note: Victaulic No. 143		
23 21	13 23-1620	EA	1-1/4" Ductile Iron, Grooved, Close Nipple	61.80	13.95
			<i>For 300 LB Rating, Add</i>	6.10	
			<i>For Galvanized Fittings, Add</i>	7.32	
			<i>For Galvanized Fittings, Add</i>	10.41	
23 21	13 23-1621	EA	1-1/2" Ductile Iron, Grooved, Close Nipple	70.73	17.45
			<i>For 300 LB Rating, Add</i>	6.64	
			<i>For Galvanized Fittings, Add</i>	7.97	
			<i>For Galvanized Fittings, Add</i>	11.34	
23 21	13 23-1622	EA	2" Ductile Iron, Grooved, Close Nipple	88.28	23.03
			<i>For 300 LB Rating, Add</i>	8.01	
			<i>For Galvanized Fittings, Add</i>	9.61	
			<i>For Galvanized Fittings, Add</i>	13.67	
23 21	13 23-1623	EA	2-1/2" Ductile Iron, Grooved, Close Nipple	105.38	27.92
			<i>For 300 LB Rating, Add</i>	9.46	
			<i>For Galvanized Fittings, Add</i>	11.36	
			<i>For Galvanized Fittings, Add</i>	16.15	
23 21	13 23-1624		Grooved Caps <small>(23 21 13 23-1507)</small>		
			Note: Victaulic No. 60		
23 21	13 23-1625	EA	1" Carbon Steel Grooved Cap	151.62	4.33
23 21	13 23-1626	EA	1-1/4" Carbon Steel Grooved Cap	153.74	5.39
23 21	13 23-1627	EA	1-1/2" Carbon Steel Grooved Cap	156.06	6.56
23 21	13 23-1628	EA	2" Carbon Steel Grooved Cap	160.19	8.67
23 21	13 23-1629	EA	2-1/2" Carbon Steel Grooved Cap	164.00	10.58
23 21	13 23-1630	EA	3" Carbon Steel Grooved Cap	168.43	12.79
23 21	13 23-1631	EA	4" Carbon Steel Grooved Cap	186.02	16.91
23 21	13 23-1632	EA	5" Carbon Steel Grooved Cap	392.06	21.05
23 21	13 23-1633	EA	6" Carbon Steel Grooved Cap	404.59	27.59
23 21	13 23-1634	EA	8" Carbon Steel Grooved Cap	730.12	32.78
23 21	13 23-1635	EA	10" Carbon Steel Grooved Cap	1,235.44	38.27
23 21	13 23-1636	EA	12" Carbon Steel Grooved Cap	2,118.21	45.89
23 21	13 23-1637		Grooved Couplings <small>(23 21 13 23-1328)</small>		
23 21	13 23-1638		Flexible Grooved Coupling <small>(23 21 13 23-1637)</small>		
			Note: Victaulic Style 77		
23 21	13 23-1639	EA	3/4" Grooved Standard Coupling	23.61	5.71
			<i>For Galvanized Fittings, Add</i>	4.19	
23 21	13 23-1640	EA	1" Grooved Standard Coupling	23.61	5.71
			<i>For Galvanized Fittings, Add</i>	4.19	
23 21	13 23-1641	EA	1-1/4" Grooved Standard Coupling	30.72	7.19
			<i>For Galvanized Fittings, Add</i>	5.58	
23 21	13 23-1642	EA	1-1/2" Grooved Standard Coupling	34.68	8.56
			<i>For Galvanized Fittings, Add</i>	6.10	
23 21	13 23-1643	EA	2" Grooved Standard Coupling	40.29	11.53
			<i>For Galvanized Fittings, Add</i>	6.44	
23 21	13 23-1644	EA	2-1/2" Grooved Standard Coupling	48.59	14.06
			<i>For Galvanized Fittings, Add</i>	7.71	
23 21	13 23-1645	EA	3" Grooved Standard Coupling	52.67	16.81
			<i>For Galvanized Fittings, Add</i>	7.71	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1646 EA 3-1/2" Grooved Standard Coupling	73.92	19.67
For Galvanized Fittings, Add	12.43	
23 21 13 23-1647 EA 4" Grooved Standard Coupling	78.05	22.42
For Galvanized Fittings, Add	12.43	
23 21 13 23-1648 EA 5" Grooved Standard Coupling	110.13	28.13
For Galvanized Fittings, Add	19.05	
23 21 13 23-1649 EA 6" Grooved Standard Coupling	135.50	36.69
For Galvanized Fittings, Add	22.52	
23 21 13 23-1650 EA 8" Grooved Standard Coupling	196.65	43.77
For Galvanized Fittings, Add	36.71	
23 21 13 23-1651 EA 10" Grooved Standard Coupling	296.56	52.45
For Galvanized Fittings, Add	61.01	
23 21 13 23-1652 EA 12" Grooved Standard Coupling	334.13	57.41
For Galvanized Fittings, Add	69.46	
23 21 13 23-1653 Zero-Flex® Rigid Coupling (23 21 13 23-1637)		
Note: Victaulic Style 07		
23 21 13 23-1654 EA 1" Grooved Rigid Coupling	29.47	5.71
For Galvanized Fittings, Add	5.11	
23 21 13 23-1655 EA 1-1/4" Grooved Rigid Coupling	31.64	7.19
For Galvanized Fittings, Add	5.11	
23 21 13 23-1656 EA 1-1/2" Grooved Rigid Coupling	33.74	8.56
For Galvanized Fittings, Add	5.11	
23 21 13 23-1657 EA 2" Grooved Rigid Coupling	38.64	11.53
For Galvanized Fittings, Add	5.23	
23 21 13 23-1658 EA 2-1/2" Grooved Rigid Coupling	45.68	14.06
For Galvanized Fittings, Add	6.03	
23 21 13 23-1659 EA 3" Grooved Rigid Coupling	49.76	16.81
For Galvanized Fittings, Add	6.03	
23 21 13 23-1660 EA 3-1/2" Grooved Rigid Coupling	58.32	19.67
For Galvanized Fittings, Add	7.05	
23 21 13 23-1661 EA 4" Grooved Rigid Coupling	74.46	22.42
For Galvanized Fittings, Add	9.99	
23 21 13 23-1662 EA 5" Grooved Rigid Coupling	95.06	28.13
For Galvanized Fittings, Add	12.98	
23 21 13 23-1663 EA 6" Grooved Rigid Coupling	125.87	36.69
For Galvanized Fittings, Add	17.35	
23 21 13 23-1664 EA 8" Grooved Rigid Coupling	177.10	43.77
For Galvanized Fittings, Add	27.33	
23 21 13 23-1665 EA 10" Grooved Rigid Coupling	278.55	52.45
For Galvanized Fittings, Add	48.97	
23 21 13 23-1666 EA 12" Grooved Rigid Coupling	309.72	57.41
For Galvanized Fittings, Add	54.80	
23 21 13 23-1667 Installation-Ready™ Coupling (23 21 13 23-1637)		
Note: Victaulic Style 009N		
23 21 13 23-1668 EA 1-1/4" Ductile Iron, Installation-Ready™ Coupling	79.70	5.34
For Galvanized Fittings, Add	18.33	
23 21 13 23-1669 EA 1-1/2" Ductile Iron, Installation-Ready™ Coupling	82.75	6.39
For Galvanized Fittings, Add	18.71	
23 21 13 23-1670 EA 2" Ductile Iron, Installation-Ready™ Coupling	95.68	8.58
For Galvanized Fittings, Add	21.16	
23 21 13 23-1671 EA 2-1/2" Ductile Iron, Installation-Ready™ Coupling	110.99	10.40
For Galvanized Fittings, Add	24.38	
23 21 13 23-1672 EA 3" Ductile Iron, Installation-Ready™ Coupling	126.69	12.49
For Galvanized Fittings, Add	27.59	
23 21 13 23-1673 EA 4" Ductile Iron, Installation-Ready™ Coupling	176.59	16.68
For Galvanized Fittings, Add	38.74	
23 21 13 23-1674 EA 5" Ductile Iron, Installation-Ready™ Coupling	279.13	20.86
For Galvanized Fittings, Add	63.37	
23 21 13 23-1675 EA 6" Ductile Iron, Installation-Ready™ Coupling	337.10	27.28
For Galvanized Fittings, Add	75.71	
23 21 13 23-1676 EA 8" Ductile Iron, Installation-Ready™ Coupling	543.28	32.45
For Galvanized Fittings, Add	126.49	
23 21 13 23-1677 Grooved Strainers And Suction Diffusers (23 21 13 23-1328)		
23 21 13 23-1678 Grooved Wye Strainers (23 21 13 23-1677)		
Note: Victaulic Style 732		
23 21 13 23-1679 EA 2" Grooved Wye Strainer	2,519.50	23.26
23 21 13 23-1680 EA 2-1/2" Grooved Wye Strainer	2,652.29	28.23
23 21 13 23-1681 EA 3" Grooved Wye Strainer	2,982.71	33.83
23 21 13 23-1682 EA 4" Grooved Wye Strainer	3,385.83	45.14
23 21 13 23-1683 EA 5" Grooved Wye Strainer	4,891.25	56.46
23 21 13 23-1684 EA 6" Grooved Wye Strainer	5,328.81	73.38
23 21 13 23-1685 EA 8" Grooved Wye Strainer	8,131.59	87.45
23 21 13 23-1686 EA 10" Grooved Wye Strainer	13,014.09	102.24
23 21 13 23-1687 EA 12" Grooved Wye Strainer	22,650.89	122.76

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1688			Grooved Tee Type Strainers (23 21 13 23-1677) Note: Victaulic Style 730		
23 21 13 23-1689	EA		1-1/2" Grooved Tee Type Strainer	1,943.76	17.66
23 21 13 23-1690	EA		2" Grooved Tee Type Strainer	2,488.83	23.26
23 21 13 23-1691	EA		2-1/2" Grooved Tee Type Strainer	2,620.41	28.23
23 21 13 23-1692	EA		3" Grooved Tee Type Strainer	2,946.70	33.83
23 21 13 23-1693	EA		4" Grooved Tee Type Strainer	3,345.00	45.14
23 21 13 23-1694	EA		5" Grooved Tee Type Strainer	4,831.81	56.46
23 21 13 23-1695	EA		6" Grooved Tee Type Strainer	5,264.72	73.38
23 21 13 23-1696	EA		8" Grooved Tee Type Strainer	8,032.35	87.45
23 21 13 23-1697	EA		10" Grooved Tee Type Strainer	11,758.09	102.24
23 21 13 23-1698	EA		12" Grooved Tee Type Strainer	15,122.50	122.76
23 21 13 23-1699			Grooved Suction Diffuser (23 21 13 23-1677) Note: Victaulic Style 731		
23 21 13 23-1700	EA		2-1/2" Grooved x 2" Flanged Suction Diffuser	5,134.58	26.11
23 21 13 23-1701	EA		3" Grooved x 2" Flanged Suction Diffuser	5,450.66	28.86
23 21 13 23-1702	EA		3" Grooved x 2-1/2" Flanged Suction Diffuser	3,937.89	33.83
23 21 13 23-1703	EA		3" Grooved x 3" Flanged Suction Diffuser	3,993.53	36.69
23 21 13 23-1704	EA		4" Grooved x 2-1/2" Flanged Suction Diffuser	4,325.89	36.69
23 21 13 23-1705	EA		4" Grooved x 3" Flanged Suction Diffuser	4,667.12	39.54
23 21 13 23-1706	EA		4" Grooved x 4" Flanged Suction Diffuser	5,395.92	39.54
23 21 13 23-1707	EA		5" Grooved x 4" Flanged Suction Diffuser	6,024.62	50.75
23 21 13 23-1708	EA		5" Grooved x 5" Flanged Suction Diffuser	6,330.71	53.61
23 21 13 23-1709	EA		6" Grooved x 4" Flanged Suction Diffuser	6,431.17	59.21
23 21 13 23-1710	EA		6" Grooved x 5" Flanged Suction Diffuser	7,684.26	64.92
23 21 13 23-1711	EA		6" Grooved x 6" Flanged Suction Diffuser	7,981.23	69.15
23 21 13 23-1712	EA		8" Grooved x 5" Flanged Suction Diffuser	8,189.29	71.90
23 21 13 23-1713	EA		8" Grooved x 6" Flanged Suction Diffuser	8,642.35	80.35
23 21 13 23-1714	EA		8" Grooved x 8" Flanged Suction Diffuser	14,796.10	87.45
23 21 13 23-1715	EA		10" Grooved x 8" Flanged Suction Diffuser	16,689.80	94.53
23 21 13 23-1716	EA		10" Grooved x 10" Flanged Suction Diffuser	20,086.93	98.01
23 21 13 23-1717	EA		12" Grooved x 10" Flanged Suction Diffuser	23,771.41	112.81
23 21 13 23-1718	EA		12" Grooved x 12" Flanged Suction Diffuser	33,009.76	119.91
23 21 13 23-1719			Grooved Steel Valves (23 21 13 23-1328)		
23 21 13 23-1720			Grooved Butterfly Valves With Standard Trim (23 21 13 23-1719)		
23 21 13 23-1721	EA		1-1/2" Butterfly Valve, Grooved, With Standard Trim	289.49	11.53
23 21 13 23-1722	EA		2" Butterfly Valve, Grooved, With Standard Trim	294.94	15.12
23 21 13 23-1723	EA		3" Butterfly Valve, Grooved, With Standard Trim	484.11	22.42
23 21 13 23-1724	EA		4" Butterfly Valve, Grooved, With Standard Trim	650.30	29.50
23 21 13 23-1725	EA		6" Butterfly Valve, Grooved, With Standard Trim	1,420.53	48.32
23 21 13 23-1726	EA		8" Butterfly Valve, Grooved, With Standard Trim	1,968.55	67.98
23 21 13 23-1727	EA		10" Butterfly Valve, Grooved, With Standard Trim	2,956.98	91.88
23 21 13 23-1728			Grooved Butterfly Valves With Stainless Steel Trim (23 21 13 23-1719)		
23 21 13 23-1729	EA		1-1/2" Butterfly Valve, Grooved, With Stainless Steel Trim	435.31	11.53
23 21 13 23-1730	EA		2" Butterfly Valve, Grooved, With Stainless Steel Trim	440.76	15.12
23 21 13 23-1731	EA		3" Butterfly Valve, Grooved, With Stainless Steel Trim	681.78	22.42
23 21 13 23-1732	EA		4" Butterfly Valve, Grooved, With Stainless Steel Trim	867.42	29.50
23 21 13 23-1733	EA		6" Butterfly Valve, Grooved, With Stainless Steel Trim	1,660.33	48.32
23 21 13 23-1734	EA		8" Butterfly Valve, Grooved, With Stainless Steel Trim	2,759.25	67.98
23 21 13 23-1735	EA		10" Butterfly Valve, Grooved, With Stainless Steel Trim	4,350.42	91.88
23 21 13 23-1736			Grooved Ball Valves With Standard Trim And Handle (23 21 13 23-1719) Note: Victaulic No. 721		
23 21 13 23-1737	EA		1-1/2" Ball Valve, Grooved, With Standard Trim	244.16	11.31
23 21 13 23-1738	EA		2" Ball Valve, Grooved, With Standard Trim	279.58	15.54
23 21 13 23-1739	EA		2-1/2" Ball Valve, Grooved, With Standard Trim	639.16	19.03
23 21 13 23-1740	EA		3" Ball Valve, Grooved, With Standard Trim	1,048.66	22.52
23 21 13 23-1741	EA		4" Ball Valve, Grooved, With Standard Trim	1,633.36	29.61
23 21 13 23-1742	EA		6" Ball Valve, Grooved, With Standard Trim	5,081.16	48.64
23 21 13 23-1743			Grooved Ball Valves With Stainless Steel Trim And Handle (23 21 13 23-1719) Note: Victaulic No. 721		
23 21 13 23-1744	EA		1-1/2" Ball Valve, Grooved, With Stainless Steel Trim	260.13	11.31
23 21 13 23-1745	EA		2" Ball Valve, Grooved, With Stainless Steel Trim	445.37	15.54
23 21 13 23-1746	EA		2-1/2" Ball Valve, Grooved, With Stainless Steel Trim	1,161.93	19.03
23 21 13 23-1747	EA		3" Ball Valve, Grooved, With Stainless Steel Trim	1,502.71	22.52
23 21 13 23-1748	EA		4" Ball Valve, Grooved, With Stainless Steel Trim	2,052.95	29.61
23 21 13 23-1749	EA		6" Ball Valve, Grooved, With Stainless Steel Trim	5,601.09	48.64
23 21 13 23-1750			Grooved Check Valves (23 21 13 23-1719) Note: Victaulic No. 712		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1751 EA 2" Check Valve, Grooved.....	370.85	15.54
23 21 13 23-1752 EA 2-1/2" Check Valve, Grooved	602.30	19.03
23 21 13 23-1753 EA 3" Check Valve, Grooved.....	701.77	22.52
23 21 13 23-1754 EA 4" Check Valve, Grooved.....	994.87	29.61
23 21 13 23-1755 Grooved Vic-Check Check Valves (23 21 13 23-1719)		
Note: Victaulic No. 716		
23 21 13 23-1756 EA 2-1/2" "Vic-Check" Check Valve, Grooved.....	481.06	19.03
23 21 13 23-1757 EA 3" "Vic-Check" Check Valve, Grooved	486.20	22.52
23 21 13 23-1758 EA 4" "Vic-Check" Check Valve, Grooved.....	609.23	29.61
23 21 13 23-1759 EA 6" "Vic-Check" Check Valve, Grooved.....	1,188.22	48.64
23 21 13 23-1760 EA 8" "Vic-Check" Check Valve, Grooved.....	1,625.80	67.67
23 21 13 23-1761 EA 10" "Vic-Check" Check Valve, Grooved.....	4,549.68	91.67
23 21 13 23-1762 EA 12" "Vic-Check" Check Valve, Grooved.....	5,387.81	105.84
23 21 13 23-1763 Grooved Plug Valves With Lever Operator (23 21 13 23-1719)		
Note: Victaulic No. 377		
23 21 13 23-1764 EA 3" Balancing Plug Valve, Grooved, With Lever Handle.....	1,041.12	22.52
23 21 13 23-1765 EA 4" Balancing Plug Valve, Grooved, With Lever Handle.....	1,152.90	29.61
23 21 13 23-1766 EA 6" Balancing Plug Valve, Grooved, With Lever Handle.....	2,060.75	48.64
23 21 13 23-1767 Grooved Plug Valve With Gear Operator (23 21 13 23-1719)		
Note: Victaulic No. 377		
23 21 13 23-1768 EA 3" Balancing Plug Valve, Grooved, With Gear Operator.....	1,853.61	22.52
23 21 13 23-1769 EA 4" Balancing Plug Valve, Grooved, With Gear Operator.....	1,965.47	29.61
23 21 13 23-1770 EA 6" Balancing Plug Valve, Grooved, With Gear Operator.....	2,873.32	48.64
23 21 13 23-1771 EA 8" Balancing Plug Valve, Grooved, With Gear Operator.....	3,842.15	67.67
23 21 13 23-1772 EA 10" Balancing Plug Valve, Grooved, With Gear Operator.....	6,036.64	91.67
23 21 13 23-1773 EA 12" Balancing Plug Valve, Grooved, With Gear Operator.....	8,751.48	105.84
23 21 13 23-1774 Prepare Pipe For Groove (23 21 13 23-1328)		
23 21 13 23-1775 Cut Grooved Pipe (23 21 13 23-1774)		
Note: For use where connecting ungrooved pipe with grooved pipe, coupling to grooved pipe, or for field groove preparation on existing cut pipe.		
23 21 13 23-1776 EA Cut 3/4" Groove Pipe	11.07	
23 21 13 23-1777 EA Cut 1" Groove Pipe.....	12.03	
23 21 13 23-1778 EA Cut 1-1/4" Groove Pipe.....	13.58	
23 21 13 23-1779 EA Cut 1-1/2" Groove Pipe.....	14.77	
23 21 13 23-1780 EA Cut 2" Groove Pipe	16.19	
23 21 13 23-1781 EA Cut 2-1/2" Groove Pipe.....	17.54	
23 21 13 23-1782 EA Cut 3" Groove Pipe.....	19.13	
23 21 13 23-1783 EA Cut 3-1/2" Groove Pipe.....	20.29	
23 21 13 23-1784 EA Cut 4" Groove Pipe.....	21.59	
23 21 13 23-1785 EA Cut 5" Groove Pipe.....	23.38	
23 21 13 23-1786 EA Cut 6" Groove Pipe.....	24.05	
23 21 13 23-1787 EA Cut 8" Groove Pipe.....	31.18	
23 21 13 23-1788 EA Cut 10" Groove Pipe.....	44.31	
23 21 13 23-1789 EA Cut 12" Groove Pipe.....	56.12	
23 21 13 23-1790 Roll Grooved Pipe (23 21 13 23-1774)		
Note: For use where connecting ungrooved pipe with grooved pipe, coupling to grooved pipe, or for field groove preparation on existing cut pipe.		
23 21 13 23-1791 EA Roll 3/4" Groove	6.33	
23 21 13 23-1792 EA Roll 1" Groove	7.38	
23 21 13 23-1793 EA Roll 1-1/4" Groove	8.42	
23 21 13 23-1794 EA Roll 1-1/2" Groove	9.46	
23 21 13 23-1795 EA Roll 2" Groove	14.52	
23 21 13 23-1796 EA Roll 2-1/2" Groove	15.30	
23 21 13 23-1797 EA Roll 3" Groove	16.83	
23 21 13 23-1798 EA Roll 3-1/2" Groove	17.91	
23 21 13 23-1799 EA Roll 4" Groove	19.57	
23 21 13 23-1800 EA Roll 5" Groove	20.05	
23 21 13 23-1801 EA Roll 6" Groove	21.05	
23 21 13 23-1802 EA Roll 8" Groove	25.51	
23 21 13 23-1803 EA Roll 10" Groove	29.02	
23 21 13 23-1804 EA Roll 12" Groove	36.60	
23 21 13 23-1805 Standard Gaskets (23 21 13 23-1774)		
Note: For use on replacement of existing gaskets.		
23 21 13 23-1806 EA 3/4" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	15.21	
23 21 13 23-1807 EA 1" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	16.10	
23 21 13 23-1808 EA 1-1/4" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	16.98	
23 21 13 23-1809 EA 1-1/2" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	18.70	
23 21 13 23-1810 EA 2" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	19.33	
23 21 13 23-1811 EA 2-1/2" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	22.26	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 21 13 23-1812	EA	3" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	24.50	
23 21 13 23-1813	EA	3-1/2" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	29.66	
23 21 13 23-1814	EA	4" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	30.17	
23 21 13 23-1815	EA	5" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	36.70	
23 21 13 23-1816	EA	6" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	39.36	
23 21 13 23-1817	EA	8" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	52.96	
23 21 13 23-1818	EA	10" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	65.64	
23 21 13 23-1819	EA	12" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	78.08	
23 21 13 23-1820	EA	14" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	109.66	
23 21 13 23-1821	EA	16" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	143.42	
23 21 13 23-1822	EA	18" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	168.03	
23 21 13 23-1823	EA	20" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	243.71	
23 21 13 23-1824	EA	24" Grooved Standard Gasket, Ethylene Propylene Diene Monomer (EPDM) "E" Or Nitrile "T"	330.57	

23 21 13 23-1825 Copper Grooved-Joint Pipe Fittings (23 21 13 23)

Note: Couplings are not included with fittings.

23 21 13 23-1826 Grooved Fittings (23 21 13 23-1826)**23 21 13 23-1827 Grooved 90 Degree Elbows (23 21 13 23-1826)**

23 21 13 23-1828	EA	2" Copper 90 Degree Elbow, Grooved.....	153.53	17.24
23 21 13 23-1829	EA	2-1/2" Copper 90 Degree Elbow, Grooved	170.85	21.05
23 21 13 23-1830	EA	3" Copper 90 Degree Elbow, Grooved.....	231.40	25.48
23 21 13 23-1831	EA	4" Copper 90 Degree Elbow, Grooved.....	481.36	33.62
23 21 13 23-1832	EA	5" Copper 90 Degree Elbow, Grooved.....	1,257.70	42.08
23 21 13 23-1833	EA	6" Copper 90 Degree Elbow, Grooved.....	1,982.90	55.09
23 21 13 23-1834	EA	8" Copper 90 Degree Elbow, Grooved.....	3,646.85	65.55

23 21 13 23-1835 Grooved 45 Degree Elbows (23 21 13 23-1826)

23 21 13 23-1836	EA	2" Copper 45 Degree Elbow, Grooved.....	153.53	17.24
23 21 13 23-1837	EA	2-1/2" Copper 45 Degree Elbow, Grooved	170.85	21.05
23 21 13 23-1838	EA	3" Copper 45 Degree Elbow, Grooved.....	231.40	25.48
23 21 13 23-1839	EA	4" Copper 45 Degree Elbow, Grooved.....	481.36	33.62
23 21 13 23-1840	EA	5" Copper 45 Degree Elbow, Grooved.....	1,257.70	42.08
23 21 13 23-1841	EA	6" Copper 45 Degree Elbow, Grooved.....	1,982.90	55.09
23 21 13 23-1842	EA	8" Copper 45 Degree Elbow, Grooved.....	3,646.85	65.55

23 21 13 23-1843 Grooved Tees (23 21 13 23-1826)

23 21 13 23-1844	EA	2" Copper Tee, Grooved.....	245.87	25.38
23 21 13 23-1845	EA	2-1/2" Copper Tee, Grooved.....	269.35	31.19
23 21 13 23-1846	EA	3" Copper Tee, Grooved.....	384.57	38.27
23 21 13 23-1847	EA	4" Copper Tee, Grooved.....	774.37	49.49
23 21 13 23-1848	EA	5" Copper Tee, Grooved.....	3,101.27	64.71
23 21 13 23-1849	EA	6" Copper Tee, Grooved.....	2,496.55	80.99
23 21 13 23-1850	EA	8" Copper Tee, Grooved.....	4,365.43	98.34

23 21 13 23-1851 Grooved Reducing Tees (23 21 13 23-1826)

23 21 13 23-1852	EA	2-1/2" Copper Tee, Reducing, Grooved.....	370.94	31.19
23 21 13 23-1853	EA	3" Copper Tee, Reducing, Grooved.....	600.27	38.27
23 21 13 23-1854	EA	4" Copper Tee, Reducing, Grooved.....	986.26	49.59
23 21 13 23-1855	EA	5" Copper Tee, Reducing, Grooved.....	2,837.35	64.82
23 21 13 23-1856	EA	6" Copper Tee, Reducing, Grooved.....	3,467.97	80.99

23 21 13 23-1857 Grooved X Cup Reducing Tees (23 21 13 23-1826)

23 21 13 23-1858	EA	2" Copper Tee, Reducing, Grooved X Cup.....	300.20	25.38
23 21 13 23-1859	EA	2-1/2" Copper Tee, Reducing, Grooved X Cup.....	372.05	31.19
23 21 13 23-1860	EA	3" Copper Tee, Reducing, Grooved X Cup.....	649.16	38.27
23 21 13 23-1861	EA	4" Copper Tee, Reducing, Grooved X Cup.....	986.26	49.49

23 21 13 23-1862 Grooved Flanged Adapter Nipples (23 21 13 23-1826)

23 21 13 23-1863	EA	2" Copper Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150	550.87	18.72
23 21 13 23-1864	EA	2-1/2" Copper Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150	580.04	22.73
23 21 13 23-1865	EA	3" Copper Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150	614.30	27.17
23 21 13 23-1866	EA	4" Copper Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150	687.10	36.58
23 21 13 23-1867	EA	5" Copper Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150	913.84	44.31
23 21 13 23-1868	EA	6" Copper Flanged Adapter Nipples With Groove Gasket, ANSI CL 125 And 150	1,017.68	59.84

23 21 13 23-1869 Grooved Concentric Reducers (23 21 13 23-1826)

23 21 13 23-1870	EA	2-1/2" x 2" Copper Concentric Reducer, Grooved	209.18	19.24
23 21 13 23-1871	EA	3" x 2" Copper Concentric Reducer, Grooved	213.42	21.47
23 21 13 23-1872	EA	3" x 2-1/2" Copper Concentric Reducer, Grooved	221.62	25.48
23 21 13 23-1873	EA	4" x 2" Copper Concentric Reducer, Grooved	400.11	25.69
23 21 13 23-1874	EA	4" x 2-1/2" Copper Concentric Reducer, Grooved	403.81	27.49



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1875 EA 4" x 3" Copper Concentric Reducer, Grooved	408.04	29.61
23 21 13 23-1876 EA 5" x 3" Copper Concentric Reducer, Grooved	1,048.87	33.83
23 21 13 23-1877 EA 5" x 4" Copper Concentric Reducer, Grooved	1,057.33	38.06
23 21 13 23-1878 EA 6" x 3" Copper Concentric Reducer, Grooved	1,142.52	40.18
23 21 13 23-1879 EA 6" x 4" Copper Concentric Reducer, Grooved	1,150.98	44.41
23 21 13 23-1880 EA 6" x 5" Copper Concentric Reducer, Grooved	1,159.44	48.64
23 21 13 23-1881 EA 8" x 6" Copper Concentric Reducer, Grooved	1,984.61	60.26
23 21 13 23-1882 Grooved X Cup Concentric Reducers (23 21 13 23-1826)		
23 21 13 23-1883 EA 2" x 1" Copper Concentric Reducer, Grooved X Cup	168.23	13.53
23 21 13 23-1884 EA 2" x 1-1/4" Copper Concentric Reducer, Grooved X Cup	169.29	14.06
23 21 13 23-1885 EA 2" x 1-1/2" Copper Concentric Reducer, Grooved X Cup	172.52	15.65
23 21 13 23-1886 EA 2-1/2" x 1" Copper Concentric Reducer, Grooved X Cup	202.99	15.12
23 21 13 23-1887 EA 2-1/2" x 1-1/4" Copper Concentric Reducer, Grooved X Cup	204.03	15.65
23 21 13 23-1888 EA 2-1/2" x 1-1/2" Copper Concentric Reducer, Grooved X Cup	207.14	17.24
23 21 13 23-1889 EA 2-1/2" x 2" Copper Concentric Reducer, Grooved X Cup	211.36	19.24
23 21 13 23-1890 EA 3" x 1-1/2" Copper Concentric Reducer, Grooved X Cup	253.17	19.24
23 21 13 23-1891 EA 3" x 2" Copper Concentric Reducer, Grooved X Cup	257.41	21.47
23 21 13 23-1892 EA 4" x 2" Copper Concentric Reducer, Grooved X Cup	449.55	25.59
23 21 13 23-1893 Grooved Standard Couplings (23 21 13 23-1826)		
23 21 13 23-1894 EA 2" Copper Standard Coupling, Grooved	58.30	8.67
23 21 13 23-1895 EA 2-1/2" Copper Standard Coupling, Grooved	68.07	10.58
23 21 13 23-1896 EA 3" Copper Standard Coupling, Grooved	76.88	12.58
23 21 13 23-1897 EA 4" Copper Standard Coupling, Grooved	112.88	16.91
23 21 13 23-1898 EA 5" Copper Standard Coupling, Grooved	176.84	21.05
23 21 13 23-1899 EA 6" Copper Standard Coupling, Grooved	233.05	27.49
23 21 13 23-1900 EA 8" Copper Standard Coupling, Grooved	342.63	32.78
23 21 13 23-1901 Grooved Caps (23 21 13 23-1826)		
23 21 13 23-1902 EA 2" Copper Cap, Grooved	99.30	8.67
23 21 13 23-1903 EA 2-1/2" Copper Cap, Grooved	142.76	10.58
23 21 13 23-1904 EA 3" Copper Cap, Grooved	176.16	12.58
23 21 13 23-1905 EA 4" Copper Cap, Grooved	260.23	16.81
23 21 13 23-1906 EA 5" Copper Cap, Grooved	443.79	21.05
23 21 13 23-1907 EA 6" Copper Cap, Grooved	517.42	27.49
23 21 13 23-1908 Grooved Valves (23 21 13 23-1825)		
23 21 13 23-1909 Grooved Butterfly Valves, Standard Trim, Without Operator (23 21 13 23-1908)		
Note: Copper body.		
23 21 13 23-1910 EA 2" Butterfly Valve, Grooved, With Standard Trim, Without Operator, Copper Body	478.23	11.31
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1911 EA 3" Butterfly Valve, Grooved, With Standard Trim, Without Operator, Copper Body	543.86	16.81
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1912 EA 4" Butterfly Valve, Grooved, With Standard Trim, Without Operator, Copper Body	718.93	22.10
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1913 EA 6" Butterfly Valve, Grooved, With Standard Trim, Without Operator, Copper Body	959.18	36.27
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1914 EA 8" Butterfly Valve, Grooved, With Standard Trim, Without Operator, Copper Body	1,057.20	50.97
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1915 Grooved Butterfly Valves, Standard Trim, With Operator (23 21 13 23-1908)		
Note: Copper body.		
23 21 13 23-1916 EA 2" Butterfly Valve, Grooved, With Standard Trim, With Operator, Copper Body	584.29	11.31
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1917 EA 3" Butterfly Valve, Grooved, With Standard Trim, With Operator, Copper Body	649.99	16.81
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1918 EA 4" Butterfly Valve, Grooved, With Standard Trim, With Operator, Copper Body	825.06	22.10
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1919 EA 6" Butterfly Valve, Grooved, With Standard Trim, With Operator, Copper Body	1,065.38	36.27
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	
23 21 13 23-1920 EA 8" Butterfly Valve, Grooved, With Standard Trim, With Operator, Copper Body	1,163.33	50.97
For Valve Bracket Insulation, Add	38.20	
For Chain Wheel, Add	43.45	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
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23 21 13 23-1921	Polyvinyl Chloride (PVC) Pressure Pipe And Fittings (23 21 13 23) Note: Socket or back weld.		
23 21 13 23-1922	Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe And Fittings (23 21 13 23-1921) Note: ASTM D1785 with D2466 fittings.		
23 21 13 23-1923	Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe (23 21 13 23-1922)		
23 21 13 23-1924	LF 1/2" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	5.30 1.36	3.02
23 21 13 23-1925	LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	6.66 1.70	3.78
23 21 13 23-1926	LF 1" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	7.47 1.81	4.03
23 21 13 23-1927	LF 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	8.38 1.95	4.33
23 21 13 23-1928	LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	8.76 1.98	4.41
23 21 13 23-1929	LF 2" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	10.84 2.38	5.28
23 21 13 23-1930	LF 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	14.03 2.82	6.27
23 21 13 23-1931	LF 3" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	17.38 3.41	7.59
23 21 13 23-1932	LF 4" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	25.72 5.12	11.36
23 21 13 23-1933	LF 6" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	37.85 6.82	15.16
23 21 13 23-1934	LF 8" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	50.05 8.13	18.07
23 21 13 23-1935	LF 10" Schedule 40 Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	100.49 9.07	20.19
23 21 13 23-1936	Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows (23 21 13 23-1922)		
23 21 13 23-1937	EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	17.89 5.12	11.41
23 21 13 23-1938	EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	23.91 6.82	15.12
23 21 13 23-1939	EA 1" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	30.28 8.46	18.82
23 21 13 23-1940	EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	43.72 11.97	26.65
23 21 13 23-1941	EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	49.07 13.50	30.03
23 21 13 23-1942	EA 2" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	63.56 17.15	38.17
23 21 13 23-1943	EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	104.06 25.37	56.46
23 21 13 23-1944	EA 3" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	134.69 33.39	74.23
23 21 13 23-1945	EA 4" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	173.96 39.65	88.18
23 21 13 23-1946	EA 6" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	251.12 45.32	100.76
23 21 13 23-1947	EA 8" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	433.89 52.87	117.58
23 21 13 23-1948	EA 10" Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	648.89 78.83	175.30
23 21 13 23-1949	Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows (23 21 13 23-1922)		
23 21 13 23-1950	EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	18.31 5.12	11.41
23 21 13 23-1951	EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	24.74 6.82	15.12
23 21 13 23-1952	EA 1" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	31.45 8.46	18.82
23 21 13 23-1953	EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	44.47 11.97	26.65
23 21 13 23-1954	EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	50.73 13.50	30.03
23 21 13 23-1955	EA 2" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	64.64 17.15	38.17
23 21 13 23-1956	EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	104.06 25.37	56.46
23 21 13 23-1957	EA 3" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	141.69 33.39	74.23
23 21 13 23-1958	EA 4" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	186.70 39.65	88.18
23 21 13 23-1959	EA 6" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	252.29 45.32	100.76
23 21 13 23-1960	EA 8" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	419.82 52.87	117.58

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-1961 EA 10" Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i>	648.89 78.83	175.30
23 21 13 23-1962 Schedule 40 Polyvinyl Chloride (PVC) Tees <small>(23 21 13 23-1922)</small>		
23 21 13 23-1963 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	29.20 8.46	18.82
23 21 13 23-1964 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	35.19 10.23	22.73
23 21 13 23-1965 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	47.07 13.50	30.03
23 21 13 23-1966 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	60.48 17.15	38.17
23 21 13 23-1967 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	72.29 20.46	45.47
23 21 13 23-1968 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	90.49 25.37	56.46
23 21 13 23-1969 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	130.95 33.39	74.23
23 21 13 23-1970 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	157.90 39.65	88.18
23 21 13 23-1971 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	222.84 52.87	117.58
23 21 13 23-1972 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	384.56 68.21	151.62
23 21 13 23-1973 EA 8" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	646.60 84.59	188.10
23 21 13 23-1974 EA 10" Schedule 40 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i>	1,848.24 126.41	281.03
23 21 13 23-1975 Schedule 40 Polyvinyl Chloride (PVC) Crosses <small>(23 21 13 23-1922)</small>		
23 21 13 23-1976 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	36.81 10.57	23.47
23 21 13 23-1977 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	44.33 12.79	28.44
23 21 13 23-1978 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	59.52 16.88	37.54
23 21 13 23-1979 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	76.66 21.43	47.68
23 21 13 23-1980 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	91.66 25.58	56.88
23 21 13 23-1981 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	115.00 31.72	70.52
23 21 13 23-1982 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	169.93 41.74	92.84
23 21 13 23-1983 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	205.53 49.56	110.17
23 21 13 23-1984 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	293.37 66.08	146.96
23 21 13 23-1985 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	530.51 85.23	189.48
23 21 13 23-1986 EA 8" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	923.88 105.68	234.93
23 21 13 23-1987 EA 10" Schedule 40 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i>	2,763.74 158.09	351.45
23 21 13 23-1988 Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <small>(23 21 13 23-1922)</small>		
23 21 13 23-1989 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	18.44 5.31	11.63
23 21 13 23-1990 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	24.22 6.79	14.91
23 21 13 23-1991 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	32.34 9.08	19.99
23 21 13 23-1992 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	39.89 11.32	24.84
23 21 13 23-1993 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	49.07 13.62	29.92
23 21 13 23-1994 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	68.82 18.90	41.56
23 21 13 23-1995 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	95.80 26.12	57.41
23 21 13 23-1996 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	127.94 32.46	71.37
23 21 13 23-1997 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	174.91 37.76	83.10
23 21 13 23-1998 EA 8" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	427.39 43.64	96.01
23 21 13 23-1999 EA 10" Schedule 40 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	508.09 58.53	128.78

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-2000			Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts (23 21 13 23-1922)		
23 21 13 23-2001	EA		1/2" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 18.81	18.81	11.41
			<i>For Work In Restricted Working Space, Add</i> 5.12		
23 21 13 23-2002	EA		3/4" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 24.49	24.49	15.12
			<i>For Work In Restricted Working Space, Add</i> 6.82		
23 21 13 23-2003	EA		1" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 30.36	30.36	18.82
			<i>For Work In Restricted Working Space, Add</i> 8.46		
23 21 13 23-2004	EA		1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 43.22	43.22	26.65
			<i>For Work In Restricted Working Space, Add</i> 11.97		
23 21 13 23-2005	EA		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 48.82	48.82	30.03
			<i>For Work In Restricted Working Space, Add</i> 13.50		
23 21 13 23-2006	EA		2" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 62.39	62.39	38.17
			<i>For Work In Restricted Working Space, Add</i> 17.15		
23 21 13 23-2007	EA		2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 92.16	92.16	56.46
			<i>For Work In Restricted Working Space, Add</i> 25.37		
23 21 13 23-2008	EA		3" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 120.04	120.04	74.23
			<i>For Work In Restricted Working Space, Add</i> 33.39		
23 21 13 23-2009	EA		4" Schedule 40 Polyvinyl Chloride (PVC) Threaded Reducing Inserts 151.90	151.90	88.18
			<i>For Work In Restricted Working Space, Add</i> 39.65		
23 21 13 23-2010			Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters (23 21 13 23-1922)		
23 21 13 23-2011	EA		1/2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 19.39	19.39	11.41
			<i>For Work In Restricted Working Space, Add</i> 5.12		
23 21 13 23-2012	EA		3/4" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 25.07	25.07	15.12
			<i>For Work In Restricted Working Space, Add</i> 6.82		
23 21 13 23-2013	EA		1" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 31.53	31.53	18.82
			<i>For Work In Restricted Working Space, Add</i> 8.46		
23 21 13 23-2014	EA		1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 43.89	43.89	26.65
			<i>For Work In Restricted Working Space, Add</i> 11.97		
23 21 13 23-2015	EA		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 50.32	50.32	30.03
			<i>For Work In Restricted Working Space, Add</i> 13.50		
23 21 13 23-2016	EA		2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 63.73	63.73	38.17
			<i>For Work In Restricted Working Space, Add</i> 17.15		
23 21 13 23-2017	EA		2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 93.65	93.65	56.46
			<i>For Work In Restricted Working Space, Add</i> 25.37		
23 21 13 23-2018	EA		3" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 124.62	124.62	74.23
			<i>For Work In Restricted Working Space, Add</i> 33.39		
23 21 13 23-2019	EA		4" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters 149.24	149.24	88.18
			<i>For Work In Restricted Working Space, Add</i> 39.65		
23 21 13 23-2020			Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters (23 21 13 23-1922)		
23 21 13 23-2021	EA		1/2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 17.89	17.89	11.41
			<i>For Work In Restricted Working Space, Add</i> 5.12		
23 21 13 23-2022	EA		3/4" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 23.82	23.82	15.12
			<i>For Work In Restricted Working Space, Add</i> 6.82		
23 21 13 23-2023	EA		1" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 29.45	29.45	18.82
			<i>For Work In Restricted Working Space, Add</i> 8.46		
23 21 13 23-2024	EA		1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 41.89	41.89	26.65
			<i>For Work In Restricted Working Space, Add</i> 11.97		
23 21 13 23-2025	EA		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 47.32	47.32	30.03
			<i>For Work In Restricted Working Space, Add</i> 13.50		
23 21 13 23-2026	EA		2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 60.31	60.31	38.17
			<i>For Work In Restricted Working Space, Add</i> 17.15		
23 21 13 23-2027	EA		2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 98.31	98.31	56.46
			<i>For Work In Restricted Working Space, Add</i> 25.37		
23 21 13 23-2028	EA		3" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 129.78	129.78	74.23
			<i>For Work In Restricted Working Space, Add</i> 33.39		
23 21 13 23-2029	EA		4" Schedule 40 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters 162.72	162.72	88.18
			<i>For Work In Restricted Working Space, Add</i> 39.65		
23 21 13 23-2030			Schedule 40 Polyvinyl Chloride (PVC) P-Traps (23 21 13 23-1922)		
23 21 13 23-2031	EA		3/4" Schedule 40 Polyvinyl Chloride (PVC) P-Traps 29.34	29.34	15.54
			<i>For Work In Restricted Working Space, Add</i> 6.98		
23 21 13 23-2032			Schedule 40 Polyvinyl Chloride (PVC) Couplings (23 21 13 23-1922)		
23 21 13 23-2033	EA		1/2" Schedule 40 Polyvinyl Chloride (PVC) Couplings 17.56	17.56	11.41
			<i>For Work In Restricted Working Space, Add</i> 5.12		
23 21 13 23-2034	EA		3/4" Schedule 40 Polyvinyl Chloride (PVC) Couplings 23.41	23.41	15.12
			<i>For Work In Restricted Working Space, Add</i> 6.82		
23 21 13 23-2035	EA		1" Schedule 40 Polyvinyl Chloride (PVC) Couplings 29.45	29.45	18.82
			<i>For Work In Restricted Working Space, Add</i> 8.46		
23 21 13 23-2036	EA		1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Couplings 41.56	41.56	26.65
			<i>For Work In Restricted Working Space, Add</i> 11.97		
23 21 13 23-2037	EA		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Couplings 46.82	46.82	30.03
			<i>For Work In Restricted Working Space, Add</i> 13.50		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-2038 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	59.98 17.15	38.17
23 21 13 23-2039 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	90.91 25.37	56.46
23 21 13 23-2040 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	121.21 33.39	74.23
23 21 13 23-2041 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	146.57 39.65	88.18
23 21 13 23-2042 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	196.67 45.32	100.76
23 21 13 23-2043 EA 8" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	261.47 52.87	117.58
23 21 13 23-2044 EA 10" Schedule 40 Polyvinyl Chloride (PVC) Couplings <i>For Work In Restricted Working Space, Add</i>	580.17 56.67	126.03
23 21 13 23-2045 Schedule 40 Polyvinyl Chloride (PVC) Unions (23 21 13 23-1922)		
23 21 13 23-2046 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	37.24 8.46	18.82
23 21 13 23-2047 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	48.18 10.23	22.73
23 21 13 23-2048 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	60.72 13.50	30.03
23 21 13 23-2049 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	95.45 17.15	38.17
23 21 13 23-2050 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	108.17 20.46	45.47
23 21 13 23-2051 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	138.44 25.37	56.46
23 21 13 23-2052 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	209.04 33.39	74.23
23 21 13 23-2053 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	235.74 39.65	88.18
23 21 13 23-2054 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	381.60 52.87	117.58
23 21 13 23-2055 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	502.60 68.19	151.62
23 21 13 23-2056 EA 8" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	736.01 84.54	188.00
23 21 13 23-2057 EA 10" Schedule 40 Polyvinyl Chloride (PVC) Unions <i>For Work In Restricted Working Space, Add</i>	1,098.59 104.98	233.35
23 21 13 23-2058 Schedule 40 Polyvinyl Chloride (PVC) Caps (23 21 13 23-1922)		
23 21 13 23-2059 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	8.46 2.34	5.15
23 21 13 23-2060 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	11.07 3.07	6.77
23 21 13 23-2061 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	14.01 3.80	8.35
23 21 13 23-2062 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	20.04 5.46	12.01
23 21 13 23-2063 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	22.25 6.08	13.32
23 21 13 23-2064 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	28.12 7.71	17.03
23 21 13 23-2065 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	45.97 11.42	25.17
23 21 13 23-2066 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	58.66 15.03	33.09
23 21 13 23-2067 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	79.13 17.84	39.23
23 21 13 23-2068 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	115.01 20.39	44.83
23 21 13 23-2069 EA 8" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	236.65 23.79	52.34
23 21 13 23-2070 EA 10" Schedule 40 Polyvinyl Chloride (PVC) Caps <i>For Work In Restricted Working Space, Add</i>	700.43 35.47	78.04
23 21 13 23-2071 Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges (23 21 13 23-1922)		
23 21 13 23-2072 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Socket Weld Flanges <i>For Work In Restricted Working Space, Add</i>	44.93 8.46	18.82
23 21 13 23-2073 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	59.75 10.23	22.73
23 21 13 23-2074 EA 1" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	73.54 13.50	30.03
23 21 13 23-2075 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	86.54 17.15	38.17
23 21 13 23-2076 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	98.26 20.46	45.47
23 21 13 23-2077 EA 2" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i>	124.54 25.37	56.46

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 20 HVAC Piping and Pumps

23 21 Hydronic Piping and Pumps



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-2078	EA	2-1/2" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges	172.99		74.23
		<i>For Work In Restricted Working Space, Add</i>	33.39		
23 21 13 23-2079	EA	3" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges	200.27		88.18
		<i>For Work In Restricted Working Space, Add</i>	39.65		
23 21 13 23-2080	EA	4" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges	262.47		117.58
		<i>For Work In Restricted Working Space, Add</i>	52.87		
23 21 13 23-2081	EA	6" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges	362.90		151.62
		<i>For Work In Restricted Working Space, Add</i>	68.19		
23 21 13 23-2082	EA	8" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges	587.74		188.00
		<i>For Work In Restricted Working Space, Add</i>	84.54		
23 21 13 23-2083	EA	10" Schedule 40 Polyvinyl Chloride (PVC) 150 LB Flanges	1,038.93		233.04
		<i>For Work In Restricted Working Space, Add</i>	104.81		
23 21 13 23-2084		Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe And Fittings <small>(23 21 13 23-1921)</small>			
		Note: ASTM D1785 with D2467 fittings.			
23 21 13 23-2085		Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe <small>(23 21 13 23-2084)</small>			
23 21 13 23-2086	LF	1/2" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	5.52		3.06
		<i>For Work In Restricted Working Space, Add</i>	1.36		
23 21 13 23-2087	LF	3/4" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	6.94		3.81
		<i>For Work In Restricted Working Space, Add</i>	1.70		
23 21 13 23-2088	LF	1" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	8.67		4.54
		<i>For Work In Restricted Working Space, Add</i>	2.04		
23 21 13 23-2089	LF	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	10.49		5.29
		<i>For Work In Restricted Working Space, Add</i>	2.39		
23 21 13 23-2090	LF	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	12.11		6.02
		<i>For Work In Restricted Working Space, Add</i>	2.72		
23 21 13 23-2091	LF	2" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	15.78		7.62
		<i>For Work In Restricted Working Space, Add</i>	3.41		
23 21 13 23-2092	LF	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	19.07		8.35
		<i>For Work In Restricted Working Space, Add</i>	3.75		
23 21 13 23-2093	LF	3" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	22.35		9.10
		<i>For Work In Restricted Working Space, Add</i>	4.09		
23 21 13 23-2094	LF	4" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	29.85		11.41
		<i>For Work In Restricted Working Space, Add</i>	5.12		
23 21 13 23-2095	LF	6" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	47.06		15.12
		<i>For Work In Restricted Working Space, Add</i>	6.82		
23 21 13 23-2096	LF	8" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	64.17		18.08
		<i>For Work In Restricted Working Space, Add</i>	8.13		
23 21 13 23-2097	LF	10" Schedule 80 Polyvinyl Chloride (PVC) Pressure Pipe	143.35		19.45
		<i>For Work In Restricted Working Space, Add</i>	8.76		
23 21 13 23-2098		Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows <small>(23 21 13 23-2084)</small>			
23 21 13 23-2099	EA	1/2" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	20.06		11.41
		<i>For Work In Restricted Working Space, Add</i>	5.12		
		<i>For Threaded Fittings, Add</i>	2.56		
23 21 13 23-2100	EA	3/4" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	26.65		15.12
		<i>For Work In Restricted Working Space, Add</i>	6.82		
		<i>For Threaded Fittings, Add</i>	3.41		
23 21 13 23-2101	EA	1" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	34.53		18.82
		<i>For Work In Restricted Working Space, Add</i>	8.46		
		<i>For Threaded Fittings, Add</i>	4.23		
23 21 13 23-2102	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	48.30		26.65
		<i>For Work In Restricted Working Space, Add</i>	11.97		
		<i>For Threaded Fittings, Add</i>	5.98		
23 21 13 23-2103	EA	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	53.98		30.03
		<i>For Work In Restricted Working Space, Add</i>	13.50		
		<i>For Threaded Fittings, Add</i>	6.75		
23 21 13 23-2104	EA	2" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	68.06		38.17
		<i>For Work In Restricted Working Space, Add</i>	17.15		
		<i>For Threaded Fittings, Add</i>	8.57		
23 21 13 23-2105	EA	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	110.14		56.46
		<i>For Work In Restricted Working Space, Add</i>	25.37		
		<i>For Threaded Fittings, Add</i>	12.69		
23 21 13 23-2106	EA	3" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	140.02		74.23
		<i>For Work In Restricted Working Space, Add</i>	33.39		
		<i>For Threaded Fittings, Add</i>	16.70		
23 21 13 23-2107	EA	4" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	175.79		88.18
		<i>For Work In Restricted Working Space, Add</i>	39.65		
		<i>For Threaded Fittings, Add</i>	19.83		
23 21 13 23-2108	EA	6" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	308.65		100.76
		<i>For Work In Restricted Working Space, Add</i>	45.32		
		<i>For Threaded Fittings, Add</i>	22.66		
23 21 13 23-2109	EA	8" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	518.81		117.58
		<i>For Work In Restricted Working Space, Add</i>	52.87		
		<i>For Threaded Fittings, Add</i>	26.43		
23 21 13 23-2110	EA	10" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows	648.89		175.30
		<i>For Work In Restricted Working Space, Add</i>	78.83		
		<i>For Threaded Fittings, Add</i>	39.41		
23 21 13 23-2111		Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <small>(23 21 13 23-2084)</small>			



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Piping and Pumps	23 20
Hydronic Piping and Pumps	23 21

23

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-2112 EA 1/2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	22.80 5.12 2.56	11.41
23 21 13 23-2113 EA 3/4" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	31.48 6.82 3.41	15.12
23 21 13 23-2114 EA 1" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	41.35 8.46 4.23	18.82
23 21 13 23-2115 EA 1-1/4" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	56.71 11.97 5.98	26.65
23 21 13 23-2116 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	64.80 13.50 6.75	30.03
23 21 13 23-2117 EA 2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	82.88 17.15 8.57	38.17
23 21 13 23-2118 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	138.70 25.37 12.69	56.46
23 21 13 23-2119 EA 3" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	177.16 33.39 16.70	74.23
23 21 13 23-2120 EA 4" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	250.81 39.65 19.83	88.18
23 21 13 23-2121 EA 6" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	300.42 45.32 22.66	100.76
23 21 13 23-2122 EA 8" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	500.09 52.87 26.43	117.58
23 21 13 23-2123 EA 10" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	627.85 78.83 39.41	175.30
23 21 13 23-2124 Schedule 80 Polyvinyl Chloride (PVC) Tees (23 21 13 23-2084)		
23 21 13 23-2125 EA 1/2" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	35.35 8.03 4.02	17.87
23 21 13 23-2126 EA 3/4" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	43.10 10.23 5.12	22.73
23 21 13 23-2127 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	56.23 13.50 6.75	30.03
23 21 13 23-2128 EA 1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	88.21 17.15 8.57	38.17
23 21 13 23-2129 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	99.27 20.46 10.23	45.47
23 21 13 23-2130 EA 2" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	123.46 25.37 12.69	56.46
23 21 13 23-2131 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	153.60 33.39 16.70	74.23
23 21 13 23-2132 EA 3" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	184.96 39.65 19.83	88.18
23 21 13 23-2133 EA 4" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	237.41 52.87 26.43	117.58
23 21 13 23-2134 EA 6" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	436.44 68.21 34.11	151.62
23 21 13 23-2135 EA 8" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	766.85 84.59 42.29	188.10
23 21 13 23-2136 EA 10" Schedule 80 Polyvinyl Chloride (PVC) Tees <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	1,848.34 126.41 63.21	281.03
23 21 13 23-2137 Schedule 80 Polyvinyl Chloride (PVC) Crosses (23 21 13 23-2084)		
23 21 13 23-2138 EA 1/2" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	46.90 10.04 5.02	22.30
23 21 13 23-2139 EA 3/4" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	56.72 12.79 6.39	28.44

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-2140	EA	1" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	73.87 16.88 8.44		37.54
23 21 13 23-2141	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	120.12 21.43 10.72		47.68
23 21 13 23-2142	EA	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	133.95 25.58 12.79		56.88
23 21 13 23-2143	EA	2" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	166.68 31.72 15.86		70.52
23 21 13 23-2144	EA	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	205.44 41.74 20.87		92.84
23 21 13 23-2145	EA	3" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	247.96 49.56 24.78		110.17
23 21 13 23-2146	EA	4" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	316.21 66.08 33.04		146.96
23 21 13 23-2147	EA	6" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	611.84 85.23 42.62		189.48
23 21 13 23-2148	EA	8" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	1,112.38 105.68 52.84		234.93
23 21 13 23-2149	EA	10" Schedule 80 Polyvinyl Chloride (PVC) Crosses <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	2,763.89 158.09 79.05		351.45
23 21 13 23-2150 Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts (23 21 13 23-2084)					
23 21 13 23-2151	EA	3/4" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	24.49 6.82		15.12
23 21 13 23-2152	EA	1" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	33.28 8.46		18.82
23 21 13 23-2153	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	47.88 11.97		26.65
23 21 13 23-2154	EA	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	55.90 13.50		30.03
23 21 13 23-2155	EA	2" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	72.72 17.15		38.17
23 21 13 23-2156	EA	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	111.55 25.37		56.46
23 21 13 23-2157	EA	3" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	154.17 33.39		74.23
23 21 13 23-2158	EA	4" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	191.61 39.65		88.18
23 21 13 23-2159	EA	6" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	216.98 45.32		100.76
23 21 13 23-2160	EA	8" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	322.57 52.87		117.58
23 21 13 23-2161	EA	10" Schedule 80 Polyvinyl Chloride (PVC) Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	517.74 61.42		136.50
23 21 13 23-2162 Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts (23 21 13 23-2084)					
23 21 13 23-2163	EA	1/2" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	17.64 5.12		11.41
23 21 13 23-2164	EA	3/4" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	25.99 6.82		15.12
23 21 13 23-2165	EA	1" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	33.28 8.46		18.82
23 21 13 23-2166	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	50.21 11.97		26.65
23 21 13 23-2167	EA	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	57.98 13.50		30.03
23 21 13 23-2168	EA	2" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	73.05 17.15		38.17
23 21 13 23-2169	EA	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	118.21 25.37		56.46
23 21 13 23-2170	EA	3" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	173.57 33.39		74.23
23 21 13 23-2171	EA	4" Schedule 80 Polyvinyl Chloride (PVC) Threaded Reducing Inserts <i>For Work In Restricted Working Space, Add</i>	227.91 39.65		88.18
23 21 13 23-2172 Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters (23 21 13 23-2084)					
23 21 13 23-2173	EA	1/2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters <i>For Work In Restricted Working Space, Add</i>	24.14 5.12		11.41
23 21 13 23-2174	EA	3/4" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters <i>For Work In Restricted Working Space, Add</i>	30.57 6.82		15.12

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-2175 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	41.85	18.82
<i>For Work In Restricted Working Space, Add</i>	8.46	
23 21 13 23-2176 EA 1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	55.88	26.65
<i>For Work In Restricted Working Space, Add</i>	11.97	
23 21 13 23-2177 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	67.97	30.03
<i>For Work In Restricted Working Space, Add</i>	13.50	
23 21 13 23-2178 EA 2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	87.12	38.17
<i>For Work In Restricted Working Space, Add</i>	17.15	
23 21 13 23-2179 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	118.71	56.46
<i>For Work In Restricted Working Space, Add</i>	25.37	
23 21 13 23-2180 EA 3" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	149.18	74.23
<i>For Work In Restricted Working Space, Add</i>	33.39	
23 21 13 23-2181 EA 4" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Male Adapters.....	199.52	88.18
<i>For Work In Restricted Working Space, Add</i>	39.65	
23 21 13 23-2182 Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters <small>(23 21 13 23-2084)</small>		
23 21 13 23-2183 EA 1/2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters	22.22	11.41
<i>For Work In Restricted Working Space, Add</i>	5.12	
23 21 13 23-2184 EA 3/4" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters	30.40	15.12
<i>For Work In Restricted Working Space, Add</i>	6.82	
23 21 13 23-2185 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters.....	39.52	18.82
<i>For Work In Restricted Working Space, Add</i>	8.46	
23 21 13 23-2186 EA 1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters	58.29	26.65
<i>For Work In Restricted Working Space, Add</i>	11.97	
23 21 13 23-2187 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters	67.55	30.03
<i>For Work In Restricted Working Space, Add</i>	13.50	
23 21 13 23-2188 EA 2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters.....	96.44	38.17
<i>For Work In Restricted Working Space, Add</i>	17.15	
23 21 13 23-2189 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters	146.69	56.46
<i>For Work In Restricted Working Space, Add</i>	25.37	
23 21 13 23-2190 EA 3" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters.....	181.23	74.23
<i>For Work In Restricted Working Space, Add</i>	33.39	
23 21 13 23-2191 EA 4" Schedule 80 Polyvinyl Chloride (PVC) Socket Weld X Threaded Female Adapters.....	252.38	88.18
<i>For Work In Restricted Working Space, Add</i>	39.65	
23 21 13 23-2192 Schedule 80 Polyvinyl Chloride (PVC) Couplings <small>(23 21 13 23-2084)</small>		
23 21 13 23-2193 EA 1/2" Schedule 80 Polyvinyl Chloride (PVC) Couplings.....	22.55	11.41
<i>For Work In Restricted Working Space, Add</i>	5.12	
<i>For Threaded Fittings, Add</i>	2.56	
23 21 13 23-2194 EA 3/4" Schedule 80 Polyvinyl Chloride (PVC) Couplings.....	30.15	15.12
<i>For Work In Restricted Working Space, Add</i>	6.82	
<i>For Threaded Fittings, Add</i>	3.41	
23 21 13 23-2195 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Couplings	35.86	18.82
<i>For Work In Restricted Working Space, Add</i>	8.46	
<i>For Threaded Fittings, Add</i>	4.23	
23 21 13 23-2196 EA 1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Couplings	51.63	26.65
<i>For Work In Restricted Working Space, Add</i>	11.97	
<i>For Threaded Fittings, Add</i>	5.98	
23 21 13 23-2197 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Couplings	57.64	30.03
<i>For Work In Restricted Working Space, Add</i>	13.50	
<i>For Threaded Fittings, Add</i>	6.75	
23 21 13 23-2198 EA 2" Schedule 80 Polyvinyl Chloride (PVC) Couplings	70.64	38.17
<i>For Work In Restricted Working Space, Add</i>	17.15	
<i>For Threaded Fittings, Add</i>	8.57	
23 21 13 23-2199 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Couplings	117.96	56.46
<i>For Work In Restricted Working Space, Add</i>	25.37	
<i>For Threaded Fittings, Add</i>	12.69	
23 21 13 23-2200 EA 3" Schedule 80 Polyvinyl Chloride (PVC) Couplings	149.68	74.23
<i>For Work In Restricted Working Space, Add</i>	33.39	
<i>For Threaded Fittings, Add</i>	16.70	
23 21 13 23-2201 EA 4" Schedule 80 Polyvinyl Chloride (PVC) Couplings	180.29	88.18
<i>For Work In Restricted Working Space, Add</i>	39.65	
<i>For Threaded Fittings, Add</i>	19.83	
23 21 13 23-2202 EA 6" Schedule 80 Polyvinyl Chloride (PVC) Couplings	254.53	100.76
<i>For Work In Restricted Working Space, Add</i>	45.32	
<i>For Threaded Fittings, Add</i>	22.66	
23 21 13 23-2203 EA 8" Schedule 80 Polyvinyl Chloride (PVC) Couplings	317.08	117.58
<i>For Work In Restricted Working Space, Add</i>	52.87	
<i>For Threaded Fittings, Add</i>	26.43	
23 21 13 23-2204 EA 10" Schedule 80 Polyvinyl Chloride (PVC) Couplings	605.14	126.03
<i>For Work In Restricted Working Space, Add</i>	56.67	
<i>For Threaded Fittings, Add</i>	28.33	
23 21 13 23-2205 Schedule 80 Polyvinyl Chloride (PVC) Unions <small>(23 21 13 23-2084)</small>		
23 21 13 23-2206 EA 1/2" Schedule 80 Polyvinyl Chloride (PVC) Unions	40.52	18.82
<i>For Work In Restricted Working Space, Add</i>	8.46	
23 21 13 23-2207 EA 3/4" Schedule 80 Polyvinyl Chloride (PVC) Unions	48.35	22.73
<i>For Work In Restricted Working Space, Add</i>	10.23	
23 21 13 23-2208 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Unions	61.22	30.03
<i>For Work In Restricted Working Space, Add</i>	13.50	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 20 HVAC Piping and Pumps

23 21 Hydronic Piping and Pumps



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 13 23-2209	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Unions	97.78		38.17
		<i>For Work In Restricted Working Space, Add</i>	17.15		
23 21 13 23-2210	EA	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Unions	120.49		45.47
		<i>For Work In Restricted Working Space, Add</i>	20.46		
23 21 13 23-2211	EA	2" Schedule 80 Polyvinyl Chloride (PVC) Unions	155.43		56.46
		<i>For Work In Restricted Working Space, Add</i>	25.37		
23 21 13 23-2212	EA	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Unions	243.21		74.23
		<i>For Work In Restricted Working Space, Add</i>	33.39		
23 21 13 23-2213	EA	3" Schedule 80 Polyvinyl Chloride (PVC) Unions	302.20		88.18
		<i>For Work In Restricted Working Space, Add</i>	39.65		
23 21 13 23-2214	EA	4" Schedule 80 Polyvinyl Chloride (PVC) Unions	382.10		117.58
		<i>For Work In Restricted Working Space, Add</i>	52.87		
23 21 13 23-2215	EA	6" Schedule 80 Polyvinyl Chloride (PVC) Unions	502.60		151.62
		<i>For Work In Restricted Working Space, Add</i>	68.19		
23 21 13 23-2216	EA	8" Schedule 80 Polyvinyl Chloride (PVC) Unions	736.01		188.00
		<i>For Work In Restricted Working Space, Add</i>	84.54		
23 21 13 23-2217	EA	10" Schedule 80 Polyvinyl Chloride (PVC) Unions	1,098.04		233.04
		<i>For Work In Restricted Working Space, Add</i>	104.81		
23 21 13 23-2218 Schedule 80 Polyvinyl Chloride (PVC) Threaded Unions (23 21 13 23-2084)					
23 21 13 23-2219	EA	1/2", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	42.71		23.49
23 21 13 23-2220	EA	3/4", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	51.16		27.17
23 21 13 23-2221	EA	1", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	62.10		32.04
23 21 13 23-2222	EA	1-1/4", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	83.86		38.17
23 21 13 23-2223	EA	1-1/2", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	101.13		45.47
23 21 13 23-2224	EA	2", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	134.84		56.46
23 21 13 23-2225	EA	3", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	291.37		109.44
23 21 13 23-2226	EA	4", Scheduler 80, Polyvinyl Chloride (PVC) Threaded Union	315.51		121.39
23 21 13 23-2227 Schedule 80 Polyvinyl Chloride (PVC) Caps (23 21 13 23-2084)					
23 21 13 23-2228	EA	1/2" Schedule 80 Polyvinyl Chloride (PVC) Caps	15.42		5.08
		<i>For Work In Restricted Working Space, Add</i>	2.30		
		<i>For Threaded Fittings, Add</i>	1.15		
23 21 13 23-2229	EA	3/4" Schedule 80 Polyvinyl Chloride (PVC) Caps	18.40		6.77
		<i>For Work In Restricted Working Space, Add</i>	3.07		
		<i>For Threaded Fittings, Add</i>	1.54		
23 21 13 23-2230	EA	1" Schedule 80 Polyvinyl Chloride (PVC) Caps	27.17		8.35
		<i>For Work In Restricted Working Space, Add</i>	3.80		
		<i>For Threaded Fittings, Add</i>	1.90		
23 21 13 23-2231	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) Caps	35.43		11.84
		<i>For Work In Restricted Working Space, Add</i>	5.39		
		<i>For Threaded Fittings, Add</i>	2.69		
23 21 13 23-2232	EA	1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Caps	37.73		13.32
		<i>For Work In Restricted Working Space, Add</i>	6.08		
		<i>For Threaded Fittings, Add</i>	3.04		
23 21 13 23-2233	EA	2" Schedule 80 Polyvinyl Chloride (PVC) Caps	51.93		17.03
		<i>For Work In Restricted Working Space, Add</i>	7.71		
		<i>For Threaded Fittings, Add</i>	3.86		
23 21 13 23-2234	EA	2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Caps	91.92		25.17
		<i>For Work In Restricted Working Space, Add</i>	11.42		
		<i>For Threaded Fittings, Add</i>	5.71		
23 21 13 23-2235	EA	3" Schedule 80 Polyvinyl Chloride (PVC) Caps	115.94		33.09
		<i>For Work In Restricted Working Space, Add</i>	15.03		
		<i>For Threaded Fittings, Add</i>	7.51		
23 21 13 23-2236	EA	4" Schedule 80 Polyvinyl Chloride (PVC) Caps	165.38		39.23
		<i>For Work In Restricted Working Space, Add</i>	17.84		
		<i>For Threaded Fittings, Add</i>	8.92		
23 21 13 23-2237	EA	6" Schedule 80 Polyvinyl Chloride (PVC) Caps	331.05		44.83
		<i>For Work In Restricted Working Space, Add</i>	20.39		
		<i>For Threaded Fittings, Add</i>	10.20		
23 21 13 23-2238	EA	8" Schedule 80 Polyvinyl Chloride (PVC) Caps	440.70		52.34
		<i>For Work In Restricted Working Space, Add</i>	23.79		
		<i>For Threaded Fittings, Add</i>	11.90		
23 21 13 23-2239	EA	10" Schedule 80 Polyvinyl Chloride (PVC) Caps	783.68		78.04
		<i>For Work In Restricted Working Space, Add</i>	35.47		
		<i>For Threaded Fittings, Add</i>	17.74		
23 21 13 23-2240 Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges (23 21 13 23-2084)					
23 21 13 23-2241	EA	1/2" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges	52.09		18.82
		<i>For Work In Restricted Working Space, Add</i>	8.46		
		<i>For Threaded Fittings, Add</i>	4.23		
23 21 13 23-2242	EA	3/4" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges	59.75		22.73
		<i>For Work In Restricted Working Space, Add</i>	10.23		
		<i>For Threaded Fittings, Add</i>	5.12		
23 21 13 23-2243	EA	1" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges	73.55		30.03
		<i>For Work In Restricted Working Space, Add</i>	13.50		
		<i>For Threaded Fittings, Add</i>	6.75		
23 21 13 23-2244	EA	1-1/4" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges	86.54		38.17
		<i>For Work In Restricted Working Space, Add</i>	17.15		
		<i>For Threaded Fittings, Add</i>	8.57		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 13 23-2245 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	98.26 20.46 10.23	45.47
23 21 13 23-2246 EA 2" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	124.54 25.37 12.69	56.46
23 21 13 23-2247 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	172.99 33.39 16.70	74.23
23 21 13 23-2248 EA 3" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	200.27 39.65 19.83	88.18
23 21 13 23-2249 EA 4" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	262.47 52.87 26.43	117.58
23 21 13 23-2250 EA 6" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	362.91 68.19 34.09	151.62
23 21 13 23-2251 EA 8" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	587.75 84.54 42.27	188.00
23 21 13 23-2252 EA 10" Schedule 80 Polyvinyl Chloride (PVC) 150 LB Flanges <i>For Work In Restricted Working Space, Add</i> <i>For Threaded Fittings, Add</i>	1,038.93 104.81 52.41	233.04
23 21 13 23-2253 Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe (23 21 13 23-1921) Note: In place pipe.		
23 21 13 23-2254 EA 1/2", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	5.74 1.72	
23 21 13 23-2255 EA 3/4", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	6.20 1.86	
23 21 13 23-2256 EA 1", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	6.98 2.09	
23 21 13 23-2257 EA 1-1/4", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	7.32 2.20	
23 21 13 23-2258 EA 1-1/2", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	7.75 2.33	
23 21 13 23-2259 EA 2", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	8.53 2.56	
23 21 13 23-2260 EA 2-1/2", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	9.18 2.75	
23 21 13 23-2261 EA 3", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	10.85 3.26	
23 21 13 23-2262 EA 4", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	14.64 4.39	
23 21 13 23-2263 EA 6", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	20.92 6.28	
23 21 13 23-2264 EA 8", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	27.90 8.37	
23 21 13 23-2265 EA 10", Cut And Prepare Existing Polyvinyl Chloride (PVC) Pressure Pipe <i>For Work In Restricted Working Space, Add</i>	34.11 10.23	
23 21 13 23-2266 Polyethylene Pipe And Fittings (23 21 13 23)		
23 21 13 23-2267 Small Diameter Tubing (23 21 13 23-2266)		
23 21 13 23-2268 Tubing (23 21 13 23-2267)		
23 21 13 23-2269 LF 1/4" Polyethylene Tubing <i>For Work In Restricted Working Space, Add</i>	3.49 0.96	
23 21 13 23-2270 LF 5/16" Polyethylene Tubing <i>For Work In Restricted Working Space, Add</i>	3.81 0.98	
23 21 13 23-2271 LF 3/8" Polyethylene Tubing <i>For Work In Restricted Working Space, Add</i>	4.04 1.00	
23 21 13 23-2272 LF 1/2" Polyethylene Tubing <i>For Work In Restricted Working Space, Add</i>	4.13 1.08	
23 21 16 Hydronic Piping Specialties (23 21)		
23 21 16 00-0001 Air Vents (23 21 16)		
23 21 16 00-0002 Screwed Ends, Cast Iron, Automatic Air Vents (23 21 16 00-0001) Note: With guided free floating lever.		
23 21 16 00-0003 EA 1/2" NPT, Cast Iron, Automatic Air Vent	384.13	33.31
23 21 16 00-0004 EA 3/4" NPT, Cast Iron, Automatic Air Vent	468.73	44.22
23 21 16 00-0005 EA 1" NPT, Cast Iron, Automatic Air Vent	1,098.71	45.95
23 21 16 00-0006 EA 1-1/4" NPT, Cast Iron, Automatic Air Vent	1,627.69	70.99
23 21 16 00-0007 EA 1-1/2" NPT, Cast Iron, Automatic Air Vent	2,737.02	76.39
23 21 16 00-0008 EA 2" NPT, Cast Iron, Automatic Air Vent	3,135.61	100.74
23 21 16 00-0009 Forged Steel, Stainless Steel Internals, Automatic Air Vents (23 21 16 00-0001) Note: With guided free floating lever.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	23 21 16 00-0010	EA	1/2" NPT, Forged Steel, Stainless Steel Internals, Automatic Air Vent.....	2,696.70	38.48
	23 21 16 00-0011	EA	3/4" NPT, Forged Steel, Stainless Steel Internals, Automatic Air Vent.....	3,382.58	44.22
	23 21 16 00-0012	EA	1" NPT, Forged Steel, Stainless Steel Internals, Automatic Air Vent.....	4,041.13	45.95
	23 21 16 00-0013	EA	1-1/4" NPT, Forged Steel, Stainless Steel Internals, Automatic Air Vent.....	6,633.85	71.22
	23 21 16 00-0014	EA	1-1/2" NPT, Forged Steel, Stainless Steel Internals, Automatic Air Vent.....	7,665.89	76.39
	23 21 16 00-0015	EA	2" NPT, Forged Steel, Stainless Steel Internals, Automatic Air Vent.....	11,278.44	100.50
	23 21 16 00-0016		Automatic Air Vent (23 21 16 00-0001)		
	23 21 16 00-0017	EA	3/4" NPT, Brass, Automatic Air Eliminator (Spirotherm VJR).....	246.83	44.22
	23 21 16 00-0018	EA	1" NPT, Brass, Automatic Air Eliminator (Spirotherm VJR).....	270.46	45.95
	23 21 16 00-0019	EA	1-1/4" NPT, Brass, Automatic Air Eliminator (Spirotherm VJR).....	382.49	70.99
	23 21 16 00-0020	EA	1-1/2" NPT, Brass, Automatic Air Eliminator (Spirotherm VJR).....	473.80	76.39
	23 21 16 00-0021	EA	2" NPT, Brass, Automatic Air Eliminator (Spirotherm VJR).....	606.09	82.31
	23 21 16 00-0022		Manual Air Vent (23 21 16 00-0001)		
	23 21 16 00-0023	EA	Manual Air Vent.....	79.24	41.46
	23 21 16 00-0024		Air Release Valves (23 21 16 00-0001)		
	23 21 16 00-0025		Simple Lever, Cast Iron, Clean Water Air Release Valves (Apco 50) (23 21 16 00-0024)		
			Note: Up to 175 psi. Stainless steel float.		
	23 21 16 00-0026	EA	1/2" NPT, Simple Lever, Cast Iron, Clean Water Air Release Valves (Apco 50).....	197.46	17.23
	23 21 16 00-0027	EA	3/4" NPT, Simple Lever, Cast Iron, Clean Water Air Release Valves (Apco 50).....	202.06	19.52
	23 21 16 00-0028	EA	1" NPT, Simple Lever, Cast Iron, Clean Water Air Release Valves (Apco 50).....	211.24	24.13
	23 21 16 00-0029		Cast Iron, Compound Lever, Clean Water Air Release Valves (Apco 200) (23 21 16 00-0024)		
			Note: Up to 175 psi. Stainless steel float.		
	23 21 16 00-0030	EA	1" NPT, Cast Iron, Compound Lever, Clean Water Air Release Valves (Apco 200A).....	809.94	24.13
	23 21 16 00-0031	EA	2" NPT, Cast Iron, Compound Lever, Clean Water Air Release Valves (Apco 200).....	971.29	41.93
	23 21 16 00-0032	EA	3" Flanged, Cast Iron, Compound Lever, Clean Water Air Release Valves (Apco 200).....	1,273.54	97.75
	23 21 16 00-0033		Cast Iron, Air/Vacuum Valves (23 21 16 00-0024)		
			Note: Up to 150 psi. Stainless steel float.		
	23 21 16 00-0034	EA	1/2" NPT, Cast Iron, Air/Vacuum Valve (Apco 141).....	391.51	17.23
	23 21 16 00-0035	EA	1" NPT, Cast Iron, Air/Vacuum Valve (Apco 142).....	482.91	24.13
	23 21 16 00-0036	EA	2" NPT, Cast Iron, Air/Vacuum Valve (Apco 144).....	834.17	41.93
	23 21 16 00-0037	EA	3" Flanged, Cast Iron, Air/Vacuum Valve (Apco 146).....	1,211.44	97.75
	23 21 16 00-0038	EA	4" Flanged, Cast Iron, Air/Vacuum Valve (Apco 152).....	1,894.63	164.10
	23 21 16 00-0039	EA	6" Flanged, Cast Iron, Air/Vacuum Valve (Apco 153).....	2,885.48	207.50
	23 21 16 00-0040		Ductile Iron, Combination Air Release And Vacuum Valves, Single Body Double Orifice (23 21 16 00-0024)		
			Note: Up to 150 psi. Stainless Steel float.		
	23 21 16 00-0041	EA	1" NPT, Ductile Iron, Combination Air Release And Vacuum Valves, Single Body Double Orifice (Apco 143C).....	700.24	24.13
	23 21 16 00-0042	EA	2" NPT, Ductile Iron, Combination Air Release And Vacuum Valves, Single Body Double Orifice (Apco 145C).....	1,074.79	41.93
	23 21 16 00-0043	EA	3" Flanged, Ductile Iron, Combination Air Release And Vacuum Valves, Single Body Double Orifice (Apco 147C).....	1,974.70	97.75
	23 21 16 00-0044	EA	4" Flanged, Ductile Iron, Combination Air Release And Vacuum Valves, Single Body Double Orifice (Apco 149C).....	2,559.56	164.10
	23 21 16 00-0045		Vent Valves (23 21 16)		
	23 21 16 00-0046	EA	1/8", 1.5 PSIG Operating Pressure, Non-Vacuum Adjustable Angle Radiator Steam Vent Valve (Hoffman 1A).....	81.30	17.23
	23 21 16 00-0047	EA	1/2" x 3/4", 35 PSIG Operating Pressure, Straight Steam Unit Heater Air Vent Valve (Hoffman 74).....	198.93	18.53
	23 21 16 00-0048	EA	1/2" x 3/4", 3 PSIG Operating Pressure, Non-Vacuum Main Steam Air Vent Valve (Hoffman 75).....	189.54	18.53
	23 21 16 00-0049	EA	1/2" x 3/4", 10 PSIG Operating Pressure, Non Vacuum Straight Non-Vacuum Main Steam Air Vent Valve (Hoffman 75H).....	196.11	18.53
	23 21 16 00-0050	EA	3/4", 150 PSIG Operating Pressure, Straight Water Main Vent Valve (Hoffman 78).....	253.63	18.53
	23 21 16 00-0051	EA	1/2" x 3/4", 75 PSIG Operating Pressure, Straight Water Main Vent Valve (Hoffman 79).....	186.96	18.53
	23 21 16 00-0052		Threaded Inlet, Drip-Pan Elbow (23 21 16)		
	23 21 16 00-0053		Cast Iron, Threaded Inlet, Drip-Pan Elbow (23 21 16 00-0052)		
	23 21 16 00-0054	EA	2-1/2" Cast Iron, Threaded Inlet, Drip-Pan Elbow.....	285.86	28.97
			For Flanged Inlet, Add.....	116.35	
	23 21 16 00-0055	EA	3" Cast Iron, Threaded Inlet, Drip-Pan Elbow.....	322.12	34.33
			For Flanged Inlet, Add.....	124.90	
	23 21 16 00-0056	EA	3-1/2" Cast Iron, Threaded Inlet, Drip-Pan Elbow.....	407.95	39.70
			For Flanged Inlet, Add.....	168.50	
	23 21 16 00-0057	EA	4" Cast Iron, Threaded Inlet, Drip-Pan Elbow.....	617.85	45.06
			For Flanged Inlet, Add.....	296.47	
	23 21 16 00-0058	EA	5" Cast Iron, Threaded Inlet, Drip-Pan Elbow.....	696.56	53.65
			For Flanged Inlet, Add.....	327.73	
	23 21 16 00-0059	EA	6" Cast Iron, Threaded Inlet, Drip-Pan Elbow.....	972.57	67.60
			For Flanged Inlet, Add.....	478.94	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0060 EA 8" Cast Iron, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	2,231.85 1,274.46	89.05
23 21 16 00-0061 Cast Steel, Threaded Inlet, Drip-Pan Elbow <small>(23 21 16 00-0052)</small>		
23 21 16 00-0062 EA 2-1/2" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	1,340.87 833.75	28.97
23 21 16 00-0063 EA 3" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	1,624.16 1,010.29	34.33
23 21 16 00-0064 EA 3-1/2" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	2,374.36 1,505.66	39.70
23 21 16 00-0065 EA 4" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	2,396.07 1,505.66	45.06
23 21 16 00-0066 EA 5" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	3,518.24 2,246.48	53.65
23 21 16 00-0067 EA 6" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	3,571.88 2,246.48	67.60
23 21 16 00-0068 EA 8" Cast Steel, Threaded Inlet, Drip-Pan Elbow <i>For Flanged Inlet, Add</i>	6,030.81 3,857.75	89.05
23 21 16 00-0069 Y-Type Strainers <small>(23 21 16)</small>		
23 21 16 00-0070 Screwed Ends, 250 LB, Iron Body, Y-Type Strainers <small>(23 21 16 00-0069)</small>		
23 21 16 00-0071 EA 1/4" Or 3/8" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	80.29 21.77 11.03	12.86
23 21 16 00-0072 EA 1/2" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	80.86 21.77 11.20	13.10
23 21 16 00-0073 EA 3/4" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	102.50 25.98 15.16	17.69
23 21 16 00-0074 EA 1" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	130.51 35.11 18.09	21.13
23 21 16 00-0075 EA 1-1/4" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	170.86 48.10 22.40	26.13
23 21 16 00-0076 EA 1-1/2" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	196.26 57.93 24.12	28.15
23 21 16 00-0077 EA 2" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	270.23 89.17 27.57	32.16
23 21 16 00-0078 EA 2-1/2" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	515.79 200.46 34.46	40.20
23 21 16 00-0079 EA 3" Screwed Ends, 250 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	667.38 261.90 43.07	50.31
23 21 16 00-0080 Flanged, 125 LB, Iron Body, Y-Type Strainers <small>(23 21 16 00-0069)</small>		
23 21 16 00-0081 EA 1-1/2" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	411.86 130.36 45.34	120.61
23 21 16 00-0082 EA 2" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	473.58 141.07 57.43	153.12
23 21 16 00-0083 EA 3" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	917.00 336.31 73.32	195.28
23 21 16 00-0084 EA 4" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,173.52 381.64 123.07	327.37
23 21 16 00-0085 EA 5" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,265.49 426.97 123.47	329.75
23 21 16 00-0086 EA 6" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,520.16 530.27 137.89	366.39
23 21 16 00-0087 EA 8" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,670.30 1,044.37 174.47	468.16
23 21 16 00-0088 EA 10" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	5,367.83 2,327.71 213.73	569.94
23 21 16 00-0089 EA 12" Flanged, 125 LB, Iron Body, Y-Type Strainer..... <i>For Galvanized Body, Add</i> <i>For Work In Restricted Working Space, Add</i>	5,858.33 2,420.30 305.32	508.87

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0090			Screwed Ends, 150 LB, Bronze Body, Y-Type Strainers (23 21 16 00-0069) Note: With screwed cap (4" size has bolted cap).		
23 21 16 00-0091	EA		1/2" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	71.43	13.10
			For 300 LB Rating, Add.....	57.97	
			For Work In Restricted Working Space, Add.....	11.20	
23 21 16 00-0092	EA		3/4" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	94.87	17.69
			For 300 LB Rating, Add.....	75.36	
			For Work In Restricted Working Space, Add.....	15.16	
23 21 16 00-0093	EA		1" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	116.14	21.13
			For 300 LB Rating, Add.....	94.93	
			For Work In Restricted Working Space, Add.....	18.09	
23 21 16 00-0094	EA		1-1/4" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	158.56	26.13
			For 300 LB Rating, Add.....	142.61	
			For Work In Restricted Working Space, Add.....	22.40	
23 21 16 00-0095	EA		1-1/2" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	189.37	28.15
			For 300 LB Rating, Add.....	185.23	
			For Work In Restricted Working Space, Add.....	24.12	
23 21 16 00-0096	EA		2" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	254.13	32.16
			For 300 LB Rating, Add.....	275.81	
			For Work In Restricted Working Space, Add.....	27.57	
23 21 16 00-0097	EA		2-1/2" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	358.28	40.20
			For 300 LB Rating, Add.....	413.80	
			For Work In Restricted Working Space, Add.....	34.46	
23 21 16 00-0098	EA		3" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	648.25	50.31
			For 300 LB Rating, Add.....	857.94	
			For Work In Restricted Working Space, Add.....	43.07	
23 21 16 00-0099	EA		4" Screwed Ends, 150 LB, Bronze Body, Y-Type Strainer.....	1,130.09	60.30
			For 300 LB Rating, Add.....	1,628.24	
			For Work In Restricted Working Space, Add.....	51.69	
23 21 16 00-0100			Flanged, 150 LB, Bronze Body, Y-Type Strainers (23 21 16 00-0069) Note: With bolted cap.		
23 21 16 00-0101	EA		2" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	615.08	153.12
			For 300 LB Rating, Add.....	254.18	
			For Work In Restricted Working Space, Add.....	57.43	
23 21 16 00-0102	EA		2-1/2" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	640.46	166.56
			For 300 LB Rating, Add.....	258.97	
			For Work In Restricted Working Space, Add.....	62.65	
23 21 16 00-0103	EA		3" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	738.64	195.28
			For 300 LB Rating, Add.....	296.55	
			For Work In Restricted Working Space, Add.....	73.32	
23 21 16 00-0104	EA		4" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	1,611.18	327.37
			For 300 LB Rating, Add.....	720.56	
			For Work In Restricted Working Space, Add.....	123.07	
23 21 16 00-0105	EA		6" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	2,280.04	366.39
			For 300 LB Rating, Add.....	1,092.25	
			For Work In Restricted Working Space, Add.....	137.89	
23 21 16 00-0106	EA		8" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	3,688.26	468.16
			For 300 LB Rating, Add.....	1,864.01	
			For Work In Restricted Working Space, Add.....	174.47	
23 21 16 00-0107	EA		10" Flanged, 150 LB, Bronze Body, Y-Type Strainer.....	11,862.75	569.94
			For 300 LB Rating, Add.....	6,690.20	
			For Work In Restricted Working Space, Add.....	213.73	
23 21 16 00-0108			Class 125, Crimped Bronze Body, Y-Type Strainers (23 21 16 00-0069) Note: Nibco®		
23 21 16 00-0109	EA		1/2" Class 125, Crimped Bronze Body, Y-Type Strainer.....	178.55	11.48
			For Work In Restricted Working Space, Add.....	7.75	
23 21 16 00-0110	EA		3/4" Class 125, Crimped Bronze Body, Y-Type Strainer.....	206.91	12.63
			For Work In Restricted Working Space, Add.....	8.83	
23 21 16 00-0111	EA		1" Class 125, Crimped Bronze Body, Y-Type Strainer.....	295.70	14.35
			For Work In Restricted Working Space, Add.....	10.55	
23 21 16 00-0112	EA		1-1/4" Class 125, Crimped Bronze Body, Y-Type Strainer.....	397.89	15.28
			For Work In Restricted Working Space, Add.....	11.63	
23 21 16 00-0113	EA		1-1/2" Class 125, Crimped Bronze Body, Y-Type Strainer.....	479.67	17.68
			For Work In Restricted Working Space, Add.....	12.92	
23 21 16 00-0114	EA		2" Class 125, Crimped Bronze Body, Y-Type Strainer.....	712.42	20.89
			For Work In Restricted Working Space, Add.....	15.50	
23 21 16 00-0115			250 PSI, Crimped Bronze Body, Y-Type Strainers (23 21 16 00-0069)		
23 21 16 00-0116	EA		1/2" 250 PSI, Crimped Bronze Body, Y-Type Strainer.....	75.20	11.48
23 21 16 00-0117	EA		3/4" 250 PSI, Crimped Bronze Body, Y-Type Strainer.....	91.65	12.63
23 21 16 00-0118	EA		1" 250 PSI, Crimped Bronze Body, Y-Type Strainer.....	133.87	14.35
23 21 16 00-0119	EA		1-1/4" 250 PSI, Crimped Bronze Body, Y-Type Strainer.....	163.39	15.28
23 21 16 00-0120	EA		1-1/2" 250 PSI, Crimped Bronze Body, Y-Type Strainer.....	194.80	17.68
23 21 16 00-0121	EA		2" 250 PSI, Crimped Bronze Body, Y-Type Strainer.....	255.54	20.89
23 21 16 00-0122			Cast Iron Body, Suction Diffusers (23 21 16) Note: 175 PSI, steel inlet vanes, steel orifice cylinder and 16 mesh bronze startup strainer.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0123 EA 2" x 1-1/2" Screwed Ends, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	537.76 22.16	45.26
23 21 16 00-0124 EA 2" x 2" Screwed Ends, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	564.50 24.62	50.20
23 21 16 00-0125 EA 2-1/2" x 2" Screwed Ends, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	573.27 25.85	52.72
23 21 16 00-0126 EA 2-1/2" x 2-1/2" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	1,080.96 62.65	166.56
23 21 16 00-0127 EA 3" x 1-1/2" Screwed Ends, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	591.82 30.03	61.34
23 21 16 00-0128 EA 3" x 2" Screwed Ends, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	670.68 30.03	61.34
23 21 16 00-0129 EA 3" x 2-1/2" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	1,131.22 67.99	181.29
23 21 16 00-0130 EA 3" x 3" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	1,153.63 73.32	195.28
23 21 16 00-0131 EA 4" x 3" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	1,398.91 98.19	261.85
23 21 16 00-0132 EA 4" x 4" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	1,644.20 123.07	327.37
23 21 16 00-0133 EA 6" x 4" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	1,886.75 123.47	329.24
23 21 16 00-0134 EA 6" x 6" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	2,282.73 137.89	366.39
23 21 16 00-0135 EA 8" x 6" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	2,576.32 174.47	468.16
23 21 16 00-0136 EA 8" x 8" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	4,009.76 174.47	468.16
23 21 16 00-0137 EA 10" x 8" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	4,576.67 213.73	569.94
23 21 16 00-0138 EA 10" x 10" Flanged, 175 LB, Cast Iron Body, Suction Diffuser <i>For Work In Restricted Working Space, Add</i>	5,360.66 213.73	569.94
23 21 16 00-0139 Duplex Strainers (23 21 16)		
23 21 16 00-0140 Iron Body, Duplex Strainers (23 21 16 00-0139)		
23 21 16 00-0141 Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainers (23 21 16 00-0140) Note: With brass or stainless steel basket.		
23 21 16 00-0142 EA 3/4" Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	926.85 17.17	28.60
23 21 16 00-0143 EA 1" Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	1,034.78 19.66	32.74
23 21 16 00-0144 EA 1-1/4" Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	1,403.98 23.08	38.48
23 21 16 00-0145 EA 1-1/2" Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	1,768.72 25.16	41.93
23 21 16 00-0146 EA 2" Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	2,371.70 30.77	51.11
23 21 16 00-0147 EA 2-1/2" Screwed Ends, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	2,984.32 39.27	65.48
23 21 16 00-0148 Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainers (23 21 16 00-0140) Note: With brass or stainless steel basket.		
23 21 16 00-0149 EA 2" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	3,226.02 57.43	153.12
23 21 16 00-0150 EA 2-1/2" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	3,334.01 62.65	166.56
23 21 16 00-0151 EA 3" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	4,275.40 73.32	195.28
23 21 16 00-0152 EA 4" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	6,704.40 109.04	290.05
23 21 16 00-0153 EA 6" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	13,141.45 137.89	366.39
23 21 16 00-0154 EA 8" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	25,039.39 174.47	468.16
23 21 16 00-0155 EA 10" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	34,591.02 213.73	569.94
23 21 16 00-0156 EA 12" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	39,120.64 431.25	718.53
23 21 16 00-0157 EA 14" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	46,672.33 305.32	814.20
23 21 16 00-0158 EA 16" Flanged, 125 LB, Bronze Diverter, Iron Body, Duplex Strainer <i>For Work In Restricted Working Space, Add</i>	58,368.91 335.85	895.61
23 21 16 00-0159 Bronze Body, Duplex Strainers (23 21 16 00-0139)		
23 21 16 00-0160 Screwed Ends, 125 LB, Bronze Diverter, Bronze Body Duplex Strainers (23 21 16 00-0159) Note: With brass or stainless steel basket.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 21 16 00-0161	EA	3/4" Screwed Ends, 125 LB, Bronze Diverter, Bronze Body Duplex Strainer	1,733.05	28.72
		<i>For Work In Restricted Working Space, Add</i>	17.17	
23 21 16 00-0162	EA	1" Screwed Ends, 125 LB, Bronze Diverter, Bronze Body Duplex Strainer	1,922.51	32.74
		<i>For Work In Restricted Working Space, Add</i>	19.66	
23 21 16 00-0163	EA	1-1/4" Screwed Ends, 125 LB, Bronze Diverter, Bronze Body Duplex Strainer	2,817.10	38.48
		<i>For Work In Restricted Working Space, Add</i>	23.08	
23 21 16 00-0164	EA	1-1/2" Screwed Ends, 125 LB, Bronze Diverter, Bronze Body Duplex Strainer	3,707.23	41.93
		<i>For Work In Restricted Working Space, Add</i>	25.16	
23 21 16 00-0165	EA	2" Screwed Ends, 125 LB, Bronze Diverter, Bronze Body Duplex Strainer	4,790.31	51.11
		<i>For Work In Restricted Working Space, Add</i>	30.77	
23 21 16 00-0166	EA	2-1/2" Screwed, 125 LB, Bronze Diverter, Bronze Body Duplex Strainer	5,883.03	65.48
		<i>For Work In Restricted Working Space, Add</i>	39.27	
23 21 16 00-0167		Flanged, 125 LB, Bronze Diverter, Bronze Body, Duplex Strainers (23 21 16 00-0159)		
		Note: With brass or stainless steel basket.		
23 21 16 00-0168	EA	2" Flanged, 125 LB, Bronze Diverter, Bronze Body, Duplex Strainer	6,713.52	153.12
		<i>For Work In Restricted Working Space, Add</i>	57.43	
23 21 16 00-0169	EA	2-1/2" Flanged, 125 LB, Bronze Diverter, Bronze Body, Duplex Strainer	6,912.09	166.56
		<i>For Work In Restricted Working Space, Add</i>	62.65	
23 21 16 00-0170	EA	3" Flanged, 125 LB, Bronze Diverter, Bronze Body, Duplex Strainer	9,484.01	195.28
		<i>For Work In Restricted Working Space, Add</i>	73.32	
23 21 16 00-0171	EA	4" Flanged, 125 LB, Bronze Diverter, Bronze Body, Duplex Strainer	14,947.58	290.05
		<i>For Work In Restricted Working Space, Add</i>	109.04	
23 21 16 00-0172	EA	6" Flanged, 125 LB, Bronze Diverter, Bronze Body, Duplex Strainer	32,526.53	366.39
		<i>For Work In Restricted Working Space, Add</i>	137.89	
23 21 16 00-0173		Cast Steel Body, Duplex Strainers (23 21 16 00-0139)		
23 21 16 00-0174		Screwed Ends, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainers		
		(23 21 16 00-0173)		
		Note: With brass or stainless steel basket.		
23 21 16 00-0175	EA	1" Screwed Ends, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	2,703.14	32.74
		<i>For Work In Restricted Working Space, Add</i>	19.66	
23 21 16 00-0176	EA	1-1/4" Screwed Ends, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	3,329.95	38.48
		<i>For Work In Restricted Working Space, Add</i>	23.07	
23 21 16 00-0177	EA	1-1/2" Screwed Ends, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	3,952.36	41.93
		<i>For Work In Restricted Working Space, Add</i>	25.16	
23 21 16 00-0178	EA	2" Screwed Ends, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	6,696.58	51.11
		<i>For Work In Restricted Working Space, Add</i>	30.77	
23 21 16 00-0179		Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainers (23 21 16 00-0173)		
		Note: With brass or stainless steel basket.		
23 21 16 00-0180	EA	2" Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	6,829.42	153.12
		<i>For Work In Restricted Working Space, Add</i>	57.43	
23 21 16 00-0181	EA	2-1/2" Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	7,506.22	166.56
		<i>For Work In Restricted Working Space, Add</i>	62.65	
23 21 16 00-0182	EA	3" Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	9,871.66	195.28
		<i>For Work In Restricted Working Space, Add</i>	73.32	
23 21 16 00-0183	EA	4" Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	14,474.68	290.05
		<i>For Work In Restricted Working Space, Add</i>	109.04	
23 21 16 00-0184	EA	6" Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	24,725.61	366.39
		<i>For Work In Restricted Working Space, Add</i>	137.89	
23 21 16 00-0185	EA	8" Flanged, 125 LB, Bronze Diverter, Cast Steel Body, Duplex Strainer	48,234.35	468.16
		<i>For Work In Restricted Working Space, Add</i>	174.47	
23 21 16 00-0186		Stainless Steel Body, Duplex Strainers (23 21 16 00-0139)		
23 21 16 00-0187		Screwed Ends, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainers (23 21 16 00-0186)		
		Note: With stainless steel basket.		
23 21 16 00-0188	EA	1" Screwed Ends, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	6,489.42	32.74
		<i>For Work In Restricted Working Space, Add</i>	19.66	
23 21 16 00-0189	EA	1-1/4" Screwed Ends, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	8,201.93	38.48
		<i>For Work In Restricted Working Space, Add</i>	23.07	
23 21 16 00-0190	EA	1-1/2" Screwed Ends, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	9,898.14	41.93
		<i>For Work In Restricted Working Space, Add</i>	25.16	
23 21 16 00-0191	EA	2" Screwed Ends, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	15,864.88	51.11
		<i>For Work In Restricted Working Space, Add</i>	30.77	
23 21 16 00-0192		Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainers (23 21 16 00-0186)		
		Note: With stainless steel basket.		
23 21 16 00-0193	EA	2" Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	16,608.04	153.12
		<i>For Work In Restricted Working Space, Add</i>	57.43	
23 21 16 00-0194	EA	2-1/2" Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	17,458.17	166.56
		<i>For Work In Restricted Working Space, Add</i>	62.65	
23 21 16 00-0195	EA	3" Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer	27,367.47	195.28
		<i>For Work In Restricted Working Space, Add</i>	73.32	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Piping and Pumps	23 20
Hydronic Piping and Pumps	23 21

23

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0196	EA		4" Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer..... <i>For Work In Restricted Working Space, Add</i>	33,434.60 109.04	290.05
23 21 16 00-0197	EA		6" Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer..... <i>For Work In Restricted Working Space, Add</i>	58,750.45 137.89	366.39
23 21 16 00-0198	EA		8" Flanged, 125 LB, Stainless Steel Diverter, Stainless Steel Body, Duplex Strainer..... <i>For Work In Restricted Working Space, Add</i>	108,598.04 174.47	468.16
23 21 16 00-0199			Pressure Regulating Valve (23 21 16)		
23 21 16 00-0200			Screwed Ends, Iron Body, Water Pressure Reducing Valves (23 21 16 00-0199) Note: For building services, 25 - 75 PSI, up to 300 Lbs. rating		
23 21 16 00-0201	EA		1/2" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	227.33 17.22	14.35
23 21 16 00-0202	EA		3/4" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	280.36 19.14	16.07
23 21 16 00-0203	EA		1" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	369.48 20.26	17.22
23 21 16 00-0204	EA		1-1/4" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	634.67 22.97	19.29
23 21 16 00-0205	EA		1-1/2" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	861.76 27.56	22.97
23 21 16 00-0206	EA		2" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	1,234.68 42.29	35.21
23 21 16 00-0207	EA		2-1/2" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	1,342.94 47.58	39.65
23 21 16 00-0208	EA		3" Screwed Ends, Iron Construction, Water Pressure Reducing Valve <i>For Work In Restricted Working Space, Add</i>	1,475.55 52.87	114.72
23 21 16 00-0209			Cast Iron Body, Steam Pressure Regulator And Reducer (23 21 16 00-0199) Note: Single seated, spring loaded, direct acting diaphragm valve.		
23 21 16 00-0210			Screwed Ends, Cast Iron Body, Steam Pressure Regulator And Reducer (23 21 16 00-0209)		
23 21 16 00-0211	EA		1/2" Screwed Ends, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	383.11 23.13	19.30
23 21 16 00-0212	EA		3/4" Screwed Ends, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	479.60 32.82	27.34
23 21 16 00-0213	EA		1" Screwed Ends, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	616.55 40.07	33.31
23 21 16 00-0214	EA		1-1/4" Screwed Ends, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	825.22 46.57	40.44
23 21 16 00-0215	EA		1-1/2" Screwed Ends, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,108.15 53.02	45.95
23 21 16 00-0216	EA		2" Screwed Ends, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,296.13 64.38	64.38
23 21 16 00-0217			Flanged, Cast Iron Body, Steam Pressure Regulator And Reducer (23 21 16 00-0209) Note: Single seated, spring loaded, direct acting diaphragm valve.		
23 21 16 00-0218	EA		2-1/2" Flanged, Cast Iron Body, Steam Pressure Regulator Valve And Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,990.82 58.52	155.58
23 21 16 00-0219	EA		3" Flanged, Cast Iron Body, Steam Pressure Regulator Valve And Reducer <i>For Work In Restricted Working Space, Add</i>	3,719.03 68.49	182.40
23 21 16 00-0220	EA		4" Flanged, Cast Iron Body, Steam Pressure Regulator Valve And Reducer <i>For Work In Restricted Working Space, Add</i>	4,782.79 114.96	305.79
23 21 16 00-0221	EA		6" Flanged, Cast Iron Body, Steam Pressure Regulator Valve And Reducer <i>For Work In Restricted Working Space, Add</i>	11,925.43 140.10	372.27
23 21 16 00-0222			Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valves (23 21 16 00-0199)		
23 21 16 00-0223			Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valves (23 21 16 00-0222)		
23 21 16 00-0224	EA		1/2" Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	2,168.06 21.02	14.01
23 21 16 00-0225	EA		3/4" Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	2,213.56 21.02	14.01
23 21 16 00-0226	EA		1" Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	2,358.33 26.54	17.69
23 21 16 00-0227	EA		1-1/4" Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	2,771.71 33.77	22.51
23 21 16 00-0228	EA		1-1/2" Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	3,173.16 38.94	25.96
23 21 16 00-0229	EA		2" Screwed Ends, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	3,934.23 45.83	30.55
23 21 16 00-0230			Flanged, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valves (23 21 16 00-0222)		
23 21 16 00-0231	EA		2-1/2" Flanged, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	4,861.22 58.52	155.58

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 21 16 00-0232	EA	3" Flanged, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	5,996.51 68.49	182.40
23 21 16 00-0233	EA	4" Flanged, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	9,083.56 114.96	305.79
23 21 16 00-0234	EA	6" Flanged, Cast Iron Body, Externally Piloted, Steam Pressure Regulating And Reducing Valve <i>For Work In Restricted Working Space, Add</i>	19,985.93 140.10	372.27
23 21 16 00-0235		Screwed Ends, Cast Iron Body, Air Pressure Reducing Valves <small>(23 21 16 00-0199)</small>		
23 21 16 00-0236	EA	1/2" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	255.27	14.92
23 21 16 00-0237	EA	3/4" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	315.97	16.53
23 21 16 00-0238	EA	1" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	419.13	17.57
23 21 16 00-0239	EA	1-1/4" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	726.44	19.98
23 21 16 00-0240	EA	1-1/2" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	988.32	23.88
23 21 16 00-0241	EA	2" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	1,414.51	36.58
23 21 16 00-0242	EA	2-1/2" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	1,532.38	39.86
23 21 16 00-0243	EA	3" Screwed Ends, Cast Iron Body, Air Pressure Reducing Valve	1,689.20	45.89
23 21 16 00-0244		Screwed Ends, Bronze Body, Water Pressure Reducing Valves <small>(23 21 16 00-0199)</small>		
		Note: For building services, bronze construction, pressure adjustment, union and strainer, factory set at 45 PSI (Watts 25AUB).		
23 21 16 00-0245	EA	1/2" Screwed Ends, Bronze Body, Water Pressure Reducing Valve	208.31	14.35
23 21 16 00-0246	EA	3/4" Screwed Ends, Bronze Body, Water Pressure Reducing Valve	228.85	16.07
23 21 16 00-0247	EA	1" Screwed Ends, Bronze Body, Water Pressure Reducing Valve	285.71	17.79
23 21 16 00-0248	EA	1-1/4" Screwed Ends, Bronze Body, Water Pressure Reducing Valve	686.73	19.29
23 21 16 00-0249	EA	1-1/2" Screwed Ends, Bronze Body, Water Pressure Reducing Valve	743.29	22.97
23 21 16 00-0250	EA	2" Screwed Ends, Bronze Body, Water Pressure Reducing Valve	1,168.40	35.21
23 21 16 00-0251		Dual Unit Reducing And Relief Valve <small>(23 21 16)</small>		
23 21 16 00-0252	EA	1/2" Dual Unit Reducing And Relief Valve	234.57	35.04
23 21 16 00-0253		Safety Relief Valve <small>(23 21 16)</small>		
		Note: Used in water heater and hot water storage tank applications.		
23 21 16 00-0254		Threaded Inlet, Bronze Body Safety Valves <small>(23 21 16 00-0253)</small>		
		Note: Variable set points to 150 psig pressure, 210 Degree F temperature range.		
23 21 16 00-0255	EA	1/2" x 1/2" Threaded Inlet, Bronze Body Safety Valve	83.53	14.35
23 21 16 00-0256	EA	3/4" x 3/4" Threaded Inlet, Bronze Body Safety Valve	118.15	15.79
23 21 16 00-0257	EA	1" x 1" Threaded Inlet, Bronze Body Safety Valve	172.79	19.23
23 21 16 00-0258	EA	1-1/4" x 1-1/4" Threaded Inlet, Bronze Body Safety Valve	226.09	20.38
23 21 16 00-0259	EA	1-1/2" x 1-1/2" Threaded Inlet, Bronze Body Safety Valve	311.79	27.27
23 21 16 00-0260	EA	2" x 2" Threaded Inlet, Bronze Body Safety Valve	420.88	32.15
23 21 16 00-0261	EA	2-1/2" x 2-1/2" Threaded Inlet, Bronze Body Safety Valve	475.03	40.19
23 21 16 00-0262		Threaded, Bronze Body, Temperature And Pressure Relief Valves <small>(23 21 16)</small>		
23 21 16 00-0263	EA	1/2" x 1/2" Threaded, Bronze Body, Temperature And Pressure Relief Valve..... <i>For Cast Iron Body, Add</i>	96.19 60.44	29.28
23 21 16 00-0264	EA	3/4" x 3/4" Threaded, Bronze Body, Temperature And Pressure Relief Valve..... <i>For Cast Iron Body, Add</i>	124.76 84.19	35.13
23 21 16 00-0265	EA	1" x 1" Threaded, Bronze Body, Temperature And Pressure Relief Valve..... <i>For Cast Iron Body, Add</i>	183.82 134.09	46.84
23 21 16 00-0266	EA	1-1/4" x 1-1/4" Threaded, Bronze Body, Temperature And Pressure Relief Valve	310.00 284.98	50.18
23 21 16 00-0267	EA	1-1/2" x 1-1/2" Threaded, Bronze Body, Temperature And Pressure Relief Valve	527.93 545.14	56.26
23 21 16 00-0268	EA	2" x 2" Threaded, Bronze Body, Temperature And Pressure Relief Valve..... <i>For Cast Iron Body, Add</i>	607.05 593.60	80.89
23 21 16 00-0269		Thermostatic Radiator Valves <small>(23 21 16)</small>		
		Note: For hot water or two pipe low pressure steam.		
23 21 16 00-0270	EA	1/2" Straight Thermostatic Radiator Valve (Danfoss 013G8015)	84.85	18.53
23 21 16 00-0271	EA	3/4" Straight Thermostatic Radiator Valve (Danfoss 013G8020)	103.60	24.97
23 21 16 00-0272	EA	1" Straight Thermostatic Radiator Valve (Danfoss 013G8025)	137.52	30.23
23 21 16 00-0273	EA	1-1/4" Straight Thermostatic Radiator Valve (Danfoss 013G8032)	212.18	38.30
23 21 16 00-0274	EA	1/2" Angle Thermostatic Radiator Valve (Danfoss 013G8014)	84.85	18.53
23 21 16 00-0275	EA	3/4" Angle Thermostatic Radiator Valve (Danfoss 013G8019)	103.60	24.97
23 21 16 00-0276	EA	1" Angle Thermostatic Radiator Valve (Danfoss 013G8024)	137.52	30.23
23 21 16 00-0277	EA	1-1/4" Angle Thermostatic Radiator Valve (Danfoss 013G8031)	212.18	38.30
23 21 16 00-0278	EA	Tamper Resistant Valve Mounted Dial And Sensor Thermostatic Operator (Danfoss 013G8240)	86.08	14.35
23 21 16 00-0279	EA	Tamper Resistant Valve Mounted Dial With Remote Sensor Thermostatic Operator (Danfoss 013G2922)	144.26	20.10
23 21 16 00-0280		Radiator Trap Repair Kits <small>(23 21 16)</small>		
		Note: For hot water or two pipe low pressure steam.		
23 21 16 00-0281	EA	1/2" Trap (Spirax-Sarco TH-125), Straight, Radiator Trap Repair Kit (Spirax-Sarco SH1031)	150.92	
23 21 16 00-0282	EA	3/4" Trap (Spirax-Sarco TH-125), Straight, Radiator Trap Repair Kit (Spirax-Sarco SH1032)	188.64	
23 21 16 00-0283	EA	1/2" Trap (Spirax-Sarco TH-125), Angle, Radiator Trap Repair Kit (Spirax-Sarco SH1026)	191.63	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0284	EA			3/4" Trap (Spirax-Sarco TH-125), Angle, Radiator Trap Repair Kit (Spirax-Sarco SH1027).....	217.74	
23 21 16 00-0285	EA			1" Trap (Spirax-Sarco TH-125), Angle, Radiator Trap Repair Kit (Spirax-Sarco SH1028).....	517.30	
23 21 16 00-0286				Horizontal Steel Expansion Tanks ^(23 21 16)		
				Note: ASME Code Stamp. 150 PSI with glass gauge and cocks.		
23 21 16 00-0287	EA			10 Gallon Horizontal Steel Expansion Tank	835.20	114.87
23 21 16 00-0288	EA			15 Gallon Horizontal Steel Expansion Tank	1,195.37	143.58
23 21 16 00-0289	EA			30 Gallon Horizontal Steel Expansion Tank	1,578.29	172.30
23 21 16 00-0290	EA			40 Gallon Horizontal Steel Expansion Tank	1,814.78	201.02
23 21 16 00-0291	EA			60 Gallon Horizontal Steel Expansion Tank	2,108.06	203.54
23 21 16 00-0292				Horizontal Diaphragm Type (Bladder) Steel Expansion Tanks ^(23 21 16)		
				Note: ASME. Precharged with working pressure 125 psi. Armstrong AX Series.		
23 21 16 00-0293	EA			7.8 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	1,588.88	86.15
23 21 16 00-0294	EA			10.9 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	1,658.76	100.50
23 21 16 00-0295	EA			21.7 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	2,474.46	114.87
23 21 16 00-0296	EA			33.6 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	2,575.83	129.22
23 21 16 00-0297	EA			44.4 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	3,493.24	143.58
23 21 16 00-0298	EA			55.7 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	3,684.19	157.94
23 21 16 00-0299	EA			68.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	4,381.24	172.30
23 21 16 00-0300	EA			77.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	4,688.43	186.65
23 21 16 00-0301	EA			90.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	5,167.54	201.02
23 21 16 00-0302	EA			110.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	5,312.15	229.73
23 21 16 00-0303	EA			132.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	6,665.08	258.45
23 21 16 00-0304	EA			158.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	7,642.68	287.17
23 21 16 00-0305	EA			211.0 Gallon Horizontal Diaphragm Type (Bladder) Steel Expansion Tank	8,871.44	344.60
23 21 16 00-0306				Vertical Diaphragm Type (Bladder) Steel Expansion Tanks (Armstrong AX) ^(23 21 16)		
				Note: ASME. Precharged with working pressure 125 psi		
23 21 16 00-0307	EA			8.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	1,811.66	86.15
23 21 16 00-0308	EA			11.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	1,869.43	100.50
23 21 16 00-0309	EA			22.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	2,677.87	114.87
23 21 16 00-0310	EA			34.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	2,859.14	129.22
23 21 16 00-0311	EA			44.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	3,636.10	143.58
23 21 16 00-0312	EA			56.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	3,824.63	157.94
23 21 16 00-0313	EA			67.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	4,664.56	172.30
23 21 16 00-0314	EA			77.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	5,041.97	186.65
23 21 16 00-0315	EA			91.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	5,576.78	201.02
23 21 16 00-0316	EA			111.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	5,714.12	229.73
23 21 16 00-0317	EA			132.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	7,030.73	258.45
23 21 16 00-0318	EA			158.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	8,158.46	287.17
23 21 16 00-0319	EA			211.0 Gallon Vertical Diaphragm Type (Bladder) Steel Expansion Tank.....	9,396.90	344.60
23 21 16 00-0320				Diaphragm Type (Residential Style) Steel Expansion Tanks ^(23 21 16)		
23 21 16 00-0321	EA			2.1 Gallon Diaphragm Type (Residential Style) Steel Expansion Tank (Watts DET-5-M1)	103.28	10.58
23 21 16 00-0322	EA			4.5 Gallon Diaphragm Type (Residential Style) Steel Expansion Tank (Watts DET-12-M1)	148.57	10.58
23 21 16 00-0323				Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tanks ^(23 21 16)		
23 21 16 00-0324	EA			15 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	1,209.56	344.71
23 21 16 00-0325	EA			20 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	1,262.47	344.71
23 21 16 00-0326	EA			30 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	1,315.38	344.71
23 21 16 00-0327	EA			40 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	1,452.92	344.71
23 21 16 00-0328	EA			47 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	1,729.85	459.34
23 21 16 00-0329	EA			60 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	2,046.55	459.58
23 21 16 00-0330	EA			80 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	2,109.39	459.58
23 21 16 00-0331	EA			87 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	2,172.24	459.58
23 21 16 00-0332	EA			120 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	2,765.39	574.32
23 21 16 00-0333	EA			187 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	8,093.56	574.32
23 21 16 00-0334	EA			264 Gallon Vertical Diaphragm Type (Bladder) Fiberglass Reinforced Polyester (FRP) Expansion Tank.....	10,299.50	688.96
23 21 16 00-0335				ASME Construction Compression Tanks ^(23 21 16)		
				Note: With gauge glass taps, 125 PSI, 240 degree F tanks below are sized by capacity and diameter and height.		
23 21 16 00-0336	EA			15 Gallon, 13" x 34-1/2" ASME Construction Compression Tank.....	1,173.35	202.17
				For Galvanized Steel Tanks, Add	433.52	
23 21 16 00-0337	EA			24 Gallon, 13" x 51" ASME Construction Compression Tank.....	1,195.69	207.91
				For Galvanized Steel Tanks, Add	439.91	
23 21 16 00-0338	EA			30 Gallon, 13" x 61-1/2" ASME Construction Compression Tank.....	1,308.04	214.80
				For Galvanized Steel Tanks, Add	490.91	
23 21 16 00-0339	EA			40 Gallon, 16-1/4" x 53" ASME Construction Compression Tank.....	1,435.40	222.84
				For Galvanized Steel Tanks, Add	548.28	
23 21 16 00-0340	EA			60 Gallon, 16-1/4" x 76-1/2" ASME Construction Compression Tank.....	1,682.14	235.47
				For Galvanized Steel Tanks, Add	663.03	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0341	EA		80 Gallon, 20-1/4" x 68" ASME Construction Compression Tank.....	1,747.61	244.67
			<i>For Galvanized Steel Tanks, Add</i>	688.54	
23 21 16 00-0342	EA		100 Gallon, 20-1/4" x 82" ASME Construction Compression Tank.....	2,175.39	266.49
			<i>For Galvanized Steel Tanks, Add</i>	886.18	
23 21 16 00-0343	EA		120 Gallon, 24-1/4" x 71-1/2" ASME Construction Compression Tank.....	2,371.54	286.02
			<i>For Galvanized Steel Tanks, Add</i>	969.04	
23 21 16 00-0344	EA		144 Gallon, 24-1/4" x 83-1/2" ASME Construction Compression Tank.....	2,961.30	322.78
			<i>For Galvanized Steel Tanks, Add</i>	1,236.26	
23 21 16 00-0345	EA		180 Gallon, 30" x 60" ASME Construction Compression Tank.....	3,773.48	369.87
			<i>For Galvanized Steel Tanks, Add</i>	1,606.58	
23 21 16 00-0346	EA		202 Gallon, 30" x 72" ASME Construction Compression Tank.....	4,530.55	410.07
			<i>For Galvanized Steel Tanks, Add</i>	1,954.83	
23 21 16 00-0347	EA		230 Gallon, 30" x 84" ASME Construction Compression Tank.....	4,955.12	445.67
			<i>For Galvanized Steel Tanks, Add</i>	2,139.72	
23 21 16 00-0348	EA		280 Gallon, 30" x 96" ASME Construction Compression Tank.....	6,282.81	489.32
			<i>For Galvanized Steel Tanks, Add</i>	2,770.87	
23 21 16 00-0349	EA		306 Gallon, 30" x 108" ASME Construction Compression Tank.....	6,476.41	522.64
			<i>For Galvanized Steel Tanks, Add</i>	2,842.12	
23 21 16 00-0350	EA		340 Gallon, 36" x 84" ASME Construction Compression Tank.....	8,380.85	561.69
			<i>For Galvanized Steel Tanks, Add</i>	3,765.00	
23 21 16 00-0351	EA		550 Gallon, 36" x 96" ASME Construction Compression Tank.....	14,044.97	659.32
			<i>For Galvanized Steel Tanks, Add</i>	6,523.07	
23 21 16 00-0352			Compression Tank Air Fittings (23 21 16)		
23 21 16 00-0353	EA		9" To 24" Diameter Compression Tank Air Fittings.....	461.50	32.16
23 21 16 00-0354	EA		>100 Gallon Compression Tank Air Fittings.....	1,622.54	37.91
23 21 16 00-0355			Vortex Air Separators With Strainer (23 21 16)		
			Note: Separators are priced by capacity in gallons per minute and by boiler connection sizes and types.		
23 21 16 00-0356	EA		2" Threaded, 56 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-2N).....	1,863.37	244.67
			<i>For 300 PSIG, Add</i>	223.92	
23 21 16 00-0357	EA		2-1/2" Threaded, 90 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-2-1/2N).....	2,315.76	280.28
			<i>For 300 PSIG, Add</i>	283.55	
23 21 16 00-0358	EA		3" Threaded, 190 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-3N).....	3,608.75	329.67
			<i>For 300 PSIG, Add</i>	466.40	
23 21 16 00-0359	EA		3" Flanged, 190 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-3F).....	3,859.11	349.11
			<i>For 300 PSIG, Add</i>	499.52	
23 21 16 00-0360	EA		4" Flanged, 300 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-4F).....	4,971.76	465.48
			<i>For 300 PSIG, Add</i>	639.97	
23 21 16 00-0361	EA		5" Flanged, 500 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-5F).....	6,288.30	553.65
			<i>For 300 PSIG, Add</i>	817.52	
23 21 16 00-0362	EA		6" Flanged, 700 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-6F).....	7,477.71	626.93
			<i>For 300 PSIG, Add</i>	979.17	
23 21 16 00-0363	EA		8" Flanged, 1,300 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-8F).....	10,838.86	752.11
			<i>For 300 PSIG, Add</i>	1,454.85	
23 21 16 00-0364	EA		10" Flanged, 2,000 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-10F).....	16,859.62	854.91
			<i>For 300 PSIG, Add</i>	2,334.65	
23 21 16 00-0365	EA		12" Flanged, 2,750 GPM, 125 PSI, With Strainer, Vortex Air Separator (Rolairtrol R-12F).....	22,769.15	1,106.29
			<i>For 300 PSIG, Add</i>	3,163.93	
23 21 16 00-0366	EA		14" Flanged, 3,400 GPM With Strainer, Vortex Air Separator (Rolairtrol R-14F).....	47,990.54	1,343.42
			<i>For 300 PSIG, Add</i>	6,893.26	
23 21 16 00-0367	EA		16" Flanged, 4,400 GPM With Strainer, Vortex Air Separator (Rolairtrol R-16F).....	59,273.02	1,612.10
			<i>For 300 PSIG, Add</i>	8,524.57	
23 21 16 00-0368	EA		18" Flanged, 5,200 GPM With Strainer, Vortex Air Separator (Rolairtrol R-18F).....	77,465.32	1,880.79
			<i>For 300 PSIG, Add</i>	11,192.35	
23 21 16 00-0369	EA		20" Flanged, 6,300 GPM With Strainer, Vortex Air Separator (Rolairtrol R-20F).....	90,666.99	2,149.47
			<i>For 300 PSIG, Add</i>	13,111.53	
23 21 16 00-0370			Vortex Air Separators (23 21 16)		
			Note: Without system strainer.		
23 21 16 00-0371	EA		2" Threaded, 56 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-2N).....	1,571.87	244.67
			<i>For 300 PSIG, Add</i>	180.20	
23 21 16 00-0372	EA		2-1/2" Threaded, 90 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-2-1/2N).....	1,997.76	280.28
			<i>For 300 PSIG, Add</i>	235.85	
23 21 16 00-0373	EA		3" Threaded, 190 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-3N).....	3,529.25	329.67
			<i>For 300 PSIG, Add</i>	454.47	
23 21 16 00-0374	EA		3" Flanged, 190 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-3F).....	3,161.28	349.11
			<i>For 300 PSIG, Add</i>	394.85	
23 21 16 00-0375	EA		4" Flanged, 300 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-4F).....	4,238.60	465.48
			<i>For 300 PSIG, Add</i>	530.00	
23 21 16 00-0376	EA		5" Flanged, 530 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-5F).....	5,519.80	553.65
			<i>For 300 PSIG, Add</i>	702.25	
23 21 16 00-0377	EA		6" Flanged, 850 GPM, 125 PSI, Vortex Air Separator (Rolairtrol RL-6F).....	6,435.38	626.93
			<i>For 300 PSIG, Add</i>	822.82	
23 21 16 00-0378	EA		8" Flanged, 1,900 GPM Vortex Air Separator (Rolairtrol RL-8F).....	8,612.86	752.11
			<i>For 300 PSIG, Add</i>	1,120.95	
23 21 16 00-0379	EA		10" Flanged, 3,600 GPM Vortex Air Separator (Rolairtrol RL-10F).....	12,098.46	854.91
			<i>For 300 PSIG, Add</i>	1,620.47	
23 21 16 00-0380	EA		12" Flanged, 4,800 GPM Vortex Air Separator (Rolairtrol RL-12F).....	18,768.75	1,106.29
			<i>For 300 PSIG, Add</i>	2,563.87	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 16 00-0381 EA 14" Flanged, 6,100 GPM Vortex Air Separator (Rolairtrol RL-14F) <i>For 300 PSIG, Add</i>	32,269.93 4,535.17	1,343.42
23 21 16 00-0382 EA 16" Flanged, 8,000 GPM Vortex Air Separator (Rolairtrol RL-16F) <i>For 300 PSIG, Add</i>	40,935.34 5,773.91	1,612.10
23 21 16 00-0383 EA 18" Flanged, 9,700 GPM Vortex Air Separator (Rolairtrol RL-18F) <i>For 300 PSIG, Add</i>	54,893.07 7,806.51	1,880.79
23 21 16 00-0384 EA 20" Flanged, 12,000 GPM Vortex Air Separator (Rolairtrol RL-20F) <i>For 300 PSIG, Add</i>	75,317.13 10,809.05	2,149.47
23 21 16 00-0385 EA 22" Flanged, 15,000 GPM Vortex Air Separator (Rolairtrol RL-22F) <i>For 300 PSIG, Add</i>	92,358.99 13,304.27	2,418.16
23 21 16 00-0386 EA 24" Flanged, 17,000 GPM Vortex Air Separator (Rolairtrol RL-24F) <i>For 300 PSIG, Add</i>	109,400.85 15,799.48	2,686.84
23 21 16 00-0387 Grooved, With Strainer, Vortex Air Separators (23 21 16)		
23 21 16 00-0388 EA 3" Grooved, 190 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-3G)	3,400.00	279.28
23 21 16 00-0389 EA 4" Grooved, 300 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-4G)	4,830.36	372.15
23 21 16 00-0390 EA 5" Grooved, 500 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-5G)	6,120.65	442.51
23 21 16 00-0391 EA 6" Grooved, 700 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-6G)	7,287.66	501.55
23 21 16 00-0392 EA 8" Grooved, 1,300 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-8G)	10,593.21	601.86
23 21 16 00-0393 EA 10" Grooved, 2,000 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-10G)	17,289.53	683.93
23 21 16 00-0394 EA 12" Grooved, 2,750 GPM, With Strainer, Vortex Air Separator (Rolairtrol R-12G)	26,414.07	885.13
23 21 16 00-0395 Grooved Vortex Air Separators (23 21 16)		
Note: Without system strainer.		
23 21 16 00-0396 EA 3" Grooved, 190 GPM Vortex Air Separator (Rolairtrol RL-3G)	2,675.67	279.28
23 21 16 00-0397 EA 4" Grooved, 300 GPM Vortex Air Separator (Rolairtrol RL-4G)	4,097.20	372.15
23 21 16 00-0398 EA 5" Grooved, 530 GPM Vortex Air Separator (Rolairtrol RL-5G)	5,352.15	442.51
23 21 16 00-0399 EA 6" Grooved, 850 GPM Vortex Air Separator (Rolairtrol RL-6G)	6,245.33	501.55
23 21 16 00-0400 EA 8" Grooved, 1,900 GPM Vortex Air Separator (Rolairtrol RL-8G)	8,384.88	601.86
23 21 16 00-0401 EA 10" Grooved, 3,600 GPM Vortex Air Separator (Rolairtrol RL-10G)	12,457.70	683.93
23 21 16 00-0402 EA 12" Grooved, 4,800 GPM Vortex Air Separator (Rolairtrol RL-12G)	20,841.88	885.13
23 21 16 00-0403 Basket Strainers (23 21 16)		
23 21 16 00-0404 Bronze Body Basket Strainers (23 21 16 00-0403)		
23 21 16 00-0405 Screwed Ends, Bronze Body Basket Strainers (23 21 16 00-0404)		
23 21 16 00-0406 EA 1/2" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	322.77 13.67	22.98
23 21 16 00-0407 EA 3/4" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	381.48 16.07	27.00
23 21 16 00-0408 EA 1" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	442.46 19.15	32.16
23 21 16 00-0409 EA 1-1/4" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	551.25 21.35	35.61
23 21 16 00-0410 EA 1-1/2" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	651.01 24.10	40.20
23 21 16 00-0411 EA 2" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	970.65 27.59	45.95
23 21 16 00-0412 EA 2-1/2" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	1,373.28 36.96	61.45
23 21 16 00-0413 EA 3" Screwed Ends, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	1,933.31 39.20	65.48
23 21 16 00-0414 Flanged, Bronze Body Basket Strainers (23 21 16 00-0404)		
23 21 16 00-0415 EA 2" Flanged, Bronze Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	1,523.03 57.43	153.12
23 21 16 00-0416 EA 2-1/2" Flanged, Bronze Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	2,292.28 62.65	166.56
23 21 16 00-0417 EA 3" Flanged, Bronze Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	2,599.59 73.32	195.28
23 21 16 00-0418 EA 4" Flanged, Bronze Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	4,395.96 123.07	327.37
23 21 16 00-0419 EA 6" Flanged, Bronze Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	8,340.47 137.89	366.39
23 21 16 00-0420 EA 8" Flanged, Bronze Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	15,210.97 174.47	468.16
23 21 16 00-0421 Iron Body Basket Strainers (23 21 16 00-0403)		
23 21 16 00-0422 Screwed Ends, Iron Body Basket Strainers (23 21 16 00-0421)		
23 21 16 00-0423 EA 1/2" Screwed Ends, Iron Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	370.85 13.67	22.98
23 21 16 00-0424 EA 3/4" Screwed Ends, Iron Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	417.62 16.07	27.00
23 21 16 00-0425 EA 1" Screwed Ends, Iron Body Basket Strainer..... <i>For Work In Restricted Working Space, Add</i>	493.53 19.15	32.16

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 21 16 00-0426	EA	1-1/4" Screwed Ends, Iron Body Basket Strainer.....	647.08		35.61
		<i>For Work In Restricted Working Space, Add</i>	21.35		
23 21 16 00-0427	EA	1-1/2" Screwed Ends, Iron Body Basket Strainer.....	709.97		40.20
		<i>For Work In Restricted Working Space, Add</i>	24.10		
23 21 16 00-0428	EA	2" Screwed Ends, Iron Body Basket Strainer.....	843.97		45.95
		<i>For Work In Restricted Working Space, Add</i>	27.59		
23 21 16 00-0429	EA	2-1/2" Screwed Ends, Iron Body Basket Strainer.....	1,197.48		61.45
		<i>For Work In Restricted Working Space, Add</i>	36.96		
23 21 16 00-0430	EA	3" Screwed Ends, Iron Body Basket Strainer.....	1,354.16		65.48
		<i>For Work In Restricted Working Space, Add</i>	39.20		
23 21 16 00-0431 Flanged, Iron Body Basket Strainers (23 21 16 00-0421)					
23 21 16 00-0432	EA	2" Flanged, Iron Body Basket Strainer.....	1,316.79		153.12
		<i>For Work In Restricted Working Space, Add</i>	57.43		
23 21 16 00-0433	EA	2-1/2" Flanged, Iron Body Basket Strainer.....	1,725.61		166.56
		<i>For Work In Restricted Working Space, Add</i>	62.65		
23 21 16 00-0434	EA	3" Flanged, Iron Body Basket Strainer.....	1,859.02		195.28
		<i>For Work In Restricted Working Space, Add</i>	73.32		
23 21 16 00-0435	EA	4" Flanged, Iron Body Basket Strainer.....	2,840.34		327.37
		<i>For Work In Restricted Working Space, Add</i>	123.07		
23 21 16 00-0436	EA	6" Flanged, Iron Body Basket Strainer.....	5,189.34		366.39
		<i>For Work In Restricted Working Space, Add</i>	137.89		
23 21 16 00-0437	EA	8" Flanged, Iron Body Basket Strainer.....	9,307.09		468.16
		<i>For Work In Restricted Working Space, Add</i>	174.47		
23 21 16 00-0438	EA	10" Flanged, Iron Body Basket Strainer.....	13,841.47		569.94
		<i>For Work In Restricted Working Space, Add</i>	213.73		
23 21 16 00-0439	EA	12" Flanged, Iron Body Basket Strainer.....	17,012.36		718.53
		<i>For Work In Restricted Working Space, Add</i>	431.07		
23 21 16 00-0440	EA	14" Flanged, Iron Body Basket Strainer.....	20,670.54		814.20
		<i>For Work In Restricted Working Space, Add</i>	305.32		
23 21 16 00-0441	EA	16" Flanged, Iron Body Basket Strainer.....	21,669.32		895.61
		<i>For Work In Restricted Working Space, Add</i>	335.85		
23 21 16 00-0442 Cast Steel Body Basket Strainers (23 21 16 00-0403)					
23 21 16 00-0443 Screwed Ends, Cast Steel Body Basket Strainers (23 21 16 00-0442)					
23 21 16 00-0444	EA	1" Screwed Ends, Cast Steel Body Basket Strainer.....	1,977.88		32.16
		<i>For Work In Restricted Working Space, Add</i>	19.15		
23 21 16 00-0445	EA	1-1/4" Screwed Ends, Cast Steel Body Basket Strainer.....	2,625.94		35.61
		<i>For Work In Restricted Working Space, Add</i>	21.35		
23 21 16 00-0446	EA	1-1/2" Screwed Ends, Cast Steel Body Basket Strainer.....	2,959.52		40.20
		<i>For Work In Restricted Working Space, Add</i>	24.09		
23 21 16 00-0447	EA	2" Screwed Ends, Cast Steel Body Basket Strainer.....	4,187.75		45.95
		<i>For Work In Restricted Working Space, Add</i>	27.59		
23 21 16 00-0448	EA	2-1/2" Screwed Ends, Cast Steel Body Basket Strainer.....	5,881.61		61.45
		<i>For Work In Restricted Working Space, Add</i>	36.96		
23 21 16 00-0449	EA	3" Screwed Ends, Cast Steel Body Basket Strainer.....	7,673.41		65.48
		<i>For Work In Restricted Working Space, Add</i>	39.21		
23 21 16 00-0450 Flanged, Cast Steel Body Basket Strainers (23 21 16 00-0442)					
23 21 16 00-0451	EA	2" Flanged, Cast Steel Body Basket Strainer.....	6,152.62		153.12
		<i>For Work In Restricted Working Space, Add</i>	57.43		
23 21 16 00-0452	EA	2-1/2" Flanged, Cast Steel Body Basket Strainer.....	8,927.57		166.56
		<i>For Work In Restricted Working Space, Add</i>	62.65		
23 21 16 00-0453	EA	3" Flanged, Cast Steel Body Basket Strainer.....	9,774.16		195.28
		<i>For Work In Restricted Working Space, Add</i>	73.32		
23 21 16 00-0454	EA	4" Flanged, Cast Steel Body Basket Strainer.....	13,792.47		327.37
		<i>For Work In Restricted Working Space, Add</i>	123.07		
23 21 16 00-0455	EA	6" Flanged, Cast Steel Body Basket Strainer.....	24,588.19		366.39
		<i>For Work In Restricted Working Space, Add</i>	137.89		
23 21 16 00-0456	EA	8" Flanged, Cast Steel Body Basket Strainer.....	40,119.99		468.16
		<i>For Work In Restricted Working Space, Add</i>	174.47		
23 21 16 00-0457 Stainless Steel Body Basket Strainers (23 21 16 00-0403)					
23 21 16 00-0458 Screwed Ends, Stainless Steel Body Basket Strainers (23 21 16 00-0457)					
23 21 16 00-0459	EA	1" Screwed Ends, Stainless Steel Body Basket Strainer.....	566.54		32.16
		<i>For Work In Restricted Working Space, Add</i>	19.15		
23 21 16 00-0460	EA	1-1/4" Screwed Ends, Stainless Steel Body Basket Strainer.....	815.27		35.61
		<i>For Work In Restricted Working Space, Add</i>	21.35		
23 21 16 00-0461	EA	1-1/2" Screwed Ends, Stainless Steel Body Basket Strainer.....	841.86		40.20
		<i>For Work In Restricted Working Space, Add</i>	24.09		
23 21 16 00-0462	EA	2" Screwed Ends, Stainless Steel Body Basket Strainer.....	1,244.25		45.95
		<i>For Work In Restricted Working Space, Add</i>	27.59		
23 21 16 00-0463	EA	2-1/2" Screwed Ends, Stainless Steel Body Basket Strainer.....	1,758.27		61.45
		<i>For Work In Restricted Working Space, Add</i>	36.96		
23 21 16 00-0464	EA	3" Screwed Ends, Stainless Steel Body Basket Strainer.....	2,482.53		65.48
		<i>For Work In Restricted Working Space, Add</i>	39.21		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 21 16 00-0465	Flanged, Stainless Steel Body Basket Strainers (23 21 16 00-0457)		
23 21 16 00-0466	EA 2" Flanged, Stainless Steel Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	1,906.16 57.43	153.12
23 21 16 00-0467	EA 2-1/2" Flanged, Stainless Steel Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	2,879.23 62.65	166.56
23 21 16 00-0468	EA 3" Flanged, Stainless Steel Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	3,260.71 73.32	195.28
23 21 16 00-0469	EA 4" Flanged, Stainless Steel Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	5,512.10 123.07	327.37
23 21 16 00-0470	EA 6" Flanged, Stainless Steel Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	8,423.49 137.89	366.39
23 21 16 00-0471	EA 8" Flanged, Stainless Steel Body Basket Strainer <i>For Work In Restricted Working Space, Add</i>	14,617.89 174.47	468.16

23 21 23 Hydronic Pumps (23 21)

23 21 23 13 In-Line Centrifugal Hydronic Pumps (23 21 23)

23 21 23 13-0001	Cast Iron Single Stage In-Line Centrifugal Pump (23 21 23 13) Note: For general service, 125 LB flanged, 3550 RPM TEFC motor. Includes packed stuffing boxes and ductile iron case.		
23 21 23 13-0002	EA 3 HP, 50 GPM At 100' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	6,501.53 446.53 1,004.69	306.79
23 21 23 13-0003	EA 5 HP, 75 GPM At 100' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	7,097.20 478.69 1,077.05	371.32
23 21 23 13-0004	EA 7-1/2 HP, 100 GPM At 150' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	8,202.77 550.43 1,238.47	441.15
23 21 23 13-0005	EA 10 HP, 125 GPM At 150' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	9,182.41 593.54 1,335.46	588.20
23 21 23 13-0006	EA 15 HP, 150 GPM At 200' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	10,528.47 688.40 1,548.90	641.09
23 21 23 13-0007	EA 30 HP, 200 GPM At 300' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	15,752.90 1,090.97 2,454.67	705.62
23 21 23 13-0008	EA 40 HP, 250 GPM At 300' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	18,508.11 1,269.07 2,855.40	881.25
23 21 23 13-0009	EA 50 HP, 300 GPM At 300' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	25,759.03 1,818.91 4,092.56	1,007.13
23 21 23 13-0010	EA 75 HP, 400 GPM At 400' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	32,775.79 2,368.76 5,329.71	1,055.40
23 21 23 13-0011	EA 100 HP, 600 GPM At 400' Head, Single Stage Cast Iron In-Line Circulating Pump <i>For Mechanical Seal, Add</i> <i>For Cast Steel Case, Add</i>	35,777.16 2,536.50 5,707.11	1,356.65

23 21 23 13-0012 Cast Iron, Single Stage, Vertical In-Line, Close Coupled, Pump (23 21 23 13)

Note: For general service, 125 LB flanged, 1,800 RPM TEFC motor.			
23 21 23 13-0013	EA 1/2 HP, 1-1/2" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	2,274.21	176.15
23 21 23 13-0014	EA 3/4 HP, 2" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	4,039.60	201.32
23 21 23 13-0015	EA 1 HP, 3" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	4,389.21	225.44
23 21 23 13-0016	EA 1-1/2 HP, 3" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	4,614.35	245.12
23 21 23 13-0017	EA 2 HP, 4" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	6,041.79	268.39
23 21 23 13-0018	EA 3 HP, 5" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	6,209.75	296.64
23 21 23 13-0019	EA 5 HP, 6" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	7,097.06	352.28
23 21 23 13-0020	EA 7-1/2 HP, 6" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	8,255.41	433.64
23 21 23 13-0021	EA 10 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	10,635.44	469.71
23 21 23 13-0022	EA 15 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	12,436.05	497.32
23 21 23 13-0023	EA 20 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	15,992.17	528.43
23 21 23 13-0024	EA 25 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	16,876.15	546.10
23 21 23 13-0025	EA 30 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	17,760.11	563.66
23 21 23 13-0026	EA 40 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	21,094.52	603.96
23 21 23 13-0027	EA 50 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	22,848.56	708.34
23 21 23 13-0028	EA 60 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	25,234.42	1,023.10
23 21 23 13-0029	EA 75 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	29,747.26	2,046.21
23 21 23 13-0030	EA 100 HP, 8" Suction And Discharge, Single Stage Cast Iron Vertical In-Line Pump	34,189.74	2,455.45

23 21 23 16 Base-Mounted, Centrifugal Hydronic Pumps (23 21 23)

See CSI section 26 29 23 00-0000 for variable frequency motor controllers.

23 21 23 16-0001 Single Stage, Cast Iron, Horizontal End Suction, Base Mounted Centrifugal Pump (23 21 23 16)

Note: 1800 RPM, welded steel baseplate, internally flushed mechanical seal, bronze wear ring, galvanized drip pan, and 3 phase 230/460V premium efficiency motor. Bell & Gossett 1510 Series.

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 20 HVAC Piping and Pumps

23 21 Hydronic Piping and Pumps



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21	23 16-0002	EA	5 HP, 50 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 1-1/4 BC, BF, 184T).....	6,402.43	335.36
23 21	23 16-0003	EA	7.5 HP, 100 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 1-1/2 BC, BF, 213T).....	7,185.79	335.78
23 21	23 16-0004	EA	10 HP, 225 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 2 E, BF, 215T).....	9,477.91	441.15
23 21	23 16-0005	EA	15 HP, 250 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 2 E, BF, 254T).....	10,375.65	542.71
23 21	23 16-0006	EA	15 HP, 300 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 3 G, BF, 254T).....	11,625.38	542.71
23 21	23 16-0007	EA	20 HP, 350 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 3 E, BF, 256T).....	11,297.62	588.20
23 21	23 16-0008	EA	20 HP, 500 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 4 E, BF, 256T).....	12,008.14	588.20
23 21	23 16-0009	EA	25 HP, 600 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 4 E, BF, 284T).....	13,120.75	616.76
23 21	23 16-0010	EA	30 HP, 750 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 5 E, BF, 286T).....	14,592.63	783.92
23 21	23 16-0011	EA	40 HP, 1,050 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 5 E, BF, 324T).....	15,434.13	881.25
23 21	23 16-0012	EA	60 HP, 1,500 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 6 E, BF, 364T).....	23,743.45	2,151.06
23 21	23 16-0013	EA	75 HP, 2,000 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 8 G, BF, 365T).....	34,444.21	2,580.80
23 21	23 16-0014	EA	100 HP, 3,000 GPM At 100' Head Single Stage Cast Iron Centrifugal Pump (B&G 1510, 8 G, BF, 404TS).....	39,051.22	3,226.00

23 21 23 16-0015 Single Stage, Vertical Split Case, Cast Iron, Horizontal End Suction, Base Mounted Centrifugal Pump (23 21 23 16)

Note: 125 LB flanged, 1750 RPM drip-proof motor, common base plate 100' head. Standard seal and motor. For general service.

23 21	23 16-0016	EA	1-1/2 HP, 40 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	6,806.51	246.49
			<i>For 300 LB Flanges, Add</i>	<i>1,590.50</i>	
23 21	23 16-0017	EA	2 HP, 50 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	8,702.94	264.48
			<i>For 300 LB Flanges, Add</i>	<i>2,076.56</i>	
23 21	23 16-0018	EA	3 HP, 90 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	10,913.89	282.46
			<i>For 300 LB Flanges, Add</i>	<i>2,610.93</i>	
23 21	23 16-0019	EA	5 HP, 100 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	12,719.59	335.36
			<i>For 300 LB Flanges, Add</i>	<i>3,028.77</i>	
23 21	23 16-0020	EA	7-1/2 HP, 150 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	13,368.17	335.78
			<i>For 300 LB Flanges, Add</i>	<i>3,183.35</i>	
23 21	23 16-0021	EA	10 HP, 200 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	13,947.16	441.15
			<i>For 300 LB Flanges, Add</i>	<i>3,288.43</i>	
23 21	23 16-0022	EA	10 HP, 225 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	14,261.74	441.15
			<i>For 300 LB Flanges, Add</i>	<i>3,367.08</i>	
23 21	23 16-0023	EA	10 HP, 250 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	14,958.57	441.15
			<i>For 300 LB Flanges, Add</i>	<i>3,541.28</i>	
23 21	23 16-0024	EA	15 HP, 300 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	17,354.36	542.71
			<i>For 300 LB Flanges, Add</i>	<i>4,094.46</i>	
23 21	23 16-0025	EA	17-1/2 HP, 350 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case.....	17,618.82	542.29
			<i>For 300 LB Flanges, Add</i>	<i>4,150.73</i>	
23 21	23 16-0026	EA	20 HP, 500 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	18,574.59	588.20
			<i>For 300 LB Flanges, Add</i>	<i>4,379.17</i>	
23 21	23 16-0027	EA	25 HP, 600 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	20,385.80	616.76
			<i>For 300 LB Flanges, Add</i>	<i>4,810.84</i>	
23 21	23 16-0028	EA	30 HP, 750 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	22,502.91	783.92
			<i>For 300 LB Flanges, Add</i>	<i>5,273.09</i>	
23 21	23 16-0029	EA	40 HP, 1,050 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	25,529.99	881.25
			<i>For 300 LB Flanges, Add</i>	<i>5,985.78</i>	
23 21	23 16-0030	EA	60 HP, 1,500 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	39,617.01	2,151.06
			<i>For 300 LB Flanges, Add</i>	<i>8,867.32</i>	
23 21	23 16-0031	EA	75 HP, 2,000 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	47,111.33	2,580.80
			<i>For 300 LB Flanges, Add</i>	<i>10,533.52</i>	
23 21	23 16-0032	EA	100 HP, 3,000 GPM Cast Iron Centrifugal Pump, Single Stage, Vertical Split Case	57,432.54	3,226.00
			<i>For 300 LB Flanges, Add</i>	<i>12,802.74</i>	

23 21 23 16-0033 Single Stage, Horizontal Split Case, Cast Iron, Horizontal End Suction, Base Mounted Centrifugal Pump (23 21 23 16)

Note: 125 LB flanged, 1750 RPM drip-proof motor, common base plate 100' head. Standard seal and motor. For general service.

23 21	23 16-0034	EA	1-1/2 HP, 40 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case.....	6,536.21	246.49
			<i>For 300 LB Flanges, Add</i>	<i>1,522.93</i>	
23 21	23 16-0035	EA	2 HP, 50 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	6,706.79	264.48
			<i>For 300 LB Flanges, Add</i>	<i>1,557.67</i>	
23 21	23 16-0036	EA	3 HP, 90 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	6,877.50	282.46
			<i>For 300 LB Flanges, Add</i>	<i>1,592.43</i>	
23 21	23 16-0037	EA	5 HP, 100 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	7,475.38	288.81
			<i>For 300 LB Flanges, Add</i>	<i>1,738.77</i>	
23 21	23 16-0038	EA	7-1/2 HP, 100 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	12,232.22	335.36
			<i>For 300 LB Flanges, Add</i>	<i>2,906.92</i>	
23 21	23 16-0039	EA	10 HP, 250 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	14,825.29	441.15
			<i>For 300 LB Flanges, Add</i>	<i>3,534.81</i>	
23 21	23 16-0040	EA	15 HP, 350 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	16,667.10	476.06
			<i>For 300 LB Flanges, Add</i>	<i>3,968.42</i>	
23 21	23 16-0041	EA	20 HP, 500 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	17,605.20	528.95
			<i>For 300 LB Flanges, Add</i>	<i>4,157.17</i>	
23 21	23 16-0042	EA	25 HP, 750 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	19,627.03	528.21
			<i>For 300 LB Flanges, Add</i>	<i>4,669.28</i>	
23 21	23 16-0043	EA	40 HP, 1,000 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	21,965.65	678.83
			<i>For 300 LB Flanges, Add</i>	<i>5,186.09</i>	
23 21	23 16-0044	EA	50 HP, 1,500 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	27,944.66	860.65
			<i>For 300 LB Flanges, Add</i>	<i>6,571.39</i>	
23 21	23 16-0045	EA	75 HP, 2,000 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case	35,673.86	1,074.95
			<i>For 300 LB Flanges, Add</i>	<i>8,400.00</i>	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 21 23 16-0046 EA 3,000 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case, 100 HP..... <i>For 300 LB Flanges, Add</i>	44,882.94 10,598.58	1,290.40
23 21 23 16-0047 EA 150 HP, 3,500 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	53,222.78 12,614.41	1,433.26
23 21 23 16-0048 EA 200 HP, 4,000 GPM Cast Iron Centrifugal Pump, Single Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	61,192.12 14,409.23	1,843.43
23 21 23 16-0049 Two Stage, Horizontal Split Case, Cast Iron, Horizontal End Suction, Base Mounted Centrifugal Pump (23 21 23 16) Note: 3500 RPM drip-proof motor, common base plate 500' head. Packed stuffing box and boiler feed water service.		
23 21 23 16-0050 EA 40 HP, 100 GPM Cast Iron Centrifugal Pump, Two Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	41,846.76 10,217.56	542.71
23 21 23 16-0051 EA 50 HP, 200 GPM Cast Iron Centrifugal Pump, Two Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	45,174.39 11,029.12	588.20
23 21 23 16-0052 EA 75 HP, 300 GPM Cast Iron Centrifugal Pump, Two Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	60,302.99 14,712.54	793.21
23 21 23 16-0053 EA 100 HP, 400 GPM Cast Iron Centrifugal Pump, Two Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	70,361.41 17,090.94	1,089.95
23 21 23 16-0054 EA 200 HP, 800 GPM Cast Iron Centrifugal Pump, Two Stage, Horizontal Split Case..... <i>For 300 LB Flanges, Add</i>	97,645.61 23,745.52	1,453.26
23 21 23 16-0055 Cast Iron Close Coupling Pumps (23 21 23 16)		
23 21 23 16-0056 Foot Mounted Cast Iron Close Coupled Pumps (23 21 23 16-0055)		
23 21 23 16-0057 EA 3 HP, 90 GPM At 50' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 1-1/2 AC, BF, 182JM).....	5,729.17	317.38
23 21 23 16-0058 EA 3 HP, 150 GPM At 40' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 2-1/2 AB, BF, 182JM).....	6,240.29	317.38
23 21 23 16-0059 EA 5 HP, 225 GPM At 50' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 2-1/2 BB, BF, 184JM).....	6,941.92	335.01
23 21 23 16-0060 EA 5 HP, 350 GPM At 25' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 4 AC, BF, 184JM).....	7,394.07	335.01
23 21 23 16-0061 EA 7.5 HP, 350 GPM At 40' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 4 AC, BF, 213JM).....	8,502.92	352.28
23 21 23 16-0062 EA 10 HP, 600 GPM At 40' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 5 A, BF, 215JM).....	10,076.43	424.07
23 21 23 16-0063 EA 15 HP, 1,000 GPM At 40' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 6 BC, BF, 254JP).....	13,233.31	522.41
23 21 23 16-0064 EA 20 HP, 1,350 GPM At 30' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 6 BC, BF, 256JP).....	14,165.45	565.42
23 21 23 16-0065 EA 25 HP, 1,550 GPM At 40' Head, Foot Mounted, Close Coupled Cast Iron Centrifugal Pump (B&G 1531, 6 BC, BF, 284JP).....	16,413.02	610.64
23 21 23 16-0066 Pumps, Polypropylene Body, Housing And Impeller, 115/230 Volt (23 21 23 16)		
23 21 23 16-0067 EA 1/3 HP, Centrifugal Pump, Polypropylene Body.....	1,439.93	163.92
23 21 23 16-0068 EA 1/2 HP, Centrifugal Pump, Polypropylene Body.....	1,536.16	173.79
23 21 23 16-0069 EA 3/4 HP, Centrifugal Pump, Polypropylene Body.....	1,792.21	185.05
23 21 23 16-0070 Multi Stage, Stainless Steel, Vertical Centrifugal Pump (23 21 23 16) Note: Suction And Discharge Ports On The Same Level		
23 21 23 16-0071 EA 7.5 HP, 90.3 GPM @ 206' Head, Multi Stage, Stainless Steel, Vertical Centrifugal Pump (Grundfos CRN15-4).....	9,095.13	451.73
23 21 23 16-0072 EA 15 HP, 159 GPM @ 250' Head, Multi Stage, Stainless Steel, Vertical Centrifugal Pump (Grundfos CRN32-4).....	12,462.02	558.58
23 21 23 16-0073 EA 25 HP, 239 GPM @ 212' Head, Multi Stage, Stainless Steel, Vertical Centrifugal Pump (Grundfos CRN64-2).....	15,267.55	704.57
23 21 23 23 Vertical-Turbine Hydronic Pumps (23 21 23) See CSI section 26 29 23 00-0000 for variable frequency motor controllers.		
23 21 23 23-0001 Cast Iron, Bronze Fitted Vertical Turbine Wet Sump Pumps (23 21 23 23) Note: For water supply, cooling towers and process liquids. Multi-stage 1750 RPM drip-proof motor. For 1' to 5' sump depth.		
23 21 23 23-0002 EA 2 HP, 50 GPM Cast Iron Turbine Pump, 3" Discharge 100' Head, 10 Stage..... <i>For Basket Strainer, Galvanized. Steel Pipe Sizes 3" To 8", Add</i> <i>For Basket Strainer, Galvanized Steel Pipe Sizes 10" And Larger, Add</i> <i>For Each Extra Column Assembly <60", Add</i>	13,175.29 479.99 348.24 1,101.04	783.92
23 21 23 23-0003 EA 3 HP, 100 GPM Cast Iron Turbine Pump, 4" Discharge 100' Head, 7 Stage..... <i>For Basket Strainer, Galvanized. Steel Pipe Sizes 3" To 8", Add</i> <i>For Basket Strainer, Galvanized Steel Pipe Sizes 10" And Larger, Add</i> <i>For Each Extra Column Assembly <60", Add</i>	15,243.15 562.33 409.90 1,266.85	881.25
23 21 23 23-0004 EA 15 HP, 250 GPM Cast Iron Turbine Pump, 6" Discharge 150' Head, 5 Stage..... <i>For Basket Strainer, Galvanized. Steel Pipe Sizes 3" To 8", Add</i> <i>For Basket Strainer, Galvanized Steel Pipe Sizes 10" And Larger, Add</i> <i>For Each Extra Column Assembly <60", Add</i>	18,394.85 674.07 490.12 1,533.31	860.65
23 21 23 23-0005 EA 25 HP, 500 GPM Cast Iron Turbine Pump, 6" Discharge 150' Head, 3 Stage..... <i>For Basket Strainer, Galvanized. Steel Pipe Sizes 3" To 8", Add</i> <i>For Basket Strainer, Galvanized Steel Pipe Sizes 10" And Larger, Add</i> <i>For Each Extra Column Assembly <60", Add</i>	21,746.61 806.05 588.59 1,803.54	993.15

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 21 Hydronic Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 21	23	23-0006	EA 50 HP, 1,000 GPM Cast Iron Turbine Pump, 8" Discharge 150' Head, 2 Stage <i>For Basket Strainer, Galvanized. Steel Pipe Sizes 3" To 8", Add</i> <i>For Basket Strainer, Galvanized Steel Pipe Sizes 10" And Larger, Add</i> <i>For Each Extra Column Assembly <60", Add</i>	26,844.82 1,004.66 736.22 2,216.71	1,074.95
23 21	23	23-0007	EA 100 HP, 2,000 GPM Cast Iron Turbine Pump, 10" Discharge 150' Head, 3 Stage <i>For Basket Strainer, Galvanized. Steel Pipe Sizes 3" To 8", Add</i> <i>For Basket Strainer, Galvanized Steel Pipe Sizes 10" And Larger, Add</i> <i>For Each Extra Column Assembly <60", Add</i>	35,349.40 1,331.02 977.53 2,910.91	1,290.40

23 21 29 Automatic Condensate Pump Units (23 21)**23 21 29 00-0001 Automatic Shallow Pan Condensate Pump (23 21 29)**

23 21	29	00-0002	EA 1/150 HP, 205 GPH (Max) Automatic Shallow Pan Condensate Pump (Little Giant 1-ABS).....	216.02	34.38
23 21	29	00-0003	EA 1/40 HP, 300 GPH (Max) Automatic Shallow Pan Condensate Pump (Little Giant 2-ABS).....	234.43	34.38
23 21	29	00-0004	EA 1/12 HP, 310 GPH (Max) Automatic Shallow Pan Condensate Pump (Little Giant 3-ABS).....	366.21	39.67

23 21 29 00-0005 Automatic Condensate Pump With Tank (23 21 29)

23 21	29	00-0006	EA 1/20 HP Automatic Condensate Pump With Tank (Hartell KT-15-1UL).....	118.11	26.45
23 21	29	00-0007	EA 1/30 HP Automatic Condensate Pump With Tank (Little Giant VCMX-20).....	125.98	26.45
23 21	29	00-0008	EA 1/50 HP, 200 GPH (Max) Automatic Condensate Removal Pump With Safety Switch (Little Giant VCL-14ULS).....	209.99	34.38
23 21	29	00-0009	EA 1/18 HP, 270 GPH (Max) Automatic Condensate Removal Pump With Safety Switch (Little Giant VCL-24ULS).....	226.59	39.67
23 21	29	00-0010	EA 1/5 HP, 450 GPH (Max) Automatic Condensate Removal Pump With Safety Switch (Little Giant VCL-45ULS) Condensate Pump.....	419.65	44.96

23 22 Steam and Condensate Piping and Pumps (23 20)**23 22 16 Steam and Condensate Heating Piping Specialties (23 22)****23 22 16 00-0001 High Temperature Safety Relief Valve (23 22 16)**

Note: Used in steam or water boiler, heating systems and unfired pressure vessel applications.

23 22 16 00-0002 Cast Iron Body Safety Valve, Steam Or Water (23 22 16 00-0001)

Note: Variable set points to 500 psig pressure, 400 Degree F temperature range.

23 22 16 00-0003 Threaded (23 22 16 00-0002)

23 22	16	00-0004	EA 3/4" x 1" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	500.19	17.22
23 22	16	00-0005	EA 1" x 1-1/4" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	523.34	20.38
23 22	16	00-0006	EA 1-1/4" x 1-1/2" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	577.10	25.84
23 22	16	00-0007	EA 1-1/2" x 2" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	711.99	28.71
23 22	16	00-0008	EA 2" x 2-1/2" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	911.61	35.30
23 22	16	00-0009	EA 2-1/2" x 2-1/2" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	1,415.33	40.19
23 22	16	00-0010	EA 3" x 3" Threaded Cast Iron Body Safety Relief Valve, Steam or Water	1,533.64	46.22

23 22 16 00-0011 Flanged (23 22 16 00-0002)

23 22	16	00-0012	EA 1-1/2" x 2-1/2" Flanged Cast Iron Body Safety Relief Valve, Steam or Water	3,527.88	120.56
23 22	16	00-0013	EA 2" x 3" Flanged Cast Iron Body Safety Relief Valve, Steam or Water.....	4,106.20	181.22
23 22	16	00-0014	EA 2-1/2" x 3" Flanged Cast Iron Body Safety Relief Valve, Steam or Water.....	4,537.36	166.88
23 22	16	00-0015	EA 2-1/2" x 4" Flanged Cast Iron Body Safety Relief Valve, Steam or Water.....	5,510.15	241.03
23 22	16	00-0016	EA 3" x 3" Flanged Cast Iron Body Safety Relief Valve, Steam or Water	5,882.87	179.75
23 22	16	00-0017	EA 3" x 4" Flanged Cast Iron Body Safety Relief Valve, Steam or Water	6,911.17	241.03
23 22	16	00-0018	EA 4" x 6" Flanged Cast Iron Body Safety Relief Valve, Steam or Water.....	11,567.20	342.04
23 22	16	00-0019	EA 6" x 8" Flanged Cast Iron Body Safety Relief Valve, Steam or Water.....	23,015.84	382.00

23 22 16 00-0020 Bronze Body Safety Valve, Threaded, Steam (23 22 16 00-0001)

Note: Variable set points to 250 psig pressure, 400 Degree F temperature range. Valve also can be set for Air or Gas with variable set points to 300 psig pressure.

23 22	16	00-0021	EA 3/4" x 3/4" Threaded Bronze Body Safety Relief Valve, Steam	544.50	15.79
23 22	16	00-0022	EA 3/4" x 1" Threaded Bronze Body Safety Relief Valve, Steam	557.66	17.22
23 22	16	00-0023	EA 1" x 1" Threaded Bronze Body Safety Relief Valve, Steam	652.83	18.94
23 22	16	00-0024	EA 1" x 1-1/4" Threaded Bronze Body Safety Relief Valve, Steam	720.96	20.38
23 22	16	00-0025	EA 1-1/4" x 1-1/4" Threaded Bronze Body Safety Relief Valve, Steam	834.22	22.97
23 22	16	00-0026	EA 1-1/4" x 1-1/2" Threaded Bronze Body Safety Relief Valve, Steam	838.12	25.84
23 22	16	00-0027	EA 1-1/2" x 1-1/2" Threaded Bronze Body Safety Relief Valve, Steam	942.87	27.27
23 22	16	00-0028	EA 1-1/2" x 2" Threaded Bronze Body Safety Relief Valve, Steam	1,027.62	28.71
23 22	16	00-0029	EA 2" x 2" Threaded Bronze Body Safety Relief Valve, Steam	1,427.66	32.15
23 22	16	00-0030	EA 2" x 2-1/2" Threaded Bronze Body Safety Relief Valve, Steam	1,560.24	35.30
23 22	16	00-0031	EA 2-1/2" x 2-1/2" Threaded Bronze Body Safety Relief Valve, Steam.....	1,861.89	40.19

23 22 16 00-0032 Bronze Body Safety Valve, Threaded, Water (23 22 16 00-0001)

Note: Variable set points to 160 psig pressure, 250 Degree F temperature range.

23 22	16	00-0033	EA 3/4" x 3/4" Threaded Bronze Body Safety Relief Valve, Water	255.26	15.79
23 22	16	00-0034	EA 3/4" x 1" Threaded Bronze Body Safety Relief Valve, Water	290.99	17.22
23 22	16	00-0035	EA 1" x 1" Threaded Bronze Body Safety Relief Valve, Water	403.68	18.94
23 22	16	00-0036	EA 1" x 1-1/4" Threaded Bronze Body Safety Relief Valve, Water	444.53	20.38
23 22	16	00-0037	EA 1-1/4" x 1-1/4" Threaded Bronze Body Safety Relief Valve, Water.....	643.80	22.97
23 22	16	00-0038	EA 1-1/2" x 1-1/2" Threaded Bronze Body Safety Relief Valve, Water.....	868.94	27.27
23 22	16	00-0039	EA 2" x 2" Threaded Bronze Body Safety Relief Valve, Water.....	1,268.42	32.15

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 22 16 00-0040		Steam Temperature Regulator, Iron Body <small>(23 22 16)</small>		
23 22 16 00-0041		Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body <small>(23 22 16 00-0040)</small>		
		Note: Up to 150 PSI.		
23 22 16 00-0042	EA	1/2" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	1,346.06	16.53
23 22 16 00-0043	EA	3/4" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	1,416.08	22.27
23 22 16 00-0044	EA	1" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	1,879.37	27.44
23 22 16 00-0045	EA	1-1/4" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,074.98	34.68
23 22 16 00-0046	EA	1-1/2" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,128.91	39.84
23 22 16 00-0047	EA	2" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,515.80	43.35
23 22 16 00-0048	EA	2-1/2" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,201.46	79.41
23 22 16 00-0049	EA	3" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	4,164.28	86.60
23 22 16 00-0050	EA	4" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	6,096.82	202.69
23 22 16 00-0051	EA	6" Single Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	10,149.06	237.90
23 22 16 00-0052		Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body <small>(23 22 16 00-0040)</small>		
23 22 16 00-0053	EA	1/2" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	1,995.89	16.53
23 22 16 00-0054	EA	3/4" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,066.91	22.27
23 22 16 00-0055	EA	1" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,158.84	27.44
23 22 16 00-0056	EA	1-1/4" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,584.15	34.68
23 22 16 00-0057	EA	1-1/2" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,768.26	39.84
23 22 16 00-0058	EA	2" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,143.63	43.35
23 22 16 00-0059	EA	2-1/2" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	4,817.05	79.41
23 22 16 00-0060	EA	3" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	5,767.04	86.60
23 22 16 00-0061	EA	4" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	7,975.76	202.69
23 22 16 00-0062	EA	6" Single Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	12,890.61	237.90
23 22 16 00-0063		Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body <small>(23 22 16 00-0040)</small>		
23 22 16 00-0064	EA	1/2" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,720.43	16.53
23 22 16 00-0065	EA	3/4" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	2,759.83	22.27
23 22 16 00-0066	EA	1" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,020.23	27.44
23 22 16 00-0067	EA	1-1/4" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,288.59	34.68
23 22 16 00-0068	EA	1-1/2" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,407.61	39.84
23 22 16 00-0069	EA	2" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,844.26	43.35
23 22 16 00-0070	EA	2-1/2" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	7,114.09	79.41
23 22 16 00-0071	EA	3" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	8,169.08	86.60
23 22 16 00-0072	EA	4" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	10,327.61	202.69
23 22 16 00-0073	EA	6" Double Seated Spring Loaded Direct Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	14,489.16	237.90
23 22 16 00-0074		Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body <small>(23 22 16 00-0040)</small>		
23 22 16 00-0075	EA	1/2" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,486.12	16.53
23 22 16 00-0076	EA	3/4" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,521.70	22.27
23 22 16 00-0077	EA	1" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,824.19	27.44
23 22 16 00-0078	EA	1-1/4" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	3,985.33	34.68
23 22 16 00-0079	EA	1-1/2" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	4,138.82	39.84
23 22 16 00-0080	EA	2" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	4,506.57	43.35
23 22 16 00-0081	EA	2-1/2" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	7,496.93	79.41
23 22 16 00-0082	EA	3" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	8,587.55	86.60
23 22 16 00-0083	EA	4" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	10,746.09	202.69
23 22 16 00-0084	EA	6" Double Seated Spring Loaded Reverse Acting Diaphragm Valve, Steam Temperature Regulator, Iron Body.....	14,907.64	237.90
23 22 16 00-0085		Steam Traps <small>(23 22 16)</small>		
23 22 16 00-0086		Inverted Bucket Steam Traps <small>(23 22 16 00-0085)</small>		
23 22 16 00-0087	EA	1/2" 250 PSI Inverted Bucket Cast Iron Steam Trap.....	327.84	34.46
		<i>For Work In Restricted Working Space, Add</i>	20.68	
23 22 16 00-0088	EA	3/4" 250 PSI Inverted Bucket Cast Iron Steam Trap.....	330.71	35.89
		<i>For Work In Restricted Working Space, Add</i>	21.54	
23 22 16 00-0089	EA	1" 250 PSI Inverted Bucket Cast Iron Steam Trap.....	493.38	38.25
		<i>For Work In Restricted Working Space, Add</i>	22.97	
23 22 16 00-0090	EA	1-1/4" 250 PSI Inverted Bucket Cast Iron Steam Trap.....	799.08	52.21
		<i>For Work In Restricted Working Space, Add</i>	31.33	
23 22 16 00-0091	EA	1-1/2" 250 PSI Inverted Bucket Cast Iron Steam Trap.....	1,191.09	64.33
		<i>For Work In Restricted Working Space, Add</i>	38.28	
23 22 16 00-0092	EA	2" 250 PSI Inverted Bucket Cast Iron Steam Trap.....	1,518.41	95.72
		<i>For Work In Restricted Working Space, Add</i>	57.44	
23 22 16 00-0093		Float And Thermostatic Steam Traps <small>(23 22 16 00-0085)</small>		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 22 Steam and Condensate Piping and Pumps**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 22 16 00-0094	EA	3/4"	15 PSI Maximum Pressure Float And Thermostatic Steam Trap	346.60	35.89
			<i>For Work In Restricted Working Space, Add</i>	21.54	
23 22 16 00-0095	EA	1"	15 PSI Maximum Pressure Float And Thermostatic Steam Trap	457.58	38.29
			<i>For Work In Restricted Working Space, Add</i>	22.97	
23 22 16 00-0096	EA	1-1/4"	15 PSI Maximum Pressure Float And Thermostatic Steam Trap	565.42	52.21
			<i>For Work In Restricted Working Space, Add</i>	31.33	
23 22 16 00-0097	EA	1-1/2"	15 PSI Maximum Pressure Float And Thermostatic Steam Trap	829.23	63.81
			<i>For Work In Restricted Working Space, Add</i>	38.29	
23 22 16 00-0098	EA	2"	15 PSI Maximum Pressure Float And Thermostatic Steam Trap	1,401.82	95.68
			<i>For Work In Restricted Working Space, Add</i>	57.43	
23 22 16 00-0099	EA	3/4"	30 PSI Maximum Pressure Float And Thermostatic Steam Trap	442.27	35.89
			<i>For Work In Restricted Working Space, Add</i>	21.54	
23 22 16 00-0100	EA	1"	30 PSI Maximum Pressure Float And Thermostatic Steam Trap	480.74	38.25
			<i>For Work In Restricted Working Space, Add</i>	22.97	
23 22 16 00-0101	EA	1-1/4"	30 PSI Maximum Pressure Float And Thermostatic Steam Trap	628.56	52.21
			<i>For Work In Restricted Working Space, Add</i>	31.33	
23 22 16 00-0102	EA	1-1/2"	30 PSI Maximum Pressure Float And Thermostatic Steam Trap	982.05	63.75
			<i>For Work In Restricted Working Space, Add</i>	38.29	
23 22 16 00-0103	EA	2"	30 PSI Maximum Pressure Float And Thermostatic Steam Trap	1,542.86	95.72
			<i>For Work In Restricted Working Space, Add</i>	57.43	
23 22 16 00-0104	EA	3/4"	75 PSI Maximum Pressure Float And Thermostatic Steam Trap	574.89	35.89
			<i>For Work In Restricted Working Space, Add</i>	21.54	
23 22 16 00-0105	EA	1"	75 PSI Maximum Pressure Float And Thermostatic Steam Trap	640.72	38.29
			<i>For Work In Restricted Working Space, Add</i>	22.97	
23 22 16 00-0106	EA	1-1/4"	75 PSI Maximum Pressure Float And Thermostatic Steam Trap	975.90	52.21
			<i>For Work In Restricted Working Space, Add</i>	31.33	
23 22 16 00-0107	EA	1-1/2"	75 PSI Maximum Pressure Float And Thermostatic Steam Trap	1,173.41	63.75
			<i>For Work In Restricted Working Space, Add</i>	38.29	
23 22 16 00-0108	EA	2"	75 PSI Maximum Pressure Float And Thermostatic Steam Trap	1,940.70	95.72
			<i>For Work In Restricted Working Space, Add</i>	57.43	
23 22 16 00-0109	EA	3/4"	150 PSI Maximum Pressure Float And Thermostatic Steam Trap	583.31	35.89
			<i>For Work In Restricted Working Space, Add</i>	21.54	
23 22 16 00-0110	EA	1"	150 PSI Maximum Pressure Float And Thermostatic Steam Trap	640.72	38.29
			<i>For Work In Restricted Working Space, Add</i>	22.97	
23 22 16 00-0111	EA	1-1/4"	150 PSI Max Pressure Float And Thermostatic Steam Trap	975.90	52.21
			<i>For Work In Restricted Working Space, Add</i>	31.33	
23 22 16 00-0112	EA	1-1/2"	150 PSI Max Pressure Float And Thermostatic Steam Trap	1,173.41	63.75
			<i>For Work In Restricted Working Space, Add</i>	38.29	
23 22 16 00-0113	EA	2"	150 PSI Maximum Pressure Float And Thermostatic Steam Trap	1,940.70	95.72
			<i>For Work In Restricted Working Space, Add</i>	57.43	

23 22 16 00-0114 Thermostatic Steam Traps (23 22 16 00-0085)

23 22 16 00-0115	EA	1/2"	25 PSI Maximum Pressure Thermostatic Steam Trap	166.58	34.46
			<i>For Work In Restricted Working Space, Add</i>	20.68	
23 22 16 00-0116	EA	3/4"	25 PSI Maximum Pressure Thermostatic Steam Trap	280.17	35.89
			<i>For Work In Restricted Working Space, Add</i>	21.54	
23 22 16 00-0117	EA	1"	25 PSI Maximum Pressure Thermostatic Steam Trap	346.50	38.25
			<i>For Work In Restricted Working Space, Add</i>	22.97	

23 22 16 00-0118 Thermodynamic Steam Traps (23 22 16 00-0085)

23 22 16 00-0119	EA	3/8"	600 PSI Maximum Pressure Thermodynamic Steam Trap	371.27	31.02
23 22 16 00-0120	EA	1/2"	600 PSI Maximum Pressure Thermodynamic Steam Trap	527.82	34.46
23 22 16 00-0121	EA	3/4"	600 PSI Maximum Pressure Thermodynamic Steam Trap	654.87	35.89
23 22 16 00-0122	EA	1"	600 PSI Maximum Pressure Thermodynamic Steam Trap	878.58	38.25

23 22 16 00-0123 Steam Moisture Separator (23 22 16 00-0085)

23 22 16 00-0124	EA	1/2"	Steam Moisture Separator, Threaded (Spirax Sarco S1)	795.93	57.43
23 22 16 00-0125	EA	3/4"	Steam Moisture Separator, Threaded (Spirax Sarco S1)	841.12	77.54
23 22 16 00-0126	EA	1"	Steam Moisture Separator, Threaded (Spirax Sarco S1)	1,013.78	87.30
23 22 16 00-0127	EA	1-1/2"	Steam Moisture Separator, Threaded (Spirax Sarco S2)	1,609.68	99.93
23 22 16 00-0128	EA	2"	Steam Moisture Separator, Flanged (Spirax Sarco S3)	1,966.57	153.12
23 22 16 00-0129	EA	2-1/2"	Steam Moisture Separator, Flanged (Spirax Sarco S3)	2,969.07	166.56
23 22 16 00-0130	EA	3"	Steam Moisture Separator, Flanged (Spirax Sarco S3)	3,388.47	195.28
23 22 16 00-0131	EA	4"	Steam Moisture Separator, Flanged (Spirax Sarco S3)	4,683.68	327.37
23 22 16 00-0132	EA	6"	Steam Moisture Separator, Flanged (Spirax Sarco S3)	9,181.01	413.52

23 22 16 00-0133 Steam/Condensate Meter (23 22 16)

Note: Meter shall be of the rotary volumetric type and sized on the maximum estimated steam demand.

23 22 16 00-0134	EA	1"	Steam/Condensate Meter	9,683.80	95.16
			<i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i>	64.52	
			<i>For Contactor Used For Dial Counter, Add</i>	567.00	
			<i>For Direct Reading Pressure Gauge, Add</i>	79.82	
			<i>For Steam Meter Pressure-Compensated Counter, Add</i>	1,220.00	
			<i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	905.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 22 16 00-0135 EA 2" Steam/Condensate Meter..... <i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i> <i>For Contactor Used For Dial Counter, Add</i> <i>For Direct Reading Pressure Gauge, Add</i> <i>For Steam Meter Pressure-Compensated Counter, Add</i> <i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	10,921.72 64.52 567.00 79.82 1,220.00 905.00	111.82
23 22 16 00-0136 EA 2-1/2" Steam/Condensate Meter <i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i> <i>For Contactor Used For Dial Counter, Add</i> <i>For Direct Reading Pressure Gauge, Add</i> <i>For Steam Meter Pressure-Compensated Counter, Add</i> <i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	11,565.54 64.52 567.00 79.82 1,220.00 905.00	138.77
23 22 16 00-0137 EA 3" Steam/Condensate Meter..... <i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i> <i>For Contactor Used For Dial Counter, Add</i> <i>For Direct Reading Pressure Gauge, Add</i> <i>For Steam Meter Pressure-Compensated Counter, Add</i> <i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	12,231.55 64.52 567.00 79.82 1,220.00 905.00	182.39
23 22 16 00-0138 EA 4" Steam/Condensate Meter..... <i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i> <i>For Contactor Used For Dial Counter, Add</i> <i>For Direct Reading Pressure Gauge, Add</i> <i>For Steam Meter Pressure-Compensated Counter, Add</i> <i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	13,716.62 64.52 567.00 79.82 1,220.00 905.00	283.36
23 22 16 00-0139 EA 6" Steam/Condensate Meter..... <i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i> <i>For Contactor Used For Dial Counter, Add</i> <i>For Direct Reading Pressure Gauge, Add</i> <i>For Steam Meter Pressure-Compensated Counter, Add</i> <i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	23,610.37 64.52 567.00 79.82 1,220.00 905.00	358.44
23 22 16 00-0140 EA 8" Steam/Condensate Meter..... <i>For Direct Reading Thermometer, Stainless Steel Case With Trim, Add</i> <i>For Contactor Used For Dial Counter, Add</i> <i>For Direct Reading Pressure Gauge, Add</i> <i>For Steam Meter Pressure-Compensated Counter, Add</i> <i>For Wall Or Panel Mounted Remote Totalizer With Contactor, Add</i>	24,377.82 64.52 567.00 79.82 1,220.00 905.00	452.54

23 22 23 Steam Condensate Pumps (23 22)

23 22 23 13 Electric-Driven Steam Condensate Pumps (23 22 23)

23 22 23 13-0001 Simplex Condensate Pumps And Motors (23 22 23 13)
Note: Cast iron receiver, float switch.

23 22 23 13-0002 20 PSI Discharge Pressure (23 22 23 13-0001)

23 22 23 13-0003 EA 3 To 6 GPM Simplex Condensate Pump And 1/3 HP Motor With 6 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	1,982.25	538.48
23 22 23 13-0004 EA 9 To 12 GPM Simplex Condensate Pump And 1/3 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	2,528.25	553.29
23 22 23 13-0005 EA 15 GPM Simplex Condensate Pump And 1/2 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	2,645.67	590.32
23 22 23 13-0006 EA 22.5 GPM Simplex Condensate Pump And 1/2 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	2,906.46	596.66
23 22 23 13-0007 EA 30 GPM Simplex Condensate Pump And 3/4 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	3,245.34	649.56
23 22 23 13-0008 EA 37.5 GPM Simplex Condensate Pump And 3/4 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	4,730.59	649.56
23 22 23 13-0009 EA 45 GPM Simplex Condensate Pump And 1 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	4,813.51	693.99
23 22 23 13-0010 EA 60 GPM Simplex Condensate Pump And 1-1/2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	5,855.60	725.72
23 22 23 13-0011 EA 75 GPM Simplex Condensate Pump And 2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	5,918.54	757.47

23 22 23 13-0012 30 PSI Discharge Pressure (23 22 23 13-0001)

23 22 23 13-0013 EA 3 To 6 GPM Simplex Condensate Pump And 1/2 HP Motor With 6 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	2,269.54	575.50
23 22 23 13-0014 EA 9 To 12 GPM Simplex Condensate Pump And 1/2 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	2,935.88	590.32
23 22 23 13-0015 EA 15 GPM Simplex Condensate Pump And 3/4 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	3,050.69	629.46
23 22 23 13-0016 EA 22.5 GPM Simplex Condensate Pump And 1 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	3,521.82	680.24
23 22 23 13-0017 EA 30 To 37.5 GPM Simplex Condensate Pump And 1 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	4,813.51	695.05
23 22 23 13-0018 EA 45 GPM Simplex Condensate Pump And 1-1/2 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	4,947.27	719.38
23 22 23 13-0019 EA 60 GPM Simplex Condensate Pump And 2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	5,099.83	757.47
23 22 23 13-0020 EA 75 GPM Simplex Condensate Pump And 3 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	5,906.48	806.13

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 22 Steam and Condensate Piping and Pumps**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 22 23 13-0021	40 PSI Discharge Pressure <small>(23 22 23 13-0001)</small>		
23 22 23 13-0022	EA 3 To 6 GPM Simplex Condensate Pump And 1 HP Motor With 6 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	2,532.16	660.13
23 22 23 13-0023	EA 9 To 15 GPM Simplex Condensate Pump And 1 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	3,180.79	713.03
23 22 23 13-0024	EA 22.5 GPM Simplex Condensate Pump And 1-1/2 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	3,714.56	704.57
23 22 23 13-0025	EA 30 To 37.5 GPM Simplex Condensate Pump And 1-1/2 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	4,923.67	719.38
23 22 23 13-0026	EA 45 GPM Simplex Condensate Pump And 2 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	5,030.27	750.06
23 22 23 13-0027	EA 60 GPM Simplex Condensate Pump And 2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	5,918.54	757.47
23 22 23 13-0028	EA 75 GPM Simplex Condensate Pump And 3 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	6,006.75	806.13
23 22 23 13-0029	50 PSI Discharge Pressure <small>(23 22 23 13-0001)</small>		
23 22 23 13-0030	EA 3 To 6 GPM Simplex Condensate Pump And 2 HP Motor With 6 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	4,700.15	715.15
23 22 23 13-0031	EA 9 To 15 GPM Simplex Condensate Pump And 2 HP Motor With 13.6 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	3,432.94	729.96
23 22 23 13-0032	EA 22.5 GPM Simplex Condensate Pump And 2 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	3,930.86	735.25
23 22 23 13-0033	EA 30 To 45 GPM Simplex Condensate Pump And 3 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	5,117.30	799.78
23 22 23 13-0034	EA 60 To 75 GPM Simplex Condensate Pump And 5 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	8,019.02	862.20
23 22 23 13-0035	Duplex Condensate Pumps And Motors <small>(23 22 23 13)</small>		
	Note: Cast iron receiver, float switch, alternator assembly.		
23 22 23 13-0036	20 PSI Discharge Pressure <small>(23 22 23 13-0035)</small>		
23 22 23 13-0037	EA 9 To 12 GPM Duplex Condensate Pump And 1/3 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	3,247.89	722.56
23 22 23 13-0038	EA 15 GPM Duplex Condensate Pump And 1/2 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	3,445.58	793.43
23 22 23 13-0039	EA 22.5 GPM Duplex Condensate Pump And 1/2 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	3,755.92	799.78
23 22 23 13-0040	EA 30 GPM Duplex Condensate Pump And 3/4 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	4,194.03	871.72
23 22 23 13-0041	EA 37.5 GPM Duplex Condensate Pump And 3/4 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	5,797.24	871.72
23 22 23 13-0042	EA 45 GPM Duplex Condensate Pump And 1 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	5,915.19	939.43
23 22 23 13-0043	EA 60 GPM Duplex Condensate Pump And 1-1/2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	6,988.48	980.69
23 22 23 13-0044	EA 75 GPM Duplex Condensate Pump And 2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 20 PSI Discharge Pressure	7,165.17	1,029.35
23 22 23 13-0045	30 PSI Discharge Pressure <small>(23 22 23 13-0035)</small>		
23 22 23 13-0046	EA 9 To 12 GPM Duplex Condensate Pump And 1/2 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	4,186.63	778.62
23 22 23 13-0047	EA 15 GPM Duplex Condensate Pump And 3/4 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	4,388.66	850.56
23 22 23 13-0048	EA 22.5 GPM Duplex Condensate Pump And 1 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	4,854.71	829.41
23 22 23 13-0049	EA 30 To 37.5 GPM Duplex Condensate Pump And 1 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	5,915.19	939.43
23 22 23 13-0050	EA 45 GPM Duplex Condensate Pump And 1-1/2 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	6,084.88	974.33
23 22 23 13-0051	EA 60 GPM Duplex Condensate Pump And 2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	6,929.23	1,029.35
23 22 23 13-0052	EA 75 GPM Duplex Condensate Pump And 3 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 30 PSI Discharge Pressure	7,276.25	1,103.41
23 22 23 13-0053	40 PSI Discharge Pressure <small>(23 22 23 13-0035)</small>		
23 22 23 13-0054	EA 9 To 15 GPM Duplex Condensate Pump And 1 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	4,553.81	918.27
23 22 23 13-0055	EA 22.5 GPM Duplex Condensate Pump And 1-1/2 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	5,022.04	959.53
23 22 23 13-0056	EA 30 To 37.5 GPM Duplex Condensate Pump And 1-1/2 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	6,099.03	974.33
23 22 23 13-0057	EA 45 GPM Duplex Condensate Pump And 2 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	6,276.91	1,023.00
23 22 23 13-0058	EA 60 GPM Duplex Condensate Pump And 2 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	7,166.35	1,029.35
23 22 23 13-0059	EA 75 GPM Duplex Condensate Pump And 3 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 40 PSI Discharge Pressure	7,304.57	1,103.41



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 22 23 13-0060	50 PSI Discharge Pressure <small>(23 22 23 13-0035)</small>		
23 22 23 13-0061	EA 9 To 15 GPM Duplex Condensate Pump And 2 HP Motor With 13.5 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	4,749.64	918.27
23 22 23 13-0062	EA 22.5 GPM Duplex Condensate Pump And 2 HP Motor With 21 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	5,129.13	1,009.25
23 22 23 13-0063	EA 30 To 45 GPM Duplex Condensate Pump And 3 HP Motor With 36 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	6,416.29	1,096.00
23 22 23 13-0064	EA 60 To 75 GPM Duplex Condensate Pump And 5 HP Motor With 50 Gallon Cast Iron Receiver, Float Switch, 50 PSI Discharge Pressure	11,054.38	1,186.98

23 23 Refrigerant Piping (23 20)

23 23 13 Refrigerant Piping Valves (23 23)

23 23 13 00-0001	Ball Valves <small>(23 23 13)</small>		
23 23 13 00-0002	Refrigeration Ball Valves, Sweat, 1400 Series <small>(23 23 13 00-0001)</small>		
23 23 13 00-0003	EA 3/8" Refrigeration Ball Valve, Sweated	47.01	11.48
23 23 13 00-0004	EA 1/2" Refrigeration Ball Valve, Sweated	48.86	11.48
23 23 13 00-0005	EA 5/8" Refrigeration Ball Valve, Sweated	66.15	11.48
23 23 13 00-0006	EA 7/8" Refrigeration Ball Valve, Sweated	88.56	12.63
23 23 13 00-0007	EA 1-1/8" Refrigeration Ball Valve, Sweated	124.50	14.35
23 23 13 00-0008	EA 1-5/8" Refrigeration Ball Valve, Sweated	203.26	17.68

23 23 13 00-0009 **Shut-Off Valves** (23 23 13)

23 23 13 00-0010	Packless <small>(23 23 13 00-0009)</small>		
23 23 13 00-0011	EA 1/2" Refrigeration Valve, Packless	63.75	11.95
23 23 13 00-0012	EA 5/8" Refrigeration Valve, Packless	79.89	13.10
23 23 13 00-0013	EA 7/8" Refrigeration Valve, Packless	164.61	17.92

23 23 13 00-0014 **Packed** (23 23 13 00-0009)

23 23 13 00-0015	EA 1-1/8" Refrigeration Valve, Packed	293.01	26.07
23 23 13 00-0016	EA 1 3/8" Refrigeration Valve, Packed	392.01	31.93
23 23 13 00-0017	EA 1-5/8" Refrigeration Valve, Packed	477.81	35.95
23 23 13 00-0018	EA 2-1/8" Refrigeration Valve, Packed	683.67	41.01
23 23 13 00-0019	EA 2-5/8" Refrigeration Valve, Packed	1,129.95	114.87
23 23 13 00-0020	EA 3-1/8" Refrigeration Valve, Packed	1,483.43	143.58
23 23 13 00-0021	EA 4-1/8" Refrigeration Valve, Packed	2,110.66	191.48

23 23 13 00-0022 **Check Valves** (23 23 13)

23 23 13 00-0023	EA 5/8" Check Valve, Refrigeration	80.26	11.48
23 23 13 00-0024	EA 7/8" Check Valve, Refrigeration	256.51	12.63
23 23 13 00-0025	EA 1-1/8" Check Valve, Refrigeration	297.38	14.35
23 23 13 00-0026	EA 1 3/8" Check Valve, Refrigeration	400.72	15.28
23 23 13 00-0027	EA 1-5/8" Check Valve, Refrigeration	528.14	17.69
23 23 13 00-0028	EA 2-1/8" Check Valve, Refrigeration	784.35	20.90
23 23 13 00-0029	EA 2-5/8" Check Valve, Refrigeration	1,097.68	30.67
23 23 13 00-0030	EA 3-1/8" Check Valve, Refrigeration	1,453.34	40.20

23 23 13 00-0031 **Solenoid Valves** (23 23 13)

23 23 13 00-0032	Solenoid Valve, 24 Volt Coil <small>(23 23 13 00-0031)</small>		
23 23 13 00-0033	EA 1/2" Solenoid Valve, Refrigeration	218.96	11.48
23 23 13 00-0034	EA 5/8" Solenoid Valve, Refrigeration	224.25	11.48
23 23 13 00-0035	EA 3/4" Solenoid Valve, Refrigeration	277.15	12.63
23 23 13 00-0036	EA 7/8" Solenoid Valve, Refrigeration	277.15	12.63
23 23 13 00-0037	EA 1-1/8" Solenoid Valve, Refrigeration	388.27	14.35
23 23 13 00-0038	EA 1 3/8" Solenoid Valve, Refrigeration	623.82	15.28
23 23 13 00-0039	EA 1-5/8" Solenoid Valve, Refrigeration	1,149.78	17.69
23 23 13 00-0040	EA 2-1/8" Solenoid Valve, Refrigeration	1,165.84	20.90

23 23 16 Refrigerant Piping Specialties (23 23)

23 23 16 00-0001	Soft Refrigeration Copper Tubing <small>(23 23 16)</small>		
Note: Based on outside diameter. Nitrogenized. Lengths up to 100' See CSI section 22 07 19 00-00226 for flexible elastomeric insulation (insulation on suction line only).			
23 23 16 00-0002	LF 1/8" Outside Diameter Soft Refrigeration Copper Tubing	4.85	2.73
23 23 16 00-0003	LF 3/16" Outside Diameter Soft Refrigeration Copper Tubing	5.10	2.80
23 23 16 00-0004	LF 1/4" Outside Diameter Soft Refrigeration Copper Tubing	5.33	2.88
23 23 16 00-0005	LF 5/16" Outside Diameter Soft Refrigeration Copper Tubing	5.74	2.93
23 23 16 00-0006	LF 3/8" Outside Diameter Soft Refrigeration Copper Tubing	5.92	2.97
23 23 16 00-0007	LF 1/2" Outside Diameter Soft Refrigeration Copper Tubing	6.69	3.12
23 23 16 00-0008	LF 5/8" Outside Diameter Soft Refrigeration Copper Tubing	7.39	3.16

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 23 Refrigerant Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 23 16 00-0009	LF	3/4" Outside Diameter Soft Refrigeration Copper Tubing	8.12	3.27
23 23 16 00-0010	LF	7/8" Outside Diameter Soft Refrigeration Copper Tubing	10.52	3.84
23 23 16 00-0011	LF	1-1/8" Outside Diameter Soft Refrigeration Copper Tubing	13.44	4.40
23 23 16 00-0012	LF	1-3/8" Outside Diameter Soft Refrigeration Copper Tubing	19.59	5.21
23 23 16 00-0013	LF	1-5/8" Outside Diameter Soft Refrigeration Copper Tubing	23.69	5.82

23 23 16 00-0014 Type L Drawn, ACR Copper Tubing (23 23 16)

Note: Nitrogenized. Lengths up to 20'. See CSI section 22 07 19 00-0226 for flexible elastomeric insulation (insulation on suction line only).

23 23 16 00-0015	LF	3/8" Outside Diameter Type L Drawn, ACR Copper Tubing	6.55	3.21
		<i>For Medical Applications "Oxygen Clean", Add</i>	0.57	
23 23 16 00-0016	LF	1/2" Outside Diameter Type L Drawn, ACR Copper Tubing	7.42	3.21
		<i>For Medical Applications "Oxygen Clean", Add</i>	0.62	
23 23 16 00-0017	LF	5/8" Outside Diameter Type L Drawn, ACR Copper Tubing	7.96	3.21
		<i>For Medical Applications "Oxygen Clean", Add</i>	0.64	
23 23 16 00-0018	LF	3/4" Outside Diameter Type L Drawn, ACR Copper Tubing	11.51	4.83
		<i>For Medical Applications "Oxygen Clean", Add</i>	0.93	
23 23 16 00-0019	LF	7/8" Outside Diameter Type L Drawn, ACR Copper Tubing	12.57	5.17
		<i>For Medical Applications "Oxygen Clean", Add</i>	1.02	
23 23 16 00-0020	LF	1-1/8" Outside Diameter Type L Drawn, ACR Copper Tubing	14.74	5.17
		<i>For Medical Applications "Oxygen Clean", Add</i>	1.13	
23 23 16 00-0021	LF	1-3/8" Outside Diameter Type L Drawn, ACR Copper Tubing	18.41	5.97
		<i>For Medical Applications "Oxygen Clean", Add</i>	1.37	
23 23 16 00-0022	LF	1-5/8" Outside Diameter Type L Drawn, ACR Copper Tubing	22.34	6.89
		<i>For Medical Applications "Oxygen Clean", Add</i>	1.63	
23 23 16 00-0023	LF	2-1/8" Outside Diameter Type L Drawn, ACR Copper Tubing	31.76	8.61
		<i>For Medical Applications "Oxygen Clean", Add</i>	2.23	
23 23 16 00-0024	LF	2-5/8" Outside Diameter Type L Drawn, ACR Copper Tubing	47.63	12.97
		<i>For Medical Applications "Oxygen Clean", Add</i>	3.36	
23 23 16 00-0025	LF	3-1/8" Outside Diameter Type L Drawn, ACR Copper Tubing	61.72	16.08
		<i>For Medical Applications "Oxygen Clean", Add</i>	4.29	
23 23 16 00-0026	LF	3-5/8" Outside Diameter Type L Drawn, ACR Copper Tubing	77.81	19.06
		<i>For Medical Applications "Oxygen Clean", Add</i>	5.32	
23 23 16 00-0027	LF	4-1/8" Outside Diameter Type L Drawn, ACR Copper Tubing	96.28	22.98
		<i>For Medical Applications "Oxygen Clean", Add</i>	6.54	

23 23 16 00-0028 Refrigeration Fittings (23 23 16)**23 23 16 00-0029 Brass Flare Fittings** (23 23 16 00-0028)**23 23 16 00-0030 Brass Flare Unions** (23 23 16 00-0029)

23 23 16 00-0031	EA	3/8" Brass Flare Union	27.01	12.40
23 23 16 00-0032	EA	1/2" Brass Flare Union	27.01	12.40
23 23 16 00-0033	EA	5/8" Brass Flare Union	29.19	12.40

23 23 16 00-0034 90 Degree Elbow Brass Flare Unions (23 23 16 00-0029)

23 23 16 00-0035	EA	3/8" 90 Degree Brass Flare Elbow Union	28.33	12.40
23 23 16 00-0036	EA	1/2" 90 Degree Brass Flare Elbow Union	28.33	12.40
23 23 16 00-0037	EA	5/8" 90 Degree Brass Flare Elbow Union	35.65	12.40

23 23 16 00-0038 Brass Flare Tees (23 23 16 00-0029)

23 23 16 00-0039	EA	3/8" Brass Flare Tee	43.49	20.66
23 23 16 00-0040	EA	1/2" Brass Flare Tee	46.75	20.66
23 23 16 00-0041	EA	5/8" Brass Flare Tee	64.50	20.66

23 23 16 00-0042 Male Connector, Half Brass Flare Unions (23 23 16 00-0029)

23 23 16 00-0043	EA	3/8" Brass Flare Male Connector, Half Union	21.01	12.40
23 23 16 00-0044	EA	1/2" Brass Flare Male Connector, Half Union	23.19	12.40
23 23 16 00-0045	EA	5/8" Brass Flare Male Connector, Half Union	26.30	12.40

23 23 16 00-0046 Female Connector, Half Brass Flare Unions (23 23 16 00-0029)

23 23 16 00-0047	EA	3/8" Brass Flare Female Connector, Half Union	23.82	12.40
23 23 16 00-0048	EA	1/2" Brass Flare Female Connector, Half Union	26.78	12.40
23 23 16 00-0049	EA	5/8" Brass Flare Female Connector, Half Union	26.78	12.40

23 23 16 00-0050 Long Forged Nuts (23 23 16 00-0029)

23 23 16 00-0051	EA	3/8" Brass Long Forged Nut	22.34	12.40
23 23 16 00-0052	EA	1/2" Brass Long Forged Nut	23.19	12.40
23 23 16 00-0053	EA	5/8" Brass Long Forged Nut	32.68	12.40

23 23 16 00-0054 Short Forged Nuts (23 23 16 00-0029)

23 23 16 00-0055	EA	3/8" Brass Short Forged Nut	21.10	12.40
23 23 16 00-0056	EA	1/2" Brass Short Forged Nut	23.07	12.40



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 23 16 00-0057 EA 5/8" Brass Short Forged Nut.....	23.48	12.40
23 23 16 00-0058 ACR Wrought Copper Fittings (23 23 16 00-0028) Note: Soldered.		
23 23 16 00-0059 ACR Wrought Copper Coupling (23 23 16 00-0058) Note: C x C		
23 23 16 00-0060 EA 1/4" ACR Wrought Copper Coupling	20.50	12.40
23 23 16 00-0061 EA 3/8" ACR Wrought Copper Coupling	20.15	12.40
23 23 16 00-0062 EA 1/2" ACR Wrought Copper Coupling	20.67	12.40
23 23 16 00-0063 EA 5/8" ACR Wrought Copper Coupling	21.27	12.97
23 23 16 00-0064 EA 3/4" ACR Wrought Copper Coupling	30.42	17.11
23 23 16 00-0065 EA 7/8" ACR Wrought Copper Coupling	29.88	17.58
23 23 16 00-0066 EA 1-1/8" ACR Wrought Copper Coupling	39.81	21.83
23 23 16 00-0067 EA 1-3/8" ACR Wrought Copper Coupling	57.31	29.87
23 23 16 00-0068 EA 1-5/8" ACR Wrought Copper Coupling	69.12	35.04
23 23 16 00-0069 EA 2-1/8" ACR Wrought Copper Coupling	91.27	42.50
23 23 16 00-0070 EA 2-5/8" ACR Wrought Copper Coupling	158.93	64.55
23 23 16 00-0071 EA 3-1/8" ACR Wrought Copper Coupling	212.03	84.89
23 23 16 00-0072 EA 4-1/8" ACR Wrought Copper Coupling	343.85	100.86
23 23 16 00-0073 ACR Wrought Copper Short Radius 90 Degree Elbows (23 23 16 00-0058) Note: C x C		
23 23 16 00-0074 EA 1/4" ACR Wrought Copper Short Radius 90 Degree Elbow.....	25.19	12.40
23 23 16 00-0075 EA 3/8" ACR Wrought Copper Short Radius 90 Degree Elbow.....	25.54	12.40
23 23 16 00-0076 EA 1/2" ACR Wrought Copper Short Radius 90 Degree Elbow.....	25.19	12.40
23 23 16 00-0077 ACR Wrought Copper Long Radius 90 Degree Elbows (23 23 16 00-0058) Note: C x C		
23 23 16 00-0078 EA 1/4" ACR Wrought Copper Long Radius 90 Degree Elbow	31.05	12.40
23 23 16 00-0079 EA 3/8" ACR Wrought Copper Long Radius 90 Degree Elbow	27.95	12.40
23 23 16 00-0080 EA 1/2" ACR Wrought Copper Long Radius 90 Degree Elbow	30.41	12.40
23 23 16 00-0081 EA 5/8" ACR Wrought Copper Long Radius 90 Degree Elbow	30.18	12.97
23 23 16 00-0082 EA 3/4" ACR Wrought Copper Long Radius 90 Degree Elbow	36.54	17.11
23 23 16 00-0083 EA 7/8" ACR Wrought Copper Long Radius 90 Degree Elbow	40.12	17.58
23 23 16 00-0084 EA 1-1/8" ACR Wrought Copper Long Radius 90 Degree Elbow	54.90	21.83
23 23 16 00-0085 EA 1-3/8" ACR Wrought Copper Long Radius 90 Degree Elbow	80.84	29.87
23 23 16 00-0086 EA 1-5/8" ACR Wrought Copper Long Radius 90 Degree Elbow	100.97	35.04
23 23 16 00-0087 EA 2-1/8" ACR Wrought Copper Long Radius 90 Degree Elbow	190.99	42.50
23 23 16 00-0088 EA 2-5/8" ACR Wrought Copper Long Radius 90 Degree Elbow	298.33	64.55
23 23 16 00-0089 EA 3-1/8" ACR Wrought Copper Long Radius 90 Degree Elbow	394.21	84.89
23 23 16 00-0090 EA 4-1/8" ACR Wrought Copper Long Radius 90 Degree Elbow	866.20	100.86
23 23 16 00-0091 ACR Wrought Copper 45 Degree Elbow (23 23 16 00-0058) Note: C x C		
23 23 16 00-0092 EA 1/4" ACR Wrought Copper 45 Degree Elbow	35.31	12.40
23 23 16 00-0093 EA 3/8" ACR Wrought Copper 45 Degree Elbow	31.05	12.40
23 23 16 00-0094 EA 1/2" ACR Wrought Copper 45 Degree Elbow	29.24	12.40
23 23 16 00-0095 EA 5/8" ACR Wrought Copper 45 Degree Elbow	23.82	12.97
23 23 16 00-0096 EA 3/4" ACR Wrought Copper 45 Degree Elbow	44.52	17.11
23 23 16 00-0097 EA 7/8" ACR Wrought Copper 45 Degree Elbow	33.85	17.58
23 23 16 00-0098 EA 1-1/8" ACR Wrought Copper 45 Degree Elbow	51.61	21.83
23 23 16 00-0099 EA 1-3/8" ACR Wrought Copper 45 Degree Elbow	70.14	29.87
23 23 16 00-0100 EA 1-5/8" ACR Wrought Copper 45 Degree Elbow	83.11	35.04
23 23 16 00-0101 EA 2-1/8" ACR Wrought Copper 45 Degree Elbow	114.64	42.50
23 23 16 00-0102 EA 2-5/8" ACR Wrought Copper 45 Degree Elbow	205.38	64.55
23 23 16 00-0103 EA 3-1/8" ACR Wrought Copper 45 Degree Elbow	278.89	84.89
23 23 16 00-0104 EA 4-1/8" ACR Wrought Copper 45 Degree Elbow	474.17	100.86
23 23 16 00-0105 ACR Wrought Copper Tee (23 23 16 00-0058) Note: C x C x C		
23 23 16 00-0106 EA 1/4" ACR Wrought Copper Tee	44.32	20.66
23 23 16 00-0107 EA 3/8" ACR Wrought Copper Tee	45.07	20.66
23 23 16 00-0108 EA 1/2" ACR Wrought Copper Tee	42.29	20.66
23 23 16 00-0109 EA 5/8" ACR Wrought Copper Tee	43.00	26.07
23 23 16 00-0110 EA 3/4" ACR Wrought Copper Tee	64.80	26.07
23 23 16 00-0111 EA 7/8" ACR Wrought Copper Tee	49.27	26.42
23 23 16 00-0112 EA 1-1/8" ACR Wrought Copper Tee	82.44	35.04
23 23 16 00-0113 EA 1-3/8" ACR Wrought Copper Tee	104.05	42.50
23 23 16 00-0114 EA 1-5/8" ACR Wrought Copper Tee	137.88	50.43
23 23 16 00-0115 EA 2-1/8" ACR Wrought Copper Tee	197.92	67.20
23 23 16 00-0116 EA 2-5/8" ACR Wrought Copper Tee	415.89	146.68
23 23 16 00-0117 EA 3-1/8" ACR Wrought Copper Tee	523.08	161.27
23 23 16 00-0118 EA 4-1/8" ACR Wrought Copper Tee	949.38	179.19

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 20 HVAC Piping and Pumps****23 23 Refrigerant Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 23 16 00-0119	ACR Wrought Copper Male Adapter (23 23 16 00-0058)		
	Note: C x M		
23 23 16 00-0120	EA 1/4" ACR Wrought Copper Male Adapter	39.54	12.40
23 23 16 00-0121	EA 3/8" ACR Wrought Copper Male Adapter	46.35	12.40
23 23 16 00-0122	EA 1/2" ACR Wrought Copper Male Adapter	35.04	12.40
23 23 16 00-0123	ACR Wrought Copper Female Adapter (23 23 16 00-0058)		
	Note: C x F		
23 23 16 00-0124	EA 1/4" ACR Wrought Copper Female Adapter	36.87	12.40
23 23 16 00-0125	EA 3/8" ACR Wrought Copper Female Adapter	32.96	12.40
23 23 16 00-0126	EA 1/2" ACR Wrought Copper Female Adapter	34.44	12.40
23 23 16 00-0127	ACR Wrought Copper Cap (23 23 16 00-0058)		
	Note: C		
23 23 16 00-0128	EA 1/4" ACR Wrought Copper Cap	15.63	8.27
23 23 16 00-0129	EA 3/8" ACR Wrought Copper Cap	14.40	8.27
23 23 16 00-0130	EA 1/2" ACR Wrought Copper Cap	15.60	8.27
23 23 16 00-0131	ACR Wrought Copper P-Trap (23 23 16 00-0058)		
23 23 16 00-0132	EA 5/8" ACR Wrought Copper P-Trap	109.93	10.58
23 23 16 00-0133	EA 3/4" ACR Wrought Copper P-Trap	151.45	11.63
23 23 16 00-0134	EA 7/8" ACR Wrought Copper P-Trap	129.10	11.63
23 23 16 00-0135	EA 1-1/8" ACR Wrought Copper P-Trap	178.40	12.69
23 23 16 00-0136	EA 1-3/8" ACR Wrought Copper P-Trap	311.47	12.69
23 23 16 00-0137	EA 1-5/8" ACR Wrought Copper P-Trap	444.42	13.75
23 23 16 00-0138	EA 2-1/8" ACR Wrought Copper P-Trap	820.30	14.81
23 23 16 00-0139	Sight Glass With Moisture And Liquid Indicator, Solder Connection (23 23 16)		
23 23 16 00-0140	EA 1/4" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	59.48	15.87
23 23 16 00-0141	EA 3/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	72.23	19.04
23 23 16 00-0142	EA 1/2" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	87.32	23.27
23 23 16 00-0143	EA 5/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	95.89	26.45
23 23 16 00-0144	EA 7/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	129.62	33.85
23 23 16 00-0145	EA 1-1/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	149.65	41.26
23 23 16 00-0146	EA 1-3/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	232.60	48.67
23 23 16 00-0147	EA 1-5/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	286.07	66.65
23 23 16 00-0148	EA 2-1/8" Outside Diameter Sight Glass With Moisture And Liquid Indicator, Solder Connection	351.04	82.51
23 23 16 00-0149	Filter Driers, Solder Connections (23 23 16)		
23 23 16 00-0150	Replaceable Core Type Filter Driers, Solder Connections (23 23 16 00-0149)		
23 23 16 00-0151	EA 5/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	543.47	9.53
23 23 16 00-0152	EA 7/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	545.15	11.63
23 23 16 00-0153	EA 1-1/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	696.13	11.63
23 23 16 00-0154	EA 1-3/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	692.04	12.69
23 23 16 00-0155	EA 1-5/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	769.79	13.75
23 23 16 00-0156	EA 2-1/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	864.17	14.81
23 23 16 00-0157	EA 2-5/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	1,009.28	15.87
23 23 16 00-0158	EA 3-1/8" Outside Diameter Replaceable Core Type Filter Drier, Solder Connections	1,259.98	15.87
23 23 16 00-0159	Sealed In-Line Filter Driers, Solder Connections (23 23 16 00-0149)		
23 23 16 00-0160	EA 1/4" Outside Diameter, 1/4 To 1 Ton, Sealed In-Line Filter Drier, Solder Connections	86.11	9.53
23 23 16 00-0161	EA 3/8" Outside Diameter, 1/2 To 2 Ton, Sealed In-Line Filter Drier, Solder Connections	110.01	9.53
23 23 16 00-0162	EA 1/2" Outside Diameter, 1 To 7 Ton, Sealed In-Line Filter Drier, Solder Connections	140.49	10.58
23 23 16 00-0163	EA 1/2" Outside Diameter, 2 To 7-1/2 Ton, Sealed In-Line Filter Drier, Solder Connections	162.81	10.58
23 23 16 00-0164	EA 5/8" Outside Diameter, 2 To 10 Ton, Sealed In-Line Filter Drier, Solder Connections	178.96	10.58
23 23 16 00-0165	EA 5/8" Outside Diameter, 4 To 8 Ton, Sealed In-Line Filter Drier, Solder Connections	207.34	10.58
23 23 16 00-0166	EA 7/8" Outside Diameter, 5 To 20 Ton, Sealed In-Line Filter Drier, Solder Connections	233.28	11.63
23 23 16 00-0167	EA 7/8" Outside Diameter, 7-1/2 To 20 Ton, Sealed In-Line Filter Drier, Solder Connections	345.78	11.63
23 23 16 00-0168	EA 1-1/8" Outside Diameter, 15 To 25 Ton, Sealed In-Line Filter Drier, Solder Connections	375.94	11.63
23 23 16 00-0169	Bi-Flow Filter Driers, Solder Connections (23 23 16 00-0149)		
23 23 16 00-0170	EA 1/4" Outside Diameter, 1 To 3-1/2 Ton, Bi-Flow Filter Drier, Solder Connections	121.33	9.53
23 23 16 00-0171	EA 3/8" Outside Diameter, 1 To 3-1/2 Ton, Bi-Flow Filter Drier, Solder Connections	135.08	9.53
23 23 16 00-0172	EA 1/2" Outside Diameter, 1 To 3-1/2 Ton, Bi-Flow Filter Drier, Solder Connections	161.00	10.58
23 23 16 00-0173	EA 3/8" Outside Diameter, 1 To 8 Ton, Bi-Flow Filter Drier, Solder Connections	145.02	9.53
23 23 16 00-0174	EA 1/2" Outside Diameter, 1 To 8 Ton, Bi-Flow Filter Drier, Solder Connections	181.51	10.58
23 23 16 00-0175	EA 5/8" Outside Diameter, 1 To 8 Ton, Bi-Flow Filter Drier, Solder Connections	210.86	10.58
23 23 16 00-0176	Refrigerant Compressor Discharge Mufflers (23 23 16)		
23 23 16 00-0177	EA 3/8" Outside Diameter, 2 Ton, Refrigerant Compressor Discharge Muffler	109.14	9.53
23 23 16 00-0178	EA 1/2" Outside Diameter, 3 Ton, Refrigerant Compressor Discharge Muffler	120.50	9.53



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 23 16 00-0179	EA			5/8" Outside Diameter, 5 Ton, Refrigerant Compressor Discharge Muffler	145.30	9.53
23 23 16 00-0180	EA			7/8" Outside Diameter, 7-1/2 To 10 Ton, Refrigerant Compressor Discharge Muffler	194.68	11.63
23 23 16 00-0181	EA			1-1/8" Outside Diameter, 10 To 15 Ton, Refrigerant Compressor Discharge Muffler	253.93	11.63
23 23 16 00-0182	EA			1-3/8" Outside Diameter, 15 To 25 Ton, Refrigerant Compressor Discharge Muffler	301.65	12.69
23 23 16 00-0183	EA			1-5/8" Outside Diameter, 25 To 50 Ton, Refrigerant Compressor Discharge Muffler	382.37	13.75
23 23 16 00-0184	EA			2-1/8" Outside Diameter, 50 To 75 Ton, Refrigerant Compressor Discharge Muffler	708.57	14.81
23 23 16 00-0185	EA			2-5/8" Outside Diameter, 75 To 100 Ton, Refrigerant Compressor Discharge Muffler	791.06	15.87
23 23 16 00-0186	EA			3-1/8" Outside Diameter, 100 To 125 Ton, Refrigerant Compressor Discharge Muffler	978.84	15.87
23 23 16 00-0187				Expansion Valves And Vibration Absorbers (23 23 16)		
23 23 16 00-0188				Thermostatic Expansion Valves (23 23 16 00-0187)		
				Note: Outside diameter pipe sizes. Sporlan TP-S.		
23 23 16 00-0189	EA			3/8" In x 5/8" Out, 1/2 To 3 Ton, Thermostatic Expansion Valve	235.29	9.53
23 23 16 00-0190	EA			1/2" In x 7/8" Out, 4 To 5 Ton, Thermostatic Expansion Valve	327.71	10.58
23 23 16 00-0191	EA			5/8" In x 7/8" Out, 6 To 8 Ton, Thermostatic Expansion Valve	559.50	10.58
23 23 16 00-0192	EA			7/8" In x 1-1/8" Out, 7 To 12 Ton, Thermostatic Expansion Valve	663.14	11.63
23 23 16 00-0193	EA			7/8" In x 1-3/8" Out, 15 To 20 Ton, Thermostatic Expansion Valve	716.03	11.63
23 23 16 00-0194				Electric Expansion Valves (23 23 16 00-0187)		
				Note: Sporlan SEI or SEH.		
23 23 16 00-0195	EA			1/2 To 11 Ton Electric Expansion Valve	574.61	13.22
				Note: Sporlan SEI.		
23 23 16 00-0196	EA			25 Ton Electric Expansion Valve	665.91	13.75
				Note: Sporlan SEI.		
23 23 16 00-0197	EA			50 Ton Electric Expansion Valve	757.73	14.28
				Note: Sporlan SEI.		
23 23 16 00-0198	EA			100 Ton Electric Expansion Valve	889.42	14.28
				Note: Sporlan SEH.		
23 23 16 00-0199	EA			175 Ton Electric Expansion Valve	1,001.85	14.81
				Note: Sporlan SEH.		
23 23 16 00-0200				Braided Stainless Steel Over Copper Vibration Absorber (23 23 16 00-0187)		
23 23 16 00-0201	EA			1/4" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	62.40	13.75
23 23 16 00-0202	EA			3/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	62.58	15.87
23 23 16 00-0203	EA			1/2" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	81.19	20.10
23 23 16 00-0204	EA			5/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	87.35	24.33
23 23 16 00-0205	EA			3/4" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	102.81	29.62
23 23 16 00-0206	EA			7/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	119.05	33.85
23 23 16 00-0207	EA			1-1/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	168.99	12.69
23 23 16 00-0208	EA			1-3/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	238.84	13.75
23 23 16 00-0209	EA			1-5/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	299.54	13.75
23 23 16 00-0210	EA			2-1/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	411.04	14.81
23 23 16 00-0211	EA			2-5/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	702.50	15.87
23 23 16 00-0212	EA			3-1/8" Outside Diameter Braided Stainless Steel Over Copper Vibration Absorber	921.14	15.87
23 23 16 00-0213				Accumulator, Refrigerant Suction Line (23 23 16)		
23 23 16 00-0214	EA			3/4" Accumulator, Refrigeration Suction Line	198.23	48.13
23 23 16 00-0215	EA			7/8" Accumulator, Refrigeration Suction Line	268.54	66.12
23 23 16 00-0216	EA			1-1/8" Accumulator, Refrigeration Suction Line	318.98	88.13
23 23 16 00-0217	EA			1 3/8" Accumulator, Refrigeration Suction Line	451.96	105.79
23 23 16 00-0218	EA			1-5/8" Accumulator, Refrigeration Suction Line	624.75	132.24
23 23 16 00-0219	EA			2-1/8" Accumulator, Refrigeration Suction Line	953.42	176.36
23 23 16 00-0220				Special Chemicals/Component (23 23 16)		
23 23 16 00-0221	GAL			Special Chemical, Inhibited Propylene Glycol, 100%	41.26	
23 23 16 00-0222	GAL			Removal And Storage For Reuse Of Inhibited Propylene Glycol	8.20	
23 23 16 00-0223	GAL			Special Chemical, Inhibited Ethylene Glycol, 100%	28.03	
23 23 16 00-0224	EA			Internal Coil/Refrigerant Piping Flush	342.86	
				Note: Up to 10 ton AC system.		
23 23 16 00-0225				Pre-Insulated, Copper Refrigeration Line Sets (23 23 16)		
23 23 16 00-0226	EA			5/16" Outside Diameter Liquid, And 5/8" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	387.30	26.64
23 23 16 00-0227	EA			5/16" Outside Diameter Liquid, And 3/4" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	411.95	26.64
23 23 16 00-0228	EA			3/8" Outside Diameter Liquid, And 5/8" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	361.10	26.88
23 23 16 00-0229	EA			3/8" Outside Diameter Liquid, And 3/4" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	435.48	27.05
23 23 16 00-0230	EA			3/8" Outside Diameter Liquid, And 7/8" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	536.43	27.79
23 23 16 00-0231	EA			3/8" Outside Diameter Liquid, And 1-1/8" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	637.65	29.64
23 23 16 00-0232	EA			1/2" Outside Diameter Liquid, And 3/4" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	460.47	27.91

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 20 HVAC Piping and Pumps

23 23 Refrigerant Piping



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 23	16 00-0233	EA	1/2" Outside Diameter Liquid, And 7/8" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	595.48	29.75
23 23	16 00-0234	EA	1/2" Outside Diameter Liquid, And 1-1/8" Outside Diameter Suction, x 30' Length, Refrigerant Line Set With 1/2" Insulation	730.59	31.70

23 23 23 Refrigerants (23 23)

23 23 23 00-0001 Refrigerant (23 23 23)

23 23 23 00-0002	LB	R-113 Refrigerant	58.19	
23 23 23 00-0003	LB	R-123 Refrigerant	42.68	
23 23 23 00-0004	LB	R-134A Refrigerant	15.21	
23 23 23 00-0005	LB	R-404A Refrigerant	27.23	
23 23 23 00-0006	LB	R-407C Refrigerant	26.93	
23 23 23 00-0007	LB	R-408A Refrigerant	61.39	
23 23 23 00-0008	LB	R-410A Refrigerant	26.39	
23 23 23 00-0009	LB	R-500 Refrigerant	52.16	
23 23 23 00-0010	LB	R-507 Refrigerant	16.79	

23 25 HVAC Water Treatment (23 20)

23 25 13 Water Treatment for Closed-Loop Hydronic Systems (23 25)

23 25 13 00-0001 Polyethylene Chemical Storage Tanks (23 25 13)

23 25 13 00-0002	EA	15 Gallon Chemical Storage Tank, Polyethylene	531.34	88.33
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23 25 13 00-0003 Gas Chlorinator (23 25 13)

23 25 13 00-0004	EA	Gas Chlorinator, Wall Or Cylinder Mounted (10 PPD) With Metering Tube And Rate Valve Metering Tube Supply Indicator, Rate Valve, And Diffuser-Ejector Unit	1,153.90	401.86
		<i>For Booster Pump, Add</i>	450.84	
23 25 13 00-0005	EA	Gas Chlorinator, Wall Or Cylinder Mounted (25 PPD) With Metering Tube And Rate Valve Metering Tube Supply Indicator, Rate Valve, And Diffuser-Ejector Unit	1,318.31	459.28
		<i>For Booster Pump, Add</i>	515.35	
23 25 13 00-0006	EA	Gas Chlorinator, Wall Or Cylinder Mounted (50 PPD) With Metering Tube And Rate Valve Metering Tube Supply Indicator, Rate Valve, And Diffuser-Ejector Unit	1,816.93	347.90
		<i>For Booster Pump, Add</i>	630.14	

23 25 13 00-0007 Bypass Shot Feeders (23 25 13)

Note: Includes up to 4 ports (in, out, fill and drain). Excludes valves.

23 25 13 00-0008 In Line Mount, 125 PSIG (23 25 13 00-0007)

23 25 13 00-0009	EA	1.7 Gallon Bypass Shot Chemical Feeder In Line Mount, 125 PSIG	1,052.97	299.39
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23 25 13 00-0010 Floor Mount, 175 PSIG (23 25 13 00-0007)

23 25 13 00-0011	EA	5 Gallon Bypass Shot Chemical Feeder, Floor Mount, 175 PSIG	1,549.07	450.67
23 25 13 00-0012	EA	12 Gallon Bypass Shot Chemical Feeder, Floor Mount, 175 PSIG	2,042.54	596.66

23 25 13 00-0013 Floor Mount, 150 LB ASME Code (23 25 13 00-0007)

23 25 13 00-0014	EA	5 Gallon Bypass Shot Chemical Feeder, Floor Mount, 150 LB ASME Code	1,549.07	450.67
23 25 13 00-0015	EA	10 Gallon Bypass Shot Chemical Feeder, Floor Mount, 150 LB ASME Code	2,042.54	596.66

23 25 13 00-0016 Floor Mount, 300 LB ASME Code (23 25 13 00-0007)

23 25 13 00-0017	EA	5 Gallon Bypass Shot Chemical Feeder, Floor Mount, 300 LB ASME Code	1,933.78	450.67
23 25 13 00-0018	EA	10 Gallon Bypass Shot Chemical Feeder, Floor Mount, 300 LB ASME Code	2,442.01	596.66

23 30 HVAC Air Distribution (23)

23 31 HVAC Ducts and Casings (23 30)

Note: Excludes angle iron, threaded rod, anchor bolts or other external supporting devices other than normal sheet metal straps. See CSI section 05 12 23 00-0106 for angle iron, 23 05 29 00-0001 for threaded rod.

23 31 13 Metal Ducts (23 31)

23 31 13 13 Rectangular Metal Ducts (23 31 13)

23 31 13 13-0001 Steel Sheet Metal Duct (23 31 13 13)

Note: Includes all fittings, transitions, collars, straps, support straps, fabrication, installation and sealing the joints by tape, mastic, or spray on sealer. Duct Sealing: Class-C requires sealing transverse joints; Class-B requires sealing all transverse joint and longitudinal seams; Class-A requires sealing all transverse joints longitudinal seams and duct wall penetrations.

23 31 13 13-0002 Galvanized Steel Sheet Metal Ductwork And Sealant (23 31 13 13-0001)

Note: SMACNA weight for galvanized steel ductwork LB/SF (surface areas) by gauge: 26 gauge - 0.906 LB/SF; 24 gauge - 1.156 LB/SF; 22 gauge - 1.406 LB/SF; 20 gauge - 1.656 LB/SF; 18 gauge - 2.156 LB/SF; 16 gauge - 2.656 LB/SF



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0003 LB Seal Class C, Rectangular Or Square, Galvanized Steel Sheet Metal Ductwork	12.40	3.25
For Polyvinyl Chloride (PVC) Coated, Add	0.48	
For Up To 200, Add	4.44	
For >200 To 500, Add	2.83	
For >500 To 1,000, Add	1.90	
For >1,000 To 2,000, Add	1.06	
For >2,000 To 5,000, Add	0.47	
For Work In Restricted Working Space, Add	3.00	
For Elevated Installation >10' To 15', Add	0.60	
For Elevated Installation >15' To 20', Add	1.20	
For Elevated Installation >20' To 25', Add	1.50	
For Elevated Installation >25' To 30', Add	2.10	
For Elevated Installation >30' To 35', Add	2.40	
For Elevated Installation >35' To 40', Add	3.00	
For Elevated Installation >40', Add	3.30	
23 31 13 13-0004 LB Seal Class B, Rectangular Or Square, Galvanized Steel Sheet Metal Ductwork.....	14.13	3.25
For Polyvinyl Chloride (PVC) Coated, Add	0.53	
For Up To 200, Add	5.03	
For >200 To 500, Add	3.20	
For >500 To 1,000, Add	2.16	
For >1,000 To 2,000, Add	1.21	
For >2,000 To 5,000, Add	0.54	
For Work In Restricted Working Space, Add	3.45	
For Elevated Installation >10' To 15', Add	0.69	
For Elevated Installation >15' To 20', Add	1.38	
For Elevated Installation >20' To 25', Add	1.73	
For Elevated Installation >25' To 30', Add	2.42	
For Elevated Installation >30' To 35', Add	2.76	
For Elevated Installation >35' To 40', Add	3.45	
For Elevated Installation >40', Add	3.80	
23 31 13 13-0005 LB Seal Class A, Rectangular Or Square, Galvanized Steel Sheet Metal Ductwork.....	16.88	3.25
For Polyvinyl Chloride (PVC) Coated, Add	0.57	
For Up To 200, Add	5.93	
For >200 To 500, Add	3.76	
For >500 To 1,000, Add	2.56	
For >1,000 To 2,000, Add	1.44	
For >2,000 To 5,000, Add	0.65	
For Work In Restricted Working Space, Add	4.20	
For Elevated Installation >10' To 15', Add	0.84	
For Elevated Installation >15' To 20', Add	1.68	
For Elevated Installation >20' To 25', Add	2.10	
For Elevated Installation >25' To 30', Add	2.94	
For Elevated Installation >30' To 35', Add	3.36	
For Elevated Installation >35' To 40', Add	4.20	
For Elevated Installation >40', Add	4.62	
23 31 13 13-0006 Alloy 3003-H14, Aluminum Sheet Metal Ductwork <small>(23 31 13 13-0001)</small>		
Note: SMACNA weight for aluminum ductwork LB/SF (surface areas) by gauge: 26 gauge - 0.224 LB/SF; 24 gauge - 0.282 LB/SF; 22 gauge - 0.352 LB/SF; 20 gauge - 0.451 LB/SF; 18 gauge - 0.563 LB/SF; 16 gauge - 0.718 LB/SF; 14 gauge - 0.901 LB/SF; 12 gauge - 0.141 LB/SF		
23 31 13 13-0007 LB Seal Class C, Alloy 3003-H14, Aluminum Sheet Metal Ductwork.....	24.15	3.25
For Work In Restricted Working Space, Add	5.93	
For Up To 200, Add	8.56	
For >200 To 500, Add	5.44	
For >500 To 1,000, Add	3.69	
For >1,000 To 2,000, Add	2.06	
For >2,000 To 5,000, Add	0.92	
For Elevated Installation >10' To 15', Add	1.19	
For Elevated Installation >15' To 20', Add	2.37	
For Elevated Installation >20' To 25', Add	2.97	
For Elevated Installation >25' To 30', Add	4.15	
For Elevated Installation >30' To 35', Add	4.74	
For Elevated Installation >35' To 40', Add	5.93	
For Elevated Installation >40', Add	6.52	
23 31 13 13-0008 LB Seal Class B, Alloy 3003-H14, Aluminum Sheet Metal Ductwork.....	27.36	3.25
For Work In Restricted Working Space, Add	6.82	
For Up To 200, Add	9.59	
For >200 To 500, Add	6.08	
For >500 To 1,000, Add	4.15	
For >1,000 To 2,000, Add	2.33	
For >2,000 To 5,000, Add	1.05	
For Elevated Installation >10' To 15', Add	1.36	
For Elevated Installation >15' To 20', Add	2.73	
For Elevated Installation >20' To 25', Add	3.41	
For Elevated Installation >25' To 30', Add	4.78	
For Elevated Installation >30' To 35', Add	5.46	
For Elevated Installation >35' To 40', Add	6.82	
For Elevated Installation >40', Add	7.50	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13	13-0009	LB	Seal Class A, Alloy 3003-H14, Aluminum Sheet Metal Ductwork <i>For Work In Restricted Working Space, Add</i> <i>For Up To 200, Add</i> <i>For >200 To 500, Add</i> <i>For >500 To 1,000, Add</i> <i>For >1,000 To 2,000, Add</i> <i>For >2,000 To 5,000, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	32.54 8.30 11.22 7.07 4.90 2.75 1.25 1.66 3.32 4.15 5.81 6.64 8.30 9.13	3.25
23 31 13	13-0010		Type 304, Stainless Steel Sheet Metal Ductwork <small>(23 31 13 13-0001)</small> Note: SMACNA weight for stainless steel ductwork LB/SF (surface areas) by gauge: 26 gauge - 0.748 LB/SF; 24 gauge - 0.987 LB/SF; 22 gauge - 1.231 LB/SF; 20 gauge - 1.491 LB/SF; 18 gauge - 2.016 LB/SF; 16 gauge - 2.499 LB/SF; 14 gauge - 3.154 LB/SF; 12 gauge - 4.427 LB/SF		
23 31 13	13-0011	LB	Seal Class C, Type 304, Stainless Steel Sheet Metal Ductwork <i>For Work In Restricted Working Space, Add</i> <i>For Welded Seams, Add</i> <i>For Up To 200, Add</i> <i>For >200 To 500, Add</i> <i>For >500 To 1,000, Add</i> <i>For >1,000 To 2,000, Add</i> <i>For >2,000 To 5,000, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	18.02 3.65 6.37 7.17 4.71 2.93 1.62 0.66 0.73 1.46 1.82 2.55 2.92 3.65 4.01	4.33
23 31 13	13-0012	LB	Seal Class B, Type 304, Stainless Steel Sheet Metal Ductwork <i>For Work In Restricted Working Space, Add</i> <i>For Welded Seams, Add</i> <i>For Up To 200, Add</i> <i>For >200 To 500, Add</i> <i>For >500 To 1,000, Add</i> <i>For >1,000 To 2,000, Add</i> <i>For >2,000 To 5,000, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	20.77 4.40 7.64 8.06 5.27 3.34 1.84 0.77 0.88 1.76 2.20 3.08 3.52 4.40 4.84	4.33
23 31 13	13-0013	LB	Seal Class A, Type 304, Stainless Steel Sheet Metal Ductwork <i>For Work In Restricted Working Space, Add</i> <i>For Welded Seams, Add</i> <i>For Up To 200, Add</i> <i>For >200 To 500, Add</i> <i>For >500 To 1,000, Add</i> <i>For >1,000 To 2,000, Add</i> <i>For >2,000 To 5,000, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	23.35 5.10 8.82 8.91 5.79 3.71 2.06 0.87 1.02 2.04 2.55 3.57 4.08 5.10 5.61	4.33
23 31 13	13-0014		Galvanized Steel Sheet Metal Ductwork By LF <small>(23 31 13 13-0001)</small> Note: Ductwork includes collars, straps, support straps, etc. Shop fabricated ductwork is designed and fabricated in shop with machines, delivered to site and installed. For fittings add the following equivalent lengths: 0.75' for duct end cap; 1.5' for tap-in; 2.5' for 45 degree elbows; 3' for 90 degree elbows, transition, taper, register box; 4' for 45 degree reducing elbow, offset, turning vanes installed in elbows; 5' for 90 degree reducing elbow, 135 degree angle gooseneck, boots; and 6' for transition/reducer.		
23 31 13	13-0015		30 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13	13-0016	LF	4" x 4", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork <i>For Seal Class B, Add</i> <i>For Seal Class A, Add</i> <i>For Work In Restricted Working Space, Add</i>	13.11 1.67 3.56 3.34	6.68
23 31 13	13-0017	LF	4" x 6", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork <i>For Seal Class B, Add</i> <i>For Seal Class A, Add</i> <i>For Work In Restricted Working Space, Add</i>	16.37 2.09 4.45 4.18	8.35
23 31 13	13-0018	LF	4" x 8", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork <i>For Seal Class B, Add</i> <i>For Seal Class A, Add</i> <i>For Work In Restricted Working Space, Add</i>	19.66 2.51 5.34 5.01	10.03



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0019 LF 4" x 10", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	22.92	11.69
For Seal Class B, Add	2.92	
For Seal Class A, Add	6.23	
For Work In Restricted Working Space, Add	5.84	
23 31 13 13-0020 LF 4" x 12", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	26.22	13.37
For Seal Class B, Add	3.34	
For Seal Class A, Add	7.13	
For Work In Restricted Working Space, Add	6.68	
23 31 13 13-0021 LF 4" x 14", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	29.48	15.04
For Seal Class B, Add	3.76	
For Seal Class A, Add	8.02	
For Work In Restricted Working Space, Add	7.52	
23 31 13 13-0022 LF 4" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	32.75	16.70
For Seal Class B, Add	4.18	
For Seal Class A, Add	8.91	
For Work In Restricted Working Space, Add	8.36	
23 31 13 13-0023 LF 6" x 6", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	19.66	10.03
For Seal Class B, Add	2.51	
For Seal Class A, Add	5.34	
For Work In Restricted Working Space, Add	5.01	
23 31 13 13-0024 LF 6" x 8", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	22.92	11.69
For Seal Class B, Add	2.92	
For Seal Class A, Add	6.23	
For Work In Restricted Working Space, Add	5.84	
23 31 13 13-0025 LF 6" x 10", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	26.22	13.37
For Seal Class B, Add	3.34	
For Seal Class A, Add	7.13	
For Work In Restricted Working Space, Add	6.68	
23 31 13 13-0026 LF 6" x 12", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	29.48	15.04
For Seal Class B, Add	3.76	
For Seal Class A, Add	8.02	
For Work In Restricted Working Space, Add	7.52	
23 31 13 13-0027 LF 6" x 14", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	32.75	16.70
For Seal Class B, Add	4.18	
For Seal Class A, Add	8.91	
For Work In Restricted Working Space, Add	8.36	
23 31 13 13-0028 LF 6" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	36.04	18.38
For Seal Class B, Add	4.59	
For Seal Class A, Add	9.80	
For Work In Restricted Working Space, Add	9.19	
23 31 13 13-0029 LF 8" x 8", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	26.22	13.37
For Seal Class B, Add	3.34	
For Seal Class A, Add	7.13	
For Work In Restricted Working Space, Add	6.68	
23 31 13 13-0030 LF 8" x 10", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	29.48	15.04
For Seal Class B, Add	3.76	
For Seal Class A, Add	8.02	
For Work In Restricted Working Space, Add	7.52	
23 31 13 13-0031 LF 8" x 12", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	32.75	16.70
For Seal Class B, Add	4.18	
For Seal Class A, Add	8.91	
For Work In Restricted Working Space, Add	8.36	
23 31 13 13-0032 LF 8" x 14", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	36.04	18.38
For Seal Class B, Add	4.59	
For Seal Class A, Add	9.80	
For Work In Restricted Working Space, Add	9.19	
23 31 13 13-0033 LF 8" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	39.30	20.04
For Seal Class B, Add	5.01	
For Seal Class A, Add	10.69	
For Work In Restricted Working Space, Add	10.02	
23 31 13 13-0034 LF 8" x 18", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.59	21.72
For Seal Class B, Add	5.43	
For Seal Class A, Add	11.58	
For Work In Restricted Working Space, Add	10.86	
23 31 13 13-0035 LF 8" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.86	23.39
For Seal Class B, Add	5.85	
For Seal Class A, Add	12.47	
For Work In Restricted Working Space, Add	11.69	
23 31 13 13-0036 LF 8" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.14	25.06
For Seal Class B, Add	6.26	
For Seal Class A, Add	13.36	
For Work In Restricted Working Space, Add	12.53	
23 31 13 13-0037 LF 8" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	52.40	26.73
For Seal Class B, Add	6.68	
For Seal Class A, Add	14.25	
For Work In Restricted Working Space, Add	13.36	
23 31 13 13-0038 LF 10" x 10", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	32.75	16.70
For Seal Class B, Add	4.18	
For Seal Class A, Add	8.91	
For Work In Restricted Working Space, Add	8.36	
23 31 13 13-0039 LF 10" x 12", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	36.04	18.38
For Seal Class B, Add	4.59	
For Seal Class A, Add	9.80	
For Work In Restricted Working Space, Add	9.19	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0040	LF 10" x 14", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	39.30	20.04
		<i>For Seal Class B, Add</i>	5.01	
		<i>For Seal Class A, Add</i>	10.69	
		<i>For Work In Restricted Working Space, Add</i>	10.02	
23 31 13	13-0041	LF 10" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.59	21.72
		<i>For Seal Class B, Add</i>	5.43	
		<i>For Seal Class A, Add</i>	11.58	
		<i>For Work In Restricted Working Space, Add</i>	10.86	
23 31 13	13-0042	LF 10" x 18", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.86	23.39
		<i>For Seal Class B, Add</i>	5.85	
		<i>For Seal Class A, Add</i>	12.47	
		<i>For Work In Restricted Working Space, Add</i>	11.69	
23 31 13	13-0043	LF 10" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.14	25.06
		<i>For Seal Class B, Add</i>	6.26	
		<i>For Seal Class A, Add</i>	13.36	
		<i>For Work In Restricted Working Space, Add</i>	12.53	
23 31 13	13-0044	LF 10" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	52.40	26.73
		<i>For Seal Class B, Add</i>	6.68	
		<i>For Seal Class A, Add</i>	14.25	
		<i>For Work In Restricted Working Space, Add</i>	13.36	
23 31 13	13-0045	LF 10" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	55.70	28.40
		<i>For Seal Class B, Add</i>	7.10	
		<i>For Seal Class A, Add</i>	15.15	
		<i>For Work In Restricted Working Space, Add</i>	14.20	
23 31 13	13-0046	LF 12" x 12", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	39.30	20.04
		<i>For Seal Class B, Add</i>	5.01	
		<i>For Seal Class A, Add</i>	10.69	
		<i>For Work In Restricted Working Space, Add</i>	10.02	
23 31 13	13-0047	LF 12" x 14", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.59	21.72
		<i>For Seal Class B, Add</i>	5.43	
		<i>For Seal Class A, Add</i>	11.58	
		<i>For Work In Restricted Working Space, Add</i>	10.86	
23 31 13	13-0048	LF 12" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.86	23.39
		<i>For Seal Class B, Add</i>	5.85	
		<i>For Seal Class A, Add</i>	12.47	
		<i>For Work In Restricted Working Space, Add</i>	11.69	
23 31 13	13-0049	LF 12" x 18", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.14	25.06
		<i>For Seal Class B, Add</i>	6.26	
		<i>For Seal Class A, Add</i>	13.36	
		<i>For Work In Restricted Working Space, Add</i>	12.53	
23 31 13	13-0050	LF 12" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	52.40	26.73
		<i>For Seal Class B, Add</i>	6.68	
		<i>For Seal Class A, Add</i>	14.25	
		<i>For Work In Restricted Working Space, Add</i>	13.36	
23 31 13	13-0051	LF 12" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	55.70	28.40
		<i>For Seal Class B, Add</i>	7.10	
		<i>For Seal Class A, Add</i>	15.15	
		<i>For Work In Restricted Working Space, Add</i>	14.20	
23 31 13	13-0052	LF 12" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.97	30.07
		<i>For Seal Class B, Add</i>	7.52	
		<i>For Seal Class A, Add</i>	16.04	
		<i>For Work In Restricted Working Space, Add</i>	15.04	
23 31 13	13-0053	LF 14" x 14", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.86	23.39
		<i>For Seal Class B, Add</i>	5.85	
		<i>For Seal Class A, Add</i>	12.47	
		<i>For Work In Restricted Working Space, Add</i>	11.69	
23 31 13	13-0054	LF 14" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.14	25.06
		<i>For Seal Class B, Add</i>	6.26	
		<i>For Seal Class A, Add</i>	13.36	
		<i>For Work In Restricted Working Space, Add</i>	12.53	
23 31 13	13-0055	LF 14" x 18", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	52.40	26.73
		<i>For Seal Class B, Add</i>	6.68	
		<i>For Seal Class A, Add</i>	14.25	
		<i>For Work In Restricted Working Space, Add</i>	13.36	
23 31 13	13-0056	LF 14" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	55.70	28.40
		<i>For Seal Class B, Add</i>	7.10	
		<i>For Seal Class A, Add</i>	15.15	
		<i>For Work In Restricted Working Space, Add</i>	14.20	
23 31 13	13-0057	LF 14" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.97	30.07
		<i>For Seal Class B, Add</i>	7.52	
		<i>For Seal Class A, Add</i>	16.04	
		<i>For Work In Restricted Working Space, Add</i>	15.04	
23 31 13	13-0058	LF 14" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.25	31.74
		<i>For Seal Class B, Add</i>	7.94	
		<i>For Seal Class A, Add</i>	16.93	
		<i>For Work In Restricted Working Space, Add</i>	15.87	
23 31 13	13-0059	LF 16" x 16", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	52.40	26.73
		<i>For Seal Class B, Add</i>	6.68	
		<i>For Seal Class A, Add</i>	14.25	
		<i>For Work In Restricted Working Space, Add</i>	13.36	
23 31 13	13-0060	LF 16" x 18", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	55.70	28.40
		<i>For Seal Class B, Add</i>	7.10	
		<i>For Seal Class A, Add</i>	15.15	
		<i>For Work In Restricted Working Space, Add</i>	14.20	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0061 LF 16" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.97	30.07
For Seal Class B, Add	7.52	
For Seal Class A, Add	16.04	
For Work In Restricted Working Space, Add	15.04	
23 31 13 13-0062 LF 16" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.25	31.74
For Seal Class B, Add	7.94	
For Seal Class A, Add	16.93	
For Work In Restricted Working Space, Add	15.87	
23 31 13 13-0063 LF 16" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	65.51	33.41
For Seal Class B, Add	8.35	
For Seal Class A, Add	17.82	
For Work In Restricted Working Space, Add	16.70	
23 31 13 13-0064 LF 18" x 18", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.97	30.07
For Seal Class B, Add	7.52	
For Seal Class A, Add	16.04	
For Work In Restricted Working Space, Add	15.04	
23 31 13 13-0065 LF 18" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.25	31.74
For Seal Class B, Add	7.94	
For Seal Class A, Add	16.93	
For Work In Restricted Working Space, Add	15.87	
23 31 13 13-0066 LF 18" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	65.51	33.41
For Seal Class B, Add	8.35	
For Seal Class A, Add	17.82	
For Work In Restricted Working Space, Add	16.70	
23 31 13 13-0067 LF 18" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	68.77	35.08
For Seal Class B, Add	8.77	
For Seal Class A, Add	18.71	
For Work In Restricted Working Space, Add	17.54	
23 31 13 13-0068 LF 20" x 20", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	65.51	33.41
For Seal Class B, Add	8.35	
For Seal Class A, Add	17.82	
For Work In Restricted Working Space, Add	16.70	
23 31 13 13-0069 LF 20" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	68.77	35.08
For Seal Class B, Add	8.77	
For Seal Class A, Add	18.71	
For Work In Restricted Working Space, Add	17.54	
23 31 13 13-0070 LF 20" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.07	36.75
For Seal Class B, Add	9.19	
For Seal Class A, Add	19.60	
For Work In Restricted Working Space, Add	18.38	
23 31 13 13-0071 LF 22" x 22", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.07	36.75
For Seal Class B, Add	9.19	
For Seal Class A, Add	19.60	
For Work In Restricted Working Space, Add	18.38	
23 31 13 13-0072 LF 22" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	75.34	38.42
For Seal Class B, Add	9.61	
For Seal Class A, Add	20.49	
For Work In Restricted Working Space, Add	19.21	
23 31 13 13-0073 LF 24" x 24", 30 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	78.63	40.10
For Seal Class B, Add	10.02	
For Seal Class A, Add	21.39	
For Work In Restricted Working Space, Add	20.05	
23 31 13 13-0074 28 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13 13-0075 LF 4" x 4", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	15.59	7.96
For Seal Class B, Add	1.99	
For Seal Class A, Add	4.24	
For Work In Restricted Working Space, Add	3.98	
23 31 13 13-0076 LF 4" x 6", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	19.51	9.94
For Seal Class B, Add	2.49	
For Seal Class A, Add	5.31	
For Work In Restricted Working Space, Add	4.97	
23 31 13 13-0077 LF 4" x 8", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	23.40	11.93
For Seal Class B, Add	2.98	
For Seal Class A, Add	6.36	
For Work In Restricted Working Space, Add	5.97	
23 31 13 13-0078 LF 4" x 10", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	27.29	13.92
For Seal Class B, Add	3.48	
For Seal Class A, Add	7.42	
For Work In Restricted Working Space, Add	6.96	
23 31 13 13-0079 LF 4" x 12", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	31.21	15.92
For Seal Class B, Add	3.98	
For Seal Class A, Add	8.49	
For Work In Restricted Working Space, Add	7.96	
23 31 13 13-0080 LF 4" x 14", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	35.09	17.90
For Seal Class B, Add	4.47	
For Seal Class A, Add	9.55	
For Work In Restricted Working Space, Add	8.95	
23 31 13 13-0081 LF 4" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	38.99	19.89
For Seal Class B, Add	4.97	
For Seal Class A, Add	10.61	
For Work In Restricted Working Space, Add	9.95	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13 13-0082	LF	6" x 6", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	23.40	11.93
		<i>For Seal Class B, Add</i>	2.98	
		<i>For Seal Class A, Add</i>	6.36	
		<i>For Work In Restricted Working Space, Add</i>	5.97	
23 31 13 13-0083	LF	6" x 8", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	27.29	13.92
		<i>For Seal Class B, Add</i>	3.48	
		<i>For Seal Class A, Add</i>	7.42	
		<i>For Work In Restricted Working Space, Add</i>	6.96	
23 31 13 13-0084	LF	6" x 10", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	31.21	15.92
		<i>For Seal Class B, Add</i>	3.98	
		<i>For Seal Class A, Add</i>	8.49	
		<i>For Work In Restricted Working Space, Add</i>	7.96	
23 31 13 13-0085	LF	6" x 12", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	35.09	17.90
		<i>For Seal Class B, Add</i>	4.47	
		<i>For Seal Class A, Add</i>	9.55	
		<i>For Work In Restricted Working Space, Add</i>	8.95	
23 31 13 13-0086	LF	6" x 14", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	38.99	19.89
		<i>For Seal Class B, Add</i>	4.97	
		<i>For Seal Class A, Add</i>	10.61	
		<i>For Work In Restricted Working Space, Add</i>	9.95	
23 31 13 13-0087	LF	6" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.91	21.88
		<i>For Seal Class B, Add</i>	5.47	
		<i>For Seal Class A, Add</i>	11.67	
		<i>For Work In Restricted Working Space, Add</i>	10.94	
23 31 13 13-0088	LF	8" x 8", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	31.21	15.92
		<i>For Seal Class B, Add</i>	3.98	
		<i>For Seal Class A, Add</i>	8.49	
		<i>For Work In Restricted Working Space, Add</i>	7.96	
23 31 13 13-0089	LF	8" x 10", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	35.09	17.90
		<i>For Seal Class B, Add</i>	4.47	
		<i>For Seal Class A, Add</i>	9.55	
		<i>For Work In Restricted Working Space, Add</i>	8.95	
23 31 13 13-0090	LF	8" x 12", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	38.99	19.89
		<i>For Seal Class B, Add</i>	4.97	
		<i>For Seal Class A, Add</i>	10.61	
		<i>For Work In Restricted Working Space, Add</i>	9.95	
23 31 13 13-0091	LF	8" x 14", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.91	21.88
		<i>For Seal Class B, Add</i>	5.47	
		<i>For Seal Class A, Add</i>	11.67	
		<i>For Work In Restricted Working Space, Add</i>	10.94	
23 31 13 13-0092	LF	8" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	46.79	23.86
		<i>For Seal Class B, Add</i>	5.97	
		<i>For Seal Class A, Add</i>	12.73	
		<i>For Work In Restricted Working Space, Add</i>	11.93	
23 31 13 13-0093	LF	8" x 18", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	50.69	25.85
		<i>For Seal Class B, Add</i>	6.46	
		<i>For Seal Class A, Add</i>	13.79	
		<i>For Work In Restricted Working Space, Add</i>	12.93	
23 31 13 13-0094	LF	8" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.61	27.85
		<i>For Seal Class B, Add</i>	6.96	
		<i>For Seal Class A, Add</i>	14.85	
		<i>For Work In Restricted Working Space, Add</i>	13.92	
23 31 13 13-0095	LF	8" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.49	29.83
		<i>For Seal Class B, Add</i>	7.46	
		<i>For Seal Class A, Add</i>	15.91	
		<i>For Work In Restricted Working Space, Add</i>	14.92	
23 31 13 13-0096	LF	8" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.41	31.82
		<i>For Seal Class B, Add</i>	7.95	
		<i>For Seal Class A, Add</i>	16.97	
		<i>For Work In Restricted Working Space, Add</i>	15.91	
23 31 13 13-0097	LF	10" x 10", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	38.99	19.89
		<i>For Seal Class B, Add</i>	4.97	
		<i>For Seal Class A, Add</i>	10.61	
		<i>For Work In Restricted Working Space, Add</i>	9.95	
23 31 13 13-0098	LF	10" x 12", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.91	21.88
		<i>For Seal Class B, Add</i>	5.47	
		<i>For Seal Class A, Add</i>	11.67	
		<i>For Work In Restricted Working Space, Add</i>	10.94	
23 31 13 13-0099	LF	10" x 14", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	46.79	23.86
		<i>For Seal Class B, Add</i>	5.97	
		<i>For Seal Class A, Add</i>	12.73	
		<i>For Work In Restricted Working Space, Add</i>	11.93	
23 31 13 13-0100	LF	10" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	50.69	25.85
		<i>For Seal Class B, Add</i>	6.46	
		<i>For Seal Class A, Add</i>	13.79	
		<i>For Work In Restricted Working Space, Add</i>	12.93	
23 31 13 13-0101	LF	10" x 18", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.61	27.85
		<i>For Seal Class B, Add</i>	6.96	
		<i>For Seal Class A, Add</i>	14.85	
		<i>For Work In Restricted Working Space, Add</i>	13.92	
23 31 13 13-0102	LF	10" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.49	29.83
		<i>For Seal Class B, Add</i>	7.46	
		<i>For Seal Class A, Add</i>	15.91	
		<i>For Work In Restricted Working Space, Add</i>	14.92	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0103 LF 10" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.41	31.82
For Seal Class B, Add	7.95	
For Seal Class A, Add	16.97	
For Work In Restricted Working Space, Add	15.91	
23 31 13 13-0104 LF 10" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.31	33.82
For Seal Class B, Add	8.45	
For Seal Class A, Add	18.04	
For Work In Restricted Working Space, Add	16.91	
23 31 13 13-0105 LF 12" x 12", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	46.79	23.86
For Seal Class B, Add	5.97	
For Seal Class A, Add	12.73	
For Work In Restricted Working Space, Add	11.93	
23 31 13 13-0106 LF 12" x 14", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	50.69	25.85
For Seal Class B, Add	6.46	
For Seal Class A, Add	13.79	
For Work In Restricted Working Space, Add	12.93	
23 31 13 13-0107 LF 12" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.61	27.85
For Seal Class B, Add	6.96	
For Seal Class A, Add	14.85	
For Work In Restricted Working Space, Add	13.92	
23 31 13 13-0108 LF 12" x 18", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.49	29.83
For Seal Class B, Add	7.46	
For Seal Class A, Add	15.91	
For Work In Restricted Working Space, Add	14.92	
23 31 13 13-0109 LF 12" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.41	31.82
For Seal Class B, Add	7.95	
For Seal Class A, Add	16.97	
For Work In Restricted Working Space, Add	15.91	
23 31 13 13-0110 LF 12" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.31	33.82
For Seal Class B, Add	8.45	
For Seal Class A, Add	18.04	
For Work In Restricted Working Space, Add	16.91	
23 31 13 13-0111 LF 12" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.20	35.79
For Seal Class B, Add	8.95	
For Seal Class A, Add	19.09	
For Work In Restricted Working Space, Add	17.90	
23 31 13 13-0112 LF 14" x 14", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.61	27.85
For Seal Class B, Add	6.96	
For Seal Class A, Add	14.85	
For Work In Restricted Working Space, Add	13.92	
23 31 13 13-0113 LF 14" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.49	29.83
For Seal Class B, Add	7.46	
For Seal Class A, Add	15.91	
For Work In Restricted Working Space, Add	14.92	
23 31 13 13-0114 LF 14" x 18", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.41	31.82
For Seal Class B, Add	7.95	
For Seal Class A, Add	16.97	
For Work In Restricted Working Space, Add	15.91	
23 31 13 13-0115 LF 14" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.31	33.82
For Seal Class B, Add	8.45	
For Seal Class A, Add	18.04	
For Work In Restricted Working Space, Add	16.91	
23 31 13 13-0116 LF 14" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.20	35.79
For Seal Class B, Add	8.95	
For Seal Class A, Add	19.09	
For Work In Restricted Working Space, Add	17.90	
23 31 13 13-0117 LF 14" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	74.11	37.79
For Seal Class B, Add	9.45	
For Seal Class A, Add	20.15	
For Work In Restricted Working Space, Add	18.89	
23 31 13 13-0118 LF 16" x 16", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	62.41	31.82
For Seal Class B, Add	7.95	
For Seal Class A, Add	16.97	
For Work In Restricted Working Space, Add	15.91	
23 31 13 13-0119 LF 16" x 18", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.31	33.82
For Seal Class B, Add	8.45	
For Seal Class A, Add	18.04	
For Work In Restricted Working Space, Add	16.91	
23 31 13 13-0120 LF 16" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.20	35.79
For Seal Class B, Add	8.95	
For Seal Class A, Add	19.09	
For Work In Restricted Working Space, Add	17.90	
23 31 13 13-0121 LF 16" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	74.11	37.79
For Seal Class B, Add	9.45	
For Seal Class A, Add	20.15	
For Work In Restricted Working Space, Add	18.89	
23 31 13 13-0122 LF 16" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	78.00	39.77
For Seal Class B, Add	9.94	
For Seal Class A, Add	21.21	
For Work In Restricted Working Space, Add	19.89	
23 31 13 13-0123 LF 18" x 18", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.20	35.79
For Seal Class B, Add	8.95	
For Seal Class A, Add	19.09	
For Work In Restricted Working Space, Add	17.90	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 13-0124	LF 18" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	74.11	37.79
	<i>For Seal Class B, Add</i>	9.45	
	<i>For Seal Class A, Add</i>	20.15	
	<i>For Work In Restricted Working Space, Add</i>	18.89	
23 31 13 13-0125	LF 18" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	78.00	39.77
	<i>For Seal Class B, Add</i>	9.94	
	<i>For Seal Class A, Add</i>	21.21	
	<i>For Work In Restricted Working Space, Add</i>	19.89	
23 31 13 13-0126	LF 18" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	81.89	41.77
	<i>For Seal Class B, Add</i>	10.44	
	<i>For Seal Class A, Add</i>	22.28	
	<i>For Work In Restricted Working Space, Add</i>	20.88	
23 31 13 13-0127	LF 20" x 20", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	78.00	39.77
	<i>For Seal Class B, Add</i>	9.94	
	<i>For Seal Class A, Add</i>	21.21	
	<i>For Work In Restricted Working Space, Add</i>	19.89	
23 31 13 13-0128	LF 20" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	81.89	41.77
	<i>For Seal Class B, Add</i>	10.44	
	<i>For Seal Class A, Add</i>	22.28	
	<i>For Work In Restricted Working Space, Add</i>	20.88	
23 31 13 13-0129	LF 20" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	85.81	43.76
	<i>For Seal Class B, Add</i>	10.94	
	<i>For Seal Class A, Add</i>	23.33	
	<i>For Work In Restricted Working Space, Add</i>	21.88	
23 31 13 13-0130	LF 22" x 22", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	85.81	43.76
	<i>For Seal Class B, Add</i>	10.94	
	<i>For Seal Class A, Add</i>	23.33	
	<i>For Work In Restricted Working Space, Add</i>	21.88	
23 31 13 13-0131	LF 22" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	89.69	45.74
	<i>For Seal Class B, Add</i>	11.43	
	<i>For Seal Class A, Add</i>	24.39	
	<i>For Work In Restricted Working Space, Add</i>	22.87	
23 31 13 13-0132	LF 24" x 24", 28 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	93.60	47.74
	<i>For Seal Class B, Add</i>	11.93	
	<i>For Seal Class A, Add</i>	25.46	
	<i>For Work In Restricted Working Space, Add</i>	23.87	
23 31 13 13-0133	26 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13 13-0134	LF 4" x 4", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	18.10	9.22
	<i>For Seal Class B, Add</i>	2.31	
	<i>For Seal Class A, Add</i>	4.92	
	<i>For Work In Restricted Working Space, Add</i>	4.61	
23 31 13 13-0135	LF 4" x 6", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	22.62	11.53
	<i>For Seal Class B, Add</i>	2.88	
	<i>For Seal Class A, Add</i>	6.15	
	<i>For Work In Restricted Working Space, Add</i>	5.77	
23 31 13 13-0136	LF 4" x 8", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	27.14	13.85
	<i>For Seal Class B, Add</i>	3.46	
	<i>For Seal Class A, Add</i>	7.38	
	<i>For Work In Restricted Working Space, Add</i>	6.92	
23 31 13 13-0137	LF 4" x 10", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	31.66	16.16
	<i>For Seal Class B, Add</i>	4.04	
	<i>For Seal Class A, Add</i>	8.61	
	<i>For Work In Restricted Working Space, Add</i>	8.07	
23 31 13 13-0138	LF 4" x 12", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	36.19	18.46
	<i>For Seal Class B, Add</i>	4.61	
	<i>For Seal Class A, Add</i>	9.84	
	<i>For Work In Restricted Working Space, Add</i>	9.23	
23 31 13 13-0139	LF 4" x 14", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	40.71	20.76
	<i>For Seal Class B, Add</i>	5.19	
	<i>For Seal Class A, Add</i>	11.07	
	<i>For Work In Restricted Working Space, Add</i>	10.38	
23 31 13 13-0140	LF 4" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.23	23.07
	<i>For Seal Class B, Add</i>	5.77	
	<i>For Seal Class A, Add</i>	12.30	
	<i>For Work In Restricted Working Space, Add</i>	11.54	
23 31 13 13-0141	LF 6" x 6", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	27.14	13.85
	<i>For Seal Class B, Add</i>	3.46	
	<i>For Seal Class A, Add</i>	7.38	
	<i>For Work In Restricted Working Space, Add</i>	6.92	
23 31 13 13-0142	LF 6" x 8", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	31.66	16.16
	<i>For Seal Class B, Add</i>	4.04	
	<i>For Seal Class A, Add</i>	8.61	
	<i>For Work In Restricted Working Space, Add</i>	8.07	
23 31 13 13-0143	LF 6" x 10", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	36.19	18.46
	<i>For Seal Class B, Add</i>	4.61	
	<i>For Seal Class A, Add</i>	9.84	
	<i>For Work In Restricted Working Space, Add</i>	9.23	
23 31 13 13-0144	LF 6" x 12", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	40.71	20.76
	<i>For Seal Class B, Add</i>	5.19	
	<i>For Seal Class A, Add</i>	11.07	
	<i>For Work In Restricted Working Space, Add</i>	10.38	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0145 LF 6" x 14", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.23	23.07
For Seal Class B, Add	5.77	
For Seal Class A, Add	12.30	
For Work In Restricted Working Space, Add	11.54	
23 31 13 13-0146 LF 6" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.78	25.38
For Seal Class B, Add	6.35	
For Seal Class A, Add	13.54	
For Work In Restricted Working Space, Add	12.69	
23 31 13 13-0147 LF 8" x 8", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	36.19	18.46
For Seal Class B, Add	4.61	
For Seal Class A, Add	9.84	
For Work In Restricted Working Space, Add	9.23	
23 31 13 13-0148 LF 8" x 10", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	40.71	20.76
For Seal Class B, Add	5.19	
For Seal Class A, Add	11.07	
For Work In Restricted Working Space, Add	10.38	
23 31 13 13-0149 LF 8" x 12", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.24	23.07
For Seal Class B, Add	5.77	
For Seal Class A, Add	12.30	
For Work In Restricted Working Space, Add	11.54	
23 31 13 13-0150 LF 8" x 14", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.78	25.38
For Seal Class B, Add	6.35	
For Seal Class A, Add	13.54	
For Work In Restricted Working Space, Add	12.69	
23 31 13 13-0151 LF 8" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.30	27.69
For Seal Class B, Add	6.92	
For Seal Class A, Add	14.77	
For Work In Restricted Working Space, Add	13.85	
23 31 13 13-0152 LF 8" x 18", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.81	29.99
For Seal Class B, Add	7.50	
For Seal Class A, Add	16.00	
For Work In Restricted Working Space, Add	15.00	
23 31 13 13-0153 LF 8" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.34	32.30
For Seal Class B, Add	8.08	
For Seal Class A, Add	17.23	
For Work In Restricted Working Space, Add	16.15	
23 31 13 13-0154 LF 8" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	67.87	34.60
For Seal Class B, Add	8.65	
For Seal Class A, Add	18.46	
For Work In Restricted Working Space, Add	17.30	
23 31 13 13-0155 LF 8" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.39	36.91
For Seal Class B, Add	9.23	
For Seal Class A, Add	19.69	
For Work In Restricted Working Space, Add	18.46	
23 31 13 13-0156 LF 10" x 10", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	45.24	23.07
For Seal Class B, Add	5.77	
For Seal Class A, Add	12.30	
For Work In Restricted Working Space, Add	11.54	
23 31 13 13-0157 LF 10" x 12", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.77	25.38
For Seal Class B, Add	6.35	
For Seal Class A, Add	13.54	
For Work In Restricted Working Space, Add	12.69	
23 31 13 13-0158 LF 10" x 14", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.30	27.69
For Seal Class B, Add	6.92	
For Seal Class A, Add	14.77	
For Work In Restricted Working Space, Add	13.85	
23 31 13 13-0159 LF 10" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.81	29.99
For Seal Class B, Add	7.50	
For Seal Class A, Add	16.00	
For Work In Restricted Working Space, Add	15.00	
23 31 13 13-0160 LF 10" x 18", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.34	32.30
For Seal Class B, Add	8.08	
For Seal Class A, Add	17.23	
For Work In Restricted Working Space, Add	16.15	
23 31 13 13-0161 LF 10" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	67.87	34.60
For Seal Class B, Add	8.65	
For Seal Class A, Add	18.46	
For Work In Restricted Working Space, Add	17.30	
23 31 13 13-0162 LF 10" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.39	36.91
For Seal Class B, Add	9.23	
For Seal Class A, Add	19.69	
For Work In Restricted Working Space, Add	18.46	
23 31 13 13-0163 LF 10" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	76.92	39.23
For Seal Class B, Add	9.81	
For Seal Class A, Add	20.92	
For Work In Restricted Working Space, Add	19.61	
23 31 13 13-0164 LF 12" x 12", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.30	27.69
For Seal Class B, Add	6.92	
For Seal Class A, Add	14.77	
For Work In Restricted Working Space, Add	13.85	
23 31 13 13-0165 LF 12" x 14", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	58.81	29.99
For Seal Class B, Add	7.50	
For Seal Class A, Add	16.00	
For Work In Restricted Working Space, Add	15.00	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0166	LF 12" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.34	32.30
		<i>For Seal Class B, Add</i>	8.08	
		<i>For Seal Class A, Add</i>	17.23	
		<i>For Work In Restricted Working Space, Add</i>	16.15	
23 31 13	13-0167	LF 12" x 18", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	67.87	34.60
		<i>For Seal Class B, Add</i>	8.65	
		<i>For Seal Class A, Add</i>	18.46	
		<i>For Work In Restricted Working Space, Add</i>	17.30	
23 31 13	13-0168	LF 12" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.39	36.91
		<i>For Seal Class B, Add</i>	9.23	
		<i>For Seal Class A, Add</i>	19.69	
		<i>For Work In Restricted Working Space, Add</i>	18.46	
23 31 13	13-0169	LF 12" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	76.92	39.23
		<i>For Seal Class B, Add</i>	9.81	
		<i>For Seal Class A, Add</i>	20.92	
		<i>For Work In Restricted Working Space, Add</i>	19.61	
23 31 13	13-0170	LF 12" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	81.43	41.53
		<i>For Seal Class B, Add</i>	10.38	
		<i>For Seal Class A, Add</i>	22.15	
		<i>For Work In Restricted Working Space, Add</i>	20.77	
23 31 13	13-0171	LF 14" x 14", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.34	32.30
		<i>For Seal Class B, Add</i>	8.08	
		<i>For Seal Class A, Add</i>	17.23	
		<i>For Work In Restricted Working Space, Add</i>	16.15	
23 31 13	13-0172	LF 14" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	67.87	34.60
		<i>For Seal Class B, Add</i>	8.65	
		<i>For Seal Class A, Add</i>	18.46	
		<i>For Work In Restricted Working Space, Add</i>	17.30	
23 31 13	13-0173	LF 14" x 18", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.39	36.91
		<i>For Seal Class B, Add</i>	9.23	
		<i>For Seal Class A, Add</i>	19.69	
		<i>For Work In Restricted Working Space, Add</i>	18.46	
23 31 13	13-0174	LF 14" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	76.92	39.23
		<i>For Seal Class B, Add</i>	9.81	
		<i>For Seal Class A, Add</i>	20.92	
		<i>For Work In Restricted Working Space, Add</i>	19.61	
23 31 13	13-0175	LF 14" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	81.43	41.53
		<i>For Seal Class B, Add</i>	10.38	
		<i>For Seal Class A, Add</i>	22.15	
		<i>For Work In Restricted Working Space, Add</i>	20.77	
23 31 13	13-0176	LF 14" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	85.97	43.84
		<i>For Seal Class B, Add</i>	10.96	
		<i>For Seal Class A, Add</i>	23.38	
		<i>For Work In Restricted Working Space, Add</i>	21.92	
23 31 13	13-0177	LF 16" x 16", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	72.39	36.91
		<i>For Seal Class B, Add</i>	9.23	
		<i>For Seal Class A, Add</i>	19.69	
		<i>For Work In Restricted Working Space, Add</i>	18.46	
23 31 13	13-0178	LF 16" x 18", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	76.92	39.23
		<i>For Seal Class B, Add</i>	9.81	
		<i>For Seal Class A, Add</i>	20.92	
		<i>For Work In Restricted Working Space, Add</i>	19.61	
23 31 13	13-0179	LF 16" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	81.43	41.53
		<i>For Seal Class B, Add</i>	10.38	
		<i>For Seal Class A, Add</i>	22.15	
		<i>For Work In Restricted Working Space, Add</i>	20.77	
23 31 13	13-0180	LF 16" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	85.97	43.84
		<i>For Seal Class B, Add</i>	10.96	
		<i>For Seal Class A, Add</i>	23.38	
		<i>For Work In Restricted Working Space, Add</i>	21.92	
23 31 13	13-0181	LF 16" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	90.49	46.15
		<i>For Seal Class B, Add</i>	11.54	
		<i>For Seal Class A, Add</i>	24.61	
		<i>For Work In Restricted Working Space, Add</i>	23.07	
23 31 13	13-0182	LF 18" x 18", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	81.43	41.53
		<i>For Seal Class B, Add</i>	10.38	
		<i>For Seal Class A, Add</i>	22.15	
		<i>For Work In Restricted Working Space, Add</i>	20.77	
23 31 13	13-0183	LF 18" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	85.97	43.84
		<i>For Seal Class B, Add</i>	10.96	
		<i>For Seal Class A, Add</i>	23.38	
		<i>For Work In Restricted Working Space, Add</i>	21.92	
23 31 13	13-0184	LF 18" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	90.49	46.15
		<i>For Seal Class B, Add</i>	11.54	
		<i>For Seal Class A, Add</i>	24.61	
		<i>For Work In Restricted Working Space, Add</i>	23.07	
23 31 13	13-0185	LF 18" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	95.01	48.45
		<i>For Seal Class B, Add</i>	12.11	
		<i>For Seal Class A, Add</i>	25.84	
		<i>For Work In Restricted Working Space, Add</i>	24.23	
23 31 13	13-0186	LF 20" x 20", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	90.49	46.15
		<i>For Seal Class B, Add</i>	11.54	
		<i>For Seal Class A, Add</i>	24.61	
		<i>For Work In Restricted Working Space, Add</i>	23.07	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0187 LF 20" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	95.01	48.45
<i>For Seal Class B, Add</i>	12.11	
<i>For Seal Class A, Add</i>	25.84	
<i>For Work In Restricted Working Space, Add</i>	24.23	
23 31 13 13-0188 LF 20" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	99.52	50.76
<i>For Seal Class B, Add</i>	12.69	
<i>For Seal Class A, Add</i>	27.07	
<i>For Work In Restricted Working Space, Add</i>	25.38	
23 31 13 13-0189 LF 22" x 22", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	99.52	50.76
<i>For Seal Class B, Add</i>	12.69	
<i>For Seal Class A, Add</i>	27.07	
<i>For Work In Restricted Working Space, Add</i>	25.38	
23 31 13 13-0190 LF 22" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	104.07	53.06
<i>For Seal Class B, Add</i>	13.27	
<i>For Seal Class A, Add</i>	28.30	
<i>For Work In Restricted Working Space, Add</i>	26.53	
23 31 13 13-0191 LF 24" x 24", 26 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	108.59	55.37
<i>For Seal Class B, Add</i>	13.84	
<i>For Seal Class A, Add</i>	29.53	
<i>For Work In Restricted Working Space, Add</i>	27.69	
23 31 13 13-0192 24 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13 13-0193 LF 4" x 4", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	27.34	14.32
<i>For Seal Class B, Add</i>	3.58	
<i>For Seal Class A, Add</i>	7.64	
<i>For Work In Restricted Working Space, Add</i>	7.16	
23 31 13 13-0194 LF 4" x 6", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	34.17	17.90
<i>For Seal Class B, Add</i>	4.48	
<i>For Seal Class A, Add</i>	9.55	
<i>For Work In Restricted Working Space, Add</i>	8.95	
23 31 13 13-0195 LF 4" x 8", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	41.00	21.48
<i>For Seal Class B, Add</i>	5.37	
<i>For Seal Class A, Add</i>	11.46	
<i>For Work In Restricted Working Space, Add</i>	10.74	
23 31 13 13-0196 LF 4" x 10", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	47.83	25.07
<i>For Seal Class B, Add</i>	6.27	
<i>For Seal Class A, Add</i>	13.37	
<i>For Work In Restricted Working Space, Add</i>	12.53	
23 31 13 13-0197 LF 4" x 12", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.67	28.65
<i>For Seal Class B, Add</i>	7.16	
<i>For Seal Class A, Add</i>	15.28	
<i>For Work In Restricted Working Space, Add</i>	14.32	
23 31 13 13-0198 LF 4" x 14", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	61.51	32.23
<i>For Seal Class B, Add</i>	8.06	
<i>For Seal Class A, Add</i>	17.19	
<i>For Work In Restricted Working Space, Add</i>	16.11	
23 31 13 13-0199 LF 4" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	68.34	35.80
<i>For Seal Class B, Add</i>	8.95	
<i>For Seal Class A, Add</i>	19.10	
<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13 13-0200 LF 6" x 6", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	41.00	21.48
<i>For Seal Class B, Add</i>	5.37	
<i>For Seal Class A, Add</i>	11.46	
<i>For Work In Restricted Working Space, Add</i>	10.74	
23 31 13 13-0201 LF 6" x 8", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	47.83	25.07
<i>For Seal Class B, Add</i>	6.27	
<i>For Seal Class A, Add</i>	13.37	
<i>For Work In Restricted Working Space, Add</i>	12.53	
23 31 13 13-0202 LF 6" x 10", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.67	28.65
<i>For Seal Class B, Add</i>	7.16	
<i>For Seal Class A, Add</i>	15.28	
<i>For Work In Restricted Working Space, Add</i>	14.32	
23 31 13 13-0203 LF 6" x 12", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	61.51	32.23
<i>For Seal Class B, Add</i>	8.06	
<i>For Seal Class A, Add</i>	17.19	
<i>For Work In Restricted Working Space, Add</i>	16.11	
23 31 13 13-0204 LF 6" x 14", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	68.34	35.80
<i>For Seal Class B, Add</i>	8.95	
<i>For Seal Class A, Add</i>	19.10	
<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13 13-0205 LF 6" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	75.18	39.39
<i>For Seal Class B, Add</i>	9.85	
<i>For Seal Class A, Add</i>	21.01	
<i>For Work In Restricted Working Space, Add</i>	19.70	
23 31 13 13-0206 LF 8" x 8", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	54.67	28.65
<i>For Seal Class B, Add</i>	7.16	
<i>For Seal Class A, Add</i>	15.28	
<i>For Work In Restricted Working Space, Add</i>	14.32	
23 31 13 13-0207 LF 8" x 10", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	61.51	32.23
<i>For Seal Class B, Add</i>	8.06	
<i>For Seal Class A, Add</i>	17.19	
<i>For Work In Restricted Working Space, Add</i>	16.11	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0208	LF 8" x 12", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	68.34	35.80
		<i>For Seal Class B, Add</i>	8.95	
		<i>For Seal Class A, Add</i>	19.10	
		<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13	13-0209	LF 8" x 14", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	75.18	39.39
		<i>For Seal Class B, Add</i>	9.85	
		<i>For Seal Class A, Add</i>	21.01	
		<i>For Work In Restricted Working Space, Add</i>	19.70	
23 31 13	13-0210	LF 8" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.00	42.96
		<i>For Seal Class B, Add</i>	10.74	
		<i>For Seal Class A, Add</i>	22.92	
		<i>For Work In Restricted Working Space, Add</i>	21.48	
23 31 13	13-0211	LF 8" x 18", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	88.83	46.55
		<i>For Seal Class B, Add</i>	11.64	
		<i>For Seal Class A, Add</i>	24.82	
		<i>For Work In Restricted Working Space, Add</i>	23.27	
23 31 13	13-0212	LF 8" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	95.67	50.13
		<i>For Seal Class B, Add</i>	12.53	
		<i>For Seal Class A, Add</i>	26.73	
		<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13	13-0213	LF 8" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	102.50	53.71
		<i>For Seal Class B, Add</i>	13.43	
		<i>For Seal Class A, Add</i>	28.64	
		<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13	13-0214	LF 8" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	109.34	57.28
		<i>For Seal Class B, Add</i>	14.32	
		<i>For Seal Class A, Add</i>	30.55	
		<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13	13-0215	LF 10" x 10", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	68.34	35.80
		<i>For Seal Class B, Add</i>	8.95	
		<i>For Seal Class A, Add</i>	19.10	
		<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13	13-0216	LF 10" x 12", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	75.18	39.39
		<i>For Seal Class B, Add</i>	9.85	
		<i>For Seal Class A, Add</i>	21.01	
		<i>For Work In Restricted Working Space, Add</i>	19.70	
23 31 13	13-0217	LF 10" x 14", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.00	42.96
		<i>For Seal Class B, Add</i>	10.74	
		<i>For Seal Class A, Add</i>	22.92	
		<i>For Work In Restricted Working Space, Add</i>	21.48	
23 31 13	13-0218	LF 10" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	88.83	46.55
		<i>For Seal Class B, Add</i>	11.64	
		<i>For Seal Class A, Add</i>	24.82	
		<i>For Work In Restricted Working Space, Add</i>	23.27	
23 31 13	13-0219	LF 10" x 18", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	95.67	50.13
		<i>For Seal Class B, Add</i>	12.53	
		<i>For Seal Class A, Add</i>	26.73	
		<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13	13-0220	LF 10" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	102.50	53.71
		<i>For Seal Class B, Add</i>	13.43	
		<i>For Seal Class A, Add</i>	28.64	
		<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13	13-0221	LF 10" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	109.34	57.28
		<i>For Seal Class B, Add</i>	14.32	
		<i>For Seal Class A, Add</i>	30.55	
		<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13	13-0222	LF 10" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	116.18	60.87
		<i>For Seal Class B, Add</i>	15.22	
		<i>For Seal Class A, Add</i>	32.46	
		<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13	13-0223	LF 10" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	123.01	64.44
		<i>For Seal Class B, Add</i>	16.11	
		<i>For Seal Class A, Add</i>	34.37	
		<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13	13-0224	LF 10" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.85	68.03
		<i>For Seal Class B, Add</i>	17.01	
		<i>For Seal Class A, Add</i>	36.28	
		<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13	13-0225	LF 10" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	136.66	71.61
		<i>For Seal Class B, Add</i>	17.90	
		<i>For Seal Class A, Add</i>	38.19	
		<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13	13-0226	LF 12" x 12", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.00	42.96
		<i>For Seal Class B, Add</i>	10.74	
		<i>For Seal Class A, Add</i>	22.92	
		<i>For Work In Restricted Working Space, Add</i>	21.48	
23 31 13	13-0227	LF 12" x 14", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	88.83	46.55
		<i>For Seal Class B, Add</i>	11.64	
		<i>For Seal Class A, Add</i>	24.82	
		<i>For Work In Restricted Working Space, Add</i>	23.27	
23 31 13	13-0228	LF 12" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	95.67	50.13
		<i>For Seal Class B, Add</i>	12.53	
		<i>For Seal Class A, Add</i>	26.73	
		<i>For Work In Restricted Working Space, Add</i>	25.06	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0229 LF 12" x 18", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	102.50	53.71
<i>For Seal Class B, Add</i>	13.43	
<i>For Seal Class A, Add</i>	28.64	
<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13 13-0230 LF 12" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	109.34	57.28
<i>For Seal Class B, Add</i>	14.32	
<i>For Seal Class A, Add</i>	30.55	
<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13 13-0231 LF 12" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	116.18	60.87
<i>For Seal Class B, Add</i>	15.22	
<i>For Seal Class A, Add</i>	32.46	
<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13 13-0232 LF 12" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	123.01	64.44
<i>For Seal Class B, Add</i>	16.11	
<i>For Seal Class A, Add</i>	34.37	
<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13 13-0233 LF 12" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.85	68.03
<i>For Seal Class B, Add</i>	17.01	
<i>For Seal Class A, Add</i>	36.28	
<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13 13-0234 LF 12" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	136.66	71.61
<i>For Seal Class B, Add</i>	17.90	
<i>For Seal Class A, Add</i>	38.19	
<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13 13-0235 LF 12" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	143.50	75.20
<i>For Seal Class B, Add</i>	18.80	
<i>For Seal Class A, Add</i>	40.10	
<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13 13-0236 LF 14" x 14", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	95.67	50.13
<i>For Seal Class B, Add</i>	12.53	
<i>For Seal Class A, Add</i>	26.73	
<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13 13-0237 LF 14" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	102.50	53.71
<i>For Seal Class B, Add</i>	13.43	
<i>For Seal Class A, Add</i>	28.64	
<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13 13-0238 LF 14" x 18", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	109.34	57.28
<i>For Seal Class B, Add</i>	14.32	
<i>For Seal Class A, Add</i>	30.55	
<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13 13-0239 LF 14" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	116.18	60.87
<i>For Seal Class B, Add</i>	15.22	
<i>For Seal Class A, Add</i>	32.46	
<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13 13-0240 LF 14" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	123.01	64.44
<i>For Seal Class B, Add</i>	16.11	
<i>For Seal Class A, Add</i>	34.37	
<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13 13-0241 LF 14" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.85	68.03
<i>For Seal Class B, Add</i>	17.01	
<i>For Seal Class A, Add</i>	36.28	
<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13 13-0242 LF 14" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	136.66	71.61
<i>For Seal Class B, Add</i>	17.90	
<i>For Seal Class A, Add</i>	38.19	
<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13 13-0243 LF 14" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	143.50	75.20
<i>For Seal Class B, Add</i>	18.80	
<i>For Seal Class A, Add</i>	40.10	
<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13 13-0244 LF 14" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.34	78.76
<i>For Seal Class B, Add</i>	19.69	
<i>For Seal Class A, Add</i>	42.01	
<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13 13-0245 LF 16" x 16", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	109.34	57.28
<i>For Seal Class B, Add</i>	14.32	
<i>For Seal Class A, Add</i>	30.55	
<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13 13-0246 LF 16" x 18", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	116.18	60.87
<i>For Seal Class B, Add</i>	15.22	
<i>For Seal Class A, Add</i>	32.46	
<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13 13-0247 LF 16" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	123.01	64.44
<i>For Seal Class B, Add</i>	16.11	
<i>For Seal Class A, Add</i>	34.37	
<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13 13-0248 LF 16" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.85	68.03
<i>For Seal Class B, Add</i>	17.01	
<i>For Seal Class A, Add</i>	36.28	
<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13 13-0249 LF 16" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	136.66	71.61
<i>For Seal Class B, Add</i>	17.90	
<i>For Seal Class A, Add</i>	38.19	
<i>For Work In Restricted Working Space, Add</i>	35.80	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0250	LF 16" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	143.50	75.20
		<i>For Seal Class B, Add</i>	18.80	
		<i>For Seal Class A, Add</i>	40.10	
		<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13	13-0251	LF 16" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.34	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0252	LF 16" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.17	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0253	LF 18" x 18", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	123.01	64.44
		<i>For Seal Class B, Add</i>	16.11	
		<i>For Seal Class A, Add</i>	34.37	
		<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13	13-0254	LF 18" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.85	68.03
		<i>For Seal Class B, Add</i>	17.01	
		<i>For Seal Class A, Add</i>	36.28	
		<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13	13-0255	LF 18" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	136.66	71.61
		<i>For Seal Class B, Add</i>	17.90	
		<i>For Seal Class A, Add</i>	38.19	
		<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13	13-0256	LF 18" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	143.50	75.20
		<i>For Seal Class B, Add</i>	18.80	
		<i>For Seal Class A, Add</i>	40.10	
		<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13	13-0257	LF 18" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.34	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0258	LF 18" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.17	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0259	LF 18" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	164.01	85.94
		<i>For Seal Class B, Add</i>	21.48	
		<i>For Seal Class A, Add</i>	45.83	
		<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13	13-0260	LF 20" x 20", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	136.66	71.61
		<i>For Seal Class B, Add</i>	17.90	
		<i>For Seal Class A, Add</i>	38.19	
		<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13	13-0261	LF 20" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	143.50	75.20
		<i>For Seal Class B, Add</i>	18.80	
		<i>For Seal Class A, Add</i>	40.10	
		<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13	13-0262	LF 20" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.34	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0263	LF 20" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.17	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0264	LF 20" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	164.01	85.94
		<i>For Seal Class B, Add</i>	21.48	
		<i>For Seal Class A, Add</i>	45.83	
		<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13	13-0265	LF 20" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	170.85	89.51
		<i>For Seal Class B, Add</i>	22.38	
		<i>For Seal Class A, Add</i>	47.74	
		<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13	13-0266	LF 22" x 22", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.34	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0267	LF 22" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.17	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0268	LF 22" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	164.01	85.94
		<i>For Seal Class B, Add</i>	21.48	
		<i>For Seal Class A, Add</i>	45.83	
		<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13	13-0269	LF 22" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	170.85	89.51
		<i>For Seal Class B, Add</i>	22.38	
		<i>For Seal Class A, Add</i>	47.74	
		<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13	13-0270	LF 22" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	177.68	93.10
		<i>For Seal Class B, Add</i>	23.27	
		<i>For Seal Class A, Add</i>	49.65	
		<i>For Work In Restricted Working Space, Add</i>	46.55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0271 LF 24" x 24", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	164.01	85.94
For Seal Class B, Add	21.48	
For Seal Class A, Add	45.83	
For Work In Restricted Working Space, Add	42.97	
23 31 13 13-0272 LF 24" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	170.85	89.51
For Seal Class B, Add	22.38	
For Seal Class A, Add	47.74	
For Work In Restricted Working Space, Add	44.76	
23 31 13 13-0273 LF 24" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	177.68	93.10
For Seal Class B, Add	23.27	
For Seal Class A, Add	49.65	
For Work In Restricted Working Space, Add	46.55	
23 31 13 13-0274 LF 24" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	184.52	96.68
For Seal Class B, Add	24.17	
For Seal Class A, Add	51.56	
For Work In Restricted Working Space, Add	48.34	
23 31 13 13-0275 LF 26" x 26", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	177.68	93.10
For Seal Class B, Add	23.27	
For Seal Class A, Add	49.65	
For Work In Restricted Working Space, Add	46.55	
23 31 13 13-0276 LF 26" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	184.52	96.68
For Seal Class B, Add	24.17	
For Seal Class A, Add	51.56	
For Work In Restricted Working Space, Add	48.34	
23 31 13 13-0277 LF 26" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	191.33	100.25
For Seal Class B, Add	25.06	
For Seal Class A, Add	53.47	
For Work In Restricted Working Space, Add	50.12	
23 31 13 13-0278 LF 28" x 28", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	191.33	100.25
For Seal Class B, Add	25.06	
For Seal Class A, Add	53.47	
For Work In Restricted Working Space, Add	50.12	
23 31 13 13-0279 LF 28" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.17	103.83
For Seal Class B, Add	25.96	
For Seal Class A, Add	55.38	
For Work In Restricted Working Space, Add	51.92	
23 31 13 13-0280 LF 30" x 30", 24 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	205.02	107.42
For Seal Class B, Add	26.85	
For Seal Class A, Add	57.29	
For Work In Restricted Working Space, Add	53.71	
23 31 13 13-0281 22 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13 13-0282 LF 4" x 4", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	28.09	14.32
For Seal Class B, Add	3.58	
For Seal Class A, Add	7.64	
For Work In Restricted Working Space, Add	7.16	
23 31 13 13-0283 LF 4" x 6", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	35.11	17.90
For Seal Class B, Add	4.48	
For Seal Class A, Add	9.55	
For Work In Restricted Working Space, Add	8.95	
23 31 13 13-0284 LF 4" x 8", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.12	21.48
For Seal Class B, Add	5.37	
For Seal Class A, Add	11.46	
For Work In Restricted Working Space, Add	10.74	
23 31 13 13-0285 LF 4" x 10", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.15	25.07
For Seal Class B, Add	6.27	
For Seal Class A, Add	13.37	
For Work In Restricted Working Space, Add	12.53	
23 31 13 13-0286 LF 4" x 12", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	56.17	28.65
For Seal Class B, Add	7.16	
For Seal Class A, Add	15.28	
For Work In Restricted Working Space, Add	14.32	
23 31 13 13-0287 LF 4" x 14", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.19	32.23
For Seal Class B, Add	8.06	
For Seal Class A, Add	17.19	
For Work In Restricted Working Space, Add	16.11	
23 31 13 13-0288 LF 4" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.22	35.80
For Seal Class B, Add	8.95	
For Seal Class A, Add	19.10	
For Work In Restricted Working Space, Add	17.90	
23 31 13 13-0289 LF 6" x 6", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	42.12	21.48
For Seal Class B, Add	5.37	
For Seal Class A, Add	11.46	
For Work In Restricted Working Space, Add	10.74	
23 31 13 13-0290 LF 6" x 8", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.15	25.07
For Seal Class B, Add	6.27	
For Seal Class A, Add	13.37	
For Work In Restricted Working Space, Add	12.53	
23 31 13 13-0291 LF 6" x 10", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	56.17	28.65
For Seal Class B, Add	7.16	
For Seal Class A, Add	15.28	
For Work In Restricted Working Space, Add	14.32	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0292	LF 6" x 12", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.19	32.23
		<i>For Seal Class B, Add</i>	8.06	
		<i>For Seal Class A, Add</i>	17.19	
		<i>For Work In Restricted Working Space, Add</i>	16.11	
23 31 13	13-0293	LF 6" x 14", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.22	35.80
		<i>For Seal Class B, Add</i>	8.95	
		<i>For Seal Class A, Add</i>	19.10	
		<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13	13-0294	LF 6" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	77.24	39.39
		<i>For Seal Class B, Add</i>	9.85	
		<i>For Seal Class A, Add</i>	21.01	
		<i>For Work In Restricted Working Space, Add</i>	19.70	
23 31 13	13-0295	LF 8" x 8", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	56.17	28.65
		<i>For Seal Class B, Add</i>	7.16	
		<i>For Seal Class A, Add</i>	15.28	
		<i>For Work In Restricted Working Space, Add</i>	14.32	
23 31 13	13-0296	LF 8" x 10", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	63.19	32.23
		<i>For Seal Class B, Add</i>	8.06	
		<i>For Seal Class A, Add</i>	17.19	
		<i>For Work In Restricted Working Space, Add</i>	16.11	
23 31 13	13-0297	LF 8" x 12", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.22	35.80
		<i>For Seal Class B, Add</i>	8.95	
		<i>For Seal Class A, Add</i>	19.10	
		<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13	13-0298	LF 8" x 14", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	77.24	39.39
		<i>For Seal Class B, Add</i>	9.85	
		<i>For Seal Class A, Add</i>	21.01	
		<i>For Work In Restricted Working Space, Add</i>	19.70	
23 31 13	13-0299	LF 8" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	84.25	42.96
		<i>For Seal Class B, Add</i>	10.74	
		<i>For Seal Class A, Add</i>	22.92	
		<i>For Work In Restricted Working Space, Add</i>	21.48	
23 31 13	13-0300	LF 8" x 18", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	91.27	46.55
		<i>For Seal Class B, Add</i>	11.64	
		<i>For Seal Class A, Add</i>	24.82	
		<i>For Work In Restricted Working Space, Add</i>	23.27	
23 31 13	13-0301	LF 8" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	98.29	50.13
		<i>For Seal Class B, Add</i>	12.53	
		<i>For Seal Class A, Add</i>	26.73	
		<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13	13-0302	LF 8" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	105.31	53.71
		<i>For Seal Class B, Add</i>	13.43	
		<i>For Seal Class A, Add</i>	28.64	
		<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13	13-0303	LF 8" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	112.34	57.28
		<i>For Seal Class B, Add</i>	14.32	
		<i>For Seal Class A, Add</i>	30.55	
		<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13	13-0304	LF 10" x 10", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	70.22	35.80
		<i>For Seal Class B, Add</i>	8.95	
		<i>For Seal Class A, Add</i>	19.10	
		<i>For Work In Restricted Working Space, Add</i>	17.90	
23 31 13	13-0305	LF 10" x 12", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	77.24	39.39
		<i>For Seal Class B, Add</i>	9.85	
		<i>For Seal Class A, Add</i>	21.01	
		<i>For Work In Restricted Working Space, Add</i>	19.70	
23 31 13	13-0306	LF 10" x 14", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	84.25	42.96
		<i>For Seal Class B, Add</i>	10.74	
		<i>For Seal Class A, Add</i>	22.92	
		<i>For Work In Restricted Working Space, Add</i>	21.48	
23 31 13	13-0307	LF 10" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	91.27	46.55
		<i>For Seal Class B, Add</i>	11.64	
		<i>For Seal Class A, Add</i>	24.82	
		<i>For Work In Restricted Working Space, Add</i>	23.27	
23 31 13	13-0308	LF 10" x 18", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	98.29	50.13
		<i>For Seal Class B, Add</i>	12.53	
		<i>For Seal Class A, Add</i>	26.73	
		<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13	13-0309	LF 10" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	105.31	53.71
		<i>For Seal Class B, Add</i>	13.43	
		<i>For Seal Class A, Add</i>	28.64	
		<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13	13-0310	LF 10" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	112.34	57.28
		<i>For Seal Class B, Add</i>	14.32	
		<i>For Seal Class A, Add</i>	30.55	
		<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13	13-0311	LF 10" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	119.36	60.87
		<i>For Seal Class B, Add</i>	15.22	
		<i>For Seal Class A, Add</i>	32.46	
		<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13	13-0312	LF 10" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	126.38	64.44
		<i>For Seal Class B, Add</i>	16.11	
		<i>For Seal Class A, Add</i>	34.37	
		<i>For Work In Restricted Working Space, Add</i>	32.23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0313 LF 10" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	133.41	68.03
<i>For Seal Class B, Add</i>	17.01	
<i>For Seal Class A, Add</i>	36.28	
<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13 13-0314 LF 10" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.41	71.61
<i>For Seal Class B, Add</i>	17.90	
<i>For Seal Class A, Add</i>	38.19	
<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13 13-0315 LF 10" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	147.43	75.20
<i>For Seal Class B, Add</i>	18.80	
<i>For Seal Class A, Add</i>	40.10	
<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13 13-0316 LF 12" x 12", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	84.25	42.96
<i>For Seal Class B, Add</i>	10.74	
<i>For Seal Class A, Add</i>	22.92	
<i>For Work In Restricted Working Space, Add</i>	21.48	
23 31 13 13-0317 LF 12" x 14", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	91.27	46.55
<i>For Seal Class B, Add</i>	11.64	
<i>For Seal Class A, Add</i>	24.82	
<i>For Work In Restricted Working Space, Add</i>	23.27	
23 31 13 13-0318 LF 12" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	98.29	50.13
<i>For Seal Class B, Add</i>	12.53	
<i>For Seal Class A, Add</i>	26.73	
<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13 13-0319 LF 12" x 18", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	105.31	53.71
<i>For Seal Class B, Add</i>	13.43	
<i>For Seal Class A, Add</i>	28.64	
<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13 13-0320 LF 12" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	112.34	57.28
<i>For Seal Class B, Add</i>	14.32	
<i>For Seal Class A, Add</i>	30.55	
<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13 13-0321 LF 12" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	119.36	60.87
<i>For Seal Class B, Add</i>	15.22	
<i>For Seal Class A, Add</i>	32.46	
<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13 13-0322 LF 12" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	126.38	64.44
<i>For Seal Class B, Add</i>	16.11	
<i>For Seal Class A, Add</i>	34.37	
<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13 13-0323 LF 12" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	133.41	68.03
<i>For Seal Class B, Add</i>	17.01	
<i>For Seal Class A, Add</i>	36.28	
<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13 13-0324 LF 12" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.41	71.61
<i>For Seal Class B, Add</i>	17.90	
<i>For Seal Class A, Add</i>	38.19	
<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13 13-0325 LF 12" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	147.43	75.20
<i>For Seal Class B, Add</i>	18.80	
<i>For Seal Class A, Add</i>	40.10	
<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13 13-0326 LF 12" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	154.46	78.76
<i>For Seal Class B, Add</i>	19.69	
<i>For Seal Class A, Add</i>	42.01	
<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13 13-0327 LF 12" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.48	82.35
<i>For Seal Class B, Add</i>	20.59	
<i>For Seal Class A, Add</i>	43.92	
<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13 13-0328 LF 12" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
<i>For Seal Class B, Add</i>	21.48	
<i>For Seal Class A, Add</i>	45.83	
<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13 13-0329 LF 14" x 14", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	98.29	50.13
<i>For Seal Class B, Add</i>	12.53	
<i>For Seal Class A, Add</i>	26.73	
<i>For Work In Restricted Working Space, Add</i>	25.06	
23 31 13 13-0330 LF 14" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	105.31	53.71
<i>For Seal Class B, Add</i>	13.43	
<i>For Seal Class A, Add</i>	28.64	
<i>For Work In Restricted Working Space, Add</i>	26.85	
23 31 13 13-0331 LF 14" x 18", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	112.34	57.28
<i>For Seal Class B, Add</i>	14.32	
<i>For Seal Class A, Add</i>	30.55	
<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13 13-0332 LF 14" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	119.36	60.87
<i>For Seal Class B, Add</i>	15.22	
<i>For Seal Class A, Add</i>	32.46	
<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13 13-0333 LF 14" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	126.38	64.44
<i>For Seal Class B, Add</i>	16.11	
<i>For Seal Class A, Add</i>	34.37	
<i>For Work In Restricted Working Space, Add</i>	32.23	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0334	LF 14" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	133.41	68.03
		<i>For Seal Class B, Add</i>	17.01	
		<i>For Seal Class A, Add</i>	36.28	
		<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13	13-0335	LF 14" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.41	71.61
		<i>For Seal Class B, Add</i>	17.90	
		<i>For Seal Class A, Add</i>	38.19	
		<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13	13-0336	LF 14" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	147.43	75.20
		<i>For Seal Class B, Add</i>	18.80	
		<i>For Seal Class A, Add</i>	40.10	
		<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13	13-0337	LF 14" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	154.46	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0338	LF 14" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.48	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0339	LF 14" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
		<i>For Seal Class B, Add</i>	21.48	
		<i>For Seal Class A, Add</i>	45.83	
		<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13	13-0340	LF 14" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	175.53	89.51
		<i>For Seal Class B, Add</i>	22.38	
		<i>For Seal Class A, Add</i>	47.74	
		<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13	13-0341	LF 16" x 16", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	112.34	57.28
		<i>For Seal Class B, Add</i>	14.32	
		<i>For Seal Class A, Add</i>	30.55	
		<i>For Work In Restricted Working Space, Add</i>	28.64	
23 31 13	13-0342	LF 16" x 18", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	119.36	60.87
		<i>For Seal Class B, Add</i>	15.22	
		<i>For Seal Class A, Add</i>	32.46	
		<i>For Work In Restricted Working Space, Add</i>	30.44	
23 31 13	13-0343	LF 16" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	126.38	64.44
		<i>For Seal Class B, Add</i>	16.11	
		<i>For Seal Class A, Add</i>	34.37	
		<i>For Work In Restricted Working Space, Add</i>	32.23	
23 31 13	13-0344	LF 16" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	133.41	68.03
		<i>For Seal Class B, Add</i>	17.01	
		<i>For Seal Class A, Add</i>	36.28	
		<i>For Work In Restricted Working Space, Add</i>	34.02	
23 31 13	13-0345	LF 16" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.41	71.61
		<i>For Seal Class B, Add</i>	17.90	
		<i>For Seal Class A, Add</i>	38.19	
		<i>For Work In Restricted Working Space, Add</i>	35.80	
23 31 13	13-0346	LF 16" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	147.43	75.20
		<i>For Seal Class B, Add</i>	18.80	
		<i>For Seal Class A, Add</i>	40.10	
		<i>For Work In Restricted Working Space, Add</i>	37.59	
23 31 13	13-0347	LF 16" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	154.46	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0348	LF 16" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.48	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0349	LF 16" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
		<i>For Seal Class B, Add</i>	21.48	
		<i>For Seal Class A, Add</i>	45.83	
		<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13	13-0350	LF 16" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	175.53	89.51
		<i>For Seal Class B, Add</i>	22.38	
		<i>For Seal Class A, Add</i>	47.74	
		<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13	13-0351	LF 16" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	182.55	93.10
		<i>For Seal Class B, Add</i>	23.27	
		<i>For Seal Class A, Add</i>	49.65	
		<i>For Work In Restricted Working Space, Add</i>	46.55	
23 31 13	13-0352	LF 16" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	189.58	96.68
		<i>For Seal Class B, Add</i>	24.17	
		<i>For Seal Class A, Add</i>	51.56	
		<i>For Work In Restricted Working Space, Add</i>	48.34	
23 31 13	13-0353	LF 16" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
		<i>For Seal Class B, Add</i>	25.06	
		<i>For Seal Class A, Add</i>	53.47	
		<i>For Work In Restricted Working Space, Add</i>	50.12	
23 31 13	13-0354	LF 16" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
		<i>For Seal Class B, Add</i>	25.96	
		<i>For Seal Class A, Add</i>	55.38	
		<i>For Work In Restricted Working Space, Add</i>	51.92	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0355 LF 16" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
For Seal Class B, Add	26.85	
For Seal Class A, Add	57.29	
For Work In Restricted Working Space, Add	53.71	
23 31 13 13-0356 LF 18" x 18", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	126.38	64.44
For Seal Class B, Add	16.11	
For Seal Class A, Add	34.37	
For Work In Restricted Working Space, Add	32.23	
23 31 13 13-0357 LF 18" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	133.41	68.03
For Seal Class B, Add	17.01	
For Seal Class A, Add	36.28	
For Work In Restricted Working Space, Add	34.02	
23 31 13 13-0358 LF 18" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.41	71.61
For Seal Class B, Add	17.90	
For Seal Class A, Add	38.19	
For Work In Restricted Working Space, Add	35.80	
23 31 13 13-0359 LF 18" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	147.43	75.20
For Seal Class B, Add	18.80	
For Seal Class A, Add	40.10	
For Work In Restricted Working Space, Add	37.59	
23 31 13 13-0360 LF 18" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	154.46	78.76
For Seal Class B, Add	19.69	
For Seal Class A, Add	42.01	
For Work In Restricted Working Space, Add	39.38	
23 31 13 13-0361 LF 18" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.48	82.35
For Seal Class B, Add	20.59	
For Seal Class A, Add	43.92	
For Work In Restricted Working Space, Add	41.18	
23 31 13 13-0362 LF 18" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
For Seal Class B, Add	21.48	
For Seal Class A, Add	45.83	
For Work In Restricted Working Space, Add	42.97	
23 31 13 13-0363 LF 18" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	175.53	89.51
For Seal Class B, Add	22.38	
For Seal Class A, Add	47.74	
For Work In Restricted Working Space, Add	44.76	
23 31 13 13-0364 LF 18" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	182.55	93.10
For Seal Class B, Add	23.27	
For Seal Class A, Add	49.65	
For Work In Restricted Working Space, Add	46.55	
23 31 13 13-0365 LF 18" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	189.58	96.68
For Seal Class B, Add	24.17	
For Seal Class A, Add	51.56	
For Work In Restricted Working Space, Add	48.34	
23 31 13 13-0366 LF 18" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
For Seal Class B, Add	25.06	
For Seal Class A, Add	53.47	
For Work In Restricted Working Space, Add	50.12	
23 31 13 13-0367 LF 18" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
For Seal Class B, Add	25.96	
For Seal Class A, Add	55.38	
For Work In Restricted Working Space, Add	51.92	
23 31 13 13-0368 LF 18" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
For Seal Class B, Add	26.85	
For Seal Class A, Add	57.29	
For Work In Restricted Working Space, Add	53.71	
23 31 13 13-0369 LF 18" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
For Seal Class B, Add	27.75	
For Seal Class A, Add	59.20	
For Work In Restricted Working Space, Add	55.50	
23 31 13 13-0370 LF 18" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
For Seal Class B, Add	28.64	
For Seal Class A, Add	61.11	
For Work In Restricted Working Space, Add	57.29	
23 31 13 13-0371 LF 20" x 20", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.41	71.61
For Seal Class B, Add	17.90	
For Seal Class A, Add	38.19	
For Work In Restricted Working Space, Add	35.80	
23 31 13 13-0372 LF 20" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	147.43	75.20
For Seal Class B, Add	18.80	
For Seal Class A, Add	40.10	
For Work In Restricted Working Space, Add	37.59	
23 31 13 13-0373 LF 20" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	154.46	78.76
For Seal Class B, Add	19.69	
For Seal Class A, Add	42.01	
For Work In Restricted Working Space, Add	39.38	
23 31 13 13-0374 LF 20" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.48	82.35
For Seal Class B, Add	20.59	
For Seal Class A, Add	43.92	
For Work In Restricted Working Space, Add	41.18	
23 31 13 13-0375 LF 20" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
For Seal Class B, Add	21.48	
For Seal Class A, Add	45.83	
For Work In Restricted Working Space, Add	42.97	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0376	LF 20" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	175.53	89.51
		<i>For Seal Class B, Add</i>	22.38	
		<i>For Seal Class A, Add</i>	47.74	
		<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13	13-0377	LF 20" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	182.55	93.10
		<i>For Seal Class B, Add</i>	23.27	
		<i>For Seal Class A, Add</i>	49.65	
		<i>For Work In Restricted Working Space, Add</i>	46.55	
23 31 13	13-0378	LF 20" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	189.58	96.68
		<i>For Seal Class B, Add</i>	24.17	
		<i>For Seal Class A, Add</i>	51.56	
		<i>For Work In Restricted Working Space, Add</i>	48.34	
23 31 13	13-0379	LF 20" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
		<i>For Seal Class B, Add</i>	25.06	
		<i>For Seal Class A, Add</i>	53.47	
		<i>For Work In Restricted Working Space, Add</i>	50.12	
23 31 13	13-0380	LF 20" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
		<i>For Seal Class B, Add</i>	25.96	
		<i>For Seal Class A, Add</i>	55.38	
		<i>For Work In Restricted Working Space, Add</i>	51.92	
23 31 13	13-0381	LF 20" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
		<i>For Seal Class B, Add</i>	26.85	
		<i>For Seal Class A, Add</i>	57.29	
		<i>For Work In Restricted Working Space, Add</i>	53.71	
23 31 13	13-0382	LF 20" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
		<i>For Seal Class B, Add</i>	27.75	
		<i>For Seal Class A, Add</i>	59.20	
		<i>For Work In Restricted Working Space, Add</i>	55.50	
23 31 13	13-0383	LF 20" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
		<i>For Seal Class B, Add</i>	28.64	
		<i>For Seal Class A, Add</i>	61.11	
		<i>For Work In Restricted Working Space, Add</i>	57.29	
23 31 13	13-0384	LF 20" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
		<i>For Seal Class B, Add</i>	29.54	
		<i>For Seal Class A, Add</i>	63.02	
		<i>For Work In Restricted Working Space, Add</i>	59.08	
23 31 13	13-0385	LF 20" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
		<i>For Seal Class B, Add</i>	30.44	
		<i>For Seal Class A, Add</i>	64.93	
		<i>For Work In Restricted Working Space, Add</i>	60.87	
23 31 13	13-0386	LF 22" x 22", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	154.46	78.76
		<i>For Seal Class B, Add</i>	19.69	
		<i>For Seal Class A, Add</i>	42.01	
		<i>For Work In Restricted Working Space, Add</i>	39.38	
23 31 13	13-0387	LF 22" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.48	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0388	LF 22" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
		<i>For Seal Class B, Add</i>	21.48	
		<i>For Seal Class A, Add</i>	45.83	
		<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13	13-0389	LF 22" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	175.53	89.51
		<i>For Seal Class B, Add</i>	22.38	
		<i>For Seal Class A, Add</i>	47.74	
		<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13	13-0390	LF 22" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	182.55	93.10
		<i>For Seal Class B, Add</i>	23.27	
		<i>For Seal Class A, Add</i>	49.65	
		<i>For Work In Restricted Working Space, Add</i>	46.55	
23 31 13	13-0391	LF 22" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	189.58	96.68
		<i>For Seal Class B, Add</i>	24.17	
		<i>For Seal Class A, Add</i>	51.56	
		<i>For Work In Restricted Working Space, Add</i>	48.34	
23 31 13	13-0392	LF 22" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
		<i>For Seal Class B, Add</i>	25.06	
		<i>For Seal Class A, Add</i>	53.47	
		<i>For Work In Restricted Working Space, Add</i>	50.12	
23 31 13	13-0393	LF 22" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
		<i>For Seal Class B, Add</i>	25.96	
		<i>For Seal Class A, Add</i>	55.38	
		<i>For Work In Restricted Working Space, Add</i>	51.92	
23 31 13	13-0394	LF 22" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
		<i>For Seal Class B, Add</i>	26.85	
		<i>For Seal Class A, Add</i>	57.29	
		<i>For Work In Restricted Working Space, Add</i>	53.71	
23 31 13	13-0395	LF 22" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
		<i>For Seal Class B, Add</i>	27.75	
		<i>For Seal Class A, Add</i>	59.20	
		<i>For Work In Restricted Working Space, Add</i>	55.50	
23 31 13	13-0396	LF 22" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
		<i>For Seal Class B, Add</i>	28.64	
		<i>For Seal Class A, Add</i>	61.11	
		<i>For Work In Restricted Working Space, Add</i>	57.29	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0397 LF 22" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
<i>For Seal Class B, Add</i>	29.54	
<i>For Seal Class A, Add</i>	63.02	
<i>For Work In Restricted Working Space, Add</i>	59.08	
23 31 13 13-0398 LF 22" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
<i>For Seal Class B, Add</i>	30.44	
<i>For Seal Class A, Add</i>	64.93	
<i>For Work In Restricted Working Space, Add</i>	60.87	
23 31 13 13-0399 LF 22" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
<i>For Seal Class B, Add</i>	31.33	
<i>For Seal Class A, Add</i>	66.84	
<i>For Work In Restricted Working Space, Add</i>	62.66	
23 31 13 13-0400 LF 24" x 24", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	168.51	85.94
<i>For Seal Class B, Add</i>	21.48	
<i>For Seal Class A, Add</i>	45.83	
<i>For Work In Restricted Working Space, Add</i>	42.97	
23 31 13 13-0401 LF 24" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	175.53	89.51
<i>For Seal Class B, Add</i>	22.38	
<i>For Seal Class A, Add</i>	47.74	
<i>For Work In Restricted Working Space, Add</i>	44.76	
23 31 13 13-0402 LF 24" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	182.55	93.10
<i>For Seal Class B, Add</i>	23.27	
<i>For Seal Class A, Add</i>	49.65	
<i>For Work In Restricted Working Space, Add</i>	46.55	
23 31 13 13-0403 LF 24" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	189.58	96.68
<i>For Seal Class B, Add</i>	24.17	
<i>For Seal Class A, Add</i>	51.56	
<i>For Work In Restricted Working Space, Add</i>	48.34	
23 31 13 13-0404 LF 24" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
<i>For Seal Class B, Add</i>	25.06	
<i>For Seal Class A, Add</i>	53.47	
<i>For Work In Restricted Working Space, Add</i>	50.12	
23 31 13 13-0405 LF 24" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
<i>For Seal Class B, Add</i>	25.96	
<i>For Seal Class A, Add</i>	55.38	
<i>For Work In Restricted Working Space, Add</i>	51.92	
23 31 13 13-0406 LF 24" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
<i>For Seal Class B, Add</i>	26.85	
<i>For Seal Class A, Add</i>	57.29	
<i>For Work In Restricted Working Space, Add</i>	53.71	
23 31 13 13-0407 LF 24" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
<i>For Seal Class B, Add</i>	27.75	
<i>For Seal Class A, Add</i>	59.20	
<i>For Work In Restricted Working Space, Add</i>	55.50	
23 31 13 13-0408 LF 24" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
<i>For Seal Class B, Add</i>	28.64	
<i>For Seal Class A, Add</i>	61.11	
<i>For Work In Restricted Working Space, Add</i>	57.29	
23 31 13 13-0409 LF 24" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
<i>For Seal Class B, Add</i>	29.54	
<i>For Seal Class A, Add</i>	63.02	
<i>For Work In Restricted Working Space, Add</i>	59.08	
23 31 13 13-0410 LF 24" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
<i>For Seal Class B, Add</i>	30.44	
<i>For Seal Class A, Add</i>	64.93	
<i>For Work In Restricted Working Space, Add</i>	60.87	
23 31 13 13-0411 LF 24" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
<i>For Seal Class B, Add</i>	31.33	
<i>For Seal Class A, Add</i>	66.84	
<i>For Work In Restricted Working Space, Add</i>	62.66	
23 31 13 13-0412 LF 24" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
<i>For Seal Class B, Add</i>	32.22	
<i>For Seal Class A, Add</i>	68.74	
<i>For Work In Restricted Working Space, Add</i>	64.45	
23 31 13 13-0413 LF 26" x 26", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	182.55	93.10
<i>For Seal Class B, Add</i>	23.27	
<i>For Seal Class A, Add</i>	49.65	
<i>For Work In Restricted Working Space, Add</i>	46.55	
23 31 13 13-0414 LF 26" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	189.58	96.68
<i>For Seal Class B, Add</i>	24.17	
<i>For Seal Class A, Add</i>	51.56	
<i>For Work In Restricted Working Space, Add</i>	48.34	
23 31 13 13-0415 LF 26" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
<i>For Seal Class B, Add</i>	25.06	
<i>For Seal Class A, Add</i>	53.47	
<i>For Work In Restricted Working Space, Add</i>	50.12	
23 31 13 13-0416 LF 26" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
<i>For Seal Class B, Add</i>	25.96	
<i>For Seal Class A, Add</i>	55.38	
<i>For Work In Restricted Working Space, Add</i>	51.92	
23 31 13 13-0417 LF 26" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
<i>For Seal Class B, Add</i>	26.85	
<i>For Seal Class A, Add</i>	57.29	
<i>For Work In Restricted Working Space, Add</i>	53.71	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0418	LF 26" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
		<i>For Seal Class B, Add</i>	27.75	
		<i>For Seal Class A, Add</i>	59.20	
		<i>For Work In Restricted Working Space, Add</i>	55.50	
23 31 13	13-0419	LF 26" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
		<i>For Seal Class B, Add</i>	28.64	
		<i>For Seal Class A, Add</i>	61.11	
		<i>For Work In Restricted Working Space, Add</i>	57.29	
23 31 13	13-0420	LF 26" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
		<i>For Seal Class B, Add</i>	29.54	
		<i>For Seal Class A, Add</i>	63.02	
		<i>For Work In Restricted Working Space, Add</i>	59.08	
23 31 13	13-0421	LF 26" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
		<i>For Seal Class B, Add</i>	30.44	
		<i>For Seal Class A, Add</i>	64.93	
		<i>For Work In Restricted Working Space, Add</i>	60.87	
23 31 13	13-0422	LF 26" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
		<i>For Seal Class B, Add</i>	31.33	
		<i>For Seal Class A, Add</i>	66.84	
		<i>For Work In Restricted Working Space, Add</i>	62.66	
23 31 13	13-0423	LF 26" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
		<i>For Seal Class B, Add</i>	32.22	
		<i>For Seal Class A, Add</i>	68.74	
		<i>For Work In Restricted Working Space, Add</i>	64.45	
23 31 13	13-0424	LF 26" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	259.78	132.48
		<i>For Seal Class B, Add</i>	33.12	
		<i>For Seal Class A, Add</i>	70.66	
		<i>For Work In Restricted Working Space, Add</i>	66.24	
23 31 13	13-0425	LF 28" x 28", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	196.58	100.25
		<i>For Seal Class B, Add</i>	25.06	
		<i>For Seal Class A, Add</i>	53.47	
		<i>For Work In Restricted Working Space, Add</i>	50.12	
23 31 13	13-0426	LF 28" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	203.60	103.83
		<i>For Seal Class B, Add</i>	25.96	
		<i>For Seal Class A, Add</i>	55.38	
		<i>For Work In Restricted Working Space, Add</i>	51.92	
23 31 13	13-0427	LF 28" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
		<i>For Seal Class B, Add</i>	26.85	
		<i>For Seal Class A, Add</i>	57.29	
		<i>For Work In Restricted Working Space, Add</i>	53.71	
23 31 13	13-0428	LF 28" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
		<i>For Seal Class B, Add</i>	27.75	
		<i>For Seal Class A, Add</i>	59.20	
		<i>For Work In Restricted Working Space, Add</i>	55.50	
23 31 13	13-0429	LF 28" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
		<i>For Seal Class B, Add</i>	28.64	
		<i>For Seal Class A, Add</i>	61.11	
		<i>For Work In Restricted Working Space, Add</i>	57.29	
23 31 13	13-0430	LF 28" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
		<i>For Seal Class B, Add</i>	29.54	
		<i>For Seal Class A, Add</i>	63.02	
		<i>For Work In Restricted Working Space, Add</i>	59.08	
23 31 13	13-0431	LF 28" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
		<i>For Seal Class B, Add</i>	30.44	
		<i>For Seal Class A, Add</i>	64.93	
		<i>For Work In Restricted Working Space, Add</i>	60.87	
23 31 13	13-0432	LF 28" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
		<i>For Seal Class B, Add</i>	31.33	
		<i>For Seal Class A, Add</i>	66.84	
		<i>For Work In Restricted Working Space, Add</i>	62.66	
23 31 13	13-0433	LF 28" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
		<i>For Seal Class B, Add</i>	32.22	
		<i>For Seal Class A, Add</i>	68.74	
		<i>For Work In Restricted Working Space, Add</i>	64.45	
23 31 13	13-0434	LF 28" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	259.78	132.48
		<i>For Seal Class B, Add</i>	33.12	
		<i>For Seal Class A, Add</i>	70.66	
		<i>For Work In Restricted Working Space, Add</i>	66.24	
23 31 13	13-0435	LF 28" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	266.81	136.06
		<i>For Seal Class B, Add</i>	34.02	
		<i>For Seal Class A, Add</i>	72.57	
		<i>For Work In Restricted Working Space, Add</i>	68.03	
23 31 13	13-0436	LF 30" x 30", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	210.64	107.42
		<i>For Seal Class B, Add</i>	26.85	
		<i>For Seal Class A, Add</i>	57.29	
		<i>For Work In Restricted Working Space, Add</i>	53.71	
23 31 13	13-0437	LF 30" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	217.65	110.99
		<i>For Seal Class B, Add</i>	27.75	
		<i>For Seal Class A, Add</i>	59.20	
		<i>For Work In Restricted Working Space, Add</i>	55.50	
23 31 13	13-0438	LF 30" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
		<i>For Seal Class B, Add</i>	28.64	
		<i>For Seal Class A, Add</i>	61.11	
		<i>For Work In Restricted Working Space, Add</i>	57.29	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0439 LF 30" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
For Seal Class B, Add	29.54	
For Seal Class A, Add	63.02	
For Work In Restricted Working Space, Add	59.08	
23 31 13 13-0440 LF 30" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
For Seal Class B, Add	30.44	
For Seal Class A, Add	64.93	
For Work In Restricted Working Space, Add	60.87	
23 31 13 13-0441 LF 30" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
For Seal Class B, Add	31.33	
For Seal Class A, Add	66.84	
For Work In Restricted Working Space, Add	62.66	
23 31 13 13-0442 LF 30" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
For Seal Class B, Add	32.22	
For Seal Class A, Add	68.74	
For Work In Restricted Working Space, Add	64.45	
23 31 13 13-0443 LF 30" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	259.78	132.48
For Seal Class B, Add	33.12	
For Seal Class A, Add	70.66	
For Work In Restricted Working Space, Add	66.24	
23 31 13 13-0444 LF 30" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	266.81	136.06
For Seal Class B, Add	34.02	
For Seal Class A, Add	72.57	
For Work In Restricted Working Space, Add	68.03	
23 31 13 13-0445 LF 30" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	273.82	139.64
For Seal Class B, Add	34.91	
For Seal Class A, Add	74.47	
For Work In Restricted Working Space, Add	69.82	
23 31 13 13-0446 LF 32" x 32", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	224.67	114.58
For Seal Class B, Add	28.64	
For Seal Class A, Add	61.11	
For Work In Restricted Working Space, Add	57.29	
23 31 13 13-0447 LF 32" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.70	118.16
For Seal Class B, Add	29.54	
For Seal Class A, Add	63.02	
For Work In Restricted Working Space, Add	59.08	
23 31 13 13-0448 LF 32" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
For Seal Class B, Add	30.44	
For Seal Class A, Add	64.93	
For Work In Restricted Working Space, Add	60.87	
23 31 13 13-0449 LF 32" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
For Seal Class B, Add	31.33	
For Seal Class A, Add	66.84	
For Work In Restricted Working Space, Add	62.66	
23 31 13 13-0450 LF 32" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
For Seal Class B, Add	32.22	
For Seal Class A, Add	68.74	
For Work In Restricted Working Space, Add	64.45	
23 31 13 13-0451 LF 32" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	259.78	132.48
For Seal Class B, Add	33.12	
For Seal Class A, Add	70.66	
For Work In Restricted Working Space, Add	66.24	
23 31 13 13-0452 LF 32" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	266.81	136.06
For Seal Class B, Add	34.02	
For Seal Class A, Add	72.57	
For Work In Restricted Working Space, Add	68.03	
23 31 13 13-0453 LF 32" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	273.82	139.64
For Seal Class B, Add	34.91	
For Seal Class A, Add	74.47	
For Work In Restricted Working Space, Add	69.82	
23 31 13 13-0454 LF 32" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	280.84	143.22
For Seal Class B, Add	35.81	
For Seal Class A, Add	76.38	
For Work In Restricted Working Space, Add	71.61	
23 31 13 13-0455 LF 34" x 34", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	238.72	121.74
For Seal Class B, Add	30.44	
For Seal Class A, Add	64.93	
For Work In Restricted Working Space, Add	60.87	
23 31 13 13-0456 LF 34" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	245.73	125.31
For Seal Class B, Add	31.33	
For Seal Class A, Add	66.84	
For Work In Restricted Working Space, Add	62.66	
23 31 13 13-0457 LF 34" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
For Seal Class B, Add	32.22	
For Seal Class A, Add	68.74	
For Work In Restricted Working Space, Add	64.45	
23 31 13 13-0458 LF 34" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	259.78	132.48
For Seal Class B, Add	33.12	
For Seal Class A, Add	70.66	
For Work In Restricted Working Space, Add	66.24	
23 31 13 13-0459 LF 34" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	266.81	136.06
For Seal Class B, Add	34.02	
For Seal Class A, Add	72.57	
For Work In Restricted Working Space, Add	68.03	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0460	LF 34" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	273.82	139.64
		<i>For Seal Class B, Add</i>	34.91	
		<i>For Seal Class A, Add</i>	74.47	
		<i>For Work In Restricted Working Space, Add</i>	69.82	
23 31 13	13-0461	LF 34" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	280.84	143.22
		<i>For Seal Class B, Add</i>	35.81	
		<i>For Seal Class A, Add</i>	76.38	
		<i>For Work In Restricted Working Space, Add</i>	71.61	
23 31 13	13-0462	LF 34" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	287.87	146.79
		<i>For Seal Class B, Add</i>	36.70	
		<i>For Seal Class A, Add</i>	78.29	
		<i>For Work In Restricted Working Space, Add</i>	73.40	
23 31 13	13-0463	LF 36" x 36", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	252.75	128.90
		<i>For Seal Class B, Add</i>	32.22	
		<i>For Seal Class A, Add</i>	68.74	
		<i>For Work In Restricted Working Space, Add</i>	64.45	
23 31 13	13-0464	LF 36" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	259.78	132.48
		<i>For Seal Class B, Add</i>	33.12	
		<i>For Seal Class A, Add</i>	70.66	
		<i>For Work In Restricted Working Space, Add</i>	66.24	
23 31 13	13-0465	LF 36" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	266.81	136.06
		<i>For Seal Class B, Add</i>	34.02	
		<i>For Seal Class A, Add</i>	72.57	
		<i>For Work In Restricted Working Space, Add</i>	68.03	
23 31 13	13-0466	LF 36" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	273.82	139.64
		<i>For Seal Class B, Add</i>	34.91	
		<i>For Seal Class A, Add</i>	74.47	
		<i>For Work In Restricted Working Space, Add</i>	69.82	
23 31 13	13-0467	LF 36" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	280.84	143.22
		<i>For Seal Class B, Add</i>	35.81	
		<i>For Seal Class A, Add</i>	76.38	
		<i>For Work In Restricted Working Space, Add</i>	71.61	
23 31 13	13-0468	LF 36" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	287.87	146.79
		<i>For Seal Class B, Add</i>	36.70	
		<i>For Seal Class A, Add</i>	78.29	
		<i>For Work In Restricted Working Space, Add</i>	73.40	
23 31 13	13-0469	LF 36" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	294.88	150.38
		<i>For Seal Class B, Add</i>	37.59	
		<i>For Seal Class A, Add</i>	80.20	
		<i>For Work In Restricted Working Space, Add</i>	75.19	
23 31 13	13-0470	LF 38" x 38", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	266.81	136.06
		<i>For Seal Class B, Add</i>	34.02	
		<i>For Seal Class A, Add</i>	72.57	
		<i>For Work In Restricted Working Space, Add</i>	68.03	
23 31 13	13-0471	LF 38" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	273.82	139.64
		<i>For Seal Class B, Add</i>	34.91	
		<i>For Seal Class A, Add</i>	74.47	
		<i>For Work In Restricted Working Space, Add</i>	69.82	
23 31 13	13-0472	LF 38" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	280.84	143.22
		<i>For Seal Class B, Add</i>	35.81	
		<i>For Seal Class A, Add</i>	76.38	
		<i>For Work In Restricted Working Space, Add</i>	71.61	
23 31 13	13-0473	LF 38" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	287.87	146.79
		<i>For Seal Class B, Add</i>	36.70	
		<i>For Seal Class A, Add</i>	78.29	
		<i>For Work In Restricted Working Space, Add</i>	73.40	
23 31 13	13-0474	LF 38" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	294.88	150.38
		<i>For Seal Class B, Add</i>	37.59	
		<i>For Seal Class A, Add</i>	80.20	
		<i>For Work In Restricted Working Space, Add</i>	75.19	
23 31 13	13-0475	LF 38" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.91	153.97
		<i>For Seal Class B, Add</i>	38.49	
		<i>For Seal Class A, Add</i>	82.12	
		<i>For Work In Restricted Working Space, Add</i>	76.98	
23 31 13	13-0476	LF 38" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	308.93	157.54
		<i>For Seal Class B, Add</i>	39.39	
		<i>For Seal Class A, Add</i>	84.02	
		<i>For Work In Restricted Working Space, Add</i>	78.77	
23 31 13	13-0477	LF 40" x 40", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	280.84	143.22
		<i>For Seal Class B, Add</i>	35.81	
		<i>For Seal Class A, Add</i>	76.38	
		<i>For Work In Restricted Working Space, Add</i>	71.61	
23 31 13	13-0478	LF 40" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	287.87	146.79
		<i>For Seal Class B, Add</i>	36.70	
		<i>For Seal Class A, Add</i>	78.29	
		<i>For Work In Restricted Working Space, Add</i>	73.40	
23 31 13	13-0479	LF 40" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	294.88	150.38
		<i>For Seal Class B, Add</i>	37.59	
		<i>For Seal Class A, Add</i>	80.20	
		<i>For Work In Restricted Working Space, Add</i>	75.19	
23 31 13	13-0480	LF 40" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.91	153.97
		<i>For Seal Class B, Add</i>	38.49	
		<i>For Seal Class A, Add</i>	82.12	
		<i>For Work In Restricted Working Space, Add</i>	76.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0481 LF 40" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	308.93	157.54
<i>For Seal Class B, Add</i>	39.39	
<i>For Seal Class A, Add</i>	84.02	
<i>For Work In Restricted Working Space, Add</i>	78.77	
23 31 13 13-0482 LF 40" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	315.95	161.13
<i>For Seal Class B, Add</i>	40.28	
<i>For Seal Class A, Add</i>	85.93	
<i>For Work In Restricted Working Space, Add</i>	80.56	
23 31 13 13-0483 LF 40" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.96	164.70
<i>For Seal Class B, Add</i>	41.18	
<i>For Seal Class A, Add</i>	87.84	
<i>For Work In Restricted Working Space, Add</i>	82.35	
23 31 13 13-0484 LF 40" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	329.99	168.28
<i>For Seal Class B, Add</i>	42.07	
<i>For Seal Class A, Add</i>	89.75	
<i>For Work In Restricted Working Space, Add</i>	84.14	
23 31 13 13-0485 LF 42" x 42", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	294.88	150.38
<i>For Seal Class B, Add</i>	37.59	
<i>For Seal Class A, Add</i>	80.20	
<i>For Work In Restricted Working Space, Add</i>	75.19	
23 31 13 13-0486 LF 42" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.91	153.97
<i>For Seal Class B, Add</i>	38.49	
<i>For Seal Class A, Add</i>	82.12	
<i>For Work In Restricted Working Space, Add</i>	76.98	
23 31 13 13-0487 LF 42" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	308.93	157.54
<i>For Seal Class B, Add</i>	39.39	
<i>For Seal Class A, Add</i>	84.02	
<i>For Work In Restricted Working Space, Add</i>	78.77	
23 31 13 13-0488 LF 42" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	315.95	161.13
<i>For Seal Class B, Add</i>	40.28	
<i>For Seal Class A, Add</i>	85.93	
<i>For Work In Restricted Working Space, Add</i>	80.56	
23 31 13 13-0489 LF 42" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.96	164.70
<i>For Seal Class B, Add</i>	41.18	
<i>For Seal Class A, Add</i>	87.84	
<i>For Work In Restricted Working Space, Add</i>	82.35	
23 31 13 13-0490 LF 42" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	329.99	168.28
<i>For Seal Class B, Add</i>	42.07	
<i>For Seal Class A, Add</i>	89.75	
<i>For Work In Restricted Working Space, Add</i>	84.14	
23 31 13 13-0491 LF 42" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	337.01	171.86
<i>For Seal Class B, Add</i>	42.97	
<i>For Seal Class A, Add</i>	91.66	
<i>For Work In Restricted Working Space, Add</i>	85.93	
23 31 13 13-0492 LF 44" x 44", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	308.93	157.54
<i>For Seal Class B, Add</i>	39.39	
<i>For Seal Class A, Add</i>	84.02	
<i>For Work In Restricted Working Space, Add</i>	78.77	
23 31 13 13-0493 LF 44" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	315.95	161.13
<i>For Seal Class B, Add</i>	40.28	
<i>For Seal Class A, Add</i>	85.93	
<i>For Work In Restricted Working Space, Add</i>	80.56	
23 31 13 13-0494 LF 44" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.96	164.70
<i>For Seal Class B, Add</i>	41.18	
<i>For Seal Class A, Add</i>	87.84	
<i>For Work In Restricted Working Space, Add</i>	82.35	
23 31 13 13-0495 LF 44" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	329.99	168.28
<i>For Seal Class B, Add</i>	42.07	
<i>For Seal Class A, Add</i>	89.75	
<i>For Work In Restricted Working Space, Add</i>	84.14	
23 31 13 13-0496 LF 44" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	337.01	171.86
<i>For Seal Class B, Add</i>	42.97	
<i>For Seal Class A, Add</i>	91.66	
<i>For Work In Restricted Working Space, Add</i>	85.93	
23 31 13 13-0497 LF 44" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.02	175.45
<i>For Seal Class B, Add</i>	43.86	
<i>For Seal Class A, Add</i>	93.57	
<i>For Work In Restricted Working Space, Add</i>	87.72	
23 31 13 13-0498 LF 46" x 46", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.96	164.70
<i>For Seal Class B, Add</i>	41.18	
<i>For Seal Class A, Add</i>	87.84	
<i>For Work In Restricted Working Space, Add</i>	82.35	
23 31 13 13-0499 LF 46" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	329.99	168.28
<i>For Seal Class B, Add</i>	42.07	
<i>For Seal Class A, Add</i>	89.75	
<i>For Work In Restricted Working Space, Add</i>	84.14	
23 31 13 13-0500 LF 46" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	337.01	171.86
<i>For Seal Class B, Add</i>	42.97	
<i>For Seal Class A, Add</i>	91.66	
<i>For Work In Restricted Working Space, Add</i>	85.93	
23 31 13 13-0501 LF 46" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.02	175.45
<i>For Seal Class B, Add</i>	43.86	
<i>For Seal Class A, Add</i>	93.57	
<i>For Work In Restricted Working Space, Add</i>	87.72	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13	13-0502	LF	46" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	351.06	179.03
			<i>For Seal Class B, Add</i>	44.76	
			<i>For Seal Class A, Add</i>	95.48	
			<i>For Work In Restricted Working Space, Add</i>	89.51	
23 31 13	13-0503	LF	48" x 48", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	337.01	171.86
			<i>For Seal Class B, Add</i>	42.97	
			<i>For Seal Class A, Add</i>	91.66	
			<i>For Work In Restricted Working Space, Add</i>	85.93	
23 31 13	13-0504	LF	48" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.02	175.45
			<i>For Seal Class B, Add</i>	43.86	
			<i>For Seal Class A, Add</i>	93.57	
			<i>For Work In Restricted Working Space, Add</i>	87.72	
23 31 13	13-0505	LF	48" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	351.06	179.03
			<i>For Seal Class B, Add</i>	44.76	
			<i>For Seal Class A, Add</i>	95.48	
			<i>For Work In Restricted Working Space, Add</i>	89.51	
23 31 13	13-0506	LF	48" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	358.08	182.61
			<i>For Seal Class B, Add</i>	45.65	
			<i>For Seal Class A, Add</i>	97.39	
			<i>For Work In Restricted Working Space, Add</i>	91.31	
23 31 13	13-0507	LF	50" x 50", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	351.06	179.03
			<i>For Seal Class B, Add</i>	44.76	
			<i>For Seal Class A, Add</i>	95.48	
			<i>For Work In Restricted Working Space, Add</i>	89.51	
23 31 13	13-0508	LF	50" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	358.08	182.61
			<i>For Seal Class B, Add</i>	45.65	
			<i>For Seal Class A, Add</i>	97.39	
			<i>For Work In Restricted Working Space, Add</i>	91.31	
23 31 13	13-0509	LF	50" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	365.10	186.18
			<i>For Seal Class B, Add</i>	46.55	
			<i>For Seal Class A, Add</i>	99.30	
			<i>For Work In Restricted Working Space, Add</i>	93.09	
23 31 13	13-0510	LF	52" x 52", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	365.10	186.18
			<i>For Seal Class B, Add</i>	46.55	
			<i>For Seal Class A, Add</i>	99.30	
			<i>For Work In Restricted Working Space, Add</i>	93.09	
23 31 13	13-0511	LF	52" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	372.11	189.77
			<i>For Seal Class B, Add</i>	47.44	
			<i>For Seal Class A, Add</i>	101.21	
			<i>For Work In Restricted Working Space, Add</i>	94.88	
23 31 13	13-0512	LF	54" x 54", 22 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	379.13	193.34
			<i>For Seal Class B, Add</i>	48.34	
			<i>For Seal Class A, Add</i>	103.12	
			<i>For Work In Restricted Working Space, Add</i>	96.67	
23 31 13	13-0513		20 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13	13-0514	LF	4" x 4", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	33.07	16.87
			<i>For Seal Class B, Add</i>	4.22	
			<i>For Seal Class A, Add</i>	9.00	
			<i>For Work In Restricted Working Space, Add</i>	8.44	
23 31 13	13-0515	LF	4" x 6", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	41.35	21.08
			<i>For Seal Class B, Add</i>	5.27	
			<i>For Seal Class A, Add</i>	11.25	
			<i>For Work In Restricted Working Space, Add</i>	10.55	
23 31 13	13-0516	LF	4" x 8", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.62	25.30
			<i>For Seal Class B, Add</i>	6.33	
			<i>For Seal Class A, Add</i>	13.49	
			<i>For Work In Restricted Working Space, Add</i>	12.65	
23 31 13	13-0517	LF	4" x 10", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	57.88	29.51
			<i>For Seal Class B, Add</i>	7.38	
			<i>For Seal Class A, Add</i>	15.74	
			<i>For Work In Restricted Working Space, Add</i>	14.76	
23 31 13	13-0518	LF	4" x 12", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.16	33.74
			<i>For Seal Class B, Add</i>	8.43	
			<i>For Seal Class A, Add</i>	17.99	
			<i>For Work In Restricted Working Space, Add</i>	16.87	
23 31 13	13-0519	LF	4" x 14", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	74.43	37.95
			<i>For Seal Class B, Add</i>	9.49	
			<i>For Seal Class A, Add</i>	20.24	
			<i>For Work In Restricted Working Space, Add</i>	18.98	
23 31 13	13-0520	LF	4" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.69	42.17
			<i>For Seal Class B, Add</i>	10.54	
			<i>For Seal Class A, Add</i>	22.49	
			<i>For Work In Restricted Working Space, Add</i>	21.09	
23 31 13	13-0521	LF	6" x 6", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	49.62	25.30
			<i>For Seal Class B, Add</i>	6.33	
			<i>For Seal Class A, Add</i>	13.49	
			<i>For Work In Restricted Working Space, Add</i>	12.65	
23 31 13	13-0522	LF	6" x 8", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	57.88	29.51
			<i>For Seal Class B, Add</i>	7.38	
			<i>For Seal Class A, Add</i>	15.74	
			<i>For Work In Restricted Working Space, Add</i>	14.76	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0523 LF 6" x 10", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.16	33.74
For Seal Class B, Add	8.43	
For Seal Class A, Add	17.99	
For Work In Restricted Working Space, Add	16.87	
23 31 13 13-0524 LF 6" x 12", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	74.43	37.95
For Seal Class B, Add	9.49	
For Seal Class A, Add	20.24	
For Work In Restricted Working Space, Add	18.98	
23 31 13 13-0525 LF 6" x 14", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.69	42.17
For Seal Class B, Add	10.54	
For Seal Class A, Add	22.49	
For Work In Restricted Working Space, Add	21.09	
23 31 13 13-0526 LF 6" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	90.97	46.39
For Seal Class B, Add	11.60	
For Seal Class A, Add	24.74	
For Work In Restricted Working Space, Add	23.20	
23 31 13 13-0527 LF 8" x 8", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	66.16	33.74
For Seal Class B, Add	8.43	
For Seal Class A, Add	17.99	
For Work In Restricted Working Space, Add	16.87	
23 31 13 13-0528 LF 8" x 10", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	74.43	37.95
For Seal Class B, Add	9.49	
For Seal Class A, Add	20.24	
For Work In Restricted Working Space, Add	18.98	
23 31 13 13-0529 LF 8" x 12", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.69	42.17
For Seal Class B, Add	10.54	
For Seal Class A, Add	22.49	
For Work In Restricted Working Space, Add	21.09	
23 31 13 13-0530 LF 8" x 14", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	90.97	46.39
For Seal Class B, Add	11.60	
For Seal Class A, Add	24.74	
For Work In Restricted Working Space, Add	23.20	
23 31 13 13-0531 LF 8" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	99.23	50.61
For Seal Class B, Add	12.65	
For Seal Class A, Add	26.99	
For Work In Restricted Working Space, Add	25.31	
23 31 13 13-0532 LF 8" x 18", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.50	54.81
For Seal Class B, Add	13.71	
For Seal Class A, Add	29.24	
For Work In Restricted Working Space, Add	27.41	
23 31 13 13-0533 LF 8" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	115.78	59.04
For Seal Class B, Add	14.76	
For Seal Class A, Add	31.49	
For Work In Restricted Working Space, Add	29.52	
23 31 13 13-0534 LF 8" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	124.03	63.25
For Seal Class B, Add	15.81	
For Seal Class A, Add	33.73	
For Work In Restricted Working Space, Add	31.63	
23 31 13 13-0535 LF 8" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	132.31	67.47
For Seal Class B, Add	16.87	
For Seal Class A, Add	35.98	
For Work In Restricted Working Space, Add	33.74	
23 31 13 13-0536 LF 10" x 10", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	82.69	42.17
For Seal Class B, Add	10.54	
For Seal Class A, Add	22.49	
For Work In Restricted Working Space, Add	21.09	
23 31 13 13-0537 LF 10" x 12", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	90.97	46.39
For Seal Class B, Add	11.60	
For Seal Class A, Add	24.74	
For Work In Restricted Working Space, Add	23.20	
23 31 13 13-0538 LF 10" x 14", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	99.23	50.61
For Seal Class B, Add	12.65	
For Seal Class A, Add	26.99	
For Work In Restricted Working Space, Add	25.31	
23 31 13 13-0539 LF 10" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.50	54.81
For Seal Class B, Add	13.71	
For Seal Class A, Add	29.24	
For Work In Restricted Working Space, Add	27.41	
23 31 13 13-0540 LF 10" x 18", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	115.78	59.04
For Seal Class B, Add	14.76	
For Seal Class A, Add	31.49	
For Work In Restricted Working Space, Add	29.52	
23 31 13 13-0541 LF 10" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	124.03	63.25
For Seal Class B, Add	15.81	
For Seal Class A, Add	33.73	
For Work In Restricted Working Space, Add	31.63	
23 31 13 13-0542 LF 10" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	132.31	67.47
For Seal Class B, Add	16.87	
For Seal Class A, Add	35.98	
For Work In Restricted Working Space, Add	33.74	
23 31 13 13-0543 LF 10" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.60	71.69
For Seal Class B, Add	17.92	
For Seal Class A, Add	38.24	
For Work In Restricted Working Space, Add	35.85	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 31 13	13-0544	LF 10" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	148.85		75.91
		<i>For Seal Class B, Add</i>	18.98		
		<i>For Seal Class A, Add</i>	40.49		
		<i>For Work In Restricted Working Space, Add</i>	37.96		
23 31 13	13-0545	LF 10" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.13		80.12
		<i>For Seal Class B, Add</i>	20.03		
		<i>For Seal Class A, Add</i>	42.74		
		<i>For Work In Restricted Working Space, Add</i>	40.07		
23 31 13	13-0546	LF 10" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	165.38		84.35
		<i>For Seal Class B, Add</i>	21.09		
		<i>For Seal Class A, Add</i>	44.98		
		<i>For Work In Restricted Working Space, Add</i>	42.17		
23 31 13	13-0547	LF 10" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	173.66		88.56
		<i>For Seal Class B, Add</i>	22.14		
		<i>For Seal Class A, Add</i>	47.23		
		<i>For Work In Restricted Working Space, Add</i>	44.28		
23 31 13	13-0548	LF 12" x 12", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	99.23		50.61
		<i>For Seal Class B, Add</i>	12.65		
		<i>For Seal Class A, Add</i>	26.99		
		<i>For Work In Restricted Working Space, Add</i>	25.31		
23 31 13	13-0549	LF 12" x 14", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.50		54.81
		<i>For Seal Class B, Add</i>	13.71		
		<i>For Seal Class A, Add</i>	29.24		
		<i>For Work In Restricted Working Space, Add</i>	27.41		
23 31 13	13-0550	LF 12" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	115.78		59.04
		<i>For Seal Class B, Add</i>	14.76		
		<i>For Seal Class A, Add</i>	31.49		
		<i>For Work In Restricted Working Space, Add</i>	29.52		
23 31 13	13-0551	LF 12" x 18", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	124.03		63.25
		<i>For Seal Class B, Add</i>	15.81		
		<i>For Seal Class A, Add</i>	33.73		
		<i>For Work In Restricted Working Space, Add</i>	31.63		
23 31 13	13-0552	LF 12" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	132.31		67.47
		<i>For Seal Class B, Add</i>	16.87		
		<i>For Seal Class A, Add</i>	35.98		
		<i>For Work In Restricted Working Space, Add</i>	33.74		
23 31 13	13-0553	LF 12" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.60		71.69
		<i>For Seal Class B, Add</i>	17.92		
		<i>For Seal Class A, Add</i>	38.24		
		<i>For Work In Restricted Working Space, Add</i>	35.85		
23 31 13	13-0554	LF 12" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	148.85		75.91
		<i>For Seal Class B, Add</i>	18.98		
		<i>For Seal Class A, Add</i>	40.49		
		<i>For Work In Restricted Working Space, Add</i>	37.96		
23 31 13	13-0555	LF 12" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.13		80.12
		<i>For Seal Class B, Add</i>	20.03		
		<i>For Seal Class A, Add</i>	42.74		
		<i>For Work In Restricted Working Space, Add</i>	40.07		
23 31 13	13-0556	LF 12" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	165.38		84.35
		<i>For Seal Class B, Add</i>	21.09		
		<i>For Seal Class A, Add</i>	44.98		
		<i>For Work In Restricted Working Space, Add</i>	42.17		
23 31 13	13-0557	LF 12" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	173.66		88.56
		<i>For Seal Class B, Add</i>	22.14		
		<i>For Seal Class A, Add</i>	47.23		
		<i>For Work In Restricted Working Space, Add</i>	44.28		
23 31 13	13-0558	LF 12" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	181.93		92.77
		<i>For Seal Class B, Add</i>	23.19		
		<i>For Seal Class A, Add</i>	49.48		
		<i>For Work In Restricted Working Space, Add</i>	46.39		
23 31 13	13-0559	LF 12" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	190.19		96.99
		<i>For Seal Class B, Add</i>	24.25		
		<i>For Seal Class A, Add</i>	51.73		
		<i>For Work In Restricted Working Space, Add</i>	48.50		
23 31 13	13-0560	LF 12" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48		101.21
		<i>For Seal Class B, Add</i>	25.30		
		<i>For Seal Class A, Add</i>	53.98		
		<i>For Work In Restricted Working Space, Add</i>	50.61		
23 31 13	13-0561	LF 14" x 14", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	115.78		59.04
		<i>For Seal Class B, Add</i>	14.76		
		<i>For Seal Class A, Add</i>	31.49		
		<i>For Work In Restricted Working Space, Add</i>	29.52		
23 31 13	13-0562	LF 14" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	124.03		63.25
		<i>For Seal Class B, Add</i>	15.81		
		<i>For Seal Class A, Add</i>	33.73		
		<i>For Work In Restricted Working Space, Add</i>	31.63		
23 31 13	13-0563	LF 14" x 18", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	132.31		67.47
		<i>For Seal Class B, Add</i>	16.87		
		<i>For Seal Class A, Add</i>	35.98		
		<i>For Work In Restricted Working Space, Add</i>	33.74		
23 31 13	13-0564	LF 14" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.60		71.69
		<i>For Seal Class B, Add</i>	17.92		
		<i>For Seal Class A, Add</i>	38.24		
		<i>For Work In Restricted Working Space, Add</i>	35.85		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0565 LF 14" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	148.85	75.91
For Seal Class B, Add	18.98	
For Seal Class A, Add	40.49	
For Work In Restricted Working Space, Add	37.96	
23 31 13 13-0566 LF 14" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.13	80.12
For Seal Class B, Add	20.03	
For Seal Class A, Add	42.74	
For Work In Restricted Working Space, Add	40.07	
23 31 13 13-0567 LF 14" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	165.38	84.35
For Seal Class B, Add	21.09	
For Seal Class A, Add	44.98	
For Work In Restricted Working Space, Add	42.17	
23 31 13 13-0568 LF 14" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	173.66	88.56
For Seal Class B, Add	22.14	
For Seal Class A, Add	47.23	
For Work In Restricted Working Space, Add	44.28	
23 31 13 13-0569 LF 14" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	181.93	92.77
For Seal Class B, Add	23.19	
For Seal Class A, Add	49.48	
For Work In Restricted Working Space, Add	46.39	
23 31 13 13-0570 LF 14" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	190.19	96.99
For Seal Class B, Add	24.25	
For Seal Class A, Add	51.73	
For Work In Restricted Working Space, Add	48.50	
23 31 13 13-0571 LF 14" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48	101.21
For Seal Class B, Add	25.30	
For Seal Class A, Add	53.98	
For Work In Restricted Working Space, Add	50.61	
23 31 13 13-0572 LF 14" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	206.73	105.42
For Seal Class B, Add	26.36	
For Seal Class A, Add	56.23	
For Work In Restricted Working Space, Add	52.72	
23 31 13 13-0573 LF 16" x 16", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	132.31	67.47
For Seal Class B, Add	16.87	
For Seal Class A, Add	35.98	
For Work In Restricted Working Space, Add	33.74	
23 31 13 13-0574 LF 16" x 18", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	140.60	71.69
For Seal Class B, Add	17.92	
For Seal Class A, Add	38.24	
For Work In Restricted Working Space, Add	35.85	
23 31 13 13-0575 LF 16" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	148.85	75.91
For Seal Class B, Add	18.98	
For Seal Class A, Add	40.49	
For Work In Restricted Working Space, Add	37.96	
23 31 13 13-0576 LF 16" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.13	80.12
For Seal Class B, Add	20.03	
For Seal Class A, Add	42.74	
For Work In Restricted Working Space, Add	40.07	
23 31 13 13-0577 LF 16" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	165.38	84.35
For Seal Class B, Add	21.09	
For Seal Class A, Add	44.98	
For Work In Restricted Working Space, Add	42.17	
23 31 13 13-0578 LF 16" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	173.66	88.56
For Seal Class B, Add	22.14	
For Seal Class A, Add	47.23	
For Work In Restricted Working Space, Add	44.28	
23 31 13 13-0579 LF 16" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	181.93	92.77
For Seal Class B, Add	23.19	
For Seal Class A, Add	49.48	
For Work In Restricted Working Space, Add	46.39	
23 31 13 13-0580 LF 16" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	190.19	96.99
For Seal Class B, Add	24.25	
For Seal Class A, Add	51.73	
For Work In Restricted Working Space, Add	48.50	
23 31 13 13-0581 LF 16" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48	101.21
For Seal Class B, Add	25.30	
For Seal Class A, Add	53.98	
For Work In Restricted Working Space, Add	50.61	
23 31 13 13-0582 LF 16" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	206.73	105.42
For Seal Class B, Add	26.36	
For Seal Class A, Add	56.23	
For Work In Restricted Working Space, Add	52.72	
23 31 13 13-0583 LF 16" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.01	109.65
For Seal Class B, Add	27.41	
For Seal Class A, Add	58.48	
For Work In Restricted Working Space, Add	54.83	
23 31 13 13-0584 LF 16" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	223.28	113.86
For Seal Class B, Add	28.47	
For Seal Class A, Add	60.73	
For Work In Restricted Working Space, Add	56.93	
23 31 13 13-0585 LF 16" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54	118.08
For Seal Class B, Add	29.52	
For Seal Class A, Add	62.98	
For Work In Restricted Working Space, Add	59.04	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 31 13	13-0586	LF 16" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81		122.30
		<i>For Seal Class B, Add</i>	30.57		
		<i>For Seal Class A, Add</i>	65.22		
		<i>For Work In Restricted Working Space, Add</i>	61.15		
23 31 13	13-0587	LF 16" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10		126.52
		<i>For Seal Class B, Add</i>	31.63		
		<i>For Seal Class A, Add</i>	67.48		
		<i>For Work In Restricted Working Space, Add</i>	63.26		
23 31 13	13-0588	LF 18" x 18", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	148.85		75.91
		<i>For Seal Class B, Add</i>	18.98		
		<i>For Seal Class A, Add</i>	40.49		
		<i>For Work In Restricted Working Space, Add</i>	37.96		
23 31 13	13-0589	LF 18" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	157.13		80.12
		<i>For Seal Class B, Add</i>	20.03		
		<i>For Seal Class A, Add</i>	42.74		
		<i>For Work In Restricted Working Space, Add</i>	40.07		
23 31 13	13-0590	LF 18" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	165.38		84.35
		<i>For Seal Class B, Add</i>	21.09		
		<i>For Seal Class A, Add</i>	44.98		
		<i>For Work In Restricted Working Space, Add</i>	42.17		
23 31 13	13-0591	LF 18" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	173.66		88.56
		<i>For Seal Class B, Add</i>	22.14		
		<i>For Seal Class A, Add</i>	47.23		
		<i>For Work In Restricted Working Space, Add</i>	44.28		
23 31 13	13-0592	LF 18" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	181.93		92.77
		<i>For Seal Class B, Add</i>	23.19		
		<i>For Seal Class A, Add</i>	49.48		
		<i>For Work In Restricted Working Space, Add</i>	46.39		
23 31 13	13-0593	LF 18" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	190.19		96.99
		<i>For Seal Class B, Add</i>	24.25		
		<i>For Seal Class A, Add</i>	51.73		
		<i>For Work In Restricted Working Space, Add</i>	48.50		
23 31 13	13-0594	LF 18" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48		101.21
		<i>For Seal Class B, Add</i>	25.30		
		<i>For Seal Class A, Add</i>	53.98		
		<i>For Work In Restricted Working Space, Add</i>	50.61		
23 31 13	13-0595	LF 18" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	206.73		105.42
		<i>For Seal Class B, Add</i>	26.36		
		<i>For Seal Class A, Add</i>	56.23		
		<i>For Work In Restricted Working Space, Add</i>	52.72		
23 31 13	13-0596	LF 18" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.01		109.65
		<i>For Seal Class B, Add</i>	27.41		
		<i>For Seal Class A, Add</i>	58.48		
		<i>For Work In Restricted Working Space, Add</i>	54.83		
23 31 13	13-0597	LF 18" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	223.28		113.86
		<i>For Seal Class B, Add</i>	28.47		
		<i>For Seal Class A, Add</i>	60.73		
		<i>For Work In Restricted Working Space, Add</i>	56.93		
23 31 13	13-0598	LF 18" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54		118.08
		<i>For Seal Class B, Add</i>	29.52		
		<i>For Seal Class A, Add</i>	62.98		
		<i>For Work In Restricted Working Space, Add</i>	59.04		
23 31 13	13-0599	LF 18" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81		122.30
		<i>For Seal Class B, Add</i>	30.57		
		<i>For Seal Class A, Add</i>	65.22		
		<i>For Work In Restricted Working Space, Add</i>	61.15		
23 31 13	13-0600	LF 18" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10		126.52
		<i>For Seal Class B, Add</i>	31.63		
		<i>For Seal Class A, Add</i>	67.48		
		<i>For Work In Restricted Working Space, Add</i>	63.26		
23 31 13	13-0601	LF 18" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34		130.72
		<i>For Seal Class B, Add</i>	32.68		
		<i>For Seal Class A, Add</i>	69.72		
		<i>For Work In Restricted Working Space, Add</i>	65.36		
23 31 13	13-0602	LF 18" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63		134.95
		<i>For Seal Class B, Add</i>	33.74		
		<i>For Seal Class A, Add</i>	71.97		
		<i>For Work In Restricted Working Space, Add</i>	67.48		
23 31 13	13-0603	LF 20" x 20", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	165.38		84.35
		<i>For Seal Class B, Add</i>	21.09		
		<i>For Seal Class A, Add</i>	44.98		
		<i>For Work In Restricted Working Space, Add</i>	42.17		
23 31 13	13-0604	LF 20" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	173.66		88.56
		<i>For Seal Class B, Add</i>	22.14		
		<i>For Seal Class A, Add</i>	47.23		
		<i>For Work In Restricted Working Space, Add</i>	44.28		
23 31 13	13-0605	LF 20" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	181.93		92.77
		<i>For Seal Class B, Add</i>	23.19		
		<i>For Seal Class A, Add</i>	49.48		
		<i>For Work In Restricted Working Space, Add</i>	46.39		
23 31 13	13-0606	LF 20" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	190.19		96.99
		<i>For Seal Class B, Add</i>	24.25		
		<i>For Seal Class A, Add</i>	51.73		
		<i>For Work In Restricted Working Space, Add</i>	48.50		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0607 LF 20" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48	101.21
For Seal Class B, Add	25.30	
For Seal Class A, Add	53.98	
For Work In Restricted Working Space, Add	50.61	
23 31 13 13-0608 LF 20" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	206.73	105.42
For Seal Class B, Add	26.36	
For Seal Class A, Add	56.23	
For Work In Restricted Working Space, Add	52.72	
23 31 13 13-0609 LF 20" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.01	109.65
For Seal Class B, Add	27.41	
For Seal Class A, Add	58.48	
For Work In Restricted Working Space, Add	54.83	
23 31 13 13-0610 LF 20" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	223.28	113.86
For Seal Class B, Add	28.47	
For Seal Class A, Add	60.73	
For Work In Restricted Working Space, Add	56.93	
23 31 13 13-0611 LF 20" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54	118.08
For Seal Class B, Add	29.52	
For Seal Class A, Add	62.98	
For Work In Restricted Working Space, Add	59.04	
23 31 13 13-0612 LF 20" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81	122.30
For Seal Class B, Add	30.57	
For Seal Class A, Add	65.22	
For Work In Restricted Working Space, Add	61.15	
23 31 13 13-0613 LF 20" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10	126.52
For Seal Class B, Add	31.63	
For Seal Class A, Add	67.48	
For Work In Restricted Working Space, Add	63.26	
23 31 13 13-0614 LF 20" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34	130.72
For Seal Class B, Add	32.68	
For Seal Class A, Add	69.72	
For Work In Restricted Working Space, Add	65.36	
23 31 13 13-0615 LF 20" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
For Seal Class B, Add	33.74	
For Seal Class A, Add	71.97	
For Work In Restricted Working Space, Add	67.48	
23 31 13 13-0616 LF 20" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
For Seal Class B, Add	34.79	
For Seal Class A, Add	74.22	
For Work In Restricted Working Space, Add	69.59	
23 31 13 13-0617 LF 20" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
For Seal Class B, Add	35.85	
For Seal Class A, Add	76.47	
For Work In Restricted Working Space, Add	71.69	
23 31 13 13-0618 LF 22" x 22", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	181.93	92.77
For Seal Class B, Add	23.19	
For Seal Class A, Add	49.48	
For Work In Restricted Working Space, Add	46.39	
23 31 13 13-0619 LF 22" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	190.19	96.99
For Seal Class B, Add	24.25	
For Seal Class A, Add	51.73	
For Work In Restricted Working Space, Add	48.50	
23 31 13 13-0620 LF 22" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48	101.21
For Seal Class B, Add	25.30	
For Seal Class A, Add	53.98	
For Work In Restricted Working Space, Add	50.61	
23 31 13 13-0621 LF 22" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	206.73	105.42
For Seal Class B, Add	26.36	
For Seal Class A, Add	56.23	
For Work In Restricted Working Space, Add	52.72	
23 31 13 13-0622 LF 22" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.01	109.65
For Seal Class B, Add	27.41	
For Seal Class A, Add	58.48	
For Work In Restricted Working Space, Add	54.83	
23 31 13 13-0623 LF 22" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	223.28	113.86
For Seal Class B, Add	28.47	
For Seal Class A, Add	60.73	
For Work In Restricted Working Space, Add	56.93	
23 31 13 13-0624 LF 22" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54	118.08
For Seal Class B, Add	29.52	
For Seal Class A, Add	62.98	
For Work In Restricted Working Space, Add	59.04	
23 31 13 13-0625 LF 22" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81	122.30
For Seal Class B, Add	30.57	
For Seal Class A, Add	65.22	
For Work In Restricted Working Space, Add	61.15	
23 31 13 13-0626 LF 22" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10	126.52
For Seal Class B, Add	31.63	
For Seal Class A, Add	67.48	
For Work In Restricted Working Space, Add	63.26	
23 31 13 13-0627 LF 22" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34	130.72
For Seal Class B, Add	32.68	
For Seal Class A, Add	69.72	
For Work In Restricted Working Space, Add	65.36	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0628	LF 22" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
		<i>For Seal Class B, Add</i>	33.74	
		<i>For Seal Class A, Add</i>	71.97	
		<i>For Work In Restricted Working Space, Add</i>	67.48	
23 31 13	13-0629	LF 22" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
		<i>For Seal Class B, Add</i>	34.79	
		<i>For Seal Class A, Add</i>	74.22	
		<i>For Work In Restricted Working Space, Add</i>	69.59	
23 31 13	13-0630	LF 22" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
		<i>For Seal Class B, Add</i>	35.85	
		<i>For Seal Class A, Add</i>	76.47	
		<i>For Work In Restricted Working Space, Add</i>	71.69	
23 31 13	13-0631	LF 22" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
		<i>For Seal Class B, Add</i>	36.90	
		<i>For Seal Class A, Add</i>	78.72	
		<i>For Work In Restricted Working Space, Add</i>	73.80	
23 31 13	13-0632	LF 24" x 24", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	198.48	101.21
		<i>For Seal Class B, Add</i>	25.30	
		<i>For Seal Class A, Add</i>	53.98	
		<i>For Work In Restricted Working Space, Add</i>	50.61	
23 31 13	13-0633	LF 24" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	206.73	105.42
		<i>For Seal Class B, Add</i>	26.36	
		<i>For Seal Class A, Add</i>	56.23	
		<i>For Work In Restricted Working Space, Add</i>	52.72	
23 31 13	13-0634	LF 24" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.01	109.65
		<i>For Seal Class B, Add</i>	27.41	
		<i>For Seal Class A, Add</i>	58.48	
		<i>For Work In Restricted Working Space, Add</i>	54.83	
23 31 13	13-0635	LF 24" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	223.28	113.86
		<i>For Seal Class B, Add</i>	28.47	
		<i>For Seal Class A, Add</i>	60.73	
		<i>For Work In Restricted Working Space, Add</i>	56.93	
23 31 13	13-0636	LF 24" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54	118.08
		<i>For Seal Class B, Add</i>	29.52	
		<i>For Seal Class A, Add</i>	62.98	
		<i>For Work In Restricted Working Space, Add</i>	59.04	
23 31 13	13-0637	LF 24" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81	122.30
		<i>For Seal Class B, Add</i>	30.57	
		<i>For Seal Class A, Add</i>	65.22	
		<i>For Work In Restricted Working Space, Add</i>	61.15	
23 31 13	13-0638	LF 24" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10	126.52
		<i>For Seal Class B, Add</i>	31.63	
		<i>For Seal Class A, Add</i>	67.48	
		<i>For Work In Restricted Working Space, Add</i>	63.26	
23 31 13	13-0639	LF 24" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34	130.72
		<i>For Seal Class B, Add</i>	32.68	
		<i>For Seal Class A, Add</i>	69.72	
		<i>For Work In Restricted Working Space, Add</i>	65.36	
23 31 13	13-0640	LF 24" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
		<i>For Seal Class B, Add</i>	33.74	
		<i>For Seal Class A, Add</i>	71.97	
		<i>For Work In Restricted Working Space, Add</i>	67.48	
23 31 13	13-0641	LF 24" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
		<i>For Seal Class B, Add</i>	34.79	
		<i>For Seal Class A, Add</i>	74.22	
		<i>For Work In Restricted Working Space, Add</i>	69.59	
23 31 13	13-0642	LF 24" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
		<i>For Seal Class B, Add</i>	35.85	
		<i>For Seal Class A, Add</i>	76.47	
		<i>For Work In Restricted Working Space, Add</i>	71.69	
23 31 13	13-0643	LF 24" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
		<i>For Seal Class B, Add</i>	36.90	
		<i>For Seal Class A, Add</i>	78.72	
		<i>For Work In Restricted Working Space, Add</i>	73.80	
23 31 13	13-0644	LF 24" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
		<i>For Seal Class B, Add</i>	37.95	
		<i>For Seal Class A, Add</i>	80.97	
		<i>For Work In Restricted Working Space, Add</i>	75.91	
23 31 13	13-0645	LF 26" x 26", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.01	109.65
		<i>For Seal Class B, Add</i>	27.41	
		<i>For Seal Class A, Add</i>	58.48	
		<i>For Work In Restricted Working Space, Add</i>	54.83	
23 31 13	13-0646	LF 26" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	223.28	113.86
		<i>For Seal Class B, Add</i>	28.47	
		<i>For Seal Class A, Add</i>	60.73	
		<i>For Work In Restricted Working Space, Add</i>	56.93	
23 31 13	13-0647	LF 26" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54	118.08
		<i>For Seal Class B, Add</i>	29.52	
		<i>For Seal Class A, Add</i>	62.98	
		<i>For Work In Restricted Working Space, Add</i>	59.04	
23 31 13	13-0648	LF 26" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81	122.30
		<i>For Seal Class B, Add</i>	30.57	
		<i>For Seal Class A, Add</i>	65.22	
		<i>For Work In Restricted Working Space, Add</i>	61.15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0649 LF 26" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10	126.52
For Seal Class B, Add	31.63	
For Seal Class A, Add	67.48	
For Work In Restricted Working Space, Add	63.26	
23 31 13 13-0650 LF 26" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34	130.72
For Seal Class B, Add	32.68	
For Seal Class A, Add	69.72	
For Work In Restricted Working Space, Add	65.36	
23 31 13 13-0651 LF 26" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
For Seal Class B, Add	33.74	
For Seal Class A, Add	71.97	
For Work In Restricted Working Space, Add	67.48	
23 31 13 13-0652 LF 26" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
For Seal Class B, Add	34.79	
For Seal Class A, Add	74.22	
For Work In Restricted Working Space, Add	69.59	
23 31 13 13-0653 LF 26" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
For Seal Class B, Add	35.85	
For Seal Class A, Add	76.47	
For Work In Restricted Working Space, Add	71.69	
23 31 13 13-0654 LF 26" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
For Seal Class B, Add	36.90	
For Seal Class A, Add	78.72	
For Work In Restricted Working Space, Add	73.80	
23 31 13 13-0655 LF 26" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
For Seal Class B, Add	37.95	
For Seal Class A, Add	80.97	
For Work In Restricted Working Space, Add	75.91	
23 31 13 13-0656 LF 26" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	305.98	156.04
For Seal Class B, Add	39.01	
For Seal Class A, Add	83.22	
For Work In Restricted Working Space, Add	78.02	
23 31 13 13-0657 LF 28" x 28", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	231.54	118.08
For Seal Class B, Add	29.52	
For Seal Class A, Add	62.98	
For Work In Restricted Working Space, Add	59.04	
23 31 13 13-0658 LF 28" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	239.81	122.30
For Seal Class B, Add	30.57	
For Seal Class A, Add	65.22	
For Work In Restricted Working Space, Add	61.15	
23 31 13 13-0659 LF 28" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10	126.52
For Seal Class B, Add	31.63	
For Seal Class A, Add	67.48	
For Work In Restricted Working Space, Add	63.26	
23 31 13 13-0660 LF 28" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34	130.72
For Seal Class B, Add	32.68	
For Seal Class A, Add	69.72	
For Work In Restricted Working Space, Add	65.36	
23 31 13 13-0661 LF 28" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
For Seal Class B, Add	33.74	
For Seal Class A, Add	71.97	
For Work In Restricted Working Space, Add	67.48	
23 31 13 13-0662 LF 28" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
For Seal Class B, Add	34.79	
For Seal Class A, Add	74.22	
For Work In Restricted Working Space, Add	69.59	
23 31 13 13-0663 LF 28" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
For Seal Class B, Add	35.85	
For Seal Class A, Add	76.47	
For Work In Restricted Working Space, Add	71.69	
23 31 13 13-0664 LF 28" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
For Seal Class B, Add	36.90	
For Seal Class A, Add	78.72	
For Work In Restricted Working Space, Add	73.80	
23 31 13 13-0665 LF 28" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
For Seal Class B, Add	37.95	
For Seal Class A, Add	80.97	
For Work In Restricted Working Space, Add	75.91	
23 31 13 13-0666 LF 28" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	305.98	156.04
For Seal Class B, Add	39.01	
For Seal Class A, Add	83.22	
For Work In Restricted Working Space, Add	78.02	
23 31 13 13-0667 LF 28" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	314.22	160.26
For Seal Class B, Add	40.06	
For Seal Class A, Add	85.47	
For Work In Restricted Working Space, Add	80.12	
23 31 13 13-0668 LF 30" x 30", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	248.10	126.52
For Seal Class B, Add	31.63	
For Seal Class A, Add	67.48	
For Work In Restricted Working Space, Add	63.26	
23 31 13 13-0669 LF 30" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	256.34	130.72
For Seal Class B, Add	32.68	
For Seal Class A, Add	69.72	
For Work In Restricted Working Space, Add	65.36	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0670	LF 30" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
		<i>For Seal Class B, Add</i>	33.74	
		<i>For Seal Class A, Add</i>	71.97	
		<i>For Work In Restricted Working Space, Add</i>	67.48	
23 31 13	13-0671	LF 30" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
		<i>For Seal Class B, Add</i>	34.79	
		<i>For Seal Class A, Add</i>	74.22	
		<i>For Work In Restricted Working Space, Add</i>	69.59	
23 31 13	13-0672	LF 30" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
		<i>For Seal Class B, Add</i>	35.85	
		<i>For Seal Class A, Add</i>	76.47	
		<i>For Work In Restricted Working Space, Add</i>	71.69	
23 31 13	13-0673	LF 30" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
		<i>For Seal Class B, Add</i>	36.90	
		<i>For Seal Class A, Add</i>	78.72	
		<i>For Work In Restricted Working Space, Add</i>	73.80	
23 31 13	13-0674	LF 30" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
		<i>For Seal Class B, Add</i>	37.95	
		<i>For Seal Class A, Add</i>	80.97	
		<i>For Work In Restricted Working Space, Add</i>	75.91	
23 31 13	13-0675	LF 30" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	305.98	156.04
		<i>For Seal Class B, Add</i>	39.01	
		<i>For Seal Class A, Add</i>	83.22	
		<i>For Work In Restricted Working Space, Add</i>	78.02	
23 31 13	13-0676	LF 30" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	314.22	160.26
		<i>For Seal Class B, Add</i>	40.06	
		<i>For Seal Class A, Add</i>	85.47	
		<i>For Work In Restricted Working Space, Add</i>	80.12	
23 31 13	13-0677	LF 30" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.50	164.46
		<i>For Seal Class B, Add</i>	41.12	
		<i>For Seal Class A, Add</i>	87.72	
		<i>For Work In Restricted Working Space, Add</i>	82.23	
23 31 13	13-0678	LF 32" x 32", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	264.63	134.95
		<i>For Seal Class B, Add</i>	33.74	
		<i>For Seal Class A, Add</i>	71.97	
		<i>For Work In Restricted Working Space, Add</i>	67.48	
23 31 13	13-0679	LF 32" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	272.89	139.16
		<i>For Seal Class B, Add</i>	34.79	
		<i>For Seal Class A, Add</i>	74.22	
		<i>For Work In Restricted Working Space, Add</i>	69.59	
23 31 13	13-0680	LF 32" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
		<i>For Seal Class B, Add</i>	35.85	
		<i>For Seal Class A, Add</i>	76.47	
		<i>For Work In Restricted Working Space, Add</i>	71.69	
23 31 13	13-0681	LF 32" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
		<i>For Seal Class B, Add</i>	36.90	
		<i>For Seal Class A, Add</i>	78.72	
		<i>For Work In Restricted Working Space, Add</i>	73.80	
23 31 13	13-0682	LF 32" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
		<i>For Seal Class B, Add</i>	37.95	
		<i>For Seal Class A, Add</i>	80.97	
		<i>For Work In Restricted Working Space, Add</i>	75.91	
23 31 13	13-0683	LF 32" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	305.98	156.04
		<i>For Seal Class B, Add</i>	39.01	
		<i>For Seal Class A, Add</i>	83.22	
		<i>For Work In Restricted Working Space, Add</i>	78.02	
23 31 13	13-0684	LF 32" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	314.22	160.26
		<i>For Seal Class B, Add</i>	40.06	
		<i>For Seal Class A, Add</i>	85.47	
		<i>For Work In Restricted Working Space, Add</i>	80.12	
23 31 13	13-0685	LF 32" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.50	164.46
		<i>For Seal Class B, Add</i>	41.12	
		<i>For Seal Class A, Add</i>	87.72	
		<i>For Work In Restricted Working Space, Add</i>	82.23	
23 31 13	13-0686	LF 32" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	330.79	168.69
		<i>For Seal Class B, Add</i>	42.17	
		<i>For Seal Class A, Add</i>	89.97	
		<i>For Work In Restricted Working Space, Add</i>	84.35	
23 31 13	13-0687	LF 34" x 34", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	281.16	143.39
		<i>For Seal Class B, Add</i>	35.85	
		<i>For Seal Class A, Add</i>	76.47	
		<i>For Work In Restricted Working Space, Add</i>	71.69	
23 31 13	13-0688	LF 34" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	289.44	147.60
		<i>For Seal Class B, Add</i>	36.90	
		<i>For Seal Class A, Add</i>	78.72	
		<i>For Work In Restricted Working Space, Add</i>	73.80	
23 31 13	13-0689	LF 34" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
		<i>For Seal Class B, Add</i>	37.95	
		<i>For Seal Class A, Add</i>	80.97	
		<i>For Work In Restricted Working Space, Add</i>	75.91	
23 31 13	13-0690	LF 34" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	305.98	156.04
		<i>For Seal Class B, Add</i>	39.01	
		<i>For Seal Class A, Add</i>	83.22	
		<i>For Work In Restricted Working Space, Add</i>	78.02	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0691 LF 34" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	314.22	160.26
For Seal Class B, Add	40.06	
For Seal Class A, Add	85.47	
For Work In Restricted Working Space, Add	80.12	
23 31 13 13-0692 LF 34" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.50	164.46
For Seal Class B, Add	41.12	
For Seal Class A, Add	87.72	
For Work In Restricted Working Space, Add	82.23	
23 31 13 13-0693 LF 34" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	330.79	168.69
For Seal Class B, Add	42.17	
For Seal Class A, Add	89.97	
For Work In Restricted Working Space, Add	84.35	
23 31 13 13-0694 LF 34" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	339.04	172.90
For Seal Class B, Add	43.23	
For Seal Class A, Add	92.21	
For Work In Restricted Working Space, Add	86.45	
23 31 13 13-0695 LF 36" x 36", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	297.69	151.82
For Seal Class B, Add	37.95	
For Seal Class A, Add	80.97	
For Work In Restricted Working Space, Add	75.91	
23 31 13 13-0696 LF 36" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	305.98	156.04
For Seal Class B, Add	39.01	
For Seal Class A, Add	83.22	
For Work In Restricted Working Space, Add	78.02	
23 31 13 13-0697 LF 36" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	314.22	160.26
For Seal Class B, Add	40.06	
For Seal Class A, Add	85.47	
For Work In Restricted Working Space, Add	80.12	
23 31 13 13-0698 LF 36" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.50	164.46
For Seal Class B, Add	41.12	
For Seal Class A, Add	87.72	
For Work In Restricted Working Space, Add	82.23	
23 31 13 13-0699 LF 36" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	330.79	168.69
For Seal Class B, Add	42.17	
For Seal Class A, Add	89.97	
For Work In Restricted Working Space, Add	84.35	
23 31 13 13-0700 LF 36" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	339.04	172.90
For Seal Class B, Add	43.23	
For Seal Class A, Add	92.21	
For Work In Restricted Working Space, Add	86.45	
23 31 13 13-0701 LF 36" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	347.32	177.12
For Seal Class B, Add	44.28	
For Seal Class A, Add	94.46	
For Work In Restricted Working Space, Add	88.56	
23 31 13 13-0702 LF 38" x 38", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	314.22	160.26
For Seal Class B, Add	40.06	
For Seal Class A, Add	85.47	
For Work In Restricted Working Space, Add	80.12	
23 31 13 13-0703 LF 38" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.50	164.46
For Seal Class B, Add	41.12	
For Seal Class A, Add	87.72	
For Work In Restricted Working Space, Add	82.23	
23 31 13 13-0704 LF 38" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	330.79	168.69
For Seal Class B, Add	42.17	
For Seal Class A, Add	89.97	
For Work In Restricted Working Space, Add	84.35	
23 31 13 13-0705 LF 38" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	339.04	172.90
For Seal Class B, Add	43.23	
For Seal Class A, Add	92.21	
For Work In Restricted Working Space, Add	86.45	
23 31 13 13-0706 LF 38" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	347.32	177.12
For Seal Class B, Add	44.28	
For Seal Class A, Add	94.46	
For Work In Restricted Working Space, Add	88.56	
23 31 13 13-0707 LF 38" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.60	181.34
For Seal Class B, Add	45.33	
For Seal Class A, Add	96.71	
For Work In Restricted Working Space, Add	90.67	
23 31 13 13-0708 LF 38" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	363.85	185.56
For Seal Class B, Add	46.39	
For Seal Class A, Add	98.96	
For Work In Restricted Working Space, Add	92.78	
23 31 13 13-0709 LF 40" x 40", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	330.79	168.69
For Seal Class B, Add	42.17	
For Seal Class A, Add	89.97	
For Work In Restricted Working Space, Add	84.35	
23 31 13 13-0710 LF 40" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	339.04	172.90
For Seal Class B, Add	43.23	
For Seal Class A, Add	92.21	
For Work In Restricted Working Space, Add	86.45	
23 31 13 13-0711 LF 40" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	347.32	177.12
For Seal Class B, Add	44.28	
For Seal Class A, Add	94.46	
For Work In Restricted Working Space, Add	88.56	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0712	LF 40" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.60	181.34
		<i>For Seal Class B, Add</i>	45.33	
		<i>For Seal Class A, Add</i>	96.71	
		<i>For Work In Restricted Working Space, Add</i>	90.67	
23 31 13	13-0713	LF 40" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	363.85	185.56
		<i>For Seal Class B, Add</i>	46.39	
		<i>For Seal Class A, Add</i>	98.96	
		<i>For Work In Restricted Working Space, Add</i>	92.78	
23 31 13	13-0714	LF 40" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	372.12	189.77
		<i>For Seal Class B, Add</i>	47.44	
		<i>For Seal Class A, Add</i>	101.21	
		<i>For Work In Restricted Working Space, Add</i>	94.88	
23 31 13	13-0715	LF 40" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	380.38	194.00
		<i>For Seal Class B, Add</i>	48.50	
		<i>For Seal Class A, Add</i>	103.46	
		<i>For Work In Restricted Working Space, Add</i>	96.99	
23 31 13	13-0716	LF 40" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	388.66	198.21
		<i>For Seal Class B, Add</i>	49.55	
		<i>For Seal Class A, Add</i>	105.71	
		<i>For Work In Restricted Working Space, Add</i>	99.10	
23 31 13	13-0717	LF 40" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	396.94	202.42
		<i>For Seal Class B, Add</i>	50.61	
		<i>For Seal Class A, Add</i>	107.96	
		<i>For Work In Restricted Working Space, Add</i>	101.21	
23 31 13	13-0718	LF 42" x 42", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	347.32	177.12
		<i>For Seal Class B, Add</i>	44.28	
		<i>For Seal Class A, Add</i>	94.46	
		<i>For Work In Restricted Working Space, Add</i>	88.56	
23 31 13	13-0719	LF 42" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.60	181.34
		<i>For Seal Class B, Add</i>	45.33	
		<i>For Seal Class A, Add</i>	96.71	
		<i>For Work In Restricted Working Space, Add</i>	90.67	
23 31 13	13-0720	LF 42" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	363.85	185.56
		<i>For Seal Class B, Add</i>	46.39	
		<i>For Seal Class A, Add</i>	98.96	
		<i>For Work In Restricted Working Space, Add</i>	92.78	
23 31 13	13-0721	LF 42" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	372.12	189.77
		<i>For Seal Class B, Add</i>	47.44	
		<i>For Seal Class A, Add</i>	101.21	
		<i>For Work In Restricted Working Space, Add</i>	94.88	
23 31 13	13-0722	LF 42" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	380.38	194.00
		<i>For Seal Class B, Add</i>	48.50	
		<i>For Seal Class A, Add</i>	103.46	
		<i>For Work In Restricted Working Space, Add</i>	96.99	
23 31 13	13-0723	LF 42" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	388.66	198.21
		<i>For Seal Class B, Add</i>	49.55	
		<i>For Seal Class A, Add</i>	105.71	
		<i>For Work In Restricted Working Space, Add</i>	99.10	
23 31 13	13-0724	LF 42" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	396.94	202.42
		<i>For Seal Class B, Add</i>	50.61	
		<i>For Seal Class A, Add</i>	107.96	
		<i>For Work In Restricted Working Space, Add</i>	101.21	
23 31 13	13-0725	LF 42" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	405.20	206.64
		<i>For Seal Class B, Add</i>	51.66	
		<i>For Seal Class A, Add</i>	110.21	
		<i>For Work In Restricted Working Space, Add</i>	103.32	
23 31 13	13-0726	LF 44" x 44", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	363.85	185.56
		<i>For Seal Class B, Add</i>	46.39	
		<i>For Seal Class A, Add</i>	98.96	
		<i>For Work In Restricted Working Space, Add</i>	92.78	
23 31 13	13-0727	LF 44" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	372.12	189.77
		<i>For Seal Class B, Add</i>	47.44	
		<i>For Seal Class A, Add</i>	101.21	
		<i>For Work In Restricted Working Space, Add</i>	94.88	
23 31 13	13-0728	LF 44" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	380.38	194.00
		<i>For Seal Class B, Add</i>	48.50	
		<i>For Seal Class A, Add</i>	103.46	
		<i>For Work In Restricted Working Space, Add</i>	96.99	
23 31 13	13-0729	LF 44" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	388.66	198.21
		<i>For Seal Class B, Add</i>	49.55	
		<i>For Seal Class A, Add</i>	105.71	
		<i>For Work In Restricted Working Space, Add</i>	99.10	
23 31 13	13-0730	LF 44" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	396.94	202.42
		<i>For Seal Class B, Add</i>	50.61	
		<i>For Seal Class A, Add</i>	107.96	
		<i>For Work In Restricted Working Space, Add</i>	101.21	
23 31 13	13-0731	LF 44" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	405.20	206.64
		<i>For Seal Class B, Add</i>	51.66	
		<i>For Seal Class A, Add</i>	110.21	
		<i>For Work In Restricted Working Space, Add</i>	103.32	
23 31 13	13-0732	LF 44" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	413.48	210.86
		<i>For Seal Class B, Add</i>	52.71	
		<i>For Seal Class A, Add</i>	112.46	
		<i>For Work In Restricted Working Space, Add</i>	105.43	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0733 LF 46" x 46", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	380.38	194.00
For Seal Class B, Add	48.50	
For Seal Class A, Add	103.46	
For Work In Restricted Working Space, Add	96.99	
23 31 13 13-0734 LF 46" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	388.66	198.21
For Seal Class B, Add	49.55	
For Seal Class A, Add	105.71	
For Work In Restricted Working Space, Add	99.10	
23 31 13 13-0735 LF 46" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	396.94	202.42
For Seal Class B, Add	50.61	
For Seal Class A, Add	107.96	
For Work In Restricted Working Space, Add	101.21	
23 31 13 13-0736 LF 46" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	405.20	206.64
For Seal Class B, Add	51.66	
For Seal Class A, Add	110.21	
For Work In Restricted Working Space, Add	103.32	
23 31 13 13-0737 LF 46" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	413.48	210.86
For Seal Class B, Add	52.71	
For Seal Class A, Add	112.46	
For Work In Restricted Working Space, Add	105.43	
23 31 13 13-0738 LF 46" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	428.78	219.30
For Seal Class B, Add	54.82	
For Seal Class A, Add	116.95	
For Work In Restricted Working Space, Add	109.64	
23 31 13 13-0739 LF 46" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	437.03	223.51
For Seal Class B, Add	55.88	
For Seal Class A, Add	119.20	
For Work In Restricted Working Space, Add	111.75	
23 31 13 13-0740 LF 48" x 48", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	396.94	202.42
For Seal Class B, Add	50.61	
For Seal Class A, Add	107.96	
For Work In Restricted Working Space, Add	101.21	
23 31 13 13-0741 LF 48" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	405.20	206.64
For Seal Class B, Add	51.66	
For Seal Class A, Add	110.21	
For Work In Restricted Working Space, Add	103.32	
23 31 13 13-0742 LF 48" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	413.48	210.86
For Seal Class B, Add	52.71	
For Seal Class A, Add	112.46	
For Work In Restricted Working Space, Add	105.43	
23 31 13 13-0743 LF 48" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	421.76	215.07
For Seal Class B, Add	53.77	
For Seal Class A, Add	114.71	
For Work In Restricted Working Space, Add	107.54	
23 31 13 13-0744 LF 48" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.00	219.30
For Seal Class B, Add	54.82	
For Seal Class A, Add	116.95	
For Work In Restricted Working Space, Add	109.64	
23 31 13 13-0745 LF 48" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	438.28	223.51
For Seal Class B, Add	55.88	
For Seal Class A, Add	119.20	
For Work In Restricted Working Space, Add	111.75	
23 31 13 13-0746 LF 48" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	446.54	227.73
For Seal Class B, Add	56.93	
For Seal Class A, Add	121.45	
For Work In Restricted Working Space, Add	113.86	
23 31 13 13-0747 LF 50" x 50", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	413.48	210.86
For Seal Class B, Add	52.71	
For Seal Class A, Add	112.46	
For Work In Restricted Working Space, Add	105.43	
23 31 13 13-0748 LF 50" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	421.76	215.07
For Seal Class B, Add	53.77	
For Seal Class A, Add	114.71	
For Work In Restricted Working Space, Add	107.54	
23 31 13 13-0749 LF 50" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.00	219.30
For Seal Class B, Add	54.82	
For Seal Class A, Add	116.95	
For Work In Restricted Working Space, Add	109.64	
23 31 13 13-0750 LF 50" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	438.28	223.51
For Seal Class B, Add	55.88	
For Seal Class A, Add	119.20	
For Work In Restricted Working Space, Add	111.75	
23 31 13 13-0751 LF 50" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	446.54	227.73
For Seal Class B, Add	56.93	
For Seal Class A, Add	121.45	
For Work In Restricted Working Space, Add	113.86	
23 31 13 13-0752 LF 50" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	454.82	231.95
For Seal Class B, Add	57.99	
For Seal Class A, Add	123.70	
For Work In Restricted Working Space, Add	115.97	
23 31 13 13-0753 LF 52" x 52", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.00	219.30
For Seal Class B, Add	54.82	
For Seal Class A, Add	116.95	
For Work In Restricted Working Space, Add	109.64	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0754	LF 52" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	438.28	223.51
		<i>For Seal Class B, Add</i>	55.88	
		<i>For Seal Class A, Add</i>	119.20	
		<i>For Work In Restricted Working Space, Add</i>	111.75	
23 31 13	13-0755	LF 52" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	446.54	227.73
		<i>For Seal Class B, Add</i>	56.93	
		<i>For Seal Class A, Add</i>	121.45	
		<i>For Work In Restricted Working Space, Add</i>	113.86	
23 31 13	13-0756	LF 52" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	454.82	231.95
		<i>For Seal Class B, Add</i>	57.99	
		<i>For Seal Class A, Add</i>	123.70	
		<i>For Work In Restricted Working Space, Add</i>	115.97	
23 31 13	13-0757	LF 52" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	463.11	236.17
		<i>For Seal Class B, Add</i>	59.04	
		<i>For Seal Class A, Add</i>	125.96	
		<i>For Work In Restricted Working Space, Add</i>	118.08	
23 31 13	13-0758	LF 54" x 54", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	446.54	227.73
		<i>For Seal Class B, Add</i>	56.93	
		<i>For Seal Class A, Add</i>	121.45	
		<i>For Work In Restricted Working Space, Add</i>	113.86	
23 31 13	13-0759	LF 54" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	454.82	231.95
		<i>For Seal Class B, Add</i>	57.99	
		<i>For Seal Class A, Add</i>	123.70	
		<i>For Work In Restricted Working Space, Add</i>	115.97	
23 31 13	13-0760	LF 54" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	463.11	236.17
		<i>For Seal Class B, Add</i>	59.04	
		<i>For Seal Class A, Add</i>	125.96	
		<i>For Work In Restricted Working Space, Add</i>	118.08	
23 31 13	13-0761	LF 54" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	471.36	240.37
		<i>For Seal Class B, Add</i>	60.09	
		<i>For Seal Class A, Add</i>	128.20	
		<i>For Work In Restricted Working Space, Add</i>	120.19	
23 31 13	13-0762	LF 54" x 62", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	479.64	244.59
		<i>For Seal Class B, Add</i>	61.15	
		<i>For Seal Class A, Add</i>	130.45	
		<i>For Work In Restricted Working Space, Add</i>	122.30	
23 31 13	13-0763	LF 54" x 64", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	487.88	248.81
		<i>For Seal Class B, Add</i>	62.20	
		<i>For Seal Class A, Add</i>	132.70	
		<i>For Work In Restricted Working Space, Add</i>	124.40	
23 31 13	13-0764	LF 56" x 56", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	463.11	236.17
		<i>For Seal Class B, Add</i>	59.04	
		<i>For Seal Class A, Add</i>	125.96	
		<i>For Work In Restricted Working Space, Add</i>	118.08	
23 31 13	13-0765	LF 56" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	471.36	240.37
		<i>For Seal Class B, Add</i>	60.09	
		<i>For Seal Class A, Add</i>	128.20	
		<i>For Work In Restricted Working Space, Add</i>	120.19	
23 31 13	13-0766	LF 56" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	479.64	244.59
		<i>For Seal Class B, Add</i>	61.15	
		<i>For Seal Class A, Add</i>	130.45	
		<i>For Work In Restricted Working Space, Add</i>	122.30	
23 31 13	13-0767	LF 56" x 62", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	487.88	248.81
		<i>For Seal Class B, Add</i>	62.20	
		<i>For Seal Class A, Add</i>	132.70	
		<i>For Work In Restricted Working Space, Add</i>	124.40	
23 31 13	13-0768	LF 56" x 64", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	496.16	253.02
		<i>For Seal Class B, Add</i>	63.26	
		<i>For Seal Class A, Add</i>	134.95	
		<i>For Work In Restricted Working Space, Add</i>	126.51	
23 31 13	13-0769	LF 58" x 58", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	479.64	244.59
		<i>For Seal Class B, Add</i>	61.15	
		<i>For Seal Class A, Add</i>	130.45	
		<i>For Work In Restricted Working Space, Add</i>	122.30	
23 31 13	13-0770	LF 58" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	487.88	248.81
		<i>For Seal Class B, Add</i>	62.20	
		<i>For Seal Class A, Add</i>	132.70	
		<i>For Work In Restricted Working Space, Add</i>	124.40	
23 31 13	13-0771	LF 58" x 62", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	496.16	253.02
		<i>For Seal Class B, Add</i>	63.26	
		<i>For Seal Class A, Add</i>	134.95	
		<i>For Work In Restricted Working Space, Add</i>	126.51	
23 31 13	13-0772	LF 58" x 64", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	504.44	257.25
		<i>For Seal Class B, Add</i>	64.31	
		<i>For Seal Class A, Add</i>	137.20	
		<i>For Work In Restricted Working Space, Add</i>	128.62	
23 31 13	13-0773	LF 58" x 66", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	512.70	261.46
		<i>For Seal Class B, Add</i>	65.37	
		<i>For Seal Class A, Add</i>	139.45	
		<i>For Work In Restricted Working Space, Add</i>	130.73	
23 31 13	13-0774	LF 60" x 60", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	496.16	253.02
		<i>For Seal Class B, Add</i>	63.26	
		<i>For Seal Class A, Add</i>	134.95	
		<i>For Work In Restricted Working Space, Add</i>	126.51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0775 LF 60" x 62", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	504.44	257.25
For Seal Class B, Add	64.31	
For Seal Class A, Add	137.20	
For Work In Restricted Working Space, Add	128.62	
23 31 13 13-0776 LF 60" x 64", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	512.70	261.46
For Seal Class B, Add	65.37	
For Seal Class A, Add	139.45	
For Work In Restricted Working Space, Add	130.73	
23 31 13 13-0777 LF 60" x 66", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	520.99	265.68
For Seal Class B, Add	66.42	
For Seal Class A, Add	141.70	
For Work In Restricted Working Space, Add	132.84	
23 31 13 13-0778 LF 60" x 68", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	529.26	269.90
For Seal Class B, Add	67.47	
For Seal Class A, Add	143.95	
For Work In Restricted Working Space, Add	134.95	
23 31 13 13-0779 LF 62" x 62", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	512.70	261.46
For Seal Class B, Add	65.37	
For Seal Class A, Add	139.45	
For Work In Restricted Working Space, Add	130.73	
23 31 13 13-0780 LF 62" x 64", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	520.99	265.68
For Seal Class B, Add	66.42	
For Seal Class A, Add	141.70	
For Work In Restricted Working Space, Add	132.84	
23 31 13 13-0781 LF 62" x 66", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	529.26	269.90
For Seal Class B, Add	67.47	
For Seal Class A, Add	143.95	
For Work In Restricted Working Space, Add	134.95	
23 31 13 13-0782 LF 62" x 68", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	537.51	274.11
For Seal Class B, Add	68.53	
For Seal Class A, Add	146.20	
For Work In Restricted Working Space, Add	137.06	
23 31 13 13-0783 LF 62" x 70", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	545.78	278.32
For Seal Class B, Add	69.58	
For Seal Class A, Add	148.44	
For Work In Restricted Working Space, Add	139.16	
23 31 13 13-0784 LF 64" x 64", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	529.26	269.90
For Seal Class B, Add	67.47	
For Seal Class A, Add	143.95	
For Work In Restricted Working Space, Add	134.95	
23 31 13 13-0785 LF 64" x 66", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	537.51	274.11
For Seal Class B, Add	68.53	
For Seal Class A, Add	146.20	
For Work In Restricted Working Space, Add	137.06	
23 31 13 13-0786 LF 64" x 68", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	545.78	278.32
For Seal Class B, Add	69.58	
For Seal Class A, Add	148.44	
For Work In Restricted Working Space, Add	139.16	
23 31 13 13-0787 LF 64" x 70", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	554.04	282.55
For Seal Class B, Add	70.64	
For Seal Class A, Add	150.69	
For Work In Restricted Working Space, Add	141.27	
23 31 13 13-0788 LF 66" x 66", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	545.78	278.32
For Seal Class B, Add	69.58	
For Seal Class A, Add	148.44	
For Work In Restricted Working Space, Add	139.16	
23 31 13 13-0789 LF 66" x 68", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	554.04	282.55
For Seal Class B, Add	70.64	
For Seal Class A, Add	150.69	
For Work In Restricted Working Space, Add	141.27	
23 31 13 13-0790 LF 66" x 70", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	562.32	286.76
For Seal Class B, Add	71.69	
For Seal Class A, Add	152.94	
For Work In Restricted Working Space, Add	143.38	
23 31 13 13-0791 LF 66" x 72", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	570.60	290.98
For Seal Class B, Add	72.75	
For Seal Class A, Add	155.19	
For Work In Restricted Working Space, Add	145.49	
23 31 13 13-0792 LF 68" x 68", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	562.32	286.76
For Seal Class B, Add	71.69	
For Seal Class A, Add	152.94	
For Work In Restricted Working Space, Add	143.38	
23 31 13 13-0793 LF 68" x 70", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	570.60	290.98
For Seal Class B, Add	72.75	
For Seal Class A, Add	155.19	
For Work In Restricted Working Space, Add	145.49	
23 31 13 13-0794 LF 68" x 72", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	578.86	295.20
For Seal Class B, Add	73.80	
For Seal Class A, Add	157.44	
For Work In Restricted Working Space, Add	147.60	
23 31 13 13-0795 LF 68" x 74", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	587.14	299.42
For Seal Class B, Add	74.85	
For Seal Class A, Add	159.69	
For Work In Restricted Working Space, Add	149.71	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0796	LF 70" x 70", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	578.86	295.20
		<i>For Seal Class B, Add</i>	73.80	
		<i>For Seal Class A, Add</i>	157.44	
		<i>For Work In Restricted Working Space, Add</i>	147.60	
23 31 13	13-0797	LF 70" x 72", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	587.14	299.42
		<i>For Seal Class B, Add</i>	74.85	
		<i>For Seal Class A, Add</i>	159.69	
		<i>For Work In Restricted Working Space, Add</i>	149.71	
23 31 13	13-0798	LF 70" x 74", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	595.42	303.63
		<i>For Seal Class B, Add</i>	75.91	
		<i>For Seal Class A, Add</i>	161.94	
		<i>For Work In Restricted Working Space, Add</i>	151.82	
23 31 13	13-0799	LF 70" x 76", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	603.66	307.86
		<i>For Seal Class B, Add</i>	76.96	
		<i>For Seal Class A, Add</i>	164.19	
		<i>For Work In Restricted Working Space, Add</i>	153.92	
23 31 13	13-0800	LF 70" x 78", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	611.94	312.06
		<i>For Seal Class B, Add</i>	78.02	
		<i>For Seal Class A, Add</i>	166.44	
		<i>For Work In Restricted Working Space, Add</i>	156.03	
23 31 13	13-0801	LF 70" x 80", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	620.19	316.28
		<i>For Seal Class B, Add</i>	79.07	
		<i>For Seal Class A, Add</i>	168.68	
		<i>For Work In Restricted Working Space, Add</i>	158.14	
23 31 13	13-0802	LF 70" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	628.49	320.50
		<i>For Seal Class B, Add</i>	80.13	
		<i>For Seal Class A, Add</i>	170.94	
		<i>For Work In Restricted Working Space, Add</i>	160.25	
23 31 13	13-0803	LF 70" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	636.76	324.72
		<i>For Seal Class B, Add</i>	81.18	
		<i>For Seal Class A, Add</i>	173.18	
		<i>For Work In Restricted Working Space, Add</i>	162.36	
23 31 13	13-0804	LF 72" x 72", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	595.42	303.63
		<i>For Seal Class B, Add</i>	75.91	
		<i>For Seal Class A, Add</i>	161.94	
		<i>For Work In Restricted Working Space, Add</i>	151.82	
23 31 13	13-0805	LF 72" x 74", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	603.66	307.86
		<i>For Seal Class B, Add</i>	76.96	
		<i>For Seal Class A, Add</i>	164.19	
		<i>For Work In Restricted Working Space, Add</i>	153.92	
23 31 13	13-0806	LF 72" x 76", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	611.94	312.06
		<i>For Seal Class B, Add</i>	78.02	
		<i>For Seal Class A, Add</i>	166.44	
		<i>For Work In Restricted Working Space, Add</i>	156.03	
23 31 13	13-0807	LF 72" x 78", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	620.19	316.28
		<i>For Seal Class B, Add</i>	79.07	
		<i>For Seal Class A, Add</i>	168.68	
		<i>For Work In Restricted Working Space, Add</i>	158.14	
23 31 13	13-0808	LF 72" x 80", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	628.49	320.50
		<i>For Seal Class B, Add</i>	80.13	
		<i>For Seal Class A, Add</i>	170.94	
		<i>For Work In Restricted Working Space, Add</i>	160.25	
23 31 13	13-0809	LF 72" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	636.76	324.72
		<i>For Seal Class B, Add</i>	81.18	
		<i>For Seal Class A, Add</i>	173.18	
		<i>For Work In Restricted Working Space, Add</i>	162.36	
23 31 13	13-0810	LF 72" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.01	328.93
		<i>For Seal Class B, Add</i>	82.23	
		<i>For Seal Class A, Add</i>	175.43	
		<i>For Work In Restricted Working Space, Add</i>	164.47	
23 31 13	13-0811	LF 74" x 74", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	611.94	312.06
		<i>For Seal Class B, Add</i>	78.02	
		<i>For Seal Class A, Add</i>	166.44	
		<i>For Work In Restricted Working Space, Add</i>	156.03	
23 31 13	13-0812	LF 74" x 76", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	620.19	316.28
		<i>For Seal Class B, Add</i>	79.07	
		<i>For Seal Class A, Add</i>	168.68	
		<i>For Work In Restricted Working Space, Add</i>	158.14	
23 31 13	13-0813	LF 74" x 78", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	628.49	320.50
		<i>For Seal Class B, Add</i>	80.13	
		<i>For Seal Class A, Add</i>	170.94	
		<i>For Work In Restricted Working Space, Add</i>	160.25	
23 31 13	13-0814	LF 74" x 80", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	636.76	324.72
		<i>For Seal Class B, Add</i>	81.18	
		<i>For Seal Class A, Add</i>	173.18	
		<i>For Work In Restricted Working Space, Add</i>	162.36	
23 31 13	13-0815	LF 74" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.01	328.93
		<i>For Seal Class B, Add</i>	82.23	
		<i>For Seal Class A, Add</i>	175.43	
		<i>For Work In Restricted Working Space, Add</i>	164.47	
23 31 13	13-0816	LF 74" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	653.30	333.16
		<i>For Seal Class B, Add</i>	83.29	
		<i>For Seal Class A, Add</i>	177.68	
		<i>For Work In Restricted Working Space, Add</i>	166.58	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0817 LF 76" x 76", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	628.49	320.50
<i>For Seal Class B, Add</i>	80.13	
<i>For Seal Class A, Add</i>	170.94	
<i>For Work In Restricted Working Space, Add</i>	160.25	
23 31 13 13-0818 LF 76" x 78", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	636.76	324.72
<i>For Seal Class B, Add</i>	81.18	
<i>For Seal Class A, Add</i>	173.18	
<i>For Work In Restricted Working Space, Add</i>	162.36	
23 31 13 13-0819 LF 76" x 80", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.01	328.93
<i>For Seal Class B, Add</i>	82.23	
<i>For Seal Class A, Add</i>	175.43	
<i>For Work In Restricted Working Space, Add</i>	164.47	
23 31 13 13-0820 LF 76" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	653.30	333.16
<i>For Seal Class B, Add</i>	83.29	
<i>For Seal Class A, Add</i>	177.68	
<i>For Work In Restricted Working Space, Add</i>	166.58	
23 31 13 13-0821 LF 76" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	661.54	337.37
<i>For Seal Class B, Add</i>	84.34	
<i>For Seal Class A, Add</i>	179.93	
<i>For Work In Restricted Working Space, Add</i>	168.68	
23 31 13 13-0822 LF 78" x 78", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.01	328.93
<i>For Seal Class B, Add</i>	82.23	
<i>For Seal Class A, Add</i>	175.43	
<i>For Work In Restricted Working Space, Add</i>	164.47	
23 31 13 13-0823 LF 78" x 80", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	653.30	333.16
<i>For Seal Class B, Add</i>	83.29	
<i>For Seal Class A, Add</i>	177.68	
<i>For Work In Restricted Working Space, Add</i>	166.58	
23 31 13 13-0824 LF 78" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	661.54	337.37
<i>For Seal Class B, Add</i>	84.34	
<i>For Seal Class A, Add</i>	179.93	
<i>For Work In Restricted Working Space, Add</i>	168.68	
23 31 13 13-0825 LF 78" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	669.82	341.59
<i>For Seal Class B, Add</i>	85.40	
<i>For Seal Class A, Add</i>	182.18	
<i>For Work In Restricted Working Space, Add</i>	170.79	
23 31 13 13-0826 LF 80" x 80", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	661.54	337.37
<i>For Seal Class B, Add</i>	84.34	
<i>For Seal Class A, Add</i>	179.93	
<i>For Work In Restricted Working Space, Add</i>	168.68	
23 31 13 13-0827 LF 80" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	669.82	341.59
<i>For Seal Class B, Add</i>	85.40	
<i>For Seal Class A, Add</i>	182.18	
<i>For Work In Restricted Working Space, Add</i>	170.79	
23 31 13 13-0828 LF 80" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	678.09	345.80
<i>For Seal Class B, Add</i>	86.45	
<i>For Seal Class A, Add</i>	184.43	
<i>For Work In Restricted Working Space, Add</i>	172.90	
23 31 13 13-0829 LF 82" x 82", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	678.09	345.80
<i>For Seal Class B, Add</i>	86.45	
<i>For Seal Class A, Add</i>	184.43	
<i>For Work In Restricted Working Space, Add</i>	172.90	
23 31 13 13-0830 LF 82" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	686.37	350.02
<i>For Seal Class B, Add</i>	87.51	
<i>For Seal Class A, Add</i>	186.68	
<i>For Work In Restricted Working Space, Add</i>	175.01	
23 31 13 13-0831 LF 84" x 84", 20 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	694.64	354.23
<i>For Seal Class B, Add</i>	88.56	
<i>For Seal Class A, Add</i>	188.93	
<i>For Work In Restricted Working Space, Add</i>	177.12	
23 31 13 13-0832 18 Gauge Galvanized Steel Metal Ductwork <small>(23 31 13 13-0014)</small>		
23 31 13 13-0833 LF 4" x 4", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	43.08	21.95
<i>For Seal Class B, Add</i>	5.49	
<i>For Seal Class A, Add</i>	11.72	
<i>For Work In Restricted Working Space, Add</i>	10.98	
23 31 13 13-0834 LF 4" x 6", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	53.83	27.45
<i>For Seal Class B, Add</i>	6.86	
<i>For Seal Class A, Add</i>	14.64	
<i>For Work In Restricted Working Space, Add</i>	13.73	
23 31 13 13-0835 LF 4" x 8", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	64.59	32.95
<i>For Seal Class B, Add</i>	8.24	
<i>For Seal Class A, Add</i>	17.57	
<i>For Work In Restricted Working Space, Add</i>	16.47	
23 31 13 13-0836 LF 4" x 10", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	75.36	38.43
<i>For Seal Class B, Add</i>	9.61	
<i>For Seal Class A, Add</i>	20.50	
<i>For Work In Restricted Working Space, Add</i>	19.22	
23 31 13 13-0837 LF 4" x 12", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	86.13	43.93
<i>For Seal Class B, Add</i>	10.98	
<i>For Seal Class A, Add</i>	23.42	
<i>For Work In Restricted Working Space, Add</i>	21.96	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 13-0838	LF 4" x 14", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	96.89	49.41
	<i>For Seal Class B, Add</i>	12.35	
	<i>For Seal Class A, Add</i>	26.35	
	<i>For Work In Restricted Working Space, Add</i>	24.71	
23 31 13 13-0839	LF 4" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.66	54.90
	<i>For Seal Class B, Add</i>	13.73	
	<i>For Seal Class A, Add</i>	29.28	
	<i>For Work In Restricted Working Space, Add</i>	27.45	
23 31 13 13-0840	LF 6" x 6", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	64.59	32.95
	<i>For Seal Class B, Add</i>	8.24	
	<i>For Seal Class A, Add</i>	17.57	
	<i>For Work In Restricted Working Space, Add</i>	16.47	
23 31 13 13-0841	LF 6" x 8", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	75.36	38.43
	<i>For Seal Class B, Add</i>	9.61	
	<i>For Seal Class A, Add</i>	20.50	
	<i>For Work In Restricted Working Space, Add</i>	19.22	
23 31 13 13-0842	LF 6" x 10", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	86.13	43.93
	<i>For Seal Class B, Add</i>	10.98	
	<i>For Seal Class A, Add</i>	23.42	
	<i>For Work In Restricted Working Space, Add</i>	21.96	
23 31 13 13-0843	LF 6" x 12", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	96.89	49.41
	<i>For Seal Class B, Add</i>	12.35	
	<i>For Seal Class A, Add</i>	26.35	
	<i>For Work In Restricted Working Space, Add</i>	24.71	
23 31 13 13-0844	LF 6" x 14", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.66	54.90
	<i>For Seal Class B, Add</i>	13.73	
	<i>For Seal Class A, Add</i>	29.28	
	<i>For Work In Restricted Working Space, Add</i>	27.45	
23 31 13 13-0845	LF 6" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	118.43	60.40
	<i>For Seal Class B, Add</i>	15.10	
	<i>For Seal Class A, Add</i>	32.21	
	<i>For Work In Restricted Working Space, Add</i>	30.20	
23 31 13 13-0846	LF 8" x 8", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	86.13	43.93
	<i>For Seal Class B, Add</i>	10.98	
	<i>For Seal Class A, Add</i>	23.42	
	<i>For Work In Restricted Working Space, Add</i>	21.96	
23 31 13 13-0847	LF 8" x 10", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	96.89	49.41
	<i>For Seal Class B, Add</i>	12.35	
	<i>For Seal Class A, Add</i>	26.35	
	<i>For Work In Restricted Working Space, Add</i>	24.71	
23 31 13 13-0848	LF 8" x 12", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.66	54.90
	<i>For Seal Class B, Add</i>	13.73	
	<i>For Seal Class A, Add</i>	29.28	
	<i>For Work In Restricted Working Space, Add</i>	27.45	
23 31 13 13-0849	LF 8" x 14", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	118.43	60.40
	<i>For Seal Class B, Add</i>	15.10	
	<i>For Seal Class A, Add</i>	32.21	
	<i>For Work In Restricted Working Space, Add</i>	30.20	
23 31 13 13-0850	LF 8" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.19	65.88
	<i>For Seal Class B, Add</i>	16.47	
	<i>For Seal Class A, Add</i>	35.14	
	<i>For Work In Restricted Working Space, Add</i>	32.94	
23 31 13 13-0851	LF 8" x 18", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	139.97	71.37
	<i>For Seal Class B, Add</i>	17.84	
	<i>For Seal Class A, Add</i>	38.07	
	<i>For Work In Restricted Working Space, Add</i>	35.69	
23 31 13 13-0852	LF 8" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.72	76.86
	<i>For Seal Class B, Add</i>	19.22	
	<i>For Seal Class A, Add</i>	40.99	
	<i>For Work In Restricted Working Space, Add</i>	38.43	
23 31 13 13-0853	LF 8" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.49	82.35
	<i>For Seal Class B, Add</i>	20.59	
	<i>For Seal Class A, Add</i>	43.92	
	<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13 13-0854	LF 8" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	172.25	87.85
	<i>For Seal Class B, Add</i>	21.96	
	<i>For Seal Class A, Add</i>	46.85	
	<i>For Work In Restricted Working Space, Add</i>	43.92	
23 31 13 13-0855	LF 10" x 10", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	107.66	54.90
	<i>For Seal Class B, Add</i>	13.73	
	<i>For Seal Class A, Add</i>	29.28	
	<i>For Work In Restricted Working Space, Add</i>	27.45	
23 31 13 13-0856	LF 10" x 12", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	118.43	60.40
	<i>For Seal Class B, Add</i>	15.10	
	<i>For Seal Class A, Add</i>	32.21	
	<i>For Work In Restricted Working Space, Add</i>	30.20	
23 31 13 13-0857	LF 10" x 14", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.19	65.88
	<i>For Seal Class B, Add</i>	16.47	
	<i>For Seal Class A, Add</i>	35.14	
	<i>For Work In Restricted Working Space, Add</i>	32.94	
23 31 13 13-0858	LF 10" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	139.97	71.37
	<i>For Seal Class B, Add</i>	17.84	
	<i>For Seal Class A, Add</i>	38.07	
	<i>For Work In Restricted Working Space, Add</i>	35.69	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0859 LF 10" x 18", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.72	76.86
<i>For Seal Class B, Add</i>	19.22	
<i>For Seal Class A, Add</i>	40.99	
<i>For Work In Restricted Working Space, Add</i>	38.43	
23 31 13 13-0860 LF 10" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.49	82.35
<i>For Seal Class B, Add</i>	20.59	
<i>For Seal Class A, Add</i>	43.92	
<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13 13-0861 LF 10" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	172.25	87.85
<i>For Seal Class B, Add</i>	21.96	
<i>For Seal Class A, Add</i>	46.85	
<i>For Work In Restricted Working Space, Add</i>	43.92	
23 31 13 13-0862 LF 10" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	183.02	93.34
<i>For Seal Class B, Add</i>	23.34	
<i>For Seal Class A, Add</i>	49.78	
<i>For Work In Restricted Working Space, Add</i>	46.67	
23 31 13 13-0863 LF 10" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	193.80	98.83
<i>For Seal Class B, Add</i>	24.71	
<i>For Seal Class A, Add</i>	52.71	
<i>For Work In Restricted Working Space, Add</i>	49.41	
23 31 13 13-0864 LF 10" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	204.57	104.33
<i>For Seal Class B, Add</i>	26.08	
<i>For Seal Class A, Add</i>	55.64	
<i>For Work In Restricted Working Space, Add</i>	52.16	
23 31 13 13-0865 LF 10" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.32	109.81
<i>For Seal Class B, Add</i>	27.45	
<i>For Seal Class A, Add</i>	58.56	
<i>For Work In Restricted Working Space, Add</i>	54.90	
23 31 13 13-0866 LF 10" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	226.08	115.30
<i>For Seal Class B, Add</i>	28.82	
<i>For Seal Class A, Add</i>	61.49	
<i>For Work In Restricted Working Space, Add</i>	57.65	
23 31 13 13-0867 LF 12" x 12", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	129.19	65.88
<i>For Seal Class B, Add</i>	16.47	
<i>For Seal Class A, Add</i>	35.14	
<i>For Work In Restricted Working Space, Add</i>	32.94	
23 31 13 13-0868 LF 12" x 14", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	139.97	71.37
<i>For Seal Class B, Add</i>	17.84	
<i>For Seal Class A, Add</i>	38.07	
<i>For Work In Restricted Working Space, Add</i>	35.69	
23 31 13 13-0869 LF 12" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.72	76.86
<i>For Seal Class B, Add</i>	19.22	
<i>For Seal Class A, Add</i>	40.99	
<i>For Work In Restricted Working Space, Add</i>	38.43	
23 31 13 13-0870 LF 12" x 18", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.49	82.35
<i>For Seal Class B, Add</i>	20.59	
<i>For Seal Class A, Add</i>	43.92	
<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13 13-0871 LF 12" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	172.25	87.85
<i>For Seal Class B, Add</i>	21.96	
<i>For Seal Class A, Add</i>	46.85	
<i>For Work In Restricted Working Space, Add</i>	43.92	
23 31 13 13-0872 LF 12" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	183.02	93.34
<i>For Seal Class B, Add</i>	23.34	
<i>For Seal Class A, Add</i>	49.78	
<i>For Work In Restricted Working Space, Add</i>	46.67	
23 31 13 13-0873 LF 12" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	193.80	98.83
<i>For Seal Class B, Add</i>	24.71	
<i>For Seal Class A, Add</i>	52.71	
<i>For Work In Restricted Working Space, Add</i>	49.41	
23 31 13 13-0874 LF 12" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	204.57	104.33
<i>For Seal Class B, Add</i>	26.08	
<i>For Seal Class A, Add</i>	55.64	
<i>For Work In Restricted Working Space, Add</i>	52.16	
23 31 13 13-0875 LF 12" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.32	109.81
<i>For Seal Class B, Add</i>	27.45	
<i>For Seal Class A, Add</i>	58.56	
<i>For Work In Restricted Working Space, Add</i>	54.90	
23 31 13 13-0876 LF 12" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	226.08	115.30
<i>For Seal Class B, Add</i>	28.82	
<i>For Seal Class A, Add</i>	61.49	
<i>For Work In Restricted Working Space, Add</i>	57.65	
23 31 13 13-0877 LF 12" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	236.84	120.79
<i>For Seal Class B, Add</i>	30.20	
<i>For Seal Class A, Add</i>	64.42	
<i>For Work In Restricted Working Space, Add</i>	60.39	
23 31 13 13-0878 LF 12" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	247.63	126.28
<i>For Seal Class B, Add</i>	31.57	
<i>For Seal Class A, Add</i>	67.35	
<i>For Work In Restricted Working Space, Add</i>	63.14	
23 31 13 13-0879 LF 12" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40	131.77
<i>For Seal Class B, Add</i>	32.94	
<i>For Seal Class A, Add</i>	70.28	
<i>For Work In Restricted Working Space, Add</i>	65.89	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0880	LF 14" x 14", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	150.72	76.86
		<i>For Seal Class B, Add</i>	19.22	
		<i>For Seal Class A, Add</i>	40.99	
		<i>For Work In Restricted Working Space, Add</i>	38.43	
23 31 13	13-0881	LF 14" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	161.49	82.35
		<i>For Seal Class B, Add</i>	20.59	
		<i>For Seal Class A, Add</i>	43.92	
		<i>For Work In Restricted Working Space, Add</i>	41.18	
23 31 13	13-0882	LF 14" x 18", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	172.25	87.85
		<i>For Seal Class B, Add</i>	21.96	
		<i>For Seal Class A, Add</i>	46.85	
		<i>For Work In Restricted Working Space, Add</i>	43.92	
23 31 13	13-0883	LF 14" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	183.02	93.34
		<i>For Seal Class B, Add</i>	23.34	
		<i>For Seal Class A, Add</i>	49.78	
		<i>For Work In Restricted Working Space, Add</i>	46.67	
23 31 13	13-0884	LF 14" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	193.80	98.83
		<i>For Seal Class B, Add</i>	24.71	
		<i>For Seal Class A, Add</i>	52.71	
		<i>For Work In Restricted Working Space, Add</i>	49.41	
23 31 13	13-0885	LF 14" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	204.57	104.33
		<i>For Seal Class B, Add</i>	26.08	
		<i>For Seal Class A, Add</i>	55.64	
		<i>For Work In Restricted Working Space, Add</i>	52.16	
23 31 13	13-0886	LF 14" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.32	109.81
		<i>For Seal Class B, Add</i>	27.45	
		<i>For Seal Class A, Add</i>	58.56	
		<i>For Work In Restricted Working Space, Add</i>	54.90	
23 31 13	13-0887	LF 14" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	226.08	115.30
		<i>For Seal Class B, Add</i>	28.82	
		<i>For Seal Class A, Add</i>	61.49	
		<i>For Work In Restricted Working Space, Add</i>	57.65	
23 31 13	13-0888	LF 14" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	236.84	120.79
		<i>For Seal Class B, Add</i>	30.20	
		<i>For Seal Class A, Add</i>	64.42	
		<i>For Work In Restricted Working Space, Add</i>	60.39	
23 31 13	13-0889	LF 14" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	247.63	126.28
		<i>For Seal Class B, Add</i>	31.57	
		<i>For Seal Class A, Add</i>	67.35	
		<i>For Work In Restricted Working Space, Add</i>	63.14	
23 31 13	13-0890	LF 14" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40	131.77
		<i>For Seal Class B, Add</i>	32.94	
		<i>For Seal Class A, Add</i>	70.28	
		<i>For Work In Restricted Working Space, Add</i>	65.89	
23 31 13	13-0891	LF 14" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	269.16	137.26
		<i>For Seal Class B, Add</i>	34.32	
		<i>For Seal Class A, Add</i>	73.21	
		<i>For Work In Restricted Working Space, Add</i>	68.63	
23 31 13	13-0892	LF 16" x 16", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	172.25	87.85
		<i>For Seal Class B, Add</i>	21.96	
		<i>For Seal Class A, Add</i>	46.85	
		<i>For Work In Restricted Working Space, Add</i>	43.92	
23 31 13	13-0893	LF 16" x 18", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	183.02	93.34
		<i>For Seal Class B, Add</i>	23.34	
		<i>For Seal Class A, Add</i>	49.78	
		<i>For Work In Restricted Working Space, Add</i>	46.67	
23 31 13	13-0894	LF 16" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	193.80	98.83
		<i>For Seal Class B, Add</i>	24.71	
		<i>For Seal Class A, Add</i>	52.71	
		<i>For Work In Restricted Working Space, Add</i>	49.41	
23 31 13	13-0895	LF 16" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	204.57	104.33
		<i>For Seal Class B, Add</i>	26.08	
		<i>For Seal Class A, Add</i>	55.64	
		<i>For Work In Restricted Working Space, Add</i>	52.16	
23 31 13	13-0896	LF 16" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.32	109.81
		<i>For Seal Class B, Add</i>	27.45	
		<i>For Seal Class A, Add</i>	58.56	
		<i>For Work In Restricted Working Space, Add</i>	54.90	
23 31 13	13-0897	LF 16" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	226.08	115.30
		<i>For Seal Class B, Add</i>	28.82	
		<i>For Seal Class A, Add</i>	61.49	
		<i>For Work In Restricted Working Space, Add</i>	57.65	
23 31 13	13-0898	LF 16" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	236.84	120.79
		<i>For Seal Class B, Add</i>	30.20	
		<i>For Seal Class A, Add</i>	64.42	
		<i>For Work In Restricted Working Space, Add</i>	60.39	
23 31 13	13-0899	LF 16" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	247.63	126.28
		<i>For Seal Class B, Add</i>	31.57	
		<i>For Seal Class A, Add</i>	67.35	
		<i>For Work In Restricted Working Space, Add</i>	63.14	
23 31 13	13-0900	LF 16" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40	131.77
		<i>For Seal Class B, Add</i>	32.94	
		<i>For Seal Class A, Add</i>	70.28	
		<i>For Work In Restricted Working Space, Add</i>	65.89	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0901 LF 16" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	269.16	137.26
For Seal Class B, Add	34.32	
For Seal Class A, Add	73.21	
For Work In Restricted Working Space, Add	68.63	
23 31 13 13-0902 LF 16" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	279.92	142.75
For Seal Class B, Add	35.69	
For Seal Class A, Add	76.13	
For Work In Restricted Working Space, Add	71.38	
23 31 13 13-0903 LF 16" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	290.68	148.23
For Seal Class B, Add	37.06	
For Seal Class A, Add	79.06	
For Work In Restricted Working Space, Add	74.12	
23 31 13 13-0904 LF 16" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46	153.74
For Seal Class B, Add	38.43	
For Seal Class A, Add	81.99	
For Work In Restricted Working Space, Add	76.87	
23 31 13 13-0905 LF 16" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22	159.23
For Seal Class B, Add	39.81	
For Seal Class A, Add	84.92	
For Work In Restricted Working Space, Add	79.61	
23 31 13 13-0906 LF 16" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
For Seal Class B, Add	41.18	
For Seal Class A, Add	87.85	
For Work In Restricted Working Space, Add	82.36	
23 31 13 13-0907 LF 18" x 18", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	193.80	98.83
For Seal Class B, Add	24.71	
For Seal Class A, Add	52.71	
For Work In Restricted Working Space, Add	49.41	
23 31 13 13-0908 LF 18" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	204.57	104.33
For Seal Class B, Add	26.08	
For Seal Class A, Add	55.64	
For Work In Restricted Working Space, Add	52.16	
23 31 13 13-0909 LF 18" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.32	109.81
For Seal Class B, Add	27.45	
For Seal Class A, Add	58.56	
For Work In Restricted Working Space, Add	54.90	
23 31 13 13-0910 LF 18" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	226.08	115.30
For Seal Class B, Add	28.82	
For Seal Class A, Add	61.49	
For Work In Restricted Working Space, Add	57.65	
23 31 13 13-0911 LF 18" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	236.84	120.79
For Seal Class B, Add	30.20	
For Seal Class A, Add	64.42	
For Work In Restricted Working Space, Add	60.39	
23 31 13 13-0912 LF 18" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	247.63	126.28
For Seal Class B, Add	31.57	
For Seal Class A, Add	67.35	
For Work In Restricted Working Space, Add	63.14	
23 31 13 13-0913 LF 18" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40	131.77
For Seal Class B, Add	32.94	
For Seal Class A, Add	70.28	
For Work In Restricted Working Space, Add	65.89	
23 31 13 13-0914 LF 18" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	269.16	137.26
For Seal Class B, Add	34.32	
For Seal Class A, Add	73.21	
For Work In Restricted Working Space, Add	68.63	
23 31 13 13-0915 LF 18" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	279.92	142.75
For Seal Class B, Add	35.69	
For Seal Class A, Add	76.13	
For Work In Restricted Working Space, Add	71.38	
23 31 13 13-0916 LF 18" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	290.68	148.23
For Seal Class B, Add	37.06	
For Seal Class A, Add	79.06	
For Work In Restricted Working Space, Add	74.12	
23 31 13 13-0917 LF 18" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46	153.74
For Seal Class B, Add	38.43	
For Seal Class A, Add	81.99	
For Work In Restricted Working Space, Add	76.87	
23 31 13 13-0918 LF 18" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22	159.23
For Seal Class B, Add	39.81	
For Seal Class A, Add	84.92	
For Work In Restricted Working Space, Add	79.61	
23 31 13 13-0919 LF 18" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
For Seal Class B, Add	41.18	
For Seal Class A, Add	87.85	
For Work In Restricted Working Space, Add	82.36	
23 31 13 13-0920 LF 18" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76	170.21
For Seal Class B, Add	42.55	
For Seal Class A, Add	90.78	
For Work In Restricted Working Space, Add	85.10	
23 31 13 13-0921 LF 18" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
For Seal Class B, Add	43.92	
For Seal Class A, Add	93.71	
For Work In Restricted Working Space, Add	87.85	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 31 13	13-0922	LF 20" x 20", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	215.32		109.81
		<i>For Seal Class B, Add</i>	27.45		
		<i>For Seal Class A, Add</i>	58.56		
		<i>For Work In Restricted Working Space, Add</i>	54.90		
23 31 13	13-0923	LF 20" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	226.08		115.30
		<i>For Seal Class B, Add</i>	28.82		
		<i>For Seal Class A, Add</i>	61.49		
		<i>For Work In Restricted Working Space, Add</i>	57.65		
23 31 13	13-0924	LF 20" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	236.84		120.79
		<i>For Seal Class B, Add</i>	30.20		
		<i>For Seal Class A, Add</i>	64.42		
		<i>For Work In Restricted Working Space, Add</i>	60.39		
23 31 13	13-0925	LF 20" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	247.63		126.28
		<i>For Seal Class B, Add</i>	31.57		
		<i>For Seal Class A, Add</i>	67.35		
		<i>For Work In Restricted Working Space, Add</i>	63.14		
23 31 13	13-0926	LF 20" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40		131.77
		<i>For Seal Class B, Add</i>	32.94		
		<i>For Seal Class A, Add</i>	70.28		
		<i>For Work In Restricted Working Space, Add</i>	65.89		
23 31 13	13-0927	LF 20" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	269.16		137.26
		<i>For Seal Class B, Add</i>	34.32		
		<i>For Seal Class A, Add</i>	73.21		
		<i>For Work In Restricted Working Space, Add</i>	68.63		
23 31 13	13-0928	LF 20" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	279.92		142.75
		<i>For Seal Class B, Add</i>	35.69		
		<i>For Seal Class A, Add</i>	76.13		
		<i>For Work In Restricted Working Space, Add</i>	71.38		
23 31 13	13-0929	LF 20" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	290.68		148.23
		<i>For Seal Class B, Add</i>	37.06		
		<i>For Seal Class A, Add</i>	79.06		
		<i>For Work In Restricted Working Space, Add</i>	74.12		
23 31 13	13-0930	LF 20" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46		153.74
		<i>For Seal Class B, Add</i>	38.43		
		<i>For Seal Class A, Add</i>	81.99		
		<i>For Work In Restricted Working Space, Add</i>	76.87		
23 31 13	13-0931	LF 20" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22		159.23
		<i>For Seal Class B, Add</i>	39.81		
		<i>For Seal Class A, Add</i>	84.92		
		<i>For Work In Restricted Working Space, Add</i>	79.61		
23 31 13	13-0932	LF 20" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98		164.71
		<i>For Seal Class B, Add</i>	41.18		
		<i>For Seal Class A, Add</i>	87.85		
		<i>For Work In Restricted Working Space, Add</i>	82.36		
23 31 13	13-0933	LF 20" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76		170.21
		<i>For Seal Class B, Add</i>	42.55		
		<i>For Seal Class A, Add</i>	90.78		
		<i>For Work In Restricted Working Space, Add</i>	85.10		
23 31 13	13-0934	LF 20" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54		175.69
		<i>For Seal Class B, Add</i>	43.92		
		<i>For Seal Class A, Add</i>	93.71		
		<i>For Work In Restricted Working Space, Add</i>	87.85		
23 31 13	13-0935	LF 20" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29		181.18
		<i>For Seal Class B, Add</i>	45.30		
		<i>For Seal Class A, Add</i>	96.63		
		<i>For Work In Restricted Working Space, Add</i>	90.59		
23 31 13	13-0936	LF 20" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05		186.68
		<i>For Seal Class B, Add</i>	46.67		
		<i>For Seal Class A, Add</i>	99.56		
		<i>For Work In Restricted Working Space, Add</i>	93.34		
23 31 13	13-0937	LF 22" x 22", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	236.84		120.79
		<i>For Seal Class B, Add</i>	30.20		
		<i>For Seal Class A, Add</i>	64.42		
		<i>For Work In Restricted Working Space, Add</i>	60.39		
23 31 13	13-0938	LF 22" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	247.63		126.28
		<i>For Seal Class B, Add</i>	31.57		
		<i>For Seal Class A, Add</i>	67.35		
		<i>For Work In Restricted Working Space, Add</i>	63.14		
23 31 13	13-0939	LF 22" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40		131.77
		<i>For Seal Class B, Add</i>	32.94		
		<i>For Seal Class A, Add</i>	70.28		
		<i>For Work In Restricted Working Space, Add</i>	65.89		
23 31 13	13-0940	LF 22" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	269.16		137.26
		<i>For Seal Class B, Add</i>	34.32		
		<i>For Seal Class A, Add</i>	73.21		
		<i>For Work In Restricted Working Space, Add</i>	68.63		
23 31 13	13-0941	LF 22" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	279.92		142.75
		<i>For Seal Class B, Add</i>	35.69		
		<i>For Seal Class A, Add</i>	76.13		
		<i>For Work In Restricted Working Space, Add</i>	71.38		
23 31 13	13-0942	LF 22" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	290.68		148.23
		<i>For Seal Class B, Add</i>	37.06		
		<i>For Seal Class A, Add</i>	79.06		
		<i>For Work In Restricted Working Space, Add</i>	74.12		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0943 LF 22" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46	153.74
For Seal Class B, Add	38.43	
For Seal Class A, Add	81.99	
For Work In Restricted Working Space, Add	76.87	
23 31 13 13-0944 LF 22" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22	159.23
For Seal Class B, Add	39.81	
For Seal Class A, Add	84.92	
For Work In Restricted Working Space, Add	79.61	
23 31 13 13-0945 LF 22" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
For Seal Class B, Add	41.18	
For Seal Class A, Add	87.85	
For Work In Restricted Working Space, Add	82.36	
23 31 13 13-0946 LF 22" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76	170.21
For Seal Class B, Add	42.55	
For Seal Class A, Add	90.78	
For Work In Restricted Working Space, Add	85.10	
23 31 13 13-0947 LF 22" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
For Seal Class B, Add	43.92	
For Seal Class A, Add	93.71	
For Work In Restricted Working Space, Add	87.85	
23 31 13 13-0948 LF 22" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29	181.18
For Seal Class B, Add	45.30	
For Seal Class A, Add	96.63	
For Work In Restricted Working Space, Add	90.59	
23 31 13 13-0949 LF 22" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
For Seal Class B, Add	46.67	
For Seal Class A, Add	99.56	
For Work In Restricted Working Space, Add	93.34	
23 31 13 13-0950 LF 22" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
For Seal Class B, Add	48.04	
For Seal Class A, Add	102.49	
For Work In Restricted Working Space, Add	96.08	
23 31 13 13-0951 LF 24" x 24", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	258.40	131.77
For Seal Class B, Add	32.94	
For Seal Class A, Add	70.28	
For Work In Restricted Working Space, Add	65.89	
23 31 13 13-0952 LF 24" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	269.16	137.26
For Seal Class B, Add	34.32	
For Seal Class A, Add	73.21	
For Work In Restricted Working Space, Add	68.63	
23 31 13 13-0953 LF 24" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	279.92	142.75
For Seal Class B, Add	35.69	
For Seal Class A, Add	76.13	
For Work In Restricted Working Space, Add	71.38	
23 31 13 13-0954 LF 24" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	290.68	148.23
For Seal Class B, Add	37.06	
For Seal Class A, Add	79.06	
For Work In Restricted Working Space, Add	74.12	
23 31 13 13-0955 LF 24" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46	153.74
For Seal Class B, Add	38.43	
For Seal Class A, Add	81.99	
For Work In Restricted Working Space, Add	76.87	
23 31 13 13-0956 LF 24" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22	159.23
For Seal Class B, Add	39.81	
For Seal Class A, Add	84.92	
For Work In Restricted Working Space, Add	79.61	
23 31 13 13-0957 LF 24" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
For Seal Class B, Add	41.18	
For Seal Class A, Add	87.85	
For Work In Restricted Working Space, Add	82.36	
23 31 13 13-0958 LF 24" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76	170.21
For Seal Class B, Add	42.55	
For Seal Class A, Add	90.78	
For Work In Restricted Working Space, Add	85.10	
23 31 13 13-0959 LF 24" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
For Seal Class B, Add	43.92	
For Seal Class A, Add	93.71	
For Work In Restricted Working Space, Add	87.85	
23 31 13 13-0960 LF 24" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29	181.18
For Seal Class B, Add	45.30	
For Seal Class A, Add	96.63	
For Work In Restricted Working Space, Add	90.59	
23 31 13 13-0961 LF 24" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
For Seal Class B, Add	46.67	
For Seal Class A, Add	99.56	
For Work In Restricted Working Space, Add	93.34	
23 31 13 13-0962 LF 24" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
For Seal Class B, Add	48.04	
For Seal Class A, Add	102.49	
For Work In Restricted Working Space, Add	96.08	
23 31 13 13-0963 LF 24" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
For Seal Class B, Add	49.41	
For Seal Class A, Add	105.41	
For Work In Restricted Working Space, Add	98.83	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-0964	LF 26" x 26", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	279.92	142.75
		<i>For Seal Class B, Add</i>	35.69	
		<i>For Seal Class A, Add</i>	76.13	
		<i>For Work In Restricted Working Space, Add</i>	71.38	
23 31 13	13-0965	LF 26" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	290.68	148.23
		<i>For Seal Class B, Add</i>	37.06	
		<i>For Seal Class A, Add</i>	79.06	
		<i>For Work In Restricted Working Space, Add</i>	74.12	
23 31 13	13-0966	LF 26" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46	153.74
		<i>For Seal Class B, Add</i>	38.43	
		<i>For Seal Class A, Add</i>	81.99	
		<i>For Work In Restricted Working Space, Add</i>	76.87	
23 31 13	13-0967	LF 26" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22	159.23
		<i>For Seal Class B, Add</i>	39.81	
		<i>For Seal Class A, Add</i>	84.92	
		<i>For Work In Restricted Working Space, Add</i>	79.61	
23 31 13	13-0968	LF 26" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
		<i>For Seal Class B, Add</i>	41.18	
		<i>For Seal Class A, Add</i>	87.85	
		<i>For Work In Restricted Working Space, Add</i>	82.36	
23 31 13	13-0969	LF 26" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76	170.21
		<i>For Seal Class B, Add</i>	42.55	
		<i>For Seal Class A, Add</i>	90.78	
		<i>For Work In Restricted Working Space, Add</i>	85.10	
23 31 13	13-0970	LF 26" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
		<i>For Seal Class B, Add</i>	43.92	
		<i>For Seal Class A, Add</i>	93.71	
		<i>For Work In Restricted Working Space, Add</i>	87.85	
23 31 13	13-0971	LF 26" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29	181.18
		<i>For Seal Class B, Add</i>	45.30	
		<i>For Seal Class A, Add</i>	96.63	
		<i>For Work In Restricted Working Space, Add</i>	90.59	
23 31 13	13-0972	LF 26" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
		<i>For Seal Class B, Add</i>	46.67	
		<i>For Seal Class A, Add</i>	99.56	
		<i>For Work In Restricted Working Space, Add</i>	93.34	
23 31 13	13-0973	LF 26" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
		<i>For Seal Class B, Add</i>	48.04	
		<i>For Seal Class A, Add</i>	102.49	
		<i>For Work In Restricted Working Space, Add</i>	96.08	
23 31 13	13-0974	LF 26" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
		<i>For Seal Class B, Add</i>	49.41	
		<i>For Seal Class A, Add</i>	105.41	
		<i>For Work In Restricted Working Space, Add</i>	98.83	
23 31 13	13-0975	LF 26" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	398.37	203.14
		<i>For Seal Class B, Add</i>	50.79	
		<i>For Seal Class A, Add</i>	108.35	
		<i>For Work In Restricted Working Space, Add</i>	101.57	
23 31 13	13-0976	LF 28" x 28", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	301.46	153.74
		<i>For Seal Class B, Add</i>	38.43	
		<i>For Seal Class A, Add</i>	81.99	
		<i>For Work In Restricted Working Space, Add</i>	76.87	
23 31 13	13-0977	LF 28" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	312.22	159.23
		<i>For Seal Class B, Add</i>	39.81	
		<i>For Seal Class A, Add</i>	84.92	
		<i>For Work In Restricted Working Space, Add</i>	79.61	
23 31 13	13-0978	LF 28" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
		<i>For Seal Class B, Add</i>	41.18	
		<i>For Seal Class A, Add</i>	87.85	
		<i>For Work In Restricted Working Space, Add</i>	82.36	
23 31 13	13-0979	LF 28" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76	170.21
		<i>For Seal Class B, Add</i>	42.55	
		<i>For Seal Class A, Add</i>	90.78	
		<i>For Work In Restricted Working Space, Add</i>	85.10	
23 31 13	13-0980	LF 28" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
		<i>For Seal Class B, Add</i>	43.92	
		<i>For Seal Class A, Add</i>	93.71	
		<i>For Work In Restricted Working Space, Add</i>	87.85	
23 31 13	13-0981	LF 28" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29	181.18
		<i>For Seal Class B, Add</i>	45.30	
		<i>For Seal Class A, Add</i>	96.63	
		<i>For Work In Restricted Working Space, Add</i>	90.59	
23 31 13	13-0982	LF 28" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
		<i>For Seal Class B, Add</i>	46.67	
		<i>For Seal Class A, Add</i>	99.56	
		<i>For Work In Restricted Working Space, Add</i>	93.34	
23 31 13	13-0983	LF 28" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
		<i>For Seal Class B, Add</i>	48.04	
		<i>For Seal Class A, Add</i>	102.49	
		<i>For Work In Restricted Working Space, Add</i>	96.08	
23 31 13	13-0984	LF 28" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
		<i>For Seal Class B, Add</i>	49.41	
		<i>For Seal Class A, Add</i>	105.41	
		<i>For Work In Restricted Working Space, Add</i>	98.83	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-0985 LF 28" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	398.37	203.14
<i>For Seal Class B, Add</i>	50.79	
<i>For Seal Class A, Add</i>	108.35	
<i>For Work In Restricted Working Space, Add</i>	101.57	
23 31 13 13-0986 LF 28" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	409.13	208.63
<i>For Seal Class B, Add</i>	52.16	
<i>For Seal Class A, Add</i>	111.27	
<i>For Work In Restricted Working Space, Add</i>	104.32	
23 31 13 13-0987 LF 30" x 30", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	322.98	164.71
<i>For Seal Class B, Add</i>	41.18	
<i>For Seal Class A, Add</i>	87.85	
<i>For Work In Restricted Working Space, Add</i>	82.36	
23 31 13 13-0988 LF 30" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	333.76	170.21
<i>For Seal Class B, Add</i>	42.55	
<i>For Seal Class A, Add</i>	90.78	
<i>For Work In Restricted Working Space, Add</i>	85.10	
23 31 13 13-0989 LF 30" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
<i>For Seal Class B, Add</i>	43.92	
<i>For Seal Class A, Add</i>	93.71	
<i>For Work In Restricted Working Space, Add</i>	87.85	
23 31 13 13-0990 LF 30" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29	181.18
<i>For Seal Class B, Add</i>	45.30	
<i>For Seal Class A, Add</i>	96.63	
<i>For Work In Restricted Working Space, Add</i>	90.59	
23 31 13 13-0991 LF 30" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
<i>For Seal Class B, Add</i>	46.67	
<i>For Seal Class A, Add</i>	99.56	
<i>For Work In Restricted Working Space, Add</i>	93.34	
23 31 13 13-0992 LF 30" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
<i>For Seal Class B, Add</i>	48.04	
<i>For Seal Class A, Add</i>	102.49	
<i>For Work In Restricted Working Space, Add</i>	96.08	
23 31 13 13-0993 LF 30" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
<i>For Seal Class B, Add</i>	49.41	
<i>For Seal Class A, Add</i>	105.41	
<i>For Work In Restricted Working Space, Add</i>	98.83	
23 31 13 13-0994 LF 30" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	398.37	203.14
<i>For Seal Class B, Add</i>	50.79	
<i>For Seal Class A, Add</i>	108.35	
<i>For Work In Restricted Working Space, Add</i>	101.57	
23 31 13 13-0995 LF 30" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	409.13	208.63
<i>For Seal Class B, Add</i>	52.16	
<i>For Seal Class A, Add</i>	111.27	
<i>For Work In Restricted Working Space, Add</i>	104.32	
23 31 13 13-0996 LF 30" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	419.88	214.14
<i>For Seal Class B, Add</i>	53.53	
<i>For Seal Class A, Add</i>	114.20	
<i>For Work In Restricted Working Space, Add</i>	107.06	
23 31 13 13-0997 LF 32" x 32", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	344.54	175.69
<i>For Seal Class B, Add</i>	43.92	
<i>For Seal Class A, Add</i>	93.71	
<i>For Work In Restricted Working Space, Add</i>	87.85	
23 31 13 13-0998 LF 32" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	355.29	181.18
<i>For Seal Class B, Add</i>	45.30	
<i>For Seal Class A, Add</i>	96.63	
<i>For Work In Restricted Working Space, Add</i>	90.59	
23 31 13 13-0999 LF 32" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
<i>For Seal Class B, Add</i>	46.67	
<i>For Seal Class A, Add</i>	99.56	
<i>For Work In Restricted Working Space, Add</i>	93.34	
23 31 13 13-1000 LF 32" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
<i>For Seal Class B, Add</i>	48.04	
<i>For Seal Class A, Add</i>	102.49	
<i>For Work In Restricted Working Space, Add</i>	96.08	
23 31 13 13-1001 LF 32" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
<i>For Seal Class B, Add</i>	49.41	
<i>For Seal Class A, Add</i>	105.41	
<i>For Work In Restricted Working Space, Add</i>	98.83	
23 31 13 13-1002 LF 32" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	398.37	203.14
<i>For Seal Class B, Add</i>	50.79	
<i>For Seal Class A, Add</i>	108.35	
<i>For Work In Restricted Working Space, Add</i>	101.57	
23 31 13 13-1003 LF 32" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	409.13	208.63
<i>For Seal Class B, Add</i>	52.16	
<i>For Seal Class A, Add</i>	111.27	
<i>For Work In Restricted Working Space, Add</i>	104.32	
23 31 13 13-1004 LF 32" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	419.88	214.14
<i>For Seal Class B, Add</i>	53.53	
<i>For Seal Class A, Add</i>	114.20	
<i>For Work In Restricted Working Space, Add</i>	107.06	
23 31 13 13-1005 LF 32" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.65	219.62
<i>For Seal Class B, Add</i>	54.90	
<i>For Seal Class A, Add</i>	117.13	
<i>For Work In Restricted Working Space, Add</i>	109.81	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-1006	LF 34" x 34", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	366.05	186.68
		<i>For Seal Class B, Add</i>	46.67	
		<i>For Seal Class A, Add</i>	99.56	
		<i>For Work In Restricted Working Space, Add</i>	93.34	
23 31 13	13-1007	LF 34" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	376.82	192.16
		<i>For Seal Class B, Add</i>	48.04	
		<i>For Seal Class A, Add</i>	102.49	
		<i>For Work In Restricted Working Space, Add</i>	96.08	
23 31 13	13-1008	LF 34" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
		<i>For Seal Class B, Add</i>	49.41	
		<i>For Seal Class A, Add</i>	105.41	
		<i>For Work In Restricted Working Space, Add</i>	98.83	
23 31 13	13-1009	LF 34" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	398.37	203.14
		<i>For Seal Class B, Add</i>	50.79	
		<i>For Seal Class A, Add</i>	108.35	
		<i>For Work In Restricted Working Space, Add</i>	101.57	
23 31 13	13-1010	LF 34" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	409.13	208.63
		<i>For Seal Class B, Add</i>	52.16	
		<i>For Seal Class A, Add</i>	111.27	
		<i>For Work In Restricted Working Space, Add</i>	104.32	
23 31 13	13-1011	LF 34" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	419.88	214.14
		<i>For Seal Class B, Add</i>	53.53	
		<i>For Seal Class A, Add</i>	114.20	
		<i>For Work In Restricted Working Space, Add</i>	107.06	
23 31 13	13-1012	LF 34" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.65	219.62
		<i>For Seal Class B, Add</i>	54.90	
		<i>For Seal Class A, Add</i>	117.13	
		<i>For Work In Restricted Working Space, Add</i>	109.81	
23 31 13	13-1013	LF 34" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	441.41	225.11
		<i>For Seal Class B, Add</i>	56.28	
		<i>For Seal Class A, Add</i>	120.06	
		<i>For Work In Restricted Working Space, Add</i>	112.55	
23 31 13	13-1014	LF 36" x 36", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	387.57	197.65
		<i>For Seal Class B, Add</i>	49.41	
		<i>For Seal Class A, Add</i>	105.41	
		<i>For Work In Restricted Working Space, Add</i>	98.83	
23 31 13	13-1015	LF 36" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	398.37	203.14
		<i>For Seal Class B, Add</i>	50.79	
		<i>For Seal Class A, Add</i>	108.35	
		<i>For Work In Restricted Working Space, Add</i>	101.57	
23 31 13	13-1016	LF 36" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	409.13	208.63
		<i>For Seal Class B, Add</i>	52.16	
		<i>For Seal Class A, Add</i>	111.27	
		<i>For Work In Restricted Working Space, Add</i>	104.32	
23 31 13	13-1017	LF 36" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	419.88	214.14
		<i>For Seal Class B, Add</i>	53.53	
		<i>For Seal Class A, Add</i>	114.20	
		<i>For Work In Restricted Working Space, Add</i>	107.06	
23 31 13	13-1018	LF 36" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.65	219.62
		<i>For Seal Class B, Add</i>	54.90	
		<i>For Seal Class A, Add</i>	117.13	
		<i>For Work In Restricted Working Space, Add</i>	109.81	
23 31 13	13-1019	LF 36" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	441.41	225.11
		<i>For Seal Class B, Add</i>	56.28	
		<i>For Seal Class A, Add</i>	120.06	
		<i>For Work In Restricted Working Space, Add</i>	112.55	
23 31 13	13-1020	LF 36" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	452.18	230.60
		<i>For Seal Class B, Add</i>	57.65	
		<i>For Seal Class A, Add</i>	122.98	
		<i>For Work In Restricted Working Space, Add</i>	115.30	
23 31 13	13-1021	LF 38" x 38", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	409.13	208.63
		<i>For Seal Class B, Add</i>	52.16	
		<i>For Seal Class A, Add</i>	111.27	
		<i>For Work In Restricted Working Space, Add</i>	104.32	
23 31 13	13-1022	LF 38" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	419.88	214.14
		<i>For Seal Class B, Add</i>	53.53	
		<i>For Seal Class A, Add</i>	114.20	
		<i>For Work In Restricted Working Space, Add</i>	107.06	
23 31 13	13-1023	LF 38" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.65	219.62
		<i>For Seal Class B, Add</i>	54.90	
		<i>For Seal Class A, Add</i>	117.13	
		<i>For Work In Restricted Working Space, Add</i>	109.81	
23 31 13	13-1024	LF 38" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	441.41	225.11
		<i>For Seal Class B, Add</i>	56.28	
		<i>For Seal Class A, Add</i>	120.06	
		<i>For Work In Restricted Working Space, Add</i>	112.55	
23 31 13	13-1025	LF 38" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	452.18	230.60
		<i>For Seal Class B, Add</i>	57.65	
		<i>For Seal Class A, Add</i>	122.98	
		<i>For Work In Restricted Working Space, Add</i>	115.30	
23 31 13	13-1026	LF 38" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	462.96	236.09
		<i>For Seal Class B, Add</i>	59.02	
		<i>For Seal Class A, Add</i>	125.91	
		<i>For Work In Restricted Working Space, Add</i>	118.04	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-1027 LF 38" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	473.73	241.58
<i>For Seal Class B, Add</i>	60.40	
<i>For Seal Class A, Add</i>	128.84	
<i>For Work In Restricted Working Space, Add</i>	120.79	
23 31 13 13-1028 LF 40" x 40", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	430.65	219.62
<i>For Seal Class B, Add</i>	54.90	
<i>For Seal Class A, Add</i>	117.13	
<i>For Work In Restricted Working Space, Add</i>	109.81	
23 31 13 13-1029 LF 40" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	441.41	225.11
<i>For Seal Class B, Add</i>	56.28	
<i>For Seal Class A, Add</i>	120.06	
<i>For Work In Restricted Working Space, Add</i>	112.55	
23 31 13 13-1030 LF 40" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	452.18	230.60
<i>For Seal Class B, Add</i>	57.65	
<i>For Seal Class A, Add</i>	122.98	
<i>For Work In Restricted Working Space, Add</i>	115.30	
23 31 13 13-1031 LF 40" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	462.96	236.09
<i>For Seal Class B, Add</i>	59.02	
<i>For Seal Class A, Add</i>	125.91	
<i>For Work In Restricted Working Space, Add</i>	118.04	
23 31 13 13-1032 LF 40" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	473.73	241.58
<i>For Seal Class B, Add</i>	60.40	
<i>For Seal Class A, Add</i>	128.84	
<i>For Work In Restricted Working Space, Add</i>	120.79	
23 31 13 13-1033 LF 40" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	484.48	247.07
<i>For Seal Class B, Add</i>	61.77	
<i>For Seal Class A, Add</i>	131.77	
<i>For Work In Restricted Working Space, Add</i>	123.53	
23 31 13 13-1034 LF 40" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	495.24	252.56
<i>For Seal Class B, Add</i>	63.14	
<i>For Seal Class A, Add</i>	134.70	
<i>For Work In Restricted Working Space, Add</i>	126.28	
23 31 13 13-1035 LF 40" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	506.02	258.04
<i>For Seal Class B, Add</i>	64.51	
<i>For Seal Class A, Add</i>	137.63	
<i>For Work In Restricted Working Space, Add</i>	129.02	
23 31 13 13-1036 LF 40" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	516.78	263.54
<i>For Seal Class B, Add</i>	65.88	
<i>For Seal Class A, Add</i>	140.55	
<i>For Work In Restricted Working Space, Add</i>	131.77	
23 31 13 13-1037 LF 42" x 42", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	452.18	230.60
<i>For Seal Class B, Add</i>	57.65	
<i>For Seal Class A, Add</i>	122.98	
<i>For Work In Restricted Working Space, Add</i>	115.30	
23 31 13 13-1038 LF 42" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	462.96	236.09
<i>For Seal Class B, Add</i>	59.02	
<i>For Seal Class A, Add</i>	125.91	
<i>For Work In Restricted Working Space, Add</i>	118.04	
23 31 13 13-1039 LF 42" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	473.73	241.58
<i>For Seal Class B, Add</i>	60.40	
<i>For Seal Class A, Add</i>	128.84	
<i>For Work In Restricted Working Space, Add</i>	120.79	
23 31 13 13-1040 LF 42" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	484.48	247.07
<i>For Seal Class B, Add</i>	61.77	
<i>For Seal Class A, Add</i>	131.77	
<i>For Work In Restricted Working Space, Add</i>	123.53	
23 31 13 13-1041 LF 42" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	495.24	252.56
<i>For Seal Class B, Add</i>	63.14	
<i>For Seal Class A, Add</i>	134.70	
<i>For Work In Restricted Working Space, Add</i>	126.28	
23 31 13 13-1042 LF 42" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	506.02	258.04
<i>For Seal Class B, Add</i>	64.51	
<i>For Seal Class A, Add</i>	137.63	
<i>For Work In Restricted Working Space, Add</i>	129.02	
23 31 13 13-1043 LF 42" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	516.78	263.54
<i>For Seal Class B, Add</i>	65.88	
<i>For Seal Class A, Add</i>	140.55	
<i>For Work In Restricted Working Space, Add</i>	131.77	
23 31 13 13-1044 LF 42" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	527.54	269.03
<i>For Seal Class B, Add</i>	67.26	
<i>For Seal Class A, Add</i>	143.48	
<i>For Work In Restricted Working Space, Add</i>	134.51	
23 31 13 13-1045 LF 44" x 44", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	473.73	241.58
<i>For Seal Class B, Add</i>	60.40	
<i>For Seal Class A, Add</i>	128.84	
<i>For Work In Restricted Working Space, Add</i>	120.79	
23 31 13 13-1046 LF 44" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	484.48	247.07
<i>For Seal Class B, Add</i>	61.77	
<i>For Seal Class A, Add</i>	131.77	
<i>For Work In Restricted Working Space, Add</i>	123.53	
23 31 13 13-1047 LF 44" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	495.24	252.56
<i>For Seal Class B, Add</i>	63.14	
<i>For Seal Class A, Add</i>	134.70	
<i>For Work In Restricted Working Space, Add</i>	126.28	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13 13-1048	LF	44" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	506.02	258.04
		<i>For Seal Class B, Add</i>	64.51	
		<i>For Seal Class A, Add</i>	137.63	
		<i>For Work In Restricted Working Space, Add</i>	129.02	
23 31 13 13-1049	LF	44" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	516.78	263.54
		<i>For Seal Class B, Add</i>	65.88	
		<i>For Seal Class A, Add</i>	140.55	
		<i>For Work In Restricted Working Space, Add</i>	131.77	
23 31 13 13-1050	LF	44" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	527.54	269.03
		<i>For Seal Class B, Add</i>	67.26	
		<i>For Seal Class A, Add</i>	143.48	
		<i>For Work In Restricted Working Space, Add</i>	134.51	
23 31 13 13-1051	LF	44" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	538.31	274.52
		<i>For Seal Class B, Add</i>	68.63	
		<i>For Seal Class A, Add</i>	146.41	
		<i>For Work In Restricted Working Space, Add</i>	137.26	
23 31 13 13-1052	LF	46" x 46", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	495.24	252.56
		<i>For Seal Class B, Add</i>	63.14	
		<i>For Seal Class A, Add</i>	134.70	
		<i>For Work In Restricted Working Space, Add</i>	126.28	
23 31 13 13-1053	LF	46" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	506.02	258.04
		<i>For Seal Class B, Add</i>	64.51	
		<i>For Seal Class A, Add</i>	137.63	
		<i>For Work In Restricted Working Space, Add</i>	129.02	
23 31 13 13-1054	LF	46" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	516.78	263.54
		<i>For Seal Class B, Add</i>	65.88	
		<i>For Seal Class A, Add</i>	140.55	
		<i>For Work In Restricted Working Space, Add</i>	131.77	
23 31 13 13-1055	LF	46" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	527.54	269.03
		<i>For Seal Class B, Add</i>	67.26	
		<i>For Seal Class A, Add</i>	143.48	
		<i>For Work In Restricted Working Space, Add</i>	134.51	
23 31 13 13-1056	LF	46" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	538.31	274.52
		<i>For Seal Class B, Add</i>	68.63	
		<i>For Seal Class A, Add</i>	146.41	
		<i>For Work In Restricted Working Space, Add</i>	137.26	
23 31 13 13-1057	LF	46" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	558.23	285.50
		<i>For Seal Class B, Add</i>	71.38	
		<i>For Seal Class A, Add</i>	152.27	
		<i>For Work In Restricted Working Space, Add</i>	142.75	
23 31 13 13-1058	LF	46" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	569.01	290.99
		<i>For Seal Class B, Add</i>	72.75	
		<i>For Seal Class A, Add</i>	155.20	
		<i>For Work In Restricted Working Space, Add</i>	145.50	
23 31 13 13-1059	LF	48" x 48", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	516.78	263.54
		<i>For Seal Class B, Add</i>	65.88	
		<i>For Seal Class A, Add</i>	140.55	
		<i>For Work In Restricted Working Space, Add</i>	131.77	
23 31 13 13-1060	LF	48" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	527.54	269.03
		<i>For Seal Class B, Add</i>	67.26	
		<i>For Seal Class A, Add</i>	143.48	
		<i>For Work In Restricted Working Space, Add</i>	134.51	
23 31 13 13-1061	LF	48" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	538.31	274.52
		<i>For Seal Class B, Add</i>	68.63	
		<i>For Seal Class A, Add</i>	146.41	
		<i>For Work In Restricted Working Space, Add</i>	137.26	
23 31 13 13-1062	LF	48" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	549.07	280.02
		<i>For Seal Class B, Add</i>	70.00	
		<i>For Seal Class A, Add</i>	149.34	
		<i>For Work In Restricted Working Space, Add</i>	140.00	
23 31 13 13-1063	LF	48" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	559.86	285.50
		<i>For Seal Class B, Add</i>	71.38	
		<i>For Seal Class A, Add</i>	152.27	
		<i>For Work In Restricted Working Space, Add</i>	142.75	
23 31 13 13-1064	LF	48" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	570.62	290.99
		<i>For Seal Class B, Add</i>	72.75	
		<i>For Seal Class A, Add</i>	155.20	
		<i>For Work In Restricted Working Space, Add</i>	145.50	
23 31 13 13-1065	LF	48" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	581.37	296.49
		<i>For Seal Class B, Add</i>	74.12	
		<i>For Seal Class A, Add</i>	158.12	
		<i>For Work In Restricted Working Space, Add</i>	148.24	
23 31 13 13-1066	LF	50" x 50", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	538.31	274.52
		<i>For Seal Class B, Add</i>	68.63	
		<i>For Seal Class A, Add</i>	146.41	
		<i>For Work In Restricted Working Space, Add</i>	137.26	
23 31 13 13-1067	LF	50" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	549.07	280.02
		<i>For Seal Class B, Add</i>	70.00	
		<i>For Seal Class A, Add</i>	149.34	
		<i>For Work In Restricted Working Space, Add</i>	140.00	
23 31 13 13-1068	LF	50" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	559.86	285.50
		<i>For Seal Class B, Add</i>	71.38	
		<i>For Seal Class A, Add</i>	152.27	
		<i>For Work In Restricted Working Space, Add</i>	142.75	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-1069 LF 50" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	570.62	290.99
<i>For Seal Class B, Add</i>	72.75	
<i>For Seal Class A, Add</i>	155.20	
<i>For Work In Restricted Working Space, Add</i>	145.50	
23 31 13 13-1070 LF 50" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	581.37	296.49
<i>For Seal Class B, Add</i>	74.12	
<i>For Seal Class A, Add</i>	158.12	
<i>For Work In Restricted Working Space, Add</i>	148.24	
23 31 13 13-1071 LF 50" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	592.13	301.97
<i>For Seal Class B, Add</i>	75.49	
<i>For Seal Class A, Add</i>	161.05	
<i>For Work In Restricted Working Space, Add</i>	150.98	
23 31 13 13-1072 LF 52" x 52", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	559.86	285.50
<i>For Seal Class B, Add</i>	71.38	
<i>For Seal Class A, Add</i>	152.27	
<i>For Work In Restricted Working Space, Add</i>	142.75	
23 31 13 13-1073 LF 52" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	570.62	290.99
<i>For Seal Class B, Add</i>	72.75	
<i>For Seal Class A, Add</i>	155.20	
<i>For Work In Restricted Working Space, Add</i>	145.50	
23 31 13 13-1074 LF 52" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	581.37	296.49
<i>For Seal Class B, Add</i>	74.12	
<i>For Seal Class A, Add</i>	158.12	
<i>For Work In Restricted Working Space, Add</i>	148.24	
23 31 13 13-1075 LF 52" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	592.13	301.97
<i>For Seal Class B, Add</i>	75.49	
<i>For Seal Class A, Add</i>	161.05	
<i>For Work In Restricted Working Space, Add</i>	150.98	
23 31 13 13-1076 LF 52" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	602.91	307.46
<i>For Seal Class B, Add</i>	76.87	
<i>For Seal Class A, Add</i>	163.98	
<i>For Work In Restricted Working Space, Add</i>	153.74	
23 31 13 13-1077 LF 54" x 54", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	581.37	296.49
<i>For Seal Class B, Add</i>	74.12	
<i>For Seal Class A, Add</i>	158.12	
<i>For Work In Restricted Working Space, Add</i>	148.24	
23 31 13 13-1078 LF 54" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	592.13	301.97
<i>For Seal Class B, Add</i>	75.49	
<i>For Seal Class A, Add</i>	161.05	
<i>For Work In Restricted Working Space, Add</i>	150.98	
23 31 13 13-1079 LF 54" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	602.91	307.46
<i>For Seal Class B, Add</i>	76.87	
<i>For Seal Class A, Add</i>	163.98	
<i>For Work In Restricted Working Space, Add</i>	153.74	
23 31 13 13-1080 LF 54" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	613.70	312.95
<i>For Seal Class B, Add</i>	78.24	
<i>For Seal Class A, Add</i>	166.91	
<i>For Work In Restricted Working Space, Add</i>	156.48	
23 31 13 13-1081 LF 54" x 62", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	624.45	318.44
<i>For Seal Class B, Add</i>	79.61	
<i>For Seal Class A, Add</i>	169.84	
<i>For Work In Restricted Working Space, Add</i>	159.22	
23 31 13 13-1082 LF 54" x 64", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	635.21	323.93
<i>For Seal Class B, Add</i>	80.98	
<i>For Seal Class A, Add</i>	172.76	
<i>For Work In Restricted Working Space, Add</i>	161.97	
23 31 13 13-1083 LF 56" x 56", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	602.91	307.46
<i>For Seal Class B, Add</i>	76.87	
<i>For Seal Class A, Add</i>	163.98	
<i>For Work In Restricted Working Space, Add</i>	153.74	
23 31 13 13-1084 LF 56" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	613.70	312.95
<i>For Seal Class B, Add</i>	78.24	
<i>For Seal Class A, Add</i>	166.91	
<i>For Work In Restricted Working Space, Add</i>	156.48	
23 31 13 13-1085 LF 56" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	624.45	318.44
<i>For Seal Class B, Add</i>	79.61	
<i>For Seal Class A, Add</i>	169.84	
<i>For Work In Restricted Working Space, Add</i>	159.22	
23 31 13 13-1086 LF 56" x 62", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	635.21	323.93
<i>For Seal Class B, Add</i>	80.98	
<i>For Seal Class A, Add</i>	172.76	
<i>For Work In Restricted Working Space, Add</i>	161.97	
23 31 13 13-1087 LF 56" x 64", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.98	329.42
<i>For Seal Class B, Add</i>	82.36	
<i>For Seal Class A, Add</i>	175.70	
<i>For Work In Restricted Working Space, Add</i>	164.72	
23 31 13 13-1088 LF 58" x 58", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	624.45	318.44
<i>For Seal Class B, Add</i>	79.61	
<i>For Seal Class A, Add</i>	169.84	
<i>For Work In Restricted Working Space, Add</i>	159.22	
23 31 13 13-1089 LF 58" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	635.21	323.93
<i>For Seal Class B, Add</i>	80.98	
<i>For Seal Class A, Add</i>	172.76	
<i>For Work In Restricted Working Space, Add</i>	161.97	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 31 13	13-1090	LF 58" x 62", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.98	329.42
		<i>For Seal Class B, Add</i>	82.36	
		<i>For Seal Class A, Add</i>	175.70	
		<i>For Work In Restricted Working Space, Add</i>	164.72	
23 31 13	13-1091	LF 58" x 64", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	656.73	334.92
		<i>For Seal Class B, Add</i>	83.73	
		<i>For Seal Class A, Add</i>	178.62	
		<i>For Work In Restricted Working Space, Add</i>	167.46	
23 31 13	13-1092	LF 58" x 66", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	667.51	340.41
		<i>For Seal Class B, Add</i>	85.10	
		<i>For Seal Class A, Add</i>	181.55	
		<i>For Work In Restricted Working Space, Add</i>	170.20	
23 31 13	13-1093	LF 60" x 60", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	645.98	329.42
		<i>For Seal Class B, Add</i>	82.36	
		<i>For Seal Class A, Add</i>	175.70	
		<i>For Work In Restricted Working Space, Add</i>	164.72	
23 31 13	13-1094	LF 60" x 62", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	656.73	334.92
		<i>For Seal Class B, Add</i>	83.73	
		<i>For Seal Class A, Add</i>	178.62	
		<i>For Work In Restricted Working Space, Add</i>	167.46	
23 31 13	13-1095	LF 60" x 64", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	667.51	340.41
		<i>For Seal Class B, Add</i>	85.10	
		<i>For Seal Class A, Add</i>	181.55	
		<i>For Work In Restricted Working Space, Add</i>	170.20	
23 31 13	13-1096	LF 60" x 66", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	678.29	345.90
		<i>For Seal Class B, Add</i>	86.48	
		<i>For Seal Class A, Add</i>	184.48	
		<i>For Work In Restricted Working Space, Add</i>	172.95	
23 31 13	13-1097	LF 60" x 68", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	689.05	351.39
		<i>For Seal Class B, Add</i>	87.85	
		<i>For Seal Class A, Add</i>	187.41	
		<i>For Work In Restricted Working Space, Add</i>	175.70	
23 31 13	13-1098	LF 62" x 62", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	667.51	340.41
		<i>For Seal Class B, Add</i>	85.10	
		<i>For Seal Class A, Add</i>	181.55	
		<i>For Work In Restricted Working Space, Add</i>	170.20	
23 31 13	13-1099	LF 62" x 64", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	678.29	345.90
		<i>For Seal Class B, Add</i>	86.48	
		<i>For Seal Class A, Add</i>	184.48	
		<i>For Work In Restricted Working Space, Add</i>	172.95	
23 31 13	13-1100	LF 62" x 66", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	689.05	351.39
		<i>For Seal Class B, Add</i>	87.85	
		<i>For Seal Class A, Add</i>	187.41	
		<i>For Work In Restricted Working Space, Add</i>	175.70	
23 31 13	13-1101	LF 62" x 68", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	699.81	356.87
		<i>For Seal Class B, Add</i>	89.22	
		<i>For Seal Class A, Add</i>	190.34	
		<i>For Work In Restricted Working Space, Add</i>	178.44	
23 31 13	13-1102	LF 62" x 70", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	710.57	362.37
		<i>For Seal Class B, Add</i>	90.59	
		<i>For Seal Class A, Add</i>	193.26	
		<i>For Work In Restricted Working Space, Add</i>	181.19	
23 31 13	13-1103	LF 64" x 64", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	689.05	351.39
		<i>For Seal Class B, Add</i>	87.85	
		<i>For Seal Class A, Add</i>	187.41	
		<i>For Work In Restricted Working Space, Add</i>	175.70	
23 31 13	13-1104	LF 64" x 66", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	699.81	356.87
		<i>For Seal Class B, Add</i>	89.22	
		<i>For Seal Class A, Add</i>	190.34	
		<i>For Work In Restricted Working Space, Add</i>	178.44	
23 31 13	13-1105	LF 64" x 68", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	710.57	362.37
		<i>For Seal Class B, Add</i>	90.59	
		<i>For Seal Class A, Add</i>	193.26	
		<i>For Work In Restricted Working Space, Add</i>	181.19	
23 31 13	13-1106	LF 64" x 70", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	721.34	367.86
		<i>For Seal Class B, Add</i>	91.96	
		<i>For Seal Class A, Add</i>	196.19	
		<i>For Work In Restricted Working Space, Add</i>	183.93	
23 31 13	13-1107	LF 66" x 66", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	710.57	362.37
		<i>For Seal Class B, Add</i>	90.59	
		<i>For Seal Class A, Add</i>	193.26	
		<i>For Work In Restricted Working Space, Add</i>	181.19	
23 31 13	13-1108	LF 66" x 68", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	721.34	367.86
		<i>For Seal Class B, Add</i>	91.96	
		<i>For Seal Class A, Add</i>	196.19	
		<i>For Work In Restricted Working Space, Add</i>	183.93	
23 31 13	13-1109	LF 66" x 70", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	732.11	373.35
		<i>For Seal Class B, Add</i>	93.34	
		<i>For Seal Class A, Add</i>	199.12	
		<i>For Work In Restricted Working Space, Add</i>	186.68	
23 31 13	13-1110	LF 66" x 72", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	742.87	378.84
		<i>For Seal Class B, Add</i>	94.71	
		<i>For Seal Class A, Add</i>	202.05	
		<i>For Work In Restricted Working Space, Add</i>	189.42	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-1111 LF 68" x 68", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	732.11	373.35
For Seal Class B, Add	93.34	
For Seal Class A, Add	199.12	
For Work In Restricted Working Space, Add	186.68	
23 31 13 13-1112 LF 68" x 70", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	742.87	378.84
For Seal Class B, Add	94.71	
For Seal Class A, Add	202.05	
For Work In Restricted Working Space, Add	189.42	
23 31 13 13-1113 LF 68" x 72", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	753.63	384.32
For Seal Class B, Add	96.08	
For Seal Class A, Add	204.98	
For Work In Restricted Working Space, Add	192.17	
23 31 13 13-1114 LF 68" x 74", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	764.39	389.82
For Seal Class B, Add	97.46	
For Seal Class A, Add	207.90	
For Work In Restricted Working Space, Add	194.91	
23 31 13 13-1115 LF 70" x 70", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	753.63	384.32
For Seal Class B, Add	96.08	
For Seal Class A, Add	204.98	
For Work In Restricted Working Space, Add	192.17	
23 31 13 13-1116 LF 70" x 72", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	764.39	389.82
For Seal Class B, Add	97.46	
For Seal Class A, Add	207.90	
For Work In Restricted Working Space, Add	194.91	
23 31 13 13-1117 LF 70" x 74", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	775.19	395.32
For Seal Class B, Add	98.83	
For Seal Class A, Add	210.84	
For Work In Restricted Working Space, Add	197.66	
23 31 13 13-1118 LF 70" x 76", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	785.94	400.80
For Seal Class B, Add	100.20	
For Seal Class A, Add	213.76	
For Work In Restricted Working Space, Add	200.40	
23 31 13 13-1119 LF 70" x 78", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	796.70	406.30
For Seal Class B, Add	101.57	
For Seal Class A, Add	216.69	
For Work In Restricted Working Space, Add	203.15	
23 31 13 13-1120 LF 70" x 80", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	807.46	411.78
For Seal Class B, Add	102.95	
For Seal Class A, Add	219.62	
For Work In Restricted Working Space, Add	205.89	
23 31 13 13-1121 LF 70" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	818.23	417.27
For Seal Class B, Add	104.32	
For Seal Class A, Add	222.55	
For Work In Restricted Working Space, Add	208.64	
23 31 13 13-1122 LF 70" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	829.02	422.77
For Seal Class B, Add	105.69	
For Seal Class A, Add	225.48	
For Work In Restricted Working Space, Add	211.38	
23 31 13 13-1123 LF 70" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	839.78	428.25
For Seal Class B, Add	107.06	
For Seal Class A, Add	228.40	
For Work In Restricted Working Space, Add	214.13	
23 31 13 13-1124 LF 72" x 72", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	775.19	395.32
For Seal Class B, Add	98.83	
For Seal Class A, Add	210.84	
For Work In Restricted Working Space, Add	197.66	
23 31 13 13-1125 LF 72" x 74", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	785.94	400.80
For Seal Class B, Add	100.20	
For Seal Class A, Add	213.76	
For Work In Restricted Working Space, Add	200.40	
23 31 13 13-1126 LF 72" x 76", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	796.70	406.30
For Seal Class B, Add	101.57	
For Seal Class A, Add	216.69	
For Work In Restricted Working Space, Add	203.15	
23 31 13 13-1127 LF 72" x 78", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	807.46	411.78
For Seal Class B, Add	102.95	
For Seal Class A, Add	219.62	
For Work In Restricted Working Space, Add	205.89	
23 31 13 13-1128 LF 72" x 80", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	818.23	417.27
For Seal Class B, Add	104.32	
For Seal Class A, Add	222.55	
For Work In Restricted Working Space, Add	208.64	
23 31 13 13-1129 LF 72" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	829.02	422.77
For Seal Class B, Add	105.69	
For Seal Class A, Add	225.48	
For Work In Restricted Working Space, Add	211.38	
23 31 13 13-1130 LF 72" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	839.78	428.25
For Seal Class B, Add	107.06	
For Seal Class A, Add	228.40	
For Work In Restricted Working Space, Add	214.13	
23 31 13 13-1131 LF 72" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	850.53	433.74
For Seal Class B, Add	108.44	
For Seal Class A, Add	231.33	
For Work In Restricted Working Space, Add	216.87	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 13-1132	LF 74" x 74", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	796.70	406.30
	<i>For Seal Class B, Add</i>	101.57	
	<i>For Seal Class A, Add</i>	216.69	
	<i>For Work In Restricted Working Space, Add</i>	203.15	
23 31 13 13-1133	LF 74" x 76", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	807.46	411.78
	<i>For Seal Class B, Add</i>	102.95	
	<i>For Seal Class A, Add</i>	219.62	
	<i>For Work In Restricted Working Space, Add</i>	205.89	
23 31 13 13-1134	LF 74" x 78", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	818.23	417.27
	<i>For Seal Class B, Add</i>	104.32	
	<i>For Seal Class A, Add</i>	222.55	
	<i>For Work In Restricted Working Space, Add</i>	208.64	
23 31 13 13-1135	LF 74" x 80", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	829.02	422.77
	<i>For Seal Class B, Add</i>	105.69	
	<i>For Seal Class A, Add</i>	225.48	
	<i>For Work In Restricted Working Space, Add</i>	211.38	
23 31 13 13-1136	LF 74" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	839.78	428.25
	<i>For Seal Class B, Add</i>	107.06	
	<i>For Seal Class A, Add</i>	228.40	
	<i>For Work In Restricted Working Space, Add</i>	214.13	
23 31 13 13-1137	LF 74" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	850.53	433.74
	<i>For Seal Class B, Add</i>	108.44	
	<i>For Seal Class A, Add</i>	231.33	
	<i>For Work In Restricted Working Space, Add</i>	216.87	
23 31 13 13-1138	LF 74" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	861.29	439.23
	<i>For Seal Class B, Add</i>	109.81	
	<i>For Seal Class A, Add</i>	234.26	
	<i>For Work In Restricted Working Space, Add</i>	219.62	
23 31 13 13-1139	LF 76" x 76", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	818.23	417.27
	<i>For Seal Class B, Add</i>	104.32	
	<i>For Seal Class A, Add</i>	222.55	
	<i>For Work In Restricted Working Space, Add</i>	208.64	
23 31 13 13-1140	LF 76" x 78", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	829.02	422.77
	<i>For Seal Class B, Add</i>	105.69	
	<i>For Seal Class A, Add</i>	225.48	
	<i>For Work In Restricted Working Space, Add</i>	211.38	
23 31 13 13-1141	LF 76" x 80", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	839.78	428.25
	<i>For Seal Class B, Add</i>	107.06	
	<i>For Seal Class A, Add</i>	228.40	
	<i>For Work In Restricted Working Space, Add</i>	214.13	
23 31 13 13-1142	LF 76" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	850.53	433.74
	<i>For Seal Class B, Add</i>	108.44	
	<i>For Seal Class A, Add</i>	231.33	
	<i>For Work In Restricted Working Space, Add</i>	216.87	
23 31 13 13-1143	LF 76" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	861.29	439.23
	<i>For Seal Class B, Add</i>	109.81	
	<i>For Seal Class A, Add</i>	234.26	
	<i>For Work In Restricted Working Space, Add</i>	219.62	
23 31 13 13-1144	LF 76" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	872.06	444.72
	<i>For Seal Class B, Add</i>	111.18	
	<i>For Seal Class A, Add</i>	237.19	
	<i>For Work In Restricted Working Space, Add</i>	222.36	
23 31 13 13-1145	LF 78" x 78", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	839.78	428.25
	<i>For Seal Class B, Add</i>	107.06	
	<i>For Seal Class A, Add</i>	228.40	
	<i>For Work In Restricted Working Space, Add</i>	214.13	
23 31 13 13-1146	LF 78" x 80", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	850.53	433.74
	<i>For Seal Class B, Add</i>	108.44	
	<i>For Seal Class A, Add</i>	231.33	
	<i>For Work In Restricted Working Space, Add</i>	216.87	
23 31 13 13-1147	LF 78" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	861.29	439.23
	<i>For Seal Class B, Add</i>	109.81	
	<i>For Seal Class A, Add</i>	234.26	
	<i>For Work In Restricted Working Space, Add</i>	219.62	
23 31 13 13-1148	LF 78" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	872.06	444.72
	<i>For Seal Class B, Add</i>	111.18	
	<i>For Seal Class A, Add</i>	237.19	
	<i>For Work In Restricted Working Space, Add</i>	222.36	
23 31 13 13-1149	LF 78" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	882.83	450.21
	<i>For Seal Class B, Add</i>	112.55	
	<i>For Seal Class A, Add</i>	240.11	
	<i>For Work In Restricted Working Space, Add</i>	225.11	
23 31 13 13-1150	LF 80" x 80", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	861.29	439.23
	<i>For Seal Class B, Add</i>	109.81	
	<i>For Seal Class A, Add</i>	234.26	
	<i>For Work In Restricted Working Space, Add</i>	219.62	
23 31 13 13-1151	LF 80" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	872.06	444.72
	<i>For Seal Class B, Add</i>	111.18	
	<i>For Seal Class A, Add</i>	237.19	
	<i>For Work In Restricted Working Space, Add</i>	222.36	
23 31 13 13-1152	LF 80" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	882.83	450.21
	<i>For Seal Class B, Add</i>	112.55	
	<i>For Seal Class A, Add</i>	240.11	
	<i>For Work In Restricted Working Space, Add</i>	225.11	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 13-1153 LF 80" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	902.76	461.20
<i>For Seal Class B, Add</i>	115.30	
<i>For Seal Class A, Add</i>	245.97	
<i>For Work In Restricted Working Space, Add</i>	230.60	
23 31 13 13-1154 LF 82" x 82", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	882.83	450.21
<i>For Seal Class B, Add</i>	112.55	
<i>For Seal Class A, Add</i>	240.11	
<i>For Work In Restricted Working Space, Add</i>	225.11	
23 31 13 13-1155 LF 82" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	893.61	455.71
<i>For Seal Class B, Add</i>	113.93	
<i>For Seal Class A, Add</i>	243.04	
<i>For Work In Restricted Working Space, Add</i>	227.85	
23 31 13 13-1156 LF 82" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	904.37	461.20
<i>For Seal Class B, Add</i>	115.30	
<i>For Seal Class A, Add</i>	245.97	
<i>For Work In Restricted Working Space, Add</i>	230.60	
23 31 13 13-1157 LF 84" x 84", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	904.37	461.20
<i>For Seal Class B, Add</i>	115.30	
<i>For Seal Class A, Add</i>	245.97	
<i>For Work In Restricted Working Space, Add</i>	230.60	
23 31 13 13-1158 LF 84" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	915.13	466.68
<i>For Seal Class B, Add</i>	116.67	
<i>For Seal Class A, Add</i>	248.90	
<i>For Work In Restricted Working Space, Add</i>	233.34	
23 31 13 13-1159 LF 86" x 86", 18 Gauge, Seal Class C, Galvanized Steel Sheet Metal Ductwork	925.89	472.18
<i>For Seal Class B, Add</i>	118.04	
<i>For Seal Class A, Add</i>	251.83	
<i>For Work In Restricted Working Space, Add</i>	236.09	

23 31 13 16 Round and Flat-Oval Spiral Ducts (23 31 13)

23 31 13 16-0001 Low Pressure Round And Flat-Oval Duct (23 31 13 16)
 Note: 7" diameter round = 4" x 11.85" flat oval. 8" diameter round = 4" x 15" flat oval. 10" diameter round = 4" x 25.99" or 6" x 15.42" or 8" x 11.14" flat oval. 12" diameter round = 6" x 23.28" or 8" x 15.85" flat oval. 14" diameter round = 6" x 32.70" or 8" x 22.14" or 10" x 17.85" or 12" x 15.14" flat oval. 16" diameter round = 6" x 43.70" or 8" x 29.99" or 10" x 24.14" or 12" x 19.85" or 14" x 17.14" flat oval. 18" diameter round = 6" x 59.41" or 8" x 39.42" or 10" x 30.42" or 12" x 24.57" or 14" x 21.85" or 16" x 19.14" flat oval. 20" diameter round = 8" x 51.98" or 10" x 38.27" or 12" x 30.85" or 14" x 26.57" or 16" x 23.85" or 18" x 21.14" flat oval. Includes sealing the joints by tape, mastic, or spray on sealer.

23 31 13 16-0002 Galvanized Sheet Metal Round And Flat-Oval Ducts (23 31 13 16-0001)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 16-0003 LF 4" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct	7.80	2.69
<i>For Seal Class B, Add</i>	0.82	
<i>For Seal Class A, Add</i>	2.20	
<i>For Up To 20', Add</i>	0.69	
<i>For >20' To 50', Add</i>	0.28	
<i>For >200' To 500', Deduct</i>	-0.17	
<i>For >500', Deduct</i>	-0.29	
<i>For 28 Gauge, Deduct</i>	-0.32	
<i>For 24 Gauge, Add</i>	0.32	
<i>For 22 Gauge, Add</i>	0.64	
<i>For 20 Gauge, Add</i>	0.96	
<i>For 18 Gauge, Add</i>	1.27	
<i>For 16 Gauge, Add</i>	1.56	
<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	1.71	
<i>For Work In Restricted Working Space, Add</i>	1.65	
<i>For Elevated Installation >10' To 15', Add</i>	0.55	
<i>For Elevated Installation >15' To 20', Add</i>	1.10	
<i>For Elevated Installation >20' To 25', Add</i>	1.37	
<i>For Elevated Installation >25' To 30', Add</i>	1.92	
<i>For Elevated Installation >30' To 35', Add</i>	2.20	
<i>For Elevated Installation >35' To 40', Add</i>	2.75	
<i>For Elevated Installation >40', Add</i>	3.02	
23 31 13 16-0004 LF 5" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct	9.02	3.05
<i>For Seal Class B, Add</i>	0.92	
<i>For Seal Class A, Add</i>	2.44	
<i>For Up To 20', Add</i>	0.88	
<i>For >20' To 50', Add</i>	0.35	
<i>For >200' To 500', Deduct</i>	-0.22	
<i>For >500', Deduct</i>	-0.37	
<i>For 28 Gauge, Deduct</i>	-0.40	
<i>For 24 Gauge, Add</i>	0.40	
<i>For 22 Gauge, Add</i>	0.80	
<i>For 20 Gauge, Add</i>	1.21	
<i>For 18 Gauge, Add</i>	1.61	
<i>For 16 Gauge, Add</i>	1.97	
<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	2.16	
<i>For Work In Restricted Working Space, Add</i>	1.83	
<i>For Elevated Installation >10' To 15', Add</i>	0.61	
<i>For Elevated Installation >15' To 20', Add</i>	1.22	
<i>For Elevated Installation >20' To 25', Add</i>	1.53	
<i>For Elevated Installation >25' To 30', Add</i>	2.14	
<i>For Elevated Installation >30' To 35', Add</i>	2.44	
<i>For Elevated Installation >35' To 40', Add</i>	3.05	
<i>For Elevated Installation >40', Add</i>	3.36	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0005	LF 6" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	10.23	3.65
	For Seal Class B, Add	1.03	
	For Seal Class A, Add	2.74	
	For Up To 20', Add	1.01	
	For >20' To 50', Add	0.40	
	For >200' To 500', Deduct	-0.25	
	For >500', Deduct	-0.42	
	For 28 Gauge, Deduct	-0.47	
	For 24 Gauge, Add	0.47	
	For 22 Gauge, Add	0.93	
	For 20 Gauge, Add	1.40	
	For 18 Gauge, Add	1.85	
	For 16 Gauge, Add	2.27	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	2.49	
	For Work In Restricted Working Space, Add	2.06	
	For Elevated Installation >10' To 15', Add	0.69	
	For Elevated Installation >15' To 20', Add	1.37	
	For Elevated Installation >20' To 25', Add	1.72	
	For Elevated Installation >25' To 30', Add	2.40	
	For Elevated Installation >30' To 35', Add	2.74	
	For Elevated Installation >35' To 40', Add	3.43	
	For Elevated Installation >40', Add	3.77	
23 31 13 16-0006	LF 7" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	11.48	4.27
	For Seal Class B, Add	1.18	
	For Seal Class A, Add	3.14	
	For Up To 20', Add	1.09	
	For >20' To 50', Add	0.44	
	For >200' To 500', Deduct	-0.27	
	For >500', Deduct	-0.46	
	For 28 Gauge, Deduct	-0.50	
	For 24 Gauge, Add	0.50	
	For 22 Gauge, Add	1.00	
	For 20 Gauge, Add	1.51	
	For 18 Gauge, Add	2.00	
	For 16 Gauge, Add	2.46	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	2.69	
	For Work In Restricted Working Space, Add	2.35	
	For Elevated Installation >10' To 15', Add	0.78	
	For Elevated Installation >15' To 20', Add	1.57	
	For Elevated Installation >20' To 25', Add	1.96	
	For Elevated Installation >25' To 30', Add	2.74	
	For Elevated Installation >30' To 35', Add	3.14	
	For Elevated Installation >35' To 40', Add	3.92	
	For Elevated Installation >40', Add	4.31	
23 31 13 16-0007	LF 8" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	13.05	4.88
	For Seal Class B, Add	1.37	
	For Seal Class A, Add	3.66	
	For Up To 20', Add	1.17	
	For >20' To 50', Add	0.47	
	For >200' To 500', Deduct	-0.29	
	For >500', Deduct	-0.49	
	For 28 Gauge, Deduct	-0.54	
	For 24 Gauge, Add	0.54	
	For 22 Gauge, Add	1.07	
	For 20 Gauge, Add	1.61	
	For 18 Gauge, Add	2.15	
	For 16 Gauge, Add	2.63	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	2.89	
	For Work In Restricted Working Space, Add	2.75	
	For Elevated Installation >10' To 15', Add	0.92	
	For Elevated Installation >15' To 20', Add	1.83	
	For Elevated Installation >20' To 25', Add	2.29	
	For Elevated Installation >25' To 30', Add	3.20	
	For Elevated Installation >30' To 35', Add	3.66	
	For Elevated Installation >35' To 40', Add	4.58	
	For Elevated Installation >40', Add	5.03	
23 31 13 16-0008	LF 10" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	16.65	6.10
	For Seal Class B, Add	1.65	
	For Seal Class A, Add	4.39	
	For Up To 20', Add	1.70	
	For >20' To 50', Add	0.68	
	For >200' To 500', Deduct	-0.43	
	For >500', Deduct	-0.71	
	For 28 Gauge, Deduct	-0.79	
	For 24 Gauge, Add	0.78	
	For 22 Gauge, Add	1.56	
	For 20 Gauge, Add	2.35	
	For 18 Gauge, Add	3.12	
	For 16 Gauge, Add	3.83	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.20	
	For Work In Restricted Working Space, Add	3.29	
	For Elevated Installation >10' To 15', Add	1.10	
	For Elevated Installation >15' To 20', Add	2.19	
	For Elevated Installation >20' To 25', Add	2.74	
	For Elevated Installation >25' To 30', Add	3.84	
	For Elevated Installation >30' To 35', Add	4.39	
	For Elevated Installation >35' To 40', Add	5.49	
	For Elevated Installation >40', Add	6.03	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 16-0009 LF 12" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	20.36	8.18
For Seal Class B, Add	2.06	
For Seal Class A, Add	5.49	
For Up To 20', Add	1.99	
For >20' To 50', Add	0.80	
For >200' To 500', Deduct	-0.50	
For >500', Deduct	-0.83	
For 28 Gauge, Deduct	-0.92	
For 24 Gauge, Add	0.92	
For 22 Gauge, Add	1.83	
For 20 Gauge, Add	2.75	
For 18 Gauge, Add	3.65	
For 16 Gauge, Add	4.48	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.91	
For Work In Restricted Working Space, Add	4.12	
For Elevated Installation >10' To 15', Add	1.37	
For Elevated Installation >15' To 20', Add	2.74	
For Elevated Installation >20' To 25', Add	3.43	
For Elevated Installation >25' To 30', Add	4.80	
For Elevated Installation >30' To 35', Add	5.49	
For Elevated Installation >35' To 40', Add	6.86	
For Elevated Installation >40', Add	7.55	
23 31 13 16-0010 LF 14" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	24.70	12.19
For Seal Class B, Add	2.57	
For Seal Class A, Add	6.86	
For Up To 20', Add	2.26	
For >20' To 50', Add	0.90	
For >200' To 500', Deduct	-0.57	
For >500', Deduct	-0.94	
For 28 Gauge, Deduct	-1.04	
For 24 Gauge, Add	1.04	
For 22 Gauge, Add	2.08	
For 20 Gauge, Add	3.12	
For 18 Gauge, Add	4.15	
For 16 Gauge, Add	5.09	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	5.58	
For Work In Restricted Working Space, Add	5.15	
For Elevated Installation >10' To 15', Add	1.72	
For Elevated Installation >15' To 20', Add	3.43	
For Elevated Installation >20' To 25', Add	4.29	
For Elevated Installation >25' To 30', Add	6.01	
For Elevated Installation >30' To 35', Add	6.86	
For Elevated Installation >35' To 40', Add	8.58	
For Elevated Installation >40', Add	9.44	
23 31 13 16-0011 LF 16" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	33.23	16.34
For Seal Class B, Add	3.43	
For Seal Class A, Add	9.15	
For Up To 20', Add	3.11	
For >20' To 50', Add	1.24	
For >200' To 500', Deduct	-0.78	
For >500', Deduct	-1.30	
For 28 Gauge, Deduct	-1.43	
For 24 Gauge, Add	1.43	
For 22 Gauge, Add	2.85	
For 20 Gauge, Add	4.29	
For 18 Gauge, Add	5.70	
For 16 Gauge, Add	6.99	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	7.67	
For Work In Restricted Working Space, Add	6.86	
For Elevated Installation >10' To 15', Add	2.29	
For Elevated Installation >15' To 20', Add	4.57	
For Elevated Installation >20' To 25', Add	5.72	
For Elevated Installation >25' To 30', Add	8.00	
For Elevated Installation >30' To 35', Add	9.15	
For Elevated Installation >35' To 40', Add	11.44	
For Elevated Installation >40', Add	12.58	
23 31 13 16-0012 LF 18" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct.....	47.47	19.63
For Up To 20', Add	6.01	
For >20' To 50', Add	2.40	
For >200' To 500', Deduct	-1.50	
For >500', Deduct	-2.50	
For 28 Gauge, Deduct	-2.77	
For 24 Gauge, Add	2.76	
For 22 Gauge, Add	5.52	
For 20 Gauge, Add	8.29	
For 18 Gauge, Add	11.01	
For 16 Gauge, Add	13.51	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	14.81	
For Work In Restricted Working Space, Add	8.24	
For Elevated Installation >10' To 15', Add	2.75	
For Elevated Installation >15' To 20', Add	5.49	
For Elevated Installation >20' To 25', Add	6.86	
For Elevated Installation >25' To 30', Add	9.61	
For Elevated Installation >30' To 35', Add	10.98	
For Elevated Installation >35' To 40', Add	13.73	
For Elevated Installation >40', Add	15.10	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0013	LF 20" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Duct	54.07	22.68
	For Up To 20', Add	6.71	
	For >20' To 50', Add	2.68	
	For >200' To 500', Deduct	-1.68	
	For >500', Deduct	-2.79	
	For 28 Gauge, Deduct	-3.10	
	For 24 Gauge, Add	3.08	
	For 22 Gauge, Add	6.16	
	For 20 Gauge, Add	9.25	
	For 18 Gauge, Add	12.29	
	For 16 Gauge, Add	15.09	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	16.54	
	For Work In Restricted Working Space, Add	9.52	
	For Elevated Installation >10' To 15', Add	3.17	
	For Elevated Installation >15' To 20', Add	6.34	
	For Elevated Installation >20' To 25', Add	7.93	
	For Elevated Installation >25' To 30', Add	11.10	
	For Elevated Installation >30' To 35', Add	12.69	
	For Elevated Installation >35' To 40', Add	15.86	
	For Elevated Installation >40', Add	17.45	
23 31 13 16-0014	Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbows (23 31 13 16-0001)		
	Note: Up to 90 degree.		
23 31 13 16-0015	EA 4" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	39.16	16.28
	For Seal Class B, Add	4.88	
	For Seal Class A, Add	13.02	
	For 28 Gauge, Deduct	-0.91	
	For 24 Gauge, Add	0.91	
	For 22 Gauge, Add	1.82	
	For 20 Gauge, Add	2.73	
	For 18 Gauge, Add	3.63	
	For 16 Gauge, Add	4.46	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.88	
	For Work In Restricted Working Space, Add	9.77	
	For Elevated Installation >10' To 15', Add	3.26	
	For Elevated Installation >15' To 20', Add	6.51	
	For Elevated Installation >20' To 25', Add	8.14	
	For Elevated Installation >25' To 30', Add	11.40	
	For Elevated Installation >30' To 35', Add	13.02	
	For Elevated Installation >35' To 40', Add	16.28	
	For Elevated Installation >40', Add	17.91	
23 31 13 16-0016	EA 5" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	44.75	18.79
	For Seal Class B, Add	5.64	
	For Seal Class A, Add	15.03	
	For 28 Gauge, Deduct	-0.99	
	For 24 Gauge, Add	0.99	
	For 22 Gauge, Add	1.98	
	For 20 Gauge, Add	2.97	
	For 18 Gauge, Add	3.95	
	For 16 Gauge, Add	4.85	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	5.31	
	For Work In Restricted Working Space, Add	11.27	
	For Elevated Installation >10' To 15', Add	3.76	
	For Elevated Installation >15' To 20', Add	7.51	
	For Elevated Installation >20' To 25', Add	9.39	
	For Elevated Installation >25' To 30', Add	13.15	
	For Elevated Installation >30' To 35', Add	15.03	
	For Elevated Installation >35' To 40', Add	18.79	
	For Elevated Installation >40', Add	20.66	
23 31 13 16-0017	EA 6" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	52.47	22.20
	For Seal Class B, Add	6.66	
	For Seal Class A, Add	17.76	
	For 28 Gauge, Deduct	-1.12	
	For 24 Gauge, Add	1.12	
	For 22 Gauge, Add	2.23	
	For 20 Gauge, Add	3.35	
	For 18 Gauge, Add	4.44	
	For 16 Gauge, Add	5.45	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	5.98	
	For Work In Restricted Working Space, Add	13.32	
	For Elevated Installation >10' To 15', Add	4.44	
	For Elevated Installation >15' To 20', Add	8.88	
	For Elevated Installation >20' To 25', Add	11.10	
	For Elevated Installation >25' To 30', Add	15.54	
	For Elevated Installation >30' To 35', Add	17.76	
	For Elevated Installation >35' To 40', Add	22.20	
	For Elevated Installation >40', Add	24.41	



Heating, Ventilating, and Air-Conditioning (HVAC)		23
HVAC Air Distribution		23 30
HVAC Ducts and Casings		23 31

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31	13 16-0018	EA	7" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow.....	67.00	28.54
			<i>For Seal Class B, Add</i>	8.56	
			<i>For Seal Class A, Add</i>	22.83	
			<i>For 28 Gauge, Deduct</i>	-1.37	
			<i>For 24 Gauge, Add</i>	1.37	
			<i>For 22 Gauge, Add</i>	2.73	
			<i>For 20 Gauge, Add</i>	4.11	
			<i>For 18 Gauge, Add</i>	5.46	
			<i>For 16 Gauge, Add</i>	6.70	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	7.34	
			<i>For Work In Restricted Working Space, Add</i>	17.12	
			<i>For Elevated Installation >10' To 15', Add</i>	5.71	
			<i>For Elevated Installation >15' To 20', Add</i>	11.42	
			<i>For Elevated Installation >20' To 25', Add</i>	14.27	
			<i>For Elevated Installation >25' To 30', Add</i>	19.98	
			<i>For Elevated Installation >30' To 35', Add</i>	22.83	
			<i>For Elevated Installation >35' To 40', Add</i>	28.54	
			<i>For Elevated Installation >40', Add</i>	31.39	
23 31	13 16-0019	EA	8" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow.....	80.24	34.76
			<i>For Seal Class B, Add</i>	10.43	
			<i>For Seal Class A, Add</i>	27.81	
			<i>For 28 Gauge, Deduct</i>	-1.48	
			<i>For 24 Gauge, Add</i>	1.48	
			<i>For 22 Gauge, Add</i>	2.95	
			<i>For 20 Gauge, Add</i>	4.44	
			<i>For 18 Gauge, Add</i>	5.90	
			<i>For 16 Gauge, Add</i>	7.24	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	7.93	
			<i>For Work In Restricted Working Space, Add</i>	20.86	
			<i>For Elevated Installation >10' To 15', Add</i>	6.95	
			<i>For Elevated Installation >15' To 20', Add</i>	13.90	
			<i>For Elevated Installation >20' To 25', Add</i>	17.38	
			<i>For Elevated Installation >25' To 30', Add</i>	24.33	
			<i>For Elevated Installation >30' To 35', Add</i>	27.81	
			<i>For Elevated Installation >35' To 40', Add</i>	34.76	
			<i>For Elevated Installation >40', Add</i>	38.24	
23 31	13 16-0020	EA	10" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow.....	122.70	54.28
			<i>For Seal Class B, Add</i>	16.28	
			<i>For Seal Class A, Add</i>	43.42	
			<i>For 28 Gauge, Deduct</i>	-1.96	
			<i>For 24 Gauge, Add</i>	1.95	
			<i>For 22 Gauge, Add</i>	3.90	
			<i>For 20 Gauge, Add</i>	5.86	
			<i>For 18 Gauge, Add</i>	7.78	
			<i>For 16 Gauge, Add</i>	9.55	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	10.47	
			<i>For Work In Restricted Working Space, Add</i>	32.57	
			<i>For Elevated Installation >10' To 15', Add</i>	10.86	
			<i>For Elevated Installation >15' To 20', Add</i>	21.71	
			<i>For Elevated Installation >20' To 25', Add</i>	27.14	
			<i>For Elevated Installation >25' To 30', Add</i>	37.99	
			<i>For Elevated Installation >30' To 35', Add</i>	43.42	
			<i>For Elevated Installation >35' To 40', Add</i>	54.28	
			<i>For Elevated Installation >40', Add</i>	59.70	
23 31	13 16-0021	EA	12" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow.....	169.19	75.01
			<i>For Seal Class B, Add</i>	22.50	
			<i>For Seal Class A, Add</i>	60.01	
			<i>For 28 Gauge, Deduct</i>	-2.66	
			<i>For 24 Gauge, Add</i>	2.65	
			<i>For 22 Gauge, Add</i>	5.28	
			<i>For 20 Gauge, Add</i>	7.94	
			<i>For 18 Gauge, Add</i>	10.54	
			<i>For 16 Gauge, Add</i>	12.94	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	14.19	
			<i>For Work In Restricted Working Space, Add</i>	45.01	
			<i>For Elevated Installation >10' To 15', Add</i>	15.00	
			<i>For Elevated Installation >15' To 20', Add</i>	30.00	
			<i>For Elevated Installation >20' To 25', Add</i>	37.51	
			<i>For Elevated Installation >25' To 30', Add</i>	52.51	
			<i>For Elevated Installation >30' To 35', Add</i>	60.01	
			<i>For Elevated Installation >35' To 40', Add</i>	75.01	
			<i>For Elevated Installation >40', Add</i>	82.51	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0022	EA 14" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	206.85	88.73
	For Seal Class B, Add	26.62	
	For Seal Class A, Add	70.99	
	For 28 Gauge, Deduct	-4.07	
	For 24 Gauge, Add	4.05	
	For 22 Gauge, Add	8.09	
	For 20 Gauge, Add	12.16	
	For 18 Gauge, Add	16.16	
	For 16 Gauge, Add	19.83	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	21.74	
	For Work In Restricted Working Space, Add	53.24	
	For Elevated Installation >10' To 15', Add	17.75	
	For Elevated Installation >15' To 20', Add	35.49	
	For Elevated Installation >20' To 25', Add	44.37	
	For Elevated Installation >25' To 30', Add	62.11	
	For Elevated Installation >30' To 35', Add	70.99	
	For Elevated Installation >35' To 40', Add	88.74	
	For Elevated Installation >40', Add	97.61	
23 31 13 16-0023	EA 16" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	237.26	97.57
	For Seal Class B, Add	29.27	
	For Seal Class A, Add	78.06	
	For 28 Gauge, Deduct	-5.83	
	For 24 Gauge, Add	5.81	
	For 22 Gauge, Add	11.60	
	For 20 Gauge, Add	17.43	
	For 18 Gauge, Add	23.16	
	For 16 Gauge, Add	28.42	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	31.16	
	For Work In Restricted Working Space, Add	58.55	
	For Elevated Installation >10' To 15', Add	19.52	
	For Elevated Installation >15' To 20', Add	39.03	
	For Elevated Installation >20' To 25', Add	48.79	
	For Elevated Installation >25' To 30', Add	68.30	
	For Elevated Installation >30' To 35', Add	78.06	
	For Elevated Installation >35' To 40', Add	97.58	
	For Elevated Installation >40', Add	107.33	
23 31 13 16-0024	EA 18" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	266.13	101.54
	For Seal Class B, Add	30.46	
	For Seal Class A, Add	81.23	
	For 28 Gauge, Deduct	-8.73	
	For 24 Gauge, Add	8.70	
	For 22 Gauge, Add	17.37	
	For 20 Gauge, Add	26.10	
	For 18 Gauge, Add	34.68	
	For 16 Gauge, Add	42.56	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	46.66	
	For Work In Restricted Working Space, Add	60.92	
	For Elevated Installation >10' To 15', Add	20.31	
	For Elevated Installation >15' To 20', Add	40.62	
	For Elevated Installation >20' To 25', Add	50.77	
	For Elevated Installation >25' To 30', Add	71.08	
	For Elevated Installation >30' To 35', Add	81.23	
	For Elevated Installation >35' To 40', Add	101.54	
	For Elevated Installation >40', Add	111.69	
23 31 13 16-0025	EA 20" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Adjustable Elbow	293.85	104.89
	For Seal Class B, Add	31.47	
	For Seal Class A, Add	83.91	
	For 28 Gauge, Deduct	-11.64	
	For 24 Gauge, Add	11.60	
	For 22 Gauge, Add	23.16	
	For 20 Gauge, Add	34.80	
	For 18 Gauge, Add	46.24	
	For 16 Gauge, Add	56.75	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	62.21	
	For Work In Restricted Working Space, Add	62.93	
	For Elevated Installation >10' To 15', Add	20.98	
	For Elevated Installation >15' To 20', Add	41.96	
	For Elevated Installation >20' To 25', Add	52.45	
	For Elevated Installation >25' To 30', Add	73.42	
	For Elevated Installation >30' To 35', Add	83.91	
	For Elevated Installation >35' To 40', Add	104.89	
	For Elevated Installation >40', Add	115.38	

23 31 13 16-0026 Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbows (23 31 13 16-0001)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 16-0027 EA 4" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow.....	33.00	10.97
For Seal Class B, Add	4.12	
For Seal Class A, Add	10.98	
For 28 Gauge, Deduct	-0.77	
For 24 Gauge, Add	0.77	
For 22 Gauge, Add	1.53	
For 20 Gauge, Add	2.30	
For 18 Gauge, Add	3.05	
For 16 Gauge, Add	3.75	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.11	
For Work In Restricted Working Space, Add	8.24	
For Elevated Installation >10' To 15', Add	2.75	
For Elevated Installation >15' To 20', Add	5.49	
For Elevated Installation >20' To 25', Add	6.86	
For Elevated Installation >25' To 30', Add	9.61	
For Elevated Installation >30' To 35', Add	10.98	
For Elevated Installation >35' To 40', Add	13.73	
For Elevated Installation >40', Add	15.10	
23 31 13 16-0028 EA 5" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow.....	37.68	12.57
For Seal Class B, Add	4.70	
For Seal Class A, Add	12.54	
For 28 Gauge, Deduct	-0.88	
For 24 Gauge, Add	0.87	
For 22 Gauge, Add	1.74	
For 20 Gauge, Add	2.62	
For 18 Gauge, Add	3.48	
For 16 Gauge, Add	4.27	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.68	
For Work In Restricted Working Space, Add	9.41	
For Elevated Installation >10' To 15', Add	3.14	
For Elevated Installation >15' To 20', Add	6.27	
For Elevated Installation >20' To 25', Add	7.84	
For Elevated Installation >25' To 30', Add	10.98	
For Elevated Installation >30' To 35', Add	12.54	
For Elevated Installation >35' To 40', Add	15.68	
For Elevated Installation >40', Add	17.25	
23 31 13 16-0029 EA 6" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow.....	43.79	14.64
For Seal Class B, Add	5.49	
For Seal Class A, Add	14.64	
For 28 Gauge, Deduct	-1.00	
For 24 Gauge, Add	0.99	
For 22 Gauge, Add	1.98	
For 20 Gauge, Add	2.98	
For 18 Gauge, Add	3.96	
For 16 Gauge, Add	4.86	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	5.33	
For Work In Restricted Working Space, Add	10.98	
For Elevated Installation >10' To 15', Add	3.66	
For Elevated Installation >15' To 20', Add	7.32	
For Elevated Installation >20' To 25', Add	9.15	
For Elevated Installation >25' To 30', Add	12.81	
For Elevated Installation >30' To 35', Add	14.64	
For Elevated Installation >35' To 40', Add	18.30	
For Elevated Installation >40', Add	20.12	
23 31 13 16-0030 EA 7" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow.....	51.54	17.56
For Seal Class B, Add	6.59	
For Seal Class A, Add	17.56	
For 28 Gauge, Deduct	-1.06	
For 24 Gauge, Add	1.05	
For 22 Gauge, Add	2.10	
For 20 Gauge, Add	3.16	
For 18 Gauge, Add	4.20	
For 16 Gauge, Add	5.15	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	5.65	
For Work In Restricted Working Space, Add	13.17	
For Elevated Installation >10' To 15', Add	4.39	
For Elevated Installation >15' To 20', Add	8.78	
For Elevated Installation >20' To 25', Add	10.98	
For Elevated Installation >25' To 30', Add	15.37	
For Elevated Installation >30' To 35', Add	17.56	
For Elevated Installation >35' To 40', Add	21.96	
For Elevated Installation >40', Add	24.15	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0031	EA 8" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	63.73	21.96
	For Seal Class B, Add	8.23	
	For Seal Class A, Add	21.95	
	For 28 Gauge, Deduct	-1.23	
	For 24 Gauge, Add	1.22	
	For 22 Gauge, Add	2.44	
	For 20 Gauge, Add	3.66	
	For 18 Gauge, Add	4.87	
	For 16 Gauge, Add	5.97	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	6.55	
	For Work In Restricted Working Space, Add	16.46	
	For Elevated Installation >10' To 15', Add	5.49	
	For Elevated Installation >15' To 20', Add	10.98	
	For Elevated Installation >20' To 25', Add	13.72	
	For Elevated Installation >25' To 30', Add	19.21	
	For Elevated Installation >30' To 35', Add	21.95	
	For Elevated Installation >35' To 40', Add	27.44	
	For Elevated Installation >40', Add	30.18	
23 31 13 16-0032	EA 10" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	85.83	29.27
	For Seal Class B, Add	10.98	
	For Seal Class A, Add	29.27	
	For 28 Gauge, Deduct	-1.75	
	For 24 Gauge, Add	1.75	
	For 22 Gauge, Add	3.49	
	For 20 Gauge, Add	5.24	
	For 18 Gauge, Add	6.96	
	For 16 Gauge, Add	8.54	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	9.36	
	For Work In Restricted Working Space, Add	21.95	
	For Elevated Installation >10' To 15', Add	7.32	
	For Elevated Installation >15' To 20', Add	14.64	
	For Elevated Installation >20' To 25', Add	18.30	
	For Elevated Installation >25' To 30', Add	25.61	
	For Elevated Installation >30' To 35', Add	29.27	
	For Elevated Installation >35' To 40', Add	36.59	
	For Elevated Installation >40', Add	40.25	
23 31 13 16-0033	EA 12" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	126.52	43.91
	For Seal Class B, Add	16.47	
	For Seal Class A, Add	43.91	
	For 28 Gauge, Deduct	-2.32	
	For 24 Gauge, Add	2.31	
	For 22 Gauge, Add	4.61	
	For 20 Gauge, Add	6.93	
	For 18 Gauge, Add	9.21	
	For 16 Gauge, Add	11.30	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	12.39	
	For Work In Restricted Working Space, Add	32.93	
	For Elevated Installation >10' To 15', Add	10.98	
	For Elevated Installation >15' To 20', Add	21.96	
	For Elevated Installation >20' To 25', Add	27.45	
	For Elevated Installation >25' To 30', Add	38.42	
	For Elevated Installation >30' To 35', Add	43.91	
	For Elevated Installation >35' To 40', Add	54.89	
	For Elevated Installation >40', Add	60.38	
23 31 13 16-0034	EA 14" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	171.59	56.10
	For Seal Class B, Add	21.04	
	For Seal Class A, Add	56.10	
	For 28 Gauge, Deduct	-4.34	
	For 24 Gauge, Add	4.32	
	For 22 Gauge, Add	8.63	
	For 20 Gauge, Add	12.97	
	For 18 Gauge, Add	17.23	
	For 16 Gauge, Add	21.15	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	23.18	
	For Work In Restricted Working Space, Add	42.08	
	For Elevated Installation >10' To 15', Add	14.03	
	For Elevated Installation >15' To 20', Add	28.05	
	For Elevated Installation >20' To 25', Add	35.07	
	For Elevated Installation >25' To 30', Add	49.09	
	For Elevated Installation >30' To 35', Add	56.10	
	For Elevated Installation >35' To 40', Add	70.13	
	For Elevated Installation >40', Add	77.14	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 16-0035 EA 16" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	215.20	70.74
For Seal Class B, Add	26.53	
For Seal Class A, Add	70.74	
For 28 Gauge, Deduct	-5.31	
For 24 Gauge, Add	5.29	
For 22 Gauge, Add	10.56	
For 20 Gauge, Add	15.87	
For 18 Gauge, Add	21.09	
For 16 Gauge, Add	25.88	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	28.37	
For Work In Restricted Working Space, Add	53.06	
For Elevated Installation >10' To 15', Add	17.69	
For Elevated Installation >15' To 20', Add	35.37	
For Elevated Installation >20' To 25', Add	44.22	
For Elevated Installation >25' To 30', Add	61.90	
For Elevated Installation >30' To 35', Add	70.74	
For Elevated Installation >35' To 40', Add	88.43	
For Elevated Installation >40', Add	97.27	
23 31 13 16-0036 EA 18" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	243.72	73.79
For Seal Class B, Add	27.63	
For Seal Class A, Add	73.67	
For 28 Gauge, Deduct	-8.25	
For 24 Gauge, Add	8.22	
For 22 Gauge, Add	16.41	
For 20 Gauge, Add	24.65	
For 18 Gauge, Add	32.75	
For 16 Gauge, Add	40.20	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	44.07	
For Work In Restricted Working Space, Add	55.25	
For Elevated Installation >10' To 15', Add	18.42	
For Elevated Installation >15' To 20', Add	36.83	
For Elevated Installation >20' To 25', Add	46.04	
For Elevated Installation >25' To 30', Add	64.46	
For Elevated Installation >30' To 35', Add	73.67	
For Elevated Installation >35' To 40', Add	92.09	
For Elevated Installation >40', Add	101.29	
23 31 13 16-0037 EA 20" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 90 Degree Elbow	268.45	75.62
For Seal Class B, Add	28.36	
For Seal Class A, Add	75.62	
For 28 Gauge, Deduct	-11.00	
For 24 Gauge, Add	10.96	
For 22 Gauge, Add	21.87	
For 20 Gauge, Add	32.87	
For 18 Gauge, Add	43.67	
For 16 Gauge, Add	53.60	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	58.76	
For Work In Restricted Working Space, Add	56.72	
For Elevated Installation >10' To 15', Add	18.91	
For Elevated Installation >15' To 20', Add	37.81	
For Elevated Installation >20' To 25', Add	47.26	
For Elevated Installation >25' To 30', Add	66.17	
For Elevated Installation >30' To 35', Add	75.62	
For Elevated Installation >35' To 40', Add	94.53	
For Elevated Installation >40', Add	103.98	
23 31 13 16-0038 Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbows (23 31 13 16-0001)		
23 31 13 16-0039 EA 4" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	30.93	10.97
For Seal Class B, Add	4.12	
For Seal Class A, Add	10.98	
For 28 Gauge, Deduct	-0.48	
For 24 Gauge, Add	0.48	
For 22 Gauge, Add	0.96	
For 20 Gauge, Add	1.44	
For 18 Gauge, Add	1.91	
For 16 Gauge, Add	2.35	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	2.58	
For Work In Restricted Working Space, Add	8.24	
For Elevated Installation >10' To 15', Add	2.75	
For Elevated Installation >15' To 20', Add	5.49	
For Elevated Installation >20' To 25', Add	6.86	
For Elevated Installation >25' To 30', Add	9.61	
For Elevated Installation >30' To 35', Add	10.98	
For Elevated Installation >35' To 40', Add	13.73	
For Elevated Installation >40', Add	15.10	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0040	EA 5" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	35.84	12.57
	For Seal Class B, Add	4.70	
	For Seal Class A, Add	12.54	
	For 28 Gauge, Deduct	-0.62	
	For 24 Gauge, Add	0.62	
	For 22 Gauge, Add	1.23	
	For 20 Gauge, Add	1.85	
	For 18 Gauge, Add	2.46	
	For 16 Gauge, Add	3.02	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	3.32	
	For Work In Restricted Working Space, Add	9.41	
	For Elevated Installation >10' To 15', Add	3.14	
	For Elevated Installation >15' To 20', Add	6.27	
	For Elevated Installation >20' To 25', Add	7.84	
	For Elevated Installation >25' To 30', Add	10.98	
	For Elevated Installation >30' To 35', Add	12.54	
	For Elevated Installation >35' To 40', Add	15.68	
	For Elevated Installation >40', Add	17.25	
23 31 13 16-0041	EA 6" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	41.47	14.64
	For Seal Class B, Add	5.49	
	For Seal Class A, Add	14.64	
	For 28 Gauge, Deduct	-0.68	
	For 24 Gauge, Add	0.67	
	For 22 Gauge, Add	1.34	
	For 20 Gauge, Add	2.02	
	For 18 Gauge, Add	2.68	
	For 16 Gauge, Add	3.29	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	3.61	
	For Work In Restricted Working Space, Add	10.98	
	For Elevated Installation >10' To 15', Add	3.66	
	For Elevated Installation >15' To 20', Add	7.32	
	For Elevated Installation >20' To 25', Add	9.15	
	For Elevated Installation >25' To 30', Add	12.81	
	For Elevated Installation >30' To 35', Add	14.64	
	For Elevated Installation >35' To 40', Add	18.30	
	For Elevated Installation >40', Add	20.12	
23 31 13 16-0042	EA 7" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	49.57	17.56
	For Seal Class B, Add	6.59	
	For Seal Class A, Add	17.56	
	For 28 Gauge, Deduct	-0.78	
	For 24 Gauge, Add	0.78	
	For 22 Gauge, Add	1.56	
	For 20 Gauge, Add	2.34	
	For 18 Gauge, Add	3.11	
	For 16 Gauge, Add	3.82	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.19	
	For Work In Restricted Working Space, Add	13.17	
	For Elevated Installation >10' To 15', Add	4.39	
	For Elevated Installation >15' To 20', Add	8.78	
	For Elevated Installation >20' To 25', Add	10.98	
	For Elevated Installation >25' To 30', Add	15.37	
	For Elevated Installation >30' To 35', Add	17.56	
	For Elevated Installation >35' To 40', Add	21.96	
	For Elevated Installation >40', Add	24.15	
23 31 13 16-0043	EA 8" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	61.32	21.96
	For Seal Class B, Add	8.23	
	For Seal Class A, Add	21.95	
	For 28 Gauge, Deduct	-0.89	
	For 24 Gauge, Add	0.89	
	For 22 Gauge, Add	1.77	
	For 20 Gauge, Add	2.67	
	For 18 Gauge, Add	3.54	
	For 16 Gauge, Add	4.35	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	4.77	
	For Work In Restricted Working Space, Add	16.46	
	For Elevated Installation >10' To 15', Add	5.49	
	For Elevated Installation >15' To 20', Add	10.98	
	For Elevated Installation >20' To 25', Add	13.72	
	For Elevated Installation >25' To 30', Add	19.21	
	For Elevated Installation >30' To 35', Add	21.95	
	For Elevated Installation >35' To 40', Add	27.44	
	For Elevated Installation >40', Add	30.18	



Heating, Ventilating, and Air-Conditioning (HVAC)		23
HVAC Air Distribution		23 30
HVAC Ducts and Casings		23 31

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31	13 16-0044	EA	10" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	83.01	29.27
			<i>For Seal Class B, Add</i>	10.98	
			<i>For Seal Class A, Add</i>	29.27	
			<i>For 28 Gauge, Deduct</i>	-1.36	
			<i>For 24 Gauge, Add</i>	1.36	
			<i>For 22 Gauge, Add</i>	2.71	
			<i>For 20 Gauge, Add</i>	4.07	
			<i>For 18 Gauge, Add</i>	5.41	
			<i>For 16 Gauge, Add</i>	6.64	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	7.27	
			<i>For Work In Restricted Working Space, Add</i>	21.95	
			<i>For Elevated Installation >10' To 15', Add</i>	7.32	
			<i>For Elevated Installation >15' To 20', Add</i>	14.64	
			<i>For Elevated Installation >20' To 25', Add</i>	18.30	
			<i>For Elevated Installation >25' To 30', Add</i>	25.61	
			<i>For Elevated Installation >30' To 35', Add</i>	29.27	
			<i>For Elevated Installation >35' To 40', Add</i>	36.59	
			<i>For Elevated Installation >40', Add</i>	40.25	
23 31	13 16-0045	EA	12" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	122.43	43.91
			<i>For Seal Class B, Add</i>	16.47	
			<i>For Seal Class A, Add</i>	43.91	
			<i>For 28 Gauge, Deduct</i>	-1.75	
			<i>For 24 Gauge, Add</i>	1.75	
			<i>For 22 Gauge, Add</i>	3.49	
			<i>For 20 Gauge, Add</i>	5.24	
			<i>For 18 Gauge, Add</i>	6.96	
			<i>For 16 Gauge, Add</i>	8.54	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	9.36	
			<i>For Work In Restricted Working Space, Add</i>	32.93	
			<i>For Elevated Installation >10' To 15', Add</i>	10.98	
			<i>For Elevated Installation >15' To 20', Add</i>	21.96	
			<i>For Elevated Installation >20' To 25', Add</i>	27.45	
			<i>For Elevated Installation >25' To 30', Add</i>	38.42	
			<i>For Elevated Installation >30' To 35', Add</i>	43.91	
			<i>For Elevated Installation >35' To 40', Add</i>	54.89	
			<i>For Elevated Installation >40', Add</i>	60.38	
23 31	13 16-0046	EA	14" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	162.15	56.10
			<i>For Seal Class B, Add</i>	21.04	
			<i>For Seal Class A, Add</i>	56.10	
			<i>For 28 Gauge, Deduct</i>	-3.03	
			<i>For 24 Gauge, Add</i>	3.02	
			<i>For 22 Gauge, Add</i>	6.03	
			<i>For 20 Gauge, Add</i>	9.06	
			<i>For 18 Gauge, Add</i>	12.04	
			<i>For 16 Gauge, Add</i>	14.78	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	16.20	
			<i>For Work In Restricted Working Space, Add</i>	42.08	
			<i>For Elevated Installation >10' To 15', Add</i>	14.03	
			<i>For Elevated Installation >15' To 20', Add</i>	28.05	
			<i>For Elevated Installation >20' To 25', Add</i>	35.07	
			<i>For Elevated Installation >25' To 30', Add</i>	49.09	
			<i>For Elevated Installation >30' To 35', Add</i>	56.10	
			<i>For Elevated Installation >35' To 40', Add</i>	70.13	
			<i>For Elevated Installation >40', Add</i>	77.14	
23 31	13 16-0047	EA	16" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	212.76	70.74
			<i>For Seal Class B, Add</i>	26.53	
			<i>For Seal Class A, Add</i>	70.74	
			<i>For 28 Gauge, Deduct</i>	-4.97	
			<i>For 24 Gauge, Add</i>	4.95	
			<i>For 22 Gauge, Add</i>	9.89	
			<i>For 20 Gauge, Add</i>	14.86	
			<i>For 18 Gauge, Add</i>	19.75	
			<i>For 16 Gauge, Add</i>	24.23	
			<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	26.57	
			<i>For Work In Restricted Working Space, Add</i>	53.06	
			<i>For Elevated Installation >10' To 15', Add</i>	17.69	
			<i>For Elevated Installation >15' To 20', Add</i>	35.37	
			<i>For Elevated Installation >20' To 25', Add</i>	44.22	
			<i>For Elevated Installation >25' To 30', Add</i>	61.90	
			<i>For Elevated Installation >30' To 35', Add</i>	70.74	
			<i>For Elevated Installation >35' To 40', Add</i>	88.43	
			<i>For Elevated Installation >40', Add</i>	97.27	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0048	EA 18" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	227.57	73.79
	<i>For Seal Class B, Add</i>	27.63	
	<i>For Seal Class A, Add</i>	73.67	
	<i>For 28 Gauge, Deduct</i>	-6.01	
	<i>For 24 Gauge, Add</i>	5.99	
	<i>For 22 Gauge, Add</i>	11.96	
	<i>For 20 Gauge, Add</i>	17.97	
	<i>For 18 Gauge, Add</i>	23.87	
	<i>For 16 Gauge, Add</i>	29.30	
	<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	32.12	
	<i>For Work In Restricted Working Space, Add</i>	55.25	
	<i>For Elevated Installation >10' To 15', Add</i>	18.42	
	<i>For Elevated Installation >15' To 20', Add</i>	36.83	
	<i>For Elevated Installation >20' To 25', Add</i>	46.04	
	<i>For Elevated Installation >25' To 30', Add</i>	64.46	
	<i>For Elevated Installation >30' To 35', Add</i>	73.67	
	<i>For Elevated Installation >35' To 40', Add</i>	92.09	
	<i>For Elevated Installation >40', Add</i>	101.29	
23 31 13 16-0049	EA 20" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval 45 Degree Elbow	244.65	75.62
	<i>For Seal Class B, Add</i>	28.36	
	<i>For Seal Class A, Add</i>	75.62	
	<i>For 28 Gauge, Deduct</i>	-7.70	
	<i>For 24 Gauge, Add</i>	7.67	
	<i>For 22 Gauge, Add</i>	15.32	
	<i>For 20 Gauge, Add</i>	23.02	
	<i>For 18 Gauge, Add</i>	30.58	
	<i>For 16 Gauge, Add</i>	37.53	
	<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	41.14	
	<i>For Work In Restricted Working Space, Add</i>	56.72	
	<i>For Elevated Installation >10' To 15', Add</i>	18.91	
	<i>For Elevated Installation >15' To 20', Add</i>	37.81	
	<i>For Elevated Installation >20' To 25', Add</i>	47.26	
	<i>For Elevated Installation >25' To 30', Add</i>	66.17	
	<i>For Elevated Installation >30' To 35', Add</i>	75.62	
	<i>For Elevated Installation >35' To 40', Add</i>	94.53	
	<i>For Elevated Installation >40', Add</i>	103.98	
23 31 13 16-0050	Galvanized Sheet Metal Round And Flat-Oval Tees (23 31 13 16-0001)		
23 31 13 16-0051	EA 4" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	48.92	16.46
	<i>For Seal Class B, Add</i>	6.17	
	<i>For Seal Class A, Add</i>	16.46	
	<i>For 28 Gauge, Deduct</i>	-1.07	
	<i>For 24 Gauge, Add</i>	1.07	
	<i>For 22 Gauge, Add</i>	2.14	
	<i>For 20 Gauge, Add</i>	3.21	
	<i>For 18 Gauge, Add</i>	4.27	
	<i>For 16 Gauge, Add</i>	5.24	
	<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	5.74	
	<i>For Work In Restricted Working Space, Add</i>	12.35	
	<i>For Elevated Installation >10' To 15', Add</i>	4.12	
	<i>For Elevated Installation >15' To 20', Add</i>	8.23	
	<i>For Elevated Installation >20' To 25', Add</i>	10.29	
	<i>For Elevated Installation >25' To 30', Add</i>	14.41	
	<i>For Elevated Installation >30' To 35', Add</i>	16.46	
	<i>For Elevated Installation >35' To 40', Add</i>	20.58	
	<i>For Elevated Installation >40', Add</i>	22.64	
23 31 13 16-0052	EA 5" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	57.36	18.79
	<i>For Seal Class B, Add</i>	7.06	
	<i>For Seal Class A, Add</i>	18.82	
	<i>For 28 Gauge, Deduct</i>	-1.43	
	<i>For 24 Gauge, Add</i>	1.42	
	<i>For 22 Gauge, Add</i>	2.84	
	<i>For 20 Gauge, Add</i>	4.27	
	<i>For 18 Gauge, Add</i>	5.67	
	<i>For 16 Gauge, Add</i>	6.96	
	<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	7.63	
	<i>For Work In Restricted Working Space, Add</i>	14.12	
	<i>For Elevated Installation >10' To 15', Add</i>	4.71	
	<i>For Elevated Installation >15' To 20', Add</i>	9.41	
	<i>For Elevated Installation >20' To 25', Add</i>	11.76	
	<i>For Elevated Installation >25' To 30', Add</i>	16.47	
	<i>For Elevated Installation >30' To 35', Add</i>	18.82	
	<i>For Elevated Installation >35' To 40', Add</i>	23.53	
	<i>For Elevated Installation >40', Add</i>	25.88	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
HVAC Ducts and Casings	23 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 16-0053 EA 6" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	66.07	21.96
For Seal Class B, Add	8.23	
For Seal Class A, Add	21.95	
For 28 Gauge, Deduct	-1.55	
For 24 Gauge, Add	1.54	
For 22 Gauge, Add	3.08	
For 20 Gauge, Add	4.63	
For 18 Gauge, Add	6.15	
For 16 Gauge, Add	7.55	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	8.28	
For Work In Restricted Working Space, Add	16.46	
For Elevated Installation >10' To 15', Add	5.49	
For Elevated Installation >15' To 20', Add	10.98	
For Elevated Installation >20' To 25', Add	13.72	
For Elevated Installation >25' To 30', Add	19.21	
For Elevated Installation >30' To 35', Add	21.95	
For Elevated Installation >35' To 40', Add	27.44	
For Elevated Installation >40', Add	30.18	
23 31 13 16-0054 EA 7" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	78.74	26.35
For Seal Class B, Add	9.88	
For Seal Class A, Add	26.34	
For 28 Gauge, Deduct	-1.78	
For 24 Gauge, Add	1.78	
For 22 Gauge, Add	3.55	
For 20 Gauge, Add	5.33	
For 18 Gauge, Add	7.08	
For 16 Gauge, Add	8.69	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	9.53	
For Work In Restricted Working Space, Add	19.76	
For Elevated Installation >10' To 15', Add	6.59	
For Elevated Installation >15' To 20', Add	13.17	
For Elevated Installation >20' To 25', Add	16.47	
For Elevated Installation >25' To 30', Add	23.05	
For Elevated Installation >30' To 35', Add	26.34	
For Elevated Installation >35' To 40', Add	32.93	
For Elevated Installation >40', Add	36.22	
23 31 13 16-0055 EA 8" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	103.16	32.93
For Seal Class B, Add	12.35	
For Seal Class A, Add	32.94	
For 28 Gauge, Deduct	-2.88	
For 24 Gauge, Add	2.87	
For 22 Gauge, Add	5.74	
For 20 Gauge, Add	8.62	
For 18 Gauge, Add	11.45	
For 16 Gauge, Add	14.05	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	15.41	
For Work In Restricted Working Space, Add	24.70	
For Elevated Installation >10' To 15', Add	8.23	
For Elevated Installation >15' To 20', Add	16.47	
For Elevated Installation >20' To 25', Add	20.59	
For Elevated Installation >25' To 30', Add	28.82	
For Elevated Installation >30' To 35', Add	32.94	
For Elevated Installation >35' To 40', Add	41.17	
For Elevated Installation >40', Add	45.29	
23 31 13 16-0056 EA 10" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	136.34	43.91
For Seal Class B, Add	16.47	
For Seal Class A, Add	43.91	
For 28 Gauge, Deduct	-3.68	
For 24 Gauge, Add	3.67	
For 22 Gauge, Add	7.32	
For 20 Gauge, Add	11.00	
For 18 Gauge, Add	14.61	
For 16 Gauge, Add	17.93	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	19.65	
For Work In Restricted Working Space, Add	32.93	
For Elevated Installation >10' To 15', Add	10.98	
For Elevated Installation >15' To 20', Add	21.96	
For Elevated Installation >20' To 25', Add	27.45	
For Elevated Installation >25' To 30', Add	38.42	
For Elevated Installation >30' To 35', Add	43.91	
For Elevated Installation >35' To 40', Add	54.89	
For Elevated Installation >40', Add	60.38	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 31 13 16-0057	EA 12" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	191.19	65.87
	For Seal Class B, Add	24.69	
	For Seal Class A, Add	65.85	
	For 28 Gauge, Deduct	-3.68	
	For 24 Gauge, Add	3.67	
	For 22 Gauge, Add	7.32	
	For 20 Gauge, Add	11.00	
	For 18 Gauge, Add	14.61	
	For 16 Gauge, Add	17.93	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	19.65	
	For Work In Restricted Working Space, Add	49.39	
	For Elevated Installation >10' To 15', Add	16.46	
	For Elevated Installation >15' To 20', Add	32.93	
	For Elevated Installation >20' To 25', Add	41.16	
	For Elevated Installation >25' To 30', Add	57.62	
	For Elevated Installation >30' To 35', Add	65.85	
	For Elevated Installation >35' To 40', Add	82.32	
	For Elevated Installation >40', Add	90.55	
23 31 13 16-0058	EA 14" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	260.89	83.91
	For Seal Class B, Add	31.54	
	For Seal Class A, Add	84.12	
	For 28 Gauge, Deduct	-7.01	
	For 24 Gauge, Add	6.98	
	For 22 Gauge, Add	13.94	
	For 20 Gauge, Add	20.95	
	For 18 Gauge, Add	27.83	
	For 16 Gauge, Add	34.16	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	37.44	
	For Work In Restricted Working Space, Add	63.09	
	For Elevated Installation >10' To 15', Add	21.03	
	For Elevated Installation >15' To 20', Add	42.06	
	For Elevated Installation >20' To 25', Add	52.57	
	For Elevated Installation >25' To 30', Add	73.60	
	For Elevated Installation >30' To 35', Add	84.12	
	For Elevated Installation >35' To 40', Add	105.15	
	For Elevated Installation >40', Add	115.66	
23 31 13 16-0059	EA 16" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	336.18	106.35
	For Seal Class B, Add	39.77	
	For Seal Class A, Add	106.06	
	For 28 Gauge, Deduct	-9.84	
	For 24 Gauge, Add	9.80	
	For 22 Gauge, Add	19.57	
	For 20 Gauge, Add	29.41	
	For 18 Gauge, Add	39.07	
	For 16 Gauge, Add	47.95	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	52.56	
	For Work In Restricted Working Space, Add	79.55	
	For Elevated Installation >10' To 15', Add	26.52	
	For Elevated Installation >15' To 20', Add	53.03	
	For Elevated Installation >20' To 25', Add	66.29	
	For Elevated Installation >25' To 30', Add	92.80	
	For Elevated Installation >30' To 35', Add	106.06	
	For Elevated Installation >35' To 40', Add	132.58	
	For Elevated Installation >40', Add	145.83	
23 31 13 16-0060	EA 18" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	386.87	118.31
	For Seal Class B, Add	44.46	
	For Seal Class A, Add	118.55	
	For 28 Gauge, Deduct	-12.53	
	For 24 Gauge, Add	12.49	
	For 22 Gauge, Add	24.93	
	For 20 Gauge, Add	37.46	
	For 18 Gauge, Add	49.77	
	For 16 Gauge, Add	61.08	
	For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	66.96	
	For Work In Restricted Working Space, Add	88.91	
	For Elevated Installation >10' To 15', Add	29.64	
	For Elevated Installation >15' To 20', Add	59.28	
	For Elevated Installation >20' To 25', Add	74.10	
	For Elevated Installation >25' To 30', Add	103.73	
	For Elevated Installation >30' To 35', Add	118.55	
	For Elevated Installation >35' To 40', Add	148.19	
	For Elevated Installation >40', Add	163.01	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 16-0061 EA 20" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Tee	406.55	122.58
For Seal Class B, Add	45.92	
For Seal Class A, Add	122.46	
For 28 Gauge, Deduct	-13.91	
For 24 Gauge, Add	13.86	
For 22 Gauge, Add	27.66	
For 20 Gauge, Add	41.57	
For 18 Gauge, Add	55.23	
For 16 Gauge, Add	67.78	
For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add	74.30	
For Work In Restricted Working Space, Add	91.84	
For Elevated Installation >10' To 15', Add	30.61	
For Elevated Installation >15' To 20', Add	61.23	
For Elevated Installation >20' To 25', Add	76.54	
For Elevated Installation >25' To 30', Add	107.15	
For Elevated Installation >30' To 35', Add	122.46	
For Elevated Installation >35' To 40', Add	153.07	
For Elevated Installation >40', Add	168.38	
23 31 13 16-0062 Galvanized Sheet Metal Round And Flat-Oval Connectors (23 31 13 16-0001)		
23 31 13 16-0063 EA 4" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector	22.12	
For Seal Class B, Add	2.93	
For Seal Class A, Add	7.80	
For Work In Restricted Working Space, Add	5.85	
For Elevated Installation >10' To 15', Add	1.95	
For Elevated Installation >15' To 20', Add	3.90	
For Elevated Installation >20' To 25', Add	4.88	
For Elevated Installation >25' To 30', Add	6.83	
For Elevated Installation >30' To 35', Add	7.80	
For Elevated Installation >35' To 40', Add	9.76	
For Elevated Installation >40', Add	10.73	
23 31 13 16-0064 EA 5" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector	23.31	
For Seal Class B, Add	3.08	
For Seal Class A, Add	8.20	
For Work In Restricted Working Space, Add	6.15	
For Elevated Installation >10' To 15', Add	2.05	
For Elevated Installation >15' To 20', Add	4.10	
For Elevated Installation >20' To 25', Add	5.13	
For Elevated Installation >25' To 30', Add	7.18	
For Elevated Installation >30' To 35', Add	8.20	
For Elevated Installation >35' To 40', Add	10.26	
For Elevated Installation >40', Add	11.28	
23 31 13 16-0065 EA 6" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector	24.98	
For Seal Class B, Add	3.29	
For Seal Class A, Add	8.78	
For Work In Restricted Working Space, Add	6.59	
For Elevated Installation >10' To 15', Add	2.20	
For Elevated Installation >15' To 20', Add	4.39	
For Elevated Installation >20' To 25', Add	5.49	
For Elevated Installation >25' To 30', Add	7.69	
For Elevated Installation >30' To 35', Add	8.78	
For Elevated Installation >35' To 40', Add	10.98	
For Elevated Installation >40', Add	12.08	
23 31 13 16-0066 EA 7" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector	26.62	
For Seal Class B, Add	3.48	
For Seal Class A, Add	9.27	
For Work In Restricted Working Space, Add	6.95	
For Elevated Installation >10' To 15', Add	2.32	
For Elevated Installation >15' To 20', Add	4.64	
For Elevated Installation >20' To 25', Add	5.80	
For Elevated Installation >25' To 30', Add	8.11	
For Elevated Installation >30' To 35', Add	9.27	
For Elevated Installation >35' To 40', Add	11.59	
For Elevated Installation >40', Add	12.75	
23 31 13 16-0067 EA 8" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector	28.89	
For Seal Class B, Add	3.75	
For Seal Class A, Add	10.00	
For Work In Restricted Working Space, Add	7.50	
For Elevated Installation >10' To 15', Add	2.50	
For Elevated Installation >15' To 20', Add	5.00	
For Elevated Installation >20' To 25', Add	6.25	
For Elevated Installation >25' To 30', Add	8.75	
For Elevated Installation >30' To 35', Add	10.00	
For Elevated Installation >35' To 40', Add	12.50	
For Elevated Installation >40', Add	13.75	
23 31 13 16-0068 EA 10" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector	34.06	
For Seal Class B, Add	4.19	
For Seal Class A, Add	11.17	
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 31 13 16-0069	EA 12" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector.....	46.43	
	<i>For Seal Class B, Add</i>	5.86	
	<i>For Seal Class A, Add</i>	15.62	
	<i>For Work In Restricted Working Space, Add</i>	11.71	
	<i>For Elevated Installation >10' To 15', Add</i>	3.90	
	<i>For Elevated Installation >15' To 20', Add</i>	7.81	
	<i>For Elevated Installation >20' To 25', Add</i>	9.76	
	<i>For Elevated Installation >25' To 30', Add</i>	13.66	
	<i>For Elevated Installation >30' To 35', Add</i>	15.62	
	<i>For Elevated Installation >35' To 40', Add</i>	19.52	
	<i>For Elevated Installation >40', Add</i>	21.47	
23 31 13 16-0070	EA 14" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector.....	53.01	
	<i>For Seal Class B, Add</i>	6.66	
	<i>For Seal Class A, Add</i>	17.76	
	<i>For Work In Restricted Working Space, Add</i>	13.32	
	<i>For Elevated Installation >10' To 15', Add</i>	4.44	
	<i>For Elevated Installation >15' To 20', Add</i>	8.88	
	<i>For Elevated Installation >20' To 25', Add</i>	11.10	
	<i>For Elevated Installation >25' To 30', Add</i>	15.54	
	<i>For Elevated Installation >30' To 35', Add</i>	17.76	
	<i>For Elevated Installation >35' To 40', Add</i>	22.21	
	<i>For Elevated Installation >40', Add</i>	24.43	
23 31 13 16-0071	EA 16" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector.....	58.30	
	<i>For Seal Class B, Add</i>	7.30	
	<i>For Seal Class A, Add</i>	19.47	
	<i>For Work In Restricted Working Space, Add</i>	14.60	
	<i>For Elevated Installation >10' To 15', Add</i>	4.87	
	<i>For Elevated Installation >15' To 20', Add</i>	9.73	
	<i>For Elevated Installation >20' To 25', Add</i>	12.17	
	<i>For Elevated Installation >25' To 30', Add</i>	17.03	
	<i>For Elevated Installation >30' To 35', Add</i>	19.47	
	<i>For Elevated Installation >35' To 40', Add</i>	24.34	
	<i>For Elevated Installation >40', Add</i>	26.77	
23 31 13 16-0072	EA 18" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector.....	63.45	
	<i>For Seal Class B, Add</i>	7.90	
	<i>For Seal Class A, Add</i>	21.08	
	<i>For Work In Restricted Working Space, Add</i>	15.81	
	<i>For Elevated Installation >10' To 15', Add</i>	5.27	
	<i>For Elevated Installation >15' To 20', Add</i>	10.54	
	<i>For Elevated Installation >20' To 25', Add</i>	13.17	
	<i>For Elevated Installation >25' To 30', Add</i>	18.44	
	<i>For Elevated Installation >30' To 35', Add</i>	21.08	
	<i>For Elevated Installation >35' To 40', Add</i>	26.35	
	<i>For Elevated Installation >40', Add</i>	28.98	
23 31 13 16-0073	EA 20" Diameter, 26 Gauge, Seal Class C, Galvanized Sheet Metal Round And Flat-Oval Connector.....	69.13	
	<i>For Seal Class B, Add</i>	8.62	
	<i>For Seal Class A, Add</i>	22.98	
	<i>For Work In Restricted Working Space, Add</i>	17.24	
	<i>For Elevated Installation >10' To 15', Add</i>	5.75	
	<i>For Elevated Installation >15' To 20', Add</i>	11.49	
	<i>For Elevated Installation >20' To 25', Add</i>	14.36	
	<i>For Elevated Installation >25' To 30', Add</i>	20.11	
	<i>For Elevated Installation >30' To 35', Add</i>	22.98	
	<i>For Elevated Installation >35' To 40', Add</i>	28.73	
	<i>For Elevated Installation >40', Add</i>	31.60	

23 31 13 19 Metal Duct Fittings (23 31 13)**23 31 13 19-0001 Sheet Metal Baffles** (23 31 13 19)

23 31 13 19-0002	LF Sheet Metal Baffles Under Raised Floor.....	43.17	34.64
	<i>For Work In Restricted Working Space, Add</i>	12.67	
	<i>For Elevated Installation >10' To 15', Add</i>	4.22	
	<i>For Elevated Installation >15' To 20', Add</i>	8.44	
	<i>For Elevated Installation >20' To 25', Add</i>	10.56	
	<i>For Elevated Installation >25' To 30', Add</i>	14.78	
	<i>For Elevated Installation >30' To 35', Add</i>	16.89	
	<i>For Elevated Installation >35' To 40', Add</i>	21.11	
	<i>For Elevated Installation >40', Add</i>	23.22	

23 31 13 19-0003 Duct Register Boots (23 31 13 19)

23 31 13 19-0004	EA 10" x 2-1/4" x 5" Register Boot, 90 Degree, Galvanized Steel.....	39.68	15.24
	<i>For Stainless Steel, Add</i>	11.95	
23 31 13 19-0005	EA 10" x 2-1/4" x 6" Register Boot, 90 Degree, Galvanized Steel.....	39.68	15.24
	<i>For Stainless Steel, Add</i>	11.95	
23 31 13 19-0006	EA 12" x 2-1/4" x 5" Register Boot, 90 Degree, Galvanized Steel.....	42.33	16.46
	<i>For Stainless Steel, Add</i>	12.22	
23 31 13 19-0007	EA 12" x 2-1/4" x 6" Register Boot, 90 Degree, Galvanized Steel.....	42.33	16.46
	<i>For Stainless Steel, Add</i>	12.22	
23 31 13 19-0008	EA 12" x 2-1/4" x 7" Register Boot, 90 Degree, Galvanized Steel.....	44.60	16.46
	<i>For Stainless Steel, Add</i>	15.17	
23 31 13 19-0009	EA 14" x 2-1/4" x 5" Register Boot, 90 Degree, Galvanized Steel.....	45.89	17.69
	<i>For Stainless Steel, Add</i>	13.68	
23 31 13 19-0010	EA 14" x 2-1/4" x 6" Register Boot, 90 Degree, Galvanized Steel.....	45.89	17.69
	<i>For Stainless Steel, Add</i>	13.68	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 13 19-0011 EA 14" x 2-1/4" x 7" Register Boot, 90 Degree, Galvanized Steel..... <i>For Stainless Steel, Add</i>	47.30 15.51	17.69
23 31 13 19-0012 EA 10" x 4" x 6" Register Boot, 90 Degree, Galvanized Steel..... <i>For Stainless Steel, Add</i>	46.09 10.76	18.91
23 31 13 19-0013 EA 12" x 4" x 6" Register Boot, 90 Degree, Galvanized Steel..... <i>For Stainless Steel, Add</i>	48.77 11.08	20.13
23 31 13 19-0014 EA 12" x 4" x 7" Register Boot, 90 Degree, Galvanized Steel..... <i>For Stainless Steel, Add</i>	54.55 18.59	20.13
23 31 13 19-0015 EA 14" x 4" x 6" Register Boot, 90 Degree, Galvanized Steel..... <i>For Stainless Steel, Add</i>	51.72 11.74	21.34
23 31 13 19-0016 EA 14" x 4" x 7" Register Boot, 90 Degree, Galvanized Steel..... <i>For Stainless Steel, Add</i>	57.38 19.10	21.34
23 31 13 19-0017 EA 12" x 2-1/4" x 5" Register Boot, Center, Galvanized Steel..... <i>For Stainless Steel, Add</i>	40.96 10.44	16.46
23 31 13 19-0018 EA 12" x 2-1/4" x 6" Register Boot, Center, Galvanized Steel..... <i>For Stainless Steel, Add</i>	40.96 10.44	16.46
23 31 13 19-0019 EA 14" x 2-1/4" x 6" Register Boot, Center, Galvanized Steel..... <i>For Stainless Steel, Add</i>	44.32 11.64	17.69
23 31 13 19-0020 EA 14" x 2-1/4" x 7" Register Boot, Center, Galvanized Steel..... <i>For Stainless Steel, Add</i>	45.67 13.39	17.69
23 31 13 19-0021 EA 10" x 4" x 6" Register Boot, Center, Galvanized Steel..... <i>For Stainless Steel, Add</i>	46.27 11.00	18.91
23 31 13 19-0022 EA 12" x 4" x 6" Register Boot, Center, Galvanized Steel..... <i>For Stainless Steel, Add</i>	48.93 11.28	20.13
23 31 13 19-0023 EA 12" x 2-1/4" x 6" Register Boot, End, Galvanized Steel..... <i>For Stainless Steel, Add</i>	41.88 11.64	16.46
23 31 13 19-0024 EA 14" x 2-1/4" x 6" Register Boot, End, Galvanized Steel..... <i>For Stainless Steel, Add</i>	44.87 12.35	17.69
23 31 13 19-0025 EA 10" x 2-1/4" x 6" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	39.69 11.95	15.24
23 31 13 19-0026 EA 12" x 2-1/4" x 6" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	42.33 12.22	16.46
23 31 13 19-0027 EA 14" x 2-1/4" x 5" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	45.89 13.68	17.69
23 31 13 19-0028 EA 14" x 2-1/4" x 6" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	45.89 13.68	17.69
23 31 13 19-0029 EA 10" x 4" x 6" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	46.09 10.76	18.91
23 31 13 19-0030 EA 12" x 4" x 6" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	48.77 11.08	20.13
23 31 13 19-0031 EA 12" x 4" x 7" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	54.55 18.59	20.13
23 31 13 19-0032 EA 14" x 4" x 7" Register Boot, Universal, Galvanized Steel..... <i>For Stainless Steel, Add</i>	56.99 18.59	21.34

23 31 13 23 Galvanized Steel Welded Duct (23 31 13)

Note: All field fabricated duct is assembled from flat duct sheets on site to fit to exact field conditions. Ductwork which is fabricated off site or snap-fitting duct is considered as shop fabricated.

23 31 13 23-0001	Welded Steel Ductwork <small>(23 31 13 23)</small>		
Note: Ductwork poundage includes all fittings, transitions, collars, straps, support straps, etc.			
23 31 13 23-0002	Galvanized Steel Welded Duct, For Kitchen <small>(23 31 13 23-0001)</small>		
Note: Also includes special exhaust systems and waste.			
23 31 13 23-0003	LB Galvanized Steel Welded Duct.....	24.96	10.50
	<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	2.89	
	<i>For Work In Restricted Working Space, Add</i>	6.32	
	<i>For Elevated Installation >10' To 15', Add</i>	2.11	
	<i>For Elevated Installation >15' To 20', Add</i>	4.21	
	<i>For Elevated Installation >20' To 25', Add</i>	5.27	
	<i>For Elevated Installation >25' To 30', Add</i>	7.37	
	<i>For Elevated Installation >30' To 35', Add</i>	8.42	
	<i>For Elevated Installation >35' To 40', Add</i>	10.53	
	<i>For Elevated Installation >40', Add</i>	11.58	
23 31 13 23-0004	Black Steel Ductwork <small>(23 31 13 23-0001)</small>		
23 31 13 23-0005	LB Black Steel Ductwork.....	22.53	10.83
	<i>For Polyvinyl Chloride (PVC) Coated, Inside And Outside, Add</i>	0.65	
	<i>For Work In Restricted Working Space, Add</i>	6.50	
	<i>For Elevated Installation >10' To 15', Add</i>	2.17	
	<i>For Elevated Installation >15' To 20', Add</i>	4.33	
	<i>For Elevated Installation >20' To 25', Add</i>	5.41	
	<i>For Elevated Installation >25' To 30', Add</i>	7.58	
	<i>For Elevated Installation >30' To 35', Add</i>	8.66	
	<i>For Elevated Installation >35' To 40', Add</i>	10.83	
	<i>For Elevated Installation >40', Add</i>	11.91	

23 31 16 Non-metal Ducts (23 31)

23 31 16 13 Fibrous-Glass Ducts (23 31 16)

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 31 HVAC Ducts and Casings



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 31 16 13-0001	Glass Fiber Duct Board <small>(23 31 16 13)</small>		
	Note: Rigid, rectangular boards faced on one side with a fire-resistant foil-scrim-kraft (FSK) vapor retarder and a lightweight fiber glass mat on the airstream surface.		
23 31 16 13-0002	SF 1" Glass Fiber Duct Board (EI-475)	10.96	2.17
23 31 16 13-0003	SF 1-1/2" Glass Fiber Duct Board (EI-800)	12.98	2.38
23 31 16 13-0004	SF 2" Glass Fiber Duct Board (EI-800)	15.07	2.62

23 31 16 16 Thermoset Fiberglass-Reinforced Plastic Ducts (23 31 16)

23 31 16 16-0001	Fiber Reinforced Round Plastic Duct <small>(23 31 16 16)</small>		
23 31 16 16-0002	Fiber Reinforced Round Plastic Duct <small>(23 31 16 16-0001)</small>		
23 31 16 16-0003	LF 2" Fiber Reinforced Plastic Duct	18.60	5.60
23 31 16 16-0004	LF 3" Fiber Reinforced Plastic Duct	23.39	6.56
23 31 16 16-0005	LF 4" Fiber Reinforced Plastic Duct	31.56	9.62
23 31 16 16-0006	LF 6" Fiber Reinforced Plastic Duct	41.99	12.16
23 31 16 16-0007	LF 8" Fiber Reinforced Plastic Duct	53.26	15.22
23 31 16 16-0008	LF 10" Fiber Reinforced Plastic Duct	64.25	18.30
23 31 16 16-0009	LF 12" Fiber Reinforced Plastic Duct	72.13	21.36
23 31 16 16-0010	LF 14" Fiber Reinforced Plastic Duct	82.56	23.36
23 31 16 16-0011	LF 16" Fiber Reinforced Plastic Duct	89.33	24.84
23 31 16 16-0012	LF 18" Fiber Reinforced Plastic Duct	111.86	27.92
23 31 16 16-0013	LF 20" Fiber Reinforced Plastic Duct	117.50	29.92
23 31 16 16-0014	LF 24" Fiber Reinforced Plastic Duct	146.23	31.94
23 31 16 16-0015	LF 30" Fiber Reinforced Plastic Duct	167.36	37.00
23 31 16 16-0016	LF 36" Fiber Reinforced Plastic Duct	192.73	44.62
23 31 16 16-0017	LF 42" Fiber Reinforced Plastic Duct	260.32	49.70
23 31 16 16-0018	LF 48" Fiber Reinforced Plastic Duct	291.60	55.83
23 31 16 16-0019	LF 54" Fiber Reinforced Plastic Duct	323.44	63.97
23 31 16 16-0020	LF 60" Fiber Reinforced Plastic Duct	366.55	74.65
23 31 16 16-0021	LF 66" Fiber Reinforced Plastic Duct	390.23	91.35
23 31 16 16-0022	LF 72" Fiber Reinforced Plastic Duct	476.17	111.65

23 31 16 16-0023 Fiber Reinforced Plastic Bell (23 31 16 16-0001)

23 31 16 16-0024	EA 2" Fiber Reinforced Plastic Bell	62.92	22.73
23 31 16 16-0025	EA 3" Fiber Reinforced Plastic Bell	75.74	26.96
23 31 16 16-0026	EA 4" Fiber Reinforced Plastic Bell	87.43	31.72
23 31 16 16-0027	EA 6" Fiber Reinforced Plastic Bell	115.12	42.29
23 31 16 16-0028	EA 8" Fiber Reinforced Plastic Bell	140.63	52.87
23 31 16 16-0029	EA 10" Fiber Reinforced Plastic Bell	163.97	63.44
23 31 16 16-0030	EA 12" Fiber Reinforced Plastic Bell	203.34	78.77
23 31 16 16-0031	EA 14" Fiber Reinforced Plastic Bell	217.22	84.58
23 31 16 16-0032	EA 16" Fiber Reinforced Plastic Bell	235.33	90.40
23 31 16 16-0033	EA 18" Fiber Reinforced Plastic Bell	253.44	97.28
23 31 16 16-0034	EA 20" Fiber Reinforced Plastic Bell	276.91	105.73
23 31 16 16-0035	EA 24" Fiber Reinforced Plastic Bell	319.86	116.31
23 31 16 16-0036	EA 30" Fiber Reinforced Plastic Bell	369.36	126.88
23 31 16 16-0037	EA 36" Fiber Reinforced Plastic Bell	418.55	142.74
23 31 16 16-0038	EA 42" Fiber Reinforced Plastic Bell	467.72	158.60
23 31 16 16-0039	EA 48" Fiber Reinforced Plastic Bell	516.87	174.46
23 31 16 16-0040	EA 54" Fiber Reinforced Plastic Bell	641.05	211.47
23 31 16 16-0041	EA 60" Fiber Reinforced Plastic Bell	768.60	264.33
23 31 16 16-0042	EA 66" Fiber Reinforced Plastic Bell	922.27	317.20
23 31 16 16-0043	EA 72" Fiber Reinforced Plastic Bell	1,054.99	359.49

23 31 16 16-0044 Fiber Reinforced Plastic Flange (23 31 16 16-0001)

23 31 16 16-0045	EA 2" Fiber Reinforced Plastic Flange	97.82	22.73
23 31 16 16-0046	EA 3" Fiber Reinforced Plastic Flange	112.82	26.96
23 31 16 16-0047	EA 4" Fiber Reinforced Plastic Flange	128.88	31.72
23 31 16 16-0048	EA 6" Fiber Reinforced Plastic Flange	167.47	42.29
23 31 16 16-0049	EA 8" Fiber Reinforced Plastic Flange	203.89	52.87
23 31 16 16-0050	EA 10" Fiber Reinforced Plastic Flange	240.31	63.44
23 31 16 16-0051	EA 12" Fiber Reinforced Plastic Flange	284.04	78.77
23 31 16 16-0052	EA 14" Fiber Reinforced Plastic Flange	315.37	84.58
23 31 16 16-0053	EA 16" Fiber Reinforced Plastic Flange	344.39	90.40
23 31 16 16-0054	EA 18" Fiber Reinforced Plastic Flange	366.87	97.28
23 31 16 16-0055	EA 20" Fiber Reinforced Plastic Flange	385.97	105.73
23 31 16 16-0056	EA 24" Fiber Reinforced Plastic Flange	450.73	116.31
23 31 16 16-0057	EA 30" Fiber Reinforced Plastic Flange	495.87	126.88
23 31 16 16-0058	EA 36" Fiber Reinforced Plastic Flange	608.31	142.74
23 31 16 16-0059	EA 42" Fiber Reinforced Plastic Flange	677.11	158.60
23 31 16 16-0060	EA 48" Fiber Reinforced Plastic Flange	767.71	174.46
23 31 16 16-0061	EA 54" Fiber Reinforced Plastic Flange	902.80	211.47
23 31 16 16-0062	EA 60" Fiber Reinforced Plastic Flange	1,080.51	264.33
23 31 16 16-0063	EA 66" Fiber Reinforced Plastic Flange	1,258.18	317.20
23 31 16 16-0064	EA 72" Fiber Reinforced Plastic Flange	1,438.89	359.49

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 16 16-0065 Fiber Reinforced Plastic 90 Degree Elbow <small>(23 31 16 16-0001)</small>		
23 31 16 16-0066 EA 2" Fiber Reinforced Plastic 90 Degree Elbow	163.33	54.77
23 31 16 16-0067 EA 3" Fiber Reinforced Plastic 90 Degree Elbow	192.01	65.45
23 31 16 16-0068 EA 4" Fiber Reinforced Plastic 90 Degree Elbow	222.85	76.13
23 31 16 16-0069 EA 6" Fiber Reinforced Plastic 90 Degree Elbow	289.14	101.50
23 31 16 16-0070 EA 8" Fiber Reinforced Plastic 90 Degree Elbow	355.43	126.88
23 31 16 16-0071 EA 10" Fiber Reinforced Plastic 90 Degree Elbow	421.73	152.25
23 31 16 16-0072 EA 12" Fiber Reinforced Plastic 90 Degree Elbow	518.41	189.37
23 31 16 16-0073 EA 14" Fiber Reinforced Plastic 90 Degree Elbow	584.98	200.47
23 31 16 16-0074 EA 16" Fiber Reinforced Plastic 90 Degree Elbow	663.91	217.71
23 31 16 16-0075 EA 18" Fiber Reinforced Plastic 90 Degree Elbow	786.11	233.46
23 31 16 16-0076 EA 20" Fiber Reinforced Plastic 90 Degree Elbow	902.87	253.76
23 31 16 16-0077 EA 24" Fiber Reinforced Plastic 90 Degree Elbow	1,043.32	279.13
23 31 16 16-0078 EA 30" Fiber Reinforced Plastic 90 Degree Elbow	1,390.95	304.51
23 31 16 16-0079 EA 36" Fiber Reinforced Plastic 90 Degree Elbow	1,770.72	342.58
23 31 16 16-0080 EA 42" Fiber Reinforced Plastic 90 Degree Elbow	2,314.05	380.74
23 31 16 16-0081 EA 48" Fiber Reinforced Plastic 90 Degree Elbow	2,737.46	418.81
23 31 16 16-0082 EA 54" Fiber Reinforced Plastic 90 Degree Elbow	3,245.22	507.52
23 31 16 16-0083 EA 60" Fiber Reinforced Plastic 90 Degree Elbow	3,936.57	634.40
23 31 16 16-0084 EA 66" Fiber Reinforced Plastic 90 Degree Elbow	4,627.50	761.07
23 31 16 16-0085 EA 72" Fiber Reinforced Plastic 90 Degree Elbow	5,276.35	862.47
23 31 16 16-0086 Fiber Reinforced Plastic 45 Degree Elbow <small>(23 31 16 16-0001)</small>		
23 31 16 16-0087 EA 2" Fiber Reinforced Plastic 45 Degree Elbow	139.33	54.77
23 31 16 16-0088 EA 3" Fiber Reinforced Plastic 45 Degree Elbow	163.65	65.45
23 31 16 16-0089 EA 4" Fiber Reinforced Plastic 45 Degree Elbow	190.11	76.13
23 31 16 16-0090 EA 6" Fiber Reinforced Plastic 45 Degree Elbow	241.15	101.50
23 31 16 16-0091 EA 8" Fiber Reinforced Plastic 45 Degree Elbow	292.18	126.88
23 31 16 16-0092 EA 10" Fiber Reinforced Plastic 45 Degree Elbow	347.63	152.25
23 31 16 16-0093 EA 12" Fiber Reinforced Plastic 45 Degree Elbow	429.04	189.37
23 31 16 16-0094 EA 14" Fiber Reinforced Plastic 45 Degree Elbow	464.92	200.47
23 31 16 16-0095 EA 16" Fiber Reinforced Plastic 45 Degree Elbow	550.29	217.60
23 31 16 16-0096 EA 18" Fiber Reinforced Plastic 45 Degree Elbow	629.35	233.67
23 31 16 16-0097 EA 20" Fiber Reinforced Plastic 45 Degree Elbow	723.94	253.76
23 31 16 16-0098 EA 24" Fiber Reinforced Plastic 45 Degree Elbow	831.25	278.92
23 31 16 16-0099 EA 30" Fiber Reinforced Plastic 45 Degree Elbow	1,041.56	304.30
23 31 16 16-0100 EA 36" Fiber Reinforced Plastic 45 Degree Elbow	1,267.35	342.89
23 31 16 16-0101 EA 42" Fiber Reinforced Plastic 45 Degree Elbow	1,601.25	380.95
23 31 16 16-0102 EA 48" Fiber Reinforced Plastic 45 Degree Elbow	1,875.87	418.81
23 31 16 16-0103 EA 54" Fiber Reinforced Plastic 45 Degree Elbow	2,237.49	507.52
23 31 16 16-0104 EA 60" Fiber Reinforced Plastic 45 Degree Elbow	2,688.90	634.40
23 31 16 16-0105 EA 66" Fiber Reinforced Plastic 45 Degree Elbow	3,163.64	759.59
23 31 16 16-0106 EA 72" Fiber Reinforced Plastic 45 Degree Elbow	3,576.56	863.31
23 31 16 16-0107 Fiber Reinforced Plastic Tee <small>(23 31 16 16-0001)</small>		
23 31 16 16-0108 EA 2" Fiber Reinforced Plastic Tee	212.53	81.73
23 31 16 16-0109 EA 3" Fiber Reinforced Plastic Tee	251.34	98.44
23 31 16 16-0110 EA 4" Fiber Reinforced Plastic Tee	288.47	114.19
23 31 16 16-0111 EA 6" Fiber Reinforced Plastic Tee	373.74	152.25
23 31 16 16-0112 EA 8" Fiber Reinforced Plastic Tee	457.33	189.37
23 31 16 16-0113 EA 10" Fiber Reinforced Plastic Tee	545.90	229.44
23 31 16 16-0114 EA 12" Fiber Reinforced Plastic Tee	659.81	278.08
23 31 16 16-0115 EA 14" Fiber Reinforced Plastic Tee	719.70	300.92
23 31 16 16-0116 EA 16" Fiber Reinforced Plastic Tee	828.35	326.92
23 31 16 16-0117 EA 18" Fiber Reinforced Plastic Tee	932.65	350.18
23 31 16 16-0118 EA 20" Fiber Reinforced Plastic Tee	1,070.75	380.74
23 31 16 16-0119 EA 24" Fiber Reinforced Plastic Tee	1,221.50	418.81
23 31 16 16-0120 EA 30" Fiber Reinforced Plastic Tee	1,448.20	456.66
23 31 16 16-0121 EA 36" Fiber Reinforced Plastic Tee	1,729.33	514.07
23 31 16 16-0122 EA 42" Fiber Reinforced Plastic Tee	2,260.61	571.17
23 31 16 16-0123 EA 48" Fiber Reinforced Plastic Tee	2,683.21	628.37
23 31 16 16-0124 EA 54" Fiber Reinforced Plastic Tee	3,232.73	761.80
23 31 16 16-0125 EA 60" Fiber Reinforced Plastic Tee	3,876.93	952.02
23 31 16 16-0126 EA 66" Fiber Reinforced Plastic Tee	4,520.54	1,141.81
23 31 16 16-0127 EA 72" Fiber Reinforced Plastic Tee	5,102.49	1,294.70
23 31 16 16-0128 Fiber Reinforced Plastic Lateral Joint <small>(23 31 16 16-0001)</small>		
23 31 16 16-0129 EA 2" Fiber Reinforced Plastic Lateral Joint	179.79	81.73
23 31 16 16-0130 EA 3" Fiber Reinforced Plastic Lateral Joint	212.05	98.44
23 31 16 16-0131 EA 4" Fiber Reinforced Plastic Lateral Joint	242.70	114.19
23 31 16 16-0132 EA 6" Fiber Reinforced Plastic Lateral Joint	310.55	152.25
23 31 16 16-0133 EA 8" Fiber Reinforced Plastic Lateral Joint	376.69	189.37
23 31 16 16-0134 EA 10" Fiber Reinforced Plastic Lateral Joint	452.17	229.44
23 31 16 16-0135 EA 12" Fiber Reinforced Plastic Lateral Joint	542.26	278.29
23 31 16 16-0136 EA 14" Fiber Reinforced Plastic Lateral Joint	588.36	300.71
23 31 16 16-0137 EA 16" Fiber Reinforced Plastic Lateral Joint	645.35	327.03
23 31 16 16-0138 EA 18" Fiber Reinforced Plastic Lateral Joint	697.58	350.51

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 31 16 16-0139	EA	20" Fiber Reinforced Plastic Lateral Joint	761.47	380.95
23 31 16 16-0140	EA	24" Fiber Reinforced Plastic Lateral Joint	841.96	418.81
23 31 16 16-0141	EA	30" Fiber Reinforced Plastic Lateral Joint	928.63	456.45
23 31 16 16-0142	EA	36" Fiber Reinforced Plastic Lateral Joint	1,048.23	513.75
23 31 16 16-0143	EA	42" Fiber Reinforced Plastic Lateral Joint	1,170.67	571.49
23 31 16 16-0144	EA	48" Fiber Reinforced Plastic Lateral Joint	1,286.80	628.16
23 31 16 16-0145	EA	54" Fiber Reinforced Plastic Lateral Joint	1,538.62	759.59
23 31 16 16-0146	EA	60" Fiber Reinforced Plastic Lateral Joint	1,883.96	953.71
23 31 16 16-0147	EA	66" Fiber Reinforced Plastic Lateral Joint	2,275.23	1,142.65
23 31 16 16-0148	EA	72" Fiber Reinforced Plastic Lateral Joint	2,550.44	1,294.70

23 31 16 16-0149 Fiber Reinforced Plastic One Piece Reducer (23 31 16 16-0001)

23 31 16 16-0150	EA	2" Fiber Reinforced Plastic One Piece Reducer	148.09	54.88
23 31 16 16-0151	EA	3" Fiber Reinforced Plastic One Piece Reducer	174.61	65.55
23 31 16 16-0152	EA	4" Fiber Reinforced Plastic One Piece Reducer	205.45	76.13
23 31 16 16-0153	EA	6" Fiber Reinforced Plastic One Piece Reducer	265.14	101.50
23 31 16 16-0154	EA	8" Fiber Reinforced Plastic One Piece Reducer	320.53	126.88
23 31 16 16-0155	EA	10" Fiber Reinforced Plastic One Piece Reducer	385.65	152.89
23 31 16 16-0156	EA	12" Fiber Reinforced Plastic One Piece Reducer	459.58	189.37
23 31 16 16-0157	EA	14" Fiber Reinforced Plastic One Piece Reducer	491.10	200.47
23 31 16 16-0158	EA	16" Fiber Reinforced Plastic One Piece Reducer	541.56	217.60
23 31 16 16-0159	EA	18" Fiber Reinforced Plastic One Piece Reducer	594.45	233.67
23 31 16 16-0160	EA	20" Fiber Reinforced Plastic One Piece Reducer	662.87	253.76
23 31 16 16-0161	EA	24" Fiber Reinforced Plastic One Piece Reducer	753.71	279.45
23 31 16 16-0162	EA	30" Fiber Reinforced Plastic One Piece Reducer	844.24	305.04
23 31 16 16-0163	EA	36" Fiber Reinforced Plastic One Piece Reducer	955.43	342.89
23 31 16 16-0164	EA	42" Fiber Reinforced Plastic One Piece Reducer	1,066.85	380.95
23 31 16 16-0165	EA	48" Fiber Reinforced Plastic One Piece Reducer	1,199.69	418.81
23 31 16 16-0166	EA	54" Fiber Reinforced Plastic One Piece Reducer	1,423.89	507.52
23 31 16 16-0167	EA	60" Fiber Reinforced Plastic One Piece Reducer	1,705.16	634.40
23 31 16 16-0168	EA	66" Fiber Reinforced Plastic One Piece Reducer	1,920.33	759.59
23 31 16 16-0169	EA	72" Fiber Reinforced Plastic One Piece Reducer	2,158.75	863.31

23 31 16 16-0170 Fiber Reinforced Plastic Two Piece Reducer (23 31 16 16-0001)

23 31 16 16-0171	EA	2" Fiber Reinforced Plastic Two Piece Reducer	174.27	54.88
23 31 16 16-0172	EA	3" Fiber Reinforced Plastic Two Piece Reducer	192.06	65.55
23 31 16 16-0173	EA	4" Fiber Reinforced Plastic Two Piece Reducer	222.90	76.13
23 31 16 16-0174	EA	6" Fiber Reinforced Plastic Two Piece Reducer	289.14	101.50
23 31 16 16-0175	EA	8" Fiber Reinforced Plastic Two Piece Reducer	355.43	126.88
23 31 16 16-0176	EA	10" Fiber Reinforced Plastic Two Piece Reducer	422.74	152.89
23 31 16 16-0177	EA	12" Fiber Reinforced Plastic Two Piece Reducer	507.57	189.37
23 31 16 16-0178	EA	14" Fiber Reinforced Plastic Two Piece Reducer	552.17	200.47
23 31 16 16-0179	EA	16" Fiber Reinforced Plastic Two Piece Reducer	602.64	217.60
23 31 16 16-0180	EA	18" Fiber Reinforced Plastic Two Piece Reducer	677.33	233.67
23 31 16 16-0181	EA	20" Fiber Reinforced Plastic Two Piece Reducer	846.09	253.76
23 31 16 16-0182	EA	24" Fiber Reinforced Plastic Two Piece Reducer	1,022.01	279.45
23 31 16 16-0183	EA	30" Fiber Reinforced Plastic Two Piece Reducer	1,097.26	305.04
23 31 16 16-0184	EA	36" Fiber Reinforced Plastic Two Piece Reducer	1,247.71	342.89
23 31 16 16-0185	EA	42" Fiber Reinforced Plastic Two Piece Reducer	1,354.77	380.95
23 31 16 16-0186	EA	48" Fiber Reinforced Plastic Two Piece Reducer	1,483.25	418.81
23 31 16 16-0187	EA	54" Fiber Reinforced Plastic Two Piece Reducer	1,652.92	507.52
23 31 16 16-0188	EA	60" Fiber Reinforced Plastic Two Piece Reducer	1,921.10	634.40
23 31 16 16-0189	EA	66" Fiber Reinforced Plastic Two Piece Reducer	2,160.27	759.59
23 31 16 16-0190	EA	72" Fiber Reinforced Plastic Two Piece Reducer	2,376.87	863.31

23 31 16 16-0191 Fiber Reinforced Plastic Butterfly Dampers (23 31 16 16-0001)

23 31 16 16-0192	EA	2" Fiber Reinforced Plastic Damper	448.07	54.77
23 31 16 16-0193	EA	3" Fiber Reinforced Plastic Damper	503.41	65.45
23 31 16 16-0194	EA	4" Fiber Reinforced Plastic Damper	558.72	76.13
23 31 16 16-0195	EA	6" Fiber Reinforced Plastic Damper	657.34	101.50
23 31 16 16-0196	EA	8" Fiber Reinforced Plastic Damper	774.74	126.88
23 31 16 16-0197	EA	10" Fiber Reinforced Plastic Damper	873.37	152.25
23 31 16 16-0198	EA	12" Fiber Reinforced Plastic Damper	991.48	189.37
23 31 16 16-0199	EA	14" Fiber Reinforced Plastic Damper	1,103.95	200.47
23 31 16 16-0200	EA	16" Fiber Reinforced Plastic Damper	1,226.59	217.71
23 31 16 16-0201	EA	18" Fiber Reinforced Plastic Damper	1,346.69	233.46
23 31 16 16-0202	EA	20" Fiber Reinforced Plastic Damper	1,436.89	253.76
23 31 16 16-0203	EA	24" Fiber Reinforced Plastic Damper	1,629.39	279.13
23 31 16 16-0204	EA	30" Fiber Reinforced Plastic Damper	1,896.96	304.51
23 31 16 16-0205	EA	36" Fiber Reinforced Plastic Damper	2,185.76	342.58
23 31 16 16-0206	EA	42" Fiber Reinforced Plastic Damper	2,512.08	380.74
23 31 16 16-0207	EA	48" Fiber Reinforced Plastic Damper	2,800.89	418.81
23 31 16 16-0208	EA	54" Fiber Reinforced Plastic Damper	3,286.71	507.52
23 31 16 16-0209	EA	60" Fiber Reinforced Plastic Damper	3,836.15	634.40
23 31 16 16-0210	EA	66" Fiber Reinforced Plastic Damper	4,347.62	761.07
23 31 16 16-0211	EA	72" Fiber Reinforced Plastic Damper	5,004.77	862.47

	MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 16 23			Fabric Ducts <small>(23 31 16)</small>		
23 31 16 23-0001			Heavy Duty Fabric Ducts (Zip-A-Duct™) <small>(23 31 16 23)</small>		
23 31 16 23-0002			Heavy Duty Fabric Duct Without Vents <small>(23 31 16 23-0001)</small>		
			Note: Includes fabric loops for cable hooks. Requires Suspension Hardware as well as an Inlet Section and Endcap per complete run. See CSI section 23 31 16 23-0064 for suspension hardware.		
23 31 16 23-0003	EA		12" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	188.92	8.46
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0004	EA		12" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	295.47	11.29
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0005	EA		16" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	227.80	14.11
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0006	EA		16" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	339.25	18.55
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0007	EA		20" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	276.36	19.36
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0008	EA		20" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	396.10	25.81
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0009	EA		24" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	321.78	25.00
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0010	EA		24" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	452.94	33.06
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0011	EA		28" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	358.91	28.64
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0012	EA		28" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	538.53	38.31
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0013	EA		32" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	394.83	31.86
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0014	EA		32" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	600.85	42.34
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0015	EA		36" Diameter x 5' Long Gray Heavy Duty Fabric Duct Without Vents.....	430.05	36.30
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0016	EA		36" Diameter x 10' Long Gray Heavy Duty Fabric Duct Without Vents.....	693.23	48.39
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0017			Heavy Duty Fabric Duct With Vents <small>(23 31 16 23-0001)</small>		
23 31 16 23-0018	EA		12" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	513.28	11.29
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0019	EA		16" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	570.13	18.55
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0020	EA		20" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	637.87	25.81
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0021	EA		24" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	707.78	33.06
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0022	EA		28" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	852.18	38.31
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0023	EA		32" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	914.50	42.34
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0024	EA		36" Diameter x 10' Long Gray Heavy Duty Fabric Duct With Vents.....	1,033.02	48.39
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0025			Heavy Duty Fabric Duct 90 Degree Elbow <small>(23 31 16 23-0001)</small>		
23 31 16 23-0026	EA		12" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	382.87	12.10
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0027	EA		16" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	428.83	19.36
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0028	EA		20" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	579.64	20.97
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0029	EA		24" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	708.36	28.22
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0030	EA		28" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	894.57	31.45
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0031	EA		32" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	1,114.40	34.27
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0032	EA		36" Diameter Gray Heavy Duty Fabric Duct 90 Degree Elbow.....	1,266.13	38.31
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0033			Heavy Duty Fabric Duct 45 Degree Elbow <small>(23 31 16 23-0001)</small>		
23 31 16 23-0034	EA		12" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow.....	293.57	12.10
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0035	EA		16" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow.....	346.06	19.36
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0036	EA		20" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow.....	387.97	20.97
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0037	EA		24" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow.....	453.52	28.22
			Note: Excludes suspension cable and hardware.		
23 31 16 23-0038	EA		28" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow.....	524.30	31.45
			Note: Excludes suspension cable and hardware.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 31 HVAC Ducts and Casings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 31 16 23-0039	EA		32" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow Note: Excludes suspension cable and hardware.	628.68	34.27
23 31 16 23-0040	EA		36" Diameter Gray Heavy Duty Fabric Duct 45 Degree Elbow Note: Excludes suspension cable and hardware.	717.14	38.31
23 31 16 23-0041			Heavy Duty Fabric Duct Tee (23 31 16 23-0001)		
23 31 16 23-0042	EA		16" x 12" x 12" Gray Heavy Duty Fabric Duct Tee Note: Excludes suspension cable and hardware.	934.88	28.22
23 31 16 23-0043	EA		20" x 16" x 16" Gray Heavy Duty Fabric Duct Tee Note: Excludes suspension cable and hardware.	984.55	30.25
23 31 16 23-0044	EA		24" x 16" x 16" Gray Heavy Duty Fabric Duct Tee Note: Excludes suspension cable and hardware.	1,068.61	40.72
23 31 16 23-0045	EA		28" x 20" x 20" Gray Heavy Duty Fabric Duct Tee Note: Excludes suspension cable and hardware.	1,124.66	45.57
23 31 16 23-0046	EA		32" x 24" x 24" Gray Heavy Duty Fabric Duct Tee Note: Excludes suspension cable and hardware.	1,167.36	49.60
23 31 16 23-0047	EA		36" x 28" x 28" Gray Heavy Duty Fabric Duct Tee Note: Excludes suspension cable and hardware.	1,224.90	55.65
23 31 16 23-0048			Heavy Duty Fabric Duct Inlets (23 31 16 23-0001)		
23 31 16 23-0049	EA		12" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	151.99	12.10
23 31 16 23-0050	EA		16" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	180.52	19.36
23 31 16 23-0051	EA		20" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	194.12	20.97
23 31 16 23-0052	EA		24" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	224.82	28.22
23 31 16 23-0053	EA		28" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	241.14	31.45
23 31 16 23-0054	EA		32" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	258.41	34.27
23 31 16 23-0055	EA		36" Diameter Gray Heavy Duty Fabric Duct Transition Inlet Note: Excludes suspension cable and hardware.	283.69	38.31
23 31 16 23-0056			Heavy Duty Fabric Duct Cap (23 31 16 23-0001)		
23 31 16 23-0057	EA		12" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	89.40	7.26
23 31 16 23-0058	EA		16" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	113.74	11.70
23 31 16 23-0059	EA		20" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	133.62	12.50
23 31 16 23-0060	EA		24" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	186.25	16.94
23 31 16 23-0061	EA		28" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	222.86	18.95
23 31 16 23-0062	EA		32" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	277.84	20.56
23 31 16 23-0063	EA		36" Diameter Gray Heavy Duty Fabric Duct End Cap Note: Excludes suspension cable and hardware.	313.49	22.99
23 31 16 23-0064			Heavy Duty Fabric Duct Suspension Hardware (23 31 16 23-0001)		
23 31 16 23-0065	EA		12 To 20 Inch Diameter Ducts Fixing Strap With Galvanized Hardware Note: Vertical support straps are recommended every six (6) to ten (10) feet along the length of the duct.	35.27	6.11
23 31 16 23-0066	EA		20 To 36 Inch Diameter Ducts Fixing Strap With Galvanized Hardware Note: Vertical support straps are recommended every six (6) to ten (10) feet along the length of the duct.	54.96	9.17
23 31 16 23-0067	EA		Galvanized Cable Locks For Horizontal Cables Note: Requires two (2) cable locks per support point or per stretcher.	13.16	3.06
23 31 16 23-0068	LF		Galvanized Plastic Coated Cable For Fabric Duct Note: Excludes anchor bolts or anchors.	0.78	0.12
23 31 16 23-0069	EA		Galvanized Stretcher For Straight Fabric Duct Runs Note: Excludes anchor bolts or anchors.	30.45	6.11
23 31 16 23-0070	EA		12 To 20 Inch Diameter Ducts Fixing Strap With Stainless Steel Hardware Note: Vertical support straps are recommended every six (6) to ten (10) feet along the length of the duct.	64.19	6.11
23 31 16 23-0071	EA		20 To 36 Inch Diameter Ducts Fixing Strap With Stainless Steel Hardware Note: Vertical support straps are recommended every six (6) to ten (10) feet along the length of the duct.	87.85	9.17
23 31 16 23-0072	EA		Stainless Steel Cable Locks For Horizontal Cables Note: Requires two (2) cable locks per support point or per stretcher.	17.23	3.06
23 31 16 23-0073	LF		Stainless Steel Plastic Coated Cable For Fabric Duct Note: Excludes anchor bolts or anchors.	2.44	0.12
23 31 16 23-0074	EA		Stainless Steel Stretcher For Straight Fabric Duct Runs Note: Excludes anchor bolts or anchors.	40.99	6.11

23 33 Air Duct Accessories (23 30)**23 33 13 Dampers** (23 33)**23 33 13 13 Volume-Control Dampers** (23 33 13)**23 33 13 13-0001 Radial Opposed Blade Damper Steel Construction (Ruskin CDR)** (23 33 13 13)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 13-0002 EA 6" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	135.97	9.76
<i>For Stainless Steel, Add</i>	127.54	
<i>For Parallel Blade Damper, Add</i>	39.24	
23 33 13 13-0003 EA 7" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	143.43	10.97
<i>For Stainless Steel, Add</i>	129.38	
<i>For Parallel Blade Damper, Add</i>	39.81	
23 33 13 13-0004 EA 8" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	151.63	12.19
<i>For Stainless Steel, Add</i>	130.74	
<i>For Parallel Blade Damper, Add</i>	40.23	
23 33 13 13-0005 EA 10" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	163.15	14.64
<i>For Stainless Steel, Add</i>	138.92	
<i>For Parallel Blade Damper, Add</i>	42.74	
23 33 13 13-0006 EA 12" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	175.88	15.86
<i>For Stainless Steel, Add</i>	147.10	
<i>For Parallel Blade Damper, Add</i>	45.26	
23 33 13 13-0007 EA 14" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	213.19	17.08
<i>For Stainless Steel, Add</i>	187.95	
<i>For Parallel Blade Damper, Add</i>	57.83	
23 33 13 13-0008 EA 15" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	232.85	18.29
<i>For Stainless Steel, Add</i>	204.30	
<i>For Parallel Blade Damper, Add</i>	62.86	
23 33 13 13-0009 EA 16" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	244.72	20.73
<i>For Stainless Steel, Add</i>	212.43	
<i>For Parallel Blade Damper, Add</i>	65.36	
23 33 13 13-0010 EA 18" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	270.10	21.96
<i>For Stainless Steel, Add</i>	236.96	
<i>For Parallel Blade Damper, Add</i>	72.91	
23 33 13 13-0011 EA 20" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	321.74	24.40
<i>For Stainless Steel, Add</i>	294.18	
<i>For Parallel Blade Damper, Add</i>	90.52	
23 33 13 13-0012 EA 24" Diameter Radial Opposed Blade Damper Round, Steel Construction, Manual Operated	357.47	24.40
<i>For Stainless Steel, Add</i>	334.98	
<i>For Parallel Blade Damper, Add</i>	103.07	
23 33 13 13-0013 Rectangular Opposed Blade Damper (Ruskin CD) <small>(23 33 13 13)</small>		
23 33 13 13-0014 EA 6" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	136.70	13.57
<i>For Stainless Steel, Add</i>	124.81	
<i>For Parallel Blade Damper, Add</i>	38.40	
23 33 13 13-0015 EA 8" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	145.36	14.17
<i>For Stainless Steel, Add</i>	133.68	
<i>For Parallel Blade Damper, Add</i>	41.13	
23 33 13 13-0016 EA 8" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	152.46	14.29
<i>For Stainless Steel, Add</i>	142.60	
<i>For Parallel Blade Damper, Add</i>	43.88	
23 33 13 13-0017 EA 10" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	152.46	14.29
<i>For Stainless Steel, Add</i>	142.60	
<i>For Parallel Blade Damper, Add</i>	43.88	
23 33 13 13-0018 EA 10" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	160.55	14.67
<i>For Stainless Steel, Add</i>	151.52	
<i>For Parallel Blade Damper, Add</i>	46.62	
23 33 13 13-0019 EA 10" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	179.12	16.26
<i>For Stainless Steel, Add</i>	169.31	
<i>For Parallel Blade Damper, Add</i>	52.10	
23 33 13 13-0020 EA 12" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	160.55	14.67
<i>For Stainless Steel, Add</i>	151.52	
<i>For Parallel Blade Damper, Add</i>	46.62	
23 33 13 13-0021 EA 12" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	176.67	15.52
<i>For Stainless Steel, Add</i>	169.31	
<i>For Parallel Blade Damper, Add</i>	52.10	
23 33 13 13-0022 EA 12" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	186.03	16.26
<i>For Stainless Steel, Add</i>	178.30	
<i>For Parallel Blade Damper, Add</i>	54.86	
23 33 13 13-0023 EA 12" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	205.55	18.33
<i>For Stainless Steel, Add</i>	195.73	
<i>For Parallel Blade Damper, Add</i>	60.22	
23 33 13 13-0024 EA 14" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	173.28	15.52
<i>For Stainless Steel, Add</i>	164.91	
<i>For Parallel Blade Damper, Add</i>	50.74	
23 33 13 13-0025 EA 14" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	186.03	16.26
<i>For Stainless Steel, Add</i>	178.30	
<i>For Parallel Blade Damper, Add</i>	54.86	
23 33 13 13-0026 EA 14" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	195.33	17.11
<i>For Stainless Steel, Add</i>	187.21	
<i>For Parallel Blade Damper, Add</i>	57.60	
23 33 13 13-0027 EA 14" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	205.87	18.33
<i>For Stainless Steel, Add</i>	196.14	
<i>For Parallel Blade Damper, Add</i>	60.35	
23 33 13 13-0028 EA 14" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	229.09	20.40
<i>For Stainless Steel, Add</i>	218.39	
<i>For Parallel Blade Damper, Add</i>	67.20	
23 33 13 13-0029 EA 16" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	186.03	16.26
<i>For Stainless Steel, Add</i>	178.30	
<i>For Parallel Blade Damper, Add</i>	54.86	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13	13-0030	EA	16" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	196.55	17.47
			<i>For Stainless Steel, Add</i>	187.21	
			<i>For Parallel Blade Damper, Add</i>	57.60	
23 33 13	13-0031	EA	16" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	208.31	19.18
			<i>For Stainless Steel, Add</i>	196.14	
			<i>For Parallel Blade Damper, Add</i>	60.35	
23 33 13	13-0032	EA	16" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	218.79	20.40
			<i>For Stainless Steel, Add</i>	205.00	
			<i>For Parallel Blade Damper, Add</i>	63.08	
23 33 13	13-0033	EA	16" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	242.11	22.36
			<i>For Stainless Steel, Add</i>	227.37	
			<i>For Parallel Blade Damper, Add</i>	69.96	
23 33 13	13-0034	EA	16" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	265.34	24.44
			<i>For Stainless Steel, Add</i>	249.63	
			<i>For Parallel Blade Damper, Add</i>	76.81	
23 33 13	13-0035	EA	18" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	195.33	17.11
			<i>For Stainless Steel, Add</i>	187.21	
			<i>For Parallel Blade Damper, Add</i>	57.60	
23 33 13	13-0036	EA	18" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	209.25	18.33
			<i>For Stainless Steel, Add</i>	200.54	
			<i>For Parallel Blade Damper, Add</i>	61.70	
23 33 13	13-0037	EA	18" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	225.71	20.40
			<i>For Stainless Steel, Add</i>	213.99	
			<i>For Parallel Blade Damper, Add</i>	65.84	
23 33 13	13-0038	EA	18" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	248.98	22.36
			<i>For Stainless Steel, Add</i>	236.30	
			<i>For Parallel Blade Damper, Add</i>	72.71	
23 33 13	13-0039	EA	18" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	268.77	24.44
			<i>For Stainless Steel, Add</i>	254.09	
			<i>For Parallel Blade Damper, Add</i>	78.18	
23 33 13	13-0040	EA	18" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	282.32	26.39
			<i>For Stainless Steel, Add</i>	263.77	
			<i>For Parallel Blade Damper, Add</i>	81.16	
23 33 13	13-0041	EA	18" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	298.26	28.47
			<i>For Stainless Steel, Add</i>	276.55	
			<i>For Parallel Blade Damper, Add</i>	85.09	
23 33 13	13-0042	EA	20" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	192.15	18.33
			<i>For Stainless Steel, Add</i>	178.31	
			<i>For Parallel Blade Damper, Add</i>	54.86	
23 33 13	13-0043	EA	20" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	210.70	20.40
			<i>For Stainless Steel, Add</i>	194.48	
			<i>For Parallel Blade Damper, Add</i>	59.84	
23 33 13	13-0044	EA	20" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	229.29	22.36
			<i>For Stainless Steel, Add</i>	210.70	
			<i>For Parallel Blade Damper, Add</i>	64.83	
23 33 13	13-0045	EA	20" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	260.36	24.44
			<i>For Stainless Steel, Add</i>	243.15	
			<i>For Parallel Blade Damper, Add</i>	74.82	
23 33 13	13-0046	EA	20" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	275.82	26.39
			<i>For Stainless Steel, Add</i>	255.32	
			<i>For Parallel Blade Damper, Add</i>	78.56	
23 33 13	13-0047	EA	20" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	291.29	28.47
			<i>For Stainless Steel, Add</i>	267.49	
			<i>For Parallel Blade Damper, Add</i>	82.30	
23 33 13	13-0048	EA	20" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	309.84	30.55
			<i>For Stainless Steel, Add</i>	283.66	
			<i>For Parallel Blade Damper, Add</i>	87.28	
23 33 13	13-0049	EA	20" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	328.40	32.50
			<i>For Stainless Steel, Add</i>	299.83	
			<i>For Parallel Blade Damper, Add</i>	92.26	
23 33 13	13-0050	EA	24" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	216.94	20.40
			<i>For Stainless Steel, Add</i>	202.59	
			<i>For Parallel Blade Damper, Add</i>	62.34	
23 33 13	13-0051	EA	24" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	241.77	22.36
			<i>For Stainless Steel, Add</i>	226.93	
			<i>For Parallel Blade Damper, Add</i>	69.82	
23 33 13	13-0052	EA	24" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	260.36	24.44
			<i>For Stainless Steel, Add</i>	243.15	
			<i>For Parallel Blade Damper, Add</i>	74.82	
23 33 13	13-0053	EA	24" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	285.18	26.39
			<i>For Stainless Steel, Add</i>	267.49	
			<i>For Parallel Blade Damper, Add</i>	82.30	
23 33 13	13-0054	EA	24" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	300.61	28.47
			<i>For Stainless Steel, Add</i>	279.60	
			<i>For Parallel Blade Damper, Add</i>	86.03	
23 33 13	13-0055	EA	24" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	316.08	30.55
			<i>For Stainless Steel, Add</i>	291.77	
			<i>For Parallel Blade Damper, Add</i>	89.78	
23 33 13	13-0056	EA	24" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	340.88	32.50
			<i>For Stainless Steel, Add</i>	316.06	
			<i>For Parallel Blade Damper, Add</i>	97.25	
23 33 13	13-0057	EA	24" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	371.78	36.66
			<i>For Stainless Steel, Add</i>	340.34	
			<i>For Parallel Blade Damper, Add</i>	104.72	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 13-0058 EA 24" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	409.00	40.69
For Stainless Steel, Add	372.84	
For Parallel Blade Damper, Add	114.72	
23 33 13 13-0059 EA 28" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	241.77	22.36
For Stainless Steel, Add	226.93	
For Parallel Blade Damper, Add	69.82	
23 33 13 13-0060 EA 28" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	260.36	24.44
For Stainless Steel, Add	243.15	
For Parallel Blade Damper, Add	74.82	
23 33 13 13-0061 EA 28" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	285.18	26.39
For Stainless Steel, Add	267.49	
For Parallel Blade Damper, Add	82.30	
23 33 13 13-0062 EA 28" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	303.73	28.47
For Stainless Steel, Add	283.66	
For Parallel Blade Damper, Add	87.28	
23 33 13 13-0063 EA 28" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	325.40	30.55
For Stainless Steel, Add	303.89	
For Parallel Blade Damper, Add	93.50	
23 33 13 13-0064 EA 28" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	347.08	32.50
For Stainless Steel, Add	324.12	
For Parallel Blade Damper, Add	99.73	
23 33 13 13-0065 EA 28" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	378.02	36.66
For Stainless Steel, Add	348.45	
For Parallel Blade Damper, Add	107.22	
23 33 13 13-0066 EA 28" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	409.00	40.69
For Stainless Steel, Add	372.84	
For Parallel Blade Damper, Add	114.72	
23 33 13 13-0067 EA 28" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	452.47	42.77
For Stainless Steel, Add	421.41	
For Parallel Blade Damper, Add	129.66	
23 33 13 13-0068 EA 28" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	495.85	46.80
For Stainless Steel, Add	461.92	
For Parallel Blade Damper, Add	142.13	
23 33 13 13-0069 EA 32" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	279.08	24.44
For Stainless Steel, Add	267.49	
For Parallel Blade Damper, Add	82.30	
23 33 13 13-0070 EA 32" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	291.38	26.39
For Stainless Steel, Add	275.55	
For Parallel Blade Damper, Add	84.78	
23 33 13 13-0071 EA 32" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	303.73	28.47
For Stainless Steel, Add	283.66	
For Parallel Blade Damper, Add	87.28	
23 33 13 13-0072 EA 32" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	322.28	30.55
For Stainless Steel, Add	299.83	
For Parallel Blade Damper, Add	92.26	
23 33 13 13-0073 EA 32" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	348.29	32.50
For Stainless Steel, Add	325.69	
For Parallel Blade Damper, Add	100.21	
23 33 13 13-0074 EA 32" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	378.02	36.66
For Stainless Steel, Add	348.45	
For Parallel Blade Damper, Add	107.22	
23 33 13 13-0075 EA 32" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	415.24	40.69
For Stainless Steel, Add	380.95	
For Parallel Blade Damper, Add	117.22	
23 33 13 13-0076 EA 32" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	452.38	44.72
For Stainless Steel, Add	413.35	
For Parallel Blade Damper, Add	127.18	
23 33 13 13-0077 EA 32" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	495.85	46.80
For Stainless Steel, Add	461.92	
For Parallel Blade Damper, Add	142.13	
23 33 13 13-0078 EA 32" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	549.30	50.10
For Stainless Steel, Add	518.70	
For Parallel Blade Damper, Add	159.60	
23 33 13 13-0079 EA 32" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	607.74	52.91
For Stainless Steel, Add	583.54	
For Parallel Blade Damper, Add	179.55	
23 33 13 13-0080 EA 36" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	303.86	26.39
For Stainless Steel, Add	291.77	
For Parallel Blade Damper, Add	89.78	
23 33 13 13-0081 EA 36" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	322.41	28.47
For Stainless Steel, Add	307.94	
For Parallel Blade Damper, Add	94.75	
23 33 13 13-0082 EA 36" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	340.96	30.55
For Stainless Steel, Add	324.12	
For Parallel Blade Damper, Add	99.73	
23 33 13 13-0083 EA 36" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	365.80	32.50
For Stainless Steel, Add	348.45	
For Parallel Blade Damper, Add	107.22	
23 33 13 13-0084 EA 36" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	387.42	36.66
For Stainless Steel, Add	360.67	
For Parallel Blade Damper, Add	110.98	
23 33 13 13-0085 EA 36" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	402.89	38.61
For Stainless Steel, Add	372.84	
For Parallel Blade Damper, Add	114.72	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13	13-0086	EA	36" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	452.38	44.72
			<i>For Stainless Steel, Add</i>	413.35	
			<i>For Parallel Blade Damper, Add</i>	127.18	
23 33 13	13-0087	EA	36" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	495.72	48.88
			<i>For Stainless Steel, Add</i>	453.80	
			<i>For Parallel Blade Damper, Add</i>	139.63	
23 33 13	13-0088	EA	36" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	538.04	50.47
			<i>For Stainless Steel, Add</i>	502.48	
			<i>For Parallel Blade Damper, Add</i>	154.61	
23 33 13	13-0089	EA	36" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	598.88	54.13
			<i>For Stainless Steel, Add</i>	567.27	
			<i>For Parallel Blade Damper, Add</i>	174.54	
23 33 13	13-0090	EA	36" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	651.08	56.95
			<i>For Stainless Steel, Add</i>	624.00	
			<i>For Parallel Blade Damper, Add</i>	192.00	
23 33 13	13-0091	EA	36" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	707.07	59.02
			<i>For Stainless Steel, Add</i>	688.84	
			<i>For Parallel Blade Damper, Add</i>	211.95	
23 33 13	13-0092	EA	40" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	316.17	30.55
			<i>For Stainless Steel, Add</i>	299.83	
			<i>For Parallel Blade Damper, Add</i>	92.26	
23 33 13	13-0093	EA	40" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	347.20	32.50
			<i>For Stainless Steel, Add</i>	332.23	
			<i>For Parallel Blade Damper, Add</i>	102.22	
23 33 13	13-0094	EA	40" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	359.56	34.58
			<i>For Stainless Steel, Add</i>	340.34	
			<i>For Parallel Blade Damper, Add</i>	104.72	
23 33 13	13-0095	EA	40" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	371.91	36.66
			<i>For Stainless Steel, Add</i>	348.45	
			<i>For Parallel Blade Damper, Add</i>	107.22	
23 33 13	13-0096	EA	40" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	405.97	38.61
			<i>For Stainless Steel, Add</i>	376.84	
			<i>For Parallel Blade Damper, Add</i>	115.95	
23 33 13	13-0097	EA	40" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	433.92	40.69
			<i>For Stainless Steel, Add</i>	405.24	
			<i>For Parallel Blade Damper, Add</i>	124.69	
23 33 13	13-0098	EA	40" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	477.17	46.80
			<i>For Stainless Steel, Add</i>	437.63	
			<i>For Parallel Blade Damper, Add</i>	134.66	
23 33 13	13-0099	EA	40" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	514.35	50.84
			<i>For Stainless Steel, Add</i>	470.08	
			<i>For Parallel Blade Damper, Add</i>	144.64	
23 33 13	13-0100	EA	40" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	561.52	54.13
			<i>For Stainless Steel, Add</i>	518.70	
			<i>For Parallel Blade Damper, Add</i>	159.60	
23 33 13	13-0101	EA	40" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	638.64	56.95
			<i>For Stainless Steel, Add</i>	607.83	
			<i>For Parallel Blade Damper, Add</i>	187.02	
23 33 13	13-0102	EA	40" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	685.77	60.24
			<i>For Stainless Steel, Add</i>	656.40	
			<i>For Parallel Blade Damper, Add</i>	201.97	
23 33 13	13-0103	EA	40" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	759.26	61.83
			<i>For Stainless Steel, Add</i>	745.58	
			<i>For Parallel Blade Damper, Add</i>	229.41	
23 33 13	13-0104	EA	40" x 40" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	831.40	65.13
			<i>For Stainless Steel, Add</i>	826.64	
			<i>For Parallel Blade Damper, Add</i>	254.35	
23 33 13	13-0105	EA	44" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	334.76	30.55
			<i>For Stainless Steel, Add</i>	316.06	
			<i>For Parallel Blade Damper, Add</i>	97.25	
23 33 13	13-0106	EA	44" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	365.80	32.50
			<i>For Stainless Steel, Add</i>	348.45	
			<i>For Parallel Blade Damper, Add</i>	107.22	
23 33 13	13-0107	EA	44" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	390.67	34.58
			<i>For Stainless Steel, Add</i>	372.84	
			<i>For Parallel Blade Damper, Add</i>	114.72	
23 33 13	13-0108	EA	44" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	403.02	36.66
			<i>For Stainless Steel, Add</i>	380.95	
			<i>For Parallel Blade Damper, Add</i>	117.22	
23 33 13	13-0109	EA	44" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	434.05	38.61
			<i>For Stainless Steel, Add</i>	413.35	
			<i>For Parallel Blade Damper, Add</i>	127.18	
23 33 13	13-0110	EA	44" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	465.08	40.69
			<i>For Stainless Steel, Add</i>	445.74	
			<i>For Parallel Blade Damper, Add</i>	137.15	
23 33 13	13-0111	EA	44" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	520.72	48.88
			<i>For Stainless Steel, Add</i>	486.30	
			<i>For Parallel Blade Damper, Add</i>	149.63	
23 33 13	13-0112	EA	44" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	564.06	52.91
			<i>For Stainless Steel, Add</i>	526.76	
			<i>For Parallel Blade Damper, Add</i>	162.08	
23 33 13	13-0113	EA	44" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	638.64	56.95
			<i>For Stainless Steel, Add</i>	607.83	
			<i>For Parallel Blade Damper, Add</i>	187.02	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 13-0114 EA 44" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	706.98	61.10
For Stainless Steel, Add	680.78	
For Parallel Blade Damper, Add	209.47	
23 33 13 13-0115 EA 44" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	781.48	65.13
For Stainless Steel, Add	761.75	
For Parallel Blade Damper, Add	234.38	
23 33 13 13-0116 EA 44" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	843.71	67.08
For Stainless Steel, Add	834.70	
For Parallel Blade Damper, Add	256.83	
23 33 13 13-0117 EA 44" x 40" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	905.94	69.17
For Stainless Steel, Add	907.66	
For Parallel Blade Damper, Add	279.28	
23 33 13 13-0118 EA 44" x 44" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	968.17	71.24
For Stainless Steel, Add	980.62	
For Parallel Blade Damper, Add	301.73	
23 33 13 13-0119 EA 48" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	359.56	32.50
For Stainless Steel, Add	340.34	
For Parallel Blade Damper, Add	104.72	
23 33 13 13-0120 EA 48" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	390.67	34.58
For Stainless Steel, Add	372.84	
For Parallel Blade Damper, Add	114.72	
23 33 13 13-0121 EA 48" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	403.02	36.66
For Stainless Steel, Add	380.95	
For Parallel Blade Damper, Add	117.22	
23 33 13 13-0122 EA 48" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	433.92	40.69
For Stainless Steel, Add	405.24	
For Parallel Blade Damper, Add	124.69	
23 33 13 13-0123 EA 48" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	471.06	44.72
For Stainless Steel, Add	437.63	
For Parallel Blade Damper, Add	134.66	
23 33 13 13-0124 EA 48" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	508.24	48.88
For Stainless Steel, Add	470.08	
For Parallel Blade Damper, Add	144.64	
23 33 13 13-0125 EA 48" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	557.86	52.91
For Stainless Steel, Add	518.70	
For Parallel Blade Damper, Add	159.60	
23 33 13 13-0126 EA 48" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	607.44	56.95
For Stainless Steel, Add	567.27	
For Parallel Blade Damper, Add	174.54	
23 33 13 13-0127 EA 48" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	675.78	61.10
For Stainless Steel, Add	640.22	
For Parallel Blade Damper, Add	196.99	
23 33 13 13-0128 EA 48" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	756.56	65.13
For Stainless Steel, Add	729.35	
For Parallel Blade Damper, Add	224.42	
23 33 13 13-0129 EA 48" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	818.84	67.08
For Stainless Steel, Add	802.37	
For Parallel Blade Damper, Add	246.88	
23 33 13 13-0130 EA 48" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	899.70	69.17
For Stainless Steel, Add	899.55	
For Parallel Blade Damper, Add	276.78	
23 33 13 13-0131 EA 48" x 40" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	968.04	73.19
For Stainless Steel, Add	972.50	
For Parallel Blade Damper, Add	299.23	
23 33 13 13-0132 EA 48" x 44" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,048.95	75.28
For Stainless Steel, Add	1,069.74	
For Parallel Blade Damper, Add	329.15	
23 33 13 13-0133 EA 48" x 48" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,117.15	81.39
For Stainless Steel, Add	1,134.59	
For Parallel Blade Damper, Add	349.10	
23 33 13 13-0134 EA 52" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	384.43	34.58
For Stainless Steel, Add	364.73	
For Parallel Blade Damper, Add	112.22	
23 33 13 13-0135 EA 52" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	415.46	36.66
For Stainless Steel, Add	397.12	
For Parallel Blade Damper, Add	122.19	
23 33 13 13-0136 EA 52" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	452.60	40.69
For Stainless Steel, Add	429.52	
For Parallel Blade Damper, Add	132.16	
23 33 13 13-0137 EA 52" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	471.06	44.72
For Stainless Steel, Add	437.63	
For Parallel Blade Damper, Add	134.66	
23 33 13 13-0138 EA 52" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	511.36	48.88
For Stainless Steel, Add	474.14	
For Parallel Blade Damper, Add	145.89	
23 33 13 13-0139 EA 52" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	551.62	52.91
For Stainless Steel, Add	510.59	
For Parallel Blade Damper, Add	157.10	
23 33 13 13-0140 EA 52" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	601.24	56.95
For Stainless Steel, Add	559.21	
For Parallel Blade Damper, Add	172.06	
23 33 13 13-0141 EA 52" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	650.86	61.10
For Stainless Steel, Add	607.83	
For Parallel Blade Damper, Add	187.02	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 33 13	13-0142	EA 52" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	719.20		65.13
		<i>For Stainless Steel, Add</i>	680.78		
		<i>For Parallel Blade Damper, Add</i>	209.47		
23 33 13	13-0143	EA 52" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	806.18		69.17
		<i>For Stainless Steel, Add</i>	777.97		
		<i>For Parallel Blade Damper, Add</i>	239.38		
23 33 13	13-0144	EA 52" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	874.61		71.24
		<i>For Stainless Steel, Add</i>	858.99		
		<i>For Parallel Blade Damper, Add</i>	264.30		
23 33 13	13-0145	EA 52" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	961.80		73.19
		<i>For Stainless Steel, Add</i>	964.39		
		<i>For Parallel Blade Damper, Add</i>	296.74		
23 33 13	13-0146	EA 52" x 40" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,048.78		77.35
		<i>For Stainless Steel, Add</i>	1,061.58		
		<i>For Parallel Blade Damper, Add</i>	326.64		
23 33 13	13-0147	EA 52" x 44" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,117.15		81.39
		<i>For Stainless Steel, Add</i>	1,134.59		
		<i>For Parallel Blade Damper, Add</i>	349.10		
23 33 13	13-0148	EA 52" x 48" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,210.28		87.50
		<i>For Stainless Steel, Add</i>	1,231.83		
		<i>For Parallel Blade Damper, Add</i>	379.02		
23 33 13	13-0149	EA 52" x 52" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,284.87		91.52
		<i>For Stainless Steel, Add</i>	1,312.91		
		<i>For Parallel Blade Damper, Add</i>	403.97		
23 33 13	13-0150	EA 56" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	403.02		36.66
		<i>For Stainless Steel, Add</i>	380.95		
		<i>For Parallel Blade Damper, Add</i>	117.22		
23 33 13	13-0151	EA 56" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	446.36		40.69
		<i>For Stainless Steel, Add</i>	421.41		
		<i>For Parallel Blade Damper, Add</i>	129.66		
23 33 13	13-0152	EA 56" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	477.30		44.72
		<i>For Stainless Steel, Add</i>	445.74		
		<i>For Parallel Blade Damper, Add</i>	137.15		
23 33 13	13-0153	EA 56" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	495.72		48.88
		<i>For Stainless Steel, Add</i>	453.80		
		<i>For Parallel Blade Damper, Add</i>	139.63		
23 33 13	13-0154	EA 56" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	542.26		52.91
		<i>For Stainless Steel, Add</i>	498.42		
		<i>For Parallel Blade Damper, Add</i>	153.36		
23 33 13	13-0155	EA 56" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	588.76		56.95
		<i>For Stainless Steel, Add</i>	542.98		
		<i>For Parallel Blade Damper, Add</i>	167.07		
23 33 13	13-0156	EA 56" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	635.26		61.10
		<i>For Stainless Steel, Add</i>	587.55		
		<i>For Parallel Blade Damper, Add</i>	180.78		
23 33 13	13-0157	EA 56" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	681.76		65.13
		<i>For Stainless Steel, Add</i>	632.11		
		<i>For Parallel Blade Damper, Add</i>	194.50		
23 33 13	13-0158	EA 56" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	768.78		69.17
		<i>For Stainless Steel, Add</i>	729.35		
		<i>For Parallel Blade Damper, Add</i>	224.42		
23 33 13	13-0159	EA 56" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	849.73		71.24
		<i>For Stainless Steel, Add</i>	826.64		
		<i>For Parallel Blade Damper, Add</i>	254.35		
23 33 13	13-0160	EA 56" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	924.40		73.19
		<i>For Stainless Steel, Add</i>	915.77		
		<i>For Parallel Blade Damper, Add</i>	281.78		
23 33 13	13-0161	EA 56" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,023.90		77.35
		<i>For Stainless Steel, Add</i>	1,029.24		
		<i>For Parallel Blade Damper, Add</i>	316.69		
23 33 13	13-0162	EA 56" x 40" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,110.91		81.39
		<i>For Stainless Steel, Add</i>	1,126.48		
		<i>For Parallel Blade Damper, Add</i>	346.61		
23 33 13	13-0163	EA 56" x 44" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,204.17		85.41
		<i>For Stainless Steel, Add</i>	1,231.83		
		<i>For Parallel Blade Damper, Add</i>	379.02		
23 33 13	13-0164	EA 56" x 48" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,278.76		89.57
		<i>For Stainless Steel, Add</i>	1,312.91		
		<i>For Parallel Blade Damper, Add</i>	403.97		
23 33 13	13-0165	EA 56" x 52" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,372.02		93.61
		<i>For Stainless Steel, Add</i>	1,418.26		
		<i>For Parallel Blade Damper, Add</i>	436.39		
23 33 13	13-0166	EA 56" x 56" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,465.29		97.63
		<i>For Stainless Steel, Add</i>	1,523.61		
		<i>For Parallel Blade Damper, Add</i>	468.80		
23 33 13	13-0167	EA 60" x 6" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	433.92		40.69
		<i>For Stainless Steel, Add</i>	405.24		
		<i>For Parallel Blade Damper, Add</i>	124.69		
23 33 13	13-0168	EA 60" x 8" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	477.30		44.72
		<i>For Stainless Steel, Add</i>	445.74		
		<i>For Parallel Blade Damper, Add</i>	137.15		
23 33 13	13-0169	EA 60" x 10" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	501.96		48.88
		<i>For Stainless Steel, Add</i>	461.92		
		<i>For Parallel Blade Damper, Add</i>	142.13		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 13-0170 EA 60" x 12" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	520.46	52.91
<i>For Stainless Steel, Add</i>	470.08	
<i>For Parallel Blade Damper, Add</i>	144.64	
23 33 13 13-0171 EA 60" x 14" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	570.08	56.95
<i>For Stainless Steel, Add</i>	518.70	
<i>For Parallel Blade Damper, Add</i>	159.60	
23 33 13 13-0172 EA 60" x 16" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	619.66	61.10
<i>For Stainless Steel, Add</i>	567.27	
<i>For Parallel Blade Damper, Add</i>	174.54	
23 33 13 13-0173 EA 60" x 18" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	672.40	65.13
<i>For Stainless Steel, Add</i>	619.94	
<i>For Parallel Blade Damper, Add</i>	190.75	
23 33 13 13-0174 EA 60" x 20" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	725.14	69.17
<i>For Stainless Steel, Add</i>	672.62	
<i>For Parallel Blade Damper, Add</i>	206.96	
23 33 13 13-0175 EA 60" x 24" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	812.29	71.24
<i>For Stainless Steel, Add</i>	777.97	
<i>For Parallel Blade Damper, Add</i>	239.38	
23 33 13 13-0176 EA 60" x 28" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	893.20	73.19
<i>For Stainless Steel, Add</i>	875.21	
<i>For Parallel Blade Damper, Add</i>	269.30	
23 33 13 13-0177 EA 60" x 32" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	986.50	77.35
<i>For Stainless Steel, Add</i>	980.62	
<i>For Parallel Blade Damper, Add</i>	301.73	
23 33 13 13-0178 EA 60" x 36" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,079.75	81.39
<i>For Stainless Steel, Add</i>	1,085.97	
<i>For Parallel Blade Damper, Add</i>	334.14	
23 33 13 13-0179 EA 60" x 40" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,154.29	85.41
<i>For Stainless Steel, Add</i>	1,166.98	
<i>For Parallel Blade Damper, Add</i>	359.07	
23 33 13 13-0180 EA 60" x 44" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,266.23	89.57
<i>For Stainless Steel, Add</i>	1,296.62	
<i>For Parallel Blade Damper, Add</i>	398.96	
23 33 13 13-0181 EA 60" x 48" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,365.73	93.61
<i>For Stainless Steel, Add</i>	1,410.08	
<i>For Parallel Blade Damper, Add</i>	433.87	
23 33 13 13-0182 EA 60" x 52" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,465.29	97.63
<i>For Stainless Steel, Add</i>	1,523.61	
<i>For Parallel Blade Damper, Add</i>	468.80	
23 33 13 13-0183 EA 60" x 56" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,552.22	101.79
<i>For Stainless Steel, Add</i>	1,620.74	
<i>For Parallel Blade Damper, Add</i>	498.69	
23 33 13 13-0184 EA 60" x 60" Rectangular Opposed Blade Damper, Steel Construction, Manual Operation	1,639.33	105.83
<i>For Stainless Steel, Add</i>	1,718.09	
<i>For Parallel Blade Damper, Add</i>	528.64	

23 33 13 16 Fire Dampers (23 33 13)

23 33 13 16-0001 Fire Dampers (23 33 13 16)

23 33 13 16-0002 SF Curtain Type, Vertical, Fire Damper	140.93	13.20
<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.77	
<i>For Dynamic Damper, Add</i>	54.65	
<i>For 3 Hour Rated, Add</i>	30.36	
<i>For Smoke Damper, Add</i>	86.03	
23 33 13 16-0003 SF Louver Type, Vertical, Fire Damper	196.14	13.20
<i>For Spring Activated Horizontal Mount Operation, Add</i>	35.19	
<i>For Dynamic Damper, Add</i>	84.47	
<i>For 3 Hour Rated, Add</i>	46.93	
<i>For Smoke Damper, Add</i>	132.96	

23 33 13 16-0004 Folding Curtain Fire Dampers (23 33 13 16)

Note: UL Listed. Air stream 22 gauge galvanized steel construction with fusible link 160 F, gravity actuated for vertical mount 1-1/2 hour fire rating. Damper blades and damper frame are in the air stream.

23 33 13 16-0005 EA 6" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	70.54	13.57
<i>For Spring Activated Horizontal Mount Operation, Add</i>	6.72	
<i>For Dynamic Damper, Add</i>	16.12	
<i>For 3 Hour Rated, Add</i>	8.96	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	7.46	
23 33 13 16-0006 EA 8" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	74.49	14.17
<i>For Spring Activated Horizontal Mount Operation, Add</i>	7.19	
<i>For Dynamic Damper, Add</i>	17.26	
<i>For 3 Hour Rated, Add</i>	9.59	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	7.99	
23 33 13 16-0007 EA 8" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	76.87	14.29
<i>For Spring Activated Horizontal Mount Operation, Add</i>	7.67	
<i>For Dynamic Damper, Add</i>	18.41	
<i>For 3 Hour Rated, Add</i>	10.23	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	8.53	
23 33 13 16-0008 EA 10" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	76.87	14.29
<i>For Spring Activated Horizontal Mount Operation, Add</i>	7.67	
<i>For Dynamic Damper, Add</i>	18.41	
<i>For 3 Hour Rated, Add</i>	10.23	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	8.53	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0009	EA 10" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	80.23	14.67
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	8.15	
	<i>For Dynamic Damper, Add</i>	19.56	
	<i>For 3 Hour Rated, Add</i>	10.87	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	9.06	
23 33 13 16-0010	EA 10" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	89.37	16.26
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	9.11	
	<i>For Dynamic Damper, Add</i>	21.86	
	<i>For 3 Hour Rated, Add</i>	12.15	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	10.12	
23 33 13 16-0011	EA 10" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	80.23	14.67
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	8.15	
	<i>For Dynamic Damper, Add</i>	19.56	
	<i>For 3 Hour Rated, Add</i>	10.87	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	9.06	
23 33 13 16-0012	EA 12" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	86.92	15.52
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	9.11	
	<i>For Dynamic Damper, Add</i>	21.86	
	<i>For 3 Hour Rated, Add</i>	12.15	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	10.12	
23 33 13 16-0013	EA 12" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	91.50	16.26
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	9.59	
	<i>For Dynamic Damper, Add</i>	23.01	
	<i>For 3 Hour Rated, Add</i>	12.79	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	10.66	
23 33 13 16-0014	EA 12" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	99.75	18.33
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	10.07	
	<i>For Dynamic Damper, Add</i>	24.17	
	<i>For 3 Hour Rated, Add</i>	13.43	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	11.19	
23 33 13 16-0015	EA 14" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	85.86	15.52
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	8.87	
	<i>For Dynamic Damper, Add</i>	21.29	
	<i>For 3 Hour Rated, Add</i>	11.83	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	9.86	
23 33 13 16-0016	EA 14" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	91.50	16.26
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	9.59	
	<i>For Dynamic Damper, Add</i>	23.01	
	<i>For 3 Hour Rated, Add</i>	12.79	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	10.66	
23 33 13 16-0017	EA 14" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	96.08	17.11
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	10.07	
	<i>For Dynamic Damper, Add</i>	24.17	
	<i>For 3 Hour Rated, Add</i>	13.43	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	11.19	
23 33 13 16-0018	EA 14" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	101.89	18.33
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	10.55	
	<i>For Dynamic Damper, Add</i>	25.33	
	<i>For 3 Hour Rated, Add</i>	14.07	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	11.73	
23 33 13 16-0019	EA 14" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	113.33	20.40
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	11.75	
	<i>For Dynamic Damper, Add</i>	28.20	
	<i>For 3 Hour Rated, Add</i>	15.67	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	13.06	
23 33 13 16-0020	EA 16" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	91.50	16.26
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	9.59	
	<i>For Dynamic Damper, Add</i>	23.01	
	<i>For 3 Hour Rated, Add</i>	12.79	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	10.66	
23 33 13 16-0021	EA 16" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	97.30	17.47
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	10.07	
	<i>For Dynamic Damper, Add</i>	24.17	
	<i>For 3 Hour Rated, Add</i>	13.43	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	11.19	
23 33 13 16-0022	EA 16" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	104.33	19.18
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	10.55	
	<i>For Dynamic Damper, Add</i>	25.33	
	<i>For 3 Hour Rated, Add</i>	14.07	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	11.73	
23 33 13 16-0023	EA 16" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	110.11	20.40
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	11.03	
	<i>For Dynamic Damper, Add</i>	26.47	
	<i>For 3 Hour Rated, Add</i>	14.70	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	12.25	
23 33 13 16-0024	EA 16" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	121.57	22.36
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	12.23	
	<i>For Dynamic Damper, Add</i>	29.35	
	<i>For 3 Hour Rated, Add</i>	16.31	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	13.59	
23 33 13 16-0025	EA 16" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	133.01	24.44
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	13.43	
	<i>For Dynamic Damper, Add</i>	32.23	
	<i>For 3 Hour Rated, Add</i>	17.91	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	14.92	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
Air Duct Accessories	23 33

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0026 EA 18" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	96.08	17.11
For Spring Activated Horizontal Mount Operation, Add	10.07	
For Dynamic Damper, Add	24.17	
For 3 Hour Rated, Add	13.43	
For Cap Of Damper Blades Outside Air Stream, Add	11.19	
23 33 13 16-0027 EA 18" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	102.94	18.33
For Spring Activated Horizontal Mount Operation, Add	10.79	
For Dynamic Damper, Add	25.89	
For 3 Hour Rated, Add	14.39	
For Cap Of Damper Blades Outside Air Stream, Add	11.99	
23 33 13 16-0028 EA 18" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	112.27	20.40
For Spring Activated Horizontal Mount Operation, Add	11.51	
For Dynamic Damper, Add	27.63	
For 3 Hour Rated, Add	15.35	
For Cap Of Damper Blades Outside Air Stream, Add	12.79	
23 33 13 16-0029 EA 18" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	123.71	22.36
For Spring Activated Horizontal Mount Operation, Add	12.71	
For Dynamic Damper, Add	30.51	
For 3 Hour Rated, Add	16.95	
For Cap Of Damper Blades Outside Air Stream, Add	14.13	
23 33 13 16-0030 EA 18" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	134.07	24.44
For Spring Activated Horizontal Mount Operation, Add	13.67	
For Dynamic Damper, Add	32.81	
For 3 Hour Rated, Add	18.23	
For Cap Of Damper Blades Outside Air Stream, Add	15.19	
23 33 13 16-0031 EA 18" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	145.50	26.39
For Spring Activated Horizontal Mount Operation, Add	14.87	
For Dynamic Damper, Add	35.68	
For 3 Hour Rated, Add	19.82	
For Cap Of Damper Blades Outside Air Stream, Add	16.52	
23 33 13 16-0032 EA 18" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	154.81	28.47
For Spring Activated Horizontal Mount Operation, Add	15.59	
For Dynamic Damper, Add	37.41	
For 3 Hour Rated, Add	20.78	
For Cap Of Damper Blades Outside Air Stream, Add	17.32	
23 33 13 16-0033 EA 20" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	101.89	18.33
For Spring Activated Horizontal Mount Operation, Add	10.55	
For Dynamic Damper, Add	25.33	
For 3 Hour Rated, Add	14.07	
For Cap Of Damper Blades Outside Air Stream, Add	11.73	
23 33 13 16-0034 EA 20" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	112.25	20.40
For Spring Activated Horizontal Mount Operation, Add	11.51	
For Dynamic Damper, Add	27.62	
For 3 Hour Rated, Add	15.35	
For Cap Of Damper Blades Outside Air Stream, Add	12.79	
23 33 13 16-0035 EA 20" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	122.63	22.36
For Spring Activated Horizontal Mount Operation, Add	12.47	
For Dynamic Damper, Add	29.93	
For 3 Hour Rated, Add	16.63	
For Cap Of Damper Blades Outside Air Stream, Add	13.86	
23 33 13 16-0036 EA 20" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	137.28	24.44
For Spring Activated Horizontal Mount Operation, Add	14.39	
For Dynamic Damper, Add	34.54	
For 3 Hour Rated, Add	19.19	
For Cap Of Damper Blades Outside Air Stream, Add	15.99	
23 33 13 16-0037 EA 20" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	146.58	26.39
For Spring Activated Horizontal Mount Operation, Add	15.11	
For Dynamic Damper, Add	36.27	
For 3 Hour Rated, Add	20.15	
For Cap Of Damper Blades Outside Air Stream, Add	16.79	
23 33 13 16-0038 EA 20" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	155.88	28.47
For Spring Activated Horizontal Mount Operation, Add	15.63	
For Dynamic Damper, Add	37.99	
For 3 Hour Rated, Add	21.11	
For Cap Of Damper Blades Outside Air Stream, Add	17.59	
23 33 13 16-0039 EA 20" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	166.25	30.55
For Spring Activated Horizontal Mount Operation, Add	16.79	
For Dynamic Damper, Add	40.29	
For 3 Hour Rated, Add	22.38	
For Cap Of Damper Blades Outside Air Stream, Add	18.65	
23 33 13 16-0040 EA 20" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	176.62	32.50
For Spring Activated Horizontal Mount Operation, Add	17.74	
For Dynamic Damper, Add	42.58	
For 3 Hour Rated, Add	23.66	
For Cap Of Damper Blades Outside Air Stream, Add	19.72	
23 33 13 16-0041 EA 24" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	114.38	20.40
For Spring Activated Horizontal Mount Operation, Add	11.99	
For Dynamic Damper, Add	28.77	
For 3 Hour Rated, Add	15.98	
For Cap Of Damper Blades Outside Air Stream, Add	13.32	
23 33 13 16-0042 EA 24" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	126.90	22.36
For Spring Activated Horizontal Mount Operation, Add	13.43	
For Dynamic Damper, Add	32.23	
For 3 Hour Rated, Add	17.91	
For Cap Of Damper Blades Outside Air Stream, Add	14.92	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0043	EA 24" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	137.28	24.44
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	14.39	
	<i>For Dynamic Damper, Add</i>	34.54	
	<i>For 3 Hour Rated, Add</i>	19.19	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	15.99	
23 33 13 16-0044	EA 24" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	149.77	26.39
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.83	
	<i>For Dynamic Damper, Add</i>	37.99	
	<i>For 3 Hour Rated, Add</i>	21.11	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	17.59	
23 33 13 16-0045	EA 24" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	159.08	28.47
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.55	
	<i>For Dynamic Damper, Add</i>	39.72	
	<i>For 3 Hour Rated, Add</i>	22.07	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	18.39	
23 33 13 16-0046	EA 24" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	168.38	30.55
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.27	
	<i>For Dynamic Damper, Add</i>	41.44	
	<i>For 3 Hour Rated, Add</i>	23.02	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	19.19	
23 33 13 16-0047	EA 24" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	180.89	32.50
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	18.70	
	<i>For Dynamic Damper, Add</i>	44.89	
	<i>For 3 Hour Rated, Add</i>	24.94	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	20.78	
23 33 13 16-0048	EA 24" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	199.50	36.66
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.14	
	<i>For Dynamic Damper, Add</i>	48.34	
	<i>For 3 Hour Rated, Add</i>	26.86	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.38	
23 33 13 16-0049	EA 24" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	220.26	40.69
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.06	
	<i>For Dynamic Damper, Add</i>	52.95	
	<i>For 3 Hour Rated, Add</i>	29.42	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	24.52	
23 33 13 16-0050	EA 28" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	126.90	22.36
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	13.43	
	<i>For Dynamic Damper, Add</i>	32.23	
	<i>For 3 Hour Rated, Add</i>	17.91	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	14.92	
23 33 13 16-0051	EA 28" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	137.28	24.44
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	14.39	
	<i>For Dynamic Damper, Add</i>	34.54	
	<i>For 3 Hour Rated, Add</i>	19.19	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	15.99	
23 33 13 16-0052	EA 28" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	149.77	26.39
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.83	
	<i>For Dynamic Damper, Add</i>	37.99	
	<i>For 3 Hour Rated, Add</i>	21.11	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	17.59	
23 33 13 16-0053	EA 28" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	160.14	28.47
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.79	
	<i>For Dynamic Damper, Add</i>	40.29	
	<i>For 3 Hour Rated, Add</i>	22.38	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	18.65	
23 33 13 16-0054	EA 28" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	171.58	30.55
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.99	
	<i>For Dynamic Damper, Add</i>	43.17	
	<i>For 3 Hour Rated, Add</i>	23.98	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	19.99	
23 33 13 16-0055	EA 28" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	183.01	32.50
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	19.18	
	<i>For Dynamic Damper, Add</i>	46.04	
	<i>For 3 Hour Rated, Add</i>	25.58	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	21.31	
23 33 13 16-0056	EA 28" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	201.63	36.66
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.62	
	<i>For Dynamic Damper, Add</i>	49.49	
	<i>For 3 Hour Rated, Add</i>	27.50	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.91	
23 33 13 16-0057	EA 28" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	220.26	40.69
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.06	
	<i>For Dynamic Damper, Add</i>	52.95	
	<i>For 3 Hour Rated, Add</i>	29.42	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	24.52	
23 33 13 16-0058	EA 28" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	239.15	42.77
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	24.94	
	<i>For Dynamic Damper, Add</i>	59.85	
	<i>For 3 Hour Rated, Add</i>	33.25	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	27.71	
23 33 13 16-0059	EA 28" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	262.03	46.80
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	27.34	
	<i>For Dynamic Damper, Add</i>	65.61	
	<i>For 3 Hour Rated, Add</i>	36.45	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	30.38	



Heating, Ventilating, and Air-Conditioning (HVAC)		23
HVAC Air Distribution		23 30
Air Duct Accessories		23 33

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0060	EA		32" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	143.67	24.44
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.83	
			<i>For Dynamic Damper, Add</i>	37.99	
			<i>For 3 Hour Rated, Add</i>	21.11	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	17.59	
23 33 13 16-0061	EA		32" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	151.89	26.39
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.31	
			<i>For Dynamic Damper, Add</i>	39.13	
			<i>For 3 Hour Rated, Add</i>	21.74	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	18.12	
23 33 13 16-0062	EA		32" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	160.14	28.47
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.79	
			<i>For Dynamic Damper, Add</i>	40.29	
			<i>For 3 Hour Rated, Add</i>	22.38	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	18.65	
23 33 13 16-0063	EA		32" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	170.50	30.55
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.74	
			<i>For Dynamic Damper, Add</i>	42.58	
			<i>For 3 Hour Rated, Add</i>	23.66	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	19.72	
23 33 13 16-0064	EA		32" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	183.42	32.50
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	19.27	
			<i>For Dynamic Damper, Add</i>	46.26	
			<i>For 3 Hour Rated, Add</i>	25.70	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	21.42	
23 33 13 16-0065	EA		32" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	201.63	36.66
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.62	
			<i>For Dynamic Damper, Add</i>	49.49	
			<i>For 3 Hour Rated, Add</i>	27.50	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.91	
23 33 13 16-0066	EA		32" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	222.40	40.69
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.55	
			<i>For Dynamic Damper, Add</i>	54.11	
			<i>For 3 Hour Rated, Add</i>	30.06	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	25.05	
23 33 13 16-0067	EA		32" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	243.14	44.72
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	24.46	
			<i>For Dynamic Damper, Add</i>	58.71	
			<i>For 3 Hour Rated, Add</i>	32.62	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	27.18	
23 33 13 16-0068	EA		32" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	262.03	46.80
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	27.34	
			<i>For Dynamic Damper, Add</i>	65.61	
			<i>For 3 Hour Rated, Add</i>	36.45	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	30.38	
23 33 13 16-0069	EA		32" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	286.73	50.10
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	30.70	
			<i>For Dynamic Damper, Add</i>	73.67	
			<i>For 3 Hour Rated, Add</i>	40.93	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	34.11	
23 33 13 16-0070	EA		32" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	312.34	52.91
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	34.53	
			<i>For Dynamic Damper, Add</i>	82.88	
			<i>For 3 Hour Rated, Add</i>	46.04	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	38.37	
23 33 13 16-0071	EA		36" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	156.16	26.39
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.27	
			<i>For Dynamic Damper, Add</i>	41.44	
			<i>For 3 Hour Rated, Add</i>	23.02	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	19.19	
23 33 13 16-0072	EA		36" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	166.52	28.47
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	18.22	
			<i>For Dynamic Damper, Add</i>	43.73	
			<i>For 3 Hour Rated, Add</i>	24.30	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	20.25	
23 33 13 16-0073	EA		36" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	176.89	30.55
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	19.18	
			<i>For Dynamic Damper, Add</i>	46.04	
			<i>For 3 Hour Rated, Add</i>	25.58	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	21.31	
23 33 13 16-0074	EA		36" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	189.41	32.50
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.62	
			<i>For Dynamic Damper, Add</i>	49.49	
			<i>For 3 Hour Rated, Add</i>	27.50	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.91	
23 33 13 16-0075	EA		36" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	204.85	36.66
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	21.35	
			<i>For Dynamic Damper, Add</i>	51.23	
			<i>For 3 Hour Rated, Add</i>	28.46	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	23.72	
23 33 13 16-0076	EA		36" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	214.15	38.61
			<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.06	
			<i>For Dynamic Damper, Add</i>	52.95	
			<i>For 3 Hour Rated, Add</i>	29.42	
			<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	24.52	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0077	EA	36" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	243.14	44.72
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	24.46	
		<i>For Dynamic Damper, Add</i>	58.71	
		<i>For 3 Hour Rated, Add</i>	32.62	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	27.18	
23 33 13 16-0078	EA	36" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	266.00	48.88
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	26.86	
		<i>For Dynamic Damper, Add</i>	64.45	
		<i>For 3 Hour Rated, Add</i>	35.81	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	29.84	
23 33 13 16-0079	EA	36" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	227.04	50.47
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.99	
		<i>For Dynamic Damper, Add</i>	40.78	
		<i>For 3 Hour Rated, Add</i>	22.66	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	18.88	
23 33 13 16-0080	EA	36" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	311.73	54.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	33.57	
		<i>For Dynamic Damper, Add</i>	80.57	
		<i>For 3 Hour Rated, Add</i>	44.76	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	37.30	
23 33 13 16-0081	EA	36" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	335.20	56.95
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	36.93	
		<i>For Dynamic Damper, Add</i>	88.62	
		<i>For 3 Hour Rated, Add</i>	49.24	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	41.03	
23 33 13 16-0082	EA	36" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	358.36	59.02
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	40.76	
		<i>For Dynamic Damper, Add</i>	97.83	
		<i>For 3 Hour Rated, Add</i>	54.35	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	45.29	
23 33 13 16-0083	EA	40" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	164.39	30.55
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.74	
		<i>For Dynamic Damper, Add</i>	42.58	
		<i>For 3 Hour Rated, Add</i>	23.66	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	19.72	
23 33 13 16-0084	EA	40" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	179.02	32.50
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	19.66	
		<i>For Dynamic Damper, Add</i>	47.19	
		<i>For 3 Hour Rated, Add</i>	26.21	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	21.85	
23 33 13 16-0085	EA	40" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	187.28	34.58
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.14	
		<i>For Dynamic Damper, Add</i>	48.34	
		<i>For 3 Hour Rated, Add</i>	26.86	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.38	
23 33 13 16-0086	EA	40" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	195.52	36.66
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.62	
		<i>For Dynamic Damper, Add</i>	49.49	
		<i>For 3 Hour Rated, Add</i>	27.50	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.91	
23 33 13 16-0087	EA	40" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	215.21	38.61
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.30	
		<i>For Dynamic Damper, Add</i>	53.52	
		<i>For 3 Hour Rated, Add</i>	29.74	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	24.78	
23 33 13 16-0088	EA	40" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	228.79	40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	23.98	
		<i>For Dynamic Damper, Add</i>	57.56	
		<i>For 3 Hour Rated, Add</i>	31.98	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	26.65	
23 33 13 16-0089	EA	40" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	255.64	46.80
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	25.90	
		<i>For Dynamic Damper, Add</i>	62.16	
		<i>For 3 Hour Rated, Add</i>	34.53	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	28.78	
23 33 13 16-0090	EA	40" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	276.39	50.84
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	27.82	
		<i>For Dynamic Damper, Add</i>	66.77	
		<i>For 3 Hour Rated, Add</i>	37.09	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	30.91	
23 33 13 16-0091	EA	40" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	298.95	54.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	30.70	
		<i>For Dynamic Damper, Add</i>	73.67	
		<i>For 3 Hour Rated, Add</i>	40.93	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	34.11	
23 33 13 16-0092	EA	40" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	330.95	56.95
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	35.97	
		<i>For Dynamic Damper, Add</i>	86.33	
		<i>For 3 Hour Rated, Add</i>	47.96	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	39.97	
23 33 13 16-0093	EA	40" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	353.50	60.24
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	38.85	
		<i>For Dynamic Damper, Add</i>	93.23	
		<i>For 3 Hour Rated, Add</i>	51.80	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	43.16	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0094 EA 40" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	381.85	61.83
<i>For Spring Activated Horizontal Mount Operation, Add</i>	44.12	
<i>For Dynamic Damper, Add</i>	105.90	
<i>For 3 Hour Rated, Add</i>	58.83	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	49.03	
23 33 13 16-0095 EA 40" x 40" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	412.95	65.13
<i>For Spring Activated Horizontal Mount Operation, Add</i>	48.92	
<i>For Dynamic Damper, Add</i>	117.41	
<i>For 3 Hour Rated, Add</i>	65.23	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	54.36	
23 33 13 16-0096 EA 44" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	174.77	30.55
<i>For Spring Activated Horizontal Mount Operation, Add</i>	18.70	
<i>For Dynamic Damper, Add</i>	44.89	
<i>For 3 Hour Rated, Add</i>	24.94	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	20.78	
23 33 13 16-0097 EA 44" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	189.41	32.50
<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.62	
<i>For Dynamic Damper, Add</i>	49.49	
<i>For 3 Hour Rated, Add</i>	27.50	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.91	
23 33 13 16-0098 EA 44" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	201.93	34.58
<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.06	
<i>For Dynamic Damper, Add</i>	52.95	
<i>For 3 Hour Rated, Add</i>	29.42	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	24.52	
23 33 13 16-0099 EA 44" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	210.18	36.66
<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.55	
<i>For Dynamic Damper, Add</i>	54.11	
<i>For 3 Hour Rated, Add</i>	30.06	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	25.05	
23 33 13 16-0100 EA 44" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	224.81	38.61
<i>For Spring Activated Horizontal Mount Operation, Add</i>	24.46	
<i>For Dynamic Damper, Add</i>	58.71	
<i>For 3 Hour Rated, Add</i>	32.62	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	27.18	
23 33 13 16-0101 EA 44" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	239.45	40.69
<i>For Spring Activated Horizontal Mount Operation, Add</i>	26.38	
<i>For Dynamic Damper, Add</i>	63.32	
<i>For 3 Hour Rated, Add</i>	35.18	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	29.31	
23 33 13 16-0102 EA 44" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	274.55	48.88
<i>For Spring Activated Horizontal Mount Operation, Add</i>	28.78	
<i>For Dynamic Damper, Add</i>	69.07	
<i>For 3 Hour Rated, Add</i>	38.37	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	31.98	
23 33 13 16-0103 EA 44" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	297.41	52.91
<i>For Spring Activated Horizontal Mount Operation, Add</i>	31.17	
<i>For Dynamic Damper, Add</i>	74.82	
<i>For 3 Hour Rated, Add</i>	41.57	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	34.64	
23 33 13 16-0104 EA 44" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	330.95	56.95
<i>For Spring Activated Horizontal Mount Operation, Add</i>	35.97	
<i>For Dynamic Damper, Add</i>	86.33	
<i>For 3 Hour Rated, Add</i>	47.96	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	39.97	
23 33 13 16-0105 EA 44" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	362.36	61.10
<i>For Spring Activated Horizontal Mount Operation, Add</i>	40.29	
<i>For Dynamic Damper, Add</i>	96.69	
<i>For 3 Hour Rated, Add</i>	53.72	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	44.77	
23 33 13 16-0106 EA 44" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	395.88	65.13
<i>For Spring Activated Horizontal Mount Operation, Add</i>	45.08	
<i>For Dynamic Damper, Add</i>	108.19	
<i>For 3 Hour Rated, Add</i>	60.11	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	50.09	
23 33 13 16-0107 EA 44" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	421.17	67.08
<i>For Spring Activated Horizontal Mount Operation, Add</i>	49.40	
<i>For Dynamic Damper, Add</i>	118.55	
<i>For 3 Hour Rated, Add</i>	65.86	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	54.89	
23 33 13 16-0108 EA 44" x 40" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	446.47	69.17
<i>For Spring Activated Horizontal Mount Operation, Add</i>	53.71	
<i>For Dynamic Damper, Add</i>	128.91	
<i>For 3 Hour Rated, Add</i>	71.62	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	59.68	
23 33 13 16-0109 EA 44" x 44" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	471.78	71.24
<i>For Spring Activated Horizontal Mount Operation, Add</i>	58.03	
<i>For Dynamic Damper, Add</i>	139.28	
<i>For 3 Hour Rated, Add</i>	77.38	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	64.48	
23 33 13 16-0110 EA 48" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	187.28	32.50
<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.14	
<i>For Dynamic Damper, Add</i>	48.34	
<i>For 3 Hour Rated, Add</i>	26.86	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	22.38	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0111	EA 48" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	201.93	34.58
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.06	
	<i>For Dynamic Damper, Add</i>	52.95	
	<i>For 3 Hour Rated, Add</i>	29.42	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	24.52	
23 33 13 16-0112	EA 48" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	210.18	36.66
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	22.55	
	<i>For Dynamic Damper, Add</i>	54.11	
	<i>For 3 Hour Rated, Add</i>	30.06	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	25.05	
23 33 13 16-0113	EA 48" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	228.79	40.69
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	23.98	
	<i>For Dynamic Damper, Add</i>	57.56	
	<i>For 3 Hour Rated, Add</i>	31.98	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	26.65	
23 33 13 16-0114	EA 48" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	249.53	44.72
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	25.90	
	<i>For Dynamic Damper, Add</i>	62.16	
	<i>For 3 Hour Rated, Add</i>	34.53	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	28.78	
23 33 13 16-0115	EA 48" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	270.28	48.88
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	27.82	
	<i>For Dynamic Damper, Add</i>	66.77	
	<i>For 3 Hour Rated, Add</i>	37.09	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	30.91	
23 33 13 16-0116	EA 48" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	295.29	52.91
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	30.70	
	<i>For Dynamic Damper, Add</i>	73.67	
	<i>For 3 Hour Rated, Add</i>	40.93	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	34.11	
23 33 13 16-0117	EA 48" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	320.29	56.95
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	33.57	
	<i>For Dynamic Damper, Add</i>	80.57	
	<i>For 3 Hour Rated, Add</i>	44.76	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	37.30	
23 33 13 16-0118	EA 48" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	351.70	61.10
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	37.89	
	<i>For Dynamic Damper, Add</i>	90.94	
	<i>For 3 Hour Rated, Add</i>	50.52	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	42.10	
23 33 13 16-0119	EA 48" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	387.35	65.13
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	43.16	
	<i>For Dynamic Damper, Add</i>	103.59	
	<i>For 3 Hour Rated, Add</i>	57.55	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	47.96	
23 33 13 16-0120	EA 48" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	412.67	67.08
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	47.48	
	<i>For Dynamic Damper, Add</i>	113.96	
	<i>For 3 Hour Rated, Add</i>	63.31	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	52.76	
23 33 13 16-0121	EA 48" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	444.33	69.17
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	53.23	
	<i>For Dynamic Damper, Add</i>	127.76	
	<i>For 3 Hour Rated, Add</i>	70.98	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	59.15	
23 33 13 16-0122	EA 48" x 40" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	475.76	73.19
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	57.56	
	<i>For Dynamic Damper, Add</i>	138.13	
	<i>For 3 Hour Rated, Add</i>	76.74	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	63.95	
23 33 13 16-0123	EA 48" x 44" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	507.44	75.28
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	63.31	
	<i>For Dynamic Damper, Add</i>	151.94	
	<i>For 3 Hour Rated, Add</i>	84.41	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	70.34	
23 33 13 16-0124	EA 48" x 48" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	542.81	81.39
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	67.14	
	<i>For Dynamic Damper, Add</i>	161.15	
	<i>For 3 Hour Rated, Add</i>	89.53	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	74.61	
23 33 13 16-0125	EA 52" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	199.80	34.58
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	21.58	
	<i>For Dynamic Damper, Add</i>	51.80	
	<i>For 3 Hour Rated, Add</i>	28.78	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	23.98	
23 33 13 16-0126	EA 52" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	214.43	36.66
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	23.50	
	<i>For Dynamic Damper, Add</i>	56.40	
	<i>For 3 Hour Rated, Add</i>	31.34	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	26.11	
23 33 13 16-0127	EA 52" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	235.18	40.69
	<i>For Spring Activated Horizontal Mount Operation, Add</i>	25.42	
	<i>For Dynamic Damper, Add</i>	61.01	
	<i>For 3 Hour Rated, Add</i>	33.89	
	<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	28.25	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
Air Duct Accessories	23 33

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0128 EA 52" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	249.53	44.72
For Spring Activated Horizontal Mount Operation, Add	25.90	
For Dynamic Damper, Add	62.16	
For 3 Hour Rated, Add	34.53	
For Cap Of Damper Blades Outside Air Stream, Add	28.78	
23 33 13 16-0129 EA 52" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	271.35	48.88
For Spring Activated Horizontal Mount Operation, Add	28.06	
For Dynamic Damper, Add	67.34	
For 3 Hour Rated, Add	37.41	
For Cap Of Damper Blades Outside Air Stream, Add	31.18	
23 33 13 16-0130 EA 52" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	293.16	52.91
For Spring Activated Horizontal Mount Operation, Add	30.22	
For Dynamic Damper, Add	72.52	
For 3 Hour Rated, Add	40.29	
For Cap Of Damper Blades Outside Air Stream, Add	33.58	
23 33 13 16-0131 EA 52" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	318.17	56.95
For Spring Activated Horizontal Mount Operation, Add	33.10	
For Dynamic Damper, Add	79.43	
For 3 Hour Rated, Add	44.13	
For Cap Of Damper Blades Outside Air Stream, Add	36.77	
23 33 13 16-0132 EA 52" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	343.17	61.10
For Spring Activated Horizontal Mount Operation, Add	35.97	
For Dynamic Damper, Add	86.33	
For 3 Hour Rated, Add	47.96	
For Cap Of Damper Blades Outside Air Stream, Add	39.97	
23 33 13 16-0133 EA 52" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	374.58	65.13
For Spring Activated Horizontal Mount Operation, Add	40.29	
For Dynamic Damper, Add	96.69	
For 3 Hour Rated, Add	53.72	
For Cap Of Damper Blades Outside Air Stream, Add	44.77	
23 33 13 16-0134 EA 52" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	412.37	69.17
For Spring Activated Horizontal Mount Operation, Add	46.04	
For Dynamic Damper, Add	110.50	
For 3 Hour Rated, Add	61.39	
For Cap Of Damper Blades Outside Air Stream, Add	51.16	
23 33 13 16-0135 EA 52" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	439.78	71.24
For Spring Activated Horizontal Mount Operation, Add	50.83	
For Dynamic Damper, Add	122.00	
For 3 Hour Rated, Add	67.78	
For Cap Of Damper Blades Outside Air Stream, Add	56.48	
23 33 13 16-0136 EA 52" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	473.62	73.19
For Spring Activated Horizontal Mount Operation, Add	57.07	
For Dynamic Damper, Add	136.98	
For 3 Hour Rated, Add	76.10	
For Cap Of Damper Blades Outside Air Stream, Add	63.42	
23 33 13 16-0137 EA 52" x 40" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	511.40	77.35
For Spring Activated Horizontal Mount Operation, Add	62.82	
For Dynamic Damper, Add	150.78	
For 3 Hour Rated, Add	83.77	
For Cap Of Damper Blades Outside Air Stream, Add	69.81	
23 33 13 16-0138 EA 52" x 44" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	542.81	81.39
For Spring Activated Horizontal Mount Operation, Add	67.14	
For Dynamic Damper, Add	161.15	
For 3 Hour Rated, Add	89.53	
For Cap Of Damper Blades Outside Air Stream, Add	74.61	
23 33 13 16-0139 EA 52" x 48" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	586.72	87.50
For Spring Activated Horizontal Mount Operation, Add	72.90	
For Dynamic Damper, Add	174.96	
For 3 Hour Rated, Add	97.20	
For Cap Of Damper Blades Outside Air Stream, Add	81.00	
23 33 13 16-0140 EA 52" x 52" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	620.26	91.52
For Spring Activated Horizontal Mount Operation, Add	77.70	
For Dynamic Damper, Add	186.47	
For 3 Hour Rated, Add	103.60	
For Cap Of Damper Blades Outside Air Stream, Add	86.33	
23 33 13 16-0141 EA 56" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	210.18	36.66
For Spring Activated Horizontal Mount Operation, Add	22.55	
For Dynamic Damper, Add	54.11	
For 3 Hour Rated, Add	30.06	
For Cap Of Damper Blades Outside Air Stream, Add	25.05	
23 33 13 16-0142 EA 56" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	233.04	40.69
For Spring Activated Horizontal Mount Operation, Add	24.94	
For Dynamic Damper, Add	59.85	
For 3 Hour Rated, Add	33.25	
For Cap Of Damper Blades Outside Air Stream, Add	27.71	
23 33 13 16-0143 EA 56" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	251.67	44.72
For Spring Activated Horizontal Mount Operation, Add	26.38	
For Dynamic Damper, Add	63.32	
For 3 Hour Rated, Add	35.18	
For Cap Of Damper Blades Outside Air Stream, Add	29.31	
23 33 13 16-0144 EA 56" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	266.00	48.88
For Spring Activated Horizontal Mount Operation, Add	26.86	
For Dynamic Damper, Add	64.45	
For 3 Hour Rated, Add	35.81	
For Cap Of Damper Blades Outside Air Stream, Add	29.84	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0145	EA	56" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	289.96	52.91
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	29.50	
		<i>For Dynamic Damper, Add</i>	70.79	
		<i>For 3 Hour Rated, Add</i>	39.33	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	32.78	
23 33 13 16-0146	EA	56" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	313.90	56.95
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	32.13	
		<i>For Dynamic Damper, Add</i>	77.12	
		<i>For 3 Hour Rated, Add</i>	42.85	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	35.71	
23 33 13 16-0147	EA	56" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	337.84	61.10
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	34.77	
		<i>For Dynamic Damper, Add</i>	83.45	
		<i>For 3 Hour Rated, Add</i>	46.36	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	38.64	
23 33 13 16-0148	EA	56" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	361.78	65.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	37.41	
		<i>For Dynamic Damper, Add</i>	89.78	
		<i>For 3 Hour Rated, Add</i>	49.88	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	41.57	
23 33 13 16-0149	EA	56" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	399.57	69.17
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	43.16	
		<i>For Dynamic Damper, Add</i>	103.59	
		<i>For 3 Hour Rated, Add</i>	57.55	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	47.96	
23 33 13 16-0150	EA	56" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	431.28	71.24
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	48.92	
		<i>For Dynamic Damper, Add</i>	117.41	
		<i>For 3 Hour Rated, Add</i>	65.23	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	54.36	
23 33 13 16-0151	EA	56" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	460.83	73.19
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	54.20	
		<i>For Dynamic Damper, Add</i>	130.07	
		<i>For 3 Hour Rated, Add</i>	72.26	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	60.22	
23 33 13 16-0152	EA	56" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	502.89	77.35
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	60.91	
		<i>For Dynamic Damper, Add</i>	146.18	
		<i>For 3 Hour Rated, Add</i>	81.21	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	67.68	
23 33 13 16-0153	EA	56" x 40" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	540.68	81.39
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	66.67	
		<i>For Dynamic Damper, Add</i>	160.00	
		<i>For 3 Hour Rated, Add</i>	88.89	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	74.07	
23 33 13 16-0154	EA	56" x 44" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	580.61	85.41
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	72.90	
		<i>For Dynamic Damper, Add</i>	174.96	
		<i>For 3 Hour Rated, Add</i>	97.20	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	81.00	
23 33 13 16-0155	EA	56" x 48" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	614.15	89.57
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	77.70	
		<i>For Dynamic Damper, Add</i>	186.47	
		<i>For 3 Hour Rated, Add</i>	103.60	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	86.33	
23 33 13 16-0156	EA	56" x 52" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	654.08	93.61
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	83.93	
		<i>For Dynamic Damper, Add</i>	201.44	
		<i>For 3 Hour Rated, Add</i>	111.91	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	93.26	
23 33 13 16-0157	EA	56" x 56" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	694.02	97.63
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	90.17	
		<i>For Dynamic Damper, Add</i>	216.40	
		<i>For 3 Hour Rated, Add</i>	120.22	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	100.19	
23 33 13 16-0158	EA	60" x 6" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	228.79	40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	23.98	
		<i>For Dynamic Damper, Add</i>	57.56	
		<i>For 3 Hour Rated, Add</i>	31.98	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	26.65	
23 33 13 16-0159	EA	60" x 8" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	251.67	44.72
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	26.38	
		<i>For Dynamic Damper, Add</i>	63.32	
		<i>For 3 Hour Rated, Add</i>	35.18	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	29.31	
23 33 13 16-0160	EA	60" x 10" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	268.14	48.88
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	27.34	
		<i>For Dynamic Damper, Add</i>	65.61	
		<i>For 3 Hour Rated, Add</i>	36.45	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	30.38	
23 33 13 16-0161	EA	60" x 12" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	282.50	52.91
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	27.82	
		<i>For Dynamic Damper, Add</i>	66.77	
		<i>For 3 Hour Rated, Add</i>	37.09	
		<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	30.91	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0162 EA 60" x 14" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	307.51	56.95
<i>For Spring Activated Horizontal Mount Operation, Add</i>	30.70	
<i>For Dynamic Damper, Add</i>	73.67	
<i>For 3 Hour Rated, Add</i>	40.93	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	34.11	
23 33 13 16-0163 EA 60" x 16" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	332.51	61.10
<i>For Spring Activated Horizontal Mount Operation, Add</i>	33.57	
<i>For Dynamic Damper, Add</i>	80.57	
<i>For 3 Hour Rated, Add</i>	44.76	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	37.30	
23 33 13 16-0164 EA 60" x 18" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	358.59	65.13
<i>For Spring Activated Horizontal Mount Operation, Add</i>	36.69	
<i>For Dynamic Damper, Add</i>	88.06	
<i>For 3 Hour Rated, Add</i>	48.92	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	40.77	
23 33 13 16-0165 EA 60" x 20" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	384.66	69.17
<i>For Spring Activated Horizontal Mount Operation, Add</i>	39.81	
<i>For Dynamic Damper, Add</i>	95.54	
<i>For 3 Hour Rated, Add</i>	53.08	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	44.23	
23 33 13 16-0166 EA 60" x 24" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	418.48	71.24
<i>For Spring Activated Horizontal Mount Operation, Add</i>	46.04	
<i>For Dynamic Damper, Add</i>	110.50	
<i>For 3 Hour Rated, Add</i>	61.39	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	51.16	
23 33 13 16-0167 EA 60" x 28" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	450.16	73.19
<i>For Spring Activated Horizontal Mount Operation, Add</i>	51.80	
<i>For Dynamic Damper, Add</i>	124.31	
<i>For 3 Hour Rated, Add</i>	69.06	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	57.55	
23 33 13 16-0168 EA 60" x 32" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	490.11	77.35
<i>For Spring Activated Horizontal Mount Operation, Add</i>	58.03	
<i>For Dynamic Damper, Add</i>	139.28	
<i>For 3 Hour Rated, Add</i>	77.38	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	64.48	
23 33 13 16-0169 EA 60" x 36" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	530.03	81.39
<i>For Spring Activated Horizontal Mount Operation, Add</i>	64.27	
<i>For Dynamic Damper, Add</i>	154.25	
<i>For 3 Hour Rated, Add</i>	85.69	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	71.41	
23 33 13 16-0170 EA 60" x 40" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	563.56	85.41
<i>For Spring Activated Horizontal Mount Operation, Add</i>	69.06	
<i>For Dynamic Damper, Add</i>	165.75	
<i>For 3 Hour Rated, Add</i>	92.09	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	76.74	
23 33 13 16-0171 EA 60" x 44" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	609.87	89.57
<i>For Spring Activated Horizontal Mount Operation, Add</i>	76.73	
<i>For Dynamic Damper, Add</i>	184.16	
<i>For 3 Hour Rated, Add</i>	102.31	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	85.26	
23 33 13 16-0172 EA 60" x 48" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	651.94	93.61
<i>For Spring Activated Horizontal Mount Operation, Add</i>	83.45	
<i>For Dynamic Damper, Add</i>	200.28	
<i>For 3 Hour Rated, Add</i>	111.27	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	92.72	
23 33 13 16-0173 EA 60" x 52" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	694.02	97.63
<i>For Spring Activated Horizontal Mount Operation, Add</i>	90.17	
<i>For Dynamic Damper, Add</i>	216.40	
<i>For 3 Hour Rated, Add</i>	120.22	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	100.19	
23 33 13 16-0174 EA 60" x 56" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	731.79	101.79
<i>For Spring Activated Horizontal Mount Operation, Add</i>	95.92	
<i>For Dynamic Damper, Add</i>	230.20	
<i>For 3 Hour Rated, Add</i>	127.89	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	106.57	
23 33 13 16-0175 EA 60" x 60" Folding Curtain Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	769.62	105.83
<i>For Spring Activated Horizontal Mount Operation, Add</i>	101.68	
<i>For Dynamic Damper, Add</i>	244.03	
<i>For 3 Hour Rated, Add</i>	135.57	
<i>For Cap Of Damper Blades Outside Air Stream, Add</i>	112.98	
23 33 13 16-0176 Parallel Blade Louver Fire Damper <small>(23 33 13 16)</small>		
Note: UL listed. 22 gauge galvanized steel construction with fusible link 160 F spring actuated 1-1/2 hour fire rating.		
23 33 13 16-0177 EA 6" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	102.45	13.57
<i>For Spring Activated Horizontal Mount Operation, Add</i>	13.90	
<i>For Dynamic Damper, Add</i>	33.35	
<i>For 3 Hour Rated, Add</i>	18.53	
23 33 13 16-0178 EA 8" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	106.93	14.17
<i>For Spring Activated Horizontal Mount Operation, Add</i>	14.49	
<i>For Dynamic Damper, Add</i>	34.78	
<i>For 3 Hour Rated, Add</i>	19.32	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 33 13 16-0179	EA	8" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	109.84		14.29
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.09		
		<i>For Dynamic Damper, Add</i>	36.22		
		<i>For 3 Hour Rated, Add</i>	20.12		
23 33 13 16-0180	EA	10" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	109.84		14.29
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.09		
		<i>For Dynamic Damper, Add</i>	36.22		
		<i>For 3 Hour Rated, Add</i>	20.12		
23 33 13 16-0181	EA	10" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	113.75		14.67
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.69		
		<i>For Dynamic Damper, Add</i>	37.67		
		<i>For 3 Hour Rated, Add</i>	20.93		
23 33 13 16-0182	EA	10" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	123.94		16.26
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.89		
		<i>For Dynamic Damper, Add</i>	40.53		
		<i>For 3 Hour Rated, Add</i>	22.52		
23 33 13 16-0183	EA	12" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	113.75		14.67
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	15.69		
		<i>For Dynamic Damper, Add</i>	37.67		
		<i>For 3 Hour Rated, Add</i>	20.93		
23 33 13 16-0184	EA	12" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	121.49		15.52
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.89		
		<i>For Dynamic Damper, Add</i>	40.53		
		<i>For 3 Hour Rated, Add</i>	22.52		
23 33 13 16-0185	EA	12" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	126.61		16.26
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.49		
		<i>For Dynamic Damper, Add</i>	41.97		
		<i>For 3 Hour Rated, Add</i>	23.32		
23 33 13 16-0186	EA	12" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	135.40		18.33
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	18.09		
		<i>For Dynamic Damper, Add</i>	43.42		
		<i>For 3 Hour Rated, Add</i>	24.12		
23 33 13 16-0187	EA	14" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	120.17		15.52
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	16.59		
		<i>For Dynamic Damper, Add</i>	39.82		
		<i>For 3 Hour Rated, Add</i>	22.12		
23 33 13 16-0188	EA	14" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	126.61		16.26
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	17.49		
		<i>For Dynamic Damper, Add</i>	41.97		
		<i>For 3 Hour Rated, Add</i>	23.32		
23 33 13 16-0189	EA	14" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	131.73		17.11
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	18.09		
		<i>For Dynamic Damper, Add</i>	43.42		
		<i>For 3 Hour Rated, Add</i>	24.12		
23 33 13 16-0190	EA	14" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	138.05		18.33
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	18.69		
		<i>For Dynamic Damper, Add</i>	44.85		
		<i>For 3 Hour Rated, Add</i>	24.92		
23 33 13 16-0191	EA	14" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	150.83		20.40
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	20.19		
		<i>For Dynamic Damper, Add</i>	48.45		
		<i>For 3 Hour Rated, Add</i>	26.92		
23 33 13 16-0192	EA	16" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	157.45		16.26
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	24.43		
		<i>For Dynamic Damper, Add</i>	58.63		
		<i>For 3 Hour Rated, Add</i>	32.57		
23 33 13 16-0193	EA	16" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	164.10		17.47
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	25.10		
		<i>For Dynamic Damper, Add</i>	60.24		
		<i>For 3 Hour Rated, Add</i>	33.47		
23 33 13 16-0194	EA	16" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	171.99		19.18
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	25.78		
		<i>For Dynamic Damper, Add</i>	61.86		
		<i>For 3 Hour Rated, Add</i>	34.37		
23 33 13 16-0195	EA	16" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	178.62		20.40
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	26.44		
		<i>For Dynamic Damper, Add</i>	63.46		
		<i>For 3 Hour Rated, Add</i>	35.26		
23 33 13 16-0196	EA	16" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	192.21		22.36
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	28.13		
		<i>For Dynamic Damper, Add</i>	67.50		
		<i>For 3 Hour Rated, Add</i>	37.50		
23 33 13 16-0197	EA	16" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	205.79		24.44
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	29.81		
		<i>For Dynamic Damper, Add</i>	71.53		
		<i>For 3 Hour Rated, Add</i>	39.74		
23 33 13 16-0198	EA	18" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	162.88		17.11
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	25.10		
		<i>For Dynamic Damper, Add</i>	60.24		
		<i>For 3 Hour Rated, Add</i>	33.47		
23 33 13 16-0199	EA	18" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	171.03		18.33
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	26.11		
		<i>For Dynamic Damper, Add</i>	62.66		
		<i>For 3 Hour Rated, Add</i>	34.81		



Heating, Ventilating, and Air-Conditioning (HVAC)		23
HVAC Air Distribution		23 30
Air Duct Accessories		23 33

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0200 EA 18" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	181.64 27.12 65.09 36.16	20.40
23 33 13 16-0201 EA 18" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	195.20 28.80 69.11 38.40	22.36
23 33 13 16-0202 EA 18" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	207.27 30.14 72.33 40.19	24.44
23 33 13 16-0203 EA 18" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	220.84 31.82 76.37 42.43	26.39
23 33 13 16-0204 EA 18" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	231.41 32.82 78.78 43.76	28.47
23 33 13 16-0205 EA 20" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	169.55 25.78 61.86 34.37	18.33
23 33 13 16-0206 EA 20" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	181.61 27.11 65.08 36.15	20.40
23 33 13 16-0207 EA 20" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	193.70 28.46 68.30 37.95	22.36
23 33 13 16-0208 EA 20" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	211.77 31.15 74.76 41.54	24.44
23 33 13 16-0209 EA 20" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	222.34 32.16 77.18 42.88	26.39
23 33 13 16-0210 EA 20" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	232.91 33.16 79.59 44.21	28.47
23 33 13 16-0211 EA 20" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	244.99 34.50 82.81 46.01	30.55
23 33 13 16-0212 EA 20" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	257.06 35.84 86.02 47.79	32.50
23 33 13 16-0213 EA 24" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	209.06 33.29 79.90 44.39	20.40
23 33 13 16-0214 EA 24" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	224.13 35.31 84.74 47.08	22.36
23 33 13 16-0215 EA 24" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	236.22 36.65 87.97 48.87	24.44
23 33 13 16-0216 EA 24" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	251.25 38.66 92.79 51.55	26.39
23 33 13 16-0217 EA 24" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	261.85 39.67 95.21 52.90	28.47
23 33 13 16-0218 EA 24" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	272.42 40.68 97.62 54.23	30.55
23 33 13 16-0219 EA 24" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	287.49 42.69 102.45 56.92	32.50
23 33 13 16-0220 EA 24" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	308.66 44.70 107.29 59.60	36.66

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 33 13 16-0221	EA	24" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	332.83		40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	47.39		
		<i>For Dynamic Damper, Add</i>	113.74		
		<i>For 3 Hour Rated, Add</i>	63.19		
23 33 13 16-0222	EA	28" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	224.13		22.36
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	35.31		
		<i>For Dynamic Damper, Add</i>	84.74		
		<i>For 3 Hour Rated, Add</i>	47.08		
23 33 13 16-0223	EA	28" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	236.22		24.44
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	36.65		
		<i>For Dynamic Damper, Add</i>	87.97		
		<i>For 3 Hour Rated, Add</i>	48.87		
23 33 13 16-0224	EA	28" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	251.25		26.39
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	38.66		
		<i>For Dynamic Damper, Add</i>	92.79		
		<i>For 3 Hour Rated, Add</i>	51.55		
23 33 13 16-0225	EA	28" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	263.33		28.47
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	40.01		
		<i>For Dynamic Damper, Add</i>	96.01		
		<i>For 3 Hour Rated, Add</i>	53.34		
23 33 13 16-0226	EA	28" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	276.91		30.55
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	41.69		
		<i>For Dynamic Damper, Add</i>	100.05		
		<i>For 3 Hour Rated, Add</i>	55.58		
23 33 13 16-0227	EA	28" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	290.46		32.50
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	43.36		
		<i>For Dynamic Damper, Add</i>	104.06		
		<i>For 3 Hour Rated, Add</i>	57.81		
23 33 13 16-0228	EA	28" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	311.64		36.66
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	45.37		
		<i>For Dynamic Damper, Add</i>	108.90		
		<i>For 3 Hour Rated, Add</i>	60.50		
23 33 13 16-0229	EA	28" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	332.83		40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	47.39		
		<i>For Dynamic Damper, Add</i>	113.74		
		<i>For 3 Hour Rated, Add</i>	63.19		
23 33 13 16-0230	EA	28" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	356.84		42.77
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	51.42		
		<i>For Dynamic Damper, Add</i>	123.41		
		<i>For 3 Hour Rated, Add</i>	68.56		
23 33 13 16-0231	EA	28" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	383.99		46.80
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	54.78		
		<i>For Dynamic Damper, Add</i>	131.47		
		<i>For 3 Hour Rated, Add</i>	73.04		
23 33 13 16-0232	EA	32" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	245.15		24.44
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	38.66		
		<i>For Dynamic Damper, Add</i>	92.79		
		<i>For 3 Hour Rated, Add</i>	51.55		
23 33 13 16-0233	EA	32" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	254.22		26.39
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	39.33		
		<i>For Dynamic Damper, Add</i>	94.39		
		<i>For 3 Hour Rated, Add</i>	52.44		
23 33 13 16-0234	EA	32" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	263.33		28.47
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	40.01		
		<i>For Dynamic Damper, Add</i>	96.01		
		<i>For 3 Hour Rated, Add</i>	53.34		
23 33 13 16-0235	EA	32" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	275.39		30.55
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	41.34		
		<i>For Dynamic Damper, Add</i>	99.23		
		<i>For 3 Hour Rated, Add</i>	55.13		
23 33 13 16-0236	EA	32" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	291.03		32.50
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	43.49		
		<i>For Dynamic Damper, Add</i>	104.37		
		<i>For 3 Hour Rated, Add</i>	57.98		
23 33 13 16-0237	EA	32" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	311.64		36.66
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	45.37		
		<i>For Dynamic Damper, Add</i>	108.90		
		<i>For 3 Hour Rated, Add</i>	60.50		
23 33 13 16-0238	EA	32" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	335.83		40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	48.07		
		<i>For Dynamic Damper, Add</i>	115.36		
		<i>For 3 Hour Rated, Add</i>	64.09		
23 33 13 16-0239	EA	32" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	359.98		44.72
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	50.75		
		<i>For Dynamic Damper, Add</i>	121.80		
		<i>For 3 Hour Rated, Add</i>	67.67		
23 33 13 16-0240	EA	32" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	383.99		46.80
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	54.78		
		<i>For Dynamic Damper, Add</i>	131.47		
		<i>For 3 Hour Rated, Add</i>	73.04		
23 33 13 16-0241	EA	32" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	414.65		50.10
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	59.48		
		<i>For Dynamic Damper, Add</i>	142.75		
		<i>For 3 Hour Rated, Add</i>	79.31		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0242 EA 32" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	447.08	52.91
For Spring Activated Horizontal Mount Operation, Add	64.85	
For Dynamic Damper, Add	155.64	
For 3 Hour Rated, Add	86.47	
23 33 13 16-0243 EA 36" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	275.56	26.39
For Spring Activated Horizontal Mount Operation, Add	44.13	
For Dynamic Damper, Add	105.92	
For 3 Hour Rated, Add	58.84	
23 33 13 16-0244 EA 36" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	288.47	28.47
For Spring Activated Horizontal Mount Operation, Add	45.66	
For Dynamic Damper, Add	109.59	
For 3 Hour Rated, Add	60.88	
23 33 13 16-0245 EA 36" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	301.39	30.55
For Spring Activated Horizontal Mount Operation, Add	47.19	
For Dynamic Damper, Add	113.27	
For 3 Hour Rated, Add	62.93	
23 33 13 16-0246 EA 36" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	317.76	32.50
For Spring Activated Horizontal Mount Operation, Add	49.50	
For Dynamic Damper, Add	118.80	
For 3 Hour Rated, Add	66.00	
23 33 13 16-0247 EA 36" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	335.12	36.66
For Spring Activated Horizontal Mount Operation, Add	50.66	
For Dynamic Damper, Add	121.58	
For 3 Hour Rated, Add	67.54	
23 33 13 16-0248 EA 36" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	346.34	38.61
For Spring Activated Horizontal Mount Operation, Add	51.81	
For Dynamic Damper, Add	124.34	
For 3 Hour Rated, Add	69.08	
23 33 13 16-0249 EA 36" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	381.72	44.72
For Spring Activated Horizontal Mount Operation, Add	55.64	
For Dynamic Damper, Add	133.54	
For 3 Hour Rated, Add	74.19	
23 33 13 16-0250 EA 36" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	410.98	48.88
For Spring Activated Horizontal Mount Operation, Add	59.48	
For Dynamic Damper, Add	142.74	
For 3 Hour Rated, Add	79.30	
23 33 13 16-0251 EA 36" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	436.33	50.47
For Spring Activated Horizontal Mount Operation, Add	64.08	
For Dynamic Damper, Add	153.80	
For 3 Hour Rated, Add	85.44	
23 33 13 16-0252 EA 36" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	474.60	54.13
For Spring Activated Horizontal Mount Operation, Add	70.22	
For Dynamic Damper, Add	168.52	
For 3 Hour Rated, Add	93.62	
23 33 13 16-0253 EA 36" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	507.02	56.95
For Spring Activated Horizontal Mount Operation, Add	75.59	
For Dynamic Damper, Add	181.41	
For 3 Hour Rated, Add	100.78	
23 33 13 16-0254 EA 36" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	540.42	59.02
For Spring Activated Horizontal Mount Operation, Add	81.73	
For Dynamic Damper, Add	196.14	
For 3 Hour Rated, Add	108.97	
23 33 13 16-0255 EA 40" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	309.51	30.55
For Spring Activated Horizontal Mount Operation, Add	50.40	
For Dynamic Damper, Add	120.95	
For 3 Hour Rated, Add	67.19	
23 33 13 16-0256 EA 40" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	329.26	32.50
For Spring Activated Horizontal Mount Operation, Add	53.46	
For Dynamic Damper, Add	128.31	
For 3 Hour Rated, Add	71.29	
23 33 13 16-0257 EA 40" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	338.79	34.58
For Spring Activated Horizontal Mount Operation, Add	54.23	
For Dynamic Damper, Add	130.16	
For 3 Hour Rated, Add	72.31	
23 33 13 16-0258 EA 40" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	348.32	36.66
For Spring Activated Horizontal Mount Operation, Add	55.00	
For Dynamic Damper, Add	132.00	
For 3 Hour Rated, Add	73.34	
23 33 13 16-0259 EA 40" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	372.49	38.61
For Spring Activated Horizontal Mount Operation, Add	57.69	
For Dynamic Damper, Add	138.46	
For 3 Hour Rated, Add	76.92	
23 33 13 16-0260 EA 40" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	390.53	40.69
For Spring Activated Horizontal Mount Operation, Add	60.37	
For Dynamic Damper, Add	144.90	
For 3 Hour Rated, Add	80.50	
23 33 13 16-0261 EA 40" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	422.50	46.80
For Spring Activated Horizontal Mount Operation, Add	63.44	
For Dynamic Damper, Add	152.26	
For 3 Hour Rated, Add	84.59	
23 33 13 16-0262 EA 40" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	448.37	50.84
For Spring Activated Horizontal Mount Operation, Add	66.51	
For Dynamic Damper, Add	159.63	
For 3 Hour Rated, Add	88.69	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0263	EA	40" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	478.61	54.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	71.12	
		<i>For Dynamic Damper, Add</i>	170.69	
		<i>For 3 Hour Rated, Add</i>	94.83	
23 33 13 16-0264	EA	40" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	524.68	56.95
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	79.56	
		<i>For Dynamic Damper, Add</i>	190.94	
		<i>For 3 Hour Rated, Add</i>	106.08	
23 33 13 16-0265	EA	40" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	554.89	60.24
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	84.16	
		<i>For Dynamic Damper, Add</i>	201.98	
		<i>For 3 Hour Rated, Add</i>	112.21	
23 33 13 16-0266	EA	40" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	597.32	61.83
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	92.61	
		<i>For Dynamic Damper, Add</i>	222.25	
		<i>For 3 Hour Rated, Add</i>	123.47	
23 33 13 16-0267	EA	40" x 40" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	641.19	65.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	100.28	
		<i>For Dynamic Damper, Add</i>	240.66	
		<i>For 3 Hour Rated, Add</i>	133.70	
23 33 13 16-0268	EA	44" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	322.45	30.55
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	51.93	
		<i>For Dynamic Damper, Add</i>	124.64	
		<i>For 3 Hour Rated, Add</i>	69.24	
23 33 13 16-0269	EA	44" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	342.21	32.50
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	55.00	
		<i>For Dynamic Damper, Add</i>	132.00	
		<i>For 3 Hour Rated, Add</i>	73.34	
23 33 13 16-0270	EA	44" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	358.57	34.58
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	57.31	
		<i>For Dynamic Damper, Add</i>	137.54	
		<i>For 3 Hour Rated, Add</i>	76.41	
23 33 13 16-0271	EA	44" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	368.09	36.66
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	58.07	
		<i>For Dynamic Damper, Add</i>	139.38	
		<i>For 3 Hour Rated, Add</i>	77.43	
23 33 13 16-0272	EA	44" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	387.84	38.61
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	61.14	
		<i>For Dynamic Damper, Add</i>	146.75	
		<i>For 3 Hour Rated, Add</i>	81.53	
23 33 13 16-0273	EA	44" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	407.60	40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	64.22	
		<i>For Dynamic Damper, Add</i>	154.12	
		<i>For 3 Hour Rated, Add</i>	85.62	
23 33 13 16-0274	EA	44" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	449.09	48.88
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	68.05	
		<i>For Dynamic Damper, Add</i>	163.32	
		<i>For 3 Hour Rated, Add</i>	90.74	
23 33 13 16-0275	EA	44" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	478.34	52.91
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	71.88	
		<i>For Dynamic Damper, Add</i>	172.52	
		<i>For 3 Hour Rated, Add</i>	95.84	
23 33 13 16-0276	EA	44" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	524.68	56.95
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	79.56	
		<i>For Dynamic Damper, Add</i>	190.94	
		<i>For 3 Hour Rated, Add</i>	106.08	
23 33 13 16-0277	EA	44" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	567.59	61.10
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	86.47	
		<i>For Dynamic Damper, Add</i>	207.52	
		<i>For 3 Hour Rated, Add</i>	115.29	
23 33 13 16-0278	EA	44" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	613.89	65.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	94.13	
		<i>For Dynamic Damper, Add</i>	225.92	
		<i>For 3 Hour Rated, Add</i>	125.51	
23 33 13 16-0279	EA	44" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	650.69	67.08
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	101.04	
		<i>For Dynamic Damper, Add</i>	242.49	
		<i>For 3 Hour Rated, Add</i>	134.72	
23 33 13 16-0280	EA	44" x 40" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	687.51	69.17
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	107.95	
		<i>For Dynamic Damper, Add</i>	259.08	
		<i>For 3 Hour Rated, Add</i>	143.93	
23 33 13 16-0281	EA	44" x 44" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	724.33	71.24
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	114.86	
		<i>For Dynamic Damper, Add</i>	275.66	
		<i>For 3 Hour Rated, Add</i>	153.14	
23 33 13 16-0282	EA	48" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	338.79	32.50
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	54.23	
		<i>For Dynamic Damper, Add</i>	130.16	
		<i>For 3 Hour Rated, Add</i>	72.31	
23 33 13 16-0283	EA	48" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	358.57	34.58
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	57.31	
		<i>For Dynamic Damper, Add</i>	137.54	
		<i>For 3 Hour Rated, Add</i>	76.41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0284 EA 48" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	368.09 58.07 139.38 77.43	36.66
23 33 13 16-0285 EA 48" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	390.53 60.37 144.90 80.50	40.69
23 33 13 16-0286 EA 48" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	416.39 63.44 152.26 84.59	44.72
23 33 13 16-0287 EA 48" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	442.26 66.51 159.63 88.69	48.88
23 33 13 16-0288 EA 48" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	474.95 71.12 170.69 94.83	52.91
23 33 13 16-0289 EA 48" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	507.61 75.72 181.73 100.96	56.95
23 33 13 16-0290 EA 48" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	550.54 82.63 198.31 110.17	61.10
23 33 13 16-0291 EA 48" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	600.25 91.06 218.55 121.42	65.13
23 33 13 16-0292 EA 48" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	637.08 97.98 235.14 130.64	67.08
23 33 13 16-0293 EA 48" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	684.09 107.18 257.23 142.91	69.17
23 33 13 16-0294 EA 48" x 40" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	727.04 114.09 273.82 152.12	73.19
23 33 13 16-0295 EA 48" x 44" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	774.06 123.30 295.91 164.40	75.28
23 33 13 16-0296 EA 48" x 48" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	819.67 129.44 310.65 172.58	81.39
23 33 13 16-0297 EA 52" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	355.15 56.54 135.69 75.38	34.58
23 33 13 16-0298 EA 52" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	374.90 59.61 143.06 79.48	36.66
23 33 13 16-0299 EA 52" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	400.77 62.68 150.43 83.57	40.69
23 33 13 16-0300 EA 52" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	416.39 63.44 152.26 84.59	44.72
23 33 13 16-0301 EA 52" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	443.98 66.90 160.56 89.20	48.88
23 33 13 16-0302 EA 52" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	471.53 70.35 168.84 93.80	52.91
23 33 13 16-0303 EA 52" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	504.22 74.96 179.90 99.94	56.95
23 33 13 16-0304 EA 52" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	536.90 79.56 190.94 106.08	61.10

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0305	EA	52" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	579.81	65.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	86.47	
		<i>For Dynamic Damper, Add</i>	207.52	
		<i>For 3 Hour Rated, Add</i>	115.29	
23 33 13 16-0306	EA	52" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	632.94	69.17
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	95.67	
		<i>For Dynamic Damper, Add</i>	229.61	
		<i>For 3 Hour Rated, Add</i>	127.56	
23 33 13 16-0307	EA	52" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	673.15	71.24
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	103.34	
		<i>For Dynamic Damper, Add</i>	248.02	
		<i>For 3 Hour Rated, Add</i>	137.79	
23 33 13 16-0308	EA	52" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	723.61	73.19
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	113.32	
		<i>For Dynamic Damper, Add</i>	271.97	
		<i>For 3 Hour Rated, Add</i>	151.10	
23 33 13 16-0309	EA	52" x 40" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	776.73	77.35
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	122.52	
		<i>For Dynamic Damper, Add</i>	294.06	
		<i>For 3 Hour Rated, Add</i>	163.37	
23 33 13 16-0310	EA	52" x 44" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	819.67	81.39
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	129.44	
		<i>For Dynamic Damper, Add</i>	310.65	
		<i>For 3 Hour Rated, Add</i>	172.58	
23 33 13 16-0311	EA	52" x 48" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	878.91	87.50
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	138.64	
		<i>For Dynamic Damper, Add</i>	332.74	
		<i>For 3 Hour Rated, Add</i>	184.86	
23 33 13 16-0312	EA	52" x 52" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	925.24	91.52
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	146.32	
		<i>For Dynamic Damper, Add</i>	351.16	
		<i>For 3 Hour Rated, Add</i>	195.09	
23 33 13 16-0313	EA	56" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	368.09	36.66
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	58.07	
		<i>For Dynamic Damper, Add</i>	139.38	
		<i>For 3 Hour Rated, Add</i>	77.43	
23 33 13 16-0314	EA	56" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	397.34	40.69
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	61.91	
		<i>For Dynamic Damper, Add</i>	148.58	
		<i>For 3 Hour Rated, Add</i>	82.54	
23 33 13 16-0315	EA	56" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	419.82	44.72
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	64.22	
		<i>For Dynamic Damper, Add</i>	154.12	
		<i>For 3 Hour Rated, Add</i>	85.62	
23 33 13 16-0316	EA	56" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	435.43	48.88
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	64.98	
		<i>For Dynamic Damper, Add</i>	155.95	
		<i>For 3 Hour Rated, Add</i>	86.64	
23 33 13 16-0317	EA	56" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	466.42	52.91
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	69.20	
		<i>For Dynamic Damper, Add</i>	166.08	
		<i>For 3 Hour Rated, Add</i>	92.27	
23 33 13 16-0318	EA	56" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	497.39	56.95
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	73.42	
		<i>For Dynamic Damper, Add</i>	176.21	
		<i>For 3 Hour Rated, Add</i>	97.89	
23 33 13 16-0319	EA	56" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	528.37	61.10
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	77.64	
		<i>For Dynamic Damper, Add</i>	186.34	
		<i>For 3 Hour Rated, Add</i>	103.52	
23 33 13 16-0320	EA	56" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	559.34	65.13
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	81.86	
		<i>For Dynamic Damper, Add</i>	196.46	
		<i>For 3 Hour Rated, Add</i>	109.15	
23 33 13 16-0321	EA	56" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	612.47	69.17
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	91.06	
		<i>For Dynamic Damper, Add</i>	218.55	
		<i>For 3 Hour Rated, Add</i>	121.42	
23 33 13 16-0322	EA	56" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	659.52	71.24
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	100.28	
		<i>For Dynamic Damper, Add</i>	240.66	
		<i>For 3 Hour Rated, Add</i>	133.70	
23 33 13 16-0323	EA	56" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	703.14	73.19
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	108.72	
		<i>For Dynamic Damper, Add</i>	260.92	
		<i>For 3 Hour Rated, Add</i>	144.95	
23 33 13 16-0324	EA	56" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	763.12	77.35
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	119.46	
		<i>For Dynamic Damper, Add</i>	286.71	
		<i>For 3 Hour Rated, Add</i>	159.28	
23 33 13 16-0325	EA	56" x 40" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	816.24	81.39
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	128.67	
		<i>For Dynamic Damper, Add</i>	308.80	
		<i>For 3 Hour Rated, Add</i>	171.56	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 16-0326 EA 56" x 44" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	872.80 138.64 332.74 184.86	85.41
23 33 13 16-0327 EA 56" x 48" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	919.13 146.32 351.16 195.09	89.57
23 33 13 16-0328 EA 56" x 52" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	975.69 156.29 375.11 208.39	93.61
23 33 13 16-0329 EA 56" x 56" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,032.26 166.27 399.05 221.69	97.63
23 33 13 16-0330 EA 60" x 6" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	390.53 60.37 144.90 80.50	40.69
23 33 13 16-0331 EA 60" x 8" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	419.82 64.22 154.12 85.62	44.72
23 33 13 16-0332 EA 60" x 10" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	438.83 65.74 157.78 87.66	48.88
23 33 13 16-0333 EA 60" x 12" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	454.48 66.51 159.63 88.69	52.91
23 33 13 16-0334 EA 60" x 14" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	487.17 71.12 170.69 94.83	56.95
23 33 13 16-0335 EA 60" x 16" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	519.83 75.72 181.73 100.96	61.10
23 33 13 16-0336 EA 60" x 18" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	554.22 80.71 193.70 107.61	65.13
23 33 13 16-0337 EA 60" x 20" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	588.61 85.70 205.67 114.26	69.17
23 33 13 16-0338 EA 60" x 24" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	639.05 95.67 229.61 127.56	71.24
23 33 13 16-0339 EA 60" x 28" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	686.09 104.88 251.71 139.84	73.19
23 33 13 16-0340 EA 60" x 32" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	742.66 114.86 275.66 153.14	77.35
23 33 13 16-0341 EA 60" x 36" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	799.21 124.83 299.60 166.45	81.39
23 33 13 16-0342 EA 60" x 40" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	845.53 132.51 318.02 176.68	85.41
23 33 13 16-0343 EA 60" x 44" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	912.31 144.78 347.48 193.04	89.57
23 33 13 16-0344 EA 60" x 48" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	972.27 155.52 373.26 207.37	93.61
23 33 13 16-0345 EA 60" x 52" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,032.26 166.27 399.05 221.69	97.63
23 33 13 16-0346 EA 60" x 56" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Spring Activated Horizontal Mount Operation, Add</i> <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,085.37 175.47 421.13 233.96	101.79

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 16-0347	EA	60" x 60" Louver Type Fire Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,138.56	105.83
		<i>For Spring Activated Horizontal Mount Operation, Add</i>	184.69	
		<i>For Dynamic Damper, Add</i>	443.25	
		<i>For 3 Hour Rated, Add</i>	246.25	
23 33 13 16-0348		Round 2 Hour Fire Damper (23 33 13 16)		
23 33 13 16-0349	EA	4" Round 2 Hour Fire Damper	128.00	24.44
23 33 13 16-0350	EA	5" Round 2 Hour Fire Damper	133.67	24.44
23 33 13 16-0351	EA	6" Round 2 Hour Fire Damper	157.33	27.74
23 33 13 16-0352	EA	7" Round 2 Hour Fire Damper	163.49	27.74
23 33 13 16-0353	EA	8" Round 2 Hour Fire Damper	196.79	30.55
23 33 13 16-0354	EA	9" Round 2 Hour Fire Damper	213.74	30.55
23 33 13 16-0355	EA	10" Round 2 Hour Fire Damper	237.53	33.97
23 33 13 16-0356	EA	12" Round 2 Hour Fire Damper	266.80	38.25
23 33 13 16-0357	EA	14" Round 2 Hour Fire Damper	303.18	43.62
23 33 13 16-0358		Round 4 Hour Fire Damper (23 33 13 16)		
23 33 13 16-0359	EA	4" Round 4 Hour Fire Damper	144.16	27.74
23 33 13 16-0360	EA	5" Round 4 Hour Fire Damper	159.60	27.74
23 33 13 16-0361	EA	6" Round 4 Hour Fire Damper	180.81	30.55
23 33 13 16-0362	EA	7" Round 4 Hour Fire Damper	200.73	30.55
23 33 13 16-0363	EA	8" Round 4 Hour Fire Damper	227.49	33.97
23 33 13 16-0364	EA	9" Round 4 Hour Fire Damper	239.63	33.97
23 33 13 16-0365	EA	10" Round 4 Hour Fire Damper	267.17	38.25
23 33 13 16-0366	EA	12" Round 4 Hour Fire Damper	295.46	43.62
23 33 13 16-0367	EA	14" Round 4 Hour Fire Damper	344.71	50.96
23 33 13 19		Smoke-Control Dampers (23 33 13)		
23 33 13 19-0001		Combination Smoke/Fire Damper (23 33 13 19)		
		Note: Leakage class I with Firestat UL 555S air foil blades.		
23 33 13 19-0002	EA	6" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	601.53	20.34
		<i>For Dynamic Damper, Add</i>	291.86	
		<i>For 3 Hour Rated, Add</i>	162.15	
23 33 13 19-0003	EA	8" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	617.46	21.26
		<i>For Dynamic Damper, Add</i>	298.99	
		<i>For 3 Hour Rated, Add</i>	166.10	
23 33 13 19-0004	EA	8" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	631.21	21.45
		<i>For Dynamic Damper, Add</i>	306.21	
		<i>For 3 Hour Rated, Add</i>	170.12	
23 33 13 19-0005	EA	10" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	595.93	21.45
		<i>For Dynamic Damper, Add</i>	287.16	
		<i>For 3 Hour Rated, Add</i>	159.53	
23 33 13 19-0006	EA	10" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	610.22	21.99
		<i>For Dynamic Damper, Add</i>	293.88	
		<i>For 3 Hour Rated, Add</i>	163.27	
23 33 13 19-0007	EA	10" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	642.53	24.38
		<i>For Dynamic Damper, Add</i>	307.37	
		<i>For 3 Hour Rated, Add</i>	170.76	
23 33 13 19-0008	EA	12" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	610.22	21.99
		<i>For Dynamic Damper, Add</i>	293.88	
		<i>For 3 Hour Rated, Add</i>	163.27	
23 33 13 19-0009	EA	12" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	638.86	23.28
		<i>For Dynamic Damper, Add</i>	307.37	
		<i>For 3 Hour Rated, Add</i>	170.76	
23 33 13 19-0010	EA	12" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	654.99	24.38
		<i>For Dynamic Damper, Add</i>	314.10	
		<i>For 3 Hour Rated, Add</i>	174.50	
23 33 13 19-0011	EA	12" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	676.68	27.50
		<i>For Dynamic Damper, Add</i>	320.87	
		<i>For 3 Hour Rated, Add</i>	178.26	
23 33 13 19-0012	EA	14" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	632.64	23.28
		<i>For Dynamic Damper, Add</i>	304.01	
		<i>For 3 Hour Rated, Add</i>	168.90	
23 33 13 19-0013	EA	14" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	654.99	24.38
		<i>For Dynamic Damper, Add</i>	314.10	
		<i>For 3 Hour Rated, Add</i>	174.50	
23 33 13 19-0014	EA	14" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	671.19	25.67
		<i>For Dynamic Damper, Add</i>	320.87	
		<i>For 3 Hour Rated, Add</i>	178.26	
23 33 13 19-0015	EA	14" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	689.21	27.50
		<i>For Dynamic Damper, Add</i>	327.63	
		<i>For 3 Hour Rated, Add</i>	182.02	
23 33 13 19-0016	EA	14" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	729.59	30.61
		<i>For Dynamic Damper, Add</i>	344.49	
		<i>For 3 Hour Rated, Add</i>	191.39	
23 33 13 19-0017	EA	16" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	715.25	24.38
		<i>For Dynamic Damper, Add</i>	346.64	
		<i>For 3 Hour Rated, Add</i>	192.58	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 19-0018 EA 16" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	728.50 350.83 194.90	26.21
23 33 13 19-0019 EA 16" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	743.58 355.01 197.23	28.78
23 33 13 19-0020 EA 16" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	756.72 359.14 199.52	30.61
23 33 13 19-0021 EA 16" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	785.24 369.59 205.33	33.55
23 33 13 19-0022 EA 16" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	813.71 380.01 211.12	36.66
23 33 13 19-0023 EA 18" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	726.67 350.83 194.90	25.67
23 33 13 19-0024 EA 18" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	743.71 357.06 198.37	27.50
23 33 13 19-0025 EA 18" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	764.52 363.36 201.86	30.61
23 33 13 19-0026 EA 18" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	792.99 373.78 207.65	33.55
23 33 13 19-0027 EA 18" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	817.56 382.09 212.27	36.66
23 33 13 19-0028 EA 18" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	846.02 392.52 218.06	39.60
23 33 13 19-0029 EA 18" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	866.79 398.78 221.54	42.71
23 33 13 19-0030 EA 20" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	739.91 355.01 197.23	27.50
23 33 13 19-0031 EA 20" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	764.47 363.33 201.85	30.61
23 33 13 19-0032 EA 20" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	789.09 371.67 206.48	33.55
23 33 13 19-0033 EA 20" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	829.21 388.38 215.77	36.66
23 33 13 19-0034 EA 20" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	849.92 394.62 219.23	39.60
23 33 13 19-0035 EA 20" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	870.64 400.86 222.70	42.71
23 33 13 19-0036 EA 20" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	895.25 409.20 227.33	45.83
23 33 13 19-0037 EA 20" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	919.81 417.51 231.95	48.76
23 33 13 19-0038 EA 24" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	757.37 359.49 199.72	30.61
23 33 13 19-0039 EA 24" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	782.16 367.93 204.41	33.55
23 33 13 19-0040 EA 24" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	801.77 373.57 207.54	36.66
23 33 13 19-0041 EA 24" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	826.48 381.96 212.20	39.60
23 33 13 19-0042 EA 24" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	843.47 386.19 214.55	42.71
23 33 13 19-0043 EA 24" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	860.40 390.38 216.88	45.83
23 33 13 19-0044 EA 24" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	885.16 398.80 221.56	48.76
23 33 13 19-0045 EA 24" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated..... <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	919.08 407.22 226.23	54.99

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 19-0046	EA		24" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	958.22	61.04
			<i>For Dynamic Damper, Add</i>	418.46	
			<i>For 3 Hour Rated, Add</i>	232.48	
23 33 13 19-0047	EA		28" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	782.16	33.55
			<i>For Dynamic Damper, Add</i>	367.93	
			<i>For 3 Hour Rated, Add</i>	204.41	
23 33 13 19-0048	EA		28" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	801.77	36.66
			<i>For Dynamic Damper, Add</i>	373.57	
			<i>For 3 Hour Rated, Add</i>	207.54	
23 33 13 19-0049	EA		28" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	826.48	39.60
			<i>For Dynamic Damper, Add</i>	381.96	
			<i>For 3 Hour Rated, Add</i>	212.20	
23 33 13 19-0050	EA		28" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	846.06	42.71
			<i>For Dynamic Damper, Add</i>	387.59	
			<i>For 3 Hour Rated, Add</i>	215.33	
23 33 13 19-0051	EA		28" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	868.22	45.83
			<i>For Dynamic Damper, Add</i>	394.61	
			<i>For 3 Hour Rated, Add</i>	219.23	
23 33 13 19-0052	EA		28" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	890.35	48.76
			<i>For Dynamic Damper, Add</i>	401.60	
			<i>For 3 Hour Rated, Add</i>	223.11	
23 33 13 19-0053	EA		28" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	924.27	54.99
			<i>For Dynamic Damper, Add</i>	410.02	
			<i>For 3 Hour Rated, Add</i>	227.79	
23 33 13 19-0054	EA		28" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	958.22	61.04
			<i>For Dynamic Damper, Add</i>	418.46	
			<i>For 3 Hour Rated, Add</i>	232.48	
23 33 13 19-0055	EA		28" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	998.57	64.16
			<i>For Dynamic Damper, Add</i>	435.29	
			<i>For 3 Hour Rated, Add</i>	241.83	
23 33 13 19-0056	EA		28" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	1,042.90	70.21
			<i>For Dynamic Damper, Add</i>	449.33	
			<i>For 3 Hour Rated, Add</i>	249.63	
23 33 13 19-0057	EA		32" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	817.32	36.66
			<i>For Dynamic Damper, Add</i>	381.96	
			<i>For 3 Hour Rated, Add</i>	212.20	
23 33 13 19-0058	EA		32" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	831.67	39.60
			<i>For Dynamic Damper, Add</i>	384.77	
			<i>For 3 Hour Rated, Add</i>	213.76	
23 33 13 19-0059	EA		32" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	846.06	42.71
			<i>For Dynamic Damper, Add</i>	387.59	
			<i>For 3 Hour Rated, Add</i>	215.33	
23 33 13 19-0060	EA		32" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	865.59	45.83
			<i>For Dynamic Damper, Add</i>	393.18	
			<i>For 3 Hour Rated, Add</i>	218.44	
23 33 13 19-0061	EA		32" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	891.32	48.76
			<i>For Dynamic Damper, Add</i>	402.13	
			<i>For 3 Hour Rated, Add</i>	223.40	
23 33 13 19-0062	EA		32" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	924.27	54.99
			<i>For Dynamic Damper, Add</i>	410.02	
			<i>For 3 Hour Rated, Add</i>	227.79	
23 33 13 19-0063	EA		32" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	963.44	61.04
			<i>For Dynamic Damper, Add</i>	421.28	
			<i>For 3 Hour Rated, Add</i>	234.04	
23 33 13 19-0064	EA		32" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	1,002.58	67.08
			<i>For Dynamic Damper, Add</i>	432.51	
			<i>For 3 Hour Rated, Add</i>	240.29	
23 33 13 19-0065	EA		32" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	1,042.90	70.21
			<i>For Dynamic Damper, Add</i>	449.33	
			<i>For 3 Hour Rated, Add</i>	249.63	
23 33 13 19-0066	EA		32" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	1,093.98	75.15
			<i>For Dynamic Damper, Add</i>	469.01	
			<i>For 3 Hour Rated, Add</i>	260.56	
23 33 13 19-0067	EA		32" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	1,148.36	79.36
			<i>For Dynamic Damper, Add</i>	491.44	
			<i>For 3 Hour Rated, Add</i>	273.02	
23 33 13 19-0068	EA		36" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	858.36	39.60
			<i>For Dynamic Damper, Add</i>	399.18	
			<i>For 3 Hour Rated, Add</i>	221.77	
23 33 13 19-0069	EA		36" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	878.79	42.71
			<i>For Dynamic Damper, Add</i>	405.26	
			<i>For 3 Hour Rated, Add</i>	225.14	
23 33 13 19-0070	EA		36" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	899.26	45.83
			<i>For Dynamic Damper, Add</i>	411.37	
			<i>For 3 Hour Rated, Add</i>	228.54	
23 33 13 19-0071	EA		36" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	925.40	48.76
			<i>For Dynamic Damper, Add</i>	420.53	
			<i>For 3 Hour Rated, Add</i>	233.63	
23 33 13 19-0072	EA		36" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	952.23	54.99
			<i>For Dynamic Damper, Add</i>	425.12	
			<i>For 3 Hour Rated, Add</i>	236.18	
23 33 13 19-0073	EA		36" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated.....	969.86	57.93
			<i>For Dynamic Damper, Add</i>	429.69	
			<i>For 3 Hour Rated, Add</i>	238.72	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 19-0074 EA 36" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,025.64 444.97 247.20	67.08
23 33 13 19-0075 EA 36" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,072.17 460.19 255.66	73.32
23 33 13 19-0076 EA 36" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,113.41 478.50 265.84	75.70
23 33 13 19-0077 EA 36" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,175.13 502.92 279.40	81.20
23 33 13 19-0078 EA 36" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,227.46 524.26 291.26	85.41
23 33 13 19-0079 EA 36" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,281.84 548.67 304.82	88.53
23 33 13 19-0080 EA 40" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,383.31 677.70 376.50	45.83
23 33 13 19-0081 EA 40" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,422.77 694.06 385.59	48.76
23 33 13 19-0082 EA 40" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,439.55 698.17 387.87	51.88
23 33 13 19-0083 EA 40" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,456.32 702.28 390.16	54.99
23 33 13 19-0084 EA 40" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,501.19 716.61 398.12	57.93
23 33 13 19-0085 EA 40" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,536.94 730.97 406.09	61.04
23 33 13 19-0086 EA 40" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,594.79 747.35 415.20	70.21
23 33 13 19-0087 EA 40" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,643.42 763.72 424.29	76.25
23 33 13 19-0088 EA 40" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,703.64 788.32 437.96	81.20
23 33 13 19-0089 EA 40" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,799.84 833.34 462.97	85.41
23 33 13 19-0090 EA 40" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,859.98 857.90 476.61	90.37
23 33 13 19-0091 EA 40" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,950.79 902.97 501.65	92.75
23 33 13 19-0092 EA 40" x 40" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	2,041.32 943.94 524.41	97.69
23 33 13 19-0093 EA 44" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,407.64 685.89 381.05	45.83
23 33 13 19-0094 EA 44" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,447.16 702.28 390.16	48.76
23 33 13 19-0095 EA 44" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,479.10 714.58 396.99	51.88
23 33 13 19-0096 EA 44" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,495.88 718.69 399.27	54.99
23 33 13 19-0097 EA 44" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,535.38 735.08 408.38	57.93
23 33 13 19-0098 EA 44" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,574.85 751.44 417.47	61.04
23 33 13 19-0099 EA 44" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,649.47 771.94 428.85	73.32
23 33 13 19-0100 EA 44" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,705.65 792.38 440.21	79.36
23 33 13 19-0101 EA 44" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	1,799.84 833.34 462.97	85.41

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 33 13 19-0102	EA	44" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,886.42		91.64
		<i>For Dynamic Damper, Add</i>	870.20		
		<i>For 3 Hour Rated, Add</i>	483.44		
23 33 13 19-0103	EA	44" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,980.58		97.69
		<i>For Dynamic Damper, Add</i>	911.14		
		<i>For 3 Hour Rated, Add</i>	506.19		
23 33 13 19-0104	EA	44" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,057.99		100.63
		<i>For Dynamic Damper, Add</i>	948.00		
		<i>For 3 Hour Rated, Add</i>	526.67		
23 33 13 19-0105	EA	44" x 40" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,135.46		103.74
		<i>For Dynamic Damper, Add</i>	984.88		
		<i>For 3 Hour Rated, Add</i>	547.16		
23 33 13 19-0106	EA	44" x 44" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,212.92		106.86
		<i>For Dynamic Damper, Add</i>	1,021.76		
		<i>For 3 Hour Rated, Add</i>	567.65		
23 33 13 19-0107	EA	48" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,439.55		48.76
		<i>For Dynamic Damper, Add</i>	698.17		
		<i>For 3 Hour Rated, Add</i>	387.87		
23 33 13 19-0108	EA	48" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,479.10		51.88
		<i>For Dynamic Damper, Add</i>	714.58		
		<i>For 3 Hour Rated, Add</i>	396.99		
23 33 13 19-0109	EA	48" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,495.88		54.99
		<i>For Dynamic Damper, Add</i>	718.69		
		<i>For 3 Hour Rated, Add</i>	399.27		
23 33 13 19-0110	EA	48" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,536.94		61.04
		<i>For Dynamic Damper, Add</i>	730.97		
		<i>For 3 Hour Rated, Add</i>	406.09		
23 33 13 19-0111	EA	48" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,585.62		67.08
		<i>For Dynamic Damper, Add</i>	747.35		
		<i>For 3 Hour Rated, Add</i>	415.20		
23 33 13 19-0112	EA	48" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,634.25		73.32
		<i>For Dynamic Damper, Add</i>	763.72		
		<i>For 3 Hour Rated, Add</i>	424.29		
23 33 13 19-0113	EA	48" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,698.13		79.36
		<i>For Dynamic Damper, Add</i>	788.32		
		<i>For 3 Hour Rated, Add</i>	437.96		
23 33 13 19-0114	EA	48" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,761.93		85.41
		<i>For Dynamic Damper, Add</i>	812.87		
		<i>For 3 Hour Rated, Add</i>	451.60		
23 33 13 19-0115	EA	48" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,848.52		91.64
		<i>For Dynamic Damper, Add</i>	849.73		
		<i>For 3 Hour Rated, Add</i>	472.07		
23 33 13 19-0116	EA	48" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,950.23		97.69
		<i>For Dynamic Damper, Add</i>	894.75		
		<i>For 3 Hour Rated, Add</i>	497.09		
23 33 13 19-0117	EA	48" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,027.74		100.63
		<i>For Dynamic Damper, Add</i>	931.66		
		<i>For 3 Hour Rated, Add</i>	517.59		
23 33 13 19-0118	EA	48" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,127.85		103.74
		<i>For Dynamic Damper, Add</i>	980.77		
		<i>For 3 Hour Rated, Add</i>	544.87		
23 33 13 19-0119	EA	48" x 40" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,214.48		109.79
		<i>For Dynamic Damper, Add</i>	1,017.65		
		<i>For 3 Hour Rated, Add</i>	565.36		
23 33 13 19-0120	EA	48" x 44" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,314.68		112.91
		<i>For Dynamic Damper, Add</i>	1,066.81		
		<i>For 3 Hour Rated, Add</i>	592.67		
23 33 13 19-0121	EA	48" x 48" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,402.82		122.07
		<i>For Dynamic Damper, Add</i>	1,099.56		
		<i>For 3 Hour Rated, Add</i>	610.87		
23 33 13 19-0122	EA	52" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,471.49		51.88
		<i>For Dynamic Damper, Add</i>	710.47		
		<i>For 3 Hour Rated, Add</i>	394.71		
23 33 13 19-0123	EA	52" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,511.01		54.99
		<i>For Dynamic Damper, Add</i>	726.86		
		<i>For 3 Hour Rated, Add</i>	403.81		
23 33 13 19-0124	EA	52" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,559.68		61.04
		<i>For Dynamic Damper, Add</i>	743.25		
		<i>For 3 Hour Rated, Add</i>	412.91		
23 33 13 19-0125	EA	52" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,585.62		67.08
		<i>For Dynamic Damper, Add</i>	747.35		
		<i>For 3 Hour Rated, Add</i>	415.20		
23 33 13 19-0126	EA	52" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,638.10		73.32
		<i>For Dynamic Damper, Add</i>	765.80		
		<i>For 3 Hour Rated, Add</i>	425.44		
23 33 13 19-0127	EA	52" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,690.52		79.36
		<i>For Dynamic Damper, Add</i>	784.21		
		<i>For 3 Hour Rated, Add</i>	435.67		
23 33 13 19-0128	EA	52" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,754.37		85.41
		<i>For Dynamic Damper, Add</i>	808.79		
		<i>For 3 Hour Rated, Add</i>	449.33		
23 33 13 19-0129	EA	52" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,818.17		91.64
		<i>For Dynamic Damper, Add</i>	833.34		
		<i>For 3 Hour Rated, Add</i>	462.97		



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
23 33 13 19-0130 EA 52" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,904.76 870.20 483.44	97.69
23 33 13 19-0131 EA 52" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,014.13 919.36 510.76	103.74
23 33 13 19-0132 EA 52" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,099.06 960.28 533.49	106.86
23 33 13 19-0133 EA 52" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,206.92 1,013.57 563.09	109.79
23 33 13 19-0134 EA 52" x 40" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,316.19 1,062.68 590.38	116.03
23 33 13 19-0135 EA 52" x 44" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,402.82 1,099.56 610.87	122.07
23 33 13 19-0136 EA 52" x 48" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,521.30 1,148.69 638.16	131.24
23 33 13 19-0137 EA 52" x 52" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,615.49 1,189.66 660.92	137.29
23 33 13 19-0138 EA 56" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,495.88 718.69 399.27	54.99
23 33 13 19-0139 EA 56" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,552.07 739.14 410.63	61.04
23 33 13 19-0140 EA 56" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,593.18 751.44 417.47	67.08
23 33 13 19-0141 EA 56" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,619.08 755.52 419.74	73.32
23 33 13 19-0142 EA 56" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,679.15 778.07 432.26	79.36
23 33 13 19-0143 EA 56" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,739.20 800.60 444.78	85.41
23 33 13 19-0144 EA 56" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,799.19 823.10 457.28	91.64
23 33 13 19-0145 EA 56" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,859.25 845.62 469.79	97.69
23 33 13 19-0146 EA 56" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,968.56 894.75 497.09	103.74
23 33 13 19-0147 EA 56" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,068.81 943.94 524.41	106.86
23 33 13 19-0148 EA 56" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,161.35 988.96 549.42	109.79
23 33 13 19-0149 EA 56" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,285.89 1,046.31 581.29	116.03
23 33 13 19-0150 EA 56" x 40" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,395.21 1,095.45 608.58	122.07
23 33 13 19-0151 EA 56" x 44" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,512.14 1,148.69 638.16	128.12
23 33 13 19-0152 EA 56" x 48" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,606.32 1,189.66 660.92	134.36
23 33 13 19-0153 EA 56" x 52" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,723.25 1,242.90 690.50	140.41
23 33 13 19-0154 EA 56" x 56" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	2,840.18 1,296.15 720.08	146.46
23 33 13 19-0155 EA 60" x 6" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,536.94 730.97 406.09	61.04
23 33 13 19-0156 EA 60" x 8" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,593.18 751.44 417.47	67.08
23 33 13 19-0157 EA 60" x 10" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	1,626.68 759.63 422.02	73.32

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 33 Air Duct Accessories



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 19-0158	EA	60" x 12" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,652.57	79.36
		<i>For Dynamic Damper, Add</i>	763.72	
		<i>For 3 Hour Rated, Add</i>	424.29	
23 33 13 19-0159	EA	60" x 14" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,716.46	85.41
		<i>For Dynamic Damper, Add</i>	788.32	
		<i>For 3 Hour Rated, Add</i>	437.96	
23 33 13 19-0160	EA	60" x 16" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,780.26	91.64
		<i>For Dynamic Damper, Add</i>	812.87	
		<i>For 3 Hour Rated, Add</i>	451.60	
23 33 13 19-0161	EA	60" x 18" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,847.88	97.69
		<i>For Dynamic Damper, Add</i>	839.48	
		<i>For 3 Hour Rated, Add</i>	466.38	
23 33 13 19-0162	EA	60" x 20" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,915.53	103.74
		<i>For Dynamic Damper, Add</i>	866.12	
		<i>For 3 Hour Rated, Add</i>	481.18	
23 33 13 19-0163	EA	60" x 24" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,023.29	106.86
		<i>For Dynamic Damper, Add</i>	919.36	
		<i>For 3 Hour Rated, Add</i>	510.76	
23 33 13 19-0164	EA	60" x 28" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,123.45	109.79
		<i>For Dynamic Damper, Add</i>	968.50	
		<i>For 3 Hour Rated, Add</i>	538.05	
23 33 13 19-0165	EA	60" x 32" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,240.42	116.03
		<i>For Dynamic Damper, Add</i>	1,021.76	
		<i>For 3 Hour Rated, Add</i>	567.65	
23 33 13 19-0166	EA	60" x 36" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,357.35	122.07
		<i>For Dynamic Damper, Add</i>	1,075.01	
		<i>For 3 Hour Rated, Add</i>	597.23	
23 33 13 19-0167	EA	60" x 40" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,451.50	128.12
		<i>For Dynamic Damper, Add</i>	1,115.95	
		<i>For 3 Hour Rated, Add</i>	619.97	
23 33 13 19-0168	EA	60" x 44" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,591.15	134.36
		<i>For Dynamic Damper, Add</i>	1,181.47	
		<i>For 3 Hour Rated, Add</i>	656.37	
23 33 13 19-0169	EA	60" x 48" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,715.69	140.41
		<i>For Dynamic Damper, Add</i>	1,238.82	
		<i>For 3 Hour Rated, Add</i>	688.23	
23 33 13 19-0170	EA	60" x 52" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,840.18	146.46
		<i>For Dynamic Damper, Add</i>	1,296.15	
		<i>For 3 Hour Rated, Add</i>	720.08	
23 33 13 19-0171	EA	60" x 56" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	2,949.45	152.69
		<i>For Dynamic Damper, Add</i>	1,345.25	
		<i>For 3 Hour Rated, Add</i>	747.36	
23 33 13 19-0172	EA	60" x 60" Louver Type Combination Fire/Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	3,058.91	158.74
		<i>For Dynamic Damper, Add</i>	1,394.46	
		<i>For 3 Hour Rated, Add</i>	774.70	
23 33 13 19-0173 Smoke Damper <small>(23 33 13 19)</small>				
Note: Leakage class I with Firestat UL 555S air foil blades.				
23 33 13 19-0174	EA	6" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	129.08	13.57
		<i>For Dynamic Damper, Add</i>	47.73	
		<i>For 3 Hour Rated, Add</i>	26.52	
23 33 13 19-0175	EA	8" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	133.14	14.17
		<i>For Dynamic Damper, Add</i>	48.93	
		<i>For 3 Hour Rated, Add</i>	27.18	
23 33 13 19-0176	EA	8" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	135.63	14.29
		<i>For Dynamic Damper, Add</i>	50.14	
		<i>For 3 Hour Rated, Add</i>	27.86	
23 33 13 19-0177	EA	10" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	135.63	14.29
		<i>For Dynamic Damper, Add</i>	50.14	
		<i>For 3 Hour Rated, Add</i>	27.86	
23 33 13 19-0178	EA	10" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	139.09	14.67
		<i>For Dynamic Damper, Add</i>	51.35	
		<i>For 3 Hour Rated, Add</i>	28.53	
23 33 13 19-0179	EA	10" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	148.44	16.26
		<i>For Dynamic Damper, Add</i>	53.76	
		<i>For 3 Hour Rated, Add</i>	29.87	
23 33 13 19-0180	EA	12" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	139.09	14.67
		<i>For Dynamic Damper, Add</i>	51.35	
		<i>For 3 Hour Rated, Add</i>	28.53	
23 33 13 19-0181	EA	12" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	145.99	15.52
		<i>For Dynamic Damper, Add</i>	53.76	
		<i>For 3 Hour Rated, Add</i>	29.87	
23 33 13 19-0182	EA	12" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	150.69	16.26
		<i>For Dynamic Damper, Add</i>	54.98	
		<i>For 3 Hour Rated, Add</i>	30.54	
23 33 13 19-0183	EA	12" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	159.03	18.33
		<i>For Dynamic Damper, Add</i>	56.18	
		<i>For 3 Hour Rated, Add</i>	31.21	
23 33 13 19-0184	EA	14" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	144.88	15.52
		<i>For Dynamic Damper, Add</i>	53.16	
		<i>For 3 Hour Rated, Add</i>	29.54	
23 33 13 19-0185	EA	14" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	150.69	16.26
		<i>For Dynamic Damper, Add</i>	54.98	
		<i>For 3 Hour Rated, Add</i>	30.54	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 19-0186 EA 14" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	155.36 56.18 31.21	17.11
23 33 13 19-0187 EA 14" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	161.28 57.40 31.89	18.33
23 33 13 19-0188 EA 14" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	172.98 60.42 33.56	20.40
23 33 13 19-0189 EA 16" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	232.19 98.99 54.99	16.26
23 33 13 19-0190 EA 16" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	238.08 100.19 55.66	17.47
23 33 13 19-0191 EA 16" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	245.22 101.41 56.34	19.18
23 33 13 19-0192 EA 16" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	251.11 102.61 57.00	20.40
23 33 13 19-0193 EA 16" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	262.84 105.64 58.69	22.36
23 33 13 19-0194 EA 16" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	274.54 108.66 60.37	24.44
23 33 13 19-0195 EA 18" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	236.86 100.19 55.66	17.11
23 33 13 19-0196 EA 18" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	243.89 102.01 56.67	18.33
23 33 13 19-0197 EA 18" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	253.37 103.83 57.68	20.40
23 33 13 19-0198 EA 18" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	265.08 106.85 59.36	22.36
23 33 13 19-0199 EA 18" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	275.65 109.26 60.70	24.44
23 33 13 19-0200 EA 18" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	287.36 112.29 62.38	26.39
23 33 13 19-0201 EA 18" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	296.83 114.10 63.39	28.47
23 33 13 19-0202 EA 20" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	242.78 101.41 56.34	18.33
23 33 13 19-0203 EA 20" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	253.36 103.82 57.68	20.40
23 33 13 19-0204 EA 20" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	263.95 106.24 59.02	22.36
23 33 13 19-0205 EA 20" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	279.03 111.08 61.71	24.44
23 33 13 19-0206 EA 20" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	288.48 112.89 62.72	26.39
23 33 13 19-0207 EA 20" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	297.95 114.71 63.73	28.47
23 33 13 19-0208 EA 20" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	308.53 117.12 65.07	30.55
23 33 13 19-0209 EA 20" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	319.11 119.53 66.41	32.50
23 33 13 19-0210 EA 24" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	320.79 140.23 77.91	20.40
23 33 13 19-0211 EA 24" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	333.63 143.87 79.93	22.36
23 33 13 19-0212 EA 24" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	344.23 146.29 81.27	24.44
23 33 13 19-0213 EA 24" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	357.04 149.91 83.29	26.39

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 19-0214	EA	24" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	366.51	28.47
		<i>For Dynamic Damper, Add</i>	151.73	
		<i>For 3 Hour Rated, Add</i>	84.29	
23 33 13 19-0215	EA	24" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	375.96	30.55
		<i>For Dynamic Damper, Add</i>	153.53	
		<i>For 3 Hour Rated, Add</i>	85.30	
23 33 13 19-0216	EA	24" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	388.80	32.50
		<i>For Dynamic Damper, Add</i>	157.16	
		<i>For 3 Hour Rated, Add</i>	87.31	
23 33 13 19-0217	EA	24" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	407.73	36.66
		<i>For Dynamic Damper, Add</i>	160.79	
		<i>For 3 Hour Rated, Add</i>	89.33	
23 33 13 19-0218	EA	24" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	428.92	40.69
		<i>For Dynamic Damper, Add</i>	165.63	
		<i>For 3 Hour Rated, Add</i>	92.02	
23 33 13 19-0219	EA	28" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	333.63	22.36
		<i>For Dynamic Damper, Add</i>	143.87	
		<i>For 3 Hour Rated, Add</i>	79.93	
23 33 13 19-0220	EA	28" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	344.23	24.44
		<i>For Dynamic Damper, Add</i>	146.29	
		<i>For 3 Hour Rated, Add</i>	81.27	
23 33 13 19-0221	EA	28" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	357.04	26.39
		<i>For Dynamic Damper, Add</i>	149.91	
		<i>For 3 Hour Rated, Add</i>	83.29	
23 33 13 19-0222	EA	28" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	367.62	28.47
		<i>For Dynamic Damper, Add</i>	152.33	
		<i>For 3 Hour Rated, Add</i>	84.63	
23 33 13 19-0223	EA	28" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	379.32	30.55
		<i>For Dynamic Damper, Add</i>	155.35	
		<i>For 3 Hour Rated, Add</i>	86.30	
23 33 13 19-0224	EA	28" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	391.03	32.50
		<i>For Dynamic Damper, Add</i>	158.37	
		<i>For 3 Hour Rated, Add</i>	87.98	
23 33 13 19-0225	EA	28" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	409.97	36.66
		<i>For Dynamic Damper, Add</i>	161.99	
		<i>For 3 Hour Rated, Add</i>	90.00	
23 33 13 19-0226	EA	28" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	428.92	40.69
		<i>For Dynamic Damper, Add</i>	165.63	
		<i>For 3 Hour Rated, Add</i>	92.02	
23 33 13 19-0227	EA	28" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	448.44	42.77
		<i>For Dynamic Damper, Add</i>	172.87	
		<i>For 3 Hour Rated, Add</i>	96.04	
23 33 13 19-0228	EA	28" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	471.86	46.80
		<i>For Dynamic Damper, Add</i>	178.92	
		<i>For 3 Hour Rated, Add</i>	99.40	
23 33 13 19-0229	EA	32" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	350.94	24.44
		<i>For Dynamic Damper, Add</i>	149.91	
		<i>For 3 Hour Rated, Add</i>	83.29	
23 33 13 19-0230	EA	32" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	359.26	26.39
		<i>For Dynamic Damper, Add</i>	151.11	
		<i>For 3 Hour Rated, Add</i>	83.95	
23 33 13 19-0231	EA	32" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	367.62	28.47
		<i>For Dynamic Damper, Add</i>	152.33	
		<i>For 3 Hour Rated, Add</i>	84.63	
23 33 13 19-0232	EA	32" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	378.19	30.55
		<i>For Dynamic Damper, Add</i>	154.74	
		<i>For 3 Hour Rated, Add</i>	85.97	
23 33 13 19-0233	EA	32" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	391.45	32.50
		<i>For Dynamic Damper, Add</i>	158.59	
		<i>For 3 Hour Rated, Add</i>	88.11	
23 33 13 19-0234	EA	32" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	409.97	36.66
		<i>For Dynamic Damper, Add</i>	161.99	
		<i>For 3 Hour Rated, Add</i>	90.00	
23 33 13 19-0235	EA	32" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	431.15	40.69
		<i>For Dynamic Damper, Add</i>	166.83	
		<i>For 3 Hour Rated, Add</i>	92.69	
23 33 13 19-0236	EA	32" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	452.34	44.72
		<i>For Dynamic Damper, Add</i>	171.68	
		<i>For 3 Hour Rated, Add</i>	95.38	
23 33 13 19-0237	EA	32" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	471.86	46.80
		<i>For Dynamic Damper, Add</i>	178.92	
		<i>For 3 Hour Rated, Add</i>	99.40	
23 33 13 19-0238	EA	32" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	497.31	50.10
		<i>For Dynamic Damper, Add</i>	187.39	
		<i>For 3 Hour Rated, Add</i>	104.10	
23 33 13 19-0239	EA	32" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	523.77	52.91
		<i>For Dynamic Damper, Add</i>	197.05	
		<i>For 3 Hour Rated, Add</i>	109.47	
23 33 13 19-0240	EA	36" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	367.59	26.39
		<i>For Dynamic Damper, Add</i>	155.61	
		<i>For 3 Hour Rated, Add</i>	86.45	
23 33 13 19-0241	EA	36" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	378.38	28.47
		<i>For Dynamic Damper, Add</i>	158.14	
		<i>For 3 Hour Rated, Add</i>	87.86	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 19-0242 EA 36" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	389.16 160.66 89.26	30.55
23 33 13 19-0243 EA 36" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	402.33 164.47 91.37	32.50
23 33 13 19-0244 EA 36" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	418.08 166.37 92.43	36.66
23 33 13 19-0245 EA 36" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	427.71 168.27 93.49	38.61
23 33 13 19-0246 EA 36" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	457.76 174.60 97.00	44.72
23 33 13 19-0247 EA 36" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	481.69 180.93 100.52	48.88
23 33 13 19-0248 EA 36" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	500.65 188.53 104.74	50.47
23 33 13 19-0249 EA 36" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	530.39 198.65 110.36	54.13
23 33 13 19-0250 EA 36" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	555.37 207.52 115.29	56.95
23 33 13 19-0251 EA 36" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	580.24 217.65 120.92	59.02
23 33 13 19-0252 EA 40" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	424.93 183.28 101.82	30.55
23 33 13 19-0253 EA 40" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	440.41 188.34 104.63	32.50
23 33 13 19-0254 EA 40" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	448.88 189.60 105.34	34.58
23 33 13 19-0255 EA 40" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	457.34 190.87 106.04	36.66
23 33 13 19-0256 EA 40" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	477.77 195.31 108.50	38.61
23 33 13 19-0257 EA 40" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	492.10 199.75 110.97	40.69
23 33 13 19-0258 EA 40" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	519.80 204.81 113.78	46.80
23 33 13 19-0259 EA 40" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	541.41 209.88 116.60	50.84
23 33 13 19-0260 EA 40" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	565.24 217.47 120.82	54.13
23 33 13 19-0261 EA 40" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	599.59 231.40 128.55	56.95
23 33 13 19-0262 EA 40" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	623.41 238.98 132.77	60.24
23 33 13 19-0263 EA 40" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	654.10 252.91 140.51	61.83
23 33 13 19-0264 EA 40" x 40" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	687.34 265.58 147.55	65.13
23 33 13 19-0265 EA 44" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	435.73 185.81 103.23	30.55
23 33 13 19-0266 EA 44" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	451.23 190.87 106.04	32.50
23 33 13 19-0267 EA 44" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	464.39 194.68 108.16	34.58
23 33 13 19-0268 EA 44" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	472.85 195.95 108.86	36.66
23 33 13 19-0269 EA 44" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add</i> <i>For 3 Hour Rated, Add</i>	488.33 201.01 111.67	38.61

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 13 19-0270	EA	44" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	503.82	40.69
		<i>For Dynamic Damper, Add</i>	206.07	
		<i>For 3 Hour Rated, Add</i>	114.49	
23 33 13 19-0271	EA	44" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	539.99	48.88
		<i>For Dynamic Damper, Add</i>	212.41	
		<i>For 3 Hour Rated, Add</i>	118.01	
23 33 13 19-0272	EA	44" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	563.92	52.91
		<i>For Dynamic Damper, Add</i>	218.73	
		<i>For 3 Hour Rated, Add</i>	121.52	
23 33 13 19-0273	EA	44" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	599.59	56.95
		<i>For Dynamic Damper, Add</i>	231.40	
		<i>For 3 Hour Rated, Add</i>	128.55	
23 33 13 19-0274	EA	44" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	632.92	61.10
		<i>For Dynamic Damper, Add</i>	242.79	
		<i>For 3 Hour Rated, Add</i>	134.89	
23 33 13 19-0275	EA	44" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	668.56	65.13
		<i>For Dynamic Damper, Add</i>	255.44	
		<i>For 3 Hour Rated, Add</i>	141.91	
23 33 13 19-0276	EA	44" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	695.78	67.08
		<i>For Dynamic Damper, Add</i>	266.84	
		<i>For 3 Hour Rated, Add</i>	148.25	
23 33 13 19-0277	EA	44" x 40" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	723.00	69.17
		<i>For Dynamic Damper, Add</i>	278.24	
		<i>For 3 Hour Rated, Add</i>	154.58	
23 33 13 19-0278	EA	44" x 44" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	750.22	71.24
		<i>For Dynamic Damper, Add</i>	289.64	
		<i>For 3 Hour Rated, Add</i>	160.91	
23 33 13 19-0279	EA	48" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	448.88	32.50
		<i>For Dynamic Damper, Add</i>	189.60	
		<i>For 3 Hour Rated, Add</i>	105.34	
23 33 13 19-0280	EA	48" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	464.39	34.58
		<i>For Dynamic Damper, Add</i>	194.68	
		<i>For 3 Hour Rated, Add</i>	108.16	
23 33 13 19-0281	EA	48" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	472.85	36.66
		<i>For Dynamic Damper, Add</i>	195.95	
		<i>For 3 Hour Rated, Add</i>	108.86	
23 33 13 19-0282	EA	48" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	492.10	40.69
		<i>For Dynamic Damper, Add</i>	199.75	
		<i>For 3 Hour Rated, Add</i>	110.97	
23 33 13 19-0283	EA	48" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	513.69	44.72
		<i>For Dynamic Damper, Add</i>	204.81	
		<i>For 3 Hour Rated, Add</i>	113.78	
23 33 13 19-0284	EA	48" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	535.30	48.88
		<i>For Dynamic Damper, Add</i>	209.88	
		<i>For 3 Hour Rated, Add</i>	116.60	
23 33 13 19-0285	EA	48" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	561.58	52.91
		<i>For Dynamic Damper, Add</i>	217.47	
		<i>For 3 Hour Rated, Add</i>	120.82	
23 33 13 19-0286	EA	48" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	587.85	56.95
		<i>For Dynamic Damper, Add</i>	225.06	
		<i>For 3 Hour Rated, Add</i>	125.03	
23 33 13 19-0287	EA	48" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	621.18	61.10
		<i>For Dynamic Damper, Add</i>	236.46	
		<i>For 3 Hour Rated, Add</i>	131.36	
23 33 13 19-0288	EA	48" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	659.19	65.13
		<i>For Dynamic Damper, Add</i>	250.38	
		<i>For 3 Hour Rated, Add</i>	139.10	
23 33 13 19-0289	EA	48" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	686.42	67.08
		<i>For Dynamic Damper, Add</i>	261.79	
		<i>For 3 Hour Rated, Add</i>	145.44	
23 33 13 19-0290	EA	48" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	720.65	69.17
		<i>For Dynamic Damper, Add</i>	276.97	
		<i>For 3 Hour Rated, Add</i>	153.87	
23 33 13 19-0291	EA	48" x 40" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	753.98	73.19
		<i>For Dynamic Damper, Add</i>	288.37	
		<i>For 3 Hour Rated, Add</i>	160.21	
23 33 13 19-0292	EA	48" x 44" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	788.22	75.28
		<i>For Dynamic Damper, Add</i>	303.56	
		<i>For 3 Hour Rated, Add</i>	168.65	
23 33 13 19-0293	EA	48" x 48" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	825.31	81.39
		<i>For Dynamic Damper, Add</i>	313.70	
		<i>For 3 Hour Rated, Add</i>	174.28	
23 33 13 19-0294	EA	52" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	462.05	34.58
		<i>For Dynamic Damper, Add</i>	193.42	
		<i>For 3 Hour Rated, Add</i>	107.45	
23 33 13 19-0295	EA	52" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	477.53	36.66
		<i>For Dynamic Damper, Add</i>	198.48	
		<i>For 3 Hour Rated, Add</i>	110.27	
23 33 13 19-0296	EA	52" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	499.12	40.69
		<i>For Dynamic Damper, Add</i>	203.54	
		<i>For 3 Hour Rated, Add</i>	113.08	
23 33 13 19-0297	EA	52" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	513.69	44.72
		<i>For Dynamic Damper, Add</i>	204.81	
		<i>For 3 Hour Rated, Add</i>	113.78	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 19-0298 EA 52" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	536.47 210.51 116.95	48.88
23 33 13 19-0299 EA 52" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	559.24 216.21 120.11	52.91
23 33 13 19-0300 EA 52" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	585.52 223.80 124.33	56.95
23 33 13 19-0301 EA 52" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	611.81 231.40 128.55	61.10
23 33 13 19-0302 EA 52" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	645.14 242.79 134.89	65.13
23 33 13 19-0303 EA 52" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	685.48 257.98 143.32	69.17
23 33 13 19-0304 EA 52" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	715.03 270.64 150.35	71.24
23 33 13 19-0305 EA 52" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	751.63 287.10 159.50	73.19
23 33 13 19-0306 EA 52" x 40" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	791.97 302.29 167.94	77.35
23 33 13 19-0307 EA 52" x 44" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	825.31 313.70 174.28	81.39
23 33 13 19-0308 EA 52" x 48" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	871.77 328.89 182.72	87.50
23 33 13 19-0309 EA 52" x 52" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	907.45 341.56 189.75	91.52
23 33 13 19-0310 EA 56" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	472.85 195.95 108.86	36.66
23 33 13 19-0311 EA 56" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	496.77 202.27 112.37	40.69
23 33 13 19-0312 EA 56" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	516.04 206.07 114.49	44.72
23 33 13 19-0313 EA 56" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	530.59 207.33 115.19	48.88
23 33 13 19-0314 EA 56" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	555.72 214.30 119.06	52.91
23 33 13 19-0315 EA 56" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	580.83 221.27 122.93	56.95
23 33 13 19-0316 EA 56" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	605.94 228.23 126.79	61.10
23 33 13 19-0317 EA 56" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	631.06 235.19 130.66	65.13
23 33 13 19-0318 EA 56" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	671.41 250.38 139.10	69.17
23 33 13 19-0319 EA 56" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	705.67 265.58 147.55	71.24
23 33 13 19-0320 EA 56" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	737.57 279.51 155.28	73.19
23 33 13 19-0321 EA 56" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	782.61 297.23 165.13	77.35
23 33 13 19-0322 EA 56" x 40" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	822.96 312.43 173.57	81.39
23 33 13 19-0323 EA 56" x 44" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	865.66 328.89 182.72	85.41
23 33 13 19-0324 EA 56" x 48" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	901.34 341.56 189.75	89.57
23 33 13 19-0325 EA 56" x 52" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated <i>For Dynamic Damper, Add For 3 Hour Rated, Add</i>	944.04 358.01 198.90	93.61

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13	19-0326	EA	56" x 56" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	986.75	97.63
			<i>For Dynamic Damper, Add</i>	374.47	
			<i>For 3 Hour Rated, Add</i>	208.04	
23 33 13	19-0327	EA	60" x 6" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	492.10	40.69
			<i>For Dynamic Damper, Add</i>	199.75	
			<i>For 3 Hour Rated, Add</i>	110.97	
23 33 13	19-0328	EA	60" x 8" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	516.04	44.72
			<i>For Dynamic Damper, Add</i>	206.07	
			<i>For 3 Hour Rated, Add</i>	114.49	
23 33 13	19-0329	EA	60" x 10" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	532.93	48.88
			<i>For Dynamic Damper, Add</i>	208.60	
			<i>For 3 Hour Rated, Add</i>	115.89	
23 33 13	19-0330	EA	60" x 12" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	547.52	52.91
			<i>For Dynamic Damper, Add</i>	209.88	
			<i>For 3 Hour Rated, Add</i>	116.60	
23 33 13	19-0331	EA	60" x 14" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	573.80	56.95
			<i>For Dynamic Damper, Add</i>	217.47	
			<i>For 3 Hour Rated, Add</i>	120.82	
23 33 13	19-0332	EA	60" x 16" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	600.07	61.10
			<i>For Dynamic Damper, Add</i>	225.06	
			<i>For 3 Hour Rated, Add</i>	125.03	
23 33 13	19-0333	EA	60" x 18" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	627.54	65.13
			<i>For Dynamic Damper, Add</i>	233.29	
			<i>For 3 Hour Rated, Add</i>	129.61	
23 33 13	19-0334	EA	60" x 20" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	655.00	69.17
			<i>For Dynamic Damper, Add</i>	241.52	
			<i>For 3 Hour Rated, Add</i>	134.18	
23 33 13	19-0335	EA	60" x 24" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	691.59	71.24
			<i>For Dynamic Damper, Add</i>	257.98	
			<i>For 3 Hour Rated, Add</i>	143.32	
23 33 13	19-0336	EA	60" x 28" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	725.83	73.19
			<i>For Dynamic Damper, Add</i>	273.17	
			<i>For 3 Hour Rated, Add</i>	151.76	
23 33 13	19-0337	EA	60" x 32" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	768.55	77.35
			<i>For Dynamic Damper, Add</i>	289.64	
			<i>For 3 Hour Rated, Add</i>	160.91	
23 33 13	19-0338	EA	60" x 36" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	811.24	81.39
			<i>For Dynamic Damper, Add</i>	306.10	
			<i>For 3 Hour Rated, Add</i>	170.06	
23 33 13	19-0339	EA	60" x 40" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	846.90	85.41
			<i>For Dynamic Damper, Add</i>	318.76	
			<i>For 3 Hour Rated, Add</i>	177.09	
23 33 13	19-0340	EA	60" x 44" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	896.62	89.57
			<i>For Dynamic Damper, Add</i>	339.01	
			<i>For 3 Hour Rated, Add</i>	188.34	
23 33 13	19-0341	EA	60" x 48" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	941.67	93.61
			<i>For Dynamic Damper, Add</i>	356.73	
			<i>For 3 Hour Rated, Add</i>	198.19	
23 33 13	19-0342	EA	60" x 52" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	986.75	97.63
			<i>For Dynamic Damper, Add</i>	374.47	
			<i>For 3 Hour Rated, Add</i>	208.04	
23 33 13	19-0343	EA	60" x 56" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,027.07	101.79
			<i>For Dynamic Damper, Add</i>	389.65	
			<i>For 3 Hour Rated, Add</i>	216.47	
23 33 13	19-0344	EA	60" x 60" Louver Type Smoke Damper, Steel Construction, UL Listed, 1-1/2 Hour Rated	1,067.45	105.83
			<i>For Dynamic Damper, Add</i>	404.85	
			<i>For 3 Hour Rated, Add</i>	224.92	

23 33 13 23 Backdraft Dampers (23 33 13)**23 33 13 23-0001 Horizontally Mounted Backdraft Damper (23 33 13 23)**

Note: Galvanized steel frame, aluminum blades. Exclude motor pack.

23 33 13	23-0002	EA	6" x 6" Horizontally Mounted Backdraft Damper	105.54	13.57
23 33 13	23-0003	EA	8" x 6" Horizontally Mounted Backdraft Damper	128.97	14.17
23 33 13	23-0004	EA	8" x 8" Horizontally Mounted Backdraft Damper	158.03	14.29
23 33 13	23-0005	EA	10" x 6" Horizontally Mounted Backdraft Damper	150.84	14.29
23 33 13	23-0006	EA	10" x 8" Horizontally Mounted Backdraft Damper	143.48	14.67
23 33 13	23-0007	EA	10" x 10" Horizontally Mounted Backdraft Damper	173.23	16.26
23 33 13	23-0008	EA	12" x 6" Horizontally Mounted Backdraft Damper	133.54	14.67
23 33 13	23-0009	EA	12" x 8" Horizontally Mounted Backdraft Damper	168.26	16.26
23 33 13	23-0010	EA	12" x 10" Horizontally Mounted Backdraft Damper	159.99	17.11
23 33 13	23-0011	EA	12" x 12" Horizontally Mounted Backdraft Damper	185.41	18.33
23 33 13	23-0012	EA	14" x 6" Horizontally Mounted Backdraft Damper	150.89	15.52
23 33 13	23-0013	EA	14" x 8" Horizontally Mounted Backdraft Damper	152.74	17.11
23 33 13	23-0014	EA	14" x 10" Horizontally Mounted Backdraft Damper	181.80	18.33
23 33 13	23-0015	EA	14" x 12" Horizontally Mounted Backdraft Damper	158.64	20.40
23 33 13	23-0016	EA	14" x 14" Horizontally Mounted Backdraft Damper	181.01	22.36
23 33 13	23-0017	EA	16" x 6" Horizontally Mounted Backdraft Damper	168.26	16.26
23 33 13	23-0018	EA	16" x 8" Horizontally Mounted Backdraft Damper	170.91	18.33
23 33 13	23-0019	EA	16" x 10" Horizontally Mounted Backdraft Damper	154.00	20.40
23 33 13	23-0020	EA	16" x 12" Horizontally Mounted Backdraft Damper	172.56	20.40
23 33 13	23-0021	EA	16" x 14" Horizontally Mounted Backdraft Damper	197.27	22.36
23 33 13	23-0022	EA	16" x 16" Horizontally Mounted Backdraft Damper	221.94	24.44

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 23-0023 EA 18" x 6" Horizontally Mounted Backdraft Damper.....	149.14	17.11
23 33 13 23-0024 EA 18" x 8" Horizontally Mounted Backdraft Damper.....	138.58	18.33
23 33 13 23-0025 EA 18" x 10" Horizontally Mounted Backdraft Damper.....	165.59	20.40
23 33 13 23-0026 EA 18" x 12" Horizontally Mounted Backdraft Damper.....	192.60	22.36
23 33 13 23-0027 EA 18" x 14" Horizontally Mounted Backdraft Damper.....	219.60	24.44
23 33 13 23-0028 EA 18" x 16" Horizontally Mounted Backdraft Damper.....	251.97	26.39
23 33 13 23-0029 EA 18" x 18" Horizontally Mounted Backdraft Damper.....	285.75	30.55
23 33 13 23-0030 EA 18" x 20" Horizontally Mounted Backdraft Damper.....	228.57	32.50
23 33 13 23-0031 EA 18" x 24" Horizontally Mounted Backdraft Damper.....	266.94	36.66
23 33 13 23-0032 EA 20" x 6" Horizontally Mounted Backdraft Damper.....	163.66	18.33
23 33 13 23-0033 EA 20" x 8" Horizontally Mounted Backdraft Damper.....	154.00	20.40
23 33 13 23-0034 EA 20" x 10" Horizontally Mounted Backdraft Damper.....	183.31	22.36
23 33 13 23-0035 EA 20" x 12" Horizontally Mounted Backdraft Damper.....	212.66	24.44
23 33 13 23-0036 EA 20" x 14" Horizontally Mounted Backdraft Damper.....	247.18	26.39
23 33 13 23-0037 EA 20" x 16" Horizontally Mounted Backdraft Damper.....	277.25	28.47
23 33 13 23-0038 EA 20" x 18" Horizontally Mounted Backdraft Damper.....	228.57	32.50
23 33 13 23-0039 EA 20" x 20" Horizontally Mounted Backdraft Damper.....	243.10	32.50
23 33 13 23-0040 EA 20" x 24" Horizontally Mounted Backdraft Damper.....	284.38	36.66
23 33 13 23-0041 EA 20" x 28" Horizontally Mounted Backdraft Damper.....	325.66	40.69
23 33 13 23-0042 EA 20" x 32" Horizontally Mounted Backdraft Damper.....	300.51	44.72
23 33 13 23-0043 EA 20" x 36" Horizontally Mounted Backdraft Damper.....	333.47	48.88
23 33 13 23-0044 EA 24" x 6" Horizontally Mounted Backdraft Damper.....	144.69	20.40
23 33 13 23-0045 EA 24" x 8" Horizontally Mounted Backdraft Damper.....	178.67	22.36
23 33 13 23-0046 EA 24" x 10" Horizontally Mounted Backdraft Damper.....	212.66	24.44
23 33 13 23-0047 EA 24" x 12" Horizontally Mounted Backdraft Damper.....	251.97	26.39
23 33 13 23-0048 EA 24" x 14" Horizontally Mounted Backdraft Damper.....	213.72	30.55
23 33 13 23-0049 EA 24" x 16" Horizontally Mounted Backdraft Damper.....	237.28	32.50
23 33 13 23-0050 EA 24" x 18" Horizontally Mounted Backdraft Damper.....	266.94	36.66
23 33 13 23-0051 EA 24" x 20" Horizontally Mounted Backdraft Damper.....	284.38	36.66
23 33 13 23-0052 EA 24" x 24" Horizontally Mounted Backdraft Damper.....	331.48	40.69
23 33 13 23-0053 EA 24" x 28" Horizontally Mounted Backdraft Damper.....	308.79	44.72
23 33 13 23-0054 EA 24" x 32" Horizontally Mounted Backdraft Damper.....	345.94	48.88
23 33 13 23-0055 EA 24" x 36" Horizontally Mounted Backdraft Damper.....	383.06	52.91
23 33 13 23-0056 EA 24" x 40" Horizontally Mounted Backdraft Damper.....	370.38	56.95
23 33 13 23-0057 EA 24" x 44" Horizontally Mounted Backdraft Damper.....	402.53	61.10
23 33 13 23-0058 EA 24" x 48" Horizontally Mounted Backdraft Damper.....	422.45	61.10
23 33 13 23-0059 EA 28" x 6" Horizontally Mounted Backdraft Damper.....	158.64	20.40
23 33 13 23-0060 EA 28" x 8" Horizontally Mounted Backdraft Damper.....	197.27	22.36
23 33 13 23-0061 EA 28" x 10" Horizontally Mounted Backdraft Damper.....	247.18	26.39
23 33 13 23-0062 EA 28" x 12" Horizontally Mounted Backdraft Damper.....	213.72	30.55
23 33 13 23-0063 EA 28" x 14" Horizontally Mounted Backdraft Damper.....	240.19	32.50
23 33 13 23-0064 EA 28" x 16" Horizontally Mounted Backdraft Damper.....	272.76	36.66
23 33 13 23-0065 EA 28" x 18" Horizontally Mounted Backdraft Damper.....	305.33	40.69
23 33 13 23-0066 EA 28" x 20" Horizontally Mounted Backdraft Damper.....	325.66	40.69
23 33 13 23-0067 EA 28" x 24" Horizontally Mounted Backdraft Damper.....	308.79	44.72
23 33 13 23-0068 EA 28" x 28" Horizontally Mounted Backdraft Damper.....	350.10	48.88
23 33 13 23-0069 EA 28" x 32" Horizontally Mounted Backdraft Damper.....	391.37	52.91
23 33 13 23-0070 EA 28" x 36" Horizontally Mounted Backdraft Damper.....	392.55	61.10
23 33 13 23-0071 EA 28" x 40" Horizontally Mounted Backdraft Damper.....	415.81	61.10
23 33 13 23-0072 EA 28" x 44" Horizontally Mounted Backdraft Damper.....	451.27	65.13
23 33 13 23-0073 EA 28" x 48" Horizontally Mounted Backdraft Damper.....	486.75	69.17
23 33 13 23-0074 EA 28" x 52" Horizontally Mounted Backdraft Damper.....	510.01	69.17
23 33 13 23-0075 EA 28" x 56" Horizontally Mounted Backdraft Damper.....	504.79	73.19
23 33 13 23-0076 EA 28" x 60" Horizontally Mounted Backdraft Damper.....	525.11	73.19
23 33 13 23-0077 EA 32" x 6" Horizontally Mounted Backdraft Damper.....	178.67	22.36
23 33 13 23-0078 EA 32" x 8" Horizontally Mounted Backdraft Damper.....	232.80	26.39
23 33 13 23-0079 EA 32" x 10" Horizontally Mounted Backdraft Damper.....	277.25	28.47
23 33 13 23-0080 EA 32" x 12" Horizontally Mounted Backdraft Damper.....	237.28	32.50
23 33 13 23-0081 EA 32" x 14" Horizontally Mounted Backdraft Damper.....	272.76	36.66
23 33 13 23-0082 EA 32" x 16" Horizontally Mounted Backdraft Damper.....	308.22	40.69
23 33 13 23-0083 EA 32" x 18" Horizontally Mounted Backdraft Damper.....	271.67	40.69
23 33 13 23-0084 EA 32" x 20" Horizontally Mounted Backdraft Damper.....	300.51	44.72
23 33 13 23-0085 EA 32" x 24" Horizontally Mounted Backdraft Damper.....	345.94	48.88
23 33 13 23-0086 EA 32" x 28" Horizontally Mounted Backdraft Damper.....	391.37	52.91
23 33 13 23-0087 EA 32" x 32" Horizontally Mounted Backdraft Damper.....	395.89	61.10
23 33 13 23-0088 EA 32" x 36" Horizontally Mounted Backdraft Damper.....	422.45	61.10
23 33 13 23-0089 EA 32" x 40" Horizontally Mounted Backdraft Damper.....	461.24	65.13
23 33 13 23-0090 EA 32" x 44" Horizontally Mounted Backdraft Damper.....	500.03	69.17
23 33 13 23-0091 EA 32" x 48" Horizontally Mounted Backdraft Damper.....	498.97	73.19
23 33 13 23-0092 EA 32" x 52" Horizontally Mounted Backdraft Damper.....	522.23	73.19
23 33 13 23-0093 EA 32" x 56" Horizontally Mounted Backdraft Damper.....	557.68	77.35
23 33 13 23-0094 EA 32" x 60" Horizontally Mounted Backdraft Damper.....	580.95	77.35
23 33 13 23-0095 EA 32" x 64" Horizontally Mounted Backdraft Damper.....	563.25	81.39
23 33 13 23-0096 EA 32" x 68" Horizontally Mounted Backdraft Damper.....	583.18	81.39
23 33 13 23-0097 EA 32" x 72" Horizontally Mounted Backdraft Damper.....	615.33	85.41
23 33 13 23-0098 EA 36" x 6" Horizontally Mounted Backdraft Damper.....	192.60	22.36
23 33 13 23-0099 EA 36" x 8" Horizontally Mounted Backdraft Damper.....	258.08	28.47
23 33 13 23-0100 EA 36" x 10" Horizontally Mounted Backdraft Damper.....	228.57	32.50
23 33 13 23-0101 EA 36" x 12" Horizontally Mounted Backdraft Damper.....	266.94	36.66
23 33 13 23-0102 EA 36" x 14" Horizontally Mounted Backdraft Damper.....	305.33	40.69
23 33 13 23-0103 EA 36" x 16" Horizontally Mounted Backdraft Damper.....	271.67	40.69

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33	13 23-0104	EA	36" x 18" Horizontally Mounted Backdraft Damper	302.57	44.72
23 33	13 23-0105	EA	36" x 20" Horizontally Mounted Backdraft Damper	333.47	48.88
23 33	13 23-0106	EA	36" x 24" Horizontally Mounted Backdraft Damper	383.06	52.91
23 33	13 23-0107	EA	36" x 28" Horizontally Mounted Backdraft Damper	392.55	61.10
23 33	13 23-0108	EA	36" x 32" Horizontally Mounted Backdraft Damper	422.45	61.10
23 33	13 23-0109	EA	36" x 36" Horizontally Mounted Backdraft Damper	464.55	65.13
23 33	13 23-0110	EA	36" x 40" Horizontally Mounted Backdraft Damper	506.68	69.17
23 33	13 23-0111	EA	36" x 44" Horizontally Mounted Backdraft Damper	507.67	73.19
23 33	13 23-0112	EA	36" x 48" Horizontally Mounted Backdraft Damper	546.07	77.35
23 33	13 23-0113	EA	36" x 52" Horizontally Mounted Backdraft Damper	572.21	77.35
23 33	13 23-0114	EA	36" x 56" Horizontally Mounted Backdraft Damper	558.28	81.39
23 33	13 23-0115	EA	36" x 60" Horizontally Mounted Backdraft Damper	580.69	81.39
23 33	13 23-0116	EA	36" x 64" Horizontally Mounted Backdraft Damper	615.33	85.41
23 33	13 23-0117	EA	36" x 68" Horizontally Mounted Backdraft Damper	637.74	85.41
23 33	13 23-0118	EA	36" x 72" Horizontally Mounted Backdraft Damper	660.19	85.41
23 33	13 23-0119	EA	40" x 6" Horizontally Mounted Backdraft Damper	212.66	24.44
23 33	13 23-0120	EA	40" x 8" Horizontally Mounted Backdraft Damper	283.36	30.55
23 33	13 23-0121	EA	40" x 10" Horizontally Mounted Backdraft Damper	243.10	32.50
23 33	13 23-0122	EA	40" x 12" Horizontally Mounted Backdraft Damper	284.38	36.66
23 33	13 23-0123	EA	40" x 14" Horizontally Mounted Backdraft Damper	325.66	40.69
23 33	13 23-0124	EA	40" x 16" Horizontally Mounted Backdraft Damper	300.51	44.72
23 33	13 23-0125	EA	40" x 18" Horizontally Mounted Backdraft Damper	333.47	48.88
23 33	13 23-0126	EA	40" x 20" Horizontally Mounted Backdraft Damper	366.44	52.91
23 33	13 23-0127	EA	40" x 24" Horizontally Mounted Backdraft Damper	370.38	56.95
23 33	13 23-0128	EA	40" x 28" Horizontally Mounted Backdraft Damper	415.81	61.10
23 33	13 23-0129	EA	40" x 32" Horizontally Mounted Backdraft Damper	461.24	65.13
23 33	13 23-0130	EA	40" x 36" Horizontally Mounted Backdraft Damper	506.68	69.17
23 33	13 23-0131	EA	40" x 40" Horizontally Mounted Backdraft Damper	510.58	73.19
23 33	13 23-0132	EA	40" x 44" Horizontally Mounted Backdraft Damper	551.86	77.35
23 33	13 23-0133	EA	40" x 48" Horizontally Mounted Backdraft Damper	580.95	77.35
23 33	13 23-0134	EA	40" x 50" Horizontally Mounted Backdraft Damper	555.79	81.39
23 33	13 23-0135	EA	44" x 6" Horizontally Mounted Backdraft Damper	237.59	26.39
23 33	13 23-0136	EA	44" x 8" Horizontally Mounted Backdraft Damper	225.66	32.50
23 33	13 23-0137	EA	44" x 10" Horizontally Mounted Backdraft Damper	269.85	36.66
23 33	13 23-0138	EA	44" x 12" Horizontally Mounted Backdraft Damper	314.04	40.69
23 33	13 23-0139	EA	44" x 14" Horizontally Mounted Backdraft Damper	294.26	44.72
23 33	13 23-0140	EA	44" x 16" Horizontally Mounted Backdraft Damper	329.32	48.88
23 33	13 23-0141	EA	44" x 18" Horizontally Mounted Backdraft Damper	352.16	48.88
23 33	13 23-0142	EA	44" x 20" Horizontally Mounted Backdraft Damper	387.22	52.91
23 33	13 23-0143	EA	44" x 24" Horizontally Mounted Backdraft Damper	402.53	61.10
23 33	13 23-0144	EA	44" x 28" Horizontally Mounted Backdraft Damper	451.27	65.13
23 33	13 23-0145	EA	44" x 32" Horizontally Mounted Backdraft Damper	500.03	69.17
23 33	13 23-0146	EA	44" x 36" Horizontally Mounted Backdraft Damper	507.67	73.19
23 33	13 23-0147	EA	44" x 40" Horizontally Mounted Backdraft Damper	551.86	77.35
23 33	13 23-0148	EA	44" x 44" Horizontally Mounted Backdraft Damper	583.83	77.35
23 33	13 23-0149	EA	44" x 48" Horizontally Mounted Backdraft Damper	573.23	81.39
23 33	13 23-0150	EA	44" x 50" Horizontally Mounted Backdraft Damper	586.91	81.39
23 33	13 23-0151	EA	48" x 6" Horizontally Mounted Backdraft Damper	258.08	28.47
23 33	13 23-0152	EA	48" x 8" Horizontally Mounted Backdraft Damper	237.28	32.50
23 33	13 23-0153	EA	48" x 10" Horizontally Mounted Backdraft Damper	284.38	36.66
23 33	13 23-0154	EA	48" x 12" Horizontally Mounted Backdraft Damper	271.67	40.69
23 33	13 23-0155	EA	48" x 14" Horizontally Mounted Backdraft Damper	308.79	44.72
23 33	13 23-0156	EA	48" x 16" Horizontally Mounted Backdraft Damper	345.94	48.88
23 33	13 23-0157	EA	48" x 18" Horizontally Mounted Backdraft Damper	383.06	52.91
23 33	13 23-0158	EA	48" x 20" Horizontally Mounted Backdraft Damper	370.38	56.95
23 33	13 23-0159	EA	48" x 24" Horizontally Mounted Backdraft Damper	422.45	61.10
23 33	13 23-0160	EA	48" x 28" Horizontally Mounted Backdraft Damper	486.75	69.17
23 33	13 23-0161	EA	48" x 32" Horizontally Mounted Backdraft Damper	498.97	73.19
23 33	13 23-0162	EA	48" x 36" Horizontally Mounted Backdraft Damper	546.07	77.35
23 33	13 23-0163	EA	48" x 40" Horizontally Mounted Backdraft Damper	580.95	77.35
23 33	13 23-0164	EA	48" x 44" Horizontally Mounted Backdraft Damper	573.23	81.39
23 33	13 23-0165	EA	48" x 48" Horizontally Mounted Backdraft Damper	615.33	85.41
23 33	13 23-0166	EA	48" x 50" Horizontally Mounted Backdraft Damper	630.28	85.41
23 33	13 23-0167	EA	50" x 6" Horizontally Mounted Backdraft Damper	265.27	28.47
23 33	13 23-0168	EA	50" x 8" Horizontally Mounted Backdraft Damper	255.32	36.66
23 33	13 23-0169	EA	50" x 10" Horizontally Mounted Backdraft Damper	303.88	40.69
23 33	13 23-0170	EA	50" x 12" Horizontally Mounted Backdraft Damper	290.11	44.72
23 33	13 23-0171	EA	50" x 14" Horizontally Mounted Backdraft Damper	328.29	48.88
23 33	13 23-0172	EA	50" x 16" Horizontally Mounted Backdraft Damper	366.44	52.91
23 33	13 23-0173	EA	50" x 18" Horizontally Mounted Backdraft Damper	404.62	56.95
23 33	13 23-0174	EA	50" x 20" Horizontally Mounted Backdraft Damper	390.88	61.10
23 33	13 23-0175	EA	50" x 24" Horizontally Mounted Backdraft Damper	444.62	65.13
23 33	13 23-0176	EA	50" x 28" Horizontally Mounted Backdraft Damper	498.36	69.17
23 33	13 23-0177	EA	50" x 32" Horizontally Mounted Backdraft Damper	510.58	73.19
23 33	13 23-0178	EA	50" x 36" Horizontally Mounted Backdraft Damper	559.14	77.35
23 33	13 23-0179	EA	50" x 40" Horizontally Mounted Backdraft Damper	555.79	81.39
23 33	13 23-0180	EA	50" x 44" Horizontally Mounted Backdraft Damper	586.91	81.39
23 33	13 23-0181	EA	50" x 48" Horizontally Mounted Backdraft Damper	630.28	85.41
23 33	13 23-0182	EA	50" x 50" Horizontally Mounted Backdraft Damper	645.84	85.41

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 33 13 23-0183

Vertically Mounted Backdraft Damper (23 33 13 23)

Note: Galvanized steel frame, aluminum blades. Excludes motor pack.

23 33 13 23-0184	EA	6" x 6"	Vertically Mounted Backdraft Damper	115.36	13.57
23 33 13 23-0185	EA	8" x 6"	Vertically Mounted Backdraft Damper	142.10	14.17
23 33 13 23-0186	EA	10" x 6"	Vertically Mounted Backdraft Damper	146.50	14.29
23 33 13 23-0187	EA	8" x 8"	Vertically Mounted Backdraft Damper	153.41	14.29
23 33 13 23-0188	EA	12" x 6"	Vertically Mounted Backdraft Damper	168.48	14.67
23 33 13 23-0189	EA	10" x 8"	Vertically Mounted Backdraft Damper	187.19	16.26
23 33 13 23-0190	EA	14" x 6"	Vertically Mounted Backdraft Damper	189.22	14.67
23 33 13 23-0191	EA	12" x 8"	Vertically Mounted Backdraft Damper	214.85	16.26
23 33 13 23-0192	EA	16" x 6"	Vertically Mounted Backdraft Damper	217.29	17.11
23 33 13 23-0193	EA	10" x 10"	Vertically Mounted Backdraft Damper	227.87	18.33
23 33 13 23-0194	EA	18" x 6"	Vertically Mounted Backdraft Damper	182.92	15.52
23 33 13 23-0195	EA	14" x 8"	Vertically Mounted Backdraft Damper	192.87	17.11
23 33 13 23-0196	EA	12" x 10"	Vertically Mounted Backdraft Damper	206.64	18.33
23 33 13 23-0197	EA	20" x 6"	Vertically Mounted Backdraft Damper	212.75	20.40
23 33 13 23-0198	EA	16" x 8"	Vertically Mounted Backdraft Damper	228.96	22.36
23 33 13 23-0199	EA	14" x 10"	Vertically Mounted Backdraft Damper	225.80	16.26
23 33 13 23-0200	EA	12" x 12"	Vertically Mounted Backdraft Damper	236.97	18.33
23 33 13 23-0201	EA	18" x 8"	Vertically Mounted Backdraft Damper	205.96	20.40
23 33 13 23-0202	EA	24" x 6"	Vertically Mounted Backdraft Damper	205.96	20.40
23 33 13 23-0203	EA	16" x 10"	Vertically Mounted Backdraft Damper	228.14	22.36
23 33 13 23-0204	EA	20" x 8"	Vertically Mounted Backdraft Damper	234.25	24.44
23 33 13 23-0205	EA	14" x 12"	Vertically Mounted Backdraft Damper	220.29	17.11
23 33 13 23-0206	EA	28" x 6"	Vertically Mounted Backdraft Damper	223.96	18.33
23 33 13 23-0207	EA	18" x 10"	Vertically Mounted Backdraft Damper	242.14	20.40
23 33 13 23-0208	EA	16" x 12"	Vertically Mounted Backdraft Damper	260.32	22.36
23 33 13 23-0209	EA	24" x 8"	Vertically Mounted Backdraft Damper	266.43	24.44
23 33 13 23-0210	EA	32" x 6"	Vertically Mounted Backdraft Damper	272.53	26.39
23 33 13 23-0211	EA	14" x 14"	Vertically Mounted Backdraft Damper	288.79	30.55
23 33 13 23-0212	EA	20" x 10"	Vertically Mounted Backdraft Damper	284.96	32.50
23 33 13 23-0213	EA	18" x 12"	Vertically Mounted Backdraft Damper	312.16	36.66
23 33 13 23-0214	EA	36" x 6"	Vertically Mounted Backdraft Damper	257.17	18.33
23 33 13 23-0215	EA	16" x 14"	Vertically Mounted Backdraft Damper	270.77	20.40
23 33 13 23-0216	EA	28" x 8"	Vertically Mounted Backdraft Damper	276.88	22.36
23 33 13 23-0217	EA	20" x 12"	Vertically Mounted Backdraft Damper	297.95	24.44
23 33 13 23-0218	EA	24" x 10"	Vertically Mounted Backdraft Damper	304.05	26.39
23 33 13 23-0219	EA	40" x 6"	Vertically Mounted Backdraft Damper	310.16	28.47
23 33 13 23-0220	EA	18" x 14"	Vertically Mounted Backdraft Damper	333.64	32.50
23 33 13 23-0221	EA	16" x 16"	Vertically Mounted Backdraft Damper	337.37	32.50
23 33 13 23-0222	EA	32" x 8"	Vertically Mounted Backdraft Damper	349.59	36.66
23 33 13 23-0223	EA	44" x 6"	Vertically Mounted Backdraft Damper	369.30	40.69
23 33 13 23-0224	EA	20" x 14"	Vertically Mounted Backdraft Damper	396.50	44.72
23 33 13 23-0225	EA	28" x 10"	Vertically Mounted Backdraft Damper	408.72	48.88
23 33 13 23-0226	EA	18" x 16"	Vertically Mounted Backdraft Damper	330.68	20.40
23 33 13 23-0227	EA	24" x 12"	Vertically Mounted Backdraft Damper	336.79	22.36
23 33 13 23-0228	EA	36" x 8"	Vertically Mounted Backdraft Damper	342.90	24.44
23 33 13 23-0229	EA	48" x 6"	Vertically Mounted Backdraft Damper	349.00	26.39
23 33 13 23-0230	EA	50" x 6"	Vertically Mounted Backdraft Damper	372.44	30.55
23 33 13 23-0231	EA	20" x 16"	Vertically Mounted Backdraft Damper	397.27	32.50
23 33 13 23-0232	EA	32" x 10"	Vertically Mounted Backdraft Damper	409.49	36.66
23 33 13 23-0233	EA	40" x 8"	Vertically Mounted Backdraft Damper	409.49	36.66
23 33 13 23-0234	EA	18" x 18"	Vertically Mounted Backdraft Damper	361.81	40.69
23 33 13 23-0235	EA	24" x 14"	Vertically Mounted Backdraft Damper	340.76	44.72
23 33 13 23-0236	EA	28" x 12"	Vertically Mounted Backdraft Damper	352.98	48.88
23 33 13 23-0237	EA	44" x 8"	Vertically Mounted Backdraft Damper	375.02	52.91
23 33 13 23-0238	EA	18" x 20"	Vertically Mounted Backdraft Damper	392.16	56.95
23 33 13 23-0239	EA	20" x 18"	Vertically Mounted Backdraft Damper	404.38	61.10
23 33 13 23-0240	EA	36" x 10"	Vertically Mounted Backdraft Damper	404.38	61.10
23 33 13 23-0241	EA	24" x 16"	Vertically Mounted Backdraft Damper	296.92	20.40
23 33 13 23-0242	EA	32" x 12"	Vertically Mounted Backdraft Damper	303.03	22.36
23 33 13 23-0243	EA	48" x 8"	Vertically Mounted Backdraft Damper	315.24	26.39
23 33 13 23-0244	EA	28" x 14"	Vertically Mounted Backdraft Damper	332.37	30.55
23 33 13 23-0245	EA	20" x 20"	Vertically Mounted Backdraft Damper	343.41	32.50
23 33 13 23-0246	EA	40" x 10"	Vertically Mounted Backdraft Damper	355.63	36.66
23 33 13 23-0247	EA	50" x 8"	Vertically Mounted Backdraft Damper	367.85	40.69
23 33 13 23-0248	EA	18" x 24"	Vertically Mounted Backdraft Damper	387.50	40.69
23 33 13 23-0249	EA	24" x 18"	Vertically Mounted Backdraft Damper	399.72	44.72
23 33 13 23-0250	EA	36" x 12"	Vertically Mounted Backdraft Damper	411.94	48.88
23 33 13 23-0251	EA	44" x 10"	Vertically Mounted Backdraft Damper	429.07	52.91
23 33 13 23-0252	EA	28" x 16"	Vertically Mounted Backdraft Damper	458.43	61.10
23 33 13 23-0253	EA	32" x 14"	Vertically Mounted Backdraft Damper	458.43	61.10
23 33 13 23-0254	EA	20" x 24"	Vertically Mounted Backdraft Damper	492.76	65.13
23 33 13 23-0255	EA	24" x 20"	Vertically Mounted Backdraft Damper	459.72	69.17
23 33 13 23-0256	EA	40" x 12"	Vertically Mounted Backdraft Damper	459.72	69.17
23 33 13 23-0257	EA	48" x 10"	Vertically Mounted Backdraft Damper	471.94	73.19
23 33 13 23-0258	EA	50" x 10"	Vertically Mounted Backdraft Damper	482.44	73.19
23 33 13 23-0259	EA	28" x 18"	Vertically Mounted Backdraft Damper	331.78	22.36
23 33 13 23-0260	EA	36" x 14"	Vertically Mounted Backdraft Damper	343.99	26.39
23 33 13 23-0261	EA	32" x 16"	Vertically Mounted Backdraft Damper	354.32	28.47
23 33 13 23-0262	EA	44" x 12"	Vertically Mounted Backdraft Damper	374.92	32.50

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 33 13 23-0263	EA	20" x 28" Vertically Mounted Backdraft Damper		403.94	36.66
23 33 13 23-0264	EA	28" x 20" Vertically Mounted Backdraft Damper		416.16	40.69
23 33 13 23-0265	EA	40" x 14" Vertically Mounted Backdraft Damper		416.16	40.69
23 33 13 23-0266	EA	24" x 24" Vertically Mounted Backdraft Damper		436.78	44.72
23 33 13 23-0267	EA	32" x 18" Vertically Mounted Backdraft Damper		449.00	48.88
23 33 13 23-0268	EA	36" x 16" Vertically Mounted Backdraft Damper		461.22	52.91
23 33 13 23-0269	EA	48" x 12" Vertically Mounted Backdraft Damper		485.66	61.10
23 33 13 23-0270	EA	50" x 12" Vertically Mounted Backdraft Damper		498.28	61.10
23 33 13 23-0271	EA	44" x 14" Vertically Mounted Backdraft Damper		518.90	65.13
23 33 13 23-0272	EA	20" x 32" Vertically Mounted Backdraft Damper		543.71	69.17
23 33 13 23-0273	EA	32" x 20" Vertically Mounted Backdraft Damper		555.93	73.19
23 33 13 23-0274	EA	40" x 16" Vertically Mounted Backdraft Damper		555.93	73.19
23 33 13 23-0275	EA	36" x 18" Vertically Mounted Backdraft Damper		572.33	77.35
23 33 13 23-0276	EA	24" x 28" Vertically Mounted Backdraft Damper		587.04	77.35
23 33 13 23-0277	EA	28" x 24" Vertically Mounted Backdraft Damper		568.83	81.39
23 33 13 23-0278	EA	48" x 14" Vertically Mounted Backdraft Damper		568.83	81.39
23 33 13 23-0279	EA	50" x 14" Vertically Mounted Backdraft Damper		594.58	85.41
23 33 13 23-0280	EA	44" x 16" Vertically Mounted Backdraft Damper		407.09	22.36
23 33 13 23-0281	EA	20" x 36" Vertically Mounted Backdraft Damper		433.15	28.47
23 33 13 23-0282	EA	36" x 20" Vertically Mounted Backdraft Damper		445.38	32.50
23 33 13 23-0283	EA	40" x 18" Vertically Mounted Backdraft Damper		457.60	36.66
23 33 13 23-0284	EA	24" x 32" Vertically Mounted Backdraft Damper		492.99	40.69
23 33 13 23-0285	EA	32" x 24" Vertically Mounted Backdraft Damper		492.99	40.69
23 33 13 23-0286	EA	48" x 16" Vertically Mounted Backdraft Damper		505.21	44.72
23 33 13 23-0287	EA	28" x 28" Vertically Mounted Backdraft Damper		525.16	48.88
23 33 13 23-0288	EA	44" x 18" Vertically Mounted Backdraft Damper		541.23	52.91
23 33 13 23-0289	EA	40" x 20" Vertically Mounted Backdraft Damper		569.53	61.10
23 33 13 23-0290	EA	50" x 16" Vertically Mounted Backdraft Damper		569.53	61.10
23 33 13 23-0291	EA	24" x 36" Vertically Mounted Backdraft Damper		612.65	65.13
23 33 13 23-0292	EA	36" x 24" Vertically Mounted Backdraft Damper		624.87	69.17
23 33 13 23-0293	EA	48" x 18" Vertically Mounted Backdraft Damper		637.09	73.19
23 33 13 23-0294	EA	44" x 20" Vertically Mounted Backdraft Damper		657.05	77.35
23 33 13 23-0295	EA	28" x 32" Vertically Mounted Backdraft Damper		664.78	77.35
23 33 13 23-0296	EA	32" x 28" Vertically Mounted Backdraft Damper		676.99	81.39
23 33 13 23-0297	EA	50" x 18" Vertically Mounted Backdraft Damper		678.90	81.39
23 33 13 23-0298	EA	24" x 40" Vertically Mounted Backdraft Damper		720.09	85.41
23 33 13 23-0299	EA	40" x 24" Vertically Mounted Backdraft Damper		720.09	85.41
23 33 13 23-0300	EA	48" x 20" Vertically Mounted Backdraft Damper		720.09	85.41
23 33 13 23-0301	EA	50" x 20" Vertically Mounted Backdraft Damper		556.12	24.44
23 33 13 23-0302	EA	28" x 36" Vertically Mounted Backdraft Damper		578.29	30.55
23 33 13 23-0303	EA	36" x 28" Vertically Mounted Backdraft Damper		584.41	32.50
23 33 13 23-0304	EA	32" x 32" Vertically Mounted Backdraft Damper		604.36	36.66
23 33 13 23-0305	EA	24" x 44" Vertically Mounted Backdraft Damper		576.91	40.69
23 33 13 23-0306	EA	44" x 24" Vertically Mounted Backdraft Damper		589.13	44.72
23 33 13 23-0307	EA	28" x 40" Vertically Mounted Backdraft Damper		628.89	48.88
23 33 13 23-0308	EA	40" x 28" Vertically Mounted Backdraft Damper		641.11	52.91
23 33 13 23-0309	EA	24" x 48" Vertically Mounted Backdraft Damper		667.13	56.95
23 33 13 23-0310	EA	32" x 36" Vertically Mounted Backdraft Damper		679.35	61.10
23 33 13 23-0311	EA	36" x 32" Vertically Mounted Backdraft Damper		691.57	65.13
23 33 13 23-0312	EA	48" x 24" Vertically Mounted Backdraft Damper		703.79	69.17
23 33 13 23-0313	EA	50" x 24" Vertically Mounted Backdraft Damper		736.67	73.19
23 33 13 23-0314	EA	28" x 44" Vertically Mounted Backdraft Damper		762.66	77.35
23 33 13 23-0315	EA	44" x 28" Vertically Mounted Backdraft Damper		762.66	77.35
23 33 13 23-0316	EA	32" x 40" Vertically Mounted Backdraft Damper		795.55	81.39
23 33 13 23-0317	EA	40" x 32" Vertically Mounted Backdraft Damper		630.58	26.39
23 33 13 23-0318	EA	36" x 36" Vertically Mounted Backdraft Damper		655.81	32.50
23 33 13 23-0319	EA	28" x 48" Vertically Mounted Backdraft Damper		688.68	36.66
23 33 13 23-0320	EA	48" x 28" Vertically Mounted Backdraft Damper		700.90	40.69
23 33 13 23-0321	EA	50" x 28" Vertically Mounted Backdraft Damper		737.23	44.72
23 33 13 23-0322	EA	32" x 44" Vertically Mounted Backdraft Damper		752.91	48.88
23 33 13 23-0323	EA	44" x 32" Vertically Mounted Backdraft Damper		752.91	48.88
23 33 13 23-0324	EA	36" x 40" Vertically Mounted Backdraft Damper		780.63	52.91
23 33 13 23-0325	EA	40" x 36" Vertically Mounted Backdraft Damper		741.35	61.10
23 33 13 23-0326	EA	28" x 52" Vertically Mounted Backdraft Damper		759.75	65.13
23 33 13 23-0327	EA	32" x 48" Vertically Mounted Backdraft Damper		802.97	69.17
23 33 13 23-0328	EA	48" x 32" Vertically Mounted Backdraft Damper		815.19	73.19
23 33 13 23-0329	EA	28" x 56" Vertically Mounted Backdraft Damper		839.82	77.35
23 33 13 23-0330	EA	36" x 44" Vertically Mounted Backdraft Damper		846.03	77.35
23 33 13 23-0331	EA	44" x 36" Vertically Mounted Backdraft Damper		858.24	81.39
23 33 13 23-0332	EA	40" x 40" Vertically Mounted Backdraft Damper		864.43	81.39
23 33 13 23-0333	EA	50" x 32" Vertically Mounted Backdraft Damper		705.57	28.47
23 33 13 23-0334	EA	32" x 52" Vertically Mounted Backdraft Damper		742.61	32.50
23 33 13 23-0335	EA	28" x 60" Vertically Mounted Backdraft Damper		761.02	36.66
23 33 13 23-0336	EA	36" x 48" Vertically Mounted Backdraft Damper		791.86	40.69
23 33 13 23-0337	EA	48" x 36" Vertically Mounted Backdraft Damper		804.08	44.72
23 33 13 23-0338	EA	40" x 44" Vertically Mounted Backdraft Damper		828.71	48.88
23 33 13 23-0339	EA	44" x 40" Vertically Mounted Backdraft Damper		840.93	52.91
23 33 13 23-0340	EA	32" x 56" Vertically Mounted Backdraft Damper		865.52	56.95
23 33 13 23-0341	EA	50" x 36" Vertically Mounted Backdraft Damper		803.34	61.10
23 33 13 23-0342	EA	36" x 52" Vertically Mounted Backdraft Damper		852.59	69.17
23 33 13 23-0343	EA	32" x 60" Vertically Mounted Backdraft Damper		881.34	73.19



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 13 23-0344 EA 40" x 48" Vertically Mounted Backdraft Damper	893.56	77.35
23 33 13 23-0345 EA 48" x 40" Vertically Mounted Backdraft Damper	893.56	77.35
23 33 13 23-0346 EA 44" x 44" Vertically Mounted Backdraft Damper	911.29	81.39
23 33 13 23-0347 EA 40" x 50" Vertically Mounted Backdraft Damper	945.56	85.41
23 33 13 23-0348 EA 50" x 40" Vertically Mounted Backdraft Damper	945.56	85.41
23 33 13 23-0349 EA 36" x 56" Vertically Mounted Backdraft Damper	779.97	28.47
23 33 13 23-0350 EA 32" x 64" Vertically Mounted Backdraft Damper	815.46	36.66
23 33 13 23-0351 EA 44" x 48" Vertically Mounted Backdraft Damper	849.73	40.69
23 33 13 23-0352 EA 48" x 44" Vertically Mounted Backdraft Damper	861.95	44.72
23 33 13 23-0353 EA 36" x 60" Vertically Mounted Backdraft Damper	890.70	48.88
23 33 13 23-0354 EA 32" x 68" Vertically Mounted Backdraft Damper	908.44	52.91
23 33 13 23-0355 EA 44" x 50" Vertically Mounted Backdraft Damper	834.19	56.95
23 33 13 23-0356 EA 50" x 44" Vertically Mounted Backdraft Damper	846.41	61.10
23 33 13 23-0357 EA 32" x 72" Vertically Mounted Backdraft Damper	889.96	65.13
23 33 13 23-0358 EA 36" x 64" Vertically Mounted Backdraft Damper	902.18	69.17
23 33 13 23-0359 EA 48" x 48" Vertically Mounted Backdraft Damper	914.40	73.19
23 33 13 23-0360 EA 48" x 50" Vertically Mounted Backdraft Damper	955.56	77.35
23 33 13 23-0361 EA 50" x 48" Vertically Mounted Backdraft Damper	967.77	81.39
23 33 13 23-0362 EA 36" x 68" Vertically Mounted Backdraft Damper	982.24	81.39
23 33 13 23-0363 EA 50" x 50" Vertically Mounted Backdraft Damper	1,010.14	85.41
23 33 13 23-0364 EA 36" x 72" Vertically Mounted Backdraft Damper	1,037.86	85.41
23 33 13 23-0365 Backdraft Damper Accessories (23 33 13 23)		
23 33 13 23-0366 EA For Motor Pack For Horizontally Mounted Backdraft Damper	282.65	30.62
23 33 13 23-0367 EA For Motor Pack For Vertically Mounted Backdraft Damper	485.86	30.62
23 33 13 33 Splitter Damper Hardware (23 33 13)		
23 33 13 33-0001 EA Splitter Damper, Hardware	43.64	8.54
23 33 13 43 Blower Check Valve (23 33 13)		
23 33 13 43-0001 Blower Check Valves With Silicone Seals (23 33 13 43)		
23 33 13 43-0002 EA 2-1/2" Blower Check Valves, Silicone Seals	288.03	31.52
23 33 13 43-0003 EA 3" Blower Check Valves, Silicone Seals	321.56	35.92
23 33 13 43-0004 EA 4" Blower Check Valves, Silicone Seals	412.90	47.66
23 33 13 43-0005 EA 5" Blower Check Valves, Silicone Seals	571.35	54.99
23 33 13 43-0006 EA 6" Blower Check Valves, Silicone Seals	639.84	65.99
23 33 13 43-0007 EA 8" Blower Check Valves, Silicone Seals	954.82	83.58
23 33 13 43-0008 Blower Check Valves With Viton Seats (23 33 13 43)		
23 33 13 43-0009 EA 2-1/2" Blower Check Valves, Viton Seats	399.23	31.52
23 33 13 43-0010 EA 3" Blower Check Valves, Viton Seats	453.72	35.92
23 33 13 43-0011 EA 4" Blower Check Valves, Viton Seats	504.92	47.66
23 33 13 43-0012 EA 5" Blower Check Valves, Viton Seats	709.11	54.99
23 33 13 43-0013 EA 6" Blower Check Valves, Viton Seats	791.91	65.99
23 33 13 43-0014 EA 8" Blower Check Valves, Viton Seats	1,223.84	83.58
23 33 19 Duct Silencers (23 33)		
23 33 19 00-0001 36" Long Packaged Duct Sound Trap (23 33 19)		
23 33 19 00-0002 EA 12" x 12" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	383.15	50.01
23 33 19 00-0003 EA 12" x 18" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	461.37	57.33
23 33 19 00-0004 EA 12" x 24" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	601.61	65.87
23 33 19 00-0005 EA 12" x 36" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	733.88	74.41
23 33 19 00-0006 EA 24" x 18" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	677.17	74.41
23 33 19 00-0007 EA 24" x 24" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	870.98	78.06
23 33 19 00-0008 EA 24" x 30" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	963.42	82.94
23 33 19 00-0009 EA 24" x 36" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	1,058.30	87.82
23 33 19 00-0010 EA 24" x 48" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	1,393.73	100.01
23 33 19 00-0011 EA 36" x 18" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	863.29	82.94
23 33 19 00-0012 EA 36" x 36" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	1,170.12	100.01
23 33 19 00-0013 EA 36" x 48" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	2,087.38	134.16
23 33 19 00-0014 EA 36" x 60" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	2,311.75	141.48
23 33 19 00-0015 EA 48" x 48" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	2,582.27	152.46
23 33 19 00-0016 EA 48" x 60" x 36" Long, Packaged Duct Sound Trap, Sound Attenuator	2,901.36	165.88
23 33 19 00-0017 60" Long Packaged Duct Sound Trap (23 33 19)		
23 33 19 00-0018 EA 12" x 12" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	428.13	109.78
23 33 19 00-0019 EA 12" x 18" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	516.97	126.85
23 33 19 00-0020 EA 12" x 24" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	675.78	146.36
23 33 19 00-0021 EA 12" x 36" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	824.50	164.66
23 33 19 00-0022 EA 24" x 18" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	760.03	164.66
23 33 19 00-0023 EA 24" x 24" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	981.84	174.41
23 33 19 00-0024 EA 24" x 30" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator	1,082.70	182.95

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 33 19 00-0025	EA	24" x 36" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,185.40	192.71
23 33 19 00-0026	EA	24" x 48" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,569.26	219.54
23 33 19 00-0027	EA	36" x 18" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	968.92	182.95
23 33 19 00-0028	EA	36" x 36" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,315.16	219.54
23 33 19 00-0029	EA	36" x 48" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	2,341.27	289.06
23 33 19 00-0030	EA	36" x 60" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	2,614.55	313.46
23 33 19 00-0031	EA	48" x 48" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	2,906.67	332.97
23 33 19 00-0032	EA	48" x 60" x 60" Long, Packaged Duct Sound Trap, Sound Attenuator.....	3,272.82	365.91

23 33 19 00-0033 84" Long Packaged Duct Sound Trap (23 33 19)

23 33 19 00-0034	EA	6" x 12" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	368.78	91.47
23 33 19 00-0035	EA	6" x 24" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	634.71	136.61
23 33 19 00-0036	EA	6" x 36" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	884.62	200.03
23 33 19 00-0037	EA	12" x 12" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	500.19	109.78
23 33 19 00-0038	EA	12" x 18" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	623.16	126.85
23 33 19 00-0039	EA	12" x 24" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	850.23	146.36
23 33 19 00-0040	EA	12" x 30" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,007.67	157.34
23 33 19 00-0041	EA	12" x 36" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,100.05	169.53
23 33 19 00-0042	EA	12" x 42" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,389.90	182.95
23 33 19 00-0043	EA	12" x 48" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,646.92	200.03
23 33 19 00-0044	EA	24" x 18" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	940.76	169.53
23 33 19 00-0045	EA	24" x 24" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,351.54	176.85
23 33 19 00-0046	EA	24" x 30" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,477.13	182.95
23 33 19 00-0047	EA	24" x 36" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	1,610.16	192.71
23 33 19 00-0048	EA	24" x 42" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	2,026.06	207.35
23 33 19 00-0049	EA	24" x 48" x 84" Long, Packaged Duct Sound Trap, Sound Attenuator.....	2,198.82	219.54

23 33 23 Turning Vanes (23 33)**23 33 23 00-0001 Duct Turning Vane Components (23 33 23)**

23 33 23 00-0002	LF	Duct Turning Vane Rail.....	13.35	3.05
		<i>For Stainless Steel, Add</i>	9.14	
23 33 23 00-0003	LF	Double Thick Factory Fabricated, Duct Turning Vane.....	13.12	1.22
		<i>For Stainless Steel, Add</i>	13.77	

23 33 23 00-0004 Duct Turning Vane Sets (23 33 23)

Note: Measured from inside corner to outside corner of ductwork.

23 33 23 00-0005	LF	12" High Duct Turning Vanes, Sets.....	54.37	4.57
		<i>For Stainless Steel, Add</i>	63.25	
23 33 23 00-0006	LF	14" High Duct Turning Vanes, Sets.....	67.63	4.88
		<i>For Stainless Steel, Add</i>	79.99	
23 33 23 00-0007	LF	16" High Duct Turning Vanes, Sets.....	92.60	5.12
		<i>For Stainless Steel, Add</i>	112.00	
23 33 23 00-0008	LF	18" High Duct Turning Vanes, Sets.....	117.63	5.49
		<i>For Stainless Steel, Add</i>	144.00	
23 33 23 00-0009	LF	20" High Duct Turning Vanes, Sets.....	130.39	5.85
		<i>For Stainless Steel, Add</i>	159.99	
23 33 23 00-0010	LF	22" High Duct Turning Vanes, Sets.....	166.86	5.49
		<i>For Stainless Steel, Add</i>	208.01	
23 33 23 00-0011	LF	24" High Duct Turning Vanes, Sets.....	205.08	6.46
		<i>For Stainless Steel, Add</i>	256.02	
23 33 23 00-0012	LF	26" High Duct Turning Vanes, Sets.....	220.21	6.76
		<i>For Stainless Steel, Add</i>	275.29	
23 33 23 00-0013	LF	30" High Duct Turning Vanes, Sets.....	245.95	7.03
		<i>For Stainless Steel, Add</i>	308.32	

23 33 33 Duct-Mounting Access Doors (23 33)**23 33 33 00-0001 Duct Access Doors, Insulated Factory Fabrication (23 33 33)**

23 33 33 00-0002	EA	6" x 6" Duct Access Doors Insulated Factory Fabrication.....	96.97	17.08
		<i>For Stainless Steel, Add</i>	56.72	
23 33 33 00-0003	EA	10" x 10" Duct Access Doors Insulated Factory Fabrication.....	102.92	17.08
		<i>For Stainless Steel, Add</i>	68.62	
23 33 33 00-0004	EA	12" x 12" Duct Access Doors Insulated Factory Fabrication.....	105.83	17.08
		<i>For Stainless Steel, Add</i>	74.44	
23 33 33 00-0005	EA	12" x 18" Duct Access Doors Insulated Factory Fabrication.....	136.93	20.73
		<i>For Stainless Steel, Add</i>	104.98	
23 33 33 00-0006	EA	16" x 12" Duct Access Doors Insulated Factory Fabrication.....	138.11	20.73
		<i>For Stainless Steel, Add</i>	107.34	
23 33 33 00-0007	EA	18" x 18" Duct Access Doors Insulated Factory Fabrication.....	171.55	28.05
		<i>For Stainless Steel, Add</i>	123.54	
23 33 33 00-0008	EA	24" x 18" Duct Access Doors Insulated Factory Fabrication.....	203.72	34.15
		<i>For Stainless Steel, Add</i>	133.02	
23 33 33 00-0009	EA	24" x 24" Duct Access Doors Insulated Factory Fabrication.....	264.62	46.34
		<i>For Stainless Steel, Add</i>	163.34	

23 33 43 Flexible Connectors (23 33)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 33 43 00-0001 LF 6-1/2" Width, Galvanized Steel, Flexible Duct Connector	15.53	3.65
23 33 43 00-0002 LF 5-3/4" Width, Vinyl/Steel, Flexible Duct Connector	15.96	3.29
23 33 46 Flexible Ducts <small>(23 33)</small>		
23 33 46 00-0001 Flexible Duct, R8.0 Insulated With Metallized Outer Jacket <small>(23 33 46)</small>		
Note: Polyester inner liner encapsulating a corrosion resistant steel wire helix, supporting a blanket of fiberglass insulation over a fiberglass scrim and a bi-directional reinforced metallized outer vapor barrier jacket.		
23 33 46 00-0002 LF 4" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	9.28	1.22
For R6.0 Insulated Flexible Duct, Deduct		-1.07
For R4.2 Insulated Flexible Duct, Deduct		-1.24
23 33 46 00-0003 LF 5" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	10.22	2.44
For R6.0 Insulated Flexible Duct, Deduct		-1.13
For R4.2 Insulated Flexible Duct, Deduct		-1.32
23 33 46 00-0004 LF 6" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	11.40	2.44
For R6.0 Insulated Flexible Duct, Deduct		-1.15
For R4.2 Insulated Flexible Duct, Deduct		-1.34
23 33 46 00-0005 LF 7" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	13.19	2.44
For R6.0 Insulated Flexible Duct, Deduct		-1.29
For R4.2 Insulated Flexible Duct, Deduct		-1.50
23 33 46 00-0006 LF 8" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	15.30	3.65
For R6.0 Insulated Flexible Duct, Deduct		-1.30
For R4.2 Insulated Flexible Duct, Deduct		-1.52
23 33 46 00-0007 LF 10" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	19.85	3.65
For R6.0 Insulated Flexible Duct, Deduct		-1.75
For R4.2 Insulated Flexible Duct, Deduct		-2.04
23 33 46 00-0008 LF 12" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	26.44	4.88
For R6.0 Insulated Flexible Duct, Deduct		-2.08
For R4.2 Insulated Flexible Duct, Deduct		-2.43
23 33 46 00-0009 LF 14" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	32.86	4.88
For R6.0 Insulated Flexible Duct, Deduct		-2.54
For R4.2 Insulated Flexible Duct, Deduct		-2.96
23 33 46 00-0010 LF 16" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	42.67	6.10
For R6.0 Insulated Flexible Duct, Deduct		-3.03
For R4.2 Insulated Flexible Duct, Deduct		-3.54
23 33 46 00-0011 LF 18" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	52.20	7.92
For R6.0 Insulated Flexible Duct, Deduct		-3.95
For R4.2 Insulated Flexible Duct, Deduct		-4.61
23 33 46 00-0012 LF 20" Diameter Flexible Duct, R8.0 Insulated With Polyester Inner Liner Over Fiberglass Insulation And Metallized Outer Jacket	62.54	8.54
For R6.0 Insulated Flexible Duct, Deduct		-5.96
For R4.2 Insulated Flexible Duct, Deduct		-6.95
23 33 46 00-0013 Collars, Sheet Metal Spin-In Type With Damper <small>(23 33 46)</small>		
23 33 46 00-0014 EA Up To 4" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	51.75	7.32
For Stainless Steel, Add		31.59
23 33 46 00-0015 EA 5" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	55.98	8.54
For Stainless Steel, Add		32.01
23 33 46 00-0016 EA 6" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	63.74	8.54
For Stainless Steel, Add		35.30
23 33 46 00-0017 EA 7" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	71.93	10.97
For Stainless Steel, Add		36.43
23 33 46 00-0018 EA 8" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	86.53	13.42
For Stainless Steel, Add		41.15
23 33 46 00-0019 EA 10" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	101.75	15.86
For Stainless Steel, Add		50.73
23 33 46 00-0020 EA 12" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	115.22	18.29
For Stainless Steel, Add		54.65
23 33 46 00-0021 EA 14" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	136.80	20.73
For Stainless Steel, Add		68.43
23 33 46 00-0022 EA 16" Diameter Flexible Duct Collar, Spin In Type, Sheet Metal, With Damper	149.06	23.18
For Stainless Steel, Add		74.87
23 33 53 Duct Liners <small>(23 33)</small>		
23 33 53 00-0001 Fiberglass Duct Liner Board, Rigid, Acoustical Insulation <small>(23 33 53)</small>		
23 33 53 00-0002 SF 1/2" Field Installed, 3 LB/CF, Fiberglass Duct Liner Board	12.98	3.22
23 33 53 00-0003 SF 3/4" Field Installed, 3 LB/CF, Fiberglass Duct Liner Board	14.16	3.22
23 33 53 00-0004 SF 1" Field Installed, 3 LB/CF, Fiberglass Duct Liner Board	15.78	4.30
23 33 53 00-0005 SF 1-1/2" Field Installed, 3 LB/CF, Fiberglass Duct Liner Board	19.39	4.30
23 33 53 00-0006 SF 2" Field Installed, 3 LB/CF, Fiberglass Duct Liner Board	23.39	4.84
23 33 53 00-0007 SF 1/2" Shop Installed, 3 LB/CF, Fiberglass Duct Liner Board	12.85	3.65

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 33 Air Duct Accessories**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 33 53 00-0008	SF	3/4" Shop Installed, 3 LB/CF, Fiberglass Duct Liner Board	14.03	3.65
23 33 53 00-0009	SF	1" Shop Installed, 3 LB/CF, Fiberglass Duct Liner Board	15.67	4.88
23 33 53 00-0010	SF	1-1/2" Shop Installed, 3 LB/CF, Fiberglass Duct Liner Board	19.14	4.88
23 33 53 00-0011	SF	2" Shop Installed, 3 LB/CF, Fiberglass Duct Liner Board	23.18	5.49
23 33 53 00-0012		Fiberglass Duct Liner Blanket, Flexible, Acoustical Insulation (23 33 53)		
23 33 53 00-0013	SF	1", R3.8, 1.5 LB/CF, T150, Fiberglass Duct Liner Blanket	4.08	3.29
23 33 53 00-0014	SF	1", R4.1, 2 LB/CF, T200, Fiberglass Duct Liner Blanket	4.80	3.29
23 33 53 00-0015	SF	1", R4.3, 3 LB/CF, T300, Fiberglass Duct Liner Blanket	6.32	3.29
23 33 53 00-0016	SF	1-1/2", T150, 1.5 LB/CF, Fiberglass Duct Liner Blanket	5.18	3.65
23 33 53 00-0017	SF	2", R7.7, 1.5 LB/CF, T150 Fiberglass Duct Liner Blanket	5.49	4.03
23 33 53 00-0018	SF	2", R8, 2 LB/CF, T200 Fiberglass Duct Liner Blanket	8.77	4.03
23 33 56		Duct Air Extractors (23 33)		
23 33 56 00-0001	EA	12" x 4" Duct Air Extractor	61.53	20.13
		<i>For Stainless Steel, Add</i>	27.66	
23 33 56 00-0002	EA	8" x 6" Duct Air Extractor	65.19	21.96
		<i>For Stainless Steel, Add</i>	27.66	
23 33 56 00-0003	EA	12" x 6" Duct Air Extractor	75.78	23.18
		<i>For Stainless Steel, Add</i>	38.27	
23 33 56 00-0004	EA	16" x 6" Duct Air Extractor	86.13	24.40
		<i>For Stainless Steel, Add</i>	48.54	
23 33 56 00-0005	EA	24" x 6" Duct Air Extractor	115.32	26.83
		<i>For Stainless Steel, Add</i>	80.16	
23 33 56 00-0006	EA	12" x 8" Duct Air Extractor	81.79	24.40
		<i>For Stainless Steel, Add</i>	42.90	
23 33 56 00-0007	EA	20" x 8" Duct Air Extractor	108.74	30.49
		<i>For Stainless Steel, Add</i>	62.09	
23 33 56 00-0008	EA	18" x 10" Duct Air Extractor	116.41	34.76
		<i>For Stainless Steel, Add</i>	60.96	
23 33 56 00-0009	EA	24" x 10" Duct Air Extractor	142.51	40.85
		<i>For Stainless Steel, Add</i>	79.03	
23 33 56 00-0010	EA	24" x 12" Duct Air Extractor	162.70	48.79
		<i>For Stainless Steel, Add</i>	84.67	
23 33 56 00-0011	EA	30" x 12" Duct Air Extractor	203.60	60.98
		<i>For Stainless Steel, Add</i>	106.12	
23 33 59		Duct Pressure Relief Doors (23 33)		
23 33 59 00-0001		Duct Pressure Relief Doors (23 33 59)		
23 33 59 00-0002	EA	18" x 18" Duct Pressure Relief Door (Ruskin PRD18)	1,244.08	36.59
23 33 59 00-0003	EA	24" x 10" Duct Pressure Relief Door (Ruskin PRD18)	1,022.10	30.49
23 33 59 00-0004	EA	24" x 12" Duct Pressure Relief Door (Ruskin PRD18)	1,012.34	33.54
23 34		HVAC Fans (23 30)		
23 34 13		Axial HVAC Fans (23 34)		
23 34 13 00-0001		Tube-Axial Fans (23 34 13)		
23 34 13 00-0002		Direct Drive Tube-Axial Duct Fans (23 34 13 00-0001)		
23 34 13 00-0003	EA	12" Direct Drive Axial Flow Fan, 1/6 HP 1,060 CFM Constant Speed, 1/8" Static Pressure	1,910.13	374.78
		<i>For 1/4" Static Pressure, Add</i>	92.79	
		<i>For 3/8" Static Pressure, Add</i>	185.57	
		<i>For 1/2" Static Pressure, Add</i>	255.16	
23 34 13 00-0004	EA	12" Direct Drive Axial Flow Fan, 1/2 HP 2,095 CFM Constant Speed, 1/8" Static Pressure	1,992.97	375.90
		<i>For 1/4" Static Pressure, Add</i>	99.41	
		<i>For 3/8" Static Pressure, Add</i>	198.83	
		<i>For 1/2" Static Pressure, Add</i>	273.39	
23 34 13 00-0005	EA	16" Direct Drive Axial Flow Fan, 1/3 HP 2,490 CFM Constant Speed, 1/8" Static Pressure	2,158.66	374.78
		<i>For 1/4" Static Pressure, Add</i>	112.67	
		<i>For 3/8" Static Pressure, Add</i>	225.34	
		<i>For 1/2" Static Pressure, Add</i>	309.84	
23 34 13 00-0006	EA	20" Direct Drive Axial Flow Fan, 3/4 HP 4,130 CFM Constant Speed, 1/8" Static Pressure	2,324.35	375.90
		<i>For 1/4" Static Pressure, Add</i>	125.92	
		<i>For 3/8" Static Pressure, Add</i>	251.85	
		<i>For 1/2" Static Pressure, Add</i>	346.29	
23 34 13 00-0007	EA	22" Direct Drive Axial Flow Fan, 3/4 HP 4,700 CFM Constant Speed, 1/8" Static Pressure	2,722.94	450.19
		<i>For 1/4" Static Pressure, Add</i>	145.81	
		<i>For 3/8" Static Pressure, Add</i>	291.61	
		<i>For 1/2" Static Pressure, Add</i>	400.97	
23 34 13 00-0008	EA	24" Direct Drive Axial Flow Fan, 1 HP 5,850 CFM Constant Speed, 1/8" Static Pressure	3,132.61	489.58
		<i>For 1/4" Static Pressure, Add</i>	172.32	
		<i>For 3/8" Static Pressure, Add</i>	344.63	
		<i>For 1/2" Static Pressure, Add</i>	473.87	
23 34 13 00-0009	EA	24" Direct Drive Axial Flow Fan, 1-1/2 HP 7,925 CFM Constant Speed, 1/8" Static Pressure	3,308.66	535.72
		<i>For 1/4" Static Pressure, Add</i>	178.94	
		<i>For 3/8" Static Pressure, Add</i>	357.89	
		<i>For 1/2" Static Pressure, Add</i>	492.09	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 13 00-0010 EA 30" Direct Drive Axial Flow Fan, 1 HP 10,640 CFM Constant Speed, 1/8" Static Pressure.....	3,776.48	562.73
<i>For 1/4" Static Pressure, Add</i>	212.08	
<i>For 3/8" Static Pressure, Add</i>	424.16	
<i>For 1/2" Static Pressure, Add</i>	583.22	
23 34 13 00-0011 EA 30" Direct Drive Axial Flow Fan, 2-1/2 HP 14,765 CFM Constant Speed, 1/8" Static Pressure.....	4,554.90	703.41
<i>For 1/4" Static Pressure, Add</i>	251.85	
<i>For 3/8" Static Pressure, Add</i>	503.69	
<i>For 1/2" Static Pressure, Add</i>	692.58	
23 34 13 00-0012 EA 36" Direct Drive Axial Flow Fan, 2 HP 16,780 CFM Constant Speed, 1/8" Static Pressure.....	5,145.76	750.68
<i>For 1/4" Static Pressure, Add</i>	291.61	
<i>For 3/8" Static Pressure, Add</i>	583.22	
<i>For 1/2" Static Pressure, Add</i>	801.93	
23 34 13 00-0013 EA 36" Direct Drive Axial Flow Fan, 5 HP 22,920 CFM Constant Speed, 1/8" Static Pressure.....	6,039.38	865.48
<i>For 1/4" Static Pressure, Add</i>	344.63	
<i>For 3/8" Static Pressure, Add</i>	689.26	
<i>For 1/2" Static Pressure, Add</i>	947.74	
23 34 13 00-0014 Belt Drive Tube-Axial Duct Fans (23 34 13 00-0001)		
23 34 13 00-0015 EA 15" Belt Drive Axial Flow Fan, 1/3 HP 2,800 CFM Constant Speed, 1/8" Static Pressure.....	1,811.16	363.53
<i>For 1/4" Static Pressure, Add</i>	86.80	
<i>For 3/8" Static Pressure, Add</i>	173.61	
<i>For 1/2" Static Pressure, Add</i>	238.71	
23 34 13 00-0016 EA 15" Belt Drive Axial Flow Fan, 1/2 HP 3,400 CFM Constant Speed, 1/8" Static Pressure.....	1,921.03	375.90
<i>For 1/4" Static Pressure, Add</i>	93.66	
<i>For 3/8" Static Pressure, Add</i>	187.32	
<i>For 1/2" Static Pressure, Add</i>	257.56	
23 34 13 00-0017 EA 18" Belt Drive Axial Flow Fan, 1/3 HP 3,280 CFM Constant Speed, 1/8" Static Pressure.....	1,984.96	388.28
<i>For 1/4" Static Pressure, Add</i>	96.70	
<i>For 3/8" Static Pressure, Add</i>	193.41	
<i>For 1/2" Static Pressure, Add</i>	265.93	
23 34 13 00-0018 EA 18" Belt Drive Axial Flow Fan, 1/2 HP 3,900 CFM Constant Speed, 1/8" Static Pressure.....	2,101.52	401.79
<i>For 1/4" Static Pressure, Add</i>	103.81	
<i>For 3/8" Static Pressure, Add</i>	207.62	
<i>For 1/2" Static Pressure, Add</i>	285.48	
23 34 13 00-0019 EA 18" Belt Drive Axial Flow Fan, 1 HP 5,250 CFM Constant Speed, 1/8" Static Pressure.....	2,372.42	417.54
<i>For 1/4" Static Pressure, Add</i>	123.10	
<i>For 3/8" Static Pressure, Add</i>	246.20	
<i>For 1/2" Static Pressure, Add</i>	338.53	
23 34 13 00-0020 EA 24" Belt Drive Axial Flow Fan, 1/2 HP 4,800 CFM Constant Speed, 1/8" Static Pressure.....	2,502.83	433.30
<i>For 1/4" Static Pressure, Add</i>	130.97	
<i>For 3/8" Static Pressure, Add</i>	261.94	
<i>For 1/2" Static Pressure, Add</i>	360.16	
23 34 13 00-0021 EA 24" Belt Drive Axial Flow Fan, 1 HP 6,430 CFM Constant Speed, 1/8" Static Pressure.....	2,803.97	450.19
<i>For 1/4" Static Pressure, Add</i>	152.29	
<i>For 3/8" Static Pressure, Add</i>	304.58	
<i>For 1/2" Static Pressure, Add</i>	418.79	
23 34 13 00-0022 EA 24" Belt Drive Axial Flow Fan, 2 HP 8,860 CFM Constant Speed, 1/8" Static Pressure.....	3,167.01	450.19
<i>For 1/4" Static Pressure, Add</i>	181.45	
<i>For 3/8" Static Pressure, Add</i>	362.89	
<i>For 1/2" Static Pressure, Add</i>	498.98	
23 34 13 00-0023 EA 30" Belt Drive Axial Flow Fan, 1 HP 9,250 CFM Constant Speed, 1/8" Static Pressure.....	3,673.73	489.58
<i>For 1/4" Static Pressure, Add</i>	215.74	
<i>For 3/8" Static Pressure, Add</i>	431.48	
<i>For 1/2" Static Pressure, Add</i>	593.29	
23 34 13 00-0024 EA 30" Belt Drive Axial Flow Fan, 5 HP 16,900 CFM Constant Speed, 1/8" Static Pressure.....	4,354.87	593.12
<i>For 1/4" Static Pressure, Add</i>	253.81	
<i>For 3/8" Static Pressure, Add</i>	507.63	
<i>For 1/2" Static Pressure, Add</i>	697.99	
23 34 13 00-0025 EA 30" Belt Drive Axial Flow Fan, 5 HP 16,150 CFM Constant Speed, 1/8" Static Pressure.....	4,967.33	593.12
<i>For 1/4" Static Pressure, Add</i>	302.41	
<i>For 3/8" Static Pressure, Add</i>	604.82	
<i>For 1/2" Static Pressure, Add</i>	831.63	
23 34 13 00-0026 EA 36" Belt Drive Axial Flow Fan, 3/4 HP 8,090 CFM Constant Speed, 1/8" Static Pressure.....	5,471.31	625.75
<i>For 1/4" Static Pressure, Add</i>	337.66	
<i>For 3/8" Static Pressure, Add</i>	675.33	
<i>For 1/2" Static Pressure, Add</i>	928.58	
23 34 13 00-0027 EA 36" Belt Drive Axial Flow Fan, 2 HP 14,475 CFM Constant Speed, 1/8" Static Pressure.....	5,978.39	661.77
<i>For 1/4" Static Pressure, Add</i>	372.60	
<i>For 3/8" Static Pressure, Add</i>	745.19	
<i>For 1/2" Static Pressure, Add</i>	1,024.64	
23 34 13 00-0028 EA 36" Belt Drive Axial Flow Fan, 7-1/2 HP 14,475 CFM Constant Speed, 1/8" Static Pressure.....	6,802.44	865.48
<i>For 1/4" Static Pressure, Add</i>	406.10	
<i>For 3/8" Static Pressure, Add</i>	812.20	
<i>For 1/2" Static Pressure, Add</i>	1,116.78	
23 34 13 00-0029 EA 36" Belt Drive Axial Flow Fan, 5 HP 20,080 CFM Constant Speed, 1/8" Static Pressure.....	7,774.39	866.60
<i>For 1/4" Static Pressure, Add</i>	483.86	
<i>For 3/8" Static Pressure, Add</i>	967.72	
<i>For 1/2" Static Pressure, Add</i>	1,330.61	
23 34 13 00-0030 EA 42" Belt Drive Axial Flow Fan, 7-1/2 HP 29,000 CFM Constant Speed, 1/8" Static Pressure.....	8,777.83	1,022.81
<i>For 1/4" Static Pressure, Add</i>	539.12	
<i>For 3/8" Static Pressure, Add</i>	1,078.23	
<i>For 1/2" Static Pressure, Add</i>	1,482.57	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 34 HVAC Fans**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**23 34 16 Centrifugal HVAC Fans (23 34)**

23 34 16 00-0001	Centrifugal Fans (23 34 16)		
	Note: All belt fans to be supplied with belt guard.		
23 34 16 00-0002	Utility Backward Inclined Steel Wheel Centrifugal Fans (23 34 16 00-0001)		
	Note: V-belt driven.		
23 34 16 00-0003	Industrial Type Utility Backward Centrifugal Fans (23 34 16 00-0002)		
	Note: Under 30" diameter wheel.		
23 34 16 00-0004	12-1/4" Diameter Wheel 650 To 2,950 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0005	EA 1/6 HP, 12-1/4" Wheel, 450 To 1,750 CFM At 1/8" Static Pressure, Centrifugal Fan	1,239.21	247.27
23 34 16 00-0006	EA 1/4 HP, 12-1/4" Wheel, 650 To 2,950 CFM At 1/8" Static Pressure, Centrifugal Fan	1,771.99	256.60
23 34 16 00-0007	EA 1/3 HP, 12-1/4" Wheel, 650 To 2,950 CFM At 1/8" Static Pressure, Centrifugal Fan	1,823.69	204.50
23 34 16 00-0008	EA 1/2 HP, 12-1/4" Wheel, 650 To 2,950 CFM At 1/8" Static Pressure, Centrifugal Fan	1,904.42	280.24
23 34 16 00-0009	EA 3/4 HP, 12-1/4" Wheel, 650 To 2,950 CFM At 1/8" Static Pressure, Centrifugal Fan	1,951.68	297.12
23 34 16 00-0010	EA 1 HP, 12-1/4" Wheel, 650 To 2,950 CFM At 1/8" Static Pressure, Centrifugal Fan	2,014.27	309.50
23 34 16 00-0011	EA 1-1/2 HP, 12-1/4" Wheel, 650 To 2,950 CFM At 1/8" Static Pressure, Centrifugal Fan	2,077.72	329.76
23 34 16 00-0012	13-1/2" Diameter Wheel 734 To 3,343 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0013	EA 1/4 HP Centrifugal Fan, 13-1/2" Wheel, 734 - 3,343 CFM At 1/8" Static Pressure	2,041.64	270.11
23 34 16 00-0014	EA 1/3 HP Centrifugal Fan, 13-1/2" Wheel, 734 - 3,343 CFM At 1/8" Static Pressure	2,078.86	280.24
23 34 16 00-0015	EA 1/2 HP Centrifugal Fan, 13-1/2" Wheel, 734 - 3,343 CFM At 1/8" Static Pressure	2,147.87	297.12
23 34 16 00-0016	EA 3/4 HP Centrifugal Fan, 13-1/2" Wheel, 734 - 3,343 CFM At 1/8" Static Pressure	2,188.39	309.50
23 34 16 00-0017	EA 1 HP Centrifugal Fan, 13-1/2" Wheel, 734 - 3,343 CFM At 1/8" Static Pressure	2,263.19	329.76
23 34 16 00-0018	EA 1-1/2 HP Centrifugal Fan, 13-1/2" Wheel, 734 - 3,343 CFM At 1/8" Static Pressure	2,337.24	345.52
23 34 16 00-0019	15" Diameter Wheel 1,258 To 4,146 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0020	EA 1/4 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,057.09	280.24
23 34 16 00-0021	EA 1/3 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,104.35	297.12
23 34 16 00-0022	EA 1/2 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,166.62	309.50
23 34 16 00-0023	EA 3/4 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,219.65	329.76
23 34 16 00-0024	EA 1 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,286.46	345.52
23 34 16 00-0025	EA 1-1/2 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,380.12	371.40
23 34 16 00-0026	EA 2 HP Centrifugal Fan, 15" Wheel, 1,258 - 4,146 CFM At 1/8" Static Pressure	2,453.26	390.53
23 34 16 00-0027	16-1/2" Diameter Wheel 977 To 4,711 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0028	EA 1/4 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	2,354.64	297.12
23 34 16 00-0029	EA 1/3 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	2,439.53	309.50
23 34 16 00-0030	EA 1/2 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	2,533.92	329.76
23 34 16 00-0031	EA 3/4 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	2,583.82	345.52
23 34 16 00-0032	EA 1 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	2,649.72	371.40
23 34 16 00-0033	EA 1-1/2 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	2,705.97	390.53
23 34 16 00-0034	EA 2 HP Centrifugal Fan, 16-1/2" Wheel, 977 - 4,711 CFM At 1/8" Static Pressure	3,004.63	424.30
23 34 16 00-0035	18-1/4" Diameter Wheel 2,193 To 6,498 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0036	EA 1/4 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,433.25	309.50
23 34 16 00-0037	EA 1/3 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,491.71	329.76
23 34 16 00-0038	EA 1/2 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,569.41	345.52
23 34 16 00-0039	EA 3/4 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,630.43	371.40
23 34 16 00-0040	EA 1 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,714.45	390.53
23 34 16 00-0041	EA 1-1/2 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,841.40	424.30
23 34 16 00-0042	EA 2 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	2,923.91	450.19
23 34 16 00-0043	EA 3 HP Centrifugal Fan, 18-1/4" Wheel, 2,193 - 6,498 CFM At 1/8" Static Pressure	3,047.16	495.20
23 34 16 00-0044	20" Diameter Wheel 2,412 To 7,364 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0045	EA 1/4 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	2,459.07	329.76
23 34 16 00-0046	EA 1/3 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	2,536.74	345.52
23 34 16 00-0047	EA 1/2 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	2,630.43	371.40
23 34 16 00-0048	EA 3/4 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	2,714.45	390.53
23 34 16 00-0049	EA 1 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	2,874.04	424.30
23 34 16 00-0050	EA 1-1/2 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	3,096.46	450.19
23 34 16 00-0051	EA 2 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	3,253.32	495.20
23 34 16 00-0052	EA 3 HP Centrifugal Fan, 20" Wheel, 2,412 - 7,364 CFM At 1/8" Static Pressure	3,415.74	530.09
23 34 16 00-0053	22-1/4" Diameter Wheel 2,265 To 8,483 CFM At 1/8" Static Pressure (23 34 16 00-0003)		
23 34 16 00-0054	EA 1/4 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	2,953.92	345.52
23 34 16 00-0055	EA 1/3 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,009.83	371.40
23 34 16 00-0056	EA 1/2 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,086.27	390.53
23 34 16 00-0057	EA 3/4 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,182.39	424.30
23 34 16 00-0058	EA 1 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,309.31	450.19
23 34 16 00-0059	EA 1-1/2 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,353.06	495.20



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 16 00-0060 EA 2 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,437.50	530.09
23 34 16 00-0061 EA 3 HP Centrifugal Fan, 22-1/4" Wheel, 2,265 - 8,483 CFM At 1/8" Static Pressure	3,588.37	594.24
23 34 16 00-0062 24-1/2" Diameter Wheel 3,055 To 11,380 CFM At 1/8" Static Pressure (23 34 16 00-0063)		
23 34 16 00-0063 EA 1/4 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	3,551.82	371.40
23 34 16 00-0064 EA 1/2 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	3,668.47	424.30
23 34 16 00-0065 EA 3/4 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	3,783.63	450.19
23 34 16 00-0066 EA 1 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	3,906.27	495.20
23 34 16 00-0067 EA 1-1/2 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	4,014.27	530.09
23 34 16 00-0068 EA 2 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	4,110.74	594.24
23 34 16 00-0069 EA 3 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	4,243.45	646.01
23 34 16 00-0070 EA 5 HP Centrifugal Fan, 24-1/2" Wheel, 3,055 - 11,380 CFM At 1/8" Static Pressure	4,553.48	742.81
23 34 16 00-0071 27" Diameter Wheel 2,734 To 13,266 CFM At 1/8" Static Pressure (23 34 16 00-0072)		
23 34 16 00-0072 EA 1/4 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	3,935.12	390.53
23 34 16 00-0073 EA 1/2 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,055.71	450.19
23 34 16 00-0074 EA 3/4 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,178.33	495.20
23 34 16 00-0075 EA 1 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,286.35	530.09
23 34 16 00-0076 EA 1-1/2 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,437.22	594.24
23 34 16 00-0077 EA 2 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,569.60	646.01
23 34 16 00-0078 EA 3 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,902.75	742.81
23 34 16 00-0079 EA 5 HP Centrifugal Fan, 27" Wheel, 2,734 - 13,266 CFM At 1/8" Static Pressure	4,950.60	824.96
23 34 16 00-0080 Large Industrial Type Utility Backward Centrifugal Fans (23 34 16 00-0081) Note: Over 30" diameter wheel.		
23 34 16 00-0081 30" Diameter Wheel 4,926 To 17,456 CFM At 1/8" Static Pressure (23 34 16 00-0082)		
23 34 16 00-0082 EA 1/2 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	5,511.46	495.20
23 34 16 00-0083 EA 3/4 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	5,615.19	530.09
23 34 16 00-0084 EA 1 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	5,775.79	594.24
23 34 16 00-0085 EA 1-1/2 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	5,919.04	646.01
23 34 16 00-0086 EA 2 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	6,131.47	742.81
23 34 16 00-0087 EA 3 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	6,321.81	824.96
23 34 16 00-0088 EA 5 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	6,637.22	990.40
23 34 16 00-0089 EA 7-1/2 HP Centrifugal Fan, 30" Wheel, 4,926 - 17,456 CFM At 1/8" Static Pressure	6,928.06	1,142.34
23 34 16 00-0090 33" Diameter Wheel 5,734 To 19,799 CFM At 1/8" Static Pressure (23 34 16 00-0091)		
23 34 16 00-0091 EA 1/2 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	6,462.88	530.09
23 34 16 00-0092 EA 3/4 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	6,668.16	594.24
23 34 16 00-0093 EA 1 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	6,855.29	646.01
23 34 16 00-0094 EA 1-1/2 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	7,110.92	742.81
23 34 16 00-0095 EA 2 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	7,344.80	824.96
23 34 16 00-0096 EA 3 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	7,703.71	990.40
23 34 16 00-0097 EA 5 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	8,103.53	1,142.34
23 34 16 00-0098 EA 7-1/2 HP Centrifugal Fan, 33" Wheel, 5,734 - 19,799 CFM At 1/8" Static Pressure	8,671.68	1,485.60
23 34 16 00-0099 36-1/2" Diameter Wheel 5,388 To 22,500 CFM At 1/8" Static Pressure (23 34 16 00-0100)		
23 34 16 00-0100 EA 1/2 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	6,898.90	594.24
23 34 16 00-0101 EA 3/4 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	7,092.53	646.01
23 34 16 00-0102 EA 1 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	7,707.27	742.81
23 34 16 00-0103 EA 1-1/2 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	8,121.82	824.96
23 34 16 00-0104 EA 2 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	8,633.35	990.40
23 34 16 00-0105 EA 3 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	9,026.32	1,142.34
23 34 16 00-0106 EA 5 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	9,851.50	1,485.60
23 34 16 00-0107 EA 7-1/2 HP Centrifugal Fan, 36-1/2" Wheel, 5,388 - 22,500 CFM At 1/8" Static Pressure	10,544.24	1,857.00
23 34 16 00-0108 Kitchen System Fans (23 34 16 00-0109)		
23 34 16 00-0109 Upblast Kitchen Exhaust Fans (23 34 16 00-0110)		
23 34 16 00-0110 Direct Drive Kitchen Upblast Exhaust Fans (23 34 16 00-0111) Note: Greenheck CUE.		
23 34 16 00-0111 EA Up To 12" Wheel Diameter, 1/6 HP Direct Drive, Kitchen Upblast Exhaust Fan	1,373.47	146.30
Note: 115V. For roof or wall installations. Includes disconnect switch.		
For Bird Screen, Add	61.24	
For Backdraft Damper, Add	169.23	
For Damper Motor, Add	277.68	
23 34 16 00-0112 EA 14" Wheel Diameter, 1/4 HP Direct Drive, Kitchen Upblast Exhaust Fan	1,616.75	146.30
Note: 115V. For roof or wall installations. Includes disconnect switch.		
For Bird Screen, Add	61.24	
For Backdraft Damper, Add	169.23	
For Damper Motor, Add	277.68	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 34 HVAC Fans



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 16 00-0113			Belt Drive Kitchen Upblast Exhaust Fans (23 34 16 00-0109) Note: Greenheck CUBE.		
23 34 16 00-0114	EA		10" Diameter Wheel, Up To 1/3 HP, 1,458 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 2,385.22 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	2,385.22	146.30
			<i>For Bird Screen, Add</i>	61.24	
			<i>For Wall Mounted Fan, Add</i>	95.41	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	177.87	
			<i>For Backdraft Damper, Add</i>	169.23	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0115	EA		12" Diameter Wheel, 1/2 HP, 1,923 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 2,490.80 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	2,490.80	146.30
			<i>For Bird Screen, Add</i>	61.24	
			<i>For Wall Mounted Fan, Add</i>	99.63	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	186.85	
			<i>For Backdraft Damper, Add</i>	169.23	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0116	EA		14" Diameter Wheel, 1/3 HP, 2,006 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 2,128.28 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	2,128.28	168.82
			<i>For Bird Screen, Add</i>	69.68	
			<i>For Wall Mounted Fan, Add</i>	85.13	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	152.20	
			<i>For Backdraft Damper, Add</i>	192.18	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0117	EA		14" Diameter Wheel, 1 HP, 2,757 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 2,280.31 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	2,280.31	168.82
			<i>For Bird Screen, Add</i>	69.68	
			<i>For Wall Mounted Fan, Add</i>	91.21	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	165.13	
			<i>For Backdraft Damper, Add</i>	192.18	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0118	EA		16" Diameter Wheel, 1/2 HP, 2,940 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 2,902.49 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	2,902.49	196.96
			<i>For Bird Screen, Add</i>	69.68	
			<i>For Wall Mounted Fan, Add</i>	116.10	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	213.23	
			<i>For Backdraft Damper, Add</i>	192.18	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0119	EA		16" Diameter Wheel, 1 HP, 3,129 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 3,065.08 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	3,065.08	196.96
			<i>For Bird Screen, Add</i>	69.68	
			<i>For Wall Mounted Fan, Add</i>	122.60	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	227.05	
			<i>For Backdraft Damper, Add</i>	192.18	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0120	EA		18" Diameter Wheel, 1/2 HP , 3,243 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 3,340.27 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	3,340.27	211.03
			<i>For Bird Screen, Add</i>	116.14	
			<i>For Wall Mounted Fan, Add</i>	133.61	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	248.05	
			<i>For Backdraft Damper, Add</i>	241.14	
			<i>For Damper Motor, Add</i>	277.68	
23 34 16 00-0121	EA		18" Diameter Wheel, 1 HP , 4,223 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan 3,593.66 Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.	3,593.66	211.03
			<i>For Bird Screen, Add</i>	116.14	
			<i>For Wall Mounted Fan, Add</i>	143.75	
			<i>For 3 Phase Motor, Deduct</i>	-50.00	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	269.59	
			<i>For Backdraft Damper, Add</i>	241.14	
			<i>For Damper Motor, Add</i>	277.68	



Heating, Ventilating, and Air-Conditioning (HVAC)		23
HVAC Air Distribution		23 30
HVAC Fans		23 34

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 16 00-0122 EA 20" Diameter Wheel, 3/4 HP, 4,438 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	3,651.38	225.09
Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	116.14	
For Wall Mounted Fan, Add	146.06	
For 3 Phase Motor, Deduct	-50.00	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	272.10	
For Backdraft Damper, Add	241.14	
For Damper Motor, Add	277.68	
23 34 16 00-0123 EA 20" Diameter Wheel, 2 HP, 6,450 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	4,008.24	225.09
Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	116.14	
For Wall Mounted Fan, Add	160.33	
For 3 Phase Motor, Deduct	-50.00	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	302.43	
For Backdraft Damper, Add	241.14	
For Damper Motor, Add	277.68	
23 34 16 00-0124 EA 24" Diameter Wheel, 3/4 HP, 5,460 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	4,617.75	253.23
Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	137.25	
For Wall Mounted Fan, Add	184.71	
For 3 Phase Motor, Deduct	-50.00	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	349.46	
For Backdraft Damper, Add	261.21	
For Damper Motor, Add	277.68	
23 34 16 00-0125 EA 24" Diameter Wheel, 2 HP, 7,985 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	4,945.04	253.23
Note: 115/208-230/60/1. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	137.25	
For Wall Mounted Fan, Add	197.80	
For 3 Phase Motor, Deduct	-50.00	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	377.28	
For Backdraft Damper, Add	261.21	
For Damper Motor, Add	277.68	
23 34 16 00-0126 EA 30" Diameter Wheel, 3/4 HP, 7,771 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	5,864.96	281.36
Note: 115/208-230/60/3. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	147.81	
For Wall Mounted Fan, Add	234.60	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	450.69	
For Backdraft Damper, Add	289.95	
For Damper Motor, Add	277.68	
23 34 16 00-0127 EA 30" Diameter Wheel, 2 HP, 10,192 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	5,972.65	281.36
Note: 115/208-230/60/3. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	147.81	
For Wall Mounted Fan, Add	238.91	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	459.84	
For Backdraft Damper, Add	289.95	
For Damper Motor, Add	277.68	
23 34 16 00-0128 EA 30" Diameter Wheel, 3 HP, 11,903 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	6,519.55	281.36
Note: 115/208-230/60/3. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	147.81	
For Wall Mounted Fan, Add	260.78	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	506.33	
For Backdraft Damper, Add	289.95	
For Damper Motor, Add	277.68	
23 34 16 00-0129 EA 30" Diameter Wheel, 5 HP, 14,266 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	6,783.50	281.36
Note: 115/208-230/60/3. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	147.81	
For Wall Mounted Fan, Add	271.34	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	528.77	
For Backdraft Damper, Add	289.95	
For Damper Motor, Add	277.68	
23 34 16 00-0130 EA 36" Diameter Wheel, 3 HP, 14,769 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	7,469.35	309.50
Note: 115/208-230/60/3. Includes heat baffle, grease baffle and disconnect switch.		
For Bird Screen, Add	168.93	
For Wall Mounted Fan, Add	298.77	
For Totally Enclosed Motor, Add	85.00	
For Grease Trap Kit, Add	76.41	
For Hinged Curb Kit, Add	582.28	
For Damper Motor, Add	277.68	
For Backdraft Damper, Add	342.18	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 34 HVAC Fans**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 16 00-0131	EA		36" Diameter Wheel, 5 HP , 17,884 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	7,772.89	309.50
			Note: 115/208-230/60/3. Includes heat baffle, grease baffle and disconnect switch.		
			<i>For Bird Screen, Add</i>	168.93	
			<i>For Wall Mounted Fan, Add</i>	310.92	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	608.08	
			<i>For Damper Motor, Add</i>	277.68	
			<i>For Backdraft Damper, Add</i>	342.18	
23 34 16 00-0132	EA		42" Diameter Wheel, 3 HP , 17,316 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	7,837.68	337.64
			Note: 230/460/60/3. Includes birdscreen, heat baffle, grease baffle and disconnect switch.		
			<i>For Bird Screen, Add</i>	168.93	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	608.81	
			<i>For Damper Motor, Add</i>	277.68	
			<i>For Backdraft Damper, Add</i>	398.46	
23 34 16 00-0133	EA		42" Diameter Wheel, 7-1/2 HP , 24,604 CFM At 1/4" Static Pressure, Belt Drive, Kitchen Upblast Exhaust Fan.....	8,504.10	337.64
			Note: 230/460/60/3. Includes birdscreen, heat baffle, grease baffle and disconnect switch.		
			<i>For Bird Screen, Add</i>	168.93	
			<i>For Totally Enclosed Motor, Add</i>	85.00	
			<i>For Grease Trap Kit, Add</i>	76.41	
			<i>For Hinged Curb Kit, Add</i>	665.45	
			<i>For Damper Motor, Add</i>	277.68	
			<i>For Backdraft Damper, Add</i>	398.46	
23 34 16 00-0134			Untempered Kitchen Make-Up Air Fans (23 34 16 00-0108)		
			Note: Roof mounted with downblast discharge, weatherhood and filter.		
23 34 16 00-0135			Direct Drive Kitchen Make-Up Air Fans (23 34 16 00-0134)		
23 34 16 00-0136	EA		7" Diameter Wheel, 1/2 HP Direct Drive, Kitchen Make-Up Air Fan	1,598.04	146.30
			Note: 115V. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	268.94	
23 34 16 00-0137	EA		8" Diameter Wheel, 1 HP Direct Drive, Kitchen Make-Up Air Fan	1,680.69	146.30
			Note: 115V. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	281.34	
23 34 16 00-0138	EA		9" Diameter Wheel, 1 HP Direct Drive, Kitchen Make-Up Air Fan	1,782.11	146.30
			Note: 115V. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	296.55	
23 34 16 00-0139			Belt Drive Kitchen Make-Up Air Fans (23 34 16 00-0134)		
23 34 16 00-0140	EA		9" Diameter Wheel, 1/2 HP Belt Drive, Kitchen Make-Up Air Fan.....	1,821.45	146.30
			Note: 115/208-230/60/1. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	302.45	
23 34 16 00-0141	EA		10" Diameter Wheel, 1-1/2 HP Belt Drive, Kitchen Make-Up Air Fan	2,035.42	196.96
			Note: 115/208-230/60/1. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	344.70	
23 34 16 00-0142	EA		12" Diameter Wheel, 2 HP Belt Drive, Kitchen Make-Up Air Fan.....	2,456.21	225.09
			Note: 115/208-230/60/1. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	413.45	
23 34 16 00-0143	EA		15" Diameter Wheel, 3 HP Belt Drive, Kitchen Make-Up Air Fan.....	2,843.26	281.36
			Note: 230/460/60/3. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	482.76	
23 34 16 00-0144	EA		18" Diameter Wheel, 5 HP Belt Drive, Kitchen Make-Up Air Fan.....	3,441.42	337.64
			Note: 230/460/60/3. For roof installations. Includes downblast discharge, weatherhood, filter and disconnect switch.		
			<i>For Extended Weatherhood, Add</i>	583.74	
23 34 16 00-0145			Replacement Parts (23 34 16 00-0001)		
23 34 16 00-0146			Replace Belts And Accessories (23 34 16 00-0145)		
23 34 16 00-0147	EA		Fan Shaft Bearing, Replacement.....	851.48	377.58
23 34 16 00-0148	EA		Fan Belt, Replacement	141.00	51.21
23 34 16 00-0149			Corrosive Fume Resistant Plastic (23 34 16 00-0001)		
23 34 16 00-0150			Centrifugal Roof Ventilators, Belt Drive, 1/4" Static Pressure (23 34 16 00-0149)		
23 34 16 00-0151	EA		250 CFM, 1/4 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	6,309.39	203.08
			<i>For Explosion Proof Motor, Add</i>	885.49	
23 34 16 00-0152	EA		895 CFM, 1/3 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	6,851.12	243.94
			<i>For Explosion Proof Motor, Add</i>	954.49	
23 34 16 00-0153	EA		1,630 CFM, 1/2 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	8,123.07	304.92
			<i>For Explosion Proof Motor, Add</i>	1,126.98	
23 34 16 00-0154	EA		2,240 CFM, 1 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	8,710.17	406.76
			<i>For Explosion Proof Motor, Add</i>	1,184.48	
23 34 16 00-0155	EA		3,810 CFM, 2 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	9,959.56	609.84
			<i>For Explosion Proof Motor, Add</i>	1,310.98	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 16 00-0156 EA 11,760 CFM, 5 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	17,159.16	1,219.68
<i>For Explosion Proof Motor, Add</i>	2,207.97	
23 34 16 00-0157 EA 18,810 CFM, 10 HP Roof Ventilator, Centrifugal, Belt Drive, Corrosive Fume Resistant Plastic.....	25,030.05	1,743.53
<i>For Explosion Proof Motor, Add</i>	3,231.46	
23 34 16 00-0158 Utility Set, Centrifugal, Belt Drive (23 34 16 00-0149)		
23 34 16 00-0159 EA 1,200 CFM, 1/4 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	6,309.39	203.08
<i>For Explosion Proof Motor, Add</i>	885.49	
23 34 16 00-0160 EA 1,520 CFM, 1/3 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	6,467.79	243.94
<i>For Explosion Proof Motor, Add</i>	896.99	
23 34 16 00-0161 EA 1,850 CFM, 1/2 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	6,589.76	304.92
<i>For Explosion Proof Motor, Add</i>	896.99	
23 34 16 00-0162 EA 2,180 CFM, 3/4 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	6,793.53	406.76
<i>For Explosion Proof Motor, Add</i>	896.99	
23 34 16 00-0163 EA 3,600 CFM, 1 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	9,346.24	609.84
<i>For Explosion Proof Motor, Add</i>	1,218.98	
23 34 16 00-0164 EA 4,250 CFM, 1-1/2 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	9,651.17	762.30
<i>For Explosion Proof Motor, Add</i>	1,218.98	
23 34 16 00-0165 EA 4,800 CFM, 2 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	9,871.18	872.31
<i>For Explosion Proof Motor, Add</i>	1,218.98	
23 34 16 00-0166 EA 6,920 CFM, 5 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	10,109.42	914.76
<i>For Explosion Proof Motor, Add</i>	1,241.98	
23 34 16 00-0167 EA 7,700 CFM, 7-1/2 HP Utility Set, Centrifugal, Belt Drive, 1/4 Static Pressure, Corrosive Fume Resistant Plastic	10,389.36	1,016.36
<i>For Explosion Proof Motor, Add</i>	1,253.48	
23 34 16 00-0168 In-Line Duct Fans (23 34 16 00-0001)		
23 34 16 00-0169 Direct Drive In-Line Duct Fans (23 34 16 00-0168)		
Note: Greenheck SQ.		
23 34 16 00-0170 EA Up To 10" Wheel Diameter, 1/16 HP Direct Drive, In Line Duct Fan	1,649.81	146.30
Note: 115V. Includes disconnect switch.		
23 34 16 00-0171 EA 13" Wheel Diameter, 1/6 HP Direct Drive, In Line Duct Fan	2,114.38	157.57
Note: 115V. Includes disconnect switch.		
23 34 16 00-0172 EA 14" Wheel Diameter, 1/3 HP Direct Drive, In Line Duct Fan	2,319.36	168.82
Note: 115V. Includes disconnect switch.		
23 34 16 00-0173 Belt Drive In-Line Duct Fans (23 34 16 00-0168)		
Note: Greenheck BSQ.		
23 34 16 00-0174 EA Up To 12" Wheel Diameter, 1/4 HP Belt Drive, In Line Duct Fan	2,424.91	168.82
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0175 EA 13" Or 14" Wheel Diameter, 1/4 HP Belt Drive, In Line Duct Fan	2,786.43	196.96
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0176 EA 13" Or 14" Wheel Diameter, 3/4 HP Belt Drive, In Line Duct Fan	3,138.70	196.96
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0177 EA 13" Or 14" Wheel Diameter, 1-1/2 HP Belt Drive, In Line Duct Fan	3,438.19	196.96
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0178 EA 16" Or 18" Wheel Diameter, 1/3 HP Belt Drive, In Line Duct Fan	3,341.86	225.09
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0179 EA 16" Or 18" Wheel Diameter, 1-1/2 HP Belt Drive, In Line Duct Fan	3,849.05	225.09
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0180 EA 24" Wheel Diameter, 1 HP Belt Drive, In Line Duct Fan	4,899.07	281.36
Note: 115/208-230/60/1. Includes disconnect switch.		
<i>For 3 Phase Motor, Deduct</i>	-50.00	
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0181 EA 24" Wheel Diameter, 3 HP Belt Drive, In Line Duct Fan	5,179.06	281.36
Note: 230/460/60/3. Includes disconnect switch.		
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0182 EA 24" Wheel Diameter, 5 HP Belt Drive, In Line Duct Fan	5,376.43	281.36
Note: Belt drive. 230/460/60/3. Includes disconnect switch.		
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0183 EA 30 Or 36" Wheel Diameter, 3 HP Belt Drive, In Line Duct Fan	6,215.44	337.64
Note: 230/460/60/3. Includes disconnect switch.		
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0184 EA 30 Or 36" Wheel Diameter, 5 HP Belt Drive, In Line Duct Fan	6,451.01	337.64
Note: 230/460/60/3. Includes disconnect switch.		
<i>For Totally Enclosed Motor, Add</i>	85.00	
23 34 16 00-0185 EA 30 Or 36" Wheel Diameter, 7-1/2 HP Belt Drive, In Line Duct Fan	6,740.50	337.64
Note: 230/460/60/3. Includes disconnect switch.		
<i>For Totally Enclosed Motor, Add</i>	85.00	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 34 HVAC Fans**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 16 00-0186			In-Line Cabinet Fans (23 34 16 00-0001)		
23 34 16 00-0187	EA		77 - 124 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	515.22	98.47
23 34 16 00-0188	EA		91 - 138 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	515.22	98.47
23 34 16 00-0189	EA		82 - 266 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	586.57	104.10
23 34 16 00-0190	EA		281 - 412 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	650.60	104.10
23 34 16 00-0191	EA		190 CFM, 115 Volt, Direct Drive Cabinet Fan.....	825.49	104.10
23 34 16 00-0192	EA		217 - 447 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	679.18	104.10
23 34 16 00-0193	EA		325 - 545 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	779.68	104.10
23 34 16 00-0194	EA		250 - 545 CFM, 115 Volt, 1/6 HP, Direct Drive In-Line Cabinet Fan.....	1,489.07	104.10
23 34 16 00-0195	EA		419 - 766 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	919.02	109.73
23 34 16 00-0196	EA		334 - 737 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	934.79	109.73
23 34 16 00-0197	EA		350 - 737 CFM, 120 Volt, 1/4 HP, Direct Drive In-Line Cabinet Fan.....	1,549.61	109.73
23 34 16 00-0198	EA		527 - 813 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	934.79	109.73
23 34 16 00-0199	EA		631 - 908 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	1,264.85	109.73
23 34 16 00-0200	EA		752 - 1244 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	1,264.85	109.73
23 34 16 00-0201	EA		1043 - 1584 CFM, 115 Volt, 1/3 HP, Direct Drive In-Line Cabinet Fan.....	1,264.85	109.73
23 34 16 00-0202	EA		999 - 1672 CFM, 115 Volt, Direct Drive In-Line Cabinet Fan.....	1,375.21	109.73
23 34 16 00-0203			Propeller And Ceiling Fans (23 34 16)		
23 34 16 00-0204			Direct Drive, Sidewall Propeller Exhaust Fan (23 34 16 00-0203)		
			Note: Greenheck SE1.		
23 34 16 00-0205	EA		1/25 HP, 307 CFM At 1/8" Static Pressure, 8" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	723.28	120.42
			Note: Includes motor side guard.		
			For Backdraft Damper, Add	198.41	
			For Wall Mount Collar, Add	285.76	
23 34 16 00-0206	EA		1/12 HP, 763 CFM At 1/8" Static Pressure, 10" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	765.07	133.93
			Note: Includes motor side guard.		
			For Backdraft Damper, Add	212.71	
			For Wall Mount Collar, Add	285.76	
23 34 16 00-0207	EA		1/8 HP, 1,149 CFM At 1/8" Static Pressure, 12" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	847.12	148.56
			Note: Includes motor side guard.		
			For Backdraft Damper, Add	232.78	
			For Wall Mount Collar, Add	293.21	
23 34 16 00-0208	EA		1/6 HP, 1,350 CFM At 1/8" Static Pressure, 14" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	1,247.19	164.31
			For Backdraft Damper, Add	278.84	
			For Wall Mount Collar, Add	298.56	
			For Motor Side Guard, Add	247.75	
23 34 16 00-0209	EA		1/6 HP, 2,012 CFM At 1/8" Static Pressure, 16" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	1,041.26	182.32
			For Backdraft Damper, Add	278.84	
			For Wall Mount Collar, Add	306.03	
			For Motor Side Guard, Add	263.66	
23 34 16 00-0210	EA		1/4 HP, 2,908 CFM At 1/8" Static Pressure, 18" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	1,169.58	202.59
			For Backdraft Damper, Add	339.35	
			For Wall Mount Collar, Add	313.48	
			For Motor Side Guard, Add	279.57	
23 34 16 00-0211	EA		1/3 HP, 3,974 CFM At 1/8" Static Pressure, 20" Diameter, Direct Drive, Sidewall Propeller Exhaust Fan.....	1,332.68	225.09
			For Backdraft Damper, Add	339.35	
			For Wall Mount Collar, Add	318.83	
			For Motor Side Guard, Add	301.81	
23 34 16 00-0212			Belt Drive Propeller Exhaust Fans (23 34 16 00-0203)		
			Note: Wall shutter 1/8" static pressure, with birdscreen.		
23 34 16 00-0213	EA		24" Propeller Exhaust Fan, V-Belt Drive, 5,795 CFM, 1/2 HP, With Wall Shutter.....	2,486.85	321.88
23 34 16 00-0214	EA		30" Propeller Exhaust Fan, V-Belt Drive, 9,060 CFM, 3/4 HP, With Wall Shutter.....	2,847.46	374.78
23 34 16 00-0215	EA		36" Propeller Exhaust Fan, V-Belt Drive, 11,850 CFM, 1 HP, With Wall Shutter.....	3,227.45	450.19
23 34 16 00-0216	EA		42" Propeller Exhaust Fan, V-Belt Drive, 17,400 CFM, 1-1/2 HP, With Wall Shutter.....	4,500.74	562.73
23 34 16 00-0217	EA		48" Propeller Exhaust Fan, V-Belt Drive, 19,870 CFM, 1-1/2 HP, With Wall Shutter.....	5,360.72	750.68
23 34 16 00-0218	EA		54" Propeller Exhaust Fan, V-Belt Drive, 26,000 CFM, 2 HP, With Wall Shutter.....	7,436.95	1,125.46
23 34 16 00-0219	EA		60" Propeller Exhaust Fan, V-Belt Drive, 35,120 CFM, 3 HP, With Wall Shutter.....	8,916.56	1,442.83
23 34 16 00-0220			Propeller Exhaust Fan Accessories (23 34 16 00-0203)		
23 34 16 00-0221	SF		Hinged Mesh Screen For Wall Propeller Fans, 1" x 1" Frame (SF Of Fan Opening).....	127.48	
23 34 16 00-0222	SF		Galvanized Weather Hood For Wall Propeller Fan (SF Of Fan Opening).....	294.20	
23 34 16 00-0223			Reversible Ceiling Fans (23 34 16 00-0203)		
23 34 16 00-0224			4 Blade Ceiling Fans (23 34 16 00-0223)		
23 34 16 00-0225	EA		42" 4-Blade Ceiling Fan, Three Speed.....	583.16	60.63
			For Brass Plated Motor, Add	20.25	
			For Light Kit, Add	26.01	
23 34 16 00-0226			5 Blade Ceiling Fans (23 34 16 00-0223)		
23 34 16 00-0227	EA		42" 5-Blade Ceiling Fan, Three Speed.....	638.50	150.03
			For Brass Plated Motor, Add	20.25	
			For Light Kit, Add	26.07	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				23 34 16 00-0228 EA 52" 5-Blade Ceiling Fan, Three Speed <i>For Brass Plated Motor, Add</i> <i>For Light Kit, Add</i>	729.28 20.25 26.19	150.03
23 34 16 00-0229				3 Blade Weatherproof Ceiling Fans (23 34 16 00-0223)		
				23 34 16 00-0230 EA 3-Blade Ceiling Fan, Weatherproof, Three Speed	597.70	55.71
23 34 16 00-0231				Ceiling Fan Down Rod (23 34 16 00-0233)		
				23 34 16 00-0232 EA 1' Ceiling Fan Down Rod	23.25	
				23 34 16 00-0233 EA 1-1/2' Ceiling Fan Down Rod	30.71	
				23 34 16 00-0234 EA 2' Ceiling Fan Down Rod	34.44	
				23 34 16 00-0235 EA 3' Ceiling Fan Down Rod	46.43	
				23 34 16 00-0236 EA 4' Ceiling Fan Down Rod	54.31	
				23 34 16 00-0237 EA 5' Ceiling Fan Down Rod	66.85	
				23 34 16 00-0238 EA 6' Ceiling Fan Down Rod	83.75	
23 34 16 00-0239				Exhaust Fans (23 34 16)		
23 34 16 00-0240				Exhaust Fans (23 34 16 00-0239) Note: Excludes ducting.		
23 34 16 00-0241				Light Duty Exhaust Fans (23 34 16 00-0240)		
23 34 16 00-0242				Light Duty Exhaust Fans (23 34 16 00-0241)		
				23 34 16 00-0243 EA 80 CFM, Single Speed, Ceiling Bathroom Exhaust Fan Without Light (NuTone InVent Series AEN80).....	247.22	48.99
				23 34 16 00-0244 EA 110 CFM, Single Speed, Ceiling Bathroom Exhaust Fan Without Light (NuTone InVent Series AEN110).....	278.94	48.99
				23 34 16 00-0245 EA 50 CFM, Ceiling/Wall Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan Without Light (Broan® 670).....	151.47	48.99
				23 34 16 00-0246 EA 70 CFM, Ceiling/Wall Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan Without Light (Broan® 671).....	160.40	48.99
				23 34 16 00-0247 EA 180 CFM, Ceiling Mounted, Polymeric Intake Grille, Vertical Discharge, Light Duty Exhaust Fan Without Light (Broan® 505).....	267.65	48.99
				23 34 16 00-0248 EA 350 CFM, Ceiling Mounted, Polymeric Intake Grille, Vertical Discharge, Light Duty Exhaust Fan Without Light (Broan® 504).....	339.36	48.99
				23 34 16 00-0249 EA 160 CFM, Ceiling/Wall Mounted, Polymeric Intake Grille, Side Discharge, Light Duty Exhaust Fan Without Light (Broan® 503).....	302.95	48.99
				23 34 16 00-0250 EA 270 CFM, Ceiling/Wall Mounted, Polymeric Intake Grille, Side Discharge, Light Duty Exhaust Fan Without Light (Broan® 502).....	404.79	48.99
23 34 16 00-0251				Light Duty Exhaust Fans With Lights (23 34 16 00-0241)		
				23 34 16 00-0252 EA 50 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Light (Broan® 678).....	199.25	48.99
				23 34 16 00-0253 EA 70 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Light (Broan® 679).....	221.63	48.99
				23 34 16 00-0254 EA 100 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Light (Broan® 680).....	418.46	48.99
				23 34 16 00-0255 EA 80 CFM, Single Speed, Ceiling Bathroom Exhaust Fan With LED Light (NuTone InVent Series AEN80L).....	375.37	48.99
				23 34 16 00-0256 EA 110 CFM, Single Speed, Ceiling Bathroom Exhaust Fan With LED Light (NuTone InVent Series AEN110L).....	392.70	48.99
23 34 16 00-0257				Light Duty Exhaust Fans With Heaters (23 34 16 00-0241)		
				23 34 16 00-0258 EA 70 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Heater Bulb (Broan® 162).....	204.10	48.99
				23 34 16 00-0259 EA 70 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Heater (Broan® 658).....	326.82	48.99
23 34 16 00-0260				Light Duty Exhaust Fans With Heaters And Lights (23 34 16 00-0241)		
				23 34 16 00-0261 EA 70 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Heater And Light (Broan® 655).....	348.09	48.99
				23 34 16 00-0262 EA 100 CFM, Ceiling Mounted, Polymeric Intake Grille, Light Duty Exhaust Fan With Heater And Light (Broan® 100HL).....	530.76	48.99
23 34 16 00-0263				Heavy Duty/Continuous Operation Exhaust Fans (23 34 16 00-0263)		
23 34 16 00-0264				Heavy Duty/Continuous Operation Exhaust Fans (23 34 16 00-0263) Note: Includes enamel steel or aluminum grille.		
				23 34 16 00-0265 EA 50 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® HD50).....	237.89	48.99
				23 34 16 00-0266 EA 80 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® HD80).....	263.54	48.99
				23 34 16 00-0267 EA 109 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L100MG).....	485.55	48.99
				23 34 16 00-0268 EA 157 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L150MG).....	497.44	48.99
				23 34 16 00-0269 EA 210 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L200MG).....	534.43	48.99
				23 34 16 00-0270 EA 259 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L250MG).....	558.08	48.99
				23 34 16 00-0271 EA 308 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L300MG).....	567.24	48.99
				23 34 16 00-0272 EA 434 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L400).....	649.82	48.99
				23 34 16 00-0273 EA 514 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L500).....	740.92	48.99

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 34 HVAC Fans**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 34 16 00-0274	EA	701 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L700).....	792.80		48.99
23 34 16 00-0275	EA	901 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L900).....	944.38		48.99
23 34 16 00-0276	EA	1,513 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L1500).....	1,214.39		48.99
23 34 16 00-0277		Heavy Duty/Continuous Operation Kitchen Exhaust Fans (23 34 16 00-0263) Note: Includes enamel steel or aluminum grille.			
23 34 16 00-0278	EA	308 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Kitchen Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L300KMG).....	504.36		48.99
23 34 16 00-0279	EA	434 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Kitchen Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L400K).....	734.11		48.99
23 34 16 00-0280	EA	514 CFM, Ceiling/Wall Mounted, Metal Intake Grille, Kitchen Heavy Duty/Continuous Operation Exhaust Fan (Broan® LoSone® Ventilator L500K).....	776.65		48.99
23 34 16 00-0281		Heavy Duty/Continuous Operation Exhaust Fans With Lights (23 34 16 00-0263)			
23 34 16 00-0282	EA	50 CFM, Ceiling/Wall Mounted, Polymeric Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan With Light (Broan® HD50L).....	258.90		48.99
23 34 16 00-0283	EA	80 CFM, Ceiling/Wall Mounted, Polymeric Intake Grille, Heavy Duty/Continuous Operation Exhaust Fan With Light (Broan® HD80L).....	282.99		48.99
23 34 16 00-0284		Fire Rated, Heavy Duty/Continuous Operation Exhaust Fans (23 34 16 00-0263)			
23 34 16 00-0285	EA	50 CFM, Ceiling Mounted, Metal Intake Grille, Fire Rated, Heavy Duty/Continuous Operation Exhaust Fan (Broan® HD50RDF).....	269.48		48.99
23 34 16 00-0286	EA	80 CFM, Ceiling Mounted, Metal Intake Grille, Fire Rated, Heavy Duty/Continuous Operation Exhaust Fan (Broan® HD80RDF).....	285.42		48.99
23 34 16 00-0287	EA	110 CFM, Ceiling Mounted, Metal Intake Grille, Fire Rated, Heavy Duty/Continuous Operation Exhaust Fan (Broan® 110RDF).....	293.12		48.99
23 34 16 00-0288		Low Sound, Direct Drive, Centrifugal Ceiling Exhaust Fans (23 34 16 00-0240)			
23 34 16 00-0289	EA	900 CFM Low Sound, Direct Drive Centrifugal Ceiling Exhaust Fan (Greenheck SP-A900).....	1,304.02		48.99
23 34 16 00-0290	EA	1050 CFM Low Sound, Direct Drive Centrifugal Ceiling Exhaust Fan (Greenheck SP-A1050).....	1,304.02		48.99
23 34 16 00-0291	EA	1410 CFM Low Sound, Direct Drive Centrifugal Ceiling Exhaust Fan (Greenheck SP-A1410).....	1,304.02		48.99
23 34 16 00-0292	EA	1550 CFM Low Sound, Direct Drive Centrifugal Ceiling Exhaust Fan (Greenheck SP-A1550).....	1,431.42		48.99
23 34 16 00-0293		Room-To-Room Exhaust Fans (23 34 16 00-0240)			
23 34 16 00-0294	EA	90 CFM, Polymeric Grilles, Wall Mounted, Room-To-Room Exhaust Fan (Broan® 512).....	193.23		48.99
23 34 16 00-0295	EA	180 CFM, Polymeric Grilles, Wall Mounted, Room-To-Room Exhaust Fan (Broan® 511).....	323.48		48.99
23 34 16 00-0296	EA	380 CFM, Polymeric Grilles, Wall Mounted, Room-To-Room Exhaust Fan (Broan® 510).....	370.95		48.99
23 34 16 00-0297		Through-Wall Exhaust Fans (23 34 16 00-0240)			
23 34 16 00-0298	EA	250 CFM, Wall Mounted, Polymeric Intake Grille, Chain Operated, Through Wall Exhaust Fan (Broan® 507).....	346.13		48.99
23 34 16 00-0299	EA	470 CFM, Wall Mounted, Polymeric Intake Grille, Chain Operated, Through Wall Exhaust Fan (Broan® 506).....	411.55		48.99
23 34 16 00-0300	EA	180 CFM, Wall Mounted, Polymeric Intake Grille, Through-Wall Exhaust Fan (Broan® 509).....	301.15		48.99
23 34 16 00-0301	EA	270 CFM, Wall Mounted, Polymeric Intake Grille, Through-Wall Exhaust Fan (Broan® 508).....	404.79		48.99
23 34 16 00-0302	EA	360 CFM, Wall Mounted, Polymeric Intake Grille, Through-Wall Exhaust Fan With Motorized Door (Broan® 12C).....	711.59		48.99
23 34 16 00-0303		Exhaust Fan Accessories (23 34 16 00-0240)			
23 34 16 00-0304		Exhaust Fan Controls (23 34 16 00-0303)			
23 34 16 00-0305	EA	Electronic Variable Speed Control Dial, Single Gang, Exhaust Fan Controls (Broan® 57).....	189.83		30.62
23 34 16 00-0306	EA	60-Minute Time Control Dial, Single Gang, Exhaust Fan Controls (Broan® 59).....	131.96		30.62
23 34 16 00-0307	EA	60-Minute Time Control Dial With Rocker Switch, Double Gang, Exhaust Fan Controls (Broan® 61).....	133.34		30.62
23 34 16 00-0308		Roof And Wall Caps For Exhaust Fans (23 34 16 00-0303)			
23 34 16 00-0309		Wall Caps For Exhaust Fans (23 34 16 00-0308)			
23 34 16 00-0310	EA	Aluminum Wall Cap For Up To 12" Duct, Installed On Exterior Walls (Broan® 613).....	300.94		61.10
23 34 16 00-0311	EA	Aluminum Wall Cap For Up To 18" Duct, Installed On Exterior Walls (Broan® 643).....	305.49		61.10
23 34 16 00-0312		Roof Caps For Exhaust Fans (23 34 16 00-0308) Note: Includes flashing and built in bird screen.			
23 34 16 00-0313	EA	Aluminum Roof Cap For Up To 8" Duct, Installed On Flat Roofs (Broan® 611).....	253.92		61.10
23 34 16 00-0314	EA	Aluminum Roof Cap For Up To 12" Duct, Installed On Flat Roofs (Broan® 612).....	372.22		61.10
23 34 16 00-0315	EA	CRCQ Steel Roof Cap For Up To 4" Duct, Installed On Sloped Roofs (Broan® 636).....	162.99		61.10
23 34 16 00-0316	EA	CRCQ Steel Roof Cap For Up To 8" Duct, Installed On Sloped Roofs (Broan® 634).....	198.47		61.10
23 34 16 00-0317		Removal And Reinstallation Of Light Duty Ceiling Exhaust Fan (23 34 16 00-0240) Note: Includes storage and cleaning.			
23 34 16 00-0318	EA	Removal And Reinstallation Of Light Duty Ceiling Exhaust Fan.....	84.40		



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 23 HVAC Power Ventilators (23 34)						
23 34 23 00-0001				Power Roof Ventilators (23 34 23)		
23 34 23 00-0002				Direct Drive, Aluminum, Centrifugal Roof Exhausters (23 34 23 00-0001)		
				Note: Greenheck G.		
23 34 23 00-0003	EA			1/25 HP, 310 CFM At 1/4" Static Pressure, 17" x 17" Base, Direct Drive, Aluminum, Centrifugal Roof Exhauster 630.76	630.76	160.94
				Note: Three speed motor.		
				For 12" Roof Curb, Add	218.12	
				For Backdraft Damper, Add	157.82	
				For Solid State Speed Control, Add	114.70	
				For Damper Motor, Add	277.68	
23 34 23 00-0004	EA			1/8 HP, 863 CFM At 1/4" Static Pressure, 17" x 17" Base, Direct Drive, Aluminum, Centrifugal Roof Exhauster 690.24	690.24	182.32
				Note: Three speed motor.		
				For 12" Roof Curb, Add	218.12	
				For Backdraft Damper, Add	157.82	
				For Solid State Speed Control, Add	114.70	
				For Damper Motor, Add	277.68	
23 34 23 00-0005	EA			1/6 HP, 1,213 CFM At 1/4" Static Pressure, 19" x 19" Base, Direct Drive, Aluminum, Centrifugal Roof Exhauster 986.95	986.95	212.71
				For 12" Roof Curb, Add	224.45	
				For Backdraft Damper, Add	169.23	
				For Solid State Speed Control, Add	114.70	
				For Damper Motor, Add	277.68	
23 34 23 00-0006	EA			1/4 HP, 1,374 CFM At 1/4" Static Pressure, 19" x 19" Base, Direct Drive, Aluminum, Centrifugal Roof Exhauster 1,017.02	1,017.02	239.72
				For 12" Roof Curb, Add	224.45	
				For Backdraft Damper, Add	169.23	
				For Solid State Speed Control, Add	114.70	
				For Damper Motor, Add	277.68	
23 34 23 00-0007	EA			1/3 HP, 1,905 CFM At 1/4" Static Pressure, 22" x 22" Base, Direct Drive, Aluminum, Centrifugal Roof Exhauster 1,306.17	1,306.17	264.48
				For 12" Roof Curb, Add	114.70	
				For Backdraft Damper, Add	277.68	
23 34 23 00-0008	EA			1/2 HP, 3,072 CFM At 1/4" Static Pressure, 22" x 22" Base, Direct Drive, Aluminum, Centrifugal Roof Exhauster 1,481.37	1,481.37	281.36
				For 12" Roof Curb, Add	235.01	
				For Backdraft Damper, Add	192.18	
				For Solid State Speed Control, Add	180.16	
				For Damper Motor, Add	277.68	
23 34 23 00-0009				Belt Drive, Aluminum, Centrifugal Roof Exhausters (23 34 23 00-0001)		
				Note: Greenheck GB.		
23 34 23 00-0010	EA			1/4 HP, 1,556 CFM At 1/4" Static Pressure, 19" x 19" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 1,455.53	1,455.53	286.53
				For 12" Roof Curb, Add	224.45	
				For Backdraft Damper, Add	169.23	
				For Damper Motor, Add	277.68	
23 34 23 00-0011	EA			1/3 HP, 1,966 CFM At 1/4" Static Pressure, 22" x 22" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 1,587.71	1,587.71	304.17
				For 12" Roof Curb, Add	235.01	
				For Backdraft Damper, Add	192.18	
				For Damper Motor, Add	277.68	
23 34 23 00-0012	EA			1/2 HP, 2,943 CFM At 1/4" Static Pressure, 22" x 22" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 2,152.02	2,152.02	363.53
				For 12" Roof Curb, Add	235.01	
				For Backdraft Damper, Add	192.18	
				For Damper Motor, Add	277.68	
23 34 23 00-0013	EA			3/4 HP, 4,289 CFM At 1/4" Static Pressure, 30" x 30" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 2,745.57	2,745.57	450.19
				For 12" Roof Curb, Add	285.69	
				For Backdraft Damper, Add	241.14	
				For Damper Motor, Add	277.68	
23 34 23 00-0014	EA			1 HP, 6,157 CFM At 1/4" Static Pressure, 34" x 34" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 3,623.06	3,623.06	562.73
				For 12" Roof Curb, Add	308.92	
				For Backdraft Damper, Add	261.21	
				For Damper Motor, Add	277.68	
23 34 23 00-0015	EA			1-1/2 HP, 8,906 CFM At 1/4" Static Pressure, 40" x 40" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 5,885.52	5,885.52	703.41
				For 12" Roof Curb, Add	344.82	
				For Backdraft Damper, Add	289.95	
				For Damper Motor, Add	277.68	
23 34 23 00-0016	EA			2 HP, 10,059 CFM At 1/4" Static Pressure, 40" x 40" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 5,936.20	5,936.20	703.41
				For 12" Roof Curb, Add	344.82	
				For Backdraft Damper, Add	289.95	
				For Damper Motor, Add	277.68	
23 34 23 00-0017	EA			3 HP, 11,703 CFM At 1/4" Static Pressure, 40" x 40" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 6,483.11	6,483.11	703.41
				For 12" Roof Curb, Add	344.82	
				For Backdraft Damper, Add	289.95	
				For Damper Motor, Add	277.68	
23 34 23 00-0018	EA			5 HP, 13,897 CFM At 1/4" Static Pressure, 40" x 40" Base, Belt Drive, Aluminum, Centrifugal Roof Exhauster 5,234.97	5,234.97	703.41
				For 12" Roof Curb, Add	344.82	
				For Backdraft Damper, Add	289.95	
				For Damper Motor, Add	277.68	
23 34 23 00-0019				Propeller Exhaust Fans, Roof Mounted Upblast (23 34 23 00-0001)		
				Note: Includes back draft damper and birdscreen and curb.		
23 34 23 00-0020	EA			30,300 CFM Belt Drive 5 HP Propeller Exhaust Fan, Roof Mounted, 3/8" Static Pressure 8,473.87	8,473.87	865.48
23 34 23 00-0021	EA			36,000 CFM Belt Drive 15 HP Propeller Exhaust Fan, Roof Mounted, 1/2" Static Pressure 13,947.02	13,947.02	1,125.12

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 34 HVAC Fans**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 34 23 00-0022		Belt Drive Supply Fans (23 34 23 00-0001)		
23 34 23 00-0023	EA	4,500 CFM, 24" x 24" Supply Fan, Roof Mounted	3,326.12	449.40
23 34 23 00-0024	EA	10,000 CFM, 36" x 36" Supply Fan, Roof Mounted	4,504.52	562.62
23 34 23 00-0025		Fan Thermostat (23 34 23 00-0001)		
23 34 23 00-0026	EA	50 To 120 Degree Line Voltage Fan Thermostat.....	146.54	
23 34 23 00-0027		Power Wall Ventilators (23 34 23)		
23 34 23 00-0028		Centrifugal Sidewall Exhausters (23 34 23 00-0027)		
23 34 23 00-0029		Direct Drive, Aluminum, Centrifugal Sidewall Exhauster (23 34 23 00-0028)		
		Note: Greenheck CW.		
23 34 23 00-0030	EA	1/25 HP, 297 CFM At 1/4" Static Pressure, Direct Drive, Aluminum, Centrifugal Sidewall Exhauster	827.76	181.19
		For Solid State Speed Control, Add	180.16	
		For Backdraft Damper, Add	221.68	
		For Damper Motor, Add	480.89	
		For Interior Wall Grill, Add	137.95	
23 34 23 00-0031	EA	1/8 HP, 861 CFM At 1/4" Static Pressure, Direct Drive, Aluminum, Centrifugal Sidewall Exhauster	949.95	212.71
		For Solid State Speed Control, Add	180.16	
		For Backdraft Damper, Add	244.63	
		For Damper Motor, Add	480.89	
		For Interior Wall Grill, Add	164.42	
23 34 23 00-0032	EA	1/6 HP, 1,179 CFM At 1/4" Static Pressure, Direct Drive, Aluminum, Centrifugal Sidewall Exhauster	1,418.93	239.72
		For Solid State Speed Control, Add	180.16	
		For Backdraft Damper, Add	276.26	
		For Damper Motor, Add	480.89	
		For Interior Wall Grill, Add	190.88	
23 34 23 00-0033		Belt Drive, Aluminum, Centrifugal Sidewall Exhausters (23 34 23 00-0028)		
		Note: Greenheck CWB.		
23 34 23 00-0034	EA	1/4 HP, 1,633 CFM At 1/4" Static Pressure, Belt Drive, Aluminum, Centrifugal Sidewall Exhauster	2,582.97	135.39
		For Solid State Speed Control, Add	180.16	
		For Backdraft Damper, Add	254.69	
		For Damper Motor, Add	480.89	
		For Interior Wall Grill, Add	291.25	
23 34 23 00-0035	EA	1/2 HP, 2,291 CFM At 1/4" Static Pressure, Belt Drive, Aluminum, Centrifugal Sidewall Exhauster	2,726.93	152.46
		For Solid State Speed Control, Add	180.16	
		For Backdraft Damper, Add	254.69	
		For Damper Motor, Add	480.89	
		For Interior Wall Grill, Add	291.25	
23 34 23 00-0036	EA	3/4 HP, 3,646 CFM At 1/4" Static Pressure, Belt Drive, Aluminum, Centrifugal Sidewall Exhauster	3,351.54	174.41
		For Solid State Speed Control, Add	180.16	
		For Backdraft Damper, Add	320.22	
		For Damper Motor, Add	480.89	
		For Interior Wall Grill, Add	338.82	
23 34 33		Air Curtains (23 34)		
23 34 33 00-0001		Unheated Air Curtains For Entrances (23 34 33)		
23 34 33 00-0002		Unheated Air Curtains, Standard Velocity (23 34 33 00-0001)		
23 34 33 00-0003	EA	Air Curtain For 3' x 8' - 10' Personnel Entrance, Unheated.....	2,385.73	824.96
		Note: Includes housing, mounting brackets and manual controls.		
		For Door Limit Switch, Combination Roller And Plunger, Add	202.02	
		For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 1Ø, Add	549.94	
		For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 1Ø	408.52	
		For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 1Ø, Add	628.50	
		For Flat Side Extension Plates, Add	162.14	
		For Clearance Adjustable-Angle Mounting Bracket, Add	324.29	
		For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	389.15	
		For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	410.77	
23 34 33 00-0004	EA	Air Curtain For 3.5' x 8' - 10' Personnel Entrance, Unheated.....	2,419.12	824.96
		Note: Includes housing, mounting brackets and manual controls.		
		For Door Limit Switch, Combination Roller And Plunger, Add	202.02	
		For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 1Ø, Add	549.94	
		For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 1Ø	408.52	
		For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 1Ø, Add	628.50	
		For Flat Side Extension Plates, Add	162.14	
		For Clearance Adjustable-Angle Mounting Bracket, Add	324.29	
		For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	389.15	
		For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	410.77	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 33 00-0005 EA Air Curtain For 4' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	2,455.29 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	824.96
23 34 33 00-0006 EA Air Curtain For 5' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	3,053.51 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	824.96
23 34 33 00-0007 EA Air Curtain For 6' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	3,464.98 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	990.40
23 34 33 00-0008 EA Air Curtain For 7' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	3,673.66 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	990.40
23 34 33 00-0009 EA Air Curtain For 8' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	4,071.48 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	1,142.34
23 34 33 00-0010 EA Air Curtain For 9' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	4,904.81 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	1,142.34
23 34 33 00-0011 EA Air Curtain For 10' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	5,010.54 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	1,142.34
23 34 33 00-0012 EA Air Curtain For 12' x 8' - 10' Personnel Entrance, Unheated..... Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Commercial Magnetic Reed Switch with Controller and Adjustable Time Delay - 115, 208-230 Volt 10, Add</i> <i>For Commercial Magnetic Reed Switch with Controller - 115, 208-230 Volt 10</i> <i>For Door Limit switch with Controller and Adjustable Time Delay - 115, 208-230 Volt, 10, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	5,291.56 202.02 549.94 408.52 628.50 162.14 324.29 389.15 410.77	1,142.34

23 34 33 00-0013 Unheated Air Curtains, High Velocity (23 34 33 00-0001)

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 34 HVAC Fans



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 33 00-0014	EA		High Velocity Air Curtain For 3' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	2,939.43 202.02 324.29 162.14 324.29 389.15 410.77	824.96
23 34 33 00-0015	EA		High Velocity Air Curtain For 3.5' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	2,982.55 202.02 324.29 162.14 324.29 389.15 410.77	824.96
23 34 33 00-0016	EA		High Velocity Air Curtain For 4' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	3,000.64 202.02 324.29 162.14 324.29 389.15 410.77	824.96
23 34 33 00-0017	EA		High Velocity Air Curtain For 5' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	3,035.42 202.02 324.29 162.14 324.29 389.15 410.77	824.96
23 34 33 00-0018	EA		High Velocity Air Curtain For 6' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	4,733.76 202.02 324.29 162.14 324.29 389.15 410.77	990.40
23 34 33 00-0019	EA		High Velocity Air Curtain For 7' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	4,948.00 202.02 324.29 162.14 324.29 389.15 410.77	990.40
23 34 33 00-0020	EA		High Velocity Air Curtain For 8' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	5,266.52 202.02 324.29 162.14 324.29 389.15 410.77	1,142.34
23 34 33 00-0021	EA		High Velocity Air Curtain For 9' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	6,008.03 202.02 324.29 162.14 324.29 389.15 410.77	1,142.34
23 34 33 00-0022	EA		High Velocity Air Curtain For 10' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	6,085.94 202.02 324.29 162.14 324.29 389.15 410.77	1,142.34
23 34 33 00-0023	EA		High Velocity Air Curtain For 12' x 10' - 12' Entrance, Unheated Note: Includes housing, mounting brackets and manual controls. <i>For Door Limit Switch, Combination Roller And Plunger, Add</i> <i>For Industrial Floor-Mounted Magnetic Reed Switch Only, Add</i> <i>For Flat Side Extension Plates, Add</i> <i>For Clearance Adjustable-Angle Mounting Bracket, Add</i> <i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i> <i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	6,389.22 202.02 324.29 162.14 324.29 389.15 410.77	1,142.34

23 34 33 00-0024 Service Window Unheated Air Curtains (23 34 33 00-0001)
Note: Normal window sizes.

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 34 33 00-0025 EA Air Curtain For 2.5' x 5' Service Window, Unheated Note: Includes housing, mounting brackets and manual controls. For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	2,176.70 202.02 162.14 324.29 389.15 410.77	650.52
23 34 33 00-0026 Heated Air Curtains For Entrances (23 34 33) Note: Includes housing, mounting brackets and manual controls.		
23 34 33 00-0027 EA 60" Heated Air Curtain With 1- 300 MBH Heater For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	4,137.80 202.02 162.14 324.29 389.15 410.77	726.48
23 34 33 00-0028 EA 60" Heated Air Curtain With 1- 400 MBH Heater For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	4,495.73 202.02 162.14 324.29 389.15 410.77	726.48
23 34 33 00-0029 EA 72" Heated Air Curtain With 1- 350 MBH Heater For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	4,964.63 202.02 162.14 324.29 389.15 410.77	871.67
23 34 33 00-0030 EA 72" Heated Air Curtain With 2- 250 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	5,394.15 202.02 162.14 324.29 389.15 410.77	871.67
23 34 33 00-0031 EA 96" Heated Air Curtain With 1- 400 MBH Heater For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	6,618.55 202.02 162.14 324.29 389.15 410.77	1,162.03
23 34 33 00-0032 EA 96" Heated Air Curtain With 2- 350 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	7,191.24 202.02 162.14 324.29 389.15 410.77	1,162.03
23 34 33 00-0033 EA 117" Heated Air Curtain With 2- 300 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	8,065.34 202.02 162.14 324.29 389.15 410.77	1,415.82
23 34 33 00-0034 EA 117" Heated Air Curtain With 2- 400 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	8,763.31 202.02 162.14 324.29 389.15 410.77	1,415.82
23 34 33 00-0035 EA 147" Heated Air Curtain With 2- 350 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	10,134.01 202.02 162.14 324.29 389.15 410.77	1,778.78
23 34 33 00-0036 EA 147" Heated Air Curtain With 3- 350 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	11,869.97 202.02 162.14 324.29 389.15 410.77	1,778.78
23 34 33 00-0037 EA 168" Heated Air Curtain With 2- 400 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	11,582.47 202.02 162.14 324.29 389.15 410.77	2,033.14
23 34 33 00-0038 EA 168" Heated Air Curtain With 3- 400 MBH Heaters For Door Limit Switch, Combination Roller And Plunger, Add For Flat Side Extension Plates, Add For Clearance Adjustable-Angle Mounting Bracket, Add For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add	13,566.00 202.02 162.14 324.29 389.15 410.77	2,033.14

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 34 HVAC Fans**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 34 33 00-0039	EA	192" Heated Air Curtain With 2- 400 MBH Heaters	13,233.27	2,323.50
		<i>For Door Limit Switch, Combination Roller And Plunger, Add</i>	202.02	
		<i>For Flat Side Extension Plates, Add</i>	162.14	
		<i>For Clearance Adjustable-Angle Mounting Bracket, Add</i>	324.29	
		<i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	389.15	
		<i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	410.77	
23 34 33 00-0040	EA	192" Heated Air Curtain With 4- 350 MBH Heaters	15,500.16	2,323.50
		<i>For Door Limit Switch, Combination Roller And Plunger, Add</i>	202.02	
		<i>For Flat Side Extension Plates, Add</i>	162.14	
		<i>For Clearance Adjustable-Angle Mounting Bracket, Add</i>	324.29	
		<i>For 10" To 16" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	389.15	
		<i>For 19" Clearance Drum-Roll-Style Extended Wall Mounting Bracket, Add</i>	410.77	

23 35 Special Exhaust Systems (23 30)**23 35 13 Dust Collection Systems (23 35)****23 35 13 13 Sawdust Collection Systems (23 35 13)****23 35 13 13-0001 Dust Collector System (23 35 13 13)**

23 35 13 13-0002	EA	1.5 HP Dust Collector Central Vacuum Unit	4,510.53	975.75
		Note: Includes fan bower, stand, cyclone, filter, silencer and 35 gallon fiber drum dust bin.		
23 35 13 13-0003	EA	2 HP Dust Collector Central Vacuum Unit	5,053.23	1,158.70
		Note: Includes fan bower, stand, cyclone, filter, silencer and 35 gallon fiber drum dust bin.		
23 35 13 13-0004	EA	2-1/2 HP Dust Collector Central Vacuum Unit	6,074.03	1,341.65
		Note: Includes fan bower, stand, cyclone, filter, silencer and 35 gallon fiber drum dust bin.		
23 35 13 13-0005	EA	3 HP Dust Collector Central Vacuum Unit	6,925.02	1,585.59
		Note: Includes fan bower, stand, cyclone, filter, silencer and 35 gallon fiber drum dust bin.		
23 35 13 13-0006	EA	5 HP Dust Collector Central Vacuum Unit	14,666.58	1,801.45
		Note: Includes fan bower, stand, cyclone, filter, silencer and 55 gallon fiber drum dust bin.		
23 35 13 13-0007	EA	7-1/2 HP Dust Collector Central Vacuum Unit	17,798.29	2,101.69
		Note: Includes fan bower, stand, cyclone, filter, silencer and 55 gallon fiber drum dust bin.		
23 35 13 13-0008	EA	10 HP Dust Collector Central Vacuum Unit	20,387.59	2,401.93
		Note: Includes fan bower, stand, cyclone, filter, silencer and 55 gallon fiber drum dust bin.		
23 35 13 13-0009	EA	15 HP Dust Collector Central Vacuum Unit	22,921.67	2,762.23
		Note: Includes fan bower, stand, cyclone, filter, silencer and two 55 gallon fiber drum dust bin.		
23 35 13 13-0010	EA	20 HP Dust Collector Central Vacuum Unit	25,575.27	3,122.51
		Note: Includes fan bower, stand, cyclone, filter, silencer and two 55 gallon fiber drum dust bin.		

23 35 13 13-0011 Vacuum Tubing And Accessories (23 35 13 13)**23 35 13 13-0012 Vacuum Tubing (23 35 13 13-0011)****23 35 13 13-0013 Flexible Hose (23 35 13 13-0012)**

23 35 13 13-0014	LF	2" Flexible Hose	12.79	2.02
23 35 13 13-0015	LF	3" Flexible Hose	15.33	2.25
23 35 13 13-0016	LF	4" Flexible Hose	16.63	2.48

23 35 13 13-0017 Galvanized Vacuum Tubing (23 35 13 13-0012)

23 35 13 13-0018	LF	2-1/8" Outside Diameter Vacuum Tubing, Galvanized	10.55	2.02
23 35 13 13-0019	LF	2-1/2" Outside Diameter Vacuum Tubing, Galvanized	11.81	2.14
23 35 13 13-0020	LF	3" Outside Diameter Vacuum Tubing, Galvanized	14.05	2.25
23 35 13 13-0021	LF	3-1/2" Outside Diameter Vacuum Tubing, Galvanized	18.27	2.37
23 35 13 13-0022	LF	4" Outside Diameter Vacuum Tubing, Galvanized	18.79	2.48
23 35 13 13-0023	LF	5" Outside Diameter Vacuum Tubing, Galvanized	31.04	2.81
23 35 13 13-0024	LF	6" Outside Diameter Vacuum Tubing, Galvanized	34.99	3.26
23 35 13 13-0025	LF	8" Outside Diameter Vacuum Tubing, Galvanized	47.34	4.50
23 35 13 13-0026	LF	10" Outside Diameter Vacuum Tubing, Galvanized	55.47	5.63
23 35 13 13-0027	LF	12" Outside Diameter Vacuum Tubing, Galvanized	137.95	7.43

23 35 13 13-0028 Vacuum Fittings, Galvanized (23 35 13 13-0011)**23 35 13 13-0029 90 Degree Elbow (23 35 13 13-0028)**

23 35 13 13-0030	EA	2-1/8" 90 Degree Elbow, Vacuum Tubing, Galvanized	53.14	12.94
23 35 13 13-0031	EA	2-1/2" 90 Degree Elbow, Vacuum Tubing, Galvanized	65.62	13.84
23 35 13 13-0032	EA	3" 90 Degree Elbow, Vacuum Tubing, Galvanized	81.67	15.08
23 35 13 13-0033	EA	3-1/2" 90 Degree Elbow, Vacuum Tubing, Galvanized	96.28	16.32
23 35 13 13-0034	EA	4" 90 Degree Elbow, Vacuum Tubing, Galvanized	114.62	18.01
23 35 13 13-0035	EA	5" 90 Degree Elbow, Vacuum Tubing, Galvanized	188.88	20.03
23 35 13 13-0036	EA	6" 90 Degree Elbow, Vacuum Tubing, Galvanized	250.46	22.51
23 35 13 13-0037	EA	8" 90 Degree Elbow, Vacuum Tubing, Galvanized	448.88	30.05

23 35 13 13-0038 45 Degree Elbow (23 35 13 13-0028)

23 35 13 13-0039	EA	2-1/8" 45 Degree Elbow, Vacuum Tubing, Galvanized	49.83	12.94
23 35 13 13-0040	EA	2-1/2" 45 Degree Elbow, Vacuum Tubing, Galvanized	62.90	13.84
23 35 13 13-0041	EA	3" 45 Degree Elbow, Vacuum Tubing, Galvanized	72.52	15.08
23 35 13 13-0042	EA	3-1/2" 45 Degree Elbow, Vacuum Tubing, Galvanized	85.95	16.32
23 35 13 13-0043	EA	4" 45 Degree Elbow, Vacuum Tubing, Galvanized	105.07	18.01

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 35 13 13-0044 EA 5" 45 Degree Elbow, Vacuum Tubing, Galvanized.....	155.75	20.03
23 35 13 13-0045 EA 6" 45 Degree Elbow, Vacuum Tubing, Galvanized.....	201.74	22.51
23 35 13 13-0046 EA 8" 45 Degree Elbow, Vacuum Tubing, Galvanized.....	367.04	30.05
23 35 13 13-0047 Wye <small>(23 35 13 13-0028)</small>		
23 35 13 13-0048 EA 2-1/8" Wye, Vacuum Tubing, Galvanized.....	96.27	21.38
23 35 13 13-0049 EA 2-1/2" Wye, Vacuum Tubing, Galvanized.....	115.42	23.07
23 35 13 13-0050 EA 3" Wye, Vacuum Tubing, Galvanized.....	140.56	24.76
23 35 13 13-0051 EA 3-1/2" Wye, Vacuum Tubing, Galvanized.....	170.54	27.58
23 35 13 13-0052 EA 4" Wye, Vacuum Tubing, Galvanized.....	226.72	29.82
23 35 13 13-0053 EA 5" Wye, Vacuum Tubing, Galvanized.....	381.65	33.20
23 35 13 13-0054 EA 6" Wye, Vacuum Tubing, Galvanized.....	505.14	37.70
23 35 13 13-0055 EA 8" Wye, Vacuum Tubing, Galvanized.....	995.30	41.08
23 35 13 13-0056 EA 10" Wye, Vacuum Tubing, Galvanized.....	1,377.42	45.02
23 35 13 13-0057 EA 12" Wye, Vacuum Tubing, Galvanized.....	1,739.59	50.42
23 35 13 13-0058 Reducer <small>(23 35 13 13-0028)</small>		
23 35 13 13-0059 EA 3" Reducer, Vacuum Tubing, Galvanized.....	54.97	15.08
23 35 13 13-0060 EA 4" Reducer, Vacuum Tubing, Galvanized.....	61.10	16.32
23 35 13 13-0061 EA 5" Reducer, Vacuum Tubing, Galvanized.....	76.98	18.01
23 35 13 13-0062 EA 6" Reducer, Vacuum Tubing, Galvanized.....	83.09	20.03
23 35 13 13-0063 EA 8" Reducer, Vacuum Tubing, Galvanized.....	97.15	22.51
23 35 13 13-0064 Air Gate Valve, Galvanized <small>(23 35 13 13-0011)</small>		
23 35 13 13-0065 EA 2-1/8" Air Gate Valve, Vacuum Tubing, Galvanized.....	374.98	30.05
23 35 13 13-0066 EA 2-1/2" Air Gate Valve, Vacuum Tubing, Galvanized.....	392.85	32.08
23 35 13 13-0067 EA 3" Air Gate Valve, Vacuum Tubing, Galvanized.....	451.17	34.55
23 35 13 13-0068 EA 3-1/2" Air Gate Valve, Vacuum Tubing, Galvanized.....	513.80	36.91
23 35 13 13-0069 EA 4" Air Gate Valve, Vacuum Tubing, Galvanized.....	579.07	39.17
23 35 13 13-0070 EA 5" Air Gate Valve, Vacuum Tubing, Galvanized.....	683.69	44.68
23 35 13 13-0071 EA 6" Air Gate Valve, Vacuum Tubing, Galvanized.....	787.32	50.09
23 35 19 Fume Exhaust Systems <small>(23 35)</small>		
23 35 19 00-0001 EA Fume Exhauster, 1 1/2 HP 630 CFM With Out Hose And Intake Nozzle.....	2,596.90	449.84
23 35 19 00-0002 EA Hose Extension Kit 5'.....	415.79	99.94
23 36 Air Terminal Units <small>(23 30)</small>		
23 36 13 Constant-Air-Volume Units <small>(23 36)</small>		
23 36 13 00-0001 Duct Boxes, Constant Volume Control <small>(23 36 13)</small>		
23 36 13 00-0002 Single Duct Boxes, Constant Volume Control <small>(23 36 13 00-0001)</small>		
23 36 13 00-0003 EA 4 - 6" Diameter Inlet, 50 - 240 CFM, Single Duct Boxes, Constant Volume Control.....	1,420.22	46.34
<i>For Boxes With Motor, Add</i>	247.45	
23 36 13 00-0004 EA 6 - 8" Diameter Inlet, 100 - 480 CFM, Single Duct Boxes, Constant Volume Control.....	1,572.08	50.01
<i>For Boxes With Motor, Add</i>	274.50	
23 36 13 00-0005 EA 7 - 10" Diameter Inlet, 150 - 720 CFM, Single Duct Boxes, Constant Volume Control.....	1,632.59	54.88
<i>For Boxes With Motor, Add</i>	282.61	
23 36 13 00-0006 EA 9 - 12" Diameter Inlet, 200 - 960 CFM, Single Duct Boxes, Constant Volume Control.....	1,662.03	57.33
<i>For Boxes With Motor, Add</i>	286.67	
23 36 13 00-0007 EA 12" Diameter Inlet, 250 - 1,200 CFM, Single Duct Boxes, Constant Volume Control.....	1,685.68	63.42
<i>For Boxes With Motor, Add</i>	286.67	
23 36 13 00-0008 EA 14" Diameter Inlet, 350 - 1,680 CFM, Single Duct Boxes, Constant Volume Control.....	1,928.05	70.74
<i>For Boxes With Motor, Add</i>	328.59	
23 36 13 00-0009 EA 16" Diameter Inlet, 450 - 2,160 CFM, Single Duct Boxes, Constant Volume Control.....	2,021.96	79.28
<i>For Boxes With Motor, Add</i>	340.76	
23 36 13 00-0010 EA 20" x 16" Inlet, 550 - 2,640 CFM, Single Duct Boxes, Constant Volume Control.....	2,143.74	95.14
<i>For Boxes With Motor, Add</i>	353.04	
23 36 13 00-0011 EA 24" x 16" Inlet, 650 - 3,120 CFM, Single Duct Boxes, Constant Volume Control.....	2,264.56	109.78
<i>For Boxes With Motor, Add</i>	365.10	
23 36 13 00-0012 Dual Duct Boxes, Constant Volume Control <small>(23 36 13 00-0001)</small>		
23 36 13 00-0013 EA 4 - 6" Diameter Inlet, 50 - 240 CFM, Dual Duct Boxes, Constant Volume Control.....	2,002.27	46.34
<i>For Boxes With Motor, Add</i>	363.86	
23 36 13 00-0014 EA 6 - 8" Diameter Inlet, 100 - 480 CFM, Dual Duct Boxes, Constant Volume Control.....	2,141.73	50.01
<i>For Boxes With Motor, Add</i>	388.43	
23 36 13 00-0015 EA 7 - 10" Diameter Inlet, 150 - 720 CFM, Dual Duct Boxes, Constant Volume Control.....	2,234.61	54.88
<i>For Boxes With Motor, Add</i>	403.01	
23 36 13 00-0016 EA 9 - 12" Diameter Inlet, 200 - 960 CFM, Dual Duct Boxes, Constant Volume Control.....	2,328.20	57.33
<i>For Boxes With Motor, Add</i>	419.90	
23 36 13 00-0017 EA 12" Diameter Inlet, 250 - 1,200 CFM, Dual Duct Boxes, Constant Volume Control.....	2,351.85	63.42
<i>For Boxes With Motor, Add</i>	419.90	
23 36 13 00-0018 EA 14" Diameter Inlet, 350 - 1,680 CFM, Dual Duct Boxes, Constant Volume Control.....	2,703.21	71.96
<i>For Boxes With Motor, Add</i>	483.62	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 36 Air Terminal Units**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 36 13 00-0019	EA		16" Diameter Inlet, 450 - 2,160 CFM, Dual Duct Boxes, Constant Volume Control	2,954.86	79.28
			<i>For Boxes With Motor, Add</i>	527.37	
23 36 13 00-0020	EA		20" x 16" Inlet, 550 - 2,640 CFM, Dual Duct Boxes, Constant Volume Control	3,180.43	95.14
			<i>For Boxes With Motor, Add</i>	560.38	
23 36 13 00-0021	EA		24" x 16" Inlet, 650 - 3,120 CFM, Dual Duct Boxes, Constant Volume Control	3,317.75	109.78
			<i>For Boxes With Motor, Add</i>	575.73	
23 36 16 Variable-Air-Volume Units (23 36)					
23 36 16 00-0001			Variable Volume Terminal Unit (23 36 16)		
			Note: Includes flow controllers, insulated plenum, system powered box mounted thermostat.		
23 36 16 00-0002			Single Duct Variable Volume Terminal Unit (23 36 16 00-0001)		
			Note: Enclosure only. For mounting DDC controls.		
23 36 16 00-0003	EA		6" Diameter Inlet, 80 To 500 CFM, Variable Air Volume Box With Enclosure Only	609.57	56.10
			Note: For mounting DDC controls		
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0004	EA		8" Diameter Inlet, 145 To 900 CFM, Variable Air Volume Box With Enclosure Only	681.85	63.42
			Note: For mounting DDC controls		
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0005	EA		10" Diameter Inlet, 230 To 1,400 CFM, Variable Air Volume Box With Enclosure Only	758.79	70.74
			Note: For mounting DDC controls		
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0006	EA		12" Diameter Inlet, 325 To 2,000 CFM, Variable Air Volume Box With Enclosure Only	808.99	79.28
			Note: For mounting DDC controls		
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0007	EA		14" Diameter Inlet, 450 To 3,000 CFM, Variable Air Volume Box With Enclosure Only	1,116.96	170.63
			Note: For mounting DDC controls		
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0008	EA		16" Diameter Inlet, 580 To 4,000 CFM, Variable Air Volume Box With Enclosure Only	1,341.43	202.47
			Note: For mounting DDC controls		
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0009			Single Duct Variable Volume Terminal Unit (23 36 16 00-0001)		
			Note: With pneumatic controls.		
23 36 16 00-0010	EA		6" Diameter Inlet, 80 - 500 CFM, Variable Air Volume Box With pneumatic controller	1,289.60	56.10
			<i>For Fan Powered Variable Air Volume Box, Add</i>	1,374.03	
			<i>For Hot Water Coils, Add</i>	433.04	
			<i>For Pressure Independent Actuator, Add</i>	67.57	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0011	EA		8" Diameter Inlet, 145 - 900 CFM, Variable Air Volume Box With pneumatic controller	1,393.80	63.42
			<i>For Fan Powered Variable Air Volume Box, Add</i>	1,471.48	
			<i>For Hot Water Coils, Add</i>	462.91	
			<i>For Pressure Independent Actuator, Add</i>	67.57	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0012	EA		10" Diameter Inlet, 230 - 1,400 CFM, Variable Air Volume Box With pneumatic controller	1,458.47	70.74
			<i>For Fan Powered Variable Air Volume Box, Add</i>	1,517.16	
			<i>For Hot Water Coils, Add</i>	475.85	
			<i>For Pressure Independent Actuator, Add</i>	67.57	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0013	EA		12" Diameter Inlet, 325 - 2,000 CFM, Variable Air Volume Box With pneumatic controller	1,520.94	79.28
			<i>For Fan Powered Variable Air Volume Box, Add</i>	1,559.81	
			<i>For Hot Water Coils, Add</i>	487.80	
			<i>For Pressure Independent Actuator, Add</i>	67.57	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0014	EA		14" Diameter Inlet, 450 To 3,000 CFM, Variable Air Volume Box With pneumatic controller	1,762.63	170.63
			<i>For Fan Powered Variable Air Volume Box, Add</i>	1,750.06	
			<i>For Hot Water Coils, Add</i>	543.54	
			<i>For Pressure Independent Actuator, Add</i>	67.57	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0015	EA		16" Diameter Inlet, 580 To 4,000 CFM, Variable Air Volume Box With pneumatic controller	2,041.10	202.47
			<i>For Fan Powered Variable Air Volume Box, Add</i>	1,896.71	
			<i>For Hot Water Coils, Add</i>	580.38	
			<i>For Pressure Independent Actuator, Add</i>	67.57	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0016			Single Duct Variable Volume Terminal Unit (23 36 16 00-0001)		
			Note: With analog electronic controls.		
23 36 16 00-0017	EA		6" Diameter Inlet, 60 To 500 CFM, Variable Air Volume Box With Analog Electronic Controls	2,136.58	56.10
			<i>For Hot Water Coils, Add</i>	776.49	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0018	EA		8" Diameter Inlet, 105 To 900 CFM, Variable Air Volume Box With Analog Electronic Controls	2,221.14	63.42
			<i>For Hot Water Coils, Add</i>	798.39	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0019	EA		10" Diameter Inlet, 165 To 1,400 CFM, Variable Air Volume Box With Analog Electronic Controls	2,298.08	70.74
			<i>For Hot Water Coils, Add</i>	816.31	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0020	EA		12" Diameter Inlet, 235 To 2,000 CFM, Variable Air Volume Box With Analog Electronic Controls	2,407.19	79.28
			<i>For Hot Water Coils, Add</i>	847.17	
			<i>For Filters And Frames, Add</i>	6.30	
23 36 16 00-0021	EA		14" Diameter Inlet, 320 To 3,000 CFM, Variable Air Volume Box With Analog Electronic Controls	2,651.34	170.63
			<i>For Hot Water Coils, Add</i>	903.92	
			<i>For Filters And Frames, Add</i>	6.30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 36 16 00-0022 EA 16" Diameter Inlet, 420 To 4,000 CFM, Variable Air Volume Box With Analog Electronic Controls <i>For Hot Water Coils, Add</i> <i>For Filters And Frames, Add</i>	2,700.44 923.83 6.30	170.63
23 36 16 00-0023 Dual Duct Variable Volume Terminal Unit <small>(23 36 16 00-0001)</small> Note: With flow control installation, plenum system power box, thermostat.		
23 36 16 00-0024 EA 6" Diameter Inlet, 75 - 500 CFM, Variable Air Volume Box, Dual Duct <i>For Filters And Frames, Add</i>	1,461.57 6.30	110.87
23 36 16 00-0025 EA 8" Diameter Inlet, 200 - 700 CFM, Variable Air Volume Box, Dual Duct <i>For Filters And Frames, Add</i>	1,597.75 6.30	126.24
23 36 16 00-0026 EA 10" Diameter Inlet, 400 - 1,000 CFM, Variable Air Volume Box, Dual Duct <i>For Filters And Frames, Add</i>	1,709.67 6.30	142.58
23 36 16 00-0027 EA 12" Diameter Inlet, 600 - 1,400 CFM, Variable Air Volume Box, Dual Duct <i>For Filters And Frames, Add</i>	1,874.63 6.30	159.05
23 36 16 00-0028 EA 14" Diameter Inlet, 800 - 2,700 CFM, Variable Air Volume Box, Dual Duct <i>For Filters And Frames, Add</i>	2,107.03 6.30	182.95
23 36 16 00-0029 EA 16" Diameter Inlet, 1,000 - 3,500 CFM, Variable Air Volume Box, Dual Duct <i>For Filters And Frames, Add</i>	2,312.10 6.30	219.54
23 36 16 00-0030 Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-M) <small>(23 36 16 00-0001)</small>		
23 36 16 00-0031 EA 0 To 200 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-A) <i>For Filters And Frames, Add</i>	611.02 6.30	76.23
23 36 16 00-0032 EA 0 To 300 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-B) <i>For Filters And Frames, Add</i>	662.93 6.30	83.85
23 36 16 00-0033 EA 0 To 400 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-C) <i>For Filters And Frames, Add</i>	716.36 6.30	91.47
23 36 16 00-0034 EA 0 To 700 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-D) <i>For Filters And Frames, Add</i>	771.37 6.30	99.10
23 36 16 00-0035 EA 0 To 1,000 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-E) <i>For Filters And Frames, Add</i>	828.13 6.30	106.72
23 36 16 00-0036 EA 0 To 1,000 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-F) <i>For Filters And Frames, Add</i>	886.69 6.30	114.35
23 36 16 00-0037 EA 0 To 1,100 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-G) <i>For Filters And Frames, Add</i>	952.29 6.30	121.97
23 36 16 00-0038 EA 0 To 1,900 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-H) <i>For Filters And Frames, Add</i>	1,015.29 6.30	129.59
23 36 16 00-0039 EA 0 To 2,400 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-J) <i>For Filters And Frames, Add</i>	1,080.58 6.30	137.21
23 36 16 00-0040 EA 0 To 3,800 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-K) <i>For Filters And Frames, Add</i>	1,148.28 6.30	144.83
23 36 16 00-0041 EA 0 To 5,400 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-L) <i>For Filters And Frames, Add</i>	1,218.61 6.30	152.46
23 36 16 00-0042 EA 0 To 5,400 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-M) <i>For Filters And Frames, Add</i>	1,291.70 6.30	160.09
23 36 16 00-0043 EA 0 To 6,700 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-N) <i>For Filters And Frames, Add</i>	1,367.80 6.30	167.71
23 36 16 00-0044 EA 0 To 10,000 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-P) <i>For Filters And Frames, Add</i>	1,440.16 6.30	175.33
23 36 16 00-0045 EA 0 To 15,000 CFM Digital Control, Constant Volume To Variable Volume Retrofit Terminal Unit (Titus DQCV-R) <i>For Filters And Frames, Add</i>	1,522.38 6.30	182.95
23 37 Air Outlets and Inlets <small>(23 30)</small>		
23 37 13 Diffusers, Registers, and Grilles <small>(23 37)</small>		
23 37 13 13 Diffusers, Registers, and Grilles <small>(23 37 13)</small>		
23 37 13 13-0001 Ceiling Diffusers <small>(23 37 13 13)</small>		
23 37 13 13-0002 Ceiling Diffusers With Perforated Face <small>(23 37 13 13-0001)</small> Note: Flush mount, aluminum construction, includes damper.		
23 37 13 13-0003 EA 6" x 6" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper <i>For Steel Construction, Deduct</i> <i>For Surface Mount, Deduct</i> <i>For Diffuser Without Damper, Deduct</i> <i>For Stainless Steel, Add</i>	127.20 -9.67 -7.74 -12.89 161.18	15.86
23 37 13 13-0004 EA 8" x 8" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper <i>For Steel Construction, Deduct</i> <i>For Surface Mount, Deduct</i> <i>For Diffuser Without Damper, Deduct</i> <i>For Stainless Steel, Add</i>	141.53 -11.82 -9.46 -15.76 197.00	15.86
23 37 13 13-0005 EA 9" x 9" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper <i>For Steel Construction, Deduct</i> <i>For Surface Mount, Deduct</i> <i>For Diffuser Without Damper, Deduct</i> <i>For Stainless Steel, Add</i>	141.53 -11.82 -9.46 -15.76 197.00	15.86
23 37 13 13-0006 EA 10" x 10" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper <i>For Steel Construction, Deduct</i> <i>For Surface Mount, Deduct</i> <i>For Diffuser Without Damper, Deduct</i> <i>For Stainless Steel, Add</i>	170.02 -14.15 -11.32 -18.86 235.80	19.51

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 37 Air Outlets and Inlets**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0007	EA		12" x 12" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper	170.02	18.29
			<i>For Steel Construction, Deduct</i>	-14.15	
			<i>For Surface Mount, Deduct</i>	-11.32	
			<i>For Diffuser Without Damper, Deduct</i>	-18.86	
			<i>For Stainless Steel, Add</i>	235.80	
23 37 13 13-0008	EA		16" x 16" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper	196.29	18.29
			<i>For Steel Construction, Deduct</i>	-18.09	
			<i>For Surface Mount, Deduct</i>	-14.47	
			<i>For Diffuser Without Damper, Deduct</i>	-24.12	
			<i>For Stainless Steel, Add</i>	301.48	
23 37 13 13-0009	EA		18" x 18" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper	224.70	24.40
			<i>For Steel Construction, Deduct</i>	-19.45	
			<i>For Surface Mount, Deduct</i>	-15.56	
			<i>For Diffuser Without Damper, Deduct</i>	-25.93	
			<i>For Stainless Steel, Add</i>	324.15	
23 37 13 13-0010	EA		20" x 20" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper	261.69	25.61
			<i>For Steel Construction, Deduct</i>	-24.29	
			<i>For Surface Mount, Deduct</i>	-19.43	
			<i>For Diffuser Without Damper, Deduct</i>	-32.38	
			<i>For Stainless Steel, Add</i>	404.75	
23 37 13 13-0011	EA		24" x 24" Ceiling Diffuser With Perforated Face, Flush Mount, Aluminum Construction With Damper	296.21	29.27
			<i>For Steel Construction, Deduct</i>	-27.01	
			<i>For Surface Mount, Deduct</i>	-21.61	
			<i>For Lay-In Mount, Deduct</i>	-21.61	
			<i>For Diffuser Without Damper, Deduct</i>	-36.01	
			<i>For Stainless Steel, Add</i>	450.13	
23 37 13 13-0012			Ceiling Diffusers With Louver Face <small>(23 37 13 13-0001)</small>		
			Note: 1 To 4 way adjustable pattern, surface mount aluminum construction.		
23 37 13 13-0013	EA		6" x 6" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	131.98	15.86
			<i>For Steel Construction, Deduct</i>	-10.39	
			<i>For Flush Mount, Add</i>	10.39	
			<i>For Stainless Steel, Add</i>	173.13	
23 37 13 13-0014	EA		8" x 8" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	150.60	15.86
			<i>For Steel Construction, Deduct</i>	-13.18	
			<i>For Flush Mount, Add</i>	13.18	
			<i>For Stainless Steel, Add</i>	219.68	
23 37 13 13-0015	EA		9" x 9" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	150.60	15.86
			<i>For Steel Construction, Deduct</i>	-13.18	
			<i>For Flush Mount, Add</i>	13.18	
			<i>For Stainless Steel, Add</i>	219.68	
23 37 13 13-0016	EA		10" x 10" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	180.77	18.29
			<i>For Steel Construction, Deduct</i>	-15.76	
			<i>For Flush Mount, Add</i>	15.76	
			<i>For Stainless Steel, Add</i>	262.68	
23 37 13 13-0017	EA		12" x 12" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	180.77	19.51
			<i>For Steel Construction, Deduct</i>	-15.76	
			<i>For Flush Mount, Add</i>	15.76	
			<i>For Stainless Steel, Add</i>	262.68	
23 37 13 13-0018	EA		24" x 12" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	232.99	24.40
			<i>For Steel Construction, Deduct</i>	-20.63	
			<i>For Flush Mount, Add</i>	20.63	
			<i>For Stainless Steel, Add</i>	343.85	
23 37 13 13-0019	EA		14" x 14" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	207.68	24.40
			<i>For Steel Construction, Deduct</i>	-16.83	
			<i>For Flush Mount, Add</i>	16.83	
			<i>For Stainless Steel, Add</i>	280.58	
23 37 13 13-0020	EA		18" x 18" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	259.53	29.27
			<i>For Steel Construction, Deduct</i>	-21.60	
			<i>For Flush Mount, Add</i>	21.60	
			<i>For Stainless Steel, Add</i>	359.98	
23 37 13 13-0021	EA		21" x 21" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	300.93	32.93
			<i>For Steel Construction, Deduct</i>	-26.86	
			<i>For Flush Mount, Add</i>	26.86	
			<i>For Stainless Steel, Add</i>	447.73	
23 37 13 13-0022	EA		24" x 24" Ceiling Diffuser, Louver Face, Adjustable Pattern, Surface Mounted, Aluminum Construction With Damper	329.02	64.52
			<i>For Steel Construction, Deduct</i>	-29.98	
			<i>For Flush Mount, Add</i>	29.98	
			<i>For Lay-In Mount, Add</i>	39.97	
			<i>For Stainless Steel, Add</i>	499.68	
23 37 13 13-0023			Round Ceiling Diffusers With Fixed Pattern <small>(23 37 13 13-0001)</small>		
			Note: Aluminum construction.		
23 37 13 13-0024	EA		6" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	217.73	15.86
			<i>For Steel Construction, Deduct</i>	-46.50	
			<i>For Stainless Steel, Add</i>	387.50	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0025 EA 8" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	225.68	15.86
<i>For Steel Construction, Deduct</i>	-48.89	
<i>For Stainless Steel, Add</i>	407.38	
23 37 13 13-0026 EA 10" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	254.54	19.51
<i>For Steel Construction, Deduct</i>	-53.65	
<i>For Stainless Steel, Add</i>	447.10	
23 37 13 13-0027 EA 12" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	274.42	18.29
<i>For Steel Construction, Deduct</i>	-59.62	
<i>For Stainless Steel, Add</i>	496.80	
23 37 13 13-0028 EA 14" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	393.84	21.96
<i>For Steel Construction, Deduct</i>	-91.81	
<i>For Stainless Steel, Add</i>	765.05	
23 37 13 13-0029 EA 16" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	415.38	23.18
<i>For Steel Construction, Deduct</i>	-97.17	
<i>For Stainless Steel, Add</i>	809.78	
23 37 13 13-0030 EA 18" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	437.24	24.40
<i>For Steel Construction, Deduct</i>	-102.54	
<i>For Stainless Steel, Add</i>	854.48	
23 37 13 13-0031 EA 20" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	506.05	24.40
<i>For Steel Construction, Deduct</i>	-121.88	
<i>For Stainless Steel, Add</i>	1,015.65	
23 37 13 13-0032 EA 24" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	604.36	28.05
<i>For Steel Construction, Deduct</i>	-148.37	
<i>For Stainless Steel, Add</i>	1,236.45	
23 37 13 13-0033 EA 28" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	680.78	29.27
<i>For Steel Construction, Deduct</i>	-169.57	
<i>For Stainless Steel, Add</i>	1,413.10	
23 37 13 13-0034 EA 32" Round Ceiling Diffuser With Fixed Pattern, Aluminum Construction	813.62	32.93
<i>For Steel Construction, Deduct</i>	-205.34	
<i>For Stainless Steel, Add</i>	1,711.18	
23 37 13 13-0035 Round Ceiling Diffusers With Adjustable Pattern Dropped Style (23 37 13 13-0001)		
Note: Aluminum construction.		
23 37 13 13-0036 EA 6" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	229.65	15.86
<i>For Steel Construction, Deduct</i>	-16.69	
<i>For Flush Mount, Deduct</i>	-8.35	
<i>For Stainless Steel, Add</i>	417.30	
23 37 13 13-0037 EA 8" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	250.19	15.86
<i>For Steel Construction, Deduct</i>	-18.75	
<i>For Flush Mount, Deduct</i>	-9.37	
<i>For Stainless Steel, Add</i>	468.65	
23 37 13 13-0038 EA 10" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	283.25	19.51
<i>For Steel Construction, Deduct</i>	-20.76	
<i>For Flush Mount, Deduct</i>	-10.38	
<i>For Stainless Steel, Add</i>	518.88	
23 37 13 13-0039 EA 12" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	306.21	19.51
<i>For Steel Construction, Deduct</i>	-23.05	
<i>For Flush Mount, Deduct</i>	-11.53	
<i>For Stainless Steel, Add</i>	576.28	
23 37 13 13-0040 EA 14" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	445.51	21.96
<i>For Steel Construction, Deduct</i>	-35.77	
<i>For Flush Mount, Deduct</i>	-17.88	
<i>For Stainless Steel, Add</i>	894.23	
23 37 13 13-0041 EA 16" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	391.35	23.18
<i>For Steel Construction, Deduct</i>	-38.22	
<i>For Flush Mount, Deduct</i>	-19.11	
<i>For Stainless Steel, Add</i>	955.50	
23 37 13 13-0042 EA 18" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	502.16	24.40
<i>For Steel Construction, Deduct</i>	-40.67	
<i>For Flush Mount, Deduct</i>	-20.34	
<i>For Stainless Steel, Add</i>	1,016.78	
23 37 13 13-0043 EA 20" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	583.33	25.61
<i>For Steel Construction, Deduct</i>	-48.35	
<i>For Flush Mount, Deduct</i>	-24.18	
<i>For Stainless Steel, Add</i>	1,208.85	
23 37 13 13-0044 EA 24" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	659.12	28.05
<i>For Steel Construction, Deduct</i>	-54.93	
<i>For Flush Mount, Deduct</i>	-27.47	
<i>For Stainless Steel, Add</i>	1,373.35	
23 37 13 13-0045 EA 28" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	800.01	29.27
<i>For Steel Construction, Deduct</i>	-68.45	
<i>For Flush Mount, Deduct</i>	-34.22	
<i>For Stainless Steel, Add</i>	1,711.18	
23 37 13 13-0046 EA 32" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	964.20	32.93
<i>For Steel Construction, Deduct</i>	-83.51	
<i>For Flush Mount, Deduct</i>	-41.75	
<i>For Stainless Steel, Add</i>	2,087.63	
23 37 13 13-0047 EA 36" Round Ceiling Diffuser With Adjustable Pattern, Aluminum Construction	1,068.54	68.67
<i>For Steel Construction, Deduct</i>	-205.34	
<i>For Stainless Steel, Add</i>	2,328.33	
23 37 13 13-0048 Linear Type Ceiling Diffusers With 2-Way Air Deflection (23 37 13 13-0001)		
23 37 13 13-0049 LF 4" Linear Type Ceiling Diffuser 40-200 CFM/LF, With 2-Way Air Deflection.....	173.48	18.29
<i>For Stainless Steel, Add</i>	250.75	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 37 Air Outlets and Inlets



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 37 13 13-0050	LF 6-1/4" Linear Type Ceiling Diffuser, 41 - 206 CFM/LF, With 2-Way Air Deflection.....	187.11	18.29
	<i>For Stainless Steel, Add</i>	284.83	
23 37 13 13-0051	LF 9-1/4" Linear Type Ceiling Diffuser, 62 - 312 CFM/LF, With 2-Way Air Deflection.....	203.89	18.29
	<i>For Stainless Steel, Add</i>	326.78	
23 37 13 13-0052	LF 12-1/4" Linear Type Ceiling Diffuser, 131 - 656 CFM/LF, With 2-Way Air Deflection.....	220.23	18.29
	<i>For Stainless Steel, Add</i>	367.63	
23 37 13 13-0053	Wall And Floor Diffusers <small>(23 37 13 13)</small>		
23 37 13 13-0054	Slot Type Linear Diffusers <small>(23 37 13 13-0053)</small>		
	Note: For sidewall sill or ceiling 1/2" 3/4" or 1" slot spacing 1-1/8" border.		
23 37 13 13-0055	LF 1 Slot Linear Diffusers 10 - 70 CFM/LF, Sidewall, Sill, Ceiling.....	58.73	6.10
	<i>For 3/4" Border, Add</i>	8.28	
	<i>For Floor Mounted Diffusers, Add</i>	9.94	
	<i>For Stainless Steel, Add</i>	43.06	
23 37 13 13-0056	LF 2 Slot Linear Diffusers 20 - 140 CFM/LF, Sidewall, Sill, Ceiling.....	72.20	7.32
	<i>For 3/4" Border, Add</i>	11.04	
	<i>For Floor Mounted Diffusers, Add</i>	13.25	
	<i>For Stainless Steel, Add</i>	57.41	
23 37 13 13-0057	LF 3 Slot Linear Diffusers 30 - 210 CFM/LF, Sidewall, Sill, Ceiling.....	101.28	8.54
	<i>For 3/4" Border, Add</i>	17.39	
	<i>For Floor Mounted Diffusers, Add</i>	20.87	
	<i>For Stainless Steel, Add</i>	90.42	
23 37 13 13-0058	LF 4 Slot Linear Diffusers 40 - 280 CFM/LF, Sidewall, Sill, Ceiling.....	134.71	8.54
	<i>For 3/4" Border, Add</i>	24.84	
	<i>For Floor Mounted Diffusers, Add</i>	29.81	
	<i>For Stainless Steel, Add</i>	129.17	
23 37 13 13-0059	LF 5 Slot Linear Diffusers 50 - 350 CFM/LF, Sidewall, Sill, Ceiling.....	169.45	9.76
	<i>For 3/4" Border, Add</i>	32.29	
	<i>For Floor Mounted Diffusers, Add</i>	38.75	
	<i>For Stainless Steel, Add</i>	167.92	
23 37 13 13-0060	LF 6 Slot Linear Diffusers 60 - 420 CFM/LF, Sidewall, Sill, Ceiling.....	198.66	12.19
	<i>For 3/4" Border, Add</i>	38.09	
	<i>For Floor Mounted Diffusers, Add</i>	45.71	
	<i>For Stainless Steel, Add</i>	198.06	
23 37 13 13-0061	Linear Bar Grilles And Registers <small>(23 37 13 13-0053)</small>		
	Note: For sidewall sill or ceiling or 15 degree deflection 1/2" bar spacing 1" border aluminum construction.		
23 37 13 13-0062	LF 2" Wide Linear Bar Grilles/Registers 30 - 70 CFM/LF, Sidewall, Sill, Ceiling.....	188.12	7.32
	<i>For Floor Mount, Add</i>	16.01	
	<i>For Opposed Blade Damper, Add</i>	32.02	
	<i>For Stainless Steel, Add</i>	208.10	
23 37 13 13-0063	LF 3" Wide Linear Bar Grilles/Registers 55 - 143 CFM/LF, Sidewall, Sill, Ceiling.....	224.93	8.54
	<i>For Floor Mount, Add</i>	19.32	
	<i>For Opposed Blade Damper, Add</i>	38.64	
	<i>For Stainless Steel, Add</i>	251.16	
23 37 13 13-0064	LF 4" Wide Linear Bar Grilles/Registers 80 - 208 CFM/LF, Sidewall, Sill, Ceiling.....	245.11	8.54
	<i>For Floor Mount, Add</i>	20.98	
	<i>For Opposed Blade Damper, Add</i>	41.95	
	<i>For Stainless Steel, Add</i>	272.69	
23 37 13 13-0065	LF 6" Wide Linear Bar Grilles/Registers 125 - 325 CFM/LF, Sidewall, Sill, Ceiling.....	300.23	12.19
	<i>For Floor Mount, Add</i>	25.39	
	<i>For Opposed Blade Damper, Add</i>	50.78	
	<i>For Stainless Steel, Add</i>	330.10	
23 37 13 13-0066	LF 9" Wide Linear Bar Grilles/Registers 225 - 450 CFM/LF, Sidewall, Sill, Ceiling.....	415.46	15.86
	<i>For Floor Mount, Add</i>	35.33	
	<i>For Opposed Blade Damper, Add</i>	70.65	
	<i>For Stainless Steel, Add</i>	459.25	
23 37 13 13-0067	LF 12" Wide Linear Bar Grilles/Registers 225 - 495 CFM/LF, Sidewall, Sill, Ceiling.....	478.65	18.29
	<i>For Floor Mount, Add</i>	40.30	
	<i>For Opposed Blade Damper, Add</i>	80.59	
	<i>For Stainless Steel, Add</i>	523.84	
23 37 13 13-0068	Return/Exhaust Registers And Grilles <small>(23 37 13 13)</small>		
23 37 13 13-0069	Return/Exhaust Registers With Frame <small>(23 37 13 13-0068)</small>		
	Note: Single deflection with opposed blade damper aluminum construction wall or ceiling mount.		
23 37 13 13-0070	EA 8" x 4" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	126.73	9.76
	<i>For Steel Construction, Deduct</i>	-17.77	
	<i>For Grilles (No Damper), Deduct</i>	-35.55	
	<i>For Removable Core, Add</i>	35.00	
	<i>For Cube Core With Frame, Add</i>	8.89	
	<i>For Cube Core Lay In, Add</i>	17.77	
	<i>For Stainless Steel, Add</i>	222.18	
23 37 13 13-0071	EA 8" x 6" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	146.05	9.76
	<i>For Steel Construction, Deduct</i>	-21.64	
	<i>For Grilles (No Damper), Deduct</i>	-43.28	
	<i>For Removable Core, Add</i>	35.00	
	<i>For Cube Core With Frame, Add</i>	10.82	
	<i>For Cube Core Lay In, Add</i>	21.64	
	<i>For Stainless Steel, Add</i>	270.48	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Distribution	23 30
Air Outlets and Inlets	23 37

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0072 EA 10" x 6" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	163.69	10.97
For Steel Construction, Deduct	-23.96	
For Grilles (No Damper), Deduct	-47.91	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	11.98	
For Cube Core Lay In, Add	23.96	
For Stainless Steel, Add	299.45	
23 37 13 13-0073 EA 10" x 10" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	170.84	12.19
For Steel Construction, Deduct	-23.96	
For Grilles (No Damper), Deduct	-47.91	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	11.98	
For Cube Core Lay In, Add	23.96	
For Stainless Steel, Add	299.45	
23 37 13 13-0074 EA 12" x 6" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	163.11	12.19
For Steel Construction, Deduct	-22.41	
For Grilles (No Damper), Deduct	-44.82	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	11.21	
For Cube Core Lay In, Add	22.41	
For Stainless Steel, Add	280.13	
23 37 13 13-0075 EA 12" x 12" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	209.56	15.86
For Steel Construction, Deduct	-29.37	
For Grilles (No Damper), Deduct	-58.73	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	14.68	
For Cube Core Lay In, Add	29.37	
For Stainless Steel, Add	367.08	
23 37 13 13-0076 EA 16" x 16" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	251.01	18.29
For Steel Construction, Deduct	-35.06	
For Grilles (No Damper), Deduct	-70.12	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	17.53	
For Cube Core Lay In, Add	35.06	
For Stainless Steel, Add	438.28	
23 37 13 13-0077 EA 18" x 18" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	308.05	21.96
For Steel Construction, Deduct	-44.05	
For Grilles (No Damper), Deduct	-88.09	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	22.02	
For Cube Core Lay In, Add	44.05	
For Stainless Steel, Add	550.58	
23 37 13 13-0078 EA 20" x 20" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	362.16	24.40
For Steel Construction, Deduct	-53.34	
For Grilles (No Damper), Deduct	-106.68	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	26.67	
For Cube Core Lay In, Add	53.34	
For Stainless Steel, Add	666.78	
23 37 13 13-0079 EA 24" x 12" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	322.87	24.40
For Steel Construction, Deduct	-44.62	
For Grilles (No Damper), Deduct	-89.23	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	22.31	
For Cube Core Lay In, Add	44.62	
For Stainless Steel, Add	557.70	
23 37 13 13-0080 EA 24" x 18" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	370.26	24.40
For Steel Construction, Deduct	-54.09	
For Grilles (No Damper), Deduct	-108.19	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	27.05	
For Cube Core Lay In, Add	54.09	
For Stainless Steel, Add	676.18	
23 37 13 13-0081 EA 24" x 24" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	390.11	28.05
For Steel Construction, Deduct	-56.07	
For Grilles (No Damper), Deduct	-112.13	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	28.03	
For Cube Core Lay In, Add	56.07	
For Stainless Steel, Add	700.83	
23 37 13 13-0082 EA 30" x 12" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	413.46	29.27
For Steel Construction, Deduct	-59.58	
For Grilles (No Damper), Deduct	-119.17	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	29.79	
For Cube Core Lay In, Add	59.58	
For Stainless Steel, Add	744.80	
23 37 13 13-0083 EA 30" x 18" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	476.89	32.93
For Steel Construction, Deduct	-69.55	
For Grilles (No Damper), Deduct	-139.10	
For Removable Core, Add	35.00	
For Cube Core With Frame, Add	34.77	
For Cube Core Lay In, Add	69.55	
For Stainless Steel, Add	869.35	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 37 Air Outlets and Inlets



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13	13-0084	EA	30" x 24" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	533.14	39.03
			<i>For Steel Construction, Deduct</i>	-75.26	
			<i>For Grilles (No Damper), Deduct</i>	-150.53	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	37.63	
			<i>For Cube Core Lay In, Add</i>	75.26	
			<i>For Stainless Steel, Add</i>	940.80	
23 37 13	13-0085	EA	30" x 30" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	696.75	39.03
			<i>For Steel Construction, Deduct</i>	-107.99	
			<i>For Grilles (No Damper), Deduct</i>	-215.97	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	53.99	
			<i>For Cube Core Lay In, Add</i>	107.99	
			<i>For Stainless Steel, Add</i>	1,349.83	
23 37 13	13-0086	EA	36" x 12" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	575.42	42.69
			<i>For Steel Construction, Deduct</i>	-81.31	
			<i>For Grilles (No Damper), Deduct</i>	-162.62	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	40.65	
			<i>For Cube Core Lay In, Add</i>	81.31	
			<i>For Stainless Steel, Add</i>	1,016.35	
23 37 13	13-0087	EA	36" x 18" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	559.87	41.47
			<i>For Steel Construction, Deduct</i>	-78.20	
			<i>For Grilles (No Damper), Deduct</i>	-156.40	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	39.10	
			<i>For Cube Core Lay In, Add</i>	78.20	
			<i>For Stainless Steel, Add</i>	977.48	
23 37 13	13-0088	EA	36" x 24" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	638.30	46.34
			<i>For Steel Construction, Deduct</i>	-91.07	
			<i>For Grilles (No Damper), Deduct</i>	-182.14	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	45.54	
			<i>For Cube Core Lay In, Add</i>	91.07	
			<i>For Stainless Steel, Add</i>	1,138.38	
23 37 13	13-0089	EA	36" x 36" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	869.74	50.01
			<i>For Steel Construction, Deduct</i>	-134.03	
			<i>For Grilles (No Damper), Deduct</i>	-268.06	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	67.02	
			<i>For Cube Core Lay In, Add</i>	134.03	
			<i>For Stainless Steel, Add</i>	1,675.38	
23 37 13	13-0090	EA	24" x 20" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	383.70	28.17
			<i>For Steel Construction, Deduct</i>	-54.23	
			<i>For Grilles (No Damper), Deduct</i>	-108.46	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	27.11	
			<i>For Cube Core Lay In, Add</i>	54.23	
			<i>For Stainless Steel, Add</i>	677.85	
23 37 13	13-0091	EA	32" x 40" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	664.18	42.22
			<i>For Steel Construction, Deduct</i>	-99.06	
			<i>For Grilles (No Damper), Deduct</i>	-198.12	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	49.53	
			<i>For Cube Core Lay In, Add</i>	99.06	
			<i>For Stainless Steel, Add</i>	1,238.25	
23 37 13	13-0092	EA	48" x 24" Single Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling.....	768.66	50.01
			<i>For Steel Construction, Deduct</i>	-113.67	
			<i>For Grilles (No Damper), Deduct</i>	-227.34	
			<i>For Removable Core, Add</i>	35.00	
			<i>For Cube Core With Frame, Add</i>	56.84	
			<i>For Cube Core Lay In, Add</i>	113.67	
			<i>For Stainless Steel, Add</i>	1,420.88	
23 37 13	13-0093		Return/Exhaust Registers Removable-Reversible <small>(23 37 13 13-0068)</small>		
			Note: Double deflection core and opposed blade damper radiused frame with boarder aluminum construction.		
23 37 13	13-0094	EA	8" x 4" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	116.68	9.76
			<i>For Steel Construction, Deduct</i>	-7.88	
			<i>For Flat Frame, Deduct</i>	-0.79	
			<i>For Grilles (No Damper), Deduct</i>	-15.76	
			<i>For Stainless Steel, Add</i>	197.05	
23 37 13	13-0095	EA	8" x 6" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	116.68	9.76
			<i>For Steel Construction, Deduct</i>	-7.88	
			<i>For Flat Frame, Deduct</i>	-0.79	
			<i>For Grilles (No Damper), Deduct</i>	-15.76	
			<i>For Stainless Steel, Add</i>	197.05	
23 37 13	13-0096	EA	10" x 6" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	143.60	10.97
			<i>For Steel Construction, Deduct</i>	-9.97	
			<i>For Flat Frame, Deduct</i>	-1.00	
			<i>For Grilles (No Damper), Deduct</i>	-19.94	
			<i>For Stainless Steel, Add</i>	249.23	
23 37 13	13-0097	EA	10" x 10" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	164.66	13.42
			<i>For Steel Construction, Deduct</i>	-11.36	
			<i>For Flat Frame, Deduct</i>	-1.14	
			<i>For Grilles (No Damper), Deduct</i>	-22.72	
			<i>For Stainless Steel, Add</i>	284.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0098 EA 12" x 6" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	162.34	12.19
<i>For Steel Construction, Deduct</i>	-11.13	
<i>For Flat Frame, Deduct</i>	-1.11	
<i>For Grilles (No Damper), Deduct</i>	-22.26	
<i>For Stainless Steel, Add</i>	278.20	
23 37 13 13-0099 EA 12" x 12" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	211.10	15.86
<i>For Steel Construction, Deduct</i>	-14.84	
<i>For Flat Frame, Deduct</i>	-1.48	
<i>For Grilles (No Damper), Deduct</i>	-29.67	
<i>For Stainless Steel, Add</i>	370.93	
23 37 13 13-0100 EA 16" x 16" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	343.86	19.51
<i>For Steel Construction, Deduct</i>	-26.82	
<i>For Flat Frame, Deduct</i>	-2.68	
<i>For Grilles (No Damper), Deduct</i>	-53.63	
<i>For Stainless Steel, Add</i>	670.40	
23 37 13 13-0101 EA 18" x 18" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	414.71	21.96
<i>For Steel Construction, Deduct</i>	-32.69	
<i>For Flat Frame, Deduct</i>	-3.27	
<i>For Grilles (No Damper), Deduct</i>	-65.38	
<i>For Stainless Steel, Add</i>	817.23	
23 37 13 13-0102 EA 20" x 20" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	468.71	24.40
<i>For Steel Construction, Deduct</i>	-37.33	
<i>For Flat Frame, Deduct</i>	-3.73	
<i>For Grilles (No Damper), Deduct</i>	-74.65	
<i>For Stainless Steel, Add</i>	933.15	
23 37 13 13-0103 EA 24" x 12" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	387.27	24.40
<i>For Steel Construction, Deduct</i>	-28.75	
<i>For Flat Frame, Deduct</i>	-2.87	
<i>For Grilles (No Damper), Deduct</i>	-57.50	
<i>For Stainless Steel, Add</i>	718.70	
23 37 13 13-0104 EA 24" x 18" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	526.37	25.61
<i>For Steel Construction, Deduct</i>	-42.66	
<i>For Flat Frame, Deduct</i>	-4.27	
<i>For Grilles (No Damper), Deduct</i>	-85.32	
<i>For Stainless Steel, Add</i>	1,066.45	
23 37 13 13-0105 EA 24" x 24" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	615.18	28.05
<i>For Steel Construction, Deduct</i>	-50.54	
<i>For Flat Frame, Deduct</i>	-5.05	
<i>For Grilles (No Damper), Deduct</i>	-101.08	
<i>For Stainless Steel, Add</i>	1,263.50	
23 37 13 13-0106 EA 30" x 12" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	467.93	29.27
<i>For Steel Construction, Deduct</i>	-35.24	
<i>For Flat Frame, Deduct</i>	-3.52	
<i>For Grilles (No Damper), Deduct</i>	-70.48	
<i>For Stainless Steel, Add</i>	880.98	
23 37 13 13-0107 EA 30" x 18" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	648.46	32.93
<i>For Steel Construction, Deduct</i>	-51.93	
<i>For Flat Frame, Deduct</i>	-5.19	
<i>For Grilles (No Damper), Deduct</i>	-103.86	
<i>For Stainless Steel, Add</i>	1,298.28	
23 37 13 13-0108 EA 30" x 24" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	780.46	39.03
<i>For Steel Construction, Deduct</i>	-62.36	
<i>For Flat Frame, Deduct</i>	-6.24	
<i>For Grilles (No Damper), Deduct</i>	-124.73	
<i>For Stainless Steel, Add</i>	1,559.10	
23 37 13 13-0109 EA 30" x 30" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	897.53	39.03
<i>For Steel Construction, Deduct</i>	-74.07	
<i>For Flat Frame, Deduct</i>	-7.41	
<i>For Grilles (No Damper), Deduct</i>	-148.14	
<i>For Stainless Steel, Add</i>	1,851.78	
23 37 13 13-0110 EA 36" x 12" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	602.41	41.47
<i>For Steel Construction, Deduct</i>	-43.35	
<i>For Flat Frame, Deduct</i>	-4.34	
<i>For Grilles (No Damper), Deduct</i>	-86.71	
<i>For Stainless Steel, Add</i>	1,083.83	
23 37 13 13-0111 EA 36" x 18" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	824.97	41.47
<i>For Steel Construction, Deduct</i>	-65.61	
<i>For Flat Frame, Deduct</i>	-6.56	
<i>For Grilles (No Damper), Deduct</i>	-131.22	
<i>For Stainless Steel, Add</i>	1,640.23	
23 37 13 13-0112 EA 36" x 24" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	957.28	46.34
<i>For Steel Construction, Deduct</i>	-77.43	
<i>For Flat Frame, Deduct</i>	-7.74	
<i>For Grilles (No Damper), Deduct</i>	-154.87	
<i>For Stainless Steel, Add</i>	1,935.83	
23 37 13 13-0113 EA 36" x 30" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	1,121.14	50.01
<i>For Steel Construction, Deduct</i>	-92.16	
<i>For Flat Frame, Deduct</i>	-9.22	
<i>For Grilles (No Damper), Deduct</i>	-184.31	
<i>For Stainless Steel, Add</i>	2,303.88	
23 37 13 13-0114 EA 36" x 36" Double Deflection Return/Exhaust Register, Aluminum, Opposed Blade Damper, Wall/Ceiling	1,186.05	50.01
<i>For Steel Construction, Deduct</i>	-98.65	
<i>For Flat Frame, Deduct</i>	-9.86	
<i>For Grilles (No Damper), Deduct</i>	-197.29	
<i>For Stainless Steel, Add</i>	2,466.15	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0115			Aluminum Eggcrate Ceiling Return Air And Exhaust Grilles (23 37 13 13-0068)		
23 37 13 13-0116	EA		6" x 6" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	59.24	11.93
23 37 13 13-0117	EA		8" x 4" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	59.24	11.93
23 37 13 13-0118	EA		8" x 6" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	64.52	11.93
23 37 13 13-0119	EA		8" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	66.63	11.93
23 37 13 13-0120	EA		10" x 4" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	64.52	11.93
23 37 13 13-0121	EA		10" x 6" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	66.63	11.93
23 37 13 13-0122	EA		10" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	79.99	15.64
23 37 13 13-0123	EA		10" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	82.10	15.64
23 37 13 13-0124	EA		12" x 6" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	77.88	15.64
23 37 13 13-0125	EA		12" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	82.10	15.64
23 37 13 13-0126	EA		12" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	84.21	15.64
23 37 13 13-0127	EA		12" x 12" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	86.32	15.64
23 37 13 13-0128	EA		14" x 6" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	83.16	15.64
23 37 13 13-0129	EA		14" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	87.38	15.64
23 37 13 13-0130	EA		14" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	89.49	15.64
23 37 13 13-0131	EA		14" x 14" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	98.99	15.64
23 37 13 13-0132	EA		16" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	87.38	15.64
23 37 13 13-0133	EA		16" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	94.77	15.64
23 37 13 13-0134	EA		16" x 12" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	98.99	15.64
23 37 13 13-0135	EA		16" x 14" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	126.78	23.07
23 37 13 13-0136	EA		16" x 16" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	128.89	23.07
23 37 13 13-0137	EA		18" x 12" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	124.67	23.07
23 37 13 13-0138	EA		18" x 18" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	152.80	26.78
23 37 13 13-0139	EA		20" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	122.56	23.07
23 37 13 13-0140	EA		20" x 20" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	163.36	26.78
23 37 13 13-0141	EA		22" x 4" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	85.27	15.64
23 37 13 13-0142	EA		22" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	124.67	23.07
23 37 13 13-0143	EA		22" x 22" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	183.06	30.50
23 37 13 13-0144	EA		24" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	122.56	23.07
23 37 13 13-0145	EA		24" x 10" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	126.78	23.07
23 37 13 13-0146	EA		24" x 12" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	146.47	26.78
			<i>For Lay-In Installation, Deduct</i>	-56.59	
23 37 13 13-0147	EA		24" x 14" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	152.80	26.78
23 37 13 13-0148	EA		24" x 16" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	170.40	30.50
23 37 13 13-0149	EA		24" x 18" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	176.73	30.50
23 37 13 13-0150	EA		24" x 20" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	184.12	30.50
23 37 13 13-0151	EA		24" x 24" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	197.84	30.50
			<i>For Lay-In Installation, Deduct</i>	-64.79	
23 37 13 13-0152	EA		30" x 8" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	149.64	26.78
23 37 13 13-0153	EA		48" x 12" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	243.78	33.43
23 37 13 13-0154	EA		48" x 24" Aluminum Eggcrate Ceiling Return Air And Exhaust Grille.....	419.34	40.85
			<i>For Lay-In Installation, Deduct</i>	-93.23	
23 37 13 13-0155			Supply Registers and Grilles (23 37 13 13)		
23 37 13 13-0156			Adjustable Curved Blade Register (23 37 13 13-0155)		
			Note: Ceiling mount aluminum construction four way pattern flush frame.		
23 37 13 13-0157	EA		6" x 6" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern.....	105.35	9.76
			<i>For Steel Construction, Deduct</i>	-10.13	
			<i>For Lay In Frame, Deduct</i>	-16.89	
			<i>For Three Way Pattern, Deduct</i>	-6.76	
			<i>For Two Way Pattern, Deduct</i>	-5.40	
			<i>For One Way Pattern, Deduct</i>	-5.40	
			<i>For Grille (No Damper), Deduct</i>	-10.13	
			<i>For Stainless Steel, Add</i>	168.90	
23 37 13 13-0158	EA		8" x 8" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern.....	109.33	9.76
			<i>For Steel Construction, Deduct</i>	-10.73	
			<i>For Lay In Frame, Deduct</i>	-17.89	
			<i>For Three Way Pattern, Deduct</i>	-7.15	
			<i>For Two Way Pattern, Deduct</i>	-5.72	
			<i>For One Way Pattern, Deduct</i>	-5.72	
			<i>For Grille (No Damper), Deduct</i>	-10.73	
			<i>For Stainless Steel, Add</i>	178.85	
23 37 13 13-0159	EA		12" x 6" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern.....	118.74	13.42
			<i>For Steel Construction, Deduct</i>	-10.13	
			<i>For Lay In Frame, Deduct</i>	-16.89	
			<i>For Three Way Pattern, Deduct</i>	-6.76	
			<i>For Two Way Pattern, Deduct</i>	-5.40	
			<i>For One Way Pattern, Deduct</i>	-5.40	
			<i>For Grille (No Damper), Deduct</i>	-10.13	
			<i>For Stainless Steel, Add</i>	168.90	
23 37 13 13-0160	EA		10" x 10" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern.....	133.32	12.19
			<i>For Steel Construction, Deduct</i>	-12.32	
			<i>For Lay In Frame, Deduct</i>	-20.54	
			<i>For Three Way Pattern, Deduct</i>	-8.21	
			<i>For Two Way Pattern, Deduct</i>	-6.57	
			<i>For One Way Pattern, Deduct</i>	-6.57	
			<i>For Grille (No Damper), Deduct</i>	-12.32	
			<i>For Stainless Steel, Add</i>	205.35	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0161 EA 12" x 12" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern	160.22	15.86
For Steel Construction, Deduct	-14.70	
For Lay In Frame, Deduct	-24.51	
For Three Way Pattern, Deduct	-9.80	
For Two Way Pattern, Deduct	-7.84	
For One Way Pattern, Deduct	-7.84	
For Grille (No Damper), Deduct	-14.70	
For Stainless Steel, Add	245.08	
23 37 13 13-0162 EA 14" x 14" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern	197.58	18.29
For Steel Construction, Deduct	-18.28	
For Lay In Frame, Deduct	-30.47	
For Three Way Pattern, Deduct	-12.19	
For Two Way Pattern, Deduct	-9.75	
For One Way Pattern, Deduct	-9.75	
For Grille (No Damper), Deduct	-18.28	
For Stainless Steel, Add	304.70	
23 37 13 13-0163 EA 16" x 16" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern	197.58	18.29
For Steel Construction, Deduct	-18.28	
For Lay In Frame, Deduct	-30.47	
For Three Way Pattern, Deduct	-12.19	
For Two Way Pattern, Deduct	-9.75	
For One Way Pattern, Deduct	-9.75	
For Grille (No Damper), Deduct	-18.28	
For Stainless Steel, Add	304.70	
23 37 13 13-0164 EA 18" x 18" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern	243.42	24.40
For Steel Construction, Deduct	-22.26	
For Lay In Frame, Deduct	-37.10	
For Three Way Pattern, Deduct	-14.84	
For Two Way Pattern, Deduct	-11.87	
For One Way Pattern, Deduct	-11.87	
For Grille (No Damper), Deduct	-22.26	
For Stainless Steel, Add	370.95	
23 37 13 13-0165 EA 24" x 24" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern	323.68	25.61
For Steel Construction, Deduct	-33.58	
For Lay In Frame, Deduct	-55.97	
For Three Way Pattern, Deduct	-22.39	
For Two Way Pattern, Deduct	-17.91	
For One Way Pattern, Deduct	-17.91	
For Grille (No Damper), Deduct	-33.58	
For Stainless Steel, Add	559.73	
23 37 13 13-0166 EA 30" x 30" Adjustable Curved Blade Register, Ceiling Mounted, Aluminum Construction, 4-Way Pattern	533.33	51.71
For Steel Construction, Deduct	-64.48	
For Lay In Frame, Deduct	-107.47	
For Three Way Pattern, Deduct	-42.99	
For Two Way Pattern, Deduct	-34.39	
For One Way Pattern, Deduct	-34.39	
For Grille (No Damper), Deduct	-64.48	
For Stainless Steel, Add	1,074.73	
23 37 13 13-0167 Removable-Reversible Core Registers <small>(23 37 13 13-0155)</small>		
Note: Double deflection radiused frame aluminum construction.		
23 37 13 13-0168 EA 6" x 6" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	122.58	9.76
For Steel Construction, Deduct	-8.48	
For Flat Frame, Deduct	-8.48	
For Grille (No Damper), Deduct	-25.44	
For Stainless Steel, Add	211.98	
23 37 13 13-0169 EA 8" x 8" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	157.02	9.76
For Steel Construction, Deduct	-11.92	
For Flat Frame, Deduct	-11.92	
For Grille (No Damper), Deduct	-35.77	
For Stainless Steel, Add	298.08	
23 37 13 13-0170 EA 12" x 6" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	199.56	13.42
For Steel Construction, Deduct	-14.84	
For Flat Frame, Deduct	-14.84	
For Grille (No Damper), Deduct	-44.51	
For Stainless Steel, Add	370.95	
23 37 13 13-0171 EA 10" x 10" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	202.20	13.42
For Steel Construction, Deduct	-15.10	
For Flat Frame, Deduct	-15.10	
For Grille (No Damper), Deduct	-45.31	
For Stainless Steel, Add	377.55	
23 37 13 13-0172 EA 12" x 12" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	258.26	15.86
For Steel Construction, Deduct	-19.61	
For Flat Frame, Deduct	-19.61	
For Grille (No Damper), Deduct	-58.82	
For Stainless Steel, Add	490.18	
23 37 13 13-0173 EA 14" x 14" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	369.80	19.51
For Steel Construction, Deduct	-29.41	
For Flat Frame, Deduct	-29.41	
For Grille (No Damper), Deduct	-88.23	
For Stainless Steel, Add	735.25	
23 37 13 13-0174 EA 16" x 16" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame	417.49	18.29
For Steel Construction, Deduct	-34.18	
For Flat Frame, Deduct	-34.18	
For Grille (No Damper), Deduct	-102.54	
For Stainless Steel, Add	854.48	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 37 Air Outlets and Inlets**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13	13-0175	EA	18" x 18" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame.....	503.07	24.40
			<i>For Steel Construction, Deduct</i>	-40.80	
			<i>For Flat Frame, Deduct</i>	-40.80	
			<i>For Grille (No Damper), Deduct</i>	-122.41	
			<i>For Stainless Steel, Add</i>	1,020.08	
23 37 13	13-0176	EA	24" x 24" Removable/Reversible Core Register, Double Deflection, Radiused Aluminum Frame.....	637.65	24.40
			<i>For Steel Construction, Deduct</i>	-53.79	
			<i>For Flat Frame, Deduct</i>	-53.79	
			<i>For Grille (No Damper), Deduct</i>	-161.36	
			<i>For Stainless Steel, Add</i>	1,344.65	
23 37 13	13-0177		Adjustable Shutter Blade Registers <small>(23 37 13 13-0155)</small>		
			Note: Double deflection flat frame aluminum construction.		
23 37 13	13-0178	EA	6" x 6" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	192.35	9.76
			<i>For Steel Construction, Deduct</i>	-15.46	
			<i>For Single Deflection, Deduct</i>	-30.91	
			<i>For Grille (No Damper), Deduct</i>	-23.18	
			<i>For Stainless Steel, Add</i>	366.40	
23 37 13	13-0179	EA	8" x 8" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	223.26	9.76
			<i>For Steel Construction, Deduct</i>	-18.55	
			<i>For Single Deflection, Deduct</i>	-37.09	
			<i>For Grille (No Damper), Deduct</i>	-27.82	
			<i>For Stainless Steel, Add</i>	463.68	
23 37 13	13-0180	EA	12" x 6" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	236.65	13.42
			<i>For Steel Construction, Deduct</i>	-18.55	
			<i>For Single Deflection, Deduct</i>	-37.09	
			<i>For Grille (No Damper), Deduct</i>	-27.82	
			<i>For Stainless Steel, Add</i>	463.68	
23 37 13	13-0181	EA	10" x 10" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	245.48	12.19
			<i>For Steel Construction, Deduct</i>	-19.43	
			<i>For Single Deflection, Deduct</i>	-38.86	
			<i>For Grille (No Damper), Deduct</i>	-29.15	
			<i>For Stainless Steel, Add</i>	485.75	
23 37 13	13-0182	EA	12" x 12" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	300.65	15.86
			<i>For Steel Construction, Deduct</i>	-23.85	
			<i>For Single Deflection, Deduct</i>	-47.69	
			<i>For Grille (No Damper), Deduct</i>	-35.77	
			<i>For Stainless Steel, Add</i>	596.15	
23 37 13	13-0183	EA	14" x 14" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	402.48	18.29
			<i>For Steel Construction, Deduct</i>	-32.68	
			<i>For Single Deflection, Deduct</i>	-65.36	
			<i>For Grille (No Damper), Deduct</i>	-49.02	
			<i>For Stainless Steel, Add</i>	816.95	
23 37 13	13-0184	EA	16" x 16" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	477.55	19.51
			<i>For Steel Construction, Deduct</i>	-40.19	
			<i>For Single Deflection, Deduct</i>	-80.37	
			<i>For Grille (No Damper), Deduct</i>	-60.28	
			<i>For Stainless Steel, Add</i>	1,004.63	
23 37 13	13-0185	EA	18" x 18" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	589.62	24.40
			<i>For Steel Construction, Deduct</i>	-49.46	
			<i>For Single Deflection, Deduct</i>	-98.92	
			<i>For Grille (No Damper), Deduct</i>	-74.19	
			<i>For Stainless Steel, Add</i>	1,236.45	
23 37 13	13-0186	EA	24" x 24" Adjustable Shutter Blade Register, Double Deflection, Flat Aluminum Frame.....	819.58	25.61
			<i>For Steel Construction, Deduct</i>	-71.98	
			<i>For Single Deflection, Deduct</i>	-143.96	
			<i>For Grille (No Damper), Deduct</i>	-107.97	
			<i>For Stainless Steel, Add</i>	1,799.48	
23 37 13	13-0187		Air Conditioning And Ventilation <small>(23 37 13 13-0155)</small>		
23 37 13	13-0188	EA	10" x 16" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	104.39	25.61
			<i>For Stainless Steel, Add</i>	133.03	
23 37 13	13-0189	EA	18" x 12" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	182.65	38.12
			<i>For Stainless Steel, Add</i>	266.05	
23 37 13	13-0190	EA	30" x 12" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	284.09	53.36
			<i>For Stainless Steel, Add</i>	443.43	
23 37 13	13-0191	EA	48" x 24" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	731.67	73.18
			<i>For Stainless Steel, Add</i>	1,463.28	
23 37 13	13-0192		Square Wall Return Air And Exhaust Grilles <small>(23 37 13 13-0155)</small>		
			Note: Egg crate design aluminum construction.		
23 37 13	13-0193	EA	8" x 8" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	93.08	30.55
23 37 13	13-0194	EA	12" x 12" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	102.92	30.55
23 37 13	13-0195	EA	18" x 18" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	153.14	45.83
23 37 13	13-0196	EA	24" x 24" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	202.34	45.83
23 37 13	13-0197	EA	28" x 28" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	343.59	61.10
23 37 13	13-0198	EA	36" x 36" Egg Crate Wall Return Air Or Exhaust Grille, Aluminum Construction.....	640.77	60.98
23 37 13	13-0199		Rectangular Four-Way Adjustable Deflection Wall Supply Grilles <small>(23 37 13 13-0155)</small>		
			Note: Aluminum construction.		
23 37 13	13-0200	EA	12" x 6" 4-Way Adjustable Wall Supply Grille, Adjustable Deflection, Aluminum Construction.....	271.53	21.99



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 13-0201 EA 14" x 6" 4-Way Adjustable Wall Supply Grille, Adjustable Deflection, Aluminum Construction.....	311.27	21.99
23 37 13 13-0202 EA 18" x 8" 4-Way Adjustable Wall Supply Grille, Adjustable Deflection, Aluminum Construction.....	375.96	24.44
23 37 13 13-0203 EA 24" x 8" 4-Way Adjustable Wall Supply Grille, Adjustable Deflection, Aluminum Construction.....	446.58	24.44
23 37 13 13-0204 EA 36" x 20" 4-Way Adjustable Wall Supply Grille, Adjustable Deflection, Aluminum Construction.....	570.65	76.38
23 37 13 13-0205 Square Ceiling Return Air And Exhaust Grilles (23 37 13 13-0155)		
Note: Egg crate design, plastic construction.		
23 37 13 13-0206 EA 24" x 24" Egg Crate Ceiling Return Air Or Exhaust Grille, Plastic Construction.....	51.13	14.63
23 37 13 13-0207 EA 24" x 48" Egg Crate Ceiling Return Air Or Exhaust Grille, Plastic Construction.....	74.51	14.75
23 37 13 13-0208 Door Grilles Sight Proof Inverted Vee Cross Section (23 37 13 13-0155)		
Note: Painted steel louvers and frame.		
23 37 13 13-0209 EA 12" x 6" Sight Proof Door Grilles, Inverted Vee Cross Section, Painted Steel.....	151.06	21.99
23 37 13 13-0210 EA 12" x 12" Sight Proof Door Grilles, Inverted Vee Cross Section, Painted Steel.....	187.63	21.99
23 37 13 13-0211 EA 18" x 18" Sight Proof Door Grilles, Inverted Vee Cross Section, Painted Steel.....	236.20	23.22
23 37 13 13-0212 EA 24" x 24" Sight Proof Door Grilles, Inverted Vee Cross Section, Painted Steel.....	328.94	27.74
23 37 13 13-0213 EA 24" x 30" Sight Proof Door Grilles, Inverted Vee Cross Section, Painted Steel.....	364.51	50.96
23 37 13 13-0214 Stainless Steel Devices (23 37 13 13-0155)		
23 37 13 13-0215 304 Stainless Steel, Louvered Partition/Door Grilles (23 37 13 13-0214)		
23 37 13 13-0216 SF Up To 4 SF, 304 Stainless Steel, Louvered Partition/Door Grille.....	240.46	19.06
For 316 Stainless Steel, Add		41.74
23 37 13 13-0217 SF >4 SF, 304 Stainless Steel, Louvered Partition/Door Grille.....	202.38	19.06
For 316 Stainless Steel, Add		34.12
23 37 13 13-0218 304 Stainless Steel, Single Deflection Supply Grilles (23 37 13 13-0214)		
23 37 13 13-0219 SF Up To 4 SF, 304 Stainless Steel, Single Deflection Supply Grille.....	181.28	19.06
For 316 Stainless Steel, Add		29.90
23 37 13 13-0220 SF >4 SF, 304 Stainless Steel, Single Deflection Supply Grille.....	153.59	19.06
For 316 Stainless Steel, Add		24.36
23 37 13 13-0221 304 Stainless Steel, Double Deflection Supply Grilles (23 37 13 13-0214)		
23 37 13 13-0222 SF Up To 4 SF, 304 Stainless Steel, Double Deflection Supply Grille.....	266.93	19.06
For 316 Stainless Steel, Add		47.03
23 37 13 13-0223 SF >4 SF, 304 Stainless Steel, Double Deflection Supply Grille.....	226.96	19.06
For 316 Stainless Steel, Add		39.04
23 37 13 13-0224 304 Stainless Steel Return Grilles (23 37 13 13-0214)		
23 37 13 13-0225 SF Up To 4 SF, 304 Stainless Steel Return Grille.....	181.28	19.06
For 316 Stainless Steel, Add		29.90
23 37 13 13-0226 SF >4 SF, 304 Stainless Steel Return Grille.....	153.59	19.06
For 316 Stainless Steel, Add		24.36
23 37 13 13-0227 304 Stainless Steel, Louvered Supply/Return Grilles (23 37 13 13-0214)		
23 37 13 13-0228 SF Up To 4 SF, 304 Stainless Steel, Louvered Supply/Return Grille.....	181.28	19.06
For 316 Stainless Steel, Add		29.90
23 37 13 13-0229 SF >4 SF, 304 Stainless Steel, Louvered Supply/Return Grille.....	153.59	19.06
For 316 Stainless Steel, Add		24.36
23 37 13 13-0230 304 Stainless Steel, Perforated Return Grilles (23 37 13 13-0214)		
23 37 13 13-0231 SF Up To 4 SF, 304 Stainless Steel, Perforated Return Grille.....	181.28	19.06
For 316 Stainless Steel, Add		29.90
23 37 13 13-0232 SF >4 SF, 304 Stainless Steel, Perforated Return Grille.....	145.98	19.06
For 316 Stainless Steel, Add		22.84
23 37 13 13-0233 304 Stainless Steel, Perforated Supply Grilles (23 37 13 13-0214)		
23 37 13 13-0234 SF Up To 4 SF, 304 Stainless Steel, Perforated Supply Grille.....	220.21	19.06
For 316 Stainless Steel, Add		37.69
23 37 13 13-0235 SF >4 SF, 304 Stainless Steel, Perforated Supply Grille.....	150.03	19.06
For 316 Stainless Steel, Add		23.65
23 37 13 13-0236 304 Stainless Steel, Door Grilles (23 37 13 13-0214)		
23 37 13 13-0237 SF Up To 4 SF, 304 Stainless Steel, Door Grille.....	330.78	19.06
For 316 Stainless Steel, Add		59.80
23 37 13 13-0238 SF >4 SF, 304 Stainless Steel, Door Grille.....	275.42	19.06
For 316 Stainless Steel, Add		48.73
23 37 13 13-0239 304 Stainless Steel, Linear Bar Grilles (23 37 13 13-0214)		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 37 Air Outlets and Inlets**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 37 13 13-0240	SF	Up To 4 SF, 304 Stainless Steel, Linear Bar Grille.....	423.70	19.06
		<i>For 316 Stainless Steel, Add</i>	78.38	
23 37 13 13-0241	SF	>4 SF, 304 Stainless Steel, Linear Bar Grille.....	362.27	19.06
		<i>For 316 Stainless Steel, Add</i>	66.10	
23 37 13 13-0242		304 Stainless Steel, Hinged Filter Grilles (23 37 13 13-0214)		
23 37 13 13-0243	SF	Up To 4 SF, 304 Stainless Steel, Hinged Filter Grille	310.54	19.06
		<i>For 316 Stainless Steel, Add</i>	55.75	
23 37 13 13-0244	SF	>4 SF, 304 Stainless Steel, Hinged Filter Grille.....	213.65	19.06
		<i>For 316 Stainless Steel, Add</i>	36.37	
23 37 13 13-0245		304 Stainless Steel, Opposed Blade Dampers Grilles (23 37 13 13-0214)		
23 37 13 13-0246	SF	Up To 4 SF, 304 Stainless Steel, Opposed Blade Dampers Grille	165.71	19.06
		<i>For 316 Stainless Steel, Add</i>	26.79	
23 37 13 13-0247	SF	Opposed Blade Dampers Grille, Stainless Steel 304, > 4 SF	125.40	19.06
		<i>For 316 Stainless Steel, Add</i>	18.72	
23 37 13 13-0248		304 Stainless Steel, Plaster Frames Replacement (23 37 13 13-0214)		
		Note: For frequent replacement.		
23 37 13 13-0249	SF	To 4 SF, 304 Stainless Steel, Plaster Frames Replacement	128.33	19.06
		<i>For 316 Stainless Steel, Add</i>	19.31	
23 37 13 13-0250	SF	>4 SF, 304 Stainless Steel, Plaster Frames Replacement	66.56	19.06
		<i>For 316 Stainless Steel, Add</i>	6.96	
23 37 13 13-0251		304 Stainless Steel, Modular Louvered Ceiling Diffusers (23 37 13 13-0214)		
23 37 13 13-0252	SF	Up To 4 SF, 304 Stainless Steel, Modular Louvered Ceiling Diffuser.....	305.87	19.06
		<i>For 316 Stainless Steel, Add</i>	54.82	
23 37 13 13-0253	SF	>4 SF, 304 Stainless Steel, Modular Louvered Ceiling Diffuser	238.56	19.06
		<i>For 316 Stainless Steel, Add</i>	41.36	
23 37 13 13-0254		304 Stainless Steel, Latticed Supply/Return Grilles (23 37 13 13-0214)		
23 37 13 13-0255	SF	Up To 4 SF, 304 Stainless Steel, Latticed Supply/Return Grille	104.97	19.06
		<i>For 316 Stainless Steel, Add</i>	14.64	
23 37 13 13-0256	SF	>4 SF, 304 Stainless Steel, Latticed Supply/Return Grille	104.97	19.06
		<i>For 316 Stainless Steel, Add</i>	14.64	
23 37 13 13-0257		Removal And Reinstallation Of Distribution Devices (23 37 13 13)		
		Note: Includes storage and cleaning. Excludes ductwork.		
23 37 13 13-0258	EA	Removal And Reinstallation Of Variable Air Volume Terminal Unit	228.69	
23 37 13 13-0259	EA	Removal And Reinstallation Of Fan Powered Variable Volume Terminal Unit	252.23	
23 37 13 13-0260	EA	Removal And Reinstallation Of Lay-in Diffuser/Register/Grille	37.80	
23 37 13 13-0261	EA	Removal And Reinstallation Of Surface Mounted Diffuser/Register/Grille.....	51.20	
23 37 13 43		Security Registers and Grilles (23 37 13)		
23 37 13 43-0001		Security Supply Or Return Grille (23 37 13 43)		
		Note: Designed for maximum security applications, 3/16" steel face plate with 2" x 2" square holes, 1/4" steel backer plate, 3/16" welded steel sleeve, 10 gauge x 2 wire mesh between face and backer plates, 1" x 1" x 3/16" angle iron frame, standard finish.		
23 37 13 43-0002	EA	8" x 4" Steel Security Grille	306.43	18.33
		<i>For Anchoring Tabs, Add</i>	26.98	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	98.09	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	67.44	
		<i>For Stainless Steel, Add</i>	350.70	
23 37 13 43-0003	EA	8" x 6" Steel Security Grille	340.36	18.94
		<i>For Anchoring Tabs, Add</i>	30.25	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	109.65	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	75.62	
		<i>For Stainless Steel, Add</i>	393.21	
23 37 13 43-0004	EA	8" x 8" Steel Security Grille	390.20	21.39
		<i>For Anchoring Tabs, Add</i>	34.74	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	125.88	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	86.86	
		<i>For Stainless Steel, Add</i>	451.66	
23 37 13 43-0005	EA	10" x 4" Steel Security Grille	339.93	20.77
		<i>For Anchoring Tabs, Add</i>	29.84	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	108.59	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	74.60	
		<i>For Stainless Steel, Add</i>	387.89	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 43-0006 EA 10" x 6" Steel Security Grille	362.82	21.99
For Anchoring Tabs, Add	31.88	
For Rear Operated Opposed Blade Damper, Add	115.99	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	79.71	
For Stainless Steel, Add	414.47	
23 37 13 43-0007 EA 10" x 8" Steel Security Grille	415.53	23.82
For Anchoring Tabs, Add	36.79	
For Rear Operated Opposed Blade Damper, Add	133.52	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	91.97	
For Stainless Steel, Add	478.23	
23 37 13 43-0008 EA 10" x 10" Steel Security Grille	464.15	25.67
For Anchoring Tabs, Add	41.28	
For Rear Operated Opposed Blade Damper, Add	149.62	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	103.21	
For Stainless Steel, Add	536.68	
23 37 13 43-0009 EA 12" x 4" Steel Security Grille	357.07	23.22
For Anchoring Tabs, Add	31.06	
For Rear Operated Opposed Blade Damper, Add	113.37	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	77.66	
For Stainless Steel, Add	403.83	
23 37 13 43-0010 EA 12" x 6" Steel Security Grille	398.75	25.67
For Anchoring Tabs, Add	34.74	
For Rear Operated Opposed Blade Damper, Add	126.73	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	86.86	
For Stainless Steel, Add	451.66	
23 37 13 43-0011 EA 12" x 8" Steel Security Grille	455.56	27.50
For Anchoring Tabs, Add	40.06	
For Rear Operated Opposed Blade Damper, Add	145.70	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	100.14	
For Stainless Steel, Add	520.74	
23 37 13 43-0012 EA 12" x 10" Steel Security Grille	496.01	29.33
For Anchoring Tabs, Add	43.74	
For Rear Operated Opposed Blade Damper, Add	158.94	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	109.34	
For Stainless Steel, Add	568.57	
23 37 13 43-0013 EA 12" x 12" Steel Security Grille	548.71	31.16
For Anchoring Tabs, Add	48.64	
For Rear Operated Opposed Blade Damper, Add	176.47	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	121.60	
For Stainless Steel, Add	632.32	
23 37 13 43-0014 EA 14" x 4" Steel Security Grille	381.17	25.05
For Anchoring Tabs, Add	33.11	
For Rear Operated Opposed Blade Damper, Add	120.89	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	82.77	
For Stainless Steel, Add	430.40	
23 37 13 43-0015 EA 14" x 6" Steel Security Grille	429.81	26.88
For Anchoring Tabs, Add	37.60	
For Rear Operated Opposed Blade Damper, Add	136.99	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	94.01	
For Stainless Steel, Add	488.85	
23 37 13 43-0016 EA 14" x 8" Steel Security Grille	479.66	29.33
For Anchoring Tabs, Add	42.10	
For Rear Operated Opposed Blade Damper, Add	153.22	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	105.25	
For Stainless Steel, Add	547.31	
23 37 13 43-0017 EA 14" x 10" Steel Security Grille	541.77	31.78
For Anchoring Tabs, Add	47.82	
For Rear Operated Opposed Blade Damper, Add	173.73	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	119.56	
For Stainless Steel, Add	621.70	
23 37 13 43-0018 EA 14" x 12" Steel Security Grille	596.93	34.83
For Anchoring Tabs, Add	52.73	
For Rear Operated Opposed Blade Damper, Add	191.51	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	131.82	
For Stainless Steel, Add	685.46	
23 37 13 43-0019 EA 14" x 14" Steel Security Grille	642.68	37.27
For Anchoring Tabs, Add	56.82	
For Rear Operated Opposed Blade Damper, Add	206.31	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	142.04	
For Stainless Steel, Add	738.60	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 37 Air Outlets and Inlets**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 37 13 43-0020	EA	16" x 6" Steel Security Grille	459.22	29.33
		<i>For Anchoring Tabs, Add</i>	40.06	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	146.06	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	100.14	
		<i>For Stainless Steel, Add</i>	520.74	
23 37 13 43-0021	EA	16" x 8" Steel Security Grille	525.42	31.78
		<i>For Anchoring Tabs, Add</i>	46.19	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	168.01	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	115.47	
		<i>For Stainless Steel, Add</i>	600.44	
23 37 13 43-0022	EA	16" x 10" Steel Security Grille	567.09	34.21
		<i>For Anchoring Tabs, Add</i>	49.87	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	181.38	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	124.67	
		<i>For Stainless Steel, Add</i>	648.27	
23 37 13 43-0023	EA	16" x 12" Steel Security Grille	640.24	36.04
		<i>For Anchoring Tabs, Add</i>	56.82	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	206.06	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	142.04	
		<i>For Stainless Steel, Add</i>	738.60	
23 37 13 43-0024	EA	16" x 14" Steel Security Grille	677.83	38.49
		<i>For Anchoring Tabs, Add</i>	60.09	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	218.00	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	150.21	
		<i>For Stainless Steel, Add</i>	781.11	
23 37 13 43-0025	EA	16" x 16" Steel Security Grille	735.86	40.94
		<i>For Anchoring Tabs, Add</i>	65.40	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	237.08	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	163.50	
		<i>For Stainless Steel, Add</i>	850.19	
23 37 13 43-0026	EA	18" x 6" Steel Security Grille	486.99	32.99
		<i>For Anchoring Tabs, Add</i>	42.10	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	153.95	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	105.25	
		<i>For Stainless Steel, Add</i>	547.31	
23 37 13 43-0027	EA	18" x 8" Steel Security Grille	557.27	35.44
		<i>For Anchoring Tabs, Add</i>	48.64	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	177.33	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	121.60	
		<i>For Stainless Steel, Add</i>	632.32	
23 37 13 43-0028	EA	18" x 10" Steel Security Grille	611.21	37.89
		<i>For Anchoring Tabs, Add</i>	53.55	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	194.98	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	133.86	
		<i>For Stainless Steel, Add</i>	696.09	
23 37 13 43-0029	EA	18" x 12" Steel Security Grille	673.33	40.32
		<i>For Anchoring Tabs, Add</i>	59.27	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	215.50	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	148.17	
		<i>For Stainless Steel, Add</i>	770.48	
23 37 13 43-0030	EA	18" x 14" Steel Security Grille	721.15	39.72
		<i>For Anchoring Tabs, Add</i>	64.17	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	232.55	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	160.43	
		<i>For Stainless Steel, Add</i>	834.25	
23 37 13 43-0031	EA	18" x 16" Steel Security Grille	790.22	41.55
		<i>For Anchoring Tabs, Add</i>	70.71	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	255.80	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	176.78	
		<i>For Stainless Steel, Add</i>	919.27	
23 37 13 43-0032	EA	18" x 18" Steel Security Grille	847.02	43.38
		<i>For Anchoring Tabs, Add</i>	76.03	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	274.77	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	190.07	
		<i>For Stainless Steel, Add</i>	988.34	
23 37 13 43-0033	EA	20" x 6" Steel Security Grille	521.72	36.04
		<i>For Anchoring Tabs, Add</i>	44.96	
		<i>For Rear Operated Opposed Blade Damper, Add</i>	164.58	
		<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
		<i>For 1" x 1" Square Holes On Face, Add</i>	112.41	
		<i>For Stainless Steel, Add</i>	584.51	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 13 43-0034 EA 20" x 8" Steel Security Grille	590.35	39.72
For Anchoring Tabs, Add	51.09	
For Rear Operated Opposed Blade Damper, Add	186.77	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	127.73	
For Stainless Steel, Add	664.21	
23 37 13 43-0035 EA 20" x 10" Steel Security Grille	651.24	41.55
For Anchoring Tabs, Add	56.82	
For Rear Operated Opposed Blade Damper, Add	207.16	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	142.04	
For Stainless Steel, Add	738.60	
23 37 13 43-0036 EA 20" x 12" Steel Security Grille	717.44	44.00
For Anchoring Tabs, Add	62.95	
For Rear Operated Opposed Blade Damper, Add	229.11	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	157.37	
For Stainless Steel, Add	818.30	
23 37 13 43-0037 EA 20" x 14" Steel Security Grille	790.59	45.83
For Anchoring Tabs, Add	69.90	
For Rear Operated Opposed Blade Damper, Add	253.80	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	174.74	
For Stainless Steel, Add	908.64	
23 37 13 43-0038 EA 20" x 16" Steel Security Grille	855.57	47.66
For Anchoring Tabs, Add	76.03	
For Rear Operated Opposed Blade Damper, Add	275.62	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	190.07	
For Stainless Steel, Add	988.34	
23 37 13 43-0039 EA 20" x 18" Steel Security Grille	916.46	49.49
For Anchoring Tabs, Add	81.75	
For Rear Operated Opposed Blade Damper, Add	296.02	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	204.37	
For Stainless Steel, Add	1,062.74	
23 37 13 43-0040 EA 20" x 20" Steel Security Grille	989.61	51.32
For Anchoring Tabs, Add	88.70	
For Rear Operated Opposed Blade Damper, Add	320.70	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	221.74	
For Stainless Steel, Add	1,153.06	
23 37 13 43-0041 EA 24" x 6" Steel Security Grille	579.31	40.32
For Anchoring Tabs, Add	49.87	
For Rear Operated Opposed Blade Damper, Add	182.60	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	124.67	
For Stainless Steel, Add	648.27	
23 37 13 43-0042 EA 24" x 8" Steel Security Grille	656.12	44.00
For Anchoring Tabs, Add	56.82	
For Rear Operated Opposed Blade Damper, Add	207.65	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	142.04	
For Stainless Steel, Add	738.60	
23 37 13 43-0043 EA 24" x 10" Steel Security Grille	719.88	45.21
For Anchoring Tabs, Add	62.95	
For Rear Operated Opposed Blade Damper, Add	229.35	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	157.37	
For Stainless Steel, Add	818.30	
23 37 13 43-0044 EA 24" x 12" Steel Security Grille	807.32	50.10
For Anchoring Tabs, Add	70.71	
For Rear Operated Opposed Blade Damper, Add	257.51	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	176.78	
For Stainless Steel, Add	919.27	
23 37 13 43-0045 EA 24" x 14" Steel Security Grille	872.29	51.94
For Anchoring Tabs, Add	76.84	
For Rear Operated Opposed Blade Damper, Add	279.34	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	192.11	
For Stainless Steel, Add	998.97	
23 37 13 43-0046 EA 24" x 16" Steel Security Grille	953.62	53.77
For Anchoring Tabs, Add	84.61	
For Rear Operated Opposed Blade Damper, Add	306.89	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	211.53	
For Stainless Steel, Add	1,099.93	
23 37 13 43-0047 EA 24" x 18" Steel Security Grille	1,047.20	55.60
For Anchoring Tabs, Add	93.60	
For Rear Operated Opposed Blade Damper, Add	338.73	
For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add	0.35	
For 1" x 1" Square Holes On Face, Add	234.01	
For Stainless Steel, Add	1,216.83	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 30 HVAC Air Distribution

23 37 Air Outlets and Inlets



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 37 13 43-0048	EA		24" x 20" Steel Security Grille	1,112.17	57.43
			<i>For Anchoring Tabs, Add</i>	99.73	
			<i>For Rear Operated Opposed Blade Damper, Add</i>	360.55	
			<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
			<i>For 1" x 1" Square Holes On Face, Add</i>	249.33	
			<i>For Stainless Steel, Add</i>	1,296.53	
23 37 13 43-0049	EA		24" x 24" Steel Security Grille	1,250.30	61.10
			<i>For Anchoring Tabs, Add</i>	112.81	
			<i>For Rear Operated Opposed Blade Damper, Add</i>	407.06	
			<i>For Each Square Inch With 1/4" Steel Backer Plate Case Hardened To Rockwell "C" 56/58, Add</i>	0.35	
			<i>For 1" x 1" Square Holes On Face, Add</i>	282.03	
			<i>For Stainless Steel, Add</i>	1,466.57	

23 37 23 HVAC Gravity Ventilators (23 37)

23 37 23 13 HVAC Gravity Dome Ventilators (23 37 23)

23 37 23 13-0001 Rectangular Gravity Intake/Relief Ventilator Hood (23 37 23 13)

Note: Includes flange base and bird screen. Excludes curb.

23 37 23 13-0002	EA		8" x 8" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,188.68	70.74
23 37 23 13-0003	EA		8" x 12" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,254.31	80.99
23 37 23 13-0004	EA		8" x 18" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,568.44	100.74
23 37 23 13-0005	EA		8" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,670.68	107.21
23 37 23 13-0006	EA		8" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,950.78	124.78
23 37 23 13-0007	EA		10" x 10" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,402.55	80.50
23 37 23 13-0008	EA		12" x 12" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,541.65	90.75
23 37 23 13-0009	EA		12" x 18" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,792.99	97.57
23 37 23 13-0010	EA		12" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,945.76	118.26
23 37 23 13-0011	EA		12" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,244.27	126.85
23 37 23 13-0012	EA		12" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,542.54	134.65
23 37 23 13-0013	EA		14" x 14" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,677.72	91.84
23 37 23 13-0014	EA		14" x 18" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	1,911.86	104.65
23 37 23 13-0015	EA		14" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,146.00	117.46
23 37 23 13-0016	EA		14" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,419.05	132.46
23 37 23 13-0017	EA		14" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,731.26	149.54
23 37 23 13-0018	EA		16" x 16" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,028.84	111.11
23 37 23 13-0019	EA		16" x 20" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,106.91	115.38
23 37 23 13-0020	EA		16" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,341.03	128.19
23 37 23 13-0021	EA		16" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,653.12	145.27
23 37 23 13-0022	EA		16" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,965.21	162.34
23 37 23 13-0023	EA		16" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,394.43	185.88
23 37 23 13-0024	EA		18" x 18" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,017.02	109.52
23 37 23 13-0025	EA		18" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,347.02	127.46
23 37 23 13-0026	EA		18" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,677.16	145.39
23 37 23 13-0027	EA		18" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,043.85	165.26
23 37 23 13-0028	EA		18" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,373.88	183.19
23 37 23 13-0029	EA		20" x 20" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,116.25	121.49
23 37 23 13-0030	EA		20" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,393.72	137.45
23 37 23 13-0031	EA		20" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,671.31	153.31
23 37 23 13-0032	EA		20" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,087.64	177.22
23 37 23 13-0033	EA		20" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,399.83	195.15
23 37 23 13-0034	EA		24" x 24" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,665.78	163.32
23 37 23 13-0035	EA		24" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	2,958.34	181.24
23 37 23 13-0036	EA		24" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,381.01	207.11
23 37 23 13-0037	EA		24" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,706.07	226.98
23 37 23 13-0038	EA		24" x 48" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	4,063.69	248.94
23 37 23 13-0039	EA		30" x 30" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,209.24	185.88
23 37 23 13-0040	EA		30" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,536.10	204.78
23 37 23 13-0041	EA		30" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,892.79	225.40
23 37 23 13-0042	EA		30" x 48" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	4,249.34	246.13
23 37 23 13-0043	EA		30" x 54" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	5,170.46	299.43
23 37 23 13-0044	EA		30" x 60" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	5,527.15	320.04
23 37 23 13-0045	EA		36" x 36" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	3,698.17	230.65
23 37 23 13-0046	EA		36" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	4,056.88	252.96
23 37 23 13-0047	EA		36" x 48" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	4,857.22	302.85
23 37 23 13-0048	EA		36" x 54" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	5,409.13	337.24
23 37 23 13-0049	EA		36" x 60" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	5,740.38	357.98
23 37 23 13-0050	EA		36" x 66" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,181.90	385.42
23 37 23 13-0051	EA		36" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,954.68	433.59
23 37 23 13-0052	EA		42" x 42" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	4,415.12	258.20
23 37 23 13-0053	EA		42" x 48" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	5,481.65	320.54
23 37 23 13-0054	EA		42" x 54" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,250.62	365.54
23 37 23 13-0055	EA		42" x 60" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,473.78	378.59
23 37 23 13-0056	EA		42" x 66" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	7,217.92	422.01
23 37 23 13-0057	EA		42" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	7,937.21	464.09
23 37 23 13-0058	EA		48" x 48" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	5,823.91	372.73
23 37 23 13-0059	EA		48" x 54" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,299.89	403.23
23 37 23 13-0060	EA		48" x 60" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,775.73	433.72
23 37 23 13-0061	EA		48" x 66" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	7,523.55	481.53
23 37 23 13-0062	EA		48" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	7,970.14	487.87
23 37 23 13-0063	EA		54" x 54" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	6,762.47	420.18
23 37 23 13-0064	EA		54" x 60" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI).....	7,585.51	471.28

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 37 23 13-0065 EA 54" x 66" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	8,230.68	511.41
23 37 23 13-0066 EA 54" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	8,764.45	544.59
23 37 23 13-0067 EA 60" x 60" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	8,429.07	523.12
23 37 23 13-0068 EA 60" x 66" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	8,850.37	557.64
23 37 23 13-0069 EA 60" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	9,487.02	600.45
23 37 23 13-0070 EA 66" x 66" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	8,840.18	603.26
23 37 23 13-0071 EA 66" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	10,337.56	705.46
23 37 23 13-0072 EA 72" x 72" Throat, Galvanized Steel, Gravity Intake/Relief Ventilator Hood (Greenheck FGI)	10,670.94	650.46

23 38 Ventilation Hoods (23 30)

23 38 13 Commercial-Kitchen Hoods (23 38)

23 38 13 13 Listed Commercial-Kitchen Hoods (23 38 13)

23 38 13 13-0001 Universal Ventless Hood (23 38 13 13)

23 38 13 13-0002	EA	109" Wide x 50" Deep x 102" High, Ventless Exhaust Hood With Stand, (Wells WVU-96)	52,763.05	486.95
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23 38 13 16 Standard Commercial-Kitchen Hoods (23 38 13)

23 38 13 16-0001 Commercial Kitchen Hood Ventilation System (23 38 13 16)

Note: Excludes fire suppression. See CSI section 23 34 16 00-0108 for exhaust and supply fans.

23 38 13 16-0002 Dry Filter Exhaust Hoods (23 38 13 16-0001)

Note: Includes stainless steel filters, exhaust damper and 48" long fluorescent light fixtures.

23 38 13 16-0003	EA	8' Long x 60" Deep Dry Filter Exhaust Hood	12,416.59	913.62
23 38 13 16-0004	EA	8'-6" Long x 60" Deep Dry Filter Exhaust Hood	12,931.05	970.73
23 38 13 16-0005	EA	9' Long x 60" Deep Dry Filter Exhaust Hood	14,433.08	1,027.83
23 38 13 16-0006	EA	9'-6" Long x 60" Deep Dry Filter Exhaust Hood	14,865.71	1,084.92
23 38 13 16-0007	EA	10' Long x 60" Deep Dry Filter Exhaust Hood	15,394.80	1,142.02
23 38 13 16-0008	EA	10'-6" Long x 60" Deep Dry Filter Exhaust Hood	15,954.73	1,199.12
23 38 13 16-0009	EA	11' Long x 60" Deep Dry Filter Exhaust Hood	16,484.50	1,256.22
23 38 13 16-0010	EA	11'-6" Long x 60" Deep Dry Filter Exhaust Hood	17,030.78	1,313.32
23 38 13 16-0011	EA	12' Long x 60" Deep Dry Filter Exhaust Hood	17,639.98	1,370.43
23 38 13 16-0012	EA	12'-6" Long x 60" Deep Dry Filter Exhaust Hood	18,166.90	1,427.53
23 38 13 16-0013	EA	13' Long x 60" Deep Dry Filter Exhaust Hood	18,600.62	1,484.63
23 38 13 16-0014	EA	13'-6" Long x 60" Deep Dry Filter Exhaust Hood	19,339.42	1,541.73
23 38 13 16-0015	EA	14' Long x 60" Deep Dry Filter Exhaust Hood	21,666.40	1,598.83
23 38 13 16-0016	EA	14'-6" Long x 60" Deep Dry Filter Exhaust Hood	22,247.02	1,655.93
23 38 13 16-0017	EA	15" Long x 60" Deep Dry Filter Exhaust Hood	23,041.25	1,713.03
23 38 13 16-0018	EA	15'-6" Long x 60" Deep Dry Filter Exhaust Hood	23,635.44	1,770.14
23 38 13 16-0019	EA	16' Long x 60" Deep Dry Filter Exhaust Hood	24,530.13	1,827.24

23 38 13 16-0020 Dry Extractor Exhaust Hoods (23 38 13 16-0001)

Note: Includes extractor inserts, exhaust damper, 48" long fluorescent light fixtures, and UDS filler panels.

23 38 13 16-0021	EA	8' Long x 60" Deep Dry Extractor Exhaust Hood	17,456.73	913.62
23 38 13 16-0022	EA	8'-6" Long x 60" Deep Dry Extractor Exhaust Hood	18,003.09	970.73
23 38 13 16-0023	EA	9' Long x 60" Deep Dry Extractor Exhaust Hood	19,600.82	1,027.83
23 38 13 16-0024	EA	9'-6" Long x 60" Deep Dry Extractor Exhaust Hood	20,161.05	1,084.92
23 38 13 16-0025	EA	10' Long x 60" Deep Dry Extractor Exhaust Hood	20,722.04	1,142.02
23 38 13 16-0026	EA	10'-6" Long x 60" Deep Dry Extractor Exhaust Hood	21,250.07	1,199.12
23 38 13 16-0027	EA	11' Long x 60" Deep Dry Extractor Exhaust Hood	21,811.74	1,256.22
23 38 13 16-0028	EA	11'-6" Long x 60" Deep Dry Extractor Exhaust Hood	22,342.07	1,313.32
23 38 13 16-0029	EA	12' Long x 60" Deep Dry Extractor Exhaust Hood	22,839.62	1,370.43
23 38 13 16-0030	EA	12'-6" Long x 60" Deep Dry Extractor Exhaust Hood	23,557.94	1,427.53
23 38 13 16-0031	EA	13' Long x 60" Deep Dry Extractor Exhaust Hood	24,390.41	1,484.63
23 38 13 16-0032	EA	13'-6" Long x 60" Deep Dry Extractor Exhaust Hood	25,272.75	1,541.73
23 38 13 16-0033	EA	14' Long x 60" Deep Dry Extractor Exhaust Hood	27,137.19	1,598.83
23 38 13 16-0034	EA	14'-6" Long x 60" Deep Dry Extractor Exhaust Hood	28,036.80	1,655.93
23 38 13 16-0035	EA	15" Long x 60" Deep Dry Extractor Exhaust Hood	29,803.97	1,713.03
23 38 13 16-0036	EA	15'-6" Long x 60" Deep Dry Extractor Exhaust Hood	31,594.40	1,770.14
23 38 13 16-0037	EA	16' Long x 60" Deep Dry Extractor Exhaust Hood	33,366.33	1,827.24

23 38 13 16-0038 Single Manifold Water Wash Exhaust Hoods (23 38 13 16-0001)

Note: Includes extraction baffles, 48" long fluorescent light fixtures, and UDS filler panels. Excludes fan wash control panel.

23 38 13 16-0039	EA	8' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	18,732.72	913.62
23 38 13 16-0040	EA	8'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	19,310.97	970.73
23 38 13 16-0041	EA	9' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	20,940.61	1,027.83
23 38 13 16-0042	EA	9'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	21,516.78	1,084.92
23 38 13 16-0043	EA	10' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	22,125.63	1,142.02
23 38 13 16-0044	EA	10'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	22,685.55	1,199.12
23 38 13 16-0045	EA	11' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	23,263.18	1,256.22
23 38 13 16-0046	EA	11'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	23,841.35	1,313.32
23 38 13 16-0047	EA	12' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	24,354.86	1,370.43
23 38 13 16-0048	EA	12'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	25,136.97	1,427.53
23 38 13 16-0049	EA	13' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	26,033.24	1,484.63
23 38 13 16-0050	EA	13'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	26,979.38	1,541.73
23 38 13 16-0051	EA	14' Long x 60" Deep Single Manifold Water Wash Exhaust Hood	28,907.62	1,598.83

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 30 HVAC Air Distribution****23 38 Ventilation Hoods**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 38 13 16-0052	EA	14'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood.....	29,871.03	1,655.93
23 38 13 16-0053	EA	15" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	31,813.65	1,713.03
23 38 13 16-0054	EA	15'-6" Long x 60" Deep Single Manifold Water Wash Exhaust Hood.....	32,774.69	1,770.14
23 38 13 16-0055	EA	16" Long x 60" Deep Single Manifold Water Wash Exhaust Hood	33,733.18	1,827.24
23 38 13 16-0056	EA	Fan Wash Control Panel.....	13,477.86	456.81

Note: Includes time clock and backflow preventer.

23 38 13 16-0057 Utility Distribution System (UDS) (23 38 13 16-0001)

Note: Includes "L" shaped primary riser, secondary riser, horizontal mechanical and electrical raceway; 2" IPS looped gas manifold with two (2) solenoid gas valves; 1" hot water manifold; 1" cold water manifold; 100 Amp 120-208 VAC/3 Ph/60 Hz main shunt trip connectors; equipment restraints; flexible drain connectors; and power interruption device. Excludes main shunt breaker.

23 38 13 16-0058	EA	8' Long Utility Distribution System (UDS).....	34,768.29	464.58
23 38 13 16-0059	EA	8'-6" Long Utility Distribution System (UDS)	35,794.66	475.89
23 38 13 16-0060	EA	9' Long Utility Distribution System (UDS).....	36,809.83	486.95
23 38 13 16-0061	EA	9'-6" Long Utility Distribution System (UDS)	37,834.05	502.49
23 38 13 16-0062	EA	10' Long Utility Distribution System (UDS).....	38,851.81	514.83
23 38 13 16-0063	EA	10'-6" Long Utility Distribution System (UDS)	39,860.01	527.84
23 38 13 16-0064	EA	11' Long Utility Distribution System (UDS).....	40,881.90	536.86
23 38 13 16-0065	EA	11'-6" Long Utility Distribution System (UDS)	41,903.19	551.03
23 38 13 16-0066	EA	12' Long Utility Distribution System (UDS).....	42,936.31	571.02
23 38 13 16-0067	EA	12'-6" Long Utility Distribution System (UDS)	43,983.75	598.19
23 38 13 16-0068	EA	13' Long Utility Distribution System (UDS).....	45,011.97	615.78
23 38 13 16-0069	EA	13'-6" Long Utility Distribution System (UDS)	46,055.30	640.90
23 38 13 16-0070	EA	14' Long Utility Distribution System (UDS).....	47,088.82	661.12
23 38 13 16-0071	EA	14'-6" Long Utility Distribution System (UDS)	48,124.98	682.71
23 38 13 16-0072	EA	15' Long Utility Distribution System (UDS).....	49,164.06	705.77
23 38 13 16-0073	EA	15'-6" Long Utility Distribution System (UDS)	50,206.34	730.33
23 38 13 16-0074	EA	16' Long Utility Distribution System (UDS).....	51,234.17	747.79

23 38 13 16-0075 Stainless Steel Exhaust Hood Material (23 38 13 16)

Note: Welded seams.

23 38 13 16-0076	SF	16 Gauge, Type 304, Stainless Steel Exhaust Hood Material	49.16	16.24
		<i>For Type 316 Stainless Steel, Add</i>	1.55	
23 38 13 16-0077	SF	14 Gauge, Type 304, Stainless Steel Exhaust Hood Material	61.44	21.65
		<i>For Type 316 Stainless Steel, Add</i>	1.93	
23 38 13 16-0078	SF	12 Gauge, Type 304, Stainless Steel Exhaust Hood Material	85.34	29.23
		<i>For Type 316 Stainless Steel, Add</i>	2.70	
23 38 13 16-0079	SF	10 Gauge, Type 304, Stainless Steel Exhaust Hood Material	106.94	35.73
		<i>For Type 316 Stainless Steel, Add</i>	3.48	

23 38 13 16-0080 Kitchen Exhaust Hood (23 38 13 16)

23 38 13 16-0081	EA	10' x 4', Type 1, Low Ceiling Sloped Front Commercial Kitchen Hood System With PSP Makeup Air (Halifax LPSHP1048).....	10,762.43	2,250.92
		Note: Ductwork connections by others.		
		<i>For Type 316 Stainless Steel, Add</i>	626.06	
23 38 13 16-0082	EA	8' x 4', Type 1, Commercial Kitchen Hood System With Short Cycle Makeup Air (Halifax SCHP848)	9,862.06	1,800.73
		Note: Ductwork connections by others.		
		<i>For Type 316 Stainless Steel, Add</i>	626.06	
23 38 13 16-0083	EA	4' x 4', Type 1, Low Ceiling Sloped Front Commercial Kitchen Hood System (Halifax LEXHP448)	5,368.07	900.37
		Note: Ductwork connections by others.		
		<i>For Type 316 Stainless Steel, Add</i>	356.73	
23 38 13 16-0084	EA	6' x 4', Type 1, Low Ceiling Sloped Front Commercial Kitchen Hood System (Halifax LEXHP648)	6,879.79	1,350.55
		Note: Ductwork connections by others.		
		<i>For Type 316 Stainless Steel, Add</i>	417.87	
23 38 13 16-0085	EA	5' x 4', Type 1, Commercial Kitchen Hood System (Halifax EXHP548)	6,214.81	1,125.46
		Note: Ductwork connections by others.		
		<i>For Type 316 Stainless Steel, Add</i>	396.39	

23 40 HVAC Air Cleaning Devices (23)**23 41 Particulate Air Filtration** (23 40)**23 41 13 Panel Air Filters** (23 41)**23 41 13 00-0001 Disposable Air Filters** (23 41 13)

23 41 13 00-0002	EA	Throwaway Glass Or Paper Media Filter, Residential.....	13.29	
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23 41 13 00-0003 Disposable Fiberglass Air Filters (23 41 13)

23 41 13 00-0004	EA	8" x 16" x 1" Disposable Fiberglass Air Filter, MERV 5.....	13.42	5.87
		Note: One-piece kraft fiberboard frame with two metal grids.		
23 41 13 00-0005	EA	8" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5.....	13.42	5.87
		Note: One-piece kraft fiberboard frame with two metal grids.		
23 41 13 00-0006	EA	8" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5.....	13.14	5.87
		Note: One-piece kraft fiberboard frame with two metal grids.		
23 41 13 00-0007	EA	10" x 10" x 1" Disposable Fiberglass Air Filter, MERV 5.....	13.04	6.14
		Note: One-piece kraft fiberboard frame with two metal grids.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 41 13 00-0008 EA 10" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.04	6.14
23 41 13 00-0009 EA 10" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.04	6.14
23 41 13 00-0010 EA 10" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.04	6.14
23 41 13 00-0011 EA 10" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.27	6.14
23 41 13 00-0012 EA 12" x 12" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.78	6.41
23 41 13 00-0013 EA 12" x 16" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.76	6.41
23 41 13 00-0014 EA 12" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.10	6.41
23 41 13 00-0015 EA 12" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.10	6.41
23 41 13 00-0016 EA 12" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.10	6.41
23 41 13 00-0017 EA 12" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.65	6.41
23 41 13 00-0018 EA 12" x 36" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	18.57	6.41
23 41 13 00-0019 EA 14" x 14" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.83	6.78
23 41 13 00-0020 EA 14" x 18" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	17.27	6.78
23 41 13 00-0021 EA 14" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.90	6.78
23 41 13 00-0022 EA 14" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.83	6.78
23 41 13 00-0023 EA 14" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.90	6.78
23 41 13 00-0024 EA 14" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.71	6.78
23 41 13 00-0025 EA 15" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.06	6.97
23 41 13 00-0026 EA 15" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.06	6.97
23 41 13 00-0027 EA 15" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	18.32	6.97
23 41 13 00-0028 EA 16" x 16" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.21	7.06
23 41 13 00-0029 EA 16" x 18" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.80	7.06
23 41 13 00-0030 EA 16" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.27	7.06
23 41 13 00-0031 EA 16" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.20	7.06
23 41 13 00-0032 EA 16" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	13.66	7.06
23 41 13 00-0033 EA 16" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	18.46	7.06
23 41 13 00-0034 EA 16" x 32" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	22.00	7.06
23 41 13 00-0035 EA 16" x 36" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	21.71	7.06
23 41 13 00-0036 EA 18" x 18" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.56	7.33
23 41 13 00-0037 EA 18" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.20	7.33
23 41 13 00-0038 EA 18" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	15.56	7.33
23 41 13 00-0039 EA 18" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	16.80	7.33
23 41 13 00-0040 EA 18" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	18.59	7.33
23 41 13 00-0041 EA 18" x 36" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	20.65	7.33
23 41 13 00-0042 EA 19" x 27" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	17.36	7.70
23 41 13 00-0043 EA 20" x 20" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	14.50	7.70
23 41 13 00-0044 EA 20" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	17.73	7.70
23 41 13 00-0045 EA 20" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	16.97	7.70
23 41 13 00-0046 EA 20" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	18.50	7.70
23 41 13 00-0047 EA 20" x 32" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	22.86	7.70
23 41 13 00-0048 EA 20" x 36" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	20.57	7.70
23 41 13 00-0049 EA 21" x 21" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.	18.66	7.79

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 40 HVAC Air Cleaning Devices****23 41 Particulate Air Filtration**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 41 13 00-0050	EA	22" x 22" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		17.84	7.88
23 41 13 00-0051	EA	24" x 24" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		17.96	7.97
23 41 13 00-0052	EA	24" x 30" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		18.58	7.97
23 41 13 00-0053	EA	24" x 36" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		24.94	7.97
23 41 13 00-0054	EA	25" x 25" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		18.08	8.06
23 41 13 00-0055	EA	25" x 32" x 1" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		25.44	8.06
23 41 13 00-0056	EA	10" x 10" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		14.96	6.14
23 41 13 00-0057	EA	10" x 20" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		13.90	6.14
23 41 13 00-0058	EA	12" x 24" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		16.25	6.41
23 41 13 00-0059	EA	14" x 20" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		16.73	6.78
23 41 13 00-0060	EA	14" x 25" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		16.73	6.78
23 41 13 00-0061	EA	15" x 20" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		17.09	6.97
23 41 13 00-0062	EA	16" x 20" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		16.98	7.06
23 41 13 00-0063	EA	16" x 24" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		16.82	7.06
23 41 13 00-0064	EA	16" x 25" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		17.21	7.06
23 41 13 00-0065	EA	18" x 24" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		18.25	7.33
23 41 13 00-0066	EA	20" x 20" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		18.86	7.70
23 41 13 00-0067	EA	20" x 24" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		18.59	7.70
23 41 13 00-0068	EA	20" x 25" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		18.59	7.70
23 41 13 00-0069	EA	24" x 24" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		19.23	7.97
23 41 13 00-0070	EA	25" x 25" x 2" Disposable Fiberglass Air Filter, MERV 5..... Note: One-piece kraft fiberboard frame with two metal grids.		19.35	8.06
23 41 13 00-0071 Disposable Pleated Air Filters (23 41 13)					
23 41 13 00-0072	EA	10" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		14.11	6.14
23 41 13 00-0073	EA	10" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		21.11	6.14
23 41 13 00-0074	EA	10" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		26.63	6.14
23 41 13 00-0075	EA	12" x 12" x 1" Disposable Pleated Air Filter, MERV 8.....		18.26	6.41
23 41 13 00-0076	EA	12" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		16.96	6.41
23 41 13 00-0077	EA	12" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		16.75	6.41
23 41 13 00-0078	EA	12" x 25" x 1" Disposable Pleated Air Filter, MERV 8.....		16.75	6.41
23 41 13 00-0079	EA	12" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		27.01	6.41
23 41 13 00-0080	EA	14" x 14" x 1" Disposable Pleated Air Filter, MERV 8.....		20.68	6.78
23 41 13 00-0081	EA	14" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		17.44	6.78
23 41 13 00-0082	EA	14" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		22.33	6.78
23 41 13 00-0083	EA	14" x 25" x 1" Disposable Pleated Air Filter, MERV 8.....		18.03	6.78
23 41 13 00-0084	EA	14" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		26.01	6.78
23 41 13 00-0085	EA	15" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		17.81	6.97
23 41 13 00-0086	EA	16" x 16" x 1" Disposable Pleated Air Filter, MERV 8.....		21.05	7.06
23 41 13 00-0087	EA	16" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		17.54	7.06
23 41 13 00-0088	EA	16" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		20.49	7.06
23 41 13 00-0089	EA	16" x 25" x 1" Disposable Pleated Air Filter, MERV 8.....		18.20	7.06
23 41 13 00-0090	EA	16" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		26.38	7.06
23 41 13 00-0091	EA	18" x 18" x 1" Disposable Pleated Air Filter, MERV 8.....		28.22	7.33
23 41 13 00-0092	EA	18" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		20.81	7.33
23 41 13 00-0093	EA	18" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		20.45	7.33
23 41 13 00-0094	EA	18" x 25" x 1" Disposable Pleated Air Filter, MERV 8.....		20.19	7.33
23 41 13 00-0095	EA	18" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		28.39	7.33
23 41 13 00-0096	EA	20" x 20" x 1" Disposable Pleated Air Filter, MERV 8.....		19.17	7.70
23 41 13 00-0097	EA	20" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		20.51	7.70
23 41 13 00-0098	EA	20" x 25" x 1" Disposable Pleated Air Filter, MERV 8.....		20.28	7.70
23 41 13 00-0099	EA	20" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		22.97	7.70
23 41 13 00-0100	EA	22" x 22" x 1" Disposable Pleated Air Filter, MERV 8.....		27.97	7.88
23 41 13 00-0101	EA	24" x 24" x 1" Disposable Pleated Air Filter, MERV 8.....		21.85	7.97
23 41 13 00-0102	EA	24" x 30" x 1" Disposable Pleated Air Filter, MERV 8.....		34.55	7.97
23 41 13 00-0103	EA	25" x 25" x 1" Disposable Pleated Air Filter, MERV 8.....		23.13	8.06
23 41 13 00-0104	EA	10" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....		16.71	6.14
23 41 13 00-0105	EA	12" x 12" x 2" Disposable Pleated Air Filter, MERV 8.....		21.89	6.41
23 41 13 00-0106	EA	12" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....		17.53	6.41
23 41 13 00-0107	EA	12" x 24" x 2" Disposable Pleated Air Filter, MERV 8.....		17.26	6.41
23 41 13 00-0108	EA	14" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....		18.24	6.78
23 41 13 00-0109	EA	14" x 25" x 2" Disposable Pleated Air Filter, MERV 8.....		19.05	6.78

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
23 41 13 00-0110 EA 15" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....	18.49	6.97
23 41 13 00-0111 EA 16" x 16" x 2" Disposable Pleated Air Filter, MERV 8.....	23.31	7.06
23 41 13 00-0112 EA 16" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....	18.11	7.06
23 41 13 00-0113 EA 16" x 24" x 2" Disposable Pleated Air Filter, MERV 8.....	20.70	7.06
23 41 13 00-0114 EA 16" x 25" x 2" Disposable Pleated Air Filter, MERV 8.....	19.15	7.06
23 41 13 00-0115 EA 18" x 18" x 2" Disposable Pleated Air Filter, MERV 8.....	26.94	7.33
23 41 13 00-0116 EA 18" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....	22.94	7.33
23 41 13 00-0117 EA 18" x 24" x 2" Disposable Pleated Air Filter, MERV 8.....	20.81	7.33
23 41 13 00-0118 EA 18" x 25" x 2" Disposable Pleated Air Filter, MERV 8.....	21.63	7.33
23 41 13 00-0119 EA 20" x 20" x 2" Disposable Pleated Air Filter, MERV 8.....	20.21	7.70
23 41 13 00-0120 EA 20" x 24" x 2" Disposable Pleated Air Filter, MERV 8.....	21.69	7.70
23 41 13 00-0121 EA 20" x 25" x 2" Disposable Pleated Air Filter, MERV 8.....	21.43	7.70
23 41 13 00-0122 EA 20" x 30" x 2" Disposable Pleated Air Filter, MERV 8.....	31.08	7.70
23 41 13 00-0123 EA 24" x 24" x 2" Disposable Pleated Air Filter, MERV 8.....	22.99	7.97
23 41 13 00-0124 EA 25" x 25" x 2" Disposable Pleated Air Filter, MERV 8.....	25.43	8.06
23 41 13 00-0125 EA 12" x 24" x 4" Disposable Pleated Air Filter, MERV 8.....	26.60	6.41
23 41 13 00-0126 EA 16" x 20" x 4" Disposable Pleated Air Filter, MERV 8.....	28.74	7.06
23 41 13 00-0127 EA 16" x 25" x 4" Disposable Pleated Air Filter, MERV 8.....	30.75	7.06
23 41 13 00-0128 EA 18" x 24" x 4" Disposable Pleated Air Filter, MERV 8.....	33.17	7.33
23 41 13 00-0129 EA 20" x 20" x 4" Disposable Pleated Air Filter, MERV 8.....	31.50	7.70
23 41 13 00-0130 EA 20" x 24" x 4" Disposable Pleated Air Filter, MERV 8.....	34.31	7.70
23 41 13 00-0131 EA 20" x 25" x 4" Disposable Pleated Air Filter, MERV 8.....	34.56	7.70
23 41 13 00-0132 EA 24" x 24" x 4" Disposable Pleated Air Filter, MERV 8.....	37.75	7.97
23 41 13 00-0133 EA 10" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	24.17	6.14
23 41 13 00-0134 EA 10" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	24.17	6.14
23 41 13 00-0135 EA 10" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	31.43	6.14
23 41 13 00-0136 EA 12" x 12" x 1" Disposable Pleated Air Filter, MERV 11.....	25.64	6.41
23 41 13 00-0137 EA 12" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	24.99	6.41
23 41 13 00-0138 EA 12" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	24.88	6.41
23 41 13 00-0139 EA 12" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	35.69	6.41
23 41 13 00-0140 EA 14" x 14" x 1" Disposable Pleated Air Filter, MERV 11.....	29.14	6.78
23 41 13 00-0141 EA 14" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	25.63	6.78
23 41 13 00-0142 EA 14" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	33.19	6.78
23 41 13 00-0143 EA 14" x 25" x 1" Disposable Pleated Air Filter, MERV 11.....	32.45	6.78
23 41 13 00-0144 EA 14" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	38.15	6.78
23 41 13 00-0145 EA 15" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	24.59	6.97
23 41 13 00-0146 EA 16" x 16" x 1" Disposable Pleated Air Filter, MERV 11.....	34.95	7.06
23 41 13 00-0147 EA 16" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	22.95	7.06
23 41 13 00-0148 EA 16" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	29.68	7.06
23 41 13 00-0149 EA 16" x 25" x 1" Disposable Pleated Air Filter, MERV 11.....	27.25	7.06
23 41 13 00-0150 EA 16" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	36.08	7.06
23 41 13 00-0151 EA 18" x 18" x 1" Disposable Pleated Air Filter, MERV 11.....	36.90	7.33
23 41 13 00-0152 EA 18" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	31.27	7.33
23 41 13 00-0153 EA 18" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	28.16	7.33
23 41 13 00-0154 EA 18" x 25" x 1" Disposable Pleated Air Filter, MERV 11.....	30.04	7.33
23 41 13 00-0155 EA 18" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	41.74	7.33
23 41 13 00-0156 EA 20" x 20" x 1" Disposable Pleated Air Filter, MERV 11.....	28.28	7.70
23 41 13 00-0157 EA 20" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	31.07	7.70
23 41 13 00-0158 EA 20" x 25" x 1" Disposable Pleated Air Filter, MERV 11.....	31.36	7.70
23 41 13 00-0159 EA 20" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	36.55	7.70
23 41 13 00-0160 EA 22" x 22" x 1" Disposable Pleated Air Filter, MERV 11.....	40.48	7.88
23 41 13 00-0161 EA 24" x 24" x 1" Disposable Pleated Air Filter, MERV 11.....	34.04	7.97
23 41 13 00-0162 EA 24" x 30" x 1" Disposable Pleated Air Filter, MERV 11.....	44.20	7.97
23 41 13 00-0163 EA 25" x 25" x 1" Disposable Pleated Air Filter, MERV 11.....	38.34	8.06
23 41 13 00-0164 EA 10" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	24.61	6.14
23 41 13 00-0165 EA 12" x 12" x 2" Disposable Pleated Air Filter, MERV 11.....	25.92	6.41
23 41 13 00-0166 EA 12" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	24.63	6.41
23 41 13 00-0167 EA 12" x 24" x 2" Disposable Pleated Air Filter, MERV 11.....	28.96	6.41
23 41 13 00-0168 EA 14" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	25.93	6.78
23 41 13 00-0169 EA 14" x 25" x 2" Disposable Pleated Air Filter, MERV 11.....	27.18	6.78
23 41 13 00-0170 EA 15" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	26.64	6.97
23 41 13 00-0171 EA 16" x 16" x 2" Disposable Pleated Air Filter, MERV 11.....	35.69	7.06
23 41 13 00-0172 EA 16" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	31.05	7.06
23 41 13 00-0173 EA 16" x 24" x 2" Disposable Pleated Air Filter, MERV 11.....	30.26	7.06
23 41 13 00-0174 EA 16" x 25" x 2" Disposable Pleated Air Filter, MERV 11.....	34.29	7.06
23 41 13 00-0175 EA 18" x 18" x 2" Disposable Pleated Air Filter, MERV 11.....	41.13	7.33
23 41 13 00-0176 EA 18" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	32.59	7.33
23 41 13 00-0177 EA 18" x 24" x 2" Disposable Pleated Air Filter, MERV 11.....	37.21	7.33
23 41 13 00-0178 EA 18" x 25" x 2" Disposable Pleated Air Filter, MERV 11.....	32.22	7.33
23 41 13 00-0179 EA 20" x 20" x 2" Disposable Pleated Air Filter, MERV 11.....	35.75	7.70
23 41 13 00-0180 EA 20" x 24" x 2" Disposable Pleated Air Filter, MERV 11.....	38.32	7.70
23 41 13 00-0181 EA 20" x 25" x 2" Disposable Pleated Air Filter, MERV 11.....	38.70	7.70
23 41 13 00-0182 EA 24" x 24" x 2" Disposable Pleated Air Filter, MERV 11.....	38.68	7.97
23 41 13 00-0183 EA 25" x 25" x 2" Disposable Pleated Air Filter, MERV 11.....	39.18	8.06
23 41 13 00-0184 EA 12" x 24" x 4" Disposable Pleated Air Filter, MERV 11.....	47.17	6.41
23 41 13 00-0185 EA 16" x 20" x 4" Disposable Pleated Air Filter, MERV 11.....	48.30	7.06
23 41 13 00-0186 EA 16" x 25" x 4" Disposable Pleated Air Filter, MERV 11.....	57.54	7.06
23 41 13 00-0187 EA 18" x 24" x 4" Disposable Pleated Air Filter, MERV 11.....	57.45	7.33
23 41 13 00-0188 EA 20" x 20" x 4" Disposable Pleated Air Filter, MERV 11.....	57.23	7.70
23 41 13 00-0189 EA 20" x 24" x 4" Disposable Pleated Air Filter, MERV 11.....	63.04	7.70
23 41 13 00-0190 EA 20" x 25" x 4" Disposable Pleated Air Filter, MERV 11.....	63.04	7.70

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 40 HVAC Air Cleaning Devices****23 41 Particulate Air Filtration**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 41 13 00-0191	EA	24" x 24" x 4"	Disposable Pleated Air Filter, MERV 11.....	70.36	7.97
23 41 13 00-0192	EA	8" x 16" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.88	5.87
23 41 13 00-0193	EA	8" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.88	5.87
23 41 13 00-0194	EA	8" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.88	5.87
23 41 13 00-0195	EA	10" x 10" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.24	6.14
23 41 13 00-0196	EA	10" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	29.88	6.14
23 41 13 00-0197	EA	10" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.24	6.14
23 41 13 00-0198	EA	10" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.24	6.14
23 41 13 00-0199	EA	10" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.24	6.14
23 41 13 00-0200	EA	12" x 12" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.26	6.41
23 41 13 00-0201	EA	12" x 16" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.62	6.41
23 41 13 00-0202	EA	12" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.26	6.41
23 41 13 00-0203	EA	12" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.26	6.41
23 41 13 00-0204	EA	12" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.62	6.41
23 41 13 00-0205	EA	12" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.62	6.41
23 41 13 00-0206	EA	12" x 36" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.98	6.41
23 41 13 00-0207	EA	14" x 14" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.74	6.78
23 41 13 00-0208	EA	14" x 18" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.10	6.78
23 41 13 00-0209	EA	14" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.74	6.78
23 41 13 00-0210	EA	14" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.74	6.78
23 41 13 00-0211	EA	14" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.74	6.78
23 41 13 00-0212	EA	14" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.10	6.78
23 41 13 00-0213	EA	15" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	30.99	6.97
23 41 13 00-0214	EA	15" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.35	6.97
23 41 13 00-0215	EA	15" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.35	6.97
23 41 13 00-0216	EA	16" x 16" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.11	7.06
23 41 13 00-0217	EA	16" x 18" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.47	7.06
23 41 13 00-0218	EA	16" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.11	7.06
23 41 13 00-0219	EA	16" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.11	7.06
23 41 13 00-0220	EA	16" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.11	7.06
23 41 13 00-0221	EA	16" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.47	7.06
23 41 13 00-0222	EA	16" x 32" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	32.47	7.06
23 41 13 00-0223	EA	16" x 36" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	36.88	7.06
23 41 13 00-0224	EA	18" x 18" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.47	7.33
23 41 13 00-0225	EA	18" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	34.19	7.33
23 41 13 00-0226	EA	18" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.47	7.33
23 41 13 00-0227	EA	18" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	34.19	7.33
23 41 13 00-0228	EA	18" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	34.19	7.33
23 41 13 00-0229	EA	18" x 36" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	37.24	7.33
23 41 13 00-0230	EA	19" x 27" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	34.69	7.70
23 41 13 00-0231	EA	20" x 20" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.97	7.70
23 41 13 00-0232	EA	20" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.97	7.70
23 41 13 00-0233	EA	20" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	31.97	7.70
23 41 13 00-0234	EA	20" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	33.33	7.70
23 41 13 00-0235	EA	20" x 32" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	37.74	7.70
23 41 13 00-0236	EA	20" x 36" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	37.74	7.70
23 41 13 00-0237	EA	21" x 21" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	34.81	7.79
23 41 13 00-0238	EA	22" x 22" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	33.57	7.88
23 41 13 00-0239	EA	24" x 24" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	36.40	7.97
23 41 13 00-0240	EA	24" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	36.40	7.97
23 41 13 00-0241	EA	24" x 36" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	40.81	7.97
23 41 13 00-0242	EA	25" x 25" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	36.52	8.06
23 41 13 00-0243	EA	25" x 32" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	40.93	8.06
23 41 13 00-0244	EA	30" x 30" x 1"	Disposable Pleated Electrostatically Charged Air Filter, MERV 13.....	41.18	8.24

23 41 13 00-0245 Carbon Vapor Trap, Disposable V-Bank Filter (23 41 13)

23 41 13 00-0246	EA	24" x 24" x 12"	Thick Carbon Vapor, Disposable V-Bank Filter.....	942.00	18.33
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23 41 13 00-0247 Electrostatic Air Filters With Frame, Element And Busbar (23 41 13)

23 41 13 00-0248	MF3		Electrostatic Air Filter, High Efficiency Non-Supported With Frame, Element And Busbar.....	70.60	
23 41 13 00-0249	MF3		Electrostatic Air Filter, Medium Efficiency Non-Supported With Frame, Element And Busbar.....	68.19	
23 41 13 00-0250	MF3		Electrostatic Air Filter, Glass/Paper Throwaway With Frame, Element And Busbar.....	2.94	

23 41 16 Renewable-Media Air Filters (23 41)**23 41 16 00-0001 Renewable-Media Electrostatic Air Filters With Frame, Element And Busbar (23 41 16)**

23 41 16 00-0002	MF3		Electrostatic Air Filter, 5' Disposable Roll Renewable With Frame, Element And Busbar.....	121.49	
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23 41 19 Washable Air Filters (23 41)**23 41 19 00-0001 Washable Electrostatic Air Filters With Frame, Element And Busbar (23 41 19)**

23 41 19 00-0002	MF3		Electrostatic Air Filter, Permanent, Washable With Frame, Element And Busbar.....	46.39	
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23 41 33 High-Efficiency Particulate Filtration (23 41)



Heating, Ventilating, and Air-Conditioning (HVAC)	23
HVAC Air Cleaning Devices	23 40
Particulate Air Filtration	23 41

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 41 33 00-0001 High Efficiency Particulate Air (HEPA) Filters ^(23 41 33) Note: Includes particle board and kraft paper frame and separator material.		
23 41 33 00-0002 High Efficiency Particulate Air (HEPA) Filters DOP Efficiency-95% ^(23 41 33 00-0001)		
23 41 33 00-0003 EA 12" x 12" x 6", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 150 CFM, Complete 126.22	126.22	17.11
For Removal And Replacement In Existing Equipment, Add	3.42	
For >10 To 25, Deduct	-3.16	
For >25 To 50, Deduct	-6.31	
For >50 To 100, Deduct	-9.47	
For >100, Deduct	-12.62	
23 41 33 00-0004 EA 24" x 12" x 6", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 375 CFM, Complete 167.53	167.53	19.55
For Removal And Replacement In Existing Equipment, Add	3.91	
For >10 To 25, Deduct	-4.19	
For >25 To 50, Deduct	-8.38	
For >50 To 100, Deduct	-12.56	
For >100, Deduct	-16.75	
23 41 33 00-0005 EA 24" x 18" x 6", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 450 CFM, Complete 196.05	196.05	22.61
For Removal And Replacement In Existing Equipment, Add	4.52	
For >10 To 25, Deduct	-4.90	
For >25 To 50, Deduct	-9.80	
For >50 To 100, Deduct	-14.70	
For >100, Deduct	-19.61	
23 41 33 00-0006 EA 24" x 24" x 6", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 700 CFM, Complete 224.60	224.60	25.67
For Removal And Replacement In Existing Equipment, Add	5.13	
For >10 To 25, Deduct	-5.62	
For >25 To 50, Deduct	-11.23	
For >50 To 100, Deduct	-16.85	
For >100, Deduct	-22.46	
23 41 33 00-0007 EA 12" x 12" x 12", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 250 CFM, Complete 153.56	153.56	18.33
For Removal And Replacement In Existing Equipment, Add	3.67	
For >10 To 25, Deduct	-3.84	
For >25 To 50, Deduct	-7.68	
For >50 To 100, Deduct	-11.52	
For >100, Deduct	-15.36	
23 41 33 00-0008 EA 24" x 12" x 12", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 500 CFM, Complete 205.93	205.93	21.39
For Removal And Replacement In Existing Equipment, Add	4.28	
For >10 To 25, Deduct	-5.15	
For >25 To 50, Deduct	-10.30	
For >50 To 100, Deduct	-15.44	
For >100, Deduct	-20.59	
23 41 33 00-0009 EA 24" x 18" x 12", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 875 CFM, Complete 246.05	246.05	24.44
For Removal And Replacement In Existing Equipment, Add	4.69	
For >10 To 25, Deduct	-6.15	
For >25 To 50, Deduct	-12.30	
For >50 To 100, Deduct	-18.45	
For >100, Deduct	-24.61	
23 41 33 00-0010 EA 24" x 24" x 12", High Efficiency Particulate Air (HEPA) Filter, 95% DOP Efficiency, 1,000 CFM, Complete 292.27	292.27	30.55
For Removal And Replacement In Existing Equipment, Add	6.11	
For >10 To 25, Deduct	-7.31	
For >25 To 50, Deduct	-14.61	
For >50 To 100, Deduct	-21.92	
For >100, Deduct	-29.23	
23 41 33 00-0011 High Efficiency Particulate Air (HEPA) Filters DOP Efficiency-99.99% ^(23 41 33 00-0001)		
23 41 33 00-0012 EA 12" x 12" x 3", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, Complete 108.20	108.20	15.28
For Removal And Replacement In Existing Equipment, Add	3.06	
For >10 To 25, Deduct	-2.71	
For >25 To 50, Deduct	-5.41	
For >50 To 100, Deduct	-8.12	
For >100, Deduct	-10.82	
23 41 33 00-0013 EA 24" x 12" x 3", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, Complete 149.49	149.49	18.33
For Removal And Replacement In Existing Equipment, Add	3.67	
For >10 To 25, Deduct	-3.74	
For >25 To 50, Deduct	-7.47	
For >50 To 100, Deduct	-11.21	
For >100, Deduct	-14.95	
23 41 33 00-0014 EA 24" x 24" x 3", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, Complete 228.16	228.16	21.39
For Removal And Replacement In Existing Equipment, Add	4.28	
For >10 To 25, Deduct	-5.70	
For >25 To 50, Deduct	-11.41	
For >50 To 100, Deduct	-17.11	
For >100, Deduct	-22.82	
23 41 33 00-0015 EA 36" x 24" x 3", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, Complete 293.08	293.08	24.44
For Removal And Replacement In Existing Equipment, Add	4.89	
For >10 To 25, Deduct	-7.33	
For >25 To 50, Deduct	-14.65	
For >50 To 100, Deduct	-21.98	
For >100, Deduct	-29.31	
23 41 33 00-0016 EA 8" x 8" x 6", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, Complete 102.02	102.02	12.22
For Removal And Replacement In Existing Equipment, Add	2.44	
For >10 To 25, Deduct	-2.55	
For >25 To 50, Deduct	-5.10	
For >50 To 100, Deduct	-7.65	
For >100, Deduct	-10.20	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 40 HVAC Air Cleaning Devices

23 41 Particulate Air Filtration



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 41 33 00-0017	EA 12" x 12" x 6", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 150 CFM, Complete <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	135.23 3.30 -3.38 -6.76 -10.14 -13.52	16.50
23 41 33 00-0018	EA 24" x 12" x 6", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 325 CFM, Complete <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	181.80 3.91 -4.55 -9.09 -13.64 -18.18	19.55
23 41 33 00-0019	EA 24" x 18" x 6", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 550 CFM, Complete <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	213.44 4.58 -5.34 -10.67 -16.01 -21.34	22.91
23 41 33 00-0020	EA 24" x 24" x 6", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 775 CFM, Complete <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	243.85 5.13 -6.10 -12.19 -18.29 -24.39	25.67
23 41 33 00-0021	EA 12" x 12" x 12", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 250 CFM, Complete..... <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	166.54 3.67 -4.16 -8.33 -12.49 -16.65	18.33
23 41 33 00-0022	EA 24" x 12" x 12", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 500 CFM, Complete..... <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	224.07 4.28 -5.60 -11.20 -16.81 -22.41	21.39
23 41 33 00-0023	EA 24" x 18" x 12", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 775 CFM, Complete..... <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	267.95 4.89 -6.70 -13.40 -20.10 -26.80	24.44
23 41 33 00-0024	EA 24" x 24" x 12", High Efficiency Particulate Air (HEPA) Filter, 99.99% DOP Efficiency, 1,100 CFM, Complete..... <i>For Removal And Replacement In Existing Equipment, Add</i> <i>For >10 To 25, Deduct</i> <i>For >25 To 50, Deduct</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	330.18 6.11 -8.25 -16.51 -24.76 -33.02	30.55
23 41 33 00-0025 High Efficiency Particulate Air (HEPA) Filter Housings, 14 Gauge Galvanized Sheet Metal (23 41 33)			
Note: Nominal sizes.			
23 41 33 00-0026	EA 12" x 12" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	313.15	91.16
23 41 33 00-0027	EA 24" x 12" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	584.88	181.19
23 41 33 00-0028	EA 24" x 18" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	593.75	181.19
23 41 33 00-0029	EA 24" x 24" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	599.66	181.19
23 41 33 00-0030	EA 24" x 48" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	641.06	181.19
23 41 33 00-0031	EA 24" x 72" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	692.81	181.19
23 41 33 00-0032	EA 48" x 48" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	1,134.28	363.53
23 41 33 00-0033	EA 48" x 72" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	1,259.95	363.53
23 41 33 00-0034	EA 48" x 96" x 6", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	1,419.63	363.53
23 41 33 00-0035	EA 12" x 12" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	338.28	91.16
23 41 33 00-0036	EA 24" x 12" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	627.75	181.19
23 41 33 00-0037	EA 24" x 18" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	638.10	181.19
23 41 33 00-0038	EA 24" x 24" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	645.50	181.19
23 41 33 00-0039	EA 24" x 48" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	694.29	181.19
23 41 33 00-0040	EA 24" x 72" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	759.34	181.19
23 41 33 00-0041	EA 48" x 48" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	1,237.77	363.53
23 41 33 00-0042	EA 48" x 72" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	1,394.50	363.53
23 41 33 00-0043	EA 48" x 96" x 12", High Efficiency Particulate Air (HEPA) Filter Housings 14 Gauge Galvanized Sheet Metal.....	1,592.62	363.53
23 41 33 00-0044 Filter, Bag Type, 90-95% Efficiency (23 41 33)			
23 41 33 00-0045	EA 0.75 - 1.25 MCFM, 24" x 12" x 29" Filter, Bag Type, 90 - 95% Efficiency.....	280.44	118.17
23 41 33 00-0046	EA 1.5 - 2.5 MCFM, 24" x 24" x 29" Filter, Bag Type, 90 - 95% Efficiency.....	321.81	118.17
23 41 33 00-0047 Filter, Bag Type, 80-85% Efficiency (23 41 33)			
23 41 33 00-0048	EA 0.75 - 1.25 MCFM, 24" x 12" x 29" Filter, Bag Type, 80 - 85% Efficiency.....	275.69	118.17
23 41 33 00-0049	EA 1.5 - 2.5 MCFM, 24" x 24" x 29" Filter, Bag Type, 80 - 85% Efficiency.....	306.21	118.17



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 42 Gas-Phase Air Filtration (23 40)

23 42 13 Activated-Carbon Air Filtration (23 42)

23 42 13 00-0001	EA	12" x 24" x 1" Thick Activated Carbon Honeycomb Disposable Filter.....	45.51	9.17
23 42 13 00-0002	EA	16" x 20" x 1" Thick Activated Carbon Honeycomb Disposable Filter.....	46.02	9.17
23 42 13 00-0003	EA	16" x 25" x 1" Thick Activated Carbon Honeycomb Disposable Filter.....	46.34	9.17
23 42 13 00-0004	EA	20" x 20" x 1" Thick Activated Carbon Honeycomb Disposable Filter.....	46.34	9.17
23 42 13 00-0005	EA	20" x 25" x 1" Thick Activated Carbon Honeycomb Disposable Filter.....	50.22	9.17
23 42 13 00-0006	EA	24" x 24" x 1" Thick Activated Carbon Honeycomb Disposable Filter.....	56.59	9.17
23 42 13 00-0007	EA	12" x 24" x 2" Thick Activated Carbon Honeycomb Disposable Filter.....	57.46	10.39
23 42 13 00-0008	EA	16" x 20" x 2" Thick Activated Carbon Honeycomb Disposable Filter.....	57.89	10.39
23 42 13 00-0009	EA	16" x 25" x 2" Thick Activated Carbon Honeycomb Disposable Filter.....	58.26	10.39
23 42 13 00-0010	EA	20" x 20" x 2" Thick Activated Carbon Honeycomb Disposable Filter.....	58.26	10.39
23 42 13 00-0011	EA	20" x 25" x 2" Thick Activated Carbon Honeycomb Disposable Filter.....	62.55	10.39
23 42 13 00-0012	EA	24" x 24" x 2" Thick Activated Carbon Honeycomb Disposable Filter.....	74.50	10.39
23 42 13 00-0013	EA	16" x 20" x 1" Thick Carbon Impregnated Pleated Air Filter.....	27.77	9.17
23 42 13 00-0014	EA	16" x 25" x 1" Thick Carbon Impregnated Pleated Air Filter.....	29.61	9.17
23 42 13 00-0015	EA	20" x 20" x 1" Thick Carbon Impregnated Pleated Air Filter.....	29.68	9.17
23 42 13 00-0016	EA	20" x 25" x 1" Thick Carbon Impregnated Pleated Air Filter.....	32.09	9.17
23 42 13 00-0017	EA	24" x 24" x 1" Thick Carbon Impregnated Pleated Air Filter.....	34.24	9.17
23 42 13 00-0018	EA	16" x 20" x 2" Thick Carbon Impregnated Pleated Air Filter.....	32.15	10.39
23 42 13 00-0019	EA	16" x 25" x 2" Thick Carbon Impregnated Pleated Air Filter.....	35.36	10.39
23 42 13 00-0020	EA	20" x 20" x 2" Thick Carbon Impregnated Pleated Air Filter.....	36.04	10.39
23 42 13 00-0021	EA	20" x 25" x 2" Thick Carbon Impregnated Pleated Air Filter.....	40.03	10.39
23 42 13 00-0022	EA	24" x 24" x 2" Thick Carbon Impregnated Pleated Air Filter.....	42.57	10.39
23 42 13 00-0023	EA	24" x 24" x 4" Thick Carbon Impregnated Pleated Air Filter.....	70.01	11.00

23 43 Electronic Air Cleaners (23 40)

23 43 23 Self-Contained Electronic Air Cleaners (23 43)

23 43 23 00-0001 Stationary Floor, Room Air Purifier (23 43 23)

23 43 23 00-0002	EA	Stationary Floor Room Air Purifier, Up to 390 SF (Blueair Pro M).....	1,132.18	
23 43 23 00-0003	EA	Stationary Floor Room Air Purifier, Up to 780 SF (Blueair Pro L).....	1,575.34	
23 43 23 00-0004	EA	Stationary Floor Room Air Purifier, Up to 1,180 SF (Blueair Pro XL).....	3,981.04	
23 43 23 00-0005	EA	Stationary Floor Room Air Purifier, Up to 550 SF (Delos Compact).....	893.21	
23 43 23 00-0006	EA	Stationary Floor Room Air Purifier, Up to 1,125 SF (Delos 468 Ultrafine).....	1,605.43	
23 43 23 00-0007	EA	Stationary Floor Room Air Purifier, Up to 3,500 SF (Delos 980P Commercial).....	6,353.53	

23 43 23 00-0008 Surface Mounted, Room Air Purifier (23 43 23)

23 43 23 00-0009	EA	Ceiling Mount Media Air Cleaner With 99.97% HEPA Filters (Honeywell F114A1067).....	2,899.24	
23 43 23 00-0010	EA	Ceiling Mount Media Air Cleaner With 99.97% HEPA Filters (Honeywell F115A1064).....	4,044.24	
23 43 23 00-0011	EA	Ceiling Mount Media Air Cleaner With 99.97% HEPA Filters (Honeywell F111A1063W-3S).....	4,627.55	

23 43 23 00-0012 Suspension Ceiling Mounted, Room Air Purifier (23 43 23)

23 43 23 00-0013	EA	2' x 4' Suspension Ceiling Mounted, Air Purification System (Armstrong VidaShield UV24).....	3,752.32	
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23 43 23 00-0014 Wall Mounted, Room Air Purifier (23 43 23)

23 43 23 00-0015	EA	Air Purifier, Wall Mount, Bipolar Ionizer (Bi-Polar 2400).....	944.40	
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23 50 Central Heating Equipment (23)

Note: Where required, mechanical equipment excludes electrical connection, disconnect, or starter unless title states otherwise. See CSI section 26 05 19 16-0011 for electrical connection and termination, 26 05 83 00-0110 for terminations, 26 28 16 16-0001 for disconnect.

23 51 Breechings, Chimneys, and Stacks (23 50)

23 51 13 Draft Control Devices (23 51)

23 51 13 13 Draft-Induction Fans (23 51 13)

23 51 13 13-0001 Vertical Discharge Fans (23 51 13 13)

Note: Includes chimney adapter. Excludes wiring.

23 51 13 13-0002 Axial Vane Vertical Discharge Fans (23 51 13 13-0001)

23 51 13 13-0003	EA	450 CFM Vertical Discharge Chimney Fan, Axial Vane.....	3,695.78	247.60
23 51 13 13-0004	EA	950 CFM Vertical Discharge Chimney Fan, Axial Vane.....	4,192.60	270.11
23 51 13 13-0005	EA	1,400 CFM Vertical Discharge Chimney Fan, Axial Vane.....	5,039.53	298.25
23 51 13 13-0006	EA	1,800 CFM Vertical Discharge Chimney Fan, Axial Vane.....	6,597.55	346.08

23 51 13 13-0007 Centrifugal Impeller Vertical Discharge Fans (23 51 13 13-0001)

23 51 13 13-0008	EA	700 CFM Vertical Discharge Chimney Fan, Centrifugal Impeller.....	4,449.99	270.11
23 51 13 13-0009	EA	1,100 CFM Vertical Discharge Chimney Fan, Centrifugal Impeller.....	5,435.00	298.25
23 51 13 13-0010	EA	2,300 CFM Vertical Discharge Chimney Fan, Centrifugal Impeller.....	7,067.60	348.89
23 51 13 13-0011	EA	3,000 CFM Vertical Discharge Chimney Fan, Centrifugal Impeller.....	8,375.75	391.09

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 51 13 13-0012	Accessories For Vertical Discharge Fans (23 51 13 13-0001)		
23 51 13 13-0013	EA Modulating Fan Controller And Sensor.....	507.70	84.41

23 51 13 16 Vent Dampers (23 51 13)

23 51 13 16-0001	Flue Shutter Draft Control Damper, Parallel Blade (23 51 13 16)		
23 51 13 16-0002	EA 3" Round Flue Shutter Draft Control Damper.....	996.89	49.97
23 51 13 16-0003	EA 4" Round Flue Shutter Draft Control Damper.....	1,093.84	53.01
23 51 13 16-0004	EA 5" Round Flue Shutter Draft Control Damper.....	1,208.60	56.27
23 51 13 16-0005	EA 6" Round Flue Shutter Draft Control Damper.....	1,291.31	60.01
23 51 13 16-0006	EA 7" Round Flue Shutter Draft Control Damper.....	1,410.39	64.29
23 51 13 16-0007	EA 8" Round Flue Shutter Draft Control Damper.....	1,497.86	69.21
23 51 13 16-0008	EA 10" Round Flue Shutter Draft Control Damper.....	1,656.71	75.05
23 51 13 16-0009	EA 12" Round Flue Shutter Draft Control Damper.....	1,819.42	81.84
23 51 13 16-0010	EA 14" Round Flue Shutter Draft Control Damper.....	2,039.24	85.81
23 51 13 16-0011	EA 16" Round Flue Shutter Draft Control Damper.....	2,191.64	90.03
23 51 13 16-0012	EA 18" Round Flue Shutter Draft Control Damper.....	2,396.16	94.54
23 51 13 16-0013	EA 20" Round Flue Shutter Draft Control Damper.....	2,820.04	149.69
23 51 13 16-0014	EA 22" Round Flue Shutter Draft Control Damper.....	3,094.66	158.98
23 51 13 16-0015	EA 24" Round Flue Shutter Draft Control Damper.....	3,354.76	168.82
23 51 13 16-0016	EA 26" Round Flue Shutter Draft Control Damper.....	3,410.83	174.45
23 51 13 16-0017	EA 28" Round Flue Shutter Draft Control Damper.....	3,518.20	180.08
23 51 13 16-0018	EA 30" Round Flue Shutter Draft Control Damper.....	3,614.14	191.33
23 51 13 16-0019	EA 32" Round Flue Shutter Draft Control Damper.....	3,772.56	196.83
23 51 13 16-0020	EA 34" Round Flue Shutter Draft Control Damper.....	3,935.81	208.08
23 51 13 16-0021	EA 36" Round Flue Shutter Draft Control Damper.....	4,122.28	225.09
23 51 13 16-0022	EA 38" Round Flue Shutter Draft Control Damper.....	4,332.19	232.82
23 51 13 16-0023	EA 40" Round Flue Shutter Draft Control Damper.....	4,527.07	236.35
23 51 13 16-0024	EA 42" Round Flue Shutter Draft Control Damper.....	4,749.56	247.60
23 51 13 16-0025	EA 44" Round Flue Shutter Draft Control Damper.....	4,973.36	258.86
23 51 13 16-0026	EA 46" Round Flue Shutter Draft Control Damper.....	5,197.77	270.11
23 51 13 16-0027	EA 48" Round Flue Shutter Draft Control Damper.....	5,421.23	281.36

23 51 13 19 Barometric Dampers (23 51 13)

23 51 13 19-0001	Barometric Dampers (23 51 13 19)		
23 51 13 19-0002	EA 6" x 6" Barometric Damper.....	463.15	9.76
23 51 13 19-0003	EA 12" x 12" Barometric Damper.....	670.17	13.42
23 51 13 19-0004	EA 18" x 18" Barometric Damper.....	897.60	20.73
23 51 13 19-0005	EA 24" x 24" Barometric Damper.....	1,071.69	39.03
23 51 13 19-0006	EA 6" Diameter Barometric Damper.....	226.62	9.76
	<i>For Stainless Steel, Add</i>	245.39	
23 51 13 19-0007	EA 7" Diameter Barometric Damper.....	268.17	10.97
	<i>For Stainless Steel, Add</i>	291.54	
23 51 13 19-0008	EA 8" Diameter Barometric Damper.....	311.14	12.19
	<i>For Stainless Steel, Add</i>	338.10	
23 51 13 19-0009	EA 9" Diameter Barometric Damper.....	383.11	12.19
	<i>For Stainless Steel, Add</i>	428.29	
23 51 13 19-0010	EA 10" Diameter Barometric Damper.....	505.13	14.64
	<i>For Stainless Steel, Add</i>	583.49	
23 51 13 19-0011	EA 12" Diameter Barometric Damper.....	641.61	15.86
	<i>For Stainless Steel, Add</i>	752.54	
23 51 13 19-0012	EA 14" Diameter Barometric Damper.....	806.89	17.08
	<i>For Stainless Steel, Add</i>	959.76	
23 51 13 19-0013	EA 15" Diameter Barometric Damper.....	963.06	18.29
	<i>For Stainless Steel, Add</i>	1,153.57	
23 51 13 19-0014	EA 16" Diameter Barometric Damper.....	1,117.42	20.73
	<i>For Stainless Steel, Add</i>	1,346.94	
23 51 13 19-0015	EA 18" Diameter Barometric Damper.....	1,472.10	21.96
	<i>For Stainless Steel, Add</i>	1,799.56	
23 51 13 19-0016	EA 20" Diameter Barometric Damper.....	1,752.39	24.40
	<i>For Stainless Steel, Add</i>	2,154.02	
23 51 13 19-0017	EA 24" Diameter Barometric Damper.....	2,113.28	24.40
	<i>For Stainless Steel, Add</i>	2,617.54	
23 51 13 19-0018	EA 30" Diameter Barometric Damper.....	2,605.67	28.05
	<i>For Stainless Steel, Add</i>	3,244.66	
23 51 13 19-0019	EA 36" Diameter Barometric Damper.....	3,324.54	29.27
	<i>For Stainless Steel, Add</i>	4,171.70	

23 51 16 Fabricated Breechings and Accessories (23 51)

23 51 16 00-0001	Round Galvanized Double Wall Flue/Vent Pipe And Fittings (23 51 16)		
23 51 16 00-0002	Round Galvanized Double Wall Flue/Vent Pipe (23 51 16 00-0001)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0003 LF 3" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	31.99	10.01
Note: 0.012" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	0.39	
For 304 Stainless Steel Liner, Add	0.53	
For 2" Wall Instead Of 1", Add	4.60	
For 3" To 4" Wall Instead Of 1", Add	8.15	
23 51 16 00-0004 LF 4" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	34.40	10.58
Note: 0.012" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	0.47	
For 304 Stainless Steel Liner, Add	0.64	
For 2" Wall Instead Of 1", Add	5.16	
For 3" To 4" Wall Instead Of 1", Add	9.03	
23 51 16 00-0005 LF 5" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	38.02	11.25
Note: 0.012" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	0.56	
For 304 Stainless Steel Liner, Add	0.76	
For 2" Wall Instead Of 1", Add	5.84	
For 3" To 4" Wall Instead Of 1", Add	10.15	
23 51 16 00-0006 LF 6" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	41.48	12.05
Note: 0.012" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	0.65	
For 304 Stainless Steel Liner, Add	0.89	
For 2" Wall Instead Of 1", Add	6.51	
For 3" To 4" Wall Instead Of 1", Add	11.25	
23 51 16 00-0007 LF 7" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	48.86	12.83
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	0.96	
For 304 Stainless Steel Liner, Add	1.31	
For 2" Wall Instead Of 1", Add	8.37	
For 3" To 4" Wall Instead Of 1", Add	14.12	
23 51 16 00-0008 LF 8" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	54.31	13.84
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	1.07	
For 304 Stainless Steel Liner, Add	1.45	
For 2" Wall Instead Of 1", Add	9.31	
For 3" To 4" Wall Instead Of 1", Add	15.70	
23 51 16 00-0009 LF 10" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	78.69	14.86
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	2.25	
For 304 Stainless Steel Liner, Add	3.07	
For 2" Wall Instead Of 1", Add	16.05	
For 3" To 4" Wall Instead Of 1", Add	25.97	
23 51 16 00-0010 LF 12" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	95.85	16.43
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	3.02	
For 304 Stainless Steel Liner, Add	4.12	
For 2" Wall Instead Of 1", Add	20.56	
For 3" To 4" Wall Instead Of 1", Add	32.89	
23 51 16 00-0011 LF 14" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	135.05	17.10
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	5.07	
For 304 Stainless Steel Liner, Add	6.91	
For 2" Wall Instead Of 1", Add	31.94	
For 3" To 4" Wall Instead Of 1", Add	50.05	
23 51 16 00-0012 LF 16" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	169.09	18.01
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	6.83	
For 304 Stainless Steel Liner, Add	9.32	
For 2" Wall Instead Of 1", Add	41.76	
For 3" To 4" Wall Instead Of 1", Add	64.89	
23 51 16 00-0013 LF 18" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	208.28	18.91
Note: 0.014" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	8.83	
For 304 Stainless Steel Liner, Add	12.04	
For 2" Wall Instead Of 1", Add	52.93	
For 3" To 4" Wall Instead Of 1", Add	81.79	
23 51 16 00-0014 LF 20" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	264.69	30.05
Note: 0.022" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	10.48	
For 304 Stainless Steel Liner, Add	14.29	
For 2" Wall Instead Of 1", Add	64.58	
For 3" To 4" Wall Instead Of 1", Add	100.58	
23 51 16 00-0015 LF 22" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	320.35	31.74
Note: 0.022" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	13.21	
For 304 Stainless Steel Liner, Add	18.02	
For 2" Wall Instead Of 1", Add	80.09	
For 3" To 4" Wall Instead Of 1", Add	124.14	
23 51 16 00-0016 LF 24" Round Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe.....	381.27	33.76
Note: 0.022" (inner wall) and 0.018" (outer wall) material thickness		
For Aluminum Liner, Add	16.29	
For 304 Stainless Steel Liner, Add	22.21	
For 2" Wall Instead Of 1", Add	97.36	
For 3" To 4" Wall Instead Of 1", Add	150.30	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0017			90 Degree Elbows <small>(23 51 16 00-0001)</small>		
23 51 16 00-0018	EA		3" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	81.71	20.03
			For Aluminum Liner, Add	1.76	
			For 304 Stainless Steel Liner, Add	2.41	
			For 2" Wall Instead Of 1", Add	14.59	
			For 3" To 4" Wall Instead Of 1", Add	24.36	
23 51 16 00-0019	EA		4" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	90.64	21.16
			For Aluminum Liner, Add	2.08	
			For 304 Stainless Steel Liner, Add	2.84	
			For 2" Wall Instead Of 1", Add	16.64	
			For 3" To 4" Wall Instead Of 1", Add	27.60	
23 51 16 00-0020	EA		5" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	101.24	22.51
			For Aluminum Liner, Add	2.49	
			For 304 Stainless Steel Liner, Add	3.39	
			For 2" Wall Instead Of 1", Add	19.17	
			For 3" To 4" Wall Instead Of 1", Add	31.55	
23 51 16 00-0021	EA		6" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	112.09	23.97
			For Aluminum Liner, Add	2.89	
			For 304 Stainless Steel Liner, Add	3.94	
			For 2" Wall Instead Of 1", Add	21.72	
			For 3" To 4" Wall Instead Of 1", Add	35.56	
23 51 16 00-0022	EA		7" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	134.08	25.66
			For Aluminum Liner, Add	3.87	
			For 304 Stainless Steel Liner, Add	5.27	
			For 2" Wall Instead Of 1", Add	27.47	
			For 3" To 4" Wall Instead Of 1", Add	44.39	
23 51 16 00-0023	EA		8" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	157.24	27.69
			For Aluminum Liner, Add	4.84	
			For 304 Stainless Steel Liner, Add	6.60	
			For 2" Wall Instead Of 1", Add	33.33	
			For 3" To 4" Wall Instead Of 1", Add	53.46	
23 51 16 00-0024	EA		10" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	277.71	30.05
			For Aluminum Liner, Add	11.14	
			For 304 Stainless Steel Liner, Add	15.18	
			For 2" Wall Instead Of 1", Add	68.26	
			For 3" To 4" Wall Instead Of 1", Add	106.16	
23 51 16 00-0025	EA		12" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	337.08	32.75
			For Aluminum Liner, Add	14.04	
			For 304 Stainless Steel Liner, Add	19.15	
			For 2" Wall Instead Of 1", Add	84.76	
			For 3" To 4" Wall Instead Of 1", Add	131.23	
23 51 16 00-0026	EA		14" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	438.73	34.33
			For Aluminum Liner, Add	19.41	
			For 304 Stainless Steel Liner, Add	26.47	
			For 2" Wall Instead Of 1", Add	114.47	
			For 3" To 4" Wall Instead Of 1", Add	175.99	
23 51 16 00-0027	EA		16" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	540.55	36.02
			For Aluminum Liner, Add	24.79	
			For 304 Stainless Steel Liner, Add	33.80	
			For 2" Wall Instead Of 1", Add	144.19	
			For 3" To 4" Wall Instead Of 1", Add	220.78	
23 51 16 00-0028	EA		18" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	700.49	37.93
			For Aluminum Liner, Add	33.31	
			For 304 Stainless Steel Liner, Add	45.42	
			For 2" Wall Instead Of 1", Add	191.17	
			For 3" To 4" Wall Instead Of 1", Add	291.50	
23 51 16 00-0029	EA		20" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	986.38	59.99
			For Aluminum Liner, Add	45.99	
			For 304 Stainless Steel Liner, Add	62.72	
			For 2" Wall Instead Of 1", Add	265.89	
			For 3" To 4" Wall Instead Of 1", Add	406.34	
23 51 16 00-0030	EA		22" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	1,303.30	63.58
			For Aluminum Liner, Add	62.94	
			For 304 Stainless Steel Liner, Add	85.82	
			For 2" Wall Instead Of 1", Add	359.20	
			For 3" To 4" Wall Instead Of 1", Add	546.74	
23 51 16 00-0031	EA		24" Round Flue/Vent, 90 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	1,471.77	67.53
			For Aluminum Liner, Add	71.65	
			For 304 Stainless Steel Liner, Add	97.71	
			For 2" Wall Instead Of 1", Add	407.73	
			For 3" To 4" Wall Instead Of 1", Add	620.05	
23 51 16 00-0032			45 Degree Elbows <small>(23 51 16 00-0001)</small>		
23 51 16 00-0033	EA		3" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	68.46	20.03
			For Aluminum Liner, Add	1.02	
			For 304 Stainless Steel Liner, Add	1.39	
			For 2" Wall Instead Of 1", Add	10.54	
			For 3" To 4" Wall Instead Of 1", Add	18.31	
23 51 16 00-0034	EA		4" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe.....	74.80	21.16
			For Aluminum Liner, Add	1.20	
			For 304 Stainless Steel Liner, Add	1.63	
			For 2" Wall Instead Of 1", Add	11.84	
			For 3" To 4" Wall Instead Of 1", Add	20.41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0035 EA 5" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	81.92	22.51
<i>For Aluminum Liner, Add</i>	1.41	
<i>For 304 Stainless Steel Liner, Add</i>	1.92	
<i>For 2" Wall Instead Of 1", Add</i>	13.32	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	22.79	
23 51 16 00-0036 EA 6" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	90.71	23.97
<i>For Aluminum Liner, Add</i>	1.69	
<i>For 304 Stainless Steel Liner, Add</i>	2.30	
<i>For 2" Wall Instead Of 1", Add</i>	15.21	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	25.82	
23 51 16 00-0037 EA 7" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	108.29	25.66
<i>For Aluminum Liner, Add</i>	2.42	
<i>For 304 Stainless Steel Liner, Add</i>	3.30	
<i>For 2" Wall Instead Of 1", Add</i>	19.63	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	32.66	
23 51 16 00-0038 EA 8" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	119.82	27.69
<i>For Aluminum Liner, Add</i>	2.78	
<i>For 304 Stainless Steel Liner, Add</i>	3.80	
<i>For 2" Wall Instead Of 1", Add</i>	22.10	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	36.62	
23 51 16 00-0039 EA 10" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	201.59	30.05
<i>For Aluminum Liner, Add</i>	6.96	
<i>For 304 Stainless Steel Liner, Add</i>	9.49	
<i>For 2" Wall Instead Of 1", Add</i>	45.47	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	71.95	
23 51 16 00-0040 EA 12" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	241.39	32.75
<i>For Aluminum Liner, Add</i>	8.78	
<i>For 304 Stainless Steel Liner, Add</i>	11.97	
<i>For 2" Wall Instead Of 1", Add</i>	56.05	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	88.17	
23 51 16 00-0041 EA 14" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	310.25	34.33
<i>For Aluminum Liner, Add</i>	12.35	
<i>For 304 Stainless Steel Liner, Add</i>	16.84	
<i>For 2" Wall Instead Of 1", Add</i>	75.92	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	118.17	
23 51 16 00-0042 EA 16" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	371.68	36.02
<i>For Aluminum Liner, Add</i>	15.49	
<i>For 304 Stainless Steel Liner, Add</i>	21.13	
<i>For 2" Wall Instead Of 1", Add</i>	93.50	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	144.76	
23 51 16 00-0043 EA 18" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	473.28	37.93
<i>For Aluminum Liner, Add</i>	20.82	
<i>For 304 Stainless Steel Liner, Add</i>	28.39	
<i>For 2" Wall Instead Of 1", Add</i>	123.03	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	189.28	
23 51 16 00-0044 EA 20" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	576.58	59.88
<i>For Aluminum Liner, Add</i>	23.48	
<i>For 304 Stainless Steel Liner, Add</i>	32.02	
<i>For 2" Wall Instead Of 1", Add</i>	143.04	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	222.05	
23 51 16 00-0045 EA 22" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	801.56	63.58
<i>For Aluminum Liner, Add</i>	35.34	
<i>For 304 Stainless Steel Liner, Add</i>	48.19	
<i>For 2" Wall Instead Of 1", Add</i>	208.67	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	320.96	
23 51 16 00-0046 EA 24" Round Flue/Vent, 45 Degree Elbow, Galvanized Double Wall Breech/Smoke Pipe	982.95	67.53
<i>For Aluminum Liner, Add</i>	44.78	
<i>For 304 Stainless Steel Liner, Add</i>	61.07	
<i>For 2" Wall Instead Of 1", Add</i>	261.14	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	400.15	
23 51 16 00-0047 Tees <small>(23 51 16 00-0001)</small>		
23 51 16 00-0048 EA 3" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe	111.90	26.67
<i>For Aluminum Liner, Add</i>	2.48	
<i>For 304 Stainless Steel Liner, Add</i>	3.38	
<i>For 2" Wall Instead Of 1", Add</i>	20.21	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	33.66	
23 51 16 00-0049 EA 4" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe	116.52	27.69
<i>For Aluminum Liner, Add</i>	2.60	
<i>For 304 Stainless Steel Liner, Add</i>	3.55	
<i>For 2" Wall Instead Of 1", Add</i>	21.11	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	35.13	
23 51 16 00-0050 EA 5" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe	121.54	28.82
<i>For Aluminum Liner, Add</i>	2.72	
<i>For 304 Stainless Steel Liner, Add</i>	3.71	
<i>For 2" Wall Instead Of 1", Add</i>	22.06	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	36.69	
23 51 16 00-0051 EA 6" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe	130.09	30.05
<i>For Aluminum Liner, Add</i>	3.03	
<i>For 304 Stainless Steel Liner, Add</i>	4.13	
<i>For 2" Wall Instead Of 1", Add</i>	24.01	
<i>For 3" To 4" Wall Instead Of 1", Add</i>	39.77	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 51 Breechings, Chimneys, and Stacks



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 51 16 00-0052	EA	7" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	154.25	31.28
		<i>For Aluminum Liner, Add</i>	4.18	
		<i>For 304 Stainless Steel Liner, Add</i>	5.69	
		<i>For 2" Wall Instead Of 1", Add</i>	30.61	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	49.83	
23 51 16 00-0053	EA	8" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	165.43	32.75
		<i>For Aluminum Liner, Add</i>	4.60	
		<i>For 304 Stainless Steel Liner, Add</i>	6.27	
		<i>For 2" Wall Instead Of 1", Add</i>	33.27	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	53.99	
23 51 16 00-0054	EA	10" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	312.42	34.33
		<i>For Aluminum Liner, Add</i>	12.47	
		<i>For 304 Stainless Steel Liner, Add</i>	17.00	
		<i>For 2" Wall Instead Of 1", Add</i>	76.58	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	119.15	
23 51 16 00-0055	EA	12" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	362.88	36.02
		<i>For Aluminum Liner, Add</i>	15.01	
		<i>For 304 Stainless Steel Liner, Add</i>	20.47	
		<i>For 2" Wall Instead Of 1", Add</i>	90.86	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	140.80	
23 51 16 00-0056	EA	14" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	544.55	40.07
		<i>For Aluminum Liner, Add</i>	24.45	
		<i>For 304 Stainless Steel Liner, Add</i>	33.34	
		<i>For 2" Wall Instead Of 1", Add</i>	143.36	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	220.04	
23 51 16 00-0057	EA	16" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	741.88	45.02
		<i>For Aluminum Liner, Add</i>	34.62	
		<i>For 304 Stainless Steel Liner, Add</i>	47.20	
		<i>For 2" Wall Instead Of 1", Add</i>	200.06	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	305.72	
23 51 16 00-0058	EA	18" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	920.83	51.44
		<i>For Aluminum Liner, Add</i>	43.57	
		<i>For 304 Stainless Steel Liner, Add</i>	59.42	
		<i>For 2" Wall Instead Of 1", Add</i>	250.53	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	382.22	
23 51 16 00-0059	EA	20" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	1,226.09	63.58
		<i>For Aluminum Liner, Add</i>	58.70	
		<i>For 304 Stainless Steel Liner, Add</i>	80.05	
		<i>For 2" Wall Instead Of 1", Add</i>	336.07	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	512.05	
23 51 16 00-0060	EA	22" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	1,539.04	83.06
		<i>For Aluminum Liner, Add</i>	73.23	
		<i>For 304 Stainless Steel Liner, Add</i>	99.85	
		<i>For 2" Wall Instead Of 1", Add</i>	420.18	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	640.66	
23 51 16 00-0061	EA	24" Round Flue/Vent, Tee, Galvanized Double Wall Breech/Smoke Pipe.....	1,770.93	87.79
		<i>For Aluminum Liner, Add</i>	85.33	
		<i>For 304 Stainless Steel Liner, Add</i>	116.36	
		<i>For 2" Wall Instead Of 1", Add</i>	487.38	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	742.05	
23 51 16 00-0062		Vent Top Caps <small>(23 51 16 00-0001)</small>		
23 51 16 00-0063	EA	3" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	56.21	15.64
		<i>For Aluminum Liner, Add</i>	0.94	
		<i>For 304 Stainless Steel Liner, Add</i>	1.28	
		<i>For 2" Wall Instead Of 1", Add</i>	9.03	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	15.51	
23 51 16 00-0064	EA	4" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	58.90	16.43
		<i>For Aluminum Liner, Add</i>	0.99	
		<i>For 304 Stainless Steel Liner, Add</i>	1.35	
		<i>For 2" Wall Instead Of 1", Add</i>	9.48	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	16.27	
23 51 16 00-0065	EA	6" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	76.16	18.01
		<i>For Aluminum Liner, Add</i>	1.71	
		<i>For 304 Stainless Steel Liner, Add</i>	2.34	
		<i>For 2" Wall Instead Of 1", Add</i>	13.84	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	23.02	
23 51 16 00-0066	EA	8" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	81.11	20.03
		<i>For Aluminum Liner, Add</i>	1.71	
		<i>For 304 Stainless Steel Liner, Add</i>	2.34	
		<i>For 2" Wall Instead Of 1", Add</i>	14.34	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	24.01	
23 51 16 00-0067	EA	10" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	98.78	21.16
		<i>For Aluminum Liner, Add</i>	2.52	
		<i>For 304 Stainless Steel Liner, Add</i>	3.44	
		<i>For 2" Wall Instead Of 1", Add</i>	19.05	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	31.23	
23 51 16 00-0068	EA	12" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe.....	116.79	22.51
		<i>For Aluminum Liner, Add</i>	3.33	
		<i>For 304 Stainless Steel Liner, Add</i>	4.54	
		<i>For 2" Wall Instead Of 1", Add</i>	23.78	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	38.49	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Central Heating Equipment	23 50
Breechings, Chimneys, and Stacks	23 51

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0069 EA 16" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe	276.63	25.66
For Aluminum Liner, Add	11.68	
For 304 Stainless Steel Liner, Add	15.93	
For 2" Wall Instead Of 1", Add	70.14	
For 3" To 4" Wall Instead Of 1", Add	108.42	
23 51 16 00-0070 EA 18" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe	516.09	32.19
For Aluminum Liner, Add	23.97	
For 304 Stainless Steel Liner, Add	32.68	
For 2" Wall Instead Of 1", Add	138.76	
For 3" To 4" Wall Instead Of 1", Add	212.15	
23 51 16 00-0071 EA 20" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe	954.71	38.61
For Aluminum Liner, Add	47.20	
For 304 Stainless Steel Liner, Add	64.37	
For 2" Wall Instead Of 1", Add	267.12	
For 3" To 4" Wall Instead Of 1", Add	405.50	
23 51 16 00-0072 EA 24" Round Flue/Vent Top Caps, Galvanized Double Wall Breech/Smoke Pipe	1,587.49	54.03
For Aluminum Liner, Add	79.88	
For 304 Stainless Steel Liner, Add	108.93	
For 2" Wall Instead Of 1", Add	449.23	
For 3" To 4" Wall Instead Of 1", Add	680.60	
23 51 16 00-0073 Wall Thimbles <small>(23 51 16 00-0001)</small>		
23 51 16 00-0074 EA 3" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	22.99	8.44
For Aluminum Liner, Add	0.11	
For 304 Stainless Steel Liner, Add	0.15	
For 2" Wall Instead Of 1", Add	2.69	
For 3" To 4" Wall Instead Of 1", Add	5.09	
23 51 16 00-0075 EA 4" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	29.13	10.81
For Aluminum Liner, Add	0.11	
For 304 Stainless Steel Liner, Add	0.15	
For 2" Wall Instead Of 1", Add	3.32	
For 3" To 4" Wall Instead Of 1", Add	6.33	
23 51 16 00-0076 EA 5" Or 6" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	38.77	14.51
For Aluminum Liner, Add	0.14	
For 304 Stainless Steel Liner, Add	0.18	
For 2" Wall Instead Of 1", Add	4.37	
For 3" To 4" Wall Instead Of 1", Add	8.37	
23 51 16 00-0077 EA 7" Or 8" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	48.53	18.01
For Aluminum Liner, Add	0.19	
For 304 Stainless Steel Liner, Add	0.26	
For 2" Wall Instead Of 1", Add	5.56	
For 3" To 4" Wall Instead Of 1", Add	10.58	
23 51 16 00-0078 EA 10" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	69.78	24.31
For Aluminum Liner, Add	0.50	
For 304 Stainless Steel Liner, Add	0.68	
For 2" Wall Instead Of 1", Add	8.78	
For 3" To 4" Wall Instead Of 1", Add	16.21	
23 51 16 00-0079 EA 12" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	88.17	30.17
For Aluminum Liner, Add	0.70	
For 304 Stainless Steel Liner, Add	0.96	
For 2" Wall Instead Of 1", Add	11.37	
For 3" To 4" Wall Instead Of 1", Add	20.82	
23 51 16 00-0080 EA 14" Or 16" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	111.67	36.02
For Aluminum Liner, Add	1.19	
For 304 Stainless Steel Liner, Add	1.62	
For 2" Wall Instead Of 1", Add	15.50	
For 3" To 4" Wall Instead Of 1", Add	27.74	
23 51 16 00-0081 EA 18" Or 20" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	145.63	42.77
For Aluminum Liner, Add	2.13	
For 304 Stainless Steel Liner, Add	2.90	
For 2" Wall Instead Of 1", Add	22.31	
For 3" To 4" Wall Instead Of 1", Add	38.81	
23 51 16 00-0082 EA 22" Or 24" Round Flue/Vent Wall Thimbles, Galvanized Double Wall Breech/Smoke Pipe	196.02	47.27
For Aluminum Liner, Add	4.28	
For 304 Stainless Steel Liner, Add	5.84	
For 2" Wall Instead Of 1", Add	35.17	
For 3" To 4" Wall Instead Of 1", Add	58.67	
23 51 16 00-0083 Adjustable Roof Flashing <small>(23 51 16 00-0001)</small>		
23 51 16 00-0084 EA 3" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	62.63	20.03
For Aluminum Liner, Add	0.70	
For 304 Stainless Steel Liner, Add	0.95	
For 2" Wall Instead Of 1", Add	8.79	
For 3" To 4" Wall Instead Of 1", Add	15.69	
23 51 16 00-0085 EA 4" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	69.28	21.16
For Aluminum Liner, Add	0.90	
For 304 Stainless Steel Liner, Add	1.22	
For 2" Wall Instead Of 1", Add	10.18	
For 3" To 4" Wall Instead Of 1", Add	17.93	
23 51 16 00-0086 EA 6" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	87.27	23.97
For Aluminum Liner, Add	1.50	
For 304 Stainless Steel Liner, Add	2.05	
For 2" Wall Instead Of 1", Add	14.19	
For 3" To 4" Wall Instead Of 1", Add	24.28	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 51 Breechings, Chimneys, and Stacks



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 51 16 00-0087	EA	8" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	106.51	27.69
		<i>For Aluminum Liner, Add</i>	2.05	
		<i>For 304 Stainless Steel Liner, Add</i>	2.80	
		<i>For 2" Wall Instead Of 1", Add</i>	18.11	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	30.63	
23 51 16 00-0088	EA	10" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	177.40	30.05
		<i>For Aluminum Liner, Add</i>	5.63	
		<i>For 304 Stainless Steel Liner, Add</i>	7.67	
		<i>For 2" Wall Instead Of 1", Add</i>	38.21	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	61.06	
23 51 16 00-0089	EA	12" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	211.65	32.75
		<i>For Aluminum Liner, Add</i>	7.14	
		<i>For 304 Stainless Steel Liner, Add</i>	9.74	
		<i>For 2" Wall Instead Of 1", Add</i>	47.13	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	74.79	
23 51 16 00-0090	EA	14" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	249.58	36.02
		<i>For Aluminum Liner, Add</i>	8.78	
		<i>For 304 Stainless Steel Liner, Add</i>	11.97	
		<i>For 2" Wall Instead Of 1", Add</i>	56.87	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	89.80	
23 51 16 00-0091	EA	16" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	298.23	40.07
		<i>For Aluminum Liner, Add</i>	10.89	
		<i>For 304 Stainless Steel Liner, Add</i>	14.85	
		<i>For 2" Wall Instead Of 1", Add</i>	69.44	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	109.16	
23 51 16 00-0092	EA	18" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	453.69	45.02
		<i>For Aluminum Liner, Add</i>	18.76	
		<i>For 304 Stainless Steel Liner, Add</i>	25.58	
		<i>For 2" Wall Instead Of 1", Add</i>	113.59	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	176.01	
23 51 16 00-0093	EA	20" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	497.76	59.99
		<i>For Aluminum Liner, Add</i>	19.12	
		<i>For 304 Stainless Steel Liner, Add</i>	26.08	
		<i>For 2" Wall Instead Of 1", Add</i>	119.32	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	186.48	
23 51 16 00-0094	EA	22" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	633.11	77.20
		<i>For Aluminum Liner, Add</i>	24.21	
		<i>For 304 Stainless Steel Liner, Add</i>	33.01	
		<i>For 2" Wall Instead Of 1", Add</i>	151.34	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	236.65	
23 51 16 00-0095	EA	24" Round Flue/Vent Adjustable Roof Flashing, Galvanized Double Wall Breech/Smoke Pipe	753.24	90.03
		<i>For Aluminum Liner, Add</i>	29.05	
		<i>For 304 Stainless Steel Liner, Add</i>	39.61	
		<i>For 2" Wall Instead Of 1", Add</i>	180.95	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	282.69	
23 51 16 00-0096		Galvanized Storm Collars <small>(23 51 16 00-0001)</small>		
23 51 16 00-0097	EA	3" Round Galvanized Storm Collar, Double Wall	24.69	8.44
		<i>For Aluminum Liner, Add</i>	0.20	
		<i>For 304 Stainless Steel Liner, Add</i>	0.27	
		<i>For 2" Wall Instead Of 1", Add</i>	3.20	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	5.85	
23 51 16 00-0098	EA	4" Round Galvanized Storm Collar, Double Wall	31.20	10.81
		<i>For Aluminum Liner, Add</i>	0.23	
		<i>For 304 Stainless Steel Liner, Add</i>	0.31	
		<i>For 2" Wall Instead Of 1", Add</i>	3.96	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	7.29	
23 51 16 00-0099	EA	5" Round Galvanized Storm Collar, Double Wall	36.73	12.61
		<i>For Aluminum Liner, Add</i>	0.29	
		<i>For 304 Stainless Steel Liner, Add</i>	0.39	
		<i>For 2" Wall Instead Of 1", Add</i>	4.72	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	8.65	
23 51 16 00-0100	EA	6" Round Galvanized Storm Collar, Double Wall	42.28	14.40
		<i>For Aluminum Liner, Add</i>	0.34	
		<i>For 304 Stainless Steel Liner, Add</i>	0.47	
		<i>For 2" Wall Instead Of 1", Add</i>	5.48	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	10.02	
23 51 16 00-0101	EA	7" Or 8" Round Galvanized Storm Collar, Double Wall	53.35	18.01
		<i>For Aluminum Liner, Add</i>	0.46	
		<i>For 304 Stainless Steel Liner, Add</i>	0.62	
		<i>For 2" Wall Instead Of 1", Add</i>	7.00	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	12.75	
23 51 16 00-0102	EA	10" Round Galvanized Storm Collar, Double Wall	73.84	24.31
		<i>For Aluminum Liner, Add</i>	0.72	
		<i>For 304 Stainless Steel Liner, Add</i>	0.98	
		<i>For 2" Wall Instead Of 1", Add</i>	10.00	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	18.03	
23 51 16 00-0103	EA	12" Round Galvanized Storm Collar, Double Wall	91.10	30.17
		<i>For Aluminum Liner, Add</i>	0.86	
		<i>For 304 Stainless Steel Liner, Add</i>	1.18	
		<i>For 2" Wall Instead Of 1", Add</i>	12.25	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	22.14	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0104 EA 14" Or 16" Round Galvanized Storm Collar, Double Wall..... <i>For Aluminum Liner, Add</i> <i>For 304 Stainless Steel Liner, Add</i> <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	116.66 1.46 2.00 16.99 29.99	36.02
23 51 16 00-0105 EA 18" Or 20" Round Galvanized Storm Collar, Double Wall..... <i>For Aluminum Liner, Add</i> <i>For 304 Stainless Steel Liner, Add</i> <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	155.12 2.65 3.62 25.15 43.08	42.77
23 51 16 00-0106 EA 22" Or 24" Round Galvanized Storm Collar, Double Wall..... <i>For Aluminum Liner, Add</i> <i>For 304 Stainless Steel Liner, Add</i> <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	219.74 5.59 7.62 42.29 69.34	47.27
23 51 16 00-0107 Oval Galvanized Double Wall Flue/Vent Pipe And Fittings (23 51 16)		
23 51 16 00-0108 Oval Galvanized Double Wall Flue/Vent Pipe (23 51 16 00-0107)		
23 51 16 00-0109 LF 4" Oval Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	42.23 7.38 12.39	10.58
23 51 16 00-0110 LF 5" Oval Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	46.66 8.41 14.01	11.25
23 51 16 00-0111 LF 6" Oval Flue/Vent Pipe, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	51.76 9.52 15.78	12.05
23 51 16 00-0112 45 Degree Elbows (23 51 16 00-0107)		
23 51 16 00-0113 EA 4" Standard Oval Flue/Vent 45 Elbow, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	92.70 16.83 27.99	21.95
23 51 16 00-0114 EA 5" Standard Oval Flue/Vent 45 Elbow, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	108.16 19.62 32.63	25.66
23 51 16 00-0115 EA 6" Standard Oval Flue/Vent 45 Elbow, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	129.04 24.19 39.92	29.04
23 51 16 00-0116 EA 4" Flat Oval Flue/Vent 45 Elbow, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	94.59 17.40 28.84	21.95
23 51 16 00-0117 EA 5" Flat Oval Flue/Vent 45 Elbow, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	112.75 21.00 34.70	25.66
23 51 16 00-0118 EA 6" Flat Oval Flue/Vent 45 Elbow, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	132.01 25.08 41.25	29.04
23 51 16 00-0119 Tees (23 51 16 00-0107)		
23 51 16 00-0120 EA 4" Standard Oval Flue/Vent Pipe Tee, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	155.46 29.96 49.11	33.32
23 51 16 00-0121 EA 4" Short Snout Oval Flue/Vent Tee, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	158.43 30.86 50.45	33.32
23 51 16 00-0122 EA 5" Standard Oval Flue/Vent Pipe Tee, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	182.08 35.49 58.02	38.26
23 51 16 00-0123 EA 6" Oval Flue/Vent Tee With Round Coupling, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	208.45 41.10 67.01	42.88
23 51 16 00-0124 Tops/Caps And Adjustable Flashing (23 51 16 00-0107)		
23 51 16 00-0125 EA 4" Oval Flue/Vent Pipe Top/Cap, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	59.79 12.51 20.13	10.81
23 51 16 00-0126 EA 6" Oval Flue/Vent Pipe Top/Cap, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	93.69 20.85 33.08	14.51
23 51 16 00-0127 EA 4" Oval Flue/Vent Adjustable Flashing, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	48.18 9.03 14.90	10.81
23 51 16 00-0128 EA 6" Oval Flue/Vent Adjustable Flashing, Galvanized Double Wall Breech/Smoke Pipe..... <i>For 2" Wall Instead Of 1", Add</i> <i>For 3" To 4" Wall Instead Of 1", Add</i>	82.75 17.56 28.16	14.51
23 51 16 00-0129 Storm Collars (23 51 16 00-0107)		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 51 16 00-0130	EA	4" Oval Galvanized Storm Collar, Double Wall	31.20	10.81
		<i>For 2" Wall Instead Of 1", Add</i>	3.96	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	7.29	
23 51 16 00-0131	EA	5" Oval Galvanized Storm Collar, Double Wall	36.73	12.61
		<i>For 2" Wall Instead Of 1", Add</i>	4.72	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	8.65	
23 51 16 00-0132	EA	6" Oval Galvanized Storm Collar, Double Wall	42.28	14.40
		<i>For 2" Wall Instead Of 1", Add</i>	5.48	
		<i>For 3" To 4" Wall Instead Of 1", Add</i>	10.02	
23 51 16 00-0133		Round Double Wall Flue/Vent Pipe And Fittings <small>(23 51 16)</small>		
		Note: 304 Stainless steel inner wall and aluminum steel outer jacket, with 1" insulation.		
23 51 16 00-0134		Round Double Wall Flue/Vent Pipe <small>(23 51 16 00-0133)</small>		
		Note: 304 Stainless steel inner wall and aluminum steel outer jacket, with 1" insulation.		
23 51 16 00-0135	LF	6" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	114.16	12.05
		<i>For 316 Stainless Steel, Add</i>	13.46	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	8.41	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	16.82	
23 51 16 00-0136	LF	8" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	137.33	13.84
		<i>For 316 Stainless Steel, Add</i>	16.42	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	10.27	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	20.53	
23 51 16 00-0137	LF	10" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	152.48	14.97
		<i>For 316 Stainless Steel, Add</i>	18.40	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	11.50	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	23.00	
23 51 16 00-0138	LF	12" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	172.01	16.32
		<i>For 316 Stainless Steel, Add</i>	20.97	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	13.11	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	26.22	
23 51 16 00-0139	LF	14" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	193.77	17.10
		<i>For 316 Stainless Steel, Add</i>	24.14	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	15.09	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	30.18	
23 51 16 00-0140	LF	16" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	204.64	18.01
		<i>For 316 Stainless Steel, Add</i>	25.53	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	15.95	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	31.91	
23 51 16 00-0141	LF	18" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	226.77	19.02
		<i>For 316 Stainless Steel, Add</i>	28.69	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	17.93	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	35.87	
23 51 16 00-0142	LF	20" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	280.37	30.05
		<i>For 316 Stainless Steel, Add</i>	32.85	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	20.53	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	41.06	
23 51 16 00-0143	LF	24" Round Flue/Vent Pipe, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	349.09	33.76
		<i>For 316 Stainless Steel, Add</i>	42.35	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	26.47	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	52.93	
23 51 16 00-0144		90 Degree Elbows <small>(23 51 16 00-0133)</small>		
23 51 16 00-0145	EA	6" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	539.52	24.88
		<i>For 316 Stainless Steel, Add</i>	95.48	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	47.74	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	95.48	
23 51 16 00-0146	EA	8" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	596.05	27.69
		<i>For 316 Stainless Steel, Add</i>	105.37	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	52.69	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	105.37	
23 51 16 00-0147	EA	10" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	678.64	30.05
		<i>For 316 Stainless Steel, Add</i>	120.71	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	60.35	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	120.71	
23 51 16 00-0148	EA	12" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	766.98	32.75
		<i>For 316 Stainless Steel, Add</i>	137.03	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	68.52	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	137.03	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0149 EA 14" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	889.65	34.33
<i>For 316 Stainless Steel, Add</i>	160.78	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	80.39	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	160.78	
23 51 16 00-0150 EA 16" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	980.47	36.02
<i>For 316 Stainless Steel, Add</i>	178.09	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	89.05	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	178.09	
23 51 16 00-0151 EA 18" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	1,133.61	37.93
<i>For 316 Stainless Steel, Add</i>	207.77	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	103.89	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	207.77	
23 51 16 00-0152 EA 20" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	1,312.60	59.99
<i>For 316 Stainless Steel, Add</i>	232.51	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	116.25	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	232.51	
23 51 16 00-0153 EA 24" Round Flue/Vent, 90 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	1,615.80	67.53
<i>For 316 Stainless Steel, Add</i>	289.40	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	144.70	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	289.40	
23 51 16 00-0154 45 Degree Elbows <small>(23 51 16 00-0133)</small>		
23 51 16 00-0155 EA 6" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	359.28	23.97
<i>For 316 Stainless Steel, Add</i>	59.86	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	29.93	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	59.86	
23 51 16 00-0156 EA 8" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	410.54	27.69
<i>For 316 Stainless Steel, Add</i>	68.27	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	34.13	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	68.27	
23 51 16 00-0157 EA 10" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	455.99	30.05
<i>For 316 Stainless Steel, Add</i>	76.18	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	38.09	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	76.18	
23 51 16 00-0158 EA 12" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	519.63	32.75
<i>For 316 Stainless Steel, Add</i>	87.56	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	43.78	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	87.56	
23 51 16 00-0159 EA 14" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	585.41	34.33
<i>For 316 Stainless Steel, Add</i>	99.93	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	49.96	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	99.93	
23 51 16 00-0160 EA 16" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	656.44	36.02
<i>For 316 Stainless Steel, Add</i>	113.28	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	56.64	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	113.28	
23 51 16 00-0161 EA 18" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	735.38	37.93
<i>For 316 Stainless Steel, Add</i>	128.13	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	64.06	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	128.13	
23 51 16 00-0162 EA 20" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	882.23	59.99
<i>For 316 Stainless Steel, Add</i>	146.43	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	73.22	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	146.43	
23 51 16 00-0163 EA 24" Round Flue/Vent, 45 Degree Elbow, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	1,108.75	67.53
<i>For 316 Stainless Steel, Add</i>	187.98	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	93.99	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	187.98	
23 51 16 00-0164 Tees <small>(23 51 16 00-0133)</small>		
23 51 16 00-0165 EA 6" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	389.24	30.05
<i>For 316 Stainless Steel, Add</i>	69.11	
<i>For Tee Cap, Add</i>	89.11	
<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	31.41	
<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	62.83	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**

MINOR		TOTAL DIRECT DEMOLITION		
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 51 16 00-0166	EA	8" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	442.96	32.75
		<i>For 316 Stainless Steel, Add</i>	79.45	
		<i>For Tee Cap, Add</i>	100.87	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	36.11	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	72.23	
23 51 16 00-0167	EA	10" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	508.70	34.33
		<i>For 316 Stainless Steel, Add</i>	93.05	
		<i>For Tee Cap, Add</i>	114.60	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	42.30	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	84.59	
23 51 16 00-0168	EA	12" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	584.70	36.02
		<i>For 316 Stainless Steel, Add</i>	108.83	
		<i>For Tee Cap, Add</i>	130.44	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	49.47	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	98.94	
23 51 16 00-0169	EA	14" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	683.78	40.07
		<i>For 316 Stainless Steel, Add</i>	128.42	
		<i>For Tee Cap, Add</i>	151.76	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	58.37	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	116.75	
23 51 16 00-0170	EA	16" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	767.94	45.02
		<i>For 316 Stainless Steel, Add</i>	144.20	
		<i>For Tee Cap, Add</i>	170.46	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	65.55	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	131.09	
23 51 16 00-0171	EA	18" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	895.29	51.44
		<i>For 316 Stainless Steel, Add</i>	168.69	
		<i>For Tee Cap, Add</i>	198.34	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	76.68	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	153.35	
23 51 16 00-0172	EA	20" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	1,024.59	63.58
		<i>For 316 Stainless Steel, Add</i>	190.46	
		<i>For Tee Cap, Add</i>	228.75	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	86.57	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	173.14	
23 51 16 00-0173	EA	24" Round Flue/Vent, Tee, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	1,301.05	90.03
		<i>For 316 Stainless Steel, Add</i>	236.71	
		<i>For Tee Cap, Add</i>	293.97	
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	107.60	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	215.19	
23 51 16 00-0174		Bellows <small>(23 51 16 00-0133)</small>		
23 51 16 00-0175	EA	6" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	737.72	23.97
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	67.77	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	135.55	
23 51 16 00-0176	EA	8" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	803.82	27.69
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	73.46	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	146.92	
23 51 16 00-0177	EA	10" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	878.99	30.05
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	80.39	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	160.78	
23 51 16 00-0178	EA	12" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	972.28	32.75
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	89.05	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	178.09	
23 51 16 00-0179	EA	14" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	1,087.52	34.33
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	100.18	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	200.35	
23 51 16 00-0180	EA	16" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	1,203.08	36.02
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	111.31	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	222.61	
23 51 16 00-0181	EA	18" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	1,343.85	37.93
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	124.91	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	249.82	
23 51 16 00-0182	EA	20" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket.....	1,559.93	59.99
		<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	140.99	
		<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	281.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0183 EA 24" Round Flue/Vent, Bellows, Lined, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	1,925.00 175.62 351.23	67.53
23 51 16 00-0184 Ventilated Roof Thimbles (23 51 16 00-0133)		
23 51 16 00-0185 EA 6" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	489.74 42.05	27.69
23 51 16 00-0186 EA 8" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	532.00 45.02	32.75
23 51 16 00-0187 EA 10" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	582.22 49.22	36.02
23 51 16 00-0188 EA 12" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	629.42 52.93	40.07
23 51 16 00-0189 EA 14" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	800.99 69.50	42.43
23 51 16 00-0190 EA 16" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	716.05 60.35	45.02
23 51 16 00-0191 EA 18" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	770.62 65.05	48.05
23 51 16 00-0192 EA 20" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	866.36 69.75	67.53
23 51 16 00-0193 EA 24" Round Flue/Vent, Ventilated Roof Thimble, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	971.87 77.91	77.09
23 51 16 00-0194 Exit Cones (23 51 16 00-0133)		
23 51 16 00-0195 EA 6" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	338.48 42.05	15.64
23 51 16 00-0196 EA 8" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	357.02 45.02	17.10
23 51 16 00-0197 EA 10" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	383.87 49.22	18.01
23 51 16 00-0198 EA 12" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	401.10 52.93	18.91
23 51 16 00-0199 EA 14" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	441.93 65.05	19.47
23 51 16 00-0200 EA 16" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	482.79 77.91	19.92
23 51 16 00-0201 EA 18" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	585.68 97.91	20.60
23 51 16 00-0202 EA 20" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	732.16 112.91	38.61
23 51 16 00-0203 EA 24" Round Flue/Vent, Exit Cone, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	920.11 139.91	41.53
23 51 16 00-0204 Vent Top Caps (23 51 16 00-0133)		
23 51 16 00-0205 EA 6" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	370.54 42.05	15.64
23 51 16 00-0206 EA 8" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	428.75 45.02	17.10
23 51 16 00-0207 EA 10" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	497.62 49.22	18.01
23 51 16 00-0208 EA 12" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	571.73 52.93	18.91
23 51 16 00-0209 EA 14" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	666.97 65.05	19.47
23 51 16 00-0210 EA 16" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	757.41 77.91	20.03
23 51 16 00-0211 EA 18" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	842.95 97.91	20.60
23 51 16 00-0212 EA 20" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	1,011.56 112.91	38.61
23 51 16 00-0213 EA 24" Round Flue/Vent Top Caps, 316 Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	1,204.55 139.91	41.53
23 51 16 00-0214 Roof Support Assemblies (23 51 16 00-0133)		
23 51 16 00-0215 EA 6" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket <i>For 316 Stainless Steel, Add</i>	559.20 97.45	28.82

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0216	EA		8" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	617.57	34.33
			<i>For 316 Stainless Steel, Add</i>	106.36	
23 51 16 00-0217	EA		10" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	678.44	37.93
			<i>For 316 Stainless Steel, Add</i>	116.75	
23 51 16 00-0218	EA		12" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	724.23	42.31
			<i>For 316 Stainless Steel, Add</i>	123.67	
23 51 16 00-0219	EA		14" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	807.58	45.02
			<i>For 316 Stainless Steel, Add</i>	139.01	
23 51 16 00-0220	EA		16" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	857.16	48.05
			<i>For 316 Stainless Steel, Add</i>	147.42	
23 51 16 00-0221	EA		18" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	920.25	51.55
			<i>For 316 Stainless Steel, Add</i>	158.30	
23 51 16 00-0222	EA		20" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	1,021.06	72.02
			<i>For 316 Stainless Steel, Add</i>	168.20	
23 51 16 00-0223	EA		24" Round Flue/Vent, Roof Support Assembly, Stainless Steel/Aluminum Flue/Vent Pipe, Stainless Steel Inner Wall/Aluminum Steel Outer Jacket	1,147.72	83.17
			<i>For 316 Stainless Steel, Add</i>	187.98	
23 51 16 00-0224			Round Stainless Steel Double Wall Flue/Vent Pipe And Fittings <small>(23 51 16)</small> Note: With 1" insulation.		
23 51 16 00-0225			Round Stainless Steel Double Wall Flue/Vent Pipe <small>(23 51 16 00-0224)</small> Note: With 1" insulation.		
23 51 16 00-0226	LF		6" Round Flue/Vent Pipe, Stainless Steel Flue/Vent Pipe	99.32	12.05
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	6.93	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	13.85	
23 51 16 00-0227	LF		7" Round Flue/Vent Pipe, Stainless Steel Flue/Vent Pipe	121.22	12.83
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	8.90	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	17.81	
23 51 16 00-0228	LF		8" Round Flue/Vent Pipe, Stainless Steel Flue/Vent Pipe	138.57	13.84
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	10.39	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	20.78	
23 51 16 00-0229	LF		10" Round Flue/Vent Pipe, Stainless Steel Flue/Vent Pipe	188.30	14.97
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	15.09	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	30.18	
23 51 16 00-0230	LF		12" Round Flue/Vent Pipe, Stainless Steel Flue/Vent Pipe	243.78	16.43
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	20.28	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	40.56	
23 51 16 00-0231	LF		14" Round Flue/Vent Pipe, Stainless Steel Flue/Vent Pipe	310.11	17.22
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	26.71	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	53.43	
23 51 16 00-0232			90 Degree Elbows <small>(23 51 16 00-0224)</small>		
23 51 16 00-0233	EA		6" Round Flue/Vent, 90 Degree Elbow, Stainless Steel Flue/Vent Pipe	214.62	23.97
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	15.46	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	30.92	
23 51 16 00-0234	EA		7" Round Flue/Vent, 90 Degree Elbow, Stainless Steel Flue/Vent Pipe	237.40	25.66
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	17.31	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	34.63	
23 51 16 00-0235	EA		8" Round Flue/Vent, 90 Degree Elbow, Stainless Steel Flue/Vent Pipe	267.12	27.69
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	19.79	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	39.58	
23 51 16 00-0236	EA		10" Round Flue/Vent, 90 Degree Elbow, Stainless Steel Flue/Vent Pipe	332.32	30.05
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	25.72	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	51.45	
23 51 16 00-0237	EA		12" Round Flue/Vent, 90 Degree Elbow, Stainless Steel Flue/Vent Pipe	395.97	32.75
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	31.41	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	62.83	
23 51 16 00-0238	EA		14" Round Flue/Vent, 90 Degree Elbow, Stainless Steel Flue/Vent Pipe	461.68	34.33
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	37.60	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	75.19	
23 51 16 00-0239			45 Degree Elbows <small>(23 51 16 00-0224)</small>		
23 51 16 00-0240	EA		6" Round Flue/Vent, 45 Degree Elbow, Stainless Steel Flue/Vent Pipe	175.98	23.97
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	11.59	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	23.19	
23 51 16 00-0241	EA		7" Round Flue/Vent, 45 Degree Elbow, Stainless Steel Flue/Vent Pipe	194.11	25.66
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	12.99	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	25.97	
23 51 16 00-0242	EA		8" Round Flue/Vent, 45 Degree Elbow, Stainless Steel Flue/Vent Pipe	217.66	27.69
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	14.84	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	29.68	
23 51 16 00-0243	EA		10" Round Flue/Vent, 45 Degree Elbow, Stainless Steel Flue/Vent Pipe	268.00	30.05
			<i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	19.29	
			<i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	38.59	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 51 16 00-0244 EA 12" Round Flue/Vent, 45 Degree Elbow, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i>	317.41 23.56	32.75
23 51 16 00-0245 EA 14" Round Flue/Vent, 45 Degree Elbow, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	367.74 28.20 56.40	34.33
23 51 16 00-0246 Tees With Tee Caps (23 51 16 00-0224)		
23 51 16 00-0247 EA 6" Round Flue/Vent, Tee, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	351.85 29.19 58.37	23.97
23 51 16 00-0248 EA 7" Round Flue/Vent, Tee, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	445.18 38.09 76.18	25.66
23 51 16 00-0249 EA 8" Round Flue/Vent, Tee, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	499.59 43.04 86.08	27.69
23 51 16 00-0250 EA 10" Round Flue/Vent, Tee, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	681.00 60.60 121.20	30.05
23 51 16 00-0251 EA 12" Round Flue/Vent, Tee, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	935.14 85.34 170.67	32.75
23 51 16 00-0252 EA 14" Round Flue/Vent, Tee, Stainless Steel Flue/Vent Pipe <i>For 2" Insulated Wall Instead Of 1" Thickness, Add</i> <i>For 3" Insulated Wall Instead Of 1" Thickness, Add</i>	1,198.74 111.31 222.61	34.33
23 51 16 00-0253 Joist Shields (23 51 16 00-0224)		
23 51 16 00-0254 EA 6" Round Flue/Vent, Joist Shield, Stainless Steel Flue/Vent Pipe	149.03	23.97
23 51 16 00-0255 EA 7" Round Flue/Vent, Joist Shield, Stainless Steel Flue/Vent Pipe	160.74	25.66
23 51 16 00-0256 EA 8" Round Flue/Vent, Joist Shield, Stainless Steel Flue/Vent Pipe	187.94	27.69
23 51 16 00-0257 EA 10" Round Flue/Vent, Joist Shield, Stainless Steel Flue/Vent Pipe	234.65	30.05
23 51 16 00-0258 EA 12" Round Flue/Vent, Joist Shield, Stainless Steel Flue/Vent Pipe	280.93	32.75
23 51 16 00-0259 EA 14" Round Flue/Vent, Joist Shield, Stainless Steel Flue/Vent Pipe	333.06	34.33
23 51 16 00-0260 Adjustable Roof Flashing (23 51 16 00-0224)		
23 51 16 00-0261 EA 6" Round Flue/Vent, Adjustable Roof Flashing, Stainless Steel Flue/Vent Pipe	177.48	23.97
23 51 16 00-0262 EA 7" Round Flue/Vent, Adjustable Roof Flashing, Stainless Steel Flue/Vent Pipe	197.82	25.66
23 51 16 00-0263 EA 8" Round Flue/Vent, Adjustable Roof Flashing, Stainless Steel Flue/Vent Pipe	215.13	27.69
23 51 16 00-0264 EA 10" Round Flue/Vent, Adjustable Roof Flashing, Stainless Steel Flue/Vent Pipe	261.84	30.05
23 51 16 00-0265 EA 12" Round Flue/Vent, Adjustable Roof Flashing, Stainless Steel Flue/Vent Pipe	323.05	32.75
23 51 16 00-0266 EA 14" Round Flue/Vent, Adjustable Roof Flashing, Stainless Steel Flue/Vent Pipe	387.43	34.21
23 51 16 00-0267 Vent Top Caps (23 51 16 00-0224)		
23 51 16 00-0268 EA 6" Round Flue/Vent Top Caps, Stainless Steel Flue/Vent Pipe	158.93	23.97
23 51 16 00-0269 EA 7" Round Flue/Vent Top Caps, Stainless Steel Flue/Vent Pipe	199.05	25.66
23 51 16 00-0270 EA 8" Round Flue/Vent Top Caps, Stainless Steel Flue/Vent Pipe	249.77	27.69
23 51 16 00-0271 EA 10" Round Flue/Vent Top Caps, Stainless Steel Flue/Vent Pipe	399.14	30.05
23 51 16 00-0272 EA 12" Round Flue/Vent Top Caps, Stainless Steel Flue/Vent Pipe	544.42	32.75
23 51 16 00-0273 EA 14" Round Flue/Vent Top Caps, Stainless Steel Flue/Vent Pipe	694.20	34.33
23 51 16 00-0274 Roof Support Assemblies (23 51 16 00-0224)		
23 51 16 00-0275 EA 6" Round Flue/Vent, Roof Support Assembly, Stainless Steel Flue/Vent Pipe	236.75	23.97
23 51 16 00-0276 EA 7" Round Flue/Vent, Roof Support Assembly, Stainless Steel Flue/Vent Pipe	263.36	25.66
23 51 16 00-0277 EA 8" Round Flue/Vent, Roof Support Assembly, Stainless Steel Flue/Vent Pipe	285.62	27.69
23 51 16 00-0278 EA 10" Round Flue/Vent, Roof Support Assembly, Stainless Steel Flue/Vent Pipe	359.47	30.05
23 51 16 00-0279 EA 12" Round Flue/Vent, Roof Support Assembly, Stainless Steel Flue/Vent Pipe	425.64	32.75
23 51 16 00-0280 EA 14" Round Flue/Vent, Roof Support Assembly, Stainless Steel Flue/Vent Pipe	521.06	34.33
23 51 16 00-0281 Polyvinyl Chloride (PVC) Flue/Vent Accessories (23 51 16)		
23 51 16 00-0282 Concentric Polyvinyl Chloride (PVC) Vent Termination (23 51 16 00-0281)		
23 51 16 00-0283 EA 2" Concentric Polyvinyl Chloride (PVC) Vent Termination	239.53	45.83
23 51 16 00-0284 EA 3" Concentric Polyvinyl Chloride (PVC) Vent Termination	260.66	45.83
23 51 16 00-0285 Polypropylene (PP) Flue/Vent Pipe And Fittings (23 51 16)		
Note: Centrotherm InnoFlue® Vent System		
23 51 16 00-0286 Polypropylene Flue/Vent Rigid Pipe Sections (23 51 16 00-0285)		
Note: Gasketed rigid single wall polypropylene vent lengths with dedicated male and female ends.		
23 51 16 00-0287 EA 2" x 12" Polypropylene Flue/Vent Rigid Pipe Section	43.17	13.92
23 51 16 00-0288 EA 2" x 24" Polypropylene Flue/Vent Rigid Pipe Section	49.42	14.65
23 51 16 00-0289 EA 2" x 36" Polypropylene Flue/Vent Rigid Pipe Section	56.79	16.29
23 51 16 00-0290 EA 2" x 72" Polypropylene Flue/Vent Rigid Pipe Section	70.83	19.16
23 51 16 00-0291 EA 3" x 12" Polypropylene Flue/Vent Rigid Pipe Section	52.11	15.95

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 51 16 00-0292	EA		3" x 24" Polypropylene Flue/Vent Rigid Pipe Section	63.62	16.80
23 51 16 00-0293	EA		3" x 36" Polypropylene Flue/Vent Rigid Pipe Section	78.63	18.67
23 51 16 00-0294	EA		3" x 72" Polypropylene Flue/Vent Rigid Pipe Section	97.57	21.96
23 51 16 00-0295	EA		4" x 12" Polypropylene Flue/Vent Rigid Pipe Section	87.68	21.11
23 51 16 00-0296	EA		4" x 24" Polypropylene Flue/Vent Rigid Pipe Section	104.33	22.22
23 51 16 00-0297	EA		4" x 36" Polypropylene Flue/Vent Rigid Pipe Section	130.58	24.70
23 51 16 00-0298	EA		4" x 72" Polypropylene Flue/Vent Rigid Pipe Section	170.05	29.05
23 51 16 00-0299	EA		5" x 12" Polypropylene Flue/Vent Rigid Pipe Section	130.09	31.16
23 51 16 00-0300	EA		5" x 24" Polypropylene Flue/Vent Rigid Pipe Section	149.58	32.79
23 51 16 00-0301	EA		5" x 36" Polypropylene Flue/Vent Rigid Pipe Section	196.29	36.44
23 51 16 00-0302	EA		5" x 72" Polypropylene Flue/Vent Rigid Pipe Section	256.44	42.88

23 51 16 00-0303 Polypropylene Flue/Vent Elbows (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0304	EA		2" Polypropylene Flue/Vent 15 Degree Elbow	53.45	16.91
23 51 16 00-0305	EA		3" Polypropylene Flue/Vent 15 Degree Elbow	63.10	17.81
23 51 16 00-0306	EA		4" Polypropylene Flue/Vent 15 Degree Elbow	79.87	18.46
23 51 16 00-0307	EA		5" Polypropylene Flue/Vent 15 Degree Elbow	93.38	19.21
23 51 16 00-0308	EA		2" Polypropylene Flue/Vent 30 Degree Elbow	53.45	16.91
23 51 16 00-0309	EA		3" Polypropylene Flue/Vent 30 Degree Elbow	63.10	17.81
23 51 16 00-0310	EA		4" Polypropylene Flue/Vent 30 Degree Elbow	79.87	18.46
23 51 16 00-0311	EA		5" Polypropylene Flue/Vent 30 Degree Elbow	93.38	19.21
23 51 16 00-0312	EA		2" Polypropylene Flue/Vent 45 Degree Elbow	53.45	16.91
23 51 16 00-0313	EA		3" Polypropylene Flue/Vent 45 Degree Elbow	63.10	17.81
23 51 16 00-0314	EA		4" Polypropylene Flue/Vent 45 Degree Elbow	79.87	18.46
23 51 16 00-0315	EA		5" Polypropylene Flue/Vent 45 Degree Elbow	93.38	19.21
23 51 16 00-0316	EA		2" Polypropylene Flue/Vent 87 Degree Elbow	53.45	16.91
23 51 16 00-0317	EA		3" Polypropylene Flue/Vent 87 Degree Elbow	63.10	17.81
23 51 16 00-0318	EA		4" Polypropylene Flue/Vent 87 Degree Elbow	78.82	18.46
23 51 16 00-0319	EA		5" Polypropylene Flue/Vent 87 Degree Elbow	95.97	19.21

23 51 16 00-0320 Polypropylene Flue/Vent Tees (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0321	EA		2" Polypropylene Flue/Vent Tee	173.89	25.38
23 51 16 00-0322	EA		3" Polypropylene Flue/Vent Tee	219.93	26.72
23 51 16 00-0323	EA		4" Polypropylene Flue/Vent Tee	259.12	27.69
23 51 16 00-0324	EA		5" Polypropylene Flue/Vent Tee	283.92	28.82

23 51 16 00-0325 Polypropylene Flue/Vent Adaptors (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0326	EA		2" Polypropylene Flue/Vent Adaptor With Gasket.....	63.68	16.91
23 51 16 00-0327	EA		3" Polypropylene Flue/Vent Adaptor With Gasket.....	92.89	17.81
23 51 16 00-0328	EA		4" Polypropylene Flue/Vent Adaptor With Gasket.....	108.71	18.46
23 51 16 00-0329	EA		5" Polypropylene Flue/Vent Adaptor With Gasket.....	149.76	19.21

23 51 16 00-0330 Polypropylene Flue/Vent Increases (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0331	EA		2" to 3" Polypropylene Flue/Vent Centric Increaser	70.92	17.36
23 51 16 00-0332	EA		3" to 4" Polypropylene Flue/Vent Centric Increaser	77.89	18.13
23 51 16 00-0333	EA		4" to 5" Polypropylene Flue/Vent Centric Increaser	143.58	18.82
23 51 16 00-0334	EA		2" to 3" Polypropylene Flue/Vent Eccentric Increaser	97.17	17.36
23 51 16 00-0335	EA		3" to 4" Polypropylene Flue/Vent Eccentric Increaser	75.75	18.13
23 51 16 00-0336	EA		4" to 5" Polypropylene Flue/Vent Eccentric Increaser	199.64	18.82

23 51 16 00-0337 Polypropylene Flue/Vent Reducers (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0338	EA		3" to 2" Polypropylene Flue/Vent Reducer	70.92	17.36
23 51 16 00-0339	EA		4" to 3" Polypropylene Flue/Vent Reducer	77.89	18.13
23 51 16 00-0340	EA		5" to 4" Polypropylene Flue/Vent Reducer	178.53	18.82

23 51 16 00-0341 Polypropylene Flue/Vent Test Ports (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0342	EA		2" Polypropylene Flue/Vent Test Port	89.11	25.38
23 51 16 00-0343	EA		3" Polypropylene Flue/Vent Test Port	100.40	26.72
23 51 16 00-0344	EA		4" Polypropylene Flue/Vent Test Port	157.00	27.69
23 51 16 00-0345	EA		5" Polypropylene Flue/Vent Test Port	167.82	28.82

23 51 16 00-0346 Polypropylene Flue/Vent Cascade Components (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0347	EA		4" x 15" Polypropylene Flue/Vent Branch Tee With 4" Feeder	263.82	27.69
23 51 16 00-0348	EA		4" x 42" Polypropylene Flue/Vent Branch Tee With 4" Feeder	345.93	34.61
23 51 16 00-0349	EA		5" x 12" Polypropylene Flue/Vent Branch Tee With 4" Feeder	215.48	28.82
23 51 16 00-0350	EA		5" x 42" Polypropylene Flue/Vent Branch Tee With 4" Feeder	320.87	36.02
23 51 16 00-0351	EA		3" to 4" Polypropylene Flue/Vent Non-Return Valve	341.08	18.13



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				23 51 16 00-0352 EA 4" to 4" Polypropylene Flue/Vent Non-Return Valve.....	395.41	18.82
23 51 16 00-0353				Polypropylene Flue/Vent Condensate Management (23 51 16 00-0285) Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.		
				23 51 16 00-0354 EA 2" Polypropylene Flue/Vent Horizontal Drain Tee.....	124.55	25.38
				23 51 16 00-0355 EA 3" Polypropylene Flue/Vent Horizontal Drain Tee.....	151.52	26.72
				23 51 16 00-0356 EA 4" Polypropylene Flue/Vent Horizontal Drain Tee.....	174.27	27.69
				23 51 16 00-0357 EA 5" Polypropylene Flue/Vent Horizontal Drain Tee.....	199.53	28.82
				23 51 16 00-0358 EA 4" Polypropylene Flue/Vent Horizontal Drain Fittings.....	222.22	27.69
				23 51 16 00-0359 EA 5" Polypropylene Flue/Vent Horizontal Drain Fittings.....	245.42	28.82
				23 51 16 00-0360 EA 2" Polypropylene Flue/Vent Tee Cap.....	73.32	8.46
				23 51 16 00-0361 EA 3" Polypropylene Flue/Vent Tee Cap.....	94.61	8.90
				23 51 16 00-0362 EA 4" Polypropylene Flue/Vent Tee Cap.....	112.78	9.23
				23 51 16 00-0363 EA 5" Polypropylene Flue/Vent Tee Cap.....	147.90	9.60
				23 51 16 00-0364 EA 2" Polypropylene Flue/Vent Tee Cap With Drain.....	139.89	25.38
				23 51 16 00-0365 EA 3" Polypropylene Flue/Vent Tee Cap With Drain.....	172.79	26.72
				23 51 16 00-0366 EA 4" Polypropylene Flue/Vent Tee Cap With Drain.....	200.65	27.69
				23 51 16 00-0367 EA 5" Polypropylene Flue/Vent Tee Cap With Drain.....	242.90	28.82
23 51 16 00-0368				Polypropylene Flue/Vent Terminations (23 51 16 00-0285)		
				23 51 16 00-0369 EA 2" Polypropylene-UV Black Flue/Vent Chimney Cover.....	185.83	16.91
				23 51 16 00-0370 EA 3" Polypropylene-UV Black Flue/Vent Chimney Cover.....	163.22	17.81
				23 51 16 00-0371 EA 4" Polypropylene-UV Black Flue/Vent Chimney Cover.....	205.20	18.46
				23 51 16 00-0372 EA 3" Stainless Steel Chimney Cover With Polypropylene-UV Black End Pipe.....	424.12	17.81
				23 51 16 00-0373 EA 4" Stainless Steel Chimney Cover With Polypropylene-UV Black End Pipe.....	453.00	18.46
				23 51 16 00-0374 EA 5" Stainless Steel Chimney Cover With Polypropylene-UV Black End Pipe.....	529.39	19.21
				23 51 16 00-0375 EA 2 1/4" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	108.01	16.91
				23 51 16 00-0376 EA 2 1/2" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	114.58	16.91
				23 51 16 00-0377 EA 2 3/4" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	121.16	16.91
				23 51 16 00-0378 EA 2 7/8" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	127.73	16.91
				23 51 16 00-0379 EA 3 1/4" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	116.82	17.81
				23 51 16 00-0380 EA 3 1/2" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	123.40	17.81
				23 51 16 00-0381 EA 3 3/4" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	129.97	17.81
				23 51 16 00-0382 EA 3 7/8" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	136.54	17.81
				23 51 16 00-0383 EA 4 1/8" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	131.58	18.46
				23 51 16 00-0384 EA 4 1/4" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	138.15	18.46
				23 51 16 00-0385 EA 4 1/2" Polypropylene-UV Black Flue/Vent B-Vent Chimney Cover Rain Collar.....	144.72	18.46
				23 51 16 00-0386 EA 2" Polypropylene-UV Black Flue/Vent Low Profile Wall Termination.....	114.52	16.91
				23 51 16 00-0387 EA 3" Polypropylene-UV Black Flue/Vent Low Profile Wall Termination.....	147.71	17.81
				23 51 16 00-0388 EA 2" Polypropylene-UV Black Flue/Vent Termination Tee.....	131.67	25.38
				23 51 16 00-0389 EA 3" Polypropylene-UV Black Flue/Vent Termination Tee.....	175.10	26.72
				23 51 16 00-0390 EA 4" Polypropylene-UV Black Flue/Vent Termination Tee.....	208.00	27.69
				23 51 16 00-0391 EA 5" Polypropylene-UV Black Flue/Vent Termination Tee.....	229.59	28.82
				23 51 16 00-0392 EA 2" x 20" Polypropylene-UV Black Flue/Vent End Pipe.....	45.42	14.65
				23 51 16 00-0393 EA 2" x 39" Polypropylene-UV Black Flue/Vent End Pipe.....	54.68	16.29
				23 51 16 00-0394 EA 3" x 20" Polypropylene-UV Black Flue/Vent End Pipe.....	54.87	16.80
				23 51 16 00-0395 EA 3" x 39" Polypropylene-UV Black Flue/Vent End Pipe.....	69.16	18.67
				23 51 16 00-0396 EA 4" x 20" Polypropylene-UV Black Flue/Vent End Pipe.....	83.65	22.22
				23 51 16 00-0397 EA 5" x 20" Polypropylene-UV Black Flue/Vent End Pipe.....	114.90	32.79
				23 51 16 00-0398 EA 5" x 39" Polypropylene-UV Black Flue/Vent End Pipe.....	140.11	36.44
				23 51 16 00-0399 EA 2" x 24" Polypropylene-UV Black Flue/Vent Vent Length.....	50.69	14.65
				23 51 16 00-0400 EA 3" x 24" Polypropylene-UV Black Flue/Vent Vent Length.....	65.79	16.80
				23 51 16 00-0401 EA 4" x 24" Polypropylene-UV Black Flue/Vent Vent Length.....	109.20	22.22
				23 51 16 00-0402 EA 2" Polypropylene-UV Black Flue/Vent 45 Degree Elbow.....	55.54	16.91
				23 51 16 00-0403 EA 3" Polypropylene-UV Black Flue/Vent 45 Degree Elbow.....	65.73	17.81
				23 51 16 00-0404 EA 4" Polypropylene-UV Black Flue/Vent 45 Degree Elbow.....	83.23	18.46
				23 51 16 00-0405 EA 2" Polypropylene-UV Black Flue/Vent 87 Degree Elbow.....	54.55	16.91
				23 51 16 00-0406 EA 3" Polypropylene-UV Black Flue/Vent 87 Degree Elbow.....	65.07	17.81
				23 51 16 00-0407 EA 4" Polypropylene-UV Black Flue/Vent 87 Degree Elbow.....	82.08	18.46
				23 51 16 00-0408 EA 2" Polypropylene-UV Black Bird Screen For Polypropylene Flue/Vent.....	36.31	8.46
				23 51 16 00-0409 EA 3" Polypropylene-UV Black Bird Screen For Polypropylene Flue/Vent.....	42.57	8.90
				23 51 16 00-0410 EA 4" Polypropylene-UV Black Bird Screen For Polypropylene Flue/Vent.....	47.91	9.23
				23 51 16 00-0411 EA 3" Stainless Steel Bird Screen For Polypropylene Flue/Vent.....	96.42	8.90
				23 51 16 00-0412 EA 5" Stainless Steel Bird Screen For Polypropylene Flue/Vent.....	110.98	9.60
23 51 16 00-0413				Polypropylene Flue/Vent Accessories (23 51 16 00-0285)		
				23 51 16 00-0414 EA 2" Spacer For Polypropylene Flue/Vent.....	18.52	4.23
				23 51 16 00-0415 EA 3" Spacer For Polypropylene Flue/Vent.....	17.52	4.45
				23 51 16 00-0416 EA 4" Spacer For Polypropylene Flue/Vent.....	18.04	4.61
				23 51 16 00-0417 EA 5" Spacer For Polypropylene Flue/Vent.....	29.20	4.80
				23 51 16 00-0418 EA 2" Flue Clamp For Polypropylene Flue/Vent.....	35.45	6.35
				23 51 16 00-0419 EA 3" Flue Clamp For Polypropylene Flue/Vent.....	41.88	6.68
				23 51 16 00-0420 EA 4" Flue Clamp For Polypropylene Flue/Vent.....	48.84	6.92
				23 51 16 00-0421 EA 2" Support Clamp For Polypropylene Flue/Vent.....	33.62	6.35
				23 51 16 00-0422 EA 4" Support Clamp For Polypropylene Flue/Vent.....	33.37	6.92
				23 51 16 00-0423 EA 5" Support Clamp For Polypropylene Flue/Vent.....	41.04	7.20
				23 51 16 00-0424 EA 3" Plastic Support Clamp For Polypropylene Flue/Vent.....	25.11	6.68
				23 51 16 00-0425 EA 2" Polypropylene-UV Black Wall Plate For Polypropylene Flue/Vent.....	48.91	16.91

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 51 Breechings, Chimneys, and Stacks**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 51 16 00-0426	EA		3" Polypropylene-UV Black Wall Plate For Polypropylene Flue/Vent.....	54.19	17.81
23 51 16 00-0427	EA		4" Polypropylene-UV Black Wall Plate For Polypropylene Flue/Vent.....	58.56	18.46
23 51 16 00-0428	EA		5" Polypropylene-UV Black Wall Plate For Polypropylene Flue/Vent.....	65.83	19.21
23 51 16 00-0429	EA		2" Single Wall EDPM Gasket For Polypropylene Flue/Vent.....	4.22	
23 51 16 00-0430	EA		3" Single Wall EDPM Gasket For Polypropylene Flue/Vent.....	4.72	
23 51 16 00-0431	EA		4" Single Wall EDPM Gasket For Polypropylene Flue/Vent.....	6.39	
23 51 16 00-0432	EA		5" Single Wall EDPM Gasket For Polypropylene Flue/Vent.....	10.55	
23 51 16 00-0433	EA		2" Connector Ring For Polypropylene Flue/Vent.....	15.10	4.23
23 51 16 00-0434	EA		3" Connector Ring For Polypropylene Flue/Vent.....	17.20	4.45
23 51 16 00-0435	EA		4" Connector Ring For Polypropylene Flue/Vent.....	18.58	4.61
23 51 16 00-0436	EA		5" Connector Ring For Polypropylene Flue/Vent.....	20.63	4.80
23 51 16 00-0437	EA		2"/4" Polypropylene Flue/Vent Air Intake, White.....	79.91	8.46
23 51 16 00-0438	EA		3"/5" Polypropylene Flue/Vent Air Intake, White.....	81.84	8.90
23 51 16 00-0439	EA		4"/6" Polypropylene Flue/Vent Air Intake, White.....	59.98	9.23
23 51 16 00-0440	EA		2" Base Support For Polypropylene Flue/Vent.....	69.78	6.35
23 51 16 00-0441	EA		3" Base Support For Polypropylene Flue/Vent.....	71.93	6.68
23 51 16 00-0442	EA		4" Base Support For Polypropylene Flue/Vent.....	97.23	6.92
23 51 16 00-0443	EA		5" Base Support For Polypropylene Flue/Vent.....	166.21	7.20

23 51 16 00-0444 Polypropylene Flue/Vent Flex Pipe (23 51 16 00-0285)

23 51 16 00-0445	LF		2", Up To 50', Polypropylene Flue/Vent Flex Pipe.....	12.49	1.49
23 51 16 00-0446	LF		2", > 50', Polypropylene Flue/Vent Flex Pipe.....	10.74	1.49
23 51 16 00-0447	LF		3", Up To 50', Polypropylene Flue/Vent Flex Pipe.....	15.37	1.75
23 51 16 00-0448	LF		3", > 50', Polypropylene Flue/Vent Flex Pipe.....	13.17	1.75
23 51 16 00-0449	LF		4", Up To 50', Polypropylene Flue/Vent Flex Pipe.....	22.28	2.17
23 51 16 00-0450	LF		4", > 50', Polypropylene Flue/Vent Flex Pipe.....	18.90	2.17

23 51 16 00-0451 Polypropylene Flue/Vent Couplers (23 51 16 00-0285)

Note: Gasketed rigid single wall polypropylene vent fittings with dedicated male and female ends.

23 51 16 00-0452	EA		2" Polypropylene Flue/Vent Coupler, Single Wall to Flex.....	85.84	16.91
23 51 16 00-0453	EA		2" Polypropylene Flue/Vent Coupler, Flex to Single Wall.....	96.81	16.91
23 51 16 00-0454	EA		3" Polypropylene Flue/Vent Coupler, Flex to Single Wall.....	202.59	17.81
23 51 16 00-0455	EA		4" Polypropylene Flue/Vent Coupler, Flex to Single Wall.....	374.75	18.46
23 51 16 00-0456	EA		2" Polypropylene Flue/Vent Coupler, Flex to Flex.....	100.05	16.91
23 51 16 00-0457	EA		3" Polypropylene Flue/Vent Coupler, Flex to Flex.....	242.68	17.81
23 51 16 00-0458	EA		4" Polypropylene Flue/Vent Coupler, Flex to Flex.....	637.63	18.46

23 51 16 00-0459 Polypropylene Flue/Vent Flex End Terminations (23 51 16 00-0285)

23 51 16 00-0460	EA		2" Polypropylene-UV Black Flue/Vent Flex End Pipe Termination.....	114.61	16.91
23 51 16 00-0461	EA		3" Polypropylene-UV Black Flue/Vent Flex End Pipe Termination.....	105.18	17.81
23 51 16 00-0462	EA		4" Polypropylene-UV Black Flue/Vent Flex End Pipe Termination.....	131.22	18.46

23 51 16 00-0463 Aluminum Flue/Vent Fittings (23 51 16)**23 51 16 00-0464 Aluminum Vent Top Caps (23 51 16 00-0463)**

23 51 16 00-0465	EA		3" Aluminum Vent Cap (Star-Kap® 3-SK).....	109.60	16.77
23 51 16 00-0466	EA		4" Aluminum Vent Cap (Star-Kap® 4-SK).....	116.66	16.43
23 51 16 00-0467	EA		5" Aluminum Vent Cap (Star-Kap® 5-SK).....	126.73	17.22
23 51 16 00-0468	EA		6" Aluminum Vent Cap (Star-Kap® 6-SK).....	179.11	18.01
23 51 16 00-0469	EA		8" Aluminum Vent Cap (Star-Kap® 8-SK).....	200.37	20.03
23 51 16 00-0470	EA		10" Aluminum Vent Cap (Star-Kap® 10-SK).....	585.89	21.16
23 51 16 00-0471	EA		12" Aluminum Vent Cap (Star-Kap® 12-SK).....	600.14	22.51

23 52 Heating Boilers (23 50)**23 52 16 Condensing Boilers (23 52)****23 52 16 13 Stainless-Steel Condensing Boilers (23 52 16)****23 52 16 13-0001 Hamilton Evo Series Stainless Steel Condensing Boilers (23 52 16 13)**

Note: Includes circulating pump, mounting rack, disconnect panel, plumbing and gas manifold, manual reset high limit and LWCO (Cal Code). Rated by gross rated output.

23 52 16 13-0002	EA		75 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW79).....	12,434.90	423.17
23 52 16 13-0003	EA		127 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW129).....	13,135.08	563.66
23 52 16 13-0004	EA		168 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW179).....	14,004.21	634.64
23 52 16 13-0005	EA		187 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW199.1).....	14,845.55	669.97
23 52 16 13-0006	EA		281 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW299).....	19,606.47	775.77
23 52 16 13-0007	EA		374 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW399).....	22,699.75	846.23
23 52 16 13-0008	EA		589 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW599).....	30,682.21	987.25
23 52 16 13-0009	EA		785 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW798).....	42,678.35	1,128.37
23 52 16 13-0010	EA		980 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW998).....	52,207.62	1,234.16
23 52 16 13-0011	EA		1,425 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW1499).....	75,411.98	1,445.64
23 52 16 13-0012	EA		1,900 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Hamilton Evo HW1999).....	83,108.73	1,551.43

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 16 13-0013		Buderus SB615 Stainless Steel Condensing Boilers <small>(23 52 16 13)</small>		
		Note: Includes Riello burners. Rated by gross rated output.		
23 52 16 13-0014	EA	484 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/145)	40,658.13	916.79
23 52 16 13-0015	EA	612 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/185)	42,517.54	987.25
23 52 16 13-0016	EA	791 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/240)	47,687.65	1,128.37
23 52 16 13-0017	EA	1,022 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/310)	51,406.47	1,269.39
23 52 16 13-0018	EA	1,317 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/400)	56,850.40	1,375.18
23 52 16 13-0019	EA	1,459 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/510)	65,128.26	1,445.64
23 52 16 13-0020	EA	2,104 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB615/640)	78,655.54	1,551.43
23 52 16 13-0021		Buderus SB735 Stainless Steel Condensing Boilers <small>(23 52 16 13)</small>		
		Note: Includes Riello burners. Rated by gross rated output.		
23 52 16 13-0022	EA	2,650 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB735/790)	77,676.81	1,692.45
23 52 16 13-0023	EA	3,251 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB735/970)	89,988.20	1,763.02
23 52 16 13-0024	EA	4,079 MBH Water, Gas Fired, Stainless Steel Condensing Boiler (Buderus SB735/1200)	104,317.14	1,833.58
23 52 16 13-0025		Laars Neotherm Stainless Steel Condensing Boiler <small>(23 52 16 13)</small>		
		Note: Compliant with SCAQMD. Rated by gross rated input.		
23 52 16 13-0026	EA	80 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH080)	7,951.03	458.39
23 52 16 13-0027	EA	105 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH105)	9,076.35	528.95
23 52 16 13-0028	EA	150 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH150)	10,169.91	634.64
23 52 16 13-0029	EA	210 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH210)	11,326.09	705.20
23 52 16 13-0030	EA	285 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH285)	14,248.11	775.77
23 52 16 13-0031	EA	399 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH399)	18,613.29	846.23
23 52 16 13-0032	EA	500 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH500)	22,361.23	916.79
23 52 16 13-0033	EA	600 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH600)	24,823.21	987.25
23 52 16 13-0034	EA	750 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH750)	26,963.70	1,057.81
23 52 16 13-0035	EA	850 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH850)	29,315.79	1,198.82
23 52 16 13-0036	EA	1,000 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH1000)	41,714.86	1,269.39
23 52 16 13-0037	EA	1,700 MBH, Gas Fired, Stainless Steel, Condensing Boiler (Laars Neotherm NTH1700)	55,454.80	1,480.97
23 52 16 13-0038	EA	150 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV150)	18,453.42	634.64
23 52 16 13-0039	EA	199 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV199)	21,433.89	846.33
23 52 16 13-0040	EA	285 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV285)	28,081.25	952.12
23 52 16 13-0041	EA	399 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV399)	35,268.47	1,163.71
23 52 16 13-0042	EA	500 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV500)	41,686.34	1,269.50
23 52 16 13-0043	EA	600 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV600)	47,149.40	1,375.28
23 52 16 13-0044	EA	750 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV750)	56,626.21	1,481.08
23 52 16 13-0045	EA	850 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV850)	62,765.59	1,586.87
23 52 16 13-0046	EA	1,000 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV1000)	82,609.63	1,692.66
23 52 16 13-0047	EA	1,700 MBH Gas Fired Condensing Volume Water Heater (Laars Neotherm NTV1700)	111,057.38	2,221.61
23 52 16 13-0048		AERCO Benchmark Stainless-Steel Condensing Boilers <small>(23 52 16 13)</small>		
		Note: Rated by gross rated output.		
23 52 16 13-0049	EA	1,500 MBH Water, 120 Volt, 1 Phase, Gas Fired, Stainless Steel Condensing Boiler (AERCO BMK1.5LN)	65,508.04	1,445.64
		Note: Includes gas PRV and pump delay relay.		
23 52 16 13-0050	EA	2,000 MBH Water, 120 Volt, 1 Phase, Gas Fired, Stainless Steel Condensing Boiler (AERCO BMK2.0LN)	77,956.48	1,551.43
		Note: Includes gas PRV and pump delay relay.		
23 52 16 13-0051	EA	3,000 MBH Water, 220 Volt, 1 Phase, 230 Volt, 3 Phase, Gas Fired, Stainless Steel Condensing Boiler (AERCO BMK3000)	112,761.11	1,727.79
		Note: Includes gas PRV and pump delay relay.		
23 52 16 13-0052	EA	3,000 MBH Water, 480 Volt, 3 Phase, Gas Fired, Stainless Steel Condensing Boiler (AERCO BMK3000)	120,295.47	1,727.79
		Note: Includes gas PRV and pump delay relay.		
23 52 16 13-0053		Lochinvar Knight Stainless Steel Condensing Boilers <small>(23 52 16 13)</small>		
		Note: Rated by gross rated output.		
23 52 16 13-0054	EA	184 MBH 95% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight KBN211)	11,022.09	634.64
23 52 16 13-0055	EA	264 MBH 95% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight KHB285N)	14,254.59	705.20
23 52 16 13-0056		Lochinvar Knight XL Stainless Steel Condensing Boilers <small>(23 52 16 13)</small>		
		Note: Rated by gross rated output.		
23 52 16 13-0057	EA	387 MBH 97% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight XL KBX0400N)	16,189.10	811.00
23 52 16 13-0058	EA	485 MBH 97% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight XL KBX0500N)	20,172.64	846.23
23 52 16 13-0059	EA	631 MBH 97% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight XL KBX0650N)	24,749.31	916.79
23 52 16 13-0060	EA	776 MBH 97% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight XL KBX0800N)	29,669.57	952.02
23 52 16 13-0061	EA	969 MBH 97% Efficient, Gas Fired, Stainless Steel Heat Exchanger, Condensing Boiler (Lochinvar Knight XL KBX1000N)	36,272.30	1,022.58
23 52 16 13-0062		Lochinvar Crest Stainless Steel Condensing Boilers <small>(23 52 16 13)</small>		
		Note: Rated by gross rated output.		
23 52 16 13-0063	EA	1,203 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN1251)	45,968.00	1,198.61

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 52 Heating Boilers**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 52 16 13-0064	EA	1,443 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN1501).....	47,452.28	1,375.18
23 52 16 13-0065	EA	1,684 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN1751).....	52,018.41	1,463.09
23 52 16 13-0066	EA	1,923 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN2001).....	56,584.54	1,551.43
23 52 16 13-0067	EA	2,400 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN2501).....	66,380.79	1,621.99
23 52 16 13-0068	EA	2,883 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN3001).....	73,540.48	1,692.45
23 52 16 13-0069	EA	3,364 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN3501).....	90,347.18	1,763.02
23 52 16 13-0070	EA	3,843 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN4001).....	99,821.69	1,833.47
23 52 16 13-0071	EA	4,804 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Lochinvar Crest FBN5001).....	122,460.56	1,903.93
23 52 16 13-0072		Patterson Kelley Stainless Steel Condensing Boilers (23 52 16 13)		
23 52 16 13-0073		Patterson Kelley Stainless Steel Condensing Boilers, SOLIS® Series (23 52 16 13-0072)		
23 52 16 13-0074	EA	1,500 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Patterson-Kelley SOLIS® SL-1500).....	47,181.69	1,445.64
23 52 16 13-0075	EA	3,000 MBH 96% Efficient, Gas Fired, Stainless Steel Firetube, Condensing Boiler (Patterson-Kelley SOLIS® SL-3000).....	72,636.52	1,727.79
23 52 16 13-0076		Patterson Kelley Stainless Steel Condensing Boilers, SONIC® Series (23 52 16 13-0072)		
23 52 16 13-0077	EA	650 MBH 97% Efficient, Gas Fired, Dual Fuel, Stainless Steel Condensing Boiler (Patterson-Kelley SONIC® SC-650 SCD-650).....	24,539.09	1,022.58
23 52 16 13-0078	EA	1,000 MBH 97% Efficient, Gas Fired, Dual Fuel, Stainless Steel Condensing Boiler (Patterson-Kelley SONIC® SC-1000 SCD-1000).....	29,495.43	1,269.39
23 52 16 13-0079	EA	2,000 MBH 97% Efficient, Gas Fired, Dual Fuel, Stainless Steel Condensing Boiler (Patterson-Kelley SONIC® SC-2000).....	50,146.20	1,551.43
23 52 16 13-0080	EA	4,000 MBH 97% Efficient, Gas Fired, Dual Fuel, Stainless Steel Condensing Boiler (Patterson-Kelley SONIC® SC-4000).....	86,287.56	1,833.58
23 52 16 13-0081		Patterson Kelley Stainless Steel Condensing Boilers, STORM® Series (23 52 16 13-0072)		
23 52 16 13-0082	EA	1,250 MBH 97% Efficient, Gas Fired, Stainless Steel Condensing Boiler (Patterson-Kelley STORM® ST1250).....	35,981.68	1,339.84
23 52 16 13-0083	EA	2,000 MBH 97% Efficient, Gas Fired, Stainless Steel Condensing Boiler (Patterson-Kelley STORM® ST2000).....	59,362.11	1,551.43
23 52 16 13-0084	EA	4,000 MBH 97% Efficient, Gas Fired, Stainless Steel Condensing Boiler (Patterson-Kelley STORM® ST4000).....	88,248.39	1,833.58
23 52 16 16		Aluminum Condensing Boilers (23 52 16)		
23 52 16 16-0001		Patterson Kelley Mach Series Aluminum Condensing Boilers (23 52 16 16)		
		Note: Compliant with SCAQMD. Rated by gross rated output.		
23 52 16 16-0002	EA	300 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach CM300).....	15,974.49	775.77
23 52 16 16-0003	EA	450 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C450).....	17,958.08	881.56
23 52 16 16-0004	EA	750 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C750).....	20,388.72	1,057.81
23 52 16 16-0005	EA	900 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C900).....	30,026.57	1,198.82
23 52 16 16-0006	EA	1,050 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C1050).....	31,374.91	1,269.39
23 52 16 16-0007	EA	1,500 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C1500).....	48,421.50	1,445.64
23 52 16 16-0008	EA	2,000 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C2000).....	52,427.37	1,551.43
23 52 16 16-0009	EA	2,500 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C2500).....	78,749.77	1,692.45
23 52 16 16-0010	EA	3,000 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C3000).....	91,459.29	1,727.79
23 52 16 16-0011	EA	4,000 MBH Water, Gas Fired, Aluminum Condensing Boiler (Patterson Kelley Mach C4000).....	104,091.51	1,833.58
23 52 16 16-0012		Weil McLain Aluminum Condensing Boilers (23 52 16 16)		
		Note: Rated by gross rated output.		
23 52 16 16-0013	EA	80 MBH Water Gas Fired Condensing Boiler (Weil McLain Ultra 80).....	8,989.70	458.39
		Note: Aluminum block with stainless steel burner. Includes boiler inline circulating pump.		
23 52 16 16-0014	EA	105 MBH Water Gas Fired Condensing Boiler (Weil McLain Ultra 80).....	9,894.56	528.95
		Note: Aluminum block with stainless steel burner. Includes boiler inline circulating pump.		
23 52 16 16-0015	EA	155 MBH Water Gas Fired Condensing Boiler (Weil McLain Ultra 80).....	11,136.30	634.64
		Note: Aluminum block with stainless steel burner. Includes boiler inline circulating pump.		
23 52 16 16-0016	EA	230 MBH Water Gas Fired Condensing Boiler (Weil McLain Ultra 80).....	12,503.33	705.20
		Note: Aluminum block with stainless steel burner. Includes boiler inline circulating pump.		
23 52 16 16-0017	EA	310 MBH Water Gas Fired Condensing Boiler (Weil McLain Ultra 80).....	16,287.05	811.00
		Note: Aluminum block with stainless steel burner. Includes boiler inline circulating pump.		
23 52 16 16-0018		Buderus GB142 Wall Hung Aluminum Condensing Boilers (23 52 16 16)		
		Note: Includes standard controls. Rated by gross rated output.		
23 52 16 16-0019	EA	75 MBH Water, Gas Fired, Wall Hung Aluminum Condensing Boiler (Buderus GB142/24).....	6,779.82	423.17
		Note: Includes an aluminum heat exchanger and three speed circulating pump.		
23 52 16 16-0020	EA	95 MBH Water, Gas Fired, Wall Hung Aluminum Condensing Boiler (Buderus GB142/30).....	7,873.17	493.62
		Note: Includes an aluminum heat exchanger and three speed circulating pump.		
23 52 16 16-0021	EA	143 MBH Water, Gas Fired, Wall Hung Aluminum Condensing Boiler (Buderus GB142/45).....	9,069.38	599.41
		Note: Includes an aluminum heat exchanger and three speed circulating pump.		
23 52 16 16-0022	EA	193 MBH Water, Gas Fired, Wall Hung Aluminum Condensing Boiler (Buderus GB142/60).....	9,923.99	669.97
		Note: Includes an aluminum heat exchanger and three speed circulating pump.		
23 52 16 16-0023	EA	Optional Vertical Or Horizontal 3" Concentric Termination Kit For GB142 (Buderus 60L46).....	333.16	105.79
23 52 16 16-0024	EA	Optional Stainless Steel Concentric Hood For GB142 (Buderus SJT3).....	434.23	105.79
23 52 16 16-0025	EA	Optional GB Floor Stand For GB142 (Buderus 7098265).....	920.52	105.79

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 16 16-0026 Buderus GB162 Wall Hung Aluminum Condensing Boilers <small>(23 52 16 16)</small> Note: Includes standard controls. Rated by gross rated output.		
23 52 16 16-0027 EA 290 MBH Water, Gas Fired, Wall Hung Aluminum Condensing Boiler (Buderus GB162/80) Note: Includes an aluminum heat exchanger, connection pump module, low loss header, outdoor reset module, outdoor temperature sensor, and 1-1/2" unions.	11,213.17	775.77
23 52 16 16-0028 EA 333 MBH Water, Gas Fired, Wall Hung Aluminum Condensing Boiler (Buderus GB162/100) Note: Includes an aluminum heat exchanger, connection pump module, low loss header, outdoor reset module, outdoor temperature sensor, and 1-1/2" unions.	13,872.33	811.00
23 52 16 16-0029 EA 580 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler In Line Cascade Package (Two Boilers) (Buderus GB162/80-TL2) Note: Includes an aluminum heat exchangers, connection pump module, inline cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	26,951.25	952.02
23 52 16 16-0030 EA 580 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler Back To Back Cascade Package (Two Boilers) (Buderus GB162/80-TR2) Note: Includes an aluminum heat exchangers, connection pump module, back to back cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	25,169.89	952.02
23 52 16 16-0031 EA 666 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler In Line Cascade Package (Two Boilers) (Buderus GB162/100-TL2) Note: Includes an aluminum heat exchangers, connection pump module, inline cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	32,269.58	1,022.58
23 52 16 16-0032 EA 666 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler Back To Back Cascade Package (Two Boilers) (Buderus GB162/100-TR2) Note: Includes an aluminum heat exchangers, connection pump module, back to back cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	30,488.23	1,022.58
23 52 16 16-0033 EA 870 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler In Line Cascade Package (Three Boilers) (Buderus GB162/80-TL3) Note: Includes an aluminum heat exchangers, connection pump module, inline cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	37,514.78	1,198.82
23 52 16 16-0034 EA 999 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler In Line Cascade Package (Three Boilers) (Buderus GB162/100-TL3) Note: Includes an aluminum heat exchangers, connection pump module, inline cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	45,386.50	1,269.39
23 52 16 16-0035 EA 1,160 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler In Line Cascade Package (Four Boilers) (Buderus GB162/80-TL4) Note: Includes an aluminum heat exchangers, connection pump module, inline cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	46,641.96	1,339.84
23 52 16 16-0036 EA 1,160 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler Back To Back Cascade Package (Four Boilers) (Buderus GB162/80-TR4) Note: Includes an aluminum heat exchangers, connection pump module, back to back cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	47,355.40	1,339.84
23 52 16 16-0037 EA 1,332 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler In Line Cascade Package (Four Boilers) (Buderus GB162/100-TL4) Note: Includes an aluminum heat exchangers, connection pump module, inline cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	56,961.26	1,375.18
23 52 16 16-0038 EA 1,332 MBH Water, Gas Fired, Frame Mounted Aluminum Condensing Boiler Back To Back Cascade Package (Four Boilers) (Buderus GB162/100-TR4) Note: Includes an aluminum heat exchangers, connection pump module, back to back cascade package (stand), RC35 controller, outdoor temperature sensor, MCM10 intelligent sequencing module, WM10 low loss header module and insulation package.	57,674.71	1,375.18
23 52 16 16-0039 EA EMS Control Module For Condensing Boiler (Buderus RC35)	757.65	105.79
23 52 16 16-0040 Buderus GB312 Aluminum Condensing Boilers <small>(23 52 16 16)</small> Note: Includes standard controls. Rated by gross rated output.		
23 52 16 16-0041 EA 305 MBH Water, Gas Fired, Aluminum Condensing Boiler (Buderus GB312/90)..... Note: Includes an aluminum heat exchanger.	16,143.49	775.77
23 52 16 16-0042 EA 409 MBH Water, Gas Fired, Aluminum Condensing Boiler (Buderus GB312/120)..... Note: Includes an aluminum heat exchanger.	18,838.71	846.23
23 52 16 16-0043 EA 544 MBH Water, Gas Fired, Aluminum Condensing Boiler (Buderus GB312/160)..... Note: Includes an aluminum heat exchanger.	23,631.96	934.35
23 52 16 16-0044 EA 676 MBH Water, Gas Fired, Aluminum Condensing Boiler (Buderus GB312/200)..... Note: Includes an aluminum heat exchanger.	27,177.44	1,022.58
23 52 16 16-0045 EA 810 MBH Water, Gas Fired, Aluminum Condensing Boiler (Buderus GB312/240)..... Note: Includes an aluminum heat exchanger.	32,533.49	1,128.37
23 52 16 16-0046 EA 944 MBH Water, Gas Fired, Aluminum Condensing Boiler (Buderus GB312/280)..... Note: Includes an aluminum heat exchanger.	35,926.80	1,234.16
23 52 16 16-0047 EA Optional CSD-1 Kit Consisting Of High And Low Gas Pressure Switches For GB312 (Buderus 7747019985).....	490.28	52.90
23 52 16 16-0048 EA Optional L4006E1125 Manual Reset Aquastat For GB312 (Buderus L4006E1125)	266.91	52.90
23 52 16 16-0049 EA Optional Hydrolevel 550 low Water Cut-Off For GB312 (Buderus 550)	379.69	52.90
23 52 16 16-0050 EA Optional Condensate Neutralization Tank For GB312 (Buderus 63035899)	798.61	52.90
23 52 16 19 Copper Water-Tube Condensing Boilers <small>(23 52 16)</small>		
23 52 16 19-0001 Laars Rheos+ Copper Fin Tube Condensing Boilers <small>(23 52 16 19)</small> Note: Rated by gross rated output.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 52 Heating Boilers



MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
23 52 16 19-0002	EA	1,200 MBH Water, Gas Fired, Copper Fin Tube Condensing Boiler (Laars Rheos+)	45,393.97	1,339.84
23 52 16 19-0003	EA	1,600 MBH Water, Gas Fired, Copper Fin Tube Condensing Boiler (Laars Rheos+)	51,187.30	1,480.97
23 52 16 19-0004	EA	2,000 MBH Water, Gas Fired, Copper Fin Tube Condensing Boiler (Laars Rheos+)	56,023.93	1,551.43
23 52 16 19-0005	EA	2,400 MBH Water, Gas Fired, Copper Fin Tube Condensing Boiler (Laars Rheos+)	60,465.72	1,621.99
23 52 16 23 Cast Iron Condensing Boilers (23 52 16)				
23 52 16 23-0001 Hydrotherm KN Cast Iron Condensing Boilers (23 52 16 23)				
Note: Compliant with SCAQMD. Rated by gross rated output.				
23 52 16 23-0002	EA	199 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-2)	15,948.88	669.97
23 52 16 23-0003	EA	399 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-4)	23,365.25	846.23
23 52 16 23-0004	EA	600 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-6)	38,472.36	987.25
23 52 16 23-0005	EA	1,000 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-10)	50,503.19	1,269.39
23 52 16 23-0006	EA	1,600 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-16)	87,859.40	1,480.97
23 52 16 23-0007	EA	1,999 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-20)	73,481.30	1,551.43
23 52 16 23-0008	EA	2,600 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-26)	122,401.03	1,692.45
23 52 16 23-0009	EA	3,000 MBH Water, Gas Fired, Cast Iron Condensing Boiler (Hydrotherm KN-30)	133,931.56	1,727.79
23 52 23 Cast-Iron Boilers (23 52)				
23 52 23 00-0001 Weil-McLain Model 80 Cast Iron Boiler (23 52 23)				
Note: Capacities are the net AHRI ratings for steam or water MBH output. Includes burner unit and controls. Excludes flue piping, fuel piping, boiler base or pad.				
23 52 23 00-0002 Gas Fired Weil-McLain Model 80 Cast Iron Boiler (23 52 23 00-0001)				
Note: Field assembled boilers can only be used in situations where package units cannot be installed.				
23 52 23 00-0003	EA	209 MBH Steam, 242 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 380)	16,455.89	3,113.83
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0004	EA	297 MBH Steam, 344 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 480)	18,028.71	3,321.42
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0005	EA	386 MBH Steam, 448 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 580)	19,753.01	3,529.01
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0006	EA	476 MBH Steam, 551 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 680)	21,354.40	3,736.59
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0007	EA	565 MBH Steam, 655 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 780)	22,831.06	3,944.18
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0008	EA	654 MBH Steam, 758 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 880)	24,863.54	4,151.77
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0009	EA	743 MBH Steam, 862 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 980)	26,427.60	4,359.36
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0010	EA	833 MBH Steam, 965 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1080)	27,663.02	4,566.94
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0011	EA	922 MBH Steam, 1,069 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1180)	28,893.84	4,774.54
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0012	EA	1,018 MBH Steam, 1,172 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1280)	30,319.71	4,982.13
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0013 Gas Fired Package Weil-McLain Model 80 Cast Iron Boiler (23 52 23 00-0001)				
23 52 23 00-0014	EA	209 MBH Steam, 242 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 380)	12,233.70	460.94
Note: Fire tested factory assembled package unit.				
23 52 23 00-0015	EA	297 MBH Steam, 344 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 480)	13,600.65	460.94
Note: Fire tested factory assembled package unit.				
23 52 23 00-0016	EA	386 MBH Steam, 448 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 580)	15,582.62	576.17
Note: Fire tested factory assembled package unit.				
23 52 23 00-0017	EA	476 MBH Steam, 551 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 680)	16,976.43	576.17
Note: Fire tested factory assembled package unit.				
23 52 23 00-0018	EA	565 MBH Steam, 655 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 780)	18,711.02	691.40
Note: Fire tested factory assembled package unit.				
23 52 23 00-0019	EA	654 MBH Steam, 758 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 880)	20,554.35	691.40
Note: Fire tested factory assembled package unit.				
23 52 23 00-0020	EA	743 MBH Steam, 862 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 980)	22,373.76	806.63
Note: Fire tested factory assembled package unit.				
23 52 23 00-0021	EA	833 MBH Steam, 965 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1080)	23,865.21	921.87
Note: Fire tested factory assembled package unit.				
23 52 23 00-0022	EA	922 MBH Steam, 1,069 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1180)	24,892.89	921.87
Note: Fire tested factory assembled package unit.				
23 52 23 00-0023	EA	1018 MBH Steam, 1172 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1280)	26,572.36	1,037.11
Note: Fire tested factory assembled package unit.				
23 52 23 00-0024 Gas/Oil Fired Weil-McLain Model 80 Cast Iron Boiler (23 52 23 00-0001)				
Note: Field assembled boilers can only be used in situations where package units cannot be installed.				
23 52 23 00-0025	EA	209 MBH Steam, 242 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 380)	17,254.57	3,113.83
Note: Includes field assembly of individual sections and testing.				
23 52 23 00-0026	EA	297 MBH Steam, 344 MBH Water Gas/Oil Fired Cast Iron Boiler	18,970.17	3,321.42
Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.				
23 52 23 00-0027	EA	386 MBH Steam, 448 MBH Water Gas/Oil Fired Cast Iron Boiler	20,608.24	3,529.01
Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.				
23 52 23 00-0028	EA	476 MBH Steam, 551 MBH Water Gas/Oil Fired Cast Iron Boiler	22,441.46	3,736.59
Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.				

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 23 00-0029 EA 565 MBH Steam, 655 MBH Water Gas/Oil Fired Cast Iron Boiler Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.	23,947.80	3,944.18
23 52 23 00-0030 EA 654 MBH Steam, 758 MBH Water Gas/Oil Fired Cast Iron Boiler Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.	26,161.23	4,151.77
23 52 23 00-0031 EA 743 MBH Steam, 862 MBH Water Gas/Oil Fired Cast Iron Boiler Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.	27,541.52	4,359.36
23 52 23 00-0032 EA 833 MBH Steam, 965 MBH Water Gas/Oil Fired Cast Iron Boiler Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.	28,882.96	4,566.94
23 52 23 00-0033 EA 922 MBH Steam, 1069 MBH Water Gas/Oil Fired Cast Iron Boiler Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.	30,115.19	4,774.54
23 52 23 00-0034 EA 1,018 MBH Steam, 1172 MBH Water Gas/Oil Fired Cast Iron Boiler Note: Weil-McLain Model 80. Includes field assembly of individual sections and testing.	31,579.23	4,982.13
23 52 23 00-0035 Gas/Oil Fired Package Weil-McLain Model 80 Cast Iron Boiler <small>(23 52 23 00-0001)</small>		
23 52 23 00-0036 EA 209 MBH Steam, 242 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 380) Note: Fire tested factory assembled package cast iron unit.	13,032.38	460.94
23 52 23 00-0037 EA 297 MBH Steam, 344 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 480) Note: Fire tested factory assembled package cast iron unit.	14,542.11	460.94
23 52 23 00-0038 EA 386 MBH Steam, 448 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 580) Note: Fire tested factory assembled package cast iron unit.	16,437.85	576.17
23 52 23 00-0039 EA 476 MBH Steam, 551 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 680) Note: Fire tested factory assembled package cast iron unit.	18,063.49	576.17
23 52 23 00-0040 EA 565 MBH Steam, 655 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 780) Note: Fire tested factory assembled package cast iron unit.	19,827.76	691.40
23 52 23 00-0041 EA 654 MBH Steam, 758 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 880) Note: Fire tested factory assembled package cast iron unit.	21,852.04	691.40
23 52 23 00-0042 EA 743 MBH Steam, 862 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 980) Note: Fire tested factory assembled package cast iron unit.	23,487.68	806.63
23 52 23 00-0043 EA 833 MBH Steam, 965 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1080) Note: Fire tested factory assembled package cast iron unit.	25,085.14	921.87
23 52 23 00-0044 EA 922 MBH Steam, 1,069 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1180) Note: Fire tested factory assembled package cast iron unit.	26,114.24	921.87
23 52 23 00-0045 EA 1,018 MBH Steam, 1,172 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1280) Note: Fire tested factory assembled package cast iron unit.	27,831.87	1,037.11
23 52 23 00-0046 Weil-McLain Model 88 Cast Iron Boiler <small>(23 52 23)</small>		
Note: Capacities are the net AHRI ratings for steam or water MBH output. Includes burner unit and controls. Excludes flue piping, fuel piping, boiler base or pad.		
23 52 23 00-0047 Gas Fired Weil-McLain Model 88 Cast Iron Boiler <small>(23 52 23 00-0046)</small>		
Note: Field assembled boilers can only be used in situations where package units cannot be installed.		
23 52 23 00-0048 EA 629 MBH Steam, 730 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 488) Note: Includes field assembly of individual sections and testing.	26,985.38	4,670.74
23 52 23 00-0049 EA 845 MBH Steam, 979 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 588) Note: Includes field assembly of individual sections and testing.	29,859.02	4,956.18
23 52 23 00-0050 EA 1072 MBH Steam, 1229 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 688) Note: Includes field assembly of individual sections and testing.	33,425.40	5,241.61
23 52 23 00-0051 EA 1,311 MBH Steam, 1,478 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 788) Note: Includes field assembly of individual sections and testing.	36,563.02	5,527.04
23 52 23 00-0052 EA 1,543 MBH Steam, 1,728 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 888) Note: Includes field assembly of individual sections and testing.	39,285.83	5,812.48
23 52 23 00-0053 EA 1,766 MBH Steam, 1,977 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 988) Note: Includes field assembly of individual sections and testing.	43,249.62	6,097.91
23 52 23 00-0054 EA 1,988 MBH Steam, 2,227 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1088) Note: Includes field assembly of individual sections and testing.	45,998.50	6,383.35
23 52 23 00-0055 EA 2,211 MBH Steam, 2,477 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1188) Note: Includes field assembly of individual sections and testing.	48,425.74	6,668.78
23 52 23 00-0056 EA 2,434 MBH Steam, 2,726 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1288) Note: Includes field assembly of individual sections and testing.	51,679.55	6,954.21
23 52 23 00-0057 EA 2,657 MBH Steam, 2,976 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1388) Note: Includes field assembly of individual sections and testing.	54,288.88	7,239.65
23 52 23 00-0058 EA 2,880 MBH Steam, 3,225 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1488) Note: Includes field assembly of individual sections and testing.	58,472.89	7,525.08
23 52 23 00-0059 EA 3,102 MBH Steam, 3,475 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1588) Note: Includes field assembly of individual sections and testing.	60,953.72	7,810.52
23 52 23 00-0060 EA 3,325 MBH Steam, 3,724 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1688) Note: Includes field assembly of individual sections and testing.	63,587.51	8,095.95
23 52 23 00-0061 EA 3,548 MBH Steam, 3,974 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1788) Note: Includes field assembly of individual sections and testing.	66,526.65	8,381.38
23 52 23 00-0062 EA 3,771 MBH Steam, 4,223 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain 1888) Note: Includes field assembly of individual sections and testing.	68,910.67	8,666.82
23 52 23 00-0063 Gas Fired Package Weil-McLain Model 88 Cast Iron Boiler <small>(23 52 23 00-0046)</small>		
23 52 23 00-0064 EA 629 MBH Steam, 730 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 488) Note: Fire tested factory assembled package unit.	22,393.55	806.63
23 52 23 00-0065 EA 845 MBH Steam, 979 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 588) Note: Fire tested factory assembled package unit.	25,398.96	921.87
23 52 23 00-0066 EA 1,072 MBH Steam, 1,229 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 688) Note: Fire tested factory assembled package unit.	29,114.01	1,037.11
23 52 23 00-0067 EA 1,311 MBH Steam, 1,478 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 788) Note: Fire tested factory assembled package unit.	32,369.63	1,152.33

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 52 Heating Boilers**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 23 00-0068 EA 1,543 MBH Steam, 1,728 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 888).....	34,761.44	1,152.33
Note: Fire tested factory assembled package unit.		
23 52 23 00-0069 EA 1,766 MBH Steam, 1,977 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 988).....	38,860.96	1,267.57
Note: Fire tested factory assembled package unit.		
23 52 23 00-0070 EA 1,988 MBH Steam, 2,227 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1088).....	41,282.46	1,267.57
Note: Fire tested factory assembled package unit.		
23 52 23 00-0071 EA 2,211 MBH Steam, 2,477 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1188).....	43,841.19	1,382.81
Note: Fire tested factory assembled package unit.		
23 52 23 00-0072 EA 2,434 MBH Steam, 2,726 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1288).....	46,768.76	1,382.81
Note: Fire tested factory assembled package unit.		
23 52 23 00-0073 EA 2,657 MBH Steam, 2,976 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1388).....	49,509.87	1,498.04
Note: Fire tested factory assembled package unit.		
23 52 23 00-0074 EA 2,880 MBH Steam, 3,225 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1488).....	52,164.68	1,613.27
Note: Fire tested factory assembled package unit.		
23 52 23 00-0075 EA 3,102 MBH Steam, 3,475 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1588).....	54,319.01	1,613.27
Note: Fire tested factory assembled package unit.		
23 52 23 00-0076 EA 3,325 MBH Steam, 3,724 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1688).....	57,085.51	1,728.51
Note: Fire tested factory assembled package unit.		
23 52 23 00-0077 EA 3,548 MBH Steam, 3,974 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1788).....	59,696.43	1,728.51
Note: Fire tested factory assembled package unit.		
23 52 23 00-0078 EA 3,771 MBH Steam, 4,223 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain 1888).....	62,242.38	1,843.74
Note: Fire tested factory assembled package unit.		
23 52 23 00-0079 Gas/Oil Fired Weil-McLain Model 88 Cast Iron Boiler (23 52 23 00-0046)		
Note: Field assembled boilers can only be used in situations where package units cannot be installed.		
23 52 23 00-0080 EA 629 MBH Steam, 730 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 488)	27,969.24	4,670.74
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0081 EA 845 MBH Steam, 979 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 588)	30,837.23	4,956.18
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0082 EA 1,072 MBH Steam, 1,229 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 688).....	34,658.06	5,241.61
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0083 EA 1,311 MBH Steam, 1,478 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 788).....	37,920.07	5,527.04
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0084 EA 1,543 MBH Steam, 1,728 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 888).....	40,504.36	5,812.48
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0085 EA 1,766 MBH Steam, 1,977 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 988).....	44,391.81	6,097.91
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0086 EA 1,988 MBH Steam, 2,227 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1088).....	47,713.20	6,383.35
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0087 EA 2,211 MBH Steam, 2,477 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1188).....	50,140.44	6,668.78
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0088 EA 2,434 MBH Steam, 2,726 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1288).....	53,360.32	6,954.21
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0089 EA 2,657 MBH Steam, 2,976 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1388).....	56,692.00	7,239.65
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0090 EA 2,880 MBH Steam, 3,225 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1488).....	60,997.58	7,525.08
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0091 EA 3,102 MBH Steam, 3,475 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1588).....	64,327.98	7,810.52
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0092 EA 3,325 MBH Steam, 3,724 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1688).....	66,110.79	8,095.95
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0093 EA 3,548 MBH Steam, 3,974 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1788).....	68,973.60	8,381.38
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0094 EA 3,771 MBH Steam, 4,223 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain 1888).....	71,384.47	8,666.82
Note: Includes field assembly of individual sections and testing.		
23 52 23 00-0095 Gas/Oil Fired Package Weil-McLain Model 88 Cast Iron Boiler (23 52 23 00-0046)		
23 52 23 00-0096 EA 629 MBH Steam, 730 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 488).....	23,377.42	806.63
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0097 EA 845 MBH Steam, 979 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 588).....	26,377.17	921.87
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0098 EA 1,072 MBH Steam, 1,229 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 688).....	30,332.53	1,037.11
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0099 EA 1,311 MBH Steam, 1,478 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 788).....	33,726.68	1,152.33
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0100 EA 1,543 MBH Steam, 1,728 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 888).....	35,982.79	1,152.33
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0101 EA 1,766 MBH Steam, 1,977 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 988).....	40,003.15	1,267.57
Note: Weil-McLain Model 88. Fire tested factory assembled package cast iron unit.		
23 52 23 00-0102 EA 1,988 MBH Steam, 2,227 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1088).....	42,997.16	1,267.57
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0103 EA 2,211 MBH Steam, 2,477 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1188).....	45,555.89	1,382.81
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0104 EA 2,434 MBH Steam, 2,726 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1288).....	48,449.53	1,382.81
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0105 EA 2,657 MBH Steam, 2,976 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1388).....	51,920.05	1,498.04
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0106 EA 2,880 MBH Steam, 3,225 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1488).....	54,689.37	1,613.27
Note: Fire tested factory assembled package cast iron unit.		
23 52 23 00-0107 EA 3,102 MBH Steam, 3,475 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1588).....	56,279.67	1,613.27
Note: Fire tested factory assembled package cast iron unit.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 23 00-0108 EA 3,325 MBH Steam, 3,724 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1688) Note: Fire tested factory assembled package cast iron unit.	59,608.79	1,728.51
23 52 23 00-0109 EA 3,548 MBH Steam, 3,974 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1788) Note: Fire tested factory assembled package cast iron unit.	62,143.37	1,728.51
23 52 23 00-0110 EA 3,771 MBH Steam, 4,223 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain 1888) Note: Fire tested factory assembled package cast iron unit.	64,687.91	1,843.74
23 52 23 00-0111 Weil-McLain Model 94 Cast Iron Boiler <small>(23 52 23)</small> Note: Capacities are the net AHRI ratings for steam or water MBH output. Includes burner unit and controls. Excludes flue piping, fuel piping, boiler base or pad.		
23 52 23 00-0112 Gas Fired Weil-McLain Model 94 Cast Iron Boiler <small>(23 52 23 00-0111)</small> Note: Field assembled boilers can only be used in situations where package units cannot be installed.		
23 52 23 00-0113 EA 1,584 MBH Steam, 1,784 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-894) Note: Includes field assembly of individual sections and testing.	74,696.67	9,082.00
23 52 23 00-0114 EA 1,800 MBH Steam, 2,050 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-994) Note: Includes field assembly of individual sections and testing.	81,051.53	9,600.97
23 52 23 00-0115 EA 2,024 MBH Steam, 2,310 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1094) Note: Includes field assembly of individual sections and testing.	86,847.23	10,119.94
23 52 23 00-0116 EA 2,249 MBH Steam, 2,571 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1194) Note: Includes field assembly of individual sections and testing.	92,520.20	10,638.91
23 52 23 00-0117 EA 2,474 MBH Steam, 2,834 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1294) Note: Includes field assembly of individual sections and testing.	98,246.49	11,157.89
23 52 23 00-0118 EA 2,703 MBH Steam, 3,098 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1394) Note: Includes field assembly of individual sections and testing.	105,446.20	11,676.86
23 52 23 00-0119 EA 2,928 MBH Steam, 3,362 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1494) Note: Includes field assembly of individual sections and testing.	110,836.46	12,195.82
23 52 23 00-0120 EA 3,154 MBH Steam, 3,628 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1594) Note: Includes field assembly of individual sections and testing.	116,049.12	12,714.80
23 52 23 00-0121 EA 3,378 MBH Steam, 3,894 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1694) Note: Includes field assembly of individual sections and testing.	124,591.10	13,233.77
23 52 23 00-0122 EA 3,604 MBH Steam, 4,162 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1794) Note: Includes field assembly of individual sections and testing.	129,800.73	13,752.75
23 52 23 00-0123 EA 3,834 MBH Steam, 4,430 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1894) Note: Includes field assembly of individual sections and testing.	134,257.00	14,271.71
23 52 23 00-0124 EA 4,059 MBH Steam, 4,700 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-1994) Note: Includes field assembly of individual sections and testing.	142,498.07	14,790.68
23 52 23 00-0125 EA 4,285 MBH Steam, 4,970 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-2094) Note: Includes field assembly of individual sections and testing.	147,751.83	15,309.66
23 52 23 00-0126 EA 4,510 MBH Steam, 5,241 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-2194) Note: Includes field assembly of individual sections and testing.	156,184.08	15,828.63
23 52 23 00-0127 EA 4,781 MBH Steam, 5,568 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-2294) Note: Includes field assembly of individual sections and testing.	161,719.60	16,347.60
23 52 23 00-0128 EA 4,961 MBH Steam, 5,787 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-2394) Note: Includes field assembly of individual sections and testing.	167,784.98	16,866.57
23 52 23 00-0129 EA 5,232 MBH Steam, 6,117 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-2494) Note: Includes field assembly of individual sections and testing.	172,981.89	17,385.54
23 52 23 00-0130 EA 5,413 MBH Steam, 6,338 MBH Water Gas Fired Cast Iron Boiler (Weil-McLain H-2594) Note: Includes field assembly of individual sections and testing.	178,330.85	17,904.51
23 52 23 00-0131 Gas Fired Package Weil-McLain Model 94 Cast Iron Boiler <small>(23 52 23 00-0111)</small>		
23 52 23 00-0132 EA 1,584 MBH Steam, 1,784 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-894) Note: Fire tested factory assembled package cast iron unit.	68,635.87	1,498.04
23 52 23 00-0133 EA 1,800 MBH Steam, 2,050 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-994) Note: Fire tested factory assembled package cast iron unit.	74,860.03	1,613.27
23 52 23 00-0134 EA 2,024 MBH Steam, 2,310 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1094) Note: Fire tested factory assembled package cast iron unit.	80,521.59	1,728.51
23 52 23 00-0135 EA 2,249 MBH Steam, 2,571 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1194) Note: Fire tested factory assembled package cast iron unit.	86,064.37	1,843.74
23 52 23 00-0136 EA 2,474 MBH Steam, 2,834 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1294) Note: Fire tested factory assembled package cast iron unit.	91,195.74	1,843.74
23 52 23 00-0137 EA 2,703 MBH Steam, 3,098 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1394) Note: Fire tested factory assembled package cast iron unit.	96,605.79	1,958.98
23 52 23 00-0138 EA 2,928 MBH Steam, 3,362 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1494) Note: Fire tested factory assembled package cast iron unit.	101,402.13	1,958.98
23 52 23 00-0139 EA 3,154 MBH Steam, 3,628 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1594) Note: Fire tested factory assembled package cast iron unit.	106,482.66	2,074.20
23 52 23 00-0140 EA 3,378 MBH Steam, 3,894 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1694) Note: Fire tested factory assembled package cast iron unit.	114,431.33	2,074.20
23 52 23 00-0141 EA 3,604 MBH Steam, 4,162 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1794) Note: Fire tested factory assembled package cast iron unit.	119,510.43	2,189.44
23 52 23 00-0142 EA 3,834 MBH Steam, 4,430 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1894) Note: Fire tested factory assembled package cast iron unit.	123,372.39	2,189.44
23 52 23 00-0143 EA 4,059 MBH Steam, 4,700 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-1994) Note: Fire tested factory assembled package cast iron unit.	131,483.79	2,304.68
23 52 23 00-0144 EA 4,285 MBH Steam, 4,970 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-2094) Note: Fire tested factory assembled package cast iron unit.	136,143.02	2,304.68
23 52 23 00-0145 EA 4,510 MBH Steam, 5,241 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-2194) Note: Fire tested factory assembled package cast iron unit.	144,469.31	2,419.90
23 52 23 00-0146 EA 4,781 MBH Steam, 5,568 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-2294) Note: Fire tested factory assembled package cast iron unit.	149,384.39	2,419.90

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 52 Heating Boilers



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 52 23 00-0147	EA	4,961 MBH Steam, 5,787 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-2394) Note: Fire tested factory assembled package cast iron unit.	155,315.95		2,535.14
23 52 23 00-0148	EA	5,232 MBH Steam, 6,117 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-2494) Note: Fire tested factory assembled package cast iron unit.	159,920.04		2,535.14
23 52 23 00-0149	EA	5,413 MBH Steam, 6,338 MBH Water Gas Fired Package Cast Iron Boiler (Weil-McLain H-2594) Note: Fire tested factory assembled package cast iron unit.	165,136.26		2,650.38
23 52 23 00-0150 Oil Fired Weil-McLain Model 94 Cast Iron Boiler <small>(23 52 23 00-0111)</small>					
Note: Field assembled boilers can only be used in situations where package units cannot be installed.					
23 52 23 00-0151	EA	1,584 MBH Steam, 1,784 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-894) Note: Includes field assembly of individual sections and testing.	70,478.49		9,082.00
23 52 23 00-0152	EA	1,800 MBH Steam, 2,050 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-994) Note: Includes field assembly of individual sections and testing.	76,833.35		9,600.97
23 52 23 00-0153	EA	2,024 MBH Steam, 2,310 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1094) Note: Includes field assembly of individual sections and testing.	84,582.64		10,119.94
23 52 23 00-0154	EA	2,249 MBH Steam, 2,571 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1194) Note: Includes field assembly of individual sections and testing.	89,745.30		10,638.91
23 52 23 00-0155	EA	2,474 MBH Steam, 2,834 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1294) Note: Includes field assembly of individual sections and testing.	95,123.85		11,157.89
23 52 23 00-0156	EA	2,703 MBH Steam, 3,098 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1394) Note: Includes field assembly of individual sections and testing.	101,934.82		11,676.86
23 52 23 00-0157	EA	2,928 MBH Steam, 3,362 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1494) Note: Includes field assembly of individual sections and testing.	107,588.01		12,195.82
23 52 23 00-0158	EA	3,154 MBH Steam, 3,628 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1594) Note: Includes field assembly of individual sections and testing.	112,803.49		12,714.80
23 52 23 00-0159	EA	3,378 MBH Steam, 3,894 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1694) Note: Includes field assembly of individual sections and testing.	122,354.79		13,233.77
23 52 23 00-0160	EA	3,604 MBH Steam, 4,162 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1794) Note: Includes field assembly of individual sections and testing.	127,565.83		13,752.75
23 52 23 00-0161	EA	3,834 MBH Steam, 4,430 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1894) Note: Includes field assembly of individual sections and testing.	132,775.55		14,271.71
23 52 23 00-0162	EA	4,059 MBH Steam, 4,700 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-1994) Note: Includes field assembly of individual sections and testing.	142,507.97		14,790.68
23 52 23 00-0163	EA	4,285 MBH Steam, 4,970 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-2094) Note: Includes field assembly of individual sections and testing.	147,761.72		15,309.66
23 52 23 00-0164	EA	4,510 MBH Steam, 5,241 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-2194) Note: Includes field assembly of individual sections and testing.	156,421.57		15,828.63
23 52 23 00-0165	EA	4,781 MBH Steam, 5,568 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-2294) Note: Includes field assembly of individual sections and testing.	161,955.67		16,347.60
23 52 23 00-0166	EA	4,961 MBH Steam, 5,787 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-2394) Note: Includes field assembly of individual sections and testing.	167,899.49		16,866.57
23 52 23 00-0167	EA	5,232 MBH Steam, 6,117 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-2494) Note: Includes field assembly of individual sections and testing.	173,096.39		17,385.54
23 52 23 00-0168	EA	5,413 MBH Steam, 6,338 MBH Water Oil Fired Cast Iron Boiler (Weil-McLain H-2594) Note: Includes field assembly of individual sections and testing.	178,453.83		17,904.51
23 52 23 00-0169 Oil Fired Package Weil-McLain Model 94 Cast Iron Boiler <small>(23 52 23 00-0111)</small>					
23 52 23 00-0170	EA	1,584 MBH Steam, 1,784 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-894) Note: Fire tested factory assembled package cast iron unit.	64,188.69		1,498.04
23 52 23 00-0171	EA	1,800 MBH Steam, 2,050 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-994) Note: Fire tested factory assembled package cast iron unit.	70,412.85		1,613.27
23 52 23 00-0172	EA	2,024 MBH Steam, 2,310 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1094) Note: Fire tested factory assembled package cast iron unit.	78,028.00		1,728.51
23 52 23 00-0173	EA	2,249 MBH Steam, 2,571 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1194) Note: Fire tested factory assembled package cast iron unit.	83,060.47		1,843.74
23 52 23 00-0174	EA	2,474 MBH Steam, 2,834 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1294) Note: Fire tested factory assembled package cast iron unit.	87,844.09		1,843.74
23 52 23 00-0175	EA	2,703 MBH Steam, 3,098 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1394) Note: Fire tested factory assembled package cast iron unit.	92,865.40		1,958.98
23 52 23 00-0176	EA	2,928 MBH Steam, 3,362 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1494) Note: Fire tested factory assembled package cast iron unit.	97,924.68		1,958.98
23 52 23 00-0177	EA	3,154 MBH Steam, 3,628 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1594) Note: Fire tested factory assembled package cast iron unit.	103,005.20		2,074.20
23 52 23 00-0178	EA	3,378 MBH Steam, 3,894 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1694) Note: Fire tested factory assembled package cast iron unit.	111,966.01		2,074.20
23 52 23 00-0179	EA	3,604 MBH Steam, 4,162 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1794) Note: Fire tested factory assembled package cast iron unit.	117,043.70		2,189.44
23 52 23 00-0180	EA	3,834 MBH Steam, 4,430 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1894) Note: Fire tested factory assembled package cast iron unit.	121,661.93		2,189.44
23 52 23 00-0181	EA	4,059 MBH Steam, 4,700 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-1994) Note: Fire tested factory assembled package cast iron unit.	131,264.68		2,304.68
23 52 23 00-0182	EA	4,285 MBH Steam, 4,970 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-2094) Note: Fire tested factory assembled package cast iron unit.	135,923.91		2,304.68
23 52 23 00-0183	EA	4,510 MBH Steam, 5,241 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-2194) Note: Fire tested factory assembled package cast iron unit.	144,449.52		2,419.90
23 52 23 00-0184	EA	4,781 MBH Steam, 5,568 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-2294) Note: Fire tested factory assembled package cast iron unit.	149,391.46		2,419.90
23 52 23 00-0185	EA	4,961 MBH Steam, 5,787 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-2394) Note: Fire tested factory assembled package cast iron unit.	155,201.44		2,535.14
23 52 23 00-0186	EA	5,232 MBH Steam, 6,117 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-2494) Note: Fire tested factory assembled package cast iron unit.	159,805.54		2,535.14

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 23 00-0187 EA 5,413 MBH Steam, 6,338 MBH Water Oil Fired Package Cast Iron Boiler (Weil-McLain H-2594) Note: Fire tested factory assembled package cast iron unit.	165,030.24	2,650.38
23 52 23 00-0188 Gas/Oil Fired Weil-McLain Model 94 Cast Iron Boiler (23 52 23 00-0111) Note: Field assembled boilers can only be used in situations where package units cannot be installed.		
23 52 23 00-0189 EA 1,584 MBH Steam, 1,784 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-894)..... Note: Includes field assembly of individual sections and testing.	76,022.63	9,082.00
23 52 23 00-0190 EA 1,800 MBH Steam, 2,050 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-994)..... Note: Includes field assembly of individual sections and testing.	82,378.90	9,600.97
23 52 23 00-0191 EA 2,024 MBH Steam, 2,310 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1094)..... Note: Includes field assembly of individual sections and testing.	88,536.48	10,119.94
23 52 23 00-0192 EA 2,249 MBH Steam, 2,571 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1194)..... Note: Includes field assembly of individual sections and testing.	94,352.22	10,638.91
23 52 23 00-0193 EA 2,474 MBH Steam, 2,834 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1294)..... Note: Includes field assembly of individual sections and testing.	100,046.00	11,157.89
23 52 23 00-0194 EA 2,703 MBH Steam, 3,098 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1394)..... Note: Includes field assembly of individual sections and testing.	106,110.59	11,676.86
23 52 23 00-0195 EA 2,928 MBH Steam, 3,362 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1494)..... Note: Includes field assembly of individual sections and testing.	113,043.09	12,195.82
23 52 23 00-0196 EA 3,154 MBH Steam, 3,628 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1594)..... Note: Includes field assembly of individual sections and testing.	118,603.49	12,714.80
23 52 23 00-0197 EA 3,378 MBH Steam, 3,894 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1694)..... Note: Includes field assembly of individual sections and testing.	127,367.41	13,233.77
23 52 23 00-0198 EA 3,604 MBH Steam, 4,162 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1794)..... Note: Includes field assembly of individual sections and testing.	132,577.04	13,752.75
23 52 23 00-0199 EA 3,834 MBH Steam, 4,430 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1894)..... Note: Includes field assembly of individual sections and testing.	137,132.26	14,271.71
23 52 23 00-0200 EA 4,059 MBH Steam, 4,700 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-1994)..... Note: Includes field assembly of individual sections and testing.	145,469.46	14,790.68
23 52 23 00-0201 EA 4,285 MBH Steam, 4,970 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-2094)..... Note: Includes field assembly of individual sections and testing.	152,136.81	15,309.66
23 52 23 00-0202 EA 4,510 MBH Steam, 5,241 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-2194)..... Note: Includes field assembly of individual sections and testing.	161,326.76	15,828.63
23 52 23 00-0203 EA 4,781 MBH Steam, 5,568 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-2294)..... Note: Includes field assembly of individual sections and testing.	166,819.87	16,347.60
23 52 23 00-0204 EA 4,961 MBH Steam, 5,787 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-2394)..... Note: Includes field assembly of individual sections and testing.	173,148.18	16,866.57
23 52 23 00-0205 EA 5,232 MBH Steam, 6,117 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-2494)..... Note: Includes field assembly of individual sections and testing.	178,346.50	17,385.54
23 52 23 00-0206 EA 5,413 MBH Steam, 6,338 MBH Water Gas/Oil Fired Cast Iron Boiler (Weil-McLain H-2594)..... Note: Includes field assembly of individual sections and testing.	183,699.70	17,904.51
23 52 23 00-0207 Gas/Oil Fired Package Weil-McLain Model 94 Cast Iron Boiler (23 52 23 00-0111)		
23 52 23 00-0208 EA 1,584 MBH Steam, 1,784 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-894)..... Note: Fire tested factory assembled package cast iron unit.	70,065.02	1,498.04
23 52 23 00-0209 EA 1,800 MBH Steam, 2,050 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-994)..... Note: Fire tested factory assembled package cast iron unit.	76,290.59	1,613.27
23 52 23 00-0210 EA 2,024 MBH Steam, 2,310 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1094)..... Note: Fire tested factory assembled package cast iron unit.	82,318.27	1,728.51
23 52 23 00-0211 EA 2,249 MBH Steam, 2,571 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1194)..... Note: Fire tested factory assembled package cast iron unit.	88,001.00	1,843.74
23 52 23 00-0212 EA 2,474 MBH Steam, 2,834 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1294)..... Note: Fire tested factory assembled package cast iron unit.	93,099.85	1,843.74
23 52 23 00-0213 EA 2,703 MBH Steam, 3,098 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1394)..... Note: Fire tested factory assembled package cast iron unit.	97,373.37	1,958.98
23 52 23 00-0214 EA 2,928 MBH Steam, 3,362 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1494)..... Note: Fire tested factory assembled package cast iron unit.	103,711.96	1,958.98
23 52 23 00-0215 EA 3,154 MBH Steam, 3,628 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1594)..... Note: Fire tested factory assembled package cast iron unit.	109,138.81	2,074.20
23 52 23 00-0216 EA 3,378 MBH Steam, 3,894 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1694)..... Note: Fire tested factory assembled package cast iron unit.	117,312.25	2,074.20
23 52 23 00-0217 EA 3,604 MBH Steam, 4,162 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1794)..... Note: Fire tested factory assembled package cast iron unit.	122,388.52	2,189.44
23 52 23 00-0218 EA 3,834 MBH Steam, 4,430 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1894)..... Note: Fire tested factory assembled package cast iron unit.	126,350.84	2,189.44
23 52 23 00-0219 EA 4,059 MBH Steam, 4,700 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-1994)..... Note: Fire tested factory assembled package cast iron unit.	134,558.37	2,304.68
23 52 23 00-0220 EA 4,285 MBH Steam, 4,970 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-2094)..... Note: Fire tested factory assembled package cast iron unit.	140,632.61	2,304.68
23 52 23 00-0221 EA 4,510 MBH Steam, 5,241 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-2194)..... Note: Fire tested factory assembled package cast iron unit.	149,688.32	2,419.90
23 52 23 00-0222 EA 4,781 MBH Steam, 5,568 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-2294)..... Note: Fire tested factory assembled package cast iron unit.	154,589.27	2,419.90
23 52 23 00-0223 EA 4,961 MBH Steam, 5,787 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-2394)..... Note: Fire tested factory assembled package cast iron unit.	160,782.34	2,535.14
23 52 23 00-0224 EA 5,232 MBH Steam, 6,117 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-2494)..... Note: Fire tested factory assembled package cast iron unit.	165,387.85	2,535.14
23 52 23 00-0225 EA 5,413 MBH Steam, 6,338 MBH Water Gas/Oil Fired Package Cast Iron Boiler (Weil-McLain H-2594)..... Note: Fire tested factory assembled package cast iron unit.	170,609.72	2,650.38

23 52 33 Water-Tube Boilers (23 52)

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 52 Heating Boilers



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 52 33 13 Finned Water-Tube Boilers (23 52 33)

23 52 33 13-0001 Laars Pennant 85% Efficient Water, Gas Fired, Copper Fin Tube LoNox Boiler (23 52 33 13)

Note: Rated by gross rated output.

23 52 33 13-0002	EA	200 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	8,931.78	628.40
23 52 33 13-0003	EA	300 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	9,829.55	698.23
23 52 33 13-0004	EA	400 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	11,293.95	837.86
23 52 33 13-0005	EA	500 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	14,415.19	872.78
23 52 33 13-0006	EA	750 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	16,935.85	1,047.33
23 52 33 13-0007	EA	1,000 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	20,808.93	1,256.80
23 52 33 13-0008	EA	1,250 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	23,633.15	1,326.63
23 52 33 13-0009	EA	1,500 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	26,176.29	1,431.36
23 52 33 13-0010	EA	1,750 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	28,540.38	1,501.18
23 52 33 13-0011	EA	2,000 MBH 85% Efficient, Water, Gas Fired, Copper Fin Tube LoNox Boiler (Laars Pennant)	30,621.97	1,536.09

23 52 33 13-0012 Patterson Kelly Modufire Forced Draft, Water, Gas Fired, Copper Fin Tube Boiler (23 52 33 13)

Note: Rated by gross rated output.

23 52 33 13-0013	EA	1,000 MBH Forced Draft, Water, Gas Fired, Copper Fin Tube Boiler (Patterson Kelly Modufire)	31,127.33	1,256.80
23 52 33 13-0014	EA	1,500 MBH Forced Draft, Water, Gas Fired, Copper Fin Tube Boiler (Patterson Kelly Modufire)	38,870.10	1,431.36
23 52 33 13-0015	EA	2,000 MBH Forced Draft, Water, Gas Fired, Copper Fin Tube Boiler (Patterson Kelly Modufire)	41,419.59	1,536.09
23 52 33 13-0016	EA	2,500 MBH Forced Draft, Water, Gas Fired, Copper Fin Tube Boiler (Patterson Kelly Modufire)	58,583.53	1,745.56
23 52 33 13-0017	EA	3,000 MBH Forced Draft, Water, Gas Fired, Copper Fin Tube Boiler (Patterson Kelly Modufire)	61,453.58	1,955.02

23 52 33 13-0018 Lochinvar Copper-Fin II Finned Tube Boiler (23 52 33 13)

Note: Rated by gross rated output.

23 52 33 13-0019	EA	340 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN0402)	13,927.25	563.87
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0020	EA	425 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN0502)	16,712.82	704.57
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0021	EA	552.5 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN0652)	17,913.05	846.33
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0022	EA	637.5 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN0752)	18,410.78	846.33
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0023	EA	841.5 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN0992)	22,835.87	1,057.92
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0024	EA	1,071 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN1262)	26,488.66	1,057.92
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0025	EA	1,224 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN1442)	28,904.95	1,057.92
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0026	EA	1,530 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN1802)	31,125.03	1,269.50
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	
23 52 33 13-0027	EA	1,759.5 MBH, 85% Efficient, Gas Fired, Copper Finned Tube Boiler (Lochinvar CHN2072)	36,817.83	1,481.08
		<i>For High And Low Gas Pressure Switch With Manual Reset, Add</i>	521.83	
		<i>For Low Water Cut-Off, Probe Type, Manual Reset With Test, Add</i>	462.27	

23 52 33 13-0028 Raypak Cupro-Nickel Finned-Tube Boiler With Pump (23 52 33 13)

Note: Rated by gross rated output.

23 52 33 13-0029	EA	385 MBH Water, Gas Fired, On/Off, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H4-399B)	13,366.40	775.02
23 52 33 13-0030	EA	420 MBH Water, Gas Fired, Two Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H3-499B)	14,387.97	698.23
23 52 33 13-0031	EA	546 MBH Water, Gas Fired, Two Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H3-649B)	16,019.20	837.86
23 52 33 13-0032	EA	630 MBH Water, Gas Fired, Two Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H3-749B)	16,997.80	951.17
23 52 33 13-0033	EA	756 MBH Water, Gas Fired, Two Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H3-899B)	18,881.42	1,047.33
23 52 33 13-0034	EA	832 MBH Water, Gas Fired, Two Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H3-989B)	20,311.20	1,127.31
23 52 33 13-0035	EA	1,058 MBH Water, Gas Fired, Three Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H8-1259B)	23,213.74	1,256.80
23 52 33 13-0036	EA	1,285 MBH Water, Gas Fired, Four Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H9-1529B)	27,024.06	1,326.63
23 52 33 13-0037	EA	1,512 MBH Water, Gas Fired, Four Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H9-1799B)	28,664.92	1,431.36
23 52 33 13-0038	EA	1,679 MBH Water, Gas Fired, Four Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H9-1999B)	34,358.95	1,466.27
23 52 33 13-0039	EA	1,739 MBH Water, Gas Fired, Four Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H9-2069B)	34,464.74	1,501.18
23 52 33 13-0040	EA	1,966 MBH Water, Gas Fired, Four Stage, Cupro-Nickel Finned-Tube Boiler With Pump (Raypak H9-2339B)	40,410.16	1,536.09

23 52 33 16 Steel Water-Tube Boilers (23 52 33)

23 52 33 16-0001 Unilux 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (23 52 33 16)

Note: Compliant with SCAQMD.

23 52 33 16-0002	EA	1,250 MBH Input/1,062 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux ZF100)	87,614.22	1,692.66
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	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 52 33 16-0003	EA			1,750 MBH Input/1,488 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux ZF150).....	94,161.52	2,115.83
23 52 33 16-0004	EA			2,200 MBH Input/1,870 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux ZF200).....	197,179.92	2,327.41
23 52 33 16-0005	EA			2,750 MBH Input/2,338 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux ZF250).....	204,569.70	2,538.99
23 52 33 16-0006	EA			3,000 MBH Input/2,550 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux ZF300).....	208,054.93	2,856.37
23 52 33 16-0007	EA			3,750 MBH Input/3,188 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux VZ350).....	219,138.51	3,173.74
23 52 33 16-0008	EA			4,300 MBH Input/3,655 MBH Output, 85% Efficient, Gas Fired, Forced Draft, Hot Water, Steel Flexible Watertube Boiler (Unilux VZ400).....	224,100.14	3,279.53
23 52 33 16-0009				Unilux 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler <small>(23 52 33 16)</small>		
				Note: Compliant with SCAQMD.		
23 52 33 16-0010	EA			1,250 MBH, 31 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF100LSG).....	102,287.59	1,904.25
23 52 33 16-0011	EA			1,750 MBH, 43.5 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF150LSG).....	107,355.44	2,221.61
23 52 33 16-0012	EA			2,200 MBH, 54.5 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF200LSG).....	211,641.70	2,433.20
23 52 33 16-0013	EA			2,750 MBH, 68 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF250LSG).....	224,730.24	2,644.79
23 52 33 16-0014	EA			3,000 MBH, 74 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF300LSG).....	229,269.53	2,856.37
23 52 33 16-0015	EA			3,750 MBH, 93 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF350LSG).....	238,136.56	3,173.74
23 52 33 16-0016	EA			4,300 MBH, 106.5 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF400LSG).....	246,166.92	3,385.32
23 52 33 16-0017	EA			5,400 MBH, 134 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF500LSG).....	242,465.09	3,596.91
23 52 33 16-0018	EA			6,250 MBH, 155 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF600LSG).....	262,520.23	3,808.49
23 52 33 16-0019	EA			7,235 MBH, 179 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF700LSG).....	276,242.70	4,020.07
23 52 33 16-0020	EA			8,270 MBH, 205 HP, 83% Efficient, Gas Fired, Forced Draft, Low Pressure Steam, Steel Flexible Watertube Boiler (Unilux ZF800LSG).....	283,315.51	4,231.65
23 52 33 16-0021				Unilux 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler <small>(23 52 33 16)</small>		
				Note: Compliant with SCAQMD.		
23 52 33 16-0022	EA			1,250 MBH, 31 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 100HS).....	110,202.89	1,904.25
23 52 33 16-0023	EA			1,750 MBH, 43.5 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 150HS).....	116,855.57	2,221.61
23 52 33 16-0024	EA			2,200 MBH, 54.5 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 200HS).....	222,407.48	2,433.20
23 52 33 16-0025	EA			2,750 MBH, 68 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 250HS).....	235,812.99	2,644.79
23 52 33 16-0026	EA			3,000 MBH, 74 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 300HS).....	240,352.28	2,856.37
23 52 33 16-0027	EA			3,750 MBH, 93 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 350HS).....	247,636.69	3,173.74
23 52 33 16-0028	EA			4,300 MBH, 106.5 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 400HS).....	255,977.37	3,385.32
23 52 33 16-0029	EA			5,400 MBH, 134 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 500HS).....	251,648.25	3,596.91
23 52 33 16-0030	EA			6,250 MBH, 155 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 600HS).....	273,288.23	3,808.49
23 52 33 16-0031	EA			7,235 MBH, 179 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 700HS).....	281,943.67	4,020.07
23 52 33 16-0032	EA			8,270 MBH, 205 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 800HS).....	294,083.51	4,231.65
23 52 33 16-0033	EA			9,300 MBH, 230 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 900HS).....	327,121.00	4,443.24
23 52 33 16-0034	EA			10,330 MBH, 256 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 1000HS).....	473,676.86	4,654.82
23 52 33 16-0035	EA			12,400 MBH, 307 HP, 81% Efficient, Gas Fired, Forced Draft, High Pressure Steam, Steel Flexible Watertube Boiler (Unilux 1200HS).....	497,690.78	4,866.40
23 52 36				Fire-Box Boiler <small>(23 52)</small>		
23 52 36 00-0001				Package Oil Fired Firebox Boilers <small>(23 52 36)</small>		
				Note: Prices are good for 15 PSI steam or 30 PSI water. Packaged type, complete with burner and all basic safety controls (low water cut-off, high/low temperature and pressure operating controls, flame failure, main and pilot gas control, etc.) Normally required (Boiler HP) boiler sizes are based on HP rating and gross output.		
23 52 36 00-0002	EA			40 HP, 1,339 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water.....	83,800.57	2,765.61
23 52 36 00-0003	EA			46 HP, 1,553 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water.....	87,611.59	2,996.08
23 52 36 00-0004	EA			53 HP, 1,784 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water.....	91,727.10	3,226.55

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 52 Heating Boilers



MINOR CSI UOM DESCRIPTION TOTAL DIRECT UNIT COST DEMOLITION UNIT COST

23 52 36 00-0005	EA	61 HP, 2,062 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	99,192.67	3,457.01
23 52 36 00-0006	EA	69 HP, 2,313 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	103,612.71	3,687.48
23 52 36 00-0007	EA	80 HP, 2,678 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	107,956.76	3,917.95
23 52 36 00-0008	EA	100 HP, 3,348 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	120,081.91	4,148.42
23 52 36 00-0009	EA	127 HP, 4,251 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	138,957.00	4,609.35
23 52 36 00-0010	EA	151 HP, 5,055 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	158,151.94	5,070.28
23 52 36 00-0011	EA	183 HP, 6,126 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	173,502.76	5,588.83
23 52 36 00-0012	EA	220 HP, 7,388 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	188,853.73	6,107.39
23 52 36 00-0013	EA	257 HP, 8,606 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	198,541.86	7,144.49
23 52 36 00-0014	EA	294 HP, 9,842 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	241,958.67	8,181.59
23 52 36 00-0015	EA	368 HP, 12,302 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	286,441.40	9,218.70
23 52 36 00-0016	EA	441 HP, 14,766 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	331,383.07	10,371.03
23 52 36 00-0017	EA	514 HP, 17,220 MBH Oil Fired Firebox Boiler, 15 PSI Steam Or 30 PSI Water	375,291.68	11,235.28

23 53 Heating Boiler Feedwater Equipment (23 50)

23 53 13 Boiler Feedwater Pumps (23 53)

See CSI section 23 53 16 00-0001 for boiler feedwater units.

23 53 16 Deaerators (23 53)

23 53 16 00-0001 Low Pressure Boiler Feed System (23 53 16)

23 53 16 00-0002 Low Pressure Boiler Feed System (23 53 16 00-0001)

Note: With deaerator includes pumps and accessories.

23 53 16 00-0003	EA	20 HP, 200 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	6,848.38	1,322.10
23 53 16 00-0004	EA	34 HP, 340 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	7,395.16	1,557.57
23 53 16 00-0005	EA	54 HP, 530 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	7,943.05	1,612.13
23 53 16 00-0006	EA	67 HP, 660 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	8,196.89	1,671.29
23 53 16 00-0007	EA	78 HP, 760 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	8,674.00	1,786.16
23 53 16 00-0008	EA	104 HP, 1,020 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	13,864.55	1,935.48
23 53 16 00-0009	EA	158 HP, 1,550 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	15,641.89	2,067.58
23 53 16 00-0010	EA	219 HP, 2,150 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	17,931.58	2,354.74
23 53 16 00-0011	EA	254 HP, 2,500 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	19,732.02	2,527.04
23 53 16 00-0012	EA	305 HP, 3,000 KW Boiler Feed System With Deaerator, Pumps And Accessories, Low Pressure System	21,258.95	2,699.34

23 53 16 00-0013 High Pressure Boiler Feed System (23 53 16 00-0001)

Note: With deaerator includes pumps and accessories.

23 53 16 00-0014	EA	10 HP, 100 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	9,496.64	1,127.17
23 53 16 00-0015	EA	20 HP, 200 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	9,896.25	1,322.10
23 53 16 00-0016	EA	34 HP, 340 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	11,013.68	1,557.57
23 53 16 00-0017	EA	54 HP, 530 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	11,902.40	1,612.13
23 53 16 00-0018	EA	67 HP, 660 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	12,110.50	1,671.29
23 53 16 00-0019	EA	78 HP, 760 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	14,615.90	1,786.16
23 53 16 00-0020	EA	104 HP, 1,020 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	19,015.54	1,935.48
23 53 16 00-0021	EA	158 HP, 1,550 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	19,506.95	2,067.58
23 53 16 00-0022	EA	183 HP, 1,800 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	21,458.36	2,214.15
23 53 16 00-0023	EA	219 HP, 2,150 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	23,091.23	2,354.74
23 53 16 00-0024	EA	254 HP, 2,500 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	24,701.93	2,527.04
23 53 16 00-0025	EA	305 HP, 3,000 KW Boiler Feed System With Deaerator, Pumps And Accessories, High Pressure System	26,649.16	2,699.34

23 53 16 00-0026 Boiler Feedwater System (23 53 16)

Note: With deaerator includes pumps and accessories.

23 53 16 00-0027	EA	1,380 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	11,866.85	1,557.57
23 53 16 00-0028	EA	2,600 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	15,472.65	1,784.44
23 53 16 00-0029	EA	4,300 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	20,423.70	2,042.31
23 53 16 00-0030	EA	6,900 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	24,570.40	2,355.89
23 53 16 00-0031	EA	8,500 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	26,076.47	2,527.04
23 53 16 00-0032	EA	11,000 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	27,509.10	2,699.34
23 53 16 00-0033	EA	13,800 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	30,624.55	3,101.49
23 53 16 00-0034	EA	17,250 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	39,612.29	3,561.06
23 53 16 00-0035	EA	20,700 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	51,435.42	4,114.72
23 53 16 00-0036	EA	27,600 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	65,124.29	4,723.27
23 53 16 00-0037	EA	34,500 LB/Hour Feedwater System With Deaerator, Pumps, And Accessories	83,475.50	5,434.28

23 53 16 00-0038 Duplex Vacuum Condensate Pumps (23 53 16)

23 53 16 00-0039	EA	7 CFM, 15 GPM, 45 Gallon Duplex Vacuum Condensate Pump Note: Two 3/4 HP vacuum pumps rated for 7 CFM, two 3/4 HP condensate pumps rated for 15 GPM at 20 PSI and 45 GAL cast iron receiver. Skidmore JVC-7-45-102.	33,065.63	918.92
23 53 16 00-0040	EA	9 CFM, 30 GPM, 45 Gallon Duplex Vacuum Condensate Pump Note: Two 1 HP vacuum pumps rated for 9 CFM, two 3/4 HP condensate pumps rated for 30 GPM at 15 PSI and 45 GAL cast iron receiver. Skidmore JVC-9-45-201.5.	33,807.33	976.36
23 53 16 00-0041	EA	12 CFM, 45 GPM, 45 Gallon Duplex Vacuum Condensate Pump Note: Two 1-1/2 HP vacuum pumps rated for 12 CFM, two 1 HP condensate pumps rated for 45 GPM at 15 PSI and 45 GAL cast iron receiver. Skidmore JVC-12-45-301.5.	34,663.00	1,033.79
23 53 16 00-0042	EA	18 CFM, 37.5 GPM, 65 Gallon Duplex Vacuum Condensate Pump Note: Two 2 HP vacuum pumps rated for 18 CFM, two 1 HP condensate pumps rated for 37.5 GPM at 20 PSI and 65 GAL cast iron receiver. Skidmore JVC-18-65-252.	33,460.15	1,091.22



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Central Heating Equipment	23 50
Heating Boiler Feedwater Equipment	23 53

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 53 16 00-0043	EA		28 CFM, 60 GPM, 110 Gallon Duplex Vacuum Condensate Pump..... Note: Two 3 HP vacuum pumps rated for 28 CFM, two 1-1/2 HP condensate pumps rated for 60 GPM at 20 PSI and 110 GAL cast iron receiver. Skidmore JVC-28-110-402.	45,491.94	1,148.66
23 53 16 00-0044	EA		42 CFM, 75 GPM, 110 Gallon Duplex Vacuum Condensate Pump..... Note: Two 5 HP vacuum pumps rated for 42 CFM, two 2 HP condensate pumps rated for 75 GPM at 20 PSI and 110 GAL cast iron receiver. Skidmore JVC-42-110-502.	47,886.20	1,206.09

23 54 Furnaces (23 50)

Note: All units based on output. See CSI section 23 84 13 00-0000 for humidifiers.

23 54 13 Electric-Resistance Furnaces (23 54)

23 54 13 00-0001 Down Flow Multi-Speed Air Handler/Electric Furnace (23 54 13)

23 54 13 00-0002	EA	Up To 2 Ton Down Flow Multi-Speed Air Handler/Electric Furnace Note: Excludes cooling equipment.	1,196.05	112.54
23 54 13 00-0003	EA	>2 To 3.5 Ton Down Flow Multi-Speed Air Handler/Electric Furnace Note: Excludes cooling equipment.	1,579.97	140.68
23 54 13 00-0004	EA	>3.5 To 5 Ton Down Flow Multi-Speed Air Handler/Electric Furnace Note: Excludes cooling equipment.	2,043.80	168.82

23 54 13 00-0005 Up/Horizontal Flow Multi-Speed Air Handler/Electric Furnace (23 54 13)

23 54 13 00-0006	EA	Up To 2 Ton Up/Horizontal Flow Multi-Speed Air Handler/Electric Furnace Note: Excludes cooling equipment.	1,196.05	112.54
23 54 13 00-0007	EA	>2 To 2.5 Ton Up/Horizontal Flow Multi-Speed Air Handler/ Electric Furnace Note: Excludes cooling equipment.	1,430.46	126.61
23 54 13 00-0008	EA	>2.5 To 3 Ton Up/Horizontal Flow Multi-Speed Air Handler/ Electric Furnace Note: Excludes cooling equipment.	1,563.32	140.68
23 54 13 00-0009	EA	>3 To 3.5 Ton Up/Horizontal Flow Multi-Speed Air Handler/ Electric Furnace Note: Excludes cooling equipment.	1,636.24	154.76
23 54 13 00-0010	EA	>3.5 To 5 Ton Up/Horizontal Flow Multi-Speed Air Handler/ Electric Furnace Note: Excludes cooling equipment.	2,043.80	168.82

23 54 13 00-0011 Heating Coil For Air Handler/Electric Furnace (23 54 13)

23 54 13 00-0012	EA	5 KW Heating Coil For Air Handler/Electric Furnace 214.03	214.03	30.62
23 54 13 00-0013	EA	7 KW Heating Coil For Air Handler/Electric Furnace 244.59	244.59	33.68
23 54 13 00-0014	EA	10 KW Heating Coil For Air Handler/Electric Furnace 265.16	265.16	36.74
23 54 13 00-0015	EA	15 KW Heating Coil For Air Handler/Electric Furnace 360.66	360.66	39.80
23 54 13 00-0016	EA	20 KW Heating Coil For Air Handler/Electric Furnace 389.56	389.56	42.86

23 54 16 Fuel-Fired Furnaces (23 54)

23 54 16 13 Gas-Fired Furnaces (23 54 16)

23 54 16 13-0001 Natural Gas Fired Forced Air Furnaces (23 54 16 13)

Note: Excludes flue, condenser, evaporator coil, piping, thermostat, ductwork and electrical connections.

23 54 16 13-0002 Up/Horizontal Flow Multi-Speed, Two Stage 96% AFUE Gas Furnace (23 54 16 13-0001)

23 54 16 13-0003	EA	40 MBH, 800 CFM Up/Horizontal Flow Multi-Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,879.00	98.47
23 54 16 13-0004	EA	60 MBH, 1,200 CFM Up/Horizontal Flow Multi-Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	2,001.86	112.54
23 54 16 13-0005	EA	80 MBH, 1,200 CFM Up/Horizontal Flow Multi-Speed, Two Stage 95% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	2,309.53	126.61
23 54 16 13-0006	EA	100 MBH, 1,600 CFM Up/Horizontal Flow Multi-Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,700.11	154.76
23 54 16 13-0007	EA	120 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,881.25	168.82

23 54 16 13-0008 Up/Horizontal Flow Variable Speed, Two Stage 95% AFUE Gas Furnace (23 54 16 13-0001)

23 54 16 13-0009	EA	40 MBH, 1,200 CFM Up/Horizontal Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	2,092.09	98.47
23 54 16 13-0010	EA	60 MBH, 1,200 CFM Up/Horizontal Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	2,291.55	112.54
23 54 16 13-0011	EA	80 MBH, 1,200 CFM Up/Horizontal Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	2,430.68	126.61
23 54 16 13-0012	EA	80 MBH, 1,600 CFM Up/Horizontal Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3.5 tons.	3,061.67	140.68
23 54 16 13-0013	EA	100 MBH, 2,000 CFM Up/Horizontal Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,868.26	154.76
23 54 16 13-0014	EA	120 MBH, 2,000 CFM Up/Horizontal Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	3,024.43	168.82

23 54 16 13-0015 Down Flow Multi-Speed, Two Stage 95% AFUE Gas Furnace (23 54 16 13-0001)

23 54 16 13-0016	EA	45 MBH, 1,600 CFM Down Flow Multi-Speed, Two Stage 95% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	1,842.29	98.47
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23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 50 Central Heating Equipment****23 54 Furnaces**

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 54 16 13-0017	EA	70 MBH, 1,600 CFM Down Flow Multi-Speed, Two Stage 95% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	2,115.01	112.54
23 54 16 13-0018	EA	90 MBH, 1,600 CFM Down Flow Multi-Speed, Two Stage 95% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	2,294.14	140.68
23 54 16 13-0019	EA	90 MBH, 2,000 CFM Down Flow Multi-Speed, Two Stage 95% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,450.31	154.76
23 54 16 13-0020		Down Flow Variable Speed, Two Stage 93% AFUE Gas Furnace (23 54 16 13-0001)		
23 54 16 13-0021	EA	40 MBH, 1,200 CFM Down Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	2,418.41	98.47
23 54 16 13-0022	EA	60 MBH, 1,200 CFM Down Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	2,547.95	112.54
23 54 16 13-0023	EA	80 MBH, 1,600 CFM Down Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	2,837.30	126.61
23 54 16 13-0024	EA	100 MBH, 2,000 CFM Down Flow Variable Speed, Two Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	3,099.68	154.76
23 54 16 13-0025	EA	120 MBH, 2,000 CFM Down Flow Variable Speed, Two Stage 93% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	3,322.44	168.82
23 54 16 13-0026		Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace (23 54 16 13-0001)		
23 54 16 13-0027	EA	40 MBH, 800 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,675.87	98.47
23 54 16 13-0028	EA	60 MBH, 1,200 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,767.11	112.54
23 54 16 13-0029	EA	80 MBH, 1,200 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,971.56	126.61
23 54 16 13-0030	EA	80 MBH, 1,600 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	1,988.20	126.61
23 54 16 13-0031	EA	80 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,169.34	140.68
23 54 16 13-0032	EA	100 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,287.21	154.76
23 54 16 13-0033	EA	120 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, One Stage 96% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	2,425.06	168.82
23 54 16 13-0034		Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace (23 54 16 13-0001)		
23 54 16 13-0035	EA	40 MBH, 1,200 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,164.74	98.47
23 54 16 13-0036	EA	60 MBH, 1,200 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,274.30	112.54
23 54 16 13-0037	EA	60 MBH, 1,600 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	1,457.10	126.61
23 54 16 13-0038	EA	80 MBH, 1,600 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	1,458.77	126.61
23 54 16 13-0039	EA	80 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	1,601.61	140.68
23 54 16 13-0040	EA	100 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	1,644.56	154.76
23 54 16 13-0041	EA	120 MBH, 2,000 CFM Up/Horizontal Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	1,827.36	168.82
23 54 16 13-0042		Down Flow Multi-Speed, One Stage 80% AFUE Gas Furnace (23 54 16 13-0001)		
23 54 16 13-0043	EA	40 MBH, 1,200 CFM Down Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,181.39	98.47
23 54 16 13-0044	EA	60 MBH, 1,200 CFM Down Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 3 tons.	1,279.29	112.54
23 54 16 13-0045	EA	80 MBH, 1,600 CFM Down Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 4 tons.	1,532.02	126.61
23 54 16 13-0046	EA	100 MBH, 2,000 CFM Down Flow Multi-Speed, One Stage 80% AFUE Gas Furnace Note: Blower cooling capacity up to 5 tons.	1,686.52	140.68
23 54 16 13-0047		75% AFUE Gas Wall/Recessed Furnace (23 54 16 13-0001)		
23 54 16 13-0048	EA	35 MBH 75% AFUE Electronic Ignition Gas Wall/Recessed Furnace Note: Includes burner, controls and electronic ignition.	2,004.12	84.41
23 54 16 13-0049	EA	55 MBH 75% AFUE Electronic Ignition Gas Wall/Recessed Furnace Note: Includes burner, controls and electronic ignition.	2,313.28	105.56
23 54 16 13-0050	EA	35 MBH 75% AFUE Gas Wall/Recessed Furnace.....	1,812.66	84.41
23 54 16 13-0051	EA	40 MBH 75% AFUE Gas Wall/Recessed Furnace.....	1,937.35	91.50
23 54 16 13-0052	EA	50 MBH 75% AFUE Gas Wall/Recessed Furnace.....	1,920.54	98.47
23 54 16 13-0053	EA	65 MBH 75% AFUE Gas Wall/Recessed Furnace.....	1,978.72	105.56
23 54 16 13-0054	EA	75 MBH 75% AFUE Gas Wall/Recessed Furnace.....	2,048.77	105.56
23 54 16 13-0055		Gas Fired Indoor Duct Furnace (23 54 16 13-0001)		
23 54 16 13-0056		Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace (23 54 16 13-0055)		
23 54 16 13-0057	EA	100 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace Note: Includes burner, controls and electronic ignition.	2,780.19	219.47

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
			23 54 16 13-0058 EA 150 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace	3,089.09	270.11
			23 54 16 13-0059 EA 200 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace	3,481.54	388.28
			23 54 16 13-0060 EA 250 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace	3,926.47	438.92
			23 54 16 13-0061 EA 300 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace	4,578.08	506.46
			23 54 16 13-0062 EA 350 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace	5,015.38	607.75
			23 54 16 13-0063 EA 400 MBH, Aluminized Steel Heat Exchanger Gas Fired Indoor Duct Furnace	5,685.94	810.33
			23 54 16 13-0064 Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace (23 54 16 13-0055)		
			Note: Includes burner, controls and electronic ignition.		
			23 54 16 13-0065 EA 100 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	3,121.96	219.47
			23 54 16 13-0066 EA 150 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	3,425.75	270.11
			23 54 16 13-0067 EA 200 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	3,944.03	388.28
			23 54 16 13-0068 EA 250 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	4,472.27	438.92
			23 54 16 13-0069 EA 300 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	5,520.06	506.46
			23 54 16 13-0070 EA 350 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	6,037.28	607.75
			23 54 16 13-0071 EA 400 MBH, Stainless Steel Heat Exchanger Gas Fired Indoor Duct Furnace	6,651.71	810.33
			23 54 16 13-0072 Natural Gas Fired Forced Air Furnaces (23 54 16 13)		
			Note: Excludes flue, condenser, evaporator coil, piping, ductwork and electrical connections.		
			23 54 16 13-0073 70% AFUE Gas Wall/Recessed Furnace (23 54 16 13-0072)		
			23 54 16 13-0074 EA 25 MBH 70% AFUE Gas Wall/Recessed Furnace (Williams 2509622A).....	1,527.40	225.09
			Note: Includes millivolt thermostate (P322016)		
			For 100 CFM, Automatic Blower Option (Williams 2901), Add	309.31	
			For 125 CFM, Automatic Blower Option (Williams 2907), Add	365.20	
			For Rear Outlet Register Option (Williams 6901), Add	80.52	
			For Starter Kit Option (Williams 9929), Add	377.94	
			Note: Includes a hold down plate, two spacer plates, a oval to round adapter, and two 4" oval pipes that are two feet in length.		
			For Freestanding Installation Kit Option (Williams 4901), Add	434.99	
			Note: For single-sided furnaces to be surface mounted rather than recessed into the wall.		
			23 54 16 13-0075 EA 35 MBH 70% AFUE Gas Wall/Recessed Furnace (Williams 3509622A).....	1,638.12	243.85
			Note: Includes millivolt thermostate (P322016)		
			For 100 CFM, Automatic Blower Option (Williams 2901), Add	309.31	
			For 125 CFM, Automatic Blower Option (Williams 2907), Add	365.20	
			For Rear Outlet Register Option (Williams 6901), Add	80.52	
			For Starter Kit Option (Williams 9929), Add	377.94	
			Note: Includes a hold down plate, two spacer plates, a oval to round adapter, and two 4" oval pipes that are two feet in length.		
			For Freestanding Installation Kit Option (Williams 4901), Add	434.99	
			Note: For single-sided furnaces to be surface mounted rather than recessed into the wall.		
			23 54 16 13-0076 EA 50 MBH 70% AFUE Gas Wall/Recessed Furnace (Williams 5009622A).....	2,112.21	262.61
			Note: Includes millivolt thermostate (P322016)		
			For 100 CFM, Automatic Blower Option (Williams 2901), Add	309.31	
			For 125 CFM, Automatic Blower Option (Williams 2907), Add	365.20	
			For Rear Outlet Register Option (Williams 6901), Add	80.52	
			For Starter Kit Option (Williams 9929), Add	377.94	
			Note: Includes a hold down plate, two spacer plates, a oval to round adapter, and two 4" oval pipes that are two feet in length.		
			For Freestanding Installation Kit Option (Williams 4901), Add	434.99	
			Note: For single-sided furnaces to be surface mounted rather than recessed into the wall.		
			23 54 16 16 Oil-Fired Furnaces (23 54 16)		
			23 54 16 16-0001 Oil Fired Forced Air Furnaces (23 54 16 16)		
			Note: Excludes flue, condenser, evaporator coil, piping, thermostat, ductwork and electrical connections.		
			23 54 16 16-0002 Up Flow Single Speed, One Stage 81% AFUE Oil Furnace (23 54 16 16-0001)		
			23 54 16 16-0003 EA 72 MBH, 1,220 CFM Up Flow Single Speed, One Stage 84% AFUE Oil Furnace.....	3,233.89	112.54
			Note: Blower cooling capacity up to 3 tons.		
			23 54 16 16-0004 EA 95 MBH, 1,590 CFM Up Flow Single Speed, One Stage 83% AFUE Oil Furnace.....	3,439.32	154.76
			Note: Blower cooling capacity up to 4 tons.		
			23 54 16 16-0005 EA 126 MBH, 1,835 CFM Up Flow Single Speed, One Stage 83% AFUE Oil Furnace.....	3,969.75	182.89
			Note: Blower cooling capacity up to 5 tons.		
			23 54 16 16-0006 Down/Horizontal Flow Single Speed, One Stage 81% AFUE Oil Furnace (23 54 16 16-0001)		
			23 54 16 16-0007 EA 95 MBH, 1,210 CFM Down/Horizontal Flow Single Speed, One Stage 83% AFUE Oil Furnace.....	3,749.00	154.76
			Note: Blower cooling capacity up to 3 tons.		
			23 54 16 16-0008 EA 126 MBH, 2,005 CFM Down/Horizontal Flow Single Speed, One Stage 84% AFUE Oil Furnace.....	3,781.62	182.89
			Note: Blower cooling capacity up to 5 tons.		
			23 54 16 16-0009 Up Flow Lowboy Single Speed, One Stage 81% AFUE Oil Furnace (23 54 16 16-0001)		
			23 54 16 16-0010 EA 95 MBH, 1,550 CFM Up Flow Lowboy Single Speed, One Stage 83% AFUE Oil Furnace	3,242.87	154.76
			Note: Blower cooling capacity up to 4 tons.		
			23 54 16 16-0011 EA 127 MBH, 2,130 CFM Up Flow Lowboy Single Speed, One Stage 83% AFUE Oil Furnace	3,849.88	182.89
			Note: Blower cooling capacity up to 5 tons.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 54 Furnaces



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 54 19 Furnace Accessories (23 54)

23 54 19 00-0001	EA	LP Gas Furnace Conversion Kit	202.84	28.14
23 54 19 00-0002	EA	1" Furnace External Filter Rack	62.24	
23 54 19 00-0003	EA	Removal And Reinstallation Of Forced Air Furnace	521.04	

Note: Includes storage and cleaning. Excludes ductwork.

23 55 Fuel-Fired Heaters (23 50)

23 55 23 Gas-Fired Radiant Heaters (23 55)

23 55 23 13 Low-Intensity Gas-Fired Radiant Heaters (23 55 23)

23 55 23 13-0001		Infrared Heaters-Radiant Energy (23 55 23 13)		
Note: For spot localized or total heating, ceiling hung units, no fan required.				
23 55 23 13-0002		Gas Fired Electric Ignition Infrared Gas Heater (23 55 23 13-0001)		
Note: Ceramic combustion, surface chromized wire screen aluminized steel housing and polished aluminum reflector.				
23 55 23 13-0003	EA	15,000 BTU Infrared Gas Heater, Electric Ignition, Ceiling Hung Unit Without Fan	960.01	114.87
23 55 23 13-0004	EA	37,500 BTU Infrared Gas Heater, Electric Ignition, Ceiling Hung Unit Without Fan	1,061.22	126.35
23 55 23 13-0005	EA	50,000 BTU Infrared Gas Heater, Electric Ignition, Ceiling Hung Unit Without Fan	1,134.63	126.35
23 55 23 13-0006	EA	75,000 BTU Infrared Gas Heater, Electric Ignition, Ceiling Hung Unit Without Fan	1,422.73	151.63
23 55 23 13-0007	EA	100,000 BTU Infrared Gas Heater, Electric Ignition, Ceiling Hung Unit Without Fan	1,435.10	151.63

23 55 23 13-0008 Rolled Steel Or Aluminum Housing Infrared Electric Heater (23 55 23 13-0001)

Note: Anodized aluminum reflector and quartz/tungsten tubular element with an inner heavy-duty coiled element.

23 55 23 13-0009	EA	1,000 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	1,075.69	123.80
For Stainless Steel Housing, Add			175.14	
23 55 23 13-0010	EA	3,200 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	1,151.14	123.80
For Stainless Steel Housing, Add			194.00	
23 55 23 13-0011	EA	5,000 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	1,237.36	123.80
For Stainless Steel Housing, Add			215.55	
23 55 23 13-0012	EA	7,300 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	1,341.01	123.80
For Stainless Steel Housing, Add			241.47	
23 55 23 13-0013	EA	10,950 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	1,464.55	135.05
For Stainless Steel Housing, Add			269.06	
23 55 23 13-0014	EA	13,500 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	1,564.58	146.30
For Stainless Steel Housing, Add			289.76	
23 55 23 13-0015	EA	24,000 Watt Infrared Elect Heater, Ceiling Hung Unit, No Fan Required	2,520.33	157.57
For Stainless Steel Housing, Add			517.43	

23 55 23 13-0016 Gas Fired Tubular Infrared Heater (23 55 23 13-0001)

Note: Per Tube Length. Includes controls and supports.

23 55 23 13-0017 "U" Package (23 55 23 13-0016)

23 55 23 13-0018	LF	Up To 75 MBH Input Radiant Heater	94.94	5.74
23 55 23 13-0019	LF	76 To 105 MBH Input Radiant Heater	109.48	6.89
23 55 23 13-0020	LF	106 To 130 MBH Input Radiant Heater	133.99	8.04

23 55 23 13-0021 "S" Straight Package (23 55 23 13-0016)

23 55 23 13-0022	LF	Up To 75 MBH Input Radiant Heater	77.10	4.59
23 55 23 13-0023	LF	76 To 105 MBH Input Radiant Heater	98.27	5.74
23 55 23 13-0024	LF	106 To 130 MBH Input Radiant Heater	119.43	6.89

23 55 33 Fuel-Fired Unit Heaters (23 55)

23 55 33 13 Oil-Fired Unit Heaters (23 55 33)

23 55 33 13-0001		Oil Fired Unit Heater (23 55 33 13)		
23 55 33 13-0002		Horizontal Fan Propelled Oil Fired Unit Heater, 115 Volt (23 55 33 13-0001)		
23 55 33 13-0003	EA	97 MBH Output, 2,000 CFM Oil Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	8,381.65	528.95
23 55 33 13-0004	EA	142 MBH Output, 3,200 CFM Oil Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	8,989.54	581.85
23 55 33 13-0005	EA	188 MBH Output, 3,200 CFM Oil Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	9,654.67	634.75

23 55 33 16 Gas-Fired Unit Heaters (23 55 33)

23 55 33 16-0001		Gas Fired Unit Heaters (23 55 33 16)		
23 55 33 16-0002		Horizontal Fan Propelled Gas Fired Unit Heaters, 115 Volt (23 55 33 16-0001)		
23 55 33 16-0003	EA	24.3 MBH Output, 30 MBH Input, 500 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	2,089.32	198.36
23 55 33 16-0004	EA	36.5 MBH Output, 45 MBH Input, 750 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	2,284.98	238.03
23 55 33 16-0005	EA	48.6 MBH Output, 60 MBH Input, 1,000 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	2,320.43	238.03
23 55 33 16-0006	EA	60.8 MBH Output, 75 MBH Input, 1,250 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	2,533.17	277.70
23 55 33 16-0007	EA	72.9 MBH Output, 90 MBH Input, 1,400 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	2,785.57	317.38
23 55 33 16-0008	EA	81 MBH Output, 100 MBH Input, 1,600 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	2,989.79	337.21
23 55 33 16-0009	EA	101.3 MBH Output, 125 MBH Input, 2,200 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	3,079.19	337.21
23 55 33 16-0010	EA	121.5 MBH Output, 150 MBH Input, 2,400 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	3,002.58	337.21



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 55 33 16-0011 EA 141.8 MBH Output, 175 MBH Input, 2,850 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	3,574.28	357.05
23 55 33 16-0012 EA 162 MBH Output, 200 MBH Input, 3,200 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	3,923.30	357.05
23 55 33 16-0013 EA 202.5 MBH Output, 250 MBH Input, 3,450 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	4,212.73	357.05
23 55 33 16-0014 EA 243 MBH Output, 300 MBH Input, 5,000 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	5,038.49	396.72
23 55 33 16-0015 EA 283.5 MBH Output, 350 MBH Input, 5,600 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	5,693.97	396.72
23 55 33 16-0016 EA 324 MBH Output, 400 MBH Input, 5,800 CFM Gas Fired Unit Heater Fan Propelled, Horizontal, 115 Volt	6,108.07	436.39

23 55 33 16-0017 Removal And Reinstallation Of Unit Heaters (23 55 33 16)

Note: Includes disconnection/reconnection of power and piping, storage, cleaning and reinstallation. Excludes removal and reinstallation of equipment supports.

23 55 33 16-0018 EA Removal And Reinstallation Of Up To 101.3 MBH Output Gas or Oil Unit Heater	660.47
23 55 33 16-0019 EA Removal And Reinstallation Of >101.3 MBH Output Gas or Oil Unit Heater	890.21

23 57 Heat Exchangers for HVAC (23 50)

23 57 13 Steam-To-Steam Heat Exchangers (23 57)

23 57 13 00-0001 Steam Generator Heat Exchanger (23 57 13)

Note: 35 PSI generated steam using 180 degree feed water; 400 degree F water to valve.

23 57 13 00-0002 EA 75 LB/Hour Steam Generator Heat Exchanger, 35 PSI	21,857.72	1,837.85
23 57 13 00-0003 EA 300 LB/Hour Steam Generator Heat Exchanger, 35 PSI	29,575.57	1,952.71
23 57 13 00-0004 EA 525 LB/Hour Steam Generator Heat Exchanger, 35 PSI	39,936.89	2,438.68

23 57 16 Steam-To-Water Heat Exchangers (23 57)

23 57 16 00-0001 Heat Exchanger, Hot Water 40 To 180 Degree By Steam 10 PSI (23 57 16)

Note: Cast iron head steel shell 4 pass 3/4" outside diameter copper tubes. Excludes controls expansion tank and accessories.

23 57 16 00-0002 EA 8 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	2,547.87	287.17
<i>For Bronze Head And Tube Sheet, Add</i>	974.24	
<i>For Copper Nickel Tubes, Add</i>	216.50	
<i>For Double Wall Tube Bundles, Add</i>	324.75	
23 57 16 00-0003 EA 10 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	3,737.87	287.17
<i>For Bronze Head And Tube Sheet, Add</i>	1,475.28	
<i>For Copper Nickel Tubes, Add</i>	327.84	
<i>For Double Wall Tube Bundles, Add</i>	491.76	
23 57 16 00-0004 EA 40 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	5,646.56	402.03
<i>For Bronze Head And Tube Sheet, Add</i>	2,282.51	
<i>For Copper Nickel Tubes, Add</i>	507.22	
<i>For Double Wall Tube Bundles, Add</i>	760.84	
23 57 16 00-0005 EA 64 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	8,880.74	402.03
<i>For Bronze Head And Tube Sheet, Add</i>	3,479.44	
<i>For Copper Nickel Tubes, Add</i>	773.21	
<i>For Double Wall Tube Bundles, Add</i>	1,159.81	
23 57 16 00-0006 EA 96 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	11,704.01	473.25
<i>For Bronze Head And Tube Sheet, Add</i>	4,620.69	
<i>For Copper Nickel Tubes, Add</i>	1,026.82	
<i>For Double Wall Tube Bundles, Add</i>	1,540.23	
23 57 16 00-0007 EA 120 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	15,404.27	604.57
<i>For Bronze Head And Tube Sheet, Add</i>	6,068.13	
<i>For Copper Nickel Tubes, Add</i>	1,348.47	
<i>For Double Wall Tube Bundles, Add</i>	2,022.71	
23 57 16 00-0008 EA 168 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	19,011.11	907.42
<i>For Bronze Head And Tube Sheet, Add</i>	7,432.07	
<i>For Copper Nickel Tubes, Add</i>	1,651.57	
<i>For Double Wall Tube Bundles, Add</i>	2,477.36	
23 57 16 00-0009 EA 240 GPM Heat Exchanger By Steam At 10 PSI, 40-180 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	28,851.60	907.42
<i>For Bronze Head And Tube Sheet, Add</i>	11,579.56	
<i>For Copper Nickel Tubes, Add</i>	2,573.24	
<i>For Double Wall Tube Bundles, Add</i>	3,859.85	

23 57 19 Liquid-To-Liquid Heat Exchangers (23 57)

23 57 19 19 Copper Tube, Water-To-Water Heat Exchanger (23 57 19)

23 57 19 19-0001 Heat Exchanger Hot Water 40-140 Degree By Water At 200 Degree F (23 57 19)

Note: Cast iron head steel shell 4 pass 3/4" outside diameter copper tubes.

23 57 19 19-0002 EA 7 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	3,042.72	287.17
<i>For Copper Nickel Tubes, Add</i>	265.98	
<i>For Double Wall Tube Bundles, Add</i>	398.97	
23 57 19 19-0003 EA 16 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	4,232.72	287.17
<i>For Copper Nickel Tubes, Add</i>	377.33	
<i>For Double Wall Tube Bundles, Add</i>	565.99	
23 57 19 19-0004 EA 34 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	6,326.99	402.03
<i>For Copper Nickel Tubes, Add</i>	575.27	
<i>For Double Wall Tube Bundles, Add</i>	862.90	
23 57 19 19-0005 EA 55 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube	9,054.56	402.03
<i>For Copper Nickel Tubes, Add</i>	828.88	
<i>For Double Wall Tube Bundles, Add</i>	1,243.32	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 50 Central Heating Equipment

23 57 Heat Exchangers for HVAC



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 57 19 19-0006	EA		74 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	11,205.17 1,020.63 1,530.95	459.47
23 57 19 19-0007	EA		86 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	14,941.28 1,373.22 2,059.83	459.47
23 57 19 19-0008	EA		112 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	18,540.30 1,707.24 2,560.86	453.70
23 57 19 19-0009	EA		126 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	23,061.10 2,127.87 3,191.80	453.70
23 57 19 19-0010	EA		152 GPM Heat Exchanger By 200 Degree Water, 40-140 Degree, 4 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	29,485.45 2,721.69 4,082.54	453.70

23 57 19 23 Refrigerant-To-Water Heat Exchanger (23 57 19)

23 57 19 23-0001	Heat Exchanger Refrigerant To Water (23 57 19 23)				
23 57 19 23-0002	EA		10 GPM Heat Exchanger By 385 Degree Water, 40-180 Degree, 3 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	3,436.87 297.74 446.61	229.73
23 57 19 23-0003	EA		53 GPM Heat Exchanger By 385 Degree Water, 40-180 Degree, 3 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	9,186.35 842.06 1,263.09	382.85
23 57 19 23-0004	EA		70 GPM Heat Exchanger By 385 Degree Water, 40-180 Degree, 3 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	12,380.59 1,138.35 1,707.52	499.44
23 57 19 23-0005	EA		87 GPM Heat Exchanger By 385 Degree Water, 40-180 Degree, 3 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	13,272.27 1,206.57 1,809.86	604.53
23 57 19 23-0006	EA		105 GPM Heat Exchanger By 385 Degree Water, 40-180 Degree, 3 Pass 3/4" Outside Diameter Copper Tube <i>For Copper Nickel Tubes, Add</i> <i>For Double Wall Tube Bundles, Add</i>	16,022.05 1,455.76 2,183.64	720.60

23 60 Central Cooling Equipment (23)

Note: Where required, mechanical equipment excludes electrical connection, disconnect, or starter unless title states otherwise. See CSI section 26 05 19 16-0011 for electrical connection and termination, 26 05 83 00-0110 for terminations, 26 28 16 16-0001 for disconnect.

23 61 Refrigerant Compressors (23 60)

23 61 16 Reciprocating Refrigerant Compressors (23 61)

23 61 16 00-0001	Reciprocating Open Type Refrigerant Compressors (23 61 16)				
Note: Includes manual reversible oil pump and automatic pressure regulator. Excludes muffler, vibration isolators, crank case oil heaters, couplings and flywheel.					
23 61 16 00-0002	EA		1/4 Ton Refrigerant Compressor, Reciprocating Open Type	716.32	108.89
23 61 16 00-0003	EA		1/3 Ton Refrigerant Compressor, Reciprocating Open Type	853.84	108.89
23 61 16 00-0004	EA		1/2 Ton Refrigerant Compressor, Reciprocating Open Type	1,160.42	136.07
23 61 16 00-0005	EA		3/4 Ton Refrigerant Compressor, Reciprocating Open Type	1,444.06	136.07
23 61 16 00-0006	EA		1 Ton Refrigerant Compressor, Reciprocating Open Type	1,615.96	136.07
23 61 16 00-0007	EA		1-1/4 Ton Refrigerant Compressor, Reciprocating Open Type	1,636.87	141.57
23 61 16 00-0008	EA		1-1/2 Ton Refrigerant Compressor, Reciprocating Open Type	1,646.90	141.57
23 61 16 00-0009	EA		1-3/4 Ton Refrigerant Compressor, Reciprocating Open Type	1,809.08	152.46
23 61 16 00-0010	EA		2 Ton Refrigerant Compressor, Reciprocating Open Type	1,945.47	163.35
23 61 16 00-0011	EA		2-1/2 Ton Refrigerant Compressor, Reciprocating Open Type	2,121.94	174.24
23 61 16 00-0012	EA		3 Ton Refrigerant Compressor, Reciprocating Open Type	2,417.04	174.24
23 61 16 00-0013	EA		3-1/2 Ton Refrigerant Compressor, Reciprocating Open Type	2,713.86	185.12
23 61 16 00-0014	EA		4 Ton Refrigerant Compressor, Reciprocating Open Type	2,770.05	196.02
23 61 16 00-0015	EA		4-1/2 Ton Refrigerant Compressor, Reciprocating Open Type	2,815.29	201.42
23 61 16 00-0016	EA		5 Ton Refrigerant Compressor, Reciprocating Open Type	4,090.09	1,054.38
23 61 16 00-0017	EA		7.5 Ton Refrigerant Compressor, Reciprocating Open Type	6,225.73	1,204.95
23 61 16 00-0018	EA		10 Ton Refrigerant Compressor, Reciprocating Open Type	8,361.54	1,355.63
23 61 16 00-0019	EA		12.5 Ton Refrigerant Compressor, Reciprocating Open Type	11,098.09	1,468.50
23 61 16 00-0020	EA		15 Ton Refrigerant Compressor, Reciprocating Open Type	13,834.97	1,581.58
23 61 16 00-0021	EA		20 Ton Refrigerant Compressor, Reciprocating Open Type	16,601.97	1,897.89
23 61 16 00-0022	EA		25 Ton Refrigerant Compressor, Reciprocating Open Type	20,015.41	2,039.86
23 61 16 00-0023	EA		30 Ton Refrigerant Compressor, Reciprocating Open Type	23,293.69	2,156.70
23 61 16 00-0024	EA		50 Ton Refrigerant Compressor, Reciprocating Open Type	30,584.99	2,433.22
23 61 16 00-0025	EA		60 Ton Refrigerant Compressor, Reciprocating Open Type	36,124.75	2,497.03
23 61 16 00-0026	EA		70 Ton Refrigerant Compressor, Reciprocating Open Type	45,292.72	2,560.74
23 61 16 00-0027	EA		75 Ton Refrigerant Compressor, Reciprocating Open Type	47,582.31	2,592.70
23 61 16 00-0028	EA		80 Ton Refrigerant Compressor, Reciprocating Open Type	49,775.61	2,624.55
23 61 16 00-0029	EA		90 Ton Refrigerant Compressor, Reciprocating Open Type	53,880.40	2,688.27
23 61 16 00-0030	EA		100 Ton Refrigerant Compressor, Reciprocating Open Type	57,605.84	2,752.18
23 61 16 00-0031	EA		110 Ton Refrigerant Compressor, Reciprocating Open Type	61,729.75	3,187.24
23 61 16 00-0032	EA		120 Ton Refrigerant Compressor, Reciprocating Open Type	64,700.76	3,258.58
23 61 16 00-0033	EA		130 Ton Refrigerant Compressor, Reciprocating Open Type	67,248.45	3,300.06
23 61 16 00-0034	EA		140 Ton Refrigerant Compressor, Reciprocating Open Type	69,506.05	3,402.16
23 61 16 00-0035	EA		150 Ton Refrigerant Compressor, Reciprocating Open Type	71,337.63	3,473.49
23 61 16 00-0036	EA		175 Ton Refrigerant Compressor, Reciprocating Open Type	73,204.20	3,568.67



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 61 16 00-0037 EA 185 Ton Refrigerant Compressor, Reciprocating Open Type	74,984.49	3,607.05
23 61 16 00-0038 EA 200 Ton Refrigerant Compressor, Reciprocating Open Type	76,797.99	3,666.74
23 61 16 00-0039 EA 225 Ton Refrigerant Compressor, Reciprocating Open Type	78,906.59	3,914.03
23 61 16 00-0040 EA 250 Ton Refrigerant Compressor, Reciprocating Open Type	80,956.26	4,125.02
23 61 16 00-0041 Reciprocating Hermetic Type Refrigerant Compressors (23 61 16)		
Note: Includes automatic reversible oil pump, suction and discharge shut-off valves, device for loading and unloading compressor cylinders and crank case oil heater. Excludes mufflers and vibration isolators.		
23 61 16 00-0042 Reciprocating Hermetic Type Refrigerant Compressors <5 Tons (23 61 16 00-0041)		
23 61 16 00-0043 EA 1/4 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,085.05	108.89
23 61 16 00-0044 EA 1/3 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,121.96	108.89
23 61 16 00-0045 EA 1/2 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,213.32	136.07
23 61 16 00-0046 EA 3/4 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,250.21	136.07
23 61 16 00-0047 EA 1 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,268.66	136.07
23 61 16 00-0048 EA 1-1/4 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,309.07	141.57
23 61 16 00-0049 EA 1-1/2 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,349.67	141.57
23 61 16 00-0050 EA 1-3/4 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,448.94	152.46
23 61 16 00-0051 EA 2 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,544.55	163.35
23 61 16 00-0052 EA 2-1/2 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,677.02	174.24
23 61 16 00-0053 EA 3 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,750.84	174.24
23 61 16 00-0054 EA 3-1/2 Ton Refrigerant Compressor, Reciprocating Hermetic Type	1,883.31	185.12
23 61 16 00-0055 EA 4 Ton Refrigerant Compressor, Reciprocating Hermetic Type	2,237.26	196.02
23 61 16 00-0056 EA 4-1/2 Ton Refrigerant Compressor, Reciprocating Hermetic Type	2,451.10	201.42
23 61 16 00-0057 Reciprocating Hermetic Type Refrigerant Compressors (23 61 16 00-0041)		
23 61 16 00-0058 EA 5 Ton Refrigerant Compressor, Reciprocating Hermetic Type	3,077.10	542.25
23 61 16 00-0059 EA 10 Ton Refrigerant Compressor, Reciprocating Hermetic Type	5,866.82	677.81
23 61 16 00-0060 EA 15 Ton Refrigerant Compressor, Reciprocating Hermetic Type	9,806.74	825.18
23 61 16 00-0061 EA 20 Ton Refrigerant Compressor, Reciprocating Hermetic Type	12,495.58	948.94
23 61 16 00-0062 EA 25 Ton Refrigerant Compressor, Reciprocating Hermetic Type	13,799.96	1,054.38
23 61 16 00-0063 EA 30 Ton Refrigerant Compressor, Reciprocating Hermetic Type	15,299.54	1,186.18
23 61 16 00-0064 EA 35 Ton Refrigerant Compressor, Reciprocating Hermetic Type	19,794.65	1,355.63
23 61 16 00-0065 EA 40 Ton Refrigerant Compressor, Reciprocating Hermetic Type	25,471.73	1,355.63
23 61 16 00-0066 EA 50 Ton Refrigerant Compressor, Reciprocating Hermetic Type	31,463.05	1,581.58
23 61 16 00-0067 EA 60 Ton Refrigerant Compressor, Reciprocating Hermetic Type	35,424.63	1,694.55
23 61 16 00-0068 EA 70 Ton Refrigerant Compressor, Reciprocating Hermetic Type	37,429.53	1,775.86
23 61 16 00-0069 EA 75 Ton Refrigerant Compressor, Reciprocating Hermetic Type	38,477.47	1,863.59
23 61 16 00-0070 EA 80 Ton Refrigerant Compressor, Reciprocating Hermetic Type	39,571.42	1,870.81
23 61 16 00-0071 EA 90 Ton Refrigerant Compressor, Reciprocating Hermetic Type	41,567.33	1,958.85
23 61 16 00-0072 EA 100 Ton Refrigerant Compressor, Reciprocating Hermetic Type	43,583.57	2,039.86
23 61 19 Scroll Refrigerant Compressors (23 61)		
23 61 19 00-0001 Scroll Refrigerant Compressors (23 61 19)		
23 61 19 00-0002 EA Up To 3 Ton Scroll Refrigerant Compressor	1,448.32	174.04
23 61 19 00-0003 EA 3.5 Ton Scroll Refrigerant Compressor	1,518.34	185.23
23 61 19 00-0004 EA 4 Ton Scroll Refrigerant Compressor	1,554.96	195.92
23 61 19 00-0005 EA 4.5 Ton Scroll Refrigerant Compressor	1,585.20	201.52
23 61 19 00-0006 EA 5 Ton Scroll Refrigerant Compressor	1,963.49	254.43
23 61 19 00-0007 EA 7.5 Ton Scroll Refrigerant Compressor	3,748.17	381.66
23 61 19 00-0008 EA 8.75 Ton Scroll Refrigerant Compressor	4,287.75	445.26
23 61 19 00-0009 EA 10 Ton Scroll Refrigerant Compressor	4,803.03	508.87
23 61 19 00-0010 EA 12 Ton Scroll Refrigerant Compressor	5,805.09	610.64
23 61 19 00-0011 EA 13.5 Ton Scroll Refrigerant Compressor	6,847.75	686.97
23 61 19 00-0012 EA 15 Ton Scroll Refrigerant Compressor	8,035.73	763.31
23 61 19 00-0013 EA 20 Ton Scroll Refrigerant Compressor	11,330.31	1,017.74
23 61 19 00-0014 EA 25 Ton Scroll Refrigerant Compressor	12,762.25	1,272.17
23 61 19 00-0015 EA 30 Ton Scroll Refrigerant Compressor	13,630.41	1,526.61
23 61 23 Rotary-Screw Refrigerant Compressors (23 61)		
23 61 23 00-0001 Rotary Screw Type Refrigerant Compressors (23 61 23)		
23 61 23 00-0002 EA 75 Ton Refrigerant Compressor, Rotary Screw Type	44,946.81	2,592.70
23 61 23 00-0003 EA 80 Ton Refrigerant Compressor, Rotary Screw Type	46,318.47	2,624.55
23 61 23 00-0004 EA 90 Ton Refrigerant Compressor, Rotary Screw Type	49,292.57	2,688.27
23 61 23 00-0005 EA 100 Ton Refrigerant Compressor, Rotary Screw Type	52,235.31	2,752.18
23 61 23 00-0006 EA 110 Ton Refrigerant Compressor, Rotary Screw Type	56,459.83	3,187.24
23 61 23 00-0007 EA 120 Ton Refrigerant Compressor, Rotary Screw Type	59,912.54	3,258.58
23 61 23 00-0008 EA 130 Ton Refrigerant Compressor, Rotary Screw Type	63,289.87	3,300.06
23 61 23 00-0009 EA 140 Ton Refrigerant Compressor, Rotary Screw Type	66,786.51	3,402.16
23 61 23 00-0010 EA 150 Ton Refrigerant Compressor, Rotary Screw Type	70,242.26	3,473.49
23 61 23 00-0011 EA 170 Ton Refrigerant Compressor, Rotary Screw Type	75,102.39	3,568.67
23 61 23 00-0012 EA 185 Ton Refrigerant Compressor, Rotary Screw Type	78,504.60	3,607.05
23 61 23 00-0013 EA 200 Ton Refrigerant Compressor, Rotary Screw Type	80,088.51	3,666.74
23 61 23 00-0014 EA 215 Ton Refrigerant Compressor, Rotary Screw Type	89,903.11	3,914.03
23 61 23 00-0015 EA 225 Ton Refrigerant Compressor, Rotary Screw Type	99,584.37	4,125.02

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 60 Central Cooling Equipment****23 61 Refrigerant Compressors**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**23 62 Packaged Compressor and Condenser Units (23 60)****23 62 13 Packaged Air-Cooled Refrigerant Compressor and Condenser Units (23 62)****23 62 13 00-0001 Packaged Chiller With Remote Air Cooled Condenser (23 62 13)**

Note: With remote air cooled condenser rated by cooling capacity, Units are factory assembled package type. Includes hermetic compressor, motor, cooler, condenser, internal piping, oil, discharge/suction gauges, lead lag switch, compressor unloaders, removable core filter drier with 3 valve by-pass, sight glass, internal wiring, motor starters, insulation, fan cycling controls, standard oil hi/low safety control switches, operation and safety controls, factory wired and installed control panel, vibration eliminators, phase monitoring for 3 phase units, start-up and equipment rigging. Units include dual compressors. Excludes piping and power wiring.

23 62 13 00-0002	EA	15 Ton Packaged Chiller With Remote Air Cooled Condensers	38,009.27	8,867.12
		<i>For Gas Fired Engine Driven, Add</i>	6,272.46	
23 62 13 00-0003	EA	20 Ton Packaged Chiller With Remote Air Cooled Condensers	42,667.97	9,346.42
		<i>For Gas Fired Engine Driven, Add</i>	7,132.34	
23 62 13 00-0004	EA	25 Ton Packaged Chiller With Remote Air Cooled Condensers	49,277.28	10,171.01
		<i>For Gas Fired Engine Driven, Add</i>	8,330.56	
23 62 13 00-0005	EA	30 Ton Packaged Chiller With Remote Air Cooled Condensers	54,886.83	10,806.76
		<i>For Gas Fired Engine Driven, Add</i>	9,357.17	
23 62 13 00-0006	EA	40 Ton Packaged Chiller With Remote Air Cooled Condensers	68,025.07	11,924.68
		<i>For Gas Fired Engine Driven, Add</i>	11,817.21	
23 62 13 00-0007	EA	50 Ton Packaged Chiller With Remote Air Cooled Condensers	74,752.86	12,350.51
		<i>For Gas Fired Engine Driven, Add</i>	13,098.91	
23 62 13 00-0008	EA	60 Ton Packaged Chiller With Remote Air Cooled Condensers	81,191.91	13,300.57
		<i>For Gas Fired Engine Driven, Add</i>	14,244.29	
23 62 13 00-0009	EA	70 Ton Packaged Chiller With Remote Air Cooled Condensers	98,076.85	14,231.16
		<i>For Gas Fired Engine Driven, Add</i>	17,455.10	
23 62 13 00-0010	EA	75 Ton Packaged Chiller With Remote Air Cooled Condensers	99,219.81	14,514.28
		<i>For Gas Fired Engine Driven, Add</i>	17,667.90	
23 62 13 00-0011	EA	80 Ton Packaged Chiller With Remote Air Cooled Condensers	101,150.96	15,145.39
		<i>For Gas Fired Engine Driven, Add</i>	17,959.52	
23 62 13 00-0012	EA	90 Ton Packaged Chiller With Remote Air Cooled Condensers	111,894.09	15,833.84
		<i>For Gas Fired Engine Driven, Add</i>	20,004.93	
23 62 13 00-0013	EA	100 Ton Packaged Chiller With Remote Air Cooled Condensers	123,471.80	16,587.86
		<i>For Gas Fired Engine Driven, Add</i>	22,207.43	
23 62 13 00-0014	EA	110 Ton Packaged Chiller With Remote Air Cooled Condensers	136,555.52	17,417.20
		<i>For Gas Fired Engine Driven, Add</i>	24,699.83	
23 62 13 00-0015	EA	120 Ton Packaged Chiller With Remote Air Cooled Condensers	147,481.69	18,333.93
		<i>For Gas Fired Engine Driven, Add</i>	26,747.63	
23 62 13 00-0016	EA	140 Ton Packaged Chiller With Remote Air Cooled Condensers	162,440.98	19,352.44
		<i>For Gas Fired Engine Driven, Add</i>	29,586.78	

23 62 23 Packaged Water-Cooled Refrigerant Compressor and Condenser Units (23 62)**23 62 23 00-0001 Water Cooled Condensing Units (23 62 23)**

Note: Includes compressor, condenser and motor, and equipment rigging. Excludes piping and power wiring.

23 62 23 00-0002	EA	5 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	8,105.97	735.25
23 62 23 00-0003	EA	10 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	12,300.14	1,073.78
23 62 23 00-0004	EA	15 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	14,091.86	1,163.71
23 62 23 00-0005	EA	20 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	17,480.67	1,396.44
23 62 23 00-0006	EA	30 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	18,864.93	1,642.94
23 62 23 00-0007	EA	60 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	40,165.42	2,467.27
23 62 23 00-0008	EA	80 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	49,858.75	2,977.77
23 62 23 00-0009	EA	120 Ton Water Cooled Condensing Unit With Compressor, Condenser And Motor	69,057.21	3,258.15

23 63 Refrigerant Condensers (23 60)**23 63 13 Air-Cooled Refrigerant Condensers (23 63)****23 63 13 00-0001 Air Cooled Condensing Units (23 63 13)**

Note: Includes compressor(s), condenser, fan, motors, discharge/suction gauges, sight glass, fan cycling controls, standard oil hi/low safety control switches, standard controls and liquid line filter dryers and phase monitoring for 3 phase units and equipment rigging. Meets minimum ASHRAE EER requirements. Excludes piping and power wiring.

23 63 13 00-0002	EA	6 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor	7,090.48	735.25
		<i>For >25 To 50, Deduct</i>	-298.84	
		<i>For >50, Deduct</i>	-478.15	
		<i>For Low Ambient Protection, 0 Degree F, Add</i>	1,055.39	
		<i>For >10 To 25, Deduct</i>	-179.31	
		<i>For Winter Start Control, Add</i>	350.43	
23 63 13 00-0003	EA	7.5 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor	8,494.65	872.78
		<i>For >25 To 50, Deduct</i>	-358.61	
		<i>For >50, Deduct</i>	-573.78	
		<i>For Low Ambient Protection, 0 Degree F, Add</i>	904.38	
		<i>For >10 To 25, Deduct</i>	-215.17	
		<i>For Winter Start Control, Add</i>	275.68	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Central Cooling Equipment	23 60
Refrigerant Condensers	23 63

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 63 13 00-0004 EA 10 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	11,062.22	1,073.78
For Low Ambient Protection, 0 Degree F, Add	1,067.32	
For >25 To 50, Deduct	-471.73	
For >50, Deduct	-754.77	
For >10 To 25, Deduct	-283.04	
For Winter Start Control, Add	351.45	
23 63 13 00-0005 EA 12.5 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	13,750.73	1,117.16
For Low Ambient Protection, 0 Degree F, Add	1,267.23	
For >25 To 50, Deduct	-602.90	
For >50, Deduct	-964.65	
For >10 To 25, Deduct	-361.74	
For Winter Start Control, Add	410.43	
23 63 13 00-0006 EA 15 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	16,444.67	1,163.71
For Winter Start Control, Add	323.13	
For >25 To 50, Deduct	-734.07	
For >50, Deduct	-1,174.52	
For >10 To 25, Deduct	-440.44	
For Low Ambient Protection, 0 Degree F, Add	1,321.69	
23 63 13 00-0007 EA 20 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	21,225.82	1,396.44
For Winter Start Control, Add	402.68	
For >25 To 50, Deduct	-955.50	
For >50, Deduct	-1,528.80	
For >10 To 25, Deduct	-573.30	
For Low Ambient Protection, 0 Degree F, Add	1,675.56	
23 63 13 00-0008 EA 25 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	24,175.98	1,502.24
For Winter Start Control, Add	446.43	
For >25 To 50, Deduct	-1,095.09	
For >50, Deduct	-1,752.15	
For Low Ambient Protection, 0 Degree F, Add	1,773.13	
For >10 To 25, Deduct	-657.06	
23 63 13 00-0009 EA 30 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	27,752.43	1,639.77
For Low Ambient Protection, 0 Degree F, Add	1,883.83	
For Winter Start Control, Add	500.82	
For >25 To 50, Deduct	-1,263.57	
For >50, Deduct	-2,021.71	
For >10 To 25, Deduct	-758.14	
23 63 13 00-0010 EA 40 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	38,286.35	1,962.60
For Low Ambient Protection, 0 Degree F, Add	2,519.66	
For Winter Start Control, Add	655.27	
For >25 To 50, Deduct	-1,762.98	
For >50, Deduct	-2,820.77	
For >10 To 25, Deduct	-1,057.79	
23 63 13 00-0011 EA 50 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	46,465.57	2,467.27
For >25 To 50, Deduct	-2,133.03	
For >50, Deduct	-3,412.84	
For Winter Start Control, Add	593.81	
For >10 To 25, Deduct	-1,279.82	
For Low Ambient Protection, 0 Degree F, Add	2,657.68	
23 63 13 00-0012 EA 60 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	53,591.78	2,723.10
For >25 To 50, Deduct	-2,475.15	
For >50, Deduct	-3,960.24	
For Winter Start Control, Add	656.39	
For >10 To 25, Deduct	-1,485.09	
For Low Ambient Protection, 0 Degree F, Add	3,002.30	
23 63 13 00-0013 EA 80 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	69,575.89	2,977.77
For >25 To 50, Deduct	-3,249.18	
For >50, Deduct	-5,198.69	
For Winter Start Control, Add	784.15	
For >10 To 25, Deduct	-1,949.51	
For Low Ambient Protection, 0 Degree F, Add	3,747.42	
23 63 13 00-0014 EA 100 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	96,194.41	2,681.17
For >25 To 50, Deduct	-4,536.82	
For >50, Deduct	-7,258.91	
For Winter Start Control, Add	999.49	
For Low Ambient Protection, 0 Degree F, Add	4,086.60	
For >10 To 25, Deduct	-2,722.09	
23 63 13 00-0015 EA 120 Ton Air Cooled Condensing Unit With Compressor, Condenser, Fan And Motor.....	118,762.66	2,772.05
For >25 To 50, Deduct	-5,655.98	
For >50, Deduct	-9,049.57	
For Low Ambient Protection, 0 Degree F, Add	4,804.35	
For >10 To 25, Deduct	-3,393.59	
23 63 13 00-0016 Air Cooled Condensing Units <small>(23 63 13)</small>		
Note: Includes compressor(s), condenser, fan, motors, discharge/suction gauges, sight glass, fan cycling controls, standard oil hi/low safety control switches, standard controls and liquid line filter dryers, 14 SEER, 1 or 3 phase and equipment rigging. Higher SEER ratings can be obtained by oversizing evaporators. Includes 20' length of piping (liquid line and insulated suction line). Excludes additional piping and power wiring.		
23 63 13 00-0017 EA 1.5 Ton, 14 SEER, Air Cooled Condensing Unit.....	2,250.13	365.91
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
For >25 To 50, Deduct	-85.06	
For >50, Deduct	-136.10	
For >10 To 25, Deduct	-51.04	
For 15 SEER, Add	408.30	
For 16 SEER, Add	697.52	
For 18 SEER, Add	1,463.09	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 60 Central Cooling Equipment

23 63 Refrigerant Condensers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 63 13 00-0018	EA		2 Ton, 14 SEER, Air Cooled Condensing Unit.....	2,419.50	406.76
			Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
			For >25 To 50, Deduct	-90.48	
			For >50, Deduct	-144.77	
			For >10 To 25, Deduct	-54.29	
			For 15 SEER, Add	434.32	
			For 16 SEER, Add	741.96	
			For 18 SEER, Add	1,556.31	
23 63 13 00-0019	EA		2.5 Ton, 14 SEER, Air Cooled Condensing Unit.....	2,566.84	447.44
			Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
			For >25 To 50, Deduct	-94.80	
			For >50, Deduct	-151.68	
			For >10 To 25, Deduct	-56.88	
			For 15 SEER, Add	455.04	
			For 16 SEER, Add	777.36	
			For 18 SEER, Add	1,630.57	
23 63 13 00-0020	EA		3 Ton, 14 SEER, Air Cooled Condensing Unit.....	2,949.33	487.87
			Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
			For >25 To 50, Deduct	-110.88	
			For >50, Deduct	-177.40	
			For >10 To 25, Deduct	-66.53	
			For 15 SEER, Add	532.20	
			For 16 SEER, Add	909.18	
			For 18 SEER, Add	1,907.07	
23 63 13 00-0021	EA		3.5 Ton, 14 SEER, Air Cooled Condensing Unit.....	3,122.39	528.79
			Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
			For >25 To 50, Deduct	-116.48	
			For >50, Deduct	-186.37	
			For >10 To 25, Deduct	-69.89	
			For 15 SEER, Add	559.10	
			For 16 SEER, Add	955.14	
			For 18 SEER, Add	2,003.46	
23 63 13 00-0022	EA		4 Ton, 14 SEER, Air Cooled Condensing Unit.....	3,481.00	569.47
			Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
			For >25 To 50, Deduct	-131.36	
			For >50, Deduct	-210.18	
			For >10 To 25, Deduct	-78.82	
			For 15 SEER, Add	630.53	
			For 16 SEER, Add	1,077.16	
			For 18 SEER, Add	2,259.41	
23 63 13 00-0023	EA		5 Ton, 14 SEER, Air Cooled Condensing Unit.....	3,930.47	609.84
			Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
			For >25 To 50, Deduct	-150.79	
			For >50, Deduct	-241.26	
			For >10 To 25, Deduct	-90.47	
			For 15 SEER, Add	723.77	
			For 16 SEER, Add	1,236.44	
			For 18 SEER, Add	2,593.51	
23 63 13 00-0024			Removal And Reinstallation Of AC Condensing Unit (23 63 13)		
			Note: Includes storage and cleaning.		
23 63 13 00-0025	EA		Removal And Reinstallation Of Up To 5 Tons Air Cooled Condensing Unit.....	375.15	
23 63 13 00-0026	EA		Removal And Reinstallation Of 7.5 To 15 Tons Air Cooled Condensing Unit.....	1,406.82	
23 63 13 00-0027	EA		Removal And Reinstallation Of 20 To 40 Tons Air Cooled Condensing Unit.....	2,222.51	
23 63 33			Evaporative Refrigerant Condensers (23 63)		
23 63 33 00-0001			Copper Coil Evaporative Refrigerant Condensers (23 63 33)		
			Note: Includes galvanized steel base construction, condenser, fan, motors, standard controls and equipment rigging. Excludes piping and power wiring.		
23 63 33 00-0002	EA		10 Ton Evaporative Refrigerant Condensers.....	19,771.80	2,516.99
23 63 33 00-0003	EA		15 Ton Evaporative Refrigerant Condensers.....	20,614.25	2,622.78
23 63 33 00-0004	EA		20 Ton Evaporative Refrigerant Condensers.....	21,675.45	2,728.58
23 63 33 00-0005	EA		25 Ton Evaporative Refrigerant Condensers.....	22,088.86	2,813.21
23 63 33 00-0006	EA		30 Ton Evaporative Refrigerant Condensers.....	23,244.15	2,940.15
23 63 33 00-0007			Evaporative Cooling Module (23 63 33)		
			Note: Includes Stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs and equipment rigging. Excludes piping and power wiring.		
23 63 33 00-0008	EA		4,110 Maximum CFM, 1/70 HP, 115 Volt, 1 Phase, Evaporative Cooling Module (Reznor REC-40).....	5,747.16	355.46
			Note: Includes stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs.		
23 63 33 00-0009	EA		5,060 Maximum CFM, 1/70 HP, 115 Volt, 1 Phase, Evaporative Cooling Module (Reznor REC-50).....	6,409.44	380.85
			Note: Includes stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs.		
23 63 33 00-0010	EA		5,860 Maximum CFM, 1/70 HP, 115 Volt, 1 Phase, Evaporative Cooling Module (Reznor REC-60).....	7,406.27	439.03
			Note: Includes stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs.		
23 63 33 00-0011	EA		7,125 Maximum CFM, 1/70 HP, 115 Volt, 1 Phase, Evaporative Cooling Module (Reznor REC-70).....	8,969.51	513.09
			Note: Includes stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 63 33 00-0012 EA 8,075 Maximum CFM, 1/70 HP, 115 Volt, 1 Phase, Evaporative Cooling Module (Reznor REC-80).....	10,301.66	629.46
Note: Includes stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs.		
23 63 33 00-0013 EA 17,730 Maximum CFM, 1/50 HP, 115 Volt, 1 Phase, Evaporative Cooling Module (Reznor REC-180).....	13,882.95	930.96
Note: Includes stainless steel evaporator cooler cabinet, 12" rigid cellulose media, electric fill and drain, evaporator cooler recirculation system, support base and legs.		

23 64 Packaged Water Chillers ^(23 60)

See CSI section 26 29 23 00-0000 for variable frequency motor controllers.

23 64 13 Absorption Water Chillers ^(23 64)

23 64 13 16 Indirect-Fired Absorption Water Chillers ^(23 64 13)

23 64 13 16-0001 Packaged, Steam Driven, Water Cooled Absorption Chillers ^(23 64 13 16)

Note: Includes refrigerant monitor with scanner, audible alarm, and lights, 460 voltage motor rating, and all accessories, controls (water temperature controller with PE switches, flow switch, etc.) factory wired and installed control panel, and also includes start-up. Price includes closed transition starter. (rated by cooling capacity in tons). Units are factory assembled package type consisting of motor, cooler, condenser, internal piping and wiring, motor starters, insulation, purge unit, controls, gauges, lubrication system, refrigerant charge, oil, phase monitoring for 3 phase units, start-up costs and equipment rigging. Exclude piping and power wiring.

23 64 13 16-0002 EA 50 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	208,611.68	12,097.51
<i>For Two Stage Unit, Add</i>		
	136,350.17	
23 64 13 16-0003 EA 100 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	263,341.71	13,926.79
<i>For Two Stage Unit, Add</i>		
	173,197.76	
23 64 13 16-0004 EA 150 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	333,706.83	14,971.31
<i>For Two Stage Unit, Add</i>		
	221,617.74	
23 64 13 16-0005 EA 200 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	370,631.19	16,015.82
<i>For Two Stage Unit, Add</i>		
	246,629.18	
23 64 13 16-0006 EA 250 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	413,826.54	16,480.04
<i>For Two Stage Unit, Add</i>		
	276,494.54	
23 64 13 16-0007 EA 300 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	466,078.95	17,060.32
<i>For Two Stage Unit, Add</i>		
	312,607.00	
23 64 13 16-0008 EA 350 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	499,752.51	17,640.61
<i>For Two Stage Unit, Add</i>		
	335,714.27	
23 64 13 16-0009 EA 400 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	594,503.66	18,569.07
<i>For Two Stage Unit, Add</i>		
	401,297.31	
23 64 13 16-0010 EA 500 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	665,334.94	19,149.35
<i>For Two Stage Unit, Add</i>		
	450,414.97	
23 64 13 16-0011 EA 650 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	805,836.88	19,729.63
<i>For Two Stage Unit, Add</i>		
	548,302.11	
23 64 13 16-0012 EA 750 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	873,648.20	21,122.30
<i>For Two Stage Unit, Add</i>		
	594,655.90	
23 64 13 16-0013 EA 850 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	936,582.73	22,398.94
<i>For Two Stage Unit, Add</i>		
	637,688.76	
23 64 13 16-0014 EA 950 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	1,004,877.84	24,033.51
<i>For Two Stage Unit, Add</i>		
	684,187.69	
23 64 13 16-0015 EA 1,125 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	1,150,153.55	24,619.68
<i>For Two Stage Unit, Add</i>		
	785,364.84	
23 64 13 16-0016 EA 1,250 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	1,259,678.37	26,026.53
<i>For Two Stage Unit, Add</i>		
	860,953.64	
23 64 13 16-0017 EA 1,450 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	1,471,035.20	27,198.89
<i>For Two Stage Unit, Add</i>		
	1,007,965.52	
23 64 13 16-0018 EA 1,700 Ton Packaged, Steam Driven, Water Cooled Absorption Chiller.....	1,719,310.73	28,019.56
<i>For Two Stage Unit, Add</i>		
	1,181,101.88	

23 64 16 Centrifugal Water Chillers ^(23 64)

23 64 16 13 Air-Cooled Centrifugal Water Chillers ^(23 64 16)

23 64 16 13-0001 Magnetic Bearing, Air Cooled Centrifugal Chillers ^(23 64 16 13)

Note: SMARTD air cooled oil-free centrifugal chiller with variable speed control, magnetic bearings, lowest ARI IPLV in industry. Includes start up, freight, R-134a refrigerant charge, BACnet or equivalent interface.

23 64 16 13-0002 EA 85 Ton, Single Compressor, Magnetic Bearing, Air Cooled Centrifugal Chiller.....	239,142.16	6,427.80
<i>For 5 Year Parts Only Compressor Warranty, Add</i>		
	6,649.50	
23 64 16 13-0003 EA 175 Ton, Two Compressor, Magnetic Bearing, Air Cooled Centrifugal Chiller.....	339,430.85	8,622.43
<i>For 5 Year Parts Only Compressor Warranty, Add</i>		
	13,299.00	
23 64 16 13-0004 EA 240 Ton, Three Compressor, Magnetic Bearing, Air Cooled Centrifugal Chiller.....	424,497.65	9,118.92
<i>For 5 Year Parts Only Compressor Warranty, Add</i>		
	19,948.50	

23 64 16 16 Water-Cooled Centrifugal Water Chillers ^(23 64 16)

23 64 16 16-0001 Packaged Water-Cooled Centrifugal Water Chillers ^(23 64 16 16)

Note: Includes integral heat exchanger, refrigerant monitor with scanner, audible alarm, and lights, 460 voltage motor rating, controls (water temperature controller with PE switches, flow switch, etc.), start-up, and closed transition starter. Rated by cooling capacity in tons. Units are factory assembled package type consisting of compressor, motor, cooler, condenser, internal piping and wiring, motor starters, insulation, purge unit, factory wired and installed control panel, gauges, lubrication system, refrigerant charge, oil, phase monitoring for 3 phase units, start-up costs and equipment rigging. Units greater than 20 tons include dual compressors. Excludes piping and power wiring.

23 64 16 16-0002 EA 180 Ton Packaged Water-Cooled Centrifugal Water Chiller.....	158,964.67	6,621.61
Note: Includes integral heat exchanger, controls, and 440/460 V motor.		
<i>For 208/230 Voltage Motor Rating, Add</i>		
	5,933.12	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 60 Central Cooling Equipment****23 64 Packaged Water Chillers**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 64 16 16-0003 EA 200 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	173,777.84 6,514.74	6,789.32
23 64 16 16-0004 EA 225 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	191,681.84 7,219.95	6,961.89
23 64 16 16-0005 EA 250 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	209,154.26 7,900.91	7,241.00
23 64 16 16-0006 EA 275 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	226,229.03 8,557.63	7,649.87
23 64 16 16-0007 EA 300 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	242,679.57 9,190.10	8,047.60
23 64 16 16-0008 EA 325 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	258,592.22 9,798.25	8,488.85
23 64 16 16-0009 EA 350 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	273,864.17 10,382.23	8,907.47
23 64 16 16-0010 EA 375 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	288,468.95 10,941.90	9,289.18
23 64 16 16-0011 EA 400 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	302,338.55 11,477.31	9,590.57
23 64 16 16-0012 EA 425 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	315,880.95 11,988.48	10,065.71
23 64 16 16-0013 EA 450 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	328,677.95 12,475.41	10,454.04
23 64 16 16-0014 EA 475 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	340,860.66 12,938.09	10,837.37
23 64 16 16-0015 EA 500 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	352,298.46 13,376.52	11,134.25
23 64 16 16-0016 EA 550 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	373,034.12 14,180.58	11,529.07
23 64 16 16-0017 EA 600 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	391,113.57 14,887.65	11,779.75
23 64 16 16-0018 EA 650 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	407,299.37 15,497.67	12,362.01
23 64 16 16-0019 EA 700 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	421,074.64 16,010.71	12,953.09
23 64 16 16-0020 EA 750 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	432,524.24 16,426.90	13,603.34
23 64 16 16-0021 EA 800 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	459,422.17 17,460.65	14,259.64
23 64 16 16-0022 EA 850 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	486,130.07 18,486.94	14,913.86
23 64 16 16-0023 EA 900 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	512,748.91 19,505.62	15,630.85
23 64 16 16-0024 EA 950 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	539,292.20 20,516.63	16,420.27
23 64 16 16-0025 EA 1,000 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	565,614.73 21,519.96	17,377.04
23 64 16 16-0026 EA 1,100 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	613,668.97 23,272.19	20,050.51
23 64 16 16-0027 EA 1,200 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	659,920.72 24,951.82	22,731.59
23 64 16 16-0028 EA 1,300 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	703,544.56 26,558.72	24,903.40
23 64 16 16-0029 EA 1,400 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	744,023.44 28,092.87	26,240.60
23 64 16 16-0030 EA 1,500 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	782,609.28 29,554.08	27,534.07

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 64 16 16-0031 EA 1,600 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	818,607.24 30,943.26	28,332.21
23 64 16 16-0032 EA 1,700 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	854,654.37 32,259.50	30,308.82
23 64 16 16-0033 EA 1,800 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	888,091.37 33,502.99	31,787.30
23 64 16 16-0034 EA 1,900 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	920,408.72 34,673.75	33,705.53
23 64 16 16-0035 EA 2,000 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	949,775.83 35,771.91	34,909.31
23 64 16 16-0036 EA 2,250 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	1,011,469.03 38,199.29	36,885.33
23 64 16 16-0037 EA 2,500 Ton Packaged Water-Cooled Centrifugal Water Chiller..... Note: Includes integral heat exchanger, controls, and 440/460 V motor. <i>For 208/230 Voltage Motor Rating, Add</i>	1,066,445.03 40,172.39	39,098.40
23 64 16 16-0038 Magnetic Bearing, Water Cooled Centrifugal Water Chillers <small>(23 64 16 16)</small> Note: SMARTD water cooled oil-free centrifugal chiller with variable speed control, magnetic bearings, 10 amp maximum inrush current and ARI part load <0.4kW per ton. Includes start up, freight, R-134a refrigerant charge, BACnet or equivalent interface, 12/18 month compressor warranty.		
23 64 16 16-0039 EA 60 To 85 Ton, Single Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	150,566.72 6,649.50 4,457.88	5,570.72
23 64 16 16-0040 EA 130 To 137 Ton, Single Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller..... <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	189,594.05 6,649.50 4,457.88	6,474.80
23 64 16 16-0041 EA 125 To 170 Ton, Dual Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	237,477.59 13,299.00 4,457.88	6,621.61
23 64 16 16-0042 EA 240 To 270 Ton, Dual Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	309,279.40 13,299.00 4,457.88	7,649.87
23 64 16 16-0043 EA 210 To 260 Ton, Three Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	311,674.68 19,948.50 4,457.88	7,241.00
23 64 16 16-0044 EA 355 To 405 Ton, Three Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	467,616.08 19,948.50 4,457.88	9,590.57
23 64 16 16-0045 EA 299 To 340 Ton, Four Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	414,280.21 24,381.50 6,209.19	8,907.47
23 64 16 16-0046 EA 540 Ton, Four Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	575,630.31 24,381.50 6,209.19	11,529.07
23 64 16 16-0047 EA 425 Ton, Five Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller..... <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	515,641.64 28,814.50 6,209.19	10,065.71
23 64 16 16-0048 EA 650 Ton, Five Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller..... <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	690,162.66 28,814.50 6,209.19	12,362.01
23 64 16 16-0049 EA 510 Ton, Six Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller..... <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	613,999.83 33,247.50 6,527.61	11,134.25
23 64 16 16-0050 EA 800 Ton, Six Compressor, Magnetic Bearing, Water Cooled Centrifugal Water Chiller..... <i>For 5 Year Parts Only Compressor Warranty, Add</i> <i>For Marine Water Box Connections, Add</i>	791,100.49 33,247.50 6,527.61	14,259.64
23 64 23 Scroll Water Chillers <small>(23 64)</small>		
23 64 23 13 Air-Cooled Scroll Water Chillers <small>(23 64 23)</small>		
23 64 23 13-0001 Packaged Air Cooled Scroll Water Chillers <small>(23 64 23 13)</small> Note: With integral heat exchanger. Rated by cooling capacity, tons. Units are factory assembled package type. Includes scroll compressor, motor, cooler, condenser, internal piping, oil, discharge/suction gauges, lead lag switch, compressor unloaders, removable core filter drier with 3-valve by-pass, sight glass, internal wiring, motor starters, insulation, fan cycling controls, standard oil hi/low safety control switches, operation and safety controls, factory wired and installed control panel, refrigerant charge, vibration eliminators, phase monitoring for 3 phase units, factory charge of refrigerant, start-up and equipment rigging. Units greater than 20 tons include dual compressors. Excludes piping and power wiring. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.		
23 64 23 13-0002 EA 10 Ton Packaged Air Cooled Scroll Water Chiller	25,791.80	1,673.82
23 64 23 13-0003 EA 15 Ton Packaged Air Cooled Scroll Water Chiller	37,759.58	1,695.27
23 64 23 13-0004 EA 18 Ton Packaged Air Cooled Scroll Water Chiller	41,207.66	1,813.30
23 64 23 13-0005 EA 22 Ton Packaged Air Cooled Scroll Water Chiller	45,331.95	1,942.05
23 64 23 13-0006 EA 25 Ton Packaged Air Cooled Scroll Water Chiller	46,076.51	2,070.82
23 64 23 13-0007 EA 30 Ton Packaged Air Cooled Scroll Water Chiller	48,621.60	2,221.03
23 64 23 13-0008 EA 40 Ton Packaged Air Cooled Scroll Water Chiller	55,587.57	2,403.43

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 60 Central Cooling Equipment****23 64 Packaged Water Chillers**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 64 23 13-0009	EA	45 Ton Packaged Air Cooled Scroll Water Chiller	59,698.53	2,607.29
23 64 23 13-0010	EA	50 Ton Packaged Air Cooled Scroll Water Chiller	63,036.47	2,682.40
23 64 23 13-0011	EA	55 Ton Packaged Air Cooled Scroll Water Chiller	65,837.46	2,800.42
23 64 23 13-0012	EA	60 Ton Packaged Air Cooled Scroll Water Chiller	68,048.92	2,896.99
23 64 23 13-0013	EA	70 Ton Packaged Air Cooled Scroll Water Chiller	78,503.37	3,261.80
23 64 23 13-0014	EA	80 Ton Packaged Air Cooled Scroll Water Chiller	84,505.60	3,572.95
23 64 23 13-0015	EA	90 Ton Packaged Air Cooled Scroll Water Chiller	86,041.94	3,583.69
23 64 23 13-0016	EA	100 Ton Packaged Air Cooled Scroll Water Chiller	91,027.88	3,594.41
23 64 23 13-0017	EA	110 Ton Packaged Air Cooled Scroll Water Chiller	95,881.64	3,605.14
23 64 23 13-0018	EA	120 Ton Packaged Air Cooled Scroll Water Chiller	100,795.75	3,615.87
23 64 23 13-0019	EA	130 Ton Packaged Air Cooled Scroll Water Chiller	105,962.58	3,626.60

23 64 23 16 Water-Cooled Scroll Water Chillers (23 64 23)**23 64 23 16-0001 Packaged Water Cooled Scroll Water Chillers (23 64 23 16)**

Note: Integral heat exchanger. Rated by cooling capacity in tons. Units are factory assembled package type. Includes hermetic compressor, motor, cooler, condenser, internal piping, oil, discharge/suction gauges, lead lag switch, compressor unloaders, removable core filter drier with 3 valve by-pass, sight glass, internal wiring, motor starters, insulation, fan cycling controls, standard oil hi/low safety control switches, operation and safety controls, factory wired and installed control panel, refrigerant charge, vibration eliminators, phase monitoring for 3 phase units, start-up costs and equipment rigging. Units greater than 20 tons include dual compressors. Excludes piping and power wiring.

23 64 23 16-0002	EA	20 Ton Packaged Water Cooled Scroll Water Chiller	28,111.20	2,129.21
23 64 23 16-0003	EA	25 Ton Packaged Water Cooled Scroll Water Chiller	32,274.28	2,193.53
23 64 23 16-0004	EA	30 Ton Packaged Water Cooled Scroll Water Chiller	35,797.36	2,408.05
23 64 23 16-0005	EA	40 Ton Packaged Water Cooled Scroll Water Chiller	44,084.17	3,087.63
23 64 23 16-0006	EA	50 Ton Packaged Water Cooled Scroll Water Chiller	48,759.08	3,383.73
23 64 23 16-0007	EA	60 Ton Packaged Water Cooled Scroll Water Chiller	51,289.78	3,738.59

23 64 26 Rotary-Screw Water Chillers (23 64)**23 64 26 13 Air-Cooled, Rotary-Screw Water Chillers (23 64 26)****23 64 26 13-0001 Packaged Air Cooled Rotary-Screw Water Chillers (23 64 26 13)**

Note: Includes hermetic direct-drive compressors start-up, coil guards, copper fins, copper tubes, factory wired and installed control panel, refrigerant monitor with scanner, audible alarm, and lights, phase monitoring for 3 phase units, 440/460 voltage motor rating, motor starters, factory charge of refrigerant and equipment rigging. Units greater than 20 tons include dual compressors. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.

23 64 26 13-0002	EA	70 Ton Packaged Air Cooled Rotary-Screw Water Chiller	106,895.13	4,109.43
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-1,511.05</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>4,029.45</i>	
23 64 26 13-0003	EA	80 Ton Packaged Air Cooled Rotary-Screw Water Chiller	114,880.03	4,463.51
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-1,622.93</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>4,327.82</i>	
23 64 26 13-0004	EA	90 Ton Packaged Air Cooled Rotary-Screw Water Chiller	120,848.03	4,656.64
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-1,707.95</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>4,554.52</i>	
23 64 26 13-0005	EA	100 Ton Packaged Air Cooled Rotary-Screw Water Chiller	125,294.75	5,010.72
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-1,766.76</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>4,711.36</i>	
23 64 26 13-0006	EA	110 Ton Packaged Air Cooled Rotary-Screw Water Chiller	134,482.51	5,257.50
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-1,899.10</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>5,064.28</i>	
23 64 26 13-0007	EA	120 Ton Packaged Air Cooled Rotary-Screw Water Chiller	142,934.72	5,364.79
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,023.31</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>5,395.50</i>	
23 64 26 13-0008	EA	130 Ton Packaged Air Cooled Rotary-Screw Water Chiller	150,896.11	5,547.20
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,138.71</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>5,703.23</i>	
23 64 26 13-0009	EA	140 Ton Packaged Air Cooled Rotary-Screw Water Chiller	155,727.88	5,665.23
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,208.45</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>5,889.20</i>	
23 64 26 13-0010	EA	160 Ton Packaged Air Cooled Rotary-Screw Water Chiller	164,461.25	5,783.24
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,336.72</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>6,231.24</i>	
23 64 26 13-0011	EA	170 Ton Packaged Air Cooled Rotary-Screw Water Chiller	171,676.43	5,965.65
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,440.92</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>6,509.12</i>	
23 64 26 13-0012	EA	180 Ton Packaged Air Cooled Rotary-Screw Water Chiller	181,042.53	6,201.70
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,576.10</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>6,869.60</i>	
23 64 26 13-0013	EA	200 Ton Packaged Air Cooled Rotary-Screw Water Chiller	189,260.60	6,330.45
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,696.63</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>7,191.03</i>	
23 64 26 13-0014	EA	215 Ton Packaged Air Cooled Rotary-Screw Water Chiller	202,915.44	6,437.76
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-2,898.88</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>7,730.35</i>	
23 64 26 13-0015	EA	225 Ton Packaged Air Cooled Rotary-Screw Water Chiller	211,990.07	6,502.13
		<i>For Aluminum Fins Instead Of Copper, Deduct</i>	<i>-3,033.71</i>	
		<i>For 208/230 Voltage Motor Rating, Add</i>	<i>8,089.90</i>	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 64 26 13-0016 EA 240 Ton Packaged Air Cooled Rotary-Screw Water Chiller..... <i>For Aluminum Fins Instead Of Copper, Deduct</i> <i>For 208/230 Voltage Motor Rating, Add</i>	221,064.68 -3,168.55 8,449.46	6,555.77
23 64 26 13-0017 EA 260 Ton Packaged Air Cooled Rotary-Screw Water Chiller..... <i>For Aluminum Fins Instead Of Copper, Deduct</i> <i>For 208/230 Voltage Motor Rating, Add</i>	248,224.15 -3,573.04 9,528.11	6,684.54
23 64 26 13-0018 EA 280 Ton Packaged Air Cooled Rotary-Screw Water Chiller..... <i>For Aluminum Fins Instead Of Copper, Deduct</i> <i>For 208/230 Voltage Motor Rating, Add</i>	261,889.74 -3,775.29 10,067.44	6,813.29
23 64 26 13-0019 EA 300 Ton Packaged Air Cooled Rotary-Screw Water Chiller..... <i>For Aluminum Fins Instead Of Copper, Deduct</i> <i>For 208/230 Voltage Motor Rating, Add</i>	280,038.98 -4,044.95 10,786.54	6,920.58
23 64 26 13-0020 EA 325 Ton Packaged Air Cooled Rotary-Screw Water Chiller..... <i>For Aluminum Fins Instead Of Copper, Deduct</i> <i>For 208/230 Voltage Motor Rating, Add</i>	307,176.99 -4,449.45 11,865.19	7,038.61
23 64 26 13-0021 EA 350 Ton Packaged Air Cooled Rotary-Screw Water Chiller..... <i>For Aluminum Fins Instead Of Copper, Deduct</i> <i>For 208/230 Voltage Motor Rating, Add</i>	334,936.55 -4,863.75 12,970.00	7,124.44

23 64 26 16 Water-Cooled, Rotary-Screw Water Chillers (23 64 26)

23 64 26 16-0001 Packaged Water Cooled Helical Rotary Water Chillers (23 64 26 16)		
Note: Integral heat exchanger. Rated by cooling capacity in tons. Factory assembled package type includes semi-hermetic compressor, motor, cooler, condenser, internal piping, oil, discharge/suction gages, lead-lag switch, compressor unloaders, removable core filter dryer, 3-valve by-pass, sight glass, internal wiring, motor starters, insulation, standard oil hi/low safety control switches, operation and safety controls, factory wired and installed control panel, full factory refrigerant charge, vibration eliminators, NEMA 1 flow switches, wye-delta starter, extended warranty on compressor(s), start-up costs and equipment rigging. Excludes piping and power wiring.		
23 64 26 16-0002 EA 70 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	70,524.58	5,222.55
23 64 26 16-0003 EA 80 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	76,539.24	5,425.65
23 64 26 16-0004 EA 90 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	81,764.30	5,570.72
23 64 26 16-0005 EA 100 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	86,314.31	5,805.73
23 64 26 16-0006 EA 110 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	90,832.61	5,965.31
23 64 26 16-0007 EA 125 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	96,335.74	6,132.78
23 64 26 16-0008 EA 130 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	129,978.92	6,304.20
23 64 26 16-0009 EA 150 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	134,938.12	6,474.80
23 64 26 16-0010 EA 175 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	138,651.13	6,635.07
23 64 26 16-0011 EA 190 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	140,054.06	6,966.88
23 64 26 16-0012 EA 200 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	139,073.39	7,302.87
23 64 26 16-0013 EA 210 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	147,143.30	7,459.19
23 64 26 16-0014 EA 235 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	159,914.43	7,622.36
23 64 26 16-0015 EA 255 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	169,898.16	7,971.23
23 64 26 16-0016 EA 275 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	179,343.55	8,293.88
23 64 26 16-0017 EA 300 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	190,337.97	8,622.43
23 64 26 16-0018 EA 350 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	208,948.80	9,386.66
23 64 26 16-0019 EA 400 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	224,186.38	10,324.40
23 64 26 16-0020 EA 450 Ton Packaged Water Cooled Helical Rotary Water Chiller.....	236,067.70	11,357.31

23 65 Cooling Towers (23 60)

23 65 13 Forced-Draft Cooling Towers (23 65)

23 65 13 16 Closed-Circuit, Forced-Draft Cooling Towers (23 65 13)

23 65 13 16-0001 Closed-Circuit, Forced-Draft Cooling Towers (23 65 13 16)		
Note: Including 2-speed motor, vibration switch, start-up costs and equipment rigging. Excludes motor starter, piping and power wiring. Rated by cooling capacity in tons. Design temperature 95 degree F in, 85 degree F out.		
23 65 13 16-0003 EA 50 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	20,639.59 10,780.75	1,781.11
23 65 13 16-0004 EA 75 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	28,486.90 15,141.50	2,178.11
23 65 13 16-0005 EA 100 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	35,691.57 18,775.46	2,736.04
23 65 13 16-0006 EA 125 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	41,176.85 21,757.62	3,057.93
23 65 13 16-0007 EA 150 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	47,067.44 24,918.59	3,444.20
23 65 13 16-0008 EA 175 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	52,924.05 28,033.41	3,862.65
23 65 13 16-0009 EA 200 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	59,400.40 31,494.32	4,302.57
23 65 13 16-0010 EA 225 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	64,894.77 34,263.05	4,849.78
23 65 13 16-0011 EA 250 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	70,686.06 37,216.37	5,386.25
23 65 13 16-0012 EA 275 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	77,339.32 40,261.97	6,373.37
23 65 13 16-0013 EA 300 Ton Blow-Thru Centrifugal Fan Type Cooling Tower..... <i>For Stainless Steel Cooling Tower, Add</i>	84,031.11 43,607.53	7,060.07

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 60 Central Cooling Equipment

23 65 Cooling Towers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 65 13 16-0014	EA		325 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	88,541.81	7,510.71
			<i>For Stainless Steel Cooling Tower, Add</i>	45,914.80	
23 65 13 16-0015	EA		350 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	93,822.03	7,950.63
			<i>For Stainless Steel Cooling Tower, Add</i>	48,625.85	
23 65 13 16-0016	EA		375 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	98,962.76	8,336.89
			<i>For Stainless Steel Cooling Tower, Add</i>	51,336.90	
23 65 13 16-0017	EA		400 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	104,861.85	8,723.16
			<i>For Stainless Steel Cooling Tower, Add</i>	54,509.41	
23 65 13 16-0018	EA		425 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	111,103.43	9,195.26
			<i>For Stainless Steel Cooling Tower, Add</i>	57,797.27	
23 65 13 16-0019	EA		450 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	118,199.52	9,667.36
			<i>For Stainless Steel Cooling Tower, Add</i>	61,604.29	
23 65 13 16-0020	EA		475 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	125,102.90	10,075.08
			<i>For Stainless Steel Cooling Tower, Add</i>	65,353.61	
23 65 13 16-0021	EA		500 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	132,017.00	10,482.81
			<i>For Stainless Steel Cooling Tower, Add</i>	69,102.93	
23 65 13 16-0022	EA		550 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	145,212.18	10,922.72
			<i>For Stainless Steel Cooling Tower, Add</i>	76,601.58	
23 65 13 16-0023	EA		600 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	159,560.99	11,351.90
			<i>For Stainless Steel Cooling Tower, Add</i>	84,792.41	
23 65 13 16-0024	EA		650 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	165,415.02	11,587.95
			<i>For Stainless Steel Cooling Tower, Add</i>	88,253.33	
23 65 13 16-0025	EA		700 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	172,422.68	11,738.16
			<i>For Stainless Steel Cooling Tower, Add</i>	92,406.43	
23 65 13 16-0026	EA		750 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	180,480.99	12,339.03
			<i>For Stainless Steel Cooling Tower, Add</i>	96,674.89	
23 65 13 16-0027	EA		800 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	189,885.20	12,939.88
			<i>For Stainless Steel Cooling Tower, Add</i>	101,750.89	
23 65 13 16-0028	EA		850 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	199,375.26	13,594.38
			<i>For Stainless Steel Cooling Tower, Add</i>	106,826.90	
23 65 13 16-0029	EA		900 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	210,403.50	14,248.90
			<i>For Stainless Steel Cooling Tower, Add</i>	112,825.82	
23 65 13 16-0030	EA		950 Ton Blow-Thru Centrifugal Fan Type Cooling Tower.....	221,774.24	14,999.96
			<i>For Stainless Steel Cooling Tower, Add</i>	118,940.11	
23 65 13 16-0031	EA		1,000 Ton Centrifugal Type Cooling Tower	234,672.39	15,751.03
			<i>For Stainless Steel Cooling Tower, Add</i>	125,977.30	

23 65 14 Induced-Draft Cooling Towers (23 65)

23 65 14 14 Open-Circuit, Induced-Draft Crossflow Cooling Towers (23 65 14)

23 65 14 14-0001 Galvanized Induced Draft Crossflow Film Filled Propeller Type Cooling Towers (23 65 14 14)

Note: Includes fan, 2-speed motor, geared speed reducer, louvers, drift eliminators, hot water distribution system, cold water collection basin, float valve and access door, vibration switch, start-up costs and equipment rigging. Excludes motor starter, piping and power wiring. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.

23 65 14 14-0002	EA		10 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	8,873.44	1,201.71
			<i>For Polymer Coating Over Galvanized Components, Add</i>	1,060.63	
			<i>For Stainless Steel Support Structure, Add</i>	2,121.26	
23 65 14 14-0003	EA		15 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	9,592.89	1,223.17
			<i>For Polymer Coating Over Galvanized Components, Add</i>	1,165.33	
			<i>For Stainless Steel Support Structure, Add</i>	2,330.66	
23 65 14 14-0004	EA		20 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	10,432.19	1,330.47
			<i>For Polymer Coating Over Galvanized Components, Add</i>	1,265.47	
			<i>For Stainless Steel Support Structure, Add</i>	2,530.95	
23 65 14 14-0005	EA		25 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	12,228.20	1,394.84
			<i>For Polymer Coating Over Galvanized Components, Add</i>	1,520.39	
			<i>For Stainless Steel Support Structure, Add</i>	3,040.78	
23 65 14 14-0006	EA		30 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	13,872.46	1,459.23
			<i>For Polymer Coating Over Galvanized Components, Add</i>	1,752.54	
			<i>For Stainless Steel Support Structure, Add</i>	3,505.09	
23 65 14 14-0007	EA		35 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	15,477.50	1,534.33
			<i>For Polymer Coating Over Galvanized Components, Add</i>	1,975.60	
			<i>For Stainless Steel Support Structure, Add</i>	3,951.19	
23 65 14 14-0008	EA		40 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	16,950.41	1,609.44
			<i>For Polymer Coating Over Galvanized Components, Add</i>	2,180.44	
			<i>For Stainless Steel Support Structure, Add</i>	4,360.88	
23 65 14 14-0009	EA		45 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	18,585.80	1,695.27
			<i>For Polymer Coating Over Galvanized Components, Add</i>	2,408.04	
			<i>For Stainless Steel Support Structure, Add</i>	4,816.09	
23 65 14 14-0010	EA		50 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	20,181.95	1,781.11
			<i>For Polymer Coating Over Galvanized Components, Add</i>	2,626.54	
			<i>For Stainless Steel Support Structure, Add</i>	5,253.08	
23 65 14 14-0011	EA		60 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	23,329.48	1,920.59
			<i>For Polymer Coating Over Galvanized Components, Add</i>	3,068.09	
			<i>For Stainless Steel Support Structure, Add</i>	6,136.19	
23 65 14 14-0012	EA		70 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	26,741.24	2,070.82
			<i>For Polymer Coating Over Galvanized Components, Add</i>	3,546.06	
			<i>For Stainless Steel Support Structure, Add</i>	7,092.12	
23 65 14 14-0013	EA		75 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower	28,317.76	2,178.11
			<i>For Polymer Coating Over Galvanized Components, Add</i>	3,760.01	
			<i>For Stainless Steel Support Structure, Add</i>	7,520.01	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 65 14 14-0014 EA 80 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	30,023.05 3,973.95 7,947.91	2,360.51
23 65 14 14-0015 EA 90 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	31,273.14 4,119.62 8,239.24	2,542.92
23 65 14 14-0016 EA 100 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	33,593.04 4,379.09 8,758.17	2,736.04
23 65 14 14-0017 EA 125 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	34,927.43 4,501.99 9,003.98	3,057.93
23 65 14 14-0018 EA 150 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	40,587.36 5,257.64 10,515.27	3,444.20
23 65 14 14-0019 EA 175 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	44,833.56 5,794.78 11,589.56	3,862.65
23 65 14 14-0020 EA 200 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	47,150.11 6,036.04 12,072.08	4,302.57
23 65 14 14-0021 EA 225 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	54,524.21 7,010.18 14,020.36	4,849.78
23 65 14 14-0022 EA 250 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	59,763.30 7,665.68 15,331.36	5,386.25
23 65 14 14-0023 EA 275 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	63,798.66 8,034.39 16,068.79	6,373.37
23 65 14 14-0024 EA 300 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	68,798.96 8,617.06 17,234.12	7,060.07
23 65 14 14-0025 EA 350 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	78,662.49 9,882.53 19,765.07	7,950.63
23 65 14 14-0026 EA 400 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	86,724.49 10,906.75 21,813.50	8,723.16
23 65 14 14-0027 EA 450 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	95,854.48 12,049.32 24,098.63	9,667.36
23 65 14 14-0028 EA 500 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	104,457.53 13,141.81 26,283.62	10,482.81
23 65 14 14-0029 EA 600 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	119,508.57 15,190.24 30,380.48	11,351.90
23 65 14 14-0030 EA 700 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	134,277.20 17,379.78 34,759.57	11,738.16
23 65 14 14-0031 EA 800 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	150,125.27 19,473.73 38,947.47	12,939.88
23 65 14 14-0032 EA 900 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	165,477.38 21,467.54 42,935.08	14,248.90
23 65 14 14-0033 EA 1,000 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	180,481.89 23,365.75 46,731.50	15,751.03
23 65 14 14-0034 EA 1,100 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	197,665.81 25,764.69 51,529.38	16,512.84
23 65 14 14-0035 EA 1,200 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	214,239.10 28,081.69 56,163.38	17,221.00
23 65 14 14-0036 EA 1,300 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	227,815.45 29,770.50 59,541.01	18,701.66
23 65 14 14-0037 EA 1,400 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	240,926.20 31,363.73 62,727.46	20,289.64
23 65 14 14-0038 EA 1,500 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	253,539.16 32,861.36 65,722.71	21,963.46
23 65 14 14-0039 EA 1,600 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	265,185.88 34,254.29 68,508.58	23,476.34
23 65 14 14-0040 EA 1,700 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	276,519.04 35,547.08 71,094.15	25,203.80
23 65 14 14-0041 EA 1,800 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower..... <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	287,644.06 36,744.27 73,488.54	27,199.51

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 60 Central Cooling Equipment

23 65 Cooling Towers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 65 14 14-0042	EA		1,900 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	298,060.45 37,836.77 75,673.53	29,195.21
23 65 14 14-0043	EA		2,000 Ton Induced Draft Crossflow Film Filled Propeller Type Cooling Tower <i>For Polymer Coating Over Galvanized Components, Add</i> <i>For Stainless Steel Support Structure, Add</i>	308,976.85 38,833.67 77,667.33	31,920.53

23 65 14 14-0044 Induced Draft Crossflow Stainless Steel Propeller Type Cooling Towers^{(23 65}

^{14 14)}

Note: Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.

23 65 14 14-0045	EA		100 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	90,872.47 4,323.67	2,736.04
23 65 14 14-0046	EA		125 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	103,004.80 4,904.53	3,036.47
23 65 14 14-0047	EA		150 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	112,555.14 5,350.93	3,444.20
23 65 14 14-0048	EA		200 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	125,043.31 5,906.67	4,302.57
23 65 14 14-0049	EA		250 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	141,547.02 6,644.41	5,386.25
23 65 14 14-0050	EA		300 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	162,363.33 7,550.57	7,060.07
23 65 14 14-0051	EA		350 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	176,847.39 8,203.42	7,950.63
23 65 14 14-0052	EA		400 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	191,138.31 8,856.27	8,723.16
23 65 14 14-0053	EA		500 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	220,542.23 10,184.84	10,482.81
23 65 14 14-0054	EA		600 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	249,191.65 11,547.57	11,351.90
23 65 14 14-0055	EA		750 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	308,841.64 14,422.77	12,339.03
23 65 14 14-0056	EA		1,000 Ton Induced Draft Crossflow Stainless Steel Propeller Type Cooling Tower <i>For Induced Draft Counter Flow Type, Add</i>	401,058.08 18,817.39	15,751.03

23 65 14 16 Closed-Circuit, Induced-Draft Counterflow Cooling Towers^(23 65 14)

23 65 14 16-0001 Stainless Steel Packaged Propeller Type Cooling Towers^(23 65 14 16)

Note: Including internal piping, fan, motor, vibration switch, start-up costs and equipment rigging. Excludes motor starter, piping or power wiring. Rated by cooling capacity in tons. Based on design water temperature 95 degree F in, 85 degree F out 79 degree F wet Bulb. 3 GPM/ton.

23 65 14 16-0002 Draw-Thru Stainless Steel Propeller Type Cooling Towers^(23 65 14 16-0001)

Note: Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.

23 65 14 16-0003	EA		50 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	38,103.10	1,781.11
23 65 14 16-0004	EA		75 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	54,211.47	2,178.11
23 65 14 16-0005	EA		100 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	63,834.84	2,736.04
23 65 14 16-0006	EA		125 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	72,372.41	3,057.93
23 65 14 16-0007	EA		150 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	79,378.35	3,444.20
23 65 14 16-0008	EA		200 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	95,157.94	4,302.57
23 65 14 16-0009	EA		250 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	111,937.83	5,386.25
23 65 14 16-0010	EA		300 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	132,586.62	7,060.07
23 65 14 16-0011	EA		350 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	145,114.84	7,950.63
23 65 14 16-0012	EA		400 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	164,571.53	8,723.16
23 65 14 16-0013	EA		500 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	190,711.19	10,482.81
23 65 14 16-0014	EA		600 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	215,372.35	11,351.90
23 65 14 16-0015	EA		750 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	266,599.80	12,339.03
23 65 14 16-0016	EA		1,000 Ton Draw-Thru Stainless Steel Propeller Type Cooling Tower	339,704.09	15,579.36

23 65 14 16-0017 Belt Driven Stainless Steel Propeller Type Cooling Towers^(23 65 14 16-0001)

Note: Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.

23 65 14 16-0018	EA		100 Ton Belt Driven Stainless Steel Propeller Type Cooling Tower	66,510.53	2,736.04
23 65 14 16-0019	EA		125 Ton Belt Driven Stainless Steel Propeller Type Cooling Tower	71,955.89	3,057.93
23 65 14 16-0020	EA		150 Ton Belt Driven Stainless Steel Propeller Type Cooling Tower	77,513.07	3,444.20
23 65 14 16-0021	EA		200 Ton Belt Driven Stainless Steel Propeller Type Cooling Tower	91,631.10	4,302.57
23 65 14 16-0022	EA		250 Ton Belt Driven Stainless Steel Propeller Type Cooling Tower	100,895.50	5,386.25

23 70 Central HVAC Equipment⁽²³⁾

Note: New air filters shall be provided on HVAC equipment prior to turning over to owner. Where required, mechanical equipment excludes electrical connection, disconnect, or starter unless title states otherwise. See CSI section 26 05 19 16-0011 for electrical connection and termination, 26 05 83 00-0110 for terminations, 26 28 16 16-0001 for disconnect.

23 72 Air-To-Air Energy Recovery Equipment^(23 70)

23 72 16 Heat-Pipe Air-To-Air Energy-Recovery Equipment^(23 72)

23 72 16 00-0001 Glycol Heat Pipe Type, 50 Percent Efficient^(23 72 16)

23 72 16 00-0002	EA		100 MBH, 1,700 CFM Glycol Heat Recovery Unit	19,122.18	574.32
23 72 16 00-0003	EA		160 MBH, 2,700 CFM Glycol Heat Recovery Unit	30,077.71	765.81
23 72 16 00-0004	EA		620 MBH, 4,000 CFM Glycol Heat Recovery Unit	44,587.93	1,148.66



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Central HVAC Equipment	23 70
Air-To-Air Energy Recovery Equipment	23 72

23

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 73 Indoor Central-Station Air-Handling Units (23 73)

23 73 13 Modular Indoor Central-Station Air-Handling Units (23 73)

Note: Sized by CFM. Includes motor drive vibration isolators. Use modifiers for Filters and heating and cooling coils. Includes double wall insulated casing, fan section, fan motor, internal dampers, starter, vibration isolators and equipment rigging. Variable speed drives are included on units with 10 HP or greater fans. Modifiers include cooling coil sections with 6 row aluminum fin coil and drain pan, heating coil section with 1 row aluminum fin coil, and filter section with replaceable filters.

23 73 13 00-0001 Single Zone Units (23 73 13)

Note: Horizontal/vertical draw-thru fan, motor and cabinet.

23 73 13 00-0002	EA 300 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan.....	2,762.95	618.36
	For Flat Filter Box And Throwaway Filters, Add	232.13	
	For Medium Capacity Filter Box And Throwaway Filters, Add	437.75	
	For Combination Filter Mixing Box And Throwaway Filters, Add	652.21	
	For Manual Roll Filter, Add	1,122.11	
	For Automatic Roll Filter, Add	1,216.09	
	For Hot Water Heating Coil, Aluminum Fins, Add	558.23	
	For Electric Heating Coil, Add	934.15	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	934.15	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	840.17	
	For Steam Heating Coil, Aluminum Fins, Add	746.19	
	For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add	608.04	
	For Chilled Water Cooling Coil, Copper Fins, Add	1,122.11	
	For Direct Expansion Cooling Coil, Copper Fins, Add	1,028.13	
	For Hot Water Heating Coil, Copper Fins, Add	746.19	
	For Variable Air Volume, Add	263.14	
	For Economizer, Panel, Controls And Damper(s), Add	1,258.36	
	For 2 Coils, Independent Circuits, Add	313.89	
23 73 13 00-0003	EA 500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan.....	4,384.61	742.03
	For Flat Filter Box And Throwaway Filters, Add	385.50	
	For Medium Capacity Filter Box And Throwaway Filters, Add	739.23	
	For Combination Filter Mixing Box And Throwaway Filters, Add	1,103.54	
	For Manual Roll Filter, Add	1,934.90	
	For Automatic Roll Filter, Add	2,101.17	
	For Hot Water Heating Coil, Aluminum Fins, Add	937.27	
	For Electric Heating Coil, Add	1,602.35	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	1,602.35	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	1,436.08	
	For Steam Heating Coil, Aluminum Fins, Add	1,269.81	
	For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add	1,050.58	
	For Chilled Water Cooling Coil, Copper Fins, Add	1,934.90	
	For Direct Expansion Cooling Coil, Copper Fins, Add	1,768.63	
	For Hot Water Heating Coil, Copper Fins, Add	1,269.81	
	For Variable Air Volume, Add	465.56	
	For Economizer, Panel, Controls And Damper(s), Add	1,381.44	
	For 2 Coils, Independent Circuits, Add	504.97	
23 73 13 00-0004	EA 800 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan.....	4,960.04	796.91
	For Flat Filter Box And Throwaway Filters, Add	439.09	
	For Medium Capacity Filter Box And Throwaway Filters, Add	844.02	
	For Combination Filter Mixing Box And Throwaway Filters, Add	1,260.34	
	For Manual Roll Filter, Add	2,215.76	
	For Automatic Roll Filter, Add	2,406.84	
	For Hot Water Heating Coil, Aluminum Fins, Add	1,069.26	
	For Electric Heating Coil, Add	1,833.59	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	1,833.59	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	1,642.51	
	For Steam Heating Coil, Aluminum Fins, Add	1,451.42	
	For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add	1,203.42	
	For Chilled Water Cooling Coil, Copper Fins, Add	2,215.76	
	For Direct Expansion Cooling Coil, Copper Fins, Add	2,024.68	
	For Hot Water Heating Coil, Copper Fins, Add	1,451.42	
	For Variable Air Volume, Add	535.04	
	For Economizer, Panel, Controls And Damper(s), Add	1,436.85	
	For 2 Coils, Independent Circuits, Add	572.44	
23 73 13 00-0005	EA 1,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan.....	5,600.07	856.32
	For Flat Filter Box And Throwaway Filters, Add	498.83	
	For Medium Capacity Filter Box And Throwaway Filters, Add	960.96	
	For Combination Filter Mixing Box And Throwaway Filters, Add	1,435.32	
	For Manual Roll Filter, Add	2,529.46	
	For Automatic Roll Filter, Add	2,748.29	
	For Hot Water Heating Coil, Aluminum Fins, Add	1,216.49	
	For Electric Heating Coil, Add	2,091.81	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	2,091.81	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	1,872.98	
	For Steam Heating Coil, Aluminum Fins, Add	1,654.15	
	For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add	1,374.15	
	For Chilled Water Cooling Coil, Copper Fins, Add	2,529.46	
	For Direct Expansion Cooling Coil, Copper Fins, Add	2,310.64	
	For Hot Water Heating Coil, Copper Fins, Add	1,654.15	
	For Variable Air Volume, Add	612.72	
	For Economizer, Panel, Controls And Damper(s), Add	1,496.45	
	For 2 Coils, Independent Circuits, Add	647.54	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 73 Indoor Central-Station Air-Handling Units**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 73 13 00-0006	EA		1,200 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	6,355.41	921.24
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	569.81	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	1,100.19	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	1,643.72	
			<i>For Manual Roll Filter, Add</i>	2,903.93	
			<i>For Automatic Roll Filter, Add</i>	3,155.98	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	1,391.67	
			<i>For Electric Heating Coil, Add</i>	2,399.85	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	2,399.85	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	2,147.80	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	1,895.76	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	1,577.99	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	2,903.93	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	2,651.89	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	1,895.76	
			<i>For Variable Air Volume, Add</i>	705.72	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	1,560.18	
			<i>For 2 Coils, Independent Circuits, Add</i>	736.36	
23 73 13 00-0007	EA		1,400 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	7,236.70	990.04
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	652.96	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	1,263.48	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	1,888.15	
			<i>For Manual Roll Filter, Add</i>	3,343.75	
			<i>For Automatic Roll Filter, Add</i>	3,634.87	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	1,597.03	
			<i>For Electric Heating Coil, Add</i>	2,761.51	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	2,761.51	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	2,470.39	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	2,179.27	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	1,817.44	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	3,343.75	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	3,052.63	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	2,179.27	
			<i>For Variable Air Volume, Add</i>	815.14	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	1,630.01	
			<i>For 2 Coils, Independent Circuits, Add</i>	840.12	
23 73 13 00-0008	EA		1,600 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	7,925.85	1,064.35
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	716.72	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	1,387.92	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	2,074.30	
			<i>For Manual Roll Filter, Add</i>	3,676.43	
			<i>For Automatic Roll Filter, Add</i>	3,996.86	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	1,753.87	
			<i>For Electric Heating Coil, Add</i>	3,035.58	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	3,035.58	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	2,715.15	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	2,394.72	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	1,998.43	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	3,676.43	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	3,356.01	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	2,394.72	
			<i>For Variable Air Volume, Add</i>	897.20	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	1,702.11	
			<i>For 2 Coils, Independent Circuits, Add</i>	920.76	
23 73 13 00-0009	EA		1,800 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	8,672.06	1,147.06
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	785.29	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	1,521.43	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	2,273.96	
			<i>For Manual Roll Filter, Add</i>	4,032.40	
			<i>For Automatic Roll Filter, Add</i>	4,384.09	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	1,922.27	
			<i>For Electric Heating Coil, Add</i>	3,329.03	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	3,329.03	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	2,977.34	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	2,625.65	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	2,192.05	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	4,032.40	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	3,680.71	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	2,625.65	
			<i>For Variable Air Volume, Add</i>	984.73	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	1,651.06	
			<i>For 2 Coils, Independent Circuits, Add</i>	1,007.88	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73 13 00-0010 EA 2,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	9,494.05 861.56 1,670.41 2,496.84 4,431.12 4,817.98 2,109.98 3,657.41 3,657.41 3,270.55 2,883.69 2,408.99 4,431.12 4,044.27 2,883.69 1,083.20 1,716.30 1,104.15	1,229.76
23 73 13 00-0011 EA 2,250 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	10,250.72 930.65 1,804.66 2,697.55 4,788.14 5,206.26 2,279.43 3,951.90 3,951.90 3,533.78 3,115.66 2,603.13 4,788.14 4,370.02 3,115.66 1,170.73 1,788.59 1,192.32	1,321.85
23 73 13 00-0012 EA 2,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	11,058.34 1,004.25 1,947.55 2,911.17 5,167.84 5,619.17 2,459.83 4,265.17 4,265.17 3,813.84 3,362.50 2,809.58 5,167.84 4,716.50 3,362.50 1,263.73 1,867.42 1,286.37	1,422.33
23 73 13 00-0013 EA 3,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	12,863.48 1,168.75 2,266.95 3,388.66 6,016.56 6,542.14 2,863.09 4,965.40 4,965.40 4,439.82 3,914.24 3,271.07 6,016.56 5,490.98 3,914.24 1,471.62 2,043.55 1,496.58	1,646.38

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 73 Indoor Central-Station Air-Handling Units**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 73 13 00-0014	EA	3,250 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	13,469.67	1,769.28
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,220.55	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	2,365.26	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	3,535.25	
		<i>For Manual Roll Filter, Add</i>	6,270.61	
		<i>For Automatic Roll Filter, Add</i>	6,817.68	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	2,988.18	
		<i>For Electric Heating Coil, Add</i>	5,176.46	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	5,176.46	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	4,629.39	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	4,082.32	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	3,408.84	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	6,270.61	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	5,723.54	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	4,082.32	
		<i>For Variable Air Volume, Add</i>	1,531.80	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,140.54	
		<i>For 2 Coils, Independent Circuits, Add</i>	1,565.80	
23 73 13 00-0015	EA	3,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	14,087.65	1,901.45
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,272.95	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	2,464.40	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	3,683.02	
		<i>For Manual Roll Filter, Add</i>	6,525.83	
		<i>For Automatic Roll Filter, Add</i>	7,094.40	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	3,114.45	
		<i>For Electric Heating Coil, Add</i>	5,388.71	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	5,388.71	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	4,820.14	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	4,251.58	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	3,547.20	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	6,525.83	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	5,957.27	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	4,251.58	
		<i>For Variable Air Volume, Add</i>	1,591.98	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,244.01	
		<i>For 2 Coils, Independent Circuits, Add</i>	1,636.19	
23 73 13 00-0016	EA	4,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	15,446.07	2,195.18
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,387.76	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	2,681.41	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	4,006.43	
		<i>For Manual Roll Filter, Add</i>	7,083.70	
		<i>For Automatic Roll Filter, Add</i>	7,699.16	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	3,390.97	
		<i>For Electric Heating Coil, Add</i>	5,852.79	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	5,852.79	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	5,237.34	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	4,621.88	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	3,849.58	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	7,083.70	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	6,468.25	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	4,621.88	
		<i>For Variable Air Volume, Add</i>	1,723.27	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,194.79	
		<i>For 2 Coils, Independent Circuits, Add</i>	1,790.79	
23 73 13 00-0017	EA	4,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	15,446.07	2,195.18
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,387.76	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	2,681.41	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	4,006.43	
		<i>For Manual Roll Filter, Add</i>	7,083.70	
		<i>For Automatic Roll Filter, Add</i>	7,699.16	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	3,390.97	
		<i>For Electric Heating Coil, Add</i>	5,852.79	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	5,852.79	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	5,237.34	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	4,621.88	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	3,849.58	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	7,083.70	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	6,468.25	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	4,621.88	
		<i>For Variable Air Volume, Add</i>	1,723.27	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,194.79	
		<i>For 2 Coils, Independent Circuits, Add</i>	1,790.79	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73 13 00-0018 EA 5,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	16,927.74 1,512.64 2,917.20 4,357.79 7,689.06 8,355.32 3,691.54 6,356.56 6,356.56 5,690.30 5,024.05 4,177.66 7,689.06 7,022.81 5,024.05 1,865.51 2,381.06 1,959.28	2,521.36
23 73 13 00-0019 EA 5,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	17,780.88 1,582.65 3,048.04 4,552.52 8,020.56 8,714.17 3,858.91 6,633.34 6,633.34 5,939.74 5,246.13 4,357.08 8,020.56 7,326.95 5,246.13 1,942.10 2,503.49 2,055.53	2,735.47
23 73 13 00-0020 EA 6,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	18,617.76 1,651.85 3,177.74 4,745.62 8,350.43 9,071.39 4,024.66 6,908.51 6,908.51 6,187.55 5,466.58 4,535.70 8,350.43 7,629.47 5,466.58 2,018.69 2,619.41 2,150.16	2,938.75
23 73 13 00-0021 EA 6,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	19,459.54 1,721.29 3,307.79 4,939.21 8,680.79 9,429.10 4,190.90 7,184.16 7,184.16 6,435.84 5,687.53 4,714.55 8,680.79 7,932.47 5,687.53 2,095.28 2,737.30 2,245.28	3,145.91

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 73 Indoor Central-Station Air-Handling Units**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 73 13 00-0022	EA	7,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	20,429.26	3,386.29
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,801.04	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	3,456.95	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	5,161.23	
		<i>For Manual Roll Filter, Add</i>	9,059.11	
		<i>For Automatic Roll Filter, Add</i>	9,838.69	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	4,381.66	
		<i>For Electric Heating Coil, Add</i>	7,499.96	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	7,499.96	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	6,720.39	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	5,940.81	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	4,919.35	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	9,059.11	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	8,279.54	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	5,940.81	
		<i>For Variable Air Volume, Add</i>	2,182.81	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,875.09	
		<i>For 2 Coils, Independent Circuits, Add</i>	2,354.76	
23 73 13 00-0023	EA	7,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	21,413.05	3,628.22
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,881.49	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	3,607.09	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	5,384.66	
		<i>For Manual Roll Filter, Add</i>	9,438.84	
		<i>For Automatic Roll Filter, Add</i>	10,249.68	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	4,573.82	
		<i>For Electric Heating Coil, Add</i>	7,817.17	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	7,817.17	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	7,006.33	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	6,195.49	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	5,124.84	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	9,438.84	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	8,628.01	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	6,195.49	
		<i>For Variable Air Volume, Add</i>	2,270.35	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,738.89	
		<i>For 2 Coils, Independent Circuits, Add</i>	2,465.64	
23 73 13 00-0024	EA	8,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	22,425.87	3,907.15
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	1,963.39	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	3,759.27	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	5,610.98	
		<i>For Manual Roll Filter, Add</i>	9,821.48	
		<i>For Automatic Roll Filter, Add</i>	10,663.58	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	4,768.88	
		<i>For Electric Heating Coil, Add</i>	8,137.28	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	8,137.28	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	7,295.18	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	6,453.08	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	5,331.79	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	9,821.48	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	8,979.38	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	6,453.08	
		<i>For Variable Air Volume, Add</i>	2,357.88	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,855.17	
		<i>For 2 Coils, Independent Circuits, Add</i>	2,579.43	
23 73 13 00-0025	EA	9,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan	23,579.31	4,232.67
		<i>For Flat Filter Box And Throwaway Filters, Add</i>	2,056.23	
		<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	3,931.45	
		<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	5,867.00	
		<i>For Manual Roll Filter, Add</i>	10,253.34	
		<i>For Automatic Roll Filter, Add</i>	11,130.61	
		<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	4,989.73	
		<i>For Electric Heating Coil, Add</i>	8,498.80	
		<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	8,498.80	
		<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	7,621.54	
		<i>For Steam Heating Coil, Aluminum Fins, Add</i>	6,744.27	
		<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	5,565.30	
		<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	10,253.34	
		<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	9,376.07	
		<i>For Hot Water Heating Coil, Copper Fins, Add</i>	6,744.27	
		<i>For Variable Air Volume, Add</i>	2,456.35	
		<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,990.19	
		<i>For 2 Coils, Independent Circuits, Add</i>	2,708.84	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73 13 00-0026 EA 10,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	24,706.12 2,147.74 4,101.76 6,120.36 10,682.54 11,594.98 5,207.92 8,857.67 8,857.67 7,945.23 7,032.79 5,797.49 10,682.54 9,770.10 7,032.79 2,554.82 3,117.22 2,835.59	4,519.10
23 73 13 00-0027 EA 11,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	24,830.11 2,171.53 4,156.16 6,203.10 10,853.20 11,783.22 5,273.07 8,993.16 8,993.16 8,063.14 7,133.12 5,891.61 10,853.20 9,923.18 7,133.12 2,604.06 3,048.91 2,855.02	4,375.67
23 73 13 00-0028 EA 12,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	25,885.94 2,241.90 4,275.79 6,379.02 11,117.04 12,064.65 5,431.41 9,221.83 9,221.83 8,274.23 7,326.62 6,032.32 11,117.04 10,169.44 7,326.62 2,653.30 3,260.15 2,967.64	4,854.67
23 73 13 00-0029 EA 13,700 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	27,267.20 2,367.63 4,519.80 6,743.79 11,765.12 12,769.39 5,739.52 9,756.59 9,756.59 8,752.32 7,748.05 6,384.69 11,765.12 10,760.85 7,748.05 2,811.95 2,836.37 3,128.43	5,049.68

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 73 Indoor Central-Station Air-Handling Units**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 73 13 00-0030	EA		15,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan 28,717.45	28,717.45	5,245.23
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	2,496.80	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	4,768.63	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	7,115.46	
			<i>For Manual Roll Filter, Add</i>	12,420.09	
			<i>For Automatic Roll Filter, Add</i>	13,481.02	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	6,054.53	
			<i>For Electric Heating Coil, Add</i>	10,298.24	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	10,298.24	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	9,237.31	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	8,176.38	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	6,740.51	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	12,420.09	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	11,359.17	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	8,176.38	
			<i>For Variable Air Volume, Add</i>	2,970.60	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,899.78	
			<i>For 2 Coils, Independent Circuits, Add</i>	3,296.12	
23 73 13 00-0031	EA		16,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan 30,259.96	30,259.96	5,446.97
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	2,638.40	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	5,044.25	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	7,527.61	
			<i>For Manual Roll Filter, Add</i>	13,154.63	
			<i>For Automatic Roll Filter, Add</i>	14,280.03	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	6,402.21	
			<i>For Electric Heating Coil, Add</i>	10,903.82	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	10,903.82	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	9,778.42	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	8,653.01	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	7,140.02	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	13,154.63	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	12,029.22	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	8,653.01	
			<i>For Variable Air Volume, Add</i>	3,151.13	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	2,950.38	
			<i>For 2 Coils, Independent Circuits, Add</i>	3,476.16	
23 73 13 00-0032	EA		17,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan 31,864.09	31,864.09	5,648.93
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	2,783.08	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	5,324.17	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	7,945.93	
			<i>For Manual Roll Filter, Add</i>	13,895.33	
			<i>For Automatic Roll Filter, Add</i>	15,085.21	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	6,756.05	
			<i>For Electric Heating Coil, Add</i>	11,515.57	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	11,515.57	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	10,325.69	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	9,135.81	
			<i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i>	7,542.60	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	13,895.33	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	12,705.45	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	9,135.81	
			<i>For Variable Air Volume, Add</i>	3,331.66	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,013.30	
			<i>For 2 Coils, Independent Circuits, Add</i>	3,662.36	
23 73 13 00-0033	EA		20,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan 35,541.36	35,541.36	6,056.06
			<i>For Flat Filter Box And Throwaway Filters, Add</i>	3,121.30	
			<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	5,982.90	
			<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	10,275.30	
			<i>For Manual Roll Filter, Add</i>	14,845.68	
			<i>For Automatic Roll Filter, Add</i>	15,652.22	
			<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	6,242.60	
			<i>For Electric Heating Coil, Add</i>	6,780.29	
			<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	11,619.53	
			<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	10,275.30	
			<i>For Steam Heating Coil, Aluminum Fins, Add</i>	8,931.06	
			<i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i>	7,154.00	
			<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	14,307.99	
			<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	12,963.76	
			<i>For Hot Water Heating Coil, Copper Fins, Add</i>	10,275.30	
			<i>For Variable Air Volume, Add</i>	3,763.85	
			<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,249.93	
			<i>For 2 Coils, Independent Circuits, Add</i>	4,091.83	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Central HVAC Equipment	23 70
Indoor Central-Station Air-Handling Units	23 73

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73 13 00-0034 EA 22,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	39,446.65 3,476.78 6,672.82 11,466.89 16,582.01 17,484.67 6,953.56 7,555.33 12,971.34 11,466.89 9,962.45 7,990.11 15,980.23 14,475.78 11,466.89 4,212.45 3,372.60 4,546.44	6,526.79
23 73 13 00-0035 EA 25,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	43,720.94 3,872.20 7,444.46 12,802.85 18,535.77 19,547.46 7,744.40 8,418.86 14,489.00 12,802.85 11,116.70 8,930.65 17,861.31 16,175.15 12,802.85 4,721.22 3,484.63 5,046.55	6,993.32
23 73 13 00-0036 EA 27,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	53,895.79 4,851.81 9,380.97 16,174.70 23,508.58 24,802.79 9,703.63 10,566.44 18,331.72 16,174.70 14,017.67 11,322.88 22,645.77 20,488.74 16,174.70 6,039.67 3,617.18 6,252.39	7,531.62
23 73 13 00-0037 EA 30,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	60,243.13 5,450.53 10,556.79 18,216.19 26,506.66 27,969.68 10,901.06 11,876.41 20,654.56 18,216.19 15,777.81 12,765.65 25,531.31 23,092.93 18,216.19 6,827.45 3,486.35 6,999.66	8,038.90

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 73 Indoor Central-Station Air-Handling Units**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 73 13 00-0038	EA		32,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	66,012.62	8,656.70
				5,983.23	
				11,595.65	
				20,014.27	
				29,135.12	
				30,744.68	
				11,966.47	
				13,039.51	
				22,696.88	
				20,014.27	
				17,331.67	
				14,031.04	
				28,062.08	
				25,379.48	
				20,014.27	
				7,511.29	
				3,619.09	
				7,674.30	
23 73 13 00-0039	EA		35,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	72,435.19	9,763.04
				6,572.04	
				12,741.18	
				21,994.90	
				32,025.84	
				33,796.01	
				13,144.07	
				14,324.18	
				24,945.18	
				21,994.90	
				19,044.63	
				15,422.87	
				30,845.73	
				27,895.45	
				21,994.90	
				8,260.77	
				3,779.45	
				8,423.63	
23 73 13 00-0040	EA		37,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	77,971.52	9,971.16
				7,085.27	
				13,743.40	
				23,730.60	
				34,565.34	
				36,477.36	
				14,170.53	
				15,445.21	
				26,917.29	
				23,730.60	
				20,543.91	
				16,645.33	
				33,290.67	
				30,103.98	
				23,730.60	
				8,922.73	
				3,900.66	
				9,071.83	
23 73 13 00-0041	EA		40,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	84,102.90	10,666.70
				7,645.83	
				14,832.99	
				25,613.73	
				37,312.06	
				39,376.47	
				15,291.66	
				16,667.94	
				29,054.41	
				25,613.73	
				22,173.04	
				17,967.89	
				35,935.79	
				32,495.10	
				25,613.73	
				9,633.92	
				3,741.15	
				9,786.56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73 13 00-0042 EA 45,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	90,777.08 8,255.03 16,016.45 27,658.59 40,293.59 42,523.30 16,510.06 17,996.53 31,374.77 27,658.59 23,942.41 19,403.56 38,807.12 35,090.94 27,658.59 10,405.29 3,886.69 10,564.18	11,517.06
23 73 13 00-0043 EA 47,500 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	94,565.08 8,596.83 16,677.85 28,799.38 41,952.53 44,273.68 17,193.66 18,741.09 32,667.96 28,799.38 24,930.81 20,202.55 40,405.10 36,536.53 28,799.38 10,832.01 3,979.20 11,003.94	12,058.01
23 73 13 00-0044 EA 50,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	98,137.17 8,920.02 17,303.81 29,879.51 43,524.24 45,932.14 17,840.03 19,445.30 33,892.67 29,879.51 25,866.35 20,959.49 41,918.98 37,905.82 29,879.51 11,236.84 4,064.25 11,418.98	12,521.78
23 73 13 00-0045 EA 55,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For Hot Water Heating Coil, Copper Fins, Add</i> <i>For Variable Air Volume, Add</i> <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	105,822.18 9,626.65 18,679.95 32,259.91 47,000.75 49,602.07 19,253.30 20,987.51 36,595.45 32,259.91 27,924.37 22,633.27 45,266.53 40,930.99 32,259.91 12,139.51 4,218.93 12,316.43	13,372.02

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 70 Central HVAC Equipment

23 73 Indoor Central-Station Air-Handling Units



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 73 13 00-0046	EA 60,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	115,795.07 10,557.09 20,500.72 35,416.18 51,625.12 54,485.52 21,114.18 23,021.11 40,183.51 35,416.18 30,648.85 24,859.09 49,718.18 44,950.85 35,416.18 13,348.54 3,944.84 13,486.44	14,299.57
23 73 13 00-0047	EA 65,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	126,965.64 11,592.35 22,522.17 38,916.90 56,746.74 59,893.18 23,184.70 25,282.33 44,160.97 38,916.90 33,672.84 27,324.55 54,649.11 49,405.04 38,916.90 14,683.39 4,108.43 14,794.19	15,458.98
23 73 13 00-0048	EA 70,000 CFM Single Zone Air Handling Unit, Built-Up, Constant Volume, Horizontal / Vertical, Draw-Through Fan For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Steam Heating Coil, Aluminum Fins, Add For Welded Exterior Waterproof Casing, Double Wall, With Insulation, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For Hot Water Heating Coil, Copper Fins, Add For Variable Air Volume, Add For Economizer, Panel, Controls And Damper(s), Add For 2 Coils, Independent Circuits, Add	139,397.54 12,739.52 24,758.91 42,787.99 62,404.79 65,866.58 25,479.05 27,786.91 48,557.64 42,787.99 37,018.34 30,048.47 60,096.93 54,327.28 42,787.99 16,155.01 4,300.46 16,247.61	16,773.01
23 73 13 00-0049	Multi-Zone Units <small>(23 73 13)</small> Note: Horizontal/vertical blow-thru fan, motor and cabinet.		
23 73 13 00-0050	EA 1,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	8,239.12 2,030.82 724.57 1,389.53 1,761.75 3,637.42 3,637.42 823.91 948.96 3,012.20 3,012.20 3,637.42 3,637.42 948.96	1,391.09
23 73 13 00-0051	EA 1,200 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	10,266.00 2,382.84 902.11 1,729.53 2,193.03 4,525.90 4,525.90 1,026.60 1,182.12 3,748.28 3,748.28 4,525.90 4,525.90 1,182.12	1,742.78



Heating, Ventilating, and Air-Conditioning (HVAC)		23
Central HVAC Equipment		23 70
Indoor Central-Station Air-Handling Units		23 73

23

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73	13 00-0052	EA	1,600 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	12,731.33 2,494.71 1,140.65 2,201.82 2,785.39 5,809.92 5,809.92 1,273.13 1,474.77 4,801.74 4,801.74 5,809.92 5,809.92 1,474.77	1,854.86
23 73	13 00-0053	EA	2,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	13,231.12 2,625.74 1,181.27 2,277.44 2,882.26 6,000.57 6,000.57 1,323.11 1,531.00 4,961.13 4,961.13 6,000.57 6,000.57 1,531.00	1,986.26
23 73	13 00-0054	EA	2,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	15,507.32 2,769.34 1,398.64 2,706.02 3,420.54 7,160.17 7,160.17 1,550.73 1,800.04 5,913.63 5,913.63 7,160.17 7,160.17 1,800.04	2,129.26
23 73	13 00-0055	EA	3,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	16,347.90 2,920.09 1,471.93 2,846.13 3,598.38 7,525.57 7,525.57 1,634.79 1,896.60 6,216.51 6,216.51 7,525.57 7,525.57 1,896.60	2,280.21
23 73	13 00-0056	EA	3,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	17,232.77 3,074.49 1,549.39 2,994.43 3,786.52 7,913.00 7,913.00 1,723.28 1,998.38 6,537.50 6,537.50 7,913.00 7,913.00 1,998.38	2,434.68
23 73	13 00-0057	EA	4,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan For Economizer, Panel, Controls And Damper(s), Add For Flat Filter Box And Throwaway Filters, Add For Medium Capacity Filter Box And Throwaway Filters, Add For Combination Filter Mixing Box And Throwaway Filters, Add For Manual Roll Filter, Add For Automatic Roll Filter, Add For Hot Water Heating Coil, Aluminum Fins, Add For Electric Heating Coil, Add For Chilled Water Cooling Coil, Aluminum Fins, Add For Direct Expansion Cooling Coil, Aluminum Fins, Add For Chilled Water Cooling Coil, Copper Fins, Add For Direct Expansion Cooling Coil, Copper Fins, Add For 2 Coils, Independent Circuits, Add	19,237.54 2,798.29 1,737.55 3,363.37 4,250.76 8,904.78 8,904.78 1,923.75 2,234.02 7,353.44 7,353.44 8,904.78 8,904.78 2,234.02	2,612.56

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 70 Central HVAC Equipment

23 73 Indoor Central-Station Air-Handling Units



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 73 13 00-0058	EA 4,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	21,034.51	2,797.86
	For Economizer, Panel, Controls And Damper(s), Add	2,948.43	
	For Flat Filter Box And Throwaway Filters, Add	1,903.59	
	For Medium Capacity Filter Box And Throwaway Filters, Add	3,687.27	
	For Combination Filter Mixing Box And Throwaway Filters, Add	4,659.06	
	For Manual Roll Filter, Add	9,770.26	
	For Automatic Roll Filter, Add	9,770.26	
	For Hot Water Heating Coil, Aluminum Fins, Add	2,103.45	
	For Electric Heating Coil, Add	2,444.20	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	8,066.53	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	8,066.53	
	For Chilled Water Cooling Coil, Copper Fins, Add	9,770.26	
	For Direct Expansion Cooling Coil, Copper Fins, Add	9,770.26	
	For 2 Coils, Independent Circuits, Add	2,444.20	
23 73 13 00-0059	EA 5,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	22,234.46	2,988.22
	For Economizer, Panel, Controls And Damper(s), Add	3,092.59	
	For Flat Filter Box And Throwaway Filters, Add	2,010.48	
	For Medium Capacity Filter Box And Throwaway Filters, Add	3,893.19	
	For Combination Filter Mixing Box And Throwaway Filters, Add	4,919.73	
	For Manual Roll Filter, Add	10,312.29	
	For Automatic Roll Filter, Add	10,312.29	
	For Hot Water Heating Coil, Aluminum Fins, Add	2,223.45	
	For Electric Heating Coil, Add	2,582.95	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	8,514.77	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	8,514.77	
	For Chilled Water Cooling Coil, Copper Fins, Add	10,312.29	
	For Direct Expansion Cooling Coil, Copper Fins, Add	10,312.29	
	For 2 Coils, Independent Circuits, Add	2,582.95	
23 73 13 00-0060	EA 5,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	24,530.96	3,192.50
	For Economizer, Panel, Controls And Damper(s), Add	3,259.57	
	For Flat Filter Box And Throwaway Filters, Add	2,224.95	
	For Medium Capacity Filter Box And Throwaway Filters, Add	4,313.02	
	For Combination Filter Mixing Box And Throwaway Filters, Add	5,448.31	
	For Manual Roll Filter, Add	11,438.74	
	For Automatic Roll Filter, Add	11,438.74	
	For Hot Water Heating Coil, Aluminum Fins, Add	2,453.10	
	For Electric Heating Coil, Add	2,852.46	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	9,441.93	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	9,441.93	
	For Chilled Water Cooling Coil, Copper Fins, Add	11,438.74	
	For Direct Expansion Cooling Coil, Copper Fins, Add	11,438.74	
	For 2 Coils, Independent Circuits, Add	2,852.46	
23 73 13 00-0061	EA 6,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	26,099.05	3,416.66
	For Economizer, Panel, Controls And Damper(s), Add	3,434.28	
	For Flat Filter Box And Throwaway Filters, Add	2,365.88	
	For Medium Capacity Filter Box And Throwaway Filters, Add	4,585.35	
	For Combination Filter Mixing Box And Throwaway Filters, Add	5,792.69	
	For Manual Roll Filter, Add	12,158.25	
	For Automatic Roll Filter, Add	12,158.25	
	For Hot Water Heating Coil, Aluminum Fins, Add	2,609.91	
	For Electric Heating Coil, Add	3,034.28	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	10,036.40	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	10,036.40	
	For Chilled Water Cooling Coil, Copper Fins, Add	12,158.25	
	For Direct Expansion Cooling Coil, Copper Fins, Add	12,158.25	
	For 2 Coils, Independent Circuits, Add	3,034.28	
23 73 13 00-0062	EA 6,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	28,624.66	3,710.15
	For Economizer, Panel, Controls And Damper(s), Add	3,662.79	
	For Flat Filter Box And Throwaway Filters, Add	2,597.67	
	For Medium Capacity Filter Box And Throwaway Filters, Add	5,036.45	
	For Combination Filter Mixing Box And Throwaway Filters, Add	6,361.77	
	For Manual Roll Filter, Add	13,360.37	
	For Automatic Roll Filter, Add	13,360.37	
	For Hot Water Heating Coil, Aluminum Fins, Add	2,862.47	
	For Electric Heating Coil, Add	3,329.04	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	11,027.50	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	11,027.50	
	For Chilled Water Cooling Coil, Copper Fins, Add	13,360.37	
	For Direct Expansion Cooling Coil, Copper Fins, Add	13,360.37	
	For 2 Coils, Independent Circuits, Add	3,329.04	
23 73 13 00-0063	EA 7,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	30,754.57	3,996.26
	For Economizer, Panel, Controls And Damper(s), Add	3,888.59	
	For Flat Filter Box And Throwaway Filters, Add	2,790.13	
	For Medium Capacity Filter Box And Throwaway Filters, Add	5,409.07	
	For Combination Filter Mixing Box And Throwaway Filters, Add	6,832.66	
	For Manual Roll Filter, Add	14,347.08	
	For Automatic Roll Filter, Add	14,347.08	
	For Hot Water Heating Coil, Aluminum Fins, Add	3,075.46	
	For Electric Heating Coil, Add	3,576.42	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	11,842.27	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	11,842.27	
	For Chilled Water Cooling Coil, Copper Fins, Add	14,347.08	
	For Direct Expansion Cooling Coil, Copper Fins, Add	14,347.08	
	For 2 Coils, Independent Circuits, Add	3,576.42	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73 13 00-0064 EA 7,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	32,263.30	4,320.78
For Economizer, Panel, Controls And Damper(s), Add	3,404.08	
For Flat Filter Box And Throwaway Filters, Add	2,918.32	
For Medium Capacity Filter Box And Throwaway Filters, Add	5,651.84	
For Combination Filter Mixing Box And Throwaway Filters, Add	7,141.80	
For Manual Roll Filter, Add	14,972.73	
For Automatic Roll Filter, Add	14,972.73	
For Hot Water Heating Coil, Aluminum Fins, Add	3,226.33	
For Electric Heating Coil, Add	3,748.39	
For Chilled Water Cooling Coil, Aluminum Fins, Add	12,362.42	
For Direct Expansion Cooling Coil, Aluminum Fins, Add	12,362.42	
For Chilled Water Cooling Coil, Copper Fins, Add	14,972.73	
For Direct Expansion Cooling Coil, Copper Fins, Add	14,972.73	
For 2 Coils, Independent Circuits, Add	3,748.39	
23 73 13 00-0065 EA 8,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	35,813.00	4,660.66
For Economizer, Panel, Controls And Damper(s), Add	3,604.77	
For Flat Filter Box And Throwaway Filters, Add	3,248.20	
For Medium Capacity Filter Box And Throwaway Filters, Add	6,296.55	
For Combination Filter Mixing Box And Throwaway Filters, Add	7,953.96	
For Manual Roll Filter, Add	16,699.29	
For Automatic Roll Filter, Add	16,699.29	
For Hot Water Heating Coil, Aluminum Fins, Add	3,581.30	
For Electric Heating Coil, Add	4,164.32	
For Chilled Water Cooling Coil, Aluminum Fins, Add	13,784.18	
For Direct Expansion Cooling Coil, Aluminum Fins, Add	13,784.18	
For Chilled Water Cooling Coil, Copper Fins, Add	16,699.29	
For Direct Expansion Cooling Coil, Copper Fins, Add	16,699.29	
For 2 Coils, Independent Circuits, Add	4,164.32	
23 73 13 00-0066 EA 8,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	37,700.63	5,023.95
For Economizer, Panel, Controls And Damper(s), Add	3,812.75	
For Flat Filter Box And Throwaway Filters, Add	3,410.97	
For Medium Capacity Filter Box And Throwaway Filters, Add	6,606.48	
For Combination Filter Mixing Box And Throwaway Filters, Add	8,347.88	
For Manual Roll Filter, Add	17,503.51	
For Automatic Roll Filter, Add	17,503.51	
For Hot Water Heating Coil, Aluminum Fins, Add	3,770.06	
For Electric Heating Coil, Add	4,380.44	
For Chilled Water Cooling Coil, Aluminum Fins, Add	14,451.63	
For Direct Expansion Cooling Coil, Aluminum Fins, Add	14,451.63	
For Chilled Water Cooling Coil, Copper Fins, Add	17,503.51	
For Direct Expansion Cooling Coil, Copper Fins, Add	17,503.51	
For 2 Coils, Independent Circuits, Add	4,380.44	
23 73 13 00-0067 EA 9,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	39,791.61	5,441.56
For Economizer, Panel, Controls And Damper(s), Add	4,039.55	
For Flat Filter Box And Throwaway Filters, Add	3,591.72	
For Medium Capacity Filter Box And Throwaway Filters, Add	6,950.97	
For Combination Filter Mixing Box And Throwaway Filters, Add	8,785.57	
For Manual Roll Filter, Add	18,398.39	
For Automatic Roll Filter, Add	18,398.39	
For Hot Water Heating Coil, Aluminum Fins, Add	3,979.16	
For Electric Heating Coil, Add	4,620.02	
For Chilled Water Cooling Coil, Aluminum Fins, Add	15,194.12	
For Direct Expansion Cooling Coil, Aluminum Fins, Add	15,194.12	
For Chilled Water Cooling Coil, Copper Fins, Add	18,398.39	
For Direct Expansion Cooling Coil, Copper Fins, Add	18,398.39	
For 2 Coils, Independent Circuits, Add	4,620.02	
23 73 13 00-0068 EA 10,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	42,041.94	5,874.08
For Economizer, Panel, Controls And Damper(s), Add	3,699.12	
For Flat Filter Box And Throwaway Filters, Add	3,784.34	
For Medium Capacity Filter Box And Throwaway Filters, Add	7,316.77	
For Combination Filter Mixing Box And Throwaway Filters, Add	9,250.93	
For Manual Roll Filter, Add	19,344.39	
For Automatic Roll Filter, Add	19,344.39	
For Hot Water Heating Coil, Aluminum Fins, Add	4,204.19	
For Electric Heating Coil, Add	4,877.09	
For Chilled Water Cooling Coil, Aluminum Fins, Add	15,979.90	
For Direct Expansion Cooling Coil, Aluminum Fins, Add	15,979.90	
For Chilled Water Cooling Coil, Copper Fins, Add	19,344.39	
For Direct Expansion Cooling Coil, Copper Fins, Add	19,344.39	
For 2 Coils, Independent Circuits, Add	4,877.09	
23 73 13 00-0069 EA 11,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	43,217.81	6,098.57
For Economizer, Panel, Controls And Damper(s), Add	3,799.84	
For Flat Filter Box And Throwaway Filters, Add	3,885.14	
For Medium Capacity Filter Box And Throwaway Filters, Add	7,508.30	
For Combination Filter Mixing Box And Throwaway Filters, Add	9,494.53	
For Manual Roll Filter, Add	19,840.04	
For Automatic Roll Filter, Add	19,840.04	
For Hot Water Heating Coil, Aluminum Fins, Add	4,321.78	
For Electric Heating Coil, Add	5,011.48	
For Chilled Water Cooling Coil, Aluminum Fins, Add	16,391.54	
For Direct Expansion Cooling Coil, Aluminum Fins, Add	16,391.54	
For Chilled Water Cooling Coil, Copper Fins, Add	19,840.04	
For Direct Expansion Cooling Coil, Copper Fins, Add	19,840.04	
For 2 Coils, Independent Circuits, Add	5,011.48	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 70 Central HVAC Equipment

23 73 Indoor Central-Station Air-Handling Units



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 73 13 00-0070	EA 12,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	44,343.25	6,316.21
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,885.42	
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	3,963.42	
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	7,696.30	
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	9,733.10	
	<i>For Manual Roll Filter, Add</i>	20,330.65	
	<i>For Automatic Roll Filter, Add</i>	20,330.65	
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	4,434.33	
	<i>For Electric Heating Coil, Add</i>	5,140.83	
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	16,798.13	
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	16,798.13	
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	20,330.65	
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	20,330.65	
	<i>For 2 Coils, Independent Circuits, Add</i>	5,140.83	
23 73 13 00-0071	EA 13,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	50,206.79	6,570.07
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,282.18	
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	4,550.13	
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	8,817.94	
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	11,140.06	
	<i>For Manual Roll Filter, Add</i>	23,378.83	
	<i>For Automatic Roll Filter, Add</i>	23,378.83	
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	5,020.68	
	<i>For Electric Heating Coil, Add</i>	5,836.60	
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	19,299.24	
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	19,299.24	
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	23,378.83	
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	23,378.83	
	<i>For 2 Coils, Independent Circuits, Add</i>	5,836.60	
23 73 13 00-0072	EA 15,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	56,028.79	6,830.34
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,443.39	
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	5,114.77	
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	9,936.67	
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	12,542.87	
	<i>For Manual Roll Filter, Add</i>	26,422.84	
	<i>For Automatic Roll Filter, Add</i>	26,422.84	
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	5,602.88	
	<i>For Electric Heating Coil, Add</i>	6,528.21	
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	21,796.19	
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	21,796.19	
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	26,422.84	
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	26,422.84	
	<i>For 2 Coils, Independent Circuits, Add</i>	6,528.21	
23 73 13 00-0073	EA 16,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	64,534.12	7,087.95
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,506.01	
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	5,947.41	
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	11,591.21	
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	14,615.52	
	<i>For Manual Roll Filter, Add</i>	30,939.73	
	<i>For Automatic Roll Filter, Add</i>	30,939.73	
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	6,453.41	
	<i>For Electric Heating Coil, Add</i>	7,541.69	
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	25,498.33	
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	25,498.33	
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	30,939.73	
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	30,939.73	
	<i>For 2 Coils, Independent Circuits, Add</i>	7,541.69	
23 73 13 00-0074	EA 17,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	73,044.53	7,343.02
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,569.53	
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	6,780.30	
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	13,246.11	
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	16,688.68	
	<i>For Manual Roll Filter, Add</i>	35,457.13	
	<i>For Automatic Roll Filter, Add</i>	35,457.13	
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	7,304.45	
	<i>For Electric Heating Coil, Add</i>	8,555.68	
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	29,200.98	
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	29,200.98	
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	35,457.13	
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	35,457.13	
	<i>For 2 Coils, Independent Circuits, Add</i>	8,555.68	
23 73 13 00-0075	EA 20,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	82,060.04	7,961.38
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	3,724.86	
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	7,637.47	
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	11,399.36	
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	18,809.42	
	<i>For Manual Roll Filter, Add</i>	29,412.83	
	<i>For Automatic Roll Filter, Add</i>	36,481.77	
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	8,206.00	
	<i>For Electric Heating Coil, Add</i>	9,619.79	
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	29,412.83	
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	29,412.83	
	<i>For Steam Heating Coil, Aluminum Fins, Add</i>	15,274.95	
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	36,481.77	
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	36,481.77	
	<i>For 2 Coils, Independent Circuits, Add</i>	9,619.79	



Heating, Ventilating, and Air-Conditioning (HVAC)		23
Central HVAC Equipment		23 70
Indoor Central-Station Air-Handling Units		23 73

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 73	13 00-0076	EA	22,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	88,498.59 3,609.91 8,234.89 12,290.84 20,279.74 31,709.62 39,329.54 8,849.86 10,373.84 31,709.62 31,709.62 16,469.78 39,329.54 39,329.54 10,373.84	8,657.03
23 73	13 00-0077	EA	25,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	105,734.32 3,768.62 9,905.56 14,791.55 24,429.96 38,286.49 47,524.18 10,573.43 12,420.97 38,286.49 38,286.49 19,811.12 47,524.18 47,524.18 12,420.97	9,352.36
23 73	13 00-0078	EA	27,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	119,599.55 3,931.70 11,237.72 16,784.36 27,733.19 43,506.42 54,021.91 11,959.96 14,063.05 43,506.42 43,506.42 22,475.44 54,021.91 54,021.91 14,063.05	10,125.64
23 73	13 00-0079	EA	30,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	129,641.03 4,101.50 12,185.27 18,200.02 30,073.75 47,183.41 58,589.84 12,964.10 15,245.39 47,183.41 47,183.41 24,370.54 58,589.84 58,589.84 15,245.39	10,898.92
23 73	13 00-0080	EA	32,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan <i>For Economizer, Panel, Controls And Damper(s), Add</i> <i>For Flat Filter Box And Throwaway Filters, Add</i> <i>For Medium Capacity Filter Box And Throwaway Filters, Add</i> <i>For Combination Filter Mixing Box And Throwaway Filters, Add</i> <i>For Manual Roll Filter, Add</i> <i>For Automatic Roll Filter, Add</i> <i>For Hot Water Heating Coil, Aluminum Fins, Add</i> <i>For Electric Heating Coil, Add</i> <i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i> <i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i> <i>For Steam Heating Coil, Aluminum Fins, Add</i> <i>For Chilled Water Cooling Coil, Copper Fins, Add</i> <i>For Direct Expansion Cooling Coil, Copper Fins, Add</i> <i>For 2 Coils, Independent Circuits, Add</i>	144,809.20 4,105.16 13,570.86 20,265.28 33,472.11 52,463.29 65,124.08 14,480.92 17,013.08 52,463.29 52,463.29 27,141.71 65,124.08 65,124.08 17,013.08	12,753.33

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 70 Central HVAC Equipment

23 73 Indoor Central-Station Air-Handling Units



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 73 13 00-0081	EA 35,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	145,489.95	13,217.43
	For Economizer, Panel, Controls And Damper(s), Add	4,190.26	
	For Flat Filter Box And Throwaway Filters, Add	13,604.89	
	For Medium Capacity Filter Box And Throwaway Filters, Add	20,312.93	
	For Combination Filter Mixing Box And Throwaway Filters, Add	33,540.18	
	For Manual Roll Filter, Add	52,531.37	
	For Automatic Roll Filter, Add	65,192.16	
	For Hot Water Heating Coil, Aluminum Fins, Add	14,549.00	
	For Electric Heating Coil, Add	17,081.15	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	52,531.37	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	52,531.37	
	For Steam Heating Coil, Aluminum Fins, Add	27,209.79	
	For Chilled Water Cooling Coil, Copper Fins, Add	65,192.16	
	For Direct Expansion Cooling Coil, Copper Fins, Add	65,192.16	
	For 2 Coils, Independent Circuits, Add	17,081.15	
23 73 13 00-0082	EA 37,500 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	152,188.48	13,680.77
	For Economizer, Panel, Controls And Damper(s), Add	4,275.35	
	For Flat Filter Box And Throwaway Filters, Add	14,240.71	
	For Medium Capacity Filter Box And Throwaway Filters, Add	21,263.25	
	For Combination Filter Mixing Box And Throwaway Filters, Add	35,112.70	
	For Manual Roll Filter, Add	55,006.55	
	For Automatic Roll Filter, Add	68,269.12	
	For Hot Water Heating Coil, Aluminum Fins, Add	15,218.85	
	For Electric Heating Coil, Add	17,871.36	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	55,006.55	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	55,006.55	
	For Steam Heating Coil, Aluminum Fins, Add	28,481.42	
	For Chilled Water Cooling Coil, Copper Fins, Add	68,269.12	
	For Direct Expansion Cooling Coil, Copper Fins, Add	68,269.12	
	For 2 Coils, Independent Circuits, Add	17,871.36	
23 73 13 00-0083	EA 40,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	159,179.66	14,686.04
	For Economizer, Panel, Controls And Damper(s), Add	4,450.76	
	For Flat Filter Box And Throwaway Filters, Add	14,869.66	
	For Medium Capacity Filter Box And Throwaway Filters, Add	22,199.67	
	For Combination Filter Mixing Box And Throwaway Filters, Add	36,650.01	
	For Manual Roll Filter, Add	57,382.05	
	For Automatic Roll Filter, Add	71,203.41	
	For Hot Water Heating Coil, Aluminum Fins, Add	15,917.97	
	For Electric Heating Coil, Add	18,682.24	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	57,382.05	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	57,382.05	
	For Steam Heating Coil, Aluminum Fins, Add	29,739.33	
	For Chilled Water Cooling Coil, Copper Fins, Add	71,203.41	
	For Direct Expansion Cooling Coil, Copper Fins, Add	71,203.41	
	For 2 Coils, Independent Circuits, Add	18,682.24	
23 73 13 00-0084	EA 45,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	171,610.51	15,458.98
	For Economizer, Panel, Controls And Damper(s), Add	4,578.32	
	For Flat Filter Box And Throwaway Filters, Add	16,061.72	
	For Medium Capacity Filter Box And Throwaway Filters, Add	23,982.65	
	For Combination Filter Mixing Box And Throwaway Filters, Add	39,604.65	
	For Manual Roll Filter, Add	62,048.24	
	For Automatic Roll Filter, Add	77,010.64	
	For Hot Water Heating Coil, Aluminum Fins, Add	17,161.05	
	For Electric Heating Coil, Add	20,153.53	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	62,048.24	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	62,048.24	
	For Steam Heating Coil, Aluminum Fins, Add	32,123.45	
	For Chilled Water Cooling Coil, Copper Fins, Add	77,010.64	
	For Direct Expansion Cooling Coil, Copper Fins, Add	77,010.64	
	For 2 Coils, Independent Circuits, Add	20,153.53	
23 73 13 00-0085	EA 50,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	184,519.10	16,309.23
	For Economizer, Panel, Controls And Damper(s), Add	4,232.85	
	For Flat Filter Box And Throwaway Filters, Add	17,285.49	
	For Medium Capacity Filter Box And Throwaway Filters, Add	25,811.59	
	For Combination Filter Mixing Box And Throwaway Filters, Add	42,630.50	
	For Manual Roll Filter, Add	66,809.09	
	For Automatic Roll Filter, Add	82,928.15	
	For Hot Water Heating Coil, Aluminum Fins, Add	18,451.91	
	For Electric Heating Coil, Add	21,675.72	
	For Chilled Water Cooling Coil, Aluminum Fins, Add	66,809.09	
	For Direct Expansion Cooling Coil, Aluminum Fins, Add	66,809.09	
	For Steam Heating Coil, Aluminum Fins, Add	34,570.97	
	For Chilled Water Cooling Coil, Copper Fins, Add	82,928.15	
	For Direct Expansion Cooling Coil, Copper Fins, Add	82,928.15	
	For 2 Coils, Independent Circuits, Add	21,675.72	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

23 73 13 00-0086	EA 55,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	198,807.09		17,314.07
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	4,372.12		
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	18,644.65		
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	27,843.37		
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	45,993.59		
	<i>For Manual Roll Filter, Add</i>	72,106.47		
	<i>For Automatic Roll Filter, Add</i>	89,515.05		
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	19,880.71		
	<i>For Electric Heating Coil, Add</i>	23,362.43		
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	72,106.47		
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	72,106.47		
	<i>For Steam Heating Coil, Aluminum Fins, Add</i>	37,289.30		
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	89,515.05		
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	89,515.05		
	<i>For 2 Coils, Independent Circuits, Add</i>	23,362.43		
23 73 13 00-0087	EA 60,000 CFM Multizone Air Handling Unit, Built-Up, Horizontal / Vertical, Draw-Through Fan	213,388.02		17,777.83
	<i>For Economizer, Panel, Controls And Damper(s), Add</i>	4,435.19		
	<i>For Flat Filter Box And Throwaway Filters, Add</i>	20,071.21		
	<i>For Medium Capacity Filter Box And Throwaway Filters, Add</i>	29,980.06		
	<i>For Combination Filter Mixing Box And Throwaway Filters, Add</i>	49,544.23		
	<i>For Manual Roll Filter, Add</i>	77,749.65		
	<i>For Automatic Roll Filter, Add</i>	96,553.27		
	<i>For Hot Water Heating Coil, Aluminum Fins, Add</i>	21,338.80		
	<i>For Electric Heating Coil, Add</i>	25,099.53		
	<i>For Chilled Water Cooling Coil, Aluminum Fins, Add</i>	77,749.65		
	<i>For Direct Expansion Cooling Coil, Aluminum Fins, Add</i>	77,749.65		
	<i>For Steam Heating Coil, Aluminum Fins, Add</i>	40,142.42		
	<i>For Chilled Water Cooling Coil, Copper Fins, Add</i>	96,553.27		
	<i>For Direct Expansion Cooling Coil, Copper Fins, Add</i>	96,553.27		
	<i>For 2 Coils, Independent Circuits, Add</i>	25,099.53		

23 73 13 00-0088 Return/Supply Air Fan (23 73 13)

Note: Includes vibration mounts.

23 73 13 00-0089	EA 300 CFM Return Air Fan	3,466.07		618.25
23 73 13 00-0090	EA 500 CFM Return Air Fan	4,501.18		741.92
23 73 13 00-0091	EA 750 CFM Return Air Fan	4,701.90		772.84
23 73 13 00-0092	EA 1,000 CFM Return Air Fan	5,373.91		819.22
23 73 13 00-0093	EA 1,250 CFM Return Air Fan	5,535.98		857.86
23 73 13 00-0094	EA 1,500 CFM Return Air Fan	5,662.30		896.51
23 73 13 00-0095	EA 1,750 CFM Return Air Fan	5,942.43		942.89
23 73 13 00-0096	EA 2,000 CFM Return Air Fan	6,614.42		989.26
23 73 13 00-0097	EA 2,250 CFM Return Air Fan	6,930.07		1,035.64
23 73 13 00-0098	EA 2,500 CFM Return Air Fan	7,103.23		1,082.01
23 73 13 00-0099	EA 3,000 CFM Return Air Fan	7,517.92		1,197.96
23 73 13 00-0100	EA 3,500 CFM Return Air Fan	7,713.35		1,259.79
23 73 13 00-0101	EA 4,000 CFM Return Air Fan	7,897.47		1,313.90
23 73 13 00-0102	EA 4,500 CFM Return Air Fan	8,128.52		1,375.85
23 73 13 00-0103	EA 5,000 CFM Return Air Fan	8,334.64		1,445.41
23 73 13 00-0104	EA 5,500 CFM Return Air Fan	8,719.87		1,615.47
23 73 13 00-0105	EA 6,000 CFM Return Air Fan	9,898.59		1,916.92
23 73 13 00-0106	EA 6,500 CFM Return Air Fan	10,157.19		1,947.84
23 73 13 00-0107	EA 7,000 CFM Return Air Fan	10,274.62		1,955.56
23 73 13 00-0108	EA 8,000 CFM Return Air Fan	10,818.24		1,986.48
23 73 13 00-0109	EA 9,000 CFM Return Air Fan	11,061.48		2,009.67
23 73 13 00-0110	EA 10,000 CFM Return Air Fan	11,638.85		2,087.29
23 73 13 00-0111	EA 12,500 CFM Return Air Fan	12,404.60		2,125.51
23 73 13 00-0112	EA 15,000 CFM Return Air Fan	14,024.43		2,185.90
23 73 13 00-0113	EA 17,500 CFM Return Air Fan	15,296.34		2,303.28
23 73 13 00-0114	EA 20,000 CFM Return Air Fan	18,218.30		2,403.54
23 73 13 00-0115	EA 22,500 CFM Return Air Fan	19,093.80		2,487.35
23 73 13 00-0116	EA 25,000 CFM Return Air Fan	19,965.83		2,558.47
23 73 13 00-0117	EA 27,500 CFM Return Air Fan	21,153.85		2,813.54
23 73 13 00-0118	EA 30,000 CFM Return Air Fan	22,620.51		2,967.90
23 73 13 00-0119	EA 35,000 CFM Return Air Fan	25,541.56		3,091.46
23 73 13 00-0120	EA 40,000 CFM Return Air Fan	30,116.05		3,400.64
23 73 13 00-0121	EA 45,000 CFM Return Air Fan	37,083.42		3,864.42
23 73 13 00-0122	EA 50,000 CFM Return Air Fan	45,192.08		4,003.88
23 73 13 00-0123	EA 55,000 CFM Return Air Fan	47,311.35		4,119.49
23 73 13 00-0124	EA 60,000 CFM Return Air Fan	48,398.48		4,227.70
23 73 13 00-0125	EA 65,000 CFM Return Air Fan	50,758.84		4,413.10
23 73 13 00-0126	EA 70,000 CFM Return Air Fan	53,314.38		4,630.41
23 73 13 00-0127	EA 75,000 CFM Return Air Fan	57,351.90		4,857.55
23 73 13 00-0128	EA 80,000 CFM Return Air Fan	59,892.87		5,115.05
23 73 13 00-0129	EA 90,000 CFM Return Air Fan	61,833.77		5,406.34
23 73 13 00-0130	EA 100,000 CFM Return Air Fan	66,497.13		5,653.79
23 73 13 00-0131	EA 115,000 CFM Return Air Fan	71,550.52		5,924.22
23 73 13 00-0132	EA 130,000 CFM Return Air Fan	77,034.66		6,222.68
23 73 13 00-0133	EA 150,000 CFM Return Air Fan	84,309.45		6,554.17

23 73 13 00-0134 Removal And Reinstallation Of Air Handling Unit (23 73 13)

Note: Air handling units with filter and coils. Includes storage and cleaning. Excludes ductwork.

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 70 Central HVAC Equipment

23 73 Indoor Central-Station Air-Handling Units



MINOR CSI UOM DESCRIPTION TOTAL DIRECT UNIT COST DEMOLITION UNIT COST

23 73 13 00-0135	EA	Removal And Reinstallation Of Up To 11,500 CFM Air Handling Unit	2,831.32	
23 73 13 00-0136	EA	Removal And Reinstallation Of >11,500 To 16,500 CFM Air Handling Unit	3,840.75	
23 73 13 00-0137	EA	Removal And Reinstallation Of >16,500 To 22,000 CFM Air Handling Unit	4,777.84	
23 73 13 00-0138	EA	Removal And Reinstallation Of >22,000 CFM Air Handling Unit	8,717.48	

23 74 Packaged Outdoor HVAC Equipment (23 70)

23 74 16 Packaged Rooftop Air-Conditioning Units (23 74)

23 74 16 13 Packaged, Large-Capacity, Rooftop Air-Conditioning Units (23 74 16)

23 74 16 13-0001 Electric Cooling, Electric Heat, Self Contained Packaged Rooftop Air-Conditioning Units (23 74 16 13)

Note: Electric heating capacity is approximately 1/2 the cooling capacity. Units < 5 tons have 14 SEER, units 5 to < 20 tons have 11 EER, and units 20 tons and over have 10 EER. Includes roof curb and economizer. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment, 26 28 16 16-0001 for disconnects.

23 74 16 13-0002	EA	2 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	5,099.64	1,770.38
		<i>For Unit Without Heat, Deduct</i>	-373.01	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
		<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0003	EA	3 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	6,575.95	1,850.85
		<i>For Unit Without Heat, Deduct</i>	-452.19	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
		<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0004	EA	4 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	7,661.26	1,931.33
		<i>For Unit Without Heat, Deduct</i>	-511.82	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
		<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0005	EA	5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	9,093.74	2,052.04
		<i>For Unit Without Heat, Deduct</i>	-591.49	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
		<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0006	EA	6 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	9,898.87	2,172.74
		<i>For Unit Without Heat, Deduct</i>	-639.79	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
		<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0007	EA	7.5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	11,079.72	2,333.69
		<i>For Unit Without Heat, Deduct</i>	-709.57	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,126.35	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0008	EA	8.5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	11,884.83	2,454.39
		<i>For Unit Without Heat, Deduct</i>	-757.87	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,126.35	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0009	EA	10 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	13,065.68	2,615.34
		<i>For Unit Without Heat, Deduct</i>	-827.64	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,151.88	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0010	EA	12.5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	15,783.99	2,826.17
		<i>For Unit Without Heat, Deduct</i>	-977.64	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,244.02	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0011	EA	15 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	18,502.29	3,037.81
		<i>For Unit Without Heat, Deduct</i>	-1,127.64	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0012	EA	17.5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	21,136.57	3,248.91
		<i>For Unit Without Heat, Deduct</i>	-1,273.43	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0013	EA	20 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	23,770.85	3,460.29
		<i>For Unit Without Heat, Deduct</i>	-1,419.23	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0014	EA	22.5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	26,648.92	3,812.23
		<i>For Unit Without Heat, Deduct</i>	-1,586.60	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0015	EA	25 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	29,526.98	4,164.42
		<i>For Unit Without Heat, Deduct</i>	-1,753.98	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0016	EA	27.5 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	32,514.71	4,556.86
		<i>For Unit Without Heat, Deduct</i>	-1,929.52	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-1,345.06	
23 74 16 13-0017	EA	30 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	35,502.43	4,949.02
		<i>For Unit Without Heat, Deduct</i>	-2,105.06	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-1,345.06	
23 74 16 13-0018	EA	35 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	41,363.50	5,773.86
		<i>For Unit Without Heat, Deduct</i>	-2,453.10	
		<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
		<i>For Unit Without Roof Curb, Deduct</i>	-1,345.06	



Heating, Ventilating, and Air-Conditioning (HVAC)		23
Central HVAC Equipment		23 70
Packaged Outdoor HVAC Equipment		23 74

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 16 13-0019	EA		40 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	47,224.55	6,598.69
			<i>For Unit Without Heat, Deduct</i>	-2,801.14	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,045.16	
23 74 16 13-0020	EA		45 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	51,936.11	7,443.65
			<i>For Unit Without Heat, Deduct</i>	-3,093.05	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,045.16	
23 74 16 13-0021	EA		50 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	56,647.69	8,288.61
			<i>For Unit Without Heat, Deduct</i>	-3,384.96	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,045.16	
23 74 16 13-0022	EA		55 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	62,369.90	9,093.32
			<i>For Unit Without Heat, Deduct</i>	-3,724.72	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,543.53	
23 74 16 13-0023	EA		60 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	68,092.09	9,898.05
			<i>For Unit Without Heat, Deduct</i>	-4,064.47	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,543.53	
23 74 16 13-0024	EA		65 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	73,646.26	10,702.76
			<i>For Unit Without Heat, Deduct</i>	-4,395.83	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,646.97	
23 74 16 13-0025	EA		70 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	79,200.41	11,507.49
			<i>For Unit Without Heat, Deduct</i>	-4,727.19	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,646.97	
23 74 16 13-0026	EA		75 Ton Electric Cooling, Electric Heat, Self Contained Package Rooftop Unit	84,861.86	12,392.68
			<i>For Unit Without Heat, Deduct</i>	-5,069.27	
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,947.32	
23 74 16 13-0027			Electric Cooling, Gas Heat, Self Contained Packaged Rooftop Air-Conditioning Units <small>(23 74 16 13)</small>		
			Note: Units < 5 tons have 14 SEER, units 5 to < 20 tons have 11 EER, and units 20 tons and over have 10 EER. Includes roof curb and economizer. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment, 26 28 16 16-0001 for Disconnects.		
23 74 16 13-0028	EA		2 Ton Electric Cooling, 50 MBH Gas Heating, Self Contained Package Rooftop Unit.....	5,008.77	1,609.44
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
			<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0029	EA		3 Ton Electric Cooling, 60 To 80 MBH Gas Heating, Self Contained Package Rooftop Unit.....	5,710.88	1,850.85
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
			<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0030	EA		4 Ton Electric Cooling, 80 To 110 MBH Gas Heating, Self Contained Package Rooftop Unit.....	7,036.96	2,132.50
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
			<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0031	EA		5 Ton Electric Cooling, 100 To 120 MBH Gas Heating, Self Contained Package Rooftop Unit.....	8,062.32	2,293.45
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
			<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0032	EA		6 Ton Electric Cooling, 140 MBH Gas Heating, Self Contained Package Rooftop Unit.....	9,030.64	2,474.51
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,103.56	
			<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
23 74 16 13-0033	EA		7.5 Ton Electric Cooling, 150 To 180 MBH Gas Heating, Self Contained Package Rooftop Unit.....	9,862.56	2,595.22
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,126.35	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0034	EA		8.5 Ton Electric Cooling, 170 To 190 MBH Gas Heating, Self Contained Package Rooftop Unit.....	11,780.29	2,152.62
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,126.35	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0035	EA		10 Ton Electric Cooling, 200 To 240 MBH Gas Heating, Self Contained Package Rooftop Unit.....	14,682.20	2,896.99
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,151.88	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0036	EA		12.5 Ton Electric Cooling, 250 MBH Gas Heating, Self Contained Package Rooftop Unit.....	16,038.52	3,138.40
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-1,244.02	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0037	EA		15 Ton Electric Cooling, 300 MBH Gas Heating, Self Contained Package Rooftop Unit.....	19,379.82	3,379.82
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0038	EA		17.5 Ton Electric Cooling, 330 MBH Gas Heating, Self Contained Package Rooftop Unit.....	20,484.52	3,621.24
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0039	EA		20 Ton Electric Cooling, 350 MBH Gas Heating, Self Contained Package Rooftop Unit.....	31,318.43	3,862.65
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0040	EA		22.5 Ton Electric Cooling, 380 MBH Gas Heating, Self Contained Package Rooftop Unit.....	38,229.21	4,265.02
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0041	EA		25 Ton Electric Cooling, 400 MBH Gas Heating, Self Contained Package Rooftop Unit.....	45,140.00	4,613.72
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
23 74 16 13-0042	EA		27.5 Ton Electric Cooling, 450 MBH Gas Heating, Self Contained Package Rooftop Unit.....	46,515.20	5,069.73
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-1,345.06	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 74 Packaged Outdoor HVAC Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 16 13-0043	EA		30 Ton Electric Cooling, 500 MBH Gas Heating, Self Contained Package Rooftop Unit.....	49,920.12	5,472.09
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-1,345.06	
23 74 16 13-0044	EA		35 Ton Electric Cooling, 550 MBH Gas Heating, Self Contained Package Rooftop Unit.....	53,653.42	6,397.52
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-1,345.06	
23 74 16 13-0045	EA		40 Ton Electric Cooling, 600 MBH Gas Heating, Self Contained Package Rooftop Unit.....	59,416.45	7,322.94
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,045.16	
23 74 16 13-0046	EA		45 Ton Electric Cooling, 650 MBH Gas Heating, Self Contained Package Rooftop Unit.....	64,061.17	8,248.37
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,045.16	
23 74 16 13-0047	EA		50 Ton Electric Cooling, 750 MBH Gas Heating, Self Contained Package Rooftop Unit.....	68,705.87	9,173.80
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,045.16	
23 74 16 13-0048	EA		55 Ton Electric Cooling, 800 MBH Gas Heating, Self Contained Package Rooftop Unit.....	75,251.71	10,099.22
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,543.53	
23 74 16 13-0049	EA		60 Ton Electric Cooling, 850 MBH Gas Heating, Self Contained Package Rooftop Unit.....	81,797.53	11,024.65
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,543.53	
23 74 16 13-0050	EA		65 Ton Electric Cooling, 900 MBH Gas Heating, Self Contained Package Rooftop Unit.....	87,586.62	11,487.37
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,646.97	
23 74 16 13-0051	EA		70 Ton Electric Cooling, 950 MBH Gas Heating, Self Contained Package Rooftop Unit.....	93,348.89	11,929.96
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,646.97	
23 74 16 13-0052	EA		75 Ton Electric Cooling, 1,000 MBH Gas Heating, Self Contained Package Rooftop Unit.....	99,137.97	12,392.68
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,947.32	
23 74 16 13-0053	EA		80 Ton Electric Cooling, 1,100 MBH Gas Heating, Self Contained Package Rooftop Unit.....	104,953.89	12,875.50
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,947.32	
23 74 16 13-0054	EA		90 Ton Electric Cooling, 1,200 MBH Gas Heating, Self Contained Package Rooftop Unit.....	142,625.48	15,128.71
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,947.32	
23 74 16 13-0055	EA		100 Ton Electric Cooling, 1,350 MBH Gas Heating, Self Contained Package Rooftop Unit.....	164,358.26	18,428.07
			<i>For Unit Without Factory Installed Economizer, Deduct</i>	-2,351.59	
			<i>For Unit Without Roof Curb, Deduct</i>	-2,947.32	
23 74 16 13-0056			AAON Rooftop Units <small>(23 74 16 13)</small> Note: Units < 5 tons have 14 SEER minimum, units 5 to < 20 tons have 11 EER minimum, and units 20 tons and over have 10 EER minimum, Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment, 07 72 13 00-0000 for roof curbs, 23 09 23 00-0000 for controls, 26 28 16 16-0001 for disconnects.		
23 74 16 13-0057			AAON RQ Rooftop Units <small>(23 74 16 13-0056)</small> Note: Includes 2" double wall foam panel construction, direct drive fan with VFD (or ECM motor), single stage on/off scroll compressor, terminal strip for field supplied thermostat, gas heat, manually adjustable OSA damper, microchannel condenser coils. Excludes economizer, controls, disconnect, roof curb, items not specifically mentioned above. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.		
23 74 16 13-0058	EA		2 Ton, Air Cooled Packaged Rooftop Units (AAON RQ-002)	14,498.44	1,609.44
			<i>For Factory Installed And Wired Dry Bulb Economizer, Add</i>	1,564.12	
			<i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i>	1,696.97	
			<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	1,336.02	
			<i>For Factory Installed Non-Fused Disconnect, Add</i>	1,529.03	
			<i>For Factory Installed Exhaust Fan, Add</i>	7,795.53	
			<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	1,819.79	
23 74 16 13-0059	EA		3 Ton, Air Cooled Packaged Rooftop Units (AAON RQ-003)	15,797.91	1,850.85
			<i>For Factory Installed And Wired Dry Bulb Economizer, Add</i>	1,676.92	
			<i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i>	1,819.79	
			<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	1,431.27	
			<i>For Factory Installed Non-Fused Disconnect, Add</i>	1,639.32	
			<i>For Factory Installed Exhaust Fan, Add</i>	7,795.53	
			<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	1,819.79	
23 74 16 13-0060	EA		4 Ton, Air Cooled Packaged Rooftop Units (AAON RQ-004)	16,396.53	2,132.50
			<i>For Factory Installed And Wired Dry Bulb Economizer, Add</i>	1,676.92	
			<i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i>	1,819.79	
			<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	1,431.27	
			<i>For Factory Installed Non-Fused Disconnect, Add</i>	1,639.32	
			<i>For Factory Installed Exhaust Fan, Add</i>	7,795.53	
			<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	1,819.79	
23 74 16 13-0061	EA		5 Ton, Air Cooled Packaged Rooftop Units (AAON RQ-005)	16,809.14	2,293.45
			<i>For Factory Installed And Wired Dry Bulb Economizer, Add</i>	1,676.92	
			<i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i>	1,819.79	
			<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	1,431.27	
			<i>For Factory Installed Non-Fused Disconnect, Add</i>	1,639.32	
			<i>For Factory Installed Exhaust Fan, Add</i>	7,795.53	
			<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	1,819.79	



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Central HVAC Equipment	23 70
Packaged Outdoor HVAC Equipment	23 74

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 16 13-0062 EA 6 Ton, Air Cooled Packaged Rooftop Units (AAON RQ-006) <i>For Factory Installed And Wired Dry Bulb Economizer, Add</i> <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	18,391.59 1,676.92 1,819.79 1,431.27 1,639.32 7,795.53 1,819.79	2,796.45
23 74 16 13-0063 AAON RNA Rooftop Units <small>(23 74 16 13-0056)</small> Note: Includes 2" double wall foam panel construction, direct drive fan with VFD, single stage on/off compressor, terminal strip for field provided thermostat, gas heat, manually adjustable OSA damper. Excludes economizer, controls, disconnect, roof curb, items not specifically mentioned above. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.		
23 74 16 13-0064 EA 6 Ton, Air Cooled Packaged Rooftop Units (AAON RNA-006) <i>For Factory Installed And Wired Dry Bulb Economizer, Add</i> <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	22,304.39 1,631.80 2,506.60 1,671.90 1,544.07 4,163.46 1,418.74	2,474.56
23 74 16 13-0065 EA 7 Ton, Air Cooled Packaged Rooftop Units (AAON RNA-007) <i>For Factory Installed And Wired Dry Bulb Economizer, Add</i> <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	23,816.39 1,631.80 2,506.60 1,671.90 1,544.07 4,163.46 1,418.74	2,595.27
23 74 16 13-0066 EA 8 Ton, Air Cooled Packaged Rooftop Units (AAON RNA-008) <i>For Factory Installed And Wired Dry Bulb Economizer, Add</i> <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	27,363.26 1,631.80 2,506.60 1,671.90 1,544.07 4,163.46 1,418.74	2,796.45
23 74 16 13-0067 EA 10 Ton, Air Cooled Packaged Rooftop Units (AAON RNA-010) <i>For Factory Installed And Wired Dry Bulb Economizer, Add</i> <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	27,630.23 1,631.80 2,506.60 1,671.90 1,544.07 4,163.46 1,418.74	2,896.99
23 74 16 13-0068 AAON RNB Rooftop Units <small>(23 74 16 13-0056)</small> Note: Includes 2" double wall foam panel construction, direct drive fan with VFD, (1) on/off scroll compressors, terminal strip for field provided thermostat, gas heat, factory installed 3 position economizer. Excludes controls, disconnect, roof curb, items not specifically mentioned above. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.		
23 74 16 13-0069 EA 9 Ton, Air Cooled Packaged Rooftop Units (AAON RNB-009) <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	32,831.43 2,403.83 1,879.95 1,491.43 3,970.45 1,426.26	2,896.99
23 74 16 13-0070 EA 11 Ton, Air Cooled Packaged Rooftop Units (AAON RNB-011) <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	33,092.60 2,403.83 1,879.95 1,491.43 3,970.45 1,426.26	2,816.52
23 74 16 13-0071 EA 13 Ton, Air Cooled Packaged Rooftop Units (AAON RNB-013) <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	36,073.51 2,403.83 1,879.95 1,491.43 3,970.45 1,426.26	3,138.40
23 74 16 13-0072 EA 15 Ton, Air Cooled Packaged Rooftop Units (AAON RNB-015) <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	36,976.93 2,403.83 1,879.95 1,491.43 3,970.45 1,426.26	3,379.82
23 74 16 13-0073 AAON RNC Rooftop Units <small>(23 74 16 13-0056)</small> Note: Includes 2" double wall foam panel construction, direct drive fan with VFD, (2) on/off scroll compressors, terminal strip for field provided thermostat, gas heat, factory installed 3 position economizer. Excludes controls, disconnect, roof curb, items not specifically mentioned above. Excludes crane and associated personnel.		
23 74 16 13-0074 EA 16 Ton, Air Cooled Packaged Rooftop Units (AAON RNC-016) <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	47,735.25 3,549.35 2,506.60 1,491.43 7,281.67 649.21	3,379.82

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 70 Central HVAC Equipment****23 74 Packaged Outdoor HVAC Equipment**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 16 13-0075	EA		18 Ton, Air Cooled Packaged Rooftop Units (AAON RNC-018)..... <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	51,571.40 3,549.35 2,506.60 1,491.43 7,281.67 649.21	3,621.24
23 74 16 13-0076	EA		20 Ton, Air Cooled Packaged Rooftop Units (AAON RNC-020)..... <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	54,643.03 3,549.35 2,506.60 1,491.43 7,281.67 649.21	3,862.65
23 74 16 13-0077	EA		25 Ton, Air Cooled Packaged Rooftop Units (AAON RNC-025)..... <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	59,067.30 3,549.35 2,506.60 1,491.43 7,281.67 649.21	4,667.37
23 74 16 13-0078	EA		30 Ton, Air Cooled Packaged Rooftop Units (AAON RNC-030)..... <i>For Single Zone VAV Controls, Includes Modulating Compressor And Supply Fan, Add</i> <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Factory Installed Exhaust Fan, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	66,970.75 3,549.35 2,506.60 1,491.43 7,281.67 649.21	5,472.09
23 74 16 13-0079			AAON RND Rooftop Units <small>(23 74 16 13-0056)</small> Note: Includes 2" double wall foam panel construction, direct drive fan with VFD, (2) variable capacity digital scroll compressor and (2) on/off compressor, VAV unit controller (varies fan speed and compressor capacity for energy savings year round), cooling only - no heat, factory installed economizer with powered exhaust fans with VFD's, (building static pressure control), factory installed non-fused disconnect and factory start up. Excludes roof curb, items not specifically mentioned above. Excludes crane and associated personnel.		
23 74 16 13-0080	EA		26 Ton, Air Cooled Packaged Rooftop Units (AAON RND-026)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	89,966.16 3,133.25 3,393.94 4,762.54	4,667.37
23 74 16 13-0081	EA		31 Ton, Air Cooled Packaged Rooftop Units (AAON RND-031)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	102,496.79 3,133.25 3,393.94 4,762.54	5,472.09
23 74 16 13-0082	EA		40 Ton, Air Cooled Packaged Rooftop Units (AAON RND-040)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	120,678.47 3,133.25 3,393.94 4,762.54	7,322.94
23 74 16 13-0083	EA		50 Ton, Air Cooled Packaged Rooftop Units (AAON RND-050)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	141,469.51 3,133.25 3,393.94 4,762.54	9,173.80
23 74 16 13-0084	EA		60 Ton, Air Cooled Packaged Rooftop Units (AAON RND-060)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	155,304.75 3,133.25 3,393.94 4,762.54	11,024.65
23 74 16 13-0085	EA		70 Ton, Air Cooled Packaged Rooftop Units (AAON RND-070)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	163,397.46 3,133.25 3,393.94 4,762.54	11,930.01
23 74 16 13-0086			AAON RNE Rooftop Units <small>(23 74 16 13-0056)</small> Note: Includes 2" double wall foam panel construction, direct drive fan with VFD, (1 or 2) variable speed VFD controlled scroll compressor and (1 or 2) on/off compressor, VAV unit controller (varies fan speed and compressor capacity for energy savings year round), cooling only - no heat, factory installed economizer with powered exhaust fans with VFD's, (building static pressure control), Microchannel condenser coils with VFD controlled condenser fans, factory installed non-fused disconnect and factory start up. Excludes roof curb, items not specifically mentioned above. Excludes crane and associated personnel.		
23 74 16 13-0087	EA		55 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-055)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	150,972.69 3,539.32 5,083.38 6,767.82	10,099.22
23 74 16 13-0088	EA		65 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-065)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	166,271.45 3,539.32 5,083.38 6,767.82	11,487.42
23 74 16 13-0089	EA		75 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-075)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	176,775.51 3,539.32 5,083.38 6,767.82	12,392.68
23 74 16 13-0090	EA		95 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-090)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	213,790.20 3,539.32 5,083.38 6,767.82	16,778.39
23 74 16 13-0091	EA		105 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-105)..... <i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i> <i>For Factory Installed Non-Fused Disconnect, Add</i> <i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	231,486.20 3,539.32 5,083.38 6,767.82	19,152.32

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 16 13-0092 EA 120 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-120).....	270,041.02	21,083.63
<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	3,539.32	
<i>For Factory Installed Non-Fused Disconnect, Add</i>	5,083.38	
<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	6,767.82	
23 74 16 13-0093 EA 130 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-130).....	276,587.97	22,371.18
<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	3,539.32	
<i>For Factory Installed Non-Fused Disconnect, Add</i>	5,083.38	
<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	6,767.82	
23 74 16 13-0094 EA 140 Ton, Air Cooled Packaged Rooftop Units (AAON RNE-140).....	289,751.57	25,026.77
<i>For Factory Authorized Start Up, 4 Hour, One Trip, Add</i>	3,539.32	
<i>For Factory Installed Non-Fused Disconnect, Add</i>	5,083.38	
<i>For Hot Water Coil In Lieu Of Gas Heat, Add</i>	6,767.82	
23 74 16 13-0095 Heat Pump, Packaged Rooftop Heat Pump Units <small>(23 74 16 13)</small>		
See CSI section 01 22 23 00-0775 for crane lifting equipment, 26 28 16 16-0001 for disconnects.		
23 74 16 13-0096 Packaged Rooftop Heat Pump Units <small>(23 74 16 13-0095)</small>		
Note: Includes evaporator and condenser coils, electric heat, thermostatic expansion valve, compressor, evaporator and condenser fans, refrigerant charge, filter section with filter, operation and safety controls, motors, condensate drain pan, condenser coil guards, manual outside air damper, and roof curb. Excludes crane and associated personnel.		
23 74 16 13-0097 EA 2 Ton Packaged Rooftop Heat Pump	6,780.95	1,448.49
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	1,984.09	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	242.48	
23 74 16 13-0098 EA 2.5 Ton Packaged Rooftop Heat Pump	7,138.96	1,557.19
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	2,101.27	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	253.14	
23 74 16 13-0099 EA 3 Ton Packaged Rooftop Heat Pump	7,550.28	1,665.77
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	2,229.66	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	266.46	
23 74 16 13-0100 EA 3.5 Ton Packaged Rooftop Heat Pump	8,102.10	1,792.49
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	2,166.06	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	285.60	
23 74 16 13-0101 EA 4 Ton Packaged Rooftop Heat Pump	8,654.16	1,919.31
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	2,315.68	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	304.76	
23 74 16 13-0102 EA 5 Ton Packaged Rooftop Heat Pump	9,275.38	2,064.16
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	2,485.02	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	260.93	
23 74 16 13-0103 EA 6 Ton Packaged Rooftop Heat Pump	10,437.72	2,227.04
<i>For Unit Without Roof Curb, Deduct</i>	-742.40	
<i>For Economizer With Outside Air Control, Add</i>	2,754.32	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	224.05	
23 74 16 13-0104 EA 7.5 Ton Packaged Rooftop Heat Pump	13,435.20	2,335.72
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	2,795.64	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	309.63	
23 74 16 13-0105 EA 8.5 Ton Packaged Rooftop Heat Pump	15,029.93	2,516.73
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	2,962.01	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	350.23	
23 74 16 13-0106 EA 10 Ton Packaged Rooftop Heat Pump	16,162.48	2,607.29
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	3,006.80	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	253.72	
23 74 16 13-0107 EA 12.5 Ton Packaged Rooftop Heat Pump	18,754.61	2,824.57
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	3,381.90	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	299.77	
23 74 16 13-0108 EA 15 Ton Packaged Rooftop Heat Pump	21,346.74	3,041.84
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	3,756.99	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	345.82	
23 74 16 13-0109 EA 17.5 Ton Packaged Rooftop Heat Pump	23,911.56	3,259.12
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	4,129.35	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	391.32	
23 74 16 13-0110 EA 20 Ton Packaged Rooftop Heat Pump	26,476.38	3,476.38
<i>For Unit Without Roof Curb, Deduct</i>	-890.88	
<i>For Economizer With Outside Air Control, Add</i>	4,501.71	
<i>For Upgrade Of Economizer To OS Air Enthalpy Control, Add</i>	436.82	
23 74 16 13-0111 Heating Only Packaged Rooftop Units <small>(23 74 16 13-0095)</small>		
Note: Includes throwaway filters, filter rack, manual outside air damper, roof curbs and electric heat. Units are shipped fully factory assembled in one piece, prewired and include start-up. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment, 26 28 16 16-0001 for disconnects.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 70 Central HVAC Equipment

23 74 Packaged Outdoor HVAC Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 16 13-0112	EA		24 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	6,734.31 -742.40 432.78	1,448.49
23 74 16 13-0113	EA		32 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	7,911.84 -742.40 509.41	1,665.77
23 74 16 13-0114	EA		45 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	10,825.97 -742.40 706.64	1,919.31
23 74 16 13-0115	EA		60 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	12,212.56 -742.40 799.84	2,064.16
23 74 16 13-0116	EA		95 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	14,350.33 -890.88 942.24	2,335.72
23 74 16 13-0117	EA		112 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	16,163.64 -890.88 1,064.34	2,516.73
23 74 16 13-0118	EA		140 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	19,125.38 -890.88 1,269.25	2,607.29
23 74 16 13-0119	EA		170 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	24,839.62 -890.88 1,657.66	3,041.84
23 74 16 13-0120	EA		200 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	32,799.53 -890.88 2,209.06	3,259.12
23 74 16 13-0121	EA		230 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	38,285.18 -890.88 2,587.26	3,476.38
23 74 16 13-0122	EA		270 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	49,777.04 -890.88 3,382.03	3,838.51
23 74 16 13-0123	EA		330 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	62,249.49 -1,345.06 4,235.79	4,884.65
23 74 16 13-0124	EA		360 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	76,588.21 -1,345.06 5,229.84	4,924.88
23 74 16 13-0125	EA		450 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	93,286.59 -1,345.06 6,376.52	5,757.82
23 74 16 13-0126	EA		540 MBH Electric Heating Only, Self Contained Package Rooftop Unit <i>For Unit Without Roof Curb, Deduct</i> <i>For Gas Heat, Add</i>	120,992.55 -2,045.16 8,271.52	7,423.59

23 74 23 Packaged, Outdoor, Heating-Only Makeup-Air Units (23 74)

23 74 23 13 Packaged, Direct-Fired, Outdoor, Heating-Only Makeup-Air Units (23 74 23)

23 74 23 13-0001			Make-Up Air Units (23 74 23 13) Note: Units are shipped fully factory assembled in one piece, prewired, prepiped, charged with refrigerant. Includes throwaway filters and start-up. Excludes crane and associated personnel. See CSI section 01 22 23 00-0775 for crane lifting equipment.		
23 74 23 13-0002			Gas-Fired Electric Spark Make-Up Air Units (23 74 23 13-0001) Note: With 2-position damper curb filter and thermostat with capillary. Excludes crane and associated personnel. See CSI section 01 22 23 00-0776 for crane lifting equipment.		
23 74 23 13-0003	EA		100,000 BTU 1/2 HP, 1,200 CFM, Make-up Air Unit, Gas Fired, Electric Spark <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	7,850.89 2,113.85 957.22	482.83
23 74 23 13-0004	EA		300,000 BTU 1-1/2 HP, 3,500 CFM, Make-up Air Unit, Gas Fired, Electric Spark <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	10,163.70 2,772.82 1,242.83	547.21
23 74 23 13-0005	EA		500,000 BTU 2 HP, 4,000 CFM, Make-up Air Unit, Gas Fired, Electric Spark <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	14,170.89 3,929.38 1,739.17	643.78
23 74 23 13-0006	EA		670,000 BTU 3 HP, 6,000 CFM, Make-up Air Unit, Gas Fired, Electric Spark <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	14,278.03 3,937.38 1,750.15	686.70
23 74 23 13-0007	EA		800,000 BTU 5 HP, 7,500 CFM, Make-up Air Unit, Gas Fired, Electric Spark <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	19,551.65 5,479.23 2,405.33	772.53
23 74 23 13-0008	EA		1,200,000 BTU 10 HP, 10,000 CFM, Make-up Air Unit, Gas Fired, Electric Spark <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	29,692.42 8,424.89 3,663.27	965.66
23 74 23 13-0009			Electric Make-Up Air Units (23 74 23 13-0001) Note: With 2-position damper curb filter and thermostat with capillary. Excludes crane and associated personnel. See CSI section 01 22 23 00-0776 for crane lifting equipment.		
23 74 23 13-0010	EA		33 KW, 1/2 HP, 1,200 CFM Make-up Air Unit, Electric <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add</i> <i>For Equipment Base Roof Curb, Add</i>	16,328.97 4,657.28 2,016.98	482.83

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 74 23 13-0011 EA 100 KW, 1-1/2 HP, 3,500 CFM Make-up Air Unit, Electric..... <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add For Equipment Base Roof Curb, Add</i>	23,395.16 6,742.26 2,896.77	547.21
23 74 23 13-0012 EA 150 KW, 2 HP, 4,000 CFM Make-up Air Unit, Electric..... <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add For Equipment Base Roof Curb, Add</i>	28,999.43 8,377.94 3,592.74	643.78
23 74 23 13-0013 EA 250 KW, 5 HP, 7,500 CFM Make-up Air Unit, Electric..... <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add For Equipment Base Roof Curb, Add</i>	37,536.44 10,874.67 4,653.43	772.53
23 74 23 13-0014 EA 400 KW, 10 HP, 10,000 CFM Make-up Air Unit, Electric..... <i>For Welded Exterior Waterproof Casing, Double-Wall, With Insulation, Add For Equipment Base Roof Curb, Add</i>	60,788.46 17,753.71 7,550.27	965.66

23 76 Evaporative Air-Cooling Equipment (23 70)

23 76 13 Direct Evaporative Air Coolers (23 76)

23 76 13 00-0001 Residential Side Or Down Draft Evaporative Cooling Unit (23 76 13)

Note: Includes motor, belt and pads.

23 76 13 00-0002 EA 3,000 CFM, 1/3 HP Residential Side Or Down Draft Evaporative Cooling Unit.....	1,476.35	337.64
23 76 13 00-0003 EA 4,300 CFM, 1/3 HP Residential Side Or Down Draft Evaporative Cooling Unit.....	1,744.67	393.91
23 76 13 00-0004 EA 4,400 CFM, 1/2 HP Residential Side Or Down Draft Evaporative Cooling Unit.....	2,268.03	450.19
23 76 13 00-0005 EA 5,000 CFM, 3/4 HP Residential Side Or Down Draft Evaporative Cooling Unit.....	2,466.15	506.46
23 76 13 00-0006 EA 6,000 CFM, 3/4 HP Residential Side Or Down Draft Evaporative Cooling Unit.....	2,835.46	562.73
23 76 13 00-0007 EA 7,000 CFM, 1 HP Residential Side Or Down Draft Evaporative Cooling Unit.....	3,050.70	619.00

23 76 13 00-0008 Industrial Side Draft/Side Discharge Evaporative Coolers (23 76 13)

Note: Excludes motor starter, piping, power wiring and equipment rigging.

23 76 13 00-0009 EA 7,500 CFM, 3/4 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	2,845.07	320.23
23 76 13 00-0010 EA 8,500 CFM, 1 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	2,936.05	330.60
23 76 13 00-0011 EA 9,500 CFM, 1 1/2 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	3,484.18	459.13
23 76 13 00-0012 EA 11,375 CFM, 2 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	7,538.78	541.97
23 76 13 00-0013 EA 13,020 CFM, 3 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	8,120.47	793.43
23 76 13 00-0014 EA 16,267 CFM, 3 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	9,314.90	846.33
23 76 13 00-0015 EA 15,438 CFM, 5 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	8,523.43	952.12
23 76 13 00-0016 EA 19,286 CFM, 5 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	10,098.41	1,190.16
23 76 13 00-0017 EA 17,672 CFM, 7-1/2 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	10,069.61	1,555.76
23 76 13 00-0018 EA 22,077 CFM, 7-1/2 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	11,235.89	1,586.87
23 76 13 00-0019 EA 24,301 CFM, 10 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	11,816.19	1,763.22
23 76 13 00-0020 EA 30,000 CFM, 20 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	15,780.23	2,755.02
23 76 13 00-0021 EA 35,000 CFM, 20 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	17,731.50	2,874.77
23 76 13 00-0022 EA 40,000 CFM, 30 HP Industrial Side Or Down Draft Evaporative Cooling Unit.....	19,704.56	3,005.43

23 80 Decentralized Unitary HVAC Equipment (23)

Note: Where required, mechanical equipment excludes electrical connection, disconnect, or starter unless title states otherwise. See CSI section 23 05 29 00-0000 for hangers and supports, 26 05 19 16-0011 for electrical connection and termination, 26 05 83 00-0110 for terminations, 26 28 16 16-0001 for disconnect.

23 81 Decentralized Unitary HVAC Equipment (23 80)

23 81 13 Packaged Terminal Air-Conditioners (23 81)

Note: Units consists of fresh air intake, throwaway filters, exhaust, automatic thermostat, hermetically sealed compressor with 5 year guarantee, "sleeve-type" construction, condensing fan motor enclosed, fan to be aluminum, three wire ground cord, multi speed fan, exposed steel parts to be phosphate bonderized with baked enamel finish and copper tubes mechanically expanded into aluminum of evaporator and condensing coils. Includes equipment rigging. Efficiency Rating (ER) not less than 9.

23 81 13 11 Packaged Terminal Air-Conditioners, Through-Wall Units (23 81 13)

23 81 13 11-0001 Packaged Terminal Air-Conditioners (23 81 13 11)

23 81 13 11-0002 Electric Heat, Heating And Cooling, Packaged Terminal Air-Conditioners (23 81 13 11-0001)

23 81 13 11-0003 EA 7,200 BTU, 13 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Packaged Terminal Air-Conditioner.....	2,030.09	211.03
<i>For >35 To 70, Deduct</i>	-48.24	
<i>For >70 To 100, Deduct</i>	-80.40	
<i>For >100, Deduct</i>	-112.56	
23 81 13 11-0004 EA 9,400 BTU, 12.1 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Packaged Terminal Air-Conditioner.....	2,124.24	244.67
<i>For >35 To 70, Deduct</i>	-49.06	
<i>For >70 To 100, Deduct</i>	-81.77	
<i>For >100, Deduct</i>	-114.48	
23 81 13 11-0005 EA 11,800 BTU, 11.6 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Packaged Terminal Air-Conditioner.....	2,248.18	260.74
<i>For >35 To 70, Deduct</i>	-51.78	
<i>For >70 To 100, Deduct</i>	-86.30	
<i>For >100, Deduct</i>	-120.82	
23 81 13 11-0006 EA 14,500 BTU, 10.4 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Packaged Terminal Air-Conditioner.....	2,429.70	280.28
<i>For >35 To 70, Deduct</i>	-56.08	
<i>For >70 To 100, Deduct</i>	-93.47	
<i>For >100, Deduct</i>	-130.86	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 81 Decentralized Unitary HVAC Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 81 13 11-0007	Heat Pump, Heating And Cooling, Packaged Terminal Air-Conditioners <small>(23 81 13 11-0001)</small>		
23 81 13 11-0008	EA 7,200 BTU, 13 EER, 230/208 Volt, Heat Pump, Heating And Cooling, Packaged Terminal Air-Conditioner	2,153.02	217.10
	For >35 To 70, Deduct	-51.59	
	For >70 To 100, Deduct	-85.98	
	For >100, Deduct	-120.37	
23 81 13 11-0009	EA 9,400 BTU, 12.1 EER, 230/208 Volt, Heat Pump, Heating And Cooling, Packaged Terminal Air-Conditioner	2,269.66	244.67
	For >35 To 70, Deduct	-53.43	
	For >70 To 100, Deduct	-89.04	
	For >100, Deduct	-124.66	
23 81 13 11-0010	EA 11,800 BTU, 11.6 EER, 230/208 Volt, Heat Pump, Heating And Cooling, Packaged Terminal Air-Conditioner	2,353.56	260.74
	For >35 To 70, Deduct	-54.94	
	For >70 To 100, Deduct	-91.57	
	For >100, Deduct	-128.20	
23 81 13 11-0011	EA 14,500 BTU, 10.4 EER, 230/208 Volt, Heat Pump, Heating And Cooling, Packaged Terminal Air-Conditioner	2,568.80	280.28
	For >35 To 70, Deduct	-60.25	
	For >70 To 100, Deduct	-100.42	
	For >100, Deduct	-140.59	

23 81 13 11-0012	Packaged Terminal Air-Conditioners, Through-Wall Unit Sleeve <small>(23 81 13 11)</small>		
	Note: Includes wall case, exterior grille, weather panel and steel closure panels. Includes bolts, nuts, washers, caulking and lintel supports. Not for use with new A/C units where wall sleeve is provided. Excludes cutting opening for unit or patching masonry or concrete.		
23 81 13 11-0013	EA Up To 10,000 BTU Unit, Thru Wall A/C Sleeve	93.25	
23 81 13 11-0014	EA >10,000 To 20,000 BTU Unit, Thru Wall A/C Sleeve	105.04	
23 81 13 11-0015	EA >20,000 To 30,000 BTU Unit, Thru Wall A/C Sleeve	116.83	

23 81 13 11-0016	Removal And Reinstallation Of Packaged Terminal Air-Conditioners, Through-Wall Units <small>(23 81 13 11)</small>		
	Note: Includes storage and cleaning.		
23 81 13 11-0017	EA Removal And Reinstallation Of Packaged Terminal Air-Conditioners, Through-Wall Units	225.09	

23 81 13 13 Packaged Terminal Air-Conditioners, Outdoor, Wall-Mounted Units (23 81 13)

23 81 13 13-0001	Single Package Vertical Wall Cooling Unit <small>(23 81 13 13)</small>		
	Note: Air-to-air type with electric heat. Includes throwaway filters. Wall units are wired for 230/208 Volt, 1 phase, 60 HZ. With solid state electronic controls, thermostat, cord and NEMA plug. Units are shipped fully factory assembled in one piece, prewired, prepiped and charged with refrigerant, complete with push button controls, insulated steel cabinet, with wall sleeve and outdoor grille and stainless steel drain pan. Excludes crane and associated personnel. See CSI section 01 22 23 00-0776 for crane lifting equipment.		
23 81 13 13-0002	EA 1/2 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	5,026.37	256.13
23 81 13 13-0003	EA 1 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	7,946.33	268.33
23 81 13 13-0004	EA 1-1/2 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	10,400.79	280.53
23 81 13 13-0005	EA 2 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	11,963.38	304.92
23 81 13 13-0006	EA 2-1/2 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	15,008.89	353.71
23 81 13 13-0007	EA 3 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	16,095.90	439.08
23 81 13 13-0008	EA 3-1/2 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	17,819.07	487.87
23 81 13 13-0009	EA 4 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	19,621.92	548.86
23 81 13 13-0010	EA 5 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	22,072.34	658.62
23 81 13 13-0011	EA 7-1/2 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	28,536.55	817.19
23 81 13 13-0012	EA 10 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	34,025.19	1,097.72
23 81 13 13-0013	EA 15 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	47,731.23	1,341.65
23 81 13 13-0014	EA 20 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	54,983.66	1,597.78
23 81 13 13-0015	EA 25 Ton Single Package Cooling, Vertical Wall Unit, Air To Air Type With Electric Heat	65,731.59	1,792.93

23 81 16 Room Air-Conditioners (23 81)

Note: Units consists of fresh air intake, throwaway filters, exhaust, automatic thermostat, hermetically sealed compressor with 5 year guarantee, "sleeve-type" construction, condensing fan motor enclosed, fan to be aluminum, three wire ground cord, multi speed fan, exposed steel parts to be phosphate bonderized with baked enamel finish and copper tubes mechanically expanded into aluminum of evaporator and condensing coils. Includes equipment rigging. Efficiency Rating (ER) not less than 9.

23 81 16 00-0001	Window Unit, Room Air-Conditioners <small>(23 81 16)</small>		
23 81 16 00-0002	Cooling Only, Window Unit, Room Air-Conditioners <small>(23 81 16 00-0001)</small>		
23 81 16 00-0003	Cooling Only, Window Unit, Room Air-Conditioners (Frigidaire) <small>(23 81 16 00-0002)</small>		
23 81 16 00-0004	EA 5,000 BTU, 11.2 EER, 115 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE0533Q1)	495.93	118.17
	For >10 To 50, Deduct	-12.98	
	For >50 To 75, Deduct	-18.17	
	For >75 To 100, Deduct	-25.96	
	For >100, Deduct	-31.15	
23 81 16 00-0005	EA 6,000 BTU, 11.2 EER, 115 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE0633Q1)	522.01	118.17
	For >10 To 50, Deduct	-14.28	
	For >50 To 75, Deduct	-20.00	
	For >75 To 100, Deduct	-28.57	
	For >100, Deduct	-34.28	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 81 16 00-0006 EA 8,000 BTU, 11.3 EER, 115 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE0833U1)	587.23	118.17
<i>For >10 To 50, Deduct</i>	-17.54	
<i>For >50 To 75, Deduct</i>	-24.56	
<i>For >75 To 100, Deduct</i>	-35.09	
<i>For >100, Deduct</i>	-42.11	
23 81 16 00-0007 EA 10,000 BTU, 11.3 EER, 115 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE1033U1)	678.54	118.17
<i>For >10 To 50, Deduct</i>	-22.11	
<i>For >50 To 75, Deduct</i>	-30.95	
<i>For >75 To 100, Deduct</i>	-44.22	
<i>For >100, Deduct</i>	-53.06	
23 81 16 00-0008 EA 12,000 BTU, 11.3 EER, 115 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE1233Q1)	795.94	118.17
<i>For >10 To 50, Deduct</i>	-27.98	
<i>For >50 To 75, Deduct</i>	-39.17	
<i>For >75 To 100, Deduct</i>	-55.96	
<i>For >100, Deduct</i>	-67.15	
23 81 16 00-0009 EA 15,100 BTU, 11.2 EER, 115 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE1533Q1)	926.38	118.17
<i>For >10 To 50, Deduct</i>	-34.50	
<i>For >50 To 75, Deduct</i>	-48.30	
<i>For >75 To 100, Deduct</i>	-69.00	
<i>For >100, Deduct</i>	-82.80	
23 81 16 00-0010 EA 8,000 BTU, 10.9 EER, 115 Volt, Cooling Only, Casement Window Unit, Room Air-Conditioner (Frigidaire FFRS0833Q1)	874.20	118.17
<i>For >10 To 50, Deduct</i>	-31.89	
<i>For >50 To 75, Deduct</i>	-44.65	
<i>For >75 To 100, Deduct</i>	-63.79	
<i>For >100, Deduct</i>	-76.54	
23 81 16 00-0011 EA 10,000 BTU, 9.5 EER, 115 Volt, Cooling Only, Casement Window Unit, Room Air-Conditioner (Frigidaire FFRS1022Q1)	939.42	118.17
<i>For >10 To 50, Deduct</i>	-35.15	
<i>For >50 To 75, Deduct</i>	-49.21	
<i>For >75 To 100, Deduct</i>	-70.31	
<i>For >100, Deduct</i>	-84.37	
23 81 16 00-0012 EA 12,000 BTU, 9.5 EER, 115 Volt, Cooling Only, Casement Window Unit, Room Air-Conditioner (Frigidaire FFRS1222Q1)	991.60	118.17
<i>For >10 To 50, Deduct</i>	-37.76	
<i>For >50 To 75, Deduct</i>	-52.87	
<i>For >75 To 100, Deduct</i>	-75.53	
<i>For >100, Deduct</i>	-90.63	
23 81 16 00-0013 EA 18,500 BTU, 11.2 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE1833Q2)	1,043.77	118.17
<i>For >10 To 50, Deduct</i>	-40.37	
<i>For >50 To 75, Deduct</i>	-56.52	
<i>For >75 To 100, Deduct</i>	-80.74	
<i>For >100, Deduct</i>	-96.89	
23 81 16 00-0014 EA 22,000 BTU, 9.8 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE2233S2)	1,148.13	118.17
<i>For >10 To 50, Deduct</i>	-45.59	
<i>For >50 To 75, Deduct</i>	-63.82	
<i>For >75 To 100, Deduct</i>	-91.18	
<i>For >100, Deduct</i>	-109.41	
23 81 16 00-0015 EA 25,000 BTU, 9.8 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRE2533S2)	1,161.17	118.17
<i>For >10 To 50, Deduct</i>	-46.24	
<i>For >50 To 75, Deduct</i>	-64.74	
<i>For >75 To 100, Deduct</i>	-92.48	
<i>For >100, Deduct</i>	-110.98	
23 81 16 00-0016 EA 28,000 BTU, 9.0 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Frigidaire FFRA2822R2)	1,912.75	118.17
<i>For >10 To 50, Deduct</i>	-83.82	
<i>For >50 To 75, Deduct</i>	-117.35	
<i>For >75 To 100, Deduct</i>	-167.64	
<i>For >100, Deduct</i>	-201.17	
23 81 16 00-0017 Cooling Only, Window Unit, Room Air-Conditioners (Friedrich Kuhl) (23 81 16 00-0002)		
23 81 16 00-0018 EA 8,000 BTU, 12.2 EER, 110 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SS08N10C)	2,029.60	118.17
23 81 16 00-0019 EA 10,000 BTU, 12.2 EER, 110 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SS10N10C)	2,229.06	118.17
23 81 16 00-0020 EA 11,900 BTU, 12.2 EER, 110 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SS12N10C)	2,319.72	118.17
23 81 16 00-0021 EA 12,000 BTU, 12.2 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SS12N30C)	2,355.98	118.17
23 81 16 00-0022 EA 20,000 BTU, 10.4 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SM18N30C)	2,682.36	118.17
23 81 16 00-0023 EA 24,000 BTU, 10.4 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SL24N30C)	3,498.30	118.17
23 81 16 00-0024 EA 28,000 BTU, 10.0 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SL28N30C)	3,770.28	118.17
23 81 16 00-0025 EA 36,000 BTU, 9.0 EER, 230/208 Volt, Cooling Only, Window Unit, Room Air-Conditioner (Friedrich SL36N30B)	4,132.92	118.17
23 81 16 00-0026 Heating And Cooling, Window Unit, Room Air-Conditioners (23 81 16 00-0001)		
23 81 16 00-0027 Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioners (Frigidaire) (23 81 16 00-0026)		
23 81 16 00-0028 EA 8,000 BTU, 9.8 EER, 115 Volt, Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioner (Frigidaire FFRH0822R1)	991.60	118.17
<i>For >10 To 50, Deduct</i>	-37.76	
<i>For >50 To 75, Deduct</i>	-52.87	
<i>For >75 To 100, Deduct</i>	-75.53	
<i>For >100, Deduct</i>	-90.63	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 81 Decentralized Unitary HVAC Equipment



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 81 16 00-0029	EA	12,000 BTU, 10.9 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioner (Frigidaire FFRH1222R2)	1,135.08	118.17	
		<i>For >10 To 50, Deduct</i>	-44.94		
		<i>For >50 To 75, Deduct</i>	-62.91		
		<i>For >75 To 100, Deduct</i>	-89.87		
		<i>For >100, Deduct</i>	-107.85		
23 81 16 00-0030	EA	18,500 BTU, 10.7 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioner (Frigidaire FFRH1822R2)	1,213.35	118.17	
		<i>For >10 To 50, Deduct</i>	-48.85		
		<i>For >50 To 75, Deduct</i>	-68.39		
		<i>For >75 To 100, Deduct</i>	-97.70		
		<i>For >100, Deduct</i>	-117.24		
23 81 16 00-0031	EA	25,000 BTU, 9.4 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioner (Frigidaire FFRH2522R2)	1,500.31	118.17	
		<i>For >10 To 50, Deduct</i>	-63.20		
		<i>For >50 To 75, Deduct</i>	-88.48		
		<i>For >75 To 100, Deduct</i>	-126.40		
		<i>For >100, Deduct</i>	-151.68		
23 81 16 00-0032		Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioners (Friedrich) (23 81 16 00-0026)			
23 81 16 00-0033	EA	12,000 BTU, 11.3 EER, 230/208 Volt, Electric Heat, Heating And Cooling, Window Unit, Room Air-Conditioner (Friedrich ES12N33B)	2,446.64	118.17	
23 81 16 00-0034		Accessories (23 81 16 00-0001)			
23 81 16 00-0035	SET	Aluminum Air Conditioner Unit Frame And Bracket Assembly	602.22	63.17	
23 81 16 00-0036		Removal And Reinstallation Of Room Air-Conditioners (23 81 16)			
		Note: Includes storage and cleaning.			
23 81 16 00-0037	EA	Removal And Reinstallation Of Room Air-Conditioning Unit In Window Lower Sash	140.68		
23 81 16 00-0038	EA	Removal And Reinstallation Of Room Air-Conditioning Unit In Window Upper Sash	302.02		
23 81 16 00-0039		Through-The-Wall, Room Air-Conditioners (23 81 16)			
		Note: Base unit excludes wall sleeve.			
23 81 16 00-0040		Cooling Only, Through-The-Wall, Room Air-Conditioners (23 81 16 00-0039)			
23 81 16 00-0041		Cooling Only, Through-The-Wall, Room Air-Conditioners (Friedrich) (23 81 16 00-0040)			
23 81 16 00-0042	EA	8,000 BTU, 10.7 EER, 115 Volt, Cooling Only, Through-The-Wall, Room Air-Conditioner (Friedrich WS08D10A)	1,526.91	84.41	
		<i>For >10 To 50, Deduct</i>	-67.90		
		<i>For >50 To 75, Deduct</i>	-95.07		
		<i>For >75 To 100, Deduct</i>	-135.81		
		<i>For >100, Deduct</i>	-162.97		
		<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68		
23 81 16 00-0043	EA	9,800 BTU, 10.7 EER, 115 Volt, Cooling Only, Through-The-Wall, Room Air-Conditioner (Friedrich WS10D10B)	1,653.83	84.41	
		<i>For >10 To 50, Deduct</i>	-74.25		
		<i>For >50 To 75, Deduct</i>	-103.95		
		<i>For >75 To 100, Deduct</i>	-148.50		
		<i>For >100, Deduct</i>	-178.20		
		<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68		
23 81 16 00-0044	EA	12,000 BTU, 9.8 EER, 115 Volt, Cooling Only, Through-The-Wall, Room Air-Conditioner (Friedrich WS12D10A)	1,889.55	84.41	
		<i>For >10 To 50, Deduct</i>	-86.04		
		<i>For >50 To 75, Deduct</i>	-120.45		
		<i>For >75 To 100, Deduct</i>	-172.07		
		<i>For >100, Deduct</i>	-206.49		
		<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68		
23 81 16 00-0045	EA	10,000 BTU, 10.7 EER, 230/208 Volt, Cooling Only, Through-The-Wall, Room Air-Conditioner (Friedrich WS10D30A)	1,653.83	84.41	
		<i>For >10 To 50, Deduct</i>	-74.25		
		<i>For >50 To 75, Deduct</i>	-103.95		
		<i>For >75 To 100, Deduct</i>	-148.50		
		<i>For >100, Deduct</i>	-178.20		
		<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68		
23 81 16 00-0046	EA	12,000 BTU, 9.8 EER, 230/208 Volt, Cooling Only, Through-The-Wall, Room Air-Conditioner (Friedrich WS12D30A)	1,889.55	84.41	
		<i>For >10 To 50, Deduct</i>	-86.04		
		<i>For >50 To 75, Deduct</i>	-120.45		
		<i>For >75 To 100, Deduct</i>	-172.07		
		<i>For >100, Deduct</i>	-206.49		
		<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68		
23 81 16 00-0047		Heating And Cooling, Through-The-Wall, Room Air-Conditioners (23 81 16 00-0039)			
23 81 16 00-0048		Electric Heat, Heating And Cooling, Through-The-Wall, Room Air-Conditioners (Friedrich) (23 81 16 00-0047)			

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 81 16 00-0049 EA 10,000 BTU, 9.8 EER, 230/208 Volt, Heating And Cooling, Through-The-Wall, Room Air-Conditioner (Friedrich WE10D33).....	1,943.94	84.41
<i>For >10 To 50, Deduct</i>	-88.76	
<i>For >50 To 75, Deduct</i>	-124.26	
<i>For >75 To 100, Deduct</i>	-177.51	
<i>For >100, Deduct</i>	-213.01	
<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68	
23 81 16 00-0050 EA 12,000 BTU, 9.8 EER, 230/208 Volt, Heating And Cooling, Through-The-Wall, Room Air-Conditioner (Friedrich WE12D33).....	2,089.00	84.41
<i>For >10 To 50, Deduct</i>	-96.01	
<i>For >50 To 75, Deduct</i>	-134.41	
<i>For >75 To 100, Deduct</i>	-192.02	
<i>For >100, Deduct</i>	-230.42	
<i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	271.68	
23 81 23 Computer-Room Air-Conditioners (23 81)		
Note: Includes equipment rigging. Indoor units include filters.		
23 81 23 12 Large-Capacity, Computer-Room Air-Conditioners, Floor Mounted Units (23 81 23)		
23 81 23 12-0001 Floor Mounted Air Cooled Direct Expansion Type (23 81 23 12)		
Note: Includes compressor sequence switch, mode alert monitor, non-locking disconnect switch, firestat, infrared humidifier, auto flush on humidifier, two liquitect sensors, floor stand, and outdoor air cooled condenser complete with fan speed control. Excludes precharged copper pipe.		
23 81 23 12-0002 EA 3 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	40,541.42	2,402.18
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	4,616.77	
23 81 23 12-0003 EA 5 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	44,748.92	2,627.37
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	5,098.26	
23 81 23 12-0004 EA 6 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	62,110.20	3,002.72
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	7,205.51	
23 81 23 12-0005 EA 8 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	68,008.76	3,190.39
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	7,907.94	
23 81 23 12-0006 EA 10 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	73,907.32	3,378.06
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	8,610.37	
23 81 23 12-0007 EA 16 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	82,725.95	4,053.67
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	9,576.17	
23 81 23 12-0008 EA 20 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	93,505.26	4,504.08
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	10,850.76	
23 81 23 12-0009 EA 22 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	97,838.86	4,652.64
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	11,360.44	
23 81 23 12-0010 EA 24 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	106,581.45	4,804.35
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	12,420.87	
23 81 23 12-0011 EA 30 Ton Air Cooled Computer Room Air Conditioner, Direct Expansion Type.....	115,238.63	5,404.89
Note: Includes interior unit and remote condenser. Excludes piping.		
<i>For Liebert Unit, Add</i>	13,399.96	
23 81 23 12-0012 Floor Mounted Chilled Water Type (23 81 23 12)		
Note: Includes mode alert monitor, non-locking disconnect switch, firestat, infrared humidifier, auto flush on humidifier, two liquitect sensors, floor stand. Excludes chilled water source. See CSI section 23 81 23 12-0020 for chilled water source.		
23 81 23 12-0013 EA 3 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	24,230.15	1,645.98
<i>For Liebert Unit, Add</i>	2,754.44	
23 81 23 12-0014 EA 5 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	26,035.66	1,823.24
<i>For Liebert Unit, Add</i>	2,950.59	
23 81 23 12-0015 EA 12 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	32,177.08	2,777.06
<i>For Liebert Unit, Add</i>	3,559.29	
23 81 23 12-0016 EA 16 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	33,645.57	2,813.65
<i>For Liebert Unit, Add</i>	3,736.81	
23 81 23 12-0017 EA 20 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	34,938.11	2,926.19
<i>For Liebert Unit, Add</i>	3,877.69	
23 81 23 12-0018 EA 22 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	35,749.09	3,207.55
<i>For Liebert Unit, Add</i>	3,934.04	
23 81 23 12-0019 EA 31 Ton Computer Room Air Conditioner, Chilled Water Type, Excludes Water Source.....	37,918.16	3,488.92
<i>For Liebert Unit, Add</i>	4,159.46	
23 81 23 12-0020 Floor Mounted Water Source (23 81 23 12)		
Note: Includes mode alert monitor, non-locking disconnect switch, firestat, infrared humidifier, auto flush on humidifier, two liquitect sensors, floor stand. Excludes water source.		
23 81 23 12-0021 EA 3 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit.....	18,744.24	1,501.36
<i>For Liebert Unit, Add</i>	2,062.56	
23 81 23 12-0022 EA 5 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit.....	20,633.97	1,576.43
<i>For Liebert Unit, Add</i>	2,284.69	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 81 Decentralized Unitary HVAC Equipment



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 81 23	12-0023	EA	6 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	26,774.63 3,038.32	1,651.50
23 81 23	12-0024	EA	8 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	28,852.38 3,268.37	1,801.63
23 81 23	12-0025	EA	9 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	30,361.31 3,442.90	1,876.93
23 81 23	12-0026	EA	10 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	31,870.23 3,617.42	1,951.77
23 81 23	12-0027	EA	12 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	33,116.17 3,744.35	2,101.90
23 81 23	12-0028	EA	16 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	34,573.61 3,903.01	2,252.04
23 81 23	12-0029	EA	20 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	35,603.60 4,005.25	2,402.18
23 81 23	12-0030	EA	25 Ton Chilled Water Source For Computer Room Air Conditioner, Chilled Water Unit..... <i>For Liebert Unit, Add</i>	40,648.84 4,548.22	2,852.58
23 81 23 12-0031 Floor Mounted Glycol System Type <small>(23 81 23 12)</small>					
Note: Includes mode alert monitor, non-locking disconnect switch, freestat, infrared humidifier, auto flush on humidifier, two liquitect sensors, floor stand. Excludes chilled water source. See CSI section 23 81 23 12-0020 for water source.					
23 81 23	12-0032	EA	3 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	49,438.64 17,632.72 8,700.00	1,645.98
23 81 23	12-0033	EA	5 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	53,190.34 18,981.27 8,700.00	1,823.24
23 81 23	12-0034	EA	6 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	69,644.63 24,784.16 8,700.00	2,042.71
23 81 23	12-0035	EA	8 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	80,595.61 28,660.90 8,700.00	2,262.17
23 81 23	12-0036	EA	9 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	85,153.74 30,278.19 8,700.00	2,371.90
23 81 23	12-0037	EA	10 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	90,949.00 32,328.48 8,700.00	2,481.63
23 81 23	12-0038	EA	12 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	97,130.56 34,513.97 8,700.00	2,591.93
23 81 23	12-0039	EA	15 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	104,311.06 37,049.09 8,700.00	2,689.84
23 81 23	12-0040	EA	16 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For 10 HP Glycol Pump, Add</i> <i>For Remote Pump Control Panel, Add</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	111,097.19 39,449.56 21,500.00 7,630.00 8,700.00	2,813.65
23 81 23	12-0041	EA	20 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For 10 HP Glycol Pump, Add</i> <i>For Remote Pump Control Panel, Add</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	121,903.61 43,253.75 21,500.00 7,630.00 8,700.00	2,926.19
23 81 23	12-0042	EA	22 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For 10 HP Glycol Pump, Add</i> <i>For Remote Pump Control Panel, Add</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	126,328.72 44,856.57 21,500.00 7,630.00 8,700.00	3,207.55
23 81 23	12-0043	EA	30 Ton Computer Room Air Conditioner, Glycol System Type..... <i>For Drycooler, Add</i> <i>Note: Installation is externally mounted.</i> <i>For 10 HP Glycol Pump, Add</i> <i>For Remote Pump Control Panel, Add</i> <i>For Integrated Fluid Econocoil (Economizer Functionality), Add</i>	154,112.10 54,635.61 21,500.00 7,630.00 8,700.00	3,488.92
23 81 23 12-0044 Removal And Reinstallation Of Computer Room Unit <small>(23 81 23 12)</small>					
Note: Includes storage and cleaning. Excludes main mechanical piping. Reconnection of existing valves are included.					
23 81 23	12-0045	EA	Removal And Reinstallation Up To 6 Ton, Floor Mounted Chilled Water Computer Room Unit.....	2,250.92	
23 81 23	12-0046	EA	Removal And Reinstallation Up To 6 Ton Direct Expansion Computer Room Unit.....	1,875.76	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 81 23 13 Computer-Room Air-Conditioners, Ceiling Mounted Units (23 81 23)

23 81 23 13-0001	EA	Horizontal Indoor Single Package Cooling Unit <small>(23 81 23 13)</small> Note: Carrier 50AH With indoor scroll compressor, plenum mounted.		
23 81 23 13-0002	EA	2 Ton Horizontal Indoor Single-Package Cooling Unit, 800 CFM Nominal	20,355.13	675.27
23 81 23 13-0003	EA	3 Ton Horizontal Indoor Single-Package Cooling Unit, 1,200 CFM Nominal	23,852.07	844.09
23 81 23 13-0004	EA	4 Ton Horizontal Indoor Single-Package Cooling Unit, 1,600 CFM Nominal	27,771.08	1,012.91
23 81 23 13-0005	EA	5 Ton Horizontal Indoor Single-Package Cooling Unit, 2,000 CFM Nominal	32,329.87	1,125.46

23 81 26 Split-System Air-Conditioners (23 81)

23 81 26 13 Small-Capacity Split-System Air-Conditioners (23 81 26)

23 81 26 13-0001	EA	Split System A/C Unit <small>(23 81 26 13)</small> See CSI section 23 23 16 00-0001 for piping.		
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23 81 26 13-0002	EA	Ductless Split System Air Conditioners <small>(23 81 26 13-0001)</small> Note: Excludes refrigerant piping, electrical, and pad. Panasonic units or equal. See CSI section 23 81 49 00-0025 for ductless heat pumps.		
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23 81 26 13-0003 Wall Mounted Ductless Split System Air Conditioners (23 81 26 13-0002)

23 81 26 13-0004	EA	9,000 BTU, 16 SEER, Wall Mounted Ductless Split System Air Conditioners	2,192.47	371.40
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0005	EA	11,900 BTU, 17 SEER, Wall Mounted Ductless Split System Air Conditioner	2,374.72	405.16
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0006	EA	17,500 BTU, 20 SEER, Wall Mounted Ductless Split System Air Conditioners	2,963.97	450.19
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0007	EA	24,200 BTU, 17 SEER, Wall Mounted Ductless Split System Air Conditioners	3,292.87	495.20
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0008	EA	25,200 BTU, 14.9 SEER, Wall Mounted Ductless Split System Air Conditioners	5,050.66	540.22
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0009	EA	29,800 BTU, 15 SEER, Wall Mounted Ductless Split System Air Conditioners	5,873.89	562.73
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0010	EA	31,400 BTU, 15.9 SEER, Wall Mounted Ductless Split System Air Conditioners	6,443.08	599.86
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		

23 81 26 13-0011 Dual and Tri Zone Wall Mounted Ductless Split System Air Conditioners (23 81 26 13-0002)

23 81 26 13-0012	EA	7,500 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	946.60	180.08
		Note: Includes indoor unit and wireless thermostat.		
23 81 26 13-0013	EA	9,000 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,000.78	191.33
		Note: Includes indoor unit and wireless thermostat.		
23 81 26 13-0014	EA	11,900 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,055.84	202.59
		Note: Includes indoor unit and wireless thermostat.		
23 81 26 13-0015	EA	17,500 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,192.62	213.84
		Note: Includes indoor unit and wireless thermostat.		
23 81 26 13-0016	EA	24,200 BTU Indoor Unit, Wall Mounted Ductless Split System Air Conditioners	1,275.51	225.09
		Note: Includes indoor unit and wireless thermostat.		
23 81 26 13-0017	EA	19,700 BTU, 16.5 SEER, Outdoor Unit, Wall Mounted Ductless Split System Air Conditioners	2,601.78	270.11
		Note: Includes outdoor unit and refrigerant charge.		
23 81 26 13-0018	EA	25,400 BTU, 16.2 SEER, Outdoor Unit, Wall Mounted Ductless Split System Air Conditioners	2,878.01	292.62
		Note: Includes outdoor unit and refrigerant charge.		
23 81 26 13-0019	EA	30,600 BTU, 17.6 SEER, Outdoor Unit, Wall Mounted Ductless Split System Air Conditioners	4,536.73	315.13
		Note: Includes outdoor unit and refrigerant charge.		

23 81 26 13-0020 Suspended Ceiling Mounted Ductless Split System Air Conditioners (23 81 26 13-0002)

23 81 26 13-0021	EA	24,400 BTU, 14.5 SEER, Ceiling Suspended Ductless Split System Air Conditioners	5,403.77	540.22
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0022	EA	31,200 BTU, 15.1 SEER, Ceiling Suspended Ductless Split System Air Conditioners	6,585.61	644.89
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0023	EA	39,000 BTU, 15.6 SEER, Ceiling Suspended Ductless Split System Air Conditioners	8,026.14	675.27
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		

23 81 26 13-0024 Recessed Ceiling Mounted Ductless Split System Air Conditioners (23 81 26 13-0002)

23 81 26 13-0025	EA	11,900 BTU, 16 SEER, Ceiling Recessed Ductless Split System Air Conditioners	3,327.55	450.19
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0026	EA	17,500 BTU, 16 SEER, Ceiling Recessed Ductless Split System Air Conditioners	3,877.30	495.20
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0027	EA	24,800 BTU, 14.1 SEER, Ceiling Recessed Ductless Split System Air Conditioners	5,381.65	585.24
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0028	EA	32,600 BTU, 14.6 SEER, Ceiling Recessed Ductless Split System Air Conditioners	6,226.52	644.89
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 26 13-0029	EA	39,500 BTU, 14.6 SEER, Ceiling Recessed Ductless Split System Air Conditioners	7,846.59	675.27
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 81 Decentralized Unitary HVAC Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 81 26	13-0030		Ductless Split System Accessories <small>(23 81 26 13-0002)</small>		
23 81 26	13-0031	LF	3" Line Set Cover, Rigid Polyvinyl Chloride (PVC) Line Set Covers	13.92	1.61
23 81 26	13-0032	LF	4" Line Set Cover, Rigid Polyvinyl Chloride (PVC) Line Set Covers	18.01	1.77
23 81 26	13-0033	LF	6" Line Set Cover, Rigid Polyvinyl Chloride (PVC) Line Set Covers	22.53	1.95
23 81 26	13-0034	EA	3" Union Coupling, Rigid Polyvinyl Chloride (PVC) Line Set Covers	23.23	3.02
23 81 26	13-0035	EA	4" Union Coupling, Rigid Polyvinyl Chloride (PVC) Line Set Covers	40.59	3.33
23 81 26	13-0036	EA	6" Union Coupling, Rigid Polyvinyl Chloride (PVC) Line Set Covers	46.28	3.66
23 81 26	13-0037	EA	3" 90 Degree Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	58.22	6.05
23 81 26	13-0038	EA	4" 90 Degree Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	97.61	6.65
23 81 26	13-0039	EA	6" 90 Degree Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	109.03	7.32
23 81 26	13-0040	EA	3" 90 Degree Long Radius Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	78.22	6.45
23 81 26	13-0041	EA	4" 90 Degree Long Radius Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	91.92	7.10
23 81 26	13-0042	EA	6" 90 Degree Long Radius Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	143.36	7.81
23 81 26	13-0043	EA	3" 45 Degree Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	58.22	6.05
23 81 26	13-0044	EA	4" 45 Degree Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	97.61	6.65
23 81 26	13-0045	EA	6" 45 Degree Elbow, Rigid Polyvinyl Chloride (PVC) Line Set Covers	109.03	7.32
23 81 26	13-0046	EA	3" Wall Penetration Cover, Rigid Polyvinyl Chloride (PVC) Line Set Covers	75.13	10.09
23 81 26	13-0047	EA	4" Wall Penetration Cover, Rigid Polyvinyl Chloride (PVC) Line Set Covers	111.06	11.09
23 81 26	13-0048	EA	6" Wall Penetration Cover, Rigid Polyvinyl Chloride (PVC) Line Set Covers	133.21	12.20
23 81 26	13-0049	EA	2-1/2" Wall Sleeve, Rigid Polyvinyl Chloride (PVC) Line Set Covers	43.65	2.01
23 81 26	13-0050	EA	3" x 20" Flexible Joint, Rigid Polyvinyl Chloride (PVC) Line Set Covers	46.48	6.05
23 81 26	13-0051	EA	4" x 20" Flexible Joint, Rigid Polyvinyl Chloride (PVC) Line Set Covers	76.48	6.65
23 81 26	13-0052	EA	3" Duct End Termination, Rigid Polyvinyl Chloride (PVC) Line Set Covers	41.78	6.05
23 81 26	13-0053	EA	4" Duct End Termination, Rigid Polyvinyl Chloride (PVC) Line Set Covers	57.70	6.65
23 81 26	13-0054	EA	6" Duct End Termination, Rigid Polyvinyl Chloride (PVC) Line Set Covers	62.07	7.32
23 81 26	13-0055	EA	4" T Joint, Rigid Polyvinyl Chloride (PVC) Line Set Covers	209.89	8.06
23 81 26	13-0056	EA	6" T Joint, Rigid Polyvinyl Chloride (PVC) Line Set Covers	238.16	8.87
23 81 26	13-0057	EA	14" Condensing Unit Mounting Blocks With End Caps	124.49	30.25
23 81 26	13-0058	EA	17" Condensing Unit Mounting Blocks With End Caps	137.65	32.26
23 81 26	13-0059	EA	36" Condensing Unit Mounting Blocks With End Caps	190.72	34.27
23 81 26	13-0060	EA	End Cap, Set of 4	23.45	
23 81 26	13-0061	EA	18" Condensing Unit Type 2 Wall Bracket, 165 LB Capacity	265.58	60.49
23 81 26	13-0062	EA	21" Condensing Unit Type 2 Wall Bracket, 220 LB Capacity	281.81	64.52
23 81 26	13-0063	LF	5/8" ID Condensate Drain Line	3.10	0.16
23 81 26	13-0064	LF	3/4" ID Condensate Drain Line	3.21	0.16
23 81 26	13-0065		Cased A/C Evaporator Coils <small>(23 81 26 13-0001)</small>		
23 81 26	13-0066		Vertical Cased A/C Evaporator Coils <small>(23 81 26 13-0065)</small>		
23 81 26	13-0067	EA	1-1/2 Ton Vertical Cased A/C Evaporator Coil	812.93	114.87
23 81 26	13-0068	EA	2 Ton Vertical Cased A/C Evaporator Coil	846.49	123.48
23 81 26	13-0069	EA	2-1/2 Ton Vertical Cased A/C Evaporator Coil	1,013.02	132.09
23 81 26	13-0070	EA	3 Ton Vertical Cased A/C Evaporator Coil	1,158.58	140.71
23 81 26	13-0071	EA	3-1/2 Ton Vertical Cased A/C Evaporator Coil	1,347.36	146.45
23 81 26	13-0072	EA	4 Ton Vertical Cased A/C Evaporator Coil	1,508.14	152.20
23 81 26	13-0073	EA	4-1/2 Ton Vertical Cased A/C Evaporator Coil	1,619.76	163.69
23 81 26	13-0074	EA	5 Ton Vertical Cased A/C Evaporator Coil	1,627.68	172.30
23 81 26	13-0075		"A" Style Horizontal Cased A/C Evaporator Coils <small>(23 81 26 13-0065)</small>		
23 81 26	13-0076	EA	2 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,005.31	117.74
23 81 26	13-0077	EA	2-1/2 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,160.77	124.34
23 81 26	13-0078	EA	3 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,333.82	132.09
23 81 26	13-0079	EA	3-1/2 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,381.83	136.86
23 81 26	13-0080	EA	4 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,446.60	143.58
23 81 26	13-0081	EA	4-1/2 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,461.68	151.05
23 81 26	13-0082	EA	5 Ton "A" Style Horizontal Cased A/C Evaporator Coil	1,476.46	158.51
23 81 26	13-0083		Slab Style Horizontal Cased A/C Evaporator Coils <small>(23 81 26 13-0065)</small>		
23 81 26	13-0084	EA	2 Ton Slab Style Horizontal Cased A/C Evaporator Coil	872.34	117.74
23 81 26	13-0085	EA	3 Ton Slab Style Horizontal Cased A/C Evaporator Coil	1,051.54	132.09
23 81 26	13-0086	EA	4 Ton Slab Style Horizontal Cased A/C Evaporator Coil	1,217.97	143.58
23 81 26	13-0087	EA	5 Ton Slab Style Horizontal Cased A/C Evaporator Coil	1,474.13	158.51
23 81 26	16		Large-Capacity Split-System Air-Conditioners <small>(23 81 26)</small>		
23 81 26	16-0001		Split System Air Conditioners, Variable Refrigerant Flow (Mitsubishi City Multi) <small>(23 81 26 16)</small>		
23 81 26	16-0002		Outdoor Units <small>(23 81 26 16-0001)</small>		
23 81 26	16-0003	EA	6 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P72YKMU-A)	17,095.37	590.86
23 81 26	16-0004	EA	8 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P96YKMU-A)	18,528.70	703.41
23 81 26	16-0005	EA	10 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P120YKMU-A)	20,854.78	844.09
23 81 26	16-0006	EA	12 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P144YKMU-A)	25,692.37	872.23
23 81 26	16-0007	EA	12 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P144YSKMU-A)	34,206.31	900.37
23 81 26	16-0008	EA	14 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P168YSKMU-A)	35,470.82	928.50
23 81 26	16-0009	EA	16 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P192YSKMU-A)	36,735.33	956.64



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 81 26 16-0010 EA 18 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P216YSKMU-A)	38,892.59	1,012.91
23 81 26 16-0011 EA 20 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P240YSKMU-A)	41,049.86	1,069.19
23 81 26 16-0012 EA 22 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P264YSKMU-A)	45,943.73	1,125.46
23 81 26 16-0013 EA 24 Ton R2-Series Outdoor Unit (Mitsubishi PURY-P288YSKMU-A)	50,837.59	1,181.73
23 81 26 16-0014 Indoor Units (23 81 26 16-0001)		
23 81 26 16-0015 EA 6 MBH Cooling, 6.7 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P06NBMU-E2)	1,759.89	182.89
23 81 26 16-0016 EA 8 MBH Cooling, 9 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P08NBMU-E2)	1,849.99	196.96
23 81 26 16-0017 EA 12 MBH Cooling, 13.5 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P12NHMU-E2)	1,929.76	211.03
23 81 26 16-0018 EA 15 MBH Cooling, 17 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P15NHMU-E2)	2,025.03	225.09
23 81 26 16-0019 EA 18 MBH Cooling, 20 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P18NHMU-E2)	2,192.05	267.30
23 81 26 16-0020 EA 24 MBH Cooling, 27 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P24NKMU-E2)	2,446.07	323.57
23 81 26 16-0021 EA 30 MBH Cooling, 34 MBH Heating Wall Mounted Indoor Unit (Mitsubishi PKFY-P30NKMU-E2)	2,650.02	351.70
23 81 26 16-0022 EA 6 MBH Cooling, 6.7 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P06NMAU-E3)	2,555.49	201.18
23 81 26 16-0023 EA 8 MBH Cooling, 9 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P08NMAU-E3)	2,643.24	216.65
23 81 26 16-0024 EA 12 MBH Cooling, 13.5 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P12NMAU-E3)	2,787.80	232.13
23 81 26 16-0025 EA 15 MBH Cooling, 17 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P15NMAU-E3)	3,025.27	247.60
23 81 26 16-0026 EA 18 MBH Cooling, 20 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P18NMAU-E3)	3,190.41	294.03
23 81 26 16-0027 EA 24 MBH Cooling, 27 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P24NMAU-E3)	3,500.09	355.92
23 81 26 16-0028 EA 27 MBH Cooling, 30 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P27NMAU-E3)	3,680.79	371.40
23 81 26 16-0029 EA 30 MBH Cooling, 34 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P30NMAU-E3)	3,882.14	386.87
23 81 26 16-0030 EA 36 MBH Cooling, 40 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P36NMAU-E3)	4,305.45	425.56
23 81 26 16-0031 EA 48 MBH Cooling, 54 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P48NMAU-E3)	4,772.66	468.12
23 81 26 16-0032 EA 54 MBH Cooling, 60 MBH Heating Ceiling Concealed Ducted Indoor Unit (Mitsubishi PEFY-P54NMAU-E3)	5,165.76	514.93
23 81 26 16-0033 EA 72 MBH Cooling, 80 MBH Heating Ceiling Concealed High Static Ducted Indoor Unit (Mitsubishi PEFY-P72NMHSU-E)	6,554.43	566.42
23 81 26 16-0034 EA 96 MBH Cooling, 108 MBH Heating Ceiling Concealed High Static Ducted Indoor Unit (Mitsubishi PEFY-P96NMHSU-E)	7,442.24	623.06
23 81 26 16-0035 EA 12 MBH Cooling, 13.5 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-EP12NEMU-E)	2,904.49	232.13
23 81 26 16-0036 EA 15 MBH Cooling, 17 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-EP15NEMU-E)	3,062.45	247.60
23 81 26 16-0037 EA 18 MBH Cooling, 20 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-EP18NEMU-E)	3,230.69	294.03
23 81 26 16-0038 EA 24 MBH Cooling, 27 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-EP24NEMU-E)	3,619.88	355.92
23 81 26 16-0039 EA 30 MBH Cooling, 34 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-EP30NEMU-E)	3,899.69	386.87
23 81 26 16-0040 EA 36 MBH Cooling, 40 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-EP36NEMU-E)	4,775.32	425.57
23 81 26 16-0041 EA 6 MBH Cooling, 6.7 MBH Heating 1-Way Ceiling Recessed Cassette With Grille (Mitsubishi PMFY-P06NBMU-ER5)	2,612.29	201.18
23 81 26 16-0042 EA 8 MBH Cooling, 9 MBH Heating 1-Way Ceiling Recessed Cassette With Grille (Mitsubishi PMFY-P08NBMU-ER5)	2,746.51	216.65
23 81 26 16-0043 EA 12 MBH Cooling, 13.5 MBH Heating 1-Way Ceiling Recessed Cassette With Grille (Mitsubishi PMFY-P12NBMU-ER5)	2,953.03	232.13
23 81 26 16-0044 EA 15 MBH Cooling, 17 MBH Heating 1-Way Ceiling Recessed Cassette With Grille (Mitsubishi PMFY-P15NBMU-ER5)	3,107.89	247.60
23 81 26 16-0045 EA 8 MBH Cooling, 9 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-P08NCMU-ER4)	2,416.05	216.65
23 81 26 16-0046 EA 12 MBH Cooling, 13.5 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-P12NCMU-ER4)	2,539.95	232.13
23 81 26 16-0047 EA 15 MBH Cooling, 17 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Mitsubishi PLFY-P15NCMU-ER4)	2,669.00	247.60
23 81 26 16-0048 Controllers For Outdoor Units (23 81 26 16-0001)		
23 81 26 16-0049 EA 8 Branch (Main BC) (Mitsubishi CMB-P108NU-HA1)	9,270.35	168.82
23 81 26 16-0050 EA 10 Branch (Main BC) (Mitsubishi CMB-P1010NU-HA1)	10,720.74	196.96
23 81 26 16-0051 EA 13 Branch (Main BC) (Mitsubishi CMB-P1013NU-GA)	11,845.84	225.09
23 81 26 16-0052 EA 16 Branch (Main BC) (Mitsubishi CMB-P1016NU-HA)	14,060.42	253.23
23 81 26 16-0053 EA 4 Branch (Sub BC) (Mitsubishi CMB-P104NU-GB)	5,166.48	112.54
23 81 26 16-0054 EA 8 Branch (Sub BC) (Mitsubishi CMB-P108NU-GB)	7,958.84	168.82
23 81 26 16-0055 EA 16 Branch (Sub BC) (Mitsubishi CMB-P1016NU-HB)	12,165.45	253.23
23 81 26 16-0056 Energy Recovery Units (23 81 26 16-0001)		
23 81 26 16-0057 EA 36.2 MBH Cooling, 39.9 MBH Heating Hydronic Heat Exchanger Auxiliary Unit (Mitsubishi PWFY-P36NMMU-E2-AU)	6,554.39	168.82
23 81 26 16-0058 EA 39.9 MBH Hydronic Heat Exchanger Booster Unit (Mitsubishi PWFY-P36NMMU-E-BU)	12,420.03	168.82
23 81 26 16-0059 EA 112 MBH Cooling, 81.4 MBH Heating Reheat Unit (Mitsubishi PEFY-AF1200CFMR)	12,595.06	196.96
23 81 26 16-0060 EA Lossnay Energy Recovery Ventilator ERV, 300 CFM (Mitsubishi LGH-F300RX5-E)	2,604.90	140.68
23 81 26 16-0061 EA Lossnay Energy Recovery Ventilator ERV, 470 CFM (Mitsubishi LGH-F470RX5-E)	3,323.54	146.30
23 81 26 16-0062 EA Lossnay Energy Recovery Ventilator ERV, 600 CFM (Mitsubishi LGH-F600RX5-E)	3,964.73	151.94
23 81 26 16-0063 EA Lossnay Energy Recovery Ventilator ERV, 1,200 CFM (Mitsubishi LGH-F1200RX5-E1)	7,241.12	168.82
23 81 26 16-0064 Piping Specialties (23 81 26 16-0001)		
23 81 26 16-0065 EA Maintenance Tool Interface (Mitsubishi CMS-MNG-E)	919.09	
23 81 26 16-0066 EA Branch Joint (Mitsubishi CMY-Y102SS-G2)	241.01	43.63
23 81 26 16-0067 EA Branch Joint (Mitsubishi CMY-Y102LS-G2)	241.01	43.63
23 81 26 16-0068 EA Branch Joint (Mitsubishi CMY-Y202S-G2)	267.41	45.93

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 81 Decentralized Unitary HVAC Equipment**MINOR
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23 81 26 16-0069	EA	Branch Joint (Mitsubishi CMY-Y302S-G2).....	335.68	51.67
23 81 26 16-0070	EA	Header - 4 Branch (Mitsubishi CMY-Y64-G-E)	438.41	74.63
23 81 26 16-0071	EA	Header - 8 Branch (Mitsubishi CMY-Y68-G-E)	742.58	149.26
23 81 26 16-0072	EA	Refrigeration Ball Valve-Flare/Schrader/Insulated - 3/8" (Mitsubishi BV38FFSI).....	134.84	18.37
23 81 26 16-0073	EA	Refrigeration Ball Valve-Flare/Schrader/Insulated - 5/8" (Mitsubishi BV58FFSI).....	151.72	25.26

23 81 26 16-0074 Split System Air Conditioners (Daikin VRV) (23 81 26 16)**23 81 26 16-0075 Heat Pump Outdoor Units (23 81 26 16-0074)**

23 81 26 16-0076	EA	6 Ton Heat Pump Outdoor Unit (Daikin)	25,415.59	590.86
23 81 26 16-0077	EA	8 Ton Heat Pump Outdoor Unit (Daikin)	28,404.19	703.41
23 81 26 16-0078	EA	10 Ton Heat Pump Outdoor Unit (Daikin)	31,661.65	844.09
23 81 26 16-0079	EA	12 Ton Heat Pump Outdoor Unit (Daikin)	39,583.29	872.23
23 81 26 16-0080	EA	14 Ton Heat Pump Outdoor Unit (Daikin)	53,088.23	928.50
23 81 26 16-0081	EA	16 Ton Heat Pump Outdoor Unit (Daikin)	56,120.58	956.64
23 81 26 16-0082	EA	18 Ton Heat Pump Outdoor Unit (Daikin)	58,996.64	1,012.91
23 81 26 16-0083	EA	20 Ton Heat Pump Outdoor Unit (Daikin)	62,085.28	1,069.19
23 81 26 16-0084	EA	22 Ton Heat Pump Outdoor Unit (Daikin)	80,479.51	1,125.46
23 81 26 16-0085	EA	24 Ton Heat Pump Outdoor Unit (Daikin)	83,568.14	1,181.73
23 81 26 16-0086	EA	26 Ton Heat Pump Outdoor Unit (Daikin)	86,656.77	1,238.00
23 81 26 16-0087	EA	28 Ton Heat Pump Outdoor Unit (Daikin)	89,532.83	1,294.27
23 81 26 16-0088	EA	30 Ton Heat Pump Outdoor Unit (Daikin)	92,621.47	1,350.55

23 81 26 16-0089 Heat Recovery Heat Pump Outdoor Units (23 81 26 16-0074)

23 81 26 16-0090	EA	6 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	32,546.52	768.13
23 81 26 16-0091	EA	8 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	35,484.33	914.43
23 81 26 16-0092	EA	10 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	38,970.58	1,097.32
23 81 26 16-0093	EA	12 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	49,034.89	1,133.90
23 81 26 16-0094	EA	14 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	66,399.99	1,207.05
23 81 26 16-0095	EA	16 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	71,575.01	1,243.63
23 81 26 16-0096	EA	18 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	74,272.25	1,316.78
23 81 26 16-0097	EA	20 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	76,969.49	1,389.94
23 81 26 16-0098	EA	22 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	101,455.95	1,463.09
23 81 26 16-0099	EA	24 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	104,153.19	1,536.25
23 81 26 16-0100	EA	26 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	109,401.37	1,609.40
23 81 26 16-0101	EA	28 Ton Heat Recovery Heat Pump Outdoor Unit (Daikin).....	112,098.60	1,682.56

23 81 26 16-0102 Indoor Units (23 81 26 16-0074)

23 81 26 16-0103	EA	7.5 MBH Cooling, 8.5 MBH Heating Wall Mounted Indoor Unit (Daikin).....	2,880.67	196.96
23 81 26 16-0104	EA	9.5 MBH Cooling, 10.5 MBH Heating Wall Mounted Indoor Unit (Daikin).....	3,010.24	202.59
23 81 26 16-0105	EA	12 MBH Cooling, 13.5 MBH Heating Wall Mounted Indoor Unit (Daikin).....	3,410.16	211.03
23 81 26 16-0106	EA	18 MBH Cooling, 20 MBH Heating Wall Mounted Indoor Unit (Daikin).....	3,815.51	267.30
23 81 26 16-0107	EA	24 MBH Cooling, 26.5 MBH Heating Wall Mounted Indoor Unit (Daikin).....	4,180.74	323.57
23 81 26 16-0108	EA	7.5 MBH Cooling, 8.5 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	4,235.63	216.65
23 81 26 16-0109	EA	9.5 MBH Cooling, 10.5 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	4,378.37	222.84
23 81 26 16-0110	EA	12 MBH Cooling, 13.5 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	4,599.50	123.80
23 81 26 16-0111	EA	18 MBH Cooling, 20 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	4,873.70	294.03
23 81 26 16-0112	EA	24 MBH Cooling, 27 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	5,773.61	355.92
23 81 26 16-0113	EA	30 MBH Cooling, 34 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	6,607.61	386.87
23 81 26 16-0114	EA	36 MBH Cooling, 40 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	7,058.00	425.56
23 81 26 16-0115	EA	48 MBH Cooling, 54 MBH Heating Ceiling Concealed Ducted Indoor Unit (Daikin).....	7,293.52	468.12
23 81 26 16-0116	EA	7.5 MBH Cooling, 8.7 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Daikin).....	4,745.02	216.65
23 81 26 16-0117	EA	9.5 MBH Cooling, 11.1 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Daikin).....	4,857.67	222.84
23 81 26 16-0118	EA	12 MBH Cooling, 14 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Daikin).....	5,167.04	232.13
23 81 26 16-0119	EA	18 MBH Cooling, 21 MBH Heating 4-Way Ceiling Recessed Cassette With Grille (Daikin).....	5,501.40	294.03

23 81 26 16-0120 Branch Selector Boxes (23 81 26 16-0074)

23 81 26 16-0121	EA	144 MBH, 4 Branch, Multi Port Branch Selector Box (Daikin).....	14,536.59	253.23
23 81 26 16-0122	EA	216 MBH, 6 Branch, Multi Port Branch Selector Box (Daikin).....	21,507.88	337.64
23 81 26 16-0123	EA	36 MBH, 4 Branch, Single Port Branch Selector Box (Daikin).....	2,852.23	112.54
23 81 26 16-0124	EA	60 MBH, 8 Branch, Single Port Branch Selector Box (Daikin).....	3,841.16	168.82
23 81 26 16-0125	EA	96 MBH, 8 Branch, Single Port Branch Selector Box (Daikin).....	4,758.01	253.23

23 81 26 16-0126 Controllers (23 81 26 16-0074)

23 81 26 16-0127	EA	Up To 16 Units, Navigation Controller (Daikin)	876.86	22.51
23 81 26 16-0128	EA	Individual Zone Controller (Daikin).....	628.19	22.51
23 81 26 16-0129	EA	Up To 16 Groups, Unified ON/OFF Controller (Daikin).....	1,235.84	22.51
23 81 26 16-0130	EA	Up To 64 Units, Multizone Controller (Daikin).....	1,739.20	22.51
23 81 26 16-0131	EA	I-Touch Manager Replaced Both Daikin IMP-128 thru 1024 and DCS601C71 (Daikin).....	16,137.62	270.11
23 81 26 16-0132	EA	I-Touch Manager D3net Plus Adapter (Daikin).....	3,032.72	22.51
23 81 26 16-0133	EA	24 Volt AC, Wired Thermostat For Split A/C Systems (Daikin).....	664.13	39.72

23 81 26 16-0134 Energy Recovery Units (23 81 26 16-0074)

23 81 26 16-0135	EA	300 CFM Energy Recovery Unit (Daikin).....	5,012.22	140.68
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 81 26 16-0136 EA 470 CFM Energy Recovery Unit (Daikin).....	6,511.52	146.30
23 81 26 16-0137 EA 600 CFM Energy Recovery Unit (Daikin).....	7,798.24	151.94
23 81 26 16-0138 EA 1,200 CFM Energy Recovery Unit (Daikin).....	14,580.35	168.82
 23 81 43 Air-Source Unitary Heat Pumps (23 81)		
23 81 43 00-0001 Single Package Thru-Wall Heat Pumps (23 81 43)		
Note: Air-to-air type with electric heat. Includes throwaway filters. Through the wall units are wired for 230/208 Volt, 1 phase, 60 HZ. With electronic controls, thermostat, cord and NEMA plug. Units are shipped fully factory assembled in one piece, prewired, prepped and charged with refrigerant, complete with push button controls all mounted in a steel cabinet, wall sleeve and outdoor grille. Excludes crane and associated personnel. See CSI section 01 22 23 00-0776 for crane lifting equipment.		
23 81 43 00-0002 EA 1/2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	2,223.07	182.95
For Unit Economizer, Add	297.08	
For >35 To 70, Deduct	-56.08	
For >70 To 100, Deduct	-93.47	
For >100, Deduct	-130.86	
For Low Ambient Protection, 0 Degree F, Add	256.67	
23 81 43 00-0003 EA 1 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	2,455.17	195.15
For Unit Economizer, Add	328.60	
For >35 To 70, Deduct	-62.31	
For >70 To 100, Deduct	-103.85	
For >100, Deduct	-145.39	
For Low Ambient Protection, 0 Degree F, Add	281.46	
23 81 43 00-0004 EA 1-1/2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	4,199.91	195.15
For Unit Economizer, Add	572.86	
For >35 To 70, Deduct	-114.65	
For >70 To 100, Deduct	-191.09	
For >100, Deduct	-267.53	
For Low Ambient Protection, 0 Degree F, Add	438.49	
23 81 43 00-0005 EA 2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	4,598.17	195.15
For Unit Economizer, Add	627.64	
For >35 To 70, Deduct	-125.87	
For >70 To 100, Deduct	-209.78	
For >100, Deduct	-293.70	
For Low Ambient Protection, 0 Degree F, Add	226.49	
23 81 43 00-0006 EA 2-1/2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	5,204.15	207.35
For Unit Economizer, Add	711.51	
For >35 To 70, Deduct	-143.32	
For >70 To 100, Deduct	-238.86	
For >100, Deduct	-334.41	
For Low Ambient Protection, 0 Degree F, Add	250.04	
23 81 43 00-0007 EA 3 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	5,453.40	219.54
For Unit Economizer, Add	746.40	
For >35 To 70, Deduct	-150.80	
For >70 To 100, Deduct	-251.33	
For >100, Deduct	-351.86	
For Low Ambient Protection, 0 Degree F, Add	760.17	
23 81 43 00-0008 EA 3-1/2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	6,142.46	219.54
For Unit Economizer, Add	841.89	
For >35 To 70, Deduct	-170.74	
For >70 To 100, Deduct	-284.56	
For >100, Deduct	-398.38	
For Low Ambient Protection, 0 Degree F, Add	852.67	
23 81 43 00-0009 EA 4 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	6,777.77	231.74
For Unit Economizer, Add	930.35	
For >35 To 70, Deduct	-189.43	
For >70 To 100, Deduct	-315.71	
For >100, Deduct	-442.00	
For Low Ambient Protection, 0 Degree F, Add	936.73	
23 81 43 00-0010 EA 5 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	7,806.39	268.33
For Unit Economizer, Add	1,071.43	
For >35 To 70, Deduct	-218.09	
For >70 To 100, Deduct	-363.49	
For >100, Deduct	-508.88	
For Low Ambient Protection, 0 Degree F, Add	1,079.23	
23 81 43 00-0011 EA 7-1/2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	14,313.55	317.11
For Unit Economizer, Add	1,978.04	
For >35 To 70, Deduct	-410.01	
For >70 To 100, Deduct	-683.36	
For >100, Deduct	-956.70	
For Low Ambient Protection, 0 Degree F, Add	1,938.33	
23 81 43 00-0012 EA 10 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	18,430.74	402.49
For Unit Economizer, Add	2,547.62	
For >35 To 70, Deduct	-528.41	
For >70 To 100, Deduct	-880.68	
For >100, Deduct	-1,232.95	
For Low Ambient Protection, 0 Degree F, Add	380.43	
23 81 43 00-0013 EA 12-1/2 Ton Single Package Heat Pump, Air To Air Type With Electric Heat.....	22,504.09	451.29
For Unit Economizer, Add	3,114.47	
For >35 To 70, Deduct	-648.05	
For >70 To 100, Deduct	-1,080.08	
For >100, Deduct	-1,512.11	
For Low Ambient Protection, 0 Degree F, Add	441.66	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 81 Decentralized Unitary HVAC Equipment**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
23 81 43 00-0014	EA 15 Ton Single Package Heat Pump, Air To Air Type With Electric Heat..... <i>For Unit Economizer, Add</i> <i>For >35 To 70, Deduct</i> <i>For >70 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Low Ambient Protection, 0 Degree F, Add</i>	27,765.00 3,846.61 -802.58 -1,337.63 -1,872.69 520.61	512.27
23 81 43 00-0015	EA 20 Ton Single Package Heat Pump, Air To Air Type With Electric Heat..... <i>For Unit Economizer, Add</i> <i>For >35 To 70, Deduct</i> <i>For >70 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Low Ambient Protection, 0 Degree F, Add</i>	36,989.49 5,134.62 -1,076.75 -1,794.59 -2,512.42 633.35	548.86
23 81 43 00-0016	EA 25 Ton Single Package Heat Pump, Air To Air Type With Electric Heat..... <i>For Unit Economizer, Add</i> <i>For >35 To 70, Deduct</i> <i>For >70 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For Low Ambient Protection, 0 Degree F, Add</i>	44,564.51 6,191.22 -1,301.08 -2,168.46 -3,035.85 732.51	597.64
23 81 43 00-0017	Single Package Vertical Wall Heat Pumps <small>(23 81 43)</small> Note: Air-to-air type with electric heat. Includes throwaway filters. Wall units are wired for 230/208 Volt, 1 phase, 60 HZ. With solid state electronic controls, thermostat, cord and NEMA plug. Units are shipped fully factory assembled in one piece, prewired, prepiped and charged with refrigerant, complete with push button controls, insulated steel cabinet, with wall sleeve and outdoor grille and stainless steel drain pan. Excludes crane and associated personnel. See CSI section 01 22 23 00-0776 for crane lifting equipment.		
23 81 43 00-0018	EA 1/2 Ton Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat	3,416.52	243.94
23 81 43 00-0019	EA 1 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat.....	4,147.34	268.33
23 81 43 00-0020	EA 1-1/2 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat	5,364.84	280.53
23 81 43 00-0021	EA 2 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat.....	6,151.46	304.92
23 81 43 00-0022	EA 2-1/2 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat	7,693.31	353.71
23 81 43 00-0023	EA 3 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat.....	8,218.25	402.49
23 81 43 00-0024	EA 3-1/2 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat	8,924.57	451.29
23 81 43 00-0025	EA 4 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat.....	10,042.56	500.07
23 81 43 00-0026	EA 5 Ton Single Package Heat Pump, Vertical Wall Unit, Air To Air Type With Electric Heat.....	11,320.92	597.64
23 81 43 00-0027	Heat Pump, Room Air-Conditioners <small>(23 81 43)</small> Note: Includes throwaway filters and supplemental heat.		
23 81 43 00-0028	Heat Pump, Window Unit, Room Air-Conditioners <small>(23 81 43 00-0027)</small>		
23 81 43 00-0029	Heat Pump, Window Unit, Room Air-Conditioners (Friedrich) <small>(23 81 43 00-0028)</small>		
23 81 43 00-0030	EA 10,000 BTU, 10.9 EER, 230/208 Volt, Heat Pump, Through-The-Wall, Room Air-Conditioner (Friedrich YS10N10C)..... <i>For >10 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100, Deduct</i>	2,501.04 -113.23 -158.53 -226.47 -271.76	118.17
23 81 43 00-0031	EA 12,000 BTU, 10.9 EER, 230/208 Volt, Heat Pump, Through-The-Wall, Room Air-Conditioner (Friedrich YS12N33C)..... <i>For >10 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100, Deduct</i>	2,827.41 -129.55 -181.37 -259.11 -310.93	118.17
23 81 43 00-0032	EA 17,500 BTU, 10.9 EER, 230/208 Volt, Heat Pump, Through-The-Wall, Room Air-Conditioner (Friedrich KHM18A34A)..... <i>For >10 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100, Deduct</i>	3,316.98 -154.03 -215.64 -308.06 -369.68	118.17
23 81 43 00-0033	EA 24,000 BTU, 10.3 EER, 230/208 Volt, Heat Pump, Through-The-Wall, Room Air-Conditioner (Friedrich YL24N35D)..... <i>For >10 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100, Deduct</i>	3,860.94 -181.23 -253.72 -362.46 -434.95	118.17
23 81 43 00-0034	Heat Pump, Through-The-Wall, Room Air-Conditioners <small>(23 81 43 00-0027)</small> Note: Base unit excludes wall sleeve.		
23 81 43 00-0035	Heat Pump, Through-The-Wall, Room Air-Conditioners (Friedrich) <small>(23 81 43 00-0034)</small>		
23 81 43 00-0036	EA 9,300 BTU, 9.8 EER, 230/208 Volt, Heat Pump, Through-The-Wall, Room Air-Conditioner (Friedrich WY09C33D)..... <i>For >10 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	2,524.17 -117.77 -164.87 -235.54 -282.64 271.68	84.41
23 81 43 00-0037	EA 11,300 BTU, 9.3 EER, 230/208 Volt, Heat Pump, Through-The-Wall, Room Air-Conditioner (Friedrich WY12D33A)..... <i>For >10 To 50, Deduct</i> <i>For >50 To 75, Deduct</i> <i>For >75 To 100, Deduct</i> <i>For >100, Deduct</i> <i>For 27" Wide x 16-3/4" Deep x 16-3/4" High, Wall Sleeve (Friedrich WSE), Add</i>	2,524.17 -117.77 -164.87 -235.54 -282.64 271.68	84.41

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 81 46 Water-Source Unitary Heat Pumps (23 81)

23 81 46 00-0001 Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pumps (23 81 46)		
Note: R410a. Includes rubber isolator hanger brackets. McQuay CCW Series.		
23 81 46 00-0002 EA 7 MBH, 300 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	3,446.20	229.73
23 81 46 00-0003 EA 9 MBH, 300 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	3,555.92	229.73
23 81 46 00-0004 EA 12 MBH, 400 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	4,111.43	252.71
23 81 46 00-0005 EA 19 MBH, 630 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	4,330.49	275.67
23 81 46 00-0006 EA 24 MBH, 800 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	4,644.63	298.65
23 81 46 00-0007 EA 30 MBH, 1,000 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	5,470.79	321.62
23 81 46 00-0008 EA 36 MBH, 1,200 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	5,589.87	344.60
23 81 46 00-0009 EA 42 MBH, 1,400 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	6,099.07	367.57
23 81 46 00-0010 EA 48 MBH, 1,600 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	6,510.73	390.54
23 81 46 00-0011 EA 60 MBH, 2,000 CFM Horizontal, Ceiling Mounted, Geothermal Water Source Heat Pump.....	6,617.64	413.52

23 81 49 Split System Heat Pumps (23 81)

23 81 49 00-0001 Split System Heat Pump (23 81 49)		
See CSI section 23 23 16 00-0001 for piping.		
23 81 49 00-0002 Air Cooled, Outdoor Section (23 81 49 00-0001)		
Note: Includes 20' length of piping (liquid line and insulated suction line). Excludes additional piping.		
23 81 49 00-0003 EA 1.5 Ton, 14 SEER, Outdoor Heat Pump Unit.....	4,253.66	362.24
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		767.03
<i>For Winterstart Control, Add</i>		203.08
<i>For 15 SEER, Add</i>		666.86
<i>For 16 SEER, Add</i>		1,074.39
<i>For 18 SEER, Add</i>		1,630.11
23 81 49 00-0004 EA 2 Ton, 14 SEER, Outdoor Heat Pump Unit.....	4,386.84	402.49
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		794.55
<i>For Winterstart Control, Add</i>		212.06
<i>For 15 SEER, Add</i>		679.86
<i>For 16 SEER, Add</i>		1,095.33
<i>For 18 SEER, Add</i>		1,661.88
23 81 49 00-0005 EA 2.5 Ton, 14 SEER, Outdoor Heat Pump Unit.....	4,793.15	467.14
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		871.43
<i>For Winterstart Control, Add</i>		234.17
<i>For 15 SEER, Add</i>		735.43
<i>For 16 SEER, Add</i>		1,184.86
<i>For 18 SEER, Add</i>		1,797.73
23 81 49 00-0006 EA 3 Ton, 14 SEER, Outdoor Heat Pump Unit.....	5,232.53	536.65
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		733.61
<i>For Winterstart Control, Add</i>		258.09
<i>For 15 SEER, Add</i>		795.49
<i>For 16 SEER, Add</i>		1,281.62
<i>For 18 SEER, Add</i>		1,944.52
23 81 49 00-0007 EA 3.5 Ton, 14 SEER, Outdoor Heat Pump Unit.....	5,398.19	557.40
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		757.55
<i>For Winterstart Control, Add</i>		266.59
<i>For 15 SEER, Add</i>		819.69
<i>For 16 SEER, Add</i>		1,320.61
<i>For 18 SEER, Add</i>		2,003.68
23 81 49 00-0008 EA 4 Ton, 14 SEER, Outdoor Heat Pump Unit.....	5,996.42	640.33
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		838.49
<i>For Winterstart Control, Add</i>		294.74
<i>For 15 SEER, Add</i>		914.70
<i>For 16 SEER, Add</i>		1,473.68
<i>For 18 SEER, Add</i>		2,235.93
23 81 49 00-0009 EA 5 Ton, 14 SEER, Outdoor Heat Pump Unit.....	6,827.36	704.36
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		542.61
<i>For Winterstart Control, Add</i>		158.83
<i>For 15 SEER, Add</i>		1,047.80
<i>For 16 SEER, Add</i>		1,688.13
<i>For 18 SEER, Add</i>		2,561.30
23 81 49 00-0010 EA 7.5 Ton, 11.5 EER, Outdoor Heat Pump Unit.....	7,554.39	787.82
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		602.81
<i>For Winterstart Control, Add</i>		176.84
23 81 49 00-0011 EA 10 Ton, 11.1 EER, Outdoor Heat Pump Unit.....	10,453.89	945.38
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		418.78
<i>For Winterstart Control, Add</i>		226.28
23 81 49 00-0012 EA 15 Ton, 10.9 EER, Outdoor Heat Pump Unit.....	13,754.32	1,102.95
Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.		
<i>For Low Ambient Protection, 0 Degree F, Add</i>		473.57
<i>For Winterstart Control, Add</i>		279.01

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 81 Decentralized Unitary HVAC Equipment



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
23 81 49 00-0013	EA	20 Ton, 10.3 EER, Outdoor Heat Pump Unit.....	24,737.15		1,181.73
		Note: Precharged with refrigerant capable of charging the system with a 20' length of piping.			
		For Low Ambient Protection, 0 Degree F, Add	502.56		
		For Winterstart Control, Add	399.28		
23 81 49 00-0014		Indoor Section, Horizontal - Upflow Including Throwaway Filters (23 81 49 00-0001)			
23 81 49 00-0015	EA	2 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 5 KW Electric Heat	1,305.90		120.42
		For Additional 5 KW Electric Heat, Add	118.49		
23 81 49 00-0016	EA	2-1/2 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 5 KW Electric Heat	1,439.18		150.02
		For Additional 5 KW Electric Heat, Add	128.91		
23 81 49 00-0017	EA	3 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 5 KW Electric Heat	1,502.11		181.19
		For Additional 5 KW Electric Heat, Add	132.06		
23 81 49 00-0018	EA	3-1/2 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 5 KW Electric Heat	2,025.32		212.15
		For Additional 5 KW Electric Heat, Add	181.30		
23 81 49 00-0019	EA	4 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 10 KW Electric Heat	2,079.54		239.16
		For Additional 5 KW Electric Heat, Add	184.01		
23 81 49 00-0020	EA	5 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 10 KW Electric Heat	2,306.50		274.61
		For Additional 5 KW Electric Heat, Add	203.20		
23 81 49 00-0021	EA	7-1/2 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 10 KW Electric Heat	4,924.70		450.19
		For Additional 5 KW Electric Heat, Add	447.45		
23 81 49 00-0022	EA	10 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 15 kW Electric Heat	7,264.14		506.46
		For Additional 5 KW Electric Heat, Add	675.77		
23 81 49 00-0023	EA	15 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 15KW Electric Heat	10,194.09		562.73
		For Additional 5 KW Electric Heat, Add	963.14		
23 81 49 00-0024	EA	20 Ton Indoor Section Split Heat Pump Packaged Unit, Horizontal Upflow With 15 KW Electric Heat	11,585.50		675.27
		For Additional 5 KW Electric Heat, Add	1,091.01		
23 81 49 00-0025		Ductless Split System Heat Pumps (23 81 49 00-0001)			
		Note: Excludes refrigerant piping, electrical, and pad. Sanyo units or equal. See CSI section 23 81 26 13-0030 for accessories.			
23 81 49 00-0026		Wall Mounted Ductless Split System Heat Pumps (23 81 49 00-0025)			
23 81 49 00-0027	EA	9,000 BTU Cooling, 12,200 BTU Heating, 16 SEER, Wall Mounted Ductless Split System Heat Pumps	2,372.02		371.40
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0028	EA	11,900 BTU Cooling, 13,300 BTU Heating, 17 SEER, Wall Mounted Ductless Split System Heat Pumps	2,620.70		405.16
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0029	EA	17,500 BTU Cooling, 20,400 BTU Heating, 20 SEER, Wall Mounted Ductless Split System Heat Pumps	3,193.79		450.19
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0030	EA	24,200 BTU Cooling, 29,000 BTU Heating, 17 SEER, Wall Mounted Ductless Split System Heat Pumps	3,674.41		495.20
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0031	EA	25,200 BTU Cooling, 29,200 BTU Heating, 14.9 SEER, Wall Mounted Ductless Split System Heat Pumps.....	5,193.70		540.22
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0032	EA	29,800 BTU Cooling, 34,800 BTU Heating, 15 SEER, Wall Mounted Ductless Split System Heat Pumps	6,010.35		562.73
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0033	EA	31,400 BTU Cooling, 36,400 BTU Heating, 15.9 SEER, Wall Mounted Ductless Split System Heat Pumps.....	6,591.21		599.86
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0034		Dual and Tri Zone Wall Mounted Ductless Split System Heat Pumps (23 81 49 00-0025)			
		Note: Use this section only when matching indoor and outdoor capacity units are not used.			
23 81 49 00-0035	EA	7,500 BTU Cooling, 8,500 BTU Heating Indoor Unit, Wall Mounted Ductless Split System Heat Pumps.....	986.10		180.08
		Note: Includes indoor unit and wireless thermostat.			
23 81 49 00-0036	EA	9,000 BTU Cooling, 12,200 BTU Heating Indoor Unit, Wall Mounted Ductless Split System Heat Pumps.....	1,041.18		191.33
		Note: Includes indoor unit and wireless thermostat.			
23 81 49 00-0037	EA	11,900 BTU Cooling, 14,300 BTU Heating Indoor Unit, Wall Mounted Ductless Split System Heat Pumps.....	1,097.14		202.59
		Note: Includes indoor unit and wireless thermostat.			
23 81 49 00-0038	EA	17,500 BTU Cooling, 20,400 BTU Heating Indoor Unit, Wall Mounted Ductless Split System Heat Pumps.....	1,247.38		213.84
		Note: Includes indoor unit and wireless thermostat.			
23 81 49 00-0039	EA	24,200 BTU Cooling, 29,000 BTU Heating Indoor Unit, Wall Mounted Ductless Split System Heat Pumps.....	1,329.37		225.09
		Note: Includes indoor unit and wireless thermostat.			
23 81 49 00-0040	EA	19,700 BTU Cooling, 24,800 BTU Heating, 16.4 SEER, Outdoor Unit, Wall Mounted Ductless Split System Heat Pumps	2,933.94		270.11
		Note: Includes outdoor unit and refrigerant charge.			
23 81 49 00-0041	EA	23,200 BTU Cooling, 29,200 BTU Heating, 16.5 SEER, Outdoor Unit, Wall Mounted Ductless Split System Heat Pumps	3,475.00		292.62
		Note: Includes outdoor unit and refrigerant charge.			
23 81 49 00-0042	EA	30,600 BTU Cooling, 32,000 BTU Heating, 17.2 SEER, Outdoor Unit, Wall Mounted Ductless Split System Heat Pumps	5,620.29		315.13
		Note: Includes outdoor unit and refrigerant charge.			
23 81 49 00-0043		Suspended Ceiling Mounted Ductless Split System Heat Pumps (23 81 49 00-0025)			
		Note: Excludes hangers.			
23 81 49 00-0044	EA	24,400 BTU Cooling, 30,800 BTU Heating, 14.5 SEER, Ceiling Suspended Ductless Split System Heat Pumps	5,547.41		540.22
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0045	EA	31,200 BTU Cooling, 37,400 BTU Heating, 15.1 SEER, Ceiling Suspended Ductless Split System Heat Pumps	6,733.74		644.89
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			
23 81 49 00-0046	EA	39,000 BTU Cooling, 44,500 BTU Heating, 15.6 SEER, Ceiling Suspended Ductless Split System Heat Pumps	8,115.91		675.27
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.			



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Decentralized Unitary HVAC Equipment	23 80
Decentralized Unitary HVAC Equipment	23 81



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 81 49 00-0047		Recessed Ceiling Mounted Ductless Split System Heat Pumps <small>(23 81 49 00-0025)</small>		
		Note: Excludes hangers.		
23 81 49 00-0048	EA	11,900 BTU Cooling, 13,600 BTU Heating, 16 SEER, Ceiling Recessed Ductless Split System Heat Pumps	3,686.65	450.19
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 49 00-0049	EA	17,500 BTU Cooling, 20,400 BTU Heating, 16 SEER, Ceiling Recessed Ductless Split System Heat Pumps	4,179.83	495.20
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 49 00-0050	EA	24,800 BTU Cooling, 29,800 BTU Heating, 14.1 SEER, Ceiling Recessed Ductless Split System Heat Pumps	5,525.29	585.24
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 49 00-0051	EA	32,600 BTU Cooling, 37,600 BTU Heating, 14.6 SEER, Ceiling Recessed Ductless Split System Heat Pumps	6,374.65	644.89
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		
23 81 49 00-0052	EA	39,500 BTU Cooling, 48,000 BTU Heating, 14.6 SEER, Ceiling Recessed Ductless Split System Heat Pumps	7,936.37	675.27
		Note: Includes indoor unit, outdoor unit, wireless thermostat and refrigerant charge.		

23 82 Convection Heating and Cooling Units (23 82)

23 82 16 Air Coils (23 82)

23 82 16 11 Hydronic Air Coils (23 82 16)

23 82 16 11-0001 Chilled Water Cooling Coils (23 82 16 11)

Note: Flanged construction, 16 gauge galvanized steel casing.

23 82 16 11-0002 2 Row Chilled Water Cooling Coils (23 82 16 11-0001)

23 82 16 11-0003	EA	12" x 12" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	1,938.46	57.43
23 82 16 11-0004	EA	12" x 24" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	3,227.78	78.11
23 82 16 11-0005	EA	24" x 30" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	4,334.43	122.91
23 82 16 11-0006	EA	24" x 48" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	5,218.86	175.74
23 82 16 11-0007	EA	30" x 48" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	5,521.63	215.95
23 82 16 11-0008	EA	30" x 60" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	6,167.99	261.89
23 82 16 11-0009	EA	30" x 72" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	6,595.06	303.24
23 82 16 11-0010	EA	30" x 84" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	7,120.05	535.73
23 82 16 11-0011	EA	34" x 32" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	4,454.01	203.66
23 82 16 11-0012	EA	34" x 48" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	5,690.16	346.78
23 82 16 11-0013	EA	34" x 60" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	6,360.16	430.75
23 82 16 11-0014	EA	34" x 72" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	6,952.28	520.23
23 82 16 11-0015	EA	34" x 84" Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	7,579.81	605.80
23 82 16 11-0016	SF	>20 SF, Chilled Water Cooling Coil, 2 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	382.18	30.54

23 82 16 11-0017 4 Row Chilled Water Cooling Coils (23 82 16 11-0001)

23 82 16 11-0018	EA	12" x 12" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	2,401.43	119.46
23 82 16 11-0019	EA	12" x 24" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	3,874.35	172.30
23 82 16 11-0020	EA	24" x 30" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	5,258.92	287.17
23 82 16 11-0021	EA	24" x 48" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	6,400.30	426.15
23 82 16 11-0022	EA	30" x 48" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	7,386.46	522.64
23 82 16 11-0023	EA	30" x 60" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	8,771.64	638.65
23 82 16 11-0024	EA	30" x 72" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	9,747.60	766.15
23 82 16 11-0025	EA	30" x 84" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	9,468.61	891.81
23 82 16 11-0026	EA	34" x 32" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	6,030.59	384.91
23 82 16 11-0027	EA	34" x 48" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	7,653.44	578.92
23 82 16 11-0028	EA	34" x 60" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	8,466.28	717.91
23 82 16 11-0029	EA	34" x 72" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	9,415.31	864.94
23 82 16 11-0030	EA	34" x 84" Chilled Water Cooling Coil, 4 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted	10,300.88	1,011.16

23 82 16 11-0031 6 Row Chilled Water Cooling Coils (23 82 16 11-0001)

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 82 Convection Heating and Cooling Units**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
23 82 16 11-0032	EA	12" x 12" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	3,401.32		151.63
23 82 16 11-0033	EA	12" x 24" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	3,981.92		225.13
23 82 16 11-0034	EA	24" x 30" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	5,378.30		383.65
23 82 16 11-0035	EA	24" x 48" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	7,274.67		574.32
23 82 16 11-0036	EA	30" x 48" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	9,579.80		717.91
23 82 16 11-0037	EA	30" x 60" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	10,848.07		883.32
23 82 16 11-0038	EA	30" x 72" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	12,610.79		1,044.12
23 82 16 11-0039	EA	30" x 84" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	11,892.09		1,216.76
23 82 16 11-0040	EA	34" x 32" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	7,526.56		525.97
23 82 16 11-0041	EA	34" x 48" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	9,572.25		788.90
23 82 16 11-0042	EA	34" x 60" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	10,721.26		987.84
23 82 16 11-0043	EA	34" x 72" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	11,832.17		1,186.68
23 82 16 11-0044	EA	34" x 84" Chilled Water Cooling Coil, 6 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	12,950.18		1,380.57
23 82 16 11-0045		8 Row Chilled Water Cooling Coils <small>(23 82 16 11-0001)</small>			
23 82 16 11-0046	EA	12" x 12" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	4,256.47		182.63
23 82 16 11-0047	EA	12" x 24" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	5,172.85		280.28
23 82 16 11-0048	EA	24" x 30" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	7,665.37		499.67
23 82 16 11-0049	EA	24" x 48" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	10,107.96		766.15
23 82 16 11-0050	EA	30" x 48" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	12,112.44		957.98
23 82 16 11-0051	EA	30" x 60" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	14,044.84		1,148.66
23 82 16 11-0052	EA	30" x 72" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	16,173.94		1,276.16
23 82 16 11-0053	EA	30" x 84" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	13,601.25		1,480.27
23 82 16 11-0054	EA	34" x 32" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	8,566.04		640.95
23 82 16 11-0055	EA	34" x 48" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	10,921.02		963.61
23 82 16 11-0056	EA	34" x 60" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	12,251.69		1,200.34
23 82 16 11-0057	EA	34" x 72" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	13,512.93		1,435.81
23 82 16 11-0058	EA	34" x 84" Chilled Water Cooling Coil, 8 Row Flanged Construction, 16 Gauge Galvanized Steel Casing, Duct Mounted.....	14,841.10		1,689.21
23 82 16 11-0059		Hot Water Heating Coils <small>(23 82 16 11)</small>			
		Note: Flanged construction.			
23 82 16 11-0060		1 Row Hot Water Heating Coils <small>(23 82 16 11-0059)</small>			
23 82 16 11-0061	EA	12" x 12" Hot Water Heating Coil, 1 Row Flanged Construction.....	1,505.22		155.07
		For 10 Fins Per Inch, Add	23.90		
		For 12 Fins Per Inch, Add	59.74		
		For 230 PSIG Heavy Duty, Add	332.09		
23 82 16 11-0062	EA	12" x 24" Hot Water Heating Coil, 1 Row Flanged Construction.....	2,242.55		198.72
		For 10 Fins Per Inch, Add	36.93		
		For 12 Fins Per Inch, Add	92.32		
		For 230 PSIG Heavy Duty, Add	488.12		
23 82 16 11-0063	EA	24" x 30" Hot Water Heating Coil, 1 Row Flanged Construction.....	2,719.28		273.38
		For 10 Fins Per Inch, Add	43.45		
		For 12 Fins Per Inch, Add	108.62		
		For 230 PSIG Heavy Duty, Add	598.55		
23 82 16 11-0064	EA	24" x 48" Hot Water Heating Coil, 1 Row Flanged Construction.....	3,209.62		383.65
		For 10 Fins Per Inch, Add	48.88		
		For 12 Fins Per Inch, Add	122.19		
		For 230 PSIG Heavy Duty, Add	718.50		
23 82 16 11-0065	EA	30" x 48" Hot Water Heating Coil, 1 Row Flanged Construction.....	3,634.31		459.47
		For 10 Fins Per Inch, Add	54.31		
		For 12 Fins Per Inch, Add	135.77		
		For 230 PSIG Heavy Duty, Add	818.75		
23 82 16 11-0066	EA	30" x 60" Hot Water Heating Coil, 1 Row Flanged Construction.....	4,244.20		574.32
		For 10 Fins Per Inch, Add	61.91		
		For 12 Fins Per Inch, Add	154.78		
		For 230 PSIG Heavy Duty, Add	963.71		



Heating, Ventilating, and Air-Conditioning (HVAC)		23
Decentralized Unitary HVAC Equipment		23 80
Convection Heating and Cooling Units		23 82



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 16 11-0067	EA		30" x 72" Hot Water Heating Coil, 1 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	4,751.97 69.51 173.78 1,078.02	637.51
23 82 16 11-0068	EA		30" x 84" Hot Water Heating Coil, 1 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	5,893.49 88.11 220.28 1,327.49	741.22
23 82 16 11-0069	EA		34" x 32" Hot Water Heating Coil, 1 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	2,544.54 38.04 95.11 573.15	321.17
23 82 16 11-0070	EA		34" x 48" Hot Water Heating Coil, 1 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	3,816.80 57.06 142.66 859.72	481.86
23 82 16 11-0071	EA		34" x 72" Hot Water Heating Coil, 1 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	5,737.44 85.60 213.99 1,293.26	728.82
23 82 16 11-0072	EA		34" x 84" Hot Water Heating Coil, 1 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	6,682.20 99.86 249.65 1,505.36	844.61
23 82 16 11-0073	SF		>15 SF Hot Water Heating Coil, 1 Row, Flanged Construction <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	303.65 4.37 10.93 69.23	42.50
23 82 16 11-0074			2 Row Hot Water Heating Coils <small>(23 82 16 11-0059)</small>		
23 82 16 11-0075	EA		12" x 12" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	2,446.58 41.27 103.18 527.61	191.82
23 82 16 11-0076	EA		12" x 24" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	2,628.52 42.36 105.90 576.76	255.00
23 82 16 11-0077	EA		24" x 30" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	3,535.46 55.39 138.48 783.67	383.65
23 82 16 11-0078	EA		24" x 48" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	4,243.81 63.00 157.49 958.16	546.76
23 82 16 11-0079	EA		30" x 48" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	4,881.36 70.60 176.50 1,111.41	675.41
23 82 16 11-0080	EA		30" x 60" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	5,170.93 70.60 176.50 1,198.28	820.14
23 82 16 11-0081	EA		30" x 72" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	5,824.59 78.20 195.51 1,356.36	957.98
23 82 16 11-0082	EA		30" x 84" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	7,182.40 99.13 247.82 1,659.09	1,113.05
23 82 16 11-0083	EA		34" x 32" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	3,100.27 42.80 106.99 716.10	480.26
23 82 16 11-0084	EA		34" x 48" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	4,652.82 64.20 160.49 1,074.87	721.47
23 82 16 11-0085	EA		34" x 72" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	6,990.16 96.29 240.73 1,615.58	1,087.77
23 82 16 11-0086	EA		34" x 84" Hot Water Heating Coil, 2 Row Flanged Construction..... <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i> <i>For 230 PSIG Heavy Duty, Add</i>	8,158.45 112.34 280.86 1,885.82	1,270.64
23 82 16 11-0087			Hot Water Preheat Coils For Multi-Zone Air Handling Units <small>(23 82 16 11)</small> Note: 2 Row coils. Coils are sized by air handling unit capacity.		
23 82 16 11-0088	EA		3,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	1,990.63	145.88
23 82 16 11-0089	EA		4,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	2,555.43	144.73

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 82 Convection Heating and Cooling Units



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 16 11-0090	EA		5,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	3,139.88	155.07
23 82 16 11-0091	EA		6,500 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	3,650.61	168.85
23 82 16 11-0092	EA		7,500 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	3,666.20	176.89
23 82 16 11-0093	EA		9,200 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	4,443.62	186.08
23 82 16 11-0094	EA		11,500 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	4,599.39	209.06
23 82 16 11-0095	EA		13,200 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	5,085.00	234.32
23 82 16 11-0096	EA		16,500 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	5,719.55	280.28
23 82 16 11-0097	EA		19,500 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	6,237.05	294.06
23 82 16 11-0098	EA		22,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	8,006.74	311.28
23 82 16 11-0099	EA		27,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	10,191.78	426.15
23 82 16 11-0100	EA		34,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	12,807.29	522.64
23 82 16 11-0101	EA		40,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	14,932.74	546.76
23 82 16 11-0102	EA		47,000 CFM, Hot Water Preheat Coils, 2 Row Coils, Multi Zone Air Handling Unit.....	17,541.44	637.51

23 82 16 12 Steam Air Coils (23 82 16)

23 82 16 12-0001 Steam Heating Coils (23 82 16 12)

Note: Flanged construction.

23 82 16 12-0002	EA		12" x 12" Steam Heating Coils, 1 Row Flanged Construction.....	2,368.01	107.98
			<i>For 2 Row Coil, Add</i>	753.34	
			<i>For 4 Row Coil, Add</i>	1,986.73	
23 82 16 12-0003	EA		12" x 24" Steam Heating Coils, 1 Row Flanged Construction.....	2,605.47	149.32
			<i>For 2 Row Coil, Add</i>	841.31	
			<i>For 4 Row Coil, Add</i>	2,212.67	
23 82 16 12-0004	EA		24" x 30" Steam Heating Coils, 1 Row Flanged Construction.....	3,379.70	267.63
			<i>For 2 Row Coil, Add</i>	1,120.76	
			<i>For 4 Row Coil, Add</i>	2,933.49	
23 82 16 12-0005	EA		24" x 48" Steam Heating Coils, 1 Row Flanged Construction.....	4,226.44	383.65
			<i>For 2 Row Coil, Add</i>	1,421.09	
			<i>For 4 Row Coil, Add</i>	3,710.43	
23 82 16 12-0006	EA		30" x 48" Steam Heating Coils, 1 Row Flanged Construction.....	4,687.21	459.47
			<i>For 2 Row Coil, Add</i>	1,589.95	
			<i>For 4 Row Coil, Add</i>	4,144.90	
23 82 16 12-0007	EA		30" x 60" Steam Heating Coils, 1 Row Flanged Construction.....	5,224.56	574.32
			<i>For 2 Row Coil, Add</i>	1,797.10	
			<i>For 4 Row Coil, Add</i>	4,673.57	
23 82 16 12-0008	EA		30" x 72" Steam Heating Coils, 1 Row Flanged Construction.....	5,736.70	637.51
			<i>For 2 Row Coil, Add</i>	1,976.27	
			<i>For 4 Row Coil, Add</i>	5,138.16	
23 82 16 12-0009	EA		30" x 84" Steam Heating Coils, 1 Row Flanged Construction.....	7,141.65	743.98
			<i>For 2 Row Coil, Add</i>	2,440.07	
			<i>For 4 Row Coil, Add</i>	6,353.11	
23 82 16 12-0010	EA		34" x 32" Steam Heating Coils, 1 Row Flanged Construction.....	3,083.43	321.17
			<i>For 2 Row Coil, Add</i>	1,053.51	
			<i>For 4 Row Coil, Add</i>	2,742.98	
23 82 16 12-0011	EA		34" x 48" Steam Heating Coils, 1 Row Flanged Construction.....	4,625.15	481.86
			<i>For 2 Row Coil, Add</i>	1,580.27	
			<i>For 4 Row Coil, Add</i>	4,114.49	
23 82 16 12-0012	EA		34" x 72" Steam Heating Coils, 1 Row Flanged Construction.....	6,935.27	721.47
			<i>For 2 Row Coil, Add</i>	2,369.19	
			<i>For 4 Row Coil, Add</i>	6,168.72	
23 82 16 12-0013	EA		34" x 84" Steam Heating Coils, 1 Row Flanged Construction.....	8,096.82	844.61
			<i>For 2 Row Coil, Add</i>	2,766.88	
			<i>For 4 Row Coil, Add</i>	7,203.81	

23 82 16 13 Refrigerant Air Coils (23 82 16)

23 82 16 13-0001 Direct Expansion Cooling Coils (23 82 16 13)

Note: Flanged construction 16 gauge galvanized steel casing.

23 82 16 13-0002 2 Row Direct Expansion Cooling Coils (23 82 16 13-0001)

23 82 16 13-0003	EA		12" x 12" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	1,859.71	86.15
			<i>For 10 Fins Per Inch, Add</i>	33.74	
			<i>For 12 Fins Per Inch, Add</i>	84.35	
23 82 16 13-0004	EA		12" x 24" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	3,610.81	118.31
			<i>For 10 Fins Per Inch, Add</i>	67.48	
			<i>For 12 Fins Per Inch, Add</i>	168.70	
23 82 16 13-0005	EA		24" x 30" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	4,963.81	186.08
			<i>For 10 Fins Per Inch, Add</i>	91.87	
			<i>For 12 Fins Per Inch, Add</i>	229.66	
23 82 16 13-0006	EA		24" x 48" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	5,962.67	267.63
			<i>For 10 Fins Per Inch, Add</i>	108.57	
			<i>For 12 Fins Per Inch, Add</i>	271.42	
23 82 16 13-0007	EA		30" x 48" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	6,919.92	327.37
			<i>For 10 Fins Per Inch, Add</i>	125.27	
			<i>For 12 Fins Per Inch, Add</i>	313.18	
23 82 16 13-0008	EA		30" x 60" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	7,723.83	396.28
			<i>For 10 Fins Per Inch, Add</i>	138.63	
			<i>For 12 Fins Per Inch, Add</i>	346.58	
23 82 16 13-0009	EA		30" x 72" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	8,852.75	459.47
			<i>For 10 Fins Per Inch, Add</i>	158.68	
			<i>For 12 Fins Per Inch, Add</i>	396.69	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 16 13-0010 EA 30" x 84" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	11,128.00 201.13 502.83	535.73
23 82 16 13-0011 EA 34" x 32" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	4,273.62 77.33 193.32	203.66
23 82 16 13-0012 EA 34" x 48" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	5,467.41 95.48 238.69	346.78
23 82 16 13-0013 EA 34" x 72" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	6,688.75 112.97 282.42	520.23
23 82 16 13-0014 EA 34" x 84" Direct Expansion Cooling Coil, 2 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	7,295.76 121.68 304.21	605.80
23 82 16 13-0015 4 Row Direct Expansion Cooling Coils <small>(23 82 16 13-0001)</small>		
23 82 16 13-0016 EA 12" x 12" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	3,103.84 57.29 143.23	119.46
23 82 16 13-0017 EA 12" x 24" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	4,435.06 81.84 204.61	172.30
23 82 16 13-0018 EA 24" x 30" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	6,002.73 108.57 271.42	287.17
23 82 16 13-0019 EA 24" x 48" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	7,281.43 128.61 321.53	426.15
23 82 16 13-0020 EA 30" x 48" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	8,393.47 146.98 367.46	522.64
23 82 16 13-0021 EA 30" x 60" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	9,961.73 173.71 434.27	638.65
23 82 16 13-0022 EA 30" x 72" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	11,052.13 190.41 476.03	766.15
23 82 16 13-0023 EA 30" x 84" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	10,688.82 178.10 445.26	891.81
23 82 16 13-0024 EA 34" x 32" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	6,865.88 121.92 304.80	384.91
23 82 16 13-0025 EA 34" x 48" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	8,684.78 150.54 376.34	578.92
23 82 16 13-0026 EA 34" x 72" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	13,004.75 219.36 548.41	1,018.29
23 82 16 13-0027 EA 34" x 84" Direct Expansion Cooling Coil, 4 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	14,874.17 250.02 625.05	1,186.68
23 82 16 13-0028 6 Row Direct Expansion Cooling Coils <small>(23 82 16 13-0001)</small>		
23 82 16 13-0029 EA 12" x 12" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	3,976.90 73.49 183.73	150.48
23 82 16 13-0030 EA 12" x 24" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	4,542.63 81.84 204.61	225.13
23 82 16 13-0031 EA 24" x 30" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	6,528.24 115.25 288.12	383.65
23 82 16 13-0032 EA 24" x 48" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	8,247.35 141.97 354.93	574.32
23 82 16 13-0033 EA 30" x 48" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	10,872.89 188.74 471.85	717.91
23 82 16 13-0034 EA 30" x 60" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	12,289.92 210.46 526.14	883.32
23 82 16 13-0035 EA 30" x 72" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	14,281.50 243.86 609.65	1,044.12
23 82 16 13-0036 EA 30" x 84" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	13,393.89 219.21 548.02	1,216.76
23 82 16 13-0037 EA 34" x 32" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing <i>For 10 Fins Per Inch, Add</i> <i>For 12 Fins Per Inch, Add</i>	8,554.60 150.05 375.14	525.97

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 82 Convection Heating and Cooling Units



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 16 13-0038	EA		34" x 48" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	10,841.58	788.90
			<i>For 10 Fins Per Inch, Add</i>	185.28	
			<i>For 12 Fins Per Inch, Add</i>	463.19	
23 82 16 13-0039	EA		34" x 72" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	13,314.59	1,176.91
			<i>For 10 Fins Per Inch, Add</i>	219.22	
			<i>For 12 Fins Per Inch, Add</i>	548.04	
23 82 16 13-0040	EA		34" x 84" Direct Expansion Cooling Coil, 6 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	14,567.97	1,380.57
			<i>For 10 Fins Per Inch, Add</i>	236.14	
			<i>For 12 Fins Per Inch, Add</i>	590.34	
23 82 16 13-0041			8 Row Direct Expansion Cooling Coils (23 82 16 13-0001)		
23 82 16 13-0042	EA		12" x 12" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	4,957.92	181.49
			<i>For 10 Fins Per Inch, Add</i>	91.87	
			<i>For 12 Fins Per Inch, Add</i>	229.66	
23 82 16 13-0043	EA		12" x 24" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	5,905.21	280.28
			<i>For 10 Fins Per Inch, Add</i>	106.90	
			<i>For 12 Fins Per Inch, Add</i>	267.24	
23 82 16 13-0044	EA		24" x 30" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	8,723.87	499.67
			<i>For 10 Fins Per Inch, Add</i>	154.50	
			<i>For 12 Fins Per Inch, Add</i>	386.25	
23 82 16 13-0045	EA		24" x 48" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	11,469.70	766.15
			<i>For 10 Fins Per Inch, Add</i>	198.76	
			<i>For 12 Fins Per Inch, Add</i>	496.91	
23 82 16 13-0046	EA		30" x 48" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	13,731.66	957.98
			<i>For 10 Fins Per Inch, Add</i>	236.34	
			<i>For 12 Fins Per Inch, Add</i>	590.86	
23 82 16 13-0047	EA		30" x 60" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	15,910.09	1,148.66
			<i>For 10 Fins Per Inch, Add</i>	272.26	
			<i>For 12 Fins Per Inch, Add</i>	680.64	
23 82 16 13-0048	EA		30" x 72" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	18,336.71	1,276.16
			<i>For 10 Fins Per Inch, Add</i>	315.68	
			<i>For 12 Fins Per Inch, Add</i>	789.21	
23 82 16 13-0049	EA		30" x 84" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	15,290.77	1,480.27
			<i>For 10 Fins Per Inch, Add</i>	246.61	
			<i>For 12 Fins Per Inch, Add</i>	616.52	
23 82 16 13-0050	EA		34" x 32" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	9,722.59	640.95
			<i>For 10 Fins Per Inch, Add</i>	168.81	
			<i>For 12 Fins Per Inch, Add</i>	422.03	
23 82 16 13-0051	EA		34" x 48" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	12,349.03	963.61
			<i>For 10 Fins Per Inch, Add</i>	208.44	
			<i>For 12 Fins Per Inch, Add</i>	521.09	
23 82 16 13-0052	EA		34" x 72" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	15,231.53	1,450.29
			<i>For 10 Fins Per Inch, Add</i>	246.62	
			<i>For 12 Fins Per Inch, Add</i>	616.54	
23 82 16 13-0053	EA		34" x 84" Direct Expansion Cooling Coil, 8 Rows Flanged Construction, 16 Gauge Galvanized Steel Casing.....	16,661.13	1,689.21
			<i>For 10 Fins Per Inch, Add</i>	265.65	
			<i>For 12 Fins Per Inch, Add</i>	664.14	
23 82 16 14			Electric-Resistance Air Coils (23 82 16)		
23 82 16 14-0001			Standard Electric Slip-In Blast Coil Heater (23 82 16 14)		
23 82 16 14-0002			Electric Slip-In Blast Coil Heater With Open Coil Element (23 82 16 14-0001)		
23 82 16 14-0003	EA		1/2 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	605.53	86.66
23 82 16 14-0004	EA		1 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	619.96	93.42
23 82 16 14-0005	EA		2 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	637.01	102.42
23 82 16 14-0006	EA		3 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	642.74	105.80
23 82 16 14-0007	EA		4 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	657.47	112.54
23 82 16 14-0008	EA		5 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	674.42	121.55
23 82 16 14-0009	EA		6 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	778.58	136.18
23 82 16 14-0010	EA		7 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	792.30	142.93
23 82 16 14-0011	EA		8 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	803.56	147.43
23 82 16 14-0012	EA		9 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	820.00	156.44
23 82 16 14-0013	EA		10 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	900.16	165.44
23 82 16 14-0014	EA		12-1/2 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	932.20	181.19
23 82 16 14-0015	EA		15 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	964.05	196.96
23 82 16 14-0016	EA		20 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	998.26	212.71
23 82 16 14-0017	EA		30 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	1,403.19	297.12
23 82 16 14-0018	EA		40 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	2,592.28	316.25
23 82 16 14-0019	EA		50 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	2,843.26	362.40
23 82 16 14-0020	EA		60 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	3,370.28	401.79
23 82 16 14-0021	EA		70 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	3,529.86	436.68
23 82 16 14-0022	EA		80 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	3,867.48	479.44
23 82 16 14-0023	EA		90 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	4,782.30	512.09
23 82 16 14-0024	EA		100 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	5,258.94	550.35
23 82 16 14-0025	EA		125 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	6,415.41	594.24
23 82 16 14-0026	EA		150 KW Electric Heater, Open Coil Element, Standard Slip-In Blast Coil Duct Heater.....	7,234.92	646.01
23 82 16 14-0027			Electric Slip-In Blast Coil Heater With Finned Tubular Element (23 82 16 14-0001)		
23 82 16 14-0028	EA		1 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	979.69	123.80

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 16 14-0029 EA 2 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,008.44	135.05
23 82 16 14-0030 EA 3 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,020.33	135.05
23 82 16 14-0031 EA 4 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,102.55	148.56
23 82 16 14-0032 EA 5 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,152.45	148.56
23 82 16 14-0033 EA 6 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,179.01	148.56
23 82 16 14-0034 EA 8 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,236.83	165.44
23 82 16 14-0035 EA 9 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,288.44	185.70
23 82 16 14-0036 EA 10 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,315.00	185.70
23 82 16 14-0037 EA 15 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,480.16	212.71
23 82 16 14-0038 EA 20 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	1,904.64	212.71
23 82 16 14-0039 EA 25 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	2,022.21	230.72
23 82 16 14-0040 EA 30 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	2,383.45	247.60
23 82 16 14-0041 EA 40 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	2,840.25	247.60
23 82 16 14-0042 EA 45 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	3,101.52	258.86
23 82 16 14-0043 EA 50 KW Electric Heater, Finned Tube Element, Standard Slip-In Blast Coil Duct Heater.....	3,259.90	258.86
23 82 19 Fan Coil Units (23 82)		
23 82 19 00-0001 Ceiling Suspended Horizontal Fan Coil Units (23 82 19)		
Note: Includes cabinet, chilled water coil, baked enamel finish, multispeed fan and fan switch with integral and/or remote thermostat to control valves and on/off and fan speeds. Excludes supports.		
23 82 19 00-0002 Horizontal Fan Coil Units With Electric Heating Coil (23 82 19 00-0001)		
23 82 19 00-0003 EA 200 CFM, 6 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	2,084.65	186.08
For 2-Way Valve Instead Of 3-Way, Deduct	-53.53	
23 82 19 00-0004 EA 300 CFM, 9 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	2,371.15	217.10
For 2-Way Valve Instead Of 3-Way, Deduct	-56.67	
23 82 19 00-0005 EA 400 CFM, 12 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	2,814.03	244.67
For 2-Way Valve Instead Of 3-Way, Deduct	-59.44	
23 82 19 00-0006 EA 600 CFM, 18 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	3,234.35	280.28
For 2-Way Valve Instead Of 3-Way, Deduct	-63.02	
23 82 19 00-0007 EA 800 CFM, 24 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	3,650.60	294.06
For 2-Way Valve Instead Of 3-Way, Deduct	-109.18	
23 82 19 00-0008 EA 1,000 CFM, 30 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	4,690.05	311.28
For 2-Way Valve Instead Of 3-Way, Deduct	-111.57	
23 82 19 00-0009 EA 1,200 CFM, 36 MBH Cooling, Horizontal Fan Coil, Electric Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	5,519.91	337.71
For 2-Way Valve Instead Of 3-Way, Deduct	-115.68	
23 82 19 00-0010 Horizontal Fan Coil Units With Hot Water Heating Coil (23 82 19 00-0001)		
23 82 19 00-0011 EA 200 CFM, 6 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	3,037.92	186.08
For 2-Way Valve Instead Of 3-Way, Deduct	-53.53	
23 82 19 00-0012 EA 300 CFM, 9 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	3,420.92	217.10
For 2-Way Valve Instead Of 3-Way, Deduct	-56.67	
23 82 19 00-0013 EA 400 CFM, 12 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	4,223.12	244.67
For 2-Way Valve Instead Of 3-Way, Deduct	-59.44	
23 82 19 00-0014 EA 600 CFM, 18 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	4,570.57	280.28
For 2-Way Valve Instead Of 3-Way, Deduct	-63.02	
23 82 19 00-0015 EA 800 CFM, 24 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	4,875.24	295.21
For 2-Way Valve Instead Of 3-Way, Deduct	-109.18	
23 82 19 00-0016 EA 1,000 CFM, 30 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	6,488.88	311.28
For 2-Way Valve Instead Of 3-Way, Deduct	-111.57	
23 82 19 00-0017 EA 1,200 CFM, 36 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	7,610.90	337.71
For 2-Way Valve Instead Of 3-Way, Deduct	-115.68	
23 82 19 00-0018 EA 1,400 CFM, 42 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	8,115.16	350.34
For 2-Way Valve Instead Of 3-Way, Deduct	-117.55	
23 82 19 00-0019 EA 1,600 CFM, 48 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	9,058.63	364.69
For 2-Way Valve Instead Of 3-Way, Deduct	-119.71	
23 82 19 00-0020 EA 1,800 CFM, 54 MBH Cooling, Horizontal Fan Coil, Hot Water Heating, Ceiling Hung, Chilled Water Coil, With Cabinet	9,744.02	379.06
For 2-Way Valve Instead Of 3-Way, Deduct	-121.86	
23 82 19 00-0021 Floor Mounted Vertical Fan Coil Units (23 82 19)		
Note: Includes cabinet, chilled water coil, baked enamel finish, multispeed fan and fan switch with integral and/or remote thermostat to control valves and on/off and fan speeds.		
23 82 19 00-0022 Vertical Fan Coil Units With Hot Water Heating Coil (23 82 19 00-0021)		
23 82 19 00-0023 EA 200 CFM, 6 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet	2,921.84	184.93
For Fan Coil Units Without Cabinet, Deduct	-401.22	
For Thru-Wall Sleeve, Add	129.11	
For 2-Way Valve Instead Of 3-Way, Deduct	-53.53	

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 82 Convection Heating and Cooling Units



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82	19 00-0024	EA	300 CFM, 9 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	3,290.92 -450.29 141.69 -56.67	217.10
23 82	19 00-0025	EA	400 CFM, 12 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	4,060.61 -560.21 152.76 -59.44	244.67
23 82	19 00-0026	EA	600 CFM, 18 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	4,642.40 -640.33 167.06 -63.02	280.28
23 82	19 00-0027	EA	800 CFM, 24 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	5,181.39 -718.30 172.81 -109.18	295.21
23 82	19 00-0028	EA	1,000 CFM, 30 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	6,233.75 -872.97 179.18 -111.57	311.28
23 82	19 00-0029	EA	1,200 CFM, 36 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	7,309.06 -1,028.79 190.14 -115.68	337.71
23 82	19 00-0030	EA	1,400 CFM, 42 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	8,009.64 -1,131.38 195.14 -117.55	350.34
23 82	19 00-0031	EA	1,600 CFM, 48 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	8,847.59 -1,254.20 200.88 -119.71	364.69
23 82	19 00-0032	EA	1,800 CFM, 54 MBH Cooling, Vertical Fan Coil, Hot Water Heating, Floor Mounted, Chilled Water Coil, With Cabinet <i>For Fan Coil Units Without Cabinet, Deduct</i> <i>For Thru-Wall Sleeve, Add</i> <i>For 2-Way Valve Instead Of 3-Way, Deduct</i>	9,436.35 -1,339.64 206.62 -121.86	364.69
23 82	19 00-0033		Removal And Reinstallation Of Fan Coil Units <small>(23 82 19)</small> Note: Includes storage and cleaning. Excludes supports.		
23 82	19 00-0034	EA	Removal And Reinstallation Of Fan Coil Unit Horizontal Or Vertical	488.38	
23 82	19 00-0035		Fan Coil Units (Carrier) <small>(23 82 19)</small> Note: Provide Pre-Manufactured Or Field Fabricated Filter Rack With 2" Merv 13, Pleated Throwaway Filters. Disconnect Switch Provided By Division 26 Contractor. Suspend Unit From Structure In Horizontal Position With All -Thread Rod And Spring Vibration Isolation (2" Minimum Deflection). Provide Necessary Mounting Bracket And Accessories For Specified Mounting. Provide Auxiliary Drain Pan With Auxiliary Drain Provided By Plumbing Contractor. Provide Unit With Space Temperature Control Devices Consistent With The Following Control Methods: Thermostat Or Room Controller For Local Override Of Centralized Controller With Integral Temperature Sensor. Temperature Sensor Without Local Override. Thermostat Or Room Controller For Local Override Of Centralized Controller With Remote Temperature Sensor. Fan Coil Unit With Integral Temperature Sensor In Return Airstream Without Local Override (Factory Default Setting).		
23 82	19 00-0036	EA	450 To 500 CFM, 12.1 To 14.2 MBH Cooling, Deck Mount, Fan Coil Unit (Carrier MMD-AP0184BH2UL-1).....	2,066.11	244.67
23 82	19 00-0037	EA	1,200 CFM, 33.3 To 39.5 MBH Cooling, Floor Mount, Fan Coil Unit (Carrier MMD-AP0360VHG2UL) <i>For Filter Box With 2" MERV 8 Filter (Carrier TCB-FB2F361VDGUL), Add</i>	3,583.10 292.48	337.71
23 82	19 00-0038	EA	150 To 230 CFM, 3.9 To 7.5 MBH Cooling, Wall Mount, Fan Coil Unit (Carrier MMK-AP0073H2UL)..... <i>For Filter Boxes For Toshiba (Carrier) High Static, Medium Static, OSA Units, and Slim Duct (Carrier FS-SPBH202), Add</i>	1,115.68 482.25	186.08
23 82	19 00-0039	EA	470 CFM, 15.8 MBH Cooling, Wall Mount, Fan Coil Unit (Carrier MMK-AP0183H2UL)..... <i>For Filter Boxes For Toshiba (Carrier) High Static, Medium Static, OSA Units, and Slim Duct (Carrier FS-SPBH202), Add</i>	1,291.76 482.25	217.10
23 82	19 00-0040	EA	Single Port Flow Selector (Carrier RBM-Y0963FUL)	1,252.62	270.27
23 82	19 00-0041	EA	Multiport Flow Selector 4-Branch Unit (Carrier RBM-Y0611F4PUL).....	3,819.73	353.44
23 82	19 00-0042	EA	Y-Branch For Heat Recovery, 61-135k BTU (Carrier RBM-BY105FUL).....	198.80	40.20
23 82	19 00-0043	EA	Y-Branch For Heat Recovery, 136-238k BTU (Carrier RBM-BY205FUL).....	272.43	43.07
23 82	19 00-0044	EA	12 MBH, Ductless Variable Flow (VRF), Wall Mounted, Indoor Heat Pump (Carrier MMK-AP0123H2UL).....	1,071.68	186.08
23 82	19 00-0045	EA	Single Port Flow Selector (Carrier RBM-Y0383FUL)	3,129.86	270.27
23 82	19 00-0046	EA	Outdoor Heat Recovery Connection (Carrier RBM-BT14FUL)	430.19	40.20

23 82 33 Convectors (23 82)

23 82 33 00-0001 Multi-Fin Convectors For Two-Pipe System (23 82 33)

Note: Complete with 6-1/4" deep cabinet enclosure.

23 82 33 00-0002 20" High Multi-Fin Convectors For Two-Pipe System (23 82 33 00-0001)



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Decentralized Unitary HVAC Equipment	23 80
Convection Heating and Cooling Units	23 82



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 33 00-0003	EA		20" High x 2' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	591.11	126.35
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	63.43	
			<i>For Snap-On Inlet Grille, Add</i>	48.29	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	139.88	
23 82 33 00-0004	EA		20" High x 3' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	697.32	137.84
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	68.65	
			<i>For Snap-On Inlet Grille, Add</i>	51.77	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	170.97	
23 82 33 00-0005	EA		20" High x 4' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	802.00	163.11
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	80.07	
			<i>For Snap-On Inlet Grille, Add</i>	59.38	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	194.28	
23 82 33 00-0006	EA		20" High x 6' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	960.77	189.52
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	92.14	
			<i>For Snap-On Inlet Grille, Add</i>	67.43	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	235.77	
23 82 33 00-0007	EA		20" High x 8' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,145.60	227.43
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	109.36	
			<i>For Snap-On Inlet Grille, Add</i>	78.91	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	280.37	
23 82 33 00-0008	EA		20" High x 10' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,289.26	250.18
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	119.69	
			<i>For Snap-On Inlet Grille, Add</i>	85.79	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	318.61	
23 82 33 00-0009	EA		20" High x 12' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,497.06	303.24
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	143.79	
			<i>For Snap-On Inlet Grille, Add</i>	101.86	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	363.21	
23 82 33 00-0010	EA		20" High x 14' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,635.03	322.19
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	152.41	
			<i>For Snap-On Inlet Grille, Add</i>	107.61	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	401.45	
23 82 33 00-0011	EA		20" High x 16' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,783.44	360.10
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	169.63	
			<i>For Snap-On Inlet Grille, Add</i>	119.08	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	433.31	
23 82 33 00-0012	EA		20" High x 18' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,968.37	398.01
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	186.87	
			<i>For Snap-On Inlet Grille, Add</i>	130.58	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	477.91	
23 82 33 00-0013	EA		20" High x 20' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,116.80	435.91
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	204.09	
			<i>For Snap-On Inlet Grille, Add</i>	142.06	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	509.78	

23 82 33 00-0014 26" High Multi-Fin Convectors For Two-Pipe System (23 82 33 00-0001)

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 82 Convection Heating and Cooling Units**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 33 00-0015	EA		26" High x 2' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	693.35	166.21
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	80.78	
			<i>For Snap-On Inlet Grille, Add</i>	59.85	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	155.43	
23 82 33 00-0016	EA		26" High x 3' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	814.30	193.09
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	92.84	
			<i>For Snap-On Inlet Grille, Add</i>	67.90	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	183.69	
23 82 33 00-0017	EA		26" High x 4' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	985.77	226.75
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	107.95	
			<i>For Snap-On Inlet Grille, Add</i>	77.97	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	226.08	
23 82 33 00-0018	EA		26" High x 6' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,156.59	252.82
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	119.66	
			<i>For Snap-On Inlet Grille, Add</i>	85.77	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	272.21	
23 82 33 00-0019	EA		26" High x 8' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,350.95	284.30
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	133.82	
			<i>For Snap-On Inlet Grille, Add</i>	95.21	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	323.71	
23 82 33 00-0020	EA		26" High x 10' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,512.68	307.96
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	144.50	
			<i>For Snap-On Inlet Grille, Add</i>	102.34	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	367.85	
23 82 33 00-0021	EA		26" High x 12' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,725.06	350.91
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	164.07	
			<i>For Snap-On Inlet Grille, Add</i>	115.38	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	419.35	
23 82 33 00-0022	EA		26" High x 14' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,882.95	372.39
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	173.60	
			<i>For Snap-On Inlet Grille, Add</i>	121.74	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	463.49	
23 82 33 00-0023	EA		26" High x 16' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,037.77	406.04
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	188.52	
			<i>For Snap-On Inlet Grille, Add</i>	131.68	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	500.28	
23 82 33 00-0024	EA		26" High x 18' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,235.14	439.02
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	203.59	
			<i>For Snap-On Inlet Grille, Add</i>	141.73	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	551.78	
23 82 33 00-0025	EA		26" High x 20' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,385.44	469.23
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	217.15	
			<i>For Snap-On Inlet Grille, Add</i>	150.77	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	588.56	

23 82 33 00-0026 32" High Multi-Fin Convectors For Two-Pipe System (23 82 33 00-0001)



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Decentralized Unitary HVAC Equipment	23 80
Convection Heating and Cooling Units	23 82

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 33 00-0027	EA		32" High x 2' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	794.63	202.17
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	97.85	
			<i>For Snap-On Inlet Grille, Add</i>	71.23	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	170.97	
23 82 33 00-0028	EA		32" High x 3' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	947.83	244.67
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	117.16	
			<i>For Snap-On Inlet Grille, Add</i>	84.11	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	202.05	
23 82 33 00-0029	EA		32" High x 4' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,143.64	286.02
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	135.94	
			<i>For Snap-On Inlet Grille, Add</i>	96.62	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	248.68	
23 82 33 00-0030	EA		32" High x 6' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,326.43	310.83
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	147.28	
			<i>For Snap-On Inlet Grille, Add</i>	104.18	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	299.43	
23 82 33 00-0031	EA		32" High x 8' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,525.79	335.86
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	158.53	
			<i>For Snap-On Inlet Grille, Add</i>	111.69	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	356.08	
23 82 33 00-0032	EA		32" High x 10' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,701.51	360.10
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	169.63	
			<i>For Snap-On Inlet Grille, Add</i>	119.08	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	404.63	
23 82 33 00-0033	EA		32" High x 12' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	1,909.55	390.43
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	183.48	
			<i>For Snap-On Inlet Grille, Add</i>	128.32	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	461.28	
23 82 33 00-0034	EA		32" High x 14' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,086.43	415.46
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	194.93	
			<i>For Snap-On Inlet Grille, Add</i>	135.95	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	509.84	
23 82 33 00-0035	EA		32" High x 16' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,243.39	443.50
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	207.33	
			<i>For Snap-On Inlet Grille, Add</i>	144.22	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	550.30	
23 82 33 00-0036	EA		32" High x 18' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,446.53	470.03
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	219.72	
			<i>For Snap-On Inlet Grille, Add</i>	152.48	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	606.95	
23 82 33 00-0037	EA		32" High x 20' Long Multi-Fin Convector, 2-Pipe System With 6-1/4" Deep Cabinet	2,596.02	492.77
			<i>For Knob Operated Damper, Add</i>	15.00	
			<i>For Metal Trim Strips, Add</i>	229.88	
			<i>For Snap-On Inlet Grille, Add</i>	159.25	
			<i>For Access Doors Hinged, Add</i>	15.00	
			<i>For Air Chamber, Auto-vent, Add</i>	18.00	
			<i>For 3 Tubes System, Add</i>	647.41	
23 82 33 00-0038			Electric Convectors, Floor Standing Units <small>(23 82 33)</small>		
23 82 33 00-0039			4" Deep Electric Convectors <small>(23 82 33 00-0038)</small>		
23 82 33 00-0040	EA		38" Long x 14" High x 4" Deep Electric Convectors, Floor Standing Units	619.14	120.75
23 82 33 00-0041	EA		50" Long x 14" High x 4" Deep Electric Convectors, Floor Standing Units	685.08	120.75

23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 80 Decentralized Unitary HVAC Equipment

23 82 Convection Heating and Cooling Units



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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23 82 33 00-0042			6" Deep Electric Convectors <small>(23 82 33 00-0038)</small>		
23 82 33 00-0043	EA		38" Long x 14" High x 6" Deep Electric Convectors, Floor Standing Units	715.51	120.75
23 82 33 00-0044	EA		50" Long x 14" High x 6" Deep Electric Convectors, Floor Standing Units	816.95	120.75
23 82 33 00-0045	EA		62" Long x 20" High x 6" Deep Electric Convectors, Floor Standing Units	905.71	120.75
23 82 33 00-0046	EA		74" Long x 20" High x 6" Deep Electric Convectors, Floor Standing Units	1,045.19	120.75

23 82 36 Finned-Tube Radiation Heaters (23 82)

23 82 36 00-0001			Finned Tube Baseboard Units <small>(23 82 36)</small>		
			Note: Complete with steel enclosure. Single heating element.		

23 82 36 00-0002			3/4" IPS Steel Tube With Steel Fins <small>(23 82 36 00-0001)</small>		
23 82 36 00-0003	EA		4' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	372.14	44.80
			<i>For 90 Degree Corner, Add</i>	53.34	
			<i>For Valve Enclosure, Add</i>	53.34	
			<i>For Filler Piece, Add</i>	46.34	
			<i>For End Cap, Add</i>	36.17	
			<i>For Copper Tube With Aluminum Fins, Add</i>	8.55	
23 82 36 00-0004	EA		6' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	494.19	67.77
			<i>For 90 Degree Corner, Add</i>	62.21	
			<i>For Valve Enclosure, Add</i>	62.21	
			<i>For Filler Piece, Add</i>	55.21	
			<i>For End Cap, Add</i>	41.94	
			<i>For Copper Tube With Aluminum Fins, Add</i>	12.82	
23 82 36 00-0005	EA		8' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	598.01	89.59
			<i>For 90 Degree Corner, Add</i>	67.43	
			<i>For Valve Enclosure, Add</i>	67.43	
			<i>For Filler Piece, Add</i>	60.43	
			<i>For End Cap, Add</i>	45.33	
			<i>For Copper Tube With Aluminum Fins, Add</i>	17.10	
23 82 36 00-0006	EA		10' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	744.89	125.44
			<i>For 90 Degree Corner, Add</i>	81.68	
			<i>For Valve Enclosure, Add</i>	81.68	
			<i>For Filler Piece, Add</i>	74.68	
			<i>For End Cap, Add</i>	54.59	
			<i>For Copper Tube With Aluminum Fins, Add</i>	21.26	
23 82 36 00-0007	EA		12' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	890.86	150.70
			<i>For 90 Degree Corner, Add</i>	96.15	
			<i>For Valve Enclosure, Add</i>	96.15	
			<i>For Filler Piece, Add</i>	89.15	
			<i>For End Cap, Add</i>	63.99	
			<i>For Copper Tube With Aluminum Fins, Add</i>	25.31	
23 82 36 00-0008	EA		14' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	1,011.63	160.81
			<i>For 90 Degree Corner, Add</i>	101.89	
			<i>For Valve Enclosure, Add</i>	101.89	
			<i>For Filler Piece, Add</i>	94.89	
			<i>For End Cap, Add</i>	67.73	
			<i>For Copper Tube With Aluminum Fins, Add</i>	30.37	
23 82 36 00-0009	EA		16' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	1,115.09	177.70
			<i>For 90 Degree Corner, Add</i>	111.54	
			<i>For Valve Enclosure, Add</i>	111.54	
			<i>For Filler Piece, Add</i>	104.54	
			<i>For End Cap, Add</i>	74.00	
			<i>For Copper Tube With Aluminum Fins, Add</i>	33.41	
23 82 36 00-0010	EA		18' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	1,273.72	201.02
			<i>For 90 Degree Corner, Add</i>	124.86	
			<i>For Valve Enclosure, Add</i>	124.86	
			<i>For Filler Piece, Add</i>	117.86	
			<i>For End Cap, Add</i>	82.66	
			<i>For Copper Tube With Aluminum Fins, Add</i>	38.47	
23 82 36 00-0011	EA		20' Long Finned Tube Baseboard Unit Complete With Enclosure And 3/4" IPS Heat Element	1,404.84	221.11
			<i>For 90 Degree Corner, Add</i>	136.36	
			<i>For Valve Enclosure, Add</i>	136.36	
			<i>For Filler Piece, Add</i>	129.36	
			<i>For End Cap, Add</i>	90.14	
			<i>For Copper Tube With Aluminum Fins, Add</i>	42.52	

23 82 36 00-0012			1" IPS Steel Tube With Steel Fins <small>(23 82 36 00-0001)</small>		
23 82 36 00-0013	EA		4' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element	438.76	44.80
			<i>For 90 Degree Corner, Add</i>	53.34	
			<i>For Valve Enclosure, Add</i>	53.34	
			<i>For Filler Piece, Add</i>	46.34	
			<i>For End Cap, Add</i>	36.17	
			<i>For Copper Tube With Aluminum Fins, Add</i>	12.21	
23 82 36 00-0014	EA		6' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element	594.11	67.77
			<i>For 90 Degree Corner, Add</i>	62.21	
			<i>For Valve Enclosure, Add</i>	62.21	
			<i>For Filler Piece, Add</i>	55.21	
			<i>For End Cap, Add</i>	41.94	
			<i>For Copper Tube With Aluminum Fins, Add</i>	18.32	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 36 00-0015 EA 8' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	731.24	89.59
<i>For 90 Degree Corner, Add</i>	67.43	
<i>For Valve Enclosure, Add</i>	67.43	
<i>For Filler Piece, Add</i>	60.43	
<i>For End Cap, Add</i>	45.33	
<i>For Copper Tube With Aluminum Fins, Add</i>	24.42	
23 82 36 00-0016 EA 10' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	910.68	125.44
<i>For 90 Degree Corner, Add</i>	81.70	
<i>For Valve Enclosure, Add</i>	81.70	
<i>For Filler Piece, Add</i>	74.70	
<i>For End Cap, Add</i>	54.61	
<i>For Copper Tube With Aluminum Fins, Add</i>	30.37	
23 82 36 00-0017 EA 12' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	1,087.87	150.70
<i>For 90 Degree Corner, Add</i>	96.11	
<i>For Valve Enclosure, Add</i>	96.11	
<i>For Filler Piece, Add</i>	89.11	
<i>For End Cap, Add</i>	63.97	
<i>For Copper Tube With Aluminum Fins, Add</i>	36.15	
23 82 36 00-0018 EA 14' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	1,248.28	160.81
<i>For 90 Degree Corner, Add</i>	101.89	
<i>For Valve Enclosure, Add</i>	101.89	
<i>For Filler Piece, Add</i>	94.89	
<i>For End Cap, Add</i>	67.73	
<i>For Copper Tube With Aluminum Fins, Add</i>	43.38	
23 82 36 00-0019 EA 16' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	1,375.04	177.70
<i>For 90 Degree Corner, Add</i>	111.47	
<i>For Valve Enclosure, Add</i>	111.47	
<i>For Filler Piece, Add</i>	104.47	
<i>For End Cap, Add</i>	73.96	
<i>For Copper Tube With Aluminum Fins, Add</i>	47.72	
23 82 36 00-0020 EA 18' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	1,573.48	201.02
<i>For 90 Degree Corner, Add</i>	124.86	
<i>For Valve Enclosure, Add</i>	124.86	
<i>For Filler Piece, Add</i>	117.86	
<i>For End Cap, Add</i>	82.66	
<i>For Copper Tube With Aluminum Fins, Add</i>	54.95	
23 82 36 00-0021 EA 20' Long Finned Tube Baseboard Unit Complete With Enclosure And 1" IPS Heat Element.....	1,735.46	221.11
<i>For 90 Degree Corner, Add</i>	136.23	
<i>For Valve Enclosure, Add</i>	136.23	
<i>For Filler Piece, Add</i>	129.23	
<i>For End Cap, Add</i>	90.05	
<i>For Copper Tube With Aluminum Fins, Add</i>	60.74	
23 82 36 00-0022 1-1/4" IPS Steel Tube With Steel Fins <small>(23 82 36 00-0001)</small>		
23 82 36 00-0023 EA 4' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element.....	505.37	44.80
<i>For 90 Degree Corner, Add</i>	53.34	
<i>For Valve Enclosure, Add</i>	53.34	
<i>For Filler Piece, Add</i>	46.34	
<i>For End Cap, Add</i>	36.17	
<i>For Copper Tube With Aluminum Fins, Add</i>	15.88	
23 82 36 00-0024 EA 6' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element.....	694.03	67.77
<i>For 90 Degree Corner, Add</i>	62.21	
<i>For Valve Enclosure, Add</i>	62.21	
<i>For Filler Piece, Add</i>	55.21	
<i>For End Cap, Add</i>	41.94	
<i>For Copper Tube With Aluminum Fins, Add</i>	23.81	
23 82 36 00-0025 EA 8' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element.....	864.46	89.59
<i>For 90 Degree Corner, Add</i>	67.43	
<i>For Valve Enclosure, Add</i>	67.43	
<i>For Filler Piece, Add</i>	60.43	
<i>For End Cap, Add</i>	45.33	
<i>For Copper Tube With Aluminum Fins, Add</i>	31.75	
23 82 36 00-0026 EA 10' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element.....	1,076.33	125.44
<i>For 90 Degree Corner, Add</i>	81.70	
<i>For Valve Enclosure, Add</i>	81.70	
<i>For Filler Piece, Add</i>	74.70	
<i>For End Cap, Add</i>	54.61	
<i>For Copper Tube With Aluminum Fins, Add</i>	39.48	
23 82 36 00-0027 EA 12' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element.....	1,285.07	150.70
<i>For 90 Degree Corner, Add</i>	96.11	
<i>For Valve Enclosure, Add</i>	96.11	
<i>For Filler Piece, Add</i>	89.11	
<i>For End Cap, Add</i>	63.97	
<i>For Copper Tube With Aluminum Fins, Add</i>	47.00	
23 82 36 00-0028 EA 14' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element.....	1,484.92	160.81
<i>For 90 Degree Corner, Add</i>	101.89	
<i>For Valve Enclosure, Add</i>	101.89	
<i>For Filler Piece, Add</i>	94.89	
<i>For End Cap, Add</i>	67.73	
<i>For Copper Tube With Aluminum Fins, Add</i>	56.40	

23 Heating, Ventilating, and Air-Conditioning (HVAC)**23 80 Decentralized Unitary HVAC Equipment****23 82 Convection Heating and Cooling Units**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

23 82 36 00-0029	EA	16' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element	1,635.35	177.70
		<i>For 90 Degree Corner, Add</i>	111.47	
		<i>For Valve Enclosure, Add</i>	111.47	
		<i>For Filler Piece, Add</i>	104.47	
		<i>For End Cap, Add</i>	73.96	
		<i>For Copper Tube With Aluminum Fins, Add</i>	62.04	
23 82 36 00-0030	EA	18' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element	1,873.23	201.02
		<i>For 90 Degree Corner, Add</i>	124.86	
		<i>For Valve Enclosure, Add</i>	124.86	
		<i>For Filler Piece, Add</i>	117.86	
		<i>For End Cap, Add</i>	82.66	
		<i>For Copper Tube With Aluminum Fins, Add</i>	71.44	
23 82 36 00-0031	EA	20' Long Finned Tube Baseboard Unit Complete With Enclosure And 1-1/4" IPS Heat Element	2,066.76	221.11
		<i>For 90 Degree Corner, Add</i>	136.23	
		<i>For Valve Enclosure, Add</i>	136.23	
		<i>For Filler Piece, Add</i>	129.23	
		<i>For End Cap, Add</i>	90.05	
		<i>For Copper Tube With Aluminum Fins, Add</i>	78.96	

23 82 36 00-0032 Electric Baseboard Heating (23 82 36)
Note: Includes 24 gauge steel enclosure and heating element

23 82 36 00-0033 Electric Wall Heating 10" Enclosure (23 82 36 00-0032)

23 82 36 00-0034	LF	Electric Wall Heating, 10" Enclosure, Low Capacity Electric Unit, Element <250 Watts/FT.....	144.01	67.09
23 82 36 00-0035	LF	Electric Wall Heating, 10" Enclosure, Low Capacity Electric Unit, Element >= 250 Watts/FT	147.06	67.09

23 82 36 00-0036 Electric Wall Heating 16" Enclosure (23 82 36 00-0032)

23 82 36 00-0037	LF	Electric Wall Heating, 16" Enclosure, Low Capacity Electric Unit, Element <350 Watts/FT.....	174.44	67.09
23 82 36 00-0038	LF	Electric Wall Heating, 16" Enclosure, Low Capacity Electric Unit, Element >= 350 Watts/FT	182.05	67.09

23 82 39 Unit Heaters (23 82)**23 82 39 13 Cabinet Unit Heaters** (23 82 39)

23 82 39 13-0001 Removal and Reinstallation of Cabinet Unit Heaters (23 82 39 13)

Note: Includes disconnection/reconnection of power and piping, storage, cleaning and reinstallation. Excludes removal and reinstallation of equipment supports.

23 82 39 13-0002	EA	Removal And Reinstallation Of Up To 58" Cabinet Unit Heater, Floor or Wall.....	315.88	
23 82 39 13-0003	EA	Removal And Reinstallation Of >58" Cabinet Unit Heater, Floor or Wall	545.62	
23 82 39 13-0004	EA	Removal And Reinstallation Of Up To 58" Cabinet Unit Heater, Ceiling	651.29	
23 82 39 13-0005	EA	Removal And Reinstallation Of >58" Cabinet Unit Heater, Ceiling	881.02	

23 82 39 16 Propeller Unit Heaters (23 82 39)

23 82 39 16-0001 Removal and Reinstallation of Propeller Unit Heaters (23 82 39 16)

Note: Includes disconnection/reconnection of power and piping, storage, cleaning and reinstallation. Excludes removal and reinstallation of equipment supports.

23 82 39 16-0002	EA	Removal And Reinstallation Of Up To 120 MBH Steam, 87.1 MBH Hot Water Hydronic Unit Heater, Horizontal or Vertical.....	689.19	
23 82 39 16-0003	EA	Removal And Reinstallation Of >120 MBH Steam, 87.1 MBH Hot Water Hydronic Unit Heater, Horizontal or Vertical.....	918.92	

23 82 39 19 Wall and Ceiling Unit Heaters (23 82 39)

23 82 39 19-0001 Electric Unit Heaters (23 82 39 19)

Note: May be mounted both vertically and horizontally.

23 82 39 19-0002	EA	3 KW, 350 CFM Electric Unit Heater, 208, 240/208, or 277 Volt	893.26	121.97
23 82 39 19-0003	EA	5 KW, 350 CFM Electric Unit Heater, 208, 240/208, or 277 Volt	893.26	121.97
23 82 39 19-0004	EA	7.5 KW, 650 CFM Electric Unit Heater, 208, 240/208, or 277 Volt	1,198.68	152.46
23 82 39 19-0005	EA	10 KW, 650 CFM Electric Unit Heater, 208, 240/208, or 277 Volt	1,374.46	182.95
23 82 39 19-0006	EA	15 KW, 910 CFM Electric Unit Heater, 208, 240/208, or 277 Volt	2,006.58	243.94
23 82 39 19-0007	EA	20 KW, 1,320 CFM Electric Unit Heater, 208, 240/208, 277, or 480 Volt	2,925.19	304.92
23 82 39 19-0008	EA	30 KW, 2,100 CFM Electric Unit Heater, Two speed; 208, 240/208, 277, or 480 Volt.....	4,040.02	365.91
23 82 39 19-0009	EA	50 KW, 3,000 CFM Electric Unit Heater, Two speed; 208, 240/208, 277, or 480 Volt	5,910.35	426.89
23 82 39 19-0010	EA	3 KW, 350 CFM Electric Unit Heater - 480 Volt	1,104.35	121.97
23 82 39 19-0011	EA	5 KW, 350 CFM Electric Unit Heater - 480 Volt	1,063.14	121.97
23 82 39 19-0012	EA	7.5 KW, 650 CFM Electric Unit Heater - 480 Volt	1,259.01	152.46
23 82 39 19-0013	EA	10 KW, 650 CFM Electric Unit Heater - 480 Volt	1,452.94	182.95
23 82 39 19-0014	EA	15 KW, 910 CFM Electric Unit Heater - 480 Volt	2,163.55	243.94

23 82 39 19-0015 Electric Ceiling and Wall Heaters (23 82 39 19)

Note: The "M" between wattages indicates two or three speed operation. 120, 240/208 or 277 Volt.

23 82 39 19-0016	EA	1,000, 1,500 Or 2,000 Watt Recessed Electric Wall Heater	407.74	76.23
23 82 39 19-0017	EA	1,500/750 Or 2,000/1,000 Watt Recessed Electric Wall Heater	477.19	85.38
23 82 39 19-0018	EA	3,000, 3,600, 4,000 Or 4,800 Watt Recessed Electric Wall Heater	747.94	85.38
23 82 39 19-0019	EA	1,000, 1,500 Or 2,000 Watt Surface Mounted Electric Wall Heater	463.34	76.23
23 82 39 19-0020	EA	1,500/750 Or 2,000/1,000 Watt Surface Mounted Electric Wall Heater	564.95	85.38
23 82 39 19-0021	EA	3,000, 3,600, 4,000 Or 4,800 Watt Surface Mounted Electric Wall Heater	851.01	85.38



Heating, Ventilating, and Air-Conditioning (HVAC)	23
Decentralized Unitary HVAC Equipment	23 80
Convection Heating and Cooling Units	23 82

23

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
23 82 39 19-0022	EA		1,000, 1,500 Or 2,000/1,500 Watt Recessed Electric Ceiling Heater	609.37	100.62
23 82 39 19-0023	EA		3,000, 4,000 Or 4,000/3,000 Watt Recessed Electric Ceiling Heater	1,138.60	106.72
23 82 39 19-0024	EA		4,800/3,600 Watt Recessed Electric Ceiling Heater	1,281.68	106.72
23 82 39 19-0025	EA		4,000/3,000/2,000 Watt Recessed Or Surface Mounted Electric Ceiling Heater	1,488.12	112.82
23 82 39 19-0026	EA		5,000/3,800/2,500 Watt Recessed Or Surface Mounted Electric Ceiling Heater	1,613.75	112.82
23 82 39 19-0027	EA		1,000, 1,500 Or 2,000/1,500 Watt Surface Mounted Electric Ceiling Heater	683.68	100.62
23 82 39 19-0028	EA		3,000, 4,000 Or 4,000/3,000 Watt Surface Mounted Electric Ceiling Heater	1,255.67	106.72
23 82 39 19-0029	EA		4,800/3,600 Watt Surface Mounted Electric Ceiling Heater	1,398.75	106.72
23 82 39 19-0030	EA		Selectable Wattage (500 Or 750 Or 1000 Or 1,250 Or 1,500 Or 1,750 Or 2,250 Watt), 240 Volt, Surface Mounted, Electric Wall Heater (Markel Series 305 - Model H30522T2DWB)	657.18	76.23
23 82 39 19-0031			Removal And Reinstallation Of Electric Unit Heaters <small>(23 82 39 19)</small> Note: Includes disconnection/reconnection of power and piping, storage, cleaning and reinstallation. Excludes removal and reinstallation of equipment supports.		
23 82 39 19-0032	EA		Removal And Reinstallation Of Up To 15KW Electric Unit Heater	413.54	
23 82 39 19-0033	EA		Removal And Reinstallation Of >15 KW Electric Unit Heater	850.10	

23 84 Humidity Control Equipment (23 80)

23 84 13 Humidifiers (23 84)

23 84 13 23 Direct-Steam-Injection Humidifiers (23 84 13)

23 84 13 23-0001 Steam Type Pneumatically Controlled (23 84 13 23)

Note: For duct or air handling installation standard unit with integral operator distribution manifold strainer trap and pneumatic modulating valve. Excludes humidistat and piping.

23 84 13 23-0002	EA		3-191 LB/Hour Steam Humidifier, 24" Manifold, Pneumatic Controls	2,076.76	303.24
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	638.34	
23 84 13 23-0003	EA		3-191 LB/Hour Steam Humidifier, 48" Manifold, Pneumatic Controls	2,076.76	303.24
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	638.34	
23 84 13 23-0004	EA		65-334 LB/Hour Steam Humidifier, 36" Manifold, Pneumatic Controls	2,996.25	303.24
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	914.19	
23 84 13 23-0005	EA		65-334 LB/Hour Steam Humidifier, 72" Manifold, Pneumatic Controls	3,111.10	379.06
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	952.47	
23 84 13 23-0006	EA		100-690 LB/Hour Steam Humidifier, 48" Manifold, Pneumatic Controls	4,508.14	303.24
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	1,367.76	
23 84 13 23-0007	EA		100-690 LB/Hour Steam Humidifier, 84" Manifold, Pneumatic Controls	4,622.99	379.06
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	1,406.04	
23 84 13 23-0008	EA		220-2,000 LB/Hour Steam Humidifier, 72" Manifold, Pneumatic Controls	6,985.31	379.06
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	2,114.74	
23 84 13 23-0009	EA		220-2,000 LB/Hour Steam Humidifier, 144" Manifold, Pneumatic Controls	7,128.90	474.39
			<i>For Electrically Controlled Unit, Add</i>	700.00	
			<i>For Each Additional Manifold, Add</i>	2,162.60	

23 84 13 29 Self-Contained Steam Humidifiers (23 84 13)

23 84 13 29-0001 Residential Humidifiers (23 84 13 29)

Note: Includes solenoid valve and flow through water supply.

23 84 13 29-0002	EA		Duct Or Furnace Mounted Humidifier, Residential Type	593.17	57.43
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END OF SECTION 23

23	23	Heating, Ventilating, and Air-Conditioning (HVAC)
	23 80	Decentralized Unitary HVAC Equipment
	23 84	Humidity Control Equipment



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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Integrated Automation	25	25
Integrated Automation Facility Controls	25 50	
Integrated Automation Control of HVAC	25 55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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25 Integrated Automation

25 50 Integrated Automation Facility Controls (25)

25 55 Integrated Automation Control of HVAC (25 50)

See CSI section 23 09 00 00-0000 for Instrumentation And Control For HVAC.

END OF SECTION 25

25	25	Integrated Automation
	25 50	Integrated Automation Facility Controls
	25 55	Integrated Automation Control of HVAC



MINOR				
CSI	UOM	DESCRIPTION	TOTAL DIRECT	DEMOLITION
			UNIT COST	UNIT COST

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 Electrical

Note: Termination costs are included with all electrical equipment, panel boards, fixtures and devices. Terminations are not included with patch panels. Electrical equipment and lighting shall conform to California Title 24.

26 01 Operation and Maintenance of Electrical Systems ⁽²⁶⁾

26 01 20 Operation and Maintenance of Low-Voltage Electrical

Distribution ^(26 01)

26 01 20 91 Low-Voltage Electrical Distribution Restoration ^(26 01 20)

26 01 20 91-0001	EA	Lock Out/Tag Out Devices ^(26 01 20 91)	
		Note: Includes following OSHA procedures and completing Owner's paperwork. Excludes circuit tracing.	
26 01 20 91-0002	EA	Lock Out/Tag Out Local Disconnect.....	44.09
		Note: Excludes tag or padlock See CSI section 26 01 20 91-0004 for padlock, 26 01 20 91-0005 for tag(s).	
26 01 20 91-0003	EA	Lock Out/Tag Out Breaker Or Motor Starter.....	44.09
		Note: Excludes tag or padlock See CSI section 26 01 20 91-0004 for padlock, 26 01 20 91-0005 for tag(s).	
26 01 20 91-0004	EA	Lock Out Padlock Device.....	12.25
		Note: Includes the installation and removal of pad lock when required	
26 01 20 91-0005	EA	Lock Out Tags.....	5.09
		Note: Includes filling out tag information, installation and removal of identifying tags.	
26 01 20 91-0006		Existing Circuit Tracing ^(26 01 20 91)	
26 01 20 91-0007	EA	Motors, Disconnects And Other Single Source Devices, Existing Circuit Tracing Per Device.....	25.48
26 01 20 91-0008	EA	Lighting, Existing Circuit Tracing Per Circuit.....	25.48

26 01 30 Operation and Maintenance of Facility Electrical Power

Generating and Storing Equipment ^(26 01)

26 01 30 91 Facility Electrical Power Generating and Storing Equipment Restoration ^(26 01 30)

26 01 30 91-0001	SF	Cleaning Photovoltaic Collectors ^(26 01 30 91)	
		Note: Includes pressure washer with filtered water (owner supplied from hose faucet).	
26 01 30 91-0002	SF	Rinse Photovoltaic Collectors.....	0.19
		Note: Rinse solar panels with clean (filtered) water using hose	
		<i>For Up To 100, Add</i>	<i>0.14</i>
		<i>For >100 To 250, Add</i>	<i>0.07</i>
		<i>For >250 To 500, Add</i>	<i>0.03</i>
		<i>For >5,000 To 10,000, Deduct</i>	<i>-0.01</i>
		<i>For >10,000 To 15,000, Deduct</i>	<i>-0.02</i>
		<i>For >15,000 To 30,000, Deduct</i>	<i>-0.03</i>
		<i>For >30,000, Deduct</i>	<i>-0.04</i>
26 01 30 91-0003	SF	Cleaning And Washing Photovoltaic Collectors With Brush, Ground Level Or On Flat Roof.....	0.32
		Note: Includes pre rinse solar panels with clean water, soft scrubber with soapy water, and final rinse with clean water.	
		<i>For Up To 100, Add</i>	<i>0.24</i>
		<i>For >100 To 250, Add</i>	<i>0.11</i>
		<i>For >250 To 500, Add</i>	<i>0.05</i>
		<i>For >5,000 To 10,000, Deduct</i>	<i>-0.02</i>
		<i>For >10,000 To 15,000, Deduct</i>	<i>-0.03</i>
		<i>For >15,000 To 30,000, Deduct</i>	<i>-0.05</i>
		<i>For >30,000, Deduct</i>	<i>-0.06</i>
26 01 30 91-0004	SF	Cleaning And Washing Photovoltaic Collectors With Telescoping Pole Brush, Pitched Roof.....	0.59
		Note: Includes pre rinse solar panels with clean water, soft scrubber with soapy water, and final rinse with clean water.	
		<i>For Up To 100, Add</i>	<i>0.44</i>
		<i>For >100 To 250, Add</i>	<i>0.21</i>
		<i>For >250 To 500, Add</i>	<i>0.09</i>
		<i>For >5,000 To 10,000, Deduct</i>	<i>-0.03</i>
		<i>For >10,000 To 15,000, Deduct</i>	<i>-0.06</i>
		<i>For >15,000 To 30,000, Deduct</i>	<i>-0.09</i>
		<i>For >30,000, Deduct</i>	<i>-0.12</i>
26 01 30 91-0005		Emergency Generator Permits ^(26 01 30 91)	
26 01 30 91-0006		Air Pollution Control Board ^(26 01 30 91-0005)	
26 01 30 91-0007	EA	APCD Permit To Construct And Operate Emergency Generator.....	4,905.32

26 01 50 Operation and Maintenance of Lighting ^(26 01)

26 01 50 51 Luminaire Relamping ^(26 01 50)

26 01 50 51-0001	EA	Replace Lamps In Existing Fixtures ^(26 01 50 51)	
		Note: Includes removal of existing lamp from fixture and installation of new lamp. Excludes disposal of hazardous lamps.	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 51-0002			Halogen Lamps (26 01 50 51-0001)		
26 01 50 51-0003	EA		300 Watt, T3, Tungsten Halogen Lamp	50.14	
26 01 50 51-0004	EA		500 Watt, T3, Tungsten Halogen Lamp	64.29	
26 01 50 51-0005	EA		1,000 Watt, T3, Tungsten Halogen Lamp	95.48	
26 01 50 51-0006	EA		60 Watt, PAR38, Halogen Lamp	25.45	
26 01 50 51-0007	EA		75 Watt, PAR38, Halogen Lamp	25.45	
26 01 50 51-0008	EA		90 Watt, PAR38, Halogen Lamp	24.18	
26 01 50 51-0009	EA		100 Watt, PAR38, Halogen Lamp	24.18	
26 01 50 51-0010	EA		60 Watt, PAR38, Halogen IR Reflective Lamp	37.42	
26 01 50 51-0011	EA		67 Watt, PAR38, Halogen IR Reflective Lamp	41.15	
26 01 50 51-0012	EA		70 Watt, PAR38, Halogen IR Reflective Lamp	40.19	
26 01 50 51-0013	EA		90 Watt, PAR38, Halogen IR Reflective Lamp	43.04	
26 01 50 51-0014	EA		100 Watt, PAR38, Halogen IR Reflective Lamp	43.64	
26 01 50 51-0015	EA		12 Watt, 10 Degree Beam, Base B01, Halogen Lamp (Soraa MR16-65-B01-12-830-10)	22.00	
26 01 50 51-0016	EA		12 Watt, 20 Degree Beam, Base B01, Halogen Lamp (Soraa MR16-75-B01-12-830-20)	22.00	
26 01 50 51-0017	EA		12 Watt, 25 Degree Beam, Base B01, Halogen Lamp (Soraa MR16-75-B01-12-830-25)	24.00	
26 01 50 51-0018	EA		12 Watt, 36 Degree Beam, Base B01, Halogen Lamp (Soraa MR16-75-B01-12-830-36)	24.00	
26 01 50 51-0019			Exit Light Lamps (26 01 50 51-0001)		
26 01 50 51-0020	EA		Convert Exit Light Lamps To Red LED Lamps	114.75	
			<i>For Green LED Lamps, Add</i>	25.00	
26 01 50 51-0021	EA		Fluorescent Lamp For Exit Light	32.49	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-8.10	
26 01 50 51-0022	EA		Lamp Replacement For Emergency Lights On Exit Sign	40.98	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-4.05	
26 01 50 51-0023			Fluorescent Lamps (26 01 50 51-0001)		
26 01 50 51-0024	EA		18", 15 Watt, T8 Fluorescent Lamp	12.89	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0025	EA		2', 17 Watt, T8 Fluorescent Lamp	15.54	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0026	EA		3', 25 Watt, T8 Fluorescent Lamp	17.86	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0027	EA		4', 28 Watt, Rapid Start T8 Fluorescent Lamp	18.13	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0028	EA		4', 32 Watt, T8 Fluorescent Lamp	17.83	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0029	EA		4', 30 Watt, T8 Fluorescent Lamp	22.43	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0030	EA		4', 28 Watt, T8 Fluorescent Lamp	19.64	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0031	EA		4', 25 Watt, T8 Fluorescent Lamp	19.53	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0032	EA		4', 44 Watt, T8HO Fluorescent Lamp	31.52	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0033	EA		8', 59 Watt, T8 Fluorescent Lamp	23.99	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0034	EA		18", 15 Watt, T12 Fluorescent Lamp	19.57	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0035	EA		2', 20 Watt, T12 Fluorescent Lamp	14.78	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0036	EA		3', 30 Watt, T12 Fluorescent Lamp	16.60	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0037	EA		4', 34 Watt, T12 Fluorescent Lamp	16.68	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0038	EA		4', 40 Watt, T12 Fluorescent Lamp	16.34	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0039	EA		8', 60 Watt, T12 Fluorescent Lamp	24.60	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0040	EA		8', 75 Watt, T12 Fluorescent Lamp	20.75	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0041	EA		8', 95 Watt, Instant Start T12 Fluorescent Lamp	35.80	
26 01 50 51-0042	EA		6" Diameter, 20 Watt, Circular T9 Fluorescent Lamp	19.80	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0043	EA		8" Diameter, 22 Watt, Circular T9 Fluorescent Lamp	16.26	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0044	EA		12" Diameter, 32 Watt, Circular T9 Fluorescent Lamp	15.72	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0045	EA		16" Diameter, 40 Watt, Circular T9 Fluorescent Lamp	17.41	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0046	EA		32 Watt, Rapid Start, U-Shaped T8 Fluorescent Lamp	28.86	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-4.05	
26 01 50 51-0047	EA		40 Watt, Rapid Start, U-Shaped T12 Fluorescent Lamp	27.81	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-4.05	
26 01 50 51-0048	EA		6", 4 Watt, T5 Fluorescent Lamp	14.32	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0049	EA		9", 6 Watt, T5 Fluorescent Lamp	14.08	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0050	EA		12", 8 Watt, T5 Fluorescent Lamp	14.54	
			<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 51-0051 EA 21", 13 Watt, T5 Fluorescent Lamp	15.22	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0052 EA 24", 14 Watt, T5 Fluorescent Lamp	17.56	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0053 EA 34", 21 Watt, T5 Fluorescent Lamp	19.10	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0054 EA 46", 28 Watt, T5 Fluorescent Lamp	18.49	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0055 EA 46", 54 Watt, T5HO Fluorescent Lamp	20.25	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0056 EA 46", 54 Watt T5 Fluorescent Lamp	17.32	
26 01 50 51-0057 EA 5-13 Watt, 2-Pin Compact Fluorescent Lamp	11.36	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-2.03	
26 01 50 51-0058 EA 9-26 Watt, 4-Pin Compact Fluorescent Lamp	12.58	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-2.03	
26 01 50 51-0059 EA 27-55 Watt, 4-Pin Compact Fluorescent Lamp	26.00	
<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-2.03	
26 01 50 51-0060 EA Compact Fluorescent 13 Watt, 4-Pin Lamps CF13DD/E/827, Dulux	33.87	
26 01 50 51-0061 EA Compact Fluorescent 18 Watt, 4-Pin Lamps CF18DD/E/827, Dulux	33.87	
26 01 50 51-0062 EA 32 Watt 2D (DoubleD) Fluorescent Lamp, 4-Pin.....	64.12	
26 01 50 51-0063 EA 26 Watt (1,600 Lumens) 4-pin Quad Tube PL Lamp	23.16	
26 01 50 51-0064 EA <9 Watt, Screw-In, Spiral Compact Fluorescent Lamps	11.86	
26 01 50 51-0065 EA 9 To 27 Watt, Screw-In, Spiral Compact Fluorescent Lamps	10.21	
26 01 50 51-0066 EA 29 To 32 Watt, Screw-In, Spiral Compact Fluorescent Lamps	10.72	
26 01 50 51-0067 EA 33 To 42 Watt, Screw-In, Spiral Compact Fluorescent Lamps	44.92	
26 01 50 51-0068 EA 43 To 65 Watt, Screw-In, Spiral Compact Fluorescent Lamps	49.02	
26 01 50 51-0069 EA 85 Watt, Screw-In, Spiral Compact Fluorescent Lamps	93.58	
26 01 50 51-0070 EA 105 Watt, Screw-In, Spiral Compact Fluorescent Lamps	112.15	
26 01 50 51-0071 EA 200 Watt, Screw-In, Spiral Compact Fluorescent Lamps	115.92	
26 01 50 51-0072 EA 11 Watt, Screw-In, Compact Fluorescent Reflector Lamps	41.84	
26 01 50 51-0073 EA 15 Watt, Screw-In, Compact Fluorescent Reflector Lamps	43.66	
26 01 50 51-0074 EA 20 To 28 Watt, Screw-In, Compact Fluorescent Reflector Lamps	50.46	
26 01 50 51-0075 Metal Halide Lamps <small>(26 01 50 51-0001)</small>		
26 01 50 51-0076 EA 50 Watt, Pulse Start Metal Halide Lamp	49.90	
26 01 50 51-0077 EA 70 Watt, Pulse Start Metal Halide Lamp	47.73	
26 01 50 51-0078 EA 100 Watt, Pulse Start Metal Halide Lamp	54.59	
26 01 50 51-0079 EA 150 Watt, Pulse Start Metal Halide Lamp	53.03	
26 01 50 51-0080 EA 175 Watt, Pulse Start Metal Halide Lamp	52.58	
26 01 50 51-0081 EA 250 Watt, Pulse Start Metal Halide Lamp	52.89	
26 01 50 51-0082 EA 400 Watt, Pulse Start Metal Halide Lamp	63.83	
26 01 50 51-0083 EA 1,000 Watt, Pulse Start Metal Halide Lamp	74.31	
26 01 50 51-0084 EA 1,500 Watt, Pulse Start Metal Halide Lamp	73.88	
26 01 50 51-0085 High Pressure Sodium Lamps <small>(26 01 50 51-0001)</small>		
26 01 50 51-0086 EA 35 Watt, High Pressure Sodium Lamp	41.06	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0087 EA 50 Watt, High Pressure Sodium Lamp	41.06	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0088 EA 70 Watt, High Pressure Sodium Lamp	41.99	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0089 EA 100 Watt, High Pressure Sodium Lamp	43.77	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0090 EA 150 Watt, High Pressure Sodium Lamp	41.99	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0091 EA 250 Watt, High Pressure Sodium Lamp	41.99	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0092 EA 400 Watt, High Pressure Sodium Lamp	39.34	
<i>For Enclosed And Gasket Light Fixtures, Add</i>	3.12	
26 01 50 51-0093 EA 1,000 Watt, High Pressure Sodium Lamp	91.98	
26 01 50 51-0094 Low Pressure Sodium Lamps <small>(26 01 50 51-0001)</small>		
26 01 50 51-0095 EA 35 Watt, Low Pressure Sodium Lamp	105.47	
26 01 50 51-0096 EA 55 Watt, Low Pressure Sodium Lamp	117.77	
26 01 50 51-0097 EA 70 Watt, Low Pressure Sodium Lamp	120.54	
26 01 50 51-0098 EA 90 Watt, Low Pressure Sodium Lamp	123.32	
26 01 50 51-0099 EA 135 Watt, Low Pressure Sodium Lamp	134.40	
26 01 50 51-0100 EA 180 Watt, Low Pressure Sodium Lamp	184.27	
26 01 50 51-0101 LED Lamps <small>(26 01 50 51-0001)</small>		
26 01 50 51-0102 LED Lamps, Candelabra Base, CA10 <small>(26 01 50 51-0101)</small>		
26 01 50 51-0103 EA 3 Watt (25 Watt Incandescent Equivalent), Candelabra Base, CA10, Dimmable LED Lamp (Energy Star)	16.36	
26 01 50 51-0104 LED Lamps, Medium Base, A19 Or A21 <small>(26 01 50 51-0101)</small>		
26 01 50 51-0105 EA 6 Watt (40 Watt Incandescent Equivalent), Medium Base, A19, Dimmable LED Lamp (Energy Star)	21.73	
26 01 50 51-0106 EA 11 Watt (60 Watt Incandescent Equivalent), Medium Base, A19, Dimmable LED Lamp (Energy Star)	21.73	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 01 50 51-0107	EA	14 Watt (75 Watt Incandescent Equivalent), Medium Base, A19, Dimmable LED Lamp (Energy Star)	36.14
26 01 50 51-0108	EA	17 Watt (75 Watt Incandescent Equivalent), Medium Base, A21, Dimmable LED Lamp (Energy Star)	25.37
26 01 50 51-0109	EA	18 Watt (100 Watt Incandescent Equivalent), Medium Base, A21, Dimmable LED Lamp (Energy Star)	45.15

26 01 50 51-0110 LED Lamps, Medium Base, BR30 Or BR40 (26 01 50 51-0101)

26 01 50 51-0111	EA	9.5 Watt (65 Watt Incandescent Equivalent), Medium Base, BR30, Dimmable LED Lamp (Energy Star)	29.39
26 01 50 51-0112	EA	14 Watt (85 Watt Incandescent Equivalent), Medium Base, BR30, Dimmable LED Lamp (Energy Star)	26.34
26 01 50 51-0113	EA	11 Watt (65 Watt Incandescent Equivalent), Medium Base, BR40, Dimmable LED Lamp (Energy Star)	34.43
26 01 50 51-0114	EA	14.5 Watt (75 Watt Incandescent Equivalent), Medium Base, BR40, Dimmable LED Lamp (Energy Star)	29.05
26 01 50 51-0115	EA	14 Watt (85 Watt Incandescent Equivalent), Medium Base, BR40, Dimmable LED Lamp (Energy Star)	38.04
26 01 50 51-0116	EA	18 Watt (90 Watt Incandescent Equivalent), Medium Base, BR40, Dimmable LED Lamp (Energy Star)	29.05

26 01 50 51-0117 LED Lamps, Medium Base, PAR (26 01 50 51-0101)

26 01 50 51-0118	EA	7 Watt (45 Watt Halogen Equivalent), Medium Base, PAR20, Dimmable LED Lamp (Energy Star)	32.27
26 01 50 51-0119	EA	12 Watt (60 Watt Halogen Equivalent), Medium Base, Short Neck Par30, Dimmable LED Lamp (Energy Star)	43.46
26 01 50 51-0120	EA	16.3 Watt (65 Watt Halogen Equivalent), Medium Base, Short Neck PAR30, Dimmable LED Lamp (Energy Star)	43.46
26 01 50 51-0121	EA	15.6 Watt (70 Watt Halogen Equivalent), Medium Base, Short Neck PAR30, Dimmable LED Lamp (Energy Star)	41.66
26 01 50 51-0122	EA	12 Watt (50 Watt Halogen Equivalent), Medium Base, Short Neck PAR30, Dimmable LED Lamp (Energy Star)	39.86
26 01 50 51-0123	EA	15 Watt (75 Watt Halogen Equivalent), Medium Base, Long Neck PAR30, Dimmable LED Lamp (Energy Star)	39.86
26 01 50 51-0124	EA	18 Watt (90 Watt Halogen Equivalent), Medium Base, Long Neck PAR30, Dimmable LED Lamp (Energy Star)	76.25
26 01 50 51-0125	EA	15 Watt (75 Watt Halogen Equivalent), Medium Base, PAR38, Dimmable LED Lamp (Energy Star)	43.46
26 01 50 51-0126	EA	18 Watt (90 Watt Halogen Equivalent), Medium Base, PAR38, Dimmable LED Lamp (Energy Star)	41.66
26 01 50 51-0127	EA	19 Watt (120 Watt Halogen Equivalent), Medium Base, Par38, Dimmable LED Lamp (Energy Star)	43.46
26 01 50 51-0128	EA	24 Watt (120 Watt Halogen Equivalent), Medium Base, PAR38, Dimmable LED Lamp (Energy Star)	43.46

26 01 50 51-0129 LED Lamps, GU Base, MR16 (26 01 50 51-0101)

26 01 50 51-0130	EA	4 Watt (20 Watt Halogen Equivalent), GU5.3 Base, MR16, LED Lamp (Energy Star)	22.74
26 01 50 51-0131	EA	6 Watt (30 Watt Halogen Equivalent), GU10 Base, MR16, Dimmable LED Lamp (Energy Star)	29.39
26 01 50 51-0132	EA	8 Watt (50 Watt Halogen Equivalent), GU5.3 Base, MR16, Dimmable LED Lamp (Energy Star)	32.27

26 01 50 51-0133 LED Lamps, PL Series (26 01 50 51-0101)

26 01 50 51-0134	EA	3.5 Watt, 2-Pin CFL G23 Base , Hybrid Lamp (GreenCreative PLS 3.5 HYB G23)	16.11
26 01 50 51-0135	EA	26 Watt, 2700K CCT, PL EDGE DiRect Series (Green Creative 9.5PLH/827/DIR)	21.50
26 01 50 51-0136	EA	26 Watt, 3000K CCT, PL EDGE DiRect Series (Green Creative 9.5PLH/830/DIR)	18.50
26 01 50 51-0137	EA	26 Watt, 3500K CCT, PL EDGE DiRect Series (Green Creative 9.5PLH/835/DIR)	20.38
26 01 50 51-0138	EA	26 Watt, 4000K CCT, PL EDGE DiRect Series (Green Creative 9.5PLH/840/DIR)	20.38
26 01 50 51-0139	EA	26 Watt, 3000K CCT, High CRI, PL EDGE DiRect Series (Green Creative 10.5PLH/930/DIR)	23.75
26 01 50 51-0140	EA	13-18 Watt, 2700K CCT, PL EDGE DiRect Series (Green Creative 5.5PLH/827/DIR)	20.38
26 01 50 51-0141	EA	13-18 Watt, 3000K CCT, PL EDGE DiRect Series (Green Creative 5.5PLH/830/DIR)	20.38
26 01 50 51-0142	EA	13-18 Watt, 3500K CCT, PL EDGE DiRect Series (Green Creative 5.5PLH/835/DIR)	20.38
26 01 50 51-0143	EA	13-18 Watt, 4000K CCT, PL EDGE DiRect Series (Green Creative 5.5PLH/840/DIR)	20.38
26 01 50 51-0144	EA	26 Watt, 2700K CCT, PL EDGE DiRect Series (Green Creative 10PLV/827/DIR)	22.63
26 01 50 51-0145	EA	26 Watt, 3000K CCT, PL EDGE DiRect Series (Green Creative 10PLV/830/DIR)	22.63
26 01 50 51-0146	EA	26 Watt, 3500K CCT, PL EDGE DiRect Series (Green Creative 10PLV/835/DIR)	22.63
26 01 50 51-0147	EA	26 Watt, 4000K CCT, PL EDGE DiRect Series (Green Creative 10PLV/840/DIR)	22.63
26 01 50 51-0148	EA	26 Watt, 3000K CCT, High CRI, PL EDGE DiRect Series (Green Creative 11PLV/930/DIR)	21.50
26 01 50 51-0149	EA	13-18 Watt, 2700K CCT, PL EDGE DiRect Series (Green Creative 6.5PLV/827/DIR)	21.50
26 01 50 51-0150	EA	13-18 Watt, 3000K CCT, PL EDGE DiRect Series (Green Creative 6.5PLV/830/DIR)	21.50
26 01 50 51-0151	EA	13-18 Watt, 3500K CCT, PL EDGE DiRect Series (Green Creative 6.5PLV/835/DIR)	22.25
26 01 50 51-0152	EA	13-18 Watt, 4000K CCT, PL EDGE DiRect Series (Green Creative 6.5PLV/840/DIR)	22.25
26 01 50 51-0153	EA	26 Watt, 2700K CCT, PL EDGE BYPass Series (Green Creative 10.5PLH/827/BYP)	22.42
26 01 50 51-0154	EA	26 Watt, 3000K CCT, PL EDGE BYPass Series (Green Creative 10.5PLH/830/BYP)	22.42
26 01 50 51-0155	EA	26 Watt, 3500K CCT, PL EDGE BYPass Series (Green Creative 10.5PLH/835/BYP)	22.42
26 01 50 51-0156	EA	26 Watt, 4000K CCT, PL EDGE BYPass Series (Green Creative 10.5PLH/840/BYP)	22.42
26 01 50 51-0157	EA	13-18 Watt, 3500K CCT, PL EDGE BYPass Series (Green Creative 6PLH/835/BYP)	23.00
26 01 50 51-0158	EA	13-18 Watt, 4000K CCT, PL EDGE BYPass Series (Green Creative 6PLH/840/BYP)	23.00
26 01 50 51-0159	EA	13 Watt, 3000K CCT, PL EDGE BYPass Series (Green Creative 6PLH/830/BYP/E26)	23.00
26 01 50 51-0160	EA	13 Watt, 3500K CCT, PL EDGE BYPass Series (Green Creative 6PLH/835/BYP/E26)	23.00
26 01 50 51-0161	EA	13 Watt, 4000K CCT, PL EDGE BYPass Series (Green Creative 6PLH/840/BYP/E26)	23.00
26 01 50 51-0162	EA	13 Watt, 3000K CCT, PL EDGE BYPass Series (Green Creative 6PLH/830/BYP/GU24)	23.00
26 01 50 51-0163	EA	13 Watt, 3500K CCT, PL EDGE BYPass Series (Green Creative 6PLH/835/BYP/GU24)	23.00
26 01 50 51-0164	EA	13 Watt, 4000K CCT, PL EDGE BYPass Series (Green Creative 6PLH/840/BYP/GU24)	23.00
26 01 50 51-0165	EA	26 Watt, 2700K CCT, PL EDGE BYPass Series (Green Creative 11.5PLV/827/BYP)	28.86
26 01 50 51-0166	EA	26 Watt, 3000K CCT, PL EDGE BYPass Series (Green Creative 11.5PLV/830/BYP)	28.86
26 01 50 51-0167	EA	26 Watt, 3500K CCT, PL EDGE BYPass Series (Green Creative 11.5PLV/835/BYP)	28.86
26 01 50 51-0168	EA	26 Watt, 4000K CCT, PL EDGE BYPass Series (Green Creative 11.5PLV/840/BYP)	27.51
26 01 50 51-0169	EA	13-18 Watt, 3500K CCT, PL EDGE BYPass Series (Green Creative 7PLV/835/BYP)	27.51
26 01 50 51-0170	EA	13-18 Watt, 4000K CCT, PL EDGE BYPass Series (Green Creative 7PLV/840/BYP)	27.51
26 01 50 51-0171	EA	4 Pin, 6 Watt, 560 Lumens 4000K CCT, Horizontal Mount LED PL Lamp (Green Creative 57898)	26.37

26 01 50 51-0172 HID LED Lamps, Medium Base E26 (26 01 50 51-0101)

26 01 50 51-0173	EA	27 Watt, 4000K CCT, Medium Base E26, LED Lamp (Green Creative 27HID/840/277V/E26)	53.38
26 01 50 51-0174	EA	27 Watt, 5000K CCT, Medium Base E26, LED Lamp (Green Creative 27HID/850/277V/E26)	53.38
26 01 50 51-0175	EA	45 Watt, 4000K CCT, Medium Base E26, LED Lamp (Green Creative 45HID/840/277V/E26)	67.24
26 01 50 51-0176	EA	45 Watt, 5000K CCT, Medium Base E26, LED Lamp (Green Creative 45HID/850/277V/E26)	67.24

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 51-0177 EA 10 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED10-3026)	48.08	
26 01 50 51-0178 EA 10 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED10-4026)	48.08	
26 01 50 51-0179 EA 10 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED10-5026)	48.08	
26 01 50 51-0180 EA 10 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED10-6026)	48.08	
26 01 50 51-0181 EA 15 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED15-3026)	49.58	
26 01 50 51-0182 EA 15 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED15-4026)	49.58	
26 01 50 51-0183 EA 15 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED15-5026)	49.58	
26 01 50 51-0184 EA 15 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED15-6026)	49.58	
26 01 50 51-0185 EA 20 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED20-3026)	55.58	
26 01 50 51-0186 EA 20 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED20-4026)	55.58	
26 01 50 51-0187 EA 20 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED20-5026)	55.58	
26 01 50 51-0188 EA 20 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED20-6026)	55.58	
26 01 50 51-0189 EA 25 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED25-3026)	63.08	
26 01 50 51-0190 EA 25 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED25-4026)	63.08	
26 01 50 51-0191 EA 25 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED25-5026)	63.08	
26 01 50 51-0192 EA 25 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED25-6026)	63.08	
26 01 50 51-0193 EA 30 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED30-3026)	79.57	
26 01 50 51-0194 EA 30 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED30-4026)	79.57	
26 01 50 51-0195 EA 30 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED30-5026)	79.57	
26 01 50 51-0196 EA 30 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED30-6026)	79.57	
26 01 50 51-0197 EA 40 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED40-3026)	93.82	
26 01 50 51-0198 EA 40 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED40-4026)	93.82	
26 01 50 51-0199 EA 40 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED40-5026)	93.82	
26 01 50 51-0200 EA 40 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED40-6026)	93.82	
26 01 50 51-0201 EA 60 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED60-3026)	103.57	
26 01 50 51-0202 EA 60 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED60-4026)	103.57	
26 01 50 51-0203 EA 60 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED60-5026)	103.57	
26 01 50 51-0204 EA 60 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED60-6026)	103.57	
26 01 50 51-0205 EA 80 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED80-3026)	138.81	
26 01 50 51-0206 EA 80 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED80-4026)	138.81	
26 01 50 51-0207 EA 80 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED80-5026)	138.81	
26 01 50 51-0208 EA 80 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED80-6026)	138.81	
26 01 50 51-0209 EA 100 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED100-3026)	143.31	
26 01 50 51-0210 EA 100 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED100-4026)	143.31	
26 01 50 51-0211 EA 100 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED100-5026)	143.31	
26 01 50 51-0212 EA 100 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED100-6026)	143.31	
26 01 50 51-0213 EA 120 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED120-3026)	169.55	
26 01 50 51-0214 EA 120 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED120-4026)	169.55	
26 01 50 51-0215 EA 120 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED120-5026)	169.55	
26 01 50 51-0216 EA 120 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED120-6026)	169.55	
26 01 50 51-0217 EA 150 Watt, 3000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED150-3026)	201.04	
26 01 50 51-0218 EA 150 Watt, 4000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED150-4026)	201.04	
26 01 50 51-0219 EA 150 Watt, 5000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED150-5026)	201.04	
26 01 50 51-0220 EA 150 Watt, 6000K CCT, Medium Base E26, LED Omnidirectional Street Lamp (Bergen industries LED150-6026)	201.04	
26 01 50 51-0221 EA 20 Watt, 4000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED20WPT40KMED-G6)	65.72	
26 01 50 51-0222 EA 20 Watt, 5000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED20WPT50KMED-G6)	70.97	
26 01 50 51-0223 EA 27 Watt, 4000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED27WPT40KMED-G5)	70.97	
26 01 50 51-0224 EA 27 Watt, 5000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED27WPT50KMED-G5)	65.72	
26 01 50 51-0225 EA 36 Watt, 4000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED36WPT40KMED-G5)	82.21	
26 01 50 51-0226 EA 36 Watt, 5000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED36WPT50KMED-G5)	75.47	
26 01 50 51-0227 EA 45 Watt, 4000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED45WPT40KMED-G5)	90.46	
26 01 50 51-0228 EA 45 Watt, 5000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED45WPT50KMED-G5)	89.58	
26 01 50 51-0229 EA 54 Watt, 4000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED54WPT40KMED-G5)	91.59	
26 01 50 51-0230 EA 54 Watt, 5000K CCT, Medium Base E26, LED Post Top Lamp (EiKO industries LED54WPT50KMED-G5)	91.59	
26 01 50 51-0231 EA 27 Watt, 4000K CCT, Medium Base E26, LED Lamp (EiKO industries LED27WPT40KMED-G7)	55.99	
26 01 50 51-0232 EA 27 Watt, 5000K CCT, Medium Base E26, LED Lamp (EiKO industries LED27WPT50KMED-G7)	55.99	
26 01 50 51-0233 EA 36 Watt, 4000K CCT, Medium Base E26, LED Lamp (EiKO industries LED36WPT40KMED-G7)	62.93	
26 01 50 51-0234 EA 36 Watt, 5000K CCT, Medium Base E26, LED Lamp (EiKO industries LED36WPT50KMED-G7)	62.93	
26 01 50 51-0235 EA 45 Watt, 4000K CCT, Medium Base E26, LED Lamp (EiKO industries LED45WPT40KMED-G7)	67.54	
26 01 50 51-0236 EA 45 Watt, 5000K CCT, Medium Base E26, LED Lamp (EiKO industries LED45WPT50KMED-G7)	67.54	
26 01 50 51-0237 EA 54 Watt, 4000K CCT, Medium Base E26, LED Lamp (EiKO industries LED54WPT40KMED-G7)	74.47	
26 01 50 51-0238 EA 54 Watt, 5000K CCT, Medium Base E26, LED Lamp (EiKO industries LED54WPT50KMED-G7)	74.47	
26 01 50 51-0239 EA 20 Watt, 5500K CCT, Medium Base E26, LED Lamp (Olympic CL-20W8-55K-E26)	74.83	
26 01 50 51-0240 EA 30 Watt, 5500K CCT, Medium Base E26, LED Lamp (Olympic CL-30W8-55K-E26)	80.98	
26 01 50 51-0241 EA 40 Watt, 5500K CCT, Medium Base E26, LED Lamp (Olympic CL-40W8-55K-E26)	100.40	
26 01 50 51-0242 EA 50 Watt, 5500K CCT, Medium Base E26, LED Lamp (Olympic CL-50W8-55K-E26)	110.44	
26 01 50 51-0243 EA 10 Watt, 5500K CCT, Medium Base E26, Compact LED Lamp (Olympic CCL-10W12-55K-E26)	44.24	
26 01 50 51-0244 EA 15 Watt, 5500K CCT, Medium Base E26, Compact LED Lamp (Olympic CCL-15W12-55K-E26)	49.63	
26 01 50 51-0245 EA 20 Watt, 5500K CCT, Medium Base E26, Compact LED Lamp (Olympic CCL-20W12-55K-E26)	52.33	
26 01 50 51-0246 EA 25 Watt, 5500K CCT, Medium Base E26, Compact LED Lamp (Olympic CCL-25W12-55K-E26)	57.36	
26 01 50 51-0247 EA 15 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148015-UNV)	68.69	
26 01 50 51-0248 EA 20 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148020-UNV)	80.23	
26 01 50 51-0249 EA 25 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148025-UNV)	109.07	
26 01 50 51-0250 EA 30 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148030-UNV)	114.84	
26 01 50 51-0251 EA 35 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148035-UNV)	124.07	
26 01 50 51-0252 EA 40 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148040-UNV)	129.83	
26 01 50 51-0253 EA 60 Watt, Medium Base E26, LED Self-Ballasted Retrofit Lamp (Nepton LED-N148060-UNV)	186.36	
26 01 50 51-0254 EA 20 Watt, 5000K CCT, 120-277 Volt, E26 (Medium) Base, LED Retrofit Omni-Directional Lamp (HYLITE HL-IOD-20W-E26-50K)	64.11	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 51-0255			HID LED Lamps, Mogul Base E39 Or EX39 <small>(26 01 50 51-0101)</small>		
26 01 50 51-0256	EA		120 Watt, 2700K CCT, Mogul Base EX39, HID LED Lamp (Green Creative 120HID/827/277V/EX39)	178.72	
26 01 50 51-0257	EA		120 Watt, 5000K CCT, Mogul Base EX39, HID LED Lamp (Green Creative 120HID/850/277V/EX39)	178.72	
26 01 50 51-0258	EA		120 Watt, 5700 CCT, Mogul Base EX39, HID LED Lamp (Green Creative 120HID/857/277V/EX39)	178.72	
26 01 50 51-0259	EA		27 Watt, 3000K CCT, Mogul Base E39, LED Lamp (Green Creative 27HID/830/277V/EX39)	53.38	
26 01 50 51-0260	EA		27 Watt, 4000K CCT, Mogul Base E39, LED Lamp (Green Creative 27HID/840/277V/EX39/R)	53.38	
26 01 50 51-0261	EA		27 Watt, 5000K CCT, Mogul Base E39, LED Lamp (Green Creative 27HID/850/277V/EX39)	53.38	
26 01 50 51-0262	EA		45 Watt, 3000K CCT, Mogul Base E39, LED Lamp (Green Creative 45HID/830/277V/EX39)	67.24	
26 01 50 51-0263	EA		45 Watt, 4000K CCT, Mogul Base E39, LED Lamp (Green Creative 45HID/840/277V/EX39/R)	67.24	
26 01 50 51-0264	EA		45 Watt, 5000K CCT, Mogul Base E39, LED Lamp (Green Creative 45HID/850/277V/EX39)	67.24	
26 01 50 51-0265	EA		80 Watt, 5000K CCT, Mogul Base E39, LED Lamp (Green Creative 80HID/850/277V/EX39)	123.48	
26 01 50 51-0266	EA		80 Watt, 3000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED80-3039)	138.81	
26 01 50 51-0267	EA		80 Watt, 4000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED80-4039)	138.81	
26 01 50 51-0268	EA		80 Watt, 5000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED80-5039)	138.81	
26 01 50 51-0269	EA		80 Watt, 6000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED80-6039)	138.81	
26 01 50 51-0270	EA		100 Watt, 3000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED100-3039)	143.31	
26 01 50 51-0271	EA		100 Watt, 4000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED100-4039)	143.31	
26 01 50 51-0272	EA		100 Watt, 5000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED100-5039)	143.31	
26 01 50 51-0273	EA		100 Watt, 6000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED100-6039)	143.31	
26 01 50 51-0274	EA		120 Watt, 3000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED120-3039)	169.55	
26 01 50 51-0275	EA		120 Watt, 4000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED120-4039)	169.55	
26 01 50 51-0276	EA		120 Watt, 5000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED120-5039)	169.55	
26 01 50 51-0277	EA		120 Watt, 6000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED120-6039)	169.55	
26 01 50 51-0278	EA		150 Watt, 3000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED150-3039)	201.04	
26 01 50 51-0279	EA		150 Watt, 4000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED150-4039)	201.04	
26 01 50 51-0280	EA		150 Watt, 5000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED150-5039)	201.04	
26 01 50 51-0281	EA		150 Watt, 6000K CCT, Mogul Base E39, LED Omnidirectional Street Lamp (Bergen industries LED150-6039)	201.04	
26 01 50 51-0282	EA		27 Watt, 4000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED27WPT40KMOG-G5)	70.97	
26 01 50 51-0283	EA		27 Watt, 5000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED27WPT50KMOG-G5)	70.97	
26 01 50 51-0284	EA		36 Watt, 4000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED36WPT40KMOG-G5)	82.21	
26 01 50 51-0285	EA		36 Watt, 5000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED36WPT50KMOG-G5)	81.18	
26 01 50 51-0286	EA		45 Watt, 4000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED45WPT40KMOG-G5)	90.46	
26 01 50 51-0287	EA		45 Watt, 5000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED45WPT50KMOG-G5)	89.58	
26 01 50 51-0288	EA		54 Watt, 4000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED54WPT40KMOG-G5)	91.59	
26 01 50 51-0289	EA		54 Watt, 5000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED54WPT50KMOG-G5)	88.98	
26 01 50 51-0290	EA		100 Watt, 4000K CCT, Mogul Base E39, LED Post Top Lamp (EiKO industries LED100WPT40KMOG-G5)	190.93	
26 01 50 51-0291	EA		20 Watt, 4000K CCT, Mogul Base E39, Horizontal LED Lamp (EiKO industries LED20WPT/180/40KMOG-G7)	70.94	
26 01 50 51-0292	EA		20 Watt, 5000K CCT, Mogul Base E39, Horizontal LED Lamp (EiKO industries LED20WPT/180/50KMOG-G7)	70.94	
26 01 50 51-0293	EA		30 Watt, 4000K CCT, Mogul Base E39, Horizontal LED Lamp (EiKO industries LED30WPT/180/40KMOG-G7)	80.27	
26 01 50 51-0294	EA		30 Watt, 5000K CCT, Mogul Base E39, Horizontal LED Lamp (EiKO industries LED30WPT/180/50KMOG-G7)	80.27	
26 01 50 51-0295	EA		40 Watt, 4000K CCT, Mogul Base E39, Horizontal LED Lamp (EiKO industries LED40WPT/180/40KMOG-G7)	85.88	
26 01 50 51-0296	EA		40 Watt, 5000K CCT, Mogul Base E39, Horizontal LED Lamp (EiKO industries LED40WPT/180/50KMOG-G7)	85.88	
26 01 50 51-0297	EA		27 Watt, 4000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED27WPT40KMOG-G7)	55.90	
26 01 50 51-0298	EA		27 Watt, 5000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED27WPT50KMOG-G7)	55.90	
26 01 50 51-0299	EA		36 Watt, 4000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED36WPT40KMOG-G7)	62.93	
26 01 50 51-0300	EA		36 Watt, 5000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED36WPT50KMOG-G7)	62.93	
26 01 50 51-0301	EA		45 Watt, 4000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED45WPT40KMOG-G7)	67.54	
26 01 50 51-0302	EA		45 Watt, 5000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED45WPT50KMOG-G7)	67.54	
26 01 50 51-0303	EA		54 Watt, 4000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED54WPT40KMOG-G7)	74.47	
26 01 50 51-0304	EA		54 Watt, 5000K CCT, Mogul Base E39, LED Lamp (EiKO industries LED54WPT50KMOG-G7)	74.47	
26 01 50 51-0305	EA		65 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-65W8-55K-E39)	132.86	
26 01 50 51-0306	EA		80 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-80W8-55K-E39)	153.41	
26 01 50 51-0307	EA		100 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-100W8-55K-E39)	182.65	
26 01 50 51-0308	EA		120 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-120W8-55K-E39)	354.85	
26 01 50 51-0309	EA		150 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-150W8-55K-E39)	335.18	
26 01 50 51-0310	EA		200 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-200W8-55K-E39)	354.85	
26 01 50 51-0311	EA		250 Watt, 5500K CCT, Mogul Base E39, LED Lamp (Olympic CL-250W8-55K-E39)	356.38	
26 01 50 51-0312	EA		24 Watt, 3000K CCT, Mogul Base E39, LED Lamp (Light Efficient Design LED-8029M30-A)	55.56	
26 01 50 51-0313	EA		24 Watt, 4000K CCT, Mogul Base E39, LED Lamp (Light Efficient Design LED-8029M40-A)	55.56	
26 01 50 51-0314	EA		24 Watt, 5700K CCT, Mogul Base E39, LED Lamp (Light Efficient Design LED-8029M57-A)	55.56	
26 01 50 51-0315	EA		100 Watt, Mogul Base E39, LED Area Lamp (MaxLite AR100LED50)	161.98	
26 01 50 51-0316	EA		115 Watt, 4000K CCT, Mogul Base EX39, HID LED Lamp (Keystone KT-LED115HID-V-EX39-840-D)	410.33	
26 01 50 51-0317	EA		40 Watt, 120-277 Volt, 5000K CCT, E39 Base, LED Arc-Cob Lamp (HYLITE HL-AC-40W-E39-50K)	168.02	
26 01 50 51-0318	EA		100 Watt, 480 Volt, 5000K CCT, E39 Base, LED Omni-Cob Lamp (HYLITE HL-OC-100W-E39-50K)	197.72	
26 01 50 51-0319	EA		45 Watt, 120-277 Volt, 5000K CCT, E39 Base, LED Omni-Cob Lamp (HYLITE HL-OC-45W-E39-50K)	87.86	
26 01 50 51-0320	EA		40 Watt, 5680 Lumens, Mogul Base E39, LED Directional Flood Lamp (HYLITE HL-IDL-40W-E39-50K)	286.04	
26 01 50 51-0321			LED Lamps, 2G11 Base <small>(26 01 50 51-0101)</small>		
26 01 50 51-0322	EA		19 Watt, 1550 Lumens, 3500K CCT, 2G11 Base, Dimmable LED Lamp (Green Creative 14.5PLL/835/DIR)	48.13	
26 01 50 51-0323			LED Lamps, GX23 Or G23 Base <small>(26 01 50 51-0101)</small>		
26 01 50 51-0324	EA		5 Watt, 580 Lumens, 2 Pin GX23 Base, Dimmable LED Lamp (Lunera HN-H-GX23-U-5W-840-G4)	23.67	
26 01 50 51-0325			LED Lamps, G24 Base <small>(26 01 50 51-0101)</small>		
26 01 50 51-0326	EA		5.5 Watt, 500 Lumens, G24 Base, LED Lamp (Green Creative 5.5PLH/835/DIR/R)	30.76	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 51-0327				LED Tubes (Fluorescent Lamp Replacement) <small>(26 01 50 51-0101)</small>		
26 01 50 51-0328	EA			2', 1,250 Lumens, 4000K CCT, LED Tube (T8 Fluorescent Lamp Replacement) (Remphos RPT-TOTALTUBEG2-T8-24IN-4000K).....	42.20	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0329	EA			2', 1,900 Lumens, 4000K CCT, LED Tube (T8 Fluorescent Lamp Replacement) (Remphos RPT-TOTALTUBEG2-T8-24INU-4000K).....	54.94	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0330	EA			3', 1,900 Lumens, 4000K CCT, LED Tube (T8 Fluorescent Lamp Replacement) (Remphos RPT-TOTALTUBEG2-T8-36IN-4000K).....	45.47	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.45	
26 01 50 51-0331	EA			4', 1,900 Lumens, 4000K CCT, LED Tube (T8 Fluorescent Lamp Replacement) (Remphos RPT-TOTALTUBEG2-T8-48IN-4000K).....	49.80	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0332	EA			4', 2,200 Lumens, 4000K CCT, LED Tube (T8 Fluorescent Lamp Replacement) (Remphos RPT-TOTALTUBEG2HO-T8-48IN-4000K).....	54.58	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0333	EA			4', 2,539 Lumens, LED Tube (T8 Fluorescent Lamp Replacement) (Carson Technology CT-D02018TBN).....	34.26	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0334	EA			2', 1,348 Lumens, LED Tube (T8 Fluorescent Lamp Replacement) (Carson Technology CT-D02010TBN).....	33.03	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0335	EA			2', 1,100 Lumens, LED Tube (T8 Fluorescent Lamp Replacement) (Sylvania LED9T8/L24/FG/835/BF).....	30.07	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.24	
26 01 50 51-0336	EA			3', 1,650 Lumens, LED Tube (T8 Fluorescent Lamp Replacement) (Sylvania LED12T8/L36/FG/835/BF).....	30.59	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.45	
26 01 50 51-0337	EA			4', 1,700 Lumens, LED Tube (T8 Fluorescent Lamp Replacement) (Sylvania LED14T8/L48/FG/835/BF).....	30.58	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0338	EA			4', 2,100 Lumens, LED Tube (T8 Fluorescent Lamp Replacement) (Sylvania LED17T8/L48/FG/835/BF).....	31.71	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-3.65	
26 01 50 51-0339				Filament LED Lamps <small>(26 01 50 51-0101)</small>		
26 01 50 51-0340	EA			7.5 Watt, 2700K CCT, Clear A19 Filament LED Lamp (Green Creative 7.5FA19DIM/827).....	17.86	
26 01 50 51-0341	EA			4.5 Watt, 2700K CCT, Clear A19 Filament LED Lamp (Green Creative 4.5A19DIM/827/R).....	17.86	
26 01 50 51-0342	EA			4.5 Watt, 2700K CCT, Clear A19 Filament LED Lamp (Green Creative 4.5FA19DIM/827).....	17.11	
26 01 50 51-0343	EA			4.5 Watt, 2400 CCT, Amber A19 Filament LED Lamp (Green Creative 4.5FA19DIM/824/A).....	17.11	
26 01 50 51-0344	EA			4.5 Watt, 2700K CCT, Clear G25 Globe Filament LED Lamp (Green Creative 4.5FG25DIM/827).....	18.31	
26 01 50 51-0345	EA			4.5 Watt, 2400 CCT, Amber G25 Globe Filament LED Lamp (Green Creative 4.5FG25DIM/824/A).....	18.31	
26 01 50 51-0346	EA			3.5 Watt, 2700K CCT, Clear B10 Candle Filament LED Lamp (Green Creative 3.5FB10DIM/827).....	15.61	
26 01 50 51-0347	EA			3.5 Watt, 2700K CCT, Clear B11 Candle Filament LED Lamp (Green Creative 3.5FB11DIM/827/E26).....	15.61	
26 01 50 51-0348	EA			3.5 Watt, 2400 CCT, Amber B10 Candle Filament LED Lamp (Green Creative 3.5FBA10DIM/824/FT/A).....	16.06	
26 01 50 51-0349	EA			3.5 Watt, 2400 CCT, Amber ST19 Filament LED Lamp (Green Creative 5FST19DIM/824/A).....	19.36	
26 01 50 51-0350	EA			4.5 Watt, 120 Volt 450 Lumens ULTRA LED Filament Lamp (Sylvania 79521).....	22.95	
26 01 50 51-0351				Other Lamps <small>(26 01 50 51-0101)</small>		
26 01 50 51-0352	EA			8 Watt, Medium Base, A19, A-Shape Dimmable LED Lamp (Philips 8A19/END/2700 DIM 6/1).....	16.99	
26 01 50 51-0353	EA			8 Watt, Medium Base, A19, A-Shape Dimmable LED Lamp (Philips 7A19/2700 DIM).....	16.99	
26 01 50 51-0354	EA			11 Watt, Medium Base, A19, A-Shape Dimmable LED Lamp (Philips 11A19/2700 DIM).....	16.99	
26 01 50 51-0355	EA			12 Watt, Medium Base, Dimmable BR40 LED Lamp (Philips 12BR40/F90 2700 DIM AF 6/1).....	17.74	
26 01 50 51-0356	EA			13 Watt, Medium Base, Dimmable PAR38 LED Single Optic Lamp (Philips 13PAR38/S15 4000 DIM AF SO 6/1).....	17.74	
26 01 50 51-0357	EA			8 Watt, Medium Base, Dimmable PAR20 LED Lamp (Philips 8PAR20/END/F36 3000 DIM 6/1).....	17.74	
26 01 50 51-0358	EA			24 Watt (100 Watt Incandescent Equivalent), Medium Base, LED Lamp (LED-8029-DL).....	210.94	
26 01 50 51-0359				LED Lamps, Light Engines, Round, LER Series <small>(26 01 50 51-0101)</small>		
26 01 50 51-0360	EA			5.5" Diameter, 17 Watt, 3000K CCT, Round LED Light Engine (Maxlite LER5.5A1730).....	55.34	
26 01 50 51-0361	EA			9 Watt, 120 Volt, 800 Lumens, 2700K, Omnidirectional Ultra LED A-line Lamp (Sylvania LED9A19/DIM/O/827/U).....	31.76	
26 01 50 51-0362				Remove Hazardous Lamps From Fixture For Recycling <small>(26 01 50 51)</small>		
				Note: Excludes containers, shipping costs and recycling fees. See CSI section 26 01 50 51-0371 for recycling hazardous lamps.		
26 01 50 51-0363	EA			Removal Of 2' Length Linear Fluorescent Lamps.....	4.30	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-1.42	
26 01 50 51-0364	EA			Removal Of 3' Length Linear Fluorescent Lamps.....	4.91	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-1.62	
26 01 50 51-0365	EA			Removal Of 4' Length Linear Fluorescent Lamps.....	5.52	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-1.82	
26 01 50 51-0366	EA			Removal Of 6' Length Linear Fluorescent Lamps.....	6.14	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-2.03	
26 01 50 51-0367	EA			Removal Of 8' Length Linear Fluorescent Lamps.....	6.75	
				<i>For Removal Of Multiple Lamps In A Fixture, Deduct</i>	-2.23	
26 01 50 51-0368	EA			Removal Of Compact Fluorescent Lamps.....	3.68	
				<i>For >25 To 40, Deduct</i>	-0.37	
				<i>For >40, Deduct</i>	-0.74	
26 01 50 51-0369	EA			Removal Of U-Shaped Or Circular Fluorescent Lamps.....	5.84	
				<i>For >25 To 40, Deduct</i>	-0.58	
				<i>For >40, Deduct</i>	-1.17	
26 01 50 51-0370	EA			Removal Of High Intensity Discharge (HID) Or Metal Halide Lamps.....	10.44	
				<i>For >25 To 40, Deduct</i>	-1.04	
				<i>For >40, Deduct</i>	-2.09	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**
 MINOR
 CSI UOM DESCRIPTION

 TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

26 01 50 51-0371	Recycle Hazardous Lamps <small>(26 01 50 51)</small> Note: Includes containers, shipping costs and recycling fees. Excludes lamp removal. See CSI section 26 01 50 51-0001 for removal of lamps from fixtures.		
26 01 50 51-0372	EA Recycle 2' Length Linear Fluorescent Lamps	1.73	
26 01 50 51-0373	EA Recycle 3' Length Linear Fluorescent Lamps	2.22	
26 01 50 51-0374	EA Recycle 4' Length Linear Fluorescent Lamps	2.71	
26 01 50 51-0375	EA Recycle 6' Length Linear Fluorescent Lamps	3.83	
26 01 50 51-0376	EA Recycle 8' Length Linear Fluorescent Lamps	4.80	
26 01 50 51-0377	EA Recycle Compact Fluorescent Lamps	4.42	
26 01 50 51-0378	EA Recycle U-Shaped Or Circular Fluorescent Lamps	4.42	
26 01 50 51-0379	EA Recycle High Intensity Discharge (HID) Lamps	6.99	
26 01 50 52	Ballasts Replacement <small>(26 01 50)</small>		
26 01 50 52-0001	Lighting Ballasts <small>(26 01 50 52)</small> Note: Excludes recycling fees. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 52-0002	Fluorescent Ballasts <small>(26 01 50 52-0001)</small>		
26 01 50 52-0003	T5 Fluorescent Ballasts <small>(26 01 50 52-0002)</small>		
26 01 50 52-0004	T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0003)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0005	14 Watt, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0004)</small>		
26 01 50 52-0006	EA 1 Lamp, 14 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	133.00	24.56
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
	<i>For High Ballast Factor, Add</i>	7.61	
26 01 50 52-0007	EA 2 Lamp, 14 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	139.13	30.69
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21	
	<i>For High Ballast Factor, Add</i>	7.61	
26 01 50 52-0008	21 Watt, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0004)</small>		
26 01 50 52-0009	EA 1 Lamp, 21 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	133.00	24.56
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
	<i>For High Ballast Factor, Add</i>	7.61	
26 01 50 52-0010	EA 2 Lamp, 21 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	139.13	30.69
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21	
	<i>For High Ballast Factor, Add</i>	7.61	
26 01 50 52-0011	28 Watt, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0004)</small>		
26 01 50 52-0012	EA 1 Lamp, 28 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	133.00	24.56
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
	<i>For High Ballast Factor, Add</i>	7.61	
26 01 50 52-0013	EA 2 Lamp, 28 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	139.13	30.69
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21	
	<i>For High Ballast Factor, Add</i>	7.61	
26 01 50 52-0014	35 Watt, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0004)</small>		
26 01 50 52-0015	EA 1 Lamp, 35 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	133.00	24.56
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 01 50 52-0016	EA 2 Lamp, 35 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	139.13	30.69
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21	
26 01 50 52-0017	54 Watt, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0004)</small>		
26 01 50 52-0018	EA 1 Lamp, 54 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	132.84	24.56
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 01 50 52-0019	EA 2 Lamp, 54 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	138.97	30.69
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21	
26 01 50 52-0020	EA 3 Lamp, 54 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	190.65	36.83
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.05	
26 01 50 52-0021	EA 4 Lamp, 54 Watt, Program/Rapid Start, T5 Fluorescent Electronic Ballast	196.79	42.97
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0022	High-Output, T5HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0003)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0023	12 Watt, High-Output, T5HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0022)</small>		
26 01 50 52-0024	EA 1 Lamp, 12 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast	111.37	24.56
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 01 50 52-0025	EA 2 Lamp, 12 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast	117.50	30.69
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21	
26 01 50 52-0026	24 Watt, High-Output, T5HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0022)</small>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0027 EA 1 Lamp, 24 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	145.94 7.37	24.56
26 01 50 52-0028 EA 2 Lamp, 24 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	152.07 9.21	30.69
26 01 50 52-0029 39 Watt, High-Output, T5HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0022)</small>		
26 01 50 52-0030 EA 1 Lamp, 39 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	145.94 7.37	24.56
26 01 50 52-0031 EA 2 Lamp, 39 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	152.07 9.21	30.69
26 01 50 52-0032 54 Watt, High-Output, T5HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0022)</small>		
26 01 50 52-0033 EA 1 Lamp, 54 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	111.37 7.37	24.56
26 01 50 52-0034 EA 2 Lamp, 54 Watt, Programmed Start, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	117.50 9.21	30.69
26 01 50 52-0035 Dimming, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0003)</small>		
26 01 50 52-0036 Step Dimming, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0035)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0037 28 Watt, Step Dimming, T5 Fluorescent Electronic Ballast <small>(26 01 50 52-0036)</small>		
26 01 50 52-0038 EA 2 Lamp, 28 Watt, Programmed Start, Step Dimming, T5 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	123.34 9.21	30.69
26 01 50 52-0039 Dimming To 5%, T5 Fluorescent Electronic Ballasts <small>(26 01 50 52-0035)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0040 54 Watt, Dimming To 5%, High-Output, T5HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0039)</small>		
26 01 50 52-0041 EA 1 Lamp, 54 Watt, Programmed Start, Dimming To 5%, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	473.44 7.37	24.56
26 01 50 52-0042 EA 2 Lamp, 54 Watt, Programmed Start, Dimming To 5%, High-Output, T5HO Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	466.50 9.21	30.69
26 01 50 52-0043 T8 Fluorescent Ballasts <small>(26 01 50 52-0002)</small>		
26 01 50 52-0044 T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0043)</small> Note: Includes 120/277 Volt and low or normal ballast factor.		
26 01 50 52-0045 17 Watt, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0044)</small>		
26 01 50 52-0046 EA 1 Lamp, 17 Watt, Instant Start, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	57.67 7.37 18.52	24.56
26 01 50 52-0047 EA 1 Lamp, 17 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	102.23 7.37 12.18	24.56
26 01 50 52-0048 EA 2 Lamp, 17 Watt, Instant Start, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	63.80 9.21 18.52	30.69
26 01 50 52-0049 EA 2 Lamp, 17 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	108.36 9.21 12.18	30.69
26 01 50 52-0050 EA 3 Lamp, 17 Watt, Instant Start, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	77.77 11.05 18.03	36.83
26 01 50 52-0051 EA 3 Lamp, 17 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	121.35 11.05 10.36	36.83
26 01 50 52-0052 EA 4 Lamp, 17 Watt, Instant Start, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	88.99 12.89 45.66	42.97
26 01 50 52-0053 EA 4 Lamp, 17 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	132.83 12.89 26.65	42.97
26 01 50 52-0054 25 Watt, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0044)</small>		
26 01 50 52-0055 EA 1 Lamp, 25 Watt, Instant Start, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	57.67 7.37 18.52	24.56
26 01 50 52-0056 EA 1 Lamp, 25 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	102.23 7.37 12.18	24.56
26 01 50 52-0057 EA 2 Lamp, 25 Watt, Instant Start, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> <i>For High Ballast Factor, Add</i>	63.80 9.21 18.52	30.69

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50	52-0058	EA	2 Lamp, 25 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	108.36 9.21 12.18	30.69
26 01 50	52-0059	EA	3 Lamp, 25 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	77.77 11.05 18.03	36.83
26 01 50	52-0060	EA	3 Lamp, 25 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	121.35 11.05 10.36	36.83
26 01 50	52-0061	EA	4 Lamp, 25 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	88.99 12.89 45.66	42.97
26 01 50	52-0062	EA	4 Lamp, 25 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	132.83 12.89 26.65	42.97
26 01 50	52-0063		28 Watt, T8 Fluorescent Electronic Ballasts (26 01 50 52-0044)		
26 01 50	52-0064	EA	1 Lamp, 28 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	57.67 7.37 18.52	24.56
26 01 50	52-0065	EA	1 Lamp, 28 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	102.23 7.37 12.18	24.56
26 01 50	52-0066	EA	2 Lamp, 28 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	63.80 9.21 18.52	30.69
26 01 50	52-0067	EA	2 Lamp, 28 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	108.36 9.21 12.18	30.69
26 01 50	52-0068	EA	3 Lamp, 28 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	77.77 11.05 18.03	36.83
26 01 50	52-0069	EA	3 Lamp, 28 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	121.35 11.05 10.36	36.83
26 01 50	52-0070	EA	4 Lamp, 28 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	88.99 12.89 45.66	42.97
26 01 50	52-0071	EA	4 Lamp, 28 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	132.83 12.89 26.65	42.97
26 01 50	52-0072		32 Watt, T8 Fluorescent Electronic Ballasts (26 01 50 52-0044)		
26 01 50	52-0073	EA	1 Lamp, 32 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	57.67 7.37 18.52	24.56
26 01 50	52-0074	EA	1 Lamp, 32 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	102.23 7.37 12.18	24.56
26 01 50	52-0075	EA	2 Lamp, 32 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	63.80 9.21 18.52	30.69
26 01 50	52-0076	EA	2 Lamp, 32 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	108.36 9.21 12.18	30.69
26 01 50	52-0077	EA	3 Lamp, 32 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	77.77 11.05 18.03	36.83
26 01 50	52-0078	EA	3 Lamp, 32 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	121.35 11.05 10.36	36.83
26 01 50	52-0079	EA	4 Lamp, 32 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	88.99 12.89 45.66	42.97
26 01 50	52-0080	EA	4 Lamp, 32 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	132.83 12.89 26.65	42.97
26 01 50	52-0081		40 Watt, T8 Fluorescent Electronic Ballasts (26 01 50 52-0044)		
26 01 50	52-0082	EA	1 Lamp, 40 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	92.79 7.37 7.92	24.56
26 01 50	52-0083	EA	1 Lamp, 40 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	102.23 7.37 12.18	24.56
26 01 50	52-0084	EA	2 Lamp, 40 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	98.92 9.21 7.92	30.69
26 01 50	52-0085	EA	2 Lamp, 40 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	108.36 9.21 12.18	30.69

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0086 EA 3 Lamp, 40 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	123.64 11.05 4.87	36.83
26 01 50 52-0087 EA 3 Lamp, 40 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	121.35 11.05	36.83
26 01 50 52-0088 EA 4 Lamp, 40 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	129.78 12.89 4.87	42.97
26 01 50 52-0089 EA 4 Lamp, 40 Watt, Program/Rapid Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	132.83 12.89	42.97
26 01 50 52-0090 96 Watt, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0044)</small>		
26 01 50 52-0091 EA 1 Lamp, 96 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	111.37 7.37 16.97	24.56
26 01 50 52-0092 EA 2 Lamp, 96 Watt, Instant Start, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add For High Ballast Factor, Add</i>	117.50 9.21 16.97	30.69
26 01 50 52-0093 High-Output, T8HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0043)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0094 48 Watt, High-Output, T8HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0093)</small>		
26 01 50 52-0095 EA 1 Lamp, 48 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.28 7.37	24.56
26 01 50 52-0096 EA 1 Lamp, 48 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	176.58 7.37	24.56
26 01 50 52-0097 EA 2 Lamp, 48 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.41 9.21	30.69
26 01 50 52-0098 EA 2 Lamp, 48 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	182.71 9.21	30.69
26 01 50 52-0099 60 Watt, High-Output, T8HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0093)</small>		
26 01 50 52-0100 EA 1 Lamp, 60 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.28 7.37	24.56
26 01 50 52-0101 EA 1 Lamp, 60 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	176.58 7.37	24.56
26 01 50 52-0102 EA 2 Lamp, 60 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.41 9.21	30.69
26 01 50 52-0103 EA 2 Lamp, 60 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	182.71 9.21	30.69
26 01 50 52-0104 72 Watt, High-Output, T8HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0093)</small>		
26 01 50 52-0105 EA 1 Lamp, 72 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.28 7.37	24.56
26 01 50 52-0106 EA 1 Lamp, 72 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	176.58 7.37	24.56
26 01 50 52-0107 EA 2 Lamp, 72 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.41 9.21	30.69
26 01 50 52-0108 EA 2 Lamp, 72 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	182.71 9.21	30.69
26 01 50 52-0109 96 Watt, High-Output, T8HO Fluorescent Electronic Ballasts <small>(26 01 50 52-0093)</small>		
26 01 50 52-0110 EA 1 Lamp, 96 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.28 7.37	24.56
26 01 50 52-0111 EA 1 Lamp, 96 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	176.58 7.37	24.56
26 01 50 52-0112 EA 2 Lamp, 96 Watt, Instant Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.41 9.21	30.69
26 01 50 52-0113 EA 2 Lamp, 96 Watt, Programmed Start, High-Output, T8HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	182.71 9.21	30.69
26 01 50 52-0114 Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0043)</small>		
26 01 50 52-0115 Load Shed 0-10 V Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0114)</small> Note: Includes 120/277 Volt and high ballast factor.		
26 01 50 52-0116 17 Watt, Load Shed 0-10 V Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0115)</small>		
26 01 50 52-0117 EA 1 Lamp, 17 Watt, Instant Start, Load Shed 0-10 V Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.40 7.37	24.56
26 01 50 52-0118 EA 2 Lamp, 17 Watt, Instant Start, Load Shed 0-10 V Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.53 9.21	30.69
26 01 50 52-0119 EA 3 Lamp, 17 Watt, Instant Start, Load Shed 0-10 V Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	86.99 11.05	36.83
26 01 50 52-0120 EA 4 Lamp, 17 Watt, Instant Start, Load Shed 0-10 V Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	104.94 12.89	42.97

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0158 EA 6 Lamp, 17 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	156.78 16.58	55.26
26 01 50 52-0159 25 Watt, Step Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0151)</small>		
26 01 50 52-0160 EA 1 Lamp, 25 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.40 7.37	24.56
26 01 50 52-0161 EA 2 Lamp, 25 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.53 9.21	30.69
26 01 50 52-0162 EA 3 Lamp, 25 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	84.62 11.05	36.83
26 01 50 52-0163 EA 4 Lamp, 25 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	104.94 12.89	42.97
26 01 50 52-0164 EA 5 Lamp, 25 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	150.63 14.73	49.11
26 01 50 52-0165 EA 6 Lamp, 25 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	156.78 16.58	55.26
26 01 50 52-0166 28 Watt, Step Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0151)</small>		
26 01 50 52-0167 EA 1 Lamp, 28 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.40 7.37	24.56
26 01 50 52-0168 EA 2 Lamp, 28 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.53 9.21	30.69
26 01 50 52-0169 EA 3 Lamp, 28 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	84.62 11.05	36.83
26 01 50 52-0170 EA 4 Lamp, 28 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	104.94 12.89	42.97
26 01 50 52-0171 EA 5 Lamp, 28 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	150.63 14.73	49.11
26 01 50 52-0172 EA 6 Lamp, 28 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	156.78 16.58	55.26
26 01 50 52-0173 32 Watt, Step Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0151)</small>		
26 01 50 52-0174 EA 1 Lamp, 32 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.40 7.37	24.56
26 01 50 52-0175 EA 2 Lamp, 32 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.53 9.21	30.69
26 01 50 52-0176 EA 3 Lamp, 32 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	84.62 11.05	36.83
26 01 50 52-0177 EA 4 Lamp, 32 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	104.94 12.89	42.97
26 01 50 52-0178 EA 5 Lamp, 32 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	150.63 14.73	49.11
26 01 50 52-0179 EA 6 Lamp, 32 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	156.78 16.58	55.26
26 01 50 52-0180 40 Watt, Step Dimming, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0151)</small>		
26 01 50 52-0181 EA 1 Lamp, 40 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.40 7.37	24.56
26 01 50 52-0182 EA 2 Lamp, 40 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.53 9.21	30.69
26 01 50 52-0183 EA 3 Lamp, 40 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	84.62 11.05	36.83
26 01 50 52-0184 EA 4 Lamp, 40 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	104.94 12.89	42.97
26 01 50 52-0185 EA 5 Lamp, 40 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	150.63 14.73	49.11
26 01 50 52-0186 EA 6 Lamp, 40 Watt, Instant Start, Step Dimming, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	156.78 16.58	55.26
26 01 50 52-0187 Dimming To 3%, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0114)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0188 17 Watt, Dimming To 3%, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0187)</small>		
26 01 50 52-0189 EA 1 Lamp, 17 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	166.96 7.37	24.56
26 01 50 52-0190 EA 2 Lamp, 17 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	173.09 9.21	30.69
26 01 50 52-0191 EA 3 Lamp, 17 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	206.79 11.05	36.83
26 01 50 52-0192 EA 4 Lamp, 17 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	212.93 12.89	42.97
26 01 50 52-0193 25 Watt, Dimming To 3%, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0187)</small>		
26 01 50 52-0194 EA 1 Lamp, 25 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	166.96 7.37	24.56
26 01 50 52-0195 EA 2 Lamp, 25 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	173.09 9.21	30.69

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50	52-0196	EA	3 Lamp, 25 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	206.79 11.05	36.83
26 01 50	52-0197	EA	4 Lamp, 25 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	212.93 12.89	42.97
26 01 50	52-0198		28 Watt, Dimming To 3%, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0187)</small>		
26 01 50	52-0199	EA	1 Lamp, 28 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	166.96 7.37	24.56
26 01 50	52-0200	EA	2 Lamp, 28 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	173.09 9.21	30.69
26 01 50	52-0201	EA	3 Lamp, 28 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	206.79 11.05	36.83
26 01 50	52-0202	EA	4 Lamp, 28 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	212.93 12.89	42.97
26 01 50	52-0203		32 Watt, Dimming To 3%, T8 Fluorescent Electronic Ballasts <small>(26 01 50 52-0187)</small>		
26 01 50	52-0204	EA	1 Lamp, 32 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	166.96 7.37	24.56
26 01 50	52-0205	EA	2 Lamp, 32 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	173.09 9.21	30.69
26 01 50	52-0206	EA	3 Lamp, 32 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	206.79 11.05	36.83
26 01 50	52-0207	EA	4 Lamp, 32 Watt, Program/Rapid Start, Dimming To 3%, T8 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	212.93 12.89	42.97
26 01 50	52-0208		T10 Fluorescent Ballasts <small>(26 01 50 52-0002)</small>		
26 01 50	52-0209		T10 Fluorescent Electronic Ballasts <small>(26 01 50 52-0208)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50	52-0210		40 Watt, T10 Fluorescent Electronic Ballasts <small>(26 01 50 52-0209)</small>		
26 01 50	52-0211	EA	1 Lamp, 40 Watt, Program/Rapid Start, T10 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.13 7.37	24.56
26 01 50	52-0212	EA	2 Lamp, 40 Watt, Program/Rapid Start, T10 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	88.26 9.21	30.69
26 01 50	52-0213	EA	3 Lamp, 40 Watt, Program/Rapid Start, T10 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	108.26 11.05	36.83
26 01 50	52-0214		T12 Fluorescent Ballasts <small>(26 01 50 52-0002)</small>		
26 01 50	52-0215		T12 Fluorescent Electronic Ballasts <small>(26 01 50 52-0214)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50	52-0216		25 Watt, T12 Fluorescent Electronic Ballasts <small>(26 01 50 52-0215)</small>		
26 01 50	52-0217	EA	1 Lamp, 25 Watt, Instant Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	57.67 7.37	24.56
26 01 50	52-0218	EA	1 Lamp, 25 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.13 7.37	24.56
26 01 50	52-0219	EA	2 Lamp, 25 Watt, Instant Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	63.80 9.21	30.69
26 01 50	52-0220	EA	2 Lamp, 25 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	88.26 9.21	30.69
26 01 50	52-0221	EA	3 Lamp, 25 Watt, Instant Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	77.77 11.05	36.83
26 01 50	52-0222	EA	4 Lamp, 25 Watt, Instant Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	88.99 12.89	42.97
26 01 50	52-0223		30 Watt, T12 Fluorescent Electronic Ballasts <small>(26 01 50 52-0215)</small>		
26 01 50	52-0224	EA	1 Lamp, 30 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.13 7.37	24.56
26 01 50	52-0225	EA	2 Lamp, 30 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	88.26 9.21	30.69
26 01 50	52-0226	EA	3 Lamp, 30 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	108.26 11.05	36.83
26 01 50	52-0227		34 Watt, T12 Fluorescent Electronic Ballasts <small>(26 01 50 52-0215)</small>		
26 01 50	52-0228	EA	1 Lamp, 34 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.13 7.37	24.56
26 01 50	52-0229	EA	2 Lamp, 34 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	88.26 9.21	30.69
26 01 50	52-0230	EA	3 Lamp, 34 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	108.26 11.05	36.83
26 01 50	52-0231		40 Watt, T12 Fluorescent Electronic Ballasts <small>(26 01 50 52-0215)</small>		
26 01 50	52-0232	EA	1 Lamp, 40 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.13 7.37	24.56



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0233 EA 2 Lamp, 40 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	88.26 9.21	30.69
26 01 50 52-0234 EA 3 Lamp, 40 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	108.26 11.05	36.83
26 01 50 52-0235 96 Watt, T12 Fluorescent Electronic Ballasts (26 01 50 52-0215)		
26 01 50 52-0236 EA 1 Lamp, 96 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	103.30 7.37	24.56
26 01 50 52-0237 EA 2 Lamp, 96 Watt, Program/Rapid Start, T12 Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	117.50 9.21	30.69
26 01 50 52-0238 High-Output, T12HO Fluorescent Electronic Ballasts (26 01 50 52-0214) Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0239 48 Watt, High-Output, T12HO Fluorescent Electronic Ballasts (26 01 50 52-0238)		
26 01 50 52-0240 EA 1 Lamp, 48 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.74 7.37	24.56
26 01 50 52-0241 EA 2 Lamp, 48 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.87 9.21	30.69
26 01 50 52-0242 60 Watt, High-Output, T12HO Fluorescent Electronic Ballasts (26 01 50 52-0238)		
26 01 50 52-0243 EA 1 Lamp, 60 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.74 7.37	24.56
26 01 50 52-0244 EA 2 Lamp, 60 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.87 9.21	30.69
26 01 50 52-0245 72 Watt, High-Output, T12HO Fluorescent Electronic Ballasts (26 01 50 52-0238)		
26 01 50 52-0246 EA 1 Lamp, 72 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.74 7.37	24.56
26 01 50 52-0247 EA 2 Lamp, 72 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.87 9.21	30.69
26 01 50 52-0248 96 Watt, High-Output, T12HO Fluorescent Electronic Ballasts (26 01 50 52-0238)		
26 01 50 52-0249 EA 2 Lamp, 96 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.74 7.37	24.56
26 01 50 52-0250 EA 2 Lamp, 96 Watt, Program/Rapid Start, High-Output, T12HO Fluorescent Electronic Ballast..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.87 9.21	30.69
26 01 50 52-0251 Emergency Fluorescent Ballasts (26 01 50 52-0002) Note: 120/277 Volt.		
26 01 50 52-0252 EA 350 To 450 Lumens, One Lamp, Code Compliance, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B100)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	211.82 -49.11 14.73	24.56
26 01 50 52-0253 EA 600 To 700 Lumens, Two Lamp, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B60)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	351.99 -51.57 15.47	30.69
26 01 50 52-0254 EA 1,100 To 1,400 Lumens, One Or Two Lamp, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B50)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	438.83 -51.57 15.47	30.69
26 01 50 52-0255 EA 600 To 700 Lumens, One Or Two Lamp, Two Hour Illumination, Emergency Fluorescent Ballast (Bodine B70A)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	322.96 -51.57 15.47	30.69
26 01 50 52-0256 EA 2,700 To 3,400 Lumens, Two Or Three Lamp, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B33)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,536.85 -54.02 16.21	36.83
26 01 50 52-0257 EA 225 To 450 Lumens, One Lamp, Four Hour Illumination, Emergency Fluorescent Ballast (Bodine B54)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	445.51 -49.11 14.73	24.56
26 01 50 52-0258 EA 325 To 1,000 Lumens, One Or Two Lamp, Ninety Minute Illumination, Emergency Compact Fluorescent Ballast (Bodine B84CG)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	750.31 -51.57 15.47	30.69
26 01 50 52-0259 EA 300 To 750 Lumens, One Or Two Lamp, Ninety Minute Illumination, Emergency Compact Fluorescent Ballast (Bodine B94CG)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	410.23 -51.57 15.47	30.69
26 01 50 52-0260 EA 200 To 625 Lumens, One Lamp, Ninety Minute Illumination, Damp Location, Emergency Compact Fluorescent Ballast (Bodine B413)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	561.89 -49.11 14.73	24.56
26 01 50 52-0261 EA 300 To 650 Lumens, One Lamp, Damp Location, Ninety Minute Illumination, Emergency Compact Fluorescent Ballast (Bodine B463)..... <i>For Factory Installation In New Fixtures, Deduct</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	434.42 -49.11 14.73	24.56

26 Electrical

26 01 Operation and Maintenance of Electrical Systems

26 01 50 Operation and Maintenance of Lighting



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 01 50 52-0262	EA	450 To 950 Lumens, One Or Two Lamp, Ninety Minute Illumination, Damp Location, Emergency Compact Fluorescent Ballast (Bodine B426)	491.13		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0263	EA	1,100 To 1,400 Lumens, One Or Two Lamp, Ninety Minute Illumination, Damp Location, Emergency Fluorescent Ballast (Bodine BDL500)	531.98		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0264	EA	600 To 700 Lumens, Two Lamp, Damp Location, Emergency Fluorescent Ballast (Bodine BDL600)	446.78		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0265	EA	600 To 700 Lumens, One Lamp, Two Hour Illumination, Emergency Fluorescent Ballast (Bodine BDL700)	453.98		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0266	EA	500 To 600 Lumens, One Lamp, Damp Location, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine BDL900)	394.92		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0267	EA	300 To 750 Lumens, One Or Two Lamp, Damp Location, Ninety Minute Illumination, Emergency Compact Fluorescent Ballast (Bodine BDL94C)	410.23		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0268	EA	450 Lumens, One Lamp, Low Profile, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine LP400)	401.28		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0269	EA	1,100 To 1,400 Lumens, One Or Two Lamp, Self Testing, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B50ST)	738.43		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0270	EA	1,800 To 3,500 Lumens, One Or Two Lamp, Self Testing, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B30ST)	924.75		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0271	EA	1,450 To 3,500 Lumens, One Or Two Lamp, Remote Control Testing, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B30RCT)	1,735.22		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0272	EA	1,100 To 1,400 Lumens, One Or Two Lamp, Remote Control Testing, Ninety Minute Illumination, Emergency Fluorescent Ballast (Bodine B50RCT)	1,203.70		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0273	EA	1,100 To 3,100 Lumens, One Or Two Lamp, Central Battery, Emergency Fluorescent Ballast With Voltage Sensing Circuit (Bodine CB90-48)	609.43		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-51.57		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.47		
26 01 50 52-0274	EA	1,050 To 3,200 Lumens, One Lamp, Interim Lighting For Generator Backup, Five Minute Illumination, Emergency Fluorescent Ballast (Bodine GEN1)	791.96		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0275	EA	250 Watt, Self-Diagnostic, Ninety Minute Illumination, Fluorescent Emergency Lighting Inverter (Bodine ELI-250-SD)	4,454.92		30.69
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0276		LED Emergency Ballasts <small>(26 01 50 52-0001)</small>			
26 01 50 52-0277	EA	Up To 520 Lumens, Ninety Minute Illumination, 120-277 Volt, 4 Watt Output, Emergency LED Driver (Bodine BSL4L)	144.29		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0278	EA	Up To 780 Lumens, Ninety Minute Illumination, 120-277 Volt, 6 Watt Output, Emergency LED Driver (Bodine BSL6LST)	214.89		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0279	EA	Up To 975 Lumens, Ninety Minute Illumination, 120-277 Volt, 7.5 Watt Output, Emergency LED Driver (Bodine BSL17C)	257.23		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0280	EA	Up To 1,300 Lumens, Ninety Minute Illumination, 120-277 Volt, 10 Watt Output, Emergency LED Driver (Bodine BSL310)	287.46		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0281	EA	Up To 2,200 Lumens, Ninety Minute Illumination, 120-277 Volt, 18 Watt Output, Emergency LED Driver (Bodine BSL718)	295.10		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0282	EA	Up To 2,600 Lumens, Ninety Minute Illumination, 120-277 Volt, 20 Watt Output, Emergency LED Driver (Bodine BSL20LV)	383.59		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		
26 01 50 52-0283	EA	Up To 2,300 Lumens, Ninety Minute Illumination, 120-277 Volt, 23 Watt LED Emergency Battery Backup (LiteTronics EB23UQ)	454.58		24.56
		<i>For Factory Installation In New Fixtures, Deduct</i>	-49.11		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.73		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0284 Compact Fluorescent Ballasts <small>(26 01 50 52-0001)</small>		
26 01 50 52-0285 Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0284)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0286 18 Watt, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0285)</small>		
26 01 50 52-0287 EA 1 Lamp, 18 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 125.69	125.69	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0288 EA 2 Lamp, 18 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 131.82	131.82	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0289 26 Watt, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0285)</small>		
26 01 50 52-0290 EA 1 Lamp, 26 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 125.69	125.69	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0291 EA 2 Lamp, 26 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 131.82	131.82	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0292 32 Watt, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0285)</small>		
26 01 50 52-0293 EA 1 Lamp, 32 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 156.30	156.30	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0294 EA 2 Lamp, 32 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 162.43	162.43	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0295 40 Watt, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0285)</small>		
26 01 50 52-0296 EA 1 Lamp, 40 Watt, Instant Start, Compact Fluorescent Electronic Ballast 122.03	122.03	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0297 EA 1 Lamp, 40 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 156.30	156.30	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0298 EA 2 Lamp, 40 Watt, Instant Start, Compact Fluorescent Electronic Ballast 231.00	231.00	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0299 EA 2 Lamp, 40 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 162.43	162.43	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0300 EA 3 Lamp, 40 Watt, Instant Start, Compact Fluorescent Electronic Ballast 272.96	272.96	36.83
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.05	
26 01 50 52-0301 42 Watt, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0285)</small>		
26 01 50 52-0302 EA 1 Lamp, 42 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 156.30	156.30	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0303 EA 2 Lamp, 42 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 162.43	162.43	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0304 55 Watt, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0285)</small>		
26 01 50 52-0305 EA 1 Lamp, 55 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 156.30	156.30	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0306 EA 2 Lamp, 55 Watt, Program/Rapid Start, Compact Fluorescent Electronic Ballast 162.43	162.43	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0307 Dimming, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0284)</small>		
26 01 50 52-0308 Dimming To 5%, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0307)</small> Note: Includes 120/277 Volt and normal ballast factor.		
26 01 50 52-0309 18 Watt, Dimming To 5%, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0308)</small>		
26 01 50 52-0310 EA 1 Lamp, 18 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast 234.58	234.58	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0311 EA 2 Lamp, 18 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast 240.71	240.71	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0312 26 Watt, Dimming To 5%, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0308)</small>		
26 01 50 52-0313 EA 1 Lamp, 26 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast 234.58	234.58	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0314 EA 2 Lamp, 26 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast 240.71	240.71	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0315 32 Watt, Dimming To 5%, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0308)</small>		
26 01 50 52-0316 EA 1 Lamp, 32 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast 234.58	234.58	24.56
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 01 50 52-0317 EA 2 Lamp, 32 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast 257.61	257.61	30.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.21	
26 01 50 52-0318 40 Watt, Dimming To 5%, Compact Fluorescent Electronic Ballasts <small>(26 01 50 52-0308)</small>		

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0319 EA 2 Lamp, 40 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast .....257.61 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 9.21	257.61	30.69
26 01 50 52-0320 42 Watt, Dimming To 5%, Compact Fluorescent Electronic Ballasts (26 01 50 52-0308)		
26 01 50 52-0321 EA 1 Lamp, 42 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast .....234.58 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 7.37	234.58	24.56
26 01 50 52-0322 EA 2 Lamp, 42 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast .....257.61 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 9.21	257.61	30.69
26 01 50 52-0323 55 Watt, Dimming To 5%, Compact Fluorescent Electronic Ballasts (26 01 50 52-0308)		
26 01 50 52-0324 EA 1 Lamp, 55 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast .....376.21 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 7.37	376.21	24.56
26 01 50 52-0325 EA 2 Lamp, 55 Watt, Program/Rapid Start, Dimming To 5%, Compact Fluorescent Electronic Ballast .....422.09 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 9.21	422.09	30.69
26 01 50 52-0326 High Intensity Discharge (HID) Ballasts (26 01 50 52-0001)		
26 01 50 52-0327 Magnetic High Intensity Discharge (HID) Ballasts (26 01 50 52-0326)		
26 01 50 52-0328 Core And Coil High Intensity Discharge (HID) Ballasts (26 01 50 52-0327)		
26 01 50 52-0329 Metal Halide, Core And Coil High Intensity Discharge (HID) Ballasts (26 01 50 52-0328)		
26 01 50 52-0330 EA 1 Lamp, 100 Watt Metal Halide, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....167.30 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	167.30	30.69
26 01 50 52-0331 EA 1 Lamp, 250 Watt Metal Halide, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....171.32 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	171.32	30.69
26 01 50 52-0332 EA 1 Lamp, 250 Watt Metal Halide, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....171.32 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	171.32	30.69
26 01 50 52-0333 EA 1 Lamp, 400 Watt Metal Halide, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....159.87 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	159.87	30.69
26 01 50 52-0334 EA 1 Lamp, 400 Watt Metal Halide, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....159.87 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	159.87	30.69
26 01 50 52-0335 EA 1 Lamp, 1,000 Watt Metal Halide, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....236.58 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	236.58	30.69
26 01 50 52-0336 EA 1 Lamp, 1,000 Watt Metal Halide, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....236.58 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	236.58	30.69
26 01 50 52-0337 EA 1 Lamp, 1,500 Watt Metal Halide, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....304.15 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	304.15	30.69
26 01 50 52-0338 EA 1 Lamp, 1,500 Watt Metal Halide, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast .....338.61 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	338.61	30.69
26 01 50 52-0339 High Pressure Sodium, Core And Coil High Intensity Discharge (HID) Ballasts (26 01 50 52-0328)		
26 01 50 52-0340 EA 1 Lamp, 50 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....151.41 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	151.41	30.69
26 01 50 52-0341 EA 1 Lamp, 70 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....160.40 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	160.40	30.69
26 01 50 52-0342 EA 1 Lamp, 100 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....156.52 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	156.52	30.69
26 01 50 52-0343 EA 1 Lamp, 150 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....183.54 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	183.54	30.69
26 01 50 52-0344 EA 1 Lamp, 150 Watt High Pressure Sodium, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....179.68 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	179.68	30.69
26 01 50 52-0345 EA 1 Lamp, 250 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....204.75 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	204.75	30.69
26 01 50 52-0346 EA 1 Lamp, 250 Watt High Pressure Sodium, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....204.75 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	204.75	30.69
26 01 50 52-0347 EA 1 Lamp, 400 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....246.45 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	246.45	30.69
26 01 50 52-0348 EA 1 Lamp, 400 Watt High Pressure Sodium, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....246.45 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	246.45	30.69
26 01 50 52-0349 EA 1 Lamp, 1,000 Watt High Pressure Sodium, 120/277 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....392.78 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	392.78	30.69
26 01 50 52-0350 EA 1 Lamp, 1,000 Watt High Pressure Sodium, 480 Volt, Core And Coil High Intensity Discharge (HID) Ballast.....392.78 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 12.89	392.78	30.69
26 01 50 52-0351 Mounting Brackets For Core And Coil High Intensity Discharge (HID) Ballasts (26 01 50 52-0328)		
26 01 50 52-0352 EA Single Mounting Bracket For Core And Coil Type .....18.42 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 3.68	18.42	
26 01 50 52-0353 EA Double Mounting Bracket For Core And Coil Type .....30.76 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 5.53	30.76	
26 01 50 52-0354 F-Can High Intensity Discharge (HID) Ballasts (26 01 50 52-0327)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 52-0355 Metal Halide, F-Can High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0354)</small>		
26 01 50 52-0356 EA 1 Lamp, 70 Watt Metal Halide, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	211.58	30.69
<i>For Pulse Start Ballast, Add</i>	16.86	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0357 EA 1 Lamp, 100 Watt Metal Halide, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	222.73	30.69
<i>For Pulse Start Ballast, Add</i>	17.98	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0358 EA 1 Lamp, 175 Watt Metal Halide, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	203.13	30.69
<i>For Pulse Start Ballast, Add</i>	16.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0359 EA 1 Lamp, 250 Watt Metal Halide, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	235.34	30.69
<i>For Pulse Start Ballast, Add</i>	19.24	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0360 EA 1 Lamp, 400 Watt Metal Halide, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	325.59	30.69
<i>For Pulse Start Ballast, Add</i>	28.26	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0361 High Pressure Sodium, F-Can High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0354)</small>		
26 01 50 52-0362 EA 1 Lamp, 70 Watt High Pressure Sodium, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	253.84	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0363 EA 1 Lamp, 100 Watt High Pressure Sodium, 120/277 Volt, F-Can High Intensity Discharge (HID) Ballast.....	271.23	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0364 Postline High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0327)</small>		
26 01 50 52-0365 Metal Halide, Postline High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0364)</small>		
26 01 50 52-0366 EA 1 Lamp, 50 Watt Metal Halide, 120 Volt, Postline High Intensity Discharge (HID) Ballast.....	420.50	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0367 High Pressure Sodium, Postline High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0364)</small>		
26 01 50 52-0368 EA 1 Lamp, 70 Watt High Pressure Sodium, 120 Volt, Postline High Intensity Discharge (HID) Ballast.....	646.19	30.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.86	
26 01 50 52-0369 EA 1 Lamp, 100 Watt High Pressure Sodium, 120 Volt, Postline High Intensity Discharge (HID) Ballast.....	720.30	30.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.86	
26 01 50 52-0370 EA 1 Lamp, 150 Watt High Pressure Sodium, 120 Volt, Postline High Intensity Discharge (HID) Ballast.....	694.66	30.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.86	
26 01 50 52-0371 Indoor Enclosed High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0327)</small>		
26 01 50 52-0372 Metal Halide, Indoor Enclosed High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0371)</small>		
26 01 50 52-0373 EA 1 Lamp, 175 Watt Metal Halide, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	517.04	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0374 EA 1 Lamp, 250 Watt Metal Halide, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	586.43	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0375 EA 1 Lamp, 400 Watt Metal Halide, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	773.59	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0376 EA 1 Lamp, 400 Watt Metal Halide, 480 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	769.56	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0377 EA 2 Lamp, 400 Watt Metal Halide, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	1,077.18	33.15
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.63	
26 01 50 52-0378 EA 2 Lamp, 400 Watt Metal Halide, 480 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	1,077.18	33.15
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.63	
26 01 50 52-0379 EA 1 Lamp, 1,000 Watt Metal Halide, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	742.02	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0380 EA 1 Lamp, 1,000 Watt Metal Halide, 480 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	872.46	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0381 High Pressure Sodium, Indoor Enclosed High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0371)</small>		
26 01 50 52-0382 EA 1 Lamp, 400 Watt High Pressure Sodium, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	962.15	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0383 EA 1 Lamp, 400 Watt High Pressure Sodium, 480 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	916.18	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0384 EA 1 Lamp, 1,000 Watt High Pressure Sodium, 120/277 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	1,176.81	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0385 EA 1 Lamp, 1,000 Watt High Pressure Sodium, 480 Volt, Indoor Enclosed High Intensity Discharge (HID) Ballast.....	1,176.81	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	
26 01 50 52-0386 Outdoor Weatherproof High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0327)</small>		
26 01 50 52-0387 Metal Halide, Outdoor Weatherproof High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0386)</small>		
26 01 50 52-0388 EA 1 Lamp, 175 Watt Metal Halide, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast.....	580.63	30.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 01 50 52-0389	EA	1 Lamp, 250 Watt Metal Halide, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	626.95	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0390	EA	1 Lamp, 400 Watt Metal Halide, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	622.39	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0391	EA	1 Lamp, 400 Watt Metal Halide, 480 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	653.42	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0392	EA	2 Lamp, 400 Watt Metal Halide, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	1,036.71	33.15	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.63		
26 01 50 52-0393	EA	2 Lamp, 400 Watt Metal Halide, 480 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	1,273.67	33.15	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.63		
26 01 50 52-0394	EA	1 Lamp, 1,000 Watt Metal Halide, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	967.54	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0395	EA	1 Lamp, 1,000 Watt Metal Halide, 480 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	881.14	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0396		High Pressure Sodium, Outdoor Weatherproof High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0386)</small>			
26 01 50 52-0397	EA	1 Lamp, 400 Watt High Pressure Sodium, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	748.70	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0398	EA	1 Lamp, 400 Watt High Pressure Sodium, 480 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	807.12	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0399	EA	1 Lamp, 1,000 Watt High Pressure Sodium, 120/277 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	1,203.77	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0400	EA	1 Lamp, 1,000 Watt High Pressure Sodium, 480 Volt, Outdoor Weatherproof High Intensity Discharge (HID) Ballast	1,036.18	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0401		Electronic High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0326)</small>			
26 01 50 52-0402		Electronic Low Frequency High Intensity Discharge (HID) Ballasts <small>(26 01 50 52-0401)</small>			
26 01 50 52-0403	EA	1 Lamp, 70 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	233.79	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0404	EA	1 Lamp, 100 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	233.79	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0405	EA	1 Lamp, 150 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	263.07	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0406	EA	1 Lamp, 250 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	673.39	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0407	EA	1 Lamp, 300 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	673.39	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0408	EA	1 Lamp, 320 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	673.39	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0409	EA	1 Lamp, 350 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	673.39	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0410	EA	1 Lamp, 400 Watt Metal Halide, 120/277 Volt, Electronic Low Frequency High Intensity Discharge (HID) Ballast	673.39	30.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0411		Owner Supplied Ballasts <small>(26 01 50 52-0001)</small>			
26 01 50 52-0412	EA	Install Owner Supplied, 1 Lamp Fluorescent Ballast	24.56		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37		
26 01 50 52-0413	EA	Install Owner Supplied, 2 Lamp Fluorescent Ballast	30.69		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.21		
26 01 50 52-0414	EA	Install Owner Supplied, 3 Lamp Fluorescent Ballast	35.61		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.68		
26 01 50 52-0415	EA	Install Owner Supplied, 4 Lamp Fluorescent Ballast	38.06		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.42		
26 01 50 52-0416	EA	Install Owner Supplied, 1 Lamp High Intensity Discharge (HID) Ballast	42.97		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.89		
26 01 50 52-0417	EA	Install Owner Supplied, 2 Lamp High Intensity Discharge (HID) Ballast	45.43		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.63		
26 01 50 53		Lens and Accessory Replacement <small>(26 01 50)</small>			
26 01 50 53-0001		Lens and Accessory Replacement <small>(26 01 50 53)</small>			
26 01 50 53-0002	EA	Removal And Replacement Of Parabolic Aluminum Louver	85.02		
26 01 50 53-0003	EA	Removal And Replacement Of Visor For Fixtures	189.10		
26 01 50 53-0004	EA	Removal And Replacement Of Globe On Pole	212.51		
26 01 50 53-0005	EA	Removal And Replacement Of Lenses For Flat Top Pole Fixtures	90.05		
26 01 50 53-0006	EA	Removal And Replacement Of 1' x 4' Diffuser With 0.125" Thick Prismatic Acrylic Diffuser	31.01		
26 01 50 53-0007	EA	Removal And Replacement Of 2' x 2' Diffuser With 0.125" Thick Prismatic Acrylic Diffuser	32.06		
26 01 50 53-0008	EA	Removal And Replacement Of 2' x 4' Diffuser With 0.125" Thick Prismatic Acrylic Diffuser	36.60		
26 01 50 53-0009	EA	Removal And Replacement Of Slide-On Lampholder	13.89		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.68		
26 01 50 53-0010	EA	Removal And Replacement Of Screw Mount Lampholder	14.06		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.68		
26 01 50 53-0011	EA	Removal And Replacement Of Medium Bi-Pin Lampholder	15.44		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.68		

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 53-0012	EA			Removal And Replacement Of Fixed High Output Lampholder, Recessed, Double Contact Double Pedestal Type <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.57 3.68	
26 01 50 53-0013	EA			Removal And Replacement Of Plunger High Output Lampholder, Recessed, Double Contact Double Pedestal Type <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.96 3.68	
26 01 50 53-0014	EA			Removal And Replacement Of Compact Twin-Tube Lampholder, Snap-in <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.23 3.68	
26 01 50 53-0015	EA			Removal And Replacement Of Exterior Light Globes	60.77	
26 01 50 81 Luminaire Replacement (26 01 50)						
26 01 50 81-0001				Retrofit Lighting Fixtures (26 01 50 81)		
26 01 50 81-0002				LED Lighting Retrofits For Existing Fixtures (26 01 50 81-0001)		
26 01 50 81-0003				LED Lighting Retrofits For Existing Downlight Fixtures (GreenCreative) (26 01 50 81-0002)		
Note: Includes removing existing lamps and disconnecting existing ballast. Includes installing adaptor frame, LED light panel, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.						
26 01 50 81-0004	EA			7" Round Downlight, 15 Watt, 2700K CCT, LED Retrofit (GreenCreative 15SMR7DIM/927)	97.50	
26 01 50 81-0005	EA			7" Round Downlight, 15 Watt, 3000K CCT, LED Retrofit (GreenCreative 15SMR7DIM/930)	97.50	
26 01 50 81-0006	EA			7" Round Downlight, 15 Watt, 4000K CCT, LED Retrofit (GreenCreative 15SMR7DIM/940)	97.50	
26 01 50 81-0007	EA			4" Diameter, 8.5 Watt, 2700K CCT, THINFIT LED Downlight, (GreenCreative 8.5DLNC4DIM/827)	82.58	
26 01 50 81-0008	EA			4" Diameter, 8.5 Watt, 3000K CCT, THINFIT LED Downlight, (GreenCreative 8.5DLNC4DIM/830)	82.58	
26 01 50 81-0009	EA			4" Diameter, 8.5 Watt, 4000K CCT, THINFIT LED Downlight, (GreenCreative 8.5DLNC4DIM/840)	82.58	
26 01 50 81-0010	EA			6" Diameter, 11.6 Watt, 2700K CCT, THINFIT LED Downlight, (GreenCreative 11.6DLNC6DIM/827)	88.86	
26 01 50 81-0011	EA			6" Diameter, 11.6 Watt, 3000K CCT, THINFIT LED Downlight, (GreenCreative 11.6DLNC6DIM/830)	88.86	
26 01 50 81-0012	EA			6" Diameter, 11.6 Watt, 4000K CCT, THINFIT LED Downlight, (GreenCreative 11.6DLNC6DIM/840)	88.86	
26 01 50 81-0013				LED Lighting Retrofits For Existing Site Fixtures (Daylight Technology) (26 01 50 81-0002)		
Note: Includes removing existing lamps and disconnecting existing ballast. Includes installing adaptor frame, LED light panel, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.						
26 01 50 81-0014	EA			2,300 Lumens, 23 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-20w)	268.71	
26 01 50 81-0015	EA			3,300 Lumens, 33 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-30w)	278.14	
26 01 50 81-0016	EA			4,400 Lumens, 44 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-40w)	287.57	
26 01 50 81-0017	EA			5,400 Lumens, 54 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-50w)	299.44	
26 01 50 81-0018	EA			6,500 Lumens, 65 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-60w)	326.94	
26 01 50 81-0019	EA			7,600 Lumens, 75 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-70w)	338.82	
26 01 50 81-0020	EA			8,600 Lumens, 86 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-80w)	364.74	
26 01 50 81-0021	EA			9,600 Lumens, 96 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-90w)	374.17	
26 01 50 81-0022	EA			10,700 Lumens, 107 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-100w)	386.05	
26 01 50 81-0023	EA			11,700 Lumens, 117 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-110w)	403.33	
26 01 50 81-0024	EA			12,800 Lumens, 128 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-120w)	422.28	
26 01 50 81-0025	EA			13,800 Lumens, 138 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-130w)	440.35	
26 01 50 81-0026	EA			14,900 Lumens, 149 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-140w)	449.77	
26 01 50 81-0027	EA			16,100 Lumens, 161 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-150w)	465.49	
26 01 50 81-0028	EA			17,200 Lumens, 172 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-160w)	484.87	
26 01 50 81-0029	EA			18,200 Lumens, 182 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-170w)	504.51	
26 01 50 81-0030	EA			19,300 Lumens, 193 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-180w)	534.36	
26 01 50 81-0031	EA			20,300 Lumens, 203 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-190w)	547.72	
26 01 50 81-0032	EA			21,400 Lumens, 214 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-200w)	571.38	
26 01 50 81-0033	EA			22,400 Lumens, 224 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-210w)	602.02	
26 01 50 81-0034	EA			23,500 Lumens, 235 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-220w)	617.73	
26 01 50 81-0035	EA			24,500 Lumens, 245 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-230w)	655.96	
26 01 50 81-0036	EA			25,600 Lumens, 256 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-240w)	690.53	
26 01 50 81-0037	EA			26,600 Lumens, 266 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-250w)	714.98	
26 01 50 81-0038	EA			27,700 Lumens, 277 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-260w)	748.76	
26 01 50 81-0039	EA			28,700 Lumens, 287 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-270w)	814.84	
26 01 50 81-0040	EA			29,800 Lumens, 298 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-280w)	822.70	
26 01 50 81-0041	EA			31,900 Lumens, 319 Watt, LED Site Retrofit Plate (Daylight Technology DL-S-300w)	843.66	
26 01 50 81-0042				LED Lighting Retrofits For Existing Fixtures (Optilumen) (26 01 50 81-0002)		
Note: Includes removing existing lamps and disconnecting existing ballast. Includes installing adaptor frame, LED light panel, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.						
26 01 50 81-0043	EA			20 Watt, 1 x 42", 3500L CCT, LED Retrofit Kit (Optilumen RKT1418M-35)	119.37	
Note: Fits 1' x 4' Troffer/Strip						
26 01 50 81-0044	EA			20 Watt, 1 x 42", 4000L CCT, LED Retrofit Kit (Optilumen RKT1418M-40)	119.37	
Note: Fits 1' x 4' Troffer/Strip						
26 01 50 81-0045	EA			20 Watt, 1 x 42", 5000L CCT, LED Retrofit Kit (Optilumen RKT1418M-50)	119.37	
Note: Fits 1' x 4' Troffer/Strip						
26 01 50 81-0046	EA			30 Watt, 2 x 42", 3500L CCT, LED Retrofit Kit (Optilumen RKT2415M-35)	123.30	
Note: Fits 2' x 4' Troffer/Strip						
26 01 50 81-0047	EA			2 x 42", 30 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT2415M-40)	123.30	
Note: Fits 2' x 4' Troffer/Strip						
26 01 50 81-0048	EA			2 x 42", 30 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT2415M-50)	123.30	
Note: Fits 2' x 4' Troffer/Strip						

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 01 50 81-0049	EA	2 x 42", 40 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT2418M-35) Note: Fits 2' x 4' Troffer/Strip	131.16
26 01 50 81-0050	EA	2 x 42", 40 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT2418M-40) Note: Fits 2' x 4' Troffer/Strip	131.16
26 01 50 81-0051	EA	2 x 42", 40 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT2418M-50) Note: Fits 2' x 4' Troffer/Strip	131.16
26 01 50 81-0052	EA	3 x 42", 30 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT3415M-35) Note: Fits 2' x 4' Troffer/Strip	123.30
26 01 50 81-0053	EA	3 x 42", 30 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT3415M-40) Note: Fits 2' x 4' Troffer/Strip	123.30
26 01 50 81-0054	EA	3 x 42", 30 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT3415M-50) Note: Fits 2' x 4' Troffer/Strip	123.30
26 01 50 81-0055	EA	3 x 42", 40 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT3418M-35) Note: Fits 2' x 4' Troffer/Strip	131.16
26 01 50 81-0056	EA	3 x 42", 40 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT3418M-40) Note: Fits 2' x 4' Troffer/Strip	131.16
26 01 50 81-0057	EA	3 x 42", 40 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT3418M-50) Note: Fits 2' x 4' Troffer/Strip	131.16
26 01 50 81-0058	EA	3 x 42", 60 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT3424M-35) Note: Fits 2' x 4' Troffer/Strip	146.87
26 01 50 81-0059	EA	3 x 42", 60 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT3424M-40) Note: Fits 2' x 4' Troffer/Strip	146.87
26 01 50 81-0060	EA	3 x 42", 60 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT3424M-50) Note: Fits 2' x 4' Troffer/Strip	146.87
26 01 50 81-0061	EA	1 x 21", 10 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT1209M-35) Note: Fits 1' x 2' Troffer/Strip	119.37
26 01 50 81-0062	EA	1 x 21", 10 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT1209M-40) Note: Fits 1' x 2' Troffer/Strip	119.37
26 01 50 81-0063	EA	1 x 21", 10 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT1209M-50) Note: Fits 1' x 2' Troffer/Strip	119.37
26 01 50 81-0064	EA	2 x 21", 22 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT2209M-35) Note: Fits 2' x 2' Troffer/Strip	119.37
26 01 50 81-0065	EA	2 x 21", 22 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT2209M-40) Note: Fits 2' x 2' Troffer/Strip	119.37
26 01 50 81-0066	EA	2 x 21", 22 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT2209M-50) Note: Fits 2' x 2' Troffer/Strip	119.37
26 01 50 81-0067	EA	3 x 21", 20 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT3209M-35) Note: Fits 2' x 2' Troffer/Strip	123.30
26 01 50 81-0068	EA	3 x 21", 20 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT3209M-40) Note: Fits 2' x 2' Troffer/Strip	123.30
26 01 50 81-0069	EA	3 x 21", 20 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT3209M-50) Note: Fits 2' x 2' Troffer/Strip	123.30
26 01 50 81-0070	EA	3 x 21", 30 Watt, 3500K CCT, LED Retrofit Kit (Optilumen RKT3210M-35) Note: Fits 2' x 2' Troffer/Strip	128.02
26 01 50 81-0071	EA	3 x 21", 30 Watt, 4000K CCT, LED Retrofit Kit (Optilumen RKT3210M-40) Note: Fits 2' x 2' Troffer/Strip	128.02
26 01 50 81-0072	EA	3 x 21", 30 Watt, 5000K CCT, LED Retrofit Kit (Optilumen RKT3210M-50) Note: Fits 2' x 2' Troffer/Strip	128.02

26 01 50 81-0073 LED Lighting Retrofits For Existing Lay-In/Troffer Fixtures (LG) (26 01 50 81-0002)

Note: Includes removing existing lamps and disconnecting existing ballast. Includes installing adaptor frame, LED light panel, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.

26 01 50 81-0074	EA	34 Watt, 3500K CCT, 2' x 4', Retrofit Troffer LED Fixture With Sensor (LG LGE-2X4RT-34-35-4400-R(W)-SN).....	248.32
26 01 50 81-0075	EA	34 Watt, 4000K CCT, 2' x 4', Retrofit Troffer LED Fixture With Sensor (LG LGE-2X4RT-34-40-4500-R(W)-SN).....	248.32
26 01 50 81-0076	EA	26 Watt, 3500K CCT, 2' x 2', Retrofit Troffer LED Fixture With Sensor (LG LGE-2X2RT-26-35-3400-R(W)-SN).....	225.54
26 01 50 81-0077	EA	26 Watt, 4000K CCT, 2' x 2', Retrofit Troffer LED Fixture With Sensor (LG LGE-2X2RT-26-40-3400-R(W)-SN).....	225.54
26 01 50 81-0078	EA	25 Watt, 3,250 Lumens, 3500K CCT, Lay-In Retrofit 2' x 2' Troffer (LG LGE-2X2SI-25-35-3200-RV) Note: No sensor, ZigBee ready driver	119.54
26 01 50 81-0079	EA	25 Watt, 3,250 Lumens, 4000K CCT, Lay-In Retrofit 2' x 2' Troffer (LG LGE-2X2SI-25-40-3200-RV) Note: No sensor, ZigBee ready driver	119.54
26 01 50 81-0080	EA	31 Watt, 4,050 Lumens, 3500K CCT, Lay-In Retrofit 2' x 4' Troffer (LG LGE-2X2SI-31-35-3200-RV) Note: No sensor, ZigBee ready driver	134.47
26 01 50 81-0081	EA	31 Watt, 4,050 Lumens, 4000K CCT, Lay-In Retrofit 2' x 4' Troffer (LG LGE-2X2SI-31-40-3200-RV) Note: No sensor, ZigBee ready driver	134.47
26 01 50 81-0082	EA	25 Watt, 3,250 Lumens, 3500K CCT, Lay-In Retrofit 2' x 2' Troffer With Sensor Connect (LG LGE-2X2SC-25-35-3200-RV) Note: Factory installed sensor and ZigBee dongle	145.46
26 01 50 81-0083	EA	25 Watt, 3,250 Lumens, 4000K CCT, Lay-In Retrofit 2' x 2' Troffer With Sensor Connect (LG LGE-2X2SC-25-40-3200-RV) Note: Factory installed sensor and ZigBee dongle	145.46
26 01 50 81-0084	EA	31 Watt, 3,250 Lumens, 3500K CCT, Lay-In Retrofit 2' x 4' Troffer With Sensor Connect (LG LGE-2X2SC-31-35-3200-RV) Note: Factory installed sensor and ZigBee dongle	149.39
26 01 50 81-0085	EA	31 Watt, 3,250 Lumens, 4000K CCT, Lay-In Retrofit 2' x 4' Troffer With Sensor Connect (LG LGE-2X2SC-31-40-3200-RV) Note: Factory installed sensor and ZigBee dongle	149.39
26 01 50 81-0086	EA	2' x 2' 2-Board, 25 Watt, 3,120 Lumens, 3500K CCT, Retrofit Board Kits (LG LGE-2BDK-25-35-3120)..... Note: No sensor, ZigBee ready driver	96.76
26 01 50 81-0087	EA	2' x 2' 2-Board, 25 Watt, 3,120 Lumens, 4000K CCT, Retrofit Board Kits (LG LGE-2BDK-25-40-3120)..... Note: No sensor, ZigBee ready driver	96.76
26 01 50 81-0088	EA	2' x 4' 4-Board, 31 Watt, 3,120 Lumens, 3500K CCT, Retrofit Board Kits (LG LGE-4BDK-31-35-3880)..... Note: No sensor, ZigBee ready driver	106.18

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 81-0089 EA 2' x 4' 4-Board, 31 Watt, 3,120 Lumens, 4000K CCT, Retrofit Board Kits (LG LGE-4BDK-31-40-3880).....	106.18	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0090 EA 2' x 2' 2-Board, 25 Watt, 3,120 Lumens, 3500K CCT, With Lens Retrofit Board Kits (LG LGE-2BDK-25-35-3120-L).....	99.11	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0091 EA 2' x 2' 2-Board, 25 Watt, 3,120 Lumens, 4000K CCT, With Lens Retrofit Board Kits (LG LGE-2BDK-25-40-3120-L).....	99.11	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0092 EA 2' x 4' 4-Board, 31 Watt, 3,120 Lumens, 3500K CCT, With Lens Retrofit Board Kits (LG LGE-4BDK-31-35-3880-L).....	108.54	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0093 EA 2' x 4' 4-Board, 31 Watt, 3,120 Lumens, 4000K CCT, With Lens Retrofit Board Kits (LG LGE-4BDK-31-40-3880-L).....	108.54	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0094 EA 6" Diameter, 16 Watt, 1,450 Lumens, 3500K CCT, Comm Retrofit Downlight (LG LGE-CRDL-16-35-1450).....	98.33	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0095 EA 6" Diameter, 16 Watt, 1,450 Lumens, 4000K CCT, Comm Retrofit Downlight (LG LGE-CRDL-16-40-1450).....	98.33	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0096 EA 8" Diameter, 22 Watt, 2,000 Lumens, 3500K CCT, Comm Retrofit Downlight (LG LGE-CRDL-22-35-2000).....	105.40	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0097 EA 8" Diameter, 22 Watt, 2,000 Lumens, 4000K CCT, Comm Retrofit Downlight (LG LGE-CRDL-22-40-2000).....	105.40	
Note: No sensor, ZigBee ready driver		
26 01 50 81-0098 LED Lighting Retrofit Accessories (LG) <small>(26 01 50 81-0002)</small>		
See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0099 EA Dongle (LG LGE-DONGLE).....	25.08	
26 01 50 81-0100 EA 1-group On/Off/Dim, 2-Button, Wireless Switch (LG LGE-SWITCH-BAT-2B)	137.15	13.97
26 01 50 81-0101 EA 2-group On/Off/Dim, 4-Button, Wireless Switch (LG LGE-SWITCH-BAT-4B)	142.73	16.76
26 01 50 81-0102 EA 1-group On/Off/Dim, 2-Button, AC Powered Switch (LG LGE-SWITCH-AC-2B)	176.16	13.97
26 01 50 81-0103 EA 2-group On/Off/Dim, 4-Button, AC Powered Switch (LG LGE-SWITCH-AC-4B)	181.74	16.76
26 01 50 81-0104 EA Photo, Motion Sensor With ZigBee Dongle plugin (LG LGE-MULTI-SENSOR)	90.61	11.17
26 01 50 81-0105 EA Tube Clip For Multi Sensor (LG LGE-TUBE-CLIP)	30.39	11.17
26 01 50 81-0106 EA Ceiling Plate For Multi Sensor (LG LGE-CEILING-PLATE)	32.67	11.17
26 01 50 81-0107 EA Wireless Interface Module (LG PIHN-W005A).....	85.20	16.76
Note: includes dongle		
26 01 50 81-0108 Retrofit Existing (T12) Fluorescent Fixtures <small>(26 01 50 81-0001)</small>		
Note: Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling, 02 84 16 00-0008 for leaking ballast disposal.		
26 01 50 81-0109 Retrofit Existing (T12) Strip Style Fluorescent Fixtures Without Reflector <small>(26 01 50 81-0108)</small>		
Note: Includes ballast, white reflective ballast cover, lamps, lamp holders, clips, wiring, cable connectors and cleaning of fixture.		
26 01 50 81-0110 EA Retrofit An Existing 4' (T12) Strip Style Fixture Without Reflector To Operate One 4' (T8) Lamp.....	109.35	
For Specular Ballast Cover, Add	13.30	
26 01 50 81-0111 EA Retrofit An Existing 4' (T12) Strip Style Fixture Without Reflector To Operate Two 4' (T8) Lamps.....	115.91	
For Specular Ballast Cover, Add	14.61	
26 01 50 81-0112 EA Retrofit An Existing 8' (T12) Strip Style Fixture Without Reflector To Operate Two 4' (T8) Lamps.....	157.36	
For Specular Ballast Cover, Add	22.90	
26 01 50 81-0113 EA Retrofit An Existing 8' (T12) Strip Style Fixture Without Reflector To Operate Four 4' (T8) Lamps	180.95	
For Specular Ballast Cover, Add	27.62	
26 01 50 81-0114 Retrofit Existing (T12) Strip Style Fluorescent Fixtures With Reflector <small>(26 01 50 81-0108)</small>		
Note: Includes ballast, white reflector and ballast cover, lamps, lamp holders, clips, wiring, cable connectors and cleaning of fixture.		
26 01 50 81-0115 EA Retrofit An Existing 4' (T12) Strip Style Fixture With Reflector To Operate One 4' (T8) Lamp	115.44	
For Specular Reflector, Add	17.05	
26 01 50 81-0116 EA Retrofit An Existing 4' (T12) Strip Style Fixture With Reflector To Operate Two 4' (T8) Lamps.....	122.73	
For Specular Reflector, Add	17.05	
26 01 50 81-0117 EA Retrofit An Existing 8' (T12) Strip Style Fixture With Reflector To Operate Two 4' (T8) Lamps.....	165.89	
For Specular Reflector, Add	17.05	
26 01 50 81-0118 EA Retrofit An Existing 8' (T12) Strip Style Fixture With Reflector To Operate Four 4' (T8) Lamps	212.91	
For Specular Reflector, Add	17.05	
26 01 50 81-0119 Retrofit Existing (T12) Troffer Style Fluorescent Fixtures <small>(26 01 50 81-0108)</small>		
Note: Includes ballast, white reflector and ballast cover, lamps, lamp holders, clips, wiring, cable connectors and cleaning of fixture.		
26 01 50 81-0120 EA Retrofit An Existing 1 x 4 (T12) Troffer Style Fixture To Operate One 4' (T8) Lamps	143.55	
For Specular Reflector, Add	17.05	
26 01 50 81-0121 EA Retrofit An Existing 1 x 4 (T12) Troffer Style Fixture To Operate Two 4' (T8) Lamps	150.11	
For Specular Reflector, Add	17.05	
26 01 50 81-0122 EA Retrofit An Existing 2 x 2 (T12) Troffer Style Fixture To Operate Two 2' (T8) Lamps	153.31	
For Specular Reflector, Add	17.05	
26 01 50 81-0123 EA Retrofit An Existing 2 x 2 (T12) Troffer Style Fixture To Operate Three 2' (T8) Lamps	171.74	
For Specular Reflector, Add	17.05	
26 01 50 81-0124 EA Retrofit An Existing 2 x 2 (T12) Troffer Style Fixture To Operate Four 2' (T8) Lamps	209.63	
For Specular Reflector, Add	17.05	
26 01 50 81-0125 EA Retrofit An Existing 2 x 4 (T12) Troffer Style Fixture To Operate Two 4' (T8) Lamps	157.43	
For Specular Reflector, Add	17.05	
26 01 50 81-0126 EA Retrofit An Existing 2 x 4 (T12) Troffer Style Fixture To Operate Three 4' (T8) Lamps	173.03	
For Specular Reflector, Add	17.05	
26 01 50 81-0127 EA Retrofit An Existing 2 x 4 (T12) Troffer Style Fixture To Operate Four 4' (T8) Lamps	185.90	
For Specular Reflector, Add	17.05	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 81-0128			Retrofit Existing Recessed Lay-In/Troffer Fixtures <small>(26 01 50 81-0001)</small>		
26 01 50 81-0129			Fluorescent Volumetric Lighting Retrofits For Existing Recessed Lay-In/Troffer Fixtures (Lithonia) <small>(26 01 50 81-0128)</small> Note: Includes removing existing lamps and ballast. Includes installing adaptor frame, volumetric reflectors, lamps and ballasts. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0130	EA		2 T8 Lamps, 0.78 Ballast Factor, 2' x 4', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	164.34	
26 01 50 81-0131	EA		2 T8 Lamps, 0.88 Ballast Factor, 2' x 4', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	164.34	
26 01 50 81-0132	EA		2 T8 Lamps, 1.20 Ballast Factor, 2' x 4', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	164.34	
26 01 50 81-0133	EA		2 T8 Lamps, 0.88 Ballast Factor, Step Dimming Ballast, 2' x 4', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	178.17	
26 01 50 81-0134	EA		2 T8 Lamps, 0.78 Ballast Factor, 2' x 4', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	164.34	
26 01 50 81-0135	EA		2 T8 Lamps, 0.88 Ballast Factor, 2' x 4', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	164.34	
26 01 50 81-0136	EA		2 T8 Lamps, 1.20 Ballast Factor, 2' x 4', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	164.34	
26 01 50 81-0137	EA		2 T8 Lamps, 0.88 Ballast Factor, Step Dimming Ballast, 2' x 4', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	178.17	
26 01 50 81-0138	EA		2 T8 Lamps, 0.78 Ballast Factor, 2' x 2', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	165.37	
26 01 50 81-0139	EA		2 T8 Lamps, 0.88 Ballast Factor, 2' x 2', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	165.37	
26 01 50 81-0140	EA		2 T8 Lamps, 1.20 Ballast Factor, 2' x 2', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	165.37	
26 01 50 81-0141	EA		2 T8 Lamps, 0.88 Ballast Factor, Step Dimming Ballast, 2' x 2', Volumetric Lighting Retrofit For Existing Parabolic Recessed Fluorescent Fixtures (Lithonia 2RT8R).....	179.19	
26 01 50 81-0142	EA		2 T8 Lamps, 0.78 Ballast Factor, 2' x 2', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	165.37	
26 01 50 81-0143	EA		2 T8 Lamps, 0.88 Ballast Factor, 2' x 2', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	165.37	
26 01 50 81-0144	EA		2 T8 Lamps, 1.20 Ballast Factor, 2' x 2', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	165.37	
26 01 50 81-0145	EA		2 T8 Lamps, 0.88 Ballast Factor, Step Dimming Ballast, 2' x 2', Volumetric Lighting Retrofit For Existing Lensed Recessed Fluorescent Fixtures (Lithonia 2RT8RT).....	179.19	
26 01 50 81-0146			LED Architectural Lighting Retrofits For Existing Recessed Lay-In/Troffer Fixtures (PlanLED) <small>(26 01 50 81-0128)</small> Note: Includes adaptor frame, optical system, LEDs and driver. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0147	EA		2,400 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (PlanLED FR3E-025).....	224.36	
26 01 50 81-0148	EA		4,300 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (PlanLED FR3E-045).....	233.76	
26 01 50 81-0149			LED Architectural Lighting Retrofits For Existing Recessed Lay-In/Troffer Fixtures (Raffino™) <small>(26 01 50 81-0128)</small> Note: Includes removing existing lamps and disconnecting existing ballast. Includes installing adaptor frame, LED light panel, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0150	EA		1,800 Lumens, 1' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR14-1800L).....	352.38	
26 01 50 81-0151	EA		2,600 Lumens, 1' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR14-2700L).....	360.88	
26 01 50 81-0152	EA		2,200 Lumens, 2' x 2', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR22-2200L).....	352.38	
26 01 50 81-0153	EA		3,300 Lumens, 2' x 2', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR22-3300L).....	360.88	
26 01 50 81-0154	EA		3,300 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR24-3000L).....	403.34	
26 01 50 81-0155	EA		4,150 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR24-4000L).....	416.08	
26 01 50 81-0156	EA		5,000 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Raffino™ LR24-5000L).....	445.81	
26 01 50 81-0157			LED Architectural Lighting Retrofits For Existing Recessed Lay-In/Troffer Fixtures (Orion) <small>(26 01 50 81-0128)</small> Note: Includes removing existing lamps and disconnecting existing ballast. Includes installing adaptor frame, LED light panel, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0158	EA		3,000 Lumens, 2' x 2', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDR-030L-FO-UNV-FDX-840-22-1P-CT-M-ST).....	326.39	
26 01 50 81-0159	EA		3,500 Lumens, 2' x 2', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDR-035L-FO-UNV-FDX-840-22-1P-CT-M-ST).....	338.24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 81-0160 EA 3,200 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDR-032L-FO-UNV-FDX-840-24-1P-CT-M-ST).....	341.79	
26 01 50 81-0161 EA 3,800 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDR-038L-FO-UNV-FDX-840-24-1P-CT-M-ST).....	353.64	
26 01 50 81-0162 EA 2,000 Lumens, 2' x 2', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDRE1A1UNVFDSX84022MST).....	246.43	
26 01 50 81-0163 EA 4,000 Lumens, 2' x 2', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDRE1B1UNVFDSX84022MST).....	252.06	
26 01 50 81-0164 EA 3,000 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDRE1D1UNVFDSX84024MST).....	261.06	
26 01 50 81-0165 EA 4,000 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDRE1E1UNVFDSX84024MST).....	266.69	
26 01 50 81-0166 EA 6,000 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (Orion LDRE1F1UNVFDSX84024MST).....	329.71	
26 01 50 81-0167 EA 8,000 Lumens, 2' x 4', LED Architectural Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (ORION LDRE1G1UNVFDSX84024MST).....	392.73	
26 01 50 81-0168 Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components) <small>(26 01 50 81-0128)</small> Note: Includes adaptor frame, optical system, lamps and ballasts. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0169 EA 1 T5 Lamp, 2' x 2', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	302.57	
26 01 50 81-0170 EA 1 T8 Lamp, 2' x 2', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	220.40	
26 01 50 81-0171 EA 2 T5 Lamps, 2' x 2', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	310.56	
26 01 50 81-0172 EA 2 T8 Lamps, 2' x 2', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	228.32	
26 01 50 81-0173 EA 3 T5 Lamps, 2' x 2', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	324.93	
26 01 50 81-0174 EA 3 T8 Lamps, 2' x 2', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	249.40	
26 01 50 81-0175 EA 1 T5 Lamp, 2' x 4', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	355.62	
26 01 50 81-0176 EA 1 T8 Lamp, 2' x 4', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	273.26	
26 01 50 81-0177 EA 2 T5 Lamps, 2' x 4', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	363.09	
26 01 50 81-0178 EA 2 T8 Lamps, 2' x 4', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	280.81	
26 01 50 81-0179 EA 3 T5 Lamps, 2' x 4', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	377.28	
26 01 50 81-0180 EA 3 T8 Lamps, 2' x 4', Fluorescent Direct-Indirect Louver Lighting Retrofit For Existing Recessed Lay-In/Troffer Fixtures (A.L.P. Lighting Components).....	301.78	
26 01 50 81-0181 LED Volumetric Lighting Retrofit For Existing Lensed Or Parabolic Recessed Lay-In/Troffer Fixtures (Lithonia 2VTL2R/RT) <small>(26 01 50 81-0128)</small> Note: Includes removing existing lamps and ballast. Includes installing LED light engine assembly, dimming driver and trim. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50 81-0182 EA 3,300 Lumens, 2' x 2', LED Volumetric Lighting Retrofit For Existing Lensed Or Parabolic Recessed Lay-In/Troffer Fixtures (Lithonia 2VTL2R/RT).....	651.03	
26 01 50 81-0183 EA 4,800 Lumens, 2' x 4', LED Volumetric Lighting Retrofit For Existing Lensed Or Parabolic Recessed Lay-In/Troffer Fixtures (Lithonia 2VTL4R/RT).....	723.45	
26 01 50 81-0184 Retrofit Existing HID Fixtures <small>(26 01 50 81-0001)</small>		
26 01 50 81-0185 EA Tear Drop LED Retrofit Kit (Holophane LTDR2 P35S 40K AS BK TDRD 3 P).....	1,474.89	
26 01 50 81-0186 LED Lighting Retrofits For Existing Fluorescent Fixtures <small>(26 01 50 81-0001)</small> Note: Excludes recycling or disposal of lamps and ballasts.		
26 01 50 81-0187 LED Lightbar Retrofit For Existing Fluorescent Fixtures (Lithonia) <small>(26 01 50 81-0186)</small>		
26 01 50 81-0188 EA 2' Length, 2 Bar, 2,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 2FT 2 2000LMHE 80CRI 35K MIN10 GZT MVOLT).....	115.84	
For >25 To 50, Deduct	-5.79	
For >50 To 100, Deduct	-10.07	
For >100, Deduct	-17.10	
26 01 50 81-0189 EA 2' Length, 4 Bar, 8,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 2FT 4 8000LMHE 80CRI MIN10 GZT MVOLT).....	167.89	
For >25 To 50, Deduct	-8.39	
For >50 To 100, Deduct	-13.97	
For >100, Deduct	-22.30	
26 01 50 81-0190 EA 3' Length, 2 Bar, 4,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 3FT 2 4000LMHE 80CRI 35K MIN10 GZT MVOLT).....	125.97	
For >25 To 50, Deduct	-6.30	
For >50 To 100, Deduct	-10.90	
For >100, Deduct	-18.42	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 01 50 81-0191	EA	3'	Length, 1 Bar, 1,600 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 3FT 1 1600LMHE 80CRI 35K MIN10 GZT MVOLT).....	115.81	
			<i>For >25 To 50, Deduct</i>	-5.79	
			<i>For >50 To 100, Deduct</i>	-10.14	
			<i>For >100, Deduct</i>	-17.40	
26 01 50 81-0192	EA	4'	Length, 2 Bar, 6,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 2 6000LMHE 80CRI 35K MIN10 GZT MVOLT).....	151.46	
			<i>For >25 To 50, Deduct</i>	-7.57	
			<i>For >50 To 100, Deduct</i>	-12.89	
			<i>For >100, Deduct</i>	-21.27	
26 01 50 81-0193	EA	4'	Length, 4 Bar, 6,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 4 6000LMHE 80CRI 35K MIN10 GZT MVOLT).....	196.57	
			<i>For >25 To 50, Deduct</i>	-9.83	
			<i>For >50 To 100, Deduct</i>	-16.27	
			<i>For >100, Deduct</i>	-25.78	
26 01 50 81-0194	EA	4'	Length, 1 Bar, 3,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 1 3000LMHE 80CRI 35K MIN10 GZT MVOLT).....	125.14	
			<i>For >25 To 50, Deduct</i>	-6.26	
			<i>For >50 To 100, Deduct</i>	-10.92	
			<i>For >100, Deduct</i>	-18.64	
26 01 50 81-0195	EA	4'	Length, 1 Bar, 4,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 1 4000LMHE 80CRI 35K MIN10 GZT MVOLT).....	125.14	
			<i>For >25 To 50, Deduct</i>	-6.26	
			<i>For >50 To 100, Deduct</i>	-10.92	
			<i>For >100, Deduct</i>	-18.64	
26 01 50 81-0196	EA	4'	Length, 4 Bar, 8,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 4 8000LMHE 80CRI 35K MIN10 GZT MVOLT).....	160.48	
			<i>For >25 To 50, Deduct</i>	-8.02	
			<i>For >50 To 100, Deduct</i>	-13.57	
			<i>For >100, Deduct</i>	-22.17	
26 01 50 81-0197	EA	4'	Length, 2 Bar, 4,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 2 4000LMHE 80CRI 35K MIN10 GZT MVOLT).....	136.42	
			<i>For >25 To 50, Deduct</i>	-6.82	
			<i>For >50 To 100, Deduct</i>	-11.76	
			<i>For >100, Deduct</i>	-19.77	
26 01 50 81-0198	EA	4'	Length, 2 Bar, 3,000 Lumens, 3500K CCT, Lightbar Kit LED Retrofit System (Lithonia LBK 4FT 2 3000LMHE 80CRI 35K MIN10 GZT MVOLT).....	136.42	
			<i>For >25 To 50, Deduct</i>	-6.82	
			<i>For >50 To 100, Deduct</i>	-11.76	
			<i>For >100, Deduct</i>	-19.77	

26 01 50 81-0199 LED Retrofit For Existing Fluorescent Fixtures (Lithonia) (26 01 50 81-0186)

26 01 50 81-0200	EA	1'x 4'	4,000 Lumens, 3500K CCT, Square Smooth Diffuser, Dimming LED Relight Assembly (Lithonia BLT4R F 40LHE SDSMT MVOLT EZ1 LP835 NLTAIR2).....	274.42	
			<i>For nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control (nLight RES7), Add</i>	179.91	
			<i>For nLight AIR radio module without sensor (nLight RIO), Add</i>	116.95	
			<i>For >25 To 50, Deduct</i>	-13.72	
			<i>For >50 To 100, Deduct</i>	-22.11	
			<i>For >100, Deduct</i>	-33.57	
26 01 50 81-0201	EA	1'x 4'	4,800 Lumens, 3500K CCT, Curved Smooth Diffuser, Dimming LED Relight Assembly (Lithonia BLT4R 48LHE ADSMT MVOLT EZ1 LP835 NLTAIR2).....	295.76	
			<i>For nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control (nLight RES7), Add</i>	179.91	
			<i>For nLight AIR radio module without sensor (nLight RIO), Add</i>	116.95	
			<i>For >25 To 50, Deduct</i>	-14.79	
			<i>For >50 To 100, Deduct</i>	-23.71	
			<i>For >100, Deduct</i>	-35.70	
26 01 50 81-0202	EA	2'x 2'	4,300 Lumens, 3500K CCT, Square Smooth Diffuser, Dimming LED Relight Assembly (Lithonia 2BLT2R 33LHE SDSMT MVOLT EZ1 LP835 NLTAIR2).....	311.71	
			<i>For nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control (nLight RES7), Add</i>	179.91	
			<i>For nLight AIR radio module without sensor (nLight RIO), Add</i>	116.95	
			<i>For >25 To 50, Deduct</i>	-15.59	
			<i>For >50 To 100, Deduct</i>	-24.91	
			<i>For >100, Deduct</i>	-37.30	
26 01 50 81-0203	EA	2'x 4'	4,000 Lumens, 3500K CCT, Square Smooth Diffuser, Dimming LED Relight Assembly (Lithonia 2BLT2R F 40LHE SDSMT MVOLT EZ1 LP835 NLTAIR2).....	336.63	
			<i>For nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control (nLight RES7), Add</i>	179.91	
			<i>For nLight AIR radio module without sensor (nLight RIO), Add</i>	116.95	
			<i>For >25 To 50, Deduct</i>	-16.83	
			<i>For >50 To 100, Deduct</i>	-26.78	
			<i>For >100, Deduct</i>	-39.79	
26 01 50 81-0204	EA	2'x 4'	4,000 Lumens, 3500K CCT, Curved Smooth Diffuser, Dimming LED Relight Assembly (Lithonia 2BLT4R 40LHE ADSMT MVOLT EZ1 LP835 NLTAIR2 RIO).....	361.15	
			<i>For nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control (nLight RES7), Add</i>	179.91	
			<i>For nLight AIR radio module without sensor (nLight RIO), Add</i>	116.95	
			<i>For >25 To 50, Deduct</i>	-18.06	
			<i>For >50 To 100, Deduct</i>	-28.92	
			<i>For >100, Deduct</i>	-43.46	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50	81-0205	EA	2'x 4', 4,800 Lumens, 3500K CCT, Curved Smooth Diffuser, Dimming LED Relight Assembly (Lithonia 2BLT4R 48LHE ADSMT MVOLT EZ1 LP835 NLTAIR2 RIO).....	390.09	
			<i>For nLight AIR PIR integral occupancy sensor with automatic dimming photocell for Networking Capabilities Individual Control (nLight RES7), Add</i>	179.91	
			<i>For nLight AIR radio module without sensor (nLight RIO), Add</i>	116.95	
			<i>For >25 To 50, Deduct</i>	-19.50	
			<i>For >50 To 100, Deduct</i>	-31.09	
			<i>For >100, Deduct</i>	-46.36	
26 01 50	81-0206		LED Lighting Retrofits For Existing Fluorescent Fixtures (ELED Lights) ^(26 01 50 81-0186)		
			Note: Includes removal of existing fluorescent lamps, installing LED strip lighting and trim. Excludes recycling or disposal of lamps. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 01 50	81-0207	EA	2' Dimmable, 20 Watts, 2900 Lumens, 4000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 2X2STRPD20W40)	106.53	
			Note: Kit contains two 2-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-5.33	
			<i>For >50 To 100, Deduct</i>	-9.37	
			<i>For >100, Deduct</i>	-16.17	
26 01 50	81-0208	EA	2' Dimmable, 20 Watts, 2900 Lumens, 5000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 2X2STRPD20W50)	106.53	
			Note: Kit contains two 2-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-5.33	
			<i>For >50 To 100, Deduct</i>	-9.37	
			<i>For >100, Deduct</i>	-16.17	
26 01 50	81-0209	EA	4' Dimmable, 32 Watts, 5000 Lumens, 4000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 2X4STRPD32W40)	140.19	
			Note: Kit contains two 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.01	
			<i>For >50 To 100, Deduct</i>	-12.05	
			<i>For >100, Deduct</i>	-20.14	
26 01 50	81-0210	EA	4' Dimmable, 32 Watts, 5000 Lumens, 5000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 2X4STRPD32W50)	140.19	
			Note: Kit contains two 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.01	
			<i>For >50 To 100, Deduct</i>	-12.05	
			<i>For >100, Deduct</i>	-20.14	
26 01 50	81-0211	EA	4' Dimmable, 35 Watts, 5500 Lumens, 3000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN30)	140.30	
			Note: Kit contains four 2-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.02	
			<i>For >50 To 100, Deduct</i>	-12.05	
			<i>For >100, Deduct</i>	-20.15	
26 01 50	81-0212	EA	4' Dimmable, 35 Watts, 5500 Lumens, 3000K, Frosted Lens, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN30F)	152.96	
			Note: Kit contains four 2-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.65	
			<i>For >50 To 100, Deduct</i>	-13.00	
			<i>For >100, Deduct</i>	-21.42	
26 01 50	81-0213	EA	4' Dimmable, 35 Watts, 5500 Lumens, 3500K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN35)	140.30	
			Note: Kit contains four 2-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.02	
			<i>For >50 To 100, Deduct</i>	-12.05	
			<i>For >100, Deduct</i>	-20.15	
26 01 50	81-0214	EA	4' Dimmable, 35 Watts, 5500 Lumens, 3500K, Frosted Lens, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN35F)	152.96	
			Note: Kit contains four 2-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.65	
			<i>For >50 To 100, Deduct</i>	-13.00	
			<i>For >100, Deduct</i>	-21.42	
26 01 50	81-0215	EA	4' Dimmable, 35 Watts, 5500 Lumens, 4000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN40)	140.30	
			Note: Kit contains four 2-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.02	
			<i>For >50 To 100, Deduct</i>	-12.05	
			<i>For >100, Deduct</i>	-20.15	
26 01 50	81-0216	EA	4' Dimmable, 35 Watts, 5500 Lumens, 4000K, Frosted Lens, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN40F)	152.96	
			Note: Kit contains four 2-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.65	
			<i>For >50 To 100, Deduct</i>	-13.00	
			<i>For >100, Deduct</i>	-21.42	
26 01 50	81-0217	EA	4' Dimmable, 35 Watts, 5500 Lumens, 5000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN50)	140.30	
			Note: Kit contains four 2-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
			<i>For >25 To 50, Deduct</i>	-7.02	
			<i>For >50 To 100, Deduct</i>	-12.05	
			<i>For >100, Deduct</i>	-20.15	

26 Electrical**26 01 Operation and Maintenance of Electrical Systems****26 01 50 Operation and Maintenance of Lighting**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 01 50 81-0218	EA	4' Dimmable, 35 Watts, 5500 Lumens, 5000K, Frosted Lens, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4STRPUSA035UN50F).....	152.96	
		Note: Kit contains four 2-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-7.65	
		<i>For >50 To 100, Deduct</i>	-13.00	
		<i>For >100, Deduct</i>	-21.42	
26 01 50 81-0219	EA	4' Dimmable, 46 Watts, 6800 Lumens, 5000K, Ultra High Lumen Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 2X4STRPD46W50).....	152.85	
		Note: Kit contains two 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-7.64	
		<i>For >50 To 100, Deduct</i>	-12.99	
		<i>For >100, Deduct</i>	-21.41	
26 01 50 81-0220	EA	4' Dimmable, 31 Watts, 5730 Lumens, 4000K, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD40).....	179.94	
		Note: Kit contains two 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-9.00	
		<i>For >50 To 100, Deduct</i>	-15.03	
		<i>For >100, Deduct</i>	-24.12	
26 01 50 81-0221	EA	4' Dimmable, 31 Watts, 5730 Lumens, 4000K, Frosted Lens, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD40F).....	195.77	
		Note: Kit contains two 4-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-9.79	
		<i>For >50 To 100, Deduct</i>	-16.21	
		<i>For >100, Deduct</i>	-25.70	
26 01 50 81-0222	EA	4' Dimmable, 31 Watts, 5730 Lumens, 5000K, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD50).....	179.94	
		Note: Kit contains two 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-9.00	
		<i>For >50 To 100, Deduct</i>	-15.03	
		<i>For >100, Deduct</i>	-24.12	
26 01 50 81-0223	EA	4' Dimmable, 31 Watts, 5730 Lumens, 5000K, Frosted Lens, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD50F).....	195.77	
		Note: Kit contains two 4-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-9.79	
		<i>For >50 To 100, Deduct</i>	-16.21	
		<i>For >100, Deduct</i>	-25.70	
26 01 50 81-0224	EA	20 Watts, Emergency Battery Backup, For Use With 2' And 4' Linear LED Retrofit Kits (ELEDLIGHTS BLD-AM20D-480800).....	194.26	
		Note: 90-minute emergency battery with DIP switch-selectable power output of 10 Watts, 15 Watts, or 20 Watts		
		<i>For >25 To 50, Deduct</i>	-9.71	
		<i>For >50 To 100, Deduct</i>	-14.88	
		<i>For >100, Deduct</i>	-20.65	
26 01 50 81-0225	EA	20 Watts, Emergency Battery Backup, For Use With 2' And 4' Linear LED Retrofit Kits (ELEDLIGHTS EM-HM-20W).....	178.24	
		Note: 90-minute emergency battery with power output of 20 Watts		
		<i>For >25 To 50, Deduct</i>	-8.91	
		<i>For >50 To 100, Deduct</i>	-13.67	
		<i>For >100, Deduct</i>	-19.05	
26 01 50 81-0226	EA	8' Dimmable, 46 Watts, 7400 Lumens, 5000K, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4X4STRPD46W50).....	182.30	
		Note: Kit contains four 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-9.12	
		<i>For >50 To 100, Deduct</i>	-15.66	
		<i>For >100, Deduct</i>	-26.19	
26 01 50 81-0227	EA	8' Dimmable, 49 Watts, 6680 Lumens, 5000K, Frosted Lens, Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4X4STRPD49W50F).....	190.21	
		Note: Kit contains four 4-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-9.51	
		<i>For >50 To 100, Deduct</i>	-16.26	
		<i>For >100, Deduct</i>	-26.98	
26 01 50 81-0228	EA	8' Dimmable, 64 Watts, 11850 Lumens, 4000K, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD40).....	267.95	
		Note: Kit contains four 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-13.40	
		<i>For >50 To 100, Deduct</i>	-22.09	
		<i>For >100, Deduct</i>	-34.76	
26 01 50 81-0229	EA	8' Dimmable, 64 Watts, 11850 Lumens, 4000K, Frosted Lens, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD40F).....	299.61	
		Note: Kit contains four 4-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-14.98	
		<i>For >50 To 100, Deduct</i>	-24.46	
		<i>For >100, Deduct</i>	-37.92	
26 01 50 81-0230	EA	8' Dimmable, 64 Watts, 11850 Lumens, 5000K, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD50).....	267.95	
		Note: Kit contains four 4-foot magnetic linear LED strips, connectors, and magnetic-mount LED driver		
		<i>For >25 To 50, Deduct</i>	-13.40	
		<i>For >50 To 100, Deduct</i>	-22.09	
		<i>For >100, Deduct</i>	-34.76	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 01 50 81-0231 EA 8' Dimmable, 64 Watts, 11850 Lumens, 5000K, Frosted Lens, High Efficacy Magnetic Linear LED Retrofit Kit (ELEDLIGHTS 4C3STRP031DD50F)	299.61	
Note: Kit contains four 4-foot magnetic linear LED strips, frosted lens covers, connectors, and magnetic-mount LED driver		
For >25 To 50, Deduct	-14.98	
For >50 To 100, Deduct	-24.46	
For >100, Deduct	-37.92	

26 05 Common Work Results for Electrical ⁽²⁶⁾

26 05 13 Medium-Voltage Cables ^(26 05)

26 05 13 16 Medium-Voltage, Single-and Multi-Conductor Cables ^(26 05 13)

26 05 13 16-0001 Wire And Cable ^(26 05 13 16)	Note: Pulled in conduit except as noted. Includes pull wires, pulling branch circuit conductors, testing, and splicing (#8 and lighter). All conductors are copper except as otherwise noted. No special set-up is required. Excludes terminations.	
26 05 13 16-0002 Wire Connections ^(26 05 13 16-0001)		
26 05 13 16-0003 Medium Voltage Up To 5 KV ^(26 05 13 16-0002)		
26 05 13 16-0004 Copper Cable Splice, Crimp Compression Connection ^(26 05 13 16-0003)	Note: For bare wire.	
26 05 13 16-0005 EA #6 AWG Crimp Compression Connection For Bare Copper Wire.....	80.93	
26 05 13 16-0006 EA #4 AWG Crimp Compression Connection For Bare Copper Wire.....	89.49	
26 05 13 16-0007 EA #3 AWG Crimp Compression Connection For Bare Copper Wire.....	104.34	
26 05 13 16-0008 EA #2 AWG Crimp Compression Connection For Bare Copper Wire.....	118.08	
26 05 13 16-0009 EA #1 AWG Crimp Compression Connection For Bare Copper Wire.....	133.37	
26 05 13 16-0010 EA 1/0 AWG Crimp Compression Connection For Bare Copper Wire.....	148.05	
26 05 13 16-0011 EA 2/0 AWG Crimp Compression Connection For Bare Copper Wire.....	162.48	
26 05 13 16-0012 EA 3/0 AWG Crimp Compression Connection For Bare Copper Wire.....	177.96	
26 05 13 16-0013 EA 4/0 AWG Crimp Compression Connection For Bare Copper Wire.....	192.80	
26 05 13 16-0014 EA 250 MCM Crimp Compression Connection For Bare Copper Wire.....	208.11	
26 05 13 16-0015 EA 300 MCM Crimp Compression Connection For Bare Copper Wire.....	224.03	
26 05 13 16-0016 EA 350 MCM Crimp Compression Connection For Bare Copper Wire.....	238.50	
26 05 13 16-0017 EA 400 MCM Crimp Compression Connection For Bare Copper Wire.....	269.96	
26 05 13 16-0018 EA 500 MCM Crimp Compression Connection For Bare Copper Wire.....	302.88	

26 05 19 Low-Voltage Electrical Power Conductors and Cables ^(26 05)

26 05 19 16 Low-Voltage, Single-and Multi-Conductor Cables ^(26 05 19)

26 05 19 16-0001 Cable Installation Methods ^(26 05 19 16)		
26 05 19 16-0002 Pull Cord ^(26 05 19 16-0001)	Note: Left in conduit for others to pull cable. Not to be used when contractor has priced new wire in a conduit. Priced when owner wants a pull cord left in a conduit for owner to pull wire at a later time.	
26 05 19 16-0003 LF Pull String Installed To Remain In Place, In Existing Conduit.....	0.39	
26 05 19 16-0004 LF Pull String Installed To Remain In Place, In New Conduits.....	0.20	
26 05 19 16-0005 LF 1/4" Nylon Pull Cord Installed To Remain In Place, In Existing Conduit.....	0.67	
26 05 19 16-0006 LF 1/4" Nylon Pull Cord Installed To Remain In Place, In New Conduits.....	0.42	
26 05 19 16-0007 Bore Conduit Into Dirt Or Sand ^(26 05 19 16-0001)	Note: For installation under roads, driveways or other structures up to 20'.	
26 05 19 16-0008 LF Bore 1" To 4" Conduit Into Dirt Or Sand.....	3.50	
26 05 19 16-0009 LF Bore 5" To 8" Conduit Into Dirt Or Sand.....	4.45	
26 05 19 16-0010 EA Boring Minimum Set-Up Charge.....	489.54	
Note: For projects where the total boring charge is less than the minimum set-up charge. Use this item exclusively. This item should not be used in conjunction with any other items in this section.		
26 05 19 16-0011 Wire and Cable ^(26 05 19 16)	Note: Pulled in conduit except as noted. Includes pull wires, pulling branch circuit conductors, splicing (#8 and lighter), identifying, tagging and testing. All conductors are copper except as otherwise noted. No special set-up is required. For tasks installed in conduit, tasks exclude conduit. Excludes terminations. See CSI section 26 05 33 13-0058 for various conduit types.	
26 05 19 16-0012 600 Volt Wire ^(26 05 19 16-0011)		
26 05 19 16-0013 600 Volt, Armored Cable, Copper Conductors ^(26 05 19 16-0012)		
26 05 19 16-0014 MC, Solid Or Stranded, Galvanized Steel Armor ^(26 05 19 16-0013)		
26 05 19 16-0015 MLF 2 Conductors, #14 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	3,855.48	1,222.79
26 05 19 16-0016 MLF 2 Conductors, #12 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	4,303.27	1,373.93
26 05 19 16-0017 MLF 2 Conductors, #10 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	5,226.25	1,509.66
26 05 19 16-0018 MLF 2 Conductors, #8 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	6,803.22	1,613.23
26 05 19 16-0019 MLF 2 Conductors, #6 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	8,583.13	1,710.20
26 05 19 16-0020 MLF 3 Conductors, #14 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	4,467.54	1,373.93
26 05 19 16-0021 MLF 3 Conductors, #12 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	5,055.91	1,509.66
26 05 19 16-0022 MLF 3 Conductors, #10 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable.....	6,498.81	1,722.30

26 Electrical**26 05 Common Work Results for Electrical****26 05 19 Low-Voltage Electrical Power Conductors and Cables**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 19 16-0023	MLF	3 Conductors, #8 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	8,589.39	1,858.40
26 05 19 16-0024	MLF	3 Conductors, #6 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	10,109.06	2,004.52
26 05 19 16-0025	MLF	3 Conductors, #4 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	12,634.51	2,152.85
26 05 19 16-0026	MLF	3 Conductors, #2 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	17,736.15	2,298.49
26 05 19 16-0027	MLF	4 Conductors, #14 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	5,211.35	1,509.66
26 05 19 16-0028	MLF	4 Conductors, #12 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	5,972.87	1,722.30
26 05 19 16-0029	MLF	4 Conductors, #10 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	9,291.39	1,910.62
26 05 19 16-0030	MLF	4 Conductors, #8 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	12,790.29	2,104.67
26 05 19 16-0031	MLF	4 Conductors, #6 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	15,756.29	2,251.89
26 05 19 16-0032	MLF	4 Conductors, #4 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	21,014.98	2,397.65
26 05 19 16-0033	MLF	4 Conductors, #2 AWG, Type MC, Solid Or Stranded, Galvanized Steel Armored Cable	27,365.87	2,542.19

26 05 19 16-0034 FPLP Solid TFN Red Armored Cable (26 05 19 16-0013)

Note: Color coded red.

26 05 19 16-0035	MLF	#18/2 With Bare #18 Ground Type TFN FPLP Red Armored Cable	4,023.99	929.33
26 05 19 16-0036	MLF	#18/4 With Bare #18 Ground Type TFN FPLP Red Armored Cable	4,563.13	1,076.06
26 05 19 16-0037	MLF	#18/6 With Bare #18 Ground Type TFN FPLP Red Armored Cable	5,691.60	1,222.79
26 05 19 16-0038	MLF	#18/8 With Bare #18 Ground Type TFN FPLP Red Armored Cable	6,538.67	1,369.53
26 05 19 16-0039	MLF	#16/2 With Bare #16 Ground Type TFN FPLP Red Armored Cable	4,574.34	1,076.06
26 05 19 16-0040	MLF	#16/4 With Bare #16 Ground Type TFN FPLP Red Armored Cable	5,422.43	1,222.79
26 05 19 16-0041	MLF	#16/6 With Bare #16 Ground Type TFN FPLP Red Armored Cable	6,861.88	1,369.53
26 05 19 16-0042	MLF	#16/8 With Bare #16 Ground Type TFN FPLP Red Armored Cable	7,819.06	1,516.26

26 05 19 16-0043 FPLP Solid THHN Red Armored Cable (26 05 19 16-0013)

Note: Color coded red.

26 05 19 16-0044	MLF	#14/2 With #14 Ground Type THHN FPLP Red Armored Cable	5,072.71	1,222.79
26 05 19 16-0045	MLF	#14/4 With #14 Ground Type THHN FPLP Red Armored Cable	6,345.96	1,369.53
26 05 19 16-0046	MLF	#14/6 With #14 Ground Type THHN FPLP Red Armored Cable	8,539.91	1,516.26
26 05 19 16-0047	MLF	#14/8 With #14 Ground Type THHN FPLP Red Armored Cable	9,931.43	1,662.99
26 05 19 16-0048	MLF	#12/2 With #12 Ground Type THHN FPLP Red Armored Cable	6,454.04	1,369.53
26 05 19 16-0049	MLF	#12/4 With #12 Ground Type THHN FPLP Red Armored Cable	7,947.53	1,516.26

26 05 19 16-0050 FPLP Twisted Shielded Pair Red Armored Cable (26 05 19 16-0013)

Note: Color coded red.

26 05 19 16-0051	MLF	#18/2 With #18 Tinned Ground FPLP Twisted Shielded Pair Red Armored Cable	4,391.04	929.33
26 05 19 16-0052	MLF	#18/2 With #18 Tinned Ground And #14/2 With #14 Tinned Ground FPLP Twisted Shielded Pair Red Armored Cable	7,073.95	1,369.53
26 05 19 16-0053	MLF	#16/2 With #16 Tinned Ground FPLP Twisted Shielded Pair Red Armored Cable	5,421.62	1,076.06
26 05 19 16-0054	MLF	#16/4 With Two #16 Tinned Grounds FPLP Twisted Shielded Pair Red Armored Cable	6,419.59	1,222.79
26 05 19 16-0055	MLF	#16/2 With #16 Tinned Ground And #12/2 With #12 Ground FPLP Twisted Shielded Pair Red Armored Cable	8,985.47	1,516.26
26 05 19 16-0056	MLF	#14/2 With One #16 Tinned Ground And One #14 Ground FPLP Twisted Shielded Pair Red Armored Cable	6,347.13	1,271.71
26 05 19 16-0057	MLF	#14/4 With Two #16 Tinned Ground And One #14 Ground FPLP Twisted Shielded Pair Red Armored Cable	7,874.19	1,467.36

26 05 19 16-0058 Armored Cable Connectors (26 05 19 16-0013)

26 05 19 16-0059	EA	3/4" Armored Cable Connector	7.47	2.68
		<i>For Work In Restricted Working Space, Add</i>	2.01	
		<i>For Elevated Installation >10' To 15', Add</i>	0.67	
		<i>For Elevated Installation >15' To 20', Add</i>	1.34	
		<i>For Elevated Installation >20' To 25', Add</i>	1.68	
		<i>For Elevated Installation >25' To 30', Add</i>	2.35	
		<i>For Elevated Installation >30' To 35', Add</i>	2.68	
		<i>For Elevated Installation >35' To 40', Add</i>	3.36	
		<i>For Elevated Installation >40', Add</i>	3.69	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.01	
26 05 19 16-0060	EA	1" Armored Cable Connector	9.95	3.58
		<i>For Work In Restricted Working Space, Add</i>	2.68	
		<i>For Elevated Installation >10' To 15', Add</i>	0.89	
		<i>For Elevated Installation >15' To 20', Add</i>	1.79	
		<i>For Elevated Installation >20' To 25', Add</i>	2.23	
		<i>For Elevated Installation >25' To 30', Add</i>	3.13	
		<i>For Elevated Installation >30' To 35', Add</i>	3.57	
		<i>For Elevated Installation >35' To 40', Add</i>	4.47	
		<i>For Elevated Installation >40', Add</i>	4.91	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.68	
26 05 19 16-0061	EA	1-1/4" Armored Cable Connector	12.52	4.47
		<i>For Work In Restricted Working Space, Add</i>	3.35	
		<i>For Elevated Installation >10' To 15', Add</i>	1.12	
		<i>For Elevated Installation >15' To 20', Add</i>	2.23	
		<i>For Elevated Installation >20' To 25', Add</i>	2.79	
		<i>For Elevated Installation >25' To 30', Add</i>	3.91	
		<i>For Elevated Installation >30' To 35', Add</i>	4.47	
		<i>For Elevated Installation >35' To 40', Add</i>	5.59	
		<i>For Elevated Installation >40', Add</i>	6.14	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.35	

26 05 19 16-0062 600 Volt, Feeder Wire, Single Stranded Copper (26 05 19 16-0012)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 19 16-0063 MLF #3 AWG, XLPE-USE-RHH-RHW, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	3,665.45	628.85
<i>For EPR Insulation, Add</i>	264.94	
<i>For Chlorosulfonated Polyethylene (CSPE) Synthetic Rubber Jacket, Add</i>	618.19	
26 05 19 16-0064 MLF 600 MCM, XLPE-USE-RHH-RHW, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	23,601.64	2,024.86
<i>For EPR Insulation, Add</i>	2,668.86	
<i>For Chlorosulfonated Polyethylene (CSPE) Synthetic Rubber Jacket, Add</i>	6,227.34	
26 05 19 16-0065 MLF #18 AWG, Type TFFN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	527.52	223.43
26 05 19 16-0066 MLF #16 AWG, Type TFFN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	657.86	245.78
26 05 19 16-0067 MLF #14 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	676.40	179.19
26 05 19 16-0068 MLF #12 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	838.86	213.60
26 05 19 16-0069 MLF #10 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	1,035.25	268.68
26 05 19 16-0070 MLF #8 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	1,446.20	354.14
26 05 19 16-0071 MLF #6 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	1,957.62	427.65
26 05 19 16-0072 MLF #4 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	2,575.43	505.40
26 05 19 16-0073 MLF #3 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	3,073.86	572.10
26 05 19 16-0074 MLF #2 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	3,666.64	640.69
26 05 19 16-0075 MLF #1 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	4,357.79	723.03
26 05 19 16-0076 MLF 1/0 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	5,068.85	791.73
26 05 19 16-0077 MLF 2/0 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	5,745.29	874.96
26 05 19 16-0078 MLF 3/0 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	6,797.05	925.46
26 05 19 16-0079 MLF 4/0 AWG, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	8,083.66	1,041.20
26 05 19 16-0080 MLF 250 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	9,473.64	1,107.67
26 05 19 16-0081 MLF 300 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	10,920.91	1,254.47
26 05 19 16-0082 MLF 350 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	12,474.79	1,388.30
26 05 19 16-0083 MLF 400 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	13,974.88	1,426.28
26 05 19 16-0084 MLF 500 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	16,557.30	1,508.96
26 05 19 16-0085 MLF 600 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	20,482.36	1,775.73
26 05 19 16-0086 MLF 750 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	31,221.90	2,103.39
26 05 19 16-0087 MLF 1,000 MCM, Type THHN-THWN, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	37,385.14	2,539.54
26 05 19 16-0088 MLF #16 AWG, Type TGGT High Temperature, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	2,798.50	536.68
26 05 19 16-0089 MLF #14 AWG, Type TGGT High Temperature, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	3,109.18	625.38
26 05 19 16-0090 MLF #12 AWG, Type TGGT High Temperature, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	3,603.17	715.54
26 05 19 16-0091 MLF #10 AWG, Type TGGT High Temperature, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	4,687.22	804.02
26 05 19 16-0092 MLF #8 AWG, Type TGGT High Temperature, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	5,312.12	893.73
26 05 19 16-0093 MLF #6 AWG, Type TGGT High Temperature, 600 Volt, Copper, Single Stranded Cable, Installed In Conduit.....	6,780.86	982.21
26 05 19 16-0094 Non-Metallic Sheathed Cable <small>(26 05 19 16-0012)</small>		
26 05 19 16-0095 Indoor Installation <small>(26 05 19 16-0094)</small>		
Note: For NM, NM-B, NMC-B and NMS-B.		
26 05 19 16-0096 MLF #14 AWG, 2 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	3,084.17	848.94
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	318.34	
26 05 19 16-0097 MLF #14 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	3,888.32	1,027.79
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	385.44	
26 05 19 16-0098 MLF #14 AWG, 4 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	5,918.70	1,137.27
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	426.48	
26 05 19 16-0099 MLF #12 AWG, 2 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	3,950.58	965.23
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	343.53	
26 05 19 16-0100 MLF #12 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	5,818.48	1,072.26
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	402.11	
26 05 19 16-0101 MLF #12 AWG, 4 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	7,846.74	1,197.60
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	449.10	
26 05 19 16-0102 MLF #10 AWG, 2 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	4,972.94	1,072.81
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	402.32	
26 05 19 16-0103 MLF #10 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	8,127.15	1,251.45
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	469.29	
26 05 19 16-0104 MLF #10 AWG, 4 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	9,722.63	1,429.97
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	536.24	
26 05 19 16-0105 MLF #8 AWG, 2 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	9,789.33	1,284.73
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	457.48	
26 05 19 16-0106 MLF #8 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	12,548.66	1,552.86
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	553.00	
26 05 19 16-0107 MLF #6 AWG, 2 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	12,948.42	1,463.48
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	519.48	
26 05 19 16-0108 MLF #6 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	17,384.60	1,765.12
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	628.40	
26 05 19 16-0109 MLF #4 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	41,307.94	1,943.86
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	691.24	
26 05 19 16-0110 MLF #2 AWG, 3 Conductors, 600 Volt, Type NM, Copper, Non-Metallic Sheathed Cable.....	48,268.00	2,111.45
<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	754.08	
26 05 19 16-0111 Direct Burial Cable <small>(26 05 19 16-0094)</small>		
Note: Excludes trench and backfill. For NM, NM-B, NMC-B and NMS-B. Copper.		
26 05 19 16-0112 MLF #14 AWG, 2 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	2,503.42	
26 05 19 16-0113 MLF #14 AWG, 3 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	3,254.11	
26 05 19 16-0114 MLF #12 AWG, 2 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	3,169.45	
26 05 19 16-0115 MLF #12 AWG, 3 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	4,028.54	

26 Electrical**26 05 Common Work Results for Electrical****26 05 19 Low-Voltage Electrical Power Conductors and Cables**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 19 16-0116	MLF	#10 AWG, 2 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench	3,429.01	
26 05 19 16-0117	MLF	#10 AWG, 3 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench	4,869.42	
26 05 19 16-0118	MLF	#8 AWG, 2 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	5,213.58	
26 05 19 16-0119	MLF	#8 AWG, 3 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	6,649.16	
26 05 19 16-0120	MLF	#6 AWG, 2 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	6,547.52	
26 05 19 16-0121	MLF	#6 AWG, 3 Conductors, 600 Volt, Type UF Copper, Direct Burial Non-Metallic Sheathed Cable, Placed In Trench.....	8,568.00	
26 05 19 16-0122		SEU Cable Copper, 3 Conductor <small>(26 05 19 16-0094)</small>		
26 05 19 16-0123	MLF	12-12-12 Cable SEU Copper	3,253.79	1,076.43
26 05 19 16-0124	MLF	10-10-10 Cable SEU Copper	4,063.03	1,222.79
26 05 19 16-0125	MLF	8-8-8 Cable SEU Copper	5,031.35	1,369.28
26 05 19 16-0126	MLF	6-6-8 Cable SEU Copper	6,046.92	1,467.97
26 05 19 16-0127	MLF	6-6-6 Cable SEU Copper	6,495.09	1,517.11
26 05 19 16-0128	MLF	4-4-6 Cable SEU Copper	7,888.82	1,663.61
26 05 19 16-0129	MLF	4-4-4 Cable SEU Copper	8,487.95	1,712.64
26 05 19 16-0130	MLF	3-3-5 Cable SEU Copper	9,862.09	1,858.40
26 05 19 16-0131	MLF	3-3-3 Cable SEU Copper	10,472.59	1,956.47
26 05 19 16-0132	MLF	2-2-4 Cable SEU Copper	11,182.29	2,055.14
26 05 19 16-0133	MLF	2-2-2 Cable SEU Copper	11,948.76	2,152.85
26 05 19 16-0134	MLF	1-1-1 Cable SEU Copper	14,597.73	2,445.59
26 05 19 16-0135	MLF	1/0-1/0-1/0 Cable SEU Copper	17,347.54	2,741.75
26 05 19 16-0136	MLF	2/0-2/0-2/0 Cable SEU Copper	20,858.47	3,087.92
26 05 19 16-0137	MLF	3/0-3/0-3/0 Cable SEU Copper	25,054.32	3,434.83
26 05 19 16-0138	MLF	4/0-4/0-4/0 Cable SEU Copper	27,998.80	3,833.21
26 05 19 16-0139		SEU Cable Aluminum, 3 Conductor <small>(26 05 19 16-0094)</small>		
26 05 19 16-0140	MLF	8-8-8 Cable SEU Aluminum	4,667.73	1,373.93
26 05 19 16-0141	MLF	6-6-6 Cable SEU Aluminum	5,359.20	1,509.66
26 05 19 16-0142	MLF	4-4-6 Cable SEU Aluminum	6,047.59	1,652.48
26 05 19 16-0143	MLF	4-4-4 Cable SEU Aluminum	6,337.94	1,722.30
26 05 19 16-0144	MLF	2-2-4 Cable SEU Aluminum	7,598.45	2,038.03
26 05 19 16-0145	MLF	2-2-2 Cable SEU Aluminum	8,078.23	2,145.27
26 05 19 16-0146	MLF	1-1-1 Cable SEU Aluminum	9,793.34	2,445.59
26 05 19 16-0147	MLF	1/0-1/0-2 Cable SEU Aluminum	10,376.66	2,574.34
26 05 19 16-0148	MLF	1/0-1/0-1/0 Cable SEU Aluminum	12,893.84	2,717.29
26 05 19 16-0149	MLF	2/0-2/0-1 Cable SEU Aluminum	11,712.54	2,911.47
26 05 19 16-0150	MLF	2/0-2/0-2/0 Cable SEU Aluminum	12,385.90	3,056.98
26 05 19 16-0151	MLF	3/0-3/0-1/0 Cable SEU Aluminum	13,581.12	3,201.02
26 05 19 16-0152	MLF	3/0-3/0-3/0 Cable SEU Aluminum	14,548.70	3,396.67
26 05 19 16-0153	MLF	4/0-4/0-2/0 Cable SEU Aluminum	15,301.10	3,672.05
26 05 19 16-0154	MLF	4/0-4/0-4/0 Cable SEU Aluminum	16,199.09	3,821.22
26 05 19 16-0155		SER Cable Copper, 4 Conductor <small>(26 05 19 16-0094)</small>		
26 05 19 16-0156	MLF	6-6-6-6 Cable SER Copper	10,356.24	1,761.92
26 05 19 16-0157	MLF	4-4-4-6 Cable SER Copper	11,355.94	1,907.68
26 05 19 16-0158	MLF	3-3-3-5 Cable SER Copper	14,070.34	2,152.85
26 05 19 16-0159	MLF	2-2-2-4 Cable SER Copper	16,106.70	2,347.03
26 05 19 16-0160	MLF	1-1-1-3 Cable SER Copper	18,772.41	2,687.45
26 05 19 16-0161	MLF	1/0-1/0-1/0-2 Cable SER Copper	22,861.75	3,080.09
26 05 19 16-0162	MLF	2/0-2/0-2/0-1 Cable SER Copper	28,637.61	3,322.82
26 05 19 16-0163	MLF	3/0-3/0-3/0-1/0 Cable SER Copper	33,076.56	3,716.67
26 05 19 16-0164		SER Cable Aluminum, 4 Conductor <small>(26 05 19 16-0094)</small>		
26 05 19 16-0165	MLF	8-8-8-8 Cable SER Aluminum	5,277.24	1,644.53
26 05 19 16-0166	MLF	6-6-6-6 Cable SER Aluminum	5,741.04	1,761.92
26 05 19 16-0167	MLF	4-4-4-6 Cable SER Aluminum	6,400.56	1,907.68
26 05 19 16-0168	MLF	2-2-2-4 Cable SER Aluminum	8,040.34	2,347.03
26 05 19 16-0169	MLF	1-1-1-3 Cable SER Aluminum	9,624.89	2,687.45
26 05 19 16-0170	MLF	1/0-1/0-1/0-2 Cable SER Aluminum	10,891.02	3,080.09
26 05 19 16-0171	MLF	2/0-2/0-2/0-1 Cable SER Aluminum	12,136.48	3,322.82
26 05 19 16-0172	MLF	3/0-3/0-3/0-1/0 Cable SER Aluminum	13,790.75	3,716.67
26 05 19 16-0173	MLF	4/0-4/0-4/0-2/0 Cable SER Aluminum	15,629.11	4,141.47
26 05 19 16-0174		Control Tray Cable, Low Voltage <small>(26 05 19 16-0011)</small>		
		Note: Type "TC" multi-conductor (individually numbered conductors) control cables installed in conduit.		
26 05 19 16-0175	MLF	2 Conductor #18 AWG, Stranded, Type TC Control Cable.....	1,101.93	541.93
		<i>For Work In Restricted Working Space, Add</i>	270.97	
26 05 19 16-0176	MLF	3 Conductor #18 AWG, Stranded, Type TC Control Cable.....	1,265.84	606.22
		<i>For Work In Restricted Working Space, Add</i>	303.11	
26 05 19 16-0177	MLF	4 Conductor #18 AWG, Stranded, Type TC Control Cable.....	1,317.89	606.18
		<i>For Work In Restricted Working Space, Add</i>	303.11	
26 05 19 16-0178	MLF	5 Conductor #18 AWG, Stranded, Type TC Control Cable.....	1,650.43	760.32
		<i>For Work In Restricted Working Space, Add</i>	380.16	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 19 16-0179 MLF 7 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,069.36 463.26	926.52
26 05 19 16-0180 MLF 9 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,351.00 509.43	1,018.85
26 05 19 16-0181 MLF 12 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,781.08 578.84	1,157.67
26 05 19 16-0182 MLF 15 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,503.29 707.50	1,415.00
26 05 19 16-0183 MLF 19 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,982.73 771.85	1,543.70
26 05 19 16-0184 MLF 25 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	4,649.84 795.98	1,591.96
26 05 19 16-0185 MLF 30 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	5,713.34 994.39	1,988.78
26 05 19 16-0186 MLF 37 Conductor #18 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	6,835.50 1,162.13	2,324.26
26 05 19 16-0187 MLF 2 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,199.09 285.21	570.87
26 05 19 16-0188 MLF 3 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,382.90 319.06	638.13
26 05 19 16-0189 MLF 4 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,608.82 367.32	734.65
26 05 19 16-0190 MLF 5 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,812.93 400.17	800.33
26 05 19 16-0191 MLF 7 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,281.92 487.64	975.29
26 05 19 16-0192 MLF 9 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,603.59 536.24	1,072.48
26 05 19 16-0193 MLF 12 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,095.52 609.30	1,218.61
26 05 19 16-0194 MLF 15 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,913.53 744.70	1,489.40
26 05 19 16-0195 MLF 19 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	4,470.38 812.40	1,624.80
26 05 19 16-0196 MLF 25 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	5,288.62 837.87	1,675.75
26 05 19 16-0197 MLF 30 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	6,487.30 1,046.67	2,093.34
26 05 19 16-0198 MLF 37 Conductor #16 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	7,779.81 1,223.30	2,446.59
26 05 19 16-0199 MLF 2 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,294.77 297.95	595.90
26 05 19 16-0200 MLF 3 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,537.05 335.15	670.30
26 05 19 16-0201 MLF 4 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,797.34 383.07	766.15
26 05 19 16-0202 MLF 5 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,013.94 412.57	825.14
26 05 19 16-0203 MLF 7 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,661.61 505.74	1,011.48
26 05 19 16-0204 MLF 9 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,056.94 558.69	1,117.16
26 05 19 16-0205 MLF 12 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,722.02 623.38	1,246.76
26 05 19 16-0206 MLF 15 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	4,445.79 744.70	1,489.18
26 05 19 16-0207 MLF 19 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	7,330.73 865.02	1,730.49
26 05 19 16-0208 MLF 25 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	6,613.59 1,011.82	2,023.18
26 05 19 16-0209 MLF 30 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	7,666.12 1,130.46	2,260.92
26 05 19 16-0210 MLF 37 Conductor #14 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	9,216.68 1,321.16	2,642.32
26 05 19 16-0211 MLF 2 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,495.26 319.06	638.13
26 05 19 16-0212 MLF 3 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,773.68 352.91	706.05
26 05 19 16-0213 MLF 4 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,146.48 406.20	812.41
26 05 19 16-0214 MLF 5 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,416.95 432.34	864.69
26 05 19 16-0215 MLF 7 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,161.22 515.46	1,030.92
26 05 19 16-0216 MLF 9 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,888.00 609.30	1,218.61
26 05 19 16-0217 MLF 12 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	4,704.22 687.39	1,374.78
26 05 19 16-0218 MLF 15 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	5,585.69 788.61	1,577.21
26 05 19 16-0219 MLF 19 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	6,587.02 893.84	1,787.69
26 05 19 16-0220 MLF 25 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	8,390.83 1,044.66	2,089.32

26 Electrical**26 05 Common Work Results for Electrical****26 05 19 Low-Voltage Electrical Power Conductors and Cables**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 05 19 16-0221	MLF		30 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	9,721.80 1,220.95	2,441.90
26 05 19 16-0222	MLF		37 Conductor #12 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	11,735.46 1,427.06	2,854.13
26 05 19 16-0223	MLF		2 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	1,761.79 335.15	670.30
26 05 19 16-0224	MLF		3 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,176.56 367.32	735.09
26 05 19 16-0225	MLF		4 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	2,638.40 418.94	837.87
26 05 19 16-0226	MLF		5 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	3,052.51 454.46	908.93
26 05 19 16-0227	MLF		7 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	4,113.26 570.43	1,140.85
26 05 19 16-0228	MLF		9 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	4,860.47 638.46	1,276.91
26 05 19 16-0229	MLF		12 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	5,664.07 744.70	1,489.40
26 05 19 16-0230	MLF		15 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	6,682.82 851.62	1,703.23
26 05 19 16-0231	MLF		19 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	7,907.23 965.23	1,930.46
26 05 19 16-0232	MLF		25 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	10,141.59 1,128.11	2,256.23
26 05 19 16-0233	MLF		30 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	11,742.49 1,318.48	2,636.96
26 05 19 16-0234	MLF		37 Conductor #10 AWG, Stranded, Type TC Control Cable..... <i>For Work In Restricted Working Space, Add</i>	14,209.99 1,541.35	3,082.70

26 05 19 16-0235 Multi-Conductor Cords, Cables And Associated Equipment (26 05 19 16-0011)

26 05 19 16-0236 Cord Grips, Cable Reels, Extension Cords, And Accessories (26 05 19 16-0235)

26 05 19 16-0237 Cable Reels (26 05 19 16-0235)

Note: Includes handling, mounting, electrical connections and installing cord. See CSI section 26 05 19 16-0235 for cords.

26 05 23 Control-Voltage Electrical Power Cables (26 05)

26 05 23 00-0001 Cable For HVAC System Controls (26 05 23)

26 05 23 00-0002 Low Voltage Thermostat Cable To 300 Volt (26 05 23 00-0001)

Note: For surface or conduit installation.

26 05 23 00-0003	MLF		#20/2 Conductor, Low Volt Thermostat Cable.....	480.56	142.44
26 05 23 00-0004	MLF		#20/3 Conductor, Low Volt Thermostat Cable.....	547.73	150.04
26 05 23 00-0005	MLF		#20/4 Conductor, Low Volt Thermostat Cable.....	593.37	158.64
26 05 23 00-0006	MLF		#20/5 Conductor, Low Volt Thermostat Cable.....	709.19	165.34
26 05 23 00-0007	MLF		#20/6 Conductor, Low Volt Thermostat Cable.....	743.29	173.16
26 05 23 00-0008	MLF		#20/7 Conductor, Low Volt Thermostat Cable.....	817.36	180.36
26 05 23 00-0009	MLF		#20/8 Conductor, Low Volt Thermostat Cable.....	881.77	187.57
26 05 23 00-0010	MLF		#20/9 Conductor, Low Volt Thermostat Cable.....	956.73	195.06
26 05 23 00-0011	MLF		#20/10 Conductor, Low Volt Thermostat Cable.....	1,028.67	200.92
26 05 23 00-0012	MLF		#18/2 Conductor, Low Volt Thermostat Cable.....	521.03	142.44
26 05 23 00-0013	MLF		#18/3 Conductor, Low Volt Thermostat Cable.....	619.94	150.04
26 05 23 00-0014	MLF		#18/4 Conductor, Low Volt Thermostat Cable.....	707.93	158.64
26 05 23 00-0015	MLF		#18/5 Conductor, Low Volt Thermostat Cable.....	756.49	165.34
26 05 23 00-0016	MLF		#18/6 Conductor, Low Volt Thermostat Cable.....	838.29	173.16
26 05 23 00-0017	MLF		#18/7 Conductor, Low Volt Thermostat Cable.....	860.98	180.36
26 05 23 00-0018	MLF		#18/8 Conductor, Low Volt Thermostat Cable.....	948.34	187.57
26 05 23 00-0019	MLF		#18/9 Conductor, Low Volt Thermostat Cable.....	1,116.45	195.06
26 05 23 00-0020	MLF		#18/10 Conductor, Low Volt Thermostat Cable.....	1,225.67	200.92

26 05 26 Grounding and Bonding for Electrical Systems (26 05)

26 05 26 00-0001 Ground Rods (26 05 26)

26 05 26 00-0002 Copper-Clad Ground Rods (26 05 26 00-0001)

26 05 26 00-0003	EA		1/2" Diameter x 8' Long Copper-Clad Ground Rods.....	105.04	91.71
26 05 26 00-0004	EA		5/8" Diameter x 8' Long Copper-Clad Ground Rods.....	109.61	91.71
26 05 26 00-0005	EA		3/4" Diameter x 8' Long Copper-Clad Ground Rods.....	128.04	91.71
26 05 26 00-0006	EA		1/2" Diameter x 10' Long Copper-Clad Ground Rods.....	123.67	91.71
26 05 26 00-0007	EA		5/8" Diameter x 10' Long Copper-Clad Ground Rods.....	129.38	91.71
26 05 26 00-0008	EA		3/4" Diameter x 10' Long Copper-Clad Ground Rods.....	152.42	91.71

26 05 26 00-0009 Copper Grounding Shaft (26 05 26 00-0001)

26 05 26 00-0010	EA		2-1/8" Diameter x 10' Long Copper Grounding Shaft.....	324.64	91.71
26 05 26 00-0011	EA		2-1/8" Diameter "L" Shaped; 3' Riser x 10' Horizontal Copper Grounding Shaft.....	402.49	91.71
26 05 26 00-0012	EA		2-1/8" Diameter "L" Shaped; 3' Riser x 20' Horizontal Copper Grounding Shaft.....	617.08	91.71



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 26 00-0013 Ground Access Wells <small>(26 05 26 00-0001)</small>		
26 05 26 00-0014 Precast Ground Access Wells <small>(26 05 26 00-0013)</small>		
26 05 26 00-0015 EA 8" Diameter x 24" Deep Precast Ground Access Well..... Note: With cast iron grate.	284.29	
26 05 26 00-0016 EA 10" Diameter x 24" Deep Precast Ground Access Well..... Note: With cast iron grate.	294.52	
26 05 26 00-0017 EA 12" Diameter x 24" Deep Precast Ground Access Well..... Note: With cast iron grate.	862.97	
26 05 26 00-0018 EA 18" Diameter x 24" Deep Precast Ground Access Well..... Note: With cast iron grate.	873.20	
26 05 26 00-0019 Polymer Concrete Ground Access Well <small>(26 05 26 00-0013)</small>		
26 05 26 00-0020 EA 12" x 12" x 12" Polymer Concrete Ground Access Well.....	543.83	
26 05 26 00-0021 EA 12" x 12" x 12" Heavy Duty Polymer Concrete Ground Access Well.....	596.87	
26 05 26 00-0022 EA 12" x 12" x 18" Polymer Concrete Ground Access Well.....	599.43	
26 05 26 00-0023 EA 12" x 12" x 18" Heavy Duty Polymer Concrete Ground Access Well.....	657.81	
26 05 26 00-0024 EA 12" x 12" x 24" Polymer Concrete Ground Access Well.....	657.18	
26 05 26 00-0025 EA 12" x 12" x 24" Heavy Duty Polymer Concrete Ground Access Well.....	721.41	
26 05 26 00-0026 EA 13" x 24" x 18" Polymer Concrete Ground Access Well.....	877.92	
26 05 26 00-0027 EA 13" x 24" x 18" Heavy Duty Polymer Concrete Ground Access Well.....	965.52	
26 05 26 00-0028 High Density Polyethylene (HDPE) Ground Access Well <small>(26 05 26 00-0013)</small>		
26 05 26 00-0029 EA 9" Diameter x 10" Deep High Density Polyethylene (HDPE) Ground Access Well..... Note: With cover.	196.59	
26 05 26 00-0030 EA 14" Diameter x 18" Deep High Density Polyethylene (HDPE) Ground Access Well..... Note: With cover.	274.43	
26 05 26 00-0031 Clay Tile Ground Access Wells <small>(26 05 26 00-0013)</small>		
26 05 26 00-0032 EA 8" Diameter x 24" Deep Clay Tile Ground Access Well With Concrete Cover.....	310.98	
26 05 26 00-0033 EA 8" Diameter x 24" Deep Clay Tile Ground Access Well With Cast Iron Grated Cover.....	327.25	
26 05 26 00-0034 EA Concrete Cover For 8" Diameter x 24" Deep Clay Tile Ground Access Well.....	99.91	
26 05 26 00-0035 Ground Rod Clamps And Fittings <small>(26 05 26)</small>		
26 05 26 00-0036 Bronze Ground Rod Clamp <small>(26 05 26 00-0035)</small>		
26 05 26 00-0037 EA 1/2" Bronze Ground Rod Clamp.....	24.81	13.82
26 05 26 00-0038 EA 5/8" Bronze Ground Rod Clamp.....	25.98	13.82
26 05 26 00-0039 EA 3/4" Bronze Ground Rod Clamp.....	27.59	13.82
26 05 26 00-0040 Bronze Pipe Clamps <small>(26 05 26 00-0035)</small>		
26 05 26 00-0041 EA 1/2" To 1" Bronze Pipe Ground Clamps.....	32.74	22.99
26 05 26 00-0042 EA 1-1/4" To 2" Bronze Ground Clamps For Pipe.....	41.50	27.51
26 05 26 00-0043 EA 2-1/2" To 3" Bronze Ground Clamps For Pipe.....	60.87	32.16
26 05 26 00-0044 EA 2-1/2" To 4" Bronze Ground Clamps For Pipe.....	74.66	41.33
26 05 26 00-0045 EA 4" To 6" Bronze Ground Clamps For Pipe.....	113.93	59.67
26 05 26 00-0046 Grounding Fittings <small>(26 05 26 00-0035)</small>		
26 05 26 00-0047 Embedded Fittings <small>(26 05 26 00-0046)</small>		
26 05 26 00-0048 EA Ground Insert With Two 3/8 x 16 Holes #2 To 250 MCM Cable Range, Embedded.....	167.06	
26 05 26 00-0049 EA Ground Insert With Four 3/8 x 16 Holes #2 To 250 MCM Cable Range, Embedded.....	177.49	
26 05 26 00-0050 EA Ground Insert With Four 3/8 x 16 Holes 250 To 500 MCM Cable Range, Embedded.....	196.00	
26 05 26 00-0051 EA #8 To 1 AWG, Copper To Aluminum, Grounding Wire Splice.....	161.91	
26 05 26 00-0052 EA 1/0 To 3/0 AWG, Copper To Aluminum, Grounding Wire Splice.....	193.99	
26 05 26 00-0053 EA 4/0 To 300 MCM, Copper To Aluminum, Grounding Wire Splice.....	227.60	
26 05 26 00-0054 EA 350 To 500 MCM, Copper To Aluminum, Grounding Wire Splice.....	256.57	
26 05 26 00-0055 Ground Rod Receptacle <small>(26 05 26 00-0046)</small>		
26 05 26 00-0056 EA 1/2" Ground Rod Receptacle.....	360.66	127.17
26 05 26 00-0057 EA 5/8" Ground Rod Receptacle.....	377.04	130.76
26 05 26 00-0058 EA 3/4" Ground Rod Receptacle.....	393.80	134.31
26 05 26 00-0059 Ground Kits For Circuit Breaker Panels <small>(26 05 26 00-0046)</small>		
26 05 26 00-0060 EA 14-8 AWG Copper Ground Kit.....	80.79	30.57
26 05 26 00-0061 EA 12-8 AWG Aluminum Ground Kit.....	87.54	30.57
26 05 26 00-0062 EA 14-4 AWG Copper Ground Kit.....	89.56	30.57
26 05 26 00-0063 EA 12-4 AWG Aluminum Ground Kit.....	106.01	30.57
26 05 26 00-0064 Insulated Grounding Bars <small>(26 05 26 00-0035)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 26 Grounding and Bonding for Electrical Systems**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 26 00-0065 EA 1/2" x 4" x 10" Insulated Ground Bar <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	337.73 55.02	30.69
26 05 26 00-0066 EA Insulated Ground Bar SK 9560 1/2" x 4" x 20" <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	354.68 55.02	30.69
26 05 26 00-0067 Ground Conductor Bonding (26 05 26)		
26 05 26 00-0068 Ground Conductor Bonding (26 05 26 00-0067)		
26 05 26 00-0069 Splice, Lug, Ground Rod, Rebar Or Structural Steel Cadweld (26 05 26 00-0068)		
26 05 26 00-0070 EA Up To #6 AWG Cadweld Connection For Splice, Lug, Ground Rod, Rebar Or Structural Steel Note: Includes molds, materials and all necessary tools to make connections.	142.15	
26 05 26 00-0071 EA #4 To #1 AWG Cadweld Connection For Splice, Lug, Ground Rod, Rebar Or Structural Steel Note: Includes molds, materials and all necessary tools to make connections.	154.37	
26 05 26 00-0072 EA 1/0 To 4/0 AWG Cadweld Connection For Splice, Lug, Ground Rod, Rebar Or Structural Steel Note: Includes molds, materials and all necessary tools to make connections.	166.61	
26 05 26 00-0073 EA 250 To 1,000 MCM AWG Cadweld Connection For Splice, Lug, Ground Rod, Rebar Or Structural Steel Note: Includes molds, materials and all necessary tools to make connections.	239.97	
26 05 26 00-0074 Tee, Wye Or Cross Cadweld (26 05 26 00-0068)		
26 05 26 00-0075 EA Up To #6 AWG Cadweld Connection For Tee, Wye Or Cross Note: Includes molds, materials and all necessary tools to make connections.	160.49	
26 05 26 00-0076 EA #4 To #1 AWG Cadweld Connection For Tee, Wye Or Cross Note: Includes molds, materials and all necessary tools to make connections.	184.94	
26 05 26 00-0077 EA 1/0 To 4/0 AWG Cadweld Connection For Tee, Wye Or Cross Note: Includes molds, materials and all necessary tools to make connections.	227.75	
26 05 26 00-0078 EA 250 To 1,000 MCM AWG Cadweld Connection For Tee, Wye Or Cross Note: Includes molds, materials and all necessary tools to make connections.	276.65	
26 05 26 00-0079 Grounding Equipment (26 05 26)		
26 05 26 00-0080 Special Grounding Equipment (26 05 26 00-0079)		
26 05 26 00-0081 Ground Reels And Ground Bus (26 05 26 00-0080)		
26 05 26 00-0082 EA Ground Reel With 50' Of Galvanized Steel Cable.....	788.21	
26 05 26 00-0083 Copper Bars (26 05 26 00-0080)		
26 05 26 00-0084 LF 1/4" x 2" Copper Bar	45.57	
26 05 26 00-0085 Phenolic Insulators (26 05 26 00-0080)		
26 05 26 00-0086 EA 2" x 2" x 1" Long Phenolic Insulators <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32.31 7.34	
26 05 26 00-0087 Grounding Studs (26 05 26 00-0080)		
26 05 26 00-0088 EA Ball Grounding Stud..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	46.78 10.95	
26 05 26 00-0089 Equipment Ground Bar Kits (26 05 26 00-0080)		
26 05 26 00-0090 EA Switch Rating 30 Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.24 7.34	
26 05 26 00-0091 EA Switch Rating 60 Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	46.31 8.07	
26 05 26 00-0092 EA Switch Rating 100 Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	53.97 9.17	
26 05 26 00-0093 EA Switch Rating 200 Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	93.64 11.00	
26 05 26 00-0094 Panelboard Ground Bar Kits (26 05 26 00-0080)		
26 05 26 00-0095 EA Panelboard Ground Bar Kit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	135.79 9.17	9.17
26 05 26 00-0096 Circuit Breaker Ground Bar Kits (26 05 26 00-0080)		
26 05 26 00-0097 EA 3 Circuit, Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30.13 5.50	5.50
26 05 26 00-0098 EA 4 Circuit, Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.59 5.50	5.50
26 05 26 00-0099 EA 7 Circuit, Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30.49 5.50	5.50
26 05 26 00-0100 EA 12 Circuit, Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	34.58 6.24	6.23
26 05 26 00-0101 EA 20 Circuit, Ground Bar Kit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	39.38 6.97	6.97



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 26 00-0102 EA 24 Circuit, Ground Bar Kit.....	43.46	7.71
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.70	
26 05 26 00-0103 EA 30 Circuit, Ground Bar Kit.....	48.57	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.80	
26 05 26 00-0104 EA 54 Circuit, Ground Bar Kit.....	56.19	10.27
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.27	
26 05 26 00-0105 EA 24 Circuit, Ground Bar Kit With #1 To 4/0 Aluminum/Copper Lug.....	61.78	7.71
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.70	
26 05 26 00-0106 EA 30 Circuit, Ground Bar Kit With #1 To 4/0 Aluminum/Copper Lug.....	68.34	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.80	
26 05 26 00-0107 EA 54 Circuit, Ground Bar Kit With #1 To 4/0 Aluminum/Copper Lug.....	76.15	10.27
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.27	

26 05 29 Hangers and Supports for Electrical Systems (26 05)

26 05 29 00-0001 Supports (26 05 29)

26 05 29 00-0002 One Hole Steel Conduit Straps (26 05 29 00-0001)

26 05 29 00-0003 EA 1/2", One Hole Steel Conduit Strap	4.45	
For >100 To 250, Deduct	-0.42	
For >50 To 100, Deduct	-0.21	
For >250 To 500, Deduct	-0.82	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.23	
26 05 29 00-0004 EA 3/4", One Hole Steel Conduit Strap	4.50	
For >100 To 250, Deduct	-0.42	
For >50 To 100, Deduct	-0.21	
For >250 To 500, Deduct	-0.83	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.23	
26 05 29 00-0005 EA 1", One Hole Steel Conduit Strap	4.76	
For >100 To 250, Deduct	-0.43	
For >50 To 100, Deduct	-0.22	
For >250 To 500, Deduct	-0.85	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.26	
26 05 29 00-0006 EA 1-1/4", One Hole Steel Conduit Strap	4.96	
For >100 To 250, Deduct	-0.44	
For >50 To 100, Deduct	-0.22	
For >250 To 500, Deduct	-0.86	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.28	
26 05 29 00-0007 EA 1-1/2", One Hole Steel Conduit Strap	5.09	
For >100 To 250, Deduct	-0.45	
For >50 To 100, Deduct	-0.23	
For >250 To 500, Deduct	-0.87	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.29	
26 05 29 00-0008 EA 2", One Hole Steel Conduit Strap	5.88	
For >100 To 250, Deduct	-0.49	
For >50 To 100, Deduct	-0.24	
For >250 To 500, Deduct	-0.93	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.37	
26 05 29 00-0009 EA 2-1/2", One Hole Steel Conduit Strap	6.69	
For >100 To 250, Deduct	-0.53	
For >50 To 100, Deduct	-0.27	
For >250 To 500, Deduct	-0.99	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.45	
26 05 29 00-0010 EA 3", One Hole Steel Conduit Strap	6.96	
For >100 To 250, Deduct	-0.54	
For >50 To 100, Deduct	-0.27	
For >250 To 500, Deduct	-1.01	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.48	
26 05 29 00-0011 EA 3-1/2", One Hole Steel Conduit Strap	8.29	
For >100 To 250, Deduct	-0.61	
For >50 To 100, Deduct	-0.31	
For >250 To 500, Deduct	-1.11	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For Work In Restricted Working Space, Add	1.17	
For >500, Deduct	-1.61	

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 29 00-0012	EA 4", One Hole Steel Conduit Strap	9.35	
	<i>For >100 To 250, Deduct</i>	-0.66	
	<i>For >50 To 100, Deduct</i>	-0.33	
	<i>For >250 To 500, Deduct</i>	-1.19	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.08	
	<i>For Work In Restricted Working Space, Add</i>	1.17	
	<i>For >500, Deduct</i>	-1.72	
26 05 29 00-0013	Two Hole Steel Conduit Straps (26 05 29 00-0001)		
26 05 29 00-0014	EA 1/2", Two Hole Steel Conduit Strap	5.17	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.48	
	<i>For >50 To 100, Deduct</i>	-0.24	
	<i>For >250 To 500, Deduct</i>	-0.94	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.40	
26 05 29 00-0015	EA 3/4", Two Hole Steel Conduit Strap	5.26	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.48	
	<i>For >50 To 100, Deduct</i>	-0.24	
	<i>For >250 To 500, Deduct</i>	-0.94	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.41	
26 05 29 00-0016	EA 1", Two Hole Steel Conduit Strap	5.30	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.49	
	<i>For >50 To 100, Deduct</i>	-0.24	
	<i>For >250 To 500, Deduct</i>	-0.95	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.41	
26 05 29 00-0017	EA 1-1/4", Two Hole Steel Conduit Strap	5.36	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.49	
	<i>For >50 To 100, Deduct</i>	-0.24	
	<i>For >250 To 500, Deduct</i>	-0.95	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.42	
26 05 29 00-0018	EA 1-1/2", Two Hole Steel Conduit Strap	5.41	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.49	
	<i>For >50 To 100, Deduct</i>	-0.25	
	<i>For >250 To 500, Deduct</i>	-0.96	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.42	
26 05 29 00-0019	EA 2", Two Hole Steel Conduit Strap	5.52	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.50	
	<i>For >50 To 100, Deduct</i>	-0.25	
	<i>For >250 To 500, Deduct</i>	-0.96	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.43	
26 05 29 00-0020	EA 2-1/2", Two Hole Steel Conduit Strap	6.12	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.53	
	<i>For >50 To 100, Deduct</i>	-0.26	
	<i>For >250 To 500, Deduct</i>	-1.01	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.49	
26 05 29 00-0021	EA 3", Two Hole Steel Conduit Strap	6.25	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.53	
	<i>For >50 To 100, Deduct</i>	-0.27	
	<i>For >250 To 500, Deduct</i>	-1.02	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.51	
26 05 29 00-0022	EA 3-1/2", Two Hole Steel Conduit Strap	6.73	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.56	
	<i>For >50 To 100, Deduct</i>	-0.28	
	<i>For >250 To 500, Deduct</i>	-1.05	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.55	
26 05 29 00-0023	EA 4", Two Hole Steel Conduit Strap	7.05	
	<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.30	
	<i>For >100 To 250, Deduct</i>	-0.57	
	<i>For >50 To 100, Deduct</i>	-0.29	
	<i>For >250 To 500, Deduct</i>	-1.08	
	<i>For Work In Restricted Working Space, Add</i>	1.32	
	<i>For >500, Deduct</i>	-1.59	
26 05 29 00-0024	Clamp Back Spacers (26 05 29 00-0001)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0025 EA 1/2" Conduit, Clamp Back Spacer	4.03	
For >100 To 250, Deduct	-0.35	
For >50 To 100, Deduct	-0.18	
For >250 To 500, Deduct	-0.68	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.02	
26 05 29 00-0026 EA 3/4" Conduit, Clamp Back Spacer	4.34	
For >100 To 250, Deduct	-0.37	
For >50 To 100, Deduct	-0.19	
For >250 To 500, Deduct	-0.71	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.05	
26 05 29 00-0027 EA 1" Conduit, Clamp Back Spacer	4.62	
For >100 To 250, Deduct	-0.38	
For >50 To 100, Deduct	-0.19	
For >250 To 500, Deduct	-0.73	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.07	
26 05 29 00-0028 EA 1-1/4" Conduit, Clamp Back Spacer	5.73	
For >100 To 250, Deduct	-0.44	
For >50 To 100, Deduct	-0.22	
For >250 To 500, Deduct	-0.81	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.19	
26 05 29 00-0029 EA 1-1/2" Conduit, Clamp Back Spacer	6.62	
For >100 To 250, Deduct	-0.48	
For >50 To 100, Deduct	-0.24	
For >250 To 500, Deduct	-0.88	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.27	
26 05 29 00-0030 EA 2" Conduit, Clamp Back Spacer	7.56	
For >100 To 250, Deduct	-0.53	
For >50 To 100, Deduct	-0.27	
For >250 To 500, Deduct	-0.95	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.37	
26 05 29 00-0031 EA 2-1/2" Conduit, Clamp Back Spacer	11.36	
For >100 To 250, Deduct	-0.72	
For >50 To 100, Deduct	-0.36	
For >250 To 500, Deduct	-1.23	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-1.75	
26 05 29 00-0032 EA 3" Conduit, Clamp Back Spacer	15.91	
For >100 To 250, Deduct	-0.95	
For >50 To 100, Deduct	-0.47	
For >250 To 500, Deduct	-1.58	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-2.20	
26 05 29 00-0033 EA 3-1/2" Conduit, Clamp Back Spacer	20.33	
For >100 To 250, Deduct	-1.17	
For >50 To 100, Deduct	-0.58	
For >250 To 500, Deduct	-1.91	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-2.65	
26 05 29 00-0034 EA 4" Conduit, Clamp Back Spacer	41.06	
For >100 To 250, Deduct	-2.21	
For >50 To 100, Deduct	-1.10	
For >250 To 500, Deduct	-3.46	
For Installation On Concrete (Includes Drilling And Fastener), Add	0.87	
For Work In Restricted Working Space, Add	0.92	
For >500, Deduct	-4.72	
26 05 29 00-0035 Conduit Clips (26 05 29 00-0001)		
Note: Push in or clip.		
26 05 29 00-0036 EA 1/2" Conduit Clip	5.08	
For >100 To 250, Deduct	-0.45	
For >50 To 100, Deduct	-0.22	
For >250 To 500, Deduct	-0.87	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For >500, Deduct	-1.29	
26 05 29 00-0037 EA 3/4" Conduit Clip	5.08	
For >100 To 250, Deduct	-0.45	
For >50 To 100, Deduct	-0.22	
For >250 To 500, Deduct	-0.87	
For Installation On Concrete (Includes Drilling And Fastener), Add	1.08	
For >500, Deduct	-1.29	

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 29 00-0038	EA	1" Conduit Clip.....	4.98	
		<i>For >100 To 250, Deduct</i>	-0.44	
		<i>For >50 To 100, Deduct</i>	-0.22	
		<i>For >250 To 500, Deduct</i>	-0.86	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.08	
		<i>For >500, Deduct</i>	-1.28	
26 05 29 00-0039	EA	1-1/4" Conduit Clip.....	5.21	
		<i>For >100 To 250, Deduct</i>	-0.46	
		<i>For >50 To 100, Deduct</i>	-0.23	
		<i>For >250 To 500, Deduct</i>	-0.88	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.08	
		<i>For >500, Deduct</i>	-1.30	
26 05 29 00-0040		Bolt And Nut Conduit Clips <small>(26 05 29 00-0001)</small>		
26 05 29 00-0041	EA	3/4" Bolt And Nut Conduit Clip (Minerallac 1B).....	6.30	
		<i>For >100 To 250, Deduct</i>	-0.56	
		<i>For >50 To 100, Deduct</i>	-0.28	
		<i>For >250 To 500, Deduct</i>	-1.08	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.32	
		<i>For >500, Deduct</i>	-1.61	
26 05 29 00-0042	EA	1" Bolt And Nut Conduit Clip (Minerallac 2B).....	6.53	
		<i>For >100 To 250, Deduct</i>	-0.57	
		<i>For >50 To 100, Deduct</i>	-0.29	
		<i>For >250 To 500, Deduct</i>	-1.10	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.32	
		<i>For >500, Deduct</i>	-1.63	
26 05 29 00-0043	EA	1-1/4" Bolt And Nut Conduit Clip (Minerallac 2-1/2B).....	6.96	
		<i>For >100 To 250, Deduct</i>	-0.61	
		<i>For >50 To 100, Deduct</i>	-0.30	
		<i>For >250 To 500, Deduct</i>	-1.17	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.40	
		<i>For >500, Deduct</i>	-1.74	
26 05 29 00-0044	EA	1-1/2" Bolt And Nut Conduit Clip (Minerallac 3B).....	7.09	
		<i>For >100 To 250, Deduct</i>	-0.61	
		<i>For >50 To 100, Deduct</i>	-0.31	
		<i>For >250 To 500, Deduct</i>	-1.18	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.40	
		<i>For >500, Deduct</i>	-1.75	
26 05 29 00-0045	EA	2" Bolt And Nut Conduit Clip (Minerallac 5B).....	7.95	
		<i>For >100 To 250, Deduct</i>	-0.66	
		<i>For >50 To 100, Deduct</i>	-0.33	
		<i>For >250 To 500, Deduct</i>	-1.25	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.40	
		<i>For >500, Deduct</i>	-1.84	
26 05 29 00-0046	EA	2-1/2" Bolt And Nut Conduit Clip (Minerallac 6B).....	8.62	
		<i>For >100 To 250, Deduct</i>	-0.71	
		<i>For >50 To 100, Deduct</i>	-0.35	
		<i>For >250 To 500, Deduct</i>	-1.33	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.48	
		<i>For >500, Deduct</i>	-1.96	
26 05 29 00-0047	EA	3" Bolt And Nut Conduit Clip (Minerallac 7B).....	9.38	
		<i>For >100 To 250, Deduct</i>	-0.74	
		<i>For >50 To 100, Deduct</i>	-0.37	
		<i>For >250 To 500, Deduct</i>	-1.39	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.48	
		<i>For >500, Deduct</i>	-2.04	
26 05 29 00-0048	EA	4" Bolt And Nut Conduit Clip (Minerallac 9B).....	17.19	
		<i>For >100 To 250, Deduct</i>	-1.17	
		<i>For >50 To 100, Deduct</i>	-0.58	
		<i>For >250 To 500, Deduct</i>	-2.05	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
		<i>For >500, Deduct</i>	-2.94	
26 05 29 00-0049		Conduit Hanger From Flange, Wire Or Rod <small>(26 05 29 00-0001)</small>		
		Note: Bat wing.		
26 05 29 00-0050	EA	1/2", Conduit Hanger From Flange, Wire Or Rod.....	3.67	
		<i>For >100 To 250, Deduct</i>	-0.33	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.64	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	0.84	
		<i>For >500, Deduct</i>	-0.96	
26 05 29 00-0051	EA	3/4", Conduit Hanger From Flange, Wire Or Rod.....	3.73	
		<i>For >100 To 250, Deduct</i>	-0.33	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.65	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	0.84	
		<i>For >500, Deduct</i>	-0.96	
26 05 29 00-0052	EA	1", Conduit Hanger From Flange, Wire Or Rod.....	3.90	
		<i>For >100 To 250, Deduct</i>	-0.34	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.66	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	0.84	
		<i>For >500, Deduct</i>	-0.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0053 EA 1-1/4", Conduit Hanger From Flange, Wire Or Rod	4.33	
<i>For >100 To 250, Deduct</i>	-0.36	
<i>For >50 To 100, Deduct</i>	-0.18	
<i>For >250 To 500, Deduct</i>	-0.69	
<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	0.84	
<i>For >500, Deduct</i>	-1.02	
26 05 29 00-0054 Beam Flange Clamps <small>(26 05 29 00-0001)</small>		
Note: For threaded rod, nut not required.		
26 05 29 00-0055 EA 1/8" To 1/4" Flange Thickness, Beam Clamp (Caddy 6TA24)	5.48	
<i>For >100 To 250, Deduct</i>	-0.43	
<i>For >50 To 100, Deduct</i>	-0.21	
<i>For >250 To 500, Deduct</i>	-0.79	
<i>For >500, Deduct</i>	-1.16	
26 05 29 00-0056 EA 5/16" To 1/2" Flange Thickness, Beam Clamp (Caddy 6TA58)	5.37	
<i>For >100 To 250, Deduct</i>	-0.42	
<i>For >50 To 100, Deduct</i>	-0.21	
<i>For >250 To 500, Deduct</i>	-0.79	
<i>For >500, Deduct</i>	-1.15	
26 05 29 00-0057 EA 9/16" To 3/4" Flange Thickness, Beam Clamp (Caddy 6TA912)	6.03	
<i>For >100 To 250, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >250 To 500, Deduct</i>	-0.83	
<i>For >500, Deduct</i>	-1.22	
26 05 29 00-0058 T-Bar Support Clips <small>(26 05 29 00-0001)</small>		
26 05 29 00-0059 EA 9/16" Grid Size, Independent T-Bar Support Clip (Caddy IDS95)	9.04	
<i>For >100 To 250, Deduct</i>	-0.76	
<i>For >50 To 100, Deduct</i>	-0.38	
<i>For >250 To 500, Deduct</i>	-1.44	
<i>For >500, Deduct</i>	-2.13	
26 05 29 00-0060 EA 15/16" Grid Size, Independent T-Bar Support Clip (Caddy IDS)	8.52	
<i>For >100 To 250, Deduct</i>	-0.73	
<i>For >50 To 100, Deduct</i>	-0.37	
<i>For >250 To 500, Deduct</i>	-1.40	
<i>For >500, Deduct</i>	-2.07	
26 05 29 00-0061 EA 15/16 Grid Size, Twist On T-Bar Support Clip (Caddy 4G16)	3.33	
<i>For >100 To 250, Deduct</i>	-0.24	
<i>For >50 To 100, Deduct</i>	-0.12	
<i>For >250 To 500, Deduct</i>	-0.44	
<i>For >500, Deduct</i>	-0.64	
26 05 29 00-0062 EA 24" Long Snap On T-Bar Electrical Box Hanger (Caddy 512)	28.28	
<i>For >100 To 250, Deduct</i>	-1.54	
<i>For >50 To 100, Deduct</i>	-0.77	
<i>For >250 To 500, Deduct</i>	-2.43	
<i>For >500, Deduct</i>	-3.32	
26 05 29 00-0063 Switch And Outlet Box Type Supports <small>(26 05 29 00-0001)</small>		
26 05 29 00-0064 EA 1/4" To 3/4" Drywall Thickness, Adjustable Switch And Outlet Box Support (Caddy MFS)	6.86	
<i>For >100 To 250, Deduct</i>	-0.47	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >250 To 500, Deduct</i>	-0.82	
<i>For >500, Deduct</i>	-1.18	
26 05 29 00-0065 EA 1/2" Drywall Thickness, Riveted Switch And Outlet Box Support (Caddy MF500)	5.77	
<i>For >100 To 250, Deduct</i>	-0.41	
<i>For >50 To 100, Deduct</i>	-0.21	
<i>For >250 To 500, Deduct</i>	-0.74	
<i>For >500, Deduct</i>	-1.07	
26 05 29 00-0066 EA Flush, Riveted Switch And Outlet Box Support (Caddy MFO)	6.71	
<i>For >100 To 250, Deduct</i>	-0.46	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >250 To 500, Deduct</i>	-0.81	
<i>For >500, Deduct</i>	-1.16	
26 05 29 00-0067 EA Snap On, Switch And Outlet Box Support (Caddy MSF)	4.22	
<i>For >100 To 250, Deduct</i>	-0.33	
<i>For >50 To 100, Deduct</i>	-0.17	
<i>For >250 To 500, Deduct</i>	-0.62	
<i>For >500, Deduct</i>	-0.91	
26 05 29 00-0068 EA 1/4-20 Thread Impression, Switch And Outlet Box Support (Caddy MFI)	4.42	
<i>For >100 To 250, Deduct</i>	-0.34	
<i>For >50 To 100, Deduct</i>	-0.17	
<i>For >250 To 500, Deduct</i>	-0.64	
<i>For >500, Deduct</i>	-0.93	
26 05 29 00-0069 Lighting Fixture Hanger <small>(26 05 29 00-0001)</small>		
Note: For existing or owner furnished fixtures.		
26 05 29 00-0070 EA Lay-In/Troffer, Straight Lip Type Fixture Support Clip (Caddy 515)	5.95	
<i>For >100 To 250, Deduct</i>	-0.54	
<i>For >50 To 100, Deduct</i>	-0.27	
<i>For >250 To 500, Deduct</i>	-1.06	
<i>For >500, Deduct</i>	-1.57	

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0071	PR		Support Bars For Recessed "High Hat" Light Fixtures (Caddy 517)	22.07	
			<i>For >100 To 250, Deduct</i>	-1.35	
			<i>For >50 To 100, Deduct</i>	-0.67	
			<i>For >250 To 500, Deduct</i>	-2.27	
			<i>For >500, Deduct</i>	-3.19	
26 05 29 00-0072	PR		Support Bars For Recessed "Lightolier" Light Fixtures (Caddy 520)	30.53	
			<i>For >100 To 250, Deduct</i>	-1.77	
			<i>For >50 To 100, Deduct</i>	-0.89	
			<i>For >250 To 500, Deduct</i>	-2.90	
			<i>For >500, Deduct</i>	-4.03	
26 05 29 00-0073			Rigid Steel Conduit Clamps For Unistrut Channel <small>(26 05 29 00-0001)</small>		
26 05 29 00-0074	EA		1/2" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	5.08	
			<i>For >100 To 250, Deduct</i>	-0.44	
			<i>For >50 To 100, Deduct</i>	-0.22	
			<i>For >250 To 500, Deduct</i>	-0.84	
			<i>For Work In Restricted Working Space, Add</i>	1.10	
			<i>For >500, Deduct</i>	-1.24	
26 05 29 00-0075	EA		3/4" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	5.10	
			<i>For >100 To 250, Deduct</i>	-0.44	
			<i>For >50 To 100, Deduct</i>	-0.22	
			<i>For >250 To 500, Deduct</i>	-0.84	
			<i>For Work In Restricted Working Space, Add</i>	1.10	
			<i>For >500, Deduct</i>	-1.24	
26 05 29 00-0076	EA		1" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	5.21	
			<i>For >100 To 250, Deduct</i>	-0.44	
			<i>For >50 To 100, Deduct</i>	-0.22	
			<i>For >250 To 500, Deduct</i>	-0.85	
			<i>For Work In Restricted Working Space, Add</i>	1.10	
			<i>For >500, Deduct</i>	-1.26	
26 05 29 00-0077	EA		1-1/4" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	6.59	
			<i>For >100 To 250, Deduct</i>	-0.57	
			<i>For >50 To 100, Deduct</i>	-0.29	
			<i>For >250 To 500, Deduct</i>	-1.11	
			<i>For Work In Restricted Working Space, Add</i>	1.47	
			<i>For >500, Deduct</i>	-1.64	
26 05 29 00-0078	EA		1-1/2" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	7.16	
			<i>For >100 To 250, Deduct</i>	-0.60	
			<i>For >50 To 100, Deduct</i>	-0.30	
			<i>For >250 To 500, Deduct</i>	-1.15	
			<i>For Work In Restricted Working Space, Add</i>	1.47	
			<i>For >500, Deduct</i>	-1.69	
26 05 29 00-0079	EA		2" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	7.22	
			<i>For >100 To 250, Deduct</i>	-0.61	
			<i>For >50 To 100, Deduct</i>	-0.30	
			<i>For >250 To 500, Deduct</i>	-1.15	
			<i>For Work In Restricted Working Space, Add</i>	1.47	
			<i>For >500, Deduct</i>	-1.70	
26 05 29 00-0080	EA		2-1/2" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	8.85	
			<i>For >100 To 250, Deduct</i>	-0.75	
			<i>For >50 To 100, Deduct</i>	-0.37	
			<i>For >250 To 500, Deduct</i>	-1.43	
			<i>For Work In Restricted Working Space, Add</i>	1.83	
			<i>For >500, Deduct</i>	-2.11	
26 05 29 00-0081	EA		3" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	9.36	
			<i>For >100 To 250, Deduct</i>	-0.77	
			<i>For >50 To 100, Deduct</i>	-0.39	
			<i>For >250 To 500, Deduct</i>	-1.47	
			<i>For Work In Restricted Working Space, Add</i>	1.83	
			<i>For >500, Deduct</i>	-2.16	
26 05 29 00-0082	EA		3-1/2" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	9.85	
			<i>For >100 To 250, Deduct</i>	-0.80	
			<i>For >50 To 100, Deduct</i>	-0.40	
			<i>For >250 To 500, Deduct</i>	-1.50	
			<i>For Work In Restricted Working Space, Add</i>	1.83	
			<i>For >500, Deduct</i>	-2.21	
26 05 29 00-0083	EA		4" Diameter, Rigid Steel Conduit Clamp For Unistrut Channel	10.03	
			<i>For >100 To 250, Deduct</i>	-0.81	
			<i>For >50 To 100, Deduct</i>	-0.40	
			<i>For >250 To 500, Deduct</i>	-1.52	
			<i>For Work In Restricted Working Space, Add</i>	1.83	
			<i>For >500, Deduct</i>	-2.23	
26 05 29 00-0084			Electrical Metallic Tubing (EMT) Conduit Clamps For Unistrut Channel <small>(26 05 29 00-0001)</small>		
26 05 29 00-0085	EA		1/2" Diameter, Electrical Metallic Tubing (EMT) Conduit Clamp For Unistrut Channel	5.45	
			<i>For >100 To 250, Deduct</i>	-0.46	
			<i>For >50 To 100, Deduct</i>	-0.23	
			<i>For >250 To 500, Deduct</i>	-0.87	
			<i>For Work In Restricted Working Space, Add</i>	1.10	
			<i>For >500, Deduct</i>	-1.28	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0086 EA 3/4" Diameter, Electrical Metallic Tubing (EMT) Conduit Clamp For Unistrut Channel.....	5.41	
<i>For >100 To 250, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >250 To 500, Deduct</i>	-0.86	
<i>For Work In Restricted Working Space, Add</i>	1.10	
<i>For >500, Deduct</i>	-1.28	
26 05 29 00-0087 EA 1" Diameter, Electrical Metallic Tubing (EMT) Conduit Clamp For Unistrut Channel.....	5.35	
<i>For >100 To 250, Deduct</i>	-0.45	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >250 To 500, Deduct</i>	-0.86	
<i>For Work In Restricted Working Space, Add</i>	1.10	
<i>For >500, Deduct</i>	-1.27	
26 05 29 00-0088 EA 1-1/4" Diameter, Electrical Metallic Tubing (EMT) Conduit Clamp For Unistrut Channel.....	7.04	
<i>For >100 To 250, Deduct</i>	-0.60	
<i>For >50 To 100, Deduct</i>	-0.30	
<i>For >250 To 500, Deduct</i>	-1.14	
<i>For Work In Restricted Working Space, Add</i>	1.47	
<i>For >500, Deduct</i>	-1.68	
26 05 29 00-0089 EA 1-1/2" Diameter, Electrical Metallic Tubing (EMT) Conduit Clamp For Unistrut Channel.....	8.04	
<i>For >100 To 250, Deduct</i>	-0.65	
<i>For >50 To 100, Deduct</i>	-0.32	
<i>For >250 To 500, Deduct</i>	-1.21	
<i>For Work In Restricted Working Space, Add</i>	1.47	
<i>For >500, Deduct</i>	-1.78	
26 05 29 00-0090 EA 2" Diameter, Electrical Metallic Tubing (EMT) Conduit Clamp For Unistrut Channel.....	8.10	
<i>For >100 To 250, Deduct</i>	-0.65	
<i>For >50 To 100, Deduct</i>	-0.32	
<i>For >250 To 500, Deduct</i>	-1.22	
<i>For Work In Restricted Working Space, Add</i>	1.47	
<i>For >500, Deduct</i>	-1.79	
26 05 29 00-0091 "J" Type Conduit Hangers (26 05 29 00-0001)		
26 05 29 00-0092 EA 1/2", "J" Type Conduit Hanger (Unistrut J1205).....	26.34	
<i>For >100 To 250, Deduct</i>	-1.75	
<i>For >50 To 100, Deduct</i>	-0.87	
<i>For >250 To 500, Deduct</i>	-3.05	
<i>For Work In Restricted Working Space, Add</i>	2.57	
<i>For >500, Deduct</i>	-4.35	
26 05 29 00-0093 EA 3/4", "J" Type Conduit Hanger (Unistrut J1207).....	26.65	
<i>For >100 To 250, Deduct</i>	-1.76	
<i>For >50 To 100, Deduct</i>	-0.88	
<i>For >250 To 500, Deduct</i>	-3.07	
<i>For Work In Restricted Working Space, Add</i>	2.57	
<i>For >500, Deduct</i>	-4.38	
26 05 29 00-0094 EA 1", "J" Type Conduit Hanger (Unistrut J1210).....	28.15	
<i>For >100 To 250, Deduct</i>	-1.90	
<i>For >50 To 100, Deduct</i>	-0.95	
<i>For >250 To 500, Deduct</i>	-3.33	
<i>For Work In Restricted Working Space, Add</i>	2.93	
<i>For >500, Deduct</i>	-4.77	
26 05 29 00-0095 EA 1-1/4", "J" Type Conduit Hanger (Unistrut J1212)	28.49	
<i>For >100 To 250, Deduct</i>	-1.91	
<i>For >50 To 100, Deduct</i>	-0.96	
<i>For >250 To 500, Deduct</i>	-3.36	
<i>For Work In Restricted Working Space, Add</i>	2.93	
<i>For >500, Deduct</i>	-4.81	
26 05 29 00-0096 EA 1-1/2", "J" Type Conduit Hanger (Unistrut J1215)	29.93	
<i>For >100 To 250, Deduct</i>	-2.05	
<i>For >50 To 100, Deduct</i>	-1.02	
<i>For >250 To 500, Deduct</i>	-3.62	
<i>For Work In Restricted Working Space, Add</i>	3.30	
<i>For >500, Deduct</i>	-5.19	
26 05 29 00-0097 EA 2", "J" Type Conduit Hanger (Unistrut J1220).....	31.19	
<i>For >100 To 250, Deduct</i>	-2.11	
<i>For >50 To 100, Deduct</i>	-1.05	
<i>For >250 To 500, Deduct</i>	-3.71	
<i>For Work In Restricted Working Space, Add</i>	3.30	
<i>For >500, Deduct</i>	-5.32	
26 05 29 00-0098 EA 2-1/2", "J" Type Conduit Hanger (Unistrut J1225)	50.46	
<i>For >100 To 250, Deduct</i>	-3.13	
<i>For >50 To 100, Deduct</i>	-1.57	
<i>For >250 To 500, Deduct</i>	-5.31	
<i>For Work In Restricted Working Space, Add</i>	3.67	
<i>For >500, Deduct</i>	-7.49	
26 05 29 00-0099 EA 3", "J" Type Conduit Hanger (Unistrut J1230).....	53.59	
<i>For >100 To 250, Deduct</i>	-3.35	
<i>For >50 To 100, Deduct</i>	-1.68	
<i>For >250 To 500, Deduct</i>	-5.70	
<i>For Work In Restricted Working Space, Add</i>	4.04	
<i>For >500, Deduct</i>	-8.05	

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 29 00-0100	EA	3-1/2", "J" Type Conduit Hanger (Unistrut J1235).....	57.67	
		<i>For >100 To 250, Deduct</i>	-3.62	
		<i>For >50 To 100, Deduct</i>	-1.81	
		<i>For >250 To 500, Deduct</i>	-6.16	
		<i>For Work In Restricted Working Space, Add</i>	4.40	
		<i>For >500, Deduct</i>	-8.70	
26 05 29 00-0101	EA	4", "J" Type Conduit Hanger (Unistrut J1240).....	77.24	
		<i>For >100 To 250, Deduct</i>	-4.60	
		<i>For >50 To 100, Deduct</i>	-2.30	
		<i>For >250 To 500, Deduct</i>	-7.63	
		<i>For Work In Restricted Working Space, Add</i>	4.40	
		<i>For >500, Deduct</i>	-10.66	
26 05 29 00-0102	EA	5", "J" Type Conduit Hanger (Unistrut J1250).....	84.89	
		<i>For >100 To 250, Deduct</i>	-5.04	
		<i>For >50 To 100, Deduct</i>	-2.52	
		<i>For >250 To 500, Deduct</i>	-8.35	
		<i>For Work In Restricted Working Space, Add</i>	4.77	
		<i>For >500, Deduct</i>	-11.67	
26 05 29 00-0103	EA	6", "J" Type Conduit Hanger (Unistrut J1260).....	120.14	
		<i>For >100 To 250, Deduct</i>	-6.92	
		<i>For >50 To 100, Deduct</i>	-3.46	
		<i>For >250 To 500, Deduct</i>	-11.30	
		<i>For Work In Restricted Working Space, Add</i>	5.50	
		<i>For >500, Deduct</i>	-15.68	

26 05 29 00-0104 Between Studs Box Brackets (26 05 29 00-0001)

26 05 29 00-0105	EA	16" Stud Spacing, 1-1/2" Or 2-1/8" Box Depth, Screw Gun Between Studs Box Bracket (Caddy SGB16A)	9.43	
		<i>For >100 To 250, Deduct</i>	-0.66	
		<i>For >50 To 100, Deduct</i>	-0.33	
		<i>For >250 To 500, Deduct</i>	-1.17	
		<i>For Work In Restricted Working Space, Add</i>	1.10	
		<i>For >500, Deduct</i>	-1.68	
26 05 29 00-0106	EA	24" Stud Spacing, 1-1/2" Or 2-1/8" Box Depth, Screw Gun Between Studs Box Bracket (Caddy SGB24A)	11.43	
		<i>For >100 To 250, Deduct</i>	-0.76	
		<i>For >50 To 100, Deduct</i>	-0.38	
		<i>For >250 To 500, Deduct</i>	-1.32	
		<i>For Work In Restricted Working Space, Add</i>	1.10	
		<i>For >500, Deduct</i>	-1.88	

26 05 29 00-0107 Hangers And Brackets (26 05 29 00-0001)

26 05 29 00-0108	EA	Rod Hangers Only With 1/4" Thread Impression (Caddy 4TI)	3.20	
		<i>For >100 To 250, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.14	
		<i>For >250 To 500, Deduct</i>	-0.55	
		<i>For >500, Deduct</i>	-0.81	
26 05 29 00-0109	EA	Angle Bracket Only With 1/4" Hole (Caddy AB).....	3.09	
		<i>For >100 To 250, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.14	
		<i>For >250 To 500, Deduct</i>	-0.54	
		<i>For >500, Deduct</i>	-0.80	
26 05 29 00-0110	EA	Offset Bracket Only With 1/4" Hole (Caddy AO).....	3.09	
		<i>For >100 To 250, Deduct</i>	-0.28	
		<i>For >50 To 100, Deduct</i>	-0.14	
		<i>For >250 To 500, Deduct</i>	-0.54	
		<i>For >500, Deduct</i>	-0.80	
26 05 29 00-0111	EA	Angle Bracket Mount, 1/4" Threaded Rod Hanger With Thread Impression (Caddy 4TIB).....	4.29	
		<i>For >100 To 250, Deduct</i>	-0.34	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.63	
		<i>For >500, Deduct</i>	-0.92	
26 05 29 00-0112	EA	Angle Bracket Mount, 3/8" Threaded Rod Hanger With Thread Impression (Caddy 6TIB).....	4.31	
		<i>For >100 To 250, Deduct</i>	-0.34	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.63	
		<i>For >500, Deduct</i>	-0.92	
26 05 29 00-0113	EA	Angle Bracket Mount, 1/4" Or 3/8" Threaded Rod Hanger With Nut (Caddy 6TB).....	4.18	
		<i>For >100 To 250, Deduct</i>	-0.33	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.62	
		<i>For >500, Deduct</i>	-0.91	
26 05 29 00-0114	EA	Offset Bracket Mount, 1/4" Threaded Rod Hanger With Thread Impression (Caddy 4TIO).....	4.29	
		<i>For >100 To 250, Deduct</i>	-0.34	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.63	
		<i>For >500, Deduct</i>	-0.92	
26 05 29 00-0115	EA	Offset Bracket Mount, 3/8" Threaded Rod Hanger With Thread Impression (Caddy 6TIO).....	4.31	
		<i>For >100 To 250, Deduct</i>	-0.34	
		<i>For >50 To 100, Deduct</i>	-0.17	
		<i>For >250 To 500, Deduct</i>	-0.63	
		<i>For >500, Deduct</i>	-0.92	

26 05 29 00-0116 Clips And Accessories (26 05 29 00-0001)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0117 EA 1/2" Diameter Center, Bridle Ring (Caddy 2BR).....	2.19	
<i>For >100 To 250, Deduct</i>	-0.19	
<i>For >50 To 100, Deduct</i>	-0.09	
<i>For >250 To 500, Deduct</i>	-0.36	
<i>For >500, Deduct</i>	-0.53	
26 05 29 00-0118 EA 3/4" Diameter Center, Bridle Ring (Caddy 2BR12).....	2.24	
<i>For >100 To 250, Deduct</i>	-0.19	
<i>For >50 To 100, Deduct</i>	-0.09	
<i>For >250 To 500, Deduct</i>	-0.36	
<i>For >500, Deduct</i>	-0.53	
26 05 29 00-0119 EA 1-1/4" Diameter Center, Bridle Ring (Caddy 2BR20).....	2.42	
<i>For >100 To 250, Deduct</i>	-0.20	
<i>For >50 To 100, Deduct</i>	-0.10	
<i>For >250 To 500, Deduct</i>	-0.37	
<i>For >500, Deduct</i>	-0.55	
26 05 29 00-0120 EA 2" Diameter Center, Bridle Ring (Caddy 2BR32).....	2.79	
<i>For >100 To 250, Deduct</i>	-0.22	
<i>For >50 To 100, Deduct</i>	-0.11	
<i>For >250 To 500, Deduct</i>	-0.40	
<i>For >500, Deduct</i>	-0.59	
26 05 29 00-0121 Wire Ties <small>(26 05 29 00-0001)</small>		
Note: Per hundred (C).		
26 05 29 00-0122 C 3" Length, 18 LB Tensile Strength, Nylon Cable Ties.....	31.24	
<i>For Up To 0.1, Add</i>	25.52	
<i>For >0.1 To 0.25, Add</i>	12.76	
<i>For >0.25 To 0.75, Add</i>	6.38	
<i>For >2.0, Deduct</i>	-2.55	
<i>For UV Black, Add</i>	0.86	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.66	
26 05 29 00-0123 C 4" Length, 18 LB Tensile Strength, Nylon Cable Ties.....	31.46	
<i>For Up To 0.1, Add</i>	25.52	
<i>For >0.1 To 0.25, Add</i>	12.76	
<i>For >0.25 To 0.75, Add</i>	6.38	
<i>For >2.0, Deduct</i>	-2.55	
<i>For UV Black, Add</i>	0.89	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.66	
26 05 29 00-0124 C 4-3/4" Length, 18 LB Tensile Strength, Nylon Cable Ties.....	31.62	
<i>For Up To 0.1, Add</i>	25.52	
<i>For >0.1 To 0.25, Add</i>	12.76	
<i>For >0.25 To 0.75, Add</i>	6.38	
<i>For >2.0, Deduct</i>	-2.55	
<i>For UV Black, Add</i>	0.92	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.66	
26 05 29 00-0125 C 5-1/2" Length, 18 LB Tensile Strength, Nylon Cable Ties.....	31.68	
<i>For Up To 0.1, Add</i>	25.52	
<i>For >0.1 To 0.25, Add</i>	12.76	
<i>For >0.25 To 0.75, Add</i>	6.38	
<i>For >2.0, Deduct</i>	-2.55	
<i>For UV Black, Add</i>	0.92	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.66	
26 05 29 00-0126 C 6-1/2" Length, 18 LB Tensile Strength, Nylon Cable Ties.....	32.85	
<i>For Up To 0.1, Add</i>	26.62	
<i>For >0.1 To 0.25, Add</i>	13.31	
<i>For >0.25 To 0.75, Add</i>	6.66	
<i>For >2.0, Deduct</i>	-2.66	
<i>For UV Black, Add</i>	0.93	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.99	
26 05 29 00-0127 C 8" Length, 18 LB Tensile Strength, Nylon Cable Ties.....	38.90	
<i>For Up To 0.1, Add</i>	27.84	
<i>For >0.1 To 0.25, Add</i>	13.92	
<i>For >0.25 To 0.75, Add</i>	6.96	
<i>For >2.0, Deduct</i>	-2.78	
<i>For UV Black, Add</i>	1.66	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.35	
26 05 29 00-0128 C 4-3/4" Length, 40 LB Tensile Strength, Nylon Cable Ties.....	37.38	
<i>For Up To 0.1, Add</i>	25.52	
<i>For >0.1 To 0.25, Add</i>	12.76	
<i>For >0.25 To 0.75, Add</i>	6.38	
<i>For >2.0, Deduct</i>	-2.55	
<i>For UV Black, Add</i>	1.78	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.66	
26 05 29 00-0129 C 6" Length, 40 LB Tensile Strength, Nylon Cable Ties.....	38.57	
<i>For Up To 0.1, Add</i>	26.62	
<i>For >0.1 To 0.25, Add</i>	13.31	
<i>For >0.25 To 0.75, Add</i>	6.66	
<i>For >2.0, Deduct</i>	-2.66	
<i>For UV Black, Add</i>	1.79	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.99	
26 05 29 00-0130 C 8" Length, 40 LB Tensile Strength, Nylon Cable Ties.....	39.85	
<i>For Up To 0.1, Add</i>	27.84	
<i>For >0.1 To 0.25, Add</i>	13.92	
<i>For >0.25 To 0.75, Add</i>	6.96	
<i>For >2.0, Deduct</i>	-2.78	
<i>For UV Black, Add</i>	1.80	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.35	

26 Electrical

26 05 Common Work Results for Electrical

26 05 29 Hangers and Supports for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 29 00-0131	C 10" Length, 40 LB Tensile Strength, Nylon Cable Ties.....	57.72	
	<i>For Up To 0.1, Add</i>	30.01	
	<i>For >0.1 To 0.25, Add</i>	15.01	
	<i>For >0.25 To 0.75, Add</i>	7.50	
	<i>For >2.0, Deduct</i>	-3.00	
	<i>For UV Black, Add</i>	4.16	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.00	
26 05 29 00-0132	C 11-1/2" Length, 40 LB Tensile Strength, Nylon Cable Ties.....	60.22	
	<i>For Up To 0.1, Add</i>	30.01	
	<i>For >0.1 To 0.25, Add</i>	15.01	
	<i>For >0.25 To 0.75, Add</i>	7.50	
	<i>For >2.0, Deduct</i>	-3.00	
	<i>For UV Black, Add</i>	4.53	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.00	
26 05 29 00-0133	C 7" Length, 50 LB Tensile Strength, Nylon Cable Ties.....	41.60	
	<i>For Up To 0.1, Add</i>	27.84	
	<i>For >0.1 To 0.25, Add</i>	13.92	
	<i>For >0.25 To 0.75, Add</i>	6.96	
	<i>For >2.0, Deduct</i>	-2.78	
	<i>For UV Black, Add</i>	2.06	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.35	
26 05 29 00-0134	C 8" Length, 50 LB Tensile Strength, Nylon Cable Ties.....	39.39	
	<i>For Up To 0.1, Add</i>	27.84	
	<i>For >0.1 To 0.25, Add</i>	13.92	
	<i>For >0.25 To 0.75, Add</i>	6.96	
	<i>For >2.0, Deduct</i>	-2.78	
	<i>For UV Black, Add</i>	1.73	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.35	
26 05 29 00-0135	C 11" Length, 50 LB Tensile Strength, Nylon Cable Ties.....	58.40	
	<i>For Up To 0.1, Add</i>	30.01	
	<i>For >0.1 To 0.25, Add</i>	15.01	
	<i>For >0.25 To 0.75, Add</i>	7.50	
	<i>For >2.0, Deduct</i>	-3.00	
	<i>For UV Black, Add</i>	4.26	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.00	
26 05 29 00-0136	C 14-1/2" Length, 50 LB Tensile Strength, Nylon Cable Ties.....	66.80	
	<i>For Up To 0.1, Add</i>	31.89	
	<i>For >0.1 To 0.25, Add</i>	15.95	
	<i>For >0.25 To 0.75, Add</i>	7.97	
	<i>For >2.0, Deduct</i>	-3.19	
	<i>For UV Black, Add</i>	5.24	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.57	
26 05 29 00-0137	C 8" Length, 120 LB Tensile Strength, Nylon Cable Ties.....	65.30	
	<i>For Up To 0.1, Add</i>	27.84	
	<i>For >0.1 To 0.25, Add</i>	13.92	
	<i>For >0.25 To 0.75, Add</i>	6.96	
	<i>For >2.0, Deduct</i>	-2.78	
	<i>For UV Black, Add</i>	5.62	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.35	
26 05 29 00-0138	C 11" Length, 120 LB Tensile Strength, Nylon Cable Ties.....	71.48	
	<i>For Up To 0.1, Add</i>	30.01	
	<i>For >0.1 To 0.25, Add</i>	15.01	
	<i>For >0.25 To 0.75, Add</i>	7.50	
	<i>For >2.0, Deduct</i>	-3.00	
	<i>For UV Black, Add</i>	6.22	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.00	
26 05 29 00-0139	C 15" Length, 120 LB Tensile Strength, Nylon Cable Ties.....	86.44	
	<i>For Up To 0.1, Add</i>	31.89	
	<i>For >0.1 To 0.25, Add</i>	15.95	
	<i>For >0.25 To 0.75, Add</i>	7.97	
	<i>For >2.0, Deduct</i>	-3.19	
	<i>For UV Black, Add</i>	8.18	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.57	
26 05 29 00-0140	C 17" Length, 120 LB Tensile Strength, Nylon Cable Ties.....	123.39	
	<i>For Up To 0.1, Add</i>	34.02	
	<i>For >0.1 To 0.25, Add</i>	17.01	
	<i>For >0.25 To 0.75, Add</i>	8.51	
	<i>For >2.0, Deduct</i>	-3.40	
	<i>For UV Black, Add</i>	13.41	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.21	
26 05 29 00-0141	C 17-3/4" Length, 175 LB Tensile Strength, Nylon Cable Ties.....	119.58	
	<i>For Up To 0.1, Add</i>	34.02	
	<i>For >0.1 To 0.25, Add</i>	17.01	
	<i>For >0.25 To 0.75, Add</i>	8.51	
	<i>For >2.0, Deduct</i>	-3.40	
	<i>For UV Black, Add</i>	12.83	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.21	
26 05 29 00-0142	C 21-11/16" Length, 175 LB Tensile Strength, Nylon Cable Ties.....	145.55	
	<i>For Up To 0.1, Add</i>	35.61	
	<i>For >0.1 To 0.25, Add</i>	17.81	
	<i>For >0.25 To 0.75, Add</i>	8.90	
	<i>For >2.0, Deduct</i>	-3.56	
	<i>For UV Black, Add</i>	16.49	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.68	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 29 00-0143 C 30" Length, 175 LB Tensile Strength, Nylon Cable Ties.....	168.38	
<i>For Up To 0.1, Add</i>	37.34	
<i>For >0.1 To 0.25, Add</i>	18.67	
<i>For >0.25 To 0.75, Add</i>	9.34	
<i>For >2.0, Deduct</i>	-3.73	
<i>For UV Black, Add</i>	19.66	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.20	
26 05 29 00-0144 C 46" Length, 175 LB Tensile Strength, Nylon Cable Ties.....	230.69	
<i>For Up To 0.1, Add</i>	40.29	
<i>For >0.1 To 0.25, Add</i>	20.15	
<i>For >0.25 To 0.75, Add</i>	10.07	
<i>For >2.0, Deduct</i>	-4.03	
<i>For UV Black, Add</i>	28.56	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.09	
26 05 29 00-0145 C 3/4" x 3/4" Self Adhesive Tie Mounts.....	41.07	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.48	
26 05 29 00-0146 C 1.1" x 1.1" Tie Mounts With Screw.....	81.43	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.97	
26 05 29 00-0147 EA 6" Length x 1/2" Width, Velcro Grip Cable Tie.....	2.41	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	0.18	
26 05 29 00-0148 EA 8" Length x 1/2" Width, Velcro Grip Cable Tie.....	2.42	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	0.15	
26 05 29 00-0149 EA 12" Length x 1/2" Width, Velcro Grip Cable Tie.....	2.97	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	0.15	
26 05 29 00-0150 EA 15" Length x 3/4" Width, Velcro Grip Cable Tie.....	4.17	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	0.15	
26 05 29 00-0151 EA 180" Length x 3/4" Width, Velcro Grip Cable Tie Roll.....	107.00	
Note: Cut to length.		
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.15	
26 05 29 00-0152 Fastening Devices For Wireway And Conduit <small>(26 05 29)</small>		
Note: Includes drilling of holes with power tools in concrete, brick, concrete block, wood, tile or steel and alignment of hangers and supports for bolts.		
26 05 29 00-0153 Toggle Bolts <small>(26 05 29 00-0152)</small>		
Note: Includes machine screw, toggle wing and drilling in concrete, concrete block, wood or steel.		
26 05 29 00-0154 EA 1/8" Diameter, 3" Length, Zinc Plated Steel, Toggle Bolt.....	9.55	
<i>For >50 To 100, Deduct</i>	-0.91	
<i>For >500, Deduct</i>	-4.53	
<i>For >250 To 500, Deduct</i>	-3.17	
<i>For >100 To 250, Deduct</i>	-1.82	
26 05 29 00-0155 EA 1/8" Diameter, 4" Length, Zinc Plated Steel, Toggle Bolt.....	9.82	
<i>For >50 To 100, Deduct</i>	-0.93	
<i>For >500, Deduct</i>	-4.65	
<i>For >250 To 500, Deduct</i>	-3.26	
<i>For >100 To 250, Deduct</i>	-1.87	
26 05 29 00-0156 EA 3/16" Diameter, 3" Length, Zinc Plated Steel, Toggle Bolt.....	10.37	
<i>For >50 To 100, Deduct</i>	-0.96	
<i>For >500, Deduct</i>	-4.79	
<i>For >250 To 500, Deduct</i>	-3.36	
<i>For >100 To 250, Deduct</i>	-1.93	
26 05 29 00-0157 EA 3/16" Diameter, 4" Length, Zinc Plated Steel, Toggle Bolt.....	10.63	
<i>For >50 To 100, Deduct</i>	-0.99	
<i>For >500, Deduct</i>	-4.90	
<i>For >250 To 500, Deduct</i>	-3.44	
<i>For >100 To 250, Deduct</i>	-1.97	
26 05 29 00-0158 EA 1/4" Diameter, 4" Length, Zinc Plated Steel, Toggle Bolt.....	10.88	
<i>For >50 To 100, Deduct</i>	-1.01	
<i>For >500, Deduct</i>	-5.02	
<i>For >250 To 500, Deduct</i>	-3.52	
<i>For >100 To 250, Deduct</i>	-2.02	
26 05 29 00-0159 EA 5/16" Diameter, 4" Length, Zinc Plated Steel, Toggle Bolt.....	12.43	
<i>For >50 To 100, Deduct</i>	-1.07	
<i>For >500, Deduct</i>	-5.27	
<i>For >250 To 500, Deduct</i>	-3.70	
<i>For >100 To 250, Deduct</i>	-2.13	
26 05 29 00-0160 EA 3/8" Diameter, 4" Length, Zinc Plated Steel, Toggle Bolt.....	12.95	
<i>For >50 To 100, Deduct</i>	-1.09	
<i>For >500, Deduct</i>	-5.41	
<i>For >250 To 500, Deduct</i>	-3.80	
<i>For >100 To 250, Deduct</i>	-2.19	
26 05 29 00-0161 Machine Screws <small>(26 05 29 00-0152)</small>		
Note: Includes drilling in concrete, concrete block, wood or steel.		
26 05 29 00-0162 EA #8 Diameter, 2" Length, Zinc Plated Steel, Machine Screw.....	2.81	
<i>For >50 To 100, Deduct</i>	-0.27	
<i>For >500, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-0.96	
<i>For >100 To 250, Deduct</i>	-0.55	
26 05 29 00-0163 EA #10 Diameter, 2" Length, Zinc Plated Steel, Machine Screw.....	2.86	
<i>For >50 To 100, Deduct</i>	-0.27	
<i>For >500, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-0.96	
<i>For >100 To 250, Deduct</i>	-0.55	

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0164	EA		1/4" Diameter, 2" Length, Zinc Plated Steel, Machine Screw	3.59	
			<i>For >50 To 100, Deduct</i>	-0.34	
			<i>For >500, Deduct</i>	-1.72	
			<i>For >250 To 500, Deduct</i>	-1.20	
			<i>For >100 To 250, Deduct</i>	-0.69	
26 05 29 00-0165	EA		5/16" Diameter, 2" Length, Zinc Plated Steel, Machine Screw	3.77	
			<i>For >50 To 100, Deduct</i>	-0.35	
			<i>For >500, Deduct</i>	-1.74	
			<i>For >250 To 500, Deduct</i>	-1.22	
			<i>For >100 To 250, Deduct</i>	-0.70	
26 05 29 00-0166	EA		3/8" Diameter, 2" Length, Zinc Plated Steel, Machine Screw	4.67	
			<i>For >50 To 100, Deduct</i>	-0.42	
			<i>For >500, Deduct</i>	-2.10	
			<i>For >250 To 500, Deduct</i>	-1.47	
			<i>For >100 To 250, Deduct</i>	-0.84	
26 05 29 00-0167			Hex Lag Bolts With Lag Shield Expansion Anchors <small>(26 05 29 00-0152)</small>		
			Note: Includes lag bolt, lag shield expansion anchor and drilling in concrete, concrete block, wood or steel.		
26 05 29 00-0168	EA		1/4" Diameter, 2" Length, Zinc Plated Steel, Hex Lag Bolt With Lag Shield Expansion Anchor	4.70	
			<i>For >50 To 100, Deduct</i>	-0.37	
			<i>For >500, Deduct</i>	-1.83	
			<i>For >250 To 500, Deduct</i>	-1.29	
			<i>For >100 To 250, Deduct</i>	-0.75	
26 05 29 00-0169	EA		5/16" Diameter, 2" Length, Zinc Plated Steel, Hex Lag Bolt With Lag Shield Expansion Anchor	4.63	
			<i>For >50 To 100, Deduct</i>	-0.37	
			<i>For >500, Deduct</i>	-1.82	
			<i>For >250 To 500, Deduct</i>	-1.28	
			<i>For >100 To 250, Deduct</i>	-0.74	
26 05 29 00-0170	EA		3/8" Diameter, 2" Length, Zinc Plated Steel, Hex Lag Bolt With Lag Shield Expansion Anchor	6.65	
			<i>For >50 To 100, Deduct</i>	-0.47	
			<i>For >500, Deduct</i>	-2.29	
			<i>For >250 To 500, Deduct</i>	-1.62	
			<i>For >100 To 250, Deduct</i>	-0.94	
26 05 29 00-0171	EA		1/2" Diameter, 2" Length, Zinc Plated Steel, Hex Lag Bolt With Lag Shield Expansion Anchor	8.52	
			<i>For >50 To 100, Deduct</i>	-0.57	
			<i>For >500, Deduct</i>	-2.74	
			<i>For >250 To 500, Deduct</i>	-1.94	
			<i>For >100 To 250, Deduct</i>	-1.14	
26 05 29 00-0172			Hanger Lag Bolts With Hex Nuts <small>(26 05 29 00-0152)</small>		
			Note: Includes hanger lag bolt (threaded one side), hex nut and drilling in concrete, concrete block, wood or steel.		
26 05 29 00-0173	EA		1/4" Diameter, 2" Length, Zinc Plated Steel, Hanger Lag Bolt With Hex Nut	3.49	
			<i>For >50 To 100, Deduct</i>	-0.29	
			<i>For >500, Deduct</i>	-1.43	
			<i>For >250 To 500, Deduct</i>	-1.01	
			<i>For >100 To 250, Deduct</i>	-0.58	
26 05 29 00-0174	EA		5/16" Diameter, 2" Length, Zinc Plated Steel, Hanger Lag Bolt With Hex Nut	3.55	
			<i>For >50 To 100, Deduct</i>	-0.29	
			<i>For >500, Deduct</i>	-1.44	
			<i>For >250 To 500, Deduct</i>	-1.01	
			<i>For >100 To 250, Deduct</i>	-0.58	
26 05 29 00-0175	EA		3/8" Diameter, 2-1/2" Length, Zinc Plated Steel, Hanger Lag Bolt With Hex Nut	4.23	
			<i>For >50 To 100, Deduct</i>	-0.33	
			<i>For >500, Deduct</i>	-1.64	
			<i>For >250 To 500, Deduct</i>	-1.15	
			<i>For >100 To 250, Deduct</i>	-0.67	
26 05 29 00-0176			Hollow Wall Screw Anchors <small>(26 05 29 00-0152)</small>		
26 05 29 00-0177	EA		6-32 Screw Size, 5/16" Hole Diameter, 1/8" To 5/8" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor	2.06	
			<i>For >50 To 100, Deduct</i>	-0.17	
			<i>For >500, Deduct</i>	-0.86	
			<i>For >250 To 500, Deduct</i>	-0.60	
			<i>For >100 To 250, Deduct</i>	-0.35	
26 05 29 00-0178	EA		6-32 Screw Size, 5/16" Hole Diameter, 5/8" To 1-1/4" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor	2.13	
			<i>For >50 To 100, Deduct</i>	-0.18	
			<i>For >500, Deduct</i>	-0.87	
			<i>For >250 To 500, Deduct</i>	-0.61	
			<i>For >100 To 250, Deduct</i>	-0.35	
26 05 29 00-0179	EA		6-32 Screw Size, 5/16" Hole Diameter, 1-1/4" To 1-3/4" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor	2.23	
			<i>For >50 To 100, Deduct</i>	-0.18	
			<i>For >500, Deduct</i>	-0.88	
			<i>For >250 To 500, Deduct</i>	-0.62	
			<i>For >100 To 250, Deduct</i>	-0.36	
26 05 29 00-0180	EA		10-24 Screw Size, 3/8" Hole Diameter, 1/8" To 5/8" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor	2.84	
			<i>For >50 To 100, Deduct</i>	-0.21	
			<i>For >500, Deduct</i>	-1.04	
			<i>For >250 To 500, Deduct</i>	-0.73	
			<i>For >100 To 250, Deduct</i>	-0.43	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 29 00-0181 EA 10-24 Screw Size, 3/8" Hole Diameter, 5/8" To 1-1/4" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor.....	2.99	
<i>For >50 To 100, Deduct</i>	-0.22	
<i>For >500, Deduct</i>	-1.06	
<i>For >250 To 500, Deduct</i>	-0.74	
<i>For >100 To 250, Deduct</i>	-0.43	
26 05 29 00-0182 EA 10-24 Screw Size, 3/8" Hole Diameter, 1-1/4" To 1-3/4" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor.....	3.03	
<i>For >50 To 100, Deduct</i>	-0.22	
<i>For >500, Deduct</i>	-1.06	
<i>For >250 To 500, Deduct</i>	-0.75	
<i>For >100 To 250, Deduct</i>	-0.44	
26 05 29 00-0183 EA 1/4-20 Screw Size, 7/16" Hole Diameter, 1/8" To 5/8" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor.....	3.06	
<i>For >50 To 100, Deduct</i>	-0.22	
<i>For >500, Deduct</i>	-1.06	
<i>For >250 To 500, Deduct</i>	-0.75	
<i>For >100 To 250, Deduct</i>	-0.44	
26 05 29 00-0184 EA 1/4-20 Screw Size, 7/16" Hole Diameter, 5/8" To 1-1/4" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor.....	3.28	
<i>For >50 To 100, Deduct</i>	-0.22	
<i>For >500, Deduct</i>	-1.08	
<i>For >250 To 500, Deduct</i>	-0.77	
<i>For >100 To 250, Deduct</i>	-0.45	
26 05 29 00-0185 EA 1/4-20 Screw Size, 7/16" Hole Diameter, 1-1/4" To 1-3/4" Grip Range, Zinc Plated Steel, Hollow Wall Screw Anchor.....	3.36	
<i>For >50 To 100, Deduct</i>	-0.23	
<i>For >500, Deduct</i>	-1.09	
<i>For >250 To 500, Deduct</i>	-0.77	
<i>For >100 To 250, Deduct</i>	-0.45	
26 05 29 00-0186 Lead Screw Anchors <small>(26 05 29 00-0152)</small>		
Note: Includes screw.		
26 05 29 00-0187 EA #6-8 Screw Size, 1/4" Hole Diameter, Lead Screw Anchor With Screw.....	4.72	
<i>For >50 To 100, Deduct</i>	-0.43	
<i>For >500, Deduct</i>	-2.14	
<i>For >250 To 500, Deduct</i>	-1.50	
<i>For >100 To 250, Deduct</i>	-0.86	
26 05 29 00-0188 EA #10-14 Screw Size, 5/16" Hole Diameter, Lead Screw Anchor With Screw.....	5.64	
<i>For >50 To 100, Deduct</i>	-0.50	
<i>For >500, Deduct</i>	-2.49	
<i>For >250 To 500, Deduct</i>	-1.75	
<i>For >100 To 250, Deduct</i>	-1.01	
26 05 29 00-0189 EA #16-18 Screw Size, 5/16" Hole Diameter, Lead Screw Anchor With Screw.....	7.67	
<i>For >50 To 100, Deduct</i>	-0.65	
<i>For >500, Deduct</i>	-3.22	
<i>For >250 To 500, Deduct</i>	-2.26	
<i>For >100 To 250, Deduct</i>	-1.30	
26 05 29 00-0190 Nailing Anchor Hilti HPS Impact Anchor Or Equal <small>(26 05 29 00-0152)</small>		
26 05 29 00-0191 EA 1/4" x 1" Nail-In Drilling In Concrete, Concrete Block, Wood Or Steel.....	1.73	
<i>For >50 To 100, Deduct</i>	-0.13	
<i>For >500, Deduct</i>	-0.63	
<i>For >250 To 500, Deduct</i>	-0.44	
<i>For >100 To 250, Deduct</i>	-0.26	
26 05 29 00-0192 EA 1/4" x 1-3/4" Nail-In Drilling In Concrete, Concrete Block, Wood Or Steel.....	2.96	
<i>For >50 To 100, Deduct</i>	-0.24	
<i>For >500, Deduct</i>	-1.20	
<i>For >250 To 500, Deduct</i>	-0.84	
<i>For >100 To 250, Deduct</i>	-0.49	
26 05 29 00-0193 EA 1/4" x 2-1/8" Nail-In Drilling In Concrete, Concrete Block, Wood Or Steel.....	4.20	
<i>For >50 To 100, Deduct</i>	-0.36	
<i>For >500, Deduct</i>	-1.78	
<i>For >250 To 500, Deduct</i>	-1.25	
<i>For >100 To 250, Deduct</i>	-0.72	
26 05 29 00-0194 Acoustical T-Bar Clips <small>(26 05 29 00-0152)</small>		
Note: For conduit installation above suspended ceilings up to 15' height.		
26 05 29 00-0195 EA 1/2" Conduit, Push-In Acoustical T-Bar Clip.....	7.40	
<i>For >50 To 100, Deduct</i>	-0.58	
<i>For >500, Deduct</i>	-2.82	
<i>For >250 To 500, Deduct</i>	-1.99	
<i>For >100 To 250, Deduct</i>	-1.15	
26 05 29 00-0196 EA 3/4" Conduit, Push-In Acoustical T-Bar Clip.....	7.76	
<i>For >50 To 100, Deduct</i>	-0.61	
<i>For >500, Deduct</i>	-2.97	
<i>For >250 To 500, Deduct</i>	-2.09	
<i>For >100 To 250, Deduct</i>	-1.21	
26 05 29 00-0197 EA 1" Conduit, Push-In Acoustical T-Bar Clip.....	8.43	
<i>For >50 To 100, Deduct</i>	-0.64	
<i>For >500, Deduct</i>	-3.16	
<i>For >250 To 500, Deduct</i>	-2.22	
<i>For >100 To 250, Deduct</i>	-1.29	
26 05 29 00-0198 Threaded Rod, Accessories And Attachments <small>(26 05 29)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 29 00-0199	Threaded Rod And Rod Accessories <small>(26 05 29 00-0199)</small>		
26 05 29 00-0200	Carbon Steel Threaded Rod <small>(26 05 29 00-0199)</small> Note: Includes plain finish.		
26 05 29 00-0201	LF 3/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	5.25	0.77
	For Galvanized, Add	1.48	
	For Zinc Coated, Add	1.06	
26 05 29 00-0202	LF 1/2" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	7.53	0.82
	For Galvanized, Add	2.36	
	For Zinc Coated, Add	1.68	
26 05 29 00-0203	LF 5/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	10.83	0.84
	For Galvanized, Add	3.66	
	For Zinc Coated, Add	2.60	
26 05 29 00-0204	LF 3/4" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	18.34	0.87
	For Galvanized, Add	6.64	
	For Zinc Coated, Add	4.73	
26 05 29 00-0205	LF 7/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	20.04	0.90
	For Galvanized, Add	7.30	
	For Zinc Coated, Add	5.20	
26 05 29 00-0206	LF 1" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	27.65	1.01
	For Galvanized, Add	10.24	
	For Zinc Coated, Add	7.30	
26 05 29 00-0207	LF 1-1/8" Diameter, Plain Finish Steel, Low Carbon Threaded Rod	34.57	1.13
	For Galvanized, Add	12.92	
	For Zinc Coated, Add	9.21	
26 05 29 00-0208	Threaded Rod Couplings <small>(26 05 29 00-0199)</small>		
26 05 29 00-0209	EA 3/8" Diameter, Threaded Rod Coupling Nut	9.97	
26 05 29 00-0210	EA 1/2" Diameter, Threaded Rod Coupling Nut	11.32	
26 05 29 00-0211	EA 5/8" Diameter, Threaded Rod Coupling Nut	14.22	
26 05 29 00-0212	EA 3/4" Diameter, Threaded Rod Coupling Nut	17.41	
26 05 29 00-0213	EA 7/8" Diameter, Threaded Rod Coupling Nut	25.79	
26 05 29 00-0214	EA 1" Diameter, Threaded Rod Coupling Nut	30.59	
26 05 29 00-0215	EA 1-1/8" Diameter, Threaded Rod Coupling Nut	59.21	
26 05 29 00-0216	Flat Washers <small>(26 05 29 00-0199)</small>		
26 05 29 00-0217	EA 3/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	0.85	0.30
	For Galvanized, Add	0.04	
26 05 29 00-0218	EA 1/2" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	1.10	0.30
	For Galvanized, Add	0.09	
26 05 29 00-0219	EA 5/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	1.46	0.30
	For Galvanized, Add	0.17	
26 05 29 00-0220	EA 3/4" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	1.80	0.61
	For Galvanized, Add	0.24	
26 05 29 00-0221	EA 7/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	2.03	0.61
	For Galvanized, Add	0.28	
26 05 29 00-0222	EA 1" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	2.41	0.61
	For Galvanized, Add	0.35	
26 05 29 00-0223	EA 1-1/8" Inside Diameter, Zinc Plated Steel, Low Carbon Flat Washer	2.70	0.61
	For Galvanized, Add	0.39	
26 05 29 00-0224	Malleable Iron Eye Sockets <small>(26 05 29 00-0199)</small> Note: Type 16.		
26 05 29 00-0225	EA 3/8" Rod Size, Malleable Iron Eye Socket	11.60	
26 05 29 00-0226	EA 1/2" Rod Size, Malleable Iron Eye Socket	13.88	
26 05 29 00-0227	EA 5/8" Rod Size, Malleable Iron Eye Socket	24.24	
26 05 29 00-0228	EA 3/4" Rod Size, Malleable Iron Eye Socket	34.59	
26 05 29 00-0229	EA 7/8" Rod Size, Malleable Iron Eye Socket	36.84	
26 05 29 00-0230	Hex Nuts <small>(26 05 29 00-0199)</small>		
26 05 29 00-0231	EA 3/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	0.82	0.30
	For Galvanized, Add	0.03	
26 05 29 00-0232	EA 1/2" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.05	0.30
	For Galvanized, Add	0.07	
26 05 29 00-0233	EA 5/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.46	0.30
	For Galvanized, Add	0.17	
26 05 29 00-0234	EA 3/4" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	1.74	0.61
	For Galvanized, Add	0.22	
26 05 29 00-0235	EA 7/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	2.58	0.61
	For Galvanized, Add	0.42	
26 05 29 00-0236	EA 1" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	3.29	0.61
	For Galvanized, Add	0.57	
26 05 29 00-0237	EA 1-1/8" Diameter, Zinc Plated Steel, Low Carbon/Grade 2 Hex Nut	5.43	0.61
	For Galvanized, Add	1.08	
26 05 29 00-0238	Forged Steel Turnbuckles <small>(26 05 29 00-0199)</small> Note: Type 13.		
26 05 29 00-0239	EA 3/8" Thread Diameter, Forged Steel Turnbuckle Body	28.41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 29 00-0240 EA 1/2" Thread Diameter, Forged Steel Turnbuckle Body	35.08	
26 05 29 00-0241 EA 5/8" Thread Diameter, Forged Steel Turnbuckle Body	46.94	
26 05 29 00-0242 EA 3/4" Thread Diameter, Forged Steel Turnbuckle Body	58.07	
26 05 29 00-0243 EA 7/8" Thread Diameter, Forged Steel Turnbuckle Body	142.68	
26 05 29 00-0244 EA 1" Thread Diameter, Forged Steel Turnbuckle Body	95.08	
26 05 29 00-0245 EA 1-1/4" Thread Diameter, Forged Steel Turnbuckle Body	190.97	
26 05 29 00-0246 Attachments <small>(26 05 29 00-0198)</small>		
26 05 29 00-0247 Welded Beam Attachments <small>(26 05 29 00-0246)</small>		
<i>Note: Type 22.</i>		
26 05 29 00-0248 EA 3/8" Rod Size, Welded Beam Attachment	52.19	12.23
26 05 29 00-0249 EA 1/2" Rod Size, Welded Beam Attachment	55.66	12.84
26 05 29 00-0250 EA 5/8" Rod Size, Welded Beam Attachment	59.24	13.57
26 05 29 00-0251 EA 3/4" Rod Size, Welded Beam Attachment	75.21	14.43
26 05 29 00-0252 EA 7/8" Rod Size, Welded Beam Attachment	90.00	15.28
26 05 29 00-0253 EA 1" Rod Size, Welded Beam Attachment	125.68	17.49
26 05 29 00-0254 EA 1-1/8" Rod Size, Welded Beam Attachment	177.17	18.34
26 05 29 00-0255 C-Clamp Style Beam Clamps <small>(26 05 29 00-0246)</small>		
<i>Note: Type 23. Top or bottom flange mount.</i>		
26 05 29 00-0256 EA 3/8" Rod Size, C-Clamp Style Beam Clamp	18.70	9.19
26 05 29 00-0257 EA 1/2" Rod Size, C-Clamp Style Beam Clamp	22.20	9.80
26 05 29 00-0258 EA 5/8" Rod Size, C-Clamp Style Beam Clamp	25.14	10.50
26 05 29 00-0259 EA 3/4" Rod Size, C-Clamp Style Beam Clamp	32.09	11.30
26 05 29 00-0260 EA 7/8" Rod Size, C-Clamp Style Beam Clamp	46.16	12.25
26 05 29 00-0261 Bottom Mount I-Beam Clamps <small>(26 05 29 00-0246)</small>		
<i>Note: Type 21. For attaching threaded rod centered under beam flanges.</i>		
26 05 29 00-0262 EA 3/8" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp	50.20	12.25
26 05 29 00-0263 EA 1/2" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp	73.29	13.36
26 05 29 00-0264 EA 5/8" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp	104.28	14.70
26 05 29 00-0265 EA 3/4" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp	124.69	16.33
26 05 29 00-0266 EA 1" Rod Size, Up To 6" Flange Width, Bottom Mount I-Beam Clamp	299.78	18.37
26 05 29 00-0267 Steel U-Bolts <small>(26 05 29 00-0246)</small>		
<i>Note: Type 24. Includes plate and nuts.</i>		
26 05 29 00-0268 EA 1/2" Pipe Size, Zinc Plated Steel, U-Bolt	15.23	7.35
26 05 29 00-0269 EA 3/4" Pipe Size, Zinc Plated Steel, U-Bolt	16.50	7.74
26 05 29 00-0270 EA 1" Pipe Size, Zinc Plated Steel, U-Bolt	17.74	8.16
26 05 29 00-0271 EA 1-1/4" Pipe Size, Zinc Plated Steel, U-Bolt	20.10	8.64
26 05 29 00-0272 EA 1-1/2" Pipe Size, Zinc Plated Steel, U-Bolt	20.79	9.19
26 05 29 00-0273 EA 2" Pipe Size, Zinc Plated Steel, U-Bolt	22.25	9.80
26 05 29 00-0274 EA 2-1/2" Pipe Size, Zinc Plated Steel, U-Bolt	31.68	10.50
26 05 29 00-0275 EA 3" Pipe Size, Zinc Plated Steel, U-Bolt	34.89	11.30
26 05 29 00-0276 EA 4" Pipe Size, Zinc Plated Steel, U-Bolt	42.02	12.25
26 05 29 00-0277 Stainless Steel Threaded Rod <small>(26 05 29 00-0198)</small>		
26 05 29 00-0278 LF 1/4" Diameter, 304/18-8 Stainless Steel Threaded Rod	4.17	0.61
<i>For 316 Stainless Steel, Add</i>		
	1.19	
26 05 29 00-0279 LF 5/16" Diameter, 304/18-8 Stainless Steel Threaded Rod	6.39	0.67
<i>For 316 Stainless Steel, Add</i>		
	2.04	
26 05 29 00-0280 LF 3/8" Diameter, 304/18-8 Stainless Steel Threaded Rod	8.27	0.77
<i>For 316 Stainless Steel, Add</i>		
	2.73	
26 05 29 00-0281 LF 7/16" Diameter, 304/18-8 Stainless Steel Threaded Rod	11.59	0.79
<i>For 316 Stainless Steel, Add</i>		
	4.05	
26 05 29 00-0282 LF 1/2" Diameter, 304/18-8 Stainless Steel Threaded Rod	13.96	0.82
<i>For 316 Stainless Steel, Add</i>		
	4.99	
26 05 29 00-0283 LF 5/8" Diameter, 304/18-8 Stainless Steel Threaded Rod	21.09	0.83
<i>For 316 Stainless Steel, Add</i>		
	7.87	
26 05 29 00-0284 LF 3/4" Diameter, 304/18-8 Stainless Steel Threaded Rod	29.66	0.84
<i>For 316 Stainless Steel, Add</i>		
	11.33	
26 05 29 00-0285 LF 7/8" Diameter, 304/18-8 Stainless Steel Threaded Rod	40.93	0.87
<i>For 316 Stainless Steel, Add</i>		
	15.87	
26 05 29 00-0286 LF 1" Diameter, 304/18-8 Stainless Steel Threaded Rod	52.64	1.01
<i>For 316 Stainless Steel, Add</i>		
	20.49	
26 05 29 00-0287 LF 1-1/4" Diameter, 304/18-8 Stainless Steel Threaded Rod	111.80	1.22
<i>For 316 Stainless Steel, Add</i>		
	44.25	
26 05 29 00-0288 Polyvinyl Chloride (PVC) Coated Supports <small>(26 05 29)</small>		
<i>Note: Includes stainless steel and/or Polyvinyl Chloride (PVC) coated hardware.</i>		
26 05 29 00-0289 Attachments <small>(26 05 29 00-0288)</small>		
26 05 29 00-0290 Polyvinyl Chloride (PVC) Coated Pipe Straps <small>(26 05 29 00-0289)</small>		
<i>Note: Includes stainless steel nuts and bolts.</i>		
26 05 29 00-0291 EA 1/2" Polyvinyl Chloride (PVC) Coated Pipe Strap	25.08	8.07

26 Electrical**26 05 Common Work Results for Electrical****26 05 29 Hangers and Supports for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 29 00-0292	EA	3/4" Polyvinyl Chloride (PVC) Coated Pipe Strap	26.33	8.80
26 05 29 00-0293	EA	1" Polyvinyl Chloride (PVC) Coated Pipe Strap	28.69	9.54
26 05 29 00-0294	EA	1-1/4" Polyvinyl Chloride (PVC) Coated Pipe Strap	32.25	11.00
26 05 29 00-0295	EA	1-1/2" Polyvinyl Chloride (PVC) Coated Pipe Strap	36.93	12.48
26 05 29 00-0296	EA	2" Polyvinyl Chloride (PVC) Coated Pipe Strap	41.17	13.21
26 05 29 00-0297	EA	2-1/2" Polyvinyl Chloride (PVC) Coated Pipe Strap	45.47	14.67
26 05 29 00-0298	EA	3" Polyvinyl Chloride (PVC) Coated Pipe Strap	54.28	16.15
26 05 29 00-0299	EA	3-1/2" Polyvinyl Chloride (PVC) Coated Pipe Strap	59.46	16.88
26 05 29 00-0300	EA	4" Polyvinyl Chloride (PVC) Coated Pipe Strap	62.38	18.34
26 05 29 00-0301	EA	5" Polyvinyl Chloride (PVC) Coated Pipe Strap	66.53	20.54

26 05 29 00-0302 Polymer Concrete Pads (26 05 29)
Note: Excludes excavation and backfill.**26 05 29 00-0303 Polymer Concrete, Box Pads** (26 05 29 00-0302)

26 05 29 00-0304	EA	24" x 36", 18" Depth, Polymer Concrete, Box Pad.....	1,387.07	133.17
26 05 29 00-0305	EA	25" x 25", 24" Depth, Polymer Concrete, Box Pad.....	1,433.38	133.17
26 05 29 00-0306	EA	40" x 44", 15" Depth, Polymer Concrete, Box Pad.....	1,858.94	133.17
26 05 29 00-0307	EA	40" x 44", 24" Depth, Polymer Concrete, Box Pad.....	1,929.49	133.17
26 05 29 00-0308	EA	52" x 36", 18" Depth, Polymer Concrete, Box Pad.....	1,793.26	133.17
26 05 29 00-0309	EA	44" x 44", 32" Depth, Polymer Concrete, Box Pad.....	2,126.47	133.17
26 05 29 00-0310	EA	40" x 58", 24" Depth, Polymer Concrete, Box Pad.....	2,381.96	133.17
26 05 29 00-0311	EA	52" x 50", 18" Depth, Polymer Concrete, Box Pad.....	2,281.46	166.46
26 05 29 00-0312	EA	74" x 76", 36" Depth, Polymer Concrete, Box Pad.....	3,475.23	166.46
26 05 29 00-0313	EA	93" x 93", 36" Depth, Polymer Concrete, Box Pad.....	4,674.91	166.46

26 05 29 00-0314 Polymer Concrete, Telecommunications Equipment Pads (26 05 29 00-0302)

26 05 29 00-0315	EA	42" x 42", 3" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	669.63	72.86
26 05 29 00-0316	EA	48" x 46", 3" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	796.14	72.86
26 05 29 00-0317	EA	60" x 42", 3" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	1,029.10	99.88
26 05 29 00-0318	EA	54" x 48", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	1,076.12	99.88
26 05 29 00-0319	EA	57" x 60", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	1,554.75	99.88
26 05 29 00-0320	EA	72" x 60", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	1,621.27	99.88
26 05 29 00-0321	EA	64" x 72", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	1,745.23	99.88
26 05 29 00-0322	EA	72" x 64", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	1,745.23	99.88
26 05 29 00-0323	EA	76" x 84", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	3,302.45	99.88
26 05 29 00-0324	EA	96" x 84", 4" Thick, Polymer Concrete, Telecommunications Equipment Pad.....	3,746.79	99.88

26 05 29 00-0325 Polymer Concrete, Electrical Equipment Pads (26 05 29 00-0302)

26 05 29 00-0326	EA	24" x 25", 2" Thick, Polymer Concrete, Electrical Equipment Pad	401.70	72.86
26 05 29 00-0327	EA	24" x 36", 2" Thick, Polymer Concrete, Electrical Equipment Pad	434.22	72.86
26 05 29 00-0328	EA	24" x 44", 2" Thick, Polymer Concrete, Electrical Equipment Pad	463.84	72.86
26 05 29 00-0329	EA	24" x 58", 2" Thick, Polymer Concrete, Electrical Equipment Pad	562.25	72.86
26 05 29 00-0330	EA	40" x 40", 3" Thick, Polymer Concrete, Electrical Equipment Pad	518.33	72.86
26 05 29 00-0331	EA	42" x 42", 3" Thick, Polymer Concrete, Electrical Equipment Pad	539.03	72.86
26 05 29 00-0332	EA	48" x 42", 4" Thick, Polymer Concrete, Electrical Equipment Pad	592.67	72.86
26 05 29 00-0333	EA	48" x 46", 3" Thick, Polymer Concrete, Electrical Equipment Pad	623.96	72.86
26 05 29 00-0334	EA	54" x 48", 4" Thick, Polymer Concrete, Electrical Equipment Pad	728.48	72.86
26 05 29 00-0335	EA	56" x 44", 3" Thick, Polymer Concrete, Electrical Equipment Pad	900.63	72.86
26 05 29 00-0336	EA	64" x 64", 4" Thick, Polymer Concrete, Electrical Equipment Pad	1,324.16	99.88
26 05 29 00-0337	EA	66" x 72", 4" Thick, Polymer Concrete, Electrical Equipment Pad	1,387.09	99.88
26 05 29 00-0338	EA	75" x 52", 4" Thick, Polymer Concrete, Electrical Equipment Pad	1,406.94	99.88
26 05 29 00-0339	EA	90" x 48", 4" Thick, Polymer Concrete, Electrical Equipment Pad	1,539.21	99.88
26 05 29 00-0340	EA	84" x 96", 4" Thick, Polymer Concrete, Electrical Equipment Pad	3,308.43	99.88
26 05 29 00-0341	EA	96" x 80", 4" Thick, Polymer Concrete, Electrical Equipment Pad	3,901.03	99.88

26 05 33 Raceway and Boxes for Electrical Systems (26 05)**26 05 33 13 Conduit for Electrical Systems** (26 05 33)**26 05 33 13-0001 Conduit Assemblies With Wire** (26 05 33 13)

Note: Includes conduit, field bending conduit up to and including 1", fittings and wire. Excludes hangers or supports.

26 05 33 13-0002 Electrical Metallic Tubing (EMT) Conduit Assemblies (26 05 33 13-0001)

Note: Includes conduit, field bends, fittings, set screw connectors, set screw couplings, straps, and copper wire as indicated. Per CLF. See CSI section 26 05 19 16-0062 for larger copper conductor, 26 05 33 13-0589 for larger EMT conduit.

26 05 33 13-0003	CLF	1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor	941.95	273.04
		Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
		<i>For 2 #12 THWN Conductor Instead Of THHN, Add</i>	1.69	
26 05 33 13-0004	CLF	1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor	1,025.83	296.50
		Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
		<i>For 3 #12 THWN Conductor Instead Of THHN, Add</i>	2.53	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0005 CLF 1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,109.73	319.96
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For Work In Restricted Working Space, Add</i>	274.29	
<i>For 4 #12 THWN Conductor Instead Of THHN, Add</i>	3.37	
26 05 33 13-0006 CLF 1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	992.40	284.77
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 2 #10 THWN Conductor Instead Of THHN, Add</i>	2.53	
26 05 33 13-0007 CLF 1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,095.93	312.14
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 3 #10 THWN Conductor Instead Of THHN, Add</i>	3.79	
26 05 33 13-0008 CLF 1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,199.45	339.50
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For Work In Restricted Working Space, Add</i>	291.04	
<i>For 4 #10 THWN Conductor Instead Of THHN, Add</i>	5.05	
26 05 33 13-0009 CLF 1/2" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor.....	1,105.41	308.23
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For Work In Restricted Working Space, Add</i>	264.23	
<i>For 2 #8 THWN Conductor Instead Of THHN, Add</i>	4.41	
26 05 33 13-0010 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,062.41	294.37
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 2 #12 THWN Conductor Instead Of THHN, Add</i>	1.69	
26 05 33 13-0011 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,146.30	317.83
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 3 #12 THWN Conductor Instead Of THHN, Add</i>	2.53	
26 05 33 13-0012 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,230.18	341.29
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
26 05 33 13-0013 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 5 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,314.06	364.76
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 5 #12 THWN Conductor Instead Of THHN, Add</i>	4.21	
26 05 33 13-0014 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,112.85	306.10
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 2 #10 THWN Conductor Instead Of THHN, Add</i>	2.53	
26 05 33 13-0015 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,216.39	333.47
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 3 #10 THWN Conductor Instead Of THHN, Add</i>	3.79	
26 05 33 13-0016 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,319.91	360.85
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 4 #10 THWN Conductor Instead Of THHN, Add</i>	5.05	
26 05 33 13-0017 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 5 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor.....	1,423.43	388.22
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For 5 #10 THWN Conductor Instead Of THHN, Add</i>	6.32	
26 05 33 13-0018 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor.....	1,370.48	364.76
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For Work In Restricted Working Space, Add</i>	312.63	
<i>For 3 #8 THWN Conductor Instead Of THHN, Add</i>	6.61	
26 05 33 13-0019 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor.....	1,515.11	399.95
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For Work In Restricted Working Space, Add</i>	342.79	
<i>For 4 #8 THWN Conductor Instead Of THHN, Add</i>	8.82	
26 05 33 13-0020 CLF 3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor.....	1,369.24	353.03
Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available.		
<i>For Work In Restricted Working Space, Add</i>	302.57	
<i>For 2 #6 THWN Conductor Instead Of THHN, Add</i>	7.29	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0021	CLF	3/4" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #6 THWN Conductor Instead Of THHN, Add</i>	1,565.01 339.44 10.93	396.04
26 05 33	13-0022	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 2 #12 THWN Conductor Instead Of THHN, Add</i>	1,238.48 1.69	316.83
26 05 33	13-0023	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 3 #12 THWN Conductor Instead Of THHN, Add</i>	1,322.37 2.53	340.29
26 05 33	13-0024	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 4 #12 THWN Conductor Instead Of THHN, Add</i>	1,406.25 2.53	363.75
26 05 33	13-0025	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 5 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 5 #12 THWN Conductor Instead Of THHN, Add</i>	1,490.14 4.21	387.20
26 05 33	13-0026	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 2 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 2 #10 THWN Conductor Instead Of THHN, Add</i>	1,288.93 2.53	328.56
26 05 33	13-0027	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 3 #10 THWN Conductor Instead Of THHN, Add</i>	1,392.46 3.79	355.93
26 05 33	13-0028	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 4 #10 THWN Conductor Instead Of THHN, Add</i>	1,495.98 5.05	383.29
26 05 33	13-0029	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 5 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For 5 #10 THWN Conductor Instead Of THHN, Add</i>	1,599.51 6.32	410.67
26 05 33	13-0030	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #8 THWN Conductor Instead Of THHN, Add</i>	1,546.56 331.93 6.61	387.20
26 05 33	13-0031	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 3 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #6 THWN Conductor Instead Of THHN, Add</i>	1,741.07 358.74 10.93	418.49
26 05 33	13-0032	CLF	1" Electrical Metallic Tubing (EMT) Conduit Assembly With 4 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, set screw connectors, set screw couplings, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 4 #6 THWN Conductor Instead Of THHN, Add</i>	1,936.84 395.61 14.57	461.50
26 05 33	13-0033		Rigid Galvanized Steel (RGS) Conduit Assemblies <small>(26 05 33 13-0001)</small> Note: Includes conduit, field bends, fittings, terminations, straps, and copper wire as indicated. Per CLF. See CSI section 26 05 19 16-0062 for larger copper conductor, 26 05 33 13-0060 for larger RGS conduit.		
26 05 33	13-0034	CLF	1/2" Rigid Galvanized Steel (RGS) Conduit Assembly With 2 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 2 #12 THWN Conductor Instead Of THHN, Add</i>	1,226.32 1.69	310.79
26 05 33	13-0035	CLF	1/2" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 3 #12 THWN Conductor Instead Of THHN, Add</i>	1,310.19 2.53	334.25
26 05 33	13-0036	CLF	1/2" Rigid Galvanized Steel (RGS) Conduit Assembly With 2 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 2 #10 THWN Conductor Instead Of THHN, Add</i>	1,276.76 2.53	322.52
26 05 33	13-0037	CLF	1/2" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 3 #10 THWN Conductor Instead Of THHN, Add</i>	1,380.28 3.79	349.90

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0038 CLF 1/2" Rigid Galvanized Steel (RGS) Conduit Assembly With 2 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 2 #8 THWN Conductor Instead Of THHN, Add</i>	1,389.76 296.54 4.41	345.98
26 05 33 13-0039 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 2 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 2 #12 THWN Conductor Instead Of THHN, Add</i>	1,352.58 1.69	331.46
26 05 33 13-0040 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 3 #12 THWN Conductor Instead Of THHN, Add</i>	1,436.47 2.53	354.92
26 05 33 13-0041 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 4 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available.	1,520.36	378.38
26 05 33 13-0042 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 2 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 2 #10 THWN Conductor Instead Of THHN, Add</i>	1,403.04 2.53	343.19
26 05 33 13-0043 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 3 #10 THWN Conductor Instead Of THHN, Add</i>	1,506.56 3.79	370.56
26 05 33 13-0044 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 4 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 4 #10 THWN Conductor Instead Of THHN, Add</i>	1,610.08 5.05	397.93
26 05 33 13-0045 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #8 THWN Conductor Instead Of THHN, Add</i>	1,660.66 344.40 6.61	401.84
26 05 33 13-0046 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 4 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 4 #8 THWN Conductor Instead Of THHN, Add</i>	1,805.28 374.56 8.82	437.03
26 05 33 13-0047 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 2 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 2 #6 THWN Conductor Instead Of THHN, Add</i>	1,659.42 334.35 7.29	390.11
26 05 33 13-0048 CLF 3/4" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #6 THWN Conductor Instead Of THHN, Add</i>	1,855.18 371.21 10.93	433.12
26 05 33 13-0049 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 3 #12 THWN Conductor Instead Of THHN, Add</i>	1,747.60 2.53	395.82
26 05 33 13-0050 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 4 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available.	1,831.48	419.28
26 05 33 13-0051 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 5 #12 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 5 #12 THWN Conductor Instead Of THHN, Add</i>	1,915.36 4.21	442.73
26 05 33 13-0052 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 3 #10 THWN Conductor Instead Of THHN, Add</i>	1,817.68 3.79	411.46
26 05 33 13-0053 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 4 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 4 #10 THWN Conductor Instead Of THHN, Add</i>	1,921.21 5.05	438.82
26 05 33 13-0054 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 5 #10 Copper THHN And 1 #12 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For 5 #10 THWN Conductor Instead Of THHN, Add</i>	2,024.73 6.32	466.19
26 05 33 13-0055 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #8 Copper THHN And 1 #10 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #8 THWN Conductor Instead Of THHN, Add</i>	1,971.78 379.49 6.61	442.73
26 05 33 13-0056 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 3 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 3 #6 THWN Conductor Instead Of THHN, Add</i>	2,166.30 406.30 10.93	474.01
26 05 33 13-0057 CLF 1" Rigid Galvanized Steel (RGS) Conduit Assembly With 4 #6 Copper THHN And 1 #8 Copper Insulated Grounding Conductor Note: Includes conduit, terminations, straps, wire as indicated. Not for use where detail is available. <i>For Work In Restricted Working Space, Add</i> <i>For 4 #6 THWN Conductor Instead Of THHN, Add</i>	2,362.07 443.17 14.57	517.02

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0058	Conduit ^(26 05 33 13) Note: Where 4-1/2" conduit is required, use tasks for 5" conduit. Add couplings as required at each fitting.		
26 05 33 13-0059	Conduit Installed Above Grade ^(26 05 33 13-0058)		
26 05 33 13-0060	Rigid Galvanized Steel (RGS) Or Galvanized Rigid Steel Conduit (GRC) Conduit ^(26 05 33 13-0059) Note: Exposed installation, branch and feeder conduit. Excludes supporting strap, hanger and fastening.		
26 05 33 13-0061	Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling ^(26 05 33 13-0060) Note: Includes field bending conduit up to and including 1". See CSI section 26 05 33 13-1358 for field bending >1".		
26 05 33 13-0062	LF 1/2" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	8.91	2.46
	For Installation In Metal Stud Wall, Add	0.62	
	For Work In Restricted Working Space, Add	1.85	
	For >1,000, Deduct	-0.74	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	0.92	
	For >500 To 1,000, Deduct	-0.51	
	For Installation In Wood Stud Wall (Includes Drilling), Add	1.54	
	For Elevated Installation >10' To 15', Add	0.62	
	For Elevated Installation >15' To 20', Add	1.23	
	For Elevated Installation >20' To 25', Add	1.54	
	For Elevated Installation >25' To 30', Add	2.15	
	For Elevated Installation >30' To 35', Add	2.46	
	For Elevated Installation >35' To 40', Add	3.08	
	For Elevated Installation >40', Add	3.38	
	For >250 To 500, Deduct	-0.14	
26 05 33 13-0063	LF 3/4" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	10.55	2.68
	For Installation In Metal Stud Wall, Add	0.72	
	For Work In Restricted Working Space, Add	2.15	
	For >1,000, Deduct	-0.88	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.07	
	For >500 To 1,000, Deduct	-0.61	
	For Installation In Wood Stud Wall (Includes Drilling), Add	1.79	
	For Elevated Installation >10' To 15', Add	0.72	
	For Elevated Installation >15' To 20', Add	1.43	
	For Elevated Installation >20' To 25', Add	1.79	
	For Elevated Installation >25' To 30', Add	2.50	
	For Elevated Installation >30' To 35', Add	2.86	
	For Elevated Installation >35' To 40', Add	3.58	
	For Elevated Installation >40', Add	3.93	
	For >250 To 500, Deduct	-0.17	
26 05 33 13-0064	LF 1" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	14.87	3.13
	For Installation In Metal Stud Wall, Add	0.96	
	For Work In Restricted Working Space, Add	2.88	
	For >1,000, Deduct	-1.25	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.44	
	For >500 To 1,000, Deduct	-0.88	
	For Installation In Wood Stud Wall (Includes Drilling), Add	2.40	
	For Elevated Installation >10' To 15', Add	0.96	
	For Elevated Installation >15' To 20', Add	1.92	
	For Elevated Installation >20' To 25', Add	2.40	
	For Elevated Installation >25' To 30', Add	3.36	
	For Elevated Installation >30' To 35', Add	3.84	
	For Elevated Installation >35' To 40', Add	4.80	
	For Elevated Installation >40', Add	5.28	
	For >250 To 500, Deduct	-0.26	
26 05 33 13-0065	LF 1-1/4" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	17.19	3.58
	For Installation In Metal Stud Wall, Add	1.02	
	For Work In Restricted Working Space, Add	3.05	
	For >1,000, Deduct	-1.46	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.53	
	For >500 To 1,000, Deduct	-1.04	
	For Installation In Wood Stud Wall (Includes Drilling), Add	2.54	
	For Elevated Installation >10' To 15', Add	1.02	
	For Elevated Installation >15' To 20', Add	2.03	
	For Elevated Installation >20' To 25', Add	2.54	
	For Elevated Installation >25' To 30', Add	3.56	
	For Elevated Installation >30' To 35', Add	4.07	
	For Elevated Installation >35' To 40', Add	5.09	
	For Elevated Installation >40', Add	5.59	
	For >250 To 500, Deduct	-0.35	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0066 LF 1-1/2" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	19.77	4.02
For Installation In Metal Stud Wall, Add	1.12	
For Work In Restricted Working Space, Add	3.35	
For >1,000, Deduct	-1.70	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.68	
For >500 To 1,000, Deduct	-1.20	
For Installation In Wood Stud Wall (Includes Drilling), Add	2.79	
For Elevated Installation >10' To 15', Add	1.12	
For Elevated Installation >15' To 20', Add	2.23	
For Elevated Installation >20' To 25', Add	2.79	
For Elevated Installation >25' To 30', Add	3.91	
For Elevated Installation >30' To 35', Add	4.47	
For Elevated Installation >35' To 40', Add	5.59	
For Elevated Installation >40', Add	6.14	
For >250 To 500, Deduct	-0.43	
26 05 33 13-0067 LF 2" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	25.24	4.91
For Installation In Metal Stud Wall, Add	1.37	
For Work In Restricted Working Space, Add	4.12	
For >1,000, Deduct	-2.18	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	2.06	
For >500 To 1,000, Deduct	-1.55	
For Installation In Wood Stud Wall (Includes Drilling), Add	3.44	
For Elevated Installation >10' To 15', Add	1.37	
For Elevated Installation >15' To 20', Add	2.75	
For Elevated Installation >20' To 25', Add	3.44	
For Elevated Installation >25' To 30', Add	4.81	
For Elevated Installation >30' To 35', Add	5.50	
For Elevated Installation >35' To 40', Add	6.87	
For Elevated Installation >40', Add	7.56	
For >250 To 500, Deduct	-0.58	
26 05 33 13-0068 LF 2-1/2" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	37.72	6.71
For Installation In Metal Stud Wall, Add	1.87	
For Work In Restricted Working Space, Add	5.60	
For >1,000, Deduct	-3.31	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	2.80	
For >500 To 1,000, Deduct	-2.36	
For Installation In Wood Stud Wall (Includes Drilling), Add	4.67	
For Elevated Installation >10' To 15', Add	1.87	
For Elevated Installation >15' To 20', Add	3.73	
For Elevated Installation >20' To 25', Add	4.67	
For Elevated Installation >25' To 30', Add	6.53	
For Elevated Installation >30' To 35', Add	7.46	
For Elevated Installation >35' To 40', Add	9.33	
For Elevated Installation >40', Add	10.26	
For >250 To 500, Deduct	-0.95	
26 05 33 13-0069 LF 3" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	49.39	8.93
For Installation In Metal Stud Wall, Add	2.51	
For Work In Restricted Working Space, Add	7.54	
For >1,000, Deduct	-4.31	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	3.77	
For >500 To 1,000, Deduct	-3.08	
For Installation In Wood Stud Wall (Includes Drilling), Add	6.28	
For Elevated Installation >10' To 15', Add	2.51	
For Elevated Installation >15' To 20', Add	5.03	
For Elevated Installation >20' To 25', Add	6.28	
For Elevated Installation >25' To 30', Add	8.80	
For Elevated Installation >30' To 35', Add	10.05	
For Elevated Installation >35' To 40', Add	12.57	
For Elevated Installation >40', Add	13.82	
For >250 To 500, Deduct	-1.21	
26 05 33 13-0070 LF 3-1/2" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	59.43	11.17
For Installation In Metal Stud Wall, Add	2.98	
For Work In Restricted Working Space, Add	8.95	
For >1,000, Deduct	-5.20	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	4.47	
For >500 To 1,000, Deduct	-3.71	
For Installation In Wood Stud Wall (Includes Drilling), Add	7.46	
For Elevated Installation >10' To 15', Add	2.98	
For Elevated Installation >15' To 20', Add	5.97	
For Elevated Installation >20' To 25', Add	7.46	
For Elevated Installation >25' To 30', Add	10.44	
For Elevated Installation >30' To 35', Add	11.93	
For Elevated Installation >35' To 40', Add	14.92	
For Elevated Installation >40', Add	16.41	
For >250 To 500, Deduct	-1.48	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0071	LF	4" Rigid Galvanized Steel (RGS) Conduit With Threaded Coupling	70.57	13.40
			<i>For Installation In Metal Stud Wall, Add</i>	3.44	
			<i>For Work In Restricted Working Space, Add</i>	10.32	
			<i>For >1,000, Deduct</i>	-6.20	
			<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	5.16	
			<i>For >500 To 1,000, Deduct</i>	-4.43	
			<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	8.60	
			<i>For Elevated Installation >10' To 15', Add</i>	3.44	
			<i>For Elevated Installation >15' To 20', Add</i>	6.88	
			<i>For Elevated Installation >20' To 25', Add</i>	8.60	
			<i>For Elevated Installation >25' To 30', Add</i>	12.04	
			<i>For Elevated Installation >30' To 35', Add</i>	13.76	
			<i>For Elevated Installation >35' To 40', Add</i>	17.21	
			<i>For Elevated Installation >40', Add</i>	18.93	
			<i>For >250 To 500, Deduct</i>	-1.81	
26 05 33	13-0072		Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow <small>(26 05 33 13-0060)</small>		
			See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33	13-0073	EA	1/2" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	33.24	11.06
			<i>For Work In Restricted Working Space, Add</i>	8.32	
			<i>For Elevated Installation >10' To 15', Add</i>	2.77	
			<i>For Elevated Installation >15' To 20', Add</i>	5.55	
			<i>For Elevated Installation >20' To 25', Add</i>	6.94	
			<i>For Elevated Installation >25' To 30', Add</i>	9.71	
			<i>For Elevated Installation >30' To 35', Add</i>	11.10	
			<i>For Elevated Installation >35' To 40', Add</i>	13.87	
			<i>For Elevated Installation >40', Add</i>	15.26	
26 05 33	13-0074	EA	3/4" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	41.74	13.74
			<i>For Work In Restricted Working Space, Add</i>	10.35	
			<i>For Elevated Installation >10' To 15', Add</i>	3.45	
			<i>For Elevated Installation >15' To 20', Add</i>	6.90	
			<i>For Elevated Installation >20' To 25', Add</i>	8.62	
			<i>For Elevated Installation >25' To 30', Add</i>	12.07	
			<i>For Elevated Installation >30' To 35', Add</i>	13.80	
			<i>For Elevated Installation >35' To 40', Add</i>	17.25	
			<i>For Elevated Installation >40', Add</i>	18.97	
26 05 33	13-0075	EA	1" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	53.22	16.87
			<i>For Work In Restricted Working Space, Add</i>	12.62	
			<i>For Elevated Installation >10' To 15', Add</i>	4.21	
			<i>For Elevated Installation >15' To 20', Add</i>	8.41	
			<i>For Elevated Installation >20' To 25', Add</i>	10.52	
			<i>For Elevated Installation >25' To 30', Add</i>	14.72	
			<i>For Elevated Installation >30' To 35', Add</i>	16.82	
			<i>For Elevated Installation >35' To 40', Add</i>	21.03	
			<i>For Elevated Installation >40', Add</i>	23.13	
26 05 33	13-0076	EA	1-1/4" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	67.92	19.55
			<i>For Work In Restricted Working Space, Add</i>	14.65	
			<i>For Elevated Installation >10' To 15', Add</i>	4.88	
			<i>For Elevated Installation >15' To 20', Add</i>	9.77	
			<i>For Elevated Installation >20' To 25', Add</i>	12.21	
			<i>For Elevated Installation >25' To 30', Add</i>	17.09	
			<i>For Elevated Installation >30' To 35', Add</i>	19.53	
			<i>For Elevated Installation >35' To 40', Add</i>	24.42	
			<i>For Elevated Installation >40', Add</i>	26.86	
26 05 33	13-0077	EA	1-1/2" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	78.81	22.46
			<i>For Work In Restricted Working Space, Add</i>	16.82	
			<i>For Elevated Installation >10' To 15', Add</i>	5.61	
			<i>For Elevated Installation >15' To 20', Add</i>	11.21	
			<i>For Elevated Installation >20' To 25', Add</i>	14.01	
			<i>For Elevated Installation >25' To 30', Add</i>	19.62	
			<i>For Elevated Installation >30' To 35', Add</i>	22.42	
			<i>For Elevated Installation >35' To 40', Add</i>	28.03	
			<i>For Elevated Installation >40', Add</i>	30.83	
26 05 33	13-0078	EA	2" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	92.95	24.69
			<i>For Work In Restricted Working Space, Add</i>	18.50	
			<i>For Elevated Installation >10' To 15', Add</i>	6.17	
			<i>For Elevated Installation >15' To 20', Add</i>	12.33	
			<i>For Elevated Installation >20' To 25', Add</i>	15.42	
			<i>For Elevated Installation >25' To 30', Add</i>	21.58	
			<i>For Elevated Installation >30' To 35', Add</i>	24.66	
			<i>For Elevated Installation >35' To 40', Add</i>	30.83	
			<i>For Elevated Installation >40', Add</i>	33.91	
26 05 33	13-0079	EA	2-1/2" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	132.84	30.84
			<i>For Work In Restricted Working Space, Add</i>	23.12	
			<i>For Elevated Installation >10' To 15', Add</i>	7.71	
			<i>For Elevated Installation >15' To 20', Add</i>	15.42	
			<i>For Elevated Installation >20' To 25', Add</i>	19.27	
			<i>For Elevated Installation >25' To 30', Add</i>	26.98	
			<i>For Elevated Installation >30' To 35', Add</i>	30.83	
			<i>For Elevated Installation >35' To 40', Add</i>	38.54	
			<i>For Elevated Installation >40', Add</i>	42.39	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0080 EA 3" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	188.02	42.01
For Work In Restricted Working Space, Add	31.50	
For Elevated Installation >10' To 15', Add	10.50	
For Elevated Installation >15' To 20', Add	21.00	
For Elevated Installation >20' To 25', Add	26.25	
For Elevated Installation >25' To 30', Add	36.75	
For Elevated Installation >30' To 35', Add	42.00	
For Elevated Installation >35' To 40', Add	52.50	
For Elevated Installation >40', Add	57.75	
26 05 33 13-0081 EA 3-1/2" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	248.23	47.37
For Work In Restricted Working Space, Add	35.53	
For Elevated Installation >10' To 15', Add	11.84	
For Elevated Installation >15' To 20', Add	23.69	
For Elevated Installation >20' To 25', Add	29.61	
For Elevated Installation >25' To 30', Add	41.45	
For Elevated Installation >30' To 35', Add	47.38	
For Elevated Installation >35' To 40', Add	59.22	
For Elevated Installation >40', Add	65.14	
26 05 33 13-0082 EA 4" Rigid Galvanized Steel (RGS) 90 Degree Standard Radius Elbow	303.71	61.67
For Work In Restricted Working Space, Add	46.24	
For Elevated Installation >10' To 15', Add	15.41	
For Elevated Installation >15' To 20', Add	30.83	
For Elevated Installation >20' To 25', Add	38.54	
For Elevated Installation >25' To 30', Add	53.95	
For Elevated Installation >30' To 35', Add	61.66	
For Elevated Installation >35' To 40', Add	77.07	
For Elevated Installation >40', Add	84.78	
26 05 33 13-0083 Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow <small>(26 05 33 13-0060)</small>		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0084 EA 1/2" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	33.24	11.06
For Work In Restricted Working Space, Add	8.32	
For Elevated Installation >10' To 15', Add	2.77	
For Elevated Installation >15' To 20', Add	5.55	
For Elevated Installation >20' To 25', Add	6.94	
For Elevated Installation >25' To 30', Add	9.71	
For Elevated Installation >30' To 35', Add	11.10	
For Elevated Installation >35' To 40', Add	13.87	
For Elevated Installation >40', Add	15.26	
26 05 33 13-0085 EA 3/4" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	41.74	13.74
For Work In Restricted Working Space, Add	10.35	
For Elevated Installation >10' To 15', Add	3.45	
For Elevated Installation >15' To 20', Add	6.90	
For Elevated Installation >20' To 25', Add	8.62	
For Elevated Installation >25' To 30', Add	12.07	
For Elevated Installation >30' To 35', Add	13.80	
For Elevated Installation >35' To 40', Add	17.25	
For Elevated Installation >40', Add	18.97	
26 05 33 13-0086 EA 1" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	53.22	16.87
For Work In Restricted Working Space, Add	12.62	
For Elevated Installation >10' To 15', Add	4.21	
For Elevated Installation >15' To 20', Add	8.41	
For Elevated Installation >20' To 25', Add	10.52	
For Elevated Installation >25' To 30', Add	14.72	
For Elevated Installation >30' To 35', Add	16.82	
For Elevated Installation >35' To 40', Add	21.03	
For Elevated Installation >40', Add	23.13	
26 05 33 13-0087 EA 1-1/4" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	67.92	19.55
For Work In Restricted Working Space, Add	14.65	
For Elevated Installation >10' To 15', Add	4.88	
For Elevated Installation >15' To 20', Add	9.77	
For Elevated Installation >20' To 25', Add	12.21	
For Elevated Installation >25' To 30', Add	17.09	
For Elevated Installation >30' To 35', Add	19.53	
For Elevated Installation >35' To 40', Add	24.42	
For Elevated Installation >40', Add	26.86	
26 05 33 13-0088 EA 1-1/2" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	78.81	22.46
For Work In Restricted Working Space, Add	16.82	
For Elevated Installation >10' To 15', Add	5.61	
For Elevated Installation >15' To 20', Add	11.21	
For Elevated Installation >20' To 25', Add	14.01	
For Elevated Installation >25' To 30', Add	19.62	
For Elevated Installation >30' To 35', Add	22.42	
For Elevated Installation >35' To 40', Add	28.03	
For Elevated Installation >40', Add	30.83	
26 05 33 13-0089 EA 2" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	92.95	24.69
For Work In Restricted Working Space, Add	18.50	
For Elevated Installation >10' To 15', Add	6.17	
For Elevated Installation >15' To 20', Add	12.33	
For Elevated Installation >20' To 25', Add	15.42	
For Elevated Installation >25' To 30', Add	21.58	
For Elevated Installation >30' To 35', Add	24.66	
For Elevated Installation >35' To 40', Add	30.83	
For Elevated Installation >40', Add	33.91	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0090	EA 2-1/2" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	130.58	30.84
	<i>For Work In Restricted Working Space, Add</i>	23.12	
	<i>For Elevated Installation >10' To 15', Add</i>	7.71	
	<i>For Elevated Installation >15' To 20', Add</i>	15.42	
	<i>For Elevated Installation >20' To 25', Add</i>	19.27	
	<i>For Elevated Installation >25' To 30', Add</i>	26.98	
	<i>For Elevated Installation >30' To 35', Add</i>	30.83	
	<i>For Elevated Installation >35' To 40', Add</i>	38.54	
	<i>For Elevated Installation >40', Add</i>	42.39	
26 05 33 13-0091	EA 3" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	179.20	42.01
	<i>For Work In Restricted Working Space, Add</i>	31.50	
	<i>For Elevated Installation >10' To 15', Add</i>	10.50	
	<i>For Elevated Installation >15' To 20', Add</i>	21.00	
	<i>For Elevated Installation >20' To 25', Add</i>	26.25	
	<i>For Elevated Installation >25' To 30', Add</i>	36.75	
	<i>For Elevated Installation >30' To 35', Add</i>	42.00	
	<i>For Elevated Installation >35' To 40', Add</i>	52.50	
	<i>For Elevated Installation >40', Add</i>	57.75	
26 05 33 13-0092	EA 3-1/2" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	235.83	47.37
	<i>For Work In Restricted Working Space, Add</i>	35.53	
	<i>For Elevated Installation >10' To 15', Add</i>	11.84	
	<i>For Elevated Installation >15' To 20', Add</i>	23.69	
	<i>For Elevated Installation >20' To 25', Add</i>	29.61	
	<i>For Elevated Installation >25' To 30', Add</i>	41.45	
	<i>For Elevated Installation >30' To 35', Add</i>	47.38	
	<i>For Elevated Installation >35' To 40', Add</i>	59.22	
	<i>For Elevated Installation >40', Add</i>	65.14	
26 05 33 13-0093	EA 4" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	287.22	61.67
	<i>For Work In Restricted Working Space, Add</i>	46.24	
	<i>For Elevated Installation >10' To 15', Add</i>	15.41	
	<i>For Elevated Installation >15' To 20', Add</i>	30.83	
	<i>For Elevated Installation >20' To 25', Add</i>	38.54	
	<i>For Elevated Installation >25' To 30', Add</i>	53.95	
	<i>For Elevated Installation >30' To 35', Add</i>	61.66	
	<i>For Elevated Installation >35' To 40', Add</i>	77.07	
	<i>For Elevated Installation >40', Add</i>	84.78	
26 05 33 13-0094	EA 5" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	496.79	100.54
	<i>For Work In Restricted Working Space, Add</i>	75.41	
	<i>For Elevated Installation >10' To 15', Add</i>	25.14	
	<i>For Elevated Installation >15' To 20', Add</i>	50.27	
	<i>For Elevated Installation >20' To 25', Add</i>	62.84	
	<i>For Elevated Installation >25' To 30', Add</i>	87.98	
	<i>For Elevated Installation >30' To 35', Add</i>	100.55	
	<i>For Elevated Installation >35' To 40', Add</i>	125.69	
	<i>For Elevated Installation >40', Add</i>	138.25	
26 05 33 13-0095	EA 6" Rigid Galvanized Steel (RGS) 45 Degree Standard Radius Elbow	746.85	151.04
	<i>For Work In Restricted Working Space, Add</i>	113.27	
	<i>For Elevated Installation >10' To 15', Add</i>	37.76	
	<i>For Elevated Installation >15' To 20', Add</i>	75.51	
	<i>For Elevated Installation >20' To 25', Add</i>	94.39	
	<i>For Elevated Installation >25' To 30', Add</i>	132.15	
	<i>For Elevated Installation >30' To 35', Add</i>	151.03	
	<i>For Elevated Installation >35' To 40', Add</i>	188.79	
	<i>For Elevated Installation >40', Add</i>	207.66	
26 05 33 13-0096	Rigid Galvanized Steel (RGS) 12" Large Radius Elbow <small>(26 05 33 13-0060)</small>		
	See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0097	EA 1" Rigid Galvanized Steel (RGS) 12" Large Radius Elbow	81.77	27.59
	<i>For Work In Restricted Working Space, Add</i>	16.56	
	<i>For Elevated Installation >10' To 15', Add</i>	5.52	
	<i>For Elevated Installation >15' To 20', Add</i>	11.04	
	<i>For Elevated Installation >20' To 25', Add</i>	13.80	
	<i>For Elevated Installation >25' To 30', Add</i>	19.32	
	<i>For Elevated Installation >30' To 35', Add</i>	22.08	
	<i>For Elevated Installation >35' To 40', Add</i>	27.60	
	<i>For Elevated Installation >40', Add</i>	30.35	
26 05 33 13-0098	EA 1-1/4" Rigid Galvanized Steel (RGS) 12" Large Radius Elbow	94.24	31.95
	<i>For Work In Restricted Working Space, Add</i>	19.17	
	<i>For Elevated Installation >10' To 15', Add</i>	6.39	
	<i>For Elevated Installation >15' To 20', Add</i>	12.78	
	<i>For Elevated Installation >20' To 25', Add</i>	15.98	
	<i>For Elevated Installation >25' To 30', Add</i>	22.37	
	<i>For Elevated Installation >30' To 35', Add</i>	25.56	
	<i>For Elevated Installation >35' To 40', Add</i>	31.95	
	<i>For Elevated Installation >40', Add</i>	35.15	
26 05 33 13-0099	EA 1-1/2" Rigid Galvanized Steel (RGS) 12" Large Radius Elbow	108.95	36.31
	<i>For Work In Restricted Working Space, Add</i>	21.78	
	<i>For Elevated Installation >10' To 15', Add</i>	7.26	
	<i>For Elevated Installation >15' To 20', Add</i>	14.52	
	<i>For Elevated Installation >20' To 25', Add</i>	18.15	
	<i>For Elevated Installation >25' To 30', Add</i>	25.41	
	<i>For Elevated Installation >30' To 35', Add</i>	29.04	
	<i>For Elevated Installation >35' To 40', Add</i>	36.31	
	<i>For Elevated Installation >40', Add</i>	39.94	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0100 EA 2" Rigid Galvanized Steel (RGS) 12" Large Radius Elbow.....	122.70	39.94
For Work In Restricted Working Space, Add	23.96	
For Elevated Installation >10' To 15', Add	7.99	
For Elevated Installation >15' To 20', Add	15.98	
For Elevated Installation >20' To 25', Add	19.97	
For Elevated Installation >25' To 30', Add	27.96	
For Elevated Installation >30' To 35', Add	31.95	
For Elevated Installation >35' To 40', Add	39.94	
For Elevated Installation >40', Add	43.93	
26 05 33 13-0101 Rigid Galvanized Steel (RGS) 15" Large Radius Elbow (26 05 33 13-0060)		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0102 EA 1" Rigid Galvanized Steel (RGS) 15" Large Radius Elbow.....	88.66	27.59
For Work In Restricted Working Space, Add	16.56	
For Elevated Installation >10' To 15', Add	5.52	
For Elevated Installation >15' To 20', Add	11.04	
For Elevated Installation >20' To 25', Add	13.80	
For Elevated Installation >25' To 30', Add	19.32	
For Elevated Installation >30' To 35', Add	22.08	
For Elevated Installation >35' To 40', Add	27.60	
For Elevated Installation >40', Add	30.35	
26 05 33 13-0103 EA 1-1/4" Rigid Galvanized Steel (RGS) 15" Large Radius Elbow.....	103.10	31.95
For Work In Restricted Working Space, Add	19.17	
For Elevated Installation >10' To 15', Add	6.39	
For Elevated Installation >15' To 20', Add	12.78	
For Elevated Installation >20' To 25', Add	15.98	
For Elevated Installation >25' To 30', Add	22.37	
For Elevated Installation >30' To 35', Add	25.56	
For Elevated Installation >35' To 40', Add	31.95	
For Elevated Installation >40', Add	35.15	
26 05 33 13-0104 EA 1-1/2" Rigid Galvanized Steel (RGS) 15" Large Radius Elbow.....	112.99	36.31
For Work In Restricted Working Space, Add	21.78	
For Elevated Installation >10' To 15', Add	7.26	
For Elevated Installation >15' To 20', Add	14.52	
For Elevated Installation >20' To 25', Add	18.15	
For Elevated Installation >25' To 30', Add	25.41	
For Elevated Installation >30' To 35', Add	29.04	
For Elevated Installation >35' To 40', Add	36.31	
For Elevated Installation >40', Add	39.94	
26 05 33 13-0105 EA 2" Rigid Galvanized Steel (RGS) 15" Large Radius Elbow.....	127.21	39.94
For Work In Restricted Working Space, Add	23.96	
For Elevated Installation >10' To 15', Add	7.99	
For Elevated Installation >15' To 20', Add	15.98	
For Elevated Installation >20' To 25', Add	19.97	
For Elevated Installation >25' To 30', Add	27.96	
For Elevated Installation >30' To 35', Add	31.95	
For Elevated Installation >35' To 40', Add	39.94	
For Elevated Installation >40', Add	43.93	
26 05 33 13-0106 EA 2-1/2" Rigid Galvanized Steel (RGS) 15" Large Radius Elbow.....	168.90	50.11
For Work In Restricted Working Space, Add	30.06	
For Elevated Installation >10' To 15', Add	10.02	
For Elevated Installation >15' To 20', Add	20.04	
For Elevated Installation >20' To 25', Add	25.05	
For Elevated Installation >25' To 30', Add	35.07	
For Elevated Installation >30' To 35', Add	40.08	
For Elevated Installation >35' To 40', Add	50.11	
For Elevated Installation >40', Add	55.12	
26 05 33 13-0107 EA 3" Rigid Galvanized Steel (RGS) 15" Large Radius Elbow.....	227.36	68.26
For Work In Restricted Working Space, Add	40.95	
For Elevated Installation >10' To 15', Add	13.65	
For Elevated Installation >15' To 20', Add	27.30	
For Elevated Installation >20' To 25', Add	34.13	
For Elevated Installation >25' To 30', Add	47.78	
For Elevated Installation >30' To 35', Add	54.60	
For Elevated Installation >35' To 40', Add	68.26	
For Elevated Installation >40', Add	75.08	
26 05 33 13-0108 Rigid Galvanized Steel (RGS) 18" Large Radius Elbow (26 05 33 13-0060)		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0109 EA 1" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	88.99	27.59
For Work In Restricted Working Space, Add	16.56	
For Elevated Installation >10' To 15', Add	5.52	
For Elevated Installation >15' To 20', Add	11.04	
For Elevated Installation >20' To 25', Add	13.80	
For Elevated Installation >25' To 30', Add	19.32	
For Elevated Installation >30' To 35', Add	22.08	
For Elevated Installation >35' To 40', Add	27.60	
For Elevated Installation >40', Add	30.35	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0110	EA 1-1/4" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	102.22	31.95
	<i>For Work In Restricted Working Space, Add</i>	19.17	
	<i>For Elevated Installation >10' To 15', Add</i>	6.39	
	<i>For Elevated Installation >15' To 20', Add</i>	12.78	
	<i>For Elevated Installation >20' To 25', Add</i>	15.98	
	<i>For Elevated Installation >25' To 30', Add</i>	22.37	
	<i>For Elevated Installation >30' To 35', Add</i>	25.56	
	<i>For Elevated Installation >35' To 40', Add</i>	31.95	
	<i>For Elevated Installation >40', Add</i>	35.15	
26 05 33 13-0111	EA 1-1/2" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	117.35	36.31
	<i>For Work In Restricted Working Space, Add</i>	21.78	
	<i>For Elevated Installation >10' To 15', Add</i>	7.26	
	<i>For Elevated Installation >15' To 20', Add</i>	14.52	
	<i>For Elevated Installation >20' To 25', Add</i>	18.15	
	<i>For Elevated Installation >25' To 30', Add</i>	25.41	
	<i>For Elevated Installation >30' To 35', Add</i>	29.04	
	<i>For Elevated Installation >35' To 40', Add</i>	36.31	
	<i>For Elevated Installation >40', Add</i>	39.94	
26 05 33 13-0112	EA 2" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	136.97	39.94
	<i>For Work In Restricted Working Space, Add</i>	23.96	
	<i>For Elevated Installation >10' To 15', Add</i>	7.99	
	<i>For Elevated Installation >15' To 20', Add</i>	15.98	
	<i>For Elevated Installation >20' To 25', Add</i>	19.97	
	<i>For Elevated Installation >25' To 30', Add</i>	27.96	
	<i>For Elevated Installation >30' To 35', Add</i>	31.95	
	<i>For Elevated Installation >35' To 40', Add</i>	39.94	
	<i>For Elevated Installation >40', Add</i>	43.93	
26 05 33 13-0113	EA 2-1/2" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	178.00	50.11
	<i>For Work In Restricted Working Space, Add</i>	30.06	
	<i>For Elevated Installation >10' To 15', Add</i>	10.02	
	<i>For Elevated Installation >15' To 20', Add</i>	20.04	
	<i>For Elevated Installation >20' To 25', Add</i>	25.05	
	<i>For Elevated Installation >25' To 30', Add</i>	35.07	
	<i>For Elevated Installation >30' To 35', Add</i>	40.08	
	<i>For Elevated Installation >35' To 40', Add</i>	50.11	
	<i>For Elevated Installation >40', Add</i>	55.12	
26 05 33 13-0114	EA 3" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	234.69	68.26
	<i>For Work In Restricted Working Space, Add</i>	40.95	
	<i>For Elevated Installation >10' To 15', Add</i>	13.65	
	<i>For Elevated Installation >15' To 20', Add</i>	27.30	
	<i>For Elevated Installation >20' To 25', Add</i>	34.13	
	<i>For Elevated Installation >25' To 30', Add</i>	47.78	
	<i>For Elevated Installation >30' To 35', Add</i>	54.60	
	<i>For Elevated Installation >35' To 40', Add</i>	68.26	
	<i>For Elevated Installation >40', Add</i>	75.08	
26 05 33 13-0115	EA 3-1/2" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	292.73	76.97
	<i>For Work In Restricted Working Space, Add</i>	46.19	
	<i>For Elevated Installation >10' To 15', Add</i>	15.40	
	<i>For Elevated Installation >15' To 20', Add</i>	30.79	
	<i>For Elevated Installation >20' To 25', Add</i>	38.49	
	<i>For Elevated Installation >25' To 30', Add</i>	53.88	
	<i>For Elevated Installation >30' To 35', Add</i>	61.58	
	<i>For Elevated Installation >35' To 40', Add</i>	76.98	
	<i>For Elevated Installation >40', Add</i>	84.67	
26 05 33 13-0116	EA 4" Rigid Galvanized Steel (RGS) 18" Large Radius Elbow.....	355.49	100.21
	<i>For Work In Restricted Working Space, Add</i>	60.13	
	<i>For Elevated Installation >10' To 15', Add</i>	20.04	
	<i>For Elevated Installation >15' To 20', Add</i>	40.08	
	<i>For Elevated Installation >20' To 25', Add</i>	50.11	
	<i>For Elevated Installation >25' To 30', Add</i>	70.15	
	<i>For Elevated Installation >30' To 35', Add</i>	80.17	
	<i>For Elevated Installation >35' To 40', Add</i>	100.21	
	<i>For Elevated Installation >40', Add</i>	110.23	
26 05 33 13-0117	Rigid Galvanized Steel (RGS) 24" Large Radius Elbow <small>(26 05 33 13-0060)</small>		
	<small>See CSI section 26 05 33 13-1358 for conduit field bending.</small>		
26 05 33 13-0118	EA 1" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	99.98	27.59
	<i>For Work In Restricted Working Space, Add</i>	16.56	
	<i>For Elevated Installation >10' To 15', Add</i>	5.52	
	<i>For Elevated Installation >15' To 20', Add</i>	11.04	
	<i>For Elevated Installation >20' To 25', Add</i>	13.80	
	<i>For Elevated Installation >25' To 30', Add</i>	19.32	
	<i>For Elevated Installation >30' To 35', Add</i>	22.08	
	<i>For Elevated Installation >35' To 40', Add</i>	27.60	
	<i>For Elevated Installation >40', Add</i>	30.35	
26 05 33 13-0119	EA 1-1/4" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	113.01	31.95
	<i>For Work In Restricted Working Space, Add</i>	19.17	
	<i>For Elevated Installation >10' To 15', Add</i>	6.39	
	<i>For Elevated Installation >15' To 20', Add</i>	12.78	
	<i>For Elevated Installation >20' To 25', Add</i>	15.98	
	<i>For Elevated Installation >25' To 30', Add</i>	22.37	
	<i>For Elevated Installation >30' To 35', Add</i>	25.56	
	<i>For Elevated Installation >35' To 40', Add</i>	31.95	
	<i>For Elevated Installation >40', Add</i>	35.15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0120 EA 1-1/2" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	125.43	36.31
For Work In Restricted Working Space, Add	21.78	
For Elevated Installation >10' To 15', Add	7.26	
For Elevated Installation >15' To 20', Add	14.52	
For Elevated Installation >20' To 25', Add	18.15	
For Elevated Installation >25' To 30', Add	25.41	
For Elevated Installation >30' To 35', Add	29.04	
For Elevated Installation >35' To 40', Add	36.31	
For Elevated Installation >40', Add	39.94	
26 05 33 13-0121 EA 2" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	148.88	39.94
For Work In Restricted Working Space, Add	23.96	
For Elevated Installation >10' To 15', Add	7.99	
For Elevated Installation >15' To 20', Add	15.98	
For Elevated Installation >20' To 25', Add	19.97	
For Elevated Installation >25' To 30', Add	27.96	
For Elevated Installation >30' To 35', Add	31.95	
For Elevated Installation >35' To 40', Add	39.94	
For Elevated Installation >40', Add	43.93	
26 05 33 13-0122 EA 2-1/2" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	194.24	50.11
For Work In Restricted Working Space, Add	30.06	
For Elevated Installation >10' To 15', Add	10.02	
For Elevated Installation >15' To 20', Add	20.04	
For Elevated Installation >20' To 25', Add	25.05	
For Elevated Installation >25' To 30', Add	35.07	
For Elevated Installation >30' To 35', Add	40.08	
For Elevated Installation >35' To 40', Add	50.11	
For Elevated Installation >40', Add	55.12	
26 05 33 13-0123 EA 3" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	260.15	68.26
For Work In Restricted Working Space, Add	40.95	
For Elevated Installation >10' To 15', Add	13.65	
For Elevated Installation >15' To 20', Add	27.30	
For Elevated Installation >20' To 25', Add	34.13	
For Elevated Installation >25' To 30', Add	47.78	
For Elevated Installation >30' To 35', Add	54.60	
For Elevated Installation >35' To 40', Add	68.26	
For Elevated Installation >40', Add	75.08	
26 05 33 13-0124 EA 3-1/2" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	317.48	76.97
For Work In Restricted Working Space, Add	46.19	
For Elevated Installation >10' To 15', Add	15.40	
For Elevated Installation >15' To 20', Add	30.79	
For Elevated Installation >20' To 25', Add	38.49	
For Elevated Installation >25' To 30', Add	53.88	
For Elevated Installation >30' To 35', Add	61.58	
For Elevated Installation >35' To 40', Add	76.98	
For Elevated Installation >40', Add	84.67	
26 05 33 13-0125 EA 4" Rigid Galvanized Steel (RGS) 24" Large Radius Elbow.....	375.22	100.21
For Work In Restricted Working Space, Add	60.13	
For Elevated Installation >10' To 15', Add	20.04	
For Elevated Installation >15' To 20', Add	40.08	
For Elevated Installation >20' To 25', Add	50.11	
For Elevated Installation >25' To 30', Add	70.15	
For Elevated Installation >30' To 35', Add	80.17	
For Elevated Installation >35' To 40', Add	100.21	
For Elevated Installation >40', Add	110.23	
26 05 33 13-0126 Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <small>(26 05 33 13-0060)</small>		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0127 EA 1" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow.....	99.31	27.59
For Work In Restricted Working Space, Add	16.56	
For Elevated Installation >10' To 15', Add	5.52	
For Elevated Installation >15' To 20', Add	11.04	
For Elevated Installation >20' To 25', Add	13.80	
For Elevated Installation >25' To 30', Add	19.32	
For Elevated Installation >30' To 35', Add	22.08	
For Elevated Installation >35' To 40', Add	27.60	
For Elevated Installation >40', Add	30.35	
26 05 33 13-0128 EA 1-1/4" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow.....	121.02	31.95
For Work In Restricted Working Space, Add	19.17	
For Elevated Installation >10' To 15', Add	6.39	
For Elevated Installation >15' To 20', Add	12.78	
For Elevated Installation >20' To 25', Add	15.98	
For Elevated Installation >25' To 30', Add	22.37	
For Elevated Installation >30' To 35', Add	25.56	
For Elevated Installation >35' To 40', Add	31.95	
For Elevated Installation >40', Add	35.15	
26 05 33 13-0129 EA 1-1/2" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow.....	134.11	36.31
For Work In Restricted Working Space, Add	21.78	
For Elevated Installation >10' To 15', Add	7.26	
For Elevated Installation >15' To 20', Add	14.52	
For Elevated Installation >20' To 25', Add	18.15	
For Elevated Installation >25' To 30', Add	25.41	
For Elevated Installation >30' To 35', Add	29.04	
For Elevated Installation >35' To 40', Add	36.31	
For Elevated Installation >40', Add	39.94	

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26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0130	EA 2" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	160.22 23.96 7.99 15.98 19.97 27.96 31.95 39.94 43.93	39.94
26 05 33 13-0131	EA 2-1/2" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	209.81 30.06 10.02 20.04 25.05 35.07 40.08 50.11 55.12	50.11
26 05 33 13-0132	EA 3" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	280.25 40.95 13.65 27.30 34.13 47.78 54.60 68.26 75.08	68.26
26 05 33 13-0133	EA 3-1/2" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	341.94 46.19 15.40 30.79 38.49 53.88 61.58 76.98 84.67	76.97
26 05 33 13-0134	EA 4" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	411.43 60.13 20.04 40.08 50.11 70.15 80.17 100.21 110.23	100.21
26 05 33 13-0135	EA 5" Rigid Galvanized Steel (RGS) 30" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	597.80 98.03 32.68 65.35 81.69 114.37 130.71 163.39 179.72	163.38
26 05 33 13-0136	Rigid Galvanized Steel (RGS) 36" Large Radius Elbow <small>(26 05 33 13-0060)</small> See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0137	EA 1" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	105.18 16.56 5.52 11.04 13.80 19.32 22.08 27.60 30.35	27.59
26 05 33 13-0138	EA 1-1/4" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	124.97 19.17 6.39 12.78 15.98 22.37 25.56 31.95 35.15	31.95
26 05 33 13-0139	EA 1-1/2" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	149.32 21.78 7.26 14.52 18.15 25.41 29.04 36.31 39.94	36.31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0140 EA 2" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	169.08	39.94
For Work In Restricted Working Space, Add	23.96	
For Elevated Installation >10' To 15', Add	7.99	
For Elevated Installation >15' To 20', Add	15.98	
For Elevated Installation >20' To 25', Add	19.97	
For Elevated Installation >25' To 30', Add	27.96	
For Elevated Installation >30' To 35', Add	31.95	
For Elevated Installation >35' To 40', Add	39.94	
For Elevated Installation >40', Add	43.93	
26 05 33 13-0141 EA 2-1/2" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	228.29	50.11
For Work In Restricted Working Space, Add	30.06	
For Elevated Installation >10' To 15', Add	10.02	
For Elevated Installation >15' To 20', Add	20.04	
For Elevated Installation >20' To 25', Add	25.05	
For Elevated Installation >25' To 30', Add	35.07	
For Elevated Installation >30' To 35', Add	40.08	
For Elevated Installation >35' To 40', Add	50.11	
For Elevated Installation >40', Add	55.12	
26 05 33 13-0142 EA 3" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	297.44	68.26
For Work In Restricted Working Space, Add	40.95	
For Elevated Installation >10' To 15', Add	13.65	
For Elevated Installation >15' To 20', Add	27.30	
For Elevated Installation >20' To 25', Add	34.13	
For Elevated Installation >25' To 30', Add	47.78	
For Elevated Installation >30' To 35', Add	54.60	
For Elevated Installation >35' To 40', Add	68.26	
For Elevated Installation >40', Add	75.08	
26 05 33 13-0143 EA 3-1/2" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	373.54	76.97
For Work In Restricted Working Space, Add	46.19	
For Elevated Installation >10' To 15', Add	15.40	
For Elevated Installation >15' To 20', Add	30.79	
For Elevated Installation >20' To 25', Add	38.49	
For Elevated Installation >25' To 30', Add	53.88	
For Elevated Installation >30' To 35', Add	61.58	
For Elevated Installation >35' To 40', Add	76.98	
For Elevated Installation >40', Add	84.67	
26 05 33 13-0144 EA 4" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	428.47	100.21
For Work In Restricted Working Space, Add	60.13	
For Elevated Installation >10' To 15', Add	20.04	
For Elevated Installation >15' To 20', Add	40.08	
For Elevated Installation >20' To 25', Add	50.11	
For Elevated Installation >25' To 30', Add	70.15	
For Elevated Installation >30' To 35', Add	80.17	
For Elevated Installation >35' To 40', Add	100.21	
For Elevated Installation >40', Add	110.23	
26 05 33 13-0145 EA 5" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	736.79	163.38
For Work In Restricted Working Space, Add	98.03	
For Elevated Installation >10' To 15', Add	32.68	
For Elevated Installation >15' To 20', Add	65.35	
For Elevated Installation >20' To 25', Add	81.69	
For Elevated Installation >25' To 30', Add	114.37	
For Elevated Installation >30' To 35', Add	130.71	
For Elevated Installation >35' To 40', Add	163.39	
For Elevated Installation >40', Add	179.72	
26 05 33 13-0146 EA 6" Rigid Galvanized Steel (RGS) 36" Large Radius Elbow.....	941.35	245.44
For Work In Restricted Working Space, Add	147.27	
For Elevated Installation >10' To 15', Add	49.09	
For Elevated Installation >15' To 20', Add	98.18	
For Elevated Installation >20' To 25', Add	122.72	
For Elevated Installation >25' To 30', Add	171.81	
For Elevated Installation >30' To 35', Add	196.36	
For Elevated Installation >35' To 40', Add	245.45	
For Elevated Installation >40', Add	269.99	
26 05 33 13-0147 Rigid Galvanized Steel (RGS) 42" Large Radius Elbow (26 05 33 13-0060)		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0148 EA 1" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow.....	113.78	27.59
For Work In Restricted Working Space, Add	16.56	
For Elevated Installation >10' To 15', Add	5.52	
For Elevated Installation >15' To 20', Add	11.04	
For Elevated Installation >20' To 25', Add	13.80	
For Elevated Installation >25' To 30', Add	19.32	
For Elevated Installation >30' To 35', Add	22.08	
For Elevated Installation >35' To 40', Add	27.60	
For Elevated Installation >40', Add	30.35	
26 05 33 13-0149 EA 1-1/4" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow.....	135.47	31.95
For Work In Restricted Working Space, Add	19.17	
For Elevated Installation >10' To 15', Add	6.39	
For Elevated Installation >15' To 20', Add	12.78	
For Elevated Installation >20' To 25', Add	15.98	
For Elevated Installation >25' To 30', Add	22.37	
For Elevated Installation >30' To 35', Add	25.56	
For Elevated Installation >35' To 40', Add	31.95	
For Elevated Installation >40', Add	35.15	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0150	EA 1-1/2" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	160.48	36.31
	<i>For Work In Restricted Working Space, Add</i>	21.78	
	<i>For Elevated Installation >10' To 15', Add</i>	7.26	
	<i>For Elevated Installation >15' To 20', Add</i>	14.52	
	<i>For Elevated Installation >20' To 25', Add</i>	18.15	
	<i>For Elevated Installation >25' To 30', Add</i>	25.41	
	<i>For Elevated Installation >30' To 35', Add</i>	29.04	
	<i>For Elevated Installation >35' To 40', Add</i>	36.31	
	<i>For Elevated Installation >40', Add</i>	39.94	
26 05 33 13-0151	EA 2" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	180.75	39.94
	<i>For Work In Restricted Working Space, Add</i>	23.96	
	<i>For Elevated Installation >10' To 15', Add</i>	7.99	
	<i>For Elevated Installation >15' To 20', Add</i>	15.98	
	<i>For Elevated Installation >20' To 25', Add</i>	19.97	
	<i>For Elevated Installation >25' To 30', Add</i>	27.96	
	<i>For Elevated Installation >30' To 35', Add</i>	31.95	
	<i>For Elevated Installation >35' To 40', Add</i>	39.94	
	<i>For Elevated Installation >40', Add</i>	43.93	
26 05 33 13-0152	EA 2-1/2" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	242.41	50.11
	<i>For Work In Restricted Working Space, Add</i>	30.06	
	<i>For Elevated Installation >10' To 15', Add</i>	10.02	
	<i>For Elevated Installation >15' To 20', Add</i>	20.04	
	<i>For Elevated Installation >20' To 25', Add</i>	25.05	
	<i>For Elevated Installation >25' To 30', Add</i>	35.07	
	<i>For Elevated Installation >30' To 35', Add</i>	40.08	
	<i>For Elevated Installation >35' To 40', Add</i>	50.11	
	<i>For Elevated Installation >40', Add</i>	55.12	
26 05 33 13-0153	EA 3" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	322.63	68.26
	<i>For Work In Restricted Working Space, Add</i>	40.95	
	<i>For Elevated Installation >10' To 15', Add</i>	13.65	
	<i>For Elevated Installation >15' To 20', Add</i>	27.30	
	<i>For Elevated Installation >20' To 25', Add</i>	34.13	
	<i>For Elevated Installation >25' To 30', Add</i>	47.78	
	<i>For Elevated Installation >30' To 35', Add</i>	54.60	
	<i>For Elevated Installation >35' To 40', Add</i>	68.26	
	<i>For Elevated Installation >40', Add</i>	75.08	
26 05 33 13-0154	EA 3-1/2" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	398.80	76.97
	<i>For Work In Restricted Working Space, Add</i>	46.19	
	<i>For Elevated Installation >10' To 15', Add</i>	15.40	
	<i>For Elevated Installation >15' To 20', Add</i>	30.79	
	<i>For Elevated Installation >20' To 25', Add</i>	38.49	
	<i>For Elevated Installation >25' To 30', Add</i>	53.88	
	<i>For Elevated Installation >30' To 35', Add</i>	61.58	
	<i>For Elevated Installation >35' To 40', Add</i>	76.98	
	<i>For Elevated Installation >40', Add</i>	84.67	
26 05 33 13-0155	EA 4" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	501.15	100.21
	<i>For Work In Restricted Working Space, Add</i>	60.13	
	<i>For Elevated Installation >10' To 15', Add</i>	20.04	
	<i>For Elevated Installation >15' To 20', Add</i>	40.08	
	<i>For Elevated Installation >20' To 25', Add</i>	50.11	
	<i>For Elevated Installation >25' To 30', Add</i>	70.15	
	<i>For Elevated Installation >30' To 35', Add</i>	80.17	
	<i>For Elevated Installation >35' To 40', Add</i>	100.21	
	<i>For Elevated Installation >40', Add</i>	110.23	
26 05 33 13-0156	EA 5" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	837.06	163.38
	<i>For Work In Restricted Working Space, Add</i>	98.03	
	<i>For Elevated Installation >10' To 15', Add</i>	32.68	
	<i>For Elevated Installation >15' To 20', Add</i>	65.35	
	<i>For Elevated Installation >20' To 25', Add</i>	81.69	
	<i>For Elevated Installation >25' To 30', Add</i>	114.37	
	<i>For Elevated Installation >30' To 35', Add</i>	130.71	
	<i>For Elevated Installation >35' To 40', Add</i>	163.39	
	<i>For Elevated Installation >40', Add</i>	179.72	
26 05 33 13-0157	EA 6" Rigid Galvanized Steel (RGS) 42" Large Radius Elbow	1,028.17	245.44
	<i>For Work In Restricted Working Space, Add</i>	147.27	
	<i>For Elevated Installation >10' To 15', Add</i>	49.09	
	<i>For Elevated Installation >15' To 20', Add</i>	98.18	
	<i>For Elevated Installation >20' To 25', Add</i>	122.72	
	<i>For Elevated Installation >25' To 30', Add</i>	171.81	
	<i>For Elevated Installation >30' To 35', Add</i>	196.36	
	<i>For Elevated Installation >35' To 40', Add</i>	245.45	
	<i>For Elevated Installation >40', Add</i>	269.99	
26 05 33 13-0158	Rigid Galvanized Steel (RGS) 48" Large Radius Elbow <small>(26 05 33 13-0060)</small>		
	See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0159	EA 1" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow	120.94	27.59
	<i>For Work In Restricted Working Space, Add</i>	16.56	
	<i>For Elevated Installation >10' To 15', Add</i>	5.52	
	<i>For Elevated Installation >15' To 20', Add</i>	11.04	
	<i>For Elevated Installation >20' To 25', Add</i>	13.80	
	<i>For Elevated Installation >25' To 30', Add</i>	19.32	
	<i>For Elevated Installation >30' To 35', Add</i>	22.08	
	<i>For Elevated Installation >35' To 40', Add</i>	27.60	
	<i>For Elevated Installation >40', Add</i>	30.35	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0160 EA 1-1/4" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	143.56	31.95
For Work In Restricted Working Space, Add	19.17	
For Elevated Installation >10' To 15', Add	6.39	
For Elevated Installation >15' To 20', Add	12.78	
For Elevated Installation >20' To 25', Add	15.98	
For Elevated Installation >25' To 30', Add	22.37	
For Elevated Installation >30' To 35', Add	25.56	
For Elevated Installation >35' To 40', Add	31.95	
For Elevated Installation >40', Add	35.15	
26 05 33 13-0161 EA 1-1/2" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	167.54	36.31
For Work In Restricted Working Space, Add	21.78	
For Elevated Installation >10' To 15', Add	7.26	
For Elevated Installation >15' To 20', Add	14.52	
For Elevated Installation >20' To 25', Add	18.15	
For Elevated Installation >25' To 30', Add	25.41	
For Elevated Installation >30' To 35', Add	29.04	
For Elevated Installation >35' To 40', Add	36.31	
For Elevated Installation >40', Add	39.94	
26 05 33 13-0162 EA 2" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	202.56	39.94
For Work In Restricted Working Space, Add	23.96	
For Elevated Installation >10' To 15', Add	7.99	
For Elevated Installation >15' To 20', Add	15.98	
For Elevated Installation >20' To 25', Add	19.97	
For Elevated Installation >25' To 30', Add	27.96	
For Elevated Installation >30' To 35', Add	31.95	
For Elevated Installation >35' To 40', Add	39.94	
For Elevated Installation >40', Add	43.93	
26 05 33 13-0163 EA 2-1/2" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	268.47	50.11
For Work In Restricted Working Space, Add	30.06	
For Elevated Installation >10' To 15', Add	10.02	
For Elevated Installation >15' To 20', Add	20.04	
For Elevated Installation >20' To 25', Add	25.05	
For Elevated Installation >25' To 30', Add	35.07	
For Elevated Installation >30' To 35', Add	40.08	
For Elevated Installation >35' To 40', Add	50.11	
For Elevated Installation >40', Add	55.12	
26 05 33 13-0164 EA 3" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	348.01	68.26
For Work In Restricted Working Space, Add	40.95	
For Elevated Installation >10' To 15', Add	13.65	
For Elevated Installation >15' To 20', Add	27.30	
For Elevated Installation >20' To 25', Add	34.13	
For Elevated Installation >25' To 30', Add	47.78	
For Elevated Installation >30' To 35', Add	54.60	
For Elevated Installation >35' To 40', Add	68.26	
For Elevated Installation >40', Add	75.08	
26 05 33 13-0165 EA 3-1/2" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	430.56	76.97
For Work In Restricted Working Space, Add	46.19	
For Elevated Installation >10' To 15', Add	15.40	
For Elevated Installation >15' To 20', Add	30.79	
For Elevated Installation >20' To 25', Add	38.49	
For Elevated Installation >25' To 30', Add	53.88	
For Elevated Installation >30' To 35', Add	61.58	
For Elevated Installation >35' To 40', Add	76.98	
For Elevated Installation >40', Add	84.67	
26 05 33 13-0166 EA 4" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	539.73	100.21
For Work In Restricted Working Space, Add	60.13	
For Elevated Installation >10' To 15', Add	20.04	
For Elevated Installation >15' To 20', Add	40.08	
For Elevated Installation >20' To 25', Add	50.11	
For Elevated Installation >25' To 30', Add	70.15	
For Elevated Installation >30' To 35', Add	80.17	
For Elevated Installation >35' To 40', Add	100.21	
For Elevated Installation >40', Add	110.23	
26 05 33 13-0167 EA 5" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	868.46	163.38
For Work In Restricted Working Space, Add	98.03	
For Elevated Installation >10' To 15', Add	32.68	
For Elevated Installation >15' To 20', Add	65.35	
For Elevated Installation >20' To 25', Add	81.69	
For Elevated Installation >25' To 30', Add	114.37	
For Elevated Installation >30' To 35', Add	130.71	
For Elevated Installation >35' To 40', Add	163.39	
For Elevated Installation >40', Add	179.72	
26 05 33 13-0168 EA 6" Rigid Galvanized Steel (RGS) 48" Large Radius Elbow.....	1,045.74	245.44
For Work In Restricted Working Space, Add	147.27	
For Elevated Installation >10' To 15', Add	49.09	
For Elevated Installation >15' To 20', Add	98.18	
For Elevated Installation >20' To 25', Add	122.72	
For Elevated Installation >25' To 30', Add	171.81	
For Elevated Installation >30' To 35', Add	196.36	
For Elevated Installation >35' To 40', Add	245.45	
For Elevated Installation >40', Add	269.99	

26 05 33 13-0169 Rigid Galvanized Steel (RGS) Plastic Insulating Bushing (26 05 33 13-0060)

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0170	EA 1/2" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing.....	14.64	7.12
	<i>For Work In Restricted Working Space, Add</i>	4.28	
	<i>For Elevated Installation >10' To 15', Add</i>	1.43	
	<i>For Elevated Installation >15' To 20', Add</i>	2.85	
	<i>For Elevated Installation >20' To 25', Add</i>	3.56	
	<i>For Elevated Installation >25' To 30', Add</i>	4.99	
	<i>For Elevated Installation >30' To 35', Add</i>	5.70	
	<i>For Elevated Installation >35' To 40', Add</i>	7.13	
	<i>For Elevated Installation >40', Add</i>	7.84	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.28	
26 05 33 13-0171	EA 3/4" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing.....	15.71	7.60
	<i>For Work In Restricted Working Space, Add</i>	4.56	
	<i>For Elevated Installation >10' To 15', Add</i>	1.52	
	<i>For Elevated Installation >15' To 20', Add</i>	3.04	
	<i>For Elevated Installation >20' To 25', Add</i>	3.80	
	<i>For Elevated Installation >25' To 30', Add</i>	5.32	
	<i>For Elevated Installation >30' To 35', Add</i>	6.08	
	<i>For Elevated Installation >35' To 40', Add</i>	7.60	
	<i>For Elevated Installation >40', Add</i>	8.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.56	
26 05 33 13-0172	EA 1" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	17.87	8.54
	<i>For Work In Restricted Working Space, Add</i>	5.13	
	<i>For Elevated Installation >10' To 15', Add</i>	1.71	
	<i>For Elevated Installation >15' To 20', Add</i>	3.42	
	<i>For Elevated Installation >20' To 25', Add</i>	4.27	
	<i>For Elevated Installation >25' To 30', Add</i>	5.98	
	<i>For Elevated Installation >30' To 35', Add</i>	6.84	
	<i>For Elevated Installation >35' To 40', Add</i>	8.55	
	<i>For Elevated Installation >40', Add</i>	9.40	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.13	
26 05 33 13-0173	EA 1-1/4" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	20.11	9.49
	<i>For Work In Restricted Working Space, Add</i>	5.70	
	<i>For Elevated Installation >10' To 15', Add</i>	1.90	
	<i>For Elevated Installation >15' To 20', Add</i>	3.80	
	<i>For Elevated Installation >20' To 25', Add</i>	4.75	
	<i>For Elevated Installation >25' To 30', Add</i>	6.65	
	<i>For Elevated Installation >30' To 35', Add</i>	7.60	
	<i>For Elevated Installation >35' To 40', Add</i>	9.50	
	<i>For Elevated Installation >40', Add</i>	10.44	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.70	
26 05 33 13-0174	EA 1-1/2" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	25.28	11.87
	<i>For Work In Restricted Working Space, Add</i>	7.12	
	<i>For Elevated Installation >10' To 15', Add</i>	2.37	
	<i>For Elevated Installation >15' To 20', Add</i>	4.75	
	<i>For Elevated Installation >20' To 25', Add</i>	5.94	
	<i>For Elevated Installation >25' To 30', Add</i>	8.31	
	<i>For Elevated Installation >30' To 35', Add</i>	9.50	
	<i>For Elevated Installation >35' To 40', Add</i>	11.87	
	<i>For Elevated Installation >40', Add</i>	13.06	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.12	
26 05 33 13-0175	EA 2" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	31.34	14.25
	<i>For Work In Restricted Working Space, Add</i>	8.55	
	<i>For Elevated Installation >10' To 15', Add</i>	2.85	
	<i>For Elevated Installation >15' To 20', Add</i>	5.70	
	<i>For Elevated Installation >20' To 25', Add</i>	7.12	
	<i>For Elevated Installation >25' To 30', Add</i>	9.97	
	<i>For Elevated Installation >30' To 35', Add</i>	11.40	
	<i>For Elevated Installation >35' To 40', Add</i>	14.25	
	<i>For Elevated Installation >40', Add</i>	15.67	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.55	
26 05 33 13-0176	EA 2-1/2" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	39.53	16.62
	<i>For Work In Restricted Working Space, Add</i>	9.97	
	<i>For Elevated Installation >10' To 15', Add</i>	3.32	
	<i>For Elevated Installation >15' To 20', Add</i>	6.65	
	<i>For Elevated Installation >20' To 25', Add</i>	8.31	
	<i>For Elevated Installation >25' To 30', Add</i>	11.63	
	<i>For Elevated Installation >30' To 35', Add</i>	13.29	
	<i>For Elevated Installation >35' To 40', Add</i>	16.62	
	<i>For Elevated Installation >40', Add</i>	18.28	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.97	
26 05 33 13-0177	EA 3" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	44.63	18.99
	<i>For Work In Restricted Working Space, Add</i>	11.40	
	<i>For Elevated Installation >10' To 15', Add</i>	3.80	
	<i>For Elevated Installation >15' To 20', Add</i>	7.60	
	<i>For Elevated Installation >20' To 25', Add</i>	9.50	
	<i>For Elevated Installation >25' To 30', Add</i>	13.30	
	<i>For Elevated Installation >30' To 35', Add</i>	15.20	
	<i>For Elevated Installation >35' To 40', Add</i>	19.00	
	<i>For Elevated Installation >40', Add</i>	20.89	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0178 EA 3-1/2" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	51.95	17.87
For Work In Restricted Working Space, Add	12.82	
For Elevated Installation >10' To 15', Add	4.27	
For Elevated Installation >15' To 20', Add	8.55	
For Elevated Installation >20' To 25', Add	10.68	
For Elevated Installation >25' To 30', Add	14.96	
For Elevated Installation >30' To 35', Add	17.09	
For Elevated Installation >35' To 40', Add	21.37	
For Elevated Installation >40', Add	23.50	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.82	
26 05 33 13-0179 EA 4" Rigid Galvanized Steel (RGS) Plastic Insulating Bushing	57.64	23.74
For Work In Restricted Working Space, Add	14.24	
For Elevated Installation >10' To 15', Add	4.75	
For Elevated Installation >15' To 20', Add	9.50	
For Elevated Installation >20' To 25', Add	11.87	
For Elevated Installation >25' To 30', Add	16.62	
For Elevated Installation >30' To 35', Add	18.99	
For Elevated Installation >35' To 40', Add	23.74	
For Elevated Installation >40', Add	26.11	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.24	
26 05 33 13-0180 Rigid Galvanized Steel (RGS) Steel Bushing (26 05 33 13-0060)		
26 05 33 13-0181 EA 1/2" Rigid Galvanized Steel (RGS) Steel Bushing	17.72	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.87	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.22	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0182 EA 3/4" Rigid Galvanized Steel (RGS) Steel Bushing	19.28	8.93
For Work In Restricted Working Space, Add	5.36	
For Elevated Installation >10' To 15', Add	1.79	
For Elevated Installation >15' To 20', Add	3.57	
For Elevated Installation >20' To 25', Add	4.47	
For Elevated Installation >25' To 30', Add	6.25	
For Elevated Installation >30' To 35', Add	7.15	
For Elevated Installation >35' To 40', Add	8.94	
For Elevated Installation >40', Add	9.83	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.36	
26 05 33 13-0183 EA 1" Rigid Galvanized Steel (RGS) Steel Bushing	22.55	10.06
For Work In Restricted Working Space, Add	6.03	
For Elevated Installation >10' To 15', Add	2.01	
For Elevated Installation >15' To 20', Add	4.02	
For Elevated Installation >20' To 25', Add	5.03	
For Elevated Installation >25' To 30', Add	7.04	
For Elevated Installation >30' To 35', Add	8.04	
For Elevated Installation >35' To 40', Add	10.06	
For Elevated Installation >40', Add	11.06	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.03	
26 05 33 13-0184 EA 1-1/4" Rigid Galvanized Steel (RGS) Steel Bushing	25.37	11.17
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.71	
26 05 33 13-0185 EA 1-1/2" Rigid Galvanized Steel (RGS) Steel Bushing	32.39	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-0186 EA 2" Rigid Galvanized Steel (RGS) Steel Bushing	38.31	16.76
For Work In Restricted Working Space, Add	10.05	
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.38	
For Elevated Installation >25' To 30', Add	11.73	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.76	
For Elevated Installation >40', Add	18.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.05	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0187	EA 2-1/2" Rigid Galvanized Steel (RGS) Steel Bushing.....	54.18	19.55
	<i>For Work In Restricted Working Space, Add</i>	11.73	
	<i>For Elevated Installation >10' To 15', Add</i>	3.91	
	<i>For Elevated Installation >15' To 20', Add</i>	7.82	
	<i>For Elevated Installation >20' To 25', Add</i>	9.78	
	<i>For Elevated Installation >25' To 30', Add</i>	13.69	
	<i>For Elevated Installation >30' To 35', Add</i>	15.64	
	<i>For Elevated Installation >35' To 40', Add</i>	19.55	
	<i>For Elevated Installation >40', Add</i>	21.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.73	
26 05 33 13-0188	EA 3" Rigid Galvanized Steel (RGS) Steel Bushing.....	64.47	22.35
	<i>For Work In Restricted Working Space, Add</i>	13.40	
	<i>For Elevated Installation >10' To 15', Add</i>	4.47	
	<i>For Elevated Installation >15' To 20', Add</i>	8.94	
	<i>For Elevated Installation >20' To 25', Add</i>	11.17	
	<i>For Elevated Installation >25' To 30', Add</i>	15.64	
	<i>For Elevated Installation >30' To 35', Add</i>	17.87	
	<i>For Elevated Installation >35' To 40', Add</i>	22.34	
	<i>For Elevated Installation >40', Add</i>	24.57	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.40	
26 05 33 13-0189	EA 3-1/2" Rigid Galvanized Steel (RGS) Steel Bushing.....	96.49	25.13
	<i>For Work In Restricted Working Space, Add</i>	15.08	
	<i>For Elevated Installation >10' To 15', Add</i>	5.03	
	<i>For Elevated Installation >15' To 20', Add</i>	10.06	
	<i>For Elevated Installation >20' To 25', Add</i>	12.57	
	<i>For Elevated Installation >25' To 30', Add</i>	17.60	
	<i>For Elevated Installation >30' To 35', Add</i>	20.11	
	<i>For Elevated Installation >35' To 40', Add</i>	25.14	
	<i>For Elevated Installation >40', Add</i>	27.65	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.08	
26 05 33 13-0190	EA 4" Rigid Galvanized Steel (RGS) Steel Bushing.....	130.81	27.93
	<i>For Work In Restricted Working Space, Add</i>	16.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.59	
	<i>For Elevated Installation >15' To 20', Add</i>	11.17	
	<i>For Elevated Installation >20' To 25', Add</i>	13.97	
	<i>For Elevated Installation >25' To 30', Add</i>	19.55	
	<i>For Elevated Installation >30' To 35', Add</i>	22.34	
	<i>For Elevated Installation >35' To 40', Add</i>	27.93	
	<i>For Elevated Installation >40', Add</i>	30.72	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.76	
26 05 33 13-0191	EA 5" Rigid Galvanized Steel (RGS) Steel Bushing.....	175.12	30.72
	<i>For Work In Restricted Working Space, Add</i>	18.43	
	<i>For Elevated Installation >10' To 15', Add</i>	6.14	
	<i>For Elevated Installation >15' To 20', Add</i>	12.29	
	<i>For Elevated Installation >20' To 25', Add</i>	15.36	
	<i>For Elevated Installation >25' To 30', Add</i>	21.50	
	<i>For Elevated Installation >30' To 35', Add</i>	24.58	
	<i>For Elevated Installation >35' To 40', Add</i>	30.72	
	<i>For Elevated Installation >40', Add</i>	33.79	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.43	
26 05 33 13-0192	EA 6" Rigid Galvanized Steel (RGS) Steel Bushing.....	258.89	33.51
	<i>For Work In Restricted Working Space, Add</i>	20.11	
	<i>For Elevated Installation >10' To 15', Add</i>	6.70	
	<i>For Elevated Installation >15' To 20', Add</i>	13.41	
	<i>For Elevated Installation >20' To 25', Add</i>	16.76	
	<i>For Elevated Installation >25' To 30', Add</i>	23.46	
	<i>For Elevated Installation >30' To 35', Add</i>	26.81	
	<i>For Elevated Installation >35' To 40', Add</i>	33.52	
	<i>For Elevated Installation >40', Add</i>	36.87	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.11	
26 05 33 13-0193	Rigid Galvanized Steel (RGS) Steel Insulated Bushing <small>(26 05 33 13-0060)</small>		
26 05 33 13-0194	EA 1/2" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	18.86	8.38
	<i>For Work In Restricted Working Space, Add</i>	5.03	
	<i>For Elevated Installation >10' To 15', Add</i>	1.68	
	<i>For Elevated Installation >15' To 20', Add</i>	3.35	
	<i>For Elevated Installation >20' To 25', Add</i>	4.19	
	<i>For Elevated Installation >25' To 30', Add</i>	5.87	
	<i>For Elevated Installation >30' To 35', Add</i>	6.70	
	<i>For Elevated Installation >35' To 40', Add</i>	8.38	
	<i>For Elevated Installation >40', Add</i>	9.22	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0195	EA 3/4" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	20.99	8.93
	<i>For Work In Restricted Working Space, Add</i>	5.36	
	<i>For Elevated Installation >10' To 15', Add</i>	1.79	
	<i>For Elevated Installation >15' To 20', Add</i>	3.57	
	<i>For Elevated Installation >20' To 25', Add</i>	4.47	
	<i>For Elevated Installation >25' To 30', Add</i>	6.25	
	<i>For Elevated Installation >30' To 35', Add</i>	7.15	
	<i>For Elevated Installation >35' To 40', Add</i>	8.94	
	<i>For Elevated Installation >40', Add</i>	9.83	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.36	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0196 EA 1" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	24.71	10.06
For Work In Restricted Working Space, Add	6.03	
For Elevated Installation >10' To 15', Add	2.01	
For Elevated Installation >15' To 20', Add	4.02	
For Elevated Installation >20' To 25', Add	5.03	
For Elevated Installation >25' To 30', Add	7.04	
For Elevated Installation >30' To 35', Add	8.04	
For Elevated Installation >35' To 40', Add	10.06	
For Elevated Installation >40', Add	11.06	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.03	
26 05 33 13-0197 EA 1-1/4" Rigid Galvanized Steel (RGS) Steel Insulated Bushing	29.01	11.17
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.71	
26 05 33 13-0198 EA 1-1/2" Rigid Galvanized Steel (RGS) Steel Insulated Bushing	36.19	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-0199 EA 2" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	45.04	16.76
For Work In Restricted Working Space, Add	10.05	
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.38	
For Elevated Installation >25' To 30', Add	11.73	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.76	
For Elevated Installation >40', Add	18.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.05	
26 05 33 13-0200 EA 2-1/2" Rigid Galvanized Steel (RGS) Steel Insulated Bushing	63.31	19.55
For Work In Restricted Working Space, Add	11.73	
For Elevated Installation >10' To 15', Add	3.91	
For Elevated Installation >15' To 20', Add	7.82	
For Elevated Installation >20' To 25', Add	9.78	
For Elevated Installation >25' To 30', Add	13.69	
For Elevated Installation >30' To 35', Add	15.64	
For Elevated Installation >35' To 40', Add	19.55	
For Elevated Installation >40', Add	21.51	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.73	
26 05 33 13-0201 EA 3" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	75.17	22.35
For Work In Restricted Working Space, Add	13.40	
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.94	
For Elevated Installation >20' To 25', Add	11.17	
For Elevated Installation >25' To 30', Add	15.64	
For Elevated Installation >30' To 35', Add	17.87	
For Elevated Installation >35' To 40', Add	22.34	
For Elevated Installation >40', Add	24.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	13.40	
26 05 33 13-0202 EA 3-1/2" Rigid Galvanized Steel (RGS) Steel Insulated Bushing	98.48	25.13
For Work In Restricted Working Space, Add	15.08	
For Elevated Installation >10' To 15', Add	5.03	
For Elevated Installation >15' To 20', Add	10.06	
For Elevated Installation >20' To 25', Add	12.57	
For Elevated Installation >25' To 30', Add	17.60	
For Elevated Installation >30' To 35', Add	20.11	
For Elevated Installation >35' To 40', Add	25.14	
For Elevated Installation >40', Add	27.65	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.08	
26 05 33 13-0203 EA 4" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	139.72	27.93
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0204	EA	5" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	184.83	30.72
			<i>For Work In Restricted Working Space, Add</i>	18.43	
			<i>For Elevated Installation >10' To 15', Add</i>	6.14	
			<i>For Elevated Installation >15' To 20', Add</i>	12.29	
			<i>For Elevated Installation >20' To 25', Add</i>	15.36	
			<i>For Elevated Installation >25' To 30', Add</i>	21.50	
			<i>For Elevated Installation >30' To 35', Add</i>	24.58	
			<i>For Elevated Installation >35' To 40', Add</i>	30.72	
			<i>For Elevated Installation >40', Add</i>	33.79	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.43	
26 05 33	13-0205	EA	6" Rigid Galvanized Steel (RGS) Steel Insulated Bushing.....	262.32	33.51
			<i>For Work In Restricted Working Space, Add</i>	20.11	
			<i>For Elevated Installation >10' To 15', Add</i>	6.70	
			<i>For Elevated Installation >15' To 20', Add</i>	13.41	
			<i>For Elevated Installation >20' To 25', Add</i>	16.76	
			<i>For Elevated Installation >25' To 30', Add</i>	23.46	
			<i>For Elevated Installation >30' To 35', Add</i>	26.81	
			<i>For Elevated Installation >35' To 40', Add</i>	33.52	
			<i>For Elevated Installation >40', Add</i>	36.87	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.11	
26 05 33	13-0206		Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing (26 05 33 13-0060)		
26 05 33	13-0207	EA	1/2" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	28.58	10.06
			<i>For Work In Restricted Working Space, Add</i>	6.03	
			<i>For Elevated Installation >10' To 15', Add</i>	2.01	
			<i>For Elevated Installation >15' To 20', Add</i>	4.02	
			<i>For Elevated Installation >20' To 25', Add</i>	5.03	
			<i>For Elevated Installation >25' To 30', Add</i>	7.04	
			<i>For Elevated Installation >30' To 35', Add</i>	8.04	
			<i>For Elevated Installation >35' To 40', Add</i>	10.06	
			<i>For Elevated Installation >40', Add</i>	11.06	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.03	
26 05 33	13-0208	EA	3/4" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	32.02	11.17
			<i>For Work In Restricted Working Space, Add</i>	6.71	
			<i>For Elevated Installation >10' To 15', Add</i>	2.24	
			<i>For Elevated Installation >15' To 20', Add</i>	4.47	
			<i>For Elevated Installation >20' To 25', Add</i>	5.59	
			<i>For Elevated Installation >25' To 30', Add</i>	7.82	
			<i>For Elevated Installation >30' To 35', Add</i>	8.94	
			<i>For Elevated Installation >35' To 40', Add</i>	11.18	
			<i>For Elevated Installation >40', Add</i>	12.29	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.71	
26 05 33	13-0209	EA	1" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	36.64	12.29
			<i>For Work In Restricted Working Space, Add</i>	7.37	
			<i>For Elevated Installation >10' To 15', Add</i>	2.46	
			<i>For Elevated Installation >15' To 20', Add</i>	4.92	
			<i>For Elevated Installation >20' To 25', Add</i>	6.15	
			<i>For Elevated Installation >25' To 30', Add</i>	8.60	
			<i>For Elevated Installation >30' To 35', Add</i>	9.83	
			<i>For Elevated Installation >35' To 40', Add</i>	12.29	
			<i>For Elevated Installation >40', Add</i>	13.52	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-0210	EA	1-1/4" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	43.53	13.97
			<i>For Work In Restricted Working Space, Add</i>	8.38	
			<i>For Elevated Installation >10' To 15', Add</i>	2.79	
			<i>For Elevated Installation >15' To 20', Add</i>	5.59	
			<i>For Elevated Installation >20' To 25', Add</i>	6.98	
			<i>For Elevated Installation >25' To 30', Add</i>	9.78	
			<i>For Elevated Installation >30' To 35', Add</i>	11.17	
			<i>For Elevated Installation >35' To 40', Add</i>	13.97	
			<i>For Elevated Installation >40', Add</i>	15.36	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-0211	EA	1-1/2" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	52.63	17.31
			<i>For Work In Restricted Working Space, Add</i>	10.39	
			<i>For Elevated Installation >10' To 15', Add</i>	3.46	
			<i>For Elevated Installation >15' To 20', Add</i>	6.93	
			<i>For Elevated Installation >20' To 25', Add</i>	8.66	
			<i>For Elevated Installation >25' To 30', Add</i>	12.12	
			<i>For Elevated Installation >30' To 35', Add</i>	13.85	
			<i>For Elevated Installation >35' To 40', Add</i>	17.32	
			<i>For Elevated Installation >40', Add</i>	19.05	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.39	
26 05 33	13-0212	EA	2" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	66.34	20.67
			<i>For Work In Restricted Working Space, Add</i>	12.40	
			<i>For Elevated Installation >10' To 15', Add</i>	4.13	
			<i>For Elevated Installation >15' To 20', Add</i>	8.27	
			<i>For Elevated Installation >20' To 25', Add</i>	10.33	
			<i>For Elevated Installation >25' To 30', Add</i>	14.47	
			<i>For Elevated Installation >30' To 35', Add</i>	16.53	
			<i>For Elevated Installation >35' To 40', Add</i>	20.67	
			<i>For Elevated Installation >40', Add</i>	22.73	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.40	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0213 EA 2-1/2" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	88.90	24.02
For Work In Restricted Working Space, Add	14.41	
For Elevated Installation >10' To 15', Add	4.80	
For Elevated Installation >15' To 20', Add	9.61	
For Elevated Installation >20' To 25', Add	12.01	
For Elevated Installation >25' To 30', Add	16.81	
For Elevated Installation >30' To 35', Add	19.22	
For Elevated Installation >35' To 40', Add	24.02	
For Elevated Installation >40', Add	26.42	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.41	
26 05 33 13-0214 EA 3" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	98.01	27.93
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-0215 EA 3-1/2" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	110.83	31.28
For Work In Restricted Working Space, Add	18.77	
For Elevated Installation >10' To 15', Add	6.26	
For Elevated Installation >15' To 20', Add	12.51	
For Elevated Installation >20' To 25', Add	15.64	
For Elevated Installation >25' To 30', Add	21.90	
For Elevated Installation >30' To 35', Add	25.02	
For Elevated Installation >35' To 40', Add	31.28	
For Elevated Installation >40', Add	34.41	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.77	
26 05 33 13-0216 EA 4" Rigid Galvanized Steel (RGS) Steel Insulated Grounding Bushing.....	143.15	34.63
For Work In Restricted Working Space, Add	20.78	
For Elevated Installation >10' To 15', Add	6.93	
For Elevated Installation >15' To 20', Add	13.85	
For Elevated Installation >20' To 25', Add	17.32	
For Elevated Installation >25' To 30', Add	24.24	
For Elevated Installation >30' To 35', Add	27.70	
For Elevated Installation >35' To 40', Add	34.63	
For Elevated Installation >40', Add	38.09	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	20.78	
26 05 33 13-0217 Rigid Galvanized Steel (RGS) Box Connectors With Set Screw <small>(26 05 33 13-0060)</small>		
26 05 33 13-0218 EA 1/2" Rigid Galvanized Steel (RGS) Box Connector With Set Screw.....	17.18	5.14
For Work In Restricted Working Space, Add	3.83	
For Elevated Installation >10' To 15', Add	1.28	
For Elevated Installation >15' To 20', Add	2.55	
For Elevated Installation >20' To 25', Add	3.19	
For Elevated Installation >25' To 30', Add	4.46	
For Elevated Installation >30' To 35', Add	5.10	
For Elevated Installation >35' To 40', Add	6.38	
For Elevated Installation >40', Add	7.01	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.83	
26 05 33 13-0219 EA 3/4" Rigid Galvanized Steel (RGS) Box Connector With Set Screw.....	20.91	5.92
For Work In Restricted Working Space, Add	4.43	
For Elevated Installation >10' To 15', Add	1.48	
For Elevated Installation >15' To 20', Add	2.95	
For Elevated Installation >20' To 25', Add	3.69	
For Elevated Installation >25' To 30', Add	5.17	
For Elevated Installation >30' To 35', Add	5.90	
For Elevated Installation >35' To 40', Add	7.38	
For Elevated Installation >40', Add	8.12	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.43	
26 05 33 13-0220 EA 1" Rigid Galvanized Steel (RGS) Box Connector With Set Screw.....	27.59	7.15
For Work In Restricted Working Space, Add	5.34	
For Elevated Installation >10' To 15', Add	1.78	
For Elevated Installation >15' To 20', Add	3.56	
For Elevated Installation >20' To 25', Add	4.45	
For Elevated Installation >25' To 30', Add	6.23	
For Elevated Installation >30' To 35', Add	7.12	
For Elevated Installation >35' To 40', Add	8.90	
For Elevated Installation >40', Add	9.78	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.34	
26 05 33 13-0221 EA 1-1/4" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	41.36	8.82
For Work In Restricted Working Space, Add	6.64	
For Elevated Installation >10' To 15', Add	2.21	
For Elevated Installation >15' To 20', Add	4.43	
For Elevated Installation >20' To 25', Add	5.54	
For Elevated Installation >25' To 30', Add	7.75	
For Elevated Installation >30' To 35', Add	8.86	
For Elevated Installation >35' To 40', Add	11.07	
For Elevated Installation >40', Add	12.18	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.64	

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Los Angeles County Development Authority

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0222	EA	1-1/2" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	56.03	11.84
		<i>For Work In Restricted Working Space, Add</i>	8.89	
		<i>For Elevated Installation >10' To 15', Add</i>	2.96	
		<i>For Elevated Installation >15' To 20', Add</i>	5.93	
		<i>For Elevated Installation >20' To 25', Add</i>	7.41	
		<i>For Elevated Installation >25' To 30', Add</i>	10.37	
		<i>For Elevated Installation >30' To 35', Add</i>	11.85	
		<i>For Elevated Installation >35' To 40', Add</i>	14.82	
		<i>For Elevated Installation >40', Add</i>	16.30	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.89	
26 05 33 13-0223	EA	2" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	96.15	17.76
		<i>For Work In Restricted Working Space, Add</i>	13.31	
		<i>For Elevated Installation >10' To 15', Add</i>	4.44	
		<i>For Elevated Installation >15' To 20', Add</i>	8.88	
		<i>For Elevated Installation >20' To 25', Add</i>	11.10	
		<i>For Elevated Installation >25' To 30', Add</i>	15.53	
		<i>For Elevated Installation >30' To 35', Add</i>	17.75	
		<i>For Elevated Installation >35' To 40', Add</i>	22.19	
		<i>For Elevated Installation >40', Add</i>	24.41	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.31	
26 05 33 13-0224	EA	2-1/2" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	177.27	19.66
		<i>For Work In Restricted Working Space, Add</i>	14.75	
		<i>For Elevated Installation >10' To 15', Add</i>	4.92	
		<i>For Elevated Installation >15' To 20', Add</i>	9.83	
		<i>For Elevated Installation >20' To 25', Add</i>	12.29	
		<i>For Elevated Installation >25' To 30', Add</i>	17.20	
		<i>For Elevated Installation >30' To 35', Add</i>	19.66	
		<i>For Elevated Installation >35' To 40', Add</i>	24.58	
		<i>For Elevated Installation >40', Add</i>	27.03	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.75	
26 05 33 13-0225	EA	3" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	211.19	23.80
		<i>For Work In Restricted Working Space, Add</i>	17.86	
		<i>For Elevated Installation >10' To 15', Add</i>	5.95	
		<i>For Elevated Installation >15' To 20', Add</i>	11.91	
		<i>For Elevated Installation >20' To 25', Add</i>	14.89	
		<i>For Elevated Installation >25' To 30', Add</i>	20.84	
		<i>For Elevated Installation >30' To 35', Add</i>	23.82	
		<i>For Elevated Installation >35' To 40', Add</i>	29.77	
		<i>For Elevated Installation >40', Add</i>	32.75	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.86	
26 05 33 13-0226	EA	3-1/2" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	286.31	29.83
		<i>For Work In Restricted Working Space, Add</i>	22.36	
		<i>For Elevated Installation >10' To 15', Add</i>	7.45	
		<i>For Elevated Installation >15' To 20', Add</i>	14.91	
		<i>For Elevated Installation >20' To 25', Add</i>	18.63	
		<i>For Elevated Installation >25' To 30', Add</i>	26.09	
		<i>For Elevated Installation >30' To 35', Add</i>	29.81	
		<i>For Elevated Installation >35' To 40', Add</i>	37.27	
		<i>For Elevated Installation >40', Add</i>	40.99	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.36	
26 05 33 13-0227	EA	4" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	335.14	35.75
		<i>For Work In Restricted Working Space, Add</i>	26.81	
		<i>For Elevated Installation >10' To 15', Add</i>	8.94	
		<i>For Elevated Installation >15' To 20', Add</i>	17.87	
		<i>For Elevated Installation >20' To 25', Add</i>	22.34	
		<i>For Elevated Installation >25' To 30', Add</i>	31.28	
		<i>For Elevated Installation >30' To 35', Add</i>	35.75	
		<i>For Elevated Installation >35' To 40', Add</i>	44.69	
		<i>For Elevated Installation >40', Add</i>	49.15	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	26.81	
26 05 33 13-0228	EA	5" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	596.08	39.77
		<i>For Work In Restricted Working Space, Add</i>	29.79	
		<i>For Elevated Installation >10' To 15', Add</i>	9.93	
		<i>For Elevated Installation >15' To 20', Add</i>	19.86	
		<i>For Elevated Installation >20' To 25', Add</i>	24.83	
		<i>For Elevated Installation >25' To 30', Add</i>	34.76	
		<i>For Elevated Installation >30' To 35', Add</i>	39.72	
		<i>For Elevated Installation >35' To 40', Add</i>	49.66	
		<i>For Elevated Installation >40', Add</i>	54.62	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.79	
26 05 33 13-0229	EA	6" Rigid Galvanized Steel (RGS) Box Connector, Insulated With Set Screw.....	713.05	44.68
		<i>For Work In Restricted Working Space, Add</i>	33.51	
		<i>For Elevated Installation >10' To 15', Add</i>	11.17	
		<i>For Elevated Installation >15' To 20', Add</i>	22.34	
		<i>For Elevated Installation >20' To 25', Add</i>	27.92	
		<i>For Elevated Installation >25' To 30', Add</i>	39.09	
		<i>For Elevated Installation >30' To 35', Add</i>	44.68	
		<i>For Elevated Installation >35' To 40', Add</i>	55.85	
		<i>For Elevated Installation >40', Add</i>	61.43	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	33.51	

26 05 33 13-0230 Rigid Galvanized Steel (RGS) Nipples (26 05 33 13-0060)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0231 EA 1/2" x 2" Long, Rigid Galvanized Steel (RGS) Nipple	16.35	7.26
For Work In Restricted Working Space, Add	4.36	
For Elevated Installation >10' To 15', Add	1.45	
For Elevated Installation >15' To 20', Add	2.91	
For Elevated Installation >20' To 25', Add	3.63	
For Elevated Installation >25' To 30', Add	5.09	
For Elevated Installation >30' To 35', Add	5.81	
For Elevated Installation >35' To 40', Add	7.27	
For Elevated Installation >40', Add	7.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.36	
26 05 33 13-0232 EA 3/4" x 2" Long, Rigid Galvanized Steel (RGS) Nipple	18.80	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0233 EA 1" x 2" Long, Rigid Galvanized Steel (RGS) Nipple	24.08	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	
26 05 33 13-0234 EA 1-1/4" x 2" Long, Rigid Galvanized Steel (RGS) Nipple	28.21	12.29
For Work In Restricted Working Space, Add	7.37	
For Elevated Installation >10' To 15', Add	2.46	
For Elevated Installation >15' To 20', Add	4.91	
For Elevated Installation >20' To 25', Add	6.14	
For Elevated Installation >25' To 30', Add	8.60	
For Elevated Installation >30' To 35', Add	9.83	
For Elevated Installation >35' To 40', Add	12.29	
For Elevated Installation >40', Add	13.51	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 05 33 13-0235 EA 1-1/2" x 2" Long, Rigid Galvanized Steel (RGS) Nipple	32.25	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-0236 EA 1/2" x 2-1/2" Long, Rigid Galvanized Steel (RGS) Nipple	16.50	7.26
For Work In Restricted Working Space, Add	4.36	
For Elevated Installation >10' To 15', Add	1.45	
For Elevated Installation >15' To 20', Add	2.91	
For Elevated Installation >20' To 25', Add	3.63	
For Elevated Installation >25' To 30', Add	5.09	
For Elevated Installation >30' To 35', Add	5.81	
For Elevated Installation >35' To 40', Add	7.27	
For Elevated Installation >40', Add	7.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.36	
26 05 33 13-0237 EA 3/4" x 2-1/2" Long, Rigid Galvanized Steel (RGS) Nipple	19.03	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0238 EA 1" x 2-1/2" Long, Rigid Galvanized Steel (RGS) Nipple	24.33	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0239	EA 1-1/4" x 2-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	28.56	12.29
	<i>For Work In Restricted Working Space, Add</i>	7.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.46	
	<i>For Elevated Installation >15' To 20', Add</i>	4.91	
	<i>For Elevated Installation >20' To 25', Add</i>	6.14	
	<i>For Elevated Installation >25' To 30', Add</i>	8.60	
	<i>For Elevated Installation >30' To 35', Add</i>	9.83	
	<i>For Elevated Installation >35' To 40', Add</i>	12.29	
	<i>For Elevated Installation >40', Add</i>	13.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-0240	EA 1-1/2" x 2-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	32.80	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0241	EA 2" x 2-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	37.16	15.64
	<i>For Work In Restricted Working Space, Add</i>	9.38	
	<i>For Elevated Installation >10' To 15', Add</i>	3.13	
	<i>For Elevated Installation >15' To 20', Add</i>	6.26	
	<i>For Elevated Installation >20' To 25', Add</i>	7.82	
	<i>For Elevated Installation >25' To 30', Add</i>	10.95	
	<i>For Elevated Installation >30' To 35', Add</i>	12.51	
	<i>For Elevated Installation >35' To 40', Add</i>	15.64	
	<i>For Elevated Installation >40', Add</i>	17.20	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-0242	EA 1/2" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	16.66	7.26
	<i>For Work In Restricted Working Space, Add</i>	4.36	
	<i>For Elevated Installation >10' To 15', Add</i>	1.45	
	<i>For Elevated Installation >15' To 20', Add</i>	2.91	
	<i>For Elevated Installation >20' To 25', Add</i>	3.63	
	<i>For Elevated Installation >25' To 30', Add</i>	5.09	
	<i>For Elevated Installation >30' To 35', Add</i>	5.81	
	<i>For Elevated Installation >35' To 40', Add</i>	7.27	
	<i>For Elevated Installation >40', Add</i>	7.99	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-0243	EA 3/4" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	19.24	8.38
	<i>For Work In Restricted Working Space, Add</i>	5.03	
	<i>For Elevated Installation >10' To 15', Add</i>	1.68	
	<i>For Elevated Installation >15' To 20', Add</i>	3.35	
	<i>For Elevated Installation >20' To 25', Add</i>	4.19	
	<i>For Elevated Installation >25' To 30', Add</i>	5.86	
	<i>For Elevated Installation >30' To 35', Add</i>	6.70	
	<i>For Elevated Installation >35' To 40', Add</i>	8.38	
	<i>For Elevated Installation >40', Add</i>	9.21	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0244	EA 1" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	24.69	10.62
	<i>For Work In Restricted Working Space, Add</i>	6.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.12	
	<i>For Elevated Installation >15' To 20', Add</i>	4.24	
	<i>For Elevated Installation >20' To 25', Add</i>	5.31	
	<i>For Elevated Installation >25' To 30', Add</i>	7.43	
	<i>For Elevated Installation >30' To 35', Add</i>	8.49	
	<i>For Elevated Installation >35' To 40', Add</i>	10.61	
	<i>For Elevated Installation >40', Add</i>	11.67	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-0245	EA 1-1/4" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	28.87	12.29
	<i>For Work In Restricted Working Space, Add</i>	7.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.46	
	<i>For Elevated Installation >15' To 20', Add</i>	4.91	
	<i>For Elevated Installation >20' To 25', Add</i>	6.14	
	<i>For Elevated Installation >25' To 30', Add</i>	8.60	
	<i>For Elevated Installation >30' To 35', Add</i>	9.83	
	<i>For Elevated Installation >35' To 40', Add</i>	12.29	
	<i>For Elevated Installation >40', Add</i>	13.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-0246	EA 1-1/2" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	33.17	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0247 EA 2" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	38.08	15.64
For Work In Restricted Working Space, Add	9.38	
For Elevated Installation >10' To 15', Add	3.13	
For Elevated Installation >15' To 20', Add	6.26	
For Elevated Installation >20' To 25', Add	7.82	
For Elevated Installation >25' To 30', Add	10.95	
For Elevated Installation >30' To 35', Add	12.51	
For Elevated Installation >35' To 40', Add	15.64	
For Elevated Installation >40', Add	17.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.38	
26 05 33 13-0248 EA 2-1/2" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	52.04	18.99
For Work In Restricted Working Space, Add	11.40	
For Elevated Installation >10' To 15', Add	3.80	
For Elevated Installation >15' To 20', Add	7.60	
For Elevated Installation >20' To 25', Add	9.50	
For Elevated Installation >25' To 30', Add	13.30	
For Elevated Installation >30' To 35', Add	15.20	
For Elevated Installation >35' To 40', Add	19.00	
For Elevated Installation >40', Add	20.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.40	
26 05 33 13-0249 EA 3" x 3" Long, Rigid Galvanized Steel (RGS) Nipple.....	69.77	26.26
For Work In Restricted Working Space, Add	15.75	
For Elevated Installation >10' To 15', Add	5.25	
For Elevated Installation >15' To 20', Add	10.50	
For Elevated Installation >20' To 25', Add	13.13	
For Elevated Installation >25' To 30', Add	18.38	
For Elevated Installation >30' To 35', Add	21.00	
For Elevated Installation >35' To 40', Add	26.25	
For Elevated Installation >40', Add	28.88	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.75	
26 05 33 13-0250 EA 1/2" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	16.86	7.26
For Work In Restricted Working Space, Add	4.36	
For Elevated Installation >10' To 15', Add	1.45	
For Elevated Installation >15' To 20', Add	2.91	
For Elevated Installation >20' To 25', Add	3.63	
For Elevated Installation >25' To 30', Add	5.09	
For Elevated Installation >30' To 35', Add	5.81	
For Elevated Installation >35' To 40', Add	7.27	
For Elevated Installation >40', Add	7.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.36	
26 05 33 13-0251 EA 3/4" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	19.34	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0252 EA 1" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	25.15	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	
26 05 33 13-0253 EA 1-1/4" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	29.46	12.29
For Work In Restricted Working Space, Add	7.37	
For Elevated Installation >10' To 15', Add	2.46	
For Elevated Installation >15' To 20', Add	4.91	
For Elevated Installation >20' To 25', Add	6.14	
For Elevated Installation >25' To 30', Add	8.60	
For Elevated Installation >30' To 35', Add	9.83	
For Elevated Installation >35' To 40', Add	12.29	
For Elevated Installation >40', Add	13.51	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 05 33 13-0254 EA 1-1/2" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple.....	33.95	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0255	EA 2" x 3-1/2" Long, Rigid Galvanized Steel (RGS), Nipple	39.03	15.64
	<i>For Work In Restricted Working Space, Add</i>	9.38	
	<i>For Elevated Installation >10' To 15', Add</i>	3.13	
	<i>For Elevated Installation >15' To 20', Add</i>	6.26	
	<i>For Elevated Installation >20' To 25', Add</i>	7.82	
	<i>For Elevated Installation >25' To 30', Add</i>	10.95	
	<i>For Elevated Installation >30' To 35', Add</i>	12.51	
	<i>For Elevated Installation >35' To 40', Add</i>	15.64	
	<i>For Elevated Installation >40', Add</i>	17.20	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-0256	EA 2-1/2" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple	54.60	18.99
	<i>For Work In Restricted Working Space, Add</i>	11.40	
	<i>For Elevated Installation >10' To 15', Add</i>	3.80	
	<i>For Elevated Installation >15' To 20', Add</i>	7.60	
	<i>For Elevated Installation >20' To 25', Add</i>	9.50	
	<i>For Elevated Installation >25' To 30', Add</i>	13.30	
	<i>For Elevated Installation >30' To 35', Add</i>	15.20	
	<i>For Elevated Installation >35' To 40', Add</i>	19.00	
	<i>For Elevated Installation >40', Add</i>	20.89	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-0257	EA 3" x 3-1/2" Long, Rigid Galvanized Steel (RGS) Nipple	71.99	26.26
	<i>For Work In Restricted Working Space, Add</i>	15.75	
	<i>For Elevated Installation >10' To 15', Add</i>	5.25	
	<i>For Elevated Installation >15' To 20', Add</i>	10.50	
	<i>For Elevated Installation >20' To 25', Add</i>	13.13	
	<i>For Elevated Installation >25' To 30', Add</i>	18.38	
	<i>For Elevated Installation >30' To 35', Add</i>	21.00	
	<i>For Elevated Installation >35' To 40', Add</i>	26.25	
	<i>For Elevated Installation >40', Add</i>	28.88	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-0258	EA 1/2" x 4" Long, Rigid Galvanized Steel (RGS) Nipple	17.06	7.26
	<i>For Work In Restricted Working Space, Add</i>	4.36	
	<i>For Elevated Installation >10' To 15', Add</i>	1.45	
	<i>For Elevated Installation >15' To 20', Add</i>	2.91	
	<i>For Elevated Installation >20' To 25', Add</i>	3.63	
	<i>For Elevated Installation >25' To 30', Add</i>	5.09	
	<i>For Elevated Installation >30' To 35', Add</i>	5.81	
	<i>For Elevated Installation >35' To 40', Add</i>	7.27	
	<i>For Elevated Installation >40', Add</i>	7.99	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-0259	EA 3/4" x 4" Long, Rigid Galvanized Steel (RGS) Nipple	19.70	8.38
	<i>For Work In Restricted Working Space, Add</i>	5.03	
	<i>For Elevated Installation >10' To 15', Add</i>	1.68	
	<i>For Elevated Installation >15' To 20', Add</i>	3.35	
	<i>For Elevated Installation >20' To 25', Add</i>	4.19	
	<i>For Elevated Installation >25' To 30', Add</i>	5.86	
	<i>For Elevated Installation >30' To 35', Add</i>	6.70	
	<i>For Elevated Installation >35' To 40', Add</i>	8.38	
	<i>For Elevated Installation >40', Add</i>	9.21	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0260	EA 1" x 4" Long, Rigid Galvanized Steel (RGS) Nipple	25.44	10.62
	<i>For Work In Restricted Working Space, Add</i>	6.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.12	
	<i>For Elevated Installation >15' To 20', Add</i>	4.24	
	<i>For Elevated Installation >20' To 25', Add</i>	5.31	
	<i>For Elevated Installation >25' To 30', Add</i>	7.43	
	<i>For Elevated Installation >30' To 35', Add</i>	8.49	
	<i>For Elevated Installation >35' To 40', Add</i>	10.61	
	<i>For Elevated Installation >40', Add</i>	11.67	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-0261	EA 1-1/4" x 4" Long, Rigid Galvanized Steel (RGS) Nipple	29.74	12.29
	<i>For Work In Restricted Working Space, Add</i>	7.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.46	
	<i>For Elevated Installation >15' To 20', Add</i>	4.91	
	<i>For Elevated Installation >20' To 25', Add</i>	6.14	
	<i>For Elevated Installation >25' To 30', Add</i>	8.60	
	<i>For Elevated Installation >30' To 35', Add</i>	9.83	
	<i>For Elevated Installation >35' To 40', Add</i>	12.29	
	<i>For Elevated Installation >40', Add</i>	13.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-0262	EA 1-1/2" x 4" Long, Rigid Galvanized Steel (RGS) Nipple	34.49	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0263 EA 2" x 4" Long, Rigid Galvanized Steel (RGS) Nipple.....	39.83	15.64
For Work In Restricted Working Space, Add	9.38	
For Elevated Installation >10' To 15', Add	3.13	
For Elevated Installation >15' To 20', Add	6.26	
For Elevated Installation >20' To 25', Add	7.82	
For Elevated Installation >25' To 30', Add	10.95	
For Elevated Installation >30' To 35', Add	12.51	
For Elevated Installation >35' To 40', Add	15.64	
For Elevated Installation >40', Add	17.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.38	
26 05 33 13-0264 EA 2-1/2" x 4" Long, Rigid Galvanized Steel (RGS) Nipple.....	55.38	18.99
For Work In Restricted Working Space, Add	11.40	
For Elevated Installation >10' To 15', Add	3.80	
For Elevated Installation >15' To 20', Add	7.60	
For Elevated Installation >20' To 25', Add	9.50	
For Elevated Installation >25' To 30', Add	13.30	
For Elevated Installation >30' To 35', Add	15.20	
For Elevated Installation >35' To 40', Add	19.00	
For Elevated Installation >40', Add	20.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.40	
26 05 33 13-0265 EA 3" x 4" Long, Rigid Galvanized Steel (RGS) Nipple.....	73.62	26.26
For Work In Restricted Working Space, Add	15.75	
For Elevated Installation >10' To 15', Add	5.25	
For Elevated Installation >15' To 20', Add	10.50	
For Elevated Installation >20' To 25', Add	13.13	
For Elevated Installation >25' To 30', Add	18.38	
For Elevated Installation >30' To 35', Add	21.00	
For Elevated Installation >35' To 40', Add	26.25	
For Elevated Installation >40', Add	28.88	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.75	
26 05 33 13-0266 EA 3-1/2" x 4" Long, Rigid Galvanized Steel (RGS) Nipple.....	84.92	29.60
For Work In Restricted Working Space, Add	17.76	
For Elevated Installation >10' To 15', Add	5.92	
For Elevated Installation >15' To 20', Add	11.84	
For Elevated Installation >20' To 25', Add	14.80	
For Elevated Installation >25' To 30', Add	20.72	
For Elevated Installation >30' To 35', Add	23.68	
For Elevated Installation >35' To 40', Add	29.61	
For Elevated Installation >40', Add	32.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	17.76	
26 05 33 13-0267 EA 4" x 4" Long, Rigid Galvanized Steel (RGS) Nipple.....	105.94	38.55
For Work In Restricted Working Space, Add	23.12	
For Elevated Installation >10' To 15', Add	7.71	
For Elevated Installation >15' To 20', Add	15.41	
For Elevated Installation >20' To 25', Add	19.27	
For Elevated Installation >25' To 30', Add	26.97	
For Elevated Installation >30' To 35', Add	30.83	
For Elevated Installation >35' To 40', Add	38.54	
For Elevated Installation >40', Add	42.39	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.12	
26 05 33 13-0268 EA 1/2" x 5" Long, Rigid Galvanized Steel (RGS) Nipple.....	17.36	7.26
For Work In Restricted Working Space, Add	4.36	
For Elevated Installation >10' To 15', Add	1.45	
For Elevated Installation >15' To 20', Add	2.91	
For Elevated Installation >20' To 25', Add	3.63	
For Elevated Installation >25' To 30', Add	5.09	
For Elevated Installation >30' To 35', Add	5.81	
For Elevated Installation >35' To 40', Add	7.27	
For Elevated Installation >40', Add	7.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.36	
26 05 33 13-0269 EA 3/4" x 5" Long, Rigid Galvanized Steel (RGS) Nipple.....	20.14	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0270 EA 1" x 5" Long, Rigid Galvanized Steel (RGS) Nipple.....	26.00	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0271	EA	1-1/4" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	30.56	12.29
			<i>For Work In Restricted Working Space, Add</i>	7.37	
			<i>For Elevated Installation >10' To 15', Add</i>	2.46	
			<i>For Elevated Installation >15' To 20', Add</i>	4.91	
			<i>For Elevated Installation >20' To 25', Add</i>	6.14	
			<i>For Elevated Installation >25' To 30', Add</i>	8.60	
			<i>For Elevated Installation >30' To 35', Add</i>	9.83	
			<i>For Elevated Installation >35' To 40', Add</i>	12.29	
			<i>For Elevated Installation >40', Add</i>	13.51	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-0272	EA	1-1/2" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	35.29	13.97
			<i>For Work In Restricted Working Space, Add</i>	8.38	
			<i>For Elevated Installation >10' To 15', Add</i>	2.79	
			<i>For Elevated Installation >15' To 20', Add</i>	5.59	
			<i>For Elevated Installation >20' To 25', Add</i>	6.98	
			<i>For Elevated Installation >25' To 30', Add</i>	9.78	
			<i>For Elevated Installation >30' To 35', Add</i>	11.17	
			<i>For Elevated Installation >35' To 40', Add</i>	13.97	
			<i>For Elevated Installation >40', Add</i>	15.36	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-0273	EA	2" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	41.26	15.64
			<i>For Work In Restricted Working Space, Add</i>	9.38	
			<i>For Elevated Installation >10' To 15', Add</i>	3.13	
			<i>For Elevated Installation >15' To 20', Add</i>	6.26	
			<i>For Elevated Installation >20' To 25', Add</i>	7.82	
			<i>For Elevated Installation >25' To 30', Add</i>	10.95	
			<i>For Elevated Installation >30' To 35', Add</i>	12.51	
			<i>For Elevated Installation >35' To 40', Add</i>	15.64	
			<i>For Elevated Installation >40', Add</i>	17.20	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33	13-0274	EA	2-1/2" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	58.55	18.99
			<i>For Work In Restricted Working Space, Add</i>	11.40	
			<i>For Elevated Installation >10' To 15', Add</i>	3.80	
			<i>For Elevated Installation >15' To 20', Add</i>	7.60	
			<i>For Elevated Installation >20' To 25', Add</i>	9.50	
			<i>For Elevated Installation >25' To 30', Add</i>	13.30	
			<i>For Elevated Installation >30' To 35', Add</i>	15.20	
			<i>For Elevated Installation >35' To 40', Add</i>	19.00	
			<i>For Elevated Installation >40', Add</i>	20.89	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33	13-0275	EA	3" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	77.06	26.26
			<i>For Work In Restricted Working Space, Add</i>	15.75	
			<i>For Elevated Installation >10' To 15', Add</i>	5.25	
			<i>For Elevated Installation >15' To 20', Add</i>	10.50	
			<i>For Elevated Installation >20' To 25', Add</i>	13.13	
			<i>For Elevated Installation >25' To 30', Add</i>	18.38	
			<i>For Elevated Installation >30' To 35', Add</i>	21.00	
			<i>For Elevated Installation >35' To 40', Add</i>	26.25	
			<i>For Elevated Installation >40', Add</i>	28.88	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33	13-0276	EA	3-1/2" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	88.33	29.60
			<i>For Work In Restricted Working Space, Add</i>	17.76	
			<i>For Elevated Installation >10' To 15', Add</i>	5.92	
			<i>For Elevated Installation >15' To 20', Add</i>	11.84	
			<i>For Elevated Installation >20' To 25', Add</i>	14.80	
			<i>For Elevated Installation >25' To 30', Add</i>	20.72	
			<i>For Elevated Installation >30' To 35', Add</i>	23.68	
			<i>For Elevated Installation >35' To 40', Add</i>	29.61	
			<i>For Elevated Installation >40', Add</i>	32.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33	13-0277	EA	4" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	110.92	38.55
			<i>For Work In Restricted Working Space, Add</i>	23.12	
			<i>For Elevated Installation >10' To 15', Add</i>	7.71	
			<i>For Elevated Installation >15' To 20', Add</i>	15.41	
			<i>For Elevated Installation >20' To 25', Add</i>	19.27	
			<i>For Elevated Installation >25' To 30', Add</i>	26.97	
			<i>For Elevated Installation >30' To 35', Add</i>	30.83	
			<i>For Elevated Installation >35' To 40', Add</i>	38.54	
			<i>For Elevated Installation >40', Add</i>	42.39	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33	13-0278	EA	5" x 5" Long, Rigid Galvanized Steel (RGS) Nipple	171.83	53.06
			<i>For Work In Restricted Working Space, Add</i>	31.84	
			<i>For Elevated Installation >10' To 15', Add</i>	10.61	
			<i>For Elevated Installation >15' To 20', Add</i>	21.23	
			<i>For Elevated Installation >20' To 25', Add</i>	26.53	
			<i>For Elevated Installation >25' To 30', Add</i>	37.15	
			<i>For Elevated Installation >30' To 35', Add</i>	42.45	
			<i>For Elevated Installation >35' To 40', Add</i>	53.07	
			<i>For Elevated Installation >40', Add</i>	58.37	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0279 EA 6" x 5" Long, Rigid Galvanized Steel (RGS) Nipple.....	218.04	68.03
For Work In Restricted Working Space, Add	40.85	
For Elevated Installation >10' To 15', Add	13.62	
For Elevated Installation >15' To 20', Add	27.23	
For Elevated Installation >20' To 25', Add	34.04	
For Elevated Installation >25' To 30', Add	47.66	
For Elevated Installation >30' To 35', Add	54.46	
For Elevated Installation >35' To 40', Add	68.08	
For Elevated Installation >40', Add	74.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.85	
26 05 33 13-0280 EA 1/2" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	17.91	7.26
For Work In Restricted Working Space, Add	4.36	
For Elevated Installation >10' To 15', Add	1.45	
For Elevated Installation >15' To 20', Add	2.91	
For Elevated Installation >20' To 25', Add	3.63	
For Elevated Installation >25' To 30', Add	5.09	
For Elevated Installation >30' To 35', Add	5.81	
For Elevated Installation >35' To 40', Add	7.27	
For Elevated Installation >40', Add	7.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.36	
26 05 33 13-0281 EA 3/4" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	20.70	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0282 EA 1" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	26.45	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	
26 05 33 13-0283 EA 1-1/4" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	31.32	12.29
For Work In Restricted Working Space, Add	7.37	
For Elevated Installation >10' To 15', Add	2.46	
For Elevated Installation >15' To 20', Add	4.91	
For Elevated Installation >20' To 25', Add	6.14	
For Elevated Installation >25' To 30', Add	8.60	
For Elevated Installation >30' To 35', Add	9.83	
For Elevated Installation >35' To 40', Add	12.29	
For Elevated Installation >40', Add	13.51	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 05 33 13-0284 EA 1-1/2" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	36.97	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-0285 EA 2" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	42.69	15.64
For Work In Restricted Working Space, Add	9.38	
For Elevated Installation >10' To 15', Add	3.13	
For Elevated Installation >15' To 20', Add	6.26	
For Elevated Installation >20' To 25', Add	7.82	
For Elevated Installation >25' To 30', Add	10.95	
For Elevated Installation >30' To 35', Add	12.51	
For Elevated Installation >35' To 40', Add	15.64	
For Elevated Installation >40', Add	17.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.38	
26 05 33 13-0286 EA 2-1/2" x 6" Long, Rigid Galvanized Steel (RGS) Nipple.....	61.32	18.99
For Work In Restricted Working Space, Add	11.40	
For Elevated Installation >10' To 15', Add	3.80	
For Elevated Installation >15' To 20', Add	7.60	
For Elevated Installation >20' To 25', Add	9.50	
For Elevated Installation >25' To 30', Add	13.30	
For Elevated Installation >30' To 35', Add	15.20	
For Elevated Installation >35' To 40', Add	19.00	
For Elevated Installation >40', Add	20.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.40	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 05 33 13-0287	EA		3" x 6" Long, Rigid Galvanized Steel (RGS) Nipple	80.54	26.26
			<i>For Work In Restricted Working Space, Add</i>	15.75	
			<i>For Elevated Installation >10' To 15', Add</i>	5.25	
			<i>For Elevated Installation >15' To 20', Add</i>	10.50	
			<i>For Elevated Installation >20' To 25', Add</i>	13.13	
			<i>For Elevated Installation >25' To 30', Add</i>	18.38	
			<i>For Elevated Installation >30' To 35', Add</i>	21.00	
			<i>For Elevated Installation >35' To 40', Add</i>	26.25	
			<i>For Elevated Installation >40', Add</i>	28.88	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-0288	EA		3-1/2" x 6" Long, Rigid Galvanized Steel (RGS) Nipple	92.49	29.60
			<i>For Work In Restricted Working Space, Add</i>	17.76	
			<i>For Elevated Installation >10' To 15', Add</i>	5.92	
			<i>For Elevated Installation >15' To 20', Add</i>	11.84	
			<i>For Elevated Installation >20' To 25', Add</i>	14.80	
			<i>For Elevated Installation >25' To 30', Add</i>	20.72	
			<i>For Elevated Installation >30' To 35', Add</i>	23.68	
			<i>For Elevated Installation >35' To 40', Add</i>	29.61	
			<i>For Elevated Installation >40', Add</i>	32.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33 13-0289	EA		4" x 6" Long, Rigid Galvanized Steel (RGS) Nipple	114.87	38.55
			<i>For Work In Restricted Working Space, Add</i>	23.12	
			<i>For Elevated Installation >10' To 15', Add</i>	7.71	
			<i>For Elevated Installation >15' To 20', Add</i>	15.41	
			<i>For Elevated Installation >20' To 25', Add</i>	19.27	
			<i>For Elevated Installation >25' To 30', Add</i>	26.97	
			<i>For Elevated Installation >30' To 35', Add</i>	30.83	
			<i>For Elevated Installation >35' To 40', Add</i>	38.54	
			<i>For Elevated Installation >40', Add</i>	42.39	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33 13-0290	EA		5" x 6" Long, Rigid Galvanized Steel (RGS) Nipple	177.62	53.06
			<i>For Work In Restricted Working Space, Add</i>	31.84	
			<i>For Elevated Installation >10' To 15', Add</i>	10.61	
			<i>For Elevated Installation >15' To 20', Add</i>	21.23	
			<i>For Elevated Installation >20' To 25', Add</i>	26.53	
			<i>For Elevated Installation >25' To 30', Add</i>	37.15	
			<i>For Elevated Installation >30' To 35', Add</i>	42.45	
			<i>For Elevated Installation >35' To 40', Add</i>	53.07	
			<i>For Elevated Installation >40', Add</i>	58.37	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	
26 05 33 13-0291	EA		6" x 6" Long, Rigid Galvanized Steel (RGS) Nipple	226.52	68.03
			<i>For Work In Restricted Working Space, Add</i>	40.85	
			<i>For Elevated Installation >10' To 15', Add</i>	13.62	
			<i>For Elevated Installation >15' To 20', Add</i>	27.23	
			<i>For Elevated Installation >20' To 25', Add</i>	34.04	
			<i>For Elevated Installation >25' To 30', Add</i>	47.66	
			<i>For Elevated Installation >30' To 35', Add</i>	54.46	
			<i>For Elevated Installation >35' To 40', Add</i>	68.08	
			<i>For Elevated Installation >40', Add</i>	74.89	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.85	
26 05 33 13-0292	EA		1/2" x 8" Long, Rigid Galvanized Steel (RGS) Nipple	19.91	7.26
			<i>For Work In Restricted Working Space, Add</i>	4.36	
			<i>For Elevated Installation >10' To 15', Add</i>	1.45	
			<i>For Elevated Installation >15' To 20', Add</i>	2.91	
			<i>For Elevated Installation >20' To 25', Add</i>	3.63	
			<i>For Elevated Installation >25' To 30', Add</i>	5.09	
			<i>For Elevated Installation >30' To 35', Add</i>	5.81	
			<i>For Elevated Installation >35' To 40', Add</i>	7.27	
			<i>For Elevated Installation >40', Add</i>	7.99	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-0293	EA		3/4" x 8" Long, Rigid Galvanized Steel (RGS) Nipple	23.26	8.38
			<i>For Work In Restricted Working Space, Add</i>	5.03	
			<i>For Elevated Installation >10' To 15', Add</i>	1.68	
			<i>For Elevated Installation >15' To 20', Add</i>	3.35	
			<i>For Elevated Installation >20' To 25', Add</i>	4.19	
			<i>For Elevated Installation >25' To 30', Add</i>	5.86	
			<i>For Elevated Installation >30' To 35', Add</i>	6.70	
			<i>For Elevated Installation >35' To 40', Add</i>	8.38	
			<i>For Elevated Installation >40', Add</i>	9.21	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0294	EA		1" x 8" Long, Rigid Galvanized Steel (RGS) Nipple	29.47	10.62
			<i>For Work In Restricted Working Space, Add</i>	6.37	
			<i>For Elevated Installation >10' To 15', Add</i>	2.12	
			<i>For Elevated Installation >15' To 20', Add</i>	4.24	
			<i>For Elevated Installation >20' To 25', Add</i>	5.31	
			<i>For Elevated Installation >25' To 30', Add</i>	7.43	
			<i>For Elevated Installation >30' To 35', Add</i>	8.49	
			<i>For Elevated Installation >35' To 40', Add</i>	10.61	
			<i>For Elevated Installation >40', Add</i>	11.67	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0295 EA 1-1/4" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	35.62	12.29
For Work In Restricted Working Space, Add	7.37	
For Elevated Installation >10' To 15', Add	2.46	
For Elevated Installation >15' To 20', Add	4.91	
For Elevated Installation >20' To 25', Add	6.14	
For Elevated Installation >25' To 30', Add	8.60	
For Elevated Installation >30' To 35', Add	9.83	
For Elevated Installation >35' To 40', Add	12.29	
For Elevated Installation >40', Add	13.51	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.37	
26 05 33 13-0296 EA 1-1/2" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	41.76	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-0297 EA 2" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	47.74	15.64
For Work In Restricted Working Space, Add	9.38	
For Elevated Installation >10' To 15', Add	3.13	
For Elevated Installation >15' To 20', Add	6.26	
For Elevated Installation >20' To 25', Add	7.82	
For Elevated Installation >25' To 30', Add	10.95	
For Elevated Installation >30' To 35', Add	12.51	
For Elevated Installation >35' To 40', Add	15.64	
For Elevated Installation >40', Add	17.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.38	
26 05 33 13-0298 EA 2-1/2" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	68.68	18.99
For Work In Restricted Working Space, Add	11.40	
For Elevated Installation >10' To 15', Add	3.80	
For Elevated Installation >15' To 20', Add	7.60	
For Elevated Installation >20' To 25', Add	9.50	
For Elevated Installation >25' To 30', Add	13.30	
For Elevated Installation >30' To 35', Add	15.20	
For Elevated Installation >35' To 40', Add	19.00	
For Elevated Installation >40', Add	20.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.40	
26 05 33 13-0299 EA 3" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	88.99	26.26
For Work In Restricted Working Space, Add	15.75	
For Elevated Installation >10' To 15', Add	5.25	
For Elevated Installation >15' To 20', Add	10.50	
For Elevated Installation >20' To 25', Add	13.13	
For Elevated Installation >25' To 30', Add	18.38	
For Elevated Installation >30' To 35', Add	21.00	
For Elevated Installation >35' To 40', Add	26.25	
For Elevated Installation >40', Add	28.88	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.75	
26 05 33 13-0300 EA 3-1/2" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	100.92	29.60
For Work In Restricted Working Space, Add	17.76	
For Elevated Installation >10' To 15', Add	5.92	
For Elevated Installation >15' To 20', Add	11.84	
For Elevated Installation >20' To 25', Add	14.80	
For Elevated Installation >25' To 30', Add	20.72	
For Elevated Installation >30' To 35', Add	23.68	
For Elevated Installation >35' To 40', Add	29.61	
For Elevated Installation >40', Add	32.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	17.76	
26 05 33 13-0301 EA 4" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	124.18	38.55
For Work In Restricted Working Space, Add	23.12	
For Elevated Installation >10' To 15', Add	7.71	
For Elevated Installation >15' To 20', Add	15.41	
For Elevated Installation >20' To 25', Add	19.27	
For Elevated Installation >25' To 30', Add	26.97	
For Elevated Installation >30' To 35', Add	30.83	
For Elevated Installation >35' To 40', Add	38.54	
For Elevated Installation >40', Add	42.39	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.12	
26 05 33 13-0302 EA 5" x 8" Long, Rigid Galvanized Steel (RGS) Nipple.....	191.04	53.06
For Work In Restricted Working Space, Add	31.84	
For Elevated Installation >10' To 15', Add	10.61	
For Elevated Installation >15' To 20', Add	21.23	
For Elevated Installation >20' To 25', Add	26.53	
For Elevated Installation >25' To 30', Add	37.15	
For Elevated Installation >30' To 35', Add	42.45	
For Elevated Installation >35' To 40', Add	53.07	
For Elevated Installation >40', Add	58.37	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	31.84	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0303	EA 6" x 8" Long, Rigid Galvanized Steel (RGS) Nipple	241.59	68.03
	<i>For Work In Restricted Working Space, Add</i>	40.85	
	<i>For Elevated Installation >10' To 15', Add</i>	13.62	
	<i>For Elevated Installation >15' To 20', Add</i>	27.23	
	<i>For Elevated Installation >20' To 25', Add</i>	34.04	
	<i>For Elevated Installation >25' To 30', Add</i>	47.66	
	<i>For Elevated Installation >30' To 35', Add</i>	54.46	
	<i>For Elevated Installation >35' To 40', Add</i>	68.08	
	<i>For Elevated Installation >40', Add</i>	74.89	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.85	
26 05 33 13-0304	EA 1/2" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	21.27	7.26
	<i>For Work In Restricted Working Space, Add</i>	4.36	
	<i>For Elevated Installation >10' To 15', Add</i>	1.45	
	<i>For Elevated Installation >15' To 20', Add</i>	2.91	
	<i>For Elevated Installation >20' To 25', Add</i>	3.63	
	<i>For Elevated Installation >25' To 30', Add</i>	5.09	
	<i>For Elevated Installation >30' To 35', Add</i>	5.81	
	<i>For Elevated Installation >35' To 40', Add</i>	7.27	
	<i>For Elevated Installation >40', Add</i>	7.99	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-0305	EA 3/4" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	24.57	8.38
	<i>For Work In Restricted Working Space, Add</i>	5.03	
	<i>For Elevated Installation >10' To 15', Add</i>	1.68	
	<i>For Elevated Installation >15' To 20', Add</i>	3.35	
	<i>For Elevated Installation >20' To 25', Add</i>	4.19	
	<i>For Elevated Installation >25' To 30', Add</i>	5.86	
	<i>For Elevated Installation >30' To 35', Add</i>	6.70	
	<i>For Elevated Installation >35' To 40', Add</i>	8.38	
	<i>For Elevated Installation >40', Add</i>	9.21	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0306	EA 1" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	31.87	10.62
	<i>For Work In Restricted Working Space, Add</i>	6.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.12	
	<i>For Elevated Installation >15' To 20', Add</i>	4.24	
	<i>For Elevated Installation >20' To 25', Add</i>	5.31	
	<i>For Elevated Installation >25' To 30', Add</i>	7.43	
	<i>For Elevated Installation >30' To 35', Add</i>	8.49	
	<i>For Elevated Installation >35' To 40', Add</i>	10.61	
	<i>For Elevated Installation >40', Add</i>	11.67	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-0307	EA 1-1/4" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	38.47	12.29
	<i>For Work In Restricted Working Space, Add</i>	7.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.46	
	<i>For Elevated Installation >15' To 20', Add</i>	4.91	
	<i>For Elevated Installation >20' To 25', Add</i>	6.14	
	<i>For Elevated Installation >25' To 30', Add</i>	8.60	
	<i>For Elevated Installation >30' To 35', Add</i>	9.83	
	<i>For Elevated Installation >35' To 40', Add</i>	12.29	
	<i>For Elevated Installation >40', Add</i>	13.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-0308	EA 1-1/2" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	44.57	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0309	EA 2" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	51.00	15.64
	<i>For Work In Restricted Working Space, Add</i>	9.38	
	<i>For Elevated Installation >10' To 15', Add</i>	3.13	
	<i>For Elevated Installation >15' To 20', Add</i>	6.26	
	<i>For Elevated Installation >20' To 25', Add</i>	7.82	
	<i>For Elevated Installation >25' To 30', Add</i>	10.95	
	<i>For Elevated Installation >30' To 35', Add</i>	12.51	
	<i>For Elevated Installation >35' To 40', Add</i>	15.64	
	<i>For Elevated Installation >40', Add</i>	17.20	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-0310	EA 2-1/2" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	73.62	18.99
	<i>For Work In Restricted Working Space, Add</i>	11.40	
	<i>For Elevated Installation >10' To 15', Add</i>	3.80	
	<i>For Elevated Installation >15' To 20', Add</i>	7.60	
	<i>For Elevated Installation >20' To 25', Add</i>	9.50	
	<i>For Elevated Installation >25' To 30', Add</i>	13.30	
	<i>For Elevated Installation >30' To 35', Add</i>	15.20	
	<i>For Elevated Installation >35' To 40', Add</i>	19.00	
	<i>For Elevated Installation >40', Add</i>	20.89	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0311 EA 3" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	95.62	26.26
For Work In Restricted Working Space, Add	15.75	
For Elevated Installation >10' To 15', Add	5.25	
For Elevated Installation >15' To 20', Add	10.50	
For Elevated Installation >20' To 25', Add	13.13	
For Elevated Installation >25' To 30', Add	18.38	
For Elevated Installation >30' To 35', Add	21.00	
For Elevated Installation >35' To 40', Add	26.25	
For Elevated Installation >40', Add	28.88	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.75	
26 05 33 13-0312 EA 3-1/2" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	109.66	29.60
For Work In Restricted Working Space, Add	17.76	
For Elevated Installation >10' To 15', Add	5.92	
For Elevated Installation >15' To 20', Add	11.84	
For Elevated Installation >20' To 25', Add	14.80	
For Elevated Installation >25' To 30', Add	20.72	
For Elevated Installation >30' To 35', Add	23.68	
For Elevated Installation >35' To 40', Add	29.61	
For Elevated Installation >40', Add	32.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	17.76	
26 05 33 13-0313 EA 4" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	135.25	38.55
For Work In Restricted Working Space, Add	23.12	
For Elevated Installation >10' To 15', Add	7.71	
For Elevated Installation >15' To 20', Add	15.41	
For Elevated Installation >20' To 25', Add	19.27	
For Elevated Installation >25' To 30', Add	26.97	
For Elevated Installation >30' To 35', Add	30.83	
For Elevated Installation >35' To 40', Add	38.54	
For Elevated Installation >40', Add	42.39	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.12	
26 05 33 13-0314 EA 5" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	205.68	53.06
For Work In Restricted Working Space, Add	31.84	
For Elevated Installation >10' To 15', Add	10.61	
For Elevated Installation >15' To 20', Add	21.23	
For Elevated Installation >20' To 25', Add	26.53	
For Elevated Installation >25' To 30', Add	37.15	
For Elevated Installation >30' To 35', Add	42.45	
For Elevated Installation >35' To 40', Add	53.07	
For Elevated Installation >40', Add	58.37	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	31.84	
26 05 33 13-0315 EA 6" x 10" Long, Rigid Galvanized Steel (RGS) Nipple	267.92	68.03
For Work In Restricted Working Space, Add	40.85	
For Elevated Installation >10' To 15', Add	13.62	
For Elevated Installation >15' To 20', Add	27.23	
For Elevated Installation >20' To 25', Add	34.04	
For Elevated Installation >25' To 30', Add	47.66	
For Elevated Installation >30' To 35', Add	54.46	
For Elevated Installation >35' To 40', Add	68.08	
For Elevated Installation >40', Add	74.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.85	
26 05 33 13-0316 EA 1/2" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	22.29	7.26
For Work In Restricted Working Space, Add	4.36	
For Elevated Installation >10' To 15', Add	1.45	
For Elevated Installation >15' To 20', Add	2.91	
For Elevated Installation >20' To 25', Add	3.63	
For Elevated Installation >25' To 30', Add	5.09	
For Elevated Installation >30' To 35', Add	5.81	
For Elevated Installation >35' To 40', Add	7.27	
For Elevated Installation >40', Add	7.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.36	
26 05 33 13-0317 EA 3/4" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	25.54	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.03	
26 05 33 13-0318 EA 1" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	33.31	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0319	EA 1-1/4" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	40.75	12.29
	<i>For Work In Restricted Working Space, Add</i>	7.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.46	
	<i>For Elevated Installation >15' To 20', Add</i>	4.91	
	<i>For Elevated Installation >20' To 25', Add</i>	6.14	
	<i>For Elevated Installation >25' To 30', Add</i>	8.60	
	<i>For Elevated Installation >30' To 35', Add</i>	9.83	
	<i>For Elevated Installation >35' To 40', Add</i>	12.29	
	<i>For Elevated Installation >40', Add</i>	13.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-0320	EA 1-1/2" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	45.98	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0321	EA 2" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	53.73	15.64
	<i>For Work In Restricted Working Space, Add</i>	9.38	
	<i>For Elevated Installation >10' To 15', Add</i>	3.13	
	<i>For Elevated Installation >15' To 20', Add</i>	6.26	
	<i>For Elevated Installation >20' To 25', Add</i>	7.82	
	<i>For Elevated Installation >25' To 30', Add</i>	10.95	
	<i>For Elevated Installation >30' To 35', Add</i>	12.51	
	<i>For Elevated Installation >35' To 40', Add</i>	15.64	
	<i>For Elevated Installation >40', Add</i>	17.20	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-0322	EA 2-1/2" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	79.43	18.99
	<i>For Work In Restricted Working Space, Add</i>	11.40	
	<i>For Elevated Installation >10' To 15', Add</i>	3.80	
	<i>For Elevated Installation >15' To 20', Add</i>	7.60	
	<i>For Elevated Installation >20' To 25', Add</i>	9.50	
	<i>For Elevated Installation >25' To 30', Add</i>	13.30	
	<i>For Elevated Installation >30' To 35', Add</i>	15.20	
	<i>For Elevated Installation >35' To 40', Add</i>	19.00	
	<i>For Elevated Installation >40', Add</i>	20.89	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-0323	EA 3" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	104.86	26.26
	<i>For Work In Restricted Working Space, Add</i>	15.75	
	<i>For Elevated Installation >10' To 15', Add</i>	5.25	
	<i>For Elevated Installation >15' To 20', Add</i>	10.50	
	<i>For Elevated Installation >20' To 25', Add</i>	13.13	
	<i>For Elevated Installation >25' To 30', Add</i>	18.38	
	<i>For Elevated Installation >30' To 35', Add</i>	21.00	
	<i>For Elevated Installation >35' To 40', Add</i>	26.25	
	<i>For Elevated Installation >40', Add</i>	28.88	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-0324	EA 3-1/2" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	118.17	29.60
	<i>For Work In Restricted Working Space, Add</i>	17.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.92	
	<i>For Elevated Installation >15' To 20', Add</i>	11.84	
	<i>For Elevated Installation >20' To 25', Add</i>	14.80	
	<i>For Elevated Installation >25' To 30', Add</i>	20.72	
	<i>For Elevated Installation >30' To 35', Add</i>	23.68	
	<i>For Elevated Installation >35' To 40', Add</i>	29.61	
	<i>For Elevated Installation >40', Add</i>	32.57	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33 13-0325	EA 4" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	146.34	38.55
	<i>For Work In Restricted Working Space, Add</i>	23.12	
	<i>For Elevated Installation >10' To 15', Add</i>	7.71	
	<i>For Elevated Installation >15' To 20', Add</i>	15.41	
	<i>For Elevated Installation >20' To 25', Add</i>	19.27	
	<i>For Elevated Installation >25' To 30', Add</i>	26.97	
	<i>For Elevated Installation >30' To 35', Add</i>	30.83	
	<i>For Elevated Installation >35' To 40', Add</i>	38.54	
	<i>For Elevated Installation >40', Add</i>	42.39	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33 13-0326	EA 5" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	226.72	53.06
	<i>For Work In Restricted Working Space, Add</i>	31.84	
	<i>For Elevated Installation >10' To 15', Add</i>	10.61	
	<i>For Elevated Installation >15' To 20', Add</i>	21.23	
	<i>For Elevated Installation >20' To 25', Add</i>	26.53	
	<i>For Elevated Installation >25' To 30', Add</i>	37.15	
	<i>For Elevated Installation >30' To 35', Add</i>	42.45	
	<i>For Elevated Installation >35' To 40', Add</i>	53.07	
	<i>For Elevated Installation >40', Add</i>	58.37	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0327 EA 6" x 12" Long, Rigid Galvanized Steel (RGS) Nipple	282.56	68.03
For Work In Restricted Working Space, Add	40.85	
For Elevated Installation >10' To 15', Add	13.62	
For Elevated Installation >15' To 20', Add	27.23	
For Elevated Installation >20' To 25', Add	34.04	
For Elevated Installation >25' To 30', Add	47.66	
For Elevated Installation >30' To 35', Add	54.46	
For Elevated Installation >35' To 40', Add	68.08	
For Elevated Installation >40', Add	74.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.85	
26 05 33 13-0328 Rigid Galvanized Steel (RGS) Off-Set Nipples (26 05 33 13-0060)		
26 05 33 13-0329 EA 1/2" Rigid Galvanized Steel (RGS) Off-Set Nipple.....	17.01	5.80
For Work In Restricted Working Space, Add	4.39	
For Elevated Installation >10' To 15', Add	1.46	
For Elevated Installation >15' To 20', Add	2.93	
For Elevated Installation >20' To 25', Add	3.66	
For Elevated Installation >25' To 30', Add	5.12	
For Elevated Installation >30' To 35', Add	5.86	
For Elevated Installation >35' To 40', Add	7.32	
For Elevated Installation >40', Add	8.05	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.39	
26 05 33 13-0330 EA 3/4" Rigid Galvanized Steel (RGS) Off-Set Nipple.....	20.27	6.71
For Work In Restricted Working Space, Add	5.00	
For Elevated Installation >10' To 15', Add	1.67	
For Elevated Installation >15' To 20', Add	3.33	
For Elevated Installation >20' To 25', Add	4.17	
For Elevated Installation >25' To 30', Add	5.83	
For Elevated Installation >30' To 35', Add	6.66	
For Elevated Installation >35' To 40', Add	8.33	
For Elevated Installation >40', Add	9.16	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.00	
26 05 33 13-0331 EA 1" Rigid Galvanized Steel (RGS) Off-Set Nipple.....	25.44	8.49
For Work In Restricted Working Space, Add	6.39	
For Elevated Installation >10' To 15', Add	2.13	
For Elevated Installation >15' To 20', Add	4.26	
For Elevated Installation >20' To 25', Add	5.33	
For Elevated Installation >25' To 30', Add	7.46	
For Elevated Installation >30' To 35', Add	8.52	
For Elevated Installation >35' To 40', Add	10.66	
For Elevated Installation >40', Add	11.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.39	
26 05 33 13-0332 EA 1-1/4" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated	32.21	10.17
For Work In Restricted Working Space, Add	7.66	
For Elevated Installation >10' To 15', Add	2.55	
For Elevated Installation >15' To 20', Add	5.11	
For Elevated Installation >20' To 25', Add	6.39	
For Elevated Installation >25' To 30', Add	8.94	
For Elevated Installation >30' To 35', Add	10.22	
For Elevated Installation >35' To 40', Add	12.77	
For Elevated Installation >40', Add	14.05	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.66	
26 05 33 13-0333 EA 1-1/2" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated	35.26	11.17
For Work In Restricted Working Space, Add	8.39	
For Elevated Installation >10' To 15', Add	2.80	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.99	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.18	
For Elevated Installation >35' To 40', Add	13.98	
For Elevated Installation >40', Add	15.37	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.39	
26 05 33 13-0334 EA 2" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated	46.04	13.74
For Work In Restricted Working Space, Add	10.33	
For Elevated Installation >10' To 15', Add	3.44	
For Elevated Installation >15' To 20', Add	6.89	
For Elevated Installation >20' To 25', Add	8.61	
For Elevated Installation >25' To 30', Add	12.05	
For Elevated Installation >30' To 35', Add	13.77	
For Elevated Installation >35' To 40', Add	17.22	
For Elevated Installation >40', Add	18.94	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.33	
26 05 33 13-0335 EA 2-1/2" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated	75.21	22.35
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0336	EA 3" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	121.03 23.12 7.71 15.42 19.27 26.98 30.83 38.54 42.39 23.12	30.84
26 05 33 13-0337	EA 3-1/2" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	149.89 27.17 9.06 18.11 22.64 31.69 36.22 45.28 49.80 27.17	36.42
26 05 33 13-0338	EA 4" Rigid Galvanized Steel (RGS) Off-Set Nipple, Insulated <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	179.67 31.51 10.50 21.00 26.26 36.76 42.01 52.51 57.76 31.51	42.01
26 05 33 13-0339 Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (26 05 33 13-0060)			
Note: Erickson fittings.			
26 05 33 13-0340	EA 1/2" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)..... <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	47.38 13.42 4.47 8.95 11.19 15.66 17.90 22.37 24.61 13.42	17.87
26 05 33 13-0341	EA 3/4" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)..... <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	53.32 14.98 4.99 9.99 12.48 17.48 19.97 24.97 27.46 14.98	20.00
26 05 33 13-0342	EA 1" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)..... <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	61.88 16.69 5.56 11.12 13.91 19.47 22.25 27.81 30.59 16.69	22.24
26 05 33 13-0343	EA 1-1/4" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson) <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	74.20 18.26 6.09 12.17 15.22 21.30 24.34 30.43 33.47 18.26	24.35
26 05 33 13-0344	EA 1-1/2" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson) <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.58 19.98 6.66 13.32 16.65 23.31 26.64 33.30 36.62 19.98	26.59

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0345 EA 2" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	104.13	28.82
For Work In Restricted Working Space, Add	21.63	
For Elevated Installation >10' To 15', Add	7.21	
For Elevated Installation >15' To 20', Add	14.42	
For Elevated Installation >20' To 25', Add	18.03	
For Elevated Installation >25' To 30', Add	25.24	
For Elevated Installation >30' To 35', Add	28.84	
For Elevated Installation >35' To 40', Add	36.06	
For Elevated Installation >40', Add	39.66	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.63	
26 05 33 13-0346 EA 2-1/2" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	163.55	35.75
For Work In Restricted Working Space, Add	26.81	
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-0347 EA 3" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	224.31	44.68
For Work In Restricted Working Space, Add	33.52	
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	33.52	
26 05 33 13-0348 EA 3-1/2" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	321.64	53.63
For Work In Restricted Working Space, Add	40.23	
For Elevated Installation >10' To 15', Add	13.41	
For Elevated Installation >15' To 20', Add	26.82	
For Elevated Installation >20' To 25', Add	33.53	
For Elevated Installation >25' To 30', Add	46.94	
For Elevated Installation >30' To 35', Add	53.64	
For Elevated Installation >35' To 40', Add	67.06	
For Elevated Installation >40', Add	73.76	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.23	
26 05 33 13-0349 EA 4" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	365.76	58.10
For Work In Restricted Working Space, Add	43.57	
For Elevated Installation >10' To 15', Add	14.52	
For Elevated Installation >15' To 20', Add	29.04	
For Elevated Installation >20' To 25', Add	36.31	
For Elevated Installation >25' To 30', Add	50.83	
For Elevated Installation >30' To 35', Add	58.09	
For Elevated Installation >35' To 40', Add	72.61	
For Elevated Installation >40', Add	79.87	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	43.57	
26 05 33 13-0350 EA 5" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	631.35	71.50
For Work In Restricted Working Space, Add	53.62	
For Elevated Installation >10' To 15', Add	17.87	
For Elevated Installation >15' To 20', Add	35.75	
For Elevated Installation >20' To 25', Add	44.68	
For Elevated Installation >25' To 30', Add	62.56	
For Elevated Installation >30' To 35', Add	71.49	
For Elevated Installation >35' To 40', Add	89.37	
For Elevated Installation >40', Add	98.30	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	53.62	
26 05 33 13-0351 EA 6" Rigid Galvanized Steel (RGS) 3-Piece Conduit Coupling (Erickson)	809.95	82.67
For Work In Restricted Working Space, Add	62.00	
For Elevated Installation >10' To 15', Add	20.67	
For Elevated Installation >15' To 20', Add	41.33	
For Elevated Installation >20' To 25', Add	51.66	
For Elevated Installation >25' To 30', Add	72.33	
For Elevated Installation >30' To 35', Add	82.66	
For Elevated Installation >35' To 40', Add	103.33	
For Elevated Installation >40', Add	113.66	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	62.00	
26 05 33 13-0352 Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connectors <small>(26 05 33 13-0060)</small>		
26 05 33 13-0353 EA 1/2" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector	28.69	8.93
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	

26 Electrical

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MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0354	EA 3/4" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	32.08 7.37 2.46 4.92 6.15 8.60 9.83 12.29 13.52	9.83
26 05 33 13-0355	EA 1" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	36.86 8.38 2.79 5.59 6.98 9.78 11.17 13.97 15.36	11.17
26 05 33 13-0356	EA 1-1/4" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	41.94 9.05 3.02 6.03 7.54 10.56 12.06 15.08 16.59	12.07
26 05 33 13-0357	EA 1-1/2" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	49.94 10.05 3.35 6.70 8.38 11.73 13.40 16.76 18.43	13.40
26 05 33 13-0358	EA 2" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	61.15 11.06 3.69 7.37 9.22 12.90 14.75 18.44 20.28	14.75
26 05 33 13-0359	EA 2-1/2" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	83.60 13.40 4.47 8.94 11.17 15.64 17.87 22.34 24.57	17.87
26 05 33 13-0360	EA 3" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	103.35 16.76 5.59 11.17 13.97 19.55 22.34 27.93 30.72	22.35
26 05 33 13-0361	EA 3-1/2" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	124.16 20.11 6.70 13.41 16.76 23.46 26.81 33.52 36.87	26.81
26 05 33 13-0362	EA 4" Rigid Galvanized Steel (RGS) To Electrical Metallic Tubing (EMT) Connector <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	140.46 21.78 7.26 14.52 18.15 25.41 29.04 36.31 39.94	29.04

26 05 33 13-0363 Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs (26 05 33 13-0060)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0364 EA 1/2" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	24.77	10.06
For Work In Restricted Working Space, Add	6.03	
For Elevated Installation >10' To 15', Add	2.01	
For Elevated Installation >15' To 20', Add	4.02	
For Elevated Installation >20' To 25', Add	5.03	
For Elevated Installation >25' To 30', Add	7.04	
For Elevated Installation >30' To 35', Add	8.04	
For Elevated Installation >35' To 40', Add	10.06	
For Elevated Installation >40', Add	11.06	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.03	
26 05 33 13-0365 EA 3/4" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	27.61	11.17
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.71	
26 05 33 13-0366 EA 1" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	34.10	13.97
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-0367 EA 1-1/4" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	41.89	16.76
For Work In Restricted Working Space, Add	10.05	
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.38	
For Elevated Installation >25' To 30', Add	11.73	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.76	
For Elevated Installation >40', Add	18.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.05	
26 05 33 13-0368 EA 1-1/2" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	53.89	22.35
For Work In Restricted Working Space, Add	13.40	
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.94	
For Elevated Installation >20' To 25', Add	11.17	
For Elevated Installation >25' To 30', Add	15.64	
For Elevated Installation >30' To 35', Add	17.87	
For Elevated Installation >35' To 40', Add	22.34	
For Elevated Installation >40', Add	24.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	13.40	
26 05 33 13-0369 EA 2" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	62.59	25.13
For Work In Restricted Working Space, Add	15.08	
For Elevated Installation >10' To 15', Add	5.03	
For Elevated Installation >15' To 20', Add	10.06	
For Elevated Installation >20' To 25', Add	12.57	
For Elevated Installation >25' To 30', Add	17.60	
For Elevated Installation >30' To 35', Add	20.11	
For Elevated Installation >35' To 40', Add	25.14	
For Elevated Installation >40', Add	27.65	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.08	
26 05 33 13-0370 EA 2-1/2" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	76.76	27.93
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-0371 EA 3" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs	103.14	35.19
For Work In Restricted Working Space, Add	21.11	
For Elevated Installation >10' To 15', Add	7.04	
For Elevated Installation >15' To 20', Add	14.08	
For Elevated Installation >20' To 25', Add	17.60	
For Elevated Installation >25' To 30', Add	24.63	
For Elevated Installation >30' To 35', Add	28.15	
For Elevated Installation >35' To 40', Add	35.19	
For Elevated Installation >40', Add	38.71	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.11	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0372	EA	3-1/2" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs.....	122.51	42.46
		<i>For Work In Restricted Working Space, Add</i>	25.47	
		<i>For Elevated Installation >10' To 15', Add</i>	8.49	
		<i>For Elevated Installation >15' To 20', Add</i>	16.98	
		<i>For Elevated Installation >20' To 25', Add</i>	21.23	
		<i>For Elevated Installation >25' To 30', Add</i>	29.72	
		<i>For Elevated Installation >30' To 35', Add</i>	33.96	
		<i>For Elevated Installation >35' To 40', Add</i>	42.45	
		<i>For Elevated Installation >40', Add</i>	46.70	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25.47	
26 05 33 13-0373	EA	4" Rigid Galvanized Steel (RGS) Water Tight Conduit Hubs.....	150.13	50.28
		<i>For Work In Restricted Working Space, Add</i>	30.16	
		<i>For Elevated Installation >10' To 15', Add</i>	10.05	
		<i>For Elevated Installation >15' To 20', Add</i>	20.11	
		<i>For Elevated Installation >20' To 25', Add</i>	25.14	
		<i>For Elevated Installation >25' To 30', Add</i>	35.19	
		<i>For Elevated Installation >30' To 35', Add</i>	40.22	
		<i>For Elevated Installation >35' To 40', Add</i>	50.27	
		<i>For Elevated Installation >40', Add</i>	55.30	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30.16	
26 05 33 13-0374		Rigid Galvanized Steel (RGS) Expansion Fittings, 4" Conduit Movement <small>(26 05 33 13-0060)</small>		
		Note: Type AX		
26 05 33 13-0375	EA	1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement.....	98.77	17.87
		<i>For Work In Restricted Working Space, Add</i>	13.41	
		<i>For Elevated Installation >10' To 15', Add</i>	4.47	
		<i>For Elevated Installation >15' To 20', Add</i>	8.94	
		<i>For Elevated Installation >20' To 25', Add</i>	11.17	
		<i>For Elevated Installation >25' To 30', Add</i>	15.64	
		<i>For Elevated Installation >30' To 35', Add</i>	17.88	
		<i>For Elevated Installation >35' To 40', Add</i>	22.35	
		<i>For Elevated Installation >40', Add</i>	24.58	
26 05 33 13-0376	EA	3/4" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement.....	112.01	20.11
		<i>For Work In Restricted Working Space, Add</i>	15.08	
		<i>For Elevated Installation >10' To 15', Add</i>	5.03	
		<i>For Elevated Installation >15' To 20', Add</i>	10.05	
		<i>For Elevated Installation >20' To 25', Add</i>	12.57	
		<i>For Elevated Installation >25' To 30', Add</i>	17.59	
		<i>For Elevated Installation >30' To 35', Add</i>	20.11	
		<i>For Elevated Installation >35' To 40', Add</i>	25.14	
		<i>For Elevated Installation >40', Add</i>	27.65	
26 05 33 13-0377	EA	1" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement.....	131.81	22.35
		<i>For Work In Restricted Working Space, Add</i>	16.76	
		<i>For Elevated Installation >10' To 15', Add</i>	5.59	
		<i>For Elevated Installation >15' To 20', Add</i>	11.17	
		<i>For Elevated Installation >20' To 25', Add</i>	13.97	
		<i>For Elevated Installation >25' To 30', Add</i>	19.55	
		<i>For Elevated Installation >30' To 35', Add</i>	22.34	
		<i>For Elevated Installation >35' To 40', Add</i>	27.93	
		<i>For Elevated Installation >40', Add</i>	30.72	
26 05 33 13-0378	EA	1-1/4" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement.....	159.82	24.58
		<i>For Work In Restricted Working Space, Add</i>	18.43	
		<i>For Elevated Installation >10' To 15', Add</i>	6.14	
		<i>For Elevated Installation >15' To 20', Add</i>	12.29	
		<i>For Elevated Installation >20' To 25', Add</i>	15.36	
		<i>For Elevated Installation >25' To 30', Add</i>	21.50	
		<i>For Elevated Installation >30' To 35', Add</i>	24.58	
		<i>For Elevated Installation >35' To 40', Add</i>	30.72	
		<i>For Elevated Installation >40', Add</i>	33.79	
26 05 33 13-0379	EA	1-1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement.....	198.51	26.81
		<i>For Work In Restricted Working Space, Add</i>	20.11	
		<i>For Elevated Installation >10' To 15', Add</i>	6.70	
		<i>For Elevated Installation >15' To 20', Add</i>	13.41	
		<i>For Elevated Installation >20' To 25', Add</i>	16.76	
		<i>For Elevated Installation >25' To 30', Add</i>	23.46	
		<i>For Elevated Installation >30' To 35', Add</i>	26.81	
		<i>For Elevated Installation >35' To 40', Add</i>	33.52	
		<i>For Elevated Installation >40', Add</i>	36.87	
26 05 33 13-0380	EA	2" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement.....	269.83	29.04
		<i>For Work In Restricted Working Space, Add</i>	21.78	
		<i>For Elevated Installation >10' To 15', Add</i>	7.26	
		<i>For Elevated Installation >15' To 20', Add</i>	14.52	
		<i>For Elevated Installation >20' To 25', Add</i>	18.15	
		<i>For Elevated Installation >25' To 30', Add</i>	25.41	
		<i>For Elevated Installation >30' To 35', Add</i>	29.04	
		<i>For Elevated Installation >35' To 40', Add</i>	36.31	
		<i>For Elevated Installation >40', Add</i>	39.94	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0381 EA 2-1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement	408.18	35.75
For Work In Restricted Working Space, Add	26.81	
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
26 05 33 13-0382 EA 3" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement	522.33	44.68
For Work In Restricted Working Space, Add	33.52	
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
26 05 33 13-0383 EA 3-1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement	755.87	53.63
For Work In Restricted Working Space, Add	40.22	
For Elevated Installation >10' To 15', Add	13.41	
For Elevated Installation >15' To 20', Add	26.81	
For Elevated Installation >20' To 25', Add	33.52	
For Elevated Installation >25' To 30', Add	46.92	
For Elevated Installation >30' To 35', Add	53.63	
For Elevated Installation >35' To 40', Add	67.04	
For Elevated Installation >40', Add	73.74	
26 05 33 13-0384 EA 4" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement	806.28	58.10
For Work In Restricted Working Space, Add	43.57	
For Elevated Installation >10' To 15', Add	14.52	
For Elevated Installation >15' To 20', Add	29.04	
For Elevated Installation >20' To 25', Add	36.31	
For Elevated Installation >25' To 30', Add	50.83	
For Elevated Installation >30' To 35', Add	58.09	
For Elevated Installation >35' To 40', Add	72.61	
For Elevated Installation >40', Add	79.87	
26 05 33 13-0385 EA 5" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement	1,224.98	71.50
For Work In Restricted Working Space, Add	53.63	
For Elevated Installation >10' To 15', Add	17.88	
For Elevated Installation >15' To 20', Add	35.75	
For Elevated Installation >20' To 25', Add	44.69	
For Elevated Installation >25' To 30', Add	62.56	
For Elevated Installation >30' To 35', Add	71.50	
For Elevated Installation >35' To 40', Add	89.38	
For Elevated Installation >40', Add	98.31	
26 05 33 13-0386 EA 6" Rigid Galvanized Steel (RGS) Expansion Fitting, 4" Conduit Movement	1,499.95	79.32
For Work In Restricted Working Space, Add	59.52	
For Elevated Installation >10' To 15', Add	19.84	
For Elevated Installation >15' To 20', Add	39.68	
For Elevated Installation >20' To 25', Add	49.60	
For Elevated Installation >25' To 30', Add	69.44	
For Elevated Installation >30' To 35', Add	79.36	
For Elevated Installation >35' To 40', Add	99.21	
For Elevated Installation >40', Add	109.13	
26 05 33 13-0387 Rigid Galvanized Steel (RGS) Expansion Fittings, 8" Conduit Movement <small>(26 05 33 13-0387)</small>		
Note: Type AX-8		
26 05 33 13-0388 EA 1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	107.81	17.87
For Work In Restricted Working Space, Add	13.41	
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.94	
For Elevated Installation >20' To 25', Add	11.17	
For Elevated Installation >25' To 30', Add	15.64	
For Elevated Installation >30' To 35', Add	17.88	
For Elevated Installation >35' To 40', Add	22.35	
For Elevated Installation >40', Add	24.58	
26 05 33 13-0389 EA 3/4" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	120.02	20.11
For Work In Restricted Working Space, Add	15.08	
For Elevated Installation >10' To 15', Add	5.03	
For Elevated Installation >15' To 20', Add	10.05	
For Elevated Installation >20' To 25', Add	12.57	
For Elevated Installation >25' To 30', Add	17.59	
For Elevated Installation >30' To 35', Add	20.11	
For Elevated Installation >35' To 40', Add	25.14	
For Elevated Installation >40', Add	27.65	
26 05 33 13-0390 EA 1" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	144.38	22.35
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0391	EA	1-1/4" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	179.62	24.58
		<i>For Work In Restricted Working Space, Add</i>	18.43	
		<i>For Elevated Installation >10' To 15', Add</i>	6.14	
		<i>For Elevated Installation >15' To 20', Add</i>	12.29	
		<i>For Elevated Installation >20' To 25', Add</i>	15.36	
		<i>For Elevated Installation >25' To 30', Add</i>	21.50	
		<i>For Elevated Installation >30' To 35', Add</i>	24.58	
		<i>For Elevated Installation >35' To 40', Add</i>	30.72	
		<i>For Elevated Installation >40', Add</i>	33.79	
26 05 33 13-0392	EA	1-1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	237.85	26.81
		<i>For Work In Restricted Working Space, Add</i>	20.11	
		<i>For Elevated Installation >10' To 15', Add</i>	6.70	
		<i>For Elevated Installation >15' To 20', Add</i>	13.41	
		<i>For Elevated Installation >20' To 25', Add</i>	16.76	
		<i>For Elevated Installation >25' To 30', Add</i>	23.46	
		<i>For Elevated Installation >30' To 35', Add</i>	26.81	
		<i>For Elevated Installation >35' To 40', Add</i>	33.52	
		<i>For Elevated Installation >40', Add</i>	36.87	
26 05 33 13-0393	EA	2" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement.....	288.62	29.04
		<i>For Work In Restricted Working Space, Add</i>	21.78	
		<i>For Elevated Installation >10' To 15', Add</i>	7.26	
		<i>For Elevated Installation >15' To 20', Add</i>	14.52	
		<i>For Elevated Installation >20' To 25', Add</i>	18.15	
		<i>For Elevated Installation >25' To 30', Add</i>	25.41	
		<i>For Elevated Installation >30' To 35', Add</i>	29.04	
		<i>For Elevated Installation >35' To 40', Add</i>	36.31	
		<i>For Elevated Installation >40', Add</i>	39.94	
26 05 33 13-0394	EA	2-1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	530.03	35.75
		<i>For Work In Restricted Working Space, Add</i>	26.81	
		<i>For Elevated Installation >10' To 15', Add</i>	8.94	
		<i>For Elevated Installation >15' To 20', Add</i>	17.87	
		<i>For Elevated Installation >20' To 25', Add</i>	22.34	
		<i>For Elevated Installation >25' To 30', Add</i>	31.28	
		<i>For Elevated Installation >30' To 35', Add</i>	35.75	
		<i>For Elevated Installation >35' To 40', Add</i>	44.69	
		<i>For Elevated Installation >40', Add</i>	49.15	
26 05 33 13-0395	EA	3" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement.....	605.54	44.68
		<i>For Work In Restricted Working Space, Add</i>	33.52	
		<i>For Elevated Installation >10' To 15', Add</i>	11.17	
		<i>For Elevated Installation >15' To 20', Add</i>	22.34	
		<i>For Elevated Installation >20' To 25', Add</i>	27.93	
		<i>For Elevated Installation >25' To 30', Add</i>	39.10	
		<i>For Elevated Installation >30' To 35', Add</i>	44.69	
		<i>For Elevated Installation >35' To 40', Add</i>	55.86	
		<i>For Elevated Installation >40', Add</i>	61.45	
26 05 33 13-0396	EA	3-1/2" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement	920.30	53.63
		<i>For Work In Restricted Working Space, Add</i>	40.22	
		<i>For Elevated Installation >10' To 15', Add</i>	13.41	
		<i>For Elevated Installation >15' To 20', Add</i>	26.81	
		<i>For Elevated Installation >20' To 25', Add</i>	33.52	
		<i>For Elevated Installation >25' To 30', Add</i>	46.92	
		<i>For Elevated Installation >30' To 35', Add</i>	53.63	
		<i>For Elevated Installation >35' To 40', Add</i>	67.04	
		<i>For Elevated Installation >40', Add</i>	73.74	
26 05 33 13-0397	EA	4" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement.....	996.34	58.10
		<i>For Work In Restricted Working Space, Add</i>	43.57	
		<i>For Elevated Installation >10' To 15', Add</i>	14.52	
		<i>For Elevated Installation >15' To 20', Add</i>	29.04	
		<i>For Elevated Installation >20' To 25', Add</i>	36.31	
		<i>For Elevated Installation >25' To 30', Add</i>	50.83	
		<i>For Elevated Installation >30' To 35', Add</i>	58.09	
		<i>For Elevated Installation >35' To 40', Add</i>	72.61	
		<i>For Elevated Installation >40', Add</i>	79.87	
26 05 33 13-0398	EA	5" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement.....	1,385.18	71.50
		<i>For Work In Restricted Working Space, Add</i>	53.63	
		<i>For Elevated Installation >10' To 15', Add</i>	17.88	
		<i>For Elevated Installation >15' To 20', Add</i>	35.75	
		<i>For Elevated Installation >20' To 25', Add</i>	44.69	
		<i>For Elevated Installation >25' To 30', Add</i>	62.56	
		<i>For Elevated Installation >30' To 35', Add</i>	71.50	
		<i>For Elevated Installation >35' To 40', Add</i>	89.38	
		<i>For Elevated Installation >40', Add</i>	98.31	
26 05 33 13-0399	EA	6" Rigid Galvanized Steel (RGS) Expansion Fitting, 8" Conduit Movement.....	1,706.06	79.32
		<i>For Work In Restricted Working Space, Add</i>	59.52	
		<i>For Elevated Installation >10' To 15', Add</i>	19.84	
		<i>For Elevated Installation >15' To 20', Add</i>	39.68	
		<i>For Elevated Installation >20' To 25', Add</i>	49.60	
		<i>For Elevated Installation >25' To 30', Add</i>	69.44	
		<i>For Elevated Installation >30' To 35', Add</i>	79.36	
		<i>For Elevated Installation >35' To 40', Add</i>	99.21	
		<i>For Elevated Installation >40', Add</i>	109.13	

26 05 33 13-0400 Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fittings, 8" Conduit Movement (26 05 33 13-0060)
 Note: Type EX

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0401 EA 1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	121.05	17.87
For Work In Restricted Working Space, Add	13.41	
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.94	
For Elevated Installation >20' To 25', Add	11.17	
For Elevated Installation >25' To 30', Add	15.64	
For Elevated Installation >30' To 35', Add	17.88	
For Elevated Installation >35' To 40', Add	22.35	
For Elevated Installation >40', Add	24.58	
26 05 33 13-0402 EA 3/4" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	151.22	20.11
For Work In Restricted Working Space, Add	15.08	
For Elevated Installation >10' To 15', Add	5.03	
For Elevated Installation >15' To 20', Add	10.05	
For Elevated Installation >20' To 25', Add	12.57	
For Elevated Installation >25' To 30', Add	17.59	
For Elevated Installation >30' To 35', Add	20.11	
For Elevated Installation >35' To 40', Add	25.14	
For Elevated Installation >40', Add	27.65	
26 05 33 13-0403 EA 1" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	186.53	22.35
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
26 05 33 13-0404 EA 1-1/4" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	225.25	24.58
For Work In Restricted Working Space, Add	18.43	
For Elevated Installation >10' To 15', Add	6.14	
For Elevated Installation >15' To 20', Add	12.29	
For Elevated Installation >20' To 25', Add	15.36	
For Elevated Installation >25' To 30', Add	21.50	
For Elevated Installation >30' To 35', Add	24.58	
For Elevated Installation >35' To 40', Add	30.72	
For Elevated Installation >40', Add	33.79	
26 05 33 13-0405 EA 1-1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	299.64	26.81
For Work In Restricted Working Space, Add	20.11	
For Elevated Installation >10' To 15', Add	6.70	
For Elevated Installation >15' To 20', Add	13.41	
For Elevated Installation >20' To 25', Add	16.76	
For Elevated Installation >25' To 30', Add	23.46	
For Elevated Installation >30' To 35', Add	26.81	
For Elevated Installation >35' To 40', Add	33.52	
For Elevated Installation >40', Add	36.87	
26 05 33 13-0406 EA 2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	408.04	29.04
For Work In Restricted Working Space, Add	21.78	
For Elevated Installation >10' To 15', Add	7.26	
For Elevated Installation >15' To 20', Add	14.52	
For Elevated Installation >20' To 25', Add	18.15	
For Elevated Installation >25' To 30', Add	25.41	
For Elevated Installation >30' To 35', Add	29.04	
For Elevated Installation >35' To 40', Add	36.31	
For Elevated Installation >40', Add	39.94	
26 05 33 13-0407 EA 2-1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	628.34	35.75
For Work In Restricted Working Space, Add	26.81	
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
26 05 33 13-0408 EA 3" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	844.91	44.68
For Work In Restricted Working Space, Add	33.52	
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
26 05 33 13-0409 EA 3-1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	1,260.77	53.63
For Work In Restricted Working Space, Add	40.22	
For Elevated Installation >10' To 15', Add	13.41	
For Elevated Installation >15' To 20', Add	26.81	
For Elevated Installation >20' To 25', Add	33.52	
For Elevated Installation >25' To 30', Add	46.92	
For Elevated Installation >30' To 35', Add	53.63	
For Elevated Installation >35' To 40', Add	67.04	
For Elevated Installation >40', Add	73.74	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0410	EA 4" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	1,306.45	58.10
	<i>For Work In Restricted Working Space, Add</i>	43.57	
	<i>For Elevated Installation >10' To 15', Add</i>	14.52	
	<i>For Elevated Installation >15' To 20', Add</i>	29.04	
	<i>For Elevated Installation >20' To 25', Add</i>	36.31	
	<i>For Elevated Installation >25' To 30', Add</i>	50.83	
	<i>For Elevated Installation >30' To 35', Add</i>	58.09	
	<i>For Elevated Installation >35' To 40', Add</i>	72.61	
	<i>For Elevated Installation >40', Add</i>	79.87	
26 05 33 13-0411	EA 5" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	1,956.83	71.50
	<i>For Work In Restricted Working Space, Add</i>	53.63	
	<i>For Elevated Installation >10' To 15', Add</i>	17.88	
	<i>For Elevated Installation >15' To 20', Add</i>	35.75	
	<i>For Elevated Installation >20' To 25', Add</i>	44.69	
	<i>For Elevated Installation >25' To 30', Add</i>	62.56	
	<i>For Elevated Installation >30' To 35', Add</i>	71.50	
	<i>For Elevated Installation >35' To 40', Add</i>	89.38	
	<i>For Elevated Installation >40', Add</i>	98.31	
26 05 33 13-0412	EA 6" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Expansion Fitting, 8" Conduit Movement.....	2,420.44	79.32
	<i>For Work In Restricted Working Space, Add</i>	59.52	
	<i>For Elevated Installation >10' To 15', Add</i>	19.84	
	<i>For Elevated Installation >15' To 20', Add</i>	39.68	
	<i>For Elevated Installation >20' To 25', Add</i>	49.60	
	<i>For Elevated Installation >25' To 30', Add</i>	69.44	
	<i>For Elevated Installation >30' To 35', Add</i>	79.36	
	<i>For Elevated Installation >35' To 40', Add</i>	99.21	
	<i>For Elevated Installation >40', Add</i>	109.13	
26 05 33 13-0413 Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fittings			
	<small>Note: Type DX</small>		
26 05 33 13-0414	EA 1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	202.65	17.87
	<i>For Work In Restricted Working Space, Add</i>	13.41	
	<i>For Elevated Installation >10' To 15', Add</i>	4.47	
	<i>For Elevated Installation >15' To 20', Add</i>	8.94	
	<i>For Elevated Installation >20' To 25', Add</i>	11.17	
	<i>For Elevated Installation >25' To 30', Add</i>	15.64	
	<i>For Elevated Installation >30' To 35', Add</i>	17.88	
	<i>For Elevated Installation >35' To 40', Add</i>	22.35	
	<i>For Elevated Installation >40', Add</i>	24.58	
26 05 33 13-0415	EA 3/4" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	240.71	20.11
	<i>For Work In Restricted Working Space, Add</i>	15.08	
	<i>For Elevated Installation >10' To 15', Add</i>	5.03	
	<i>For Elevated Installation >15' To 20', Add</i>	10.05	
	<i>For Elevated Installation >20' To 25', Add</i>	12.57	
	<i>For Elevated Installation >25' To 30', Add</i>	17.59	
	<i>For Elevated Installation >30' To 35', Add</i>	20.11	
	<i>For Elevated Installation >35' To 40', Add</i>	25.14	
	<i>For Elevated Installation >40', Add</i>	27.65	
26 05 33 13-0416	EA 1" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	289.80	22.35
	<i>For Work In Restricted Working Space, Add</i>	16.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.59	
	<i>For Elevated Installation >15' To 20', Add</i>	11.17	
	<i>For Elevated Installation >20' To 25', Add</i>	13.97	
	<i>For Elevated Installation >25' To 30', Add</i>	19.55	
	<i>For Elevated Installation >30' To 35', Add</i>	22.34	
	<i>For Elevated Installation >35' To 40', Add</i>	27.93	
	<i>For Elevated Installation >40', Add</i>	30.72	
26 05 33 13-0417	EA 1-1/4" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	339.68	24.58
	<i>For Work In Restricted Working Space, Add</i>	18.43	
	<i>For Elevated Installation >10' To 15', Add</i>	6.14	
	<i>For Elevated Installation >15' To 20', Add</i>	12.29	
	<i>For Elevated Installation >20' To 25', Add</i>	15.36	
	<i>For Elevated Installation >25' To 30', Add</i>	21.50	
	<i>For Elevated Installation >30' To 35', Add</i>	24.58	
	<i>For Elevated Installation >35' To 40', Add</i>	30.72	
	<i>For Elevated Installation >40', Add</i>	33.79	
26 05 33 13-0418	EA 1-1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	375.42	26.81
	<i>For Work In Restricted Working Space, Add</i>	20.11	
	<i>For Elevated Installation >10' To 15', Add</i>	6.70	
	<i>For Elevated Installation >15' To 20', Add</i>	13.41	
	<i>For Elevated Installation >20' To 25', Add</i>	16.76	
	<i>For Elevated Installation >25' To 30', Add</i>	23.46	
	<i>For Elevated Installation >30' To 35', Add</i>	26.81	
	<i>For Elevated Installation >35' To 40', Add</i>	33.52	
	<i>For Elevated Installation >40', Add</i>	36.87	
26 05 33 13-0419	EA 2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	461.55	29.04
	<i>For Work In Restricted Working Space, Add</i>	21.78	
	<i>For Elevated Installation >10' To 15', Add</i>	7.26	
	<i>For Elevated Installation >15' To 20', Add</i>	14.52	
	<i>For Elevated Installation >20' To 25', Add</i>	18.15	
	<i>For Elevated Installation >25' To 30', Add</i>	25.41	
	<i>For Elevated Installation >30' To 35', Add</i>	29.04	
	<i>For Elevated Installation >35' To 40', Add</i>	36.31	
	<i>For Elevated Installation >40', Add</i>	39.94	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0420 EA 2-1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting.....	608.47	35.75
For Work In Restricted Working Space, Add	26.81	
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
26 05 33 13-0421 EA 3" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	771.28	44.68
For Work In Restricted Working Space, Add	33.52	
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
26 05 33 13-0422 EA 3-1/2" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting.....	869.83	53.63
For Work In Restricted Working Space, Add	40.22	
For Elevated Installation >10' To 15', Add	13.41	
For Elevated Installation >15' To 20', Add	26.81	
For Elevated Installation >20' To 25', Add	33.52	
For Elevated Installation >25' To 30', Add	46.92	
For Elevated Installation >30' To 35', Add	53.63	
For Elevated Installation >35' To 40', Add	67.04	
For Elevated Installation >40', Add	73.74	
26 05 33 13-0423 EA 4" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	1,050.65	58.10
For Work In Restricted Working Space, Add	43.57	
For Elevated Installation >10' To 15', Add	14.52	
For Elevated Installation >15' To 20', Add	29.04	
For Elevated Installation >20' To 25', Add	36.31	
For Elevated Installation >25' To 30', Add	50.83	
For Elevated Installation >30' To 35', Add	58.09	
For Elevated Installation >35' To 40', Add	72.61	
For Elevated Installation >40', Add	79.87	
26 05 33 13-0424 EA 5" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	1,780.44	71.50
For Work In Restricted Working Space, Add	53.63	
For Elevated Installation >10' To 15', Add	17.88	
For Elevated Installation >15' To 20', Add	35.75	
For Elevated Installation >20' To 25', Add	44.69	
For Elevated Installation >25' To 30', Add	62.56	
For Elevated Installation >30' To 35', Add	71.50	
For Elevated Installation >35' To 40', Add	89.38	
For Elevated Installation >40', Add	98.31	
26 05 33 13-0425 EA 6" Rigid Galvanized Steel (RGS)/Intermediate Metal Conduit (IMC) Deflection Expansion Fitting	2,810.53	79.32
For Work In Restricted Working Space, Add	59.52	
For Elevated Installation >10' To 15', Add	19.84	
For Elevated Installation >15' To 20', Add	39.68	
For Elevated Installation >20' To 25', Add	49.60	
For Elevated Installation >25' To 30', Add	69.44	
For Elevated Installation >30' To 35', Add	79.36	
For Elevated Installation >35' To 40', Add	99.21	
For Elevated Installation >40', Add	109.13	
26 05 33 13-0426 Rigid Galvanized Steel (RGS) Conduit Bonding Jumpers (26 05 33 13-0060)		
26 05 33 13-0427 EA 1/2" To 3/4" Conduit, 14" Bonding Jumper	54.92	8.93
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
26 05 33 13-0428 EA 1" To 1-1/4" Conduit, 14" Bonding Jumper	63.79	11.17
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
26 05 33 13-0429 EA 1-1/2" To 2" Conduit, 14" Bonding Jumper	78.42	13.40
For Work In Restricted Working Space, Add	10.05	
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.38	
For Elevated Installation >25' To 30', Add	11.73	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.76	
For Elevated Installation >40', Add	18.43	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0430	EA	2-1/2" To 3" Conduit, 14" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	109.57 13.40 4.47 8.94 11.17 15.64 17.87 22.34 24.57	17.87
26 05 33	13-0431	EA	3-1/2" To 4" Conduit, 14" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	165.86 20.11 6.70 13.41 16.76 23.46 26.82 33.52 36.87	26.81
26 05 33	13-0432	EA	5" To 6" Conduit, 14" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	277.13 26.81 8.94 17.87 22.34 31.28 35.75 44.69 49.15	35.75
26 05 33	13-0433	EA	1/2" To 3/4" Conduit, 24" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	60.49 6.71 2.24 4.47 5.59 7.82 8.94 11.18 12.29	8.93
26 05 33	13-0434	EA	1" To 1-1/4" Conduit, 24" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	70.84 8.38 2.79 5.59 6.98 9.78 11.17 13.97 15.36	11.17
26 05 33	13-0435	EA	1-1/2" To 2" Conduit, 24" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	84.87 10.05 3.35 6.70 8.38 11.73 13.40 16.76 18.43	13.40
26 05 33	13-0436	EA	2-1/2" To 3" Conduit, 24" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	118.14 13.40 4.47 8.94 11.17 15.64 17.87 22.34 24.57	17.87
26 05 33	13-0437	EA	3-1/2" To 4" Conduit, 24" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	177.23 20.11 6.70 13.41 16.76 23.46 26.82 33.52 36.87	26.81
26 05 33	13-0438	EA	5" To 6" Conduit, 24" Bonding Jumper <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i>	313.80 26.81 8.94 17.87 22.34 31.28 35.75 44.69 49.15	35.75

26 05 33 13-0439 Rigid Galvanized Steel (RGS) Sealing Fittings, Vertical/Horizontal (26 05 33 13-0060)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0440 EA 1/2" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal.....	99.83	27.93
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-0441 EA 3/4" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal.....	118.67	33.51
For Work In Restricted Working Space, Add	20.11	
For Elevated Installation >10' To 15', Add	6.70	
For Elevated Installation >15' To 20', Add	13.41	
For Elevated Installation >20' To 25', Add	16.76	
For Elevated Installation >25' To 30', Add	23.46	
For Elevated Installation >30' To 35', Add	26.81	
For Elevated Installation >35' To 40', Add	33.52	
For Elevated Installation >40', Add	36.87	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	20.11	
26 05 33 13-0442 EA 1" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal	144.57	39.10
For Work In Restricted Working Space, Add	23.46	
For Elevated Installation >10' To 15', Add	7.82	
For Elevated Installation >15' To 20', Add	15.64	
For Elevated Installation >20' To 25', Add	19.55	
For Elevated Installation >25' To 30', Add	27.37	
For Elevated Installation >30' To 35', Add	31.28	
For Elevated Installation >35' To 40', Add	39.10	
For Elevated Installation >40', Add	43.01	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.46	
26 05 33 13-0443 EA 1-1/4" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal	169.97	44.68
For Work In Restricted Working Space, Add	26.81	
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-0444 EA 1-1/2" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal	221.88	50.28
For Work In Restricted Working Space, Add	30.16	
For Elevated Installation >10' To 15', Add	10.05	
For Elevated Installation >15' To 20', Add	20.11	
For Elevated Installation >20' To 25', Add	25.14	
For Elevated Installation >25' To 30', Add	35.19	
For Elevated Installation >30' To 35', Add	40.22	
For Elevated Installation >35' To 40', Add	50.27	
For Elevated Installation >40', Add	55.30	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	30.16	
26 05 33 13-0445 EA 2" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal	268.93	55.86
For Work In Restricted Working Space, Add	33.52	
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	33.52	
26 05 33 13-0446 EA 2-1/2" Rigid Galvanized Steel (RGS) Conduit Sealing Fitting, Vertical/Horizontal	378.32	67.03
For Work In Restricted Working Space, Add	40.22	
For Elevated Installation >10' To 15', Add	13.41	
For Elevated Installation >15' To 20', Add	26.81	
For Elevated Installation >20' To 25', Add	33.52	
For Elevated Installation >25' To 30', Add	46.92	
For Elevated Installation >30' To 35', Add	53.62	
For Elevated Installation >35' To 40', Add	67.03	
For Elevated Installation >40', Add	73.73	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.22	
26 05 33 13-0447 EA 3" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal	454.77	78.20
For Work In Restricted Working Space, Add	46.92	
For Elevated Installation >10' To 15', Add	15.64	
For Elevated Installation >15' To 20', Add	31.28	
For Elevated Installation >20' To 25', Add	39.10	
For Elevated Installation >25' To 30', Add	54.74	
For Elevated Installation >30' To 35', Add	62.56	
For Elevated Installation >35' To 40', Add	78.20	
For Elevated Installation >40', Add	86.02	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	46.92	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0448	EA 3-1/2" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal	1,039.27	89.37
	<i>For Work In Restricted Working Space, Add</i>	53.63	
	<i>For Elevated Installation >10' To 15', Add</i>	17.88	
	<i>For Elevated Installation >15' To 20', Add</i>	35.75	
	<i>For Elevated Installation >20' To 25', Add</i>	44.69	
	<i>For Elevated Installation >25' To 30', Add</i>	62.56	
	<i>For Elevated Installation >30' To 35', Add</i>	71.50	
	<i>For Elevated Installation >35' To 40', Add</i>	89.38	
	<i>For Elevated Installation >40', Add</i>	98.31	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	53.63	
26 05 33 13-0449	EA 4" Rigid Galvanized Steel (RGS) Sealing Fitting, Vertical/Horizontal.....	1,197.02	100.54
	<i>For Work In Restricted Working Space, Add</i>	60.33	
	<i>For Elevated Installation >10' To 15', Add</i>	20.11	
	<i>For Elevated Installation >15' To 20', Add</i>	40.22	
	<i>For Elevated Installation >20' To 25', Add</i>	50.27	
	<i>For Elevated Installation >25' To 30', Add</i>	70.38	
	<i>For Elevated Installation >30' To 35', Add</i>	80.44	
	<i>For Elevated Installation >35' To 40', Add</i>	100.55	
	<i>For Elevated Installation >40', Add</i>	110.60	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	60.33	
26 05 33 13-0450	Rigid Galvanized Steel (RGS) Threaded Couplings <small>(26 05 33 13-0060)</small>		
26 05 33 13-0451	EA 1/2" Rigid Galvanized Steel (RGS) Threaded Coupling.....	14.79	6.71
	<i>For Work In Restricted Working Space, Add</i>	4.02	
	<i>For Elevated Installation >10' To 15', Add</i>	1.34	
	<i>For Elevated Installation >15' To 20', Add</i>	2.68	
	<i>For Elevated Installation >20' To 25', Add</i>	3.35	
	<i>For Elevated Installation >25' To 30', Add</i>	4.69	
	<i>For Elevated Installation >30' To 35', Add</i>	5.36	
	<i>For Elevated Installation >35' To 40', Add</i>	6.70	
	<i>For Elevated Installation >40', Add</i>	7.37	
26 05 33 13-0452	EA 3/4" Rigid Galvanized Steel (RGS) Threaded Coupling.....	20.72	9.49
	<i>For Work In Restricted Working Space, Add</i>	5.70	
	<i>For Elevated Installation >10' To 15', Add</i>	1.90	
	<i>For Elevated Installation >15' To 20', Add</i>	3.80	
	<i>For Elevated Installation >20' To 25', Add</i>	4.75	
	<i>For Elevated Installation >25' To 30', Add</i>	6.65	
	<i>For Elevated Installation >30' To 35', Add</i>	7.60	
	<i>For Elevated Installation >35' To 40', Add</i>	9.50	
	<i>For Elevated Installation >40', Add</i>	10.44	
26 05 33 13-0453	EA 1" Rigid Galvanized Steel (RGS) Threaded Coupling.....	27.23	12.29
	<i>For Work In Restricted Working Space, Add</i>	7.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.46	
	<i>For Elevated Installation >15' To 20', Add</i>	4.92	
	<i>For Elevated Installation >20' To 25', Add</i>	6.15	
	<i>For Elevated Installation >25' To 30', Add</i>	8.60	
	<i>For Elevated Installation >30' To 35', Add</i>	9.83	
	<i>For Elevated Installation >35' To 40', Add</i>	12.29	
	<i>For Elevated Installation >40', Add</i>	13.52	
26 05 33 13-0454	EA 1-1/4" Rigid Galvanized Steel (RGS) Threaded Coupling.....	31.27	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
26 05 33 13-0455	EA 1-1/2" Rigid Galvanized Steel (RGS) Threaded Coupling.....	37.69	16.76
	<i>For Work In Restricted Working Space, Add</i>	10.05	
	<i>For Elevated Installation >10' To 15', Add</i>	3.35	
	<i>For Elevated Installation >15' To 20', Add</i>	6.70	
	<i>For Elevated Installation >20' To 25', Add</i>	8.38	
	<i>For Elevated Installation >25' To 30', Add</i>	11.73	
	<i>For Elevated Installation >30' To 35', Add</i>	13.40	
	<i>For Elevated Installation >35' To 40', Add</i>	16.76	
	<i>For Elevated Installation >40', Add</i>	18.43	
26 05 33 13-0456	EA 2" Rigid Galvanized Steel (RGS) Threaded Coupling.....	44.22	18.99
	<i>For Work In Restricted Working Space, Add</i>	11.40	
	<i>For Elevated Installation >10' To 15', Add</i>	3.80	
	<i>For Elevated Installation >15' To 20', Add</i>	7.60	
	<i>For Elevated Installation >20' To 25', Add</i>	9.50	
	<i>For Elevated Installation >25' To 30', Add</i>	13.30	
	<i>For Elevated Installation >30' To 35', Add</i>	15.20	
	<i>For Elevated Installation >35' To 40', Add</i>	19.00	
	<i>For Elevated Installation >40', Add</i>	20.89	
26 05 33 13-0457	EA 2-1/2" Rigid Galvanized Steel (RGS) Threaded Coupling.....	56.45	21.22
	<i>For Work In Restricted Working Space, Add</i>	12.74	
	<i>For Elevated Installation >10' To 15', Add</i>	4.25	
	<i>For Elevated Installation >15' To 20', Add</i>	8.49	
	<i>For Elevated Installation >20' To 25', Add</i>	10.62	
	<i>For Elevated Installation >25' To 30', Add</i>	14.86	
	<i>For Elevated Installation >30' To 35', Add</i>	16.98	
	<i>For Elevated Installation >35' To 40', Add</i>	21.23	
	<i>For Elevated Installation >40', Add</i>	23.35	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0458 EA 3" Rigid Galvanized Steel (RGS) Threaded Coupling.....	66.23	24.02
For Work In Restricted Working Space, Add	14.41	
For Elevated Installation >10' To 15', Add	4.80	
For Elevated Installation >15' To 20', Add	9.61	
For Elevated Installation >20' To 25', Add	12.01	
For Elevated Installation >25' To 30', Add	16.81	
For Elevated Installation >30' To 35', Add	19.22	
For Elevated Installation >35' To 40', Add	24.02	
For Elevated Installation >40', Add	26.42	
26 05 33 13-0459 EA 3-1/2" Rigid Galvanized Steel (RGS) Threaded Coupling.....	77.08	26.26
For Work In Restricted Working Space, Add	15.75	
For Elevated Installation >10' To 15', Add	5.25	
For Elevated Installation >15' To 20', Add	10.50	
For Elevated Installation >20' To 25', Add	13.13	
For Elevated Installation >25' To 30', Add	18.38	
For Elevated Installation >30' To 35', Add	21.00	
For Elevated Installation >35' To 40', Add	26.25	
For Elevated Installation >40', Add	28.88	
26 05 33 13-0460 EA 4" Threaded Rigid Galvanized Steel (RGS) Coupling.....	81.46	27.93
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
26 05 33 13-0461 Rigid Galvanized Steel (RGS) Sealing Locknut (26 05 33 13-0060)		
26 05 33 13-0462 EA 1/2" Rigid Galvanized Steel (RGS) Sealing Locknut.....	3.46	1.11
26 05 33 13-0463 EA 3/4" Rigid Galvanized Steel (RGS) Sealing Locknut.....	4.76	1.67
26 05 33 13-0464 EA 1" Rigid Galvanized Steel (RGS) Sealing Locknut.....	7.91	2.80
26 05 33 13-0465 EA 1-1/4" Rigid Galvanized Steel (RGS) Sealing Locknut.....	11.46	3.91
26 05 33 13-0466 EA 1-1/2" Rigid Galvanized Steel (RGS) Sealing Locknut.....	13.73	4.47
26 05 33 13-0467 EA 2" Rigid Galvanized Steel (RGS) Sealing Locknut.....	16.18	5.02
26 05 33 13-0468 Rigid Galvanized Steel (RGS) Fire Stop Fittings (26 05 33 13-0060)		
26 05 33 13-0469 EA 1/2" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	209.08	13.56
For Work In Restricted Working Space, Add	10.17	
For Elevated Installation >10' To 15', Add	3.39	
For Elevated Installation >15' To 20', Add	6.78	
For Elevated Installation >20' To 25', Add	8.48	
For Elevated Installation >25' To 30', Add	11.87	
For Elevated Installation >30' To 35', Add	13.56	
For Elevated Installation >35' To 40', Add	16.95	
For Elevated Installation >40', Add	18.65	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.17	
26 05 33 13-0470 EA 3/4" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	212.34	14.86
For Work In Restricted Working Space, Add	11.15	
For Elevated Installation >10' To 15', Add	3.72	
For Elevated Installation >15' To 20', Add	7.43	
For Elevated Installation >20' To 25', Add	9.29	
For Elevated Installation >25' To 30', Add	13.01	
For Elevated Installation >30' To 35', Add	14.86	
For Elevated Installation >35' To 40', Add	18.58	
For Elevated Installation >40', Add	20.44	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.15	
26 05 33 13-0471 EA 1" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	255.10	16.31
For Work In Restricted Working Space, Add	12.21	
For Elevated Installation >10' To 15', Add	4.07	
For Elevated Installation >15' To 20', Add	8.14	
For Elevated Installation >20' To 25', Add	10.18	
For Elevated Installation >25' To 30', Add	14.25	
For Elevated Installation >30' To 35', Add	16.28	
For Elevated Installation >35' To 40', Add	20.35	
For Elevated Installation >40', Add	22.39	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.21	
26 05 33 13-0472 EA 1-1/4" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	280.03	17.87
For Work In Restricted Working Space, Add	13.42	
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.94	
For Elevated Installation >20' To 25', Add	11.18	
For Elevated Installation >25' To 30', Add	15.65	
For Elevated Installation >30' To 35', Add	17.89	
For Elevated Installation >35' To 40', Add	22.36	
For Elevated Installation >40', Add	24.60	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	13.42	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

Los Angeles County Development Authority

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0473	EA	1-1/2" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	319.58	20.11
		<i>For Work In Restricted Working Space, Add</i>	15.08	
		<i>For Elevated Installation >10' To 15', Add</i>	5.03	
		<i>For Elevated Installation >15' To 20', Add</i>	10.06	
		<i>For Elevated Installation >20' To 25', Add</i>	12.57	
		<i>For Elevated Installation >25' To 30', Add</i>	17.60	
		<i>For Elevated Installation >30' To 35', Add</i>	20.11	
		<i>For Elevated Installation >35' To 40', Add</i>	25.14	
		<i>For Elevated Installation >40', Add</i>	27.65	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.08	
26 05 33 13-0474	EA	2" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	474.23	22.35
		<i>For Work In Restricted Working Space, Add</i>	16.77	
		<i>For Elevated Installation >10' To 15', Add</i>	5.59	
		<i>For Elevated Installation >15' To 20', Add</i>	11.18	
		<i>For Elevated Installation >20' To 25', Add</i>	13.97	
		<i>For Elevated Installation >25' To 30', Add</i>	19.56	
		<i>For Elevated Installation >30' To 35', Add</i>	22.36	
		<i>For Elevated Installation >35' To 40', Add</i>	27.95	
		<i>For Elevated Installation >40', Add</i>	30.74	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.77	
26 05 33 13-0475	EA	2-1/2" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	545.15	29.83
		<i>For Work In Restricted Working Space, Add</i>	22.36	
		<i>For Elevated Installation >10' To 15', Add</i>	7.45	
		<i>For Elevated Installation >15' To 20', Add</i>	14.90	
		<i>For Elevated Installation >20' To 25', Add</i>	18.63	
		<i>For Elevated Installation >25' To 30', Add</i>	26.08	
		<i>For Elevated Installation >30' To 35', Add</i>	29.81	
		<i>For Elevated Installation >35' To 40', Add</i>	37.26	
		<i>For Elevated Installation >40', Add</i>	40.99	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.36	
26 05 33 13-0476	EA	3" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	604.81	32.73
		<i>For Work In Restricted Working Space, Add</i>	24.57	
		<i>For Elevated Installation >10' To 15', Add</i>	8.19	
		<i>For Elevated Installation >15' To 20', Add</i>	16.38	
		<i>For Elevated Installation >20' To 25', Add</i>	20.47	
		<i>For Elevated Installation >25' To 30', Add</i>	28.66	
		<i>For Elevated Installation >30' To 35', Add</i>	32.76	
		<i>For Elevated Installation >35' To 40', Add</i>	40.95	
		<i>For Elevated Installation >40', Add</i>	45.04	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	24.57	
26 05 33 13-0477	EA	3-1/2" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	703.81	35.75
		<i>For Work In Restricted Working Space, Add</i>	26.81	
		<i>For Elevated Installation >10' To 15', Add</i>	8.94	
		<i>For Elevated Installation >15' To 20', Add</i>	17.88	
		<i>For Elevated Installation >20' To 25', Add</i>	22.35	
		<i>For Elevated Installation >25' To 30', Add</i>	31.28	
		<i>For Elevated Installation >30' To 35', Add</i>	35.75	
		<i>For Elevated Installation >35' To 40', Add</i>	44.69	
		<i>For Elevated Installation >40', Add</i>	49.16	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	26.81	
26 05 33 13-0478	EA	4" Rigid Galvanized Steel (RGS) Fire Stop Fitting.....	793.41	40.22
		<i>For Work In Restricted Working Space, Add</i>	30.16	
		<i>For Elevated Installation >10' To 15', Add</i>	10.05	
		<i>For Elevated Installation >15' To 20', Add</i>	20.11	
		<i>For Elevated Installation >20' To 25', Add</i>	25.14	
		<i>For Elevated Installation >25' To 30', Add</i>	35.19	
		<i>For Elevated Installation >30' To 35', Add</i>	40.22	
		<i>For Elevated Installation >35' To 40', Add</i>	50.27	
		<i>For Elevated Installation >40', Add</i>	55.30	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30.16	
26 05 33 13-0479		Rigid Galvanized Steel (RGS) Reducing Bushings (26 05 33 13-0060)		
26 05 33 13-0480	EA	3/4" x 1/2" Rigid Galvanized Steel (RGS) Reducing Bushing.....	18.26	8.66
		<i>For Work In Restricted Working Space, Add</i>	5.19	
		<i>For Elevated Installation >10' To 15', Add</i>	1.73	
		<i>For Elevated Installation >15' To 20', Add</i>	3.46	
		<i>For Elevated Installation >20' To 25', Add</i>	4.33	
		<i>For Elevated Installation >25' To 30', Add</i>	6.06	
		<i>For Elevated Installation >30' To 35', Add</i>	6.92	
		<i>For Elevated Installation >35' To 40', Add</i>	8.66	
		<i>For Elevated Installation >40', Add</i>	9.52	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.19	
26 05 33 13-0481	EA	1" x 1/2" Rigid Galvanized Steel (RGS) Reducing Bushing.....	20.18	9.21
		<i>For Work In Restricted Working Space, Add</i>	5.53	
		<i>For Elevated Installation >10' To 15', Add</i>	1.84	
		<i>For Elevated Installation >15' To 20', Add</i>	3.69	
		<i>For Elevated Installation >20' To 25', Add</i>	4.61	
		<i>For Elevated Installation >25' To 30', Add</i>	6.45	
		<i>For Elevated Installation >30' To 35', Add</i>	7.38	
		<i>For Elevated Installation >35' To 40', Add</i>	9.22	
		<i>For Elevated Installation >40', Add</i>	10.14	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.53	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0482 EA 1" x 3/4" Rigid Galvanized Steel (RGS) Reducing Bushing	20.73	9.49
For Work In Restricted Working Space, Add	5.70	
For Elevated Installation >10' To 15', Add	1.90	
For Elevated Installation >15' To 20', Add	3.80	
For Elevated Installation >20' To 25', Add	4.75	
For Elevated Installation >25' To 30', Add	6.65	
For Elevated Installation >30' To 35', Add	7.60	
For Elevated Installation >35' To 40', Add	9.50	
For Elevated Installation >40', Add	10.44	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.70	
26 05 33 13-0483 EA 1-1/4" x 1/2" Rigid Galvanized Steel (RGS) Reducing Bushing	24.06	9.77
For Work In Restricted Working Space, Add	5.87	
For Elevated Installation >10' To 15', Add	1.96	
For Elevated Installation >15' To 20', Add	3.91	
For Elevated Installation >20' To 25', Add	4.89	
For Elevated Installation >25' To 30', Add	6.84	
For Elevated Installation >30' To 35', Add	7.82	
For Elevated Installation >35' To 40', Add	9.78	
For Elevated Installation >40', Add	10.75	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 05 33 13-0484 EA 1-1/4" x 3/4" Rigid Galvanized Steel (RGS) Reducing Bushing	24.62	10.06
For Work In Restricted Working Space, Add	6.03	
For Elevated Installation >10' To 15', Add	2.01	
For Elevated Installation >15' To 20', Add	4.02	
For Elevated Installation >20' To 25', Add	5.03	
For Elevated Installation >25' To 30', Add	7.04	
For Elevated Installation >30' To 35', Add	8.04	
For Elevated Installation >35' To 40', Add	10.06	
For Elevated Installation >40', Add	11.06	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.03	
26 05 33 13-0485 EA 1-1/4" x 1" Rigid Galvanized Steel (RGS) Reducing Bushing	25.73	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	
26 05 33 13-0486 EA 1-1/2" x 1/2" Rigid Galvanized Steel (RGS) Reducing Bushing	27.81	11.17
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.71	
26 05 33 13-0487 EA 1-1/2" x 3/4" Rigid Galvanized Steel (RGS) Reducing Bushing	28.36	11.45
For Work In Restricted Working Space, Add	6.87	
For Elevated Installation >10' To 15', Add	2.29	
For Elevated Installation >15' To 20', Add	4.58	
For Elevated Installation >20' To 25', Add	5.73	
For Elevated Installation >25' To 30', Add	8.02	
For Elevated Installation >30' To 35', Add	9.16	
For Elevated Installation >35' To 40', Add	11.45	
For Elevated Installation >40', Add	12.60	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.87	
26 05 33 13-0488 EA 1-1/2" x 1" Rigid Galvanized Steel (RGS) Reducing Bushing	29.48	12.01
For Work In Restricted Working Space, Add	7.21	
For Elevated Installation >10' To 15', Add	2.40	
For Elevated Installation >15' To 20', Add	4.80	
For Elevated Installation >20' To 25', Add	6.01	
For Elevated Installation >25' To 30', Add	8.41	
For Elevated Installation >30' To 35', Add	9.61	
For Elevated Installation >35' To 40', Add	12.01	
For Elevated Installation >40', Add	13.21	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.21	
26 05 33 13-0489 EA 1-1/2" x 1-1/4" Rigid Galvanized Steel (RGS) Reducing Bushing	30.59	12.57
For Work In Restricted Working Space, Add	7.54	
For Elevated Installation >10' To 15', Add	2.51	
For Elevated Installation >15' To 20', Add	5.03	
For Elevated Installation >20' To 25', Add	6.28	
For Elevated Installation >25' To 30', Add	8.80	
For Elevated Installation >30' To 35', Add	10.05	
For Elevated Installation >35' To 40', Add	12.57	
For Elevated Installation >40', Add	13.82	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.54	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

Los Angeles County Development Authority

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0490	EA 2" x 1/2" Rigid Galvanized Steel (RGS) Reducing Bushing	37.12	12.57
	<i>For Work In Restricted Working Space, Add</i>	7.54	
	<i>For Elevated Installation >10' To 15', Add</i>	2.51	
	<i>For Elevated Installation >15' To 20', Add</i>	5.03	
	<i>For Elevated Installation >20' To 25', Add</i>	6.28	
	<i>For Elevated Installation >25' To 30', Add</i>	8.80	
	<i>For Elevated Installation >30' To 35', Add</i>	10.05	
	<i>For Elevated Installation >35' To 40', Add</i>	12.57	
	<i>For Elevated Installation >40', Add</i>	13.82	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.54	
26 05 33 13-0491	EA 2" x 3/4" Rigid Galvanized Steel (RGS) Reducing Bushing	37.68	12.85
	<i>For Work In Restricted Working Space, Add</i>	7.71	
	<i>For Elevated Installation >10' To 15', Add</i>	2.57	
	<i>For Elevated Installation >15' To 20', Add</i>	5.14	
	<i>For Elevated Installation >20' To 25', Add</i>	6.42	
	<i>For Elevated Installation >25' To 30', Add</i>	8.99	
	<i>For Elevated Installation >30' To 35', Add</i>	10.28	
	<i>For Elevated Installation >35' To 40', Add</i>	12.85	
	<i>For Elevated Installation >40', Add</i>	14.13	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.71	
26 05 33 13-0492	EA 2" x 1" Rigid Galvanized Steel (RGS) Reducing Bushing	38.80	13.40
	<i>For Work In Restricted Working Space, Add</i>	8.04	
	<i>For Elevated Installation >10' To 15', Add</i>	2.68	
	<i>For Elevated Installation >15' To 20', Add</i>	5.36	
	<i>For Elevated Installation >20' To 25', Add</i>	6.70	
	<i>For Elevated Installation >25' To 30', Add</i>	9.38	
	<i>For Elevated Installation >30' To 35', Add</i>	10.72	
	<i>For Elevated Installation >35' To 40', Add</i>	13.41	
	<i>For Elevated Installation >40', Add</i>	14.75	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.04	
26 05 33 13-0493	EA 2" x 1-1/4" Rigid Galvanized Steel (RGS) Reducing Bushing	39.92	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0494	EA 2" x 1-1/2" Rigid Galvanized Steel (RGS) Reducing Bushing	42.71	15.36
	<i>For Work In Restricted Working Space, Add</i>	9.22	
	<i>For Elevated Installation >10' To 15', Add</i>	3.07	
	<i>For Elevated Installation >15' To 20', Add</i>	6.14	
	<i>For Elevated Installation >20' To 25', Add</i>	7.68	
	<i>For Elevated Installation >25' To 30', Add</i>	10.75	
	<i>For Elevated Installation >30' To 35', Add</i>	12.29	
	<i>For Elevated Installation >35' To 40', Add</i>	15.36	
	<i>For Elevated Installation >40', Add</i>	16.90	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.22	
26 05 33 13-0495	EA 2-1/2" x 2" Rigid Galvanized Steel (RGS) Reducing Bushing	54.08	18.16
	<i>For Work In Restricted Working Space, Add</i>	10.89	
	<i>For Elevated Installation >10' To 15', Add</i>	3.63	
	<i>For Elevated Installation >15' To 20', Add</i>	7.26	
	<i>For Elevated Installation >20' To 25', Add</i>	9.08	
	<i>For Elevated Installation >25' To 30', Add</i>	12.71	
	<i>For Elevated Installation >30' To 35', Add</i>	14.52	
	<i>For Elevated Installation >35' To 40', Add</i>	18.16	
	<i>For Elevated Installation >40', Add</i>	19.97	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.89	

26 05 33 13-0496 Rigid Galvanized Steel (RGS) Locknuts (26 05 33 13-0060)

26 05 33 13-0497	EA 1/2" Rigid Galvanized Steel (RGS) Locknuts	2.33	1.11
	<i>For Work In Restricted Working Space, Add</i>	0.67	
	<i>For Elevated Installation >10' To 15', Add</i>	0.22	
	<i>For Elevated Installation >15' To 20', Add</i>	0.45	
	<i>For Elevated Installation >20' To 25', Add</i>	0.56	
	<i>For Elevated Installation >25' To 30', Add</i>	0.78	
	<i>For Elevated Installation >30' To 35', Add</i>	0.90	
	<i>For Elevated Installation >35' To 40', Add</i>	1.12	
	<i>For Elevated Installation >40', Add</i>	1.23	
26 05 33 13-0498	EA 3/4" Rigid Galvanized Steel (RGS) Locknuts	3.47	1.67
	<i>For Work In Restricted Working Space, Add</i>	1.01	
	<i>For Elevated Installation >10' To 15', Add</i>	0.34	
	<i>For Elevated Installation >15' To 20', Add</i>	0.67	
	<i>For Elevated Installation >20' To 25', Add</i>	0.84	
	<i>For Elevated Installation >25' To 30', Add</i>	1.17	
	<i>For Elevated Installation >30' To 35', Add</i>	1.34	
	<i>For Elevated Installation >35' To 40', Add</i>	1.68	
	<i>For Elevated Installation >40', Add</i>	1.84	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0499 EA 1" Rigid Galvanized Steel (RGS) Locknuts.....	5.78	2.80
For Work In Restricted Working Space, Add	1.67	
For Elevated Installation >10' To 15', Add	0.56	
For Elevated Installation >15' To 20', Add	1.12	
For Elevated Installation >20' To 25', Add	1.40	
For Elevated Installation >25' To 30', Add	1.95	
For Elevated Installation >30' To 35', Add	2.23	
For Elevated Installation >35' To 40', Add	2.79	
For Elevated Installation >40', Add	3.07	
26 05 33 13-0500 EA 1-1/4" Rigid Galvanized Steel (RGS) Locknuts.....	8.15	3.91
For Work In Restricted Working Space, Add	2.35	
For Elevated Installation >10' To 15', Add	0.78	
For Elevated Installation >15' To 20', Add	1.56	
For Elevated Installation >20' To 25', Add	1.96	
For Elevated Installation >25' To 30', Add	2.74	
For Elevated Installation >30' To 35', Add	3.13	
For Elevated Installation >35' To 40', Add	3.91	
For Elevated Installation >40', Add	4.30	
26 05 33 13-0501 EA 1-1/2" Rigid Galvanized Steel (RGS) Locknuts.....	9.36	4.47
For Work In Restricted Working Space, Add	2.68	
For Elevated Installation >10' To 15', Add	0.89	
For Elevated Installation >15' To 20', Add	1.79	
For Elevated Installation >20' To 25', Add	2.23	
For Elevated Installation >25' To 30', Add	3.13	
For Elevated Installation >30' To 35', Add	3.57	
For Elevated Installation >35' To 40', Add	4.47	
For Elevated Installation >40', Add	4.91	
26 05 33 13-0502 EA 2" Rigid Galvanized Steel (RGS) Locknuts.....	10.59	5.02
For Work In Restricted Working Space, Add	3.02	
For Elevated Installation >10' To 15', Add	1.01	
For Elevated Installation >15' To 20', Add	2.01	
For Elevated Installation >20' To 25', Add	2.52	
For Elevated Installation >25' To 30', Add	3.52	
For Elevated Installation >30' To 35', Add	4.02	
For Elevated Installation >35' To 40', Add	5.03	
For Elevated Installation >40', Add	5.53	
26 05 33 13-0503 EA 2-1/2" Rigid Galvanized Steel (RGS) Locknuts.....	14.82	6.71
For Work In Restricted Working Space, Add	4.02	
For Elevated Installation >10' To 15', Add	1.34	
For Elevated Installation >15' To 20', Add	2.68	
For Elevated Installation >20' To 25', Add	3.35	
For Elevated Installation >25' To 30', Add	4.69	
For Elevated Installation >30' To 35', Add	5.36	
For Elevated Installation >35' To 40', Add	6.70	
For Elevated Installation >40', Add	7.37	
26 05 33 13-0504 EA 3" Rigid Galvanized Steel (RGS) Locknuts.....	18.33	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.87	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.22	
26 05 33 13-0505 EA 3-1/2" Rigid Galvanized Steel (RGS) Locknuts.....	21.60	9.49
For Work In Restricted Working Space, Add	5.70	
For Elevated Installation >10' To 15', Add	1.90	
For Elevated Installation >15' To 20', Add	3.80	
For Elevated Installation >20' To 25', Add	4.75	
For Elevated Installation >25' To 30', Add	6.65	
For Elevated Installation >30' To 35', Add	7.60	
For Elevated Installation >35' To 40', Add	9.50	
For Elevated Installation >40', Add	10.44	
26 05 33 13-0506 EA 4" Rigid Galvanized Steel (RGS) Locknuts.....	24.22	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
26 05 33 13-0507 Rigid Galvanized Steel (RGS) Grounding Locknuts (26 05 33 13-0060)		
26 05 33 13-0508 EA 1/2" Rigid Galvanized Steel (RGS) Grounding Locknuts.....	3.54	1.11
For Work In Restricted Working Space, Add	0.67	
For Elevated Installation >10' To 15', Add	0.22	
For Elevated Installation >15' To 20', Add	0.45	
For Elevated Installation >20' To 25', Add	0.56	
For Elevated Installation >25' To 30', Add	0.78	
For Elevated Installation >30' To 35', Add	0.90	
For Elevated Installation >35' To 40', Add	1.12	
For Elevated Installation >40', Add	1.23	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0509	EA	3/4" Rigid Galvanized Steel (RGS) Grounding Locknuts	4.91	1.67
		<i>For Work In Restricted Working Space, Add</i>	1.01	
		<i>For Elevated Installation >10' To 15', Add</i>	0.34	
		<i>For Elevated Installation >15' To 20', Add</i>	0.67	
		<i>For Elevated Installation >20' To 25', Add</i>	0.84	
		<i>For Elevated Installation >25' To 30', Add</i>	1.17	
		<i>For Elevated Installation >30' To 35', Add</i>	1.34	
		<i>For Elevated Installation >35' To 40', Add</i>	1.68	
		<i>For Elevated Installation >40', Add</i>	1.84	
26 05 33 13-0510	EA	1" Rigid Galvanized Steel (RGS) Grounding Locknuts	7.81	2.80
		<i>For Work In Restricted Working Space, Add</i>	1.67	
		<i>For Elevated Installation >10' To 15', Add</i>	0.56	
		<i>For Elevated Installation >15' To 20', Add</i>	1.12	
		<i>For Elevated Installation >20' To 25', Add</i>	1.40	
		<i>For Elevated Installation >25' To 30', Add</i>	1.95	
		<i>For Elevated Installation >30' To 35', Add</i>	2.23	
		<i>For Elevated Installation >35' To 40', Add</i>	2.79	
		<i>For Elevated Installation >40', Add</i>	3.07	
26 05 33 13-0511	EA	1-1/4" Rigid Galvanized Steel (RGS) Grounding Locknuts	10.93	3.91
		<i>For Work In Restricted Working Space, Add</i>	2.35	
		<i>For Elevated Installation >10' To 15', Add</i>	0.78	
		<i>For Elevated Installation >15' To 20', Add</i>	1.56	
		<i>For Elevated Installation >20' To 25', Add</i>	1.96	
		<i>For Elevated Installation >25' To 30', Add</i>	2.74	
		<i>For Elevated Installation >30' To 35', Add</i>	3.13	
		<i>For Elevated Installation >35' To 40', Add</i>	3.91	
		<i>For Elevated Installation >40', Add</i>	4.30	
26 05 33 13-0512	EA	1-1/2" Rigid Galvanized Steel (RGS) Grounding Locknuts	12.33	4.47
		<i>For Work In Restricted Working Space, Add</i>	2.68	
		<i>For Elevated Installation >10' To 15', Add</i>	0.89	
		<i>For Elevated Installation >15' To 20', Add</i>	1.79	
		<i>For Elevated Installation >20' To 25', Add</i>	2.23	
		<i>For Elevated Installation >25' To 30', Add</i>	3.13	
		<i>For Elevated Installation >30' To 35', Add</i>	3.57	
		<i>For Elevated Installation >35' To 40', Add</i>	4.47	
		<i>For Elevated Installation >40', Add</i>	4.91	
26 05 33 13-0513	EA	2" Rigid Galvanized Steel (RGS) Grounding Locknuts	14.49	5.02
		<i>For Work In Restricted Working Space, Add</i>	3.02	
		<i>For Elevated Installation >10' To 15', Add</i>	1.01	
		<i>For Elevated Installation >15' To 20', Add</i>	2.01	
		<i>For Elevated Installation >20' To 25', Add</i>	2.52	
		<i>For Elevated Installation >25' To 30', Add</i>	3.52	
		<i>For Elevated Installation >30' To 35', Add</i>	4.02	
		<i>For Elevated Installation >35' To 40', Add</i>	5.03	
		<i>For Elevated Installation >40', Add</i>	5.53	
26 05 33 13-0514	EA	2-1/2" Rigid Galvanized Steel (RGS) Grounding Locknuts	21.64	6.71
		<i>For Work In Restricted Working Space, Add</i>	4.02	
		<i>For Elevated Installation >10' To 15', Add</i>	1.34	
		<i>For Elevated Installation >15' To 20', Add</i>	2.68	
		<i>For Elevated Installation >20' To 25', Add</i>	3.35	
		<i>For Elevated Installation >25' To 30', Add</i>	4.69	
		<i>For Elevated Installation >30' To 35', Add</i>	5.36	
		<i>For Elevated Installation >35' To 40', Add</i>	6.70	
		<i>For Elevated Installation >40', Add</i>	7.37	
26 05 33 13-0515	EA	3" Rigid Galvanized Steel (RGS) Grounding Locknuts	27.22	8.38
		<i>For Work In Restricted Working Space, Add</i>	5.03	
		<i>For Elevated Installation >10' To 15', Add</i>	1.68	
		<i>For Elevated Installation >15' To 20', Add</i>	3.35	
		<i>For Elevated Installation >20' To 25', Add</i>	4.19	
		<i>For Elevated Installation >25' To 30', Add</i>	5.87	
		<i>For Elevated Installation >30' To 35', Add</i>	6.70	
		<i>For Elevated Installation >35' To 40', Add</i>	8.38	
		<i>For Elevated Installation >40', Add</i>	9.22	
26 05 33 13-0516	EA	3-1/2" Rigid Galvanized Steel (RGS) Grounding Locknuts	35.98	9.49
		<i>For Work In Restricted Working Space, Add</i>	5.70	
		<i>For Elevated Installation >10' To 15', Add</i>	1.90	
		<i>For Elevated Installation >15' To 20', Add</i>	3.80	
		<i>For Elevated Installation >20' To 25', Add</i>	4.75	
		<i>For Elevated Installation >25' To 30', Add</i>	6.65	
		<i>For Elevated Installation >30' To 35', Add</i>	7.60	
		<i>For Elevated Installation >35' To 40', Add</i>	9.50	
		<i>For Elevated Installation >40', Add</i>	10.44	
26 05 33 13-0517	EA	4" Rigid Galvanized Steel (RGS) Grounding Locknuts	43.13	10.62
		<i>For Work In Restricted Working Space, Add</i>	6.37	
		<i>For Elevated Installation >10' To 15', Add</i>	2.12	
		<i>For Elevated Installation >15' To 20', Add</i>	4.24	
		<i>For Elevated Installation >20' To 25', Add</i>	5.31	
		<i>For Elevated Installation >25' To 30', Add</i>	7.43	
		<i>For Elevated Installation >30' To 35', Add</i>	8.49	
		<i>For Elevated Installation >35' To 40', Add</i>	10.61	
		<i>For Elevated Installation >40', Add</i>	11.67	

26 05 33 13-0518 Rigid Galvanized Steel (RGS) Insulated Ground Bushing (26 05 33 13-0060)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0519 EA 1/2" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	9.96	3.35
<i>For Work In Restricted Working Space, Add</i>	2.01	
<i>For Elevated Installation >10' To 15', Add</i>	0.67	
<i>For Elevated Installation >15' To 20', Add</i>	1.34	
<i>For Elevated Installation >20' To 25', Add</i>	1.68	
<i>For Elevated Installation >25' To 30', Add</i>	2.35	
<i>For Elevated Installation >30' To 35', Add</i>	2.68	
<i>For Elevated Installation >35' To 40', Add</i>	3.36	
<i>For Elevated Installation >40', Add</i>	3.69	
26 05 33 13-0520 EA 3/4" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	12.46	4.47
<i>For Work In Restricted Working Space, Add</i>	2.68	
<i>For Elevated Installation >10' To 15', Add</i>	0.89	
<i>For Elevated Installation >15' To 20', Add</i>	1.79	
<i>For Elevated Installation >20' To 25', Add</i>	2.23	
<i>For Elevated Installation >25' To 30', Add</i>	3.13	
<i>For Elevated Installation >30' To 35', Add</i>	3.57	
<i>For Elevated Installation >35' To 40', Add</i>	4.47	
<i>For Elevated Installation >40', Add</i>	4.91	
26 05 33 13-0521 EA 1" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	15.92	5.58
<i>For Work In Restricted Working Space, Add</i>	3.35	
<i>For Elevated Installation >10' To 15', Add</i>	1.12	
<i>For Elevated Installation >15' To 20', Add</i>	2.23	
<i>For Elevated Installation >20' To 25', Add</i>	2.79	
<i>For Elevated Installation >25' To 30', Add</i>	3.91	
<i>For Elevated Installation >30' To 35', Add</i>	4.47	
<i>For Elevated Installation >35' To 40', Add</i>	5.59	
<i>For Elevated Installation >40', Add</i>	6.14	
26 05 33 13-0522 EA 1-1/4" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	23.17	8.93
<i>For Work In Restricted Working Space, Add</i>	5.36	
<i>For Elevated Installation >10' To 15', Add</i>	1.79	
<i>For Elevated Installation >15' To 20', Add</i>	3.57	
<i>For Elevated Installation >20' To 25', Add</i>	4.47	
<i>For Elevated Installation >25' To 30', Add</i>	6.25	
<i>For Elevated Installation >30' To 35', Add</i>	7.15	
<i>For Elevated Installation >35' To 40', Add</i>	8.94	
<i>For Elevated Installation >40', Add</i>	9.83	
26 05 33 13-0523 EA 1-1/2" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	26.11	10.06
<i>For Work In Restricted Working Space, Add</i>	6.03	
<i>For Elevated Installation >10' To 15', Add</i>	2.01	
<i>For Elevated Installation >15' To 20', Add</i>	4.02	
<i>For Elevated Installation >20' To 25', Add</i>	5.03	
<i>For Elevated Installation >25' To 30', Add</i>	7.04	
<i>For Elevated Installation >30' To 35', Add</i>	8.04	
<i>For Elevated Installation >35' To 40', Add</i>	10.06	
<i>For Elevated Installation >40', Add</i>	11.06	
26 05 33 13-0524 EA 2" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	29.71	11.17
<i>For Work In Restricted Working Space, Add</i>	6.71	
<i>For Elevated Installation >10' To 15', Add</i>	2.24	
<i>For Elevated Installation >15' To 20', Add</i>	4.47	
<i>For Elevated Installation >20' To 25', Add</i>	5.59	
<i>For Elevated Installation >25' To 30', Add</i>	7.82	
<i>For Elevated Installation >30' To 35', Add</i>	8.94	
<i>For Elevated Installation >35' To 40', Add</i>	11.18	
<i>For Elevated Installation >40', Add</i>	12.29	
26 05 33 13-0525 EA 2-1/2" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	41.03	13.40
<i>For Work In Restricted Working Space, Add</i>	8.04	
<i>For Elevated Installation >10' To 15', Add</i>	2.68	
<i>For Elevated Installation >15' To 20', Add</i>	5.36	
<i>For Elevated Installation >20' To 25', Add</i>	6.70	
<i>For Elevated Installation >25' To 30', Add</i>	9.38	
<i>For Elevated Installation >30' To 35', Add</i>	10.72	
<i>For Elevated Installation >35' To 40', Add</i>	13.41	
<i>For Elevated Installation >40', Add</i>	14.75	
26 05 33 13-0526 EA 3" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	49.80	16.76
<i>For Work In Restricted Working Space, Add</i>	10.05	
<i>For Elevated Installation >10' To 15', Add</i>	3.35	
<i>For Elevated Installation >15' To 20', Add</i>	6.70	
<i>For Elevated Installation >20' To 25', Add</i>	8.38	
<i>For Elevated Installation >25' To 30', Add</i>	11.73	
<i>For Elevated Installation >30' To 35', Add</i>	13.40	
<i>For Elevated Installation >35' To 40', Add</i>	16.76	
<i>For Elevated Installation >40', Add</i>	18.43	
26 05 33 13-0527 EA 3-1/2" Rigid Galvanized Steel (RGS) Insulated Ground Bushing.....	61.51	22.35
<i>For Work In Restricted Working Space, Add</i>	13.40	
<i>For Elevated Installation >10' To 15', Add</i>	4.47	
<i>For Elevated Installation >15' To 20', Add</i>	8.94	
<i>For Elevated Installation >20' To 25', Add</i>	11.17	
<i>For Elevated Installation >25' To 30', Add</i>	15.64	
<i>For Elevated Installation >30' To 35', Add</i>	17.87	
<i>For Elevated Installation >35' To 40', Add</i>	22.34	
<i>For Elevated Installation >40', Add</i>	24.57	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0528	EA 4" Rigid Galvanized Steel (RGS) Insulated Ground Bushing	74.89	27.93
	<i>For Work In Restricted Working Space, Add</i>	16.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.59	
	<i>For Elevated Installation >15' To 20', Add</i>	11.17	
	<i>For Elevated Installation >20' To 25', Add</i>	13.97	
	<i>For Elevated Installation >25' To 30', Add</i>	19.55	
	<i>For Elevated Installation >30' To 35', Add</i>	22.34	
	<i>For Elevated Installation >35' To 40', Add</i>	27.93	
	<i>For Elevated Installation >40', Add</i>	30.72	
26 05 33 13-0529	Rigid Galvanized Steel (RGS) Threadless Compression Connectors <small>(26 05 33 13-0660)</small>		
26 05 33 13-0530	EA 1/2" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	23.63	10.06
	<i>For Work In Restricted Working Space, Add</i>	6.03	
	<i>For Elevated Installation >10' To 15', Add</i>	2.01	
	<i>For Elevated Installation >15' To 20', Add</i>	4.02	
	<i>For Elevated Installation >20' To 25', Add</i>	5.03	
	<i>For Elevated Installation >25' To 30', Add</i>	7.04	
	<i>For Elevated Installation >30' To 35', Add</i>	8.04	
	<i>For Elevated Installation >35' To 40', Add</i>	10.06	
	<i>For Elevated Installation >40', Add</i>	11.06	
26 05 33 13-0531	EA 3/4" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	28.01	11.17
	<i>For Work In Restricted Working Space, Add</i>	6.71	
	<i>For Elevated Installation >10' To 15', Add</i>	2.24	
	<i>For Elevated Installation >15' To 20', Add</i>	4.47	
	<i>For Elevated Installation >20' To 25', Add</i>	5.59	
	<i>For Elevated Installation >25' To 30', Add</i>	7.82	
	<i>For Elevated Installation >30' To 35', Add</i>	8.94	
	<i>For Elevated Installation >35' To 40', Add</i>	11.18	
	<i>For Elevated Installation >40', Add</i>	12.29	
26 05 33 13-0532	EA 1" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	36.77	13.97
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
26 05 33 13-0533	EA 1-1/4" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	50.15	16.76
	<i>For Work In Restricted Working Space, Add</i>	10.05	
	<i>For Elevated Installation >10' To 15', Add</i>	3.35	
	<i>For Elevated Installation >15' To 20', Add</i>	6.70	
	<i>For Elevated Installation >20' To 25', Add</i>	8.38	
	<i>For Elevated Installation >25' To 30', Add</i>	11.73	
	<i>For Elevated Installation >30' To 35', Add</i>	13.40	
	<i>For Elevated Installation >35' To 40', Add</i>	16.76	
	<i>For Elevated Installation >40', Add</i>	18.43	
26 05 33 13-0534	EA 1-1/2" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	67.73	22.35
	<i>For Work In Restricted Working Space, Add</i>	13.40	
	<i>For Elevated Installation >10' To 15', Add</i>	4.47	
	<i>For Elevated Installation >15' To 20', Add</i>	8.94	
	<i>For Elevated Installation >20' To 25', Add</i>	11.17	
	<i>For Elevated Installation >25' To 30', Add</i>	15.64	
	<i>For Elevated Installation >30' To 35', Add</i>	17.87	
	<i>For Elevated Installation >35' To 40', Add</i>	22.34	
	<i>For Elevated Installation >40', Add</i>	24.57	
26 05 33 13-0535	EA 2" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	100.08	27.93
	<i>For Work In Restricted Working Space, Add</i>	16.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.59	
	<i>For Elevated Installation >15' To 20', Add</i>	11.17	
	<i>For Elevated Installation >20' To 25', Add</i>	13.97	
	<i>For Elevated Installation >25' To 30', Add</i>	19.55	
	<i>For Elevated Installation >30' To 35', Add</i>	22.34	
	<i>For Elevated Installation >35' To 40', Add</i>	27.93	
	<i>For Elevated Installation >40', Add</i>	30.72	
26 05 33 13-0536	EA 2-1/2" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	169.03	33.51
	<i>For Work In Restricted Working Space, Add</i>	20.11	
	<i>For Elevated Installation >10' To 15', Add</i>	6.70	
	<i>For Elevated Installation >15' To 20', Add</i>	13.41	
	<i>For Elevated Installation >20' To 25', Add</i>	16.76	
	<i>For Elevated Installation >25' To 30', Add</i>	23.46	
	<i>For Elevated Installation >30' To 35', Add</i>	26.81	
	<i>For Elevated Installation >35' To 40', Add</i>	33.52	
	<i>For Elevated Installation >40', Add</i>	36.87	
26 05 33 13-0537	EA 3" Rigid Galvanized Steel (RGS) Threadless Compression Connectors	213.43	39.10
	<i>For Work In Restricted Working Space, Add</i>	23.46	
	<i>For Elevated Installation >10' To 15', Add</i>	7.82	
	<i>For Elevated Installation >15' To 20', Add</i>	15.64	
	<i>For Elevated Installation >20' To 25', Add</i>	19.55	
	<i>For Elevated Installation >25' To 30', Add</i>	27.37	
	<i>For Elevated Installation >30' To 35', Add</i>	31.28	
	<i>For Elevated Installation >35' To 40', Add</i>	39.10	
	<i>For Elevated Installation >40', Add</i>	43.01	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0538 EA 3-1/2" Rigid Galvanized Steel (RGS) Threadless Compression Connectors.....	271.68	47.48
<i>For Work In Restricted Working Space, Add</i>	28.49	
<i>For Elevated Installation >10' To 15', Add</i>	9.50	
<i>For Elevated Installation >15' To 20', Add</i>	18.99	
<i>For Elevated Installation >20' To 25', Add</i>	23.74	
<i>For Elevated Installation >25' To 30', Add</i>	33.24	
<i>For Elevated Installation >30' To 35', Add</i>	37.98	
<i>For Elevated Installation >35' To 40', Add</i>	47.48	
<i>For Elevated Installation >40', Add</i>	52.23	
26 05 33 13-0539 EA 4" Rigid Galvanized Steel (RGS) Threadless Compression Connectors.....	328.07	55.86
<i>For Work In Restricted Working Space, Add</i>	33.52	
<i>For Elevated Installation >10' To 15', Add</i>	11.17	
<i>For Elevated Installation >15' To 20', Add</i>	22.34	
<i>For Elevated Installation >20' To 25', Add</i>	27.93	
<i>For Elevated Installation >25' To 30', Add</i>	39.10	
<i>For Elevated Installation >30' To 35', Add</i>	44.69	
<i>For Elevated Installation >35' To 40', Add</i>	55.86	
<i>For Elevated Installation >40', Add</i>	61.45	
26 05 33 13-0540 Rigid Galvanized Steel (RGS) Compression Coupling <small>(26 05 33 13-0060)</small>		
26 05 33 13-0541 EA 1/2" Rigid Galvanized Steel (RGS) Compression Coupling.....	33.60	13.97
<i>For Work In Restricted Working Space, Add</i>	8.38	
<i>For Elevated Installation >10' To 15', Add</i>	2.79	
<i>For Elevated Installation >15' To 20', Add</i>	5.59	
<i>For Elevated Installation >20' To 25', Add</i>	6.98	
<i>For Elevated Installation >25' To 30', Add</i>	9.78	
<i>For Elevated Installation >30' To 35', Add</i>	11.17	
<i>For Elevated Installation >35' To 40', Add</i>	13.97	
<i>For Elevated Installation >40', Add</i>	15.36	
26 05 33 13-0542 EA 3/4" Rigid Galvanized Steel (RGS) Compression Coupling.....	42.61	16.76
<i>For Work In Restricted Working Space, Add</i>	10.05	
<i>For Elevated Installation >10' To 15', Add</i>	3.35	
<i>For Elevated Installation >15' To 20', Add</i>	6.70	
<i>For Elevated Installation >20' To 25', Add</i>	8.38	
<i>For Elevated Installation >25' To 30', Add</i>	11.73	
<i>For Elevated Installation >30' To 35', Add</i>	13.40	
<i>For Elevated Installation >35' To 40', Add</i>	16.76	
<i>For Elevated Installation >40', Add</i>	18.43	
26 05 33 13-0543 EA 1" Rigid Galvanized Steel (RGS) Compression Coupling.....	60.55	22.35
<i>For Work In Restricted Working Space, Add</i>	13.40	
<i>For Elevated Installation >10' To 15', Add</i>	4.47	
<i>For Elevated Installation >15' To 20', Add</i>	8.94	
<i>For Elevated Installation >20' To 25', Add</i>	11.17	
<i>For Elevated Installation >25' To 30', Add</i>	15.64	
<i>For Elevated Installation >30' To 35', Add</i>	17.87	
<i>For Elevated Installation >35' To 40', Add</i>	22.34	
<i>For Elevated Installation >40', Add</i>	24.57	
26 05 33 13-0544 EA 1-1/4" Rigid Galvanized Steel (RGS) Compression Coupling.....	79.35	27.93
<i>For Work In Restricted Working Space, Add</i>	16.76	
<i>For Elevated Installation >10' To 15', Add</i>	5.59	
<i>For Elevated Installation >15' To 20', Add</i>	11.17	
<i>For Elevated Installation >20' To 25', Add</i>	13.97	
<i>For Elevated Installation >25' To 30', Add</i>	19.55	
<i>For Elevated Installation >30' To 35', Add</i>	22.34	
<i>For Elevated Installation >35' To 40', Add</i>	27.93	
<i>For Elevated Installation >40', Add</i>	30.72	
26 05 33 13-0545 EA 1-1/2" Rigid Galvanized Steel (RGS) Compression Coupling.....	97.61	33.51
<i>For Work In Restricted Working Space, Add</i>	20.11	
<i>For Elevated Installation >10' To 15', Add</i>	6.70	
<i>For Elevated Installation >15' To 20', Add</i>	13.41	
<i>For Elevated Installation >20' To 25', Add</i>	16.76	
<i>For Elevated Installation >25' To 30', Add</i>	23.46	
<i>For Elevated Installation >30' To 35', Add</i>	26.81	
<i>For Elevated Installation >35' To 40', Add</i>	33.52	
<i>For Elevated Installation >40', Add</i>	36.87	
26 05 33 13-0546 EA 2" Rigid Galvanized Steel (RGS) Compression Coupling.....	145.07	39.10
<i>For Work In Restricted Working Space, Add</i>	23.46	
<i>For Elevated Installation >10' To 15', Add</i>	7.82	
<i>For Elevated Installation >15' To 20', Add</i>	15.64	
<i>For Elevated Installation >20' To 25', Add</i>	19.55	
<i>For Elevated Installation >25' To 30', Add</i>	27.37	
<i>For Elevated Installation >30' To 35', Add</i>	31.28	
<i>For Elevated Installation >35' To 40', Add</i>	39.10	
<i>For Elevated Installation >40', Add</i>	43.01	
26 05 33 13-0547 EA 2-1/2" Rigid Galvanized Steel (RGS) Compression Coupling.....	230.23	44.68
<i>For Work In Restricted Working Space, Add</i>	26.81	
<i>For Elevated Installation >10' To 15', Add</i>	8.94	
<i>For Elevated Installation >15' To 20', Add</i>	17.87	
<i>For Elevated Installation >20' To 25', Add</i>	22.34	
<i>For Elevated Installation >25' To 30', Add</i>	31.28	
<i>For Elevated Installation >30' To 35', Add</i>	35.75	
<i>For Elevated Installation >35' To 40', Add</i>	44.69	
<i>For Elevated Installation >40', Add</i>	49.15	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0548	EA	3" Rigid Galvanized Steel (RGS) Compression Coupling	263.70	38.55
		<i>For Work In Restricted Working Space, Add</i>	23.12	
		<i>For Elevated Installation >10' To 15', Add</i>	7.71	
		<i>For Elevated Installation >15' To 20', Add</i>	15.42	
		<i>For Elevated Installation >20' To 25', Add</i>	19.27	
		<i>For Elevated Installation >25' To 30', Add</i>	26.98	
		<i>For Elevated Installation >30' To 35', Add</i>	30.83	
		<i>For Elevated Installation >35' To 40', Add</i>	38.54	
		<i>For Elevated Installation >40', Add</i>	42.39	
26 05 33 13-0549	EA	3-1/2" Rigid Galvanized Steel (RGS) Compression Coupling	362.98	58.65
		<i>For Work In Restricted Working Space, Add</i>	35.19	
		<i>For Elevated Installation >10' To 15', Add</i>	11.73	
		<i>For Elevated Installation >15' To 20', Add</i>	23.46	
		<i>For Elevated Installation >20' To 25', Add</i>	29.33	
		<i>For Elevated Installation >25' To 30', Add</i>	41.06	
		<i>For Elevated Installation >30' To 35', Add</i>	46.92	
		<i>For Elevated Installation >35' To 40', Add</i>	58.66	
		<i>For Elevated Installation >40', Add</i>	64.52	
26 05 33 13-0550	EA	4" Rigid Galvanized Steel (RGS) Compression Coupling	448.41	67.03
		<i>For Work In Restricted Working Space, Add</i>	40.22	
		<i>For Elevated Installation >10' To 15', Add</i>	13.41	
		<i>For Elevated Installation >15' To 20', Add</i>	26.81	
		<i>For Elevated Installation >20' To 25', Add</i>	33.52	
		<i>For Elevated Installation >25' To 30', Add</i>	46.92	
		<i>For Elevated Installation >30' To 35', Add</i>	53.62	
		<i>For Elevated Installation >35' To 40', Add</i>	67.03	
		<i>For Elevated Installation >40', Add</i>	73.73	
26 05 33 13-0551		Zinc Plated Steel Snap-in Knock Out Seal <small>(26 05 33 13-0060)</small>		
26 05 33 13-0552	EA	1/2" Zinc Plated Steel Snap-in Knock Out Seal	5.86	2.80
		<i>For Work In Restricted Working Space, Add</i>	1.67	
		<i>For Elevated Installation >10' To 15', Add</i>	0.56	
		<i>For Elevated Installation >15' To 20', Add</i>	1.12	
		<i>For Elevated Installation >20' To 25', Add</i>	1.40	
		<i>For Elevated Installation >25' To 30', Add</i>	1.95	
		<i>For Elevated Installation >30' To 35', Add</i>	2.23	
		<i>For Elevated Installation >35' To 40', Add</i>	2.79	
		<i>For Elevated Installation >40', Add</i>	3.07	
26 05 33 13-0553	EA	3/4" Zinc Plated Steel Snap-in Knock Out Seal	7.07	3.35
		<i>For Work In Restricted Working Space, Add</i>	2.01	
		<i>For Elevated Installation >10' To 15', Add</i>	0.67	
		<i>For Elevated Installation >15' To 20', Add</i>	1.34	
		<i>For Elevated Installation >20' To 25', Add</i>	1.68	
		<i>For Elevated Installation >25' To 30', Add</i>	2.35	
		<i>For Elevated Installation >30' To 35', Add</i>	2.68	
		<i>For Elevated Installation >35' To 40', Add</i>	3.36	
		<i>For Elevated Installation >40', Add</i>	3.69	
26 05 33 13-0554	EA	1" Zinc Plated Steel Snap-in Knock Out Seal	8.39	3.91
		<i>For Work In Restricted Working Space, Add</i>	2.35	
		<i>For Elevated Installation >10' To 15', Add</i>	0.78	
		<i>For Elevated Installation >15' To 20', Add</i>	1.56	
		<i>For Elevated Installation >20' To 25', Add</i>	1.96	
		<i>For Elevated Installation >25' To 30', Add</i>	2.74	
		<i>For Elevated Installation >30' To 35', Add</i>	3.13	
		<i>For Elevated Installation >35' To 40', Add</i>	3.91	
		<i>For Elevated Installation >40', Add</i>	4.30	
26 05 33 13-0555	EA	1-1/4" Zinc Plated Steel Snap-in Knock Out Seal	10.81	5.02
		<i>For Work In Restricted Working Space, Add</i>	3.02	
		<i>For Elevated Installation >10' To 15', Add</i>	1.01	
		<i>For Elevated Installation >15' To 20', Add</i>	2.01	
		<i>For Elevated Installation >20' To 25', Add</i>	2.52	
		<i>For Elevated Installation >25' To 30', Add</i>	3.52	
		<i>For Elevated Installation >30' To 35', Add</i>	4.02	
		<i>For Elevated Installation >35' To 40', Add</i>	5.03	
		<i>For Elevated Installation >40', Add</i>	5.53	
26 05 33 13-0556	EA	1-1/2" Zinc Plated Steel Snap-in Knock Out Seal	12.22	5.58
		<i>For Work In Restricted Working Space, Add</i>	3.35	
		<i>For Elevated Installation >10' To 15', Add</i>	1.12	
		<i>For Elevated Installation >15' To 20', Add</i>	2.23	
		<i>For Elevated Installation >20' To 25', Add</i>	2.79	
		<i>For Elevated Installation >25' To 30', Add</i>	3.91	
		<i>For Elevated Installation >30' To 35', Add</i>	4.47	
		<i>For Elevated Installation >35' To 40', Add</i>	5.59	
		<i>For Elevated Installation >40', Add</i>	6.14	
26 05 33 13-0557	EA	2" Zinc Plated Steel Snap-in Knock Out Seal	14.87	6.71
		<i>For Work In Restricted Working Space, Add</i>	4.02	
		<i>For Elevated Installation >10' To 15', Add</i>	1.34	
		<i>For Elevated Installation >15' To 20', Add</i>	2.68	
		<i>For Elevated Installation >20' To 25', Add</i>	3.35	
		<i>For Elevated Installation >25' To 30', Add</i>	4.69	
		<i>For Elevated Installation >30' To 35', Add</i>	5.36	
		<i>For Elevated Installation >35' To 40', Add</i>	6.70	
		<i>For Elevated Installation >40', Add</i>	7.37	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0558 Zinc Plated Steel 3-Piece Knock Out Seal <small>(26 05 33 13-0060)</small>		
26 05 33 13-0559 EA 1/2" Zinc Plated Steel 3-Piece Knock Out Seal	7.23	2.80
For Work In Restricted Working Space, Add	1.67	
For Elevated Installation >10' To 15', Add	0.56	
For Elevated Installation >15' To 20', Add	1.12	
For Elevated Installation >20' To 25', Add	1.40	
For Elevated Installation >25' To 30', Add	1.95	
For Elevated Installation >30' To 35', Add	2.23	
For Elevated Installation >35' To 40', Add	2.79	
For Elevated Installation >40', Add	3.07	
26 05 33 13-0560 EA 3/4" Zinc Plated Steel 3-Piece Knock Out Seal	8.63	3.35
For Work In Restricted Working Space, Add	2.01	
For Elevated Installation >10' To 15', Add	0.67	
For Elevated Installation >15' To 20', Add	1.34	
For Elevated Installation >20' To 25', Add	1.68	
For Elevated Installation >25' To 30', Add	2.35	
For Elevated Installation >30' To 35', Add	2.68	
For Elevated Installation >35' To 40', Add	3.36	
For Elevated Installation >40', Add	3.69	
26 05 33 13-0561 EA 1" Zinc Plated Steel 3-Piece Knock Out Seal	10.47	3.91
For Work In Restricted Working Space, Add	2.35	
For Elevated Installation >10' To 15', Add	0.78	
For Elevated Installation >15' To 20', Add	1.56	
For Elevated Installation >20' To 25', Add	1.96	
For Elevated Installation >25' To 30', Add	2.74	
For Elevated Installation >30' To 35', Add	3.13	
For Elevated Installation >35' To 40', Add	3.91	
For Elevated Installation >40', Add	4.30	
26 05 33 13-0562 EA 1-1/4" Zinc Plated Steel 3-Piece Knock Out Seal	13.47	5.02
For Work In Restricted Working Space, Add	3.02	
For Elevated Installation >10' To 15', Add	1.01	
For Elevated Installation >15' To 20', Add	2.01	
For Elevated Installation >20' To 25', Add	2.52	
For Elevated Installation >25' To 30', Add	3.52	
For Elevated Installation >30' To 35', Add	4.02	
For Elevated Installation >35' To 40', Add	5.03	
For Elevated Installation >40', Add	5.53	
26 05 33 13-0563 EA 1-1/2" Zinc Plated Steel 3-Piece Knock Out Seal	16.61	5.58
For Work In Restricted Working Space, Add	3.35	
For Elevated Installation >10' To 15', Add	1.12	
For Elevated Installation >15' To 20', Add	2.23	
For Elevated Installation >20' To 25', Add	2.79	
For Elevated Installation >25' To 30', Add	3.91	
For Elevated Installation >30' To 35', Add	4.47	
For Elevated Installation >35' To 40', Add	5.59	
For Elevated Installation >40', Add	6.14	
26 05 33 13-0564 EA 2" Zinc Plated Steel 3-Piece Knock Out Seal	20.10	6.71
For Work In Restricted Working Space, Add	4.02	
For Elevated Installation >10' To 15', Add	1.34	
For Elevated Installation >15' To 20', Add	2.68	
For Elevated Installation >20' To 25', Add	3.35	
For Elevated Installation >25' To 30', Add	4.69	
For Elevated Installation >30' To 35', Add	5.36	
For Elevated Installation >35' To 40', Add	6.70	
For Elevated Installation >40', Add	7.37	
26 05 33 13-0565 EA 2-1/2" Zinc Plated Steel 3-Piece Knock Out Seal	24.64	8.38
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.87	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.22	
26 05 33 13-0566 EA 3" Zinc Plated Steel 3-Piece Knock Out Seal	28.83	9.49
For Work In Restricted Working Space, Add	5.70	
For Elevated Installation >10' To 15', Add	1.90	
For Elevated Installation >15' To 20', Add	3.80	
For Elevated Installation >20' To 25', Add	4.75	
For Elevated Installation >25' To 30', Add	6.65	
For Elevated Installation >30' To 35', Add	7.60	
For Elevated Installation >35' To 40', Add	9.50	
For Elevated Installation >40', Add	10.44	
26 05 33 13-0567 EA 3-1/2" Zinc Plated Steel 3-Piece Knock Out Seal	35.08	10.62
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-0568	EA	4" Zinc Plated Steel 3-Piece Knock Out Seal	41.24	11.73
		<i>For Work In Restricted Working Space, Add</i>	7.04	
		<i>For Elevated Installation >10' To 15', Add</i>	2.35	
		<i>For Elevated Installation >15' To 20', Add</i>	4.69	
		<i>For Elevated Installation >20' To 25', Add</i>	5.87	
		<i>For Elevated Installation >25' To 30', Add</i>	8.21	
		<i>For Elevated Installation >30' To 35', Add</i>	9.38	
		<i>For Elevated Installation >35' To 40', Add</i>	11.73	
		<i>For Elevated Installation >40', Add</i>	12.90	

26 05 33 13-0569 Rigid Galvanized Steel (RGS) Chase Nipples (26 05 33 13-0060)

26 05 33 13-0570	EA	1/2" Rigid Galvanized Steel (RGS) Chase Nipple.....	13.82	6.71
		<i>For Work In Restricted Working Space, Add</i>	4.02	
		<i>For Elevated Installation >10' To 15', Add</i>	1.34	
		<i>For Elevated Installation >15' To 20', Add</i>	2.68	
		<i>For Elevated Installation >20' To 25', Add</i>	3.35	
		<i>For Elevated Installation >25' To 30', Add</i>	4.69	
		<i>For Elevated Installation >30' To 35', Add</i>	5.36	
		<i>For Elevated Installation >35' To 40', Add</i>	6.70	
		<i>For Elevated Installation >40', Add</i>	7.37	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.02	
26 05 33 13-0571	EA	3/4" Rigid Galvanized Steel (RGS) Chase Nipple.....	16.35	7.82
		<i>For Work In Restricted Working Space, Add</i>	4.69	
		<i>For Elevated Installation >10' To 15', Add</i>	1.56	
		<i>For Elevated Installation >15' To 20', Add</i>	3.13	
		<i>For Elevated Installation >20' To 25', Add</i>	3.91	
		<i>For Elevated Installation >25' To 30', Add</i>	5.47	
		<i>For Elevated Installation >30' To 35', Add</i>	6.26	
		<i>For Elevated Installation >35' To 40', Add</i>	7.82	
		<i>For Elevated Installation >40', Add</i>	8.60	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.69	
26 05 33 13-0572	EA	1" Rigid Galvanized Steel (RGS) Chase Nipple.....	20.53	9.49
		<i>For Work In Restricted Working Space, Add</i>	5.70	
		<i>For Elevated Installation >10' To 15', Add</i>	1.90	
		<i>For Elevated Installation >15' To 20', Add</i>	3.80	
		<i>For Elevated Installation >20' To 25', Add</i>	4.75	
		<i>For Elevated Installation >25' To 30', Add</i>	6.65	
		<i>For Elevated Installation >30' To 35', Add</i>	7.60	
		<i>For Elevated Installation >35' To 40', Add</i>	9.50	
		<i>For Elevated Installation >40', Add</i>	10.44	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.70	
26 05 33 13-0573	EA	1-1/4" Rigid Galvanized Steel (RGS) Chase Nipple.....	25.02	11.17
		<i>For Work In Restricted Working Space, Add</i>	6.71	
		<i>For Elevated Installation >10' To 15', Add</i>	2.24	
		<i>For Elevated Installation >15' To 20', Add</i>	4.47	
		<i>For Elevated Installation >20' To 25', Add</i>	5.59	
		<i>For Elevated Installation >25' To 30', Add</i>	7.82	
		<i>For Elevated Installation >30' To 35', Add</i>	8.94	
		<i>For Elevated Installation >35' To 40', Add</i>	11.18	
		<i>For Elevated Installation >40', Add</i>	12.29	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.71	
26 05 33 13-0574	EA	1-1/2" Rigid Galvanized Steel (RGS) Chase Nipple.....	31.37	13.97
		<i>For Work In Restricted Working Space, Add</i>	8.38	
		<i>For Elevated Installation >10' To 15', Add</i>	2.79	
		<i>For Elevated Installation >15' To 20', Add</i>	5.59	
		<i>For Elevated Installation >20' To 25', Add</i>	6.98	
		<i>For Elevated Installation >25' To 30', Add</i>	9.78	
		<i>For Elevated Installation >30' To 35', Add</i>	11.17	
		<i>For Elevated Installation >35' To 40', Add</i>	13.97	
		<i>For Elevated Installation >40', Add</i>	15.36	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0575	EA	2" Rigid Galvanized Steel (RGS) Chase Nipple.....	39.09	16.76
		<i>For Work In Restricted Working Space, Add</i>	10.05	
		<i>For Elevated Installation >10' To 15', Add</i>	3.35	
		<i>For Elevated Installation >15' To 20', Add</i>	6.70	
		<i>For Elevated Installation >20' To 25', Add</i>	8.38	
		<i>For Elevated Installation >25' To 30', Add</i>	11.73	
		<i>For Elevated Installation >30' To 35', Add</i>	13.40	
		<i>For Elevated Installation >35' To 40', Add</i>	16.76	
		<i>For Elevated Installation >40', Add</i>	18.43	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.05	
26 05 33 13-0576	EA	2-1/2" Rigid Galvanized Steel (RGS) Chase Nipple.....	49.71	19.55
		<i>For Work In Restricted Working Space, Add</i>	11.73	
		<i>For Elevated Installation >10' To 15', Add</i>	3.91	
		<i>For Elevated Installation >15' To 20', Add</i>	7.82	
		<i>For Elevated Installation >20' To 25', Add</i>	9.78	
		<i>For Elevated Installation >25' To 30', Add</i>	13.69	
		<i>For Elevated Installation >30' To 35', Add</i>	15.64	
		<i>For Elevated Installation >35' To 40', Add</i>	19.55	
		<i>For Elevated Installation >40', Add</i>	21.51	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.73	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0577 EA 3" Rigid Galvanized Steel (RGS) Chase Nipple.....	55.57	22.35
For Work In Restricted Working Space, Add	13.40	
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.94	
For Elevated Installation >20' To 25', Add	11.17	
For Elevated Installation >25' To 30', Add	15.64	
For Elevated Installation >30' To 35', Add	17.87	
For Elevated Installation >35' To 40', Add	22.34	
For Elevated Installation >40', Add	24.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	13.40	
26 05 33 13-0578 EA 3-1/2" Rigid Galvanized Steel (RGS) Chase Nipple	69.53	25.13
For Work In Restricted Working Space, Add	15.08	
For Elevated Installation >10' To 15', Add	5.03	
For Elevated Installation >15' To 20', Add	10.06	
For Elevated Installation >20' To 25', Add	12.57	
For Elevated Installation >25' To 30', Add	17.60	
For Elevated Installation >30' To 35', Add	20.11	
For Elevated Installation >35' To 40', Add	25.14	
For Elevated Installation >40', Add	27.65	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.08	
26 05 33 13-0579 EA 4" Rigid Galvanized Steel (RGS) Chase Nipple.....	96.20	27.93
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-0580 Rigid Galvanized Steel (RGS) Pulling Elbow <small>(26 05 33 13-0060)</small>		
26 05 33 13-0581 EA 1/2" Rigid Galvanized Steel (RGS) Pulling Elbow.....	27.43	10.06
For Work In Restricted Working Space, Add	6.03	
For Elevated Installation >10' To 15', Add	2.01	
For Elevated Installation >15' To 20', Add	4.02	
For Elevated Installation >20' To 25', Add	5.03	
For Elevated Installation >25' To 30', Add	7.04	
For Elevated Installation >30' To 35', Add	8.04	
For Elevated Installation >35' To 40', Add	10.06	
For Elevated Installation >40', Add	11.06	
26 05 33 13-0582 EA 3/4" Rigid Galvanized Steel (RGS) Pulling Elbow.....	31.86	11.73
For Work In Restricted Working Space, Add	7.04	
For Elevated Installation >10' To 15', Add	2.35	
For Elevated Installation >15' To 20', Add	4.69	
For Elevated Installation >20' To 25', Add	5.87	
For Elevated Installation >25' To 30', Add	8.21	
For Elevated Installation >30' To 35', Add	9.38	
For Elevated Installation >35' To 40', Add	11.73	
For Elevated Installation >40', Add	12.90	
26 05 33 13-0583 EA 1" Rigid Galvanized Steel (RGS) Pulling Elbow.....	40.76	13.40
For Work In Restricted Working Space, Add	8.04	
For Elevated Installation >10' To 15', Add	2.68	
For Elevated Installation >15' To 20', Add	5.36	
For Elevated Installation >20' To 25', Add	6.70	
For Elevated Installation >25' To 30', Add	9.38	
For Elevated Installation >30' To 35', Add	10.72	
For Elevated Installation >35' To 40', Add	13.41	
For Elevated Installation >40', Add	14.75	
26 05 33 13-0584 EA 1-1/4" Rigid Galvanized Steel (RGS) Pulling Elbow	52.29	16.76
For Work In Restricted Working Space, Add	10.05	
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.38	
For Elevated Installation >25' To 30', Add	11.73	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.76	
For Elevated Installation >40', Add	18.43	
26 05 33 13-0585 EA 1-1/2" Rigid Galvanized Steel (RGS) Pulling Elbow	70.03	20.11
For Work In Restricted Working Space, Add	12.07	
For Elevated Installation >10' To 15', Add	4.02	
For Elevated Installation >15' To 20', Add	8.04	
For Elevated Installation >20' To 25', Add	10.06	
For Elevated Installation >25' To 30', Add	14.08	
For Elevated Installation >30' To 35', Add	16.09	
For Elevated Installation >35' To 40', Add	20.11	
For Elevated Installation >40', Add	22.12	
26 05 33 13-0586 EA 2" Rigid Galvanized Steel (RGS) Pulling Elbow.....	94.10	23.46
For Work In Restricted Working Space, Add	14.08	
For Elevated Installation >10' To 15', Add	4.69	
For Elevated Installation >15' To 20', Add	9.38	
For Elevated Installation >20' To 25', Add	11.73	
For Elevated Installation >25' To 30', Add	16.42	
For Elevated Installation >30' To 35', Add	18.77	
For Elevated Installation >35' To 40', Add	23.46	
For Elevated Installation >40', Add	25.81	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0587	EA	2-1/2" Rigid Galvanized Steel (RGS) Pulling Elbow.....	131.52	26.81
			<i>For Work In Restricted Working Space, Add</i>	16.09	
			<i>For Elevated Installation >10' To 15', Add</i>	5.36	
			<i>For Elevated Installation >15' To 20', Add</i>	10.73	
			<i>For Elevated Installation >20' To 25', Add</i>	13.41	
			<i>For Elevated Installation >25' To 30', Add</i>	18.77	
			<i>For Elevated Installation >30' To 35', Add</i>	21.45	
			<i>For Elevated Installation >35' To 40', Add</i>	26.82	
			<i>For Elevated Installation >40', Add</i>	29.50	
26 05 33	13-0588	EA	3" Rigid Galvanized Steel (RGS) Pulling Elbow.....	232.04	33.51
			<i>For Work In Restricted Working Space, Add</i>	20.11	
			<i>For Elevated Installation >10' To 15', Add</i>	6.70	
			<i>For Elevated Installation >15' To 20', Add</i>	13.41	
			<i>For Elevated Installation >20' To 25', Add</i>	16.76	
			<i>For Elevated Installation >25' To 30', Add</i>	23.46	
			<i>For Elevated Installation >30' To 35', Add</i>	26.81	
			<i>For Elevated Installation >35' To 40', Add</i>	33.52	
			<i>For Elevated Installation >40', Add</i>	36.87	
26 05 33	13-0589		Electrical Metallic Tubing (EMT) Thinwall Conduit <small>(26 05 33 13-0059)</small>		
			Note: Exposed installation, branch and feeder conduit. Excludes supporting strap, hanger and fastening.		
26 05 33	13-0590		Electrical Metallic Tubing (EMT) Thinwall Conduit <small>(26 05 33 13-0589)</small>		
			Note: Includes field bending conduit up to and including 1". See CSI section 26 05 33 13-1358 for field bending >1".		
26 05 33	13-0591	LF	1/2" Electrical Metallic Tubing (EMT) Conduit.....	6.04	2.02
			<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.75	
			<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	1.26	
			<i>For Work In Restricted Working Space, Add</i>	1.51	
			<i>For >1,000, Deduct</i>	-0.48	
			<i>For >250 To 500, Deduct</i>	-0.05	
			<i>For >500 To 1,000, Deduct</i>	-0.33	
			<i>For Elevated Installation >10' To 15', Add</i>	0.50	
			<i>For Elevated Installation >15' To 20', Add</i>	1.00	
			<i>For Elevated Installation >20' To 25', Add</i>	1.26	
			<i>For Elevated Installation >25' To 30', Add</i>	1.76	
			<i>For Elevated Installation >30' To 35', Add</i>	2.01	
			<i>For Elevated Installation >35' To 40', Add</i>	2.51	
			<i>For Elevated Installation >40', Add</i>	2.76	
			<i>For Installation In Metal Stud Wall, Add</i>	0.50	
			<i>For Factory Applied Color Coating, Add</i>	0.31	
26 05 33	13-0592	LF	3/4" Electrical Metallic Tubing (EMT) Conduit.....	7.18	2.24
			<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.84	
			<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	1.40	
			<i>For Work In Restricted Working Space, Add</i>	1.67	
			<i>For >1,000, Deduct</i>	-0.58	
			<i>For >250 To 500, Deduct</i>	-0.08	
			<i>For >500 To 1,000, Deduct</i>	-0.40	
			<i>For Elevated Installation >10' To 15', Add</i>	0.56	
			<i>For Elevated Installation >15' To 20', Add</i>	1.12	
			<i>For Elevated Installation >20' To 25', Add</i>	1.40	
			<i>For Elevated Installation >25' To 30', Add</i>	1.95	
			<i>For Elevated Installation >30' To 35', Add</i>	2.23	
			<i>For Elevated Installation >35' To 40', Add</i>	2.79	
			<i>For Elevated Installation >40', Add</i>	3.07	
			<i>For Installation In Metal Stud Wall, Add</i>	0.56	
			<i>For Factory Applied Color Coating, Add</i>	0.48	
26 05 33	13-0593	LF	1" Electrical Metallic Tubing (EMT) Conduit.....	8.81	2.46
			<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.92	
			<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	1.54	
			<i>For Work In Restricted Working Space, Add</i>	1.85	
			<i>For >1,000, Deduct</i>	-0.73	
			<i>For >250 To 500, Deduct</i>	-0.13	
			<i>For >500 To 1,000, Deduct</i>	-0.51	
			<i>For Elevated Installation >10' To 15', Add</i>	0.62	
			<i>For Elevated Installation >15' To 20', Add</i>	1.23	
			<i>For Elevated Installation >20' To 25', Add</i>	1.54	
			<i>For Elevated Installation >25' To 30', Add</i>	2.15	
			<i>For Elevated Installation >30' To 35', Add</i>	2.46	
			<i>For Elevated Installation >35' To 40', Add</i>	3.08	
			<i>For Elevated Installation >40', Add</i>	3.38	
			<i>For Installation In Metal Stud Wall, Add</i>	0.62	
			<i>For Factory Applied Color Coating, Add</i>	0.80	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0594 LF 1-1/4" Electrical Metallic Tubing (EMT) Conduit	11.12	2.77
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.04	
For Installation In Wood Stud Wall (Includes Drilling), Add	1.73	
For Work In Restricted Working Space, Add	2.08	
For >1,000, Deduct	-0.94	
For >250 To 500, Deduct	-0.21	
For >500 To 1,000, Deduct	-0.66	
For Elevated Installation >10' To 15', Add	0.69	
For Elevated Installation >15' To 20', Add	1.39	
For Elevated Installation >20' To 25', Add	1.73	
For Elevated Installation >25' To 30', Add	2.43	
For Elevated Installation >30' To 35', Add	2.77	
For Elevated Installation >35' To 40', Add	3.47	
For Elevated Installation >40', Add	3.81	
For Installation In Metal Stud Wall, Add	0.69	
For Factory Applied Color Coating, Add	1.26	
26 05 33 13-0595 LF 1-1/2" Electrical Metallic Tubing (EMT) Conduit	13.04	3.13
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.17	
For Installation In Wood Stud Wall (Includes Drilling), Add	1.96	
For Work In Restricted Working Space, Add	2.35	
For >1,000, Deduct	-1.11	
For >250 To 500, Deduct	-0.26	
For >500 To 1,000, Deduct	-0.78	
For Elevated Installation >10' To 15', Add	0.78	
For Elevated Installation >15' To 20', Add	1.56	
For Elevated Installation >20' To 25', Add	1.96	
For Elevated Installation >25' To 30', Add	2.74	
For Elevated Installation >30' To 35', Add	3.13	
For Elevated Installation >35' To 40', Add	3.91	
For Elevated Installation >40', Add	4.30	
For Installation In Metal Stud Wall, Add	0.78	
For Factory Applied Color Coating, Add	1.57	
26 05 33 13-0596 LF 2" Electrical Metallic Tubing (EMT) Conduit.....	15.12	3.58
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.34	
For Installation In Wood Stud Wall (Includes Drilling), Add	2.23	
For Work In Restricted Working Space, Add	2.68	
For >1,000, Deduct	-1.29	
For >250 To 500, Deduct	-0.31	
For >500 To 1,000, Deduct	-0.91	
For Elevated Installation >10' To 15', Add	0.89	
For Elevated Installation >15' To 20', Add	1.79	
For Elevated Installation >20' To 25', Add	2.23	
For Elevated Installation >25' To 30', Add	3.13	
For Elevated Installation >30' To 35', Add	3.57	
For Elevated Installation >35' To 40', Add	4.47	
For Elevated Installation >40', Add	4.91	
For Installation In Metal Stud Wall, Add	0.89	
For Factory Applied Color Coating, Add	1.86	
26 05 33 13-0597 LF 2-1/2" Electrical Metallic Tubing (EMT) Conduit	19.79	4.24
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.59	
For Installation In Wood Stud Wall (Includes Drilling), Add	2.66	
For Work In Restricted Working Space, Add	3.19	
For >1,000, Deduct	-1.71	
For >250 To 500, Deduct	-0.46	
For >500 To 1,000, Deduct	-1.22	
For Elevated Installation >10' To 15', Add	1.06	
For Elevated Installation >15' To 20', Add	2.12	
For Elevated Installation >20' To 25', Add	2.66	
For Elevated Installation >25' To 30', Add	3.72	
For Elevated Installation >30' To 35', Add	4.25	
For Elevated Installation >35' To 40', Add	5.31	
For Elevated Installation >40', Add	5.84	
For Installation In Metal Stud Wall, Add	1.06	
For Factory Applied Color Coating, Add	2.75	
26 05 33 13-0598 LF 3" Electrical Metallic Tubing (EMT) Conduit.....	23.77	4.91
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.84	
For Installation In Wood Stud Wall (Includes Drilling), Add	3.07	
For Work In Restricted Working Space, Add	3.69	
For >1,000, Deduct	-2.07	
For >250 To 500, Deduct	-0.57	
For >500 To 1,000, Deduct	-1.48	
For Elevated Installation >10' To 15', Add	1.23	
For Elevated Installation >15' To 20', Add	2.46	
For Elevated Installation >20' To 25', Add	3.07	
For Elevated Installation >25' To 30', Add	4.30	
For Elevated Installation >30' To 35', Add	4.92	
For Elevated Installation >35' To 40', Add	6.15	
For Elevated Installation >40', Add	6.76	
For Installation In Metal Stud Wall, Add	1.23	
For Factory Applied Color Coating, Add	3.44	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0599	LF 3-1/2" Electrical Metallic Tubing (EMT) Conduit.....	29.87	5.80
	<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	2.18	
	<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	3.63	
	<i>For Work In Restricted Working Space, Add</i>	4.36	
	<i>For >1,000, Deduct</i>	-2.62	
	<i>For >250 To 500, Deduct</i>	-0.77	
	<i>For >500 To 1,000, Deduct</i>	-1.88	
	<i>For Elevated Installation >10' To 15', Add</i>	1.45	
	<i>For Elevated Installation >15' To 20', Add</i>	2.91	
	<i>For Elevated Installation >20' To 25', Add</i>	3.63	
	<i>For Elevated Installation >25' To 30', Add</i>	5.09	
	<i>For Elevated Installation >30' To 35', Add</i>	5.81	
	<i>For Elevated Installation >35' To 40', Add</i>	7.27	
	<i>For Elevated Installation >40', Add</i>	7.99	
	<i>For Installation In Metal Stud Wall, Add</i>	1.45	
	<i>For Factory Applied Color Coating, Add</i>	4.60	
26 05 33 13-0600	LF 4" Electrical Metallic Tubing (EMT) Conduit.....	39.27	8.80
	<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	3.30	
	<i>For Installation In Wood Stud Wall (Includes Drilling), Add</i>	5.50	
	<i>For Work In Restricted Working Space, Add</i>	6.60	
	<i>For >1,000, Deduct</i>	-3.38	
	<i>For >250 To 500, Deduct</i>	-0.86	
	<i>For >500 To 1,000, Deduct</i>	-2.40	
	<i>For Elevated Installation >10' To 15', Add</i>	2.20	
	<i>For Elevated Installation >15' To 20', Add</i>	4.40	
	<i>For Elevated Installation >20' To 25', Add</i>	5.50	
	<i>For Elevated Installation >25' To 30', Add</i>	7.70	
	<i>For Elevated Installation >30' To 35', Add</i>	8.80	
	<i>For Elevated Installation >35' To 40', Add</i>	11.00	
	<i>For Elevated Installation >40', Add</i>	12.09	
	<i>For Installation In Metal Stud Wall, Add</i>	2.20	
	<i>For Factory Applied Color Coating, Add</i>	5.18	
26 05 33 13-0601	Electrical Metallic Tubing (EMT) 90 Degree Elbows <small>(26 05 33 13-0589)</small>		
	<small>See CSI section 26 05 33 13-1358 for conduit field bending.</small>		
26 05 33 13-0602	EA 1/2" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	14.61	4.91
	<i>For Work In Restricted Working Space, Add</i>	3.69	
	<i>For Elevated Installation >10' To 15', Add</i>	1.23	
	<i>For Elevated Installation >15' To 20', Add</i>	2.46	
	<i>For Elevated Installation >20' To 25', Add</i>	3.07	
	<i>For Elevated Installation >25' To 30', Add</i>	4.30	
	<i>For Elevated Installation >30' To 35', Add</i>	4.92	
	<i>For Elevated Installation >35' To 40', Add</i>	6.15	
	<i>For Elevated Installation >40', Add</i>	6.76	
26 05 33 13-0603	EA 3/4" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	15.46	5.36
	<i>For Work In Restricted Working Space, Add</i>	4.02	
	<i>For Elevated Installation >10' To 15', Add</i>	1.34	
	<i>For Elevated Installation >15' To 20', Add</i>	2.68	
	<i>For Elevated Installation >20' To 25', Add</i>	3.35	
	<i>For Elevated Installation >25' To 30', Add</i>	4.69	
	<i>For Elevated Installation >30' To 35', Add</i>	5.36	
	<i>For Elevated Installation >35' To 40', Add</i>	6.70	
	<i>For Elevated Installation >40', Add</i>	7.37	
26 05 33 13-0604	EA 1" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	18.88	6.26
	<i>For Work In Restricted Working Space, Add</i>	4.69	
	<i>For Elevated Installation >10' To 15', Add</i>	1.56	
	<i>For Elevated Installation >15' To 20', Add</i>	3.13	
	<i>For Elevated Installation >20' To 25', Add</i>	3.91	
	<i>For Elevated Installation >25' To 30', Add</i>	5.47	
	<i>For Elevated Installation >30' To 35', Add</i>	6.26	
	<i>For Elevated Installation >35' To 40', Add</i>	7.82	
	<i>For Elevated Installation >40', Add</i>	8.60	
26 05 33 13-0605	EA 1-1/4" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	20.79	6.71
	<i>For Work In Restricted Working Space, Add</i>	5.03	
	<i>For Elevated Installation >10' To 15', Add</i>	1.68	
	<i>For Elevated Installation >15' To 20', Add</i>	3.35	
	<i>For Elevated Installation >20' To 25', Add</i>	4.19	
	<i>For Elevated Installation >25' To 30', Add</i>	5.87	
	<i>For Elevated Installation >30' To 35', Add</i>	6.70	
	<i>For Elevated Installation >35' To 40', Add</i>	8.38	
	<i>For Elevated Installation >40', Add</i>	9.22	
26 05 33 13-0606	EA 1-1/2" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	24.64	8.04
	<i>For Work In Restricted Working Space, Add</i>	6.03	
	<i>For Elevated Installation >10' To 15', Add</i>	2.01	
	<i>For Elevated Installation >15' To 20', Add</i>	4.02	
	<i>For Elevated Installation >20' To 25', Add</i>	5.03	
	<i>For Elevated Installation >25' To 30', Add</i>	7.04	
	<i>For Elevated Installation >30' To 35', Add</i>	8.04	
	<i>For Elevated Installation >35' To 40', Add</i>	10.06	
	<i>For Elevated Installation >40', Add</i>	11.06	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0607 EA 2" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	32.39	10.28
For Work In Restricted Working Space, Add	7.71	
For Elevated Installation >10' To 15', Add	2.57	
For Elevated Installation >15' To 20', Add	5.14	
For Elevated Installation >20' To 25', Add	6.42	
For Elevated Installation >25' To 30', Add	8.99	
For Elevated Installation >30' To 35', Add	10.28	
For Elevated Installation >35' To 40', Add	12.85	
For Elevated Installation >40', Add	14.13	
26 05 33 13-0608 EA 2-1/2" Electrical Metallic Tubing (EMT) 90 Degree Elbow	43.84	11.62
For Work In Restricted Working Space, Add	8.71	
For Elevated Installation >10' To 15', Add	2.90	
For Elevated Installation >15' To 20', Add	5.81	
For Elevated Installation >20' To 25', Add	7.26	
For Elevated Installation >25' To 30', Add	10.16	
For Elevated Installation >30' To 35', Add	11.62	
For Elevated Installation >35' To 40', Add	14.52	
For Elevated Installation >40', Add	15.97	
26 05 33 13-0609 EA 3" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	56.30	12.96
For Work In Restricted Working Space, Add	9.72	
For Elevated Installation >10' To 15', Add	3.24	
For Elevated Installation >15' To 20', Add	6.48	
For Elevated Installation >20' To 25', Add	8.10	
For Elevated Installation >25' To 30', Add	11.34	
For Elevated Installation >30' To 35', Add	12.96	
For Elevated Installation >35' To 40', Add	16.20	
For Elevated Installation >40', Add	17.82	
26 05 33 13-0610 EA 3-1/2" Electrical Metallic Tubing (EMT) 90 Degree Elbow	64.02	14.30
For Work In Restricted Working Space, Add	10.73	
For Elevated Installation >10' To 15', Add	3.58	
For Elevated Installation >15' To 20', Add	7.15	
For Elevated Installation >20' To 25', Add	8.94	
For Elevated Installation >25' To 30', Add	12.51	
For Elevated Installation >30' To 35', Add	14.30	
For Elevated Installation >35' To 40', Add	17.88	
For Elevated Installation >40', Add	19.66	
26 05 33 13-0611 EA 4" Electrical Metallic Tubing (EMT) 90 Degree Elbow.....	134.61	38.47
For Work In Restricted Working Space, Add	28.86	
For Elevated Installation >10' To 15', Add	9.62	
For Elevated Installation >15' To 20', Add	19.24	
For Elevated Installation >20' To 25', Add	24.05	
For Elevated Installation >25' To 30', Add	33.67	
For Elevated Installation >30' To 35', Add	38.48	
For Elevated Installation >35' To 40', Add	48.10	
For Elevated Installation >40', Add	52.90	
26 05 33 13-0612 Electrical Metallic Tubing (EMT) 45 Degree Elbows (26 05 33 13-0589)		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0613 EA 1/2" Electrical Metallic Tubing (EMT) 45 Degree Elbow.....	14.36	4.91
For Work In Restricted Working Space, Add	3.69	
For Elevated Installation >10' To 15', Add	1.23	
For Elevated Installation >15' To 20', Add	2.46	
For Elevated Installation >20' To 25', Add	3.07	
For Elevated Installation >25' To 30', Add	4.30	
For Elevated Installation >30' To 35', Add	4.92	
For Elevated Installation >35' To 40', Add	6.15	
For Elevated Installation >40', Add	6.76	
26 05 33 13-0614 EA 3/4" Electrical Metallic Tubing (EMT) 45 Degree Elbow.....	15.61	5.36
For Work In Restricted Working Space, Add	4.02	
For Elevated Installation >10' To 15', Add	1.34	
For Elevated Installation >15' To 20', Add	2.68	
For Elevated Installation >20' To 25', Add	3.35	
For Elevated Installation >25' To 30', Add	4.69	
For Elevated Installation >30' To 35', Add	5.36	
For Elevated Installation >35' To 40', Add	6.70	
For Elevated Installation >40', Add	7.37	
26 05 33 13-0615 EA 1" Electrical Metallic Tubing (EMT) 45 Degree Elbow.....	19.21	6.26
For Work In Restricted Working Space, Add	4.69	
For Elevated Installation >10' To 15', Add	1.56	
For Elevated Installation >15' To 20', Add	3.13	
For Elevated Installation >20' To 25', Add	3.91	
For Elevated Installation >25' To 30', Add	5.47	
For Elevated Installation >30' To 35', Add	6.26	
For Elevated Installation >35' To 40', Add	7.82	
For Elevated Installation >40', Add	8.60	
26 05 33 13-0616 EA 1-1/4" Electrical Metallic Tubing (EMT) 45 Degree Elbow	21.41	6.71
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.87	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.22	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0617	EA 1-1/2" Electrical Metallic Tubing (EMT) 45 Degree Elbow	25.42	8.04
	<i>For Work In Restricted Working Space, Add</i>	6.03	
	<i>For Elevated Installation >10' To 15', Add</i>	2.01	
	<i>For Elevated Installation >15' To 20', Add</i>	4.02	
	<i>For Elevated Installation >20' To 25', Add</i>	5.03	
	<i>For Elevated Installation >25' To 30', Add</i>	7.04	
	<i>For Elevated Installation >30' To 35', Add</i>	8.04	
	<i>For Elevated Installation >35' To 40', Add</i>	10.06	
	<i>For Elevated Installation >40', Add</i>	11.06	
26 05 33 13-0618	EA 2" Electrical Metallic Tubing (EMT) 45 Degree Elbow.....	32.14	10.28
	<i>For Work In Restricted Working Space, Add</i>	7.71	
	<i>For Elevated Installation >10' To 15', Add</i>	2.57	
	<i>For Elevated Installation >15' To 20', Add</i>	5.14	
	<i>For Elevated Installation >20' To 25', Add</i>	6.42	
	<i>For Elevated Installation >25' To 30', Add</i>	8.99	
	<i>For Elevated Installation >30' To 35', Add</i>	10.28	
	<i>For Elevated Installation >35' To 40', Add</i>	12.85	
	<i>For Elevated Installation >40', Add</i>	14.13	
26 05 33 13-0619	EA 2-1/2" Electrical Metallic Tubing (EMT) 45 Degree Elbow	46.10	11.62
	<i>For Work In Restricted Working Space, Add</i>	8.71	
	<i>For Elevated Installation >10' To 15', Add</i>	2.90	
	<i>For Elevated Installation >15' To 20', Add</i>	5.81	
	<i>For Elevated Installation >20' To 25', Add</i>	7.26	
	<i>For Elevated Installation >25' To 30', Add</i>	10.16	
	<i>For Elevated Installation >30' To 35', Add</i>	11.62	
	<i>For Elevated Installation >35' To 40', Add</i>	14.52	
	<i>For Elevated Installation >40', Add</i>	15.97	
26 05 33 13-0620	EA 3" Electrical Metallic Tubing (EMT) 45 Degree Elbow.....	58.10	12.96
	<i>For Work In Restricted Working Space, Add</i>	9.72	
	<i>For Elevated Installation >10' To 15', Add</i>	3.24	
	<i>For Elevated Installation >15' To 20', Add</i>	6.48	
	<i>For Elevated Installation >20' To 25', Add</i>	8.10	
	<i>For Elevated Installation >25' To 30', Add</i>	11.34	
	<i>For Elevated Installation >30' To 35', Add</i>	12.96	
	<i>For Elevated Installation >35' To 40', Add</i>	16.20	
	<i>For Elevated Installation >40', Add</i>	17.82	
26 05 33 13-0621	EA 3-1/2" Electrical Metallic Tubing (EMT) 45 Degree Elbow	68.91	14.30
	<i>For Work In Restricted Working Space, Add</i>	10.73	
	<i>For Elevated Installation >10' To 15', Add</i>	3.58	
	<i>For Elevated Installation >15' To 20', Add</i>	7.15	
	<i>For Elevated Installation >20' To 25', Add</i>	8.94	
	<i>For Elevated Installation >25' To 30', Add</i>	12.51	
	<i>For Elevated Installation >30' To 35', Add</i>	14.30	
	<i>For Elevated Installation >35' To 40', Add</i>	17.88	
	<i>For Elevated Installation >40', Add</i>	19.66	
26 05 33 13-0622	EA 4" Electrical Metallic Tubing (EMT) 45 Degree Elbow.....	131.19	38.47
	<i>For Work In Restricted Working Space, Add</i>	28.86	
	<i>For Elevated Installation >10' To 15', Add</i>	9.62	
	<i>For Elevated Installation >15' To 20', Add</i>	19.24	
	<i>For Elevated Installation >20' To 25', Add</i>	24.05	
	<i>For Elevated Installation >25' To 30', Add</i>	33.67	
	<i>For Elevated Installation >30' To 35', Add</i>	38.48	
	<i>For Elevated Installation >35' To 40', Add</i>	48.10	
	<i>For Elevated Installation >40', Add</i>	52.90	
26 05 33 13-0623	Electrical Metallic Tubing (EMT) Set Screw Couplings <small>(26 05 33 13-0589)</small>		
26 05 33 13-0624	EA 1/2" Electrical Metallic Tubing (EMT) Set Screw Coupling.....	5.85	2.68
	<i>For Work In Restricted Working Space, Add</i>	1.67	
	<i>For Elevated Installation >10' To 15', Add</i>	0.56	
	<i>For Elevated Installation >15' To 20', Add</i>	1.12	
	<i>For Elevated Installation >20' To 25', Add</i>	1.40	
	<i>For Elevated Installation >25' To 30', Add</i>	1.95	
	<i>For Elevated Installation >30' To 35', Add</i>	2.23	
	<i>For Elevated Installation >35' To 40', Add</i>	2.79	
	<i>For Elevated Installation >40', Add</i>	3.07	
26 05 33 13-0625	EA 3/4" Electrical Metallic Tubing (EMT) Set Screw Coupling.....	7.09	2.68
	<i>For Work In Restricted Working Space, Add</i>	2.01	
	<i>For Elevated Installation >10' To 15', Add</i>	0.67	
	<i>For Elevated Installation >15' To 20', Add</i>	1.34	
	<i>For Elevated Installation >20' To 25', Add</i>	1.68	
	<i>For Elevated Installation >25' To 30', Add</i>	2.35	
	<i>For Elevated Installation >30' To 35', Add</i>	2.68	
	<i>For Elevated Installation >35' To 40', Add</i>	3.35	
	<i>For Elevated Installation >40', Add</i>	3.69	
26 05 33 13-0626	EA 1" Electrical Metallic Tubing (EMT) Set Screw Coupling.....	8.42	3.13
	<i>For Work In Restricted Working Space, Add</i>	2.35	
	<i>For Elevated Installation >10' To 15', Add</i>	0.78	
	<i>For Elevated Installation >15' To 20', Add</i>	1.56	
	<i>For Elevated Installation >20' To 25', Add</i>	1.96	
	<i>For Elevated Installation >25' To 30', Add</i>	2.74	
	<i>For Elevated Installation >30' To 35', Add</i>	3.13	
	<i>For Elevated Installation >35' To 40', Add</i>	3.91	
	<i>For Elevated Installation >40', Add</i>	4.30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0627 EA 1-1/4" Electrical Metallic Tubing (EMT) Set Screw Coupling	11.37	4.02
For Work In Restricted Working Space, Add	3.02	
For Elevated Installation >10' To 15', Add	1.01	
For Elevated Installation >15' To 20', Add	2.01	
For Elevated Installation >20' To 25', Add	2.52	
For Elevated Installation >25' To 30', Add	3.52	
For Elevated Installation >30' To 35', Add	4.02	
For Elevated Installation >35' To 40', Add	5.03	
For Elevated Installation >40', Add	5.53	
26 05 33 13-0628 EA 1-1/2" Electrical Metallic Tubing (EMT) Set Screw Coupling	14.02	4.91
For Work In Restricted Working Space, Add	3.69	
For Elevated Installation >10' To 15', Add	1.23	
For Elevated Installation >15' To 20', Add	2.46	
For Elevated Installation >20' To 25', Add	3.07	
For Elevated Installation >25' To 30', Add	4.30	
For Elevated Installation >30' To 35', Add	4.92	
For Elevated Installation >35' To 40', Add	6.15	
For Elevated Installation >40', Add	6.76	
26 05 33 13-0629 EA 2" Electrical Metallic Tubing (EMT) Set Screw Coupling.....	19.05	6.71
For Work In Restricted Working Space, Add	5.03	
For Elevated Installation >10' To 15', Add	1.68	
For Elevated Installation >15' To 20', Add	3.35	
For Elevated Installation >20' To 25', Add	4.19	
For Elevated Installation >25' To 30', Add	5.86	
For Elevated Installation >30' To 35', Add	6.70	
For Elevated Installation >35' To 40', Add	8.38	
For Elevated Installation >40', Add	9.21	
26 05 33 13-0630 EA 2-1/2" Electrical Metallic Tubing (EMT) Set Screw Coupling	26.38	8.93
For Work In Restricted Working Space, Add	6.71	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
26 05 33 13-0631 EA 3" Electrical Metallic Tubing (EMT) Set Screw Coupling.....	34.18	10.28
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
26 05 33 13-0632 EA 3-1/2" Electrical Metallic Tubing (EMT) Set Screw Coupling	38.46	11.17
For Work In Restricted Working Space, Add	10.05	
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.38	
For Elevated Installation >25' To 30', Add	11.73	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.76	
For Elevated Installation >40', Add	18.43	
26 05 33 13-0633 EA 4" Electrical Metallic Tubing (EMT) Set Screw Coupling.....	112.02	31.88
For Work In Restricted Working Space, Add	30.96	
For Elevated Installation >10' To 15', Add	10.32	
For Elevated Installation >15' To 20', Add	20.64	
For Elevated Installation >20' To 25', Add	25.80	
For Elevated Installation >25' To 30', Add	36.12	
For Elevated Installation >30' To 35', Add	41.28	
For Elevated Installation >35' To 40', Add	51.60	
For Elevated Installation >40', Add	56.76	
26 05 33 13-0634 Electrical Metallic Tubing (EMT) Compression Couplings (26 05 33 13-0589)		
26 05 33 13-0635 EA 1/2 Electrical Metallic Tubing (EMT) Compression Coupling.....	7.37	2.68
For Work In Restricted Working Space, Add	2.01	
For Elevated Installation >10' To 15', Add	0.67	
For Elevated Installation >15' To 20', Add	1.34	
For Elevated Installation >20' To 25', Add	1.68	
For Elevated Installation >25' To 30', Add	2.35	
For Elevated Installation >30' To 35', Add	2.68	
For Elevated Installation >35' To 40', Add	3.36	
For Elevated Installation >40', Add	3.69	
26 05 33 13-0636 EA 3/4" Electrical Metallic Tubing (EMT) Compression Coupling.....	8.55	3.13
For Work In Restricted Working Space, Add	2.35	
For Elevated Installation >10' To 15', Add	0.78	
For Elevated Installation >15' To 20', Add	1.56	
For Elevated Installation >20' To 25', Add	1.96	
For Elevated Installation >25' To 30', Add	2.74	
For Elevated Installation >30' To 35', Add	3.13	
For Elevated Installation >35' To 40', Add	3.91	
For Elevated Installation >40', Add	4.30	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0637	EA	1" Electrical Metallic Tubing (EMT) Compression Coupling.....	12.18	4.47
			<i>For Work In Restricted Working Space, Add</i>	3.35	
			<i>For Elevated Installation >10' To 15', Add</i>	1.12	
			<i>For Elevated Installation >15' To 20', Add</i>	2.23	
			<i>For Elevated Installation >20' To 25', Add</i>	2.79	
			<i>For Elevated Installation >25' To 30', Add</i>	3.91	
			<i>For Elevated Installation >30' To 35', Add</i>	4.47	
			<i>For Elevated Installation >35' To 40', Add</i>	5.59	
			<i>For Elevated Installation >40', Add</i>	6.14	
26 05 33	13-0638	EA	1-1/4" Electrical Metallic Tubing (EMT) Compression Coupling.....	15.51	5.36
			<i>For Work In Restricted Working Space, Add</i>	4.02	
			<i>For Elevated Installation >10' To 15', Add</i>	1.34	
			<i>For Elevated Installation >15' To 20', Add</i>	2.68	
			<i>For Elevated Installation >20' To 25', Add</i>	3.35	
			<i>For Elevated Installation >25' To 30', Add</i>	4.69	
			<i>For Elevated Installation >30' To 35', Add</i>	5.36	
			<i>For Elevated Installation >35' To 40', Add</i>	6.70	
			<i>For Elevated Installation >40', Add</i>	7.37	
26 05 33	13-0639	EA	1-1/2" Electrical Metallic Tubing (EMT) Compression Coupling.....	18.61	6.26
			<i>For Work In Restricted Working Space, Add</i>	4.69	
			<i>For Elevated Installation >10' To 15', Add</i>	1.56	
			<i>For Elevated Installation >15' To 20', Add</i>	3.13	
			<i>For Elevated Installation >20' To 25', Add</i>	3.91	
			<i>For Elevated Installation >25' To 30', Add</i>	5.47	
			<i>For Elevated Installation >30' To 35', Add</i>	6.26	
			<i>For Elevated Installation >35' To 40', Add</i>	7.82	
			<i>For Elevated Installation >40', Add</i>	8.60	
26 05 33	13-0640	EA	2" Electrical Metallic Tubing (EMT) Compression Coupling.....	24.79	8.04
			<i>For Work In Restricted Working Space, Add</i>	6.03	
			<i>For Elevated Installation >10' To 15', Add</i>	2.01	
			<i>For Elevated Installation >15' To 20', Add</i>	4.02	
			<i>For Elevated Installation >20' To 25', Add</i>	5.03	
			<i>For Elevated Installation >25' To 30', Add</i>	7.04	
			<i>For Elevated Installation >30' To 35', Add</i>	8.04	
			<i>For Elevated Installation >35' To 40', Add</i>	10.06	
			<i>For Elevated Installation >40', Add</i>	11.06	
26 05 33	13-0641	EA	2-1/2" Electrical Metallic Tubing (EMT) Compression Coupling.....	39.03	10.73
			<i>For Work In Restricted Working Space, Add</i>	8.04	
			<i>For Elevated Installation >10' To 15', Add</i>	2.68	
			<i>For Elevated Installation >15' To 20', Add</i>	5.36	
			<i>For Elevated Installation >20' To 25', Add</i>	6.70	
			<i>For Elevated Installation >25' To 30', Add</i>	9.38	
			<i>For Elevated Installation >30' To 35', Add</i>	10.72	
			<i>For Elevated Installation >35' To 40', Add</i>	13.41	
			<i>For Elevated Installation >40', Add</i>	14.75	
26 05 33	13-0642	EA	3" Electrical Metallic Tubing (EMT) Compression Coupling.....	45.16	12.51
			<i>For Work In Restricted Working Space, Add</i>	9.38	
			<i>For Elevated Installation >10' To 15', Add</i>	3.13	
			<i>For Elevated Installation >15' To 20', Add</i>	6.26	
			<i>For Elevated Installation >20' To 25', Add</i>	7.82	
			<i>For Elevated Installation >25' To 30', Add</i>	10.95	
			<i>For Elevated Installation >30' To 35', Add</i>	12.51	
			<i>For Elevated Installation >35' To 40', Add</i>	15.64	
			<i>For Elevated Installation >40', Add</i>	17.20	
26 05 33	13-0643	EA	3-1/2" Electrical Metallic Tubing (EMT) Compression Coupling.....	56.47	15.64
			<i>For Work In Restricted Working Space, Add</i>	11.73	
			<i>For Elevated Installation >10' To 15', Add</i>	3.91	
			<i>For Elevated Installation >15' To 20', Add</i>	7.82	
			<i>For Elevated Installation >20' To 25', Add</i>	9.78	
			<i>For Elevated Installation >25' To 30', Add</i>	13.69	
			<i>For Elevated Installation >30' To 35', Add</i>	15.64	
			<i>For Elevated Installation >35' To 40', Add</i>	19.55	
			<i>For Elevated Installation >40', Add</i>	21.51	
26 05 33	13-0644	EA	4" Electrical Metallic Tubing (EMT) Compression Coupling.....	72.43	20.11
			<i>For Work In Restricted Working Space, Add</i>	15.08	
			<i>For Elevated Installation >10' To 15', Add</i>	5.03	
			<i>For Elevated Installation >15' To 20', Add</i>	10.06	
			<i>For Elevated Installation >20' To 25', Add</i>	12.57	
			<i>For Elevated Installation >25' To 30', Add</i>	17.60	
			<i>For Elevated Installation >30' To 35', Add</i>	20.11	
			<i>For Elevated Installation >35' To 40', Add</i>	25.14	
			<i>For Elevated Installation >40', Add</i>	27.65	
26 05 33	13-0645		Electrical Metallic Tubing (EMT) Raintight Compression Couplings <small>(26 05 33 13-0589)</small>		
26 05 33	13-0646	EA	1/2 Electrical Metallic Tubing (EMT) Raintight Compression Coupling	8.32	2.68
			<i>For Work In Restricted Working Space, Add</i>	2.01	
			<i>For Elevated Installation >10' To 15', Add</i>	0.67	
			<i>For Elevated Installation >15' To 20', Add</i>	1.34	
			<i>For Elevated Installation >20' To 25', Add</i>	1.68	
			<i>For Elevated Installation >25' To 30', Add</i>	2.35	
			<i>For Elevated Installation >30' To 35', Add</i>	2.68	
			<i>For Elevated Installation >35' To 40', Add</i>	3.36	
			<i>For Elevated Installation >40', Add</i>	3.69	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.01	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0647 EA 3/4" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	9.59	3.13
For Work In Restricted Working Space, Add	2.35	
For Elevated Installation >10' To 15', Add	0.78	
For Elevated Installation >15' To 20', Add	1.56	
For Elevated Installation >20' To 25', Add	1.96	
For Elevated Installation >25' To 30', Add	2.74	
For Elevated Installation >30' To 35', Add	3.13	
For Elevated Installation >35' To 40', Add	3.91	
For Elevated Installation >40', Add	4.30	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.35	
26 05 33 13-0648 EA 1" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	14.17	4.47
For Work In Restricted Working Space, Add	3.35	
For Elevated Installation >10' To 15', Add	1.12	
For Elevated Installation >15' To 20', Add	2.24	
For Elevated Installation >20' To 25', Add	2.80	
For Elevated Installation >25' To 30', Add	3.91	
For Elevated Installation >30' To 35', Add	4.47	
For Elevated Installation >35' To 40', Add	5.59	
For Elevated Installation >40', Add	6.15	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.35	
26 05 33 13-0649 EA 1-1/4" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	17.91	5.36
For Work In Restricted Working Space, Add	4.02	
For Elevated Installation >10' To 15', Add	1.34	
For Elevated Installation >15' To 20', Add	2.68	
For Elevated Installation >20' To 25', Add	3.35	
For Elevated Installation >25' To 30', Add	4.69	
For Elevated Installation >30' To 35', Add	5.36	
For Elevated Installation >35' To 40', Add	6.70	
For Elevated Installation >40', Add	7.37	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.02	
26 05 33 13-0650 EA 1-1/2" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	22.88	6.26
For Work In Restricted Working Space, Add	4.69	
For Elevated Installation >10' To 15', Add	1.56	
For Elevated Installation >15' To 20', Add	3.13	
For Elevated Installation >20' To 25', Add	3.91	
For Elevated Installation >25' To 30', Add	5.47	
For Elevated Installation >30' To 35', Add	6.26	
For Elevated Installation >35' To 40', Add	7.82	
For Elevated Installation >40', Add	8.60	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.69	
26 05 33 13-0651 EA 2" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	27.88	7.60
For Work In Restricted Working Space, Add	5.70	
For Elevated Installation >10' To 15', Add	1.90	
For Elevated Installation >15' To 20', Add	3.80	
For Elevated Installation >20' To 25', Add	4.75	
For Elevated Installation >25' To 30', Add	6.65	
For Elevated Installation >30' To 35', Add	7.60	
For Elevated Installation >35' To 40', Add	9.50	
For Elevated Installation >40', Add	10.44	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.70	
26 05 33 13-0652 EA 2-1/2" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	37.52	10.28
For Work In Restricted Working Space, Add	7.71	
For Elevated Installation >10' To 15', Add	2.57	
For Elevated Installation >15' To 20', Add	5.14	
For Elevated Installation >20' To 25', Add	6.42	
For Elevated Installation >25' To 30', Add	8.99	
For Elevated Installation >30' To 35', Add	10.28	
For Elevated Installation >35' To 40', Add	12.85	
For Elevated Installation >40', Add	14.13	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.71	
26 05 33 13-0653 EA 3" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	47.35	12.51
For Work In Restricted Working Space, Add	9.38	
For Elevated Installation >10' To 15', Add	3.13	
For Elevated Installation >15' To 20', Add	6.26	
For Elevated Installation >20' To 25', Add	7.82	
For Elevated Installation >25' To 30', Add	10.95	
For Elevated Installation >30' To 35', Add	12.51	
For Elevated Installation >35' To 40', Add	15.64	
For Elevated Installation >40', Add	17.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.38	
26 05 33 13-0654 EA 3-1/2" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	62.35	15.64
For Work In Restricted Working Space, Add	11.73	
For Elevated Installation >10' To 15', Add	3.91	
For Elevated Installation >15' To 20', Add	7.82	
For Elevated Installation >20' To 25', Add	9.78	
For Elevated Installation >25' To 30', Add	13.69	
For Elevated Installation >30' To 35', Add	15.64	
For Elevated Installation >35' To 40', Add	19.55	
For Elevated Installation >40', Add	21.51	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.73	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0655	EA 4" Electrical Metallic Tubing (EMT) Raintight Compression Coupling.....	76.27	20.11
	<i>For Work In Restricted Working Space, Add</i>	15.08	
	<i>For Elevated Installation >10' To 15', Add</i>	5.03	
	<i>For Elevated Installation >15' To 20', Add</i>	10.06	
	<i>For Elevated Installation >20' To 25', Add</i>	12.57	
	<i>For Elevated Installation >25' To 30', Add</i>	17.60	
	<i>For Elevated Installation >30' To 35', Add</i>	20.11	
	<i>For Elevated Installation >35' To 40', Add</i>	25.14	
	<i>For Elevated Installation >40', Add</i>	27.65	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.08	
26 05 33 13-0656	Electrical Metallic Tubing (EMT) Insulated Bushing <small>(26 05 33 13-0569)</small>		
26 05 33 13-0657	EA 1/2" Electrical Metallic Tubing (EMT) Insulated Bushing.....	7.58	3.02
	<i>For Work In Restricted Working Space, Add</i>	2.25	
	<i>For Elevated Installation >10' To 15', Add</i>	0.75	
	<i>For Elevated Installation >15' To 20', Add</i>	1.50	
	<i>For Elevated Installation >20' To 25', Add</i>	1.87	
	<i>For Elevated Installation >25' To 30', Add</i>	2.62	
	<i>For Elevated Installation >30' To 35', Add</i>	3.00	
	<i>For Elevated Installation >35' To 40', Add</i>	3.75	
	<i>For Elevated Installation >40', Add</i>	4.12	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.25	
26 05 33 13-0658	EA 3/4" Electrical Metallic Tubing (EMT) Insulated Bushing.....	8.29	3.24
	<i>For Work In Restricted Working Space, Add</i>	2.45	
	<i>For Elevated Installation >10' To 15', Add</i>	0.82	
	<i>For Elevated Installation >15' To 20', Add</i>	1.63	
	<i>For Elevated Installation >20' To 25', Add</i>	2.04	
	<i>For Elevated Installation >25' To 30', Add</i>	2.85	
	<i>For Elevated Installation >30' To 35', Add</i>	3.26	
	<i>For Elevated Installation >35' To 40', Add</i>	4.08	
	<i>For Elevated Installation >40', Add</i>	4.48	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.45	
26 05 33 13-0659	EA 1" Electrical Metallic Tubing (EMT) Insulated Bushing.....	10.39	4.02
	<i>For Work In Restricted Working Space, Add</i>	2.98	
	<i>For Elevated Installation >10' To 15', Add</i>	0.99	
	<i>For Elevated Installation >15' To 20', Add</i>	1.99	
	<i>For Elevated Installation >20' To 25', Add</i>	2.49	
	<i>For Elevated Installation >25' To 30', Add</i>	3.48	
	<i>For Elevated Installation >30' To 35', Add</i>	3.98	
	<i>For Elevated Installation >35' To 40', Add</i>	4.97	
	<i>For Elevated Installation >40', Add</i>	5.47	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.98	
26 05 33 13-0660	EA 1-1/4" Electrical Metallic Tubing (EMT) Insulated Bushing	13.28	5.14
	<i>For Work In Restricted Working Space, Add</i>	3.82	
	<i>For Elevated Installation >10' To 15', Add</i>	1.27	
	<i>For Elevated Installation >15' To 20', Add</i>	2.55	
	<i>For Elevated Installation >20' To 25', Add</i>	3.18	
	<i>For Elevated Installation >25' To 30', Add</i>	4.46	
	<i>For Elevated Installation >30' To 35', Add</i>	5.09	
	<i>For Elevated Installation >35' To 40', Add</i>	6.37	
	<i>For Elevated Installation >40', Add</i>	7.00	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.82	
26 05 33 13-0661	EA 1-1/2" Electrical Metallic Tubing (EMT) Insulated Bushing	15.73	5.92
	<i>For Work In Restricted Working Space, Add</i>	4.46	
	<i>For Elevated Installation >10' To 15', Add</i>	1.49	
	<i>For Elevated Installation >15' To 20', Add</i>	2.97	
	<i>For Elevated Installation >20' To 25', Add</i>	3.72	
	<i>For Elevated Installation >25' To 30', Add</i>	5.20	
	<i>For Elevated Installation >30' To 35', Add</i>	5.94	
	<i>For Elevated Installation >35' To 40', Add</i>	7.43	
	<i>For Elevated Installation >40', Add</i>	8.17	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.46	
26 05 33 13-0662	EA 2" Electrical Metallic Tubing (EMT) Insulated Bushing.....	19.32	7.15
	<i>For Work In Restricted Working Space, Add</i>	5.36	
	<i>For Elevated Installation >10' To 15', Add</i>	1.79	
	<i>For Elevated Installation >15' To 20', Add</i>	3.57	
	<i>For Elevated Installation >20' To 25', Add</i>	4.47	
	<i>For Elevated Installation >25' To 30', Add</i>	6.25	
	<i>For Elevated Installation >30' To 35', Add</i>	7.15	
	<i>For Elevated Installation >35' To 40', Add</i>	8.94	
	<i>For Elevated Installation >40', Add</i>	9.83	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.36	
26 05 33 13-0663	EA 2-1/2" Electrical Metallic Tubing (EMT) Insulated Bushing	27.94	9.94
	<i>For Work In Restricted Working Space, Add</i>	7.44	
	<i>For Elevated Installation >10' To 15', Add</i>	2.48	
	<i>For Elevated Installation >15' To 20', Add</i>	4.96	
	<i>For Elevated Installation >20' To 25', Add</i>	6.20	
	<i>For Elevated Installation >25' To 30', Add</i>	8.68	
	<i>For Elevated Installation >30' To 35', Add</i>	9.92	
	<i>For Elevated Installation >35' To 40', Add</i>	12.40	
	<i>For Elevated Installation >40', Add</i>	13.64	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.44	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0664 EA 3" Electrical Metallic Tubing (EMT) Insulated Bushing.....	37.06	13.18
For Work In Restricted Working Space, Add	9.92	
For Elevated Installation >10' To 15', Add	3.31	
For Elevated Installation >15' To 20', Add	6.61	
For Elevated Installation >20' To 25', Add	8.27	
For Elevated Installation >25' To 30', Add	11.57	
For Elevated Installation >30' To 35', Add	13.23	
For Elevated Installation >35' To 40', Add	16.54	
For Elevated Installation >40', Add	18.19	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.92	
26 05 33 13-0665 EA 3-1/2" Electrical Metallic Tubing (EMT) Insulated Bushing	47.49	16.98
For Work In Restricted Working Space, Add	12.77	
For Elevated Installation >10' To 15', Add	4.26	
For Elevated Installation >15' To 20', Add	8.51	
For Elevated Installation >20' To 25', Add	10.64	
For Elevated Installation >25' To 30', Add	14.90	
For Elevated Installation >30' To 35', Add	17.03	
For Elevated Installation >35' To 40', Add	21.29	
For Elevated Installation >40', Add	23.41	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.77	
26 05 33 13-0666 EA 4" Electrical Metallic Tubing (EMT) Insulated Bushing.....	61.34	22.35
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-0667 Electrical Metallic Tubing (EMT) Straight Box Connectors With Set Screw ⁽²⁶⁾		
<small>05 33 13-0589</small>		
26 05 33 13-0668 EA 1/2" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	5.79	2.24
For Work In Restricted Working Space, Add	1.67	
For Elevated Installation >10' To 15', Add	0.56	
For Elevated Installation >15' To 20', Add	1.12	
For Elevated Installation >20' To 25', Add	1.40	
For Elevated Installation >25' To 30', Add	1.95	
For Elevated Installation >30' To 35', Add	2.23	
For Elevated Installation >35' To 40', Add	2.79	
For Elevated Installation >40', Add	3.07	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	1.67	
26 05 33 13-0669 EA 3/4" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	7.05	2.68
For Work In Restricted Working Space, Add	2.01	
For Elevated Installation >10' To 15', Add	0.67	
For Elevated Installation >15' To 20', Add	1.34	
For Elevated Installation >20' To 25', Add	1.68	
For Elevated Installation >25' To 30', Add	2.35	
For Elevated Installation >30' To 35', Add	2.68	
For Elevated Installation >35' To 40', Add	3.36	
For Elevated Installation >40', Add	3.69	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.01	
26 05 33 13-0670 EA 1" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	8.42	3.13
For Work In Restricted Working Space, Add	2.35	
For Elevated Installation >10' To 15', Add	0.78	
For Elevated Installation >15' To 20', Add	1.56	
For Elevated Installation >20' To 25', Add	1.96	
For Elevated Installation >25' To 30', Add	2.74	
For Elevated Installation >30' To 35', Add	3.13	
For Elevated Installation >35' To 40', Add	3.91	
For Elevated Installation >40', Add	4.30	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.35	
26 05 33 13-0671 EA 1-1/4" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw	12.27	4.47
For Work In Restricted Working Space, Add	3.35	
For Elevated Installation >10' To 15', Add	1.12	
For Elevated Installation >15' To 20', Add	2.23	
For Elevated Installation >20' To 25', Add	2.79	
For Elevated Installation >25' To 30', Add	3.91	
For Elevated Installation >30' To 35', Add	4.47	
For Elevated Installation >35' To 40', Add	5.59	
For Elevated Installation >40', Add	6.14	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.35	
26 05 33 13-0672 EA 1-1/2" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw	15.00	5.36
For Work In Restricted Working Space, Add	4.02	
For Elevated Installation >10' To 15', Add	1.34	
For Elevated Installation >15' To 20', Add	2.68	
For Elevated Installation >20' To 25', Add	3.35	
For Elevated Installation >25' To 30', Add	4.69	
For Elevated Installation >30' To 35', Add	5.36	
For Elevated Installation >35' To 40', Add	6.70	
For Elevated Installation >40', Add	7.37	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.02	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0673	EA 2" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	19.13	6.71
	<i>For Work In Restricted Working Space, Add</i>	5.03	
	<i>For Elevated Installation >10' To 15', Add</i>	1.68	
	<i>For Elevated Installation >15' To 20', Add</i>	3.35	
	<i>For Elevated Installation >20' To 25', Add</i>	4.19	
	<i>For Elevated Installation >25' To 30', Add</i>	5.87	
	<i>For Elevated Installation >30' To 35', Add</i>	6.70	
	<i>For Elevated Installation >35' To 40', Add</i>	8.38	
	<i>For Elevated Installation >40', Add</i>	9.22	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0674	EA 2-1/2" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	28.95	8.93
	<i>For Work In Restricted Working Space, Add</i>	6.71	
	<i>For Elevated Installation >10' To 15', Add</i>	2.24	
	<i>For Elevated Installation >15' To 20', Add</i>	4.47	
	<i>For Elevated Installation >20' To 25', Add</i>	5.59	
	<i>For Elevated Installation >25' To 30', Add</i>	7.82	
	<i>For Elevated Installation >30' To 35', Add</i>	8.94	
	<i>For Elevated Installation >35' To 40', Add</i>	11.18	
	<i>For Elevated Installation >40', Add</i>	12.29	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.71	
26 05 33 13-0675	EA 3" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	36.00	11.17
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0676	EA 3-1/2" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	42.58	13.40
	<i>For Work In Restricted Working Space, Add</i>	10.05	
	<i>For Elevated Installation >10' To 15', Add</i>	3.35	
	<i>For Elevated Installation >15' To 20', Add</i>	6.70	
	<i>For Elevated Installation >20' To 25', Add</i>	8.38	
	<i>For Elevated Installation >25' To 30', Add</i>	11.73	
	<i>For Elevated Installation >30' To 35', Add</i>	13.40	
	<i>For Elevated Installation >35' To 40', Add</i>	16.76	
	<i>For Elevated Installation >40', Add</i>	18.43	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.05	
26 05 33 13-0677	EA 4" Electrical Metallic Tubing (EMT) Straight Box Connector With Set Screw.....	49.60	15.64
	<i>For Work In Restricted Working Space, Add</i>	11.73	
	<i>For Elevated Installation >10' To 15', Add</i>	3.91	
	<i>For Elevated Installation >15' To 20', Add</i>	7.82	
	<i>For Elevated Installation >20' To 25', Add</i>	9.78	
	<i>For Elevated Installation >25' To 30', Add</i>	13.69	
	<i>For Elevated Installation >30' To 35', Add</i>	15.64	
	<i>For Elevated Installation >35' To 40', Add</i>	19.55	
	<i>For Elevated Installation >40', Add</i>	21.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.73	
26 05 33 13-0678	Electrical Metallic Tubing (EMT) Insulated Straight Box Connectors With Set Screw <small>(26 05 33 13-0589)</small>		
26 05 33 13-0679	EA 1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	7.84	3.02
	<i>For Work In Restricted Working Space, Add</i>	2.25	
	<i>For Elevated Installation >10' To 15', Add</i>	0.75	
	<i>For Elevated Installation >15' To 20', Add</i>	1.50	
	<i>For Elevated Installation >20' To 25', Add</i>	1.87	
	<i>For Elevated Installation >25' To 30', Add</i>	2.62	
	<i>For Elevated Installation >30' To 35', Add</i>	3.00	
	<i>For Elevated Installation >35' To 40', Add</i>	3.75	
	<i>For Elevated Installation >40', Add</i>	4.12	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.25	
26 05 33 13-0680	EA 3/4" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	8.71	3.24
	<i>For Work In Restricted Working Space, Add</i>	2.45	
	<i>For Elevated Installation >10' To 15', Add</i>	0.82	
	<i>For Elevated Installation >15' To 20', Add</i>	1.63	
	<i>For Elevated Installation >20' To 25', Add</i>	2.04	
	<i>For Elevated Installation >25' To 30', Add</i>	2.85	
	<i>For Elevated Installation >30' To 35', Add</i>	3.26	
	<i>For Elevated Installation >35' To 40', Add</i>	4.08	
	<i>For Elevated Installation >40', Add</i>	4.48	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.45	
26 05 33 13-0681	EA 1" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	10.94	4.02
	<i>For Work In Restricted Working Space, Add</i>	2.98	
	<i>For Elevated Installation >10' To 15', Add</i>	0.99	
	<i>For Elevated Installation >15' To 20', Add</i>	1.99	
	<i>For Elevated Installation >20' To 25', Add</i>	2.49	
	<i>For Elevated Installation >25' To 30', Add</i>	3.48	
	<i>For Elevated Installation >30' To 35', Add</i>	3.98	
	<i>For Elevated Installation >35' To 40', Add</i>	4.97	
	<i>For Elevated Installation >40', Add</i>	5.47	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0682 EA 1-1/4" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	14.40	5.14
For Work In Restricted Working Space, Add	3.82	
For Elevated Installation >10' To 15', Add	1.27	
For Elevated Installation >15' To 20', Add	2.55	
For Elevated Installation >20' To 25', Add	3.18	
For Elevated Installation >25' To 30', Add	4.46	
For Elevated Installation >30' To 35', Add	5.09	
For Elevated Installation >35' To 40', Add	6.37	
For Elevated Installation >40', Add	7.00	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.82	
26 05 33 13-0683 EA 1-1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	17.08	5.92
For Work In Restricted Working Space, Add	4.46	
For Elevated Installation >10' To 15', Add	1.49	
For Elevated Installation >15' To 20', Add	2.97	
For Elevated Installation >20' To 25', Add	3.72	
For Elevated Installation >25' To 30', Add	5.20	
For Elevated Installation >30' To 35', Add	5.94	
For Elevated Installation >35' To 40', Add	7.43	
For Elevated Installation >40', Add	8.17	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.46	
26 05 33 13-0684 EA 2" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	20.92	7.15
For Work In Restricted Working Space, Add	5.36	
For Elevated Installation >10' To 15', Add	1.79	
For Elevated Installation >15' To 20', Add	3.57	
For Elevated Installation >20' To 25', Add	4.47	
For Elevated Installation >25' To 30', Add	6.25	
For Elevated Installation >30' To 35', Add	7.15	
For Elevated Installation >35' To 40', Add	8.94	
For Elevated Installation >40', Add	9.83	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.36	
26 05 33 13-0685 EA 2-1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	34.79	9.94
For Work In Restricted Working Space, Add	7.44	
For Elevated Installation >10' To 15', Add	2.48	
For Elevated Installation >15' To 20', Add	4.96	
For Elevated Installation >20' To 25', Add	6.20	
For Elevated Installation >25' To 30', Add	8.68	
For Elevated Installation >30' To 35', Add	9.92	
For Elevated Installation >35' To 40', Add	12.40	
For Elevated Installation >40', Add	13.64	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.44	
26 05 33 13-0686 EA 3" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	45.02	13.18
For Work In Restricted Working Space, Add	9.92	
For Elevated Installation >10' To 15', Add	3.31	
For Elevated Installation >15' To 20', Add	6.61	
For Elevated Installation >20' To 25', Add	8.27	
For Elevated Installation >25' To 30', Add	11.57	
For Elevated Installation >30' To 35', Add	13.23	
For Elevated Installation >35' To 40', Add	16.54	
For Elevated Installation >40', Add	18.19	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.92	
26 05 33 13-0687 EA 3-1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	57.51	16.98
For Work In Restricted Working Space, Add	12.77	
For Elevated Installation >10' To 15', Add	4.26	
For Elevated Installation >15' To 20', Add	8.51	
For Elevated Installation >20' To 25', Add	10.64	
For Elevated Installation >25' To 30', Add	14.90	
For Elevated Installation >30' To 35', Add	17.03	
For Elevated Installation >35' To 40', Add	21.29	
For Elevated Installation >40', Add	23.41	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.77	
26 05 33 13-0688 EA 4" Electrical Metallic Tubing (EMT) Insulated Straight Box Connector With Set Screw	72.30	22.35
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-0689 Electrical Metallic Tubing (EMT) Straight Box Compression Connectors <small>(26 05 33 13-0589)</small>		
26 05 33 13-0690 EA 1/2" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	7.05	2.68
For Work In Restricted Working Space, Add	2.01	
For Elevated Installation >10' To 15', Add	0.67	
For Elevated Installation >15' To 20', Add	1.34	
For Elevated Installation >20' To 25', Add	1.68	
For Elevated Installation >25' To 30', Add	2.35	
For Elevated Installation >30' To 35', Add	2.68	
For Elevated Installation >35' To 40', Add	3.36	
For Elevated Installation >40', Add	3.69	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.01	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0691	EA 3/4" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	8.34	3.13
	<i>For Work In Restricted Working Space, Add</i>	2.35	
	<i>For Elevated Installation >10' To 15', Add</i>	0.78	
	<i>For Elevated Installation >15' To 20', Add</i>	1.56	
	<i>For Elevated Installation >20' To 25', Add</i>	1.96	
	<i>For Elevated Installation >25' To 30', Add</i>	2.74	
	<i>For Elevated Installation >30' To 35', Add</i>	3.13	
	<i>For Elevated Installation >35' To 40', Add</i>	3.91	
	<i>For Elevated Installation >40', Add</i>	4.30	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.35	
26 05 33 13-0692	EA 1" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	11.91	4.47
	<i>For Work In Restricted Working Space, Add</i>	3.35	
	<i>For Elevated Installation >10' To 15', Add</i>	1.12	
	<i>For Elevated Installation >15' To 20', Add</i>	2.23	
	<i>For Elevated Installation >20' To 25', Add</i>	2.79	
	<i>For Elevated Installation >25' To 30', Add</i>	3.91	
	<i>For Elevated Installation >30' To 35', Add</i>	4.47	
	<i>For Elevated Installation >35' To 40', Add</i>	5.59	
	<i>For Elevated Installation >40', Add</i>	6.14	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.35	
26 05 33 13-0693	EA 1-1/4" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	14.79	5.36
	<i>For Work In Restricted Working Space, Add</i>	4.02	
	<i>For Elevated Installation >10' To 15', Add</i>	1.34	
	<i>For Elevated Installation >15' To 20', Add</i>	2.68	
	<i>For Elevated Installation >20' To 25', Add</i>	3.35	
	<i>For Elevated Installation >25' To 30', Add</i>	4.69	
	<i>For Elevated Installation >30' To 35', Add</i>	5.36	
	<i>For Elevated Installation >35' To 40', Add</i>	6.70	
	<i>For Elevated Installation >40', Add</i>	7.37	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.02	
26 05 33 13-0694	EA 1-1/2" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	17.60	6.26
	<i>For Work In Restricted Working Space, Add</i>	4.69	
	<i>For Elevated Installation >10' To 15', Add</i>	1.56	
	<i>For Elevated Installation >15' To 20', Add</i>	3.13	
	<i>For Elevated Installation >20' To 25', Add</i>	3.91	
	<i>For Elevated Installation >25' To 30', Add</i>	5.47	
	<i>For Elevated Installation >30' To 35', Add</i>	6.26	
	<i>For Elevated Installation >35' To 40', Add</i>	7.82	
	<i>For Elevated Installation >40', Add</i>	8.60	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.69	
26 05 33 13-0695	EA 2" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	22.95	8.04
	<i>For Work In Restricted Working Space, Add</i>	6.03	
	<i>For Elevated Installation >10' To 15', Add</i>	2.01	
	<i>For Elevated Installation >15' To 20', Add</i>	4.02	
	<i>For Elevated Installation >20' To 25', Add</i>	5.03	
	<i>For Elevated Installation >25' To 30', Add</i>	7.04	
	<i>For Elevated Installation >30' To 35', Add</i>	8.04	
	<i>For Elevated Installation >35' To 40', Add</i>	10.06	
	<i>For Elevated Installation >40', Add</i>	11.06	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.03	
26 05 33 13-0696	EA 2-1/2" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	35.35	10.73
	<i>For Work In Restricted Working Space, Add</i>	8.04	
	<i>For Elevated Installation >10' To 15', Add</i>	2.68	
	<i>For Elevated Installation >15' To 20', Add</i>	5.36	
	<i>For Elevated Installation >20' To 25', Add</i>	6.70	
	<i>For Elevated Installation >25' To 30', Add</i>	9.38	
	<i>For Elevated Installation >30' To 35', Add</i>	10.72	
	<i>For Elevated Installation >35' To 40', Add</i>	13.41	
	<i>For Elevated Installation >40', Add</i>	14.75	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.04	
26 05 33 13-0697	EA 3" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	44.69	13.40
	<i>For Work In Restricted Working Space, Add</i>	10.05	
	<i>For Elevated Installation >10' To 15', Add</i>	3.35	
	<i>For Elevated Installation >15' To 20', Add</i>	6.70	
	<i>For Elevated Installation >20' To 25', Add</i>	8.38	
	<i>For Elevated Installation >25' To 30', Add</i>	11.73	
	<i>For Elevated Installation >30' To 35', Add</i>	13.40	
	<i>For Elevated Installation >35' To 40', Add</i>	16.76	
	<i>For Elevated Installation >40', Add</i>	18.43	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.05	
26 05 33 13-0698	EA 3-1/2" Electrical Metallic Tubing (EMT) Straight Box Compression Connector	56.32	15.64
	<i>For Work In Restricted Working Space, Add</i>	11.73	
	<i>For Elevated Installation >10' To 15', Add</i>	3.91	
	<i>For Elevated Installation >15' To 20', Add</i>	7.82	
	<i>For Elevated Installation >20' To 25', Add</i>	9.78	
	<i>For Elevated Installation >25' To 30', Add</i>	13.69	
	<i>For Elevated Installation >30' To 35', Add</i>	15.64	
	<i>For Elevated Installation >35' To 40', Add</i>	19.55	
	<i>For Elevated Installation >40', Add</i>	21.51	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.73	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0699 EA 4" Electrical Metallic Tubing (EMT) Straight Box Compression Connector.....	63.36	17.87
<i>For Work In Restricted Working Space, Add</i>	13.40	
<i>For Elevated Installation >10' To 15', Add</i>	4.47	
<i>For Elevated Installation >15' To 20', Add</i>	8.94	
<i>For Elevated Installation >20' To 25', Add</i>	11.17	
<i>For Elevated Installation >25' To 30', Add</i>	15.64	
<i>For Elevated Installation >30' To 35', Add</i>	17.87	
<i>For Elevated Installation >35' To 40', Add</i>	22.34	
<i>For Elevated Installation >40', Add</i>	24.57	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.40	
26 05 33 13-0700 Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connectors		
(26 05 33 13-0589)		
26 05 33 13-0701 EA 1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	8.08	3.02
<i>For Work In Restricted Working Space, Add</i>	2.25	
<i>For Elevated Installation >10' To 15', Add</i>	0.75	
<i>For Elevated Installation >15' To 20', Add</i>	1.50	
<i>For Elevated Installation >20' To 25', Add</i>	1.87	
<i>For Elevated Installation >25' To 30', Add</i>	2.62	
<i>For Elevated Installation >30' To 35', Add</i>	3.00	
<i>For Elevated Installation >35' To 40', Add</i>	3.75	
<i>For Elevated Installation >40', Add</i>	4.12	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.25	
26 05 33 13-0702 EA 3/4" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	8.96	3.24
<i>For Work In Restricted Working Space, Add</i>	2.45	
<i>For Elevated Installation >10' To 15', Add</i>	0.82	
<i>For Elevated Installation >15' To 20', Add</i>	1.63	
<i>For Elevated Installation >20' To 25', Add</i>	2.04	
<i>For Elevated Installation >25' To 30', Add</i>	2.85	
<i>For Elevated Installation >30' To 35', Add</i>	3.26	
<i>For Elevated Installation >35' To 40', Add</i>	4.08	
<i>For Elevated Installation >40', Add</i>	4.48	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.45	
26 05 33 13-0703 EA 1" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	11.15	4.02
<i>For Work In Restricted Working Space, Add</i>	2.98	
<i>For Elevated Installation >10' To 15', Add</i>	0.99	
<i>For Elevated Installation >15' To 20', Add</i>	1.99	
<i>For Elevated Installation >20' To 25', Add</i>	2.49	
<i>For Elevated Installation >25' To 30', Add</i>	3.48	
<i>For Elevated Installation >30' To 35', Add</i>	3.98	
<i>For Elevated Installation >35' To 40', Add</i>	4.97	
<i>For Elevated Installation >40', Add</i>	5.47	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.98	
26 05 33 13-0704 EA 1-1/4" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	14.99	5.14
<i>For Work In Restricted Working Space, Add</i>	3.82	
<i>For Elevated Installation >10' To 15', Add</i>	1.27	
<i>For Elevated Installation >15' To 20', Add</i>	2.55	
<i>For Elevated Installation >20' To 25', Add</i>	3.18	
<i>For Elevated Installation >25' To 30', Add</i>	4.46	
<i>For Elevated Installation >30' To 35', Add</i>	5.09	
<i>For Elevated Installation >35' To 40', Add</i>	6.37	
<i>For Elevated Installation >40', Add</i>	7.00	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.82	
26 05 33 13-0705 EA 1-1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	18.06	5.92
<i>For Work In Restricted Working Space, Add</i>	4.46	
<i>For Elevated Installation >10' To 15', Add</i>	1.49	
<i>For Elevated Installation >15' To 20', Add</i>	2.97	
<i>For Elevated Installation >20' To 25', Add</i>	3.72	
<i>For Elevated Installation >25' To 30', Add</i>	5.20	
<i>For Elevated Installation >30' To 35', Add</i>	5.94	
<i>For Elevated Installation >35' To 40', Add</i>	7.43	
<i>For Elevated Installation >40', Add</i>	8.17	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.46	
26 05 33 13-0706 EA 2" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	22.34	7.15
<i>For Work In Restricted Working Space, Add</i>	5.36	
<i>For Elevated Installation >10' To 15', Add</i>	1.79	
<i>For Elevated Installation >15' To 20', Add</i>	3.57	
<i>For Elevated Installation >20' To 25', Add</i>	4.47	
<i>For Elevated Installation >25' To 30', Add</i>	6.25	
<i>For Elevated Installation >30' To 35', Add</i>	7.15	
<i>For Elevated Installation >35' To 40', Add</i>	8.94	
<i>For Elevated Installation >40', Add</i>	9.63	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.36	
26 05 33 13-0707 EA 2-1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	39.95	9.94
<i>For Work In Restricted Working Space, Add</i>	7.44	
<i>For Elevated Installation >10' To 15', Add</i>	2.48	
<i>For Elevated Installation >15' To 20', Add</i>	4.96	
<i>For Elevated Installation >20' To 25', Add</i>	6.20	
<i>For Elevated Installation >25' To 30', Add</i>	8.68	
<i>For Elevated Installation >30' To 35', Add</i>	9.92	
<i>For Elevated Installation >35' To 40', Add</i>	12.40	
<i>For Elevated Installation >40', Add</i>	13.64	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.44	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0708	EA 3" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector.....	53.68	13.18
	<i>For Work In Restricted Working Space, Add</i>	9.92	
	<i>For Elevated Installation >10' To 15', Add</i>	3.31	
	<i>For Elevated Installation >15' To 20', Add</i>	6.61	
	<i>For Elevated Installation >20' To 25', Add</i>	8.27	
	<i>For Elevated Installation >25' To 30', Add</i>	11.57	
	<i>For Elevated Installation >30' To 35', Add</i>	13.23	
	<i>For Elevated Installation >35' To 40', Add</i>	16.54	
	<i>For Elevated Installation >40', Add</i>	18.19	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.92	
26 05 33 13-0709	EA 3-1/2" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector	72.69	16.98
	<i>For Work In Restricted Working Space, Add</i>	12.77	
	<i>For Elevated Installation >10' To 15', Add</i>	4.26	
	<i>For Elevated Installation >15' To 20', Add</i>	8.51	
	<i>For Elevated Installation >20' To 25', Add</i>	10.64	
	<i>For Elevated Installation >25' To 30', Add</i>	14.90	
	<i>For Elevated Installation >30' To 35', Add</i>	17.03	
	<i>For Elevated Installation >35' To 40', Add</i>	21.29	
	<i>For Elevated Installation >40', Add</i>	23.41	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.77	
26 05 33 13-0710	EA 4" Electrical Metallic Tubing (EMT) Insulated Straight Box Compression Connector.....	91.09	22.35
	<i>For Work In Restricted Working Space, Add</i>	16.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.59	
	<i>For Elevated Installation >15' To 20', Add</i>	11.17	
	<i>For Elevated Installation >20' To 25', Add</i>	13.97	
	<i>For Elevated Installation >25' To 30', Add</i>	19.55	
	<i>For Elevated Installation >30' To 35', Add</i>	22.34	
	<i>For Elevated Installation >35' To 40', Add</i>	27.93	
	<i>For Elevated Installation >40', Add</i>	30.72	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.76	
26 05 33 13-0711 Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapters			
<small>(26 05 33 13-0589)</small>			
26 05 33 13-0712	EA 1/2" To 3/8" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter	11.36	4.02
	<i>For Work In Restricted Working Space, Add</i>	2.98	
	<i>For Elevated Installation >10' To 15', Add</i>	0.99	
	<i>For Elevated Installation >15' To 20', Add</i>	1.98	
	<i>For Elevated Installation >20' To 25', Add</i>	2.48	
	<i>For Elevated Installation >25' To 30', Add</i>	3.47	
	<i>For Elevated Installation >30' To 35', Add</i>	3.97	
	<i>For Elevated Installation >35' To 40', Add</i>	4.96	
	<i>For Elevated Installation >40', Add</i>	5.46	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.98	
26 05 33 13-0713	EA 1/2" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter.....	12.14	4.02
	<i>For Work In Restricted Working Space, Add</i>	2.98	
	<i>For Elevated Installation >10' To 15', Add</i>	0.99	
	<i>For Elevated Installation >15' To 20', Add</i>	1.98	
	<i>For Elevated Installation >20' To 25', Add</i>	2.48	
	<i>For Elevated Installation >25' To 30', Add</i>	3.47	
	<i>For Elevated Installation >30' To 35', Add</i>	3.97	
	<i>For Elevated Installation >35' To 40', Add</i>	4.96	
	<i>For Elevated Installation >40', Add</i>	5.46	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.98	
26 05 33 13-0714	EA 3/4" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter.....	13.58	4.36
	<i>For Work In Restricted Working Space, Add</i>	3.31	
	<i>For Elevated Installation >10' To 15', Add</i>	1.10	
	<i>For Elevated Installation >15' To 20', Add</i>	2.21	
	<i>For Elevated Installation >20' To 25', Add</i>	2.76	
	<i>For Elevated Installation >25' To 30', Add</i>	3.86	
	<i>For Elevated Installation >30' To 35', Add</i>	4.41	
	<i>For Elevated Installation >35' To 40', Add</i>	5.52	
	<i>For Elevated Installation >40', Add</i>	6.07	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.31	
26 05 33 13-0715	EA 1" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter.....	15.81	5.02
	<i>For Work In Restricted Working Space, Add</i>	3.76	
	<i>For Elevated Installation >10' To 15', Add</i>	1.25	
	<i>For Elevated Installation >15' To 20', Add</i>	2.51	
	<i>For Elevated Installation >20' To 25', Add</i>	3.14	
	<i>For Elevated Installation >25' To 30', Add</i>	4.39	
	<i>For Elevated Installation >30' To 35', Add</i>	5.02	
	<i>For Elevated Installation >35' To 40', Add</i>	6.27	
	<i>For Elevated Installation >40', Add</i>	6.90	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.76	
26 05 33 13-0716	EA 1-1/4" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter.....	22.59	6.04
	<i>For Work In Restricted Working Space, Add</i>	4.55	
	<i>For Elevated Installation >10' To 15', Add</i>	1.52	
	<i>For Elevated Installation >15' To 20', Add</i>	3.03	
	<i>For Elevated Installation >20' To 25', Add</i>	3.79	
	<i>For Elevated Installation >25' To 30', Add</i>	5.31	
	<i>For Elevated Installation >30' To 35', Add</i>	6.07	
	<i>For Elevated Installation >35' To 40', Add</i>	7.59	
	<i>For Elevated Installation >40', Add</i>	8.34	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.55	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0717 EA 1-1/2" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	27.65 5.20 1.73 3.47 4.33 6.07 6.93 8.67 9.53 5.20	6.93
26 05 33 13-0718 EA 2" Electrical Metallic Tubing (EMT) To Flexible Conduit Compression Adapter..... <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.06 6.50 2.17 4.33 5.42 7.58 8.67 10.84 11.92 6.50	8.71
26 05 33 13-0719 Electrical Metallic Tubing (EMT) Pulling Elbows <small>(26 05 33 13-0589)</small>		
26 05 33 13-0720 EA 1/2" Electrical Metallic Tubing (EMT) Pulling Elbow With Set Screws <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.85 6.03 4.02 6.03	10.06
26 05 33 13-0721 EA 3/4" Electrical Metallic Tubing (EMT) Pulling Elbow With Set Screws <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	27.81 7.04 4.69 7.04	11.73
26 05 33 13-0722 EA 1" Electrical Metallic Tubing (EMT) Pulling Elbow With Set Screws <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	34.57 8.04 5.36 8.04	13.40
26 05 33 13-0723 EA 1-1/4" Electrical Metallic Tubing (EMT) Pulling Elbow With Set Screws <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.19 10.05 6.70 10.05	16.76
26 05 33 13-0724 Intermediate Metal Conduit (IMC) <small>(26 05 33 13-0059)</small> Note: Exposed installation, branch and feeder conduit. Excludes supporting strap, hanger and fastening.		
26 05 33 13-0725 Intermediate Metal Conduit (IMC) Conduit <small>(26 05 33 13-0724)</small> Note: Includes field bending conduit up to and including 1". See CSI section 26 05 33 13-1358 for field bending >1".		
26 05 33 13-0726 LF 1/2" Intermediate Metal Conduit (IMC) Conduit <i>For >500 To 1,000, Deduct</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For >1,000, Deduct</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For >250 To 500, Deduct</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Metal Stud Wall, Add</i>	8.33 -0.19 0.87 -0.25 0.58 1.16 1.45 2.03 2.32 2.90 3.19 1.74 -0.13 1.45 0.58	2.24
26 05 33 13-0727 LF 3/4" Intermediate Metal Conduit (IMC) Conduit <i>For >500 To 1,000, Deduct</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For >1,000, Deduct</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For >250 To 500, Deduct</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Metal Stud Wall, Add</i>	9.95 -0.23 1.04 -0.30 0.69 1.39 1.73 2.43 2.77 3.47 3.81 2.08 -0.15 1.73 0.69	2.46

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0728	LF 1" Intermediate Metal Conduit (IMC) Conduit	13.38	2.68
	For >500 To 1,000, Deduct	-0.35	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.31	
	For >1,000, Deduct	-0.47	
	For Elevated Installation >10' To 15', Add	0.87	
	For Elevated Installation >15' To 20', Add	1.74	
	For Elevated Installation >20' To 25', Add	2.18	
	For Elevated Installation >25' To 30', Add	3.05	
	For Elevated Installation >30' To 35', Add	3.48	
	For Elevated Installation >35' To 40', Add	4.36	
	For Elevated Installation >40', Add	4.79	
	For Work In Restricted Working Space, Add	2.61	
	For >250 To 500, Deduct	-0.23	
	For Installation In Wood Stud Wall (Includes Drilling), Add	2.18	
	For Installation In Metal Stud Wall, Add	0.87	
26 05 33 13-0729	LF 1-1/4" Intermediate Metal Conduit (IMC) Conduit	15.51	5.36
	For >500 To 1,000, Deduct	-0.44	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.44	
	For >1,000, Deduct	-0.59	
	For Elevated Installation >10' To 15', Add	0.96	
	For Elevated Installation >15' To 20', Add	1.92	
	For Elevated Installation >20' To 25', Add	2.40	
	For Elevated Installation >25' To 30', Add	3.36	
	For Elevated Installation >30' To 35', Add	3.84	
	For Elevated Installation >35' To 40', Add	4.80	
	For Elevated Installation >40', Add	5.28	
	For Work In Restricted Working Space, Add	2.88	
	For >250 To 500, Deduct	-0.30	
	For Installation In Wood Stud Wall (Includes Drilling), Add	2.40	
	For Installation In Metal Stud Wall, Add	0.96	
26 05 33 13-0730	LF 1-1/2" Intermediate Metal Conduit (IMC) Conduit	17.48	3.58
	For >500 To 1,000, Deduct	-0.52	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.58	
	For >1,000, Deduct	-0.70	
	For Elevated Installation >10' To 15', Add	1.05	
	For Elevated Installation >15' To 20', Add	2.10	
	For Elevated Installation >20' To 25', Add	2.63	
	For Elevated Installation >25' To 30', Add	3.68	
	For Elevated Installation >30' To 35', Add	4.20	
	For Elevated Installation >35' To 40', Add	5.25	
	For Elevated Installation >40', Add	5.78	
	For Work In Restricted Working Space, Add	3.15	
	For >250 To 500, Deduct	-0.35	
	For Installation In Wood Stud Wall (Includes Drilling), Add	2.63	
	For Installation In Metal Stud Wall, Add	1.05	
26 05 33 13-0731	LF 2" Intermediate Metal Conduit (IMC) Conduit	22.20	4.02
	For >500 To 1,000, Deduct	-0.71	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	1.91	
	For >1,000, Deduct	-0.95	
	For Elevated Installation >10' To 15', Add	1.27	
	For Elevated Installation >15' To 20', Add	2.55	
	For Elevated Installation >20' To 25', Add	3.18	
	For Elevated Installation >25' To 30', Add	4.46	
	For Elevated Installation >30' To 35', Add	5.09	
	For Elevated Installation >35' To 40', Add	6.37	
	For Elevated Installation >40', Add	7.00	
	For Work In Restricted Working Space, Add	3.82	
	For >250 To 500, Deduct	-0.47	
	For Installation In Wood Stud Wall (Includes Drilling), Add	3.18	
	For Installation In Metal Stud Wall, Add	1.27	
26 05 33 13-0732	LF 2-1/2" Intermediate Metal Conduit (IMC) Conduit	37.86	5.36
	For >500 To 1,000, Deduct	-1.57	
	For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	2.53	
	For >1,000, Deduct	-2.10	
	For Elevated Installation >10' To 15', Add	1.69	
	For Elevated Installation >15' To 20', Add	3.37	
	For Elevated Installation >20' To 25', Add	4.22	
	For Elevated Installation >25' To 30', Add	5.90	
	For Elevated Installation >30' To 35', Add	6.75	
	For Elevated Installation >35' To 40', Add	8.44	
	For Elevated Installation >40', Add	9.28	
	For Work In Restricted Working Space, Add	5.06	
	For >250 To 500, Deduct	-1.05	
	For Installation In Wood Stud Wall (Includes Drilling), Add	4.22	
	For Installation In Metal Stud Wall, Add	1.69	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0733 LF 3" Intermediate Metal Conduit (IMC) Conduit	48.19	6.71
For >500 To 1,000, Deduct	-1.94	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	3.35	
For >1,000, Deduct	-2.58	
For Elevated Installation >10' To 15', Add	2.24	
For Elevated Installation >15' To 20', Add	4.47	
For Elevated Installation >20' To 25', Add	5.59	
For Elevated Installation >25' To 30', Add	7.82	
For Elevated Installation >30' To 35', Add	8.94	
For Elevated Installation >35' To 40', Add	11.18	
For Elevated Installation >40', Add	12.29	
For Work In Restricted Working Space, Add	6.71	
For >250 To 500, Deduct	-1.29	
For Installation In Wood Stud Wall (Includes Drilling), Add	5.59	
For Installation In Metal Stud Wall, Add	2.24	
26 05 33 13-0734 LF 3-1/2" Intermediate Metal Conduit (IMC) Conduit	55.51	8.04
For >500 To 1,000, Deduct	-2.24	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	3.84	
For >1,000, Deduct	-2.99	
For Elevated Installation >10' To 15', Add	2.56	
For Elevated Installation >15' To 20', Add	5.12	
For Elevated Installation >20' To 25', Add	6.40	
For Elevated Installation >25' To 30', Add	8.95	
For Elevated Installation >30' To 35', Add	10.23	
For Elevated Installation >35' To 40', Add	12.79	
For Elevated Installation >40', Add	14.07	
For Work In Restricted Working Space, Add	7.67	
For >250 To 500, Deduct	-1.50	
For Installation In Wood Stud Wall (Includes Drilling), Add	6.40	
For Installation In Metal Stud Wall, Add	2.56	
26 05 33 13-0735 LF 4" Intermediate Metal Conduit (IMC) Conduit	65.05	9.38
For >500 To 1,000, Deduct	-2.64	
For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add	4.47	
For >1,000, Deduct	-3.52	
For Elevated Installation >10' To 15', Add	2.98	
For Elevated Installation >15' To 20', Add	5.97	
For Elevated Installation >20' To 25', Add	7.46	
For Elevated Installation >25' To 30', Add	10.44	
For Elevated Installation >30' To 35', Add	11.93	
For Elevated Installation >35' To 40', Add	14.92	
For Elevated Installation >40', Add	16.41	
For Work In Restricted Working Space, Add	8.95	
For >250 To 500, Deduct	-1.76	
For Installation In Wood Stud Wall (Includes Drilling), Add	7.46	
For Installation In Metal Stud Wall, Add	2.98	
26 05 33 13-0736 Intermediate Metal Conduit (IMC) 90 Degree Elbows <small>(26 05 33 13-0724)</small>		
See CSI section 26 05 33 13-1358 for conduit field bending.		
26 05 33 13-0737 EA 1/2" Intermediate Metal Conduit (IMC) 90 Degree Elbow	39.80	11.06
For Elevated Installation >10' To 15', Add	2.77	
For Elevated Installation >15' To 20', Add	5.55	
For Elevated Installation >20' To 25', Add	6.94	
For Elevated Installation >25' To 30', Add	9.71	
For Elevated Installation >30' To 35', Add	11.10	
For Elevated Installation >35' To 40', Add	13.87	
For Elevated Installation >40', Add	15.26	
For Work In Restricted Working Space, Add	8.32	
26 05 33 13-0738 EA 3/4" Intermediate Metal Conduit (IMC) 90 Degree Elbow	48.02	13.74
For Elevated Installation >10' To 15', Add	3.45	
For Elevated Installation >15' To 20', Add	6.90	
For Elevated Installation >20' To 25', Add	8.62	
For Elevated Installation >25' To 30', Add	12.07	
For Elevated Installation >30' To 35', Add	13.80	
For Elevated Installation >35' To 40', Add	17.25	
For Elevated Installation >40', Add	18.97	
For Work In Restricted Working Space, Add	10.35	
26 05 33 13-0739 EA 1" Intermediate Metal Conduit (IMC) 90 Degree Elbow	61.30	16.87
For Elevated Installation >10' To 15', Add	4.21	
For Elevated Installation >15' To 20', Add	8.41	
For Elevated Installation >20' To 25', Add	10.52	
For Elevated Installation >25' To 30', Add	14.72	
For Elevated Installation >30' To 35', Add	16.82	
For Elevated Installation >35' To 40', Add	21.03	
For Elevated Installation >40', Add	23.13	
For Work In Restricted Working Space, Add	12.62	
26 05 33 13-0740 EA 1-1/4" Intermediate Metal Conduit (IMC) 90 Degree Elbow	75.80	19.55
For Elevated Installation >10' To 15', Add	4.88	
For Elevated Installation >15' To 20', Add	9.77	
For Elevated Installation >20' To 25', Add	12.21	
For Elevated Installation >25' To 30', Add	17.09	
For Elevated Installation >30' To 35', Add	19.53	
For Elevated Installation >35' To 40', Add	24.42	
For Elevated Installation >40', Add	26.86	
For Work In Restricted Working Space, Add	14.65	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0741	EA 1-1/2" Intermediate Metal Conduit (IMC) 90 Degree Elbow	90.16	22.46
	<i>For Elevated Installation >10' To 15', Add</i>	5.61	
	<i>For Elevated Installation >15' To 20', Add</i>	11.21	
	<i>For Elevated Installation >20' To 25', Add</i>	14.01	
	<i>For Elevated Installation >25' To 30', Add</i>	19.62	
	<i>For Elevated Installation >30' To 35', Add</i>	22.42	
	<i>For Elevated Installation >35' To 40', Add</i>	28.03	
	<i>For Elevated Installation >40', Add</i>	30.83	
	<i>For Work In Restricted Working Space, Add</i>	16.82	
26 05 33 13-0742	EA 2" Intermediate Metal Conduit (IMC) 90 Degree Elbow	110.76	24.69
	<i>For Elevated Installation >10' To 15', Add</i>	6.17	
	<i>For Elevated Installation >15' To 20', Add</i>	12.33	
	<i>For Elevated Installation >20' To 25', Add</i>	15.42	
	<i>For Elevated Installation >25' To 30', Add</i>	21.58	
	<i>For Elevated Installation >30' To 35', Add</i>	24.66	
	<i>For Elevated Installation >35' To 40', Add</i>	30.83	
	<i>For Elevated Installation >40', Add</i>	33.91	
	<i>For Work In Restricted Working Space, Add</i>	18.50	
26 05 33 13-0743	EA 2-1/2" Intermediate Metal Conduit (IMC) 90 Degree Elbow	160.45	30.84
	<i>For Elevated Installation >10' To 15', Add</i>	7.71	
	<i>For Elevated Installation >15' To 20', Add</i>	15.42	
	<i>For Elevated Installation >20' To 25', Add</i>	19.27	
	<i>For Elevated Installation >25' To 30', Add</i>	26.98	
	<i>For Elevated Installation >30' To 35', Add</i>	30.83	
	<i>For Elevated Installation >35' To 40', Add</i>	38.54	
	<i>For Elevated Installation >40', Add</i>	42.39	
	<i>For Work In Restricted Working Space, Add</i>	23.12	
26 05 33 13-0744	EA 3" Intermediate Metal Conduit (IMC) 90 Degree Elbow	232.63	42.01
	<i>For Elevated Installation >10' To 15', Add</i>	10.50	
	<i>For Elevated Installation >15' To 20', Add</i>	21.00	
	<i>For Elevated Installation >20' To 25', Add</i>	26.25	
	<i>For Elevated Installation >25' To 30', Add</i>	36.75	
	<i>For Elevated Installation >30' To 35', Add</i>	42.00	
	<i>For Elevated Installation >35' To 40', Add</i>	52.50	
	<i>For Elevated Installation >40', Add</i>	57.75	
	<i>For Work In Restricted Working Space, Add</i>	31.50	
26 05 33 13-0745	EA 3-1/2" Intermediate Metal Conduit (IMC) 90 Degree Elbow	343.76	47.37
	<i>For Elevated Installation >10' To 15', Add</i>	11.84	
	<i>For Elevated Installation >15' To 20', Add</i>	23.69	
	<i>For Elevated Installation >20' To 25', Add</i>	29.61	
	<i>For Elevated Installation >25' To 30', Add</i>	41.45	
	<i>For Elevated Installation >30' To 35', Add</i>	47.38	
	<i>For Elevated Installation >35' To 40', Add</i>	59.22	
	<i>For Elevated Installation >40', Add</i>	65.14	
	<i>For Work In Restricted Working Space, Add</i>	35.53	
26 05 33 13-0746	EA 4" Intermediate Metal Conduit (IMC) 90 Degree Elbow	415.51	61.67
	<i>For Elevated Installation >10' To 15', Add</i>	15.41	
	<i>For Elevated Installation >15' To 20', Add</i>	30.83	
	<i>For Elevated Installation >20' To 25', Add</i>	38.54	
	<i>For Elevated Installation >25' To 30', Add</i>	53.95	
	<i>For Elevated Installation >30' To 35', Add</i>	61.66	
	<i>For Elevated Installation >35' To 40', Add</i>	77.07	
	<i>For Elevated Installation >40', Add</i>	84.78	
	<i>For Work In Restricted Working Space, Add</i>	46.24	
26 05 33 13-0747	Intermediate Metal Conduit (IMC) Bushing Sets With Locknut <small>(26 05 33 13-0724)</small>		
26 05 33 13-0748	EA 1/2" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	15.36	5.80
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-0749	EA 3/4" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	18.18	0.67
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-0750	EA 1" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	23.60	8.49
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-0751	EA 1-1/4" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	28.86	10.28
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.71	
26 05 33 13-0752	EA 1-1/2" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	32.45	11.17
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0753	EA 2" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	42.09	13.85
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.39	
26 05 33 13-0754	EA 2-1/2" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	79.10	22.35
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.76	
26 05 33 13-0755	EA 3" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	96.63	30.39
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.79	
26 05 33 13-0756	EA 3-1/2" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	127.86	36.19
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	27.15	
26 05 33 13-0757	EA 4" Intermediate Metal Conduit (IMC) Bushing Set With Locknut.....	151.22	42.01
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.50	
26 05 33 13-0758	Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fittings <small>(26 05 33 13-0724)</small>		
	Note: 3-Piece coupling.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0759 EA 1/2" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	51.20	17.87
For Elevated Installation >10' To 15', Add	4.47	
For Elevated Installation >15' To 20', Add	8.95	
For Elevated Installation >20' To 25', Add	11.19	
For Elevated Installation >25' To 30', Add	15.66	
For Elevated Installation >30' To 35', Add	17.90	
For Elevated Installation >35' To 40', Add	22.37	
For Elevated Installation >40', Add	24.61	
For Work In Restricted Working Space, Add	13.42	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	13.42	
26 05 33 13-0760 EA 3/4" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	58.26	20.00
For Elevated Installation >10' To 15', Add	4.99	
For Elevated Installation >15' To 20', Add	9.99	
For Elevated Installation >20' To 25', Add	12.48	
For Elevated Installation >25' To 30', Add	17.48	
For Elevated Installation >30' To 35', Add	19.97	
For Elevated Installation >35' To 40', Add	24.97	
For Elevated Installation >40', Add	27.46	
For Work In Restricted Working Space, Add	14.98	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.98	
26 05 33 13-0761 EA 1" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	71.68	22.24
For Elevated Installation >10' To 15', Add	5.56	
For Elevated Installation >15' To 20', Add	11.12	
For Elevated Installation >20' To 25', Add	13.91	
For Elevated Installation >25' To 30', Add	19.47	
For Elevated Installation >30' To 35', Add	22.25	
For Elevated Installation >35' To 40', Add	27.81	
For Elevated Installation >40', Add	30.59	
For Work In Restricted Working Space, Add	16.69	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.69	
26 05 33 13-0762 EA 1-1/4" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting	90.41	24.35
For Elevated Installation >10' To 15', Add	6.09	
For Elevated Installation >15' To 20', Add	12.17	
For Elevated Installation >20' To 25', Add	15.22	
For Elevated Installation >25' To 30', Add	21.30	
For Elevated Installation >30' To 35', Add	24.34	
For Elevated Installation >35' To 40', Add	30.43	
For Elevated Installation >40', Add	33.47	
For Work In Restricted Working Space, Add	18.26	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.26	
26 05 33 13-0763 EA 1-1/2" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting	103.67	26.59
For Elevated Installation >10' To 15', Add	6.66	
For Elevated Installation >15' To 20', Add	13.32	
For Elevated Installation >20' To 25', Add	16.65	
For Elevated Installation >25' To 30', Add	23.31	
For Elevated Installation >30' To 35', Add	26.64	
For Elevated Installation >35' To 40', Add	33.30	
For Elevated Installation >40', Add	36.62	
For Work In Restricted Working Space, Add	19.98	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	19.98	
26 05 33 13-0764 EA 2" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	146.28	28.82
For Elevated Installation >10' To 15', Add	7.21	
For Elevated Installation >15' To 20', Add	14.42	
For Elevated Installation >20' To 25', Add	18.03	
For Elevated Installation >25' To 30', Add	25.24	
For Elevated Installation >30' To 35', Add	28.84	
For Elevated Installation >35' To 40', Add	36.06	
For Elevated Installation >40', Add	39.66	
For Work In Restricted Working Space, Add	21.63	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.63	
26 05 33 13-0765 EA 2-1/2" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting	248.02	35.75
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Work In Restricted Working Space, Add	26.81	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-0766 EA 3" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	353.66	44.68
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
For Work In Restricted Working Space, Add	33.52	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	33.52	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0767	EA	3-1/2" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	522.79	53.63
			<i>For Elevated Installation >10' To 15', Add</i>	13.41	
			<i>For Elevated Installation >15' To 20', Add</i>	26.82	
			<i>For Elevated Installation >20' To 25', Add</i>	33.53	
			<i>For Elevated Installation >25' To 30', Add</i>	46.94	
			<i>For Elevated Installation >30' To 35', Add</i>	53.64	
			<i>For Elevated Installation >35' To 40', Add</i>	67.06	
			<i>For Elevated Installation >40', Add</i>	73.76	
			<i>For Work In Restricted Working Space, Add</i>	40.23	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.23	
26 05 33	13-0768	EA	4" Intermediate Metal Conduit (IMC) Erickson Or "Kwik-Couple" Fitting.....	605.29	58.10
			<i>For Elevated Installation >10' To 15', Add</i>	14.52	
			<i>For Elevated Installation >15' To 20', Add</i>	29.04	
			<i>For Elevated Installation >20' To 25', Add</i>	36.31	
			<i>For Elevated Installation >25' To 30', Add</i>	50.83	
			<i>For Elevated Installation >30' To 35', Add</i>	58.09	
			<i>For Elevated Installation >35' To 40', Add</i>	72.61	
			<i>For Elevated Installation >40', Add</i>	79.87	
			<i>For Work In Restricted Working Space, Add</i>	43.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	43.57	
26 05 33 13-0769 Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connectors <small>(26 05 33 13-0724)</small>					
26 05 33	13-0770	EA	1/2" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector.....	29.39	8.93
			<i>For Elevated Installation >10' To 15', Add</i>	2.24	
			<i>For Elevated Installation >15' To 20', Add</i>	4.47	
			<i>For Elevated Installation >20' To 25', Add</i>	5.59	
			<i>For Elevated Installation >25' To 30', Add</i>	7.82	
			<i>For Elevated Installation >30' To 35', Add</i>	8.94	
			<i>For Elevated Installation >35' To 40', Add</i>	11.18	
			<i>For Elevated Installation >40', Add</i>	12.29	
			<i>For Work In Restricted Working Space, Add</i>	6.71	
26 05 33	13-0771	EA	3/4" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector.....	32.91	9.83
			<i>For Elevated Installation >10' To 15', Add</i>	2.46	
			<i>For Elevated Installation >15' To 20', Add</i>	4.92	
			<i>For Elevated Installation >20' To 25', Add</i>	6.15	
			<i>For Elevated Installation >25' To 30', Add</i>	8.60	
			<i>For Elevated Installation >30' To 35', Add</i>	9.83	
			<i>For Elevated Installation >35' To 40', Add</i>	12.29	
			<i>For Elevated Installation >40', Add</i>	13.52	
			<i>For Work In Restricted Working Space, Add</i>	7.37	
26 05 33	13-0772	EA	1" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector.....	37.85	11.17
			<i>For Elevated Installation >10' To 15', Add</i>	2.79	
			<i>For Elevated Installation >15' To 20', Add</i>	5.59	
			<i>For Elevated Installation >20' To 25', Add</i>	6.98	
			<i>For Elevated Installation >25' To 30', Add</i>	9.78	
			<i>For Elevated Installation >30' To 35', Add</i>	11.17	
			<i>For Elevated Installation >35' To 40', Add</i>	13.97	
			<i>For Elevated Installation >40', Add</i>	15.36	
			<i>For Work In Restricted Working Space, Add</i>	8.38	
26 05 33	13-0773	EA	1-1/4" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector.....	43.25	12.07
			<i>For Elevated Installation >10' To 15', Add</i>	3.02	
			<i>For Elevated Installation >15' To 20', Add</i>	6.03	
			<i>For Elevated Installation >20' To 25', Add</i>	7.54	
			<i>For Elevated Installation >25' To 30', Add</i>	10.56	
			<i>For Elevated Installation >30' To 35', Add</i>	12.06	
			<i>For Elevated Installation >35' To 40', Add</i>	15.08	
			<i>For Elevated Installation >40', Add</i>	16.59	
			<i>For Work In Restricted Working Space, Add</i>	9.05	
26 05 33	13-0774	EA	1-1/2" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector.....	51.75	13.40
			<i>For Elevated Installation >10' To 15', Add</i>	3.35	
			<i>For Elevated Installation >15' To 20', Add</i>	6.70	
			<i>For Elevated Installation >20' To 25', Add</i>	8.38	
			<i>For Elevated Installation >25' To 30', Add</i>	11.73	
			<i>For Elevated Installation >30' To 35', Add</i>	13.40	
			<i>For Elevated Installation >35' To 40', Add</i>	16.76	
			<i>For Elevated Installation >40', Add</i>	18.43	
			<i>For Work In Restricted Working Space, Add</i>	10.05	
26 05 33	13-0775	EA	2" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector.....	63.84	14.75
			<i>For Elevated Installation >10' To 15', Add</i>	3.69	
			<i>For Elevated Installation >15' To 20', Add</i>	7.37	
			<i>For Elevated Installation >20' To 25', Add</i>	9.22	
			<i>For Elevated Installation >25' To 30', Add</i>	12.90	
			<i>For Elevated Installation >30' To 35', Add</i>	14.75	
			<i>For Elevated Installation >35' To 40', Add</i>	18.44	
			<i>For Elevated Installation >40', Add</i>	20.28	
			<i>For Work In Restricted Working Space, Add</i>	11.06	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0776 EA 2-1/2" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector	87.91	17.87
<i>For Elevated Installation >10' To 15', Add</i>	4.47	
<i>For Elevated Installation >15' To 20', Add</i>	8.94	
<i>For Elevated Installation >20' To 25', Add</i>	11.17	
<i>For Elevated Installation >25' To 30', Add</i>	15.64	
<i>For Elevated Installation >30' To 35', Add</i>	17.87	
<i>For Elevated Installation >35' To 40', Add</i>	22.34	
<i>For Elevated Installation >40', Add</i>	24.57	
<i>For Work In Restricted Working Space, Add</i>	13.40	
26 05 33 13-0777 EA 3" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector	108.61	22.35
<i>For Elevated Installation >10' To 15', Add</i>	5.59	
<i>For Elevated Installation >15' To 20', Add</i>	11.17	
<i>For Elevated Installation >20' To 25', Add</i>	13.97	
<i>For Elevated Installation >25' To 30', Add</i>	19.55	
<i>For Elevated Installation >30' To 35', Add</i>	22.34	
<i>For Elevated Installation >35' To 40', Add</i>	27.93	
<i>For Elevated Installation >40', Add</i>	30.72	
<i>For Work In Restricted Working Space, Add</i>	16.76	
26 05 33 13-0778 EA 3-1/2" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector	130.49	26.81
<i>For Elevated Installation >10' To 15', Add</i>	6.70	
<i>For Elevated Installation >15' To 20', Add</i>	13.41	
<i>For Elevated Installation >20' To 25', Add</i>	16.76	
<i>For Elevated Installation >25' To 30', Add</i>	23.46	
<i>For Elevated Installation >30' To 35', Add</i>	26.81	
<i>For Elevated Installation >35' To 40', Add</i>	33.52	
<i>For Elevated Installation >40', Add</i>	36.87	
<i>For Work In Restricted Working Space, Add</i>	20.11	
26 05 33 13-0779 EA 4" Rigid Galvanized Steel (RGS) Or Intermediate Metal Conduit (IMC) To Electrical Metallic Tubing (EMT) Connector	147.97	29.04
<i>For Elevated Installation >10' To 15', Add</i>	7.26	
<i>For Elevated Installation >15' To 20', Add</i>	14.52	
<i>For Elevated Installation >20' To 25', Add</i>	18.15	
<i>For Elevated Installation >25' To 30', Add</i>	25.41	
<i>For Elevated Installation >30' To 35', Add</i>	29.04	
<i>For Elevated Installation >35' To 40', Add</i>	36.31	
<i>For Elevated Installation >40', Add</i>	39.94	
<i>For Work In Restricted Working Space, Add</i>	21.78	
26 05 33 13-0780 Intermediate Metal Conduit (IMC) Rain Tight Threaded Hubs <small>(26 05 33 13-0724)</small>		
26 05 33 13-0781 EA 1/2" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	25.29	8.93
<i>For Elevated Installation >10' To 15', Add</i>	2.24	
<i>For Elevated Installation >15' To 20', Add</i>	4.47	
<i>For Elevated Installation >20' To 25', Add</i>	5.59	
<i>For Elevated Installation >25' To 30', Add</i>	7.82	
<i>For Elevated Installation >30' To 35', Add</i>	8.94	
<i>For Elevated Installation >35' To 40', Add</i>	11.18	
<i>For Elevated Installation >40', Add</i>	12.29	
<i>For Work In Restricted Working Space, Add</i>	6.71	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.71	
26 05 33 13-0782 EA 3/4" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	32.33	11.17
<i>For Elevated Installation >10' To 15', Add</i>	2.79	
<i>For Elevated Installation >15' To 20', Add</i>	5.59	
<i>For Elevated Installation >20' To 25', Add</i>	6.98	
<i>For Elevated Installation >25' To 30', Add</i>	9.78	
<i>For Elevated Installation >30' To 35', Add</i>	11.17	
<i>For Elevated Installation >35' To 40', Add</i>	13.97	
<i>For Elevated Installation >40', Add</i>	15.36	
<i>For Work In Restricted Working Space, Add</i>	8.38	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-0783 EA 1" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	40.01	13.40
<i>For Elevated Installation >10' To 15', Add</i>	3.35	
<i>For Elevated Installation >15' To 20', Add</i>	6.70	
<i>For Elevated Installation >20' To 25', Add</i>	8.38	
<i>For Elevated Installation >25' To 30', Add</i>	11.73	
<i>For Elevated Installation >30' To 35', Add</i>	13.40	
<i>For Elevated Installation >35' To 40', Add</i>	16.76	
<i>For Elevated Installation >40', Add</i>	18.43	
<i>For Work In Restricted Working Space, Add</i>	10.05	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.05	
26 05 33 13-0784 EA 1-1/4" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	48.31	15.64
<i>For Elevated Installation >10' To 15', Add</i>	3.91	
<i>For Elevated Installation >15' To 20', Add</i>	7.82	
<i>For Elevated Installation >20' To 25', Add</i>	9.78	
<i>For Elevated Installation >25' To 30', Add</i>	13.69	
<i>For Elevated Installation >30' To 35', Add</i>	15.64	
<i>For Elevated Installation >35' To 40', Add</i>	19.56	
<i>For Elevated Installation >40', Add</i>	21.51	
<i>For Work In Restricted Working Space, Add</i>	11.73	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.73	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0785	EA	1-1/2" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	56.54	17.87
			<i>For Elevated Installation >10' To 15', Add</i>	4.47	
			<i>For Elevated Installation >15' To 20', Add</i>	8.94	
			<i>For Elevated Installation >20' To 25', Add</i>	11.17	
			<i>For Elevated Installation >25' To 30', Add</i>	15.64	
			<i>For Elevated Installation >30' To 35', Add</i>	17.87	
			<i>For Elevated Installation >35' To 40', Add</i>	22.34	
			<i>For Elevated Installation >40', Add</i>	24.57	
			<i>For Work In Restricted Working Space, Add</i>	13.40	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13.40	
26 05 33	13-0786	EA	2" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub.....	67.40	20.11
			<i>For Elevated Installation >10' To 15', Add</i>	5.03	
			<i>For Elevated Installation >15' To 20', Add</i>	10.05	
			<i>For Elevated Installation >20' To 25', Add</i>	12.57	
			<i>For Elevated Installation >25' To 30', Add</i>	17.59	
			<i>For Elevated Installation >30' To 35', Add</i>	20.11	
			<i>For Elevated Installation >35' To 40', Add</i>	25.14	
			<i>For Elevated Installation >40', Add</i>	27.65	
			<i>For Work In Restricted Working Space, Add</i>	15.08	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.08	
26 05 33	13-0787	EA	2-1/2" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	84.57	22.35
			<i>For Elevated Installation >10' To 15', Add</i>	5.59	
			<i>For Elevated Installation >15' To 20', Add</i>	11.17	
			<i>For Elevated Installation >20' To 25', Add</i>	13.97	
			<i>For Elevated Installation >25' To 30', Add</i>	19.55	
			<i>For Elevated Installation >30' To 35', Add</i>	22.34	
			<i>For Elevated Installation >35' To 40', Add</i>	27.93	
			<i>For Elevated Installation >40', Add</i>	30.72	
			<i>For Work In Restricted Working Space, Add</i>	16.76	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.76	
26 05 33	13-0788	EA	3" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub.....	100.11	24.58
			<i>For Elevated Installation >10' To 15', Add</i>	6.14	
			<i>For Elevated Installation >15' To 20', Add</i>	12.29	
			<i>For Elevated Installation >20' To 25', Add</i>	15.36	
			<i>For Elevated Installation >25' To 30', Add</i>	21.50	
			<i>For Elevated Installation >30' To 35', Add</i>	24.58	
			<i>For Elevated Installation >35' To 40', Add</i>	30.72	
			<i>For Elevated Installation >40', Add</i>	33.79	
			<i>For Work In Restricted Working Space, Add</i>	18.43	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.43	
26 05 33	13-0789	EA	3-1/2" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub	122.75	29.04
			<i>For Elevated Installation >10' To 15', Add</i>	7.26	
			<i>For Elevated Installation >15' To 20', Add</i>	14.52	
			<i>For Elevated Installation >20' To 25', Add</i>	18.16	
			<i>For Elevated Installation >25' To 30', Add</i>	25.42	
			<i>For Elevated Installation >30' To 35', Add</i>	29.05	
			<i>For Elevated Installation >35' To 40', Add</i>	36.31	
			<i>For Elevated Installation >40', Add</i>	39.94	
			<i>For Work In Restricted Working Space, Add</i>	21.79	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21.79	
26 05 33	13-0790	EA	4" Intermediate Metal Conduit (IMC) Rain Tight Threaded Hub.....	141.45	31.28
			<i>For Elevated Installation >10' To 15', Add</i>	7.82	
			<i>For Elevated Installation >15' To 20', Add</i>	15.64	
			<i>For Elevated Installation >20' To 25', Add</i>	19.55	
			<i>For Elevated Installation >25' To 30', Add</i>	27.37	
			<i>For Elevated Installation >30' To 35', Add</i>	31.28	
			<i>For Elevated Installation >35' To 40', Add</i>	39.10	
			<i>For Elevated Installation >40', Add</i>	43.00	
			<i>For Work In Restricted Working Space, Add</i>	23.46	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.46	
26 05 33	13-0791		Intermediate Metal Conduit (IMC) Expansion Fittings <small>(26 05 33 13-0724)</small>		
26 05 33	13-0792	EA	1/2" Intermediate Metal Conduit (IMC) Expansion Fitting	171.61	17.87
			<i>For Elevated Installation >10' To 15', Add</i>	4.47	
			<i>For Elevated Installation >15' To 20', Add</i>	8.94	
			<i>For Elevated Installation >20' To 25', Add</i>	11.17	
			<i>For Elevated Installation >25' To 30', Add</i>	15.64	
			<i>For Elevated Installation >30' To 35', Add</i>	17.88	
			<i>For Elevated Installation >35' To 40', Add</i>	22.35	
			<i>For Elevated Installation >40', Add</i>	24.58	
			<i>For Work In Restricted Working Space, Add</i>	13.41	
26 05 33	13-0793	EA	3/4" Intermediate Metal Conduit (IMC) Expansion Fitting	189.88	20.11
			<i>For Elevated Installation >10' To 15', Add</i>	5.03	
			<i>For Elevated Installation >15' To 20', Add</i>	10.05	
			<i>For Elevated Installation >20' To 25', Add</i>	12.57	
			<i>For Elevated Installation >25' To 30', Add</i>	17.59	
			<i>For Elevated Installation >30' To 35', Add</i>	20.11	
			<i>For Elevated Installation >35' To 40', Add</i>	25.14	
			<i>For Elevated Installation >40', Add</i>	27.65	
			<i>For Work In Restricted Working Space, Add</i>	15.08	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0794 EA 1" Intermediate Metal Conduit (IMC) Expansion Fitting	211.02	22.35
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Work In Restricted Working Space, Add	16.76	
26 05 33 13-0795 EA 1-1/4" Intermediate Metal Conduit (IMC) Expansion Fitting	254.99	24.58
For Elevated Installation >10' To 15', Add	6.14	
For Elevated Installation >15' To 20', Add	12.29	
For Elevated Installation >20' To 25', Add	15.36	
For Elevated Installation >25' To 30', Add	21.50	
For Elevated Installation >30' To 35', Add	24.58	
For Elevated Installation >35' To 40', Add	30.72	
For Elevated Installation >40', Add	33.79	
For Work In Restricted Working Space, Add	18.43	
26 05 33 13-0796 EA 1-1/2" Intermediate Metal Conduit (IMC) Expansion Fitting	312.54	26.81
For Elevated Installation >10' To 15', Add	6.70	
For Elevated Installation >15' To 20', Add	13.41	
For Elevated Installation >20' To 25', Add	16.76	
For Elevated Installation >25' To 30', Add	23.46	
For Elevated Installation >30' To 35', Add	26.81	
For Elevated Installation >35' To 40', Add	33.52	
For Elevated Installation >40', Add	36.87	
For Work In Restricted Working Space, Add	20.11	
26 05 33 13-0797 EA 2" Intermediate Metal Conduit (IMC) Expansion Fitting	411.16	29.04
For Elevated Installation >10' To 15', Add	7.26	
For Elevated Installation >15' To 20', Add	14.52	
For Elevated Installation >20' To 25', Add	18.15	
For Elevated Installation >25' To 30', Add	25.41	
For Elevated Installation >30' To 35', Add	29.04	
For Elevated Installation >35' To 40', Add	36.31	
For Elevated Installation >40', Add	39.94	
For Work In Restricted Working Space, Add	21.78	
26 05 33 13-0798 EA 2-1/2" Intermediate Metal Conduit (IMC) Expansion Fitting	621.15	35.75
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Work In Restricted Working Space, Add	26.81	
26 05 33 13-0799 EA 3" Intermediate Metal Conduit (IMC) Expansion Fitting	746.70	44.68
For Elevated Installation >10' To 15', Add	11.17	
For Elevated Installation >15' To 20', Add	22.34	
For Elevated Installation >20' To 25', Add	27.93	
For Elevated Installation >25' To 30', Add	39.10	
For Elevated Installation >30' To 35', Add	44.69	
For Elevated Installation >35' To 40', Add	55.86	
For Elevated Installation >40', Add	61.45	
For Work In Restricted Working Space, Add	33.52	
26 05 33 13-0800 EA 3-1/2" Intermediate Metal Conduit (IMC) Expansion Fitting	1,041.21	53.63
For Elevated Installation >10' To 15', Add	13.41	
For Elevated Installation >15' To 20', Add	26.81	
For Elevated Installation >20' To 25', Add	33.52	
For Elevated Installation >25' To 30', Add	46.92	
For Elevated Installation >30' To 35', Add	53.63	
For Elevated Installation >35' To 40', Add	67.04	
For Elevated Installation >40', Add	73.74	
For Work In Restricted Working Space, Add	40.22	
26 05 33 13-0801 EA 4" Intermediate Metal Conduit (IMC) Expansion Fitting	1,204.34	58.10
For Elevated Installation >10' To 15', Add	14.52	
For Elevated Installation >15' To 20', Add	29.04	
For Elevated Installation >20' To 25', Add	36.31	
For Elevated Installation >25' To 30', Add	50.83	
For Elevated Installation >30' To 35', Add	58.09	
For Elevated Installation >35' To 40', Add	72.61	
For Elevated Installation >40', Add	79.87	
For Work In Restricted Working Space, Add	43.57	
26 05 33 13-0802 Intermediate Metal Conduit (IMC) Sealing Fittings, Vertical/Horizontal <small>(26 05 33 13-0724)</small>		
26 05 33 13-0803 EA 1/2" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal	104.70	27.93
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Work In Restricted Working Space, Add	16.76	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0804	EA 3/4" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	124.39	33.51
	<i>For Elevated Installation >10' To 15', Add</i>	6.70	
	<i>For Elevated Installation >15' To 20', Add</i>	13.41	
	<i>For Elevated Installation >20' To 25', Add</i>	16.76	
	<i>For Elevated Installation >25' To 30', Add</i>	23.46	
	<i>For Elevated Installation >30' To 35', Add</i>	26.81	
	<i>For Elevated Installation >35' To 40', Add</i>	33.52	
	<i>For Elevated Installation >40', Add</i>	36.87	
	<i>For Work In Restricted Working Space, Add</i>	20.11	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.11	
26 05 33 13-0805	EA 1" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	151.92	39.10
	<i>For Elevated Installation >10' To 15', Add</i>	7.82	
	<i>For Elevated Installation >15' To 20', Add</i>	15.64	
	<i>For Elevated Installation >20' To 25', Add</i>	19.55	
	<i>For Elevated Installation >25' To 30', Add</i>	27.37	
	<i>For Elevated Installation >30' To 35', Add</i>	31.28	
	<i>For Elevated Installation >35' To 40', Add</i>	39.10	
	<i>For Elevated Installation >40', Add</i>	43.01	
	<i>For Work In Restricted Working Space, Add</i>	23.46	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.46	
26 05 33 13-0806	EA 1-1/4" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	178.89	44.68
	<i>For Elevated Installation >10' To 15', Add</i>	8.94	
	<i>For Elevated Installation >15' To 20', Add</i>	17.87	
	<i>For Elevated Installation >20' To 25', Add</i>	22.34	
	<i>For Elevated Installation >25' To 30', Add</i>	31.28	
	<i>For Elevated Installation >30' To 35', Add</i>	35.75	
	<i>For Elevated Installation >35' To 40', Add</i>	44.69	
	<i>For Elevated Installation >40', Add</i>	49.15	
	<i>For Work In Restricted Working Space, Add</i>	26.81	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	26.81	
26 05 33 13-0807	EA 1-1/2" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	235.31	50.28
	<i>For Elevated Installation >10' To 15', Add</i>	10.05	
	<i>For Elevated Installation >15' To 20', Add</i>	20.11	
	<i>For Elevated Installation >20' To 25', Add</i>	25.14	
	<i>For Elevated Installation >25' To 30', Add</i>	35.19	
	<i>For Elevated Installation >30' To 35', Add</i>	40.22	
	<i>For Elevated Installation >35' To 40', Add</i>	50.27	
	<i>For Elevated Installation >40', Add</i>	55.30	
	<i>For Work In Restricted Working Space, Add</i>	30.16	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30.16	
26 05 33 13-0808	EA 2" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	286.34	55.86
	<i>For Elevated Installation >10' To 15', Add</i>	11.17	
	<i>For Elevated Installation >15' To 20', Add</i>	22.34	
	<i>For Elevated Installation >20' To 25', Add</i>	27.93	
	<i>For Elevated Installation >25' To 30', Add</i>	39.10	
	<i>For Elevated Installation >30' To 35', Add</i>	44.69	
	<i>For Elevated Installation >35' To 40', Add</i>	55.86	
	<i>For Elevated Installation >40', Add</i>	61.45	
	<i>For Work In Restricted Working Space, Add</i>	33.52	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	33.52	
26 05 33 13-0809	EA 2-1/2" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	405.36	67.03
	<i>For Elevated Installation >10' To 15', Add</i>	13.41	
	<i>For Elevated Installation >15' To 20', Add</i>	26.81	
	<i>For Elevated Installation >20' To 25', Add</i>	33.52	
	<i>For Elevated Installation >25' To 30', Add</i>	46.92	
	<i>For Elevated Installation >30' To 35', Add</i>	53.62	
	<i>For Elevated Installation >35' To 40', Add</i>	67.03	
	<i>For Elevated Installation >40', Add</i>	73.73	
	<i>For Work In Restricted Working Space, Add</i>	40.22	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.22	
26 05 33 13-0810	EA 3" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	487.80	78.20
	<i>For Elevated Installation >10' To 15', Add</i>	15.64	
	<i>For Elevated Installation >15' To 20', Add</i>	31.28	
	<i>For Elevated Installation >20' To 25', Add</i>	39.10	
	<i>For Elevated Installation >25' To 30', Add</i>	54.74	
	<i>For Elevated Installation >30' To 35', Add</i>	62.56	
	<i>For Elevated Installation >35' To 40', Add</i>	78.20	
	<i>For Elevated Installation >40', Add</i>	86.02	
	<i>For Work In Restricted Working Space, Add</i>	46.92	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	46.92	
26 05 33 13-0811	EA 3-1/2" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal.....	1,134.53	89.37
	<i>For Elevated Installation >10' To 15', Add</i>	17.88	
	<i>For Elevated Installation >15' To 20', Add</i>	35.75	
	<i>For Elevated Installation >20' To 25', Add</i>	44.69	
	<i>For Elevated Installation >25' To 30', Add</i>	62.56	
	<i>For Elevated Installation >30' To 35', Add</i>	71.50	
	<i>For Elevated Installation >35' To 40', Add</i>	89.38	
	<i>For Elevated Installation >40', Add</i>	98.31	
	<i>For Work In Restricted Working Space, Add</i>	53.63	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	53.63	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0812 EA 4" Intermediate Metal Conduit (IMC) Sealing Fitting, Vertical/Horizontal	1,307.26	100.54
For Elevated Installation >10' To 15', Add	20.11	
For Elevated Installation >15' To 20', Add	40.22	
For Elevated Installation >20' To 25', Add	50.27	
For Elevated Installation >25' To 30', Add	70.38	
For Elevated Installation >30' To 35', Add	80.44	
For Elevated Installation >35' To 40', Add	100.55	
For Elevated Installation >40', Add	110.60	
For Work In Restricted Working Space, Add	60.33	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	60.33	
26 05 33 13-0813 Intermediate Metal Conduit (IMC) Threaded Couplings <small>(26 05 33 13-0724)</small>		
26 05 33 13-0814 EA 1/2" Intermediate Metal Conduit (IMC) Threaded Coupling	15.07	5.36
For Elevated Installation >10' To 15', Add	1.34	
For Elevated Installation >15' To 20', Add	2.68	
For Elevated Installation >20' To 25', Add	3.35	
For Elevated Installation >25' To 30', Add	4.69	
For Elevated Installation >30' To 35', Add	5.36	
For Elevated Installation >35' To 40', Add	6.70	
For Elevated Installation >40', Add	7.37	
For Work In Restricted Working Space, Add	4.02	
26 05 33 13-0815 EA 3/4" Intermediate Metal Conduit (IMC) Threaded Coupling	21.02	7.60
For Elevated Installation >10' To 15', Add	1.90	
For Elevated Installation >15' To 20', Add	3.80	
For Elevated Installation >20' To 25', Add	4.75	
For Elevated Installation >25' To 30', Add	6.65	
For Elevated Installation >30' To 35', Add	7.60	
For Elevated Installation >35' To 40', Add	9.50	
For Elevated Installation >40', Add	10.45	
For Work In Restricted Working Space, Add	5.70	
26 05 33 13-0816 EA 1" Intermediate Metal Conduit (IMC) Threaded Coupling	27.57	9.83
For Elevated Installation >10' To 15', Add	2.46	
For Elevated Installation >15' To 20', Add	4.91	
For Elevated Installation >20' To 25', Add	6.14	
For Elevated Installation >25' To 30', Add	8.60	
For Elevated Installation >30' To 35', Add	9.82	
For Elevated Installation >35' To 40', Add	12.28	
For Elevated Installation >40', Add	13.51	
For Work In Restricted Working Space, Add	7.37	
26 05 33 13-0817 EA 1-1/4" Intermediate Metal Conduit (IMC) Threaded Coupling	31.70	11.17
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Work In Restricted Working Space, Add	8.38	
26 05 33 13-0818 EA 1-1/2" Intermediate Metal Conduit (IMC) Threaded Coupling	38.25	13.40
For Elevated Installation >10' To 15', Add	3.35	
For Elevated Installation >15' To 20', Add	6.70	
For Elevated Installation >20' To 25', Add	8.37	
For Elevated Installation >25' To 30', Add	11.72	
For Elevated Installation >30' To 35', Add	13.40	
For Elevated Installation >35' To 40', Add	16.75	
For Elevated Installation >40', Add	18.42	
For Work In Restricted Working Space, Add	10.05	
26 05 33 13-0819 EA 2" Intermediate Metal Conduit (IMC) Threaded Coupling	44.27	15.20
For Elevated Installation >10' To 15', Add	3.80	
For Elevated Installation >15' To 20', Add	7.60	
For Elevated Installation >20' To 25', Add	9.50	
For Elevated Installation >25' To 30', Add	13.30	
For Elevated Installation >30' To 35', Add	15.20	
For Elevated Installation >35' To 40', Add	19.00	
For Elevated Installation >40', Add	20.90	
For Work In Restricted Working Space, Add	11.40	
26 05 33 13-0820 EA 2-1/2" Intermediate Metal Conduit (IMC) Threaded Coupling	56.33	16.98
For Elevated Installation >10' To 15', Add	4.25	
For Elevated Installation >15' To 20', Add	8.49	
For Elevated Installation >20' To 25', Add	10.61	
For Elevated Installation >25' To 30', Add	14.86	
For Elevated Installation >30' To 35', Add	16.98	
For Elevated Installation >35' To 40', Add	21.23	
For Elevated Installation >40', Add	23.35	
For Work In Restricted Working Space, Add	12.74	
26 05 33 13-0821 EA 3" Intermediate Metal Conduit (IMC) Threaded Coupling	67.00	19.22
For Elevated Installation >10' To 15', Add	4.80	
For Elevated Installation >15' To 20', Add	9.61	
For Elevated Installation >20' To 25', Add	12.01	
For Elevated Installation >25' To 30', Add	16.81	
For Elevated Installation >30' To 35', Add	19.22	
For Elevated Installation >35' To 40', Add	24.02	
For Elevated Installation >40', Add	26.42	
For Work In Restricted Working Space, Add	14.41	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0822	EA	3-1/2" Intermediate Metal Conduit (IMC) Threaded Coupling	77.86	21.00
			<i>For Elevated Installation >10' To 15', Add</i>	5.25	
			<i>For Elevated Installation >15' To 20', Add</i>	10.50	
			<i>For Elevated Installation >20' To 25', Add</i>	13.13	
			<i>For Elevated Installation >25' To 30', Add</i>	18.38	
			<i>For Elevated Installation >30' To 35', Add</i>	21.01	
			<i>For Elevated Installation >35' To 40', Add</i>	26.26	
			<i>For Elevated Installation >40', Add</i>	28.89	
			<i>For Work In Restricted Working Space, Add</i>	15.76	
26 05 33	13-0823	EA	4" Intermediate Metal Conduit (IMC) Threaded Coupling	81.38	22.35
			<i>For Elevated Installation >10' To 15', Add</i>	5.58	
			<i>For Elevated Installation >15' To 20', Add</i>	11.17	
			<i>For Elevated Installation >20' To 25', Add</i>	13.96	
			<i>For Elevated Installation >25' To 30', Add</i>	19.54	
			<i>For Elevated Installation >30' To 35', Add</i>	22.34	
			<i>For Elevated Installation >35' To 40', Add</i>	27.92	
			<i>For Elevated Installation >40', Add</i>	30.71	
			<i>For Work In Restricted Working Space, Add</i>	16.75	
26 05 33	13-0824		Intermediate Metal Conduit (IMC) Reducer Bushings <small>(26 05 33 13-0724)</small>		
26 05 33	13-0825	EA	1/2" To 3/4" Intermediate Metal Conduit (IMC) Reducing Bushing	7.44	2.24
			<i>For Elevated Installation >10' To 15', Add</i>	0.56	
			<i>For Elevated Installation >15' To 20', Add</i>	1.12	
			<i>For Elevated Installation >20' To 25', Add</i>	1.40	
			<i>For Elevated Installation >25' To 30', Add</i>	1.95	
			<i>For Elevated Installation >30' To 35', Add</i>	2.23	
			<i>For Elevated Installation >35' To 40', Add</i>	2.79	
			<i>For Elevated Installation >40', Add</i>	3.07	
			<i>For Work In Restricted Working Space, Add</i>	1.67	
26 05 33	13-0826	EA	3/4" To 1" Intermediate Metal Conduit (IMC) Reducing Bushing	8.52	2.24
			<i>For Elevated Installation >10' To 15', Add</i>	0.56	
			<i>For Elevated Installation >15' To 20', Add</i>	1.12	
			<i>For Elevated Installation >20' To 25', Add</i>	1.40	
			<i>For Elevated Installation >25' To 30', Add</i>	1.95	
			<i>For Elevated Installation >30' To 35', Add</i>	2.23	
			<i>For Elevated Installation >35' To 40', Add</i>	2.79	
			<i>For Elevated Installation >40', Add</i>	3.07	
			<i>For Work In Restricted Working Space, Add</i>	1.67	
26 05 33	13-0827		Explosion Proof Conduit Fittings <small>(26 05 33 13-0059)</small>		
			Note: For use with Rigid Galvanized Steel (RGS), Electrical Metallic Tubing (EMT) and Intermediate Metal Conduit (IMC) conduit.		
26 05 33	13-0828		Explosion Proof Malleable Iron Conduit Unions <small>(26 05 33 13-0827)</small>		
26 05 33	13-0829	EA	1/2" Explosion Proof Malleable Iron Conduit Union	41.38	9.31
26 05 33	13-0830	EA	3/4" Explosion Proof Malleable Iron Conduit Union	50.65	10.29
26 05 33	13-0831	EA	1" Explosion Proof Malleable Iron Conduit Union	79.54	13.72
26 05 33	13-0832	EA	1-1/4" Explosion Proof Malleable Iron Conduit Union	104.37	15.19
26 05 33	13-0833	EA	1-1/2" Explosion Proof Malleable Iron Conduit Union	131.19	18.62
26 05 33	13-0834	EA	2" Explosion Proof Malleable Iron Conduit Union	162.91	21.55
26 05 33	13-0835	EA	2-1/2" Explosion Proof Malleable Iron Conduit Union	247.32	30.82
26 05 33	13-0836	EA	3" Explosion Proof Malleable Iron Conduit Union	313.56	36.68
26 05 33	13-0837	EA	3-1/2" Explosion Proof Malleable Iron Conduit Union	521.06	44.02
26 05 33	13-0838	EA	4" Explosion Proof Malleable Iron Conduit Union	555.64	56.25
26 05 33	13-0839		Explosion Proof Malleable Iron Conduit Bodies <small>(26 05 33 13-0827)</small>		
26 05 33	13-0840	EA	1/2" Explosion Proof Malleable Iron Two Hub Conduit Body	145.45	29.39
26 05 33	13-0841	EA	3/4" Explosion Proof Malleable Iron Two Hub Conduit Body	164.00	33.32
26 05 33	13-0842	EA	1" Explosion Proof Malleable Iron Two Hub Conduit Body	191.37	36.74
26 05 33	13-0843	EA	1/2" Explosion Proof Malleable Iron Three Hub Conduit Body	165.19	36.74
26 05 33	13-0844	EA	3/4" Explosion Proof Malleable Iron Three Hub Conduit Body	196.90	44.09
26 05 33	13-0845	EA	1" Explosion Proof Malleable Iron Three Hub Conduit Body	232.49	50.46
26 05 33	13-0846		Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical <small>(26 05 33 13-0827)</small>		
			Note: Includes sealing gasket and lock nut.		
26 05 33	13-0847	EA	1/2" x 1" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	120.34	24.49
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.37	
26 05 33	13-0848	EA	3/4" x 1" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	123.70	27.43
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.58	
26 05 33	13-0849	EA	1" x 1-1/2" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	135.00	29.88
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.41	
26 05 33	13-0850	EA	1-1/4" x 2" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	173.03	36.74
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	27.56	
26 05 33	13-0851	EA	1-1/2" x 2" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	219.77	43.11
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32.33	
26 05 33	13-0852	EA	2" x 2-1/2" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	280.57	48.99
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.74	
26 05 33	13-0853	EA	2-1/2" x 3" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical	400.51	73.37
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	55.02	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-0854 EA 3" x 4" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical.....	506.00	91.95
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	68.96	
26 05 33 13-0855 EA 3-1/2" x 4" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical.....	706.26	101.25
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.94	
26 05 33 13-0856 EA 4" x 5" Explosion Proof Malleable Iron Conduit Sealing Fitting, Horizontal/Vertical.....	905.29	110.05
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.54	
26 05 33 13-0857 Explosion Proof Flexible Conduit Couplings <small>(26 05 33 13-0827)</small>		
26 05 33 13-0858 EA 1/2" x 12" Explosion Proof Flexible Conduit Coupling.....	306.73	11.26
26 05 33 13-0859 EA 3/4" x 15" Explosion Proof Flexible Conduit Coupling.....	400.73	12.74
26 05 33 13-0860 Schedule 40 Polyvinyl Chloride (PVC) Conduit <small>(26 05 33 13-0059)</small>		
<i>Note: Exposed installation, branch and feeder conduit. Excludes supporting strap, hanger and fastening.</i>		
26 05 33 13-0861 Schedule 40 Polyvinyl Chloride (PVC) Conduit With Glued Couplings <small>(26 05 33 13-0860)</small>		
<i>Note: Includes field bending conduit up to and including 1". See CSI section 26 05 33 13-1368 for field bending >1".</i>		
26 05 33 13-0862 LF 1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	5.39	1.75
<i>For Schedule 60, Add</i>	0.47	
<i>For Schedule 80, Add</i>	0.79	
26 05 33 13-0863 LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	6.16	1.92
<i>For Schedule 60, Add</i>	0.58	
<i>For Schedule 80, Add</i>	0.95	
26 05 33 13-0864 LF 1" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	7.63	2.24
<i>For Schedule 60, Add</i>	0.79	
<i>For Schedule 80, Add</i>	1.27	
26 05 33 13-0865 LF 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	9.11	2.56
<i>For Schedule 60, Add</i>	1.00	
<i>For Schedule 80, Add</i>	1.59	
26 05 33 13-0866 LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	10.71	2.98
<i>For Schedule 60, Add</i>	1.18	
<i>For Schedule 80, Add</i>	1.88	
26 05 33 13-0867 LF 2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	12.80	3.42
<i>For Schedule 60, Add</i>	1.49	
<i>For Schedule 80, Add</i>	2.35	
26 05 33 13-0868 LF 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	16.96	4.06
<i>For Schedule 60, Add</i>	2.21	
<i>For Schedule 80, Add</i>	3.40	
26 05 33 13-0869 LF 3" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	19.87	4.70
<i>For Schedule 60, Add</i>	2.62	
<i>For Schedule 80, Add</i>	4.02	
26 05 33 13-0870 LF 3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	24.26	5.55
<i>For Schedule 60, Add</i>	3.29	
<i>For Schedule 80, Add</i>	5.02	
26 05 33 13-0871 LF 4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	28.50	6.83
<i>For Schedule 60, Add</i>	3.71	
<i>For Schedule 80, Add</i>	5.71	
26 05 33 13-0872 LF 5" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	40.66	9.61
<i>For Schedule 60, Add</i>	5.36	
<i>For Schedule 80, Add</i>	8.23	
26 05 33 13-0873 LF 6" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End.....	54.00	12.81
<i>For Schedule 60, Add</i>	7.10	
<i>For Schedule 80, Add</i>	10.90	
26 05 33 13-0874 Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbows <small>(26 05 33 13-0860)</small>		
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
26 05 33 13-0875 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow.....	22.76	8.53
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
<i>For Schedule 60, Add</i>	1.42	
<i>For Schedule 80, Add</i>	2.63	
26 05 33 13-0876 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow.....	25.18	9.40
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
<i>For Schedule 60, Add</i>	1.60	
<i>For Schedule 80, Add</i>	2.94	
26 05 33 13-0877 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow.....	29.33	10.68
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
<i>For Schedule 60, Add</i>	2.00	
<i>For Schedule 80, Add</i>	3.60	
26 05 33 13-0878 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow.....	37.99	13.66
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
<i>For Schedule 60, Add</i>	2.67	
<i>For Schedule 80, Add</i>	4.76	
26 05 33 13-0879 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow.....	47.89	17.08
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
<i>For Schedule 60, Add</i>	3.43	
<i>For Schedule 80, Add</i>	6.09	
26 05 33 13-0880 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow.....	60.56	21.35
<i>See CSI section 26 05 33 13-1368 for conduit field bending.</i>		
<i>For Schedule 60, Add</i>	4.47	
<i>For Schedule 80, Add</i>	7.85	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0881	EA	2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	76.74 6.38 10.85	25.61
26 05 33	13-0882	EA	3" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	95.44 8.92 14.72	29.89
26 05 33	13-0883	EA	3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	119.53 11.74 19.15	36.29
26 05 33	13-0884	EA	4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	143.79 14.60 23.64	42.69
26 05 33	13-0885	EA	5" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	198.78 23.01 36.22	53.37
26 05 33	13-0886	EA	6" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	243.42 28.83 45.17	64.05
26 05 33	13-0887		Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbows <small>(26 05 33 13-0886)</small> See CSI section 26 05 33 13-1368 for conduit field bending.		
26 05 33	13-0888	EA	1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	22.76 1.42 2.63	8.53
26 05 33	13-0889	EA	3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	25.08 1.57 2.91	9.40
26 05 33	13-0890	EA	1" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	29.19 1.96 3.55	10.68
26 05 33	13-0891	EA	1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	37.58 2.56 4.61	13.66
26 05 33	13-0892	EA	1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	46.97 3.20 5.77	17.08
26 05 33	13-0893	EA	2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	60.07 4.34 7.68	21.35
26 05 33	13-0894	EA	2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	75.82 6.15 10.52	25.61
26 05 33	13-0895	EA	3" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	94.28 8.63 14.32	29.89
26 05 33	13-0896	EA	3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	116.26 10.92 18.01	36.29
26 05 33	13-0897	EA	4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	140.98 13.90 22.66	42.69
26 05 33	13-0898	EA	5" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	195.14 22.10 34.94	53.37
26 05 33	13-0899	EA	6" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow..... See CSI section 26 05 33 13-1368 for conduit field bending. <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	232.59 26.13 41.38	64.05
26 05 33	13-0900		Schedule 40 Polyvinyl Chloride (PVC) Conduit 18" Large Radius Elbow <small>(26 05 33 13-0886)</small>		
26 05 33	13-0901	EA	1" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow..... <i>For Schedule 80, Add</i>	89.35 17.48	27.59
26 05 33	13-0902	EA	1-1/4" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow..... <i>For Schedule 80, Add</i>	104.76 20.69	31.95
26 05 33	13-0903	EA	1-1/2" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow..... <i>For Schedule 80, Add</i>	118.58 23.35	36.31



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0904 EA 2" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow	141.47	39.94
For Schedule 80, Add	29.54	
26 05 33 13-0905 EA 2-1/2" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow	186.43	50.11
For Schedule 80, Add	40.20	
26 05 33 13-0906 EA 3" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow	243.04	68.26
For Schedule 80, Add	50.94	
26 05 33 13-0907 EA 3-1/2" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow	293.60	76.97
For Schedule 80, Add	64.27	
26 05 33 13-0908 EA 4" Schedule 40, Polyvinyl Chloride (PVC), 18" Large Radius Elbow	350.19	100.21
For Schedule 80, Add	72.46	
26 05 33 13-0909 Schedule 40 Polyvinyl Chloride (PVC) Conduit 24" Large Radius Elbow <small>(26 05 33 13-0860)</small>		
26 05 33 13-0910 EA 1" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	95.62	27.59
For Schedule 80, Add	19.67	
26 05 33 13-0911 EA 1-1/4" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	119.86	31.95
For Schedule 80, Add	25.98	
26 05 33 13-0912 EA 1-1/2" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	140.19	36.31
For Schedule 80, Add	30.91	
26 05 33 13-0913 EA 2" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	152.17	39.94
For Schedule 80, Add	33.29	
26 05 33 13-0914 EA 2-1/2" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	219.39	50.11
For Schedule 80, Add	51.73	
26 05 33 13-0915 EA 3" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	290.98	68.26
For Schedule 80, Add	67.72	
26 05 33 13-0916 EA 3-1/2" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	323.11	76.97
For Schedule 80, Add	74.60	
26 05 33 13-0917 EA 4" Schedule 40, Polyvinyl Chloride (PVC), 24" Large Radius Elbow	385.92	100.21
For Schedule 80, Add	84.97	
26 05 33 13-0918 Schedule 40 Polyvinyl Chloride (PVC) Conduit 30" Large Radius Elbow <small>(26 05 33 13-0860)</small>		
26 05 33 13-0919 EA 1" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	112.53	27.59
For Schedule 80, Add	25.59	
26 05 33 13-0920 EA 1-1/4" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	126.94	31.95
For Schedule 80, Add	28.45	
26 05 33 13-0921 EA 1-1/2" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	144.35	36.31
For Schedule 80, Add	32.37	
26 05 33 13-0922 EA 2" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	172.34	39.94
For Schedule 80, Add	40.35	
26 05 33 13-0923 EA 2-1/2" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	231.68	50.11
For Schedule 80, Add	56.04	
26 05 33 13-0924 EA 3" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	301.29	68.26
For Schedule 80, Add	71.32	
26 05 33 13-0925 EA 3-1/2" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	362.40	76.97
For Schedule 80, Add	88.35	
26 05 33 13-0926 EA 4" Schedule 40, Polyvinyl Chloride (PVC), 30" Large Radius Elbow	421.20	100.21
For Schedule 80, Add	97.32	
26 05 33 13-0927 Schedule 40 Polyvinyl Chloride (PVC) Conduit 36" Large Radius Elbow <small>(26 05 33 13-0860)</small>		
26 05 33 13-0928 EA 1" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	115.99	27.59
For Schedule 80, Add	26.80	
26 05 33 13-0929 EA 1-1/4" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	147.91	31.95
For Schedule 80, Add	35.79	
26 05 33 13-0930 EA 1-1/2" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	160.98	36.31
For Schedule 80, Add	38.19	
26 05 33 13-0931 EA 2" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	173.09	39.94
For Schedule 80, Add	40.61	
26 05 33 13-0932 EA 2-1/2" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	258.72	50.11
For Schedule 80, Add	65.50	
26 05 33 13-0933 EA 3" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	361.90	68.26
For Schedule 80, Add	92.54	
26 05 33 13-0934 EA 3-1/2" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	417.60	76.97
For Schedule 80, Add	107.67	
26 05 33 13-0935 EA 4" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	486.57	100.21
For Schedule 80, Add	120.19	
26 05 33 13-0936 EA 5" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	778.13	163.11
For Schedule 80, Add	190.65	
26 05 33 13-0937 EA 6" Schedule 40, Polyvinyl Chloride (PVC), 36" Large Radius Elbow	1,138.32	245.78
For Schedule 80, Add	275.69	
26 05 33 13-0938 Schedule 40 Polyvinyl Chloride (PVC) Conduit 48" Large Radius Elbow <small>(26 05 33 13-0860)</small>		
26 05 33 13-0939 EA 1" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	129.25	27.59
For Schedule 80, Add	31.44	
26 05 33 13-0940 EA 1-1/4" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	151.46	31.95
For Schedule 80, Add	37.04	
26 05 33 13-0941 EA 1-1/2" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	171.65	36.31
For Schedule 80, Add	41.93	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-0942	EA	2" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	209.95	39.94
			<i>For Schedule 80, Add</i>	53.51	
26 05 33	13-0943	EA	2-1/2" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	285.12	50.11
			<i>For Schedule 80, Add</i>	74.74	
26 05 33	13-0944	EA	3" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	405.25	68.26
			<i>For Schedule 80, Add</i>	107.71	
26 05 33	13-0945	EA	3-1/2" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	459.05	76.97
			<i>For Schedule 80, Add</i>	122.18	
26 05 33	13-0946	EA	4" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	558.51	100.21
			<i>For Schedule 80, Add</i>	145.37	
26 05 33	13-0947	EA	5" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	820.22	163.11
			<i>For Schedule 80, Add</i>	205.38	
26 05 33	13-0948	EA	6" Schedule 40, Polyvinyl Chloride (PVC), 48" Large Radius Elbow	1,172.41	245.78
			<i>For Schedule 80, Add</i>	287.62	
26 05 33 13-0949 Polyvinyl Chloride (PVC) Conduit Female Adapters (26 05 33 13-0860)					
26 05 33	13-0950	EA	1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter	15.60	5.98
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.49	
26 05 33	13-0951	EA	3/4" Polyvinyl Chloride (PVC) Conduit Female Adapter	17.97	6.83
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.12	
26 05 33	13-0952	EA	1" Polyvinyl Chloride (PVC) Conduit Female Adapter	20.43	7.68
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.76	
26 05 33	13-0953	EA	1-1/4" Polyvinyl Chloride (PVC) Conduit Female Adapter	23.03	8.53
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.41	
26 05 33	13-0954	EA	1-1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter	28.51	10.68
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.00	
26 05 33	13-0955	EA	2" Polyvinyl Chloride (PVC) Conduit Female Adapter	34.63	12.81
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.61	
26 05 33	13-0956	EA	2-1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter	47.48	17.08
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.81	
26 05 33	13-0957	EA	3" Polyvinyl Chloride (PVC) Conduit Female Adapter	59.89	21.35
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.01	
26 05 33	13-0958	EA	3-1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter	77.66	27.76
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.81	
26 05 33	13-0959	EA	4" Polyvinyl Chloride (PVC) Conduit Female Adapter	94.05	34.16
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25.62	
26 05 33	13-0960	EA	5" Polyvinyl Chloride (PVC) Conduit Female Adapter	124.24	42.69
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32.02	
26 05 33	13-0961	EA	6" Polyvinyl Chloride (PVC) Conduit Female Adapter	154.54	53.37
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.03	
26 05 33 13-0962 Polyvinyl Chloride (PVC) Conduit Bell Ends And Plug (26 05 33 13-0860)					
26 05 33	13-0963	EA	1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	18.11	5.12
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.84	
26 05 33	13-0964	EA	3/4" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	20.63	5.98
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.49	
26 05 33	13-0965	EA	1" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	23.17	6.83
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.12	
26 05 33	13-0966	EA	1-1/4" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	27.57	7.68
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.76	
26 05 33	13-0967	EA	1-1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	30.74	8.53
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.41	
26 05 33	13-0968	EA	2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	36.91	9.82
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-0969	EA	2-1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	41.31	11.10
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.33	
26 05 33	13-0970	EA	3" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	46.76	12.81
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.61	
26 05 33	13-0971	EA	3-1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	55.40	14.95
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.21	
26 05 33	13-0972	EA	4" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	61.13	17.08
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.81	
26 05 33	13-0973	EA	5" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	77.31	19.21
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.41	
26 05 33	13-0974	EA	6" Polyvinyl Chloride (PVC) Conduit Bell End And Plug	86.98	21.35
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.01	
26 05 33 13-0975 Polyvinyl Chloride (PVC) Conduit Terminal Adapters (26 05 33 13-0860)					
26 05 33	13-0976	EA	1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter	16.96	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.93	
26 05 33	13-0977	EA	3/4" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter	20.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.90	
26 05 33	13-0978	EA	1" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter	22.93	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.56	
26 05 33	13-0979	EA	1-1/4" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter	25.76	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.30	
26 05 33	13-0980	EA	1-1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter	28.28	10.68
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.00	
26 05 33	13-0981	EA	2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter	34.32	12.81
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.61	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-0982 EA 2-1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter.....	46.86	17.08
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.81	
26 05 33 13-0983 EA 3" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter.....	59.03	21.35
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.01	
26 05 33 13-0984 EA 3-1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter.....	76.55	27.76
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	20.81	
26 05 33 13-0985 EA 4" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter.....	92.91	34.16
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	25.62	
26 05 33 13-0986 EA 5" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter.....	122.00	42.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.02	
26 05 33 13-0987 EA 6" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter.....	151.86	53.37
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.03	
26 05 33 13-0988 Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover <small>(26 05 33 13-0860)</small>		
26 05 33 13-0989 EA 1/2" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	48.74	17.08
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.81	
26 05 33 13-0990 EA 3/4" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	56.60	19.21
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.41	
26 05 33 13-0991 EA 1" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	62.86	21.35
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.01	
26 05 33 13-0992 EA 1-1/4" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	77.60	25.61
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	19.22	
26 05 33 13-0993 EA 1-1/2" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	95.91	32.02
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	24.02	
26 05 33 13-0994 EA 2" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	124.20	38.42
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	28.82	
26 05 33 13-0995 EA 2-1/2" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	212.12	42.69
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.02	
26 05 33 13-0996 EA 3" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	226.48	46.97
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	35.23	
26 05 33 13-0997 EA 3-1/2" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	246.14	53.37
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.03	
26 05 33 13-0998 EA 4" Polyvinyl Chloride (PVC) Type C, LB, LR Or LL, Two Hub Conduit Body With Cover.....	274.86	61.91
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	46.43	
26 05 33 13-0999 Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover <small>(26 05 33 13-0860)</small>		
26 05 33 13-1000 EA 1/2" Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover.....	63.92	22.35
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-1001 EA 3/4" Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover.....	71.55	24.58
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.43	
26 05 33 13-1002 EA 1" Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover.....	77.37	26.81
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	20.11	
26 05 33 13-1003 EA 1-1/4" Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover.....	96.86	31.28
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.46	
26 05 33 13-1004 EA 1-1/2" Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover.....	117.00	37.99
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	28.49	
26 05 33 13-1005 EA 2" Polyvinyl Chloride (PVC) Type T, Three Hub Conduit Body With Cover.....	143.95	44.68
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	33.52	
26 05 33 13-1006 Polyvinyl Chloride (PVC) Conduit Expansion Joint <small>(26 05 33 13-0860)</small>		
26 05 33 13-1007 EA 1/2" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	105.06	21.35
26 05 33 13-1008 EA 3/4" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	117.04	25.61
26 05 33 13-1009 EA 1" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	129.80	29.89
26 05 33 13-1010 EA 1-1/4" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	141.79	34.16
26 05 33 13-1011 EA 1-1/2" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	153.47	38.42
26 05 33 13-1012 EA 2" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	167.64	42.69
26 05 33 13-1013 EA 2-1/2" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	205.09	49.10
26 05 33 13-1014 EA 3" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	245.59	55.50
26 05 33 13-1015 EA 3-1/2" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	287.44	64.05
26 05 33 13-1016 EA 4" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	341.92	74.72
26 05 33 13-1017 EA 5" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	452.02	89.66
26 05 33 13-1018 EA 6" Polyvinyl Chloride (PVC) Conduit Expansion Joint.....	594.30	115.28
26 05 33 13-1019 Polyvinyl Chloride (PVC) Conduit End Caps <small>(26 05 33 13-0860)</small>		
26 05 33 13-1020 EA 1/2" Polyvinyl Chloride (PVC) Conduit End Cap.....	13.40	4.27
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.20	
26 05 33 13-1021 EA 3/4" Polyvinyl Chloride (PVC) Conduit End Cap.....	15.84	5.12
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.84	
26 05 33 13-1022 EA 1" Polyvinyl Chloride (PVC) Conduit End Cap.....	18.22	5.98
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.49	
26 05 33 13-1023 EA 1-1/4" Polyvinyl Chloride (PVC) Conduit End Cap.....	21.79	6.83
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.12	
26 05 33 13-1024 EA 1-1/2" Polyvinyl Chloride (PVC) Conduit End Cap.....	25.40	7.68
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.76	
26 05 33 13-1025 EA 2" Polyvinyl Chloride (PVC) Conduit End Cap.....	30.01	8.53
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.41	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-1026	EA 2-1/2" Polyvinyl Chloride (PVC) Conduit End Cap <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	42.87 7.37	9.82
26 05 33 13-1027	EA 3" Polyvinyl Chloride (PVC) Conduit End Cap <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	46.96 8.33	11.10
26 05 33 13-1028	EA 3-1/2" Polyvinyl Chloride (PVC) Conduit End Cap <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	60.04 9.29	12.38
26 05 33 13-1029	EA 4" Polyvinyl Chloride (PVC) Conduit End Cap <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	72.67 9.93	13.23
26 05 33 13-1030	EA 5" Polyvinyl Chloride (PVC) Conduit End Cap <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	84.53 11.21	14.95
26 05 33 13-1031	EA 6" Polyvinyl Chloride (PVC) Conduit End Cap <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	106.97 12.81	17.08
26 05 33 13-1032	Polyvinyl Chloride (PVC) Type LB Telecommunications Conduit Bodies With Cover (Smart Pathways) <small>(26 05 33 13-0860)</small>		
26 05 33 13-1033	EA 2" Polyvinyl Chloride (PVC) Type LB Telecommunications Conduit Body With Cover (Smart Pathways EZLB200) <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	133.80 28.82	38.42
26 05 33 13-1034	EA 3/4" To 1-1/4" Polyvinyl Chloride (PVC) Type LB Telecommunications Conduit Body With Cover (Smart Pathways KBLB121)..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	140.23 19.22	25.61
26 05 33 13-1035	EA 1-1/2" To 2-1/2" Polyvinyl Chloride (PVC) Type LB Telecommunications Conduit Body With Cover (Smart Pathways KBLB251)..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	340.28 32.02	42.69
26 05 33 13-1036	EA 3" To 4" Polyvinyl Chloride (PVC) Type LB Telecommunications Conduit Body With Cover (Smart Pathways KBLB401)..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	662.92 46.43	61.91
26 05 33 13-1037	Conduit Installed Below Grade <small>(26 05 33 13-0058)</small> Note: By direct burial in trench or in concrete slabs or duct banks. Includes detectable warning tape for underground conduits. Excludes trenching, backfilling and concrete.		
26 05 33 13-1038	Schedule 40 Polyvinyl Chloride (PVC) Conduit, Direct Burial <small>(26 05 33 13-1037)</small>		
26 05 33 13-1039	Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial <small>(26 05 33 13-1038)</small> Note: Includes field bend conduit up to and including 1". See CSI section 26 05 33 13-1368 for field bending >1".		
26 05 33 13-1040	LF 1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	4.48 0.43 0.70	
26 05 33 13-1041	LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	5.09 0.52 0.85	
26 05 33 13-1042	LF 1" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	6.04 0.71 1.11	
26 05 33 13-1043	LF 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	6.98 0.89 1.38	
26 05 33 13-1044	LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	7.78 1.04 1.59	
26 05 33 13-1045	LF 2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	9.08 1.31 1.98	
26 05 33 13-1046	LF 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	11.89 1.96 2.89	
26 05 33 13-1047	LF 3" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	13.47 2.30 3.38	
26 05 33 13-1048	LF 3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	15.99 2.88 4.20	
26 05 33 13-1049	LF 4" Schedule 40 Polyvinyl Chloride (PVC) Conduit With Coupled End, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	17.29 3.15 4.58	
26 05 33 13-1050	Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbows, Direct Burial <small>(26 05 33 13-1038)</small> See CSI section 26 05 33 13-1368 for conduit field bending.		
26 05 33 13-1051	EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	28.09 1.69 3.16	
26 05 33 13-1052	EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	33.72 2.03 3.80	
26 05 33 13-1053	EA 1" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial..... <i>For Schedule 60, Add</i> <i>For Schedule 80, Add</i>	40.01 2.53 4.66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1054 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	46.52	
<i>For Schedule 60, Add</i>	3.09	
<i>For Schedule 80, Add</i>	5.61	
26 05 33 13-1055 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	53.23	
<i>For Schedule 60, Add</i>	3.70	
<i>For Schedule 80, Add</i>	6.62	
26 05 33 13-1056 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	60.56	
<i>For Schedule 60, Add</i>	4.47	
<i>For Schedule 80, Add</i>	7.85	
26 05 33 13-1057 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	71.40	
<i>For Schedule 60, Add</i>	6.11	
<i>For Schedule 80, Add</i>	10.31	
26 05 33 13-1058 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	84.77	
<i>For Schedule 60, Add</i>	8.38	
<i>For Schedule 80, Add</i>	13.66	
26 05 33 13-1059 EA 3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	103.52	
<i>For Schedule 60, Add</i>	10.94	
<i>For Schedule 80, Add</i>	17.55	
26 05 33 13-1060 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 90 Degree Elbow, Direct Burial	122.44	
<i>For Schedule 60, Add</i>	13.53	
<i>For Schedule 80, Add</i>	21.51	
26 05 33 13-1061 Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbows, Direct Burial		
<small>(26 05 33 13-1038)</small>		
See CSI section 26 05 33 13-1368 for conduit field bending.		
26 05 33 13-1062 EA 1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	28.09	
<i>For Schedule 60, Add</i>	1.69	
<i>For Schedule 80, Add</i>	3.16	
26 05 33 13-1063 EA 3/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	33.62	
<i>For Schedule 60, Add</i>	2.00	
<i>For Schedule 80, Add</i>	3.76	
26 05 33 13-1064 EA 1" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	39.87	
<i>For Schedule 60, Add</i>	2.50	
<i>For Schedule 80, Add</i>	4.61	
26 05 33 13-1065 EA 1-1/4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	46.11	
<i>For Schedule 60, Add</i>	2.99	
<i>For Schedule 80, Add</i>	5.47	
26 05 33 13-1066 EA 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	52.31	
<i>For Schedule 60, Add</i>	3.47	
<i>For Schedule 80, Add</i>	6.30	
26 05 33 13-1067 EA 2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	60.07	
<i>For Schedule 60, Add</i>	4.34	
<i>For Schedule 80, Add</i>	7.68	
26 05 33 13-1068 EA 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	70.48	
<i>For Schedule 60, Add</i>	5.88	
<i>For Schedule 80, Add</i>	9.99	
26 05 33 13-1069 EA 3" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	83.61	
<i>For Schedule 60, Add</i>	8.09	
<i>For Schedule 80, Add</i>	13.25	
26 05 33 13-1070 EA 3-1/2" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	100.25	
<i>For Schedule 60, Add</i>	10.12	
<i>For Schedule 80, Add</i>	16.41	
26 05 33 13-1071 EA 4" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	119.63	
<i>For Schedule 60, Add</i>	12.83	
<i>For Schedule 80, Add</i>	20.52	
26 05 33 13-1072 EA 5" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	157.79	
<i>For Schedule 60, Add</i>	20.23	
<i>For Schedule 80, Add</i>	31.21	
26 05 33 13-1073 EA 6" Schedule 40 Polyvinyl Chloride (PVC) Conduit 45 Degree Elbow, Direct Burial	179.22	
<i>For Schedule 60, Add</i>	23.46	
<i>For Schedule 80, Add</i>	36.04	
26 05 33 13-1074 Polyvinyl Chloride (PVC) Conduit Female Adapters, Direct Burial		
<small>(26 05 33 13-1038)</small>		
26 05 33 13-1075 EA 1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	15.60	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.49	
26 05 33 13-1076 EA 3/4" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	17.97	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.12	
26 05 33 13-1077 EA 1" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	20.43	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.76	
26 05 33 13-1078 EA 1-1/4" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	23.03	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.41	
26 05 33 13-1079 EA 1-1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	25.31	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.04	
26 05 33 13-1080 EA 2" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	28.22	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.68	
26 05 33 13-1081 EA 2-1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	33.61	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.65	
26 05 33 13-1082 EA 3" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	38.54	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.61	
26 05 33 13-1083 EA 3-1/2" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial	45.64	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.21	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-1084	EA	4" Polyvinyl Chloride (PVC) Conduit Female Adapter, Direct Burial <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	51.35 12.81	
26 05 33 13-1085		Polyvinyl Chloride (PVC) Conduit Bell Ends And Plug, Direct Burial ^(26 05 33 13-1038)		
26 05 33 13-1086	EA	1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	18.11	
26 05 33 13-1087	EA	3/4" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	20.63	
26 05 33 13-1088	EA	1" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	23.17	
26 05 33 13-1089	EA	1-1/4" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	29.71	
26 05 33 13-1090	EA	1-1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	32.87	
26 05 33 13-1091	EA	2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	36.91	
26 05 33 13-1092	EA	2-1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	41.31	
26 05 33 13-1093	EA	3" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	46.76	
26 05 33 13-1094	EA	3-1/2" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	55.40	
26 05 33 13-1095	EA	4" Polyvinyl Chloride (PVC) Conduit Bell End And Plug, Direct Burial.....	61.13	
26 05 33 13-1096		Polyvinyl Chloride (PVC) Conduit Male Terminal Adapters, Direct Burial ^(26 05 33 13-1038)		
26 05 33 13-1097	EA	1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapters, Direct Burial.....	15.49	
26 05 33 13-1098	EA	3/4" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapters, Direct Burial.....	17.97	
26 05 33 13-1099	EA	1" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapters, Direct Burial.....	20.28	
26 05 33 13-1100	EA	1-1/4" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapters, Direct Burial.....	22.77	
26 05 33 13-1101	EA	1-1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	25.08	
26 05 33 13-1102	EA	2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	27.91	
26 05 33 13-1103	EA	2-1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	32.99	
26 05 33 13-1104	EA	3" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	37.68	
26 05 33 13-1105	EA	3-1/2" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	44.53	
26 05 33 13-1106	EA	4" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	50.21	
26 05 33 13-1107	EA	5" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	63.29	
26 05 33 13-1108	EA	6" Polyvinyl Chloride (PVC) Conduit Male Terminal Adapter, Direct Burial.....	71.81	
26 05 33 13-1109		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial ^(26 05 33 13-1037)		
		Note: 40 mil Polyvinyl Chloride (PVC) coated, 2 mil urethane lined (Ocal Blue, Crouse-Hinds, Appleton or O-Z/Gedney).		
26 05 33 13-1110		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial ^(26 05 33 13-1109)		
		Note: Includes field bending for conduit up to and including 1". See CSI section 26 05 33 13-1358 for field bending >1".		
26 05 33 13-1111	LF	1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	11.83 -1.03 -0.44 -0.73	2.35
26 05 33 13-1112	LF	3/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	13.28 -1.16 -0.50 -0.83	2.91
26 05 33 13-1113	LF	1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	16.34 -1.44 -0.62 -1.03	3.24
26 05 33 13-1114	LF	1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	19.73 -1.75 -0.76 -1.26	4.36
26 05 33 13-1115	LF	1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	23.18 -2.07 -0.91 -1.49	4.91
26 05 33 13-1116	LF	2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	29.39 -2.63 -1.16 -1.90	5.36
26 05 33 13-1117	LF	2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	42.69 -3.85 -1.72 -2.78	8.04
26 05 33 13-1118	LF	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	55.05 -4.95 -2.19 -3.57	10.06
26 05 33 13-1119	LF	3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	67.93 -6.09 -2.70 -4.40	10.62
26 05 33 13-1120	LF	4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial..... <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	80.67 -7.23 -3.20 -5.21	11.73

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1121 LF 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	126.03 -11.54 -5.24 -8.39	16.20
26 05 33 13-1122 LF 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Conduit, Direct Burial <i>For >1,000, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i>	168.16 -15.48 -7.07 -11.27	21.22
26 05 33 13-1123 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Couplings, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33 13-1124 EA 1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	12.70	3.35
26 05 33 13-1125 EA 3/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	15.21	4.47
26 05 33 13-1126 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	19.33	5.58
26 05 33 13-1127 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	21.80	6.15
26 05 33 13-1128 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	25.83	7.26
26 05 33 13-1129 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	33.30	8.38
26 05 33 13-1130 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	61.06	10.06
26 05 33 13-1131 EA 3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	77.66	13.97
26 05 33 13-1132 EA 3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	96.20	16.20
26 05 33 13-1133 EA 4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	119.29	22.35
26 05 33 13-1134 EA 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	304.52	30.72
26 05 33 13-1135 EA 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Coupling, Direct Burial.....	306.17	17.31
26 05 33 13-1136 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbows, Direct Burial <small>(26 05 33 13-1109)</small> Note: 90, 45, or 30 degree.		
26 05 33 13-1137 EA 1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	48.94	13.97
26 05 33 13-1138 EA 3/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	56.44	17.31
26 05 33 13-1139 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	67.47	21.22
26 05 33 13-1140 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	79.89	24.58
26 05 33 13-1141 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	93.63	27.93
26 05 33 13-1142 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	114.16	30.72
26 05 33 13-1143 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	176.40	38.55
26 05 33 13-1144 EA 3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	263.71	52.50
26 05 33 13-1145 EA 3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	326.66	59.21
26 05 33 13-1146 EA 4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	374.30	77.08
26 05 33 13-1147 EA 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	781.84	125.68
26 05 33 13-1148 EA 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Standard Radius Elbow, Direct Burial.....	1,230.28	188.81
26 05 33 13-1149 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 12" Large Radius Elbows, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33 13-1150 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 12" Large Radius Elbow, Direct Burial.....	116.98	21.22
26 05 33 13-1151 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 12" Large Radius Elbow, Direct Burial.....	131.58	24.58
26 05 33 13-1152 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 12" Large Radius Elbow, Direct Burial.....	150.23	27.93
26 05 33 13-1153 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 12" Large Radius Elbow, Direct Burial.....	179.46	30.72
26 05 33 13-1154 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 12" Large Radius Elbow, Direct Burial.....	250.31	38.55
26 05 33 13-1155 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbows, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33 13-1156 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbow, Direct Burial.....	130.38	21.22
26 05 33 13-1157 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbow, Direct Burial.....	153.71	24.58
26 05 33 13-1158 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbow, Direct Burial.....	166.09	27.93
26 05 33 13-1159 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbow, Direct Burial.....	214.05	30.72
26 05 33 13-1160 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbow, Direct Burial.....	283.67	38.55

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-1161	EA	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 15" Large Radius Elbow, Direct Burial.....	362.64	52.50
26 05 33	13-1162		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbows, Direct Burial (26 05 33 13-1109)		
26 05 33	13-1163	EA	1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	146.39	21.22
26 05 33	13-1164	EA	1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	165.23	24.58
26 05 33	13-1165	EA	1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	186.45	27.93
26 05 33	13-1166	EA	2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	225.53	30.72
26 05 33	13-1167	EA	2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	322.00	38.55
26 05 33	13-1168	EA	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	407.64	52.50
26 05 33	13-1169	EA	3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	515.13	59.21
26 05 33	13-1170	EA	4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 18" Large Radius Elbow, Direct Burial.....	579.63	77.08
26 05 33	13-1171		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbows, Direct Burial (26 05 33 13-1109)		
26 05 33	13-1172	EA	1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	174.04	21.22
26 05 33	13-1173	EA	1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	192.28	24.58
26 05 33	13-1174	EA	1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	217.16	27.93
26 05 33	13-1175	EA	2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	269.75	30.72
26 05 33	13-1176	EA	2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	390.61	38.55
26 05 33	13-1177	EA	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	483.89	52.50
26 05 33	13-1178	EA	3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	561.68	59.21
26 05 33	13-1179	EA	4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 24" Large Radius Elbow, Direct Burial.....	665.09	77.08
26 05 33	13-1180		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbows, Direct Burial (26 05 33 13-1109)		
26 05 33	13-1181	EA	1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	195.56	21.22
26 05 33	13-1182	EA	1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	217.46	24.58
26 05 33	13-1183	EA	1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	247.39	27.93
26 05 33	13-1184	EA	2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	308.25	30.72
26 05 33	13-1185	EA	2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	428.04	38.55
26 05 33	13-1186	EA	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	544.88	52.50
26 05 33	13-1187	EA	3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	674.88	59.21
26 05 33	13-1188	EA	4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	743.55	77.08
26 05 33	13-1189	EA	5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 30" Large Radius Elbow, Direct Burial.....	1,239.85	125.68
26 05 33	13-1190		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbows, Direct Burial (26 05 33 13-1109)		
26 05 33	13-1191	EA	1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	223.70	21.22
26 05 33	13-1192	EA	1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	247.88	24.58
26 05 33	13-1193	EA	1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	280.52	27.93
26 05 33	13-1194	EA	2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	350.95	30.72
26 05 33	13-1195	EA	2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	490.41	38.55
26 05 33	13-1196	EA	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	622.58	52.50
26 05 33	13-1197	EA	3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	731.59	59.21

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1198 EA 4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	844.83	77.08
26 05 33 13-1199 EA 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	1,310.83	125.68
26 05 33 13-1200 EA 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 36" Large Radius Elbow, Direct Burial.....	1,791.16	188.81
26 05 33 13-1201 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbows, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33 13-1202 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	262.88	21.22
26 05 33 13-1203 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	275.00	24.58
26 05 33 13-1204 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	324.87	27.93
26 05 33 13-1205 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	410.38	30.72
26 05 33 13-1206 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	574.51	38.55
26 05 33 13-1207 EA 3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	727.33	52.50
26 05 33 13-1208 EA 3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	889.28	59.21
26 05 33 13-1209 EA 4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	1,041.86	77.08
26 05 33 13-1210 EA 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	1,542.36	125.68
26 05 33 13-1211 EA 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 42" Large Radius Elbow, Direct Burial.....	1,897.44	188.81
26 05 33 13-1212 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbows, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33 13-1213 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	272.32	21.22
26 05 33 13-1214 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	320.88	24.58
26 05 33 13-1215 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	363.22	27.93
26 05 33 13-1216 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	428.26	30.72
26 05 33 13-1217 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	595.52	38.55
26 05 33 13-1218 EA 3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	759.55	52.50
26 05 33 13-1219 EA 3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	975.16	59.21
26 05 33 13-1220 EA 4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	1,086.55	77.08
26 05 33 13-1221 EA 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	1,604.56	125.68
26 05 33 13-1222 EA 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) 48" Large Radius Elbow, Direct Burial.....	1,951.44	188.81
26 05 33 13-1223 Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS), UNF Conduit Unions, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33 13-1224 EA 1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	90.54	13.97
26 05 33 13-1225 EA 3/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	98.38	17.31
26 05 33 13-1226 EA 1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	127.93	21.22
26 05 33 13-1227 EA 1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	186.70	24.58
26 05 33 13-1228 EA 1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	221.77	27.93
26 05 33 13-1229 EA 2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	282.54	30.72
26 05 33 13-1230 EA 2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	376.41	38.55
26 05 33 13-1231 EA 3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	489.75	38.55
26 05 33 13-1232 EA 3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	630.31	59.21
26 05 33 13-1233 EA 4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	811.45	77.08
26 05 33 13-1234 EA 5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	1,479.89	125.68
26 05 33 13-1235 EA 6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNF Conduit Union, Direct Burial.....	1,840.77	188.81

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-1236		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS), UNY Conduit Unions, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33	13-1237	EA	1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	92.65	13.97
26 05 33	13-1238	EA	3/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	106.44	17.31
26 05 33	13-1239	EA	1" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	132.22	21.22
26 05 33	13-1240	EA	1-1/4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	194.58	24.58
26 05 33	13-1241	EA	1-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	232.71	27.93
26 05 33	13-1242	EA	2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	306.17	30.72
26 05 33	13-1243	EA	2-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	426.97	38.55
26 05 33	13-1244	EA	3" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	541.16	38.55
26 05 33	13-1245	EA	3-1/2" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	723.25	59.21
26 05 33	13-1246	EA	4" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	904.04	77.08
26 05 33	13-1247	EA	5" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	1,649.63	125.68
26 05 33	13-1248	EA	6" Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) UNY Conduit Union, Direct Burial	2,114.85	188.81
26 05 33	13-1249		Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS), Nipples, Direct Burial <small>(26 05 33 13-1109)</small>		
26 05 33	13-1250	EA	1/2" x 2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	31.16	6.71
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.02	
26 05 33	13-1251	EA	3/4" x 2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	34.86	8.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33	13-1252	EA	1" x 2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	40.31	10.62
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33	13-1253	EA	1-1/4" x 2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	48.06	12.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-1254	EA	1-1/2" x 2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	52.18	13.97
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-1255	EA	1/2" x 2-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	34.57	7.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33	13-1256	EA	3/4" x 2-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	37.28	8.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33	13-1257	EA	1" x 2-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	42.76	10.62
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33	13-1258	EA	1-1/4" x 2-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	50.66	12.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-1259	EA	1-1/2" x 2-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	54.98	13.97
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-1260	EA	2" x 2-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	59.54	15.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33	13-1261	EA	1/2" x 3" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	34.74	7.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33	13-1262	EA	3/4" x 3" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	37.44	8.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33	13-1263	EA	1" x 3" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	43.08	10.62
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33	13-1264	EA	1-1/4" x 3" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	50.99	12.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-1265	EA	1-1/2" x 3" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	55.32	13.97
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-1266	EA	2" x 3" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	60.42	15.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1267 EA 1/2" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	37.04	7.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-1268 EA 3/4" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	39.75	8.38
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-1269 EA 1" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	45.55	10.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-1270 EA 1-1/4" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	52.40	12.29
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-1271 EA 1-1/2" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	56.87	13.97
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1272 EA 2" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	63.13	15.64
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-1273 EA 2-1/2" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	88.55	18.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-1274 EA 3" x 3-1/2" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	114.36	26.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-1275 EA 1/2" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	37.21	7.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-1276 EA 3/4" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	40.06	8.38
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-1277 EA 1" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	45.89	10.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-1278 EA 1-1/4" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	53.80	12.29
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-1279 EA 1-1/2" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	58.42	13.97
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1280 EA 2" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	65.85	15.64
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-1281 EA 2-1/2" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	90.95	18.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-1282 EA 3" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	119.53	26.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-1283 EA 3-1/2" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	142.81	29.60
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33 13-1284 EA 4" x 4" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	166.51	38.55
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33 13-1285 EA 1/2" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	37.53	7.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-1286 EA 3/4" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	40.40	8.38
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-1287 EA 1" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	46.26	10.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-1288 EA 1-1/4" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	54.46	12.29
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-1289 EA 1-1/2" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	59.10	13.97
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1290 EA 2" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	67.33	15.64
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-1291 EA 2-1/2" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	100.51	18.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-1292 EA 3" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	127.27	26.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-1293 EA 3-1/2" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	144.46	29.60
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33 13-1294 EA 4" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial.....	170.93	38.55
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-1295	EA	5" x 5" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	252.12	53.06
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	
26 05 33	13-1296	EA	1/2" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	38.13	7.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33	13-1297	EA	3/4" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	41.01	8.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33	13-1298	EA	1" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	46.91	10.62
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33	13-1299	EA	1-1/4" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	55.67	12.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-1300	EA	1-1/2" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	60.56	13.97
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-1301	EA	2" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	68.81	15.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33	13-1302	EA	2-1/2" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	110.21	18.99
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33	13-1303	EA	3" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	137.55	26.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33	13-1304	EA	3-1/2" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	153.72	29.60
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33	13-1305	EA	4" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	186.55	38.55
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33	13-1306	EA	5" x 6" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	275.48	53.06
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	
26 05 33	13-1307	EA	1/2" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	39.08	7.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33	13-1308	EA	3/4" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	41.93	8.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33	13-1309	EA	1" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	48.37	10.62
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33	13-1310	EA	1-1/4" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	55.99	12.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-1311	EA	1-1/2" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	63.52	13.97
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33	13-1312	EA	2" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	76.04	15.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33	13-1313	EA	2-1/2" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	122.14	18.99
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33	13-1314	EA	3" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	151.62	26.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33	13-1315	EA	3-1/2" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	176.92	29.60
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33	13-1316	EA	4" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	210.01	38.55
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33	13-1317	EA	5" x 8" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	291.49	53.06
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	
26 05 33	13-1318	EA	1/2" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	40.07	7.26
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33	13-1319	EA	3/4" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	42.90	8.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33	13-1320	EA	1" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	49.80	10.62
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33	13-1321	EA	1-1/4" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	60.35	12.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33	13-1322	EA	1-1/2" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	70.55	13.97
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1323 EA 2" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	86.66	15.64
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-1324 EA 2-1/2" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	134.76	18.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-1325 EA 3" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	169.65	26.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-1326 EA 3-1/2" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	201.27	29.60
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33 13-1327 EA 4" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	251.06	38.55
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33 13-1328 EA 5" x 10" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	323.44	53.06
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	
26 05 33 13-1329 EA 1/2" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	41.09	7.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.36	
26 05 33 13-1330 EA 3/4" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	44.04	8.38
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.03	
26 05 33 13-1331 EA 1" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	53.44	10.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-1332 EA 1-1/4" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	67.53	12.29
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.37	
26 05 33 13-1333 EA 1-1/2" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	79.07	13.97
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1334 EA 2" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	95.20	15.64
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.38	
26 05 33 13-1335 EA 2-1/2" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	151.60	18.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.40	
26 05 33 13-1336 EA 3" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	196.67	26.26
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.75	
26 05 33 13-1337 EA 3-1/2" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	216.22	29.60
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17.76	
26 05 33 13-1338 EA 4" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	263.65	38.55
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.12	
26 05 33 13-1339 EA 5" x 12" Long Polyvinyl Chloride (PVC) Coated, Urethane Lined, Rigid Galvanized Steel (RGS) Nipple, Direct Burial	328.00	53.06
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.84	
26 05 33 13-1340 Spacers <small>(26 05 33 13-1037)</small>		
<i>Note: For concrete encasement applications. See CSI section 03 30 53 00-0001 for concrete., 26 05 33 13-1037 for conduit.</i>		
26 05 33 13-1341 EA 1" Base Spacers, Average 4" Wide, Direct Burial	11.45	
26 05 33 13-1342 EA 1" Intermediate Spacers, Average 4" Wide, Direct Burial	12.28	
26 05 33 13-1343 EA 1-1/4" Base Spacer, Average 4" Wide, Direct Burial	13.60	
26 05 33 13-1344 EA 1-1/4" Intermediate Spacers, Average 4" Wide, Direct Burial	14.61	
26 05 33 13-1345 EA 1-1/2" Base Spacer, Average 4" Wide, Direct Burial	13.74	
26 05 33 13-1346 EA 1-1/2" Intermediate Spacers, Average 4" Wide, Direct Burial	14.70	
26 05 33 13-1347 EA 2" Base Spacer, Average 4" Wide, Direct Burial	17.01	
26 05 33 13-1348 EA 2" Intermediate Spacers, Average 4" Wide, Direct Burial	15.78	
26 05 33 13-1349 EA 2-1/2" Base Spacer, Average 4" Wide, Direct Burial	18.78	
26 05 33 13-1350 EA 2-1/2" Intermediate Spacers, Average 4" Wide, Direct Burial	18.16	
26 05 33 13-1351 EA 3" Base Spacer, Average 4" Wide, Direct Burial	21.46	
26 05 33 13-1352 EA 3" Intermediate Spacers, Average 4" Wide, Direct Burial	20.52	
26 05 33 13-1353 EA 3-1/2" Base Spacer, Average 4" Wide, Direct Burial	23.26	
26 05 33 13-1354 EA 3-1/2" Intermediate Spacers, Average 4" Wide, Direct Burial	22.25	
26 05 33 13-1355 EA 4" Base Spacer, Average 4" Wide, Direct Burial	23.98	
26 05 33 13-1356 EA 4" Intermediate Spacers, Average 4" Wide, Direct Burial	22.88	
26 05 33 13-1357 Conduit Field Bending <small>(26 05 33 13-0058)</small>		
<i>Note: Conduit tasks by LF include field bending up to and include 1" conduit.</i>		
26 05 33 13-1358 Metallic Conduit Field Bending <small>(26 05 33 13-1357)</small>		
<i>Note: For use with Rigid Galvanized Steel (RGS), Electrical Metallic Tubing (EMT), and Intermediate Metal Conduit (IMC).</i>		
26 05 33 13-1359 EA 1-1/4" Metallic Conduit Field Bending	20.09	
<i>For Aluminum Conduit Bending, Add</i>	13.26	
26 05 33 13-1360 EA 1-1/2" Metallic Conduit Field Bending	25.11	
<i>For Aluminum Conduit Bending, Add</i>	16.57	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-1361	EA	2" Metallic Conduit Field Bending	31.39	
		<i>For Aluminum Conduit Bending, Add</i>	20.72	
26 05 33 13-1362	EA	2-1/2" Metallic Conduit Field Bending	43.95	
		<i>For Aluminum Conduit Bending, Add</i>	29.01	
26 05 33 13-1363	EA	3" Metallic Conduit Field Bending	56.51	
		<i>For Aluminum Conduit Bending, Add</i>	37.30	
26 05 33 13-1364	EA	3-1/2" Metallic Conduit Field Bending	75.34	
		<i>For Aluminum Conduit Bending, Add</i>	49.72	
26 05 33 13-1365	EA	4" Metallic Conduit Field Bending	87.89	
		<i>For Aluminum Conduit Bending, Add</i>	58.01	
26 05 33 13-1366	EA	5" Metallic Conduit Field Bending	100.45	
		<i>For Aluminum Conduit Bending, Add</i>	66.30	
26 05 33 13-1367	EA	6" Metallic Conduit Field Bending	119.29	
		<i>For Aluminum Conduit Bending, Add</i>	78.73	

26 05 33 13-1368 Plastic Conduit Field Bending (26 05 33 13-1357)

Note: For PVC conduits.

26 05 33 13-1369	EA	1" Plastic Conduit Field Bending	28.88	
26 05 33 13-1370	EA	1-1/4" Plastic Conduit Field Bending	31.39	
26 05 33 13-1371	EA	1-1/2" Plastic Conduit Field Bending	37.67	
26 05 33 13-1372	EA	2" Plastic Conduit Field Bending	50.22	
26 05 33 13-1373	EA	2-1/2" Plastic Conduit Field Bending	62.78	
26 05 33 13-1374	EA	3" Plastic Conduit Field Bending	75.34	
26 05 33 13-1375	EA	3-1/2" Plastic Conduit Field Bending	87.89	
26 05 33 13-1376	EA	4" Plastic Conduit Field Bending	100.45	
26 05 33 13-1377	EA	5" Plastic Conduit Field Bending	113.00	
26 05 33 13-1378	EA	6" Plastic Conduit Field Bending	125.56	

26 05 33 13-1379 Cut And Thread Existing In-Place Threaded Conduit (26 05 33 13-0058)

Note: For use when connecting conduit to an existing in-place system.

26 05 33 13-1380	EA	1/2", Cut And Thread Existing In-Place Threaded Conduit	36.74	
		<i>For Work In Restricted Working Space, Add</i>	11.02	
26 05 33 13-1381	EA	3/4", Cut And Thread Existing In-Place Threaded Conduit	40.41	
		<i>For Work In Restricted Working Space, Add</i>	12.12	
26 05 33 13-1382	EA	1", Cut And Thread Existing In-Place Threaded Conduit	44.09	
		<i>For Work In Restricted Working Space, Add</i>	13.23	
26 05 33 13-1383	EA	1-1/4", Cut And Thread Existing In-Place Threaded Conduit	47.76	
		<i>For Work In Restricted Working Space, Add</i>	14.33	
26 05 33 13-1384	EA	1-1/2", Cut And Thread Existing In-Place Threaded Conduit	50.21	
		<i>For Work In Restricted Working Space, Add</i>	15.06	
26 05 33 13-1385	EA	2", Cut And Thread Existing In-Place Threaded Conduit	52.66	
		<i>For Work In Restricted Working Space, Add</i>	15.80	
26 05 33 13-1386	EA	2-1/2", Cut And Thread Existing In-Place Threaded Conduit	55.12	
		<i>For Work In Restricted Working Space, Add</i>	16.54	
26 05 33 13-1387	EA	3", Cut And Thread Existing In-Place Threaded Conduit	57.57	
		<i>For Work In Restricted Working Space, Add</i>	17.27	
26 05 33 13-1388	EA	3-1/2", Cut And Thread Existing In-Place Threaded Conduit	58.79	
		<i>For Work In Restricted Working Space, Add</i>	17.64	
26 05 33 13-1389	EA	4", Cut And Thread Existing In-Place Threaded Conduit	60.02	
		<i>For Work In Restricted Working Space, Add</i>	18.01	
26 05 33 13-1390	EA	5", Cut And Thread Existing In-Place Threaded Conduit	62.47	
		<i>For Work In Restricted Working Space, Add</i>	18.74	
26 05 33 13-1391	EA	6", Cut And Thread Existing In-Place Threaded Conduit	64.92	
		<i>For Work In Restricted Working Space, Add</i>	19.48	

26 05 33 13-1392 Flexible Conduit (26 05 33 13-0058)**26 05 33 13-1393 Flexible Liquid Tight Metallic Conduit And Connectors** (26 05 33 13-1392)

Note: Steel inner core with PVC cover.

26 05 33 13-1394 Flexible Liquid Tight Metallic Conduit (26 05 33 13-1393)

26 05 33 13-1395	LF	1/2" Flexible Liquid Tight Metallic Conduit	4.88	1.34
		<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.50	
		<i>For Work In Restricted Working Space, Add</i>	1.01	
26 05 33 13-1396	LF	3/4" Flexible Liquid Tight Metallic Conduit	6.55	1.78
		<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.67	
		<i>For Work In Restricted Working Space, Add</i>	1.34	
26 05 33 13-1397	LF	1" Flexible Liquid Tight Metallic Conduit	7.61	1.78
		<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.67	
		<i>For Work In Restricted Working Space, Add</i>	1.34	
26 05 33 13-1398	LF	1-1/4" Flexible Liquid Tight Metallic Conduit	9.86	2.24
		<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	0.84	
		<i>For Work In Restricted Working Space, Add</i>	1.67	
26 05 33 13-1399	LF	1-1/2" Flexible Liquid Tight Metallic Conduit	12.71	2.68
		<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	1.01	
		<i>For Work In Restricted Working Space, Add</i>	2.01	
26 05 33 13-1400	LF	2" Flexible Liquid Tight Metallic Conduit	16.70	3.58
		<i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i>	1.34	
		<i>For Work In Restricted Working Space, Add</i>	2.68	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1401 LF 2-1/2" Flexible Liquid Tight Metallic Conduit..... <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Work In Restricted Working Space, Add</i>	22.89 1.51 3.02	4.02
26 05 33 13-1402 LF 3" Flexible Liquid Tight Metallic Conduit..... <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Work In Restricted Working Space, Add</i>	33.86 1.84 3.69	4.91
26 05 33 13-1403 LF 4" Flexible Liquid Tight Metallic Conduit..... <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add For Work In Restricted Working Space, Add</i>	46.43 2.35 4.69	6.26
26 05 33 13-1404 Straight Liquid Tight Connector (26 05 33 13-1393)		
26 05 33 13-1405 EA 1/2" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.73 2.68 2.68	3.58
26 05 33 13-1406 EA 3/4" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.51 3.02 3.02	4.02
26 05 33 13-1407 EA 1" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.90 3.35 3.35	4.47
26 05 33 13-1408 EA 1-1/4" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	27.00 3.69 3.69	4.91
26 05 33 13-1409 EA 1-1/2" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	34.39 4.02 4.02	5.36
26 05 33 13-1410 EA 2" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	47.61 4.69 4.69	6.26
26 05 33 13-1411 EA 2-1/2" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	165.24 6.03 6.03	8.04
26 05 33 13-1412 EA 3" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	213.43 6.37 6.37	8.49
26 05 33 13-1413 EA 4" Straight Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	260.83 9.38 9.38	12.51
26 05 33 13-1414 90 Degree Angle Liquid Tight Connector (26 05 33 13-1393)		
26 05 33 13-1415 EA 1/2" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	19.47 3.69 3.69	4.91
26 05 33 13-1416 EA 3/4" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.03 4.02 4.02	5.36
26 05 33 13-1417 EA 1" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	31.33 4.69 4.69	6.26
26 05 33 13-1418 EA 1-1/4" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	39.71 5.03 5.03	6.71
26 05 33 13-1419 EA 1-1/2" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	48.35 5.36 5.36	7.15
26 05 33 13-1420 EA 2" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	64.24 6.03 6.03	8.04
26 05 33 13-1421 EA 2-1/2" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	231.39 6.37 6.37	8.49
26 05 33 13-1422 EA 3" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	273.47 7.37 7.37	9.83
26 05 33 13-1423 EA 4" 90 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	377.89 11.73 11.73	15.64
26 05 33 13-1424 45 Degree Angle Connector (26 05 33 13-1393)		
26 05 33 13-1425 EA 1/2" 45 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.57 3.69 3.69	4.91
26 05 33 13-1426 EA 3/4" 45 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.03 4.02 4.02	5.36
26 05 33 13-1427 EA 1" 45 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	33.57 4.69 4.69	6.26
26 05 33 13-1428 EA 1-1/4" 45 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	38.26 5.03 5.03	6.71

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-1429	EA	1-1/2" 45 Degree Angle Liquid Tight Connector..... <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	42.94 5.36 5.36	7.15
26 05 33	13-1430		Flexible Metallic Conduit And Connectors (26 05 33 13-1392)		
26 05 33	13-1431		Flexible Steel Conduit (26 05 33 13-1430)		
26 05 33	13-1432	LF	1/2" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	4.43 0.37 0.13 0.92 0.55 1.10	1.46
26 05 33	13-1433	LF	3/4" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	5.01 0.40 0.17 1.00 0.60 1.19	1.95
26 05 33	13-1434	LF	1" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	6.20 0.43 0.32 1.07 0.64 1.28	1.95
26 05 33	13-1435	LF	1-1/4" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	7.03 0.45 0.41 1.13 0.68 1.36	2.45
26 05 33	13-1436	LF	1-1/2" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	9.11 0.47 0.73 1.18 0.71 1.41	2.94
26 05 33	13-1437	LF	2" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	10.29 0.49 0.89 1.22 0.73 1.47	3.91
26 05 33	13-1438	LF	2-1/2" Flexible Steel Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	12.64 0.61 1.08 1.53 0.92 1.83	4.40
26 05 33	13-1439	LF	3" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	18.68 0.73 1.87 1.84 1.10 2.20	5.38
26 05 33	13-1440	LF	3-1/2" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	22.86 0.86 2.36 2.14 1.28 2.57	5.87
26 05 33	13-1441	LF	4" Flexible Metallic Conduit..... <i>For Installation In Metal Stud Wall, Add</i> <i>For Flexible Aluminum Conduit, Add</i> <i>For Installation In Wood Stud Wall (Includes Drilling), Add</i> <i>For Installation In Concrete Beam, Slab, Etc. (Excludes Concrete), Add</i> <i>For Work In Restricted Working Space, Add</i>	26.28 0.98 2.72 2.45 1.47 2.93	6.85
26 05 33	13-1442		Plain Squeeze Type Straight Connector (26 05 33 13-1430)		
26 05 33	13-1443	EA	1/2" Flexible Straight Connectors, Plain..... <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.87 1.83 1.83	4.40
26 05 33	13-1444	EA	3/4" Flexible Straight Connectors, Plain..... <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.25 2.20 2.20	5.38
26 05 33	13-1445	EA	1" Flexible Straight Connectors, Plain..... <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.17 2.93 2.93	5.87
26 05 33	13-1446	EA	1-1/4" Flexible Straight Connectors, Plain..... <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.69 3.67 3.67	6.85
26 05 33	13-1447	EA	1-1/2" Flexible Straight Connectors, Plain..... <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.80 4.58 4.58	8.32

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1448 EA 2" Flexible Straight Connectors, Plain.....	38.99	8.32
For Work In Restricted Working Space, Add	5.50	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.50	
26 05 33 13-1449 EA 2-1/2" Flexible Straight Connectors, Plain.....	61.98	10.27
For Work In Restricted Working Space, Add	6.42	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.42	
26 05 33 13-1450 EA 3" Flexible Straight Connectors, Plain.....	80.70	11.24
For Work In Restricted Working Space, Add	7.34	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 05 33 13-1451 EA 3-1/2" Flexible Straight Connectors, Plain.....	245.05	13.21
For Work In Restricted Working Space, Add	8.25	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.25	
26 05 33 13-1452 EA 4" Flexible Straight Connectors, Plain.....	305.78	16.15
For Work In Restricted Working Space, Add	9.17	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.17	
26 05 33 13-1453 Insulated Throat Squeeze Type Straight Connector (26 05 33 13-1430)		
26 05 33 13-1454 EA 1/2" Flexible Straight Connectors, Insulated.....	9.82	4.40
For Work In Restricted Working Space, Add	1.83	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	1.83	
26 05 33 13-1455 EA 3/4" Flexible Straight Connectors, Insulated.....	11.50	5.38
For Work In Restricted Working Space, Add	2.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.20	
26 05 33 13-1456 EA 1" Flexible Straight Connectors, Insulated.....	17.87	5.87
For Work In Restricted Working Space, Add	2.93	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.93	
26 05 33 13-1457 EA 1-1/4" Flexible Straight Connectors, Insulated.....	25.81	6.85
For Work In Restricted Working Space, Add	3.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.67	
26 05 33 13-1458 EA 1-1/2" Flexible Straight Connectors, Insulated.....	35.35	7.34
For Work In Restricted Working Space, Add	4.58	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.58	
26 05 33 13-1459 EA 2" Flexible Straight Connectors, Insulated.....	48.80	8.32
For Work In Restricted Working Space, Add	5.50	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.50	
26 05 33 13-1460 EA 2-1/2" Flexible Straight Connectors, Insulated.....	82.95	10.27
For Work In Restricted Working Space, Add	6.42	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.42	
26 05 33 13-1461 EA 3" Flexible Straight Connectors, Insulated.....	105.43	11.24
For Work In Restricted Working Space, Add	7.34	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 05 33 13-1462 EA 3-1/2" Flexible Straight Connectors, Insulated.....	283.17	13.21
For Work In Restricted Working Space, Add	8.25	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.25	
26 05 33 13-1463 EA 4" Flexible Straight Connectors, Insulated.....	363.10	16.15
For Work In Restricted Working Space, Add	9.17	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.17	
26 05 33 13-1464 Plain Squeeze Type 90 Degree Connector (26 05 33 13-1430)		
26 05 33 13-1465 EA 1/2" Flexible 90 Degree Connector, Plain.....	13.23	5.38
For Work In Restricted Working Space, Add	2.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.57	
26 05 33 13-1466 EA 3/4" Flexible 90 Degree Connector, Plain.....	17.09	5.87
For Work In Restricted Working Space, Add	2.93	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	2.93	
26 05 33 13-1467 EA 1" Flexible 90 Degree Connector, Plain.....	23.76	6.85
For Work In Restricted Working Space, Add	3.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.67	
26 05 33 13-1468 EA 1-1/4" Flexible 90 Degree Connector, Plain.....	36.56	7.34
For Work In Restricted Working Space, Add	4.40	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.40	
26 05 33 13-1469 EA 1-1/2" Flexible 90 Degree Connector, Plain.....	56.60	8.56
For Work In Restricted Working Space, Add	5.50	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.50	
26 05 33 13-1470 EA 2" Flexible 90 Degree Connector, Plain.....	68.10	10.51
For Work In Restricted Working Space, Add	6.24	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.24	
26 05 33 13-1471 EA 2-1/2" Flexible 90 Degree Connector, Plain.....	147.77	11.24
For Work In Restricted Working Space, Add	7.34	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 05 33 13-1472 EA 3" Flexible 90 Degree Connector, Plain.....	189.40	13.21
For Work In Restricted Working Space, Add	8.25	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.25	
26 05 33 13-1473 EA 3-1/2" Flexible 90 Degree Connector, Plain.....	398.73	16.15
For Work In Restricted Working Space, Add	9.17	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.17	
26 05 33 13-1474 EA 4" Flexible 90 Degree Connector, Plain.....	710.38	18.34
For Work In Restricted Working Space, Add	11.00	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.00	
26 05 33 13-1475 Insulated Throat Squeeze Type 90 Degree Connector (26 05 33 13-1430)		

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-1476	EA	1/2" Flexible 90 Degree Connector, Insulated.....	14.55	5.38
			<i>For Work In Restricted Working Space, Add</i>	2.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.57	
26 05 33	13-1477	EA	3/4" Flexible 90 Degree Connector, Insulated.....	18.71	5.87
			<i>For Work In Restricted Working Space, Add</i>	2.93	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33	13-1478	EA	1" Flexible 90 Degree Connector, Insulated	23.76	6.85
			<i>For Work In Restricted Working Space, Add</i>	3.67	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.67	
26 05 33	13-1479	EA	1-1/4" Flexible 90 Degree Connector, Insulated	42.35	7.34
			<i>For Work In Restricted Working Space, Add</i>	4.40	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.40	
26 05 33	13-1480	EA	1-1/2" Flexible 90 Degree Connector, Insulated	67.11	8.56
			<i>For Work In Restricted Working Space, Add</i>	5.50	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.50	
26 05 33	13-1481	EA	2" Flexible 90 Degree Connector, Insulated	85.18	10.51
			<i>For Work In Restricted Working Space, Add</i>	6.24	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.24	
26 05 33	13-1482	EA	2-1/2" Flexible 90 Degree Connector, Insulated	201.18	11.24
			<i>For Work In Restricted Working Space, Add</i>	7.34	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.34	
26 05 33	13-1483	EA	3" Flexible 90 Degree Connector, Insulated	247.27	13.21
			<i>For Work In Restricted Working Space, Add</i>	8.25	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.25	
26 05 33	13-1484	EA	3-1/2" Flexible 90 Degree Connector, Insulated	661.00	16.15
			<i>For Work In Restricted Working Space, Add</i>	9.17	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.17	
26 05 33	13-1485	EA	4" Flexible 90 Degree Connector, Insulated	985.06	18.34
			<i>For Work In Restricted Working Space, Add</i>	11.00	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.00	
26 05 33	13-1486		Plain Squeeze Type 45 Degree Connector (26 05 33 13-1430)		
26 05 33	13-1487	EA	3/8" Flexible 45 Degree Connector, Plain	11.19	4.89
			<i>For Work In Restricted Working Space, Add</i>	2.20	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.20	
26 05 33	13-1488	EA	1/2" Flexible 45 Degree Connector, Plain	14.93	5.38
			<i>For Work In Restricted Working Space, Add</i>	2.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.57	
26 05 33	13-1489	EA	3/4" Flexible 45 Degree Connector, Plain	18.99	5.87
			<i>For Work In Restricted Working Space, Add</i>	2.93	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33	13-1490		Insulated Squeeze Type 45 Degree Connector (26 05 33 13-1430)		
26 05 33	13-1491	EA	3/8" Flexible 45 Degree Connector, Insulated.....	11.93	5.87
			<i>For Work In Restricted Working Space, Add</i>	2.20	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.20	
26 05 33	13-1492	EA	1/2" Flexible 45 Degree Connector, Insulated.....	16.14	5.38
			<i>For Work In Restricted Working Space, Add</i>	2.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.57	
26 05 33	13-1493	EA	3/4" Flexible 45 Degree Connector, Insulated.....	20.70	5.87
			<i>For Work In Restricted Working Space, Add</i>	2.93	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33	13-1494		Plain Screw-In Connector (26 05 33 13-1430)		
26 05 33	13-1495	EA	3/8" Flexible Steel Screw-in Connector, Plain.....	6.14	3.91
			<i>For Work In Restricted Working Space, Add</i>	1.65	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.65	
26 05 33	13-1496	EA	1/2" Flexible Steel Screw-in Connector, Plain.....	6.65	4.40
			<i>For Work In Restricted Working Space, Add</i>	1.83	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.83	
26 05 33	13-1497	EA	3/4" Flexible Steel Screw-in Connector, Plain.....	8.42	5.38
			<i>For Work In Restricted Working Space, Add</i>	2.20	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.20	
26 05 33	13-1498	EA	1" Flexible Steel Screw-in Connector, Plain.....	11.96	5.87
			<i>For Work In Restricted Working Space, Add</i>	2.93	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33	13-1499	EA	1-1/4" Flexible Steel Screw-in Connector, Plain.....	17.33	6.85
			<i>For Work In Restricted Working Space, Add</i>	3.67	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.67	
26 05 33	13-1500	EA	1-1/2" Flexible Steel Screw-in Connector, Plain.....	21.22	7.34
			<i>For Work In Restricted Working Space, Add</i>	4.58	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.58	
26 05 33	13-1501	EA	2" Flexible Steel Screw-in Connector, Plain.....	30.67	8.32
			<i>For Work In Restricted Working Space, Add</i>	5.50	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.50	
26 05 33	13-1502		Insulated Screw-In Connector (26 05 33 13-1430)		
26 05 33	13-1503	EA	3/8" Flexible Steel Screw-in Connector, Insulated.....	6.46	3.91
			<i>For Work In Restricted Working Space, Add</i>	1.65	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.65	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1504 EA 1/2" Flexible Steel Screw-in Connector, Insulated	6.90	4.40
<i>For Work In Restricted Working Space, Add</i>	1.83	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.83	
26 05 33 13-1505 EA 3/4" Flexible Steel Screw-in Connector, Insulated	9.07	5.38
<i>For Work In Restricted Working Space, Add</i>	2.20	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.20	
26 05 33 13-1506 EA 1" Flexible Steel Screw-in Connector, Insulated	12.95	5.87
<i>For Work In Restricted Working Space, Add</i>	2.93	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33 13-1507 EA 1-1/4" Flexible Steel Screw-in Connector, Insulated	18.74	6.85
<i>For Work In Restricted Working Space, Add</i>	3.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.67	
26 05 33 13-1508 EA 1-1/2" Flexible Steel Screw-in Connector, Insulated	22.90	7.34
<i>For Work In Restricted Working Space, Add</i>	4.58	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.58	
26 05 33 13-1509 EA 2" Flexible Steel Screw-in Connector, Insulated	32.16	8.32
<i>For Work In Restricted Working Space, Add</i>	5.50	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.50	
26 05 33 13-1510 Screw-In Coupling (26 05 33 13-1430)		
26 05 33 13-1511 EA 1/2" Flexible Steel Screw-in Coupling	7.26	4.40
<i>For Work In Restricted Working Space, Add</i>	1.83	
26 05 33 13-1512 EA 3/4" Flexible Steel Screw-in Coupling	9.44	5.38
<i>For Work In Restricted Working Space, Add</i>	2.20	
26 05 33 13-1513 Flexible To Electrical Metallic Tubing (EMT) Coupling (26 05 33 13-1430)		
26 05 33 13-1514 EA 3/8" Flexible Steel To Electrical Metallic Tubing (EMT) Coupling	9.42	3.91
<i>For Work In Restricted Working Space, Add</i>	1.65	
26 05 33 13-1515 EA 1/2" Flexible Steel To Electrical Metallic Tubing (EMT) Coupling	12.65	4.40
<i>For Work In Restricted Working Space, Add</i>	1.83	
26 05 33 13-1516 EA 3/4" Flexible Steel To Electrical Metallic Tubing (EMT) Coupling	16.64	5.38
<i>For Work In Restricted Working Space, Add</i>	2.20	
26 05 33 13-1517 Die Cast Squeeze Type Straight Connector (26 05 33 13-1430)		
26 05 33 13-1518 EA 3/8" Flexible Straight Connector, Die Cast	6.34	3.91
<i>For Work In Restricted Working Space, Add</i>	1.65	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.65	
26 05 33 13-1519 EA 1/2" Flexible Straight Connector, Die Cast	7.16	4.40
<i>For Work In Restricted Working Space, Add</i>	1.83	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.83	
26 05 33 13-1520 EA 3/4" Flexible Straight Connector, Die Cast	8.86	5.38
<i>For Work In Restricted Working Space, Add</i>	2.20	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.20	
26 05 33 13-1521 EA 1" Flexible Straight Connector, Die Cast	13.17	5.87
<i>For Work In Restricted Working Space, Add</i>	2.93	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33 13-1522 EA 1-1/4" Flexible Straight Connector, Die Cast	17.63	6.85
<i>For Work In Restricted Working Space, Add</i>	3.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.67	
26 05 33 13-1523 EA 1-1/2" Flexible Straight Connector, Die Cast	23.76	7.34
<i>For Work In Restricted Working Space, Add</i>	4.58	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.58	
26 05 33 13-1524 EA 2" Flexible Straight Connector, Die Cast	30.54	8.32
<i>For Work In Restricted Working Space, Add</i>	5.50	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.50	
26 05 33 13-1525 Die Cast Squeeze Type 90 Degree Connector (26 05 33 13-1430)		
26 05 33 13-1526 EA 3/8" Flexible 90 Degree Connector, Die Cast	8.41	4.89
<i>For Work In Restricted Working Space, Add</i>	2.20	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.20	
26 05 33 13-1527 EA 1/2" Flexible 90 Degree Connector, Die Cast	10.36	5.38
<i>For Work In Restricted Working Space, Add</i>	2.57	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.57	
26 05 33 13-1528 EA 3/4" Flexible 90 Degree Connector, Die Cast	12.49	5.87
<i>For Work In Restricted Working Space, Add</i>	2.93	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2.93	
26 05 33 13-1529 EA 1" Flexible 90 Degree Connector, Die Cast	19.39	6.85
<i>For Work In Restricted Working Space, Add</i>	3.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.67	
26 05 33 13-1530 EA 1-1/4" Flexible 90 Degree Connector, Die Cast	27.17	7.34
<i>For Work In Restricted Working Space, Add</i>	4.40	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.40	
26 05 33 13-1531 EA 1-1/2" Flexible 90 Degree Connector, Die Cast	41.66	8.56
<i>For Work In Restricted Working Space, Add</i>	5.50	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.50	
26 05 33 13-1532 EA 2" Flexible 90 Degree Connector, Die Cast	49.67	10.51
<i>For Work In Restricted Working Space, Add</i>	6.24	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.24	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 05 33 13-1533			Metallic Conduit Bodies <small>(26 05 33 13-0058)</small>		
26 05 33 13-1534			Threaded, Cast Aluminum Conduit Body <small>(26 05 33 13-1533)</small> Note: For use with Rigid Galvanized Steel (RGS), Galvanized Rigid Steel Conduit (GRC), Intermediate Metal Conduit (IMC), or Aluminum Rigid Conduit (ARC)		
26 05 33 13-1535			Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <small>(26 05 33 13-1534)</small>		
26 05 33 13-1536	EA		1/2" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	63.18	21.45
			For Mogul LB, Add	4.48	
			For Work In Restricted Working Space, Add	16.09	
			For Elevated Installation >10' To 15', Add	5.36	
			For Elevated Installation >15' To 20', Add	10.73	
			For Elevated Installation >20' To 25', Add	13.41	
			For Elevated Installation >25' To 30', Add	18.77	
			For Elevated Installation >30' To 35', Add	21.45	
			For Elevated Installation >35' To 40', Add	26.82	
			For Elevated Installation >40', Add	29.50	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.09	
26 05 33 13-1537	EA		3/4" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	74.41	24.58
			For Mogul LB, Add	6.66	
			For Work In Restricted Working Space, Add	18.43	
			For Elevated Installation >10' To 15', Add	6.14	
			For Elevated Installation >15' To 20', Add	12.29	
			For Elevated Installation >20' To 25', Add	15.36	
			For Elevated Installation >25' To 30', Add	21.50	
			For Elevated Installation >30' To 35', Add	24.58	
			For Elevated Installation >35' To 40', Add	30.72	
			For Elevated Installation >40', Add	33.79	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.43	
26 05 33 13-1538	EA		1" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	89.96	28.60
			For Mogul LB, Add	10.27	
			For Work In Restricted Working Space, Add	21.45	
			For Elevated Installation >10' To 15', Add	7.15	
			For Elevated Installation >15' To 20', Add	14.30	
			For Elevated Installation >20' To 25', Add	17.88	
			For Elevated Installation >25' To 30', Add	25.03	
			For Elevated Installation >30' To 35', Add	28.60	
			For Elevated Installation >35' To 40', Add	35.75	
			For Elevated Installation >40', Add	39.33	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.45	
26 05 33 13-1539	EA		1-1/4" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	109.12	32.62
			For Mogul LB, Add	16.59	
			For Work In Restricted Working Space, Add	24.47	
			For Elevated Installation >10' To 15', Add	8.16	
			For Elevated Installation >15' To 20', Add	16.31	
			For Elevated Installation >20' To 25', Add	20.39	
			For Elevated Installation >25' To 30', Add	28.55	
			For Elevated Installation >30' To 35', Add	32.62	
			For Elevated Installation >35' To 40', Add	40.78	
			For Elevated Installation >40', Add	44.86	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	24.47	
26 05 33 13-1540	EA		1-1/2" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	124.93	35.75
			For Mogul LB, Add	22.20	
			For Work In Restricted Working Space, Add	26.81	
			For Elevated Installation >10' To 15', Add	8.94	
			For Elevated Installation >15' To 20', Add	17.87	
			For Elevated Installation >20' To 25', Add	22.34	
			For Elevated Installation >25' To 30', Add	31.28	
			For Elevated Installation >30' To 35', Add	35.75	
			For Elevated Installation >35' To 40', Add	44.69	
			For Elevated Installation >40', Add	49.15	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-1541	EA		2" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	164.69	42.90
			For Mogul LB, Add	37.72	
			For Work In Restricted Working Space, Add	32.18	
			For Elevated Installation >10' To 15', Add	10.73	
			For Elevated Installation >15' To 20', Add	21.45	
			For Elevated Installation >20' To 25', Add	26.81	
			For Elevated Installation >25' To 30', Add	37.54	
			For Elevated Installation >30' To 35', Add	42.90	
			For Elevated Installation >35' To 40', Add	53.63	
			For Elevated Installation >40', Add	58.99	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.18	
26 05 33 13-1542	EA		2-1/2" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	277.94	60.33
			For Mogul LB, Add	87.80	
			For Work In Restricted Working Space, Add	45.25	
			For Elevated Installation >10' To 15', Add	15.08	
			For Elevated Installation >15' To 20', Add	30.16	
			For Elevated Installation >20' To 25', Add	37.71	
			For Elevated Installation >25' To 30', Add	52.79	
			For Elevated Installation >30' To 35', Add	60.33	
			For Elevated Installation >35' To 40', Add	75.41	
			For Elevated Installation >40', Add	82.95	
			For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	45.25	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-1543 EA 3" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	365.22	80.43
For Mogul LB, Add	113.04	
For Work In Restricted Working Space, Add	60.33	
For Elevated Installation >10' To 15', Add	20.11	
For Elevated Installation >15' To 20', Add	40.22	
For Elevated Installation >20' To 25', Add	50.27	
For Elevated Installation >25' To 30', Add	70.38	
For Elevated Installation >30' To 35', Add	80.44	
For Elevated Installation >35' To 40', Add	100.55	
For Elevated Installation >40', Add	110.60	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	60.33	
26 05 33 13-1544 EA 3-1/2" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	486.10	100.54
For Mogul LB, Add	163.49	
For Work In Restricted Working Space, Add	75.41	
For Elevated Installation >10' To 15', Add	25.14	
For Elevated Installation >15' To 20', Add	50.27	
For Elevated Installation >20' To 25', Add	62.84	
For Elevated Installation >25' To 30', Add	87.98	
For Elevated Installation >30' To 35', Add	100.54	
For Elevated Installation >35' To 40', Add	125.68	
For Elevated Installation >40', Add	138.25	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	75.41	
26 05 33 13-1545 EA 4" Type LB, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	632.29	122.44
For Mogul LB, Add	229.34	
For Work In Restricted Working Space, Add	91.83	
For Elevated Installation >10' To 15', Add	30.61	
For Elevated Installation >15' To 20', Add	61.22	
For Elevated Installation >20' To 25', Add	76.53	
For Elevated Installation >25' To 30', Add	107.14	
For Elevated Installation >30' To 35', Add	122.44	
For Elevated Installation >35' To 40', Add	153.05	
For Elevated Installation >40', Add	168.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	91.83	
26 05 33 13-1546 Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With		
Cover <small>(26 05 33 13-1534)</small>		
26 05 33 13-1547 EA 1/2" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	64.34	21.45
For Mogul LB, Add	5.35	
For Work In Restricted Working Space, Add	16.09	
For Elevated Installation >10' To 15', Add	5.36	
For Elevated Installation >15' To 20', Add	10.73	
For Elevated Installation >20' To 25', Add	13.41	
For Elevated Installation >25' To 30', Add	18.77	
For Elevated Installation >30' To 35', Add	21.45	
For Elevated Installation >35' To 40', Add	26.82	
For Elevated Installation >40', Add	29.50	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.09	
26 05 33 13-1548 EA 3/4" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	75.54	24.58
For Mogul LB, Add	7.50	
For Work In Restricted Working Space, Add	18.43	
For Elevated Installation >10' To 15', Add	6.14	
For Elevated Installation >15' To 20', Add	12.29	
For Elevated Installation >20' To 25', Add	15.36	
For Elevated Installation >25' To 30', Add	21.50	
For Elevated Installation >30' To 35', Add	24.58	
For Elevated Installation >35' To 40', Add	30.72	
For Elevated Installation >40', Add	33.79	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.43	
26 05 33 13-1549 EA 1" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	92.24	28.60
For Mogul LB, Add	11.98	
For Work In Restricted Working Space, Add	21.45	
For Elevated Installation >10' To 15', Add	7.15	
For Elevated Installation >15' To 20', Add	14.30	
For Elevated Installation >20' To 25', Add	17.88	
For Elevated Installation >25' To 30', Add	25.03	
For Elevated Installation >30' To 35', Add	28.60	
For Elevated Installation >35' To 40', Add	35.75	
For Elevated Installation >40', Add	39.33	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.45	
26 05 33 13-1550 EA 1-1/4" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	111.90	32.62
For Mogul LB, Add	18.68	
For Work In Restricted Working Space, Add	24.47	
For Elevated Installation >10' To 15', Add	8.16	
For Elevated Installation >15' To 20', Add	16.31	
For Elevated Installation >20' To 25', Add	20.39	
For Elevated Installation >25' To 30', Add	28.55	
For Elevated Installation >30' To 35', Add	32.62	
For Elevated Installation >35' To 40', Add	40.78	
For Elevated Installation >40', Add	44.86	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	24.47	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-1551	EA 1-1/2" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <i>For Mogul LB, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	129.66 25.75 26.81 8.94 17.87 22.34 31.28 35.75 44.69 49.15 26.81	35.75
26 05 33 13-1552	EA 2" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <i>For Mogul LB, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	174.84 45.33 32.18 10.73 21.45 26.81 37.54 42.90 53.63 58.99 32.18	42.90
26 05 33 13-1553	EA 2-1/2" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <i>For Mogul LB, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	272.82 83.96 45.25 15.08 30.16 37.71 52.79 60.33 75.41 82.95 45.25	60.33
26 05 33 13-1554	EA 3" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <i>For Mogul LB, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	348.00 100.13 60.33 20.11 40.22 50.27 70.38 80.44 100.55 110.60 60.33	80.43
26 05 33 13-1555	EA 3-1/2" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <i>For Mogul LB, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	500.79 174.50 75.41 25.14 50.27 62.84 87.98 100.54 125.68 138.25 75.41	100.54
26 05 33 13-1556	EA 4" Type LL Or LR, Threaded, Two Hub Cast Aluminum Conduit Body With Cover <i>For Mogul LB, Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	662.31 251.85 91.83 30.61 61.22 76.53 107.14 122.44 153.05 168.36 91.83	122.44
26 05 33 13-1557	Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover ^{(26 05}		
26 05 33 13-1558	EA 1/2" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover <i>For Work In Restricted Working Space, Add</i> <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	74.10 18.43 6.14 12.29 15.36 21.50 24.58 30.72 33.79 18.43	24.58

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1559 EA 3/4" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	87.80	28.60
For Work In Restricted Working Space, Add	21.45	
For Elevated Installation >10' To 15', Add	7.15	
For Elevated Installation >15' To 20', Add	14.30	
For Elevated Installation >20' To 25', Add	17.88	
For Elevated Installation >25' To 30', Add	25.03	
For Elevated Installation >30' To 35', Add	28.60	
For Elevated Installation >35' To 40', Add	35.75	
For Elevated Installation >40', Add	39.33	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.45	
26 05 33 13-1560 EA 1" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	101.27	31.28
For Work In Restricted Working Space, Add	23.46	
For Elevated Installation >10' To 15', Add	7.82	
For Elevated Installation >15' To 20', Add	15.64	
For Elevated Installation >20' To 25', Add	19.55	
For Elevated Installation >25' To 30', Add	27.37	
For Elevated Installation >30' To 35', Add	31.28	
For Elevated Installation >35' To 40', Add	39.10	
For Elevated Installation >40', Add	43.01	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.46	
26 05 33 13-1561 EA 1-1/4" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	124.34	35.75
For Work In Restricted Working Space, Add	26.81	
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-1562 EA 1-1/2" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	143.75	39.33
For Work In Restricted Working Space, Add	29.49	
For Elevated Installation >10' To 15', Add	9.83	
For Elevated Installation >15' To 20', Add	19.66	
For Elevated Installation >20' To 25', Add	24.58	
For Elevated Installation >25' To 30', Add	34.41	
For Elevated Installation >30' To 35', Add	39.32	
For Elevated Installation >35' To 40', Add	49.16	
For Elevated Installation >40', Add	54.07	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.49	
26 05 33 13-1563 EA 2" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	192.79	46.03
For Work In Restricted Working Space, Add	34.52	
For Elevated Installation >10' To 15', Add	11.51	
For Elevated Installation >15' To 20', Add	23.01	
For Elevated Installation >20' To 25', Add	28.77	
For Elevated Installation >25' To 30', Add	40.27	
For Elevated Installation >30' To 35', Add	46.03	
For Elevated Installation >35' To 40', Add	57.54	
For Elevated Installation >40', Add	63.29	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	34.52	
26 05 33 13-1564 EA 2-1/2" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	304.90	67.03
For Work In Restricted Working Space, Add	50.27	
For Elevated Installation >10' To 15', Add	16.76	
For Elevated Installation >15' To 20', Add	33.51	
For Elevated Installation >20' To 25', Add	41.89	
For Elevated Installation >25' To 30', Add	58.65	
For Elevated Installation >30' To 35', Add	67.03	
For Elevated Installation >35' To 40', Add	83.79	
For Elevated Installation >40', Add	92.16	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	50.27	
26 05 33 13-1565 EA 3" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	393.90	87.14
For Work In Restricted Working Space, Add	65.36	
For Elevated Installation >10' To 15', Add	21.79	
For Elevated Installation >15' To 20', Add	43.57	
For Elevated Installation >20' To 25', Add	54.46	
For Elevated Installation >25' To 30', Add	76.25	
For Elevated Installation >30' To 35', Add	87.14	
For Elevated Installation >35' To 40', Add	108.93	
For Elevated Installation >40', Add	119.82	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	65.36	
26 05 33 13-1566 EA 3-1/2" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover.....	633.75	107.25
For Work In Restricted Working Space, Add	80.43	
For Elevated Installation >10' To 15', Add	26.81	
For Elevated Installation >15' To 20', Add	53.62	
For Elevated Installation >20' To 25', Add	67.03	
For Elevated Installation >25' To 30', Add	93.84	
For Elevated Installation >30' To 35', Add	107.24	
For Elevated Installation >35' To 40', Add	134.06	
For Elevated Installation >40', Add	147.46	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	80.43	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

Los Angeles County Development Authority

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-1567	EA 4" Type T, Threaded, Three Hub Cast Aluminum Conduit Body With Cover	725.45	129.15
	<i>For Work In Restricted Working Space, Add</i>	96.86	
	<i>For Elevated Installation >10' To 15', Add</i>	32.29	
	<i>For Elevated Installation >15' To 20', Add</i>	64.57	
	<i>For Elevated Installation >20' To 25', Add</i>	80.72	
	<i>For Elevated Installation >25' To 30', Add</i>	113.00	
	<i>For Elevated Installation >30' To 35', Add</i>	129.14	
	<i>For Elevated Installation >35' To 40', Add</i>	161.43	
	<i>For Elevated Installation >40', Add</i>	177.57	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	96.86	
26 05 33 13-1568	RGS Type C Conduit Bodies With Cover (26 05 33 13-1534)		
26 05 33 13-1569	EA 1/2" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	64.58	21.45
	<i>For Work In Restricted Working Space, Add</i>	16.09	
	<i>For Elevated Installation >10' To 15', Add</i>	5.36	
	<i>For Elevated Installation >15' To 20', Add</i>	10.73	
	<i>For Elevated Installation >20' To 25', Add</i>	13.41	
	<i>For Elevated Installation >25' To 30', Add</i>	18.77	
	<i>For Elevated Installation >30' To 35', Add</i>	21.45	
	<i>For Elevated Installation >35' To 40', Add</i>	26.82	
	<i>For Elevated Installation >40', Add</i>	29.50	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.09	
26 05 33 13-1570	EA 3/4" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	74.74	24.58
	<i>For Work In Restricted Working Space, Add</i>	18.43	
	<i>For Elevated Installation >10' To 15', Add</i>	6.14	
	<i>For Elevated Installation >15' To 20', Add</i>	12.29	
	<i>For Elevated Installation >20' To 25', Add</i>	15.36	
	<i>For Elevated Installation >25' To 30', Add</i>	21.50	
	<i>For Elevated Installation >30' To 35', Add</i>	24.58	
	<i>For Elevated Installation >35' To 40', Add</i>	30.72	
	<i>For Elevated Installation >40', Add</i>	33.79	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.43	
26 05 33 13-1571	EA 1" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	90.19	28.15
	<i>For Work In Restricted Working Space, Add</i>	21.11	
	<i>For Elevated Installation >10' To 15', Add</i>	7.04	
	<i>For Elevated Installation >15' To 20', Add</i>	14.08	
	<i>For Elevated Installation >20' To 25', Add</i>	17.60	
	<i>For Elevated Installation >25' To 30', Add</i>	24.63	
	<i>For Elevated Installation >30' To 35', Add</i>	28.15	
	<i>For Elevated Installation >35' To 40', Add</i>	35.19	
	<i>For Elevated Installation >40', Add</i>	38.71	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21.11	
26 05 33 13-1572	EA 1-1/4" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	110.80	32.62
	<i>For Work In Restricted Working Space, Add</i>	24.47	
	<i>For Elevated Installation >10' To 15', Add</i>	8.16	
	<i>For Elevated Installation >15' To 20', Add</i>	16.31	
	<i>For Elevated Installation >20' To 25', Add</i>	20.39	
	<i>For Elevated Installation >25' To 30', Add</i>	28.55	
	<i>For Elevated Installation >30' To 35', Add</i>	32.62	
	<i>For Elevated Installation >35' To 40', Add</i>	40.78	
	<i>For Elevated Installation >40', Add</i>	44.86	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	24.47	
26 05 33 13-1573	EA 1-1/2" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	124.16	35.75
	<i>For Work In Restricted Working Space, Add</i>	26.81	
	<i>For Elevated Installation >10' To 15', Add</i>	8.94	
	<i>For Elevated Installation >15' To 20', Add</i>	17.87	
	<i>For Elevated Installation >20' To 25', Add</i>	22.34	
	<i>For Elevated Installation >25' To 30', Add</i>	31.28	
	<i>For Elevated Installation >30' To 35', Add</i>	35.75	
	<i>For Elevated Installation >35' To 40', Add</i>	44.69	
	<i>For Elevated Installation >40', Add</i>	49.15	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	26.81	
26 05 33 13-1574	EA 2" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	164.77	42.90
	<i>For Work In Restricted Working Space, Add</i>	32.18	
	<i>For Elevated Installation >10' To 15', Add</i>	10.73	
	<i>For Elevated Installation >15' To 20', Add</i>	21.45	
	<i>For Elevated Installation >20' To 25', Add</i>	26.81	
	<i>For Elevated Installation >25' To 30', Add</i>	37.54	
	<i>For Elevated Installation >30' To 35', Add</i>	42.90	
	<i>For Elevated Installation >35' To 40', Add</i>	53.63	
	<i>For Elevated Installation >40', Add</i>	58.99	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32.18	
26 05 33 13-1575	EA 2-1/2" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	268.50	60.33
	<i>For Work In Restricted Working Space, Add</i>	45.25	
	<i>For Elevated Installation >10' To 15', Add</i>	15.08	
	<i>For Elevated Installation >15' To 20', Add</i>	30.16	
	<i>For Elevated Installation >20' To 25', Add</i>	37.71	
	<i>For Elevated Installation >25' To 30', Add</i>	52.79	
	<i>For Elevated Installation >30' To 35', Add</i>	60.33	
	<i>For Elevated Installation >35' To 40', Add</i>	75.41	
	<i>For Elevated Installation >40', Add</i>	82.95	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	45.25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1576 EA 3" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	345.24	80.43
For Work In Restricted Working Space, Add	60.33	
For Elevated Installation >10' To 15', Add	20.11	
For Elevated Installation >15' To 20', Add	40.22	
For Elevated Installation >20' To 25', Add	50.27	
For Elevated Installation >25' To 30', Add	70.38	
For Elevated Installation >30' To 35', Add	80.44	
For Elevated Installation >35' To 40', Add	100.55	
For Elevated Installation >40', Add	110.60	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	60.33	
26 05 33 13-1577 EA 3-1/2" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	491.96	100.54
For Work In Restricted Working Space, Add	75.41	
For Elevated Installation >10' To 15', Add	25.14	
For Elevated Installation >15' To 20', Add	50.27	
For Elevated Installation >20' To 25', Add	62.84	
For Elevated Installation >25' To 30', Add	87.98	
For Elevated Installation >30' To 35', Add	100.54	
For Elevated Installation >35' To 40', Add	125.68	
For Elevated Installation >40', Add	138.25	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	75.41	
26 05 33 13-1578 EA 4" Type C, Threaded, Two Hub Cast Aluminum Conduit Body With Cover	635.05	122.44
For Work In Restricted Working Space, Add	91.83	
For Elevated Installation >10' To 15', Add	30.61	
For Elevated Installation >15' To 20', Add	61.22	
For Elevated Installation >20' To 25', Add	76.53	
For Elevated Installation >25' To 30', Add	107.14	
For Elevated Installation >30' To 35', Add	122.44	
For Elevated Installation >35' To 40', Add	153.05	
For Elevated Installation >40', Add	168.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	91.83	
26 05 33 13-1579 Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover <small>(26 05 33 13-1534)</small>		
26 05 33 13-1580 EA 1/2" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover	85.92	28.15
For Work In Restricted Working Space, Add	21.11	
For Elevated Installation >10' To 15', Add	7.04	
For Elevated Installation >15' To 20', Add	14.08	
For Elevated Installation >20' To 25', Add	17.60	
For Elevated Installation >25' To 30', Add	24.63	
For Elevated Installation >30' To 35', Add	28.15	
For Elevated Installation >35' To 40', Add	35.19	
For Elevated Installation >40', Add	38.71	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.11	
26 05 33 13-1581 EA 3/4" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover	99.22	31.28
For Work In Restricted Working Space, Add	23.46	
For Elevated Installation >10' To 15', Add	7.82	
For Elevated Installation >15' To 20', Add	15.64	
For Elevated Installation >20' To 25', Add	19.55	
For Elevated Installation >25' To 30', Add	27.37	
For Elevated Installation >30' To 35', Add	31.28	
For Elevated Installation >35' To 40', Add	39.10	
For Elevated Installation >40', Add	43.01	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	23.46	
26 05 33 13-1582 EA 1" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover	121.59	34.41
For Work In Restricted Working Space, Add	25.81	
For Elevated Installation >10' To 15', Add	8.60	
For Elevated Installation >15' To 20', Add	17.21	
For Elevated Installation >20' To 25', Add	21.51	
For Elevated Installation >25' To 30', Add	30.11	
For Elevated Installation >30' To 35', Add	34.41	
For Elevated Installation >35' To 40', Add	43.02	
For Elevated Installation >40', Add	47.32	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	25.81	
26 05 33 13-1583 EA 1-1/4" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover	140.18	39.33
For Work In Restricted Working Space, Add	29.49	
For Elevated Installation >10' To 15', Add	9.83	
For Elevated Installation >15' To 20', Add	19.66	
For Elevated Installation >20' To 25', Add	24.58	
For Elevated Installation >25' To 30', Add	34.41	
For Elevated Installation >30' To 35', Add	39.32	
For Elevated Installation >35' To 40', Add	49.16	
For Elevated Installation >40', Add	54.07	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.49	
26 05 33 13-1584 EA 1-1/2" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover	180.59	42.90
For Work In Restricted Working Space, Add	32.18	
For Elevated Installation >10' To 15', Add	10.73	
For Elevated Installation >15' To 20', Add	21.45	
For Elevated Installation >20' To 25', Add	26.81	
For Elevated Installation >25' To 30', Add	37.54	
For Elevated Installation >30' To 35', Add	42.90	
For Elevated Installation >35' To 40', Add	53.63	
For Elevated Installation >40', Add	58.99	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.18	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	13-1585	EA	2" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover.....	218.30	52.73
			<i>For Work In Restricted Working Space, Add</i>	39.55	
			<i>For Elevated Installation >10' To 15', Add</i>	13.18	
			<i>For Elevated Installation >15' To 20', Add</i>	26.36	
			<i>For Elevated Installation >20' To 25', Add</i>	32.96	
			<i>For Elevated Installation >25' To 30', Add</i>	46.14	
			<i>For Elevated Installation >30' To 35', Add</i>	52.73	
			<i>For Elevated Installation >35' To 40', Add</i>	65.91	
			<i>For Elevated Installation >40', Add</i>	72.50	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	39.55	
26 05 33	13-1586	EA	2-1/2" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover.....	407.84	77.30
			<i>For Work In Restricted Working Space, Add</i>	57.98	
			<i>For Elevated Installation >10' To 15', Add</i>	19.33	
			<i>For Elevated Installation >15' To 20', Add</i>	38.65	
			<i>For Elevated Installation >20' To 25', Add</i>	48.32	
			<i>For Elevated Installation >25' To 30', Add</i>	67.64	
			<i>For Elevated Installation >30' To 35', Add</i>	77.31	
			<i>For Elevated Installation >35' To 40', Add</i>	96.64	
			<i>For Elevated Installation >40', Add</i>	106.30	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	57.98	
26 05 33	13-1587	EA	3" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover.....	502.72	100.54
			<i>For Work In Restricted Working Space, Add</i>	75.41	
			<i>For Elevated Installation >10' To 15', Add</i>	25.14	
			<i>For Elevated Installation >15' To 20', Add</i>	50.27	
			<i>For Elevated Installation >20' To 25', Add</i>	62.84	
			<i>For Elevated Installation >25' To 30', Add</i>	87.98	
			<i>For Elevated Installation >30' To 35', Add</i>	100.54	
			<i>For Elevated Installation >35' To 40', Add</i>	125.68	
			<i>For Elevated Installation >40', Add</i>	138.25	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.41	
26 05 33	13-1588	EA	3-1/2" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover.....	718.21	124.23
			<i>For Work In Restricted Working Space, Add</i>	93.84	
			<i>For Elevated Installation >10' To 15', Add</i>	31.28	
			<i>For Elevated Installation >15' To 20', Add</i>	62.56	
			<i>For Elevated Installation >20' To 25', Add</i>	78.20	
			<i>For Elevated Installation >25' To 30', Add</i>	109.48	
			<i>For Elevated Installation >30' To 35', Add</i>	125.12	
			<i>For Elevated Installation >35' To 40', Add</i>	156.41	
			<i>For Elevated Installation >40', Add</i>	172.05	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	93.84	
26 05 33	13-1589	EA	4" Type X, Threaded, Four Hub Cast Aluminum Conduit Body With Cover.....	867.69	149.26
			<i>For Work In Restricted Working Space, Add</i>	111.94	
			<i>For Elevated Installation >10' To 15', Add</i>	37.31	
			<i>For Elevated Installation >15' To 20', Add</i>	74.63	
			<i>For Elevated Installation >20' To 25', Add</i>	93.28	
			<i>For Elevated Installation >25' To 30', Add</i>	130.60	
			<i>For Elevated Installation >30' To 35', Add</i>	149.25	
			<i>For Elevated Installation >35' To 40', Add</i>	186.57	
			<i>For Elevated Installation >40', Add</i>	205.22	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	111.94	
26 05 33	13-1590		Threaded, Malleable Iron Conduit Body <small>(26 05 33 13-1533)</small>		
			Note: For use with Rigid Galvanized Steel (RGS), Galvanized Rigid Steel Conduit (GRC), or Intermediate Metal Conduit (IMC)		
26 05 33	13-1591		Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover <small>(26 05 33 13-1590)</small>		
26 05 33	13-1592	EA	1/2" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	66.43	21.45
			<i>For Elevated Installation >10' To 15', Add</i>	5.36	
			<i>For Elevated Installation >15' To 20', Add</i>	10.73	
			<i>For Elevated Installation >20' To 25', Add</i>	13.41	
			<i>For Elevated Installation >25' To 30', Add</i>	18.77	
			<i>For Elevated Installation >30' To 35', Add</i>	21.45	
			<i>For Elevated Installation >35' To 40', Add</i>	26.82	
			<i>For Elevated Installation >40', Add</i>	29.50	
			<i>For Work In Restricted Working Space, Add</i>	16.09	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.09	
26 05 33	13-1593	EA	3/4" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	77.13	24.58
			<i>For Elevated Installation >10' To 15', Add</i>	6.14	
			<i>For Elevated Installation >15' To 20', Add</i>	12.29	
			<i>For Elevated Installation >20' To 25', Add</i>	15.36	
			<i>For Elevated Installation >25' To 30', Add</i>	21.50	
			<i>For Elevated Installation >30' To 35', Add</i>	24.58	
			<i>For Elevated Installation >35' To 40', Add</i>	30.72	
			<i>For Elevated Installation >40', Add</i>	33.79	
			<i>For Work In Restricted Working Space, Add</i>	18.43	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.43	
26 05 33	13-1594	EA	1" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	94.88	28.60
			<i>For Elevated Installation >10' To 15', Add</i>	7.15	
			<i>For Elevated Installation >15' To 20', Add</i>	14.30	
			<i>For Elevated Installation >20' To 25', Add</i>	17.88	
			<i>For Elevated Installation >25' To 30', Add</i>	25.03	
			<i>For Elevated Installation >30' To 35', Add</i>	28.60	
			<i>For Elevated Installation >35' To 40', Add</i>	35.75	
			<i>For Elevated Installation >40', Add</i>	39.33	
			<i>For Work In Restricted Working Space, Add</i>	21.45	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21.45	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1595 EA 1-1/4" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	123.50	32.62
For Elevated Installation >10' To 15', Add	8.16	
For Elevated Installation >15' To 20', Add	16.31	
For Elevated Installation >20' To 25', Add	20.39	
For Elevated Installation >25' To 30', Add	28.54	
For Elevated Installation >30' To 35', Add	32.62	
For Elevated Installation >35' To 40', Add	40.78	
For Elevated Installation >40', Add	44.85	
For Work In Restricted Working Space, Add	24.47	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	24.47	
26 05 33 13-1596 EA 1-1/2" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	140.83	35.75
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Work In Restricted Working Space, Add	26.81	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-1597 EA 2" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	193.37	42.90
For Elevated Installation >10' To 15', Add	10.73	
For Elevated Installation >15' To 20', Add	21.45	
For Elevated Installation >20' To 25', Add	26.81	
For Elevated Installation >25' To 30', Add	37.54	
For Elevated Installation >30' To 35', Add	42.90	
For Elevated Installation >35' To 40', Add	53.63	
For Elevated Installation >40', Add	58.99	
For Work In Restricted Working Space, Add	32.18	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.18	
26 05 33 13-1598 EA 2-1/2" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	327.10	60.33
For Elevated Installation >10' To 15', Add	15.08	
For Elevated Installation >15' To 20', Add	30.16	
For Elevated Installation >20' To 25', Add	37.71	
For Elevated Installation >25' To 30', Add	52.79	
For Elevated Installation >30' To 35', Add	60.33	
For Elevated Installation >35' To 40', Add	75.41	
For Elevated Installation >40', Add	82.95	
For Work In Restricted Working Space, Add	45.25	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	45.25	
26 05 33 13-1599 EA 3" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	464.07	80.43
For Elevated Installation >10' To 15', Add	20.11	
For Elevated Installation >15' To 20', Add	40.22	
For Elevated Installation >20' To 25', Add	50.28	
For Elevated Installation >25' To 30', Add	70.39	
For Elevated Installation >30' To 35', Add	80.44	
For Elevated Installation >35' To 40', Add	100.55	
For Elevated Installation >40', Add	110.61	
For Work In Restricted Working Space, Add	60.33	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	60.33	
26 05 33 13-1600 EA 3-1/2" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	640.68	100.54
For Elevated Installation >10' To 15', Add	25.14	
For Elevated Installation >15' To 20', Add	50.27	
For Elevated Installation >20' To 25', Add	62.84	
For Elevated Installation >25' To 30', Add	87.98	
For Elevated Installation >30' To 35', Add	100.54	
For Elevated Installation >35' To 40', Add	125.68	
For Elevated Installation >40', Add	138.25	
For Work In Restricted Working Space, Add	75.41	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	75.41	
26 05 33 13-1601 EA 4" Type LB, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	766.48	122.44
For Elevated Installation >10' To 15', Add	30.61	
For Elevated Installation >15' To 20', Add	61.22	
For Elevated Installation >20' To 25', Add	76.53	
For Elevated Installation >25' To 30', Add	107.14	
For Elevated Installation >30' To 35', Add	122.44	
For Elevated Installation >35' To 40', Add	153.06	
For Elevated Installation >40', Add	168.36	
For Work In Restricted Working Space, Add	91.83	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	91.83	
26 05 33 13-1602 Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover <small>(26 05 33 13-1590)</small>		
26 05 33 13-1603 EA 1/2" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	69.39	21.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.09	
26 05 33 13-1604 EA 3/4" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	78.00	24.58
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.43	
26 05 33 13-1605 EA 1" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	99.41	28.60
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.45	
26 05 33 13-1606 EA 1-1/4" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	126.53	32.62
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	24.47	
26 05 33 13-1607 EA 1-1/2" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	144.54	35.75
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	
26 05 33 13-1608 EA 2" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	185.76	42.90
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.18	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-1609	EA 2-1/2" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	284.83 45.25	60.33
26 05 33 13-1610	EA 3" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	388.07 60.33	80.43
26 05 33 13-1611	EA 3-1/2" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	685.44 75.41	100.54
26 05 33 13-1612	EA 4" Type LL Or LR, Threaded, Two Hub Malleable Iron Conduit Body With Cover <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	799.50 91.83	122.44
26 05 33 13-1613	Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <small>(26 05 33 13-1690)</small>		
26 05 33 13-1614	EA 1/2" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	82.57 6.14 12.29 15.36 21.50 24.58 30.72 33.79 18.43 18.43	24.58
26 05 33 13-1615	EA 3/4" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	97.32 7.26 14.52 18.15 25.41 29.04 36.31 39.94 21.78 21.78	28.60
26 05 33 13-1616	EA 1" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	115.57 7.82 15.64 19.55 27.37 31.28 39.10 43.01 23.46 23.46	31.28
26 05 33 13-1617	EA 1-1/4" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	146.16 8.83 17.65 22.06 30.89 35.30 44.13 48.54 26.48 26.48	35.75
26 05 33 13-1618	EA 1-1/2" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	167.90 9.83 19.66 24.58 34.41 39.32 49.16 54.07 29.49 29.49	39.33
26 05 33 13-1619	EA 2" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	224.09 11.51 23.01 28.77 40.27 46.03 57.54 63.29 34.52 34.52	46.03
26 05 33 13-1620	EA 2-1/2" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover <i>For Elevated Installation >10' To 15', Add</i> <i>For Elevated Installation >15' To 20', Add</i> <i>For Elevated Installation >20' To 25', Add</i> <i>For Elevated Installation >25' To 30', Add</i> <i>For Elevated Installation >30' To 35', Add</i> <i>For Elevated Installation >35' To 40', Add</i> <i>For Elevated Installation >40', Add</i> <i>For Work In Restricted Working Space, Add</i> <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	281.95 16.76 33.51 41.89 58.65 67.03 83.79 92.16 50.27 50.27	67.03



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1621 EA 3" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover.....	407.91	87.14
For Elevated Installation >10' To 15', Add	21.79	
For Elevated Installation >15' To 20', Add	43.57	
For Elevated Installation >20' To 25', Add	54.46	
For Elevated Installation >25' To 30', Add	76.25	
For Elevated Installation >30' To 35', Add	87.14	
For Elevated Installation >35' To 40', Add	108.93	
For Elevated Installation >40', Add	119.82	
For Work In Restricted Working Space, Add	65.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	65.36	
26 05 33 13-1622 EA 3-1/2" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover	722.86	107.25
For Elevated Installation >10' To 15', Add	26.81	
For Elevated Installation >15' To 20', Add	53.62	
For Elevated Installation >20' To 25', Add	67.03	
For Elevated Installation >25' To 30', Add	93.84	
For Elevated Installation >30' To 35', Add	107.24	
For Elevated Installation >35' To 40', Add	134.06	
For Elevated Installation >40', Add	147.46	
For Work In Restricted Working Space, Add	80.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	80.43	
26 05 33 13-1623 EA 4" Type T, Threaded, Three Hub Malleable Iron Conduit Body With Cover.....	835.23	129.15
For Elevated Installation >10' To 15', Add	32.40	
For Elevated Installation >15' To 20', Add	64.80	
For Elevated Installation >20' To 25', Add	81.00	
For Elevated Installation >25' To 30', Add	113.39	
For Elevated Installation >30' To 35', Add	129.59	
For Elevated Installation >35' To 40', Add	161.99	
For Elevated Installation >40', Add	178.19	
For Work In Restricted Working Space, Add	97.19	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	97.19	
26 05 33 13-1624 Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover (26 05 33		
13-1590)		
26 05 33 13-1625 EA 1/2" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	66.65	21.45
For Elevated Installation >10' To 15', Add	5.36	
For Elevated Installation >15' To 20', Add	10.73	
For Elevated Installation >20' To 25', Add	13.41	
For Elevated Installation >25' To 30', Add	18.77	
For Elevated Installation >30' To 35', Add	21.45	
For Elevated Installation >35' To 40', Add	26.82	
For Elevated Installation >40', Add	29.50	
For Work In Restricted Working Space, Add	16.09	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.09	
26 05 33 13-1626 EA 3/4" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	80.96	24.58
For Elevated Installation >10' To 15', Add	6.14	
For Elevated Installation >15' To 20', Add	12.29	
For Elevated Installation >20' To 25', Add	15.36	
For Elevated Installation >25' To 30', Add	21.50	
For Elevated Installation >30' To 35', Add	24.58	
For Elevated Installation >35' To 40', Add	30.72	
For Elevated Installation >40', Add	33.79	
For Work In Restricted Working Space, Add	18.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.43	
26 05 33 13-1627 EA 1" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	94.84	28.15
For Elevated Installation >10' To 15', Add	7.04	
For Elevated Installation >15' To 20', Add	14.08	
For Elevated Installation >20' To 25', Add	17.60	
For Elevated Installation >25' To 30', Add	24.64	
For Elevated Installation >30' To 35', Add	28.16	
For Elevated Installation >35' To 40', Add	35.20	
For Elevated Installation >40', Add	38.71	
For Work In Restricted Working Space, Add	21.12	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	21.12	
26 05 33 13-1628 EA 1-1/4" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	129.09	32.62
For Elevated Installation >10' To 15', Add	8.16	
For Elevated Installation >15' To 20', Add	16.31	
For Elevated Installation >20' To 25', Add	20.39	
For Elevated Installation >25' To 30', Add	28.55	
For Elevated Installation >30' To 35', Add	32.62	
For Elevated Installation >35' To 40', Add	40.78	
For Elevated Installation >40', Add	44.86	
For Work In Restricted Working Space, Add	24.47	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	24.47	
26 05 33 13-1629 EA 1-1/2" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	151.29	35.75
For Elevated Installation >10' To 15', Add	8.94	
For Elevated Installation >15' To 20', Add	17.87	
For Elevated Installation >20' To 25', Add	22.34	
For Elevated Installation >25' To 30', Add	31.28	
For Elevated Installation >30' To 35', Add	35.75	
For Elevated Installation >35' To 40', Add	44.69	
For Elevated Installation >40', Add	49.15	
For Work In Restricted Working Space, Add	26.81	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	26.81	

26 Electrical

26 05 Common Work Results for Electrical

26 05 33 Raceway and Boxes for Electrical Systems



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-1630	EA 2" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	196.36	42.90
	<i>For Elevated Installation >10' To 15', Add</i>	10.73	
	<i>For Elevated Installation >15' To 20', Add</i>	21.45	
	<i>For Elevated Installation >20' To 25', Add</i>	26.81	
	<i>For Elevated Installation >25' To 30', Add</i>	37.54	
	<i>For Elevated Installation >30' To 35', Add</i>	42.90	
	<i>For Elevated Installation >35' To 40', Add</i>	53.63	
	<i>For Elevated Installation >40', Add</i>	58.99	
	<i>For Work In Restricted Working Space, Add</i>	32.18	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32.18	
26 05 33 13-1631	EA 2-1/2" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	435.95	113.16
	<i>For Elevated Installation >10' To 15', Add</i>	28.28	
	<i>For Elevated Installation >15' To 20', Add</i>	56.56	
	<i>For Elevated Installation >20' To 25', Add</i>	70.70	
	<i>For Elevated Installation >25' To 30', Add</i>	98.98	
	<i>For Elevated Installation >30' To 35', Add</i>	113.12	
	<i>For Elevated Installation >35' To 40', Add</i>	141.40	
	<i>For Elevated Installation >40', Add</i>	155.53	
	<i>For Work In Restricted Working Space, Add</i>	84.84	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	84.84	
26 05 33 13-1632	EA 3" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	419.99	80.43
	<i>For Elevated Installation >10' To 15', Add</i>	20.11	
	<i>For Elevated Installation >15' To 20', Add</i>	40.22	
	<i>For Elevated Installation >20' To 25', Add</i>	50.28	
	<i>For Elevated Installation >25' To 30', Add</i>	70.39	
	<i>For Elevated Installation >30' To 35', Add</i>	80.44	
	<i>For Elevated Installation >35' To 40', Add</i>	100.55	
	<i>For Elevated Installation >40', Add</i>	110.61	
	<i>For Work In Restricted Working Space, Add</i>	60.33	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	60.33	
26 05 33 13-1633	EA 3-1/2" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	685.44	100.54
	<i>For Elevated Installation >10' To 15', Add</i>	25.14	
	<i>For Elevated Installation >15' To 20', Add</i>	50.27	
	<i>For Elevated Installation >20' To 25', Add</i>	62.84	
	<i>For Elevated Installation >25' To 30', Add</i>	87.98	
	<i>For Elevated Installation >30' To 35', Add</i>	100.54	
	<i>For Elevated Installation >35' To 40', Add</i>	125.68	
	<i>For Elevated Installation >40', Add</i>	138.25	
	<i>For Work In Restricted Working Space, Add</i>	75.41	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	75.41	
26 05 33 13-1634	EA 4" Type C, Threaded, Two Hub Malleable Iron Conduit Body With Cover.....	799.48	122.44
	<i>For Elevated Installation >10' To 15', Add</i>	30.61	
	<i>For Elevated Installation >15' To 20', Add</i>	61.22	
	<i>For Elevated Installation >20' To 25', Add</i>	76.52	
	<i>For Elevated Installation >25' To 30', Add</i>	107.13	
	<i>For Elevated Installation >30' To 35', Add</i>	122.44	
	<i>For Elevated Installation >35' To 40', Add</i>	153.05	
	<i>For Elevated Installation >40', Add</i>	168.35	
	<i>For Work In Restricted Working Space, Add</i>	91.83	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	91.83	
26 05 33 13-1635	Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover <small>(26 05 33 13-1590)</small>		
26 05 33 13-1636	EA 1/2" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	93.81	28.15
	<i>For Elevated Installation >10' To 15', Add</i>	7.04	
	<i>For Elevated Installation >15' To 20', Add</i>	14.08	
	<i>For Elevated Installation >20' To 25', Add</i>	17.60	
	<i>For Elevated Installation >25' To 30', Add</i>	24.63	
	<i>For Elevated Installation >30' To 35', Add</i>	28.15	
	<i>For Elevated Installation >35' To 40', Add</i>	35.19	
	<i>For Elevated Installation >40', Add</i>	38.71	
	<i>For Work In Restricted Working Space, Add</i>	21.11	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21.11	
26 05 33 13-1637	EA 3/4" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	102.50	31.28
	<i>For Elevated Installation >10' To 15', Add</i>	7.82	
	<i>For Elevated Installation >15' To 20', Add</i>	15.64	
	<i>For Elevated Installation >20' To 25', Add</i>	19.55	
	<i>For Elevated Installation >25' To 30', Add</i>	27.37	
	<i>For Elevated Installation >30' To 35', Add</i>	31.28	
	<i>For Elevated Installation >35' To 40', Add</i>	39.10	
	<i>For Elevated Installation >40', Add</i>	43.01	
	<i>For Work In Restricted Working Space, Add</i>	23.46	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.46	
26 05 33 13-1638	EA 1" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	119.38	34.41
	<i>For Elevated Installation >10' To 15', Add</i>	8.60	
	<i>For Elevated Installation >15' To 20', Add</i>	17.21	
	<i>For Elevated Installation >20' To 25', Add</i>	21.51	
	<i>For Elevated Installation >25' To 30', Add</i>	30.11	
	<i>For Elevated Installation >30' To 35', Add</i>	34.41	
	<i>For Elevated Installation >35' To 40', Add</i>	43.02	
	<i>For Elevated Installation >40', Add</i>	47.32	
	<i>For Work In Restricted Working Space, Add</i>	25.81	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25.81	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1639 EA 1-1/4" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	142.34	39.33
For Elevated Installation >10' To 15', Add	9.83	
For Elevated Installation >15' To 20', Add	19.66	
For Elevated Installation >20' To 25', Add	24.58	
For Elevated Installation >25' To 30', Add	34.41	
For Elevated Installation >30' To 35', Add	39.32	
For Elevated Installation >35' To 40', Add	49.16	
For Elevated Installation >40', Add	54.07	
For Work In Restricted Working Space, Add	29.49	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.49	
26 05 33 13-1640 EA 1-1/2" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	164.70	42.90
For Elevated Installation >10' To 15', Add	10.73	
For Elevated Installation >15' To 20', Add	21.45	
For Elevated Installation >20' To 25', Add	26.81	
For Elevated Installation >25' To 30', Add	37.54	
For Elevated Installation >30' To 35', Add	42.90	
For Elevated Installation >35' To 40', Add	53.63	
For Elevated Installation >40', Add	58.99	
For Work In Restricted Working Space, Add	32.18	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	32.18	
26 05 33 13-1641 EA 2" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	231.83	52.73
For Elevated Installation >10' To 15', Add	13.18	
For Elevated Installation >15' To 20', Add	26.36	
For Elevated Installation >20' To 25', Add	32.96	
For Elevated Installation >25' To 30', Add	46.14	
For Elevated Installation >30' To 35', Add	52.73	
For Elevated Installation >35' To 40', Add	65.91	
For Elevated Installation >40', Add	72.50	
For Work In Restricted Working Space, Add	39.55	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	39.55	
26 05 33 13-1642 EA 2-1/2" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	371.84	77.30
For Elevated Installation >10' To 15', Add	19.33	
For Elevated Installation >15' To 20', Add	38.65	
For Elevated Installation >20' To 25', Add	48.32	
For Elevated Installation >25' To 30', Add	67.64	
For Elevated Installation >30' To 35', Add	77.31	
For Elevated Installation >35' To 40', Add	96.64	
For Elevated Installation >40', Add	106.30	
For Work In Restricted Working Space, Add	57.98	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	57.98	
26 05 33 13-1643 EA 3" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	548.09	100.54
For Elevated Installation >10' To 15', Add	25.14	
For Elevated Installation >15' To 20', Add	50.27	
For Elevated Installation >20' To 25', Add	62.84	
For Elevated Installation >25' To 30', Add	87.98	
For Elevated Installation >30' To 35', Add	100.54	
For Elevated Installation >35' To 40', Add	125.68	
For Elevated Installation >40', Add	138.25	
For Work In Restricted Working Space, Add	75.41	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	75.41	
26 05 33 13-1644 EA 3-1/2" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	823.70	124.23
For Elevated Installation >10' To 15', Add	31.06	
For Elevated Installation >15' To 20', Add	62.11	
For Elevated Installation >20' To 25', Add	77.64	
For Elevated Installation >25' To 30', Add	108.70	
For Elevated Installation >30' To 35', Add	124.23	
For Elevated Installation >35' To 40', Add	155.29	
For Elevated Installation >40', Add	170.81	
For Work In Restricted Working Space, Add	93.17	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	93.17	
26 05 33 13-1645 EA 4" Type X, Threaded, Four Hub Malleable Iron Conduit Body With Cover	917.95	149.26
For Elevated Installation >10' To 15', Add	37.31	
For Elevated Installation >15' To 20', Add	74.63	
For Elevated Installation >20' To 25', Add	93.28	
For Elevated Installation >25' To 30', Add	130.60	
For Elevated Installation >30' To 35', Add	149.25	
For Elevated Installation >35' To 40', Add	186.57	
For Elevated Installation >40', Add	205.22	
For Work In Restricted Working Space, Add	111.94	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	111.94	
26 05 33 13-1646 Set Screw, Cast Aluminum Conduit Body <small>(26 05 33 13-1633)</small>		
Note: For use with Electrical Metallic Tubing (EMT)		
26 05 33 13-1647 Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover <small>(26 05 33 13-1646)</small>		
26 05 33 13-1648 EA 1/2" Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	32.33	8.49
For Work In Restricted Working Space, Add	6.37	
For Elevated Installation >10' To 15', Add	2.12	
For Elevated Installation >15' To 20', Add	4.24	
For Elevated Installation >20' To 25', Add	5.31	
For Elevated Installation >25' To 30', Add	7.43	
For Elevated Installation >30' To 35', Add	8.49	
For Elevated Installation >35' To 40', Add	10.61	
For Elevated Installation >40', Add	11.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	6.37	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 13-1649	EA 3/4" Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	41.28	11.17
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1650	EA 1" Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	56.19	13.85
	<i>For Work In Restricted Working Space, Add</i>	10.39	
	<i>For Elevated Installation >10' To 15', Add</i>	3.46	
	<i>For Elevated Installation >15' To 20', Add</i>	6.93	
	<i>For Elevated Installation >20' To 25', Add</i>	8.66	
	<i>For Elevated Installation >25' To 30', Add</i>	12.12	
	<i>For Elevated Installation >30' To 35', Add</i>	13.85	
	<i>For Elevated Installation >35' To 40', Add</i>	17.32	
	<i>For Elevated Installation >40', Add</i>	19.05	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.39	
26 05 33 13-1651	EA 1-1/4" Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	73.12	16.98
	<i>For Work In Restricted Working Space, Add</i>	12.74	
	<i>For Elevated Installation >10' To 15', Add</i>	4.25	
	<i>For Elevated Installation >15' To 20', Add</i>	8.49	
	<i>For Elevated Installation >20' To 25', Add</i>	10.62	
	<i>For Elevated Installation >25' To 30', Add</i>	14.86	
	<i>For Elevated Installation >30' To 35', Add</i>	16.98	
	<i>For Elevated Installation >35' To 40', Add</i>	21.23	
	<i>For Elevated Installation >40', Add</i>	23.35	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.74	
26 05 33 13-1652	EA 1-1/2" Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	96.85	19.66
	<i>For Work In Restricted Working Space, Add</i>	14.75	
	<i>For Elevated Installation >10' To 15', Add</i>	4.92	
	<i>For Elevated Installation >15' To 20', Add</i>	9.83	
	<i>For Elevated Installation >20' To 25', Add</i>	12.29	
	<i>For Elevated Installation >25' To 30', Add</i>	17.20	
	<i>For Elevated Installation >30' To 35', Add</i>	19.66	
	<i>For Elevated Installation >35' To 40', Add</i>	24.58	
	<i>For Elevated Installation >40', Add</i>	27.03	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.75	
26 05 33 13-1653	EA 2" Type LB, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	129.27	22.35
	<i>For Work In Restricted Working Space, Add</i>	16.76	
	<i>For Elevated Installation >10' To 15', Add</i>	5.59	
	<i>For Elevated Installation >15' To 20', Add</i>	11.17	
	<i>For Elevated Installation >20' To 25', Add</i>	13.97	
	<i>For Elevated Installation >25' To 30', Add</i>	19.55	
	<i>For Elevated Installation >30' To 35', Add</i>	22.34	
	<i>For Elevated Installation >35' To 40', Add</i>	27.93	
	<i>For Elevated Installation >40', Add</i>	30.72	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.76	
26 05 33 13-1654	Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover <small>(26 05 33 13-1646)</small>		
26 05 33 13-1655	EA 1/2" Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	32.64	8.49
	<i>For Work In Restricted Working Space, Add</i>	6.37	
	<i>For Elevated Installation >10' To 15', Add</i>	2.12	
	<i>For Elevated Installation >15' To 20', Add</i>	4.24	
	<i>For Elevated Installation >20' To 25', Add</i>	5.31	
	<i>For Elevated Installation >25' To 30', Add</i>	7.43	
	<i>For Elevated Installation >30' To 35', Add</i>	8.49	
	<i>For Elevated Installation >35' To 40', Add</i>	10.61	
	<i>For Elevated Installation >40', Add</i>	11.67	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-1656	EA 3/4" Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	42.46	11.17
	<i>For Work In Restricted Working Space, Add</i>	8.38	
	<i>For Elevated Installation >10' To 15', Add</i>	2.79	
	<i>For Elevated Installation >15' To 20', Add</i>	5.59	
	<i>For Elevated Installation >20' To 25', Add</i>	6.98	
	<i>For Elevated Installation >25' To 30', Add</i>	9.78	
	<i>For Elevated Installation >30' To 35', Add</i>	11.17	
	<i>For Elevated Installation >35' To 40', Add</i>	13.97	
	<i>For Elevated Installation >40', Add</i>	15.36	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1657	EA 1" Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	52.11	13.85
	<i>For Work In Restricted Working Space, Add</i>	10.39	
	<i>For Elevated Installation >10' To 15', Add</i>	3.46	
	<i>For Elevated Installation >15' To 20', Add</i>	6.93	
	<i>For Elevated Installation >20' To 25', Add</i>	8.66	
	<i>For Elevated Installation >25' To 30', Add</i>	12.12	
	<i>For Elevated Installation >30' To 35', Add</i>	13.85	
	<i>For Elevated Installation >35' To 40', Add</i>	17.32	
	<i>For Elevated Installation >40', Add</i>	19.05	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.39	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1658 EA 1-1/4" Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	72.78	16.98
For Work In Restricted Working Space, Add	12.74	
For Elevated Installation >10' To 15', Add	4.25	
For Elevated Installation >15' To 20', Add	8.49	
For Elevated Installation >20' To 25', Add	10.62	
For Elevated Installation >25' To 30', Add	14.86	
For Elevated Installation >30' To 35', Add	16.98	
For Elevated Installation >35' To 40', Add	21.23	
For Elevated Installation >40', Add	23.35	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.74	
26 05 33 13-1659 EA 1-1/2" Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	90.07	19.66
For Work In Restricted Working Space, Add	14.75	
For Elevated Installation >10' To 15', Add	4.92	
For Elevated Installation >15' To 20', Add	9.83	
For Elevated Installation >20' To 25', Add	12.29	
For Elevated Installation >25' To 30', Add	17.20	
For Elevated Installation >30' To 35', Add	19.66	
For Elevated Installation >35' To 40', Add	24.58	
For Elevated Installation >40', Add	27.03	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.75	
26 05 33 13-1660 EA 2" Type LL Or LR, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	128.68	22.35
For Work In Restricted Working Space, Add	16.76	
For Elevated Installation >10' To 15', Add	5.59	
For Elevated Installation >15' To 20', Add	11.17	
For Elevated Installation >20' To 25', Add	13.97	
For Elevated Installation >25' To 30', Add	19.55	
For Elevated Installation >30' To 35', Add	22.34	
For Elevated Installation >35' To 40', Add	27.93	
For Elevated Installation >40', Add	30.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.76	
26 05 33 13-1661 Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover ⁽²⁶⁾		
<small>05 33 13-1646</small>		
26 05 33 13-1662 EA 1/2" Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover	41.92	11.17
For Work In Restricted Working Space, Add	8.38	
For Elevated Installation >10' To 15', Add	2.79	
For Elevated Installation >15' To 20', Add	5.59	
For Elevated Installation >20' To 25', Add	6.98	
For Elevated Installation >25' To 30', Add	9.78	
For Elevated Installation >30' To 35', Add	11.17	
For Elevated Installation >35' To 40', Add	13.97	
For Elevated Installation >40', Add	15.36	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	8.38	
26 05 33 13-1663 EA 3/4" Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover	54.79	13.85
For Work In Restricted Working Space, Add	10.39	
For Elevated Installation >10' To 15', Add	3.46	
For Elevated Installation >15' To 20', Add	6.93	
For Elevated Installation >20' To 25', Add	8.66	
For Elevated Installation >25' To 30', Add	12.12	
For Elevated Installation >30' To 35', Add	13.85	
For Elevated Installation >35' To 40', Add	17.32	
For Elevated Installation >40', Add	19.05	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	10.39	
26 05 33 13-1664 EA 1" Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover	66.02	16.98
For Work In Restricted Working Space, Add	12.74	
For Elevated Installation >10' To 15', Add	4.25	
For Elevated Installation >15' To 20', Add	8.49	
For Elevated Installation >20' To 25', Add	10.62	
For Elevated Installation >25' To 30', Add	14.86	
For Elevated Installation >30' To 35', Add	16.98	
For Elevated Installation >35' To 40', Add	21.23	
For Elevated Installation >40', Add	23.35	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.74	
26 05 33 13-1665 EA 1-1/4" Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover	92.07	19.66
For Work In Restricted Working Space, Add	15.42	
For Elevated Installation >10' To 15', Add	5.14	
For Elevated Installation >15' To 20', Add	10.28	
For Elevated Installation >20' To 25', Add	12.85	
For Elevated Installation >25' To 30', Add	17.99	
For Elevated Installation >30' To 35', Add	20.56	
For Elevated Installation >35' To 40', Add	25.70	
For Elevated Installation >40', Add	28.26	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.42	
26 05 33 13-1666 EA 1-1/2" Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover	118.64	22.35
For Work In Restricted Working Space, Add	18.10	
For Elevated Installation >10' To 15', Add	6.03	
For Elevated Installation >15' To 20', Add	12.07	
For Elevated Installation >20' To 25', Add	15.08	
For Elevated Installation >25' To 30', Add	21.12	
For Elevated Installation >30' To 35', Add	24.13	
For Elevated Installation >35' To 40', Add	30.17	
For Elevated Installation >40', Add	33.18	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.10	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 13-1667	EA	2" Type T, Set Screw, Three Hub Cast Aluminum Conduit Body With Cover	160.89	25.02
		<i>For Work In Restricted Working Space, Add</i>	20.78	
		<i>For Elevated Installation >10' To 15', Add</i>	6.93	
		<i>For Elevated Installation >15' To 20', Add</i>	13.85	
		<i>For Elevated Installation >20' To 25', Add</i>	17.32	
		<i>For Elevated Installation >25' To 30', Add</i>	24.24	
		<i>For Elevated Installation >30' To 35', Add</i>	27.70	
		<i>For Elevated Installation >35' To 40', Add</i>	34.63	
		<i>For Elevated Installation >40', Add</i>	38.09	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.78	

26 05 33 13-1668 Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover (26 05 33 13-1646)

26 05 33 13-1669	EA	1/2" Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	33.63	8.49
		<i>For Work In Restricted Working Space, Add</i>	6.37	
		<i>For Elevated Installation >10' To 15', Add</i>	2.12	
		<i>For Elevated Installation >15' To 20', Add</i>	4.24	
		<i>For Elevated Installation >20' To 25', Add</i>	5.31	
		<i>For Elevated Installation >25' To 30', Add</i>	7.43	
		<i>For Elevated Installation >30' To 35', Add</i>	8.49	
		<i>For Elevated Installation >35' To 40', Add</i>	10.61	
		<i>For Elevated Installation >40', Add</i>	11.67	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6.37	
26 05 33 13-1670	EA	3/4" Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	45.06	11.17
		<i>For Work In Restricted Working Space, Add</i>	8.38	
		<i>For Elevated Installation >10' To 15', Add</i>	2.79	
		<i>For Elevated Installation >15' To 20', Add</i>	5.59	
		<i>For Elevated Installation >20' To 25', Add</i>	6.98	
		<i>For Elevated Installation >25' To 30', Add</i>	9.78	
		<i>For Elevated Installation >30' To 35', Add</i>	11.17	
		<i>For Elevated Installation >35' To 40', Add</i>	13.97	
		<i>For Elevated Installation >40', Add</i>	15.36	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8.38	
26 05 33 13-1671	EA	1" Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	57.67	13.85
		<i>For Work In Restricted Working Space, Add</i>	10.39	
		<i>For Elevated Installation >10' To 15', Add</i>	3.46	
		<i>For Elevated Installation >15' To 20', Add</i>	6.93	
		<i>For Elevated Installation >20' To 25', Add</i>	8.66	
		<i>For Elevated Installation >25' To 30', Add</i>	12.12	
		<i>For Elevated Installation >30' To 35', Add</i>	13.85	
		<i>For Elevated Installation >35' To 40', Add</i>	17.32	
		<i>For Elevated Installation >40', Add</i>	19.05	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10.39	
26 05 33 13-1672	EA	1-1/4" Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	74.89	16.98
		<i>For Work In Restricted Working Space, Add</i>	12.74	
		<i>For Elevated Installation >10' To 15', Add</i>	4.25	
		<i>For Elevated Installation >15' To 20', Add</i>	8.49	
		<i>For Elevated Installation >20' To 25', Add</i>	10.62	
		<i>For Elevated Installation >25' To 30', Add</i>	14.86	
		<i>For Elevated Installation >30' To 35', Add</i>	16.98	
		<i>For Elevated Installation >35' To 40', Add</i>	21.23	
		<i>For Elevated Installation >40', Add</i>	23.35	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.74	
26 05 33 13-1673	EA	1-1/2" Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	91.28	19.66
		<i>For Work In Restricted Working Space, Add</i>	14.75	
		<i>For Elevated Installation >10' To 15', Add</i>	4.92	
		<i>For Elevated Installation >15' To 20', Add</i>	9.83	
		<i>For Elevated Installation >20' To 25', Add</i>	12.29	
		<i>For Elevated Installation >25' To 30', Add</i>	17.20	
		<i>For Elevated Installation >30' To 35', Add</i>	19.66	
		<i>For Elevated Installation >35' To 40', Add</i>	24.58	
		<i>For Elevated Installation >40', Add</i>	27.03	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.75	
26 05 33 13-1674	EA	2" Type C, Set Screw, Two Hub Cast Aluminum Conduit Body With Cover	140.00	22.35
		<i>For Work In Restricted Working Space, Add</i>	16.76	
		<i>For Elevated Installation >10' To 15', Add</i>	5.59	
		<i>For Elevated Installation >15' To 20', Add</i>	11.17	
		<i>For Elevated Installation >20' To 25', Add</i>	13.97	
		<i>For Elevated Installation >25' To 30', Add</i>	19.55	
		<i>For Elevated Installation >30' To 35', Add</i>	22.34	
		<i>For Elevated Installation >35' To 40', Add</i>	27.93	
		<i>For Elevated Installation >40', Add</i>	30.72	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.76	

26 05 33 13-1675 Replacement Covers And Gaskets For Conduit Body (26 05 33 13-1533)**26 05 33 13-1676 Replacement Stamped Aluminum Conduit Body Cover** (26 05 33 13-1675)

26 05 33 13-1677	EA	1/2" Replacement Stamped Aluminum Conduit Body Cover	11.84	4.36
26 05 33 13-1678	EA	3/4" Replacement Stamped Aluminum Conduit Body Cover	14.54	5.08
26 05 33 13-1679	EA	1" Replacement Stamped Aluminum Conduit Body Cover	18.62	6.54
26 05 33 13-1680	EA	1-1/4" Replacement Stamped Aluminum Conduit Body Cover	22.66	7.99
26 05 33 13-1681	EA	1-1/2" Replacement Stamped Aluminum Conduit Body Cover	27.93	9.44
26 05 33 13-1682	EA	2" Replacement Stamped Aluminum Conduit Body Cover	33.18	10.89
26 05 33 13-1683	EA	2-1/2" Replacement Stamped Aluminum Conduit Body Cover	44.41	12.34

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 13-1684 EA 3" Replacement Stamped Aluminum Conduit Body Cover	56.96	17.42
26 05 33 13-1685 EA 3-1/2" Replacement Stamped Aluminum Conduit Body Cover	61.81	19.61
26 05 33 13-1686 EA 4" Replacement Stamped Aluminum Conduit Body Cover	77.88	24.69
26 05 33 13-1687 Replacement Cast Steel Conduit Body Cover <small>(26 05 33 13-1675)</small>		
26 05 33 13-1688 EA 1/2" Replacement Cast Steel Conduit Body Cover	13.97	4.36
26 05 33 13-1689 EA 3/4" Replacement Cast Steel Conduit Body Cover	16.40	5.08
26 05 33 13-1690 EA 1" Replacement Cast Steel Conduit Body Cover	23.20	6.54
26 05 33 13-1691 EA 1-1/4" Replacement Cast Steel Conduit Body Cover	28.86	7.99
26 05 33 13-1692 EA 1-1/2" Replacement Cast Steel Conduit Body Cover	35.15	9.44
26 05 33 13-1693 EA 2" Replacement Cast Steel Conduit Body Cover	41.44	10.89
26 05 33 13-1694 EA 2-1/2" Replacement Cast Steel Conduit Body Cover	47.69	12.34
26 05 33 13-1695 EA 3" Replacement Cast Steel Conduit Body Cover	64.71	17.42
26 05 33 13-1696 EA 3-1/2" Replacement Cast Steel Conduit Body Cover	74.01	19.61
26 05 33 13-1697 EA 4" Replacement Cast Steel Conduit Body Cover	93.32	24.69
26 05 33 13-1698 Replacement Velbuna Composition Conduit Body Gasket <small>(26 05 33 13-1675)</small>		
26 05 33 13-1699 EA 1/2" Replacement Velbuna Composition Conduit Body Gasket	10.88	4.36
26 05 33 13-1700 EA 3/4" Replacement Velbuna Composition Conduit Body Gasket	12.41	5.08
26 05 33 13-1701 EA 1" Replacement Velbuna Composition Conduit Body Gasket	16.24	6.54
26 05 33 13-1702 EA 1-1/4" Replacement Velbuna Composition Conduit Body Gasket	21.22	7.99
26 05 33 13-1703 EA 1-1/2" Replacement Velbuna Composition Conduit Body Gasket	24.12	9.44
26 05 33 13-1704 EA 2" Replacement Velbuna Composition Conduit Body Gasket	28.78	10.89
26 05 33 13-1705 EA 2-1/2" Replacement Velbuna Composition Conduit Body Gasket	38.39	12.34
26 05 33 13-1706 EA 3" Replacement Velbuna Composition Conduit Body Gasket	49.45	17.42
26 05 33 13-1707 EA 3-1/2" Replacement Velbuna Composition Conduit Body Gasket	54.69	19.61
26 05 33 13-1708 EA 4" Replacement Velbuna Composition Conduit Body Gasket	64.74	24.69
26 05 33 13-1709 Replacement Neoprene Conduit Body Gasket <small>(26 05 33 13-1675)</small>		
26 05 33 13-1710 EA 1/2" Replacement Neoprene Conduit Body Gasket	12.36	4.36
26 05 33 13-1711 EA 3/4" Replacement Neoprene Conduit Body Gasket	13.82	5.08
26 05 33 13-1712 EA 1" Replacement Neoprene Conduit Body Gasket	18.09	6.54
26 05 33 13-1713 EA 1-1/4" Replacement Neoprene Conduit Body Gasket	22.17	7.99
26 05 33 13-1714 EA 1-1/2" Replacement Neoprene Conduit Body Gasket	25.07	9.44
26 05 33 13-1715 EA 2" Replacement Neoprene Conduit Body Gasket	28.88	10.89
26 05 33 13-1716 EA 2-1/2" Replacement Neoprene Conduit Body Gasket	38.62	12.34
26 05 33 13-1717 EA 3" Replacement Neoprene Conduit Body Gasket	49.68	17.42
26 05 33 13-1718 EA 3-1/2" Replacement Neoprene Conduit Body Gasket	56.27	19.61
26 05 33 13-1719 EA 4" Replacement Neoprene Conduit Body Gasket	66.32	24.69
26 05 33 13-1720 Cutting Knockouts In-Place Metal Boxes Or Enclosures <small>(26 05 33 13-0058)</small>		
Note: For use when connecting conduit to an existing in-place system.		
26 05 33 13-1721 EA 1/2", Cutting Knockouts In-Place Metal Boxes Or Enclosures	18.49	
<i>For Work In Restricted Working Space, Add</i>	5.55	
26 05 33 13-1722 EA 3/4", Cutting Knockouts In-Place Metal Boxes Or Enclosures	20.82	
<i>For Work In Restricted Working Space, Add</i>	6.25	
26 05 33 13-1723 EA 1", Cutting Knockouts In-Place Metal Boxes Or Enclosures	24.49	
<i>For Work In Restricted Working Space, Add</i>	7.35	
26 05 33 13-1724 EA 1-1/4", Cutting Knockouts In-Place Metal Boxes Or Enclosures	27.19	
<i>For Work In Restricted Working Space, Add</i>	8.16	
26 05 33 13-1725 EA 1-1/2", Cutting Knockouts In-Place Metal Boxes Or Enclosures	30.62	
<i>For Work In Restricted Working Space, Add</i>	9.19	
26 05 33 13-1726 EA 2", Cutting Knockouts In-Place Metal Boxes Or Enclosures	36.26	
<i>For Work In Restricted Working Space, Add</i>	10.88	
26 05 33 13-1727 EA 2-1/2", Cutting Knockouts In-Place Metal Boxes Or Enclosures	42.86	
<i>For Work In Restricted Working Space, Add</i>	12.86	
26 05 33 13-1728 EA 3", Cutting Knockouts In-Place Metal Boxes Or Enclosures	48.99	
<i>For Work In Restricted Working Space, Add</i>	14.70	
26 05 33 13-1729 EA 3-1/2", Cutting Knockouts In-Place Metal Boxes Or Enclosures	55.12	
<i>For Work In Restricted Working Space, Add</i>	16.54	
26 05 33 13-1730 EA 4", Cutting Knockouts In-Place Metal Boxes Or Enclosures	61.24	
<i>For Work In Restricted Working Space, Add</i>	18.37	
26 05 33 16 Boxes for Electrical Systems <small>(26 05 33)</small>		
See CSI section 26 27 16 00-0000 for larger junction boxes and enclosures.		
26 05 33 16-0001 Steel Junction, Device, And Fixture Boxes, Rings And Covers <small>(26 05 33 16)</small>		
Note: Thin wall metal. See CSI section 26 27 26 00-0003 for steel box/receptacle assemblies, 26 27 26 00-0126 for steel box/switch assemblies.		
26 05 33 16-0002 4" Square Steel Boxes, Rings And Covers <small>(26 05 33 16-0001)</small>		
26 05 33 16-0003 EA 1-1/2" Depth, 4" Square Steel Box	39.75	18.34
<i>For Stud Bracket, Add</i>	0.75	
26 05 33 16-0004 EA 2-1/8" Depth, 4" Square Steel Box	41.14	18.34
<i>For Stud Bracket, Add</i>	1.35	
26 05 33 16-0005 EA 3-1/2" Depth, 4" Square Steel Box	45.92	18.34
<i>For Stud Bracket, Add</i>	1.47	

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 05 33 16-0006	EA	1-1/2" Depth, 4" Square Steel Extension Ring	31.27	12.23
26 05 33 16-0007	EA	2-1/8" Depth, 4" Square Steel Extension Ring	26.43	12.23
26 05 33 16-0008	EA	1/2" Depth, 1 Gang, 4" Square Steel Mud Ring	13.69	6.11
26 05 33 16-0009	EA	5/8" Depth, 1 Gang, 4" Square Steel Mud Ring	13.91	6.11
26 05 33 16-0010	EA	3/4" Depth, 1 Gang, 4" Square Steel Mud Ring	14.07	6.11
26 05 33 16-0011	EA	1" Depth, 1 Gang, 4" Square Steel Mud Ring	14.59	6.11
26 05 33 16-0012	EA	1-1/4" Depth, 1 Gang, 4" Square Steel Mud Ring	14.74	6.11
26 05 33 16-0013	EA	1-1/2" Depth, 1 Gang, 4" Square Steel Mud Ring	16.40	6.11
26 05 33 16-0014	EA	1/2" Depth, 2 Gang, 4" Square Steel Mud Ring	14.32	6.11
26 05 33 16-0015	EA	5/8" Depth, 2 Gang, 4" Square Steel Mud Ring	14.48	6.11
26 05 33 16-0016	EA	3/4" Depth, 2 Gang, 4" Square Steel Mud Ring	14.68	6.11
26 05 33 16-0017	EA	1" Depth, 2 Gang, 4" Square Steel Mud Ring	16.37	6.11
26 05 33 16-0018	EA	1-1/4" Depth, 2 Gang, 4" Square Steel Mud Ring	16.72	6.11
26 05 33 16-0019	EA	1-1/2" Depth, 2 Gang, 4" Square Steel Mud Ring	18.87	6.11
26 05 33 16-0020	EA	3/4" Depth, Fixture Cover, 4" Square Mud Rings	15.14	6.11
26 05 33 16-0021	EA	1" Depth, Fixture Cover, 4" Square Mud Rings	16.51	6.11
26 05 33 16-0022	EA	One Toggle Switch, 4" Square Steel Exposed Work Cover	14.29	6.11
26 05 33 16-0023	EA	Two Toggle Switches, 4" Square Steel Exposed Work Cover	14.42	6.11
26 05 33 16-0024	EA	One Duplex Receptacle, 4" Square Steel Exposed Work Cover	14.26	6.11
26 05 33 16-0025	EA	Two Duplex Receptacles, 4" Square Steel Exposed Work Cover	14.63	6.11
26 05 33 16-0026	EA	One Toggle Switch And One Duplex Receptacle, 4" Square Steel Exposed Work Cover	14.93	6.11
26 05 33 16-0027	EA	One Toggle Switch And One 1.406" Diameter Receptacle, 4" Square Steel Exposed Work Cover	18.73	6.11
26 05 33 16-0028	EA	One 1.406" Diameter Receptacle, 4" Square Steel Exposed Work Cover	14.88	6.11
26 05 33 16-0029	EA	Two 1.406" Diameter Receptacles, 4" Square Steel Exposed Work Cover	18.73	6.11
26 05 33 16-0030	EA	One 1.620" Diameter Receptacle, 4" Square Steel Exposed Work Cover	14.88	6.11
26 05 33 16-0031	EA	One 1.719" Diameter Receptacle, 4" Square Steel Exposed Work Cover	15.77	6.11
26 05 33 16-0032	EA	One 2.165" Diameter Receptacle, 4" Square Steel Exposed Work Cover	18.73	6.11
26 05 33 16-0033	EA	One 2.480" Diameter Receptacle, 4" Square Steel Exposed Work Cover	18.73	6.11
26 05 33 16-0034	EA	Flat, 4" Square Steel Exposed Work Cover	13.21	6.11

26 05 33 16-0035 4-11/16" Square Steel Boxes, Rings And Covers (26 05 33 16-0001)

26 05 33 16-0036	EA	1-1/2" Depth, 4-11/16" Square Steel Box	44.90	18.34
26 05 33 16-0037	EA	2-1/8" Depth, 4-11/16" Square Steel Box	41.75	18.34
		<i>For Stud Bracket, Add</i>	0.71	
26 05 33 16-0038	EA	3-1/4" Depth, 4-11/16" Square Steel Box	57.57	18.34
26 05 33 16-0039	EA	1-1/2" Depth, 4-11/16" Square Extension Ring	32.58	12.23
26 05 33 16-0040	EA	2-1/8" Depth, 4-11/16" Square Extension Ring	33.36	12.23
26 05 33 16-0041	EA	1/2" Depth, 1 Gang, 4-11/16" Square Steel Mud Ring	16.84	6.11
26 05 33 16-0042	EA	5/8" Depth, 1 Gang, 4-11/16" Square Steel Mud Ring	16.88	6.11
26 05 33 16-0043	EA	3/4" Depth, 1 Gang, 4-11/16" Square Steel Mud Ring	18.22	6.11
26 05 33 16-0044	EA	1" Depth, 1 Gang, 4-11/16" Square Steel Mud Ring	17.68	6.11
26 05 33 16-0045	EA	1-1/4" Depth, 1 Gang, 4-11/16" Square Steel Mud Ring	17.56	6.11
26 05 33 16-0046	EA	1-1/2" Depth, 1 Gang, 4-11/16" Square Steel Mud Ring	23.15	6.11
26 05 33 16-0047	EA	1/2" Depth, 2 Gang, 4-11/16" Square Steel Mud Ring	17.91	6.11
26 05 33 16-0048	EA	5/8" Depth, 2 Gang, 4-11/16" Square Steel Mud Ring	18.20	6.11
26 05 33 16-0049	EA	3/4" Depth, 2 Gang, 4-11/16" Square Steel Mud Ring	18.22	6.11
26 05 33 16-0050	EA	1" Depth, 2 Gang, 4-11/16" Square Steel Mud Ring	20.20	6.11
26 05 33 16-0051	EA	1-1/4" Depth, 2 Gang, 4-11/16" Square Steel Mud Ring	20.61	6.11
26 05 33 16-0052	EA	1-1/2" Depth, 2 Gang, 4-11/16" Square Steel Mud Ring	25.40	6.11
26 05 33 16-0053	EA	1/2" Depth, Fixture Cover, 4-11/16" Square Steel Mud Ring	17.65	6.11
26 05 33 16-0054	EA	5/8" Depth, Fixture Cover, 4-11/16" Square Steel Mud Ring	17.79	6.11
26 05 33 16-0055	EA	One Toggle Switch, 4-11/16" Square Steel Exposed Work Cover	21.50	6.11
26 05 33 16-0056	EA	Two Toggle Switches, 4-11/16" Square Steel Exposed Work Cover	22.54	6.11
26 05 33 16-0057	EA	One Duplex Receptacle, 4-11/16" Square Steel Exposed Work Cover	21.19	6.11
26 05 33 16-0058	EA	Two Duplex Receptacles, 4-11/16" Square Steel Exposed Work Cover	20.06	6.11
26 05 33 16-0059	EA	One Toggle Switch And One Duplex Receptacle, 4-11/16" Square Steel Exposed Work Cover	23.85	6.11
26 05 33 16-0060	EA	One 1.594" Diameter Receptacle, 4-11/16" Square Steel Exposed Work Cover	22.53	6.11
26 05 33 16-0061	EA	One 2.141" Diameter Receptacle, 4-11/16" Square Steel Exposed Work Cover	22.53	6.11
26 05 33 16-0062	EA	One 2.625" Diameter Receptacle, 4-11/16" Square Steel Exposed Work Cover	22.53	6.11
26 05 33 16-0063	EA	Flat, 4-11/16" Square Steel Exposed Work Cover	14.06	6.11

26 05 33 16-0064 Steel Square Box Brackets (26 05 33 16-0001)

26 05 33 16-0065	EA	16" Or 24" Width Box Bracket, For Multiple 1-1/2" And 2-1/8" Deep Boxes	19.78	9.18
26 05 33 16-0066	EA	Single Box Bracket, One 4" Or 4-11/16" Square Box	14.43	6.12
26 05 33 16-0067	EA	16" Box Bracket, Up To Three 4" Or 4-11/16" Square Boxes	23.14	9.18
26 05 33 16-0068	EA	24" Box Bracket, Up To Four 4" Or 4-11/16" Square Boxes	24.86	9.18

26 05 33 16-0069 4" Octagon Steel Boxes And Covers (26 05 33 16-0001)

26 05 33 16-0070	EA	1-1/2" Depth, 4" Steel Octagon Box	33.08	15.28
		<i>For Stud Bracket, Add</i>	1.83	
26 05 33 16-0071	EA	2-1/8" Depth, 4" Steel Octagon Box	34.30	15.28
26 05 33 16-0072	EA	Flat, 4" Octagon Steel Exposed Work Cover	13.13	6.11

26 05 33 16-0073 4" Steel Octagonal Concrete Rings And Steel Covers (26 05 33 16-0001)

		Note: Placed in concrete slabs or walls.		
26 05 33 16-0074	EA	2" Depth, 4" Steel Octagonal Concrete Ring	54.42	
26 05 33 16-0075	EA	2-1/2" Depth, 4" Steel Octagonal Concrete Ring	57.77	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 16-0076 EA 3" Depth, 4" Steel Octagonal Concrete Ring	60.45	
26 05 33 16-0077 EA 3-1/2" Depth, 4" Steel Octagonal Concrete Ring	63.06	
26 05 33 16-0078 EA 4" Depth, 4" Steel Octagonal Concrete Ring	68.86	
26 05 33 16-0079 EA 5" Depth, 4" Steel Octagonal Concrete Ring	74.87	
26 05 33 16-0080 EA 6" Depth, 4" Steel Octagonal Concrete Ring	79.55	
26 05 33 16-0081 EA Flat, 4" Steel Octagonal Concrete Cover	14.81	6.11
26 05 33 16-0082 4-1/2" Steel Gang Boxes <small>(26 05 33 16-0001)</small>		
26 05 33 16-0083 EA 2 Device, 1-5/8" Depth, 4-1/2" Steel Gang Box	50.34	15.28
26 05 33 16-0084 EA 3 Device, 1-5/8" Depth, 4-1/2" Steel Gang Box	55.29	16.51
26 05 33 16-0085 EA 4 Device, 1-5/8" Depth, 4-1/2" Steel Gang Box	66.50	18.34
26 05 33 16-0086 EA 5 Device, 1-5/8" Depth, 4-1/2" Steel Gang Box	86.85	20.17
26 05 33 16-0087 EA 6 Device, 1-5/8" Depth, 4-1/2" Steel Gang Box	128.92	22.01
26 05 33 16-0088 EA 2 Device, 2-1/2" Depth, 4-1/2" Steel Gang Box	69.15	15.28
26 05 33 16-0089 EA 3 Device, 2-1/2" Depth, 4-1/2" Steel Gang Box	75.34	16.51
26 05 33 16-0090 EA 4 Device, 2-1/2" Depth, 4-1/2" Steel Gang Box	100.36	18.34
26 05 33 16-0091 EA 5 Device, 2-1/2" Depth, 4-1/2" Steel Gang Box	128.95	20.17
26 05 33 16-0092 EA 6 Device, 2-1/2" Depth, 4-1/2" Steel Gang Box	212.16	22.01
26 05 33 16-0093 EA 2 Device, Gang Box Mud Ring	22.02	6.11
26 05 33 16-0094 EA 3 Device, Gang Box Mud Ring	22.33	6.11
26 05 33 16-0095 EA 4 Device, Gang Box Mud Ring	25.96	6.11
26 05 33 16-0096 EA 5 Device, Gang Box Mud Ring	32.19	6.11
26 05 33 16-0097 EA 6 Device, Gang Box Mud Ring	45.87	6.11
26 05 33 16-0098 EA 2 Device, Gang Box Flat Cover	18.90	6.11
26 05 33 16-0099 EA 3 Device, Gang Box Flat Cover	22.30	6.11
26 05 33 16-0100 EA 4 Device, Gang Box Flat Cover	26.80	6.11
26 05 33 16-0101 EA 5 Device, Gang Box Flat Cover	32.54	6.11
26 05 33 16-0102 EA 6 Device, Gang Box Flat Cover	46.83	6.11
26 05 33 16-0103 Steel Switch Boxes <small>(26 05 33 16-0001)</small>		
26 05 33 16-0104 EA 2-1/2" Depth, 3" x 2", Stud Bracket, Steel Switch Box	35.43	15.28
26 05 33 16-0105 EA 2-3/4" Depth, 3" x 2", Stud Bracket, Steel Switch Box	35.95	15.28
26 05 33 16-0106 EA 3-1/2" Depth, 3" x 2", Stud Bracket, Steel Switch Box	38.67	15.28
26 05 33 16-0107 EA 2-1/2" Depth, 2 Device, Stud Bracket, Steel Box	44.77	15.28
26 05 33 16-0108 EA 2-1/2" Depth, 3 Device, Stud Bracket, Steel Box	45.30	15.28
26 05 33 16-0109 EA 2-1/2" Depth, 4 Device, Stud Bracket, Steel Box	53.57	15.28
26 05 33 16-0110 4" x 2" Steel Handy Boxes, Extension Rings And Covers <small>(26 05 33 16-0001)</small>		
26 05 33 16-0111 EA 1-1/2" Deep, 4" x 2" Steel Handy Box	32.95	15.28
For Stud Bracket, Add	2.94	
26 05 33 16-0112 EA 1-7/8" Deep, 4" x 2" Steel Handy Box	33.51	15.28
For Stud Bracket, Add	1.27	
26 05 33 16-0113 EA 2-1/8" Deep, 4" x 2" Steel Handy Box	34.76	15.28
For Stud Bracket, Add	1.72	
26 05 33 16-0114 EA 1-1/2" Deep, 4" x 2" Steel Handy Box Extension Ring	21.75	9.17
26 05 33 16-0115 EA 1-7/8" Deep, 4" x 2" Steel Handy Box Extension Ring	21.19	9.17
26 05 33 16-0116 EA GFI Receptacle, 2" x 4" Steel Handy Box Exposed Work Cover	7.34	3.06
26 05 33 16-0117 EA 1.406" Diameter Receptacle, 4" x 2" Steel Handy Box Exposed Work Cover	7.45	3.06
26 05 33 16-0118 EA Duplex Receptacle, 4" x 2" Steel Handy Box Exposed Work Cover	6.92	3.06
26 05 33 16-0119 EA Toggle Switch, 4" x 2" Steel Handy Box Exposed Work Cover	6.95	3.06
26 05 33 16-0120 EA 1.594" Diameter Receptacle, 4" x 2" Steel Handy Box Exposed Work Cover	8.03	3.06
26 05 33 16-0121 EA Flat, 2" x 4" Steel Handy Box Exposed Work Cover	6.95	3.06
26 05 33 16-0122 3-1/2" Depth, 3-3/4" Steel Masonry Boxes <small>(26 05 33 16-0001)</small>		
26 05 33 16-0123 EA 1 Device, 3-1/2" Depth, 3-3/4" Steel Masonry Box	49.41	21.40
26 05 33 16-0124 EA 2 Device, 3-1/2" Depth, 3-3/4" Steel Masonry Box	55.22	22.62
26 05 33 16-0125 EA 3 Device, 3-1/2" Depth, 3-3/4" Steel Masonry Box	63.23	24.45
26 05 33 16-0126 EA 4 Device, 3-1/2" Depth, 3-3/4" Steel Masonry Box	71.99	26.90
26 05 33 16-0127 Cast Boxes <small>(26 05 33 16)</small>		
Note: For flush or surface mount.		
26 05 33 16-0128 Cast Iron Alloy Boxes <small>(26 05 33 16-0127)</small>		
See CSI section 26 27 26 00-0257 for box covers.		
26 05 33 16-0129 Shallow, Single Gang Cast Iron Alloy Boxes <small>(26 05 33 16-0128)</small>		
Note: Up to 2" deep boxes.		
26 05 33 16-0130 EA 1/2" Depth, Type FS, Shallow, Single Gang Cast Iron Alloy Box	105.42	36.68
Note: One hub.		
26 05 33 16-0131 EA 3/4" Depth, Type FS, Shallow, Single Gang Cast Iron Alloy Box	113.46	42.79
Note: One hub.		
26 05 33 16-0132 EA 1" Depth, Type FS, Shallow, Single Gang Cast Iron Alloy Box	133.55	51.96
Note: One hub.		
26 05 33 16-0133 EA 1/2" Depth, Type FSC, Shallow, Single Gang Cast Iron Alloy Box	131.65	48.91
Note: Two hub.		
26 05 33 16-0134 EA 3/4" Depth, Type FSC, Shallow, Single Gang Cast Iron Alloy Box	168.44	58.09
Note: Two hub.		

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 05 33 16-0135	EA	1/2" Depth, Type FSL, Shallow, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	131.10		48.91
26 05 33 16-0136	EA	3/4" Depth, Type FSL, Shallow, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	157.68		58.09
26 05 33 16-0137	EA	1/2" Depth, Type FSR, Shallow, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	134.57		48.91
26 05 33 16-0138	EA	3/4" Depth, Type FSR, Shallow, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	157.73		58.09
26 05 33 16-0139	EA	1/2" Depth, Type FSS, Shallow, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	131.10		48.91
26 05 33 16-0140	EA	3/4" Depth, Type FSS, Shallow, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	153.46		58.09
26 05 33 16-0141	EA	1/2" Depth, Type FSCA, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	156.13		61.14
26 05 33 16-0142	EA	3/4" Depth, Type FSCA, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	184.74		73.37
26 05 33 16-0143	EA	1/2" Depth, Type FSCC, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	162.76		61.14
26 05 33 16-0144	EA	3/4" Depth, Type FSCC, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	210.05		73.37
26 05 33 16-0145	EA	1/2" Depth, Type FSCT, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	167.10		61.14
26 05 33 16-0146	EA	3/4" Depth, Type FSCT, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	199.64		73.37
26 05 33 16-0147	EA	1/2" Depth, Type FST, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	155.56		61.14
26 05 33 16-0148	EA	3/4" Depth, Type FST, Shallow, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	202.57		73.37
26 05 33 16-0149	EA	1/2" Depth, Type FSX, Shallow, Single Gang Cast Iron Alloy Box..... Note: Four hubs.	198.44		73.37
26 05 33 16-0150	EA	3/4" Depth, Type FSX, Shallow, Single Gang Cast Iron Alloy Box..... Note: Four hubs.	239.41		88.65
26 05 33 16-0151		Deep, Single Gang Cast Iron Alloy Boxes (26 05 33 16-0128) Note: >2" deep boxes.			
26 05 33 16-0152	EA	1/2" Depth, Type FD, Deep, Single Gang Cast Iron Alloy Box..... Note: One hub.	110.31		36.68
26 05 33 16-0153	EA	3/4" Depth, Type FD, Deep, Single Gang Cast Iron Alloy Box..... Note: One hub.	127.02		42.79
26 05 33 16-0154	EA	1" Depth, Type FD, Deep, Single Gang Cast Iron Alloy Box..... Note: One hub.	149.20		51.96
26 05 33 16-0155	EA	1/2" Depth, Type FDC, Deep, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	140.59		48.91
26 05 33 16-0156	EA	3/4" Depth, Type FDC, Deep, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	162.28		58.09
26 05 33 16-0157	EA	1" Depth, Type FDC, Deep, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	195.04		70.31
26 05 33 16-0158	EA	3/4" Depth, Type FDS, Deep, Single Gang Cast Iron Alloy Box..... Note: Two hubs.	174.46		58.09
26 05 33 16-0159	EA	3/4" Depth, Type FDCC, Deep, Single Gang Cast Iron Alloy Box..... Note: Three hubs.	224.48		73.37
26 05 33 16-0160		Shallow, Two Gang Cast Iron Alloy Boxes (26 05 33 16-0128) Note: Up to 2" deep boxes.			
26 05 33 16-0161	EA	1/2" Depth, Type FS, Shallow, Two Gang Cast Iron Alloy Box..... Note: One hub.	126.91		39.74
26 05 33 16-0162	EA	3/4" Depth, Type FS, Shallow, Two Gang Cast Iron Alloy Box..... Note: One hub.	140.58		45.85
26 05 33 16-0163	EA	1" Depth, Type FS, Shallow, Two Gang Cast Iron Alloy Box..... Note: One hub.	163.27		55.03
26 05 33 16-0164	EA	1/2" Depth, Type FSC, Shallow, Two Gang Cast Iron Alloy Box..... Note: Two hubs.	153.71		51.96
26 05 33 16-0165	EA	3/4" Depth, Type FSC, Shallow, Two Gang Cast Iron Alloy Box..... Note: Two hubs.	174.56		61.14
26 05 33 16-0166		Deep, Two Gang Cast Iron Alloy Boxes (26 05 33 16-0128) Note: >2" deep boxes.			
26 05 33 16-0167	EA	1/2" Depth, Type FD, Deep, Two Gang Cast Iron Alloy Box..... Note: One hub.	141.58		39.74
26 05 33 16-0168	EA	3/4" Depth, Type FD, Deep, Two Gang Cast Iron Alloy Box..... Note: One hub.	154.38		45.85
26 05 33 16-0169	EA	1/2" Depth, Type FDC, Deep, Two Gang Cast Iron Alloy Box..... Note: Two hubs.	175.80		51.96
26 05 33 16-0170	EA	3/4" Depth, Type FDC, Deep, Two Gang Cast Iron Alloy Box..... Note: Two hubs.	197.89		61.14
26 05 33 16-0171		Cast Aluminum Boxes (26 05 33 16-0127) See CSI section 26 27 26 00-0257 for box covers.			

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 16-0172 Shallow, Single Gang Cast Aluminum Boxes <small>(26 05 33 16-0171)</small> Note: Up to 2" deep boxes.		
26 05 33 16-0173 EA 1/2" Depth, Type FS, Shallow, Single Gang Cast Aluminum Box..... Note: One hub.	93.19	30.57
26 05 33 16-0174 EA 3/4" Depth, Type FS, Shallow, Single Gang Cast Aluminum Box..... Note: One hub.	106.70	36.68
26 05 33 16-0175 EA 1" Depth, Type FS, Shallow, Single Gang Cast Aluminum Box..... Note: One hub.	118.51	45.85
26 05 33 16-0176 EA 1/2" Depth, Type FSA, Shallow, Single Gang Cast Aluminum Box..... Note: One hub.	87.50	30.57
26 05 33 16-0177 EA 3/4" Depth, Type FSA, Shallow, Single Gang Cast Aluminum Box..... Note: One hub.	110.72	36.68
26 05 33 16-0178 EA 1/2" Depth, Type FSC, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	118.20	42.79
26 05 33 16-0179 EA 3/4" Depth, Type FSC, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	142.00	51.96
26 05 33 16-0180 EA 1" Depth, Type FSC, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	178.20	64.20
26 05 33 16-0181 EA 1/2" Depth, Type FSL, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	128.11	42.79
26 05 33 16-0182 EA 3/4" Depth, Type FSL, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	137.18	51.96
26 05 33 16-0183 EA 1/2" Depth, Type FSLB, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	122.48	42.79
26 05 33 16-0184 EA 3/4" Depth, Type FSLB, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	140.54	51.96
26 05 33 16-0185 EA 1/2" Depth, Type FSR, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	118.84	42.79
26 05 33 16-0186 EA 3/4" Depth, Type FSR, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	140.54	51.96
26 05 33 16-0187 EA 1/2" Depth, Type FSS, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	110.44	42.79
26 05 33 16-0188 EA 3/4" Depth, Type FSS, Shallow, Single Gang Cast Aluminum Box..... Note: Two hubs.	149.47	51.96
26 05 33 16-0189 EA 1/2" Depth, Type FSCA, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	140.68	55.03
26 05 33 16-0190 EA 3/4" Depth, Type FSCA, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	170.92	67.26
26 05 33 16-0191 EA 1/2" Depth, Type FSCT, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	149.39	55.03
26 05 33 16-0192 EA 3/4" Depth, Type FSCT, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	201.08	67.26
26 05 33 16-0193 EA 1/2" Depth, Type FSCT, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	148.66	55.03
26 05 33 16-0194 EA 3/4" Depth, Type FSCT, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	182.40	67.26
26 05 33 16-0195 EA 3/4" Depth, Type FST, Shallow, Single Gang Cast Aluminum Box..... Note: Three hubs.	184.98	67.26
26 05 33 16-0196 EA 1/2" Depth, Type FSX, Shallow, Single Gang Cast Aluminum Box..... Note: Four hubs.	181.26	67.26
26 05 33 16-0197 EA 3/4" Depth, Type FSX, Shallow, Single Gang Cast Aluminum Box..... Note: Four hubs.	221.26	82.54
26 05 33 16-0198 Deep, Single Gang Cast Aluminum Boxes <small>(26 05 33 16-0171)</small> Note: >2" deep boxes.		
26 05 33 16-0199 EA 1/2" Depth, Type FD, Deep, Single Gang Cast Aluminum Box..... Note: One hub.	103.29	30.57
26 05 33 16-0200 EA 3/4" Depth, Type FD, Deep, Single Gang Cast Aluminum Box..... Note: One hub.	123.74	36.68
26 05 33 16-0201 EA 1" Depth, Type FD, Deep, Single Gang Cast Aluminum Box..... Note: One hub.	141.94	45.85
26 05 33 16-0202 EA 3/4" Depth, Type FDA, Deep, Single Gang Cast Aluminum Box..... Note: One hub.	132.96	36.68
26 05 33 16-0203 EA 1/2" Depth, Type FDC, Deep, Single Gang Cast Aluminum Box..... Note: Two hubs.	131.26	42.79
26 05 33 16-0204 EA 3/4" Depth, Type FDC, Deep, Single Gang Cast Aluminum Box..... Note: Two hubs.	158.03	51.96
26 05 33 16-0205 EA 1" Depth, Type FDC, Deep, Single Gang Cast Aluminum Box..... Note: Two hubs.	176.69	64.20
26 05 33 16-0206 EA 3/4" Depth, Type FDS, Deep, Single Gang Cast Aluminum Box..... Note: Two hubs.	160.17	51.96
26 05 33 16-0207 EA 3/4" Depth, Type FDCC, Deep, Single Gang Cast Aluminum Box..... Note: Three hubs.	195.86	67.26
26 05 33 16-0208 Shallow, Two Gang Cast Aluminum Boxes <small>(26 05 33 16-0171)</small> Note: Up to 2" deep boxes.		
26 05 33 16-0209 EA 1/2" Depth, Type FS, Shallow, Two Gang Cast Aluminum Box..... Note: One hub.	123.55	33.62
26 05 33 16-0210 EA 3/4" Depth, Type FS, Shallow, Two Gang Cast Aluminum Box..... Note: One hub.	141.47	39.74
26 05 33 16-0211 EA 1" Depth, Type FS, Shallow, Two Gang Cast Aluminum Box..... Note: One hub.	151.85	48.91

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	16-0212	EA	1/2" Depth, Type FSC, Shallow, Two Gang Cast Aluminum Box..... Note: Two hubs.	154.38	45.85
26 05 33	16-0213	EA	3/4" Depth, Type FSC, Shallow, Two Gang Cast Aluminum Box..... Note: Two hubs.	157.36	55.03
26 05 33	16-0214	EA	1" Depth, Type FSC, Shallow, Two Gang Cast Aluminum Box..... Note: Two hubs.	194.39	67.26
26 05 33	16-0215		Deep, Two Gang Cast Aluminum Boxes (26 05 33 16-0171) Note: >2" deep boxes.		
26 05 33	16-0216	EA	1/2" Depth, Type FD, Deep, Two Gang Cast Aluminum Box..... Note: One hub.	123.44	33.62
26 05 33	16-0217	EA	3/4" Depth, Type FD, Deep, Two Gang Cast Aluminum Box..... Note: One hub.	142.84	39.74
26 05 33	16-0218	EA	1/2" Depth, Type FDC, Deep, Two Gang Cast Aluminum Box..... Note: Two hubs.	157.53	45.85
26 05 33	16-0219	EA	3/4" Depth, Type FDC, Deep, Two Gang Cast Aluminum Box..... Note: Two hubs.	178.48	55.03
26 05 33	16-0220	EA	1/2" Depth, Type FDC, Deep, Two Gang Cast Aluminum Box..... Note: Two hubs.	157.53	45.85
26 05 33	16-0221	EA	3/4" Depth, Type FDC, Deep, Two Gang Cast Aluminum Box..... Note: Two hubs.	178.48	55.03
26 05 33	16-0222		Shallow, Three Gang Cast Aluminum Boxes (26 05 33 16-0171) Note: Up to 2" deep boxes.		
26 05 33	16-0223	EA	1/2" Depth, Type FSC, Shallow, Three Gang Cast Aluminum Box..... Note: Two hubs.	165.33	48.91
26 05 33	16-0224	EA	3/4" Depth, Type FSC, Shallow, Three Gang Cast Aluminum Box..... Note: Two hubs.	185.46	58.09
26 05 33	16-0225		Deep, Three Gang Cast Aluminum Boxes (26 05 33 16-0171) Note: >2" deep boxes.		
26 05 33	16-0226	EA	3/4" Depth, Type FD, Deep, Three Gang Cast Aluminum Box..... Note: One hub.	188.64	42.79
26 05 33	16-0227	EA	1" Depth, Type FD, Deep, Three Gang Cast Aluminum Box..... Note: One hub.	210.22	51.96
26 05 33	16-0228		Poke Thru Units (26 05 33 16)		
26 05 33	16-0229		Surface Poke Thru Units (26 05 33 16-0228) Note: Excludes concrete drilling.		
26 05 33	16-0230	EA	Single 20 Amperes, Duplex Receptacle RC3 Power And Communications Poke Thru Unit..... Note: Tile or carpet with brushed aluminum flange with black non-metallic cover. Excludes communication jacks. Wiremold RC3ATCAL.	507.59	45.85
26 05 33	16-0231	EA	Retrofit Kit Upgrades Existing RC3 Series Power And Communications Poke Thru Unit To Meet Scrub Water Requirements..... Note: Includes 20 Amp duplex receptacle. Tile or carpet with brushed aluminum flange with black non-metallic cover. Wiremold RC3KTCAL.	324.43	
26 05 33	16-0232	EA	20 Amperes, Replacement Duplex Receptacle For RC3 Series Power And Communications Poke Thru Unit..... Note: Wiremold RC37REC.	46.24	12.23
26 05 33	16-0233	EA	Abandonment Plate For RC3 Series Power And Communications Poke Thru Unit..... Note: Wiremold RC3APTCBK.	54.57	6.11
26 05 33	16-0234	EA	Four 20 Amperes, Receptacles RC4 Power And Communications Poke Thru Unit..... Note: Tile or carpet with brushed aluminum flange with black non-metallic cover. Excludes communication jacks. Wiremold RC4ATCAL.	573.64	48.91
26 05 33	16-0235	EA	Retrofit Kit Upgrades Existing RC4 Series Power And Communications Poke Thru Unit To Meet Scrub Water Requirements..... Note: Includes two 20 Amp duplex receptacles. Tile or carpet with brushed aluminum flange with black non-metallic cover. Excludes communication jacks. Wiremold RC4KTCAL.	304.06	
26 05 33	16-0236	EA	Two 20 Amperes, Replacement Duplex Receptacles For RC4 Series Power And Communications Poke Thru Unit..... Note: Wiremold RC4REC2.	78.86	18.34
26 05 33	16-0237	EA	Abandonment Plate For RC4 Series Power And Communications Poke Thru Unit..... Note: Wiremold RC4APTCBK.	54.57	6.11
26 05 33	16-0238	EA	Abandonment Plug For RC4 Series Power And Communications Poke Thru Unit..... Note: Wiremold ABPLUG4.	158.18	12.23
26 05 33	16-0239	EA	Four Jack RC9AMD Communications Poke Thru Unit..... Note: Tile or carpet with brushed aluminum flange with black non-metallic cover. Includes bezels to accept four Ortronics TracJack inserts and two Ortronics Series II inserts. Excludes communication jacks. Wiremold RC9AMDTCAL.	454.55	42.79
26 05 33	16-0240	EA	Abandonment Plate For RC9 Series Communications Poke Thru Unit..... Note: Wiremold RC9APTCBK.	38.21	6.11
26 05 33	16-0241	EA	Eight Jack AMD8 Communications Poke Thru Unit..... Note: Tile or carpet with brushed aluminum flange with black non-metallic cover. Includes bezels to accept eight Ortronics TracJack inserts and four Ortronics Series II inserts. Excludes communication jacks. Wiremold AMD8ATCAL.	452.48	42.79
26 05 33	16-0242	EA	Communication Conduit Adapter For Poke Thru Units..... Note: Includes two conduit connections for communication systems. Wiremold COM75.	52.78	6.11
26 05 33	16-0243		Recessed Poke Thru Units (26 05 33 16-0228) Note: Excludes concrete drilling.		

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 16-0244				Evolution 6AT Poke Thru Units <small>(26 05 33 16-0243)</small>		
				Note: Excludes concrete drilling.		
26 05 33 16-0245	EA			Recessed Prewired Assembly With Surface Style Cover (Wiremold 6ATCP).....	806.91	48.91
				Note: For carpet, tile, wood and laminate floors. For use in 6" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0246	EA			Recessed Prewired Assembly With Flush Style Cover (Wiremold 6ATP).....	807.01	48.91
				Note: For tile, wood and laminate floors. For use in 6" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0247	EA			Recessed Assembly With Surface Style Cover (Wiremold 6ATC).....	769.50	48.91
				Note: For carpet, tile, wood and laminate floors. For use in 6" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Diecast aluminum cover is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0248	EA			Recessed Assembly With Flush Style Cover (Wiremold 6AT).....	769.50	48.91
				Note: For tile, wood or laminate floors. For use in 6" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Die-cast aluminum cover is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0249	EA			Recessed Prewired Audio/Video Assembly With Surface Style Cover (Wiremold 6ATCPA).....	806.91	48.91
				Note: For carpet, tile, wood and laminate floors. For use in 6" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0250	EA			Recessed Prewired Audio/Video Assembly With Flush Style Cover (Wiremold 6ATPA).....	806.91	48.91
				Note: For tile, wood and laminate floors. For use in 6" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0251	EA			Recessed Furniture Feed Assembly With Surface Style Cover (Wiremold 6ATCFF).....	737.84	48.91
				Note: For carpet, tile, wood and laminate floors. For use in 6" diameter cored hole. Die-cast aluminum cover assembly provides one (1) 3/4" trade size screw plug opening and one (1) concentric 2" to 1 1/4" trade size screw plug opening and is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.		
26 05 33 16-0252	EA			Recessed Assembly With Disposable Plate (Wiremold 6STC).....	465.46	45.85
				Note: Includes 6" core hole poke-thru stem assembly with a disposable plate. Devices are recessed 3 1/4" below floor surface. No cover assembly is included. No device plates are included. For use with the following cover assemblies (purchased separately): 6CTC, 6CT, and 6CFFTC Series.		
26 05 33 16-0253	EA			Recessed Prewired Audio/Video Assembly With Disposable Plate (Wiremold 6STCPAV).....	498.55	45.85
				Note: Includes 6" core hole poke-thru stem assembly with a disposable plate. Devices are recessed 3 1/4" below floor surface. No cover assembly is included. For use with the following cover assemblies(purchased separately): 6CTC and 6CT Series.		
26 05 33 16-0254	EA			Recessed Prewired Assembly With Disposable Plate (Wiremold 6STCP).....	501.82	45.85
				Note: Includes 6" core hole poke-thru stem assembly with a disposable plate. Devices are recessed 3 1/4" below floor surface. No cover assembly is included. For use with the following cover assemblies (purchased separately): 6CTC and 6CT Series.		
26 05 33 16-0255	EA			6" Pre-Pour Poke-Thru Sleeve (Wiremold 6PPS).....	144.40	24.45
				Note: Non-metallic sleeve attaches to structural decking and maintains 6" to 6-1/8" diameter cast in core hole. Unit includes three (3) attachment legs, two (2) end caps and three (3) thumb screws.		
26 05 33 16-0256	EA			Surface Style Cover Assembly (Wiremold 6CTC).....	323.80	12.23
				Note: Die-cast aluminum cover assembly. Cover assembly is available in the following finishes: black (BK), gray (GY), nickel (NK), brass (BS), and bronze (BZ). 6CTC Series cover assemblies designed for use with 6STC, 6STCP, and 6STCPAV Poke-Thru Stem Assemblies.		
26 05 33 16-0257	EA			Flush Style Cover Assembly (Wiremold 6CT).....	323.80	12.23
				Note: Die-cast aluminum cover assembly. Cover assembly is available in the following finishes: black (BK), gray (GY), nickel (NK), brass (BS), and bronze (BZ). 6CT Series cover assemblies designed for use with 6STC, 6STCP and 6STCPAV Poke-Thru Stem Assemblies. Includes one (1) 6TS Tile Shim.		
26 05 33 16-0258	EA			Furniture Feed Cover Assembly (Wiremold 6CFFTC).....	269.56	12.23
				Note: Surface style, die-cast aluminum cover assembly, with one (1) 3/4" trade size screw plug opening, and one (1) concentric 2" to 1-1/4" trade size screw plug opening. Cover assembly is available in finishes: black (BK), gray(GY), nickel (NK), brass (BS), and bronze (BZ). 6CFFTC Series Cover Assemblies designed for use with 6STC Poke- Thru Stem Assembly. Includes one (1) 3/4" and one (1) 2" trade size conduit fittings and one (1) divider to separate services.		
26 05 33 16-0259	EA			Tile Shim (Wiremold 6TS).....	39.24	3.06
				Note: Used for floor coverings greater than 5/16" The 6TS will allow the top surface of the cover to be flush with the finished floor. Includes: two (2) 1/8" thick shims and two (2) 1/16" thick shims. Up to a total of 3/8" of adjustment.		
26 05 33 16-0260	EA			Device Mounting Plate (Wiremold 6AAP).....	20.10	6.11
				Note: Device plate that will accept up to two (2) Extron® Electronics AAP style plates. For use in the center compartment only. Devices supplied by others.		
26 05 33 16-0261	EA			Device Mounting Plate (Wiremold 6ACT8A).....	23.04	6.11
				Note: Device plate that will accept up to eight (8) ports of communication devices. For use in the center compartment only. Devices supplied by others.		
26 05 33 16-0262	EA			Device Mounting Plate (Wiremold 6B).....	20.01	6.11
				Note: Device plate used to blank off center compartment, when no devices are used.		
26 05 33 16-0263	EA			Device Mounting Plate (Wiremold 6DEC).....	20.07	6.11
				Note: Device plate that will accept Decorator style devices such as 20 amperes receptacles, GFCIs, 106 adapters or A/V devices. For use in the center compartment only. Devices supplied by others.		
26 05 33 16-0264	EA			Device Mounting Plate (Wiremold 6DP).....	19.94	6.11
				Note: Device plate that will accept standard 20 amperes duplex receptacle or duplex Turnlok receptacle. For use in the center compartment only. Devices supplied by others.		
26 05 33 16-0265	EA			Device Mounting Plate (Wiremold 6MAAP).....	23.35	6.11
				Note: Device plate that will accept up to six (6) Extron® Electronics MAAP style plates. For use in the center compartment only. Devices supplied by others.		
26 05 33 16-0266	EA			Device Mounting Plate (Wiremold 6MAAP2A).....	23.11	6.11
				Note: Combination device plate that will accept up to three (3) Extron® Electronics MAAP style plates, and up to two (2) ports of communication devices. For use in the center compartment only. Devices supplied by others.		

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33	16-0267	EA	Mosaic Mounting Plate (Wiremold 6MOS)..... Note: Device plate will accept two (2) standard [45mm x 45mm] or one (1) standard [45mm x 90mm] Mosaic style device(s). Devices supplied by others.	23.64	6.11
26 05 33	16-0268	EA	Device Mounting Plate (Wiremold 6S1)..... Note: Receptacle opening 1 3/8". For 6" poke-thru units only.	19.66	6.11
26 05 33	16-0269	EA	Device Mounting Plate (Wiremold 6S2)..... Note: Receptacle opening 1 9/16". For 6" poke-thru units only.	19.67	6.11
26 05 33	16-0270	EA	Device Mounting Plate (Wiremold 6SER)..... Note: Device plate that will accept up to four (4) Ortronics® Series II dual modular inserts. For use in the center compartment only. Devices supplied by others.	19.42	6.11
26 05 33	16-0271	EA	Device Mounting Plate (Wiremold 6TRAC)..... Note: Device plate that will accept up to eight (8) Ortronics® TracJack devices. For use in the center compartment only. Devices supplied by others.	19.42	6.11
26 05 33	16-0272	EA	20 Amperes, Duplex Receptacles (Wiremold 68REC)..... Note: Two (2) proprietary 20 amperes duplex power receptacles with mounting plates. Designed to fit in either of the two side compartments in both the 6ATC and the 8ATC Series Poke-Thru Devices. Receptacle can be wired as a standard or isolated ground device.	45.74	9.17
26 05 33	16-0273	EA	Device Mounting Plate (Wiremold 68B)..... Note: Blank plate. Used to blank off either of the side compartments when no devices or cabling are to be used.	17.87	6.11
26 05 33	16-0274	EA	Device Mounting Plate (Wiremold 68MAAP)..... Note: Device plate that will accept up to two (2) Extron® Electronics MAAP device plates. For use in either of the two side compartments only. Not for use in the center compartment. Extron Devices supplied by others.	18.29	6.11
26 05 33	16-0275	EA	20 Amperes, Duplex Receptacles (Wiremold 68REC-25)..... Note: Two (2) proprietary 20 amperes duplex power receptacles with mounting plates and 25' leads. Designed to fit in either of the two side compartments in both the 6ATC and the 8ATC Series Poke-Thru Devices. Receptacle can be wired as a standard or isolated	140.52	11.00
26 05 33	16-0276	EA	Device Mounting Plate (Wiremold 682A)..... Note: Device plate that will accept up to two (2) ports of communication devices. For use in either of the two side compartments only. Not for use in the center compartment. Communication devices supplied by others.	22.84	6.11
26 05 33	16-0277	EA	Bottom Housing Assembly (Wiremold 5PTHA)..... Note: Half-gang pass through housing assembly. Designed to allow pass through of communication cables when no conduit is required. For use on side compartments only.	23.75	6.11
26 05 33	16-0278	EA	Bottom Housing Assembly (Wiremold 5BLH)..... Note: Half-gang blank housing assembly. Designed to blank off compartment when no cable pass through is required. For use on side compartments only. Includes tunnels for 6" and 8" poke-thru devices.	24.40	6.11
26 05 33	16-0279	EA	Bottom Housing Assembly (Wiremold 152CHA)..... Note: One and a half-gang 2" trade size conduit housing assembly. Recommended for use with furniture feed devices (6ATCFF). Covers the center compartment and one of the side compartments.	38.00	12.23
26 05 33	16-0280	EA	Bottom Housing Assembly (Wiremold 575CHA)..... Note: Half-gang 3/4" trade size conduit housing assembly. Includes junction box attached to 3/4" trade size conduit for electrical power connections. For use on side compartments only.	43.78	15.28
26 05 33	16-0281	EA	Bottom Housing Assembly (Wiremold 175CHA)..... Note: One-gang 3/4" trade size conduit housing assembly. Includes junction box attached to 3/4" trade size conduit for electrical power connections.	47.99	15.28
26 05 33	16-0282	EA	Bottom Housing Assembly (Wiremold 1125CHA)..... Note: One-gang 1 1/4" trade size conduit housing assembly.	36.58	12.23
26 05 33	16-0283	EA	Bottom Housing Assembly (Wiremold 1PTHA)..... Note: One-gang pass through housing assembly. Designed to allow pass through of communication cables when no conduit is required.	23.60	6.11
26 05 33	16-0284	EA	Bottom Housing Assembly (Wiremold 1BLH)..... Note: One-gang blank housing assembly. Designed to blank off compartment when no cable pass through is required.	23.60	6.11
26 05 33	16-0285	EA	Bottom Housing Assembly (Wiremold 15FFHA)..... Note: One and a half-gang pass through conduit housing assembly. Used for furniture feed applications on the center compartment only. Only for use with 6AT Series units.	24.81	6.11
26 05 33	16-0286	EA	Bottom Housing Assembly (Wiremold 1BHA)..... Note: One-gang bottom housing assembly. Designed to accept 175CHA, 1125CHA, 1PTHA, and 1BLH plates.	25.63	6.11
26 05 33	16-0287		Evolution 8AT Poke Thru Units (26 05 33 16-0243) Note: Excludes concrete drilling.		
26 05 33	16-0288	EA	Recessed Prewired Assembly With Surface Style Cover (Wiremold 8ATCP)..... Note: For carpet, tile, wood and laminate floors. For use in 8" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.	1,055.72	48.91
26 05 33	16-0289	EA	Recessed Prewired Assembly With Flush Style Cover (Wiremold 8ATP)..... Note: For tile, wood and laminate floors. For use in 8" diameter cored hole. Devices are recessed 3 1/4" [83mm] below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.	1,005.24	48.91
26 05 33	16-0290	EA	Recessed Prewired Assembly With Flush Style Cover (Wiremold 8AT2P)..... Note: For tile, wood and laminate floors. For use in 8" diameter cored hole. Devices are recessed 3 1/4" [83mm] below floor surface. Die-cast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.	1,067.14	48.91
26 05 33	16-0291	EA	Recessed Assembly With Surface Style Cover (Wiremold 8ATC)..... Note: For carpet, tile, wood and laminate floors. For use in 8" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Diecast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.	995.74	48.91
26 05 33	16-0292	EA	Recessed Assembly With Flush Style Cover (Wiremold 8AT)..... Note: For tile, wood and laminate floors. For use in 8" diameter cored hole. Devices are recessed 3 1/4" below floor surface. Diecast aluminum cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze.	986.73	48.91
26 05 33	16-0293	EA	Recessed Assembly With Disposable Plate (Wiremold 8STC)..... Note: Includes 8" core hole poke-thru stem assembly with a disposable plate. Devices are recessed 3 1/4" below floor surface. No cover assembly is included. For use with the following cover assemblies (purchased separately): 8CTC and 8CT Series.	599.02	45.85

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 16-0294 EA Recessed Prewired Assembly With Disposable Plate (Wiremold 8STCP) Note: Includes 8" core hole poke-thru stem assembly with a disposable plate. Devices are recessed 3 1/4" below floor surface. No cover assembly is included. For use with the following cover assemblies (purchased separately): 8CTC and 8CT Series.	670.13	45.85
26 05 33 16-0295 EA 8" Pre-Pour Poke-Thru Sleeve (Wiremold 8PPS)..... Note: Non-metallic sleeve attaches to structural decking and maintains 8" to 8 1/8" diameter cast in core hole. Unit includes three (3) attachment legs, two (2) end caps and three (3) thumb screws.	172.15	24.45
26 05 33 16-0296 EA Surface Style Cover Assembly (Wiremold 8CTC)..... Note: Die-cast aluminum cover assembly. Cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze. 8CTC Series Cover Assemblies designed for use with 8STC and 8STCP Poke-Thru Stem Assemblies.	349.99	12.23
26 05 33 16-0297 EA Flush Style Cover Assembly (Wiremold 8CT)..... Note: Die-cast aluminum cover assembly. Cover assembly is available in the following finishes: (BK) painted black, (GY) painted gray, (NK) nickel, (BS) brass, and (BZ) bronze. 8CTC Series Cover Assemblies designed for use with 8STC and 8STCP Poke-Thru Stem Assemblies. Includes one (1) 8TS Tile Shim.	349.99	12.23
26 05 33 16-0298 EA Tile Shim (Wiremold 8TS)..... Note: Used for floor coverings greater than 5/16". The 8TS will allow the top surface of the cover to be flush with the finished floor. Includes: two (2) 1/8" thick shims and two (2) 1/16" thick shims. Up to a total of 3/8" [9.5mm] of adjustment.	60.82	3.06
26 05 33 16-0299 EA Device Mounting Plate (Wiremold 8B)..... Note: Singlegang device plate used to blank off any one (1) of the three (3) gangs in the center compartment, when no devices are used.	20.73	6.11
26 05 33 16-0300 EA Device Mounting Plate (Wiremold 8DP)..... Note: Singlegang device plate that accepts standard 20 amperes duplex receptacle or a duplex Turnlok receptacle. Fits in any one (1) of the three (3) gangs in the center compartment. Devices supplied by others.	20.84	6.11
26 05 33 16-0301 EA Device Mounting Plate (Wiremold 8DEC)..... Note: Singlegang device plate that will accept Decorator style devices such as 20 amperes receptacles, GGCI's, 106 adapters or A/V devices. Fits in any one (1) of the three (3) gangs in the center compartment. Devices supplied by others.	20.97	6.11
26 05 33 16-0302 EA Device Mounting Plate (Wiremold 8ACT6A)..... Note: Singlegang device plate that will accept up to six (6) ports of communication devices. Fits in any one (1) of the three (3) gangs in the center compartment. Devices supplied by others.	24.12	6.11
26 05 33 16-0303 EA Mosaic Mounting Plate (Wiremold 8MOS)..... Note: Device plate accepts three (3) standard Mosaic devices. Devices supplied by others.	28.98	6.11
26 05 33 16-0304 EA Crestron Double Gang Plate (Wiremold 8CREST)..... Note: Device plate accepts Crestron double-gang decorator style devices.	28.93	6.11
26 05 33 16-0305 EA Device Mounting Plate (Wiremold 8S1)..... Note: Receptacle opening 1 3/8". For 8" poke-thru units only.	20.14	6.11
26 05 33 16-0306 EA Device Mounting Plate (Wiremold 8S2)..... Note: Receptacle opening 1 9/16". For 8" poke-thru units only.	20.38	6.11
26 05 33 16-0307 EA Device Mounting Plate (Wiremold 8TRAC)..... Note: Singlegang device plate that will accept up to six (6) Ortronics TracJack devices. Fits in any one (1) of the three (3) gangs in the center compartment. Devices supplied by others.	20.14	6.11
26 05 33 16-0308 EA Device Mounting Plate (Wiremold 8SER)..... Note: Singlegang device plate that will accept up to three (3) Ortronics Series II dual modular inserts. Fits in any one (1) of the three (3) gangs in the center compartment. Devices supplied by others.	20.14	6.11
26 05 33 16-0309 EA Device Mounting Plate (Wiremold 8MAAP)..... Note: Singlegang device plate that will accept up to four (4) Extron® Electronics MAAP style plates. Fits in any one (1) of the three (3) gangs in the center compartment. Devices supplied by others.	28.54	6.11
26 05 33 16-0310 EA Device Mounting Plate (Wiremold 8AAP)..... Note: Twogang device plate that will accept up to four (4) Extron® Electronics AAP style plates. 8AAP takes up 2 of the 3 gangs in the center compartment. Devices supplied by others.	23.98	6.11
26 05 33 16-0311 EA 8" Divider (Wiremold 8DIV)..... Note: Divider allows for separation of services when required.	27.47	6.11
26 05 33 16-0312 EA Bottom Housing Assembly (Wiremold 22CHA)..... Note: Two-gang 2" trade size conduit housing assembly. Used on 8AT Series devices. Covers two (2) of the three (3) gangs in the center compartment. Only for use with 8AT Series units.	38.00	12.23

26 05 33 23 Surface Raceways for Electrical Systems (26 05 33)

26 05 33 23-0001	Raceways (26 05 33 23)		
26 05 33 23-0002	Wireway With Screw Cover (26 05 33 23-0001)		
	Note: Also known as wire trough. Galvanized steel construction. Mounted exposed on flat wall surface.		
26 05 33 23-0003	2-1/2" x 2-1/2", Wireway With Screw Cover (26 05 33 23-0002)		
26 05 33 23-0004	LF 2-1/2" x 2-1/2", NEMA 1, Surface Mounted Wireway With Screw Cover For Combination Hinged Screw Cover, Add For Concrete Or Masonry Surface, Add	27.28 0.81 0.56	5.58
26 05 33 23-0005	EA 2-1/2" x 2-1/2", End Plate For Surface Mounted Wireway With Screw Cover..... For Combination Hinged Screw Cover, Add	22.60 0.29	8.38
26 05 33 23-0006	EA 2-1/2" x 2-1/2", Coupling For Surface Mounted Wireway With Screw Cover..... For Combination Hinged Screw Cover, Add	26.73 0.29	10.45
26 05 33 23-0007	EA 2-1/2" x 2-1/2", Panel Adapter For Surface Mounted Wireway With Screw Cover..... For Combination Hinged Screw Cover, Add	56.22 0.86	19.55
26 05 33 23-0008	EA 2-1/2" x 2-1/2", Elbow For Surface Mounted Wireway With Screw Cover For Combination Hinged Screw Cover, Add	90.33 2.56	19.55
26 05 33 23-0009	EA 2-1/2" x 2-1/2", Tee For Surface Mounted Wireway With Screw Cover..... For Combination Hinged Screw Cover, Add	133.78 3.91	27.82
26 05 33 23-0010	EA 2-1/2" x 2-1/2", Cross For Surface Mounted Wireway With Screw Cover For Combination Hinged Screw Cover, Add	150.17 4.44	30.72
26 05 33 23-0011	4" x 4", Wireway With Screw Cover (26 05 33 23-0002)		

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 33 23-0012	LF 4" x 4", NEMA 1, Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	33.41 0.97 0.70	7.04
26 05 33 23-0013	LF 4" x 4", NEMA 3R, Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	59.87 2.29 0.70	7.04
26 05 33 23-0014	EA 4" x 4", End Plate For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	18.38 0.30	6.15
26 05 33 23-0015	EA 4" x 4", Coupling For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	29.55 0.30	11.73
26 05 33 23-0016	EA 4" x 4", Panel Adapter For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	66.42 0.93	23.91
26 05 33 23-0017	EA 4" x 4", Elbow For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	103.92 2.80	23.91
26 05 33 23-0018	EA 4" x 4", Tee For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	147.10 4.25	31.06
26 05 33 23-0019	EA 4" x 4", Cross For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	169.94 4.87	36.31
26 05 33 23-0020	6" x 6", Wireway With Screw Cover <small>(26 05 33 23-0002)</small>		
26 05 33 23-0021	LF 6" x 6", NEMA 1, Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	49.89 1.66 0.84	8.38
26 05 33 23-0022	LF 6" x 6", NEMA 3R, Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	96.29 3.98 0.84	8.38
26 05 33 23-0023	EA 6" x 6", End Plate For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	23.21 0.49	6.71
26 05 33 23-0024	EA 6" x 6", Coupling For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	37.74 0.49	13.97
26 05 33 23-0025	EA 6" x 6", Panel Adapter For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	93.63 1.91	27.82
26 05 33 23-0026	EA 6" x 6", Elbow For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	133.23 3.89	27.82
26 05 33 23-0027	EA 6" x 6", Tee For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	209.04 6.98	34.75
26 05 33 23-0028	EA 6" x 6", Cross For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	226.66 7.31	40.22
26 05 33 23-0029	8" x 8", Wireway With Screw Cover <small>(26 05 33 23-0002)</small>		
26 05 33 23-0030	LF 8" x 8", NEMA 1, Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	80.34 3.10 0.91	9.16
26 05 33 23-0031	LF 8" x 8", NEMA 3R, Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	146.41 6.41 0.91	9.16
26 05 33 23-0032	EA 8" x 8", End Plate For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	25.56 0.55	7.26
26 05 33 23-0033	EA 8" x 8", Coupling For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	41.20 0.55	15.08
26 05 33 23-0034	EA 8" x 8", Panel Adapter For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	104.47 2.16	30.61
26 05 33 23-0035	EA 8" x 8", Elbow For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	168.79 5.38	30.61
26 05 33 23-0036	EA 8" x 8", Tee For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	251.25 8.79	37.77
26 05 33 23-0037	EA 8" x 8", Cross For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	350.50 12.94	45.81
26 05 33 23-0038	10" x 10", Wireway With Screw Cover <small>(26 05 33 23-0002)</small>		
26 05 33 23-0039	LF 10" x 10", NEMA 1, Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	116.54 4.76 1.06	10.62
26 05 33 23-0040	LF 10" x 10", NEMA 3R, Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i> <i>For Concrete Or Masonry Surface, Add</i>	205.95 9.23 1.06	10.62
26 05 33 23-0041	EA 10" x 10", End Plate For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	35.71 0.95	8.38
26 05 33 23-0042	EA 10" x 10", Coupling For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	52.46 0.95	16.76
26 05 33 23-0043	EA 10" x 10", Panel Adapter For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	139.06 3.62	33.29
26 05 33 23-0044	EA 10" x 10", Elbow For Surface Mounted Wireway With Screw Cover..... <i>For Combination Hinged Screw Cover, Add</i>	266.65 10.00	33.29
26 05 33 23-0045	EA 10" x 10", Tee For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	402.97 15.95	42.01
26 05 33 23-0046	EA 10" x 10", Cross For Surface Mounted Wireway With Screw Cover <i>For Combination Hinged Screw Cover, Add</i>	574.38 23.97	47.48

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 23-0047 12" x 12", Wireway With Screw Cover <small>(26 05 33 23-0002)</small>		
26 05 33 23-0048 LF 12" x 12", NEMA 1, Surface Mounted Wireway With Screw Cover.....	136.87	12.85
For Combination Hinged Screw Cover, Add	5.56	
For Concrete Or Masonry Surface, Add	1.28	
26 05 33 23-0049 LF 12" x 12", NEMA 3R, Surface Mounted Wireway With Screw Cover.....	226.71	12.85
For Combination Hinged Screw Cover, Add	10.05	
For Concrete Or Masonry Surface, Add	1.28	
26 05 33 23-0050 EA 12" x 12", End Plate For Surface Mounted Wireway With Screw Cover.....	46.83	8.93
For Combination Hinged Screw Cover, Add	1.45	
26 05 33 23-0051 EA 12" x 12", Coupling For Surface Mounted Wireway With Screw Cover.....	64.71	17.87
For Combination Hinged Screw Cover, Add	1.45	
26 05 33 23-0052 EA 12" x 12", Panel Adapter For Surface Mounted Wireway With Screw Cover.....	182.11	36.31
For Combination Hinged Screw Cover, Add	5.47	
26 05 33 23-0053 EA 12" x 12", Elbow For Surface Mounted Wireway With Screw Cover.....	351.08	36.31
For Combination Hinged Screw Cover, Add	13.92	
26 05 33 23-0054 EA 12" x 12", Tee For Surface Mounted Wireway With Screw Cover.....	452.68	44.68
For Combination Hinged Screw Cover, Add	18.17	
26 05 33 23-0055 EA 12" x 12", Cross For Surface Mounted Wireway With Screw Cover.....	736.65	50.28
For Combination Hinged Screw Cover, Add	31.81	
26 05 33 23-0056 Surface Metal Raceways <small>(26 05 33 23-0001)</small>		
Note: Exposed on flat wall surface.		
26 05 33 23-0057 One Piece Surface Metal Raceways <small>(26 05 33 23-0056)</small>		
Note: Exposed installations on masonry, concrete block or drywall walls or ceilings. (Wiremold or approved equal).		
26 05 33 23-0058 3/4" x 17/32" One Piece Surface Metal Raceways (Wiremold #500) <small>(26 05 33 23-0057)</small>		
Note: Available in ivory.		
26 05 33 23-0059 LF 3/4" x 17/32" One Piece Surface Metal Raceway (Wiremold #500).....	4.93	1.67
For Concrete Or Masonry Surface, Add	0.17	
26 05 33 23-0060 EA Bushing (Wiremold #502).....	4.84	2.24
26 05 33 23-0061 EA One Or Two Hole Strap (Wiremold #504).....	4.88	2.24
26 05 33 23-0062 EA Connection Cover (Wiremold #506).....	5.07	2.24
26 05 33 23-0063 EA Flat 90 Degree Elbow (Wiremold #511).....	7.69	2.68
26 05 33 23-0064 EA Flat 45 Degree Elbow (Wiremold #512).....	12.73	2.80
26 05 33 23-0065 EA Adjustable Internal Elbow (Wiremold #517).....	9.58	3.35
26 05 33 23-0066 EA Adjustable External Elbow (Wiremold #518).....	9.37	3.35
26 05 33 23-0067 3/4" x 21/32" One Piece Surface Metal Raceways (Wiremold #700) <small>(26 05 33 23-0057)</small>		
Note: Available in ivory and white.		
26 05 33 23-0068 LF 3/4" x 21/32" One Piece Surface Metal Raceway (Wiremold #700).....	6.23	2.24
For Concrete Or Masonry Surface, Add	0.22	
26 05 33 23-0069 EA Bushing (Wiremold #702).....	4.97	2.24
26 05 33 23-0070 EA One Or Two Hole Strap (Wiremold #704).....	5.12	2.24
26 05 33 23-0071 EA Connection Cover (Wiremold #706).....	5.16	2.24
26 05 33 23-0072 EA Flat 90 Degree Elbow (Wiremold #711).....	11.36	4.47
26 05 33 23-0073 EA Flat 45 Degree Elbow (Wiremold #712).....	17.81	4.47
26 05 33 23-0074 EA Adjustable Internal Elbow (Wiremold #717).....	12.25	4.47
26 05 33 23-0075 EA Adjustable External Elbow (Wiremold #718).....	11.84	4.47
26 05 33 23-0076 One Piece Surface Metal Raceways Fittings (Wiremold #500 And 700 Fittings) <small>(26 05 33 23-0057)</small>		
Note: Available in ivory.		
26 05 33 23-0077 EA 18" Flex Fitting, For #500 Or 700 (Wiremold #5700F).....	33.66	3.35
26 05 33 23-0078 EA Galvanized Coupling For #500 Or 700 (Wiremold #5701).....	5.10	2.24
26 05 33 23-0079 EA Supporting Clip, For #500 Or 700 (Wiremold #5703).....	5.10	2.24
26 05 33 23-0080 EA Ground Clamp (Wiremold #5709).....	14.72	3.35
26 05 33 23-0081 EA Grounding Connector (Wiremold #5709GC).....	12.44	3.35
26 05 33 23-0082 EA L Or R (Left Or Right) Twisted Internal Ell (Wiremold #5711).....	14.15	4.47
26 05 33 23-0083 EA Tee (Wiremold #5715).....	15.93	5.58
26 05 33 23-0084 EA 2-1/2" x 2-3/8" x 2-1/2" Corner Box (Wiremold #5719).....	27.58	4.47
26 05 33 23-0085 EA Utility Box For #500 Or #700 (Wiremold #57242).....	21.25	4.47
26 05 33 23-0086 EA 2-3/8" Diameter, Blank Cover (Wiremold #5731).....	11.43	2.80
26 05 33 23-0087 EA 3" Diameter, Outlet Box (Wiremold #5733).....	26.28	4.47
26 05 33 23-0088 EA 4-3/4" Square x 1-3/8" Deep, Distribution Box (Wiremold #5735).....	26.18	4.47
26 05 33 23-0089 EA 4-3/8" Blank Cover (Wiremold #5736).....	12.11	2.80
26 05 33 23-0090 EA 4-3/4" Diameter, Extension Box/Open Base (Wiremold #5737).....	23.80	4.47
26 05 33 23-0091 EA 5-1/2" Diameter, Extension Box/Open Base (Wiremold #5737A).....	22.97	4.47
26 05 33 23-0092 EA 4-3/4" Diameter, Fixture Box/Solid Base (Wiremold #5738).....	23.16	4.47
26 05 33 23-0093 EA 5-1/2" Diameter, Fixture Box/Solid Base (Wiremold #5738A).....	23.16	4.47
26 05 33 23-0094 EA 5-1/2" Diameter, Fan Box/Solid Base (Wiremold #5738AF).....	26.18	4.47
26 05 33 23-0095 EA 6-3/8" Diameter, Fixture Box/Solid Base (Wiremold #5739).....	25.86	4.47
26 05 33 23-0096 EA 6-3/8" Diameter, Extension Box/Open Base (Wiremold #5739A).....	27.60	4.47
26 05 33 23-0097 EA Standard Switch Box For #500, Or #700 (Wiremold #57240).....	31.15	7.26
26 05 33 23-0098 EA Duplex Receptacle And Box, Ground, For #500 Or #700 (Wiremold #57243G).....	49.34	13.97
26 05 33 23-0099 EA 2-13/16" x 4-5/8" x 1-3/8" Switch And Receptacle Box For Shallow Type Switches (Wiremold #5741).....	23.56	7.26
26 05 33 23-0100 EA 1 Gang, 4-5/8" x 2-7/8" x 2-3/4" Extra Deep Switch And Receptacle Box (Wiremold #5744).....	37.27	7.26

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 23-0101	EA	2 Gang, 4-3/4" x 4-3/4" x 2-3/4" Extra Deep Switch And Receptacle Box (Wiremold #5744-2).....	42.71	7.26
26 05 33 23-0102	EA	3 Gang, 4-5/8" x 6-1/2" x 2-3/4" Extra Deep Switch And Receptacle Box (Wiremold #5744-3).....	64.83	7.26
26 05 33 23-0103	EA	1 Gang, Signal Box (Wiremold #5744S).....	33.76	6.15
26 05 33 23-0104	EA	2 Gang, Signal Box (Wiremold #5744S-2).....	37.68	6.15
26 05 33 23-0105	EA	3 Gang, Signal Box (Wiremold #5744S-3).....	60.42	6.15
26 05 33 23-0106	EA	4-5/8" x 2-7/8" x 1-3/4" Combination Switch And Receptacle Box With 1/2" KO's (Wiremold #5745).....	24.60	7.26
26 05 33 23-0107	EA	4-5/8" x 2-7/8" x 1-3/8", 1 Gang, Shallow Switch And Receptacle Box For Standard Shallow Devices (Wiremold #5747).....	21.63	7.26
26 05 33 23-0108	EA	4-3/4" x 4-3/4" x 1-3/8", 2 Gang, Shallow Switch And Receptacle Box For Standard Shallow Devices (Wiremold #5747-2).....	30.42	7.26
26 05 33 23-0109	EA	4-5/8" x 6-1/2" x 2-3/4", 3 Gang, Shallow Switch And Receptacle Box For Standard Shallow Devices (Wiremold #5747-3).....	59.17	7.26
26 05 33 23-0110	EA	4-5/8" x 2-7/8" x 1-3/4", 1 Gang, Switch And Receptacle Box For Deep Devices (Wiremold #5748).....	23.12	7.26
26 05 33 23-0111	EA	4-3/4" x 4-3/4" x 1-3/4", 2 Gang, Switch And Receptacle Box For Deep Devices (Wiremold #5748-2).....	32.20	7.26
26 05 33 23-0112	EA	4-5/8" x 6-1/2" x 1-3/4", 3 Gang, Switch And Receptacle Box For Deep Devices (Wiremold #5748-3).....	57.51	7.26
26 05 33 23-0113	EA	4-5/8" x 8-11/32" x 1-3/4", 4 Gang, Switch And Receptacle Box For Deep Devices (Wiremold #5748-4).....	85.36	7.26
26 05 33 23-0114	EA	4-5/8" x 10-5/32" x 1-3/4", 5 Gang, Switch And Receptacle Box For Deep Devices (Wiremold #5748-5).....	140.74	7.26
26 05 33 23-0115	EA	4-5/8" x 11-31/32" x 1-3/4", 6 Gang, Switch And Receptacle Box For Deep Devices (Wiremold #5748-6).....	143.21	7.26
26 05 33 23-0116	EA	4-3/8" x 2-7/8" x 15/16" Shallow Switch And Receptacle Box For Shallow Duplex Devices (Wiremold #5748-S).....	22.84	7.26
26 05 33 23-0117	EA	4-5/8" x 2-7/8" x 15/16", 1 Gang, Flush-Type Extension Adapter (Wiremold #5751).....	22.20	7.26
26 05 33 23-0118	EA	4-5/4" x 4-3/4" x 15/16", 2 Gang, Flush-Type Extension Adapter (Wiremold #5751-2).....	29.53	7.26
26 05 33 23-0119	EA	4-5/8" x 6-1/2" x 15/16", 3 Gang, Flush-Type Extension Adapter (Wiremold #5751-3).....	58.07	7.26
26 05 33 23-0120	EA	4-5/8" x 2-7/8" x 1-3/4", 1 Gang, Deep Flush-Type Extension Adapter (Wiremold #5751A).....	24.00	7.26
26 05 33 23-0121	EA	4-11/16" x 4-11/16" x 1-3/8", 2 Gang, Alarm Device Box (Wiremold #5752).....	31.07	7.26
26 05 33 23-0122	EA	4-11/16" x 4-11/16" x 2-3/4", 2 Gang, Extra Deep Alarm Device Box (Wiremold #5753).....	44.76	7.26
26 05 33 23-0123	EA	Blank Extension Box (Wiremold #5760).....	15.55	2.80
26 05 33 23-0124	EA	1/2" Special Nipple (Wiremold #5780).....	14.81	2.80
26 05 33 23-0125	EA	1/2" Box Connector (Wiremold #5781).....	9.85	2.80
26 05 33 23-0126	EA	3/4" Box Connector (Wiremold #5781A).....	18.59	3.35
26 05 33 23-0127	EA	1/2" Conduit Connector (Wiremold #5782).....	9.94	2.80
26 05 33 23-0128	EA	3/4" Conduit Connector (Wiremold #5782A).....	23.29	3.35
26 05 33 23-0129	EA	1/2" Elbow Conduit Connector (Wiremold #5784).....	20.87	3.35
26 05 33 23-0130	EA	Combination Connector, To Any 3-1/4" Or 4" Outlet Box (Wiremold #5785).....	11.61	3.35
26 05 33 23-0131	EA	Offset Connector (Wiremold #5786).....	19.37	3.35
26 05 33 23-0132	EA	Armor Cable Connector (Wiremold #5790B).....	10.09	2.80
26 05 33 23-0133	EA	1/2" Electrical Metallic Tubing (EMT) Connector, For #500 Or 700 (Wiremold #5791).....	8.93	2.24

26 05 33 23-0134 1-9/16" x 11/32" One Piece Surface Metal Raceways (Wiremold #1500) (26 05

<small>33 23-0057</small> Note: Galvanized finish.				
26 05 33 23-0135	LF	1-9/16" x 11/32" One Piece Surface Metal Raceway (Wiremold #1500-10).....	9.00	2.80
<i>For Concrete Or Masonry Surface, Add</i>			0.28	
26 05 33 23-0136	EA	Wire Clip (Wiremold #1500WC).....	5.60	2.24
26 05 33 23-0137	EA	Bushing (Wiremold #1502).....	6.63	2.80
26 05 33 23-0138	EA	2-Hole Strap (Wiremold #1504).....	7.51	3.35
26 05 33 23-0139	EA	Flat Elbow (Wiremold #1511).....	29.05	10.62
26 05 33 23-0140	EA	Internal Elbow (Wiremold #1517).....	30.02	10.62
26 05 33 23-0141	EA	Adapter Fitting (Wiremold #1517B).....	32.28	10.62
26 05 33 23-0142	EA	External Elbow (Wiremold #1518).....	32.09	10.62
26 05 33 23-0143	EA	Utility Box (Wiremold #1528).....	29.02	7.26
26 05 33 23-0144	EA	Junction Box (Wiremold #1542D).....	29.92	7.26
26 05 33 23-0145	EA	Duplex Receptacle (Wiremold #1543GL).....	58.64	13.97
26 05 33 23-0146	EA	Single Receptacle Box (Wiremold #1546A).....	30.82	7.26
26 05 33 23-0147	EA	Duplex Receptacle Box (Wiremold #1546B).....	37.71	7.26
26 05 33 23-0148	EA	Telephone Box (Wiremold #1546T).....	36.99	7.26
26 05 33 23-0149	EA	Combination Connection (Wiremold #1585).....	17.89	3.35

26 05 33 23-0150 2-7/32" x 28/32" One Piece Surface Metal Raceways (Wiremold #2600) (26 05

<small>33 23-0057</small> Note: Galvanized finish.				
26 05 33 23-0151	LF	2-7/32" x 28/32" One Piece Surface Metal Raceway (Wiremold #2600-10).....	14.95	5.02
<i>For Concrete Or Masonry Surface, Add</i>			0.50	
26 05 33 23-0152	EA	Wire Clip (Wiremold #2600WC).....	5.65	2.24
26 05 33 23-0153	EA	Fiber Bushing (Wiremold #2602).....	6.30	2.24
26 05 33 23-0154	EA	2-5/8", 90 Degree Flat Elbow (Wiremold #2611).....	22.45	3.91
26 05 33 23-0155	EA	5" Diameter, Junction Box (Wiremold #2642D).....	33.60	5.58
26 05 33 23-0156	EA	Service Fitting (Wiremold #2686FO).....	32.97	6.71

26 05 33 23-0157 Two Piece Surface Metal Raceways (26 05 33 23-0056)
Note: Exposed installations on masonry, concrete block or drywall walls or ceilings. (Wiremold or approved equal).**26 05 33 23-0158 1-9/32" x 3/4" Two Piece Surface Metal Raceways (Wiremold #2000) (26 05 33 23-**

<small>0157</small>				
26 05 33 23-0159	LF	1-9/32" x 3/4" Two Piece Surface Metal Raceway Base And Cover (Wiremold #2000BC).....	8.59	2.80
<i>For Concrete Or Masonry Surface, Add</i>			0.28	
26 05 33 23-0160	EA	Wire Clip (Wiremold #2000WC).....	4.13	2.24
26 05 33 23-0161	EA	Coupling (Wiremold #2001).....	11.02	2.80
26 05 33 23-0162	EA	Supporting Clip (Wiremold #2003).....	5.31	1.67
26 05 33 23-0163	EA	Cover Clip (Wiremold #2006).....	4.93	1.67

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 23-0164 EA Ground Clamp (Wiremold #2009).....	12.75	2.80
26 05 33 23-0165 EA Entrance End Fitting (Wiremold #2010A2).....	25.32	8.38
26 05 33 23-0166 EA Entrance End Fitting (Wiremold #2010A3).....	43.19	11.17
26 05 33 23-0167 EA Blank End Fitting (Wiremold #2010B).....	6.73	2.80
26 05 33 23-0168 EA Flat 90 Degree Elbow (Wiremold #2011).....	21.79	7.26
26 05 33 23-0169 EA Tee (Wiremold #2015).....	39.86	10.50
26 05 33 23-0170 EA Internal Corner Coupling (Wiremold #2017TC).....	13.99	5.58
26 05 33 23-0171 EA Single Gang Device Box (Wiremold #2048).....	32.94	9.94
26 05 33 23-0172 EA 2-Gang device Box (Wiremold #2048-2).....	51.80	11.06
26 05 33 23-0173 EA Flush Plate Adapter (Wiremold #2051H).....	35.71	11.06
26 05 33 23-0174 EA Side Reducing Connector (Wiremold #2089).....	29.32	5.58
26 05 33 23-0175 EA #2089E End Reducing Connector.....	12.10	2.80
26 05 33 23-0176	1-7/8" x 7/8" Two Piece Surface Metal Raceways (Wiremold #2400) <small>(26 05 33 23-0157)</small>	
	Note: Available in gray enamel (G) or ivory (V).	
26 05 33 23-0177 LF 1-7/8" x 7/8" Two Piece Surface Metal Raceway Base (Wiremold #2400B).....	7.35	2.80
	<i>For Concrete Or Masonry Surface, Add</i>	
	<i>0.28</i>	
26 05 33 23-0178 LF 1-7/8" x 7/8" Divided Two Piece Surface Metal Raceway Base (Wiremold #2400BD).....	8.05	2.80
	<i>For Concrete Or Masonry Surface, Add</i>	
	<i>0.28</i>	
26 05 33 23-0179 LF Raceway Cover (Wiremold #2400C).....	2.91	0.56
26 05 33 23-0180 EA Wire Clip (Wiremold #2400WC).....	4.12	2.24
26 05 33 23-0181 EA Coupling (Wiremold #2401).....	10.94	2.80
26 05 33 23-0182 EA Divided Raceway Coupling (Wiremold #2401D).....	8.96	2.80
26 05 33 23-0183 EA Cover Clip (Wiremold #2406).....	4.96	1.67
26 05 33 23-0184 EA Device Bracket Frame (Wiremold #2407-2CM).....	36.89	8.38
26 05 33 23-0185 EA Device Bracket Frame (Wiremold #2407-2TJ).....	35.35	8.38
26 05 33 23-0186 EA Ground Clamp (Wiremold #2409).....	9.64	2.24
26 05 33 23-0187 EA End Fitting (Wiremold #2410A).....	24.27	8.38
26 05 33 23-0188 EA Blank End (Wiremold #2410B).....	6.80	2.80
26 05 33 23-0189 EA Divided Blank End Fitting (Wiremold #2410BD).....	6.88	2.80
26 05 33 23-0190 EA Entrance End Fitting (Wiremold #2410C).....	36.73	8.38
26 05 33 23-0191 EA Divided Entrance End Fitting (Wiremold #2410D).....	35.23	8.38
26 05 33 23-0192 EA Divided Entrance End Fitting (Wiremold #2410DFO).....	57.54	8.38
26 05 33 23-0193 EA Full Cap Entrance End Fitting (Wiremold #2410FC).....	44.16	8.38
26 05 33 23-0194 EA Divided Flat 90 Degree Elbow (Wiremold #2411D).....	27.19	8.38
26 05 33 23-0195 EA Radiused Divided Flat 90 Degree Elbow (Wiremold #2411DFO).....	43.35	8.38
26 05 33 23-0196 EA Radiused Flat 90 Degree Elbow (Wiremold #2411FO).....	38.85	8.27
26 05 33 23-0197 EA Flat 90 Degree Elbow (Wiremold #2411M).....	25.93	8.38
26 05 33 23-0198 EA Radiused Divided Tee (Wiremold #2415DFO).....	46.48	8.27
26 05 33 23-0199 EA Radiused Tee (Wiremold #2415FO).....	44.21	8.27
26 05 33 23-0200 EA Tee (Wiremold #2415M).....	30.67	8.27
26 05 33 23-0201 EA Divided Internal Coupling (Wiremold #2417D).....	25.64	8.27
26 05 33 23-0202 EA Radiused Divided Internal Coupling (Wiremold #2417DFO).....	40.10	8.27
26 05 33 23-0203 EA Radiused Internal Coupling (Wiremold #2417FO).....	38.92	8.27
26 05 33 23-0204 EA Internal Coupling (Wiremold #2417M).....	24.85	8.27
26 05 33 23-0205 EA Radiused Divided External Coupling (Wiremold #2418DFO).....	43.57	8.27
26 05 33 23-0206 EA Radiused External Coupling (Wiremold #2418FO).....	42.87	8.27
26 05 33 23-0207 EA External Coupling (Wiremold #2418M).....	30.16	8.27
26 05 33 23-0208 EA 1 Gang, Extra Deep Switch And Receptacle (Wiremold #2444).....	39.63	7.26
26 05 33 23-0209 EA 2 Gang, Extra Deep Switch And Receptacle Box (Wiremold #2444-2).....	43.97	7.26
26 05 33 23-0210 EA Over Raceway, Extra Deep Switch And Receptacle Box, 2 Gang (Wiremold #2444-2LS).....	44.20	7.26
26 05 33 23-0211 EA Divided, 1 Gang, Extra Deep Switch And Receptacle (Wiremold #2444D).....	42.36	7.26
26 05 33 23-0212 EA Divided, 2 Gang, Extra Deep Switch And Receptacle Box (Wiremold #2444D-2A).....	59.71	7.26
26 05 33 23-0213 EA Divided, Over Raceway, 2 Gang, Extra Deep Switch And Receptacle Box (Wiremold #2444D-2N).....	52.58	7.26
26 05 33 23-0214 EA 4-5/8" x 2-7/8" x 1-3/4", 1 Gang, Switch And Receptacle Box For Shallow Devices (Wiremold #2448).....	27.81	7.26
26 05 33 23-0215 EA 4-3/4" x 4-3/4" x 1-3/4", 2 Gang, Switch And Receptacle Box For Shallow Devices (Wiremold #2448-2).....	43.01	7.26
26 05 33 23-0216 EA Device Bracket Type Adapter Plate (Wiremold #2450).....	13.22	2.80
26 05 33 23-0217 EA 4-1/2" x 4-1/2" Back Feed Fitting (Wiremold #2451H).....	31.38	8.38
26 05 33 23-0218 EA Bridge Fitting For 2400/700/500 (Wiremold #2475D).....	93.07	8.38
26 05 33 23-0219 EA Side Reducing Connector (Wiremold #2489).....	27.14	4.47
26 05 33 23-0220	2-3/4" x 1-17/32" Two Piece Surface Metal Raceways (Wiremold #3000) <small>(26 05 33 23-0157)</small>	
	Note: Available in gray enamel (G) or ivory (V).	
26 05 33 23-0221 LF 2-3/4" x 1-17/32" Two Piece Surface Metal Raceway Base (Wiremold #3000B).....	14.46	5.02
	<i>For Concrete Or Masonry Surface, Add</i>	
	<i>0.50</i>	
26 05 33 23-0222 LF Raceway Cover (Wiremold #3000CE).....	3.40	0.56
26 05 33 23-0223 EA Wire Clips For Conductors (Wiremold #3000WC).....	5.51	2.24
26 05 33 23-0224 EA Couplings (Wiremold #3001).....	14.28	2.24
26 05 33 23-0225 EA Rigid Inside Coupling (Wiremold #3001A).....	14.03	2.80
26 05 33 23-0226 EA Supporting Clip (Wiremold #3003).....	10.39	2.80
26 05 33 23-0227 EA Clip Cover (Wiremold #3006E).....	5.99	2.24
26 05 33 23-0228 EA Device Brackets (Wiremold #3007C).....	15.44	4.47
26 05 33 23-0229 EA C-Hanger (Wiremold #3008C).....	15.32	3.35
26 05 33 23-0230 EA Entrance End Fitting For Connecting To 1/2" Conduit Or Armored Connectors (Wiremold #3010AE).....	35.79	10.62
26 05 33 23-0231 EA Blank End Fittings (Wiremold #3010B).....	13.12	4.47
26 05 33 23-0232 EA Entrance End Fitting For Connecting To Rigid Or Flexible Conduit (Wiremold #3010C).....	39.59	10.62
26 05 33 23-0233 EA Flat 90 Degree Elbow (Wiremold #3011E).....	59.39	13.85
26 05 33 23-0234 EA Wall Box Connector (Wiremold #3014C).....	42.58	13.97

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 23-0235	EA	Tee Fitting (Wiremold #3015E).....	81.57	17.31
26 05 33 23-0236	EA	Internal Corner Coupling (Wiremold #3017TCE).....	38.69	10.62
26 05 33 23-0237	EA	External Corner (Wiremold #3018AE).....	47.62	10.62
26 05 33 23-0238	EA	Single Receptacle Cover With Face Diameters Of 1.38" To 1.4" (Wiremold #3027AE).....	34.13	10.62
26 05 33 23-0239	EA	Utility Box (Wiremold #3028).....	57.49	10.62
26 05 33 23-0240	EA	Single Receptacle Cover With Face Diameters Of 1.56" To 1.57" (Wiremold #3033JE).....	18.52	2.80
26 05 33 23-0241	EA	Blank Cover (Wiremold #3036HE).....	20.25	2.80
26 05 33 23-0242	EA	Switch Cover (Wiremold #3040CE).....	18.47	2.80
26 05 33 23-0243	EA	Duplex Receptacle Cover (Wiremold #3043BE).....	21.88	3.35
26 05 33 23-0244	EA	15 Amperes, 125 Volt Duplex Grounding Receptacle And Cover (Wiremold #3043GE).....	56.86	14.53
26 05 33 23-0245	EA	2 Gang, Extra Deep Switch And Receptacle Box (Wiremold #3044-2).....	64.67	10.62
26 05 33 23-0246	EA	Duplex Receptacle Cover (Wiremold #3046BE).....	18.64	3.35
26 05 33 23-0247	EA	Tap Off Fitting (Wiremold #3046H-2).....	21.54	2.80
26 05 33 23-0248	EA	1-15/16" Deep x 6" Long, Circuit Breaker Housing (Wiremold #3046KD).....	85.64	6.71
26 05 33 23-0249	EA	2-3/4" Deep x 7-3/8" Long, Circuit Breaker Housing (Wiremold #3046KTSQ).....	210.55	6.71
26 05 33 23-0250	EA	1-13/16" Deep x 7-3/8" Long, Circuit Breaker Housing (Wiremold #3046QOU).....	74.44	6.71
26 05 33 23-0251	EA	1-13/16" Deep x 7-15/16" Long x 2-13/16" Wide, Bump Up Device Plate Cover (Wiremold #3046S).....	80.64	6.71
26 05 33 23-0252	EA	1-13/32" Deep x 7-15/16" Long x 2-13/16" Wide, Bump Up Device Plate Cover (Wiremold #3046U).....	80.64	6.71
26 05 33 23-0253	EA	Rectangular Receptacle Cover (Wiremold #3048R).....	25.46	3.35

26 05 33 23-0254 4-3/4" x 1-3/4" Two Piece Surface Metal Raceways (Wiremold #4000) (26 05 33)

23-0157

Note: Available in gray enamel (G) or ivory (V).

26 05 33 23-0255	LF	4-3/4" x 1-3/4" Two Piece Surface Metal Raceway Base (Wiremold #4000B-10).....	17.83	5.02
		<i>For Concrete Or Masonry Surface, Add</i>	<i>0.54</i>	
26 05 33 23-0256	LF	Raceway Cover (Wiremold #4000C).....	6.29	0.56
26 05 33 23-0257	LF	Divider (Wiremold #4000D).....	3.05	0.56
26 05 33 23-0258	EA	Wire Clips For Conductors (Wiremold #4000WC).....	6.83	2.80
26 05 33 23-0259	EA	Couplings (Wiremold #4001A).....	17.77	3.35
26 05 33 23-0260	EA	Divider Clip (Wiremold #4001D).....	8.37	3.35
26 05 33 23-0261	EA	Seam Clip (Wiremold #4006).....	8.52	3.35
26 05 33 23-0262	EA	Single Device Fitting (Wiremold #4007C-1R).....	35.56	7.26
26 05 33 23-0263	EA	Blank End Fittings (Wiremold #4010B).....	18.89	4.47
26 05 33 23-0264	EA	Entrance End Fitting (Wiremold #4010DFO).....	72.55	17.20
26 05 33 23-0265	EA	Flat 90 Degree Elbow (Wiremold #4011).....	67.49	13.97
26 05 33 23-0266	EA	Radiused Flat 90 Degree Elbow (Wiremold #4011FO).....	79.76	13.97
26 05 33 23-0267	EA	Internal Or External 45 Degree Elbow (Wiremold #4012TX).....	73.46	17.31
26 05 33 23-0268	EA	Wall Box Connector (Wiremold #4014A).....	98.01	17.31
26 05 33 23-0269	EA	Tee Fitting (Wiremold #4015).....	108.78	17.31
26 05 33 23-0270	EA	Divided Tee Fitting (Wiremold #4015D).....	113.10	17.31
26 05 33 23-0271	EA	Radiused Full Capacity Divided Tee Fitting (Wiremold #4015DFO).....	135.12	17.31
26 05 33 23-0272	EA	Radiused Tee Fitting (Wiremold #4015FO).....	135.55	17.31
26 05 33 23-0273	EA	Internal Elbow (Wiremold #4017).....	59.64	17.31
26 05 33 23-0274	EA	Internal Elbow (Wiremold #4017FO).....	106.87	17.31
26 05 33 23-0275	EA	Inverted Internal Elbow (Wiremold #4017N).....	66.13	17.31
26 05 33 23-0276	EA	Internal Corner Coupling (Wiremold #4017TCA).....	56.21	17.31
26 05 33 23-0277	EA	External Elbow (Wiremold #4018).....	89.14	17.31
26 05 33 23-0278	EA	Radiused External Elbow (Wiremold #4018FO).....	103.50	17.31
26 05 33 23-0279	EA	Single Locking Receptacle And Two RJ11/45 Modulaular Connectors Outlet Cover (Wiremold #4046ARJ).....	87.69	7.26
26 05 33 23-0280	EA	Double Duplex Receptacle Outlet Cover (Wiremold #4046B-2).....	93.00	7.26
26 05 33 23-0281	EA	Duplex Receptacle And Two RJ11/45 Modular Connector Cover (Wiremold #4046DRJ).....	93.00	7.26
26 05 33 23-0282	EA	Double Duplex Receptacle And Four RJ11/45 Modular Connector Cover (Wiremold #4046DRJ-2).....	124.39	7.26
26 05 33 23-0283	EA	Tap-Off Fitting (Wiremold #4046H-2).....	25.99	7.26
26 05 33 23-0284	EA	Combination Single Receptacle And Phone Outlet Center (Wiremold #4046JRJ).....	79.87	3.35
26 05 33 23-0285	EA	Rectangular Receptacle And Two RJ11/45 Modular Connector Cover (Wiremold #4046RRJ).....	95.20	7.26
26 05 33 23-0286	EA	1 Gang Device Plate (Wiremold #G4047C-1).....	25.81	7.26
26 05 33 23-0287	EA	2 Gang Device Plate (Wiremold #G4047C-2).....	30.14	7.26
26 05 33 23-0288	EA	Device Mounting Bracket (Wiremold #4050).....	29.30	5.58
26 05 33 23-0289	EA	#4000 To #3000 Take-off Connector (Wiremold #4074A).....	137.21	17.31
26 05 33 23-0290	EA	Bridge Fitting (Wiremold #4075D).....	123.60	17.31
26 05 33 23-0291	EA	Bridge Fitting (Wiremold #4075DA).....	123.60	17.31
26 05 33 23-0292	EA	Panel Connector (Wiremold #4086A).....	99.01	32.95
26 05 33 23-0293	EA	Reducing Connector Fitting (Wiremold #4089).....	61.00	17.31

26 05 33 23-0294 4-3/4" x 3-9/16" Two Piece Surface Metal Raceways (Wiremold #6000) (26 05)

33 23-0157

Note: Available in gray enamel (G) or ivory (V).

26 05 33 23-0295	LF	4-3/4" x 3-9/16" Two Piece Surface Metal Raceway Base (Wiremold #6000B-10).....	28.19	6.15
		<i>For Concrete Or Masonry Surface, Add</i>	<i>0.61</i>	
26 05 33 23-0296	LF	Raceway Cover (Wiremold #6000C).....	8.24	1.67
26 05 33 23-0297	LF	Divider (Wiremold #6000DA).....	8.79	1.67
26 05 33 23-0298	EA	Wire Clips For Conductors (Wiremold #6000WC).....	8.62	2.80
26 05 33 23-0299	EA	Couplings (Wiremold #6001A).....	23.06	5.58
26 05 33 23-0300	EA	Divider Clip (Wiremold #6001D).....	10.78	2.80
26 05 33 23-0301	EA	Converter Coupling (Wiremold #6001TX).....	30.02	7.26
26 05 33 23-0302	EA	Connection Cover (Wiremold #6006).....	28.37	7.26
26 05 33 23-0303	EA	Single Gang Device Plate (Wiremold #6007C-1).....	29.87	7.26
26 05 33 23-0304	EA	Two Gang Device Plate (Wiremold #6007C-2).....	32.93	7.26
26 05 33 23-0305	EA	C-Hanger (Wiremold #6008A).....	47.85	10.62
26 05 33 23-0306	EA	Blank End Fittings (Wiremold #6010B).....	49.80	16.76



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 23-0307 EA Combination Flat Elbow (Wiremold #6011TX).....	98.46	16.76
26 05 33 23-0308 EA Internal-External 45 Degree Elbow (Wiremold #6012TX).....	100.44	16.09
26 05 33 23-0309 EA Connector Fitting (Wiremold #6014A).....	145.26	17.31
26 05 33 23-0310 EA Combination Internal-External Elbow (Wiremold #6017TX).....	101.45	18.99
26 05 33 23-0311 EA Circuit Breaker Housing (Wiremold #6046KD).....	181.52	18.99
26 05 33 23-0312 EA #6000 To #6000 Take-off Connector (Wiremold #6074).....	175.69	16.76
26 05 33 23-0313 EA #6000 To #4000 Take-off Connector (Wiremold #6074A).....	190.55	16.76
26 05 33 23-0314 EA Panel Connector (Wiremold #6086).....	105.75	38.88
26 05 33 23-0315 Two Piece Surface Aluminum Raceways <small>(26 05 33 23-0056)</small>		
<i>Note: Exposed installations on masonry, concrete block or drywall walls or ceilings. (Wiremold or approved equal).</i>		
26 05 33 23-0316 1-7/16" x 1-1/8" Two Piece Surface Aluminum Raceways (Wiremold #AL2000) <small>(26 05 33 23-0315)</small>		
26 05 33 23-0317 LF 1-7/16" x 1-1/8" Two Piece Surface Aluminum Raceway Base (Wiremold #AL2000B).....	11.07	2.80
<i>For Concrete Or Masonry Surface, Add</i>		<i>0.28</i>
26 05 33 23-0318 LF Aluminum Raceway Cover (Wiremold #AL2000C).....	5.46	0.56
26 05 33 23-0319 EA Wire Clip (Wiremold #AL2000WC).....	5.39	2.24
26 05 33 23-0320 EA Coupling (Wiremold #AL2001).....	11.99	2.80
26 05 33 23-0321 EA Supporting Clip (Wiremold #AL2003).....	5.82	1.67
26 05 33 23-0322 EA Cover Clip (Wiremold #AL2006).....	7.35	1.67
26 05 33 23-0323 EA Ground Clamp (Wiremold #AL2009).....	10.55	2.80
26 05 33 23-0324 EA Entrance End Fitting (Wiremold #AL2010A).....	29.51	8.38
26 05 33 23-0325 EA Blank End Fitting (Wiremold #AL2010B).....	9.55	2.80
26 05 33 23-0326 EA Flat 90 Degree Elbow (Wiremold #AL2011).....	34.07	7.26
26 05 33 23-0327 EA Tee (Wiremold #AL2015).....	46.24	10.50
26 05 33 23-0328 EA Internal Corner Elbow (Wiremold #AL2017).....	30.77	5.58
26 05 33 23-0329 EA External Corner Elbow (Wiremold #AL2018).....	30.71	5.58
26 05 33 23-0330 EA 2 To 15 Amperes, In-Line Receptacle (Wiremold #AL2043).....	50.35	11.06
26 05 33 23-0331 EA 4-13/16" Round Fixture Box (Wiremold #AL2038).....	115.62	9.94
26 05 33 23-0332 EA 4-1/2" x 3" x 2-1/4" D Box (Wiremold #AL2044).....	51.76	9.94
26 05 33 23-0333 EA 4-5/8" x 4-7/8" x 2-1/2" D Box (Wiremold #AL2044-2).....	106.59	11.06
26 05 33 23-0334 EA Single Gang Shallow Device Box (Wiremold #AL2047).....	53.58	9.94
26 05 33 23-0335 EA 2-Gang Shallow Device Box (Wiremold #AL2047-2).....	94.31	11.06
26 05 33 23-0336 EA Flush Plate Adapter (Wiremold #AL2051H).....	40.83	11.06
26 05 33 23-0337 2" x 1-9/32" Two Piece Surface Aluminum Raceways (Wiremold #AL2400) <small>(26 05 33 23-0315)</small>		
26 05 33 23-0338 LF 2" x 1-9/32" Two Piece Surface Aluminum Raceway Base (Wiremold #AL2400B).....	12.40	2.80
<i>For Concrete Or Masonry Surface, Add</i>		<i>0.28</i>
26 05 33 23-0339 LF Aluminum Raceway Cover (Wiremold #AL2400C).....	5.64	0.56
26 05 33 23-0340 EA Wire Clip (Wiremold #AL2400WC).....	7.34	2.24
26 05 33 23-0341 EA Coupling (Wiremold #AL2401).....	13.84	2.80
26 05 33 23-0342 EA Cover Clip (Wiremold #AL2406).....	9.53	1.67
26 05 33 23-0343 EA Ground Clamp (Wiremold #AL2409).....	8.39	2.24
26 05 33 23-0344 EA Blank End (Wiremold #AL2410B).....	10.56	2.80
26 05 33 23-0345 EA End Fitting (Wiremold #AL2410B2).....	22.79	8.38
26 05 33 23-0346 EA Flat 90 Degree Elbow (Wiremold #AL2411).....	41.19	8.38
26 05 33 23-0347 EA Tee (Wiremold #AL2415).....	44.87	8.27
26 05 33 23-0348 EA Fourway Fitting (Wiremold #AL2416).....	52.62	8.27
26 05 33 23-0349 EA Internal Coupling (Wiremold #AL2417).....	41.04	8.27
26 05 33 23-0350 EA External Coupling (Wiremold #AL2418).....	44.15	8.27
26 05 33 23-0351 EA 4-1/2" x 4-1/2" Back Feed Fitting (Wiremold #AL2451H).....	36.79	8.38
26 05 33 23-0352 2-7/8" x 1-7/8" Two Piece Surface Aluminum Raceways (Wiremold #AL3300) <small>(26 05 33 23-0315)</small>		
26 05 33 23-0353 LF 2-7/8" x 1-7/8" Two Piece Surface Aluminum Raceway Base (Wiremold #AL3300B).....	22.44	5.02
<i>For Concrete Or Masonry Surface, Add</i>		<i>0.50</i>
26 05 33 23-0354 LF Aluminum Raceway Cover (Wiremold #AL3300CE).....	6.73	0.56
26 05 33 23-0355 LF Raceway Divider (Wiremold #AL3300D).....	5.54	5.02
26 05 33 23-0356 EA Wire Clips For Conductors (Wiremold #AL3300WC).....	10.74	2.24
26 05 33 23-0357 EA Couplings (Wiremold #AL3301).....	19.28	2.24
26 05 33 23-0358 EA Divider Coupling (Wiremold #AL3301D).....	16.23	2.80
26 05 33 23-0359 EA Ground Clamp (Wiremold #AL3309).....	10.86	2.24
26 05 33 23-0360 EA Blank End Fittings (Wiremold #AL3310B).....	22.62	4.47
26 05 33 23-0361 EA End Fitting (Wiremold #AL3310B1).....	36.29	10.62
26 05 33 23-0362 EA Flat 90 Degree Elbow (Wiremold #AL3311).....	112.92	13.85
<i>Note: Includes two (2) AL3301 couplings.</i>		
26 05 33 23-0363 EA Tee Fitting (Wiremold #AL3315).....	129.33	17.31
<i>Note: Includes three (3) AL3301 couplings.</i>		
26 05 33 23-0364 EA Cross Fitting (Wiremold #AL3316).....	146.58	17.31
<i>Note: Includes four (4) AL3301 couplings.</i>		
26 05 33 23-0365 EA Internal Elbow (Wiremold #AL3317).....	106.12	10.62
<i>Note: Includes two (2) AL3301 couplings.</i>		
26 05 33 23-0366 EA External Elbow (Wiremold #AL3318).....	106.24	10.62
<i>Note: Includes two (2) AL3301 couplings.</i>		
26 05 33 23-0367 EA Duplex Receptacle Cover (Wiremold #AL3346D).....	23.42	3.35
26 05 33 23-0368 EA Single Receptacle Cover (Wiremold #AL3346E).....	23.27	3.35

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	26 05 33 23-0369	EA	GFCI/Surge Receptacle Cover (Wiremold #AL3346G).....	23.02	3.35
	26 05 33 23-0370	EA	Single Device Cover Plate (Wiremold #AL3356R).....	23.10	2.80
26 05 33 23-0371	5" x 2" Two Piece Surface Aluminum Raceways (Wiremold #AL5200) <small>(26 05 33 23-0315)</small>				
	26 05 33 23-0372	LF	5" x 2" Two Piece Surface Aluminum Raceway Base (Wiremold #AL5200B-10).....	26.92	5.02
			<i>For Concrete Or Masonry Surface, Add</i> 0.54		
	26 05 33 23-0373	LF	Aluminum Raceway Cover (Wiremold #AL5200C).....	11.11	0.56
	26 05 33 23-0374	LF	Divider (Wiremold #AL5200D).....	6.50	0.56
	26 05 33 23-0375	EA	Wire Clips For Conductors (Wiremold #AL5200WC).....	8.91	2.80
	26 05 33 23-0376	EA	Wire Clips For Conductors (Wiremold #AL5200WC2).....	7.47	2.80
	26 05 33 23-0377	EA	Wire Clips For Conductors (Wiremold #AL5200WC3).....	7.42	2.80
	26 05 33 23-0378	EA	Couplings (Wiremold #AL5201).....	17.39	3.35
	26 05 33 23-0379	EA	Cover Clip (Wiremold #AL5206).....	15.43	3.35
	26 05 33 23-0380	EA	Ground Adapter (Wiremold #AL5209).....	19.19	3.35
	26 05 33 23-0381	EA	Blank End Fittings (Wiremold #AL5210B).....	20.26	4.47
	26 05 33 23-0382	EA	Blank End Fittings (Wiremold #AL5210B1).....	21.75	4.47
	26 05 33 23-0383	EA	Blank End Fittings (Wiremold #AL5210B2).....	22.08	4.47
	26 05 33 23-0384	EA	Blank End Fittings (Wiremold #AL5210B3).....	21.40	4.47
	26 05 33 23-0385	EA	Flat 90 Degree Elbow (Wiremold #AL5211).....	111.99	13.97
			Note: Includes two (2) pairs of AL5201 couplings.		
	26 05 33 23-0386	EA	Wall Box Connector (Wiremold #AL5214).....	87.99	17.31
	26 05 33 23-0387	EA	Tee Fitting (Wiremold #AL5215).....	131.03	17.31
			Note: Includes three (3) pairs of AL5201 couplings.		
	26 05 33 23-0388	EA	Four Way Fitting (Wiremold #AL5216).....	143.77	17.31
			Note: Includes four (4) pairs of AL5201 couplings.		
	26 05 33 23-0389	EA	Internal Elbow (Wiremold #AL5217).....	116.20	17.31
			Note: Includes two (2) pairs of AL5201 couplings.		
	26 05 33 23-0390	EA	Internal Corner Coupling (Wiremold #AL5217A).....	49.14	17.31
	26 05 33 23-0391	EA	Inverted Internal Elbow (Wiremold #AL5217N).....	119.45	17.31
	26 05 33 23-0392	EA	External Elbow (Wiremold #AL5218).....	117.21	17.31
			Note: Includes two (2) pairs of AL5201 couplings.		
	26 05 33 23-0393	EA	Blank Device Cover Plate (Wiremold #AL5246B).....	25.14	3.35
	26 05 33 23-0394	EA	Receptacle Device Cover Plate (Wiremold #AL5246D).....	29.80	3.35
	26 05 33 23-0395	EA	Double Receptacle Device Cover Plate (Wiremold #AL5246DD).....	35.38	3.35
	26 05 33 23-0396	EA	Device Cover Plate (Wiremold #AL5246F).....	33.18	3.35
	26 05 33 23-0397	EA	Device Cover Plate (Wiremold #AL5246G).....	30.63	3.35
	26 05 33 23-0398	EA	Offset Divider (Wiremold #AL5260).....	28.66	7.26
26 05 33 23-0399	3" x 2-1/4" Two Piece Surface Aluminum Raceways (Wiremold #ALA3800) <small>(26 05 33 23-0315)</small>				
	26 05 33 23-0400	LF	Single Channel, 3" x 2-1/4" Two Piece Surface Aluminum Raceway Base (Wiremold #ALA3800B-10).....	23.96	5.02
	26 05 33 23-0401	EA	Cover Clip (Wiremold #ALA3806).....	11.44	3.35
	26 05 33 23-0402	EA	Blank End Fittings (Wiremold #ALA3810B).....	20.08	4.47
	26 05 33 23-0403	EA	Entrance End Cap Fittings (Wiremold #ALA3810B1).....	21.59	4.47
	26 05 33 23-0404	EA	Flat 90 Degree Elbow (Wiremold #ALA3811).....	110.85	13.97
			Note: Includes two (2) ALA01 couplings.		
	26 05 33 23-0405	EA	Flat Tee Fitting (Wiremold #ALA3815).....	114.31	17.31
			Note: Includes three (3) ALA01 couplings.		
	26 05 33 23-0406	EA	Internal Elbow (Wiremold #ALA3817).....	111.44	17.31
			Note: Includes two (2) ALA01 couplings.		
	26 05 33 23-0407	EA	Inverted Internal Elbow (Wiremold #ALA3817N).....	131.25	17.31
			Note: Includes two (2) ALA01 couplings.		
	26 05 33 23-0408	EA	External Elbow (Wiremold #ALA3818).....	112.91	17.31
			Note: Includes two (2) ALA01 couplings.		
26 05 33 23-0409	6" x 2-1/4" Two Piece Surface Aluminum Raceways (Wiremold #ALA4800) <small>(26 05 33 23-0315)</small>				
	26 05 33 23-0410	LF	Two Channel, 6" x 2-1/4" Two Piece Surface Aluminum Raceway Base (Wiremold #ALA4800B-10).....	39.58	5.02
	26 05 33 23-0411	EA	Cover Clip (Wiremold #ALA4806).....	16.93	3.35
	26 05 33 23-0412	EA	Blank End Fittings (Wiremold #ALA4810B).....	22.14	4.47
	26 05 33 23-0413	EA	Entrance End Cap Fittings (Wiremold #ALA4810B2).....	24.75	4.47
	26 05 33 23-0414	EA	Flat 90 Degree Elbow (Wiremold #ALA4811).....	147.26	13.97
			Note: Includes four (4) ALA01 couplings.		
	26 05 33 23-0415	EA	Flat Tee Fitting (Wiremold #ALA4815).....	201.92	17.31
			Note: Includes six (6) ALA01 couplings.		
	26 05 33 23-0416	EA	Internal Elbow (Wiremold #ALA4817).....	135.21	17.31
			Note: Includes four (4) ALA01 couplings.		
	26 05 33 23-0417	EA	Inverted Internal Elbow (Wiremold #ALA4817N).....	159.79	17.31
			Note: Includes four (4) ALA01 couplings.		
	26 05 33 23-0418	EA	External Elbow (Wiremold #ALA4818).....	142.13	17.31
			Note: Includes four (4) ALA01 couplings.		
26 05 33 23-0419	Two Piece Surface Aluminum Raceways Fittings (Wiremold #ALA3800 And #ALA4800) <small>(26 05 33 23-0315)</small>				
			See CSI section 26 27 26 00-0010 for receptacles.		
	26 05 33 23-0420	LF	3" Wide Aluminum Raceway Cover (Wiremold #ALAC-5).....	8.55	0.56
			Note: For use with ALA3800 single channel raceway and ALA4800 dual channel raceway.		
	26 05 33 23-0421	EA	Wire Clips (Wiremold #ALAWC).....	7.57	2.80

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 23-0422	EA			Slide Couplings (Wiremold #ALA01).....	18.80	3.35
26 05 33 23-0423	EA			Grounding Adapter (Wiremold #ALA09).....	15.91	3.35
26 05 33 23-0424	EA			Bend Radius Control Insert For Flat Elbow (Wiremold #ALA11RI).....	43.21	13.97
26 05 33 23-0425	EA			Internal Corner Coupling (Wiremold #ALA17A).....	51.43	17.31
26 05 33 23-0426	EA			Bend Radius Control Insert For Internal And External Elbow (Wiremold #ALA17/18RI).....	48.41	13.97
26 05 33 23-0427	EA			Blank Cover Plate (Wiremold #ALA-BL).....	20.69	3.35
26 05 33 23-0428	EA			Duplex Receptacle Cover Plate (Wiremold #ALA-DR).....	22.11	3.35
26 05 33 23-0429	EA			Single Receptacle Cover Plate, 1.40" Diameter Opening (Wiremold #ALA-E).....	23.05	3.35
26 05 33 23-0430	EA			Single Receptacle Cover Plate, 1.59" Diameter Opening (Wiremold #ALA-F).....	22.63	3.35
26 05 33 23-0431	EA			GFCI/Surge/Decorator Cover Plate (Wiremold #ALA-G).....	22.30	3.35
26 05 33 23-0432	EA			Single Receptacle Cover Plate, 2.13" Diameter Opening (Wiremold #ALA-J).....	23.06	3.35
26 05 33 23-0433	EA			Toggle Switch Cover Plate (Wiremold #ALA-N).....	23.68	3.35
26 05 33 23-0434	EA			Active LPB Cover Plate (Wiremold #ALA-LPB).....	30.56	3.35
26 05 33 23-0435	EA			Active MAB Cover Plate (Wiremold #ALA-MAB).....	28.68	3.35
26 05 33 23-0436	EA			Ortronics Cover Plate (Wiremold #ALA-MABRT).....	33.17	3.35
26 05 33 23-0437	EA			1-3/4" x 2-3/4" Cover Plate (Wiremold #ALA-SG).....	21.62	3.35
26 05 33 23-0438	EA			Active 2A Cover Plate (Wiremold #ALA-2A).....	32.02	3.35
26 05 33 23-0439	EA			Ortronics Communications Cover Plate (Wiremold #ALA-ABRT).....	29.24	3.35
26 05 33 23-0440	EA			3/4" Grommet/Mousehole Cover Plate (Wiremold #ALA-Z).....	23.62	3.35
26 05 33 23-0441	EA			Ortronics Low Profile Cover Plate (Wiremold #ALA-LPB3S2).....	29.51	3.35
26 05 33 23-0442				Surface Non-Metallic Raceways (26 05 33 23-0001) Note: Exposed on flat wall surface.		
26 05 33 23-0443				One Piece Surface Non-Metallic Raceways (26 05 33 23-0442) Note: Exposed on flat wall surface. (Wiremold or approved equal).		
26 05 33 23-0444				7/8" x 7/16" One Piece Surface Non-Metallic Raceways (Wiremold #400) (26 05 33 23-0443)		
26 05 33 23-0445	LF			7/8" x 7/16" One Piece Surface Non-Metallic Raceway Base And Cover (Wiremold #400BAC).....	6.50	2.24
				<i>For Concrete Or Masonry Surface, Add</i>	0.22	
26 05 33 23-0446	EA			Wire Clip (Wiremold #400WC).....	4.90	2.24
26 05 33 23-0447	EA			Cover Clip (Wiremold #406).....	5.17	2.24
26 05 33 23-0448	EA			Blank End Clip (Wiremold #410B).....	9.93	4.47
26 05 33 23-0449	EA			Flat 90 Degree Elbow (Wiremold #411).....	11.61	4.47
26 05 33 23-0450	EA			Tee (Wiremold #415).....	14.62	5.58
26 05 33 23-0451	EA			Internal Elbow (Wiremold #417).....	11.40	4.47
26 05 33 23-0452	EA			External Elbow (Wiremold #418).....	11.40	4.47
26 05 33 23-0453				1-5/16" x 7/16" One Piece Surface Non-Metallic Raceways (Wiremold #800) (26 05 33 23-0443)		
26 05 33 23-0454	LF			1-5/16" x 7/16" One Piece Surface Non-Metallic Raceway Base And Cover (Wiremold #800BAC).....	7.24	2.24
				<i>For Concrete Or Masonry Surface, Add</i>	0.22	
26 05 33 23-0455	EA			Wire Clip (Wiremold #800WC).....	4.93	2.24
26 05 33 23-0456	EA			Cover Clip (Wiremold #806).....	5.03	2.24
26 05 33 23-0457	EA			Entrance End Fitting (Wiremold #810A2).....	15.09	4.47
26 05 33 23-0458	EA			Blank End Fitting (Wiremold #810B).....	9.93	4.47
26 05 33 23-0459	EA			Flat 90 Degree Elbow (Wiremold #811).....	11.42	4.47
26 05 33 23-0460	EA			Tee (Wiremold #815).....	14.35	5.58
26 05 33 23-0461	EA			Internal Elbow (Wiremold #817).....	11.20	4.47
26 05 33 23-0462	EA			External Elbow (Wiremold #818).....	11.20	4.47
26 05 33 23-0463	EA			End Reducer, #800 To #400 (Wiremold #889A).....	12.61	4.47
26 05 33 23-0464				2-1/4" x 11/16" One Piece Surface Non-Metallic Raceways (Wiremold #2300) (26 05 33 23-0443)		
26 05 33 23-0465	LF			2-1/4" x 11/16" One Piece Surface Non-Metallic Raceway Base And Cover (Wiremold #2300BAC).....	8.33	2.24
				<i>For Concrete Or Masonry Surface, Add</i>	0.22	
26 05 33 23-0466	LF			2-1/4" x 11/16" One Piece Surface Non-Metallic Divided Raceway Base And Cover (Wiremold #2300BACD).....	8.86	2.24
				<i>For Concrete Or Masonry Surface, Add</i>	0.22	
26 05 33 23-0467	EA			Wire Clip (Wiremold #2300WC).....	5.16	2.24
26 05 33 23-0468	EA			Cover Clip (Wiremold #2306).....	5.43	2.24
26 05 33 23-0469	EA			Entrance End Fitting (Wiremold #2310A).....	16.39	4.47
26 05 33 23-0470	EA			Blank End Fitting (Wiremold #2310B).....	10.44	4.47
26 05 33 23-0471	EA			Divided Entrance End Fitting (Wiremold #2310DFO).....	18.42	4.47
26 05 33 23-0472	EA			Flat 90 Degree Elbow (Wiremold #2311).....	11.64	4.47
26 05 33 23-0473	EA			Divided Flat 90 Degree Elbow (Wiremold #2311DFO).....	12.50	4.47
26 05 33 23-0474	EA			Tee (Wiremold #2315).....	14.48	5.58
26 05 33 23-0475	EA			Internal Elbow (Wiremold #2317).....	11.64	4.47
26 05 33 23-0476	EA			Divided Internal Elbow (Wiremold #2317DFO).....	12.51	4.47
26 05 33 23-0477	EA			External Elbow (Wiremold #2318).....	11.66	4.47
26 05 33 23-0478	EA			Divided External Elbow (Wiremold #2318DFO).....	12.67	4.47
26 05 33 23-0479	EA			End Reducer, #2300 To #400 (Wiremold #2389).....	12.68	4.47
26 05 33 23-0480	EA			End Reducer, #2300 To #800 (Wiremold #2389A).....	13.23	4.47
26 05 33 23-0481				One Piece Surface Non-Metallic Raceway Fittings (Wiremold #400, #800 Or #2300) (26 05 33 23-0443)		
26 05 33 23-0482	EA			Blank Cover, 4-1/2" Diameter (Wiremold #2336).....	14.08	3.91
26 05 33 23-0483	EA			Extension Box, 5-1/2" Diameter (Wiremold #2337A).....	23.03	4.47

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 33 23-0484	EA	-A Fixture Box, 5-1/2" Diameter (Wiremold #233).....	23.15	4.47
26 05 33 23-0485	EA	Extra Deep Device Box, 1 Gang, 2-3/4" Deep x 4-3/4" Long x 3" Wide (Wiremold #2344)	20.91	4.47
26 05 33 23-0486	EA	Extra Deep Device Box, 2 Gang, 2-3/4" Deep x 4-3/4" Long x 4-7/8" Wide (Wiremold #2344-2)	24.21	4.47
26 05 33 23-0487	EA	Extra Deep Divided Device Box, 1 Gang, 2-3/4" Deep x 4-3/4" Long x 3" Wide (Wiremold #2344D)	22.77	4.47
26 05 33 23-0488	EA	Deep Divided Device Box, 2 Gang, 2-1/4" Deep x 4-3/4" Long x 4-7/8" Wide (Wiremold #2344SD-2A)	24.72	4.47
26 05 33 23-0489	EA	1-Gang Standard Device Box, 1-3/8" Deep x 4-3/4" Long x 3" Wide (Wiremold #2347).....	20.97	7.26
26 05 33 23-0490	EA	2-Gang Standard Device Box, 1-3/8" Deep x 4-3/4" Long x 4-7/8" Wide (Wiremold #2347-2)	23.88	7.26
26 05 33 23-0491	EA	1-Gang Deep Device Box, 1-3/4" Deep x 4-3/4" Long x 3" Wide (Wiremold #2348).....	21.82	7.26
26 05 33 23-0492	EA	2-Gang Deep Device Box, 1-3/4" Deep x 4-3/4" Long x 4-7/8" Wide (Wiremold #2348-2)	26.20	7.26
26 05 33 23-0493	EA	3-Gang Deep Device Box, 1-3/4" Deep x 5" Long x 7" Wide (Wiremold #2348-3).....	31.28	7.26
26 05 33 23-0494	EA	1-Gang Deep Device Box With Magnetic Backing, 1-3/4" Deep x 4-3/4" Long x 3" Wide (Wiremold #2348AMP).....	29.66	7.26
26 05 33 23-0495	EA	1-Gang Divided Deep Device Box, 1-3/4" Deep x 4-3/4" Long x 3" Wide (Wiremold #2348D)	26.89	7.26
26 05 33 23-0496	EA	Shallow Device And Extension Box, 7/8" Deep x 4-3/4" Long x 3" Wide (Wiremold #2348S/51)	20.54	7.26

26 05 33 23-0497 3/4" x 3/8" One Piece Surface Non-Metallic Raceways (Wiremold #2700)⁽²⁶⁾

26 05 33 23-0498	LF	3/4" x 3/8" One Piece Surface Non-Metallic Raceway Base And Cover (Wiremold #2700).....	5.97	2.24
		<i>For Concrete Or Masonry Surface, Add</i>	0.22	
26 05 33 23-0499	EA	3/4" Wire Clip (Wiremold #2700WC).....	2.56	1.11
26 05 33 23-0500	EA	Cover Clip (Wiremold #2706).....	3.83	1.11
26 05 33 23-0501	EA	Blank End (Wiremold #2710B).....	6.05	2.24
26 05 33 23-0502	EA	Flat 90 Degree Elbow (Wiremold #2711).....	7.20	2.80
26 05 33 23-0503	EA	Tee (Wiremold #2715).....	11.69	5.02
26 05 33 23-0504	EA	Internal Elbow (Wiremold #2717).....	8.33	3.35
26 05 33 23-0505	EA	External Elbow (Wiremold #2718).....	8.32	3.35
26 05 33 23-0506	EA	Drop Ceiling Connector (Wiremold #2786).....	9.81	3.91

26 05 33 23-0507 1" x 1/2" One Piece Surface Non-Metallic Raceways (Wiremold #2800)^(26 05 33)

26 05 33 23-0508	LF	1" x 1/2" One Piece Surface Non-Metallic Raceway Base And Cover (Wiremold #2800).....	7.65	2.80
		<i>For Concrete Or Masonry Surface, Add</i>	0.28	
26 05 33 23-0509	EA	1" Wire Clip (Wiremold #2800WC).....	3.80	1.67
26 05 33 23-0510	EA	Cover Clip (Wiremold #2806).....	5.03	1.67
26 05 33 23-0511	EA	Blank End (Wiremold #2810B).....	7.26	2.80
26 05 33 23-0512	EA	Flat 90 Degree Elbow (Wiremold #2811).....	9.57	3.91
26 05 33 23-0513	EA	Radiused Flat 90 Degree Elbow (Wiremold #2811FO).....	10.18	3.91
26 05 33 23-0514	EA	Tee (Wiremold #2815).....	14.04	6.15
26 05 33 23-0515	EA	Internal Elbow (Wiremold #2817).....	10.66	4.47
26 05 33 23-0516	EA	External Elbow (Wiremold #2818).....	10.68	4.47
26 05 33 23-0517	EA	Radiused Tee (Wiremold #2815FO).....	14.86	6.15
26 05 33 23-0518	EA	Radiused Internal Elbow (Wiremold #2817FO).....	11.39	4.47
26 05 33 23-0519	EA	Radiused External Elbow (Wiremold #2818FO).....	11.29	4.47
26 05 33 23-0520	EA	Drop Ceiling Connector (Wiremold #2886).....	12.04	5.02
26 05 33 23-0521	EA	Reducer, #2800 To #2700 (Wiremold #2889).....	10.83	4.47
26 05 33 23-0522	EA	Radiused Flat 90 Degree Elbow (Wiremold #2911FO).....	11.70	4.47

26 05 33 23-0523 1-1/2" x 3/4" One Piece Surface Non-Metallic Raceways (Wiremold #2900)

26 05 33 23-0524	LF	1-1/2" x 3/4" One Piece Surface Non-Metallic Raceway Base And Cover (Wiremold #2900)	9.31	3.35
		<i>For Concrete Or Masonry Surface, Add</i>	0.34	
26 05 33 23-0525	EA	1-1/2" Wire Clip (Wiremold #2900WC).....	5.02	2.24
26 05 33 23-0526	EA	Cover Clip (Wiremold #2906).....	6.28	2.24
26 05 33 23-0527	EA	Blank End (Wiremold #2910B).....	8.52	3.35
26 05 33 23-0528	EA	Flat 90 Degree Elbow (Wiremold #2911).....	10.75	4.47
26 05 33 23-0529	EA	Tee (Wiremold #2915).....	15.22	6.71
26 05 33 23-0530	EA	Radiused Tee (Wiremold #2915FO).....	16.20	6.71
26 05 33 23-0531	EA	Internal Elbow (Wiremold #2917).....	11.88	5.02
26 05 33 23-0532	EA	Radiused Internal Elbow (Wiremold #2917FO).....	12.87	5.02
26 05 33 23-0533	EA	Radiused External Elbow (Wiremold #2918FO).....	13.15	5.02
26 05 33 23-0534	EA	External Elbow (Wiremold #2918).....	11.87	5.02
26 05 33 23-0535	EA	Drop Ceiling Connector (Wiremold #2986).....	12.04	5.02
26 05 33 23-0536	EA	Reducer, #2900 To #2800 (Wiremold #2989).....	13.37	5.58
26 05 33 23-0537	EA	Reducer, #2900 To #2700 (Wiremold #2989A).....	13.04	5.58

26 05 33 23-0538 Two Piece Surface Non-Metallic Raceways^(26 05 33 23-0442)

Note: Exposed on flat wall surface. (Wiremold or approved equal).

26 05 33 23-0539 5" x 1" Two Piece Surface Non-Metallic Raceways (Wiremold #500)^(26 05 33 23-0538)

26 05 33 23-0540	LF	5" x 1" Two Piece Surface Non-Metallic Raceway Base (Wiremold #5000B).....	14.33	5.02
		<i>For Concrete Or Masonry Surface, Add</i>	0.50	
26 05 33 23-0541	LF	Black, Gray Or White, Cover (Wiremold #5000C).....	13.68	5.02
26 05 33 23-0542	LF	Oak Veneer, Cover (Wiremold #5000COA).....	24.76	5.02
26 05 33 23-0543	LF	Maple Wood Veneer, Cover (Wiremold #5000CW).....	20.38	5.02
26 05 33 23-0544	LF	Black, Gray Or White, Quarter Round Trim (Wiremold #5000T).....	1.90	0.56
26 05 33 23-0545	LF	Oak Veneer, Quarter Round Trim (Wiremold #5000TOA).....	7.45	0.56
26 05 33 23-0546	LF	Maple Wood Veneer, Quarter Round Trim (Wiremold #5000TW).....	4.67	0.56
26 05 33 23-0547	EA	Base Coupling (Wiremold #5001).....	13.42	5.58
26 05 33 23-0548	EA	Blank/Coax Adapter (Wiremold #5004).....	7.45	2.80

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 33 23-0549 EA Low Voltage Blank Plate (Wiremold #5005)	9.88	3.35
26 05 33 23-0550 EA Cover Clip (Wiremold #5006).....	14.35	5.58
26 05 33 23-0551 EA Internal Wire Guard (Wiremold #5006A).....	13.50	5.58
26 05 33 23-0552 EA Device Bracket (Wiremold #5007C).....	15.24	5.58
26 05 33 23-0553 EA Device Plate (Wiremold #5007C-1)	27.85	11.17
26 05 33 23-0554 EA Deep Device Plate (Wiremold #5007C-2).....	28.74	11.17
26 05 33 23-0555 EA Right Or Left End Cap (Wiremold #5010).....	24.48	10.62
26 05 33 23-0556 EA Entrance End Feed (Wiremold #5010A).....	46.68	17.31
26 05 33 23-0557 EA Internal Base Elbow (Wiremold #5017B).....	32.87	13.97
26 05 33 23-0558 EA Internal Cover Elbow (Wiremold #5017C).....	29.33	11.17
26 05 33 23-0559 EA Internal Elbow Wire Guard (Wiremold #5017WG).....	20.26	8.38
26 05 33 23-0560 EA External Base Elbow (Wiremold #5018B).....	32.81	13.97
26 05 33 23-0561 EA External Cover Elbow (Wiremold #5018C).....	29.57	11.17
26 05 33 23-0562 EA External Elbow Wire Guard (Wiremold #5018WG).....	13.27	5.58
26 05 33 23-0563 5-1/4" x 1-11/16" Two Piece Surface Non-Metallic Raceways (Wiremold #5400) <small>(26 05 33 23-0538)</small>		
26 05 33 23-0564 LF 5-1/4" x 1-11/16", Two Compartment, Two Piece Surface Non-Metallic Raceway Base (Wiremold #5400TB).....	15.60	5.02
<i>For Concrete Or Masonry Surface, Add</i>	<i>0.50</i>	
26 05 33 23-0565 LF Full Width Cover (Wiremold #5400C).....	5.18	0.56
26 05 33 23-0566 LF Twin Snap Cover (Wiremold #5400TC).....	3.37	0.56
26 05 33 23-0567 EA Twin Snap Cover Wire Clips (Wiremold #5400TWC).....	6.17	2.80
26 05 33 23-0568 EA Cover Clip (Wiremold #5406A).....	10.16	3.35
26 05 33 23-0569 EA Twin Cover Clip (Wiremold #5406T).....	8.66	3.35
26 05 33 23-0570 EA Base Seam Clip (Wiremold #5406TB).....	7.82	3.35
26 05 33 23-0571 EA L Or R (Left Or Right) Transition Fitting (Wiremold #5408).....	57.50	17.31
26 05 33 23-0572 EA End Cap (Wiremold #5410).....	28.57	10.62
26 05 33 23-0573 EA Radiused Divided Entrance Cap Fitting (Wiremold #5410DFO).....	55.31	17.31
26 05 33 23-0574 EA Radiused Flat 90 Degree Elbow (Wiremold #5411FO).....	50.11	13.97
26 05 33 23-0575 EA Tee Fitting (Wiremold #5415).....	58.02	17.31
26 05 33 23-0576 EA Radiused Tee Fitting (Wiremold #5415FO).....	60.60	17.31
26 05 33 23-0577 EA Radiused Internal Elbow (Wiremold #5417FO).....	48.58	17.31
26 05 33 23-0578 EA External Elbow (Wiremold #5418).....	49.23	17.31
26 05 33 23-0579 EA Radiused External Elbow (Wiremold #5418FO).....	49.82	17.31
26 05 33 23-0580 EA 5-5/32" x 6" Device Bracket (Wiremold #5450).....	22.97	5.58
26 05 33 23-0581 EA 7-19/32" x 7-1/2" Device Bracket (Wiremold #5450A3).....	29.99	5.58
26 05 33 23-0582 EA 2-1/2" x 4-7/8" Twin Snap Device Bracket (Wiremold #5450T).....	17.78	5.58
26 05 33 23-0583 EA Transition Fitting (Wiremold #5474).....	51.03	17.31
26 05 33 23-0584 6-11/16" x 1-11/16" Two Piece Surface Non-Metallic Raceways (Wiremold #5500) <small>(26 05 33 23-0538)</small>		
26 05 33 23-0585 LF 6-11/16" x 1-11/16", Three Compartment Divided, Two Piece Surface Non-Metallic Raceway Base (Wiremold #5500BD3).....	19.28	5.02
<i>For Concrete Or Masonry Surface, Add</i>	<i>0.50</i>	
26 05 33 23-0586 LF Cover (Wiremold #5500C).....	6.77	0.56
26 05 33 23-0587 EA Wire Clips (Wiremold #5500WC).....	7.11	2.80
26 05 33 23-0588 EA Cover Clip (Wiremold #5506).....	11.34	3.35
26 05 33 23-0589 EA Base Seam Clip Fitting (Wiremold #5506B).....	8.21	3.35
26 05 33 23-0590 EA Modular Furniture Adapter (Wiremold #5507AD).....	10.61	3.35
26 05 33 23-0591 EA Blank Faceplate (Wiremold #5507B).....	10.65	3.35
26 05 33 23-0592 EA Duplex Receptacle Faceplate (Wiremold #5507D).....	10.71	3.35
26 05 33 23-0593 EA Dual RJ Connector Faceplate (Wiremold #5507FR).....	10.71	3.35
26 05 33 23-0594 EA Rectangular Receptacle Faceplate (Wiremold #5507R).....	10.60	3.35
26 05 33 23-0595 EA Dual RJ Connector Faceplate (Wiremold #5507RJ).....	10.63	3.35
26 05 33 23-0596 EA Rectangular Spacer Fitting (Wiremold #5507S).....	10.55	3.35
26 05 33 23-0597 EA Switch Faceplate (Wiremold #5507SW).....	10.57	3.35
26 05 33 23-0598 EA Twistlock Faceplate (Wiremold #5507T1).....	10.65	3.35
26 05 33 23-0599 EA Single Receptacle Faceplate (Wiremold #5507T2).....	10.44	3.35
26 05 33 23-0600 EA 6-5/8" x 6" Device Bracket (Wiremold #5550).....	27.27	5.58
26 05 33 23-0601 EA 9-5/8" x 7-1/2" Device Bracket (Wiremold #5550A4).....	36.33	5.58
26 05 33 23-0602 EA End Cap (Wiremold #5510).....	30.85	10.62
26 05 33 23-0603 EA Entrance End Fitting (Wiremold #5510D).....	62.57	17.31
26 05 33 23-0604 EA Radiused Flat 90 Degree Elbow (Wiremold #5511FO).....	56.80	13.97
26 05 33 23-0605 EA Backfeed Connector (Wiremold #5514A).....	46.10	13.97
26 05 33 23-0606 EA Tee Fitting (Wiremold #5515).....	65.62	17.31
26 05 33 23-0607 EA Radiused Internal Elbow (Wiremold #5517FO).....	53.23	17.31
26 05 33 23-0608 EA External Elbow (Wiremold #5518).....	54.46	17.31
26 05 33 23-0609 EA Radiused External Elbow (Wiremold #5518FO).....	57.08	17.31
26 05 33 23-0610 EA Transition Fitting (Wiremold #5574).....	51.98	17.31
26 05 33 23-0611 EA Transition Fitting (Wiremold #5574A).....	68.92	17.31
26 05 33 23-0612 Surface Cable Protection System <small>(26 05 33 23)</small>		
26 05 33 23-0613 EA 35-1/2" Long x 18-9/16" Wide x 3" High, Three Channel, Heavy Duty Polyurethane, Surface Cable Protector (Yellow Jacket® CP-YJHD-3).....	625.94	
Note: Modular interlocking design with hinged lid.		
26 05 33 23-0614 EA 35-3/4" Long x 19-3/4" Wide x 1-7/8" High, Five Channel, Heavy Duty Polyurethane, Surface Cable Protector (Yellow Jacket® CP-YJHD-5).....	471.88	
Note: Modular interlocking design with hinged lid.		

26 Electrical**26 05 Common Work Results for Electrical****26 05 33 Raceway and Boxes for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**26 05 36 Cable Trays for Electrical Systems** (26 05)

26 05 36 00-0001	Cable Trays <small>(26 05 36)</small> Note: Excludes supporting hangers.		
26 05 36 00-0002	Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0001)</small>		
26 05 36 00-0003	4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0002)</small>		
26 05 36 00-0004	4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0003)</small>		
26 05 36 00-0005	LF 6" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	42.89	11.74
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.31	
26 05 36 00-0006	LF 9" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	46.37	12.60
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.59	
26 05 36 00-0007	LF 12" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	50.70	13.57
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.94	
26 05 36 00-0008	LF 18" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	56.54	14.43
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.46	
26 05 36 00-0009	LF 24" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	62.20	14.92
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.98	
26 05 36 00-0010	LF 30" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	75.91	17.24
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-6.16	
26 05 36 00-0011	LF 36" Wide, 4" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	85.13	19.68
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-6.88	
26 05 36 00-0012	6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0003)</small>		
26 05 36 00-0013	LF 6" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	40.38	11.50
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.08	
26 05 36 00-0014	LF 9" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	43.73	12.23
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.35	
26 05 36 00-0015	LF 12" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	46.64	13.33
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.55	
26 05 36 00-0016	LF 18" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	51.22	14.06
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.95	
26 05 36 00-0017	LF 24" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	55.30	14.55
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.32	
26 05 36 00-0018	LF 30" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	65.04	16.76
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-5.11	
26 05 36 00-0019	LF 36" Wide, 6" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	71.06	18.34
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-5.57	
26 05 36 00-0020	9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0003)</small>		
26 05 36 00-0021	LF 6" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	38.89	11.37
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-2.94	
26 05 36 00-0022	LF 9" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	40.04	11.74
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.02	
26 05 36 00-0023	LF 12" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	44.18	12.48
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.38	
26 05 36 00-0024	LF 18" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	48.45	13.09
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.75	
26 05 36 00-0025	LF 24" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	52.62	13.45
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.14	
26 05 36 00-0026	LF 30" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	57.37	14.67
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.52	
26 05 36 00-0027	LF 36" Wide, 9" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	61.61	15.89
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.84	
26 05 36 00-0028	12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0003)</small>		
26 05 36 00-0029	LF 6" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	37.74	10.88
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-2.87	
26 05 36 00-0030	LF 9" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	38.53	11.12
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-2.93	
26 05 36 00-0031	LF 12" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	40.80	11.74
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.10	
26 05 36 00-0032	LF 18" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	43.23	12.35
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.30	
26 05 36 00-0033	LF 24" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	45.11	12.35
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.48	
26 05 36 00-0034	LF 30" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	49.89	13.33
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-3.88	
26 05 36 00-0035	LF 36" Wide, 12" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray	52.56	13.94
	<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-4.09	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0036				18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-0003)</small>		
26 05 36 00-0037	LF			6" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 37.23	10.64	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -2.83		
26 05 36 00-0038	LF			9" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 37.88	10.88	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -2.88		
26 05 36 00-0039	LF			12" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 40.16	11.50	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -3.06		
26 05 36 00-0040	LF			18" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 42.17	11.99	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -3.22		
26 05 36 00-0041	LF			24" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 42.89	12.11	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -3.28		
26 05 36 00-0042	LF			30" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 45.55	12.96	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -3.47		
26 05 36 00-0043	LF			36" Wide, 18" Rung Spacing, 4-5/8" High, Straight Sections, Ladder Bottom Galvanized Steel Cable Tray 47.50	13.70	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -3.61		
26 05 36 00-0044				4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fittings <small>(26 05 36 00-0002)</small>		
26 05 36 00-0045				12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0046	EA			6" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 330.34	122.65	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -22.82		
26 05 36 00-0047	EA			9" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 368.81	139.65	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -25.24		
26 05 36 00-0048	EA			12" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 405.31	154.44	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -27.67		
26 05 36 00-0049	EA			18" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 507.47	189.28	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -34.97		
26 05 36 00-0050	EA			24" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 578.18	217.29	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -39.71		
26 05 36 00-0051	EA			30" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 691.57	244.56	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -48.78		
26 05 36 00-0052	EA			36" Wide, 12" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 797.84	279.53	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -56.49		
26 05 36 00-0053				24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0054	EA			6" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 472.57	127.54	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -36.63		
26 05 36 00-0055	EA			9" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 512.35	146.61	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -39.02		
26 05 36 00-0056	EA			12" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 549.72	163.00	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -41.39		
26 05 36 00-0057	EA			18" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 637.40	202.49	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -46.87		
26 05 36 00-0058	EA			24" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 713.40	234.89	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -51.77		
26 05 36 00-0059	EA			30" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 794.30	266.56	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -57.21		
26 05 36 00-0060	EA			36" Wide, 24" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 930.62	308.76	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -67.33		
26 05 36 00-0061				36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0062	EA			6" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 510.15	133.28	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -39.91		
26 05 36 00-0063	EA			9" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 561.08	154.32	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -43.25		
26 05 36 00-0064	EA			12" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting 605.83	172.66	
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> -46.19		

26 Electrical
26 05 Common Work Results for Electrical
26 05 36 Cable Trays for Electrical Systems



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0065	EA		18" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	726.17 -54.51	217.29
26 05 36 00-0066	EA		24" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	825.14 -61.26	255.08
26 05 36 00-0067	EA		30" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	969.09 -72.45	293.47
26 05 36 00-0068	EA		36" Wide, 36" Radius, Horizontal 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	1,098.58 -81.13	344.83
26 05 36 00-0069			12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0070	EA		6" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	246.09 -83.51 -17.20 -47.15	88.89
26 05 36 00-0071	EA		9" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	279.62 -91.62 -19.08 -51.42	106.62
26 05 36 00-0072	EA		12" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	309.79 -99.05 -20.79 -55.36	122.28
26 05 36 00-0073	EA		18" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	369.52 -113.10 -24.08 -62.71	154.56
26 05 36 00-0074	EA		24" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	459.47 -142.29 -30.17 -79.06	189.28
26 05 36 00-0075	EA		30" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	546.19 -173.63 -36.51 -96.94	217.29
26 05 36 00-0076	EA		36" Wide, 12" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	617.16 -190.63 -40.46 -105.87	255.08
26 05 36 00-0077			24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0078	EA		6" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	276.76 -98.75 -20.04 -56.19	91.71
26 05 36 00-0079	EA		9" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	316.25 -109.45 -22.41 -61.98	110.54
26 05 36 00-0080	EA		12" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	360.73 -123.94 -25.44 -70.11	127.66
26 05 36 00-0081	EA		18" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	423.73 -137.94 -28.79 -77.33	163.00
26 05 36 00-0082	EA		24" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	521.41 -168.68 -35.27 -94.46	202.49
26 05 36 00-0083	EA		30" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i>	611.40 -199.27 -41.57 -111.74	234.89

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0084 EA 36" Wide, 24" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	717.98	279.65
<i>For 30 Degree Bend, Deduct</i>	-231.79	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.50	
<i>For 60 Degree Bend, Deduct</i>	-129.75	
26 05 36 00-0085 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-004)		
26 05 36 00-0086 EA 6" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	335.65	94.65
<i>For 30 Degree Bend, Deduct</i>	-129.43	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.68	
<i>For 60 Degree Bend, Deduct</i>	-74.50	
26 05 36 00-0087 EA 9" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	379.53	114.94
<i>For 30 Degree Bend, Deduct</i>	-141.70	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.38	
<i>For 60 Degree Bend, Deduct</i>	-81.19	
26 05 36 00-0088 EA 12" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	414.32	133.40
<i>For 30 Degree Bend, Deduct</i>	-150.06	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.32	
<i>For 60 Degree Bend, Deduct</i>	-85.59	
26 05 36 00-0089 EA 18" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	495.83	172.66
<i>For 30 Degree Bend, Deduct</i>	-171.96	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.19	
<i>For 60 Degree Bend, Deduct</i>	-97.42	
26 05 36 00-0090 EA 24" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	582.18	217.29
<i>For 30 Degree Bend, Deduct</i>	-193.43	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.11	
<i>For 60 Degree Bend, Deduct</i>	-108.81	
26 05 36 00-0091 EA 30" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	709.15	255.08
<i>For 30 Degree Bend, Deduct</i>	-241.22	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.66	
<i>For 60 Degree Bend, Deduct</i>	-136.23	
26 05 36 00-0092 EA 36" Wide, 36" Radius, Horizontal 45 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	830.63	308.76
<i>For 30 Degree Bend, Deduct</i>	-276.72	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-57.33	
<i>For 60 Degree Bend, Deduct</i>	-155.74	
26 05 36 00-0093 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-004)		
26 05 36 00-0094 EA 6" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	359.15	122.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.73	
26 05 36 00-0095 EA 9" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	391.74	139.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-27.53	
26 05 36 00-0096 EA 12" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	421.59	154.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.29	
26 05 36 00-0097 EA 18" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	486.90	189.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.92	
26 05 36 00-0098 EA 24" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	540.76	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.97	
26 05 36 00-0099 EA 30" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	600.43	244.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.66	
26 05 36 00-0100 EA 36" Wide, 12" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	665.28	279.16
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.26	
26 05 36 00-0101 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-004)		
26 05 36 00-0102 EA 6" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	432.22	127.54
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.59	
26 05 36 00-0103 EA 9" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	469.54	146.73
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.73	
26 05 36 00-0104 EA 12" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	505.65	163.00
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.98	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 05 36 00-0105	EA	18" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	583.83		202.49
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.51		
26 05 36 00-0106	EA	24" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	650.33		234.89
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-45.46		
26 05 36 00-0107	EA	30" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	717.52		266.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.54		
26 05 36 00-0108	EA	36" Wide, 24" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	821.77		308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.44		
26 05 36 00-0109		36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>			
26 05 36 00-0110	EA	6" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	518.58		133.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.75		
26 05 36 00-0111	EA	9" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	564.44		154.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.58		
26 05 36 00-0112	EA	12" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	598.54		172.66
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-45.46		
26 05 36 00-0113	EA	18" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	697.89		217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.68		
26 05 36 00-0114	EA	24" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	764.43		255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.18		
26 05 36 00-0115	EA	30" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	874.81		293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-63.03		
26 05 36 00-0116	EA	36" Wide, 36" Radius, Vertical 90 Degree Elbows, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	985.30		344.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-69.80		
26 05 36 00-0117		12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>			
26 05 36 00-0118	EA	6" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	640.26		234.89
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.46		
26 05 36 00-0119	EA	9" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	692.58		255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.00		
26 05 36 00-0120	EA	12" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	726.60		266.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-50.44		
26 05 36 00-0121	EA	18" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	812.24		293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.77		
26 05 36 00-0122	EA	24" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	921.81		325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.03		
26 05 36 00-0123	EA	30" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,028.81		345.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-74.10		
26 05 36 00-0124	EA	36" Wide, 12" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,164.34		391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-83.84		
26 05 36 00-0125		24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>			
26 05 36 00-0126	EA	6" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	815.14		255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-60.26		
26 05 36 00-0127	EA	9" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	874.54		279.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-64.15		
26 05 36 00-0128	EA	12" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	912.52		293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-66.80		
26 05 36 00-0129	EA	18" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	999.80		325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.83		
26 05 36 00-0130	EA	24" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,109.08		366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-80.34		
26 05 36 00-0131	EA	30" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,194.06		391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.82		

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0132	EA			36" Wide, 24" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,447.47	451.82
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.10	
26 05 36 00-0133				36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0134	EA			6" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,049.10	279.65
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-81.61	
26 05 36 00-0135	EA			9" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,120.03	308.76
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.27	
26 05 36 00-0136	EA			12" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,189.22	325.75
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-91.77	
26 05 36 00-0137	EA			18" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,305.92	366.83
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-100.02	
26 05 36 00-0138	EA			24" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,481.60	418.81
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-113.26	
26 05 36 00-0139	EA			30" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,607.17	451.82
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-123.07	
26 05 36 00-0140	EA			36" Wide, 36" Radius, Horizontal Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,806.02	533.14
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-136.17	
26 05 36 00-0141				12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0142	EA			6" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	785.60	217.29
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-60.45	
26 05 36 00-0143	EA			9" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	803.58	225.84
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-61.53	
26 05 36 00-0144	EA			12" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	822.25	234.89
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.65	
26 05 36 00-0145	EA			18" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	863.42	255.08
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.08	
26 05 36 00-0146	EA			24" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	890.01	266.56
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-66.78	
26 05 36 00-0147	EA			30" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	964.51	293.47
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.00	
26 05 36 00-0148	EA			36" Wide, 12" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,036.94	325.75
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-76.55	
26 05 36 00-0149				24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		
26 05 36 00-0150	EA			6" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,156.51	234.89
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-96.08	
26 05 36 00-0151	EA			9" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,183.82	244.56
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-98.00	
26 05 36 00-0152	EA			12" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,212.54	255.08
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-100.00	
26 05 36 00-0153	EA			18" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,275.66	279.65
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-104.27	
26 05 36 00-0154	EA			24" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,321.06	293.47
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.65	
26 05 36 00-0155	EA			30" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,397.20	325.75
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-112.57	
26 05 36 00-0156	EA			36" Wide, 24" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,502.76	366.83
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-119.71	
26 05 36 00-0157				36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0044)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0158 EA 6" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,855.07	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-164.25	
26 05 36 00-0159 EA 9" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,892.80	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-167.06	
26 05 36 00-0160 EA 12" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,933.04	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-170.00	
26 05 36 00-0161 EA 18" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,000.26	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-174.29	
26 05 36 00-0162 EA 24" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,047.16	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-177.57	
26 05 36 00-0163 EA 30" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,171.29	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-186.56	
26 05 36 00-0164 EA 36" Wide, 36" Radius, Vertical Tees, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,276.40	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-192.74	
26 05 36 00-0165 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0044)		
26 05 36 00-0166 EA 6" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	797.38	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.28	
26 05 36 00-0167 EA 9" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	837.77	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-58.04	
26 05 36 00-0168 EA 12" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	895.81	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.43	
26 05 36 00-0169 EA 18" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	961.96	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-67.41	
26 05 36 00-0170 EA 24" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,082.64	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-75.67	
26 05 36 00-0171 EA 30" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,214.19	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.52	
26 05 36 00-0172 EA 36" Wide, 12" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,328.62	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-95.21	
26 05 36 00-0173 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0044)		
26 05 36 00-0174 EA 6" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,140.94	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.95	
26 05 36 00-0175 EA 9" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,192.23	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-90.44	
26 05 36 00-0176 EA 12" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,246.50	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-94.08	
26 05 36 00-0177 EA 18" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,327.76	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-100.19	
26 05 36 00-0178 EA 24" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,473.47	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-109.70	
26 05 36 00-0179 EA 30" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,584.00	489.12
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-117.64	
26 05 36 00-0180 EA 36" Wide, 24" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,780.02	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-133.57	
26 05 36 00-0181 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0044)		
26 05 36 00-0182 EA 6" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,447.05	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-114.14	
26 05 36 00-0183 EA 9" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,524.60	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-119.87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0184 EA 12" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,607.87	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-125.89	
26 05 36 00-0185 EA 18" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,755.73	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-137.93	
26 05 36 00-0186 EA 24" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,002.86	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-155.85	
26 05 36 00-0187 EA 30" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,183.73	585.96
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-169.54	
26 05 36 00-0188 EA 36" Wide, 36" Radius, Horizontal Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,387.80	652.73
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-184.39	
26 05 36 00-0189 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-004)</small>		
26 05 36 00-0190 EA 6" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	936.10	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-69.15	
26 05 36 00-0191 EA 9" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	983.34	308.88
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.59	
26 05 36 00-0192 EA 12" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,054.49	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-78.31	
26 05 36 00-0193 EA 18" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,135.99	345.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-84.80	
26 05 36 00-0194 EA 24" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,276.51	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-95.06	
26 05 36 00-0195 EA 30" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,446.82	418.93
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-109.77	
26 05 36 00-0196 EA 36" Wide, 12" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,586.76	451.21
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-121.07	
26 05 36 00-0197 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-004)</small>		
26 05 36 00-0198 EA 6" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,410.02	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-113.85	
26 05 36 00-0199 EA 9" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,469.66	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-118.18	
26 05 36 00-0200 EA 12" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,532.29	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-122.66	
26 05 36 00-0201 EA 18" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,631.94	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-130.60	
26 05 36 00-0202 EA 24" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,797.70	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-142.12	
26 05 36 00-0203 EA 30" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,929.96	489.12
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-152.24	
26 05 36 00-0204 EA 36" Wide, 24" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,181.14	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-173.68	
26 05 36 00-0205 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-004)</small>		
26 05 36 00-0206 EA 6" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,823.10	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-151.74	
26 05 36 00-0207 EA 9" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,917.36	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-159.15	
26 05 36 00-0208 EA 12" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,017.34	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-166.84	
26 05 36 00-0209 EA 18" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,206.99	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-183.05	
26 05 36 00-0210 EA 24" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,504.26	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-205.99	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0211	EA	30" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,726.90	585.96
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-223.86	
26 05 36 00-0212	EA	36" Wide, 36" Radius, Vertical Crosses, 4" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,972.75	652.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-242.88	
26 05 36 00-0213		6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fittings <small>(26 05 36 00-0002)</small>		
26 05 36 00-0214		12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0215	EA	6" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	312.34	122.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.02	
26 05 36 00-0216	EA	9" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	349.38	139.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.30	
26 05 36 00-0217	EA	12" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	384.17	154.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.55	
26 05 36 00-0218	EA	18" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	480.04	189.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.23	
26 05 36 00-0219	EA	24" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	547.33	217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.62	
26 05 36 00-0220	EA	30" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	651.00	244.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.72	
26 05 36 00-0221	EA	36" Wide, 12" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	750.41	279.53
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.75	
26 05 36 00-0222		24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0223	EA	6" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	435.43	127.54
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.91	
26 05 36 00-0224	EA	9" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	474.07	146.61
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.19	
26 05 36 00-0225	EA	12" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	510.01	163.00
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.41	
26 05 36 00-0226	EA	18" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	594.54	202.49
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.58	
26 05 36 00-0227	EA	24" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	667.40	234.89
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-47.17	
26 05 36 00-0228	EA	30" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	744.31	266.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.21	
26 05 36 00-0229	EA	36" Wide, 24" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	871.20	308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-61.39	
26 05 36 00-0230		36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0231	EA	6" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	469.01	133.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.79	
26 05 36 00-0232	EA	9" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	517.65	154.32
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.91	
26 05 36 00-0233	EA	12" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	560.40	172.66
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.65	
26 05 36 00-0234	EA	18" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	674.18	217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.31	
26 05 36 00-0235	EA	24" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	768.00	255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.54	
26 05 36 00-0236	EA	30" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	900.52	293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.60	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0237 EA 36" Wide, 36" Radius, Horizontal 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	1,023.73 -73.64	344.83
26 05 36 00-0238 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0239 EA 6" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	232.09 -15.80 -42.53 -75.81	88.89
26 05 36 00-0240 EA 9" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	265.05 -17.62 -46.61 -83.61	106.62
26 05 36 00-0241 EA 12" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	294.65 -19.28 -50.36 -90.73	122.28
26 05 36 00-0242 EA 18" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	353.52 -22.48 -57.43 -104.30	154.56
26 05 36 00-0243 EA 24" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	438.90 -28.12 -72.28 -130.98	189.28
26 05 36 00-0244 EA 30" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	519.90 -33.88 -88.26 -159.18	217.29
26 05 36 00-0245 EA 36" Wide, 12" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	589.73 -37.71 -96.82 -175.54	255.08
26 05 36 00-0246 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0247 EA 6" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	259.05 -18.27 -50.35 -89.01	91.71
26 05 36 00-0248 EA 9" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	297.39 -20.53 -55.76 -99.07	110.54
26 05 36 00-0249 EA 12" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	339.59 -23.32 -63.13 -112.32	127.66
26 05 36 00-0250 EA 18" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	402.02 -26.62 -70.17 -126.00	163.00
26 05 36 00-0251 EA 24" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	495.12 -32.64 -85.78 -154.22	202.49
26 05 36 00-0252 EA 30" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	579.98 -38.43 -101.37 -181.99	234.89
26 05 36 00-0253 EA 36" Wide, 24" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 30 Degree Bend, Deduct</i>	681.98 -44.90 -117.87 -211.99	279.65

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 36 00-0254		36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0255	EA	6" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	310.22	94.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.14	
		<i>For 60 Degree Bend, Deduct</i>	-66.11	
		<i>For 30 Degree Bend, Deduct</i>	-115.44	
26 05 36 00-0256	EA	9" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	352.67	114.94
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.69	
		<i>For 60 Degree Bend, Deduct</i>	-72.33	
		<i>For 30 Degree Bend, Deduct</i>	-126.93	
26 05 36 00-0257	EA	12" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	386.89	133.40
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-27.57	
		<i>For 60 Degree Bend, Deduct</i>	-76.54	
		<i>For 30 Degree Bend, Deduct</i>	-134.97	
26 05 36 00-0258	EA	18" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	466.12	172.66
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.22	
		<i>For 60 Degree Bend, Deduct</i>	-87.61	
		<i>For 30 Degree Bend, Deduct</i>	-155.62	
26 05 36 00-0259	EA	24" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	550.76	217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.97	
		<i>For 60 Degree Bend, Deduct</i>	-98.44	
		<i>For 30 Degree Bend, Deduct</i>	-176.15	
26 05 36 00-0260	EA	30" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	668.58	255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-45.60	
		<i>For 60 Degree Bend, Deduct</i>	-122.84	
		<i>For 30 Degree Bend, Deduct</i>	-218.91	
26 05 36 00-0261	EA	36" Wide, 36" Radius, Horizontal 45 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	785.49	308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.82	
		<i>For 60 Degree Bend, Deduct</i>	-140.84	
		<i>For 30 Degree Bend, Deduct</i>	-251.89	
26 05 36 00-0262		12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0263	EA	6" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	346.72	122.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.48	
26 05 36 00-0264	EA	9" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	379.02	139.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.26	
26 05 36 00-0265	EA	12" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	408.45	154.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-27.98	
26 05 36 00-0266	EA	18" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	473.18	189.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-31.54	
26 05 36 00-0267	EA	24" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	526.47	217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.54	
26 05 36 00-0268	EA	30" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	585.01	244.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.12	
26 05 36 00-0269	EA	36" Wide, 12" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	649.28	279.16
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.66	
26 05 36 00-0270		24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0271	EA	6" Wide, 24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	414.65	127.54
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.84	
26 05 36 00-0272	EA	9" Wide, 24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	451.54	146.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.93	
26 05 36 00-0273	EA	12" Wide, 24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	486.94	163.00
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.11	
26 05 36 00-0274	EA	18" Wide, 24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	564.12	202.49
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.54	
26 05 36 00-0275	EA	24" Wide, 24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	629.62	234.89
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.39	
26 05 36 00-0276	EA	30" Wide, 24" Radius, Vertical 90 Degree Elbows, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	695.67	266.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-47.35	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0303 EA 6" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,004.25	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-77.13	
26 05 36 00-0304 EA 9" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,073.47	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-81.61	
26 05 36 00-0305 EA 12" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,139.51	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.80	
26 05 36 00-0306 EA 18" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,252.50	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-94.68	
26 05 36 00-0307 EA 24" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,421.32	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.24	
26 05 36 00-0308 EA 30" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,541.46	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-116.50	
26 05 36 00-0309 EA 36" Wide, 36" Radius, Horizontal Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,735.46	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-129.11	
26 05 36 00-0310 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0213)		
26 05 36 00-0311 EA 6" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	753.03	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-57.19	
26 05 36 00-0312 EA 9" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	770.73	225.84
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-58.25	
26 05 36 00-0313 EA 12" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	789.11	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-59.34	
26 05 36 00-0314 EA 18" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	829.71	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-61.71	
26 05 36 00-0315 EA 24" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	855.73	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-63.36	
26 05 36 00-0316 EA 30" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	927.95	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.34	
26 05 36 00-0317 EA 36" Wide, 12" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	998.95	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.75	
26 05 36 00-0318 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0213)		
26 05 36 00-0319 EA 6" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,097.65	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-90.19	
26 05 36 00-0320 EA 9" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,124.11	244.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-92.03	
26 05 36 00-0321 EA 12" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,151.97	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-93.94	
26 05 36 00-0322 EA 18" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,213.37	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-98.04	
26 05 36 00-0323 EA 24" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,257.06	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-101.25	
26 05 36 00-0324 EA 30" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,331.49	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-106.00	
26 05 36 00-0325 EA 36" Wide, 24" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,434.20	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-112.85	
26 05 36 00-0326 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0213)		
26 05 36 00-0327 EA 6" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,745.07	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-153.25	
26 05 36 00-0328 EA 9" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,781.38	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-155.92	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0329 EA 12" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,820.19	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-158.72	
26 05 36 00-0330 EA 18" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,885.98	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-162.87	
26 05 36 00-0331 EA 24" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,931.45	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-166.00	
26 05 36 00-0332 EA 30" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,051.30	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-174.56	
26 05 36 00-0333 EA 36" Wide, 36" Radius, Vertical Tees, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,154.98	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-180.60	
26 05 36 00-0334 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0335 EA 6" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	773.67	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.91	
26 05 36 00-0336 EA 9" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	812.91	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.56	
26 05 36 00-0337 EA 12" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	868.67	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-59.72	
26 05 36 00-0338 EA 18" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	932.25	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-64.44	
26 05 36 00-0339 EA 24" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,049.50	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.36	
26 05 36 00-0340 EA 30" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,174.48	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-82.55	
26 05 36 00-0341 EA 36" Wide, 12" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,284.34	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-90.79	
26 05 36 00-0342 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0343 EA 6" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,094.94	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-82.35	
26 05 36 00-0344 EA 9" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,144.80	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-85.70	
26 05 36 00-0345 EA 12" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,197.64	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-89.19	
26 05 36 00-0346 EA 18" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,275.76	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-94.99	
26 05 36 00-0347 EA 24" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,418.04	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-104.16	
26 05 36 00-0348 EA 30" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,524.86	489.12
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-111.73	
26 05 36 00-0349 EA 36" Wide, 24" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,711.46	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-126.71	
26 05 36 00-0350 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0351 EA 6" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,382.77	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.71	
26 05 36 00-0352 EA 9" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,457.47	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-113.16	
26 05 36 00-0353 EA 12" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,537.88	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-118.89	
26 05 36 00-0354 EA 18" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,678.60	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-130.21	
26 05 36 00-0355 EA 24" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,917.16	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-147.28	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0356	EA	30" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,090.87	585.96
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-160.25	
26 05 36 00-0357	EA	36" Wide, 36" Radius, Horizontal Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,287.80	652.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-174.39	
26 05 36 00-0358		12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0359	EA	6" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	901.72	293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.72	
26 05 36 00-0360	EA	9" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	947.30	308.88
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.99	
26 05 36 00-0361	EA	12" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,015.13	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-74.37	
26 05 36 00-0362	EA	18" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,092.91	345.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-80.50	
26 05 36 00-0363	EA	24" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,228.45	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-90.25	
26 05 36 00-0364	EA	30" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,389.24	418.93
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-104.01	
26 05 36 00-0365	EA	36" Wide, 12" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,522.55	451.21
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-114.65	
26 05 36 00-0366		24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0367	EA	6" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,343.32	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.18	
26 05 36 00-0368	EA	9" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,400.90	345.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-111.31	
26 05 36 00-0369	EA	12" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,461.45	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-115.58	
26 05 36 00-0370	EA	18" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,556.54	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-123.06	
26 05 36 00-0371	EA	24" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,717.34	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-134.09	
26 05 36 00-0372	EA	30" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,844.21	489.12
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-143.66	
26 05 36 00-0373	EA	36" Wide, 24" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,081.72	533.14
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-163.74	
26 05 36 00-0374		36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0213)</small>		
26 05 36 00-0375	EA	6" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,729.89	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-142.42	
26 05 36 00-0376	EA	9" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,820.01	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-149.41	
26 05 36 00-0377	EA	12" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,915.85	418.81
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-156.69	
26 05 36 00-0378	EA	18" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,095.14	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-171.87	
26 05 36 00-0379	EA	24" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,379.98	533.14
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-193.57	
26 05 36 00-0380	EA	30" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,592.27	585.96
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-210.39	
26 05 36 00-0381	EA	36" Wide, 36" Radius, Vertical Crosses, 6" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,827.76	652.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-228.38	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0382				9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fittings <small>(26 05 36 00-0002)</small>		
26 05 36 00-0383				12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0384	EA			6" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	294.34	122.65
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-19.22	
26 05 36 00-0385	EA			9" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	329.96	139.65
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.36	
26 05 36 00-0386	EA			12" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	363.03	154.44
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.44	
26 05 36 00-0387	EA			18" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	452.61	189.28
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.49	
26 05 36 00-0388	EA			24" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	516.47	217.29
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-33.54	
26 05 36 00-0389	EA			30" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	610.43	244.56
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.66	
26 05 36 00-0390	EA			36" Wide, 12" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	702.99	279.53
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-47.01	
26 05 36 00-0391				24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0392	EA			6" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	398.29	127.54
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.20	
26 05 36 00-0393	EA			9" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	435.78	146.61
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-31.36	
26 05 36 00-0394	EA			12" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	470.30	163.00
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-33.44	
26 05 36 00-0395	EA			18" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	551.69	202.49
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.30	
26 05 36 00-0396	EA			24" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	621.40	234.89
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.57	
26 05 36 00-0397	EA			30" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	694.31	266.56
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-47.21	
26 05 36 00-0398	EA			36" Wide, 24" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	811.77	308.76
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.44	
26 05 36 00-0399				36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0400	EA			6" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	427.87	133.28
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-31.68	
26 05 36 00-0401	EA			9" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	474.23	154.32
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.57	
26 05 36 00-0402	EA			12" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	514.98	172.66
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.11	
26 05 36 00-0403	EA			18" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	622.18	217.29
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.11	
26 05 36 00-0404	EA			24" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	710.86	255.08
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.83	
26 05 36 00-0405	EA			30" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	831.95	293.47
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-58.74	
26 05 36 00-0406	EA			36" Wide, 36" Radius, Horizontal 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	948.88	344.83
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-66.16	
26 05 36 00-0407				12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 05 36 00-0408	EA	6" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	218.09		88.89
		<i>For 60 Degree Bend, Deduct</i>	-37.91		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-14.40		
		<i>For 30 Degree Bend, Deduct</i>	-68.11		
26 05 36 00-0409	EA	9" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	250.48		106.62
		<i>For 60 Degree Bend, Deduct</i>	-41.80		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-16.17		
		<i>For 30 Degree Bend, Deduct</i>	-75.59		
26 05 36 00-0410	EA	12" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	279.51		122.28
		<i>For 60 Degree Bend, Deduct</i>	-45.36		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-17.76		
		<i>For 30 Degree Bend, Deduct</i>	-82.40		
26 05 36 00-0411	EA	18" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	337.52		154.56
		<i>For 60 Degree Bend, Deduct</i>	-52.15		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.88		
		<i>For 30 Degree Bend, Deduct</i>	-95.50		
26 05 36 00-0412	EA	24" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	418.33		189.28
		<i>For 60 Degree Bend, Deduct</i>	-65.49		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.06		
		<i>For 30 Degree Bend, Deduct</i>	-119.66		
26 05 36 00-0413	EA	30" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	493.62		217.29
		<i>For 60 Degree Bend, Deduct</i>	-79.59		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-31.25		
		<i>For 30 Degree Bend, Deduct</i>	-144.72		
26 05 36 00-0414	EA	36" Wide, 12" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	562.30		255.08
		<i>For 60 Degree Bend, Deduct</i>	-87.77		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.97		
		<i>For 30 Degree Bend, Deduct</i>	-160.46		
26 05 36 00-0415		24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>			
26 05 36 00-0416	EA	6" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	241.33		91.71
		<i>For 60 Degree Bend, Deduct</i>	-44.50		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-16.49		
		<i>For 30 Degree Bend, Deduct</i>	-79.26		
26 05 36 00-0417	EA	9" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	278.54		110.54
		<i>For 60 Degree Bend, Deduct</i>	-49.54		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-18.64		
		<i>For 30 Degree Bend, Deduct</i>	-88.71		
26 05 36 00-0418	EA	12" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	318.45		127.66
		<i>For 60 Degree Bend, Deduct</i>	-56.16		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.21		
		<i>For 30 Degree Bend, Deduct</i>	-100.69		
26 05 36 00-0419	EA	18" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	380.30		163.00
		<i>For 60 Degree Bend, Deduct</i>	-63.00		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.44		
		<i>For 30 Degree Bend, Deduct</i>	-114.06		
26 05 36 00-0420	EA	24" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	468.84		202.49
		<i>For 60 Degree Bend, Deduct</i>	-77.11		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.01		
		<i>For 30 Degree Bend, Deduct</i>	-139.77		
26 05 36 00-0421	EA	30" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	548.55		234.89
		<i>For 60 Degree Bend, Deduct</i>	-90.99		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.28		
		<i>For 30 Degree Bend, Deduct</i>	-164.71		
26 05 36 00-0422	EA	36" Wide, 24" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	645.99		279.65
		<i>For 60 Degree Bend, Deduct</i>	-106.00		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.30		
		<i>For 30 Degree Bend, Deduct</i>	-192.19		
26 05 36 00-0423		36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>			
26 05 36 00-0424	EA	6" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	284.79		94.65
		<i>For 60 Degree Bend, Deduct</i>	-57.72		
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.60		
		<i>For 30 Degree Bend, Deduct</i>	-101.45		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0425 EA 9" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	325.82	114.94
<i>For 60 Degree Bend, Deduct</i>	-63.47	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.01	
<i>For 30 Degree Bend, Deduct</i>	-112.16	
26 05 36 00-0426 EA 12" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	359.46	133.40
<i>For 60 Degree Bend, Deduct</i>	-67.49	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.83	
<i>For 30 Degree Bend, Deduct</i>	-119.89	
26 05 36 00-0427 EA 18" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	436.41	172.66
<i>For 60 Degree Bend, Deduct</i>	-77.81	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.25	
<i>For 30 Degree Bend, Deduct</i>	-139.28	
26 05 36 00-0428 EA 24" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	519.33	217.29
<i>For 60 Degree Bend, Deduct</i>	-88.07	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-33.82	
<i>For 30 Degree Bend, Deduct</i>	-158.86	
26 05 36 00-0429 EA 30" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	628.01	255.08
<i>For 60 Degree Bend, Deduct</i>	-109.45	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.54	
<i>For 30 Degree Bend, Deduct</i>	-196.60	
26 05 36 00-0430 EA 36" Wide, 36" Radius, Horizontal 45 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	740.35	308.76
<i>For 60 Degree Bend, Deduct</i>	-125.95	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.30	
<i>For 30 Degree Bend, Deduct</i>	-227.07	
26 05 36 00-0431 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0382)		
26 05 36 00-0432 EA 6" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	328.08	122.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-22.62	
26 05 36 00-0433 EA 9" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	359.95	139.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.35	
26 05 36 00-0434 EA 12" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	388.74	154.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.01	
26 05 36 00-0435 EA 18" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	452.61	189.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.49	
26 05 36 00-0436 EA 24" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	505.05	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.40	
26 05 36 00-0437 EA 30" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	561.86	244.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.81	
26 05 36 00-0438 EA 36" Wide, 12" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	625.28	279.16
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.26	
26 05 36 00-0439 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0382)		
26 05 36 00-0440 EA 6" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	388.29	127.54
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.20	
26 05 36 00-0441 EA 9" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	424.55	146.73
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.23	
26 05 36 00-0442 EA 12" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	458.87	163.00
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.30	
26 05 36 00-0443 EA 18" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	534.55	202.49
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.58	
26 05 36 00-0444 EA 24" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	598.55	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.28	
26 05 36 00-0445 EA 30" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	662.89	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.07	
26 05 36 00-0446 EA 36" Wide, 24" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	760.35	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-50.30	
26 05 36 00-0447 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting (26 05 36 00-0382)		

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0448	EA		6" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	459.30	133.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.82	
26 05 36 00-0449	EA		9" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	503.02	154.44
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.44	
26 05 36 00-0450	EA		12" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	536.40	172.66
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.25	
26 05 36 00-0451	EA		18" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	630.75	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.97	
26 05 36 00-0452	EA		24" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	696.58	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.40	
26 05 36 00-0453	EA		30" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	797.67	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.31	
26 05 36 00-0454	EA		36" Wide, 36" Radius, Vertical 90 Degree Elbows, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	903.17	344.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-61.59	
26 05 36 00-0455			12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0456	EA		6" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	582.83	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.71	
26 05 36 00-0457	EA		9" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	630.87	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.83	
26 05 36 00-0458	EA		12" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	661.46	266.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.93	
26 05 36 00-0459	EA		18" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	737.67	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.31	
26 05 36 00-0460	EA		24" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	834.39	325.75
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.29	
26 05 36 00-0461	EA		30" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	924.25	345.44
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-63.64	
26 05 36 00-0462	EA		36" Wide, 12" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,046.07	391.05
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.02	
26 05 36 00-0463			24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0464	EA		6" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	725.15	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.26	
26 05 36 00-0465	EA		9" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	780.26	279.65
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-54.73	
26 05 36 00-0466	EA		12" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	814.81	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-57.03	
26 05 36 00-0467	EA		18" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	894.38	325.75
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.29	
26 05 36 00-0468	EA		24" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	994.23	366.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.85	
26 05 36 00-0469	EA		30" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,068.92	391.05
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-74.30	
26 05 36 00-0470	EA		36" Wide, 24" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,287.20	451.82
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-91.07	
26 05 36 00-0471			36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0472	EA		6" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	914.54	279.65
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.15	
26 05 36 00-0473	EA		9" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	980.33	308.76
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0474 EA 12" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,040.09	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-76.86	
26 05 36 00-0475 EA 18" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,145.65	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-84.00	
26 05 36 00-0476 EA 24" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,300.75	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-95.18	
26 05 36 00-0477 EA 30" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,410.05	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-103.36	
26 05 36 00-0478 EA 36" Wide, 36" Radius, Horizontal Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,594.32	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-115.00	
26 05 36 00-0479 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0480 EA 6" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	687.89	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-50.68	
26 05 36 00-0481 EA 9" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	705.02	225.84
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.68	
26 05 36 00-0482 EA 12" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	722.82	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.71	
26 05 36 00-0483 EA 18" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	762.29	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-54.97	
26 05 36 00-0484 EA 24" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	787.16	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.50	
26 05 36 00-0485 EA 30" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	854.81	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-61.03	
26 05 36 00-0486 EA 36" Wide, 12" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	922.95	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.15	
26 05 36 00-0487 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0488 EA 6" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	979.95	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-78.42	
26 05 36 00-0489 EA 9" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,004.69	244.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-80.09	
26 05 36 00-0490 EA 12" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,030.84	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-81.83	
26 05 36 00-0491 EA 18" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,088.81	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-85.58	
26 05 36 00-0492 EA 24" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,129.07	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-88.45	
26 05 36 00-0493 EA 30" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,200.08	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-92.86	
26 05 36 00-0494 EA 36" Wide, 24" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,297.06	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-99.14	
26 05 36 00-0495 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0496 EA 6" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,525.09	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-131.25	
26 05 36 00-0497 EA 9" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,558.53	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-133.64	
26 05 36 00-0498 EA 12" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,594.49	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-136.15	
26 05 36 00-0499 EA 18" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,657.42	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-140.01	
26 05 36 00-0500 EA 24" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,700.04	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-142.86	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0501	EA	30" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,811.31	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-150.56</i>	
26 05 36 00-0502	EA	36" Wide, 36" Radius, Vertical Tees, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,912.14	418.81
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-156.32</i>	
26 05 36 00-0503		12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0504	EA	6" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	726.25	293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-48.17</i>	
26 05 36 00-0505	EA	9" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	763.20	308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-50.59</i>	
26 05 36 00-0506	EA	12" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	814.39	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-54.29</i>	
26 05 36 00-0507	EA	18" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	872.82	345.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-58.50</i>	
26 05 36 00-0508	EA	24" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	983.21	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-65.73</i>	
26 05 36 00-0509	EA	30" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,095.05	418.81
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-74.61</i>	
26 05 36 00-0510	EA	36" Wide, 12" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,195.77	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-81.93</i>	
26 05 36 00-0511		24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0512	EA	6" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,002.95	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-73.15</i>	
26 05 36 00-0513	EA	9" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,049.95	345.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-76.21</i>	
26 05 36 00-0514	EA	12" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,099.94	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-79.42</i>	
26 05 36 00-0515	EA	18" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,171.77	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-84.59</i>	
26 05 36 00-0516	EA	24" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,307.20	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-93.07</i>	
26 05 36 00-0517	EA	30" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,406.59	489.12
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-99.90</i>	
26 05 36 00-0518	EA	36" Wide, 24" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,574.32	533.14
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-113.00</i>	
26 05 36 00-0519		36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0520	EA	6" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,254.21	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-94.85</i>	
26 05 36 00-0521	EA	9" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,323.19	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-99.73</i>	
26 05 36 00-0522	EA	12" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,397.89	418.81
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-104.89</i>	
26 05 36 00-0523	EA	18" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,524.32	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-114.78</i>	
26 05 36 00-0524	EA	24" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,745.74	533.14
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-130.14</i>	
26 05 36 00-0525	EA	30" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,905.17	585.96
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-141.68</i>	
26 05 36 00-0526	EA	36" Wide, 36" Radius, Horizontal Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,087.82	652.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	<i>-154.39</i>	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0527 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0528 EA 6" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	832.95	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-58.84	
26 05 36 00-0529 EA 9" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	875.22	308.88
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-61.78	
26 05 36 00-0530 EA 12" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	936.42	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-66.50	
26 05 36 00-0531 EA 18" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,006.75	345.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-71.88	
26 05 36 00-0532 EA 24" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,132.35	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-80.64	
26 05 36 00-0533 EA 30" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,274.08	418.93
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-92.50	
26 05 36 00-0534 EA 36" Wide, 12" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,394.13	451.21
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-101.81	
26 05 36 00-0535 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0536 EA 6" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,209.93	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-93.84	
26 05 36 00-0537 EA 9" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,263.36	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-97.55	
26 05 36 00-0538 EA 12" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,319.78	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-101.41	
26 05 36 00-0539 EA 18" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,405.76	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-107.99	
26 05 36 00-0540 EA 24" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,556.61	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-118.01	
26 05 36 00-0541 EA 30" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,672.71	489.12
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-126.51	
26 05 36 00-0542 EA 36" Wide, 24" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,882.87	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-143.85	
26 05 36 00-0543 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0382)</small>		
26 05 36 00-0544 EA 6" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,543.48	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-123.78	
26 05 36 00-0545 EA 9" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,625.31	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-129.94	
26 05 36 00-0546 EA 12" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,712.87	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-136.39	
26 05 36 00-0547 EA 18" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,871.44	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-149.50	
26 05 36 00-0548 EA 24" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,131.43	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-168.71	
26 05 36 00-0549 EA 30" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,323.00	585.96
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-183.47	
26 05 36 00-0550 EA 36" Wide, 36" Radius, Vertical Crosses, 9" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,537.78	652.73
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-199.38	
26 05 36 00-0551 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fittings <small>(26 05 36 00-0002)</small>		
26 05 36 00-0552 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0553	EA		6" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	288.04 -18.59	122.65
26 05 36 00-0554	EA		9" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	323.16 -20.68	139.65
26 05 36 00-0555	EA		12" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	355.63 -22.70	154.44
26 05 36 00-0556	EA		18" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	443.01 -28.53	189.28
26 05 36 00-0557	EA		24" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	505.68 -32.46	217.29
26 05 36 00-0558	EA		30" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	596.23 -39.24	244.56
26 05 36 00-0559	EA		36" Wide, 12" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	686.39 -45.35	279.53
26 05 36 00-0560			24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0561	EA		6" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	385.29 -27.90	127.54
26 05 36 00-0562	EA		9" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	422.39 -30.02	146.61
26 05 36 00-0563	EA		12" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	456.40 -32.05	163.00
26 05 36 00-0564	EA		18" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	536.69 -36.80	202.49
26 05 36 00-0565	EA		24" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	605.30 -40.96	234.89
26 05 36 00-0566	EA		30" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	676.81 -45.46	266.56
26 05 36 00-0567	EA		36" Wide, 24" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	790.97 -53.36	308.76
26 05 36 00-0568			36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0569	EA		6" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	413.47 -30.24	133.28
26 05 36 00-0570	EA		9" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	459.03 -33.05	154.32
26 05 36 00-0571	EA		12" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	499.08 -35.52	172.66
26 05 36 00-0572	EA		18" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	603.98 -42.29	217.29
26 05 36 00-0573	EA		24" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	690.87 -47.83	255.08
26 05 36 00-0574	EA		30" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	807.95 -56.34	293.47
26 05 36 00-0575	EA		36" Wide, 36" Radius, Horizontal 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	922.68 -63.54	344.83
26 05 36 00-0576			12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0577	EA		6" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 30 Degree Bend, Deduct</i> <i>For 60 Degree Bend, Deduct</i>	213.20 -13.92 -65.43 -36.29	88.89

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0578 EA 9" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	245.38	106.62
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-15.66	
<i>For 30 Degree Bend, Deduct</i>	-72.79	
<i>For 60 Degree Bend, Deduct</i>	-40.12	
26 05 36 00-0579 EA 12" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	274.21	122.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-17.23	
<i>For 30 Degree Bend, Deduct</i>	-79.49	
<i>For 60 Degree Bend, Deduct</i>	-43.62	
26 05 36 00-0580 EA 18" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	331.92	154.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.32	
<i>For 30 Degree Bend, Deduct</i>	-92.42	
<i>For 60 Degree Bend, Deduct</i>	-50.30	
26 05 36 00-0581 EA 24" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	411.13	189.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.34	
<i>For 30 Degree Bend, Deduct</i>	-115.70	
<i>For 60 Degree Bend, Deduct</i>	-63.11	
26 05 36 00-0582 EA 30" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	484.42	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.33	
<i>For 30 Degree Bend, Deduct</i>	-139.66	
<i>For 60 Degree Bend, Deduct</i>	-76.55	
26 05 36 00-0583 EA 36" Wide, 12" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	552.70	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.01	
<i>For 30 Degree Bend, Deduct</i>	-155.18	
<i>For 60 Degree Bend, Deduct</i>	-84.60	
26 05 36 00-0584 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0585 EA 6" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	235.14	91.71
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-15.88	
<i>For 30 Degree Bend, Deduct</i>	-75.86	
<i>For 60 Degree Bend, Deduct</i>	-42.46	
26 05 36 00-0586 EA 9" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	271.94	110.54
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-17.98	
<i>For 30 Degree Bend, Deduct</i>	-85.08	
<i>For 60 Degree Bend, Deduct</i>	-47.36	
26 05 36 00-0587 EA 12" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	311.05	127.66
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.47	
<i>For 30 Degree Bend, Deduct</i>	-96.62	
<i>For 60 Degree Bend, Deduct</i>	-53.72	
26 05 36 00-0588 EA 18" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	372.70	163.00
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.68	
<i>For 30 Degree Bend, Deduct</i>	-109.88	
<i>For 60 Degree Bend, Deduct</i>	-60.49	
26 05 36 00-0589 EA 24" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	459.64	202.49
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.09	
<i>For 30 Degree Bend, Deduct</i>	-134.71	
<i>For 60 Degree Bend, Deduct</i>	-74.07	
26 05 36 00-0590 EA 30" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	537.55	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.18	
<i>For 30 Degree Bend, Deduct</i>	-158.66	
<i>For 60 Degree Bend, Deduct</i>	-87.36	
26 05 36 00-0591 EA 36" Wide, 24" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	633.39	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.04	
<i>For 30 Degree Bend, Deduct</i>	-185.26	
<i>For 60 Degree Bend, Deduct</i>	-101.84	
26 05 36 00-0592 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0593 EA 6" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	275.89	94.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-19.71	
<i>For 30 Degree Bend, Deduct</i>	-96.56	
<i>For 60 Degree Bend, Deduct</i>	-54.78	
26 05 36 00-0594 EA 9" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	316.42	114.94
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-22.07	
<i>For 30 Degree Bend, Deduct</i>	-106.99	
<i>For 60 Degree Bend, Deduct</i>	-60.36	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 05 36 00-0595	EA	12" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	349.86		133.40
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.87		
		<i>For 30 Degree Bend, Deduct</i>	-114.61		
		<i>For 60 Degree Bend, Deduct</i>	-64.32		
26 05 36 00-0596	EA	18" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	426.01		172.66
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.21		
		<i>For 30 Degree Bend, Deduct</i>	-133.56		
		<i>For 60 Degree Bend, Deduct</i>	-74.38		
26 05 36 00-0597	EA	24" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	508.33		217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.72		
		<i>For 30 Degree Bend, Deduct</i>	-152.81		
		<i>For 60 Degree Bend, Deduct</i>	-64.44		
26 05 36 00-0598	EA	30" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	613.81		255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.12		
		<i>For 30 Degree Bend, Deduct</i>	-188.79		
		<i>For 60 Degree Bend, Deduct</i>	-104.77		
26 05 36 00-0599	EA	36" Wide, 36" Radius, Horizontal 45 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	724.55		308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.72		
		<i>For 30 Degree Bend, Deduct</i>	-218.38		
		<i>For 60 Degree Bend, Deduct</i>	-120.73		
26 05 36 00-0600		12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>			
26 05 36 00-0601	EA	6" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	319.38		122.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.75		
26 05 36 00-0602	EA	9" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	351.05		139.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.46		
26 05 36 00-0603	EA	12" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	379.54		154.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.09		
26 05 36 00-0604	EA	18" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	443.01		189.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.53		
26 05 36 00-0605	EA	24" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	495.05		217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-31.40		
26 05 36 00-0606	EA	30" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	551.07		244.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.73		
26 05 36 00-0607	EA	36" Wide, 12" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	614.08		279.16
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.14		
26 05 36 00-0608		24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>			
26 05 36 00-0609	EA	6" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	375.99		127.54
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.97		
26 05 36 00-0610	EA	9" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	411.95		146.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.97		
26 05 36 00-0611	EA	12" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	445.77		163.00
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.99		
26 05 36 00-0612	EA	18" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	520.75		202.49
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.20		
26 05 36 00-0613	EA	24" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	584.05		234.89
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.83		
26 05 36 00-0614	EA	30" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	647.59		266.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.54		
26 05 36 00-0615	EA	36" Wide, 24" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	743.15		308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.58		
26 05 36 00-0616		36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>			
26 05 36 00-0617	EA	6" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	442.70		133.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-33.16		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0618 EA 9" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	485.82	154.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.72	
26 05 36 00-0619 EA 12" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	519.00	172.66
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.51	
26 05 36 00-0620 EA 18" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	611.95	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.09	
26 05 36 00-0621 EA 24" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	677.58	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.50	
26 05 36 00-0622 EA 30" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	776.07	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-53.15	
26 05 36 00-0623 EA 36" Wide, 36" Radius, Vertical 90 Degree Elbows, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	880.17	344.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-59.29	
26 05 36 00-0624 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0625 EA 6" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	563.69	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.80	
26 05 36 00-0626 EA 9" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	610.30	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.77	
26 05 36 00-0627 EA 12" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	639.74	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.76	
26 05 36 00-0628 EA 18" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	712.82	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.83	
26 05 36 00-0629 EA 24" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	805.25	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-53.38	
26 05 36 00-0630 EA 30" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	889.39	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-60.15	
26 05 36 00-0631 EA 36" Wide, 12" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,006.64	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.07	
26 05 36 00-0632 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0633 EA 6" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	695.15	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.26	
26 05 36 00-0634 EA 9" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	748.84	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.58	
26 05 36 00-0635 EA 12" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	782.24	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-53.77	
26 05 36 00-0636 EA 18" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	859.24	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-58.78	
26 05 36 00-0637 EA 24" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	955.95	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.03	
26 05 36 00-0638 EA 30" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,027.21	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-70.13	
26 05 36 00-0639 EA 36" Wide, 24" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,233.77	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-85.73	
26 05 36 00-0640 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0641 EA 6" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	869.68	279.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-63.67	
26 05 36 00-0642 EA 9" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	933.76	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-67.64	
26 05 36 00-0643 EA 12" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	990.38	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-71.89	
26 05 36 00-0644 EA 18" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting	1,092.22	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-78.65	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0645	EA		24" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,240.47	418.81
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-89.15	
26 05 36 00-0646	EA		30" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,344.34	451.82
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-96.79	
26 05 36 00-0647	EA		36" Wide, 36" Radius, Horizontal Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,523.76	533.14
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.94	
26 05 36 00-0648			12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0649	EA		6" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	655.32	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-47.42	
26 05 36 00-0650	EA		9" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	672.16	225.84
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.39	
26 05 36 00-0651	EA		12" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	689.68	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.40	
26 05 36 00-0652	EA		18" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	728.58	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.60	
26 05 36 00-0653	EA		24" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	752.88	266.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-53.07	
26 05 36 00-0654	EA		30" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	818.24	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-57.37	
26 05 36 00-0655	EA		36" Wide, 12" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	884.96	325.75
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-61.35	
26 05 36 00-0656			24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0657	EA		6" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	921.10	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.54	
26 05 36 00-0658	EA		9" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	944.98	244.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-74.12	
26 05 36 00-0659	EA		12" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	970.27	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-75.77	
26 05 36 00-0660	EA		18" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,026.53	279.65
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-79.35	
26 05 36 00-0661	EA		24" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,065.08	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-82.05	
26 05 36 00-0662	EA		30" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,134.37	325.75
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.29	
26 05 36 00-0663	EA		36" Wide, 24" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,228.50	366.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-92.28	
26 05 36 00-0664			36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0665	EA		6" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,415.10	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-120.25	
26 05 36 00-0666	EA		9" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,447.11	266.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-122.49	
26 05 36 00-0667	EA		12" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,481.64	279.65
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-124.86	
26 05 36 00-0668	EA		18" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,543.15	308.76
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-128.58	
26 05 36 00-0669	EA		24" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,584.33	325.75
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-131.28	
26 05 36 00-0670	EA		30" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,691.32	366.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-138.56	
26 05 36 00-0671	EA		36" Wide, 36" Radius, Vertical Tees, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,790.72	418.81
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-144.18	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0672				12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0673	EA			6" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	702.53	293.47
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-45.80	
26 05 36 00-0674	EA			9" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	738.35	308.76
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.10	
26 05 36 00-0675	EA			12" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	787.25	325.75
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.58	
26 05 36 00-0676	EA			18" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	843.11	345.44
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.53	
26 05 36 00-0677	EA			24" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	950.07	391.05
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.42	
26 05 36 00-0678	EA			30" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,055.34	418.81
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-70.64	
26 05 36 00-0679	EA			36" Wide, 12" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,151.49	451.82
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-77.50	
26 05 36 00-0680				24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0681	EA			6" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	956.95	325.75
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.55	
26 05 36 00-0682	EA			9" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,002.53	345.44
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-71.47	
26 05 36 00-0683	EA			12" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,051.08	366.83
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-74.54	
26 05 36 00-0684	EA			18" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,119.78	391.05
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-79.39	
26 05 36 00-0685	EA			24" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,251.77	451.82
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-87.53	
26 05 36 00-0686	EA			30" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,347.45	489.12
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-93.99	
26 05 36 00-0687	EA			36" Wide, 24" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,505.76	533.14
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-106.14	
26 05 36 00-0688				36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0689	EA			6" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,189.93	366.83
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-88.42	
26 05 36 00-0690	EA			9" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,256.05	391.05
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-93.01	
26 05 36 00-0691	EA			12" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,327.89	418.81
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-97.89	
26 05 36 00-0692	EA			18" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,447.19	451.82
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.07	
26 05 36 00-0693	EA			24" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,660.03	533.14
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-121.57	
26 05 36 00-0694	EA			30" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,812.32	585.96
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-132.40	
26 05 36 00-0695	EA			36" Wide, 36" Radius, Horizontal Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,987.82	652.73
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-144.39	
26 05 36 00-0696				12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0697	EA			6" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	798.57	293.47
				<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.40	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0698	EA	9" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	839.18	308.88
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-58.18	
26 05 36 00-0699	EA	12" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	897.07	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.56	
26 05 36 00-0700	EA	18" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	963.66	345.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-67.57	
26 05 36 00-0701	EA	24" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,084.29	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-75.84	
26 05 36 00-0702	EA	30" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,216.49	418.93
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-86.74	
26 05 36 00-0703	EA	36" Wide, 12" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,329.92	451.21
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-95.39	
26 05 36 00-0704		24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0705	EA	6" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,143.24	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-87.18	
26 05 36 00-0706	EA	9" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,194.60	345.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-90.68	
26 05 36 00-0707	EA	12" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,248.94	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-94.32	
26 05 36 00-0708	EA	18" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,330.36	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-100.45	
26 05 36 00-0709	EA	24" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,476.24	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-109.98	
26 05 36 00-0710	EA	30" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,586.96	489.12
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-117.94	
26 05 36 00-0711	EA	36" Wide, 24" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,783.45	533.14
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-133.91	
26 05 36 00-0712		36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting <small>(26 05 36 00-0551)</small>		
26 05 36 00-0713	EA	6" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,450.27	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-114.46	
26 05 36 00-0714	EA	9" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,527.96	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-120.21	
26 05 36 00-0715	EA	12" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,611.37	418.81
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-126.24	
26 05 36 00-0716	EA	18" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	1,759.59	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-138.31	
26 05 36 00-0717	EA	24" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,007.15	533.14
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-156.28	
26 05 36 00-0718	EA	30" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,188.37	585.96
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-170.00	
26 05 36 00-0719	EA	36" Wide, 36" Radius, Vertical Crosses, 12" Rung Spacing, 4-5/8" High, Ladder Bottom Galvanized Steel Cable Tray Fitting.....	2,392.80	652.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-184.89	
26 05 36 00-0720		Dropout Or End Plates And Reducers <small>(26 05 36 00-0002)</small>		
26 05 36 00-0721		Straight Reducers <small>(26 05 36 00-0720)</small>		
26 05 36 00-0722	EA	9" To 6" Reducer, Steel Cable Tray.....	281.86	90.24
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.66	
26 05 36 00-0723	EA	12" To 9" Reducer, Steel Cable Tray.....	297.15	97.70
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.57	
26 05 36 00-0724	EA	18" To 12" Reducer, Steel Cable Tray.....	322.28	112.74
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-22.83	
26 05 36 00-0725	EA	24" To 18" Reducer, Steel Cable Tray.....	354.56	130.48
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.58	
26 05 36 00-0726	EA	30" To 24" Reducer, Steel Cable Tray.....	384.55	146.73
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.23	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0727 EA 36" To 30" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	436.56 -29.68	167.65
26 05 36 00-0728 Reducers <small>(26 05 36 00-0720)</small>		
26 05 36 00-0729 EA 18" To 6" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	328.11 -23.41	112.87
26 05 36 00-0730 EA 24" To 12" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	360.59 -25.17	130.60
26 05 36 00-0731 EA 30" To 12" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	395.79 -27.36	146.61
26 05 36 00-0732 EA 30" To 18" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	401.30 -27.92	146.49
26 05 36 00-0733 EA 36" To 12" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	439.42 -29.97	167.65
26 05 36 00-0734 EA 36" To 18" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	452.47 -30.91	172.05
26 05 36 00-0735 EA 36" To 24" Reducer, Steel Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	467.35 -31.94	177.55
26 05 36 00-0736 Dropout Or End Plate <small>(26 05 36 00-0720)</small>		
26 05 36 00-0737 EA 6" Dropout Or End Plate, Steel Cable Tray.....	75.85	36.68
26 05 36 00-0738 EA 9" Dropout Or End Plate, Steel Cable Tray.....	87.10	41.94
26 05 36 00-0739 EA 12" Dropout Or End Plate, Steel Cable Tray.....	94.06	45.12
26 05 36 00-0740 EA 18" Dropout Or End Plate, Steel Cable Tray.....	111.03	53.32
26 05 36 00-0741 EA 24" Dropout Or End Plate, Steel Cable Tray.....	124.68	58.70
26 05 36 00-0742 EA 30" Dropout Or End Plate, Steel Cable Tray.....	138.14	65.17
26 05 36 00-0743 EA 36" Dropout Or End Plate, Steel Cable Tray.....	155.99	73.37
26 05 36 00-0744 Ladder Bottom Aluminum Cable Tray <small>(26 05 36 00-0001)</small> Note: 4-5/8" Height		
26 05 36 00-0745 Straight Tray Sections <small>(26 05 36 00-0744)</small>		
26 05 36 00-0746 4" Rung Spacing <small>(26 05 36 00-0745)</small>		
26 05 36 00-0747 LF 6" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	132.26 -12.51 6.61 18.41	8.56
26 05 36 00-0748 LF 9" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	139.88 -13.24 6.99 19.48	9.05
26 05 36 00-0749 LF 12" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	147.50 -13.96 7.38 20.55	9.41
26 05 36 00-0750 LF 18" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	163.92 -15.53 8.20 22.87	10.27
26 05 36 00-0751 LF 24" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	189.70 -18.06 9.49 26.63	11.00
26 05 36 00-0752 LF 30" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	208.20 -19.85 10.41 29.28	11.74
26 05 36 00-0753 LF 36" Aluminum Cable Tray, 4" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	224.50 -21.41 11.23 31.59	12.48
26 05 36 00-0754 6" Rung Spacing <small>(26 05 36 00-0745)</small>		
26 05 36 00-0755 LF 6" Aluminum Cable Tray, 6" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	121.53 -11.44 6.08 16.80	8.56
26 05 36 00-0756 LF 9" Aluminum Cable Tray, 6" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	128.53 -12.10 6.43 17.78	9.05
26 05 36 00-0757 LF 12" Aluminum Cable Tray, 6" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	135.52 -12.77 6.78 18.75	9.41
26 05 36 00-0758 LF 18" Aluminum Cable Tray, 6" Rung Spacing, Straight Section..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i> <i>For Class 12C Instead Of Class 12B, Add</i>	150.59 -14.20 7.53 20.87	10.27

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0759 LF 24" Aluminum Cable Tray, 6" Rung Spacing, Straight Section	174.12	11.00
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-16.50	
For 6" Overall Height Instead Of 4-5/8", Add	8.71	
For Class 12C Instead Of Class 12B, Add	24.29	
26 05 36 00-0760 LF 30" Aluminum Cable Tray, 6" Rung Spacing, Straight Section	191.05	11.74
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-18.13	
For 6" Overall Height Instead Of 4-5/8", Add	9.55	
For Class 12C Instead Of Class 12B, Add	26.71	
26 05 36 00-0761 LF 36" Aluminum Cable Tray, 6" Rung Spacing, Straight Section	205.99	12.48
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-19.56	
For 6" Overall Height Instead Of 4-5/8", Add	10.30	
For Class 12C Instead Of Class 12B, Add	28.82	
26 05 36 00-0762 9" Rung Spacing <small>(26 05 36 00-0745)</small>		
26 05 36 00-0763 LF 6" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	107.86	8.19
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-10.10	
For 6" Overall Height Instead Of 4-5/8", Add	5.39	
For Class 12C Instead Of Class 12B, Add	14.81	
26 05 36 00-0764 LF 9" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	108.98	8.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-10.18	
For 6" Overall Height Instead Of 4-5/8", Add	5.45	
For Class 12C Instead Of Class 12B, Add	14.92	
26 05 36 00-0765 LF 12" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	117.00	9.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-10.95	
For 6" Overall Height Instead Of 4-5/8", Add	5.85	
For Class 12C Instead Of Class 12B, Add	16.05	
26 05 36 00-0766 LF 18" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	124.90	9.66
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-11.68	
For 6" Overall Height Instead Of 4-5/8", Add	6.25	
For Class 12C Instead Of Class 12B, Add	17.12	
26 05 36 00-0767 LF 24" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	142.21	10.02
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-13.39	
For 6" Overall Height Instead Of 4-5/8", Add	7.11	
For Class 12C Instead Of Class 12B, Add	19.66	
26 05 36 00-0768 LF 30" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	157.68	10.76
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-14.87	
For 6" Overall Height Instead Of 4-5/8", Add	7.88	
For Class 12C Instead Of Class 12B, Add	21.85	
26 05 36 00-0769 LF 36" Aluminum Cable Tray, 9" Rung Spacing, Straight Section	167.10	11.74
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-15.73	
For 6" Overall Height Instead Of 4-5/8", Add	8.36	
For Class 12C Instead Of Class 12B, Add	23.11	
26 05 36 00-0770 12" Rung Spacing <small>(26 05 36 00-0745)</small>		
26 05 36 00-0771 LF 6" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	105.81	7.95
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-9.92	
For 6" Overall Height Instead Of 4-5/8", Add	5.29	
For Class 12C Instead Of Class 12B, Add	14.55	
26 05 36 00-0772 LF 9" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	106.81	8.19
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-10.00	
For 6" Overall Height Instead Of 4-5/8", Add	5.34	
For Class 12C Instead Of Class 12B, Add	14.65	
26 05 36 00-0773 LF 12" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	110.76	8.68
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-10.35	
For 6" Overall Height Instead Of 4-5/8", Add	5.54	
For Class 12C Instead Of Class 12B, Add	15.16	
26 05 36 00-0774 LF 18" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	117.35	9.17
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-10.97	
For 6" Overall Height Instead Of 4-5/8", Add	5.87	
For Class 12C Instead Of Class 12B, Add	16.07	
26 05 36 00-0775 LF 24" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	129.08	9.29
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-12.13	
For 6" Overall Height Instead Of 4-5/8", Add	6.45	
For Class 12C Instead Of Class 12B, Add	17.80	
26 05 36 00-0776 LF 30" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	138.41	10.27
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-12.99	
For 6" Overall Height Instead Of 4-5/8", Add	6.92	
For Class 12C Instead Of Class 12B, Add	19.06	
26 05 36 00-0777 LF 36" Aluminum Cable Tray, 12" Rung Spacing, Straight Section	146.12	11.12
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-13.69	
For 6" Overall Height Instead Of 4-5/8", Add	7.31	
For Class 12C Instead Of Class 12B, Add	20.07	
26 05 36 00-0778 18" Rung Spacing <small>(26 05 36 00-0745)</small>		
26 05 36 00-0779 LF 6" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	104.93	7.71
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-9.85	
For 6" Overall Height Instead Of 4-5/8", Add	5.25	
For Class 12C Instead Of Class 12B, Add	14.45	
26 05 36 00-0780 LF 9" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	104.36	8.07
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-9.77	
For 6" Overall Height Instead Of 4-5/8", Add	5.22	
For Class 12C Instead Of Class 12B, Add	14.32	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0781 LF 12" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	110.15	8.32
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-10.32	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	5.51	
<i>For Class 12C Instead Of Class 12B, Add</i>	15.13	
26 05 36 00-0782 LF 18" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	116.10	8.80
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-10.88	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	5.81	
<i>For Class 12C Instead Of Class 12B, Add</i>	15.95	
26 05 36 00-0783 LF 24" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	124.18	8.93
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-11.68	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	6.21	
<i>For Class 12C Instead Of Class 12B, Add</i>	17.14	
26 05 36 00-0784 LF 30" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	129.19	9.78
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-12.11	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	6.46	
<i>For Class 12C Instead Of Class 12B, Add</i>	17.76	
26 05 36 00-0785 LF 36" Aluminum Cable Tray, 18" Rung Spacing, Straight Section	135.98	10.64
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-12.71	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	6.80	
<i>For Class 12C Instead Of Class 12B, Add</i>	18.62	
26 05 36 00-0786 4" Rung Tray Fittings (26 05 36 00-0744)		
26 05 36 00-0787 90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-0786)		
26 05 36 00-0788 EA 6" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	348.57	122.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.64	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	17.43	
26 05 36 00-0789 EA 9" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	380.69	139.65
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.43	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	19.03	
26 05 36 00-0790 EA 12" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	432.57	154.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.39	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.63	
26 05 36 00-0791 EA 18" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	512.64	189.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.49	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.63	
26 05 36 00-0792 EA 24" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	606.82	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.57	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.34	
26 05 36 00-0793 EA 30" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	666.81	244.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.30	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.34	
26 05 36 00-0794 EA 36" Horizontal 90 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	779.85	279.53
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-54.69	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	38.99	
26 05 36 00-0795 90 Degree, 24" Radius Horizontal Elbows (26 05 36 00-0786)		
26 05 36 00-0796 EA 6" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	468.16	127.54
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.19	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.41	
26 05 36 00-0797 EA 9" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	510.90	146.61
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.87	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.55	
26 05 36 00-0798 EA 12" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	551.04	163.00
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.52	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	27.55	
26 05 36 00-0799 EA 18" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	640.46	202.49
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-47.18	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	32.02	
26 05 36 00-0800 EA 24" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	723.66	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.80	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	36.18	
26 05 36 00-0801 EA 30" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	807.61	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-58.54	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	40.38	
26 05 36 00-0802 EA 36" Horizontal 90 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	923.57	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-66.62	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	46.18	
26 05 36 00-0803 90 Degree, 36" Radius Horizontal Elbows (26 05 36 00-0786)		
26 05 36 00-0804 EA 6" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	503.30	133.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.22	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.17	
26 05 36 00-0805 EA 9" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	545.53	154.32
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.70	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	27.28	
26 05 36 00-0806 EA 12" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	609.14	172.66
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.52	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.46	
26 05 36 00-0807 EA 18" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	723.65	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-54.26	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	36.18	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0808	EA 24" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	834.09 -62.15 41.70	255.08
26 05 36 00-0809	EA 30" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	938.20 -69.36 46.91	293.47
26 05 36 00-0810	EA 36" Horizontal 90 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,089.42 -80.21 54.47	344.83
26 05 36 00-0811	45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-0786)</small>		
26 05 36 00-0812	EA 6" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	243.03 -81.83 -16.90 -46.14 12.15	88.89
26 05 36 00-0813	EA 9" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	276.21 -89.75 -18.74 -50.29 13.81	106.62
26 05 36 00-0814	EA 12" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	306.03 -96.99 -20.41 -54.12 15.30	122.28
26 05 36 00-0815	EA 18" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	378.01 -117.77 -24.92 -65.51 18.90	154.56
26 05 36 00-0816	EA 24" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	465.17 -145.43 -30.74 -80.95 23.26	189.28
26 05 36 00-0817	EA 30" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	533.80 -166.82 -35.27 -92.85 26.69	217.29
26 05 36 00-0818	EA 36" Horizontal 45 Degree Elbow, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	604.07 -183.43 -39.15 -101.55 30.20	255.08
26 05 36 00-0819	45 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-0786)</small>		
26 05 36 00-0820	EA 6" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	280.56 -100.84 -20.42 -57.45 14.03	91.71
26 05 36 00-0821	EA 9" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	326.65 -115.17 -23.45 -65.41 16.33	110.54
26 05 36 00-0822	EA 12" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	358.78 -122.87 -25.24 -69.47 17.94	127.66
26 05 36 00-0823	EA 18" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	428.73 -140.69 -29.29 -78.98 21.44	163.00
26 05 36 00-0824	EA 24" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	519.97 -167.89 -35.13 -93.98 26.00	202.49
26 05 36 00-0825	EA 30" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	610.48 -198.77 -41.48 -111.43 30.52	234.89
26 05 36 00-0826	EA 36" Horizontal 45 Degree Elbow, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 30 Degree Bend, Deduct</i> <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 60 Degree Bend, Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	696.02 -219.71 -46.30 -122.51 34.80	279.65

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0827 45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-0786)</small>		
26 05 36 00-0828 EA 6" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	329.26	94.65
For 30 Degree Bend, Deduct	-125.91	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-25.04	
For 60 Degree Bend, Deduct	-72.39	
For 6" Overall Height Instead Of 4-5/8", Add	16.46	
26 05 36 00-0829 EA 9" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	366.79	114.94
For 30 Degree Bend, Deduct	-134.70	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-27.10	
For 60 Degree Bend, Deduct	-76.99	
For 6" Overall Height Instead Of 4-5/8", Add	18.34	
26 05 36 00-0830 EA 12" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	401.23	133.40
For 30 Degree Bend, Deduct	-142.86	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-29.01	
For 60 Degree Bend, Deduct	-81.27	
For 6" Overall Height Instead Of 4-5/8", Add	20.06	
26 05 36 00-0831 EA 18" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	485.01	172.66
For 30 Degree Bend, Deduct	-166.01	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-34.11	
For 60 Degree Bend, Deduct	-93.85	
For 6" Overall Height Instead Of 4-5/8", Add	24.25	
26 05 36 00-0832 EA 24" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	603.17	217.29
For 30 Degree Bend, Deduct	-204.97	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-42.21	
For 60 Degree Bend, Deduct	-115.74	
For 6" Overall Height Instead Of 4-5/8", Add	30.16	
26 05 36 00-0833 EA 30" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	680.74	255.08
For 30 Degree Bend, Deduct	-225.60	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-46.82	
For 60 Degree Bend, Deduct	-126.86	
For 6" Overall Height Instead Of 4-5/8", Add	34.04	
26 05 36 00-0834 EA 36" Horizontal 45 Degree Elbow, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	795.78	308.76
For 30 Degree Bend, Deduct	-257.55	
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-53.85	
For 60 Degree Bend, Deduct	-144.24	
For 6" Overall Height Instead Of 4-5/8", Add	39.79	
26 05 36 00-0835 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-0786)</small>		
26 05 36 00-0836 EA 6" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	383.09	122.28
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-28.12	
For 6" Overall Height Instead Of 4-5/8", Add	19.15	
26 05 36 00-0837 EA 9" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	421.89	139.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-30.55	
For 6" Overall Height Instead Of 4-5/8", Add	21.09	
26 05 36 00-0838 EA 12" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	449.65	154.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-32.10	
For 6" Overall Height Instead Of 4-5/8", Add	22.48	
26 05 36 00-0839 EA 18" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	514.33	189.28
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-35.66	
For 6" Overall Height Instead Of 4-5/8", Add	25.72	
26 05 36 00-0840 EA 24" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	570.83	217.29
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-38.97	
For 6" Overall Height Instead Of 4-5/8", Add	28.54	
26 05 36 00-0841 EA 30" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	626.00	244.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-42.22	
For 6" Overall Height Instead Of 4-5/8", Add	31.30	
26 05 36 00-0842 EA 36" Vertical Riser 90 Degree, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	690.22	279.16
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-45.76	
For 6" Overall Height Instead Of 4-5/8", Add	34.51	
26 05 36 00-0843 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-0786)</small>		
26 05 36 00-0844 EA 6" Vertical Riser 90 Degree, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	406.55	127.54
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-30.03	
For 6" Overall Height Instead Of 4-5/8", Add	20.33	
26 05 36 00-0845 EA 9" Vertical Riser 90 Degree, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	446.67	146.73
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-32.44	
For 6" Overall Height Instead Of 4-5/8", Add	22.33	
26 05 36 00-0846 EA 12" Vertical Riser 90 Degree, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	478.74	163.00
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-34.29	
For 6" Overall Height Instead Of 4-5/8", Add	23.94	
26 05 36 00-0847 EA 18" Vertical Riser 90 Degree, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	555.83	202.49
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-38.71	
For 6" Overall Height Instead Of 4-5/8", Add	27.79	
26 05 36 00-0848 EA 24" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray	622.87	234.89
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-42.72	
For 6" Overall Height Instead Of 4-5/8", Add	31.14	
26 05 36 00-0849 EA 30" Vertical Riser 90 Degree, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	688.82	266.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-46.67	
For 6" Overall Height Instead Of 4-5/8", Add	34.44	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0850	EA	36" Vertical Riser 90 Degree, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	775.44	308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.81	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	38.77	
26 05 36 00-0851		90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-0786)</small>		
26 05 36 00-0852	EA	6" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	522.08	133.28
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.10	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.10	
26 05 36 00-0853	EA	9" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	563.75	154.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.51	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	28.19	
26 05 36 00-0854	EA	12" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	613.84	172.66
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.99	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.69	
26 05 36 00-0855	EA	18" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	701.22	217.29
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.01	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	35.06	
26 05 36 00-0856	EA	24" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	777.23	255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.46	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	38.86	
26 05 36 00-0857	EA	30" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	867.26	293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.27	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	43.36	
26 05 36 00-0858	EA	36" Vertical Riser 90 Degree, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	969.06	344.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.18	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	48.45	
26 05 36 00-0859		12" Radius Horizontal Tees <small>(26 05 36 00-0786)</small>		
26 05 36 00-0860	EA	6" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	598.23	234.89
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.25	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	29.91	
26 05 36 00-0861	EA	9" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	645.54	255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.30	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	32.28	
26 05 36 00-0862	EA	12" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	668.09	266.56
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.59	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.40	
26 05 36 00-0863	EA	18" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	756.95	293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.24	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	37.85	
26 05 36 00-0864	EA	24" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	837.93	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.64	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	41.90	
26 05 36 00-0865	EA	30" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	918.12	345.44
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-63.03	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	45.91	
26 05 36 00-0866	EA	36" Horizontal Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray	1,062.03	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-73.61	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	53.10	
26 05 36 00-0867		24" Radius Horizontal Tees <small>(26 05 36 00-0786)</small>		
26 05 36 00-0868	EA	6" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	777.76	255.08
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.52	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	38.89	
26 05 36 00-0869	EA	9" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	838.93	279.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-60.59	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	41.95	
26 05 36 00-0870	EA	12" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	872.22	293.47
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.77	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	43.61	
26 05 36 00-0871	EA	18" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	959.98	325.75
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-68.85	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	48.00	
26 05 36 00-0872	EA	24" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,065.69	366.83
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-76.00	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	53.28	
26 05 36 00-0873	EA	30" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,150.18	391.05
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-82.43	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	57.51	
26 05 36 00-0874	EA	36" Horizontal Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,515.76	451.82
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-113.93	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	75.79	
26 05 36 00-0875		36" Radius Horizontal Tees <small>(26 05 36 00-0786)</small>		
26 05 36 00-0876	EA	6" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	964.37	279.65
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-73.14	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	48.22	
26 05 36 00-0877	EA	9" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,026.58	308.76
		<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-76.93	
		<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	51.33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0878 EA 12" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,102.37 -83.09 55.12	325.75
26 05 36 00-0879 EA 18" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,201.30 -89.56 60.07	366.83
26 05 36 00-0880 EA 24" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,348.87 -99.99 67.44	418.81
26 05 36 00-0881 EA 30" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,576.78 -120.03 78.84	451.82
26 05 36 00-0882 EA 36" Horizontal Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,804.03 -135.97 90.20	533.14
26 05 36 00-0883 12" Radius Vertical Tees <small>(26 05 36 00-0786)</small>		
26 05 36 00-0884 EA 6" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	826.66 -64.56 41.33	217.29
26 05 36 00-0885 EA 9" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	854.50 -66.63 42.73	225.84
26 05 36 00-0886 EA 12" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	872.84 -67.71 43.64	234.89
26 05 36 00-0887 EA 18" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	916.76 -70.42 45.84	255.08
26 05 36 00-0888 EA 24" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	976.60 -75.44 48.83	266.56
26 05 36 00-0889 EA 30" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,031.56 -78.70 51.58	293.47
26 05 36 00-0890 EA 36" Vertical Tee, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,102.37 -83.09 55.12	325.75
26 05 36 00-0891 24" Radius Vertical Tees <small>(26 05 36 00-0786)</small>		
26 05 36 00-0892 EA 6" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,177.96 -98.23 58.90	234.89
26 05 36 00-0893 EA 9" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,204.30 -100.05 60.22	244.56
26 05 36 00-0894 EA 12" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,232.05 -101.95 61.60	255.08
26 05 36 00-0895 EA 18" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,296.61 -106.36 64.83	279.65
26 05 36 00-0896 EA 24" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,340.07 -109.55 67.00	293.47
26 05 36 00-0897 EA 30" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,414.27 -114.28 70.71	325.75
26 05 36 00-0898 EA 36" Vertical Tee, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,560.67 -125.50 78.03	366.83
26 05 36 00-0899 36" Radius Vertical Tee <small>(26 05 36 00-0786)</small>		
26 05 36 00-0900 EA 6" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,921.46 -170.89 96.07	255.08
26 05 36 00-0901 EA 9" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,960.04 -173.79 98.00	266.56
26 05 36 00-0902 EA 12" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,001.14 -176.81 100.06	279.65
26 05 36 00-0903 EA 18" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,069.25 -181.19 103.46	308.76
26 05 36 00-0904 EA 24" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,117.01 -184.55 105.85	325.75
26 05 36 00-0905 EA 30" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,243.70 -193.80 112.19	366.83

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-0906	EA 36" Vertical Tee, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,349.67 -200.07 117.48	418.81
26 05 36 00-0907	12" Radius Horizontal Crosses (26 05 36 00-0786)		
26 05 36 00-0908	EA 6" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	777.29 -53.27 38.86	293.47
26 05 36 00-0909	EA 9" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	833.33 -57.60 41.67	308.76
26 05 36 00-0910	EA 12" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	865.05 -59.36 43.25	325.75
26 05 36 00-0911	EA 18" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	965.58 -67.77 48.28	345.44
26 05 36 00-0912	EA 24" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,055.25 -72.93 52.76	391.05
26 05 36 00-0913	EA 30" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,172.58 -82.36 58.63	418.81
26 05 36 00-0914	EA 36" Horizontal Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,346.24 -96.98 67.31	451.82
26 05 36 00-0915	24" Radius Horizontal Crosses (26 05 36 00-0786)		
26 05 36 00-0916	EA 6" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,095.59 -82.41 54.78	325.75
26 05 36 00-0917	EA 9" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,145.26 -85.74 57.26	345.44
26 05 36 00-0918	EA 12" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,197.91 -89.22 59.90	366.83
26 05 36 00-0919	EA 18" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,268.84 -94.29 63.44	391.05
26 05 36 00-0920	EA 24" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,424.22 -104.77 71.21	451.82
26 05 36 00-0921	EA 30" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,602.57 -119.50 80.13	489.12
26 05 36 00-0922	EA 36" Horizontal Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,776.31 -133.20 88.82	533.14
26 05 36 00-0923	36" Radius Horizontal Crosses (26 05 36 00-0786)		
26 05 36 00-0924	EA 6" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,262.33 -95.66 63.12	366.83
26 05 36 00-0925	EA 9" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,394.61 -106.87 69.73	391.05
26 05 36 00-0926	EA 12" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,485.31 -113.63 74.27	418.81
26 05 36 00-0927	EA 18" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,519.15 -114.27 75.96	451.82
26 05 36 00-0928	EA 24" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,837.93 -139.36 91.90	533.14
26 05 36 00-0929	EA 30" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,027.65 -153.93 101.38	585.96
26 05 36 00-0930	EA 36" Horizontal Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,257.53 -171.36 112.88	652.73
26 05 36 00-0931	12" Radius Vertical Cross (26 05 36 00-0786)		
26 05 36 00-0932	EA 6" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	777.29 -53.27 38.86	293.47
26 05 36 00-0933	EA 9" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	833.50 -57.61 41.68	308.88

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0934 EA 12" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	864.95	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-59.35	
For 6" Overall Height Instead Of 4-5/8", Add	43.25	
26 05 36 00-0935 EA 18" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	965.80	345.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-67.78	
For 6" Overall Height Instead Of 4-5/8", Add	48.29	
26 05 36 00-0936 EA 24" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,055.25	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-72.93	
For 6" Overall Height Instead Of 4-5/8", Add	52.76	
26 05 36 00-0937 EA 30" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,172.90	418.93
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-82.38	
For 6" Overall Height Instead Of 4-5/8", Add	58.65	
26 05 36 00-0938 EA 36" Vertical Cross, 4" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,345.32	451.21
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-96.93	
For 6" Overall Height Instead Of 4-5/8", Add	67.27	
26 05 36 00-0939 24" Radius Vertical Crosses (26 05 36 00-0786)		
26 05 36 00-0940 EA 6" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,095.59	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-82.41	
For 6" Overall Height Instead Of 4-5/8", Add	54.78	
26 05 36 00-0941 EA 9" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,145.26	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-85.74	
For 6" Overall Height Instead Of 4-5/8", Add	57.26	
26 05 36 00-0942 EA 12" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,197.91	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-89.22	
For 6" Overall Height Instead Of 4-5/8", Add	59.90	
26 05 36 00-0943 EA 18" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,268.84	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-94.29	
For 6" Overall Height Instead Of 4-5/8", Add	63.44	
26 05 36 00-0944 EA 24" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,424.22	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-104.77	
For 6" Overall Height Instead Of 4-5/8", Add	71.21	
26 05 36 00-0945 EA 30" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,533.93	489.12
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-112.63	
For 6" Overall Height Instead Of 4-5/8", Add	76.70	
26 05 36 00-0946 EA 36" Vertical Cross, 4" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,698.93	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-125.46	
For 6" Overall Height Instead Of 4-5/8", Add	84.95	
26 05 36 00-0947 36" Radius Vertical Crosses (26 05 36 00-0786)		
26 05 36 00-0948 EA 6" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,555.25	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-124.96	
For 6" Overall Height Instead Of 4-5/8", Add	77.76	
26 05 36 00-0949 EA 9" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,634.98	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-130.91	
For 6" Overall Height Instead Of 4-5/8", Add	81.75	
26 05 36 00-0950 EA 12" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,740.10	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-139.11	
For 6" Overall Height Instead Of 4-5/8", Add	87.01	
26 05 36 00-0951 EA 18" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,863.94	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-148.75	
For 6" Overall Height Instead Of 4-5/8", Add	93.20	
26 05 36 00-0952 EA 24" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,265.10	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-182.08	
For 6" Overall Height Instead Of 4-5/8", Add	113.26	
26 05 36 00-0953 EA 30" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,500.59	585.96
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-201.23	
For 6" Overall Height Instead Of 4-5/8", Add	125.03	
26 05 36 00-0954 EA 36" Vertical Cross, 4" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,783.86	652.73
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-223.99	
For 6" Overall Height Instead Of 4-5/8", Add	139.19	
26 05 36 00-0955 6" Rung Tray Fittings (26 05 36 00-0744)		
26 05 36 00-0956 90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-0955)		
26 05 36 00-0957 EA 6" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	327.96	122.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-22.58	
For 6" Overall Height Instead Of 4-5/8", Add	16.40	
26 05 36 00-0958 EA 9" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	359.56	139.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-24.32	
For 6" Overall Height Instead Of 4-5/8", Add	17.98	
26 05 36 00-0959 EA 12" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	407.53	154.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-27.89	
For 6" Overall Height Instead Of 4-5/8", Add	20.38	
26 05 36 00-0960 EA 18" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	484.47	189.28
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-32.67	
For 6" Overall Height Instead Of 4-5/8", Add	24.22	
26 05 36 00-0961 EA 24" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	571.87	217.29
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-39.08	
For 6" Overall Height Instead Of 4-5/8", Add	28.59	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0962	EA		30" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	629.78	244.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.60	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	31.49	
26 05 36 00-0963	EA		36" Horizontal 90 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	734.99	279.53
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-50.21	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	36.75	
26 05 36 00-0964			90 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-0955)</small>		
26 05 36 00-0965	EA		6" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	431.65	127.54
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.54	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.58	
26 05 36 00-0966	EA		9" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	472.82	146.61
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.06	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.64	
26 05 36 00-0967	EA		12" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	511.14	163.00
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.53	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.56	
26 05 36 00-0968	EA		18" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	597.17	202.49
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.85	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	29.86	
26 05 36 00-0969	EA		24" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	676.20	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.05	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.81	
26 05 36 00-0970	EA		30" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	755.71	266.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-53.35	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	37.79	
26 05 36 00-0971	EA		36" Horizontal 90 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	865.15	308.76
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-60.78	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	43.26	
26 05 36 00-0972			90 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-0955)</small>		
26 05 36 00-0973	EA		6" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	463.14	133.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.21	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.16	
26 05 36 00-0974	EA		9" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	504.33	154.32
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.58	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.22	
26 05 36 00-0975	EA		12" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	563.24	172.66
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.93	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	28.16	
26 05 36 00-0976	EA		18" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	672.02	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.09	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.60	
26 05 36 00-0977	EA		24" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	775.67	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.31	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	38.78	
26 05 36 00-0978	EA		30" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	874.04	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.95	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	43.70	
26 05 36 00-0979	EA		36" Horizontal 90 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,015.87	344.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-72.86	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	50.79	
26 05 36 00-0980			45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-0955)</small>		
26 05 36 00-0981	EA		6" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	229.47	88.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-15.54	
			<i>For 30 Degree Bend, Deduct</i>	-74.37	
			<i>For 60 Degree Bend, Deduct</i>	-41.66	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	11.47	
26 05 36 00-0982	EA		9" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	262.13	106.62
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-17.33	
			<i>For 30 Degree Bend, Deduct</i>	-82.00	
			<i>For 60 Degree Bend, Deduct</i>	-45.65	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	13.11	
26 05 36 00-0983	EA		12" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	291.42	122.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-18.95	
			<i>For 30 Degree Bend, Deduct</i>	-88.95	
			<i>For 60 Degree Bend, Deduct</i>	-49.29	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	14.57	
26 05 36 00-0984	EA		18" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	360.80	154.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.20	
			<i>For 30 Degree Bend, Deduct</i>	-108.30	
			<i>For 60 Degree Bend, Deduct</i>	-59.83	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	18.04	
26 05 36 00-0985	EA		24" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	443.79	189.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.61	
			<i>For 30 Degree Bend, Deduct</i>	-133.67	
			<i>For 60 Degree Bend, Deduct</i>	-73.89	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	22.19	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-0986 EA 30" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	509.28	217.29
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-32.82	
For 30 Degree Bend, Deduct	-153.33	
For 60 Degree Bend, Deduct	-84.76	
For 6" Overall Height Instead Of 4-5/8", Add	25.46	
26 05 36 00-0987 EA 36" Horizontal 45 Degree Elbow, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	578.51	255.08
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-36.59	
For 30 Degree Bend, Deduct	-169.37	
For 60 Degree Bend, Deduct	-93.12	
For 6" Overall Height Instead Of 4-5/8", Add	28.93	
26 05 36 00-0988 45 Degree, 24" Radius Horizontal Elbows (26 05 36 00-0955)		
26 05 36 00-0989 EA 6" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	262.30	91.71
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-18.59	
For 30 Degree Bend, Deduct	-90.80	
For 60 Degree Bend, Deduct	-51.42	
For 6" Overall Height Instead Of 4-5/8", Add	13.12	
26 05 36 00-0990 EA 9" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	306.31	110.54
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-21.42	
For 30 Degree Bend, Deduct	-103.98	
For 60 Degree Bend, Deduct	-58.70	
For 6" Overall Height Instead Of 4-5/8", Add	15.32	
26 05 36 00-0991 EA 12" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	337.92	127.66
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-23.16	
For 30 Degree Bend, Deduct	-111.40	
For 60 Degree Bend, Deduct	-62.58	
For 6" Overall Height Instead Of 4-5/8", Add	16.90	
26 05 36 00-0992 EA 18" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	406.31	163.00
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-27.04	
For 30 Degree Bend, Deduct	-128.36	
For 60 Degree Bend, Deduct	-71.58	
For 6" Overall Height Instead Of 4-5/8", Add	20.32	
26 05 36 00-0993 EA 24" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	493.89	202.49
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-32.52	
For 30 Degree Bend, Deduct	-153.54	
For 60 Degree Bend, Deduct	-85.38	
For 6" Overall Height Instead Of 4-5/8", Add	24.69	
26 05 36 00-0994 EA 30" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	579.19	234.89
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-38.35	
For 30 Degree Bend, Deduct	-181.56	
For 60 Degree Bend, Deduct	-101.11	
For 6" Overall Height Instead Of 4-5/8", Add	28.96	
26 05 36 00-0995 EA 36" Horizontal 45 Degree Elbow, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	663.16	279.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-43.02	
For 30 Degree Bend, Deduct	-201.64	
For 60 Degree Bend, Deduct	-111.66	
For 6" Overall Height Instead Of 4-5/8", Add	33.16	
26 05 36 00-0996 45 Degree, 36" Radius Horizontal Elbows (26 05 36 00-0955)		
26 05 36 00-0997 EA 6" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	304.74	94.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-22.59	
For 30 Degree Bend, Deduct	-112.43	
For 60 Degree Bend, Deduct	-64.30	
For 6" Overall Height Instead Of 4-5/8", Add	15.24	
26 05 36 00-0998 EA 9" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	341.75	114.94
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-24.60	
For 30 Degree Bend, Deduct	-120.92	
For 60 Degree Bend, Deduct	-68.72	
For 6" Overall Height Instead Of 4-5/8", Add	17.09	
26 05 36 00-0999 EA 12" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	375.67	133.40
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-26.45	
For 30 Degree Bend, Deduct	-128.80	
For 60 Degree Bend, Deduct	-72.84	
For 6" Overall Height Instead Of 4-5/8", Add	18.78	
26 05 36 00-1000 EA 18" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	456.84	172.66
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-31.29	
For 30 Degree Bend, Deduct	-150.51	
For 60 Degree Bend, Deduct	-84.55	
For 6" Overall Height Instead Of 4-5/8", Add	22.84	
26 05 36 00-1001 EA 24" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	568.74	217.29
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-38.76	
For 30 Degree Bend, Deduct	-186.04	
For 60 Degree Bend, Deduct	-104.38	
For 6" Overall Height Instead Of 4-5/8", Add	28.44	
26 05 36 00-1002 EA 30" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	644.23	255.08
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-43.16	
For 30 Degree Bend, Deduct	-205.52	
For 60 Degree Bend, Deduct	-114.81	
For 6" Overall Height Instead Of 4-5/8", Add	32.21	
26 05 36 00-1003 EA 36" Horizontal 45 Degree Elbow, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	755.62	308.76
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-49.83	
For 30 Degree Bend, Deduct	-235.46	
For 60 Degree Bend, Deduct	-130.99	
For 6" Overall Height Instead Of 4-5/8", Add	37.78	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1004			90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-0955)</small>		
26 05 36 00-1005	EA		6" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....368.75	368.75	122.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.69	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	18.44	
26 05 36 00-1006	EA		9" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....406.77	406.77	139.65
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.04	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	20.34	
26 05 36 00-1007	EA		12" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....434.26	434.26	154.44
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.56	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.71	
26 05 36 00-1008	EA		18" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....498.42	498.42	189.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.07	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	24.92	
26 05 36 00-1009	EA		24" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....554.14	554.14	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.30	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	27.71	
26 05 36 00-1010	EA		30" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....608.53	608.53	244.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.47	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.43	
26 05 36 00-1011	EA		36" Vertical Riser 90 Degree, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....672.23	672.23	279.16
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.96	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.61	
26 05 36 00-1012			90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-0955)</small>		
26 05 36 00-1013	EA		6" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....391.03	391.03	127.54
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.47	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	19.55	
26 05 36 00-1014	EA		9" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....430.50	430.50	146.73
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.82	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.53	
26 05 36 00-1015	EA		12" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....462.18	462.18	163.00
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.63	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.11	
26 05 36 00-1016	EA		18" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....538.36	538.36	202.49
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-36.97	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.92	
26 05 36 00-1017	EA		24" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....604.35	604.35	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-40.86	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.22	
26 05 36 00-1018	EA		30" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....669.26	669.26	266.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.71	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.46	
26 05 36 00-1019	EA		36" Vertical Riser 90 Degree, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray .....754.58	754.58	308.76
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.73	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	37.73	
26 05 36 00-1020			90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-0955)</small>		
26 05 36 00-1021	EA		6" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....498.08	498.08	133.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.70	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	24.90	
26 05 36 00-1022	EA		9" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....539.23	539.23	154.44
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.06	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.96	
26 05 36 00-1023	EA		12" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....587.76	587.76	172.66
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.38	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	29.39	
26 05 36 00-1024	EA		18" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....674.10	674.10	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-49.30	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.71	
26 05 36 00-1025	EA		24" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....749.07	749.07	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-53.65	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	37.45	
26 05 36 00-1026	EA		30" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....837.01	837.01	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-59.25	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	41.85	
26 05 36 00-1027	EA		36" Vertical Riser 90 Degree, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray .....937.51	937.51	344.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.02	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	46.88	
26 05 36 00-1028			12" Radius Horizontal Tees <small>(26 05 36 00-0955)</small>		
26 05 36 00-1029	EA		6" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....582.32	582.32	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.66	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	29.12	
26 05 36 00-1030	EA		9" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....628.59	628.59	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.60	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	31.43	
26 05 36 00-1031	EA		12" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray .....650.87	650.87	266.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.87	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	32.54	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1032 EA 18" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	736.35	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-49.18	
For 6" Overall Height Instead Of 4-5/8", Add	36.82	
26 05 36 00-1033 EA 24" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	815.24	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-54.38	
For 6" Overall Height Instead Of 4-5/8", Add	40.76	
26 05 36 00-1034 EA 30" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	891.78	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-60.39	
For 6" Overall Height Instead Of 4-5/8", Add	44.59	
26 05 36 00-1035 EA 36" Horizontal Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,030.47	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-70.46	
For 6" Overall Height Instead Of 4-5/8", Add	51.52	
26 05 36 00-1036 24" Radius Horizontal Tees (26 05 36 00-0955)		
26 05 36 00-1037 EA 6" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	750.63	255.08
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-53.80	
For 6" Overall Height Instead Of 4-5/8", Add	37.53	
26 05 36 00-1038 EA 9" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	810.24	279.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-57.72	
For 6" Overall Height Instead Of 4-5/8", Add	40.51	
26 05 36 00-1039 EA 12" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	842.75	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-59.82	
For 6" Overall Height Instead Of 4-5/8", Add	42.14	
26 05 36 00-1040 EA 18" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	927.90	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-65.64	
For 6" Overall Height Instead Of 4-5/8", Add	46.40	
26 05 36 00-1041 EA 24" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,030.75	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-72.51	
For 6" Overall Height Instead Of 4-5/8", Add	51.54	
26 05 36 00-1042 EA 30" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,111.84	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-78.59	
For 6" Overall Height Instead Of 4-5/8", Add	55.59	
26 05 36 00-1043 EA 36" Horizontal Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,457.08	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-108.06	
For 6" Overall Height Instead Of 4-5/8", Add	72.85	
26 05 36 00-1044 36" Radius Horizontal Tees (26 05 36 00-0955)		
26 05 36 00-1045 EA 6" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	926.03	279.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-69.30	
For 6" Overall Height Instead Of 4-5/8", Add	46.30	
26 05 36 00-1046 EA 9" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	987.20	308.76
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-72.99	
For 6" Overall Height Instead Of 4-5/8", Add	49.36	
26 05 36 00-1047 EA 12" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,059.34	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-78.79	
For 6" Overall Height Instead Of 4-5/8", Add	52.97	
26 05 36 00-1048 EA 18" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,155.93	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-85.02	
For 6" Overall Height Instead Of 4-5/8", Add	57.80	
26 05 36 00-1049 EA 24" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,298.80	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-94.98	
For 6" Overall Height Instead Of 4-5/8", Add	64.94	
26 05 36 00-1050 EA 30" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,513.41	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-113.69	
For 6" Overall Height Instead Of 4-5/8", Add	75.67	
26 05 36 00-1051 EA 36" Horizontal Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,733.61	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-128.93	
For 6" Overall Height Instead Of 4-5/8", Add	86.68	
26 05 36 00-1052 12" Radius Vertical Tees (26 05 36 00-0955)		
26 05 36 00-1053 EA 6" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	790.94	217.29
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-60.98	
For 6" Overall Height Instead Of 4-5/8", Add	39.55	
26 05 36 00-1054 EA 9" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	817.72	225.84
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-62.95	
For 6" Overall Height Instead Of 4-5/8", Add	40.89	
26 05 36 00-1055 EA 12" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	835.80	234.89
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-64.01	
For 6" Overall Height Instead Of 4-5/8", Add	41.79	
26 05 36 00-1056 EA 18" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	878.94	255.08
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-66.64	
For 6" Overall Height Instead Of 4-5/8", Add	43.95	
26 05 36 00-1057 EA 24" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	935.66	266.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-71.35	
For 6" Overall Height Instead Of 4-5/8", Add	46.78	
26 05 36 00-1058 EA 30" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	989.83	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-74.53	
For 6" Overall Height Instead Of 4-5/8", Add	49.49	
26 05 36 00-1059 EA 36" Vertical Tee, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,059.34	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-78.79	
For 6" Overall Height Instead Of 4-5/8", Add	52.97	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**
 MINOR
 CSI UOM DESCRIPTION

 TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1060			24" Radius Vertical Tees (26 05 36 00-0955)		
26 05 36 00-1061	EA		6" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,117.46	234.89
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-92.18	
			For 6" Overall Height Instead Of 4-5/8", Add	55.87	
26 05 36 00-1062	EA		9" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,143.01	244.56
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-93.92	
			For 6" Overall Height Instead Of 4-5/8", Add	57.15	
26 05 36 00-1063	EA		12" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,169.98	255.08
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-95.74	
			For 6" Overall Height Instead Of 4-5/8", Add	58.50	
26 05 36 00-1064	EA		18" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,232.72	279.65
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-99.97	
			For 6" Overall Height Instead Of 4-5/8", Add	61.64	
26 05 36 00-1065	EA		24" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,274.62	293.47
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-103.07	
			For 6" Overall Height Instead Of 4-5/8", Add	63.73	
26 05 36 00-1066	EA		30" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,347.25	325.75
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-107.58	
			For 6" Overall Height Instead Of 4-5/8", Add	67.36	
26 05 36 00-1067	EA		36" Vertical Tee, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,487.65	366.83
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-118.20	
			For 6" Overall Height Instead Of 4-5/8", Add	74.38	
26 05 36 00-1068			36" Radius Vertical Tees (26 05 36 00-0955)		
26 05 36 00-1069	EA		6" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,806.36	255.08
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-159.38	
			For 6" Overall Height Instead Of 4-5/8", Add	90.32	
26 05 36 00-1070	EA		9" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,843.45	266.56
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-162.13	
			For 6" Overall Height Instead Of 4-5/8", Add	92.17	
26 05 36 00-1071	EA		12" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,883.05	279.65
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-165.01	
			For 6" Overall Height Instead Of 4-5/8", Add	94.15	
26 05 36 00-1072	EA		18" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,949.66	308.76
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-169.23	
			For 6" Overall Height Instead Of 4-5/8", Add	97.48	
26 05 36 00-1073	EA		24" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,995.93	325.75
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-172.44	
			For 6" Overall Height Instead Of 4-5/8", Add	99.80	
26 05 36 00-1074	EA		30" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	2,118.14	366.83
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-181.24	
			For 6" Overall Height Instead Of 4-5/8", Add	105.91	
26 05 36 00-1075	EA		36" Vertical Tee, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray	2,222.61	418.81
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-187.36	
			For 6" Overall Height Instead Of 4-5/8", Add	111.13	
26 05 36 00-1076			12" Radius Horizontal Crosses (26 05 36 00-0955)		
26 05 36 00-1077	EA		6" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	755.12	293.47
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-51.06	
			For 6" Overall Height Instead Of 4-5/8", Add	37.76	
26 05 36 00-1078	EA		9" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	808.82	308.76
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-55.15	
			For 6" Overall Height Instead Of 4-5/8", Add	40.44	
26 05 36 00-1079	EA		12" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	840.28	325.75
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-56.88	
			For 6" Overall Height Instead Of 4-5/8", Add	42.01	
26 05 36 00-1080	EA		18" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	935.59	345.44
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-64.77	
			For 6" Overall Height Instead Of 4-5/8", Add	46.78	
26 05 36 00-1081	EA		24" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	1,024.22	391.05
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-69.83	
			For 6" Overall Height Instead Of 4-5/8", Add	51.21	
26 05 36 00-1082	EA		30" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	1,136.06	418.81
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-78.71	
			For 6" Overall Height Instead Of 4-5/8", Add	56.80	
26 05 36 00-1083	EA		36" Horizontal Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray	1,300.61	451.82
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-92.41	
			For 6" Overall Height Instead Of 4-5/8", Add	65.03	
26 05 36 00-1084			24" Radius Horizontal Crosses (26 05 36 00-0955)		
26 05 36 00-1085	EA		6" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,053.08	325.75
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-78.16	
			For 6" Overall Height Instead Of 4-5/8", Add	52.65	
26 05 36 00-1086	EA		9" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,101.45	345.44
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-81.36	
			For 6" Overall Height Instead Of 4-5/8", Add	55.07	
26 05 36 00-1087	EA		12" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray	1,152.80	366.83
			For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-84.71	
			For 6" Overall Height Instead Of 4-5/8", Add	57.64	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1088 EA 18" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,221.37	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-89.55	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	61.07	
26 05 36 00-1089 EA 24" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,372.58	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-99.61	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	68.63	
26 05 36 00-1090 EA 30" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,478.65	489.12
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.11	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	73.93	
26 05 36 00-1091 EA 36" Horizontal Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,636.60	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-119.23	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	81.83	
26 05 36 00-1092 36" Radius Horizontal Crosses <small>(26 05 36 00-0955)</small>		
26 05 36 00-1093 EA 6" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,212.26	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-90.66	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	60.61	
26 05 36 00-1094 EA 9" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,277.70	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-95.18	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	63.89	
26 05 36 00-1095 EA 12" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,361.39	418.81
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-101.24	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	68.07	
26 05 36 00-1096 EA 18" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,460.21	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-108.37	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	73.01	
26 05 36 00-1097 EA 24" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,764.91	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-132.06	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	88.25	
26 05 36 00-1098 EA 30" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,946.80	585.96
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-145.85	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	97.34	
26 05 36 00-1099 EA 36" Horizontal Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,167.55	652.73
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-162.36	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	108.38	
26 05 36 00-1100 12" Radius Vertical Crosses <small>(26 05 36 00-0955)</small>		
26 05 36 00-1101 EA 6" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	755.12	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-51.06	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	37.76	
26 05 36 00-1102 EA 9" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	808.99	308.88
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-55.16	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	40.45	
26 05 36 00-1103 EA 12" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	840.18	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.87	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	42.01	
26 05 36 00-1104 EA 18" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	935.81	345.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-64.79	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	46.79	
26 05 36 00-1105 EA 24" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,024.22	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-69.83	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	51.21	
26 05 36 00-1106 EA 30" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,136.38	418.93
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-78.73	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	56.82	
26 05 36 00-1107 EA 36" Vertical Cross, 6" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,299.69	451.21
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-92.37	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	64.98	
26 05 36 00-1108 24" Radius Vertical Crosses <small>(26 05 36 00-0955)</small>		
26 05 36 00-1109 EA 6" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,053.08	325.75
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-78.16	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	52.65	
26 05 36 00-1110 EA 9" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,101.45	345.44
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-81.36	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	55.07	
26 05 36 00-1111 EA 12" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,152.80	366.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-84.71	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	57.64	
26 05 36 00-1112 EA 18" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,221.37	391.05
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-89.55	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	61.07	
26 05 36 00-1113 EA 24" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,372.58	451.82
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-99.61	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	68.63	
26 05 36 00-1114 EA 30" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,478.65	489.12
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-107.11	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	73.93	
26 05 36 00-1115 EA 36" Vertical Cross, 6" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,636.60	533.14
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-119.23	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	81.83	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**
 MINOR
 CSI UOM DESCRIPTION

 TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

26 05 36 00-1116 36" Radius Vertical Crosses (26 05 36 00-0955)			
26 05 36 00-1117	EA 6" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,482.64	366.83
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-117.69	
	For 6" Overall Height Instead Of 4-5/8", Add	74.13	
26 05 36 00-1118	EA 9" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,559.35	391.05
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-123.34	
	For 6" Overall Height Instead Of 4-5/8", Add	77.97	
26 05 36 00-1119	EA 12" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,659.94	418.81
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-131.10	
	For 6" Overall Height Instead Of 4-5/8", Add	83.00	
26 05 36 00-1120	EA 18" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,778.47	451.82
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-140.20	
	For 6" Overall Height Instead Of 4-5/8", Add	88.92	
26 05 36 00-1121	EA 24" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,159.22	533.14
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-171.49	
	For 6" Overall Height Instead Of 4-5/8", Add	107.96	
26 05 36 00-1122	EA 30" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,383.36	585.96
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-189.50	
	For 6" Overall Height Instead Of 4-5/8", Add	119.17	
26 05 36 00-1123	EA 36" Vertical Cross, 6" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	2,653.40	652.73
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-210.95	
	For 6" Overall Height Instead Of 4-5/8", Add	132.67	
26 05 36 00-1124 9" Rung Tray Fittings (26 05 36 00-0744)			
26 05 36 00-1125 90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1124)			
26 05 36 00-1126	EA 6" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	307.36	122.65
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-20.52	
	For 6" Overall Height Instead Of 4-5/8", Add	15.37	
26 05 36 00-1127	EA 9" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	338.44	139.65
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-22.20	
	For 6" Overall Height Instead Of 4-5/8", Add	16.92	
26 05 36 00-1128	EA 12" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	382.50	154.44
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-25.38	
	For 6" Overall Height Instead Of 4-5/8", Add	19.13	
26 05 36 00-1129	EA 18" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	456.31	189.28
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-29.86	
	For 6" Overall Height Instead Of 4-5/8", Add	22.82	
26 05 36 00-1130	EA 24" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	536.93	217.29
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-35.58	
	For 6" Overall Height Instead Of 4-5/8", Add	26.85	
26 05 36 00-1131	EA 30" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	592.75	244.56
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-38.90	
	For 6" Overall Height Instead Of 4-5/8", Add	29.64	
26 05 36 00-1132	EA 36" Horizontal 90 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	690.14	279.53
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-45.72	
	For 6" Overall Height Instead Of 4-5/8", Add	34.51	
26 05 36 00-1133 90 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1124)			
26 05 36 00-1134	EA 6" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	395.14	127.54
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-28.88	
	For 6" Overall Height Instead Of 4-5/8", Add	19.76	
26 05 36 00-1135	EA 9" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	434.75	146.61
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-31.26	
	For 6" Overall Height Instead Of 4-5/8", Add	21.74	
26 05 36 00-1136	EA 12" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	471.24	163.00
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-33.54	
	For 6" Overall Height Instead Of 4-5/8", Add	23.56	
26 05 36 00-1137	EA 18" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	553.87	202.49
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-38.52	
	For 6" Overall Height Instead Of 4-5/8", Add	27.69	
26 05 36 00-1138	EA 24" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	628.74	234.89
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-43.30	
	For 6" Overall Height Instead Of 4-5/8", Add	31.44	
26 05 36 00-1139	EA 30" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	703.81	266.56
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-48.16	
	For 6" Overall Height Instead Of 4-5/8", Add	35.19	
26 05 36 00-1140	EA 36" Horizontal 90 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	806.73	308.76
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-54.94	
	For 6" Overall Height Instead Of 4-5/8", Add	40.34	
26 05 36 00-1141 90 Degree, 36" Radius Horizontal Elbows (26 05 36 00-1124)			
26 05 36 00-1142	EA 6" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	422.98	133.28
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-31.19	
	For 6" Overall Height Instead Of 4-5/8", Add	21.15	
26 05 36 00-1143	EA 9" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	463.12	154.32
	For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-33.46	
	For 6" Overall Height Instead Of 4-5/8", Add	23.16	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1144	EA		12" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	517.34	172.66
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.34	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.97	
26 05 36 00-1145	EA		18" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	620.38	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-43.93	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	31.02	
26 05 36 00-1146	EA		24" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	717.25	255.08
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-50.47	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	35.86	
26 05 36 00-1147	EA		30" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	809.89	293.47
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-56.53	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	40.49	
26 05 36 00-1148	EA		36" Horizontal 90 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	942.33	344.83
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-65.50	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	47.12	
26 05 36 00-1149			45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-1124)</small>		
26 05 36 00-1150	EA		6" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	215.90	88.89
			<i>For 30 Degree Bend, Deduct</i>	-66.91	
			<i>For 60 Degree Bend, Deduct</i>	-37.18	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-14.19	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	10.80	
26 05 36 00-1151	EA		9" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	248.04	106.62
			<i>For 30 Degree Bend, Deduct</i>	-74.25	
			<i>For 60 Degree Bend, Deduct</i>	-41.00	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-15.92	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	12.40	
26 05 36 00-1152	EA		12" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	276.82	122.28
			<i>For 30 Degree Bend, Deduct</i>	-80.92	
			<i>For 60 Degree Bend, Deduct</i>	-44.48	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-17.49	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	13.84	
26 05 36 00-1153	EA		18" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	343.59	154.56
			<i>For 30 Degree Bend, Deduct</i>	-98.84	
			<i>For 60 Degree Bend, Deduct</i>	-54.15	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.48	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	17.18	
26 05 36 00-1154	EA		24" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	422.40	189.28
			<i>For 30 Degree Bend, Deduct</i>	-121.90	
			<i>For 60 Degree Bend, Deduct</i>	-66.83	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.47	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.12	
26 05 36 00-1155	EA		30" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	484.77	217.29
			<i>For 30 Degree Bend, Deduct</i>	-139.85	
			<i>For 60 Degree Bend, Deduct</i>	-76.67	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.37	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	24.24	
26 05 36 00-1156	EA		36" Horizontal 45 Degree Elbow, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	552.96	255.08
			<i>For 30 Degree Bend, Deduct</i>	-155.32	
			<i>For 60 Degree Bend, Deduct</i>	-84.69	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.04	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	27.65	
26 05 36 00-1157			45 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-1124)</small>		
26 05 36 00-1158	EA		6" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	244.05	91.71
			<i>For 30 Degree Bend, Deduct</i>	-80.76	
			<i>For 60 Degree Bend, Deduct</i>	-45.40	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-16.77	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	12.20	
26 05 36 00-1159	EA		9" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	285.97	110.54
			<i>For 30 Degree Bend, Deduct</i>	-92.79	
			<i>For 60 Degree Bend, Deduct</i>	-51.99	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-19.38	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	14.30	
26 05 36 00-1160	EA		12" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	317.06	127.66
			<i>For 30 Degree Bend, Deduct</i>	-99.92	
			<i>For 60 Degree Bend, Deduct</i>	-55.70	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.07	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	15.85	
26 05 36 00-1161	EA		18" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	383.88	163.00
			<i>For 30 Degree Bend, Deduct</i>	-116.03	
			<i>For 60 Degree Bend, Deduct</i>	-64.18	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.80	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	19.19	
26 05 36 00-1162	EA		24" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	467.81	202.49
			<i>For 30 Degree Bend, Deduct</i>	-139.20	
			<i>For 60 Degree Bend, Deduct</i>	-76.77	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.91	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.39	
26 05 36 00-1163	EA		30" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	547.89	234.89
			<i>For 30 Degree Bend, Deduct</i>	-164.34	
			<i>For 60 Degree Bend, Deduct</i>	-90.78	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.22	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	27.39	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1164	EA		36" Horizontal 45 Degree Elbow, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	630.30	279.65
			<i>For 30 Degree Bend, Deduct</i>	-183.57	
			<i>For 60 Degree Bend, Deduct</i>	-100.82	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.73	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	31.52	
26 05 36 00-1165			45 Degree, 36" Radius Horizontal Elbows (26 05 36 00-1124)		
26 05 36 00-1166	EA		6" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	280.23	94.65
			<i>For 30 Degree Bend, Deduct</i>	-98.95	
			<i>For 60 Degree Bend, Deduct</i>	-56.21	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.14	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	14.01	
26 05 36 00-1167	EA		9" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	316.72	114.94
			<i>For 30 Degree Bend, Deduct</i>	-107.16	
			<i>For 60 Degree Bend, Deduct</i>	-60.46	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-22.10	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	15.84	
26 05 36 00-1168	EA		12" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	350.12	133.40
			<i>For 30 Degree Bend, Deduct</i>	-114.75	
			<i>For 60 Degree Bend, Deduct</i>	-64.40	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.90	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	17.51	
26 05 36 00-1169	EA		18" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	428.68	172.66
			<i>For 30 Degree Bend, Deduct</i>	-135.03	
			<i>For 60 Degree Bend, Deduct</i>	-75.26	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.48	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.43	
26 05 36 00-1170	EA		24" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	534.32	217.29
			<i>For 30 Degree Bend, Deduct</i>	-167.11	
			<i>For 60 Degree Bend, Deduct</i>	-93.02	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.32	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.72	
26 05 36 00-1171	EA		30" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	607.72	255.08
			<i>For 30 Degree Bend, Deduct</i>	-185.44	
			<i>For 60 Degree Bend, Deduct</i>	-102.76	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-39.51	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.39	
26 05 36 00-1172	EA		36" Horizontal 45 Degree Elbow, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	715.46	308.76
			<i>For 30 Degree Bend, Deduct</i>	-213.38	
			<i>For 60 Degree Bend, Deduct</i>	-117.73	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-45.81	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	35.77	
26 05 36 00-1173			90 Degree, 12" Radius Vertical Risers (26 05 36 00-1124)		
26 05 36 00-1174	EA		6" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	347.23	122.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.53	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	17.36	
26 05 36 00-1175	EA		9" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	384.08	139.65
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.77	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	19.20	
26 05 36 00-1176	EA		12" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	411.19	154.44
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.25	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	20.56	
26 05 36 00-1177	EA		18" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	474.56	189.28
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-31.68	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.73	
26 05 36 00-1178	EA		24" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	529.10	217.29
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.80	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.46	
26 05 36 00-1179	EA		30" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	582.32	244.56
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.85	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	29.12	
26 05 36 00-1180	EA		36" Vertical Riser 90 Degree, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray	645.23	279.16
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.26	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	32.26	
26 05 36 00-1181			90 Degree, 24" Radius Vertical Risers (26 05 36 00-1124)		
26 05 36 00-1182	EA		6" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray	367.76	127.54
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-26.15	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	18.39	
26 05 36 00-1183	EA		9" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray	406.25	146.73
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-28.40	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	20.31	
26 05 36 00-1184	EA		12" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray	437.34	163.00
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-30.15	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.87	
26 05 36 00-1185	EA		18" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray	512.15	202.49
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.34	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.61	
26 05 36 00-1186	EA		24" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray	576.58	234.89
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.09	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	28.83	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1187 EA 30" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	639.92 -41.78 32.00	266.56
26 05 36 00-1188 EA 36" Vertical Riser 90 Degree, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	723.28 -46.60 36.16	308.76
26 05 36 00-1189 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-1124)</small>		
26 05 36 00-1190 EA 6" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	462.10 -35.10 23.11	133.28
26 05 36 00-1191 EA 9" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	502.46 -37.38 25.12	154.44
26 05 36 00-1192 EA 12" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	548.64 -40.47 27.43	172.66
26 05 36 00-1193 EA 18" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	633.42 -45.23 31.67	217.29
26 05 36 00-1194 EA 24" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	706.82 -49.42 35.34	255.08
26 05 36 00-1195 EA 30" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	791.63 -54.71 39.58	293.47
26 05 36 00-1196 EA 36" Vertical Riser 90 Degree, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	890.17 -60.29 44.51	344.83
26 05 36 00-1197 12" Radius Horizontal Tees <small>(26 05 36 00-1124)</small>		
26 05 36 00-1198 EA 6" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	550.50 -35.48 27.53	234.89
26 05 36 00-1199 EA 9" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	594.68 -38.21 29.73	255.08
26 05 36 00-1200 EA 12" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	616.45 -39.43 30.82	266.56
26 05 36 00-1201 EA 18" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	695.14 -45.06 34.76	293.47
26 05 36 00-1202 EA 24" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	769.87 -49.64 38.49	325.75
26 05 36 00-1203 EA 30" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	839.10 -55.13 41.96	345.44
26 05 36 00-1204 EA 36" Horizontal Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	967.36 -64.15 48.37	391.05
26 05 36 00-1205 24" Radius Horizontal Tees <small>(26 05 36 00-1124)</small>		
26 05 36 00-1206 EA 6" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	696.39 -48.38 34.82	255.08
26 05 36 00-1207 EA 9" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	752.87 -51.99 37.64	279.65
26 05 36 00-1208 EA 12" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	783.81 -53.93 39.19	293.47
26 05 36 00-1209 EA 18" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	863.75 -59.23 43.19	325.75
26 05 36 00-1210 EA 24" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	960.86 -65.52 48.04	366.83
26 05 36 00-1211 EA 30" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,035.17 -70.93 51.76	391.05
26 05 36 00-1212 EA 36" Horizontal Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,339.72 -96.32 66.99	451.82
26 05 36 00-1213 36" Radius Horizontal Tees <small>(26 05 36 00-1124)</small>		
26 05 36 00-1214 EA 6" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	849.36 -61.64 42.47	279.65

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1215	EA 9" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	908.44 -65.11 45.42	308.76
26 05 36 00-1216	EA 12" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	973.28 -70.18 48.66	325.75
26 05 36 00-1217	EA 18" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,065.17 -75.95 53.26	366.83
26 05 36 00-1218	EA 24" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,198.65 -84.97 59.93	418.81
26 05 36 00-1219	EA 30" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,386.67 -101.02 69.33	451.82
26 05 36 00-1220	EA 36" Horizontal Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,592.79 -114.85 79.64	533.14
26 05 36 00-1221	12" Radius Vertical Tees (26 05 36 00-1124)		
26 05 36 00-1222	EA 6" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	719.48 -53.84 35.97	217.29
26 05 36 00-1223	EA 9" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	744.18 -55.59 37.21	225.84
26 05 36 00-1224	EA 12" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	761.74 -56.60 38.09	234.89
26 05 36 00-1225	EA 18" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	803.31 -59.07 40.17	255.08
26 05 36 00-1226	EA 24" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	853.77 -63.16 42.69	266.56
26 05 36 00-1227	EA 30" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	906.38 -66.18 45.32	293.47
26 05 36 00-1228	EA 36" Vertical Tee, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	973.28 -70.18 48.66	325.75
26 05 36 00-1229	24" Radius Vertical Tees (26 05 36 00-1124)		
26 05 36 00-1230	EA 6" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	996.45 -80.07 49.82	234.89
26 05 36 00-1231	EA 9" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,020.44 -81.66 51.02	244.56
26 05 36 00-1232	EA 12" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,045.85 -83.33 52.29	255.08
26 05 36 00-1233	EA 18" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,104.93 -87.19 55.25	279.65
26 05 36 00-1234	EA 24" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,143.70 -89.91 57.19	293.47
26 05 36 00-1235	EA 30" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,213.21 -94.17 60.66	325.75
26 05 36 00-1236	EA 36" Vertical Tee, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,341.61 -103.59 67.08	366.83
26 05 36 00-1237	36" Radius Vertical Tees (26 05 36 00-1124)		
26 05 36 00-1238	EA 6" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,576.16 -136.36 78.81	255.08
26 05 36 00-1239	EA 9" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,610.26 -138.81 80.51	266.56
26 05 36 00-1240	EA 12" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,646.88 -141.39 82.34	279.65
26 05 36 00-1241	EA 18" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,710.50 -145.32 85.53	308.76
26 05 36 00-1242	EA 24" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,753.77 -148.23 87.69	325.75

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1243 EA 30" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,867.02	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-156.13	
For 6" Overall Height Instead Of 4-5/8", Add	93.35	
26 05 36 00-1244 EA 36" Vertical Tee, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,968.50	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-161.95	
For 6" Overall Height Instead Of 4-5/8", Add	98.43	
26 05 36 00-1245 12" Radius Horizontal Crosses (26 05 36 00-1124)		
26 05 36 00-1246 EA 6" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	710.79	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-46.62	
For 6" Overall Height Instead Of 4-5/8", Add	35.54	
26 05 36 00-1247 EA 9" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	759.79	308.76
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-50.25	
For 6" Overall Height Instead Of 4-5/8", Add	37.99	
26 05 36 00-1248 EA 12" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	790.73	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-51.92	
For 6" Overall Height Instead Of 4-5/8", Add	39.54	
26 05 36 00-1249 EA 18" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	875.61	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-58.78	
For 6" Overall Height Instead Of 4-5/8", Add	43.78	
26 05 36 00-1250 EA 24" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	962.15	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-63.62	
For 6" Overall Height Instead Of 4-5/8", Add	48.11	
26 05 36 00-1251 EA 30" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,063.04	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-71.41	
For 6" Overall Height Instead Of 4-5/8", Add	53.15	
26 05 36 00-1252 EA 36" Horizontal Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,209.33	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-83.29	
For 6" Overall Height Instead Of 4-5/8", Add	60.47	
26 05 36 00-1253 24" Radius Horizontal Crosses (26 05 36 00-1124)		
26 05 36 00-1254 EA 6" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	968.07	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-69.66	
For 6" Overall Height Instead Of 4-5/8", Add	48.40	
26 05 36 00-1255 EA 9" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,013.82	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-72.60	
For 6" Overall Height Instead Of 4-5/8", Add	50.69	
26 05 36 00-1256 EA 12" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,062.56	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-75.69	
For 6" Overall Height Instead Of 4-5/8", Add	53.13	
26 05 36 00-1257 EA 18" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,126.45	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-80.05	
For 6" Overall Height Instead Of 4-5/8", Add	56.32	
26 05 36 00-1258 EA 24" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,269.31	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-89.28	
For 6" Overall Height Instead Of 4-5/8", Add	63.47	
26 05 36 00-1259 EA 30" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,368.07	489.12
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-96.05	
For 6" Overall Height Instead Of 4-5/8", Add	68.40	
26 05 36 00-1260 EA 36" Horizontal Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,511.94	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-106.76	
For 6" Overall Height Instead Of 4-5/8", Add	75.60	
26 05 36 00-1261 36" Radius Horizontal Crosses (26 05 36 00-1124)		
26 05 36 00-1262 EA 6" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,112.11	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-80.64	
For 6" Overall Height Instead Of 4-5/8", Add	55.61	
26 05 36 00-1263 EA 9" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,173.39	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-84.75	
For 6" Overall Height Instead Of 4-5/8", Add	58.67	
26 05 36 00-1264 EA 12" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,250.81	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-90.18	
For 6" Overall Height Instead Of 4-5/8", Add	62.54	
26 05 36 00-1265 EA 18" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,342.33	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-96.59	
For 6" Overall Height Instead Of 4-5/8", Add	67.12	
26 05 36 00-1266 EA 24" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,618.87	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-117.45	
For 6" Overall Height Instead Of 4-5/8", Add	80.94	
26 05 36 00-1267 EA 30" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,785.11	585.96
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-129.68	
For 6" Overall Height Instead Of 4-5/8", Add	89.26	
26 05 36 00-1268 EA 36" Horizontal Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,987.61	652.73
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-144.37	
For 6" Overall Height Instead Of 4-5/8", Add	99.38	
26 05 36 00-1269 12" Radius Vertical Crosses (26 05 36 00-1124)		
26 05 36 00-1270 EA 6" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	710.79	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-46.62	
For 6" Overall Height Instead Of 4-5/8", Add	35.54	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1271	EA 9" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	759.79 -50.25 37.99	308.76
26 05 36 00-1272	EA 12" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	790.73 -51.92 39.54	325.75
26 05 36 00-1273	EA 18" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	875.61 -58.78 43.78	345.44
26 05 36 00-1274	EA 24" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	962.15 -63.62 48.11	391.05
26 05 36 00-1275	EA 30" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,063.04 -71.41 53.15	418.81
26 05 36 00-1276	EA 36" Vertical Cross, 9" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,207.49 -83.19 60.37	450.60
26 05 36 00-1277	24" Radius Vertical Crosses (26 05 36 00-1124)		
26 05 36 00-1278	EA 6" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	968.07 -69.66 48.40	325.75
26 05 36 00-1279	EA 9" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,013.82 -72.60 50.69	345.44
26 05 36 00-1280	EA 12" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,062.56 -75.69 53.13	366.83
26 05 36 00-1281	EA 18" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,126.45 -80.05 56.32	391.05
26 05 36 00-1282	EA 24" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,269.31 -89.28 63.47	451.82
26 05 36 00-1283	EA 30" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,368.07 -96.05 68.40	489.12
26 05 36 00-1284	EA 36" Vertical Cross, 9" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,511.94 -106.76 75.60	533.14
26 05 36 00-1285	36" Radius Vertical Crosses (26 05 36 00-1124)		
26 05 36 00-1286	EA 6" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,337.44 -103.17 66.87	366.83
26 05 36 00-1287	EA 9" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,408.10 -108.22 70.41	391.05
26 05 36 00-1288	EA 12" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,499.60 -115.06 74.98	418.81
26 05 36 00-1289	EA 18" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,607.55 -123.11 80.38	451.82
26 05 36 00-1290	EA 24" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,947.46 -150.31 97.37	533.14
26 05 36 00-1291	EA 30" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,148.91 -166.06 107.45	585.96
26 05 36 00-1292	EA 36" Vertical Cross, 9" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	2,392.48 -184.85 119.62	652.73
26 05 36 00-1293	12" Rung Tray Fittings (26 05 36 00-0744)		
26 05 36 00-1294	90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1293)		
26 05 36 00-1295	EA 6" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	300.15 -19.80 15.01	122.65
26 05 36 00-1296	EA 9" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	331.05 -21.46 16.55	139.65
26 05 36 00-1297	EA 12" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	373.74 -24.51 18.69	154.44
26 05 36 00-1298	EA 18" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	446.45 -28.87 22.32	189.28



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1299 EA 24" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	524.70	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.36	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.24	
26 05 36 00-1300 EA 30" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	579.79	244.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.60	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	28.99	
26 05 36 00-1301 EA 36" Horizontal 90 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	674.44	279.53
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.15	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	33.72	
26 05 36 00-1302 90 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-1293)</small>		
26 05 36 00-1303 EA 6" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	382.36	127.54
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-27.61	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	19.12	
26 05 36 00-1304 EA 9" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	421.42	146.61
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.92	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	21.07	
26 05 36 00-1305 EA 12" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	457.28	163.00
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.14	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	22.86	
26 05 36 00-1306 EA 18" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	538.72	202.49
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-37.00	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.94	
26 05 36 00-1307 EA 24" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	612.13	234.89
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-41.64	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.61	
26 05 36 00-1308 EA 30" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	685.65	266.56
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-46.35	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	34.28	
26 05 36 00-1309 EA 36" Horizontal 90 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	786.29	308.76
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-52.90	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	39.31	
26 05 36 00-1310 90 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1293)</small>		
26 05 36 00-1311 EA 6" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	408.92	133.28
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.78	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	20.45	
26 05 36 00-1312 EA 9" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	448.70	154.32
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-32.02	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	22.44	
26 05 36 00-1313 EA 12" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	501.28	172.66
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-35.74	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	25.06	
26 05 36 00-1314 EA 18" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	602.31	217.29
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-42.12	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.12	
26 05 36 00-1315 EA 24" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	696.81	255.08
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-48.42	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	34.84	
26 05 36 00-1316 EA 30" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	787.44	293.47
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-54.29	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	39.37	
26 05 36 00-1317 EA 36" Horizontal 90 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	916.59	344.83
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-62.93	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	45.83	
26 05 36 00-1318 45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-1293)</small>		
26 05 36 00-1319 EA 6" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	211.16	88.89
<i>For 30 Degree Bend, Deduct</i>	-64.30	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-13.71	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	10.56	
<i>For 60 Degree Bend, Deduct</i>	-35.62	
26 05 36 00-1320 EA 9" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	243.11	106.62
<i>For 30 Degree Bend, Deduct</i>	-71.54	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-15.43	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	12.16	
<i>For 60 Degree Bend, Deduct</i>	-39.37	
26 05 36 00-1321 EA 12" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	271.71	122.28
<i>For 30 Degree Bend, Deduct</i>	-78.11	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-16.98	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	13.59	
<i>For 60 Degree Bend, Deduct</i>	-42.79	
26 05 36 00-1322 EA 18" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	337.57	154.56
<i>For 30 Degree Bend, Deduct</i>	-95.53	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.88	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	16.88	
<i>For 60 Degree Bend, Deduct</i>	-52.17	
26 05 36 00-1323 EA 24" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	414.92	189.28
<i>For 30 Degree Bend, Deduct</i>	-117.79	
<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-25.72	
<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	20.75	
<i>For 60 Degree Bend, Deduct</i>	-64.36	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1324	EA		30" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	476.19	217.29
			<i>For 30 Degree Bend, Deduct</i>	-135.13	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.51	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	23.81	
			<i>For 60 Degree Bend, Deduct</i>	-73.84	
26 05 36 00-1325	EA		36" Horizontal 45 Degree Elbow, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	544.01	255.08
			<i>For 30 Degree Bend, Deduct</i>	-150.40	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-33.14	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	27.20	
			<i>For 60 Degree Bend, Deduct</i>	-81.73	
26 05 36 00-1326			45 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-1293)</small>		
26 05 36 00-1327	EA		6" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	237.66	91.71
			<i>For 30 Degree Bend, Deduct</i>	-77.24	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-16.13	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	11.88	
			<i>For 60 Degree Bend, Deduct</i>	-43.29	
26 05 36 00-1328	EA		9" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	278.85	110.54
			<i>For 30 Degree Bend, Deduct</i>	-88.88	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-18.67	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	13.94	
			<i>For 60 Degree Bend, Deduct</i>	-49.64	
26 05 36 00-1329	EA		12" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	309.75	127.66
			<i>For 30 Degree Bend, Deduct</i>	-95.90	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-20.34	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	15.49	
			<i>For 60 Degree Bend, Deduct</i>	-53.29	
26 05 36 00-1330	EA		18" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	376.03	163.00
			<i>For 30 Degree Bend, Deduct</i>	-111.71	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-24.02	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	18.80	
			<i>For 60 Degree Bend, Deduct</i>	-61.59	
26 05 36 00-1331	EA		24" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	458.69	202.49
			<i>For 30 Degree Bend, Deduct</i>	-134.18	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-29.00	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	22.93	
			<i>For 60 Degree Bend, Deduct</i>	-73.76	
26 05 36 00-1332	EA		30" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	536.94	234.89
			<i>For 30 Degree Bend, Deduct</i>	-158.32	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.12	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.85	
			<i>For 60 Degree Bend, Deduct</i>	-87.16	
26 05 36 00-1333	EA		36" Horizontal 45 Degree Elbow, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	618.80	279.65
			<i>For 30 Degree Bend, Deduct</i>	-177.24	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.58	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	30.94	
			<i>For 60 Degree Bend, Deduct</i>	-97.02	
26 05 36 00-1334			45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1293)</small>		
26 05 36 00-1335	EA		6" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	271.65	94.65
			<i>For 30 Degree Bend, Deduct</i>	-94.23	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-19.28	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	13.58	
			<i>For 60 Degree Bend, Deduct</i>	-53.38	
26 05 36 00-1336	EA		9" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	307.96	114.94
			<i>For 30 Degree Bend, Deduct</i>	-102.34	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-21.22	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	15.40	
			<i>For 60 Degree Bend, Deduct</i>	-57.57	
26 05 36 00-1337	EA		12" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	341.17	133.40
			<i>For 30 Degree Bend, Deduct</i>	-109.83	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-23.00	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	17.06	
			<i>For 60 Degree Bend, Deduct</i>	-61.45	
26 05 36 00-1338	EA		18" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	418.82	172.66
			<i>For 30 Degree Bend, Deduct</i>	-129.60	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-27.49	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	20.94	
			<i>For 60 Degree Bend, Deduct</i>	-72.01	
26 05 36 00-1339	EA		24" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	522.27	217.29
			<i>For 30 Degree Bend, Deduct</i>	-160.48	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-34.12	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	26.11	
			<i>For 60 Degree Bend, Deduct</i>	-89.04	
26 05 36 00-1340	EA		30" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	594.94	255.08
			<i>For 30 Degree Bend, Deduct</i>	-178.41	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-38.24	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	29.75	
			<i>For 60 Degree Bend, Deduct</i>	-98.54	
26 05 36 00-1341	EA		36" Horizontal 45 Degree Elbow, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	701.40	308.76
			<i>For 30 Degree Bend, Deduct</i>	-205.64	
			<i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i>	-44.41	
			<i>For 6" Overall Height Instead Of 4-5/8", Add</i>	35.07	
			<i>For 60 Degree Bend, Deduct</i>	-113.09	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1342 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-1293)</small>		
26 05 36 00-1343 EA 6" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	332.89 -23.10 16.64	122.28
26 05 36 00-1344 EA 9" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	368.95 -25.25 18.45	139.65
26 05 36 00-1345 EA 12" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	395.80 -26.71 19.79	154.44
26 05 36 00-1346 EA 18" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	458.65 -30.09 22.93	189.28
26 05 36 00-1347 EA 24" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	512.41 -33.13 25.62	217.29
26 05 36 00-1348 EA 30" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	564.85 -36.11 28.24	244.56
26 05 36 00-1349 EA 36" Vertical Riser 90 Degree, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	627.24 -39.46 31.36	279.16
26 05 36 00-1350 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-1293)</small>		
26 05 36 00-1351 EA 6" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	352.24 -24.59 17.61	127.54
26 05 36 00-1352 EA 9" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	390.08 -26.78 19.50	146.73
26 05 36 00-1353 EA 12" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	420.78 -28.49 21.04	163.00
26 05 36 00-1354 EA 18" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	494.68 -32.60 24.73	202.49
26 05 36 00-1355 EA 24" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	558.06 -36.24 27.90	234.89
26 05 36 00-1356 EA 30" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	620.36 -39.82 31.02	266.56
26 05 36 00-1357 EA 36" Vertical Riser 90 Degree, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	702.42 -44.51 35.12	308.76
26 05 36 00-1358 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-1293)</small>		
26 05 36 00-1359 EA 6" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	438.10 -32.70 21.91	133.28
26 05 36 00-1360 EA 9" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	477.95 -34.93 23.90	154.44
26 05 36 00-1361 EA 12" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	522.56 -37.86 26.13	172.66
26 05 36 00-1362 EA 18" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	606.30 -42.52 30.32	217.29
26 05 36 00-1363 EA 24" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	678.66 -46.61 33.93	255.08
26 05 36 00-1364 EA 30" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	761.38 -51.68 38.07	293.47
26 05 36 00-1365 EA 36" Vertical Riser 90 Degree, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	858.62 -57.13 42.93	344.83
26 05 36 00-1366 12" Radius Horizontal Tees <small>(26 05 36 00-1293)</small>		
26 05 36 00-1367 EA 6" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	534.59 -33.89 26.73	234.89
26 05 36 00-1368 EA 9" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	577.73 -36.51 28.89	255.08
26 05 36 00-1369 EA 12" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	599.24 -37.71 29.96	266.56

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1370	EA 18" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	674.54 -43.00 33.73	293.47
26 05 36 00-1371	EA 24" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	747.18 -47.57 37.36	325.75
26 05 36 00-1372	EA 30" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	812.76 -52.49 40.64	345.44
26 05 36 00-1373	EA 36" Horizontal Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	935.81 -60.99 46.79	391.05
26 05 36 00-1374	24" Radius Horizontal Tees <small>(26 05 36 00-1293)</small>		
26 05 36 00-1375	EA 6" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	669.27 -45.67 33.46	255.08
26 05 36 00-1376	EA 9" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	724.18 -49.12 36.21	279.65
26 05 36 00-1377	EA 12" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	754.34 -50.98 37.72	293.47
26 05 36 00-1378	EA 18" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	831.67 -56.02 41.58	325.75
26 05 36 00-1379	EA 24" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	925.91 -62.02 46.30	366.83
26 05 36 00-1380	EA 30" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	996.83 -67.09 49.84	391.05
26 05 36 00-1381	EA 36" Horizontal Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,281.05 -90.46 64.05	451.82
26 05 36 00-1382	36" Radius Horizontal Tees <small>(26 05 36 00-1293)</small>		
26 05 36 00-1383	EA 6" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	811.02 -57.80 40.55	279.65
26 05 36 00-1384	EA 9" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	869.06 -61.17 43.45	308.76
26 05 36 00-1385	EA 12" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	930.25 -65.88 46.51	325.75
26 05 36 00-1386	EA 18" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,019.79 -71.41 50.99	366.83
26 05 36 00-1387	EA 24" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,148.58 -79.96 57.43	418.81
26 05 36 00-1388	EA 30" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,323.29 -94.68 66.16	451.82
26 05 36 00-1389	EA 36" Horizontal Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,522.38 -107.81 76.12	533.14
26 05 36 00-1390	12" Radius Vertical Tees <small>(26 05 36 00-1293)</small>		
26 05 36 00-1391	EA 6" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	683.75 -50.27 34.19	217.29
26 05 36 00-1392	EA 9" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	707.41 -51.92 35.37	225.84
26 05 36 00-1393	EA 12" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	724.71 -52.90 36.24	234.89
26 05 36 00-1394	EA 18" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	765.50 -55.29 38.28	255.08
26 05 36 00-1395	EA 24" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	812.82 -59.07 40.64	266.56
26 05 36 00-1396	EA 30" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	864.66 -62.01 43.23	293.47
26 05 36 00-1397	EA 36" Vertical Tee, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	930.25 -65.88 46.51	325.75

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1398 24" Radius Vertical Tees <small>(26 05 36 00-1293)</small>		
26 05 36 00-1399 EA 6" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	935.95	234.89
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-74.02	
For 6" Overall Height Instead Of 4-5/8", Add	46.80	
26 05 36 00-1400 EA 9" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	959.16	244.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-75.54	
For 6" Overall Height Instead Of 4-5/8", Add	47.96	
26 05 36 00-1401 EA 12" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	983.78	255.08
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-77.12	
For 6" Overall Height Instead Of 4-5/8", Add	49.19	
26 05 36 00-1402 EA 18" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,041.04	279.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-80.80	
For 6" Overall Height Instead Of 4-5/8", Add	52.05	
26 05 36 00-1403 EA 24" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,078.24	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-83.37	
For 6" Overall Height Instead Of 4-5/8", Add	53.91	
26 05 36 00-1404 EA 30" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,146.18	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-87.47	
For 6" Overall Height Instead Of 4-5/8", Add	57.31	
26 05 36 00-1405 EA 36" Vertical Tee, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,268.59	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-96.29	
For 6" Overall Height Instead Of 4-5/8", Add	63.43	
26 05 36 00-1406 36" Radius Vertical Tees <small>(26 05 36 00-1293)</small>		
26 05 36 00-1407 EA 6" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,461.06	255.08
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-124.85	
For 6" Overall Height Instead Of 4-5/8", Add	73.05	
26 05 36 00-1408 EA 9" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,493.67	266.56
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-127.15	
For 6" Overall Height Instead Of 4-5/8", Add	74.68	
26 05 36 00-1409 EA 12" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,528.79	279.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-129.58	
For 6" Overall Height Instead Of 4-5/8", Add	76.44	
26 05 36 00-1410 EA 18" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,590.91	308.76
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-133.36	
For 6" Overall Height Instead Of 4-5/8", Add	79.55	
26 05 36 00-1411 EA 24" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,632.69	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-136.12	
For 6" Overall Height Instead Of 4-5/8", Add	81.63	
26 05 36 00-1412 EA 30" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,741.46	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-143.58	
For 6" Overall Height Instead Of 4-5/8", Add	87.07	
26 05 36 00-1413 EA 36" Vertical Tee, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray.....	1,841.45	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-149.25	
For 6" Overall Height Instead Of 4-5/8", Add	92.07	
26 05 36 00-1414 12" Radius Horizontal Crosses <small>(26 05 36 00-1293)</small>		
26 05 36 00-1415 EA 6" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	688.62	293.47
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-44.41	
For 6" Overall Height Instead Of 4-5/8", Add	34.43	
26 05 36 00-1416 EA 9" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	735.28	308.76
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-47.80	
For 6" Overall Height Instead Of 4-5/8", Add	36.76	
26 05 36 00-1417 EA 12" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	765.95	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-49.45	
For 6" Overall Height Instead Of 4-5/8", Add	38.30	
26 05 36 00-1418 EA 18" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	845.62	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-55.78	
For 6" Overall Height Instead Of 4-5/8", Add	42.28	
26 05 36 00-1419 EA 24" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	931.11	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-60.52	
For 6" Overall Height Instead Of 4-5/8", Add	46.56	
26 05 36 00-1420 EA 30" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,026.53	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-67.76	
For 6" Overall Height Instead Of 4-5/8", Add	51.33	
26 05 36 00-1421 EA 36" Horizontal Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray.....	1,163.69	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-78.72	
For 6" Overall Height Instead Of 4-5/8", Add	58.18	
26 05 36 00-1422 24" Radius Horizontal Crosses <small>(26 05 36 00-1293)</small>		
26 05 36 00-1423 EA 6" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	925.56	325.75
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-65.41	
For 6" Overall Height Instead Of 4-5/8", Add	46.28	
26 05 36 00-1424 EA 9" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	970.01	345.44
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-68.22	
For 6" Overall Height Instead Of 4-5/8", Add	48.50	
26 05 36 00-1425 EA 12" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray.....	1,017.45	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-71.18	
For 6" Overall Height Instead Of 4-5/8", Add	50.87	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 05 36 00-1426	EA	18" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,078.98 -75.31 53.95		391.05
26 05 36 00-1427	EA	24" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,217.68 -84.12 60.88		451.82
26 05 36 00-1428	EA	30" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,312.78 -90.52 65.64		489.12
26 05 36 00-1429	EA	36" Horizontal Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,449.62 -100.53 72.48		533.14
26 05 36 00-1430 36" Radius Horizontal Crosses (26 05 36 00-1293)					
26 05 36 00-1431	EA	6" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,062.04 -75.63 53.10		366.83
26 05 36 00-1432	EA	9" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,121.23 -79.53 56.06		391.05
26 05 36 00-1433	EA	12" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,195.52 -84.66 59.78		418.81
26 05 36 00-1434	EA	18" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,283.39 -90.69 64.17		451.82
26 05 36 00-1435	EA	24" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,545.85 -110.15 77.29		533.14
26 05 36 00-1436	EA	30" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,704.27 -121.59 85.21		585.96
26 05 36 00-1437	EA	36" Horizontal Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,897.64 -135.37 94.88		652.73
26 05 36 00-1438 12" Radius Vertical Crosses (26 05 36 00-1293)					
26 05 36 00-1439	EA	6" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	688.62 -44.41 34.43		293.47
26 05 36 00-1440	EA	9" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	735.45 -47.80 36.77		308.88
26 05 36 00-1441	EA	12" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	765.85 -49.44 38.29		325.75
26 05 36 00-1442	EA	18" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	845.84 -55.79 42.29		345.56
26 05 36 00-1443	EA	24" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	931.11 -60.52 46.56		391.05
26 05 36 00-1444	EA	30" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,026.85 -67.77 51.34		418.93
26 05 36 00-1445	EA	36" Vertical Cross, 12" Rung Spacing, 12" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,162.77 -78.68 58.14		451.21
26 05 36 00-1446 24" Radius Vertical Crosses (26 05 36 00-1293)					
26 05 36 00-1447	EA	6" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	925.56 -65.41 46.28		325.75
26 05 36 00-1448	EA	9" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	970.01 -68.22 48.50		345.44
26 05 36 00-1449	EA	12" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,017.45 -71.18 50.87		366.83
26 05 36 00-1450	EA	18" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,078.98 -75.31 53.95		391.05
26 05 36 00-1451	EA	24" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,217.68 -84.12 60.88		451.82
26 05 36 00-1452	EA	30" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,312.78 -90.52 65.64		489.12
26 05 36 00-1453	EA	36" Vertical Cross, 12" Rung Spacing, 24" Radius, Aluminum Cable Tray..... <i>For 3-5/8" Overall Height Instead Of 4-5/8", Deduct</i> <i>For 6" Overall Height Instead Of 4-5/8", Add</i>	1,449.62 -100.53 72.48		533.14

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1454 36" Radius Vertical Crosses <small>(26 05 36 00-1293)</small>		
26 05 36 00-1455 EA 6" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,264.83	366.83
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-95.91	
For 6" Overall Height Instead Of 4-5/8", Add	63.24	
26 05 36 00-1456 EA 9" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,332.47	391.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-100.66	
For 6" Overall Height Instead Of 4-5/8", Add	66.62	
26 05 36 00-1457 EA 12" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,419.44	418.81
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-107.05	
For 6" Overall Height Instead Of 4-5/8", Add	70.97	
26 05 36 00-1458 EA 18" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,522.09	451.82
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-114.56	
For 6" Overall Height Instead Of 4-5/8", Add	76.10	
26 05 36 00-1459 EA 24" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	1,841.58	533.14
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-139.73	
For 6" Overall Height Instead Of 4-5/8", Add	92.08	
26 05 36 00-1460 EA 30" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	2,031.69	585.96
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-154.34	
For 6" Overall Height Instead Of 4-5/8", Add	101.58	
26 05 36 00-1461 EA 36" Vertical Cross, 12" Rung Spacing, 36" Radius, Aluminum Cable Tray	2,262.03	652.73
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-171.81	
For 6" Overall Height Instead Of 4-5/8", Add	113.10	
26 05 36 00-1462 Dropout Or End Plates And Reducers <small>(26 05 36 00-0744)</small>		
26 05 36 00-1463 Straight Reducers <small>(26 05 36 00-1462)</small>		
26 05 36 00-1464 EA 9" To 6" Reducer, Aluminum Cable Tray	267.79	90.24
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-19.26	
For 6" Overall Height Instead Of 4-5/8", Add	13.39	
26 05 36 00-1465 EA 12" To 9" Reducer, Aluminum Cable Tray	282.83	97.70
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-20.14	
For 6" Overall Height Instead Of 4-5/8", Add	14.14	
26 05 36 00-1466 EA 18" To 12" Reducer, Aluminum Cable Tray	310.57	112.74
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-21.66	
For 6" Overall Height Instead Of 4-5/8", Add	15.53	
26 05 36 00-1467 EA 24" To 18" Reducer, Aluminum Cable Tray	342.61	130.48
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-23.39	
For 6" Overall Height Instead Of 4-5/8", Add	17.13	
26 05 36 00-1468 EA 30" To 24" Reducer, Aluminum Cable Tray	372.35	146.73
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-25.01	
For 6" Overall Height Instead Of 4-5/8", Add	18.62	
26 05 36 00-1469 EA 36" To 30" Reducer, Aluminum Cable Tray	415.04	167.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-27.53	
For 6" Overall Height Instead Of 4-5/8", Add	20.75	
26 05 36 00-1470 Reducers <small>(26 05 36 00-1462)</small>		
26 05 36 00-1471 EA 18" To 6" Reducer, Aluminum Cable Tray	310.69	112.87
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-21.66	
For 6" Overall Height Instead Of 4-5/8", Add	15.53	
26 05 36 00-1472 EA 24" To 12" Reducer, Aluminum Cable Tray	342.92	130.60
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-23.41	
For 6" Overall Height Instead Of 4-5/8", Add	17.15	
26 05 36 00-1473 EA 30" To 12" Reducer, Aluminum Cable Tray	372.16	146.61
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-25.00	
For 6" Overall Height Instead Of 4-5/8", Add	18.61	
26 05 36 00-1474 EA 30" To 18" Reducer, Aluminum Cable Tray	374.56	146.49
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-25.25	
For 6" Overall Height Instead Of 4-5/8", Add	18.73	
26 05 36 00-1475 EA 36" To 12" Reducer, Aluminum Cable Tray	412.43	167.65
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-27.27	
For 6" Overall Height Instead Of 4-5/8", Add	20.62	
26 05 36 00-1476 EA 36" To 18" Reducer, Aluminum Cable Tray	422.38	172.05
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-27.90	
For 6" Overall Height Instead Of 4-5/8", Add	21.12	
26 05 36 00-1477 EA 36" To 24" Reducer, Aluminum Cable Tray	436.76	177.55
For 3-5/8" Overall Height Instead Of 4-5/8", Deduct	-28.88	
For 6" Overall Height Instead Of 4-5/8", Add	21.84	
26 05 36 00-1478 Dropout Or End Plate <small>(26 05 36 00-1462)</small>		
26 05 36 00-1479 EA 6" Dropout Or End Plate, Aluminum Cable Tray	76.66	36.68
26 05 36 00-1480 EA 9" Dropout Or End Plate, Aluminum Cable Tray	86.38	41.94
26 05 36 00-1481 EA 12" Dropout Or End Plate, Aluminum Cable Tray	93.19	45.12
26 05 36 00-1482 EA 18" Dropout Or End Plate, Aluminum Cable Tray	113.01	53.32
26 05 36 00-1483 EA 24" Dropout Or End Plate, Aluminum Cable Tray	126.12	58.70
26 05 36 00-1484 EA 30" Dropout Or End Plate, Aluminum Cable Tray	142.35	65.17
26 05 36 00-1485 EA 36" Dropout Or End Plate, Aluminum Cable Tray	159.70	73.37

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 36 00-1486	Solid Bottom Cable Tray (26 05 36 00-0001) Note: 3-5/8" Height.		
26 05 36 00-1487	Solid Bottom Galvanized Steel Straight Tray Sections (26 05 36 00-1486)		
26 05 36 00-1488	LF 6" Solid Bottom Steel Cable Tray, Straight Section	32.21	9.54
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	3.23	
26 05 36 00-1489	LF 12" Solid Bottom Steel Cable Tray, Straight Section	40.15	11.74
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	4.07	
26 05 36 00-1490	LF 18" Solid Bottom Steel Cable Tray, Straight Section	53.45	16.88
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	5.20	
26 05 36 00-1491	LF 24" Solid Bottom Steel Cable Tray, Straight Section	61.85	19.32
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	6.05	
26 05 36 00-1492	LF 30" Solid Bottom Steel Cable Tray, Straight Section	74.12	23.35
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	7.22	
26 05 36 00-1493	LF 36" Solid Bottom Steel Cable Tray, Straight Section	94.95	26.78
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	9.78	
26 05 36 00-1494	Solid Bottom Galvanized Steel Cable Tray Fittings (26 05 36 00-1486)		
26 05 36 00-1495	90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1494)		
26 05 36 00-1496	EA 6" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	326.74	122.40
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	28.62	
26 05 36 00-1497	EA 12" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	424.58	172.17
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	34.98	
26 05 36 00-1498	EA 18" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	519.38	217.29
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	41.69	
26 05 36 00-1499	EA 24" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	636.55	266.93
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	50.98	
26 05 36 00-1500	EA 30" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	743.92	309.37
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	60.04	
26 05 36 00-1501	EA 36" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	836.03	345.44
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	67.83	
26 05 36 00-1502	90 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1494)		
26 05 36 00-1503	EA 6" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	386.82	127.42
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	36.78	
26 05 36 00-1504	EA 12" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	509.85	183.54
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	45.88	
26 05 36 00-1505	EA 18" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	627.20	234.89
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	54.94	
26 05 36 00-1506	EA 24" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	764.19	293.47
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	65.72	
26 05 36 00-1507	EA 30" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	896.35	344.83
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	76.99	
26 05 36 00-1508	EA 36" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	1,012.84	391.05
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	86.75	
26 05 36 00-1509	90 Degree, 36" Radius Horizontal Elbows (26 05 36 00-1494)		
26 05 36 00-1510	EA 6" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray	477.27	133.16
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	49.41	
26 05 36 00-1511	EA 12" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray	613.95	196.01
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	59.43	
26 05 36 00-1512	EA 18" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray	776.97	255.44
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	73.97	
26 05 36 00-1513	EA 24" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray	923.66	325.75
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	84.25	
26 05 36 00-1514	EA 30" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray	1,108.62	391.05
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	101.11	
26 05 36 00-1515	EA 36" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray	1,264.41	450.60
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	114.55	
26 05 36 00-1516	45 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1494)		
26 05 36 00-1517	EA 6" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	296.17	122.40
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	24.02	
26 05 36 00-1518	EA 12" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	390.19	172.17
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	29.82	
26 05 36 00-1519	EA 18" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	479.66	217.05
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	35.77	
26 05 36 00-1520	EA 24" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	588.01	266.56
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	43.77	
26 05 36 00-1521	EA 30" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	686.82	309.37
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	51.47	
26 05 36 00-1522	EA 36" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Steel Cable Tray	769.87	344.83
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	58.02	
26 05 36 00-1523	45 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1494)		
26 05 36 00-1524	EA 6" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray	343.37	127.54
	For 4-5/8" Overall Height Instead Of 3-5/8", Add	30.25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1525 EA 12" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	458.59 38.22	183.42
26 05 36 00-1526 EA 18" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	568.75 46.12	235.15
26 05 36 00-1527 EA 24" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	695.42 55.40	293.47
26 05 36 00-1528 EA 30" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	817.00 64.98	345.44
26 05 36 00-1529 EA 36" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	922.58 73.21	391.05
26 05 36 00-1530 45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1494)</small>		
26 05 36 00-1531 EA 6" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	413.74 39.84	133.28
26 05 36 00-1532 EA 12" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	511.73 47.14	177.67
26 05 36 00-1533 EA 18" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	689.16 60.80	255.44
26 05 36 00-1534 EA 24" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	829.46 70.02	326.37
26 05 36 00-1535 EA 30" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	994.42 83.98	391.05
26 05 36 00-1536 EA 36" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Steel Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,137.93 95.39	451.82
26 05 36 00-1537 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-1494)</small>		
26 05 36 00-1538 EA 6" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	353.22 32.64	122.04
26 05 36 00-1539 EA 12" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	444.22 37.93	172.17
26 05 36 00-1540 EA 18" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	521.84 42.06	217.29
26 05 36 00-1541 EA 24" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	631.64 50.25	266.93
26 05 36 00-1542 EA 30" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	714.45 55.62	309.37
26 05 36 00-1543 EA 36" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	780.92 59.68	344.83
26 05 36 00-1544 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-1494)</small>		
26 05 36 00-1545 EA 6" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	423.66 42.31	127.42
26 05 36 00-1546 EA 12" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	536.86 49.93	183.54
26 05 36 00-1547 EA 18" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	641.93 57.15	234.89
26 05 36 00-1548 EA 24" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	761.73 65.35	293.47
26 05 36 00-1549 EA 30" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	861.97 71.83	344.83
26 05 36 00-1550 EA 36" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	966.18 79.75	391.05
26 05 36 00-1551 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-1494)</small>		
26 05 36 00-1552 EA 6" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	509.20 54.20	133.16
26 05 36 00-1553 EA 12" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	618.52 63.10	178.04
26 05 36 00-1554 EA 18" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	776.97 73.97	255.44
26 05 36 00-1555 EA 24" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	928.57 84.99	325.75
26 05 36 00-1556 EA 30" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,071.78 95.59	391.05
26 05 36 00-1557 EA 36" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,207.92 106.08	450.60
26 05 36 00-1558 12" Radius Horizontal Tees <small>(26 05 36 00-1494)</small>		
26 05 36 00-1559 EA 6" Horizontal Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	563.34 45.36	234.89
26 05 36 00-1560 EA 12" Horizontal Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	675.00 52.42	292.98
26 05 36 00-1561 EA 18" Horizontal Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	796.74 61.94	345.44
26 05 36 00-1562 EA 24" Horizontal Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	947.60 72.19	419.66
26 05 36 00-1563 EA 30" Horizontal Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,035.39 80.01	451.82

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1564	EA	36" Horizontal Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,212.85 93.06	533.14
26 05 36 00-1565		24" Radius Horizontal Tees <small>(26 05 36 00-1494)</small>		
26 05 36 00-1566	EA	6" Horizontal Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	692.87 61.41	255.08
26 05 36 00-1567	EA	12" Horizontal Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	854.89 73.94	325.75
26 05 36 00-1568	EA	18" Horizontal Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	998.10 84.53	391.05
26 05 36 00-1569	EA	24" Horizontal Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,284.29 111.12	489.12
26 05 36 00-1570	EA	30" Horizontal Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,399.51 121.06	533.14
26 05 36 00-1571	EA	36" Horizontal Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,640.49 137.28	652.73
26 05 36 00-1572		36" Radius Horizontal Tees <small>(26 05 36 00-1494)</small>		
26 05 36 00-1573	EA	6" Horizontal Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	885.97 86.30	279.65
26 05 36 00-1574	EA	12" Horizontal Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,080.49 100.93	366.83
26 05 36 00-1575	EA	18" Horizontal Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,263.80 114.28	451.82
26 05 36 00-1576	EA	24" Horizontal Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,544.41 142.80	533.14
26 05 36 00-1577	EA	30" Horizontal Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,692.04 155.83	587.92
26 05 36 00-1578	EA	36" Horizontal Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,959.59 171.66	733.68
26 05 36 00-1579		12" Radius Vertical Tees <small>(26 05 36 00-1494)</small>		
26 05 36 00-1580	EA	6" Vertical Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	673.86 61.94	234.89
26 05 36 00-1581	EA	12" Vertical Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	783.84 68.66	293.47
26 05 36 00-1582	EA	18" Vertical Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	842.61 72.09	325.75
26 05 36 00-1583	EA	24" Vertical Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	903.72 78.10	344.83
26 05 36 00-1584	EA	30" Vertical Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,003.02 85.27	391.05
26 05 36 00-1585	EA	36" Vertical Tee, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,116.44 92.17	451.82
26 05 36 00-1586		24" Radius Vertical Tees <small>(26 05 36 00-1494)</small>		
26 05 36 00-1587	EA	6" Vertical Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	842.69 83.89	255.08
26 05 36 00-1588	EA	12" Vertical Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	980.15 92.72	325.75
26 05 36 00-1589	EA	18" Vertical Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,070.67 99.46	366.83
26 05 36 00-1590	EA	24" Vertical Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,133.18 104.80	391.05
26 05 36 00-1591	EA	30" Vertical Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,280.99 116.85	451.82
26 05 36 00-1592	EA	36" Vertical Tee, Solid Bottom, 24" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,441.26 127.32	533.14
26 05 36 00-1593		36" Radius Vertical Tees <small>(26 05 36 00-1494)</small>		
26 05 36 00-1594	EA	6" Vertical Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,116.13 120.89	279.16
26 05 36 00-1595	EA	12" Vertical Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,274.52 130.04	366.83
26 05 36 00-1596	EA	18" Vertical Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,410.18 141.73	418.81
26 05 36 00-1597	EA	24" Vertical Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,489.75 148.17	451.82
26 05 36 00-1598	EA	30" Vertical Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,748.26 173.37	533.14
26 05 36 00-1599	EA	36" Vertical Tee, Solid Bottom, 36" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,885.39 185.14	585.96
26 05 36 00-1600		12" Radius Horizontal Crosses <small>(26 05 36 00-1494)</small>		
26 05 36 00-1601	EA	6" Horizontal Cross, Solid Bottom, 12" Radius, Steel Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	695.42 55.40	293.47



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1602 EA 12" Horizontal Cross, Solid Bottom, 12" Radius, Steel Cable Tray.....	799.20	345.44
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	62.31	
26 05 36 00-1603 EA 18" Horizontal Cross, Solid Bottom, 12" Radius, Steel Cable Tray.....	960.73	418.81
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	74.32	
26 05 36 00-1604 EA 24" Horizontal Cross, Solid Bottom, 12" Radius, Steel Cable Tray.....	1,109.92	489.12
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	84.97	
26 05 36 00-1605 EA 30" Horizontal Cross, Solid Bottom, 12" Radius, Steel Cable Tray.....	1,305.77	585.96
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	98.20	
26 05 36 00-1606 EA 36" Horizontal Cross, Solid Bottom, 12" Radius, Steel Cable Tray.....	1,448.92	652.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	108.55	
26 05 36 00-1607 24" Radius Horizontal Crosses <small>(26 05 36 00-1494)</small>		
26 05 36 00-1608 EA 6" Horizontal Cross, Solid Bottom, 24" Radius, Steel Cable Tray.....	919.72	326.37
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	83.56	
26 05 36 00-1609 EA 12" Horizontal Cross, Solid Bottom, 24" Radius, Steel Cable Tray.....	1,071.78	391.05
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	95.59	
26 05 36 00-1610 EA 18" Horizontal Cross, Solid Bottom, 24" Radius, Steel Cable Tray.....	1,284.29	489.12
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	111.12	
26 05 36 00-1611 EA 24" Horizontal Cross, Solid Bottom, 24" Radius, Steel Cable Tray.....	1,581.52	587.92
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	139.25	
26 05 36 00-1612 EA 30" Horizontal Cross, Solid Bottom, 24" Radius, Steel Cable Tray.....	1,738.73	652.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	152.02	
26 05 36 00-1613 EA 36" Horizontal Cross, Solid Bottom, 24" Radius, Steel Cable Tray.....	1,910.47	733.68
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	164.29	
26 05 36 00-1614 36" Radius Horizontal Crosses <small>(26 05 36 00-1494)</small>		
26 05 36 00-1615 EA 6" Horizontal Cross, Solid Bottom, 36" Radius, Steel Cable Tray.....	1,225.40	366.83
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	122.67	
26 05 36 00-1616 EA 12" Horizontal Cross, Solid Bottom, 36" Radius, Steel Cable Tray.....	1,428.35	451.82
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	138.96	
26 05 36 00-1617 EA 18" Horizontal Cross, Solid Bottom, 36" Radius, Steel Cable Tray.....	1,716.60	587.92
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	159.51	
26 05 36 00-1618 EA 24" Horizontal Cross, Solid Bottom, 36" Radius, Steel Cable Tray.....	1,959.77	652.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	185.18	
26 05 36 00-1619 EA 30" Horizontal Cross, Solid Bottom, 36" Radius, Steel Cable Tray.....	2,168.35	733.68
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	202.97	
26 05 36 00-1620 EA 36" Horizontal Cross, Solid Bottom, 36" Radius, Steel Cable Tray.....	2,402.84	837.50
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	220.84	
26 05 36 00-1621 Straight Reducers <small>(26 05 36 00-1494)</small>		
26 05 36 00-1622 EA 12" To 6" Reducer, Solid Bottom, Steel Cable Tray.....	283.38	97.82
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	26.20	
26 05 36 00-1623 EA 18" To 12" Reducer, Solid Bottom, Steel Cable Tray.....	307.06	110.54
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	27.63	
26 05 36 00-1624 EA 24" To 18" Reducer, Solid Bottom, Steel Cable Tray.....	340.01	127.42
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	29.77	
26 05 36 00-1625 EA 30" To 24" Reducer, Solid Bottom, Steel Cable Tray.....	382.10	146.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	32.86	
26 05 36 00-1626 EA 36" To 30" Reducer, Solid Bottom, Steel Cable Tray.....	413.70	162.76
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.93	
26 05 36 00-1627 Reducers <small>(26 05 36 00-1494)</small>		
26 05 36 00-1628 EA 18" To 6" Reducer, Solid Bottom, Steel Cable Tray.....	307.17	110.66
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	27.64	
26 05 36 00-1629 EA 24" To 12" Reducer, Solid Bottom, Steel Cable Tray.....	338.00	127.66
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	29.43	
26 05 36 00-1630 EA 30" To 12" Reducer, Solid Bottom, Steel Cable Tray.....	376.99	146.61
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	32.11	
26 05 36 00-1631 EA 30" To 18" Reducer, Solid Bottom, Steel Cable Tray.....	379.25	146.49
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	32.47	
26 05 36 00-1632 EA 36" To 12" Reducer, Solid Bottom, Steel Cable Tray.....	411.24	162.76
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.56	
26 05 36 00-1633 EA 36" To 18" Reducer, Solid Bottom, Steel Cable Tray.....	413.70	162.76
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.93	
26 05 36 00-1634 EA 36" To 24" Reducer, Solid Bottom, Steel Cable Tray.....	416.64	163.00
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	35.32	
26 05 36 00-1635 Dropout Or End Plate <small>(26 05 36 00-1494)</small>		
26 05 36 00-1636 EA 6" Dropout Or End Plate, Solid Bottom, Steel Cable Tray.....	86.19	36.68
26 05 36 00-1637 EA 12" Dropout Or End Plate, Solid Bottom, Steel Cable Tray.....	105.78	44.76
26 05 36 00-1638 EA 18" Dropout Or End Plate, Solid Bottom, Steel Cable Tray.....	121.93	53.07
26 05 36 00-1639 EA 24" Dropout Or End Plate, Solid Bottom, Steel Cable Tray.....	137.24	58.70
26 05 36 00-1640 EA 30" Dropout Or End Plate, Solid Bottom, Steel Cable Tray.....	152.81	65.17
26 05 36 00-1641 EA 36" Dropout Or End Plate, Solid Bottom, Steel Cable Tray.....	169.56	73.37
26 05 36 00-1642 Solid Bottom Aluminum Straight Cable Tray Sections <small>(26 05 36 00-1486)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1643	LF 6" Solid Bottom Aluminum Cable Tray, Straight Section..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	27.87 2.89	7.71
26 05 36 00-1644	LF 12" Solid Bottom Aluminum Cable Tray, Straight Section..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.73 3.71	9.05
26 05 36 00-1645	LF 18" Solid Bottom Aluminum Cable Tray, Straight Section..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	44.38 4.69	11.74
26 05 36 00-1646	LF 24" Solid Bottom Aluminum Cable Tray, Straight Section..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	52.74 5.76	12.96
26 05 36 00-1647	LF 30" Solid Bottom Aluminum Cable Tray, Straight Section..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	64.69 6.91	16.76
26 05 36 00-1648	LF 36" Solid Bottom Steel Aluminum Tray, Straight Section..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	76.86 8.47	18.34
26 05 36 00-1649	Solid Bottom Aluminum Cable Tray Fittings (26 05 36 00-1486)		
26 05 36 00-1650	90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1649)		
26 05 36 00-1651	EA 6" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	324.69 28.31	122.40
26 05 36 00-1652	EA 12" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	392.74 33.22	154.07
26 05 36 00-1653	EA 18" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	453.61 39.28	172.54
26 05 36 00-1654	EA 24" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	528.35 45.47	202.61
26 05 36 00-1655	EA 30" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	623.99 54.41	235.15
26 05 36 00-1656	EA 36" Horizontal 90 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	705.35 61.30	266.93
26 05 36 00-1657	90 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1649)		
26 05 36 00-1658	EA 6" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	384.13 36.38	127.42
26 05 36 00-1659	EA 12" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	475.75 44.16	163.25
26 05 36 00-1660	EA 18" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	537.77 50.10	183.42
26 05 36 00-1661	EA 24" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	648.99 61.13	217.29
26 05 36 00-1662	EA 30" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	752.87 70.47	254.71
26 05 36 00-1663	EA 36" Horizontal 90 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	866.47 81.06	293.47
26 05 36 00-1664	90 Degree, 36" Radius Horizontal Elbows (26 05 36 00-1649)		
26 05 36 00-1665	EA 6" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	476.56 49.30	133.16
26 05 36 00-1666	EA 12" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	593.77 60.25	172.90
26 05 36 00-1667	EA 18" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	688.86 70.67	196.01
26 05 36 00-1668	EA 24" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	779.59 77.85	234.53
26 05 36 00-1669	EA 30" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	905.61 89.24	279.65
26 05 36 00-1670	EA 36" Horizontal 90 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,057.10 104.36	325.26
26 05 36 00-1671	45 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1649)		
26 05 36 00-1672	EA 6" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	298.26 24.33	122.40
26 05 36 00-1673	EA 12" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	362.85 28.74	154.07
26 05 36 00-1674	EA 18" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	416.82 33.79	172.42
26 05 36 00-1675	EA 24" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	485.68 39.15	202.25
26 05 36 00-1676	EA 30" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	572.93 46.75	235.15
26 05 36 00-1677	EA 36" Horizontal 45 Degree Elbow, Solid Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	646.77 52.65	266.20
26 05 36 00-1678	45 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1649)		
26 05 36 00-1679	EA 6" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	346.51 30.72	127.54
26 05 36 00-1680	EA 12" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	430.68 37.43	163.00
26 05 36 00-1681	EA 18" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	487.32 42.47	183.78



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1682 EA 24" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	585.89 51.66	217.29
26 05 36 00-1683 EA 30" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	681.83 59.70	255.44
26 05 36 00-1684 EA 36" Horizontal 45 Degree Elbow, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	783.45 68.61	293.47
26 05 36 00-1685 45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1649)</small>		
26 05 36 00-1686 EA 6" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	420.84 40.91	133.28
26 05 36 00-1687 EA 12" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	525.99 50.14	172.54
26 05 36 00-1688 EA 18" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	609.16 58.71	196.01
26 05 36 00-1689 EA 24" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	695.08 65.07	235.15
26 05 36 00-1690 EA 30" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	808.90 74.74	279.65
26 05 36 00-1691 EA 36" Horizontal 45 Degree Elbow, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	945.71 87.46	326.37
26 05 36 00-1692 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-1649)</small>		
26 05 36 00-1693 EA 6" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	346.79 31.68	122.04
26 05 36 00-1694 EA 12" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	405.94 35.20	154.07
26 05 36 00-1695 EA 18" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	455.50 39.57	172.54
26 05 36 00-1696 EA 24" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	515.14 43.49	202.61
26 05 36 00-1697 EA 30" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	580.59 47.90	235.15
26 05 36 00-1698 EA 36" Vertical Riser 90 Degree, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	638.01 51.33	266.20
26 05 36 00-1699 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-1649)</small>		
26 05 36 00-1700 EA 6" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	416.21 41.19	127.42
26 05 36 00-1701 EA 12" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	492.73 46.71	163.25
26 05 36 00-1702 EA 18" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	543.43 50.94	183.42
26 05 36 00-1703 EA 24" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	620.68 56.88	217.29
26 05 36 00-1704 EA 30" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	698.16 62.27	254.71
26 05 36 00-1705 EA 36" Vertical Riser 90 Degree, Solid Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	791.00 69.74	293.47
26 05 36 00-1706 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-1649)</small>		
26 05 36 00-1707 EA 6" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	489.77 51.28	133.16
26 05 36 00-1708 EA 12" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	590.00 59.69	172.90
26 05 36 00-1709 EA 18" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	654.89 65.57	196.01
26 05 36 00-1710 EA 24" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	732.42 70.77	234.53
26 05 36 00-1711 EA 30" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	843.35 79.90	279.65
26 05 36 00-1712 EA 36" Vertical Riser 90 Degree, Solid Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	934.46 85.97	325.26
26 05 36 00-1713 12" Radius Horizontal Tees <small>(26 05 36 00-1649)</small>		
26 05 36 00-1714 EA 6" Horizontal Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	578.21 47.59	234.89
26 05 36 00-1715 EA 12" Horizontal Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	670.09 56.15	266.20
26 05 36 00-1716 EA 18" Horizontal Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	743.83 62.66	293.47
26 05 36 00-1717 EA 24" Horizontal Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	828.85 69.93	326.37
26 05 36 00-1718 EA 30" Horizontal Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	980.10 81.83	391.05
26 05 36 00-1719 EA 36" Horizontal Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	1,192.55 97.36	489.12

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1720			24" Radius Horizontal Tees <small>(26 05 36 00-1649)</small>		
26 05 36 00-1721	EA		6" Horizontal Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....732.71	732.71	255.08
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	67.39	
26 05 36 00-1722	EA		12" Horizontal Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....836.28	836.28	293.47
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	76.53	
26 05 36 00-1723	EA		18" Horizontal Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....935.42	935.42	325.75
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	86.02	
26 05 36 00-1724	EA		24" Horizontal Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....1,132.93	1,132.93	391.05
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	104.76	
26 05 36 00-1725	EA		30" Horizontal Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....1,362.36	1,362.36	489.12
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	122.83	
26 05 36 00-1726	EA		36" Horizontal Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....1,504.44	1,504.44	534.73
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	136.54	
26 05 36 00-1727			36" Radius Horizontal Tees <small>(26 05 36 00-1649)</small>		
26 05 36 00-1728	EA		6" Horizontal Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....965.99	965.99	279.65
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	98.30	
26 05 36 00-1729	EA		12" Horizontal Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,090.14	1,090.14	325.75
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	109.22	
26 05 36 00-1730	EA		18" Horizontal Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,243.46	1,243.46	366.83
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	125.38	
26 05 36 00-1731	EA		24" Horizontal Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,486.94	1,486.94	450.60
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	147.93	
26 05 36 00-1732	EA		30" Horizontal Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,791.10	1,791.10	587.92
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	170.69	
26 05 36 00-1733	EA		36" Horizontal Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,993.53	1,993.53	652.73
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	190.24	
26 05 36 00-1734			12" Radius Vertical Tees <small>(26 05 36 00-1649)</small>		
26 05 36 00-1735	EA		6" Vertical Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray .....657.45	657.45	234.89
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	59.48	
26 05 36 00-1736	EA		12" Vertical Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray .....716.02	716.02	266.56
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	62.97	
26 05 36 00-1737	EA		18" Vertical Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray .....748.30	748.30	279.16
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	65.72	
26 05 36 00-1738	EA		24" Vertical Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray .....790.22	790.22	292.98
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	69.70	
26 05 36 00-1739	EA		30" Vertical Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray .....871.27	871.27	325.75
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	76.39	
26 05 36 00-1740	EA		36" Vertical Tee, Solid Bottom, 12" Radius, Aluminum Cable Tray .....998.97	998.97	391.05
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	84.66	
26 05 36 00-1741			24" Radius Vertical Tees <small>(26 05 36 00-1649)</small>		
26 05 36 00-1742	EA		6" Vertical Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....817.61	817.61	255.08
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	80.12	
26 05 36 00-1743	EA		12" Vertical Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....904.20	904.20	293.47
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	86.72	
26 05 36 00-1744	EA		18" Vertical Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....958.04	958.04	308.76
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	92.24	
26 05 36 00-1745	EA		24" Vertical Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....1,024.10	1,024.10	325.75
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	99.32	
26 05 36 00-1746	EA		30" Vertical Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....1,139.69	1,139.69	366.83
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	109.81	
26 05 36 00-1747	EA		36" Vertical Tee, Solid Bottom, 24" Radius, Aluminum Cable Tray .....1,307.70	1,307.70	450.60
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	121.04	
26 05 36 00-1748			36" Radius Vertical Tees <small>(26 05 36 00-1649)</small>		
26 05 36 00-1749	EA		6" Vertical Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,078.48	1,078.48	279.16
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	115.24	
26 05 36 00-1750	EA		12" Vertical Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,177.81	1,177.81	321.84
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	123.04	
26 05 36 00-1751	EA		18" Vertical Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,253.85	1,253.85	344.83
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	130.62	
26 05 36 00-1752	EA		24" Vertical Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,309.50	1,309.50	366.83
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	135.29	
26 05 36 00-1753	EA		30" Vertical Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....1,452.64	1,452.64	418.81
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	148.10	
26 05 36 00-1754	EA		36" Vertical Tee, Solid Bottom, 36" Radius, Aluminum Cable Tray .....971.68	971.68	533.14
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	56.89	
26 05 36 00-1755			12" Radius Horizontal Crosses <small>(26 05 36 00-1649)</small>		
26 05 36 00-1756	EA		6" Horizontal Cross, Solid Bottom, 12" Radius, Aluminum Cable Tray .....682.06	682.06	266.56
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	57.88	
26 05 36 00-1757	EA		12" Horizontal Cross, Solid Bottom, 12" Radius, Aluminum Cable Tray .....757.04	757.04	293.47
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	64.64	
26 05 36 00-1758	EA		18" Horizontal Cross, Solid Bottom, 12" Radius, Aluminum Cable Tray .....880.27	880.27	344.83
			<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	74.58	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1759 EA 24" Horizontal Cross, Solid Bottom, 12" Radius, Aluminum Cable Tray.....	1,045.10	418.81
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	86.97	
26 05 36 00-1760 EA 30" Horizontal Cross, Solid Bottom, 12" Radius, Aluminum Cable Tray.....	1,143.55	450.60
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	96.42	
26 05 36 00-1761 EA 36" Horizontal Cross, Solid Bottom, 12" Radius, Aluminum Cable Tray.....	1,325.20	534.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	109.66	
26 05 36 00-1762 24" Radius Horizontal Crosses <small>(26 05 36 00-1649)</small>		
26 05 36 00-1763 EA 6" Horizontal Cross, Solid Bottom, 24" Radius, Aluminum Cable Tray.....	904.98	293.96
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	86.76	
26 05 36 00-1764 EA 12" Horizontal Cross, Solid Bottom, 24" Radius, Aluminum Cable Tray.....	1,024.10	325.75
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	99.32	
26 05 36 00-1765 EA 18" Horizontal Cross, Solid Bottom, 24" Radius, Aluminum Cable Tray.....	1,174.44	391.05
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	110.99	
26 05 36 00-1766 EA 24" Horizontal Cross, Solid Bottom, 24" Radius, Aluminum Cable Tray.....	1,449.43	490.46
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	135.68	
26 05 36 00-1767 EA 30" Horizontal Cross, Solid Bottom, 24" Radius, Aluminum Cable Tray.....	1,589.35	534.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	149.28	
26 05 36 00-1768 EA 36" Horizontal Cross, Solid Bottom, 24" Radius, Aluminum Cable Tray.....	1,814.29	652.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	163.35	
26 05 36 00-1769 36" Radius Horizontal Crosses <small>(26 05 36 00-1649)</small>		
26 05 36 00-1770 EA 6" Horizontal Cross, Solid Bottom, 36" Radius, Aluminum Cable Tray.....	1,250.51	325.75
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	133.28	
26 05 36 00-1771 EA 12" Horizontal Cross, Solid Bottom, 36" Radius, Aluminum Cable Tray.....	1,375.53	366.83
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	145.19	
26 05 36 00-1772 EA 18" Horizontal Cross, Solid Bottom, 36" Radius, Aluminum Cable Tray.....	1,601.99	451.82
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	165.00	
26 05 36 00-1773 EA 24" Horizontal Cross, Solid Bottom, 36" Radius, Aluminum Cable Tray.....	1,904.31	587.92
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	187.67	
26 05 36 00-1774 EA 30" Horizontal Cross, Solid Bottom, 36" Radius, Aluminum Cable Tray.....	2,087.86	652.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	204.39	
26 05 36 00-1775 EA 36" Horizontal Cross, Solid Bottom, 36" Radius, Aluminum Cable Tray.....	2,392.57	733.68
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	236.61	
26 05 36 00-1776 Straight Reducers <small>(26 05 36 00-1649)</small>		
26 05 36 00-1777 EA 12" To 6" Reducer, Solid Bottom, Aluminum Cable Tray.....	256.83	83.88
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	24.54	
26 05 36 00-1778 EA 18" To 12" Reducer, Solid Bottom, Aluminum Cable Tray.....	283.53	97.70
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	26.25	
26 05 36 00-1779 EA 24" To 18" Reducer, Solid Bottom, Aluminum Cable Tray.....	312.56	110.54
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	28.46	
26 05 36 00-1780 EA 30" To 24" Reducer, Solid Bottom, Aluminum Cable Tray.....	352.21	127.54
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	31.57	
26 05 36 00-1781 EA 36" To 30" Reducer, Solid Bottom, Aluminum Cable Tray.....	391.34	146.49
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.28	
26 05 36 00-1782 Reducers <small>(26 05 36 00-1649)</small>		
26 05 36 00-1783 EA 18" To 6" Reducer, Solid Bottom, Aluminum Cable Tray.....	281.73	97.70
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	25.97	
26 05 36 00-1784 EA 24" To 12" Reducer, Solid Bottom, Aluminum Cable Tray.....	311.01	110.78
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	28.19	
26 05 36 00-1785 EA 30" To 12" Reducer, Solid Bottom, Aluminum Cable Tray.....	348.29	127.42
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	31.00	
26 05 36 00-1786 EA 30" To 18" Reducer, Solid Bottom, Aluminum Cable Tray.....	350.03	127.42
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	31.27	
26 05 36 00-1787 EA 36" To 12" Reducer, Solid Bottom, Aluminum Cable Tray.....	391.34	146.49
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.28	
26 05 36 00-1788 EA 36" To 18" Reducer, Solid Bottom, Aluminum Cable Tray.....	393.22	146.49
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	34.57	
26 05 36 00-1789 EA 36" To 24" Reducer, Solid Bottom, Aluminum Cable Tray.....	397.39	146.73
<i>For 4-5/8" Overall Height Instead Of 3-5/8", Add</i>	35.15	
26 05 36 00-1790 Dropout Or End Plate <small>(26 05 36 00-1649)</small>		
26 05 36 00-1791 EA 6" Dropout Or End Plate, Solid Bottom, Aluminum Cable Tray.....	85.01	36.68
26 05 36 00-1792 EA 12" Dropout Or End Plate, Solid Bottom, Aluminum Cable Tray.....	101.57	44.76
26 05 36 00-1793 EA 18" Dropout Or End Plate, Solid Bottom, Aluminum Cable Tray.....	120.79	53.07
26 05 36 00-1794 EA 24" Dropout Or End Plate, Solid Bottom, Aluminum Cable Tray.....	133.39	58.70
26 05 36 00-1795 EA 30" Dropout Or End Plate, Solid Bottom, Aluminum Cable Tray.....	150.11	65.17
26 05 36 00-1796 EA 36" Dropout Or End Plate, Solid Bottom, Aluminum Cable Tray.....	170.39	73.37
26 05 36 00-1797 Vented Bottom Cable Tray <small>(26 05 36 00-0001)</small>		
Note: 6" Height.		
26 05 36 00-1798 Vented Bottom Galvanized Steel Cable Tray <small>(26 05 36 00-1797)</small>		
26 05 36 00-1799 LF 6" Vented Bottom Steel Cable Tray, Straight Section.....	41.31	12.84
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-3.06	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1800	LF 12" Vented Bottom Steel Cable Tray, Straight Section	48.65	14.67
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-3.65	
26 05 36 00-1801	LF 18" Vented Bottom Steel Cable Tray, Straight Section	57.31	16.88
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-4.32	
26 05 36 00-1802	LF 24" Vented Bottom Steel Cable Tray, Straight Section	65.77	19.32
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-4.96	
26 05 36 00-1803	LF 30" Vented Bottom Steel Cable Tray, Straight Section	87.04	23.35
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-6.75	
26 05 36 00-1804	LF 36" Vented Bottom Steel Cable Tray, Straight Section	102.76	29.34
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-7.83	
26 05 36 00-1805	Vented Bottom Galvanized Steel Cable Tray Fittings (26 05 36 00-1797)		
26 05 36 00-1806	90 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1805)		
26 05 36 00-1807	EA 6" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	379.91	154.56
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-25.11	
26 05 36 00-1808	EA 12" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	493.82	209.10
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-31.95	
26 05 36 00-1809	EA 18" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	611.31	266.56
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-38.91	
26 05 36 00-1810	EA 24" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	749.82	326.37
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-47.78	
26 05 36 00-1811	EA 30" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	845.94	367.58
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-53.96	
26 05 36 00-1812	EA 36" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	969.46	419.66
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-61.97	
26 05 36 00-1813	90 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1805)		
26 05 36 00-1814	EA 6" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	452.20	162.88
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-31.65	
26 05 36 00-1815	EA 12" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	584.63	225.84
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-39.64	
26 05 36 00-1816	EA 18" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	740.74	293.47
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-49.62	
26 05 36 00-1817	EA 24" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	895.04	366.83
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-58.93	
26 05 36 00-1818	EA 30" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	958.70	378.94
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-64.29	
26 05 36 00-1819	EA 36" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	1,194.91	489.12
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-78.73	
26 05 36 00-1820	90 Degree, 36" Radius Horizontal Elbows (26 05 36 00-1805)		
26 05 36 00-1821	EA 6" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	556.96	172.17
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-41.34	
26 05 36 00-1822	EA 12" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	716.94	244.93
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-51.29	
26 05 36 00-1823	EA 18" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	914.51	326.37
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-64.25	
26 05 36 00-1824	EA 24" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	1,089.09	418.81
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-74.01	
26 05 36 00-1825	EA 30" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	1,254.39	489.12
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-84.68	
26 05 36 00-1826	EA 36" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	1,466.18	585.96
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-97.78	
26 05 36 00-1827	45 Degree, 12" Radius Horizontal Elbows (26 05 36 00-1805)		
26 05 36 00-1828	EA 6" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	353.20	154.68
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-22.43	
26 05 36 00-1829	EA 12" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	461.87	209.10
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-28.76	
26 05 36 00-1830	EA 18" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	573.93	266.20
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-35.21	
26 05 36 00-1831	EA 24" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	703.56	325.75
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-43.21	
26 05 36 00-1832	EA 30" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	794.61	367.58
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-48.83	
26 05 36 00-1833	EA 36" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Steel Cable Tray	908.48	418.81
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-55.95	
26 05 36 00-1834	45 Degree, 24" Radius Horizontal Elbows (26 05 36 00-1805)		
26 05 36 00-1835	EA 6" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	412.69	163.00
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-27.68	
26 05 36 00-1836	EA 12" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	538.83	225.84
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-35.06	
26 05 36 00-1837	EA 18" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	686.16	293.96
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-44.12	
26 05 36 00-1838	EA 24" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	832.64	366.83
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-52.69	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1839 EA 30" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	954.68	419.66
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-60.49	
26 05 36 00-1840 EA 36" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Steel Cable Tray	1,111.38	489.12
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-70.38	
26 05 36 00-1841 45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1805)</small>		
26 05 36 00-1842 EA 6" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	498.12	172.54
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-35.43	
26 05 36 00-1843 EA 12" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	647.92	244.20
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-44.44	
26 05 36 00-1844 EA 18" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	832.99	326.37
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-56.10	
26 05 36 00-1845 EA 24" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	1,004.64	419.66
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-65.49	
26 05 36 00-1846 EA 30" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	1,157.77	489.12
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-75.02	
26 05 36 00-1847 EA 36" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Steel Cable Tray	1,361.62	587.92
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-87.17	
26 05 36 00-1848 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-1805)</small>		
26 05 36 00-1849 EA 6" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Steel Cable Tray	414.72	154.07
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-28.63	
26 05 36 00-1850 EA 12" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Steel Cable Tray	524.70	209.10
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-35.04	
26 05 36 00-1851 EA 18" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Steel Cable Tray	622.75	266.56
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-40.06	
26 05 36 00-1852 EA 24" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Steel Cable Tray	747.53	326.37
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-47.56	
26 05 36 00-1853 EA 30" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Steel Cable Tray	820.78	367.58
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-51.45	
26 05 36 00-1854 EA 36" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Steel Cable Tray	917.53	418.81
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-56.86	
26 05 36 00-1855 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-1805)</small>		
26 05 36 00-1856 EA 6" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Steel Cable Tray	497.95	162.88
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-36.22	
26 05 36 00-1857 EA 12" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Steel Cable Tray	616.65	225.84
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-42.84	
26 05 36 00-1858 EA 18" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Steel Cable Tray	754.46	293.47
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-50.99	
26 05 36 00-1859 EA 24" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Steel Cable Tray	885.89	366.83
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-58.02	
26 05 36 00-1860 EA 30" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Steel Cable Tray	1,006.74	418.81
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-65.78	
26 05 36 00-1861 EA 36" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Steel Cable Tray	1,137.73	489.12
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-73.01	
26 05 36 00-1862 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-1805)</small>		
26 05 36 00-1863 EA 6" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Steel Cable Tray	593.56	172.17
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-45.00	
26 05 36 00-1864 EA 12" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Steel Cable Tray	732.96	244.93
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-52.89	
26 05 36 00-1865 EA 18" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Steel Cable Tray	905.36	326.37
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-63.34	
26 05 36 00-1866 EA 24" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Steel Cable Tray	1,084.52	418.81
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-73.56	
26 05 36 00-1867 EA 30" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Steel Cable Tray	1,210.93	489.12
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-80.33	
26 05 36 00-1868 EA 36" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Steel Cable Tray	1,415.86	585.96
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-92.75	
26 05 36 00-1869 12" Radius Horizontal Tees <small>(26 05 36 00-1805)</small>		
26 05 36 00-1870 EA 6" Horizontal Tee, Vented Bottom, 12" Radius, Steel Cable Tray	674.40	293.47
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-42.98	
26 05 36 00-1871 EA 12" Horizontal Tee, Vented Bottom, 12" Radius, Steel Cable Tray	816.05	366.10
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-51.10	
26 05 36 00-1872 EA 18" Horizontal Tee, Vented Bottom, 12" Radius, Steel Cable Tray	932.86	419.66
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-58.31	
26 05 36 00-1873 EA 24" Horizontal Tee, Vented Bottom, 12" Radius, Steel Cable Tray	1,085.12	489.12
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-67.75	
26 05 36 00-1874 EA 30" Horizontal Tee, Vented Bottom, 12" Radius, Steel Cable Tray	1,197.46	533.14
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-75.31	
26 05 36 00-1875 EA 36" Horizontal Tee, Vented Bottom, 12" Radius, Steel Cable Tray	1,315.21	585.96
<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-82.69	
26 05 36 00-1876 24" Radius Horizontal Tees <small>(26 05 36 00-1805)</small>		

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1877	EA	6" Horizontal Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	849.50	325.75
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-57.80	
26 05 36 00-1878	EA	12" Horizontal Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,031.91	418.81
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-68.29	
26 05 36 00-1879	EA	18" Horizontal Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,188.05	489.12
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-78.05	
26 05 36 00-1880	EA	24" Horizontal Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,461.61	585.96
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-97.33	
26 05 36 00-1881	EA	30" Horizontal Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,614.00	652.73
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-107.01	
26 05 36 00-1882	EA	36" Horizontal Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,803.80	733.68
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-119.24	
26 05 36 00-1883		36" Radius Horizontal Tees <small>(26 05 36 00-1805)</small>		
26 05 36 00-1884	EA	6" Horizontal Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,050.59	366.83
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-74.49	
26 05 36 00-1885	EA	12" Horizontal Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,316.15	489.12
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-90.86	
26 05 36 00-1886	EA	18" Horizontal Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,526.50	587.92
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-103.66	
26 05 36 00-1887	EA	24" Horizontal Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,881.57	733.68
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-127.02	
26 05 36 00-1888	EA	30" Horizontal Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	2,099.95	841.40
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-139.88	
26 05 36 00-1889	EA	36" Horizontal Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	2,449.53	975.67
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-163.65	
26 05 36 00-1890		12" Radius Vertical Tees <small>(26 05 36 00-1805)</small>		
26 05 36 00-1891	EA	6" Vertical Tee, Vented Bottom, 12" Radius, Steel Cable Tray.....	797.92	293.47
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-55.34	
26 05 36 00-1892	EA	12" Vertical Tee, Vented Bottom, 12" Radius, Steel Cable Tray.....	924.78	366.83
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-61.91	
26 05 36 00-1893	EA	18" Vertical Tee, Vented Bottom, 12" Radius, Steel Cable Tray.....	972.05	391.05
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-64.61	
26 05 36 00-1894	EA	24" Vertical Tee, Vented Bottom, 12" Radius, Steel Cable Tray.....	1,036.48	418.81
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-68.75	
26 05 36 00-1895	EA	30" Vertical Tee, Vented Bottom, 12" Radius, Steel Cable Tray.....	1,112.08	451.82
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-73.56	
26 05 36 00-1896	EA	36" Vertical Tee, Vented Bottom, 12" Radius, Steel Cable Tray.....	1,254.65	533.14
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-81.03	
26 05 36 00-1897		24" Radius Vertical Tees <small>(26 05 36 00-1805)</small>		
26 05 36 00-1898	EA	6" Vertical Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	957.01	325.75
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-68.55	
26 05 36 00-1899	EA	12" Vertical Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,132.55	418.81
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-78.36	
26 05 36 00-1900	EA	18" Vertical Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,208.15	451.82
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-83.17	
26 05 36 00-1901	EA	24" Vertical Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,304.71	489.12
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-89.71	
26 05 36 00-1902	EA	30" Vertical Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,403.33	533.14
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-95.90	
26 05 36 00-1903	EA	36" Vertical Tee, Vented Bottom, 24" Radius, Steel Cable Tray.....	1,646.02	652.73
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-110.21	
26 05 36 00-1904		36" Radius Vertical Tees <small>(26 05 36 00-1805)</small>		
26 05 36 00-1905	EA	6" Vertical Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,268.96	366.10
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-96.39	
26 05 36 00-1906	EA	12" Vertical Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,489.99	489.12
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-108.24	
26 05 36 00-1907	EA	18" Vertical Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,586.33	533.14
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-114.20	
26 05 36 00-1908	EA	24" Vertical Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,723.22	587.92
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-123.33	
26 05 36 00-1909	EA	30" Vertical Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	1,945.68	652.73
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-140.17	
26 05 36 00-1910	EA	36" Vertical Tee, Vented Bottom, 36" Radius, Steel Cable Tray.....	2,265.11	837.50
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-156.72	
26 05 36 00-1911		12" Radius Horizontal Crosses <small>(26 05 36 00-1805)</small>		
26 05 36 00-1912	EA	6" Horizontal Cross, Vented Bottom, 12" Radius, Steel Cable Tray.....	849.29	366.83
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-54.36	
26 05 36 00-1913	EA	12" Horizontal Cross, Vented Bottom, 12" Radius, Steel Cable Tray.....	939.72	419.66
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-59.00	
26 05 36 00-1914	EA	18" Horizontal Cross, Vented Bottom, 12" Radius, Steel Cable Tray.....	1,082.83	489.12
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-67.52	
26 05 36 00-1915	EA	24" Horizontal Cross, Vented Bottom, 12" Radius, Steel Cable Tray.....	1,258.02	585.96
		<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-76.97	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1916 EA 30" Horizontal Cross, Vented Bottom, 12" Radius, Steel Cable Tray	1,399.71	650.41
For 4-5/8" Overall Height Instead Of 6", Deduct	-85.77	
26 05 36 00-1917 EA 36" Horizontal Cross, Vented Bottom, 12" Radius, Steel Cable Tray	1,577.34	733.68
For 4-5/8" Overall Height Instead Of 6", Deduct	-96.59	
26 05 36 00-1918 24" Radius Horizontal Crosses (26 05 36 00-1805)		
26 05 36 00-1919 EA 6" Horizontal Cross, Vented Bottom, 24" Radius, Steel Cable Tray	1,072.39	419.66
For 4-5/8" Overall Height Instead Of 6", Deduct	-72.26	
26 05 36 00-1920 EA 12" Horizontal Cross, Vented Bottom, 24" Radius, Steel Cable Tray	1,206.35	489.12
For 4-5/8" Overall Height Instead Of 6", Deduct	-79.88	
26 05 36 00-1921 EA 18" Horizontal Cross, Vented Bottom, 24" Radius, Steel Cable Tray	1,406.71	585.96
For 4-5/8" Overall Height Instead Of 6", Deduct	-91.84	
26 05 36 00-1922 EA 24" Horizontal Cross, Vented Bottom, 24" Radius, Steel Cable Tray	1,769.49	733.68
For 4-5/8" Overall Height Instead Of 6", Deduct	-115.81	
26 05 36 00-1923 EA 30" Horizontal Cross, Vented Bottom, 24" Radius, Steel Cable Tray	1,999.76	837.50
For 4-5/8" Overall Height Instead Of 6", Deduct	-130.18	
26 05 36 00-1924 EA 36" Horizontal Cross, Vented Bottom, 24" Radius, Steel Cable Tray	2,266.53	975.67
For 4-5/8" Overall Height Instead Of 6", Deduct	-145.35	
26 05 36 00-1925 36" Radius Horizontal Crosses (26 05 36 00-1805)		
26 05 36 00-1926 EA 6" Horizontal Cross, Vented Bottom, 36" Radius, Steel Cable Tray	1,444.24	489.12
For 4-5/8" Overall Height Instead Of 6", Deduct	-103.66	
26 05 36 00-1927 EA 12" Horizontal Cross, Vented Bottom, 36" Radius, Steel Cable Tray	1,640.87	587.92
For 4-5/8" Overall Height Instead Of 6", Deduct	-115.10	
26 05 36 00-1928 EA 18" Horizontal Cross, Vented Bottom, 36" Radius, Steel Cable Tray	1,897.58	733.68
For 4-5/8" Overall Height Instead Of 6", Deduct	-128.62	
26 05 36 00-1929 EA 24" Horizontal Cross, Vented Bottom, 36" Radius, Steel Cable Tray	2,446.79	980.80
For 4-5/8" Overall Height Instead Of 6", Deduct	-162.94	
26 05 36 00-1930 EA 30" Horizontal Cross, Vented Bottom, 36" Radius, Steel Cable Tray	2,851.70	1,175.72
For 4-5/8" Overall Height Instead Of 6", Deduct	-187.19	
26 05 36 00-1931 EA 36" Horizontal Cross, Vented Bottom, 36" Radius, Steel Cable Tray	3,406.31	1,467.36
For 4-5/8" Overall Height Instead Of 6", Deduct	-218.35	
26 05 36 00-1932 Straight Reducers (26 05 36 00-1805)		
26 05 36 00-1933 EA 12" To 6" Reducer, Vented Bottom, Steel Cable Tray	323.76	124.97
For 4-5/8" Overall Height Instead Of 6", Deduct	-21.96	
26 05 36 00-1934 EA 18" To 12" Reducer, Vented Bottom, Steel Cable Tray	352.74	139.65
For 4-5/8" Overall Height Instead Of 6", Deduct	-23.64	
26 05 36 00-1935 EA 24" To 18" Reducer, Vented Bottom, Steel Cable Tray	399.35	162.76
For 4-5/8" Overall Height Instead Of 6", Deduct	-26.37	
26 05 36 00-1936 EA 30" To 24" Reducer, Vented Bottom, Steel Cable Tray	438.37	183.42
For 4-5/8" Overall Height Instead Of 6", Deduct	-28.55	
26 05 36 00-1937 EA 36" To 30" Reducer, Vented Bottom, Steel Cable Tray	478.49	202.00
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.02	
26 05 36 00-1938 Reducers (26 05 36 00-1805)		
26 05 36 00-1939 EA 18" To 6" Reducer, Vented Bottom, Steel Cable Tray	352.74	139.65
For 4-5/8" Overall Height Instead Of 6", Deduct	-23.64	
26 05 36 00-1940 EA 24" To 12" Reducer, Vented Bottom, Steel Cable Tray	397.55	163.00
For 4-5/8" Overall Height Instead Of 6", Deduct	-26.17	
26 05 36 00-1941 EA 30" To 12" Reducer, Vented Bottom, Steel Cable Tray	435.77	183.17
For 4-5/8" Overall Height Instead Of 6", Deduct	-28.31	
26 05 36 00-1942 EA 30" To 18" Reducer, Vented Bottom, Steel Cable Tray	437.76	183.05
For 4-5/8" Overall Height Instead Of 6", Deduct	-28.52	
26 05 36 00-1943 EA 36" To 12" Reducer, Vented Bottom, Steel Cable Tray	476.20	202.00
For 4-5/8" Overall Height Instead Of 6", Deduct	-30.79	
26 05 36 00-1944 EA 36" To 18" Reducer, Vented Bottom, Steel Cable Tray	478.49	202.00
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.02	
26 05 36 00-1945 EA 36" To 24" Reducer, Vented Bottom, Steel Cable Tray	481.53	202.49
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.28	
26 05 36 00-1946 Dropout Or End Plate (26 05 36 00-1805)		
26 05 36 00-1947 EA 6" Dropout Or End Plate, Vented Bottom, Steel Cable Tray	102.76	45.12
26 05 36 00-1948 EA 12" Dropout Or End Plate, Vented Bottom, Steel Cable Tray	121.91	52.95
26 05 36 00-1949 EA 18" Dropout Or End Plate, Vented Bottom, Steel Cable Tray	134.35	58.45
26 05 36 00-1950 EA 24" Dropout Or End Plate, Vented Bottom, Steel Cable Tray	151.14	65.17
26 05 36 00-1951 EA 30" Dropout Or End Plate, Vented Bottom, Steel Cable Tray	167.66	73.24
26 05 36 00-1952 EA 36" Dropout Or End Plate, Vented Bottom, Steel Cable Tray	196.31	87.55
26 05 36 00-1953 Vented Bottom Aluminum Cable Tray (26 05 36 00-1797)		
26 05 36 00-1954 LF 6" Vented Bottom Aluminum Cable Tray, Straight Section	38.24	9.54
For 4-5/8" Overall Height Instead Of 6", Deduct	-3.02	
26 05 36 00-1955 LF 9" Vented Bottom Aluminum Cable Tray, Straight Section	42.44	10.51
For 4-5/8" Overall Height Instead Of 6", Deduct	-3.37	
26 05 36 00-1956 LF 12" Vented Bottom Aluminum Cable Tray, Straight Section	47.48	11.74
For 4-5/8" Overall Height Instead Of 6", Deduct	-3.77	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-1957	LF 18" Vented Bottom Aluminum Cable Tray, Straight Section	55.35	13.09
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-4.44	
26 05 36 00-1958	LF 24" Vented Bottom Aluminum Cable Tray, Straight Section	63.56	14.55
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-5.15	
26 05 36 00-1959	LF 30" Vented Bottom Aluminum Cable Tray, Straight Section	80.86	16.76
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-6.69	
26 05 36 00-1960	LF 36" Vented Bottom Aluminum Cable Tray, Straight Section	89.91	19.68
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-7.36	
26 05 36 00-1961	Vented Bottom Aluminum Cable Tray Fittings <small>(26 05 36 00-1977)</small>		
26 05 36 00-1962	90 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-1961)</small>		
26 05 36 00-1963	EA 6" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	439.15	154.56
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-31.04	
26 05 36 00-1964	EA 9" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	477.09	167.77
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-33.73	
26 05 36 00-1965	EA 12" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	525.40	188.92
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-36.80	
26 05 36 00-1966	EA 18" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	593.76	209.34
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-41.93	
26 05 36 00-1967	EA 24" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	710.03	255.44
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-49.72	
26 05 36 00-1968	EA 30" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	839.97	293.96
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-59.50	
26 05 36 00-1969	EA 36" Horizontal 90 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	925.61	326.37
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-65.36	
26 05 36 00-1970	90 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-1961)</small>		
26 05 36 00-1971	EA 6" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	534.70	162.88
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-39.90	
26 05 36 00-1972	EA 12" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	645.38	202.49
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-47.67	
26 05 36 00-1973	EA 18" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	731.80	225.84
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-54.36	
26 05 36 00-1974	EA 24" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	870.63	279.16
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-63.80	
26 05 36 00-1975	EA 30" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	1,005.27	325.26
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-73.43	
26 05 36 00-1976	EA 36" Horizontal 90 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	1,111.50	366.83
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-80.58	
26 05 36 00-1977	90 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1961)</small>		
26 05 36 00-1978	EA 6" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray	658.17	172.17
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-51.47	
26 05 36 00-1979	EA 12" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray	786.40	217.54
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-60.51	
26 05 36 00-1980	EA 18" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray	889.82	244.93
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-68.58	
26 05 36 00-1981	EA 24" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray	1,041.07	308.76
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-78.37	
26 05 36 00-1982	EA 30" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray	1,117.24	299.22
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-86.79	
26 05 36 00-1983	EA 36" Horizontal 90 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray	1,369.13	418.81
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-102.02	
26 05 36 00-1984	45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-1961)</small>		
26 05 36 00-1985	EA 6" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	399.41	154.68
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-27.05	
26 05 36 00-1986	EA 9" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	433.92	168.01
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-29.40	
26 05 36 00-1987	EA 12" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	479.07	188.92
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-32.17	
26 05 36 00-1988	EA 18" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	539.50	209.10
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-36.52	
26 05 36 00-1989	EA 24" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	646.90	255.08
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-43.43	
26 05 36 00-1990	EA 30" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	762.96	293.96
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-51.80	
26 05 36 00-1991	EA 36" Horizontal 45 Degree Elbow, Vented Bottom, 12" Radius, Aluminum Cable Tray	840.67	325.75
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-56.92	
26 05 36 00-1992	45 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-1961)</small>		
26 05 36 00-1993	EA 6" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	477.04	163.00
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-34.12	
26 05 36 00-1994	EA 12" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	577.63	202.49
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-40.89	
26 05 36 00-1995	EA 18" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray	654.10	226.22
	<i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	-46.56	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-1996 EA 24" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	782.17 -54.92	279.65
26 05 36 00-1997 EA 30" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	905.29 -63.33	326.37
26 05 36 00-1998 EA 36" Horizontal 45 Degree Elbow, Vented Bottom, 24" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,001.48 -69.58	366.83
26 05 36 00-1999 45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-1961)</small>		
26 05 36 00-2000 EA 6" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	577.06 -43.33	172.54
26 05 36 00-2001 EA 12" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	692.31 -51.14	217.05
26 05 36 00-2002 EA 18" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	783.85 -57.98	244.93
26 05 36 00-2003 EA 24" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	926.12 -66.84	309.37
26 05 36 00-2004 EA 30" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,058.17 -77.03	345.44
26 05 36 00-2005 EA 36" Horizontal 45 Degree Elbow, Vented Bottom, 36" Radius, Aluminum Cable Tray..... <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,223.07 -87.33	419.66
26 05 36 00-2006 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-1961)</small>		
26 05 36 00-2007 EA 6" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	477.99 -34.95	154.07
26 05 36 00-2008 EA 9" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	513.18 -37.37	167.40
26 05 36 00-2009 EA 12" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	551.72 -39.43	188.92
26 05 36 00-2010 EA 18" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	593.76 -41.93	209.34
26 05 36 00-2011 EA 24" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	696.87 -48.40	255.44
26 05 36 00-2012 EA 30" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	774.17 -52.92	293.96
26 05 36 00-2013 EA 36" Vertical Riser 90 Degree, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	829.88 -55.84	325.75
26 05 36 00-2014 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-1961)</small>		
26 05 36 00-2015 EA 6" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	568.92 -43.32	162.88
26 05 36 00-2016 EA 12" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	661.17 -49.25	202.49
26 05 36 00-2017 EA 18" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	729.17 -54.09	225.84
26 05 36 00-2018 EA 24" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	823.97 -59.10	279.65
26 05 36 00-2019 EA 30" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	919.37 -64.79	325.75
26 05 36 00-2020 EA 36" Vertical Riser 90 Degree, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,006.22 -70.05	366.83
26 05 36 00-2021 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-1961)</small>		
26 05 36 00-2022 EA 6" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	655.54 -51.20	172.17
26 05 36 00-2023 EA 12" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	757.45 -57.61	217.54
26 05 36 00-2024 EA 18" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	850.33 -64.63	244.93
26 05 36 00-2025 EA 24" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	993.69 -73.64	308.76
26 05 36 00-2026 EA 30" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,102.12 -81.43	345.44
26 05 36 00-2027 EA 36" Vertical Riser 90 Degree, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,240.15 -89.12	418.81
26 05 36 00-2028 12" Radius Horizontal Tees <small>(26 05 36 00-1961)</small>		
26 05 36 00-2029 EA 6" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	765.49 -52.09	293.47
26 05 36 00-2030 EA 9" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	798.92 -54.16	308.76
26 05 36 00-2031 EA 12" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	849.98 -57.90	325.26
26 05 36 00-2032 EA 18" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	970.59 -66.43	367.58
26 05 36 00-2033 EA 24" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,108.55 -75.96	418.81
26 05 36 00-2034 EA 30" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,254.76 -84.72	489.12

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 05 36 00-2035	EA 36" Horizontal Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,388.76 -94.44	533.14
26 05 36 00-2036	24" Radius Horizontal Tees <small>(26 05 36 00-1961)</small>		
26 05 36 00-2037	EA 6" Horizontal Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	964.12 -69.26	325.75
26 05 36 00-2038	EA 12" Horizontal Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,089.22 -78.41	366.10
26 05 36 00-2039	EA 18" Horizontal Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,224.36 -87.54	418.81
26 05 36 00-2040	EA 24" Horizontal Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,471.06 -106.45	487.77
26 05 36 00-2041	EA 30" Horizontal Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,690.47 -120.06	587.92
26 05 36 00-2042	EA 36" Horizontal Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,917.00 -137.31	652.73
26 05 36 00-2043	36" Radius Horizontal Tees <small>(26 05 36 00-1961)</small>		
26 05 36 00-2044	EA 6" Horizontal Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,287.85 -98.22	366.83
26 05 36 00-2045	EA 12" Horizontal Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,474.41 -112.54	418.81
26 05 36 00-2046	EA 18" Horizontal Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,562.60 -122.22	408.54
26 05 36 00-2047	EA 24" Horizontal Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	2,003.19 -151.49	585.96
26 05 36 00-2048	EA 30" Horizontal Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	2,320.03 -170.62	736.61
26 05 36 00-2049	EA 36" Horizontal Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	2,659.29 -196.14	837.50
26 05 36 00-2050	12" Radius Vertical Tees <small>(26 05 36 00-1961)</small>		
26 05 36 00-2051	EA 6" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	868.14 -62.36	293.47
26 05 36 00-2052	EA 9" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	896.31 -63.90	308.76
26 05 36 00-2053	EA 12" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	953.59 -68.21	325.75
26 05 36 00-2054	EA 18" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	988.94 -70.11	345.44
26 05 36 00-2055	EA 24" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,033.95 -72.89	366.10
26 05 36 00-2056	EA 30" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,094.00 -76.81	391.05
26 05 36 00-2057	EA 36" Vertical Tee, Vented Bottom, 12" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,211.73 -83.62	450.60
26 05 36 00-2058	24" Radius Vertical Tees <small>(26 05 36 00-1961)</small>		
26 05 36 00-2059	EA 6" Vertical Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,079.93 -80.84	325.75
26 05 36 00-2060	EA 12" Vertical Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,189.24 -88.42	366.10
26 05 36 00-2061	EA 18" Vertical Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,270.36 -94.45	391.05
26 05 36 00-2062	EA 24" Vertical Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,355.97 -100.70	418.81
26 05 36 00-2063	EA 30" Vertical Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,461.78 -108.62	450.60
26 05 36 00-2064	EA 36" Vertical Tee, Vented Bottom, 24" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,615.08 -116.95	534.73
26 05 36 00-2065	36" Radius Vertical Tees <small>(26 05 36 00-1961)</small>		
26 05 36 00-2066	EA 6" Vertical Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,439.29 -113.42	366.10
26 05 36 00-2067	EA 12" Vertical Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,579.70 -123.07	418.81
26 05 36 00-2068	EA 18" Vertical Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,659.19 -128.36	450.60
26 05 36 00-2069	EA 24" Vertical Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,791.25 -138.26	490.46
26 05 36 00-2070	EA 30" Vertical Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	1,944.09 -149.85	534.73
26 05 36 00-2071	EA 36" Vertical Tee, Vented Bottom, 36" Radius, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	2,189.53 -164.75	650.41
26 05 36 00-2072	12" Radius Horizontal Crosses <small>(26 05 36 00-1961)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-2073 EA 6" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	887.79	325.75
For 4-5/8" Overall Height Instead Of 6", Deduct	-61.63	
26 05 36 00-2074 EA 9" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	944.20	345.44
For 4-5/8" Overall Height Instead Of 6", Deduct	-65.64	
26 05 36 00-2075 EA 12" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	991.64	367.58
For 4-5/8" Overall Height Instead Of 6", Deduct	-68.53	
26 05 36 00-2076 EA 18" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	1,095.39	418.81
For 4-5/8" Overall Height Instead Of 6", Deduct	-74.64	
26 05 36 00-2077 EA 24" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	1,255.22	487.77
For 4-5/8" Overall Height Instead Of 6", Deduct	-84.87	
26 05 36 00-2078 EA 30" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	1,423.03	531.67
For 4-5/8" Overall Height Instead Of 6", Deduct	-98.00	
26 05 36 00-2079 EA 36" Horizontal Cross, Vented Bottom, 12" Radius, Aluminum Cable Tray.....	1,735.39	652.73
For 4-5/8" Overall Height Instead Of 6", Deduct	-119.14	
26 05 36 00-2080 24" Radius Horizontal Crosses (26 05 36 00-1961)		
26 05 36 00-2081 EA 6" Horizontal Cross, Vented Bottom, 24" Radius, Aluminum Cable Tray.....	1,231.17	367.58
For 4-5/8" Overall Height Instead Of 6", Deduct	-92.49	
26 05 36 00-2082 EA 12" Horizontal Cross, Vented Bottom, 24" Radius, Aluminum Cable Tray.....	1,374.39	418.81
For 4-5/8" Overall Height Instead Of 6", Deduct	-102.54	
26 05 36 00-2083 EA 18" Horizontal Cross, Vented Bottom, 24" Radius, Aluminum Cable Tray.....	1,542.12	487.77
For 4-5/8" Overall Height Instead Of 6", Deduct	-113.56	
26 05 36 00-2084 EA 24" Horizontal Cross, Vented Bottom, 24" Radius, Aluminum Cable Tray.....	1,818.95	585.96
For 4-5/8" Overall Height Instead Of 6", Deduct	-133.06	
26 05 36 00-2085 EA 30" Horizontal Cross, Vented Bottom, 24" Radius, Aluminum Cable Tray.....	1,992.12	650.41
For 4-5/8" Overall Height Instead Of 6", Deduct	-145.01	
26 05 36 00-2086 EA 36" Horizontal Cross, Vented Bottom, 24" Radius, Aluminum Cable Tray.....	2,422.40	837.50
For 4-5/8" Overall Height Instead Of 6", Deduct	-172.45	
26 05 36 00-2087 36" Radius Horizontal Crosses (26 05 36 00-1961)		
26 05 36 00-2088 EA 6" Horizontal Cross, Vented Bottom, 36" Radius, Aluminum Cable Tray.....	1,711.30	418.81
For 4-5/8" Overall Height Instead Of 6", Deduct	-136.23	
26 05 36 00-2089 EA 12" Horizontal Cross, Vented Bottom, 36" Radius, Aluminum Cable Tray.....	1,896.54	490.46
For 4-5/8" Overall Height Instead Of 6", Deduct	-148.79	
26 05 36 00-2090 EA 18" Horizontal Cross, Vented Bottom, 36" Radius, Aluminum Cable Tray.....	2,147.96	585.96
For 4-5/8" Overall Height Instead Of 6", Deduct	-165.96	
26 05 36 00-2091 EA 24" Horizontal Cross, Vented Bottom, 36" Radius, Aluminum Cable Tray.....	2,583.24	736.61
For 4-5/8" Overall Height Instead Of 6", Deduct	-196.94	
26 05 36 00-2092 EA 30" Horizontal Cross, Vented Bottom, 36" Radius, Aluminum Cable Tray.....	2,876.26	841.40
For 4-5/8" Overall Height Instead Of 6", Deduct	-217.51	
26 05 36 00-2093 EA 36" Horizontal Cross, Vented Bottom, 36" Radius, Aluminum Cable Tray.....	3,336.92	975.67
For 4-5/8" Overall Height Instead Of 6", Deduct	-252.39	
26 05 36 00-2094 Straight Reducers (26 05 36 00-1961)		
26 05 36 00-2095 EA 9" To 6" Reducer, Vented Bottom, Aluminum Cable Tray.....	331.59	97.82
For 4-5/8" Overall Height Instead Of 6", Deduct	-25.00	
26 05 36 00-2096 EA 12" To 9" Reducer, Vented Bottom, Aluminum Cable Tray.....	348.09	103.09
For 4-5/8" Overall Height Instead Of 6", Deduct	-26.22	
26 05 36 00-2097 EA 18" To 12" Reducer, Vented Bottom, Aluminum Cable Tray.....	393.18	122.16
For 4-5/8" Overall Height Instead Of 6", Deduct	-29.13	
26 05 36 00-2098 EA 24" To 18" Reducer, Vented Bottom, Aluminum Cable Tray.....	435.14	139.52
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.89	
26 05 36 00-2099 EA 30" To 24" Reducer, Vented Bottom, Aluminum Cable Tray.....	479.68	163.00
For 4-5/8" Overall Height Instead Of 6", Deduct	-34.38	
26 05 36 00-2100 EA 36" To 30" Reducer, Vented Bottom, Aluminum Cable Tray.....	520.92	183.05
For 4-5/8" Overall Height Instead Of 6", Deduct	-36.84	
26 05 36 00-2101 Reducers (26 05 36 00-1961)		
26 05 36 00-2102 EA 12" To 6" Reducer, Vented Bottom, Aluminum Cable Tray.....	347.81	102.84
For 4-5/8" Overall Height Instead Of 6", Deduct	-26.21	
26 05 36 00-2103 EA 18" To 6" Reducer, Vented Bottom, Aluminum Cable Tray.....	393.04	122.16
For 4-5/8" Overall Height Instead Of 6", Deduct	-29.13	
26 05 36 00-2104 EA 18" To 9" Reducer, Vented Bottom, Aluminum Cable Tray.....	393.04	122.16
For 4-5/8" Overall Height Instead Of 6", Deduct	-29.13	
26 05 36 00-2105 EA 24" To 6" Reducer, Vented Bottom, Aluminum Cable Tray.....	435.32	139.65
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.90	
26 05 36 00-2106 EA 24" To 9" Reducer, Vented Bottom, Aluminum Cable Tray.....	435.32	139.65
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.90	
26 05 36 00-2107 EA 24" To 12" Reducer, Vented Bottom, Aluminum Cable Tray.....	435.67	139.77
For 4-5/8" Overall Height Instead Of 6", Deduct	-31.92	
26 05 36 00-2108 EA 30" To 12" Reducer, Vented Bottom, Aluminum Cable Tray.....	484.69	162.88
For 4-5/8" Overall Height Instead Of 6", Deduct	-34.89	
26 05 36 00-2109 EA 30" To 18" Reducer, Vented Bottom, Aluminum Cable Tray.....	479.19	162.76
For 4-5/8" Overall Height Instead Of 6", Deduct	-34.36	
26 05 36 00-2110 EA 36" To 12" Reducer, Vented Bottom, Aluminum Cable Tray.....	520.92	183.05
For 4-5/8" Overall Height Instead Of 6", Deduct	-36.84	
26 05 36 00-2111 EA 36" To 18" Reducer, Vented Bottom, Aluminum Cable Tray.....	520.92	183.05
For 4-5/8" Overall Height Instead Of 6", Deduct	-36.84	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 36 00-2112	EA	36" To 24" Reducer, Vented Bottom, Aluminum Cable Tray <i>For 4-5/8" Overall Height Instead Of 6", Deduct</i>	521.53 -36.87	183.42
26 05 36 00-2113		Dropout Or End Plate <small>(26 05 36 00-1961)</small>		
26 05 36 00-2114	EA	6" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	109.68	45.12
26 05 36 00-2115	EA	9" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	119.68	49.28
26 05 36 00-2116	EA	12" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	128.97	52.95
26 05 36 00-2117	EA	18" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	146.50	58.45
26 05 36 00-2118	EA	24" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	167.93	65.17
26 05 36 00-2119	EA	30" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	185.31	73.24
26 05 36 00-2120	EA	36" Dropout Or End Plate, Vented Bottom, Aluminum Cable Tray	212.16	83.88
26 05 36 00-2121		Cable Tray Covers And Dividers <small>(26 05 36 00-0001)</small>		
26 05 36 00-2122		Galvanized Steel Covers <small>(26 05 36 00-2121)</small>		
26 05 36 00-2123		Ventilated Straight Sections <small>(26 05 36 00-2122)</small>		
26 05 36 00-2124	LF	6" Steel Cable Tray Cover, Straight Section	10.94	2.20
26 05 36 00-2125	LF	9" Steel Cable Tray Cover, Straight Section	13.20	2.57
26 05 36 00-2126	LF	12" Steel Cable Tray Cover, Straight Section	15.52	2.94
26 05 36 00-2127	LF	18" Steel Cable Tray Cover, Straight Section	21.04	3.91
26 05 36 00-2128	LF	24" Steel Cable Tray Cover, Straight Section	26.66	5.26
26 05 36 00-2129	LF	30" Steel Cable Tray Cover, Straight Section	32.34	6.48
26 05 36 00-2130	LF	36" Steel Cable Tray Cover, Straight Section	147.12	73.49
26 05 36 00-2131		90 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-2122)</small>		
26 05 36 00-2132	EA	6" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	66.84	7.83
26 05 36 00-2133	EA	9" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	74.75	9.17
26 05 36 00-2134	EA	12" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	80.96	10.88
26 05 36 00-2135	EA	18" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	110.14	13.94
26 05 36 00-2136	EA	24" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	134.84	17.73
26 05 36 00-2137	EA	30" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	163.09	19.68
26 05 36 00-2138	EA	36" Horizontal 90 Degree Elbow, 12" Radius, Steel Cable Tray Cover	197.01	23.48
26 05 36 00-2139		90 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-2122)</small>		
26 05 36 00-2140	EA	6" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	103.63	8.68
26 05 36 00-2141	EA	9" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	108.38	10.15
26 05 36 00-2142	EA	12" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	122.22	12.23
26 05 36 00-2143	EA	18" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	151.62	15.53
26 05 36 00-2144	EA	24" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	185.91	19.56
26 05 36 00-2145	EA	30" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	238.88	22.50
26 05 36 00-2146	EA	36" Horizontal 90 Degree Elbow, 24" Radius, Steel Cable Tray Cover	277.83	26.66
26 05 36 00-2147		90 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-2122)</small>		
26 05 36 00-2148	EA	6" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	146.61	9.78
26 05 36 00-2149	EA	9" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	162.94	11.24
26 05 36 00-2150	EA	12" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	176.53	13.94
26 05 36 00-2151	EA	18" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	223.89	16.27
26 05 36 00-2152	EA	24" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	270.94	22.62
26 05 36 00-2153	EA	30" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	319.33	25.56
26 05 36 00-2154	EA	36" Horizontal 90 Degree Elbow, 36" Radius, Steel Cable Tray Cover	373.66	29.34
26 05 36 00-2155		45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-2122)</small>		
26 05 36 00-2156	EA	6" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	51.30	7.83
		<i>For 60 Degree Bend, Deduct</i>	-13.92	
		<i>For 30 Degree Bend, Deduct</i>	-23.63	
26 05 36 00-2157	EA	9" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	61.03	9.17
		<i>For 60 Degree Bend, Deduct</i>	-16.63	
		<i>For 30 Degree Bend, Deduct</i>	-28.22	
26 05 36 00-2158	EA	12" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	68.38	10.88
		<i>For 60 Degree Bend, Deduct</i>	-18.41	
		<i>For 30 Degree Bend, Deduct</i>	-31.29	
26 05 36 00-2159	EA	18" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	82.83	13.33
		<i>For 60 Degree Bend, Deduct</i>	-22.23	
		<i>For 30 Degree Bend, Deduct</i>	-37.78	
26 05 36 00-2160	EA	24" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	96.69	15.40
		<i>For 60 Degree Bend, Deduct</i>	-25.98	
		<i>For 30 Degree Bend, Deduct</i>	-44.16	
26 05 36 00-2161	EA	30" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	113.14	17.73
		<i>For 60 Degree Bend, Deduct</i>	-30.52	
		<i>For 30 Degree Bend, Deduct</i>	-51.85	
26 05 36 00-2162	EA	36" Horizontal 45 Degree Elbow, 12" Radius, Steel Cable Tray Cover	126.39	19.56
		<i>For 60 Degree Bend, Deduct</i>	-34.21	
		<i>For 30 Degree Bend, Deduct</i>	-58.10	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-2163 45 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-2122)</small>		
26 05 36 00-2164 EA 6" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	70.47	8.68
<i>For 60 Degree Bend, Deduct</i>	-19.94	
<i>For 30 Degree Bend, Deduct</i>	-33.71	
26 05 36 00-2165 EA 9" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	79.78	10.15
<i>For 60 Degree Bend, Deduct</i>	-22.45	
<i>For 30 Degree Bend, Deduct</i>	-37.97	
26 05 36 00-2166 EA 12" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	91.34	12.23
<i>For 60 Degree Bend, Deduct</i>	-25.44	
<i>For 30 Degree Bend, Deduct</i>	-43.09	
26 05 36 00-2167 EA 18" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	105.69	14.67
<i>For 60 Degree Bend, Deduct</i>	-29.25	
<i>For 30 Degree Bend, Deduct</i>	-49.56	
26 05 36 00-2168 EA 24" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	121.78	16.76
<i>For 60 Degree Bend, Deduct</i>	-33.75	
<i>For 30 Degree Bend, Deduct</i>	-57.18	
26 05 36 00-2169 EA 30" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	151.64	19.56
<i>For 60 Degree Bend, Deduct</i>	-42.52	
<i>For 30 Degree Bend, Deduct</i>	-71.96	
26 05 36 00-2170 EA 36" Horizontal 45 Degree Elbow, 24" Radius, Steel Cable Tray Cover	168.04	22.62
<i>For 60 Degree Bend, Deduct</i>	-46.79	
<i>For 30 Degree Bend, Deduct</i>	-79.24	
26 05 36 00-2171 45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-2122)</small>		
26 05 36 00-2172 EA 6" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	97.46	9.78
<i>For 60 Degree Bend, Deduct</i>	-28.42	
<i>For 30 Degree Bend, Deduct</i>	-47.91	
26 05 36 00-2173 EA 9" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	110.33	11.24
<i>For 60 Degree Bend, Deduct</i>	-32.08	
<i>For 30 Degree Bend, Deduct</i>	-54.09	
26 05 36 00-2174 EA 12" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	123.85	13.94
<i>For 60 Degree Bend, Deduct</i>	-35.53	
<i>For 30 Degree Bend, Deduct</i>	-60.00	
26 05 36 00-2175 EA 18" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	141.35	15.53
<i>For 60 Degree Bend, Deduct</i>	-40.70	
<i>For 30 Degree Bend, Deduct</i>	-68.70	
26 05 36 00-2176 EA 24" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	172.27	18.95
<i>For 60 Degree Bend, Deduct</i>	-49.58	
<i>For 30 Degree Bend, Deduct</i>	-83.69	
26 05 36 00-2177 EA 30" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	190.92	22.62
<i>For 60 Degree Bend, Deduct</i>	-54.34	
<i>For 30 Degree Bend, Deduct</i>	-91.83	
26 05 36 00-2178 EA 36" Horizontal 45 Degree Elbow, 36" Radius, Steel Cable Tray Cover	226.07	24.45
<i>For 60 Degree Bend, Deduct</i>	-65.22	
<i>For 30 Degree Bend, Deduct</i>	-110.06	
26 05 36 00-2179 90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-2122)</small>		
26 05 36 00-2180 EA 6" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	57.89	7.83
26 05 36 00-2181 EA 9" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	61.03	9.17
26 05 36 00-2182 EA 12" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	67.24	10.88
26 05 36 00-2183 EA 18" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	78.28	13.33
26 05 36 00-2184 EA 24" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	85.95	17.24
26 05 36 00-2185 EA 30" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	95.61	19.68
26 05 36 00-2186 EA 36" Vertical Riser 90 Degree, 12" Radius, Steel Cable Tray Cover	120.29	23.48
26 05 36 00-2187 90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-2122)</small>		
26 05 36 00-2188 EA 6" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	69.32	8.68
26 05 36 00-2189 EA 9" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	77.50	10.15
26 05 36 00-2190 EA 12" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	83.33	12.23
26 05 36 00-2191 EA 18" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	107.94	14.67
26 05 36 00-2192 EA 24" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	125.33	18.95
26 05 36 00-2193 EA 30" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	143.99	22.62
26 05 36 00-2194 EA 36" Vertical Riser 90 Degree, 24" Radius, Steel Cable Tray Cover	165.74	26.66
26 05 36 00-2195 90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-2122)</small>		
26 05 36 00-2196 EA 6" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	80.28	9.78
26 05 36 00-2197 EA 9" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	100.03	11.24
26 05 36 00-2198 EA 12" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	114.77	13.94
26 05 36 00-2199 EA 18" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	141.35	15.53
26 05 36 00-2200 EA 24" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	164.25	21.65
26 05 36 00-2201 EA 30" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	195.81	25.56
26 05 36 00-2202 EA 36" Vertical Riser 90 Degree, 36" Radius, Steel Cable Tray Cover	229.55	29.34
26 05 36 00-2203 12" Radius Horizontal Tees <small>(26 05 36 00-2122)</small>		
26 05 36 00-2204 EA 6" Horizontal Tee, 12" Radius, Steel Cable Tray Cover	102.48	12.72
26 05 36 00-2205 EA 9" Horizontal Tee, 12" Radius, Steel Cable Tray Cover	107.94	14.67
26 05 36 00-2206 EA 12" Horizontal Tee, 12" Radius, Steel Cable Tray Cover	122.45	17.24

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	26 05 36 00-2207	EA	18" Horizontal Tee, 12" Radius, Steel Cable Tray Cover.....	147.06	19.56
	26 05 36 00-2208	EA	24" Horizontal Tee, 12" Radius, Steel Cable Tray Cover.....	181.77	22.62
	26 05 36 00-2209	EA	30" Horizontal Tee, 12" Radius, Steel Cable Tray Cover.....	223.52	32.53
	26 05 36 00-2210	EA	36" Horizontal Tee, 12" Radius, Steel Cable Tray Cover.....	268.65	39.01
26 05 36 00-2211	24" Radius Horizontal Tees (26 05 36 00-2122)				
	26 05 36 00-2212	EA	6" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	150.34	13.33
	26 05 36 00-2213	EA	9" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	172.22	15.53
	26 05 36 00-2214	EA	12" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	181.51	18.34
	26 05 36 00-2215	EA	18" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	229.40	21.04
	26 05 36 00-2216	EA	24" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	338.03	24.45
	26 05 36 00-2217	EA	30" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	399.72	36.68
	26 05 36 00-2218	EA	36" Horizontal Tee, 24" Radius, Steel Cable Tray Cover.....	448.05	45.12
26 05 36 00-2219	36" Radius Horizontal Tees (26 05 36 00-2122)				
	26 05 36 00-2220	EA	6" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	254.26	13.94
	26 05 36 00-2221	EA	9" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	262.76	16.27
	26 05 36 00-2222	EA	12" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	293.41	19.56
	26 05 36 00-2223	EA	18" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	344.24	22.62
	26 05 36 00-2224	EA	24" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	447.10	26.66
	26 05 36 00-2225	EA	30" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	506.95	42.06
	26 05 36 00-2226	EA	36" Horizontal Tee, 36" Radius, Steel Cable Tray Cover.....	585.03	53.19
26 05 36 00-2227	12" Radius Horizontal Crosses (26 05 36 00-2122)				
	26 05 36 00-2228	EA	6" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	149.96	17.24
	26 05 36 00-2229	EA	9" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	158.67	18.34
	26 05 36 00-2230	EA	12" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	175.65	19.56
	26 05 36 00-2231	EA	18" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	206.93	22.62
	26 05 36 00-2232	EA	24" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	260.07	32.53
	26 05 36 00-2233	EA	30" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	300.61	39.01
	26 05 36 00-2234	EA	36" Horizontal Cross, 12" Radius, Steel Cable Tray Cover.....	344.31	41.94
26 05 36 00-2235	24" Radius Horizontal Crosses (26 05 36 00-2122)				
	26 05 36 00-2236	EA	6" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	261.64	18.34
	26 05 36 00-2237	EA	9" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	284.27	19.56
	26 05 36 00-2238	EA	12" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	304.89	21.04
	26 05 36 00-2239	EA	18" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	363.19	24.45
	26 05 36 00-2240	EA	24" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	454.58	36.68
	26 05 36 00-2241	EA	30" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	518.87	45.12
	26 05 36 00-2242	EA	36" Horizontal Cross, 24" Radius, Steel Cable Tray Cover.....	580.01	48.79
26 05 36 00-2243	36" Radius Horizontal Crosses (26 05 36 00-2122)				
	26 05 36 00-2244	EA	6" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	419.22	19.56
	26 05 36 00-2245	EA	9" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	435.28	21.04
	26 05 36 00-2246	EA	12" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	458.61	22.62
	26 05 36 00-2247	EA	18" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	529.45	26.66
	26 05 36 00-2248	EA	24" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	687.61	41.94
	26 05 36 00-2249	EA	30" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	752.41	53.44
	26 05 36 00-2250	EA	36" Horizontal Cross, 36" Radius, Steel Cable Tray Cover.....	806.92	58.70
26 05 36 00-2251	Reducers (26 05 36 00-2122)				
	26 05 36 00-2252	EA	9" To 6" Reducer, Steel Cable Tray Covers.....	66.76	9.17
	26 05 36 00-2253	EA	12" To 6" Reducer, Steel Cable Tray Covers.....	71.85	10.88
	26 05 36 00-2254	EA	12" To 9" Reducer, Steel Cable Tray Covers.....	71.85	10.88
	26 05 36 00-2255	EA	18" To 6" Reducer, Steel Cable Tray Covers.....	79.42	13.33
	26 05 36 00-2256	EA	18" To 12" Reducer, Steel Cable Tray Covers.....	79.42	13.33
	26 05 36 00-2257	EA	24" To 12" Reducer, Steel Cable Tray Covers.....	97.65	14.67
	26 05 36 00-2258	EA	24" To 18" Reducer, Steel Cable Tray Covers.....	104.51	14.67
	26 05 36 00-2259	EA	30" To 12" Reducer, Steel Cable Tray Covers.....	101.17	16.76
	26 05 36 00-2260	EA	30" To 18" Reducer, Steel Cable Tray Covers.....	108.03	16.76
	26 05 36 00-2261	EA	30" To 24" Reducer, Steel Cable Tray Covers.....	112.61	16.76
	26 05 36 00-2262	EA	36" To 12" Reducer, Steel Cable Tray Covers.....	117.43	18.34
	26 05 36 00-2263	EA	36" To 18" Reducer, Steel Cable Tray Covers.....	119.72	18.34
	26 05 36 00-2264	EA	36" To 24" Reducer, Steel Cable Tray Covers.....	122.01	18.34
	26 05 36 00-2265	EA	36" To 30" Reducer, Steel Cable Tray Covers.....	123.15	18.34
26 05 36 00-2266	Aluminum Covers (26 05 36 00-2121)				
26 05 36 00-2267	Ventilated Straight Sections (26 05 36 00-2266)				
	26 05 36 00-2268	LF	6" Aluminum Cable Tray Cover, Straight Section.....	11.96	2.20
	26 05 36 00-2269	LF	9" Aluminum Cable Tray Cover, Straight Section.....	14.27	2.57
	26 05 36 00-2270	LF	12" Aluminum Cable Tray Cover, Straight Section.....	16.76	2.94
	26 05 36 00-2271	LF	18" Aluminum Cable Tray Cover, Straight Section.....	22.30	3.91



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-2272 LF 24" Aluminum Cable Tray Cover, Straight Section	28.66	5.26
26 05 36 00-2273 LF 30" Aluminum Cable Tray Cover, Straight Section	32.57	6.48
26 05 36 00-2274 LF 36" Aluminum Cable Tray Cover, Straight Section	145.61	73.49
26 05 36 00-2275 90 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-2266)</small>		
26 05 36 00-2276 EA 6" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	64.48	7.83
26 05 36 00-2277 EA 9" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	68.90	9.17
26 05 36 00-2278 EA 12" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	76.15	10.88
26 05 36 00-2279 EA 18" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	99.19	13.94
26 05 36 00-2280 EA 24" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	125.70	17.73
26 05 36 00-2281 EA 30" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	147.78	19.68
26 05 36 00-2282 EA 36" Horizontal 90 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	179.94	23.48
26 05 36 00-2283 90 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-2266)</small>		
26 05 36 00-2284 EA 6" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	84.80	8.68
26 05 36 00-2285 EA 9" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	104.02	10.15
26 05 36 00-2286 EA 12" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	116.51	12.23
26 05 36 00-2287 EA 18" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	139.76	15.53
26 05 36 00-2288 EA 24" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	173.41	19.56
26 05 36 00-2289 EA 30" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	209.63	22.50
26 05 36 00-2290 EA 36" Horizontal 90 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	256.77	26.66
26 05 36 00-2291 90 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-2266)</small>		
26 05 36 00-2292 EA 6" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	136.88	9.78
26 05 36 00-2293 EA 9" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	150.65	11.24
26 05 36 00-2294 EA 12" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	172.97	13.94
26 05 36 00-2295 EA 18" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	205.91	16.27
26 05 36 00-2296 EA 24" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	254.35	22.62
26 05 36 00-2297 EA 30" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	292.79	25.56
26 05 36 00-2298 EA 36" Horizontal 90 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	341.53	29.34
26 05 36 00-2299 45 Degree, 12" Radius Horizontal Elbows <small>(26 05 36 00-2266)</small>		
26 05 36 00-2300 EA 6" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	51.08	7.83
<i>For 30 Degree Bend, Deduct</i>	-23.51	
<i>For 60 Degree Bend, Deduct</i>	-13.84	
26 05 36 00-2301 EA 9" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	54.38	9.17
<i>For 30 Degree Bend, Deduct</i>	-24.56	
<i>For 60 Degree Bend, Deduct</i>	-14.43	
26 05 36 00-2302 EA 12" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	61.85	10.88
<i>For 30 Degree Bend, Deduct</i>	-27.70	
<i>For 60 Degree Bend, Deduct</i>	-16.26	
26 05 36 00-2303 EA 18" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	72.48	13.33
<i>For 30 Degree Bend, Deduct</i>	-32.09	
<i>For 60 Degree Bend, Deduct</i>	-18.81	
26 05 36 00-2304 EA 24" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	81.64	15.40
<i>For 30 Degree Bend, Deduct</i>	-35.88	
<i>For 60 Degree Bend, Deduct</i>	-21.01	
26 05 36 00-2305 EA 30" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	100.03	17.73
<i>For 30 Degree Bend, Deduct</i>	-44.64	
<i>For 60 Degree Bend, Deduct</i>	-26.19	
26 05 36 00-2306 EA 36" Horizontal 45 Degree Elbow, 12" Radius, Aluminum Cable Tray Cover.....	117.51	19.56
<i>For 30 Degree Bend, Deduct</i>	-53.22	
<i>For 60 Degree Bend, Deduct</i>	-31.28	
26 05 36 00-2307 45 Degree, 24" Radius Horizontal Elbows <small>(26 05 36 00-2266)</small>		
26 05 36 00-2308 EA 6" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	58.56	8.68
<i>For 30 Degree Bend, Deduct</i>	-27.16	
<i>For 60 Degree Bend, Deduct</i>	-16.01	
26 05 36 00-2309 EA 9" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	72.74	10.15
<i>For 30 Degree Bend, Deduct</i>	-34.10	
<i>For 60 Degree Bend, Deduct</i>	-20.12	
26 05 36 00-2310 EA 12" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	78.52	12.23
<i>For 30 Degree Bend, Deduct</i>	-36.04	
<i>For 60 Degree Bend, Deduct</i>	-21.21	
26 05 36 00-2311 EA 18" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	94.87	14.67
<i>For 30 Degree Bend, Deduct</i>	-43.61	
<i>For 60 Degree Bend, Deduct</i>	-25.67	
26 05 36 00-2312 EA 24" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	115.14	16.76
<i>For 30 Degree Bend, Deduct</i>	-53.53	
<i>For 60 Degree Bend, Deduct</i>	-31.56	
26 05 36 00-2313 EA 30" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	133.23	19.56
<i>For 30 Degree Bend, Deduct</i>	-61.84	
<i>For 60 Degree Bend, Deduct</i>	-36.45	
26 05 36 00-2314 EA 36" Horizontal 45 Degree Elbow, 24" Radius, Aluminum Cable Tray Cover.....	153.84	22.62
<i>For 30 Degree Bend, Deduct</i>	-71.43	
<i>For 60 Degree Bend, Deduct</i>	-42.11	

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-2315			45 Degree, 36" Radius Horizontal Elbows <small>(26 05 36 00-2266)</small>		
26 05 36 00-2316	EA		6" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	92.23	9.78
			<i>For 30 Degree Bend, Deduct</i>	-45.04	
			<i>For 60 Degree Bend, Deduct</i>	-26.70	
26 05 36 00-2317	EA		9" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	101.50	11.24
			<i>For 30 Degree Bend, Deduct</i>	-49.23	
			<i>For 60 Degree Bend, Deduct</i>	-29.16	
26 05 36 00-2318	EA		12" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	110.34	13.94
			<i>For 30 Degree Bend, Deduct</i>	-52.57	
			<i>For 60 Degree Bend, Deduct</i>	-31.08	
26 05 36 00-2319	EA		18" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	130.84	15.53
			<i>For 30 Degree Bend, Deduct</i>	-62.92	
			<i>For 60 Degree Bend, Deduct</i>	-37.24	
26 05 36 00-2320	EA		24" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	158.95	18.95
			<i>For 30 Degree Bend, Deduct</i>	-76.37	
			<i>For 60 Degree Bend, Deduct</i>	-45.19	
26 05 36 00-2321	EA		30" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	182.89	22.62
			<i>For 30 Degree Bend, Deduct</i>	-87.41	
			<i>For 60 Degree Bend, Deduct</i>	-51.69	
26 05 36 00-2322	EA		36" Horizontal 45 Degree Elbow, 36" Radius, Aluminum Cable Tray Cover.....	206.13	24.45
			<i>For 30 Degree Bend, Deduct</i>	-99.10	
			<i>For 60 Degree Bend, Deduct</i>	-58.64	
26 05 36 00-2323			90 Degree, 12" Radius Vertical Risers <small>(26 05 36 00-2266)</small>		
26 05 36 00-2324	EA		6" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	56.85	7.83
26 05 36 00-2325	EA		9" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	59.41	9.17
26 05 36 00-2326	EA		12" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	66.10	10.88
26 05 36 00-2327	EA		18" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	78.10	13.33
26 05 36 00-2328	EA		24" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	86.85	17.24
26 05 36 00-2329	EA		30" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	91.92	19.68
26 05 36 00-2330	EA		36" Vertical Riser 90 Degree, 12" Radius, Aluminum Cable Tray Cover.....	110.59	23.48
26 05 36 00-2331			90 Degree, 24" Radius Vertical Risers <small>(26 05 36 00-2266)</small>		
26 05 36 00-2332	EA		6" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	64.69	8.68
26 05 36 00-2333	EA		9" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	71.62	10.15
26 05 36 00-2334	EA		12" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	79.64	12.23
26 05 36 00-2335	EA		18" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	95.95	14.67
26 05 36 00-2336	EA		24" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	109.75	18.95
26 05 36 00-2337	EA		30" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	138.16	22.62
26 05 36 00-2338	EA		36" Vertical Riser 90 Degree, 24" Radius, Aluminum Cable Tray Cover.....	153.99	26.66
26 05 36 00-2339			90 Degree, 36" Radius Vertical Risers <small>(26 05 36 00-2266)</small>		
26 05 36 00-2340	EA		6" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	74.32	9.78
26 05 36 00-2341	EA		9" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	90.33	11.24
26 05 36 00-2342	EA		12" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	105.94	13.94
26 05 36 00-2343	EA		18" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	126.37	15.53
26 05 36 00-2344	EA		24" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	154.57	21.65
26 05 36 00-2345	EA		30" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	192.25	25.56
26 05 36 00-2346	EA		36" Vertical Riser 90 Degree, 36" Radius, Aluminum Cable Tray Cover.....	209.71	29.34
26 05 36 00-2347			12" Radius Horizontal Tees <small>(26 05 36 00-2266)</small>		
26 05 36 00-2348	EA		6" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	92.78	12.72
26 05 36 00-2349	EA		9" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	100.42	14.67
26 05 36 00-2350	EA		12" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	113.57	17.24
26 05 36 00-2351	EA		18" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	133.23	19.56
26 05 36 00-2352	EA		24" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	165.02	22.62
26 05 36 00-2353	EA		30" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	203.95	32.53
26 05 36 00-2354	EA		36" Horizontal Tee, 12" Radius, Aluminum Cable Tray Cover.....	246.05	39.01
26 05 36 00-2355			24" Radius Horizontal Tees <small>(26 05 36 00-2266)</small>		
26 05 36 00-2356	EA		6" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	138.42	13.33
26 05 36 00-2357	EA		9" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	155.41	15.53
26 05 36 00-2358	EA		12" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	175.77	18.34
26 05 36 00-2359	EA		18" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	204.78	21.04
26 05 36 00-2360	EA		24" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	311.01	24.45
26 05 36 00-2361	EA		30" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	360.58	36.68
26 05 36 00-2362	EA		36" Horizontal Tee, 24" Radius, Aluminum Cable Tray Cover.....	408.11	45.12
26 05 36 00-2363			36" Radius Horizontal Tees <small>(26 05 36 00-2266)</small>		
26 05 36 00-2364	EA		6" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	235.49	13.94
26 05 36 00-2365	EA		9" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	243.88	16.27
26 05 36 00-2366	EA		12" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	271.71	19.56
26 05 36 00-2367	EA		18" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	308.07	22.62
26 05 36 00-2368	EA		24" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	388.59	26.66



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-2369 EA 30" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	456.59	42.06
26 05 36 00-2370 EA 36" Horizontal Tee, 36" Radius, Aluminum Cable Tray Cover.....	524.35	53.19
26 05 36 00-2371 12" Radius Horizontal Crosses (26 05 36 00-2266)		
26 05 36 00-2372 EA 6" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	138.21	17.24
26 05 36 00-2373 EA 9" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	146.75	18.34
26 05 36 00-2374 EA 12" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	162.28	19.56
26 05 36 00-2375 EA 18" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	194.06	22.62
26 05 36 00-2376 EA 24" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	235.18	32.53
26 05 36 00-2377 EA 30" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	279.49	39.01
26 05 36 00-2378 EA 36" Horizontal Cross, 12" Radius, Aluminum Cable Tray Cover.....	317.83	41.94
26 05 36 00-2379 24" Radius Horizontal Crosses (26 05 36 00-2266)		
26 05 36 00-2380 EA 6" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	245.10	18.34
26 05 36 00-2381 EA 9" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	262.78	19.56
26 05 36 00-2382 EA 12" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	282.98	21.04
26 05 36 00-2383 EA 18" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	328.89	24.45
26 05 36 00-2384 EA 24" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	405.22	36.68
26 05 36 00-2385 EA 30" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	477.29	45.12
26 05 36 00-2386 EA 36" Horizontal Cross, 24" Radius, Aluminum Cable Tray Cover.....	517.04	48.79
26 05 36 00-2387 36" Radius Horizontal Crosses (26 05 36 00-2266)		
26 05 36 00-2388 EA 6" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	376.72	19.56
26 05 36 00-2389 EA 9" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	394.70	21.04
26 05 36 00-2390 EA 12" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	424.26	22.62
26 05 36 00-2391 EA 18" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	469.03	26.66
26 05 36 00-2392 EA 24" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	595.06	41.94
26 05 36 00-2393 EA 30" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	692.31	53.44
26 05 36 00-2394 EA 36" Horizontal Cross, 36" Radius, Aluminum Cable Tray Cover.....	756.94	58.70
26 05 36 00-2395 Reducers (26 05 36 00-2266)		
26 05 36 00-2396 EA 9" To 6" Reducer, Aluminum Cable Tray Covers.....	70.03	9.17
26 05 36 00-2397 EA 12" To 6" Reducer, Aluminum Cable Tray Covers.....	75.07	10.88
26 05 36 00-2398 EA 12" To 9" Reducer, Aluminum Cable Tray Covers.....	75.07	10.88
26 05 36 00-2399 EA 18" To 6" Reducer, Aluminum Cable Tray Covers.....	84.79	13.33
26 05 36 00-2400 EA 18" To 12" Reducer, Aluminum Cable Tray Covers.....	84.79	13.33
26 05 36 00-2401 EA 24" To 12" Reducer, Aluminum Cable Tray Covers.....	93.71	14.67
26 05 36 00-2402 EA 24" To 18" Reducer, Aluminum Cable Tray Covers.....	102.61	14.67
26 05 36 00-2403 EA 30" To 12" Reducer, Aluminum Cable Tray Covers.....	108.41	16.76
26 05 36 00-2404 EA 30" To 18" Reducer, Aluminum Cable Tray Covers.....	111.73	16.76
26 05 36 00-2405 EA 30" To 24" Reducer, Aluminum Cable Tray Covers.....	114.02	16.76
26 05 36 00-2406 EA 36" To 12" Reducer, Aluminum Cable Tray Covers.....	119.88	18.34
26 05 36 00-2407 EA 36" To 18" Reducer, Aluminum Cable Tray Covers.....	122.12	18.34
26 05 36 00-2408 EA 36" To 24" Reducer, Aluminum Cable Tray Covers.....	123.23	18.34
26 05 36 00-2409 EA 36" To 30" Reducer, Aluminum Cable Tray Covers.....	124.35	18.34
26 05 36 00-2410 Galvanized Steel Dividers (26 05 36 00-2121)		
26 05 36 00-2411 Straight Dividers (26 05 36 00-2410)		
26 05 36 00-2412 LF 3" Deep Galvanized Steel Divider Strip, Straight.....	11.18	2.94
26 05 36 00-2413 LF 4" Deep Galvanized Steel Divider Strip, Straight.....	13.17	3.18
26 05 36 00-2414 LF 6" Deep Galvanized Steel Divider Strip, Straight.....	16.29	3.67
26 05 36 00-2415 3" Deep Vertical Dividers (26 05 36 00-2410)		
26 05 36 00-2416 EA Vertical Divider, 3" Deep, 12" Radius, 30 Degree, Steel Cable Tray.....	65.86	21.04
26 05 36 00-2417 EA Vertical Divider, 3" Deep, 12" Radius, 45 Degree, Steel Cable Tray.....	74.97	21.77
26 05 36 00-2418 EA Vertical Divider, 3" Deep, 12" Radius, 60 Degree, Steel Cable Tray.....	78.83	22.62
26 05 36 00-2419 EA Vertical Divider, 3" Deep, 12" Radius, 90 Degree, Steel Cable Tray.....	90.60	23.48
26 05 36 00-2420 EA Vertical Divider, 3" Deep, 24" Radius, 30 Degree, Steel Cable Tray.....	86.02	23.48
26 05 36 00-2421 EA Vertical Divider, 3" Deep, 24" Radius, 45 Degree, Steel Cable Tray.....	93.33	24.45
26 05 36 00-2422 EA Vertical Divider, 3" Deep, 24" Radius, 60 Degree, Steel Cable Tray.....	108.89	25.56
26 05 36 00-2423 EA Vertical Divider, 3" Deep, 24" Radius, 90 Degree, Steel Cable Tray.....	134.86	26.66
26 05 36 00-2424 EA Vertical Divider, 3" Deep, 36" Radius, 30 Degree, Steel Cable Tray.....	107.41	26.66
26 05 36 00-2425 EA Vertical Divider, 3" Deep, 36" Radius, 45 Degree, Steel Cable Tray.....	119.78	28.00
26 05 36 00-2426 EA Vertical Divider, 3" Deep, 36" Radius, 60 Degree, Steel Cable Tray.....	134.69	29.34
26 05 36 00-2427 EA Vertical Divider, 3" Deep, 36" Radius, 90 Degree, Steel Cable Tray.....	170.43	30.94
26 05 36 00-2428 4" Deep Vertical Dividers (26 05 36 00-2410)		
26 05 36 00-2429 EA Vertical Divider, 4" Deep, 12" Radius, 30 Degree, Steel Cable Tray.....	75.54	21.77
26 05 36 00-2430 EA Vertical Divider, 4" Deep, 12" Radius, 45 Degree, Steel Cable Tray.....	83.41	22.62
26 05 36 00-2431 EA Vertical Divider, 4" Deep, 12" Radius, 60 Degree, Steel Cable Tray.....	90.60	23.48
26 05 36 00-2432 EA Vertical Divider, 4" Deep, 12" Radius, 90 Degree, Steel Cable Tray.....	103.62	24.45
26 05 36 00-2433 EA Vertical Divider, 4" Deep, 24" Radius, 30 Degree, Steel Cable Tray.....	103.62	24.45

26 Electrical**26 05 Common Work Results for Electrical****26 05 36 Cable Trays for Electrical Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 36 00-2434	EA	Vertical Divider, 4" Deep, 24" Radius, 45 Degree, Steel Cable Tray	121.47	25.56
26 05 36 00-2435	EA	Vertical Divider, 4" Deep, 24" Radius, 60 Degree, Steel Cable Tray	133.72	26.66
26 05 36 00-2436	EA	Vertical Divider, 4" Deep, 24" Radius, 90 Degree, Steel Cable Tray	165.53	28.00
26 05 36 00-2437	EA	Vertical Divider, 4" Deep, 36" Radius, 30 Degree, Steel Cable Tray	115.75	25.56
26 05 36 00-2438	EA	Vertical Divider, 4" Deep, 36" Radius, 45 Degree, Steel Cable Tray	128.00	26.66
26 05 36 00-2439	EA	Vertical Divider, 4" Deep, 36" Radius, 60 Degree, Steel Cable Tray	151.80	28.00
26 05 36 00-2440	EA	Vertical Divider, 4" Deep, 36" Radius, 90 Degree, Steel Cable Tray	191.87	29.34
26 05 36 00-2441		6" Deep Vertical Dividers <small>(26 05 36 00-2410)</small>		
26 05 36 00-2442	EA	Vertical Divider, 6" Deep, 12" Radius, 30 Degree, Steel Cable Tray	83.61	24.45
26 05 36 00-2443	EA	Vertical Divider, 6" Deep, 12" Radius, 45 Degree, Steel Cable Tray	90.59	25.56
26 05 36 00-2444	EA	Vertical Divider, 6" Deep, 12" Radius, 60 Degree, Steel Cable Tray	99.41	26.66
26 05 36 00-2445	EA	Vertical Divider, 6" Deep, 12" Radius, 90 Degree, Steel Cable Tray	115.20	28.00
26 05 36 00-2446	EA	Vertical Divider, 6" Deep, 24" Radius, 30 Degree, Steel Cable Tray	105.45	25.56
26 05 36 00-2447	EA	Vertical Divider, 6" Deep, 24" Radius, 45 Degree, Steel Cable Tray	123.43	26.66
26 05 36 00-2448	EA	Vertical Divider, 6" Deep, 24" Radius, 60 Degree, Steel Cable Tray	136.93	28.00
26 05 36 00-2449	EA	Vertical Divider, 6" Deep, 24" Radius, 90 Degree, Steel Cable Tray	167.86	29.34
26 05 36 00-2450	EA	Vertical Divider, 6" Deep, 36" Radius, 30 Degree, Steel Cable Tray	117.71	26.66
26 05 36 00-2451	EA	Vertical Divider, 6" Deep, 36" Radius, 45 Degree, Steel Cable Tray	136.93	28.00
26 05 36 00-2452	EA	Vertical Divider, 6" Deep, 36" Radius, 60 Degree, Steel Cable Tray	167.86	29.34
26 05 36 00-2453	EA	Vertical Divider, 6" Deep, 36" Radius, 90 Degree, Steel Cable Tray	204.74	30.94
26 05 36 00-2454		Horizontal Dividers <small>(26 05 36 00-2410)</small>		
26 05 36 00-2455	EA	3" Deep Horizontal Fitting Divider Strip, Steel Cable Tray	73.62	17.73
26 05 36 00-2456	EA	4" Deep Horizontal Fitting Divider Strip, Steel Cable Tray	81.83	19.56
26 05 36 00-2457	EA	6" Deep Horizontal Fitting Divider Strip, Steel Cable Tray	99.10	21.77
26 05 36 00-2458		Aluminum Dividers <small>(26 05 36 00-2121)</small>		
26 05 36 00-2459		Straight Dividers <small>(26 05 36 00-2458)</small>		
26 05 36 00-2460	LF	3" Deep Aluminum Divider Strip, Straight	10.79	2.82
26 05 36 00-2461	LF	4" Deep Aluminum Divider Strip, Straight	12.73	3.06
26 05 36 00-2462	LF	6" Deep Aluminum Divider Strip, Straight	15.69	3.43
26 05 36 00-2463		3" Deep Vertical Dividers <small>(26 05 36 00-2458)</small>		
26 05 36 00-2464	EA	Vertical Divider, 3" Deep, 12" Radius, 30 Degree, Aluminum Cable Tray.....	58.23	20.29
26 05 36 00-2465	EA	Vertical Divider, 3" Deep, 12" Radius, 45 Degree, Aluminum Cable Tray.....	63.85	21.04
26 05 36 00-2466	EA	Vertical Divider, 3" Deep, 12" Radius, 60 Degree, Aluminum Cable Tray.....	69.98	21.77
26 05 36 00-2467	EA	Vertical Divider, 3" Deep, 12" Radius, 90 Degree, Aluminum Cable Tray.....	80.42	22.62
26 05 36 00-2468	EA	Vertical Divider, 3" Deep, 24" Radius, 30 Degree, Aluminum Cable Tray.....	78.29	22.62
26 05 36 00-2469	EA	Vertical Divider, 3" Deep, 24" Radius, 45 Degree, Aluminum Cable Tray.....	86.17	23.48
26 05 36 00-2470	EA	Vertical Divider, 3" Deep, 24" Radius, 60 Degree, Aluminum Cable Tray.....	99.52	24.45
26 05 36 00-2471	EA	Vertical Divider, 3" Deep, 24" Radius, 90 Degree, Aluminum Cable Tray.....	122.73	25.56
26 05 36 00-2472	EA	Vertical Divider, 3" Deep, 36" Radius, 30 Degree, Aluminum Cable Tray.....	104.56	25.56
26 05 36 00-2473	EA	Vertical Divider, 3" Deep, 36" Radius, 45 Degree, Aluminum Cable Tray.....	124.69	26.66
26 05 36 00-2474	EA	Vertical Divider, 3" Deep, 36" Radius, 60 Degree, Aluminum Cable Tray.....	150.28	28.00
26 05 36 00-2475	EA	Vertical Divider, 3" Deep, 36" Radius, 90 Degree, Aluminum Cable Tray.....	184.68	29.34
26 05 36 00-2476		4" Deep Vertical Dividers <small>(26 05 36 00-2458)</small>		
26 05 36 00-2477	EA	Vertical Divider, 4" Deep, 12" Radius, 30 Degree, Aluminum Cable Tray.....	69.51	21.04
26 05 36 00-2478	EA	Vertical Divider, 4" Deep, 12" Radius, 45 Degree, Aluminum Cable Tray.....	76.29	21.77
26 05 36 00-2479	EA	Vertical Divider, 4" Deep, 12" Radius, 60 Degree, Aluminum Cable Tray.....	83.63	22.62
26 05 36 00-2480	EA	Vertical Divider, 4" Deep, 12" Radius, 90 Degree, Aluminum Cable Tray.....	93.65	23.48
26 05 36 00-2481	EA	Vertical Divider, 4" Deep, 24" Radius, 30 Degree, Aluminum Cable Tray.....	92.58	23.48
26 05 36 00-2482	EA	Vertical Divider, 4" Deep, 24" Radius, 45 Degree, Aluminum Cable Tray.....	107.00	24.45
26 05 36 00-2483	EA	Vertical Divider, 4" Deep, 24" Radius, 60 Degree, Aluminum Cable Tray.....	120.59	25.56
26 05 36 00-2484	EA	Vertical Divider, 4" Deep, 24" Radius, 90 Degree, Aluminum Cable Tray.....	151.42	26.66
26 05 36 00-2485	EA	Vertical Divider, 4" Deep, 36" Radius, 30 Degree, Aluminum Cable Tray.....	124.11	24.45
26 05 36 00-2486	EA	Vertical Divider, 4" Deep, 36" Radius, 45 Degree, Aluminum Cable Tray.....	149.46	25.56
26 05 36 00-2487	EA	Vertical Divider, 4" Deep, 36" Radius, 60 Degree, Aluminum Cable Tray.....	174.94	26.66
26 05 36 00-2488	EA	Vertical Divider, 4" Deep, 36" Radius, 90 Degree, Aluminum Cable Tray.....	211.22	28.00
26 05 36 00-2489		6" Deep Vertical Dividers <small>(26 05 36 00-2458)</small>		
26 05 36 00-2490	EA	Vertical Divider, 6" Deep, 12" Radius, 30 Degree, Aluminum Cable Tray.....	76.98	23.48
26 05 36 00-2491	EA	Vertical Divider, 6" Deep, 12" Radius, 45 Degree, Aluminum Cable Tray.....	85.62	24.45
26 05 36 00-2492	EA	Vertical Divider, 6" Deep, 12" Radius, 60 Degree, Aluminum Cable Tray.....	89.59	25.56
26 05 36 00-2493	EA	Vertical Divider, 6" Deep, 12" Radius, 90 Degree, Aluminum Cable Tray.....	100.10	26.66
26 05 36 00-2494	EA	Vertical Divider, 6" Deep, 24" Radius, 30 Degree, Aluminum Cable Tray.....	96.31	24.45
26 05 36 00-2495	EA	Vertical Divider, 6" Deep, 24" Radius, 45 Degree, Aluminum Cable Tray.....	118.46	25.56
26 05 36 00-2496	EA	Vertical Divider, 6" Deep, 24" Radius, 60 Degree, Aluminum Cable Tray.....	127.90	26.66
26 05 36 00-2497	EA	Vertical Divider, 6" Deep, 24" Radius, 90 Degree, Aluminum Cable Tray.....	159.90	28.00
26 05 36 00-2498	EA	Vertical Divider, 6" Deep, 36" Radius, 30 Degree, Aluminum Cable Tray.....	127.01	25.56
26 05 36 00-2499	EA	Vertical Divider, 6" Deep, 36" Radius, 45 Degree, Aluminum Cable Tray.....	157.83	26.66
26 05 36 00-2500	EA	Vertical Divider, 6" Deep, 36" Radius, 60 Degree, Aluminum Cable Tray.....	180.22	28.00



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 36 00-2501 EA Vertical Divider, 6" Deep, 36" Radius, 90 Degree, Aluminum Cable Tray	209.27	29.34
26 05 36 00-2502 Horizontal Dividers <small>(26 05 36 00-2458)</small>		
26 05 36 00-2503 EA 3" Deep Horizontal Fitting Divider Strip, Aluminum Cable Tray	66.91	16.76
26 05 36 00-2504 EA 4" Deep Horizontal Fitting Divider Strip, Aluminum Cable Tray	73.33	18.34
26 05 36 00-2505 EA 6" Deep Horizontal Fitting Divider Strip, Aluminum Cable Tray	90.41	20.29
26 05 36 00-2506 Cable Tray Wall Brackets <small>(26 05 36 00-0001)</small>		
26 05 36 00-2507 Wall Brackets <small>(26 05 36 00-2506)</small>		
26 05 36 00-2508 EA 6" Wide Cable Tray Wall Bracket.....	90.72	24.45
26 05 36 00-2509 EA 9" Wide Cable Tray Wall Bracket.....	93.97	25.56
26 05 36 00-2510 EA 12" Wide Cable Tray Wall Bracket.....	103.08	26.66
26 05 36 00-2511 EA 18" Wide Cable Tray Wall Bracket.....	109.43	28.00
26 05 36 00-2512 EA 24" Wide Cable Tray Wall Bracket.....	118.90	29.34
26 05 36 00-2513 EA 30" Wide Cable Tray Wall Bracket.....	141.46	30.94
26 05 36 00-2514 EA 36" Wide Cable Tray Wall Bracket.....	169.30	33.01
26 05 39 Underfloor Raceways for Electrical Systems <small>(26 05)</small>		
26 05 39 00-0001 Underfloor Ducts <small>(26 05 39)</small>		
26 05 39 00-0002 Straight Duct Sections 10' Long, 14 Gauge Steel <small>(26 05 39 00-0001)</small>		
26 05 39 00-0003 Standard Ducts, 3.8 Square Inches <small>(26 05 39 00-0002)</small>		
26 05 39 00-0004 EA Standard Underfloor Straight Duct Blank Without Inserts, 10' Long, 14 Gauge, 3.8 Square Inches.....	108.07	21.52
26 05 39 00-0005 EA Standard Underfloor Straight Duct With 7/8" Inserts On 24" Centers, 10' Long, 14 Gauge, 3.8 Square Inches.....	136.30	25.19
26 05 39 00-0006 Large Capacity Ducts, 8.9 Square Inches <small>(26 05 39 00-0002)</small>		
26 05 39 00-0007 EA Large Capacity Underfloor Straight Duct Blank Without Inserts, 10' Long, 14 Gauge, 8.9 Square Inches	181.11	27.27
26 05 39 00-0008 EA Large Capacity Underfloor Straight Duct With 7/8" Inserts On 24" Centers, 10' Long, 14 Gauge, 8.9 Square Inches.....	207.57	30.21
26 05 39 00-0009 Junction Boxes <small>(26 05 39 00-0001)</small>		
26 05 39 00-0010 One Level Junction Boxes <small>(26 05 39 00-0009)</small>		
26 05 39 00-0011 EA 1 Level UF Duct Junction Box, 1 Standard Duct Without Partitions In Box.....	275.92	42.79
26 05 39 00-0012 EA 1 Level UF Duct Junction Box, 1 Large Duct Without Partitions In Box	312.70	45.85
26 05 39 00-0013 EA 1 Level UF Duct Junction Box, 1 Standard And Large Duct Per Side With Partitions In Box	506.79	42.79
Note: Isolate each duct and form a continuous raceway through the box in both directions.		
26 05 39 00-0014 EA 1 Level UF Duct Junction Box, 2 Standard Ducts Per Side With Partitions In Box	342.82	45.85
26 05 39 00-0015 EA 1 Level UF Duct Junction Box, 3 Standard Ducts Per Side With Partitions In Box	545.63	60.28
26 05 39 00-0016 EA 1 Level UF Duct Junction Box, 2 Large Ducts Per Side With Partitions In Box Duct	767.94	65.54
26 05 39 00-0017 Two Level Junction Boxes <small>(26 05 39 00-0009)</small>		
26 05 39 00-0018 EA 2 Level UF Duct Junction Box, 2 Standard Duct Cross, Intersects At Right Angles, Raceway Bottom Level.....	1,176.95	43.28
Note: Accepts two standard ducts to form a continuous raceway at right angles to the top level raceway.		
26 05 39 00-0019 EA 2 Level UF Duct Junction Box, 2 Large Duct Bottom Level: Accepts Two Large Capacity Ducts.....	1,354.66	45.85
26 05 39 00-0020 Elbow Fittings <small>(26 05 39 00-0001)</small>		
26 05 39 00-0021 90 Degree Horizontal Elbow <small>(26 05 39 00-0020)</small>		
26 05 39 00-0022 EA Underfloor Standard Duct Horizontal Elbow Fitting, 90 Degree	135.40	15.77
26 05 39 00-0023 EA Underfloor Large Duct Horizontal Elbow Fitting, 90 Degree	139.54	15.77
26 05 39 00-0024 90 Degree Vertical Elbow <small>(26 05 39 00-0020)</small>		
26 05 39 00-0025 EA Underfloor Standard Duct Vertical Elbow Fitting, 90 Degree	75.17	15.77
26 05 39 00-0026 EA Underfloor Large Duct Vertical Elbow Fitting, 90 Degree	76.83	15.77
26 05 39 00-0027 Offset Elbow <small>(26 05 39 00-0020)</small>		
Note: Two elbows required for crossover or crossunder.		
26 05 39 00-0028 EA Underfloor Standard Duct Offset Elbow 45 Degree, 2 Required For Over-Under.....	75.17	18.34
26 05 39 00-0029 EA Underfloor Large Duct Offset Elbow 45 Degree, 2 Required For Over-Under	76.83	18.34
26 05 39 00-0030 Couplings <small>(26 05 39 00-0001)</small>		
26 05 39 00-0031 Sleeve Couplings <small>(26 05 39 00-0030)</small>		
26 05 39 00-0032 EA Underfloor Standard Duct Sleeve Coupling	47.78	24.45
26 05 39 00-0033 EA Underfloor Large Duct Sleeve Coupling	74.14	24.45

26 Electrical**26 05 Common Work Results for Electrical****26 05 39 Underfloor Raceways for Electrical Systems**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 39 00-0034			Expansion Couplings (26 05 39 00-0030)		
	26 05 39 00-0035	EA	Underfloor Standard Duct Expansion Coupling	107.44	24.45
	26 05 39 00-0036	EA	Underfloor Large Duct Expansion Coupling	109.51	25.80
26 05 39 00-0037			Reducing Couplings (26 05 39 00-0030)		
	26 05 39 00-0038	EA	Reducing Coupling, Large To Standard Duct Underfloor Duct Coupling	106.10	3.67
26 05 39 00-0039			Duct Supports (26 05 39 00-0001)		
26 05 39 00-0040			Combination Support And Coupling (26 05 39 00-0039)		
			Note: Includes leveling legs and anchoring feet.		
	26 05 39 00-0041	EA	1 Standard Duct Support And Coupling With Legs With Leveling Legs And Anchor Feet	109.47	51.35
	26 05 39 00-0042	EA	2 Standard Duct Support And Coupling With Legs With Leveling Legs And Anchor Feet	121.98	51.35
	26 05 39 00-0043	EA	3 Standard Duct Support And Coupling With Legs With Leveling Legs And Anchor Feet	134.57	51.35
	26 05 39 00-0044	EA	1 Large Duct Support And Coupling With Legs With Leveling Legs And Anchor Feet	121.98	57.48
	26 05 39 00-0045	EA	2 Large Duct Support And Coupling With Legs With Leveling Legs And Anchor Feet	147.46	57.48
	26 05 39 00-0046	EA	1 Standard And 1 Large Duct Support And Coupling With Leveling Legs And Anchor Feet	134.57	61.14
	26 05 39 00-0047	EA	2 Standard And 1 Large Duct Support And Coupling With Leveling Legs And Anchor Feet	134.57	61.14
	26 05 39 00-0048	EA	1 Standard And 2 Large Duct Support And Coupling With Leveling Legs And Anchor Feet	147.46	61.14
26 05 39 00-0049			Duct Support Only (26 05 39 00-0039)		
			Note: Includes leveling legs and anchoring feet.		
	26 05 39 00-0050	EA	1 Underfloor Duct Support Only With Leveling Legs And Anchor Feet	98.80	45.24
	26 05 39 00-0051	EA	2 Underfloor Duct Support Only With Leveling Legs And Anchor Feet	116.26	45.24
	26 05 39 00-0052	EA	3 Underfloor Duct Support Only With Leveling Legs And Anchor Feet	135.08	45.24
26 05 39 00-0053			Underfloor Duct Accessories (26 05 39 00-0001)		
26 05 39 00-0054			Plugs For Unused Junction Box Openings And Duct Ends (26 05 39 00-0053)		
	26 05 39 00-0055	EA	Standard Plugs For Unused Junction Box Opening And Underfloor Duct Ends	28.81	3.67
	26 05 39 00-0056	EA	Large Plugs For Unused Junction Box Opening And Underfloor Duct Ends	29.45	3.67
26 05 39 00-0057			Conduit Adapters (26 05 39 00-0053)		
	26 05 39 00-0058	EA	One 1-1/4" Conduit To Standard Duct Underfloor Conduit To Duct, Adapter	40.30	6.11
	26 05 39 00-0059	EA	Two 1-1/4" Conduit To Standard Duct Underfloor Conduit To Duct, Adapter	42.80	6.11
	26 05 39 00-0060	EA	One 2" Conduit To Standard Duct Underfloor Conduit To Duct, Adapter	41.56	6.11
	26 05 39 00-0061	EA	Three 1-1/4" Conduit To Large Duct Underfloor Conduit To Duct, Adapter	42.85	6.11
26 05 39 00-0062			Holders And Caps (26 05 39 00-0053)		
	26 05 39 00-0063	EA	Tile Holder, Underfloor Duct Accessories	259.41	51.35
	26 05 39 00-0064	EA	Terrazzo Holder, Underfloor Duct Accessories	498.00	51.35
	26 05 39 00-0065	EA	Closing Caps For Inserts, Underfloor Duct Accessories	3.35	1.22
26 05 39 00-0066			Underfloor Dust Pans (26 05 39 00-0001)		
	26 05 39 00-0067	EA	Underfloor Dust Carpet Pan	113.68	6.71

26 05 43 Underground Ducts and Raceways for Electrical Systems (26 05)

Note: Includes warning tape. See CSI section 33 71 19 23-0000 for underground trenched ductbank.

26 05 53 Identification for Electrical Systems (26 05)

26 05 53 00-0001			Conduit Markers Pressure-Sensitive (26 05 53)		
			Note: Stick-on, includes arrow tape.		
	26 05 53 00-0002	EA	1/2" Outside Diameter Pressure Sensitive Marker Stick-on	13.80	
	26 05 53 00-0003	EA	3/4" Outside Diameter Pressure Sensitive Marker Stick-on	14.41	
	26 05 53 00-0004	EA	1" Outside Diameter Pressure Sensitive Marker Stick-on	15.64	
	26 05 53 00-0005	EA	1-1/4" Outside Diameter Pressure Sensitive Marker Stick-on	15.89	
	26 05 53 00-0006	EA	1-1/2" Outside Diameter Pressure Sensitive Marker Stick-on	16.13	
	26 05 53 00-0007	EA	2" Outside Diameter Pressure Sensitive Marker Stick-on	16.50	
	26 05 53 00-0008	EA	2-1/2" Outside Diameter Pressure Sensitive Marker Stick-on	19.38	
	26 05 53 00-0009	EA	3" Outside Diameter Pressure Sensitive Marker Stick-on	19.87	
	26 05 53 00-0010	EA	3-1/2" Outside Diameter Pressure Sensitive Marker Stick-on	20.23	
	26 05 53 00-0011	EA	4" Outside Diameter Pressure Sensitive Marker Stick-on	20.61	
	26 05 53 00-0012	EA	4-1/2" Outside Diameter Pressure Sensitive Marker Stick-on	21.38	
	26 05 53 00-0013	EA	5" Outside Diameter Pressure Sensitive Marker Stick-on	22.19	
	26 05 53 00-0014	EA	6" Outside Diameter Pressure Sensitive Marker Stick-on	22.92	
	26 05 53 00-0015	EA	7" Outside Diameter Pressure Sensitive Marker Stick-on	23.64	
	26 05 53 00-0016	EA	8" Outside Diameter Pressure Sensitive Marker Stick-on	25.98	
	26 05 53 00-0017	EA	10" Outside Diameter Pressure Sensitive Marker Stick-on	27.32	

26 05 53 00-0018 Labeling Existing Electrical Wires (26 05 53)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
Note: Self-adhesive vinyl coated white cloth		
26 05 53 00-0019 EA Labeling Existing Wire	3.77	
26 05 53 00-0020 Equipment Labeling (26 05 53)		
26 05 53 00-0021 EA Label Both Ends Of One 4 Pair Cable	24.07	
26 05 53 00-0022 EA Label single gang face plate (2 labels required)	19.25	
26 05 53 00-0023 EA Label two gang face plate (4 labels required)	28.88	
26 05 53 00-0024 EA Label both ends of a Siamese (dual 4 Pair cable)	24.07	
26 05 83 Wiring Connections (26 05)		
26 05 83 00-0001 Tape Wrapped Compression Connectors (26 05 83)		
26 05 83 00-0002 EA #6 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	15.63	5.50
26 05 83 00-0003 EA #4 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	17.07	6.11
26 05 83 00-0004 EA #2 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	18.36	6.72
26 05 83 00-0005 EA 1/0 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	21.09	7.34
26 05 83 00-0006 EA 2/0 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	22.71	7.95
26 05 83 00-0007 EA 3/0 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	25.11	8.56
26 05 83 00-0008 EA 4/0 AWG Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	26.90	9.17
26 05 83 00-0009 EA 250 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	29.25	9.78
26 05 83 00-0010 EA 300 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	32.40	11.00
26 05 83 00-0011 EA 350 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	34.03	11.62
26 05 83 00-0012 EA 400 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	37.62	12.23
26 05 83 00-0013 EA 500 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	40.79	12.84
26 05 83 00-0014 EA 750 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	45.48	14.06
26 05 83 00-0015 EA 1,000 MCM Compression Connection, Tape Wrapped Low Voltage, To 600 Volt	52.62	15.89
26 05 83 00-0016 One Hole Compression Lugs (26 05 83)		
26 05 83 00-0017 EA #22-18 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	20.87	15.89
26 05 83 00-0018 EA #16-14 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	21.00	15.89
26 05 83 00-0019 EA #12-10 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	23.75	17.12
26 05 83 00-0020 EA #8 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	29.18	18.95
26 05 83 00-0021 EA #6 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	41.10	24.45
26 05 83 00-0022 EA #4 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	48.27	24.45
26 05 83 00-0023 EA #2 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	55.54	24.45
26 05 83 00-0024 EA 1/0 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	68.53	36.68
26 05 83 00-0025 EA 2/0 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	80.43	36.68
26 05 83 00-0026 EA 3/0 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	94.14	36.68
26 05 83 00-0027 EA 4/0 AWG Low Voltage (To 600 Volt) One Hole Compression Lug	113.57	48.91
26 05 83 00-0028 EA 250 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	134.71	73.37
26 05 83 00-0029 EA 300 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	154.08	73.37
26 05 83 00-0030 EA 350 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	165.63	73.37
26 05 83 00-0031 EA 400 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	180.28	85.60
26 05 83 00-0032 EA 500 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	197.05	85.60
26 05 83 00-0033 EA 750 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	214.19	97.82
26 05 83 00-0034 EA 1,000 MCM Low Voltage (To 600 Volt) One Hole Compression Lug	251.18	110.05
26 05 83 00-0035 Tape Wrapped Split Bolt Connectors (26 05 83)		
26 05 83 00-0036 EA #8 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	63.88	48.91
26 05 83 00-0037 EA #6 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	70.24	52.58
26 05 83 00-0038 EA #4 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	80.04	55.03
26 05 83 00-0039 EA #2 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	92.75	61.14
26 05 83 00-0040 EA 1/0 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	109.32	67.26
26 05 83 00-0041 EA 2/0 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	122.00	73.37
26 05 83 00-0042 EA 3/0 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	152.28	79.48
26 05 83 00-0043 EA 4/0 AWG Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	163.35	85.60
26 05 83 00-0044 EA 250 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	172.09	91.71
26 05 83 00-0045 EA 300 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	195.53	100.88
26 05 83 00-0046 EA 350 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	218.95	146.73
26 05 83 00-0047 EA 400 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	239.54	122.28
26 05 83 00-0048 EA 500 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	260.12	165.08
26 05 83 00-0049 EA 750 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	287.13	171.20
26 05 83 00-0050 EA 1,000 MCM Split Bolt Connectors, Wrapped, Low Voltage, To 600 Volt	323.64	183.42
26 05 83 00-0051 Cable Termination Lugs Handwrapped, No Stress Cone (26 05 83)		
26 05 83 00-0052 EA #8 Or #6 AWG Cable Termination Lugs, Wrapped, No Stress Cones, Low Volt, To 600 Volt	103.54	48.91
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	25.68	
26 05 83 00-0053 EA #4 AWG Cable Termination Lugs, Wrapped, No Stress Cones, Low Volt, To 600 Volt	115.44	48.91
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.11	
26 05 83 00-0054 EA 1/0 AWG Cable Termination Lugs, Wrapped, No Stress Cones, Low Volt, To 600 Volt	160.04	73.37
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	40.76	
26 05 83 00-0055 EA 4/0 AWG Cable Termination Lugs, Wrapped, No Stress Cones, Low Volt, To 600 Volt	182.02	73.37
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	47.03	
26 05 83 00-0056 EA 300 MCM Cable Termination Lugs, Wrapped, No Stress Cones, Low Volt, To 600 Volt	217.50	91.71
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	55.58	

26 Electrical**26 05 Common Work Results for Electrical****26 05 83 Wiring Connections**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 05 83 00-0057	EA	500 MCM Cable Termination Lugs, Wrapped, No Stress Cones, Low Volt, To 600 Volt <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	303.39 76.43	122.28
26 05 83 00-0058 Parallel Gutter Tap Or Motor Connection (26 05 83)				
26 05 83 00-0059	EA	#8 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	42.51	22.13
26 05 83 00-0060	EA	#6 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	45.60	22.13
26 05 83 00-0061	EA	#4 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	48.12	22.13
26 05 83 00-0062	EA	#2 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	55.37	25.44
26 05 83 00-0063	EA	1/0 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	68.35	31.79
26 05 83 00-0064	EA	2/0 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	80.24	37.78
26 05 83 00-0065	EA	3/0 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	93.93	44.27
26 05 83 00-0066	EA	4/0 AWG Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	113.33	53.68
26 05 83 00-0067	EA	250 MCM Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	134.43	63.71
26 05 83 00-0068	EA	300 MCM Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	153.75	72.76
26 05 83 00-0069	EA	350 MCM Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	165.29	78.38
26 05 83 00-0070	EA	400 MCM Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	179.88	84.87
26 05 83 00-0071	EA	500 MCM Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	196.61	92.68
26 05 83 00-0072	EA	750 MCM Parallel Gutter Tap, Versitap, Insulation With Duct Seal And Tap	197.01	92.68
26 05 83 00-0073	EA	#8 AWG Parallel Gutter Tap, Versitap, Insulating Cover	42.51	22.13
26 05 83 00-0074	EA	#6 AWG Parallel Gutter Tap, Versitap, Insulating Cover	45.60	22.13
26 05 83 00-0075	EA	#4 AWG Parallel Gutter Tap, Versitap, Insulating Cover	48.12	22.13
26 05 83 00-0076	EA	#2 AWG Parallel Gutter Tap, Versitap, Insulating Cover	55.37	25.44
26 05 83 00-0077	EA	1/0 AWG Parallel Gutter Tap, Versitap, Insulating Cover	68.35	31.79
26 05 83 00-0078	EA	2/0 AWG Parallel Gutter Tap, Versitap, Insulating Cover	80.24	37.78
26 05 83 00-0079	EA	3/0 AWG Parallel Gutter Tap, Versitap, Insulating Cover	93.93	44.27
26 05 83 00-0080	EA	4/0 AWG Parallel Gutter Tap, Versitap, Insulating Cover	113.33	53.68
26 05 83 00-0081	EA	250 MCM Parallel Gutter Tap, Versitap, Insulating Cover	134.43	63.71
26 05 83 00-0082	EA	300 MCM Parallel Gutter Tap, Versitap, Insulating Cover	153.75	72.76
26 05 83 00-0083	EA	350 MCM Parallel Gutter Tap, Versitap, Insulating Cover	165.29	78.38
26 05 83 00-0084	EA	400 MCM Parallel Gutter Tap, Versitap, Insulating Cover	179.88	84.87
26 05 83 00-0085	EA	500 MCM Parallel Gutter Tap, Versitap, Insulating Cover	196.61	92.68
26 05 83 00-0086	EA	750 MCM Parallel Gutter Tap, Versitap, Insulating Cover	197.01	92.68
26 05 83 00-0087 Copper Mechanical Lugs (26 05 83)				
26 05 83 00-0088	EA	#8 Copper Mechanical Lugs	34.66	15.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.17	
26 05 83 00-0089	EA	#6 Copper Mechanical Lugs	41.61	18.46
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.08	
26 05 83 00-0090	EA	#4 Copper Mechanical Lugs	48.08	21.40
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.84	
26 05 83 00-0091	EA	#2 Copper Mechanical Lugs	62.89	27.27
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.38	
26 05 83 00-0092	EA	1/0 Copper Mechanical Lugs	84.70	36.68
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 05 83 00-0093	EA	2/0 Copper Mechanical Lugs	100.94	42.55
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25.57	
26 05 83 00-0094	EA	3/0 Copper Mechanical Lugs	118.01	48.91
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 05 83 00-0095	EA	4/0 Copper Mechanical Lugs	134.31	54.90
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32.91	
26 05 83 00-0096	EA	250 MCM Copper Mechanical Lugs	153.75	61.14
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 05 83 00-0097	EA	300 MCM Copper Mechanical Lugs	172.89	67.26
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.37	
26 05 83 00-0098	EA	350 MCM Copper Mechanical Lugs	191.96	73.37
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.02	
26 05 83 00-0099	EA	400 MCM Copper Mechanical Lugs	210.89	79.48
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	47.65	
26 05 83 00-0100	EA	500 MCM Copper Mechanical Lugs	230.14	85.60
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	51.36	
26 05 83 00-0101	EA	750 MCM Copper Mechanical Lugs	260.84	97.45
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	58.51	
26 05 83 00-0102	EA	1,000 MCM Copper Mechanical Lugs	295.30	110.05
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66.03	
26 05 83 00-0103 Gel Connectors (26 05 83)				
26 05 83 00-0104	EA	3 Port, #14 to 2/0, Push On Gel Stub Splice Kit	67.54	
		Note: Kit contains connector, gel filled cap and cap clamp.		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.68	
26 05 83 00-0105	EA	4 Port, #14 to 2, Gel Tap Splice Kit	65.12	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4.41	
26 05 83 00-0106 Other Connections (26 05 83)				
26 05 83 00-0107	EA	#14 AWG Motor Connection, Spade Lug, Machine Bolt/Nut, Insulated With Tape	12.00	5.58
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.35	
26 05 83 00-0108	EA	#12 AWG Motor Connection, Spade Lug, Machine Bolt/Nut, Insulated With Tape	12.08	5.58
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3.35	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 05 83 00-0109 EA #10 AWG Motor Connection, Spade Lug, Machine Bolt/Nut, Insulated With Tape..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.16 3.35	5.58
26 05 83 00-0110 Motor/Equipment Connections And Terminations <small>(26 05 83)</small>		
<small>Note: Includes rotation testing. If equipment rating is other than horsepower (KW, CFM, tons, Btu/Hr, etc.) convert units to horsepower and select proper circuit characteristics. Includes material conduit (6 LF max.), connectors and conductors. To connect electrical wiring to all new or existing equipment motors. See CSI section 23 05 13 00-0000 for motors, 23 05 13 00-0216 for motor mounting.</small>		
26 05 83 00-0111 AC Single Phase, 230 Volt <small>(26 05 83 00-0110)</small>		
26 05 83 00-0112 EA <1/2 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	75.80	30.57
26 05 83 00-0113 EA 1/2 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	75.31	30.57
26 05 83 00-0114 EA 3/4 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	88.13	36.68
26 05 83 00-0115 EA 1 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	107.56	45.85
26 05 83 00-0116 EA 1-1/2 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	108.54	45.85
26 05 83 00-0117 EA 2 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	108.74	45.85
26 05 83 00-0118 EA 3 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	111.98	45.85
26 05 83 00-0119 EA 5 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	142.95	61.14
26 05 83 00-0120 EA 7-1/2 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	146.59	61.14
26 05 83 00-0121 EA 10 HP AC Motor Single Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	185.32	76.43
26 05 83 00-0122 AC Three Phase, 230 Volt <small>(26 05 83 00-0110)</small>		
26 05 83 00-0123 EA 1/2 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	75.31	30.57
26 05 83 00-0124 EA 3/4 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	88.13	36.68
26 05 83 00-0125 EA 1 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	107.56	45.85
26 05 83 00-0126 EA 1-1/2 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	108.54	45.85
26 05 83 00-0127 EA 2 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	108.74	45.85
26 05 83 00-0128 EA 3 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	111.98	45.85
26 05 83 00-0129 EA 5 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	142.95	61.14
26 05 83 00-0130 EA 7-1/2 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	146.59	61.14
26 05 83 00-0131 EA 10 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing	185.32	76.43
26 05 83 00-0132 EA 15 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	190.24	76.43
26 05 83 00-0133 EA 20 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	240.20	91.71
26 05 83 00-0134 EA 25 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	247.69	91.71
26 05 83 00-0135 EA 30 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	338.06	122.28
26 05 83 00-0136 EA 40 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	423.80	152.84
26 05 83 00-0137 EA 50 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	499.32	183.42
26 05 83 00-0138 EA 60 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	594.49	213.99
26 05 83 00-0139 EA 75 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	683.40	244.56
26 05 83 00-0140 EA 100 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	848.10	305.70
26 05 83 00-0141 EA 125 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	1,001.50	363.78
26 05 83 00-0142 EA 150 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	1,186.36	424.31
26 05 83 00-0143 EA 200 HP AC Motor Three Phase, 230 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	1,689.48	636.34
26 05 83 00-0144 AC Three Phase, 460 Volt <small>(26 05 83 00-0110)</small>		
26 05 83 00-0145 EA 1/2 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	75.31	30.57
26 05 83 00-0146 EA 3/4 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	88.13	36.68
26 05 83 00-0147 EA 1 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	107.56	45.85
26 05 83 00-0148 EA 1-1/2 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing	108.54	45.85
26 05 83 00-0149 EA 2 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	108.74	45.85
26 05 83 00-0150 EA 3 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	111.98	45.85
26 05 83 00-0151 EA 5 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	142.95	61.14
26 05 83 00-0152 EA 7-1/2 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing	146.59	61.14
26 05 83 00-0153 EA 10 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing	185.32	76.43
26 05 83 00-0154 EA 15 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	190.24	76.43
26 05 83 00-0155 EA 20 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	240.21	91.71
26 05 83 00-0156 EA 25 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	247.68	91.71
26 05 83 00-0157 EA 30 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	338.06	122.28
26 05 83 00-0158 EA 40 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	424.16	153.10
26 05 83 00-0159 EA 50 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	499.32	183.42
26 05 83 00-0160 EA 60 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	594.49	213.99
26 05 83 00-0161 EA 75 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	683.40	244.56
26 05 83 00-0162 EA 100 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	848.10	305.70
26 05 83 00-0163 EA 125 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	1,001.85	363.91
26 05 83 00-0164 EA 150 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	1,186.83	424.55
26 05 83 00-0165 EA 200 HP AC Motor Three Phase, 460 Volt Motor/Equipment, Connection, Termination And Rotation Testing.....	1,690.54	636.84
26 05 83 00-0166 AC Single Phase, 120 Volt <small>(26 05 83 00-0110)</small>		
26 05 83 00-0167 EA 1/2 HP AC And Less Single Phase, 120 Volt Motor/Equipment, Connection, Termination And Rotation Testing	75.80	30.57
26 05 83 00-0168 Motor Moisture Sensor <small>(26 05 83 00-0110)</small>		
26 05 83 00-0169 EA Motor Moisture Sensor Located In Winding.....	841.60	

26 09 Instrumentation and Control for Electrical Systems (26)



MINOR
 CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

Note: Includes testing of new devices and certification.

26 09 13 Electrical Power Monitoring (26 09)

26 09 13 00-001 Vending Machine Energy Usage Controls (26 09 13)			
26 09 13 00-0002	EA Wallmount VendingMiser® With PIR Occupany Sensor (Energy Miser VM150)	428.55	12.25
26 09 13 00-0003	EA Wallmount VendingMiser® With 14' Data Cable (Energy Miser VM151)	381.05	6.12
26 09 13 00-0004	EA Weatherproof Wallmount VendingMiser® With PIR Occupany Sensor (Energy Miser VM151)	449.66	12.25
26 09 13 00-0005	EA Weatherproof Wallmount VendingMiser® With 14' Data Cable (Energy Miser VM161)	402.16	6.12
26 09 13 00-0006	EA Velcro Mounted Easy-Install VendingMiser® With PIR Occupany Sensor (Energy Miser VM170)	416.30	9.80
26 09 13 00-0007	EA Velcro Mounted Easy-Install VendingMiser® With 14' Data Cable (Energy Miser VM171)	374.92	4.90
26 09 13 00-0008	EA Weatherproof Velcro Mounted Easy-Install VendingMiser® With PIR Occupany Sensor (Energy Miser VM180)	437.41	9.80
26 09 13 00-0009	EA Weatherproof Velcro Mounted Easy-Install VendingMiser® With 14' Data Cable (Energy Miser VM181)	396.03	4.90
26 09 13 00-0010	EA Wallmount CoolerMiser With PIR Occupany Sensor (Energy Miser CM150)	388.44	12.25
26 09 13 00-0011	EA Wallmount CoolerMiser With 14' Data Cable (Energy Miser CM151)	340.94	6.12
26 09 13 00-0012	EA Velcro Mounted Easy-Install CoolerMiser With PIR Occupany Sensor (Energy Miser CM170)	376.19	9.80
26 09 13 00-0013	EA Velcro Mounted Easy-Install CoolerMiser With 14' Data Cable (Energy Miser CM171)	334.81	4.90
26 09 13 00-0014	EA Wallmount SnackMiser With PIR Occupany Sensor (Energy Miser SM150)	388.44	12.25
26 09 13 00-0015	EA Wallmount SnackMiser With 14' Data Cable (Energy Miser SM151)	340.94	6.12
26 09 13 00-0016	EA Velcro Mounted Easy-Install SnackMiser With PIR Occupany Sensor (Energy Miser SM170)	376.19	9.80
26 09 13 00-0017	EA Velcro Mounted Easy-Install SnackMiser With 14' Data Cable (Energy Miser SM171)	334.81	4.90
26 09 13 00-0018	EA 1200 Watt, Multi Plug Load, Wallmount PlugMiser With PIR Occupany Sensor (Energy Miser PM150)	388.44	12.25
26 09 13 00-0019	EA 1200 Watt, Multi Plug Load, Wallmount PlugMiser With 14' Data Cable (Energy Miser PM151)	340.94	6.12
26 09 13 00-0020	EA 1200 Watt, Multi Plug Load, Table Leg Mount PlugMiser With PIR Occupany Sensor (Energy Miser PM190)	388.44	12.25
26 09 13 00-0021	EA Watsup Line Logger (Energy Miser 60500)	292.40	18.37
26 09 13 00-0022	EA Watsup Pro Line Logger (Energy Miser 60501)	366.29	18.37
26 09 13 00-0023	EA Test Drive Kit And Wallmount VendingMiser® With PIR Occupany Sensor (Energy Miser TD150)	700.89	24.49
26 09 13 00-0024	EA Test Drive Kit And Velcro Mounted Easy-Install VendingMiser® With PIR Occupany Sensor (Energy Miser TD170)	688.64	22.04
26 09 13 00-0025 Work Station Energy Usage Controls (26 09 13)			
26 09 13 00-0026	EA Power Strip With Personal Sensor (Wattstopper IDP-3050-A)	185.03	12.25

26 09 23 Lighting Control Devices (26 09)

26 09 23 00-0001 Lighting Contactors (26 09 23)			
Note: Up to 600 volt.			
26 09 23 00-0002 Electrically Held, Lighting Contactors (26 09 23 00-0001)			
26 09 23 00-0003 NEMA 1 Enclosure, Electrically Held, Lighting Contactors (26 09 23 00-0002)			
26 09 23 00-0004 2-Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactors (26 09 23 00-0003)			
26 09 23 00-0005	EA 20 Amperes, 2 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	537.12	97.82
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	58.70	
26 09 23 00-0006	EA 30 Amperes, 2 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	666.67	110.05
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	66.03	
26 09 23 00-0007	EA 60 Amperes, 2 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	1,257.10	171.20
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	102.71	
26 09 23 00-0008	EA 100 Amperes, 2 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	1,966.68	232.33
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	139.40	
26 09 23 00-0009	EA 200 Amperes, 2 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	4,143.63	305.70
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	183.42	
26 09 23 00-0010 3-Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactors (26 09 23 00-0003)			
26 09 23 00-0011	EA 20 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	606.69	110.05
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	66.03	
26 09 23 00-0012	EA 30 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	730.53	122.28
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	73.37	
26 09 23 00-0013	EA 60 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	1,358.56	195.65
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	117.39	
26 09 23 00-0014	EA 100 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	2,122.55	256.78
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	154.07	
26 09 23 00-0015	EA 200 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	4,445.87	336.27
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	201.76	
26 09 23 00-0016 4-Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactors (26 09 23 00-0003)			
26 09 23 00-0017	EA 20 Amperes, 4 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	716.27	122.28
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	73.37	
26 09 23 00-0018	EA 30 Amperes, 4 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	862.87	134.50
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	80.70	
26 09 23 00-0019	EA 60 Amperes, 4 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	1,647.63	220.10
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	132.06	
26 09 23 00-0020	EA 100 Amperes, 4 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	2,545.78	281.25
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	168.74	
26 09 23 00-0021	EA 200 Amperes, 4 Pole, NEMA 1 Enclosure, Electrically Held, Lighting Contactor	5,691.93	366.83
	For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	220.10	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0022 NEMA 3R Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0022)</small>		
26 09 23 00-0023 2-Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0022)</small>		
26 09 23 00-0024 EA 30 Amperes, 2 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 887.19	887.19	110.05
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>66.03</i>	
26 09 23 00-0025 EA 60 Amperes, 2 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 1,804.52	1,804.52	171.20
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>102.71</i>	
26 09 23 00-0026 EA 100 Amperes, 2 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 2,721.85	2,721.85	232.33
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>139.40</i>	
26 09 23 00-0027 3-Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0022)</small>		
26 09 23 00-0028 EA 30 Amperes, 3 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 1,276.11	1,276.11	122.28
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>73.37</i>	
26 09 23 00-0029 EA 60 Amperes, 3 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 1,978.30	1,978.30	195.65
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>117.39</i>	
26 09 23 00-0030 EA 100 Amperes, 3 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 2,999.54	2,999.54	256.78
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>154.07</i>	
26 09 23 00-0031 EA 200 Amperes, 3 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 6,977.15	6,977.15	336.27
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>201.76</i>	
26 09 23 00-0032 4-Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0022)</small>		
26 09 23 00-0033 EA 30 Amperes, 4 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 1,202.54	1,202.54	134.50
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>80.70</i>	
26 09 23 00-0034 EA 60 Amperes, 4 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 1,983.39	1,983.39	220.10
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>132.06</i>	
26 09 23 00-0035 EA 100 Amperes, 4 Pole, NEMA 3R Enclosure, Electrically Held, Lighting Contactor 2,715.33	2,715.33	281.25
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>168.74</i>	
26 09 23 00-0036 NEMA 4 Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0002)</small>		
26 09 23 00-0037 2-Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0036)</small>		
26 09 23 00-0038 EA 20 Amperes, 2 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 900.13	900.13	97.82
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>58.70</i>	
26 09 23 00-0039 EA 30 Amperes, 2 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 1,147.95	1,147.95	110.05
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>66.03</i>	
26 09 23 00-0040 EA 60 Amperes, 2 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 2,216.85	2,216.85	171.20
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>102.71</i>	
26 09 23 00-0041 EA 100 Amperes, 2 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 3,329.84	3,329.84	232.33
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>139.40</i>	
26 09 23 00-0042 EA 200 Amperes, 2 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 6,470.30	6,470.30	305.70
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>183.42</i>	
26 09 23 00-0043 3-Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0036)</small>		
26 09 23 00-0044 EA 20 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 931.76	931.76	110.05
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>66.03</i>	
26 09 23 00-0045 EA 30 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 1,211.82	1,211.82	122.28
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>73.37</i>	
26 09 23 00-0046 EA 60 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 2,321.12	2,321.12	195.65
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>117.39</i>	
26 09 23 00-0047 EA 100 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 3,484.78	3,484.78	256.78
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>154.07</i>	
26 09 23 00-0048 EA 200 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 6,771.60	6,771.60	336.27
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>201.76</i>	
26 09 23 00-0049 4-Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0036)</small>		
26 09 23 00-0050 EA 20 Amperes, 4 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 1,006.47	1,006.47	122.28
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>73.37</i>	
26 09 23 00-0051 EA 30 Amperes, 4 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 1,344.16	1,344.16	134.50
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>80.70</i>	
26 09 23 00-0052 EA 60 Amperes, 4 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 2,984.53	2,984.53	220.10
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>132.06</i>	
26 09 23 00-0053 EA 100 Amperes, 4 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 4,282.34	4,282.34	281.25
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>168.74</i>	
26 09 23 00-0054 EA 200 Amperes, 4 Pole, NEMA 4 Enclosure, Electrically Held, Lighting Contactor 9,049.65	9,049.65	366.83
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>220.10</i>	
26 09 23 00-0055 NEMA 12/3R Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0002)</small>		
26 09 23 00-0056 2-Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactors <small>(26 09 23 00-0055)</small>		
26 09 23 00-0057 EA 60 Amperes, 2 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor 2,711.41	2,711.41	171.20
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>102.71</i>	
26 09 23 00-0058 EA 100 Amperes, 2 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor 3,848.98	3,848.98	232.33
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>139.40</i>	
26 09 23 00-0059 EA 200 Amperes, 2 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor 3,598.36	3,598.36	305.70
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>183.42</i>	

26 Electrical**26 09 Instrumentation and Control for Electrical Systems****26 09 23 Lighting Control Devices**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 09 23 00-0060	3-Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactors ^(26 09 23 00-0055)		
26 09 23 00-0061	EA 60 Amperes, 3 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,896.13 117.39	195.65
26 09 23 00-0062	EA 100 Amperes, 3 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,091.91 154.07	256.78
26 09 23 00-0063	4-Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactors ^(26 09 23 00-0055)		
26 09 23 00-0064	EA 60 Amperes, 4 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,480.83 132.06	220.10
26 09 23 00-0065	EA 100 Amperes, 4 Pole, NEMA 12/3R Enclosure, Electrically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,049.09 168.74	281.25
26 09 23 00-0066	Mechanically Held, Lighting Contactors ^(26 09 23 00-0001)		
26 09 23 00-0067	NEMA 1 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0066)		
26 09 23 00-0068	2-Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0067)		
26 09 23 00-0069	EA 20 Amperes, 2 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	801.69 58.70	97.82
26 09 23 00-0070	EA 30 Amperes, 2 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	912.47 66.03	110.05
26 09 23 00-0071	EA 60 Amperes, 2 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,735.57 102.71	171.20
26 09 23 00-0072	EA 100 Amperes, 2 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,419.81 139.40	232.33
26 09 23 00-0073	EA 200 Amperes, 2 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,614.68 183.42	305.70
26 09 23 00-0074	3-Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0067)		
26 09 23 00-0075	EA 20 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	855.88 66.03	110.05
26 09 23 00-0076	EA 30 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	978.21 73.37	122.28
26 09 23 00-0077	EA 60 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,839.84 117.39	195.65
26 09 23 00-0078	EA 100 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,576.62 154.07	256.78
26 09 23 00-0079	EA 200 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,315.65 201.76	336.27
26 09 23 00-0080	4-Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0067)		
26 09 23 00-0081	EA 20 Amperes, 4 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	923.41 73.37	122.28
26 09 23 00-0082	EA 30 Amperes, 4 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,042.07 80.70	134.50
26 09 23 00-0083	EA 60 Amperes, 4 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,154.24 132.06	220.10
26 09 23 00-0084	EA 100 Amperes, 4 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,027.06 168.74	281.25
26 09 23 00-0085	EA 200 Amperes, 4 Pole, NEMA 1 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,632.07 220.10	366.83
26 09 23 00-0086	NEMA 4 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0066)		
26 09 23 00-0087	2-Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0086)		
26 09 23 00-0088	EA 20 Amperes, 2 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,210.84 58.70	97.82
26 09 23 00-0089	EA 30 Amperes, 2 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,393.76 66.03	110.05
26 09 23 00-0090	EA 60 Amperes, 2 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,698.13 102.71	171.20
26 09 23 00-0091	EA 100 Amperes, 2 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,782.98 139.40	232.33
26 09 23 00-0092	EA 200 Amperes, 2 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,939.48 183.42	305.70
26 09 23 00-0093	3-Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactors ^(26 09 23 00-0086)		
26 09 23 00-0094	EA 20 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,278.36 66.03	110.05
26 09 23 00-0095	EA 30 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,459.50 73.37	122.28



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0096 EA 60 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,802.41 117.39	195.65
26 09 23 00-0097 EA 100 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,940.73 154.07	256.78
26 09 23 00-0098 EA 200 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8,642.32 201.76	336.27
26 09 23 00-0099 4-Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactors <small>(26 09 23 00-0096)</small>		
26 09 23 00-0100 EA 20 Amperes, 4 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,351.02 73.37	122.28
26 09 23 00-0101 EA 30 Amperes, 4 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,523.35 80.70	134.50
26 09 23 00-0102 EA 60 Amperes, 4 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,491.14 132.06	220.10
26 09 23 00-0103 EA 100 Amperes, 4 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,763.62 168.74	281.25
26 09 23 00-0104 EA 200 Amperes, 4 Pole, NEMA 4 Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10,921.31 220.10	366.83
26 09 23 00-0105 NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactors <small>(26 09 23 00-0096)</small>		
26 09 23 00-0106 2-Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactors <small>(26 09 23 00-0105)</small>		
26 09 23 00-0107 EA 30 Amperes, 2 Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	750.57 66.03	110.05
26 09 23 00-0108 EA 60 Amperes, 2 Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,389.35 102.71	195.65
26 09 23 00-0109 EA 100 Amperes, 2 Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,893.19 139.40	232.33
26 09 23 00-0110 EA 200 Amperes, 2 Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,425.27 183.42	305.70
26 09 23 00-0111 3-Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactors <small>(26 09 23 00-0105)</small>		
26 09 23 00-0112 EA 30 Amperes, 3 Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	798.88 73.37	122.28
26 09 23 00-0113 4-Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactors <small>(26 09 23 00-0105)</small>		
26 09 23 00-0114 EA 200 Amperes, 4 Pole, NEMA 12/3R Enclosure, Mechanically Held, Lighting Contactor <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,973.17 220.10	366.83
26 09 23 00-0115 Combination Lighting Contactors <small>(26 09 23)</small> Note: Up to 600 volt.		
26 09 23 00-0116 Electrically Held, Combination Lighting Contactors <small>(26 09 23 00-0115)</small>		
26 09 23 00-0117 NEMA 1 Enclosure, Electrically Held, Combination Lighting Contactors <small>(26 09 23 00-0116)</small>		
26 09 23 00-0118 3-Pole, NEMA 1 Enclosure, Electrically Held, Combination Lighting Contactors <small>(26 09 23 00-0117)</small>		
26 09 23 00-0119 EA 30 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,556.65 80.70	134.50
26 09 23 00-0120 EA 60 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,439.99 129.13	215.21
26 09 23 00-0121 EA 100 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,950.80 169.48	282.47
26 09 23 00-0122 EA 200 Amperes, 3 Pole, NEMA 1 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,237.11 221.94	369.89
26 09 23 00-0123 NEMA 4 Enclosure, Electrically Held, Combination Lighting Contactors <small>(26 09 23 00-0118)</small>		
26 09 23 00-0124 3-Pole, NEMA 4 Enclosure, Electrically Held, Combination Lighting Contactors <small>(26 09 23 00-0123)</small>		
26 09 23 00-0125 EA 30 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,838.67 80.70	134.50
26 09 23 00-0126 EA 60 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,415.78 129.13	215.21
26 09 23 00-0127 EA 100 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,398.59 169.48	282.47

26 Electrical**26 09 Instrumentation and Control for Electrical Systems****26 09 23 Lighting Control Devices**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 09 23 00-0128	EA	200 Amperes, 3 Pole, NEMA 4 Enclosure, Electrically Held, Combination Lighting Contactor With Fused Disconnect Switch	11,647.47	369.89
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	221.94	
26 09 23 00-0129		Mechanically Held, Combination Lighting Contactors <small>(26 09 23 00-0115)</small>		
26 09 23 00-0130		NEMA 1 Enclosure, Mechanically Held, Combination Lighting Contactors <small>(26 09 23 00-0129)</small>		
26 09 23 00-0131		3-Pole, NEMA 1 Enclosure, Mechanically Held, Combination Lighting Contactors <small>(26 09 23 00-0130)</small>		
26 09 23 00-0132	EA	30 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	1,703.01	134.50
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	80.70	
26 09 23 00-0133	EA	60 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	2,946.60	215.21
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	129.13	
26 09 23 00-0134	EA	100 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	4,430.68	282.47
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	169.48	
26 09 23 00-0135	EA	200 Amperes, 3 Pole, NEMA 1 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	8,600.75	369.89
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	221.94	
26 09 23 00-0136		NEMA 4 Enclosure, Mechanically Held, Combination Lighting Contactors <small>(26 09 23 00-0129)</small>		
26 09 23 00-0137		3-Pole, NEMA 4 Enclosure, Mechanically Held, Combination Lighting Contactors <small>(26 09 23 00-0136)</small>		
26 09 23 00-0138	EA	30 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	2,986.43	134.50
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	80.70	
26 09 23 00-0139	EA	60 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	4,925.21	215.21
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	129.13	
26 09 23 00-0140	EA	100 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	7,879.87	282.47
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	169.48	
26 09 23 00-0141	EA	200 Amperes, 3 Pole, NEMA 4 Enclosure, Mechanically Held, Combination Lighting Contactor With Fused Disconnect Switch	13,011.11	369.89
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	221.94	
26 09 23 00-0142		Photo-Cell, Relay, Lighting Arrester, Receptacle And Bracket <small>(26 09 23)</small>		
26 09 23 00-0143	EA	105 To 130 Volt Relay, Photo-Cell, Lighting Arrester, Receptacle And Bracket	119.85	31.79
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	19.11	
26 09 23 00-0144	EA	105 To 285 Volt Relay, Photo-Cell, Lighting Arrester, Receptacle And Bracket	129.16	31.79
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	19.11	
26 09 23 00-0145		Dimming Module System (Lutron Grafik Eye) <small>(26 09 23)</small>		
26 09 23 00-0146	EA	2,000 Watt Dimming Capacity, 120/277 Volt, Dimming Module System (Lutron Grafik Eye Hi-Power HP-2).....	1,749.66	122.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.37	
26 09 23 00-0147	EA	4,000 Watt Dimming Capacity, 120/277 Volt, Dimming Module System (Lutron Grafik Eye Hi-Power HP-4).....	2,260.84	122.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.37	
26 09 23 00-0148	EA	6,000 Watt Dimming Capacity, 120/277 Volt, Dimming Module System (Lutron Grafik Eye Hi-Power HP-6).....	2,781.13	122.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.37	
26 09 23 00-0149		Dimming Module Contol (Leviton) <small>(26 09 23)</small>		
26 09 23 00-0150	EA	5 Amperes, Wireless Dimming Module (Leviton WSD05-9D0)	226.37	15.31
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.19	
26 09 23 00-0151		Light Control Panels <small>(26 09 23)</small>		
26 09 23 00-0152		Lighting Control Panels (Watt Stopper) <small>(26 09 23 00-0151)</small>		
26 09 23 00-0153		Lighting Control Panels (Watt Stopper) <small>(26 09 23 00-0152)</small>		
26 09 23 00-0154	EA	4 Relays, Surface Mount, Lighting Control Panel (Watt Stopper LP8S-4)	1,951.51	171.47
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	102.88	
26 09 23 00-0155	EA	8 Relays, Surface Mount, Lighting Control Panel (Watt Stopper LP8S-8)	1,829.68	183.72
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	110.23	
26 09 23 00-0156	EA	8 Relays, Surface Mount, Lighting Control Panel With Group Switching Card (Watt Stopper LP8S-8-G)	2,058.27	183.72
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	110.23	
26 09 23 00-0157	EA	8 Relays, Surface Mount, Lighting Control Panel With DIN Rail (Watt Stopper LP24S-8).....	3,081.25	183.72
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	110.23	
26 09 23 00-0158	EA	8 Relays, Surface Mount, Lighting Control Panel With Group Switching Card And DIN Rail (Watt Stopper LP24S-8-G)	3,349.62	183.72
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	110.23	
26 09 23 00-0159	EA	4 Relays, Flush Mount, Lighting Control Panel (Watt Stopper LP8F-4)	2,171.35	171.47
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	102.88	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0160 EA 8 Relays, Flush Mount, Lighting Control Panel (Watt Stopper LP8F-8).....	2,329.91	183.72
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>110.23</i>	
26 09 23 00-0161 EA 8 Relays, Flush Mount, Lighting Control Panel With Group Switching Card (Watt Stopper LP8F-8-G).....	2,598.02	183.72
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>110.23</i>	
26 09 23 00-0162 EA 8 Relays, Flush Mount, Lighting Control Panel With DIN Rail (Watt Stopper LP24F-8).....	3,188.50	183.72
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>110.23</i>	
26 09 23 00-0163 EA 8 Relays, Flush Mount, Lighting Control Panel With Group Switching Card And DIN Rail (Watt Stopper LP24F-8-G).....	3,456.86	183.72
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>110.23</i>	
26 09 23 00-0164 Accessories For Lighting Control Panels (Watt Stopper) (26 09 23 00-0152)		
26 09 23 00-0165 EA Low Voltage Photocell For Watt Stopper Lighting Control Panels (Watt Stopper EM-24A2).....	188.68	30.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>18.37</i>	
26 09 23 00-0166 EA Automatic Control Switch For Watt Stopper Lighting Control Panels (Watt Stopper AS-100-W).....	145.18	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>14.70</i>	
26 09 23 00-0167 EA Low Voltage Momentary Switch For Watt Stopper Lighting Control Panels (Watt Stopper DCC2).....	76.22	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>14.70</i>	
26 09 23 00-0168 Lighting Control Panels (Synergy) (26 09 23 00-0151)		
26 09 23 00-0169 Lighting Control Panels (Synergy) (26 09 23 00-0168)		
26 09 23 00-0170 EA 8 Relays, Surface Mount, Lighting Control Panel (Synergy SwitchPak SPak 8S).....	2,776.65	183.72
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>110.23</i>	
26 09 23 00-0171 Accessories For Lighting Control Panels (Synergy) (26 09 23 00-0168)		
26 09 23 00-0172 EA Outdoor Photocell For Synergy SwitchPak Lighting Control Panels (Synergy LSA-APS-OL).....	681.12	30.62
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>18.37</i>	
26 09 23 00-0173 EA Sweepswitch, Line Voltage Override Switch For Synergy SwitchPak Lighting Control Panels (Synergy SSPL-20).....	263.80	12.25
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>7.35</i>	
26 09 23 00-0174 EA Override Switch For Synergy SwitchPak Lighting Control Panels (Synergy LVPS-2BT).....	149.36	18.37
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>11.02</i>	
26 09 23 00-0175 Lighting Switching Panels (Lutron) (26 09 23 00-0151)		
26 09 23 00-0176 Lighting Switching Panels (Lutron) (26 09 23 00-0175)		
26 09 23 00-0177 EA 8 Switch Legs, Surface Mount, Feed-Through, Lighting Switching Panels (Lutron Softswitch128® XPS8-FT).....	2,259.30	183.72
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>110.23</i>	
26 09 23 00-0178 EA 12 Switch Legs, Surface Mount, Feed-Through, Lighting Switching Panels (Lutron Softswitch128® XPS12-FT).....	3,097.98	195.97
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>117.58</i>	
26 09 23 00-0179 EA 16 Switch Legs, Surface Mount, Feed-Through, Lighting Switching Panels (Lutron Softswitch128® XPS16-FT).....	4,057.04	208.21
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>124.93</i>	
26 09 23 00-0180 Wireless (ZigBee) LED Lighting Control Panels (PlanLED GigaTera) (26 09 23 00-0151)		
26 09 23 00-0181 EA 6 Zone, Surface Mount, 0 To 10 Volt Dimming, Wireless (ZigBee) LED Lighting Control Panel (PlanLED GigaTera IPC6Z).....	1,510.75	171.47
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>102.88</i>	
26 09 23 00-0182 EA 12 Zone, Surface Mount, 0 To 10 Volt Dimming, Wireless (ZigBee) LED Lighting Control Panel (PlanLED GigaTera IPC12Z).....	1,723.08	171.47
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>102.88</i>	
26 09 23 00-0183 EA 18 Zone, Surface Mount, 0 To 10 Volt Dimming, Wireless (ZigBee) LED Lighting Control Panel (PlanLED GigaTera IPC18Z).....	1,935.41	171.47
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>102.88</i>	
26 09 23 00-0184 Power Filters (26 09 23 00-0151)		
26 09 23 00-0185 EA 600 Amperes, 480/277 Volt, 4 Conductor Power Filter With 80" X 60" X 17" Enclosure.....	29,905.18	1,018.95
26 09 23 00-0186 EA 200 Amperes, 480/277 Volt, 4 Conductor Power Filter With 25" X 40" X 17" Enclosure.....	17,606.39	443.02
26 09 23 00-0187 Signal Filters (26 09 23 00-0151)		
26 09 23 00-0188 EA 0.5 Amperes, 125 Volt, 500 Conductor Signal Filter With 19" X 36-3/4" X 19-1/8 Case.....	13,928.50	926.39
26 09 23 00-0189 EA 0.5 Amperes, 125 Volt, 200 Conductor Signal Filter With 29" X 40" X 11" Case.....	9,492.37	566.15
26 09 23 00-0190 EA 0.5 Amperes, 125 Volt, 3 Pair Conductor Signal Filter With 12" X 12" X 4" Case.....	5,301.94	328.69
26 09 23 00-0191 EA 5 Amperes, 24 Volt DC, 5 Volt, 2 - 1 Pair Conductor Signal Filter With Case.....	7,159.75	328.69
26 09 23 00-0192 Lighting Control Devices (Encelium) (26 09 23)		
26 09 23 00-0193 EA 8 Port, G4, Wired Energy Control Unit, GreenBus II™ (120 Volt) With Polaris 3D™ (Encelium EN-ECU-G4-P3D).....	16,076.81	122.48
Note: Excludes GB II cable.		
26 09 23 00-0194 EA Server, System Support Unit (SSU) (Encelium EN-SSU-1U).....	7,347.22	122.48
Note: Excludes GB II and Ethernet cable.		
26 09 23 00-0195 EA Server, System Support Unit (SSU), VIRTUAL (Encelium EN-SW-SSUVIRT).....	3,821.76	122.48
Note: Excludes GB II and Ethernet cable.		
26 09 23 00-0196 EA Server, System Support Unit (SSU) With BACnet (Encelium EN-SSU-BIF-KIT).....	16,171.39	122.48
Note: Excludes GB II and Ethernet cable.		
26 09 23 00-0197 EA Isolated, Wired Luminaire Control Module (Encelium EN-iLCM-1R10V-GB2-BK).....	126.65	15.31
Note: Excludes GB II cable.		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0198	EA		Damp Rated, Isolated, Wired Luminaire Control Module (Encelium EN-iLCM-1R10V-GB2-BK/DR).....	196.50	15.31
			Note: Excludes GB II cable.		
26 09 23 00-0199	EA		Wired Area Lighting Controller, Heavy Duty Relay With 0-10V Dimming (Encelium EN-ALC-1R10V-GB2-BK).....	246.86	30.62
			Note: Excludes GB II cable.		
26 09 23 00-0200	EA		Damp Rated, Wired Area Lighting Controller, Heavy Duty Relay With 0-10V Dimming (Encelium EN-ALC-1R10V-GB2-BK-DR).....	298.20	30.62
			Note: Excludes GB II cable.		
26 09 23 00-0201	EA		Wired Sensor Interface Module (Encelium EN-SIM-AI/SPS-GB2-BK).....	157.27	30.62
			Note: Excludes GB II cable.		
26 09 23 00-0202	EA		Damp Rated, Wired Sensor Interface Module (Encelium EN-SIM-AI/SPS-GB2-BK/DR).....	227.12	30.62
			Note: Excludes GB II cable.		
26 09 23 00-0203	EA		16 Port, Rack Mounted, Wired Ethernet Switch (Encelium ETH-700).....	572.70	61.24
			Note: Excludes cable.		
26 09 23 00-0204	EA		Rack Mounted, Wired Power Bar (Encelium PWR-700).....	429.21	61.24
26 09 23 00-0205	EA		Rack Mounted, Wired Power Bar With Surge Protection (Encelium PWR-800).....	789.93	61.24
26 09 23 00-0206	EA		Wall Mounted, 4U Mounting Rack (Encelium RCK-700).....	267.05	61.24
26 09 23 00-0207	EA		4 Port, 10/100 VPN, Dual WAN, Wired Router (Encelium RV042).....	886.02	61.24
			Note: Excludes cable.		
26 09 23 00-0208	EA		Wired BACnet Interface (Encelium BIF-600).....	9,314.08	244.95
			Note: Excludes cable.		
26 09 23 00-0209	EA		Wired AV Interface (Encelium EN-SW-AVINT).....	6,902.21	61.24
			Note: Excludes cable.		
26 09 23 00-0210	EA		Two Button, GB2, Wired Wall Station (Encelium EN-WS-2B-GB2-WH).....	257.71	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0211	EA		3 Scene, GB2, Wired Wall Station (Encelium EN-WS-SC3-GB2-WH).....	314.46	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0212	EA		3 Zone, GB2, Wired Wall Station (Encelium EN-WS-ZC3-GB2-WH).....	300.77	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0213	EA		5 Scene, GB2, Wired Wall Station (Encelium EN-WS-SC5-GB2-WH).....	314.46	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0214	EA		6 Zone, GB2, Wired Wall Station (Encelium EN-WS-ZC6-GB2-WH).....	300.77	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0215	EA		Rocker Switch, GB2, Wired Wall Station (Encelium EN-WS-R-GB2-WT).....	227.04	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0216	EA		Scene Controller, GB2, Wired Wall Station (Encelium EN-WS-SC3D-GB2-WT).....	314.46	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0217	EA		3 Zone Controller, GB2, Wired Wall Station (Encelium EN-WS-ZC3-GB2-WT).....	300.77	15.31
			Note: Includes white finish. Excludes GB II cable.		
26 09 23 00-0218	EA		Wired Key Switch Controller (Encelium KSW-300).....	221.52	15.31
			Note: Excludes GB II cable.		
26 09 23 00-0219	EA		Wall Station Surface Mount Kit (Encelium EN-SMK-ZB-WH).....	93.81	15.31
			Note: Includes white finish.		
26 09 23 00-0220	EA		1/2' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-0.5FT-GB2).....	75.60	30.62
26 09 23 00-0221	EA		1' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-01FT-GB2).....	76.20	30.62
26 09 23 00-0222	EA		5' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-05FT-GB2).....	81.04	30.62
26 09 23 00-0223	EA		10' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-10FT-GB2).....	85.81	30.62
26 09 23 00-0224	EA		15' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-15FT-GB2).....	91.51	30.62
26 09 23 00-0225	EA		20' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-20FT-GB2).....	96.65	30.62
26 09 23 00-0226	EA		25' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-25FT-GB2).....	102.96	30.62
26 09 23 00-0227	EA		50' Length, Pre-Terminated, GreenBus II™ Cable (Encelium EN-PTC-50FT-GB2).....	131.49	30.62
26 09 23 00-0228	EA		1,000' Box, GreenBus II™ Cable (Encelium EN-BC-1000FT-GB2).....	852.73	30.62
26 09 23 00-0229	EA		Box Of 50, Greenbus II™ Connectors (Encelium EN-CON-50-GB2).....	206.05	30.62
26 09 23 00-0230	EA		1,000' Box, Category 5, Network Cable (Encelium NWC-400-B).....	1,101.24	30.62
26 09 23 00-0231	EA		Indoor Wired Photo Sensor (Encelium PHS-700).....	642.49	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0232	EA		Outdoor Wired Photo Sensor (Encelium PHS-800).....	642.49	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0233	EA		Skylight Wired Photo Sensor (Encelium PHS-900).....	642.49	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0234	EA		450 SF, 360 Degree, Passive Infrared, Ceiling Mounted, Wired Occupancy Sensor (Encelium SCP-0450).....	333.27	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0235	EA		1,500 SF, 360 Degree, Passive Infrared, Ceiling Mounted, Wired Occupancy Sensor (Encelium SCP-1500).....	322.90	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0236	EA		2,500 SF, Wide View, Passive Infrared, Wall Mounted, Wired Occupancy Sensor (Encelium SWP-WV00).....	329.82	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0237	EA		High-Bay, Passive Infrared, Wall Mounted, Wired Occupancy Sensor (Encelium SWP-HBAY).....	364.38	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0238	EA		Long-Range, Passive Infrared, Wall Mounted, Wired Occupancy Sensor (Encelium SWP-LRNG).....	329.82	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0239	EA		120-277 Volt AC, No Neutral, Passive Infrared, Wall Switch Mounted, Wired Occupancy Sensor (Encelium SSP-LNV).....	260.72	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0240	EA		High Bay, Passive Infrared, Fixture Mounted, Wired Occupancy Sensor (Encelium WSPERM24V).....	276.51	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0241	EA		High Bay, Passive Infrared, Surface Mounted, Wired Occupancy Sensor (Encelium WSPSM24V).....	276.51	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0242	EA		360 Degree Lens, Wired Occupancy Sensor (Encelium WSPLENS360).....	144.87	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0243	EA		Passive Infrared, Wall Switch Mounted, Wired Occupancy Sensor (Encelium PW-100-24).....	338.37	61.24
			Note: Excludes GB II cable.		
26 09 23 00-0244	EA		Hallway, Wired Occupancy Sensor (Encelium HW-13).....	479.24	61.24
			Note: Excludes GB II cable.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0245 EA 500 SF, 180 Degree, (Multi) Passive Infrared And Ultrasonic, Ceiling Mounted, Wired Occupancy Sensor (Encelium SCM-0500).....	419.66	61.24
Note: Excludes GB II cable.		
26 09 23 00-0246 EA 1,000 SF, 360 Degree, (Multi) Passive Infrared And Ultrasonic, Ceiling Mounted, Wired Occupancy Sensor (Encelium SCM-1000).....	447.31	61.24
Note: Excludes GB II cable.		
26 09 23 00-0247 EA 2,000 SF, 360 Degree, (Multi) Passive Infrared And Ultrasonic, Ceiling Mounted, Wired Occupancy Sensor (Encelium SCM-2000).....	461.14	61.24
Note: Excludes GB II cable.		
26 09 23 00-0248 EA 1,200 SF, (Multi) Passive Infrared And Ultrasonic, Wall Mounted, Wired Occupancy Sensor (Encelium SWM-1200).....	416.20	61.24
Note: Excludes GB II cable.		
26 09 23 00-0249 EA 120-277 Volt AC, No Neutral, Passive Infrared And Ultrasonic, Wall Switch Mounted, Wired Occupancy Sensor (Encelium SSM-LNV).....	347.11	61.24
Note: Excludes GB II cable.		
26 09 23 00-0250 EA 500 SF, 180 Degree, Dual Technology, Ceiling Mounted, Wired Occupancy Sensor (Encelium OSC05-M0W).....	434.53	61.24
Note: Excludes GB II cable.		
26 09 23 00-0251 EA 1,200 SF, 360 Degree, Dual Technology, Wall Mounted, Wired Occupancy Sensor (Encelium OSW12-M0W).....	430.91	61.24
Note: Excludes GB II cable.		
26 09 23 00-0252 EA 2,000 SF, 360 Degree, Dual Technology, Ceiling Mounted, Wired Occupancy Sensor (Encelium OSC20-M0W).....	478.06	61.24
Note: Excludes GB II cable.		
26 09 23 00-0253 EA 1,000 SF, 360 Degree, Dual Technology, Ceiling Mounted, Wired Occupancy Sensor (Encelium OSC10-M0W).....	463.56	61.24
Note: Excludes GB II cable.		
26 09 23 00-0254 EA Dual Technology, Wall Switch Mounted, Wired Occupancy Sensor (Encelium DW-100-24).....	498.99	61.24
Note: Excludes GB II cable.		
26 09 23 00-0255 EA Dual Technology, Wall Switch Mounted, Wired Occupancy Sensor (Encelium WSD-PDT-LV).....	463.71	61.24
Note: Excludes GB II cable.		
26 09 23 00-0256 EA Wide View, Dual Technology, Wired Occupancy Sensor (Encelium WV-PDT).....	463.71	61.24
Note: Excludes GB II cable.		
26 09 23 00-0257 EA 10 Amperes, 120 Volt, Single Relay, UL924 Automatic Load Control Relay (ALCR) (Encelium ESRU1C).....	304.46	61.24
26 09 23 00-0258 EA 10A, 277V, Single Relay, UL924 Automatic Load Control Relay (ALCR) (Encelium ESRH1C).....	326.18	61.24
26 09 23 00-0259 EA 20 Amperes, 120 Volt, Dual Relay, UL924 Automatic Load Control Relay (ALCR) (Encelium ESR01P).....	572.22	61.24
26 09 23 00-0260 EA 20A, 277V, Dual Relay, UL924 Automatic Load Control Relay (ALCR) (Encelium ESR02P).....	612.10	61.24
26 09 23 00-0261 EA 10 Amperes, 120 Volt, Dual Relay, UL924 Automatic Load Control Relay (ALCR) (Encelium ESR2401D).....	451.21	61.24
26 09 23 00-0262 EA 10A, 277V, Dual Relay, UL924 Automatic Load Control Relay (ALCR) (Encelium ESR2402D).....	470.48	61.24
26 09 23 00-0263 EA 24 Circuit, Relay Module (Encelium EN-RPM-24C-GB2).....	1,350.77	122.48
Note: Excludes GB II cable and enclosure.		
26 09 23 00-0264 EA 24 Circuit, 120/277V, Relay Panel With Relay Module (Encelium EN-RP-24C-GB2-120/277V).....	4,218.29	489.91
Note: Excludes GB II cable.		
26 09 23 00-0265 EA 12 Relays, 24 Circuit, 120-347V, Emergency Relay Panel (Encelium EN-RPA12R120-347V).....	6,161.38	489.91
Note: Excludes GB II cable.		
26 09 23 00-0266 EA 24 Relays, 24 Circuit, 120-347V, Emergency Relay Panel (Encelium EN-RPA24R120-347V).....	8,104.46	489.91
Note: Excludes GB II cable.		
26 09 23 00-0267 EA Wired Phase Cut Dimming Module (Encelium EN-PCDM-GB2).....	675.39	61.24
Note: Excludes GB II cable.		
26 09 23 00-0268 EA Wired DALI Bridge (Encelium EN-DB-1L-GB2).....	774.13	61.24
Note: Excludes GB II cable.		
26 09 23 00-0269 EA Wireless Manager (Encelium EN-WM-ZB-P3D).....	2,097.16	61.24
Note: Includes white finish.		
26 09 23 00-0270 EA Wireless Control Module (Encelium EN-WCM-ZB).....	285.04	30.62
26 09 23 00-0271 EA Damp Rated, Wireless Control Module (Encelium EN-WCM-ZB-DR).....	337.70	30.62
26 09 23 00-0272 EA Wireless Area Lighting Controller (Encelium EN-ALC-ZB-BK).....	339.01	30.62
26 09 23 00-0273 EA Damp Rated, Wireless Area Lighting Controller (Encelium EN-ALC-ZB-BK-DR).....	351.43	30.62
26 09 23 00-0274 EA 2 Button Switch, Wireless Wall Station (Encelium EN-WS-2B-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0275 EA 3 Scene Control, Wireless Wall Station (Encelium EN-WS-SC3-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0276 EA 3 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC3-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0277 EA 5 Scene Control, Wireless Wall Station (Encelium EN-WS-SC5-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0278 EA 6 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC6-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0279 EA Single Zone On/Off, Wireless Rocker Switch (Encelium WSS0S-DOW).....	262.97	15.31
26 09 23 00-0280 EA 315 MHz, Wireless Photocell (Encelium TAP-17C).....	556.91	61.24
26 09 23 00-0281 EA 450 SF, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-0450-ZB).....	346.28	61.24
26 09 23 00-0282 EA 1,500 SF, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-1500-ZB).....	346.28	61.24
26 09 23 00-0283 EA 1,500 SF, Damp Rated, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-1500-ZB-DR).....	398.94	61.24
26 09 23 00-0284 EA 450 SF, Damp Rated, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-0450-ZB-DR).....	398.94	61.24
26 09 23 00-0285 EA 2 Button Switch, Wireless Wall Station (Encelium EN-WS-2B-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0286 EA 3 Scene Control, Wireless Wall Station (Encelium EN-WS-SC3-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0287 EA 3 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC3-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0288 EA 5 Scene Control, Wireless Wall Station (Encelium EN-WS-SC5-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0289 EA 6 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC6-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0290 EA Single Zone On/Off, Wireless Rocker Switch (Encelium WSS0S-DOW).....	262.97	15.31
Note: Includes white finish.		
26 09 23 00-0291 EA 315 MHz, Wireless Photocell (Encelium TAP-17C).....	556.91	61.24
26 09 23 00-0292 EA 3 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC3-ZB-WH).....	254.42	15.31
26 09 23 00-0293 EA 5 Scene Control, Wireless Wall Station (Encelium EN-WS-SC5-ZB-WH).....	254.42	15.31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0294 EA 6 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC6-ZB-WH).....	254.42	15.31
26 09 23 00-0295 EA Single Zone On/Off, Wireless Rocker Switch (Encelium WSS0S-DOW).....	262.97	15.31
26 09 23 00-0296 EA 315 MHz, Wireless Photocell (Encelium TAP-17C).....	556.91	61.24
26 09 23 00-0297 EA 450 SF, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-0450-ZB).....	346.28	61.24
26 09 23 00-0298 EA 1,500 SF, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-1500-ZB).....	346.28	61.24
26 09 23 00-0299 EA 1,500 SF, Damp Rated, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-1500-ZB-DR).....	398.94	61.24
26 09 23 00-0300 EA 450 SF, Damp Rated, Ceiling Mounted, Wireless Sensor With Photocell (Encelium EN-SCPPH-0450-ZB-DR).....	398.94	61.24
26 09 23 00-0301 EA 2 Button Switch, Wireless Wall Station (Encelium EN-WS-2B-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0302 EA 3 Scene Control, Wireless, Wall Station (Encelium EN-WS-SC3-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0303 EA 3 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC3-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0304 EA 5 Scene Control, Wireless Wall Station (Encelium EN-WS-SC5-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0305 EA 6 Zone Control, Wireless Wall Station (Encelium EN-WS-ZC6-ZB-WH).....	254.42	15.31
Note: Includes white finish.		
26 09 23 00-0306 EA Single Zone On/Off, Wireless Rocker Switch (Encelium WSS0S-DOW).....	262.97	15.31
26 09 23 00-0307 EA 315 MHz, Wireless Photocell (Encelium TAP-17C).....	556.91	61.24
26 09 23 00-0308 EA Ceiling Mounted, Wireless Mounting Kit (Encelium EN-SCPPH-MK-ZB).....	152.75	61.24
26 09 23 00-0309 EA Wireless Ethernet Transceiver Unit (cns-enocean Connectivity Kit).....	730.13	61.24
26 09 23 00-0310 Lighting Control Sensors (26 09 23)		
26 09 23 00-0311 EA DALIMulti Sensor, 600 SF (Fifthlight FLT-MTS6-DALI).....	389.48	27.55
26 09 23 00-0312 EA DALIMulti Sensor, 1,200 SF (Fifthlight FLT-MTS12-DALI).....	389.48	27.55
26 09 23 00-0313 EA Smart Multi-sensor (LG 9SD131VVDA.ALWB000).....	340.95	27.55
26 09 23 00-0314 EA Zigbee Dongle (LG 9CM2315VD2.AWP01U).....	102.49	18.37
26 09 23 00-0315 EA Clip for Performance Troffer (LG BKTR015122.BUAAWAA).....	8.15	
26 09 23 00-0316 EA Clip for Downlight (BKTC015123.BUAAWAA).....	66.84	
26 09 23 00-0317 EA Clip for Tube (LG BKTTU015121.BUAAWAA).....	11.68	
26 09 23 00-0318 Radio Controlled Devices (Lutron) (26 09 23)		
26 09 23 00-0319 Tabletop Transmitters For Radio Controlled Devices (26 09 23 00-0318)		
26 09 23 00-0320 Switched Lighting Controls, Tabletop Wireless Transmitter (26 09 23 00-0319)		
26 09 23 00-0321 EA One Zone Of On/Off Switched Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-SW-B-WH).....	514.85	18.37
26 09 23 00-0322 EA Two Zones Of On/Off Switched Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2SW-B-WH).....	669.81	18.37
26 09 23 00-0323 EA Three Zones Of On/Off Switched Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-3SW-B-WH).....	844.13	18.37
26 09 23 00-0324 Dimmable Lighting Controls, Tabletop Wireless Transmitter (26 09 23 00-0319)		
26 09 23 00-0325 EA One Zone Of Dimmable Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-L-B-WH).....	514.85	18.37
26 09 23 00-0326 EA Two Zones Of Dimmable Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2L-B-WH).....	611.70	18.37
26 09 23 00-0327 EA Three Zones Of Dimmable Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-3L-B-WH).....	844.13	18.37
26 09 23 00-0328 EA One Zone Of Four Pre Set Lighting Levels And Dimmable Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-L-WH).....	514.85	18.37
26 09 23 00-0329 EA Two Zones Of Four Pre Set Lighting Levels And Dimmable Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2L-WH).....	669.81	18.37
26 09 23 00-0330 EA Three Zones Of Four Pre Set Lighting Levels And Dimmable Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-3L-WH).....	844.13	18.37
26 09 23 00-0331 Dimmable And Switched Lighting Controls, Tabletop Wireless Transmitter (26 09 23 00-0319)		
26 09 23 00-0332 EA One Zone Of Dimmable Lighting Controls And One Zone Of On/Off Switched Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-LSW-B-WH).....	669.81	18.37
26 09 23 00-0333 EA Two Zones Of Dimmable Lighting Controls And One Zone Of On/Off Switched Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2LSW-B-WH).....	844.13	18.37
26 09 23 00-0334 EA One Zone Of Dimmable Lighting Controls And Two Zones Of On/Off Switched Lighting Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-L2SW-B-WH).....	844.13	18.37
26 09 23 00-0335 Dimmable Lighting Controls And Shade Or Projection Controls, Tabletop Wireless Transmitter (26 09 23 00-0319)		
26 09 23 00-0336 EA One Zone Of Open/Stop/Close Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-C3-B-WH).....	514.85	18.37
26 09 23 00-0337 EA Two Zones Of Open/Stop/Close Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2C3-B-WH).....	669.81	18.37
26 09 23 00-0338 EA One Zone Of Dimmable Lighting Controls And One Zone Of Output Switch Projection Screen Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-LC2-B-WH).....	611.70	18.37
26 09 23 00-0339 EA Two Zones Of Dimmable Lighting Controls And One Zone Of Output Switch Projection Screen Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2LC2-B-WH).....	747.29	18.37
26 09 23 00-0340 EA One Zone Of Dimmable Lighting Controls And One Zone Of Open/Stop/Close Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-LC3-B-WH).....	669.81	18.37
26 09 23 00-0341 EA Two Zones Of Dimmable Lighting Controls And One Zone Of Open/Stop/Close Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2LC3-B-WH).....	805.39	18.37
26 09 23 00-0342 EA One Zone Of Dimmable Lighting Controls And Two Zones Of Open/Stop/Close Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-L2C3-B-WH).....	669.81	18.37



			MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0343			Dimmable Lighting Controls And Sivoia QED Shade Controls, Tabletop Wireless Transmitter <small>(26 09 23 00-0319)</small>		
26 09 23 00-0344	EA		One Zone Of Sivoia QED Open/Stop/Preset Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-Q-B-WH).....	514.85	18.37
26 09 23 00-0345	EA		Two Zones Of Sivoia QED Open/Stop/Preset Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2Q-B-WH).....	669.81	18.37
26 09 23 00-0346	EA		One Zone Of Dimmable Lighting Controls And One Zone Of Sivoia QED Open/Stop/Preset Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-LQ-B-WH).....	669.81	18.37
26 09 23 00-0347	EA		Two Zones Of Dimmable Lighting Controls And One Zone Of Sivoia QED Open/Stop/Preset Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-2LQ-B-WH).....	844.13	18.37
26 09 23 00-0348	EA		One Zone Of Dimmable Lighting Controls And Two Zones Of Sivoia QED Open/Stop/Preset Motorized Shade Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-L2Q-B-WH).....	669.81	18.37
26 09 23 00-0349	EA		One Zone Of Dimmable Lighting Controls, One Zone Of Sivoia QED Open/Stop/Preset Motorized Shade Controls, One Zone Of Output Controls, Tabletop Wireless Transmitter (Lutron RTA-TX-LQC2-B-WH).....	844.13	18.37
26 09 23 00-0350			Output Switch Closure Controls, Tabletop Wireless Transmitter <small>(26 09 23 00-0319)</small>		
26 09 23 00-0351	EA		Five Buttons Of Output Switch Closures For Grafik Eye Systems, Tabletop Wireless Transmitter (Lutron RTA-TX-C5-WH).....	514.85	18.37
26 09 23 00-0352	EA		Nine Buttons Of Output Switch Closures For Grafik Eye Systems, Tabletop Wireless Transmitter (Lutron RTA-TX-C5C4-WH).....	669.81	18.37
26 09 23 00-0353	EA		Thirteen Buttons Of Output Switch Closures For Grafik Eye Systems, Tabletop Wireless Transmitter (Lutron RTA-TX-C52C4-WH).....	844.13	18.37
26 09 23 00-0354			Accessories For Tabletop Wireless Transmitter <small>(26 09 23 00-0319)</small>		
26 09 23 00-0355	EA		Security Mounting Brackets For Tabletop Wireless Transmitters (Lutron RTA-SEC-WH).....	108.10	18.37
26 09 23 00-0356			Wall Box Transmitters For Radio Controlled Devices <small>(26 09 23 00-0318)</small>		
26 09 23 00-0357	EA		On/Off Switched Lighting Controls, Wall Box Wireless Transmitter (Lutron RTA-WX-2BSW-WH).....	476.12	18.37
26 09 23 00-0358	EA		Dimmable Lighting Controls, Wall Box Wireless Transmitter (Lutron RTA-WX-2B-WH).....	514.85	18.37
26 09 23 00-0359	EA		Four Preset Lighting Level And Dimmable Lighting Controls, Wall Box Wireless Transmitter (Lutron RTA-WX-5B-WH).....	514.85	18.37
26 09 23 00-0360	EA		Open/Stop/Close Motorized Shade Controls, Wall Box Wireless Transmitter (Lutron RTA-WX-C3LB-WH).....	514.85	18.37
26 09 23 00-0361	EA		Up/Down Projection Screen Controls, Wall Box Wireless Transmitter (Lutron RTA-WX-C2LB-WH).....	514.85	18.37
26 09 23 00-0362	EA		Open/Stop/Close Sivoia QED Shade Controls, Wall Box Wireless Transmitter (Lutron RTA-WX-Q3LB-WH).....	514.85	18.37
26 09 23 00-0363			Interfaces For Radio Controlled Devices <small>(26 09 23 00-0318)</small>		
26 09 23 00-0364	EA		Incandescent And Magnetic Low Voltage Lighting Interface For Radio Controlled Devices (Lutron FDI-INC-2000).....	476.12	18.37
26 09 23 00-0365	EA		Lutron Tu-Wire Ballast Interface For Radio Controlled Devices (Lutron FDI-INC-2000).....	476.12	18.37
26 09 23 00-0366	EA		Electronic Low Voltage Lighting Interface For Radio Controlled Devices (Lutron FDI-ELV-1000).....	476.12	18.37
26 09 23 00-0367	EA		Sivoia QED Controllable Window Treatments Contact Closure Interface For Radio Controlled Devices (Lutron SVQ-CCI-8).....	968.10	18.37
26 09 23 00-0368	EA		RS-232 Interface For Radio Controlled Devices (Lutron RTA-RS232).....	1,386.47	18.37
26 09 23 00-0369	EA		Switch Closure Input Interface For Radio Controlled (Lutron RTA-SCI).....	1,386.47	18.37
26 09 23 00-0370			Fluorescent Controllers For Radio Controlled Devices <small>(26 09 23 00-0318)</small>		
26 09 23 00-0371	EA		On/Off Switched Fluorescent Controllers For Radio Controlled Devices (Lutron RTA-RX-SW).....	611.70	18.37
26 09 23 00-0372	EA		Dimmable Fluorescent Controllers For Radio Controlled Devices (Lutron RTA-RX-F).....	689.18	18.37
26 09 23 00-0373	EA		Switch Closures And Dimmable Fluorescent Controllers For Radio Controlled Devices (Lutron RTA-RX-F-SC).....	805.39	18.37
26 09 23 00-0374			AC Motor Group Controllers For Radio Controlled Devices <small>(26 09 23 00-0318)</small>		
26 09 23 00-0375	EA		Up To Two Motors, AC Motor Group Controllers For Radio Controlled Devices (Lutron WC-2M-GC).....	902.24	18.37
26 09 23 00-0376	EA		Up To Four Motors, AC Motor Group Controllers For Radio Controlled Devices (Lutron WC-4M-GC).....	1,241.20	18.37
26 09 23 00-0377			RF Wireless Technology, Switches And Dimmers (Lutron® Maestro Wireless®) <small>(26 09 23)</small>		
26 09 23 00-0378			RF Wireless Technology, Switches (Lutron® Maestro Wireless®) <small>(26 09 23 00-0377)</small>		
26 09 23 00-0379	EA		6 Amperes Lighting, 3 Amperes Fan, RF Wireless Technology, Electronic Switch (Lutron® Maestro Wireless® MRF2-6ANS).....	138.14	24.49
26 09 23 00-0380	EA		8 Amperes Lighting, 5.8 Amperes Fan, RF Wireless Technology, Spec Grade Electronic Switch (Lutron® Maestro Wireless® MRF2-8ANS-120).....	162.80	24.49
26 09 23 00-0381	EA		8 Amperes Lighting, 3 Amperes Fan, RF Wireless Technology, Spec Grade Electronic Switch (Lutron® Maestro Wireless® MRF2-8S-DV).....	254.71	24.49
26 09 23 00-0382	EA		120 Volt, Claro® Gloss Finish, RF Wireless Technology, Companion Switch (Lutron® Maestro Wireless® MA-AS-277).....	97.00	24.49
26 09 23 00-0383	EA		277 Volt, Claro® Gloss Finish, RF Wireless Technology, Companion Switch (Lutron® Maestro Wireless® MA-AS-277).....	118.54	24.49
26 09 23 00-0384	EA		120 Volt, Satin Colors® Satin Finish, RF Wireless Technology, Companion Switch (Lutron® Maestro Wireless® MSC-AS).....	106.04	24.49
26 09 23 00-0385	EA		277 Volt, Satin Colors® Satin Finish, RF Wireless Technology, Companion Switch (Lutron® Maestro Wireless® MSC-AS-277).....	128.02	24.49
26 09 23 00-0386			RF Wireless Technology, Dimmers (Lutron® Maestro Wireless®) <small>(26 09 23 00-0377)</small>		

26 Electrical**26 09 Instrumentation and Control for Electrical Systems****26 09 23 Lighting Control Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0387	EA		600 Watt, 120 Volt, RF Wireless Technology, Incandescent Dimmer (Lutron® Maestro Wireless® MRF2-600M)	132.45	24.49
26 09 23 00-0388	EA		600 Watt, 120 Volt, RF Wireless Technology, Magnetic Low Voltage Dimmer (Lutron® Maestro Wireless® MRF2-6MLV)	143.83	24.49
26 09 23 00-0389	EA		600 Watt, 120 Volt, RF Wireless Technology, Spec Grade Neutral Wire Dimmer (Lutron® Maestro Wireless® MRF2-6ND-120)	172.28	24.49
26 09 23 00-0390	EA		1,000 Watt, 120 Volt, RF Wireless Technology, Spec Grade Dimmer (Lutron® Maestro Wireless® MRF2-10D-120)	184.53	30.62
26 09 23 00-0391	EA		600 Watt, 120 Volt, RF Wireless Technology, Electronic Low-Voltage Dimmer (Lutron® Maestro Wireless® MRF2-6ELV-120)	228.24	24.49
26 09 23 00-0392	EA		120 Volt, Claro® Gloss Finish, RF Wireless Technology, Companion Dimmer (Lutron® Maestro Wireless® MA-R)	75.07	24.49
26 09 23 00-0393	EA		277 Volt, Claro® Gloss Finish, RF Wireless Technology, Companion Dimmer (Lutron® Maestro Wireless® MA-R-277)	90.72	24.49
26 09 23 00-0394	EA		120 Volt, Satin Colors® Satin Finish, RF Wireless Technology, Companion Dimmer (Lutron® Maestro Wireless® MSC-AD)	80.77	24.49
26 09 23 00-0395	EA		277 Volt, Satin Colors® Satin Finish, RF Wireless Technology, Companion Dimmer (Lutron® Maestro Wireless® MSC-AD-277)	96.41	24.49
26 09 23 00-0396	EA		6 Amperes, 120/277 Volt, RF Wireless Technology, 3-Wire Fluorescent Spec Grade Neutral Wire Dimmer (Lutron® Maestro Wireless® MRF2-F6AN-DV)	256.45	42.86
26 09 23 00-0397			Removal And Reinstallation Of Occupancy Sensors <small>(26 09 23)</small>		
26 09 23 00-0398	EA		Removal And Reinstallation Of Ceiling Mounted Occupancy Sensor	82.67	
			Note: Includes storing and cleaning.		
26 09 23 00-0399	EA		Removal And Reinstallation Of Wall Mounted Occupancy Sensor	55.12	
			Note: Includes storing and cleaning.		
26 09 23 00-0400			Occupancy Sensors (Watt Stopper) <small>(26 09 23)</small>		
			Note: Includes testing of new devices and certification.		
26 09 23 00-0401			Occupancy Sensors <small>(26 09 23 00-0400)</small>		
			Note: Exclude boxes.		
26 09 23 00-0402			Wall Switch Mounted Occupancy Sensors <small>(26 09 23 00-0401)</small>		
26 09 23 00-0403			Ultrasonic, Wall Switch Mounted Occupancy Sensors <small>(26 09 23 00-0402)</small>		
26 09 23 00-0404	EA		Ultrasonic, Wall Switch Mounted Occupancy Sensor (Watt Stopper UW-100)	137.42	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0405	EA		Dual Relay, Ultrasonic, Wall Switch Mounted Occupancy Sensor (Watt Stopper UW-200)	162.43	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0406			Passive Infrared, Wall Switch Mounted Occupancy Sensors <small>(26 09 23 00-0402)</small>		
26 09 23 00-0407	EA		Nightlight, Passive Infrared, Wall Switch Mounted Occupancy Sensor (Watt Stopper WN-100)	113.24	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0408	EA		Passive Infrared, Wall Switch Mounted Occupancy Sensor (Watt Stopper WS)	105.66	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0409	EA		Passive Infrared, Wall Switch Mounted Occupancy Sensor (Watt Stopper PW-100)	119.81	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0410	EA		Dual Relay, Passive Infrared, Wall Switch Mounted Occupancy Sensor (Watt Stopper PW-200)	138.93	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0411	EA		Dimmable, Passive Infrared, Wall Switch Mounted Occupancy Sensor (Watt Stopper WD)	137.36	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0412			Passive Infrared And Ultrasonic, Wall Switch Mounted Occupancy Sensors <small>(26 09 23 00-0402)</small>		
26 09 23 00-0413	EA		Passive Infrared And Ultrasonic, Wall Switch Mounted Occupancy Sensor (Watt Stopper DW-100)	200.51	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0414	EA		Dual Relay, Passive Infrared And Ultrasonic, Wall Switch Mounted Occupancy Sensor (Watt Stopper DW-200)	216.33	12.25
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35	
26 09 23 00-0415			Wall Switch Mounted Occupancy Sensor Accessories <small>(26 09 23 00-0402)</small>		
26 09 23 00-0416	EA		Single Gang, Plastic Switch Plate Cover For Occupancy Sensors (Watt Stopper ASP)	7.63	3.06
26 09 23 00-0417	EA		One Side Blank, Double Gang, Plastic Switch Plate Cover For Occupancy Sensors (Watt Stopper ASP)	8.89	3.06
26 09 23 00-0418	EA		Switch Option, Double Gang, Plastic Switch Plate Cover For Occupancy Sensors (Watt Stopper ASP)	8.89	3.06
26 09 23 00-0419			Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0401)</small>		
26 09 23 00-0420			Ultrasonic, Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0419)</small>		
26 09 23 00-0421			25 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0420)</small>		
26 09 23 00-0422	EA		500 SF 360 Degree Coverage, 25 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper W-500A)	180.31	27.55
26 09 23 00-0423	EA		1,000 SF 360 Degree Coverage, 25 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper W-1000A)	207.51	27.55
26 09 23 00-0424	EA		2,000 SF 360 Degree Coverage, 25 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper W-2000A)	234.91	27.55
26 09 23 00-0425	EA		90 LF Hallway Coverage, 25 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper W-2000H)	232.44	27.55
26 09 23 00-0426			32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0420)</small>		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0427 EA 600 SF 360 Degree Coverage, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-605).....	196.41	27.55
26 09 23 00-0428 EA 1,100 SF 360 Degree Coverage, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-1105).....	224.00	27.55
26 09 23 00-0429 EA 2,205 SF 360 Degree Coverage, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-2205).....	250.12	27.55
26 09 23 00-0430 EA 90 LF Hallway Coverage, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-2255).....	254.55	27.55
26 09 23 00-0431 EA 600 SF 360 Degree Coverage, Isolated Relay, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-600).....	212.90	27.55
26 09 23 00-0432 EA 1,100 SF 360 Degree Coverage, Isolated Relay, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-1100).....	241.17	27.55
26 09 23 00-0433 EA 2,200 SF 360 Degree Coverage, Isolated Relay, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-2200).....	269.34	27.55
26 09 23 00-0434 EA 90 LF Hallway Coverage, Isolated Relay, 32 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper WT-2250).....	277.45	27.55
26 09 23 00-0435 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0420)</small>		
26 09 23 00-0436 EA 500 SF 360 Degree Coverage, Isolated Relay, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-300-1).....	204.38	27.55
26 09 23 00-0437 EA 1,000 SF 360 Degree Coverage, Isolated Relay, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-300-2).....	237.34	27.55
26 09 23 00-0438 EA 2,000 SF 360 Degree Coverage, Isolated Relay, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-300-3).....	264.93	27.55
26 09 23 00-0439 EA 500 SF 360 Degree Coverage, Panel Integrating, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-305-1).....	192.23	27.55
26 09 23 00-0440 EA 1,000 SF 360 Degree Coverage, Panel Integrating, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-305-2).....	233.78	27.55
26 09 23 00-0441 EA 2,000 SF 360 Degree Coverage, Panel Integrating, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-305-3).....	247.23	27.55
26 09 23 00-0442 EA 500 SF 360 Degree Coverage, Line Voltage, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-355-1).....	206.09	27.55
26 09 23 00-0443 EA 1,000 SF 360 Degree Coverage, Line Voltage, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-355-2).....	230.01	27.55
26 09 23 00-0444 EA 2,000 SF 360 Degree Coverage, Line Voltage, 40 KHZ Ultrasonic, Ceiling Mounted Occupancy Sensor (Watt Stopper UT-355-3).....	259.54	27.55
26 09 23 00-0445 Passive Infrared, Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0419)</small>		
26 09 23 00-0446 EA 30 Segment, 5 Level Lens, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper WPIR).....	148.56	27.55
26 09 23 00-0447 EA HVAC/BAS, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper CI-12/24).....	151.77	27.55
26 09 23 00-0448 EA Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper CI-205).....	159.38	27.55
26 09 23 00-0449 EA Line Voltage, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper CI-355).....	179.79	27.55
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		<i>16.54</i>
26 09 23 00-0450 EA Low Profile, Isolated Relay, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper CI-305).....	182.27	27.55
26 09 23 00-0451 EA Isolated Relay, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper CI-200).....	192.95	27.55
26 09 23 00-0452 EA Low Profile, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper CI-300).....	210.05	27.55
26 09 23 00-0453 Passive Infrared And Ultrasonic, Ceiling Mounted Occupancy Sensors <small>(26 09 23 00-0419)</small>		
26 09 23 00-0454 EA 1,000 SF 360 Degree Coverage, Line Voltage, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper DT-355).....	249.89	27.55
26 09 23 00-0455 EA 1,000 SF 360 Degree Coverage, Isolated Relay, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper DT-300).....	286.06	27.55
26 09 23 00-0456 EA 1,000 SF 360 Degree Coverage, Passive Infrared, Ceiling Mounted Occupancy Sensor (Watt Stopper DT-305).....	242.21	27.55
26 09 23 00-0457 Ceiling/Wall Mounted Occupancy Sensors <small>(26 09 23 00-0401)</small>		
26 09 23 00-0458 Passive Infrared, Ceiling/Wall Mounted Occupancy Sensors <small>(26 09 23 00-0457)</small>		
26 09 23 00-0459 EA 120 LF Coverage, Low Temperature, Passive Infrared, Ceiling/Wall Mounted Occupancy Sensor (Watt Stopper CB-100-1/3).....	307.74	27.55
26 09 23 00-0460 EA 2,000 SF Coverage, Low Temperature, Passive Infrared, Ceiling/Wall Mounted Occupancy Sensor (Watt Stopper CB-100).....	307.74	27.55
26 09 23 00-0461 Passive Infrared And Ultrasonic, Ceiling/Wall Mounted Occupancy Sensors <small>(26 09 23 00-0457)</small>		
26 09 23 00-0462 EA 2,000 SF Coverage, Passive Infrared And Ultrasonic, Ceiling/Wall Mounted Occupancy Sensor (Watt Stopper DT-200).....	286.06	27.55
26 09 23 00-0463 Occupancy Sensor Power Packs <small>(26 09 23 00-0400)</small>		
26 09 23 00-0464 Single Voltage, Occupancy Sensor Power Packs <small>(26 09 23 00-0463)</small>		
26 09 23 00-0465 EA 220 To 240 Volt AC, 20 Amperes, Occupancy Sensor Power Pack (Watt Stopper B230E-P).....	99.56	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		<i>14.70</i>
26 09 23 00-0466 EA 347 Volt AC, 15 Amperes, Occupancy Sensor Power Pack (Watt Stopper B347D-P).....	90.38	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		<i>14.70</i>
26 09 23 00-0467 Auxiliary, Occupancy Sensor Power Packs <small>(26 09 23 00-0463)</small>		

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MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 09 23 00-0468	EA	120, 277 Or 347 Volt AC, 20 Amperes, Auxiliary Occupancy Sensor Power Pack (Watt Stopper S120/277/347E-P).....	82.81		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0469		Universal Voltage, Power Packs For Occupancy Sensors <small>(26 09 23 00-0463)</small>			
26 09 23 00-0470	EA	120/277 Volt AC, 20 Amperes, Dual Voltage, Occupancy Sensor Power Pack (Watt Stopper BZ-100).....	110.51		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0471		Form C, Occupancy Sensor Power Packs <small>(26 09 23 00-0463)</small>			
26 09 23 00-0472	EA	120 Volt AC, Form C, Occupancy Sensor Power Pack (Watt Stopper A120C-P).....	99.98		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0473	EA	277 Volt AC, Form C, Occupancy Sensor Power Pack (Watt Stopper A277C-P).....	100.06		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0474		Two Relay, Occupancy Sensor Power Packs <small>(26 09 23 00-0463)</small>			
26 09 23 00-0475	EA	120 Volt AC, Two Relay, Occupancy Sensor Power Pack (Watt Stopper C120E-P).....	126.61		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0476	EA	277 Volt AC, Two Relay, Occupancy Sensor Power Pack (Watt Stopper C277E-P).....	128.43		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0477		Occupancy Sensor Power Supplies <small>(26 09 23 00-0463)</small>			
26 09 23 00-0478	EA	120 Volt AC, Occupancy Sensor Power Supply (Watt Stopper BZ-150).....	114.81		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0479	EA	277 Volt AC, Occupancy Sensor Power Supply (Watt Stopper AT-277).....	261.23		24.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70		
26 09 23 00-0480		Intelligent, Occupancy Sensor Power Packs <small>(26 09 23 00-0463)</small>			
26 09 23 00-0481	EA	120/277 Volt AC, Two Relays, Two Dimming Channels, Intelligent Occupancy Sensor Power Pack (Watt Stopper LC-100).....	346.62		24.49
26 09 23 00-0482		DIN Rail Mounted, Occupancy Sensor Power Packs <small>(26 09 23 00-0463)</small>			
26 09 23 00-0483	EA	120/230/277 Volt AC, DIN Rail Mounted, Occupancy Sensor Power Pack (Watt Stopper BD-100).....	109.47		24.49
26 09 23 00-0484		Occupancy Sensor Accessories <small>(26 09 23 00-0400)</small>			
26 09 23 00-0485		Protective Cages For Occupancy Sensors <small>(26 09 23 00-0484)</small>			
26 09 23 00-0486	EA	Protective Cage For Occupancy Sensors (Watt Stopper WC).....	63.48		9.18
26 09 23 00-0487		Mounting Brackets For Occupancy Sensors <small>(26 09 23 00-0484)</small>			
26 09 23 00-0488	EA	Mounting Bracket For Occupancy Sensor (Watt Stopper MB).....	48.64		15.31
		Note: Includes J-plate for mounting to HID fixtures or L-plate for mounting to fluorescent fixtures, walls, shelves and girders.			
26 09 23 00-0489		Occupancy/Lighting Logger <small>(26 09 23 00-0484)</small>			
		Note: Logs when a space is occupied/vacant and when lighting is on/off.			
26 09 23 00-0490	EA	Occupancy/Lighting Logger With Connector Cable (Watt Stopper IT-200).....	473.27		52.05
26 09 23 00-0491		Digital Time Light Switches <small>(26 09 23 00-0400)</small>			
26 09 23 00-0492	EA	Preset Time, Wall Switch Mounted, Digital Time Light Switch (Watt Stopper TS-400).....	102.08		12.25
26 09 23 00-0493		Digital High/Low Passive Infrared Fixture Integrated Outdoor Sensor <small>(26 09 23 00-0400)</small>			
26 09 23 00-0494	EA	Digital High/Low Passive Infrared Fixture Integrated Outdoor Sensor (Watt Stopper FSP-211).....	222.86		39.80
26 09 23 00-0495		Occupancy Sensors (Sensor Switch) <small>(26 09 23)</small>			
		Note: Includes testing of new devices and certification.			
26 09 23 00-0496		Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0495)</small>			
		Note: Exclude boxes			
26 09 23 00-0497		Wall Switch Mount Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0496)</small>			
26 09 23 00-0498		Passive Infrared, Wall Switch Mount Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0497)</small>			
26 09 23 00-0499	EA	Single Pole, Low Voltage, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD LV).....	218.18		12.25
		<i>For Low Voltage Relay Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
26 09 23 00-0500	EA	Nightlight, Line Voltage, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD NL).....	153.62		12.25
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.35		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0501 EA Single Pole, Line Voltage, Fully Automatic, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD)	146.52	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0502 EA Single Pole, Line Voltage, Semi-Automatic, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD SA)	146.52	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0503 EA 2-Pole, Line Voltage, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD 2P)	185.90	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0504 EA Single Pole, Passive Infrared, Large Area, Wall Switch Mount Occupancy Sensor (Sensor Switch LWS)	185.90	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
26 09 23 00-0505 EA 2-Pole, Passive Infrared, Large Area, Wall Switch Mount Occupancy Sensor (Sensor Switch LWS 2P)	226.27	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
26 09 23 00-0506 EA Single Pole, Passive Infrared, Internally Powered, Wall Switch Mount Occupancy Sensor (Sensor Switch IPD)	185.90	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
26 09 23 00-0507 Dual Technology, Wall Switch Mount Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0497)</small>		
Note: Includes passive infrared and microphonics detection		
26 09 23 00-0508 EA Single Pole, Low Voltage, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD PDT LV)	282.75	12.25
For Low Voltage Relay Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
26 09 23 00-0509 EA Nightlight, Line Voltage, Dual Technology, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD PDT NL)	218.18	12.25
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0510 EA Single Pole, Line Voltage, Fully Automatic, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD PDT)	213.35	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0511 EA Single Pole, Line Voltage, Semi-Automatic, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD PDT SA)	213.35	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0512 EA 2-Pole, Line Voltage, Passive Infrared, Wall Switch Mount Occupancy Sensor (Sensor Switch WSD PDT 2P)	250.47	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.35	
26 09 23 00-0513 EA Single Pole, Dual Technology, Large Area, Wall Switch Mount Occupancy Sensor (Sensor Switch LWS PDT)	250.47	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
26 09 23 00-0514 EA 2-Pole, Dual Technology, Large Area, Wall Switch Mount Occupancy Sensor (Sensor Switch LWS PDT 2P)	269.84	12.25
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
26 09 23 00-0515 Wall Switch Mount Occupancy Sensor Accessories (Sensor Switch) <small>(26 09 23 00-0497)</small>		
26 09 23 00-0516 EA One Blank, 2-Gang, Plastic Switch Plate Cover For Occupancy Sensors (Sensor Switch WS BPX)	19.03	3.06
26 09 23 00-0517 EA One Switch, 2-Gang, Plastic Switch Plate Cover For Occupancy Sensors (Sensor Switch WS SPX)	19.03	3.06
26 09 23 00-0518 EA Two Blanks, 3-Gang, Plastic Switch Plate Cover For Occupancy Sensors (Sensor Switch WS BPX 3)	38.40	3.06
26 09 23 00-0519 EA Two Switches, 3-Gang, Plastic Switch Plate Cover For Occupancy Sensors (Sensor Switch WS SPX 3)	38.40	3.06
26 09 23 00-0520 360 Degree View Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0496)</small>		
26 09 23 00-0521 Passive Infrared, 360 Degree View Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0520)</small>		
Note: One photocell or dimming option per occupancy sensor		
26 09 23 00-0522 EA Low Voltage, Passive Infrared, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CM 9)	248.81	27.55
For Low Voltage Relay Option, Add	17.61	
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Occupancy Controlled Dimming Option, Add	29.35	
For Photocell Option With Dimming Capability, Add	44.02	
26 09 23 00-0523 EA Low Voltage, Passive Infrared, Recessed Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch RM 9)	248.81	27.55
For Low Voltage Relay Option, Add	17.61	
For Photocell (Inhibit Mode Only) Option, Add	17.61	
For Low Temp/High Humidity Option, Add	14.67	
For Occupancy Controlled Dimming Option, Add	29.35	
For Photocell Option With Dimming Capability, Add	44.02	

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26 09 23 Lighting Control Devices



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0524	EA		Low Voltage, Passive Infrared, Fixture (Box) Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMB 9)	248.81	27.55
			<i>For Low Voltage Relay Option, Add</i>	17.61	
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0525	EA		Single Pole, Line Voltage, Passive Infrared, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR 9)	264.95	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0526	EA		Single Pole, Line Voltage, Passive Infrared, Recessed Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR 9)	264.95	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0527	EA		Single Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB 9)	213.30	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0528	EA		2-Pole, Line Voltage, Passive Infrared, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR 9 2P)	329.52	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0529	EA		2-Pole, Line Voltage, Passive Infrared, Recessed Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR 9 2P)	329.52	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0530	EA		2-Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB 9 2P)	277.87	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0531	EA		Low Voltage, Passive Infrared, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CM 10)	248.81	27.55
			<i>For Low Voltage Relay Option, Add</i>	17.61	
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0532	EA		Low Voltage, Passive Infrared, Recessed Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch RM 10)	248.81	27.55
			<i>For Low Voltage Relay Option, Add</i>	17.61	
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0533	EA		Low Voltage, Passive Infrared, Fixture (Box) Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMB 10)	248.81	27.55
			<i>For Low Voltage Relay Option, Add</i>	17.61	
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0534	EA		Single Pole, Line Voltage, Passive Infrared, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR 10)	264.95	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0535	EA		Single Pole, Line Voltage, Passive Infrared, Recessed Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR 10)	264.95	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0536	EA		Single Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB 10)	213.30	27.55
			<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
			<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 09 23 00-0537 EA 2-Pole, Line Voltage, Passive Infrared, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR 10 2P).....	329.52	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0538 EA 2-Pole, Line Voltage, Passive Infrared, Recessed Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR 10 2P).....	329.52	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0539 EA 2-Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB 10 2P).....	277.87	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0540 Dual Technology, 360 Degree View Occupancy Sensors (Sensor Switch)₍₂₆		
<small>09 23 00-0520</small>		
Note: One photocell or dimming option per occupancy sensor. Includes passive infrared and microphonics detection		
26 09 23 00-0541 EA Low Voltage, Dual Technology, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CM PDT 9).....	313.38	27.55
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0542 EA Low Voltage, Dual Technology, Recessed Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch RM PDT 9).....	313.38	27.55
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0543 EA Low Voltage, Dual Technology, Fixture (Box) Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMB PDT 9).....	313.38	27.55
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0544 EA Single Pole, Line Voltage, Dual Technology, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR PDT 9).....	297.24	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0545 EA Single Pole, Line Voltage, Dual Technology, Recessed Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR PDT 9).....	297.24	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0546 EA Single Pole, Line Voltage, Dual Technology, Fixture (Box) Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB PDT 9).....	245.59	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0547 EA 2-Pole, Line Voltage, Dual Technology, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR PDT 9 2P).....	361.80	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0548 EA 2-Pole, Line Voltage, Dual Technology, Recessed Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR PDT 9 2P).....	361.80	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0549 EA 2-Pole, Line Voltage, Dual Technology, Fixture (Box) Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB PDT 9 2P).....	310.15	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	

26 Electrical

26 09 Instrumentation and Control for Electrical Systems

26 09 23 Lighting Control Devices



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 09 23 00-0550	EA Low Voltage, Dual Technology, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CM PDT 10).....	313.38	27.55
	<i>For Low Voltage Relay Option, Add</i>	17.61	
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
	<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0551	EA Low Voltage, Dual Technology, Recessed Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch RM PDT 10).....	313.38	27.55
	<i>For Low Voltage Relay Option, Add</i>	17.61	
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
	<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0552	EA Low Voltage, Dual Technology, Fixture (Box) Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMB PDT 10).....	313.38	27.55
	<i>For Low Voltage Relay Option, Add</i>	17.61	
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
	<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
26 09 23 00-0553	EA Single Pole, Line Voltage, Dual Technology, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR PDT 10).....	297.24	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
	<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0554	EA Single Pole, Line Voltage, Dual Technology, Recessed Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR PDT 10).....	297.24	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
	<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0555	EA Single Pole, Line Voltage, Dual Technology, Fixture (Box) Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB PDT 10).....	245.59	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
	<i>For Photocell Option With Dimming Capability, Add</i>	44.02	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0556	EA 2-Pole, Line Voltage, Dual Technology, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMR PDT 10 2P).....	361.80	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0557	EA 2-Pole, Line Voltage, Dual Technology, Recessed Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch RMR PDT 10 2P).....	361.80	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0558	EA 2-Pole, Line Voltage, Dual Technology, Fixture (Box) Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch CMRB PDT 10 2P).....	310.15	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Photocell Option With Dual Zone On/Off, Add</i>	44.02	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0559	Wide View And Hallway Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0496)</small>		
26 09 23 00-0560	Passive Infrared, Wide View And Hallway Occupancy Sensors (Sensor Switch) <small>(26 09 23 00-0559)</small>		
26 09 23 00-0561	EA Low Voltage, Passive Infrared, Wall Mount, Wide View Occupancy Sensor (Sensor Switch WV 16).....	248.81	27.55
	<i>For Low Voltage Relay Option, Add</i>	17.61	
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Ceiling Mount, Add</i>	29.35	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
26 09 23 00-0562	EA Low Voltage, Passive Infrared, Wall Mount, Hallway Occupancy Sensor (Sensor Switch HW 13).....	281.10	27.55
	<i>For Low Voltage Relay Option, Add</i>	17.61	
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Ceiling Mount, Add</i>	29.35	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
26 09 23 00-0563	EA Line Voltage, Passive Infrared, Wall Mount, Hallway Occupancy Sensor (Sensor Switch HWR 13).....	345.66	27.55
	<i>For Ceiling Mount, Add</i>	29.35	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
26 09 23 00-0564	EA Single Pole, Line Voltage, Passive Infrared, Wall Mount, Wide View Occupancy Sensor (Sensor Switch WVR 16).....	329.52	27.55
	<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
	<i>For Ceiling Mount, Add</i>	29.35	
	<i>For Low Temp/High Humidity Option, Add</i>	14.67	
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0565 EA 2-Pole, Line Voltage, Passive Infrared, Wall Mount, Wide View Occupancy Sensor (Sensor Switch WVR 16 2P).....	394.08	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Ceiling Mount, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0566 Dual Technology, Wide View And Hallway Occupancy Sensors (Sensor Switch) (26 09 23 00-0566)		
Note: Includes passive infrared and microphonics detection		
26 09 23 00-0567 EA Low Voltage, Dual Technology, Wall Mount, Wide View Occupancy Sensor (Sensor Switch WV PDT 16).....	313.38	27.55
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Ceiling Mount, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
26 09 23 00-0568 EA Single Pole, Line Voltage, Dual Technology, Wall Mount, Wide View Occupancy Sensor (Sensor Switch WVR PDT 16).....	361.80	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Ceiling Mount, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0569 EA 2-Pole, Line Voltage, Dual Technology, Wall Mount, Wide View Occupancy Sensor (Sensor Switch WVR PDT 16 2P).....	426.37	27.55
<i>For Photocell (Inhibit Mode Only) Option, Add</i>	17.61	
<i>For Ceiling Mount, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0570 High Bay Occupancy Sensors (Sensor Switch) (26 09 23 00-0496)		
26 09 23 00-0571 Passive Infrared, High Bay Occupancy Sensors (Sensor Switch) (26 09 23 00-0570)		
26 09 23 00-0572 EA Low Voltage, Passive Infrared, Ceiling Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CM 6).....	248.81	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
26 09 23 00-0573 EA Low Voltage, Passive Infrared, Recessed Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch RM 6).....	248.81	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
26 09 23 00-0574 EA Low Voltage, Passive Infrared, Fixture (Box) Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMB 6).....	248.81	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
26 09 23 00-0575 EA Single Pole, Line Voltage, Passive Infrared, Ceiling Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMR 6).....	213.30	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Start To High, HID Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0576 EA Single Pole, Line Voltage, Passive Infrared, Recessed Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch RMR 6).....	213.30	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Start To High, HID Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0577 EA Single Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMRB 6).....	213.30	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Start To High, HID Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0578 EA 2-Pole, Line Voltage, Passive Infrared, Ceiling Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMR 6 2P).....	277.87	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0579 EA 2-Pole, Line Voltage, Passive Infrared, Recessed Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch RMR 6 2P).....	277.87	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0580 EA 2-Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMRB 6 2P).....	277.87	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	

26 Electrical

26 09 Instrumentation and Control for Electrical Systems

26 09 23 Lighting Control Devices



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 09 23 00-0581	EA	208/240 Volt AC, Line Voltage, Passive Infrared, Ceiling Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMR 6 208).....	235.90		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0582	EA	208/240 Volt AC, Line Voltage, Passive Infrared, Recessed Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch RMR 6 208).....	235.90		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0583	EA	208/240 Volt AC, Line Voltage, Passive Infrared, Fixture (Box) Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMRB 6 208).....	235.90		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0584	EA	480 Volt AC, Line Voltage, Passive Infrared, Ceiling Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMR 6 480).....	235.90		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0585	EA	480 Volt AC, Line Voltage, Passive Infrared, Recessed Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch RMR 6 480).....	235.90		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0586	EA	480 Volt AC, Line Voltage, Passive Infrared, Fixture (Box) Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch CMRB 6 480).....	235.90		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0587	EA	Low Voltage, Passive Infrared, Surface Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HM 50).....	281.10		27.55
		<i>For Low Voltage Relay Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Occupancy Controlled Dimming Option, Add</i>	29.35		
26 09 23 00-0588	EA	Low Voltage, Passive Infrared, Recessed Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch RM 50).....	281.10		27.55
		<i>For Low Voltage Relay Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Occupancy Controlled Dimming Option, Add</i>	29.35		
26 09 23 00-0589	EA	Low Voltage, Passive Infrared, Fixture (Box) Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch CMB 50).....	281.10		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Voltage Relay Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Occupancy Controlled Dimming Option, Add</i>	29.35		
26 09 23 00-0590	EA	Single Pole, Line Voltage, Passive Infrared, Surface Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMR 50).....	342.43		27.55
		<i>For Start To High, HID Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Occupancy Controlled Dimming Option, Add</i>	29.35		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0591	EA	Single Pole, Line Voltage, Passive Infrared, Recessed Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch RMR 50).....	342.43		27.55
		<i>For Start To High, HID Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Occupancy Controlled Dimming Option, Add</i>	29.35		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0592	EA	Single Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch CMRB 50).....	342.43		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Start To High, HID Option, Add</i>	17.61		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Occupancy Controlled Dimming Option, Add</i>	29.35		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0593	EA	2-Pole, Line Voltage, Recessed Mount, Passive Infrared, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch RMR 50 2P).....	300.47		27.55
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0594	EA	2-Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch CMRB 50 2P).....	300.47		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0595	EA	208/240 Volt AC, Line Voltage, Passive Infrared, Recessed Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch RMR 50 208).....	252.04		27.55
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0596	EA	208/240 Volt AC, Line Voltage, Passive Infrared, Fixture (Box) Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch CMRB 50 208).....	252.04		27.55
		<i>For Photocell Option, Add</i>	29.35		
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		
26 09 23 00-0597	EA	480 Volt AC, Line Voltage, Passive Infrared, Recessed Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch RMR 50 480).....	252.04		27.55
		<i>For Low Temp/High Humidity Option, Add</i>	14.67		
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0598 EA 480 Volt AC, Line Voltage, Passive Infrared, Fixture (Box) Mount, Bi-Directional Aisle Way View, High Bay Occupancy Sensor (Sensor Switch CMRB 50 480).....	252.04	27.55
<i>For Photocell Option, Add</i>	29.35	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0599 EA Low Voltage, Passive Infrared, Surface Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HM 10).....	281.10	27.55
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
26 09 23 00-0600 EA Low Voltage, Passive Infrared, Fixture (Box) Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMB 10).....	281.10	27.55
<i>For Low Voltage Relay Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
26 09 23 00-0601 EA Single Pole, Line Voltage, Passive Infrared, Surface Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMR 10).....	342.43	27.55
<i>For Start To High, HID Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0602 EA Single Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMRB 10).....	342.43	27.55
<i>For Start To High, HID Option, Add</i>	17.61	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Occupancy Controlled Dimming Option, Add</i>	29.35	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0603 EA 2-Pole, Line Voltage, Passive Infrared, Fixture (Box) Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMRB 10 2P).....	329.52	27.55
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0604 EA 480 Volt AC, Line Voltage, Passive Infrared, Fixture (Box) Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMRB 10 480).....	297.24	27.55
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0605 EA 208/240 Volt AC, Line Voltage, Passive Infrared, Fixture (Box) Mount, End Of Aisle Way View, High Bay Occupancy Sensor (Sensor Switch HMRB 10 208).....	297.24	27.55
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0606 Occupancy Sensor Power Packs (Sensor Switch) (26 09 23 00-0495)		
26 09 23 00-0607 EA Single Pole, 20 Amperes, 120/277 Volt AC, Occupancy Sensor Power Pack With Relay Circuit Protection (Sensor Switch PP20).....	139.38	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0608 EA 2-Pole, 20 Amperes, 120/277 Volt AC, Occupancy Sensor Power Pack With Relay Circuit Protection (Sensor Switch PP20 2P).....	203.94	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0609 EA Single Pole, 20 Amperes, 120/277 Volt AC, Occupancy Sensor Power Pack Without Relay Circuit Protection (Sensor Switch MP20).....	107.10	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0610 EA 2-Pole, 20 Amperes, 120/277 Volt AC, Occupancy Sensor Slave Pack Without Relay Circuit Protection (Sensor Switch MSP20).....	97.41	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0611 EA 20 Amperes, 120/277 Volt AC, Occupancy Sensor Slave Pack (Sensor Switch SP20).....	129.70	24.49
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0612 EA 120/277 Volt AC, High Intensity Discharge (HID) Power Pack With 20 Minute Start To High Override (Sensor Switch PP20 SH).....	210.40	24.49
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0613 EA 120/277 Volt AC, 2-Pole, Power Pack With Alternating Relays (Sensor Switch PP 2PAR).....	210.40	24.49
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0614 EA 120/277 Volt AC, Power Pack With Momentary Contacts For Latching Contactors Or Relays (Sensor Switch PP 2PM).....	210.40	24.49
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.70	
26 09 23 00-0615 Daylighting Control (Sensor Switch) (26 09 23 00-0495)		
26 09 23 00-0616 EA Low Voltage, Ceiling Mount, On-Off Switching Photocell (Sensor Switch CM PC).....	216.53	27.55
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0617 EA Low Voltage, Recessed Mount, On-Off Switching Photocell (Sensor Switch RM PC).....	216.53	27.55
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0618 EA Low Voltage, Fixture (Box) Mount, On-Off Switching Photocell (Sensor Switch CMB PC).....	216.53	27.55
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0619 EA Line Voltage, Ceiling Mount, On-Off Switching Photocell (Sensor Switch CMR PC).....	216.53	27.55
<i>For 480 Volt AC Option, Add</i>	20.54	
<i>For Low Temp/High Humidity Option, Add</i>	14.67	
<i>For Dual Zone Option, Add</i>	44.02	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	

26 Electrical**26 09 Instrumentation and Control for Electrical Systems****26 09 23 Lighting Control Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0620	EA		Line Voltage, Recessed Mount, On-Off Switching Photocell (Sensor Switch RMR PC).....	216.53	27.55
			<i>For 480 Volt AC Option, Add</i>	20.54	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0621	EA		Line Voltage, Fixture (Box) Mount, On-Off Switching Photocell (Sensor Switch CMRB PC).....	216.53	27.55
			<i>For 480 Volt AC Option, Add</i>	20.54	
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0622	EA		Low Voltage, Ceiling Mount, Automatic Dimming Control Photocell (Sensor Switch CM ADC).....	216.53	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0623	EA		Low Voltage, Recessed Mount, Automatic Dimming Control Photocell (Sensor Switch RM ADC).....	216.53	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0624	EA		Low Voltage, Fixture (Box) Mount, Automatic Dimming Control Photocell (Sensor Switch CMB ADC).....	216.53	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0625	EA		Line Voltage, Ceiling Mount, Automatic Dimming Control Photocell (Sensor Switch CMR ADC).....	216.53	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0626	EA		Line Voltage, Recessed Mount, Automatic Dimming Control Photocell (Sensor Switch RMR ADC).....	216.53	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0627	EA		Line Voltage, Fixture (Box) Mount, Automatic Dimming Control Photocell (Sensor Switch CMRB ADC).....	216.53	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0628	EA		Low Voltage, Ceiling Mount, Combination On/Off And Dimming Control Photocell (Sensor Switch CM PC ADC).....	313.38	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0629	EA		Low Voltage, Recessed Mount, Combination On/Off And Dimming Control Photocell (Sensor Switch RM PC ADC).....	313.38	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0630	EA		Low Voltage, Fixture (Box) Mount, Combination On/Off And Dimming Control Photocell (Sensor Switch CMB PC ADC).....	313.38	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
26 09 23 00-0631	EA		Line Voltage, Ceiling Mount, Combination On/Off And Dimming Control Photocell (Sensor Switch CMR PC ADC).....	313.38	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0632	EA		Line Voltage, Recessed Mount, Combination On/Off And Dimming Control Photocell (Sensor Switch RMR PC ADC).....	313.38	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0633	EA		Line Voltage, Fixture (Box) Mount, Combination On/Off And Dimming Control Photocell (Sensor Switch CMRB PC ADC).....	313.38	27.55
			<i>For Low Temp/High Humidity Option, Add</i>	14.67	
			<i>For Dual Zone Option, Add</i>	44.02	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.54	
26 09 23 00-0634			Occupancy Sensors (Sensor Switch nLight®) (26 09 23)		
			Note: Includes testing of new devices and certification.		
26 09 23 00-0635			Occupancy Sensors (Sensor Switch nLight®) (26 09 23 00-0634)		
			Note: Excludes boxes.		
26 09 23 00-0636			Wall Switch Mount Occupancy Sensors (Sensor Switch nLight®) (26 09 23 00-0635)		
26 09 23 00-0637			Dual Technology, Wall Switch Mount Occupancy Sensors (Sensor Switch nLight®) (26 09 23 00-0636)		
			Note: Includes passive infrared and microphonics detection		
26 09 23 00-0638	EA		Low Voltage, Dual Technology, Wall Switch Mount Occupancy Sensor With Raise/Lower Dim Control (Sensor Switch nLight® nWSX PDT LV DX).....	339.66	12.25
26 09 23 00-0639			360 Degree View Occupancy Sensors (Sensor Switch nLight®) (26 09 23 00-0635)		
26 09 23 00-0640			Passive Infrared, 360 Degree View Occupancy Sensors (Sensor Switch nLight®) (26 09 23 00-0639)		
			Note: One photocell or dimming option per occupancy sensor		
26 09 23 00-0641	EA		Low Voltage, Passive Infrared, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch nLight® nCM 9).....	401.46	27.55
26 09 23 00-0642	EA		Low Voltage, Passive Infrared, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch nLight® nCM 10).....	401.46	27.55
26 09 23 00-0643	EA		Low Voltage, Passive Infrared, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor With Auto Dimming Control Photocell (Sensor Switch nLight® nCM 10 ADC).....	401.46	27.55

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0644 Dual Technology, 360 Degree View Occupancy Sensors (Sensor Switch nLight®) <small>(26 09 23 00-0639)</small> Note: One photocell or dimming option per occupancy sensor. Includes passive infrared and microphonics detection		
26 09 23 00-0645 EA Low Voltage, Dual Technology, Ceiling Mount, Standard Range, 360 Degree View Occupancy Sensor (Sensor Switch nLight® nCM PDT 9).....	470.72	27.55
26 09 23 00-0646 EA Low Voltage, Dual Technology, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch nLight® nCM PDT 10).....	470.72	27.55
26 09 23 00-0647 EA 2-Channel, Low Voltage, Dual Technology, Ceiling Mount, Extended Range, 360 Degree View Occupancy Sensor (Sensor Switch nLight® nCM PDT 10 2P).....	488.01	27.55
26 09 23 00-0648 Wide View And Hallway Occupancy Sensors (Sensor Switch nLight®) <small>(26 09 23 00-0635)</small>		
26 09 23 00-0649 Dual Technology, Wide View And Hallway Occupancy Sensors (Sensor Switch nLight®) <small>(26 09 23 00-0648)</small> Note: Includes passive infrared and microphonics detection		
26 09 23 00-0650 EA Low Voltage, Dual Technology, Corner/Ceiling Mount, Wide View Occupancy Sensor (Sensor Switch nLight® nWV PDT 16)	470.72	27.55
26 09 23 00-0651 High Bay Occupancy Sensors (Sensor Switch nLight®) <small>(26 09 23 00-0635)</small>		
26 09 23 00-0652 Passive Infrared, High Bay Occupancy Sensors (Sensor Switch nLight®) <small>(26 09 23 00-0651)</small>		
26 09 23 00-0653 EA Low Voltage, Passive Infrared, Fixture (Box) Mount, 360 Degree View, High Bay Occupancy Sensor (Sensor Switch nLight® nCMB 6)	401.46	27.55
26 09 23 00-0654 Occupancy Sensor Power Packs (Sensor Switch nLight®) <small>(26 09 23 00-0634)</small>		
26 09 23 00-0655 EA 150mA At 15 Volt DC Output, 120-277 Volt AC Input, Standard Power Supply (Sensor Switch nLight® PS-150).....	135.57	24.49
26 09 23 00-0656 EA 250mA At 15 Volt DC Output, 120-277 Volt AC Input, Standard Power Supply (Sensor Switch nLight® PS-250).....	170.24	24.49
26 09 23 00-0657 EA 30mA/Port At 15 Volt DC Output, 120-277 Volt AC Input, Dimming Power Pack (Sensor Switch nLight® nEPP5 D KO).....	229.08	24.49
26 09 23 00-0658 EA System Power Pack and Relay, Switching Module (Sensor Switch nLight® nPP 16)	229.08	24.49
26 09 23 00-0659 Occupancy Sensor Accessories (Sensor Switch nLight®) <small>(26 09 23 00-0634)</small>		
26 09 23 00-0660 EA RS232 AV Integrator (Sensor Switch nLight® nIO X).....	488.01	27.55
26 09 23 00-0661 EA 8 Port, Aggregation Bridge With Power Supply (Sensor Switch nLight® nBRG 8 KIT)	392.59	27.55
26 09 23 00-0662 Daylighting Controls (Sensor Switch nLight®) <small>(26 09 23 00-0634)</small>		
26 09 23 00-0663 EA Low Voltage, Ceiling Mount, Automatic Dimming Control Photocell (Sensor Switch nLight® nCM ADC)	332.19	27.55
26 09 23 00-0664 Controls (Sensor Switch nLight®) <small>(26 09 23 00-0634)</small>		
26 09 23 00-0665 EA On/Off And Raise/Lower Control, Push Button Digital Wall Switch, WallPod® Station (Sensor Switch nLight® nPODM DX).....	217.90	27.55
26 09 23 00-0666 EA 1 Scene Controller (2 Buttons), Push Button Digital Wall Switch, WallPod® Station (Sensor Switch nLight® nPODM 1SB).....	314.90	27.55
26 09 23 00-0667 EA On/Off Push Button Digital Wall Switch, WallPod® Station (Sensor Switch nLight® nPODM).....	730.48	27.55
26 09 23 00-0668 EA 3-1/2" Screen, High Resolution Touch Screen Controller, WallPod® Station (Sensor Switch nLight® nPOD GFX)	730.48	27.55
26 09 23 00-0669 EA 3-1/2" Screen, Touch Screen Clock And Network Interface Controller, Gateway (Sensor Switch nLight® nGWY2).....	2,739.23	27.55
26 09 23 00-0670 Occupancy Sensors (Lutron) <small>(26 09 23)</small> Note: Includes testing of new devices and certification.		
26 09 23 00-0671 Wireless Occupancy Sensors <small>(26 09 23 00-0670)</small>		
26 09 23 00-0672 EA Wireless, Passive Infrared, Ceiling Mount, 360 Degree View Occupancy/Vacancy Sensor (Lutron® LRF2-OCR2B-P-WH)	161.69	27.55
26 09 23 00-0673 EA Wireless, Passive Infrared, Ceiling Mount, 360 Degree View Vacancy Sensor (Lutron® LRF2-VCR2B-P-WH).....	168.85	27.55
26 09 23 00-0674 EA Wireless, Passive Infrared, Hallway Wall Mount, Occupancy/Vacancy Sensor (Lutron® LRF2-OHLB-P-WH)	163.39	27.55
26 09 23 00-0675 EA Wireless, Passive Infrared, Hallway Wall Mount, Vacancy Sensor (Lutron® LRF2-VHLB-P-WH).....	172.86	27.55
26 09 23 00-0676 EA Wireless, Passive Infrared, 90 Degree Corner Mount, Occupancy/Vacancy Sensor (Lutron® LRF2-OKLB-P-WH)	165.51	27.55
26 09 23 00-0677 EA Wireless, Passive Infrared, 90 Degree Corner Mount, Vacancy Sensor (Lutron® LRF2-VKLB-P-WH).....	172.86	27.55
26 09 23 00-0678 EA Wireless, Passive Infrared, 180 Degree Wall Mount, Occupancy/Vacancy Sensor (Lutron® LRF2-OWLB-P-WH).....	161.69	27.55
26 09 23 00-0679 EA Wireless, Passive Infrared, 180 Degree Wall Mount, Vacancy Sensor (Lutron® LRF2-VWLB-P-WH).....	165.51	27.55
26 09 23 00-0680 EA Wireless, Passive Infrared, Ceiling Mount, 360 Degree View, High Bay Occupancy Sensor (Lutron® FHB140NP24V).....	163.39	27.55
26 09 23 00-0681 EA Wireless, Dual Technology, Ceiling Mount, 500 SF Coverage, 180 Degree View Occupancy Sensor (Lutron® LOS-CDT-500-WH)	252.57	27.55
26 09 23 00-0682 EA Wireless, Dual Technology, Ceiling Mount, 500 SF Coverage, 180 Degree View Occupancy Sensor With Relay (Lutron® LOS-CDT-500R-WH).....	269.55	27.55
26 09 23 00-0683 EA Wireless, Dual Technology, Ceiling Mount, 1,000 SF Coverage, 180 Degree View Occupancy Sensor (Lutron® LOS-CDT-1000-WH)	307.77	27.55
26 09 23 00-0684 EA Wireless, Dual Technology, Ceiling Mount, 1,000 SF Coverage, 180 Degree View Occupancy Sensor With Relay (Lutron® LOS-CDT-1000R-WH).....	324.76	27.55
26 09 23 00-0685 EA Wireless, Dual Technology, Ceiling Mount, 2,000 SF Coverage, 360 Degree View Occupancy Sensor (Lutron® LOS-CDT-2000-WH)	333.25	27.55

26 Electrical**26 09 Instrumentation and Control for Electrical Systems****26 09 23 Lighting Control Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0686	EA		Wireless, Dual Technology, Ceiling Mount, 2,000 SF Coverage, 360 Degree View Occupancy Sensor With Relay (Lutron® LOS-CDT-2000R-WH).....	350.24	27.55
26 09 23 00-0687	EA		Wireless, Passive Infrared, Ceiling Mount, 450 SF Coverage, 360 Degree View Occupancy Sensor (Lutron® LOS-CIR-450-WH).....	199.06	27.55
26 09 23 00-0688	EA		Wireless, Passive Infrared, Ceiling Mount, 1,000 SF Coverage, 360 Degree View Occupancy Sensor (Lutron® LOS-CIR-1500-WH).....	210.10	27.55
26 09 23 00-0689	EA		Wireless, Ultrasonic, Ceiling Mount, 500 SF Coverage, 180 Degree View Occupancy Sensor (Lutron® LOS-CUS-500-WH).....	246.20	27.55
26 09 23 00-0690	EA		Wireless, Ultrasonic, Ceiling Mount, 1,000 SF Coverage, 180 Degree View Occupancy Sensor (Lutron® LOS-CUS-1000-WH).....	273.80	27.55
26 09 23 00-0691	EA		Wireless, Ultrasonic, Ceiling Mount, 2,000 SF Coverage, 360 Degree View Occupancy Sensor (Lutron® LOS-CUS-2000-WH).....	295.03	27.55
26 09 23 00-0692	EA		Wireless, Passive Infrared, 1,600 SF Coverage, 110 Degree Wall Mount, Occupancy Sensor (Lutron® LOS-WIR-WH).....	254.69	27.55
26 09 23 00-0693	EA		Wireless, Passive Infrared, RF Daylight Sensor (Lutron® LRF2-DCRB-WH).....	234.07	27.55
26 09 23 00-0694	EA		Wireless, Dual Technology, Wall Mount, 1,000 SF Coverage, 180 Degree View Occupancy Sensor (Lutron® LOS-SIR-HD-WH).....	195.69	27.55
26 09 23 00-0695	EA		Wireless, Dual Technology, Wall Mount, 1,000 SF Coverage, 180 Degree View Occupancy Sensor, Dual Circuit (Lutron® LOS-S2IR-HD-WH).....	240.94	27.55
26 09 23 00-0696	EA		Wireless, Switch and Ceiling Retrofit Sensor (Lutron® MRF2-1S8A-10C).....	292.62	27.55
26 09 23 00-0697	EA		Wireless, Switch and Hallway Retrofit Sensor (Lutron® MRF2-1S8A-10H).....	310.60	27.55
26 09 23 00-0698	EA		Wireless, Switch and Corner Retrofit Sensor (Lutron® MRF2-1S8A-10K).....	310.60	27.55
26 09 23 00-0699	EA		Wireless, Switch and Wall Retrofit Sensor (Lutron® MRF2-1S8A-10W).....	310.60	27.55
26 09 23 00-0700	EA		Wireless, Switch and Vacancy Retrofit Sensor (Lutron® MRF2-1S8A-10V).....	327.08	27.55
26 09 23 00-0701	EA		Wireless, Two Switches and Wall Retrofit Sensor (Lutron® MRF2-2S8A-10W).....	530.64	39.80
26 09 23 00-0702 Nodes And Modules (26 09 23 00-0670)					
26 09 23 00-0703	EA		0 Wired Inputs, Ceiling Mount, QS Sensor Module (Lutron® QSM2-XW-C).....	263.18	27.55
26 09 23 00-0704	EA		0 Wired Inputs, Junction Box Ceiling Mount, QS Sensor Module (Lutron® QSM2-XW-J).....	263.18	27.55
26 09 23 00-0705	EA		4 Wired Inputs, Ceiling Mount, QS Sensor Module (Lutron® QSM2-4W-C).....	333.25	27.55
26 09 23 00-0706	EA		4 Wired Inputs, Junction Box Ceiling Mount, QS Sensor Module (Lutron® QSM2-4W-J).....	333.25	27.55
26 09 23 00-0707	EA		120 Volt, Gang Box Mount, 3-Wire Fluorescent Power Module (Lutron® PHPM-3F-120-WH).....	426.43	30.62
26 09 23 00-0708	EA		120 Volt, Gang Box Mount, Switching Power Module (Lutron® PHPM-SW-DV-WH).....	426.43	30.62
26 09 23 00-0709	EA		120 Volt, Gang Box Mount, Phase Adaptive Power Module (Lutron® PHPM-PA-120-WH).....	517.73	30.62
26 09 23 00-0710	EA		120 Volt, Gang Box Mount, Phase Adaptive Power Module With 3-Wire Fluorescent Input (Lutron® PHPM-WBX-120-WH).....	530.47	30.62
26 09 23 00-0711	EA		120/277 Volt, Gang Box Mount, 3-Wire Fluorescent Power Module (Lutron® PHPM-3F-DV-WH).....	655.75	30.62
26 09 23 00-0712	EA		120/277 Volt, Gang Box Mount, Phase Adaptive Power Module (Lutron® PHPM-PA-DV-WH).....	696.09	30.62
26 09 23 00-0713	EA		120/277 Volt, Gang Box Mount, Phase Adaptive Power Module With 3-Wire Fluorescent Input (Lutron® PHPM-WBX-DV-WH).....	736.43	30.62
26 09 23 00-0714	EA		1 Circuit, Surface Mount, HP Hi-Power Dimming Module System (Lutron® HP-2).....	1,993.03	48.99
26 09 23 00-0715	EA		2 Circuits, Surface Mount, HP Hi-Power Dimming Module System (Lutron® HP-4).....	1,957.51	55.12
26 09 23 00-0716	EA		3 Circuits, Surface Mount, HP Hi-Power Dimming Module System (Lutron® HP-6).....	2,872.17	61.24
26 09 23 00-0717 Other Accessories (26 09 23 00-0670)					
26 09 23 00-0718	EA		Pico® Wireless Control Wallplate Adapter (Lutron® PJ).....	41.41	
26 09 23 00-0719	EA		Pico® Wireless Control (Lutron® PJ).....	54.22	
26 09 23 00-0720	EA		4-Scene Wireless Remote Control (Lutron® GRX-IT-WH).....	160.86	
26 09 23 00-0721	EA		8-Scene Wireless Remote Control (Lutron® GRX-8IT-WH).....	307.37	
26 09 23 00-0722	EA		4 Button, EcoSystem® Wall Control With Raise/Lower (Lutron® CC-4BRL).....	321.00	27.55
26 09 23 00-0723	EA		seeTouch® QS Wallstation (Lutron® QSWS2).....	407.06	27.55
26 09 23 00-0724	EA		seeTouch® QS Wallstation With Infrared Receiver (Lutron® QSWS2).....	407.06	27.55
26 09 23 00-0725	EA		120/277 Volt, Energi Savr Node™ With Softswitch®, Fixture Controller (Lutron® QSN-4S16-S).....	668.49	30.62
26 09 23 00-0726	EA		120/277 Volt, Energi Savr Node™ For 0-10 V Models, Fixture Controller (Lutron® QSN-4T16-S).....	916.91	30.62
26 09 23 00-0727	EA		Control Interface (Lutron® QSE-CI-NWK-E).....	1,104.01	27.55
26 09 23 00-0728	EA		1 EcoSystem® Digital Link, Energi Savr Node™, Digital Fixture Controller (Lutron® QSN-1ECO-S).....	1,095.54	27.55
26 09 23 00-0729	EA		2 EcoSystem® Digital Links, Energi Savr Node™, Digital Fixture Controller (Lutron® QSN-2ECO-S).....	1,467.12	27.55
26 09 23 00-0730	MLF		5 Conductor, Non-Plenum, Low Voltage Grafik Eye Cable (Lutron® GRX-CBL-346S).....	2,348.88	855.96
26 09 23 00-0731	MLF		5 Conductor, Plenum Rated, Low Voltage Grafik Eye Cable (Lutron® GRX-PCBL-346S).....	3,198.21	855.96
26 09 23 00-0732 Fixture Mounted Occupancy Sensors (Leviton) (26 09 23)					
Note: Includes testing of new devices and certification.					
26 09 23 00-0733	EA		120-347 Volt, Passive Infrared, Fixture Mount, 360 Degree View, High Bay Occupancy Sensor (Leviton® OSFHU-ITW).....	154.89	27.55
26 09 23 00-0734	EA		480 Volt, Passive Infrared, Fixture Mount, 360 Degree View, High Bay Occupancy Sensor (Leviton® OSFHU-I4W).....	135.36	27.55
26 09 23 00-0735	EA		120-347 Volt, Passive Infrared, Fixture Mount, 360 Degree View, Cold Storage Occupancy Sensor (Leviton® OSFHU-CTW).....	171.03	27.55
26 09 23 00-0736	EA		480 Volt, Passive Infrared, Fixture Mount, 360 Degree View, Cold Storage Occupancy Sensor (Leviton® OSFHU-C4W).....	135.36	27.55
26 09 23 00-0737	EA		120-347 Volt, Dual Detection Occupancy Wall Sensor Switch (Lithonia WSX-PDT).....	226.88	12.23
26 09 23 00-0738 Wireless Enabled Communication Devices For Streetlights (26 09 23)					
Note: Includes testing of new devices and certification.					
26 09 23 00-0739 Wireless Enabled Communication Nodes For Streetlights (Roam®) (26 09 23 00-0738)					
26 09 23 00-0740	EA		120/244/277 Voltage, Wireless Enabled Communication Node For Streetlights (Roam® REN127 NM1).....	346.04	
26 09 23 00-0741	EA		480 Voltage, Wireless Enabled Communication Node For Streetlights (Roam® REN480 NM1).....	484.58	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 09 23 00-0742 Wireless Enabled Communication Devices For Streetlights (Roam®) <small>(26 09 23 00-0738)</small>		
26 09 23 00-0743 EA Retrofit Receptacle Kit (Roam® DUR103).....	58.60	
<small>Note: For adapting light fixtures for use with a NEMA locking type photocontrol.</small>		
26 09 23 00-0744 EA Wireless Enabled Backbone And Data Backhaul Device, Gateway (Roam® REG127).....	13,990.76	68.67
26 09 23 00-0745 Counter Mounted Consolets <small>(26 09 23)</small>		
26 09 23 00-0746 EA 20" x 24" Type 12, Oil Tight Consolets, Counter Mounted (Schaefer's SPCL-20C24).....	675.83	152.84
26 09 23 00-0747 Lighting Console And Stations <small>(26 09 23)</small>		
26 09 23 00-0748 EA 80 Channel, 40 Faders, Lighting Console (ETC ColorSource CS 40)	4,932.08	152.84
<small>For Lighting Console Dust Cover (ETC ColorSource CS40DC), Add</small>		
<small>For Lighting Console Case (ETC ColorSourcePart 11866), Add</small>		
26 09 23 00-0749 EA 10 Preset, Lighting Control Station (Doug Fleenor PRE10-A2)	3,407.29	91.71
26 09 23 00-0750 Theatre Lighting Console <small>(26 09 23)</small>		
26 09 23 00-0751 EA Theatre Lighting Console (ETC Colorsources 20).....	3,538.12	183.42
26 09 23 00-0752 Emergency Lighting Controls <small>(26 09 23)</small>		
26 09 23 00-0753 Emergency Lighting Control Units (Watt Stopper ELCU) <small>(26 09 23 00-0752)</small>		
<small>Note: The ELCU monitors a single circuit and can be wired either as a control device, so that emergency lighting follows the control of normal lighting, or as a bypass device to shunt emergency power around a control device when normal power fails. Includes integral push-to-test button and LED indicator for emergency and normal power.</small>		
26 09 23 00-0754 EA DIN Rail Mount, Emergency Lighting Control/Bypass Shunt Unit (Watt Stopper ELCU-100).....	235.50	30.62
26 09 23 00-0755 EA 1/2" Knockout Mount, Emergency Lighting Control/Bypass Shunt Unit (Watt Stopper ELCU-200)	235.50	30.62
26 09 23 00-0756 Emergency Shunt Relays (Lighting Control & Design GR 2001™) <small>(26 09 23 00-0752)</small>		
<small>Note: Normally-closed, electrically-held relay to be wired in parallel with a wall switch. Manually controlled emergency lighting will be automatically shunted on during a power outage. Includes two-gang NEMA 1 junction box, voltage-separating barrier and plaster ring separating normal and emergency power. Excludes wall plate and switch.</small>		
26 09 23 00-0757 EA 1 Emergency Shunt Relay And NEMA 1 Enclosure (Lighting Control & Design GR 2001™).....	398.61	42.86
26 09 23 00-0758 EA 2 Emergency Shunt Relays And NEMA 1 Enclosure (Lighting Control & Design GR 2001™)	544.78	48.99
26 09 23 00-0759 EA 2 Emergency Shunt Relays And NEMA 1 Enclosure (Lighting Control & Design GR 2001™ Dual).....	735.94	55.12
<small>Note: Controls normal and emergency lighting from single-pole wall switch.</small>		
26 09 23 00-0760 Photocells <small>(26 09 23)</small>		
26 09 23 00-0761 EA Plug-In Photocell For Lighting Fixtures (Intermac® LC2000).....	96.25	
26 09 23 00-0762 EA Wired Photocell For Lighting Fixtures (Intermac® K4021C).....	217.86	
26 09 23 00-0763 Outdoor Lighting Motion Sensors <small>(26 09 23)</small>		
26 09 23 00-0764 EA 70' Range, 180 Degree Detection Zone, 8 Amperes, Switching Capacity, Polycarbonate Housing, Outdoor Motion Sensor (Lithonia OMS 1000)	128.46	30.62
26 09 23 00-0765 EA 70' Range, 200 Degree Detection Zone, 10 Amperes, Switching Capacity, Cast Aluminum Housing, Outdoor Motion Sensor (Lithonia OMS 2000)	140.64	30.62
26 09 23 00-0766 EA 30' Range, 360 Degree Detection Zone, Line Voltage, Plastic Housing, IP66 Rated, Outdoor Motion Sensor With Photocell (SensorSwitch SBOR)	593.12	30.62
<small>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>		
	18.37	
26 09 23 00-0767 Street Light Controls <small>(26 09 23)</small>		
26 09 23 00-0768 Photo Controls <small>(26 09 23 00-0767)</small>		
26 09 23 00-0769 EA Photo Control, 120 Volt As Manufactured By Cooper Lighting #RA1014	90.44	
26 09 23 00-0770 EA Photo Control, Multi-Tap As Manufactured By Cooper Lighting #RA1016.....	101.18	
26 09 23 00-0771 Connector Node <small>(26 09 23 00-0767)</small>		
26 09 23 00-0772 EA Outdoor Lighting Connector Node (Philips City Touch LLC7260).....	537.30	3.46

26 20 Low-Voltage Electrical Distribution (26)

26 21 Low-Voltage Electrical Service Entrance (26 20)

See CSI section 26 05 13 00-0000 for wire and cables.

26 21 13 Low-Voltage Overhead Electrical Service Entrance (26 21)

26 21 13 00-0001 Service Drop Cable And Weatherheads (26 21 13)

26 21 13 00-0002 600 Volt Insulated Stranded Conductors (26 21 13 00-0001)

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 21 13 00-0003			Weatherproof Conduit Hubs (26 21 13 00-0002)		
26 21 13 00-0004	EA		1/2" Weatherproof Conduit Hubs	56.68	21.52
26 21 13 00-0005	EA		3/4" Weatherproof Conduit Hubs	64.66	24.45
26 21 13 00-0006	EA		1" Weatherproof Conduit Hubs	75.09	27.39
26 21 13 00-0007	EA		1-1/4" Weatherproof Conduit Hubs	104.71	36.68
26 21 13 00-0008	EA		1-1/2" Weatherproof Conduit Hubs	115.14	39.62
26 21 13 00-0009	EA		2" Weatherproof Conduit Hubs	148.69	45.98
26 21 13 00-0010	EA		2-1/2" Weatherproof Conduit Hubs	195.16	51.84
26 21 13 00-0011	EA		3" Weatherproof Conduit Hubs	251.96	61.14
26 21 13 00-0012	EA		4" Weatherproof Conduit Hubs	446.46	122.28
26 21 13 00-0013			Service Entrance Cap, Threaded Weatherhead, Galvanized (26 21 13 00-0002)		
26 21 13 00-0014	EA		1/2" Galvanized Threaded Service Entrance Weatherhead Cap For #14 Through #10 AWG Cable Service.....	62.80	21.52
26 21 13 00-0015	EA		3/4" Galvanized Threaded Service Entrance Weatherhead Cap For #12 Through #8 AWG Cable Service.....	71.99	24.45
26 21 13 00-0016	EA		1" Galvanized Threaded Service Entrance Weatherhead Cap For #6 AWG Cable Service	82.33	27.39
26 21 13 00-0017	EA		1-1/4" Galvanized Threaded Service Entrance Weatherhead Cap For #4 Through #2 AWG Cable Service.....	110.61	36.68
26 21 13 00-0018	EA		1-1/2" Galvanized Threaded Service Entrance Weatherhead Cap For #4 Through #2 AWG Cable Service.....	124.80	39.62
26 21 13 00-0019	EA		2" Galvanized Threaded Service Entrance Weatherhead Cap For 1/0 Through 2/0 AWG Cable Service.....	163.04	45.98
26 21 13 00-0020	EA		2-1/2" Galvanized Threaded Service Entrance Weatherhead Cap For 3/0 Through 4/0 Cable Service	270.39	51.84
26 21 13 00-0021	EA		3" Galvanized Threaded Service Entrance Weatherhead Cap For 250 Through 350 MCM Cable Service	308.12	61.14
26 21 13 00-0022	EA		4" Galvanized Threaded Service Entrance Weatherhead Cap For 600 Through 750 MCM Cable Service.....	509.96	122.28
26 21 13 00-0023			Service Entrance Cap, Clamp-On Weatherhead, Aluminum (26 21 13 00-0002)		
26 21 13 00-0024	EA		1/2" Aluminum Clamp-On Service Entrance Weatherhead Cap For #14 To #12 AWG Cable Service	60.83	21.52
26 21 13 00-0025	EA		3/4" Aluminum Clamp-On Service Entrance Weatherhead Cap For #10 To #8 AWG Cable Service	68.69	24.45
26 21 13 00-0026	EA		1" Aluminum Clamp-On Service Entrance Weatherhead Cap For #6 AWG Cable Service	77.87	27.27
26 21 13 00-0027	EA		1-1/4" Aluminum Clamp-On Service Entrance Weatherhead Cap For #4 To #2 AWG Cable Service	103.55	36.68
26 21 13 00-0028	EA		1-1/2" Aluminum Clamp-On Service Entrance Weatherhead Cap For #4 To #2 AWG Cable Service.....	115.26	39.62
26 21 13 00-0029	EA		2" Aluminum Clamp-On Service Entrance Weatherhead Cap For 1/0 To 2/0 AWG Cable Service	135.79	45.98
26 21 13 00-0030	EA		2-1/2" Aluminum Clamp-On Service Entrance Weatherhead Cap For 3/0 To 4/0 Cable Service	219.26	51.84
26 21 13 00-0031	EA		3" Aluminum Clamp-On Service Entrance Weatherhead Cap For 250 To 350 MCM Cable Service	282.41	61.14
26 21 13 00-0032	EA		3-1/2" Aluminum Clamp-On Service Entrance Weatherhead Cap For 400 To 500 MCM Cable Service.....	398.46	91.71
26 21 13 00-0033	EA		4" Aluminum Clamp-On Service Entrance Weatherhead Cap For 600 To 750 MCM Cable Service.....	479.36	122.28
26 21 13 00-0034			Service Entrance Cap, Threaded Weatherhead, Polyvinyl Chloride (PVC) (26 21 13 00-0002)		
26 21 13 00-0035	EA		1/2" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For #14 To #12 AWG Cable Service.....	59.13	21.52
26 21 13 00-0036	EA		3/4" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For #10 To #8 AWG Cable Service	67.67	24.45
26 21 13 00-0037	EA		1" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For #6 AWG Cable Service	76.88	27.27
26 21 13 00-0038	EA		1-1/4" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For #4 To #2 AWG Cable Service	102.40	36.68
26 21 13 00-0039	EA		1-1/2" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For #4 To #2 AWG Cable Service.....	111.56	39.62
26 21 13 00-0040	EA		2" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For 1/0 To 2/0 AWG Cable Service.....	137.05	45.98
26 21 13 00-0041	EA		2-1/2" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For 3/0 To 4/0 Cable Service	231.40	51.84
26 21 13 00-0042	EA		3" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For 250 To 350 MCM Cable Service.....	259.03	61.14
26 21 13 00-0043	EA		3-1/2" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For 400 To 500 MCM Cable Service.....	446.32	91.71
26 21 13 00-0044	EA		4" Polyvinyl Chloride (PVC) Threaded Service Entrance Weatherhead Cap For 600 To 750 MCM Cable Service.....	618.59	122.28

26 22 Low-Voltage Transformers (26 20)

26 22 13 Low-Voltage Distribution Transformers (26 22)

26 22 13 00-0001			Single Phase General Purpose "Dry Type" Transformers (26 22 13)		
Note: 60 HZ type EP and EPT 115 C rise, 185 C insulation, type DT-3 and DS-3 150 C rise, 220 C insulation. Indoor Use. Wall mounted for up to 10 KVA, floor mounted for 15 KVA and larger. DT-3 and DS-3 use weathershields for outdoor placement. UL listed.					
26 22 13 00-0002			480 Volt, 120/240 Volt, General Purpose Dry Type Transformers (26 22 13 00-0001)		
Note: 2-2.5 Percent taps above and 4-2.5 percent taps below.					
26 22 13 00-0003	EA		1 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	1,632.61	313.91
26 22 13 00-0004	EA		3 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	2,283.06	376.69
26 22 13 00-0005	EA		5 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	2,972.37	393.01
26 22 13 00-0006	EA		7.5 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	3,667.94	408.09
26 22 13 00-0007	EA		10 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	5,349.01	439.47
26 22 13 00-0008	EA		15 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	6,429.16	470.87
For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add				411.56	
For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add				274.37	
26 22 13 00-0009	EA		25 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	7,061.23	502.25
For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add				454.25	
For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add				302.84	
26 22 13 00-0010	EA		37.5 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	6,776.16	565.04
For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add				423.46	
For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add				282.30	
26 22 13 00-0011	EA		50 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose.....	8,125.88	627.82
For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add				515.27	
For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add				343.51	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Transformers	26 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 22 13 00-0012 EA 75 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose..... <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	10,819.46 698.45 465.64	753.38
26 22 13 00-0013 EA 100 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose..... <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	13,802.49 903.35 602.23	878.95
26 22 13 00-0014 EA 167 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose..... <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	22,238.37 1,498.37 998.91	1,130.07
26 22 13 00-0015 EA 250 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose..... <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	40,663.05 2,842.55 1,895.03	1,381.20
26 22 13 00-0016 EA 333 KVA, 480 Volt - 120/240 Volt Transformer, Dry, 1 Phase, 60 Hertz, General Purpose..... <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	64,286.17 4,586.03 3,057.35	1,569.55
26 22 13 00-0017 240 x 480 Volt, 120/240 Volt, General Purpose Dry Type Transformers (26 22 13 00-0001) Note: 1-10 Percent x 2-5 percent FCBN taps.		
26 22 13 00-0018 EA 3 KVA, 240 x 480 Volt - 120/240 Volt Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	1,815.44	376.69
26 22 13 00-0019 EA 5 KVA, 240 x 480 Volt - 120/240 Volt Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	2,223.05	392.38
26 22 13 00-0020 EA 7.5 KVA, 240 x 480 Volt - 120/240 Volt Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	2,830.32	408.09
26 22 13 00-0021 EA 10 KVA, 240 x 480 Volt - 120/240 Volt Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	3,379.34	439.47
26 22 13 00-0022 240 x 480 Volt, 120/240 Volt, General Purpose Dry Type Transformers (26 22 13 00-0001) Note: 2-5 Percent x 4 - 2.5 percent FCBN taps.		
26 22 13 00-0023 EA 15 KVA, 240 x 480 Volt - 120/240 Volt Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	6,703.53	470.87
26 22 13 00-0024 EA 25 KVA, 240 x 480 Volt - 120/240 Volt Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	7,364.07	502.25
26 22 13 00-0025 1 Phase Mounting Brackets (26 22 13 00-0001)		
26 22 13 00-0026 EA 1 Phase Mounting Brackets (Set Of 2) For Transformers Up To 100 KVA.....	620.72	223.43
26 22 13 00-0027 1 Phase Weathershields (26 22 13 00-0001) Note: Use with types DT-3 and DS-3.		
26 22 13 00-0028 EA 37.5 KVA 1 Phase Weathershields, Set Of 2.....	197.67	
26 22 13 00-0029 EA 50 KVA 1 Phase Weathershields, Set Of 2.....	251.97	
26 22 13 00-0030 EA 75 KVA 1 Phase Weathershields, Set Of 2.....	300.46	
26 22 13 00-0031 EA 100 KVA 1 Phase Weathershields, Set Of 2.....	358.45	
26 22 13 00-0032 EA 167 KVA 1 Phase Weathershields, Set Of 2.....	484.96	
26 22 13 00-0033 EA 250 KVA 1 Phase Weathershields, Set Of 2.....	579.84	
26 22 13 00-0034 EA 333 KVA 1 Phase Weathershields, Set Of 2.....	711.63	
26 22 13 00-0035 Packaged Power Supply (26 22 13 00-0001) Note: 2-5 Percent FCBN taps.		
26 22 13 00-0036 EA 5 KVA, 480 Volt - 120/240 Volt, Transformer With 6 - 1 Pole / 3 - 2 Pole Max 20 Amperes Breakers.....	3,690.90	392.38
26 22 13 00-0037 EA 7.5 KVA, 480 Volt - 120/240 Volt, Transformer With 8 - 1 Pole / 4 - 2 Pole Max 30 Amperes Breakers.....	4,214.25	408.09
26 22 13 00-0038 EA 10 KVA, 480 Volt - 120/240 Volt, Transformer With 10 - 1 Pole / 5 - 2 Pole Max 40 Amperes Breakers.....	4,570.07	439.47
26 22 13 00-0039 EA 15 KVA, 480 Volt - 120/240 Volt, Transformer With 16 - 1 Pole / 8 - 2 Pole Max 60 Amperes Breakers.....	5,732.39	470.87
26 22 13 00-0040 EA 25 KVA, 480 Volt - 120/240 Volt, Transformer With 24 - 1 Pole / 12 - 2 Pole Max 100 Amperes Breakers.....	8,150.18	502.25
26 22 13 00-0041 240 Volt, 120/240 Volt, Single Phase Isolation Transformer Computer Grade (26 22 13 00-0001)		
26 22 13 00-0042 EA 0.5 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	2,752.63	282.52
26 22 13 00-0043 EA 1 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	4,027.81	313.91
26 22 13 00-0044 EA 2.5 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	4,680.50	376.69
26 22 13 00-0045 EA 5 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	5,212.67	392.38
26 22 13 00-0046 EA 7.5 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	5,929.32	408.09
26 22 13 00-0047 EA 10 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	7,784.35	439.47
26 22 13 00-0048 EA 15 KVA, 1 Phase, 240 Volt - 120/240 Volt, Isolation Transformer.....	10,261.39	470.87
26 22 13 00-0049 1 Phase, 208/600 Volt, Dry General Purpose Transformer (26 22 13 00-0001)		
26 22 13 00-0050 EA 15 KVA, 208/600 Volt, Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	12,803.96	470.87
26 22 13 00-0051 EA 25 KVA, 208/600 Volt, Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	13,259.92	502.25
26 22 13 00-0052 EA 30 KVA, 208/600 Volt, Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	13,757.70	533.65
26 22 13 00-0053 EA 37.5 KVA, 208/600 Volt, Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	18,370.21	565.04
26 22 13 00-0054 EA 45 KVA, 208/600 Volt, Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	19,075.27	596.43
26 22 13 00-0055 EA 50 KVA, 208/600 Volt, Transformer, 1 Phase, 60 Hertz, General Purpose, Dry.....	25,696.94	627.82
26 22 13 00-0056 3 Phase General Purpose "Dry Type" Transformer (26 22 13 00-0001) Note: 60 Hz type EP and EPT 115 C rise, 185 C insulation, type DT-3 and DS-3 150 C rise, 220 C insulation. Indoor use. Wall mounted for up to 10 KVA, floor mounted for 15 KVA and larger. DT-3 and DS-3 use weathershields for outdoor placement. UL listed.		

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 22 Low-Voltage Transformers



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 22 13 00-0057		Packaged Power Supply <small>(26 22 13 00-0056)</small>		
		Note: 2-5 Percent FCBN taps.		
26 22 13 00-0058	EA	15 KVA, 480 Volt - 208/120 Volt, Transformer With 12 - 1 Pole / 4 - 3 Pole Max, 40 Amperes Breakers.....	16,629.26	1,349.81
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	696.48	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,044.72	
26 22 13 00-0059	EA	22.5 KVA, 480 Volt - 208/120 Volt, Transformer With 18 - 1 Pole / 6 - 3 Pole Max, 60 Amperes Breakers.....	20,149.79	1,443.98
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	863.09	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,294.64	
26 22 13 00-0060	EA	30 KVA, 480 Volt - 208/120 Volt, Transformer With 24 - 1 Pole / 8 - 3 Pole Max, 80 Amperes Breakers.....	24,319.10	1,569.55
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,059.00	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,588.50	
26 22 13 00-0061		480 Volt x 208Y/120 Volt, 2-2.5 Percent FCAN And 4-2.5 Percent FCBN Taps <small>(26 22 13 00-0056)</small>		
26 22 13 00-0062	EA	30 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	10,259.15	690.60
		<i>For K13 Factor Rating, Add</i>	8,877.95	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	443.90	
		<i>For K4 Factor Rating, Add</i>	6,214.57	
		<i>For K20 Factor Rating, Add</i>	11,541.34	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	665.85	
26 22 13 00-0063	EA	37.5 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	12,480.40	753.38
		<i>For K13 Factor Rating, Add</i>	10,973.64	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	548.68	
		<i>For K4 Factor Rating, Add</i>	7,681.55	
		<i>For K20 Factor Rating, Add</i>	14,265.73	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	823.02	
26 22 13 00-0064	EA	45 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	13,014.78	816.16
		<i>For K13 Factor Rating, Add</i>	11,382.45	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	569.12	
		<i>For K4 Factor Rating, Add</i>	7,967.72	
		<i>For K20 Factor Rating, Add</i>	14,797.19	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	853.68	
26 22 13 00-0065	EA	50 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	17,315.18	878.95
		<i>For K13 Factor Rating, Add</i>	15,557.29	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	777.86	
		<i>For K4 Factor Rating, Add</i>	10,890.10	
		<i>For K20 Factor Rating, Add</i>	20,224.48	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,166.80	
26 22 13 00-0066	EA	75 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	16,987.23	941.73
		<i>For K13 Factor Rating, Add</i>	15,103.78	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	755.19	
		<i>For K4 Factor Rating, Add</i>	10,572.65	
		<i>For K20 Factor Rating, Add</i>	19,634.91	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,132.78	
26 22 13 00-0067	EA	112.5 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	21,194.49	1,130.07
		<i>For K13 Factor Rating, Add</i>	18,934.35	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	946.72	
		<i>For K4 Factor Rating, Add</i>	13,254.05	
		<i>For K20 Factor Rating, Add</i>	24,614.66	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,420.08	
26 22 13 00-0068	EA	150 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	27,763.13	1,255.64
		<i>For K13 Factor Rating, Add</i>	25,251.86	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,262.59	
		<i>For K4 Factor Rating, Add</i>	17,676.30	
		<i>For K20 Factor Rating, Add</i>	32,827.42	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,893.89	
26 22 13 00-0069	EA	225 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	38,029.26	1,569.55
		<i>For K13 Factor Rating, Add</i>	34,890.17	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	1,744.51	
		<i>For K4 Factor Rating, Add</i>	24,423.12	
		<i>For K20 Factor Rating, Add</i>	45,357.22	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	2,616.76	
26 22 13 00-0070	EA	300 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	46,316.33	1,946.24
		<i>For K13 Factor Rating, Add</i>	42,423.86	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	2,121.19	
		<i>For K4 Factor Rating, Add</i>	29,696.70	
		<i>For K20 Factor Rating, Add</i>	55,151.02	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	3,181.79	
26 22 13 00-0071	EA	500 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	66,894.28	2,385.71
		<i>For K13 Factor Rating, Add</i>	62,122.86	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	3,106.14	
		<i>For K4 Factor Rating, Add</i>	43,486.00	
		<i>For K20 Factor Rating, Add</i>	80,759.72	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	4,659.21	
26 22 13 00-0072	EA	750 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry.....	157,307.81	2,876.18
		<i>For K13 Factor Rating, Add</i>	151,531.88	
		<i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i>	7,576.59	
		<i>For K4 Factor Rating, Add</i>	106,072.32	
		<i>For K20 Factor Rating, Add</i>	196,991.44	
		<i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	11,364.89	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Transformers	26 22	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 22 13 00-0073	EA 1,000 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K4 Factor Rating, Add</i> <i>For K20 Factor Rating, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i>	208,023.20 201,745.02 10,087.25 141,221.51 262,268.53 15,130.88	3,139.09
26 22 13 00-0074	480 Volt x 208Y/120 Volt, 2-2.5 Percent FCAN And 2-2.5 Percent FCBN Taps <small>(26 22 13 00-0056)</small>		
26 22 13 00-0075	EA 6 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K4 Factor Rating, Add</i> <i>For K13 Factor Rating, Add</i> <i>For K20 Factor Rating, Add</i>	5,563.91 3,213.55 4,590.79 5,968.03	486.56
26 22 13 00-0076	EA 9 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K4 Factor Rating, Add</i> <i>For K13 Factor Rating, Add</i> <i>For K20 Factor Rating, Add</i>	6,926.11 4,123.15 5,890.21 7,657.27	517.95
26 22 13 00-0077	EA 15 KVA, 480 x 208 Y / 120 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K4 Factor Rating, Add</i> <i>For K13 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	9,212.15 5,657.46 8,082.08 404.10 606.16 10,506.70	565.04
26 22 13 00-0078	480 Volt x 480Y/277 Volt, 2-2.5 Percent FCAN And 4 Percent FCBN Taps <small>(26 22 13 00-0056)</small>		
26 22 13 00-0079	EA 30 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	18,280.75 16,899.55 11,829.69 844.98 1,267.47 21,969.42	690.60
26 22 13 00-0080	EA 45 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	20,438.16 18,805.83 13,164.08 940.29 1,410.44 24,447.58	816.16
26 22 13 00-0081	EA 75 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	30,484.88 28,601.43 20,021.00 1,430.07 2,145.11 37,181.86	941.73
26 22 13 00-0082	EA 112.5 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	38,336.78 36,076.64 25,253.65 1,803.83 2,705.75 46,899.63	1,130.07
26 22 13 00-0083	EA 150 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	46,305.87 43,794.60 30,656.22 2,189.73 3,284.60 56,932.98	1,255.64
26 22 13 00-0084	EA 225 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	59,406.65 56,267.56 39,387.29 2,813.38 4,220.07 73,147.83	1,569.55
26 22 13 00-0085	EA 300 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	72,183.20 68,290.73 47,803.51 3,414.54 5,121.80 88,777.95	1,946.24
26 22 13 00-0086	EA 500 KVA, 480 x 480 Y / 277 Volt, Transformer, 3 Phase, 60 Hertz, General Purpose, Dry..... <i>For K13 Factor Rating, Add</i> <i>For K4 Factor Rating, Add</i> <i>For Stainless Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For Silicon Steel Core With High Magnetic Permeability And Low Loss, Add</i> <i>For K20 Factor Rating, Add</i>	116,935.28 112,163.86 78,514.70 5,608.19 8,412.29 145,813.02	2,385.71
26 22 13 00-0087	3 Phase 60 Hz K20 Dry Type Transformers <small>(26 22 13 00-0056)</small>		
26 22 13 00-0088	3 Phase 60 Hz K20 Dry Type Transformers, 115 C Rise <small>(26 22 13 00-0087)</small> Note: 220 C insulation 480 V-208 Y/120 V. 2-2.5 Percent above and 4-2.5 percent taps below.		
26 22 13 00-0089	EA 15 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20	8,562.44	565.04
26 22 13 00-0090	EA 30 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20	13,154.48	690.60
26 22 13 00-0091	EA 45 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20	19,559.98	816.16
26 22 13 00-0092	EA 75 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20	25,123.00	941.73

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 22 Low-Voltage Transformers**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 22 13 00-0093	EA	112.5 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	38,108.31	1,130.07
26 22 13 00-0094	EA	150 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	46,505.78	1,255.64
26 22 13 00-0095	EA	225 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	53,944.82	1,569.55
26 22 13 00-0096	EA	300 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	86,383.96	1,946.24
26 22 13 00-0097		3 Phase 60 Hz K20 Dry Type Transformers, 80 C Rise <small>(26 22 13 00-0087)</small>		
		Note: 220 C insulation 480 V-208 Y/120 V. 2-2.5 Percent above and 4-2.5 percent taps below.		
26 22 13 00-0098	EA	15 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	10,054.63	565.04
26 22 13 00-0099	EA	30 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	15,510.56	690.60
26 22 13 00-0100	EA	45 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	23,144.09	816.16
26 22 13 00-0101	EA	75 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	29,763.78	941.73
26 22 13 00-0102	EA	112.5 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	45,276.52	1,130.07
26 22 13 00-0103	EA	150 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	55,308.97	1,255.64
26 22 13 00-0104	EA	225 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	64,104.54	1,569.55
26 22 13 00-0105	EA	300 KVA, 480 Volt - 208 Y / 120 Volt Transformer, 3 Phase, 60 Hertz, K20.....	102,883.68	1,946.24
26 22 13 00-0106		NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0056)</small>		
26 22 13 00-0107		Aluminum Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0106)</small>		
		Note: Two taps at 2.5%, four at -2.5%.		
26 22 13 00-0108		150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0107)</small>		
26 22 13 00-0109	EA	15 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	3,545.10	562.73
26 22 13 00-0110	EA	30 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	4,324.79	687.78
26 22 13 00-0111	EA	45 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	5,209.31	812.84
26 22 13 00-0112	EA	75 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	6,953.63	937.89
26 22 13 00-0113	EA	112.5 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	9,268.81	1,125.46
26 22 13 00-0114	EA	150 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	11,490.78	1,250.52
26 22 13 00-0115	EA	225 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	15,209.79	1,563.14
26 22 13 00-0116	EA	300 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	21,341.69	1,938.30
26 22 13 00-0117		115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0107)</small>		
26 22 13 00-0118	EA	15 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	4,273.10	562.73
26 22 13 00-0119	EA	30 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	5,206.62	687.78
26 22 13 00-0120	EA	45 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	6,284.65	812.84
26 22 13 00-0121	EA	75 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	8,477.23	937.89
26 22 13 00-0122	EA	112.5 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	10,841.41	1,125.46
26 22 13 00-0123	EA	150 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	14,187.71	1,250.52
26 22 13 00-0124	EA	225 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	18,835.08	1,563.14
26 22 13 00-0125	EA	300 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	26,581.22	1,938.30
26 22 13 00-0126		80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0107)</small>		
26 22 13 00-0127	EA	15 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	4,998.16	562.73
26 22 13 00-0128	EA	30 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	6,090.90	687.78
26 22 13 00-0129	EA	45 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	7,360.00	812.84
26 22 13 00-0130	EA	75 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	9,998.39	937.89
26 22 13 00-0131	EA	112.5 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	12,825.52	1,125.46
26 22 13 00-0132	EA	150 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	16,884.63	1,250.52
26 22 13 00-0133	EA	225 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	22,460.38	1,563.14
26 22 13 00-0134	EA	300 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase, K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Aluminum Windings, NEMA Premium Efficient Dry Type Transformer.....	31,820.75	1,938.30

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 22 13 00-0135		Copper Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0106)</small> Note: Two taps at 2.5%, four at -2.5%.		
26 22 13 00-0136		150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0135)</small>		
26 22 13 00-0137	EA	15 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	4,755.65	562.73
26 22 13 00-0138	EA	30 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	5,796.96	687.78
26 22 13 00-0139	EA	45 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	6,999.91	812.84
26 22 13 00-0140	EA	75 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	9,491.33	937.89
26 22 13 00-0141	EA	112.5 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	12,854.91	1,125.46
26 22 13 00-0142	EA	150 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	16,078.74	1,250.52
26 22 13 00-0143	EA	225 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	21,375.24	1,563.14
26 22 13 00-0144	EA	300 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 150 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	30,255.50	1,938.30
26 22 13 00-0145		115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0135)</small>		
26 22 13 00-0146	EA	15 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	5,480.71	562.73
26 22 13 00-0147	EA	30 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	6,681.24	687.78
26 22 13 00-0148	EA	45 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	8,075.26	812.84
26 22 13 00-0149	EA	75 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	11,014.95	937.89
26 22 13 00-0150	EA	112.5 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	16,715.36	1,125.46
26 22 13 00-0151	EA	150 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	21,041.47	1,250.52
26 22 13 00-0152	EA	225 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	26,852.38	1,563.14
26 22 13 00-0153	EA	300 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 115 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	39,928.67	1,938.30
26 22 13 00-0154		80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformers <small>(26 22 13 00-0135)</small>		
26 22 13 00-0155	EA	15 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	6,208.22	562.73
26 22 13 00-0156	EA	30 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	7,565.51	687.78
26 22 13 00-0157	EA	45 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	9,150.59	812.84
26 22 13 00-0158	EA	75 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	12,536.09	937.89
26 22 13 00-0159	EA	112.5 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	19,816.47	1,125.46
26 22 13 00-0160	EA	150 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	25,541.25	1,250.52
26 22 13 00-0161	EA	225 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	32,327.06	1,563.14
26 22 13 00-0162	EA	300 kVA, 480 Volt Delta 208Y/120 Volt, 3 Phase K-1, NEMA 2 Enclosure, 80 Degree C Temperature Rise, Copper Windings, NEMA Premium Efficient Dry Type Transformer.....	47,654.47	1,938.30
26 22 13 00-0163		3 Phase Weathershields <small>(26 22 13 00-0056)</small> Note: Use with type DT-3 and DS-3.		
26 22 13 00-0164	EA	45-112.5 KVA 3 Phase Weathershields With DT-3, DS-3, Set Of 2.....	1,963.40	
26 22 13 00-0165	EA	150-300 KVA 3 Phase Weathershields With DT-3, DS-3, Set Of 2.....	3,334.22	
26 22 13 00-0166	EA	500-1,000 KVA 3 Phase Weathershields With DT-3, DS-3, Set Of 2.....	3,334.22	
26 22 13 00-0167		Three Phase Mounting Brackets <small>(26 22 13 00-0056)</small>		
26 22 13 00-0168	EA	3 Phase Mounting Brackets (Set Of 2) For Transformers Up To 112.5 KVA.....	1,494.96	223.43

26 24 Switchboards and Panelboards (26 20)

26 24 13 Switchboards (26 24)

Note: Installation of free-standing building distribution switchboards. Switchboard sections to be mounted on 4" concrete pad. Includes material, handling, unloading at job site, assembly and installation, wiring connections, testing and cleanup. Exclude concrete pad and foundation.

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 24 13 00-0001	Fusible Switch Type 240 Volt, 3 Phase, 3 Wire (26 24 13)			
26 24 13 00-0002	Incoming Service Section Main Device Only (26 24 13 00-0001)			
	Note: Copper bus, non-metering type, with fuses.			
26 24 13 00-0003	EA	400 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch	4,348.67	1,069.57
26 24 13 00-0004	EA	600 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch	4,816.22	1,131.33
26 24 13 00-0005	EA	800 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch	7,808.07	1,283.32
26 24 13 00-0006	EA	1,200 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch	8,411.29	1,375.76
26 24 13 00-0007	EA	1,600 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch	13,536.40	1,466.86
26 24 13 00-0008	EA	2,000 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch	15,098.66	1,559.67
26 24 13 00-0009	EA	400 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	5,277.10	1,069.57
26 24 13 00-0010	EA	600 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	6,772.91	1,131.33
26 24 13 00-0011	EA	800 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	9,455.90	1,284.42
26 24 13 00-0012	EA	1,200 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	12,955.55	1,375.76
26 24 13 00-0013	EA	1,600 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	13,536.40	1,468.33
26 24 13 00-0014	EA	2,000 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	15,098.66	1,559.67
26 24 13 00-0015	EA	2,500 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	18,159.37	1,630.59
26 24 13 00-0016	EA	3,000 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	20,590.63	1,746.88
26 24 13 00-0017	EA	4,000 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker	24,315.28	1,883.10
26 24 13 00-0018	EA	400 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	2,940.18	947.67
26 24 13 00-0019	EA	600 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	3,250.35	1,008.93
26 24 13 00-0020	EA	800 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	3,722.67	1,161.40
26 24 13 00-0021	EA	1,000 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	4,015.64	1,210.20
26 24 13 00-0022	EA	1,200 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	4,277.85	1,253.85
26 24 13 00-0023	EA	1,600 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	4,689.10	1,344.34
26 24 13 00-0024	EA	2,000 Amperes, 240 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug	5,070.39	1,436.54
26 24 13 00-0025	Branch Breaker Units (26 24 13 00-0001)			
	Note: Includes branch breaker(s) and portion of distribution section occupied by that breaker. 240 V, 3 pole. Use upper range to determine breaker unless designing for future expansion.			
26 24 13 00-0026	EA	15 To 60 Amperes, 240 Volt, MC Branch Breaker	375.91	37.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.38	
26 24 13 00-0027	EA	70 To 100 Amperes, 240 Volt, MC Branch Breaker	550.54	58.70
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	35.22	
26 24 13 00-0028	EA	125 To 225 Amperes, 240 Volt, MC Branch Breaker	1,481.41	106.99
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	64.20	
26 24 13 00-0029	EA	100 To 400 Amperes, 240 Volt, MC Branch Breaker	2,632.84	139.40
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	83.64	
26 24 13 00-0030	EA	300 To 600 Amperes, 240 Volt, MC Branch Breaker	4,684.65	342.38
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	205.40	
26 24 13 00-0031	EA	400 To 800 Amperes, 240 Volt, MC Branch Breaker	7,511.40	342.38
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	205.40	
26 24 13 00-0032	EA	600 To 1,200 Amperes, 240 Volt, MC Branch Breaker	12,175.16	610.18
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	366.11	
26 24 13 00-0033	Fusible Switch Type 480 Volt, 3 Phase, 3 Wire (26 24 13)			
26 24 13 00-0034	Incoming Service Section Main Device Only (26 24 13 00-0033)			
	Note: Copper bus, non-metering type, with fuses.			
26 24 13 00-0035	EA	400 Amperes, 480 Volt, 3 Phase, 3 Wire, Distribution Switchboard With Main Switch	6,159.23	1,387.87
26 24 13 00-0036	EA	600 Amperes, 480 Volt, 3 Phase, 3 Wire, Distribution Switchboard With Main Switch	6,884.20	1,387.87
26 24 13 00-0037	EA	800 Amperes, 480 Volt, 3 Phase, 3 Wire, Distribution Switchboard With Main Switch	10,232.53	1,803.62
26 24 13 00-0038	EA	1,200 Amperes, 480 Volt, 3 Phase, 3 Wire, Distribution Switchboard With Main Switch	11,601.67	1,803.62
26 24 13 00-0039	Fusible Switch Type 120/240 Volt, 1 Phase, 3 Wire (26 24 13)			
26 24 13 00-0040	Incoming Service Section Main Device Only (26 24 13 00-0039)			
	Note: Copper bus, non-metering type, with fuses.			
26 24 13 00-0041	EA	200/400 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Switch	3,914.04	947.67
26 24 13 00-0042	EA	600 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Switch	4,360.56	1,008.93
26 24 13 00-0043	EA	800 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Switch	6,701.47	1,161.40
26 24 13 00-0044	EA	1,200 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Switch	7,281.62	1,252.88
26 24 13 00-0045	EA	200/400 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With MC Main Breaker	4,795.40	947.67
26 24 13 00-0046	EA	600 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With MC Main Breaker	6,066.78	1,008.93
26 24 13 00-0047	EA	800 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With MC Main Breaker	8,531.98	1,161.40
26 24 13 00-0048	EA	1,200 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With MC Main Breaker	12,274.09	1,252.88
26 24 13 00-0049	EA	2,000 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With MC Main Breaker	14,413.08	1,406.21
26 24 13 00-0050	EA	200/400 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	2,731.62	825.26
26 24 13 00-0051	EA	600 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	3,063.22	886.64
26 24 13 00-0052	EA	800 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	3,596.05	1,039.13
26 24 13 00-0053	EA	1,000 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	3,872.59	1,087.91
26 24 13 00-0054	EA	1,200 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	4,140.35	1,131.33
26 24 13 00-0055	EA	1,600 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	4,493.86	1,210.20
26 24 13 00-0056	EA	2,000 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	4,839.80	1,283.32
26 24 13 00-0057	EA	2,500 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	6,008.01	1,589.63
26 24 13 00-0058	EA	3,000 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	6,726.77	1,742.48
26 24 13 00-0059	EA	4,000 Amperes, 120/240 Volt, 1 Phase, 3 Wire, Distribution Switchboard With Main Lug	7,924.20	1,880.04

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 13 00-0060 Branch Breaker Units <small>(26 24 13 00-0039)</small>		
<small>Note: Includes branch breaker(s) and portion of distribution section occupied by that breaker. 240 V, 2 pole. Use upper range to determine breaker unless designing for future expansion.</small>		
26 24 13 00-0061 EA 15 To 60 Amperes, 120 / 240 Volt, MC Branch Breaker.....	201.53	32.40
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>19.44</i>	
26 24 13 00-0062 EA 70 To 100 Amperes, 120 / 240 Volt, MC Branch Breaker.....	320.04	53.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>32.28</i>	
26 24 13 00-0063 EA 125 To 225 Amperes, 120 / 240 Volt, MC Branch Breaker.....	979.04	75.20
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>45.12</i>	
26 24 13 00-0064 EA 100 To 400 Amperes, 120 / 240 Volt, MC Branch Breaker.....	2,820.32	96.60
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>57.96</i>	
26 24 13 00-0065 EA 300 To 600 Amperes, 120/240 Volt, MC Branch Breaker.....	4,438.73	235.39
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>141.22</i>	
26 24 13 00-0066 EA 400 To 800 Amperes, 120/240 Volt, MC Branch Breaker.....	6,314.44	235.39
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>141.22</i>	
26 24 13 00-0067 EA 600 To 1,200 Amperes, 120/240 Volt, MC Branch Breaker.....	10,409.22	449.37
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>269.66</i>	
26 24 13 00-0068 Fusible Switch Type 120/208 Volt, 3 Phase, 4 Wire <small>(26 24 13)</small>		
26 24 13 00-0069 Incoming Service Section Main Device Only <small>(26 24 13 00-0068)</small>		
<small>Note: Copper bus, non-metering type, with fuses.</small>		
26 24 13 00-0070 EA 400 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	4,350.18	1,069.57
26 24 13 00-0071 EA 600 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	4,814.55	1,131.33
26 24 13 00-0072 EA 800 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	7,805.91	1,283.32
26 24 13 00-0073 EA 1,200 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	8,408.82	1,375.76
26 24 13 00-0074 EA 1,600 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	13,530.76	1,466.86
26 24 13 00-0075 EA 2,000 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	15,098.66	1,559.67
26 24 13 00-0076 EA 400 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	5,278.61	1,069.57
26 24 13 00-0077 EA 600 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	6,771.24	1,131.33
26 24 13 00-0078 EA 800 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	9,455.90	1,284.42
26 24 13 00-0079 EA 1,200 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	12,953.08	1,375.76
26 24 13 00-0080 EA 1,600 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	13,533.58	1,468.33
26 24 13 00-0081 EA 2,000 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	15,098.66	1,559.67
26 24 13 00-0082 EA 400 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	3,087.30	947.67
26 24 13 00-0083 EA 600 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	3,454.72	1,008.93
26 24 13 00-0084 EA 800 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	4,029.15	1,161.40
26 24 13 00-0085 EA 1,000 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	4,337.55	1,210.20
26 24 13 00-0086 EA 1,200 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	4,635.83	1,253.85
26 24 13 00-0087 EA 1,600 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	5,033.28	1,344.34
26 24 13 00-0088 EA 2,000 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	5,436.20	1,436.54
26 24 13 00-0089 EA 2,500 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	6,457.42	1,632.43
26 24 13 00-0090 EA 3,000 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	7,148.21	1,746.76
26 24 13 00-0091 EA 4,000 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	8,450.88	1,876.98
26 24 13 00-0092 Branch Breaker Units <small>(26 24 13 00-0068)</small>		
<small>Note: Includes branch breaker(s) and portion of distribution section occupied by that breaker. 120/208 V, 3 pole. Use upper range to determine breaker unless designing for future expansion.</small>		
26 24 13 00-0093 EA 15 To 60 Amperes, 120/208 Volt, MC Branch Breaker.....	375.91	37.29
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>22.38</i>	
26 24 13 00-0094 EA 70 To 100 Amperes, 120/208 Volt, MC Branch Breaker.....	550.54	58.70
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>35.22</i>	
26 24 13 00-0095 EA 125 To 225 Amperes, 120/208 Volt, MC Branch Breaker.....	1,481.41	106.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>64.20</i>	
26 24 13 00-0096 EA 100 To 400 Amperes, 120/208 Volt, MC Branch Breaker.....	2,632.84	139.40
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>83.64</i>	
26 24 13 00-0097 EA 300 To 600 Amperes, 120/208 Volt, MC Branch Breaker.....	4,684.65	342.38
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>205.40</i>	
26 24 13 00-0098 EA 400 To 800 Amperes, 120/208 Volt, MC Branch Breaker.....	7,511.40	342.38
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>205.40</i>	
26 24 13 00-0099 EA 600 To 1,200 Amperes, 120/208 Volt, MC Branch Breaker.....	12,175.16	610.18
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>366.11</i>	
26 24 13 00-0100 Fusible Switch Type 277/480 Volt, 3 Phase, 4 Wire <small>(26 24 13)</small>		
26 24 13 00-0101 Incoming Service Section Main Device Only <small>(26 24 13 00-0100)</small>		
<small>Note: Copper bus, non-metering type, with fuses.</small>		
26 24 13 00-0102 EA 400 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	5,634.33	1,466.86
26 24 13 00-0103 EA 600 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	6,187.16	1,559.67
26 24 13 00-0104 EA 800 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	8,828.28	1,740.89
26 24 13 00-0105 EA 1,200 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Switch.....	9,652.71	1,864.02
26 24 13 00-0106 EA 400 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	7,210.60	1,466.86
26 24 13 00-0107 EA 600 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	9,720.12	1,559.67
26 24 13 00-0108 EA 800 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	11,014.93	1,742.85
26 24 13 00-0109 EA 1,200 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	13,929.55	1,864.02
26 24 13 00-0110 EA 1,600 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	14,572.27	1,987.65
26 24 13 00-0111 EA 2,000 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With MC Main Breaker.....	16,201.65	2,111.16
26 24 13 00-0112 EA 400 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	3,087.30	947.67
26 24 13 00-0113 EA 600 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	3,454.72	1,008.93
26 24 13 00-0114 EA 800 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	4,029.15	1,161.40

26	Electrical
26 20	Low-Voltage Electrical Distribution
26 24	Switchboards and Panelboards



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 24	13 00-0115	EA	1,000 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	4,337.55	1,210.20
26 24	13 00-0116	EA	1,200 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	4,635.83	1,253.85
26 24	13 00-0117	EA	1,600 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	5,033.28	1,344.34
26 24	13 00-0118	EA	2,000 Amperes, 480/277 Volt, 3 Phase, 4 Wire, Distribution Switchboard With Main Lug.....	5,436.20	1,436.54

26 24 13 00-0119 Branch Breaker Units (26 24 13 00-0100)

Note: Includes branch breaker(s) and portion of distribution section occupied by that breaker. 480 V, 3 pole. Use upper range to determine breaker unless designing for future expansion.

26 24	13 00-0120	EA	15 To 60 Amperes, 480/277 Volt, MC Branch Breaker.....	780.81	37.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.38	
26 24	13 00-0121	EA	70 To 100 Amperes, 480/277 Volt, MC Branch Breaker.....	898.94	58.70
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	35.22	
26 24	13 00-0122	EA	125 To 225 Amperes, 480/277 Volt, MC Branch Breaker.....	1,630.19	106.99
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	64.20	
26 24	13 00-0123	EA	100 To 400 Amperes, 480/277 Volt, MC Branch Breaker.....	2,632.84	139.40
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	83.64	
26 24	13 00-0124	EA	300 To 600 Amperes, 480/277 Volt, MC Branch Breaker.....	6,308.01	342.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	205.40	
26 24	13 00-0125	EA	400 To 800 Amperes, 480/277 Volt, MC Branch Breaker.....	6,453.02	342.38
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	205.40	
26 24	13 00-0126	EA	600 To 1,200 Amperes, 480/277 Volt, MC Branch Breaker.....	10,350.30	610.18
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	366.11	

26 24 13 00-0127 Fusible Branch Circuit Switch (26 24 13)

Note: Includes switch fuses, and portion of distribution section occupied by that branch device.

26 24 13 00-0128 240 Volt, 2 Pole Twin Branch Switch Units (26 24 13 00-0127)

26 24	13 00-0129	EA	30/30 Amperes, 240 Volt, 2 Pole Twin Branch Switch Unit.....	800.59	95.99
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0130	EA	30/60 Amperes, 240 Volt, 2 Pole Twin Branch Switch Unit.....	797.77	95.99
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0131	EA	60/60 Amperes, 240 Volt, 2 Pole Twin Branch Switch Unit.....	797.77	95.99
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0132	EA	60/100 Amperes, 240 Volt, 2 Pole Twin Branch Switch Unit.....	1,253.71	126.56
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0133	EA	100/100 Amperes, 240 Volt, 2 Pole Twin Branch Switch Unit.....	1,253.71	126.56
			<i>For Electrical Interlock Kit, Add</i>	329.23	

26 24 13 00-0134 240 Volt, 2 Pole Single Branch Switch Units (26 24 13 00-0127)

26 24	13 00-0135	EA	100 Amperes, 240 Volt, 2 Pole Single Branch Switch Unit.....	916.84	94.16
			<i>For Electrical Interlock Kit, Add</i>	315.39	
26 24	13 00-0136	EA	200 Amperes, 240 Volt, 2 Pole Single Branch Switch Unit.....	1,339.76	94.16
			<i>For Electrical Interlock Kit, Add</i>	315.39	
26 24	13 00-0137	EA	400 Amperes, 240 Volt, 2 Pole Single Branch Switch Unit.....	3,442.83	253.73

26 24 13 00-0138 240 Volt, 3 Pole Twin Branch Switch Units (26 24 13 00-0127)

26 24	13 00-0139	EA	30/30 Amperes, 240 Volt, 3 Pole Twin Branch Switch Unit.....	1,026.92	108.22
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0140	EA	30/60 Amperes, 240 Volt, 3 Pole Twin Branch Switch Unit.....	1,024.10	108.22
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0141	EA	60/60 Amperes, 240 Volt, 3 Pole Twin Branch Switch Unit.....	1,024.10	108.22
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0142	EA	60/100 Amperes, 240 Volt, 3 Pole Twin Branch Switch Unit.....	1,543.95	144.90
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0143	EA	100/100 Amperes, 240 Volt, 3 Pole Twin Branch Switch Unit.....	1,543.95	144.90
			<i>For Electrical Interlock Kit, Add</i>	329.23	

26 24 13 00-0144 240 Volt, 3 Pole Single Branch Switch Units (26 24 13 00-0127)

26 24	13 00-0145	EA	100 Amperes, 240 Volt, 3 Pole Single Branch Switch Unit.....	1,110.96	106.38
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0146	EA	200 Amperes, 240 Volt, 3 Pole Single Branch Switch Unit.....	1,800.40	106.38
			<i>For Electrical Interlock Kit, Add</i>	315.39	
26 24	13 00-0147	EA	400 Amperes, 240 Volt, 3 Pole Single Branch Switch Unit.....	4,614.82	284.05
26 24	13 00-0148	EA	600 Amperes, 240 Volt, 3 Pole Single Branch Switch Unit.....	6,593.04	363.91
26 24	13 00-0149	EA	800 Amperes, 240 Volt, 3 Pole Single Branch Switch Unit.....	12,283.99	493.03

26 24 13 00-0150 600 Volt, 3 Pole Twin Branch Switch Units (26 24 13 00-0127)

26 24	13 00-0151	EA	30/30 Amperes, 600 Volt, 3 Pole Twin Branch Switch Unit.....	1,453.85	108.22
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0152	EA	30/60 Amperes, 600 Volt, 3 Pole Twin Branch Switch Unit.....	1,450.99	108.22
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0153	EA	60/60 Amperes, 600 Volt, 3 Pole Twin Branch Switch Unit.....	1,453.85	108.22
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0154	EA	60/100 Amperes, 600 Volt, 3 Pole Twin Branch Switch Unit.....	2,188.12	144.90
			<i>For Electrical Interlock Kit, Add</i>	329.23	
26 24	13 00-0155	EA	100/100 Amperes, 600 Volt, 3 Pole Twin Branch Switch Unit.....	2,235.79	144.90
			<i>For Electrical Interlock Kit, Add</i>	329.23	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Switchboards and Panelboards	26 24	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 24 13 00-0156	EA 200/200 Amperes, 600 Volt, 3 Pole Twin Branch Switch Unit <i>For Electrical Interlock Kit, Add</i>	4,768.67 329.23	189.54
26 24 13 00-0157	600 Volt, 3 Pole, Single Branch Switch Units <small>(26 24 13 00-0127)</small>		
26 24 13 00-0158	EA 100 Amperes, 600 Volt, 3 Pole Single Branch Switch Unit <i>For Electrical Interlock Kit, Add</i>	1,570.78 329.23	106.38
26 24 13 00-0159	EA 200 Amperes, 600 Volt, 3 Pole Single Branch Switch Unit <i>For Electrical Interlock Kit, Add</i>	2,384.16 315.39	106.38
26 24 13 00-0160	EA 400 Amperes, 600 Volt, 3 Pole Single Branch Switch Unit <i>For Electrical Interlock Kit, Add</i>	5,798.93 315.39	284.05
26 24 13 00-0161	EA 600 Amperes, 600 Volt, 3 Pole Single Branch Switch Unit	7,041.23	363.91
26 24 13 00-0162	EA 800 Amperes, 600 Volt, 3 Pole Single Branch Switch Unit	12,283.99	493.03
26 24 13 00-0163	Service And Distribution Structures <small>(26 24 13)</small>		
26 24 13 00-0164	Switchboard Sections <small>(26 24 13 00-0163)</small>		
26 24 13 00-0165	EA 600 Amperes, 480 Volt, 4 Wire, Switchboard Incoming No Switch Circuit	4,803.35	1,018.95
26 24 13 00-0166	EA 800 Amperes, 480 Volt, 4 Wire, Switchboard Incoming No Switch Circuit	5,261.11	1,107.61
26 24 13 00-0167	EA 1,200 Amperes, 480 Volt, 4 Wire, Switchboard Incoming No Switch Circuit	6,597.85	1,415.26
26 24 13 00-0168	EA 1,600 Amperes, 480 Volt, 4 Wire, Switchboard Incoming No Switch Circuit	7,215.88	1,543.89
26 24 13 00-0169	EA 2,000 Amperes, 480 Volt, 4 Wire, Switchboard Incoming No Switch Circuit	7,695.63	1,643.55
26 24 13 00-0170	EA 400 Amperes, 480 Volt, Switchboard Incoming For Switch Circuit Section	5,715.34	893.86
26 24 13 00-0171	EA 200 Amperes, Distribution Section Subfeeder Lug-Rated	3,253.34	849.11
26 24 13 00-0172	EA 400 Amperes, Distribution Section Subfeeder Lug-Rated	3,604.97	920.77
26 24 13 00-0173	EA 120/208 Or 277/480 Volt, 4 Wire, Distribution Section Aluminum Bus	8,129.01	1,018.95
26 24 13 00-0174	EA 800 Amperes, Switchboard Distribution Section Aluminum Bus Less Breaker	8,723.79	1,021.64
26 24 13 00-0175	EA 1,000 Amperes, Switchboard Distribution Section Aluminum Bus Less Breaker	9,575.62	1,140.62
26 24 13 00-0176	EA 15 To 60 Amperes, 240 Volt, 1 Phase, Feed Section Circuit Breaker FA Frame	182.18	61.14
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	37.34	
26 24 13 00-0177	EA 70 To 100 Amperes, 240 Volt, 3 Phase, Feed Section Circuit Breaker FA Frame	222.38	62.24
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.11	
26 24 13 00-0178	EA 70 To 225 Amperes, 480 Volt, 3 Phase, Feed Section Circuit Breaker KA Frame	1,030.15	73.49
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	95.03	
26 24 13 00-0179	EA 125 To 400 Amperes, 480 Volt, 3 Phase, Feed Section Circuit Breaker LA Frame	1,707.59	158.35
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	132.34	
26 24 13 00-0180	EA 100 Amperes, 240 Volt HIC, 3 Phase, Switchboard Feed Section Branch Circuit Breaker	679.56	220.59
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	76.43	
26 24 13 00-0181	EA 225 Amperes, 240 Volt HIC, 3 Phase, Switchboard Feed Section Branch Circuit Breaker	1,919.89	127.42
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	95.03	
26 24 13 00-0182	Switchboard, Structure Per Section Copper, 480 Volt <small>(26 24 13 00-0163)</small>		
26 24 13 00-0183	EA 225 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	2,490.03	530.69
26 24 13 00-0184	EA 400 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	3,542.12	717.65
26 24 13 00-0185	EA 600 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	3,973.56	873.44
26 24 13 00-0186	EA 800 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	5,010.73	1,222.79
26 24 13 00-0187	EA 1,200 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	6,209.12	1,528.49
26 24 13 00-0188	EA 1,600 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	6,844.04	1,528.49
26 24 13 00-0189	EA 2,000 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	8,448.54	2,038.03
26 24 13 00-0190	EA 2,500 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	9,665.97	2,038.03
26 24 13 00-0191	EA 3,000 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	11,366.28	2,426.15
26 24 13 00-0192	EA 4,000 Amperes, 480 Volt, Copper, Structure Per Section, Switchboard	13,606.47	2,426.15
26 24 13 00-0193	Main Devices <small>(26 24 13)</small>		
26 24 13 00-0194	Power Circuit Breakers <small>(26 24 13 00-0193)</small>		
26 24 13 00-0195	DSL Breaker With Current Limiters And Amptector <small>(26 24 13 00-0194)</small>		
	Note: 11 Static trip not applicable to ground-fault or plug in test feature. Manually operated.		
26 24 13 00-0196	EA 50 To 800 Amperes, DSL-206, Main Breaker With Current Limiter, Amptector Static Trip	8,742.83	1,283.93
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	768.73	
26 24 13 00-0197	EA 50 To 1,600 Amperes, DSL-416, Main Breaker With Current Limiter, Amptector Static Trip	15,955.42	2,139.89
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,282.65	
26 24 13 00-0198	EA 1,200 To 3,200 Amperes, DSL-632, Main Breaker With Current Limiter, Amptector Static Trip	35,947.24	3,595.01
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,137.75	
26 24 13 00-0199	EA 4,000 Amperes, DSL-840, Main Breaker With Current Limiter, Amptector Static Trip	57,907.40	5,820.49
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,554.63	
26 24 13 00-0200	EA Ground-Fault Trip All Power Breakers - Factory Installed	3,048.66	
26 24 13 00-0201	EA Key Interlock All Power Breakers - Factory Installed	393.73	
26 24 13 00-0202	EA Short Time Delay Selective Trip - Factory Installed	516.54	
26 24 13 00-0203	EA Shunt Trip Manually Open Breakers - Factory Installed	372.05	
26 24 13 00-0204	DSL Breaker Electrical Operated And Amptector <small>(26 24 13 00-0194)</small>		
	Note: 11 Static trip not applicable to ground-fault or plug in test feature. Manually operated.		
26 24 13 00-0205	EA 50 To 800 Amperes, DSL-206, Main Breaker, Electrical Operated With Amptector Static Trip	10,245.09	1,345.07
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	810.87	
26 24 13 00-0206	EA 50 To 1,600 Amperes, DSL-416, Main Breaker, Electrical Operated With Amptector Static Trip	19,033.89	2,262.17
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,350.65	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 24 13 00-0207	EA	1,200 To 3,200 Amperes, DSL-632, Main Breaker, Electrical Operated With Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40,386.72 2,247.78	3,729.52
26 24 13 00-0208	EA	4,000 Amperes, DSL-840, Main Breaker, Electrical Operated With Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	62,369.18 3,758.58	6,113.97
26 24 13 00-0209		DS Breakers With Amptector Static Trip, Manually Operated <small>(26 24 13 00-0194)</small> Note: Includes integral ground fault and plug-in test provision. Excludes system, add price from section drawout mounted manually operated.		
26 24 13 00-0210	EA	50 To 800 Amperes, DS-206, Main Breaker With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,957.02 705.46	1,173.88
26 24 13 00-0211	EA	50 To 1,600 Amperes, DS-416, Main Breaker With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12,731.07 1,175.76	1,968.69
26 24 13 00-0212	EA	2,000 Amperes, DS-420, Main Breaker With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,865.73 1,959.60	3,301.54
26 24 13 00-0213	EA	1,200 To 3,200 Amperes, DS-632, Main Breaker With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32,560.92 3,263.68	5,319.14
26 24 13 00-0214	EA	4,000 Amperes, DS-840, Main Breaker With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	52,985.71 5,426.59	8,681.82
26 24 13 00-0215		DS Breakers With Amptector Static Trip, Electrically Operated <small>(26 24 13 00-0194)</small> Note: Includes integral ground fault and plug-in test provision. Excludes system, add price from section drawout mounted electrical operated.		
26 24 13 00-0216	EA	50 To 800 Amperes, DS-206, Main Breaker, Electrical Operated With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8,210.12 672.85	1,124.96
26 24 13 00-0217	EA	50 To 1,600 Amperes, DS-416, Main Breaker, Electrical Operated With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15,324.95 1,121.14	1,883.10
26 24 13 00-0218	EA	2,000 Amperes, DS-420, Main Breaker, Electrical Operated With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21,817.98 1,871.62	3,130.35
26 24 13 00-0219	EA	1,200 To 3,200 Amperes, DS-632, Main Breaker, Electrical Operated With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36,008.10 3,119.37	5,099.04
26 24 13 00-0220	EA	4,000 Amperes, DS-840, Main Breaker, Electrical Operated With Groundfault, Amptector Static Trip <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	56,302.86 5,210.76	8,742.97
26 24 13 00-0221		Molded Case Circuit Breakers Conventional <small>(26 24 13 00-0194)</small>		
26 24 13 00-0222	EA	70 To 225 Amperes, 3 Pole, Conventional Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,949.33 591.67	1,027.15
26 24 13 00-0223	EA	125 To 400 Amperes, 3 Pole, Conventional Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,317.96 643.58	1,027.15
26 24 13 00-0224	EA	300 To 600 Amperes, 3 Pole, Conventional Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,789.73 705.46	1,222.79
26 24 13 00-0225	EA	400 To 800 Amperes, 3 Pole, Conventional Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,695.48 764.24	1,222.79
26 24 13 00-0226	EA	600 To 1,200 Amperes, 3 Pole, Conventional Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8,459.25 837.53	1,467.36
26 24 13 00-0227	EA	1,000 To 2,000 Amperes, 3 Pole, Conventional Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13,680.52 926.36	1,467.36
26 24 13 00-0228	EA	Shunt Trip, Factory Installed	390.11	
26 24 13 00-0229	EA	Groundfault Trip Complete Interrupting Circuit, Factory Installed	90.30	
26 24 13 00-0230		Switchboard Branch Breaker 480 Volt <small>(26 24 13 00-0193)</small>		
26 24 13 00-0231	EA	60 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	615.97 53.17	88.65
26 24 13 00-0232	EA	100 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	726.32 70.55	117.63
26 24 13 00-0233	EA	225 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,103.26 106.27	177.06
26 24 13 00-0234	EA	400 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,780.36 133.30	222.18
26 24 13 00-0235	EA	600 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,364.70 178.77	297.99
26 24 13 00-0236	EA	800 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,063.13 229.27	382.13
26 24 13 00-0237	EA	1,000 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,535.93 349.37	582.30
26 24 13 00-0238	EA	1,200 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,535.93 349.37	582.30
26 24 13 00-0239	EA	1,600 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9,167.08 489.12	815.24
26 24 13 00-0240	EA	2,000 Amperes, 3 Phase, 480 Volt Switchboard Branch Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11,434.81 733.68	1,222.79
26 24 13 00-0241		Switchboard 277/480 Volt Main Breaker <small>(26 24 13 00-0193)</small>		
26 24 13 00-0242	EA	400 Amperes, 277/480 Volt, Main Breaker, Switchboard <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,425.64 318.44	530.69
26 24 13 00-0243	EA	600 Amperes, 277/480 Volt, Main Breaker, Switchboard <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,526.53 348.71	581.19
26 24 13 00-0244	EA	800 Amperes, 277/480 Volt, Main Breaker, Switchboard <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8,111.03 524.06	873.44



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Switchboards and Panelboards	26 24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 13 00-0245 EA 1,200 Amperes, 277/480 Volt, Main Breaker, Switchboard <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	13,878.65 733.68	1,222.79
26 24 13 00-0246 EA 1,600 Amperes, 277/480 Volt, Main Breaker, Switchboard <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14,138.36 811.59	1,352.65
26 24 13 00-0247 EA 2,000 Amperes, 277/480 Volt, Main Breaker, Switchboard <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,652.89 1,455.71	2,426.15
26 24 13 00-0248 Branch Or Distribution Devices (26 24 13)		
26 24 13 00-0249 3 Pole, Panel Mounted, Molded Case Circuit Breakers (26 24 13 00-0248) Note: Includes certified refurbished circuit breakers.		
26 24 13 00-0250 EA 15 To 60 Amperes, 600 Volt, Type EHB, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	646.43 29.35	44.02
26 24 13 00-0251 EA 70 To 100 Amperes, 600 Volt, Type EHB, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	651.69 36.68	55.03
26 24 13 00-0252 EA 125 To 150 Amperes, 600 Volt, Type FB, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,575.41 44.02	66.03
26 24 13 00-0253 EA 70 To 225 Amperes, 600 Volt, Type JDB, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,285.64 56.86	85.60
26 24 13 00-0254 EA 125 To 400 Amperes, 600 Volt, Type LBB, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,224.04 70.43	105.65
26 24 13 00-0255 EA 300 To 600 Amperes, 600 Volt, Type LC, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,224.31 82.54	123.50
26 24 13 00-0256 EA 900 To 1,000 Amperes, 600 Volt, Type NB, 3 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,453.93 93.18	139.40
26 24 13 00-0257 2 Pole, Panel Mounted, Molded Case Circuit Breakers (26 24 13 00-0248) Note: Includes certified refurbished circuit breakers.		
26 24 13 00-0258 EA 15 To 60 Amperes, 600 Volt, Type EHB, 2 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	445.13 22.01	33.01
26 24 13 00-0259 EA 70 To 100 Amperes, 600 Volt, Type EHB, 2 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	571.73 29.35	44.02
26 24 13 00-0260 EA 125 To 150 Amperes, 600 Volt, Type FB, 2 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,571.02 36.68	55.03
26 24 13 00-0261 EA 70 To 225 Amperes, 600 Volt, Type JDB, 2 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,492.02 40.35	61.14
26 24 13 00-0262 EA 125 To 400 Amperes, 600 Volt, Type LBB, 2 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,631.68 53.19	79.48
26 24 13 00-0263 EA 900 To 1,000 Amperes, 600 Volt, Type NB, 2 Pole, Panel Mounted, Molded Case Circuit Breaker <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,971.49 77.03	115.55
26 24 13 00-0264 Meter Devices And Instrumentation (26 24 13) Note: Factory installed accessories.		
26 24 13 00-0265 Compartments For Instrument Transformers And Metering Devices (26 24 13 00-0264)		
26 24 13 00-0266 EA Compartment For, Up To 800 Amperes, Primary Current Transformer	471.39	
26 24 13 00-0267 EA Compartment For, 1,000 To 1,500 Amperes, Primary Current Transformer	680.89	
26 24 13 00-0268 EA Compartment For, 2,000 To 6,000 Amperes, Primary Current Transformer	801.90	
26 24 13 00-0269 Instruments (26 24 13 00-0264)		
26 24 13 00-0270 EA AC Voltmeter	642.96	
26 24 13 00-0271 EA AC Ammeter	642.96	
26 24 13 00-0272 EA AC Wattmeter	1,717.58	
26 24 13 00-0273 EA Variometer	1,939.73	
26 24 13 00-0274 EA Power Factor Meter	1,549.62	
26 24 13 00-0275 EA Frequency Meter	1,710.36	
26 24 13 00-0276 EA 200 Volt-Amperes Max Potential Transformer	577.95	
26 24 13 00-0277 EA AC Watt-hour Meter Indicating 1 Or 2 Element With Test Block And Plug Block	2,176.33	
26 24 13 00-0278 EA AC Watt-hour Meter Recording 2 Element With Recording KW Demand Type R-2	3,641.06	
26 24 13 00-0279 EA Weatherproof, Modify Meter	3,490.13	
26 24 13 00-0280 EA Control Switch Resistor Type 130 V	81.33	
26 24 13 00-0281 EA Metering Instrument: Voltage, Amperes And Watt Hour	4,392.03	
26 24 16 Panelboards (26 24)		
26 24 16 00-0001 Branch Circuit Panelboard (26 24 16) Note: Includes wiring connections, drilling hole (or removing knock-out on residential units), labeling and testing. All NEMA 3R panelboards include weatherproof hubs. Copper bussing. Panelboards with less than a 30 circuit capacity do not have the door in a door trim front option.		
26 24 16 00-0002 Assembled Lighting And Power Panelboards (26 24 16 00-0001) Note: Includes main lugs or breaker (as indicated). 20 Amp, 1 pole branch circuit plug-on breakers (the number of which is indicated). Panelboard box, trim and connection of main service cable from meter.		
26 24 16 00-0003 120/240 Volt, 3 Wire, 1 Phase, Main Lugs Assembled Panelboards (26 24 16 00-0002)		
26 24 16 00-0004 EA 100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers <i>For NEMA 3R Panelboard, Add</i>	1,321.47 1,534.02	348.49

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 24 16 00-0005	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	1,502.09	348.49
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0006	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers	1,705.71	483.00
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0007	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers	1,912.03	483.00
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0008	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	2,105.99	605.29
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0009	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	2,305.00	605.29
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0010	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers	2,497.37	696.99
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0011	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers	2,999.32	892.64
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0012	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	3,156.73	892.64
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0013	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	3,311.74	1,021.03
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0014	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers.....	3,561.88	1,021.03
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0015	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers.....	3,716.19	1,149.43
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0016	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	3,945.18	1,149.43
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0017	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	4,084.91	1,271.71
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0018	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	4,315.49	1,271.71
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0019	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	4,526.93	1,406.21
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0020	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	4,673.65	1,406.21
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0021	EA	225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	4,886.23	1,406.21
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0022		120/240 Volt, 3 Wire, 1 Phase, Main Breaker Assembled Panelboards <small>(26 24 16 00-0022)</small>		
26 24 16 00-0023	EA	50 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Up To 50 Ampere Main Breaker, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers.....	1,567.64	336.27
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0024	EA	50 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, Up To 50 Ampere Main Breaker, 12 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	1,750.92	336.27
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0025	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >50 To 100 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers	2,172.36	574.71
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0026	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >50 To 100 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers	2,463.78	574.71
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0027	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >50 To 100 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	2,661.68	703.11
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0028	EA	100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	2,867.92	703.11
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0029 EA 100 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers.....	3,051.31	843.73
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0030 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers.....	3,692.21	843.73
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0031 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	3,855.48	1,033.26
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0032 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	4,032.60	1,033.26
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0033 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers.....	4,226.38	1,161.66
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0034 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers.....	4,383.95	1,161.66
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0035 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	4,551.81	1,271.71
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0036 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	4,731.51	1,271.71
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0037 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	4,924.99	1,504.04
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0038 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	5,134.62	1,504.04
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0039 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	5,363.33	1,504.04
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0040 EA 225 Ampere Rating, 120/240 Volt, 3 Wire, 1 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	5,505.44	1,589.63
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0041 120/208 Volt, 4 Wire, 3 Phase, Main Lugs Assembled Panelboards <small>(26 24 16 00-0002)</small>		
26 24 16 00-0042 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers.....	1,595.67	397.41
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0043 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	1,790.76	397.41
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0044 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers.....	2,012.25	531.92
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0045 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers.....	2,244.99	531.92
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0046 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	2,453.60	654.19
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0047 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	2,676.42	654.19
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0048 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers.....	2,886.39	776.47
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0049 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers.....	3,103.29	776.47
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0050 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	3,305.11	910.98
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0051 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	3,537.53	910.98
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 24 16 00-0052	EA	100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers.....	3,774.21		1,051.60
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0053	EA	100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers.....	4,006.58		1,051.60
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0054	EA	225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	4,470.39		1,271.71
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0055	EA	225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	4,628.25		1,271.71
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0056	EA	225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	4,899.42		1,412.32
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0057	EA	225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	5,145.27		1,412.32
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0058	EA	225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	5,319.37		1,540.72
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0059	EA	225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	5,564.75		1,540.72
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0060	EA	400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	5,413.76		1,367.09
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0061	EA	400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	5,587.97		1,436.78
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0062	EA	400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	5,871.31		1,513.21
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0063	EA	400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	6,135.62		1,601.86
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0064	EA	400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	6,320.44		1,650.77
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0065	EA	400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	6,617.90		1,751.65
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0066		120/208 Volt, 4 Wire, 3 Phase, Main Breaker Assembled Panelboards <small>(26 24 16 00-0062)</small>			
26 24 16 00-0067	EA	50 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Up To 50 Ampere Main Breaker, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers.....	1,899.85		385.18
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0068	EA	50 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Up To 50 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	2,097.45		385.18
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0069	EA	50 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Up To 50 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers.....	2,332.60		507.46
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0070	EA	50 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, Up To 50 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers.....	2,659.90		507.46
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0071	EA	100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	3,141.14		764.24
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0072	EA	100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	3,344.98		764.24
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0073	EA	100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers.....	3,565.61		892.64
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0074	EA	100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers.....	3,749.29		892.64
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0075 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	3,996.89	1,033.26
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0076 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	4,165.99	1,033.26
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0077 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers.....	4,440.23	1,161.66
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0078 EA 100 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers.....	4,675.49	1,161.66
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0079 EA 225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	5,496.47	1,345.07
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0080 EA 225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	5,739.51	1,418.44
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0081 EA 225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	5,842.77	1,418.44
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0082 EA 225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	6,115.51	1,601.86
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0083 EA 225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	6,306.06	1,601.86
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0084 EA 225 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	6,431.18	1,601.86
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0085 EA 400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	6,467.61	1,473.47
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0086 EA 400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	6,733.23	1,559.06
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0087 EA 400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	6,839.97	1,601.86
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0088 EA 400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	7,134.27	1,699.68
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0089 EA 400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	7,323.70	1,748.59
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0090 EA 400 Ampere Rating, 120/208 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	7,502.37	1,809.74
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0091 480 Volt, 3 Wire, 3 Phase, Main Lugs Assembled Panelboards <small>(26 24 16 00-0002)</small>		
26 24 16 00-0092 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers.....	1,801.35	391.30
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0093 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	2,059.27	391.30
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0094 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers.....	2,306.70	538.03
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0095 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers.....	2,564.60	538.03
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0096 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	2,805.37	672.53
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0097 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	3,058.87	672.53
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 24 16 00-0098	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers.....	3,323.25		813.16
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0099	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers.....	3,565.86		813.16
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0100	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	3,832.23		966.01
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0101	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	4,089.51		966.01
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0102	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers.....	4,326.35		1,100.51
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0103	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers.....	4,579.85		1,100.51
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0104	EA	225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	5,120.36		1,338.95
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0105	EA	225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	5,373.56		1,338.95
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0106	EA	225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	5,642.91		1,467.36
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0107	EA	225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	5,840.51		1,467.36
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0108	EA	225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	6,139.80		1,620.20
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0109	EA	225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	6,354.48		1,620.20
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0110		480 Volt, 3 Wire, 3 Phase, Main Breaker Assembled Panelboards <small>(26 24 16 00-0002)</small>			
26 24 16 00-0111	EA	50 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Up To 50 Amp Main Breaker, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers.....	2,292.32		415.75
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0112	EA	50 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Up To 50 Amp Main Breaker, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	2,544.45		452.43
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0113	EA	50 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, Up To 50 Amp Main Breaker, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers.....	2,799.31		562.48
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0114	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Amp Main Breaker, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers.....	3,363.98		684.76
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0115	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Amp Main Breaker, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	3,607.20		758.13
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0116	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Amp Main Breaker, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	3,828.93		819.28
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0117	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers.....	4,073.26		892.64
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0118	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers.....	4,308.39		966.01
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0119	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	4,523.55		1,027.15
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0120	EA	100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	4,754.35		1,088.28
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0121 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers	5,004.08	1,161.66
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0122 EA 100 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers	5,276.97	1,253.37
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0123 EA 225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers	6,642.20	1,393.98
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0124 EA 225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers	6,903.88	1,479.58
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0125 EA 225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers	7,090.07	1,516.26
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0126 EA 225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers	7,384.25	1,614.09
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0127 EA 225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers	7,589.00	1,675.23
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0128 EA 225 Ampere Rating, 480 Volt, 3 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers	7,801.30	1,727.81
<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0129 277/480 Volt, 4 Wire, 3 Phase, Main Lugs Assembled Panelboards <small>(26 24 16 00-0002)</small>		
26 24 16 00-0130 EA 100 Ampere Rating , 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 12 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers	2,192.72	427.98
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0131 EA 100 Ampere Rating , 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers	2,480.81	427.98
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0132 EA 100 Ampere Rating , 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers	2,761.46	568.60
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0133 EA 100 Ampere Rating , 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers	3,044.39	568.60
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0134 EA 100 Ampere Rating , 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers	3,331.90	703.11
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0135 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers	3,613.50	703.11
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0136 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers	3,899.69	843.73
<i>For NEMA 3R Panelboard, Add</i>	1,534.02	
26 24 16 00-0137 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers	4,184.69	843.73
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0138 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers	4,495.99	990.46
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0139 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers	4,756.91	990.46
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0140 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 30 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers	5,032.55	996.57
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0141 EA 100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 32 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers	5,325.93	996.57
<i>For NEMA 3R Panelboard, Add</i>	1,687.00	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0142 EA 225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers	6,066.77	1,381.76
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0143 EA 225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers	6,366.90	1,381.76
<i>For NEMA 3R Panelboard, Add</i>	1,992.76	
<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 24 16 00-0144	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	6,598.94		1,455.12
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0145	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	6,926.54		1,552.94
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0146	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	7,174.20		1,552.94
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0147	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, Main Lugs, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	7,537.63		1,699.68
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0148		277/480 Volt, 4 Wire, 3 Phase, Main Breaker Assembled Panelboards <small>(26 24 16 00-0002)</small>			
26 24 16 00-0149	EA	50 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, 50 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Eight 20 Ampere Breakers.....	2,846.57		525.80
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0150	EA	50 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, 50 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Ten 20 Ampere Breakers.....	3,141.44		525.80
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0151	EA	50 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, 50 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Twelve 20 Ampere Breakers.....	3,425.24		696.99
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0152	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Fourteen 20 Ampere Breakers.....	4,079.41		696.99
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0153	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 20 Circuit Capacity Assembled Panelboard With Sixteen 20 Ampere Breakers.....	4,352.74		880.41
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0154	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Eighteen 20 Ampere Breakers.....	4,625.62		880.41
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0155	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 24 Circuit Capacity Assembled Panelboard With Twenty 20 Ampere Breakers.....	4,889.31		1,008.80
		<i>For NEMA 3R Panelboard, Add</i>	1,534.02		
26 24 16 00-0156	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Two 20 Ampere Breakers.....	5,133.02		1,008.80
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0157	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Four 20 Ampere Breakers.....	5,392.37		1,149.43
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0158	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Six 20 Ampere Breakers.....	5,670.63		1,149.43
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0159	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Twenty-Eight 20 Ampere Breakers.....	5,909.97		1,271.71
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0160	EA	100 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >50 To 100 Ampere Main Breaker, 30 Circuit Capacity Assembled Panelboard With Thirty 20 Ampere Breakers.....	6,161.15		1,271.71
		<i>For NEMA 3R Panelboard, Add</i>	1,687.00		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27		
26 24 16 00-0161	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Two 20 Ampere Breakers.....	8,057.15		1,504.04
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0162	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Four 20 Ampere Breakers.....	8,362.08		1,504.04
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0163	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main 42 Circuit Capacity Assembled Panelboard With Thirty-Six 20 Ampere Breakers.....	8,587.06		1,644.65
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0164	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 42 Circuit Capacity Assembled Panelboard With Thirty-Eight 20 Ampere Breakers.....	8,927.84		1,644.65
		<i>For NEMA 3R Panelboard, Add</i>	1,992.76		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53		
26 24 16 00-0165	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty 20 Ampere Breakers.....	9,173.45		1,797.51
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		
26 24 16 00-0166	EA	225 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >100 To 225 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	9,427.42		1,797.51
		<i>For NEMA 3R Panelboard, Add</i>	2,074.05		
		<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07		



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Switchboards and Panelboards	26 24	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0167	EA		400 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >225 To 400 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	11,191.36	2,001.72
			<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0168	EA		600 Ampere Rating, 277/480 Volt, 4 Wire, 3 Phase, >400 To 600 Ampere Main Breaker, 54 Circuit Capacity Assembled Panelboard With Forty-Two 20 Ampere Breakers.....	13,623.47	2,402.78
			<i>For NEMA 3R Panelboard, Add</i>	2,074.05	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0169			Unassembled Lighting And Power Panelboards <small>(26 24 16 00-0001)</small> Note: Includes the main device (lugs or breaker), connection of main service cable from meter and that portion of the panel box, trim and interior occupied by that device. Spaces include that portion of the panel box, trim and interior reserved by that space. The maximum single pole capacity of the panelboard main device (lugs, breakers) is indicated. Excludes branch breakers. A complete panelboard will be the sum of main device and the branch circuit breakers and spaces (within the capacity of the main device). See CSI section 26 28 16 13-0001 for circuit breakers.		
26 24 16 00-0170			240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase Unassembled Panelboards <small>(26 24 16 00-0169)</small> Note: As manufactured by Square D or equal. Accepts plug-on and bolt-on breakers.		
26 24 16 00-0171			Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase Unassembled Panelboards <small>(26 24 16 00-0170)</small>		
26 24 16 00-0172	EA		100 Ampere Rating, 12 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	700.85	
26 24 16 00-0173	EA		100 Ampere Rating, 20 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	806.13	
26 24 16 00-0174	EA		225 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,096.40	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0175	EA		225 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,265.23	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0176	EA		225 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,431.50	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0177	EA		400 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,600.38	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0178	EA		400 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,737.28	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0179	EA		400 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,902.17	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0180	EA		600 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,064.24	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0181	EA		600 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,200.45	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0182	EA		600 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,402.70	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0183			Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase Unassembled Panelboards <small>(26 24 16 00-0170)</small>		
26 24 16 00-0184	EA		100 Ampere Rating, 12 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,042.25	
26 24 16 00-0185	EA		100 Ampere Rating, 20 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,180.43	
26 24 16 00-0186	EA		225 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,890.35	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0187	EA		225 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,098.36	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0188	EA		225 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,293.61	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0189	EA		400 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	3,988.87	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0190	EA		400 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	4,221.18	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0191	EA		400 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	4,431.36	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0192			Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase Unassembled Panelboards <small>(26 24 16 00-0170)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0193 EA 100 Ampere Rating, 12 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,421.01	
26 24 16 00-0194 EA 100 Ampere Rating, 20 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,518.06	
26 24 16 00-0195 EA 225 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,791.19	
26 24 16 00-0196 EA 225 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,956.59	
26 24 16 00-0197 EA 225 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,109.83	
26 24 16 00-0198 EA 400 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,411.76	
26 24 16 00-0199 EA 400 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,539.75	
26 24 16 00-0200 EA 400 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,696.41	
26 24 16 00-0201 EA 600 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,921.57	
26 24 16 00-0202 EA 600 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	3,052.80	
26 24 16 00-0203 EA 600 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	3,242.29	
26 24 16 00-0204 Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase Unassembled Panelboards <small>(26 24 16 00-0170)</small>		
26 24 16 00-0205 EA 100 Ampere Rating, 12 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,754.18	
26 24 16 00-0206 EA 100 Ampere Rating, 20 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	1,883.44	
26 24 16 00-0207 EA 225 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,718.20	
26 24 16 00-0208 EA 225 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	2,909.75	
26 24 16 00-0209 EA 225 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	3,092.65	
26 24 16 00-0210 EA 400 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	4,770.76	
26 24 16 00-0211 EA 400 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	4,994.84	
26 24 16 00-0212 EA 400 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 3 Wire, 1 Phase, Unassembled Panelboard	5,202.97	
26 24 16 00-0213 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase Unassembled Panelboards <small>(26 24 16 00-0169)</small>		
Note: As manufactured by Square D or equal. Accepts plug-on and bolt-on breakers		
26 24 16 00-0214 Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase Unassembled Panelboards <small>(26 24 16 00-0213)</small>		
26 24 16 00-0215 EA 100 Ampere Rating, 12 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	789.69	
26 24 16 00-0216 EA 100 Ampere Rating, 24 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	928.49	
26 24 16 00-0217 EA 100 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,044.70	
For Door-In-Door (Hinged) Trim Front, Add	123.27	
26 24 16 00-0218 EA 225 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,181.80	
For Door-In-Door (Hinged) Trim Front, Add	123.27	
26 24 16 00-0219 EA 225 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,360.13	
For Door-In-Door (Hinged) Trim Front, Add	210.53	
26 24 16 00-0220 EA 225 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,506.01	
For Door-In-Door (Hinged) Trim Front, Add	269.07	
26 24 16 00-0221 EA 400 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,736.36	
For Door-In-Door (Hinged) Trim Front, Add	123.27	
26 24 16 00-0222 EA 400 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,870.78	
For Door-In-Door (Hinged) Trim Front, Add	210.53	
26 24 16 00-0223 EA 400 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,019.03	
For Door-In-Door (Hinged) Trim Front, Add	269.07	
26 24 16 00-0224 EA 600 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,215.29	
For Door-In-Door (Hinged) Trim Front, Add	123.27	
26 24 16 00-0225 EA 600 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,445.60	
For Door-In-Door (Hinged) Trim Front, Add	210.53	
26 24 16 00-0226 EA 600 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,894.89	
For Door-In-Door (Hinged) Trim Front, Add	269.07	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0227				Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase Unassembled Panelboards <small>(26 24 16 00-0213)</small>		
26 24 16 00-0228	EA			100 Ampere Rating, 12 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,222.34	
26 24 16 00-0229	EA			100 Ampere Rating, 24 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,378.46	
26 24 16 00-0230	EA			100 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,579.02	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0231	EA			225 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,342.15	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0232	EA			225 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,535.92	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0233	EA			225 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,715.94	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0234	EA			400 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,761.83	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0235	EA			400 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,977.51	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0236	EA			400 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 1, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	4,156.58	
				<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0237				Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase Unassembled Panelboards <small>(26 24 16 00-0213)</small>		
26 24 16 00-0238	EA			100 Ampere Rating, 12 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,509.85	
26 24 16 00-0239	EA			100 Ampere Rating, 24 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,640.42	
26 24 16 00-0240	EA			100 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,747.71	
26 24 16 00-0241	EA			225 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,876.58	
26 24 16 00-0242	EA			225 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,051.49	
26 24 16 00-0243	EA			225 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,184.33	
26 24 16 00-0244	EA			400 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,547.75	
26 24 16 00-0245	EA			400 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,673.25	
26 24 16 00-0246	EA			400 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,813.26	
26 24 16 00-0247	EA			600 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,072.63	
26 24 16 00-0248	EA			600 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,287.16	
26 24 16 00-0249	EA			600 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,736.46	
26 24 16 00-0250				Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase Unassembled Panelboards <small>(26 24 16 00-0213)</small>		
26 24 16 00-0251	EA			100 Ampere Rating, 12 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	1,934.27	
26 24 16 00-0252	EA			100 Ampere Rating, 24 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,081.48	
26 24 16 00-0253	EA			100 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	2,277.24	
26 24 16 00-0254	EA			225 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,170.00	
26 24 16 00-0255	EA			225 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,347.30	
26 24 16 00-0256	EA			225 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	3,514.98	
26 24 16 00-0257	EA			400 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	5,262.79	
26 24 16 00-0258	EA			400 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	5,485.60	
26 24 16 00-0259	EA			400 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 240 Volt AC, 48 Volt DC, 4 Wire, 3 Phase, Unassembled Panelboard	5,676.74	
26 24 16 00-0260				480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboards <small>(26 24 16 00-0169)</small>		
				Note: As manufactured by Square D or equal.		

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0261			Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboards <small>(26 24 16 00-0260)</small>		
26 24 16 00-0262	EA		125 Ampere Rating, 12 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	1,134.03	
26 24 16 00-0263	EA		125 Ampere Rating, 18 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	1,244.04	
26 24 16 00-0264	EA		250 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	1,716.74	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0265	EA		250 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	1,913.69	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0266	EA		250 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,083.97	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0267	EA		400 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,077.07	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0268	EA		400 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,188.34	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0269	EA		400 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,376.99	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0270	EA		600 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,505.91	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0271	EA		600 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,686.00	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0272	EA		600 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,932.74	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0273			Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboards <small>(26 24 16 00-0260)</small>		
26 24 16 00-0274	EA		100 Ampere Rating, 12 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,327.43	
26 24 16 00-0275	EA		100 Ampere Rating, 18 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,400.93	
26 24 16 00-0276	EA		125 Ampere Rating, 18 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,606.35	
26 24 16 00-0277	EA		125 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,745.79	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0278	EA		125 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,022.16	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0279	EA		250 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,928.24	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0280	EA		250 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,100.80	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0281	EA		250 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,322.95	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0282	EA		400 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,459.28	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0283	EA		400 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,690.32	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0284	EA		400 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 1, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,900.13	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0285			Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboards <small>(26 24 16 00-0260)</small>		
26 24 16 00-0286	EA		125 Ampere Rating, 12 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	1,829.50	
26 24 16 00-0287	EA		125 Ampere Rating, 18 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	1,939.51	
26 24 16 00-0288	EA		250 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,395.75	
26 24 16 00-0289	EA		250 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,712.04	
26 24 16 00-0290	EA		250 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,868.61	
26 24 16 00-0291	EA		400 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,861.70	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0292 EA 400 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	2,952.40	
26 24 16 00-0293 EA 400 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,111.55	
26 24 16 00-0294 EA 600 Ampere Rating, 30 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,309.06	
26 24 16 00-0295 EA 600 Ampere Rating, 42 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,472.35	
26 24 16 00-0296 EA 600 Ampere Rating, 54 Circuit Capacity, Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,682.96	
26 24 16 00-0297 Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboards <small>(26 24 16 00-0260)</small>		
26 24 16 00-0298 EA 100 Ampere Rating, 12 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,171.05	
26 24 16 00-0299 EA 100 Ampere Rating, 18 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,244.55	
26 24 16 00-0300 EA 125 Ampere Rating, 18 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,291.53	
26 24 16 00-0301 EA 125 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,424.80	
26 24 16 00-0302 EA 125 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	3,820.51	
26 24 16 00-0303 EA 250 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,712.87	
26 24 16 00-0304 EA 250 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	4,864.86	
26 24 16 00-0305 EA 250 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	5,057.52	
26 24 16 00-0306 EA 400 Ampere Rating, 30 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	5,193.85	
26 24 16 00-0307 EA 400 Ampere Rating, 42 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	5,406.03	
26 24 16 00-0308 EA 400 Ampere Rating, 54 Circuit Capacity, Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 3 Wire, 1 Phase, Unassembled Panelboard	5,612.96	
26 24 16 00-0309 480Y/277 Volt AC, 4 Wire, 3 Phase, Unassembled Panelboards <small>(26 24 16 00-0169)</small>		
<i>Note: As manufactured by Square D or equal.</i>		
26 24 16 00-0310 Main Lugs, NEMA 1, 480Y/277 Volt AC, 4 Wire, 3 Phase, Unassembled Panelboards <small>(26 24 16 00-0309)</small>		
26 24 16 00-0311 EA 125 Ampere Rating, 12 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	1,180.66	
26 24 16 00-0312 EA 125 Ampere Rating, 18 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	1,291.37	
26 24 16 00-0313 EA 125 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	1,493.94	
26 24 16 00-0314 EA 250 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	1,785.36	
26 24 16 00-0315 EA 250 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	1,983.81	
26 24 16 00-0316 EA 250 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	2,152.78	
26 24 16 00-0317 EA 400 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	2,167.78	
26 24 16 00-0318 EA 400 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	2,300.82	
26 24 16 00-0319 EA 400 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	2,488.04	
26 24 16 00-0320 EA 600 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	2,617.21	
26 24 16 00-0321 EA 600 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	2,798.14	
26 24 16 00-0322 EA 600 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Lugs, Unassembled Panelboard	3,045.79	
26 24 16 00-0323 Main Breaker, NEMA 1, 480Y/277 Volt AC, 4 Wire, 3 Phase, Unassembled Panelboards <small>(26 24 16 00-0309)</small>		
26 24 16 00-0324 EA 100 Ampere Rating, 12 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	2,567.48	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 24 16 00-0325	EA		100 Ampere Rating, 18 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	2,641.67	
26 24 16 00-0326	EA		100 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	2,862.25	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0327	EA		125 Ampere Rating, 18 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	2,936.32	
26 24 16 00-0328	EA		125 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	3,076.35	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0329	EA		125 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	3,351.99	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0330	EA		250 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	4,315.31	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0331	EA		250 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	4,489.96	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0332	EA		250 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	4,709.76	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0333	EA		400 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	4,923.11	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	123.27	
26 24 16 00-0334	EA		400 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	5,156.38	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	210.53	
26 24 16 00-0335	EA		400 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 1, Main Breaker, Unassembled Panelboard	5,366.04	
			<i>For Door-In-Door (Hinged) Trim Front, Add</i>	269.07	
26 24 16 00-0336			Main Lugs, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 4 Wire, 3 Phase, Unassembled Panelboards <small>(26 24 16 00-0309)</small>		
26 24 16 00-0337	EA		125 Ampere Rating, 12 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	1,876.14	
26 24 16 00-0338	EA		125 Ampere Rating, 18 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	1,986.84	
26 24 16 00-0339	EA		125 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	2,179.12	
26 24 16 00-0340	EA		250 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	2,464.37	
26 24 16 00-0341	EA		250 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	2,782.16	
26 24 16 00-0342	EA		250 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	2,937.42	
26 24 16 00-0343	EA		400 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	2,954.47	
26 24 16 00-0344	EA		400 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	3,064.88	
26 24 16 00-0345	EA		400 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	3,222.61	
26 24 16 00-0346	EA		600 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	3,420.36	
26 24 16 00-0347	EA		600 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	3,584.14	
26 24 16 00-0348	EA		600 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Lugs, Unassembled Panelboard	3,794.76	
26 24 16 00-0349			Main Breaker, NEMA 3R, 5, Or 12, 480Y/277 Volt AC, 4 Wire, 3 Phase, Unassembled Panelboards <small>(26 24 16 00-0309)</small>		
26 24 16 00-0350	EA		100 Ampere Rating, 12 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	3,246.49	
26 24 16 00-0351	EA		100 Ampere Rating, 18 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	3,320.68	
26 24 16 00-0352	EA		100 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	3,660.60	
26 24 16 00-0353	EA		125 Ampere Rating, 18 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	3,621.51	
26 24 16 00-0354	EA		125 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	3,755.36	
26 24 16 00-0355	EA		125 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	4,150.35	
26 24 16 00-0356	EA		250 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	5,099.95	
26 24 16 00-0357	EA		250 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	5,254.02	
26 24 16 00-0358	EA		250 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	5,444.33	
26 24 16 00-0359	EA		400 Ampere Rating, 30 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard	5,657.67	



Electrical	26	26
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0360	EA		400 Ampere Rating, 42 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard.....	5,871.74	
26 24 16 00-0361	EA		400 Ampere Rating, 54 Circuit Capacity, 277/480 Volt, 4 Wire, 3 Phase, NEMA 3R, 5, 12, Main Breaker, Unassembled Panelboard.....	6,077.98	
26 24 16 00-0362			600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboards (26 24 16 00-0169) Note: Square D I-Line or equal.		
26 24 16 00-0363			Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboards (26 24 16 00-0362)		
26 24 16 00-0364	EA		400 Ampere Rating, 27" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	2,010.24	363.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	218.19	
26 24 16 00-0365	EA		400 Ampere Rating, 45" Breaker Mounted Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	2,354.04	363.53
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	218.13	
26 24 16 00-0366	EA		400 Ampere Rating, 63" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	2,612.94	363.53
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	218.13	
26 24 16 00-0367	EA		600 Ampere Rating, 27" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	2,980.58	597.01
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	358.21	
26 24 16 00-0368	EA		600 Ampere Rating, 45" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	3,180.96	597.01
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	358.21	
26 24 16 00-0369	EA		600 Ampere Rating, 63" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	3,400.84	597.01
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	358.21	
26 24 16 00-0370	EA		800 Ampere Rating, 27" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	3,674.31	793.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	476.16	
26 24 16 00-0371	EA		800 Ampere Rating, 45" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	3,867.12	795.98
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	477.62	
26 24 16 00-0372	EA		800 Ampere Rating, 63" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	3,945.62	793.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	476.16	
26 24 16 00-0373	EA		800 Ampere Rating, 99" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	4,581.32	793.64
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	476.16	
26 24 16 00-0374	EA		1,200 Ampere Rating, 27" Breaker Mounting Space, 600 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	5,970.91	1,194.03
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	716.42	
26 24 16 00-0375	EA		1,200 Ampere Rating, 45" Breaker Mounting Space, 600 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	6,403.58	1,194.03
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	716.42	
26 24 16 00-0376	EA		1,200 Ampere Rating, 63" Breaker Mounting Space, 600 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	6,757.34	1,194.03
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	716.42	
26 24 16 00-0377	EA		1,200 Ampere Rating, 99" Breaker Mounting Space, 600 Ampere Maximum Branch Breaker Size, Main Lugs, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	7,189.13	1,194.03
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	716.42	
26 24 16 00-0378			Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboards (26 24 16 00-0362)		
26 24 16 00-0379	EA		225 Ampere Rating, 36" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	3,884.84	371.34
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	222.80	
26 24 16 00-0380	EA		400 Ampere Rating, 27" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	5,099.95	421.17
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	252.72	
26 24 16 00-0381	EA		400 Ampere Rating, 45" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	5,349.98	421.17
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	252.72	
26 24 16 00-0382	EA		400 Ampere Rating, 81" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	6,085.87	421.17
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	252.72	
26 24 16 00-0383	EA		600 Ampere Rating, 36" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	7,937.47	690.41
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	414.27	
26 24 16 00-0384	EA		600 Ampere Rating, 72" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	8,350.77	692.30
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	415.37	
26 24 16 00-0385	EA		600 Ampere Rating, 72" Breaker Mounting Space, 600 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	8,691.10	690.41
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	414.27	
26 24 16 00-0386	EA		800 Ampere Rating, 36" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	10,035.83	923.00
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	553.83	
26 24 16 00-0387	EA		800 Ampere Rating, 72" Breaker Mounting Space, 250 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard.....	10,524.92	919.77
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	551.87	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0388	EA		800 Ampere Rating, 72" Breaker Mounting Space, 600 Ampere Maximum Branch Breaker Size, Main Breaker, NEMA 1, 600 Volt AC, 250 Volt DC, 3 Phase, Unassembled Panelboard..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11,012.56 551.87	919.77
26 24 16 00-0389			Residential Lighting And Power Panelboards (26 24 16 00-0001) See CSI section 26 28 16 13-0001 for circuit breakers.		
26 24 16 00-0390			Residential Type Unassembled Load Center (26 24 16 00-0389) Note: Interior box and cover, includes ground bar kit.		
26 24 16 00-0391			Main Lug Load Center, 3 Phase, 4 Wire, 208 Y/120 Volt AC (26 24 16 00-0390) Note: 3 Phase, 4 wire, 240/120 Volt AC Delta; 3 phase, 3 wire, 240 Volt AC Delta.		
26 24 16 00-0392	EA		60 Ampere Rating, 3 Circuit, Main Lug Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Unassembled Panelboard	231.61	67.26
26 24 16 00-0393	EA		125 Ampere Rating, 3 Circuit, Main Lug Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Unassembled Panelboard	416.99	73.37
26 24 16 00-0394			Main Lug Load Center, Single Phase, 3 Wire, 120/240 Volt, Rainproof (26 24 16 00-0390)		
26 24 16 00-0395	EA		40 Ampere Rating, 2 Circuit, Main Lug Load Center, 3 Wire 120/240 Volt, 1 Phase, Rainproof, Unassembled Panelboard	235.58	67.26
26 24 16 00-0396	EA		70 Ampere Rating, 4 Circuit, Main Lug Load Center, 3 Wire 120/240 Volt, 1 Phase, Rainproof, Unassembled Panelboard	262.86	73.37
26 24 16 00-0397	EA		100 Ampere Rating, 8 Circuit, Main Lug Load Center, 3 Wire 120/240 Volt, 1 Phase, Rainproof, Unassembled Panelboard	917.19	349.10
26 24 16 00-0398	EA		150 Ampere Rating, 30 Circuit, Main Lug Load Center, 3 Wire 120/240 Volt, 1 Phase, Rainproof, Unassembled Panelboard	2,080.25	794.81
26 24 16 00-0399			Main Lug Load Center, 3 Phase, 4 Wire, 208 Y/120 Volt AC (26 24 16 00-0390) Note: 3 Phase, 4 wire, 240/120 Volt AC Delta; 3 phase, 3 wire, 240 Volt AC Delta, Rainproof.		
26 24 16 00-0400	EA		60 Ampere Rating, 3 Circuit, Main Lug Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Rainproof, Unassembled Panelboard	292.09	67.26
26 24 16 00-0401	EA		125 Ampere Rating, 20 Circuit, Main Lug Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Rainproof, Unassembled Panelboard	2,012.58	733.80
26 24 16 00-0402			Main Breaker Load Center, Single Phase, 3 Wire, 120/240 Volt (26 24 16 00-0390)		
26 24 16 00-0403	EA		125 Ampere Rating, 24 Circuit, Main Breaker Load Center, 3 Wire, 120/240 Volt, Single Phase, Unassembled Panelboard	2,167.92	733.80
26 24 16 00-0404	EA		150 Ampere Rating, 30 Circuit, Main Breaker Load Center, 3 Wire, 120/240 Volt, Single Phase, Unassembled Panelboard	2,353.26	794.81
26 24 16 00-0405	EA		300 Ampere Rating, 42 Circuit, Main Breaker Load Center, 3 Wire, 120/240 Volt, Single Phase, Unassembled Panelboard	8,345.75	1,222.79
26 24 16 00-0406			Main Breaker Load Center, 3 Phase, 4 Wire, 208 Y/120 Volt AC (26 24 16 00-0390) Note: 3 Phase, 4 wire, 240/120 Volt AC Delta; 3 phase, 3 wire, 240 V Delta.		
26 24 16 00-0407	EA		125 Ampere Rating, 30 Circuit, Main Breaker Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Unassembled Panelboard	3,171.49	733.80
26 24 16 00-0408	EA		150 Ampere Rating, 40 Circuit, Main Breaker Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Unassembled Panelboard	3,459.65	794.81
26 24 16 00-0409	EA		300 Ampere Rating, 42 Circuit, Main Breaker Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Unassembled Panelboard	9,190.19	1,222.79
26 24 16 00-0410			Main Breaker Load Center, Single Phase, 3 Wire, 120/240 Volt, Rainproof (26 24 16 00-0390)		
26 24 16 00-0411	EA		125 Ampere Rating, 24 Circuit, Main Breaker Load Center, 3 Wire 120/240 Volt, 1 Phase, Rainproof, Unassembled Panelboard	2,280.23	733.80
26 24 16 00-0412	EA		150 Ampere Rating, 30 Circuit, Main Breaker Load Center, 3 Wire 120/240 Volt, 1 Phase, Rainproof, Unassembled Panelboard	2,545.06	794.81
26 24 16 00-0413			Main Breaker Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC (26 24 16 00-0390) Note: 3 Phase, 4 wire, 240/120 Volt AC Delta; 3 phase, 3 wire, 240 Volt AC Delta, Rainproof.		
26 24 16 00-0414	EA		125 Ampere Rating, 30 Circuit, Main Breaker Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Rainproof, Unassembled Panelboard	3,357.76	733.80
26 24 16 00-0415	EA		155 Ampere Rating, 30 Circuit, Main Breaker Load Center, 3 Phase 4 Wire, 208 Y/120 Volt AC, 3 Phase 4 Wire 240/120 Volt AC Delta, 3 Phase 3 Wire 240 Volt AC Delta, Rainproof, Unassembled Panelboard	3,479.86	794.81
26 24 16 00-0416			Residential Type Assembled Load Center (26 24 16 00-0389)		
26 24 16 00-0417			Main Lug Load Center, 4 Wire, 20 Amperes, 120/208 Volt (26 24 16 00-0416) Note: Includes 1 pole plug-in breaker.		
26 24 16 00-0418	EA		125 Ampere Rating, Main Lugs, Indoor, 12 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,118.02	407.80
26 24 16 00-0419	EA		125 Ampere Rating, Main Lugs, Indoor, 18 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,666.87	611.40
26 24 16 00-0420	EA		125 Ampere Rating, Main Lugs, Rainproof, 12 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,175.04	407.80

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0421 EA 125 Ampere Rating, Main Lugs, Rainproof, 18 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,718.70	611.40
26 24 16 00-0422 EA 200 Ampere Rating, Main Lugs, Indoor, 24 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,109.93	752.63
26 24 16 00-0423 EA 200 Ampere Rating, Main Lugs, Indoor, 30 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers.....	2,304.28	815.24
26 24 16 00-0424 EA 200 Ampere Rating, Main Lugs, Indoor, 36 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers.....	2,821.06	978.60
26 24 16 00-0425 EA 200 Ampere Rating, Main Lugs, Indoor, 42 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers.....	3,387.31	1,222.79
26 24 16 00-0426 EA 200 Ampere Rating, Main Lugs, Rainproof, 24 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,170.41	752.63
26 24 16 00-0427 EA 200 Ampere Rating, Main Lugs, Rainproof, 30 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,372.53	814.75
26 24 16 00-0428 EA 200 Ampere Rating, Main Lugs, Rainproof, 36 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	3,053.08	977.86
26 24 16 00-0429 EA 200 Ampere Rating, Main Lugs, Rainproof, 42 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	3,620.58	1,222.79
26 24 16 00-0430 EA 400 Ampere Rating, Main Lugs, Indoor, 42 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers.....	4,142.85	1,358.65
26 24 16 00-0431 EA 400 Ampere Rating, Main Lugs, Rainproof, 42 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	4,350.20	1,358.65
26 24 16 00-0432 Main Breaker Load Center, 3 Wire, 20 Amperes, 120/240 Volt, 1 Phase (26 24 16 00-0416) Note: Includes 1 pole plug-in breaker.		
26 24 16 00-0433 EA 125 Ampere Rating, Main Breaker, Indoor, 12 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,111.10	407.80
26 24 16 00-0434 EA 125 Ampere Rating, Main Breaker, Indoor, 18 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,642.68	611.40
26 24 16 00-0435 EA 200 Ampere Rating, Main Breaker, Indoor, 20 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,900.86	652.36
26 24 16 00-0436 EA 200 Ampere Rating, Main Breaker, Indoor, 24 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,179.79	753.00
26 24 16 00-0437 EA 200 Ampere Rating, Main Breaker, Indoor, 30 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,399.32	815.24
26 24 16 00-0438 EA 200 Ampere Rating, Main Breaker, Indoor, 40 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	3,176.43	1,087.06
26 24 16 00-0439 EA 200 Ampere Rating, Main Breaker, Rainproof, 20 Circuits, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	1,918.14	652.36
26 24 16 00-0440 EA 200 Ampere Rating, Main Breaker, Rainproof, 24 Circuits, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,213.61	752.63
26 24 16 00-0441 EA 200 Ampere Rating, Main Breaker, Rainproof, 30 Circuits, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,407.09	814.75
26 24 16 00-0442 EA 200 Ampere Rating, Main Breaker, Rainproof, 40 Circuits, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	3,081.40	1,087.06
26 24 16 00-0443 EA 400 Ampere Rating, Main Breaker, Indoor, 42 Circuit, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	5,870.77	1,358.65
26 24 16 00-0444 EA 400 Ampere Rating, Main Breaker, Rainproof, 42 Circuits, 3 Wire, 120/240 Volt, 1 Phase, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	6,216.35	1,358.65
26 24 16 00-0445 Main Breaker Load Center, 4 Wire, 20 Amperes, 120/208 Volt (26 24 16 00-0416) Note: Includes 1 pole plug-in breaker.		
26 24 16 00-0446 EA 200 Ampere Rating, Main Breaker, Indoor, 30 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,883.13	815.24
26 24 16 00-0447 EA 200 Ampere Rating, Main Breaker, Indoor, 42 Circuit, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	3,940.24	1,222.79
26 24 16 00-0448 EA 200 Ampere Rating, Main Breaker, Rainproof, 30 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	2,985.94	814.75
26 24 16 00-0449 EA 200 Ampere Rating, Main Breaker, Rainproof, 42 Circuits, 4 Wire, 120/208 Volt, Assembled Panelboard With 20 Ampere, 1 Pole Plug-In Breakers	4,043.92	1,222.79
26 24 16 00-0450 Panel Mounted Accessories And Fuseholders (26 24 16 00-0001)		
26 24 16 00-0451 Midget Finger-Safe Fuse Holders (26 24 16 00-0450) Note: 30 Amp capacity. Excludes fuse.		
26 24 16 00-0452 EA 1 Pole Midget Finger-Safe Fuse Holder.....	78.30	22.01
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.67	
26 24 16 00-0453 EA 1 Pole With Indicator Midget Finger-Safe Fuse Holder.....	92.23	22.01
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.67	
26 24 16 00-0454 EA 2 Pole Midget Finger-Safe Fuse Holder.....	126.31	33.01
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	22.01	
26 24 16 00-0455 EA 2 Pole With Indicators Midget Finger-Safe Fuse Holder.....	162.66	33.01
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	22.01	
26 24 16 00-0456 EA 3 Pole Midget Finger-Safe Fuse Holder.....	185.58	44.02
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.35	
26 24 16 00-0457 EA 3 Pole With Indicators Midget Finger-Safe Fuse Holder	233.85	44.02
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.35	
26 24 16 00-0458 EA 3 Pole With 4th Neutral Pole Midget Finger-Safe Fuse Holder	274.23	44.02
Note: With indicators.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.35	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 16 00-0459	EA		3 Pole With 4th Neutral Pole Midget Finger-Safe Fuse Holder.....	220.70	44.02
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 24 16 00-0460	EA		4 Pole Midget Finger-Safe Fuse Holder.....	233.73	55.03
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 24 16 00-0461	EA		4 Pole With Indicator Midget Finger-Safe Fuse Holder.....	286.74	55.03
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 24 16 00-0462	EA		12 To 24 Volt DC Midget Finger-Safe Fuse Holder	92.27	22.01
			Note: With indicator.		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 24 16 00-0463	EA		20 To 24 Volt DC Midget Finger-Safe Fuse Holder	99.67	22.01
			Note: With indicator.		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 24 16 00-0464	EA		35 To 48 Volt DC Midget Finger-Safe Fuse Holder	93.64	22.01
			Note: With indicator.		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 24 16 00-0465			Removal And Reinstallation Of Panelboards <small>(26 24 16 00-0001)</small>		
			Note: Includes storage, cleaning and supply materials.		
26 24 16 00-0466	EA		Removal And Reinstallation Of Up To 42 Circuit Capacity Panelboards With Breakers.....	1,535.46	
			Note: Includes removal and reinstallation of main wiring to panelboard.		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	458.55	
26 24 16 00-0467	EA		Removal And Reinstallation Of Breaker, 1-2-3 Pole, Any Amperage	81.49	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23.84	
26 24 16 00-0468	EA		Panelboard Filler Plate, Fits 1" Opening.....	5.83	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1.15	
26 24 16 00-0469			Combination Transformer/Panelboard <small>(26 24 16)</small>		
26 24 16 00-0470			Mini Power-Zone™ Unit Substation <small>(26 24 16 00-0469)</small>		
			Note: 480 Volt Primary, 208 Star/120 Volt Secondary Voltage, NQ Paneboard Interior, Interrupt Rating 18 kAIR, Type NEMA 3R Enclosure, (2) 5 Percent Fcbr Taps; QOB360 Secondary Main Breaker Type; FAL34040 Primary Main Breaker Type		
26 24 16 00-0471	EA		15 KVA, 480 Volt Primary, 208Y120 Secondary, 3 Phase, NEMA 3R Enclosure, Mini Power-Zone™ Unit Substation (Square D MPZB15T2F).....	28,196.56	996.26
			Note: 24 single pole circuit capacity		
26 24 16 00-0472	EA		22.5 KVA, 480 Volt Primary, 208Y120 Secondary, 3 Phase, NEMA 3R Enclosure, Mini Power-Zone™ Unit Substation (Square D MPZB22T2F).....	34,629.50	1,113.06
			Note: 24 single pole circuit capacity		
26 24 16 00-0473	EA		30 KVA, 480 Volt Primary, 208Y120 Secondary, 3 Phase, NEMA 3R Enclosure, Mini Power-Zone™ Unit Substation (Square D MPZB30T2F).....	42,174.92	1,222.99
			Note: 24 single pole circuit capacity		
26 24 16 00-0474			Mini Power-Zone™ Unit Substation <small>(26 24 16 00-0469)</small>		
			Note: 480 Volt Primary, 208 Star/120 Volt Secondary Voltage, NQ Paneboard Interior, Interrupt Rating 25 kAIR, Type NEMA 3R Enclosure, (2) 5 Percent Fcbr Taps; QOB360 Secondary Main Breaker Type; FAL34040 Primary Main Breaker Type		
26 24 16 00-0475	EA		15 KVA, 480 Volt Primary, 208Y120 Secondary, 3 Phase, NEMA 3R Enclosure, Mini Power-Zone™ Unit Substation (Square D MPZB15T2F25K).....	35,580.25	996.26
			Note: 24 single pole circuit capacity		
26 24 16 00-0476	EA		22.5 KVA, 480 Volt Primary, 208Y120 Secondary, 3 Phase, NEMA 3R Enclosure, Mini Power-Zone™ Unit Substation (Square D MPZB22T2F25K).....	41,123.51	1,113.06
			Note: 24 single pole circuit capacity		
26 24 16 00-0477	EA		30 KVA, 480 Volt Primary, 208Y120 Secondary, 3 Phase, NEMA 3R Enclosure, Mini Power-Zone™ Unit Substation (Square D MPZB30T2F25K).....	46,881.24	1,222.99
			Note: 24 single pole circuit capacity		
26 24 19			Motor-Control Centers <small>(26 24)</small>		
26 24 19 00-0001			Combination Starters With Molded Case Circuit Breakers <small>(26 24 19)</small>		
			Note: Includes NEMA I enclosure of indoor installation, vertical free standing floor mounted sections (90" high x 20" wide x 16" o 20" Deep), fully factory assembled and wired internally.		
26 24 19 00-0002			230 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small>		
			Note: 1-Speed non-reversing.		
26 24 19 00-0003	EA		230 Volt, Full Volt, 1 Speed, Non-Reversing, 7-1/2 HP Combination With Molded Case Circuit	2,382.62	111.72
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0004	EA		230 Volt, Full Volt, 1 Speed, Non-Reversing, 15 HP Combination With Molded Case Circuit	2,820.67	117.31
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	70.38	
26 24 19 00-0005	EA		230 Volt, Full Volt, 1 Speed, Non-Reversing, 30 HP Combination With Molded Case Circuit	4,193.75	122.89
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.73	
26 24 19 00-0006	EA		230 Volt, Full Volt, 1 Speed, Non-Reversing, 50 HP Combination With Molded Case Circuit	7,596.92	145.24
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.14	
26 24 19 00-0007	EA		230 Volt, Full Volt, 1 Speed, Non-Reversing, 100 HP Combination With Molded Case Circuit	15,291.37	167.57
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	100.55	
26 24 19 00-0008	EA		230 Volt, Full Volt, 1 Speed, Non-Reversing, 200 HP Combination With Molded Case Circuit	25,722.46	223.43
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	134.06	
26 24 19 00-0009			480 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small>		
			Note: 1-Speed non-reversing.		



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Switchboards and Panelboards	26 24	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0010	EA		480 Volt, Full Volt, 1 Speed, Non-Reversing, 10 HP Combination With Molded Case Circuit .....2,382.62 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 67.03		111.72
26 24 19 00-0011	EA		480 Volt, Full Volt, 1 Speed, Non-Reversing, 25 HP Combination With Molded Case Circuit .....2,820.67 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 70.38		117.31
26 24 19 00-0012	EA		480 Volt, Full Volt, 1 Speed, Non-Reversing, 50 HP Combination With Molded Case Circuit .....4,193.75 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 73.73		122.89
26 24 19 00-0013	EA		480 Volt, Full Volt, 1 Speed, Non-Reversing, 100 HP Combination With Molded Case Circuit .....7,596.92 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 87.14		145.24
26 24 19 00-0014	EA		480 Volt, Full Volt, 1 Speed, Non-Reversing, 200 HP Combination With Molded Case Circuit .....15,291.37 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 100.55		167.57
26 24 19 00-0015	EA		480 Volt, Full Volt, 1 Speed, Non-Reversing, 400 HP Combination With Molded Case Circuit .....25,722.46 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 134.06		223.43
26 24 19 00-0016			230 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small> Note: 1-Speed reversing.		
26 24 19 00-0017	EA		230 Volt, Full Volt, 1 Speed, Reversing, 7-1/2 HP Combination With Molded Case Circuit.....3,448.66 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 67.03		111.72
26 24 19 00-0018	EA		230 Volt, Full Volt, 1 Speed, Reversing, 15 HP Combination With Molded Case Circuit.....4,593.64 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 70.38		117.31
26 24 19 00-0019	EA		230 Volt, Full Volt, 1 Speed, Reversing, 30 HP Combination With Molded Case Circuit.....6,581.06 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 73.73		122.89
26 24 19 00-0020	EA		230 Volt, Full Volt, 1 Speed, Reversing, 50 HP Combination With Molded Case Circuit.....11,508.75 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 87.14		145.24
26 24 19 00-0021	EA		230 Volt, Full Volt, 1 Speed, Reversing, 100 HP Combination With Molded Case Circuit.....22,643.00 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 100.55		167.57
26 24 19 00-0022	EA		230 Volt, Full Volt, 1 Speed, Reversing, 200 HP Combination With Molded Case Circuit.....39,016.38 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 134.06		223.43
26 24 19 00-0023			480 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small> Note: 1-Speed reversing.		
26 24 19 00-0024	EA		480 Volt, Full Volt, 1 Speed, Reversing, 10 HP Combination With Molded Case Circuit.....3,448.66 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 67.03		111.72
26 24 19 00-0025	EA		480 Volt, Full Volt, 1 Speed, Reversing, 25 HP Combination With Molded Case Circuit.....4,593.64 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 70.38		117.31
26 24 19 00-0026	EA		480 Volt, Full Volt, 1 Speed, Reversing, 50 HP Combination With Molded Case Circuit.....6,581.06 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 73.73		122.89
26 24 19 00-0027	EA		480 Volt, Full Volt, 1 Speed, Reversing, 100 HP Combination With Molded Case Circuit.....11,508.75 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 87.14		145.24
26 24 19 00-0028	EA		480 Volt, Full Volt, 1 Speed, Reversing, 200 HP Combination With Molded Case Circuit.....22,643.00 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 100.55		167.57
26 24 19 00-0029	EA		480 Volt, Full Volt, 1 Speed, Reversing, 400 HP Combination With Molded Case Circuit.....39,016.38 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 134.06		223.43
26 24 19 00-0030			230 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small> Note: 2-Speed non-reversing, 2 wind.		
26 24 19 00-0031	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 7-1/2 HP Combination With Molded Case Circuit.....4,199.30 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 107.24		178.75
26 24 19 00-0032	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 15 HP Combination With Molded Case Circuit.....5,771.04 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 113.95		189.92
26 24 19 00-0033	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 30 HP Combination With Molded Case Circuit.....8,490.08 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 120.65		201.09
26 24 19 00-0034	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 50 HP Combination With Molded Case Circuit.....15,161.29 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 137.41		229.02
26 24 19 00-0035	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 100 HP Combination With Molded Case Circuit.....25,107.19 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 160.88		268.11
26 24 19 00-0036			480 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small> Note: 2-Speed non-reversing, 2 wind.		
26 24 19 00-0037	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 10 HP Combination With Molded Case Circuit.....4,199.30 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 107.24		178.75
26 24 19 00-0038	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 25 HP Combination With Molded Case Circuit.....5,771.04 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 113.95		189.92
26 24 19 00-0039	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 50 HP Combination With Molded Case Circuit.....8,490.08 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 120.65		201.09
26 24 19 00-0040	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 100 HP Combination With Molded Case Circuit.....15,161.29 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 137.41		229.02
26 24 19 00-0041	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 200 HP Combination With Molded Case Circuit.....25,107.19 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 160.88		268.11
26 24 19 00-0042			230 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small> Note: 2-Speed non-reversing, 2 wind.		
26 24 19 00-0043	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 7-1/2 HP Combination With Molded Case Circuit.....4,842.20 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 67.03		111.72
26 24 19 00-0044	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 15 HP Combination With Molded Case Circuit.....7,202.28 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 70.38		117.31
26 24 19 00-0045	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 30 HP Combination With Molded Case Circuit.....9,855.98 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 73.73		122.89
26 24 19 00-0046	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 50 HP Combination With Molded Case Circuit.....18,508.05 <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i> 87.14		145.24

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 24 Switchboards and Panelboards



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0047	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 100 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32,058.96 100.55	167.57
26 24 19 00-0048			480 Volt Combination With Molded Case Circuit, Full Volt <small>(26 24 19 00-0001)</small> Note: 2-Speed non-reversing, 1 wind.		
26 24 19 00-0049	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 10 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,842.20 67.03	111.72
26 24 19 00-0050	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 25 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,202.28 70.38	117.31
26 24 19 00-0051	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 50 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9,855.98 73.73	122.89
26 24 19 00-0052	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 100 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,508.05 87.14	145.24
26 24 19 00-0053	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 200 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	32,058.96 100.55	167.57
26 24 19 00-0054			230 Volt Combination With Molded Case Circuit <small>(26 24 19 00-0001)</small> Note: Reducing volt, auto-transformer.		
26 24 19 00-0055	EA		230 Volt, Reduced Volt, Auto Transformer, 15 HP Combination With Molded Case Circuit	7,157.11	117.31
26 24 19 00-0056	EA		230 Volt, Reduced Volt, Auto Transformer, 30 HP Combination With Molded Case Circuit	10,953.51	128.47
26 24 19 00-0057	EA		230 Volt, Reduced Volt, Auto Transformer, 50 HP Combination With Molded Case Circuit	18,456.10	145.24
26 24 19 00-0058	EA		230 Volt, Reduced Volt, Auto Transformer, 100 HP Combination With Molded Case Circuit	28,544.63	167.57
26 24 19 00-0059	EA		230 Volt, Reduced Volt, Auto Transformer, 200 HP Combination With Molded Case Circuit	48,827.59	223.43
26 24 19 00-0060			480 Volt Combination With Molded Case Circuit <small>(26 24 19 00-0001)</small> Note: Reducing volt, auto-transformer.		
26 24 19 00-0061	EA		480 Volt, Reduced Volt, Auto Transformer, 25 HP Combination With Molded Case Circuit	7,157.11	117.31
26 24 19 00-0062	EA		480 Volt, Reduced Volt, Auto Transformer, 50 HP Combination With Molded Case Circuit	10,953.51	128.47
26 24 19 00-0063	EA		480 Volt, Reduced Volt, Auto Transformer, 100 HP Combination With Molded Case Circuit	18,456.10	145.24
26 24 19 00-0064	EA		480 Volt, Reduced Volt, Auto Transformer, 200 HP Combination With Molded Case Circuit	28,544.63	167.57
26 24 19 00-0065	EA		480 Volt, Reduced Volt, Auto Transformer, 400 HP Combination With Molded Case Circuit	48,827.59	223.43
26 24 19 00-0066			230 Volt Combination With Molded Case Circuit <small>(26 24 19 00-0001)</small> Note: Reducing volt, part winding.		
26 24 19 00-0067	EA		230 Volt, Reduced Volt, Part Winding Starters, 10 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,897.20 107.24	178.75
26 24 19 00-0068	EA		230 Volt, Reduced Volt, Part Winding Starters, 25 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,324.01 124.00	206.68
26 24 19 00-0069	EA		230 Volt, Reduced Volt, Part Winding Starters, 50 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11,107.16 137.41	229.02
26 24 19 00-0070	EA		230 Volt, Reduced Volt, Part Winding Starters, 75 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,920.73 167.58	279.29
26 24 19 00-0071	EA		230 Volt, Reduced Volt, Part Winding Starters, 150 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25,990.61 214.50	357.49
26 24 19 00-0072			480 Volt Combination With Molded Case Circuit <small>(26 24 19 00-0001)</small> Note: Reducing volt, part winding.		
26 24 19 00-0073	EA		480 Volt, Reduced Volt, Part Winding Starters, 15 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,897.20 107.24	178.75
26 24 19 00-0074	EA		480 Volt, Reduced Volt, Part Winding Starters, 40 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,324.01 124.00	206.68
26 24 19 00-0075	EA		480 Volt, Reduced Volt, Part Winding Starters, 75 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11,107.16 137.41	229.02
26 24 19 00-0076	EA		480 Volt, Reduced Volt, Part Winding Starters, 150 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,920.73 167.58	279.29
26 24 19 00-0077	EA		480 Volt, Reduced Volt, Part Winding Starters, 350 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25,990.61 214.50	357.49
26 24 19 00-0078			230 Volt Combination With Molded Case Circuit <small>(26 24 19 00-0001)</small> Note: Reducing volt, energy saver.		
26 24 19 00-0079	EA		230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 7-1/2 HP Combination With Molded Case Circuit	20,179.39	145.24
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.14	
26 24 19 00-0080	EA		230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 15 HP Combination With Molded Case Circuit	21,409.57	178.75
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	107.24	
26 24 19 00-0081	EA		230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 30 HP Combination With Molded Case Circuit	23,642.68	206.68
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	124.00	
26 24 19 00-0082	EA		230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 50 HP Combination With Molded Case Circuit	35,788.77	229.02
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	137.41	
26 24 19 00-0083	EA		230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 100 HP Combination With Molded Case Circuit	48,806.06	279.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	167.58	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0084 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 200 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66,231.47 214.50	357.49
26 24 19 00-0085 480 Volt Combination With Molded Case Circuit <small>(26 24 19 00-0001)</small> Note: Reducing volt, energy saver.		
26 24 19 00-0086 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 10 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20,179.39 87.14	145.24
26 24 19 00-0087 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 25 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21,409.57 107.24	178.75
26 24 19 00-0088 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 50 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	23,642.68 124.00	206.68
26 24 19 00-0089 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 100 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	35,788.77 137.41	229.02
26 24 19 00-0090 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 200 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	48,806.06 167.58	279.29
26 24 19 00-0091 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 400 HP Combination With Molded Case Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66,231.47 214.50	357.49
26 24 19 00-0092 Combination Starters With Current Limiting Circuit Breakers <small>(26 24 19)</small> Note: Includes NEMA I enclosure of indoor installation, vertical free standing floor mounted sections (90" high x 20" wide x 16" to 20" deep), fully factory assembled and wired internally.		
26 24 19 00-0093 230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 1-speed non-reversing.		
26 24 19 00-0094 EA 230 Volt, Full Volt, 1 Speed, Non-Reversing, 7-1/2 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,184.41 67.03	111.72
26 24 19 00-0095 EA 230 Volt, Full Volt, 1 Speed, Non-Reversing, 15 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,622.46 70.38	117.31
26 24 19 00-0096 EA 230 Volt, Full Volt, 1 Speed, Non-Reversing, 30 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,596.32 73.73	122.89
26 24 19 00-0097 EA 230 Volt, Full Volt, 1 Speed, Non-Reversing, 50 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10,304.94 87.14	145.24
26 24 19 00-0098 EA 230 Volt, Full Volt, 1 Speed, Non-Reversing, 100 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,439.81 100.55	167.57
26 24 19 00-0099 EA 230 Volt, Full Volt, 1 Speed, Non-Reversing, 200 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30,052.13 134.06	223.43
26 24 19 00-0100 480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 1-speed non-reversing.		
26 24 19 00-0101 EA 480 Volt, Full Volt, 1 Speed, Non-Reversing, 10 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,184.41 67.03	111.72
26 24 19 00-0102 EA 480 Volt, Full Volt, 1 Speed, Non-Reversing, 25 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,622.46 70.38	117.31
26 24 19 00-0103 EA 480 Volt, Full Volt, 1 Speed, Non-Reversing, 50 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,596.32 73.73	122.89
26 24 19 00-0104 EA 480 Volt, Full Volt, 1 Speed, Non-Reversing, 100 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	10,304.94 87.14	145.24
26 24 19 00-0105 EA 480 Volt, Full Volt, 1 Speed, Non-Reversing, 200 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18,439.81 100.55	167.57
26 24 19 00-0106 EA 480 Volt, Full Volt, 1 Speed, Non-Reversing, 400 HP Combination Starters With Current Limiting Circuit..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	30,052.13 134.06	223.43
26 24 19 00-0107 230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 1-speed reversing.		
26 24 19 00-0108 EA 230 Volt, Full Volt, 1 Speed, Reversing, 7-1/2 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,243.68 67.03	111.72
26 24 19 00-0109 EA 230 Volt, Full Volt, 1 Speed, Reversing, 15 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,379.62 70.38	117.31
26 24 19 00-0110 EA 230 Volt, Full Volt, 1 Speed, Reversing, 30 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,952.00 73.73	122.89
26 24 19 00-0111 EA 230 Volt, Full Volt, 1 Speed, Reversing, 50 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14,180.64 87.14	145.24
26 24 19 00-0112 EA 230 Volt, Full Volt, 1 Speed, Reversing, 100 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25,728.20 100.55	167.57
26 24 19 00-0113 480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 1-speed reversing.		
26 24 19 00-0114 EA 480 Volt, Full Volt, 1 Speed, Reversing, 10 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,243.68 67.03	111.72
26 24 19 00-0115 EA 480 Volt, Full Volt, 1 Speed, Reversing, 25 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,379.62 70.38	117.31

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 24 Switchboards and Panelboards



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0116	EA		480 Volt, Full Volt, 1 Speed, Reversing, 50 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7,952.00 73.73	122.89
26 24 19 00-0117	EA		480 Volt, Full Volt, 1 Speed, Reversing, 100 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14,180.64 87.14	145.24
26 24 19 00-0118	EA		480 Volt, Full Volt, 1 Speed, Reversing, 200 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	25,728.20 100.55	167.57
26 24 19 00-0119			230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 2-speed non-reversing, 2 wind.		
26 24 19 00-0120	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 7-1/2 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,980.76 107.24	178.75
26 24 19 00-0121	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 15 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,541.21 113.95	189.92
26 24 19 00-0122	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 30 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9,838.45 120.65	201.09
26 24 19 00-0123	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 50 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17,801.55 137.41	229.02
26 24 19 00-0124	EA		230 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 100 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	28,167.55 160.88	268.11
26 24 19 00-0125			480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 2-speed non-reversing, 2 wind.		
26 24 19 00-0126	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 10 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,980.76 107.24	178.75
26 24 19 00-0127	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 25 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	6,541.21 113.95	189.92
26 24 19 00-0128	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 50 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9,838.45 120.65	201.09
26 24 19 00-0129	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 100 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	17,801.55 137.41	229.02
26 24 19 00-0130	EA		480 Volt, Full Volt, 2 Speed, 2 Wind Starter, Non-Reverse, 200 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	28,167.55 160.88	268.11
26 24 19 00-0131			230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 2-speed non-reversing, 1 wind.		
26 24 19 00-0132	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 7-1/2 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,735.38 100.55	167.57
26 24 19 00-0133	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 15 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8,081.77 107.24	178.75
26 24 19 00-0134	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 30 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11,331.62 113.95	189.92
26 24 19 00-0135	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 50 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21,261.92 130.71	217.85
26 24 19 00-0136	EA		230 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 100 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	35,237.09 154.17	256.95
26 24 19 00-0137			480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Full volt, 2-speed non-reversing, 1 wind.		
26 24 19 00-0138	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 10 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,735.38 100.55	167.57
26 24 19 00-0139	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 25 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	8,081.77 107.24	178.75
26 24 19 00-0140	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 50 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11,331.62 113.95	189.92
26 24 19 00-0141	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 100 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	21,261.92 130.71	217.85
26 24 19 00-0142	EA		480 Volt, Full Volt, 2 Speed, 1 Wind Starter, Non-Reverse, 200 HP Combination Starters With Current Limiting Circuit <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	35,237.09 154.17	256.95



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Switchboards and Panelboards	26 24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0143 230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Reduced volt, auto-transformer.		
26 24 19 00-0144 EA 230 Volt, Reduced Volt, Auto Transformer, 15 HP Combination Starters With Current Limiting Circuit	7,915.99	117.31
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	70.38	
26 24 19 00-0145 EA 230 Volt, Reduced Volt, Auto Transformer, 30 HP Combination Starters With Current Limiting Circuit	12,742.30	128.47
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	77.09	
26 24 19 00-0146 EA 230 Volt, Reduced Volt, Auto Transformer, 50 HP Combination Starters With Current Limiting Circuit	21,530.01	145.24
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0147 EA 230 Volt, Reduced Volt, Auto Transformer, 100 HP Combination Starters With Current Limiting Circuit	32,612.31	167.57
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	100.55	
26 24 19 00-0148 EA 230 Volt, Reduced Volt, Auto Transformer, 200 HP Combination Starters With Current Limiting Circuit	53,654.14	223.43
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	134.06	
26 24 19 00-0149 480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Reduced volt, auto-transformer.		
26 24 19 00-0150 EA 480 Volt, Reduced Volt, Auto Transformer, 25 HP Combination Starters With Current Limiting Circuit	7,915.99	117.31
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	70.38	
26 24 19 00-0151 EA 480 Volt, Reduced Volt, Auto Transformer, 50 HP Combination Starters With Current Limiting Circuit	12,742.30	128.47
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	77.09	
26 24 19 00-0152 EA 480 Volt, Reduced Volt, Auto Transformer, 100 HP Combination Starters With Current Limiting Circuit	21,530.01	145.24
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0153 EA 480 Volt, Reduced Volt, Auto Transformer, 200 HP Combination Starters With Current Limiting Circuit	32,612.31	167.57
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	100.55	
26 24 19 00-0154 EA 480 Volt, Reduced Volt, Auto Transformer, 400 HP Combination Starters With Current Limiting Circuit	53,654.14	223.43
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	134.06	
26 24 19 00-0155 230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Reduced volt, part winding.		
26 24 19 00-0156 EA 230 Volt, Reduced Volt, Part Winding Starters, 10 HP Combination Starters With Current Limiting Circuit	5,678.66	178.75
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	107.24	
26 24 19 00-0157 EA 230 Volt, Reduced Volt, Part Winding Starters, 25 HP Combination Starters With Current Limiting Circuit	7,089.66	206.68
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	124.00	
26 24 19 00-0158 EA 230 Volt, Reduced Volt, Part Winding Starters, 50 HP Combination Starters With Current Limiting Circuit	12,446.49	229.02
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	137.41	
26 24 19 00-0159 EA 230 Volt, Reduced Volt, Part Winding Starters, 75 HP Combination Starters With Current Limiting Circuit	22,033.03	279.29
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	167.58	
26 24 19 00-0160 EA 230 Volt, Reduced Volt, Part Winding Starters, 150 HP Combination Starters With Current Limiting Circuit	32,499.80	357.49
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	214.50	
26 24 19 00-0161 480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Reduced volt, part winding.		
26 24 19 00-0162 EA 480 Volt, Reduced Volt, Part Winding Starters, 15 HP Combination Starters With Current Limiting Circuit	5,678.66	178.75
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	107.24	
26 24 19 00-0163 EA 480 Volt, Reduced Volt, Part Winding Starters, 40 HP Combination Starters With Current Limiting Circuit	7,089.66	206.68
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	124.00	
26 24 19 00-0164 EA 480 Volt, Reduced Volt, Part Winding Starters, 75 HP Combination Starters With Current Limiting Circuit	12,446.49	229.02
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	137.41	
26 24 19 00-0165 EA 480 Volt, Reduced Volt, Part Winding Starters, 150 HP Combination Starters With Current Limiting Circuit	22,033.03	279.29
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	167.58	
26 24 19 00-0166 EA 480 Volt, Reduced Volt, Part Winding Starters, 350 HP Combination Starters With Current Limiting Circuit	32,499.80	357.49
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	214.50	
26 24 19 00-0167 230 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Reduced volt, energy saving		
26 24 19 00-0168 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 7.5 HP Combination Starters With Current Limiting Circuit	20,827.59	145.24
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0169 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 15 HP Combination Starters With Current Limiting Circuit	22,051.00	178.75
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	107.24	
26 24 19 00-0170 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 30 HP Combination Starters With Current Limiting Circuit	24,261.53	206.68
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	124.00	
26 24 19 00-0171 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 50 HP Combination Starters With Current Limiting Circuit	36,301.46	229.02
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	137.41	
26 24 19 00-0172 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 100 HP Combination Starters With Current Limiting Circuit	49,203.57	279.29
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	167.58	
26 24 19 00-0173 EA 230 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 200 HP Combination Starters With Current Limiting Circuit	68,957.56	357.49
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	214.50	
26 24 19 00-0174 480 Volt Combination Starters With Current Limiting Circuit <small>(26 24 19 00-0092)</small> Note: Reduced volt, energy saving		
26 24 19 00-0175 EA 480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 10 HP Combination Starters With Current Limiting Circuit	20,827.64	145.24
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.15	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0176	EA		480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 25 HP Combination Starters With Current Limiting Circuit.....	22,051.00	178.75
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	107.24	
26 24 19 00-0177	EA		480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 50 HP Combination Starters With Current Limiting Circuit.....	24,261.53	206.68
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	124.00	
26 24 19 00-0178	EA		480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 100 HP Combination Starters With Current Limiting Circuit.....	36,301.46	229.02
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	137.41	
26 24 19 00-0179	EA		480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 200 HP Combination Starters With Current Limiting Circuit.....	49,203.57	279.29
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	167.58	
26 24 19 00-0180	EA		480 Volt, Energy Saver Solid State Reduced Volt Starter With MCP, 400 HP Combination Starters With Current Limiting Circuit.....	68,957.56	357.49
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	214.50	
26 24 19 00-0181			Combination Starters With Fusible Switch <small>(26 24 19)</small>		
			Note: Includes NEMA I enclosure of indoor installation, vertical free standing floor mounted sections (90" high x 20" wide x 16" to 20" deep), fully factory assembled and Wired Internally.		
26 24 19 00-0182			230 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small>		
			Note: 1-Speed non-reversing.		
26 24 19 00-0183	EA		7-1/2 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	2,120.62	111.72
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0184	EA		15 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	2,922.30	117.31
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	70.38	
26 24 19 00-0185	EA		30 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	4,921.01	122.89
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.73	
26 24 19 00-0186	EA		50 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	8,674.25	145.24
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.14	
26 24 19 00-0187	EA		100 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	14,076.26	167.57
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	100.55	
26 24 19 00-0188	EA		200 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	25,101.36	223.43
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	134.06	
26 24 19 00-0189			480 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small>		
			Note: 1-Speed non-reversing.		
26 24 19 00-0190	EA		10 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	2,120.62	111.72
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0191	EA		25 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	2,922.30	117.31
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	70.38	
26 24 19 00-0192	EA		50 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	4,921.01	122.89
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.73	
26 24 19 00-0193	EA		100 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	8,674.25	145.24
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.14	
26 24 19 00-0194	EA		200 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	14,076.26	167.57
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	100.55	
26 24 19 00-0195	EA		400 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Non-Reversing.....	25,101.36	223.43
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	134.06	
26 24 19 00-0196			230 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small>		
			Note: 1-Speed reversing.		
26 24 19 00-0197	EA		7-1/2 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	3,419.30	111.72
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0198	EA		15 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	5,090.53	117.31
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	70.38	
26 24 19 00-0199	EA		30 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	8,139.47	122.89
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.73	
26 24 19 00-0200	EA		50 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	13,261.40	145.24
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.14	
26 24 19 00-0201	EA		100 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	20,397.99	167.57
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	100.55	
26 24 19 00-0202	EA		200 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	34,668.64	223.43
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	134.06	
26 24 19 00-0203			480 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small>		
			Note: 1-Speed reversing.		
26 24 19 00-0204	EA		10 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	3,419.30	111.72
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0205	EA		25 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	5,090.53	117.31
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	70.38	
26 24 19 00-0206	EA		50 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	8,139.47	122.89
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	73.73	
26 24 19 00-0207	EA		100 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	13,261.40	145.24
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.14	
26 24 19 00-0208	EA		200 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	20,397.99	167.57
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	100.55	
26 24 19 00-0209	EA		400 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 1 Speed Reversing.....	34,668.64	223.43
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	134.06	



Electrical	26	26	
Low-Voltage Electrical Distribution			26 20
Switchboards and Panelboards			26 24

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0210 230 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small> Note: 2-Speed non-reversing, 2 wind.		
26 24 19 00-0211 EA 10 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 4,009.58	178.75	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	107.24	
26 24 19 00-0212 EA 15 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 5,509.04	189.92	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	113.95	
26 24 19 00-0213 EA 30 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 8,659.47	201.09	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	120.65	
26 24 19 00-0214 EA 50 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 15,454.90	229.02	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	137.41	
26 24 19 00-0215 EA 100 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 24,612.57	268.11	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	160.88	
26 24 19 00-0216 480 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small> Note: 2-Speed non-reversing, 2 wind.		
26 24 19 00-0217 EA 10 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 4,009.58	178.75	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	107.24	
26 24 19 00-0218 EA 25 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 5,509.04	189.92	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	113.95	
26 24 19 00-0219 EA 50 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 8,659.47	201.09	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	120.65	
26 24 19 00-0220 EA 100 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 15,454.90	229.02	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	137.41	
26 24 19 00-0221 EA 200 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 2 Wind Starter 24,612.57	268.11	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	160.88	
26 24 19 00-0222 230 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small> Note: 2-Speed non-reversing, 1 wind.		
26 24 19 00-0223 EA 7-1/2 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 4,566.65	111.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0224 EA 15 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 6,958.36	117.31	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	70.38	
26 24 19 00-0225 EA 30 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 10,014.08	122.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	73.73	
26 24 19 00-0226 EA 50 HP, 230 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 20,174.87	145.24	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0227 480 Volt Combination Starters With Fusible Switch, Full Volt <small>(26 24 19 00-0181)</small> Note: 2-Speed non-reversing, 1 wind.		
26 24 19 00-0228 EA 10 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 4,566.65	111.72	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0229 EA 25 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 6,958.36	117.31	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	70.38	
26 24 19 00-0230 EA 50 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 10,014.08	122.89	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	73.73	
26 24 19 00-0231 EA 100 HP, 480 Volt, Combination Starters With Fusible Switch, Full Volt, 2 Speed Non-Reversing, 1 Wind Starter 20,174.87	145.24	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0232 230 Volt Combination Starters With Fusible Switch, Reduced Volt <small>(26 24 19 00-0181)</small> Note: Auto-transformer.		
26 24 19 00-0233 EA 15 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 6,910.93	117.31	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	70.38	
26 24 19 00-0234 EA 30 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 12,193.47	128.47	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	77.09	
26 24 19 00-0235 EA 50 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 20,308.12	145.24	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0236 EA 100 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 27,112.70	167.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	100.55	
26 24 19 00-0237 EA 200 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 45,543.63	223.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	134.06	
26 24 19 00-0238 480 Volt Combination Starters With Fusible Switch, Reduced Volt <small>(26 24 19 00-0181)</small> Note: Auto-transformer.		
26 24 19 00-0239 EA 25 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 6,910.93	117.31	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	70.38	
26 24 19 00-0240 EA 50 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 12,193.47	128.47	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	77.09	
26 24 19 00-0241 EA 100 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 20,308.12	145.24	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	87.14	
26 24 19 00-0242 EA 200 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 27,112.70	167.57	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	100.55	
26 24 19 00-0243 EA 400 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Auto-Transformer 45,543.63	223.43	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	134.06	
26 24 19 00-0244 230 Volt Combination Starters With Fusible Switch, Reduced Volt <small>(26 24 19 00-0181)</small> Note: Part winding.		

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 24 19 00-0245	EA	10 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	4,926.56	178.75
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>107.24</i>	
26 24 19 00-0246	EA	25 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	6,518.24	206.68
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>124.00</i>	
26 24 19 00-0247	EA	50 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	10,366.36	229.02
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>137.41</i>	
26 24 19 00-0248	EA	75 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	20,644.01	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>167.58</i>	
26 24 19 00-0249		480 Volt Combination Starters With Fusible Switch, Reduced Volt <small>(26 24 19 00-0181)</small>		
		Note: Part winding.		
26 24 19 00-0250	EA	15 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	4,926.56	178.75
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>107.24</i>	
26 24 19 00-0251	EA	40 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	6,518.24	206.68
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>124.00</i>	
26 24 19 00-0252	EA	75 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	10,366.36	229.02
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>137.41</i>	
26 24 19 00-0253	EA	150 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Part Winding Starters.....	20,644.01	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>167.58</i>	
26 24 19 00-0254		230 Volt Combination Starters With Fusible Switch, Reduced Volt <small>(26 24 19 00-0181)</small>		
		Note: Energy saver.		
26 24 19 00-0255	EA	7.5 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	20,177.13	145.24
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>87.14</i>	
26 24 19 00-0256	EA	15 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	21,409.57	178.75
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>107.24</i>	
26 24 19 00-0257	EA	30 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	23,642.68	206.68
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>124.00</i>	
26 24 19 00-0258	EA	50 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	35,788.77	229.02
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>137.41</i>	
26 24 19 00-0259	EA	100 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	48,806.06	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>167.58</i>	
26 24 19 00-0260	EA	200 HP, 230 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	66,231.47	357.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>214.50</i>	
26 24 19 00-0261		480 Volt Combination Starters With Fusible Switch, Reduced Volt <small>(26 24 19 00-0181)</small>		
		Note: Energy saver.		
26 24 19 00-0262	EA	10 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	20,177.13	145.24
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>87.14</i>	
26 24 19 00-0263	EA	25 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	21,409.57	178.75
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>107.24</i>	
26 24 19 00-0264	EA	50 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	23,642.68	206.68
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>124.00</i>	
26 24 19 00-0265	EA	100 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	35,788.77	229.02
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>137.41</i>	
26 24 19 00-0266	EA	200 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	48,806.06	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>167.58</i>	
26 24 19 00-0267	EA	400 HP, 480 Volt, Combination Starters With Fusible Switch, Reduced Volt, Energy Saver Solid State Starter With MCP.....	66,231.47	357.49
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>214.50</i>	
26 24 19 00-0268		Starter Accessories <small>(26 24 19)</small>		
		Note: Additional options or accessories for the Combination Starters		
26 24 19 00-0269		Starter Modifications <small>(26 24 19 00-0268)</small>		
26 24 19 00-0270	EA	Size 1, 2, 50 VA, 60 Hertz, Standard Control Circuit Transformer	188.55	
26 24 19 00-0271	EA	Size 3, 4, 150 VA, 60 Hertz, Standard Control Circuit Transformer	352.34	
26 24 19 00-0272	EA	Size 5, 6, 50 VA, 60 Hertz, Control Circuit Transformer.....	503.66	
26 24 19 00-0273	EA	Extra 50 VA, 60 Hertz, Control Circuit Transformer, All Sizes	126.48	
26 24 19 00-0274	EA	Extra 100 VA, 60 Hertz, Control Circuit Transformer, All Sizes	178.43	
26 24 19 00-0275	EA	Extra 150 VA, 60 Hertz, Control Circuit Transformer, All Sizes	300.39	
26 24 19 00-0276	EA	Overload Relay Heater Elements, 3 Per Starter	74.53	
26 24 19 00-0277	EA	N. O. Overload Relay Alarm	63.24	
26 24 19 00-0278	EA	Control Circuit Fuses, Primary/Secondary	141.50	
26 24 19 00-0279	EA	Control Devices Type PB2 Mount On Device, 2 Unit Pushbutton	174.94	
26 24 19 00-0280	EA	Control Devices Type PB2 Mount On Device, 3 Unit Pushbutton	342.17	
26 24 19 00-0281	EA	Control Devices Type PB2 Mount On Device, 2 Or 3 Post Select	174.94	
26 24 19 00-0282	EA	Control Devices Type PB2 Mount On Device, Individual Light Full V	200.67	
26 24 19 00-0283	EA	Control Devices Type PB2 Mount On Device, Individual Light Transformer.....	241.83	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				26 24 19 00-0284 EA Control Devices Type PB2 Mount On Device, Individual Light Push To.....	285.57	
				26 24 19 00-0285 EA Blank Devices Panel.....	54.03	
				26 24 19 00-0286 EA Oversize Or Special Color Starter.....	84.90	
				26 24 19 00-0287 EA Mini Voltmeter/Ammeter With Current Transformer.....	741.01	
				26 24 19 00-0288 EA Mini Elapsed Time Meters, Non-Resettable.....	671.54	
				26 24 19 00-0289 EA Panel Elapsed Time Meter, Resettable.....	1,003.36	
				26 24 19 00-0290 EA Terminal Blocks, Side Mounted, Press Connection, Plug-In Press.....	84.90	
				26 24 19 00-0291 EA Terminal Blocks, Side Mounted, Press Connection, Plug-In Screw.....	120.92	
				26 24 19 00-0292 EA Terminal Blocks, Front Mounted, Press Connection, Standard.....	84.90	
				26 24 19 00-0293 EA Terminal Blocks, Front Mounted, Press Connection, Plug-In.....	120.92	
				26 24 19 00-0294 EA Terminal Blocks, Front Mounted, Press Connection, Screw-Type Utility.....	120.92	
				26 24 19 00-0295 EA Terminal Blocks, Front Mounted, Press Connection, Plug-In Screw Type.....	174.94	
				26 24 19 00-0296 EA MOR - A Solid State Modular Overload Relay.....	434.79	
				26 24 19 00-0297 EA Heater Module.....	79.77	
				26 24 19 00-0298 EA LAM - Long Acceleration Module.....	495.54	
				26 24 19 00-0299 EA JAM - Jam Protection Module.....	568.06	
				26 24 19 00-0300 EA PUM - Phase Unbalance Module.....	1,078.10	
				26 24 19 00-0301 EA ULM - Underload Module.....	517.29	
				26 24 19 00-0302 EA Wiring To Common Control Circuit Transformer.....	113.61	
				26 24 19 00-0303 EA Handle Operator Separable Source Control Circuit.....	212.72	
				26 24 19 00-0304 EA Type SIS Control Wire.....	89.44	
				26 24 19 00-0305 EA Ring Or Spade Terminals Control.....	113.61	
				26 24 19 00-0306 EA Ring Terminals Power.....	113.61	
				26 24 19 00-0307 EA 14 Gauge Control Wire.....	89.44	
				26 24 19 00-0308 EA Wiremakers.....	113.61	
				26 24 19 00-0309 EA Wiring Diagram On Door.....	67.68	
				26 24 19 00-0310 EA Special Color Or Type Control Wire.....	82.19	
				26 24 19 00-0311 EA Current Transformer 12.5 VA.....	645.41	
				26 24 19 00-0312 EA Ground Fault Relay-Instant Non-Adjust, Size 1 Thru 4.....	2,061.92	
				26 24 19 00-0313 EA Ground Fault Relay-Instant Non-Adjust, Size 5 Thru 6.....	2,320.57	
26 24 19 00-0314				Control Relays And Special Components (26 24 19 00-0268)		
				26 24 19 00-0315 EA 600 Volt, 2 Pole, Control Relays.....	568.86	
				26 24 19 00-0316 EA 600 Volt, 4 Pole, Control Relays.....	672.16	
				26 24 19 00-0317 EA 600 Volt, 6 Pole, Control Relays.....	786.62	
				26 24 19 00-0318 EA 600 Volt, 8 Pole, Control Relays.....	875.20	
				26 24 19 00-0319 EA Pneumatic Timer, Control Relays.....	756.12	
				26 24 19 00-0320 EA Motor Driven Timer, Control Relays.....	1,970.32	
				26 24 19 00-0321 EA 7 Days Time Switch, Control Relays.....	2,479.92	
				26 24 19 00-0322 EA 24 Hour Time Switch, Control Relays.....	695.41	
				26 24 19 00-0323 EA Phase Voltage, Control Relays.....	1,182.93	
				26 24 19 00-0324 EA Two Circuit Alternator, Control Relays.....	1,655.73	
				26 24 19 00-0325 EA Manual 120 Volt, Control Relays.....	161.89	
				26 24 19 00-0326 EA Over-Current Relay, Control Relays.....	4,612.13	
				26 24 19 00-0327 EA UV-Relay, Control Relays.....	3,906.29	
				26 24 19 00-0328 EA Over-Current Relay, Control Relays.....	3,906.29	
				26 24 19 00-0329 EA Teleductor, Control Relays.....	1,219.72	
				26 24 19 00-0330 EA Current Transducer, Control Relays.....	3,280.19	
				26 24 19 00-0331 EA Watt Transducer, Control Relays.....	6,560.38	
				26 24 19 00-0332 EA Control Relays, Blank, Add For Each 1x.....	222.60	
				26 24 19 00-0333 EA Control Relays, Fixed Mounted Back Pan, 20" Structure With Wireway.....	332.99	
				26 24 19 00-0334 EA Control Relays, Fixed Mounted Back Pan, 24" Structure With Wireway.....	375.30	
				26 24 19 00-0335 EA Control Relays, Fixed Mounted Back Pan, 280" Structure With Wireway.....	417.61	
				26 24 19 00-0336 EA Control Relays, Fixed Mounted Back Pan, 20" Structure Without Wireway.....	375.30	
				26 24 19 00-0337 EA Control Relays, Fixed Mounted Back Pan, 24" Structure Without Wireway.....	417.61	
				26 24 19 00-0338 EA Control Relays, Fixed Mounted Back Pan, 2820" Structure Without Wireway.....	439.69	
26 24 19 00-0339				Circuit Breaker Modifications/Accessories (26 24 19 00-0268)		
				26 24 19 00-0340 EA Shunt Trip, Circuit Breaker.....	358.37	
				26 24 19 00-0341 EA Auxiliary Switch, Circuit Breaker.....	123.78	
				26 24 19 00-0342 EA Key Interlock, Circuit Breaker.....	445.22	
				26 24 19 00-0343 EA GFR Ground Fault, Circuit Breaker.....	2,052.39	
				26 24 19 00-0344 EA Seltronic Breaker, Circuit Breaker.....	1,188.91	
26 24 19 00-0345				Incoming Line And Feeder Circuit Breakers (26 24 19 00-0268)		
				26 24 19 00-0346 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 100.....	1,796.90	72.61
				<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	43.57	
				26 24 19 00-0347 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 150.....	3,117.73	111.72
				<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
				26 24 19 00-0348 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 100/100.....	3,018.94	72.61
				<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	43.57	
				26 24 19 00-0349 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 100/150.....	4,337.20	111.72
				<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
				26 24 19 00-0350 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 150/150.....	5,582.39	111.72
				<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
				26 24 19 00-0351 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 250.....	3,421.50	145.24
				<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	87.15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0352 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 400	5,579.20	156.40
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	93.86	
26 24 19 00-0353 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 600	7,361.19	201.09
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	120.60	
26 24 19 00-0354 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 800	8,633.78	307.22
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	184.39	
26 24 19 00-0355 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 1200	12,217.05	463.63
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	278.40	
26 24 19 00-0356 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 2000	26,926.65	614.44
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	368.35	
26 24 19 00-0357 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 2500	40,287.85	770.84
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	462.07	
26 24 19 00-0358 EA Incoming Line And Feeder Circuit Breaker, Standard Mold, Type A, B, 3000	67,354.56	893.62
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	536.70	
26 24 19 00-0359 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 50.....	2,164.80	72.61
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	43.57	
26 24 19 00-0360 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 150.....	3,475.34	111.72
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0361 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 50.....	2,164.80	72.61
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	43.57	
26 24 19 00-0362 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 50/50.....	3,475.34	111.72
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0363 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 50/150.....	3,700.71	72.61
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	43.57	
26 24 19 00-0364 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 150/150.....	5,062.70	111.72
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0365 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 50.....	6,292.46	111.72
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0366 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 100.....	3,297.82	111.72
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0367 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 400.....	8,345.64	307.22
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	184.39	
26 24 19 00-0368 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 125-225	8,345.64	307.22
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	184.39	
26 24 19 00-0369 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 125-400	11,269.58	335.15
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	201.00	
26 24 19 00-0370 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 300-600	14,082.60	391.00
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	234.50	
26 24 19 00-0371 EA Incoming Line And Feeder Circuit Breaker, Current Limiting Mold, Case Circuit Breakers, 300-800	16,199.61	463.63
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	278.40	
26 24 19 00-0372 Incoming Line And Feeder Fusible Switches (26 24 19 00-0268)		
26 24 19 00-0373 EA 30 To 60 Amperes, Incoming Line And Feeder Fusible Switches.....	1,930.01	111.72
26 24 19 00-0374 EA Incoming Line And Feeder Fusible Switches, 30 Dual / 60 Dual	2,991.19	111.72
26 24 19 00-0375 EA 100 Amperes, Incoming Line And Feeder Fusible Switches.....	3,104.13	139.64
26 24 19 00-0376 EA 200 Amperes, Incoming Line And Feeder Fusible Switches.....	5,066.44	167.57
26 24 19 00-0377 EA 400 Amperes, Incoming Line And Feeder Fusible Switches.....	10,023.42	212.26
26 24 19 00-0378 EA 600 Amperes, Incoming Line And Feeder Fusible Switches.....	14,065.33	279.29
26 24 19 00-0379 EA 800 Amperes, Incoming Line And Feeder Fusible Switches.....	34,303.86	374.25
26 24 19 00-0380 EA 1,200 Amperes, Incoming Line And Feeder Fusible Switches.....	38,672.75	519.48
26 24 19 00-0381 Dry Type Distribution Transformers (26 24 19 00-0268)		
26 24 19 00-0382 EA 500 VA, Phase 1, Dry Type Distribution Transformers	1,754.59	
26 24 19 00-0383 EA 750 VA, Phase 1, Dry Type Distribution Transformers	1,811.19	
26 24 19 00-0384 EA 1,000 VA, Phase 1, Dry Type Distribution Transformers	1,870.36	
26 24 19 00-0385 EA 1,500 VA, Phase 1, Dry Type Distribution Transformers	2,145.64	
26 24 19 00-0386 EA 2,000 VA, Phase 1, Dry Type Distribution Transformers	2,325.73	
26 24 19 00-0387 EA 3,000 VA, Phase 1, Dry Type Distribution Transformers	2,593.72	
26 24 19 00-0388 EA 5,000 VA, Phase 1, Dry Type Distribution Transformers	3,164.44	
26 24 19 00-0389 EA 7,500 VA, Phase 1, Dry Type Distribution Transformers	3,565.78	
26 24 19 00-0390 EA 9,000 VA, Phase 3, Dry Type Distribution Transformers	8,289.28	
26 24 19 00-0391 EA 10,000 VA, Phase 1, Dry Type Distribution Transformers	4,399.34	
26 24 19 00-0392 EA 15,000 VA, Phase 1, Dry Type Distribution Transformers	6,094.75	
26 24 19 00-0393 EA 15,000 VA, Phase 3, Dry Type Distribution Transformers	9,498.45	
26 24 19 00-0394 EA 20,000 VA, Phase 1, Dry Type Distribution Transformers	8,796.10	
26 24 19 00-0395 EA 30,000 VA, Phase 1, Dry Type Distribution Transformers	12,189.51	
26 24 19 00-0396 EA 30,000 VA, Phase 3, Dry Type Distribution Transformers	12,400.53	
26 24 19 00-0397 EA 45,000 VA, Phase 1, Dry Type Distribution Transformers	17,177.03	
26 24 19 00-0398 Metering Equipment (26 24 19 00-0268)		
26 24 19 00-0399 EA Metering Equipment, Voltmeter, Panel Type	828.41	
26 24 19 00-0400 EA Metering Equipment, Voltmeter, Switchboard Type	1,811.19	
26 24 19 00-0401 EA Metering Equipment, Ammeter, Panel	746.09	
26 24 19 00-0402 EA Metering Equipment, Ammeter, Switchboard Type.....	1,811.19	
26 24 19 00-0403 EA Metering Equipment, Voltmeter/Ammeter, Switch	1,005.93	
26 24 19 00-0404 EA Metering Equipment, Control Switch, 4 Circuits.....	1,067.68	
26 24 19 00-0405 EA Add For Additional Circuits	132.95	
26 24 19 00-0406 EA Metering Equipment, Indicating Wattmeter.....	3,735.58	
26 24 19 00-0407 EA Metering Equipment, Indicating Power Factor	3,913.09	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0408 EA Metering Equipment, Integrating Watt-hour	3,450.01	
26 24 19 00-0409 EA Add For Demand Attachment	870.21	
26 24 19 00-0410 EA 800 Amperes, Metering Equipment, Current Transformer	1,031.66	
26 24 19 00-0411 EA 1,000 Amperes, Metering Equipment, Current Transformer	1,780.32	
26 24 19 00-0412 EA 2,000 Amperes, Metering Equipment, Current Transformer	2,073.61	
26 24 19 00-0413 EA Metering Equipment, Potential Transformer	1,728.86	
26 24 19 00-0414 EA Metering Equipment, Surge Arrester	1,860.07	
26 24 19 00-0415 EA Metering Equipment, Ground Detector System	1,422.71	
26 24 19 00-0416 Current Limiting Reactors (26 24 19 00-0268)		
26 24 19 00-0417 EA 600 Amperes, Current Limiting Reactors	31,754.98	
26 24 19 00-0418 EA 800 Amperes, Current Limiting Reactors	46,244.49	
26 24 19 00-0419 EA 1,000 Amperes, Current Limiting Reactors	60,767.45	
26 24 19 00-0420 EA 1,200 Amperes, Current Limiting Reactors	92,499.27	
26 24 19 00-0421 Incoming Line Cable Space Requirements, Main Lugs Only (26 24 19 00-0268)		
26 24 19 00-0422 EA Incoming Line Cable Space Requirement, 350 MCC, 2 Screw	490.11	
26 24 19 00-0423 EA Incoming Line Cable Space Requirement, 350 MCC, 2 Crimp	490.11	
26 24 19 00-0424 EA Incoming Line Cable Space Requirement, 350 MCC, 4 Screw	677.57	
26 24 19 00-0425 EA Incoming Line Cable Space Requirement, 350 MCC, 4 Crimp	1,239.95	
26 24 19 00-0426 EA Incoming Line Cable Space Requirement, 600 MCC, 2 Screw	677.57	
26 24 19 00-0427 EA Incoming Line Cable Space Requirement, 600 MCC, 2 Crimp	865.03	
26 24 19 00-0428 EA Incoming Line Cable Space Requirement, 600 MCC, 4 Screw	865.03	
26 24 19 00-0429 EA Incoming Line Cable Space Requirement, 600 MCC, 4 Crimp	1,237.69	
26 24 19 00-0430 EA Incoming Line Cable Space Requirement, 750 MCC, 2 Screw	865.03	
26 24 19 00-0431 EA Incoming Line Cable Space Requirement, 750 MCC, 2 Crimp	1,237.69	
26 24 19 00-0432 EA Incoming Line Cable Space Requirement, 750 MCC, 4 Screw	1,052.49	
26 24 19 00-0433 EA Incoming Line Cable Space Requirement, 750 MCC, 4 Crimp	3,412.69	
26 24 19 00-0434 EA Incoming Line Cable Space Requirement, 1,000 MCC, 2 Screw	1,052.49	
26 24 19 00-0435 EA Incoming Line Cable Space Requirement, 1,000 MCC, 2 Crimp	1,237.69	
26 24 19 00-0436 EA Incoming Line Cable Space Requirement, 1,000 MCC, 4 Screw	3,412.69	
26 24 19 00-0437 EA Incoming Line Cable Space Requirement, 1,000 MCC, 4 Crimp	3,412.69	
26 24 19 00-0438 EA Bus Duct Transition Pull Box	1,113.94	
26 24 19 00-0439 EA Throat And Transition To Substation	2,150.45	
26 24 19 00-0440 EA Service Entrance Label	465.71	
26 24 19 00-0441 EA Type W To 5 Star - 10" Transition	973.45	
26 24 19 00-0442 EA 600 Amperes, Sub Feed Lugs On Main Bus	577.72	
26 24 19 00-0443 Standard Structures And Structure Options/Modifications (26 24 19 00-0268)		
26 24 19 00-0444 EA Standard Structure Add For Each Additional 4" Of Structure Width	307.52	
26 24 19 00-0445 EA Standard Structure Add For 8" Vertical Wireway In Lieu Of 4"	307.52	
26 24 19 00-0446 EA Standard Structure Single Corner Section "L", 16" Depth	951.33	
26 24 19 00-0447 EA Standard Structure Single Corner Section "L", 21" Depth	1,073.01	
26 24 19 00-0448 EA Standard Structure Unused Space/Future Space	91.81	
26 24 19 00-0449 EA Standard Structure NEMA 12 Dustproof	247.79	
26 24 19 00-0450 EA Standard Structure Bottom Plate For NEMA 1 Gasket Enclosure	51.99	
26 24 19 00-0451 EA Standard Structure 150 Watt Space	223.45	
26 24 19 00-0452 EA Standard Structure Thermostat For Space Heater Control	703.42	
26 24 19 00-0453 EA Standard Structure Rear Hinged Structure Door, 72" High	223.45	
26 24 19 00-0454 EA Standard Structure NEMA 2 Drip Shield On Top Of MCC	454.44	
26 24 19 00-0455 EA Standard Structure NEMA 3R N-Walk In Front Mounted	6,483.09	
26 24 19 00-0456 EA Standard Structure NEMA 3R N-Walk In Back-to-back	7,493.50	
26 24 19 00-0457 EA Standard Structure NEMA 3R Walk-In Aisle Front Mounted	7,500.75	
26 24 19 00-0458 Installation Hours For Vertical Sections (26 24 19 00-0268)		
26 24 19 00-0459 EA Install Vertical Section, 230/480 Volt, 1 Section, 600 Amperes	670.27	335.15
26 24 19 00-0460 EA Install Vertical Section, 230/480 Volt, 2 Section, 600 Amperes	1,005.40	502.73
26 24 19 00-0461 EA Install Vertical Section, 230/480 Volt, 3 Section, 600 Amperes	1,117.16	558.59
26 24 19 00-0462 EA Install Vertical Section, 230/480 Volt, 4 Section, 600 Amperes	1,340.72	670.30
26 24 19 00-0463 EA Bolt To Floor, Vertical Section, 230/480 Volt, 600 Amperes	111.72	55.86
26 24 19 00-0464 EA Install Vertical Section, 230/480 Volt, 1 Section, 800 Amperes	670.27	335.15
26 24 19 00-0465 EA Install Vertical Section, 230/480 Volt, 2 Section, 800 Amperes	1,005.40	502.73
26 24 19 00-0466 EA Install Vertical Section, 230/480 Volt, 3 Section, 800 Amperes	1,117.16	558.59
26 24 19 00-0467 EA Install Vertical Section, 230/480 Volt, 4 Section, 800 Amperes	1,340.72	670.30
26 24 19 00-0468 EA Bolt To Floor, Vertical Section, 230/480 Volt, 800 Amperes	111.72	55.86
26 24 19 00-0469 EA Install Vertical Section, 230/480 Volt, 1 Section, 1,200 Amperes	782.03	391.00
26 24 19 00-0470 EA Install Vertical Section, 230/480 Volt, 2 Section, 1,200 Amperes	1,005.40	502.73
26 24 19 00-0471 EA Install Vertical Section, 230/480 Volt, 3 Section, 1,200 Amperes	1,340.72	670.30
26 24 19 00-0472 EA Install Vertical Section, 230/480 Volt, 4 Section, 1,200 Amperes	1,563.83	781.91
26 24 19 00-0473 EA Bolt To Floor, Vertical Section, 230/480 Volt, 1,200 Amperes	167.57	83.79
26 24 19 00-0474 EA Install Vertical Section, 230/480 Volt, 1 Section, 1,600 Amperes	893.73	446.86
26 24 19 00-0475 EA Install Vertical Section, 230/480 Volt, 2 Section, 1,600 Amperes	1,228.98	614.44
26 24 19 00-0476 EA Install Vertical Section, 230/480 Volt, 3 Section, 1,600 Amperes	1,563.83	781.91
26 24 19 00-0477 EA Install Vertical Section, 230/480 Volt, 4 Section, 1,600 Amperes	1,787.16	893.62
26 24 19 00-0478 EA Bolt To Floor, Vertical Section, 230/480 Volt, 1,600 Amperes	223.43	111.72
26 24 19 00-0479 EA Install Vertical Section, 230/480 Volt, 1 Section, 2,000 Amperes	893.73	446.86

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 24 Switchboards and Panelboards



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 24 19 00-0480	EA	Install Vertical Section, 230/480 Volt, 2 Section, 2,000 Amperes		1,340.72	670.30
26 24 19 00-0481	EA	Install Vertical Section, 230/480 Volt, 3 Section, 2,000 Amperes		1,675.57	837.76
26 24 19 00-0482	EA	Install Vertical Section, 230/480 Volt, 4 Section, 2,000 Amperes		1,899.30	949.70
26 24 19 00-0483	EA	Bolt To Floor, Vertical Section, 230/480 Volt, 2,000 Amperes		223.43	111.72
26 24 19 00-0484		Motor Control Centers <small>(26 24 19)</small>			
26 24 19 00-0485		2.4 KV Motor Control Centers <small>(26 24 19 00-0484)</small>			
26 24 19 00-0486	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 100 To 300 Hp		12,597.19	223.43
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		134.06	
26 24 19 00-0487	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 400 Hp		12,597.19	223.43
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		134.06	
26 24 19 00-0488	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 600 Hp		12,597.19	223.43
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		134.06	
26 24 19 00-0489	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 700 Hp		12,653.09	251.36
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		150.83	
26 24 19 00-0490	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 1,000 Hp		13,444.62	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		167.58	
26 24 19 00-0491	EA	2,400 KV CL 11-202, Squirrel Cage Motor Control, 1,250 Hp		13,500.45	307.22
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		184.33	
26 24 19 00-0492	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 1,500 Hp		13,556.30	335.15
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		201.08	
26 24 19 00-0493	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 1,750 Hp		13,668.06	391.00
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		234.61	
26 24 19 00-0494	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 2,000 Hp		13,779.76	446.86
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		268.12	
26 24 19 00-0495	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 2,250 Hp		23,061.77	502.73
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		301.62	
26 24 19 00-0496	EA	2.4 KV CL 11-202, Squirrel Cage Motor Control, 2,500 Hp		24,763.85	558.59
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		335.15	
26 24 19 00-0497	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 100 Hp		18,628.50	223.43
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		134.06	
26 24 19 00-0498	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 150 Hp		19,411.12	240.19
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		144.12	
26 24 19 00-0499	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 200 Hp		22,046.37	262.53
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		157.52	
26 24 19 00-0500	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 300 Hp		24,532.26	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		167.58	
26 24 19 00-0501	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 400 Hp		26,702.45	323.98
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		194.40	
26 24 19 00-0502	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 600 Hp		29,251.49	346.32
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		207.80	
26 24 19 00-0503	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 700 Hp		31,799.02	368.67
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		221.19	
26 24 19 00-0504	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 1,000 Hp		34,825.29	402.18
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		241.31	
26 24 19 00-0505	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 1,250 Hp		40,513.45	446.86
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		268.12	
26 24 19 00-0506	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 1,500 Hp		43,888.23	474.80
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		284.90	
26 24 19 00-0507	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 1,750 Hp		66,929.57	558.59
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		335.15	
26 24 19 00-0508	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 2,000 Hp		71,321.87	614.44
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		368.69	
26 24 19 00-0509	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 2,250 Hp		75,149.31	670.30
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		402.22	
26 24 19 00-0510	EA	2.4 KV CL 13-202, Wound Rotor Motor Control, 2,500 Hp		81,827.53	726.27
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		435.77	
26 24 19 00-0511	EA	2.4 KV CL 14-202, Synchronous Motor Control, 100 To 300 Hp		17,583.65	223.43
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		134.06	
26 24 19 00-0512	EA	2.4 KV CL 14-202, Synchronous Motor Control, 400 Hp		17,639.55	251.36
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		150.83	
26 24 19 00-0513	EA	2.4 KV CL 14-202, Synchronous Motor Control, 600 Hp		17,695.38	279.29
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		167.58	
26 24 19 00-0514	EA	2.4 KV CL 14-202, Synchronous Motor Control, 700 Hp		17,751.21	307.22
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		184.33	
26 24 19 00-0515	EA	2.4 KV CL 14-202, Synchronous Motor Control, 1,000 Hp		17,810.03	335.15
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		201.08	
26 24 19 00-0516	EA	2,400 Volt CL 14-202, Synchronous Motor Control, 1,250 HP		17,865.94	363.07
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		217.85	
26 24 19 00-0517	EA	2.4 KV CL 14-202, Synchronous Motor Control, 1,500 Hp		17,921.79	391.00
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		234.61	
26 24 19 00-0518	EA	2.4 KV CL 14-202, Synchronous Motor Control, 1,750 Hp		18,145.16	502.73
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		301.62	
26 24 19 00-0519	EA	2.4 KV CL 14-202, Synchronous Motor Control, 2,000 Hp		30,746.12	558.59
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		335.15	
26 24 19 00-0520	EA	2.4 KV CL 14-202, Synchronous Motor Control, 2,250 Hp		30,857.94	614.44
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		368.69	
26 24 19 00-0521	EA	2.4 KV CL 14-202, Synchronous Motor Control, 2,500 Hp		32,551.08	670.30
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		402.22	
26 24 19 00-0522	EA	Add For Reversing Starters, 100 To 700 HP		6,926.55	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		67.03	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0523 EA Add For Reversing Starters, 1,000 To 1,500 Hp.....	7,134.62	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0524 EA Add For Reversing Starters, 1,750 To 2,500 HP	10,887.48	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	67.03	
26 24 19 00-0525 4.8 KV Motor Control Centers (26 24 19 00-0484)		
26 24 19 00-0526 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 100 To 600 HP.....	13,764.38	335.15
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	201.08	
26 24 19 00-0527 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 700 HP	13,820.29	363.07
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	217.85	
26 24 19 00-0528 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 2,050 HP	13,876.14	391.00
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	234.61	
26 24 19 00-0529 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 1,250 HP.....	13,932.03	418.93
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	251.38	
26 24 19 00-0530 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 1,500 HP	14,716.12	446.86
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	268.12	
26 24 19 00-0531 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 1,750 HP	14,772.04	474.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	284.90	
26 24 19 00-0532 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 2,000 HP	14,827.79	502.73
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	301.62	
26 24 19 00-0533 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 2,250 HP	14,883.75	530.66
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	318.41	
26 24 19 00-0534 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 2,500 HP.....	14,939.55	558.59
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	335.15	
26 24 19 00-0535 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 3,000 HP	25,181.00	726.27
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	435.77	
26 24 19 00-0536 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 3,500 HP	25,292.26	781.91
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	469.15	
26 24 19 00-0537 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 4,000 HP	26,986.89	837.76
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	502.67	
26 24 19 00-0538 EA 4.8 KV CL 11-202, Squirrel Cage Motor Control, 4,500 HP	27,098.48	893.62
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	536.15	
26 24 19 00-0539 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 100 HP	19,062.97	335.15
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	201.08	
26 24 19 00-0540 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 150 HP	19,326.95	363.07
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	217.85	
26 24 19 00-0541 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 200 HP	22,518.85	391.00
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	234.61	
26 24 19 00-0542 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 300 HP	25,019.67	418.93
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	251.38	
26 24 19 00-0543 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 400 HP	27,156.27	446.86
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	268.12	
26 24 19 00-0544 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 600 HP	29,716.57	474.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	284.90	
26 24 19 00-0545 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 700 HP	32,120.64	502.73
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	301.62	
26 24 19 00-0546 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 1,000 HP	35,290.35	530.66
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	318.41	
26 24 19 00-0547 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 1,250 HP	40,845.38	558.59
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	335.15	
26 24 19 00-0548 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 1,500 HP	44,625.88	586.51
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	351.91	
26 24 19 00-0549 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 1,750 HP	48,462.24	642.37
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	385.44	
26 24 19 00-0550 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 2,000 HP	51,623.01	670.30
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	402.22	
26 24 19 00-0551 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 2,250 HP	54,605.23	698.23
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	418.94	
26 24 19 00-0552 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 2,500 HP	58,770.90	726.27
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	435.77	
26 24 19 00-0553 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 3,000 HP	93,007.50	893.62
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	536.15	
26 24 19 00-0554 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 3,500 HP	103,404.69	949.70
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	569.79	
26 24 19 00-0555 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 4,000 HP	124,212.62	1,005.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	603.24	
26 24 19 00-0556 EA 4.8 KV CL 13-202, Wound Rotor Motor Control, 4,500 HP	131,354.19	1,005.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	603.24	
26 24 19 00-0557 EA 4.8 KV CL 14-202, Synchronous Motor Control, 100 To 600 HP	18,859.63	391.00
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	234.61	
26 24 19 00-0558 EA 4.8 KV CL 14-202, Synchronous Motor Control, 700 HP	18,915.52	418.93
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	251.38	
26 24 19 00-0559 EA 4.8 KV CL 14-202, Synchronous Motor Control, 1,000 HP	18,971.33	446.86
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	268.12	
26 24 19 00-0560 EA 4.8 KV CL 14-202, Synchronous Motor Control, 1,250 HP	19,027.25	474.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	284.90	
26 24 19 00-0561 EA 4.8 KV CL 14-202, Synchronous Motor Control, 1,500 HP	20,649.54	502.73
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	301.62	
26 24 19 00-0562 EA 4.8 KV CL 14-202, Synchronous Motor Control, 1,750 HP	20,705.50	530.66
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	318.41	
26 24 19 00-0563 EA 4.8 KV CL 14-202, Synchronous Motor Control, 2,000 HP	20,761.30	558.59
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	335.15	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 24 19 00-0564	EA	4.8 KV CL 14-202, Synchronous Motor Control, 2,250 HP.....	20,817.18	586.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	351.91	
26 24 19 00-0565	EA	4.8 KV CL 14-202, Synchronous Motor Control, 2,500 HP.....	20,873.12	614.44
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	368.69	
26 24 19 00-0566	EA	4.8 KV CL 14-202, Synchronous Motor Control, 3,000 HP.....	21,207.97	781.91
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	469.15	
26 24 19 00-0567	EA	4.8 KV CL 14-202, Synchronous Motor Control, 3,500 HP.....	34,016.99	837.76
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	502.67	
26 24 19 00-0568	EA	4.8 KV CL 14-202, Synchronous Motor Control, 4,000 HP.....	35,704.03	893.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	536.15	
26 24 19 00-0569	EA	4.8 KV CL 14-202, Synchronous Motor Control, 4,500 HP.....	35,704.03	893.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	536.15	
26 24 19 00-0570	EA	Add For Reversing Starters, 100 To 1,250 HP.....	10,409.56	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0571	EA	Add For Reversing Starters, 1,500 To 2,500 HP.....	10,725.76	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0572	EA	Add For Reversing Starters, 3,000 To 4,500 HP.....	16,428.64	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	67.03	
26 24 19 00-0573		2.4/4.8 KV Motor Control Centers, Accessories <small>(26 24 19 00-0484)</small>		
26 24 19 00-0574	EA	2.4/4.8 KV Load Break Disconnect Switch 600 Amperes.....	13,546.54	223.43
26 24 19 00-0575	EA	2.4/4.8 KV Load Break Disconnect Switch 1,200 Amperes.....	16,279.21	335.15
26 24 19 00-0576	EA	2.4/4.8 KV NEMA 3 Weather Resistant.....	5,332.47	
26 24 19 00-0577	EA	2.4/4.8 KV Space Heaters.....	260.34	16.76
26 24 19 00-0578	EA	2.4/4.8 KV Potential Transformer Fused.....	1,544.86	
26 24 19 00-0579	EA	2.4/4.8 KV Current Transformer 600 Volt, 5 KVA.....	828.89	
26 24 19 00-0580	EA	2.4/4.8 KV Control Transformer 4 KVA Max.....	2,468.61	
26 24 19 00-0581	EA	2.4/4.8 KV Pushbuttons Each.....	158.10	
26 24 19 00-0582	EA	2.4/4.8 KV Selector Switch Each.....	523.99	
26 24 19 00-0583	EA	2.4/4.8 KV Indicating Light.....	158.10	
26 24 19 00-0584	EA	2.4/4.8 KV Push To Test Light.....	478.82	
26 24 19 00-0585	EA	2.4/4.8 KV AC Voltmeter, Switchboard Type.....	1,273.83	
26 24 19 00-0586	EA	2.4/4.8 KV AC Ammeter, Switchboard Type.....	1,273.83	
26 24 19 00-0587	EA	2.4/4.8 KV Power Factor Meter.....	3,810.20	
26 24 19 00-0588	EA	2.4/4.8 KV Watt Hr Meter, 2 Element Drawout.....	2,626.71	
26 24 19 00-0589	EA	2.4/4.8 KV Operation Counter.....	512.33	16.76
26 24 19 00-0590	EA	2.4/4.8 KV Phase Failure Protection.....	3,684.77	55.86
26 24 19 00-0591	EA	2.4/4.8 KV Ground Protection.....	7,039.34	27.93
26 24 19 00-0592	EA	2.4/4.8 KV Synchronous Motor DC Protection.....	2,083.14	27.93
26 24 19 00-0593	EA	2.4/4.8 KV Lightning Arresters.....	5,334.56	16.76
26 24 19 00-0594	EA	2.4/4.8 KV Portable Lifting Mechanism.....	7,727.07	
26 24 19 00-0595	EA	2.4/4.8 KV Auxiliary Timing Relay.....	7,719.12	55.86
26 24 19 00-0596	EA	2.4/4.8 KV Auxiliary Control Relay.....	513.39	55.86
26 24 19 00-0597		Incoming Section And Feeder Air Circuit Breakers <small>(26 24 19 00-0484)</small>		
		Note: 3 Pole. Includes structure.		
26 24 19 00-0598	EA	Incoming Section MCC, Air Circuit Breaker, 70 - 100 Amperes, 14,000 Ampere IC, 3-Pole, With Structure Included.....	1,123.85	335.04
26 24 19 00-0599	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 225 Amperes, 22,000 Ampere IC, 3-Pole, With Structure Included.....	1,955.37	593.05
26 24 19 00-0600	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 400 Amperes, 30,000 Ampere IC, 3-Pole, With Structure Included.....	2,361.59	759.35
26 24 19 00-0601	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 600 Amperes, 30,000 Ampere IC, 3-Pole, With Structure Included.....	3,774.28	1,222.79
26 24 19 00-0602	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 1,200 Amperes, 30,000 Ampere IC, 3-Pole, With Structure Included.....	4,415.17	1,345.07
26 24 19 00-0603	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 2,000 Amperes, 30,000 Ampere IC, 3-Pole, With Structure Included.....	5,591.41	1,491.81
26 24 19 00-0604	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 400 Amperes, 45,000 Ampere IC, 3-Pole, With Structure Included.....	6,513.45	1,748.59
26 24 19 00-0605	EA	Incoming Section MCC, Air Circuit Breaker, 125 - 400 Amperes, 100,000 Ampere IC, 3-Pole, With Structure Included.....	10,797.66	2,037.17
26 24 19 00-0606		Main Lugs Only <small>(26 24 19 00-0484)</small>		
26 24 19 00-0607	EA	600 Amperes Incoming Section, Main Lugs.....	960.15	427.98
26 24 19 00-0608	EA	800 Amperes Incoming Section, Main Lugs.....	1,046.72	427.98
26 24 19 00-0609	EA	1,200 Amperes Incoming Section, Main Lugs.....	1,485.73	672.53
26 24 19 00-0610	EA	2,000 Amperes Incoming Section, Main Lugs.....	3,443.46	1,222.79
26 24 19 00-0611	EA	3,000 Amperes Incoming Section, Main Lugs.....	5,207.12	1,773.04
26 24 19 00-0612	EA	4,000 Amperes Incoming Section, Main Lugs.....	7,379.02	2,445.59
26 24 19 00-0613		Incoming Main Circuit Breaker Structure <small>(26 24 19 00-0484)</small>		
		Note: Includes structure, main breaker, 42 KA bus bracing, 600 A tin plated copper bus, NEMA 1 enclosure, 15" cabinet depth, and 1/4" x 2" tin plated copper horizontal ground bus.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0614 EA 225 Amperes, Main Circuit Breaker Section.....	5,431.93	591.71
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0615 EA 400 Amperes, Main Circuit Breaker Section.....	11,290.09	760.09
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0616 EA 600 Amperes, Main Circuit Breaker Section.....	11,914.01	1,183.90
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0617 EA 800 Amperes, Main Circuit Breaker Section.....	16,686.35	1,183.90
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0618 EA 1,200 Amperes, Main Circuit Breaker Section.....	23,970.15	1,339.57
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0619 Incoming Fusible Main Disconnect Section <small>(26 24 19 00-0484)</small>		
Note: Includes structure, fuses, 42 KA bus bracing, 600 A tin plated copper bus, NEMA 1 enclosure, 15" cabinet depth, and 1/4" x 2" tin plated copper horizontal ground bus.		
26 24 19 00-0620 EA 200 Amperes, Fusible Main Disconnect Section.....	4,754.74	592.44
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0621 EA 400 Amperes, Fusible Main Disconnect Section.....	6,537.07	760.46
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0622 EA 600 Amperes, Fusible Main Disconnect Section.....	12,625.07	1,184.89
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0623 EA 800 Amperes, Fusible Main Disconnect Section.....	14,582.78	1,184.89
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0624 EA 1,200 Amperes, Fusible Main Disconnect Section.....	20,378.97	1,340.79
For NEMA 12, Add	245.00	
For NEMA 1 With Gaskets, Add	97.00	
For 20" Cabinet Depth, Add	108.00	
For 800 Amperes, Tin Plated Copper Bus, Add	182.00	
For 1,200 Amperes, Tin Plated Copper Bus, Add	334.00	
26 24 19 00-0625 Circuit Breaker Combination Starters <small>(26 24 19 00-0484)</small>		
26 24 19 00-0626 Class I, Type A <small>(26 24 19 00-0625)</small>		
26 24 19 00-0627 EA Size 1, Class I, Type A Circuit Breaker Combination Starter.....	915.43	248.22
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	141.53	
26 24 19 00-0628 EA Size 2, Class I, Type A Circuit Breaker Combination Starter.....	1,058.14	248.22
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	156.77	
26 24 19 00-0629 EA Size 3, Class I, Type A Circuit Breaker Combination Starter.....	1,521.68	352.16
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	210.83	
26 24 19 00-0630 EA Size 4, Class I, Type A Circuit Breaker Combination Starter.....	2,421.72	463.44
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	277.91	
26 24 19 00-0631 EA Size 5, Class I, Type A Circuit Breaker Combination Starter.....	4,209.27	579.60
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	347.39	
26 24 19 00-0632 Class I, Type B <small>(26 24 19 00-0625)</small>		
26 24 19 00-0633 EA Size 1, Class I, Type B Circuit Breaker Combination Starter.....	856.36	216.43
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	122.28	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24	19 00-0634	EA	Size 2, Class I, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	994.59 137.70	216.43
26 24	19 00-0635	EA	Size 3, Class I, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,446.00 188.12	313.04
26 24	19 00-0636	EA	Size 4, Class I, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,344.52 254.75	424.31
26 24	19 00-0637	EA	Size 5, Class I, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,147.01 328.71	541.70
26 24	19 00-0638		Class I, Type C <small>(26 24 19 00-0625)</small>		
26 24	19 00-0639	EA	Size 1, Class I, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	886.70 110.76	200.54
26 24	19 00-0640	EA	Size 2, Class I, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,036.34 130.08	200.54
26 24	19 00-0641	EA	Size 3, Class I, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,528.06 179.82	299.59
26 24	19 00-0642	EA	Size 4, Class I, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,433.56 248.54	414.53
26 24	19 00-0643	EA	Size 5, Class I, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,225.80 318.44	531.92
26 24	19 00-0644		Class II, Type B <small>(26 24 19 00-0625)</small>		
26 24	19 00-0645	EA	Size 1, Class II, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	940.54 167.97	297.14
26 24	19 00-0646	EA	Size 2, Class II, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,259.00 187.55	297.14
26 24	19 00-0647	EA	Size 3, Class II, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,757.89 236.98	396.19
26 24	19 00-0648	EA	Size 4, Class II, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,796.06 305.70	507.46
26 24	19 00-0649	EA	Size 5, Class II, Type B Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,880.35 372.80	619.96
26 24	19 00-0650		Class II, Type C <small>(26 24 19 00-0625)</small>		
26 24	19 00-0651	EA	Size 1, Class II, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,129.22 160.90	281.25
26 24	19 00-0652	EA	Size 2, Class II, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,288.27 175.69	281.25
26 24	19 00-0653	EA	Size 3, Class II, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,845.51 229.85	383.96
26 24	19 00-0654	EA	Size 4, Class II, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,876.13 296.80	495.24
26 24	19 00-0655	EA	Size 5, Class II, Type C Circuit Breaker Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,976.75 368.31	611.40
26 24	19 00-0656		Fused Disconnect Combination Starter <small>(26 24 19 00-0484)</small>		
26 24	19 00-0657		Class I, Type A <small>(26 24 19 00-0656)</small>		
26 24	19 00-0658	EA	Size 1, Class I, Type A Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	843.53 137.70	228.66
26 24	19 00-0659	EA	Size 2, Class I, Type A Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,252.45 187.55	313.04
26 24	19 00-0660	EA	Size 3, Class I, Type A Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,938.77 244.56	407.19
26 24	19 00-0661	EA	Size 4, Class I, Type A Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,660.84 343.48	571.04
26 24	19 00-0662	EA	Size 5, Class I, Type A Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,501.59 436.71	727.56
26 24	19 00-0663		Class I, Type B <small>(26 24 19 00-0656)</small>		
26 24	19 00-0664	EA	Size 1, Class I, Type B Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	841.62 122.28	204.21
26 24	19 00-0665	EA	Size 2, Class I, Type B Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,136.67 167.97	280.02
26 24	19 00-0666	EA	Size 3, Class I, Type B Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,658.80 224.78	374.17
26 24	19 00-0667	EA	Size 4, Class I, Type B Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,725.64 325.21	540.47
26 24	19 00-0668	EA	Size 5, Class I, Type B Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,549.30 413.11	687.21
26 24	19 00-0669		Class I, Type C <small>(26 24 19 00-0656)</small>		
26 24	19 00-0670	EA	Size 1, Class I, Type C Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	876.28 114.50	190.76
26 24	19 00-0671	EA	Size 2, Class I, Type C Fused Disconnect Combination Starter <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,180.67 156.77	259.23



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Switchboards and Panelboards	26 24	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0672 EA Size 3, Class I, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,777.88 218.36	360.72
26 24 19 00-0673 EA Size 4, Class I, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,843.57 318.44	531.92
26 24 19 00-0674 EA Size 5, Class I, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	4,319.90 407.60	679.87
26 24 19 00-0675 Class II, Type B <small>(26 24 19 00-0656)</small>		
26 24 19 00-0676 EA Size 1, Class II, Type B Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,078.56 171.74	286.14
26 24 19 00-0677 EA Size 2, Class II, Type B Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,385.50 213.77	357.05
26 24 19 00-0678 EA Size 3, Class II, Type B Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,975.44 275.40	459.77
26 24 19 00-0679 EA Size 4, Class II, Type B Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,143.08 372.80	619.96
26 24 19 00-0680 EA Size 5, Class II, Type B Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,219.05 463.18	774.03
26 24 19 00-0681 Class II, Type C <small>(26 24 19 00-0656)</small>		
26 24 19 00-0682 EA Size 1, Class II, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,103.02 160.90	269.01
26 24 19 00-0683 EA Size 2, Class II, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,429.08 202.45	337.49
26 24 19 00-0684 EA Size 3, Class II, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	2,068.98 263.53	438.98
26 24 19 00-0685 EA Size 4, Class II, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	3,246.61 363.93	605.29
26 24 19 00-0686 EA Size 5, Class II, Type C Fused Disconnect Combination Starter..... <i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5,314.15 449.56	749.57
26 24 19 00-0687 Space Complete With Bus And Hardware <small>(26 24 19 00-0484)</small>		
26 24 19 00-0688 Circuit Breaker Type <small>(26 24 19 00-0687)</small>		
26 24 19 00-0689 EA Circuit Breaker Type, Size 1 Space Complete With Bus And Hardware.....	267.24	83.15
26 24 19 00-0690 EA Circuit Breaker Type, Size 2 Space Complete With Bus And Hardware.....	267.24	83.15
26 24 19 00-0691 EA Circuit Breaker Type, Size 3 Space Complete With Bus And Hardware.....	396.00	121.06
26 24 19 00-0692 EA Circuit Breaker Type, Size 4 Space Complete With Bus And Hardware.....	478.46	158.96
26 24 19 00-0693 EA Circuit Breaker Type, Size 5 Space Complete With Bus And Hardware.....	789.22	242.11
26 24 19 00-0694 Fused Disconnect Type <small>(26 24 19 00-0687)</small>		
26 24 19 00-0695 EA Fused Disconnect Type, Size 1 Space Complete With Bus And Hardware.....	267.24	83.15
26 24 19 00-0696 EA Fused Disconnect Type, Size 2 Space Complete With Bus And Hardware.....	360.36	121.06
26 24 19 00-0697 EA Fused Disconnect Type, Size 3 Space Complete With Bus And Hardware.....	495.90	158.96
26 24 19 00-0698 EA Fused Disconnect Type, Size 4 Space Complete With Bus And Hardware.....	837.88	242.11
26 24 19 00-0699 EA Fused Disconnect Type, Size 5 Space Complete With Bus And Hardware.....	1,176.00	352.16
26 24 19 00-0700 Blank Space For Future Expansion <small>(26 24 19 00-0687)</small>		
Note: Factory modified no labor costs.		
26 24 19 00-0701 EA Blank Space For Future Expansion, Size 1 Factory Modified, No Crew Costs.....	101.55	
26 24 19 00-0702 EA Blank Space For Future Expansion, Size 2 Factory Modified, No Crew Costs.....	101.55	
26 24 19 00-0703 EA Blank Space For Future Expansion, Size 3 Factory Modified, No Crew Costs.....	153.96	
26 24 19 00-0704 EA Blank Space For Future Expansion, Size 4 Factory Modified, No Crew Costs.....	153.96	
26 24 19 00-0705 EA Blank Space For Future Expansion, Size 5 Factory Modified, No Crew Costs.....	306.28	
26 24 19 00-0706 Structure Combination Of Starters To 72" High <small>(26 24 19 00-0687)</small>		
26 24 19 00-0707 EA Structure Combination Of Starters To 72" High.....	2,937.93	643.56
26 24 19 00-0708 Motor Control Center Basic Distribution Section <small>(26 24 19 00-0484)</small>		
26 24 19 00-0709 EA 20" Wide Basic Section With Vertical Wireway..... <i>For 2,000 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 1 With Gasket, Add</i> <i>For 600 Amperes, Tin Plated Copper Vertical, Add</i> <i>For 1,200 Amperes, Tin Plated Copper Bus, Add</i> <i>For 1,600 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 12, Add</i> <i>For 20" Cabinet Depth, Add</i> <i>For 800 Amperes, Tin Plated Copper Bus, Add</i>	5,245.72 506.00 97.00 210.00 334.00 402.00 245.00 108.00 182.00	1,675.96

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 24	19 00-0710	EA	25" To 35" Wide Basic Section (No Vertical Wireway)..... <i>For 2,000 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 1 With Gasket, Add</i> <i>For 600 Amperes, Tin Plated Copper Vertical, Add</i> <i>For 1,200 Amperes, Tin Plated Copper Bus, Add</i> <i>For 1,600 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 12, Add</i> <i>For 20" Cabinet Depth, Add</i> <i>For 800 Amperes, Tin Plated Copper Bus, Add</i>	5,245.72 506.00 97.00 210.00 334.00 402.00 245.00 108.00 182.00	1,675.96
26 24	19 00-0711	EA	25" Wide Basic Section With 9" Wide Vertical Wireway..... <i>For 2,000 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 1 With Gasket, Add</i> <i>For 600 Amperes, Tin Plated Copper Vertical, Add</i> <i>For 1,200 Amperes, Tin Plated Copper Bus, Add</i> <i>For 1,600 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 12, Add</i> <i>For 20" Cabinet Depth, Add</i> <i>For 800 Amperes, Tin Plated Copper Bus, Add</i>	5,691.96 506.00 97.00 210.00 334.00 402.00 245.00 108.00 182.00	1,675.96
26 24	19 00-0712	EA	Corner Section..... <i>For 2,000 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 1 With Gasket, Add</i> <i>For 600 Amperes, Tin Plated Copper Vertical, Add</i> <i>For 1,200 Amperes, Tin Plated Copper Bus, Add</i> <i>For 1,600 Amperes, Tin Plated Copper Bus, Add</i> <i>For NEMA 12, Add</i> <i>For 20" Cabinet Depth, Add</i> <i>For 800 Amperes, Tin Plated Copper Bus, Add</i>	5,691.96 506.00 97.00 210.00 334.00 402.00 245.00 108.00 182.00	1,675.96

26 24 19 00-0713 Motor Control Center Starters With HMCP Circuit Breaker (26 24 19 00-0484)
Note: Includes door, unit support pan, heater elements, and NEMA 1 with gasket, or NEMA 12 enclosure. Line voltages of 208 V, 240 V, 480 V, and 600 V.

26 24 19 00-0714 FVNR Starters With HMCP Circuit Breaker	<small>(26 24 19 00-0713)</small>				
26 24 19 00-0715	EA	Class 1, Type A, Size 1 FVNR Starters With HMCP Circuit Breaker.....	1,247.20	235.39	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	141.22		
26 24 19 00-0716	EA	Class 1, Type A, Size 2 FVNR Starters With HMCP Circuit Breaker.....	1,387.67	261.06	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	156.63		
26 24 19 00-0717	EA	Class 1, Type A, Size 3 FVNR Starters With HMCP Circuit Breaker.....	2,347.77	350.94	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	210.59		
26 24 19 00-0718	EA	Class 1, Type A, Size 4 FVNR Starters With HMCP Circuit Breaker.....	3,378.89	462.70	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	277.66		
26 24 19 00-0719	EA	Class 1, Type A, Size 5 FVNR Starters With HMCP Circuit Breaker.....	7,430.52	578.26	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	346.99		
26 24 19 00-0720	EA	Class 1, Type A, Size 6 FVNR Starters With HMCP Circuit Breaker.....	16,936.98	578.26	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	346.99		
26 24 19 00-0721	EA	Class 1, Type B, Size 1 FVNR Starters With HMCP Circuit Breaker.....	1,239.74	203.60	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	122.15		
26 24 19 00-0722	EA	Class 1, Type B, Size 2 FVNR Starters With HMCP Circuit Breaker.....	1,398.01	229.27	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	137.56		
26 24 19 00-0723	EA	Class 1, Type B, Size 3 FVNR Starters With HMCP Circuit Breaker.....	2,374.22	313.04	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	187.81		
26 24 19 00-0724	EA	Class 1, Type B, Size 4 FVNR Starters With HMCP Circuit Breaker.....	3,358.93	424.31	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	254.61		
26 24 19 00-0725	EA	Class 1, Type B, Size 5 FVNR Starters With HMCP Circuit Breaker.....	7,426.45	547.81	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	328.71		
26 24 19 00-0726	EA	Class 1, Type B, Size 6 FVNR Starters With HMCP Circuit Breaker.....	17,035.20	547.81	
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	328.71		

26 24 19 00-0727 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker	<small>(26 24 19 00-0713)</small>			
26 24 19 00-0728	EA	Class 1, Type A, Size 1 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	1,950.48	294.58
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	176.70	
26 24 19 00-0729	EA	Class 1, Type A, Size 2 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	2,372.69	325.87
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	195.54	
26 24 19 00-0730	EA	Class 1, Type A, Size 3 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	3,853.64	438.00
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	262.78	
26 24 19 00-0731	EA	Class 1, Type A, Size 4 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	6,529.89	578.99
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	347.39	
26 24 19 00-0732	EA	Class 1, Type A, Size 5 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	11,609.19	724.39
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	434.64	
26 24 19 00-0733	EA	Class 1, Type B, Size 1 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	1,955.41	254.34
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	152.59	
26 24 19 00-0734	EA	Class 1, Type B, Size 2 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	2,396.80	286.75
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	172.07	
26 24 19 00-0735	EA	Class 1, Type B, Size 3 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	3,892.35	391.91
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	235.15	
26 24 19 00-0736	EA	Class 1, Type B, Size 4 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	6,518.70	530.69
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	318.44	
26 24 19 00-0737	EA	Class 1, Type B, Size 5 Two Speed 2-Winding (TS2W) With HMCP Circuit Breaker.....	11,616.53	685.37
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	411.25	

26 24 19 00-0738 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker (26 24 19 00-0713)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 24 19 00-0739 EA Class 1, Type A, Size 1 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	2,121.09	294.58
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>176.70</i>	
26 24 19 00-0740 EA Class 1, Type A, Size 2 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	2,965.28	325.87
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>195.54</i>	
26 24 19 00-0741 EA Class 1, Type A, Size 3 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	5,494.91	438.00
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>262.78</i>	
26 24 19 00-0742 EA Class 1, Type A, Size 4 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	7,472.79	578.99
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>347.39</i>	
26 24 19 00-0743 EA Class 1, Type A, Size 5 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	14,731.35	724.39
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>434.64</i>	
26 24 19 00-0744 EA Class 1, Type B, Size 1 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	2,126.02	254.34
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>152.59</i>	
26 24 19 00-0745 EA Class 1, Type B, Size 2 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	2,989.39	286.75
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>172.07</i>	
26 24 19 00-0746 EA Class 1, Type B, Size 3 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	5,533.62	391.91
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>235.15</i>	
26 24 19 00-0747 EA Class 1, Type B, Size 4 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	7,461.61	530.69
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>318.44</i>	
26 24 19 00-0748 EA Class 1, Type B, Size 5 Two Speed 1-Winding (TS1W) With HMCP Circuit Breaker.....	14,738.69	685.37
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>411.25</i>	
26 24 19 00-0749 Motor Control Center Starters With Fusible Disconnect <small>(26 24 19 00-0484)</small>		
<i>Note: Includes fuses, door, unit support pan, heater elements, and NEMA 1 with gasket, or NEMA 12 enclosure. Line voltages of 208 V, 240 V, 480 V, and 600 V.</i>		
26 24 19 00-0750 FVNR Starters With Fusible Disconnect <small>(26 24 19 00-0749)</small>		
26 24 19 00-0751 EA Class 1, Type A, Size 1 FVNR Starters With Fusible Disconnect.....	1,028.85	229.52
26 24 19 00-0752 EA Class 1, Type A, Size 2 FVNR Starters With Fusible Disconnect.....	1,348.40	311.93
26 24 19 00-0753 EA Class 1, Type A, Size 3 FVNR Starters With Fusible Disconnect.....	2,183.60	406.46
26 24 19 00-0754 EA Class 1, Type A, Size 4 FVNR Starters With Fusible Disconnect.....	3,617.65	572.51
26 24 19 00-0755 EA Class 1, Type A, Size 5 FVNR Starters With Fusible Disconnect.....	7,027.83	727.80
26 24 19 00-0756 EA Class 1, Type A, Size 6 FVNR Starters With Fusible Disconnect.....	17,177.98	727.80
26 24 19 00-0757 EA Class 1, Type B, Size 1 FVNR Starters With Fusible Disconnect.....	1,032.24	203.48
26 24 19 00-0758 EA Class 1, Type B, Size 2 FVNR Starters With Fusible Disconnect.....	1,357.31	279.41
26 24 19 00-0759 EA Class 1, Type B, Size 3 FVNR Starters With Fusible Disconnect.....	2,222.19	374.66
26 24 19 00-0760 EA Class 1, Type B, Size 4 FVNR Starters With Fusible Disconnect.....	3,613.62	542.07
26 24 19 00-0761 EA Class 1, Type B, Size 5 FVNR Starters With Fusible Disconnect.....	7,006.01	688.56
26 24 19 00-0762 EA Class 1, Type B, Size 6 FVNR Starters With Fusible Disconnect.....	17,258.52	688.56
26 24 19 00-0763 Two Speed 2-Winding (TS2W) With Fusible Disconnect <small>(26 24 19 00-0749)</small>		
26 24 19 00-0764 EA Class 1, Type A, Size 1 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	1,710.88	287.36
26 24 19 00-0765 EA Class 1, Type A, Size 2 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	2,377.89	389.94
26 24 19 00-0766 EA Class 1, Type A, Size 3 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	3,627.08	507.82
26 24 19 00-0767 EA Class 1, Type A, Size 4 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	7,405.41	717.65
26 24 19 00-0768 EA Class 1, Type A, Size 5 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	11,861.66	839.81
26 24 19 00-0769 EA Class 1, Type B, Size 1 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	1,729.45	254.34
26 24 19 00-0770 EA Class 1, Type B, Size 2 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	2,398.35	348.98
26 24 19 00-0771 EA Class 1, Type B, Size 3 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	3,679.99	468.82
26 24 19 00-0772 EA Class 1, Type B, Size 4 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	7,408.15	676.32
26 24 19 00-0773 EA Class 1, Type B, Size 5 Two Speed 2-Winding (TS2W) With Fusible Disconnect.....	11,851.23	792.01
26 24 19 00-0774 Two Speed 1-Winding (TS1W) With Fusible Disconnect <small>(26 24 19 00-0749)</small>		
26 24 19 00-0775 EA Class 1, Type A, Size 1 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	1,967.93	287.36
26 24 19 00-0776 EA Class 1, Type A, Size 2 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	2,979.57	389.94
26 24 19 00-0777 EA Class 1, Type A, Size 3 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	5,285.41	507.82
26 24 19 00-0778 EA Class 1, Type A, Size 4 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	7,751.18	717.65
26 24 19 00-0779 EA Class 1, Type A, Size 5 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	14,349.15	839.81
26 24 19 00-0780 EA Class 1, Type B, Size 1 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	1,987.26	254.34
26 24 19 00-0781 EA Class 1, Type B, Size 2 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	3,000.04	348.98
26 24 19 00-0782 EA Class 1, Type B, Size 3 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	5,338.32	468.82
26 24 19 00-0783 EA Class 1, Type B, Size 4 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	7,753.92	676.32
26 24 19 00-0784 EA Class 1, Type B, Size 5 Two Speed 1-Winding (TS1W) With Fusible Disconnect.....	14,338.72	792.01
26 24 19 00-0785 Tin Plated Copper Bus Bar And Ground Bus Bar Splice Kit <small>(26 24 19 00-0484)</small>		
<i>Note: Per section. Labor is included in basic distribution section.</i>		
26 24 19 00-0786 EA 600 Amperes, Horizontal Tin Plated Copper Bus Kit.....	203.50	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>9.19</i>	
26 24 19 00-0787 EA 800 Amperes, Horizontal Tin Plated Copper Bus Kit.....	247.48	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>9.19</i>	
26 24 19 00-0788 EA 1,200 Amperes, Horizontal Tin Plated Copper Bus Kit.....	297.58	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>11.02</i>	
26 24 19 00-0789 EA 1,600 Amperes, Horizontal Tin Plated Copper Bus Kit.....	384.03	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>11.02</i>	
26 24 19 00-0790 EA 2,000 Amperes, Horizontal Tin Plated Copper Bus Kit.....	638.86	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>12.86</i>	
26 24 19 00-0791 EA 1/4" x 2" Horizontal Tin Plated Copper Ground Bus Kit.....	118.51	
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	<i>7.35</i>	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 24 Switchboards and Panelboards**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 24 19 00-0792	Disconnect Switch For Motor Control Centers <small>(26 24 19 00-0484)</small>		
26 24 19 00-0793	3 Pole Circuit Breaker Disconnect For Motor Control Center <small>(26 24 19 00-0792)</small> Note: Includes door, unit support pan, inverse time (Thermal Magnetic) circuit breaker, and NEMA 1, NEMA 1 with gasket, or NEMA 12 enclosure. Class 1 type A (no starters).		
26 24 19 00-0794	EA 150 Amperes Rating, 15 To 100 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	866.72	176.70
26 24 19 00-0795	EA 150 Amperes Rating, 125 To 150 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	1,473.80	195.65
26 24 19 00-0796	EA 225 Amperes Rating, 70 To 225 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	1,807.39	263.51
26 24 19 00-0797	EA 400 Amperes Rating, 125 To 400 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	2,964.99	347.27
26 24 19 00-0798	EA 600 Amperes Rating, 300 To 600 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	5,059.85	434.09
26 24 19 00-0799	EA 800 Amperes Rating, 400 To 800 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	5,748.91	434.09
26 24 19 00-0800	EA 1,200 Amperes Rating, 600 To 1,200 Amperes Trip Range, 3 Pole Circuit Breaker Disconnect.....	11,710.98	543.53
26 24 19 00-0801	Fusible Disconnect Switch For Motor Control Center <small>(26 24 19 00-0792)</small> Note: Includes door, unit support pan, fuses and NEMA 1, NEMA 1 with gasket, or NEMA 12 enclosure. Class 1 type A (no starters).		
26 24 19 00-0802	EA 30 Amperes Switch Rating, Fusible Disconnect Switch With 30 Amperes Fuse Clips.....	718.93	171.81
26 24 19 00-0803	EA 60 Amperes Switch Rating, Fusible Disconnect Switch With 60 Amperes Fuse Clips.....	866.45	234.16
26 24 19 00-0804	EA 100 Amperes Switch Rating, Fusible Disconnect Switch With 100 Amperes Fuse Clips.....	1,174.69	299.59
26 24 19 00-0805	EA 200 Amperes Switch Rating, Fusible Disconnect Switch With 200 Amperes Fuse Clips.....	2,113.01	429.20
26 24 19 00-0806	EA 400 Amperes Switch Rating, Fusible Disconnect Switch With 400 Amperes Fuse Clips.....	3,624.77	545.86
26 24 19 00-0807	EA 600 Amperes Switch Rating, Fusible Disconnect Switch With 600 Amperes Fuse Clips.....	7,901.39	545.86
26 24 19 00-0808	EA 800 Amperes Switch Rating, Fusible Disconnect Switch With 800 Amperes Fuse Clips.....	9,772.37	682.32
26 24 19 00-0809	EA 1,200 Amperes Switch Rating, Fusible Disconnect Switch With 1,200 Amperes Fuse Clips.....	14,249.18	682.32
26 24 19 00-0810	Control Circuit Transformer <small>(26 24 19 00-0484)</small>		
26 24 19 00-0811	EA Control Circuit Transformer, Size 1 Factory Installed.....	54.17	
26 24 19 00-0812	EA Control Circuit Transformer, Size 2 Factory Installed.....	54.17	
26 24 19 00-0813	EA Control Circuit Transformer, Size 3 Factory Installed.....	104.34	
26 24 19 00-0814	EA Control Circuit Transformer, Size 4 Factory Installed.....	104.34	
26 24 19 00-0815	EA Control Circuit Transformer, Size 5 Factory Installed.....	144.95	
26 24 19 00-0816	EA Control Circuit Fuse And Holder Small Dim, Dual Element Time Delay.....	49.20	13.84
26 24 19 00-0817	Cover Mounted Control Devices <small>(26 24 19 00-0484)</small>		
26 24 19 00-0818	EA Control Device, 2 Unit Push Button Station Cover Mounted.....	105.12	24.45
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	15.29	
26 24 19 00-0819	EA Control Device, 2-3 Unit Selector Switch Cover Mounted.....	119.87	24.45
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	19.11	
26 24 19 00-0820	EA Control Device, Pilot Light Cover Mounted.....	96.35	24.45
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.45	
26 24 19 00-0821	EA Control Device, Hand-Off-Auto Switch Cover Mounted With Pilot Light.....	279.41	83.15
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	50.12	
26 24 19 00-0822	EA Auxiliary Contact Add Per Starter.....	296.57	31.67
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	19.01	
26 24 19 00-0823	Extra Interlocks <small>(26 24 19 00-0484)</small> Note: Per contact.		
26 24 19 00-0824	EA Extra Interlocks, Class I, Type A Per Contact.....	69.87	15.89
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.45	
26 24 19 00-0825	EA Extra Interlocks, Class I, Type B Per Contact.....	92.52	15.89
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.45	
26 24 19 00-0826	EA Extra Interlocks, Class I, Type C Per Contact.....	99.78	15.89
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.55	
26 24 19 00-0827	EA Extra Interlocks, Class II, Type B Per Contact.....	88.89	15.89
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.64	
26 24 19 00-0828	EA Extra Interlocks, Class II, Type C Per Contact.....	91.69	15.89
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.77	
26 24 19 00-0829	Special Cabinet Provisions <small>(26 24 19 00-0484)</small>		
26 24 19 00-0830	EA Provisions For Bus Duct Entrance Special Cabinet Provisions.....	678.19	
26 24 19 00-0831	Nameplate Requirements <small>(26 24 19 00-0484)</small>		
26 24 19 00-0832	EA Special Cabinet Nameplate Requirements.....	24.08	
26 24 19 00-0833	Auxiliary Relays <small>(26 24 19 00-0484)</small>		
26 24 19 00-0834	EA Industrial Control Relay, 10 Amperes, Class A600 With 2 Contacts.....	150.42	30.62
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.37	
26 24 19 00-0835	EA Timing Relay, Solid State, DPDT 0.1-1.0 Sec Variable, Off-Delay.....	143.17	27.55
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.37	
26 24 19 00-0836	EA General Purpose Control Relay, 240 Volt AC, 10 Amperes, With Base.....	89.11	27.55
	<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.37	
26 24 19 00-0837	Motor Control Center Accessories <small>(26 24 19 00-0484)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 24 19 00-0838

Lighting Transformer With Circuit Breaker (26 24 19 00-0837)

Note: For 240 V, 480 V, or 600 V primary. Includes door, unit support pan, and NEMA 1, NEMA 1 with gasket, or NEMA 12 enclosure for MCC only.

26 24 19 00-0839	EA	1 Phase, 5 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	4,158.17	392.38
26 24 19 00-0840	EA	1 Phase, 7.5 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	4,323.31	408.09
26 24 19 00-0841	EA	1 Phase, 10 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	4,726.09	439.47
26 24 19 00-0842	EA	1 Phase, 15 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	5,892.89	470.87
26 24 19 00-0843	EA	1 Phase, 25 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	7,846.04	502.25
26 24 19 00-0844	EA	1 Phase, 37.5 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	9,607.43	565.04
26 24 19 00-0845	EA	1 Phase, 50 KVA, 120/240 Volt Secondary Lighting Transformer With Circuit Breaker.....	12,556.00	627.82
26 24 19 00-0846	EA	3 Phase, 10 KVA, 120/208 Volt Secondary Lighting Transformer With Circuit Breaker.....	7,423.18	517.95
26 24 19 00-0847	EA	3 Phase, 15 KVA, 120/208 Volt Secondary Lighting Transformer With Circuit Breaker.....	8,066.27	565.04
26 24 19 00-0848	EA	3 Phase, 25 KVA, 120/208 Volt Secondary Lighting Transformer With Circuit Breaker.....	9,214.66	627.82
26 24 19 00-0849	EA	3 Phase, 30 KVA, 120/208 Volt Secondary Lighting Transformer With Circuit Breaker.....	9,790.28	690.60
26 24 19 00-0850	EA	3 Phase, 37.5 KVA, 120/208 Volt Secondary Lighting Transformer With Circuit Breaker.....	11,764.87	753.38
26 24 19 00-0851	EA	3 Phase, 45 KVA, 120/208 Volt Secondary Lighting Transformer With Circuit Breaker.....	12,162.15	816.16

26 24 19 00-0852

Bolt-On Lighting Panel (26 24 19 00-0837)

Note: Includes door, T-handle, unit support pan, neutral bar (10 KA IC RMS), and NEMA 1, NEMA 1 with gasket, or NEMA 12 enclosure. For MCC only.

26 24 19 00-0853	EA	18 Circuit Bolt-On Lighting Panel, MLO, 1 Phase, 3 Wire, 120/240 Volt.....	2,008.39	636.34
26 24 19 00-0854	EA	30 Circuit Bolt-On Lighting Panel, MLO, 1 Phase, 3 Wire, 120/240 Volt.....	3,193.36	1,107.61
26 24 19 00-0855	EA	42 Circuit Bolt-On Lighting Panel, MLO, 1 Phase, 3 Wire, 120/240 Volt.....	4,258.05	1,498.53
26 24 19 00-0856	EA	18 Circuit Bolt-On Lighting Panel, MLO, 3 Phase, 4 Wire, 120/208 Volt.....	2,112.73	688.56
26 24 19 00-0857	EA	30 Circuit Bolt-On Lighting Panel, MLO, 3 Phase, 4 Wire, 120/208 Volt.....	3,146.23	1,084.01
26 24 19 00-0858	EA	42 Circuit Bolt-On Lighting Panel, MLO, 3 Phase, 4 Wire, 120/208 Volt.....	4,445.37	1,592.20
26 24 19 00-0859	EA	18 Circuit Bolt-On Lighting Panel, MCB, 1 Phase, 3 Wire, 120/240 Volt.....	3,209.46	738.08
26 24 19 00-0860	EA	30 Circuit Bolt-On Lighting Panel, MCB, 1 Phase, 3 Wire, 120/240 Volt.....	4,381.80	1,184.89
26 24 19 00-0861	EA	42 Circuit Bolt-On Lighting Panel, MCB, 1 Phase, 3 Wire, 120/240 Volt.....	5,535.00	1,592.20
26 24 19 00-0862	EA	18 Circuit Bolt-On Lighting Panel, MCB, 3 Phase, 4 Wire, 120/208 Volt.....	3,325.55	796.03
26 24 19 00-0863	EA	30 Circuit Bolt-On Lighting Panel, MCB, 3 Phase, 4 Wire, 120/208 Volt.....	4,381.80	1,184.89
26 24 19 00-0864	EA	42 Circuit Bolt-On Lighting Panel, MCB, 3 Phase, 4 Wire, 120/208 Volt.....	5,637.71	1,643.55

26 24 19 00-0865

Factory Installed Bolt-On Branch Circuit Breaker (26 24 19 00-0837)

Note: For MCC lighting panel only.

26 24 19 00-0866	EA	15 To 30 Amperes, 1 Pole, Bolt-On Branch Circuit Breaker.....	20.59	
26 24 19 00-0867	EA	15 To 30 Amperes, 1 Pole (GFI) Bolt-On Branch Circuit Breaker.....	209.01	
26 24 19 00-0868	EA	15 To 50 Amperes, 2 Pole, Bolt-On Branch Circuit Breaker.....	40.24	
26 24 19 00-0869	EA	60 To 100 Amperes, 2 Pole, Bolt-On Branch Circuit Breaker.....	92.65	
26 24 19 00-0870	EA	15 To 50 Amperes, 3 Pole, Bolt-On Branch Circuit Breaker.....	108.56	
26 24 19 00-0871	EA	60 To 100 Amperes, 3 Pole, Bolt-On Branch Circuit Breaker.....	164.71	

26 24 19 00-0872

Blank Unit Door (BUD) (26 24 19 00-0837)

Note: With NEMA 1, NEMA 1 with gasket, or NEMA 12 enclosure. Factory installed.

26 24 19 00-0873	EA	6" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	55.74	
26 24 19 00-0874	EA	12" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	66.88	
26 24 19 00-0875	EA	18" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	100.32	
26 24 19 00-0876	EA	24" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	133.77	
26 24 19 00-0877	EA	30" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	200.65	
26 24 19 00-0878	EA	48" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	234.09	
26 24 19 00-0879	EA	72" High Blank Unit Door (BUD) With NEMA 1, NEMA 1 With Gasket, Or NEMA 12 Enclosure.....	267.53	

26 25 Enclosed Bus Assemblies (26 20)

26 25 13 Low-Voltage Busways (26 25)

26 25 13 00-0001 Plug-In Bus Duct (26 25 13)

Note: Based on an average of 100' horizontal run with a 15' maximum mounting height. Each 100' of bus duct includes 2 elbows, 1 end cap, and switchboard stub. Excludes hangers with anchors and hardware support.

26 25 13 00-0002 600 Volt, 3-Phase, 3-Wire, Copper Conductors (26 25 13 00-0001)

26 25 13 00-0003	LF	225 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	283.13	36.68
		For Up To 25, Add	70.78	
		For >25 To 50, Add	42.47	
		For >50 To 100, Add	21.23	
26 25 13 00-0004	LF	400 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	398.69	36.68
		For Up To 25, Add	99.67	
		For >25 To 50, Add	59.80	
		For >50 To 100, Add	29.90	
26 25 13 00-0005	LF	600 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	504.23	48.91
		For Up To 25, Add	126.06	
		For >25 To 50, Add	75.63	
		For >50 To 100, Add	37.82	
26 25 13 00-0006	LF	800 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	693.32	48.91
		For Up To 25, Add	173.33	
		For >25 To 50, Add	104.00	
		For >50 To 100, Add	52.00	

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 25 Enclosed Bus Assemblies



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 25 13 00-0007	LF		1,000 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	731.60	61.14
			<i>For Up To 25, Add</i>	182.90	
			<i>For >25 To 50, Add</i>	109.74	
			<i>For >50 To 100, Add</i>	54.87	
26 25 13 00-0008	LF		1,350 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	1,015.67	61.14
			<i>For Up To 25, Add</i>	253.92	
			<i>For >25 To 50, Add</i>	152.35	
			<i>For >50 To 100, Add</i>	76.18	
26 25 13 00-0009	LF		1,600 Amperes, Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	1,186.89	64.20
			<i>For Up To 25, Add</i>	296.72	
			<i>For >25 To 50, Add</i>	178.03	
			<i>For >50 To 100, Add</i>	89.02	
26 25 13 00-0010	LF		2,000 Amperes Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	1,442.40	66.03
			<i>For Up To 25, Add</i>	360.60	
			<i>For >25 To 50, Add</i>	216.36	
			<i>For >50 To 100, Add</i>	108.18	
26 25 13 00-0011	LF		2,500 Amperes Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	1,777.49	69.70
			<i>For Up To 25, Add</i>	444.37	
			<i>For >25 To 50, Add</i>	266.62	
			<i>For >50 To 100, Add</i>	133.31	
26 25 13 00-0012	LF		3,000 Amperes Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	2,052.59	81.32
			<i>For Up To 25, Add</i>	513.15	
			<i>For >25 To 50, Add</i>	307.89	
			<i>For >50 To 100, Add</i>	153.94	
26 25 13 00-0013	LF		4,000 Amperes Bus Duct 600 Volt, 3 Phase, 3 Wire Copper Conductors.....	2,374.15	88.65
			<i>For Up To 25, Add</i>	593.54	
			<i>For >25 To 50, Add</i>	356.12	
			<i>For >50 To 100, Add</i>	178.06	
26 25 13 00-0014			277/480 Volt, 3-Phase, 4-Wire, 100% Neutral, Copper Conductors <small>(26 25 13 00-0001)</small>		
26 25 13 00-0015	LF		225 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	457.97	36.68
			<i>For Up To 25, Add</i>	114.49	
			<i>For >25 To 50, Add</i>	68.70	
			<i>For >50 To 100, Add</i>	34.35	
26 25 13 00-0016	LF		400 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	658.93	36.68
			<i>For Up To 25, Add</i>	164.73	
			<i>For >25 To 50, Add</i>	98.84	
			<i>For >50 To 100, Add</i>	49.42	
26 25 13 00-0017	LF		600 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	745.03	48.91
			<i>For Up To 25, Add</i>	186.26	
			<i>For >25 To 50, Add</i>	111.75	
			<i>For >50 To 100, Add</i>	55.88	
26 25 13 00-0018	LF		800 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	945.67	48.91
			<i>For Up To 25, Add</i>	236.42	
			<i>For >25 To 50, Add</i>	141.85	
			<i>For >50 To 100, Add</i>	70.93	
26 25 13 00-0019	LF		1,000 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	1,152.34	61.14
			<i>For Up To 25, Add</i>	288.09	
			<i>For >25 To 50, Add</i>	172.85	
			<i>For >50 To 100, Add</i>	86.43	
26 25 13 00-0020	LF		1,350 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	1,490.33	61.14
			<i>For Up To 25, Add</i>	372.58	
			<i>For >25 To 50, Add</i>	223.55	
			<i>For >50 To 100, Add</i>	111.77	
26 25 13 00-0021	LF		1,600 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	1,924.82	63.34
			<i>For Up To 25, Add</i>	481.21	
			<i>For >25 To 50, Add</i>	288.72	
			<i>For >50 To 100, Add</i>	144.36	
26 25 13 00-0022	LF		2,000 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	2,315.92	66.03
			<i>For Up To 25, Add</i>	578.98	
			<i>For >25 To 50, Add</i>	347.39	
			<i>For >50 To 100, Add</i>	173.69	
26 25 13 00-0023	LF		2,500 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	2,869.49	69.09
			<i>For Up To 25, Add</i>	717.37	
			<i>For >25 To 50, Add</i>	430.42	
			<i>For >50 To 100, Add</i>	215.21	
26 25 13 00-0024	LF		3,000 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	3,312.62	81.32
			<i>For Up To 25, Add</i>	828.16	
			<i>For >25 To 50, Add</i>	496.89	
			<i>For >50 To 100, Add</i>	248.45	
26 25 13 00-0025	LF		4,000 Amperes Bus Duct 277/480 Volt, 3 Phase, 4 Wire Copper Conductors.....	3,838.71	88.65
			<i>For Up To 25, Add</i>	959.68	
			<i>For >25 To 50, Add</i>	575.81	
			<i>For >50 To 100, Add</i>	287.90	
26 25 13 00-0026			Cable Tap Boxes <small>(26 25 13 00-0001)</small>		
26 25 13 00-0027			600 Volt, 3-Phase, 3-Wire, Copper Conductors <small>(26 25 13 00-0026)</small>		
26 25 13 00-0028	EA		225 Amperes Cable Tap Box, 600 Volt, 3 Phase, 3 Wire	2,299.86	171.20
26 25 13 00-0029	EA		400 Amperes Cable Tap Box, 600 Volt, 3 Phase, 3 Wire	2,380.25	171.20
26 25 13 00-0030	EA		600 Amperes Cable Tap Box, 600 Volt, 3 Phase, 3 Wire	2,575.30	232.33
26 25 13 00-0031	EA		800 Amperes Cable Tap Box, 600 Volt, 3 Phase, 3 Wire	2,742.90	232.33
26 25 13 00-0032	EA		1,000 Amperes Cable Tap Box, 600 Volt, 3 Phase, 3 Wire	2,943.30	305.70



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Enclosed Bus Assemblies	26 25	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 25	13 00-0033	EA	1,350 Amperes Cable Tap Box, 600 Volt, 3 Phase, 3 Wire	3,225.33	305.70
26 25	13 00-0034		277/480 Volt, 3-Phase, 4-Wire, 100% Neutral, Copper Conductors (26 25 13 00-0026)		
26 25	13 00-0035	EA	225 Amperes Cable Tap Box 277/480 Volt, 3 Phase, 4 Wire	2,380.25	336.27
26 25	13 00-0036	EA	400 Amperes Cable Tap Box 277/480 Volt, 3 Phase, 4 Wire	2,589.33	336.27
26 25	13 00-0037	EA	600 Amperes Cable Tap Box 277/480 Volt, 3 Phase, 4 Wire	2,769.72	458.54
26 25	13 00-0038	EA	800 Amperes Cable Tap Box 277/480 Volt, 3 Phase, 4 Wire	3,112.73	458.54
26 25	13 00-0039	EA	1,000 Amperes Cable Tap Box 277/480 Volt, 3 Phase, 4 Wire	3,276.96	611.40
26 25	13 00-0040	EA	1,350 Amperes Cable Tap Box 277/480 Volt, 3 Phase, 4 Wire	3,726.84	611.40
26 25	13 00-0041		Bus Duct Plug-In Circuit Breaker (26 25 13 00-0001)		
26 25	13 00-0042		240 Volt, 3-Phase (26 25 13 00-0041)		
26 25	13 00-0043	EA	60 Amperes, 240 Volt, 3 Phase, Bus Duct Plug-In Circuit Breaker.....	1,041.89	122.28
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66.89	
26 25	13 00-0044	EA	100 Amperes, 240 Volt, 3 Phase, Bus Duct Plug-In Circuit Breaker.....	2,061.50	122.28
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	85.87	
26 25	13 00-0045		600 Volt, 3-Phase (26 25 13 00-0041)		
26 25	13 00-0046	EA	60 Amperes, 600 Volt, 3 Phase, Bus Duct Plug-in Circuit Breaker	1,998.24	122.28
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66.89	
26 25	13 00-0047	EA	100 Amperes, 600 Volt, 3 Phase, Bus Duct Plug-in Circuit Breaker	2,588.01	122.28
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	85.87	
26 25	13 00-0048		120/208 Volt, 3-Phase, 4-Wire (26 25 13 00-0041)		
26 25	13 00-0049	EA	60 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Bus Duct Plug-in Circuit Breaker.....	1,199.65	146.73
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	76.43	
26 25	13 00-0050	EA	100 Amperes, 120/208 Volt, 3 Phase, 4 Wire, Bus Duct Plug-in Circuit Breaker.....	1,434.16	146.73
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	95.53	
26 25	13 00-0051		277/480 Volt, 3-Phase, 4-Wire (26 25 13 00-0041)		
26 25	13 00-0052	EA	60 Amperes, 277/480 Volt, 3 Phase, 4 Wire, Bus Duct Plug-In Circuit Breaker	1,370.48	146.73
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	76.43	
26 25	13 00-0053	EA	100 Amperes, 277/480 Volt, 3 Phase, 4 Wire, Bus Duct Plug-In Circuit Breaker	2,103.10	146.73
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	95.53	
26 25	13 00-0054	EA	225 Amperes, 277/480 Volt, 3 Phase, 4 Wire, Bus Duct Plug-In Circuit Breaker	3,091.56	507.46
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	219.93	
26 25	13 00-0055	EA	400 Amperes, 277/480 Volt, 3 Phase, 4 Wire, Bus Duct Plug-In Circuit Breaker	7,367.40	507.46
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	477.65	
26 25	13 00-0056	EA	600 Amperes, 277/480 Volt, 3 Phase, 4 Wire, Bus Duct Plug-In Circuit Breaker	8,262.55	1,467.36
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	664.56	
26 25	13 00-0057	EA	800 Amperes, 277/480 Volt, 3 Phase, 4 Wire, Bus Duct Plug-In Circuit Breaker	10,420.11	1,467.36
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	1,175.76	
26 25	13 00-0058		Bus Duct Plug-In Fusible Switch (26 25 13 00-0001)		
26 25	13 00-0059		240 Volt, 3-Pole, 3-Fuse (26 25 13 00-0058)		
26 25	13 00-0060	EA	30 Amperes, 240 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,039.54	122.28
26 25	13 00-0061	EA	60 Amperes, 240 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,142.95	122.28
26 25	13 00-0062	EA	100 Amperes, 240 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,577.70	146.73
26 25	13 00-0063	EA	200 Amperes, 240 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	2,663.98	293.47
26 25	13 00-0064	EA	400 Amperes, 240 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	6,719.29	660.31
26 25	13 00-0065	EA	600 Amperes, 240 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	10,066.23	1,149.43
26 25	13 00-0066		600 Volt, 3-Pole, 3-Fuse (26 25 13 00-0058)		
26 25	13 00-0067	EA	30 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,079.29	134.50
26 25	13 00-0068	EA	60 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,180.14	134.50
26 25	13 00-0069	EA	100 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,589.59	134.50
26 25	13 00-0070	EA	200 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	2,727.52	281.25
26 25	13 00-0071	EA	400 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	6,686.63	635.85
26 25	13 00-0072	EA	600 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	10,297.82	1,222.79
26 25	13 00-0073	EA	800 Amperes, 600 Volt, 3 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	16,851.71	1,589.63
26 25	13 00-0074		120/208 Volt, 4-pole, 3 Fuse (26 25 13 00-0058)		
26 25	13 00-0075	EA	30 Amperes, 120/208 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,202.59	158.96
26 25	13 00-0076	EA	60 Amperes, 120/208 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,293.06	158.96
26 25	13 00-0077	EA	100 Amperes, 120/208 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,748.09	158.96
26 25	13 00-0078	EA	200 Amperes, 120/208 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	2,962.94	330.15
26 25	13 00-0079	EA	400 Amperes, 120/208 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	7,377.22	733.68
26 25	13 00-0080	EA	600 AAmperes, 120/208 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	10,741.54	1,124.96
26 25	13 00-0081		277/480 Volt, 4-pole, 3-Fuse (26 25 13 00-0058)		

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 25 Enclosed Bus Assemblies



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 25 13 00-0082	EA		30 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,241.88	158.96
26 25 13 00-0083	EA		60 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,332.34	134.88
26 25 13 00-0084	EA		100 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	1,863.94	183.42
26 25 13 00-0085	EA		200 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	3,086.93	330.15
26 25 13 00-0086	EA		400 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	7,377.22	733.68
26 25 13 00-0087	EA		600 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	10,741.54	1,124.96
26 25 13 00-0088	EA		800 Amperes, 277/480 Volt, 4 Phase, 3 Fuses, Bus Duct Plug-in Fusible Switch	16,976.84	1,491.81

26 25 16 Low-Voltage Cablebus Systems (26 25)

26 25 16 00-0001			Feeder Bus Duct <small>(26 25 16)</small> Note: Based on an average of 100' horizontal run with a 15' maximum mounting height. Each 100' of bus duct includes 2 elbows, 1 end cap, and switchboard stub. Excludes hangers with anchors and hardware support.		
26 25 16 00-0002			600 Volt, 3 Phase, 3 Wire, Ventilated Low Impedance <small>(26 25 16 00-0001)</small> Note: Copper conductors.		
26 25 16 00-0003	LF		800 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	829.01	51.35
			<i>For Up To 25, Add</i>	207.25	
			<i>For >25 To 50, Add</i>	124.35	
			<i>For >50 To 100, Add</i>	62.18	
26 25 16 00-0004	LF		1,000 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	840.65	51.35
			<i>For Up To 25, Add</i>	210.16	
			<i>For >25 To 50, Add</i>	126.10	
			<i>For >50 To 100, Add</i>	63.05	
26 25 16 00-0005	LF		1,350 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	1,099.03	51.35
			<i>For Up To 25, Add</i>	274.76	
			<i>For >25 To 50, Add</i>	164.85	
			<i>For >50 To 100, Add</i>	82.43	
26 25 16 00-0006	LF		1,600 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	1,319.17	51.35
			<i>For Up To 25, Add</i>	329.79	
			<i>For >25 To 50, Add</i>	197.88	
			<i>For >50 To 100, Add</i>	98.94	
26 25 16 00-0007	LF		2,000 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	1,611.91	51.35
			<i>For Up To 25, Add</i>	402.98	
			<i>For >25 To 50, Add</i>	241.79	
			<i>For >50 To 100, Add</i>	120.89	
26 25 16 00-0008	LF		3,000 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	2,199.88	122.28
			<i>For Up To 25, Add</i>	549.97	
			<i>For >25 To 50, Add</i>	329.98	
			<i>For >50 To 100, Add</i>	164.99	
26 25 16 00-0009	LF		4,000 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	3,039.26	122.28
			<i>For Up To 25, Add</i>	759.82	
			<i>For >25 To 50, Add</i>	455.89	
			<i>For >50 To 100, Add</i>	227.94	
26 25 16 00-0010	LF		5,000 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	3,595.85	122.28
			<i>For Up To 25, Add</i>	898.96	
			<i>For >25 To 50, Add</i>	539.38	
			<i>For >50 To 100, Add</i>	269.69	
26 25 16 00-0011	LF		6,000 Amperes, 600 Volt, 3 Phase, 3 Wire Copper Conductors, Bus Duct With Supports	4,428.12	122.28
			<i>For Up To 25, Add</i>	1,107.03	
			<i>For >25 To 50, Add</i>	664.22	
			<i>For >50 To 100, Add</i>	332.11	
26 25 16 00-0012			277/480 Volt, 3 Phase, 4 Wire, Half Neutral, Ventilated <small>(26 25 16 00-0001)</small> Note: Low impedance, copper conductors.		
26 25 16 00-0013	LF		800 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	949.77	55.03
			<i>For Up To 25, Add</i>	237.44	
			<i>For >25 To 50, Add</i>	142.47	
			<i>For >50 To 100, Add</i>	71.23	
26 25 16 00-0014	LF		1,000 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	965.14	55.03
			<i>For Up To 25, Add</i>	241.29	
			<i>For >25 To 50, Add</i>	144.77	
			<i>For >50 To 100, Add</i>	72.39	
26 25 16 00-0015	LF		1,350 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	1,240.96	55.03
			<i>For Up To 25, Add</i>	310.24	
			<i>For >25 To 50, Add</i>	186.14	
			<i>For >50 To 100, Add</i>	93.07	
26 25 16 00-0016	LF		1,600 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	1,471.04	55.03
			<i>For Up To 25, Add</i>	367.76	
			<i>For >25 To 50, Add</i>	220.66	
			<i>For >50 To 100, Add</i>	110.33	
26 25 16 00-0017	LF		2,000 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	1,776.66	55.03
			<i>For Up To 25, Add</i>	444.17	
			<i>For >25 To 50, Add</i>	266.50	
			<i>For >50 To 100, Add</i>	133.25	
26 25 16 00-0018	LF		3,000 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	2,728.85	94.16
			<i>For Up To 25, Add</i>	682.21	
			<i>For >25 To 50, Add</i>	409.33	
			<i>For >50 To 100, Add</i>	204.66	
26 25 16 00-0019	LF		4,000 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	3,422.38	94.16
			<i>For Up To 25, Add</i>	855.60	
			<i>For >25 To 50, Add</i>	513.36	
			<i>For >50 To 100, Add</i>	256.68	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Enclosed Bus Assemblies	26 25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 25 16 00-0020 LF 5,000 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	4,049.66	174.86
For Up To 25, Add	1,012.42	
For >25 To 50, Add	607.45	
For >50 To 100, Add	303.72	
26 25 16 00-0021 LF 6,000 Amperes, 277/480 Volt, 3 Phase, 4 Wire Copper Conductors, Bus Duct With Supports	4,993.01	174.86
For Up To 25, Add	1,248.25	
For >25 To 50, Add	748.95	
For >50 To 100, Add	374.48	

26 27 Low-Voltage Distribution Equipment (26 20)

26 27 13 Electricity Metering (26 27)

26 27 13 00-0001 Revenue Metering (26 27 13)

26 27 13 00-0002 Meter Socket Base (26 27 13 00-0001)

Note: NEMA 3R. See CSI section 26 27 13 00-0013 for meter.

26 27 13 00-0003 EA 100 Amperes, 1 Phase, 3 Wire, 4 Terminal Meter Socket With Bypass	276.44	79.48
26 27 13 00-0004 EA 100 Amperes, 1 Phase, 3 Wire, 5 Terminal Meter Socket With Bypass	292.97	79.48
26 27 13 00-0005 EA 150 Amperes, 1 Phase, 3 Wire, 4 Terminal Meter Socket With Bypass	326.93	88.65
26 27 13 00-0006 EA 150 Amperes, 1 Phase, 3 Wire, 5 Terminal Meter Socket With Bypass	337.54	88.65
26 27 13 00-0007 EA 200 Amperes, 1 Phase, 3 Wire, 4 Terminal Meter Socket With Bypass	377.40	97.82
26 27 13 00-0008 EA 200 Amperes, 1 Phase, 3 Wire, 5 Terminal Meter Socket With Bypass	382.10	97.82
26 27 13 00-0009 EA 200 Amperes, 3 Phase, 4 Wire, 7 Terminal Meter Socket With Bypass And Jaw Release	981.89	155.29
26 27 13 00-0010 EA 320 Amperes, 3 Phase, 4 Wire, 7 Terminal Meter Socket With Bypass And Jaw Release	1,253.25	173.64
26 27 13 00-0011 EA 400 Amperes, 3 Phase, 4 Wire, 7 Terminal Meter Socket With Bypass And Jaw Release	2,717.81	191.98
26 27 13 00-0012 EA Combination Motor And Current Transformer Cabinet, 15 To 30 Amperes, 13 Terminal, Underground, With Test Switch And Transformer, Socket Base	2,783.78	611.40

26 27 13 00-0013 Meter Device (26 27 13 00-0001)

Note: Direct read, with 15 minute demand. See CSI section 26 27 13 00-0002 for socket base.

26 27 13 00-0014 EA 100 Amperes, 120 Volt, Or 240 Volt, 1 Phase, KWH Meter	272.55	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.04	
26 27 13 00-0015 EA 150 Amperes, 120 Volt, Or 240 Volt, 1 Phase, KWH Meter	322.09	25.38
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.22	
26 27 13 00-0016 EA 200 Amperes, 120 Volt, Or 240 Volt, 1 Phase, KWH Meter	393.87	25.68
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.41	
26 27 13 00-0017 EA 200 Amperes, 120 Volt, Or 240 Volt, 3 Phase, KWH Meter	767.29	25.97
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	15.62	
26 27 13 00-0018 EA 320 Amperes, 120 Volt, Or 240 Volt, 3 Phase, KWH Meter	1,074.34	27.55
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	16.54	
26 27 13 00-0019 EA 400 Amperes, 120 Volt, Or 240 Volt, 3 Phase, KWH Meter	1,742.06	30.62
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.37	

26 27 13 00-0020 Current Transformer Enclosure (26 27 13 00-0001)

26 27 13 00-0021 EA 18" x 24" x 9", NEMA 3R, Screwed Cover, Current Transformer Enclosure	572.32	158.96
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26 27 13 00-0022 120/240 Volt Meter Center And Main Breaker, Indoor Housing (26 27 13 00-0001)

26 27 13 00-0023 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max., 2 Pole (26 27 13 00-0022)

26 27 13 00-0024 EA 3 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	1,061.75	76.43
26 27 13 00-0025 EA 4 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	1,397.07	91.71
26 27 13 00-0026 EA 5 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	1,730.62	106.99
26 27 13 00-0027 EA 6 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	2,005.35	122.28
26 27 13 00-0028 EA 7 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	2,609.78	137.56
26 27 13 00-0029 EA 8 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	2,818.57	152.84
26 27 13 00-0030 EA 10 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 125 Amperes Max	3,289.62	183.42

26 27 13 00-0031 1,200 Amperes Bus, 4 Jaw Sockets, 200 Amperes Max., 2 Pole (26 27 13 00-0022)

26 27 13 00-0032 EA 3 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 200 Amperes Max	1,952.85	76.43
26 27 13 00-0033 EA 4 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 200 Amperes Max	2,571.54	91.71
26 27 13 00-0034 EA 6 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 200 Amperes Max	3,541.61	122.28
26 27 13 00-0035 EA 7 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 200 Amperes Max	3,928.60	137.56
26 27 13 00-0036 EA 8 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 200 Amperes Max	4,939.36	152.84

26 27 13 00-0037 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole (26 27 13 00-0022)

26 27 13 00-0038 EA 3 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	1,625.48	106.99
26 27 13 00-0039 EA 4 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,133.67	122.28
26 27 13 00-0040 EA 5 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,609.78	137.56
26 27 13 00-0041 EA 6 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,068.08	152.84
26 27 13 00-0042 EA 7 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,864.98	168.14
26 27 13 00-0043 EA 8 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,055.96	183.42
26 27 13 00-0044 EA 10 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	5,025.99	213.99

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 27 Low-Voltage Distribution Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 27 13 00-0045		1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0022)</small>		
26 27 13 00-0046	EA	3 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,513.00	106.99
26 27 13 00-0047	EA	4 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,292.09	122.28
26 27 13 00-0048	EA	6 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,636.39	152.84
26 27 13 00-0049	EA	7 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,969.93	168.14
26 27 13 00-0050	EA	8 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	6,354.92	183.42
26 27 13 00-0051		120/208 Volt Meter Center And Main Breaker, Indoor Housing <small>(26 27 13 00-0001)</small>		
26 27 13 00-0052		800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max., 2 Pole <small>(26 27 13 00-0051)</small>		
26 27 13 00-0053	EA	3 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	1,156.48	91.71
26 27 13 00-0054	EA	4 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	1,511.42	106.99
26 27 13 00-0055	EA	5 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	1,864.56	122.28
26 27 13 00-0056	EA	6 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	2,164.24	137.56
26 27 13 00-0057	EA	7 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	2,658.18	152.84
26 27 13 00-0058	EA	8 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	2,866.96	168.14
26 27 13 00-0059	EA	10 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 125 Amperes Max	3,534.05	198.71
26 27 13 00-0060		1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0051)</small>		
26 27 13 00-0061	EA	3 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,054.71	91.71
26 27 13 00-0062	EA	4 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,709.05	106.99
26 27 13 00-0063	EA	6 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	3,910.77	137.56
26 27 13 00-0064	EA	7 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	4,297.78	152.84
26 27 13 00-0065	EA	8 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	5,201.65	168.14
26 27 13 00-0066		800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0051)</small>		
26 27 13 00-0067	EA	3 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	1,720.22	122.28
26 27 13 00-0068	EA	4 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,235.55	137.56
26 27 13 00-0069	EA	5 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,765.14	152.84
26 27 13 00-0070	EA	6 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,223.43	168.14
26 27 13 00-0071	EA	7 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,056.00	183.42
26 27 13 00-0072	EA	8 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,246.93	198.71
26 27 13 00-0073	EA	10 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	5,288.29	229.27
26 27 13 00-0074		1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0051)</small>		
26 27 13 00-0075	EA	3 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,632.70	122.28
26 27 13 00-0076	EA	4 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,465.25	137.56
26 27 13 00-0077	EA	6 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,969.96	168.14
26 27 13 00-0078	EA	7 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	5,196.55	183.42
26 27 13 00-0079	EA	8 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	6,599.40	198.71
26 27 13 00-0080		120/240 Volt Meter Center And Main Breaker, NEMA 3R Housing <small>(26 27 13 00-0001)</small>		
26 27 13 00-0081		800 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0080)</small>		
26 27 13 00-0082	EA	3 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	1,061.75	76.43
26 27 13 00-0083	EA	4 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	1,397.07	91.71
26 27 13 00-0084	EA	6 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,005.35	122.28
26 27 13 00-0085	EA	7 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,609.78	137.56
26 27 13 00-0086	EA	8 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	3,228.47	152.84
26 27 13 00-0087		1,200 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0080)</small>		
26 27 13 00-0088	EA	3 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	1,952.84	76.43
26 27 13 00-0089	EA	4 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,571.53	91.71
26 27 13 00-0090	EA	6 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	3,719.81	122.28
26 27 13 00-0091	EA	7 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	4,106.81	137.56
26 27 13 00-0092	EA	8 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 10,000 Amperes Interrupting Capacity	4,939.36	152.84
26 27 13 00-0093		800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0080)</small>		
26 27 13 00-0094	EA	3 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	1,625.48	106.99
26 27 13 00-0095	EA	4 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,133.67	122.28
26 27 13 00-0096	EA	6 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,068.08	152.84
26 27 13 00-0097	EA	7 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,864.98	168.14
26 27 13 00-0098	EA	8 Meters And Main, 120/240 Volt, 800 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,055.96	183.42



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 13 00-0099 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0080)</small>		
26 27 13 00-0100 EA 3 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,513.01	106.99
26 27 13 00-0101 EA 4 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,292.09	122.28
26 27 13 00-0102 EA 6 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,636.39	152.84
26 27 13 00-0103 EA 7 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,969.93	168.14
26 27 13 00-0104 EA 8 Meters And Main, 120/240 Volt, 1,200 Amperes Bus, 4 Jaw Sockets, 42,000 Amperes Interrupting Capacity	6,354.97	183.42
26 27 13 00-0105 120/208 Volt Meter Center And Main Breaker, NEMA 3R Housing <small>(26 27 13 00-0001)</small>		
26 27 13 00-0106 800 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0105)</small>		
26 27 13 00-0107 EA 3 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	1,156.48	91.71
26 27 13 00-0108 EA 4 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	1,511.42	106.99
26 27 13 00-0109 EA 6 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,164.24	137.56
26 27 13 00-0110 EA 7 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,836.39	152.84
26 27 13 00-0111 EA 8 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	3,223.40	168.14
26 27 13 00-0112 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0105)</small>		
26 27 13 00-0113 EA 3 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,054.70	91.71
26 27 13 00-0114 EA 4 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	2,709.04	106.99
26 27 13 00-0115 EA 6 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	3,732.56	137.56
26 27 13 00-0116 EA 7 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	4,119.56	152.84
26 27 13 00-0117 EA 8 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 10,000 Amperes Interrupting Capacity	5,201.62	168.14
26 27 13 00-0118 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0105)</small>		
26 27 13 00-0119 EA 3 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	1,720.20	122.28
26 27 13 00-0120 EA 4 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,235.53	137.56
26 27 13 00-0121 EA 6 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,223.40	168.14
26 27 13 00-0122 EA 7 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,055.96	183.42
26 27 13 00-0123 EA 8 Meters And Main, 120/208 Volt, 800 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,246.93	198.71
26 27 13 00-0124 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity, 2 Pole <small>(26 27 13 00-0105)</small>		
26 27 13 00-0125 EA 3 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	2,632.68	122.28
26 27 13 00-0126 EA 4 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	3,465.23	137.56
26 27 13 00-0127 EA 6 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	4,969.93	168.14
26 27 13 00-0128 EA 7 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	5,196.55	183.42
26 27 13 00-0129 EA 8 Meters And Main, 120/208 Volt, 1,200 Amperes Bus, 5 Jaw Sockets, 42,000 Amperes Interrupting Capacity	6,599.40	198.71
26 27 13 00-0130 Watt/Hour Meters <small>(26 27 13)</small>		
26 27 13 00-0131 EA Single Phase M-90 Meter, Socket, NEMA 3R Enclosure	1,220.43	73.37
26 27 13 00-0132 EA Three Phase M-90 Meter/Main Breaker Combination With Socket, NEMA 3R Enclosure	3,438.72	146.73
26 27 13 00-0133 EA Three Phase M-90 Meter In Line Secondary With Socket, NEMA 3R Enclosure	1,826.70	110.05
26 27 13 00-0134 EA Three Phase M-90 Meter, Primary Side Transformer Mount With Socket Totally Enclosed, NEMA 3R Enclosure	2,233.72	110.05
26 27 13 00-0135 EA Three Phase M-90 Meter, Primary Side Pole Mount With Socket, NEMA 3R Enclosure	1,886.49	110.05
26 27 13 00-0136 EA C.T. For M-90 Meter On Primary Side, NEMA 3R Enclosure	1,277.13	101.49
26 27 13 00-0137 EA P.T. For M-90 Meter On Primary Side, NEMA 3R Enclosure	2,183.49	183.42
26 27 13 00-0138 Watt/Hour Meter Systems <small>(26 27 13)</small>		
Note: Includes NEMA 3R enclosure with C.T. and NEMA 3R C.T. enclosure. systems with main breakers include an additional NEMA 3R enclosure.		
26 27 13 00-0139 Watt/Hour Meter System Without Main Breaker <small>(26 27 13 00-0138)</small>		
26 27 13 00-0140 EA 400 Amperes System; 200 Amperes M-90 Meter And Enclosure	5,599.24	733.80
26 27 13 00-0141 EA 600 To 800 Amperes System; 200 Amperes M-90 Meter And Enclosure	6,559.80	733.80
26 27 13 00-0142 Watt/Hour Meter System With Main Breaker <small>(26 27 13 00-0138)</small>		
26 27 13 00-0143 EA 400 Amperes System; 400 Amperes Main Breaker, 200 Amperes M-90 Meter And Enclosure	9,816.57	733.80
26 27 13 00-0144 EA 600 Amperes System; 600 Amperes Main Breaker, 200 Amperes M-90 Meter And Enclosure	11,911.12	733.80
26 27 13 00-0145 EA 800 Amperes System; 800 Amperes Main Breaker, 200 Amperes M-90 Meter And Enclosure	12,799.40	733.80
26 27 16 Electrical Cabinets and Enclosures <small>(26 27)</small>		
Note: Can be used as enclosure or pull/junction boxes.		
26 27 16 00-0001 NEMA 1 Enclosures, Lockable <small>(26 27 16)</small>		
26 27 16 00-0002 Hinged Cover, Galvanized Steel NEMA 1 Enclosures <small>(26 27 16 00-0001)</small>		

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 27 Low-Voltage Distribution Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 16 00-0003			4" Depth, Hinged Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0002)		
26 27 16 00-0004	EA		6" x 4" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	78.58	24.45
26 27 16 00-0005	EA		6" x 6" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	88.22	26.90
26 27 16 00-0006	EA		8" x 6" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	97.96	29.34
26 27 16 00-0007	EA		8" x 8" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	114.37	34.24
26 27 16 00-0008	EA		10" x 8" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	124.68	36.68
26 27 16 00-0009	EA		10" x 10" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	135.77	39.13
26 27 16 00-0010	EA		12" x 8" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	135.37	39.13
26 27 16 00-0011	EA		12" x 10" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	146.75	41.57
26 27 16 00-0012	EA		12" x 12" x 4" Hinged Cover, Galvanized Steel NEMA 1 Enclosure	158.72	44.02
26 27 16 00-0013	EA		16" x 12" x 4", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	205.55	58.70
26 27 16 00-0014	EA		16" x 16" x 4" Hinged Cover, Galvanized Steel NEMA 1 Enclosure	249.40	70.93
26 27 16 00-0015	EA		18" x 12" x 4" Hinged Cover, Galvanized Steel NEMA 1 Enclosure	236.73	68.48
26 27 16 00-0016			6" Depth, Hinged Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0002)		
26 27 16 00-0017	EA		6" x 6" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	98.74	29.34
26 27 16 00-0018	EA		8" x 8" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	120.13	34.24
26 27 16 00-0019	EA		10" x 8" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	143.28	41.57
26 27 16 00-0020	EA		10" x 10" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	154.95	44.02
26 27 16 00-0021	EA		12" x 10" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	166.87	46.46
26 27 16 00-0022	EA		12" x 12" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	179.36	48.91
26 27 16 00-0023	EA		16" x 12" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	227.49	63.59
26 27 16 00-0024	EA		16" x 16" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	275.61	78.26
26 27 16 00-0025	EA		18" x 12" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	265.72	75.82
26 27 16 00-0026	EA		18" x 18" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	346.21	97.82
26 27 16 00-0027	EA		24" x 18" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	446.72	112.50
26 27 16 00-0028	EA		24" x 24" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	511.59	122.28
26 27 16 00-0029	EA		30" x 24" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	570.70	129.61
26 27 16 00-0030	EA		36" x 24" x 6", Hinged Cover, Galvanized Steel NEMA 1 Enclosure	623.70	134.50
26 27 16 00-0031	EA		24-1/2" x 12-1/2" x 6-1/2", Hinged Cover, Galvanized Steel NEMA 1 Enclosure (Control Products MH3803L)	419.28	97.82
26 27 16 00-0032			Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0001)		
26 27 16 00-0033			3" Depth, Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0032)		
26 27 16 00-0034	EA		4" x 4" x 3" Screw Cover, Galvanized Steel NEMA 1 Enclosure	53.80	17.12
26 27 16 00-0035	EA		6" x 6" x 3" Screw Cover, Galvanized Steel NEMA 1 Enclosure	76.90	24.45
26 27 16 00-0036	EA		8" x 6" x 3" Screw Cover, Galvanized Steel NEMA 1 Enclosure	85.81	26.90
26 27 16 00-0037			4" Depth, Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0032)		
26 27 16 00-0038	EA		4" x 4" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	60.11	19.56
26 27 16 00-0039	EA		6" x 4" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	74.51	24.45
26 27 16 00-0040	EA		6" x 6" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	83.27	26.90
26 27 16 00-0041	EA		8" x 6" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	92.18	29.34
26 27 16 00-0042	EA		8" x 8" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	107.56	34.24
26 27 16 00-0043	EA		10" x 8" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	116.89	36.68
26 27 16 00-0044	EA		10" x 10" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	126.72	39.13
26 27 16 00-0045	EA		12" x 8" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	126.34	39.13
26 27 16 00-0046	EA		12" x 10" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	136.61	41.57
26 27 16 00-0047	EA		12" x 12" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	147.18	44.02
26 27 16 00-0048	EA		16" x 12" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	192.42	58.70
26 27 16 00-0049	EA		16" x 16" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	238.39	73.37
26 27 16 00-0050	EA		18" x 12" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	221.17	68.48
26 27 16 00-0051	EA		18" x 18" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	286.53	88.04
26 27 16 00-0052	EA		24" x 24" x 4" Screw Cover, Galvanized Steel NEMA 1 Enclosure	415.19	110.05
26 27 16 00-0053			6" Depth, Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0032)		
26 27 16 00-0054	EA		6" x 6" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	92.71	29.34
26 27 16 00-0055	EA		8" x 6" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	102.32	31.79
26 27 16 00-0056	EA		8" x 8" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	117.93	36.68
26 27 16 00-0057	EA		10" x 8" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	133.89	41.57
26 27 16 00-0058	EA		10" x 10" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	144.30	44.02
26 27 16 00-0059	EA		12" x 10" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	154.83	46.46
26 27 16 00-0060	EA		12" x 12" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	165.80	48.91
26 27 16 00-0061	EA		16" x 12" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	212.20	63.59
26 27 16 00-0062	EA		16" x 16" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	260.72	78.26
26 27 16 00-0063	EA		18" x 12" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	247.67	75.82
26 27 16 00-0064	EA		18" x 18" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	322.08	97.82
26 27 16 00-0065	EA		24" x 18" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	403.11	112.50
26 27 16 00-0066	EA		24" x 24" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	462.58	122.28
26 27 16 00-0067	EA		30" x 24" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	499.65	129.61
26 27 16 00-0068	EA		36" x 24" x 6" Screw Cover, Galvanized Steel NEMA 1 Enclosure	547.17	134.50
26 27 16 00-0069			8" Depth, Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0032)		
26 27 16 00-0070	EA		8" x 8" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure	133.89	41.57
26 27 16 00-0071	EA		12" x 12" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure	182.91	53.80



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Distribution Equipment	26 27	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 16 00-0072 EA 16" x 12" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	232.53	68.48
26 27 16 00-0073 EA 16" x 16" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	288.55	85.60
26 27 16 00-0074 EA 18" x 12" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	275.66	83.15
26 27 16 00-0075 EA 18" x 18" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	341.51	102.72
26 27 16 00-0076 EA 24" x 12" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	380.61	117.39
26 27 16 00-0077 EA 24" x 18" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	442.47	124.72
26 27 16 00-0078 EA 24" x 24" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	510.12	134.50
26 27 16 00-0079 EA 30" x 24" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	542.89	141.84
26 27 16 00-0080 EA 30" x 30" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	570.55	146.73
26 27 16 00-0081 EA 36" x 24" x 8" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	586.00	146.73
26 27 16 00-0082 10" Depth, Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0032)		
26 27 16 00-0083 EA 18" x 12" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	312.98	92.93
26 27 16 00-0084 EA 18" x 18" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	412.13	119.83
26 27 16 00-0085 EA 24" x 12" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	416.64	127.17
26 27 16 00-0086 EA 24" x 18" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	542.97	136.95
26 27 16 00-0087 EA 24" x 24" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	625.40	151.62
26 27 16 00-0088 EA 30" x 24" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	695.10	156.51
26 27 16 00-0089 EA 36" x 24" x 10" Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	741.77	163.86
26 27 16 00-0090 12" Depth, Screw Cover, Galvanized Steel NEMA 1 Enclosures (26 27 16 00-0032)		
26 27 16 00-0091 EA 18" x 18" x 12", Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	455.00	132.06
26 27 16 00-0092 EA 24" x 12" x 12", Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	452.48	139.40
26 27 16 00-0093 EA 24" x 18" x 12", Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	596.90	151.62
26 27 16 00-0094 EA 24" x 24" x 12", Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	682.60	166.30
26 27 16 00-0095 EA 30" x 24" x 12", Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	767.10	173.64
26 27 16 00-0096 EA 36" x 24" x 12", Screw Cover, Galvanized Steel NEMA 1 Enclosure.....	809.27	180.98
26 27 16 00-0097 NEMA 1 Enclosures For Up To 6 Boards, Lockable (26 27 16)		
26 27 16 00-0098 4.5" Depth, Hinged Cover, Powder Coated Steel, NEMA 1 Enclosures (26 27 16 00-0097)		
26 27 16 00-0099 EA 24" High x 18" Wide x 4.5" Deep, 18 Gauge, Powder Coated Steel, NEMA 1 Enclosure (RS2 Technologies NCL-12).....	1,220.94	107.61
26 27 16 00-0100 NEMA 12 Enclosures, Lockable (26 27 16)		
Note: Dust-tight enclosures.		
26 27 16 00-0101 Hinged Cover, Galvanized Steel NEMA 12 Enclosures (26 27 16 00-0100)		
26 27 16 00-0102 4" Depth, Hinged Cover, Galvanized Steel NEMA 12 Enclosures (26 27 16 00-0101)		
26 27 16 00-0103 EA 4" x 4" x 4" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	114.85	19.56
26 27 16 00-0104 EA 6" x 6" x 4" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	149.28	26.90
26 27 16 00-0105 EA 8" x 8" x 4" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	184.48	34.24
26 27 16 00-0106 EA 10" x 8" x 4" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	199.80	36.68
26 27 16 00-0107 EA 12" x 6" x 4" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	224.71	39.13
26 27 16 00-0108 EA 12" x 10" x 4" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	242.18	41.57
26 27 16 00-0109 6" Depth, Hinged Cover, Galvanized Steel NEMA 12 Enclosures (26 27 16 00-0101)		
26 27 16 00-0110 EA 6" x 6" x 6" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	165.83	29.34
26 27 16 00-0111 EA 8" x 6" x 6" Hinged Cover, Galvanized Steel NEMA 12 Enclosure.....	182.82	31.79
26 27 16 00-0112 Screw Cover, Galvanized Steel NEMA 12 Enclosures (26 27 16 00-0100)		
26 27 16 00-0113 4" Depth, Screw Cover, Galvanized Steel NEMA 12 Enclosures (26 27 16 00-0112)		
26 27 16 00-0114 EA 4" x 4" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	230.46	19.56
26 27 16 00-0115 EA 6" x 6" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	275.89	26.90
26 27 16 00-0116 EA 8" x 6" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	312.16	29.34
26 27 16 00-0117 EA 8" x 8" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	357.03	34.24
26 27 16 00-0118 EA 10" x 8" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	366.97	36.68
26 27 16 00-0119 EA 10" x 10" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	434.09	39.13
26 27 16 00-0120 EA 12" x 10" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	466.18	41.57
26 27 16 00-0121 EA 12" x 12" x 4" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	531.01	44.02
26 27 16 00-0122 6" Depth, Screw Cover, Galvanized Steel NEMA 12 Enclosures (26 27 16 00-0112)		
26 27 16 00-0123 EA 6" x 6" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	336.45	29.34
26 27 16 00-0124 EA 8" x 6" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	380.58	31.79
26 27 16 00-0125 EA 8" x 8" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	414.51	36.68
26 27 16 00-0126 EA 10" x 10" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	490.15	44.02
26 27 16 00-0127 EA 12" x 12" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	532.11	48.91
26 27 16 00-0128 EA 16" x 14" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	739.65	63.59
26 27 16 00-0129 EA 18" x 18" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	1,146.32	97.82
26 27 16 00-0130 EA 24" x 16" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	1,504.14	112.50
26 27 16 00-0131 EA 24" x 24" x 6" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	1,696.60	122.28

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 27 Low-Voltage Distribution Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 27 16 00-0132		8" Depth, Screw Cover, Galvanized Steel NEMA 12 Enclosures <small>(26 27 16 00-0112)</small>		
26 27 16 00-0133	EA	24" x 18" x 8" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	1,567.15	124.72
26 27 16 00-0134	EA	24" x 24" x 8" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	1,807.59	134.50
26 27 16 00-0135	EA	30" x 24" x 8" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	1,987.95	141.84
26 27 16 00-0136	EA	30" x 30" x 8" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	2,193.40	146.73
26 27 16 00-0137	EA	36" x 24" x 8" Screw Cover, Galvanized Steel NEMA 12 Enclosure.....	2,162.86	146.73
26 27 16 00-0138		NEMA 3 Enclosures, Lockable <small>(26 27 16)</small>		
		Note: Can be used underground or encased in concrete.		
26 27 16 00-0139		2" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0140	EA	4" x 4" x 2" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	319.08	85.60
26 27 16 00-0141		3" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0142	EA	4" x 4" x 3" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	342.48	85.60
26 27 16 00-0143	EA	5" x 5" x 3" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	437.18	88.65
26 27 16 00-0144	EA	6" x 4" x 3" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	453.10	88.65
26 27 16 00-0145	EA	6" x 6" x 3" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	568.82	91.71
26 27 16 00-0146		4" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0147	EA	4" x 4" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	432.87	88.65
26 27 16 00-0148	EA	5" x 5" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	474.51	88.65
26 27 16 00-0149	EA	6" x 4" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	494.61	91.71
26 27 16 00-0150	EA	6" x 6" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	622.51	91.71
26 27 16 00-0151	EA	8" x 6" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	684.25	97.82
26 27 16 00-0152	EA	8" x 8" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	736.51	103.94
26 27 16 00-0153	EA	10" x 6" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	766.93	103.94
26 27 16 00-0154	EA	10" x 8" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	911.70	106.99
26 27 16 00-0155	EA	12" x 6" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	988.96	110.05
26 27 16 00-0156	EA	12" x 12" x 4" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,353.49	122.28
26 27 16 00-0157		6" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0158	EA	6" x 6" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	657.43	94.77
26 27 16 00-0159	EA	8" x 6" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	828.29	106.99
26 27 16 00-0160	EA	8" x 8" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	970.25	110.05
26 27 16 00-0161	EA	10" x 8" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,117.97	113.11
26 27 16 00-0162	EA	10" x 10" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,189.72	113.11
26 27 16 00-0163	EA	12" x 8" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,353.10	122.28
26 27 16 00-0164	EA	12" x 12" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,565.11	137.56
26 27 16 00-0165	EA	16" x 6" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,474.81	131.45
26 27 16 00-0166	EA	18" x 12" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	2,867.23	244.56
26 27 16 00-0167	EA	18" x 18" x 6", Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	4,966.16	305.70
26 27 16 00-0168		8" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0169	EA	8" x 8" x 8" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,200.96	116.16
26 27 16 00-0170	EA	12" x 8" x 8" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,805.78	152.84
26 27 16 00-0171	EA	12" x 12" x 8" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	1,835.08	152.84
26 27 16 00-0172	EA	16" x 12" x 8" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	2,486.34	229.27
26 27 16 00-0173	EA	18" x 12" x 8" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	3,274.24	244.56
26 27 16 00-0174	EA	24" x 24" x 8" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	8,306.92	427.98
26 27 16 00-0175		10" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0176	EA	18" x 12" x 10" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	4,365.63	305.70
26 27 16 00-0177		12" Depth, Screw Cover, Galvanized Cast Iron NEMA 3 Enclosures <small>(26 27 16 00-0138)</small>		
26 27 16 00-0178	EA	18" x 18" x 12" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	6,713.38	366.83
26 27 16 00-0179	EA	24" x 12" x 12" Screw Cover, Galvanized Cast Iron NEMA 3 Enclosure.....	5,521.34	336.27
26 27 16 00-0180		NEMA 3R Enclosures, Lockable <small>(26 27 16)</small>		
		Note: Rain-tight enclosures.		
26 27 16 00-0181		Hinged Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0180)</small>		
26 27 16 00-0182		4" Depth, Hinged Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0181)</small>		
26 27 16 00-0183	EA	6" x 4" x 4" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	105.42	24.45
26 27 16 00-0184	EA	6" x 6" x 4" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	116.41	26.90
26 27 16 00-0185	EA	8" x 6" x 4" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	174.49	29.34

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 16 00-0186 6" Depth, Hinged Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0181)</small>		
26 27 16 00-0187 EA 12" x 10" x 6" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	288.40	46.46
26 27 16 00-0188 EA 12" x 12" x 6" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	312.06	48.91
26 27 16 00-0189 EA 16" x 12" x 6" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	406.30	63.59
26 27 16 00-0190 EA 16" x 16" x 6" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	485.41	78.26
26 27 16 00-0191 EA 18" x 18" x 6" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	552.68	97.82
26 27 16 00-0192 8" Depth, Hinged Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0181)</small>		
26 27 16 00-0193 EA 24" x 20" x 8" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	844.39	124.72
26 27 16 00-0194 EA 24" x 24" x 8" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	937.28	134.50
26 27 16 00-0195 EA 30" x 24" x 8" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,057.11	141.84
26 27 16 00-0196 EA 30" x 30" x 8" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,112.36	146.73
26 27 16 00-0197 10" Depth, Hinged Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0181)</small>		
26 27 16 00-0198 EA 12" x 48" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,047.66	151.62
26 27 16 00-0199 EA 12" x 54" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,183.49	171.20
26 27 16 00-0200 EA 12" x 60" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,310.18	189.54
26 27 16 00-0201 EA 12" x 66" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,443.57	209.10
26 27 16 00-0202 EA 12" x 72" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,571.49	227.44
26 27 16 00-0203 EA 18" x 18" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	677.61	119.83
26 27 16 00-0204 EA 24" x 24" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,047.65	151.62
26 27 16 00-0205 EA 30" x 24" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,245.32	156.51
26 27 16 00-0206 EA 36" x 36" x 10" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,582.10	171.20
26 27 16 00-0207 12" Depth, Hinged Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0181)</small>		
26 27 16 00-0208 EA 12" x 48" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,021.72	121.06
26 27 16 00-0209 EA 12" x 54" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,145.55	135.73
26 27 16 00-0210 EA 12" x 60" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,268.18	150.40
26 27 16 00-0211 EA 12" x 66" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,402.76	166.30
26 27 16 00-0212 EA 12" x 72" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,526.60	180.98
26 27 16 00-0213 EA 18" x 24" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	763.30	90.49
26 27 16 00-0214 EA 18" x 32" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,021.72	121.06
26 27 16 00-0215 EA 18" x 36" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,145.55	135.73
26 27 16 00-0216 EA 18" x 42" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,348.89	158.96
26 27 16 00-0217 EA 18" x 48" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,526.60	180.98
26 27 16 00-0218 EA 30" x 30" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,449.57	178.53
26 27 16 00-0219 EA 36" x 24" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,526.60	180.98
26 27 16 00-0220 EA 36" x 30" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,609.09	185.87
26 27 16 00-0221 EA 36" x 36" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,794.79	195.65
26 27 16 00-0222 EA 42" x 30" x 12" Hinged Cover, Galvanized Steel NEMA 3R Enclosure.....	1,948.03	205.43
26 27 16 00-0223 Screw Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0180)</small>		
26 27 16 00-0224 4" Depth, Screw Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0223)</small>		
26 27 16 00-0225 EA 4" x 4" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	75.59	19.56
26 27 16 00-0226 EA 6" x 4" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	91.17	24.45
26 27 16 00-0227 EA 6" x 6" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	100.70	26.90
26 27 16 00-0228 EA 8" x 6" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	111.78	29.34
26 27 16 00-0229 EA 8" x 8" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	129.76	34.24
26 27 16 00-0230 EA 10" x 8" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	141.59	36.68
26 27 16 00-0231 EA 10" x 10" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	154.51	39.13
26 27 16 00-0232 EA 12" x 8" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	153.78	39.13
26 27 16 00-0233 EA 12" x 10" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	168.40	41.57
26 27 16 00-0234 EA 12" x 12" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	181.32	44.02
26 27 16 00-0235 EA 18" x 12" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	273.43	68.48
26 27 16 00-0236 EA 18" x 18" x 4", Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	365.58	88.04
26 27 16 00-0237 6" Depth, Screw Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0223)</small>		
26 27 16 00-0238 EA 6" x 6" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	104.49	29.34
26 27 16 00-0239 EA 8" x 8" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	134.56	36.68
26 27 16 00-0240 EA 10" x 8" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	162.62	41.57
26 27 16 00-0241 EA 10" x 10" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	176.55	44.02
26 27 16 00-0242 EA 12" x 8" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	175.47	44.02
26 27 16 00-0243 EA 12" x 10" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	190.28	46.46
26 27 16 00-0244 EA 12" x 12" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	205.22	48.91
26 27 16 00-0245 EA 16" x 12" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	267.90	63.59
26 27 16 00-0246 EA 18" x 12" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	307.69	75.82
26 27 16 00-0247 EA 18" x 18" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	411.50	97.82
26 27 16 00-0248 EA 24" x 12" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	428.71	105.16
26 27 16 00-0249 EA 24" x 18" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	492.22	112.50
26 27 16 00-0250 EA 24" x 24" x 6" Screw Cover, Galvanized Steel NEMA 3R Enclosure.....	555.71	122.28
26 27 16 00-0251 8" Depth, Screw Cover, Galvanized Steel NEMA 3R Enclosures <small>(26 27 16 00-0223)</small>		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	26 27 16 00-0252	EA	12" x 12" x 8", Screw Cover, Galvanized Steel NEMA 3R Enclosure	229.98	53.80
	26 27 16 00-0253	EA	18" x 12" x 8", Screw Cover, Galvanized Steel NEMA 3R Enclosure	331.57	83.15
	26 27 16 00-0254	EA	18" x 18" x 8", Screw Cover, Galvanized Steel NEMA 3R Enclosure	455.47	107.61
	26 27 16 00-0255	EA	24" x 18" x 8", Screw Cover, Galvanized Steel NEMA 3R Enclosure	544.57	124.72
	26 27 16 00-0256	EA	24" x 24" x 8", Screw Cover, Galvanized Steel NEMA 3R Enclosure	618.06	134.50
	26 27 16 00-0257	EA	30" x 24" x 8", Screw Cover, Galvanized Steel NEMA 3R Enclosure	688.82	141.84
	26 27 16 00-0258		10" Depth, Screw Cover, Galvanized Steel NEMA 3R Enclosures (26 27 16 00-0223)		
	26 27 16 00-0259	EA	18" x 18" x 10" Screw Cover, Galvanized Steel NEMA 3R Enclosure	502.17	119.83
	26 27 16 00-0260	EA	24" x 24" x 10" Screw Cover, Galvanized Steel NEMA 3R Enclosure	678.55	151.62
	26 27 16 00-0261	EA	30" x 24" x 10" Screw Cover, Galvanized Steel NEMA 3R Enclosure	747.30	156.51
	26 27 16 00-0262		12" Depth, Screw Cover, Galvanized Steel NEMA 3R Enclosures (26 27 16 00-0223)		
	26 27 16 00-0263	EA	24" x 24" x 12" Screw Cover, Galvanized Steel NEMA 3R Enclosure	749.96	166.30
	26 27 16 00-0264	EA	30" x 30" x 12" Screw Cover, Galvanized Steel NEMA 3R Enclosure	1,059.23	180.98
	26 27 16 00-0265	EA	36" x 30" x 12" Screw Cover, Galvanized Steel NEMA 3R Enclosure	1,095.06	185.87
	26 27 16 00-0266	EA	36" x 36" x 12" Screw Cover, Galvanized Steel NEMA 3R Enclosure	1,287.02	195.65
	26 27 16 00-0267		NEMA 4 Enclosures, Lockable (26 27 16)		
			Note: Water-tight enclosures.		
	26 27 16 00-0268		Hinge Cover, Painted Steel NEMA 4 Enclosures (26 27 16 00-0267)		
	26 27 16 00-0269	EA	12" x 10" x 5" Hinge Cover, Painted Steel NEMA 4 Enclosure	258.75	44.02
	26 27 16 00-0270	EA	10" x 8" x 6" Hinge Cover, Painted Steel NEMA 4 Enclosure	239.10	41.57
	26 27 16 00-0271	EA	12" x 12" x 6" Hinge Cover, Painted Steel NEMA 4 Enclosure	278.77	48.91
	26 27 16 00-0272	EA	14" x 12" x 6" Hinge Cover, Painted Steel NEMA 4 Enclosure	327.93	56.25
	26 27 16 00-0273	EA	16" x 14" x 6" Hinge Cover, Painted Steel NEMA 4 Enclosure	397.71	70.93
	26 27 16 00-0274		NEMA 4X Enclosures, Lockable (26 27 16)		
			Note: Water-tight enclosures.		
	26 27 16 00-0275		Clamp Cover, 304 Stainless Steel NEMA 4X Enclosures (26 27 16 00-0274)		
	26 27 16 00-0276	EA	10" x 8" x 4", Clamp Cover, 304 Stainless Steel NEMA 4X Enclosure	684.38	36.68
			For 316 Stainless Steel, Add	94.83	
	26 27 16 00-0277	EA	12" x 10" x 6", Clamp Cover, 304 Stainless Steel NEMA 4X Enclosure	963.97	46.46
			For 316 Stainless Steel, Add	135.65	
	26 27 16 00-0278	EA	14" x 12" x 6", Clamp Cover, 304 Stainless Steel NEMA 4X Enclosure	1,202.20	56.25
			For 316 Stainless Steel, Add	169.85	
	26 27 16 00-0279	EA	16" x 14" x 6", Clamp Cover, 304 Stainless Steel NEMA 4X Enclosure	1,448.48	70.93
			For 316 Stainless Steel, Add	203.39	
	26 27 16 00-0280		Screw Cover, Polycarbonate NEMA 4X Enclosures (26 27 16 00-0274)		
			Note: NEMA 3R, 4, 4X and 12 rated.		
	26 27 16 00-0281	EA	6" x 6" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	149.92	26.90
	26 27 16 00-0282	EA	8" x 6" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	169.09	29.34
	26 27 16 00-0283	EA	8" x 8" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	193.29	34.24
	26 27 16 00-0284	EA	10" x 8" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	210.28	36.68
	26 27 16 00-0285	EA	12" x 10" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	243.16	41.57
	26 27 16 00-0286	EA	10" x 8" x 6" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	227.94	41.57
	26 27 16 00-0287	EA	12" x 10" x 6" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	266.20	46.46
	26 27 16 00-0288	EA	14" x 12" x 6" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	334.23	56.25
	26 27 16 00-0289	EA	16" x 14" x 8" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	425.36	77.04
	26 27 16 00-0290	EA	18" x 16" x 10" Screw Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	544.08	110.90
	26 27 16 00-0291	EA	6" x 6" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	161.90	26.90
	26 27 16 00-0292	EA	8" x 6" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	183.24	29.34
	26 27 16 00-0293	EA	8" x 8" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	208.52	34.24
	26 27 16 00-0294	EA	10" x 8" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	228.76	36.68
	26 27 16 00-0295	EA	12" x 10" x 4" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	262.74	41.57
	26 27 16 00-0296	EA	10" x 8" x 6" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	246.44	41.57
	26 27 16 00-0297	EA	12" x 10" x 6" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	291.29	46.46
	26 27 16 00-0298	EA	14" x 12" x 6" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	347.28	56.25
	26 27 16 00-0299	EA	16" x 14" x 8" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	452.56	77.04
	26 27 16 00-0300	EA	18" x 16" x 10" Screw Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	573.43	110.90
	26 27 16 00-0301		Hinged Cover, Polycarbonate NEMA 4X Enclosures (26 27 16 00-0274)		
			Note: NEMA 3R, 4, 4X and 12 rated.		
	26 27 16 00-0302	EA	6" x 6" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	183.65	26.90
	26 27 16 00-0303	EA	8" x 6" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	196.29	29.34
	26 27 16 00-0304	EA	8" x 8" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	222.65	34.24
	26 27 16 00-0305	EA	10" x 8" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	240.73	36.68
	26 27 16 00-0306	EA	12" x 10" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	285.60	41.57
	26 27 16 00-0307	EA	10" x 8" x 6" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	261.67	41.57
	26 27 16 00-0308	EA	12" x 10" x 6" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	322.82	46.46
	26 27 16 00-0309	EA	14" x 12" x 6" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	383.19	56.25
	26 27 16 00-0310	EA	16" x 14" x 8" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	467.79	77.04
	26 27 16 00-0311	EA	18" x 16" x 10" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Opaque Cover	599.54	110.90



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MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 27 16 00-0312	EA	6" x 6" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	192.36	26.90
26 27 16 00-0313	EA	8" x 6" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	212.59	29.34
26 27 16 00-0314	EA	8" x 8" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	237.88	34.24
26 27 16 00-0315	EA	10" x 8" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	257.04	36.68
26 27 16 00-0316	EA	12" x 10" x 4" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	307.35	41.57
26 27 16 00-0317	EA	10" x 8" x 6" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	280.15	41.57
26 27 16 00-0318	EA	12" x 10" x 6" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	345.67	46.46
26 27 16 00-0319	EA	14" x 12" x 6" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	394.06	56.25
26 27 16 00-0320	EA	16" x 14" x 8" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	503.67	77.04
26 27 16 00-0321	EA	18" x 16" x 10" Hinged Cover, Polycarbonate NEMA 4X Enclosure With Clear Cover	637.62	110.90
26 27 16 00-0322		Breaker Enclosures <small>(26 27 16)</small>		
		See CSI section 26 24 16 00-0001 for lighting and power panel boards.		
26 27 16 00-0323		15 To 100 Amperes, F-Frame Breaker Enclosures <small>(26 27 16 00-0322)</small>		
26 27 16 00-0324	EA	NEMA 1, Painted Steel, 15 To 100 Amperes, F-Frame Breaker Enclosure	398.68	97.82
26 27 16 00-0325	EA	NEMA 3R, Painted Steel, 15 To 100 Amperes, F-Frame Breaker Enclosure	732.77	97.82
26 27 16 00-0326	EA	NEMA 3/3R/4/4X/5/12, Stainless Steel, 15 To 100 Amperes, F-Frame Breaker Enclosure	1,806.26	134.50
26 27 16 00-0327	EA	NEMA 7, Cast Aluminum, 15 To 100 Amperes, F-Frame Breaker Enclosure	2,448.41	146.73
26 27 16 00-0328	EA	NEMA 9, Cast Aluminum, 15 To 100 Amperes, F-Frame Breaker Enclosure	1,785.59	146.73
26 27 16 00-0329	EA	NEMA 12, Painted Steel, 15 To 100 Amperes, F-Frame Breaker Enclosure	628.90	134.50
26 27 16 00-0330		15 To 250 Amperes, H Or J-Frame Breaker Enclosures <small>(26 27 16 00-0322)</small>		
26 27 16 00-0331	EA	NEMA 1, Painted Steel, 15 To 250 Amperes, H Or J-Frame Breaker Enclosure	636.40	134.50
26 27 16 00-0332	EA	NEMA 3R, Painted Steel, 15 To 250 Amperes, H Or J-Frame Breaker Enclosure	1,171.40	134.50
26 27 16 00-0333	EA	NEMA 3/3R/4/4X/5/12, Stainless Steel, 15 To 250 Amperes, H Or J-Frame Breaker Enclosure	4,000.19	171.20
26 27 16 00-0334	EA	NEMA 12, Painted Steel, 15 To 250 Amperes, H Or J-Frame Breaker Enclosure	967.58	171.20
26 27 16 00-0335		125 To 400 Amperes, L-Frame Breaker Enclosures <small>(26 27 16 00-0322)</small>		
26 27 16 00-0336	EA	NEMA 1, Painted Steel, 125 To 400 Amperes, L-Frame Breaker Enclosure	996.71	269.01
26 27 16 00-0337	EA	NEMA 3R, Painted Steel, 125 To 400 Amperes, L-Frame Breaker Enclosure	2,315.99	269.01
26 27 16 00-0338	EA	NEMA 3/3R/4/4X/5/12, Stainless Steel, 125 To 400 Amperes, L-Frame Breaker Enclosure	6,779.03	342.38
26 27 16 00-0339	EA	NEMA 12, Painted Steel, 125 To 400 Amperes, L-Frame Breaker Enclosure	1,654.70	342.38
26 27 16 00-0340		300 To 800 Amperes, M-Frame Breaker Enclosures <small>(26 27 16 00-0322)</small>		
26 27 16 00-0341	EA	NEMA 1, Painted Steel, 300 To 800 Amperes, M-Frame Breaker Enclosure	1,952.14	513.58
26 27 16 00-0342	EA	NEMA 3R, Painted Steel, 300 To 800 Amperes, M-Frame Breaker Enclosure	3,346.52	513.58
26 27 16 00-0343	EA	NEMA 3/3R/4/4X/5/12, Stainless Steel, 300 To 800 Amperes, M-Frame Breaker Enclosure	12,197.29	660.31
26 27 16 00-0344	EA	NEMA 12, Painted Steel, 300 To 800 Amperes, M-Frame Breaker Enclosure	6,603.67	660.31
26 27 16 00-0345		250 To 1,200 Amperes, P-Frame Breaker Enclosures <small>(26 27 16 00-0322)</small>		
26 27 16 00-0346	EA	NEMA 1, Painted Steel, 250 To 1,200 Amperes, P-Frame Breaker Enclosure	2,380.77	513.58
26 27 16 00-0347	EA	NEMA 3R, Painted Steel, 250 To 1,200 Amperes, P-Frame Breaker Enclosure	4,024.37	513.58
26 27 16 00-0348	EA	NEMA 3R/5/12, Painted Steel, 250 To 1,200 Amperes, P-Frame Breaker Enclosure	8,300.99	660.31
26 27 16 00-0349		Legend Plates <small>(26 27 16)</small>		
26 27 16 00-0350	EA	3" Phenolic Plastic Cabinet Legend Plate Engraved With 1/2" Letters	22.69	6.11
26 27 16 00-0351	EA	3" Engraved Aluminum Cabinet Legend Plate Engraved With 1/2" Letters	29.65	6.11
26 27 19		Multi-Outlet Assemblies <small>(26 27)</small>		
26 27 19 00-0001		Surface Metal Raceway, Preassembled With Outlets <small>(26 27 19)</small>		
		Note: Exposed installations on masonry, concrete block or drywall walls or ceilings. (Wiremold or approved equal).		
26 27 19 00-0002	LF	Single Circuit, Plugmold #2000, 3' With Outlets 6" On Center	28.50	8.93
		<i>For Concrete Or Masonry Surface, Add</i>	0.89	
26 27 19 00-0003	LF	Single Circuit, Plugmold #2000, 6' With Outlets 6" On Center	22.01	6.35
		<i>For Concrete Or Masonry Surface, Add</i>	0.64	
26 27 19 00-0004	LF	Single Circuit, Plugmold #2000, 6' With Outlets 9" On Center	20.83	6.72
		<i>For Concrete Or Masonry Surface, Add</i>	0.67	
26 27 19 00-0005	LF	Single Circuit, Plugmold #2000, 6' With Outlets 12" On Center	22.80	6.35
		<i>For Concrete Or Masonry Surface, Add</i>	0.64	
26 27 19 00-0006	LF	Single Circuit, Plugmold #2000, 6' With Outlets 18" On Center	18.72	6.48
		<i>For Concrete Or Masonry Surface, Add</i>	0.65	
26 27 19 00-0007	LF	Two Circuits, Plugmold #2000, 6' With Outlets 9" On Center	25.40	6.35
		<i>For Concrete Or Masonry Surface, Add</i>	0.64	
26 27 19 00-0008	LF	Two Circuits, Plugmold #2000, 6' With Outlets 12" On Center	22.56	6.35
		<i>For Concrete Or Masonry Surface, Add</i>	0.64	
26 27 19 00-0009	LF	Two Circuits, Plugmold #2000, 6' With Outlets 18" On Center	24.27	6.35
		<i>For Concrete Or Masonry Surface, Add</i>	0.64	
26 27 23		Indoor Service Poles <small>(26 27)</small>		

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 27 Low-Voltage Distribution Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 27 23 00-0001	Communication And Power Poles ^(26 27 23)		
	Note: Includes separate compartments for power and communication cable. Includes removable cover plates with knock-outs for modular jacks and openings to accept modular furniture adapters for communication devices. Includes all necessary mounting plates and assemblies. Excludes electrical and communications wire, power outlets and communication devices. Wiremold Tele-Power Pole series.		
26 27 23 00-0002	Steel Communication And Power Poles ^(26 27 23 00-0001)		
26 27 23 00-0003	2-1/4" Width, Steel Communication And Power Poles ^(26 27 23 00-0002)		
26 27 23 00-0004	2-1/4" Width, Steel Communication And Power Poles ^(26 27 23 00-0003)		
26 27 23 00-0005	EA 2-1/4" x 2-5/16", 10'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	319.66	54.19
26 27 23 00-0006	EA 2-1/4" x 2-5/16", 12'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	347.11	54.19
26 27 23 00-0007	EA 2-1/4" x 2-5/16", 15'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	378.85	54.19
26 27 23 00-0008	Additional Cover Plates For 2-1/4" Width, Steel Communication And Power Poles ^(26 27 23 00-0003)		
	Note: Excludes receptacles, communication jacks and wiring.		
26 27 23 00-0009	EA Add-On 2-1/4" Width Steel Cover Plate For Two Duplex Receptacles And One Single Receptacle	65.45	11.17
26 27 23 00-0010	EA Add-On 2-1/4" Width Steel Cover Plate For Three Duplex Receptacles.....	56.79	11.17
26 27 23 00-0011	EA Add-On 2-1/4" Width Steel Cover Plate For Two Duplex Receptacles And One GFCI Receptacle.....	64.25	11.17
26 27 23 00-0012	EA Add-On 2-1/4" Width Steel Cover Plate For Data And A/V Modular Devices	47.70	11.17
26 27 23 00-0013	EA Add-On 2-1/4" Width Steel Cover Plate Radius Control Entrance End Fitting	39.35	11.17
26 27 23 00-0014	2-3/4" Width, Steel Communication And Power Poles ^(26 27 23 00-0002)		
26 27 23 00-0015	2-3/4" Width, Steel Communication And Power Poles ^(26 27 23 00-0014)		
26 27 23 00-0016	EA 2-3/4" x 1-17/32", 10'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	413.79	54.19
26 27 23 00-0017	EA 2-3/4" x 1-17/32", 12'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	472.78	54.19
26 27 23 00-0018	EA 2-3/4" x 1-17/32", 15'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	504.62	54.19
26 27 23 00-0019	Additional Cover Plates For 2-3/4" Width, Steel Communication And Power Poles ^(26 27 23 00-0014)		
	Note: Excludes receptacles and communication jacks.		
26 27 23 00-0020	EA Add-On 2-3/4" Width Steel Cover Plate For One Single Receptacle	44.01	11.17
26 27 23 00-0021	EA Add-On 2-3/4" Width Steel Cover Plate For One Duplex Receptacle	39.61	11.17
26 27 23 00-0022	EA Add-On 2-3/4" Width Steel Cover Plate For Data And A/V Modular Devices	42.76	11.17
26 27 23 00-0023	3" Width, Steel Communication And Power Poles ^(26 27 23 00-0002)		
26 27 23 00-0024	3" Width, Steel Communication And Power Poles ^(26 27 23 00-0023)		
26 27 23 00-0025	EA 3" x 2-3/4", 10'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	538.80	54.19
26 27 23 00-0026	EA 3" x 2-3/4", 12'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	609.82	54.19
26 27 23 00-0027	EA 3" x 2-3/4", 15'-5" Height, Enamel Finish, Steel Communication And Power Pole.....	656.63	54.19
26 27 23 00-0028	Additional Cover Plates For 3" Width, Steel Communication And Power Poles ^(26 27 23 00-0023)		
	Note: Excludes receptacles and communication jacks.		
26 27 23 00-0029	EA Add-On 3" Width Steel Steel Cover Plate For One Single Receptacle	44.01	11.17
26 27 23 00-0030	EA Add-On 3" Width Steel Cover Plate For One Duplex Receptacle	39.61	11.17
26 27 23 00-0031	EA Add-On 3" Width Steel Cover Plate For Data And A/V Modular Devices.....	42.76	11.17
26 27 23 00-0032	Aluminum Communication And Power Poles ^(26 27 23 00-0001)		
26 27 23 00-0033	2-1/8" Width, Aluminum Communication And Power Poles ^(26 27 23 00-0032)		
26 27 23 00-0034	2-1/8" Width, Aluminum Communication And Power Poles ^(26 27 23 00-0033)		
26 27 23 00-0035	EA 2-1/8" x 2-3/8", 10'-5" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	432.26	54.19
26 27 23 00-0036	EA 2-1/8" x 2-3/8", 12'-5" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	481.91	54.19
26 27 23 00-0037	EA 2-1/8" x 2-3/8", 15'-5" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	537.57	54.19
26 27 23 00-0038	Additional Cover Plates For 2-1/8" Width, Aluminum Communication And Power Poles ^(26 27 23 00-0033)		
26 27 23 00-0039	EA Add-On 2-1/8" Width Aluminum Cover Plate For Two Duplex Receptacles And One Single Receptacle.....	67.15	11.17
26 27 23 00-0040	EA Add-On 2-1/8" Width Aluminum Cover Plate For Three Duplex Receptacles.....	68.55	11.17
26 27 23 00-0041	EA Add-On 2-1/8" Width Aluminum Cover Plate For Two Duplex Receptacles And One GFCI Receptacle.....	73.21	11.17
26 27 23 00-0042	EA Add-On 2-1/8" Width Aluminum Cover Plate For Data And A/V Modular Devices.....	50.32	11.17
26 27 23 00-0043	EA Add-On 2-1/8" Width Aluminum Radius Control Entrance End Fitting.....	39.35	11.17
26 27 23 00-0044	2-1/4" Width, Aluminum Communication And Power Poles ^(26 27 23 00-0032)		
26 27 23 00-0045	EA 2-1/4" x 2-5/16", 10'-2" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	416.76	54.19
26 27 23 00-0046	EA 2-1/4" x 2-5/16", 12'-8" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	467.68	54.19
26 27 23 00-0047	EA 2-1/4" x 2-5/16", 15'-2" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	527.67	54.19



	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 23 00-0048		5" Width, Aluminum Communication And Power Poles <small>(26 27 23 00-0032)</small>		
26 27 23 00-0049	EA	5" x 4-3/4", 10'-2" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	870.32	54.19
26 27 23 00-0050	EA	5" x 4-3/4", 12'-8" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	995.21	54.19
26 27 23 00-0051	EA	5" x 4-3/4", 15'-2" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	1,135.08	54.19
26 27 23 00-0052		2" Diameter, Round Aluminum Communication And Power Pole <small>(26 27 23 00-0032)</small>		
26 27 23 00-0053	EA	2" Diameter, 10'-4" Height, Satin Anodized Finish, Aluminum Communication And Power Pole.....	473.67	54.19
26 27 23 00-0054	EA	2" Diameter, 10'-4" Height, Painted White Finish, Aluminum Communication And Power Pole.....	448.50	54.19
26 27 23 00-0055	EA	2" Diameter, 10'-4" Height, Polished Anodized Finish, Aluminum Communication And Power Pole.....	574.11	54.19
26 27 26		Wiring Devices <small>(26 27)</small>		
		Note: Includes device, installation, wire connections, support clips (where necessary) and testing. Assemblies include outlet device, cover plate, mounting and appropriate box.		
26 27 26 00-0001		Receptacles <small>(26 27 26)</small>		
26 27 26 00-0002		General Use Receptacles <small>(26 27 26 00-0001)</small>		
26 27 26 00-0003		Receptacle Assemblies <small>(26 27 26 00-0002)</small>		
		Note: Includes 4" square steel box, bracket, mud ring, receptacle and cover plate.		
26 27 26 00-0004	EA	15 Amperes, 1 Gang, NEMA 5-15, Duplex Receptacle Assembly.....	98.93	43.41
26 27 26 00-0005	EA	20 Amperes, 1 Gang, NEMA 5-20, Duplex Receptacle Assembly.....	106.09	46.46
26 27 26 00-0006	EA	15 Amperes, 2 Gang, NEMA 5-15, Duplex Receptacle Assembly.....	127.63	55.64
26 27 26 00-0007	EA	20 Amperes, 2 Gang, NEMA 5-20, Duplex Receptacle Assembly.....	141.95	61.76
26 27 26 00-0008	EA	15 Amperes, 1 Gang, GFI, Duplex Receptacle Assembly.....	113.07	43.41
26 27 26 00-0009	EA	20 Amperes, 1 Gang, GFI, Duplex Receptacle Assembly.....	120.97	46.46
26 27 26 00-0010		Receptacle Components <small>(26 27 26 00-0002)</small>		
26 27 26 00-0011	EA	15 Amperes, 125 Volt, 1 Phase, NEMA 5-15, Single Receptacle.....	28.31	12.23
26 27 26 00-0012	EA	15 Amperes, 125 Volt, 1 Phase, NEMA 5-15, Duplex Receptacle.....	27.48	12.23
26 27 26 00-0013	EA	15 Amperes, 120/277 Volt, 3 Wire, Single Receptacle.....	32.34	12.23
26 27 26 00-0014	EA	15 Amperes, 120/277 Volt, 3 Wire, Duplex Receptacle.....	35.16	12.23
26 27 26 00-0015	EA	15 Amperes, 250 Volt, 1 Phase, NEMA 6-15, Single Receptacle.....	44.86	15.28
26 27 26 00-0016	EA	15 Amperes, 250 Volt, 1 Phase, NEMA 6-15, Duplex Receptacle.....	54.09	15.28
26 27 26 00-0017	EA	20 Amperes, 125 Volt, 1 Phase, NEMA 5-20, Single Receptacle.....	29.39	12.23
26 27 26 00-0018	EA	20 Amperes, 125 Volt, 1 Phase, NEMA 5-20, Duplex Receptacle.....	28.53	12.23
26 27 26 00-0019	EA	20 Amperes, 120/277 Volt, Single Receptacle.....	41.20	12.23
26 27 26 00-0020	EA	20 Amperes, 120/277 Volt, Duplex Receptacle.....	34.27	12.23
26 27 26 00-0021	EA	20 Amperes, 250 Volt, 1 Phase, NEMA 6-20, Single Receptacle.....	44.86	15.28
26 27 26 00-0022	EA	20 Amperes, 250 Volt, 1 Phase, NEMA 6-20, Duplex Receptacle.....	54.09	15.28
26 27 26 00-0023	EA	20 Amperes, 125/250 Volt, 1 Phase, NEMA 14-20, Single Receptacle.....	83.72	15.28
26 27 26 00-0024	EA	20 Amperes, 250 Volt, 3 Phase, NEMA 15-20, Single Receptacle.....	83.72	15.28
26 27 26 00-0025	EA	25 Amperes, 120/277 Volt, Duplex Receptacle.....	70.82	18.34
26 27 26 00-0026		Specialty Receptacles <small>(26 27 26 00-0001)</small>		
26 27 26 00-0027		Specialty Receptacles <small>(26 27 26 00-0026)</small>		
26 27 26 00-0028	EA	30 Amperes, 125 Volt, 1 Phase, NEMA 5-30, Single Receptacle.....	63.75	21.40
26 27 26 00-0029	EA	30 Amperes, 250 Volt, 1 Phase, NEMA 6-30, Single Receptacle.....	63.75	21.40
26 27 26 00-0030	EA	30 Amperes, 125/250 Volt, NEMA 10-30, Single Receptacles.....	84.62	21.40
26 27 26 00-0031	EA	30 Amperes, 125/250 Volt, 1 Phase, NEMA 14-30, Single Receptacle.....	95.94	21.40
26 27 26 00-0032	EA	30 Amperes, 250 Volt, 3 Phase, NEMA 15-30, Single Receptacle.....	102.06	24.45
26 27 26 00-0033	EA	50 Amperes, 125 Volt, 1 Phase, NEMA 5-50, Single Receptacle.....	94.38	24.45
26 27 26 00-0034	EA	50 Amperes, 250 Volt, 1 Phase, NEMA 6-50, Single Receptacle.....	92.22	24.45
26 27 26 00-0035	EA	50 Amperes, 277 Volt, NEMA 7-50, Single Receptacle.....	81.06	24.45
26 27 26 00-0036	EA	50 Amperes, 125/250 Volt, NEMA 10-50, Single Receptacle.....	102.48	24.45
26 27 26 00-0037	EA	50 Amperes, 125/250 Volt, 1 Phase, NEMA 14-50, Single Receptacle.....	113.87	24.45
26 27 26 00-0038	EA	50 Amperes, 250 Volt, 3 Phase, NEMA 15-50, Single Receptacle.....	119.98	27.51
26 27 26 00-0039	EA	60 Amperes, 125/250 Volt, 1 Phase, NEMA 14-60, Single Receptacle.....	132.01	30.57
26 27 26 00-0040	EA	60 Amperes, 250 Volt, 3 Phase, NEMA 15-60, Single Receptacle.....	144.24	36.68
26 27 26 00-0041	EA	100 Amperes, 480 Volt, 3 Phase, Joy Receptacle With Box, Complete.....	1,363.39	287.36
26 27 26 00-0042	EA	400 Amperes, 4 Pole Weatherproof Generator Receptacle With Box, Complete.....	3,315.62	351.55
26 27 26 00-0043	EA	30 Amperes, 230 Volt, Dryer Receptacle.....	76.02	24.45
26 27 26 00-0044	EA	60 Amperes, 230 Volt, Range Receptacle.....	111.34	36.68
26 27 26 00-0045	EA	15 Or 20 Amperes, 120/277 Volt, Clock Hanger Receptacle.....	70.93	15.28
26 27 26 00-0046	EA	Cable Reel With 20 Amperes, 120 Volt Receptacle, Complete.....	1,434.96	372.35
26 27 26 00-0047		Isolated Ground Receptacles <small>(26 27 26 00-0026)</small>		
26 27 26 00-0048	EA	15 Amperes, 125 Volt, NEMA 5-15R Isolated Ground Receptacle, Simplex.....	94.42	12.23
		Note: 2 Pole, 3 wire.		
26 27 26 00-0049	EA	20 Amperes, 120 Volt Isolated Ground Receptacles, Simplex.....	60.41	15.28
26 27 26 00-0050	EA	20 Amperes, 120 Volt Isolated Ground Receptacles, Duplex.....	60.20	15.28
26 27 26 00-0051	EA	30 Amperes, 120 Volt Isolated Ground Receptacles, Simplex.....	83.87	24.45
26 27 26 00-0052	EA	Locking 15 Amperes, 250 Volt Isolated Ground Receptacles.....	67.52	15.28
26 27 26 00-0053	EA	Locking 15 Amperes, 277 Volt Isolated Ground Receptacles.....	61.99	15.28

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
			26 27 26 00-0054 EA Locking 20 Amperes, 120/208 Volt Isolated Ground Receptacles	85.40	18.34
			26 27 26 00-0055 EA Locking 20 Amperes, 277/480 Volt Isolated Ground Receptacles	68.18	18.34
			26 27 26 00-0056 EA Locking 20 Amperes, 347/600 Volt Isolated Ground Receptacles	87.45	18.34
			26 27 26 00-0057 EA Locking 30 Amperes, 120/208 Volt Isolated Ground Receptacles	106.23	18.34
			26 27 26 00-0058 EA Locking 30 Amperes, 277 Volt Isolated Ground Receptacles	105.21	24.45
26 27 26 00-0059			Explosion Proof Receptacles <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0060 EA 1/2", 20 Amperes, 2 Watt, 3 Pole, Type CPS Explosion Proof Receptacle Assembly	957.28	30.57
			26 27 26 00-0061 EA 3/4", 20 Amperes, 2 Watt, 3 Pole, Type CPS Explosion Proof Receptacle Assembly	881.42	33.62
			26 27 26 00-0062 EA 3/4", 30 Amperes, 2 Watt, 3 Pole, Type CES/CESD Explosion Proof Receptacle Assembly	1,464.85	61.14
			26 27 26 00-0063 EA 3/4", 30 Amperes, 3 Watt, 4 Pole, Type CES/CESD Explosion Proof Receptacle Assembly	1,846.96	61.14
			26 27 26 00-0064 EA 1-1/4", 60 Amperes, 2 Watt, 4 Pole, Type CES/CESD Explosion Proof Receptacle Assembly	2,335.51	91.71
			26 27 26 00-0065 EA 1-1/4", 60 Amperes, 3 Watt, 4 Pole, Type CES/CESD Explosion Proof Receptacle Assembly	2,224.89	91.71
26 27 26 00-0066			Ground Fault Circuit Interrupter (GFCI) <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0067 EA 15 Amperes, Ground Fault Circuit Interrupter (GFCI), Duplex Receptacle	38.57	15.28
			26 27 26 00-0068 EA 20 Amperes, Ground Fault Circuit Interrupter (GFCI), Duplex Receptacle	55.64	18.34
26 27 26 00-0069			Arc Fault Circuit Interrupter (AFCI) <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0070 EA 15 Amperes, 125 Volt Duplex Arc Fault Circuit Interrupter (AFCI), Tamper Resistant Receptacle	69.41	15.28
			26 27 26 00-0071 EA 20 Amperes, 125 Volt Duplex Arc Fault Circuit Interrupter (AFCI), Tamper Resistant Receptacle	76.26	15.28
26 27 26 00-0072			Locking Receptacle <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0073 EA NEMA L5-15, 125 Volt, 2 Pole, 15 Amperes, Locking Receptacle	56.84	15.28
			26 27 26 00-0074 EA NEMA L6-15, 250 Volt, 2 Pole, 15 Amperes, Locking Receptacle	70.48	15.28
			26 27 26 00-0075 EA NEMA L5-20, 125 Volt, 2 Pole, 20 Amperes, Locking Receptacle	62.80	18.34
			26 27 26 00-0076 EA NEMA L6-20, 250 Volt, 2 Pole, 20 Amperes, Locking Receptacle	62.19	18.34
			26 27 26 00-0077 EA NEMA L8-20, 480 Volt, 2 Pole, 20 Amperes, Locking Receptacle	74.19	18.34
			26 27 26 00-0078 EA NEMA L9-20, 600 Volt, 2 Pole, 20 Amperes, Locking Receptacle	89.69	18.34
			26 27 26 00-0079 EA NEMA L10-20, 125/250 Volt, 3 Pole, 20 Amperes, Locking Receptacle	87.98	18.34
			26 27 26 00-0080 EA NEMA L14-20, 125/250 Volt, 3 Pole, 20 Amperes, Locking Receptacle	76.64	18.34
			26 27 26 00-0081 EA NEMA L5-30, 125 Volt, 2 Pole, 30 Amperes, Locking Receptacle	86.83	24.45
			26 27 26 00-0082 EA NEMA L6-30, 250 Volt, 2 Pole, 30 Amperes, Locking Receptacle	88.27	24.45
			26 27 26 00-0083 EA NEMA L15-30, 250 Volt, 3 Pole, 30 Amperes, Locking Receptacle	112.82	24.45
26 27 26 00-0084			Weathertight Pin And Sleeve Receptacle <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0085 EA 20 Amperes, 2 Pole, 3 Wire, 125 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 320R4W)	276.10	61.14
			26 27 26 00-0086 EA 20 Amperes, 2 Pole, 3 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 320R6W)	275.47	61.14
			26 27 26 00-0087 EA 20 Amperes, 2 Pole, 3 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 320R7W)	287.46	61.14
			26 27 26 00-0088 EA 20 Amperes, 3 Pole, 4 Wire, 125/250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 420R12W)	350.56	67.26
			26 27 26 00-0089 EA 20 Amperes, 3 Pole, 4 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 420R9W)	351.56	67.26
			26 27 26 00-0090 EA 20 Amperes, 3 Pole, 4 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 420R7W)	349.25	67.26
			26 27 26 00-0091 EA 30 Amperes, 2 Pole, 3 Wire, 125 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 330R4W)	418.51	75.20
			26 27 26 00-0092 EA 30 Amperes, 2 Pole, 3 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 330R6W)	398.99	75.20
			26 27 26 00-0093 EA 30 Amperes, 2 Pole, 3 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 330R7W)	429.54	75.20
			26 27 26 00-0094 EA 30 Amperes, 3 Pole, 4 Wire, 125/250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 430R12W)	434.01	82.54
			26 27 26 00-0095 EA 30 Amperes, 3 Pole, 4 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 430R9W)	433.63	82.54
			26 27 26 00-0096 EA 30 Amperes, 3 Pole, 4 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 430R7W)	436.39	82.54
			26 27 26 00-0097 EA 60 Amperes, 2 Pole, 3 Wire, 125 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 360R4W)	610.21	97.82
			26 27 26 00-0098 EA 60 Amperes, 2 Pole, 3 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 360R6W)	586.58	97.82
			26 27 26 00-0099 EA 60 Amperes, 2 Pole, 3 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 360R7W)	601.96	97.82
			26 27 26 00-0100 EA 60 Amperes, 3 Pole, 4 Wire, 125/250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 460R12W)	670.36	108.83
			26 27 26 00-0101 EA 60 Amperes, 3 Pole, 4 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 460R9W)	670.81	108.83
			26 27 26 00-0102 EA 60 Amperes, 3 Pole, 4 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 460R7W)	671.27	108.83
			26 27 26 00-0103 EA 100 Amperes, 2 Pole, 3 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 3100R6W)	746.15	122.28
			26 27 26 00-0104 EA 100 Amperes, 2 Pole, 3 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 3100R7W)	776.44	122.28
			26 27 26 00-0105 EA 100 Amperes, 3 Pole, 4 Wire, 125/250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 4100R12W)	835.39	134.50
			26 27 26 00-0106 EA 100 Amperes, 3 Pole, 4 Wire, 250 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 4100R9W)	833.12	134.50
			26 27 26 00-0107 EA 100 Amperes, 3 Pole, 4 Wire, 480 Volt, Watertight Pin And Sleeve Receptacle (Hubbell 4100R7W)	837.39	134.50
26 27 26 00-0108			Corrosion Resistant Receptacle <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0109 EA 15/20 Amperes, 125 Volt Corrosion Resistant, Power Receptacles	73.74	12.23
			26 27 26 00-0110 EA 15/20 Amperes, 250 Volt Corrosion Resistant, Power Receptacles	147.05	15.28
26 27 26 00-0111			Tamper Resistant Receptacle <small>(26 27 26 00-0026)</small>		
			26 27 26 00-0112 EA 15 Amperes, 125 Volt Duplex Tamper Resistant Receptacle	30.30	12.23
			Note: Pass & Seymour 3232-TR.		
			26 27 26 00-0113 EA 20 Amperes, 125 Volt Duplex Tamper Resistant Receptacle	33.32	12.23
			Note: Pass & Seymour TR20.		
			26 27 26 00-0114 EA 15 Amperes, 125 Volt Single Specification Grade Tamper Resistant Receptacle	41.96	12.23
			Note: Pass & Seymour TR5251.		
			26 27 26 00-0115 EA 20 Amperes, 125 Volt Single Specification Grade Tamper Resistant Receptacle	46.02	12.23
			Note: Pass & Seymour TR5351.		



Electrical	26	26
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 26 00-0116 EA 15 Amperes, 125 Volt Duplex Ground Fault Circuit Interrupter (GFCI), Tamper Resistant Receptacle.....	70.38	12.23
Note: Pass & Seymour S1595-TR*CC8.		
26 27 26 00-0117 EA 15 Amperes, 125 Volt Duplex Ground Fault Circuit Interrupter (GFCI), Specification Grade Tamper Resistant Receptacle.....	76.18	12.23
Note: Pass & Seymour 1595-TRS.		
26 27 26 00-0118 EA 20 Amperes, 125 Volt Duplex Ground Fault Circuit Interrupter (GFCI), Specification Grade Tamper Resistant Receptacle.....	81.72	12.23
Note: Pass & Seymour 2095-TRS.		
26 27 26 00-0119 USB Charger/Duplex Tamper-Resistant Receptacles (26 27 26 00-0026)		
26 27 26 00-0120 EA 15 Amperes, 125 Volt Duplex USB Charger/Duplex Tamper-Resistant Receptacle.....	72.50	12.23
26 27 26 00-0121 EA 20 Amperes, 125 Volt Duplex USB Charger/Duplex Tamper-Resistant Receptacle.....	78.50	12.23
26 27 26 00-0122 Television Receptacle (26 27 26 00-0001)		
26 27 26 00-0123 EA TV Receptacle With Cover (Type F), Complete.....	77.47	28.37
26 27 26 00-0124 Switches (26 27 26)		
26 27 26 00-0125 Switches (26 27 26 00-0124)		
26 27 26 00-0126 Switch Assemblies (26 27 26 00-0125)		
Note: Includes 4" square steel box, bracket, mud ring, switch and cover plate.		
26 27 26 00-0127 EA 1 Gang, 15 Amperes, 120/277 Volt, SPST, Switch Assembly	102.26	42.79
26 27 26 00-0128 EA 1 Gang, 20 Amperes, 120/277 Volt, SPST, Switch Assembly	110.10	46.46
26 27 26 00-0129 EA 2 Gang, 15 Amperes, 120/277 Volt, SPST, Switch Assembly	137.34	55.94
26 27 26 00-0130 EA 2 Gang, 20 Amperes, 120/277 Volt, SPST, Switch Assembly	150.58	62.06
26 27 26 00-0131 EA 3 Gang, 15 Amperes, 120/277 Volt, SPST, Switch Assembly	234.82	95.99
26 27 26 00-0132 EA 3 Gang, 20 Amperes, 120/277 Volt, SPST, Switch Assembly	254.69	105.16
26 27 26 00-0133 EA 4 Gang, 15 Amperes, 120/277 Volt, SPST, Switch Assembly	270.06	108.52
26 27 26 00-0134 EA 4 Gang, 20 Amperes, 120/277 Volt, SPST, Switch Assembly	296.55	120.75
26 27 26 00-0135 Switch Components (26 27 26 00-0125)		
26 27 26 00-0136 EA 15 Amperes, 120/277 Volt, SPST Switch	32.03	12.23
26 27 26 00-0137 EA 15 Amperes, 120/277 Volt, 3-Way Switch	40.53	15.28
26 27 26 00-0138 EA 15 Amperes, 120/277 Volt, 4-Way Switch	77.81	24.45
26 27 26 00-0139 EA 15 Amperes, 120/277 Volt, DPST Switch	36.44	12.23
26 27 26 00-0140 EA 15 Amperes, 120/277 Volt, Thermal Switch.....	68.25	15.28
26 27 26 00-0141 EA 20 Amperes, 120/277 Volt, SPST Switch	38.66	15.28
26 27 26 00-0142 EA 20 Amperes, 120/277 Volt, 3-Way Switch	47.74	18.34
26 27 26 00-0143 EA 20 Amperes, 120/277 Volt, 4-Way Switch	104.03	24.45
26 27 26 00-0144 EA 20 Amperes, 120/277 Volt, DPST Switch	45.73	15.28
26 27 26 00-0145 EA 20 Amperes, 120/277 Volt, DPDT Switch.....	48.86	15.28
26 27 26 00-0146 EA 15 Amperes, 120/277 Volt, Single Pole, Toggle, Three Position, Center Off, Momentary Contact Switch	87.17	15.31
26 27 26 00-0147 EA 15 Amperes, 120/277 Volt, Key Operated, Single Pole, Three Position, Center Off, Momentary Contact Switch	110.11	15.31
26 27 26 00-0148 EA Momentary Contact Switch With Separate Neon Pilot.....	83.67	18.37
Note: Neon Pilot is 125 V, 1 / 125W.		
26 27 26 00-0149 EA 20 Amperes, 125 Volt AC, Single Pole, Maintained Contact Switch With Center Off	58.49	21.40
Note: Or 250 VAC 10 Amp, double throw BAT handle.		
26 27 26 00-0150 EA 20 Amperes, 125 Volt AC, Double Pole, Maintained Contact Switch.....	71.78	24.45
Note: Or 250 VAC 10 Amp, with center off double throw BAT handle.		
26 27 26 00-0151 EA 20 Amperes, 125 Volt AC, Three Pole, Maintained Contact Switch.....	104.10	24.45
Note: Or 250 VAC 10 Amp, with center off double throw BAT handle.		
26 27 26 00-0152 EA 30 Amperes, 120/277 Volt, Single Pole, Local Switch	87.09	24.49
26 27 26 00-0153 EA 30 Amperes, 120/277 Volt, Double Pole, Local Switch.....	107.70	24.49
26 27 26 00-0154 EA 30 Amperes, 120/277 Volt, Three-Way Local Switch.....	112.33	30.62
26 27 26 00-0155 EA 30 Amperes, 120/277 Volt, Four-Way Local Switch.....	157.37	33.68
26 27 26 00-0156 EA 15 Amperes, 120/277 Volt, Local Switch With Neon Pilot.....	73.94	20.03
26 27 26 00-0157 EA 15 Amperes, 120/277 Volt, Local Switch With Separate Neon Pilot.....	105.35	20.03
Note: Neon pilot is 125V, 1/25W. Requires 2 gang installation.		
26 27 26 00-0158 EA 15 Amperes, 120 Volt, Clear Toggle, Lighted In On Position, Single Pole, Lighted Toggle Switch	91.81	20.03
26 27 26 00-0159 EA 15 Amperes, 120 Volt, Ivory Toggle, Lighted In Off Position, Lighted Toggle Switch	87.15	20.03
26 27 26 00-0160 EA 6 Amperes, 125 Volt, Door Open-Light On, Automatic Door Switch.....	97.91	9.92
26 27 26 00-0161 EA 6 Amperes, 125 Volt, Door Closed-Light On, Automatic Door Switch.....	104.23	9.92
26 27 26 00-0162 EA 15 Amperes, 120/277 Volt, Three Position, Center Off, Toggle, Single Pole Momentary Contact Switch	110.08	38.22
26 27 26 00-0163 EA Three Position, Center Off, Key Operated, Momentary Contact Switch	133.02	38.22
Note: 15A, 120/277 V, Single Pole		
26 27 26 00-0164 EA Single Pole, Slide Dimmer (Leviton IP710-LFZ)	159.77	12.25
26 27 26 00-0165 EA 8 Amperes, 120/277 Volt, 0 To 10 Volt Dimmer LED Control Switch, White (Lutron DVSTV-WH).....	75.75	12.25
26 27 26 00-0166 EA 120/277 Volt, (8 Amperes Lighting/3 Amperes Fan), Wireless Dimming Switch (Lutron MRF2-8S-DV-WH).....	271.03	12.23
26 27 26 00-0167 EA 120 Volt, Companion Wireless Dimmer Switch (Lutron MA-AS-WH).....	48.65	12.23
26 27 26 00-0168 EA 1200VA 0-10V LED And Fluorescent, Sunrise Electronic Wall Dimmer (Philips SR1200ZTUNV).....	80.50	12.25
26 27 26 00-0169 EA 1 Zone, 2 Button Wireless Scheduling Switch (LG 9SSA2B1T520.ALWB000)	91.84	12.25
26 27 26 00-0170 EA 2 Zone, 4 Button Wireless Scheduling Switch (LG 9SSA2B2T520.ALWB000)	116.59	12.25
26 27 26 00-0171 EA Wireless Single Rocker Remote Switch (Leviton WSS0S-S9).....	164.56	12.25
26 27 26 00-0172 Specialty Switches (26 27 26 00-0124)		

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 27 Low-Voltage Distribution Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 27 26 00-0173	Dimmers With SPST Switch (26 27 26 00-0172)		
26 27 26 00-0174	EA 600 Watt Dimmers With SPST Switch	71.40	27.51
26 27 26 00-0175	EA 1,000 Watt Dimmers With SPST Switch	122.53	27.51
26 27 26 00-0176	EA 1,500 Watt Dimmers With SPST Switch	220.59	44.27
26 27 26 00-0177	EA 2,000 Watt Dimmers With SPST Switch	285.83	44.27
26 27 26 00-0178	EA 600 Watt Fluorescent Dimmer Switch.....	159.28	32.65
26 27 26 00-0179	EA 1,000 Watt Fluorescent Dimmer Switch.....	215.41	32.65
26 27 26 00-0180	EA 1,500 Watt Fluorescent Dimmer Switch.....	389.75	49.28
26 27 26 00-0181	EA Remote Speed Switch For Paddle Fan.....	117.57	40.72
26 27 26 00-0182	EA 600 Watt Combination Remote Speed Switch/Incandescent Dimmer	193.80	60.77
26 27 26 00-0183	Time Switches (26 27 26 00-0172)		
26 27 26 00-0184	EA 40 Amperes, 125 Volt, SPST, Standard Time Switch	132.43	36.68
26 27 26 00-0185	EA 40 Amperes, 277 Volt, SPST, Standard Time Switch	135.38	36.68
26 27 26 00-0186	EA 40 Amperes, 125 Volt, DPST, Standard Time Switch	132.43	36.68
26 27 26 00-0187	EA 40 Amperes, 277 Volt, DPST, Standard Time Switch	135.38	36.68
26 27 26 00-0188	EA 40 Amperes, 125 Volt, SPST, 7-Day Time Switch	152.11	36.68
26 27 26 00-0189	EA 40 Amperes, 277 Volt, SPST, 7-Day Time Switch	152.11	36.68
26 27 26 00-0190	EA 40 Amperes, 125 Volt, DPDT, 7-Day Time Switch.....	268.26	36.68
26 27 26 00-0191	EA 40 Amperes, 277 Volt, DPDT, 7-Day Time Switch.....	268.26	36.68
26 27 26 00-0192	EA 20 Amperes, 125 Volt, SPST, Programmable Time Switch	230.99	36.68
26 27 26 00-0193	EA 20 Amperes, 277 Volt, SPST, Programmable Time Switch	253.75	36.68
26 27 26 00-0194	EA 20 Amperes, 277 Volt, SPST, Weatherproof Programmable Time Switch.....	253.75	36.68
26 27 26 00-0195	EA 40 Amperes, 125 Volt, 4PST, Astro Dial Time Switch	307.53	36.68
26 27 26 00-0196	EA 40 Amperes, 277 Volt, 4PST, Astro Dial Time Switch	316.58	36.68
26 27 26 00-0197	EA 40 Amperes, 125 Volt, SPST, Weatherproof Standard Time Switch	132.43	36.68
26 27 26 00-0198	EA 40 Amperes, 277 Volt, SPST, Weatherproof Standard Time Switch	135.38	36.68
26 27 26 00-0199	EA 40 Amperes, 125 Volt, DPST, Weatherproof Standard Time Switch	132.43	36.68
26 27 26 00-0200	EA 40 Amperes, 277 Volt, DPST, Weatherproof Standard Time Switch	135.38	36.68
26 27 26 00-0201	EA 40 Amperes, 125 Volt, SPST, Weatherproof 7-Day Time Switch	152.11	36.68
26 27 26 00-0202	EA 40 Amperes, 277 Volt, SPST, Weatherproof 7-Day Time Switch	152.11	36.68
26 27 26 00-0203	EA 40 Amperes, 125 Volt, DPDT, Weatherproof 7-Day Time Switch	268.26	36.68
26 27 26 00-0204	EA 40 Amperes, 277 Volt, DPDT, Weatherproof 7-Day Time Switch	268.26	36.68
26 27 26 00-0205	EA 40 Amperes, 125 Volt, 4PST, Weatherproof Astro Dial Time Switch.....	307.53	36.68
26 27 26 00-0206	EA 40 Amperes, 277 Volt, 4PST, Weatherproof Astro Dial Time Switch.....	316.58	36.68
26 27 26 00-0207	Low Voltage Switching (26 27 26 00-0172)		
26 27 26 00-0208	EA 36 Pin Male Or Female Connector	215.38	12.23
26 27 26 00-0209	Other Switches (26 27 26 00-0172)		
26 27 26 00-0210	EA SPST Locking Switch For Concealed Devices	123.19	48.91
26 27 26 00-0211	EA 3-Way Locking Switch For Concealed Devices	124.79	48.91
26 27 26 00-0212	EA Emergency Off Switch, With 1 Non-Closing Contact, Circular, Red, With Guard	136.46	45.73
26 27 26 00-0213	EA 15 Amperes Momentary Contact Switch.....	130.01	45.73
26 27 26 00-0214	EA 20 Amperes Momentary Contact Switch.....	136.80	45.73
26 27 26 00-0215	Plates And Covers (26 27 26)		
26 27 26 00-0216	Wall Plates (26 27 26 00-0215)		
26 27 26 00-0217	Nylon Wall Plates (26 27 26 00-0216)		
26 27 26 00-0218	EA 1 Gang Nylon Switch Wall Plates	1.97	0.61
26 27 26 00-0219	EA 2 Gang Nylon Switch Wall Plates	3.34	0.92
26 27 26 00-0220	EA 3 Gang Nylon Switch Wall Plates	4.76	1.22
26 27 26 00-0221	EA 4 Gang Nylon Switch Wall Plate	6.88	1.54
26 27 26 00-0222	EA 1 Gang Duplex Nylon Wall Plate.....	1.99	0.61
26 27 26 00-0223	EA 2 Gang Duplex Nylon Wall Plate.....	3.43	0.92
26 27 26 00-0224	Plastic Wall Plates (26 27 26 00-0216)		
26 27 26 00-0225	EA 1 Gang Plastic Switch Wall Plates	1.82	0.61
26 27 26 00-0226	EA 2 Gang Plastic Switch Wall Plates	3.05	0.92
26 27 26 00-0227	EA 3 Gang Plastic Switch Wall Plates	4.28	1.22
26 27 26 00-0228	EA 4 Gang Plastic Switch Wall Plates	6.88	1.54
26 27 26 00-0229	EA 1 Gang Duplex Plastic Wall Plate	1.82	0.61
26 27 26 00-0230	EA 2 Gang Duplex Plastic Wall Plate	3.06	0.92
26 27 26 00-0231	Brass Wall Plates (26 27 26 00-0216)		
26 27 26 00-0232	EA 1 Gang, 0.04" Brass Switch Wall Plates	19.65	2.76
26 27 26 00-0233	EA 2 Gang, 0.04" Brass Switch Wall Plates	37.06	3.18
26 27 26 00-0234	EA 3 Gang, 0.04" Brass Switch Wall Plates	54.36	3.55
26 27 26 00-0235	EA 4 Gang, 0.04" Brass Switch Wall Plates	84.76	3.85
26 27 26 00-0236	EA 5 Gang, 0.04" Brass Switch Wall Plates	103.30	4.11
26 27 26 00-0237	EA 6 Gang, 0.04" Brass Switch Wall Plates	119.62	4.29
26 27 26 00-0238	EA 1 Gang, 0.04" Brass Duplex Receptacle Wall Plate.....	19.65	2.76



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 27 26 00-0239 EA 2 Gang, 0.04" Brass Duplex Receptacle Wall Plate	43.50	3.18
26 27 26 00-0240 EA 3 Gang 0.04" Brass Duplex Receptacle Wall Plate	62.84	3.55
26 27 26 00-0241 Stainless Steel Wall Plates (26 27 26 00-0216)		
26 27 26 00-0242 EA 1 Gang, 302 Stainless Steel With Satin Finish Switch Wall Plates	10.36	2.76
26 27 26 00-0243 EA 2 Gang, 302 Stainless Steel With Satin Finish Switch Wall Plates	16.74	3.18
26 27 26 00-0244 EA 3 Gang, 302 Stainless Steel With Satin Finish Switch Wall Plates	23.51	3.55
26 27 26 00-0245 EA 4 Gang, 302 Stainless Steel With Satin Finish Switch Wall Plates	34.65	3.85
26 27 26 00-0246 EA 5 Gang, 302 Stainless Steel With Satin Finish Switch Wall Plates	40.85	4.11
26 27 26 00-0247 EA 6 Gang, 302 Stainless Steel With Satin Finish Switch Wall Plates	49.50	4.29
26 27 26 00-0248 EA 1 Gang, 302 Stainless Steel With Satin Finish Duplex Receptacle Wall Plate	11.38	2.76
26 27 26 00-0249 EA 2 Gang, 302 Stainless Steel With Satin Finish Duplex Receptacle Wall Plate	19.15	3.18
26 27 26 00-0250 EA 3 Gang, 302 Stainless Steel With Satin Finish Duplex Receptacle Wall Plate	31.49	3.55
26 27 26 00-0251 EA 4 Gang, 302 Stainless Steel With Satin Finish Duplex Receptacle Wall Plate	38.11	3.85
26 27 26 00-0252 Chrome Wall Plates (26 27 26 00-0216)		
26 27 26 00-0253 EA 1 Gang, 0.040" Chrome Switch Wall Plate	39.67	2.76
26 27 26 00-0254 EA 2 Gang 0.040" Chrome Switch Wall Plate	74.55	3.18
26 27 26 00-0255 EA 3 Gang 0.040" Chrome Switch Wall Plate	109.43	3.55
26 27 26 00-0256 EA 1 Gang 0.040" Chrome Duplex Receptacle Wall Plate	39.64	2.76
26 27 26 00-0257 Weatherproof Covers (26 27 26 00-0215)		
26 27 26 00-0258 Stamped Metallic Weatherproof Covers (26 27 26 00-0257)		
Note: Includes electrostatically applied powder coating and neoprene gasket.		
26 27 26 00-0259 EA Blank Cover, Single Gang, Stamped Metallic Weatherproof Cover (Killark® 1FBC)	12.40	0.61
26 27 26 00-0260 EA Duplex Receptacle, Single Gang, Stamped Metallic Weatherproof Cover (Killark® 1FAC)	13.44	0.61
26 27 26 00-0261 EA Single Receptacle, Single Gang, Stamped Metallic Weatherproof Cover (Killark® 1FRC)	13.44	0.61
26 27 26 00-0262 EA Toggle Switch, Single Gang, Stamped Metallic Weatherproof Cover (Killark® 1FTC)	13.44	0.61
26 27 26 00-0263 EA Blank Cover, Two Gang, Stamped Metallic Weatherproof Cover (Killark® 2FBC)	16.48	0.92
26 27 26 00-0264 EA Duplex Receptacle, Two Gang, Stamped Metallic Weatherproof Cover (Killark® 2FAC)	18.72	0.92
26 27 26 00-0265 EA Single Receptacle, Two Gang, Stamped Metallic Weatherproof Cover (Killark® 2FRC)	18.94	0.92
26 27 26 00-0266 EA Toggle Switch, Two Gang, Stamped Metallic Weatherproof Cover (Killark® 2FTC)	18.94	0.92
26 27 26 00-0267 EA Toggle Switch And Duplex Receptacle, Two Gang, Stamped Metallic Weatherproof Cover (Killark® 2FTAC)	25.76	0.92
26 27 26 00-0268 EA Blank Cover, Three Gang, Stamped Metallic Weatherproof Cover (Killark® 3FB)	24.39	1.22
26 27 26 00-0269 EA Toggle Switch, Three Gang, Stamped Metallic Weatherproof Cover (Killark® 3FT)	26.67	1.22
26 27 26 00-0270 Cast Metallic Weatherproof Covers (26 27 26 00-0257)		
Note: Includes electrostatically applied powder coating and neoprene gasket.		
26 27 26 00-0271 EA Blank Cover, Single Gang, Cast Metallic Weatherproof Cover (Killark® FSBC)	15.18	0.61
26 27 26 00-0272 EA Duplex Receptacle, Single Gang, Cast Metallic Weatherproof Cover With Self Closing Lid (Killark® FCLA)	48.52	0.61
26 27 26 00-0273 EA Single Receptacle, Single Gang, Cast Metallic Weatherproof Cover With Self Closing Lid (Killark® FCLR)	54.41	0.61
26 27 26 00-0274 EA Guarded Toggle Switch, Single Gang, Cast Metallic Weatherproof Cover (Killark® FSTG)	15.07	0.61
26 27 26 00-0275 EA Toggle Switch, Single Gang, Cast Metallic Weatherproof Cover With Self Closing Lid (Killark® FCLT)	41.12	0.61
26 27 26 00-0276 EA Lever Operated Toggle Switch, Single Gang, Cast Metallic Weatherproof Cover (Killark® FSPT)	68.42	0.61
26 27 26 00-0277 EA Plunger Operated Toggle Switch, Single Gang, Cast Metallic Weatherproof Cover (Killark® FST)	87.11	0.61
26 27 26 00-0278 EA Blank Cover, Two Gang, Cast Metallic Weatherproof Cover (Killark® 2FSBC)	18.94	0.92
26 27 26 00-0279 EA Plunger Operated Toggle Switch, Two Gang, Cast Metallic Weatherproof Cover (Killark® 2FST)	137.61	0.92
26 27 26 00-0280 EA Blank Cover, Three Gang, Cast Metallic Weatherproof Cover (Killark® 3FSBC)	31.71	1.22
26 27 26 00-0281 EA Plunger Operated Toggle Switch, Three Gang, Cast Metallic Weatherproof Cover (Killark® 3FST)	131.46	1.22
26 27 26 00-0282 Die Cast Aluminum Weatherproof Covers (26 27 26 00-0257)		
Note: Includes electrostatically applied powder coating and neoprene gasket.		
26 27 26 00-0283 EA Duplex Receptacle, Single Gang, Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Bell® 5027)	5.38	0.61
26 27 26 00-0284 EA Single Receptacle, Single Gang, Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Bell® 5026)	6.90	0.61
26 27 26 00-0285 EA Duplex Receptacles, Two Gang, Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Bell® 5032)	9.26	0.92
26 27 26 00-0286 EA Toggle Switch, Two Gang, Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Bell® 5041)	10.05	0.92
26 27 26 00-0287 EA Toggle Switch And Duplex Receptacle, Two Gang, Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Bell® 5042)	10.05	0.92
26 27 26 00-0288 EA Toggle Switch And Single Receptacle, Two Gang, Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Bell® 5043)	11.19	0.92
26 27 26 00-0289 Heavy Duty Die Cast Aluminum Weatherproof Covers (26 27 26 00-0257)		
Note: Includes baked on lacquer finish and neoprene gasket.		
26 27 26 00-0290 EA Duplex Receptacle, Single Gang, Heavy Duty Die Cast Aluminum Weatherproof Cover With Self Closing Lid (Pass & Seymour Legrand® 4510)	54.87	0.61
26 27 26 00-0291 Polycarbonate Weatherproof Covers (26 27 26 00-0257)		
Note: Includes neoprene gasket.		
26 27 26 00-0292 EA Toggle Switch, Single Gang, Polycarbonate Weatherproof Cover With Tinted Lid (Bell® 5730)	11.05	0.61
26 27 26 00-0293 EA Duplex Receptacle, Single Gang, Polycarbonate Weatherproof Cover With Tinted Lid (Bell® 5730)	11.05	0.61
26 27 26 00-0294 EA Single Receptacle, Single Gang, Polycarbonate Weatherproof Cover With Tinted Lid (Bell® 5730)	11.05	0.61
26 27 26 00-0295 EA Duplex Receptacle, Two Gang, Polycarbonate Weatherproof Cover With Tinted Lid (Bell® 5775)	13.68	0.92

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 27 Low-Voltage Distribution Equipment**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 27 26 00-0296	EA	Toggle Switch And Single Receptacle, Two Gang, Polycarbonate Weatherproof Cover With Tinted Lid (Bell® 5775).....	13.68	0.92
26 27 26 00-0297		High Impact Thermoplastic Weatherproof Covers (26 27 26 00-0257)		
Note: Includes neoprene gasket.				
26 27 26 00-0298	EA	Duplex Receptacle, Single Gang, High Impact Thermoplastic Weatherproof Cover With Self Closing Lid (Hubbell® HBL522).....	92.10	0.61
26 27 26 00-0299		Non-Metallic (PVC) Weatherproof Covers (26 27 26 00-0257)		
Note: Includes neoprene gasket.				
26 27 26 00-0300	EA	Blank Cover, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	12.58	0.61
26 27 26 00-0301	EA	Blank Cover, Two Gang, Non-Metallic (PVC) Weatherproof Cover.....	13.53	0.92
26 27 26 00-0302	EA	Toggle Switch, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	12.62	0.61
26 27 26 00-0303	EA	Switch, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	27.77	0.61
26 27 26 00-0304	EA	Duplex Receptacle, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	32.18	0.61
26 27 26 00-0305	EA	20 Amperes, Receptacle, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	26.09	0.61
26 27 26 00-0306	EA	30 Amperes, Receptacle, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	19.45	0.61
26 27 26 00-0307	EA	50 Amperes, Receptacle, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	22.76	0.61
26 27 26 00-0308	EA	Plunger Switch, Single Gang, Non-Metallic (PVC) Weatherproof Cover.....	20.36	0.61
26 27 26 00-0309	EA	Double Duplex Receptacle, Two Gang, Non-Metallic (PVC) Weatherproof Cover.....	29.31	0.92
26 27 26 00-0310		Removal And Reinstallation Of Wiring Devices (26 27 26)		
Note: Includes storage and cleaning.				
26 27 26 00-0311	EA	Removal And Reinstallation Of Receptacle, Switch, Outlet Or Special System Device.....	80.45	
26 27 26 00-0312	EA	Removal And Reinstallation Of Receptacle Or Switch Outlet Cover Plate.....	10.19	
26 27 26 00-0313		In Line Midget Fuseholders (26 27 26)		
See CSI section 26 28 13 00-0078 for fuses.				
26 27 26 00-0314	EA	Single Pole Water Resistant In Line Midget Fuseholder.....	90.27	
26 27 26 00-0315	EA	Double Pole Water Resistant In Line Midget Fuseholder.....	211.32	
26 27 26 00-0316		Limit Switches (26 27 26)		
26 27 26 00-0317		Heavy Duty Precision Oiltight (26 27 26 00-0316)		
26 27 26 00-0318		Lever Arm, Plunger, Wobble Stick Type (26 27 26 00-0317)		
26 27 26 00-0319	EA	Limit Switch, Heavy Duty, Lever Arm Weatherproof, 10 Amperes Rated.....	366.86	77.04
26 27 33		Power Distribution Units (26 27)		
Note: Includes wiring connections and testing.				
26 27 33 00-0001		Liebert Precision Power Center (26 27 33)		
Note: With K20 Trans Spike Suppression Modules Lighting/Surge Arrestors. Includes start-up.				
26 27 33 00-0002	EA	PDU 15 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC015C).....	21,308.89	376.00
26 27 33 00-0003	EA	PDU 30 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC030C).....	25,734.42	407.55
26 27 33 00-0004	EA	PDU 50 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC050C).....	29,329.68	452.43
26 27 33 00-0005	EA	PDU 75 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC075C).....	33,749.57	489.12
26 27 33 00-0006	EA	PDU 100 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC100C).....	36,819.25	611.40
26 27 33 00-0007	EA	PDU 125 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC125C).....	41,301.49	733.68
26 27 33 00-0008	EA	PDU 150 KVA, 208/480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC150C).....	47,653.28	855.96
26 27 33 00-0009	EA	PDU 200 KVA, 480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC200C).....	50,099.77	978.23
26 27 33 00-0010	EA	PDU 225 KVA, 480/600 Input Voltage, 120/208 Output Voltage (Liebert PPC225C).....	52,920.16	1,100.51
26 27 33 00-0011	EA	Ex Panelboard 10-30 KVA.....	1,881.47	122.28
26 27 33 00-0012	EA	Ex Panelboard 50-125 KVA.....	2,815.07	152.84
26 27 33 00-0013	EA	Ex Panelboard 150-220 KVA.....	6,366.05	183.42
26 27 33 00-0014	EA	Removal And Reinstallation Of Power Distribution Unit.....	1,956.47	
Note: Includes disconnection / reconnection of branch circuits, storage and cleaning.				
26 27 33 00-0015	EA	Start-Up Liebert Power Distribution Unit Line Item Applies To A Relocation Only.....	1,467.36	
26 27 73		Door Chimes (26 27)		
26 27 73 00-0001		Door Bell Chime And Door Button With Built-In Viewer (26 27 73)		
Note: Non-electric chime, mounted on door				
26 27 73 00-0002	EA	Mechanical Door Bell Chime And Door Button With Built-In Viewer (Newhouse Hardware MCHBV).....	80.32	16.28
26 27 73 00-0003		Wireless Door Bell System (26 27 73)		
26 27 73 00-0004	EA	Wireless Doorbell Chime And Push Button (Broan LA542WH).....	141.54	
Note: Includes 2 push buttons				
26 27 73 00-0005	EA	Wireless Doorbell Chime And Push Button (STI-3350G).....	133.24	
Note: Includes 2 push buttons				
26 27 73 00-0006	EA	Wireless Doorbell Chime And Push Button (GE 19300).....	99.31	
Note: Includes 2 push buttons				
26 27 73 00-0007		Door Bell Buzzer System, Wired (26 27 73)		



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Distribution Equipment	26 27	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 27 73 00-0008 EA Door Bell, Push-Button And Transformer, Complete	669.04	254.71
26 27 73 00-0009 EA Visual Flashing Doorbell Indicator, Wire To Existing System, Complete	272.08	61.14
26 27 73 00-0010 EA Removal And Replacement Of Bell/Buzzer, Complete	110.35	30.57

Note: Includes removal of existing.

26 28 Low-Voltage Circuit Protective Devices (26 20)

26 28 13 Fuses (26 28)

26 28 13 00-0001 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuses (26 28 13)

26 28 13 00-0002 EA 1 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	29.83	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0003 EA 2 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	29.02	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0004 EA 3 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	27.90	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0005 EA 5 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	27.75	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0006 EA 6 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	28.79	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0007 EA 8 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	26.75	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0008 EA 10 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	26.27	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0009 EA 15 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	22.31	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0010 EA 20 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	21.71	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0011 EA 25 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	22.86	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0012 EA 30 Amperes, 125 Volt AC, Type T Dual Element, Time Delay, Edison Base Plug Fuse.....	22.06	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	

26 28 13 00-0013 Class RK1, Time Delay Fuses (26 28 13)

26 28 13 00-0014 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuses (26 28 13 00-0013)

26 28 13 00-0015 EA 1 Ampere, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse	49.32	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0016 EA 2 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	45.73	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0017 EA 3 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	48.23	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0018 EA 4 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	47.90	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0019 EA 5 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	45.40	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0020 EA 10 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	43.91	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0021 EA 15 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	39.94	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0022 EA 20 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	39.64	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0023 EA 25 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	39.97	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0024 EA 30 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	39.56	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0025 EA 35 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	56.44	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0026 EA 40 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	55.24	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0027 EA 45 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	56.14	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0028 EA 50 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	55.40	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	
26 28 13 00-0029 EA 60 Amperes, 250 Volt AC, 200 kAmp I.R., Ferrule Type, Class RK1, Time Delay Fuse.....	54.32	8.80
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	5.87	

26 28 13 00-0030 250 Volt AC, 200 kAmp I.R., BladeType, Class RK1, Time Delay Fuses (26 28 13 00-0013)

26 28 13 00-0031 EA 70 Amperes, 250 Volt AC, 200 kAmp I.R., BladeType, Class RK1, Time Delay Fuse.....	104.02	11.00
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.34	
26 28 13 00-0032 EA 80 Amperes, 250 Volt AC, 200 kAmp I.R., BladeType, Class RK1, Time Delay Fuse.....	103.42	11.00
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.34	
26 28 13 00-0033 EA 90 Amperes, 250 Volt AC, 200 kAmp I.R., BladeType, Class RK1, Time Delay Fuse.....	115.54	11.00
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.34	
26 28 13 00-0034 EA 100 Amperes, 250 Volt AC, 200 kAmp I.R., BladeType, Class RK1, Time Delay Fuse.....	102.47	11.00
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.34	
26 28 13 00-0035 EA 110 Amperes, 250 Volt AC, 200 kAmp I.R., BladeType, Class RK1, Time Delay Fuse.....	301.93	11.00
<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	7.34	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 13 00-0076 EA 500 Amperes, 600 Volt AC, 200 kAmp I.R., Blade Type, Class RK1, Time Delay Fuse.....	1,082.27	22.01
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.67	
26 28 13 00-0077 EA 600 Amperes, 600 Volt AC, 200 kAmp I.R., Blade Type, Class RK1, Time Delay Fuse.....	942.56	22.01
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.67	
26 28 13 00-0078 600 Volt AC, Class CC Midget Fuses (26 28 13)		
Note: 250/300 Volt DC.		
26 28 13 00-0079 EA 1 Amperes, 600 Volt AC, Class CC Midget Fuse.....	57.47	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0080 EA 2 Amperes, 600 Volt AC, Class CC Midget Fuse.....	58.42	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0081 EA 3 Amperes, 600 Volt AC, Class CC Midget Fuse.....	58.15	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0082 EA 5 Amperes, 600 Volt AC, Class CC Midget Fuse.....	57.85	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0083 EA 6 Amperes, 600 Volt AC, Class CC Midget Fuse.....	62.33	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0084 EA 8 Amperes, 600 Volt AC, Class CC Midget Fuse.....	55.16	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0085 EA 10 Amperes, 600 Volt AC, Class CC Midget Fuse.....	63.58	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0086 EA 15 Amperes, 600 Volt AC, Class CC Midget Fuse.....	57.88	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0087 EA 20 Amperes, 600 Volt AC, Class CC Midget Fuse.....	56.71	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0088 EA 25 Amperes, 600 Volt AC, Class CC Midget Fuse.....	54.02	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0089 EA 30 Amperes, 600 Volt AC, Class CC Midget Fuse.....	56.30	8.80
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.87	
26 28 13 00-0090 200,000 Ampere Interrupting Capacity, 600 Volt AC, Class J Bolted Fuse (26 28 13)		
26 28 13 00-0091 EA 1 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	77.26	6.11
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.67	
26 28 13 00-0092 EA 3 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	77.88	6.11
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	3.67	
26 28 13 00-0093 EA 6 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	66.17	7.34
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	4.40	
26 28 13 00-0094 EA 10 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	64.84	9.17
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.50	
26 28 13 00-0095 EA 15 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	66.33	9.17
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.50	
26 28 13 00-0096 EA 20 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	65.00	9.17
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	5.50	
26 28 13 00-0097 EA 25 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	82.52	12.23
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 28 13 00-0098 EA 30 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	67.60	12.23
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 28 13 00-0099 EA 35 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	123.29	12.23
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 28 13 00-0100 EA 40 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	104.10	12.23
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 28 13 00-0101 EA 45 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	120.35	12.23
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	7.34	
26 28 13 00-0102 EA 50 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	104.41	15.28
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.17	
26 28 13 00-0103 EA 60 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	102.35	15.28
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	9.17	
26 28 13 00-0104 EA 70 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	161.89	18.34
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.01	
26 28 13 00-0105 EA 80 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	173.27	18.34
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.01	
26 28 13 00-0106 EA 90 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	170.36	18.34
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	11.01	
26 28 13 00-0107 EA 100 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	146.28	21.40
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.84	
26 28 13 00-0108 EA 110 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	358.66	21.40
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.84	
26 28 13 00-0109 EA 125 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	303.00	21.40
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	12.84	
26 28 13 00-0110 EA 150 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	286.65	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.68	
26 28 13 00-0111 EA 175 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	291.08	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.68	
26 28 13 00-0112 EA 200 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	239.31	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.68	
26 28 13 00-0113 EA 225 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	626.47	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.68	
26 28 13 00-0114 EA 250 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	578.15	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.68	
26 28 13 00-0115 EA 300 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse.....	531.66	24.45
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.68	

26 Electrical

26 20 Low-Voltage Electrical Distribution

26 28 Low-Voltage Circuit Protective Devices



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 28 13 00-0116	EA	350 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse	581.14	24.45
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.68	
26 28 13 00-0117	EA	400 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse	475.64	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0118	EA	450 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse	1,027.76	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0119	EA	500 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse	868.26	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0120	EA	600 Amperes, 600 Volt AC, 200 kAmp I.R., Class J Bolted Fuse	641.44	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0121		600 Volt AC, 200 kAmp I.R., Class L Bolted Fuses <small>(26 28 13)</small>		
26 28 13 00-0122	EA	100 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,987.44	15.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.17	
26 28 13 00-0123	EA	150 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,991.38	15.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.17	
26 28 13 00-0124	EA	200 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,995.05	15.28
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	9.17	
26 28 13 00-0125	EA	250 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,987.06	18.34
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.00	
26 28 13 00-0126	EA	300 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,829.31	18.34
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	11.00	
26 28 13 00-0127	EA	350 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,956.48	21.40
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.84	
26 28 13 00-0128	EA	400 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,799.87	21.40
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.84	
26 28 13 00-0129	EA	450 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	2,014.34	21.40
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.84	
26 28 13 00-0130	EA	500 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,974.82	21.40
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	12.84	
26 28 13 00-0131	EA	600 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,753.79	24.45
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 13 00-0132	EA	601 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,801.32	24.45
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 13 00-0133	EA	650 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	2,398.73	24.45
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 13 00-0134	EA	700 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,745.17	24.45
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 13 00-0135	EA	750 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	2,684.65	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0136	EA	800 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,540.77	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0137	EA	900 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	2,255.99	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0138	EA	1,000 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,514.63	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0139	EA	1,200 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,560.09	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0140	EA	1,350 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	3,484.07	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0141	EA	1,400 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	3,434.94	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0142	EA	1,500 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	3,097.83	27.51
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	16.51	
26 28 13 00-0143	EA	1,600 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	1,929.15	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0144	EA	1,800 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	4,104.54	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0145	EA	2,000 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	2,622.55	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0146	EA	2,500 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	3,550.30	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0147	EA	2,501 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	6,058.09	30.57
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 13 00-0148	EA	3,000 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	3,958.04	33.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.18	
26 28 13 00-0149	EA	3,500 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	8,201.77	33.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.18	
26 28 13 00-0150	EA	3,800 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	9,519.38	33.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.18	
26 28 13 00-0151	EA	4,000 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	5,497.94	33.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.18	
26 28 13 00-0152	EA	5,000 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	8,685.57	33.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.18	
26 28 13 00-0153	EA	6,000 Amperes, 600 Volt AC, 200 kAmp I.R., Class L Bolted Fuse	14,388.21	33.62
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	20.18	

26 28 16 Enclosed Switches and Circuit Breakers (26 28)

26 28 16 13 Enclosed Circuit Breakers (26 28 16)

26 28 16 13-0001 Branch Circuit Breakers (26 28 16 13)

Note: For installation in existing and new panelboards. Use task modifier for installation in new panelboards.



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0002 Branch Circuit Breakers 10,000 Amperes Interrupting Capacity, Plug-On ^(26 28) <small>^{16 13-0001} Note: Includes connection of electrical wire.</small>		
26 28 16 13-0003 EA 1 Pole, 120/240 Volt, 15 To 30 Amperes, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	58.11	22.01
For Bolt-On, Add	15.82	
For Installation In New Panelboard, Deduct	-12.23	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	14.67	
26 28 16 13-0004 EA 1 Pole, 120/240 Volt, 35 To 60 Amperes, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	58.11	22.01
For Bolt-On, Add	15.82	
For Installation In New Panelboard, Deduct	-12.23	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	14.67	
26 28 16 13-0005 EA 1 Pole, 120/240 Volt, 70 To 100 Amperes, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	82.36	27.51
For Bolt-On, Add	20.99	
For Installation In New Panelboard, Deduct	-15.29	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	18.34	
26 28 16 13-0006 EA 1 Pole GFI, 15 To 30 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	118.84	27.51
For Bolt-On, Add	25.55	
For Installation In New Panelboard, Deduct	-15.29	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	18.34	
26 28 16 13-0007 EA 1 Pole GFI, 35 To 60 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Protection Circuit Breaker, 10,000 Amperes Interrupting Capacity	160.55	27.51
For Bolt-On, Add	30.77	
For Installation In New Panelboard, Deduct	-15.29	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	18.34	
26 28 16 13-0008 EA 1 Pole GFI, 15 To 30 Amperes, 120/240 Volt, UL Listed 30mA Equipment Protection Circuit Breaker, 10,000 Amperes Interrupting Capacity	184.34	27.51
For Bolt-On, Add	33.74	
For Installation In New Panelboard, Deduct	-15.29	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	18.34	
26 28 16 13-0009 EA 1 Pole GFI, 15 To 20 Amperes, 120/240 Volt, "Arc Fault" Circuit Breaker, 10,000 Amperes Interrupting Capacity	95.86	27.51
For Bolt-On, Add	22.68	
For Installation In New Panelboard, Deduct	-15.29	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	18.34	
26 28 16 13-0010 EA 2 Pole, 15 To 30 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	94.59	33.01
For Bolt-On, Add	24.66	
For Installation In New Panelboard, Deduct	-18.34	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	22.01	
26 28 16 13-0011 EA 2 Pole, 35 To 60 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	94.59	33.01
For Bolt-On, Add	24.66	
For Installation In New Panelboard, Deduct	-18.34	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	22.01	
26 28 16 13-0012 EA 2 Pole, 70 To 100 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	140.26	44.02
For Bolt-On, Add	34.65	
For Installation In New Panelboard, Deduct	-24.46	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	29.35	
26 28 16 13-0013 EA 2 Pole, 110 To 125 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	224.86	55.03
For Bolt-On, Add	49.51	
For Installation In New Panelboard, Deduct	-30.57	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	36.68	
26 28 16 13-0014 EA 2 Pole, 150 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	263.24	61.14
For Bolt-On, Add	56.44	
For Installation In New Panelboard, Deduct	-33.63	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	40.35	
26 28 16 13-0015 EA 2 Pole GFI, 15 To 50 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	218.35	39.13
For Bolt-On, Add	42.70	
For Installation In New Panelboard, Deduct	-22.01	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	26.41	
26 28 16 13-0016 EA 2 Pole GFI, 15 To 50 Amperes, 120/240 Volt, UL Listed 30mA Equipment Protection Circuit Breaker, 10,000 Amperes Interrupting Capacity	286.58	39.13
For Bolt-On, Add	51.23	
For Installation In New Panelboard, Deduct	-22.01	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	26.41	
26 28 16 13-0017 EA 3 Pole, 15 To 30 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	172.09	44.02
For Bolt-On, Add	38.63	
For Installation In New Panelboard, Deduct	-24.46	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	29.35	
26 28 16 13-0018 EA 3 Pole, 35 To 60 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	172.09	44.02
For Bolt-On, Add	38.63	
For Installation In New Panelboard, Deduct	-24.46	
<small>Note: Also for use with new interiors in panelboards. For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</small>	29.35	

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 28 Low-Voltage Circuit Protective Devices



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0019	EA	3 Pole, 70 To 100 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	.....	224.45	55.03
		<i>For Bolt-On, Add</i>		49.46	
		<i>For Installation In New Panelboard, Deduct</i>		-30.57	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		36.68	
26 28 16 13-0020	EA	3 Pole, 110 To 125 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	.....	332.35	66.03
		<i>For Bolt-On, Add</i>		67.22	
		<i>For Installation In New Panelboard, Deduct</i>		-36.68	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		44.02	
26 28 16 13-0021	EA	3 Pole, 150 Amperes, 120/240 Volt, Branch Circuit Breaker, 10,000 Amperes Interrupting Capacity	.....	421.02	77.04
		<i>For Bolt-On, Add</i>		82.59	
		<i>For Installation In New Panelboard, Deduct</i>		-42.80	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		51.36	
26 28 16 13-0022		Branch Circuit Breakers 14,000 Amperes Interrupting Capacity, Plug-On <small>(26 28 16 13-0001)</small>			
		<i>Note: Includes connection of electrical wire.</i>			
26 28 16 13-0023	EA	1 Pole, 277/480 Volt, 15 To 30 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	79.72	22.01
		<i>For Bolt-On, Add</i>		18.52	
		<i>For Installation In New Panelboard, Deduct</i>		-12.23	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		14.67	
26 28 16 13-0024	EA	1 Pole, 277/480 Volt, 35 To 60 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	79.72	22.01
		<i>For Bolt-On, Add</i>		18.52	
		<i>For Installation In New Panelboard, Deduct</i>		-12.23	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		14.67	
26 28 16 13-0025	EA	1 Pole, 277/480 Volt, 70 To 100 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	137.61	27.51
		<i>For Bolt-On, Add</i>		27.90	
		<i>For Installation In New Panelboard, Deduct</i>		-15.29	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		18.34	
26 28 16 13-0026	EA	1 Pole GFI, 277/480 Volt, 15 To 60 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	207.75	27.51
		<i>For Bolt-On, Add</i>		36.67	
		<i>For Installation In New Panelboard, Deduct</i>		-15.29	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		18.34	
26 28 16 13-0027	EA	2 Pole, 277/480 Volt, 15 To 30 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	151.49	33.01
		<i>For Bolt-On, Add</i>		31.78	
		<i>For Installation In New Panelboard, Deduct</i>		-18.34	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		22.01	
26 28 16 13-0028	EA	2 Pole, 277/480 Volt, 35 To 60 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	151.49	33.01
		<i>For Bolt-On, Add</i>		31.78	
		<i>For Installation In New Panelboard, Deduct</i>		-18.34	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		22.01	
26 28 16 13-0029	EA	2 Pole, 277/480 Volt, 70 To 100 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	289.76	44.02
		<i>For Bolt-On, Add</i>		53.34	
		<i>For Installation In New Panelboard, Deduct</i>		-24.46	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		29.35	
26 28 16 13-0030	EA	2 Pole, 277/480 Volt, 110 To 125 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	392.75	55.03
		<i>For Bolt-On, Add</i>		70.49	
		<i>For Installation In New Panelboard, Deduct</i>		-30.57	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		36.68	
26 28 16 13-0031	EA	2 Pole, 277/480 Volt, 150 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	568.83	61.14
		<i>For Bolt-On, Add</i>		94.64	
		<i>For Installation In New Panelboard, Deduct</i>		-33.63	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		40.35	
26 28 16 13-0032	EA	3 Pole, 277/480 Volt, 15 To 30 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	238.11	44.02
		<i>For Bolt-On, Add</i>		46.88	
		<i>For Installation In New Panelboard, Deduct</i>		-24.46	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		29.35	
26 28 16 13-0033	EA	3 Pole, 277/480 Volt, 35 To 60 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	238.11	44.02
		<i>For Bolt-On, Add</i>		46.88	
		<i>For Installation In New Panelboard, Deduct</i>		-24.46	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		29.35	
26 28 16 13-0034	EA	3 Pole, 277/480 Volt, 70 To 100 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	351.70	55.03
		<i>For Bolt-On, Add</i>		65.36	
		<i>For Installation In New Panelboard, Deduct</i>		-30.57	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		36.68	
26 28 16 13-0035	EA	3 Pole, 277/480 Volt, 110 To 125 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity	.....	495.34	66.03
		<i>For Bolt-On, Add</i>		87.60	
		<i>For Installation In New Panelboard, Deduct</i>		-36.68	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		44.02	



Electrical	26	
Low-Voltage Electrical Distribution	26 20	26
Low-Voltage Circuit Protective Devices	26 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0036	EA		3 Pole, 277/480 Volt, 150 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity 756.73		77.04
			<i>For Bolt-On, Add</i>	124.55	
			<i>For Installation In New Panelboard, Deduct</i>	-42.80	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	51.36	
26 28 16 13-0037	EA		3 Pole, 277/480 Volt, 175 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity 870.66		82.54
			<i>For Bolt-On, Add</i>	140.93	
			<i>For Installation In New Panelboard, Deduct</i>	-45.86	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	55.03	
26 28 16 13-0038	EA		3 Pole, 277/480 Volt, 200 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity 935.12		88.04
			<i>For Bolt-On, Add</i>	151.13	
			<i>For Installation In New Panelboard, Deduct</i>	-48.91	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	58.70	
26 28 16 13-0039	EA		3 Pole, 277/480 Volt, 225 Amperes, Branch Circuit Breaker, 14,000 Amperes Interrupting Capacity 1,102.21		93.54
			<i>For Bolt-On, Add</i>	174.16	
			<i>For Installation In New Panelboard, Deduct</i>	-51.97	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	62.36	
26 28 16 13-0040			Branch Circuit Breakers 18,000 Amperes Interrupting Capacity, Plug-On <small>(26 28 16 13-0001)</small>		
			<i>Note: Includes connection of electrical wire.</i>		
26 28 16 13-0041	EA		15 To 30 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 93.92		22.01
			<i>For Bolt-On, Add</i>	20.30	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0042	EA		35 To 60 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 93.92		22.01
			<i>For Bolt-On, Add</i>	20.30	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0043	EA		70 To 100 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 151.64		27.51
			<i>For Bolt-On, Add</i>	29.65	
			<i>For Installation In New Panelboard, Deduct</i>	-15.29	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 16 13-0044	EA		15 To 30 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 188.51		33.01
			<i>For Bolt-On, Add</i>	36.40	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0045	EA		35 To 60 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 188.51		33.01
			<i>For Bolt-On, Add</i>	36.40	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0046	EA		70 To 100 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 325.26		44.02
			<i>For Bolt-On, Add</i>	57.78	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0047	EA		110 To 125 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 811.25		55.03
			<i>For Bolt-On, Add</i>	122.81	
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0048	EA		15 To 30 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 299.20		44.02
			<i>For Bolt-On, Add</i>	54.52	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0049	EA		35 To 60 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 299.20		44.02
			<i>For Bolt-On, Add</i>	54.52	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0050	EA		70 To 100 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 396.16		55.03
			<i>For Bolt-On, Add</i>	70.92	
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0051	EA		110 To 125 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 18,000 Amperes Interrupting Capacity 1,003.43		66.03
			<i>For Bolt-On, Add</i>	151.11	
			<i>For Installation In New Panelboard, Deduct</i>	-36.68	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.02	
26 28 16 13-0052			Branch Circuit Breakers 22,000 Amperes Interrupting Capacity, Plug-On <small>(26 28 16 13-0001)</small>		
			<i>Note: Includes connection of electrical wire.</i>		

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 28 Low-Voltage Circuit Protective Devices



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0053	EA		15 To 30 Amperes, 1 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	105.98	22.01
			<i>For Bolt-On, Add</i>	21.81	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0054	EA		35 To 60 Amperes, 1 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	105.98	22.01
			<i>For Bolt-On, Add</i>	21.81	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0055	EA		70 To 100 Amperes, 1 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	125.54	27.51
			<i>For Bolt-On, Add</i>	26.39	
			<i>For Installation In New Panelboard, Deduct</i>	-15.29	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 16 13-0056	EA		15 To 30 Amperes, 1 Pole GFI, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	206.14	27.51
			<i>For Bolt-On, Add</i>	36.47	
			<i>For Installation In New Panelboard, Deduct</i>	-15.29	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	18.34	
26 28 16 13-0057	EA		15 To 30 Amperes, 2 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	219.98	33.01
			<i>For Bolt-On, Add</i>	40.34	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0058	EA		35 To 60 Amperes, 2 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	219.98	33.01
			<i>For Bolt-On, Add</i>	40.34	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0059	EA		70 To 100 Amperes, 2 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	268.25	44.02
			<i>For Bolt-On, Add</i>	50.65	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0060	EA		110 To 125 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	383.56	55.03
			<i>For Bolt-On, Add</i>	69.34	
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0061	EA		150 To 225 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	492.12	61.14
			<i>For Bolt-On, Add</i>	85.05	
			<i>For Installation In New Panelboard, Deduct</i>	-33.63	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.35	
26 28 16 13-0062	EA		250 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	612.93	71.54
			<i>For Bolt-On, Add</i>	104.43	
			<i>For Installation In New Panelboard, Deduct</i>	-39.74	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	47.69	
26 28 16 13-0063	EA		300 To 400 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	663.31	82.54
			<i>For Bolt-On, Add</i>	115.01	
			<i>For Installation In New Panelboard, Deduct</i>	-45.86	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	55.03	
26 28 16 13-0064	EA		15 To 30 Amperes, 3 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	268.78	44.02
			<i>For Bolt-On, Add</i>	50.72	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0065	EA		35 To 60 Amperes, 3 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	268.78	44.02
			<i>For Bolt-On, Add</i>	50.72	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0066	EA		70 To 100 Amperes, 3 Pole, 120/240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	316.54	55.03
			<i>For Bolt-On, Add</i>	60.97	
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0067	EA		110 To 125 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	474.51	66.03
			<i>For Bolt-On, Add</i>	84.99	
			<i>For Installation In New Panelboard, Deduct</i>	-36.68	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.02	
26 28 16 13-0068	EA		150 To 225 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	622.30	85.60
			<i>For Bolt-On, Add</i>	110.96	
			<i>For Installation In New Panelboard, Deduct</i>	-47.39	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	56.86	
26 28 16 13-0069	EA		250 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity	766.49	99.05
			<i>For Bolt-On, Add</i>	134.33	
			<i>For Installation In New Panelboard, Deduct</i>	-55.03	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66.03	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0070	EA		300 To 400 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 22,000 Amperes Interrupting Capacity.....	814.85	105.16
			<i>For Bolt-On, Add</i>	142.51	
			<i>For Installation In New Panelboard, Deduct</i>	-58.08	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.70	
26 28 16 13-0071			Branch Circuit Breakers 25,000 Amperes Interrupting Capacity, Plug-On^(26 28)		
			^{16 13-0001} <i>Note: Includes connection of electrical wire.</i>		
26 28 16 13-0072	EA		15 To 30 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	227.84	33.01
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	41.32	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0073	EA		35 To 60 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	227.84	33.01
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	41.32	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0074	EA		70 To 100 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	344.25	44.02
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	60.15	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0075	EA		110 To 125 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	553.39	55.03
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	90.57	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0076	EA		150 To 225 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	856.07	68.48
			<i>For Installation In New Panelboard, Deduct</i>	-38.21	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	133.76	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	45.85	
26 28 16 13-0077	EA		250 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	968.12	71.54
			<i>For Installation In New Panelboard, Deduct</i>	-39.74	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	148.83	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	47.69	
26 28 16 13-0078	EA		300 To 400 Amperes, 2 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	1,059.38	82.54
			<i>For Installation In New Panelboard, Deduct</i>	-45.86	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	164.52	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	55.03	
26 28 16 13-0079	EA		15 To 30 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	326.22	44.02
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	57.90	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0080	EA		35 To 60 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	326.22	44.02
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	57.90	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0081	EA		70 To 100 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	410.78	55.03
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	72.75	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0082	EA		110 To 125 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	687.57	66.03
			<i>For Installation In New Panelboard, Deduct</i>	-36.68	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	111.62	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.02	
26 28 16 13-0083	EA		150 To 225 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	1,000.96	85.60
			<i>For Installation In New Panelboard, Deduct</i>	-47.39	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	158.29	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	56.86	
26 28 16 13-0084	EA		250 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	1,181.74	99.05
			<i>For Installation In New Panelboard, Deduct</i>	-55.03	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	186.24	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	66.03	
26 28 16 13-0085	EA		300 To 400 Amperes, 3 Pole, 240/480 Volt, Branch Circuit Breaker, 25,000 Amperes Interrupting Capacity	1,277.63	105.16
			<i>For Installation In New Panelboard, Deduct</i>	-58.08	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	200.36	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	69.70	
26 28 16 13-0086			Branch Circuit Breakers 30,000 Amperes Interrupting Capacity, Plug-On^(26 28)		
			^{16 13-0001} <i>Note: Includes connection of electrical wire.</i>		

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0087	EA	2 Pole, 240/480 Volt, 15-30 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	235.65	33.01
		<i>For Bolt-On, Add</i>		42.30	
		<i>For Installation In New Panelboard, Deduct</i>		-18.34	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		22.01	
26 28 16 13-0088	EA	2 Pole, 240/480 Volt, 35-60 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	235.65	33.01
		<i>For Bolt-On, Add</i>		42.30	
		<i>For Installation In New Panelboard, Deduct</i>		-18.34	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		22.01	
26 28 16 13-0089	EA	2 Pole, 240/480 Volt, 70-100 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	416.38	44.02
		<i>For Bolt-On, Add</i>		69.17	
		<i>For Installation In New Panelboard, Deduct</i>		-24.46	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		29.35	
26 28 16 13-0090	EA	2 Pole, 240/480 Volt, 110-125 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	753.38	55.03
		<i>For Bolt-On, Add</i>		115.57	
		<i>For Installation In New Panelboard, Deduct</i>		-30.57	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		36.68	
26 28 16 13-0091	EA	2 Pole, 240/480 Volt, 150-225 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	1,186.65	68.48
		<i>For Bolt-On, Add</i>		175.08	
		<i>For Installation In New Panelboard, Deduct</i>		-38.21	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		45.85	
26 28 16 13-0092	EA	2 Pole, 240/480 Volt, 250 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	1,348.32	71.54
		<i>For Bolt-On, Add</i>		196.36	
		<i>For Installation In New Panelboard, Deduct</i>		-39.74	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		47.69	
26 28 16 13-0093	EA	2 Pole, 240/480 Volt, 300-400 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	1,469.67	82.54
		<i>For Bolt-On, Add</i>		215.81	
		<i>For Installation In New Panelboard, Deduct</i>		-45.86	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		55.03	
26 28 16 13-0094	EA	3 Pole, 240/480 Volt, 15-30 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	380.31	44.02
		<i>For Bolt-On, Add</i>		64.66	
		<i>For Installation In New Panelboard, Deduct</i>		-24.46	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		29.35	
26 28 16 13-0095	EA	3 Pole, 240/480 Volt, 35-60 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	380.31	44.02
		<i>For Bolt-On, Add</i>		64.66	
		<i>For Installation In New Panelboard, Deduct</i>		-24.46	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		29.35	
26 28 16 13-0096	EA	3 Pole, 240/480 Volt, 70-100 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	504.55	55.03
		<i>For Bolt-On, Add</i>		84.47	
		<i>For Installation In New Panelboard, Deduct</i>		-30.57	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		36.68	
26 28 16 13-0097	EA	3 Pole, 240/480 Volt, 110-125 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	916.07	66.03
		<i>For Bolt-On, Add</i>		140.19	
		<i>For Installation In New Panelboard, Deduct</i>		-36.68	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		44.02	
26 28 16 13-0098	EA	3 Pole, 240/480 Volt, 150-225 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	1,158.04	85.60
		<i>For Bolt-On, Add</i>		177.92	
		<i>For Installation In New Panelboard, Deduct</i>		-47.39	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		56.86	
26 28 16 13-0099	EA	3 Pole, 240/480 Volt, 250 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	1,834.53	99.05
		<i>For Bolt-On, Add</i>		267.83	
		<i>For Installation In New Panelboard, Deduct</i>		-55.03	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		66.03	
26 28 16 13-0100	EA	3 Pole, 240/480 Volt, 300-400 Amperes, Branch Circuit Breaker, 30,000 Amperes Interrupting Capacity	.....	1,953.51	105.16
		<i>For Bolt-On, Add</i>		284.85	
		<i>For Installation In New Panelboard, Deduct</i>		-58.08	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		69.70	
26 28 16 13-0101		Branch Circuit Breakers 35,000 Amperes Interrupting Capacity, Plug-On ^(26 28 16 13-0001)			
		<i>Note: Includes connection of electrical wire.</i>			
26 28 16 13-0102	EA	1 Pole, 480 Volt, 15-30 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity	.....	125.67	22.01
		<i>For Bolt-On, Add</i>		24.27	
		<i>For Installation In New Panelboard, Deduct</i>		-12.23	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		14.67	
26 28 16 13-0103	EA	1 Pole, 480 Volt, 35-60 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity	.....	125.67	22.01
		<i>For Bolt-On, Add</i>		24.27	
		<i>For Installation In New Panelboard, Deduct</i>		-12.23	
		<i>Note: Also for use with new interiors in panelboards.</i>			
		<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>		14.67	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0104 EA 1 Pole, 480 Volt, 70-100 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	213.72	27.51
For Bolt-On, Add	37.41	
For Installation In New Panelboard, Deduct	-15.29	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.34	
26 28 16 13-0105 EA 2 Pole, 480 Volt, 15-30 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	267.64	33.01
For Bolt-On, Add	46.29	
For Installation In New Panelboard, Deduct	-18.34	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	22.01	
26 28 16 13-0106 EA 2 Pole, 480 Volt, 35-60 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	267.64	33.01
For Bolt-On, Add	46.29	
For Installation In New Panelboard, Deduct	-18.34	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	22.01	
26 28 16 13-0107 EA 2 Pole, 480 Volt, 70-100 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	482.58	44.02
For Bolt-On, Add	77.44	
For Installation In New Panelboard, Deduct	-24.46	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.35	
26 28 16 13-0108 EA 2 Pole, 480 Volt, 110-125 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	885.61	55.03
For Bolt-On, Add	132.10	
For Installation In New Panelboard, Deduct	-30.57	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	36.68	
26 28 16 13-0109 EA 2 Pole, 480 Volt, 150-225 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	1,708.93	68.48
For Bolt-On, Add	240.36	
For Installation In New Panelboard, Deduct	-38.21	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	45.85	
26 28 16 13-0110 EA 3 Pole, 480 Volt, 15-30 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	438.04	44.02
For Bolt-On, Add	71.87	
For Installation In New Panelboard, Deduct	-24.46	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.35	
26 28 16 13-0111 EA 3 Pole, 480 Volt, 35-60 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	438.04	44.02
For Bolt-On, Add	71.87	
For Installation In New Panelboard, Deduct	-24.46	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	29.35	
26 28 16 13-0112 EA 3 Pole, 480 Volt, 70-100 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	584.75	55.03
For Bolt-On, Add	94.49	
For Installation In New Panelboard, Deduct	-30.57	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	36.68	
26 28 16 13-0113 EA 3 Pole, 480 Volt, 110-125 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	1,090.38	66.03
For Bolt-On, Add	161.98	
For Installation In New Panelboard, Deduct	-36.68	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	44.02	
26 28 16 13-0114 EA 3 Pole, 480 Volt, 150-225 Amperes, Branch Circuit Breaker, 35,000 Amperes Interrupting Capacity.....	2,124.71	85.60
For Bolt-On, Add	298.76	
For Installation In New Panelboard, Deduct	-47.39	
Note: Also for use with new interiors in panelboards.		
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	56.86	
26 28 16 13-0115 Branch Circuit Breakers 42,000 Amperes Interrupting Capacity, Plug-On ^(26 28)		
^{16 13-0001} Note: Includes connection of electrical wire.		
26 28 16 13-0116 EA 15 To 30 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity.....	181.14	22.01
For Installation In New Panelboard, Deduct	-12.23	
Note: Also for use with new interiors in panelboards.		
For Bolt-On, Add	31.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.67	
26 28 16 13-0117 EA 35 To 60 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Ampere Interrupting Capacity.....	181.14	22.01
For Installation In New Panelboard, Deduct	-12.23	
Note: Also for use with new interiors in panelboards.		
For Bolt-On, Add	31.20	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	14.67	
26 28 16 13-0118 EA 70 To 100 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity.....	272.71	27.51
For Installation In New Panelboard, Deduct	-15.29	
Note: Also for use with new interiors in panelboards.		
For Bolt-On, Add	44.79	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	18.34	
26 28 16 13-0119 EA 15 To 30 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity.....	331.82	33.01
For Installation In New Panelboard, Deduct	-18.34	
Note: Also for use with new interiors in panelboards.		
For Bolt-On, Add	54.32	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	22.01	
26 28 16 13-0120 EA 35 To 60 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity.....	331.82	33.01
For Installation In New Panelboard, Deduct	-18.34	
Note: Also for use with new interiors in panelboards.		
For Bolt-On, Add	54.32	
For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add	22.01	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0121	EA		70 To 100 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	620.73	44.02
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	94.71	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0122	EA		110 To 125 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	1,120.02	55.03
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	161.40	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0123	EA		150 To 225 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	2,220.14	61.14
			<i>For Installation In New Panelboard, Deduct</i>	-33.63	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	301.06	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	40.35	
26 28 16 13-0124	EA		15 To 30 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	566.64	44.02
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	87.95	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0125	EA		35 To 60 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	566.64	44.02
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	87.95	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0126	EA		70 To 100 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	783.44	55.03
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	119.33	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0127	EA		110 To 125 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	1,264.68	66.03
			<i>For Installation In New Panelboard, Deduct</i>	-36.68	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	183.76	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.02	
26 28 16 13-0128	EA		150 To 225 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 42,000 Amperes Interrupting Capacity	2,804.11	85.60
			<i>For Installation In New Panelboard, Deduct</i>	-47.39	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Bolt-On, Add</i>	383.68	
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	56.86	
26 28 16 13-0129			Branch Circuit Breakers 65,000 Amperes Interrupting Capacity, Plug-On <small>(26 28 16 13-0001)</small>		
			<i>Note: Includes connection of electrical wire.</i>		
26 28 16 13-0130	EA		15 To 30 Amperes, 1 Pole, 240 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	85.40	22.01
			<i>For Bolt-On, Add</i>	19.23	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0131	EA		15 To 30 Amperes, 2 Pole, 240 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	176.19	33.01
			<i>For Bolt-On, Add</i>	34.86	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0132	EA		15 To 30 Amperes, 3 Pole, 240 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	276.93	44.02
			<i>For Bolt-On, Add</i>	51.73	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0133	EA		15 To 30 Amperes, 1 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	171.63	22.01
			<i>For Bolt-On, Add</i>	30.01	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0134	EA		35 To 60 Amperes, 1 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	171.63	22.01
			<i>For Bolt-On, Add</i>	30.01	
			<i>For Installation In New Panelboard, Deduct</i>	-12.23	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	14.67	
26 28 16 13-0135	EA		70 To 100 Amperes, 1 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	341.85	44.02
			<i>For Bolt-On, Add</i>	59.85	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0136	EA		15 To 30 Amperes, 2 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	384.68	33.01
			<i>For Bolt-On, Add</i>	60.92	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	
26 28 16 13-0137	EA		35 To 60 Amperes, 2 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity	384.68	33.01
			<i>For Bolt-On, Add</i>	60.92	
			<i>For Installation In New Panelboard, Deduct</i>	-18.34	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	22.01	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 13-0138	EA		70 To 100 Amperes, 2 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	739.87	44.02
			<i>For Bolt-On, Add</i>	109.60	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0139	EA		110 To 125 Amperes, 2 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	1,252.25	55.03
			<i>For Bolt-On, Add</i>	177.93	
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0140	EA		150 To 225 Amperes, 2 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	2,747.12	68.48
			<i>For Bolt-On, Add</i>	370.14	
			<i>For Installation In New Panelboard, Deduct</i>	-38.21	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	45.85	
26 28 16 13-0141	EA		15 To 30 Amperes, 3 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	642.26	44.02
			<i>For Bolt-On, Add</i>	97.40	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0142	EA		35 To 60 Amperes, 3 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	642.26	44.02
			<i>For Bolt-On, Add</i>	97.40	
			<i>For Installation In New Panelboard, Deduct</i>	-24.46	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	29.35	
26 28 16 13-0143	EA		70 To 100 Amperes, 3 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	893.22	55.03
			<i>For Bolt-On, Add</i>	133.05	
			<i>For Installation In New Panelboard, Deduct</i>	-30.57	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	36.68	
26 28 16 13-0144	EA		110 To 125 Amperes, 3 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	1,360.85	66.03
			<i>For Bolt-On, Add</i>	195.78	
			<i>For Installation In New Panelboard, Deduct</i>	-36.68	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	44.02	
26 28 16 13-0145	EA		150 To 225 Amperes, 3 Pole, 480 Volt, Branch Circuit Breaker, 65,000 Amperes Interrupting Capacity.....	3,415.92	85.60
			<i>For Bolt-On, Add</i>	460.16	
			<i>For Installation In New Panelboard, Deduct</i>	-47.39	
			<i>Note: Also for use with new interiors in panelboards.</i>		
			<i>For Personal Protective Equipment (Arc Flash) When Working On Energized Equipment, Add</i>	56.86	
26 28 16 16 Enclosed Switches (26 28 16)					
26 28 16 16-0001			Motor And Circuit Disconnects (26 28 16 16) Note: Work includes mounting, material handling, uploading at job site and termination of all conductors entering and leaving the disconnect.		
26 28 16 16-0002			NEMA 1 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0001)		
26 28 16 16-0003			Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0002) Note: Includes fuses and neutral bar.		
26 28 16 16-0004			240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0003)		
26 28 16 16-0005	EA		30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	486.18	122.28
26 28 16 16-0006	EA		60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	777.95	147.34
26 28 16 16-0007	EA		100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,078.60	172.42
26 28 16 16-0008	EA		200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,865.57	271.46
26 28 16 16-0009	EA		400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	4,015.45	421.86
26 28 16 16-0010	EA		600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	6,730.40	623.63
26 28 16 16-0011	EA		800 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	9,217.74	733.68
26 28 16 16-0012	EA		1,200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	12,415.67	855.96
26 28 16 16-0013			600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0003)		
26 28 16 16-0014	EA		30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	755.44	135.85
26 28 16 16-0015	EA		60 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	911.53	163.73
26 28 16 16-0016	EA		100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,470.92	191.37
26 28 16 16-0017	EA		200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	2,168.88	302.03
26 28 16 16-0018	EA		400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	4,791.29	468.58

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 28 16 16-0019	EA	600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	7,480.90		692.59
26 28 16 16-0020	EA	800 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	11,127.22		814.75
26 28 16 16-0021	EA	1,200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	15,252.10		951.08
26 28 16 16-0022		240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0003)</small>			
26 28 16 16-0023	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	686.00		191.98
26 28 16 16-0024	EA	60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,019.66		254.95
26 28 16 16-0025	EA	100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,391.38		283.08
26 28 16 16-0026	EA	200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	2,202.43		443.26
26 28 16 16-0027	EA	400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	4,634.05		727.56
26 28 16 16-0028	EA	600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	7,587.99		1,019.19
26 28 16 16-0029		600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0003)</small>			
26 28 16 16-0030	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	908.28		212.15
26 28 16 16-0031	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,150.34		283.08
26 28 16 16-0032	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,725.20		318.54
26 28 16 16-0033	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	2,535.21		485.44
26 28 16 16-0034	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	5,737.40		783.81
26 28 16 16-0035	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	9,272.24		1,132.30
26 28 16 16-0036	EA	800 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	14,894.22		1,345.07
26 28 16 16-0037	EA	1,200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	19,097.73		1,528.49
26 28 16 16-0038		240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0003)</small>			
26 28 16 16-0039	EA	30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	662.79		191.98
26 28 16 16-0040	EA	60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	989.67		254.95
26 28 16 16-0041	EA	100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,336.82		283.08
26 28 16 16-0042	EA	200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	2,277.47		443.26
26 28 16 16-0043	EA	400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	5,056.91		727.56
26 28 16 16-0044	EA	600 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	8,224.15		1,019.19
26 28 16 16-0045	EA	800 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	13,735.54		1,283.93
26 28 16 16-0046	EA	1,200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	16,971.04		1,467.36
26 28 16 16-0047		600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0003)</small>			
26 28 16 16-0048	EA	30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	993.42		212.15
26 28 16 16-0049	EA	60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,254.97		283.08
26 28 16 16-0050	EA	100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,878.20		318.54
26 28 16 16-0051	EA	200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	2,764.24		485.44
26 28 16 16-0052	EA	400 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	6,226.05		783.81
26 28 16 16-0053	EA	600 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	10,135.25		1,132.30
26 28 16 16-0054	EA	800 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	16,327.02		1,345.07
26 28 16 16-0055	EA	1,200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	20,645.45		1,528.49



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0056 Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0002)</small>		
26 28 16 16-0057 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0058 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	471.50	176.94
26 28 16 16-0059 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	738.39	246.15
26 28 16 16-0060 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,029.35	283.08
26 28 16 16-0061 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,610.73	452.92
26 28 16 16-0062 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,283.04	754.83
26 28 16 16-0063 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	5,410.78	1,029.35
26 28 16 16-0064 EA 800 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	7,780.62	1,222.79
26 28 16 16-0065 EA 1,200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	10,313.31	1,427.12
26 28 16 16-0066 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0067 EA 30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	520.84	195.28
26 28 16 16-0068 EA 60 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	836.80	276.23
26 28 16 16-0069 EA 100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,164.57	314.50
26 28 16 16-0070 EA 200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,806.82	492.30
26 28 16 16-0071 EA 400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,532.58	808.75
26 28 16 16-0072 EA 600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	5,984.93	1,132.18
26 28 16 16-0073 EA 800 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	8,656.48	1,222.79
26 28 16 16-0074 EA 1,200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	11,512.76	1,427.12
26 28 16 16-0075 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0076 EA 30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	545.38	158.96
26 28 16 16-0077 EA 60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	841.16	221.32
26 28 16 16-0078 EA 100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,147.53	254.95
26 28 16 16-0079 EA 200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,800.78	407.80
26 28 16 16-0080 EA 400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,644.94	679.26
26 28 16 16-0081 EA 600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	5,924.70	926.27
26 28 16 16-0082 EA 800 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	10,338.34	1,100.51
26 28 16 16-0083 EA 1,200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	13,515.27	1,283.93
26 28 16 16-0084 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0085 EA 30 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	594.44	175.47
26 28 16 16-0086 EA 60 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	923.61	248.84
26 28 16 16-0087 EA 100 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,249.71	283.08
26 28 16 16-0088 EA 200 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,942.05	443.26
26 28 16 16-0089 EA 400 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,905.27	727.56
26 28 16 16-0090 EA 600 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	6,400.83	1,019.19
26 28 16 16-0091 EA 800 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	10,917.99	1,100.51

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 28 16 16-0092		600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0093	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	637.64	175.71
26 28 16 16-0094	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	997.29	248.59
26 28 16 16-0095	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,369.54	283.08
26 28 16 16-0096	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	2,126.62	443.02
26 28 16 16-0097	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	4,163.45	727.80
26 28 16 16-0098	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	7,164.91	1,018.95
26 28 16 16-0099	EA	800 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	11,790.06	1,100.51
26 28 16 16-0100	EA	1,200 Amperes, 600 Volt Class, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	15,469.53	1,283.93
26 28 16 16-0101		240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0102	EA	30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	960.36	159.21
26 28 16 16-0103	EA	60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,152.40	221.57
26 28 16 16-0104	EA	100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,789.45	254.71
26 28 16 16-0105	EA	200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	2,678.72	407.55
26 28 16 16-0106		480 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0107	EA	30 Amperes, 480 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,039.17	175.47
26 28 16 16-0108	EA	60 Amperes, 480 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,257.11	248.84
26 28 16 16-0109	EA	100 Amperes, 480 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,937.51	283.08
26 28 16 16-0110	EA	200 Amperes, 480 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	2,882.72	443.26
26 28 16 16-0111		600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0056)</small>		
26 28 16 16-0112	EA	30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,159.43	175.71
26 28 16 16-0113	EA	60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,389.76	248.59
26 28 16 16-0114	EA	100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	2,176.04	283.08
26 28 16 16-0115	EA	200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,230.20	443.02
26 28 16 16-0116		General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0002)</small>		
		Note: Includes fuses and neutral bar.		
26 28 16 16-0117		240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0116)</small>		
26 28 16 16-0118	EA	30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	331.63	106.38
26 28 16 16-0119	EA	60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	456.54	128.03
26 28 16 16-0120	EA	100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	714.93	149.67
26 28 16 16-0121	EA	200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,334.29	236.12
26 28 16 16-0122	EA	400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,225.80	366.22
26 28 16 16-0123	EA	600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	6,070.88	542.07
26 28 16 16-0124		240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0116)</small>		
26 28 16 16-0125	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	452.85	167.16



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0126 EA 60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	643.12	221.57
26 28 16 16-0127 EA 100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	907.85	246.15
26 28 16 16-0128 EA 200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,634.04	385.30
26 28 16 16-0129 EA 400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	3,762.31	632.92
26 28 16 16-0130 EA 600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	6,765.12	886.03
26 28 16 16-0131 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0116)</small>		
26 28 16 16-0132 EA 30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	508.96	167.16
26 28 16 16-0133 EA 60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	733.58	221.57
26 28 16 16-0134 EA 100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	990.17	246.15
26 28 16 16-0135 EA 200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	1,841.43	385.30
26 28 16 16-0136 EA 400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	4,116.79	632.92
26 28 16 16-0137 EA 600 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch	6,989.83	886.03
26 28 16 16-0138 General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0002)</small>		
26 28 16 16-0139 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0138)</small>		
26 28 16 16-0140 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	452.42	147.95
26 28 16 16-0141 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	609.33	170.09
26 28 16 16-0142 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,406.27	271.83
26 28 16 16-0143 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,050.89	452.43
26 28 16 16-0144 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	5,326.07	616.53
26 28 16 16-0145 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0138)</small>		
26 28 16 16-0146 EA 30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	427.75	138.42
26 28 16 16-0147 EA 60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	585.33	192.59
26 28 16 16-0148 EA 100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	909.40	221.57
26 28 16 16-0149 EA 200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	1,572.38	354.49
26 28 16 16-0150 EA 400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	3,328.78	590.85
26 28 16 16-0151 EA 600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Safety Switch.....	5,706.26	805.33
26 28 16 16-0152 NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0001)</small>		
26 28 16 16-0153 Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0152)</small> Note: With fuses, neutral bar, and hub if required.		
26 28 16 16-0154 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0153)</small>		
26 28 16 16-0155 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	723.59	143.67
26 28 16 16-0156 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,166.07	172.42
26 28 16 16-0157 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,461.37	200.54
26 28 16 16-0158 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	2,135.87	305.70
26 28 16 16-0159 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	4,769.22	489.12
26 28 16 16-0160 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	8,413.22	652.36

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 28 16 16-0161	EA	800 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	12,679.11		733.68
26 28 16 16-0162	EA	1,200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	16,832.13		855.96
26 28 16 16-0163		600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ⁽²⁶⁾			
		^{28 16 16-0153)}			
26 28 16 16-0164	EA	30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,260.19		191.49
26 28 16 16-0165	EA	60 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,498.83		234.77
26 28 16 16-0166	EA	100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,144.34		269.63
26 28 16 16-0167	EA	200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	3,014.70		404.38
26 28 16 16-0168	EA	400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	6,618.65		661.65
26 28 16 16-0169	EA	600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	12,253.39		909.88
26 28 16 16-0170	EA	800 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	18,092.87		1,047.69
26 28 16 16-0171	EA	1,200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	19,924.32		1,179.38
26 28 16 16-0172		240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ⁽²⁶⁾			
		^{28 16 16-0153)}			
26 28 16 16-0173	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	911.55		226.22
26 28 16 16-0174	EA	60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,462.84		299.59
26 28 16 16-0175	EA	100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,771.77		328.93
26 28 16 16-0176	EA	200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,621.23		509.30
26 28 16 16-0177	EA	400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	5,736.04		849.23
26 28 16 16-0178	EA	600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	9,644.17		1,132.30
26 28 16 16-0179		600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ⁽²⁶⁾			
		^{28 16 16-0153)}			
26 28 16 16-0180	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,416.15		268.16
26 28 16 16-0181	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,687.31		328.69
26 28 16 16-0182	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,275.76		377.36
26 28 16 16-0183	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	3,301.13		566.15
26 28 16 16-0184	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	7,022.64		926.39
26 28 16 16-0185	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	12,791.81		1,273.78
26 28 16 16-0186	EA	800 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	18,197.66		1,467.36
26 28 16 16-0187	EA	1,200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	21,811.52		1,650.77
26 28 16 16-0188		240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ⁽²⁶⁾			
		^{28 16 16-0153)}			
26 28 16 16-0189	EA	30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,006.70		226.22
26 28 16 16-0190	EA	60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,465.60		299.59
26 28 16 16-0191	EA	100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,905.54		328.93
26 28 16 16-0192	EA	200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,710.46		509.30
26 28 16 16-0193	EA	400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	5,817.89		849.23
26 28 16 16-0194	EA	600 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	10,544.47		1,132.30
26 28 16 16-0195	EA	800 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	17,761.73		1,283.93



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0196 EA 1,200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	22,175.90	1,467.36
26 28 16 16-0197 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches^(26 28 16 16-0153)		
26 28 16 16-0198 EA 30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,470.74	268.40
26 28 16 16-0199 EA 60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,748.68	328.93
26 28 16 16-0200 EA 100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,412.17	377.23
26 28 16 16-0201 EA 200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	3,389.80	566.15
26 28 16 16-0202 EA 400 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	7,343.20	926.27
26 28 16 16-0203 EA 600 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	13,160.11	1,273.54
26 28 16 16-0204 EA 800 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	19,357.41	1,467.36
26 28 16 16-0205 EA 1,200 Amperes, 600 Volt Class, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	23,340.21	1,650.77
26 28 16 16-0206 Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches^(26 28 16 16-0152)		
26 28 16 16-0207 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches^(26 28 16 16-0206)		
26 28 16 16-0208 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	689.83	125.83
26 28 16 16-0209 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,134.90	174.25
26 28 16 16-0210 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,500.18	199.81
26 28 16 16-0211 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,980.23	323.55
26 28 16 16-0212 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	4,458.25	539.74
26 28 16 16-0213 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	8,202.55	719.62
26 28 16 16-0214 EA 800 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	13,279.29	856.33
26 28 16 16-0215 EA 1,200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	17,572.08	978.60
26 28 16 16-0216 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches^(26 28 16 16-0206)		
26 28 16 16-0217 EA 30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	777.50	138.66
26 28 16 16-0218 EA 60 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,287.04	194.06
26 28 16 16-0219 EA 100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,695.74	219.12
26 28 16 16-0220 EA 200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,203.07	339.69
26 28 16 16-0221 EA 400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	5,072.40	566.15
26 28 16 16-0222 EA 600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	8,862.09	754.83
26 28 16 16-0223 EA 800 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	14,166.45	897.05
26 28 16 16-0224 EA 1,200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	18,740.09	1,018.95
26 28 16 16-0225 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches^(26 28 16 16-0206)		
26 28 16 16-0226 EA 30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	815.64	188.67
26 28 16 16-0227 EA 60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,309.09	261.31
26 28 16 16-0228 EA 100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	1,699.97	299.71
26 28 16 16-0229 EA 200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	2,303.72	485.32
26 28 16 16-0230 EA 400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	5,066.48	809.48
26 28 16 16-0231 EA 600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch.....	9,056.36	1,079.11

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 28 16 16-0232	EA	800 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	14,285.48		1,283.93
26 28 16 16-0233	EA	1,200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	18,976.94		1,467.36
26 28 16 16-0234		480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0206)</small>			
26 28 16 16-0235	EA	30 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	885.44		207.88
26 28 16 16-0236	EA	60 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,425.00		291.15
26 28 16 16-0237	EA	100 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,836.59		328.69
26 28 16 16-0238	EA	200 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	2,447.47		509.54
26 28 16 16-0239	EA	400 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	5,391.87		849.11
26 28 16 16-0240	EA	600 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	9,654.59		1,132.18
26 28 16 16-0241	EA	800 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	15,244.49		1,345.07
26 28 16 16-0242	EA	1,200 Amperes, 480 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	20,243.08		1,528.49
26 28 16 16-0243		600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0206)</small>			
26 28 16 16-0244	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	451.41		207.88
26 28 16 16-0245	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,481.14		291.15
26 28 16 16-0246	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,914.87		328.69
26 28 16 16-0247	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	2,542.73		509.54
26 28 16 16-0248	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	5,638.51		849.11
26 28 16 16-0249	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	9,616.90		1,132.18
26 28 16 16-0250	EA	800 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	15,223.38		1,345.07
26 28 16 16-0251	EA	1,200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	20,214.35		1,528.49
26 28 16 16-0252		General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0152)</small>			
		Note: With fuses, neutral bar, and hub if required.			
26 28 16 16-0253		240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0252)</small>			
26 28 16 16-0254	EA	30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	432.47		124.97
26 28 16 16-0255	EA	60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	617.47		149.92
26 28 16 16-0256	EA	100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	818.28		174.37
26 28 16 16-0257	EA	200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,703.28		265.83
26 28 16 16-0258	EA	400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	4,227.93		425.29
26 28 16 16-0259	EA	600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 1 Blade And Fuseholder, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	7,545.34		567.37
26 28 16 16-0260		240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches <small>(26 28 16 16-0252)</small>			
26 28 16 16-0261	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	577.10		196.99
26 28 16 16-0262	EA	60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	839.36		260.58
26 28 16 16-0263	EA	100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,040.82		285.89
26 28 16 16-0264	EA	200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	2,058.90		443.02
26 28 16 16-0265	EA	400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	4,856.74		738.32
26 28 16 16-0266	EA	600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 2 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	8,390.45		984.84



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0267 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ^(26 28 16 16-0252)		
26 28 16 16-0268 EA 30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	655.75	196.87
26 28 16 16-0269 EA 60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	918.18	260.58
26 28 16 16-0270 EA 100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,294.69	285.89
26 28 16 16-0271 EA 200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	2,222.88	443.02
26 28 16 16-0272 EA 400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	4,962.08	738.45
26 28 16 16-0273 EA 600 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	9,213.04	984.84
26 28 16 16-0274 EA 800 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, General Duty Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	13,245.86	1,115.67
26 28 16 16-0275 General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ^(26 28 16 16-0152)		
26 28 16 16-0276 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ^(26 28 16 16-0275)		
26 28 16 16-0277 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	391.17	109.44
26 28 16 16-0278 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	647.73	151.50
26 28 16 16-0279 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	676.86	173.76
26 28 16 16-0280 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,734.89	281.25
26 28 16 16-0281 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	4,316.98	469.31
26 28 16 16-0282 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	7,665.70	625.70
26 28 16 16-0283 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switches ^(26 28 16 16-0275)		
26 28 16 16-0284 EA 30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	614.26	164.10
26 28 16 16-0285 EA 60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	886.73	227.20
26 28 16 16-0286 EA 100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	1,318.11	260.58
26 28 16 16-0287 EA 200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, General Duty Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Bolt-On Hubs, Safety Switch	2,272.79	421.98
26 28 16 16-0288 NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches ^(26 28 16 16-0001)		
26 28 16 16-0289 Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches ^(26 28 16 16-0288)		
Note: With fuses and neutral bar (stainless steel).		
26 28 16 16-0290 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches ^(26 28 16 16-0289)		
26 28 16 16-0291 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	1,992.89	122.28
26 28 16 16-0292 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,393.85	147.34
26 28 16 16-0293 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	4,919.19	172.17
26 28 16 16-0294 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	6,794.57	271.71
26 28 16 16-0295 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	13,849.33	421.62
26 28 16 16-0296 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	19,902.59	623.38
26 28 16 16-0297 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches ^(26 28 16 16-0289)		
26 28 16 16-0298 EA 30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,534.37	135.85
26 28 16 16-0299 EA 60 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,814.85	163.61
26 28 16 16-0300 EA 100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	5,317.21	191.25

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 28 16 16-0301	EA	200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		7,506.00	302.03
26 28 16 16-0302	EA	400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		14,374.08	468.82
26 28 16 16-0303	EA	600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		20,604.77	692.59
26 28 16 16-0304		240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0289)</small>			
26 28 16 16-0305	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		2,224.32	192.22
26 28 16 16-0306	EA	60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		2,784.13	254.71
26 28 16 16-0307	EA	100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		5,367.27	283.08
26 28 16 16-0308	EA	200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		7,618.50	443.02
26 28 16 16-0309	EA	400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		14,892.07	727.80
26 28 16 16-0310	EA	600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		21,257.64	1,018.95
26 28 16 16-0311		600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0289)</small>			
26 28 16 16-0312	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		2,694.27	212.28
26 28 16 16-0313	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		3,061.41	283.08
26 28 16 16-0314	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		5,586.88	318.42
26 28 16 16-0315	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		7,893.85	485.20
26 28 16 16-0316	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		15,370.81	783.81
26 28 16 16-0317	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		21,867.38	1,132.18
26 28 16 16-0318		240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0289)</small>			
26 28 16 16-0319	EA	30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		2,669.19	192.22
26 28 16 16-0320	EA	60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		3,340.27	254.71
26 28 16 16-0321	EA	100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		6,480.10	283.08
26 28 16 16-0322	EA	200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		9,140.24	443.02
26 28 16 16-0323	EA	400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		17,887.05	727.80
26 28 16 16-0324	EA	600 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		25,373.46	1,018.95
26 28 16 16-0325		600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0289)</small>			
26 28 16 16-0326	EA	30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		3,219.94	212.28
26 28 16 16-0327	EA	60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		3,657.51	283.08
26 28 16 16-0328	EA	100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		6,722.79	318.42
26 28 16 16-0329	EA	200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		9,428.31	485.20
26 28 16 16-0330	EA	400 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		18,406.21	783.81
26 28 16 16-0331	EA	600 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		26,039.32	1,132.18
26 28 16 16-0332		Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0288)</small>			
26 28 16 16-0333		240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0332)</small>			
26 28 16 16-0334	EA	30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		1,910.80	122.28
26 28 16 16-0335	EA	60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch		2,320.08	170.09



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16	16-0336	EA	100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	4,400.79	195.65
26 28 16	16-0337	EA	200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	6,094.87	312.54
26 28 16	16-0338	EA	400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	11,109.12	520.42
26 28 16	16-0339	EA	600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	15,920.73	708.97
26 28 16	16-0340		600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0332)</small>		
26 28 16	16-0341	EA	30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,174.13	134.88
26 28 16	16-0342	EA	60 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,644.04	190.76
26 28 16	16-0343	EA	100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	5,017.03	217.42
26 28 16	16-0344	EA	200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	6,930.59	339.69
26 28 16	16-0345	EA	400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	12,624.74	559.06
26 28 16	16-0346	EA	600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	18,139.93	782.58
26 28 16	16-0347		240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0332)</small>		
26 28 16	16-0348	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	1,984.68	159.21
26 28 16	16-0349	EA	60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,391.36	221.57
26 28 16	16-0350	EA	100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,489.31	254.71
26 28 16	16-0351	EA	200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	4,824.67	407.55
26 28 16	16-0352	EA	400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	6,828.38	679.38
26 28 16	16-0353	EA	600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	16,833.11	926.39
26 28 16	16-0354		600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0332)</small>		
26 28 16	16-0355	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,255.65	175.71
26 28 16	16-0356	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,759.70	248.59
26 28 16	16-0357	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	5,148.36	283.08
26 28 16	16-0358	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	7,137.19	443.02
26 28 16	16-0359	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	14,292.30	727.80
26 28 16	16-0360	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	19,158.44	1,018.95
26 28 16	16-0361		240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0332)</small>		
26 28 16	16-0362	EA	30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	2,745.23	159.21
26 28 16	16-0363	EA	60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	3,283.43	221.57
26 28 16	16-0364	EA	100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	7,454.59	254.71
26 28 16	16-0365	EA	200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	11,366.79	407.55
26 28 16	16-0366		600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0332)</small>		
26 28 16	16-0367	EA	30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	3,124.85	175.71
26 28 16	16-0368	EA	60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	3,743.23	248.59
26 28 16	16-0369	EA	100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	8,503.36	283.08

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0370 EA 200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Stainless Steel Non-Fusible, NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	12,945.04	443.02
26 28 16 16-0371 Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0288)		
26 28 16 16-0372 600 Volt Class, 3 Phase, 3 Pole, Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0371)		
26 28 16 16-0373 EA 30 Amperes, 600 Volt Class, 3 Phase, 3 Pole, Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	4,161.15	212.15
26 28 16 16-0374 EA 60 Amperes, 600 Volt Class, 3 Phase, 3 Pole, Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	4,721.02	283.08
26 28 16 16-0375 EA 100 Amperes, 600 Volt Class, 3 Phase, 3 Pole, Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	8,592.84	318.54
26 28 16 16-0376 600 Volt Class, 3 Phase, 3 Pole, Non-Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0371)		
26 28 16 16-0377 EA 30 Amperes, 600 Volt Class, 3 Phase, 3 Pole, Non-Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	3,908.02	175.47
26 28 16 16-0378 EA 60 Amperes, 600 Volt Class, 3 Phase, 3 Pole, Non-Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	4,454.06	248.84
26 28 16 16-0379 EA 100 Amperes, 600 Volt Class, 3 Phase, 3 Pole, Non-Fusible, Krydon NEMA 4, 4X Or 5 Enclosure, Neutral Kit, Safety Switch	8,144.21	283.08
26 28 16 16-0380 NEMA 7 Or 9 Enclosures, Neutral Kit, Safety Switches (26 28 16 16-0001)		
Note: Class 1, groups C and D, division 1 or 2, NEMA 7; Class 2, groups E, F and G, division 1 or 2, NEMA 9; or Class 3, division 1 Or 2, NEMA 9, hazardous locations as defined in NEC article 500.		
26 28 16 16-0381 Heavy Duty Fusible, NEMA 7 Or 9 Enclosures, Neutral Kit, Safety Switches (26 28 16 16-0380)		
Note: With fuses and neutral bar.		
26 28 16 16-0382 EA 30 Amperes, 240 Volt, 3 Phase, Heavy Duty Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	3,270.27	244.56
26 28 16 16-0383 EA 60 Amperes, 240 Volt, 3 Phase, Heavy Duty Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	3,688.72	291.15
26 28 16 16-0384 EA 100 Amperes, 240 Volt, 3 Phase, Heavy Duty Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	4,089.12	328.69
26 28 16 16-0385 EA 200 Amperes, 240 Volt, 3 Phase, Heavy Duty Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	8,728.15	509.54
26 28 16 16-0386 Heavy Duty Non-Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0380)		
26 28 16 16-0387 EA 60 Amperes, 240 Volt, 3 Phase, Heavy Duty Non-Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	2,512.67	291.15
26 28 16 16-0388 EA 100 Amperes, 240 Volt, 3 Phase, Heavy Duty Non-Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	2,943.78	328.69
26 28 16 16-0389 EA 200 Amperes, 240 Volt, 3 Phase, Heavy Duty Non-Fusible, NEMA 7 Or 9 Enclosure, Neutral Kit, Safety Switch	5,437.55	509.54
26 28 16 16-0390 NEMA 12 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0001)		
26 28 16 16-0391 Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0390)		
Note: With fuses and neutral bar.		
26 28 16 16-0392 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0391)		
26 28 16 16-0393 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	706.30	122.28
26 28 16 16-0394 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	925.70	147.34
26 28 16 16-0395 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,270.99	172.42
26 28 16 16-0396 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,148.80	271.46
26 28 16 16-0397 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	4,628.66	421.86
26 28 16 16-0398 EA 600 Amperes, 240 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	8,394.57	623.63
26 28 16 16-0399 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches (26 28 16 16-0391)		
26 28 16 16-0400 EA 30 Amperes, 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,124.31	135.73
26 28 16 16-0401 EA 60 Amperes, 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,152.82	163.86
26 28 16 16-0402 EA 100 Amperes, 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,672.65	191.37
26 28 16 16-0403 EA 200 Amperes, 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,616.17	302.03
26 28 16 16-0404 EA 400 Amperes, 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	5,759.79	468.33
26 28 16 16-0405 EA 600 Amperes, 600 Volt Class, 1 Phase, 2 Pole, 2 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	11,458.12	692.71



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0406 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0391)</small>		
26 28 16 16-0407 EA 30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	975.54	191.98
26 28 16 16-0408 EA 60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,354.51	254.95
26 28 16 16-0409 EA 100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,866.69	283.08
26 28 16 16-0410 EA 200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,768.45	443.26
26 28 16 16-0411 EA 400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	5,472.95	727.56
26 28 16 16-0412 EA 600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	8,827.14	1,019.19
26 28 16 16-0413 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0391)</small>		
26 28 16 16-0414 EA 30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,311.26	212.15
26 28 16 16-0415 EA 60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,473.23	283.08
26 28 16 16-0416 EA 100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,198.76	318.54
26 28 16 16-0417 EA 200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	3,193.95	485.44
26 28 16 16-0418 EA 400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	6,758.05	783.81
26 28 16 16-0419 EA 600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	12,808.88	1,132.30
26 28 16 16-0420 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0391)</small>		
26 28 16 16-0421 EA 30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,046.12	191.98
26 28 16 16-0422 EA 60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,402.99	254.95
26 28 16 16-0423 EA 100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,018.87	283.08
26 28 16 16-0424 EA 200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,959.51	443.26
26 28 16 16-0425 EA 400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	5,984.51	727.56
26 28 16 16-0426 EA 600 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	9,172.73	1,019.19
26 28 16 16-0427 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0391)</small>		
26 28 16 16-0428 EA 30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,393.08	212.15
26 28 16 16-0429 EA 60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	1,691.49	283.08
26 28 16 16-0430 EA 100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	2,348.83	318.54
26 28 16 16-0431 EA 200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	3,480.40	485.44
26 28 16 16-0432 EA 400 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	7,221.84	783.81
26 28 16 16-0433 EA 600 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 3 Blades And Fuseholders, Heavy Duty Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch	13,190.81	1,132.30
26 28 16 16-0434 Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0390)</small>		
26 28 16 16-0435 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0434)</small>		
26 28 16 16-0436 EA 30 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....	740.65	176.70
26 28 16 16-0437 EA 60 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....	979.93	246.39
26 28 16 16-0438 EA 100 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....	1,307.86	283.08
26 28 16 16-0439 EA 200 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....	1,855.75	453.04
26 28 16 16-0440 EA 400 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....	4,128.90	755.07

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 28 16 16-0441	EA	600 Amperes, 240 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		6,571.05	1,029.60
26 28 16 16-0442		600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0434)</small>			
26 28 16 16-0443	EA	30 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		825.94	195.04
26 28 16 16-0444	EA	60 Amperes, Non-Fused, NEMA 12, Heavy Duty Disconnect Switch, 600 Volt, 1 Phase.....		1,088.66	276.36
26 28 16 16-0445	EA	100 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,457.86	314.26
26 28 16 16-0446	EA	200 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		2,016.28	492.18
26 28 16 16-0447	EA	400 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		4,369.60	808.87
26 28 16 16-0448	EA	600 Amperes, 600 Volt Class, 1 Phase, 2 Wire, 2 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		7,260.35	1,132.30
26 28 16 16-0449		240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0434)</small>			
26 28 16 16-0450	EA	30 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		953.36	158.96
26 28 16 16-0451	EA	60 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,250.55	221.32
26 28 16 16-0452	EA	100 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,677.62	254.95
26 28 16 16-0453	EA	200 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		2,380.91	407.80
26 28 16 16-0454	EA	400 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		5,071.07	679.26
26 28 16 16-0455	EA	600 Amperes, 240 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		8,047.77	926.27
26 28 16 16-0456		600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0434)</small>			
26 28 16 16-0457	EA	30 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		927.04	175.47
26 28 16 16-0458	EA	60 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,349.64	248.84
26 28 16 16-0459	EA	100 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,793.79	283.08
26 28 16 16-0460	EA	200 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		2,338.84	443.26
26 28 16 16-0461	EA	400 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		5,077.39	727.56
26 28 16 16-0462	EA	600 Amperes, 600 Volt Class, 3 Phase, 3 Wire, 3 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		9,608.72	1,019.19
26 28 16 16-0463		240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0434)</small>			
26 28 16 16-0464	EA	30 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,155.26	158.96
26 28 16 16-0465	EA	60 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,365.38	221.32
26 28 16 16-0466	EA	100 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		2,148.02	254.95
26 28 16 16-0467	EA	200 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		3,405.07	407.80
26 28 16 16-0468	EA	400 Amperes, 240 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		6,226.82	519.69
26 28 16 16-0469		600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switches <small>(26 28 16 16-0434)</small>			
26 28 16 16-0470	EA	30 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,197.13	175.47
26 28 16 16-0471	EA	60 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		1,486.05	248.84
26 28 16 16-0472	EA	100 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		2,291.69	283.08
26 28 16 16-0473	EA	200 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		3,491.49	443.26
26 28 16 16-0474	EA	400 Amperes, 600 Volt Class, 3 Phase, 4 Wire, 4 Blades, Heavy Duty Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Safety Switch.....		6,583.60	684.76
26 28 16 16-0475		Double Throw Safety Switches <small>(26 28 16 16-0001)</small>			

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0476	NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>	
26 28 16 16-0477	240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>	
26 28 16 16-0478	EA 30 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	885.55 157.12
26 28 16 16-0479	EA 60 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,315.68 205.43
26 28 16 16-0480	EA 100 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,850.94 268.40
26 28 16 16-0481	EA 200 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	2,470.69 349.10
26 28 16 16-0482	EA 400 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	6,074.17 436.54
26 28 16 16-0483	EA 600 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	11,077.07 700.04
26 28 16 16-0484	EA 800 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	12,658.37 978.23
26 28 16 16-0485	EA 1,000 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	18,749.74 1,100.51
26 28 16 16-0486	EA 1,200 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	22,113.19 1,222.79
26 28 16 16-0487	240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>	
26 28 16 16-0488	EA 30 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,111.41 220.10
26 28 16 16-0489	EA 60 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,556.91 287.36
26 28 16 16-0490	EA 100 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	2,359.52 376.00
26 28 16 16-0491	EA 200 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	3,482.38 489.12
26 28 16 16-0492	EA 400 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	8,367.44 611.40
26 28 16 16-0493	EA 600 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	11,640.76 978.23
26 28 16 16-0494	EA 800 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	13,639.92 1,100.51
26 28 16 16-0495	EA 1,000 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	19,606.59 1,222.79
26 28 16 16-0496	EA 1,200 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	23,274.73 1,345.07
26 28 16 16-0497	EA 1,600 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	26,950.33 1,589.63
26 28 16 16-0498	EA 2,000 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	30,667.14 1,834.19
26 28 16 16-0499	EA 2,600 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	41,876.92 2,078.74
26 28 16 16-0500	EA 3,000 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	45,985.21 2,323.31
26 28 16 16-0501	240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>	
26 28 16 16-0502	EA 30 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,481.57 275.13
26 28 16 16-0503	EA 60 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	2,166.94 359.50
26 28 16 16-0504	EA 100 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	3,892.48 469.55
26 28 16 16-0505	EA 200 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	5,341.09 610.18
26 28 16 16-0506	EA 400 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	10,894.14 764.24
26 28 16 16-0507	EA 600 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	13,711.35 1,224.62
26 28 16 16-0508	EA 800 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	17,410.64 1,345.07
26 28 16 16-0509	EA 1,000 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	23,267.61 1,406.21
26 28 16 16-0510	EA 1,200 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	26,129.34 1,467.36
26 28 16 16-0511	EA 1,600 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	31,914.60 1,711.91
26 28 16 16-0512	EA 2,000 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	36,726.46 1,956.47
26 28 16 16-0513	EA 2,600 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	52,330.19 2,201.02
26 28 16 16-0514	EA 3,000 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	57,856.60 2,445.59
26 28 16 16-0515	600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>	
26 28 16 16-0516	EA 60 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,528.38 205.43
26 28 16 16-0517	EA 100 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	2,309.63 268.40
26 28 16 16-0518	EA 200 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	3,417.45 349.10
26 28 16 16-0519	EA 400 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	8,167.33 436.54
26 28 16 16-0520	EA 600 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	12,056.84 700.04
26 28 16 16-0521	EA 800 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	13,728.61 978.23
26 28 16 16-0522	EA 1,000 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	20,404.61 1,100.51
26 28 16 16-0523	EA 1,200 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	24,079.96 1,222.79
26 28 16 16-0524	600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>	
26 28 16 16-0525	EA 60 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	1,692.04 287.36

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 28 Low-Voltage Circuit Protective Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	26 28 16 16-0526	EA	100 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	2,524.18	376.00
	26 28 16 16-0527	EA	200 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	3,696.31	489.12
	26 28 16 16-0528	EA	400 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	8,516.77	611.40
	26 28 16 16-0529	EA	600 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	12,615.05	978.23
	26 28 16 16-0530	EA	800 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	14,783.81	1,100.51
	26 28 16 16-0531	EA	1,000 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	20,423.77	1,222.79
	26 28 16 16-0532	EA	1,200 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	25,333.20	1,345.07
	26 28 16 16-0533	EA	1,600 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	30,634.85	1,589.63
	26 28 16 16-0534	EA	2,000 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	34,851.95	1,834.19
	26 28 16 16-0535	EA	2,600 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	41,876.86	2,078.74
	26 28 16 16-0536	EA	3,000 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	50,119.07	2,323.31
	26 28 16 16-0537		600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0476)</small>		
	26 28 16 16-0538	EA	60 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	2,299.97	359.50
	26 28 16 16-0539	EA	100 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	4,085.27	469.55
	26 28 16 16-0540	EA	200 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	5,738.61	610.18
	26 28 16 16-0541	EA	400 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	11,742.18	764.24
	26 28 16 16-0542	EA	600 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	14,661.71	1,224.62
	26 28 16 16-0543	EA	800 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	18,882.69	1,345.07
	26 28 16 16-0544	EA	1,000 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	25,313.13	1,406.21
	26 28 16 16-0545	EA	1,200 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	28,448.80	1,467.36
	26 28 16 16-0546	EA	1,600 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	34,763.67	1,711.91
	26 28 16 16-0547	EA	2,000 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	40,007.81	1,956.47
	26 28 16 16-0548	EA	2,600 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	57,123.02	2,201.02
	26 28 16 16-0549	EA	3,000 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 1 Enclosure, Neutral Kit, Double Throw Safety Switch	63,153.14	2,445.59
	26 28 16 16-0550		NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0475)</small>		
	26 28 16 16-0551		240 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0550)</small>		
	26 28 16 16-0552	EA	100 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	2,333.19	268.40
	26 28 16 16-0553	EA	200 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	5,430.70	349.10
	26 28 16 16-0554	EA	400 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	17,998.16	436.54
	26 28 16 16-0555	EA	600 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	31,014.13	700.04
	26 28 16 16-0556		240 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0550)</small>		
	26 28 16 16-0557	EA	100 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	3,051.06	375.39
	26 28 16 16-0558	EA	200 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	4,961.19	488.51
	26 28 16 16-0559	EA	400 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	18,508.97	611.40
	26 28 16 16-0560	EA	600 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	20,020.54	980.07
	26 28 16 16-0561		240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0550)</small>		
	26 28 16 16-0562	EA	30 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	2,966.55	275.25
	26 28 16 16-0563	EA	60 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	3,673.25	359.26
	26 28 16 16-0564	EA	100 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	5,161.44	469.43
	26 28 16 16-0565	EA	200 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	7,483.96	610.42
	26 28 16 16-0566	EA	400 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	12,789.42	764.24
	26 28 16 16-0567	EA	600 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	14,820.51	1,224.75
	26 28 16 16-0568		600 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0550)</small>		
	26 28 16 16-0569	EA	60 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	1,985.48	205.43
	26 28 16 16-0570	EA	100 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	3,035.23	268.40
	26 28 16 16-0571	EA	200 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	5,566.94	349.10
	26 28 16 16-0572	EA	400 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	10,781.80	436.54
	26 28 16 16-0573	EA	600 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch	14,373.35	700.04
	26 28 16 16-0574		600 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0550)</small>		



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Circuit Protective Devices	26 28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 28 16 16-0575 EA 60 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	2,232.83	287.36
26 28 16 16-0576 EA 100 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	3,381.57	375.39
26 28 16 16-0577 EA 200 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	6,101.99	488.51
26 28 16 16-0578 EA 400 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	11,652.79	611.40
26 28 16 16-0579 EA 600 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	15,613.52	980.07
26 28 16 16-0580 600 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0550)</small>		
26 28 16 16-0581 EA 60 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	3,704.09	359.26
26 28 16 16-0582 EA 100 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	5,175.58	469.43
26 28 16 16-0583 EA 200 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	7,680.35	610.42
26 28 16 16-0584 EA 400 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	12,766.23	764.24
26 28 16 16-0585 EA 600 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 3R Enclosure, Neutral Kit, Double Throw Safety Switch.....	14,948.32	1,224.75
26 28 16 16-0586 NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0475)</small>		
26 28 16 16-0587 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0586)</small>		
26 28 16 16-0588 EA 30 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	2,392.93	157.25
26 28 16 16-0589 EA 60 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	2,702.47	205.31
26 28 16 16-0590 EA 100 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	3,047.17	268.28
26 28 16 16-0591 EA 200 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	4,194.89	348.86
26 28 16 16-0592 EA 400 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	7,902.30	436.66
26 28 16 16-0593 EA 600 Amperes, 240 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	11,570.67	699.80
26 28 16 16-0594 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0586)</small>		
26 28 16 16-0595 EA 30 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	2,738.01	220.10
26 28 16 16-0596 EA 60 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	3,230.58	287.36
26 28 16 16-0597 EA 100 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	3,823.46	375.39
26 28 16 16-0598 EA 200 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	5,341.29	488.51
26 28 16 16-0599 EA 400 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	9,818.63	611.40
26 28 16 16-0600 EA 600 Amperes, 240 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	12,923.04	980.07
26 28 16 16-0601 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0586)</small>		
26 28 16 16-0602 EA 30 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	4,106.91	275.25
26 28 16 16-0603 EA 60 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	4,794.00	359.26
26 28 16 16-0604 EA 100 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	6,579.62	469.43
26 28 16 16-0605 EA 200 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	8,945.69	610.42
26 28 16 16-0606 EA 400 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	16,669.93	764.24
26 28 16 16-0607 EA 600 Amperes, 240 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	20,630.54	1,224.75
26 28 16 16-0608 600 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0586)</small>		
26 28 16 16-0609 EA 60 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	3,584.86	205.31
26 28 16 16-0610 EA 100 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	3,754.02	268.28
26 28 16 16-0611 EA 200 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	7,165.00	348.86
26 28 16 16-0612 EA 400 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	10,359.59	436.66
26 28 16 16-0613 EA 600 Amperes, 600 Volt Class, 2 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	13,875.90	699.80
26 28 16 16-0614 600 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0586)</small>		
26 28 16 16-0615 EA 60 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	3,916.13	287.36
26 28 16 16-0616 EA 100 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	4,138.06	375.39
26 28 16 16-0617 EA 200 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	7,783.90	488.51
26 28 16 16-0618 EA 400 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	11,207.94	611.40
26 28 16 16-0619 EA 600 Amperes, 600 Volt Class, 3 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	15,089.35	980.07
26 28 16 16-0620 600 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switches <small>(26 28 16 16-0586)</small>		
26 28 16 16-0621 EA 60 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	4,844.27	359.26
26 28 16 16-0622 EA 100 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	6,950.44	469.43
26 28 16 16-0623 EA 200 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	9,164.25	610.42
26 28 16 16-0624 EA 400 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	17,140.39	764.24
26 28 16 16-0625 EA 600 Amperes, 600 Volt Class, 4 Pole, Non-Fusible, NEMA 12 Enclosure, Neutral Kit, Double Throw Safety Switch	21,254.12	1,224.75
26 28 16 16-0626 Removal And Reinstallation Of Disconnect Switches <small>(26 28 16 16-0001)</small>		
Note: Includes storage and cleaning.		
26 28 16 16-0627 EA Removal And Reinstallation Of Up To 100 Amperes Safety Disconnect Switch.....	611.40	

26	Electrical
26 20	Low-Voltage Electrical Distribution
26 28	Low-Voltage Circuit Protective Devices



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 28 16 16-0628	EA		Removal And Reinstallation Of >100 To 200 Amperes Safety Disconnect Switch	794.85	
26 28 16 16-0629	EA		Removal And Reinstallation Of >200 To 300 Amperes Safety Disconnect Switch	886.59	
26 28 16 16-0630	EA		Removal And Reinstallation Of >300 To 400 Amperes Safety Disconnect Switch	1,039.44	

26 28 16 16-0631 Bolted Contact Switches (26 28 16 16)
 Note: Work includes mounting, material handling, uploading at job site and termination of all conductors entering and leaving the switch.

26 28 16 16-0632 Electrical Trip, Bolted Contact Switches (26 28 16 16-0631)

26 28 16 16-0633 Top Feed, Electrical Trip, Bolted Contact Switches (26 28 16 16-0632)

26 28 16 16-0634	EA		800 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB0833T120480).....	10,108.68	1,222.79
26 28 16 16-0635	EA		1,200 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB1233T120480).....	10,926.57	1,467.36
26 28 16 16-0636	EA		1,600 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB1633T120480).....	11,877.24	1,711.91
26 28 16 16-0637	EA		2,000 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB2033T120480).....	12,524.42	1,956.47
26 28 16 16-0638	EA		2,500 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB2533T120480).....	14,145.31	2,201.02
26 28 16 16-0639	EA		3,000 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB3033T120480).....	17,776.79	2,445.59
26 28 16 16-0640	EA		4,000 Amperes, Top Feed, Electrical Trip, Bolted Contact Switch (Eaton CB4033T120480).....	24,002.85	2,934.70

26 28 16 16-0641 Bottom Feed, Electrical Trip, Bolted Contact Switches (26 28 16 16-0632)

26 28 16 16-0642	EA		800 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB0833B120480).....	10,721.98	1,222.79
26 28 16 16-0643	EA		1,200 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB1233B120480).....	11,660.00	1,467.36
26 28 16 16-0644	EA		1,600 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB1633B120480).....	12,604.35	1,711.91
26 28 16 16-0645	EA		2,000 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB2033B120480).....	13,567.66	1,956.47
26 28 16 16-0646	EA		2,500 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB2533B120480).....	15,270.75	2,201.02
26 28 16 16-0647	EA		3,000 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB3033B120480).....	19,888.57	2,445.59
26 28 16 16-0648	EA		4,000 Amperes, Bottom Feed, Electrical Trip, Bolted Contact Switch (Eaton CB4033B120480).....	26,203.14	2,934.70

26 28 16 16-0649 Manually Operated, Bolted Contact Switches (26 28 16 16-0631)

26 28 16 16-0650 Top Feed, Manually Operated, Bolted Contact Switches (26 28 16 16-0649)

26 28 16 16-0651	EA		800 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA0833T480).....	7,351.99	1,222.79
26 28 16 16-0652	EA		1,200 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA1233T480).....	8,202.76	1,467.36
26 28 16 16-0653	EA		1,600 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA1633T480).....	9,105.38	1,711.91
26 28 16 16-0654	EA		2,000 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA2033T480).....	10,000.41	1,956.47
26 28 16 16-0655	EA		2,500 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA2533T480).....	10,958.68	2,201.02
26 28 16 16-0656	EA		3,000 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA3033T480).....	14,590.16	2,445.59
26 28 16 16-0657	EA		4,000 Amperes, Top Feed, Manually Operated, Bolted Contact Switch (Eaton QA4033T480).....	20,740.34	2,934.70

26 28 16 16-0658 Bottom Feed, Manually Operated, Bolted Contact Switches (26 28 16 16-0649)

26 28 16 16-0659	EA		800 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA0833B480).....	7,757.91	1,222.79
26 28 16 16-0660	EA		1,200 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA1233B480).....	8,816.06	1,467.36
26 28 16 16-0661	EA		1,600 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA1633B480).....	9,699.71	1,711.91
26 28 16 16-0662	EA		2,000 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA2033B480).....	10,785.68	1,956.47
26 28 16 16-0663	EA		2,500 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA2533B480).....	11,945.02	2,201.02
26 28 16 16-0664	EA		3,000 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA3033B480).....	16,543.87	2,445.59
26 28 16 16-0665	EA		4,000 Amperes, Bottom Feed, Manually Operated, Bolted Contact Switch (Eaton QA4033B480).....	22,788.89	2,934.70

26 29 Low-Voltage Controllers (26 20)

26 29 13 Enclosed Controllers (26 29)

26 29 13 13 Across-The-Line Motor Controllers (26 29 13)

26 29 13 13-0001 Manual Motor Starters (26 29 13 13)

26 29 13 13-0002 Fractional HP Manual Motor Starters (26 29 13 13-0001)

26 29 13 13-0003	EA		NEMA 1, 1 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FG1).....	231.36	61.24
			<i>For Flush Cover Plate In Lieu Of NEMA 1, Deduct</i>	-3.02	
			<i>For Oversized Enclosure, Add</i>	30.38	
			<i>For Pilot Light, Add</i>	44.56	
26 29 13 13-0004	EA		NEMA 1, 2 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FG2).....	303.04	79.61
			<i>For Flush Cover Plate In Lieu Of NEMA 1, Deduct</i>	-3.02	
			<i>For Oversized Enclosure, Add</i>	30.38	
			<i>For Pilot Light, Add</i>	44.56	
26 29 13 13-0005	EA		NEMA 1, 1 Pole, Key Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FG3).....	261.74	61.24
			<i>For Flush Cover Plate In Lieu Of NEMA 1, Deduct</i>	-3.02	
			<i>For Oversized Enclosure, Add</i>	30.38	
			<i>For Pilot Light, Add</i>	44.56	
26 29 13 13-0006	EA		NEMA 1, 2 Pole, Key Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FG4).....	333.43	79.61
			<i>For Flush Cover Plate In Lieu Of NEMA 1, Deduct</i>	-3.02	
			<i>For Oversized Enclosure, Add</i>	30.38	
			<i>For Pilot Light, Add</i>	44.56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0007 EA NEMA 1, Handle Guard/Lockoff, 1 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FG5).....	244.52	61.24
<i>For Oversize Enclosure, Add</i>	30.38	
26 29 13 13-0008 EA NEMA 1, Handle Guard/Lockoff, 2 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FG6).....	320.26	79.61
<i>For Oversize Enclosure, Add</i>	30.38	
26 29 13 13-0009 EA NEMA 4, Handle Guard/Lockoff, 1 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FW1).....	492.82	73.49
<i>For Pilot Light, Add</i>	116.46	
26 29 13 13-0010 EA NEMA 4, Handle Guard/Lockoff, 2 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FW2).....	567.56	91.86
<i>For Pilot Light, Add</i>	116.46	
26 29 13 13-0011 EA NEMA 3R, 7 And 9, Handle Guard/Lockoff, 1 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FR1).....	523.20	73.49
26 29 13 13-0012 EA NEMA 3R, 7 And 9, Handle Guard/Lockoff, 2 Pole, Toggle Operator, Up To 1 HP, Manual Motor Starter With Thermal Overload Protection (Square D 2510FR2).....	594.90	91.86
26 29 13 13-0013 Non-Reversing Manual Motor Starters <small>(26 29 13 13-0001)</small>		
26 29 13 13-0014 EA NEMA 1, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KG1).....	186.97	61.24
<i>Note: NEMA 1 or flush cover plate installation.</i>		
<i>For Oversize Enclosure, Add</i>	14.66	
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0015 EA NEMA 1, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KG2).....	304.82	79.61
<i>Note: NEMA 1 or flush cover plate installation.</i>		
<i>For Oversize Enclosure, Add</i>	14.66	
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0016 EA NEMA 1, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 3 HP At 230 Volt, 7-1/2 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KG5).....	210.94	67.37
<i>Note: NEMA 1 or flush cover plate installation.</i>		
<i>For Oversize Enclosure, Add</i>	14.66	
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0017 EA NEMA 1, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 15 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KG6).....	329.77	85.74
<i>Note: NEMA 1 or flush cover plate installation.</i>		
<i>For Oversize Enclosure, Add</i>	14.66	
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0018 EA NEMA 1, Non-Reversing, 2 Pole, Key Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KG3).....	215.31	61.24
<i>Note: NEMA 1 or flush cover plate installation.</i>		
<i>For Oversize Enclosure, Add</i>	14.66	
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0019 EA NEMA 1, Non-Reversing, 3 Pole, Key Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KG4).....	334.14	79.61
<i>Note: NEMA 1 or flush cover plate installation.</i>		
<i>For Oversize Enclosure, Add</i>	14.66	
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0020 EA NEMA 4, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KW1).....	453.81	73.49
<i>For Pilot Light, Add</i>	111.40	
26 29 13 13-0021 EA NEMA 4, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KW2).....	560.91	91.86
<i>For Pilot Light, Add</i>	111.40	
26 29 13 13-0022 EA NEMA 4, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 3 HP At 230 Volt, 7-1/2 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KW5).....	478.76	79.61
<i>For Pilot Light, Add</i>	111.40	
26 29 13 13-0023 EA NEMA 4, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 15 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KW6).....	582.94	97.98
<i>For Pilot Light, Add</i>	111.40	
26 29 13 13-0024 EA NEMA 3R, 7 And 9, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KR1).....	481.17	73.49
26 29 13 13-0025 EA NEMA 3R, 7 And 9, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KR2).....	596.09	91.86
26 29 13 13-0026 EA Open Type, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KO1).....	136.55	42.86
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0027 EA Open Type, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KO2).....	254.40	61.24
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0028 EA Open Type, Non-Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 3 HP At 230 Volt, 7-1/2 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KO5).....	160.52	48.99
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0029 EA Open Type, Non-Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 15 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2510KO6).....	278.37	67.37
<i>For Pilot Light, Add</i>	70.36	
26 29 13 13-0030 Reversing Manual Motor Starters <small>(26 29 13 13-0001)</small>		
26 29 13 13-0031 EA NEMA 1, Reversing, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2511KG11).....	500.91	110.23
<i>For Pilot Light, Add</i>	113.35	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0032	EA		NEMA 1, Reversing, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2511KG22).....	724.89	146.97
			<i>For Pilot Light, Add</i>	113.35	
26 29 13 13-0033			Two Speed Manual Motor Starters <small>(26 29 13 13-0001)</small>		
26 29 13 13-0034	EA		NEMA 1, Two Speed, 2 Pole, Toggle Operator, 2 HP At 115 Volt, 2 HP At 230 Volt, 3 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2512KG11).....	500.91	110.23
26 29 13 13-0035	EA		NEMA 1, Two Speed, 3 Pole, Toggle Operator, 2 HP At 115 Volt, 7-1/2 HP At 230 Volt, 10 HP At 460 Volt, Manual Motor Starting Switch Without Thermal Overload Protection (Square D 2512KG22).....	724.89	146.97
26 29 13 13-0036			Non-Reversing Integral HP Manual Motor Starters <small>(26 29 13 13-0001)</small>		
26 29 13 13-0037	EA		NEMA 1, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBG1).....	457.89	73.49
26 29 13 13-0038	EA		NEMA 1, Non-Reversing Integral HP, 2 Pole, Toggle Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510TBG1).....	457.89	73.49
26 29 13 13-0039	EA		NEMA 4, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBW11).....	944.19	85.74
26 29 13 13-0040	EA		NEMA 4X, Non-Reversing Integral HP, 2 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBW1).....	944.19	85.74
26 29 13 13-0041	EA		NEMA 7 And 9, Non-Reversing Integral HP, 2 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBR1).....	1,231.80	85.74
26 29 13 13-0042	EA		Type 12, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBA1).....	582.65	85.74
26 29 13 13-0043	EA		Open, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBO1).....	390.77	55.12
26 29 13 13-0044	EA		NEMA 1, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCG1).....	543.06	79.61
26 29 13 13-0045	EA		NEMA 1, Non-Reversing Integral HP, 2 Pole, Toggle Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510TCG1).....	543.06	79.61
26 29 13 13-0046	EA		NEMA 4, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCW11).....	1,129.62	91.86
26 29 13 13-0047	EA		NEMA 4X, Non-Reversing Integral HP, 2 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCW1).....	1,129.62	91.86
26 29 13 13-0048	EA		NEMA 7 And 9, Non-Reversing Integral HP, 2 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCR1).....	1,439.51	91.86
26 29 13 13-0049	EA		Type 12, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCA1).....	667.82	91.86
26 29 13 13-0050	EA		Open, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCO1).....	475.94	61.24
26 29 13 13-0051	EA		NEMA 1, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCG2).....	712.28	85.74
26 29 13 13-0052	EA		NEMA 1, Non-Reversing Integral HP, 2 Pole, Toggle Operator, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510TCG2).....	712.28	85.74
26 29 13 13-0053	EA		NEMA 4, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCW12).....	1,342.39	97.98
26 29 13 13-0054	EA		NEMA 4X, Non-Reversing Integral HP, 2 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCW2).....	1,342.39	97.98
26 29 13 13-0055	EA		NEMA 7 And 9, Non-Reversing Integral HP, 2 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCR2).....	1,639.11	97.98
26 29 13 13-0056	EA		Type 12, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCA2).....	840.08	97.98
26 29 13 13-0057	EA		Open, Non-Reversing Integral HP, 2 Pole, Push Button Operator, NEMA Size M-1P, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCO2).....	648.19	67.37
26 29 13 13-0058	EA		NEMA 1, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBG2).....	567.06	91.86
26 29 13 13-0059	EA		NEMA 1, Non-Reversing Integral HP, 3 Pole, Toggle Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510TBG2).....	567.06	91.86
26 29 13 13-0060	EA		NEMA 4, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBW12).....	1,053.35	104.11
26 29 13 13-0061	EA		NEMA 4X, Non-Reversing Integral HP, 3 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBW2).....	1,053.35	104.11
26 29 13 13-0062	EA		NEMA 7 And 9, Non-Reversing Integral HP, 3 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBR2).....	1,349.06	104.11
26 29 13 13-0063	EA		Type 12, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBA2).....	692.82	104.11
26 29 13 13-0064	EA		Open, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2510MBO2).....	502.97	73.49
26 29 13 13-0065	EA		NEMA 1, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCG3).....	652.23	97.98
26 29 13 13-0066	EA		NEMA 1, Non-Reversing Integral HP, 3 Pole, Toggle Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510TCG3).....	652.23	97.98
26 29 13 13-0067	EA		NEMA 4, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCW13).....	1,238.78	110.23
26 29 13 13-0068	EA		NEMA 4X, Non-Reversing Integral HP, 3 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCW3).....	1,238.78	110.23
26 29 13 13-0069	EA		NEMA 7 And 9, Non-Reversing Integral HP, 3 Pole, External Toggle Operator To Actuate A Push Button Operator Inside, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCR3).....	1,555.76	110.23
26 29 13 13-0070	EA		Type 12, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCA3).....	776.98	110.23
26 29 13 13-0071	EA		Open, Non-Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2510MCO3).....	585.10	79.61



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Controllers	26 29	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0072 Reversing Integral HP Manual Motor Starters <small>(26 29 13 13-0001)</small>		
26 29 13 13-0073 EA NEMA 1, Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2511MBG1).....	1,319.06	128.60
26 29 13 13-0074 EA NEMA 1, Reversing Integral HP, 3 Pole, Toggle Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2511TBG1).....	1,319.06	128.60
26 29 13 13-0075 EA Open, Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2511MBO1).....	1,159.50	91.86
26 29 13 13-0076 EA NEMA 1, Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2511MCG1).....	1,559.27	140.85
26 29 13 13-0077 EA Open, Reversing Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2511MCO1).....	1,399.70	104.11
26 29 13 13-0078 Two Speed Integral HP Manual Motor Starters <small>(26 29 13 13-0001)</small>		
26 29 13 13-0079 EA NEMA 1, Two Speed Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2512MBG1).....	1,319.06	128.60
26 29 13 13-0080 EA Open, Two Speed Integral HP, 3 Pole, Push Button Operator, NEMA Size M-0, Manual Motor Starter With Thermal Overload Protection (Square D 2512MBO1).....	1,159.50	91.86
26 29 13 13-0081 EA NEMA 1, Two Speed Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2512MCG1).....	1,559.27	140.85
26 29 13 13-0082 EA Open, Two Speed Integral HP, 3 Pole, Push Button Operator, NEMA Size M-1, Manual Motor Starter With Thermal Overload Protection (Square D 2512MCO1).....	1,399.70	104.11
26 29 13 13-0083 Magnetic Motor Starters <small>(26 29 13 13)</small>		
26 29 13 13-0084 Non-Reversing, Magnetic Contactors <small>(26 29 13 13-0083)</small>		
26 29 13 13-0085 Open Enclosure, Non-Reversing, Magnetic Contactors <small>(26 29 13 13-0084)</small>		
26 29 13 13-0086 EA Size 00, 1 Phase, 2 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SAO11).....	535.60	122.48
<i>For Factory Installed Accessory, Deduct</i>	<i>-244.95</i>	
26 29 13 13-0087 EA Size 00, 3 Phase, 3 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SAO12).....	602.63	134.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-269.45</i>	
26 29 13 13-0088 EA Size 0, 1 Phase, 1 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBO5).....	578.13	122.48
<i>For Factory Installed Accessory, Deduct</i>	<i>-244.95</i>	
26 29 13 13-0089 EA Size 0, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBO1).....	646.18	134.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-269.45</i>	
26 29 13 13-0090 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBO2).....	713.22	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0091 EA Size 0, 3 Phase, 4 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBO3).....	901.13	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0092 EA Size 0, 3 Phase, 5 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBO4).....	1,133.62	220.46
<i>For Factory Installed Accessory, Deduct</i>	<i>-440.92</i>	
26 29 13 13-0093 EA Size 1, 1 Phase, 1 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCO5).....	673.52	134.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-269.45</i>	
26 29 13 13-0094 EA Size 1, 1 Phase, 2 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCO1).....	740.56	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0095 EA Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCO2).....	809.61	159.22
<i>For Factory Installed Accessory, Deduct</i>	<i>-318.44</i>	
26 29 13 13-0096 EA Size 1, 3 Phase, 4 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCO3).....	1,035.29	214.34
<i>For Factory Installed Accessory, Deduct</i>	<i>-428.67</i>	
26 29 13 13-0097 EA Size 1, 3 Phase, 5 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCO4).....	1,266.76	251.08
<i>For Factory Installed Accessory, Deduct</i>	<i>-502.16</i>	
26 29 13 13-0098 EA Size 2, 1 Phase, 2 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDO1).....	1,131.47	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0099 EA Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDO2).....	1,260.65	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0100 EA Size 2, 3 Phase, 4 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDO3).....	1,643.40	244.95
<i>For Factory Installed Accessory, Deduct</i>	<i>-489.91</i>	
26 29 13 13-0101 EA Size 3, 1 Phase, 2 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEO1).....	1,694.09	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0102 EA Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEO2).....	1,933.03	244.95
<i>For Factory Installed Accessory, Deduct</i>	<i>-489.91</i>	
26 29 13 13-0103 EA Size 3, 3 Phase, 4 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEO3).....	2,458.58	306.19
<i>For Factory Installed Accessory, Deduct</i>	<i>-612.39</i>	

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 29 Low-Voltage Controllers



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13	13-0104	EA	Size 3, 3 Phase, 5 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEO4).....	3,504.66	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13	13-0105	EA	Size 4, 1 Phase, 2 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFO1).....	3,814.61	306.19
			<i>For Factory Installed Accessory, Deduct</i>	-612.39	
26 29 13	13-0106	EA	Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFO2).....	4,197.36	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13	13-0107	EA	Size 4, 3 Phase, 4 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFO3).....	5,674.84	428.67
			<i>For Factory Installed Accessory, Deduct</i>	-857.34	
26 29 13	13-0108	EA	Size 5, 1 Phase, 2 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SGO1).....	7,674.02	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13	13-0109	EA	Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SGO2).....	8,525.59	489.91
			<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13	13-0110	EA	Size 6, 3 Phase, 3 Pole, 150 HP At 200 Volt, 200 HP At 230 Volt, 400 HP At 460/575 Volt, 540 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SHO2).....	22,067.42	734.87
			<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13	13-0111	EA	Size 7, 3 Phase, 3 Pole, 300 HP At 230 Volt, 600 HP At 460/575 Volt, 810 Amperes, Open Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SJO2).....	31,601.80	1,102.29
			<i>For Factory Installed Accessory, Deduct</i>	-2,204.59	
26 29 13	13-0112		NEMA 1, Non-Reversing, Magnetic Contactors <small>(26 29 13 13-0084)</small>		
26 29 13	13-0113	EA	Size 00, 1 Phase, 2 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SAG11).....	566.99	122.48
			<i>For Factory Installed Accessory, Deduct</i>	-244.95	
26 29 13	13-0114	EA	Size 00, 3 Phase, 3 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SAG12).....	634.03	134.72
			<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13	13-0115	EA	Size 0, 1 Phase, 1 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBG5).....	609.53	122.48
			<i>For Factory Installed Accessory, Deduct</i>	-244.95	
26 29 13	13-0116	EA	Size 0, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBG1).....	678.59	134.72
			<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13	13-0117	EA	Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBG2).....	745.62	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13	13-0118	EA	Size 0, 3 Phase, 4 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBG3).....	935.57	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13	13-0119	EA	Size 0, 3 Phase, 5 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBG4).....	1,169.06	220.46
			<i>For Factory Installed Accessory, Deduct</i>	-440.92	
26 29 13	13-0120	EA	Size 1, 1 Phase, 1 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCG5).....	706.94	134.72
			<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13	13-0121	EA	Size 1, 1 Phase, 2 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCG1).....	776.00	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13	13-0122	EA	Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCG2).....	843.03	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13	13-0123	EA	Size 1, 3 Phase, 4 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCG3).....	1,069.72	214.34
			<i>For Factory Installed Accessory, Deduct</i>	-428.67	
26 29 13	13-0124	EA	Size 1, 3 Phase, 5 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCG4).....	1,300.18	251.08
			<i>For Factory Installed Accessory, Deduct</i>	-502.16	
26 29 13	13-0125	EA	Size 2, 1 Phase, 2 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDG1).....	1,281.35	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13	13-0126	EA	Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDG2).....	1,411.54	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13	13-0127	EA	Size 2, 3 Phase, 4 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDG3).....	1,793.28	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13	13-0128	EA	Size 3, 1 Phase, 2 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEG1).....	1,988.79	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13	13-0129	EA	Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEG2).....	2,226.72	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13	13-0130	EA	Size 3, 3 Phase, 4 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEG3).....	2,753.28	306.19
			<i>For Factory Installed Accessory, Deduct</i>	-612.39	
26 29 13	13-0131	EA	Size 4, 1 Phase, 2 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFG1).....	4,425.28	306.19
			<i>For Factory Installed Accessory, Deduct</i>	-612.39	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0132 EA Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFG2).....	4,808.03	367.43
<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0133 EA Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SGG2).....	9,638.57	489.91
<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13 13-0134 EA Size 6, 3 Phase, 3 Pole, 150 HP At 200 Volt, 200 HP At 230 Volt, 400 HP At 460/575 Volt, 540 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SHG2).....	26,961.89	734.87
<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13 13-0135 EA Size 7, 3 Phase, 3 Pole, 300 HP At 230 Volt, 600 HP At 460/575 Volt, 810 Amperes, NEMA 1 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SJG2).....	36,510.45	1,102.29
<i>For Factory Installed Accessory, Deduct</i>	-2,204.59	
26 29 13 13-0136 NEMA 12, Non-Reversing, Magnetic Contactors <small>(26 29 13 13-0084)</small>		
26 29 13 13-0137 EA Size 0, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBA1).....	851.76	134.72
<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0138 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBA2).....	918.80	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0139 EA Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCA2).....	1,016.20	159.22
<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0140 EA Size 2, 1 Phase, 2 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDA1).....	1,597.32	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0141 EA Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDA2).....	1,728.52	183.72
<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0142 EA Size 3, 1 Phase, 2 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEA1).....	2,363.50	183.72
<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0143 EA Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEA2).....	2,600.42	244.95
<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0144 EA Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFA2).....	6,048.61	367.43
<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0145 EA Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SGA2).....	12,813.44	489.91
<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13 13-0146 EA Size 6, 3 Phase, 3 Pole, 150 HP At 200 Volt, 200 HP At 230 Volt, 400 HP At 460/575 Volt, 540 Amperes, NEMA 12 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SHA2).....	30,854.78	734.87
<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13 13-0147 NEMA 4/4X, Non-Reversing, Magnetic Contactors <small>(26 29 13 13-0084)</small>		
Note: Brushed stainless steel enclosure.		
26 29 13 13-0148 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBW12).....	1,250.97	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0149 EA Size 1, 1 Phase, 2 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCW11).....	1,295.53	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0150 EA Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCW12).....	1,362.55	159.22
<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0151 EA Size 1, 3 Phase, 4 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SCW13).....	1,589.25	214.34
<i>For Factory Installed Accessory, Deduct</i>	-428.67	
26 29 13 13-0152 EA Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SDW12).....	2,450.59	183.72
<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0153 EA Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SEW11).....	3,697.19	244.95
<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0154 EA Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SFW12).....	7,318.56	367.43
<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0155 EA Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SGW12).....	12,813.44	489.91
<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13 13-0156 EA Size 6, 3 Phase, 3 Pole, 150 HP At 200 Volt, 200 HP At 230 Volt, 400 HP At 460/575 Volt, 540 Amperes, NEMA 4/4X Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SHW2).....	34,172.45	734.87
<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13 13-0157 NEMA 7/9, Non-Reversing, Magnetic Contactors <small>(26 29 13 13-0084)</small>		
Note: Bolted cast iron enclosure.		
26 29 13 13-0158 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 7/9 Enclosure, Non-Reversing, Magnetic Contactors (Square D 8502SBT2).....	2,488.26	195.97
<i>For Factory Installed Accessory, Deduct</i>	-391.93	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 29 Low-Voltage Controllers**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 29 13 13-0159	Non-Reversing, Magnetic Starters (26 29 13 13-0083)			
26 29 13 13-0160	Open Enclosure, Non-Reversing, Magnetic Starters (26 29 13 13-0159)			
26 29 13 13-0161	EA	Size 00, 1 Phase, 2 Pole, 3/4 HP At 115 Volt, 1 HP At 230 Volt, 9 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SAO11)	635.86	122.48
		<i>For Factory Installed Accessory, Deduct</i>	-244.95	
26 29 13 13-0162	EA	Size 00, 3 Phase, 3 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SAO12)	660.36	134.72
		<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0163	EA	Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBO1)	709.98	134.72
		<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0164	EA	Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBO2)	785.12	146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0165	EA	Size 0, 3 Phase, 5 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBO4)	1,260.21	220.46
		<i>For Factory Installed Accessory, Deduct</i>	-440.92	
26 29 13 13-0166	EA	Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCO1)	807.40	146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0167	EA	Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCO3)	946.33	159.22
		<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0168	EA	Size 1, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 36 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCO2)	988.86	159.22
		<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0169	EA	Size 2, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 45 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDO6)	1,223.63	146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0170	EA	Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDO1)	1,391.29	183.72
		<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0171	EA	Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SEO1)	2,148.74	244.95
		<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0172	EA	Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFO1)	4,529.53	367.43
		<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0173	EA	Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SGO1)	10,248.22	489.91
		<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13 13-0174	EA	Size 6, 3 Phase, 3 Pole, 150 HP At 200 Volt, 200 HP At 230 Volt, 400 HP At 460/575 Volt, 540 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SHO2)	23,502.44	734.87
		<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13 13-0175	EA	Size 7, 3 Phase, 3 Pole, 300 HP At 230 Volt, 600 HP At 460/575 Volt, 810 Amperes, Open Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SJO2)	33,862.19	1,102.29
		<i>For Factory Installed Accessory, Deduct</i>	-2,204.59	
26 29 13 13-0176	NEMA 1, Non-Reversing, Magnetic Starters (26 29 13 13-0159)			
26 29 13 13-0177	EA	Size 00, 1 Phase, 2 Pole, .34 HP At 115 Volt, 1 HP At 230 Volt, 9 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SAG11)	669.28	122.48
		<i>For Factory Installed Accessory, Deduct</i>	-244.95	
26 29 13 13-0178	EA	Size 00, 3 Phase, 3 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SAG12)	693.78	134.72
		<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0179	EA	Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBG1)	743.40	134.72
		<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0180	EA	Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBG2)	818.54	146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0181	EA	Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCG1)	839.81	146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0182	EA	Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCG3)	915.94	159.22
		<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0183	EA	Size 1, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 36 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCG2)	1,023.29	159.22
		<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0184	EA	Size 2, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 45 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDG6)	1,374.52	146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0185	EA	Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDG1)	1,542.18	183.72
		<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0186	EA	Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SEG1)	2,443.45	244.95
		<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0187	EA	Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFG1)	5,140.20	367.43
		<i>For Factory Installed Accessory, Deduct</i>	-734.87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0188 EA Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, NEMA 1 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SGG1).....	11,364.24	489.91
<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13 13-0189 NEMA 12, Non-Reversing, Magnetic Starters (26 29 13 13-0159)		
26 29 13 13-0190 EA Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBA1).....	916.58	134.72
<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0191 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBA2).....	991.71	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0192 EA Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCA1).....	1,012.98	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0193 EA Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCA3).....	1,089.12	159.22
<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0194 EA Size 1, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 36 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCA2).....	1,196.47	159.22
<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0195 EA Size 2, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 45 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDA6).....	1,691.50	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0196 EA Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDA1).....	1,858.15	183.72
<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0197 EA Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SEA1).....	2,817.14	244.95
<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0198 EA Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFA1).....	6,379.77	367.43
<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0199 EA Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SGA1).....	14,536.08	489.91
<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13 13-0200 EA Size 6, 3 Phase, 3 Pole, 150 HP At 200 Volt, 200 HP At 230 Volt, 400 HP At 460/575 Volt, 540 Amperes, NEMA 12 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SHA2).....	34,612.98	734.87
<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13 13-0201 NEMA 3R, Non-Reversing, Magnetic Starters (26 29 13 13-0159)		
26 29 13 13-0202 EA Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBH1).....	916.58	134.72
<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13 13-0203 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBH2).....	991.71	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0204 EA Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCH1).....	1,012.98	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0205 EA Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCH3).....	1,089.12	159.22
<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0206 EA Size 1, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 36 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCH2).....	1,196.47	159.22
<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0207 EA Size 2, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 45 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDH6).....	1,691.50	146.97
<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0208 EA Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDH1).....	1,858.15	183.72
<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0209 EA Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SEH1).....	2,817.14	244.95
<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0210 EA Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 3R Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFH1).....	6,379.77	367.43
<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0211 NEMA 3R/4/4X/7/9, Non-Reversing, Magnetic Starters (26 29 13 13-0159)		
Note: Bolted cast aluminum enclosure.		
26 29 13 13-0212 EA Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 3R/4/4X/7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBT4).....	2,593.77	208.21
<i>For Factory Installed Accessory, Deduct</i>	-416.42	
26 29 13 13-0213 EA Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 3R/4/4X/7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCR1).....	3,183.17	208.21
<i>For Factory Installed Accessory, Deduct</i>	-416.42	
26 29 13 13-0214 EA Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 3R/4/4X/7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCR3).....	3,280.58	220.46
<i>For Factory Installed Accessory, Deduct</i>	-440.92	
26 29 13 13-0215 EA Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 3R/4/4X/7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDR1).....	5,074.49	244.95
<i>For Factory Installed Accessory, Deduct</i>	-489.91	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 29 Low-Voltage Controllers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13	13-0216	EA	Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 3R/4/4X/7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SET43).....	6,120.57	306.19
			<i>For Factory Installed Accessory, Deduct</i>	-672.39	
26 29 13	13-0217	EA	Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 3R/4/4X/7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFT41).....	9,746.99	428.67
			<i>For Factory Installed Accessory, Deduct</i>	-857.34	
26 29 13	13-0218		NEMA 4/4X, Non-Reversing, Magnetic Starters <small>(26 29 13 13-0159)</small>		
			Note: Brushed stainless steel enclosure.		
26 29 13	13-0219	EA	Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBW11).....	1,247.74	134.72
			<i>For Factory Installed Accessory, Deduct</i>	-269.45	
26 29 13	13-0220	EA	Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBW12).....	1,323.89	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13	13-0221	EA	Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCW11).....	1,359.33	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13	13-0222	EA	Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCW13).....	1,435.47	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13	13-0223	EA	Size 1, 1 Phase, 2 Pole, 3 HP At 200/230 Volt, 7-1/2 HP At 460/575 Volt, 36 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCW12).....	1,542.82	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13	13-0224	EA	Size 2, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 45 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDW16).....	2,411.55	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13	13-0225	EA	Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SEW11).....	3,912.90	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13	13-0226	EA	Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFW11).....	7,648.70	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13	13-0227	EA	Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, NEMA 4/4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SGW11).....	16,975.72	489.91
			<i>For Factory Installed Accessory, Deduct</i>	-979.82	
26 29 13	13-0228		NEMA 4X, Non-Reversing, Magnetic Starters <small>(26 29 13 13-0159)</small>		
			Note: Glass polyester enclosure.		
26 29 13	13-0229	EA	Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDW21).....	2,581.23	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13	13-0230	EA	Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SEW21).....	4,769.66	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13	13-0231	EA	Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 4X Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SFW21).....	9,378.43	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13	13-0232		NEMA 7/9, Non-Reversing, Magnetic Starters <small>(26 29 13 13-0159)</small>		
			Note: Bolted cast iron enclosure.		
26 29 13	13-0233	EA	Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBT1).....	2,509.53	195.97
			<i>For Factory Installed Accessory, Deduct</i>	-391.93	
26 29 13	13-0234	EA	Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SBT2).....	2,593.77	208.21
			<i>For Factory Installed Accessory, Deduct</i>	-416.42	
26 29 13	13-0235	EA	Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCT1).....	2,630.22	208.21
			<i>For Factory Installed Accessory, Deduct</i>	-416.42	
26 29 13	13-0236	EA	Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCT3).....	2,710.42	220.46
			<i>For Factory Installed Accessory, Deduct</i>	-440.92	
26 29 13	13-0237	EA	Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 36 Amperes, NEMA 7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SCT2).....	2,833.98	220.46
			<i>For Factory Installed Accessory, Deduct</i>	-440.92	
26 29 13	13-0238	EA	Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 7/9 Enclosure, Full Voltage, Non-Reversing Magnetic Starter (Square D 8536SDT1).....	4,158.99	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13	13-0239		Reversing, Magnetic Starters <small>(26 29 13 13-0083)</small>		
26 29 13	13-0240		Open Enclosure, Reversing, Magnetic Starters <small>(26 29 13 13-0239)</small>		
26 29 13	13-0241	EA	Size 00, 1 Phase, 3 Pole, 3/4 HP At 115 Volt, 1 HP At 230 Volt, 9 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SAO13).....	1,192.42	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13	13-0242	EA	Size 00, 3 Phase, 3 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SAO16).....	1,256.22	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	



Electrical	26	26
Low-Voltage Electrical Distribution	26 20	
Low-Voltage Controllers	26 29	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0243	EA		Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBO1).....	1,390.08	171.47
			<i>For Factory Installed Accessory, Deduct</i>	-342.93	
26 29 13 13-0244	EA		Size 0, 1 Phase, 3 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBO2).....	1,442.94	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0245	EA		Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBO10).....	1,478.38	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0246	EA		Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCO2).....	1,581.87	195.97
			<i>For Factory Installed Accessory, Deduct</i>	-391.93	
26 29 13 13-0247	EA		Size 1, 1 Phase, 3 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCO3).....	1,649.00	214.34
			<i>For Factory Installed Accessory, Deduct</i>	-428.67	
26 29 13 13-0248	EA		Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCO7).....	1,685.45	214.34
			<i>For Factory Installed Accessory, Deduct</i>	-428.67	
26 29 13 13-0249	EA		Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SDO1).....	2,868.79	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0250	EA		Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SEO1).....	4,686.50	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0251	EA		Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230, 100 HP At 460/575 Volt, 135 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SFO1).....	10,753.50	551.15
			<i>For Factory Installed Accessory, Deduct</i>	-1,102.29	
26 29 13 13-0252	EA		Size 5, 3 Phase, 3 Pole, 75 HP At 200 Volt, 100 HP At 230 Volt, 200 HP At 460/575 Volt, 270 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SGO1).....	20,011.60	734.87
			<i>For Factory Installed Accessory, Deduct</i>	-1,469.73	
26 29 13 13-0253	EA		Size 7, 3 Phase, 3 Pole, 300 HP At 230 Volt, 600 HP At 460/575 Volt, 810 Amperes, Open Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SJO1).....	64,723.54	1,347.25
			<i>For Factory Installed Accessory, Deduct</i>	-2,694.50	
26 29 13 13-0254			NEMA 1, Reversing, Magnetic Starters <small>(26 29 13 13-0239)</small>		
26 29 13 13-0255	EA		Size 00, 1 Phase, 2 Pole, 3/4 HP At 115 Volt, 1 HP At 230 Volt, 9 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SAG13).....	1,228.69	146.97
			<i>For Factory Installed Accessory, Deduct</i>	-293.95	
26 29 13 13-0256	EA		Size 00, 1 Phase, 3 Pole, 3/4 HP At 115 Volt, 1 HP At 230 Volt, 9 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SAG15).....	1,283.56	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0257	EA		Size 00, 3 Phase, 3 Pole, 1-1/2 HP At 200/230 Volt, 2 HP At 460/575 Volt, 9 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SAG16).....	1,320.02	159.22
			<i>For Factory Installed Accessory, Deduct</i>	-318.44	
26 29 13 13-0258	EA		Size 0, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBG1).....	1,450.84	171.47
			<i>For Factory Installed Accessory, Deduct</i>	-342.93	
26 29 13 13-0259	EA		Size 0, 1 Phase, 3 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 18 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBG2).....	1,505.73	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0260	EA		Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBG4).....	1,542.18	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0261	EA		Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCG2).....	1,673.02	195.97
			<i>For Factory Installed Accessory, Deduct</i>	-391.93	
26 29 13 13-0262	EA		Size 1, 1 Phase, 3 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCG6).....	1,740.14	214.34
			<i>For Factory Installed Accessory, Deduct</i>	-428.67	
26 29 13 13-0263	EA		Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCG8).....	1,776.60	214.34
			<i>For Factory Installed Accessory, Deduct</i>	-428.67	
26 29 13 13-0264	EA		Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SDG2).....	3,105.76	244.95
			<i>For Factory Installed Accessory, Deduct</i>	-489.91	
26 29 13 13-0265	EA		Size 3, 3 Phase, 3 Pole, 25 HP At 200 Volt, 30 HP At 230 Volt, 50 HP At 460/575 Volt, 90 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SEG2).....	5,096.65	367.43
			<i>For Factory Installed Accessory, Deduct</i>	-734.87	
26 29 13 13-0266	EA		Size 4, 3 Phase, 3 Pole, 40 HP At 200 Volt, 50 HP At 230 Volt, 100 HP At 460/575 Volt, 135 Amperes, NEMA 1 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SFG3).....	11,506.97	551.15
			<i>For Factory Installed Accessory, Deduct</i>	-1,102.29	
26 29 13 13-0267			NEMA 12, Reversing, Magnetic Starters <small>(26 29 13 13-0239)</small>		
26 29 13 13-0268	EA		Size 0, 1 Phase, 3 Pole, 3/4 HP At 115 Volt, 1 HP At 230 Volt, 18 Amperes, NEMA 12 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBA2).....	1,764.98	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0269	EA		Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 12 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBA4).....	1,801.44	183.72
			<i>For Factory Installed Accessory, Deduct</i>	-367.43	
26 29 13 13-0270	EA		Size 1, 3 Phase, 3 Pole, 7-1/2 HP At 200/230 Volt, 10 HP At 460/575 Volt, 27 Amperes, NEMA 12 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCA4).....	2,035.86	214.34
			<i>For Factory Installed Accessory, Deduct</i>	-428.67	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 29 Low-Voltage Controllers**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 29 13 13-0271	EA	Size 2, 3 Phase, 3 Pole, 10 HP At 200 Volt, 15 HP At 230 Volt, 25 HP At 460/575 Volt, 45 Amperes, NEMA 12 Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SDA1).....	3,539.21		244.95
		<i>For Factory Installed Accessory, Deduct</i>	-489.91		
26 29 13 13-0272		NEMA 4X, Reversing, Magnetic Starters (26 29 13 13-0239)			
		Note: Brushed stainless steel enclosure.			
26 29 13 13-0273	EA	Size 0, 3 Phase, 3 Pole, 3 HP At 200/230 Volt, 5 HP At 460/575 Volt, 18 Amperes, NEMA 4/4X Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SBW14).....	2,204.50		183.72
		<i>For Factory Installed Accessory, Deduct</i>	-367.43		
26 29 13 13-0274	EA	Size 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 27 Amperes, NEMA 4/4X Enclosure, Full Voltage, Reversing Magnetic Starter (Square D 8736SCW11).....	2,596.62		195.97
		<i>For Factory Installed Accessory, Deduct</i>	-391.93		
26 29 13 13-0275		Magnetic Contactor/Starters Accessories (26 29 13 13-0083)			
26 29 13 13-0276	EA	NEMA 1 Enclosure Start/Stop Push Button Kit, Contactor/Starter Accessory (Square D 9999SA2).....	164.58		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0277	EA	NEMA 12 Enclosure Start/Stop Push Button Kit, Contactor/Starter Accessory (Square D 9999SA3).....	278.91		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0278	EA	NEMA 1 Enclosure Selector Switch Kit, Contactor/Starter Accessory (Square D 9999SC2).....	164.58		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0279	EA	NEMA 12 Enclosure Selector Switch Kit, Contactor/Starter Accessory (Square D 9999SC8).....	278.91		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0280	EA	NEMA 1 And 12 Enclosure Red Pilot Light Kit, Contactor/Starter Accessory (Square D 9999SP2R).....	278.91		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0281	EA	Internal Non-Convertible Contact Block Kit, 1 Contact, Contactor/Starter Accessory (Square D 9999SX11).....	138.82		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0282	EA	External Convertible Field Contact, 1 Contact, Contactor/Starter Accessory (Square D 9999SX6).....	123.81		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0283	EA	External Convertible Field Contacts, 2 Contacts Or 1 Overlapping Contact, Contactor/Starter Accessory (Square D 9999SX8).....	164.58		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0284	EA	External Field Non-Convertible Contact, 1 Contact, Contactor/Starter Accessory (Square D 9999SX13).....	138.82		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0285	EA	External Field Non-Convertible Contacts, 2 Contacts Or 1 Overlapping Contact, Contactor/Starter Accessory (Square D 9999SX15).....	185.37		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0286	EA	30 Amperes, 1 Contact Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SB6).....	206.96		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0287	EA	45 Amperes, 1 Contact Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SB11).....	355.93		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0288	EA	60 Amperes, 1 Contact Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SB21).....	377.88		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0289	EA	30 Amperes, 2 Contact Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SB8).....	452.14		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0290	EA	45 Amperes, 2 Contact Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SB13).....	788.20		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0291	EA	60 Amperes, 2 Contact Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SB23).....	788.20		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0292	EA	Adapter Bracket For Power Pole Adder Kit, Contactor/Starter Accessory (Square D 9999SBT1).....	48.52		9.19
		<i>For Factory Installed Accessory, Deduct</i>	-18.37		
26 29 13 13-0293	EA	1 Pole Control Circuit Fuse Holder, Contactor/Starter Accessory (Square D 9999SF3).....	98.40		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0294	EA	2 Pole Control Circuit Fuse Holder, Contactor/Starter Accessory (Square D 9999SF4).....	129.94		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0295	EA	Transient Suppression Module, Contactor/Starter Accessory (Square D 9999ST1).....	102.22		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0296	EA	Terminal Block, Contactor/Starter Accessory (Square D 9999T7).....	56.84		9.19
		<i>For Factory Installed Accessory, Deduct</i>	-18.37		
26 29 13 13-0297	EA	Closing Plate For NEMA 1 Enclosures, Contactor/Starter Accessory (Square D 9999SG1).....	34.89		9.19
		<i>For Factory Installed Accessory, Deduct</i>	-18.37		
26 29 13 13-0298	EA	1 Pole Disconnect Switch And Breaker Interlock, Contactor/Starter Accessory (Square D 9999R39).....	180.40		12.25
		<i>For Factory Installed Accessory, Deduct</i>	-24.49		
26 29 13 13-0299	EA	2 Pole Disconnect Switch And Breaker Interlock, Contactor/Starter Accessory (Square D 9999R40).....	311.25		15.31
		<i>For Factory Installed Accessory, Deduct</i>	-30.62		
26 29 13 13-0300		Definite Purpose Starters (26 29 13 13)			
26 29 13 13-0301		Open Enclosure, Definite Purpose Starter (26 29 13 13-0300)			
26 29 13 13-0302	EA	Open Enclosure, 3 Phase, 3 Pole, 3 HP At 230 Volt, 5 HP At 460/575 Volt, 20 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO13).....	594.73		146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95		
26 29 13 13-0303	EA	Open Enclosure, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 25 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO22).....	593.71		146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95		
26 29 13 13-0304	EA	Open Enclosure, 3 Phase, 3 Pole, 7.5 HP At 230 Volt, 10 HP At 460/575 Volt, 25 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO23).....	642.51		159.22
		<i>For Factory Installed Accessory, Deduct</i>	-318.44		
26 29 13 13-0305	EA	Open Enclosure, 1 Phase, 2 Pole, 2 HP At 115 Volt, 5 HP At 230 Volt, 30 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO32).....	631.19		146.97
		<i>For Factory Installed Accessory, Deduct</i>	-293.95		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0306 EA Open Enclosure, 3 Phase, 3 Pole, 10 HP At 230 Volt, 15 HP At 460/575 Volt, 30 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO33)	686.06	159.22
<i>For Factory Installed Accessory, Deduct</i>	<i>-318.44</i>	
26 29 13 13-0307 EA Open Enclosure, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 40 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO42)	663.59	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0308 EA Open Enclosure, 3 Phase, 3 Pole, 10 HP At 230 Volt, 20 HP At 460/575 Volt, 40 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO43)	771.50	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0309 EA Open Enclosure, 1 Phase, 2 Pole, 3 HP At 115 Volt, 10 HP At 230 Volt, 50 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO52)	855.56	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0310 EA Open Enclosure, 3 Phase, 3 Pole, 15 HP At 230 Volt, 30 HP At 460/575 Volt, 50 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSO53)	1,074.78	214.34
<i>For Factory Installed Accessory, Deduct</i>	<i>-428.67</i>	
26 29 13 13-0311 NEMA 1, Definite Purpose Starter <small>(26 29 13 13-0300)</small>		
26 29 13 13-0312 EA NEMA 1, 1 Phase, 2 Pole, 1 HP At 115 Volt, 2 HP At 230 Volt, 20 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG12)	605.67	134.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-269.45</i>	
26 29 13 13-0313 EA NEMA 1, 3 Phase, 3 Pole, 3 HP At 230 Volt, 5 HP At 460/575 Volt, 20 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG13)	654.48	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0314 EA NEMA 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 3 HP At 230 Volt, 25 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG22)	652.45	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0315 EA NEMA 1, 3 Phase, 3 Pole, 7.5 HP At 230 Volt, 10 HP At 460/575 Volt, 25 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG23)	704.29	159.22
<i>For Factory Installed Accessory, Deduct</i>	<i>-318.44</i>	
26 29 13 13-0316 EA NEMA 1, 1 Phase, 2 Pole, 2 HP At 115 Volt, 5 HP At 230 Volt, 30 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG32)	690.94	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0317 EA NEMA 1, 3 Phase, 3 Pole, 10 HP At 230 Volt, 15 HP At 460/575 Volt, 30 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG33)	746.82	159.22
<i>For Factory Installed Accessory, Deduct</i>	<i>-318.44</i>	
26 29 13 13-0318 EA NEMA 1, 1 Phase, 2 Pole, 3 HP At 115 Volt, 7-1/2 HP At 230 Volt, 40 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG42)	725.37	146.97
<i>For Factory Installed Accessory, Deduct</i>	<i>-293.95</i>	
26 29 13 13-0319 EA NEMA 1, 3 Phase, 3 Pole, 10 HP At 230 Volt, 20 HP At 460/575 Volt, 40 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG43)	832.27	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0320 EA NEMA 1, 1 Phase, 2 Pole, 3 HP At 115 Volt, 10 HP At 230 Volt, 50 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG52)	913.29	183.72
<i>For Factory Installed Accessory, Deduct</i>	<i>-367.43</i>	
26 29 13 13-0321 EA NEMA 1, 3 Phase, 3 Pole, 15 HP At 230 Volt, 30 HP At 460/575 Volt, 50 Amperes, Definite Purpose Starter With Thermal Overload Protection (Square D 8911DPSG53)	1,133.52	214.34
<i>For Factory Installed Accessory, Deduct</i>	<i>-428.67</i>	
26 29 13 13-0322 Definite Purpose Starter Accessory <small>(26 29 13 13-0300)</small>		
26 29 13 13-0323 EA Start-Stop Push Button Kit, Definite Purpose Starter Accessory	185.37	15.31
Note: Or Hand-Off-Auto Selector Switch Kit		
<i>For Factory Installed Accessory, Deduct</i>	<i>-30.62</i>	
26 29 13 13-0324 Panel Mounted Miniature Contactor <small>(26 29 13 13)</small>		
26 29 13 13-0325 Non-Reversing, Panel Mounted Miniature Contactor <small>(26 29 13 13-0324)</small>		
26 29 13 13-0326 EA 3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, AC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LC1K)	180.20	61.24
26 29 13 13-0327 EA 3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 9 Amperes, 20 Amperes, AC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LC1K)	210.67	67.37
26 29 13 13-0328 EA 3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, AC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LC1K)	210.67	67.37
26 29 13 13-0329 EA 3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, AC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LC1K)	234.06	73.49
26 29 13 13-0330 EA 3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, DC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K)	198.43	61.24
26 29 13 13-0331 EA 3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, DC Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K)	208.56	61.24
26 29 13 13-0332 EA 3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K)	227.89	67.37
26 29 13 13-0333 EA 3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K)	238.02	67.37

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 29 Low-Voltage Controllers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0334	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K).....	233.97	67.37
26 29 13 13-0335	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K).....	238.02	67.37
26 29 13 13-0336	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Coil, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K).....	254.32	73.49
26 29 13 13-0337	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K).....	244.09	67.37
26 29 13 13-0338	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP1K).....	264.45	73.49
26 29 13 13-0339	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP4K).....	246.12	67.37
26 29 13 13-0340	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP4K).....	246.12	67.37
26 29 13 13-0341	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP4K).....	274.57	73.49
26 29 13 13-0342	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Non-Reversing, Panel Mounted Miniature Contactor (Square D LP4K).....	274.57	73.49
26 29 13 13-0343			Reversing, Panel Mounted Miniature Contactor <small>(26 29 13 13-0324)</small>		
26 29 13 13-0344	EA		3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, AC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	254.13	61.24
26 29 13 13-0345	EA		3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, AC Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	274.39	61.24
26 29 13 13-0346	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, AC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	303.84	67.37
26 29 13 13-0347	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 9 Amperes, 20 Amperes, AC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	303.84	67.37
26 29 13 13-0348	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, AC Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	324.10	67.37
26 29 13 13-0349	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, AC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	340.40	73.49
26 29 13 13-0350	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 4 Pole, Without Auxiliary Contacts, 12 Amperes, 20 Amperes, AC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LC2K).....	340.40	73.49
26 29 13 13-0351	EA		3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, DC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LP2K).....	291.60	61.24
26 29 13 13-0352	EA		3 Phase (1-1/2 HP At 200/230 Volt, 3 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 6 Amperes, 15 Amperes, DC Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LP2K).....	311.86	61.24
26 29 13 13-0353	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LP2K).....	339.29	67.37
26 29 13 13-0354	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LP2K).....	359.54	67.37
26 29 13 13-0355	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Coil, Reversing, Panel Mounted Miniature Contactor (Square D LP2K).....	381.92	73.49
26 29 13 13-0356	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LP2K).....	402.18	73.49
26 29 13 13-0357	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LP5K).....	328.15	67.37
26 29 13 13-0358	EA		3 Phase (2 HP At 200 Volt, 3 HP At 230 Volt, 5 HP At 460/575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 9 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LP5K).....	375.75	67.37
26 29 13 13-0359	EA		3 Phase (3 HP At 200/230 Volt, 7-1/2 HP At 460 Volt, 10 HP At 575 Volt), 1 Phase (1/2 HP At 115 Volt, 1-1/2 HP At 230 Volt), 3 Pole, Auxiliary Contacts, 12 Amperes, 20 Amperes, DC Low Consumption Coil With Integral Suppression, Reversing, Panel Mounted Miniature Contactor (Square D LP5K).....	424.45	73.49
26 29 13 13-0360			Panel Mounted Miniature Contactor Accessories <small>(26 29 13 13-0324)</small>		
26 29 13 13-0361	EA		2 Auxiliary Contacts, 10 Amperes, Panel Mounted Miniature Contactor Accessory (Square D LA1KN02).....	77.14	30.62
26 29 13 13-0362	EA		4 Auxiliary Contacts, 10 Amperes, Panel Mounted Miniature Contactor Accessory (Square D LA1KN40).....	84.96	30.62
26 29 13 13-0363	EA		Electronic Time Delay Contact, 2 Amperes, Panel Mounted Miniature Contactor Accessory (Square D LA2KT2U).....	99.12	30.62
26 29 13 13-0364	EA		Overload Relay, Panel Mounted Miniature Contactor Accessory (Square D LR2K0301).....	127.28	30.62

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0365 Reduced Voltage Auto Transformer Type 240-600 Volt, 3 Pole <small>(26 29 13 13)</small>		
26 29 13 13-0366 NEMA 1 Enclosure <small>(26 29 13 13-0365)</small>		
26 29 13 13-0367 EA Reduced Voltage Auto Transformer Starter, Size 3, 50 HP, NEMA 1, 240 - 600 Volt, 3 Pole, Non-Reversing	7,282.44	586.94
For NEMA 4, Add	760.45	
26 29 13 13-0368 EA Reduced Voltage Auto Transformer Starter, Size 4, 100 HP, NEMA 1, 240 - 600 Volt, 3 Pole, Non-Reversing	12,679.84	782.58
For NEMA 4, Add	1,389.02	
26 29 13 13-0369 EA Reduced Voltage Auto Transformer Starter, Size 5, 200 HP, NEMA 1, 240 - 600 Volt, 3 Pole, Non-Reversing	22,134.11	929.33
For NEMA 4, Add	2,535.17	
26 29 13 13-0370 EA Reduced Voltage Auto Transformer Starter, Size 6, 300 HP, NEMA 1, 240 - 600 Volt, 3 Pole, Non-Reversing	53,817.50	1,137.20
For NEMA 4, Add	6,444.13	
26 29 13 13-0371 EA Reduced Voltage Auto Transformer Starter, Size 7, 600 HP, NEMA 1, 240 - 600 Volt, 3 Pole, Non-Reversing	85,812.68	1,455.12
For NEMA 4, Add	10,362.66	
26 29 13 13-0372 NEMA 12 Enclosure <small>(26 29 13 13-0365)</small>		
26 29 13 13-0373 EA Reduced Voltage Auto Transformer Starter, Size 3, 50 HP, NEMA 12, 240 - 600 Volt, 3 Pole, Non-Reversing	7,231.77	599.41
26 29 13 13-0374 EA Reduced Voltage Auto Transformer Starter, Size 4, 100 HP, NEMA 12, 240 - 600 Volt, 3 Pole, Non-Reversing	12,587.29	783.81
26 29 13 13-0375 EA Reduced Voltage Auto Transformer Starter, Size 5, 200 HP, NEMA 12, 240 - 600 Volt, 3 Pole, Non-Reversing	21,965.18	926.39
26 29 13 13-0376 EA Reduced Voltage Auto Transformer Starter, Size 6, 300 HP, NEMA 12, 240 - 600 Volt, 3 Pole, Non-Reversing	53,388.10	1,132.18
26 29 13 13-0377 EA Reduced Voltage Auto Transformer Starter, Size 7, 600 HP, NEMA 12, 240 - 600 Volt, 3 Pole, Non-Reversing	85,122.17	1,455.73
26 29 13 13-0378 Factory Modifications Pilot Devices <small>(26 29 13 13-0365)</small>		
26 29 13 13-0379 EA Start-Stop Push-button, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device.....	179.16	
26 29 13 13-0380 EA H-O-A Select Switch, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device.....	197.60	
26 29 13 13-0381 EA Forward-Reverse-Stop, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device.....	336.35	
26 29 13 13-0382 EA Pilot Light, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device.....	182.75	
26 29 13 13-0383 EA Fused Control Circuit, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device.....	262.77	
26 29 13 13-0384 EA Auxiliary Interlock, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device	131.39	
26 29 13 13-0385 EA Auxiliary Relay, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Pilot Device	428.84	
26 29 13 13-0386 Factory Modifications Meters <small>(26 29 13 13-0365)</small>		
26 29 13 13-0387 EA Ammeter And Switch, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Meter	1,723.80	
26 29 13 13-0388 EA Voltmeter, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Meter	1,664.95	
26 29 13 13-0389 EA Wattmeter, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Meter	588.61	
26 29 13 13-0390 EA Elapsed-time Meter, Factory Modification Reduced Voltage Auto Transformer Starter, 240 - 600 Volt, 3 Phase, Meter	487.73	
26 29 13 13-0391 Factory Modifications Main Circuit Breakers <small>(26 29 13 13-0365)</small>		
26 29 13 13-0392 EA Reduced Voltage Auto Transformer Starter, Size 3, Circuit Breaker, Factory Modification Main Circuit Breaker.....	2,278.25	
26 29 13 13-0393 EA Reduced Voltage Auto Transformer Starter, Size 4, Circuit Breaker, Factory Modification Main Circuit Breaker.....	4,166.64	
26 29 13 13-0394 EA Reduced Voltage Auto Transformer Starter, Size 5-7, Circuit Breaker, Factory Modification Main Circuit Breaker.....	8,862.86	
26 29 13 13-0395 Factory Modifications Addition <small>(26 29 13 13-0365)</small>		
Note: For reversing service auto transformer type.		
26 29 13 13-0396 EA Reduced Voltage Auto Transformer Starter, Size 3, Factory Modification For Reversing Type 240 - 600 Volt, 3 Phase	382.62	
26 29 13 13-0397 EA Reduced Voltage Auto Transformer Starter, Size 4, Factory Modification For Reversing Type 240 - 600 Volt, 3 Phase	382.62	
26 29 13 13-0398 EA Reduced Voltage Auto Transformer Starter, Size 5, Factory Modification For Reversing Type 240 - 600 Volt, 3 Phase	382.62	
26 29 13 13-0399 EA Reduced Voltage Auto Transformer Starter, Size 6, 7, Factory Modification For Reversing Type 240 - 600 Volt, 3 Phase	382.62	
26 29 13 13-0400 Combination Starters Non-Reversing <small>(26 29 13 13)</small>		
26 29 13 13-0401 240-600 Volt, 3-Pole <small>(26 29 13 13-0400)</small>		
26 29 13 13-0402 NEMA 1 With Disconnect Switch <small>(26 29 13 13-0401)</small>		
26 29 13 13-0403 EA Combination Starter, Size 0, NEMA 1 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	1,456.62	281.25
For Electronic Overloads, Add	169.20	
26 29 13 13-0404 EA Combination Starter, Size 1, NEMA 1 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	1,825.52	440.20
For Electronic Overloads, Add	178.49	
26 29 13 13-0405 EA Combination Starter, Size 2, NEMA 1 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	2,506.44	513.58
For Electronic Overloads, Add	282.62	
26 29 13 13-0406 EA Combination Starter, Size 3, NEMA 1 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	3,749.56	635.85
For Electronic Overloads, Add	470.41	

26 Electrical**26 20 Low-Voltage Electrical Distribution****26 29 Low-Voltage Controllers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0407	EA		Combination Starter, Size 4, NEMA 1 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	6,813.48	1,014.91
			<i>For Electronic Overloads, Add</i>	907.34	
26 29 13 13-0408	EA		Combination Starter, Size 5, NEMA 1 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	13,269.49	1,271.71
			<i>For Electronic Overloads, Add</i>	2,037.18	
26 29 13 13-0409			NEMA 1 With Circuit Breaker <small>(26 29 13 13-0401)</small>		
26 29 13 13-0410	EA		Combination Starter, Size 0, NEMA 1 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	1,808.91	281.25
			<i>For Electronic Overloads, Add</i>	236.13	
26 29 13 13-0411	EA		Combination Starter, Size 1, NEMA 1 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	2,177.81	440.20
			<i>For Electronic Overloads, Add</i>	245.43	
26 29 13 13-0412	EA		Combination Starter, Size 2, NEMA 1 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	2,848.94	513.58
			<i>For Electronic Overloads, Add</i>	347.69	
26 29 13 13-0413	EA		Combination Starter, Size 3, NEMA 1 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	3,935.49	635.85
			<i>For Electronic Overloads, Add</i>	505.73	
26 29 13 13-0414	EA		Combination Starter, Size 4, NEMA 1 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	7,880.13	1,014.91
			<i>For Electronic Overloads, Add</i>	1,110.01	
26 29 13 13-0415	EA		Combination Starter, Size 5, NEMA 1 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	16,097.60	1,271.71
			<i>For Electronic Overloads, Add</i>	2,574.52	
26 29 13 13-0416			Factory Modifications For NEMA 1 Enclosure <small>(26 29 13 13-0401)</small>		
26 29 13 13-0417	EA		Start-Stop Push-button, Factory Modifications - NEMA 1 Combination Motor Starter, 240 - 600 Volt	160.43	
26 29 13 13-0418	EA		H-O-A Select Switch, Factory Modifications - NEMA 1 Combination Motor Starter, 240 - 600 Volt	376.81	
26 29 13 13-0419	EA		Pilot Light, Factory Modifications - NEMA 1 Combination Motor Starter, 240 - 600 Volt	260.06	
26 29 13 13-0420			NEMA 4 With Disconnect Switch <small>(26 29 13 13-0401)</small>		
26 29 13 13-0421	EA		Combination Starter, Size 0, NEMA 4 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	2,584.76	366.83
			<i>For Electronic Overloads, Add</i>	347.69	
26 29 13 13-0422	EA		Combination Starter, Size 1, NEMA 4 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	2,897.87	513.58
			<i>For Electronic Overloads, Add</i>	356.99	
26 29 13 13-0423	EA		Combination Starter, Size 2, NEMA 4 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	4,067.96	562.48
			<i>For Electronic Overloads, Add</i>	557.79	
26 29 13 13-0424	EA		Combination Starter, Size 3, NEMA 4 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	6,359.22	684.76
			<i>For Electronic Overloads, Add</i>	950.11	
26 29 13 13-0425	EA		Combination Starter, Size 4, NEMA 4 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	10,042.80	1,014.91
			<i>For Electronic Overloads, Add</i>	1,520.91	
26 29 13 13-0426	EA		Combination Starter, Size 5, NEMA 4 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	21,509.16	1,271.71
			<i>For Electronic Overloads, Add</i>	3,602.72	
26 29 13 13-0427			NEMA 4 With Circuit Breaker <small>(26 29 13 13-0401)</small>		
26 29 13 13-0428	EA		Combination Starter, Size 0, NEMA 4 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	2,937.05	366.83
			<i>For Electronic Overloads, Add</i>	414.63	
26 29 13 13-0429	EA		Combination Starter, Size 1, NEMA 4 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	3,250.16	513.58
			<i>For Electronic Overloads, Add</i>	423.92	
26 29 13 13-0430	EA		Combination Starter, Size 2, NEMA 4 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	4,410.46	562.48
			<i>For Electronic Overloads, Add</i>	622.87	
26 29 13 13-0431	EA		Combination Starter, Size 3, NEMA 4 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	6,545.15	684.76
			<i>For Electronic Overloads, Add</i>	985.43	
26 29 13 13-0432	EA		Combination Starter, Size 4, NEMA 4 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	11,109.46	1,014.91
			<i>For Electronic Overloads, Add</i>	1,723.58	
26 29 13 13-0433	EA		Combination Starter, Size 5, NEMA 4 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	20,403.36	1,271.71
			<i>For Electronic Overloads, Add</i>	3,392.62	
26 29 13 13-0434			Factory Modifications For NEMA 4 Enclosure <small>(26 29 13 13-0401)</small>		
26 29 13 13-0435	EA		Start-Stop Push-button, Factory Modifications - NEMA 4 Combination Motor Starter, 240 - 600 Volt	160.45	
26 29 13 13-0436	EA		H-O-A Select Switch, Factory Modifications - NEMA 4 Combination Motor Starter, 240 - 600 Volt	376.81	
26 29 13 13-0437	EA		Pilot Light, Factory Modifications - NEMA 4 Combination Motor Starter, 240 - 600 Volt	260.06	
26 29 13 13-0438			NEMA 12 With Disconnect Switch <small>(26 29 13 13-0401)</small>		
26 29 13 13-0439	EA		Combination Starter, Size 0, NEMA 12 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	1,501.14	283.08
			<i>For Electronic Overloads, Add</i>	177.66	
26 29 13 13-0440	EA		Combination Starter, Size 1, NEMA 12 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	1,872.49	443.02
			<i>For Electronic Overloads, Add</i>	187.42	
26 29 13 13-0441	EA		Combination Starter, Size 2, NEMA 12 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	2,580.81	509.54
			<i>For Electronic Overloads, Add</i>	296.75	
26 29 13 13-0442	EA		Combination Starter, Size 3, NEMA 12 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	3,873.34	636.84
			<i>For Electronic Overloads, Add</i>	493.92	
26 29 13 13-0443	EA		Combination Starter, Size 4, NEMA 12 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	7,052.25	1,019.07
			<i>For Electronic Overloads, Add</i>	952.71	
26 29 13 13-0444	EA		Combination Starter, Size 5, NEMA 12 With Disconnect Switch Non-Reversing, 240 - 600 Volt, 3 Phase	13,805.58	1,273.66
			<i>For Electronic Overloads, Add</i>	2,139.04	
26 29 13 13-0445			NEMA 12 With Circuit Breaker <small>(26 29 13 13-0401)</small>		
26 29 13 13-0446	EA		Combination Starter, Size 0, NEMA 12 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase	1,921.80	283.08
			<i>For Electronic Overloads, Add</i>	257.58	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 13 13-0447 EA Combination Starter, Size 1, NEMA 12 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	2,295.15	443.02
<i>For Electronic Overloads, Add</i>	<i>267.72</i>	
26 29 13 13-0448 EA Combination Starter, Size 2, NEMA 12 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	3,015.17	509.54
<i>For Electronic Overloads, Add</i>	<i>379.27</i>	
26 29 13 13-0449 EA Combination Starter, Size 3, NEMA 12 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	4,177.27	636.84
<i>For Electronic Overloads, Add</i>	<i>551.67</i>	
26 29 13 13-0450 EA Combination Starter, Size 4, NEMA 12 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	8,410.82	1,019.07
<i>For Electronic Overloads, Add</i>	<i>1,210.84</i>	
26 29 13 13-0451 EA Combination Starter, Size 5, NEMA 12 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	17,328.46	1,273.66
<i>For Electronic Overloads, Add</i>	<i>2,808.39</i>	
26 29 13 13-0452 Factory Modifications For NEMA 12 Enclosure <small>(26 29 13 13-0401)</small>		
26 29 13 13-0453 EA Start-Stop Push-button, Factory Modifications - NEMA 12 Combination Motor Starter, 240 - 600 Volt.....	159.12	
26 29 13 13-0454 EA H-O-A Select Switch, Factory Modifications - NEMA 12 Combination Motor Starter, 240 - 600 Volt.....	373.68	
26 29 13 13-0455 EA Pilot Light, Factory Modifications - NEMA 12 Combination Motor Starter, 240 - 600 Volt.....	257.90	
26 29 13 13-0456 NEMA 7 Or 9 With Circuit Breaker <small>(26 29 13 13-0401)</small>		
26 29 13 13-0457 EA Combination Starter, Size 0, NEMA 7 Or 9 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	3,312.35	586.94
26 29 13 13-0458 EA Combination Starter, Size 1, NEMA 7 Or 9 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	4,482.56	782.58
26 29 13 13-0459 EA Combination Starter, Size 2, NEMA 7 Or 9 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	4,963.51	1,076.06
26 29 13 13-0460 EA Combination Starter, Size 3, NEMA 7 Or 9 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	7,322.66	1,467.36
26 29 13 13-0461 EA Combination Starter, Size 4, NEMA 7 Or 9 With Circuit Breaker, Non-Reversing, 240 - 600 Volt, 3 Phase.....	10,971.66	2,054.29
26 29 13 13-0462 Factory Modifications For NEMA 7 Or 9 Enclosure <small>(26 29 13 13-0401)</small>		
26 29 13 13-0463 EA Start-Stop Push-button, Factory Modifications - NEMA 7 Or 9 Combination Motor Starter, 240 - 600 Volt.....	954.10	
26 29 13 13-0464 EA H-O-A Select Switch, Factory Modifications - NEMA 7 Or 9 Combination Motor Starter, 240 - 600 Volt.....	954.10	
26 29 13 13-0465 EA Pilot Light, Factory Modifications - NEMA 7 Or 9 Combination Motor Starter, 240 - 600 Volt.....	954.10	
26 29 13 13-0466 Combination Starters Reversing <small>(26 29 13 13)</small>		
26 29 13 13-0467 240-600 Volt, 3 Pole <small>(26 29 13 13-0466)</small>		
26 29 13 13-0468 NEMA 1 With Disconnect Switch <small>(26 29 13 13-0467)</small>		
26 29 13 13-0469 EA Combination Starter, Size 0, NEMA 1 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	1,816.01	366.83
26 29 13 13-0470 EA Combination Starter, Size 1, NEMA 1 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	2,151.26	513.58
26 29 13 13-0471 EA Combination Starter, Size 2, NEMA 1 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	3,024.85	562.48
26 29 13 13-0472 EA Combination Starter, Size 3, NEMA 1 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	4,494.89	684.76
26 29 13 13-0473 EA Combination Starter, Size 4, NEMA 1 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	8,606.55	1,014.91
26 29 13 13-0474 NEMA 1 With Circuit Breaker <small>(26 29 13 13-0467)</small>		
26 29 13 13-0475 EA Combination Starter, Size 0, NEMA 1 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	2,001.89	366.83
26 29 13 13-0476 EA Combination Starter, Size 1, NEMA 1 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	2,349.67	513.58
26 29 13 13-0477 EA Combination Starter, Size 2, NEMA 1 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	3,257.12	562.48
26 29 13 13-0478 EA Combination Starter, Size 3, NEMA 1 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	4,175.11	684.76
26 29 13 13-0479 EA Combination Starter, Size 4, NEMA 1 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	9,234.83	1,014.91
26 29 13 13-0480 NEMA 12 With Disconnect Switch <small>(26 29 13 13-0467)</small>		
26 29 13 13-0481 EA Combination Starter, Size 0, NEMA 12 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	1,924.10	377.48
26 29 13 13-0482 EA Combination Starter, Size 1, NEMA 12 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	2,266.58	509.54
26 29 13 13-0483 EA Combination Starter, Size 2, NEMA 12 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	3,217.62	566.15
26 29 13 13-0484 EA Combination Starter, Size 3, NEMA 12 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	4,814.34	679.38
26 29 13 13-0485 EA Combination Starter, Size 4, NEMA 12 With Disconnect Switch, Reversing, 240 - 600 Volt, 3 Phase.....	9,275.60	1,019.07
26 29 13 13-0486 NEMA 12 With Circuit Breaker <small>(26 29 13 13-0467)</small>		
26 29 13 13-0487 EA Combination Starter, Size 0, NEMA 12 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	2,128.91	377.48
26 29 13 13-0488 EA Combination Starter, Size 1, NEMA 12 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	2,485.21	509.54
26 29 13 13-0489 EA Combination Starter, Size 2, NEMA 12 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	3,473.56	566.15
26 29 13 13-0490 EA Combination Starter, Size 3, NEMA 12 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	4,461.98	679.38
26 29 13 13-0491 EA Combination Starter, Size 4, NEMA 12 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	9,967.87	1,019.07
26 29 13 13-0492 NEMA 7 Or 9 With Circuit Breaker <small>(26 29 13 13-0467)</small>		
26 29 13 13-0493 EA Combination Starter, Size 0, NEMA 7 Or 9 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	4,044.16	782.58
26 29 13 13-0494 EA Combination Starter, Size 1, NEMA 7 Or 9 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	4,397.90	978.23
26 29 13 13-0495 EA Combination Starter, Size 2, NEMA 7 Or 9 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	6,271.81	1,271.71
26 29 13 13-0496 EA Combination Starter, Size 3, NEMA 7 Or 9 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	9,840.52	1,662.99
26 29 13 13-0497 EA Combination Starter, Size 4, NEMA 7 Or 9 With Circuit Breaker, Reversing, 240 - 600 Volt, 3 Phase.....	17,662.28	2,249.94
26 29 13 13-0498 Solid State Motor Controllers <small>(26 29 13 13)</small>		
26 29 13 13-0499 Adjustable Voltage Drives, DC Motors <small>(26 29 13 13-0498)</small>		
26 29 13 13-0500 EA 0.5-1.5 HP DC Solid State Motor Controller, Reversing With Dynamic Braking.....	1,408.75	220.10

26 Electrical
26 20 Low-Voltage Electrical Distribution
26 29 Low-Voltage Controllers



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 29 13 13-0501	EA	0.5-2.0 HP DC Solid State Motor Controller, Non-Reversing With Dynamic Braking.....	1,668.85		220.10
26 29 13 13-0502		Removal And Reinstallation Of Motor Starters (26 29 13 13)			
		Note: Includes storage and cleaning.			
26 29 13 13-0503	EA	Removal And Reinstallation Of Up To 25 HP Motor Starter With Disconnect.....	873.42		
26 29 13 13-0504		Auxiliary Devices (26 29 13 13)			
26 29 13 13-0505	EA	Normally Open, Auxiliary Contact.....	447.07		122.28
26 29 13 13-0506	EA	Normally Closed, Auxiliary Contact.....	447.07		122.28
26 29 13 13-0507	EA	Pilot Light Kit.....	467.50		122.28
26 29 23		Variable-Frequency Motor Controllers (26 29)			
26 29 23 00-0001		208/230 Volt, Ultra Low Harmonic (ULH) Variable Frequency Drives (26 29 23)			
		Note: 1 or 3 phase. Wall mounted. ABB ACH580 Series. Includes full voltage bypass with main input circuit breaker. NEMA 1 enclosure.			
26 29 23 00-0002	EA	3/4 HP, 208/230 Volt Variable Frequency Drive	2,283.99		433.76
		For 6-Pulse Drive Package, Deduct	-778.99		
26 29 23 00-0003	EA	1 HP, 208/230 Volt Variable Frequency Drive	2,574.34		474.08
		For 6-Pulse Drive Package, Deduct	-896.81		
26 29 23 00-0004	EA	1-1/2 HP, 208/230 Volt Variable Frequency Drive	2,995.73		521.28
		For 6-Pulse Drive Package, Deduct	-1,074.24		
26 29 23 00-0005	EA	2 HP, 208/230 Volt Variable Frequency Drive	3,165.73		501.07
		For 6-Pulse Drive Package, Deduct	-1,189.97		
26 29 23 00-0006	EA	3 HP, 208/230 Volt Variable Frequency Drive	3,392.28		546.31
		For 6-Pulse Drive Package, Deduct	-1,264.82		
26 29 23 00-0007	EA	5 HP, 208/230 Volt Variable Frequency Drive	3,675.80		546.31
		For 6-Pulse Drive Package, Deduct	-1,420.76		
26 29 23 00-0008	EA	7.5 HP, 208/230 Volt Variable Frequency Drive	4,391.81		652.29
		For 6-Pulse Drive Package, Deduct	-1,697.98		
26 29 23 00-0009	EA	10 HP, 208/230 Volt Variable Frequency Drive	4,801.35		652.29
		For 6-Pulse Drive Package, Deduct	-1,923.23		
26 29 23 00-0010	EA	15 HP, 208/230 Volt Variable Frequency Drive	6,311.63		982.14
		For 6-Pulse Drive Package, Deduct	-2,391.04		
26 29 23 00-0011	EA	20 HP, 208/230 Volt Variable Frequency Drive	7,445.73		982.14
		For 6-Pulse Drive Package, Deduct	-3,014.79		
26 29 23 00-0012	EA	25 HP, 208/230 Volt Variable Frequency Drive	9,067.27		1,304.68
		For 6-Pulse Drive Package, Deduct	-3,551.91		
26 29 23 00-0013	EA	30 HP, 208/230 Volt Variable Frequency Drive	10,484.88		1,304.68
		For 6-Pulse Drive Package, Deduct	-4,331.59		
26 29 23 00-0014	EA	40 HP, 208/230 Volt Variable Frequency Drive	11,713.48		1,304.68
		For 6-Pulse Drive Package, Deduct	-5,007.32		
26 29 23 00-0015	EA	50 HP, 208/230 Volt Variable Frequency Drive	15,458.42		1,649.29
		For 6-Pulse Drive Package, Deduct	-6,687.98		
26 29 23 00-0016	EA	60 HP, 208/230 Volt Variable Frequency Drive	18,645.31		1,951.07
		For 6-Pulse Drive Package, Deduct	-8,108.74		
26 29 23 00-0017	EA	75 HP, 208/230 Volt Variable Frequency Drive	21,165.51		1,951.07
		For 6-Pulse Drive Package, Deduct	-9,494.85		
26 29 23 00-0018		460/480 Volt, Ultra Low Harmonic (ULH) Variable Frequency Drives (26 29 23)			
		Note: 3 Phase. ABB ACH580 Series. Includes full voltage bypass with main circuit breaker. NEMA 1 enclosure.			
26 29 23 00-0019	EA	3 HP, 480 Volt Variable Frequency Drive	5,467.21		780.45
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-2,148.47		
26 29 23 00-0020	EA	5 HP, 480 Volt Variable Frequency Drive	5,656.22		780.45
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-2,252.43		
26 29 23 00-0021	EA	7.5 HP, 480 Volt Variable Frequency Drive	6,175.56		929.92
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-2,373.71		
26 29 23 00-0022	EA	10 HP, 480 Volt Variable Frequency Drive	6,207.06		929.92
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-2,391.04		
26 29 23 00-0023	EA	15 HP, 480 Volt Variable Frequency Drive	8,301.02		1,409.79
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-3,014.79		
26 29 23 00-0024	EA	20 HP, 480 Volt Variable Frequency Drive	8,742.05		1,409.79
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-3,257.36		
26 29 23 00-0025	EA	25 HP, 480 Volt Variable Frequency Drive	10,492.61		1,859.83
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-3,725.17		
26 29 23 00-0026	EA	30 HP, 480 Volt Variable Frequency Drive	12,067.73		1,859.83
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-4,591.49		
26 29 23 00-0027	EA	40 HP, 480 Volt Variable Frequency Drive	13,705.86		1,859.83
		Note: Wall mounted.			
		For 6-Pulse Drive Package, Deduct	-5,492.46		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 29 23 00-0028 EA 50 HP, 480 Volt Variable Frequency Drive Note: Wall mounted. <i>For 6-Pulse Drive Package, Deduct</i>	17,955.81 -7,277.08	2,362.44
26 29 23 00-0029 EA 60 HP, 480 Volt Variable Frequency Drive Note: Wall mounted. <i>For 6-Pulse Drive Package, Deduct</i>	24,000.57 -10,118.60	2,801.56
26 29 23 00-0030 EA 75 HP, 480 Volt Variable Frequency Drive Note: Wall mounted. <i>For 6-Pulse Drive Package, Deduct</i>	25,512.69 -10,950.27	2,801.56
26 29 23 00-0031 EA 100 HP, 480 Volt Variable Frequency Drive Note: Wall mounted. <i>For 6-Pulse Drive Package, Deduct</i>	29,555.34 -12,821.52	3,121.80
26 29 23 00-0032 EA 125 HP, 480 Volt Variable Frequency Drive Note: Wall mounted. <i>For 6-Pulse Drive Package, Deduct</i>	31,193.47 -13,722.49	3,121.80
26 29 23 00-0033 EA 150 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	34,595.74 -15,593.74	3,121.80
26 29 23 00-0034 EA 200 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	39,919.85 -17,811.51	3,767.64
26 29 23 00-0035 EA 250 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	50,064.77 -23,206.25	3,935.79
26 29 23 00-0036 EA 300 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	58,730.71 -27,334.09	4,516.18
26 29 23 00-0037 EA 350 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	67,608.13 -31,796.67	4,897.94
26 29 23 00-0038 EA 400 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	78,412.38 -37,309.23	5,288.77
26 29 23 00-0039 EA 450 HP, 480 Volt Variable Frequency Drive Note: Floor mounted. <i>For 6-Pulse Drive Package, Deduct</i>	84,504.33 -40,168.78	5,735.10

26 29 33 Controllers for Fire Pump Drivers (26 29)

26 29 33 13 Full-Service Controllers for Fire Pump Electric-Motor Drivers (26 29 33)

26 29 33 13-0001 Electric Controllers For Fire Pumps (26 29 33 13)

26 29 33 13-0002 Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller (26 29 33 13-0001)

26 29 33 13-0003 EA 30 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	34,102.97	250.82
26 29 33 13-0004 EA 40 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	38,613.37	278.68
26 29 33 13-0005 EA 50 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	40,475.28	306.56
26 29 33 13-0006 EA 75 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	46,161.27	334.42
26 29 33 13-0007 EA 150 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	48,750.06	390.17
26 29 33 13-0008 EA 175 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	51,900.73	501.64
26 29 33 13-0009 EA 200 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	56,246.16	557.38
26 29 33 13-0010 EA 250 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	64,329.61	635.41
26 29 33 13-0011 EA 300 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	77,582.20	685.57
26 29 33 13-0012 EA 350 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	91,194.23	780.33
26 29 33 13-0013 EA 400 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	108,872.08	836.06
26 29 33 13-0014 EA 500 HP Wye-Delta (Star-Delta), Closed Transition Electric Fire Pump Controller With Automatic Transfer Switch	122,946.58	891.80

26 29 33 19 Controllers for Fire Pump Diesel Engine Drivers (26 29 33)

See CSI section 26 29 33 13-0000 for controllers for fire pump diesel engine drivers.

26 30 Facility Electrical Power Generating and Storing Equipment

26 31 Photovoltaic Collectors (26 30)

26 31 00 00-0001 Rigid Photovoltaic Modules (26 31)

26 31 00 00-0002 Sanyo Rigid Photovoltaic Modules (26 31 00 00-0001)

26 31 00 00-0003 EA 205 Watt Hybrid Monocrystalline With Thin Amorphous Layers Photovoltaic Module, 62.2" x 31.4", 16.3% Module Efficiency (Sanyo HIP-205NHKA6).....	2,192.16	116.16
<i>For >25 To 50, Deduct</i>	-158.60	
<i>For >50 To 100, Deduct</i>	-213.41	
<i>For >100, Deduct</i>	-317.21	
26 31 00 00-0004 EA 210 Watt Hybrid Monocrystalline With Thin Amorphous Layers Photovoltaic Module, 62.2" x 31.4", 16.7% Module Efficiency (Sanyo HIP-210NHKA6).....	2,298.39	116.16
<i>For >25 To 50, Deduct</i>	-166.57	
<i>For >50 To 100, Deduct</i>	-224.03	
<i>For >100, Deduct</i>	-333.14	
26 31 00 00-0005 EA 215 Watt Hybrid Monocrystalline With Thin Amorphous Layers Photovoltaic Module, 62.2" x 31.4", 17.1% Module Efficiency (Sanyo HIP-215HNKA6).....	2,150.48	116.16
<i>For >25 To 50, Deduct</i>	-155.48	
<i>For >50 To 100, Deduct</i>	-209.24	
<i>For >100, Deduct</i>	-310.96	

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 31 Photovoltaic Collectors**
 MINOR
 CSI UOM DESCRIPTION

 TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

26 31 00 00-0006 Sharp Rigid Photovoltaic Modules (26 31 00 00-0001)			
26 31 00 00-0007	EA	224 Watt Polycrystalline Photovoltaic Module, 64.6" x 39.1", 13.74% Module Efficiency (Sharp ND-224UC1).....	1,713.79
		<i>For >25 To 50, Deduct</i>	-122.73
		<i>For >50 To 100, Deduct</i>	-165.57
		<i>For >100, Deduct</i>	-245.45
26 31 00 00-0008	EA	230 Watt Monocrystalline Photovoltaic Module, 64.6" x 39.1", 14.1% Module Efficiency (Sharp NU-U230F3).....	1,950.92
		<i>For >25 To 50, Deduct</i>	-140.51
		<i>For >50 To 100, Deduct</i>	-189.28
		<i>For >100, Deduct</i>	-281.02
26 31 00 00-0009	EA	235 Watt Monocrystalline Photovoltaic Module, 64.6" x 39.1", 14.4% Module Efficiency (Sharp NU-U235F1).....	1,988.48
		<i>For >25 To 50, Deduct</i>	-143.33
		<i>For >50 To 100, Deduct</i>	-193.04
		<i>For >100, Deduct</i>	-286.66
26 31 00 00-0010	EA	240 Watt Monocrystalline Photovoltaic Module, 64.6" x 39.1", 14.7% Module Efficiency (Sharp NU-U240F1).....	1,871.09
		<i>For >25 To 50, Deduct</i>	-134.52
		<i>For >50 To 100, Deduct</i>	-181.30
		<i>For >100, Deduct</i>	-269.05
26 31 00 00-0011 BP Solar Rigid Photovoltaic Modules (26 31 00 00-0001)			
		Note: Approved for applications in NEC Class 1, Division 2, Groups C and D hazardous locations.	
26 31 00 00-0012	EA	50 Watt Polycrystalline Photovoltaic Module, 33" x 21.1" (BP SX350J).....	840.29
		<i>For >25 To 50, Deduct</i>	-57.21
		<i>For >50 To 100, Deduct</i>	-78.22
		<i>For >100, Deduct</i>	-114.43
26 31 00 00-0013	EA	75 Watt Polycrystalline Photovoltaic Module, 47.6" x 21.14" (BP SX375J).....	1,039.86
		<i>For >25 To 50, Deduct</i>	-72.18
		<i>For >50 To 100, Deduct</i>	-98.18
		<i>For >100, Deduct</i>	-144.36
26 31 00 00-0014	EA	80 Watt Polycrystalline Photovoltaic Module, 47.6" x 20.9" (BP SX380J).....	1,119.68
		<i>For >25 To 50, Deduct</i>	-78.17
		<i>For >50 To 100, Deduct</i>	-106.16
		<i>For >100, Deduct</i>	-156.34
26 31 00 00-0015 Solarflexion Solar Rigid Photovoltaic Modules (26 31 00 00-0001)			
26 31 00 00-0016	EA	450 Watt 144 ½ cells BoW Monocrystalline Solar Panel (SolarFlexion PS450M4H-24TH).....	659.62
		<i>For >25 To 50, Deduct</i>	-43.66
		<i>For >50 To 100, Deduct</i>	-60.15
		<i>For >100, Deduct</i>	-87.33
26 31 00 00-0017 Photovoltaic Inverters (26 31)			
26 31 00 00-0018 Fronius Photovoltaic Inverters (26 31 00 00-0017)			
26 31 00 00-0019	EA	3 KW Photovoltaic Inverter (Fronius IG Plus 3.0-1).....	5,236.20
26 31 00 00-0020	EA	5 KW Photovoltaic Inverter (Fronius IG Plus 5.0-1).....	6,910.06
26 31 00 00-0021	EA	6 KW Photovoltaic Inverter (Fronius IG Plus 6.0-1).....	7,294.63
26 31 00 00-0022	EA	7.5 KW Photovoltaic Inverter (Fronius IG Plus 7.5-1).....	8,157.45
26 31 00 00-0023	EA	10 KW Photovoltaic Inverter (Fronius IG Plus 10.0-1).....	12,923.19
26 31 00 00-0024	EA	12 KW Photovoltaic Inverter (Fronius IG Plus 12.0-3-1).....	15,023.96
26 31 00 00-0025	EA	11.4 KW Photovoltaic Inverter (Fronius IG Plus 11.4-3 Delta).....	12,223.05
26 31 00 00-0026	EA	11.4 KW Photovoltaic Inverter (Fronius IG Plus 11.4-3).....	15,475.01
26 31 00 00-0027	EA	Inverter Display Stand (Fronius 4,045,894).....	454.96
61.14			
26 31 00 00-0028 SMA Photovoltaic Inverters (26 31 00 00-0017)			
26 31 00 00-0029	EA	4 KW AC Photovoltaic Inverter (SMA Sunny Boy 4000TL-US-22).....	3,886.16
26 31 00 00-0030	EA	5 KW AC Photovoltaic Inverter (SMA Sunny Boy 5000TL-US-22).....	4,666.71
26 31 00 00-0031	EA	6 KW AC Photovoltaic Inverter (SMA Sunny Boy 6000TL-US-22).....	5,394.14
26 31 00 00-0032	EA	7 KW AC Photovoltaic Inverter (SMA Sunny Boy 7000TL-US-22).....	5,946.47
26 31 00 00-0033	EA	8 KW AC Photovoltaic Inverter (SMA Sunny Boy 8000TL-US-12).....	5,762.41
122.28			
122.28			
122.28			
122.28			
122.28			
244.56			
244.56			
26 31 00 00-0034 PVPowered Photovoltaic Inverters (26 31 00 00-0017)			
26 31 00 00-0035	EA	120 Volt, 1.1 KW Photovoltaic Inverter (PVPowered PVP1100).....	4,811.34
26 31 00 00-0036	EA	240 Volt, 2 KW Photovoltaic Inverter (PVPowered PVP2000).....	5,032.45
26 31 00 00-0037	EA	240 Volt, 2.5 KW Photovoltaic Inverter (PVPowered PVP2500).....	5,561.25
26 31 00 00-0038	EA	240 Volt, 3.5 KW Photovoltaic Inverter (PVPowered PVP3500).....	6,593.41
26 31 00 00-0039	EA	208 Volt, 4.6 KW Photovoltaic Inverter (PVPowered PVP4600).....	8,038.99
26 31 00 00-0040	EA	240 Volt, 4.8 KW Photovoltaic Inverter (PVPowered PVP4800).....	8,106.31
26 31 00 00-0041	EA	240 Volt, 5.2 KW Photovoltaic Inverter (PVPowered PVP5200).....	8,554.31
26 31 00 00-0042	EA	208 Volt, 75 KW Photovoltaic Inverter (PVPowered PVP75kW).....	102,084.48
26 31 00 00-0043	EA	480 Volt, 75 KW Photovoltaic Inverter (PVPowered PVP75kW).....	102,219.69
26 31 00 00-0044	EA	208 Volt, 100 KW Photovoltaic Inverter (PVPowered PVP100kW).....	110,617.61
26 31 00 00-0045	EA	480 Volt, 100 KW Photovoltaic Inverter (PVPowered PVP100kW).....	102,542.39
152.84			
183.42			
183.42			
183.42			
978.23			
978.23			
978.23			
978.23			
26 31 00 00-0046 Solectria Photovoltaic Inverters (26 31 00 00-0017)			
26 31 00 00-0047	EA	208 Or 480 Volt, 10 KW Photovoltaic Inverter (Solectria PVI).....	16,047.51
244.56			



Electrical	26	26	
Facility Electrical Power Generating and Storing Equipment			26 30
Photovoltaic Collectors			26 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 31 00 00-0048 EA 208 Or 480 Volt, 13 KW Photovoltaic Inverter (Solectria PVI)	16,047.51	244.56
26 31 00 00-0049 EA 208 Volt, 15 KW, Photovoltaic Inverter (Solectria PVI)	16,517.39	244.56
26 31 00 00-0050 EA 480 Volt, 15 KW Photovoltaic Inverter (Solectria PVI)	16,517.39	244.56
26 31 00 00-0051 EA 208 Volt, 50 KW Photovoltaic Inverter (Solectria PVI)	50,283.11	733.68
26 31 00 00-0052 EA 480 Volt, 50 KW Photovoltaic Inverter (Solectria PVI)	47,933.69	733.68
26 31 00 00-0053 EA 208 Volt, 60 KW Photovoltaic Inverter (Solectria PVI)	54,981.95	733.68
26 31 00 00-0054 EA 480 Volt, 60 KW Photovoltaic Inverter (Solectria PVI)	53,676.72	733.68
26 31 00 00-0055 EA 208 Volt, 75 KW Photovoltaic Inverter (Solectria PVI)	58,375.56	733.68
26 31 00 00-0056 EA 480 Volt, 75 KW Photovoltaic Inverter (Solectria PVI)	55,765.09	733.68
26 31 00 00-0057 EA 208 Volt, 85 KW Photovoltaic Inverter (Solectria PVI)	61,475.14	978.23
26 31 00 00-0058 EA 480 Volt, 85 KW Photovoltaic Inverter (Solectria PVI)	58,603.63	978.23
26 31 00 00-0059 EA 208 Volt, 100 KW Photovoltaic Inverter (Solectria PVI)	63,824.56	978.23
26 31 00 00-0060 EA 480 Volt, 100 KW Photovoltaic Inverter (Solectria PVI)	60,430.95	978.23
26 31 00 00-0061 Xantrex Photovoltaic Inverters (26 31 00 00-0017)		
26 31 00 00-0062 EA 0.6 KW Photovoltaic Inverter (Xantrex 806-1206).....	669.81	30.57
26 31 00 00-0063 EA 1 KW Photovoltaic Inverter (Xantrex 806-1210).....	730.26	30.57
26 31 00 00-0064 EA 2 KW Photovoltaic Inverter (Xantrex 806-1220).....	1,174.56	30.57
26 31 00 00-0065 Chint Power Systems Photovoltaic Inverters (26 31 00 00-0017)		
26 31 00 00-0066 EA 208 Volt, 25 KW, Photovoltaic Inverter (CPS SCA25KTL-D0).....	7,324.36	489.12
26 31 00 00-0067 Photovoltaic DC-DC Converters (26 31)		
26 31 00 00-0068 EA 15 Amperes, 20 To 35 Volt Input, 13.8 Volt Output DC Voltage Converter (Samlex SDC-20)	392.23	45.85
Note: Hazardous locations.		
26 31 00 00-0069 EA 20 Amperes, 20 To 35 Volt Input, 13.8 Volt Output DC Voltage Converter (Samlex SDC-23)	260.75	45.85
26 31 00 00-0070 EA 60 Amperes, 20 To 35 Volt Input, 13.8 Volt Output DC Voltage Converter (Samlex SDC-60)	730.31	45.85
26 31 00 00-0071 Photovoltaic Combiner Boxes (26 31)		
26 31 00 00-0072 Midnight Solar Photovoltaic Combiner Boxes (26 31 00 00-0071)		
26 31 00 00-0073 EA 3 - 150 Volt DC Breaker Or 3 - 600 Volt DC Fuse Holder, NEMA 3R, Aluminum Photovoltaic Combiner Box (Midnite Solar MNPV3).....	466.25	122.28
26 31 00 00-0074 EA 6 - 150 Volt DC Breaker Or 4 - 600 Volt DC Fuse Holder, NEMA 3R, Aluminum Photovoltaic Combiner Box (Midnite Solar MNPV6).....	454.08	122.28
26 31 00 00-0075 EA 12 - 150 Volt DC Breaker Or 10 - 600 Volt DC Fuse Holder, NEMA 3R, Aluminum Photovoltaic Combiner Box (Midnite Solar MNPV12).....	723.10	183.42
26 31 00 00-0076 EA 6 - 300 Volt DC Breaker, NEMA 3R, Aluminum Photovoltaic Combiner Box (Midnite Solar MNPV12-250)	727.36	183.42
26 31 00 00-0077 EA 16, 600 Volt DC Breakers, NEMA 3R, Aluminum Photovoltaic Combiner Box (Midnite Solar MNPV16).....	1,122.31	183.42
26 31 00 00-0078 SMA Photovoltaic Combiner Boxes (26 31 00 00-0071)		
26 31 00 00-0079 EA 6 Input NEMA 3R, Steel Photovoltaic Combiner Box (SMA SBCB-6).....	1,040.92	122.28
26 31 00 00-0080 EA 12 Input NEMA 3R, Steel Photovoltaic Combiner Box (SMA SCCB-12)	1,248.41	122.28
26 31 00 00-0081 EA 28 Input NEMA 3R, Steel Photovoltaic Combiner Box (SMA SCCB-28)	2,417.51	244.56
26 31 00 00-0082 EA 52 Input NEMA 3R, Steel Photovoltaic Combiner Box (SMA SCCB-52)	5,576.66	244.56
26 31 00 00-0083 EA 4 Input NEMA 3R, Steel Combination DC Disconnect And Photovoltaic Combiner Box (SMA Combi-Switch)	928.63	122.28
26 31 00 00-0084 Photovoltaic Charge Controller (26 31)		
26 31 00 00-0085 EA 35 Amperes, 12 Or 24 Volt, Charge Controller (Xantrex C-35).....	312.40	45.85
26 31 00 00-0086 EA 40 Amperes, 12 Or 24 Volt, Charge Controller (Xantrex C-40).....	418.05	45.85
26 31 00 00-0087 EA 60 Amperes, 12 Or 24 Volt, Charge Controller (Xantrex C-60).....	488.49	45.85
26 31 00 00-0088 EA Remote Digital Meter For Xantrex C-35, 40 And 60	373.45	45.85
26 31 00 00-0089 EA MPPT Charge Controller (Xantrex XW SCC)	1,300.76	61.14
26 31 00 00-0090 Photovoltaic Batteries (26 31)		
26 31 00 00-0091 Concorde Photovoltaic Batteries (26 31 00 00-0090)		
26 31 00 00-0092 EA 34 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-340T).....	290.00	18.34
26 31 00 00-0093 EA 45 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-420T).....	365.56	24.45
26 31 00 00-0094 EA 49 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-490T).....	396.27	24.45
26 31 00 00-0095 EA 56 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-560T).....	453.35	36.68
26 31 00 00-0096 EA 69 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-690T).....	516.68	36.68
26 31 00 00-0097 EA 89 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-890T).....	613.35	42.79
26 31 00 00-0098 EA 104 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-1040T).....	703.44	48.91
26 31 00 00-0099 EA 108 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-1080T).....	695.23	48.91
26 31 00 00-0100 EA 210 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-2120T).....	1,277.21	58.09
26 31 00 00-0101 EA 255 Ampere Hours, 12 Volt, Sealed Absorbed Glass Mat (AGM) Battery (Concorde PVX-2580T).....	1,477.54	61.14
26 31 00 00-0102 Deka Photovoltaic Batteries (26 31 00 00-0090)		
26 31 00 00-0103 EA 31 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8GU1).....	303.06	30.62
26 31 00 00-0104 EA 50 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8G22NF).....	418.11	30.62
26 31 00 00-0105 EA 74 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8G24)	617.67	30.62

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 31 Photovoltaic Collectors**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 31 00 00-0106	EA	86 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8G27).....	706.88	30.62
26 31 00 00-0107	EA	98 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8G31).....	709.23	30.62
26 31 00 00-0108	EA	183 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8G4D).....	1,376.01	30.62
26 31 00 00-0109	EA	225 Amperes Hours Capacity At 20 Hour Lead Acid Battery (Deka BYDK8G8D).....	1,592.01	30.62
26 31 00 00-0110 Battery Enclosures (26 31 00 00-0090)				
26 31 00 00-0111	EA	14" x 12" x 8" NEMA 3R Aluminum Photovoltaic Battery Enclosure (IronRidge 55-2501-010).....	342.88	30.57
26 31 00 00-0112	EA	22" x 16" x 8" NEMA 3R Aluminum Photovoltaic Battery Enclosure (IronRidge BETS1GC).....	1,688.27	30.62
26 31 00 00-0113	EA	37" x 16" x 8" NEMA 3R Aluminum Photovoltaic Battery Enclosure (IronRidge BETS2GCL).....	1,587.31	30.62
26 31 00 00-0114	EA	37" x 16" x 14.5" NEMA 3R Aluminum Photovoltaic Battery Enclosure (IronRidge BETS4GC).....	2,115.56	30.62
26 31 00 00-0115	EA	15" x 17.1" x 8.4" NEMA 3R Aluminum Photovoltaic Battery Enclosure (IronRidge BETSLCF1).....	941.66	30.62
26 31 00 00-0116	EA	31" x 36" x 14" NEMA 3R Aluminum Photovoltaic Battery Enclosure (IronRidge BETSBR827BP).....	2,216.52	30.62
26 31 00 00-0117 Photovoltaic System Monitoring (26 31)				
26 31 00 00-0118	EA	Solar Inverter Monitor (Xantrex 864-0203).....	723.79	61.14
26 31 00 00-0119	EA	Photovoltaic System Monitoring, Remote Diagnosis, Data Storage Communication Hub (SMA Sunny WebBox).....	1,503.28	30.57
26 31 00 00-0120	EA	Sun Radiation And Temperature Monitor (SMA Sunny SensorBox).....	1,255.65	30.57
26 31 00 00-0121	EA	PT100 Ambient Temperature Sensor For Sunny SensorBox (SMA).....	229.76	30.57
26 31 00 00-0122	EA	Wind Sensor Accessory For Sunny SensorBox (SMA).....	569.02	61.14
26 31 00 00-0123	EA	Sunny Boy Control with RS485 (SMA).....	1,478.62	30.57
26 31 00 00-0124	EA	RS 485 Module (SMA).....	334.41	30.57
26 31 00 00-0125	EA	RS 232 Module (SMA).....	342.88	30.57
26 31 00 00-0126	EA	Wireless Monitor with Bluetooth (SMA Sunny Beam).....	642.80	30.57
26 31 00 00-0127	EA	Bluetooth Piggy-Back Computer Card (SMA).....	347.45	30.57
26 31 00 00-0128	EA	RS485-N Communication Computer Card (SMA).....	345.08	30.57
26 31 00 00-0129	EA	Bluetooth Repeater (SMA).....	653.87	30.57
26 31 00 00-0130	EA	Sunny Boy PC Service Cable (SMA).....	311.08	9.17
26 31 00 00-0131	EA	Integrated Revenue Grade Meter, Option (PVPowered).....	6,022.11	30.57
26 31 00 00-0132	EA	Data Monitoring Module (PVPowered PVM1010).....	652.49	30.57
26 31 00 00-0133	EA	Wireless IG Personal Display (Fronius 4,240,108).....	653.11	30.57
26 31 00 00-0134	EA	DatCom Power Supply (Fronius 43,0001,2311).....	213.44	30.57
26 31 00 00-0135	EA	Wireless Card For IG Personal Display (Fronius 4,240,008,Z).....	387.43	30.57
26 31 00 00-0136	EA	Retrofit Solar Inverter Interface And Power Supply Option Communication Card (Fronius 4,240,001,Z).....	327.33	30.57
26 31 00 00-0137	EA	Datalogger Pro Box (Fronius 4,240,102).....	1,294.40	30.57
26 31 00 00-0138	EA	Datalogger Easy Box (Fronius 4,240,103).....	840.93	30.57
26 31 00 00-0139	EA	Datalogger Interface Box (Fronius 4,240,105).....	1,461.74	30.57
26 31 00 00-0140	EA	Datalogger Web (Fronius 4,240,122).....	2,514.00	30.57
26 31 00 00-0141	EA	Interface Box (Fronius 4,240,109).....	673.22	30.57
26 31 00 00-0142	EA	Interface Card (Fronius 4,240,009,Z).....	479.48	30.57
26 31 00 00-0143	EA	Interface Card Easy (Fronius 4,240,013,Z).....	315.13	30.57
26 31 00 00-0144	EA	Sensor Box (Fronius 4,240,104).....	1,352.01	30.57
26 31 00 00-0145	EA	Ambient Temperature Sensor (Fronius 43,0001,1188).....	147.20	30.57
26 31 00 00-0146	EA	Irradiance Sensor (Fronius 43,0001,1188).....	467.55	30.57
26 31 00 00-0147	EA	Module Temperature Sensor (Fronius 43,0001,1190).....	521.07	30.57
26 31 00 00-0148	EA	Wind Speed Sensor (Fronius 42,0411,0027).....	271.20	61.14
26 31 00 00-0149 Photovoltaic System Accessories (26 31)				
26 31 00 00-0150	EA	Four Inverter Bypass Switch (OutBack AC-IOB-100Q).....	993.85	61.14
26 31 00 00-0151	EA	Line Communication Filter (Enphase LCF).....	2,167.41	122.28
26 31 00 00-0152	EA	15 Meter RS 485 Communication Cable (SMA).....	166.25	9.17
26 31 00 00-0153	EA	15 Meter RS 232 Communication Cable (SMA).....	250.77	9.17
26 31 00 00-0154	EA	24" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	38.01	3.03
26 31 00 00-0155	EA	36" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	40.85	3.03
26 31 00 00-0156	EA	48" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	42.45	3.03
26 31 00 00-0157	EA	72" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	46.89	3.03
26 31 00 00-0158	EA	120" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	53.54	3.03
26 31 00 00-0159	EA	240" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	84.90	6.05
26 31 00 00-0160	EA	360" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	105.56	6.05
26 31 00 00-0161	EA	420" #10 AWG Male Or Female Photovoltaic Multi-Contact Module Interconnect.....	138.44	9.08
26 31 00 00-0162	EA	36" #10 AWG Male And Female Photovoltaic Multi-Contact Module Interconnect.....	48.00	3.03
26 31 00 00-0163	EA	120" #10 AWG Male And Female Photovoltaic Multi-Contact Module Interconnect.....	66.86	3.03
26 31 00 00-0164	EA	240" #10 AWG Male And Female Photovoltaic Multi-Contact Module Interconnect.....	98.21	6.05
26 31 00 00-0165	EA	360" #10 AWG Male And Female Photovoltaic Multi-Contact Module Interconnect.....	131.49	6.05
26 31 00 00-0166	EA	600" #10 AWG Male And Female Photovoltaic Multi-Contact Module Interconnect.....	213.06	12.11
26 31 00 00-0167	EA	1200" #10 AWG Male And Female Photovoltaic Multi-Contact Module Interconnect.....	222.46	12.11
26 31 00 00-0168	EA	Lighting Kit, 9 Watt Fluorescent, 12 Volt, 4.5 Ampere Hours Battery.....	3,964.32	330.15
Note: Tamper proof enclosure.				
26 31 00 00-0169 Photovoltaic Mounting Systems (26 31)				
26 31 00 00-0170	LF	Anodized Aluminum Photovoltaic Module Mounting Rail (UNIRAC SolarMount Standard).....	13.40	3.06
26 31 00 00-0171	EA	Splice Bar For Photovoltaic Module Mounting Rail (UNIRAC 310229).....	37.93	15.28
26 31 00 00-0172	EA	Splice Plate For Photovoltaic Module Mounting Rail (UNIRAC 310216).....	48.39	15.28
26 31 00 00-0173	EA	8" x 3/8" Hanger Bolt (UNIRAC 310046).....	25.71	6.11
Note: Supports mounting rail above tile or metal roof.				
26 31 00 00-0174	EA	Mounting Rail Grounding Clip (UNIRAC 980006).....	12.09	4.59
Note: One grounding clip for every two top mounting clamps (end clamps + mid clamps) in your installation. Only one of the two rails in each row requires grounding clips.				

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 31 00 00-0175 EA Mounting Rail Grounding Lugs (UNIRAC 980012) Note: Two grounding lugs for each rail splice and one additional lug for each rail.	26.19	6.11
26 31 00 00-0176 EA Anodized Aluminum Photovoltaic Module Mounting End Clamp (UNIRAC 320002) Note: Four for each row of modules you plan to mount.	6.99	2.04
26 31 00 00-0177 EA Anodized Aluminum Photovoltaic Module Mounting Mid Clamp (UNIRAC 320008) Note: For each row, take one less than the number of modules in the row and multiply that figure by 2.	7.33	2.04
26 31 00 00-0178 EA Photovoltaic Module Mount L-Feet (UNIRAC 310065)	18.08	6.11
26 31 00 00-0179 EA 12" Leg Extension, Photovoltaic Module One Leg Tilt Kit (UNIRAC 310121) Note: Includes one square tube, one strut insert, two L-feet, and stainless steel hardware for use with mounting rail. Excludes standoffs.	108.14	30.57
26 31 00 00-0180 EA 30" Leg Extension, Photovoltaic Module One Leg Tilt Kit (UNIRAC 310122) Note: Includes one square tube, one strut insert, two L-feet, and stainless steel hardware for use with mounting rail. Excludes standoffs.	119.98	30.57
26 31 00 00-0181 EA 44" Leg Extension, Photovoltaic Module One Leg Tilt Kit (UNIRAC 310123) Note: Includes one square tube, one strut insert, two L-feet, and stainless steel hardware for use with mounting rail. Excludes standoffs.	129.51	30.57
26 31 00 00-0182 EA 12" Leg Extension, Photovoltaic Module Two Leg Tilt Kit (UNIRAC 310107) Note: Includes two square tubes, two strut inserts, and fasteners for use with mounting rail. Excludes standoffs and L-feet.	158.76	45.85
26 31 00 00-0183 EA 44" Leg Extension, Photovoltaic Module Two Leg Tilt Kit (UNIRAC 310108) Note: Includes two square tubes, two strut inserts, and fasteners for use with mounting rail. Excludes standoffs and L-feet.	194.26	45.85
26 31 00 00-0184 EA 72" Leg Extension, Photovoltaic Module Two Leg Tilt Kit (UNIRAC 310109) Note: Includes two square tubes, two strut inserts, and fasteners for use with mounting rail. Excludes standoffs and L-feet.	226.47	45.85
26 31 00 00-0185 EA 18" Leg Extension, Photovoltaic Module Four Leg Tilt Kit (UNIRAC 310111) Note: Includes four square tubes, four strut inserts, and fasteners for use with mounting rail. Excludes standoffs and L-feet.	248.50	61.14
26 31 00 00-0186 EA 64" Leg Extension, Photovoltaic Module Four Leg Tilt Kit (UNIRAC 310112) Note: Includes four square tubes, four strut inserts, and fasteners for use with mounting rail. Excludes standoffs and L-feet.	333.30	61.14
26 31 00 00-0187 EA 104" Leg Extension, Photovoltaic Module Four Leg Tilt Kit (UNIRAC 310110) Note: Includes four square tubes, four strut inserts, and fasteners for use with mounting rail. Excludes standoffs and L-feet.	468.07	91.71
26 31 00 00-0188 EA Ballasted Photovoltaic Module Frame (UNIRAC 310351) Note: Excludes ballast.	228.45	
26 31 00 00-0189 EA Ballasted Photovoltaic Module Frame With Module Mount (UNIRAC 310355) Note: Excludes ballast.	426.31	
26 31 00 00-0190 EA 3" High Galvanized Steel Photovoltaic Module Standoff (UNIRAC 310051).....	84.51	30.57
26 31 00 00-0191 EA 4" High Galvanized Steel Photovoltaic Module Standoff (UNIRAC 310052).....	85.59	30.57
26 31 00 00-0192 EA 6" High Galvanized Steel Photovoltaic Module Standoff (UNIRAC 310053).....	86.59	30.57
26 31 00 00-0193 EA 7" High Galvanized Steel Photovoltaic Module Standoff (UNIRAC 310054).....	89.08	30.57
26 31 00 00-0194 EA 3" High Aluminum Photovoltaic Module Standoff (UNIRAC 310553).....	77.90	30.57
26 31 00 00-0195 EA 4" High Aluminum Photovoltaic Module Standoff (UNIRAC 310554).....	79.16	30.57
26 31 00 00-0196 EA 6" High Aluminum Photovoltaic Module Standoff (UNIRAC 310555).....	82.83	30.57
26 31 00 00-0197 EA 7" High Aluminum Photovoltaic Module Standoff (UNIRAC 310556).....	81.79	30.57
26 31 00 00-0198 EA 3" Photovoltaic Module FastFoot Standoff Assembly (UNIRAC 310390)	163.36	45.85
26 31 00 00-0199 EA 4" Photovoltaic Module FastFoot Standoff Assembly (UNIRAC 310391)	164.12	45.85
26 31 00 00-0200 EA 7" Photovoltaic Module FastFoot Standoff Assembly (UNIRAC 310394)	166.36	45.85
26 31 00 00-0201 EA Photovoltaic Module RapidFoot Standoff Assembly (UNIRAC 310370)	164.02	45.85
26 31 00 00-0202 EA Photovoltaic Module Standoff Flashing (UNIRAC 990103).....	32.88	6.11
26 31 00 00-0203 EA Photovoltaic Module Standoff Ethylene Propylene Diene Monomer (EPDM) Patch (UNIRAC 990161).....	21.46	6.11
26 31 00 00-0204 EA 1/4" Photovoltaic Module Standing Seam Metal Roof Mounting Block (UNIRAC 004030M-0100)	40.95	9.17
26 31 00 00-0205 EA 3/8" Photovoltaic Module Standing Seam Metal Roof Mounting Block (UNIRAC 004031M-0100).....	42.66	9.17
26 31 00 00-0206 EA Photovoltaic Module Standing Seam Metal Roof Mounting Clamp (UNIRAC 004032M-0100)..... Note: Mid or end clamp.	11.96	2.04
26 31 00 00-0207 EA Photovoltaic Module Tile Roof Mounting Hook (UNIRAC 905011C-0024)	54.85	6.11
26 31 00 00-0208 EA Photovoltaic Module Wire Clip (UNIRAC 908002S-0100)	2.76	

26 32 Packaged Generator Assemblies (26 30)

26 32 13 Engine Generators (26 32)

See CSI section 23 13 23 13-0001 for fuel storage tanks.

26 32 13 13 Diesel-Engine-Driven Generator Sets (26 32 13)

See CSI section 01 22 23 00-0707 for fuel reimbursement for commissioning.

26 32 13 13-0001 Diesel Generator Sets (Cummins) (26 32 13 13)

Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad without enclosure. Includes manufacturer's representative at startup. Excludes fuel, fuel tank, enclosure, active diesel particulate filter, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 23 13 23 13-0001 for fuel day tank, 26 36 23 00-0000 for automatic transfer switch.

26 32 13 13-0002 EA 20 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	33,785.56	1,063.31
<i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i>	<i>18,392.32</i>	
<i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i>	<i>24,523.10</i>	
<i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i>	<i>11,718.62</i>	
<i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i>	<i>15,624.82</i>	
<i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i>	<i>12,679.64</i>	
<i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	<i>4,979.88</i>	
<i>For Single Phase, Add</i>	<i>1,266.91</i>	

26 Electrical

26 30 Facility Electrical Power Generating and Storing Equipment

26 32 Packaged Generator Assemblies



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13	13-0003	EA	25 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	35,533.41 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88	1,123.13
26 32 13	13-0004	EA	30 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i> <i>For Single Phase, Add</i>	37,303.65 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88 1,397.02	1,186.26
26 32 13	13-0005	EA	35 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	38,060.70 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88	1,309.21
26 32 13	13-0006	EA	40 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	38,831.19 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88	1,435.48
26 32 13	13-0007	EA	50 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	45,573.53 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88	1,648.14
26 32 13	13-0008	EA	60 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	49,107.70 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88	1,894.04
26 32 13	13-0009	EA	80 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	57,700.28 18,392.32 24,523.10 11,718.62 15,624.82 12,679.64 4,979.88	2,219.68
26 32 13	13-0010	EA	100 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	62,022.91 26,076.98 19,557.74 23,889.00 17,916.75 16,268.20 7,553.42	2,578.55
26 32 13	13-0011	EA	125 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	63,432.06 26,076.98 19,557.74 23,889.00 17,916.75 16,268.20 7,553.42	3,057.04
26 32 13	13-0012	EA	150 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	70,124.78 26,076.98 19,557.74 23,889.00 17,916.75 16,268.20 7,553.42	3,369.39
26 32 13	13-0013	EA	175 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	73,682.13 26,076.98 19,557.74 23,889.00 17,916.75 16,268.20 7,553.42	3,761.49
26 32 13	13-0014	EA	200 KW, 3 Phase, Standby Diesel Generator Set (Cummins) <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	78,315.18 26,076.98 19,557.74 23,889.00 17,916.75 16,268.20 7,553.42	4,120.36

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13 13-0015 EA 230 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	84,444.15	4,352.96
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	26,076.98	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	19,557.74	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	23,889.00	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	17,916.75	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	16,268.20	
For Weather Resistant Steel Diesel Generator Enclosure, Add	7,553.42	
26 32 13 13-0016 EA 250 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	88,020.85	4,532.39
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0017 EA 275 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	95,800.78	4,778.29
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0018 EA 300 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	97,880.74	4,990.95
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0019 EA 350 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	110,364.67	5,582.42
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0020 EA 400 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	118,823.92	6,114.08
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0021 EA 450 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	134,182.22	6,585.93
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0022 EA 500 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	141,136.16	7,017.91
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0023 EA 600 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	205,227.88	7,729.00
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	117,700.64	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	160,675.28	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	140,388.21	
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	187,184.28	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	120,506.46	
For Weather Resistant Steel Diesel Generator Enclosure, Add	100,069.00	
26 32 13 13-0024 EA 750 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	235,043.05	8,499.90
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	117,700.64	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	160,675.28	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	140,388.21	
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	187,184.28	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	120,506.46	
For Weather Resistant Steel Diesel Generator Enclosure, Add	100,069.00	
26 32 13 13-0025 EA 800 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	245,451.18	8,685.98
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	117,700.64	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	160,675.28	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	140,388.21	
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	187,184.28	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	120,506.46	
For Weather Resistant Steel Diesel Generator Enclosure, Add	100,069.00	
26 32 13 13-0026 EA 900 KW, 3 Phase, Standby Diesel Generator Set (Cummins).....	299,457.53	9,363.85
For Weather Resistant Aluminum Diesel Generator Enclosure, Add	117,700.64	
For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	160,675.28	
For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	140,388.21	
For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	187,184.28	
For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	120,506.46	
For Weather Resistant Steel Diesel Generator Enclosure, Add	100,069.00	

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 32 Packaged Generator Assemblies**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13	13-0027	EA	1,000 KW, 3 Phase, Standby Diesel Generator Set (Cummins)..... <i>For Weather Resistant Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add</i> <i>For Quietsite Level 1 Steel Diesel Generator Enclosure, Add</i> <i>For Weather Resistant Steel Diesel Generator Enclosure, Add</i>	334,502.74 117,700.64 160,675.28 140,388.21 187,184.28 120,506.46 100,069.00	9,968.60
26 32 13	13-0028		Diesel Generator Sets (Generac SD) ^(26 32 13 13) Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with 24 hour run time fuel tank, radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad. Includes startup and training. Excludes fuel, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 26 36 23 00-0000 for automatic transfer switch.		
26 32 13	13-0029	EA	10 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	23,354.64 3,299.18 6,109.47	664.57
26 32 13	13-0030	EA	15 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	23,792.43 3,299.18 6,109.47	797.49
26 32 13	13-0031	EA	20 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	24,635.34 3,299.18 6,109.47	890.53
26 32 13	13-0032	EA	25 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	26,441.56 3,299.18 6,109.47	1,063.31
26 32 13	13-0033	EA	30 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	27,022.37 3,299.18 6,109.47	1,186.26
26 32 13	13-0034	EA	35 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	29,958.58 3,299.18 6,109.47	1,309.21
26 32 13	13-0035	EA	40 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	30,452.06 3,299.18 6,109.47	1,435.48
26 32 13	13-0036	EA	50 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	31,503.24 3,299.18 6,109.47	1,648.14
26 32 13	13-0037	EA	60 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	34,386.42 3,999.00 8,028.99	1,894.04
26 32 13	13-0038	EA	80 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	41,422.10 3,999.00 8,657.84	2,219.68
26 32 13	13-0039	EA	100 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	43,207.73 5,931.18 10,590.02	2,551.96
26 32 13	13-0040	EA	135 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	53,637.48 5,931.18 10,948.93	3,123.49
26 32 13	13-0041	EA	150 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	56,508.67 5,931.18 10,948.93	3,369.39
26 32 13	13-0042	EA	180 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	64,221.78 5,931.18 10,948.93	3,821.30
26 32 13	13-0043	EA	200 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	64,199.73 7,438.14 12,455.89	4,120.36
26 32 13	13-0044	EA	230 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	77,612.69 7,438.14 20,027.99	4,352.96
26 32 13	13-0045	EA	250 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	82,566.41 7,438.14 20,027.99	4,532.39
26 32 13	13-0046	EA	275 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	84,779.43 11,330.50 23,920.35	4,778.29
26 32 13	13-0047	EA	300 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	92,935.82 11,330.50 23,920.35	4,990.95
26 32 13	13-0048	EA	350 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	100,875.08 11,330.50 24,614.18	5,582.42
26 32 13	13-0049	EA	400 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	108,376.89 11,330.50 24,614.18	5,981.16
26 32 13	13-0050	EA	500 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	120,518.17 18,995.25 27,069.23	7,017.90
26 32 13	13-0051	EA	600 KW, Industrial, Diesel Generator Set (Generac SD)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 1 Steel Weather/Sound Protective Housing, Add</i>	162,448.23 24,733.82 38,017.49	7,729.00

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13 13-0052		Diesel Generator Sets (Kohler) <small>(26 32 13 13)</small> Note: 3 Phase, 4-Wire 480/277, 416/240 or 380/220 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad. Includes manufacturer's representative at startup. Excludes fuel, fuel tank, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 23 13 23 13-0001 for fuel day tank, 26 36 23 00-0000 for automatic transfer switch.		
26 32 13 13-0053	EA	80 KW Diesel Generator Set, 3 Phase (Kohler 80REOZJ).....	31,588.11	2,219.68
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	18,392.32	
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	24,523.10	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	11,718.62	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	15,624.82	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	12,679.64	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	4,979.88	
26 32 13 13-0054	EA	100 KW Diesel Generator Set, 3 Phase (Kohler 100REOZJ).....	33,217.36	2,578.55
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	26,076.98	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	19,557.74	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	23,889.00	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	17,916.75	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	16,268.20	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	7,553.42	
26 32 13 13-0055	EA	125 KW Diesel Generator Set, 3 Phase (Kohler 125REOZJ).....	41,808.79	3,057.04
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	26,076.98	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	19,557.74	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	23,889.00	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	17,916.75	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	16,268.20	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	7,553.42	
26 32 13 13-0056	EA	150 KW Diesel Generator Set, 3 Phase (Kohler 150REOZJ).....	43,220.47	3,369.39
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	26,076.98	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	19,557.74	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	23,889.00	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	17,916.75	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	16,268.20	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	7,553.42	
26 32 13 13-0057	EA	200 KW Diesel Generator Set, 3 Phase (Kohler 200REOZJ).....	51,425.81	4,120.36
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	26,076.98	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	19,557.74	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	23,889.00	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	17,916.75	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	16,268.20	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	7,553.42	
26 32 13 13-0058	EA	250 KW Diesel Generator Set, 3 Phase (Kohler 250REOZJ).....	63,846.45	4,532.39
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0059	EA	300 KW Diesel Generator Set, 3 Phase (Kohler 300REOZJ).....	69,984.70	4,990.95
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0060	EA	350 KW Diesel Generator Set, 3 Phase (Kohler 350REOZJ).....	77,485.33	5,582.42
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0061	EA	400 KW Diesel Generator Set, 3 Phase (Kohler 400REOZJ).....	82,381.42	6,114.08
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0062	EA	500 KW Diesel Generator Set, 3 Phase (Kohler 500REOZJ).....	97,518.61	7,017.91
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	88,404.38	
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	59,412.42	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	66,303.29	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	54,241.50	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	48,985.80	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	72,322.00	
26 32 13 13-0063	EA	600 KW Diesel Generator Set, 3 Phase (Kohler 600REOZJ).....	120,786.59	7,729.00
		For Weather Resistant Aluminum Diesel Generator Enclosure, Add	117,700.64	
		For Quietsite Level 2 Steel Diesel Generator Enclosure, Add	160,675.28	
		For Quietsite Level 1 Aluminum Diesel Generator Enclosure, Add	140,388.21	
		For Quietsite Level 2 Aluminum Diesel Generator Enclosure, Add	187,184.28	
		For Quietsite Level 1 Steel Diesel Generator Enclosure, Add	120,506.46	
		For Weather Resistant Steel Diesel Generator Enclosure, Add	100,069.00	
26 32 13 13-0064	EA	1,250 KW Diesel Generator Set, 3 Phase (Kohlar REOZDD).....	465,819.66	10,300.90
26 32 13 13-0065	EA	1,500 KW Diesel Generator Set, 3 Phase (Kohlar REOZDD).....	476,092.07	10,633.18

26 Electrical
26 30 Facility Electrical Power Generating and Storing Equipment
26 32 Packaged Generator Assemblies



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 32 13 13-0066	EA	1,750 KW Diesel Generator Set, 3 Phase (Kohlar REOZDD).....		557,003.18	10,965.47
26 32 13 13-0067	EA	2,000 KW Diesel Generator Set, 3 Phase (Kohlar REOZDD).....		656,776.18	11,297.75
26 32 13 13-0068	EA	2,250 KW Diesel Generator Set, 3 Phase (Kohlar REOZDD).....		747,905.00	11,630.04
26 32 13 13-0069	EA	2,500 KW Diesel Generator Set, 3 Phase (Kohlar REOZDB).....		942,577.24	11,962.33
26 32 13 13-0070	EA	2,800 KW Diesel Generator Set, 3 Phase (Kohlar REOZDB).....		1,137,249.50	12,294.62
26 32 13 13-0071	EA	3,000 KW Diesel Generator Set, 3 Phase (Kohlar REOZD).....		1,301,149.35	12,959.19
26 32 13 13-0072	EA	3,250 KW Diesel Generator Set, 3 Phase (Kohlar REOZD).....		1,388,971.92	13,623.76
26 32 13 13-0073	EA	4,000 KW Diesel Generator Set, 3 Phase (Caterpillar C175).....		2,027,292.36	15,617.49
26 32 13 13-0074 Diesel Generator Sets (Taylor) <small>(26 32 13 13)</small>					
Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad without enclosure. Includes manufacturer's representative at startup. Excludes fuel tank, enclosure, active diesel particulate filter, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 23 13 23 13-0001 for fuel day tank, 26 36 23 00-0000 for automatic transfer switch.					
26 32 13 13-0075	EA	9 KW Diesel Generator Set, 3 Phase (Taylor TD9).....		23,453.89	796.69
26 32 13 13-0076	EA	13 KW Diesel Generator Set, 3 Phase (Taylor TD13).....		24,115.07	898.64
26 32 13 13-0077	EA	20 KW Diesel Generator Set, 3 Phase (Taylor TD20).....		25,235.80	1,002.84
26 32 13 13-0078	EA	28 KW Diesel Generator Set, 3 Phase (Taylor TD28).....		28,025.01	1,124.86
26 32 13 13-0079	EA	30 KW Diesel Generator Set, 3 Phase (Taylor TD30).....		29,319.31	1,186.26
26 32 13 13-0080	EA	55 KW Diesel Generator Set, 3 Phase (Taylor TD55).....		32,836.37	1,771.09
26 32 13 13-0081	EA	60 KW Diesel Generator Set, 3 Phase (Taylor TD60).....		35,611.94	1,894.04
26 32 13 13-0082	EA	80 KW Diesel Generator Set, 3 Phase (Taylor TD80).....		38,265.22	2,219.68
26 32 13 13-0083	EA	100 KW Diesel Generator Set, 3 Phase (Taylor TD100).....		39,753.53	2,578.55
26 32 13 13-0084	EA	125 KW Diesel Generator Set, 3 Phase (Taylor TD125).....		52,861.90	3,057.04
26 32 13 13-0085	EA	140 KW Diesel Generator Set, 3 Phase (Taylor TD140).....		53,754.87	3,213.22
26 32 13 13-0086	EA	150 KW Diesel Generator Set, 3 Phase (Taylor TD150).....		54,702.71	3,369.39
26 32 13 13-0087	EA	175 KW Diesel Generator Set, 3 Phase (Taylor TD175).....		58,291.78	3,761.49
26 32 13 13-0088	EA	200 KW Diesel Generator Set, 3 Phase (Taylor TD200).....		60,976.59	4,120.36
26 32 13 13-0089	EA	250 KW Diesel Generator Set, 3 Phase (Taylor TD250).....		73,955.37	4,532.39
26 32 13 13-0090	EA	300 KW Diesel Generator Set, 3 Phase (Taylor TD300).....		83,784.78	4,990.95
26 32 13 13-0091	EA	350 KW Diesel Generator Set, 3 Phase (Taylor TD350).....		91,486.07	5,582.42
26 32 13 13-0092	EA	400 KW Diesel Generator Set, 3 Phase (Taylor TD400).....		93,905.15	6,114.08
26 32 13 13-0093	EA	450 KW Diesel Generator Set, 3 Phase (Taylor TD450).....		101,349.40	6,585.93
26 32 13 13-0094	EA	500 KW Diesel Generator Set, 3 Phase (Taylor TD500).....		106,562.84	7,017.90
26 32 13 13-0095	EA	550 KW Diesel Generator Set, 3 Phase (Taylor TD550).....		109,613.37	7,373.45
26 32 13 13-0096	EA	600 KW Diesel Generator Set, 3 Phase (Taylor TD600).....		134,915.79	7,729.00
26 32 13 13-0097 Diesel Particulate Filters <small>(26 32 13 13)</small>					
26 32 13 13-0098	EA	Up To 50 KW Diesel Generator, Active Diesel Particulate Filter With Stainless Steel Enclosure.....		36,154.06	
Note: Includes 304 stainless steel housing, CARB Level 3+ Verified, and 4KW rated. Requires 480 volt, 3 phase power to a supplied 20 amp CB.					
26 32 13 13-0099	EA	>50 To 75 KW Diesel Generator, Active Diesel Particulate Filter With Stainless Steel Enclosure.....		47,266.14	
Note: Includes 304 stainless steel housing, CARB Level 3+ Verified, and 4KW rated. Requires 480 volt, 3 phase power to a supplied 20 amp CB.					
26 32 13 13-0100	EA	>75 To 100 KW Diesel Generator, Active Diesel Particulate Filter With Stainless Steel Enclosure.....		57,271.40	
Note: Includes 304 stainless steel housing, CARB Level 3+ Verified, and 4KW rated. Requires 480 volt, 3 phase power to a supplied 20 amp CB.					
26 32 13 13-0101	EA	>100 To 200 KW Diesel Generator, Active Diesel Particulate Filter With Stainless Steel Enclosure.....		70,256.13	
Note: Includes 304 stainless steel housing, CARB Level 3+ Verified, and 4KW rated. Requires 480 volt, 3 phase power to a supplied 20 amp CB.					
26 32 13 13-0102	EA	>200 To 500 KW Diesel Generator, Active Diesel Particulate Filter With Stainless Steel Enclosure.....		82,584.29	
Note: Includes 304 stainless steel housing, CARB Level 3+ Verified, and 4KW rated. Requires 480 volt, 3 phase power to a supplied 20 amp CB.					
26 32 13 13-0103	EA	>500 To 1,000 KW Diesel Generator, Active Diesel Particulate Filter With Stainless Steel Enclosure.....		103,167.83	
Note: Includes 304 stainless steel housing, CARB Level 3+ Verified, and 4KW rated. Requires 480 volt, 3 phase power to a supplied 20 amp CB.					
26 32 13 19 Natural Gas-Engine-Driven Generator Sets <small>(26 32 13)</small>					
26 32 13 19-0001 Natural Gas Or Propane Generator Sets (Cummins) <small>(26 32 13 19)</small>					
Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad without enclosure. Includes manufacturer's representative at startup. Excludes fuel, fuel tank, enclosure, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 26 36 23 00-0000 for automatic transfer switches.					
26 32 13 19-0002	EA	20 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGMA).....		15,073.09	890.53
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add				11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add				15,624.82	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add				4,905.54	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add				4,529.28	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add				8,138.76	
26 32 13 19-0003	EA	25 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGMB).....		17,032.15	1,063.31
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add				11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add				15,624.82	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add				4,905.54	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add				4,529.28	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add				8,138.76	



Electrical	26
Facility Electrical Power Generating and Storing Equipment	26 30
Packaged Generator Assemblies	26 32

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13 19-0004 EA 29 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGMC)	19,663.99	1,182.94
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	15,624.82	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	4,905.54	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	4,529.28	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	8,138.76	
26 32 13 19-0005 EA 35 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGPA)	22,310.83	1,309.21
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	15,624.82	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	4,529.28	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	13,875.82	
26 32 13 19-0006 EA 40 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGPB)	25,042.34	1,435.48
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	15,624.82	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	4,529.28	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	13,875.82	
26 32 13 19-0007 EA 45 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGPC)	27,142.63	1,548.46
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	15,624.82	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	4,529.28	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	13,875.82	
26 32 13 19-0008 EA 60 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGHE)	29,708.12	1,894.04
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	15,624.82	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	4,529.28	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	13,875.82	
26 32 13 19-0009 EA 70 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGHF)	31,884.09	2,119.99
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	11,718.62	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	15,624.82	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	4,529.28	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	13,875.82	
26 32 13 19-0010 EA 85 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGHG)	41,836.68	2,266.20
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0011 EA 100 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGHH)	50,409.99	2,551.96
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0012 EA 125 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGLA)	57,738.19	3,057.04
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0013 EA 150 KW Natural Gas Or Propane Generator Set, 3 Phase (Cummins GGLB)	68,619.07	3,369.39
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0014 EA 175 KW Natural Gas Generator Set, 3 Phase (Cummins GFBA)	110,938.85	8,962.31
For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add	48,764.56	
For Weather Resistant Steel Natural Gas Generator Enclosure, Add	44,052.38	
For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add	72,277.86	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	48,165.88	
For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add	65,019.42	
26 32 13 19-0015 EA 205 KW Natural Gas Generator Set, 3 Phase (Cummins GFBB)	125,936.67	4,047.26
For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add	48,764.56	
For Weather Resistant Steel Natural Gas Generator Enclosure, Add	44,052.38	
For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add	72,277.86	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	48,165.88	
For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add	65,019.42	
26 32 13 19-0016 EA 250 KW Natural Gas Generator Set, 3 Phase (Cummins GFBC)	135,435.02	4,532.39
For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add	48,764.56	
For Weather Resistant Steel Natural Gas Generator Enclosure, Add	44,052.38	
For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add	72,277.86	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	48,165.88	
For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add	65,019.42	
26 32 13 19-0017 EA 300 KW Natural Gas Generator Set, 3 Phase (Cummins GFEA)	175,124.52	4,990.95
For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add	48,764.56	
For Weather Resistant Steel Natural Gas Generator Enclosure, Add	44,052.38	
For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add	72,277.86	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	48,165.88	
For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add	65,019.42	

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 32 Packaged Generator Assemblies**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13 19-0018	EA		350 KW Natural Gas Generator Set, 3 Phase (Cummins GFEB)	187,988.17	5,582.42
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	48,764.56	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	44,052.38	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	72,277.86	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	48,165.88	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	65,019.42	
26 32 13 19-0019	EA		450 KW Natural Gas Generator Set, 3 Phase (Cummins GFGA)	264,066.65	6,585.93
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	102,201.24	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	136,268.32	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	96,190.08	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	109,255.28	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	154,415.60	
26 32 13 19-0020	EA		500 KW Natural Gas Generator Set, 3 Phase (Cummins GFJB)	337,659.32	7,017.90
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	102,201.24	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	136,268.32	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	96,190.08	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	109,255.28	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	154,415.60	
26 32 13 19-0021	EA		550 KW Natural Gas Generator Set, 3 Phase (Cummins GFJC)	377,816.61	7,396.71
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	102,201.24	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	136,268.32	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	96,190.08	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	109,255.28	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	154,415.60	
26 32 13 19-0022	EA		600 KW Natural Gas Generator Set, 3 Phase (Cummins GFLA)	430,322.23	7,729.00
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	102,201.24	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	136,268.32	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	96,190.08	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	109,255.28	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	154,415.60	
26 32 13 19-0023	EA		650 KW Natural Gas Generator Set, 3 Phase (Cummins GFLB)	449,946.16	8,021.40
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	102,201.24	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	136,268.32	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	96,190.08	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	109,255.28	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	154,415.60	
26 32 13 19-0024	EA		725 KW Natural Gas Generator Set, 3 Phase (Cummins GFCL)	475,921.25	8,573.00
			<i>For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add</i>	102,201.24	
			<i>For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add</i>	136,268.32	
			<i>For Weather Resistant Steel Natural Gas Generator Enclosure, Add</i>	96,190.08	
			<i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	109,255.28	
			<i>For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add</i>	154,415.60	
26 32 13 19-0025			Natural Gas Or Propane Generator Sets (Generac QTA) <small>(26 32 13 19)</small>		
			Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad. Includes startup and training. Excludes fuel, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 26 36 23 00-0000 for automatic transfer switches.		
26 32 13 19-0026	EA		25 KW, Commercial, Natural Gas Generator Set (Generac QTA)	18,247.94	1,063.31
			<i>For Steel Weather Protective Housing, Add</i>	1,246.36	
			<i>For Aluminum Weather Protective Housing, Add</i>	1,935.52	
26 32 13 19-0027	EA		55 KW, Commercial, Natural Gas Generator Set (Generac QTA)	27,095.93	1,774.41
			<i>For Steel Weather Protective Housing, Add</i>	1,767.56	
			<i>For Aluminum Weather Protective Housing, Add</i>	2,274.43	
26 32 13 19-0028	EA		70 KW, Commercial, Natural Gas Generator Set (Generac QTA)	30,414.77	2,119.99
			<i>For Steel Weather Protective Housing, Add</i>	2,286.10	
			<i>For Aluminum Weather Protective Housing, Add</i>	2,272.43	
26 32 13 19-0029	EA		80 KW, Commercial, Natural Gas Generator Set (Generac QTA)	32,022.45	2,219.68
			<i>For Steel Weather Protective Housing, Add</i>	1,767.56	
			<i>For Aluminum Weather Protective Housing, Add</i>	2,661.33	
26 32 13 19-0030	EA		100 KW, Commercial, Natural Gas Generator Set (Generac QTA)	39,134.75	2,551.96
			<i>For Steel Weather Protective Housing, Add</i>	2,286.10	
			<i>For Aluminum Weather Protective Housing, Add</i>	2,449.39	
26 32 13 19-0031	EA		130 KW, Commercial, Natural Gas Generator Set (Generac QTA)	45,231.04	3,043.75
			<i>For Steel Weather Protective Housing, Add</i>	2,286.10	
			<i>For Aluminum Weather Protective Housing, Add</i>	2,016.50	
26 32 13 19-0032	EA		150 KW, Commercial, Natural Gas Generator Set (Generac QTA)	51,072.03	3,369.39
			<i>For Steel Weather Protective Housing, Add</i>	2,286.10	
			<i>For Aluminum Weather Protective Housing, Add</i>	1,963.51	
26 32 13 19-0033			Natural Gas Or Propane Generator Sets (Generac SG) <small>(26 32 13 19)</small>		
			Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad. Includes startup and training. Excludes fuel, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 26 36 23 00-0000 for automatic transfer switches.		
26 32 13 19-0034	EA		35 KW, Industrial, Natural Gas Or Propane Generator Set (Generac SG)	21,490.70	1,309.21
			<i>For Steel Weather Protective Housing, Add</i>	3,799.05	
			<i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	6,803.30	
26 32 13 19-0035	EA		40 KW, Industrial, Natural Gas Or Propane Generator Set (Generac SG)	24,131.64	1,435.48
			<i>For Steel Weather Protective Housing, Add</i>	3,799.05	
			<i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	6,803.30	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13 19-0036 EA 45 KW, Industrial, Natural Gas Or Propane Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	25,121.40 3,799.05 6,803.30	1,548.46
26 32 13 19-0037 EA 70 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	33,433.68 2,286.10 9,500.62	2,119.99
26 32 13 19-0038 EA 100 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	39,889.23 2,286.10 9,500.62	2,551.96
26 32 13 19-0039 EA 130 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	48,184.97 2,286.10 9,500.62	3,043.75
26 32 13 19-0040 EA 150 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	80,211.41 9,997.50 18,225.44	3,369.39
26 32 13 19-0041 EA 175 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	89,171.56 9,997.50 18,225.44	3,761.49
26 32 13 19-0042 EA 200 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	94,420.17 9,997.50 18,225.44	4,120.36
26 32 13 19-0043 EA 250 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	136,047.04 9,997.50 18,225.44	4,532.39
26 32 13 19-0044 EA 275 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	138,752.26 9,997.50 18,225.44	4,778.29
26 32 13 19-0045 EA 300 KW, Industrial, Natural Gas Generator Set (Generac SG)..... <i>For Steel Weather Protective Housing, Add</i> <i>For Level 2 Steel Weather/Sound Protective Housing, Add</i>	141,518.01 9,997.50 18,225.44	4,990.95
26 32 13 19-0046 Natural Gas Or Propane Generator Sets (Taylor) <small>(26 32 13 19)</small> Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad without enclosure. Includes manufacturer's representative at startup. Excludes fuel tank, enclosure, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 26 36 23 00-0000 for automatic transfer switches.		
26 32 13 19-0047 EA 30 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG30).....	25,558.41	1,186.26
26 32 13 19-0048 EA 40 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG40).....	27,848.61	1,422.19
26 32 13 19-0049 EA 60 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG60).....	29,063.39	1,894.04
26 32 13 19-0050 EA 80 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG80).....	43,272.15	2,219.68
26 32 13 19-0051 EA 100 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG100).....	47,096.07	2,578.55
26 32 13 19-0052 EA 125 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG125).....	61,705.32	3,057.04
26 32 13 19-0053 EA 150 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG150).....	64,659.53	3,369.39
26 32 13 19-0054 EA 200 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG200).....	106,759.44	4,120.36
26 32 13 19-0055 EA 250 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG250).....	149,156.73	4,532.39
26 32 13 19-0056 EA 350 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG350).....	181,836.03	5,582.42
26 32 13 19-0057 EA 400 KW Natural Gas Or Propane Generator Set, 3 Phase (Taylor TG400).....	216,716.09	6,114.08
26 32 13 19-0058 Natural Gas Or Propane Generator Sets (Kohler KG) <small>(26 32 13 19)</small> Note: 3 Phase, 4-Wire 480/277 or 208/120 Volt complete with radiator, fuel pump, battery charger, silencer, exhaust flex, indicating and operating controls, electronic governor. Pricing based on installation above grade on concrete pad. Includes startup and training. Excludes fuel, utility piping, wiring, automatic transfer switch, loadbank testing and concrete pad. See CSI section 01 22 23 00-0686 for loadbank rental, 01 22 23 00-0707 for fuel reimbursement, 26 36 23 00-0000 for automatic transfer switches.		
26 32 13 19-0059 EA 40 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG40)..... <i>For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	20,889.55 11,718.62 15,624.82 23,289.74 4,529.28 13,875.82	1,435.48
26 32 13 19-0060 EA 45 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG45)..... <i>For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	22,065.45 11,718.62 15,624.82 23,289.74 4,529.28 13,875.82	1,548.46
26 32 13 19-0061 EA 50 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG50)..... <i>For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	23,759.47 11,718.62 15,624.82 23,289.74 4,529.28 13,875.82	1,661.44
26 32 13 19-0062 EA 60 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG60)..... <i>For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add</i> <i>For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add</i>	25,001.89 11,718.62 15,624.82 23,289.74 4,529.28 13,875.82	1,894.04

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 32 Packaged Generator Assemblies**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 32 13 19-0063 EA 80 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG80).....	30,038.21	2,266.20
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0064 EA 100 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG100).....	33,848.14	2,551.96
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0065 EA 125 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG125).....	38,466.97	3,057.04
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0066 EA 150 KW Natural Gas Or Propane Generator Set, 3 Phase (Kohler KG150).....	46,033.12	3,369.39
For Quietsite Level 1 Steel Natural Gas Or Propane Generator Enclosure, Add	17,916.75	
For Quietsite Level 2 Aluminum Natural Gas Or Propane Generator Enclosure, Add	23,289.74	
For Quietsite Level 2 Steel Natural Gas Or Propane Generator Enclosure, Add	23,889.00	
For Weather Resistant Steel Natural Gas Or Propane Generator Enclosure, Add	8,254.88	
For Weather Resistant Aluminum Natural Gas Or Propane Generator Enclosure, Add	16,268.20	
26 32 13 19-0067 EA 180 KW Natural Gas Generator Set, 3 Phase (Kohler KG180).....	66,973.19	8,962.31
For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add	48,764.56	
For Weather Resistant Steel Natural Gas Generator Enclosure, Add	44,052.38	
For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add	72,277.86	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	48,165.88	
For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add	65,019.42	
26 32 13 19-0068 EA 200 KW Natural Gas Generator Set, 3 Phase (Kohler KG200).....	76,173.60	4,047.26
For Quietsite Level 1 Steel Natural Gas Generator Enclosure, Add	48,764.56	
For Weather Resistant Steel Natural Gas Generator Enclosure, Add	44,052.38	
For Quietsite Level 2 Aluminum Natural Gas Generator Enclosure, Add	72,277.86	
For Weather Resistant Aluminum Natural Gas Generator Enclosure, Add	48,165.88	
For Quietsite Level 2 Steel Natural Gas Generator Enclosure, Add	65,019.42	
26 32 13 19-0069 Small Natural Gas Or Propane Air Cooled Generator Sets (26 32 13 19)		
26 32 13 19-0070 EA 7.5 KW Natural Gas Or Propane Air Cooled Generator Set.....	5,101.59	565.04
Note: Includes weatherproof composite enclosure and 100 A automatic transfer switch.		
26 32 13 19-0071 EA 10 KW Natural Gas Or Propane Air Cooled Generator Set.....	6,438.12	627.82
Note: Includes weatherproof composite enclosure and 200 A automatic transfer switch.		
26 32 13 19-0072 EA 14 KW Natural Gas Or Propane Air Cooled Generator Set.....	7,427.43	690.60
Note: Includes weatherproof composite enclosure and 200 A automatic transfer switch.		
26 32 29 Rotary Converters (26 32)		
26 32 29 00-0001 60 Hz AC Input 230 Or 460 Volt, 125 Volt DC Output (26 32 29)		
26 32 29 00-0002 EA 3 KW, 24 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	9,830.05	244.56
26 32 29 00-0003 EA 5 KW, 40 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	11,978.71	244.56
26 32 29 00-0004 EA 7.5 KW, 60 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	15,875.97	244.56
26 32 29 00-0005 EA 10 KW, 80 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	16,001.04	244.56
26 32 29 00-0006 EA 15 KW, 120 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	17,758.81	305.70
26 32 29 00-0007 EA 20 KW, 160 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	19,235.13	305.70
26 32 29 00-0008 EA 25 KW, 200 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	20,142.99	305.70
26 32 29 00-0009 EA 40 KW, 320 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	24,525.46	403.52
26 32 29 00-0010 EA 50 KW, 400 Amperes, 125 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	27,262.43	403.52
26 32 29 00-0011 60 Hz AC Input, 230 Or 460 Volt, 250 Volts DC Output (26 32 29)		
26 32 29 00-0012 EA 3 KW, 12 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	11,385.57	244.56
26 32 29 00-0013 EA 5 KW, 20 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	13,581.36	244.56
26 32 29 00-0014 EA 7.5 KW, 30 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	15,537.53	244.56
26 32 29 00-0015 EA 10 KW, 40 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	15,969.30	244.56
26 32 29 00-0016 EA 15 KW, 60 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	18,085.47	305.70
26 32 29 00-0017 EA 20 KW, 80 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	19,892.69	305.70
26 32 29 00-0018 EA 25 KW, 100 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	20,550.25	305.70
26 32 29 00-0019 EA 40 KW, 160 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	24,427.89	403.52
26 32 29 00-0020 EA 50 KW, 200 Amperes, 250 Volt DC, Rectifier 230 Or 460 AC To DC Conversion.....	25,916.94	403.52
26 32 29 00-0021 460 Volt 3 Phase AC Motor Drive 250 Volt DC (26 32 29)		
26 32 29 00-0022 EA 33 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	28,224.72	4,652.02
26 32 29 00-0023 EA 40 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	31,252.59	4,652.02
26 32 29 00-0024 EA 50 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	35,520.82	6,645.74
26 32 29 00-0025 EA 65 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	41,503.57	6,645.74
26 32 29 00-0026 EA 85 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	47,151.65	6,645.74
26 32 29 00-0027 EA 100 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	55,284.23	9,968.60
26 32 29 00-0028 EA 125 KW, 460 Volt AC Drive Motor To 250 Volt DC, AC To DC Electrical Conversion.....	66,918.11	9,968.60

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 33 Battery Equipment (26 30)

26 33 13 Batteries (26 33)

26 33 13 00-0001 Standby Batteries (26 33 13)

26 33 13 00-0002	EA	12 Volt, 100 Ampere Hours To 10.5 Volt Capacity, 6-Cell, Valve Regulated Lead-Calcium, Standby Battery	1,204.03	30.62
26 33 13 00-0003	EA	12 Volt, 100 Ampere Hours To 10.5 Volt Capacity, 6-Cell, Valve Regulated Lead-Calcium, Standby Battery With Steel Jacket	1,300.88	30.62
26 33 13 00-0004	EA	725CCA, Group 31, 12 Volt Lead Calcium Standby Battery	397.02	30.62
26 33 13 00-0005	EA	810CCA, Group 24, 12 Volt Lead Calcium Standby Battery	360.09	30.62
26 33 13 00-0006	EA	1080CCA, Group 4D, 12 Volt Lead Calcium Standby Battery	623.41	30.62
26 33 13 00-0007	EA	1400CCA, Group 8D, 12 Volt Lead Calcium Standby Battery	725.45	30.62

26 33 43 Battery Chargers (26 33)

26 33 43 00-0001 Solid State Chargers, Single Phase (26 33 43)

Note: Includes wall bracket, 10' of DC charging cable and standard connector, 208/240/480 V.

26 33 43 00-0002	EA	Solid State Battery Charger, 6 Cell Single Phase With Wall Bracket, 208/240/480 Volt	3,398.43	698.23
26 33 43 00-0003	EA	Solid State Battery Charger, 9 Cell Single Phase With Wall Bracket, 208/240/480 Volt	3,971.61	698.23
26 33 43 00-0004	EA	Solid State Battery Charger, 12 Cell Single Phase With Wall Bracket, 208/240/480 Volt	4,372.86	698.23
26 33 43 00-0005	EA	Solid State Battery Charger, 18 Cell Single Phase With Wall Bracket, 208/240/480 Volt	4,624.53	826.70

26 33 53 Static Uninterruptible Power Supply (26 33)

26 33 53 00-0001 Single Phase, Uninterruptible Power Supply Systems (UPS) (26 33 53)

26 33 53 00-0002 Single Phase, Uninterruptible Power Supply Systems (UPS) (26 33 53 00-0001)

26 33 53 00-0003 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (26 33 53 00-0002)

Note: Rack mount or tower configuration. Includes 40 or 70 Hertz automatic frequency detection, internal automatic and manual bypass switch and self diagnostics.

26 33 53 00-0004	EA	0.5 kVA, 450 Watt, 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-500RT120)	1,147.45	121.06
		Note: Includes 12 minutes of battery backup at full load.		
26 33 53 00-0005	EA	0.7 kVA, 630 Watt, 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-700RT120)	1,370.38	141.23
		Note: Includes 6 minutes of battery backup at full load.		
26 33 53 00-0006	EA	1 kVA, 900 Watt, 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-1000RT120)	1,688.10	161.40
		Note: Includes 5 minutes of battery backup at full load.		
26 33 53 00-0007	EA	1.5 kVA, 1,350 Watt, 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-1500RT120)	2,060.94	181.59
		Note: Includes 5 minutes of battery backup at full load.		
26 33 53 00-0008	EA	2 kVA, 1,800 Watt, 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-2000RT120)	2,642.11	201.76
		Note: Includes 4 minutes of battery backup at full load.		
26 33 53 00-0009	EA	3 kVA, 2,700 Watt, 120 Volt AC Output, 120 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-3000RT120)	4,248.72	242.11
		Note: Includes 4 minutes of battery backup at full load.		

26 33 53 00-0010 208 Volt AC Output, 208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (26 33 53 00-0002)

Note: Rack mount or tower configuration. Includes 40 or 70 Hertz automatic frequency detection, internal automatic and manual bypass switch and self diagnostics.

26 33 53 00-0011	EA	3 kVA, 2,700 Watt, 208 Volt AC Output, 208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-3000RT208)	4,170.85	242.11
		Note: Includes 4 minutes of battery backup at full load.		

26 33 53 00-0012 120/208 Volt AC Output, 120/208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (26 33 53 00-0002)

Note: Rack mount or tower configuration. Includes 50 or 60 Hertz automatic frequency detection, internal automatic and manual bypass switch and self diagnostics.

26 33 53 00-0013	EA	5 kVA, 4,000 Watt, 120/208 Volt AC Output, 120/208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-5000RT208)	6,429.94	322.82
		Note: Includes 5 minutes of battery backup at full load.		
26 33 53 00-0014	EA	6 kVA, 4,800 Watt, 120/208 Volt AC Output, 120/208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-6000RT208)	7,032.43	363.17
		Note: Includes 4 minutes of battery backup at full load.		
26 33 53 00-0015	EA	8 kVA, 7,200 Watt, 120/208 Volt AC Output, 120/208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-8000RT208)	10,507.66	443.87
		Note: Includes 7 minutes of battery backup at full load.		
26 33 53 00-0016	EA	10 kVA, 9,000 Watt, 120/208 Volt AC Output, 120/208 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-10000RT208)	12,076.64	484.22
		Note: Includes 4-1/2 minutes of battery backup at full load.		

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 33 Battery Equipment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 33 53 00-0017		230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) <small>(26 33 53 00-0002)</small> Note: Rack mount or tower configuration. Includes 40 or 70 Hertz automatic frequency detection, internal automatic and manual bypass switch and self diagnostics.		
26 33 53 00-0018	EA	0.7 KVA, 630 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-700RT230).....	1,370.38	141.23
		Note: Includes 11 minutes of battery backup at full load.		
26 33 53 00-0019	EA	1 KVA, 900 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-1000RT230).....	1,688.10	161.40
		Note: Includes 6 minutes of battery backup at full load.		
26 33 53 00-0020	EA	1.5 KVA, 1,350 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-1500RT230).....	2,083.94	181.59
		Note: Includes 4 minutes of battery backup at full load.		
26 33 53 00-0021	EA	2 KVA, 1,800 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-2000RT230).....	2,647.66	201.76
		Note: Includes 4 minutes of battery backup at full load.		
26 33 53 00-0022	EA	3 KVA, 2,700 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-3000RT230).....	4,266.00	242.11
		Note: Includes 4 minutes of battery backup at full load.		
26 33 53 00-0023	EA	5 KVA, 4,000 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-5000RT230).....	6,169.89	322.82
		Note: Includes 9 minutes of battery backup at full load.		
26 33 53 00-0024	EA	6 KVA, 4,800 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-6000RT230).....	7,573.09	363.17
		Note: Includes 6 minutes of battery backup at full load.		
26 33 53 00-0025	EA	10 KVA, 9,000 Watt, 230 Volt AC Output, 230 Volt AC Input, Single Phase, On-Line, Uninterruptible Power Supply (UPS) (Liebert® GXT3-10000RT230).....	11,704.89	484.22
		Note: Includes 3 minutes of battery backup at full load.		
26 33 53 00-0026		Optional Accessories For Single Phase, Uninterruptible Power Supply Systems <small>(26 33 53 00-0001)</small>		
26 33 53 00-0027	EA	External Battery Cabinet For 0.5 To 2 KVA Single Phase, Uninterruptible Power Supply Systems (Liebert® GXT3-48VBATT).....	756.66	36.68
		Note: Rack mount or tower configuration.		
26 33 53 00-0028	EA	External Battery Cabinet For 3 KVA Single Phase, Uninterruptible Power Supply Systems (Liebert® GXT3-72VBATT).....	990.58	36.68
		Note: Rack mount or tower configuration.		
26 33 53 00-0029	EA	External Battery Cabinet For 5 To 6 KVA Single Phase, Uninterruptible Power Supply Systems (Liebert® GXT3-144VBATT).....	964.54	36.68
		Note: Rack mount or tower configuration.		
26 33 53 00-0030	EA	External Battery Cabinet For 8 To 10 KVA Single Phase, Uninterruptible Power Supply Systems (Liebert® GXT3-288RTVBATT).....	655.89	36.68
		Note: Rack mount or tower configuration.		
26 33 53 00-0031	EA	Internal Replacement Battery For 5 To 6 KVA Single Phase, Uninterruptible Power Supply Systems (Liebert® GXT3-144VBATKIT).....	976.35	121.06
26 33 53 00-0032	EA	Internal Replacement Battery For 8 To 10 KVA Single Phase, Uninterruptible Power Supply Systems (Liebert® GXT3-288RTBKIT).....	1,098.64	161.40
26 33 53 00-0033		Three Phase, Uninterruptible Power Supply Systems (UPS) <small>(26 33 53)</small>		
26 33 53 00-0034		208 Volt AC Output, 120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply (UPS) With Internal Battery <small>(26 33 53 00-0033)</small> Note: Includes start-up, 60 Hz frequency, bypass switch and diagnostics.		
26 33 53 00-0035	EA	10 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System With Internal Battery (Emerson eXM UPS).....	41,840.64	484.22
26 33 53 00-0036	EA	15 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System With Internal Battery (Emerson eXM UPS).....	46,328.07	645.63
26 33 53 00-0037	EA	20 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System With Internal Battery (Emerson eXM UPS).....	51,790.71	807.04
26 33 53 00-0038	EA	30 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System With Internal Battery (Emerson eXM UPS).....	56,180.62	968.45
26 33 53 00-0039	EA	40 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System With Internal Battery (Emerson eXM UPS).....	67,591.98	1,129.86
26 33 53 00-0040		208 Volt AC Output, 120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply (UPS) Without Internal Battery <small>(26 33 53 00-0033)</small> Note: Excludes Internal Battery See CSI section 26 33 53 00-0055 for batteries.		
26 33 53 00-0041	EA	60 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	91,710.25	1,925.90
26 33 53 00-0042	EA	80 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	99,755.15	2,384.44
26 33 53 00-0043	EA	100 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	110,339.86	2,781.86
26 33 53 00-0044	EA	120 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	136,208.94	3,148.69
26 33 53 00-0045	EA	140 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	141,430.05	3,515.53
26 33 53 00-0046	EA	160 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	147,013.44	3,882.37



Electrical	26	26
Facility Electrical Power Generating and Storing Equipment	26 30	
Battery Equipment	26 33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 33 53 00-0047 EA 180 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	153,767.08	4,249.20
26 33 53 00-0048 EA 200 kVA, 208/120 Volt AC Output, 208-120 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	160,520.72	4,616.04
26 33 53 00-0049 480 Volt AC Output, 480 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply (UPS) Without Internal Battery (26 33 53 00-0033) Note: Excludes Internal Battery See CSI section 26 33 53 00-0055 for batteries.		
26 33 53 00-0050 EA 50 kVA, 480 Volt AC Output, 480 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	85,607.16	1,589.63
26 33 53 00-0051 EA 100 kVA, 480 Volt AC Output, 480 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	110,924.98	2,794.08
26 33 53 00-0052 EA 150 kVA, 480 Volt AC Output, 480 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	151,576.42	3,228.17
26 33 53 00-0053 EA 200 kVA, 480 Volt AC Output, 480 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	178,518.21	3,546.10
26 33 53 00-0054 EA 250 kVA, 480 Volt AC Output, 480 Volt AC Input, Three Phase, On-Line, Uninterruptible Power Supply System Without Internal Battery (Emerson eXM UPS).....	208,775.69	3,912.93
26 33 53 00-0055 Optional Accessories For Three Phase, Uninterruptible Power Supply Systems (26 33 53 00-0033)		
26 33 53 00-0056 EA Programmable Relay Board For Three Phase Uninterruptible Power Supply Systems.....	676.30	61.14
26 33 53 00-0057 EA Network Interface Card For Three Phase Uninterruptible Power Supply Systems.....	1,086.71	61.14
26 33 53 00-0058 EA Remote Status Panel With 100' Of Cable For Three Phase Uninterruptible Power Supply Systems.....	2,092.28	122.28
26 33 53 00-0059 EA Slim Line Distribution Panel With Two 42 Pole Panels For Three Phase Uninterruptible Power Supply Systems.....	6,522.01	489.12
26 33 53 00-0060 EA 12 Volt, 491 Watt, 3 Phase, 134 Ampere Hours, Battery For Uninterruptible Power Supply Systems (C&D UPS12-490MR).....	636.43	61.14
26 33 53 00-0061 EA 12 Volt, 204 Watt, 3 Phase, 55 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX200).....	347.09	61.14
26 33 53 00-0062 EA 12 Volt, 257 Watt, 3 Phase, 65 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX250).....	389.31	61.14
26 33 53 00-0063 EA 12 Volt, 311 Watt, 3 Phase, 75 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX300).....	431.53	61.14
26 33 53 00-0064 EA 12 Volt, 374 Watt, 3 Phase, 90 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX350).....	507.53	61.14
26 33 53 00-0065 EA 12 Volt, 415 Watt, 3 Phase, 100 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX400).....	532.86	61.14
26 33 53 00-0066 EA 12 Volt, 493 Watt, 3 Phase, 135 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX500).....	663.74	61.14
26 33 53 00-0067 EA 12 Volt, 540 Watt, 3 Phase, 150 Ampere Hours, Battery For Uninterruptible Power Supply Systems (Fiamm 12FLX540).....	695.41	61.14
26 33 53 00-0068 Other Uninterruptable Power Supply Equipment (26 33 53)		
26 33 53 00-0069 EA Uninterrupted Power Supply Slim-Line Distribution Panel 42 Pole GE Plug-In.....	6,235.04	111.72
26 33 53 00-0070 EA Uninterrupted Power Supply Slim-Line Distribution Panel 84 Pole GE Plug-In.....	7,494.96	223.43
26 33 53 00-0071 EA 1 Pole, 15 To 60 Amperes, GE Plug-In Breakers For UPS Distribution Panel.....	32.06	6.71
26 33 53 00-0072 EA 2 Pole, 15 To 40 Amperes, GE Plug-In Breakers For UPS Distribution Panel.....	58.22	8.38
26 33 53 00-0073 EA 2 Pole, 50 To 80 Amperes, GE Plug-In Breakers For UPS Distribution Panel.....	110.04	8.38
26 33 53 00-0074 EA 3 Pole, 15 To 60 Amperes, GE Plug-In Breakers For UPS Distribution Panel.....	161.24	11.17
26 33 53 00-0075 EA 3 Pole, 70 To 100 Amperes, GE Plug-In Breakers For UPS Distribution Panel.....	229.65	11.17
26 33 53 00-0076 EA Uninterrupted Power Supply Remote Status Panel.....	4,265.72	111.72
26 33 53 00-0077 EA Uninterrupted Power Supply Remote Contact Board.....	1,411.33	83.79
26 33 53 00-0078 Battery Backup Uninterruptible Power Supply (UPS) (26 33 53)		
26 33 53 00-0079 EA 1000 VA, 600 Watt, 120 Volt, Battery Backup Uninterruptible Power Supply (UPS) (APC SMC1000)..... Note: With 8 battery backup and surge protector outlets	686.74	
26 33 53 00-0080 EA 1500 VA, 900 Watt, 120 Volt, Battery Backup Uninterruptible Power Supply (UPS) (APC SMC1500)..... Note: With 8 battery backup and surge protector outlets	848.63	
26 35 Power Filters and Conditioners (26 30)		
26 35 33 Power Factor Correction Equipment (26 35)		
26 35 33 16 Low-Voltage Power Factor Correction Equipment (26 35 33)		
26 35 33 16-0001 Power Factor Correction Capacitors (26 35 33 16)		
26 35 33 16-0002 EA Power Factor Correction Capacitors, 2.0 KVAC.....	911.11	
26 35 33 16-0003 EA Power Factor Correction Capacitors, 3.0 KVAC.....	1,009.07	
26 35 33 16-0004 EA Power Factor Correction Capacitors, 4.0 KVAC.....	1,107.04	
26 35 33 16-0005 EA Power Factor Correction Capacitors, 5.0 KVAC.....	1,201.09	
26 35 33 16-0006 EA Power Factor Correction Capacitors, 7.5 KVAC.....	1,475.40	
26 35 33 16-0007 EA Power Factor Correction Capacitors, 10.0 KVAC.....	1,802.62	
26 35 33 16-0008 EA Power Factor Correction Capacitors, 15.0 KVAC.....	2,784.26	
26 35 33 16-0009 EA Power Factor Correction Capacitors, 20.0 KVAC.....	3,381.87	
26 35 33 16-0010 EA Power Factor Correction Capacitors, 25.0 KVAC.....	4,369.39	
26 35 33 16-0011 EA Power Factor Correction Capacitors, 30.0 KVAC.....	4,968.95	
26 35 33 16-0012 EA Power Factor Correction Capacitors, 50.0 KVAC.....	8,719.18	

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 35 Power Filters and Conditioners**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 35 33 16-0013	EA	Power Factor Correction Capacitors, 75.0 KVAC	13,110.12	
26 35 33 16-0014	EA	Power Factor Correction Capacitors, 100.0 KVAC	17,481.47	
26 35 33 16-0015	EA	Power Factor Correction Capacitors, Fuse Kit	811.18	

26 35 43 Static-Frequency Converters (26 35)**26 35 43 00-0001 Rotary Phase Converter With NEMA 1 Indoor Enclosure (26 35 43)**

26 35 43 00-0002	EA	750 Watt Output Rotary Phase Converter With NEMA 1 Enclosure	716.71	122.28
26 35 43 00-0003	EA	2 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	1,249.43	146.73
26 35 43 00-0004	EA	3 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	1,432.33	195.65
26 35 43 00-0005	EA	5 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	1,967.10	244.56
26 35 43 00-0006	EA	7 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	2,709.99	317.93
26 35 43 00-0007	EA	11 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	3,502.56	391.30
26 35 43 00-0008	EA	15 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	4,394.51	464.66
26 35 43 00-0009	EA	21 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	5,361.34	525.80
26 35 43 00-0010	EA	29 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	6,227.29	635.85
26 35 43 00-0011	EA	36 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	7,131.44	715.34
26 35 43 00-0012	EA	44 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	8,035.60	794.81
26 35 43 00-0013	EA	55 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	9,980.36	959.89
26 35 43 00-0014	EA	74 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	12,979.86	1,155.54
26 35 43 00-0015	EA	87 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	16,461.99	1,406.21
26 35 43 00-0016	EA	110 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	18,826.73	1,644.65
26 35 43 00-0017	EA	125 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	24,273.17	1,834.19
26 35 43 00-0018	EA	165 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	37,182.30	2,078.74
26 35 43 00-0019	EA	220 KW Output Rotary Phase Converter With NEMA 1 Enclosure.....	55,556.22	2,323.31

26 35 53 Voltage Regulators (26 35)**26 35 53 00-0001 Voltage Regulators, 480/277 Or 208/120 Volt, 3 Phase (26 35 53)**

Note: For diesel motor generator sets mounted in switchgear cabinet.

26 35 53 00-0002	EA	50 KVA Volt Regulator For Diesel M-G 480/277 Or 208/120 Volt, 3 Phase In Switchgear	7,267.22	1,944.24
26 35 53 00-0003	EA	75 KVA Volt Regulator For Diesel M-G 480/277 Or 208/120 Volt, 3 Phase In Switchgear	8,278.97	2,445.59
26 35 53 00-0004	EA	100 KVA Volt Regulator For Diesel M-G 480/277 Or 208/120 Volt, 3 Phase In Switchgear	9,210.62	2,910.25

26 36 Transfer Switches (26 36)**26 36 13 Manual Transfer Switches (26 36)****26 36 13 00-0001 Fused Manual Transfer Switches (26 36 13)**

26 36 13 00-0002	EA	30 Amperes, Manual Transfer Switch, Fused, 3 Pole, 480 Volt.....	1,363.85	213.99
26 36 13 00-0003	EA	60 Amperes, Manual Transfer Switch, Fused, 3 Pole, 480 Volt.....	1,589.45	265.83

26 36 13 00-0004 Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure

(26 36 13)

26 36 13 00-0005	EA	40 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT40).....	3,944.57	313.91
		For NEMA 12 Enclosure, Add	1,228.43	
		For NEMA 3R Enclosure, Add	1,305.22	
26 36 13 00-0006	EA	70 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT70).....	4,357.31	376.69
		For NEMA 12 Enclosure, Add	1,228.43	
		For NEMA 3R Enclosure, Add	1,305.22	
26 36 13 00-0007	EA	125 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT125).....	4,940.40	439.47
		For NEMA 12 Enclosure, Add	1,228.43	
		For NEMA 3R Enclosure, Add	1,305.22	
26 36 13 00-0008	EA	150 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT150).....	6,153.77	502.25
		For NEMA 12 Enclosure, Add	1,228.43	
		For NEMA 3R Enclosure, Add	1,535.55	
26 36 13 00-0009	EA	225 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT225).....	7,642.48	565.04
		For NEMA 12 Enclosure, Add	1,228.43	
		For NEMA 3R Enclosure, Add	1,535.55	
26 36 13 00-0010	EA	260 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT260).....	8,595.82	627.82
		For NEMA 12 Enclosure, Add	1,228.43	
		For NEMA 3R Enclosure, Add	1,535.55	
26 36 13 00-0011	EA	300 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT300).....	9,564.65	690.60
		For NEMA 12 Enclosure, Add	1,535.55	
		For NEMA 3R Enclosure, Add	1,811.94	
26 36 13 00-0012	EA	400 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT400).....	11,255.67	753.38
		For NEMA 12 Enclosure, Add	1,535.55	
		For NEMA 3R Enclosure, Add	1,811.94	
26 36 13 00-0013	EA	600 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT600).....	14,911.08	941.73
		For NEMA 12 Enclosure, Add	1,535.55	
		For NEMA 3R Enclosure, Add	1,811.94	
26 36 13 00-0014	EA	800 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT800).....	16,743.42	1,130.07
		For NEMA 12 Enclosure, Add	2,149.77	
		For NEMA 3R Enclosure, Add	2,226.53	
26 36 13 00-0015	EA	1,000 Amperes, Non-Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OT1000).....	22,289.36	1,594.98
		For NEMA 12 Enclosure, Add	2,149.77	
		For NEMA 3R Enclosure, Add	2,226.53	

26 36 23 Automatic Transfer Switches (26 36)



Electrical	26	26
Facility Electrical Power Generating and Storing Equipment	26 30	
Transfer Switches	26 36	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 36 23 00-0001 Automatic Transfer Switch <small>(26 36 23)</small>		
26 36 23 00-0002 Automatic Transfer Switch, 2 Pole Circuit Breaker, NEMA 1 Enclosure <small>(26 36 23)</small> <small>00-0001</small> Note: Programmable, 120/240 volt single phase, 3 wire.		
26 36 23 00-0003 EA 100 Amperes, Automatic Transfer Switch, 120/240 Volt, NEMA 1, 2 Pole Circuit Breaker, Programmable, 3 Wire.....	3,492.42	439.47
For Level 2 Controller, Add	202.54	
For Level 3 Controller, Add	418.16	
For Level 4 Controller, Add	607.63	
26 36 23 00-0004 EA 225 Amperes, Automatic Transfer Switch, 120/240 Volt, NEMA 1, 2 Pole Circuit Breaker, Programmable, 3 Wire.....	4,766.21	565.04
For Level 2 Controller, Add	281.80	
For Level 3 Controller, Add	581.78	
For Level 4 Controller, Add	845.40	
26 36 23 00-0005 EA 400 Amperes, Automatic Transfer Switch, 120/240 Volt, NEMA 1, 2 Pole Circuit Breaker, Programmable, 3 Wire.....	7,642.76	753.38
For Level 2 Controller, Add	475.54	
For Level 3 Controller, Add	981.76	
For Level 4 Controller, Add	1,426.62	
26 36 23 00-0006 EA 600 Amperes, Automatic Transfer Switch, 120/240 Volt, NEMA 1, 2 Pole Circuit Breaker, Programmable, 3 Wire.....	12,560.12	941.73
For Level 2 Controller, Add	827.44	
For Level 3 Controller, Add	1,708.27	
For Level 4 Controller, Add	2,482.33	
26 36 23 00-0007 Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure <small>(26 36 23)</small> <small>00-0001</small>		
26 36 23 00-0008 EA 40 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC40)	5,952.07	313.91
For NEMA 4 Enclosure, Add	1,381.99	
For NEMA 12 Enclosure, Add	1,381.99	
For Level 2 Controller, Add	412.63	
For Level 3 Controller, Add	851.88	
For Level 4 Controller, Add	1,237.89	
For NEMA 3R Enclosure, Add	1,305.22	
26 36 23 00-0009 EA 70 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC70)	6,864.56	376.69
For NEMA 4 Enclosure, Add	1,381.99	
For NEMA 12 Enclosure, Add	1,381.99	
For Level 2 Controller, Add	473.62	
For Level 3 Controller, Add	977.79	
For Level 4 Controller, Add	1,420.85	
For NEMA 3R Enclosure, Add	1,305.22	
26 36 23 00-0010 EA 100 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC100)	7,199.04	408.09
For NEMA 4 Enclosure, Add	1,381.99	
For NEMA 12 Enclosure, Add	1,381.99	
For Level 2 Controller, Add	494.67	
For Level 3 Controller, Add	1,021.26	
For Level 4 Controller, Add	1,484.02	
For NEMA 3R Enclosure, Add	1,305.22	
26 36 23 00-0011 EA 125 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC125)	7,533.53	439.47
For NEMA 4 Enclosure, Add	1,381.99	
For NEMA 12 Enclosure, Add	1,381.99	
For Level 2 Controller, Add	515.73	
For Level 3 Controller, Add	1,064.73	
For Level 4 Controller, Add	1,547.19	
For NEMA 3R Enclosure, Add	1,305.22	
26 36 23 00-0012 EA 150 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC150)	8,972.56	502.25
For NEMA 12 Enclosure, Add	1,381.99	
For NEMA 4 Enclosure, Add	1,996.21	
For NEMA 3R Enclosure, Add	1,535.55	
For Level 2 Controller, Add	617.52	
For Level 3 Controller, Add	1,274.89	
For Level 4 Controller, Add	1,852.57	
26 36 23 00-0013 EA 225 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC225)	10,249.70	565.04
For NEMA 12 Enclosure, Add	1,381.99	
For NEMA 4 Enclosure, Add	1,996.21	
For NEMA 3R Enclosure, Add	1,535.55	
For Level 2 Controller, Add	706.77	
For Level 3 Controller, Add	1,459.14	
For Level 4 Controller, Add	2,120.31	
26 36 23 00-0014 EA 260 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC260)	11,308.62	627.82
For NEMA 12 Enclosure, Add	1,381.99	
For NEMA 4 Enclosure, Add	1,996.21	
For NEMA 3R Enclosure, Add	1,535.55	
For Level 2 Controller, Add	779.11	
For Level 3 Controller, Add	1,608.48	
For Level 4 Controller, Add	2,337.32	
26 36 23 00-0015 EA 300 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC300)	11,798.80	690.60
For NEMA 12 Enclosure, Add	1,535.55	
For NEMA 3R Enclosure, Add	1,811.94	
For NEMA 4 Enclosure, Add	2,149.77	
For Level 2 Controller, Add	807.36	
For Level 3 Controller, Add	1,666.82	
For Level 4 Controller, Add	2,422.09	

26 Electrical

26 30 Facility Electrical Power Generating and Storing Equipment

26 36 Transfer Switches



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 36 23 00-0016	EA	400 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC400).....	13,357.48	753.38
		<i>For NEMA 12 Enclosure, Add</i>	1,535.55	
		<i>For NEMA 3R Enclosure, Add</i>	1,811.94	
		<i>For NEMA 4 Enclosure, Add</i>	2,149.77	
		<i>For Level 2 Controller, Add</i>	918.43	
		<i>For Level 3 Controller, Add</i>	1,896.12	
		<i>For Level 4 Controller, Add</i>	2,755.29	
26 36 23 00-0017	EA	600 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC600).....	18,351.71	941.73
		<i>For NEMA 12 Enclosure, Add</i>	1,535.55	
		<i>For NEMA 3R Enclosure, Add</i>	1,811.94	
		<i>For NEMA 4 Enclosure, Add</i>	2,149.77	
		<i>For Level 2 Controller, Add</i>	1,276.29	
		<i>For Level 3 Controller, Add</i>	2,634.92	
		<i>For Level 4 Controller, Add</i>	3,828.87	
26 36 23 00-0018	EA	800 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC800).....	20,543.03	1,130.07
		<i>For NEMA 3R Enclosure, Add</i>	2,226.53	
		<i>For Level 2 Controller, Add</i>	1,416.92	
		<i>For Level 3 Controller, Add</i>	2,925.26	
		<i>For Level 4 Controller, Add</i>	4,250.77	
		<i>For NEMA 4 Enclosure, Add</i>	2,456.89	
		<i>For NEMA 12 Enclosure, Add</i>	2,149.77	
26 36 23 00-0019	EA	1,000 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC1000).....	26,730.90	1,594.98
		<i>For NEMA 3R Enclosure, Add</i>	2,226.53	
		<i>For Level 2 Controller, Add</i>	1,824.42	
		<i>For Level 3 Controller, Add</i>	3,766.55	
		<i>For Level 4 Controller, Add</i>	5,473.27	
		<i>For NEMA 4 Enclosure, Add</i>	2,456.89	
		<i>For NEMA 12 Enclosure, Add</i>	2,149.77	
26 36 23 00-0020	EA	1,200 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC1200).....	34,868.88	1,727.89
		<i>For NEMA 3R Enclosure, Add</i>	4,913.75	
		<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
		<i>For Level 2 Controller, Add</i>	2,434.52	
		<i>For Level 3 Controller, Add</i>	5,026.10	
		<i>For Level 4 Controller, Add</i>	7,303.55	
		<i>For NEMA 12 Enclosure, Add</i>	2,303.33	
26 36 23 00-0021	EA	1,600 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC1600).....	37,096.95	1,993.72
		<i>For NEMA 3R Enclosure, Add</i>	7,984.83	
		<i>For NEMA 4 Enclosure, Add</i>	9,827.47	
		<i>For NEMA 12 Enclosure, Add</i>	7,984.83	
		<i>For Level 2 Controller, Add</i>	2,565.99	
		<i>For Level 3 Controller, Add</i>	5,297.52	
		<i>For Level 4 Controller, Add</i>	7,697.96	
26 36 23 00-0022	EA	2,000 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC2000).....	42,426.07	2,259.55
		<i>For NEMA 3R Enclosure, Add</i>	7,984.83	
		<i>For NEMA 4 Enclosure, Add</i>	9,827.47	
		<i>For NEMA 12 Enclosure, Add</i>	7,984.83	
		<i>For Level 2 Controller, Add</i>	2,937.79	
		<i>For Level 3 Controller, Add</i>	6,065.12	
		<i>For Level 4 Controller, Add</i>	8,813.37	
26 36 23 00-0023	EA	3,000 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC3000).....	51,207.86	2,791.21
		<i>For NEMA 3R Enclosure, Add</i>	7,984.83	
		<i>For Level 2 Controller, Add</i>	3,535.97	
		<i>For Level 3 Controller, Add</i>	7,300.07	
		<i>For Level 4 Controller, Add</i>	10,607.91	
26 36 23 00-0024	EA	4,000 Amperes, Automatic Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPC4000).....	89,666.09	3,322.87
		<i>For NEMA 3R Enclosure, Add</i>	14,802.63	
		<i>For Level 2 Controller, Add</i>	6,434.08	
		<i>For Level 3 Controller, Add</i>	13,283.26	
		<i>For Level 4 Controller, Add</i>	19,302.23	
26 36 23 00-0025		Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure <small>(26 36 23 00-0001)</small>		
26 36 23 00-0026	EA	150 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC150).....	29,176.51	2,385.71
		<i>For NEMA 12 Enclosure, Add</i>	1,458.78	
		<i>For NEMA 3R Enclosure, Add</i>	2,687.21	
		<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
		<i>For Level 2 Controller, Add</i>	1,891.39	
		<i>For Level 3 Controller, Add</i>	3,904.81	
		<i>For Level 4 Controller, Add</i>	5,674.18	
26 36 23 00-0027	EA	225 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC225).....	30,444.32	2,511.27
		<i>For NEMA 12 Enclosure, Add</i>	1,458.78	
		<i>For NEMA 3R Enclosure, Add</i>	2,687.21	
		<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
		<i>For Level 2 Controller, Add</i>	1,970.19	
		<i>For Level 3 Controller, Add</i>	4,067.48	
		<i>For Level 4 Controller, Add</i>	5,910.56	
26 36 23 00-0028	EA	260 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC260).....	31,911.86	2,636.84
		<i>For NEMA 12 Enclosure, Add</i>	1,458.78	
		<i>For NEMA 3R Enclosure, Add</i>	2,687.21	
		<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
		<i>For Level 2 Controller, Add</i>	2,064.46	
		<i>For Level 3 Controller, Add</i>	4,262.11	
		<i>For Level 4 Controller, Add</i>	6,193.38	



Electrical	26	26
Facility Electrical Power Generating and Storing Equipment	26 30	
Transfer Switches	26 36	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 36 23 00-0029	EA		300 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC300).....	35,766.30	2,699.62
			<i>For NEMA 12 Enclosure, Add</i>	1,458.78	
			<i>For NEMA 3R Enclosure, Add</i>	2,687.21	
			<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
			<i>For Level 2 Controller, Add</i>	2,353.45	
			<i>For Level 3 Controller, Add</i>	4,858.73	
			<i>For Level 4 Controller, Add</i>	7,060.34	
26 36 23 00-0030	EA		400 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC400).....	41,496.42	2,762.40
			<i>For NEMA 12 Enclosure, Add</i>	1,458.78	
			<i>For NEMA 3R Enclosure, Add</i>	2,687.21	
			<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
			<i>For Level 2 Controller, Add</i>	2,787.80	
			<i>For Level 3 Controller, Add</i>	5,755.46	
			<i>For Level 4 Controller, Add</i>	8,363.40	
26 36 23 00-0031	EA		600 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC600).....	50,088.31	2,887.96
			<i>For NEMA 3R Enclosure, Add</i>	2,687.21	
			<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
			<i>For Level 2 Controller, Add</i>	3,434.21	
			<i>For Level 3 Controller, Add</i>	7,089.98	
			<i>For Level 4 Controller, Add</i>	10,302.63	
			<i>For NEMA 12 Enclosure, Add</i>	1,535.55	
26 36 23 00-0032	EA		800 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC800).....	55,322.27	3,013.53
			<i>For NEMA 3R Enclosure, Add</i>	2,763.98	
			<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
			<i>For Level 2 Controller, Add</i>	3,820.38	
			<i>For Level 3 Controller, Add</i>	7,887.24	
			<i>For Level 4 Controller, Add</i>	11,461.14	
			<i>For NEMA 12 Enclosure, Add</i>	1,689.11	
26 36 23 00-0033	EA		1,000 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC1000).....	69,678.92	3,515.78
			<i>For NEMA 3R Enclosure, Add</i>	2,763.98	
			<i>For NEMA 4 Enclosure, Add</i>	2,763.98	
			<i>For Level 2 Controller, Add</i>	4,855.17	
			<i>For Level 3 Controller, Add</i>	10,023.58	
			<i>For Level 4 Controller, Add</i>	14,565.51	
			<i>For NEMA 12 Enclosure, Add</i>	1,689.11	
26 36 23 00-0034	EA		1,200 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC1200).....	91,842.91	3,987.44
			<i>For NEMA 3R Enclosure, Add</i>	12,284.33	
			<i>For NEMA 12 Enclosure, Add</i>	12,284.33	
			<i>For Level 2 Controller, Add</i>	6,499.77	
			<i>For Level 3 Controller, Add</i>	13,418.88	
			<i>For Level 4 Controller, Add</i>	19,499.32	
			<i>For NEMA 4 Enclosure, Add</i>	15,355.41	
26 36 23 00-0035	EA		1,600 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC1600).....	120,379.46	4,253.28
			<i>For NEMA 3R Enclosure, Add</i>	26,104.20	
			<i>For NEMA 12 Enclosure, Add</i>	24,322.98	
			<i>For Level 2 Controller, Add</i>	8,670.15	
			<i>For Level 3 Controller, Add</i>	17,899.67	
			<i>For Level 4 Controller, Add</i>	26,010.45	
			<i>For NEMA 4 Enclosure, Add</i>	26,104.20	
26 36 23 00-0036	EA		2,000 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC2000).....	136,790.62	4,652.02
			<i>For NEMA 3R Enclosure, Add</i>	26,104.20	
			<i>For NEMA 12 Enclosure, Add</i>	24,322.98	
			<i>For Level 2 Controller, Add</i>	9,880.21	
			<i>For Level 3 Controller, Add</i>	20,397.85	
			<i>For Level 4 Controller, Add</i>	29,640.63	
			<i>For NEMA 4 Enclosure, Add</i>	26,104.20	
26 36 23 00-0037	EA		3,000 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC3000).....	220,022.39	5,316.59
			<i>For NEMA 3R Enclosure, Add</i>	32,246.35	
			<i>For Level 2 Controller, Add</i>	16,227.66	
			<i>For Level 3 Controller, Add</i>	33,502.27	
			<i>For Level 4 Controller, Add</i>	48,682.99	
26 36 23 00-0038	EA		4,000 Amperes, Bypass Isolation Transfer Switch, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins BTPC4000).....	237,348.30	5,981.16
			<i>For NEMA 3R Enclosure, Add</i>	32,246.35	
			<i>For Level 2 Controller, Add</i>	17,467.41	
			<i>For Level 3 Controller, Add</i>	36,061.76	
			<i>For Level 4 Controller, Add</i>	52,402.24	
26 36 23 00-0039			Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure		
			<small>(26 36 23 00-0001)</small>		
26 36 23 00-0040	EA		40 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE40).....	9,826.28	313.91
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	712.88	
			<i>For Level 3 Controller, Add</i>	1,471.75	
			<i>For Level 4 Controller, Add</i>	2,138.64	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	

26 Electrical**26 30 Facility Electrical Power Generating and Storing Equipment****26 36 Transfer Switches**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 36 23 00-0041	EA		70 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE70).....	10,605.06	376.69
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	763.51	
			<i>For Level 3 Controller, Add</i>	1,576.27	
			<i>For Level 4 Controller, Add</i>	2,290.52	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	
26 36 23 00-0042	EA		100 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE100).....	10,993.74	408.09
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	788.76	
			<i>For Level 3 Controller, Add</i>	1,628.41	
			<i>For Level 4 Controller, Add</i>	2,366.29	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	
26 36 23 00-0043	EA		125 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE125).....	11,382.43	439.47
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	814.02	
			<i>For Level 3 Controller, Add</i>	1,680.56	
			<i>For Level 4 Controller, Add</i>	2,442.06	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	
26 36 23 00-0044	EA		150 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE150).....	13,684.41	502.25
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	982.69	
			<i>For Level 3 Controller, Add</i>	2,028.78	
			<i>For Level 4 Controller, Add</i>	2,948.08	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	
			<i>For Four Pole Circuit Breaker, Add</i>	3,838.85	
26 36 23 00-0045	EA		225 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE225).....	17,870.02	565.04
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	1,297.35	
			<i>For Level 3 Controller, Add</i>	2,678.39	
			<i>For Level 4 Controller, Add</i>	3,892.04	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	
			<i>For Four Pole Circuit Breaker, Add</i>	3,838.85	
26 36 23 00-0046	EA		250 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE250).....	19,010.60	627.82
			<i>For NEMA 12 Enclosure, Add</i>	1,381.99	
			<i>For Level 2 Controller, Add</i>	1,376.01	
			<i>For Level 3 Controller, Add</i>	2,840.79	
			<i>For Level 4 Controller, Add</i>	4,128.03	
			<i>For NEMA 3R Enclosure, Add</i>	767.78	
			<i>For Four Pole Circuit Breaker, Add</i>	3,838.85	
26 36 23 00-0047	EA		300 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE300).....	19,748.56	690.60
			<i>For NEMA 12 Enclosure, Add</i>	1,535.55	
			<i>For NEMA 3R Enclosure, Add</i>	1,996.21	
			<i>For Level 2 Controller, Add</i>	1,423.47	
			<i>For Level 3 Controller, Add</i>	2,938.78	
			<i>For Level 4 Controller, Add</i>	4,270.41	
			<i>For Four Pole Circuit Breaker, Add</i>	5,220.84	
26 36 23 00-0048	EA		400 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE400).....	22,364.48	753.38
			<i>For NEMA 12 Enclosure, Add</i>	1,535.55	
			<i>For NEMA 3R Enclosure, Add</i>	1,996.21	
			<i>For Level 2 Controller, Add</i>	1,616.47	
			<i>For Level 3 Controller, Add</i>	3,337.24	
			<i>For Level 4 Controller, Add</i>	4,849.42	
			<i>For Four Pole Circuit Breaker, Add</i>	5,220.84	
26 36 23 00-0049	EA		600 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE600).....	27,120.79	941.73
			<i>For NEMA 12 Enclosure, Add</i>	1,535.55	
			<i>For NEMA 3R Enclosure, Add</i>	1,996.21	
			<i>For Level 2 Controller, Add</i>	1,955.89	
			<i>For Level 3 Controller, Add</i>	4,037.97	
			<i>For Level 4 Controller, Add</i>	5,867.68	
			<i>For Four Pole Circuit Breaker, Add</i>	5,220.84	
26 36 23 00-0050	EA		800 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE800).....	28,167.58	1,130.07
			<i>For NEMA 3R Enclosure, Add</i>	3,439.63	
			<i>For NEMA 12 Enclosure, Add</i>	2,149.77	
			<i>For Level 2 Controller, Add</i>	2,007.83	
			<i>For Level 3 Controller, Add</i>	4,145.19	
			<i>For Level 4 Controller, Add</i>	6,023.48	
			<i>For Four Pole Circuit Breaker, Add</i>	7,447.38	
26 36 23 00-0051	EA		1,000 Amperes, Automatic Transfer Switch/Service Entrance, 3 Pole Circuit Breaker, NEMA 1 Enclosure (Cummins OTPCSE1000).....	33,319.33	1,594.98
			<i>For NEMA 3R Enclosure, Add</i>	3,439.63	
			<i>For NEMA 12 Enclosure, Add</i>	2,149.77	
			<i>For Level 2 Controller, Add</i>	2,335.03	
			<i>For Level 3 Controller, Add</i>	4,820.70	
			<i>For Level 4 Controller, Add</i>	7,005.08	
			<i>For Four Pole Circuit Breaker, Add</i>	7,447.38	



Electrical	26	26
Facility Electrical Power Generating and Storing Equipment	26 30	
Transfer Switches	26 36	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 36 23 00-0052 Accessories ^(26 36 23)		
26 36 23 00-0053 EA Auxiliary Contacts For Automatic Transfer Switch	356.25	
26 36 23 00-0054 EA Battery Charger For Automatic Transfer Switch	2,917.54	
26 36 23 00-0055 EA Elevator Relay Signal For Automatic Transfer Switch	1,059.53	
 26 40 Electrical And Cathodic Protection ⁽²⁶⁾		
26 43 Surge Protective Devices ^(26 40)		
26 43 13 Surge Protective Devices for Low-Voltage Electrical Power Circuits ^(26 43)		
26 43 13 00-0001 25 kA Low Exposure (14 kAIC) Transient Voltage Surge Suppression ^(26 43 13)		
Note: Liebert LPL		
26 43 13 00-0002 EA 120/240 Volt AC Single Phase, 3 Wire 25 kA Low Exposure Transient Voltage Surge Suppressor	240.64	30.57
26 43 13 00-0003 EA 208 Volt AC Three Phase, 3 Wire 25 kA Low Exposure Transient Voltage Surge Suppressor	258.85	30.57
26 43 13 00-0004 EA 240/120 Volt AC Three Phase, 4 Wire 25 kA Low Exposure Transient Voltage Surge Suppressor	271.08	36.68
26 43 13 00-0005 EA 277 Volt AC Single Phase, 2 Wire 25 kA Low Exposure Transient Voltage Surge Suppressor	223.20	24.45
26 43 13 00-0006 EA 480/277 Volt AC Three Phase, 4 Wire 25 kA Low Exposure Transient Voltage Surge Suppressor	271.08	36.68
 26 43 13 00-0007 50 kA Low Exposure (14 kAIC) Transient Voltage Surge Suppression ^(26 43 13)		
Note: Liebert LPL		
26 43 13 00-0008 EA 120/240 Volt AC Single Phase, 3 Wire 50 kA Low Exposure Transient Voltage Surge Suppressor	330.38	30.57
26 43 13 00-0009 EA 208/120 Volt AC Three Phase, 4 Wire 50 kA Low Exposure Transient Voltage Surge Suppressor	353.02	36.68
26 43 13 00-0010 EA 208 Volt AC Three Phase, 3 Wire 50 kA Low Exposure Transient Voltage Surge Suppressor	340.79	30.57
26 43 13 00-0011 EA 480/277 Volt AC Three Phase, 4 Wire 50 kA Low Exposure Transient Voltage Surge Suppressor	353.02	36.68
 26 43 13 00-0012 100 kA Low Exposure (14 kAIC) Transient Voltage Surge Suppression ^(26 43 13)		
Note: Liebert LPL		
26 43 13 00-0013 EA 120/240 Volt AC Single Phase, 3 Wire 100 kA Low Exposure Transient Voltage Surge Suppressor	398.02	30.57
26 43 13 00-0014 EA 208/120 Volt AC Three Phase, 4 Wire 100 kA Low Exposure Transient Voltage Surge Suppressor	420.66	36.68
26 43 13 00-0015 EA 277 Volt AC Single Phase, 2 Wire 100 kA Low Exposure Transient Voltage Surge Suppressor	370.18	24.45
26 43 13 00-0016 EA 480/277 Volt AC Three Phase, 4 Wire 100 kA Low Exposure Transient Voltage Surge Suppressor	420.66	36.68
 26 43 13 00-0017 100 kA Low Exposure (65 kAIC) Transient Voltage Surge Suppression ^(26 43 13)		
Note: Liebert LPM		
26 43 13 00-0018 EA 120/240 Volt AC Single Phase, 3 Wire 100 kA Medium Exposure Transient Voltage Surge Suppressor	468.26	30.57
26 43 13 00-0019 EA 208/120 Volt AC Three Phase, 4 Wire 100 kA Medium Exposure Transient Voltage Surge Suppressor	528.61	36.68
26 43 13 00-0020 EA 277 Volt AC Three Phase, 2 Wire 100 kA Medium Exposure Transient Voltage Surge Suppressor	441.72	24.45
 26 43 13 00-0021 160 kA Low Exposure (65 kAIC) Transient Voltage Surge Suppression ^(26 43 13)		
Note: Liebert LPM		
26 43 13 00-0022 EA 208/120 Volt AC Single Phase, 4 Wire 160 kA Medium Exposure Transient Voltage Surge Suppressor	821.27	36.68
26 43 13 00-0023 EA 208 Volt AC Three Phase, 3 Wire 160 kA Medium Exposure Transient Voltage Surge Suppressor	809.04	30.57
26 43 13 00-0024 EA 480/277 Volt AC Three Phase, 4 Wire 160 kA Medium Exposure Transient Voltage Surge Suppressor	821.27	36.68
 26 43 13 00-0025 250 kA, 500 Joule Transient Voltage Surge Suppression ^(26 43 13)		
Note: Liebert Interceptor Hybrid.		
26 43 13 00-0026 EA LED Display, 120/208 Volt AC Three Phase, 250 kA Transient Voltage Surge Suppressor	7,942.80	61.14
26 43 13 00-0027 EA Audible Alarm/LED Display, 120/208 Volt AC Three Phase, 250 kA Transient Voltage Surge Suppressor	9,716.00	61.14
 26 43 13 00-0028 Class 1310 Transient Voltage Surge Suppression ^(26 43 13)		
Note: Supplied with audible alarm, alarm enable/disable switch and dry contacts. Square D.		
26 43 13 00-0029 NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor ^(26 43 13 00-0028)		
Note: Square D. EMA series.		
26 43 13 00-0030 EA 120 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor	3,834.58	158.96
For Integral Disconnect, Add		265.68
For Surge Counter, Add		203.04
26 43 13 00-0031 EA 160 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor	4,231.55	183.42
For Integral Disconnect, Add		265.68
For Surge Counter, Add		203.04
26 43 13 00-0032 EA 240 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor	6,167.65	213.99
For Integral Disconnect, Add		265.68
For Surge Counter, Add		203.04
26 43 13 00-0033 EA 320 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor	8,194.17	244.56
For Integral Disconnect, Add		265.68
For Surge Counter, Add		203.04
26 43 13 00-0034 EA 480 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor	12,118.21	336.27
For Integral Disconnect, Add		265.68
For Surge Counter, Add		203.04
26 43 13 00-0035 EA 120 kA, 120/208 Volt, 1 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor	3,999.34	158.96
For Integral Disconnect, Add		265.68
For Surge Counter, Add		203.04

26	Electrical
26 40	Electrical And Cathodic Protection
26 43	Surge Protective Devices



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 43 13 00-0036 EA 160 kA, 120/208 Volt, 1 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,412.55 265.68 203.04	183.42
26 43 13 00-0037 EA 240 kA, 120/208 Volt, 1 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	6,447.28 265.68 203.04	213.99
26 43 13 00-0038 EA 320 kA, 120/208 Volt, 1 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	8,557.32 265.68 203.04	244.56
26 43 13 00-0039 EA 480 kA, 120/208 Volt, 1 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	12,678.61 265.68 203.04	336.27
26 43 13 00-0040 EA 120 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	3,999.34 265.68 203.04	158.96
26 43 13 00-0041 EA 160 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,412.55 265.68 203.04	183.42
26 43 13 00-0042 EA 240 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	6,447.22 265.68 203.04	213.99
26 43 13 00-0043 EA 320 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	8,557.32 265.68 203.04	244.56
26 43 13 00-0044 EA 480 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	12,678.61 265.68 203.04	336.27
26 43 13 00-0045 EA 120 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,164.12 265.68 203.04	158.96
26 43 13 00-0046 EA 160 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,595.87 265.68 203.04	183.42
26 43 13 00-0047 EA 240 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	6,729.21 265.68 203.04	213.99
26 43 13 00-0048 EA 320 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	8,922.86 265.68 203.04	244.56
26 43 13 00-0049 EA 480 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	13,241.28 265.68 203.04	336.27
26 43 13 00-0050 EA 120 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,355.56 265.68 203.04	158.96
26 43 13 00-0051 EA 160 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,786.19 265.68 203.04	183.42
26 43 13 00-0052 EA 240 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	7,023.91 265.68 203.04	213.99
26 43 13 00-0053 EA 320 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	9,305.74 265.68 203.04	244.56
26 43 13 00-0054 EA 480 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	13,034.14 265.68 203.04	336.27
26 43 13 00-0055 NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor ⁽²⁶⁾ <small>43 13 00-0028</small> Note: Square D EBA series.		
26 43 13 00-0056 EA 120 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	2,999.26 265.68 203.04	158.96
26 43 13 00-0057 EA 160 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	3,621.32 265.68 203.04	183.42
26 43 13 00-0058 EA 240 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	5,292.86 265.68 203.04	213.99
26 43 13 00-0059 EA 120 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	3,093.23 265.68 203.04	158.96
26 43 13 00-0060 EA 160 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	3,760.55 265.68 203.04	183.42
26 43 13 00-0061 EA 240 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	5,475.01 265.68 203.04	213.99
26 43 13 00-0062 EA 120 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	3,093.23 265.68 203.04	158.96
26 43 13 00-0063 EA 160 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	3,760.55 265.68 203.04	183.42



Electrical	26	26
Electrical And Cathodic Protection	26 40	
Surge Protective Devices	26 43	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 43 13 00-0064	EA		240 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,475.01 265.68 203.04	213.99
26 43 13 00-0065	EA		120 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	3,212.74 265.68 203.04	158.96
26 43 13 00-0066	EA		160 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	3,910.22 265.68 203.04	183.42
26 43 13 00-0067	EA		240 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,708.21 265.68 203.04	213.99
26 43 13 00-0068	EA		120 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	3,338.05 265.68 203.04	158.96
26 43 13 00-0069	EA		160 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	4,069.16 265.68 203.04	183.42
26 43 13 00-0070	EA		240 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 1/3R/12 Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,953.01 265.68 203.04	213.99
26 43 13 00-0071			NEMA 4X Modular Device Transient Voltage Surge Suppressor <small>(26 43 13 00-0028)</small> Note: Square D EMA series. Stainless steel.		
26 43 13 00-0072	EA		120 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	4,930.99 265.68 203.04	158.96
26 43 13 00-0073	EA		160 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,327.97 265.68 203.04	183.42
26 43 13 00-0074	EA		240 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	7,264.07 265.68 203.04	213.99
26 43 13 00-0075	EA		120 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,095.75 265.68 203.04	158.96
26 43 13 00-0076	EA		160 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,508.96 265.68 203.04	183.42
26 43 13 00-0077	EA		240 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	7,543.69 265.68 203.04	213.99
26 43 13 00-0078	EA		120 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,095.75 265.68 203.04	158.96
26 43 13 00-0079	EA		160 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,508.96 265.68 203.04	183.42
26 43 13 00-0080	EA		240 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	7,543.63 265.68 203.04	213.99
26 43 13 00-0081	EA		120 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,260.54 265.68 203.04	158.96
26 43 13 00-0082	EA		160 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,692.28 265.68 203.04	183.42
26 43 13 00-0083	EA		240 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	7,825.62 265.68 203.04	213.99
26 43 13 00-0084	EA		120 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,451.97 265.68 203.04	158.96
26 43 13 00-0085	EA		160 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	5,882.60 265.68 203.04	183.42
26 43 13 00-0086	EA		240 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 4X Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	8,120.32 265.68 203.04	213.99
26 43 13 00-0087			NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <small>(26 43 13 00-0028)</small> Note: Square D EBA series. Stainless steel.		
26 43 13 00-0088	EA		120 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	4,095.67 265.68 203.04	158.96
26 43 13 00-0089	EA		160 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	4,717.73 265.68 203.04	183.42
26 43 13 00-0090	EA		240 kA, 120/240 Volt, 1 Phase, 3 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor..... <i>For Integral Disconnect, Add For Surge Counter, Add</i>	6,389.27 265.68 203.04	213.99

26 Electrical**26 40 Electrical And Cathodic Protection****26 43 Surge Protective Devices**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 43 13 00-0091	EA		120 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,189.64 265.68 203.04	158.96
26 43 13 00-0092	EA		160 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,856.96 265.68 203.04	183.42
26 43 13 00-0093	EA		240 kA, 120/208 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	6,571.42 265.68 203.04	213.99
26 43 13 00-0094	EA		120 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,189.64 265.68 203.04	158.96
26 43 13 00-0095	EA		160 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,856.96 265.68 203.04	183.42
26 43 13 00-0096	EA		240 kA, 120/240 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	6,571.42 265.68 203.04	213.99
26 43 13 00-0097	EA		120 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,309.15 265.68 203.04	158.96
26 43 13 00-0098	EA		160 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	5,006.63 265.68 203.04	183.42
26 43 13 00-0099	EA		240 kA, 277/480 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	6,804.62 265.68 203.04	213.99
26 43 13 00-0100	EA		120 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	4,434.46 265.68 203.04	158.96
26 43 13 00-0101	EA		160 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	5,165.58 265.68 203.04	183.42
26 43 13 00-0102	EA		240 kA, 347/600 Volt, 3 Phase, 4 Wire NEMA 4X Non-Modular Device Transient Voltage Surge Suppressor <i>For Integral Disconnect, Add</i> <i>For Surge Counter, Add</i>	7,049.43 265.68 203.04	213.99

26 50 Lighting ⁽²⁶⁾

Note: Includes testing of fixture, a set of lamps (light bulbs), wire nuts, ground wire connector, fixture whip, ballast(s), mounting brackets where necessary and cable connectors. Lay-in fixtures include support wire, clips and seismic supports.

26 51 Interior Lighting ^(26 50)**26 51 13 Incandescent Interior Lighting** ^(26 51)**26 51 13 00-0001 Recessed Fixtures** ^(26 51 13)

Note: Housing and trim priced separately.

26 51 13 00-0002 Incandescent, Recessed Fixture Housings ^(26 51 13 00-0001)

26 51 13 00-0003	EA		4" Round, Incandescent, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	85.84 4.29	34.98
26 51 13 00-0004	EA		5" Round, Incandescent, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	85.84 4.29	34.98
26 51 13 00-0005	EA		6" Round, Incandescent, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	91.16 4.66	36.68
26 51 13 00-0006	EA		7" Round, Incandescent, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	96.66 5.05	38.27
26 51 13 00-0007	EA		8" Round, Incandescent, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	102.18 5.45	39.87
26 51 13 00-0008	EA		10" To 12" Square, Incandescent, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	104.08 5.22	42.31

26 51 13 00-0009 Recessed Fixture Trim ^(26 51 13 00-0001)

26 51 13 00-0010	EA		Circular, Recessed Fixture Trim	66.84	17.12
26 51 13 00-0011	EA		Circular Clear Lens, Recessed Fixture Trim	74.38	17.12
26 51 13 00-0012	EA		Open/Baffle, Recessed Fixture Trim	87.44	17.12
26 51 13 00-0013	EA		Specular Reflector, Recessed Fixture Trim	94.37	17.12
26 51 13 00-0014	EA		Eyeball, Recessed Fixture Trim	74.49	17.12
26 51 13 00-0015	EA		10" To 12" Square, Clear Lens, Recessed Fixture Trim	70.44	17.12
26 51 13 00-0016	EA		10" To 12" Square, Drop Dish, Recessed Fixture Trim	75.08	17.12

26 51 13 00-0017 Track Lighting ^(26 51 13)**26 51 13 00-0018 Track Lighting Tracks** ^(26 51 13 00-0017)

26 51 13 00-0019	LF		1 Circuit Track Lighting Track	24.14	8.07
26 51 13 00-0020	LF		2 Circuit Track Lighting Track	31.13	8.07
26 51 13 00-0021	LF		3 Circuit Track Lighting Track	37.11	8.07
26 51 13 00-0022	LF		4 Circuit Track Lighting Track	43.10	9.78

26 51 13 00-0023 Incandescent Track Lighting Fixtures ^(26 51 13 00-0017)



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 13 00-0024 EA Incandescent Track Lighting Fixture, 120 Volt.....	86.52	20.42
26 51 13 00-0025 EA Par 20 Track Fixture, White Or Black Finish, 120 Volt.....	59.17	20.42
26 51 13 00-0026 EA Par 30 Track Fixture, White Or Black Finish, 120 Volt.....	81.26	20.42
26 51 13 00-0027 EA Par 38 Track Fixture, White Or Black Finish, 120 Volt.....	83.45	20.42
26 51 13 00-0028 EA PAR 16, Baffled Cylinder Track Fixture, White or Black Finish, 120 Volt.....	69.17	20.42
26 51 13 00-0029 EA PAR 20, Baffled Cylinder Track Fixture, White or Black Finish, 120 Volt.....	59.17	20.42
26 51 13 00-0030 EA PAR 30, Baffled Cylinder Track Fixture, White or Black Finish, 120 Volt.....	68.12	20.42
26 51 13 00-0031 EA PAR 38, Baffled Cylinder Track Fixture, White or Black Finish, 120 Volt.....	85.64	20.42
26 51 13 00-0032 Track Lighting Accessories (26 51 13 00-0017)		
26 51 13 00-0033 Pendant Mounting (26 51 13 00-0032)		
26 51 13 00-0034 EA Track Lighting Pendant Mounting, Up to 12".....	27.07	
26 51 13 00-0035 EA Track Lighting Pendant Mounting, >12" To 24".....	34.47	
26 51 13 00-0036 EA Track Lighting Pendant Mounting, >24" To 36".....	41.92	
26 51 13 00-0037 Wet Location, Dust Resistant, Vapor Tight Fixtures (26 51 13)		
26 51 13 00-0038 Incandescent, Wet Location, Dust Resistant, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixtures (26 51 13 00-0037)		
26 51 13 00-0039 EA 100 Watt Incandescent, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture.....	131.77	48.91
For Wall Mounted, Add	5.10	
26 51 13 00-0040 EA 200 Watt Incandescent, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture.....	150.20	48.91
For Wall Mounted, Add	5.10	
26 51 16 Fluorescent Interior Lighting (26 51)		
26 51 16 00-0001 Fluorescent Fixtures (26 51 16)		
26 51 16 00-0002 Surface Mounted, Wraparound Fluorescent Fixtures (26 51 16 00-0001)		
26 51 16 00-0003 6" x 2', Surface Mounted, Wraparound Fluorescent Fixtures (26 51 16 00-0002)		
26 51 16 00-0004 EA 1 T8 Lamp, 6" x 2', Surface Mounted, Wraparound Fluorescent Fixture.....	191.40	34.97
26 51 16 00-0005 EA 2 T8 Lamps, 6" x 2', Surface Mounted, Wraparound Fluorescent Fixture.....	215.43	34.97
26 51 16 00-0006 6" x 4', Surface Mounted, Wraparound Fluorescent Fixtures (26 51 16 00-0002)		
26 51 16 00-0007 EA 1 T8 Lamp, 6" x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	216.56	36.42
26 51 16 00-0008 EA 2 T8 Lamps, 6" x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	242.95	36.42
26 51 16 00-0009 1' x 4', Surface Mounted, Wraparound Fluorescent Fixtures (26 51 16 00-0002)		
26 51 16 00-0010 EA 2 T8 Lamps, 1' x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	258.76	40.89
26 51 16 00-0011 EA 3 T8 Lamps, 1' x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	307.81	40.89
26 51 16 00-0012 EA 4 T8 Lamps, 1' x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	361.79	40.89
26 51 16 00-0013 2' x 2', Surface Mounted, Wraparound Fluorescent Fixtures (26 51 16 00-0002)		
26 51 16 00-0014 EA 2 T8 Lamps, 2' x 2', Surface Mounted, Wraparound Fluorescent Fixture.....	209.60	44.68
26 51 16 00-0015 EA 3 T8 Lamps, 2' x 2', Surface Mounted, Wraparound Fluorescent Fixture.....	243.05	44.68
26 51 16 00-0016 2' x 4', Surface Mounted, Wraparound Fluorescent Fixtures (26 51 16 00-0002)		
26 51 16 00-0017 EA 2 T8 Lamps, 2' x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	331.14	52.06
26 51 16 00-0018 EA 3 T8 Lamps, 2' x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	356.86	52.06
26 51 16 00-0019 EA 4 T8 Lamps, 2' x 4', Surface Mounted, Wraparound Fluorescent Fixture.....	405.84	52.06
26 51 16 00-0020 Surface Mounted, Box Type Fluorescent Fixtures (26 51 16 00-0001)		
Note: Includes prismatic lens.		
26 51 16 00-0021 1' x 4', Surface Mounted, Box Type Fluorescent Fixtures (26 51 16 00-0020)		
26 51 16 00-0022 EA 2 T8 Lamps, 1' x 4', Surface Mounted, Box Type Fluorescent Fixture.....	257.29	40.55
26 51 16 00-0023 EA 3 T8 Lamps, 1' x 4', Surface Mounted, Box Type Fluorescent Fixture.....	420.95	40.55
26 51 16 00-0024 EA 4 T8 Lamps, 1' x 4', Surface Mounted, Box Type Fluorescent Fixture.....	480.79	40.55
26 51 16 00-0025 2' x 2', Surface Mounted, Box Type Fluorescent Fixtures (26 51 16 00-0020)		
26 51 16 00-0026 EA 2 T8 Lamps, 2' x 2', Surface Mounted, Box Type Fluorescent Fixture.....	404.20	44.68
26 51 16 00-0027 EA 3 T8 Lamps, 2' x 2', Surface Mounted, Box Type Fluorescent Fixture.....	441.89	44.68
26 51 16 00-0028 EA 4 T8 Lamps, 2' x 2', Surface Mounted, Box Type Fluorescent Fixture.....	469.06	44.68
26 51 16 00-0029 2' x 4', Surface Mounted, Box Type Fluorescent Fixtures (26 51 16 00-0020)		
26 51 16 00-0030 EA 2 T8 Lamps, 2' x 4', Surface Mounted, Box Type Fluorescent Fixture.....	409.45	52.06
26 51 16 00-0031 EA 3 T8 Lamps, 2' x 4', Surface Mounted, Box Type Fluorescent Fixture.....	449.70	52.06
26 51 16 00-0032 EA 4 T8 Lamps, 2' x 4', Surface Mounted, Box Type Fluorescent Fixture.....	471.87	52.06

26	26 Electrical
	26 50 Lighting
	26 51 Interior Lighting



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
26 51 16 00-0033	EA	6 T8 Lamps, 2' x 4', Surface Mounted, Box Type Fluorescent Fixture		505.60	52.06
26 51 16 00-0034		4' x 4', Surface Mounted, Box Type Fluorescent Fixtures <small>(26 51 16 00-0020)</small>			
26 51 16 00-0035	EA	4 T8 Lamps, 4' x 4', Surface Mounted, Box Type Fluorescent Fixture		816.05	67.03
26 51 16 00-0036	EA	6 T8 Lamps, 4' x 4', Surface Mounted, Box Type Fluorescent Fixture		829.60	67.03
26 51 16 00-0037	EA	8 T8 Lamps, 4' x 4', Surface Mounted, Box Type Fluorescent Fixture		654.34	67.03
26 51 16 00-0038		Recessed Fluorescent Fixtures <small>(26 51 16 00-0001)</small>			
26 51 16 00-0039		Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0038)</small>			
26 51 16 00-0040		1' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture <small>(26 51 16 00-0039)</small>			
26 51 16 00-0041	EA	2 T8 Lamps, 1' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		367.01	34.97
		<i>For Drywall Or Plaster Ceilings, Add</i>		23.63	
26 51 16 00-0042		1' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture <small>(26 51 16 00-0039)</small>			
26 51 16 00-0043	EA	2 T8 Lamps, 1' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		485.68	40.55
		<i>For Drywall Or Plaster Ceilings, Add</i>		27.65	
26 51 16 00-0044	EA	2 T5 Lamps, 1' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		910.69	40.55
		<i>For Drywall Or Plaster Ceilings, Add</i>		27.65	
26 51 16 00-0045		2' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture <small>(26 51 16 00-0039)</small>			
26 51 16 00-0046	EA	2 T8 Lamps, 2' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		490.98	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.16	
26 51 16 00-0047	EA	3 T8 Lamps, 2' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		566.14	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.16	
26 51 16 00-0048	EA	4 T8 Lamps, 2' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		571.87	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.17	
26 51 16 00-0049	EA	2 T5 Lamps, 2' x 2', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		617.52	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.16	
26 51 16 00-0050		2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture <small>(26 51 16 00-0039)</small>			
26 51 16 00-0051	EA	2 T8 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		469.05	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0052	EA	3 T8 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		668.81	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0053	EA	4 T8 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		675.58	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0054	EA	6 T8 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		755.93	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0055	EA	2 T5 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		642.88	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0056	EA	3 T5 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		893.98	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0057	EA	4 T5 Lamps, 2' x 4', Prismatic Lensed, Lay-In/Troffer Fluorescent Fixture		909.90	52.06
		<i>For Drywall Or Plaster Ceilings, Add</i>		35.19	
26 51 16 00-0058		Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0038)</small>			
26 51 16 00-0059		1' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0058)</small>			
26 51 16 00-0060	EA	1 T8 Lamp, 1' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		435.51	34.97
		<i>For Drywall Or Plaster Ceilings, Add</i>		23.63	
26 51 16 00-0061	EA	2 T8 Lamps, 1' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		441.23	34.97
		<i>For Drywall Or Plaster Ceilings, Add</i>		23.63	
26 51 16 00-0062	EA	3 T8 Lamps, 1' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		521.18	34.97
		<i>For Drywall Or Plaster Ceilings, Add</i>		23.63	
26 51 16 00-0063		1' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0058)</small>			
26 51 16 00-0064	EA	1 T8 Lamp, 1' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		495.86	40.55
		<i>For Drywall Or Plaster Ceilings, Add</i>		27.65	
26 51 16 00-0065	EA	2 T8 Lamps, 1' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		502.64	40.55
		<i>For Drywall Or Plaster Ceilings, Add</i>		27.65	
26 51 16 00-0066	EA	3 T8 Lamps, 1' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		570.39	40.55
		<i>For Drywall Or Plaster Ceilings, Add</i>		27.65	
26 51 16 00-0067		2' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0058)</small>			
26 51 16 00-0068	EA	2 T8 Lamps, 2' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		507.10	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.17	
26 51 16 00-0069	EA	3 T8 Lamps, 2' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		512.82	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.17	
26 51 16 00-0070	EA	4 T8 Lamps, 2' x 2', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture		591.54	44.68
		<i>For Drywall Or Plaster Ceilings, Add</i>		30.17	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 16 00-0071 2' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0058)</small>		
26 51 16 00-0072 EA 2 T8 Lamps, 2' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	469.05 35.19	52.06
26 51 16 00-0073 EA 3 T8 Lamps, 2' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	554.06 35.19	52.06
26 51 16 00-0074 EA 4 T8 Lamps, 2' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	634.76 35.19	52.06
26 51 16 00-0075 EA 6 T8 Lamps, 2' x 4', Parabolic, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	722.54 35.19	52.06
26 51 16 00-0076 Direct-Indirect, Recessed Fluorescent Fixtures <small>(26 51 16 00-0038)</small>		
26 51 16 00-0077 1' x 4', Direct-Indirect, Recessed Fluorescent Fixtures <small>(26 51 16 00-0076)</small>		
26 51 16 00-0078 EA 1 T8 Lamp, 1' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	961.36 27.65	40.55
26 51 16 00-0079 EA 2 T8 Lamps, 1' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	968.14 27.65	40.55
26 51 16 00-0080 EA 1 T5 Lamp, 1' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	1,146.05 27.65	40.55
26 51 16 00-0081 EA 2 T5 Lamps, 1' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	1,161.97 27.65	40.55
26 51 16 00-0082 2' x 2', Direct-Indirect, Recessed Fluorescent Fixtures <small>(26 51 16 00-0076)</small>		
26 51 16 00-0083 EA 2 T8 Lamps, 2' x 2', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	752.66 30.16	44.68
26 51 16 00-0084 EA 3 T8 Lamps, 2' x 2', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	842.74 30.16	44.68
26 51 16 00-0085 EA 2 T5 Lamps, 2' x 2', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	1,037.94 30.16	44.68
26 51 16 00-0086 2' x 4', Direct-Indirect, Recessed Fluorescent Fixtures <small>(26 51 16 00-0076)</small>		
26 51 16 00-0087 EA 2 T8 Lamps, 2' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	843.88 35.19	52.06
26 51 16 00-0088 EA 3 T8 Lamps, 2' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	1,051.06 35.19	52.06
26 51 16 00-0089 EA 1 T5 Lamp, 2' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	1,120.88 35.19	52.06
26 51 16 00-0090 EA 2 T5 Lamps, 2' x 4', Direct-Indirect, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	1,232.74 35.19	52.06
26 51 16 00-0091 Volumetric, Recessed Fluorescent Fixtures <small>(26 51 16 00-0038)</small>		
26 51 16 00-0092 1' x 4', Volumetric, Recessed Fluorescent Fixtures <small>(26 51 16 00-0091)</small>		
26 51 16 00-0093 EA 2 T8 Lamps, 1' x 4', Volumetric, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	744.29 27.65	40.55
26 51 16 00-0094 EA 2 T5 Lamps, 1' x 4', Volumetric, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	996.45 27.65	40.55
26 51 16 00-0095 2' x 2', Volumetric, Recessed Fluorescent Fixtures <small>(26 51 16 00-0091)</small>		
26 51 16 00-0096 EA 2 T8 Lamps, 2' x 2', Volumetric, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	739.80 30.16	44.68
26 51 16 00-0097 EA 2 T5 Lamps, 2' x 2', Volumetric, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	852.55 30.16	44.68
26 51 16 00-0098 2' x 4', Volumetric, Recessed Fluorescent Fixtures <small>(26 51 16 00-0091)</small>		
26 51 16 00-0099 EA 2 T8 Lamps, 2' x 4', Volumetric, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	820.66 35.19	52.06
26 51 16 00-0100 EA 2 T5 Lamps, 2' x 4', Volumetric, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	822.54 35.19	52.06
26 51 16 00-0101 Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0038)</small>		
26 51 16 00-0102 1' x 4', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0101)</small>		
26 51 16 00-0103 EA 2 T8 Lamps, 1' x 4', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	688.02 27.65	40.55
26 51 16 00-0104 2' x 2', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0101)</small>		
26 51 16 00-0105 EA 2 T8 Lamps, 2' x 2', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	655.98 30.16	44.68

26	26 Electrical
	26 50 Lighting
	26 51 Interior Lighting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 16 00-0106 2' x 4', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0101)</small>		
26 51 16 00-0107 EA 2 T8 Lamps, 2' x 4', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	796.19 35.19	52.06
26 51 16 00-0108 EA 3 T8 Lamps, 2' x 4', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	615.42 35.19	52.06
26 51 16 00-0109 EA 4 T8 Lamps, 2' x 4', Wet Location, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	917.07 35.19	52.06
26 51 16 00-0110 Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0039)</small>		
26 51 16 00-0111 1' x 4', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0110)</small>		
26 51 16 00-0112 EA 2 T8 Lamps, 1' x 4', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	653.76 27.65	40.55
26 51 16 00-0113 2' x 2', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0110)</small>		
26 51 16 00-0114 EA 2 T8 Lamps, 2' x 2', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	655.16 30.16	44.68
26 51 16 00-0115 2' x 4', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixtures <small>(26 51 16 00-0110)</small>		
26 51 16 00-0116 EA 2 T8 Lamps, 2' x 4', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	815.42 35.19	52.06
26 51 16 00-0117 EA 3 T8 Lamps, 2' x 4', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	828.87 35.19	52.06
26 51 16 00-0118 EA 4 T8 Lamps, 2' x 4', Vandal Resistant, Lensed, Lay-In/Troffer, Recessed Fluorescent Fixture <i>For Drywall Or Plaster Ceilings, Add</i>	849.83 35.19	52.06
26 51 16 00-0119 Striplight Fluorescent Fixtures <small>(26 51 16 00-0001)</small>		
26 51 16 00-0120 1 Lamp Cross Section, Striplight Fluorescent Fixtures <small>(26 51 16 00-0119)</small>		
26 51 16 00-0121 EA 1-1/2' Length, 1 T8 Lamp, Striplight Fluorescent Fixture	267.34	33.51
26 51 16 00-0122 EA 2' Length, 1 T8 Lamp, Striplight Fluorescent Fixture	333.09	33.51
26 51 16 00-0123 EA 3' Length, 1 T8 Lamp, Striplight Fluorescent Fixture	324.91	37.20
26 51 16 00-0124 EA 4' Length, 1 T8 Lamp, Striplight Fluorescent Fixture	330.46	40.89
26 51 16 00-0125 EA 8' Length, 1 T8 Lamp, Striplight Fluorescent Fixture	404.70	48.43
26 51 16 00-0126 2 Lamp Cross Section, Striplight Fluorescent Fixtures <small>(26 51 16 00-0119)</small>		
26 51 16 00-0127 EA 2' Length, 2 T8 Lamps, Striplight Fluorescent Fixture	329.54	37.20
26 51 16 00-0128 EA 3' Length, 2 T8 Lamps, Striplight Fluorescent Fixture	337.30	40.89
26 51 16 00-0129 EA 4' Length, 2 T8 Lamps, Striplight Fluorescent Fixture	342.82	44.68
26 51 16 00-0130 3 Lamp Cross Section, Striplight Fluorescent Fixtures <small>(26 51 16 00-0119)</small>		
26 51 16 00-0131 EA 2' Length, 3 T8 Lamps, Striplight Fluorescent Fixture	494.85	37.20
26 51 16 00-0132 EA 3' Length, 3 T8 Lamps, Striplight Fluorescent Fixture	474.00	40.89
26 51 16 00-0133 EA 4' Length, 3 T8 Lamps, Striplight Fluorescent Fixture	479.50	44.68
26 51 16 00-0134 Display Case Fluorescent Fixtures <small>(26 51 16 00-0119)</small>		
26 51 16 00-0135 EA 1 T8 Lamp, 1-1/2' Length, Undercabinet/Display Case Fluorescent Fixture (Lightolier TCU15W).....	178.25	36.68
26 51 16 00-0136 EA 1 T8 Lamp, 2' Length, Undercabinet/Display Case Fluorescent Fixture (Lightolier TCU20W).....	242.27	36.68
26 51 16 00-0137 EA 1 T8 Lamp, 3' Length, Undercabinet/Display Case Fluorescent Fixture (Lightolier TCU30W).....	261.42	42.79
26 51 16 00-0138 EA 1 T8 Lamp, 4' Length, Undercabinet/Display Case Fluorescent Fixture (Lightolier TCU40W).....	270.52	42.79
26 51 16 00-0139 Industrial Fluorescent Fixtures <small>(26 51 16 00-0001)</small>		
26 51 16 00-0140 1 Lamp Cross Section, Industrial Fluorescent Fixtures <small>(26 51 16 00-0139)</small>		
26 51 16 00-0141 EA 2' Length, 1 T8 Lamp, Industrial Fluorescent Fixture	396.18	33.51
26 51 16 00-0142 EA 4' Length, 1 T8 Lamp, Industrial Fluorescent Fixture	415.63	40.89
26 51 16 00-0143 EA 8' Length, 1 T8 Lamp, Industrial Fluorescent Fixture	780.78	52.06
26 51 16 00-0144 2 Lamp Cross Section, Industrial Fluorescent Fixtures <small>(26 51 16 00-0139)</small>		
26 51 16 00-0145 EA 2' Length, 2 T8 Lamps, Industrial Fluorescent Fixture	407.48	37.20
26 51 16 00-0146 EA 4' Length, 2 T8 Lamps, Industrial Fluorescent Fixture	428.00	44.68
26 51 16 00-0147 EA 8' Length, 2 T8 Lamps, Industrial Fluorescent Fixture	794.33	52.06
26 51 16 00-0148 3 Lamp Cross Section, Industrial Fluorescent Fixtures <small>(26 51 16 00-0139)</small>		



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 16 00-0149 EA 2' Length, 3 T8 Lamps, Industrial Fluorescent Fixture	424.33	37.20
26 51 16 00-0150 EA 4' Length, 3 T8 Lamps, Industrial Fluorescent Fixture	443.13	44.68
26 51 16 00-0151 EA 8' Length, 3 T8 Lamps, Industrial Fluorescent Fixture	681.70	52.06
26 51 16 00-0152 4 Lamp Cross Section, Industrial Fluorescent Fixtures (26 51 16 00-0139)		
26 51 16 00-0153 EA 4' Length, 4 T8 Lamps, Industrial Fluorescent Fixture	620.25	44.68
26 51 16 00-0154 EA 8' Length, 4 T8 Lamps, Industrial Fluorescent Fixture	917.93	52.06
26 51 16 00-0155 Flanged Fluorescent Fixture (26 51 16 00-0001)		
Note: For plaster or drywall application. With electronic ballast.		
26 51 16 00-0156 EA 2 T8 Lamps, 2' x 4', Prismatic Lensed, Flanged Fluorescent Fixture	573.03	67.03
26 51 16 00-0157 EA 3 T8 Lamps, 2' x 4', Prismatic Lensed, Flanged Fluorescent Fixture	691.14	67.03
26 51 16 00-0158 EA 4 T8 Lamps, 2' x 4', Prismatic Lensed, Flanged Fluorescent Fixture	697.91	67.03
26 51 16 00-0159 Undercabinet Fluorescent Fixtures (26 51 16 00-0001)		
26 51 16 00-0160 EA 1 T5 Lamp, 12-3/16" Length, Slimline Undercabinet Fluorescent Fixture	204.67	30.17
26 51 16 00-0161 EA 1 T5 Lamp, 21-3/16" Length, Slimline Undercabinet Fluorescent Fixture	237.20	36.86
26 51 16 00-0162 EA 2 T5 Lamps, 24-7/16" Length, Slimline Undercabinet Fluorescent Fixture	232.97	36.86
26 51 16 00-0163 EA 1 T5 Lamp, 33-7/16" Length, Slimline Undercabinet Fluorescent Fixture	284.21	40.22
26 51 16 00-0164 EA 2 T5 Lamps, 42-7/16" Length, Slimline Undercabinet Fluorescent Fixture	330.30	46.92
26 51 16 00-0165 Corner Mounted, Fluorescent Fixtures (26 51 16 00-0001)		
Note: Includes acrylic drop dish diffuser.		
26 51 16 00-0166 2' Length, Corner Mounted, Fluorescent Fixtures (26 51 16 00-0165)		
26 51 16 00-0167 EA 1 T8 Lamp, 2' Length, Corner Mounted, Fluorescent Fixture	258.01	33.51
26 51 16 00-0168 EA 2 T8 Lamps, 2' Length, Corner Mounted, Fluorescent Fixture	288.03	33.51
26 51 16 00-0169 3' Length, Corner Mounted, Fluorescent Fixtures (26 51 16 00-0165)		
26 51 16 00-0170 EA 1 T8 Lamp, 3' Length, Corner Mounted, Fluorescent Fixture	294.77	35.19
26 51 16 00-0171 EA 2 T8 Lamps, 3' Length, Corner Mounted, Fluorescent Fixture	323.43	35.19
26 51 16 00-0172 4' Length, Corner Mounted, Fluorescent Fixtures (26 51 16 00-0165)		
26 51 16 00-0173 EA 1 T8 Lamp, 4' Length, Corner Mounted, Fluorescent Fixture	290.49	36.86
26 51 16 00-0174 EA 2 T8 Lamps, 4' Length, Corner Mounted, Fluorescent Fixture	320.24	36.86
26 51 16 00-0175 Wall Bracket, Fluorescent Fixtures (26 51 16 00-0001)		
26 51 16 00-0176 Wall Bracket, Fluorescent Fixtures (Lithonia W) (26 51 16 00-0175)		
Note: Includes extruded aluminum housing with brushed finish, acrylic diffuser and solid-state electronic ballast.		
26 51 16 00-0177 2' Length, Wall Bracket, Fluorescent Fixtures (Lithonia W) (26 51 16 00-0176)		
26 51 16 00-0178 EA 1 T8 Lamp, 2' Length, Wall Bracket, Fluorescent Fixture (Lithonia W)	244.95	56.25
26 51 16 00-0179 EA 2 T8 Lamps, 2' Length, Wall Bracket, Fluorescent Fixture (Lithonia W)	249.82	56.25
26 51 16 00-0180 3' Length, Wall Bracket, Fluorescent Fixtures (Lithonia W) (26 51 16 00-0176)		
26 51 16 00-0181 EA 1 T8 Lamp, 3' Length, Wall Bracket, Fluorescent Fixture (Lithonia W)	319.27	56.25
26 51 16 00-0182 EA 2 T8 Lamps, 3' Length, Wall Bracket, Fluorescent Fixture (Lithonia W)	326.08	56.25
26 51 16 00-0183 4' Length, Wall Bracket, Fluorescent Fixtures (Lithonia W) (26 51 16 00-0176)		
26 51 16 00-0184 EA 1 T8 Lamp, 4' Length, Wall Bracket, Fluorescent Fixture (Lithonia W)	330.76	56.25
26 51 16 00-0185 EA 2 T8 Lamps, 4' Length, Wall Bracket, Fluorescent Fixture (Lithonia W)	335.64	56.25
26 51 16 00-0186 Wall Bracket, Fluorescent Fixtures (Lithonia WP) (26 51 16 00-0175)		
Note: Includes 20 gauge steel housing with baked finish, acrylic diffuser and solid-state electronic ballast.		
26 51 16 00-0187 2' Length, Wall Bracket, Fluorescent Fixtures (Lithonia WP) (26 51 16 00-0186)		
26 51 16 00-0188 EA 1 T8 Lamp, 2' Length, Wall Bracket, Fluorescent Fixture (Lithonia WP)	670.21	56.25
26 51 16 00-0189 EA 2 T8 Lamps, 2' Length, Wall Bracket, Fluorescent Fixture (Lithonia WP)	675.09	56.25
26 51 16 00-0190 3' Length, Wall Bracket, Fluorescent Fixtures (Lithonia WP) (26 51 16 00-0186)		
26 51 16 00-0191 EA 1 T8 Lamp, 3' Length, Wall Bracket, Fluorescent Fixture (Lithonia WP)	523.74	56.25
26 51 16 00-0192 EA 2 T8 Lamps, 3' Length, Wall Bracket, Fluorescent Fixture (Lithonia WP)	530.55	56.25
26 51 16 00-0193 4' Length, Wall Bracket, Fluorescent Fixtures (Lithonia WP) (26 51 16 00-0186)		
26 51 16 00-0194 EA 1 T8 Lamp, 4' Length, Wall Bracket, Fluorescent Fixture (Lithonia WP)	606.74	56.25
26 51 16 00-0195 EA 2 T8 Lamps, 4' Length, Wall Bracket, Fluorescent Fixture (Lithonia WP)	611.62	56.25

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 51 16 00-0196	Wall Bracket, Fluorescent Fixtures (Lithonia WC) ^(26 51 16 00-0175) Note: Includes 20 gauge steel housing with baked finish, acrylic diffuser and solid-state electronic ballast.		
26 51 16 00-0197	2' Length, Wall Bracket, Fluorescent Fixtures (Lithonia WC) ^(26 51 16 00-0196)		
26 51 16 00-0198	EA 1 T8 Lamp, 2' Length, Wall Bracket, Fluorescent Fixture (Lithonia WC).....	234.28	56.25
26 51 16 00-0199	EA 2 T8 Lamps, 2' Length, Wall Bracket, Fluorescent Fixture (Lithonia WC).....	239.16	56.25
26 51 16 00-0200	3' Length, Wall Bracket, Fluorescent Fixtures (Lithonia WC) ^(26 51 16 00-0196)		
26 51 16 00-0201	EA 1 T8 Lamp, 3' Length, Wall Bracket, Fluorescent Fixture (Lithonia WC).....	236.22	56.25
26 51 16 00-0202	EA 2 T8 Lamps, 3' Length, Wall Bracket, Fluorescent Fixture (Lithonia WC).....	243.02	56.25
26 51 16 00-0203	4' Length, Wall Bracket, Fluorescent Fixtures (Lithonia WC) ^(26 51 16 00-0196)		
26 51 16 00-0204	EA 1 T8 Lamp, 4' Length, Wall Bracket, Fluorescent Fixture (Lithonia WC).....	226.11	56.25
26 51 16 00-0205	EA 2 T8 Lamps, 4' Length, Wall Bracket, Fluorescent Fixture (Lithonia WC).....	230.99	56.25
26 51 16 00-0206	Low Occupancy, Industrial Fluorescent Fixtures ^(26 51 16 00-0001)		
26 51 16 00-0207	EA 1 T8 Lamp, 4' Length, Bi-Level Illumination, Industrial Fluorescent Fixture With Integral Occupancy Sensor (Deco SMART™ DSBL-CP).....	283.56	40.89
26 51 16 00-0208	EA 2 T8 Lamps, 4' Length, Bi-Level Illumination, Industrial Fluorescent Fixture With Integral Occupancy Sensor (Deco SMART™ DSBL-CP).....	289.15	44.68
26 51 16 00-0209	Ceiling Mounted Fluorescent Fixtures ^(26 51 16)		
26 51 16 00-0210	Ceiling Mounted, Compact Fluorescent/Incandescent Fixtures ^(26 51 16 00-0209)		
26 51 16 00-0211	Glass Globe, Compact Fluorescent/Incandescent Fixtures ^(26 51 16 00-0210)		
26 51 16 00-0212	EA 6" Diameter, Ceiling Mounted, Glass Globe, Compact Fluorescent/Incandescent Fixture	211.72	48.91
26 51 16 00-0213	EA 9" Diameter, Ceiling Mounted, Mushroom Style Glass Globe, Compact Fluorescent/Incandescent Fixture.....	259.04	48.91
26 51 16 00-0214	Ceiling Mounted, Circline Fluorescent Fixtures ^(26 51 16 00-0209)		
26 51 16 00-0215	Exposed Lamps, Circline Fluorescent Fixtures ^(26 51 16 00-0214)		
26 51 16 00-0216	EA 8-1/2" Diameter, Ceiling Mounted, Exposed Lamps, Circline Fluorescent Fixture	169.92	48.91
26 51 16 00-0217	EA 12" Diameter, Ceiling Mounted, Exposed Lamps, Circline Fluorescent Fixture	187.69	48.91
26 51 16 00-0218	Low Profile Acrylic Diffuser, Circline Fluorescent Fixtures ^(26 51 16 00-0214)		
26 51 16 00-0219	EA 11" Diameter, Ceiling Mounted, Low Profile Acrylic Diffuser, Circline Fluorescent Fixture	274.44	48.91
26 51 16 00-0220	EA 14" Diameter, Ceiling Mounted, Low Profile Acrylic Diffuser, Circline Fluorescent Fixture	404.71	48.91
26 51 16 00-0221	EA 19" Diameter, Ceiling Mounted, Low Profile Acrylic Diffuser, Circline Fluorescent Fixture	494.97	48.91
26 51 16 00-0222	EA 12" Square, Ceiling Mounted, Low Profile Acrylic Diffuser, Circline Fluorescent Fixture	316.64	48.91
26 51 16 00-0223	EA 15" Square, Ceiling Mounted, Low Profile Acrylic Diffuser, Circline Fluorescent Fixture	407.38	48.91
26 51 16 00-0224	EA 19" Square, Ceiling Mounted, Low Profile Acrylic Diffuser, Circline Fluorescent Fixture	494.97	48.91
26 51 16 00-0225	Ceiling Mounted, Double Twin Tube Compact Fluorescent Fixtures ^(26 51 16 00-0209)		
26 51 16 00-0226	Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixtures ^(26 51 16 00-0225)		
26 51 16 00-0227	EA 11" Diameter, Ceiling Mounted, Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixture	278.73	48.91
26 51 16 00-0228	EA 14" Diameter, Ceiling Mounted, Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixture	373.72	48.91
26 51 16 00-0229	EA 19" Diameter, Ceiling Mounted, Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixture	454.81	48.91
26 51 16 00-0230	EA 12" Square, Ceiling Mounted, Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixture	217.70	48.91
26 51 16 00-0231	EA 15" Square, Ceiling Mounted, Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixture	267.39	48.91
26 51 16 00-0232	EA 19" Square, Ceiling Mounted, Low Profile Acrylic Diffuser, Double Twin Tube Compact Fluorescent Fixture	361.55	48.91
26 51 16 00-0233	Pendant Mounted, Compact Fluorescent/Incandescent Downlights ^(26 51 16 00-0209)		
26 51 16 00-0234	Pendant Mounted, Compact Fluorescent/Incandescent Open Reflector Downlights ^(26 51 16 00-0233)		
26 51 16 00-0235	EA 6" Diameter, Pendant Mounted, Open Reflector Compact Fluorescent/Incandescent Downlight	464.44	40.18
26 51 16 00-0236	Pendant Mounted, Compact Fluorescent/Incandescent Downlights With Baffle ^(26 51 16 00-0233)		
26 51 16 00-0237	EA 6" Diameter, Pendant Mounted, Compact Fluorescent/Incandescent Downlight With Baffle.....	536.47	40.18
26 51 16 00-0238	EA 8" Diameter, Pendant Mounted, Compact Fluorescent/Incandescent Downlight With Baffle.....	768.87	40.18
26 51 16 00-0239	Pendant Mounted, Horizontal Indirect Fluorescent Fixtures ^(26 51 16 00-0209)		
26 51 16 00-0240	EA 1 T5HO Lamp, 4' Length, Pendant Mounted, Horizontal Indirect Fluorescent Fixture	303.33	40.18
26 51 16 00-0241	EA 2 T5HO Lamps, 4' Length, Pendant Mounted, Horizontal Indirect Fluorescent Fixture	321.90	40.18
26 51 16 00-0242	EA 3 T5HO Lamps, 4' Length, Pendant Mounted, Horizontal Indirect Fluorescent Fixture	385.61	40.18
26 51 16 00-0243	EA 2 T5HO Lamps, 8' Length, Pendant Mounted, Horizontal Indirect Fluorescent Fixture	401.91	40.18

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 16 00-0244 EA 4 T5HO Lamps, 8' Length, Pendant Mounted, Horizontal Indirect Fluorescent Fixture	480.09	40.18
26 51 16 00-0245 EA 6 T5HO Lamps, 8' Length, Pendant Mounted, Horizontal Indirect Fluorescent Fixture	572.63	40.18
26 51 16 00-0246 Fluorescent, Recessed Fixture Housings (26 51 16)		
26 51 16 00-0247 EA 4" Round, Fluorescent, T Or ICT Recessed Fixture Housing	138.67	34.98
For ICAT Housing, Add	11.10	
26 51 16 00-0248 EA 5" Round, Fluorescent, T Or ICT Recessed Fixture Housing	143.36	34.98
For ICAT Housing, Add	11.71	
26 51 16 00-0249 EA 6" Round, Fluorescent, T Or ICT Recessed Fixture Housing	149.35	36.56
For ICAT Housing, Add	12.17	
26 51 16 00-0250 EA 7" Round, Fluorescent, T Or ICT Recessed Fixture Housing	156.96	37.90
For ICAT Housing, Add	12.83	
26 51 16 00-0251 EA 8" Round, Fluorescent, T Or ICT Recessed Fixture Housing	163.60	39.87
For ICAT Housing, Add	13.37	
26 51 16 00-0252 EA 10" To 12" Square, Fluorescent, T Or ICT Recessed Fixture Housing	169.40	42.31
For ICAT Housing, Add	13.65	
26 51 16 00-0253 Compact Fluorescent, Recessed Fixture Housings (26 51 16)		
26 51 16 00-0254 EA 4" Round, Compact Fluorescent, T Or ICT Recessed Fixture Housing	158.84	34.98
For ICAT Housing, Add	13.71	
26 51 16 00-0255 EA 5" Round, Compact Fluorescent, T Or ICT Recessed Fixture Housing	163.46	34.98
For ICAT Housing, Add	14.30	
26 51 16 00-0256 EA 6" Round, Compact Fluorescent, T Or ICT Recessed Fixture Housing	169.61	36.68
For ICAT Housing, Add	14.78	
26 51 16 00-0257 EA 7" Round, Compact Fluorescent, T Or ICT Recessed Fixture Housing	174.56	38.27
For ICAT Housing, Add	15.10	
26 51 16 00-0258 EA 8" Round, Compact Fluorescent, T Or ICT Recessed Fixture Housing	180.25	39.87
For ICAT Housing, Add	15.52	
26 51 16 00-0259 EA 10" To 12" Round, Compact Fluorescent, T Or ICT Recessed Fixture Housing	185.70	42.31
For ICAT Housing, Add	15.75	
26 51 16 00-0260 Fluorescent Track Lighting Fixtures (26 51 16)		
26 51 16 00-0261 EA 2L 18W BX Track Fixture, Electronic Ballast	297.34	20.42
Note: White or Black Finish, 120V.		
26 51 16 00-0262 EA 2L 39W BX Track Fixture, Electronic Ballast	306.10	20.42
Note: White or Black Finish, 120V.		
26 51 16 00-0263 EA 2L 40W BX Track Fixture, Electronic Ballast	311.57	20.42
Note: White or Black Finish, 120V.		
26 51 16 00-0264 EA 2L 50W BX Track Fixture, Electronic Ballast	194.83	20.42
Note: White or Black Finish, 120V.		
26 51 16 00-0265 EA 2L, 55 Watt BX Track Fixture, Electronic Ballast	333.27	20.42
Note: White or Black Finish, 120V.		
26 51 16 00-0266 Compact Fluorescent Track Lighting Fixtures (26 51 16)		
26 51 16 00-0267 EA Compact Fluorescent Track Lighting Fixture	101.73	20.42
26 51 16 00-0268 Compact Fluorescent, Wet Location, Dust Resistant, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixtures (26 51 16)		
26 51 16 00-0269 EA 13 Watt Compact Fluorescent, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture	141.28	48.91
For Wall Mounted, Add	6.02	
26 51 16 00-0270 EA 22 Watt Compact Fluorescent, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture	144.91	48.91
For Wall Mounted, Add	6.02	
26 51 16 00-0271 EA 28 Watt Compact Fluorescent, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture	153.87	48.91
For Wall Mounted, Add	6.02	
26 51 16 00-0272 Wet Location, Dust Resistant, Vapor Tight, Enclosed And Gasketed, Industrial Fluorescent Fixtures (26 51 16)		
26 51 16 00-0273 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixtures (26 51 16 00-0272)		
26 51 16 00-0274 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixtures (Lithonia DMW) (26 51 16 00-0273)		
Note: Includes high impact acrylic molded lens.		
26 51 16 00-0275 EA 1 T8 Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia DMW)	318.00	52.06
For T5 Fixture Instead Of T8, Add	27.46	
26 51 16 00-0276 EA 2 T8 Lamps, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia DMW)	333.66	52.06
For T5 Fixture Instead Of T8, Add	29.25	
26 51 16 00-0277 EA 3 T8 Lamps, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia DMW)	525.52	52.06
For T5 Fixture Instead Of T8, Add	51.22	
26 51 16 00-0278 EA 1 T8HO Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia DMW)	452.25	52.06
26 51 16 00-0279 EA 2 T8HO Lamps, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia DMW)	731.04	52.06



MINOR
 CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

26 51 16 00-0280	4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixtures (Day-Brite V2W) <small>(26 51 16 00-0273)</small>		
	Note: Includes high impact acrylic molded lens.		
26 51 16 00-0281	EA 1 T8 Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Day-Brite V2W).....	366.72	52.06
26 51 16 00-0282	EA 2 T8 Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Day-Brite V2W).....	371.48	52.06
26 51 16 00-0283	EA 3 T8 Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Day-Brite V2W).....	543.01	52.06
26 51 16 00-0284	EA 1 T8HO Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Day-Brite V2W).....	448.04	52.06
26 51 16 00-0285	EA 2 T8HO Lamp, 4' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Day-Brite V2W).....	468.51	52.06
26 51 16 00-0286	8' Length, Enclosed And Gasketed, Industrial Fluorescent Fixtures <small>(26 51 16 00-0272)</small>		
	Note: Includes high impact acrylic molded lens.		
26 51 16 00-0287	8' Length, Enclosed And Gasketed, Industrial Fluorescent Fixtures (Lithonia TDMW) <small>(26 51 16 00-0286)</small>		
	Note: Includes high impact acrylic molded lens.		
26 51 16 00-0288	EA 2 T8 Lamps, 8' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia TDMW).....	602.93	70.72
	For T5 Fixture Instead Of T8, Add	56.88	
26 51 16 00-0289	EA 4 T8 Lamps, 8' Length, Enclosed And Gasketed, Industrial Fluorescent Fixture (Lithonia TDMW).....	627.62	70.72
	For T5 Fixture Instead Of T8, Add	59.71	
26 51 16 00-0290	High Bay Fluorescent Fixtures <small>(26 51 16)</small>		
26 51 16 00-0291	(T8) Fluorescent, High Bay Fixtures <small>(26 51 16 00-0290)</small>		
26 51 16 00-0292	(T8) Fluorescent, High Bay Fixtures (Lithonia) <small>(26 51 16 00-0291)</small>		
	Note: For 8' fixture, use two (2) 4' fixtures.		
26 51 16 00-0293	EA 2 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	510.15	113.95
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0294	EA 3 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	534.20	126.24
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0295	EA 4 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	605.47	144.11
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0296	EA 6 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	727.72	151.82
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0297	EA 8 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	792.34	158.86
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0298	EA 4 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia IBZ).....	448.36	144.11
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0299	EA 6 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia IBZ).....	473.08	151.82
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0300	EA 8 T8 Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia IBZ).....	541.38	158.86
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0301	(T5HO) Fluorescent, High Bay Fixtures <small>(26 51 16 00-0290)</small>		
26 51 16 00-0302	(T5HO) Fluorescent, High Bay Fixtures (Lithonia) <small>(26 51 16 00-0301)</small>		
	Note: For 8' fixture, use two (2) 4' fixtures.		
26 51 16 00-0303	EA 2 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	514.67	113.95
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0304	EA 3 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	538.22	126.24
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0305	EA 4 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	612.75	144.11
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	
26 51 16 00-0306	EA 6 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia FGB).....	743.73	151.82
	For Wire Guard, Add	40.50	
	For Acrylic Lens, Add	54.00	
	For Polycarbonate Lens, Add	47.75	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 16 00-0307 EA 4 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia IBZ)	470.39	144.11
For Wire Guard, Add	40.50	
For Acrylic Lens, Add	54.00	
For Polycarbonate Lens, Add	47.75	
26 51 16 00-0308 EA 6 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia IBZ)	518.26	151.82
For Wire Guard, Add	40.50	
For Acrylic Lens, Add	54.00	
For Polycarbonate Lens, Add	47.75	
26 51 16 00-0309 EA 8 T5HO Lamps, 4' Length, Fluorescent High Bay Fixture (Lithonia IBZ)	604.29	158.86
For Wire Guard, Add	40.50	
For Acrylic Lens, Add	54.00	
For Polycarbonate Lens, Add	47.75	
26 51 19 LED Interior Lighting (26 51)		
26 51 19 00-0001 LED Fixtures (26 51 19)		
26 51 19 00-0002 Undercabinet LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0003 EA 12" Length, Undercabinet/Modular General Purpose LED Fixture (Lithonia RAZ12-M6)	138.66	30.17
For >50 To 100, Deduct	-4.72	
For >100 To 250, Deduct	-8.19	
For >250 To 500, Deduct	-13.87	
For >500, Deduct	-19.54	
26 51 19 00-0004 EA 18" Length, Undercabinet/Modular General Purpose LED Fixture (Lithonia RAZ18-M6)	171.60	36.86
For >50 To 100, Deduct	-5.83	
For >100 To 250, Deduct	-10.12	
For >250 To 500, Deduct	-17.16	
For >500, Deduct	-24.20	
26 51 19 00-0005 EA 24" Length, Undercabinet/Modular General Purpose LED Fixture (Lithonia RAZ24-M6)	172.78	36.86
For >50 To 100, Deduct	-5.86	
For >100 To 250, Deduct	-10.18	
For >250 To 500, Deduct	-17.28	
For >500, Deduct	-24.38	
26 51 19 00-0006 EA 24" HIDE-A-LITE V Series LED Undercabinet Fixture (Progress Lighting P700003-028-30)	163.53	30.17
For >50 To 100, Deduct	-5.35	
For >100 To 250, Deduct	-9.43	
For >250 To 500, Deduct	-16.35	
For >500, Deduct	-23.27	
26 51 19 00-0007 Surface Mount Linear/Striplight LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0008 Striplight LED Fixtures (Lithonia ZL) (26 51 19 00-0007)		
26 51 19 00-0009 EA 3,000 Lumens, 2' Length, LED Striplight Fixture (Lithonia ZL1)	207.15	33.51
For >50 To 100, Deduct	-6.44	
For >100 To 250, Deduct	-11.61	
For >250 To 500, Deduct	-20.72	
For >500, Deduct	-29.82	
26 51 19 00-0010 EA 2,800 Lumens, 4' Length, LED Striplight Fixture (Lithonia ZL1)	218.31	40.89
For >50 To 100, Deduct	-6.99	
For >100 To 250, Deduct	-12.45	
For >250 To 500, Deduct	-21.83	
For >500, Deduct	-31.21	
26 51 19 00-0011 EA 1,400 Lumens, 2' Length, Lensed LED Striplight Fixture (Lithonia ZL2)	236.96	33.51
For >50 To 100, Deduct	-7.18	
For >100 To 250, Deduct	-13.11	
For >250 To 500, Deduct	-23.70	
For >500, Deduct	-34.29	
26 51 19 00-0012 EA 2,300 Lumens, 4' Length, Lensed LED Striplight Fixture (Lithonia ZL2)	248.12	40.89
For >50 To 100, Deduct	-7.74	
For >100 To 250, Deduct	-13.94	
For >250 To 500, Deduct	-24.81	
For >500, Deduct	-35.68	
26 51 19 00-0013 EA 4,600 Lumens, 4' Length, Lensed LED Striplight Fixture (Lithonia ZL2)	308.59	40.89
For >50 To 100, Deduct	-9.25	
For >100 To 250, Deduct	-16.97	
For >250 To 500, Deduct	-30.86	
For >500, Deduct	-44.75	
26 51 19 00-0014 Striplight LED Fixtures (Mobern) (26 51 19 00-0007)		
26 51 19 00-0015 EA 1,100 Lumens, 12 Watt, 2' Length, Chrome, LED Bracket Fixture (Mobern 7924LED12DMV30)	220.72	33.51
For >50 To 100, Deduct	-6.78	
For >100 To 250, Deduct	-12.29	
For >250 To 500, Deduct	-22.07	
For >500, Deduct	-31.85	
26 51 19 00-0016 Striplight LED Fixtures (Eaton) (26 51 19 00-0007)		
26 51 19 00-0017 EA 2,301 Lumens, 18 Watt, 4' Length, LED Strip Lighting (Eaton Lighting 4SNLED-LD4-22SL-LC-UNV-L840-CD1-U)	280.71	40.89
For >50 To 100, Deduct	-8.55	
For >100 To 250, Deduct	-15.57	
For >250 To 500, Deduct	-28.07	
For >500, Deduct	-40.57	



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0018	EA 2,382 Lumens, 16 Watt, 4' Length, LED Clear Lensed Striplight (Cooper Industries 4SNLED-LD5-22SL-LC-UNV-L840-CD1-U)	264.72	40.89
	<i>For >50 To 100, Deduct</i>	-8.15	
	<i>For >100 To 250, Deduct</i>	-14.77	
	<i>For >250 To 500, Deduct</i>	-26.47	
	<i>For >500, Deduct</i>	-38.17	
26 51 19 00-0019	EA 2,382 Lumens, 16 Watt, 4' Length, Clear Lens, LED Striplight (Cooper Industries Metalux Series 4SNLED-LD5-22SL-LC-UNV-830-CD1-U)	280.71	40.89
	<i>For >50 To 100, Deduct</i>	-8.55	
	<i>For >100 To 250, Deduct</i>	-15.57	
	<i>For >250 To 500, Deduct</i>	-28.07	
	<i>For >500, Deduct</i>	-40.57	
26 51 19 00-0020	Lay-In/Troffer LED Fixtures <small>(26 51 19 00-0001)</small>		
26 51 19 00-0021	Prismatic Lensed, Lay-In/Troffer LED Fixtures <small>(26 51 19 00-0020)</small>		
26 51 19 00-0022	Prismatic Lensed, Lay-In/Troffer LED Fixtures (Lithonia) <small>(26 51 19 00-0021)</small>		
26 51 19 00-0023	EA 1' x 4', 4,300 Lumens, Prismatic Lensed, Lay-In/Troffer LED Fixture (Lithonia TL4)	594.36	40.55
	<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	45.08	
	<i>For >50 To 100, Deduct</i>	-16.40	
	<i>For >100 To 250, Deduct</i>	-31.25	
	<i>For >250 To 500, Deduct</i>	-59.44	
	<i>For >500, Deduct</i>	-87.62	
26 51 19 00-0024	EA 2' x 2', 3,300 Lumens, Prismatic Lensed, Lay-In/Troffer LED Fixture (Lithonia 2TL2)	325.72	44.68
	<i>For Drywall Or Plaster Ceilings, Add</i>	30.16	
	<i>For >50 To 100, Deduct</i>	-9.82	
	<i>For >100 To 250, Deduct</i>	-17.96	
	<i>For >250 To 500, Deduct</i>	-32.57	
	<i>For >500, Deduct</i>	-47.18	
26 51 19 00-0025	EA 2' x 4', 4,600 Lumens, Prismatic Lensed, Lay-In/Troffer LED Fixture (Lithonia 2TL4)	599.67	52.06
	<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	49.54	
	<i>For >50 To 100, Deduct</i>	-16.95	
	<i>For >100 To 250, Deduct</i>	-31.94	
	<i>For >250 To 500, Deduct</i>	-59.97	
	<i>For >500, Deduct</i>	-88.00	
26 51 19 00-0026	Prismatic Lensed, Lay-In/Troffer LED Fixtures (Lunera) <small>(26 51 19 00-0021)</small>		
26 51 19 00-0027	EA 1' x 4', 3,200 Lumens, Prismatic Lensed, Lay-In/Troffer LED Fixture (Lunera® 14G4)	857.29	40.55
	<i>For >50 To 100, Deduct</i>	-22.97	
	<i>For >100 To 250, Deduct</i>	-44.40	
	<i>For >250 To 500, Deduct</i>	-85.73	
	<i>For >500, Deduct</i>	-127.06	
26 51 19 00-0028	EA 2' x 2', 3,200 Lumens, Prismatic Lensed, Lay-In/Troffer LED Fixture (Lunera® 22G5)	602.32	44.68
	<i>For >50 To 100, Deduct</i>	-16.73	
	<i>For >100 To 250, Deduct</i>	-31.79	
	<i>For >250 To 500, Deduct</i>	-60.23	
	<i>For >500, Deduct</i>	-88.67	
26 51 19 00-0029	EA 2' x 4', 4,175 Lumens, Prismatic Lensed, Lay-In/Troffer LED Fixture (Lunera® 24G4)	784.93	52.06
	<i>For >50 To 100, Deduct</i>	-21.58	
	<i>For >100 To 250, Deduct</i>	-41.20	
	<i>For >250 To 500, Deduct</i>	-78.49	
	<i>For >500, Deduct</i>	-115.78	
26 51 19 00-0030	Prismatic Lensed, Lay-In/Troffer LED Fixtures (PlanLED) <small>(26 51 19 00-0021)</small>		
26 51 19 00-0031	EA 2,591 Lumens, 2' x 2', Prismatic Lensed, Lay-In/Troffer LED Fixture (PlanLED FTB4E)	396.14	44.68
	<i>For >50 To 100, Deduct</i>	-11.58	
	<i>For >100 To 250, Deduct</i>	-21.48	
	<i>For >250 To 500, Deduct</i>	-39.61	
	<i>For >500, Deduct</i>	-57.75	
26 51 19 00-0032	EA 3,883 Lumens, 2' x 2', Prismatic Lensed, Lay-In/Troffer LED Fixture (PlanLED FTB4E)	438.61	44.68
	<i>For >50 To 100, Deduct</i>	-12.64	
	<i>For >100 To 250, Deduct</i>	-23.61	
	<i>For >250 To 500, Deduct</i>	-43.86	
	<i>For >500, Deduct</i>	-64.12	
26 51 19 00-0033	EA 3,700 Lumens, 2' x 2', Prismatic Lensed, Lay-In/Troffer LED Fixture (PlanLED BL220-40)	372.79	44.68
	<i>For >50 To 100, Deduct</i>	-11.00	
	<i>For >100 To 250, Deduct</i>	-20.32	
	<i>For >250 To 500, Deduct</i>	-37.28	
	<i>For >500, Deduct</i>	-54.24	
26 51 19 00-0034	EA 4,200 Lumens, 2' x 2', Prismatic Lensed, Lay-In/Troffer LED Fixture (PlanLED BL220-45)	372.79	44.68
	<i>For >50 To 100, Deduct</i>	-11.00	
	<i>For >100 To 250, Deduct</i>	-20.32	
	<i>For >250 To 500, Deduct</i>	-37.28	
	<i>For >500, Deduct</i>	-54.24	
26 51 19 00-0035	EA 4,600 Lumens, 2' x 2', Prismatic Lensed, Lay-In/Troffer LED Fixture (PlanLED BL220-50)	400.39	44.68
	<i>For >50 To 100, Deduct</i>	-11.69	
	<i>For >100 To 250, Deduct</i>	-21.70	
	<i>For >250 To 500, Deduct</i>	-40.04	
	<i>For >500, Deduct</i>	-58.38	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0036 Volumetric, Lay-In/Troffer LED Fixtures <small>(26 51 19 00-0020)</small>		
26 51 19 00-0037 Volumetric, Lay-In/Troffer LED Fixtures (Lithonia) <small>(26 51 19 00-0036)</small>		
26 51 19 00-0038 EA 1' x 4', 3,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia RTL4)	458.29	40.55
For Drywall Or Plaster Ceilings, Add	27.65	
For >50 To 100, Deduct	-12.99	
For >100 To 250, Deduct	-24.45	
For >250 To 500, Deduct	-45.83	
For >500, Deduct	-67.21	
26 51 19 00-0039 EA 1' x 4', 4,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia RTL4)	690.99	40.55
For Drywall Or Plaster Ceilings, Add	27.65	
For >50 To 100, Deduct	-18.81	
For >100 To 250, Deduct	-36.09	
For >250 To 500, Deduct	-69.10	
For >500, Deduct	-102.11	
26 51 19 00-0040 EA 2' x 2', 2,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia 2RTL2)	536.55	44.68
For Drywall Or Plaster Ceilings With Frame Kit, Add	43.59	
For >50 To 100, Deduct	-15.09	
For >100 To 250, Deduct	-28.50	
For >250 To 500, Deduct	-53.66	
For >500, Deduct	-78.81	
26 51 19 00-0041 EA 2' x 2', 3,300 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia 2RTL2)	616.55	44.68
For Drywall Or Plaster Ceilings With Frame Kit, Add	47.59	
For >50 To 100, Deduct	-17.09	
For >100 To 250, Deduct	-32.50	
For >250 To 500, Deduct	-61.66	
For >500, Deduct	-90.81	
26 51 19 00-0042 EA 2' x 2', 4,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia 2RTL2)	680.56	44.68
For >50 To 100, Deduct	-18.69	
For >100 To 250, Deduct	-35.70	
For >250 To 500, Deduct	-68.06	
For >500, Deduct	-100.41	
26 51 19 00-0043 EA 2' x 4', 4,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia 2RTL4)	691.74	52.06
For Drywall Or Plaster Ceilings With Frame Kit, Add	54.14	
For >50 To 100, Deduct	-19.25	
For >100 To 250, Deduct	-36.54	
For >250 To 500, Deduct	-69.17	
For >500, Deduct	-101.81	
26 51 19 00-0044 EA 2' x 4', 4,800 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia 2RTL4)	755.74	52.06
For Drywall Or Plaster Ceilings With Frame Kit, Add	57.34	
For >50 To 100, Deduct	-20.85	
For >100 To 250, Deduct	-39.74	
For >250 To 500, Deduct	-75.57	
For >500, Deduct	-111.41	
26 51 19 00-0045 EA 2' x 4', 6,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture (Lithonia 2RTL4)	819.75	52.06
For Drywall Or Plaster Ceilings With Frame Kit, Add	60.54	
For >50 To 100, Deduct	-22.45	
For >100 To 250, Deduct	-42.94	
For >250 To 500, Deduct	-81.98	
For >500, Deduct	-121.01	
26 51 19 00-0046 EA 2' x 2', 2,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture With Acrylic Linear Prismatic Diffuser (Lithonia 2VTL2)	472.56	44.68
For Drywall Or Plaster Ceilings With Frame Kit, Add	40.39	
For >50 To 100, Deduct	-13.49	
For >100 To 250, Deduct	-25.30	
For >250 To 500, Deduct	-47.26	
For >500, Deduct	-69.21	
26 51 19 00-0047 EA 2' x 2', 3,300 Lumens, Volumetric, Lay-In/Troffer LED Fixture With Acrylic Linear Prismatic Diffuser (Lithonia 2VTL2)	552.55	44.68
For Drywall Or Plaster Ceilings With Frame Kit, Add	44.39	
For >50 To 100, Deduct	-15.49	
For >100 To 250, Deduct	-29.30	
For >250 To 500, Deduct	-55.26	
For >500, Deduct	-81.21	
26 51 19 00-0048 EA 2' x 2', 4,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture With Acrylic Linear Prismatic Diffuser (Lithonia 2VTL2)	600.55	44.68
For Drywall Or Plaster Ceilings With Frame Kit, Add	46.79	
For >50 To 100, Deduct	-16.69	
For >100 To 250, Deduct	-31.70	
For >250 To 500, Deduct	-60.06	
For >500, Deduct	-88.41	
26 51 19 00-0049 EA 2' x 4', 3,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture With Acrylic Linear Prismatic Diffuser (Lithonia 2VTL4)	595.74	52.06
For Drywall Or Plaster Ceilings With Frame Kit, Add	49.34	
For >50 To 100, Deduct	-16.85	
For >100 To 250, Deduct	-31.74	
For >250 To 500, Deduct	-59.57	
For >500, Deduct	-87.41	
26 51 19 00-0050 EA 2' x 4', 4,000 Lumens, Volumetric, Lay-In/Troffer LED Fixture With Acrylic Linear Prismatic Diffuser (Lithonia 2VTL4)	627.73	52.06
For Drywall Or Plaster Ceilings With Frame Kit, Add	50.94	
For >50 To 100, Deduct	-17.65	
For >100 To 250, Deduct	-33.34	
For >250 To 500, Deduct	-62.77	
For >500, Deduct	-92.20	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 51 19 00-0051	EA	2' x 4', 4,800 Lumens, Volumetric, Lay-In/Troffer LED Fixture With Acrylic Linear Prismatic Diffuser (Lithonia 2VTL4)	691.74	52.06
		<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	54.14	
		<i>For >50 To 100, Deduct</i>	-19.25	
		<i>For >100 To 250, Deduct</i>	-36.54	
		<i>For >250 To 500, Deduct</i>	-69.17	
		<i>For >500, Deduct</i>	-101.81	
26 51 19 00-0052		Architectural, Lay-In/Troffer LED Fixtures (26 51 19 00-0020)		
26 51 19 00-0053		Architectural, Lay-In/Troffer LED Fixtures (Lithonia) (26 51 19 00-0052)		
		Note: Includes 4,000K color temperature, 120/277 voltage and steel housing assembly. Excludes sensors.		
26 51 19 00-0054	EA	2,100 Lumens, 1' x 4', Architectural, Lay-In/Troffer LED Fixture (Lithonia ALL4)	368.24	52.06
		<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	37.96	
		<i>For >50 To 100, Deduct</i>	-11.16	
		<i>For >100 To 250, Deduct</i>	-20.37	
		<i>For >250 To 500, Deduct</i>	-36.82	
		<i>For >500, Deduct</i>	-53.28	
26 51 19 00-0055	EA	4,300 Lumens, 1' x 4', Architectural, Lay-In/Troffer LED Fixture (Lithonia ALL4)	429.94	52.06
		<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	41.05	
		<i>For >50 To 100, Deduct</i>	-12.70	
		<i>For >100 To 250, Deduct</i>	-23.45	
		<i>For >250 To 500, Deduct</i>	-42.99	
		<i>For >500, Deduct</i>	-62.54	
26 51 19 00-0056	EA	6,400 Lumens, 1' x 4', Architectural, Lay-In/Troffer LED Fixture (Lithonia ALL4)	485.48	52.06
		<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	43.83	
		<i>For >50 To 100, Deduct</i>	-14.09	
		<i>For >100 To 250, Deduct</i>	-26.23	
		<i>For >250 To 500, Deduct</i>	-48.55	
		<i>For >500, Deduct</i>	-70.87	
26 51 19 00-0057		Architectural, Lay-In/Troffer LED Fixtures (CREE® CR Series) (26 51 19 00-0052)		
		Note: Includes 3,000K, 3,500 or 4,000K color temperature, 120/277 voltage and 20 gauge steel housing assembly. Excludes sensors.		
26 51 19 00-0058	EA	1' x 4', 2,200 Lumens, Architectural, Lay-In/Troffer LED Fixture (Cree® CR14™)	495.84	52.06
		<i>For Expanded Size Junction Box For Through Wiring, Add</i>	5.34	
		<i>For Drywall Or Plaster Ceilings, Add</i>	150.69	
		<i>For Surface Mount, Add</i>	271.22	
		<i>For >50 To 100, Deduct</i>	-14.35	
		<i>For >100 To 250, Deduct</i>	-26.75	
		<i>For >250 To 500, Deduct</i>	-49.58	
		<i>For >500, Deduct</i>	-72.42	
26 51 19 00-0059	EA	1' x 4', 3,100 Lumens, Architectural, Lay-In/Troffer LED Fixture (Cree® CR14™)	535.89	52.06
		<i>For Expanded Size Junction Box For Through Wiring, Add</i>	5.34	
		<i>For Drywall Or Plaster Ceilings, Add</i>	150.69	
		<i>For Surface Mount, Add</i>	271.22	
		<i>For >50 To 100, Deduct</i>	-15.35	
		<i>For >100 To 250, Deduct</i>	-28.75	
		<i>For >250 To 500, Deduct</i>	-53.59	
		<i>For >500, Deduct</i>	-78.43	
26 51 19 00-0060	EA	1' x 4', 4,000 Lumens, Architectural, Lay-In/Troffer LED Fixture (Cree® CR14™)	535.89	52.06
		<i>For Expanded Size Junction Box For Through Wiring, Add</i>	5.34	
		<i>For Drywall Or Plaster Ceilings, Add</i>	150.69	
		<i>For Surface Mount, Add</i>	271.22	
		<i>For >50 To 100, Deduct</i>	-15.35	
		<i>For >100 To 250, Deduct</i>	-28.75	
		<i>For >250 To 500, Deduct</i>	-53.59	
		<i>For >500, Deduct</i>	-78.43	
26 51 19 00-0061	EA	1' x 4', 5,000 Lumens, Architectural, Lay-In/Troffer LED Fixture (Cree® CR14™)	595.02	52.06
		<i>For Expanded Size Junction Box For Through Wiring, Add</i>	5.34	
		<i>For Drywall Or Plaster Ceilings, Add</i>	150.69	
		<i>For Surface Mount, Add</i>	271.22	
		<i>For >50 To 100, Deduct</i>	-16.83	
		<i>For >100 To 250, Deduct</i>	-31.71	
		<i>For >250 To 500, Deduct</i>	-69.50	
		<i>For >500, Deduct</i>	-87.30	
26 51 19 00-0062	EA	2' x 2', 2,000 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR22™)	462.00	44.68
		Note: CCT 30K to 50K		
		<i>For Expanded Size Junction Box For Through Wiring, Add</i>	5.34	
		<i>For Drywall Or Plaster Ceilings, Add</i>	131.88	
		<i>For Surface Mount, Add</i>	255.64	
		<i>For >50 To 100, Deduct</i>	-13.23	
		<i>For >100 To 250, Deduct</i>	-24.78	
		<i>For >250 To 500, Deduct</i>	-46.20	
		<i>For >500, Deduct</i>	-67.62	
26 51 19 00-0063	EA	2' x 2', 3,200 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR22™)	435.07	44.68
		Note: CCT 30K to 50K		
		<i>For Expanded Size Junction Box For Through Wiring, Add</i>	5.34	
		<i>For Drywall Or Plaster Ceilings, Add</i>	131.88	
		<i>For Surface Mount, Add</i>	255.64	
		<i>For >50 To 100, Deduct</i>	-12.55	
		<i>For >100 To 250, Deduct</i>	-23.43	
		<i>For >250 To 500, Deduct</i>	-43.51	
		<i>For >500, Deduct</i>	-63.58	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0064 EA 2' x 4', 2,200 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR24™).....	518.06	52.06
Note: CCT 30K to 50K		
For Expanded Size Junction Box For Through Wiring, Add	5.34	
For Drywall Or Plaster Ceilings, Add	154.50	
For Surface Mount, Add	296.02	
For >50 To 100, Deduct	-14.91	
For >100 To 250, Deduct	-27.86	
For >250 To 500, Deduct	-51.81	
For >500, Deduct	-75.75	
26 51 19 00-0065 EA 2' x 4', 3,100 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR24™).....	535.89	52.06
Note: CCT 30K to 50K		
For Expanded Size Junction Box For Through Wiring, Add	5.34	
For Drywall Or Plaster Ceilings, Add	154.50	
For Surface Mount, Add	296.02	
For >50 To 100, Deduct	-15.35	
For >100 To 250, Deduct	-28.75	
For >250 To 500, Deduct	-53.59	
For >500, Deduct	-78.43	
26 51 19 00-0066 EA 2' x 4', 4,000 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR24™).....	535.89	52.06
Note: CCT 30K to 50K		
For Expanded Size Junction Box For Through Wiring, Add	5.34	
For Drywall Or Plaster Ceilings, Add	154.50	
For Surface Mount, Add	296.02	
For >50 To 100, Deduct	-15.35	
For >100 To 250, Deduct	-28.75	
For >250 To 500, Deduct	-53.59	
For >500, Deduct	-78.43	
26 51 19 00-0067 EA 2' x 4', 4,000 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR24 LHE™).....	686.57	52.06
Note: CCT 30K to 50K		
For Expanded Size Junction Box For Through Wiring, Add	5.34	
For Drywall Or Plaster Ceilings, Add	154.50	
For Surface Mount, Add	296.02	
For >50 To 100, Deduct	-19.12	
For >100 To 250, Deduct	-36.28	
For >250 To 500, Deduct	-68.66	
For >500, Deduct	-101.03	
26 51 19 00-0068 EA 2' x 4', 5,000 Lumens, Architectural, 120-277 Volt, Lay-In/Troffer LED Fixture (Cree® CR24™).....	595.02	52.06
Note: CCT 30K to 50K		
For Expanded Size Junction Box For Through Wiring, Add	5.34	
For Drywall Or Plaster Ceilings, Add	154.50	
For Surface Mount, Add	296.02	
For >50 To 100, Deduct	-16.83	
For >100 To 250, Deduct	-31.71	
For >250 To 500, Deduct	-59.50	
For >500, Deduct	-87.30	
26 51 19 00-0069 Architectural, Lay-In/Troffer LED Fixtures (Metalux®) <small>(26 51 19 00-0052)</small>		
Note: Includes 3,000K, 3,500 or 4,000K color temperature, 120/277 voltage and code gauge steel housing assembly. Excludes sensors.		
26 51 19 00-0070 EA 2' x 2', 2,500 Lumens, Architectural, Lay-In/Troffer LED Fixture (Metalux® Accord™ 2AC).....	264.71	44.68
For >50 To 100, Deduct	-8.29	
For >100 To 250, Deduct	-14.91	
For >250 To 500, Deduct	-26.47	
For >500, Deduct	-38.03	
26 51 19 00-0071 EA 2' x 4', 4,700 Lumens, Architectural, Lay-In/Troffer LED Fixture (Metalux® Accord™ 2AC).....	350.47	52.06
For >50 To 100, Deduct	-10.72	
For >100 To 250, Deduct	-19.48	
For >250 To 500, Deduct	-35.05	
For >500, Deduct	-50.62	
26 51 19 00-0072 Architectural, Lay-In/Troffer LED Fixtures (Finelite) <small>(26 51 19 00-0052)</small>		
Note: Includes 3,000K color temperature, 120/277 voltage and 20 gauge steel housing assembly. Excludes sensors.		
26 51 19 00-0073 EA 2' x 2', 4,301 Lumens, Architectural, Lay-In/Troffer LED Fixture (Finelite HPR LED A 2x2).....	396.71	44.68
For >50 To 100, Deduct	-11.59	
For >100 To 250, Deduct	-21.51	
For >250 To 500, Deduct	-39.67	
For >500, Deduct	-57.83	
26 51 19 00-0074 EA 2' x 4', 4,671 Lumens, Architectural, Lay-In/Troffer LED Fixture (Finelite HPR LED A 2x2).....	538.17	52.50
For >50 To 100, Deduct	-15.41	
For >100 To 250, Deduct	-28.86	
For >250 To 500, Deduct	-53.82	
For >500, Deduct	-78.77	
26 51 19 00-0075 Shadow Box Style, Lay-In/Troffer LED Fixtures <small>(26 51 19 00-0020)</small>		
26 51 19 00-0076 Shadow Box Style, Lay-In/Troffer LED Fixtures (Lithonia SBSL) <small>(26 51 19 00-0075)</small>		
26 51 19 00-0077 EA 2' x 2', 3,300 Lumens, Shadow Box Style, Lay-In/Troffer LED Fixture (Lithonia 2SBSL2).....	631.29	44.68
For Drywall Or Plaster Ceilings, Add	30.16	
For >50 To 100, Deduct	-17.46	
For >100 To 250, Deduct	-33.24	
For >250 To 500, Deduct	-63.13	
For >500, Deduct	-93.02	

26	Electrical
26 50	Lighting
26 51	Interior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0078	EA		2' x 4', 4,600 Lumens, Shadow Box Style, Lay-In/Troffer LED Fixture (Lithonia 2SBSL4).....	861.65	52.06
			<i>For Drywall Or Plaster Ceilings With Frame Kit, Add</i>	62.64	
			<i>For >50 To 100, Deduct</i>	-23.50	
			<i>For >100 To 250, Deduct</i>	-45.04	
			<i>For >250 To 500, Deduct</i>	-86.17	
			<i>For >500, Deduct</i>	-127.29	
26 51 19 00-0079			Panel Type, Lay-In/Troffer LED Fixtures (26 51 19 00-0020)		
26 51 19 00-0080			Panel Type, Lay-In/Troffer LED Fixtures (PlanLED Galaxy) (26 51 19 00-0079)		
26 51 19 00-0081	EA		1' x 4', 3,100 Lumens, Panel Type, Lay-In/Troffer LED Fixture (PlanLED Galaxy GL140-34).....	430.17	52.06
			<i>For >50 To 100, Deduct</i>	-12.77	
			<i>For >100 To 250, Deduct</i>	-23.46	
			<i>For >250 To 500, Deduct</i>	-43.02	
			<i>For >500, Deduct</i>	-62.57	
26 51 19 00-0082	EA		2' x 2', 3,100 Lumens, Panel Type, Lay-In/Troffer LED Fixture (PlanLED Galaxy GL220-34).....	447.02	52.06
			<i>For >50 To 100, Deduct</i>	-13.13	
			<i>For >100 To 250, Deduct</i>	-24.31	
			<i>For >250 To 500, Deduct</i>	-44.70	
			<i>For >500, Deduct</i>	-65.10	
26 51 19 00-0083	EA		2' x 4', 4,000 Lumens, Panel Type, Lay-In/Troffer LED Fixture (PlanLED Galaxy GL240-40).....	558.73	52.06
			<i>For >50 To 100, Deduct</i>	-15.92	
			<i>For >100 To 250, Deduct</i>	-29.89	
			<i>For >250 To 500, Deduct</i>	-55.87	
			<i>For >500, Deduct</i>	-81.85	
26 51 19 00-0084	EA		2' x 4', 5,000 Lumens, Panel Type, Lay-In/Troffer LED Fixture (PlanLED Galaxy GL240-52).....	558.73	52.06
			<i>For >50 To 100, Deduct</i>	-15.92	
			<i>For >100 To 250, Deduct</i>	-29.89	
			<i>For >250 To 500, Deduct</i>	-55.87	
			<i>For >500, Deduct</i>	-81.85	
26 51 19 00-0085			Panel Type, Lay-In/Troffer LED Fixtures (Sylvania) (26 51 19 00-0079)		
26 51 19 00-0086	EA		1' x 4', 3,300 Lumens, 32 Watt, LED Edge Lite Panel (Sylvania PANELF1A/032UNVD840/14G/WH).....	226.34	52.06
			<i>For Surface Mounting Kit (Sylvania SMKIT1A/14A/WH), Add</i>	55.34	
			<i>For >50 To 100, Deduct</i>	-7.61	
			<i>For >100 To 250, Deduct</i>	-13.27	
			<i>For >250 To 500, Deduct</i>	-22.63	
			<i>For >500, Deduct</i>	-32.00	
26 51 19 00-0087	EA		2' x 2', 3,500 Lumens, 32 Watt, LED Edge Lite Panel (Sylvania PANELF1A/032UNVD840/22G/WH).....	233.56	52.06
			<i>For >50 To 100, Deduct</i>	-7.79	
			<i>For >100 To 250, Deduct</i>	-13.63	
			<i>For >250 To 500, Deduct</i>	-23.36	
			<i>For >500, Deduct</i>	-33.08	
26 51 19 00-0088	EA		2' x 4', 3,300 Lumens, 32 Watt, LED Edge Lite Panel (Sylvania PANELF1A/032UNVD840/24G/WH).....	236.86	52.06
			<i>For Surface Mounting Kit (Sylvania SMKIT1A/24A/WH)</i>	69.17	
			<i>For >50 To 100, Deduct</i>	-7.88	
			<i>For >100 To 250, Deduct</i>	-13.80	
			<i>For >250 To 500, Deduct</i>	-23.69	
			<i>For >500, Deduct</i>	-33.57	
26 51 19 00-0089	EA		2' x 4', 3,300 Lumens, 32 Watt, 3500K CCT, LED Edge Lite Panel With Kit (Sylvania PANELF1A/032UNVD835/24G/WH_SMKIT1A/24A/WH).....	548.60	52.06
			<i>For >50 To 100, Deduct</i>	-15.67	
			<i>For >100 To 250, Deduct</i>	-29.39	
			<i>For >250 To 500, Deduct</i>	-54.86	
			<i>For >500, Deduct</i>	-80.34	
26 51 19 00-0090			Surface Mount LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0091			Surface Mount, Volumetric LED Fixtures (Lithonia STL) (26 51 19 00-0090)		
26 51 19 00-0092	EA		2' Length, 2,200 Lumens, Surface Mount, Volumetric LED Fixture (Lithonia STL2).....	321.80	33.51
			<i>For >50 To 100, Deduct</i>	-9.30	
			<i>For >100 To 250, Deduct</i>	-17.35	
			<i>For >250 To 500, Deduct</i>	-32.18	
			<i>For >500, Deduct</i>	-47.01	
26 51 19 00-0093	EA		4' Length, 3,000 Lumens, Surface Mount, Volumetric LED Fixture (Lithonia STL4).....	258.41	40.89
			<i>For >50 To 100, Deduct</i>	-8.00	
			<i>For >100 To 250, Deduct</i>	-14.46	
			<i>For >250 To 500, Deduct</i>	-25.84	
			<i>For >500, Deduct</i>	-37.23	
26 51 19 00-0094	EA		4' Length, 4,000 Lumens, Surface Mount, Volumetric LED Fixture (Lithonia STL4).....	326.48	40.89
			<i>For >50 To 100, Deduct</i>	-9.70	
			<i>For >100 To 250, Deduct</i>	-17.86	
			<i>For >250 To 500, Deduct</i>	-32.65	
			<i>For >500, Deduct</i>	-47.44	
26 51 19 00-0095			Surface Mount, Wraparound LED Fixtures (Lithonia LBL) (26 51 19 00-0090)		
26 51 19 00-0096	EA		2' Length, 2,000 Lumens, Surface Mount, Wraparound LED Fixture (Lithonia LBL2).....	273.00	33.51
			<i>For >50 To 100, Deduct</i>	-8.08	
			<i>For >100 To 250, Deduct</i>	-14.91	
			<i>For >250 To 500, Deduct</i>	-27.30	
			<i>For >500, Deduct</i>	-39.69	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0097 EA 4' Length, 4,000 Lumens, Surface Mount, Wraparound LED Fixture (Lithonia LBL4)	358.80	40.89
For >50 To 100, Deduct	-10.51	
For >100 To 250, Deduct	-19.48	
For >250 To 500, Deduct	-35.88	
For >500, Deduct	-52.28	
26 51 19 00-0098 Surface Mount, Shadow Box Style LED Fixtures (26 51 19 00-0090)		
26 51 19 00-0099 Surface Mount, Shadow Box Style LED Fixtures (Lithonia SBSLX) (26 51 19 00-0098)		
26 51 19 00-0100 EA 2' x 2', 3,300 Lumens, Surface Mount, Shadow Box Style LED Fixture (Lithonia 2SBSLX2)	810.43	44.68
For >50 To 100, Deduct	-21.94	
For >100 To 250, Deduct	-42.20	
For >250 To 500, Deduct	-81.04	
For >500, Deduct	-119.89	
26 51 19 00-0101 EA 2' x 4', 4,600 Lumens, Surface Mount, Shadow Box Style LED Fixture (Lithonia 2SBSLX4)	1,040.80	52.06
For >50 To 100, Deduct	-27.98	
For >100 To 250, Deduct	-54.00	
For >250 To 500, Deduct	-104.08	
For >500, Deduct	-154.16	
26 51 19 00-0102 Surface Mount, Low Profile Fixtures (26 51 19 00-0090)		
26 51 19 00-0103 EA 6" Diameter, 993 Lumens, Low Profile Surface Mount, LED Fixture (RP Lighting - 8538-90)	106.93	30.62
For >50 To 100, Deduct	-4.20	
For >100 To 250, Deduct	-6.88	
For >250 To 500, Deduct	-10.69	
For >500, Deduct	-14.51	
26 51 19 00-0104 EA 6" Diameter, 1,215 Lumens, Low Profile Surface Mount, LED Fixture (RP Lighting - 8569).....	87.09	30.62
For >50 To 100, Deduct	-3.71	
For >100 To 250, Deduct	-5.89	
For >250 To 500, Deduct	-8.71	
For >500, Deduct	-11.53	
26 51 19 00-0105 EA 13" Diameter, 1,400 Lumens, Low Profile Surface Mount, LED Fixture (RP Lighting - 4329).....	148.57	30.62
For >50 To 100, Deduct	-5.25	
For >100 To 250, Deduct	-8.96	
For >250 To 500, Deduct	-14.86	
For >500, Deduct	-20.75	
26 51 19 00-0106 EA 15" Diameter, 2,100 Lumens, Low Profile Surface Mount, LED Fixture (RP Lighting 4330).....	180.31	30.62
For >50 To 100, Deduct	-6.04	
For >100 To 250, Deduct	-10.55	
For >250 To 500, Deduct	-18.03	
For >500, Deduct	-25.52	
26 51 19 00-0107 Recessed LED Downlights (26 51 19 00-0001)		
26 51 19 00-0108 Recessed LED Downlights (26 51 19 00-0107)		
26 51 19 00-0109 Recessed LED Downlights (Lithonia) (26 51 19 00-0108)		
Note: Includes housing and trim.		
26 51 19 00-0110 EA 8" Diameter, 1,200 Lumens, Recessed LED Downlight With Open Trim (Lithonia DOM8 LED).....	368.28	53.80
For Dimming Driver And Sensor Switch nLight Dimming Relay, Add	75.92	
For >50 To 100, Deduct	-11.22	
For >100 To 250, Deduct	-20.43	
For >250 To 500, Deduct	-36.83	
For >500, Deduct	-53.22	
26 51 19 00-0111 EA 8" Diameter, 1,500 Lumens, Recessed LED Downlight With Open Trim (Lithonia DOM8 LED).....	399.13	53.80
For Dimming Driver And Sensor Switch nLight Dimming Relay, Add	75.92	
For >50 To 100, Deduct	-12.00	
For >100 To 250, Deduct	-21.97	
For >250 To 500, Deduct	-39.91	
For >500, Deduct	-57.85	
26 51 19 00-0112 Recessed LED Downlights (Portfolio®) (26 51 19 00-0108)		
Note: Includes housing and trim.		
26 51 19 00-0113 EA 4" Diameter, 1,300 Lumens, Recessed LED Downlight With Open Trim (Portfolio® LD413).....	237.06	53.80
For >50 To 100, Deduct	-7.94	
For >100 To 250, Deduct	-13.87	
For >250 To 500, Deduct	-23.71	
For >500, Deduct	-33.54	
26 51 19 00-0114 Recessed LED Downlights (Gotham® EVO®) (26 51 19 00-0108)		
Note: Includes housing and trim.		
26 51 19 00-0115 EA 6" Diameter, 1,800 Lumens, Recessed LED Downlight With Open Trim (Gotham® EVO® ALED)	285.86	53.80
For >50 To 100, Deduct	-9.16	
For >100 To 250, Deduct	-16.31	
For >250 To 500, Deduct	-28.59	
For >500, Deduct	-40.86	

26 Electrical

26 50 Lighting

26 51 Interior Lighting



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0116	EA	6" Diameter, 1,800 Lumens, Recessed LED Shower Downlight With Non-Conductive Regressed Lens (Gotham® EVO® ALED).....	294.53	53.80
		<i>For >50 To 100, Deduct</i>	-9.38	
		<i>For >100 To 250, Deduct</i>	-16.74	
		<i>For >250 To 500, Deduct</i>	-29.45	
		<i>For >500, Deduct</i>	-42.16	
26 51 19 00-0117	EA	6" Diameter, 1,800 Lumens, Recessed LED Wallwash Downlight With Specular Reflector Trim (Gotham® EVO® DLWLED).....	330.09	53.80
		<i>For >50 To 100, Deduct</i>	-10.27	
		<i>For >100 To 250, Deduct</i>	-18.52	
		<i>For >250 To 500, Deduct</i>	-33.01	
		<i>For >500, Deduct</i>	-47.50	
26 51 19 00-0118	EA	6" Diameter, 1,800 Lumens, Decorative Recessed LED Downlight With Glass Drop Luminous Ring (Gotham® EVO® ALED).....	333.57	53.80
		<i>For >50 To 100, Deduct</i>	-10.36	
		<i>For >100 To 250, Deduct</i>	-18.70	
		<i>For >250 To 500, Deduct</i>	-33.36	
		<i>For >500, Deduct</i>	-48.02	
26 51 19 00-0119	EA	6" Diameter, 1,800 Lumens, Vandal Resistant, Recessed LED Downlight With Tempered Prismatic Lens (Gotham® EVO® VRALED).....	363.92	53.80
		<i>For >50 To 100, Deduct</i>	-11.12	
		<i>For >100 To 250, Deduct</i>	-20.21	
		<i>For >250 To 500, Deduct</i>	-36.39	
		<i>For >500, Deduct</i>	-52.57	
26 51 19 00-0120		Recessed LED Downlights (Lightolier) <small>(26 51 19 00-0108)</small>		
		Note: Includes housing and trim.		
26 51 19 00-0121	EA	4" Diameter, 500 Lumens, Recessed LED Downlight With Open Trim (Lightolier C4L05DL).....	605.53	53.80
		<i>For >50 To 100, Deduct</i>	-17.16	
		<i>For >100 To 250, Deduct</i>	-32.29	
		<i>For >250 To 500, Deduct</i>	-60.55	
		<i>For >500, Deduct</i>	-88.81	
26 51 19 00-0122	EA	4" Diameter, 1,000 Lumens, Recessed LED Downlight With Open Trim (Lightolier C4L10DL).....	710.76	53.80
		<i>For >50 To 100, Deduct</i>	-19.79	
		<i>For >100 To 250, Deduct</i>	-37.56	
		<i>For >250 To 500, Deduct</i>	-71.08	
		<i>For >500, Deduct</i>	-104.60	
26 51 19 00-0123	EA	6" Diameter, 1,500 Lumens, Recessed LED Downlight With Open Trim (Lightolier C6L1520DL).....	763.26	53.80
		<i>For >50 To 100, Deduct</i>	-21.10	
		<i>For >100 To 250, Deduct</i>	-40.18	
		<i>For >250 To 500, Deduct</i>	-76.33	
		<i>For >500, Deduct</i>	-112.47	
26 51 19 00-0124	EA	6" Diameter, 2,000 Lumens, Recessed LED Downlight With Open Trim (Lightolier C6L1520DL).....	763.26	53.80
		<i>For >50 To 100, Deduct</i>	-21.10	
		<i>For >100 To 250, Deduct</i>	-40.18	
		<i>For >250 To 500, Deduct</i>	-76.33	
		<i>For >500, Deduct</i>	-112.47	
26 51 19 00-0125	EA	7" Diameter, 1,500 Lumens, Recessed LED Downlight With Open Trim (Lightolier C7L1520DL).....	789.63	53.80
		<i>For >50 To 100, Deduct</i>	-21.76	
		<i>For >100 To 250, Deduct</i>	-41.50	
		<i>For >250 To 500, Deduct</i>	-78.96	
		<i>For >500, Deduct</i>	-116.43	
26 51 19 00-0126	EA	7" Diameter, 2,000 Lumens, Recessed LED Downlight With Open Trim (Lightolier C7L1520DL).....	816.01	53.80
		<i>For >50 To 100, Deduct</i>	-22.42	
		<i>For >100 To 250, Deduct</i>	-42.82	
		<i>For >250 To 500, Deduct</i>	-81.60	
		<i>For >500, Deduct</i>	-120.38	
26 51 19 00-0127		Recessed LED Downlights (Cooper) <small>(26 51 19 00-0108)</small>		
26 51 19 00-0128	EA	600 Lumens, 2700K CCT, LED Downlight (Cooper Halo ML5606827).....	150.94	53.80
		<i>For >50 To 100, Deduct</i>	-5.79	
		<i>For >100 To 250, Deduct</i>	-9.56	
		<i>For >250 To 500, Deduct</i>	-15.09	
		<i>For >500, Deduct</i>	-20.62	
26 51 19 00-0129	EA	600 Lumens, 3000K CCT, LED Downlight (Cooper Halo ML5606830).....	150.94	53.80
		<i>For >50 To 100, Deduct</i>	-5.79	
		<i>For >100 To 250, Deduct</i>	-9.56	
		<i>For >250 To 500, Deduct</i>	-15.09	
		<i>For >500, Deduct</i>	-20.62	
26 51 19 00-0130	EA	600 Lumens, 3500K CCT, LED Downlight (Cooper Halo ML5606835).....	150.94	53.80
		<i>For >50 To 100, Deduct</i>	-5.79	
		<i>For >100 To 250, Deduct</i>	-9.56	
		<i>For >250 To 500, Deduct</i>	-15.09	
		<i>For >500, Deduct</i>	-20.62	
26 51 19 00-0131	EA	600 Lumens, 4000K CCT, LED Downlight (Cooper Halo ML5606840).....	150.94	53.80
		<i>For >50 To 100, Deduct</i>	-5.79	
		<i>For >100 To 250, Deduct</i>	-9.56	
		<i>For >250 To 500, Deduct</i>	-15.09	
		<i>For >500, Deduct</i>	-20.62	
26 51 19 00-0132	EA	900 Lumens, 2700K CCT, LED Downlight (Cooper Halo ML5609827).....	153.55	53.80
		<i>For >50 To 100, Deduct</i>	-5.86	
		<i>For >100 To 250, Deduct</i>	-9.70	
		<i>For >250 To 500, Deduct</i>	-15.36	
		<i>For >500, Deduct</i>	-21.01	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51	19 00-0133	EA	900 Lumens, 3000K CCT, LED Downlight (Cooper Halo ML5609830)	153.55	53.80
			<i>For >50 To 100, Deduct</i>	-5.86	
			<i>For >100 To 250, Deduct</i>	-9.70	
			<i>For >250 To 500, Deduct</i>	-15.36	
			<i>For >500, Deduct</i>	-21.01	
26 51	19 00-0134	EA	900 Lumens, 3500K CCT, LED Downlight (Cooper Halo ML5609835)	153.55	53.80
			<i>For >50 To 100, Deduct</i>	-5.86	
			<i>For >100 To 250, Deduct</i>	-9.70	
			<i>For >250 To 500, Deduct</i>	-15.36	
			<i>For >500, Deduct</i>	-21.01	
26 51	19 00-0135	EA	900 Lumens, 4000K CCT, LED Downlight (Cooper Halo ML5609840)	153.55	53.80
			<i>For >50 To 100, Deduct</i>	-5.86	
			<i>For >100 To 250, Deduct</i>	-9.70	
			<i>For >250 To 500, Deduct</i>	-15.36	
			<i>For >500, Deduct</i>	-21.01	
26 51	19 00-0136	EA	1,200 Lumens, 2700K CCT, LED Downlight (Cooper Halo ML5612827)	189.02	53.80
			<i>For >50 To 100, Deduct</i>	-6.74	
			<i>For >100 To 250, Deduct</i>	-11.47	
			<i>For >250 To 500, Deduct</i>	-18.90	
			<i>For >500, Deduct</i>	-26.34	
26 51	19 00-0137	EA	1,200 Lumens, 3000K CCT, LED Downlight (Cooper Halo ML5612830)	187.22	53.80
			<i>For >50 To 100, Deduct</i>	-6.70	
			<i>For >100 To 250, Deduct</i>	-11.38	
			<i>For >250 To 500, Deduct</i>	-18.72	
			<i>For >500, Deduct</i>	-26.07	
26 51	19 00-0138	EA	1,200 Lumens, 3500K CCT, LED Downlight (Cooper Halo ML5612835)	187.22	53.80
			<i>For >50 To 100, Deduct</i>	-6.70	
			<i>For >100 To 250, Deduct</i>	-11.38	
			<i>For >250 To 500, Deduct</i>	-18.72	
			<i>For >500, Deduct</i>	-26.07	
26 51	19 00-0139	EA	1,200 Lumens, 4000K CCT, LED Downlight (Cooper Halo ML5612840)	187.22	53.80
			<i>For >50 To 100, Deduct</i>	-6.70	
			<i>For >100 To 250, Deduct</i>	-11.38	
			<i>For >250 To 500, Deduct</i>	-18.72	
			<i>For >500, Deduct</i>	-26.07	
26 51	19 00-0140	EA	5" LED Trim, Polymer Dead-Front, Shallow White Baffle And Flange (Cooper Halo 591WB)	88.78	17.12
			<i>For >50 To 100, Deduct</i>	-2.86	
			<i>For >100 To 250, Deduct</i>	-5.08	
			<i>For >250 To 500, Deduct</i>	-8.88	
			<i>For >500, Deduct</i>	-12.68	
26 51	19 00-0141	EA	5" LED Trim, Specular Reflector And White Flange (Cooper Halo 592SC)	56.32	17.12
			<i>For >50 To 100, Deduct</i>	-2.05	
			<i>For >100 To 250, Deduct</i>	-3.46	
			<i>For >250 To 500, Deduct</i>	-5.63	
			<i>For >500, Deduct</i>	-7.81	
26 51	19 00-0142	EA	5" LED Trim, Haze Reflector And White Flange (Cooper Halo 592H)	70.29	17.12
			<i>For >50 To 100, Deduct</i>	-2.40	
			<i>For >100 To 250, Deduct</i>	-4.16	
			<i>For >250 To 500, Deduct</i>	-7.03	
			<i>For >500, Deduct</i>	-9.90	
26 51	19 00-0143	EA	5" LED Trim, White Reflector And Flange (Cooper Halo 592W)	59.13	17.12
			<i>For >50 To 100, Deduct</i>	-2.12	
			<i>For >100 To 250, Deduct</i>	-3.60	
			<i>For >250 To 500, Deduct</i>	-5.91	
			<i>For >500, Deduct</i>	-8.23	
26 51	19 00-0144	EA	5" LED Trim, White Micro-Step Baffle And Flange (Cooper Halo 593WB)	47.72	17.12
			<i>For >50 To 100, Deduct</i>	-1.84	
			<i>For >100 To 250, Deduct</i>	-3.03	
			<i>For >250 To 500, Deduct</i>	-4.77	
			<i>For >500, Deduct</i>	-6.52	
26 51	19 00-0145	EA	5" LED Trim, Black Micro-Step Baffle And White Flange (Cooper Halo 593BB)	58.63	17.12
			<i>For >50 To 100, Deduct</i>	-2.11	
			<i>For >100 To 250, Deduct</i>	-3.57	
			<i>For >250 To 500, Deduct</i>	-5.86	
			<i>For >500, Deduct</i>	-8.15	
26 51	19 00-0146	EA	5" LED Trim, Satin Nickel Micro-Step Baffle And Flange (Cooper Halo 593SNB)	65.28	17.12
			<i>For >50 To 100, Deduct</i>	-2.27	
			<i>For >100 To 250, Deduct</i>	-3.91	
			<i>For >250 To 500, Deduct</i>	-6.53	
			<i>For >500, Deduct</i>	-9.15	
26 51	19 00-0147	EA	5" LED Trim, Tuscan Bronze Micro-Step Baffle And Flange (Cooper Halo 593TBZB)	71.20	17.12
			<i>For >50 To 100, Deduct</i>	-2.42	
			<i>For >100 To 250, Deduct</i>	-4.20	
			<i>For >250 To 500, Deduct</i>	-7.12	
			<i>For >500, Deduct</i>	-10.04	
26 51	19 00-0148	EA	5" LED Directional Trim, White eyeball, Baffle And Flange (Cooper Halo 594WB)	82.76	17.12
			<i>For >50 To 100, Deduct</i>	-2.71	
			<i>For >100 To 250, Deduct</i>	-4.78	
			<i>For >250 To 500, Deduct</i>	-8.28	
			<i>For >500, Deduct</i>	-11.77	
26 51	19 00-0149	EA	5" LED Directional Trim, Satin Nickel eyeball, Baffle And Flange (Cooper Halo 594SNB)	83.14	17.12
			<i>For >50 To 100, Deduct</i>	-2.72	
			<i>For >100 To 250, Deduct</i>	-4.80	
			<i>For >250 To 500, Deduct</i>	-8.31	
			<i>For >500, Deduct</i>	-11.83	

26 Electrical
26 50 Lighting
26 51 Interior Lighting



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0150	EA	5" LED Directional Trim, Tuscan Bronze eyeball, Baffle And Flange (Cooper Halo 594TBZB)	81.48	17.12
		<i>For >50 To 100, Deduct</i>	-2.68	
		<i>For >100 To 250, Deduct</i>	-4.72	
		<i>For >250 To 500, Deduct</i>	-8.15	
		<i>For >500, Deduct</i>	-11.58	
26 51 19 00-0151	EA	5" LED Trim, Wall Wash - Specular reflector, repositionable Specular kick reflector, White Flange (Cooper Halo 595WW).....	100.45	17.12
		<i>For >50 To 100, Deduct</i>	-3.15	
		<i>For >100 To 250, Deduct</i>	-5.66	
		<i>For >250 To 500, Deduct</i>	-10.05	
		<i>For >500, Deduct</i>	-14.43	
26 51 19 00-0152	EA	5" LED Trim, White Shallow Baffle And Flange (Cooper Halo 596WB)	48.13	17.12
		<i>For >50 To 100, Deduct</i>	-1.85	
		<i>For >100 To 250, Deduct</i>	-3.05	
		<i>For >250 To 500, Deduct</i>	-4.81	
		<i>For >500, Deduct</i>	-6.58	
26 51 19 00-0153	EA	6" LED Trim, Polymer Dead-Front, White Shallow Baffle And Flange (Cooper Halo 691WB)	86.00	17.12
		<i>For >50 To 100, Deduct</i>	-2.79	
		<i>For >100 To 250, Deduct</i>	-4.94	
		<i>For >250 To 500, Deduct</i>	-8.60	
		<i>For >500, Deduct</i>	-12.26	
26 51 19 00-0154	EA	6" LED Trim, Specular Reflector And White Flange (Cooper Halo 692SC)	73.23	17.12
		<i>For >50 To 100, Deduct</i>	-2.47	
		<i>For >100 To 250, Deduct</i>	-4.30	
		<i>For >250 To 500, Deduct</i>	-7.32	
		<i>For >500, Deduct</i>	-10.34	
26 51 19 00-0155	EA	6" LED Trim, Haze Reflector And White Flange (Cooper Halo 692H)	68.75	17.12
		<i>For >50 To 100, Deduct</i>	-2.36	
		<i>For >100 To 250, Deduct</i>	-4.08	
		<i>For >250 To 500, Deduct</i>	-6.88	
		<i>For >500, Deduct</i>	-9.67	
26 51 19 00-0156	EA	6" LED Trim, White Reflector And Flange (Cooper Halo 692W)	61.36	17.12
		<i>For >50 To 100, Deduct</i>	-2.18	
		<i>For >100 To 250, Deduct</i>	-3.71	
		<i>For >250 To 500, Deduct</i>	-6.14	
		<i>For >500, Deduct</i>	-8.56	
26 51 19 00-0157	EA	6" LED Trim, White Micro-Step Baffle And Flange (Cooper Halo 693WB)	61.90	17.12
		<i>For >50 To 100, Deduct</i>	-2.19	
		<i>For >100 To 250, Deduct</i>	-3.74	
		<i>For >250 To 500, Deduct</i>	-6.19	
		<i>For >500, Deduct</i>	-8.64	
26 51 19 00-0158	EA	6" LED Trim, Black Micro-Step Baffle And White Flange (Cooper Halo 693BB).....	66.64	17.12
		<i>For >50 To 100, Deduct</i>	-2.31	
		<i>For >100 To 250, Deduct</i>	-3.97	
		<i>For >250 To 500, Deduct</i>	-6.66	
		<i>For >500, Deduct</i>	-9.35	
26 51 19 00-0159	EA	6" LED Trim, Satin Nickel Micro-Step Baffle And Flange (Cooper Halo 693SNB)	61.07	17.12
		<i>For >50 To 100, Deduct</i>	-2.17	
		<i>For >100 To 250, Deduct</i>	-3.70	
		<i>For >250 To 500, Deduct</i>	-6.11	
		<i>For >500, Deduct</i>	-8.52	
26 51 19 00-0160	EA	6" LED Trim, Tuscan Bronze Micro-Step Baffle And Flange (Cooper Halo 693TBZB)	76.19	17.12
		<i>For >50 To 100, Deduct</i>	-2.55	
		<i>For >100 To 250, Deduct</i>	-4.45	
		<i>For >250 To 500, Deduct</i>	-7.62	
		<i>For >500, Deduct</i>	-10.79	
26 51 19 00-0161	EA	6" LED Directional Trim, White eyeball, Baffle And Flange (Cooper Halo 694WB).....	82.57	17.12
		<i>For >50 To 100, Deduct</i>	-2.71	
		<i>For >100 To 250, Deduct</i>	-4.77	
		<i>For >250 To 500, Deduct</i>	-8.26	
		<i>For >500, Deduct</i>	-11.74	
26 51 19 00-0162	EA	6" LED Directional Trim, Satin Nickel eyeball, Baffle And Flange (Cooper Halo 694SNB)	103.77	17.12
		<i>For >50 To 100, Deduct</i>	-3.24	
		<i>For >100 To 250, Deduct</i>	-5.83	
		<i>For >250 To 500, Deduct</i>	-10.38	
		<i>For >500, Deduct</i>	-14.92	
26 51 19 00-0163	EA	6" LED Directional Trim, Tuscan Bronze eyeball, Baffle And Flange (Cooper Halo 694TBZB)	101.11	17.12
		<i>For >50 To 100, Deduct</i>	-3.17	
		<i>For >100 To 250, Deduct</i>	-5.70	
		<i>For >250 To 500, Deduct</i>	-10.11	
		<i>For >500, Deduct</i>	-14.52	
26 51 19 00-0164	EA	6" LED Trim, Wall Wash - Specular reflector, repositionable Specular kick reflector, White Flange (Cooper Halo 695WW).....	102.28	17.12
		<i>For >50 To 100, Deduct</i>	-3.20	
		<i>For >100 To 250, Deduct</i>	-5.76	
		<i>For >250 To 500, Deduct</i>	-10.23	
		<i>For >500, Deduct</i>	-14.70	
26 51 19 00-0165	EA	6" LED Trim, White Shallow Baffle And Flange (Cooper Halo 696WB)	62.54	17.12
		<i>For >50 To 100, Deduct</i>	-2.21	
		<i>For >100 To 250, Deduct</i>	-3.77	
		<i>For >250 To 500, Deduct</i>	-6.25	
		<i>For >500, Deduct</i>	-8.74	
26 51 19 00-0166	EA	6" LED, Insulated Ceiling, Air-Tite, New Construction Housing (Cooper Halo H750ICAT)	60.73	36.68
		<i>For >50 To 100, Deduct</i>	-2.89	
		<i>For >100 To 250, Deduct</i>	-4.41	
		<i>For >250 To 500, Deduct</i>	-6.07	
		<i>For >500, Deduct</i>	-7.73	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51	19 00-0167	EA	6" LED, Insulated Ceiling, Air-Tite, Remodel Housing (Cooper Halo H750RICAT)	65.92	36.68
			<i>For >50 To 100, Deduct</i>	-3.02	
			<i>For >100 To 250, Deduct</i>	-4.67	
			<i>For >250 To 500, Deduct</i>	-6.59	
			<i>For >500, Deduct</i>	-8.51	
26 51	19 00-0168	EA	6" LED, Non-IC, Air-Tite, New Construction Housing (Cooper Halo H750T)	63.84	36.68
			<i>For >50 To 100, Deduct</i>	-2.97	
			<i>For >100 To 250, Deduct</i>	-4.57	
			<i>For >250 To 500, Deduct</i>	-6.38	
			<i>For >500, Deduct</i>	-8.20	
26 51	19 00-0169	EA	6" LED, Non-IC, New Construction/Remodel Chicago Plenum Housing (Cooper Halo H750TCP)	84.30	36.68
			<i>For >50 To 100, Deduct</i>	-3.48	
			<i>For >100 To 250, Deduct</i>	-5.59	
			<i>For >250 To 500, Deduct</i>	-8.43	
			<i>For >500, Deduct</i>	-11.27	
26 51	19 00-0170	EA	6" LED, Shallow, Insulated Ceiling, Air-Tite, New Constr. (Cooper Halo H2750ICAT)	81.90	36.68
			<i>For >50 To 100, Deduct</i>	-3.42	
			<i>For >100 To 250, Deduct</i>	-5.47	
			<i>For >250 To 500, Deduct</i>	-8.19	
			<i>For >500, Deduct</i>	-10.91	
26 51	19 00-0171	EA	6" Insulated Ceiling, Air-Tite New Construction Housing (Cooper Halo H7ICAT)	66.63	36.68
			<i>For >50 To 100, Deduct</i>	-3.04	
			<i>For >100 To 250, Deduct</i>	-4.71	
			<i>For >250 To 500, Deduct</i>	-6.66	
			<i>For >500, Deduct</i>	-8.62	
26 51	19 00-0172	EA	6" Insulated Ceiling, Air-Tite Remodel Housing (Cooper Halo H7RICAT)	70.13	36.68
			<i>For >50 To 100, Deduct</i>	-3.13	
			<i>For >100 To 250, Deduct</i>	-4.88	
			<i>For >250 To 500, Deduct</i>	-7.01	
			<i>For >500, Deduct</i>	-9.14	
26 51	19 00-0173	EA	6" Insulated Ceiling, New Construction Housing (Cooper Halo H7ICT)	65.90	36.68
			<i>For >50 To 100, Deduct</i>	-3.02	
			<i>For >100 To 250, Deduct</i>	-4.67	
			<i>For >250 To 500, Deduct</i>	-6.59	
			<i>For >500, Deduct</i>	-8.51	
26 51	19 00-0174	EA	6" Insulated Ceiling, Remodel Housing (Cooper Halo H7RICT)	69.73	36.68
			<i>For >50 To 100, Deduct</i>	-3.12	
			<i>For >100 To 250, Deduct</i>	-4.86	
			<i>For >250 To 500, Deduct</i>	-6.97	
			<i>For >500, Deduct</i>	-9.08	
26 51	19 00-0175	EA	6" Insulated Ceiling, Air-Tite New Construction Housing, No Socket Bracket (Cooper Halo H7ICATNB)	66.54	36.68
			<i>For >50 To 100, Deduct</i>	-3.04	
			<i>For >100 To 250, Deduct</i>	-4.70	
			<i>For >250 To 500, Deduct</i>	-6.65	
			<i>For >500, Deduct</i>	-8.61	
26 51	19 00-0176	EA	6" Insulated Ceiling, New Construction Housing, No Socket Bracket (Cooper Halo H7ICTNB)	66.18	36.68
			<i>For >50 To 100, Deduct</i>	-3.03	
			<i>For >100 To 250, Deduct</i>	-4.68	
			<i>For >250 To 500, Deduct</i>	-6.62	
			<i>For >500, Deduct</i>	-8.55	
26 51	19 00-0177	EA	6" Non-IC, New Construction Housing (Cooper Halo H7T)	68.94	36.68
			<i>For >50 To 100, Deduct</i>	-3.10	
			<i>For >100 To 250, Deduct</i>	-4.82	
			<i>For >250 To 500, Deduct</i>	-6.89	
			<i>For >500, Deduct</i>	-8.97	
26 51	19 00-0178	EA	6" Non-IC, Remodel Housing (Cooper Halo H7RT)	70.44	36.68
			<i>For >50 To 100, Deduct</i>	-3.14	
			<i>For >100 To 250, Deduct</i>	-4.90	
			<i>For >250 To 500, Deduct</i>	-7.04	
			<i>For >500, Deduct</i>	-9.19	
26 51	19 00-0179	EA	6" Non-IC, New Construction Housing, No Socket Bracket (Cooper Halo H7TNB)	70.92	36.68
			<i>For >50 To 100, Deduct</i>	-3.15	
			<i>For >100 To 250, Deduct</i>	-4.92	
			<i>For >250 To 500, Deduct</i>	-7.09	
			<i>For >500, Deduct</i>	-9.26	
26 51	19 00-0180	EA	6" Non-IC, Chicago Plenum, New Construction/Remodel Housing (Cooper Halo H7TCP)	94.09	36.68
			<i>For >50 To 100, Deduct</i>	-3.73	
			<i>For >100 To 250, Deduct</i>	-6.08	
			<i>For >250 To 500, Deduct</i>	-9.41	
			<i>For >500, Deduct</i>	-12.74	
26 51	19 00-0181	EA	6" Insulated Ceiling, Universal New Construction Housing (Cooper Halo H7UICT)	88.28	36.68
			<i>For >50 To 100, Deduct</i>	-3.58	
			<i>For >100 To 250, Deduct</i>	-5.79	
			<i>For >250 To 500, Deduct</i>	-8.83	
			<i>For >500, Deduct</i>	-11.87	
26 51	19 00-0182	EA	6" Insulated Ceiling, Universal, Air-Tite, New Construction Housing (Cooper Halo H7UICAT)	88.95	36.68
			<i>For >50 To 100, Deduct</i>	-3.60	
			<i>For >100 To 250, Deduct</i>	-5.82	
			<i>For >250 To 500, Deduct</i>	-8.90	
			<i>For >500, Deduct</i>	-11.97	
26 51	19 00-0183	EA	6" Insulated Ceiling, Air-Tite New Construction Housing (Cooper Halo EI700AT)	92.84	36.68
			<i>For >50 To 100, Deduct</i>	-3.70	
			<i>For >100 To 250, Deduct</i>	-6.02	
			<i>For >250 To 500, Deduct</i>	-9.28	
			<i>For >500, Deduct</i>	-12.55	

26 Electrical

26 50 Lighting

26 51 Interior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0184	EA 6" Insulated Ceiling, Air-Tite Remodel Housing (Cooper Halo EI700RAT)	92.84	36.68
	For>50 To 100, Deduct	-3.70	
	For>100 To 250, Deduct	-6.02	
	For>250 To 500, Deduct	-9.28	
	For>500, Deduct	-12.55	
26 51 19 00-0185	EA 6" Insulated Ceiling, New Construction Housing (Cooper Halo EI700).....	92.84	36.68
	For>50 To 100, Deduct	-3.70	
	For>100 To 250, Deduct	-6.02	
	For>250 To 500, Deduct	-9.28	
	For>500, Deduct	-12.55	
26 51 19 00-0186	EA 6" Insulated Ceiling, Remodel Housing (Cooper Halo EI700R)	92.84	36.68
	For>50 To 100, Deduct	-3.70	
	For>100 To 250, Deduct	-6.02	
	For>250 To 500, Deduct	-9.28	
	For>500, Deduct	-12.55	
26 51 19 00-0187	EA 6" Insulated Ceiling, Air-Tite New Construction Housing, No Socket Bracket (Cooper Halo EI700ATNB)	92.84	36.68
	For>50 To 100, Deduct	-3.70	
	For>100 To 250, Deduct	-6.02	
	For>250 To 500, Deduct	-9.28	
	For>500, Deduct	-12.55	
26 51 19 00-0188	EA 6" Insulated Ceiling, New Construction Housing, No Socket Bracket (Cooper Halo EI700NB)	82.67	36.68
	For>50 To 100, Deduct	-3.44	
	For>100 To 250, Deduct	-5.51	
	For>250 To 500, Deduct	-8.27	
	For>500, Deduct	-11.02	
26 51 19 00-0189	EA 6" Insulated Ceiling, Universal New Construction Housing (Cooper Halo EI700U).....	82.67	36.68
	For>50 To 100, Deduct	-3.44	
	For>100 To 250, Deduct	-5.51	
	For>250 To 500, Deduct	-8.27	
	For>500, Deduct	-11.02	
26 51 19 00-0190	EA 6" Insulated Ceiling, Universal, Air-Tite, New Construction Housing (Cooper Halo EI700UAT).....	82.67	36.68
	For>50 To 100, Deduct	-3.44	
	For>100 To 250, Deduct	-5.51	
	For>250 To 500, Deduct	-8.27	
	For>500, Deduct	-11.02	
26 51 19 00-0191	EA 6" Non-IC, New Construction Housing (Cooper Halo ET700).....	82.67	36.68
	For>50 To 100, Deduct	-3.44	
	For>100 To 250, Deduct	-5.51	
	For>250 To 500, Deduct	-8.27	
	For>500, Deduct	-11.02	
26 51 19 00-0192	EA 6" Non-IC, Remodel Housing (Cooper Halo ET700R)	82.67	36.68
	For>50 To 100, Deduct	-3.44	
	For>100 To 250, Deduct	-5.51	
	For>250 To 500, Deduct	-8.27	
	For>500, Deduct	-11.02	
26 51 19 00-0193	EA 6" Shallow, Insulated Ceiling, Air-Tite New Construction (Cooper Halo H27ICAT).....	83.41	36.68
	For>50 To 100, Deduct	-3.46	
	For>100 To 250, Deduct	-5.55	
	For>250 To 500, Deduct	-8.34	
	For>500, Deduct	-11.14	
26 51 19 00-0194	EA 6" Shallow, Insulated Ceiling, Air-Tite Remodel Housing (Cooper Halo H27RICAT).....	94.84	36.68
	For>50 To 100, Deduct	-3.75	
	For>100 To 250, Deduct	-6.12	
	For>250 To 500, Deduct	-9.48	
	For>500, Deduct	-12.85	
26 51 19 00-0195	EA 6" Shallow, Insulated Ceiling, New Construction Housing (Cooper Halo H27ICT).....	83.41	36.68
	For>50 To 100, Deduct	-3.46	
	For>100 To 250, Deduct	-5.55	
	For>250 To 500, Deduct	-8.34	
	For>500, Deduct	-11.14	
26 51 19 00-0196	EA 6" Shallow, Insulated Ceiling, Remodel Housing (Cooper Halo H27RICT).....	91.61	36.68
	For>50 To 100, Deduct	-3.67	
	For>100 To 250, Deduct	-5.96	
	For>250 To 500, Deduct	-9.16	
	For>500, Deduct	-12.37	
26 51 19 00-0197	EA 6" Shallow, Non-IC, New Construction Housing (Cooper Halo H27T)	78.78	36.68
	For>50 To 100, Deduct	-3.35	
	For>100 To 250, Deduct	-5.31	
	For>250 To 500, Deduct	-7.88	
	For>500, Deduct	-10.44	
26 51 19 00-0198	EA 6" Shallow, Non-IC, Remodel Housing (Cooper Halo H27RT).....	79.90	36.68
	For>50 To 100, Deduct	-3.37	
	For>100 To 250, Deduct	-5.37	
	For>250 To 500, Deduct	-7.99	
	For>500, Deduct	-10.61	
26 51 19 00-0199	EA 6" Shallow, Insulated Ceiling, Air-Tite New Construction (Cooper Halo EI2700AT).....	87.89	36.68
	For>50 To 100, Deduct	-3.57	
	For>100 To 250, Deduct	-5.77	
	For>250 To 500, Deduct	-8.79	
	For>500, Deduct	-11.81	
26 51 19 00-0200	EA 6" Shallow, Insulated Ceiling, New Construction Housing (Cooper Halo EI2700).....	87.89	36.68
	For>50 To 100, Deduct	-3.57	
	For>100 To 250, Deduct	-5.77	
	For>250 To 500, Deduct	-8.79	
	For>500, Deduct	-11.81	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0201	EA		6" Shallow, Insulated Ceiling, Air-Tite Remodel Housing (Cooper Halo EI2700R)	87.89	36.68
			<i>For >50 To 100, Deduct</i>	-3.57	
			<i>For >100 To 250, Deduct</i>	-5.77	
			<i>For >250 To 500, Deduct</i>	-8.79	
			<i>For >500, Deduct</i>	-11.81	
26 51 19 00-0202	EA		6" Shallow, Non-IC, New Construction Housing (Cooper Halo ET2700)	87.89	36.68
			<i>For >50 To 100, Deduct</i>	-3.57	
			<i>For >100 To 250, Deduct</i>	-5.77	
			<i>For >250 To 500, Deduct</i>	-8.79	
			<i>For >500, Deduct</i>	-11.81	
26 51 19 00-0203	EA		6" Shallow, Non-IC, Remodel Housing (Cooper Halo ET2700R).....	87.89	36.68
			<i>For >50 To 100, Deduct</i>	-3.57	
			<i>For >100 To 250, Deduct</i>	-5.77	
			<i>For >250 To 500, Deduct</i>	-8.79	
			<i>For >500, Deduct</i>	-11.81	
26 51 19 00-0204	EA		6" Retrofit Enclosure, Non-IC, BX Whip (Cooper Halo ML7BXRFK)	70.97	17.12
			<i>For >50 To 100, Deduct</i>	-2.42	
			<i>For >100 To 250, Deduct</i>	-4.19	
			<i>For >250 To 500, Deduct</i>	-7.10	
			<i>For >500, Deduct</i>	-10.00	
26 51 19 00-0205	EA		6" Retrofit Enclosure, Non-IC, E26 Screw base Interface (Cooper Halo ML7E26RFK).....	73.29	17.12
			<i>For >50 To 100, Deduct</i>	-2.47	
			<i>For >100 To 250, Deduct</i>	-4.31	
			<i>For >250 To 500, Deduct</i>	-7.33	
			<i>For >500, Deduct</i>	-10.35	
26 51 19 00-0206	EA		5" LED, Insulated Ceiling, Air-Tite, New Construction Housing (Cooper Halo H550ICAT)	73.73	36.68
			<i>For >50 To 100, Deduct</i>	-3.22	
			<i>For >100 To 250, Deduct</i>	-5.06	
			<i>For >250 To 500, Deduct</i>	-7.37	
			<i>For >500, Deduct</i>	-9.68	
26 51 19 00-0207	EA		5" LED, Insulated Ceiling, Air-Tite, Remodel Housing (Cooper Halo H550RICAT)	74.00	36.68
			<i>For >50 To 100, Deduct</i>	-3.23	
			<i>For >100 To 250, Deduct</i>	-5.08	
			<i>For >250 To 500, Deduct</i>	-7.40	
			<i>For >500, Deduct</i>	-9.72	
26 51 19 00-0208	EA		5" Insulated Ceiling, Air-Tite New Construction Housing (Cooper Halo H5ICAT)	69.19	36.68
			<i>For >50 To 100, Deduct</i>	-3.11	
			<i>For >100 To 250, Deduct</i>	-4.84	
			<i>For >250 To 500, Deduct</i>	-6.92	
			<i>For >500, Deduct</i>	-9.00	
26 51 19 00-0209	EA		5" Insulated Ceiling, Air-Tite Remodel Housing (Cooper Halo H5RICAT)	71.55	36.68
			<i>For >50 To 100, Deduct</i>	-3.16	
			<i>For >100 To 250, Deduct</i>	-4.95	
			<i>For >250 To 500, Deduct</i>	-7.16	
			<i>For >500, Deduct</i>	-9.36	
26 51 19 00-0210	EA		5" Non-IC, New Construction Housing (Cooper Halo H5T).....	70.78	36.68
			<i>For >50 To 100, Deduct</i>	-3.15	
			<i>For >100 To 250, Deduct</i>	-4.91	
			<i>For >250 To 500, Deduct</i>	-7.08	
			<i>For >500, Deduct</i>	-9.24	
26 51 19 00-0211	EA		5" Non-IC, Remodel Housing (Cooper Halo H5RT).....	71.50	36.68
			<i>For >50 To 100, Deduct</i>	-3.16	
			<i>For >100 To 250, Deduct</i>	-4.95	
			<i>For >250 To 500, Deduct</i>	-7.15	
			<i>For >500, Deduct</i>	-9.35	
26 51 19 00-0212	EA		5" Insulated Ceiling, Air-Tite New Construction Housing (Cooper Halo EI500AT).....	81.66	36.68
			<i>For >50 To 100, Deduct</i>	-3.42	
			<i>For >100 To 250, Deduct</i>	-5.46	
			<i>For >250 To 500, Deduct</i>	-8.17	
			<i>For >500, Deduct</i>	-10.87	
26 51 19 00-0213	EA		5" Insulated Ceiling, Air-Tite Remodel Housing (Cooper Halo EI500RAT).....	82.20	36.68
			<i>For >50 To 100, Deduct</i>	-3.43	
			<i>For >100 To 250, Deduct</i>	-5.49	
			<i>For >250 To 500, Deduct</i>	-8.22	
			<i>For >500, Deduct</i>	-10.95	
26 51 19 00-0214	EA		5" Non-IC, New Construction Housing (Cooper Halo ET500).....	84.93	36.68
			<i>For >50 To 100, Deduct</i>	-3.50	
			<i>For >100 To 250, Deduct</i>	-5.62	
			<i>For >250 To 500, Deduct</i>	-8.49	
			<i>For >500, Deduct</i>	-11.36	
26 51 19 00-0215	EA		5" Non-IC, Remodel Housing (Cooper Halo ET500R)	86.85	36.68
			<i>For >50 To 100, Deduct</i>	-3.55	
			<i>For >100 To 250, Deduct</i>	-5.72	
			<i>For >250 To 500, Deduct</i>	-8.69	
			<i>For >500, Deduct</i>	-11.65	
26 51 19 00-0216	EA		5" Shallow, Insulated Ceiling, Air-Tite New Construction (Cooper Halo H25ICAT).....	95.25	36.68
			<i>For >50 To 100, Deduct</i>	-3.76	
			<i>For >100 To 250, Deduct</i>	-6.14	
			<i>For >250 To 500, Deduct</i>	-9.53	
			<i>For >500, Deduct</i>	-12.91	
26 51 19 00-0217			Recessed LED Downlights (Maxlite DLR) <small>(26 51 19 00-0108)</small>		

26 Electrical**26 50 Lighting****26 51 Interior Lighting**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0218	EA 4" Diameter, 1,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR410)	176.34	53.80
	<i>For >50 To 100, Deduct</i>	-6.43	
	<i>For >100 To 250, Deduct</i>	-10.83	
	<i>For >250 To 500, Deduct</i>	-17.63	
	<i>For >500, Deduct</i>	-24.43	
26 51 19 00-0219	EA 4" Diameter, 1,500 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR415)	178.78	53.80
	<i>For >50 To 100, Deduct</i>	-6.49	
	<i>For >100 To 250, Deduct</i>	-10.96	
	<i>For >250 To 500, Deduct</i>	-17.88	
	<i>For >500, Deduct</i>	-24.80	
26 51 19 00-0220	EA 4" Diameter, 2,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR420)	186.15	53.80
	<i>For >50 To 100, Deduct</i>	-6.67	
	<i>For >100 To 250, Deduct</i>	-11.33	
	<i>For >250 To 500, Deduct</i>	-18.62	
	<i>For >500, Deduct</i>	-25.90	
26 51 19 00-0221	EA 6" Diameter, 1,500 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR615)	171.42	53.80
	<i>For >50 To 100, Deduct</i>	-6.30	
	<i>For >100 To 250, Deduct</i>	-10.59	
	<i>For >250 To 500, Deduct</i>	-17.14	
	<i>For >500, Deduct</i>	-23.70	
26 51 19 00-0222	EA 6" Diameter, 2,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR620)	171.42	53.80
	<i>For >50 To 100, Deduct</i>	-6.30	
	<i>For >100 To 250, Deduct</i>	-10.59	
	<i>For >250 To 500, Deduct</i>	-17.14	
	<i>For >500, Deduct</i>	-23.70	
26 51 19 00-0223	EA 6" Diameter, 3,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR630)	171.42	53.80
	<i>For >50 To 100, Deduct</i>	-6.30	
	<i>For >100 To 250, Deduct</i>	-10.59	
	<i>For >250 To 500, Deduct</i>	-17.14	
	<i>For >500, Deduct</i>	-23.70	
26 51 19 00-0224	EA 8" Diameter, 1,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR810)	186.15	53.80
	<i>For >50 To 100, Deduct</i>	-6.67	
	<i>For >100 To 250, Deduct</i>	-11.33	
	<i>For >250 To 500, Deduct</i>	-18.62	
	<i>For >500, Deduct</i>	-25.90	
26 51 19 00-0225	EA 8" Diameter, 1,500 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR815)	188.59	53.80
	<i>For >50 To 100, Deduct</i>	-6.73	
	<i>For >100 To 250, Deduct</i>	-11.45	
	<i>For >250 To 500, Deduct</i>	-18.86	
	<i>For >500, Deduct</i>	-26.27	
26 51 19 00-0226	EA 8" Diameter, 2,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR820)	193.49	53.80
	<i>For >50 To 100, Deduct</i>	-6.86	
	<i>For >100 To 250, Deduct</i>	-11.69	
	<i>For >250 To 500, Deduct</i>	-19.35	
	<i>For >500, Deduct</i>	-27.01	
26 51 19 00-0227	EA 8" Diameter, 3,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR830)	208.20	53.80
	<i>For >50 To 100, Deduct</i>	-7.22	
	<i>For >100 To 250, Deduct</i>	-12.43	
	<i>For >250 To 500, Deduct</i>	-20.82	
	<i>For >500, Deduct</i>	-29.21	
26 51 19 00-0228	EA 8" Diameter, 5,000 Lumens, Recessed LED Downlight Retrofit (MaxLite DLR850)	227.82	53.80
	<i>For >50 To 100, Deduct</i>	-7.71	
	<i>For >100 To 250, Deduct</i>	-13.41	
	<i>For >250 To 500, Deduct</i>	-22.78	
	<i>For >500, Deduct</i>	-32.16	
26 51 19 00-0229	Recessed LED Downlight Retrofits And Trim (CREE®) <small>(26 51 19 00-0107)</small>		
26 51 19 00-0230	Recessed LED Downlight Retrofits (CREE®) <small>(26 51 19 00-0229)</small> Note: Dimmable to 5%. For installation in standard recessed IC or non-IC housings. Includes removal of existing lamp from fixture. Excludes housing and disposal of hazardous lamps.		
26 51 19 00-0231	EA 4" Diameter, 575 Lumens, Recessed LED Downlight Retrofit (Cree® CR4-575L)	113.60	
	<i>For >50 To 100, Deduct</i>	-3.60	
	<i>For >100 To 250, Deduct</i>	-6.44	
	<i>For >250 To 500, Deduct</i>	-11.36	
	<i>For >500, Deduct</i>	-16.28	
26 51 19 00-0232	EA 6" Diameter, 625 Lumens, Recessed LED Downlight Retrofit (Cree® CR6-625L)	100.13	
	<i>For >50 To 100, Deduct</i>	-3.27	
	<i>For >100 To 250, Deduct</i>	-5.77	
	<i>For >250 To 500, Deduct</i>	-10.01	
	<i>For >500, Deduct</i>	-14.26	
26 51 19 00-0233	EA 6" Diameter, 800 Lumens, Recessed LED Downlight Retrofit (Cree® CR6-800L)	127.06	
	<i>For >50 To 100, Deduct</i>	-3.94	
	<i>For >100 To 250, Deduct</i>	-7.12	
	<i>For >250 To 500, Deduct</i>	-12.71	
	<i>For >500, Deduct</i>	-18.29	
26 51 19 00-0234	EA 6" Diameter, 650 Lumens, Recessed LED Downlight Retrofit (Cree® LR6C-277)	142.76	
	<i>For >50 To 100, Deduct</i>	-4.33	
	<i>For >100 To 250, Deduct</i>	-7.90	
	<i>For >250 To 500, Deduct</i>	-14.28	
	<i>For >500, Deduct</i>	-20.65	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0235 EA 6" Diameter, 1,000 Lumens, Deep Recessed LED Downlight Retrofit (Cree® LR6-10L-XXX-120V-A-DR)	156.22	
For >50 To 100, Deduct	-4.67	
For >100 To 250, Deduct	-8.58	
For >250 To 500, Deduct	-15.62	
For >500, Deduct	-22.67	
26 51 19 00-0236 Recessed LED Downlight Retrofits Trim (CREE®) (26 51 19 00-0229)		
Note: For installation in standard recessed IC or non-IC housings. Excludes housing and lamp.		
26 51 19 00-0237 EA 6" Diameter, Diffuse Anodized Finish Reflector For LED Downlight Retrofits (Cree® CT6AX)	40.77	8.56
For >50 To 100, Deduct	-1.48	
For >100 To 250, Deduct	-2.50	
For >250 To 500, Deduct	-4.08	
For >500, Deduct	-5.66	
26 51 19 00-0238 EA 6" Diameter, Diffuse Anodized Finish Reflector With Painted Flange For LED Downlight Retrofits (Cree® LT6AP).....	49.75	8.56
For >50 To 100, Deduct	-1.70	
For >100 To 250, Deduct	-2.95	
For >250 To 500, Deduct	-4.98	
For >500, Deduct	-7.00	
26 51 19 00-0239 EA 6" Diameter, Flat Black Finish Trim And Reflector For LED Downlight Retrofits (Cree® CT6BB)	43.02	8.56
For >50 To 100, Deduct	-1.53	
For >100 To 250, Deduct	-2.61	
For >250 To 500, Deduct	-4.30	
For >500, Deduct	-5.99	
26 51 19 00-0240 Recessed LED Downlight Fixture Housings (CREE®) (26 51 19 00-0229)		
Note: Excludes lamp and trim.		
26 51 19 00-0241 EA 6" Diameter, IC Rated, Architectural Recessed LED Downlight Fixture Housing (Cree® H6).....	108.89	36.68
For >50 To 100, Deduct	-4.10	
For >100 To 250, Deduct	-6.82	
For >250 To 500, Deduct	-10.89	
For >500, Deduct	-14.96	
26 51 19 00-0242 EA 6" Diameter, IC Rated, Retrofit Recessed LED Downlight Fixture Housing (Cree® RR6).....	77.46	36.68
For >50 To 100, Deduct	-3.31	
For >100 To 250, Deduct	-5.25	
For >250 To 500, Deduct	-7.75	
For >500, Deduct	-10.24	
26 51 19 00-0243 Can Retrofit Or Surface Mount, LED Downlights (26 51 19 00-0107)		
26 51 19 00-0244 EA 6" Diameter, 15 Watt, Can Retrofit Or Surface Mount, LED Downlight (Lighting Science® GLP6)	96.67	33.51
For >50 To 100, Deduct	-3.67	
For >100 To 250, Deduct	-6.09	
For >250 To 500, Deduct	-9.67	
For >500, Deduct	-13.24	
26 51 19 00-0245 EA 4" Diameter, 7 Watt, Can Retrofit, LED Downlight (Green Creative0 1-811-D)	78.64	33.51
For >50 To 100, Deduct	-3.22	
For >100 To 250, Deduct	-5.19	
For >250 To 500, Deduct	-7.86	
For >500, Deduct	-10.54	
26 51 19 00-0246 EA 6" Diameter, 9.5 Watt, Can Retrofit, LED Downlight (Green Creative0 1-808-D)	78.64	33.51
For >50 To 100, Deduct	-3.22	
For >100 To 250, Deduct	-5.19	
For >250 To 500, Deduct	-7.86	
For >500, Deduct	-10.54	
26 51 19 00-0247 EA 6" Diameter, 8.9 Watt, Can Retrofit, LED Downlight (Lithonia 6BP)	137.81	33.51
For Recessed IC/Non-IC Rated Housing For New Construction, Add	50.14	
For >50 To 100, Deduct	-4.70	
For >100 To 250, Deduct	-8.15	
For >250 To 500, Deduct	-13.78	
For >500, Deduct	-19.41	
26 51 19 00-0248 EA 4" Diameter, 8 Watt, 600 Lumens, Retrofit LED Downlight (Sylvania LED/RT4/550/840)	68.70	33.51
For >50 To 100, Deduct	-2.97	
For >100 To 250, Deduct	-4.69	
For >250 To 500, Deduct	-6.87	
For >500, Deduct	-9.05	
26 51 19 00-0249 EA 5" Diameter, 10 Watt, 700 Lumens, Retrofit LED Downlight (Sylvania LED/RT5/6/625/840)	76.10	33.51
For >50 To 100, Deduct	-3.16	
For >100 To 250, Deduct	-5.06	
For >250 To 500, Deduct	-7.61	
For >500, Deduct	-10.16	
26 51 19 00-0250 EA 6" Diameter, 800 Lumens, 10 Watt, Retrofit LED Wallwash Downlight (Indy Lighting LRT6-08LM)	918.06	33.51
For >50 To 100, Deduct	-24.21	
For >100 To 250, Deduct	-47.16	
For >250 To 500, Deduct	-91.81	
For >500, Deduct	-136.45	
26 51 19 00-0251 Wall Mount LED Cylinder Downlight (26 51 19 00-0001)		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51	19 00-0252	EA	9" Diameter, 2,200 Lumens, Wall Mount LED Cylinder Downlight With Semi-Specular Trim (Gotham® EVO® CLED9).....	371.84	52.06
			<i>For >50 To 100, Deduct</i>	-11.25	
			<i>For >100 To 250, Deduct</i>	-20.55	
			<i>For >250 To 500, Deduct</i>	-37.18	
			<i>For >500, Deduct</i>	-53.82	
26 51	19 00-0253	EA	10-3/4" x 6-1/4" x 5-1/2", LED Wall Pack, 27 Watt, 120 Volt.....	215.73	52.06
			<i>For >50 To 100, Deduct</i>	-7.35	
			<i>For >100 To 250, Deduct</i>	-12.74	
			<i>For >250 To 500, Deduct</i>	-21.57	
			<i>For >500, Deduct</i>	-30.40	
26 51	19 00-0254		Wall Sconce And Wall Wash LED Fixtures (26 51 19 00-0001)		
26 51	19 00-0255		LED Wall Sconce Fixtures (Hudson Valley Lighting) (26 51 19 00-0254)		
26 51	19 00-0256	EA	2-1/2" Diameter x 15-1/2" High, Polished Nickel, LED Wall Sconce (Hudson Valley Lighting SHAW 1200-PN).....	526.67	48.91
			<i>For >50 To 100, Deduct</i>	-15.00	
			<i>For >100 To 250, Deduct</i>	-28.17	
			<i>For >250 To 500, Deduct</i>	-52.67	
			<i>For >500, Deduct</i>	-77.17	
26 51	19 00-0257		LED Wall Sconce Fixtures (Kichler) (26 51 19 00-0254)		
26 51	19 00-0258	EA	6" High x 11.75" Wide x 3.5" Deep, 900 Lumens, 15 Watt, White Acrylic Diffuser, Brushed Nickel, LED Wall Sconce (Kichler 10790NILED).....	292.86	48.91
			<i>For >50 To 100, Deduct</i>	-9.16	
			<i>For >100 To 250, Deduct</i>	-16.48	
			<i>For >250 To 500, Deduct</i>	-29.29	
			<i>For >500, Deduct</i>	-42.09	
26 51	19 00-0259		LED Wall Sconce Fixtures (Metalux) (26 51 19 00-0254)		
26 51	19 00-0260	EA	9.875" High x 7.125" Wide x 3.5" Deep, 9 Watt, White Acrylic Diffuser, Brushed Nickel, LED Wall Sconce (Metalux AFX VNTS071009L30ENBN).....	160.40	48.91
			<i>For >50 To 100, Deduct</i>	-5.84	
			<i>For >100 To 250, Deduct</i>	-9.85	
			<i>For >250 To 500, Deduct</i>	-16.04	
			<i>For >500, Deduct</i>	-22.23	
26 51	19 00-0261	EA	5" LED, Cape Sconce Wall Light, White (AFX CAPW050804L30ENWH).....	149.52	48.91
			<i>For >50 To 100, Deduct</i>	-5.57	
			<i>For >100 To 250, Deduct</i>	-9.31	
			<i>For >250 To 500, Deduct</i>	-14.95	
			<i>For >500, Deduct</i>	-20.59	
26 51	19 00-0262		Concealed Continuous LED Fixtures (26 51 19 00-0001)		
26 51	19 00-0263		Concealed Continuous LED Fixtures (Fraqtir™ S301) (26 51 19 00-0262)		
26 51	19 00-0264	LF	Fixed Surface Mount, Concealed Continuous LED Fixture With Remote Driver (Fraqtir™ S301).....	718.05	5.58
			<i>For >50 To 100, Deduct</i>	-18.23	
			<i>For >100 To 250, Deduct</i>	-36.18	
			<i>For >250 To 500, Deduct</i>	-71.81	
			<i>For >500, Deduct</i>	-107.43	
26 51	19 00-0265	LF	Fixed Surface Mount, Concealed Continuous LED Fixture With Remote Dimming Driver (Fraqtir™ S301).....	818.70	5.58
			<i>For >50 To 100, Deduct</i>	-20.75	
			<i>For >100 To 250, Deduct</i>	-41.21	
			<i>For >250 To 500, Deduct</i>	-81.87	
			<i>For >500, Deduct</i>	-122.53	
26 51	19 00-0266		Low Bay LED Fixtures (26 51 19 00-0001)		
26 51	19 00-0267		LED Linear Low Bay Fixtures (PlanLED) (26 51 19 00-0266)		
26 51	19 00-0268	EA	4' Length, 23 Watt, LED Linear Low Bay Fixture (PlanLED A1W4).....	366.52	67.03
			<i>For >50 To 100, Deduct</i>	-11.96	
			<i>For >100 To 250, Deduct</i>	-21.12	
			<i>For >250 To 500, Deduct</i>	-36.65	
			<i>For >500, Deduct</i>	-52.19	
26 51	19 00-0269	EA	4' Length, 42 Watt, LED Linear Low Bay Fixture (PlanLED A2W4A).....	498.16	67.03
			<i>For >50 To 100, Deduct</i>	-15.25	
			<i>For >100 To 250, Deduct</i>	-27.70	
			<i>For >250 To 500, Deduct</i>	-49.82	
			<i>For >500, Deduct</i>	-71.93	
26 51	19 00-0270	EA	8' Length, 84 Watt, LED Linear Low Bay Fixture (PlanLED A2W5A).....	829.72	83.79
			<i>For >50 To 100, Deduct</i>	-24.23	
			<i>For >100 To 250, Deduct</i>	-44.98	
			<i>For >250 To 500, Deduct</i>	-82.97	
			<i>For >500, Deduct</i>	-120.97	
26 51	19 00-0271		LED Low Bay Fixtures (CREE®) (26 51 19 00-0266)		
26 51	19 00-0272		LED Low Bay Fixtures (CREE® LS) (26 51 19 00-0271)		
			Note: Includes 120/277 voltage and 22 gauge steel housing assembly. Excludes sensors.		



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0273 EA 2,500 Lumens, 4' Length, LED Low Bay Fixture (Cree® LS4-25L-35K-10V)	334.88	67.03
For >50 To 100, Deduct	-11.17	
For >100 To 250, Deduct	-19.54	
For >250 To 500, Deduct	-33.49	
For >500, Deduct	-47.44	
26 51 19 00-0274 EA 2,500 Lumens, 4' Length, LED Low Bay Fixture (Cree® LS4-25L-50K-10V)	357.76	67.03
For >50 To 100, Deduct	-11.74	
For >100 To 250, Deduct	-20.68	
For >250 To 500, Deduct	-35.78	
For >500, Deduct	-50.87	
26 51 19 00-0275 EA 4,000 Lumens, 4' Length, LED Low Bay Fixture (Cree® LS4-40L-35K-10V)	344.41	67.03
For >50 To 100, Deduct	-11.40	
For >100 To 250, Deduct	-20.01	
For >250 To 500, Deduct	-34.44	
For >500, Deduct	-48.87	
26 51 19 00-0276 EA 4,000 Lumens, 4' Length, LED Low Bay Fixture (Cree® LS4-40L-50K-10V)	367.30	67.03
For >50 To 100, Deduct	-11.98	
For >100 To 250, Deduct	-21.16	
For >250 To 500, Deduct	-36.73	
For >500, Deduct	-52.30	
26 51 19 00-0277 EA 5,000 Lumens, 4' Length, LED Low Bay Fixture (Cree® LS4-50L-35K-10V)	384.47	67.03
For >50 To 100, Deduct	-12.40	
For >100 To 250, Deduct	-22.02	
For >250 To 500, Deduct	-38.45	
For >500, Deduct	-54.88	
26 51 19 00-0278 EA 5,000 Lumens, 4' Length, LED Low Bay Fixture (Cree® LS4-50L-50K-10V)	407.36	67.03
For >50 To 100, Deduct	-12.98	
For >100 To 250, Deduct	-23.16	
For >250 To 500, Deduct	-40.74	
For >500, Deduct	-58.31	
26 51 19 00-0279 EA 8,000 Lumens, 8' Length, LED Low Bay Fixture (Cree® LS8-80L-35K-10V)	540.18	83.79
For >50 To 100, Deduct	-17.00	
For >100 To 250, Deduct	-30.50	
For >250 To 500, Deduct	-54.02	
For >500, Deduct	-77.54	
26 51 19 00-0280 EA 8,000 Lumens, 8' Length, LED Low Bay Fixture (Cree® LS8-80L-50K-10V)	582.14	83.79
For >50 To 100, Deduct	-18.04	
For >100 To 250, Deduct	-32.60	
For >250 To 500, Deduct	-58.21	
For >500, Deduct	-83.83	
26 51 19 00-0281 EA 10,000 Lumens, 8' Length, LED Low Bay Fixture (Cree® LS8-100L-35K-10V)	669.88	83.79
For >50 To 100, Deduct	-20.24	
For >100 To 250, Deduct	-36.99	
For >250 To 500, Deduct	-66.99	
For >500, Deduct	-96.99	
26 51 19 00-0282 EA 10,000 Lumens, 8' Length, LED Low Bay Fixture (Cree® LS8-100L-50K-10V)	692.76	83.79
For >50 To 100, Deduct	-20.81	
For >100 To 250, Deduct	-38.13	
For >250 To 500, Deduct	-69.28	
For >500, Deduct	-100.42	
26 51 19 00-0283 LED Low Bay Fixtures (CREE® LN) <small>(26 51 19 00-0271)</small>		
Note: Includes 120/277 voltage and aluminum housing assembly. Excludes sensors.		
26 51 19 00-0284 EA 3,400 Lumens, 4' Length, LED Low Bay Fixture (Cree® LN4-34L-35K-10V)	758.30	67.03
For >50 To 100, Deduct	-21.75	
For >100 To 250, Deduct	-40.71	
For >250 To 500, Deduct	-75.83	
For >500, Deduct	-110.95	
26 51 19 00-0285 EA 3,400 Lumens, 4' Length, LED Low Bay Fixture, Smartcast Technology (Cree® LN4-34L-35K-CMA)	853.67	67.03
For >50 To 100, Deduct	-24.13	
For >100 To 250, Deduct	-45.48	
For >250 To 500, Deduct	-85.37	
For >500, Deduct	-125.26	
26 51 19 00-0286 LED Linear Low Bay Fixtures (CREE® CS) <small>(26 51 19 00-0271)</small>		
Note: Includes 3,500 or 4,000K color temperature, 120/277 voltage and lightweight polymer housing assembly. Excludes sensors.		
26 51 19 00-0287 EA 4,000 Lumens, 4' Length, LED Linear Low Bay Fixture (Cree® CS14™).....	733.32	67.03
For >50 To 100, Deduct	-21.13	
For >100 To 250, Deduct	-39.46	
For >250 To 500, Deduct	-73.33	
For >500, Deduct	-107.21	
26 51 19 00-0288 EA 7,500 Lumens, 8' Length, LED Linear Low Bay Fixture (Cree® CS18™).....	911.57	83.79
For >50 To 100, Deduct	-26.28	
For >100 To 250, Deduct	-49.07	
For >250 To 500, Deduct	-91.16	
For >500, Deduct	-133.24	
26 51 19 00-0289 EA 8,000 Lumens, 8' Length, LED Linear Low Bay Fixture (Cree® CS18™).....	1,160.65	83.79
For >50 To 100, Deduct	-32.51	
For >100 To 250, Deduct	-61.52	
For >250 To 500, Deduct	-116.07	
For >500, Deduct	-170.61	

26 Electrical

26 50 Lighting

26 51 Interior Lighting



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51	19 00-0290		Accessories For LED Low Bay Fixtures (CREE®) <small>(26 51 19 00-0271)</small>		
	26 51 19 00-0291	EA	Continuous Row Through Wiring Kit For 4' Fixtures (Cree® LS4TWK).....	64.28	18.37
			<i>For >50 To 100, Deduct</i>	-2.37	
			<i>For >100 To 250, Deduct</i>	-3.98	
			<i>For >250 To 500, Deduct</i>	-6.43	
			<i>For >500, Deduct</i>	-8.88	
	26 51 19 00-0292	EA	Continuous Row Through Wiring Kit For 8' Fixtures (Cree® LS8TWK).....	71.02	18.37
			<i>For >50 To 100, Deduct</i>	-2.54	
			<i>For >100 To 250, Deduct</i>	-4.32	
			<i>For >250 To 500, Deduct</i>	-7.10	
			<i>For >500, Deduct</i>	-9.89	
	26 51 19 00-0293	EA	Top Housing Aligner For Continuous Row Installations (Cree® LS-RJ).....	53.05	18.37
			<i>For >50 To 100, Deduct</i>	-2.09	
			<i>For >100 To 250, Deduct</i>	-3.42	
			<i>For >250 To 500, Deduct</i>	-5.31	
			<i>For >500, Deduct</i>	-7.19	
	26 51 19 00-0294	EA	Reflector Joint Aligner For Continuous Row Installations (Cree® LS-RFLJ).....	41.84	18.37
			<i>For >50 To 100, Deduct</i>	-1.81	
			<i>For >100 To 250, Deduct</i>	-2.86	
			<i>For >250 To 500, Deduct</i>	-4.18	
			<i>For >500, Deduct</i>	-5.51	
	26 51 19 00-0295	EA	Solid Reflector, Pair (Cree® LS4-SR).....	142.81	18.37
			<i>For >50 To 100, Deduct</i>	-4.34	
			<i>For >100 To 250, Deduct</i>	-7.91	
			<i>For >250 To 500, Deduct</i>	-14.28	
			<i>For >500, Deduct</i>	-20.66	
	26 51 19 00-0296	EA	Solid Reflector, Pair (Cree® LS8-SR).....	198.92	18.37
			<i>For >50 To 100, Deduct</i>	-5.74	
			<i>For >100 To 250, Deduct</i>	-10.71	
			<i>For >250 To 500, Deduct</i>	-19.89	
			<i>For >500, Deduct</i>	-29.07	
	26 51 19 00-0297	EA	5" Cable Canopy With #18/2 SJT Cord, 48" (Cree® AC5-18/2-48-Q14B-JB).....	71.02	18.37
			<i>For >50 To 100, Deduct</i>	-2.54	
			<i>For >100 To 250, Deduct</i>	-4.32	
			<i>For >250 To 500, Deduct</i>	-7.10	
			<i>For >500, Deduct</i>	-9.89	
	26 51 19 00-0298	EA	5" Cable Canopy With #18/2 SJT Cord, 72" (Cree® AC5-18/2-72-Q14B-JB).....	102.43	18.37
			<i>For >50 To 100, Deduct</i>	-3.33	
			<i>For >100 To 250, Deduct</i>	-5.89	
			<i>For >250 To 500, Deduct</i>	-10.24	
			<i>For >500, Deduct</i>	-14.60	
	26 51 19 00-0299	EA	5" Cable Canopy With #18/5 SJT Cord, 48" (Cree® AC5-18/5-48-Q14B-JB).....	79.98	18.37
			<i>For >50 To 100, Deduct</i>	-2.77	
			<i>For >100 To 250, Deduct</i>	-4.76	
			<i>For >250 To 500, Deduct</i>	-8.00	
			<i>For >500, Deduct</i>	-11.23	
	26 51 19 00-0300	EA	5" Cable Canopy With #18/5 SJT Cord, 72" (Cree® AC5-18/5-72-Q14B-JB).....	109.16	18.37
			<i>For >50 To 100, Deduct</i>	-3.49	
			<i>For >100 To 250, Deduct</i>	-6.22	
			<i>For >250 To 500, Deduct</i>	-10.92	
			<i>For >500, Deduct</i>	-15.61	
	26 51 19 00-0301	EA	5" Cable Canopy With #18/5 SJT Cord, 96" (Cree® AC5-18/5-96-Q14B-JB).....	115.90	18.37
			<i>For >50 To 100, Deduct</i>	-3.66	
			<i>For >100 To 250, Deduct</i>	-6.56	
			<i>For >250 To 500, Deduct</i>	-11.59	
			<i>For >500, Deduct</i>	-16.62	
	26 51 19 00-0302	EA	5" Cable Canopy With #12/3 SJT Cord, 48" (Cree® AC5-12/3-48-Q14B-JB).....	97.93	18.37
			<i>For >50 To 100, Deduct</i>	-3.21	
			<i>For >100 To 250, Deduct</i>	-5.66	
			<i>For >250 To 500, Deduct</i>	-9.79	
			<i>For >500, Deduct</i>	-13.92	
	26 51 19 00-0303	EA	5" Cable Canopy With #12/3 SJT Cord, 72" (Cree® AC5-12/3-72-Q14B-JB).....	149.54	18.37
			<i>For >50 To 100, Deduct</i>	-4.50	
			<i>For >100 To 250, Deduct</i>	-8.24	
			<i>For >250 To 500, Deduct</i>	-14.95	
			<i>For >500, Deduct</i>	-21.67	
	26 51 19 00-0304	EA	Set Of End Caps, One With Power Feed, One Without (Cree® LN-EC).....	75.50	18.37
			<i>For >50 To 100, Deduct</i>	-2.65	
			<i>For >100 To 250, Deduct</i>	-4.54	
			<i>For >250 To 500, Deduct</i>	-7.55	
			<i>For >500, Deduct</i>	-10.56	
	26 51 19 00-0305	EA	Canopy Kit With Aircraft Cable And Opening For Power Feed (Cree® LN-CK-5-AC).....	93.45	18.37
			<i>For >50 To 100, Deduct</i>	-3.10	
			<i>For >100 To 250, Deduct</i>	-5.44	
			<i>For >250 To 500, Deduct</i>	-9.35	
			<i>For >500, Deduct</i>	-13.25	
	26 51 19 00-0306	EA	Canopy Kit With Aircraft Cable No Opening For Power Feed (Cree® LN-CK-0-AC).....	71.02	18.37
			<i>For >50 To 100, Deduct</i>	-2.54	
			<i>For >100 To 250, Deduct</i>	-4.32	
			<i>For >250 To 500, Deduct</i>	-7.10	
			<i>For >500, Deduct</i>	-9.89	
	26 51 19 00-0307	EA	Emergency 125W Inverter, Ceiling Installed (Cree® ELI-125W).....	1,469.47	44.68
			<i>For >50 To 100, Deduct</i>	-38.41	
			<i>For >100 To 250, Deduct</i>	-75.15	
			<i>For >250 To 500, Deduct</i>	-146.95	
			<i>For >500, Deduct</i>	-218.74	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0308 EA 120 Volt, Emergency Relay For Use With Generator Power (Cree® EL-SR-120).....	515.80	44.68
For >50 To 100, Deduct	-14.57	
For >100 To 250, Deduct	-27.47	
For >250 To 500, Deduct	-51.58	
For >500, Deduct	-75.69	
26 51 19 00-0309 LED Linear Low Bay Fixtures (Lithonia MSL) (26 51 19 00-0266)		
Note: Includes 3,500K, 4,000K or 5,000K color temperature, 120/277 voltage and steel housing assembly. Excludes sensors.		
26 51 19 00-0310 EA 4,000 Lumens, 4' Length, LED Linear Low Bay Fixture (Lithonia MSL).....	976.45	67.03
For >50 To 100, Deduct	-27.20	
For >100 To 250, Deduct	-51.62	
For >250 To 500, Deduct	-97.65	
For >500, Deduct	-143.67	
26 51 19 00-0311 High Bay LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0312 LED High Bay Fixtures (Columbia Lighting LWS) (26 51 19 00-0311)		
26 51 19 00-0313 EA 16" x 24", 7,909 Lumens, 58.8 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-30-LW-W-EU).....	492.58	122.89
For >50 To 100, Deduct	-18.46	
For >100 To 250, Deduct	-30.77	
For >250 To 500, Deduct	-49.26	
For >500, Deduct	-67.74	
26 51 19 00-0314 EA 16" x 24", 8,526 Lumens, 58.8 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-50-LW-W-EU).....	492.58	122.89
For >50 To 100, Deduct	-18.46	
For >100 To 250, Deduct	-30.77	
For >250 To 500, Deduct	-49.26	
For >500, Deduct	-67.74	
26 51 19 00-0315 EA 16" x 24", 11,812 Lumens, 82.9 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-30-ML-W-EU).....	551.82	122.89
For >50 To 100, Deduct	-19.94	
For >100 To 250, Deduct	-33.74	
For >250 To 500, Deduct	-55.18	
For >500, Deduct	-76.63	
26 51 19 00-0316 EA 16" x 24", 12,734 Lumens, 82.9 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-50-ML-W-EU).....	551.82	122.89
For >50 To 100, Deduct	-19.94	
For >100 To 250, Deduct	-33.74	
For >250 To 500, Deduct	-55.18	
For >500, Deduct	-76.63	
26 51 19 00-0317 EA 16" x 24", 14,813 Lumens, 112.5 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-30-HL-W-EU).....	650.54	122.89
For >50 To 100, Deduct	-22.41	
For >100 To 250, Deduct	-38.67	
For >250 To 500, Deduct	-65.05	
For >500, Deduct	-91.44	
26 51 19 00-0318 EA 16" x 24", 15,968 Lumens, 112.5 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-50-HL-W-EU).....	650.54	122.89
For >50 To 100, Deduct	-22.41	
For >100 To 250, Deduct	-38.67	
For >250 To 500, Deduct	-65.05	
For >500, Deduct	-91.44	
26 51 19 00-0319 EA 16" x 24", 18,714 Lumens, 137.1 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-30-VL-W-EU).....	690.02	122.89
For >50 To 100, Deduct	-23.40	
For >100 To 250, Deduct	-40.65	
For >250 To 500, Deduct	-69.00	
For >500, Deduct	-97.36	
26 51 19 00-0320 EA 16" x 24", 19,511 Lumens, 137.1 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-50-VL-W-EU).....	690.02	122.89
For >50 To 100, Deduct	-23.40	
For >100 To 250, Deduct	-40.65	
For >250 To 500, Deduct	-69.00	
For >500, Deduct	-97.36	
26 51 19 00-0321 EA 16" x 24", 22,994 Lumens, 174 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-30-XL-W-EU).....	719.64	122.89
For >50 To 100, Deduct	-24.14	
For >100 To 250, Deduct	-42.13	
For >250 To 500, Deduct	-71.96	
For >500, Deduct	-101.80	
26 51 19 00-0322 EA 16" x 24", 24,787 Lumens, 174 Watt, LED Suspended High Bay/Low Bay Fixture (Columbia LWS-50-XL-W-EU).....	719.64	122.89
For >50 To 100, Deduct	-24.14	
For >100 To 250, Deduct	-42.13	
For >250 To 500, Deduct	-71.96	
For >500, Deduct	-101.80	
26 51 19 00-0323 LED High Bay Fixtures (Cree) (26 51 19 00-0311)		
26 51 19 00-0324 LED High Bay Fixtures (CREE®) (26 51 19 00-0323)		
26 51 19 00-0325 EA 18,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-M-40K-8-UL-10V).....	892.36	122.89
For >50 To 100, Deduct	-28.45	
For >100 To 250, Deduct	-50.76	
For >250 To 500, Deduct	-89.24	
For >500, Deduct	-127.71	
26 51 19 00-0326 EA 18,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-M-40K-8-UL-ML).....	1,076.02	122.89
For >50 To 100, Deduct	-33.05	
For >100 To 250, Deduct	-59.95	
For >250 To 500, Deduct	-107.60	
For >500, Deduct	-155.26	

26 Electrical

26 50 Lighting

26 51 Interior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0327	EA		18,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-M-40K-8-UH-10V).....	986.28	122.89
			<i>For >50 To 100, Deduct</i>	-30.80	
			<i>For >100 To 250, Deduct</i>	-55.46	
			<i>For >250 To 500, Deduct</i>	-98.63	
			<i>For >500, Deduct</i>	-141.80	
26 51 19 00-0328	EA		18,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-M-40K-8-UH-ML).....	1,132.13	122.89
			<i>For >50 To 100, Deduct</i>	-34.45	
			<i>For >100 To 250, Deduct</i>	-62.75	
			<i>For >250 To 500, Deduct</i>	-113.21	
			<i>For >500, Deduct</i>	-163.68	
26 51 19 00-0329	EA		24,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-H-40K-8-UL-10V).....	924.79	122.89
			<i>For >50 To 100, Deduct</i>	-29.26	
			<i>For >100 To 250, Deduct</i>	-52.38	
			<i>For >250 To 500, Deduct</i>	-92.48	
			<i>For >500, Deduct</i>	-132.57	
26 51 19 00-0330	EA		24,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-H-40K-8-UL-ML).....	1,109.68	122.89
			<i>For >50 To 100, Deduct</i>	-33.89	
			<i>For >100 To 250, Deduct</i>	-61.63	
			<i>For >250 To 500, Deduct</i>	-110.97	
			<i>For >500, Deduct</i>	-160.31	
26 51 19 00-0331	EA		24,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-H-40K-8-UH-10V).....	1,019.93	122.89
			<i>For >50 To 100, Deduct</i>	-31.64	
			<i>For >100 To 250, Deduct</i>	-57.14	
			<i>For >250 To 500, Deduct</i>	-101.99	
			<i>For >500, Deduct</i>	-146.85	
26 51 19 00-0332	EA		24,000 Median Lumens, Universal Mount, LED High Bay Fixture (Cree® CXB-A-UV-H-40K-8-UH-ML).....	1,165.78	122.89
			<i>For >50 To 100, Deduct</i>	-35.29	
			<i>For >100 To 250, Deduct</i>	-64.43	
			<i>For >250 To 500, Deduct</i>	-116.58	
			<i>For >500, Deduct</i>	-168.72	

26 51 19 00-0333 Accessories For LED High Bay Fixtures (CREE®) (26 51 19 00-0323)

26 51 19 00-0334	EA		15 Amperes, 120 Volt, Straight Blade Plug For LED High Bay Fixtures (Cree® AP-515P).....	64.28	18.37
			<i>For >50 To 100, Deduct</i>	-2.37	
			<i>For >100 To 250, Deduct</i>	-3.98	
			<i>For >250 To 500, Deduct</i>	-6.43	
			<i>For >500, Deduct</i>	-8.88	
26 51 19 00-0335	EA		15 Amperes, 120 Volt, Twist Lock Plug For LED High Bay Fixtures (Cree® AP-L515P).....	64.28	18.37
			<i>For >50 To 100, Deduct</i>	-2.37	
			<i>For >100 To 250, Deduct</i>	-3.98	
			<i>For >250 To 500, Deduct</i>	-6.43	
			<i>For >500, Deduct</i>	-8.88	
26 51 19 00-0336	EA		16" Matte Spun Aluminum Reflector For LED High Bay Fixture (Cree® CXBA16N).....	86.71	18.37
			<i>For >50 To 100, Deduct</i>	-2.93	
			<i>For >100 To 250, Deduct</i>	-5.10	
			<i>For >250 To 500, Deduct</i>	-8.67	
			<i>For >500, Deduct</i>	-12.24	
26 51 19 00-0337	EA		16" Clear Acrylic Reflector For LED High Bay Fixture (Cree® CXBP16).....	131.59	18.37
			<i>For >50 To 100, Deduct</i>	-4.06	
			<i>For >100 To 250, Deduct</i>	-7.35	
			<i>For >250 To 500, Deduct</i>	-13.16	
			<i>For >500, Deduct</i>	-18.97	
26 51 19 00-0338	EA		16" White Acrylic Reflector For LED High Bay Fixture (Cree® CXBW16).....	154.04	18.37
			<i>For >50 To 100, Deduct</i>	-4.62	
			<i>For >100 To 250, Deduct</i>	-8.47	
			<i>For >250 To 500, Deduct</i>	-15.40	
			<i>For >500, Deduct</i>	-22.34	
26 51 19 00-0339	EA		16" Clear Prismatic Conical Lens For Prismatic And Acrylic Reflectors For LED High Bay Fixtures (Cree® CL16).....	86.71	18.37
			<i>For >50 To 100, Deduct</i>	-2.93	
			<i>For >100 To 250, Deduct</i>	-5.10	
			<i>For >250 To 500, Deduct</i>	-8.67	
			<i>For >500, Deduct</i>	-12.24	
26 51 19 00-0340	EA		16" Clear Prismatic Drop Lens For Prismatic And Acrylic Reflectors For LED High Bay Fixtures (Cree® DL16).....	88.97	18.37
			<i>For >50 To 100, Deduct</i>	-2.99	
			<i>For >100 To 250, Deduct</i>	-5.21	
			<i>For >250 To 500, Deduct</i>	-8.90	
			<i>For >500, Deduct</i>	-12.58	
26 51 19 00-0341	EA		16" Wire Guard For Aluminum Reflector For LED High Bay Fixtures (Cree® WG-A).....	64.28	18.37
			<i>For >50 To 100, Deduct</i>	-2.37	
			<i>For >100 To 250, Deduct</i>	-3.98	
			<i>For >250 To 500, Deduct</i>	-6.43	
			<i>For >500, Deduct</i>	-8.88	
26 51 19 00-0342	EA		16" Wire Guard For Prismatic And Acrylic Reflector For LED High Bay Fixtures (Cree® WG-AP).....	68.77	18.37
			<i>For >50 To 100, Deduct</i>	-2.48	
			<i>For >100 To 250, Deduct</i>	-4.20	
			<i>For >250 To 500, Deduct</i>	-6.88	
			<i>For >500, Deduct</i>	-9.55	
26 51 19 00-0343	EA		5' Galvanized Safety Cable For LED High Bay Fixtures (Cree® SC-5).....	44.09	18.37
			<i>For >50 To 100, Deduct</i>	-1.87	
			<i>For >100 To 250, Deduct</i>	-2.97	
			<i>For >250 To 500, Deduct</i>	-4.41	
			<i>For >500, Deduct</i>	-5.85	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0344	EA		10' Galvanized Safety Cable For LED High Bay Fixtures (Cree® SC-10)	46.34	18.37
			<i>For >50 To 100, Deduct</i>	-1.92	
			<i>For >100 To 250, Deduct</i>	-3.08	
			<i>For >250 To 500, Deduct</i>	-4.63	
			<i>For >500, Deduct</i>	-6.19	
26 51 19 00-0345			LED High Bay Fixtures (DLE) <small>(26 51 19 00-0311)</small>		
26 51 19 00-0346	EA		12,000 Lumens, 120 Watt, LED High Bay Fixture (DLE-12-ST/HV)	1,432.71	122.89
			<i>For >50 To 100, Deduct</i>	-41.96	
			<i>For >100 To 250, Deduct</i>	-77.78	
			<i>For >250 To 500, Deduct</i>	-143.27	
			<i>For >500, Deduct</i>	-208.76	
26 51 19 00-0347	EA		18,000 Lumens, 180 Watt, LED High Bay Fixture (DLE-18-ST/HV)	1,759.70	122.89
			<i>For >50 To 100, Deduct</i>	-50.14	
			<i>For >100 To 250, Deduct</i>	-94.13	
			<i>For >250 To 500, Deduct</i>	-175.97	
			<i>For >500, Deduct</i>	-257.81	
26 51 19 00-0348	EA		24,000 Lumens, 230 Watt, LED High Bay Fixture (DLE-24-ST/HV)	2,063.33	122.89
			<i>For >50 To 100, Deduct</i>	-57.73	
			<i>For >100 To 250, Deduct</i>	-109.31	
			<i>For >250 To 500, Deduct</i>	-206.33	
			<i>For >500, Deduct</i>	-303.36	
26 51 19 00-0349			LED High Bay Fixtures (Everlast) <small>(26 51 19 00-0311)</small>		
26 51 19 00-0350			LED High Bay Fixtures (Everlast EL-LED-LG) <small>(26 51 19 00-0349)</small>		
26 51 19 00-0351	EA		13,500 Lumens, 150 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AC)	967.71	122.89
			<i>For >50 To 100, Deduct</i>	-30.34	
			<i>For >100 To 250, Deduct</i>	-54.53	
			<i>For >250 To 500, Deduct</i>	-96.77	
			<i>For >500, Deduct</i>	-139.01	
26 51 19 00-0352	EA		13,500 Lumens, 150 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AO)	1,022.91	122.89
			<i>For >50 To 100, Deduct</i>	-31.72	
			<i>For >100 To 250, Deduct</i>	-57.29	
			<i>For >250 To 500, Deduct</i>	-102.29	
			<i>For >500, Deduct</i>	-147.29	
26 51 19 00-0353	EA		15,000 Lumens, 150 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AL16)	912.50	122.89
			<i>For >50 To 100, Deduct</i>	-28.96	
			<i>For >100 To 250, Deduct</i>	-51.77	
			<i>For >250 To 500, Deduct</i>	-91.25	
			<i>For >500, Deduct</i>	-130.73	
26 51 19 00-0354	EA		15,000 Lumens, 150 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AL22)	935.86	122.89
			<i>For >50 To 100, Deduct</i>	-29.54	
			<i>For >100 To 250, Deduct</i>	-52.94	
			<i>For >250 To 500, Deduct</i>	-93.59	
			<i>For >500, Deduct</i>	-134.23	
26 51 19 00-0355	EA		17,500 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AC)	1,063.25	122.89
			<i>For >50 To 100, Deduct</i>	-32.73	
			<i>For >100 To 250, Deduct</i>	-59.31	
			<i>For >250 To 500, Deduct</i>	-106.33	
			<i>For >500, Deduct</i>	-153.34	
26 51 19 00-0356	EA		17,500 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AO)	1,158.80	122.89
			<i>For >50 To 100, Deduct</i>	-35.11	
			<i>For >100 To 250, Deduct</i>	-64.08	
			<i>For >250 To 500, Deduct</i>	-115.88	
			<i>For >500, Deduct</i>	-167.68	
26 51 19 00-0357	EA		20,000 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AL16)	1,012.29	122.89
			<i>For >50 To 100, Deduct</i>	-31.45	
			<i>For >100 To 250, Deduct</i>	-56.76	
			<i>For >250 To 500, Deduct</i>	-101.23	
			<i>For >500, Deduct</i>	-145.70	
26 51 19 00-0358	EA		20,000 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-LG, AL22)	1,095.10	122.89
			<i>For >50 To 100, Deduct</i>	-33.52	
			<i>For >100 To 250, Deduct</i>	-60.90	
			<i>For >250 To 500, Deduct</i>	-109.51	
			<i>For >500, Deduct</i>	-158.12	
26 51 19 00-0359	EA		34,000 Lumens, 300 Watt, LED High Bay Fixture (Everlast EL-LED-LG-HW, AL30)	1,594.08	122.89
			<i>For >50 To 100, Deduct</i>	-46.00	
			<i>For >100 To 250, Deduct</i>	-85.85	
			<i>For >250 To 500, Deduct</i>	-159.41	
			<i>For >500, Deduct</i>	-232.97	
26 51 19 00-0360	EA		43,000 Lumens, 400 Watt, LED High Bay Fixture (Everlast EL-LED-LG-HW, AL30)	1,742.71	122.89
			<i>For >50 To 100, Deduct</i>	-49.71	
			<i>For >100 To 250, Deduct</i>	-93.28	
			<i>For >250 To 500, Deduct</i>	-174.27	
			<i>For >500, Deduct</i>	-255.26	
26 51 19 00-0361	EA		66,000 Lumens, 600 Watt, LED High Bay Fixture (Everlast EL-LED-LG-HW, AL30)	2,167.38	122.89
			<i>For >50 To 100, Deduct</i>	-60.33	
			<i>For >100 To 250, Deduct</i>	-114.51	
			<i>For >250 To 500, Deduct</i>	-216.74	
			<i>For >500, Deduct</i>	-318.96	
26 51 19 00-0362			LED High Bay Fixtures (Everlast EL-LED-CS) <small>(26 51 19 00-0349)</small>		

26 Electrical
26 50 Lighting
26 51 Interior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0363	EA 5,000 Lumens, 50 Watt, LED High Bay Fixture (Everlast EL-LED-CS).....	606.74	122.89
	<i>For >50 To 100, Deduct</i>	-21.31	
	<i>For >100 To 250, Deduct</i>	-36.48	
	<i>For >250 To 500, Deduct</i>	-60.67	
	<i>For >500, Deduct</i>	-84.87	
26 51 19 00-0364	EA 10,000 Lumens, 100 Watt, LED High Bay Fixture (Everlast EL-LED-CS)	893.39	122.89
	<i>For >50 To 100, Deduct</i>	-28.48	
	<i>For >100 To 250, Deduct</i>	-50.81	
	<i>For >250 To 500, Deduct</i>	-89.34	
	<i>For >500, Deduct</i>	-127.86	
26 51 19 00-0365	EA 15,000 Lumens, 150 Watt, LED High Bay Fixture (Everlast EL-LED-CS)	1,020.79	122.89
	<i>For >50 To 100, Deduct</i>	-31.66	
	<i>For >100 To 250, Deduct</i>	-57.18	
	<i>For >250 To 500, Deduct</i>	-102.08	
	<i>For >500, Deduct</i>	-146.97	
26 51 19 00-0366	EA 20,000 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-CS)	1,169.42	122.89
	<i>For >50 To 100, Deduct</i>	-35.38	
	<i>For >100 To 250, Deduct</i>	-64.62	
	<i>For >250 To 500, Deduct</i>	-116.94	
	<i>For >500, Deduct</i>	-169.27	
26 51 19 00-0367	EA 30,000 Lumens, 300 Watt, LED High Bay Fixture (Everlast EL-LED-CS)	1,264.97	122.89
	<i>For >50 To 100, Deduct</i>	-37.77	
	<i>For >100 To 250, Deduct</i>	-69.39	
	<i>For >250 To 500, Deduct</i>	-126.50	
	<i>For >500, Deduct</i>	-183.60	
26 51 19 00-0368	LED High Bay Fixtures (Everlast EL-LED-HB-LG) <small>(26 51 19 00-0349)</small>		
26 51 19 00-0369	EA 10,000 Lumens, 100 Watt, LED High Bay Fixture (Everlast EL-LED-HB-LG).....	797.84	122.89
	<i>For >50 To 100, Deduct</i>	-26.09	
	<i>For >100 To 250, Deduct</i>	-46.04	
	<i>For >250 To 500, Deduct</i>	-79.78	
	<i>For >500, Deduct</i>	-113.53	
26 51 19 00-0370	EA 15,000 Lumens, 150 Watt, LED High Bay Fixture (Everlast EL-LED-HB-LG).....	850.92	122.89
	<i>For >50 To 100, Deduct</i>	-27.42	
	<i>For >100 To 250, Deduct</i>	-48.69	
	<i>For >250 To 500, Deduct</i>	-85.09	
	<i>For >500, Deduct</i>	-121.49	
26 51 19 00-0371	EA 20,000 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-HB-LG).....	925.24	122.89
	<i>For >50 To 100, Deduct</i>	-29.28	
	<i>For >100 To 250, Deduct</i>	-52.41	
	<i>For >250 To 500, Deduct</i>	-92.52	
	<i>For >500, Deduct</i>	-132.64	
26 51 19 00-0372	LED High Bay Fixtures (Everlast EL-LED-LHB) <small>(26 51 19 00-0349)</small>		
26 51 19 00-0373	EA 13,000 Lumens, 100 Watt, LED High Bay Fixture (Everlast EL-LED-LHB).....	810.58	122.89
	<i>For >50 To 100, Deduct</i>	-26.41	
	<i>For >100 To 250, Deduct</i>	-46.67	
	<i>For >250 To 500, Deduct</i>	-81.06	
	<i>For >500, Deduct</i>	-115.44	
26 51 19 00-0374	EA 26,000 Lumens, 200 Watt, LED High Bay Fixture (Everlast EL-LED-LHB).....	999.56	122.89
	<i>For >50 To 100, Deduct</i>	-31.13	
	<i>For >100 To 250, Deduct</i>	-56.12	
	<i>For >250 To 500, Deduct</i>	-99.96	
	<i>For >500, Deduct</i>	-143.79	
26 51 19 00-0375	EA 39,000 Lumens, 300 Watt, LED High Bay Fixture (Everlast EL-LED-LHB).....	1,243.74	122.89
	<i>For >50 To 100, Deduct</i>	-37.24	
	<i>For >100 To 250, Deduct</i>	-68.33	
	<i>For >250 To 500, Deduct</i>	-124.37	
	<i>For >500, Deduct</i>	-180.42	
26 51 19 00-0376	LED High Bay Fixtures (Lithonia IBG) <small>(26 51 19 00-0311)</small>		
26 51 19 00-0377	EA 8,000 Lumens, 48 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 8000LM SEF ACL GND MVOLT)	417.31	120.65
	<i>For >50 To 100, Deduct</i>	-15.02	
	<i>For >100 To 250, Deduct</i>	-25.45	
	<i>For >250 To 500, Deduct</i>	-41.73	
	<i>For >500, Deduct</i>	-58.01	
26 51 19 00-0378	EA 12,000 Lumens, 76 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 12000LM SEF ACL GND MVOLT)	432.96	120.65
	<i>For >50 To 100, Deduct</i>	-15.41	
	<i>For >100 To 250, Deduct</i>	-26.24	
	<i>For >250 To 500, Deduct</i>	-43.30	
	<i>For >500, Deduct</i>	-60.36	
26 51 19 00-0379	EA 15,000 Lumens, 93 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 15000LM SEF ACL GND MVOLT)	468.18	120.65
	<i>For >50 To 100, Deduct</i>	-16.29	
	<i>For >100 To 250, Deduct</i>	-28.00	
	<i>For >250 To 500, Deduct</i>	-46.82	
	<i>For >500, Deduct</i>	-65.64	
26 51 19 00-0380	EA 18,000 Lumens, 105 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 18000LM SEF ACL GND MVOLT)	523.77	120.65
	<i>For >50 To 100, Deduct</i>	-17.68	
	<i>For >100 To 250, Deduct</i>	-30.78	
	<i>For >250 To 500, Deduct</i>	-52.38	
	<i>For >500, Deduct</i>	-73.98	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0381	EA		24,000 Lumens, 144 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 24000LM SEF ACL GND MVOLT)	569.04	120.65
			<i>For >50 To 100, Deduct</i>	-18.81	
			<i>For >100 To 250, Deduct</i>	-33.04	
			<i>For >250 To 500, Deduct</i>	-56.90	
			<i>For >500, Deduct</i>	-80.77	
26 51 19 00-0382	EA		30,000 Lumens, 178 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 30000LM SEF ACL GND MVOLT)	675.45	120.65
			<i>For >50 To 100, Deduct</i>	-21.48	
			<i>For >100 To 250, Deduct</i>	-38.36	
			<i>For >250 To 500, Deduct</i>	-67.55	
			<i>For >500, Deduct</i>	-96.73	
26 51 19 00-0383	EA		36,000 Lumens, 218 Watt, 25.6" Length, LED High Bay Fixture (Lithonia IBG 36000LM SEF ACL GND MVOLT)	811.30	120.65
			<i>For >50 To 100, Deduct</i>	-24.87	
			<i>For >100 To 250, Deduct</i>	-45.15	
			<i>For >250 To 500, Deduct</i>	-81.13	
			<i>For >500, Deduct</i>	-117.11	
26 51 19 00-0384	EA		48,000 Lumens, 284 Watt, 47.29" Length, LED High Bay Fixture (Lithonia IBG 48000LM SEF ACL GND MVOLT)	1,166.38	122.89
			<i>For >50 To 100, Deduct</i>	-35.30	
			<i>For >100 To 250, Deduct</i>	-64.46	
			<i>For >250 To 500, Deduct</i>	-116.64	
			<i>For >500, Deduct</i>	-168.81	
26 51 19 00-0385			LED High Bay Fixtures (Lithonia IBL) <small>(26 51 19 00-0311)</small>		
26 51 19 00-0386	EA		9,000 Lumens, 45" Length, LED High Bay Fixture (Lithonia IBL 9L)	624.37	122.89
			<i>For >50 To 100, Deduct</i>	-21.75	
			<i>For >100 To 250, Deduct</i>	-37.36	
			<i>For >250 To 500, Deduct</i>	-62.44	
			<i>For >500, Deduct</i>	-87.51	
26 51 19 00-0387	EA		12,000 Lumens, 45" Length, LED High Bay Fixture (Lithonia IBL 12L)	673.73	122.89
			<i>For >50 To 100, Deduct</i>	-22.99	
			<i>For >100 To 250, Deduct</i>	-39.83	
			<i>For >250 To 500, Deduct</i>	-67.37	
			<i>For >500, Deduct</i>	-94.92	
26 51 19 00-0388	EA		18,000 Lumens, 45" Length, LED High Bay Fixture (Lithonia IBL 18L)	807.00	122.89
			<i>For >50 To 100, Deduct</i>	-26.32	
			<i>For >100 To 250, Deduct</i>	-46.49	
			<i>For >250 To 500, Deduct</i>	-80.70	
			<i>For >500, Deduct</i>	-114.91	
26 51 19 00-0389	EA		24,000 Lumens, 45" Length, LED High Bay Fixture (Lithonia IBL 24L)	860.31	122.89
			<i>For >50 To 100, Deduct</i>	-27.65	
			<i>For >100 To 250, Deduct</i>	-49.16	
			<i>For >250 To 500, Deduct</i>	-86.03	
			<i>For >500, Deduct</i>	-122.90	
26 51 19 00-0390			LED High Bay Fixtures (Metalux SSLED) <small>(26 51 19 00-0311)</small>		
26 51 19 00-0391	EA		12,000 Lumens, 80 Watt, 5000K, LED Round High Bay Fixture (Metalux SSLED-LD5-12-M-UNV-L840-CD1U)	740.79	122.89
			<i>For >50 To 100, Deduct</i>	-24.66	
			<i>For >100 To 250, Deduct</i>	-43.18	
			<i>For >250 To 500, Deduct</i>	-74.08	
			<i>For >500, Deduct</i>	-104.97	
26 51 19 00-0392	EA		15,000 Lumens, 100 Watt, 5000K, LED Round High Bay Fixture (Metalux SSLED-LD5-15-M-UNV-L840-CD1U)	760.24	122.89
			<i>For >50 To 100, Deduct</i>	-25.15	
			<i>For >100 To 250, Deduct</i>	-44.16	
			<i>For >250 To 500, Deduct</i>	-76.02	
			<i>For >500, Deduct</i>	-107.89	
26 51 19 00-0393	EA		18,000 Lumens, 120 Watt, 5000K, LED Round High Bay Fixture (Metalux SSLED-LD5-18-M-UNV-L840-CD1U)	768.07	122.89
			<i>For >50 To 100, Deduct</i>	-25.35	
			<i>For >100 To 250, Deduct</i>	-44.55	
			<i>For >250 To 500, Deduct</i>	-76.81	
			<i>For >500, Deduct</i>	-109.07	
26 51 19 00-0394	EA		24,000 Lumens, 160 Watt, 5000K, LED Round High Bay Fixture (Metalux SSLED-LD5-24-M-UNV-L840-CD1U)	842.64	122.89
			<i>For >50 To 100, Deduct</i>	-27.21	
			<i>For >100 To 250, Deduct</i>	-48.28	
			<i>For >250 To 500, Deduct</i>	-84.26	
			<i>For >500, Deduct</i>	-120.25	
26 51 19 00-0395	EA		30,000 Lumens, 200 Watt, 5000K, LED Round High Bay Fixture (Metalux SSLED-LD5-30-M-UNV-L840-CD1U)	929.49	122.89
			<i>For >50 To 100, Deduct</i>	-29.38	
			<i>For >100 To 250, Deduct</i>	-52.62	
			<i>For >250 To 500, Deduct</i>	-92.95	
			<i>For >500, Deduct</i>	-133.28	
26 51 19 00-0396	EA		36,000 Lumens, 240 Watt, 5000K, LED Round High Bay Fixture (Metalux SSLED-LD5-36-M-UNV-L840-CD1U)	962.08	122.89
			<i>For >50 To 100, Deduct</i>	-30.20	
			<i>For >100 To 250, Deduct</i>	-54.25	
			<i>For >250 To 500, Deduct</i>	-96.21	
			<i>For >500, Deduct</i>	-138.17	
26 51 19 00-0397			LED High Bay Fixtures (PlanLED) <small>(26 51 19 00-0311)</small>		
26 51 19 00-0398			LED High Bay Fixtures (PlanLED LUNA) <small>(26 51 19 00-0397)</small>		
			Note: Includes aluminum alloy chassis.		

26 Electrical
26 50 Lighting
26 51 Interior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0399	EA		7,000 Lumens, LED High Bay Fixture (PlanLED LUNA LN70)	942.23	122.89
			<i>For >50 To 100, Deduct</i>	-29.70	
			<i>For >100 To 250, Deduct</i>	-53.26	
			<i>For >250 To 500, Deduct</i>	-94.22	
			<i>For >500, Deduct</i>	-135.19	
26 51 19 00-0400	EA		9,800 Lumens, LED High Bay Fixture (PlanLED LUNA LN98)	1,061.13	122.89
			<i>For >50 To 100, Deduct</i>	-32.67	
			<i>For >100 To 250, Deduct</i>	-59.20	
			<i>For >250 To 500, Deduct</i>	-106.11	
			<i>For >500, Deduct</i>	-153.03	
26 51 19 00-0401	EA		13,000 Lumens, LED High Bay Fixture (PlanLED LUNA LN130)	1,233.12	122.89
			<i>For >50 To 100, Deduct</i>	-36.97	
			<i>For >100 To 250, Deduct</i>	-67.80	
			<i>For >250 To 500, Deduct</i>	-123.31	
			<i>For >500, Deduct</i>	-178.82	
26 51 19 00-0402	EA		16,000 Lumens, LED High Bay Fixture (PlanLED LUNA LN160)	1,400.86	122.89
			<i>For >50 To 100, Deduct</i>	-41.17	
			<i>For >100 To 250, Deduct</i>	-76.19	
			<i>For >250 To 500, Deduct</i>	-140.09	
			<i>For >500, Deduct</i>	-203.98	
26 51 19 00-0403			LED High Bay Fixtures (PlanLED IBL) <small>(26 51 19 00-0397)</small>		
			Note: Includes aluminum alloy chassis.		
26 51 19 00-0404	EA		13,650 Lumens, 130 Watt, 46.5" Length, LED Indirect High Bay Fixture (PlanLED IBL 130W)	1,027.16	122.89
			<i>For 480 Volt, Add</i>	59.54	
			<i>For >50 To 100, Deduct</i>	-31.82	
			<i>For >100 To 250, Deduct</i>	-57.50	
			<i>For >250 To 500, Deduct</i>	-102.72	
			<i>For >500, Deduct</i>	-147.93	
26 51 19 00-0405	EA		21,000 Lumens, 200 Watt, 46.5" Length, LED Indirect High Bay Fixture (PlanLED IBL 200W)	1,441.20	122.89
			<i>For 480 Volt, Add</i>	75.44	
			<i>For >50 To 100, Deduct</i>	-42.17	
			<i>For >100 To 250, Deduct</i>	-78.20	
			<i>For >250 To 500, Deduct</i>	-144.12	
			<i>For >500, Deduct</i>	-210.04	
26 51 19 00-0406	EA		42,000 Lumens, 400 Watt, 46.5" Length, LED Indirect High Bay Fixture (PlanLED IBL 400W)	2,581.42	122.89
			<i>For 480 Volt, Add</i>	119.67	
			<i>For >50 To 100, Deduct</i>	-70.68	
			<i>For >100 To 250, Deduct</i>	-135.22	
			<i>For >250 To 500, Deduct</i>	-258.14	
			<i>For >500, Deduct</i>	-381.07	
26 51 19 00-0407			LED High Bay Fixtures (PlanLED SEGA) <small>(26 51 19 00-0397)</small>		
			Note: Includes aluminum alloy chassis.		
26 51 19 00-0408	EA		10,400 Lumens, 80 Watt, LED High Bay Fixture (PlanLED SEGA SE080)	804.21	122.89
			<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
			<i>For >50 To 100, Deduct</i>	-26.25	
			<i>For >100 To 250, Deduct</i>	-46.36	
			<i>For >250 To 500, Deduct</i>	-80.42	
			<i>For >500, Deduct</i>	-114.49	
26 51 19 00-0409	EA		13,000 Lumens, 100 Watt, LED High Bay Fixture (PlanLED SEGA SE100)	861.54	122.89
			<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
			<i>For >50 To 100, Deduct</i>	-27.68	
			<i>For >100 To 250, Deduct</i>	-49.22	
			<i>For >250 To 500, Deduct</i>	-86.15	
			<i>For >500, Deduct</i>	-123.09	
26 51 19 00-0410	EA		16,900 Lumens, 130 Watt, LED High Bay Fixture (PlanLED SEGA SE130)	1,059.01	122.89
			<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
			<i>For >50 To 100, Deduct</i>	-32.62	
			<i>For >100 To 250, Deduct</i>	-59.10	
			<i>For >250 To 500, Deduct</i>	-105.90	
			<i>For >500, Deduct</i>	-152.71	
26 51 19 00-0411	EA		20,800 Lumens, 160 Watt, LED High Bay Fixture (PlanLED SEGA SE160)	1,201.27	122.89
			<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
			<i>For >50 To 100, Deduct</i>	-36.18	
			<i>For >100 To 250, Deduct</i>	-66.21	
			<i>For >250 To 500, Deduct</i>	-120.13	
			<i>For >500, Deduct</i>	-174.05	
26 51 19 00-0412	EA		50,000 Lumens, 400 Watt, Array, LED High Bay Fixture (PlanLED SEGA SE400)	2,250.18	122.89
			<i>For >50 To 100, Deduct</i>	-62.40	
			<i>For >100 To 250, Deduct</i>	-118.65	
			<i>For >250 To 500, Deduct</i>	-225.02	
			<i>For >500, Deduct</i>	-331.38	
26 51 19 00-0413	EA		57,040 Lumens, 500 Watt, Array, LED High Bay Fixture (PlanLED SEGA SE500)	2,437.04	122.89
			<i>For >50 To 100, Deduct</i>	-67.07	
			<i>For >100 To 250, Deduct</i>	-128.00	
			<i>For >250 To 500, Deduct</i>	-243.70	
			<i>For >500, Deduct</i>	-359.41	
26 51 19 00-0414	EA		80,000 Lumens, 640 Watt, Array, LED High Bay Fixture (PlanLED SEGA SE640)	3,723.25	122.89
			<i>For >50 To 100, Deduct</i>	-99.23	
			<i>For >100 To 250, Deduct</i>	-192.31	
			<i>For >250 To 500, Deduct</i>	-372.33	
			<i>For >500, Deduct</i>	-552.34	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0415		Wet/Hazardous Location, LED Fixtures <small>(26 51 19 00-0001)</small>		
26 51 19 00-0416		Wet Location, LED Fixtures <small>(26 51 19 00-0415)</small>		
26 51 19 00-0417		Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM) <small>(26 51 19 00-0416)</small>		
		Note: Includes 5,600K CRI LED arrays, heat and impact resistant glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		
26 51 19 00-0418	EA	3,531 Lumens, 29 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM3L).....	2,286.12	93.85
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-61.06	
		<i>For >100 To 250, Deduct</i>	-118.22	
		<i>For >250 To 500, Deduct</i>	-228.61	
		<i>For >500, Deduct</i>	-339.01	
26 51 19 00-0419	EA	5,335 Lumens, 43 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM5L).....	2,330.79	100.54
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-62.46	
		<i>For >100 To 250, Deduct</i>	-120.73	
		<i>For >250 To 500, Deduct</i>	-233.08	
		<i>For >500, Deduct</i>	-345.43	
26 51 19 00-0420	EA	7,195 Lumens, 62 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM7L).....	2,630.46	107.25
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-70.23	
		<i>For >100 To 250, Deduct</i>	-135.99	
		<i>For >250 To 500, Deduct</i>	-263.05	
		<i>For >500, Deduct</i>	-390.10	
26 51 19 00-0421	EA	9,266 Lumens, 85 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM9L).....	3,164.12	113.95
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-83.85	
		<i>For >100 To 250, Deduct</i>	-162.95	
		<i>For >250 To 500, Deduct</i>	-316.41	
		<i>For >500, Deduct</i>	-469.87	
26 51 19 00-0422	EA	11,440 Lumens, 113 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM11L).....	4,032.04	120.65
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-105.83	
		<i>For >100 To 250, Deduct</i>	-206.63	
		<i>For >250 To 500, Deduct</i>	-403.20	
		<i>For >500, Deduct</i>	-599.78	

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 51 19 00-0423	EA	13,226 Lumens, 131 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM11L).....	5,301.04	124.00
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-137.69	
		<i>For >100 To 250, Deduct</i>	-270.22	
		<i>For >250 To 500, Deduct</i>	-530.10	
		<i>For >500, Deduct</i>	-789.99	
26 51 19 00-0424	EA	18,793 Lumens, 168 Watt, Pendant Mount, Wet Location, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Champ® Pro PVM17L).....	6,137.45	127.36
		<i>For Ceiling Mount, Add</i>	19.83	
		<i>For Quick Clip Mounting Option, Add</i>	29.15	
		<i>For Frosted Lens, Add</i>	62.70	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For Stanchion Mount, Add</i>	135.26	
		<i>For Wall Mount, Add</i>	149.73	
		<i>For Polycarbonate Lens, Add</i>	116.20	
		<i>For Teflon Coated Lens, Add</i>	133.07	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For >50 To 100, Deduct</i>	-158.74	
		<i>For >100 To 250, Deduct</i>	-312.18	
		<i>For >250 To 500, Deduct</i>	-613.75	
		<i>For >500, Deduct</i>	-915.31	
26 51 19 00-0425		Wet Location, NEMA 4X, LED Floodlight (Cooper Champ® Pro PFM) <small>(26 51 19 00-0416)</small>		
		Note: Includes 5,600K CRI LED arrays, shatter resistant glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		
26 51 19 00-0426	EA	5,183 Lumens, 45 Watt, Yoke Mount, Wet Location, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® Pro PFM5L).....	2,062.16	100.54
		<i>For Bolt-On Visor, Add</i>	107.94	
		<i>For Bolt-On Wire Guard, Add</i>	222.02	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For >50 To 100, Deduct</i>	-55.74	
		<i>For >100 To 250, Deduct</i>	-107.30	
		<i>For >250 To 500, Deduct</i>	-206.22	
		<i>For >500, Deduct</i>	-305.13	
26 51 19 00-0427	EA	7,095 Lumens, 62 Watt, Yoke Mount, Wet Location, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® Pro PFM7L).....	3,037.50	107.25
		<i>For Bolt-On Visor, Add</i>	107.94	
		<i>For Bolt-On Wire Guard, Add</i>	222.02	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For >50 To 100, Deduct</i>	-80.41	
		<i>For >100 To 250, Deduct</i>	-156.34	
		<i>For >250 To 500, Deduct</i>	-303.75	
		<i>For >500, Deduct</i>	-451.16	
26 51 19 00-0428	EA	9,132 Lumens, 79 Watt, Yoke Mount, Wet Location, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® Pro PFM9L).....	3,348.33	113.95
		<i>For Bolt-On Visor, Add</i>	107.94	
		<i>For Bolt-On Wire Guard, Add</i>	222.02	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For >50 To 100, Deduct</i>	-88.46	
		<i>For >100 To 250, Deduct</i>	-172.16	
		<i>For >250 To 500, Deduct</i>	-334.83	
		<i>For >500, Deduct</i>	-497.50	
26 51 19 00-0429	EA	11,107 Lumens, 99 Watt, Yoke Mount, Wet Location, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® Pro PFM11L).....	3,842.79	120.65
		<i>For Bolt-On Visor, Add</i>	107.94	
		<i>For Bolt-On Wire Guard, Add</i>	222.02	
		<i>For 480 Volt, Add</i>	190.09	
		<i>For Warm White Color Rendering, Add</i>	80.71	
		<i>For >50 To 100, Deduct</i>	-101.10	
		<i>For >100 To 250, Deduct</i>	-197.17	
		<i>For >250 To 500, Deduct</i>	-384.28	
		<i>For >500, Deduct</i>	-571.39	
26 51 19 00-0430		Wet Location, NEMA 4X, Low Bay, LED Fixture (Cooper Vaporgard™ Pro P2L) <small>(26 51 19 00-0416)</small>		
		Note: Includes 5,600K CRI LED arrays, heat resistant glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0431	EA		1,400 Lumens, 25 Watt, Pendant Mount, Wet Location, NEMA 4X, Low Bay, LED Fixture (Cooper Vaporgard™ Pro P2LC).....	1,433.65	93.85
			<i>For 12/24 Volt DC Driver, Add</i>	30.68	
			<i>For Frosted Lens, Add</i>	62.70	
			<i>For 55 Degree Ambient Suitability (AC Only), Add</i>	41.77	
			<i>For Warm White Color Rendering, Add</i>	80.71	
			<i>For Ceiling Mount, Add</i>	95.31	
			<i>For Wall Mount, Add</i>	138.23	
			<i>For Teflon Coated Lens, Add</i>	133.07	
			<i>For Wall Mount With Junction Box, Add</i>	200.80	
			<i>For >50 To 100, Deduct</i>	-39.75	
			<i>For >100 To 250, Deduct</i>	-75.59	
			<i>For >250 To 500, Deduct</i>	-143.37	
			<i>For >500, Deduct</i>	-211.14	
26 51 19 00-0432			Vaportight, LED Fixtures (26 51 19 00-0415)		
26 51 19 00-0433			General Distribution, Vaportight, LED Fixtures (Metalux) (26 51 19 00-0432)		
26 51 19 00-0434	EA		2', 2,000 Lumens, 16 Watt, 120-277 Volt, Dimming, General Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-2-G-UNV-L850-CD1-U)	332.97	53.63
			<i>For >50 To 100, Deduct</i>	-10.56	
			<i>For >100 To 250, Deduct</i>	-18.88	
			<i>For >250 To 500, Deduct</i>	-33.30	
			<i>For >500, Deduct</i>	-47.71	
26 51 19 00-0435	EA		2', 3,000 Lumens, 24 Watt, 120-277 Volt, Dimming, General Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-3-G-UNV-L850-CD1-U)	347.55	53.63
			<i>For >50 To 100, Deduct</i>	-10.92	
			<i>For >100 To 250, Deduct</i>	-19.61	
			<i>For >250 To 500, Deduct</i>	-34.76	
			<i>For >500, Deduct</i>	-49.90	
26 51 19 00-0436	EA		2', 4,000 Lumens, 32 Watt, 120-277 Volt, Dimming, General Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-4-G-UNV-L850-CD1-U)	376.74	53.63
			<i>For >50 To 100, Deduct</i>	-11.65	
			<i>For >100 To 250, Deduct</i>	-21.07	
			<i>For >250 To 500, Deduct</i>	-37.67	
			<i>For >500, Deduct</i>	-54.28	
26 51 19 00-0437	EA		4', 4,000 Lumens, 32 Watt, 120-277 Volt, Dimming, General Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-4-G-UNV-L850-CD1-U)	335.23	67.03
			<i>For >50 To 100, Deduct</i>	-11.17	
			<i>For >100 To 250, Deduct</i>	-19.55	
			<i>For >250 To 500, Deduct</i>	-33.52	
			<i>For >500, Deduct</i>	-47.49	
26 51 19 00-0438	EA		4', 6,000 Lumens, 51 Watt, 120-277 Volt, Dimming, General Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-6-G-UNV-L850-CD1-U)	377.08	67.03
			<i>For >50 To 100, Deduct</i>	-12.22	
			<i>For >100 To 250, Deduct</i>	-21.65	
			<i>For >250 To 500, Deduct</i>	-37.71	
			<i>For >500, Deduct</i>	-53.77	
26 51 19 00-0439	EA		4', 8,000 Lumens, 67 Watt, 120-277 Volt, Dimming, General Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-8-G-UNV-L850-CD1-U)	530.40	67.03
			<i>For >50 To 100, Deduct</i>	-16.05	
			<i>For >100 To 250, Deduct</i>	-29.31	
			<i>For >250 To 500, Deduct</i>	-53.04	
			<i>For >500, Deduct</i>	-76.77	
26 51 19 00-0440			Wide Distribution, Vaportight, LED Fixtures (Metalux) (26 51 19 00-0432)		
26 51 19 00-0441	EA		2', 2,000 Lumens, 17 Watt, 120-277 Volt, Dimming, Wide Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-2-W-UNV-L850-CD1-U)	362.14	53.63
			<i>For >50 To 100, Deduct</i>	-11.29	
			<i>For >100 To 250, Deduct</i>	-20.34	
			<i>For >250 To 500, Deduct</i>	-36.21	
			<i>For >500, Deduct</i>	-52.09	
26 51 19 00-0442	EA		2', 3,000 Lumens, 25 Watt, 120-277 Volt, Dimming, Wide Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-3-W-UNV-L850-CD1-U)	376.74	53.63
			<i>For >50 To 100, Deduct</i>	-11.65	
			<i>For >100 To 250, Deduct</i>	-21.07	
			<i>For >250 To 500, Deduct</i>	-37.67	
			<i>For >500, Deduct</i>	-54.28	
26 51 19 00-0443	EA		2', 4,000 Lumens, 34 Watt, 120-277 Volt, Dimming, Wide Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-4-W-UNV-L850-CD1-U)	405.92	53.63
			<i>For >50 To 100, Deduct</i>	-12.38	
			<i>For >100 To 250, Deduct</i>	-22.53	
			<i>For >250 To 500, Deduct</i>	-40.59	
			<i>For >500, Deduct</i>	-58.65	
26 51 19 00-0444	EA		4', 4,000 Lumens, 31 Watt, 120-277 Volt, Dimming, Wide Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-4-W-UNV-L850-CD1-U)	472.04	67.03
			<i>For >50 To 100, Deduct</i>	-14.59	
			<i>For >100 To 250, Deduct</i>	-26.40	
			<i>For >250 To 500, Deduct</i>	-47.20	
			<i>For >500, Deduct</i>	-68.01	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0445	EA	4', 6,000 Lumens, 49 Watt, 120-277 Volt, Dimming, Wide Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-6-W-UNV-L850-CD1-U).....	530.40	67.03
		<i>For >50 To 100, Deduct</i>	-16.05	
		<i>For >100 To 250, Deduct</i>	-29.31	
		<i>For >250 To 500, Deduct</i>	-53.04	
		<i>For >500, Deduct</i>	-76.77	
26 51 19 00-0446	EA	4', 8,000 Lumens, 70 Watt, 120-277 Volt, Dimming, Wide Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-8-W-UNV-L850-CD1-U).....	588.77	67.03
		<i>For >50 To 100, Deduct</i>	-17.51	
		<i>For >100 To 250, Deduct</i>	-32.23	
		<i>For >250 To 500, Deduct</i>	-58.88	
		<i>For >500, Deduct</i>	-85.52	
26 51 19 00-0447		Parking Garage Distribution, Vaportight, LED Fixtures (Metalux) (26 51 19 00-0432)		
26 51 19 00-0448	EA	2', 2,000 Lumens, 17 Watt, 120-277 Volt, Dimming, Parking Garage Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-2-P-UNV-L850-CD1-U).....	362.14	53.63
		<i>For >50 To 100, Deduct</i>	-11.29	
		<i>For >100 To 250, Deduct</i>	-20.34	
		<i>For >250 To 500, Deduct</i>	-36.21	
		<i>For >500, Deduct</i>	-52.09	
26 51 19 00-0449	EA	2', 3,000 Lumens, 25 Watt, 120-277 Volt, Dimming, Parking Garage Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-3-P-UNV-L850-CD1-U).....	377.85	53.63
		<i>For >50 To 100, Deduct</i>	-11.68	
		<i>For >100 To 250, Deduct</i>	-21.13	
		<i>For >250 To 500, Deduct</i>	-37.79	
		<i>For >500, Deduct</i>	-54.44	
26 51 19 00-0450	EA	2', 4,000 Lumens, 34 Watt, 120-277 Volt, Dimming, Parking Garage Distribution, Vaportight Industrial LED Fixture (Metalux 2VT3-LD5-4-P-UNV-L850-CD1-U).....	405.92	53.63
		<i>For >50 To 100, Deduct</i>	-12.38	
		<i>For >100 To 250, Deduct</i>	-22.53	
		<i>For >250 To 500, Deduct</i>	-40.59	
		<i>For >500, Deduct</i>	-58.65	
26 51 19 00-0451	EA	4', 4,000 Lumens, 31 Watt, 120-277 Volt, Dimming, Parking Garage Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-4-P-UNV-L850-CD1-U).....	472.04	67.03
		<i>For >50 To 100, Deduct</i>	-14.59	
		<i>For >100 To 250, Deduct</i>	-26.40	
		<i>For >250 To 500, Deduct</i>	-47.20	
		<i>For >500, Deduct</i>	-68.01	
26 51 19 00-0452	EA	4', 6,000 Lumens, 49 Watt, 120-277 Volt, Dimming, Parking Garage Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-6-P-UNV-L850-CD1-U).....	530.40	67.03
		<i>For >50 To 100, Deduct</i>	-16.05	
		<i>For >100 To 250, Deduct</i>	-29.31	
		<i>For >250 To 500, Deduct</i>	-53.04	
		<i>For >500, Deduct</i>	-76.77	
26 51 19 00-0453	EA	4', 8,000 Lumens, 69 Watt, 120-277 Volt, Dimming, Parking Garage Distribution, Vaportight Industrial LED Fixture (Metalux 4VT3-LD5-8-P-UNV-L850-CD1-U).....	588.77	67.03
		<i>For >50 To 100, Deduct</i>	-17.51	
		<i>For >100 To 250, Deduct</i>	-32.23	
		<i>For >250 To 500, Deduct</i>	-58.88	
		<i>For >500, Deduct</i>	-85.52	
26 51 19 00-0454		Ceiling Mounted LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0455		Ceiling Mounted, LED Drum Fixtures (Enertron) (26 51 19 00-0454)		
26 51 19 00-0456	EA	11" Diameter, 530 Lumens, 7 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED1X611-30).....	115.78	44.68
		<i>For >50 To 100, Deduct</i>	-4.57	
		<i>For >100 To 250, Deduct</i>	-7.46	
		<i>For >250 To 500, Deduct</i>	-11.58	
		<i>For >500, Deduct</i>	-15.69	
26 51 19 00-0457	EA	11" Diameter, 1,060 Lumens, 10 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED2X611-30).....	120.62	44.68
		<i>For >50 To 100, Deduct</i>	-4.69	
		<i>For >100 To 250, Deduct</i>	-7.71	
		<i>For >250 To 500, Deduct</i>	-12.06	
		<i>For >500, Deduct</i>	-16.42	
26 51 19 00-0458	EA	11" Diameter, 1,590 Lumens, 14 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED3X611-30).....	125.46	44.68
		<i>For >50 To 100, Deduct</i>	-4.81	
		<i>For >100 To 250, Deduct</i>	-7.95	
		<i>For >250 To 500, Deduct</i>	-12.55	
		<i>For >500, Deduct</i>	-17.14	
26 51 19 00-0459	EA	11" Diameter, 2,120 Lumens, 17 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED4X611-30).....	130.29	44.68
		<i>For >50 To 100, Deduct</i>	-4.93	
		<i>For >100 To 250, Deduct</i>	-8.19	
		<i>For >250 To 500, Deduct</i>	-13.03	
		<i>For >500, Deduct</i>	-17.87	
26 51 19 00-0460	EA	14" Diameter, 530 Lumens, 7 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED1X614-30).....	127.50	49.15
		<i>For >50 To 100, Deduct</i>	-5.03	
		<i>For >100 To 250, Deduct</i>	-8.22	
		<i>For >250 To 500, Deduct</i>	-12.75	
		<i>For >500, Deduct</i>	-17.28	
26 51 19 00-0461	EA	14" Diameter, 1,060 Lumens, 10 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED2X614-30).....	132.34	49.15
		<i>For >50 To 100, Deduct</i>	-5.15	
		<i>For >100 To 250, Deduct</i>	-8.46	
		<i>For >250 To 500, Deduct</i>	-13.23	
		<i>For >500, Deduct</i>	-18.01	

Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0462 EA 14" Diameter, 1,590 Lumens, 14 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED3X614-30)	137.18	49.15
For >50 To 100, Deduct	-5.27	
For >100 To 250, Deduct	-8.70	
For >250 To 500, Deduct	-13.72	
For >500, Deduct	-18.73	
26 51 19 00-0463 EA 14" Diameter, 2,120 Lumens, 17 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED4X614-30)	142.02	49.15
For >50 To 100, Deduct	-5.39	
For >100 To 250, Deduct	-8.94	
For >250 To 500, Deduct	-14.20	
For >500, Deduct	-19.46	
26 51 19 00-0464 EA 14" Diameter, 3,180 Lumens, 24 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED6X614-30)	151.70	49.15
For >50 To 100, Deduct	-5.64	
For >100 To 250, Deduct	-9.43	
For >250 To 500, Deduct	-15.17	
For >500, Deduct	-20.91	
26 51 19 00-0465 EA 11" Diameter, 530 Lumens, 7 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED1X611-35)	115.77	44.68
For >50 To 100, Deduct	-4.57	
For >100 To 250, Deduct	-7.46	
For >250 To 500, Deduct	-11.58	
For >500, Deduct	-15.69	
26 51 19 00-0466 EA 11" Diameter, 1,060 Lumens, 10 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X611-35)	120.61	44.68
For >50 To 100, Deduct	-4.69	
For >100 To 250, Deduct	-7.71	
For >250 To 500, Deduct	-12.06	
For >500, Deduct	-16.42	
26 51 19 00-0467 EA 11" Diameter, 1,590 Lumens, 14 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED3X611-35)	125.45	44.68
For >50 To 100, Deduct	-4.81	
For >100 To 250, Deduct	-7.95	
For >250 To 500, Deduct	-12.55	
For >500, Deduct	-17.14	
26 51 19 00-0468 EA 11" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED4X611-35)	130.29	44.68
For >50 To 100, Deduct	-4.93	
For >100 To 250, Deduct	-8.19	
For >250 To 500, Deduct	-13.03	
For >500, Deduct	-17.87	
26 51 19 00-0469 EA 14" Diameter, 530 Lumens, 7 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED1X614-35)	127.50	49.15
For >50 To 100, Deduct	-5.03	
For >100 To 250, Deduct	-8.22	
For >250 To 500, Deduct	-12.75	
For >500, Deduct	-17.28	
26 51 19 00-0470 EA 14" Diameter, 1,060 Lumens, 10 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X614-35)	132.34	49.15
For >50 To 100, Deduct	-5.15	
For >100 To 250, Deduct	-8.46	
For >250 To 500, Deduct	-13.23	
For >500, Deduct	-18.01	
26 51 19 00-0471 EA 14" Diameter, 1,590 Lumens, 14 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED3X614-35)	137.18	49.15
For >50 To 100, Deduct	-5.27	
For >100 To 250, Deduct	-8.70	
For >250 To 500, Deduct	-13.72	
For >500, Deduct	-18.73	
26 51 19 00-0472 EA 14" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED4X614-35)	142.02	49.15
For >50 To 100, Deduct	-5.39	
For >100 To 250, Deduct	-8.94	
For >250 To 500, Deduct	-14.20	
For >500, Deduct	-19.46	
26 51 19 00-0473 EA 14" Diameter, 3,180 Lumens, 24 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED6X614-30)	151.70	49.15
For >50 To 100, Deduct	-5.64	
For >100 To 250, Deduct	-9.43	
For >250 To 500, Deduct	-15.17	
For >500, Deduct	-20.91	
26 51 19 00-0474 EA 11" Diameter, 550 Lumens, 7 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X611-40)	115.77	44.68
For >50 To 100, Deduct	-4.57	
For >100 To 250, Deduct	-7.46	
For >250 To 500, Deduct	-11.58	
For >500, Deduct	-15.69	
26 51 19 00-0475 EA 11" Diameter, 1,100 Lumens, 10 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED2X611-40)	120.61	44.68
For >50 To 100, Deduct	-4.69	
For >100 To 250, Deduct	-7.71	
For >250 To 500, Deduct	-12.06	
For >500, Deduct	-16.42	
26 51 19 00-0476 EA 11" Diameter, 1,650 Lumens, 14 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED3X611-40)	125.45	44.68
For >50 To 100, Deduct	-4.81	
For >100 To 250, Deduct	-7.95	
For >250 To 500, Deduct	-12.55	
For >500, Deduct	-17.14	
26 51 19 00-0477 EA 11" Diameter, 2,200 Lumens, 17 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED4X611-40)	130.29	44.68
For >50 To 100, Deduct	-4.93	
For >100 To 250, Deduct	-8.19	
For >250 To 500, Deduct	-13.03	
For >500, Deduct	-17.87	
26 51 19 00-0478 EA 14" Diameter, 550 Lumens, 7 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X614-40)	127.50	49.15
For >50 To 100, Deduct	-5.03	
For >100 To 250, Deduct	-8.22	
For >250 To 500, Deduct	-12.75	
For >500, Deduct	-17.28	

26 Electrical

26 50 Lighting

26 51 Interior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0479	EA 14" Diameter, 1,100 Lumens, 10 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED2X614-40)	132.34	49.15
	<i>For >50 To 100, Deduct</i>	-5.15	
	<i>For >100 To 250, Deduct</i>	-8.46	
	<i>For >250 To 500, Deduct</i>	-13.23	
	<i>For >500, Deduct</i>	-18.01	
26 51 19 00-0480	EA 14" Diameter, 1,650 Lumens, 14 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED3X614-40)	137.18	49.15
	<i>For >50 To 100, Deduct</i>	-5.27	
	<i>For >100 To 250, Deduct</i>	-8.70	
	<i>For >250 To 500, Deduct</i>	-13.72	
	<i>For >500, Deduct</i>	-18.73	
26 51 19 00-0481	EA 14" Diameter, 2,200 Lumens, 17 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED4X614-40)	142.02	49.15
	<i>For >50 To 100, Deduct</i>	-5.39	
	<i>For >100 To 250, Deduct</i>	-8.94	
	<i>For >250 To 500, Deduct</i>	-14.20	
	<i>For >500, Deduct</i>	-19.46	
26 51 19 00-0482	EA 14" Diameter, 3,300 Lumens, 24 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED6X614-40)	151.70	49.15
	<i>For >50 To 100, Deduct</i>	-5.64	
	<i>For >100 To 250, Deduct</i>	-9.43	
	<i>For >250 To 500, Deduct</i>	-15.17	
	<i>For >500, Deduct</i>	-20.91	
26 51 19 00-0483	EA 11" Diameter, 560 Lumens, 7 Watt, 5000K CCT, LED Drum Fixture (Enertron 10LED1X611-50)	115.77	44.68
	<i>For >50 To 100, Deduct</i>	-4.57	
	<i>For >100 To 250, Deduct</i>	-7.46	
	<i>For >250 To 500, Deduct</i>	-11.58	
	<i>For >500, Deduct</i>	-15.69	
26 51 19 00-0484	EA 11" Diameter, 1,120 Lumens, 10 Watt, 5000K CCT, LED Drum Fixture (Enertron 10LED2X611-50)	120.61	44.68
	<i>For >50 To 100, Deduct</i>	-4.69	
	<i>For >100 To 250, Deduct</i>	-7.71	
	<i>For >250 To 500, Deduct</i>	-12.06	
	<i>For >500, Deduct</i>	-16.42	
26 51 19 00-0485	EA 11" Diameter, 1,680 Lumens, 14 Watt, 5000K CCT, LED Drum Fixture (Enertron 10LED3X611-50)	125.45	44.68
	<i>For >50 To 100, Deduct</i>	-4.81	
	<i>For >100 To 250, Deduct</i>	-7.95	
	<i>For >250 To 500, Deduct</i>	-12.55	
	<i>For >500, Deduct</i>	-17.14	
26 51 19 00-0486	EA 11" Diameter, 2,240 Lumens, 17 Watt, 5000K CCT, LED Drum Fixture (Enertron 10LED4X611-50)	130.29	44.68
	<i>For >50 To 100, Deduct</i>	-4.93	
	<i>For >100 To 250, Deduct</i>	-8.19	
	<i>For >250 To 500, Deduct</i>	-13.03	
	<i>For >500, Deduct</i>	-17.87	
26 51 19 00-0487	EA 14" Diameter, 560 Lumens, 7 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X614-40)	127.50	49.15
	<i>For >50 To 100, Deduct</i>	-5.03	
	<i>For >100 To 250, Deduct</i>	-8.22	
	<i>For >250 To 500, Deduct</i>	-12.75	
	<i>For >500, Deduct</i>	-17.28	
26 51 19 00-0488	EA 14" Diameter, 1,120 Lumens, 10 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED2X614-40)	132.34	49.15
	<i>For >50 To 100, Deduct</i>	-5.15	
	<i>For >100 To 250, Deduct</i>	-8.46	
	<i>For >250 To 500, Deduct</i>	-13.23	
	<i>For >500, Deduct</i>	-18.01	
26 51 19 00-0489	EA 14" Diameter, 1,680 Lumens, 14 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED3X614-40)	137.18	49.15
	<i>For >50 To 100, Deduct</i>	-5.27	
	<i>For >100 To 250, Deduct</i>	-8.70	
	<i>For >250 To 500, Deduct</i>	-13.72	
	<i>For >500, Deduct</i>	-18.73	
26 51 19 00-0490	EA 14" Diameter, 2,240 Lumens, 17 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED4X614-40)	142.02	49.15
	<i>For >50 To 100, Deduct</i>	-5.39	
	<i>For >100 To 250, Deduct</i>	-8.94	
	<i>For >250 To 500, Deduct</i>	-14.20	
	<i>For >500, Deduct</i>	-19.46	
26 51 19 00-0491	EA 14" Diameter, 3,360 Lumens, 24 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED6X614-40)	151.70	49.15
	<i>For >50 To 100, Deduct</i>	-5.64	
	<i>For >100 To 250, Deduct</i>	-9.43	
	<i>For >250 To 500, Deduct</i>	-15.17	
	<i>For >500, Deduct</i>	-20.91	
26 51 19 00-0492	EA 19" Diameter, 1,060 Lumens, 10 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED1X12S19-30)	157.46	53.06
	<i>For >50 To 100, Deduct</i>	-5.95	
	<i>For >100 To 250, Deduct</i>	-9.88	
	<i>For >250 To 500, Deduct</i>	-15.75	
	<i>For >500, Deduct</i>	-21.61	
26 51 19 00-0493	EA 19" Diameter, 2,120 Lumens, 17 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED4X619-30)	168.46	53.06
	<i>For >50 To 100, Deduct</i>	-6.22	
	<i>For >100 To 250, Deduct</i>	-10.43	
	<i>For >250 To 500, Deduct</i>	-16.85	
	<i>For >500, Deduct</i>	-23.26	
26 51 19 00-0494	EA 19" Diameter, 2,120 Lumens, 17 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED2X12S19-30)	165.78	53.06
	<i>For >50 To 100, Deduct</i>	-6.16	
	<i>For >100 To 250, Deduct</i>	-10.30	
	<i>For >250 To 500, Deduct</i>	-16.58	
	<i>For >500, Deduct</i>	-22.86	
26 51 19 00-0495	EA 19" Diameter, 1,910 Lumens, 18 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED1X12H19-30)	165.73	53.06
	<i>For >50 To 100, Deduct</i>	-6.15	
	<i>For >100 To 250, Deduct</i>	-10.30	
	<i>For >250 To 500, Deduct</i>	-16.57	
	<i>For >500, Deduct</i>	-22.85	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0496 EA 19" Diameter, 3,180 Lumens, 24 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED6X619-30)	178.14	53.06
<i>For >50 To 100, Deduct</i>	-6.46	
<i>For >100 To 250, Deduct</i>	-10.92	
<i>For >250 To 500, Deduct</i>	-17.81	
<i>For >500, Deduct</i>	-24.71	
26 51 19 00-0497 EA 19" Diameter, 3,160 Lumens, 25 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED3X12S19-30)	174.14	53.06
<i>For >50 To 100, Deduct</i>	-6.36	
<i>For >100 To 250, Deduct</i>	-10.72	
<i>For >250 To 500, Deduct</i>	-17.41	
<i>For >500, Deduct</i>	-24.11	
26 51 19 00-0498 EA 19" Diameter, 4,240 Lumens, 31 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED8X619-30)	190.90	53.06
<i>For >50 To 100, Deduct</i>	-6.78	
<i>For >100 To 250, Deduct</i>	-11.56	
<i>For >250 To 500, Deduct</i>	-19.09	
<i>For >500, Deduct</i>	-26.62	
26 51 19 00-0499 EA 19" Diameter, 3,820 Lumens, 32 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED2X12H19-30)	185.44	53.06
<i>For >50 To 100, Deduct</i>	-6.65	
<i>For >100 To 250, Deduct</i>	-11.28	
<i>For >250 To 500, Deduct</i>	-18.54	
<i>For >500, Deduct</i>	-25.81	
26 51 19 00-0500 EA 19" Diameter, 4,240 Lumens, 32 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED4X12S19-30)	185.49	53.06
<i>For >50 To 100, Deduct</i>	-6.65	
<i>For >100 To 250, Deduct</i>	-11.29	
<i>For >250 To 500, Deduct</i>	-18.55	
<i>For >500, Deduct</i>	-25.81	
26 51 19 00-0501 EA 19" Diameter, 1,060 Lumens, 10 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED1X12S19-35)	157.46	53.06
<i>For >50 To 100, Deduct</i>	-5.95	
<i>For >100 To 250, Deduct</i>	-9.88	
<i>For >250 To 500, Deduct</i>	-15.75	
<i>For >500, Deduct</i>	-21.61	
26 51 19 00-0502 EA 19" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED4X619-35)	168.46	53.06
<i>For >50 To 100, Deduct</i>	-6.22	
<i>For >100 To 250, Deduct</i>	-10.43	
<i>For >250 To 500, Deduct</i>	-16.85	
<i>For >500, Deduct</i>	-23.26	
26 51 19 00-0503 EA 19" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X12S19-35)	165.78	53.06
<i>For >50 To 100, Deduct</i>	-6.16	
<i>For >100 To 250, Deduct</i>	-10.30	
<i>For >250 To 500, Deduct</i>	-16.58	
<i>For >500, Deduct</i>	-22.86	
26 51 19 00-0504 EA 19" Diameter, 1,910 Lumens, 18 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED1X12H19-35)	165.73	53.06
<i>For >50 To 100, Deduct</i>	-6.15	
<i>For >100 To 250, Deduct</i>	-10.30	
<i>For >250 To 500, Deduct</i>	-16.57	
<i>For >500, Deduct</i>	-22.85	
26 51 19 00-0505 EA 19" Diameter, 3,180 Lumens, 24 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED6X619-30)	178.14	53.06
<i>For >50 To 100, Deduct</i>	-6.46	
<i>For >100 To 250, Deduct</i>	-10.92	
<i>For >250 To 500, Deduct</i>	-17.81	
<i>For >500, Deduct</i>	-24.71	
26 51 19 00-0506 EA 19" Diameter, 3,160 Lumens, 25 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED3X12S19-30)	174.14	53.06
<i>For >50 To 100, Deduct</i>	-6.36	
<i>For >100 To 250, Deduct</i>	-10.72	
<i>For >250 To 500, Deduct</i>	-17.41	
<i>For >500, Deduct</i>	-24.11	
26 51 19 00-0507 EA 19" Diameter, 4,240 Lumens, 31 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED8X619-30)	190.90	53.06
<i>For >50 To 100, Deduct</i>	-6.78	
<i>For >100 To 250, Deduct</i>	-11.56	
<i>For >250 To 500, Deduct</i>	-19.09	
<i>For >500, Deduct</i>	-26.62	
26 51 19 00-0508 EA 19" Diameter, 3,820 Lumens, 32 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X12H19-35)	185.44	53.06
<i>For >50 To 100, Deduct</i>	-6.65	
<i>For >100 To 250, Deduct</i>	-11.28	
<i>For >250 To 500, Deduct</i>	-18.54	
<i>For >500, Deduct</i>	-25.81	
26 51 19 00-0509 EA 19" Diameter, 4,240 Lumens, 32 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED4X12S19-35)	185.49	53.06
<i>For >50 To 100, Deduct</i>	-6.65	
<i>For >100 To 250, Deduct</i>	-11.29	
<i>For >250 To 500, Deduct</i>	-18.55	
<i>For >500, Deduct</i>	-25.81	
26 51 19 00-0510 EA 19" Diameter, 1,100 Lumens, 10 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X12S19-40)	157.46	53.06
<i>For >50 To 100, Deduct</i>	-5.95	
<i>For >100 To 250, Deduct</i>	-9.88	
<i>For >250 To 500, Deduct</i>	-15.75	
<i>For >500, Deduct</i>	-21.61	
26 51 19 00-0511 EA 19" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X12S19-35)	168.46	53.06
<i>For >50 To 100, Deduct</i>	-6.22	
<i>For >100 To 250, Deduct</i>	-10.43	
<i>For >250 To 500, Deduct</i>	-16.85	
<i>For >500, Deduct</i>	-23.26	
26 51 19 00-0512 EA 19" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X12S19-35)	165.78	53.06
<i>For >50 To 100, Deduct</i>	-6.16	
<i>For >100 To 250, Deduct</i>	-10.30	
<i>For >250 To 500, Deduct</i>	-16.58	
<i>For >500, Deduct</i>	-22.86	

26 Electrical**26 50 Lighting****26 51 Interior Lighting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 19 00-0513	EA	19" Diameter, 2,000 Lumens, 18 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X12H19-40)	165.73	53.06	
		<i>For >50 To 100, Deduct</i>	-6.15		
		<i>For >100 To 250, Deduct</i>	-10.30		
		<i>For >250 To 500, Deduct</i>	-16.57		
		<i>For >500, Deduct</i>	-22.85		
26 51 19 00-0514	EA	19" Diameter, 3,180 Lumens, 24 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED6X619-30)	178.14	53.06	
		<i>For >50 To 100, Deduct</i>	-6.46		
		<i>For >100 To 250, Deduct</i>	-10.92		
		<i>For >250 To 500, Deduct</i>	-17.81		
		<i>For >500, Deduct</i>	-24.71		
26 51 19 00-0515	EA	19" Diameter, 3,160 Lumens, 25 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED3X12S19-30)	174.14	53.06	
		<i>For >50 To 100, Deduct</i>	-6.36		
		<i>For >100 To 250, Deduct</i>	-10.72		
		<i>For >250 To 500, Deduct</i>	-17.41		
		<i>For >500, Deduct</i>	-24.11		
26 51 19 00-0516	EA	19" Diameter, 4,240 Lumens, 31 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED8X619-30)	190.90	53.06	
		<i>For >50 To 100, Deduct</i>	-6.78		
		<i>For >100 To 250, Deduct</i>	-11.56		
		<i>For >250 To 500, Deduct</i>	-19.09		
		<i>For >500, Deduct</i>	-26.62		
26 51 19 00-0517	EA	19" Diameter, 4,000 Lumens, 32 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED2X12H19-40)	185.44	53.06	
		<i>For >50 To 100, Deduct</i>	-6.65		
		<i>For >100 To 250, Deduct</i>	-11.28		
		<i>For >250 To 500, Deduct</i>	-18.54		
		<i>For >500, Deduct</i>	-25.81		
26 51 19 00-0518	EA	19" Diameter, 4,400 Lumens, 32 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED4X12S19-40)	185.49	53.06	
		<i>For >50 To 100, Deduct</i>	-6.65		
		<i>For >100 To 250, Deduct</i>	-11.29		
		<i>For >250 To 500, Deduct</i>	-18.55		
		<i>For >500, Deduct</i>	-25.81		
26 51 19 00-0519	EA	19" Diameter, 1,120 Lumens, 10 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X12S19-50)	157.46	53.06	
		<i>For >50 To 100, Deduct</i>	-5.95		
		<i>For >100 To 250, Deduct</i>	-9.88		
		<i>For >250 To 500, Deduct</i>	-15.75		
		<i>For >500, Deduct</i>	-21.61		
26 51 19 00-0520	EA	19" Diameter, 2,120 Lumens, 17 Watt, 3500K CCT, LED Drum Fixture (Enertron 10LED2X12S19-35)	168.46	53.06	
		<i>For >50 To 100, Deduct</i>	-6.22		
		<i>For >100 To 250, Deduct</i>	-10.43		
		<i>For >250 To 500, Deduct</i>	-16.85		
		<i>For >500, Deduct</i>	-23.26		
26 51 19 00-0521	EA	19" Diameter, 2,240 Lumens, 17 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED2X12S19-50)	165.78	53.06	
		<i>For >50 To 100, Deduct</i>	-6.16		
		<i>For >100 To 250, Deduct</i>	-10.30		
		<i>For >250 To 500, Deduct</i>	-16.58		
		<i>For >500, Deduct</i>	-22.86		
26 51 19 00-0522	EA	19" Diameter, 2,010 Lumens, 18 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED1X12H19-50)	165.73	53.06	
		<i>For >50 To 100, Deduct</i>	-6.15		
		<i>For >100 To 250, Deduct</i>	-10.30		
		<i>For >250 To 500, Deduct</i>	-16.57		
		<i>For >500, Deduct</i>	-22.85		
26 51 19 00-0523	EA	19" Diameter, 3,180 Lumens, 24 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED6X619-30)	178.14	53.06	
		<i>For >50 To 100, Deduct</i>	-6.46		
		<i>For >100 To 250, Deduct</i>	-10.92		
		<i>For >250 To 500, Deduct</i>	-17.81		
		<i>For >500, Deduct</i>	-24.71		
26 51 19 00-0524	EA	19" Diameter, 3,160 Lumens, 25 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED3X12S19-30)	174.14	53.06	
		<i>For >50 To 100, Deduct</i>	-6.36		
		<i>For >100 To 250, Deduct</i>	-10.72		
		<i>For >250 To 500, Deduct</i>	-17.41		
		<i>For >500, Deduct</i>	-24.11		
26 51 19 00-0525	EA	19" Diameter, 4,240 Lumens, 31 Watt, 3000K CCT, LED Drum Fixture (Enertron 10LED8X619-30)	190.90	53.06	
		<i>For >50 To 100, Deduct</i>	-6.78		
		<i>For >100 To 250, Deduct</i>	-11.56		
		<i>For >250 To 500, Deduct</i>	-19.09		
		<i>For >500, Deduct</i>	-26.62		
26 51 19 00-0526	EA	19" Diameter, 4,020 Lumens, 32 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED2X12H19-50)	185.44	53.06	
		<i>For >50 To 100, Deduct</i>	-6.65		
		<i>For >100 To 250, Deduct</i>	-11.28		
		<i>For >250 To 500, Deduct</i>	-18.54		
		<i>For >500, Deduct</i>	-25.81		
26 51 19 00-0527	EA	19" Diameter, 4,480 Lumens, 32 Watt, 4000K CCT, LED Drum Fixture (Enertron 10LED4X12S19-50)	185.49	53.06	
		<i>For >50 To 100, Deduct</i>	-6.65		
		<i>For >100 To 250, Deduct</i>	-11.29		
		<i>For >250 To 500, Deduct</i>	-18.55		
		<i>For >500, Deduct</i>	-25.81		
26 51 19 00-0528		Ceiling Mounted, LED Mushroom Fixtures (Mobern) <small>(26 51 19 00-0454)</small>			
26 51 19 00-0529	EA	14" Diameter, 800 Lumens, 12 Watt, LED Ceiling Fixture (Mobern 6814LED12MV30)	189.78	49.15	
		<i>For >50 To 100, Deduct</i>	-6.59		
		<i>For >100 To 250, Deduct</i>	-11.33		
		<i>For >250 To 500, Deduct</i>	-18.98		
		<i>For >500, Deduct</i>	-26.62		
26 51 19 00-0530		Ceiling Mounted, LED Fixtures (Sylvania) <small>(26 51 19 00-0454)</small>			



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0531	EA 12.5" x 12.5" x 2.32" Deep, 4,200 Lumens, 35 Watt, LED Garage Light Fixture (Sylvania GARAG1/035UNVD740/G5/SV/D).....	705.98	53.06
	For >50 To 100, Deduct	-19.66	
	For >100 To 250, Deduct	-37.31	
	For >250 To 500, Deduct	-70.60	
	For >500, Deduct	-103.89	
26 51 19 00-0532	EA 2' x 2', 32 Watt, 120-277 Volt, 4000K CCT, LED, Grid Mount Edge-Lit Panel With Surface Mount Kit, White (Sylvania PANELF1A/032UNVD840/22G/MWH + SMK1T1A/24A/WH).....	271.76	44.68
	For >50 To 100, Deduct	-8.47	
	For >100 To 250, Deduct	-15.26	
	For >250 To 500, Deduct	-27.18	
	For >500, Deduct	-39.09	
26 51 19 00-0533	EA 2' x 4', 32 Watt, 120-277 Volt, 3500K CCT, LED, Grid Mount Edge-Lit Panel With Surface Mount Kit, White (Sylvania PANELF1A/032UNVD835/24G/MWH + SMK1T1A/24A/WH).....	338.29	52.06
	For >50 To 100, Deduct	-10.41	
	For >100 To 250, Deduct	-18.87	
	For >250 To 500, Deduct	-33.83	
	For >500, Deduct	-48.79	
26 51 19 00-0534	EA 2' x 4', 32 Watt, 120-277 Volt, 4000K CCT, LED, Grid Mount Edge-Lit Panel With Surface Mount Kit, White (Sylvania PANELF1A/032UNVD840/24G/MWH + SMK1T1A/24A/WH).....	342.26	52.06
	For >50 To 100, Deduct	-10.51	
	For >100 To 250, Deduct	-19.07	
	For >250 To 500, Deduct	-34.23	
	For >500, Deduct	-49.38	
26 51 19 00-0535	Refrigeration/Display LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0536	Refrigeration/Display LED Fixtures (Lithonia) (26 51 19 00-0535)		
	Note: Fixtures exclude driver.		
26 51 19 00-0537	EA 5' Length, Center Mount, Refrigeration/Display, Vertical LED Fixture (Lithonia FSV5 CM).....	279.63	52.06
	For >50 To 100, Deduct	-8.95	
	For >100 To 250, Deduct	-15.94	
	For >250 To 500, Deduct	-27.96	
	For >500, Deduct	-39.99	
26 51 19 00-0538	EA 5' Length, Left And Right Mount (Pair), Refrigeration/Display, Vertical LED Fixture (Lithonia FSVDRVL RLEM DLC).....	366.74	92.16
	For >50 To 100, Deduct	-12.66	
	For >100 To 250, Deduct	-21.83	
	For >250 To 500, Deduct	-36.67	
	For >500, Deduct	-51.52	
26 51 19 00-0539	EA Up To 5 Door Configuration, LED Driver For Refrigeration/Display, Vertical LED Fixtures (Lithonia FSVDRVL).....	334.83	73.74
	For >50 To 100, Deduct	-11.16	
	For >100 To 250, Deduct	-19.53	
	For >250 To 500, Deduct	-33.48	
	For >500, Deduct	-47.43	
26 51 19 00-0540	Ceiling Mount LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0541	EA 10-1/2" x 10-1/2", Ceiling Mounted, Box Type 17W LED Fixture.....	239.98	44.68
26 51 19 00-0542	Pendant Mount, LED Fixtures (26 51 19 00-0001)		
26 51 19 00-0543	Pendant Mount, Circular Architectural LED Fixtures (Delray Lighting) (26 51 19 00-0542)		
26 51 19 00-0544	EA 2,166 Lumens, 2' Diameter, White Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC2 W W35 S).....	2,598.33	113.95
	For >50 To 100, Deduct	-69.71	
	For >100 To 250, Deduct	-134.66	
	For >250 To 500, Deduct	-259.83	
	For >500, Deduct	-385.00	
26 51 19 00-0545	EA 3,250 Lumens, 3' Diameter, White Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC3 W W35 S).....	3,926.23	120.65
	For >50 To 100, Deduct	-103.18	
	For >100 To 250, Deduct	-201.34	
	For >250 To 500, Deduct	-392.62	
	For >500, Deduct	-583.91	
26 51 19 00-0546	EA 4,333 Lumens, 4' Diameter, White Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC4 W W35 S).....	5,015.26	127.36
	For >50 To 100, Deduct	-130.69	
	For >100 To 250, Deduct	-256.07	
	For >250 To 500, Deduct	-501.53	
	For >500, Deduct	-746.98	
26 51 19 00-0547	EA 5,416 Lumens, 5' Diameter, White Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC5 W W35 S).....	6,343.16	134.06
	For >50 To 100, Deduct	-164.16	
	For >100 To 250, Deduct	-322.74	
	For >250 To 500, Deduct	-634.32	
	For >500, Deduct	-945.89	
26 51 19 00-0548	EA 2,166 Lumens, 2' Diameter, Silver Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC2 S W35 S).....	2,756.26	113.95
	For >50 To 100, Deduct	-73.65	
	For >100 To 250, Deduct	-142.56	
	For >250 To 500, Deduct	-275.63	
	For >500, Deduct	-408.69	



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 51 19 00-0549	EA	3,250 Lumens, 3' Diameter, Silver Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC3 S W35 S)	4,135.48	120.65
		<i>For >50 To 100, Deduct</i>	-108.41	
		<i>For >100 To 250, Deduct</i>	-211.80	
		<i>For >250 To 500, Deduct</i>	-413.55	
		<i>For >500, Deduct</i>	-615.29	
26 51 19 00-0550	EA	4,333 Lumens, 4' Diameter, Silver Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC4 S W35 S)	5,226.49	127.36
		<i>For >50 To 100, Deduct</i>	-135.97	
		<i>For >100 To 250, Deduct</i>	-266.63	
		<i>For >250 To 500, Deduct</i>	-522.65	
		<i>For >500, Deduct</i>	-778.67	
26 51 19 00-0551	EA	5,416 Lumens, 5' Diameter, Silver Finish, Pendant Mount, Circular Architectural LED Fixture (Delray Lighting UC5 S W35 S)	6,580.05	134.06
		<i>For >50 To 100, Deduct</i>	-170.09	
		<i>For >100 To 250, Deduct</i>	-334.59	
		<i>For >250 To 500, Deduct</i>	-658.01	
		<i>For >500, Deduct</i>	-981.42	
26 51 19 00-0552		Pendant Mount, LED Commercial Fixtures (DMF) <small>(26 51 19 00-0542)</small>		
26 51 19 00-0553	EA	3,000 Lumens, 18-1/4" Diameter, Pendant Mount, LED Commercial Fixture (DMF DP610LED)	1,005.99	67.03
		<i>For >50 To 100, Deduct</i>	-27.94	
		<i>For >100 To 250, Deduct</i>	-53.09	
		<i>For >250 To 500, Deduct</i>	-100.60	
		<i>For >500, Deduct</i>	-148.11	
26 51 19 00-0554		LED Track Lighting Fixtures <small>(26 51 19)</small>		
26 51 19 00-0555	EA	19 Watt, Dimmable, LED Track Lighting Fixture (Juno® TRAC-MASTER® Cylindra™)	196.84	20.42
		<i>For >50 To 100, Deduct</i>	-5.69	
		<i>For >100 To 250, Deduct</i>	-10.61	
		<i>For >250 To 500, Deduct</i>	-19.68	
		<i>For >500, Deduct</i>	-28.76	
26 51 19 00-0556	EA	18 Watt, Dimmable, LED Track Lighting Fixture (HALO® Stasis L805MED)	341.64	20.42
		<i>For >50 To 100, Deduct</i>	-9.31	
		<i>For >100 To 250, Deduct</i>	-17.85	
		<i>For >250 To 500, Deduct</i>	-34.16	
		<i>For >500, Deduct</i>	-50.48	
26 51 19 00-0557	EA	24 Watt, Dimmable, LED Track Lighting Fixture (Amerlux CNTRV33)	202.34	20.42
		<i>For >50 To 100, Deduct</i>	-5.82	
		<i>For >100 To 250, Deduct</i>	-10.88	
		<i>For >250 To 500, Deduct</i>	-20.23	
		<i>For >500, Deduct</i>	-29.59	
26 51 23		HID Interior Lighting <small>(26 51)</small>		
26 51 23 00-0001		Large Interior Area Fixtures <small>(26 51 23)</small>		
26 51 23 00-0002		Recessed Mounted, Large Interior Area Fixtures <small>(26 51 23 00-0001)</small> Note: Cast aluminum socket housing, anodized aluminum reflector, tempered glass or acrylic lens, plaster mounting frames and brackets.		
26 51 23 00-0003		High Pressure Sodium, Recessed Mounted, Large Interior Area Fixtures <small>(26 51 23 00-0002)</small>		
26 51 23 00-0004	EA	150 Watt High Pressure Sodium, Recessed Mounted, Large Interior Area Fixture	478.21	130.35
		<i>For Wire Guard, Add</i>	40.50	
		<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0005	EA	250 Watt High Pressure Sodium, Recessed Mounted, Large Interior Area Fixture	498.02	138.42
		<i>For Wire Guard, Add</i>	40.50	
		<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0006	EA	400 Watt High Pressure Sodium, Recessed Mounted, Large Interior Area Fixture	521.24	157.99
		<i>For Wire Guard, Add</i>	40.50	
		<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0007		Metal Halide, Recessed Mounted, Large Interior Area Fixtures <small>(26 51 23 00-0002)</small>		
26 51 23 00-0008	EA	150 Watt Metal Halide, Recessed Mounted, Large Interior Area Fixture	486.91	130.35
		<i>For Wire Guard, Add</i>	40.50	
		<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0009	EA	250 Watt Metal Halide, Recessed Mounted, Large Interior Area Fixture	501.72	138.42
		<i>For Wire Guard, Add</i>	40.50	
		<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0010	EA	400 Watt Metal Halide, Recessed Mounted, Large Interior Area Fixture	533.77	157.99
		<i>For Wire Guard, Add</i>	40.50	
		<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0011		Low Bay Fixtures, Large Interior Area Fixtures <small>(26 51 23 00-0001)</small> Note: Heavy duty steel housing, aluminum reflector, tempered glass or acrylic lens. Low bay fixtures are for mounting below 20-25 feet.		
26 51 23 00-0012		High Pressure Sodium, Low Bay Fixtures <small>(26 51 23 00-0011)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 23 00-0013 EA 150 Watt High Pressure Sodium, Low Bay Fixture.....	441.94	119.09
For Wire Guard, Add	40.50	
For Glass Or Acrylic Reflector, Add	90.00	
For Instant Quartz Restrike, Add	60.00	
For Enclosed And Gasketed, Add	75.47	
26 51 23 00-0014 EA 250 Watt High Pressure Sodium, Low Bay Fixture.....	454.66	126.46
For Wire Guard, Add	40.50	
For Glass Or Acrylic Reflector, Add	90.00	
For Instant Quartz Restrike, Add	60.00	
For Enclosed And Gasketed, Add	75.47	
26 51 23 00-0015 EA 400 Watt High Pressure Sodium, Low Bay Fixture.....	482.87	144.33
For Wire Guard, Add	40.50	
For Glass Or Acrylic Reflector, Add	90.00	
For Instant Quartz Restrike, Add	60.00	
For Enclosed And Gasketed, Add	75.47	
26 51 23 00-0016 Metal Halide, Low Bay Fixtures (26 51 23 00-001)		
26 51 23 00-0017 EA 175 Watt Metal Halide, Low Bay Fixture.....	435.24	119.09
For Wire Guard, Add	40.50	
For Glass Or Acrylic Reflector, Add	90.00	
For Instant Quartz Restrike, Add	60.00	
For Enclosed And Gasketed, Add	75.47	
26 51 23 00-0018 EA 250 Watt Metal Halide, Low Bay Fixture.....	447.15	126.46
For Wire Guard, Add	40.50	
For Glass Or Acrylic Reflector, Add	90.00	
For Instant Quartz Restrike, Add	60.00	
For Enclosed And Gasketed, Add	75.47	
26 51 23 00-0019 EA 400 Watt Metal Halide, Low Bay Fixture.....	486.27	144.33
For Wire Guard, Add	40.50	
For Glass Or Acrylic Reflector, Add	90.00	
For Instant Quartz Restrike, Add	60.00	
For Enclosed And Gasketed, Add	75.47	
26 51 23 00-0020 High Bay Fixtures, Large Interior Area Fixtures (26 51 23 00-0001)		
Note: High bay fixtures are for mounting above 20-25 feet. See CSI section 01 22 23 00-0001 for lifts.		
26 51 23 00-0021 High Pressure Sodium, High Bay Fixtures (26 51 23 00-0020)		
Note: Includes heavy duty steel housing and aluminum reflector. Excludes lens.		
26 51 23 00-0022 EA 250 Watt High Pressure Sodium, High Bay Fixture.....	409.58	126.46
For Wire Guard, Add	40.50	
For Tempered Glass Or Acrylic Lens, Add	60.50	
For Ballast Safety Chain, Add	12.13	
For Polycarbonate Lens, Add	47.75	
For Glass Or Acrylic Reflector, Add	90.00	
For Security Chain, Add	19.34	
For Optical Safety Chain, Add	7.47	
For Instant Quartz Restrike, Add	60.00	
26 51 23 00-0023 EA 400 Watt High Pressure Sodium, High Bay Fixture.....	442.55	144.33
For Wire Guard, Add	40.50	
For Tempered Glass Or Acrylic Lens, Add	60.50	
For Ballast Safety Chain, Add	12.13	
For Polycarbonate Lens, Add	47.75	
For Glass Or Acrylic Reflector, Add	90.00	
For Security Chain, Add	19.34	
For Optical Safety Chain, Add	7.47	
For Instant Quartz Restrike, Add	60.00	
26 51 23 00-0024 EA 1,000 Watt High Pressure Sodium, High Bay Fixture.....	642.34	151.82
For Wire Guard, Add	40.50	
For Tempered Glass Or Acrylic Lens, Add	60.50	
For Ballast Safety Chain, Add	12.13	
For Polycarbonate Lens, Add	47.75	
For Glass Or Acrylic Reflector, Add	90.00	
For Security Chain, Add	19.34	
For Optical Safety Chain, Add	7.47	
For Instant Quartz Restrike, Add	60.00	
26 51 23 00-0025 Metal Halide, High Bay Fixtures (26 51 23 00-0020)		
Note: Includes heavy duty steel housing and aluminum reflector. Excludes lens.		
26 51 23 00-0026 EA 250 Watt Metal Halide, High Bay Fixture.....	380.90	126.46
For Wire Guard, Add	40.50	
For Tempered Glass Or Acrylic Lens, Add	60.50	
For Ballast Safety Chain, Add	12.13	
For Polycarbonate Lens, Add	47.75	
For Glass Or Acrylic Reflector, Add	90.00	
For Security Chain, Add	19.34	
For Optical Safety Chain, Add	7.47	
For Instant Quartz Restrike, Add	60.00	

26 Electrical

26 50 Lighting

26 51 Interior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 51 23 00-0027	EA 400 Watt Metal Halide, High Bay Fixture	419.85	144.33
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Tempered Glass Or Acrylic Lens, Add</i>	60.50	
	<i>For Ballast Safety Chain, Add</i>	12.13	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Glass Or Acrylic Reflector, Add</i>	90.00	
	<i>For Security Chain, Add</i>	19.34	
	<i>For Optical Safety Chain, Add</i>	7.47	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0028	EA 1,000 Watt Metal Halide, High Bay Fixture	542.84	151.82
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Tempered Glass Or Acrylic Lens, Add</i>	60.50	
	<i>For Ballast Safety Chain, Add</i>	12.13	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Glass Or Acrylic Reflector, Add</i>	90.00	
	<i>For Security Chain, Add</i>	19.34	
	<i>For Optical Safety Chain, Add</i>	7.47	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0029	Induction, High Bay Fixtures <small>(26 51 23 00-0020)</small>		
26 51 23 00-0030	Induction, High Bay Fixtures (Everlast®) <small>(26 51 23 00-0029)</small>		
	Note: Includes die cast aluminum ballast casing and acrylic lens.		
26 51 23 00-0031	EA 100 Watt Induction, High Bay Fixture (Everlast® Huron EHBUS-AC)	479.57	110.60
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0032	EA 120 Watt Induction, High Bay Fixture (Everlast® Huron EHBUS-AC)	513.79	114.29
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0033	EA 150 Watt Induction, High Bay Fixture (Everlast® Huron EHBUS-AC)	523.33	117.98
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0034	EA 200 Watt Induction, High Bay Fixture (Everlast® Huron EHBUS-AC)	569.38	121.66
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0035	EA 250 Watt Induction, High Bay Fixture (Everlast® Huron EHBUS-AC)	583.86	125.35
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0036	EA 100 Watt Induction, Variable Dimming, High Bay Fixture (Everlast® Huron EHBUS-AC)	514.12	110.60
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0037	EA 120 Watt Induction, Variable Dimming, High Bay Fixture (Everlast® Huron EHBUS-AC)	548.34	114.29
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0038	EA 150 Watt Induction, Variable Dimming, High Bay Fixture (Everlast® Huron EHBUS-AC)	557.88	117.98
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0039	EA 200 Watt Induction, Variable Dimming, High Bay Fixture (Everlast® Huron EHBUS-AC)	603.94	121.66
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0040	EA 250 Watt Induction, Variable Dimming, High Bay Fixture (Everlast® Huron EHBUS-AC)	618.41	125.35
	<i>For Impact Resistant Silicon Lens, Add</i>	20.00	
26 51 23 00-0041	Ceiling Mounted, Large Interior Area Fixtures <small>(26 51 23 00-0001)</small>		
	Note: Heavy duty aluminum housing, aluminum reflector, acrylic drop dish lens, fully gasketed.		
26 51 23 00-0042	High Pressure Sodium, Ceiling Mounted, Large Interior Area Fixtures <small>(26 51 23 00-0041)</small>		
26 51 23 00-0043	EA 100 Watt High Pressure Sodium, Ceiling Mounted, Large Interior Area Fixture	342.81	84.74
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0044	EA 150 Watt High Pressure Sodium, Ceiling Mounted, Large Interior Area Fixture	673.02	84.74
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0045	EA 250 Watt High Pressure Sodium, Ceiling Mounted, Large Interior Area Fixture	773.62	84.74
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0046	EA 400 Watt High Pressure Sodium, Ceiling Mounted, Large Interior Area Fixture	1,035.36	84.74
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0047	Metal Halide, Ceiling Mounted, Large Interior Area Fixtures <small>(26 51 23 00-0041)</small>		
26 51 23 00-0048	EA 100 Watt Metal Halide, Ceiling Mounted, Large Interior Area Fixture	313.27	84.74
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0049	EA 175 Watt Metal Halide, Ceiling Mounted, Large Interior Area Fixture	329.67	94.04
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0050	EA 250 Watt Metal Halide, Ceiling Mounted, Large Interior Area Fixture	350.66	101.86
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	
26 51 23 00-0051	EA 400 Watt Metal Halide, Ceiling Mounted, Large Interior Area Fixture	393.34	121.31
	<i>For Wire Guard, Add</i>	40.50	
	<i>For Polycarbonate Lens, Add</i>	47.75	
	<i>For Instant Quartz Restrike, Add</i>	60.00	



Electrical	26	26
Lighting	26 50	
Interior Lighting	26 51	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 51 23 00-0052 High Pressure Sodium, Recessed Fixture Housings <small>(26 51 23)</small>		
26 51 23 00-0053 EA 4" Round, High Pressure Sodium, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	165.49 14.56	35.22
26 51 23 00-0054 EA 5" Round, High Pressure Sodium, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	173.03 15.54	35.22
26 51 23 00-0055 EA 6" Round, High Pressure Sodium, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	181.75 16.35	36.68
26 51 23 00-0056 EA 7" Round, High Pressure Sodium, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	188.31 16.88	38.27
26 51 23 00-0057 EA 8" Round, High Pressure Sodium, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	194.80 17.40	39.87
26 51 23 00-0058 EA 10" To 12" Square, High Pressure Sodium, T Or ICT Recessed Fixture Housing <i>For ICAT Housing, Add</i>	200.47 17.66	42.31
26 51 23 00-0059 Metal Halide Track Lighting Fixtures <small>(26 51 23)</small>		
26 51 23 00-0060 EA Metal Halide Track Lighting Fixture	107.85	20.42
26 51 23 00-0061 Metal Halide, Wet Location, Dust Resistant, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixtures <small>(26 51 23)</small>		
26 51 23 00-0062 EA 75 Watt Metal Halide, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	172.82 6.30	48.91
26 51 23 00-0063 EA 100 Watt Metal Halide, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	177.91 6.30	48.91
26 51 23 00-0064 EA 150 Watt Metal Halide, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	188.24 6.30	48.91
26 51 23 00-0065 EA 175 Watt Metal Halide, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	203.78 6.30	48.91
26 51 23 00-0066 High Pressure Sodium, Wet Location, Dust Resistant, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixtures <small>(26 51 23)</small>		
26 51 23 00-0067 EA 70 Watt High Pressure Sodium, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	160.71 6.67	48.91
26 51 23 00-0068 EA 100 Watt High Pressure Sodium, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	167.03 6.67	48.91
26 51 23 00-0069 EA 150 Watt High Pressure Sodium, Ceiling Mounted, Cast Metal Guard, Enclosed And Gasketed, Vapor Tight Fixture <i>For Wall Mounted, Add</i>	191.46 6.67	48.91
26 51 33 Interior Lighting Accessories <small>(26 51)</small>		
26 51 33 00-0001 Accessories And Modifiers For Fixtures <small>(26 51 33)</small>		
26 51 33 00-0002 Lens Modifications <small>(26 51 33 00-0001)</small>		
26 51 33 00-0003 EA For 1' x 2' Drop Dish Diffuser Instead Of Prismatic Lens, Add.....	37.68	
26 51 33 00-0004 EA For 1' x 4' Drop Dish Diffuser Instead Of Prismatic Lens, Add.....	46.55	
26 51 33 00-0005 EA For 2' x 2' Drop Dish Diffuser Instead Of Prismatic Lens, Add.....	48.76	
26 51 33 00-0006 EA For 2' x 4' Drop Dish Diffuser Instead Of Prismatic Lens, Add.....	53.20	
26 51 33 00-0007 EA For 4' x 4' Drop Dish Diffuser Instead Of Prismatic Lens, Add.....	64.28	
26 51 33 00-0008 EA For 1' x 2' Egg Crate/Cube Louvers Instead Of Prismatic Lens, Add.....	15.52	
26 51 33 00-0009 EA For 1' x 4' Egg Crate/Cube Louvers Instead Of Prismatic Lens, Add.....	22.16	
26 51 33 00-0010 EA For 2' x 2' Egg Crate/Cube Louvers Instead Of Prismatic Lens, Add.....	24.38	
26 51 33 00-0011 EA For 2' x 4' Egg Crate/Cube Louvers Instead Of Prismatic Lens, Add.....	28.81	
26 51 33 00-0012 Pendant Mounting Modifications <small>(26 51 33 00-0001)</small>		
Note: Per pendant. Use demolition cost for associated light fixture for demolition of pendant mounted light fixture assembly.		
26 51 33 00-0013 EA For Pendant Mounting Up to 1'-6" Long Section.....	16.85	
Note: Per pendant.		
26 51 33 00-0014 EA For Pendant Mounting 2' Long Section.....	19.51	
Note: Per pendant.		
26 51 33 00-0015 EA For Pendant Mounting 3' Long Section.....	24.96	
Note: Per pendant.		
26 51 33 00-0016 EA For Pendant Mounting 4' Long Section.....	29.48	
Note: Per pendant.		
26 51 33 00-0017 EA For Pendant Mounting 6' Long Section.....	37.24	
Note: Per pendant.		
26 51 33 00-0018 EA For Pendant Mounting 8' Long Section.....	50.54	
Note: Per pendant.		
26 51 33 00-0019 Fluorescent Light Accessories <small>(26 51 33 00-0001)</small>		
26 51 33 00-0020 EA Blank Metal Light Box Plate.....	30.98	
26 51 33 00-0021 EA Factory Installed Fixture Mounted Occupancy Sensor	170.65	

26	26 Electrical
	26 50 Lighting
	26 51 Interior Lighting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 51 33 00-0022	Wire Guards <small>(26 51 33 00-0001)</small>		
26 51 33 00-0023	EA Wire Guard for 6" x 2' Fixture.....	71.51	6.12
26 51 33 00-0024	EA Wire Guard for 6" x 4' Fixture.....	100.18	9.80
26 51 33 00-0025	EA Wire Guard for 1" x 2' Fixture.....	79.84	6.74
26 51 33 00-0026	EA Wire Guard for 1" x 4' Fixture.....	113.26	10.41
26 51 33 00-0027	EA Wire Guard for 2" x 2' Fixture.....	97.66	7.35
26 51 33 00-0028	EA Wire Guard for 2" x 4' Fixture.....	133.44	11.02

26 51 33 00-0029	Lighting Accessories <small>(26 51 33)</small>		
26 51 33 00-0030	Modular Flexible Wiring Systems <small>(26 51 33 00-0029)</small>		
26 51 33 00-0031	EA 10' Length, 2-Circuit, Modular Power Cable (Day-Brite PC-12-2E-10)	102.91	6.60
26 51 33 00-0032	EA 15' Length, 2-Circuit, Modular Power Cable (Day-Brite PC-12-2E-15)	122.16	6.60
26 51 33 00-0033	EA 20' Length, 2-Circuit, Modular Power Cable (Day-Brite PC-12-2E-20)	147.94	6.60
26 51 33 00-0034	EA 15' Length, 2-Circuit, Modular Lighting Cable (Day-Brite LC-27-2E-15)	122.16	6.60
26 51 33 00-0035	EA 3 Out, 3-Circuit, Modular Lighting Interface (Day-Brite LI-27-3E)	100.81	6.60
26 51 33 00-0036	EA 13' Length, 2-Circuit, Modular Reddy-Connect Cable (Day-Brite RC-27-2D-13)	152.72	6.60
26 51 33 00-0037	EA 3" Length, 2-Circuit, Modular Lighting Adapter (Day-Brite LA-27-7M)	82.48	6.60
26 51 33 00-0038	EA 3" Length, 2-Circuit, Modular Lighting Tap (Day-Brite LT-27-2E)	93.96	6.60
26 51 33 00-0039	EA 7' Length, Single Level, Modular Lighting Switch Unit (Day-Brite LS-27-SL-07)	123.20	6.60
26 51 33 00-0040	EA 7' Length, 1-Circuit Multi-Level, Modular Lighting Switch Unit (Day-Brite LS-27-ML-07)	123.20	6.60
26 51 33 00-0041	EA 7' Length, 2-Circuit Multi-Level, Modular Lighting Switch Unit (Day-Brite LS-27-2C-07)	125.36	6.60
26 51 33 00-0042	EA 7' Length, 1st 3-Way, Modular Lighting Switch Unit (Day-Brite LS-27-3A-07)	124.56	6.60
26 51 33 00-0043	EA 7' Length, 2nd 3-Way, Modular Lighting Switch Unit (Day-Brite LS-27-3B-07)	124.56	6.60
26 51 33 00-0044	EA 15' Length, Single Level, Modular Lighting Switch Unit (Day-Brite LS-27-SL-15)	143.88	6.60
26 51 33 00-0045	EA 3" Length, 2-Circuit, Modular Lighting Adapter (Day-Brite LA-27-4D)	63.49	6.60
26 51 33 00-0046	EA 3" Length, 1-Circuit, Modular Lighting Distribution Cable (Day-Brite LD-27-1E)	58.99	6.60
26 51 33 00-0047	EA 3" Length, 2-Circuit, Modular Lighting Distribution Cable (Day-Brite LD-27-2E)	60.56	6.60
26 51 33 00-0048	EA 3" Length, 1-Circuit, Modular Lighting Tap (Day-Brite LT-27-1E)	77.28	6.60
26 51 33 00-0049	EA 15' Length, 1-Circuit, Modular Lighting Tap (Day-Brite LT-27-1E-15)	102.91	6.60
26 51 33 00-0050	EA 15' Length, 1-Circuit, Modular Lighting Cable (Day-Brite LC-27-1E-15)	105.64	6.60
26 51 33 00-0051	EA Modular Lighting Junction Or Circuit Splitter (Day-Brite LJ-27-3E)	81.43	6.60
26 51 33 00-0052	EA 3" Length, 1-Circuit, Modular Power Distribution Cable (Day-Brite PD-12-1E)	58.99	6.60
26 51 33 00-0053	EA Removal And Reinstallation Of Modular Wiring Complete Including Storage And Cleaning.....	55.02	

26 51 33 00-0054	Additional Lighting Wire Whips <small>(26 51 33)</small>		
26 51 33 00-0055	LF For Each Additional LF Of Interior Lighting Wire Whip, Add	1.85	
	Note: Wire whips are included with interior lighting fixtures, where necessary, up to six feet in length. Use this task for additional required whip length. For example, if the fixture requires a 15' wire whip then use 9 LF of this task to reach required length.		

26 51 33 00-0056	Removal And Reinstallation Of Light Fixtures <small>(26 51 33)</small>		
	Note: Includes disconnection of wire, on-site storage, general cleaning, installation and electrical wire hook-up.		
26 51 33 00-0057	EA Removal And Reinstallation Of Lay-In Fluorescent Light Fixture	130.15	
26 51 33 00-0058	EA Removal And Reinstallation Of Surface Mounted Or Pendant Light Fixture	148.74	

26 52 Safety Lighting (26 50)

26 52 13 Emergency and Exit Lighting (26 52)

26 52 13 13 Emergency Lighting (26 52 13)

26 52 13 13-0001	Commercial Emergency Lights <small>(26 52 13 13)</small>		
26 52 13 13-0002	Polycarbonate Housing, Commercial Emergency Lights <small>(26 52 13 13-0001)</small>		
	Note: Includes lead-calcium batteries and two adjustable lamp heads.		
26 52 13 13-0003	EA 3 Max Wattage At 90 Minutes, 3.6 Volt, Polycarbonate Housing, LED Lamps, Commercial Emergency Light (Lithonia ELM2 LED)	247.09	30.57
26 52 13 13-0004	EA 10.8 Max Wattage At 90 Minutes, 6 Volt, Polycarbonate Housing, Krypton Lamps, Commercial Emergency Light (Lithonia ELM2)	168.94	30.57
	For Halogen Lamps, Add	27.55	
	For Self-Diagnostics, Add	87.50	
26 52 13 13-0005	EA 18 Max Wattage At 90 Minutes, 6 Volt, Polycarbonate Housing, Krypton Lamps, Commercial Emergency Light (Lithonia ELM618)	271.21	30.57
	For Halogen Lamps, Add	27.55	
	For Self-Diagnostics, Add	87.50	
26 52 13 13-0006	EA 27 Max Wattage At 90 Minutes, 6 Volt, Remote Capability, Polycarbonate Housing, Krypton Lamps, Commercial Emergency Light (Lithonia ELM627)	317.51	30.57
	For Halogen Lamps, Add	27.55	
	For Self-Diagnostics, Add	87.50	
26 52 13 13-0007	EA 54 Max Wattage At 90 Minutes, 6 Volt, Remote Capability, Polycarbonate Housing, Krypton Lamps, Commercial Emergency Light (Lithonia ELM654)	476.63	30.57
	For Halogen Lamps, Add	27.55	
	For Self-Diagnostics, Add	87.50	



Electrical	26	26
Lighting	26 50	
Safety Lighting	26 52	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 52 13 13-0008	EA		54 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Polycarbonate Housing, Krypton Lamps, Commercial Emergency Light (Lithonia ELM1254).....	541.22	30.57
			<i>For Halogen Lamps, Add</i>	27.55	
			<i>For Self-Diagnostics, Add</i>	87.50	
26 52 13 13-0009	EA		72 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Polycarbonate Housing, Krypton Lamps, Commercial Emergency Light (Lithonia ELM1272).....	792.86	30.57
			<i>For Halogen Lamps, Add</i>	27.55	
			<i>For Self-Diagnostics, Add</i>	87.50	
26 52 13 13-0010			Remote Heads For Commercial Emergency Lights (26 52 13 13-0001)		
			Note: For use with fixtures that have remote capability.		
26 52 13 13-0011	EA		6 Watt, 6 Volt, Aluminum Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA MT H0606).....	167.69	18.34
26 52 13 13-0012	EA		6 Watt, 6 Volt, Gasketed Fiberglass Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA NX H0606).....	168.85	18.34
26 52 13 13-0013	EA		8 Watt, 8 Volt, Gasketed Fiberglass Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA NX H0806).....	172.76	18.34
26 52 13 13-0014	EA		12 Watt, 12 Volt, Aluminum Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA MT H1212).....	172.12	18.34
26 52 13 13-0015	EA		12 Watt, 12 Volt, Thermoplastic Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA H1212).....	148.14	18.34
26 52 13 13-0016	EA		12 Watt, 12 Volt, Thermoplastic Housing, Incandescent Lamp, Emergency Light Remote Head (Lithonia ELA N1206).....	100.51	18.34
26 52 13 13-0017			Industrial Emergency Lights (26 52 13 13)		
26 52 13 13-0018			Painted Steel Housing, Industrial Emergency Lights (26 52 13 13-0017)		
26 52 13 13-0019			Painted Steel Housing, Industrial Emergency Lights (26 52 13 13-0018)		
			Note: Includes lead-calcium batteries and two adjustable lamp heads.		
26 52 13 13-0020	EA		16 Max Wattage At 90 Minutes, 6 Volt, Painted Steel Housing, Incandescent Lamps, Industrial Emergency Light (Lithonia ELT16).....	441.48	30.57
			<i>For Wireguard, Add</i>	228.84	
26 52 13 13-0021	EA		24 Max Wattage At 90 Minutes, 6 Volt, Remote Capability, Painted Steel Housing, Incandescent Lamps, Industrial Emergency Light (Lithonia ELT24).....	369.22	30.57
			<i>For Wireguard, Add</i>	228.84	
26 52 13 13-0022	EA		36 Max Wattage At 90 Minutes, 6 Volt, Remote Capability, Painted Steel Housing, Incandescent Lamps, Industrial Emergency Light (Lithonia ELT36).....	580.41	30.57
			<i>For Wireguard, Add</i>	228.84	
26 52 13 13-0023	EA		50 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Painted Steel Housing, Incandescent Lamps, Industrial Emergency Light (Lithonia ELT50).....	616.86	30.57
			<i>For Wireguard, Add</i>	228.84	
26 52 13 13-0024	EA		125 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Painted Steel Housing, Incandescent Lamps, Industrial Emergency Light (Lithonia ELT125).....	884.16	30.57
			<i>For Wireguard, Add</i>	243.74	
26 52 13 13-0025	EA		275 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Painted Steel Housing, Incandescent Lamps, Industrial Emergency Light (Lithonia ELT275).....	1,395.51	30.57
			<i>For Wireguard, Add</i>	243.74	
26 52 13 13-0026			Remote Heads For Painted Steel Housing, Industrial Emergency Lights (26 52 13 13-0018)		
			Note: For use with fixtures that have remote capability.		
26 52 13 13-0027	EA		8 Watt, 6 Volt, Thermoplastic Housing, Incandescent Lamp, Emergency Light Remote Head (Lithonia ELA N0806).....	127.96	18.34
			<i>For Wireguard, Add</i>	184.68	
26 52 13 13-0028	EA		12 Watt, 6 Volt, Thermoplastic Housing, Incandescent Lamp, Emergency Light Remote Head (Lithonia ELA N1206).....	132.51	18.34
			<i>For Wireguard, Add</i>	184.68	
26 52 13 13-0029	EA		8 Watt, 12 Volt, Thermoplastic Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA H0812).....	128.60	18.34
			<i>For Wireguard, Add</i>	184.68	
26 52 13 13-0030	EA		12 Watt, 12 Volt, Thermoplastic Housing, Incandescent Lamp, Emergency Light Remote Head (Lithonia ELA N1212).....	129.34	18.34
			<i>For Wireguard, Add</i>	184.68	
26 52 13 13-0031	EA		12 Watt, 25 Volt, Thermoplastic Housing, Incandescent Lamp, Emergency Light Remote Head (Lithonia ELA N2512).....	132.51	18.34
			<i>For Wireguard, Add</i>	184.68	
26 52 13 13-0032	EA		12 Watt, 25 Volt, Aluminum Housing, Incandescent Lamp, Emergency Light Remote Head (Lithonia ELA MT N2512).....	155.54	18.34
			<i>For Wireguard, Add</i>	184.68	
26 52 13 13-0033			Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Lights (26 52 13 13-0017)		
26 52 13 13-0034			Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Lights (26 52 13 13-0033)		
			Note: Includes lead-calcium batteries and two adjustable lamp heads.		
26 52 13 13-0035	EA		18 Max Wattage At 90 Minutes, 6 Volt, Krypton Lamps, Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Light (Lithonia IND618).....	435.67	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	105.50	
26 52 13 13-0036	EA		36 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Krypton Lamps, Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Light (Lithonia IND1236).....	474.24	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	105.50	



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 52 13 13-0037	EA		54 Max Wattage At 90 Minutes, 6 Volt, Remote Capability, Krypton Lamps, Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Light (Lithonia IND654).....	463.67	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	105.50	
26 52 13 13-0038	EA		54 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Krypton Lamps, Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Light (Lithonia IND1254).....	490.61	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	105.50	
26 52 13 13-0039	EA		100 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Krypton Lamps, Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Light (Lithonia IND12100).....	831.86	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	105.50	
26 52 13 13-0040	EA		18 Max Wattage At 90 Minutes, 6 Volt, Krypton Lamps, NEMA 4X, Rugged Injection-Molded Thermoplastic Housing, Harsh Environment Industrial Emergency Light (Lithonia INDX618).....	651.73	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	61.50	
26 52 13 13-0041	EA		36 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Krypton Lamps, NEMA 4X, Rugged Injection-Molded Thermoplastic Housing, Harsh Environment Industrial Emergency Light (Lithonia INDX1236).....	730.97	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	61.50	
26 52 13 13-0042	EA		54 Max Wattage At 90 Minutes, 12 Volt, Remote Capability, Krypton Lamps, NEMA 4X, Rugged Injection-Molded Thermoplastic Housing, Harsh Environment Industrial Emergency Light (Lithonia INDX1254).....	771.11	30.57
			<i>For Wireguard, Add</i>	222.50	
			<i>For Self-Diagnostics, Add</i>	61.50	
26 52 13 13-0043			Remote Heads For Rugged Injection-Molded Thermoplastic Housing, Industrial Emergency Lights <small>(26 52 13 13-0033)</small>		
			Note: For use with fixtures that have remote capability.		
26 52 13 13-0044	EA		9 Watt, 6 Volt, Heavyweight Polycarbonate Housing, Krypton Lamp, Emergency Light Remote Head (Lithonia ELA IND K0906).....	110.53	18.34
26 52 13 13-0045	EA		12 Watt, 6 Volt, Heavyweight Polycarbonate Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA IND H1206).....	119.72	18.34
26 52 13 13-0046	EA		9 Watt, 12 Volt, Heavyweight Polycarbonate Housing, Krypton Lamp, Emergency Light Remote Head (Lithonia ELA IND K0912).....	110.64	18.34
26 52 13 13-0047	EA		12 Watt, 12 Volt, Heavyweight Polycarbonate Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA IND H1212).....	117.40	18.34
26 52 13 13-0048	EA		12 Watt, 20 Volt, Heavyweight Polycarbonate Housing, Halogen Lamp, Emergency Light Remote Head (Lithonia ELA IND H2012).....	100.03	18.34
26 52 13 13-0049			Outdoor Emergency Lights <small>(26 52 13 13)</small>		
26 52 13 13-0050			Gasketed Die-Cast Aluminum Housing, Outdoor Emergency Lights <small>(26 52 13 13-0049)</small>		
			Note: Includes nickel-cadmium batteries.		
26 52 13 13-0051	EA		10 Max Wattage At 90 Minutes, LED Lamps, Gasketed Aluminum Die-Cast Housing, Outdoor Emergency Light (Dual-Lite PG Series).....	690.29	30.57
26 52 13 13-0052	EA		10 Max Wattage At 90 Minutes, LED Lamps, Gasketed Aluminum Die-Cast Housing, Outdoor Emergency Light With Heater (Dual-Lite PG Series).....	825.00	30.57
26 52 13 13-0053			Recessed Emergency Lights <small>(26 52 13 13)</small>		
26 52 13 13-0054	EA		10 Watt At 90 Minutes, 6 Volt, Halogen Lamp, 8" Round, Recessed High-Hat Emergency Light (Lithonia ELRG).....	753.13	30.57
			<i>For Wire Guard, Add</i>	60.00	
26 52 13 13-0055	EA		16 Max Wattage At 90 Minutes, 6 Volt, 12" x 12" Polycarbonate Housing, Glass Sealed-Beam Lamps, Recessed Emergency Light (Lithonia ELR2).....	587.38	61.14
			Note: Includes lead-calcium batteries and two adjustable lamp heads.		
			<i>For Wireguard, Add</i>	243.74	
26 52 13 13-0056	EA		50 Max Wattage At 90 Minutes, 12 Volt, 12" x 12" Polycarbonate Housing, Glass Sealed-Beam Lamps, Recessed Emergency Light (Lithonia ELR4).....	848.45	61.14
			Note: Includes lead-calcium batteries and two adjustable lamp heads.		
			<i>For Wireguard, Add</i>	243.74	
26 52 13 13-0057			Square Wraparound Emergency Lights <small>(26 52 13 13)</small>		
26 52 13 13-0058	EA		10 Max Wattage At 90 Minutes, 6 Volt, Halogen Lamp, 10-5/16" x 10-5/16" Lexan Frame, Square Wraparound Emergency Light (Lithonia ELSQ).....	341.36	30.57
26 52 13 16			Exit Signs <small>(26 52 13)</small>		
			Note: Excludes pendants.		
26 52 13 16-0001			LED Exit Signs <small>(26 52 13 16)</small>		
			Note: Includes red LED lamps.		
26 52 13 16-0002	EA		Single Face, Thermoplastic Housing, LED Exit Sign (Lithonia LQM-S-W-3-R-120/277-M6).....	196.23	44.70
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-7.14	
			<i>For >100 To 250, Deduct</i>	-12.05	
			<i>For >250 To 500, Deduct</i>	-19.62	
			<i>For >500, Deduct</i>	-27.20	



Electrical	26	26
Lighting	26 50	
Safety Lighting	26 52	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 52	13 16-0003	EA	Double Face, Thermoplastic Housing, LED Exit Sign (Lithonia LQM-S-W-3-R-120/277-M6).....	196.23	44.70
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-7.14	
			<i>For >100 To 250, Deduct</i>	-12.05	
			<i>For >250 To 500, Deduct</i>	-19.62	
			<i>For >500, Deduct</i>	-27.20	
26 52	13 16-0004	EA	Single Face, Thermoplastic Housing, LED Exit Sign With Battery Back-Up (Lithonia LQM-S-W-3-R-120/277-EL-N-M6).....	276.16	44.70
			<i>For Self-Diagnostics, Add</i>	50.00	
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-9.14	
			<i>For >100 To 250, Deduct</i>	-16.04	
			<i>For >250 To 500, Deduct</i>	-27.62	
			<i>For >500, Deduct</i>	-39.19	
26 52	13 16-0005	EA	Double Face, Thermoplastic Housing, LED Exit Sign With Battery Back-Up (Lithonia LQM ELN).....	276.16	44.70
			<i>For Self-Diagnostics, Add</i>	50.00	
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-9.14	
			<i>For >100 To 250, Deduct</i>	-16.04	
			<i>For >250 To 500, Deduct</i>	-27.62	
			<i>For >500, Deduct</i>	-39.19	
26 52	13 16-0006	EA	Single Face, Die-Cast Aluminum Housing, LED Exit Sign (Lithonia LQC-W-1-R).....	304.71	44.70
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-9.85	
			<i>For >100 To 250, Deduct</i>	-17.47	
			<i>For >250 To 500, Deduct</i>	-30.47	
			<i>For >500, Deduct</i>	-43.47	
26 52	13 16-0007	EA	Double Face, Die-Cast Aluminum Housing, LED Exit Sign (Lithonia LQC-W-2-R).....	346.37	44.70
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-10.89	
			<i>For >100 To 250, Deduct</i>	-19.55	
			<i>For >250 To 500, Deduct</i>	-34.64	
			<i>For >500, Deduct</i>	-49.72	
26 52	13 16-0008	EA	Single Face, Die-Cast Aluminum Housing, LED Exit Sign With Battery Back-Up (Lithonia LQC-W-1-R-EL-N).....	287.30	44.70
			<i>For Self-Diagnostics, Add</i>	50.00	
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-9.42	
			<i>For >100 To 250, Deduct</i>	-16.60	
			<i>For >250 To 500, Deduct</i>	-28.73	
			<i>For >500, Deduct</i>	-40.86	
26 52	13 16-0009	EA	Double Face, Die-Cast Aluminum Housing, LED Exit Sign With Battery Back-Up (Lithonia LQC-W-2-R-EL-N).....	317.54	44.70
			<i>For Self-Diagnostics, Add</i>	50.00	
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-10.17	
			<i>For >100 To 250, Deduct</i>	-18.11	
			<i>For >250 To 500, Deduct</i>	-31.75	
			<i>For >500, Deduct</i>	-45.40	
26 52	13 16-0010	EA	Single Face, Thermoplastic Housing, LED Exit Sign/Emergency Light Combo With Battery Back-Up (Lithonia LHQM-S-W-3-R-M4).....	365.24	44.70
			Note: Includes two circular side mounted krypton emergency lights.		
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-12.19	
			<i>For >100 To 250, Deduct</i>	-21.32	
			<i>For >250 To 500, Deduct</i>	-36.52	
			<i>For >500, Deduct</i>	-51.73	
26 52	13 16-0011	EA	Single Face, Thermoplastic Housing, LED Exit Sign/Emergency Light Combo With Battery Back-Up (Lithonia LHQM-LED-R-M6).....	309.47	44.70
			Note: Includes two circular side mounted LED emergency lights.		
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-10.79	
			<i>For >100 To 250, Deduct</i>	-18.53	
			<i>For >250 To 500, Deduct</i>	-30.95	
			<i>For >500, Deduct</i>	-43.36	
26 52	13 16-0012	EA	Single Face, Powder Coated Steel Housing, LED Exit Sign/Emergency Light Combo With Battery Back-Up (Big Beam COM-PH).....	459.59	44.70
			Note: Includes two rectangular front mounted high intensity tungsten emergency lights.		
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-14.55	
			<i>For >100 To 250, Deduct</i>	-26.04	
			<i>For >250 To 500, Deduct</i>	-45.96	
			<i>For >500, Deduct</i>	-65.88	
26 52	13 16-0013	EA	Single Face, Powder Coated Steel Housing, LED Exit Sign/Emergency Light Combo With Battery Back-Up (Big Beam COM).....	481.54	44.70
			Note: Includes two circular side mounted PAR 36 emergency lights.		
			<i>For Green LED Lamps, Add</i>	15.00	
			<i>For >50 To 100, Deduct</i>	-15.10	
			<i>For >100 To 250, Deduct</i>	-27.13	
			<i>For >250 To 500, Deduct</i>	-48.15	
			<i>For >500, Deduct</i>	-69.17	
26 52	13 16-0014	EA	Single Or Double Face, Polycarbonate Housing, LED Emergency Exit Sign (Eaton Lighting APX6R).....	128.92	44.70
			<i>For >50 To 100, Deduct</i>	-5.46	
			<i>For >100 To 250, Deduct</i>	-8.68	
			<i>For >250 To 500, Deduct</i>	-12.89	
			<i>For >500, Deduct</i>	-17.10	



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 52 13 16-0015	EA 120-277 Volt, LED Emergency Exit Sign With Nickel Cadmium Battery, Red (Cooper Industries APX7R)	129.43	44.70
	<i>For >50 To 100, Deduct</i>	-5.47	
	<i>For >100 To 250, Deduct</i>	-8.71	
	<i>For >250 To 500, Deduct</i>	-12.94	
	<i>For >500, Deduct</i>	-17.18	
26 52 13 16-0016	Edge-Lit LED Exit Signs <small>(26 52 13 16)</small>		
	Note: Includes red LED lamps.		
26 52 13 16-0017	EA Single Face, Edge-Lit LED Exit Sign (Lithonia EDG-1- R-M6)	271.07	44.70
	<i>For Green LED Lamps, Add</i>	40.00	
	<i>For >50 To 100, Deduct</i>	-9.01	
	<i>For >100 To 250, Deduct</i>	-15.79	
	<i>For >250 To 500, Deduct</i>	-27.11	
	<i>For >500, Deduct</i>	-38.43	
26 52 13 16-0018	EA Double Face, Edge-Lit LED Exit Sign (Lithonia EDG-2-R-M6)	273.96	44.70
	<i>For Green LED Lamps, Add</i>	40.00	
	<i>For >50 To 100, Deduct</i>	-9.08	
	<i>For >100 To 250, Deduct</i>	-15.93	
	<i>For >250 To 500, Deduct</i>	-27.40	
	<i>For >500, Deduct</i>	-38.86	
26 52 13 16-0019	EA Single Face, Edge-Lit LED Exit Sign With Battery Back-Up (Lithonia EDG-1-R-EL-M6)	293.47	44.70
	<i>For Self-Diagnostics, Add</i>	50.00	
	<i>For Green LED Lamps, Add</i>	40.00	
	<i>For >50 To 100, Deduct</i>	-9.57	
	<i>For >100 To 250, Deduct</i>	-16.91	
	<i>For >250 To 500, Deduct</i>	-29.35	
	<i>For >500, Deduct</i>	-41.79	
26 52 13 16-0020	EA Double Face, Edge-Lit LED Exit Sign With Battery Back-Up (Lithonia EDG-2-R-EL-M6).....	351.80	44.70
	<i>For Self-Diagnostics, Add</i>	50.00	
	<i>For Green LED Lamps, Add</i>	40.00	
	<i>For >50 To 100, Deduct</i>	-11.03	
	<i>For >100 To 250, Deduct</i>	-19.82	
	<i>For >250 To 500, Deduct</i>	-35.18	
	<i>For >500, Deduct</i>	-50.54	
26 52 13 16-0021	Self-Luminous Tritium Exit Signs <small>(26 52 13 16)</small>		
	Note: Includes red or green tritium filled pyrex glass light tubes with phosphor coating.		
26 52 13 16-0022	EA 10 Year, Single Face, Acrylonitrile Butadiene Styrene (ABS) Housing, Self-Luminous Tritium Exit Sign (Isolite SLX-60-S-10-R).....	583.84	44.70
	<i>For >50 To 100, Deduct</i>	-16.83	
	<i>For >100 To 250, Deduct</i>	-31.43	
	<i>For >250 To 500, Deduct</i>	-58.38	
	<i>For >500, Deduct</i>	-85.34	
26 52 13 16-0023	EA 10 Year, Double Face, Acrylonitrile Butadiene Styrene (ABS) Housing, Self-Luminous Tritium Exit Sign (Isolite SLX-60-D-10-R).....	1,077.76	44.70
	<i>For >50 To 100, Deduct</i>	-29.18	
	<i>For >100 To 250, Deduct</i>	-56.12	
	<i>For >250 To 500, Deduct</i>	-107.78	
	<i>For >500, Deduct</i>	-159.43	
26 52 13 16-0024	EA 20 Year, Single Face, Acrylonitrile Butadiene Styrene (ABS) Housing, Self-Luminous Tritium Exit Sign (Isolite SLX-60-S-20-R).....	696.35	44.70
	<i>For >50 To 100, Deduct</i>	-19.64	
	<i>For >100 To 250, Deduct</i>	-37.05	
	<i>For >250 To 500, Deduct</i>	-69.64	
	<i>For >500, Deduct</i>	-102.22	
26 52 13 16-0025	EA 20 Year, Double Face, Acrylonitrile Butadiene Styrene (ABS) Housing, Self-Luminous Tritium Exit Sign (Isolite SLX-60-D-20-R).....	1,168.09	44.70
	<i>For >50 To 100, Deduct</i>	-31.44	
	<i>For >100 To 250, Deduct</i>	-60.64	
	<i>For >250 To 500, Deduct</i>	-116.81	
	<i>For >500, Deduct</i>	-172.98	
26 52 13 16-0026	EA 10 Year, Single Face, Aluminum Housing, Self-Luminous Tritium Exit Sign (Isolite 2040-01-10-R).....	639.83	44.70
	<i>For >50 To 100, Deduct</i>	-18.23	
	<i>For >100 To 250, Deduct</i>	-34.23	
	<i>For >250 To 500, Deduct</i>	-63.98	
	<i>For >500, Deduct</i>	-93.74	
26 52 13 16-0027	EA 10 Year, Double Face, Aluminum Housing, Self-Luminous Tritium Exit Sign (Isolite 2040-07-10-R)	1,168.09	44.70
	<i>For >50 To 100, Deduct</i>	-31.44	
	<i>For >100 To 250, Deduct</i>	-60.64	
	<i>For >250 To 500, Deduct</i>	-116.81	
	<i>For >500, Deduct</i>	-172.98	
26 52 13 16-0028	EA 20 Year, Single Face, Aluminum Housing, Self-Luminous Tritium Exit Sign (Isolite 2040-01-20-R).....	786.16	44.70
	<i>For >50 To 100, Deduct</i>	-21.89	
	<i>For >100 To 250, Deduct</i>	-41.54	
	<i>For >250 To 500, Deduct</i>	-78.62	
	<i>For >500, Deduct</i>	-115.69	
26 52 13 16-0029	EA 20 Year, Double Face, Aluminum Housing, Self-Luminous Tritium Exit Sign (Isolite 2040-07-20-R)	1,451.23	44.70
	<i>For >50 To 100, Deduct</i>	-38.52	
	<i>For >100 To 250, Deduct</i>	-74.80	
	<i>For >250 To 500, Deduct</i>	-145.12	
	<i>For >500, Deduct</i>	-215.45	



Electrical	26	26
Lighting	26 50	
Safety Lighting	26 52	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 52 13 16-0030	Vandal-Resistant LED Exit Signs <small>(26 52 13 16)</small>		
	Note: Includes red LED lamps.		
26 52 13 16-0031	EA Single Face, Aluminum Housing, Vandal-Resistant/Wet Location, LED Exit Sign (Lithonia LV-S-W-1-R-120/277)	550.56	44.70
	For >50 To 100, Deduct	-16.00	
	For >100 To 250, Deduct	-29.76	
	For >250 To 500, Deduct	-55.06	
	For >500, Deduct	-80.35	
26 52 13 16-0032	EA Single Face, Aluminum Housing, Vandal-Resistant/Wet Location, LED Exit Sign With Battery Backup (Lithonia LV-S-W-1-R-120/277-EL-N)	856.42	44.70
	For >50 To 100, Deduct	-23.65	
	For >100 To 250, Deduct	-45.06	
	For >250 To 500, Deduct	-85.64	
	For >500, Deduct	-126.23	
26 52 13 16-0033	EA Single Face, Aluminum Housing, NEMA 4X, Vandal-Resistant/Wet Location, LED Exit Sign With Battery Backup (Lithonia LV-S-1-R-120/277-EL-N-UM-4X)	1,043.95	44.70
	For >50 To 100, Deduct	-28.33	
	For >100 To 250, Deduct	-54.43	
	For >250 To 500, Deduct	-104.40	
	For >500, Deduct	-154.36	
26 52 13 16-0034	Removal And Reinstallation Of Exit Light Fixture <small>(26 52 13 16)</small>		
26 52 13 16-0035	EA Removal And Reinstall Of Exit Light Fixtures	91.71	
	Note: Includes storage and cleaning.		
	For >50 To 100, Deduct	-4.59	
	For >100 To 250, Deduct	-6.88	
	For >250 To 500, Deduct	-9.17	
	For >500, Deduct	-11.46	
26 52 13 16-0036	Exit Sign Accessories <small>(26 52 13 16)</small>		
26 52 13 16-0037	EA Polycarbonate Vandal Shield For Exit Signs (Radiant-Lite BG-1).....	130.12	12.25
	For >50 To 100, Deduct	-3.87	
	For >100 To 250, Deduct	-7.12	
	For >250 To 500, Deduct	-13.01	
	For >500, Deduct	-18.91	
26 52 13 16-0038	EA Wire Guard For Exit Signs Or Emergency Lights (Best Lighting Products WG-1)	75.45	12.25
	For >50 To 100, Deduct	-2.50	
	For >100 To 250, Deduct	-4.38	
	For >250 To 500, Deduct	-7.55	
	For >500, Deduct	-10.71	
26 52 13 16-0039	EA Wire Guard For Combination Exit Sign And Emergency Light (Best Lighting Products WG-3)	121.51	9.80
	For >50 To 100, Deduct	-3.53	
	For >100 To 250, Deduct	-6.57	
	For >250 To 500, Deduct	-12.15	
	For >500, Deduct	-17.74	
26 52 13 16-0040	EA Removal And Replacement Of Battery For Exit Signs.....	129.81	
	Note: Battery: nickel cadmium, 1.2 volt, 1 Ah battery capacity		
	For >50 To 100, Deduct	-4.01	
	For >100 To 250, Deduct	-7.26	
	For >250 To 500, Deduct	-12.98	
	For >500, Deduct	-18.71	

26 54 Classified Location Lighting (26 50)

26 54 19 LED Classified Location Lighting (26 54)

26 54 19 00-0001	Class I Division 2, Hazardous Location, LED Fixtures <small>(26 54 19)</small>		
26 54 19 00-0002	Class I Division 2, Hazardous Location, NEMA 4X, LED Floodlight (Cooper Champ® FMV) <small>(26 54 19 00-0001)</small>		
	Note: Includes 5,600K CRI LED arrays, shatter resistant glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		
26 54 19 00-0003	EA 5,183 Lumens, 45 Watt, Yoke Mount, Class I Division 2, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® FMV5L).....	2,473.09	100.54
	For Bolt-On Visor, Add	94.27	
	For Bolt-On Wire Guard, Add	193.89	
	For 480 Volt, Add	166.01	
	For Warm White Color Rendering, Add	70.48	
	For >50 To 100, Deduct	-66.02	
	For >100 To 250, Deduct	-127.84	
	For >250 To 500, Deduct	-247.31	
	For >500, Deduct	-366.77	
26 54 19 00-0004	EA 7,095 Lumens, 62 Watt, Yoke Mount, Class I Division 2, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® FMV7L).....	3,027.29	107.25
	For Bolt-On Visor, Add	94.27	
	For Bolt-On Wire Guard, Add	193.89	
	For 480 Volt, Add	166.01	
	For Warm White Color Rendering, Add	70.48	
	For >50 To 100, Deduct	-80.15	
	For >100 To 250, Deduct	-155.83	
	For >250 To 500, Deduct	-302.73	
	For >500, Deduct	-449.62	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 54 19 00-0005	EA	9,132 Lumens, 79 Watt, Yoke Mount, Class I Division 2, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® FMV9L).....	3,418.61	113.95
		<i>For Bolt-On Visor, Add</i>	94.27	
		<i>For Bolt-On Wire Guard, Add</i>	193.89	
		<i>For 480 Volt, Add</i>	166.01	
		<i>For Warm White Color Rendering, Add</i>	70.48	
		<i>For >50 To 100, Deduct</i>	-90.21	
		<i>For >100 To 250, Deduct</i>	-175.68	
		<i>For >250 To 500, Deduct</i>	-341.86	
		<i>For >500, Deduct</i>	-508.04	
26 54 19 00-0006	EA	11,107 Lumens, 99 Watt, Yoke Mount, Class I Division 2, NEMA 4X, 7 x 6 Optic, Glass Lens, LED Floodlight (Cooper Champ® FMV11L).....	3,820.77	120.65
		<i>For Bolt-On Visor, Add</i>	94.27	
		<i>For Bolt-On Wire Guard, Add</i>	193.89	
		<i>For 480 Volt, Add</i>	166.01	
		<i>For Warm White Color Rendering, Add</i>	70.48	
		<i>For >50 To 100, Deduct</i>	-100.55	
		<i>For >100 To 250, Deduct</i>	-196.07	
		<i>For >250 To 500, Deduct</i>	-382.08	
		<i>For >500, Deduct</i>	-568.09	
26 54 19 00-0007		Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Vaporgard™ V2LC) (26 54 19 00-0007) Note: Includes 5,600K CRI LED arrays, heat resistant glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		
26 54 19 00-0008	EA	1,600 Lumens, 25 Watt, Pendant Mount, Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Vaporgard™ V2LC).....	1,465.55	93.85
		<i>For 12/24 Volt DC Driver, Add</i>	26.79	
		<i>For Frosted Lens, Add</i>	54.75	
		<i>For Warm White Color Temperature LEDs, Add</i>	70.48	
		<i>For 55 Degree Ambient Suitability (AC Only) Option, Add</i>	36.48	
		<i>For Stanchion Mount, Add</i>	225.86	
		<i>For Ceiling Mount, Add</i>	90.57	
		<i>For Wall Mount, Add</i>	132.21	
		<i>For Teflon Coated Lens, Add</i>	116.21	
		<i>For Wall Mount With Junction Box, Add</i>	193.04	
		<i>For >50 To 100, Deduct</i>	-40.55	
		<i>For >100 To 250, Deduct</i>	-77.19	
		<i>For >250 To 500, Deduct</i>	-146.56	
		<i>For >500, Deduct</i>	-215.92	
26 54 19 00-0009		Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Champ® VMV) (26 54 19 00-0009) Note: Includes 5,600K CRI LED arrays, heat and impact resistant glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		
26 54 19 00-0010	EA	3,240 Lumens, 47 Watt, Pendant Mount, Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Champ® VMV3L).....	2,324.44	93.85
		<i>For Ceiling Mount, Add</i>	17.33	
		<i>For Quick Clip Mounting Option, Add</i>	25.46	
		<i>For Frosted Lens, Add</i>	54.75	
		<i>For Warm White Color Rendering, Add</i>	70.48	
		<i>For Polycarbonate Lens, Add</i>	101.48	
		<i>For 480 Volt, Add</i>	166.01	
		<i>For >50 To 100, Deduct</i>	-62.02	
		<i>For >100 To 250, Deduct</i>	-120.13	
		<i>For >250 To 500, Deduct</i>	-232.44	
		<i>For >500, Deduct</i>	-344.76	
26 54 19 00-0011	EA	3,778 Lumens, 63 Watt, Pendant Mount, Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Champ® VMV5L).....	2,574.15	100.54
		<i>For Ceiling Mount, Add</i>	17.33	
		<i>For Quick Clip Mounting Option, Add</i>	25.46	
		<i>For Frosted Lens, Add</i>	54.75	
		<i>For Warm White Color Rendering, Add</i>	70.48	
		<i>For Polycarbonate Lens, Add</i>	101.48	
		<i>For 480 Volt, Add</i>	166.01	
		<i>For >50 To 100, Deduct</i>	-68.54	
		<i>For >100 To 250, Deduct</i>	-132.90	
		<i>For >250 To 500, Deduct</i>	-257.42	
		<i>For >500, Deduct</i>	-381.93	
26 54 19 00-0012	EA	6,340 Lumens, 98 Watt, Pendant Mount, Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Champ® VMV7L).....	2,883.73	107.25
		<i>For Ceiling Mount, Add</i>	17.33	
		<i>For Quick Clip Mounting Option, Add</i>	25.46	
		<i>For Frosted Lens, Add</i>	54.75	
		<i>For Warm White Color Rendering, Add</i>	70.48	
		<i>For Polycarbonate Lens, Add</i>	101.48	
		<i>For 480 Volt, Add</i>	166.01	
		<i>For >50 To 100, Deduct</i>	-76.56	
		<i>For >100 To 250, Deduct</i>	-148.66	
		<i>For >250 To 500, Deduct</i>	-288.37	
		<i>For >500, Deduct</i>	-428.09	



Electrical	26	26
Lighting	26 50	
Classified Location Lighting	26 54	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
26 54 19 00-0013 EA 6,340 Lumens, 98 Watt, Pendant Mount, Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Champ® VMV9L).....	3,754.74	113.95
For Ceiling Mount, Add	17.33	
For Quick Clip Mounting Option, Add	25.46	
For Frosted Lens, Add	54.75	
For Warm White Color Rendering, Add	70.48	
For Polycarbonate Lens, Add	101.48	
For 480 Volt, Add	166.01	
For >50 To 100, Deduct	-98.62	
For >100 To 250, Deduct	-192.49	
For >250 To 500, Deduct	-375.47	
For >500, Deduct	-558.46	
26 54 19 00-0014 EA 9,720 Lumens, 137 Watt, Pendant Mount, Class I Division 2, Hazardous Location, NEMA 4X, LED Fixture (Cooper Champ® VMV11L).....	4,306.93	120.65
For Ceiling Mount, Add	17.33	
For Quick Clip Mounting Option, Add	25.46	
For Frosted Lens, Add	54.75	
For Warm White Color Rendering, Add	70.48	
For Polycarbonate Lens, Add	101.48	
For 480 Volt, Add	166.01	
For >50 To 100, Deduct	-112.70	
For >100 To 250, Deduct	-220.37	
For >250 To 500, Deduct	-430.69	
For >500, Deduct	-641.01	
26 54 19 00-0015 Class I Division 1, Explosion Proof, LED Fixtures (26 54 19)		
26 54 19 00-0016 Class I Division 1, Explosion Proof, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Hazard Gard® EVLL) (26 54 19 00-0015)		
Note: Includes 5,600K CRI LED arrays, shatter resistant and explosion proof glass lens, silicone gaskets, stainless steel external hardware and powder coated aluminum housing.		
26 54 19 00-0017 EA 5,625 Lumens, 80 Watt, Pendant Mount, Class I Division 1, Explosion Proof, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Hazard Gard® EVLL5L).....	3,742.97	100.54
For Wall Mount, Deduct	-14.26	
For Warm Color Temperature LEDs, Add	76.86	
For Stainless Steel Guard, Add	137.97	
For Ceiling Mount, Add	166.44	
For Stanchion Mount, Add	193.71	
For Yoke Mount, Add	484.27	
For >50 To 100, Deduct	-97.76	
For >100 To 250, Deduct	-191.34	
For >250 To 500, Deduct	-374.30	
For >500, Deduct	-557.26	
26 54 19 00-0018 EA 6,750 Lumens, 100 Watt, Pendant Mount, Class I Division 1, Explosion Proof, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Hazard Gard® EVLL7L).....	4,549.79	107.25
For Wall Mount, Deduct	-14.26	
For Warm Color Temperature LEDs, Add	76.86	
For Stainless Steel Guard, Add	137.97	
For Ceiling Mount, Add	166.44	
For Stanchion Mount, Add	193.71	
For Yoke Mount, Add	484.27	
For >50 To 100, Deduct	-118.21	
For >100 To 250, Deduct	-231.96	
For >250 To 500, Deduct	-454.98	
For >500, Deduct	-678.00	
26 54 19 00-0019 EA 9,000 Lumens, 130 Watt, Pendant Mount, Class I Division 1, Explosion Proof, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Hazard Gard® EVLL9L).....	5,284.37	113.95
For Wall Mount, Deduct	-14.26	
For Warm Color Temperature LEDs, Add	76.86	
For Stainless Steel Guard, Add	137.97	
For Ceiling Mount, Add	166.44	
For Stanchion Mount, Add	193.71	
For Yoke Mount, Add	484.27	
For >50 To 100, Deduct	-136.86	
For >100 To 250, Deduct	-268.97	
For >250 To 500, Deduct	-528.44	
For >500, Deduct	-787.91	
26 54 19 00-0020 EA 10,500 Lumens, 151 Watt, Pendant Mount, Class I Division 1, Explosion Proof, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Hazard Gard® EVLL11L).....	6,032.44	120.65
For Wall Mount, Deduct	-14.26	
For Warm Color Temperature LEDs, Add	76.86	
For Stainless Steel Guard, Add	137.97	
For Ceiling Mount, Add	166.44	
For Stanchion Mount, Add	193.71	
For Yoke Mount, Add	484.27	
For >50 To 100, Deduct	-155.84	
For >100 To 250, Deduct	-306.65	
For >250 To 500, Deduct	-603.24	
For >500, Deduct	-899.84	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 54 19 00-0021	EA	13,500 Lumens, 175 Watt, Pendant Mount, Class I Division 1, Explosion Proof, NEMA 4X, High Bay/Low Bay, LED Fixture (Cooper Hazard Gard® EVLL13L).....	6,988.78	116.18
		<i>For Wall Mount, Deduct</i>	-14.26	
		<i>For Warm Color Temperature LEDs, Add</i>	76.86	
		<i>For Stainless Steel Guard, Add</i>	137.97	
		<i>For Ceiling Mount, Add</i>	166.44	
		<i>For Stanchion Mount, Add</i>	193.71	
		<i>For Yoke Mount, Add</i>	484.27	
		<i>For >50 To 100, Deduct</i>	-180.03	
		<i>For >100 To 250, Deduct</i>	-354.75	
		<i>For >250 To 500, Deduct</i>	-698.88	
		<i>For >500, Deduct</i>	-1,043.01	

26 55 Special Purpose Lighting (26 50)

26 55 13 Landscape Lighting (26 55)

26 55 13 00-0001		Bollards <small>(26 55 13)</small> Note: Excludes concrete base.		
26 55 13 00-0002		Aluminum Architectural Bollards <small>(26 55 13 00-0001)</small>		
26 55 13 00-0003		High Pressure Sodium, Aluminum Architectural Bollards <small>(26 55 13 00-0002)</small>		
26 55 13 00-0004		Square, High Pressure Sodium, Aluminum Architectural Bollards <small>(26 55 13 00-0003)</small>		
26 55 13 00-0005	EA	24" Overall Height, 6-3/4" Square, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,587.21	103.94
26 55 13 00-0006	EA	30" Overall Height, 6-3/4" Square, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,599.43	110.05
26 55 13 00-0007	EA	36" Overall Height, 6-3/4" Square, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,611.66	116.16
26 55 13 00-0008	EA	42" Overall Height, 6-3/4" Square, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,490.69	122.28
26 55 13 00-0009	EA	24" Overall Height, 6-3/4" Square, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,587.21	103.94
26 55 13 00-0010	EA	30" Overall Height, 6-3/4" Square, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,599.43	110.05
26 55 13 00-0011	EA	36" Overall Height, 6-3/4" Square, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,611.66	116.16
26 55 13 00-0012	EA	42" Overall Height, 6-3/4" Square, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,490.69	122.28
26 55 13 00-0013	EA	24" Overall Height, 6-3/4" Square, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,587.21	103.94
26 55 13 00-0014	EA	30" Overall Height, 6-3/4" Square, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,599.43	110.05
26 55 13 00-0015	EA	36" Overall Height, 6-3/4" Square, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,611.66	116.16
26 55 13 00-0016	EA	42" Overall Height, 6-3/4" Square, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,490.69	122.28
26 55 13 00-0017	EA	24" Overall Height, 6-3/4" Square, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,587.21	103.94
26 55 13 00-0018	EA	30" Overall Height, 6-3/4" Square, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,599.43	110.05
26 55 13 00-0019	EA	36" Overall Height, 6-3/4" Square, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,611.66	116.16
26 55 13 00-0020	EA	42" Overall Height, 6-3/4" Square, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,490.69	122.28
26 55 13 00-0021		Round, High Pressure Sodium, Aluminum Architectural Bollards <small>(26 55 13 00-0003)</small>		
26 55 13 00-0022	EA	24" Overall Height, 7" Diameter, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,526.04	103.94
26 55 13 00-0023	EA	30" Overall Height, 7" Diameter, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,538.26	110.05
26 55 13 00-0024	EA	36" Overall Height, 7" Diameter, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,550.49	116.16
26 55 13 00-0025	EA	42" Overall Height, 7" Diameter, 35 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,428.97	122.28
26 55 13 00-0026	EA	24" Overall Height, 7" Diameter, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,526.04	103.94
26 55 13 00-0027	EA	30" Overall Height, 7" Diameter, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,538.26	110.05
26 55 13 00-0028	EA	36" Overall Height, 7" Diameter, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,550.49	116.16
26 55 13 00-0029	EA	42" Overall Height, 7" Diameter, 50 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,428.97	122.28
26 55 13 00-0030	EA	24" Overall Height, 7" Diameter, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,526.04	103.94
26 55 13 00-0031	EA	30" Overall Height, 7" Diameter, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,538.26	110.05
26 55 13 00-0032	EA	36" Overall Height, 7" Diameter, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,550.49	116.16
26 55 13 00-0033	EA	42" Overall Height, 7" Diameter, 70 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,428.97	122.28
26 55 13 00-0034	EA	24" Overall Height, 7" Diameter, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,526.04	103.94
26 55 13 00-0035	EA	30" Overall Height, 7" Diameter, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,538.26	110.05
26 55 13 00-0036	EA	36" Overall Height, 7" Diameter, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,550.49	116.16
26 55 13 00-0037	EA	42" Overall Height, 7" Diameter, 100 Watt High Pressure Sodium, Aluminum Architectural Bollard	1,428.97	122.28
26 55 13 00-0038		Metal Halide, Aluminum Architectural Bollards <small>(26 55 13 00-0002)</small>		
26 55 13 00-0039		Square, Metal Halide, Aluminum Architectural Bollards <small>(26 55 13 00-0038)</small>		
26 55 13 00-0040	EA	24" Overall Height, 6-3/4" Square, 50 Watt Metal Halide, Aluminum Architectural Bollard	1,666.62	103.94
26 55 13 00-0041	EA	30" Overall Height, 6-3/4" Square, 50 Watt Metal Halide, Aluminum Architectural Bollard	1,678.84	110.05
26 55 13 00-0042	EA	36" Overall Height, 6-3/4" Square, 50 Watt Metal Halide, Aluminum Architectural Bollard	1,691.07	116.16
26 55 13 00-0043	EA	42" Overall Height, 6-3/4" Square, 50 Watt Metal Halide, Aluminum Architectural Bollard	1,569.55	122.28
26 55 13 00-0044	EA	24" Overall Height, 6-3/4" Square, 70 Watt Metal Halide, Aluminum Architectural Bollard	1,666.62	103.94
26 55 13 00-0045	EA	30" Overall Height, 6-3/4" Square, 70 Watt Metal Halide, Aluminum Architectural Bollard	1,678.84	110.05
26 55 13 00-0046	EA	36" Overall Height, 6-3/4" Square, 70 Watt Metal Halide, Aluminum Architectural Bollard	1,691.07	116.16
26 55 13 00-0047	EA	42" Overall Height, 6-3/4" Square, 70 Watt Metal Halide, Aluminum Architectural Bollard	1,569.55	122.28
26 55 13 00-0048	EA	24" Overall Height, 6-3/4" Square, 100 Watt Metal Halide, Aluminum Architectural Bollard	1,666.62	103.94
26 55 13 00-0049	EA	30" Overall Height, 6-3/4" Square, 100 Watt Metal Halide, Aluminum Architectural Bollard	1,678.84	110.05
26 55 13 00-0050	EA	36" Overall Height, 6-3/4" Square, 100 Watt Metal Halide, Aluminum Architectural Bollard	1,691.07	116.16
26 55 13 00-0051	EA	42" Overall Height, 6-3/4" Square, 100 Watt Metal Halide, Aluminum Architectural Bollard	1,636.01	122.28
26 55 13 00-0052		Round, Metal Halide, Aluminum Architectural Bollards <small>(26 55 13 00-0038)</small>		
26 55 13 00-0053	EA	24" Overall Height, 7" Diameter, 50 Watt Metal Halide, Aluminum Architectural Bollard	1,604.90	103.94
26 55 13 00-0054	EA	30" Overall Height, 7" Diameter, 50 Watt Metal Halide, Aluminum Architectural Bollard	1,617.12	110.05



Electrical	26	26
Lighting	26 50	
Special Purpose Lighting	26 55	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 55 13 00-0055	EA 36" Overall Height, 7" Diameter, 50 Watt Metal Halide, Aluminum Architectural Bollard.....	1,629.35	116.16
26 55 13 00-0056	EA 42" Overall Height, 7" Diameter, 50 Watt Metal Halide, Aluminum Architectural Bollard.....	1,507.83	122.28
26 55 13 00-0057	EA 24" Overall Height, 7" Diameter, 70 Watt Metal Halide, Aluminum Architectural Bollard.....	1,604.90	103.94
26 55 13 00-0058	EA 30" Overall Height, 7" Diameter, 70 Watt Metal Halide, Aluminum Architectural Bollard.....	1,617.12	110.05
26 55 13 00-0059	EA 36" Overall Height, 7" Diameter, 70 Watt Metal Halide, Aluminum Architectural Bollard.....	1,629.35	116.16
26 55 13 00-0060	EA 42" Overall Height, 7" Diameter, 70 Watt Metal Halide, Aluminum Architectural Bollard.....	1,507.83	122.28
26 55 13 00-0061	EA 24" Overall Height, 7" Diameter, 100 Watt Metal Halide, Aluminum Architectural Bollard.....	1,604.90	103.94
26 55 13 00-0062	EA 30" Overall Height, 7" Diameter, 100 Watt Metal Halide, Aluminum Architectural Bollard.....	1,617.12	110.05
26 55 13 00-0063	EA 36" Overall Height, 7" Diameter, 100 Watt Metal Halide, Aluminum Architectural Bollard.....	1,629.35	116.16
26 55 13 00-0064	EA 42" Overall Height, 7" Diameter, 100 Watt Metal Halide, Aluminum Architectural Bollard.....	1,507.83	122.28
26 55 13 00-0065	Compact Fluorescent, Aluminum Architectural Bollards (26 55 13 00-0002)		
26 55 13 00-0066	Square, Compact Fluorescent, Aluminum Architectural Bollards (26 55 13 00-0065)		
26 55 13 00-0067	EA 24" Overall Height, 6-3/4" Square, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,580.24	103.94
26 55 13 00-0068	EA 30" Overall Height, 6-3/4" Square, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,592.46	110.05
26 55 13 00-0069	EA 36" Overall Height, 6-3/4" Square, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,604.69	116.16
26 55 13 00-0070	EA 42" Overall Height, 6-3/4" Square, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,484.98	122.28
26 55 13 00-0071	EA 24" Overall Height, 6-3/4" Square, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,580.24	103.94
26 55 13 00-0072	EA 30" Overall Height, 6-3/4" Square, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,592.46	110.05
26 55 13 00-0073	EA 36" Overall Height, 6-3/4" Square, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,604.69	116.16
26 55 13 00-0074	EA 42" Overall Height, 6-3/4" Square, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,484.98	122.28
26 55 13 00-0075	EA 24" Overall Height, 6-3/4" Square, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,580.24	103.94
26 55 13 00-0076	EA 30" Overall Height, 6-3/4" Square, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,592.46	110.05
26 55 13 00-0077	EA 36" Overall Height, 6-3/4" Square, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,604.69	116.16
26 55 13 00-0078	EA 42" Overall Height, 6-3/4" Square, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,484.98	122.28
26 55 13 00-0079	Round, Compact Fluorescent, Aluminum Architectural Bollards (26 55 13 00-0065)		
26 55 13 00-0080	EA 24" Overall Height, 7" Diameter, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,519.87	103.94
26 55 13 00-0081	EA 30" Overall Height, 7" Diameter, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,532.09	110.05
26 55 13 00-0082	EA 36" Overall Height, 7" Diameter, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,544.32	116.16
26 55 13 00-0083	EA 42" Overall Height, 7" Diameter, 26 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,425.77	122.28
26 55 13 00-0084	EA 24" Overall Height, 7" Diameter, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,519.87	103.94
26 55 13 00-0085	EA 30" Overall Height, 7" Diameter, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,532.09	110.05
26 55 13 00-0086	EA 36" Overall Height, 7" Diameter, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,544.32	116.16
26 55 13 00-0087	EA 42" Overall Height, 7" Diameter, 32 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,425.77	122.28
26 55 13 00-0088	EA 24" Overall Height, 7" Diameter, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,519.87	103.94
26 55 13 00-0089	EA 30" Overall Height, 7" Diameter, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,532.09	110.05
26 55 13 00-0090	EA 36" Overall Height, 7" Diameter, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,544.32	116.16
26 55 13 00-0091	EA 42" Overall Height, 7" Diameter, 42 Watt Compact Fluorescent, Aluminum Architectural Bollard.....	1,425.77	122.28
26 55 13 00-0092	LED, Aluminum Architectural Bollards (26 55 13 00-0002)		
26 55 13 00-0093	Square, LED, Aluminum Architectural Bollards (26 55 13 00-0092)		
26 55 13 00-0094	EA 24" Overall Height, 6-3/4" Square, 12 LEDs, Aluminum Architectural Bollard.....	1,893.72	103.94
26 55 13 00-0095	EA 30" Overall Height, 6-3/4" Square, 12 LEDs, Aluminum Architectural Bollard.....	1,905.94	110.05
26 55 13 00-0096	EA 36" Overall Height, 6-3/4" Square, 12 LEDs, Aluminum Architectural Bollard.....	1,918.17	116.16
26 55 13 00-0097	EA 42" Overall Height, 6-3/4" Square, 12 LEDs, Aluminum Architectural Bollard.....	1,800.13	122.28
26 55 13 00-0098	EA 24" Overall Height, 6-3/4" Square, 24 LEDs, Aluminum Architectural Bollard.....	2,314.02	103.94
26 55 13 00-0099	EA 30" Overall Height, 6-3/4" Square, 24 LEDs, Aluminum Architectural Bollard.....	2,326.24	110.05
26 55 13 00-0100	EA 36" Overall Height, 6-3/4" Square, 24 LEDs, Aluminum Architectural Bollard.....	2,338.47	116.16
26 55 13 00-0101	EA 42" Overall Height, 6-3/4" Square, 24 LEDs, Aluminum Architectural Bollard.....	2,218.34	122.28
26 55 13 00-0102	Round, LED, Aluminum Architectural Bollards (26 55 13 00-0092)		
26 55 13 00-0103	EA 24" Overall Height, 7" Diameter, 12 LEDs, Aluminum Architectural Bollard.....	1,831.03	103.94
26 55 13 00-0104	EA 30" Overall Height, 7" Diameter, 12 LEDs, Aluminum Architectural Bollard.....	1,843.25	110.05
26 55 13 00-0105	EA 36" Overall Height, 7" Diameter, 12 LEDs, Aluminum Architectural Bollard.....	1,855.48	116.16
26 55 13 00-0106	EA 42" Overall Height, 7" Diameter, 12 LEDs, Aluminum Architectural Bollard.....	1,735.35	122.28
26 55 13 00-0107	EA 24" Overall Height, 7" Diameter, 24 LEDs, Aluminum Architectural Bollard.....	2,251.33	103.94
26 55 13 00-0108	EA 30" Overall Height, 7" Diameter, 24 LEDs, Aluminum Architectural Bollard.....	2,263.55	110.05
26 55 13 00-0109	EA 36" Overall Height, 7" Diameter, 24 LEDs, Aluminum Architectural Bollard.....	2,275.78	116.16
26 55 13 00-0110	EA 42" Overall Height, 7" Diameter, 24 LEDs, Aluminum Architectural Bollard.....	2,156.39	122.28
26 55 13 00-0111	Reinforced Concrete Bollards (26 55 13 00-0001)		
26 55 13 00-0112	EA 48" Overall Height, 12" Diameter, LED Light, Reinforced Concrete Bollard.....	1,557.70	305.70
26 55 13 00-0113	EA 58" Overall Height, 18" Diameter, High Intensity Discharge (HID) Light, Reinforced Concrete Bollard.....	2,745.88	407.55
26 55 13 00-0114	Low Voltage (26 55 13)		
26 55 13 00-0115	EA Low Voltage Recessed Uplight.....	749.88	222.55
26 55 13 00-0116	EA Low Voltage Walkway.....	519.35	122.28
26 55 13 00-0117	EA Low Voltage Malibu - 5 Light Set.....	526.35	163.25
26 55 13 00-0118	EA Low Voltage Mushroom 24" Pier.....	449.40	122.28

26	Electrical
26 50	Lighting
26 55	Special Purpose Lighting

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 55 13 00-0119	Recessed, Adjustable <small>(26 55 13)</small>		
26 55 13 00-0120	EA 150 Watt Incandescent Recessed, Adjustable.....	855.92	195.65
26 55 13 00-0121	EA 300 Watt Incandescent Recessed, Adjustable.....	930.86	195.65
26 55 13 00-0122	Recessed, Uplight <small>(26 55 13)</small>		
26 55 13 00-0123	EA 50 Watt Incandescent Recessed Uplight.....	770.98	195.65
26 55 13 00-0124	EA 150 Watt Incandescent Recessed Uplight.....	785.97	195.65
26 55 13 00-0125	EA 300 Watt Incandescent Recessed Uplight.....	830.94	195.65
26 55 13 00-0126	EA 500 Watt Quartz Recessed Uplight.....	825.94	195.65
26 55 13 00-0127	EA 5 Watt, LED Recessed Uplight.....	1,158.53	195.65
26 55 13 00-0128	EA 15 Watt, LED Recessed Uplight.....	1,275.63	195.65
26 55 13 00-0129	Recessed Wall Light <small>(26 55 13)</small>		
26 55 13 00-0130	EA 100 Watt Incandescent Recessed Wall Light.....	404.44	122.28
26 55 13 00-0131	EA 100 Watt Fluorescent Recessed Wall Light.....	389.45	122.28
26 55 13 00-0132	EA 100 Watt High Intensity Discharge (HID) Recessed Wall Light.....	621.28	163.25
26 55 13 00-0133	Step Lights <small>(26 55 13)</small>		
26 55 13 00-0134	EA Incandescent Step Light.....	330.49	97.82
26 55 13 00-0135	EA Fluorescent Step Light.....	380.51	97.82
26 55 13 00-0136	EA 5 Watt, LED Step Light.....	636.71	97.82
26 55 13 00-0137	EA 15 Watt, LED Step Light.....	761.62	97.82
26 55 13 00-0138	Tree Lights, Surface Adjustable <small>(26 55 13)</small>		
26 55 13 00-0139	EA 50 Watt Incandescent Tree Lights.....	686.23	163.25
26 55 13 00-0140	EA 100 Watt Incandescent Tree Lights.....	701.22	163.25
26 55 13 00-0141	EA 150 Watt Incandescent Tree Lights.....	888.82	244.56
26 55 16	Walkway Lighting <small>(26 55)</small>		
26 55 16 00-0001	Incandescent Walkway <small>(26 55 16)</small>		
26 55 16 00-0002	EA Post Top 300 Watt Incandescent Walkway Fixture.....	404.45	113.72
26 55 16 00-0003	Metal Halide Walkway <small>(26 55 16)</small>		
26 55 16 00-0004	EA Post Top 100 Watt Metal Halide Walkway Fixture.....	622.49	178.77
26 55 16 00-0005	EA Post Top 150-175 Watt Metal Halide Walkway Fixture.....	658.54	185.26
26 55 16 00-0006	EA Post Top 250 Watt Metal Halide Walkway Fixture.....	708.90	192.34
26 55 16 00-0007	EA Post Top 400 Watt Metal Halide Walkway Fixture.....	759.50	207.88
26 55 16 00-0008	EA Round Luminaries 100 Watt Metal Halide Walkway Fixture.....	678.01	192.34
26 55 16 00-0009	EA Round Luminaries 150-175 Watt Metal Halide Walkway Fixture.....	681.92	178.77
26 55 16 00-0010	EA Round Luminaries 250 Watt Metal Halide Walkway Fixture.....	695.63	185.26
26 55 16 00-0011	EA Spherical 100 Watt Metal Halide Walkway Fixture.....	548.24	127.42
26 55 16 00-0012	EA Spherical 150-175 Watt Metal Halide Walkway Fixture.....	579.13	127.42
26 55 16 00-0013	EA Spherical 250 Watt Metal Halide Walkway Fixture.....	610.03	127.42
26 55 16 00-0014	EA Spherical 400 Watt Metal Halide Walkway Fixture.....	688.66	143.43
26 55 16 00-0015	EA Low Walkway 100 Watt Metal Halide Walkway Fixture.....	522.48	114.45
26 55 16 00-0016	High Pressure Sodium Walkway <small>(26 55 16)</small>		
26 55 16 00-0017	EA Post Top 100 Watt High Pressure Sodium Walkway Fixture.....	564.53	178.77
26 55 16 00-0018	EA Post Top 150-175 Watt High Pressure Sodium Walkway Fixture.....	595.54	185.26
26 55 16 00-0019	EA Post Top 250 Watt High Pressure Sodium Walkway Fixture.....	637.94	192.34
26 55 16 00-0020	EA Post Top 400 Watt High Pressure Sodium Walkway Fixture.....	684.34	207.88
26 55 16 00-0021	EA Round Luminaries 100 Watt High Pressure Sodium Walkway Fixture.....	613.81	192.34
26 55 16 00-0022	EA Round Luminaries 150-175 Watt High Pressure Sodium Walkway Fixture.....	610.96	178.77
26 55 16 00-0023	EA Round Luminaries 250 Watt High Pressure Sodium Walkway Fixture.....	624.52	185.26
26 55 16 00-0024	EA Spherical 100 Watt High Pressure Sodium Walkway Fixture.....	484.04	127.42
26 55 16 00-0025	EA Spherical 175 150-Watt High Pressure Sodium Walkway Fixture.....	508.18	127.42
26 55 16 00-0026	EA Spherical 250 Watt High Pressure Sodium Walkway Fixture.....	532.31	127.42
26 55 16 00-0027	EA Spherical 400 Watt High Pressure Sodium Walkway Fixture.....	600.80	143.43
26 55 16 00-0028	EA Low Walkway 100 Watt High Pressure Sodium Walkway Fixture.....	463.14	114.45
26 55 16 00-0029	Walkway, Adjustable <small>(26 55 16)</small>		
26 55 16 00-0030	EA 2' Fluorescent Adjustable Walkway Fixture.....	585.62	163.25
26 55 16 00-0031	EA 4' Fluorescent Adjustable Walkway Fixture.....	600.86	163.25
26 55 16 00-0032	EA 8' Fluorescent Adjustable Walkway Fixture.....	1,027.68	244.56
26 55 16 00-0033	EA 50 Watt Incandescent Adjustable Walkway Fixture.....	488.44	122.28
26 55 16 00-0034	EA 150 Watt Incandescent Adjustable Walkway Fixture.....	508.76	122.28
26 55 16 00-0035	Wall Or Post Mounted, Outdoor Area Lighting (Prisma Lighting) <small>(26 55 16)</small>		
	Note: Excludes posts.		



Electrical	26	26
Lighting	26 50	
Special Purpose Lighting	26 55	

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 55 16 00-0036	EA	42 Watt Compact Fluorescent, Wet Location, Aluminum Construction, Wall Luminaire (Prisma Nikko +45/G).....	987.66		42.86
26 55 16 00-0037		LED Walkway <small>(26 55 16)</small>			
26 55 16 00-0038		LED Pathway Fixtures (CREE® BetaLED® Edge® PWY-EDG) <small>(26 55 16 00-0037)</small>			
		Note: UL wet listed. Includes 5,700K color temperature, 120/277 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.			
26 55 16 00-0039	EA	13" Height, 1,248 Lumens, 22 Watt, LED Pathway Fixture (CREE® BetaLED® Edge® PWY-EDG)	999.44		93.85
		For Multi-Level Drive Currents, Add	267.03		
26 55 16 00-0040	EA	18" Height, 1,248 Lumens, 22 Watt, LED Pathway Fixture (CREE® BetaLED® Edge® PWY-EDG)	1,031.86		93.85
		For Multi-Level Drive Currents, Add	267.03		
26 55 16 00-0041	EA	36" Height, 1,248 Lumens, 22 Watt, LED Pathway Fixture (CREE® BetaLED® Edge® PWY-EDG)	1,089.08		93.85
		For Multi-Level Drive Currents, Add	267.03		
26 55 16 00-0042	EA	42" Height, 1,248 Lumens, 22 Watt, LED Pathway Fixture (CREE® BetaLED® Edge® PWY-EDG)	1,132.95		93.85
		For Multi-Level Drive Currents, Add	267.03		
26 55 16 00-0043	EA	96" Height, 1,248 Lumens, 22 Watt, LED Pathway Fixture (CREE® BetaLED® Edge® PWY-EDG)	1,301.62		120.65
		For Multi-Level Drive Currents, Add	267.03		
26 55 16 00-0044		Wall Mounted Walkway Lighting <small>(26 55 16 00-0037)</small>			
26 55 16 00-0045	EA	Wall Mounted Lantern With LED Kit, No. PDEX-Bracket (Herwig P-492).....	4,472.49		
		Note: Type Fixture 17 as Post			
26 55 16 00-0046		Pole Mounted Walkway Lighting <small>(26 55 16 00-0037)</small>			
26 55 16 00-0047	EA	43-1/2" Height x 19" Diameter, LED Post Lantern (Herwig AP-27).....	4,127.76		
26 55 16 00-0048	EA	12' Tapered and Fluted Post (Herwig BRA Series, BRAJ-12)	4,052.55		
		Note: Washers and nuts included			
26 55 29		Underwater Lighting <small>(26 55)</small>			
26 55 29 00-0001		Underwater Lights <small>(26 55 29)</small>			
26 55 29 00-0002	EA	150 Watt, 120 Volt Underwater Lights	547.35		81.32
26 55 29 00-0003	EA	300 Watt, 120 Volt Underwater Lights	607.30		81.32
26 55 29 00-0004	EA	1,000 Watt, 120 Volt Underwater Lights	1,468.63		122.28
26 55 29 00-0005	EA	50 Watt, 12 Volt Underwater Lights	572.33		81.32
26 55 29 00-0006	EA	300 Watt, 12 Volt Underwater Lights	642.28		81.32
26 55 29 00-0007	SET	Under Water Fountain Fixture, Set Of 6, 300 Watt, Incandescent.....	1,640.55		183.42
26 55 53		Security Lighting <small>(26 55)</small>			
26 55 53 11		Security Flood Lighting <small>(26 55 53)</small>			
26 55 53 11-0001		Flood Lights (General Electric Powerflood®) <small>(26 55 53 11)</small>			
26 55 53 11-0002		MPF (Small Size) Series GE Flood Lights <small>(26 55 53 11-0001)</small>			
		Note: For perimeters, entrances, building facades and sign lighting. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Anodized aluminum reflector. 1/2" threaded mounting knuckle.			
26 55 53 11-0003		High Pressure Sodium MPF Series GE Flood Lights <small>(26 55 53 11-0002)</small>			
26 55 53 11-0004	EA	70 Watt High Pressure Sodium MPF Series GE Flood Light.....	379.45		103.06
26 55 53 11-0005	EA	100 Watt High Pressure Sodium MPF Series GE Flood Light.....	382.91		103.06
26 55 53 11-0006	EA	150 Watt High Pressure Sodium MPF Series GE Flood Light.....	388.69		103.06
26 55 53 11-0007		Metal Halide MPF Series GE Flood Lights <small>(26 55 53 11-0002)</small>			
26 55 53 11-0008	EA	70 Watt Metal Halide MPF Series GE Flood Light.....	516.95		103.06
26 55 53 11-0009		P-154 (Small Size) Series GE Flood Lights <small>(26 55 53 11-0001)</small>			
		Note: For parking lots, building security, building facades, recreation areas and sign lighting. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Anodized aluminum reflector. Yoke or slip fitter mounting.			
26 55 53 11-0010		High Pressure Sodium P-154 Series GE Flood Lights <small>(26 55 53 11-0009)</small>			
26 55 53 11-0011	EA	70 Watt High Pressure Sodium P-154 Series GE Flood Light.....	772.83		137.41
26 55 53 11-0012	EA	100 Watt High Pressure Sodium P-154 Series GE Flood Light.....	777.45		137.41
26 55 53 11-0013	EA	150 Watt High Pressure Sodium P-154 Series GE Flood Light.....	785.54		137.41
26 55 53 11-0014	EA	250 Watt High Pressure Sodium P-154 Series GE Flood Light.....	876.82		137.41
26 55 53 11-0015	EA	400 Watt High Pressure Sodium P-154 Series GE Flood Light.....	903.39		137.41
26 55 53 11-0016		Metal Halide P-154 Series GE Flood Lights <small>(26 55 53 11-0009)</small>			
26 55 53 11-0017	EA	175 Watt Metal Halide P-154 Series GE Flood Light.....	764.74		137.41
26 55 53 11-0018	EA	250 Watt Metal Halide P-154 Series GE Flood Light.....	805.18		137.41
26 55 53 11-0019	EA	400 Watt Metal Halide P-154 Series GE Flood Light.....	825.98		137.41

26	26	Electrical
	26 50	Lighting
	26 55	Special Purpose Lighting



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 55 53 11-0020		PF-154 (Medium Size) Series GE Flood Lights <small>(26 55 53 11-0001)</small> Note: For parking lots, building security and building facades. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Anodized aluminum reflector. Yoke or slip fitter mounting.			
26 55 53 11-0021		High Pressure Sodium PF-154 Series GE Flood Lights <small>(26 55 53 11-0020)</small>			
26 55 53 11-0022	EA	70 Watt High Pressure Sodium PF-154 Series GE Flood Light.....	787.54		154.60
26 55 53 11-0023	EA	100 Watt High Pressure Sodium PF-154 Series GE Flood Light.....	793.31		154.60
26 55 53 11-0024	EA	150 Watt High Pressure Sodium PF-154 Series GE Flood Light.....	802.56		154.60
26 55 53 11-0025	EA	250 Watt High Pressure Sodium PF-154 Series GE Flood Light.....	892.68		154.60
26 55 53 11-0026	EA	400 Watt High Pressure Sodium PF-154 Series GE Flood Light.....	918.10		154.60
26 55 53 11-0027		Metal Halide PF-154 GE Flood Lights <small>(26 55 53 11-0020)</small>			
26 55 53 11-0028	EA	175 Watt Metal Halide PF-154 Series GE Flood Light.....	780.60		154.60
26 55 53 11-0029	EA	250 Watt Metal Halide PF-154 Series GE Flood Light.....	819.89		154.60
26 55 53 11-0030	EA	400 Watt Metal Halide PF-154 Series GE Flood Light.....	840.69		154.60
26 55 53 11-0031		PF-400 (Medium Size) Series GE Flood Lights <small>(26 55 53 11-0001)</small> Note: For parking lots, building security, building facades, shipping yards and rail yards. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Formed aluminum reflector. Yoke or slip fitter mounting.			
26 55 53 11-0032		High Pressure Sodium PF-400 Series GE Flood Lights <small>(26 55 53 11-0031)</small>			
26 55 53 11-0033	EA	150 Watt High Pressure Sodium PF-400 Series GE Flood Light.....	1,060.22		154.60
26 55 53 11-0034	EA	200 Watt High Pressure Sodium PF-400 Series GE Flood Light.....	1,141.10		154.60
26 55 53 11-0035	EA	250 Watt High Pressure Sodium PF-400 Series GE Flood Light.....	1,135.33		154.60
26 55 53 11-0036	EA	400 Watt High Pressure Sodium PF-400 Series GE Flood Light.....	1,164.21		154.60
26 55 53 11-0037		Metal Halide PF-400 GE Flood Lights <small>(26 55 53 11-0031)</small>			
26 55 53 11-0038	EA	175 Watt Metal Halide PF-400 Series GE Flood Light.....	1,090.26		154.60
26 55 53 11-0039	EA	250 Watt Metal Halide PF-400 Series GE Flood Light.....	1,114.53		154.60
26 55 53 11-0040	EA	400 Watt Metal Halide PF-400 Series GE Flood Light.....	1,139.95		154.60
26 55 53 11-0041		PF-1000 (Large Size) Series GE Flood Lights <small>(26 55 53 11-0001)</small> Note: For parking lots, industrial yards and sports stadiums. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Formed aluminum reflector. Yoke or slip fitter mounting.			
26 55 53 11-0042		High Pressure Sodium PF-1000 Series GE Flood Lights <small>(26 55 53 11-0041)</small>			
26 55 53 11-0043	EA	750 Watt High Pressure Sodium PF-1000 Series GE Flood Light.....	1,440.06		171.77
26 55 53 11-0044	EA	1,000 Watt High Pressure Sodium PF-1000 Series GE Flood Light.....	1,440.06		171.77
26 55 53 11-0045		Metal Halide PF-1000 Series GE Flood Lights <small>(26 55 53 11-0041)</small>			
26 55 53 11-0046	EA	1,000 Watt Metal Halide PF-1000 Series GE Flood Light.....	1,373.05		171.77
26 55 53 11-0047		HLU/VLU (Medium Size) FRP Series GE Flood Lights <small>(26 55 53 11-0001)</small> Note: For parking lots, industrial yards, construction sites, recreation areas and facades. Includes corrosion resistant reinforced polyester housing and thermal shock resistant lens. Hydroformed aluminum reflector. Yoke or slip fitter mounting.			
26 55 53 11-0048		High Pressure Sodium HLU/VLU FRP Series GE Flood Lights <small>(26 55 53 11-0047)</small>			
26 55 53 11-0049	EA	250 Watt High Pressure Sodium HLU/VLU FRP Series GE Flood Light.....	1,171.15		154.60
26 55 53 11-0050	EA	400 Watt High Pressure Sodium HLU/VLU FRP Series GE Flood Light.....	1,193.10		154.60
26 55 53 11-0051		Metal Halide HLU/VLU Series GE Flood Lights <small>(26 55 53 11-0047)</small>			
26 55 53 11-0052	EA	400 Watt Metal Halide HLU/VLU FRP Series GE Flood Light.....	1,183.86		154.60
26 55 53 11-0053		Accessories For Powerflood GE Flood Lights <small>(26 55 53 11-0001)</small>			
26 55 53 11-0054	EA	Wireguard For Powerflood GE Flood Light.....	201.59		34.35
26 55 53 11-0055	EA	Polycarbonate Vandal Shield For Powerflood GE Flood Light.....	116.08		34.35
26 55 53 11-0056	EA	Top Visor For Powerflood Flood Light.....	169.23		34.35
26 55 53 11-0057	EA	Top And Two Side Visors For Powerflood GE Flood Light.....	128.79		34.35
26 55 53 11-0058	EA	Pipe Wall Mounting Bracket For Powerflood GE Flood Light.....	323.99		103.06
26 55 53 11-0059	EA	Multiple Mounting Channel For Powerflood GE Flood Light.....	141.50		34.35
26 55 53 11-0060	EA	Wall Or Flat Surface Bracket For Powerflood GE Flood Light.....	237.33		103.06
26 55 53 11-0061	EA	Steel Angle Bracket For Powerflood GE Flood Light.....	247.73		103.06
26 55 53 11-0062	EA	Cross Arm Adaptor For Powerflood GE Flood Light.....	105.68		34.35
26 55 53 11-0063	EA	120/240 Volt, 277 Volt, NEMA Twistlock Photocontrol For Powerflood GE Flood Light.....	102.22		34.35
26 55 53 11-0064		Flood Lights (Lithonia Contour Series) <small>(26 55 53 11)</small>			



Electrical	26	26
Lighting	26 50	
Special Purpose Lighting	26 55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 55 53 11-0065 TFM (Small Size) Series Lithonia Flood Lights <small>(26 55 53 11-0064)</small> Note: For signs, flags, facades and landscaping. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Faceted parabolic optics. 1/2" threaded mounting knuckle.		
26 55 53 11-0066 High Pressure Sodium TFM Series Lithonia Flood Lights <small>(26 55 53 11-0065)</small>		
26 55 53 11-0067 EA 70 Watt High Pressure Sodium TFM Series Lithonia Flood Light.....	711.31	137.41
26 55 53 11-0068 EA 100 Watt High Pressure Sodium TFM Series Lithonia Flood Light.....	778.03	137.41
26 55 53 11-0069 EA 150 Watt High Pressure Sodium TFM Series Lithonia Flood Light.....	843.36	137.41
26 55 53 11-0070 Metal Halide TFM Series Lithonia Flood Lights <small>(26 55 53 11-0065)</small>		
26 55 53 11-0071 EA 50 Watt Metal Halide TFM Series Lithonia Flood Light.....	924.89	137.41
26 55 53 11-0072 EA 70 Watt Metal Halide TFM Series Lithonia Flood Light.....	908.83	137.41
26 55 53 11-0073 EA 100 Watt Metal Halide TFM Series Lithonia Flood Light.....	882.94	137.41
26 55 53 11-0074 EA 175 Watt Metal Halide TFM Series Lithonia Flood Light.....	881.03	137.41
26 55 53 11-0075 Compact Fluorescent TFM Series Lithonia Flood Lights <small>(26 55 53 11-0065)</small>		
26 55 53 11-0076 EA 42 Watt Compact Fluorescent TFM Series Lithonia Flood Light.....	918.23	137.41
26 55 53 11-0077 TFL (Medium Size) Series Lithonia Flood Lights <small>(26 55 53 11-0064)</small> Note: For recreation areas, parking lots, building facades and car lots. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Anodized aluminum reflector. Yoke or slip fitter mounting.		
26 55 53 11-0078 High Pressure Sodium TFL Series Lithonia Flood Lights <small>(26 55 53 11-0077)</small>		
26 55 53 11-0079 EA 250 Watt High Pressure Sodium TFL Series Lithonia Flood Light.....	1,093.31	154.60
26 55 53 11-0080 EA 400 Watt High Pressure Sodium TFL Series Lithonia Flood Light.....	1,115.57	154.60
26 55 53 11-0081 Metal Halide TFL Series Lithonia Flood Lights <small>(26 55 53 11-0077)</small>		
26 55 53 11-0082 EA 175 Watt Metal Halide TFL Series Lithonia Flood Light.....	1,043.31	154.60
26 55 53 11-0083 EA 250 Watt Metal Halide TFL Series Lithonia Flood Light.....	1,043.31	154.60
26 55 53 11-0084 EA 400 Watt Metal Halide TFL Series Lithonia Flood Light.....	1,078.20	154.60
26 55 53 11-0085 TFR (Low Profile) Series Lithonia Flood Lights <small>(26 55 53 11-0064)</small> Note: For recreation areas, parking lots, building facades and car lots. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Anodized aluminum reflector. Yoke or slip fitter mounting.		
26 55 53 11-0086 High Pressure Sodium TFR Lithonia Flood Lights <small>(26 55 53 11-0085)</small>		
26 55 53 11-0087 EA 150 Watt High Pressure Sodium Horizontal TFR Series Lithonia Flood Light.....	1,047.87	137.41
26 55 53 11-0088 EA 250 Watt High Pressure Sodium Horizontal TFR Series Lithonia Flood Light.....	1,081.17	137.41
26 55 53 11-0089 EA 400 Watt High Pressure Sodium Horizontal TFR Series Lithonia Flood Light.....	1,109.00	137.41
26 55 53 11-0090 Metal Halide TFR Lithonia Flood Lights <small>(26 55 53 11-0085)</small>		
26 55 53 11-0091 EA 250 Watt Metal Halide TFR Series Lithonia Flood Light.....	1,036.73	137.41
26 55 53 11-0092 EA 400 Watt Metal Halide TFR Series Lithonia Flood Light.....	1,070.08	137.41
26 55 53 11-0093 TFA (Large Size) Series Lithonia Flood Lights <small>(26 55 53 11-0064)</small> Note: For industrial yards, parking lots, construction sites, streets and recreational areas. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Anodized aluminum reflector. Yoke or slip fitter mounting.		
26 55 53 11-0094 High Pressure Sodium TFA Series Lithonia Flood Lights <small>(26 55 53 11-0093)</small>		
26 55 53 11-0095 EA 1,000 Watt High Pressure Sodium TFA Series Lithonia Flood Light.....	2,039.46	171.77
26 55 53 11-0096 Metal Halide TFA Series Lithonia Flood Lights <small>(26 55 53 11-0093)</small>		
26 55 53 11-0097 EA 400 Watt Metal Halide TFA Series Lithonia Flood Light.....	1,566.81	171.77
26 55 53 11-0098 EA 1,000 Watt Metal Halide TFA Series Lithonia Flood Light.....	1,733.62	171.77
26 55 53 11-0099 Accessories For Contour Series Lithonia Flood Lights <small>(26 55 53 11-0064)</small>		
26 55 53 11-0100 EA Wireguard For Contour Series Lithonia Flood Light.....	173.56	34.35
26 55 53 11-0101 EA Vandal Guard For Contour Series Lithonia Flood Light.....	337.28	34.35
26 55 53 11-0102 EA Upper Visor For Contour Series Lithonia Flood Light.....	142.66	34.35
26 55 53 11-0103 EA Full Visor For Contour Series Lithonia Flood Light.....	192.69	34.35
26 55 53 11-0104 EA Pipe Wall Mounting Bracket For Contour Series Lithonia Flood Light.....	428.51	103.06
26 55 53 11-0105 EA Radius Wall Bracket For Contour Series Lithonia Flood Light.....	339.98	103.06
26 55 53 11-0106 EA Steel Angle Bracket For Contour Series Lithonia Flood Light.....	339.98	103.06
26 55 53 11-0107 EA U Bolt Wall Bracket For Contour Series Lithonia Flood Light, Mounts To 2" Pipe.....	375.29	103.06
26 55 53 11-0108 EA Crossarm Adapter For Horizontal Mounted Contour Lithonia Series Flood Light.....	165.95	34.35
26 55 53 11-0109 EA 120/240 Volt, 277 Volt, NEMA Twistlock Photocontrol For Contour Lithonia Series Flood Light.....	132.03	34.35

26	26	Electrical
	26 50	Lighting
	26 55	Special Purpose Lighting



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 55 53 11-0110	Flood Lights (Eaton) <small>(26 55 53 11)</small>		
26 55 53 11-0111	EA 6" x 6", 16,932 Lumens, 128 Watt, LED Flood Light (Eaton NFFLD-C40-D-UNV-66-T-CB).....	1,122.50	137.41
	<i>For NEMA Photocontrol Option (Eaton OA/RA1016), Add</i>	59.82	
	<i>For >50 To 100, Deduct</i>	-34.93	
	<i>For >100 To 250, Deduct</i>	-63.00	
	<i>For >250 To 500, Deduct</i>	-112.25	
	<i>For >500, Deduct</i>	-161.50	
26 55 53 11-0112	EA 16,900 Lumens, 128 Watt, NEMA 6H x 6V Wide, Trunnion Mount, 4000K CCT, Night Falcon LED Flood Light With Multi-Tap (Cooper Industries NFFLD-C40-D-UNV-66-T-CB-PER7+OA/RA1016).....	1,396.06	151.06
	<i>For >50 To 100, Deduct</i>	-42.45	
	<i>For >100 To 250, Deduct</i>	-77.36	
	<i>For >250 To 500, Deduct</i>	-139.61	
	<i>For >500, Deduct</i>	-201.86	
26 55 53 11-0113	Flood Lights (Ruud) <small>(26 55 53 11)</small>		
26 55 53 11-0114	NS (Micro) Series Ruud Flood Lights <small>(26 55 53 11-0113)</small>		
	Note: Provides conventional floodlighting, 1/2" threaded mounting knuckle.		
26 55 53 11-0115	High Pressure Sodium NS Series Ruud Flood Lights <small>(26 55 53 11-0114)</small>		
26 55 53 11-0116	EA 35 Watt High Pressure Sodium NS Series Ruud Flood Light	467.26	103.06
26 55 53 11-0117	EA 50 Watt High Pressure Sodium NS Series Ruud Flood Light	467.26	103.06
26 55 53 11-0118	EA 70 Watt High Pressure Sodium NS Series Ruud Flood Light	467.26	103.06
26 55 53 11-0119	EA 100 Watt High Pressure Sodium NS Series Ruud Flood Light	467.26	103.06
26 55 53 11-0120	EA 150 Watt High Pressure Sodium NS Series Ruud Flood Light	467.26	103.06
26 55 53 11-0121	Metal Halide NS Series Ruud Flood Lights <small>(26 55 53 11-0114)</small>		
26 55 53 11-0122	EA 50 Watt Metal Halide NS Series Ruud Flood Light	531.97	103.06
26 55 53 11-0123	EA 70 Watt Metal Halide NS Series Ruud Flood Light	531.97	103.06
26 55 53 11-0124	EA 100 Watt Metal Halide NS Series Ruud Flood Light	531.97	103.06
26 55 53 11-0125	Compact Fluorescent NS Series Ruud Flood Lights <small>(26 55 53 11-0114)</small>		
26 55 53 11-0126	EA 13 Watt Compact Fluorescent NS Series Ruud Flood Light	400.25	103.06
26 55 53 11-0127	EA 26 Watt Compact Fluorescent NS Series Ruud Flood Light	416.42	103.06
26 55 53 11-0128	EA 32 Watt Compact Fluorescent NS Series Ruud Flood Light	421.04	103.06
26 55 53 11-0129	EA 42 Watt Compact Fluorescent NS Series Ruud Flood Light	425.67	103.06
26 55 53 11-0130	NSF/NSW/NSC (Standard, Wide And Cutoff Micro) Series Ruud Flood Lights <small>(26 55 53 11-0113)</small>		
	Note: The NSF is suited for large open areas and façade applications. The NSW is suited for roadway applications, parking areas or security. The NSC is designed for parking lot and outdoor sports areas. Yoke or slip fitter mounting.		
26 55 53 11-0131	High Pressure Sodium NSF/NSW/NSC Series Ruud Flood Lights <small>(26 55 53 11-0130)</small>		
26 55 53 11-0132	EA 150 Watt High Pressure Sodium NSF/NSW/NSC Series Ruud Flood Light	720.52	154.60
26 55 53 11-0133	EA 250 Watt High Pressure Sodium NSF/NSW/NSC Series Ruud Flood Light	762.12	154.60
26 55 53 11-0134	EA 400 Watt High Pressure Sodium NSF/NSW/NSC Series Ruud Flood Light	785.23	154.60
26 55 53 11-0135	Metal Halide NSF/NSW/NSC Series Ruud Flood Lights <small>(26 55 53 11-0130)</small>		
26 55 53 11-0136	EA 175 Watt Metal Halide NSF/NSW/NSC Series Ruud Flood Light	711.28	154.60
26 55 53 11-0137	EA 250 Watt Metal Halide NSF/NSW/NSC Series Ruud Flood Light	715.90	154.60
26 55 53 11-0138	EA 400 Watt Metal Halide NSF/NSW/NSC Series Ruud Flood Light	729.76	154.60
26 55 53 11-0139	Compact Fluorescent NSF/NSW/NSC Series Ruud Flood Lights <small>(26 55 53 11-0130)</small>		
26 55 53 11-0140	EA 70 Watt Compact Fluorescent NSF/NSW/NSC Series Ruud Flood Light	695.10	154.60
26 55 53 11-0141	FS (Square) Series Ruud Flood Lights <small>(26 55 53 11-0113)</small>		
	Note: For signs, large open areas and façade applications. Yoke or slip fitter mounting.		
26 55 53 11-0142	High Pressure Sodium FS Series Ruud Flood Lights <small>(26 55 53 11-0141)</small>		
26 55 53 11-0143	EA 250 Watt High Pressure Sodium FS Series Ruud Flood Light.....	843.00	154.60
26 55 53 11-0144	EA 400 Watt High Pressure Sodium FS Series Ruud Flood Light.....	847.62	154.60
26 55 53 11-0145	EA 1,000 Watt High Pressure Sodium FS Series Ruud Flood Light.....	1,441.22	171.77
26 55 53 11-0146	Metal Halide FS Series Ruud Flood Lights <small>(26 55 53 11-0141)</small>		
26 55 53 11-0147	EA 175 Watt Metal Halide FS Series Ruud Flood Light.....	843.00	154.60
26 55 53 11-0148	EA 250 Watt Metal Halide FS Series Ruud Flood Light.....	847.62	154.60
26 55 53 11-0149	EA 400 Watt Metal Halide FS Series Ruud Flood Light.....	861.49	154.60
26 55 53 11-0150	EA 1,000 Watt Metal Halide FS Series Ruud Flood Light.....	1,288.70	171.77
26 55 53 11-0151	MFS (Mini Square) Series Ruud Flood Lights <small>(26 55 53 11-0113)</small>		
	Note: For signs, large open areas and façade applications. Yoke or slip fitter mounting.		



Electrical	26	26
Lighting	26 50	
Special Purpose Lighting	26 55	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 55 53 11-0152	High Pressure Sodium MFS Series Ruud Flood Lights (26 55 53 11-0151)	
26 55 53 11-0153 EA 35 Watt High Pressure Sodium MFS Series Ruud Flood Light.....	660.75	137.41
26 55 53 11-0154 EA 50 Watt High Pressure Sodium MFS Series Ruud Flood Light.....	709.28	137.41
26 55 53 11-0155 EA 70 Watt High Pressure Sodium MFS Series Ruud Flood Light.....	709.28	137.41
26 55 53 11-0156 EA 100 Watt High Pressure Sodium MFS Series Ruud Flood Light.....	709.28	137.41
26 55 53 11-0157 EA 150 Watt High Pressure Sodium MFS Series Ruud Flood Light.....	709.28	137.41
26 55 53 11-0158	Metal Halide MFS Series Ruud Flood Lights (26 55 53 11-0151)	
26 55 53 11-0159 EA 50 Watt Metal Halide MFS Series Ruud Flood Light.....	725.46	137.41
26 55 53 11-0160 EA 70 Watt Metal Halide MFS Series Ruud Flood Light.....	725.46	137.41
26 55 53 11-0161 EA 100 Watt Metal Halide MFS Series Ruud Flood Light.....	725.46	137.41
26 55 53 11-0162 EA 175 Watt Metal Halide MFS Series Ruud Flood Light.....	700.04	137.41
26 55 53 11-0163	MCF/MPM/MPN (Mini Cutoff. Parabolic Medium And Narrow Mini Square) Series Ruud Flood Lights (26 55 53 11-0113)	
Note: The MCF is suited for parking lots, volleyball courts and tennis courts. The MPM and MPN are suited for flagpoles, columns and narrow signs. Yoke or slip fitter mounting.		
26 55 53 11-0164	High Pressure Sodium MCF/MPM/MPN Series Ruud Flood Lights (26 55 53 11-0163)	
26 55 53 11-0165 EA 35 Watt High Pressure Sodium MCF/MPM/MPN Series Ruud Flood Light.....	718.52	137.41
26 55 53 11-0166 EA 50 Watt High Pressure Sodium MCF/MPM/MPN Series Ruud Flood Light.....	767.05	137.41
26 55 53 11-0167 EA 70 Watt High Pressure Sodium MCF/MPM/MPN Series Ruud Flood Light.....	767.05	137.41
26 55 53 11-0168 EA 100 Watt High Pressure Sodium MCF/MPM/MPN Series Ruud Flood Light.....	767.05	137.41
26 55 53 11-0169 EA 150 Watt High Pressure Sodium MCF/MPM/MPN Series Ruud Flood Light.....	767.05	137.41
26 55 53 11-0170	Metal Halide MCF/MPM/MPN Series Ruud Flood Lights (26 55 53 11-0163)	
26 55 53 11-0171 EA 50 Watt Metal Halide MCF/MPM/MPN Series Ruud Flood Light.....	783.23	137.41
26 55 53 11-0172 EA 70 Watt Metal Halide MCF/MPM/MPN Series Ruud Flood Light.....	783.23	137.41
26 55 53 11-0173 EA 100 Watt Metal Halide MCF/MPM/MPN Series Ruud Flood Light.....	783.23	137.41
26 55 53 11-0174 EA 175 Watt Metal Halide MCF/MPM/MPN Series Ruud Flood Light.....	757.81	137.41
26 55 53 11-0175	CF (Cutoff Square) Series Ruud Flood Lights (26 55 53 11-0113)	
Note: The CF is suited for parking lots, volleyball courts and tennis courts. Yoke or slip fitter mounting.		
26 55 53 11-0176	High Pressure Sodium CF Series Ruud Flood Lights (26 55 53 11-0175)	
26 55 53 11-0177 EA 250 Watt High Pressure Sodium CF Series Ruud Flood Light.....	951.61	154.60
26 55 53 11-0178 EA 400 Watt High Pressure Sodium CF Series Ruud Flood Light.....	974.72	154.60
26 55 53 11-0179 EA 1,000 Watt High Pressure Sodium CF Series Ruud Flood Light.....	1,498.99	171.77
26 55 53 11-0180	Metal Halide CF Series Ruud Flood Lights (26 55 53 11-0175)	
26 55 53 11-0181 EA 175 Watt Metal Halide CF Series Ruud Flood Light.....	900.77	154.60
26 55 53 11-0182 EA 250 Watt Metal Halide CF Series Ruud Flood Light.....	905.39	154.60
26 55 53 11-0183 EA 400 Watt Metal Halide CF Series Ruud Flood Light.....	919.26	154.60
26 55 53 11-0184 EA 1,000 Watt Metal Halide CF Series Ruud Flood Light.....	1,346.47	171.77
26 55 53 11-0185	CN (Narrow Beam Cutoff Square) Series Ruud Flood Lights (26 55 53 11-0113)	
Note: The CN is suited for large sports fields, building facades and signs. Yoke or slip fitter mounting.		
26 55 53 11-0186	High Pressure Sodium CN Series Ruud Flood Lights (26 55 53 11-0185)	
26 55 53 11-0187 EA 400 High Pressure Sodium CN Series Ruud Flood Light.....	1,230.93	171.77
26 55 53 11-0188 EA 1,000 High Pressure Sodium CN Series Ruud Flood Light.....	1,471.26	171.77
26 55 53 11-0189	Metal Halide CN Series Ruud Flood Lights (26 55 53 11-0185)	
26 55 53 11-0190 EA 400 Watt Metal Halide CN Series Ruud Flood Light.....	1,175.46	171.77
26 55 53 11-0191 EA 1,000 Watt Metal Halide CN Series Ruud Flood Light.....	1,318.74	171.77
26 55 53 11-0192	PM/PN (Parabolic Medium And Narrow Square) Series Ruud Flood Lights (26 55 53 11-0113)	
Note: The PM and PN are suited for flagpoles, columns and narrow signs. Yoke or slip fitter mounting.		
26 55 53 11-0193	High Pressure Sodium PM/PN Series Ruud Flood Lights (26 55 53 11-0192)	
26 55 53 11-0194 EA 250 Watt High Pressure Sodium PM/PN Series Ruud Flood Light.....	983.96	154.60
26 55 53 11-0195 EA 400 Watt High Pressure Sodium PM/PN Series Ruud Flood Light.....	1,007.07	154.60
26 55 53 11-0196	Metal Halide PM/PN Series Ruud Flood Lights (26 55 53 11-0192)	
26 55 53 11-0197 EA 175 Watt Metal Halide PM/PN Series Ruud Flood Light.....	933.12	154.60
26 55 53 11-0198 EA 250 Watt Metal Halide PM/PN Series Ruud Flood Light.....	937.74	154.60
26 55 53 11-0199 EA 400 Watt Metal Halide PM/PN Series Ruud Flood Light.....	951.61	154.60
26 55 53 11-0200 EA 1,000 Watt Metal Halide PM/PN Series Ruud Flood Light.....	1,378.82	171.77

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 55 53	11-0201		Accessories For Ruud Flood Lighting (26 55 53 11-0113)		
26 55 53	11-0202	EA	Wireguard For Ruud Flood Light.....	103.37	34.35
26 55 53	11-0203	EA	Deep Baffle (Full Visor) For Ruud Flood Light	165.77	34.35
26 55 53	11-0204	EA	Glare Guard (Upper Visor) For Ruud Flood Light	119.55	34.35
26 55 53	11-0205	EA	Vandal Shield For Ruud Flood Light	142.66	34.35
26 55 53	11-0206	EA	Pipe Mounting Bracket For Ruud Flood Light	284.70	103.06
26 55 53	11-0207	EA	120/240 Volt, 277 Volt, NEMA Twistlock Photocontrol For Ruud Flood Light	89.51	34.35
26 55 53	11-0208		Flood Lights (Lumark) (26 55 53 11)		
26 55 53	11-0209		QZ Wedge Series Quartz Lumark Flood Lights (26 55 53 11-0208)		
			Note: For small outdoor areas. Die-cast aluminum housing heat and weather resistant gaskets.		
26 55 53	11-0210	EA	500 Watt QZ Wedge Series Quartz Lumark Flood Light.....	253.39	103.06
26 55 53	11-0211		LQL Series Quartz Lumark Flood Lights (26 55 53 11-0208)		
			Note: For medium size outdoor areas. Die-cast aluminum housing heat and weather resistant gaskets.		
26 55 53	11-0212	EA	1,500 Watt LQL Series Quartz Lumark Flood Light	321.56	103.06
26 55 53	11-0213		Flood Lights (Kim Lighting) (26 55 53 11)		
26 55 53	11-0214		MicroFlood® Series Kim Lighting Flood Lights (26 55 53 11-0213)		
			Note: For signs, flags, facades and landscaping. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and gasketed and tempered lens. 1/2" threaded mounting knuckle.		
26 55 53	11-0215		LED MicroFlood® Series Kim Lighting Flood Lights (26 55 53 11-0214)		
26 55 53	11-0216	EA	5 Watt, LED MicroFlood® Series Kim Lighting Flood Light.....	540.74	42.86
			For >50 To 100, Deduct	-15.66	
			For >100 To 250, Deduct	-29.18	
			For >250 To 500, Deduct	-54.07	
			For >500, Deduct	-78.97	
26 55 53	11-0217	EA	15 Watt, LED MicroFlood® Series Kim Lighting Flood Light.....	668.99	42.86
			For >50 To 100, Deduct	-18.87	
			For >100 To 250, Deduct	-35.59	
			For >250 To 500, Deduct	-66.90	
			For >500, Deduct	-98.21	
26 55 53	11-0218		Scarab® Series Kim Lighting Flood Lights (26 55 53 11-0213)		
			Note: For signs, flags, facades and landscaping. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and gasketed and tempered lens. 1/2" threaded mounting knuckle.		
26 55 53	11-0219		LED Scarab® Series Kim Lighting Accent Flood Lights (26 55 53 11-0218)		
			Note: Spot or narrow style accent flood lights.		
26 55 53	11-0220	EA	6 Watt LED Scarab® Series Kim Lighting Accent Flood Light (Kim EL731).....	826.57	42.86
			For >50 To 100, Deduct	-22.81	
			For >100 To 250, Deduct	-43.47	
			For >250 To 500, Deduct	-82.66	
			For >500, Deduct	-121.84	
26 55 53	11-0221	EA	15 Watt LED Scarab® Series Kim Lighting Accent Flood Light (Kim EL733).....	900.16	42.86
			Note: Includes adjustable glare shield.		
			For >50 To 100, Deduct	-24.65	
			For >100 To 250, Deduct	-47.15	
			For >250 To 500, Deduct	-90.02	
			For >500, Deduct	-132.88	
26 55 53	11-0222		Cooper Lighting (26 55 53 11)		
26 55 53	11-0223		Flood Lights; Lumiere® Series Cooper Lighting (26 55 53 11-0222)		
			Note: For signs, flags, facades and landscaping. Includes die-cast aluminum housing, corrosion resistant polyester powder finish and gasketed and tempered lens. 1/2" threaded mounting knuckle.		
26 55 53	11-0224		LED Lumiere® Series Cooper Lighting Flood Lights (26 55 53 11-0223)		
26 55 53	11-0225	EA	12 Watt, LED, Aluminum Construction, Lumiere® Series Cooper Lighting Flood Light (Lumiere® Cambria 203).....	704.07	42.86
			For Tree Mount, Add	64.31	
			For >50 To 100, Deduct	-19.75	
			For >100 To 250, Deduct	-37.35	
			For >250 To 500, Deduct	-70.41	
			For >500, Deduct	-103.47	
26 55 53	11-0226	EA	12 Watt, LED, Brass Construction, Lumiere® Series Cooper Lighting Flood Light (Lumiere® Cambria 203).....	894.36	42.86
			For Tree Mount, Add	64.31	
			For >50 To 100, Deduct	-24.50	
			For >100 To 250, Deduct	-46.86	
			For >250 To 500, Deduct	-89.44	
			For >500, Deduct	-132.01	
26 55 53	11-0227	EA	12 Watt, LED, Aluminum Construction, Lumiere® Series Cooper Lighting Hanging Flood Light (Lumiere® Cambria 213).....	781.64	42.86
			For >50 To 100, Deduct	-21.68	
			For >100 To 250, Deduct	-41.23	
			For >250 To 500, Deduct	-78.16	
			For >500, Deduct	-115.10	



Electrical	26	26
Lighting	26 50	
Special Purpose Lighting	26 55	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 55 53 11-0228	EA Expanding Tree Strap, Tree Mounting Accessory For Lumiere® Flood Lights (Lumiere TM04-4) Note: For use with up to four fixtures. For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	315.16 -9.41 -17.29 -31.52 -45.74	30.62
26 55 53 11-0229	EA 12 Volt, Wet Listed, Low Voltage Lighting Transformer For Lumiere® 203 Flood Lights (Lumiere T100) For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	501.72 -13.77 -26.31 -50.17 -74.03	24.49
26 55 53 11-0230	EA 12 Volt, Wet Listed, Low Voltage Lighting Transformer For Lumiere® 213 Flood Lights (Lumiere) For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	172.86 -5.55 -9.87 -17.29 -24.70	24.49
26 55 53 11-0231	Flood Lights (CREE® BetaLED®) <small>(26 55 53 11)</small>		
26 55 53 11-0232	Yoke Mount, Square, LED Flood Lights (CREE® BetaLED® FLD-304) <small>(26 55 53 11-0231)</small> Note: UL wet listed. Includes 5,700K color temperature, 120-480 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 55 53 11-0233	EA 40 LEDs, 47 Watt, Yoke Mount, Square, LED Flood Light (CREE® BetaLED® FLD-304)..... For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	1,292.40 -38.49 -70.80 -129.24 -187.68	123.60
26 55 53 11-0234	EA 60 LEDs, 68 Watt, Yoke Mount, Square, LED Flood Light (CREE® BetaLED® FLD-304)..... For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	1,416.76 -41.94 -77.36 -141.68 -205.99	130.47
26 55 53 11-0235	Adjustable Arm Mount, Rectangular, LED Flood Lights (CREE® BetaLED® Edge® FLD-EDG) <small>(26 55 53 11-0231)</small> Note: UL wet listed. Includes 5,700K color temperature, 120/277 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 55 53 11-0236	EA 20 LEDs, 26 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	1,120.37 107.78 -33.85 -61.86 -112.04 -162.22	116.73
26 55 53 11-0237	EA 40 LEDs, 47 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	1,414.47 107.78 -41.54 -76.90 -141.45 -205.99	123.60
26 55 53 11-0238	EA 60 LEDs, 68 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	1,708.58 107.78 -49.24 -91.95 -170.86 -249.76	130.47
26 55 53 11-0239	EA 80 LEDs, 90 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	2,115.23 107.78 -59.75 -112.63 -211.52 -310.42	137.32
26 55 53 11-0240	EA 100 LEDs, 111 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	2,409.34 107.78 -67.44 -127.68 -240.93 -354.19	144.19
26 55 53 11-0241	EA 120 LEDs, 132 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	2,703.44 107.78 -75.14 -142.73 -270.34 -397.96	151.06
26 55 53 11-0242	EA 140 LEDs, 157 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG)..... For 480 Volt, Add For >50 To 100, Deduct For >100 To 250, Deduct For >250 To 500, Deduct For >500, Deduct	3,087.19 107.78 -85.08 -162.26 -308.72 -455.18	157.93

26	Electrical
26 50	Lighting
26 55	Special Purpose Lighting

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 55 53 11-0243	EA	160 LEDs, 179 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (CREE® BetaLED® Edge® FLD-EDG).....	3,381.31	164.79
		<i>For 480 Volt, Add</i>	107.78	
		<i>For >50 To 100, Deduct</i>	-92.77	
		<i>For >100 To 250, Deduct</i>	-177.31	
		<i>For >250 To 500, Deduct</i>	-338.13	
		<i>For >500, Deduct</i>	-498.96	
26 55 53 11-0244		Adjustable Arm Mount, Rectangular, High Output, LED Flood Lights (CREE® BetaLED® Edge® FLD-EHO) <small>(26 55 53 11-0231)</small>		
		Note: UL wet listed. Includes 5,700K color temperature, 120/277 voltage, 700mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 55 53 11-0245	EA	120 LEDs, 267 Watt, Adjustable Arm Mount, Rectangular, High Output, LED Flood Light (CREE® BetaLED® Edge® FLD-EHO).....	2,590.91	151.06
		<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
		<i>For Bird Spikes, Add</i>	50.55	
		<i>For 5,000K Color Temperature, Add</i>	56.24	
		<i>For Fuse, Add</i>	67.48	
		<i>For 0 To 10 Volt Dimming, Add</i>	67.48	
		<i>For 480 Volt, Add</i>	101.23	
		<i>For Multi-Level, Add</i>	146.21	
		<i>For 1,000mA Driver, Add</i>	188.96	
		<i>For >50 To 100, Deduct</i>	-72.33	
		<i>For >100 To 250, Deduct</i>	-137.10	
		<i>For >250 To 500, Deduct</i>	-259.09	
		<i>For >500, Deduct</i>	-381.08	
26 55 53 11-0246	EA	240 LEDs, 533 Watt, Adjustable Arm Mount, Rectangular, High Output, LED Flood Light (CREE® BetaLED® Edge® FLD-EHO).....	4,407.47	185.40
		<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
		<i>For 5,000K Color Temperature, Add</i>	56.24	
		<i>For Fuse, Add</i>	67.48	
		<i>For 0 To 10 Volt Dimming, Add</i>	67.48	
		<i>For Bird Spikes, Add</i>	75.24	
		<i>For Multi-Level, Add</i>	146.21	
		<i>For 1,000mA Driver, Add</i>	188.96	
		<i>For 480 Volt, Add</i>	202.45	
		<i>For >50 To 100, Deduct</i>	-119.46	
		<i>For >100 To 250, Deduct</i>	-229.64	
		<i>For >250 To 500, Deduct</i>	-440.75	
		<i>For >500, Deduct</i>	-651.85	
26 55 53 11-0247		Direct Or Adjustable Arm Mount, Rectangular, High Output, LED Flood Lights (CREE® BetaLED® OSQ™) <small>(26 55 53 11-0231)</small>		
		Note: UL wet listed. Includes 3,000K or 4,000K or 5,700K color temperature, 120/277 voltage, Class 1 driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 55 53 11-0248	EA	112 Watt, Direct Or Adjustable Arm Mount, Rectangular, High Output, LED Flood Light (CREE® BetaLED® OSQ™ OSQ-A-NM-XXX-A-XXX-US-UL)	1,506.75	151.06
		<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
		<i>For Front Facing Optics, Back Light Shield, Add</i>	38.72	
		<i>For Rotated Optics, Back Light Shield, Add</i>	38.72	
		<i>For Field Adjustable Output, Add</i>	33.75	
		<i>For Fuse, Add</i>	67.48	
		<i>For 0 To 10 Volt Dimming, Add</i>	67.48	
		<i>For Multi-Level, Add</i>	146.21	
		<i>For >50 To 100, Deduct</i>	-45.22	
		<i>For >100 To 250, Deduct</i>	-82.89	
		<i>For >250 To 500, Deduct</i>	-150.68	
		<i>For >500, Deduct</i>	-218.46	
26 55 53 11-0249	EA	168 Watt, Direct Or Adjustable Arm Mount, Rectangular, High Output, LED Flood Light (CREE® BetaLED® OSQ™ OSQ-A-NM-XXX-J-XXX-US-UL)	1,613.04	151.06
		Note: Type III, IV or V medium optics only.		
		<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
		<i>For Front Facing Optics, Back Light Shield, Add</i>	38.72	
		<i>For Rotated Optics, Back Light Shield, Add</i>	38.72	
		<i>For Field Adjustable Output, Add</i>	33.75	
		<i>For Fuse, Add</i>	67.48	
		<i>For 0 To 10 Volt Dimming, Add</i>	67.48	
		<i>For Type II Medium Or Type V Short Optics, Add</i>	281.17	
		<i>For Multi-Level, Add</i>	146.21	
		<i>For >50 To 100, Deduct</i>	-47.88	
		<i>For >100 To 250, Deduct</i>	-88.21	
		<i>For >250 To 500, Deduct</i>	-161.30	
		<i>For >500, Deduct</i>	-234.40	



Electrical	26	26
Lighting	26 50	
Special Purpose Lighting	26 55	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 55 53 11-0250	EA 223 Watt, Direct Or Adjustable Arm Mount, Rectangular, High Output, LED Flood Light (CREE® BetaLED® OSQ™ OSQ-A-NM-XXX-S-XXX-US-UL) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For Field Adjustable Output, Add</i> <i>For Front Facing Optics, Back Light Shield, Add</i> <i>For Rotated Optics, Back Light Shield, Add</i> <i>For Fuse, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For Multi-Level, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	2,071.44 22.49 33.75 46.88 46.88 67.48 67.48 146.21 -61.06 -112.84 -207.14 -301.45	185.40
26 55 53 11-0251	Flood Lights (PlanLED) (26 55 53 11)		
26 55 53 11-0252	Adjustable Arm Mount, LED Flood Lights (PlanLED WAPA) (26 55 53 11-0251)		
26 55 53 11-0253	EA 6,250 Lumens, 50 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (PlanLED WAPA WP050) <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	661.24 -22.71 -39.24 -66.12 -93.01	123.60
26 55 53 11-0254	EA 9,375 Lumens, 75 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (PlanLED WAPA WP075) <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	791.75 -26.32 -46.11 -79.18 -112.24	130.47
26 55 53 11-0255	EA 12,500 Lumens, 100 Watt, Adjustable Arm Mount, Rectangular, LED Flood Light (PlanLED WAPA WP100) <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	914.28 -29.90 -52.75 -91.43 -130.10	140.76
26 55 53 11-0256	Adjustable Arm Mount, LED Sports Flood Lights (PlanLED SUFA) (26 55 53 11-0251)		
26 55 53 11-0257	EA 21,000 Lumens, 200 Watt, LED Sports Flood Light (PlanLED SUFA SF200) <i>For 0 To 10 Volt Dimming, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	1,855.16 91.72 -60.11 -106.49 -185.52 -264.54	274.66
26 55 53 11-0258	EA 42,000 Lumens, 400 Watt, LED Sports Flood Light (PlanLED SUFA SF400) <i>For 0 To 10 Volt Dimming, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	2,884.96 91.72 -85.86 -157.98 -288.50 -419.01	274.66
26 55 53 11-0259	EA 84,000 Lumens, 800 Watt, LED Sports Flood Light (PlanLED SUFA SF800) <i>For 0 To 10 Volt Dimming, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	5,101.70 91.72 -141.28 -268.82 -510.17 -751.52	274.66
26 55 53 11-0260	Adjustable Arm Mount, LED High Mast Flood Lights (PlanLED MAHA) (26 55 53 11-0251)		
26 55 53 11-0261	EA 26,000 Lumens, 200 Watt, Adjustable Arm Mount, Rectangular, LED High Mast Flood Light (PlanLED MAHA MA200) <i>For 0 To 10 Volt Dimming, Add</i> <i>For 480 Volt, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	1,645.90 91.72 138.02 -50.07 -91.22 -164.59 -237.96	178.53
26 55 53 11-0262	EA 39,000 Lumens, 300 Watt, Adjustable Arm Mount, Rectangular, LED High Mast Flood Light (PlanLED MAHA MA300) <i>For 0 To 10 Volt Dimming, Add</i> <i>For 480 Volt, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	2,109.78 91.72 111.45 -62.01 -114.76 -210.98 -307.20	185.40
26 55 53 11-0263	EA 52,000 Lumens, 400 Watt, Adjustable Arm Mount, Rectangular, LED High Mast Flood Light (PlanLED MAHA MA400) <i>For 0 To 10 Volt Dimming, Add</i> <i>For 480 Volt, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500, Deduct</i>	2,694.68 91.72 90.35 -76.98 -144.35 -269.47 -394.59	192.26

26 55 53 12 Security Hazardous Location Flood Lights (26 55 53)

Note: For general to heavy industrial applications in marine and corrosive environments. Class 1 Division 2.

26	26	Electrical
	26 50	Lighting
	26 55	Special Purpose Lighting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 55 53 12-0001 Lithonia Hazardous Location Flood Lights <small>(26 55 53 12)</small>		
26 55 53 12-0002 HFR (Horizontally Oriented Mogul Base) Series Hazardous Location Flood Lights <small>(26 55 53 12-0001)</small> Note: Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Precision-formed reflector. Yoke mounting.		
26 55 53 12-0003 High Pressure Sodium HFR Series Hazardous Location Flood Lights <small>(26 55 53 12-0002)</small>		
26 55 53 12-0004 EA 150 Watt High Pressure Sodium HFR Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,038.14	137.41
26 55 53 12-0005 EA 250 Watt High Pressure Sodium HFR Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,109.78	137.41
26 55 53 12-0006 EA 400 Watt High Pressure Sodium HFR Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,040.45	137.41
26 55 53 12-0007 Metal Halide HFR Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0002)</small>		
26 55 53 12-0008 EA 250 Watt Metal Halide HFR Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,102.13	137.41
26 55 53 12-0009 EA 400 Watt Metal Halide HFR Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,068.19	137.41
26 55 53 12-0010 HFM (Medium Base) Series Hazardous Location Flood Lights <small>(26 55 53 12-0001)</small> Note: Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Precision-formed reflector. Yoke mounting.		
26 55 53 12-0011 High Pressure Sodium HFM Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0010)</small>		
26 55 53 12-0012 EA 100 Watt High Pressure Sodium HFM Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	988.90	137.41
26 55 53 12-0013 EA 150 Watt High Pressure Sodium HFM Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,031.65	137.41
26 55 53 12-0014 Metal Halide HFM Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0010)</small>		
26 55 53 12-0015 EA 175 Watt Metal Halide HFM Series Lithonia Class 1 Div 2 Hazardous Location Flood Light.....	873.35	137.41
26 55 53 12-0016 HFA (Large) Series Hazardous Location Flood Lights <small>(26 55 53 12-0001)</small> Note: Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Precision-formed reflector. Yoke mounting.		
26 55 53 12-0017 High Pressure Sodium HFA Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0016)</small>		
26 55 53 12-0018 EA 250 Watt High Pressure Sodium HFA Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,399.62	171.77
26 55 53 12-0019 EA 400 Watt High Pressure Sodium HFA Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,420.42	171.77
26 55 53 12-0020 Metal Halide HFA Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0016)</small>		
26 55 53 12-0021 EA 250 Watt Metal Halide HFA Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,392.69	171.77
26 55 53 12-0022 EA 400 Watt Metal Halide HFA Series Lithonia Class 1 Div 2 Hazardous Location Flood Light	1,420.42	171.77
26 55 53 12-0023 HFL (Medium) Series Hazardous Location Flood Lights <small>(26 55 53 12-0001)</small> Note: Includes die-cast aluminum housing, corrosion resistant polyester powder finish and thermal shock resistant lens. Precision-formed reflector. Yoke mounting.		
26 55 53 12-0024 High Pressure Sodium HFL Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0023)</small>		
26 55 53 12-0025 EA 400 Watt High Pressure Sodium HFL Series Lithonia Class 1 Div 2 Hazardous Location Flood Light.....	1,037.11	154.60
26 55 53 12-0026 Metal Halide HFL Series Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0023)</small>		
26 55 53 12-0027 EA 400 Watt Metal Halide HFL Series Lithonia Class 1 Div 2 Hazardous Location Flood Light.....	1,118.00	154.60
26 55 53 12-0028 Accessories For Lithonia Hazardous Location Flood Lights <small>(26 55 53 12-0001)</small> See CSI section 26 55 53 11-0099 for accessories.		
26 55 53 13 Security High Performance Flood Lights <small>(26 55 53)</small> Note: For airport aprons and parking areas.		
26 55 53 13-0001 Lithonia High Performance Flood Lights <small>(26 55 53 13)</small>		
26 55 53 13-0002 170S Series Lithonia High Performance Flood Lights <small>(26 55 53 13-0001)</small> Note: Die-cast aluminum housing welded seams, stainless steel hardware, corrosion resistant polyester powder finish, and thermal and shock resistant flat lens.		
26 55 53 13-0003 High Pressure Sodium 170S Series Lithonia High Performance Flood Lights <small>(26 55 53 13-0002)</small>		
26 55 53 13-0004 EA 250 Watt High Pressure Sodium 170S Series Lithonia High Performance Flood Light	2,420.41	206.13
26 55 53 13-0005 EA 400 Watt High Pressure Sodium 170S Series Lithonia High Performance Flood Light	2,609.91	206.13
26 55 53 13-0006 EA 750 Watt High Pressure Sodium 170S Series Lithonia High Performance Flood Light	2,619.15	206.13
26 55 53 13-0007 EA 1,000 Watt High Pressure Sodium 170S Series Lithonia High Performance Flood Light	2,908.01	206.13

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 55 53 13-0008 Metal Halide 170S Series Lithonia High Performance Flood Lights <small>(26 55 53 13-0002)</small>		
26 55 53 13-0009 EA 320 Watt Metal Halide 170S Series Lithonia High Performance Flood Light.....	2,787.85	206.13
26 55 53 13-0010 EA 350 Watt Metal Halide 170S Series Lithonia High Performance Flood Light.....	2,659.71	206.13
26 55 53 13-0011 EA 400 Watt Metal Halide 170S Series Lithonia High Performance Flood Light.....	2,538.27	206.13
26 55 53 13-0012 EA 1,000 Watt Metal Halide 170S Series Lithonia High Performance Flood Light.....	2,658.43	206.13
26 55 53 13-0013 Accessories For Lithonia High Performance Flood Lights <small>(26 55 53 13-0002)</small>		
<small>See CSI section 26 55 53 11-0099 for accessories.</small>		
26 55 61 Theatrical Lighting <small>(26 55)</small>		
26 55 61 00-0001 Stage Lighting <small>(26 55 61)</small>		
26 55 61 00-0002 EA Ellipsoidal Spotlight, Two 6" x 9" Lenses.....	645.97	148.58
<small>Note: Stainless steel shutter blades, complete with color frame, c-clamp, safety cable, 20 amperes, 3 watts ground, male pin connector and high performance lamp.</small>		
26 55 61 00-0003 EA Ellipsoidal Spotlight, Two 6" x 12" Lenses.....	645.97	148.58
<small>Note: Stainless steel shutter blades, complete with color frame, c-clamp, safety cable, 20 amperes, 3 watts ground, male pin connector and high performance lamp.</small>		
26 55 61 00-0004 EA Ellipsoidal Spotlight, Two 6" x 16" Lenses.....	645.97	148.58
<small>Note: Stainless steel shutter blades, complete with color frame, c-clamp, safety cable, 20 amperes, 3 watts ground, male pin connector and high performance lamp.</small>		
26 55 61 00-0005 EA 14" Scoop Floodlight Altman #SC14.....	666.74	148.58
26 55 61 00-0006 EA 6" Diameter Fresnel Spotlight, Spherical Specular Alzak1.....	526.09	148.58
<small>Note: Reflector, heat resistant fresnel lens, slidefocus flood to spot, complete with yoke, c-clamp, safety cable, color frame, male pin connector and lamp.</small>		
26 55 61 00-0007 EA 8" Diameter Fresnel Spotlight, Spherical Specular Alzak.....	861.71	148.58
<small>Note: Reflector, heat resistant fresnel lens, slidefocus flood to spot, complete with yoke, C-clamp, safety cable, color frame, male pin connector and lamp.</small>		
26 55 61 00-0008 EA Follow Spotlight With Steel Chassis And Lightweight.....	2,259.68	148.58
<small>Note: Aluminum housing, includes lamp adjustment plate, silent lamp fan, dowser, iris and clipper, rear lens control, coated lenses, six color boomerang, color fan, 34" x 34" castered stand.</small>		
26 55 61 00-0009 EA Follow Spotlight With Steel Chassis And Lightweight.....	2,722.57	148.58
<small>Note: Aluminum housing, includes lamp adjustment plate, ballast, electronic power supply, stepdown transformer, silent lamp fan, dowser, iris and clipper, rear lens control, coated lenses, six color boomerang, color fan, 34" x 34" castered stand.</small>		
26 55 61 00-0010 EA 300 To 1000 Watt, PAR 64 Can Lighting With 20 Gauge Sheet Steel.....	479.51	148.58
<small>Note: Formed lamp housing, hinged and latched rear housing secured by retention ring, safety cable, safety screen, PAR 64 lamp, male pin connector.</small>		
26 55 61 00-0011 EA 6' Length, Multi-Lamp Compartmented Striplighting Luminaire.....	1,721.18	148.58
<small>Note: With continuous sheet steel housing, supported by 1-1/2" x 3/16" steel yoke with C-clamp, includes 30 lights per section wired on 3 circuits, alzak aluminum reflector with matte finish.</small>		
26 55 61 00-0012 EA 1,000 Watt, 25 To 125' Throw, Follow Spotlight (Times Square Lighting QF1000S).....	2,934.16	148.58
26 55 68 Athletic Field Lighting <small>(26 55)</small>		
26 55 68 00-0001 Sports Lighting System <small>(26 55 68)</small>		
<small>Note: Musco.</small>		
26 55 68 00-0002 Round Steel Tapered Poles <small>(26 55 68 00-0001)</small>		
<small>Note: With Internal wiring harness.</small>		
26 55 68 00-0003 EA 20' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	4,092.46	659.59
26 55 68 00-0004 EA 25' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	4,924.09	797.00
26 55 68 00-0005 EA 30' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	5,553.66	865.71
26 55 68 00-0006 EA 35' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	6,078.59	900.07
26 55 68 00-0007 EA 40' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	7,648.88	934.42
26 55 68 00-0008 EA 45' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	8,770.11	1,140.54
26 55 68 00-0009 EA 50' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	9,426.64	1,209.26
26 55 68 00-0010 EA 55' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	10,708.16	1,374.15
26 55 68 00-0011 EA 60' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	12,159.16	1,545.92
26 55 68 00-0012 EA 65' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	13,425.68	1,694.66
26 55 68 00-0013 EA 70' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	14,637.71	1,894.04
26 55 68 00-0014 EA 75' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	15,950.82	2,126.64
26 55 68 00-0015 EA 80' Steel Tapered Pole With Precast Concrete Foundation Sleeve.....	17,870.28	2,558.61
26 55 68 00-0016 Steel Pole Brackets <small>(26 55 68 00-0001)</small>		
26 55 68 00-0017 EA Two Light Bracket.....	728.08	68.71
26 55 68 00-0018 EA Three Light Bracket.....	914.15	96.19
26 55 68 00-0019 EA Four Light Bracket.....	1,324.75	116.81
26 55 68 00-0020 EA Five Light Bracket.....	1,506.48	137.41
26 55 68 00-0021 EA Six Light Bracket.....	1,829.80	158.02
26 55 68 00-0022 EA Seven Light Bracket.....	2,095.32	178.64
26 55 68 00-0023 EA Eight Light Bracket.....	2,397.09	206.13
26 55 68 00-0024 EA Nine Light Bracket.....	2,709.84	226.74
26 55 68 00-0025 Light Fixtures <small>(26 55 68 00-0001)</small>		
26 55 68 00-0026 EA 120 or 270 Volt, Sportlite Fixtures Complete with 1,000 Watt Metal Halide Lamp, Hook Cord And Plug.....	1,415.36	
<small>For 1,500 Watt Metal Halide Lamp, Add</small>		15.16

26	Electrical
26 50	Lighting
26 55	Special Purpose Lighting



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 55 68 00-0027	Electrical Component Enclosure <small>(26 55 68 00-0001)</small>		
	Note: Pole mounted NEMA 3R enclosure with thermal magnetic breaker and multiple ballasts to match total light fixtures. For light structures with more than 6 lights, use multiple enclosures.		
26 55 68 00-0028	EA Electrical Component Enclosure For 2 Lights, Pole Mounted	1,015.94	79.48
26 55 68 00-0029	EA Electrical Component Enclosure For 3 Lights, Pole Mounted	1,524.32	122.28
26 55 68 00-0030	EA Electrical Component Enclosure For 4 Lights, Pole Mounted	1,749.14	152.84
26 55 68 00-0031	EA Electrical Component Enclosure For 5 Lights, Pole Mounted	2,262.02	171.20
26 55 68 00-0032	EA Electrical Component Enclosure For 6 Lights, Pole Mounted	2,543.97	183.42
26 55 68 00-0033	Accessories <small>(26 55 68 00-0001)</small>		
26 55 68 00-0034	EA Time Delay Kit (Musco®)	1,024.78	244.95
26 55 68 00-0035	EA Remote Switch Box Push Button (Musco®)	2,094.53	244.95
26 55 68 00-0036	EA Push Button Strobe Kit (Musco®)	2,522.43	244.95
26 55 68 00-0037	EA Additional Control-Link Unit (Musco®)	12,167.21	734.87
26 55 68 00-0038	EA Auxiliary Brackets For Speakers Or Egress Fixtures, For New Installations (Musco®)	1,314.31	122.28
26 55 68 00-0039	EA Auxiliary Brackets For Speakers Or Egress Fixtures, For Retrofit Applications (Musco®)	1,558.87	244.56

26 56 Exterior Lighting (26 50)

26 56 13	Lighting Poles and Standards <small>(26 56)</small>		
26 56 13 00-0001	Poles And Standards <small>(26 56 13)</small>		
26 56 13 00-0002	Roadway Light Poles <small>(26 56 13 00-0001)</small>		
	Note: Excludes lighting fixtures.		
26 56 13 00-0003	Steel Roadway Light Poles <small>(26 56 13 00-0002)</small>		
	Note: Includes prime painted finish, anchor bolts, steel base with nut covers, reinforced handhole with cover and grounding provisions, and fixture arm(s).		
26 56 13 00-0004	Round Tapered, Steel Roadway Light Poles <small>(26 56 13 00-0003)</small>		
26 56 13 00-0005	Round Tapered, Steel Roadway Light Poles With Upsweep Style Arms <small>(26 56 13 00-0004)</small>		
26 56 13 00-0006	Round Tapered, Steel Roadway Light Poles With Single Upsweep Style Arm <small>(26 56 13 00-0005)</small>		
26 56 13 00-0007	EA 20' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	3,138.89	412.24
	For Galvanized Finish, Add	69.43	
	For >10 To 20, Deduct	-78.47	
	For >20 To 40, Deduct	-156.94	
	For >40, Deduct	-256.03	
26 56 13 00-0008	EA 20' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base	3,144.61	412.24
	For Galvanized Finish, Add	69.60	
	For >10 To 20, Deduct	-78.62	
	For >20 To 40, Deduct	-157.23	
	For >40, Deduct	-256.46	
26 56 13 00-0009	EA 25' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	3,453.34	549.66
	For Galvanized Finish, Add	70.62	
	For >10 To 20, Deduct	-86.33	
	For >20 To 40, Deduct	-172.67	
	For >40, Deduct	-286.48	
26 56 13 00-0010	EA 25' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base	3,522.12	549.66
	For Galvanized Finish, Add	72.68	
	For >10 To 20, Deduct	-88.05	
	For >20 To 40, Deduct	-176.11	
	For >40, Deduct	-291.64	
26 56 13 00-0011	EA 25' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base	3,590.91	549.66
	For Galvanized Finish, Add	74.75	
	For >10 To 20, Deduct	-89.77	
	For >20 To 40, Deduct	-179.55	
	For >40, Deduct	-296.80	
26 56 13 00-0012	EA 30' High, 6.6" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	3,742.80	618.37
	For Galvanized Finish, Add	75.18	
	For >10 To 20, Deduct	-93.57	
	For >20 To 40, Deduct	-187.14	
	For >40, Deduct	-311.63	
26 56 13 00-0013	EA 30' High, 6.6" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base	3,775.42	618.37
	For Galvanized Finish, Add	76.16	
	For >10 To 20, Deduct	-94.39	
	For >20 To 40, Deduct	-188.77	
	For >40, Deduct	-314.07	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0014	EA 30' High, 6.6" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base.....	3,781.63	618.37
	<i>For Galvanized Finish, Add</i>	76.35	
	<i>For >10 To 20, Deduct</i>	-94.54	
	<i>For >20 To 40, Deduct</i>	-189.08	
	<i>For >40, Deduct</i>	-314.54	
26 56 13 00-0015	EA 35' High, 7.3" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base.....	3,966.13	652.72
	<i>For Galvanized Finish, Add</i>	79.82	
	<i>For >10 To 20, Deduct</i>	-99.15	
	<i>For >20 To 40, Deduct</i>	-198.31	
	<i>For >40, Deduct</i>	-330.10	
26 56 13 00-0016	EA 35' High, 7.3" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base.....	3,990.76	652.72
	<i>For Galvanized Finish, Add</i>	80.56	
	<i>For >10 To 20, Deduct</i>	-99.77	
	<i>For >20 To 40, Deduct</i>	-199.54	
	<i>For >40, Deduct</i>	-331.94	
26 56 13 00-0017	EA 35' High, 7.3" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base.....	4,017.67	652.72
	<i>For Galvanized Finish, Add</i>	81.37	
	<i>For >10 To 20, Deduct</i>	-100.44	
	<i>For >20 To 40, Deduct</i>	-200.88	
	<i>For >40, Deduct</i>	-333.96	
26 56 13 00-0018	EA 40' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base.....	4,568.26	687.07
	<i>For Galvanized Finish, Add</i>	95.82	
	<i>For >10 To 20, Deduct</i>	-114.21	
	<i>For >20 To 40, Deduct</i>	-228.41	
	<i>For >40, Deduct</i>	-376.97	
26 56 13 00-0019	EA 40' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base.....	4,577.03	687.07
	<i>For Galvanized Finish, Add</i>	96.09	
	<i>For >10 To 20, Deduct</i>	-114.43	
	<i>For >20 To 40, Deduct</i>	-228.85	
	<i>For >40, Deduct</i>	-377.63	
26 56 13 00-0020	EA 40' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base.....	4,585.70	687.07
	<i>For Galvanized Finish, Add</i>	96.35	
	<i>For >10 To 20, Deduct</i>	-114.64	
	<i>For >20 To 40, Deduct</i>	-229.29	
	<i>For >40, Deduct</i>	-378.28	

26 56 13 00-0021 Round Tapered, Steel Roadway Light Poles With Two Upsweep Style Arms
(26 56 13 00-0005)

26 56 13 00-0022	EA 20' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base.....	3,900.58	480.96
	<i>For Galvanized Finish, Add</i>	88.16	
	<i>For >10 To 20, Deduct</i>	-97.51	
	<i>For >20 To 40, Deduct</i>	-195.03	
	<i>For >40, Deduct</i>	-316.59	
26 56 13 00-0023	EA 20' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base.....	3,971.70	498.13
	<i>For Galvanized Finish, Add</i>	89.26	
	<i>For >10 To 20, Deduct</i>	-99.29	
	<i>For >20 To 40, Deduct</i>	-198.59	
	<i>For >40, Deduct</i>	-322.78	
26 56 13 00-0024	EA 20' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base.....	4,033.74	515.31
	<i>For Galvanized Finish, Add</i>	90.09	
	<i>For >10 To 20, Deduct</i>	-100.84	
	<i>For >20 To 40, Deduct</i>	-201.69	
	<i>For >40, Deduct</i>	-328.30	
26 56 13 00-0025	EA 25' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base.....	3,937.13	618.37
	<i>For Galvanized Finish, Add</i>	81.01	
	<i>For >10 To 20, Deduct</i>	-98.43	
	<i>For >20 To 40, Deduct</i>	-196.86	
	<i>For >40, Deduct</i>	-326.20	
26 56 13 00-0026	EA 25' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base.....	3,986.08	635.54
	<i>For Galvanized Finish, Add</i>	81.45	
	<i>For >10 To 20, Deduct</i>	-99.65	
	<i>For >20 To 40, Deduct</i>	-199.30	
	<i>For >40, Deduct</i>	-330.73	
26 56 13 00-0027	EA 25' High, 5.9" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base.....	4,026.34	652.72
	<i>For Galvanized Finish, Add</i>	81.63	
	<i>For >10 To 20, Deduct</i>	-100.66	
	<i>For >20 To 40, Deduct</i>	-201.32	
	<i>For >40, Deduct</i>	-334.61	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 56 13 00-0028	EA	30'	High, 6.6" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base	4,254.69	687.07
			<i>For Galvanized Finish, Add</i>	86.42	
			<i>For >10 To 20, Deduct</i>	-106.37	
			<i>For >20 To 40, Deduct</i>	-212.73	
			<i>For >40, Deduct</i>	-353.46	
26 56 13 00-0029	EA	30'	High, 6.6" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base	4,297.92	704.25
			<i>For Galvanized Finish, Add</i>	86.68	
			<i>For >10 To 20, Deduct</i>	-107.45	
			<i>For >20 To 40, Deduct</i>	-214.90	
			<i>For >40, Deduct</i>	-357.56	
26 56 13 00-0030	EA	30'	High, 6.6" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base	4,337.89	721.42
			<i>For Galvanized Finish, Add</i>	86.85	
			<i>For >10 To 20, Deduct</i>	-108.45	
			<i>For >20 To 40, Deduct</i>	-216.89	
			<i>For >40, Deduct</i>	-361.41	
26 56 13 00-0031	EA	35'	High, 7.3" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base	4,512.11	721.42
			<i>For Galvanized Finish, Add</i>	92.08	
			<i>For >10 To 20, Deduct</i>	-112.80	
			<i>For >20 To 40, Deduct</i>	-225.61	
			<i>For >40, Deduct</i>	-374.48	
26 56 13 00-0032	EA	35'	High, 7.3" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base	4,584.60	738.60
			<i>For Galvanized Finish, Add</i>	93.22	
			<i>For >10 To 20, Deduct</i>	-114.62	
			<i>For >20 To 40, Deduct</i>	-229.23	
			<i>For >40, Deduct</i>	-380.78	
26 56 13 00-0033	EA	35'	High, 7.3" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base	4,655.11	755.78
			<i>For Galvanized Finish, Add</i>	94.31	
			<i>For >10 To 20, Deduct</i>	-116.38	
			<i>For >20 To 40, Deduct</i>	-232.76	
			<i>For >40, Deduct</i>	-386.92	
26 56 13 00-0034	EA	40'	High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base	5,080.33	755.78
			<i>For Galvanized Finish, Add</i>	107.06	
			<i>For >10 To 20, Deduct</i>	-127.01	
			<i>For >20 To 40, Deduct</i>	-254.02	
			<i>For >40, Deduct</i>	-418.81	
26 56 13 00-0035	EA	40'	High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base	5,120.41	772.96
			<i>For Galvanized Finish, Add</i>	107.23	
			<i>For >10 To 20, Deduct</i>	-128.01	
			<i>For >20 To 40, Deduct</i>	-256.02	
			<i>For >40, Deduct</i>	-422.68	
26 56 13 00-0036	EA	40'	High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base	5,160.67	790.14
			<i>For Galvanized Finish, Add</i>	107.41	
			<i>For >10 To 20, Deduct</i>	-129.02	
			<i>For >20 To 40, Deduct</i>	-258.03	
			<i>For >40, Deduct</i>	-426.56	

26 56 13 00-0037 Round Tapered, Steel Roadway Light Poles With Three Upsweep Style Arms (26 56 13 00-0005)

26 56 13 00-0038	EA	25'	High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base	4,614.77	687.07
			<i>For Galvanized Finish, Add</i>	97.22	
			<i>For >10 To 20, Deduct</i>	-115.37	
			<i>For >20 To 40, Deduct</i>	-230.74	
			<i>For >40, Deduct</i>	-380.46	
26 56 13 00-0039	EA	25'	High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base	4,689.29	721.42
			<i>For Galvanized Finish, Add</i>	97.39	
			<i>For >10 To 20, Deduct</i>	-117.23	
			<i>For >20 To 40, Deduct</i>	-234.46	
			<i>For >40, Deduct</i>	-387.77	
26 56 13 00-0040	EA	25'	High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 8' Upsweep Style Arms, Anchor Base	4,772.48	755.78
			<i>For Galvanized Finish, Add</i>	97.83	
			<i>For >10 To 20, Deduct</i>	-119.31	
			<i>For >20 To 40, Deduct</i>	-238.62	
			<i>For >40, Deduct</i>	-395.73	
26 56 13 00-0041	EA	30'	High, 7.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base	4,897.43	755.78
			<i>For Galvanized Finish, Add</i>	101.58	
			<i>For >10 To 20, Deduct</i>	-122.44	
			<i>For >20 To 40, Deduct</i>	-244.87	
			<i>For >40, Deduct</i>	-405.10	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0042	EA 30' High, 7.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base.....	4,974.72	790.14
	<i>For Galvanized Finish, Add</i>	101.83	
	<i>For >10 To 20, Deduct</i>	-124.37	
	<i>For >20 To 40, Deduct</i>	-248.74	
	<i>For >40, Deduct</i>	-412.61	
26 56 13 00-0043	EA 30' High, 7.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 8' Upsweep Style Arms, Anchor Base.....	5,049.23	824.49
	<i>For Galvanized Finish, Add</i>	102.01	
	<i>For >10 To 20, Deduct</i>	-126.23	
	<i>For >20 To 40, Deduct</i>	-252.46	
	<i>For >40, Deduct</i>	-419.92	
26 56 13 00-0044	EA 35' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base.....	5,204.03	790.14
	<i>For Galvanized Finish, Add</i>	108.71	
	<i>For >10 To 20, Deduct</i>	-130.10	
	<i>For >20 To 40, Deduct</i>	-260.20	
	<i>For >40, Deduct</i>	-429.81	
26 56 13 00-0045	EA 35' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base.....	5,278.54	824.49
	<i>For Galvanized Finish, Add</i>	108.89	
	<i>For >10 To 20, Deduct</i>	-131.96	
	<i>For >20 To 40, Deduct</i>	-263.93	
	<i>For >40, Deduct</i>	-437.11	
26 56 13 00-0046	EA 35' High, 8.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 8' Upsweep Style Arms, Anchor Base.....	5,353.08	858.84
	<i>For Galvanized Finish, Add</i>	109.06	
	<i>For >10 To 20, Deduct</i>	-133.83	
	<i>For >20 To 40, Deduct</i>	-267.65	
	<i>For >40, Deduct</i>	-444.42	
26 56 13 00-0047	EA 40' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base.....	5,592.41	824.49
	<i>For Galvanized Finish, Add</i>	118.30	
	<i>For >10 To 20, Deduct</i>	-139.81	
	<i>For >20 To 40, Deduct</i>	-279.62	
	<i>For >40, Deduct</i>	-460.66	
26 56 13 00-0048	EA 40' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base.....	5,666.64	858.84
	<i>For Galvanized Finish, Add</i>	118.47	
	<i>For >10 To 20, Deduct</i>	-141.67	
	<i>For >20 To 40, Deduct</i>	-283.33	
	<i>For >40, Deduct</i>	-467.94	
26 56 13 00-0049	EA 40' High, 9.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Three 8' Upsweep Style Arms, Anchor Base.....	5,746.97	893.20
	<i>For Galvanized Finish, Add</i>	118.82	
	<i>For >10 To 20, Deduct</i>	-143.67	
	<i>For >20 To 40, Deduct</i>	-287.35	
	<i>For >40, Deduct</i>	-475.68	
26 56 13 00-0050	Round Tapered, Steel Roadway Light Poles With Four Upsweep Style Arms		
	<small>(26 56 13 00-0005)</small>		
26 56 13 00-0051	EA 25' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base.....	5,129.70	755.78
	<i>For Galvanized Finish, Add</i>	108.54	
	<i>For >10 To 20, Deduct</i>	-128.24	
	<i>For >20 To 40, Deduct</i>	-256.49	
	<i>For >40, Deduct</i>	-422.52	
26 56 13 00-0052	EA 25' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base.....	5,241.43	807.32
	<i>For Galvanized Finish, Add</i>	108.80	
	<i>For >10 To 20, Deduct</i>	-131.04	
	<i>For >20 To 40, Deduct</i>	-262.07	
	<i>For >40, Deduct</i>	-433.47	
26 56 13 00-0053	EA 25' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 8' Upsweep Style Arms, Anchor Base.....	5,350.22	858.84
	<i>For Galvanized Finish, Add</i>	108.98	
	<i>For >10 To 20, Deduct</i>	-133.76	
	<i>For >20 To 40, Deduct</i>	-267.51	
	<i>For >40, Deduct</i>	-444.21	
26 56 13 00-0054	EA 30' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base.....	5,447.94	824.49
	<i>For Galvanized Finish, Add</i>	113.97	
	<i>For >10 To 20, Deduct</i>	-136.20	
	<i>For >20 To 40, Deduct</i>	-272.40	
	<i>For >40, Deduct</i>	-449.82	
26 56 13 00-0055	EA 30' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base.....	5,557.12	876.02
	<i>For Galvanized Finish, Add</i>	114.15	
	<i>For >10 To 20, Deduct</i>	-138.93	
	<i>For >20 To 40, Deduct</i>	-277.86	
	<i>For >40, Deduct</i>	-460.59	

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	UNIT COST
26 56 13 00-0056	EA	30' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 8' Upsweep Style Arms, Anchor Base	5,632.78		927.55
		<i>For Galvanized Finish, Add</i>	113.33		
		<i>For >10 To 20, Deduct</i>	-140.82		
		<i>For >20 To 40, Deduct</i>	-281.64		
		<i>For >40, Deduct</i>	-468.84		
26 56 13 00-0057	EA	35' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base	5,846.68		858.84
		<i>For Galvanized Finish, Add</i>	123.87		
		<i>For >10 To 20, Deduct</i>	-146.17		
		<i>For >20 To 40, Deduct</i>	-292.33		
		<i>For >40, Deduct</i>	-481.44		
26 56 13 00-0058	EA	35' High, 9.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base	5,995.07		910.37
		<i>For Galvanized Finish, Add</i>	125.23		
		<i>For >10 To 20, Deduct</i>	-149.88		
		<i>For >20 To 40, Deduct</i>	-299.75		
		<i>For >40, Deduct</i>	-495.15		
26 56 13 00-0059	EA	35' High, 9.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 8' Upsweep Style Arms, Anchor Base	6,067.49		961.90
		<i>For Galvanized Finish, Add</i>	124.31		
		<i>For >10 To 20, Deduct</i>	-151.69		
		<i>For >20 To 40, Deduct</i>	-303.37		
		<i>For >40, Deduct</i>	-503.16		
26 56 13 00-0060	EA	40' High, 10.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base	6,104.19		893.20
		<i>For Galvanized Finish, Add</i>	129.53		
		<i>For >10 To 20, Deduct</i>	-152.60		
		<i>For >20 To 40, Deduct</i>	-305.21		
		<i>For >40, Deduct</i>	-502.47		
26 56 13 00-0061	EA	40' High, 10.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base	6,212.97		944.73
		<i>For Galvanized Finish, Add</i>	129.71		
		<i>For >10 To 20, Deduct</i>	-155.32		
		<i>For >20 To 40, Deduct</i>	-310.65		
		<i>For >40, Deduct</i>	-513.21		
26 56 13 00-0062	EA	40' High, 10.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Four 8' Upsweep Style Arms, Anchor Base	6,324.71		996.26
		<i>For Galvanized Finish, Add</i>	129.97		
		<i>For >10 To 20, Deduct</i>	-158.12		
		<i>For >20 To 40, Deduct</i>	-316.24		
		<i>For >40, Deduct</i>	-524.17		
26 56 13 00-0063		Round Tapered, Steel Roadway Light Poles With Davit Style Arm <small>(26 56 13 00-0004)</small>			
26 56 13 00-0064		Round Tapered, Steel Roadway Light Poles With Single Davit Style Arm <small>(26 56 13 00-0063)</small>			
26 56 13 00-0065	EA	25' High, 6.4" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6.5' Davit Style Arm, Anchor Base	3,666.19		549.66
		<i>For Galvanized Finish, Add</i>	77.01		
		<i>For >10 To 20, Deduct</i>	-91.65		
		<i>For >20 To 40, Deduct</i>	-183.31		
		<i>For >40, Deduct</i>	-302.45		
26 56 13 00-0066	EA	30' High, 7.1" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6.5' Davit Style Arm, Anchor Base	4,147.62		618.37
		<i>For Galvanized Finish, Add</i>	87.33		
		<i>For >10 To 20, Deduct</i>	-103.69		
		<i>For >20 To 40, Deduct</i>	-207.38		
		<i>For >40, Deduct</i>	-341.99		
26 56 13 00-0067	EA	35' High, 7.8" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6.5' Davit Style Arm, Anchor Base	4,264.22		652.72
		<i>For Galvanized Finish, Add</i>	88.76		
		<i>For >10 To 20, Deduct</i>	-106.61		
		<i>For >20 To 40, Deduct</i>	-213.21		
		<i>For >40, Deduct</i>	-352.45		
26 56 13 00-0068	EA	40' High, 9.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 6.5' Davit Style Arm, Anchor Base	5,067.68		687.07
		<i>For Galvanized Finish, Add</i>	110.81		
		<i>For >10 To 20, Deduct</i>	-126.69		
		<i>For >20 To 40, Deduct</i>	-253.38		
		<i>For >40, Deduct</i>	-414.43		
26 56 13 00-0069		Round Tapered, Steel Roadway Light Poles With Truss Style Arms <small>(26 56 13 00-0004)</small>			
26 56 13 00-0070		Round Tapered, Steel Roadway Light Poles With Single Truss Style Arm <small>(26 56 13 00-0069)</small>			
26 56 13 00-0071	EA	25' High, 6.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 10' Truss Style Arm, Anchor Base	4,693.71		549.66
		<i>For Galvanized Finish, Add</i>	107.83		
		<i>For >10 To 20, Deduct</i>	-117.34		
		<i>For >20 To 40, Deduct</i>	-234.69		
		<i>For >40, Deduct</i>	-379.51		



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0072	EA 25' High, 6.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 12' Truss Style Arm, Anchor Base.....	4,737.76	549.66
	For Galvanized Finish, Add	109.15	
	For >10 To 20, Deduct	-118.44	
	For >20 To 40, Deduct	-236.89	
	For >40, Deduct	-382.82	
26 56 13 00-0073	EA 25' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	4,757.86	549.66
	For Galvanized Finish, Add	109.76	
	For >10 To 20, Deduct	-118.95	
	For >20 To 40, Deduct	-237.89	
	For >40, Deduct	-384.32	
26 56 13 00-0074	EA 30' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 10' Truss Style Arm, Anchor Base.....	4,875.17	618.37
	For Galvanized Finish, Add	109.15	
	For >10 To 20, Deduct	-121.88	
	For >20 To 40, Deduct	-243.76	
	For >40, Deduct	-396.56	
26 56 13 00-0075	EA 30' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 12' Truss Style Arm, Anchor Base.....	4,882.86	618.37
	For Galvanized Finish, Add	109.38	
	For >10 To 20, Deduct	-122.07	
	For >20 To 40, Deduct	-244.14	
	For >40, Deduct	-397.13	
26 56 13 00-0076	EA 30' High, 7.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	4,962.28	618.37
	For Galvanized Finish, Add	111.77	
	For >10 To 20, Deduct	-124.06	
	For >20 To 40, Deduct	-248.11	
	For >40, Deduct	-403.09	
26 56 13 00-0077	EA 35' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 10' Truss Style Arm, Anchor Base.....	4,970.00	652.72
	For Galvanized Finish, Add	109.94	
	For >10 To 20, Deduct	-124.25	
	For >20 To 40, Deduct	-248.50	
	For >40, Deduct	-405.39	
26 56 13 00-0078	EA 35' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 12' Truss Style Arm, Anchor Base.....	5,016.51	652.72
	For Galvanized Finish, Add	111.33	
	For >10 To 20, Deduct	-125.41	
	For >20 To 40, Deduct	-250.83	
	For >40, Deduct	-408.87	
26 56 13 00-0079	EA 35' High, 8.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	5,260.40	652.72
	For Galvanized Finish, Add	118.65	
	For >10 To 20, Deduct	-131.51	
	For >20 To 40, Deduct	-263.02	
	For >40, Deduct	-427.17	
26 56 13 00-0080	Round Tapered, Steel Roadway Light Poles With Two Truss Style Arms <small>(26 56 13 00-0069)</small>		
26 56 13 00-0081	EA 25' High, 6.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 10' Truss Style Arms, Anchor Base.....	6,140.43	687.07
	For Galvanized Finish, Add	142.99	
	For >10 To 20, Deduct	-153.51	
	For >20 To 40, Deduct	-307.02	
	For >40, Deduct	-494.89	
26 56 13 00-0082	EA 25' High, 6.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 12' Truss Style Arms, Anchor Base.....	6,251.31	721.42
	For Galvanized Finish, Add	144.25	
	For >10 To 20, Deduct	-156.28	
	For >20 To 40, Deduct	-312.57	
	For >40, Deduct	-504.92	
26 56 13 00-0083	EA 25' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 15' Truss Style Arms, Anchor Base.....	6,485.57	755.78
	For Galvanized Finish, Add	149.22	
	For >10 To 20, Deduct	-162.14	
	For >20 To 40, Deduct	-324.28	
	For >40, Deduct	-524.21	
26 56 13 00-0084	EA 30' High, 7.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 10' Truss Style Arms, Anchor Base.....	6,253.40	755.78
	For Galvanized Finish, Add	142.26	
	For >10 To 20, Deduct	-156.34	
	For >20 To 40, Deduct	-312.67	
	For >40, Deduct	-506.79	
26 56 13 00-0085	EA 30' High, 7.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 12' Truss Style Arms, Anchor Base.....	6,539.99	790.14
	For Galvanized Finish, Add	148.79	
	For >10 To 20, Deduct	-163.50	
	For >20 To 40, Deduct	-327.00	
	For >40, Deduct	-530.01	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0086	EA 30' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 15' Truss Style Arms, Anchor Base	6,715.91	824.49
	<i>For Galvanized Finish, Add</i>	152.01	
	<i>For >10 To 20, Deduct</i>	-167.90	
	<i>For >20 To 40, Deduct</i>	-335.80	
	<i>For >40, Deduct</i>	-544.92	
26 56 13 00-0087	EA 35' High, 8.0" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 10' Truss Style Arms, Anchor Base	6,443.81	790.14
	<i>For Galvanized Finish, Add</i>	145.91	
	<i>For >10 To 20, Deduct</i>	-161.10	
	<i>For >20 To 40, Deduct</i>	-322.19	
	<i>For >40, Deduct</i>	-522.79	
26 56 13 00-0088	EA 35' High, 8.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 12' Truss Style Arms, Anchor Base	6,823.32	824.49
	<i>For Galvanized Finish, Add</i>	155.23	
	<i>For >10 To 20, Deduct</i>	-170.58	
	<i>For >20 To 40, Deduct</i>	-341.17	
	<i>For >40, Deduct</i>	-552.97	
26 56 13 00-0089	EA 35' High, 8.5" Base OD, 7 Gauge, Round Tapered, Steel Roadway Light Pole With Two 15' Truss Style Arms, Anchor Base	7,051.68	858.84
	<i>For Galvanized Finish, Add</i>	160.02	
	<i>For >10 To 20, Deduct</i>	-176.29	
	<i>For >20 To 40, Deduct</i>	-352.58	
	<i>For >40, Deduct</i>	-571.82	
26 56 13 00-0090	Aluminum Roadway Light Poles <small>(26 56 13 00-0002)</small>		
	Note: Includes satin finish, anchor bolts, cast aluminum base with nut covers, reinforced handhole with cover and grounding provisions, and fixture arm(s).		
26 56 13 00-0091	Round Tapered, Aluminum Roadway Light Poles <small>(26 56 13 00-0090)</small>		
26 56 13 00-0092	Round Tapered, Aluminum Roadway Light Poles With Upsweep Style Arms <small>(26 56 13 00-0091)</small>		
26 56 13 00-0093	Round Tapered, Aluminum Roadway Light Poles With Single Upsweep Style Arm <small>(26 56 13 00-0092)</small>		
26 56 13 00-0094	EA 20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	2,831.83	412.24
	<i>For >10 To 20, Deduct</i>	-70.80	
	<i>For >20 To 40, Deduct</i>	-141.59	
	<i>For >40, Deduct</i>	-233.00	
26 56 13 00-0095	EA 20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base	2,856.13	412.24
	<i>For >10 To 20, Deduct</i>	-71.40	
	<i>For >20 To 40, Deduct</i>	-142.81	
	<i>For >40, Deduct</i>	-234.82	
26 56 13 00-0096	EA 25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	3,473.46	549.66
	<i>For >10 To 20, Deduct</i>	-86.84	
	<i>For >20 To 40, Deduct</i>	-173.67	
	<i>For >40, Deduct</i>	-287.99	
26 56 13 00-0097	EA 25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base	3,519.37	549.66
	<i>For >10 To 20, Deduct</i>	-87.98	
	<i>For >20 To 40, Deduct</i>	-175.97	
	<i>For >40, Deduct</i>	-291.44	
26 56 13 00-0098	EA 25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base	3,561.59	549.66
	<i>For >10 To 20, Deduct</i>	-89.04	
	<i>For >20 To 40, Deduct</i>	-178.08	
	<i>For >40, Deduct</i>	-294.60	
26 56 13 00-0099	EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	3,986.52	618.37
	<i>For >10 To 20, Deduct</i>	-99.66	
	<i>For >20 To 40, Deduct</i>	-199.33	
	<i>For >40, Deduct</i>	-329.91	
26 56 13 00-0100	EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base	4,025.26	618.37
	<i>For >10 To 20, Deduct</i>	-100.63	
	<i>For >20 To 40, Deduct</i>	-201.26	
	<i>For >40, Deduct</i>	-332.81	
26 56 13 00-0101	EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base	4,068.58	618.37
	<i>For >10 To 20, Deduct</i>	-101.71	
	<i>For >20 To 40, Deduct</i>	-203.43	
	<i>For >40, Deduct</i>	-336.06	
26 56 13 00-0102	EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Upsweep Style Arm, Anchor Base	4,668.11	652.72
	<i>For >10 To 20, Deduct</i>	-116.70	
	<i>For >20 To 40, Deduct</i>	-233.41	
	<i>For >40, Deduct</i>	-382.74	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0103 EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Upsweep Style Arm, Anchor Base.....	4,706.75	652.72
<i>For >10 To 20, Deduct</i>	-117.67	
<i>For >20 To 40, Deduct</i>	-235.34	
<i>For >40, Deduct</i>	-385.64	
26 56 13 00-0104 EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Upsweep Style Arm, Anchor Base.....	4,739.12	652.72
<i>For >10 To 20, Deduct</i>	-118.48	
<i>For >20 To 40, Deduct</i>	-236.96	
<i>For >40, Deduct</i>	-388.07	
26 56 13 00-0105 Round Tapered, Aluminum Roadway Light Poles With Two Upsweep Style Arms <small>(26 56 13 00-0092)</small>		
26 56 13 00-0106 EA 20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base.....	3,245.11	480.96
<i>For >10 To 20, Deduct</i>	-81.13	
<i>For >20 To 40, Deduct</i>	-162.26	
<i>For >40, Deduct</i>	-267.43	
26 56 13 00-0107 EA 20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base.....	3,483.23	480.96
<i>For >10 To 20, Deduct</i>	-87.08	
<i>For >20 To 40, Deduct</i>	-174.16	
<i>For >40, Deduct</i>	-285.29	
26 56 13 00-0108 EA 20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base.....	3,598.35	515.31
<i>For >10 To 20, Deduct</i>	-89.96	
<i>For >20 To 40, Deduct</i>	-179.92	
<i>For >40, Deduct</i>	-295.64	
26 56 13 00-0109 EA 25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base.....	3,873.68	618.37
<i>For >10 To 20, Deduct</i>	-96.84	
<i>For >20 To 40, Deduct</i>	-193.68	
<i>For >40, Deduct</i>	-321.44	
26 56 13 00-0110 EA 25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base.....	4,059.62	635.54
<i>For >10 To 20, Deduct</i>	-101.49	
<i>For >20 To 40, Deduct</i>	-202.98	
<i>For >40, Deduct</i>	-336.25	
26 56 13 00-0111 EA 25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base.....	4,327.51	652.72
<i>For >10 To 20, Deduct</i>	-108.19	
<i>For >20 To 40, Deduct</i>	-216.38	
<i>For >40, Deduct</i>	-357.20	
26 56 13 00-0112 EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base.....	4,470.22	687.07
<i>For >10 To 20, Deduct</i>	-111.76	
<i>For >20 To 40, Deduct</i>	-223.51	
<i>For >40, Deduct</i>	-369.62	
26 56 13 00-0113 EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base.....	4,645.20	704.25
<i>For >10 To 20, Deduct</i>	-116.13	
<i>For >20 To 40, Deduct</i>	-232.26	
<i>For >40, Deduct</i>	-383.60	
26 56 13 00-0114 EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base.....	4,858.61	721.42
<i>For >10 To 20, Deduct</i>	-121.47	
<i>For >20 To 40, Deduct</i>	-242.93	
<i>For >40, Deduct</i>	-400.47	
26 56 13 00-0115 EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 4' Upsweep Style Arms, Anchor Base.....	5,069.25	721.42
<i>For >10 To 20, Deduct</i>	-126.73	
<i>For >20 To 40, Deduct</i>	-253.46	
<i>For >40, Deduct</i>	-416.27	
26 56 13 00-0116 EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 6' Upsweep Style Arms, Anchor Base.....	5,541.99	738.60
<i>For >10 To 20, Deduct</i>	-138.55	
<i>For >20 To 40, Deduct</i>	-277.10	
<i>For >40, Deduct</i>	-452.58	
26 56 13 00-0117 EA 35' High, 8" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 8' Upsweep Style Arms, Anchor Base.....	6,091.72	755.78
<i>For >10 To 20, Deduct</i>	-152.29	
<i>For >20 To 40, Deduct</i>	-304.59	
<i>For >40, Deduct</i>	-494.67	
26 56 13 00-0118 Round Tapered, Aluminum Roadway Light Poles With Three Upsweep Style Arms <small>(26 56 13 00-0092)</small>		
26 56 13 00-0119 EA 20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base.....	3,765.85	549.66
<i>For >10 To 20, Deduct</i>	-94.15	
<i>For >20 To 40, Deduct</i>	-188.29	
<i>For >40, Deduct</i>	-309.92	



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0120	EA	20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base	4,027.17	584.01
		<i>For >10 To 20, Deduct</i>	-100.68	
		<i>For >20 To 40, Deduct</i>	-201.36	
		<i>For >40, Deduct</i>	-331.24	
26 56 13 00-0121	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base	4,579.87	687.07
		<i>For >10 To 20, Deduct</i>	-114.50	
		<i>For >20 To 40, Deduct</i>	-228.99	
		<i>For >40, Deduct</i>	-377.84	
26 56 13 00-0122	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base	4,775.95	721.42
		<i>For >10 To 20, Deduct</i>	-119.40	
		<i>For >20 To 40, Deduct</i>	-238.80	
		<i>For >40, Deduct</i>	-394.27	
26 56 13 00-0123	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base	5,001.71	755.78
		<i>For >10 To 20, Deduct</i>	-125.04	
		<i>For >20 To 40, Deduct</i>	-250.09	
		<i>For >40, Deduct</i>	-412.92	
26 56 13 00-0124	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base	5,180.06	790.14
		<i>For >10 To 20, Deduct</i>	-129.50	
		<i>For >20 To 40, Deduct</i>	-259.00	
		<i>For >40, Deduct</i>	-428.01	
26 56 13 00-0125	EA	35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 4' Upsweep Style Arms, Anchor Base	5,408.13	790.14
		<i>For >10 To 20, Deduct</i>	-135.20	
		<i>For >20 To 40, Deduct</i>	-270.41	
		<i>For >40, Deduct</i>	-445.12	
26 56 13 00-0126	EA	35' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 6' Upsweep Style Arms, Anchor Base	5,881.56	824.49
		<i>For >10 To 20, Deduct</i>	-147.04	
		<i>For >20 To 40, Deduct</i>	-294.08	
		<i>For >40, Deduct</i>	-482.34	
26 56 13 00-0127	EA	35' High, 8" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Three 8' Upsweep Style Arms, Anchor Base	11,421.27	858.84
		<i>For >10 To 20, Deduct</i>	-285.53	
		<i>For >20 To 40, Deduct</i>	-571.06	
		<i>For >40, Deduct</i>	-899.54	

26 56 13 00-0128 Round Tapered, Aluminum Roadway Light Poles With Four Upsweep Style Arms (26 56 13 00-0092)

26 56 13 00-0129	EA	20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base	3,902.67	618.37
		<i>For >10 To 20, Deduct</i>	-97.57	
		<i>For >20 To 40, Deduct</i>	-195.13	
		<i>For >40, Deduct</i>	-323.62	
26 56 13 00-0130	EA	20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base	4,048.47	618.37
		<i>For >10 To 20, Deduct</i>	-101.21	
		<i>For >20 To 40, Deduct</i>	-202.42	
		<i>For >40, Deduct</i>	-334.55	
26 56 13 00-0131	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base	5,010.77	755.78
		<i>For >10 To 20, Deduct</i>	-125.27	
		<i>For >20 To 40, Deduct</i>	-250.54	
		<i>For >40, Deduct</i>	-413.60	
26 56 13 00-0132	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base	5,424.65	807.32
		<i>For >10 To 20, Deduct</i>	-135.62	
		<i>For >20 To 40, Deduct</i>	-271.23	
		<i>For >40, Deduct</i>	-447.21	
26 56 13 00-0133	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base	5,657.58	824.49
		<i>For >10 To 20, Deduct</i>	-141.44	
		<i>For >20 To 40, Deduct</i>	-282.88	
		<i>For >40, Deduct</i>	-465.54	
26 56 13 00-0134	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base	6,039.21	876.02
		<i>For >10 To 20, Deduct</i>	-150.98	
		<i>For >20 To 40, Deduct</i>	-301.96	
		<i>For >40, Deduct</i>	-496.74	
26 56 13 00-0135	EA	35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 4' Upsweep Style Arms, Anchor Base	5,957.45	858.84
		<i>For >10 To 20, Deduct</i>	-148.94	
		<i>For >20 To 40, Deduct</i>	-297.87	
		<i>For >40, Deduct</i>	-489.75	
26 56 13 00-0136	EA	35' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 6' Upsweep Style Arms, Anchor Base	6,774.28	910.37
		<i>For >10 To 20, Deduct</i>	-169.36	
		<i>For >20 To 40, Deduct</i>	-338.71	
		<i>For >40, Deduct</i>	-553.59	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0137	EA	35' High, 8" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Four 8' Upsweep Style Arms, Anchor Base.....	7,496.59	961.90
		<i>For >10 To 20, Deduct</i>	-187.41	
		<i>For >20 To 40, Deduct</i>	-374.83	
		<i>For >40, Deduct</i>	-610.34	
26 56 13 00-0138		Round Tapered, Aluminum Roadway Light Poles With Truss Style Arms ^(26 56 13 00-0091)		
26 56 13 00-0139		Round Tapered, Aluminum Roadway Light Poles With Single Truss Style Arm ^(26 56 13 00-0138)		
26 56 13 00-0140	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Truss Style Arm, Anchor Base.....	4,148.08	549.66
		<i>For >10 To 20, Deduct</i>	-103.70	
		<i>For >20 To 40, Deduct</i>	-207.40	
		<i>For >40, Deduct</i>	-338.59	
26 56 13 00-0141	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 10' Truss Style Arm, Anchor Base.....	4,180.55	549.66
		<i>For >10 To 20, Deduct</i>	-104.51	
		<i>For >20 To 40, Deduct</i>	-209.03	
		<i>For >40, Deduct</i>	-341.02	
26 56 13 00-0142	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 12' Truss Style Arm, Anchor Base.....	4,263.51	549.66
		<i>For >10 To 20, Deduct</i>	-106.59	
		<i>For >20 To 40, Deduct</i>	-213.18	
		<i>For >40, Deduct</i>	-347.25	
26 56 13 00-0143	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	4,387.99	549.66
		<i>For >10 To 20, Deduct</i>	-109.70	
		<i>For >20 To 40, Deduct</i>	-219.40	
		<i>For >40, Deduct</i>	-356.58	
26 56 13 00-0144	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Truss Style Arm, Anchor Base.....	4,670.41	618.37
		<i>For >10 To 20, Deduct</i>	-116.76	
		<i>For >20 To 40, Deduct</i>	-233.52	
		<i>For >40, Deduct</i>	-381.20	
26 56 13 00-0145	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 10' Truss Style Arm, Anchor Base.....	4,743.61	618.37
		<i>For >10 To 20, Deduct</i>	-118.59	
		<i>For >20 To 40, Deduct</i>	-237.18	
		<i>For >40, Deduct</i>	-386.69	
26 56 13 00-0146	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 12' Truss Style Arm, Anchor Base.....	4,821.69	618.37
		<i>For >10 To 20, Deduct</i>	-120.54	
		<i>For >20 To 40, Deduct</i>	-241.08	
		<i>For >40, Deduct</i>	-392.55	
26 56 13 00-0147	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	5,292.65	618.37
		<i>For >10 To 20, Deduct</i>	-132.32	
		<i>For >20 To 40, Deduct</i>	-264.63	
		<i>For >40, Deduct</i>	-427.87	
26 56 13 00-0148	EA	35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Truss Style Arm, Anchor Base.....	5,074.04	652.72
		<i>For >10 To 20, Deduct</i>	-126.85	
		<i>For >20 To 40, Deduct</i>	-253.70	
		<i>For >40, Deduct</i>	-413.19	
26 56 13 00-0149	EA	35' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 10' Truss Style Arm, Anchor Base.....	5,678.35	652.72
		<i>For >10 To 20, Deduct</i>	-141.96	
		<i>For >20 To 40, Deduct</i>	-283.92	
		<i>For >40, Deduct</i>	-458.51	
26 56 13 00-0150	EA	35' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 12' Truss Style Arm, Anchor Base.....	5,737.21	652.72
		<i>For >10 To 20, Deduct</i>	-143.43	
		<i>For >20 To 40, Deduct</i>	-286.86	
		<i>For >40, Deduct</i>	-462.93	
26 56 13 00-0151	EA	35' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	6,110.88	652.72
		<i>For >10 To 20, Deduct</i>	-152.77	
		<i>For >20 To 40, Deduct</i>	-305.54	
		<i>For >40, Deduct</i>	-490.95	
26 56 13 00-0152	EA	35' High, 8" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 15' Truss Style Arm, Anchor Base.....	6,451.67	652.72
		<i>For >10 To 20, Deduct</i>	-161.29	
		<i>For >20 To 40, Deduct</i>	-322.58	
		<i>For >40, Deduct</i>	-516.51	
26 56 13 00-0153		Round Tapered, Aluminum Roadway Light Poles With Two Truss Style Arms ^(26 56 13 00-0138)		
26 56 13 00-0154	EA	25' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 10' Truss Style Arms, Anchor Base.....	5,382.76	687.07
		<i>For >10 To 20, Deduct</i>	-134.57	
		<i>For >20 To 40, Deduct</i>	-269.14	
		<i>For >40, Deduct</i>	-438.06	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 56	13 00-0155	EA	25' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 12' Truss Style Arms, Anchor Base.....	5,534.43	721.42
			<i>For >10 To 20, Deduct</i>	-138.36	
			<i>For >20 To 40, Deduct</i>	-276.72	
			<i>For >40, Deduct</i>	-451.15	
26 56	13 00-0156	EA	25' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 15' Truss Style Arms, Anchor Base.....	5,656.51	755.78
			<i>For >10 To 20, Deduct</i>	-141.41	
			<i>For >20 To 40, Deduct</i>	-282.83	
			<i>For >40, Deduct</i>	-462.03	
26 56	13 00-0157	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 10' Truss Style Arms, Anchor Base.....	5,798.73	755.78
			<i>For >10 To 20, Deduct</i>	-144.97	
			<i>For >20 To 40, Deduct</i>	-289.94	
			<i>For >40, Deduct</i>	-472.69	
26 56	13 00-0158	EA	30' High, 8" Base OD, 0.219" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 12' Truss Style Arms, Anchor Base.....	6,299.86	790.14
			<i>For >10 To 20, Deduct</i>	-157.50	
			<i>For >20 To 40, Deduct</i>	-314.99	
			<i>For >40, Deduct</i>	-512.00	
26 56	13 00-0159	EA	30' High, 8" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 15' Truss Style Arms, Anchor Base.....	7,221.75	824.49
			<i>For >10 To 20, Deduct</i>	-180.54	
			<i>For >20 To 40, Deduct</i>	-361.09	
			<i>For >40, Deduct</i>	-582.86	
26 56	13 00-0160	EA	35' High, 8" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 10' Truss Style Arms, Anchor Base.....	6,984.14	790.14
			<i>For >10 To 20, Deduct</i>	-174.60	
			<i>For >20 To 40, Deduct</i>	-349.21	
			<i>For >40, Deduct</i>	-563.32	
26 56	13 00-0161	EA	35' High, 10" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 12' Truss Style Arms, Anchor Base.....	7,122.36	824.49
			<i>For >10 To 20, Deduct</i>	-178.06	
			<i>For >20 To 40, Deduct</i>	-356.12	
			<i>For >40, Deduct</i>	-575.40	
26 56	13 00-0162	EA	35' High, 10" Base OD, 0.250" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Two 15' Truss Style Arms, Anchor Base.....	8,650.08	858.84
			<i>For >10 To 20, Deduct</i>	-216.25	
			<i>For >20 To 40, Deduct</i>	-432.50	
			<i>For >40, Deduct</i>	-691.70	

26 56 13 00-0163 Round Tapered, Aluminum Roadway Light Poles With Davit Style Arm (26 56 13 00-0091)

26 56 13 00-0164 Round Tapered, Aluminum Roadway Light Poles With Single Davit Style Arm (26 56 13 00-0163)

26 56	13 00-0165	EA	20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Davit Style Arm, Anchor Base.....	3,399.30	412.24
			<i>For >10 To 20, Deduct</i>	-84.98	
			<i>For >20 To 40, Deduct</i>	-169.97	
			<i>For >40, Deduct</i>	-275.56	
26 56	13 00-0166	EA	20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Davit Style Arm, Anchor Base.....	3,491.02	412.24
			<i>For >10 To 20, Deduct</i>	-87.28	
			<i>For >20 To 40, Deduct</i>	-174.55	
			<i>For >40, Deduct</i>	-282.44	
26 56	13 00-0167	EA	20' High, 6" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Davit Style Arm, Anchor Base.....	3,582.94	412.24
			<i>For >10 To 20, Deduct</i>	-89.57	
			<i>For >20 To 40, Deduct</i>	-179.15	
			<i>For >40, Deduct</i>	-289.33	
26 56	13 00-0168	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Davit Style Arm, Anchor Base.....	4,049.19	549.66
			<i>For >10 To 20, Deduct</i>	-101.23	
			<i>For >20 To 40, Deduct</i>	-202.46	
			<i>For >40, Deduct</i>	-331.17	
26 56	13 00-0169	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Davit Style Arm, Anchor Base.....	4,119.10	549.66
			<i>For >10 To 20, Deduct</i>	-102.98	
			<i>For >20 To 40, Deduct</i>	-205.96	
			<i>For >40, Deduct</i>	-336.42	
26 56	13 00-0170	EA	25' High, 7" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Davit Style Arm, Anchor Base.....	4,195.49	549.66
			<i>For >10 To 20, Deduct</i>	-104.89	
			<i>For >20 To 40, Deduct</i>	-209.77	
			<i>For >40, Deduct</i>	-342.14	
26 56	13 00-0171	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Davit Style Arm, Anchor Base.....	4,569.82	618.37
			<i>For >10 To 20, Deduct</i>	-114.25	
			<i>For >20 To 40, Deduct</i>	-228.49	
			<i>For >40, Deduct</i>	-373.65	
26 56	13 00-0172	EA	30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Davit Style Arm, Anchor Base.....	4,664.73	618.37
			<i>For >10 To 20, Deduct</i>	-116.62	
			<i>For >20 To 40, Deduct</i>	-233.24	
			<i>For >40, Deduct</i>	-380.77	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0173	EA 30' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Davit Style Arm, Anchor Base <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	4,678.97 -116.97 -233.95 -381.84	618.37
26 56 13 00-0174	EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 4' Davit Style Arm, Anchor Base <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	4,976.24 -124.41 -248.81 -405.85	652.72
26 56 13 00-0175	EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 6' Davit Style Arm, Anchor Base <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,017.87 -125.45 -250.89 -408.98	652.72
26 56 13 00-0176	EA 35' High, 8" Base OD, 0.188" Wall Thickness, Round Tapered, Aluminum Roadway Light Pole With Single 8' Davit Style Arm, Anchor Base <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,115.47 -127.89 -255.77 -416.30	652.72
26 56 13 00-0177	Area Light Poles <small>(26 56 13 00-0001)</small> Note: Excludes lighting fixtures.		
26 56 13 00-0178	Steel Area Light Poles <small>(26 56 13 00-0177)</small> Note: Includes powdercoat finish, anchor bolts, base cover, reinforced handhole with cover and grounding provisions, factory drilled fixture mounting holes and tenon, open or capped top.		
26 56 13 00-0179	Round Straight, Steel Area Light Poles <small>(26 56 13 00-0178)</small>		
26 56 13 00-0180	Round Straight, Steel Area Light Poles, Anchor Base <small>(26 56 13 00-0179)</small>		
26 56 13 00-0181	EA 10' High, 3" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,579.30 32.95 -55.96 -100.93 -212.85	240.48
26 56 13 00-0182	EA 12' High, 3" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,708.85 34.78 -60.11 -108.63 -228.84	274.83
26 56 13 00-0183	EA 14' High, 3" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,908.39 38.70 -67.06 -121.22 -255.34	309.18
26 56 13 00-0184	EA 16' High, 3" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,114.00 42.81 -74.25 -134.24 -282.75	343.54
26 56 13 00-0185	EA 18' High, 3" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,243.56 44.63 -78.41 -141.93 -298.75	377.89
26 56 13 00-0186	EA 20' High, 3" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,357.91 46.00 -81.95 -148.56 -312.46	412.24
26 56 13 00-0187	EA 10' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,658.40 35.32 -59.12 -106.47 -224.71	240.48
26 56 13 00-0188	EA 12' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,791.00 37.24 -63.40 -114.38 -241.17	274.83
26 56 13 00-0189	EA 14' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,072.68 43.63 -73.63 -132.72 -279.98	309.18
26 56 13 00-0190	EA 16' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,220.49 46.00 -78.51 -141.69 -298.72	343.54
26 56 13 00-0191	EA 18' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base..... <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,359.17 48.10 -83.03 -150.03 -316.09	377.89

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0192	EA		20' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base.....	2,467.43	412.24
			<i>For Galvanized Finish, Add</i>	49.29	
			<i>For >10 To 20, Deduct</i>	-86.33	
			<i>For >20 To 40, Deduct</i>	-156.23	
			<i>For >40, Deduct</i>	-328.89	
26 56 13 00-0193	EA		25' High, 4" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base.....	2,854.84	549.66
			<i>For Galvanized Finish, Add</i>	52.67	
			<i>For >10 To 20, Deduct</i>	-97.70	
			<i>For >20 To 40, Deduct</i>	-177.85	
			<i>For >40, Deduct</i>	-373.26	
26 56 13 00-0194	EA		10' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	1,658.40	240.48
			<i>For Galvanized Finish, Add</i>	35.32	
			<i>For >10 To 20, Deduct</i>	-59.12	
			<i>For >20 To 40, Deduct</i>	-106.47	
			<i>For >40, Deduct</i>	-224.71	
26 56 13 00-0195	EA		12' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	1,800.12	274.83
			<i>For Galvanized Finish, Add</i>	37.51	
			<i>For >10 To 20, Deduct</i>	-63.76	
			<i>For >20 To 40, Deduct</i>	-115.02	
			<i>For >40, Deduct</i>	-242.54	
26 56 13 00-0196	EA		14' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	2,121.36	309.18
			<i>For Galvanized Finish, Add</i>	45.09	
			<i>For >10 To 20, Deduct</i>	-75.58	
			<i>For >20 To 40, Deduct</i>	-136.13	
			<i>For >40, Deduct</i>	-287.29	
26 56 13 00-0197	EA		16' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	2,229.61	343.54
			<i>For Galvanized Finish, Add</i>	46.28	
			<i>For >10 To 20, Deduct</i>	-78.88	
			<i>For >20 To 40, Deduct</i>	-142.33	
			<i>For >40, Deduct</i>	-300.09	
26 56 13 00-0198	EA		18' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	2,359.17	377.89
			<i>For Galvanized Finish, Add</i>	48.10	
			<i>For >10 To 20, Deduct</i>	-83.03	
			<i>For >20 To 40, Deduct</i>	-150.03	
			<i>For >40, Deduct</i>	-316.09	
26 56 13 00-0199	EA		20' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	2,467.43	412.24
			<i>For Galvanized Finish, Add</i>	49.29	
			<i>For >10 To 20, Deduct</i>	-86.33	
			<i>For >20 To 40, Deduct</i>	-156.23	
			<i>For >40, Deduct</i>	-328.89	
26 56 13 00-0200	EA		25' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	2,940.03	549.66
			<i>For Galvanized Finish, Add</i>	55.22	
			<i>For >10 To 20, Deduct</i>	-101.11	
			<i>For >20 To 40, Deduct</i>	-183.82	
			<i>For >40, Deduct</i>	-386.04	
26 56 13 00-0201	EA		30' High, 4-1/2" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base	3,235.65	618.37
			<i>For Galvanized Finish, Add</i>	59.97	
			<i>For >10 To 20, Deduct</i>	-110.88	
			<i>For >20 To 40, Deduct</i>	-201.76	
			<i>For >40, Deduct</i>	-423.51	
26 56 13 00-0202	EA		20' High, 5" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base.....	2,662.15	412.24
			<i>For Galvanized Finish, Add</i>	55.13	
			<i>For >10 To 20, Deduct</i>	-94.12	
			<i>For >20 To 40, Deduct</i>	-169.86	
			<i>For >40, Deduct</i>	-358.10	
26 56 13 00-0203	EA		25' High, 5" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base.....	2,979.58	549.66
			<i>For Galvanized Finish, Add</i>	56.41	
			<i>For >10 To 20, Deduct</i>	-102.69	
			<i>For >20 To 40, Deduct</i>	-186.58	
			<i>For >40, Deduct</i>	-391.97	
26 56 13 00-0204	EA		30' High, 5" OD, 11 Gauge, Round Straight, Steel Area Light Pole, Anchor Base.....	3,311.71	618.37
			<i>For Galvanized Finish, Add</i>	62.25	
			<i>For >10 To 20, Deduct</i>	-113.92	
			<i>For >20 To 40, Deduct</i>	-207.09	
			<i>For >40, Deduct</i>	-434.92	
26 56 13 00-0205			Round Tapered, Steel Area Light Poles <small>(26 56 13 00-0178)</small>		
26 56 13 00-0206			Round Tapered, Steel Area Light Poles, Anchor Base <small>(26 56 13 00-0205)</small>		
26 56 13 00-0207	EA		20' High, 5.90" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base.....	3,349.76	412.24
			<i>For Galvanized Finish, Add</i>	75.76	
			<i>For >10 To 20, Deduct</i>	-121.62	
			<i>For >20 To 40, Deduct</i>	-217.99	
			<i>For >40, Deduct</i>	-461.24	
26 56 13 00-0208	EA		20' High, 6.50" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base.....	3,444.07	412.24
			<i>For Galvanized Finish, Add</i>	78.59	
			<i>For >10 To 20, Deduct</i>	-125.40	
			<i>For >20 To 40, Deduct</i>	-224.60	
			<i>For >40, Deduct</i>	-475.39	
26 56 13 00-0209	EA		25' High, 5.90" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base.....	3,925.79	549.66
			<i>For Galvanized Finish, Add</i>	84.79	
			<i>For >10 To 20, Deduct</i>	-140.54	
			<i>For >20 To 40, Deduct</i>	-252.82	
			<i>For >40, Deduct</i>	-533.90	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56	13 00-0210	EA	25' High, 7.00" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	4,120.51 90.64 -148.33 -266.45 -563.11	549.66
26 56	13 00-0211	EA	30' High, 6.60" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	4,367.45 93.92 -156.15 -280.99 -593.28	618.37
26 56	13 00-0212	EA	30' High, 8.00" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	4,693.00 103.69 -169.17 -303.78 -642.11	618.37
26 56	13 00-0213	EA	35' High, 7.30" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	4,828.64 105.70 -173.56 -311.90 -659.02	652.72
26 56	13 00-0214	EA	35' High, 8.50" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,029.45 111.72 -181.60 -325.95 -689.15	652.72
26 56	13 00-0215	EA	35' High, 9.50" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,510.16 126.14 -200.82 -359.60 -761.25	652.72
26 56	13 00-0216	EA	39' High, 7.82" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,542.36 125.05 -201.08 -360.48 -762.65	687.07
26 56	13 00-0217	EA	39' High, 9.00" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,627.55 127.60 -204.49 -366.45 -775.43	687.07
26 56	13 00-0218	EA	45' High, 10.00" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	7,679.69 176.80 -280.39 -501.85 -1,062.63	893.20
26 56	13 00-0219	EA	50' High, 10.00" Base OD, 11 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	7,936.28 176.25 -286.53 -514.32 -1,087.38	1,030.61
26 56	13 00-0220	EA	25' High, 7.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	5,440.95 130.25 -201.15 -358.88 -761.18	549.66
26 56	13 00-0221	EA	30' High, 8.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	6,180.78 148.32 -228.68 -407.92 -865.28	618.37
26 56	13 00-0222	EA	39' High, 9.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	7,182.26 174.24 -266.68 -475.28 -1,008.63	687.07
26 56	13 00-0223	EA	45' High, 10.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	8,628.95 205.28 -318.36 -568.30 -1,205.02	893.20
26 56	13 00-0224	EA	50' High, 10.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	10,078.19 240.51 -372.21 -664.25 -1,408.67	1,030.61
26 56	13 00-0225	EA	50' High, 11.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	11,316.48 277.66 -421.74 -750.93 -1,594.41	1,030.61
26 56	13 00-0226	EA	50' High, 13.00" Base OD, 7 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	15,454.27 401.79 -587.25 -1,040.57 -2,215.08	1,030.61

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0227	EA		50' High, 13.00" Base OD, 3 Gauge, Round Tapered, Steel Area Light Pole, Anchor Base.....	17,462.31	1,030.61
			<i>For Galvanized Finish, Add</i>	462.03	
			<i>For >10 To 20, Deduct</i>	-667.57	
			<i>For >20 To 40, Deduct</i>	-1,181.14	
			<i>For >40, Deduct</i>	-2,516.29	
26 56 13 00-0228			Square Straight, Steel Area Light Poles (26 56 13 00-0178)		
26 56 13 00-0229			Square Straight, Steel Area Light Poles, Anchor Base (26 56 13 00-0228)		
26 56 13 00-0230	EA		10' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	1,554.96	240.48
			<i>For Galvanized Finish, Add</i>	32.22	
			<i>For >10 To 20, Deduct</i>	-54.98	
			<i>For >20 To 40, Deduct</i>	-99.23	
			<i>For >40, Deduct</i>	-209.20	
26 56 13 00-0231	EA		12' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	1,623.66	274.83
			<i>For Galvanized Finish, Add</i>	32.22	
			<i>For >10 To 20, Deduct</i>	-56.70	
			<i>For >20 To 40, Deduct</i>	-102.66	
			<i>For >40, Deduct</i>	-216.07	
26 56 13 00-0232	EA		14' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	1,744.09	309.18
			<i>For Galvanized Finish, Add</i>	33.77	
			<i>For >10 To 20, Deduct</i>	-60.49	
			<i>For >20 To 40, Deduct</i>	-109.72	
			<i>For >40, Deduct</i>	-230.70	
26 56 13 00-0233	EA		15' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	1,851.46	326.36
			<i>For Galvanized Finish, Add</i>	35.96	
			<i>For >10 To 20, Deduct</i>	-64.27	
			<i>For >20 To 40, Deduct</i>	-116.55	
			<i>For >40, Deduct</i>	-245.08	
26 56 13 00-0234	EA		16' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	1,885.81	343.54
			<i>For Galvanized Finish, Add</i>	35.96	
			<i>For >10 To 20, Deduct</i>	-65.13	
			<i>For >20 To 40, Deduct</i>	-118.27	
			<i>For >40, Deduct</i>	-248.52	
26 56 13 00-0235	EA		18' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	1,987.99	377.89
			<i>For Galvanized Finish, Add</i>	36.97	
			<i>For >10 To 20, Deduct</i>	-68.18	
			<i>For >20 To 40, Deduct</i>	-124.04	
			<i>For >40, Deduct</i>	-260.41	
26 56 13 00-0236	EA		20' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	2,084.08	412.24
			<i>For Galvanized Finish, Add</i>	37.79	
			<i>For >10 To 20, Deduct</i>	-71.00	
			<i>For >20 To 40, Deduct</i>	-129.40	
			<i>For >40, Deduct</i>	-271.39	
26 56 13 00-0237	EA		25' High, 4" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	2,541.46	549.66
			<i>For Galvanized Finish, Add</i>	43.26	
			<i>For >10 To 20, Deduct</i>	-85.17	
			<i>For >20 To 40, Deduct</i>	-155.92	
			<i>For >40, Deduct</i>	-326.25	
26 56 13 00-0238	EA		20' High, 5" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	2,494.82	412.24
			<i>For Galvanized Finish, Add</i>	50.11	
			<i>For >10 To 20, Deduct</i>	-87.43	
			<i>For >20 To 40, Deduct</i>	-158.15	
			<i>For >40, Deduct</i>	-333.00	
26 56 13 00-0239	EA		25' High, 5" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	3,107.36	549.66
			<i>For Galvanized Finish, Add</i>	60.24	
			<i>For >10 To 20, Deduct</i>	-107.80	
			<i>For >20 To 40, Deduct</i>	-195.53	
			<i>For >40, Deduct</i>	-411.14	
26 56 13 00-0240	EA		30' High, 5" OD, 11 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	3,576.40	618.37
			<i>For Galvanized Finish, Add</i>	70.19	
			<i>For >10 To 20, Deduct</i>	-124.51	
			<i>For >20 To 40, Deduct</i>	-225.61	
			<i>For >40, Deduct</i>	-474.62	
26 56 13 00-0241	EA		20' High, 4" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	2,382.24	412.24
			<i>For Galvanized Finish, Add</i>	46.73	
			<i>For >10 To 20, Deduct</i>	-82.92	
			<i>For >20 To 40, Deduct</i>	-150.27	
			<i>For >40, Deduct</i>	-316.11	
26 56 13 00-0242	EA		25' High, 4" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	2,888.30	549.66
			<i>For Galvanized Finish, Add</i>	53.67	
			<i>For >10 To 20, Deduct</i>	-99.04	
			<i>For >20 To 40, Deduct</i>	-180.19	
			<i>For >40, Deduct</i>	-378.28	
26 56 13 00-0243	EA		30' High, 4" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	3,387.77	618.37
			<i>For Galvanized Finish, Add</i>	64.53	
			<i>For >10 To 20, Deduct</i>	-116.96	
			<i>For >20 To 40, Deduct</i>	-212.41	
			<i>For >40, Deduct</i>	-446.33	
26 56 13 00-0244	EA		20' High, 5" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	2,768.64	412.24
			<i>For Galvanized Finish, Add</i>	58.32	
			<i>For >10 To 20, Deduct</i>	-98.38	
			<i>For >20 To 40, Deduct</i>	-177.32	
			<i>For >40, Deduct</i>	-374.07	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0245	EA		25' High, 5" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	3,381.19	549.66
			<i>For Galvanized Finish, Add</i>	68.46	
			<i>For >10 To 20, Deduct</i>	-118.76	
			<i>For >20 To 40, Deduct</i>	-214.70	
			<i>For >40, Deduct</i>	-452.21	
26 56 13 00-0246	EA		30' High, 5" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	3,835.02	618.37
			<i>For Galvanized Finish, Add</i>	77.95	
			<i>For >10 To 20, Deduct</i>	-134.85	
			<i>For >20 To 40, Deduct</i>	-243.72	
			<i>For >40, Deduct</i>	-513.42	
26 56 13 00-0247	EA		35' High, 5" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	4,281.00	652.72
			<i>For Galvanized Finish, Add</i>	89.27	
			<i>For >10 To 20, Deduct</i>	-151.66	
			<i>For >20 To 40, Deduct</i>	-273.56	
			<i>For >40, Deduct</i>	-576.88	
26 56 13 00-0248	EA		30' High, 6" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	4,434.39	618.37
			<i>For Galvanized Finish, Add</i>	95.93	
			<i>For >10 To 20, Deduct</i>	-158.82	
			<i>For >20 To 40, Deduct</i>	-285.67	
			<i>For >40, Deduct</i>	-603.32	
26 56 13 00-0249	EA		35' High, 6" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	4,883.41	652.72
			<i>For Galvanized Finish, Add</i>	107.34	
			<i>For >10 To 20, Deduct</i>	-175.75	
			<i>For >20 To 40, Deduct</i>	-315.73	
			<i>For >40, Deduct</i>	-667.24	
26 56 13 00-0250	EA		40' High, 6" OD, 7 Gauge, Square Straight, Steel Area Light Pole, Anchor Base.....	5,168.13	687.07
			<i>For Galvanized Finish, Add</i>	113.82	
			<i>For >10 To 20, Deduct</i>	-186.11	
			<i>For >20 To 40, Deduct</i>	-334.29	
			<i>For >40, Deduct</i>	-706.51	
26 56 13 00-0251			Hinged, Square Straight, Steel Area Light Poles <small>(26 56 13 00-0178)</small>		
26 56 13 00-0252			Hinged, Square Straight, Steel Area Light Poles, Anchor Base <small>(26 56 13 00-0251)</small>		
26 56 13 00-0253	EA		20' High, 6.44" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	5,869.57	412.24
			<i>For Galvanized Finish, Add</i>	151.35	
			<i>For >10 To 20, Deduct</i>	-222.42	
			<i>For >20 To 40, Deduct</i>	-394.38	
			<i>For >40, Deduct</i>	-839.21	
26 56 13 00-0254	EA		25' High, 6.44" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	6,487.43	549.66
			<i>For Galvanized Finish, Add</i>	161.64	
			<i>For >10 To 20, Deduct</i>	-243.01	
			<i>For >20 To 40, Deduct</i>	-432.13	
			<i>For >40, Deduct</i>	-918.15	
26 56 13 00-0255	EA		30' High, 6.44" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	9,187.84	618.37
			<i>For Galvanized Finish, Add</i>	238.53	
			<i>For >10 To 20, Deduct</i>	-348.96	
			<i>For >20 To 40, Deduct</i>	-618.41	
			<i>For >40, Deduct</i>	-1,316.34	
26 56 13 00-0256	EA		20' High, 7.32" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	5,992.55	412.24
			<i>For Galvanized Finish, Add</i>	155.04	
			<i>For >10 To 20, Deduct</i>	-227.33	
			<i>For >20 To 40, Deduct</i>	-402.99	
			<i>For >40, Deduct</i>	-857.66	
26 56 13 00-0257	EA		25' High, 7.32" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	7,202.61	549.66
			<i>For Galvanized Finish, Add</i>	183.10	
			<i>For >10 To 20, Deduct</i>	-271.61	
			<i>For >20 To 40, Deduct</i>	-482.20	
			<i>For >40, Deduct</i>	-1,025.43	
26 56 13 00-0258	EA		30' High, 7.32" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	10,252.51	618.37
			<i>For Galvanized Finish, Add</i>	270.47	
			<i>For >10 To 20, Deduct</i>	-391.55	
			<i>For >20 To 40, Deduct</i>	-692.94	
			<i>For >40, Deduct</i>	-1,476.04	
26 56 13 00-0259	EA		35' High, 7.32" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	11,806.59	652.72
			<i>For Galvanized Finish, Add</i>	315.03	
			<i>For >10 To 20, Deduct</i>	-452.68	
			<i>For >20 To 40, Deduct</i>	-800.35	
			<i>For >40, Deduct</i>	-1,705.72	
26 56 13 00-0260	EA		39' High, 7.32" OD, 11 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	13,936.70	687.07
			<i>For Galvanized Finish, Add</i>	376.88	
			<i>For >10 To 20, Deduct</i>	-536.86	
			<i>For >20 To 40, Deduct</i>	-948.09	
			<i>For >40, Deduct</i>	-2,021.80	
26 56 13 00-0261	EA		20' High, 4" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	5,675.41	412.24
			<i>For Galvanized Finish, Add</i>	145.53	
			<i>For >10 To 20, Deduct</i>	-214.65	
			<i>For >20 To 40, Deduct</i>	-380.79	
			<i>For >40, Deduct</i>	-810.09	
26 56 13 00-0262	EA		25' High, 4" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	6,176.77	549.66
			<i>For Galvanized Finish, Add</i>	152.32	
			<i>For >10 To 20, Deduct</i>	-230.58	
			<i>For >20 To 40, Deduct</i>	-410.39	
			<i>For >40, Deduct</i>	-871.55	

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0263	EA		30' High, 4" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	8,640.93	618.37
			<i>For Galvanized Finish, Add</i>	222.13	
			<i>For >10 To 20, Deduct</i>	-327.09	
			<i>For >20 To 40, Deduct</i>	-580.13	
			<i>For >40, Deduct</i>	-1,234.30	
26 56 13 00-0264	EA		20' High, 6.44" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	5,898.70	412.24
			<i>For Galvanized Finish, Add</i>	152.23	
			<i>For >10 To 20, Deduct</i>	-223.58	
			<i>For >20 To 40, Deduct</i>	-396.42	
			<i>For >40, Deduct</i>	-843.58	
26 56 13 00-0265	EA		25' High, 6.44" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	6,911.36	549.66
			<i>For Galvanized Finish, Add</i>	174.36	
			<i>For >10 To 20, Deduct</i>	-259.96	
			<i>For >20 To 40, Deduct</i>	-461.81	
			<i>For >40, Deduct</i>	-981.74	
26 56 13 00-0266	EA		30' High, 6.44" OD, 7 Gauge, Hinged Square Straight, Steel Area Light Pole, Anchor Base	9,848.00	618.37
			<i>For Galvanized Finish, Add</i>	258.34	
			<i>For >10 To 20, Deduct</i>	-375.37	
			<i>For >20 To 40, Deduct</i>	-664.63	
			<i>For >40, Deduct</i>	-1,415.36	
26 56 13 00-0267	EA		20' High, 7.32" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	6,241.73	412.24
			<i>For Galvanized Finish, Add</i>	162.52	
			<i>For >10 To 20, Deduct</i>	-237.30	
			<i>For >20 To 40, Deduct</i>	-420.43	
			<i>For >40, Deduct</i>	-895.04	
26 56 13 00-0268	EA		25' High, 7.32" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	7,529.46	549.66
			<i>For Galvanized Finish, Add</i>	192.90	
			<i>For >10 To 20, Deduct</i>	-284.69	
			<i>For >20 To 40, Deduct</i>	-505.08	
			<i>For >40, Deduct</i>	-1,074.45	
26 56 13 00-0269	EA		30' High, 7.32" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	10,576.12	618.37
			<i>For Galvanized Finish, Add</i>	280.18	
			<i>For >10 To 20, Deduct</i>	-404.49	
			<i>For >20 To 40, Deduct</i>	-715.59	
			<i>For >40, Deduct</i>	-1,524.58	
26 56 13 00-0270	EA		35' High, 7.32" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	12,201.40	652.72
			<i>For Galvanized Finish, Add</i>	326.88	
			<i>For >10 To 20, Deduct</i>	-468.47	
			<i>For >20 To 40, Deduct</i>	-827.99	
			<i>For >40, Deduct</i>	-1,764.94	
26 56 13 00-0271	EA		39' High, 7.32" OD, 7 Gauge, Hinged, Square Straight, Steel Area Light Pole, Anchor Base	14,147.05	687.07
			<i>For Galvanized Finish, Add</i>	383.19	
			<i>For >10 To 20, Deduct</i>	-545.27	
			<i>For >20 To 40, Deduct</i>	-962.81	
			<i>For >40, Deduct</i>	-2,053.35	
26 56 13 00-0272			Square Tapered, Steel Area Light Poles <small>(26 56 13 00-0178)</small>		
26 56 13 00-0273			Square Tapered, Steel Area Light Poles, Anchor Base <small>(26 56 13 00-0272)</small>		
26 56 13 00-0274	EA		20' High, 5.25" Base OD, 11 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	4,375.08	412.24
			<i>For Galvanized Finish, Add</i>	106.52	
			<i>For >10 To 20, Deduct</i>	-162.64	
			<i>For >20 To 40, Deduct</i>	-289.77	
			<i>For >40, Deduct</i>	-615.04	
26 56 13 00-0275	EA		25' High, 6.00" Base OD, 11 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	5,276.66	549.66
			<i>For Galvanized Finish, Add</i>	125.32	
			<i>For >10 To 20, Deduct</i>	-194.58	
			<i>For >20 To 40, Deduct</i>	-347.38	
			<i>For >40, Deduct</i>	-736.53	
26 56 13 00-0276	EA		30' High, 6.41" Base OD, 11 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	5,867.40	618.37
			<i>For Galvanized Finish, Add</i>	138.92	
			<i>For >10 To 20, Deduct</i>	-216.15	
			<i>For >20 To 40, Deduct</i>	-385.98	
			<i>For >40, Deduct</i>	-818.27	
26 56 13 00-0277	EA		35' High, 6.81" Base OD, 11 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	6,535.48	652.72
			<i>For Galvanized Finish, Add</i>	156.90	
			<i>For >10 To 20, Deduct</i>	-241.84	
			<i>For >20 To 40, Deduct</i>	-431.37	
			<i>For >40, Deduct</i>	-915.05	
26 56 13 00-0278	EA		39' High, 7.18" Base OD, 11 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	6,890.18	687.07
			<i>For Galvanized Finish, Add</i>	165.48	
			<i>For >10 To 20, Deduct</i>	-254.99	
			<i>For >20 To 40, Deduct</i>	-454.83	
			<i>For >40, Deduct</i>	-964.82	
26 56 13 00-0279	EA		20' High, 5.50" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	5,741.15	412.24
			<i>For Galvanized Finish, Add</i>	147.50	
			<i>For >10 To 20, Deduct</i>	-217.28	
			<i>For >20 To 40, Deduct</i>	-385.39	
			<i>For >40, Deduct</i>	-819.95	
26 56 13 00-0280	EA		25' High, 6.41" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base.....	6,347.62	549.66
			<i>For Galvanized Finish, Add</i>	157.45	
			<i>For >10 To 20, Deduct</i>	-237.42	
			<i>For >20 To 40, Deduct</i>	-422.35	
			<i>For >40, Deduct</i>	-897.18	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0281	EA		30' High, 6.41" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	6,743.64 165.21 -251.19 -447.32 -949.71	618.37
26 56 13 00-0282	EA		30' High, 7.13" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	7,546.85 189.30 -283.32 -503.54 -1,070.19	618.37
26 56 13 00-0283	EA		35' High, 7.13" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	8,193.64 206.65 -308.16 -547.45 -1,163.77	652.72
26 56 13 00-0284	EA		35' High, 7.88" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	9,188.53 236.49 -347.96 -617.09 -1,313.01	652.72
26 56 13 00-0285	EA		39' High, 7.13" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	8,307.98 208.01 -311.71 -554.08 -1,177.49	687.07
26 56 13 00-0286	EA		39' High, 8.75" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	10,757.19 281.49 -409.68 -725.52 -1,544.87	687.07
26 56 13 00-0287	EA		45' High, 7.88" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	9,751.63 238.96 -363.27 -646.89 -1,373.43	893.20
26 56 13 00-0288	EA		45' High, 8.75" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	11,421.96 289.07 -430.08 -763.81 -1,623.97	893.20
26 56 13 00-0289	EA		50' High, 8.81" Base OD, 7 Gauge, Square Tapered, Steel Area Light Pole, Anchor Base <i>For Galvanized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	11,781.99 291.62 -440.36 -783.51 -1,664.24	1,030.61
26 56 13 00-0290			Factory Accessories For Steel Area Light Poles <small>(26 56 13 00-0178)</small>		
26 56 13 00-0291	EA		1/2", 3/4" Or 1" Factory Threaded Pipe Coupling Or Nipple For Steel Area Light Poles.....	107.87	
26 56 13 00-0292	EA		Extra Handhole For Steel Area Light Poles	160.42	
26 56 13 00-0293	EA		Vibration Dampener For Steel Area Light Poles	163.19	
26 56 13 00-0294			Aluminum Area Light Poles <small>(26 56 13 00-0177)</small> Note: Includes satin brushed or painted finish, anchor bolts, base cover, reinforced handhole with cover and grounding provisions, factory drilled fixture mounting holes and tenon, open or capped top.		
26 56 13 00-0295			Round Straight, Aluminum Area Light Poles <small>(26 56 13 00-0294)</small>		
26 56 13 00-0296			Round Straight, Aluminum Area Light Poles, Anchor Base <small>(26 56 13 00-0295)</small>		
26 56 13 00-0297	EA		8' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	857.28 44.50 89.01 -28.11 -51.76 -107.98	206.13
26 56 13 00-0298	EA		10' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	948.83 46.79 93.57 -30.74 -56.80 -118.28	240.48
26 56 13 00-0299	EA		12' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,046.06 49.64 99.28 -33.60 -62.23 -129.43	274.83
26 56 13 00-0300	EA		14' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,144.44 52.61 105.21 -36.50 -67.74 -140.75	309.18

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0301	EA 15' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,198.18 54.55 109.09 -38.14 -70.82 -147.09	326.36
26 56 13 00-0302	EA 16' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,250.79 56.37 112.74 -39.73 -73.81 -153.27	343.54
26 56 13 00-0303	EA 16' High, 4" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,319.26 63.22 126.44 -42.46 -78.61 -163.54	343.54
26 56 13 00-0304	EA 18' High, 4" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,431.33 67.56 135.11 -45.92 -85.08 -176.91	377.89
26 56 13 00-0305	EA 20' High, 4" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,536.56 71.21 142.41 -49.10 -91.07 -189.26	412.24
26 56 13 00-0306	EA 15' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,450.38 79.77 159.53 -48.22 -88.47 -184.92	326.36
26 56 13 00-0307	EA 20' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,788.75 96.43 192.85 -59.18 -108.72 -227.09	412.24
26 56 13 00-0308	EA 20' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,916.56 109.21 218.41 -64.30 -117.67 -246.26	412.24
26 56 13 00-0309	EA 25' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,311.21 121.19 242.38 -75.96 -139.80 -291.72	549.66
26 56 13 00-0310	EA 30' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,675.71 143.90 287.80 -88.48 -162.57 -339.52	618.37
26 56 13 00-0311	EA 20' High, 4" OD, 0.250", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,615.30 79.08 158.16 -52.24 -96.58 -201.07	412.24
26 56 13 00-0312	EA 20' High, 5" OD, 0.250", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,906.29 108.18 216.36 -63.88 -116.95 -244.72	412.24
26 56 13 00-0313	EA 25' High, 5" OD, 0.250", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,292.95 119.36 238.73 -75.23 -138.52 -288.98	549.66
26 56 13 00-0314	EA 25' High, 6" OD, 0.250", Round Straight, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,458.42 135.91 271.82 -81.85 -150.10 -313.80	549.66



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0315 EA 30' High, 6" OD, 0.250", Round Straight, Aluminum Area Light Pole, Anchor Base	2,862.85	618.37
For Bronze Or Satin Anodized Finish, Add	162.61	
For Black Anodized Finish, Add	325.22	
For >10 To 20, Deduct	-95.96	
For >20 To 40, Deduct	-175.66	
For >40, Deduct	-367.59	
26 56 13 00-0316 Round Straight, Aluminum Area Light Poles, Hinged Anchor Base <small>(26 56 13 00-0295)</small>		
26 56 13 00-0317 EA 8' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	973.68	206.13
For Bronze, Satin Or Black Anodized Finish, Add	84.22	
For >10 To 20, Deduct	-32.76	
For >20 To 40, Deduct	-59.91	
For >40, Deduct	-125.44	
26 56 13 00-0318 EA 10' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,088.05	240.48
For Bronze, Satin Or Black Anodized Finish, Add	91.06	
For >10 To 20, Deduct	-36.31	
For >20 To 40, Deduct	-66.54	
For >40, Deduct	-139.16	
26 56 13 00-0319 EA 12' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,197.83	274.83
For Bronze, Satin Or Black Anodized Finish, Add	97.23	
For >10 To 20, Deduct	-39.67	
For >20 To 40, Deduct	-72.85	
For >40, Deduct	-152.19	
26 56 13 00-0320 EA 14' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,285.94	309.18
For Bronze, Satin Or Black Anodized Finish, Add	100.14	
For >10 To 20, Deduct	-42.16	
For >20 To 40, Deduct	-77.65	
For >40, Deduct	-161.97	
26 56 13 00-0321 EA 16' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,387.73	343.54
For Bronze, Satin Or Black Anodized Finish, Add	105.10	
For >10 To 20, Deduct	-45.20	
For >20 To 40, Deduct	-83.40	
For >40, Deduct	-173.81	
26 56 13 00-0322 EA 10' High, 5" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,112.01	240.48
For Bronze, Satin Or Black Anodized Finish, Add	94.66	
For >10 To 20, Deduct	-37.27	
For >20 To 40, Deduct	-68.22	
For >40, Deduct	-142.75	
26 56 13 00-0323 EA 12' High, 5" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,219.51	274.83
For Bronze, Satin Or Black Anodized Finish, Add	100.48	
For >10 To 20, Deduct	-40.54	
For >20 To 40, Deduct	-74.37	
For >40, Deduct	-155.44	
26 56 13 00-0324 EA 14' High, 5" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,330.44	309.18
For Bronze, Satin Or Black Anodized Finish, Add	106.81	
For >10 To 20, Deduct	-43.94	
For >20 To 40, Deduct	-80.76	
For >40, Deduct	-168.65	
26 56 13 00-0325 EA 16' High, 5" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,440.22	343.54
For Bronze, Satin Or Black Anodized Finish, Add	112.97	
For >10 To 20, Deduct	-47.30	
For >20 To 40, Deduct	-87.07	
For >40, Deduct	-181.68	
26 56 13 00-0326 EA 18' High, 5" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,555.72	377.89
For Bronze, Satin Or Black Anodized Finish, Add	119.99	
For >10 To 20, Deduct	-50.89	
For >20 To 40, Deduct	-93.78	
For >40, Deduct	-195.57	
26 56 13 00-0327 EA 20' High, 5" OD, 0.125", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,664.37	412.24
For Bronze, Satin Or Black Anodized Finish, Add	125.98	
For >10 To 20, Deduct	-54.21	
For >20 To 40, Deduct	-100.02	
For >40, Deduct	-208.43	
26 56 13 00-0328 EA 12' High, 5" OD, 0.156", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,264.01	274.83
For Bronze, Satin Or Black Anodized Finish, Add	107.15	
For >10 To 20, Deduct	-42.32	
For >20 To 40, Deduct	-77.49	
For >40, Deduct	-162.12	
26 56 13 00-0329 EA 14' High, 5" OD, 0.156", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,382.93	309.18
For Bronze, Satin Or Black Anodized Finish, Add	114.68	
For >10 To 20, Deduct	-46.04	
For >20 To 40, Deduct	-84.44	
For >40, Deduct	-176.52	
26 56 13 00-0330 EA 16' High, 5" OD, 0.156", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,500.70	343.54
For Bronze, Satin Or Black Anodized Finish, Add	122.04	
For >10 To 20, Deduct	-49.72	
For >20 To 40, Deduct	-91.31	
For >40, Deduct	-190.75	
26 56 13 00-0331 EA 18' High, 5" OD, 0.156", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base	1,620.76	377.89
For Bronze, Satin Or Black Anodized Finish, Add	129.75	
For >10 To 20, Deduct	-53.49	
For >20 To 40, Deduct	-98.34	
For >40, Deduct	-205.33	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56	13 00-0332	EA	16' High, 6" OD, 0.156", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,564.61 131.63 -52.28 -95.78 -200.34	343.54
26 56	13 00-0333	EA	20' High, 6" OD, 0.156", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,813.86 148.41 -60.19 -110.48 -230.85	412.24
26 56	13 00-0334	EA	12' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,306.24 113.49 -44.00 -80.44 -168.45	274.83
26 56	13 00-0335	EA	14' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,437.71 122.90 -48.23 -88.27 -184.74	309.18
26 56	13 00-0336	EA	16' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,557.76 130.60 -52.00 -95.30 -199.31	343.54
26 56	13 00-0337	EA	18' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,684.67 139.33 -56.05 -102.81 -214.91	377.89
26 56	13 00-0338	EA	20' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,808.15 147.55 -59.96 -110.08 -230.00	412.24
26 56	13 00-0339	EA	16' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,641.06 143.10 -55.34 -101.13 -211.81	343.54
26 56	13 00-0340	EA	18' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,778.24 153.37 -59.79 -109.36 -228.95	377.89
26 56	13 00-0341	EA	20' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,843.53 152.86 -61.37 -112.56 -235.31	412.24
26 56	13 00-0342		Round Straight, Aluminum Area Light Poles, Direct Burial <small>(26 56 13 00-0295)</small> Note: Includes rubberized undercoating on embedded portion.		
26 56	13 00-0343	EA	10' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	763.48 41.99 83.99 -25.39 -46.57 -97.35	171.77
26 56	13 00-0344	EA	12' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	819.51 44.16 88.32 -27.11 -49.81 -104.03	188.95
26 56	13 00-0345	EA	14' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	905.21 49.30 98.59 -30.02 -55.12 -115.17	206.13
26 56	13 00-0346	EA	15' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	931.46 51.92 103.84 -31.07 -56.96 -119.11	206.13
26 56	13 00-0347	EA	16' High, 4" OD, 0.125", Round Straight, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	964.55 55.23 110.46 -32.40 -59.27 -124.07	206.13

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0348 EA 18' High, 4" OD, 0.188", Round Straight, Aluminum Area Light Pole, Direct Burial	1,099.32	223.30
For Bronze Or Satin Anodized Finish, Add	65.27	
For Black Anodized Finish, Add	130.55	
For >10 To 20, Deduct	-37.27	
For >20 To 40, Deduct	-68.02	
For >40, Deduct	-142.57	
26 56 13 00-0349 EA 20' High, 4" OD, 0.188", Round Straight, Aluminum Area Light Pole, Direct Burial	1,175.91	240.48
For Bronze Or Satin Anodized Finish, Add	69.50	
For Black Anodized Finish, Add	138.99	
For >10 To 20, Deduct	-39.82	
For >20 To 40, Deduct	-72.69	
For >40, Deduct	-152.34	
26 56 13 00-0350 EA 20' High, 5" OD, 0.188", Round Straight, Aluminum Area Light Pole, Direct Burial	1,352.79	240.48
For Bronze Or Satin Anodized Finish, Add	87.18	
For Black Anodized Finish, Add	174.37	
For >10 To 20, Deduct	-46.90	
For >20 To 40, Deduct	-85.08	
For >40, Deduct	-178.87	
26 56 13 00-0351 EA 25' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Direct Burial	1,648.58	274.83
For Bronze Or Satin Anodized Finish, Add	109.89	
For Black Anodized Finish, Add	219.78	
For >10 To 20, Deduct	-57.70	
For >20 To 40, Deduct	-104.41	
For >40, Deduct	-219.80	
26 56 13 00-0352 EA 30' High, 6" OD, 0.188", Round Straight, Aluminum Area Light Pole, Direct Burial	1,870.20	309.18
For Bronze Or Satin Anodized Finish, Add	125.18	
For Black Anodized Finish, Add	250.37	
For >10 To 20, Deduct	-65.53	
For >20 To 40, Deduct	-118.55	
For >40, Deduct	-249.61	
26 56 13 00-0353 EA 30' High, 6" OD, 0.250", Round Straight, Aluminum Area Light Pole, Direct Burial	2,079.03	309.18
For Bronze Or Satin Anodized Finish, Add	146.07	
For Black Anodized Finish, Add	292.13	
For >10 To 20, Deduct	-73.89	
For >20 To 40, Deduct	-133.16	
For >40, Deduct	-280.94	
26 56 13 00-0354 Round Tapered, Aluminum Area Light Poles <small>(26 56 13 00-0294)</small>		
26 56 13 00-0355 Round Tapered, Aluminum Area Light Poles, Anchor Base <small>(26 56 13 00-0354)</small>		
26 56 13 00-0356 EA 8' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	735.18	206.13
For Bronze Or Satin Anodized Finish, Add	32.29	
For Black Anodized Finish, Add	64.59	
For >10 To 20, Deduct	-23.22	
For >20 To 40, Deduct	-43.22	
For >40, Deduct	-89.67	
26 56 13 00-0357 EA 10' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	830.15	240.48
For Bronze Or Satin Anodized Finish, Add	34.92	
For Black Anodized Finish, Add	69.84	
For >10 To 20, Deduct	-25.99	
For >20 To 40, Deduct	-48.49	
For >40, Deduct	-100.47	
26 56 13 00-0358 EA 12' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	925.10	274.83
For Bronze Or Satin Anodized Finish, Add	37.54	
For Black Anodized Finish, Add	75.09	
For >10 To 20, Deduct	-28.76	
For >20 To 40, Deduct	-53.76	
For >40, Deduct	-111.28	
26 56 13 00-0359 EA 14' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,030.32	309.18
For Bronze Or Satin Anodized Finish, Add	41.20	
For Black Anodized Finish, Add	82.39	
For >10 To 20, Deduct	-31.94	
For >20 To 40, Deduct	-59.76	
For >40, Deduct	-123.63	
26 56 13 00-0360 EA 16' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,134.40	343.54
For Bronze Or Satin Anodized Finish, Add	44.73	
For Black Anodized Finish, Add	89.47	
For >10 To 20, Deduct	-35.07	
For >20 To 40, Deduct	-65.67	
For >40, Deduct	-135.81	
26 56 13 00-0361 EA 10' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	859.82	240.48
For Bronze Or Satin Anodized Finish, Add	37.89	
For Black Anodized Finish, Add	75.77	
For >10 To 20, Deduct	-27.18	
For >20 To 40, Deduct	-50.57	
For >40, Deduct	-104.93	
26 56 13 00-0362 EA 12' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	971.88	274.83
For Bronze Or Satin Anodized Finish, Add	42.22	
For Black Anodized Finish, Add	84.44	
For >10 To 20, Deduct	-30.63	
For >20 To 40, Deduct	-57.04	
For >40, Deduct	-118.30	

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0363	EA	14' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,080.53	309.18
		<i>For Bronze Or Satin Anodized Finish, Add</i>	46.22	
		<i>For Black Anodized Finish, Add</i>	92.43	
		<i>For >10 To 20, Deduct</i>	-33.95	
		<i>For >20 To 40, Deduct</i>	-63.27	
		<i>For >40, Deduct</i>	-131.16	
26 56 13 00-0364	EA	18' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,289.83	377.89
		<i>For Bronze Or Satin Anodized Finish, Add</i>	53.41	
		<i>For Black Anodized Finish, Add</i>	106.81	
		<i>For >10 To 20, Deduct</i>	-40.26	
		<i>For >20 To 40, Deduct</i>	-75.17	
		<i>For >40, Deduct</i>	-155.69	
26 56 13 00-0365	EA	20' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,387.07	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	56.26	
		<i>For Black Anodized Finish, Add</i>	112.52	
		<i>For >10 To 20, Deduct</i>	-43.12	
		<i>For >20 To 40, Deduct</i>	-80.61	
		<i>For >40, Deduct</i>	-166.84	
26 56 13 00-0366	EA	12' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,014.10	274.83
		<i>For Bronze Or Satin Anodized Finish, Add</i>	46.44	
		<i>For Black Anodized Finish, Add</i>	92.89	
		<i>For >10 To 20, Deduct</i>	-32.32	
		<i>For >20 To 40, Deduct</i>	-59.99	
		<i>For >40, Deduct</i>	-124.63	
26 56 13 00-0367	EA	14' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,129.60	309.18
		<i>For Bronze Or Satin Anodized Finish, Add</i>	51.12	
		<i>For Black Anodized Finish, Add</i>	102.25	
		<i>For >10 To 20, Deduct</i>	-35.91	
		<i>For >20 To 40, Deduct</i>	-66.70	
		<i>For >40, Deduct</i>	-138.52	
26 56 13 00-0368	EA	16' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,253.08	343.54
		<i>For Bronze Or Satin Anodized Finish, Add</i>	56.60	
		<i>For Black Anodized Finish, Add</i>	113.20	
		<i>For >10 To 20, Deduct</i>	-39.82	
		<i>For >20 To 40, Deduct</i>	-73.97	
		<i>For >40, Deduct</i>	-153.61	
26 56 13 00-0369	EA	18' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,356.02	377.89
		<i>For Bronze Or Satin Anodized Finish, Add</i>	60.02	
		<i>For Black Anodized Finish, Add</i>	120.05	
		<i>For >10 To 20, Deduct</i>	-42.90	
		<i>For >20 To 40, Deduct</i>	-79.81	
		<i>For >40, Deduct</i>	-165.61	
26 56 13 00-0370	EA	20' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,474.94	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	65.05	
		<i>For Black Anodized Finish, Add</i>	130.09	
		<i>For >10 To 20, Deduct</i>	-46.63	
		<i>For >20 To 40, Deduct</i>	-86.76	
		<i>For >40, Deduct</i>	-180.02	
26 56 13 00-0371	EA	16' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,364.91	343.54
		<i>For Bronze Or Satin Anodized Finish, Add</i>	67.78	
		<i>For Black Anodized Finish, Add</i>	135.57	
		<i>For >10 To 20, Deduct</i>	-44.29	
		<i>For >20 To 40, Deduct</i>	-81.80	
		<i>For >40, Deduct</i>	-170.38	
26 56 13 00-0372	EA	18' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,498.66	377.89
		<i>For Bronze Or Satin Anodized Finish, Add</i>	74.29	
		<i>For Black Anodized Finish, Add</i>	148.58	
		<i>For >10 To 20, Deduct</i>	-48.61	
		<i>For >20 To 40, Deduct</i>	-89.79	
		<i>For >40, Deduct</i>	-187.01	
26 56 13 00-0373	EA	20' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,585.63	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	76.11	
		<i>For Black Anodized Finish, Add</i>	152.23	
		<i>For >10 To 20, Deduct</i>	-51.06	
		<i>For >20 To 40, Deduct</i>	-94.50	
		<i>For >40, Deduct</i>	-196.62	
26 56 13 00-0374	EA	23' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,824.60	480.96
		<i>For Bronze Or Satin Anodized Finish, Add</i>	86.27	
		<i>For Black Anodized Finish, Add</i>	172.54	
		<i>For >10 To 20, Deduct</i>	-58.56	
		<i>For >20 To 40, Deduct</i>	-108.48	
		<i>For >40, Deduct</i>	-225.60	
26 56 13 00-0375	EA	25' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,070.43	549.66
		<i>For Bronze Or Satin Anodized Finish, Add</i>	97.11	
		<i>For Black Anodized Finish, Add</i>	194.22	
		<i>For >10 To 20, Deduct</i>	-66.33	
		<i>For >20 To 40, Deduct</i>	-122.94	
		<i>For >40, Deduct</i>	-255.60	
26 56 13 00-0376	EA	18' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,610.49	377.89
		<i>For Bronze Or Satin Anodized Finish, Add</i>	85.47	
		<i>For Black Anodized Finish, Add</i>	170.94	
		<i>For >10 To 20, Deduct</i>	-53.08	
		<i>For >20 To 40, Deduct</i>	-97.62	
		<i>For >40, Deduct</i>	-203.78	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0377	EA 20' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,721.43 89.69 179.39 -56.49 -104.01 -216.99	412.24
26 56 13 00-0378	EA 23' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,931.87 97.00 193.99 -62.85 -115.99 -241.69	480.96
26 56 13 00-0379	EA 25' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,152.59 105.33 210.65 -69.61 -128.69 -267.92	549.66
26 56 13 00-0380	EA 28' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,313.73 114.57 229.14 -75.03 -138.60 -288.66	584.01
26 56 13 00-0381	EA 30' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,477.15 124.04 248.08 -80.54 -148.67 -309.74	618.37
26 56 13 00-0382	EA 23' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,038.00 107.61 215.22 -67.09 -123.42 -257.61	480.96
26 56 13 00-0383	EA 25' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,223.34 112.40 224.80 -72.44 -133.65 -278.54	549.66
26 56 13 00-0384	EA 28' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,390.19 122.22 244.43 -78.09 -143.95 -300.13	584.01
26 56 13 00-0385	EA 30' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,595.83 135.91 271.82 -85.28 -156.97 -327.54	618.37
26 56 13 00-0386	EA 33' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,681.54 141.05 282.09 -88.20 -162.29 -338.68	635.54
26 56 13 00-0387	EA 35' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,853.97 154.85 309.71 -94.58 -173.67 -362.82	652.72
26 56 13 00-0388	EA 12' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,060.89 51.12 102.25 -34.19 -63.27 -131.65	274.83
26 56 13 00-0389	EA 14' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,184.38 56.60 113.20 -38.10 -70.54 -146.74	309.18
26 56 13 00-0390	EA 16' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,312.41 62.53 125.07 -42.19 -78.13 -162.51	343.54

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0391	EA 18' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,427.91	377.89
	<i>For Bronze Or Satin Anodized Finish, Add</i>	67.21	
	<i>For Black Anodized Finish, Add</i>	134.43	
	<i>For >10 To 20, Deduct</i>	-45.78	
	<i>For >20 To 40, Deduct</i>	-84.84	
	<i>For >40, Deduct</i>	-176.40	
26 56 13 00-0392	EA 20' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,542.27	412.24
	<i>For Bronze Or Satin Anodized Finish, Add</i>	71.78	
	<i>For Black Anodized Finish, Add</i>	143.56	
	<i>For >10 To 20, Deduct</i>	-49.32	
	<i>For >20 To 40, Deduct</i>	-91.47	
	<i>For >40, Deduct</i>	-190.12	
26 56 13 00-0393	EA 16' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,436.80	343.54
	<i>For Bronze Or Satin Anodized Finish, Add</i>	74.97	
	<i>For Black Anodized Finish, Add</i>	149.95	
	<i>For >10 To 20, Deduct</i>	-47.17	
	<i>For >20 To 40, Deduct</i>	-86.83	
	<i>For >40, Deduct</i>	-181.17	
26 56 13 00-0394	EA 18' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,573.98	377.89
	<i>For Bronze Or Satin Anodized Finish, Add</i>	81.82	
	<i>For Black Anodized Finish, Add</i>	163.64	
	<i>For >10 To 20, Deduct</i>	-51.62	
	<i>For >20 To 40, Deduct</i>	-95.06	
	<i>For >40, Deduct</i>	-198.31	
26 56 13 00-0395	EA 20' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,675.78	412.24
	<i>For Bronze Or Satin Anodized Finish, Add</i>	85.13	
	<i>For Black Anodized Finish, Add</i>	170.26	
	<i>For >10 To 20, Deduct</i>	-54.66	
	<i>For >20 To 40, Deduct</i>	-100.81	
	<i>For >40, Deduct</i>	-210.14	
26 56 13 00-0396	EA 23' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	1,909.05	480.96
	<i>For Bronze Or Satin Anodized Finish, Add</i>	94.72	
	<i>For Black Anodized Finish, Add</i>	189.43	
	<i>For >10 To 20, Deduct</i>	-61.93	
	<i>For >20 To 40, Deduct</i>	-114.40	
	<i>For >40, Deduct</i>	-238.26	
26 56 13 00-0397	EA 25' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,149.17	549.66
	<i>For Bronze Or Satin Anodized Finish, Add</i>	104.99	
	<i>For Black Anodized Finish, Add</i>	209.97	
	<i>For >10 To 20, Deduct</i>	-69.48	
	<i>For >20 To 40, Deduct</i>	-128.46	
	<i>For >40, Deduct</i>	-267.41	
26 56 13 00-0398	EA 23' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,166.94	480.96
	<i>For Bronze Or Satin Anodized Finish, Add</i>	120.50	
	<i>For Black Anodized Finish, Add</i>	241.01	
	<i>For >10 To 20, Deduct</i>	-72.25	
	<i>For >20 To 40, Deduct</i>	-132.45	
	<i>For >40, Deduct</i>	-276.95	
26 56 13 00-0399	EA 25' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,394.51	549.66
	<i>For Bronze Or Satin Anodized Finish, Add</i>	129.52	
	<i>For Black Anodized Finish, Add</i>	259.04	
	<i>For >10 To 20, Deduct</i>	-79.29	
	<i>For >20 To 40, Deduct</i>	-145.63	
	<i>For >40, Deduct</i>	-304.21	
26 56 13 00-0400	EA 28' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,575.06	584.01
	<i>For Bronze Or Satin Anodized Finish, Add</i>	140.70	
	<i>For Black Anodized Finish, Add</i>	281.41	
	<i>For >10 To 20, Deduct</i>	-85.48	
	<i>For >20 To 40, Deduct</i>	-156.89	
	<i>For >40, Deduct</i>	-327.86	
26 56 13 00-0401	EA 30' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,736.19	618.37
	<i>For Bronze Or Satin Anodized Finish, Add</i>	149.95	
	<i>For Black Anodized Finish, Add</i>	299.89	
	<i>For >10 To 20, Deduct</i>	-90.90	
	<i>For >20 To 40, Deduct</i>	-166.80	
	<i>For >40, Deduct</i>	-348.59	
26 56 13 00-0402	EA 33' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,881.24	635.54
	<i>For Bronze Or Satin Anodized Finish, Add</i>	161.02	
	<i>For Black Anodized Finish, Add</i>	322.03	
	<i>For >10 To 20, Deduct</i>	-96.18	
	<i>For >20 To 40, Deduct</i>	-176.27	
	<i>For >40, Deduct</i>	-368.63	
26 56 13 00-0403	EA 35' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,008.02	652.72
	<i>For Bronze Or Satin Anodized Finish, Add</i>	170.26	
	<i>For Black Anodized Finish, Add</i>	340.52	
	<i>For >10 To 20, Deduct</i>	-100.74	
	<i>For >20 To 40, Deduct</i>	-184.45	
	<i>For >40, Deduct</i>	-385.93	
26 56 13 00-0404	EA 37' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,116.55	669.90
	<i>For Bronze Or Satin Anodized Finish, Add</i>	177.68	
	<i>For Black Anodized Finish, Add</i>	355.35	
	<i>For >10 To 20, Deduct</i>	-104.57	
	<i>For >20 To 40, Deduct</i>	-191.36	
	<i>For >40, Deduct</i>	-400.49	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0405 EA 39' High, 8" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,310.66	687.07
For Bronze Or Satin Anodized Finish, Add	193.65	
For Black Anodized Finish, Add	387.30	
For >10 To 20, Deduct	-111.81	
For >20 To 40, Deduct	-204.26	
For >40, Deduct	-427.89	
26 56 13 00-0406 EA 28' High, 10" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,068.03	584.01
For Bronze Or Satin Anodized Finish, Add	190.00	
For Black Anodized Finish, Add	380.00	
For >10 To 20, Deduct	-105.20	
For >20 To 40, Deduct	-191.40	
For >40, Deduct	-401.80	
26 56 13 00-0407 EA 30' High, 10" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,306.76	618.37
For Bronze Or Satin Anodized Finish, Add	207.00	
For Black Anodized Finish, Add	414.01	
For >10 To 20, Deduct	-113.72	
For >20 To 40, Deduct	-206.74	
For >40, Deduct	-434.18	
26 56 13 00-0408 EA 33' High, 10" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,474.63	635.54
For Bronze Or Satin Anodized Finish, Add	220.35	
For Black Anodized Finish, Add	440.71	
For >10 To 20, Deduct	-119.92	
For >20 To 40, Deduct	-217.80	
For >40, Deduct	-457.64	
26 56 13 00-0409 EA 35' High, 10" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,602.55	652.72
For Bronze Or Satin Anodized Finish, Add	229.71	
For Black Anodized Finish, Add	459.42	
For >10 To 20, Deduct	-124.52	
For >20 To 40, Deduct	-226.07	
For >40, Deduct	-475.11	
26 56 13 00-0410 EA 37' High, 10" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,674.56	669.90
For Bronze Or Satin Anodized Finish, Add	233.48	
For Black Anodized Finish, Add	466.95	
For >10 To 20, Deduct	-126.89	
For >20 To 40, Deduct	-230.42	
For >40, Deduct	-484.19	
26 56 13 00-0411 EA 39' High, 10" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,888.08	687.07
For Bronze Or Satin Anodized Finish, Add	251.39	
For Black Anodized Finish, Add	502.79	
For >10 To 20, Deduct	-134.91	
For >20 To 40, Deduct	-244.68	
For >40, Deduct	-514.50	
26 56 13 00-0412 EA 28' High, 8" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	2,911.69	584.01
For Bronze Or Satin Anodized Finish, Add	174.37	
For Black Anodized Finish, Add	348.73	
For >10 To 20, Deduct	-98.95	
For >20 To 40, Deduct	-180.46	
For >40, Deduct	-378.35	
26 56 13 00-0413 EA 30' High, 8" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,129.88	618.37
For Bronze Or Satin Anodized Finish, Add	189.32	
For Black Anodized Finish, Add	378.63	
For >10 To 20, Deduct	-106.64	
For >20 To 40, Deduct	-194.36	
For >40, Deduct	-407.65	
26 56 13 00-0414 EA 33' High, 8" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,215.59	635.54
For Bronze Or Satin Anodized Finish, Add	194.45	
For Black Anodized Finish, Add	388.90	
For >10 To 20, Deduct	-109.56	
For >20 To 40, Deduct	-199.67	
For >40, Deduct	-418.78	
26 56 13 00-0415 EA 35' High, 8" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,432.52	652.72
For Bronze Or Satin Anodized Finish, Add	212.71	
For Black Anodized Finish, Add	425.42	
For >10 To 20, Deduct	-117.72	
For >20 To 40, Deduct	-214.17	
For >40, Deduct	-449.61	
26 56 13 00-0416 EA 37' High, 8" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,539.91	669.90
For Bronze Or Satin Anodized Finish, Add	220.01	
For Black Anodized Finish, Add	440.02	
For >10 To 20, Deduct	-121.50	
For >20 To 40, Deduct	-221.00	
For >40, Deduct	-464.00	
26 56 13 00-0417 EA 39' High, 8" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,754.57	687.07
For Bronze Or Satin Anodized Finish, Add	238.04	
For Black Anodized Finish, Add	476.08	
For >10 To 20, Deduct	-129.57	
For >20 To 40, Deduct	-235.34	
For >40, Deduct	-494.48	
26 56 13 00-0418 EA 28' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,626.05	584.01
For Bronze Or Satin Anodized Finish, Add	245.80	
For Black Anodized Finish, Add	491.60	
For >10 To 20, Deduct	-127.52	
For >20 To 40, Deduct	-230.46	
For >40, Deduct	-485.51	



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0419	EA	30' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	3,833.96	618.37
		<i>For Bronze Or Satin Anodized Finish, Add</i>	259.72	
		<i>For Black Anodized Finish, Add</i>	519.45	
		<i>For >10 To 20, Deduct</i>	-134.81	
		<i>For >20 To 40, Deduct</i>	-243.64	
		<i>For >40, Deduct</i>	-513.26	
26 56 13 00-0420	EA	33' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	4,004.12	635.54
		<i>For Bronze Or Satin Anodized Finish, Add</i>	273.30	
		<i>For Black Anodized Finish, Add</i>	546.61	
		<i>For >10 To 20, Deduct</i>	-141.10	
		<i>For >20 To 40, Deduct</i>	-254.87	
		<i>For >40, Deduct</i>	-537.06	
26 56 13 00-0421	EA	35' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	4,266.70	652.72
		<i>For Bronze Or Satin Anodized Finish, Add</i>	296.13	
		<i>For Black Anodized Finish, Add</i>	592.25	
		<i>For >10 To 20, Deduct</i>	-151.09	
		<i>For >20 To 40, Deduct</i>	-272.56	
		<i>For >40, Deduct</i>	-574.73	
26 56 13 00-0422	EA	37' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	4,326.15	669.90
		<i>For Bronze Or Satin Anodized Finish, Add</i>	298.64	
		<i>For Black Anodized Finish, Add</i>	597.27	
		<i>For >10 To 20, Deduct</i>	-152.95	
		<i>For >20 To 40, Deduct</i>	-276.03	
		<i>For >40, Deduct</i>	-581.93	
26 56 13 00-0423	EA	39' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	4,587.60	687.07
		<i>For Bronze Or Satin Anodized Finish, Add</i>	321.35	
		<i>For Black Anodized Finish, Add</i>	642.69	
		<i>For >10 To 20, Deduct</i>	-162.89	
		<i>For >20 To 40, Deduct</i>	-293.65	
		<i>For >40, Deduct</i>	-619.43	
26 56 13 00-0424	EA	48' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	5,803.03	1,030.61
		<i>For Bronze Or Satin Anodized Finish, Add</i>	374.18	
		<i>For Black Anodized Finish, Add</i>	748.36	
		<i>For >10 To 20, Deduct</i>	-201.20	
		<i>For >20 To 40, Deduct</i>	-364.99	
		<i>For >40, Deduct</i>	-767.39	
26 56 13 00-0425	EA	50' High, 10" OD, 0.250", Round Tapered, Aluminum Area Light Pole, Anchor Base	5,944.53	1,030.61
		<i>For Bronze Or Satin Anodized Finish, Add</i>	388.33	
		<i>For Black Anodized Finish, Add</i>	776.66	
		<i>For >10 To 20, Deduct</i>	-206.86	
		<i>For >20 To 40, Deduct</i>	-374.89	
		<i>For >40, Deduct</i>	-788.62	
26 56 13 00-0426		Round Tapered, Aluminum Area Light Poles, Hinged Anchor Base <small>(26 56 13 00-0354)</small>		
26 56 13 00-0427	EA	8' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	980.53	206.13
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	85.24	
		<i>For >10 To 20, Deduct</i>	-33.04	
		<i>For >20 To 40, Deduct</i>	-60.39	
		<i>For >40, Deduct</i>	-126.47	
26 56 13 00-0428	EA	10' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,073.21	240.48
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	88.84	
		<i>For >10 To 20, Deduct</i>	-35.71	
		<i>For >20 To 40, Deduct</i>	-65.51	
		<i>For >40, Deduct</i>	-136.93	
26 56 13 00-0429	EA	12' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,167.02	274.83
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	92.60	
		<i>For >10 To 20, Deduct</i>	-38.44	
		<i>For >20 To 40, Deduct</i>	-70.70	
		<i>For >40, Deduct</i>	-147.57	
26 56 13 00-0430	EA	14' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,263.11	309.18
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	96.71	
		<i>For >10 To 20, Deduct</i>	-41.25	
		<i>For >20 To 40, Deduct</i>	-76.05	
		<i>For >40, Deduct</i>	-158.55	
26 56 13 00-0431	EA	16' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,358.06	343.54
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	100.65	
		<i>For >10 To 20, Deduct</i>	-44.02	
		<i>For >20 To 40, Deduct</i>	-81.32	
		<i>For >40, Deduct</i>	-169.36	
26 56 13 00-0432	EA	10' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,086.91	240.48
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	90.89	
		<i>For >10 To 20, Deduct</i>	-36.26	
		<i>For >20 To 40, Deduct</i>	-66.46	
		<i>For >40, Deduct</i>	-138.99	
26 56 13 00-0433	EA	12' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,182.99	274.83
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	95.00	
		<i>For >10 To 20, Deduct</i>	-39.07	
		<i>For >20 To 40, Deduct</i>	-71.82	
		<i>For >40, Deduct</i>	-149.97	
26 56 13 00-0434	EA	14' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base	1,281.37	309.18
		<i>For Bronze, Satin Or Black Anodized Finish, Add</i>	99.45	
		<i>For >10 To 20, Deduct</i>	-41.98	
		<i>For >20 To 40, Deduct</i>	-77.33	
		<i>For >40, Deduct</i>	-161.29	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0435	EA		16' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,378.60 103.73 -44.84 -82.76 -172.44	343.54
26 56 13 00-0436	EA		18' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,490.67 110.23 -48.29 -89.23 -185.81	377.89
26 56 13 00-0437	EA		20' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,592.48 115.20 -51.33 -94.98 -197.65	412.24
26 56 13 00-0438	EA		12' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,227.50 101.68 -40.86 -74.93 -156.64	274.83
26 56 13 00-0439	EA		14' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,331.58 106.98 -43.99 -80.84 -168.82	309.18
26 56 13 00-0440	EA		16' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,449.35 114.34 -47.67 -87.71 -183.05	343.54
26 56 13 00-0441	EA		18' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,555.72 119.99 -50.89 -93.78 -195.57	377.89
26 56 13 00-0442	EA		20' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,676.92 127.86 -54.71 -100.89 -210.31	412.24
26 56 13 00-0443	EA		16' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,514.40 124.10 -50.27 -92.27 -192.81	343.54
26 56 13 00-0444	EA		18' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,643.59 133.17 -54.41 -99.94 -208.75	377.89
26 56 13 00-0445	EA		20' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,747.67 138.48 -57.54 -105.85 -220.93	412.24
26 56 13 00-0446	EA		12' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,262.87 106.98 -42.27 -77.41 -161.95	274.83
26 56 13 00-0447	EA		14' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,385.22 115.03 -46.13 -84.60 -176.86	309.18
26 56 13 00-0448	EA		16' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,514.40 124.10 -50.27 -92.27 -192.81	343.54
26 56 13 00-0449	EA		18' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,629.89 131.12 -53.86 -98.98 -206.69	377.89
26 56 13 00-0450	EA		20' High, 5" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,753.38 139.33 -57.77 -106.25 -221.78	412.24
26 56 13 00-0451	EA		16' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,588.57 135.23 -53.24 -97.46 -203.93	343.54

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0452	EA 18' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,726.89 145.67 -57.74 -105.77 -221.24	377.89
26 56 13 00-0453	EA 20' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Hinged Anchor Base <i>For Bronze, Satin Or Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,836.68 151.83 -61.10 -112.08 -234.28	412.24
26 56 13 00-0454	Round Tapered, Aluminum Area Light Poles, Direct Burial <small>(26 56 13 00-0354)</small> Note: Includes rubberized undercoating on embedded portion.		
26 56 13 00-0455	EA 8' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	681.32 33.78 67.56 -22.10 -40.82 -85.02	171.77
26 56 13 00-0456	EA 10' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	713.27 36.97 73.95 -23.38 -43.06 -89.81	171.77
26 56 13 00-0457	EA 12' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	773.87 39.60 79.20 -25.29 -46.61 -97.19	188.95
26 56 13 00-0458	EA 14' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	826.47 41.42 82.85 -26.88 -49.61 -103.36	206.13
26 56 13 00-0459	EA 16' High, 4" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	867.55 45.53 91.06 -28.52 -52.48 -109.52	206.13
26 56 13 00-0460	EA 12' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	804.68 42.68 85.36 -26.52 -48.77 -101.81	188.95
26 56 13 00-0461	EA 14' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	870.98 45.87 91.75 -28.66 -52.72 -110.04	206.13
26 56 13 00-0462	EA 16' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	893.80 48.16 96.31 -29.57 -54.32 -113.46	206.13
26 56 13 00-0463	EA 18' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	964.67 51.81 103.62 -31.89 -58.60 -122.37	223.30
26 56 13 00-0464	EA 20' High, 5" OD, 0.125", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,030.99 55.00 110.01 -34.03 -62.55 -130.60	240.48
26 56 13 00-0465	EA 16' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	959.99 54.78 109.55 -32.22 -58.95 -123.39	206.13
26 56 13 00-0466	EA 18' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial <i>For Bronze Or Satin Anodized Finish, Add</i> <i>For Black Anodized Finish, Add</i> <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,037.70 59.11 118.22 -34.81 -63.71 -133.33	223.30

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0467 EA 20' High, 5" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial	1,109.73	240.48
For Bronze Or Satin Anodized Finish, Add	62.88	
For Black Anodized Finish, Add	125.75	
For >10 To 20, Deduct	-37.17	
For >20 To 40, Deduct	-68.06	
For >40, Deduct	-142.41	
26 56 13 00-0468 EA 18' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial	1,131.27	223.30
For Bronze Or Satin Anodized Finish, Add	68.47	
For Black Anodized Finish, Add	136.94	
For >10 To 20, Deduct	-38.55	
For >20 To 40, Deduct	-70.26	
For >40, Deduct	-147.36	
26 56 13 00-0469 EA 25' High, 6" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial	1,447.74	274.83
For Bronze Or Satin Anodized Finish, Add	89.81	
For Black Anodized Finish, Add	179.62	
For >10 To 20, Deduct	-49.66	
For >20 To 40, Deduct	-90.35	
For >40, Deduct	-189.68	
26 56 13 00-0470 EA 25' High, 6" OD, 0.188", Round Tapered, Aluminum Area Light Pole, Direct Burial	1,576.69	274.83
For Bronze Or Satin Anodized Finish, Add	102.70	
For Black Anodized Finish, Add	205.41	
For >10 To 20, Deduct	-54.82	
For >20 To 40, Deduct	-99.38	
For >40, Deduct	-209.02	
26 56 13 00-0471 EA 30' High, 7" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial	1,756.09	309.18
For Bronze Or Satin Anodized Finish, Add	113.77	
For Black Anodized Finish, Add	227.54	
For >10 To 20, Deduct	-60.97	
For >20 To 40, Deduct	-110.56	
For >40, Deduct	-232.50	
26 56 13 00-0472 EA 30' High, 8" OD, 0.156", Round Tapered, Aluminum Area Light Pole, Direct Burial	1,896.45	309.18
For Bronze Or Satin Anodized Finish, Add	127.81	
For Black Anodized Finish, Add	255.62	
For >10 To 20, Deduct	-66.58	
For >20 To 40, Deduct	-120.38	
For >40, Deduct	-253.55	
26 56 13 00-0473 Square Straight, Aluminum Area Light Poles <small>(26 56 13 00-0294)</small>		
26 56 13 00-0474 Square Straight, Aluminum Area Light Poles, Anchor Base <small>(26 56 13 00-0473)</small>		
26 56 13 00-0475 EA 8' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	883.53	206.13
For Bronze Or Satin Anodized Finish, Add	47.13	
For Black Anodized Finish, Add	94.26	
For >10 To 20, Deduct	-29.16	
For >20 To 40, Deduct	-53.60	
For >40, Deduct	-111.92	
26 56 13 00-0476 EA 10' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	976.21	240.48
For Bronze Or Satin Anodized Finish, Add	49.53	
For Black Anodized Finish, Add	99.05	
For >10 To 20, Deduct	-31.83	
For >20 To 40, Deduct	-58.72	
For >40, Deduct	-122.38	
26 56 13 00-0477 EA 12' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	1,078.01	274.83
For Bronze Or Satin Anodized Finish, Add	52.84	
For Black Anodized Finish, Add	105.67	
For >10 To 20, Deduct	-34.88	
For >20 To 40, Deduct	-64.47	
For >40, Deduct	-134.22	
26 56 13 00-0478 EA 14' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	1,178.67	309.18
For Bronze Or Satin Anodized Finish, Add	56.03	
For Black Anodized Finish, Add	112.06	
For >10 To 20, Deduct	-37.87	
For >20 To 40, Deduct	-70.14	
For >40, Deduct	-145.88	
26 56 13 00-0479 EA 15' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	1,233.56	326.36
For Bronze Or Satin Anodized Finish, Add	58.08	
For Black Anodized Finish, Add	116.17	
For >10 To 20, Deduct	-39.55	
For >20 To 40, Deduct	-73.29	
For >40, Deduct	-152.40	
26 56 13 00-0480 EA 16' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	1,288.45	343.54
For Bronze Or Satin Anodized Finish, Add	60.14	
For Black Anodized Finish, Add	120.28	
For >10 To 20, Deduct	-41.23	
For >20 To 40, Deduct	-76.45	
For >40, Deduct	-158.91	
26 56 13 00-0481 EA 18' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	1,395.96	377.89
For Bronze Or Satin Anodized Finish, Add	64.02	
For Black Anodized Finish, Add	128.04	
For >10 To 20, Deduct	-44.50	
For >20 To 40, Deduct	-82.60	
For >40, Deduct	-171.61	



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0482	EA	20' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Anchor Base	1,513.74	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	68.93	
		<i>For Black Anodized Finish, Add</i>	137.85	
		<i>For >10 To 20, Deduct</i>	-48.18	
		<i>For >20 To 40, Deduct</i>	-89.47	
		<i>For >40, Deduct</i>	-185.84	
26 56 13 00-0483	EA	16' High, 4" OD, 0.188", Square Straight, Aluminum Area Light Pole, Anchor Base	1,367.19	343.54
		<i>For Bronze Or Satin Anodized Finish, Add</i>	68.01	
		<i>For Black Anodized Finish, Add</i>	136.02	
		<i>For >10 To 20, Deduct</i>	-44.38	
		<i>For >20 To 40, Deduct</i>	-81.96	
		<i>For >40, Deduct</i>	-170.73	
26 56 13 00-0484	EA	18' High, 4" OD, 0.188", Square Straight, Aluminum Area Light Pole, Anchor Base	1,476.98	377.89
		<i>For Bronze Or Satin Anodized Finish, Add</i>	72.12	
		<i>For Black Anodized Finish, Add</i>	144.24	
		<i>For >10 To 20, Deduct</i>	-47.74	
		<i>For >20 To 40, Deduct</i>	-88.27	
		<i>For >40, Deduct</i>	-183.76	
26 56 13 00-0485	EA	20' High, 4" OD, 0.188", Square Straight, Aluminum Area Light Pole, Anchor Base	1,601.61	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	77.71	
		<i>For Black Anodized Finish, Add</i>	155.42	
		<i>For >10 To 20, Deduct</i>	-51.70	
		<i>For >20 To 40, Deduct</i>	-95.62	
		<i>For >40, Deduct</i>	-199.02	
26 56 13 00-0486	EA	15' High, 5" OD, 0.188", Square Straight, Aluminum Area Light Pole, Anchor Base	1,575.90	326.36
		<i>For Bronze Or Satin Anodized Finish, Add</i>	92.32	
		<i>For Black Anodized Finish, Add</i>	184.64	
		<i>For >10 To 20, Deduct</i>	-53.25	
		<i>For >20 To 40, Deduct</i>	-97.26	
		<i>For >40, Deduct</i>	-203.75	
26 56 13 00-0487	EA	20' High, 5" OD, 0.188", Square Straight, Aluminum Area Light Pole, Anchor Base	1,929.11	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	110.46	
		<i>For Black Anodized Finish, Add</i>	220.92	
		<i>For >10 To 20, Deduct</i>	-64.80	
		<i>For >20 To 40, Deduct</i>	-118.55	
		<i>For >40, Deduct</i>	-248.14	
26 56 13 00-0488	EA	25' High, 5" OD, 0.188", Square Straight, Aluminum Area Light Pole, Anchor Base	2,346.59	549.66
		<i>For Bronze Or Satin Anodized Finish, Add</i>	124.73	
		<i>For Black Anodized Finish, Add</i>	249.45	
		<i>For >10 To 20, Deduct</i>	-77.37	
		<i>For >20 To 40, Deduct</i>	-142.27	
		<i>For >40, Deduct</i>	-297.02	
26 56 13 00-0489	EA	20' High, 4" OD, 0.250", Square Straight, Aluminum Area Light Pole, Anchor Base	1,672.36	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	84.79	
		<i>For Black Anodized Finish, Add</i>	169.57	
		<i>For >10 To 20, Deduct</i>	-54.53	
		<i>For >20 To 40, Deduct</i>	-100.58	
		<i>For >40, Deduct</i>	-209.63	
26 56 13 00-0490	EA	20' High, 5" OD, 0.250", Square Straight, Aluminum Area Light Pole, Anchor Base	2,067.19	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	124.27	
		<i>For Black Anodized Finish, Add</i>	248.54	
		<i>For >10 To 20, Deduct</i>	-70.32	
		<i>For >20 To 40, Deduct</i>	-128.21	
		<i>For >40, Deduct</i>	-268.85	
26 56 13 00-0491	EA	25' High, 5" OD, 0.250", Square Straight, Aluminum Area Light Pole, Anchor Base	2,472.11	549.66
		<i>For Bronze Or Satin Anodized Finish, Add</i>	137.28	
		<i>For Black Anodized Finish, Add</i>	274.56	
		<i>For >10 To 20, Deduct</i>	-82.39	
		<i>For >20 To 40, Deduct</i>	-151.06	
		<i>For >40, Deduct</i>	-315.85	
26 56 13 00-0492	EA	20' High, 6" OD, 0.250", Square Straight, Aluminum Area Light Pole, Anchor Base	2,284.01	412.24
		<i>For Bronze Or Satin Anodized Finish, Add</i>	145.95	
		<i>For Black Anodized Finish, Add</i>	291.90	
		<i>For >10 To 20, Deduct</i>	-78.99	
		<i>For >20 To 40, Deduct</i>	-143.39	
		<i>For >40, Deduct</i>	-301.38	
26 56 13 00-0493	EA	25' High, 6" OD, 0.250", Square Straight, Aluminum Area Light Pole, Anchor Base	2,755.11	549.66
		<i>For Bronze Or Satin Anodized Finish, Add</i>	165.58	
		<i>For Black Anodized Finish, Add</i>	331.16	
		<i>For >10 To 20, Deduct</i>	-93.71	
		<i>For >20 To 40, Deduct</i>	-170.87	
		<i>For >40, Deduct</i>	-358.30	
26 56 13 00-0494	EA	30' High, 6" OD, 0.250", Square Straight, Aluminum Area Light Pole, Anchor Base	3,186.94	618.37
		<i>For Bronze Or Satin Anodized Finish, Add</i>	195.02	
		<i>For Black Anodized Finish, Add</i>	390.04	
		<i>For >10 To 20, Deduct</i>	-108.93	
		<i>For >20 To 40, Deduct</i>	-198.35	
		<i>For >40, Deduct</i>	-416.20	

26 56 13 00-0495 Square Straight, Aluminum Area Light Poles, Direct Burial (26 56 13 00-0473)
 Note: Includes rubberized undercoating on embedded portion.



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0496 EA 10' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Direct Burial	793.15	171.77
For Bronze Or Satin Anodized Finish, Add	44.96	
For Black Anodized Finish, Add	89.92	
For >10 To 20, Deduct	-26.57	
For >20 To 40, Deduct	-48.65	
For >40, Deduct	-101.80	
26 56 13 00-0497 EA 12' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Direct Burial	885.70	188.95
For Bronze Or Satin Anodized Finish, Add	50.78	
For Black Anodized Finish, Add	101.56	
For >10 To 20, Deduct	-29.76	
For >20 To 40, Deduct	-54.44	
For >40, Deduct	-113.96	
26 56 13 00-0498 EA 14' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Direct Burial	944.01	206.13
For Bronze Or Satin Anodized Finish, Add	53.18	
For Black Anodized Finish, Add	106.35	
For >10 To 20, Deduct	-31.58	
For >20 To 40, Deduct	-57.84	
For >40, Deduct	-120.99	
26 56 13 00-0499 EA 15' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Direct Burial	972.54	206.13
For Bronze Or Satin Anodized Finish, Add	56.03	
For Black Anodized Finish, Add	112.06	
For >10 To 20, Deduct	-32.72	
For >20 To 40, Deduct	-59.83	
For >40, Deduct	-125.27	
26 56 13 00-0500 EA 16' High, 4" OD, 0.125", Square Straight, Aluminum Area Light Pole, Direct Burial	1,007.92	206.13
For Bronze Or Satin Anodized Finish, Add	59.57	
For Black Anodized Finish, Add	119.14	
For >10 To 20, Deduct	-34.13	
For >20 To 40, Deduct	-62.31	
For >40, Deduct	-130.58	
26 56 13 00-0501 EA 18' High, 4" OD, 0.188", Square Straight, Aluminum Area Light Pole, Direct Burial	1,163.23	223.30
For Bronze Or Satin Anodized Finish, Add	71.66	
For Black Anodized Finish, Add	143.33	
For >10 To 20, Deduct	-39.83	
For >20 To 40, Deduct	-72.49	
For >40, Deduct	-152.16	
26 56 13 00-0502 EA 20' High, 4" OD, 0.188", Square Straight, Aluminum Area Light Pole, Direct Burial	1,246.66	240.48
For Bronze Or Satin Anodized Finish, Add	76.57	
For Black Anodized Finish, Add	153.14	
For >10 To 20, Deduct	-42.65	
For >20 To 40, Deduct	-77.65	
For >40, Deduct	-162.95	
26 56 13 00-0503 EA 20' High, 5" OD, 0.188", Square Straight, Aluminum Area Light Pole, Direct Burial	1,425.82	240.48
For Bronze Or Satin Anodized Finish, Add	94.49	
For Black Anodized Finish, Add	188.97	
For >10 To 20, Deduct	-49.82	
For >20 To 40, Deduct	-90.19	
For >40, Deduct	-189.83	
26 56 13 00-0504 EA 25' High, 5" OD, 0.188", Square Straight, Aluminum Area Light Pole, Direct Burial	1,638.31	274.83
For Bronze Or Satin Anodized Finish, Add	108.87	
For Black Anodized Finish, Add	217.73	
For >10 To 20, Deduct	-57.29	
For >20 To 40, Deduct	-103.69	
For >40, Deduct	-218.26	
26 56 13 00-0505 EA 25' High, 6" OD, 0.250", Square Straight, Aluminum Area Light Pole, Direct Burial	2,038.85	274.83
For Bronze Or Satin Anodized Finish, Add	148.92	
For Black Anodized Finish, Add	297.84	
For >10 To 20, Deduct	-73.31	
For >20 To 40, Deduct	-131.73	
For >40, Deduct	-278.34	
26 56 13 00-0506 Factory Accessories For Aluminum Area Light Poles <small>(26 56 13 00-0294)</small>		
26 56 13 00-0507 EA 1/2", 3/4" Or 1" Factory Threaded Pipe Coupling Or Nipple For Aluminum Area Light Poles	107.87	
26 56 13 00-0508 EA Extra Handhole For Aluminum Area Light Poles	42.53	
26 56 13 00-0509 EA Vibration Dampener For Aluminum Area Light Poles	163.19	
26 56 13 00-0510 Fiberglass Area Light Poles <small>(26 56 13 00-0177)</small>		
Note: Includes UV resistant textured weave finish, anchor bolts, base cover, reinforced handhole with cover and grounding provisions and tenon top.		
26 56 13 00-0511 Round Tapered, Fiberglass Area Light Poles <small>(26 56 13 00-0510)</small>		
26 56 13 00-0512 Round Tapered, Fiberglass Area Light Poles, Anchor Base <small>(26 56 13 00-0511)</small>		
26 56 13 00-0513 EA 10' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base	1,470.76	240.48
For >10 To 20, Deduct	-51.62	
For >20 To 40, Deduct	-93.33	
For >40, Deduct	-196.57	
26 56 13 00-0514 EA 12' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base	1,598.37	274.83
For >10 To 20, Deduct	-55.69	
For >20 To 40, Deduct	-100.89	
For >40, Deduct	-212.27	

26 Electrical
26 50 Lighting
26 56 Exterior Lighting



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0515	EA	14' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,727.68	309.18
		<i>For >10 To 20, Deduct</i>	-59.83	
		<i>For >20 To 40, Deduct</i>	-108.57	
		<i>For >40, Deduct</i>	-228.23	
26 56 13 00-0516	EA	16' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,855.30	343.54
		<i>For >10 To 20, Deduct</i>	-63.91	
		<i>For >20 To 40, Deduct</i>	-116.13	
		<i>For >40, Deduct</i>	-243.94	
26 56 13 00-0517	EA	18' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,013.23	377.89
		<i>For >10 To 20, Deduct</i>	-69.19	
		<i>For >20 To 40, Deduct</i>	-125.81	
		<i>For >40, Deduct</i>	-264.20	
26 56 13 00-0518	EA	20' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,144.22	412.24
		<i>For >10 To 20, Deduct</i>	-73.40	
		<i>For >20 To 40, Deduct</i>	-133.61	
		<i>For >40, Deduct</i>	-280.41	
26 56 13 00-0519	EA	22' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,342.23	480.96
		<i>For >10 To 20, Deduct</i>	-79.26	
		<i>For >20 To 40, Deduct</i>	-144.72	
		<i>For >40, Deduct</i>	-303.24	
26 56 13 00-0520	EA	24' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,538.57	549.66
		<i>For >10 To 20, Deduct</i>	-85.05	
		<i>For >20 To 40, Deduct</i>	-155.71	
		<i>For >40, Deduct</i>	-325.82	
26 56 13 00-0521	EA	26' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,674.92	549.66
		<i>For >10 To 20, Deduct</i>	-90.51	
		<i>For >20 To 40, Deduct</i>	-165.26	
		<i>For >40, Deduct</i>	-346.27	
26 56 13 00-0522	EA	28' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,863.14	584.01
		<i>For >10 To 20, Deduct</i>	-97.01	
		<i>For >20 To 40, Deduct</i>	-177.06	
		<i>For >40, Deduct</i>	-371.07	
26 56 13 00-0523	EA	30' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	3,051.36	618.37
		<i>For >10 To 20, Deduct</i>	-103.50	
		<i>For >20 To 40, Deduct</i>	-188.86	
		<i>For >40, Deduct</i>	-395.87	
26 56 13 00-0524	EA	10' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,625.62	240.48
		<i>For >10 To 20, Deduct</i>	-57.81	
		<i>For >20 To 40, Deduct</i>	-104.17	
		<i>For >40, Deduct</i>	-219.80	
26 56 13 00-0525	EA	12' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,722.94	274.83
		<i>For >10 To 20, Deduct</i>	-60.67	
		<i>For >20 To 40, Deduct</i>	-109.61	
		<i>For >40, Deduct</i>	-230.96	
26 56 13 00-0526	EA	14' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,821.95	309.18
		<i>For >10 To 20, Deduct</i>	-63.60	
		<i>For >20 To 40, Deduct</i>	-115.17	
		<i>For >40, Deduct</i>	-242.37	
26 56 13 00-0527	EA	16' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,924.32	343.54
		<i>For >10 To 20, Deduct</i>	-66.67	
		<i>For >20 To 40, Deduct</i>	-120.96	
		<i>For >40, Deduct</i>	-254.29	
26 56 13 00-0528	EA	18' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,035.11	377.89
		<i>For >10 To 20, Deduct</i>	-70.07	
		<i>For >20 To 40, Deduct</i>	-127.34	
		<i>For >40, Deduct</i>	-267.48	
26 56 13 00-0529	EA	20' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,144.22	412.24
		<i>For >10 To 20, Deduct</i>	-73.40	
		<i>For >20 To 40, Deduct</i>	-133.61	
		<i>For >40, Deduct</i>	-280.41	
26 56 13 00-0530	EA	22' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,322.03	480.96
		<i>For >10 To 20, Deduct</i>	-78.45	
		<i>For >20 To 40, Deduct</i>	-143.30	
		<i>For >40, Deduct</i>	-300.21	
26 56 13 00-0531	EA	24' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,538.57	549.66
		<i>For >10 To 20, Deduct</i>	-85.05	
		<i>For >20 To 40, Deduct</i>	-155.71	
		<i>For >40, Deduct</i>	-325.82	
26 56 13 00-0532	EA	26' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,595.80	549.66
		<i>For >10 To 20, Deduct</i>	-87.34	
		<i>For >20 To 40, Deduct</i>	-159.72	
		<i>For >40, Deduct</i>	-334.40	
26 56 13 00-0533	EA	28' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,723.43	584.01
		<i>For >10 To 20, Deduct</i>	-91.42	
		<i>For >20 To 40, Deduct</i>	-167.28	
		<i>For >40, Deduct</i>	-350.11	
26 56 13 00-0534	EA	30' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	2,851.04	618.37
		<i>For >10 To 20, Deduct</i>	-95.49	
		<i>For >20 To 40, Deduct</i>	-174.84	
		<i>For >40, Deduct</i>	-365.82	
26 56 13 00-0535	EA	10' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base.....	1,852.87	240.48
		<i>For >10 To 20, Deduct</i>	-66.90	
		<i>For >20 To 40, Deduct</i>	-120.08	
		<i>For >40, Deduct</i>	-253.88	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 13 00-0536	EA 12' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,973.76 -70.71 -127.17 -268.58	274.83
26 56 13 00-0537	EA 14' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,094.65 -74.51 -134.26 -283.28	309.18
26 56 13 00-0538	EA 16' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,217.22 -78.38 -141.46 -298.23	343.54
26 56 13 00-0539	EA 18' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,346.53 -82.52 -149.14 -314.19	377.89
26 56 13 00-0540	EA 20' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,485.94 -87.07 -157.53 -331.67	412.24
26 56 13 00-0541	EA 22' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,709.20 -93.94 -170.41 -358.29	480.96
26 56 13 00-0542	EA 24' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	2,934.15 -100.88 -183.40 -385.16	549.66
26 56 13 00-0543	EA 26' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	3,021.68 -104.38 -189.53 -398.29	549.66
26 56 13 00-0544	EA 28' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	3,228.43 -111.62 -202.63 -425.86	584.01
26 56 13 00-0545	EA 30' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	3,396.44 -117.31 -213.02 -447.63	618.37
26 56 13 00-0546	EA 32' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	3,530.12 -122.14 -221.69 -465.96	635.54
26 56 13 00-0547	EA 34' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Anchor Base..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	3,663.79 -126.97 -230.36 -484.30	652.72
26 56 13 00-0548	Round Tapered, Fiberglass Area Light Poles, Direct Burial <small>(26 56 13 00-0511)</small>		
26 56 13 00-0549	EA 10' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	909.14 -31.21 -56.77 -119.19	171.77
26 56 13 00-0550	EA 12' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	975.47 -33.35 -60.73 -127.43	188.95
26 56 13 00-0551	EA 14' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,040.12 -35.42 -64.56 -135.41	206.13
26 56 13 00-0552	EA 16' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,068.74 -36.57 -66.57 -139.70	206.13
26 56 13 00-0553	EA 18' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,150.22 -39.31 -71.58 -150.20	223.30
26 56 13 00-0554	EA 20' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,218.26 -41.52 -75.66 -158.69	240.48
26 56 13 00-0555	EA 22' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,291.33 -43.92 -80.09 -167.93	257.65
26 56 13 00-0556	EA 24' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial..... <i>For >10 To 20, Deduct</i> <i>For >20 To 40, Deduct</i> <i>For >40, Deduct</i>	1,372.81 -46.67 -85.10 -178.44	274.83

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56	13 00-0557	EA	26' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,534.41	274.83
			<i>For >10 To 20, Deduct</i>	-53.13	
			<i>For >20 To 40, Deduct</i>	-96.42	
			<i>For >40, Deduct</i>	-202.68	
26 56	13 00-0558	EA	28' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,730.36	292.01
			<i>For >10 To 20, Deduct</i>	-60.45	
			<i>For >20 To 40, Deduct</i>	-109.45	
			<i>For >40, Deduct</i>	-230.35	
26 56	13 00-0559	EA	30' High, 3.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,926.32	309.18
			<i>For >10 To 20, Deduct</i>	-67.78	
			<i>For >20 To 40, Deduct</i>	-122.48	
			<i>For >40, Deduct</i>	-258.03	
26 56	13 00-0560	EA	10' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,064.01	171.77
			<i>For >10 To 20, Deduct</i>	-37.41	
			<i>For >20 To 40, Deduct</i>	-67.61	
			<i>For >40, Deduct</i>	-142.42	
26 56	13 00-0561	EA	12' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,138.76	188.95
			<i>For >10 To 20, Deduct</i>	-39.88	
			<i>For >20 To 40, Deduct</i>	-72.16	
			<i>For >40, Deduct</i>	-151.92	
26 56	13 00-0562	EA	14' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,213.51	206.13
			<i>For >10 To 20, Deduct</i>	-42.36	
			<i>For >20 To 40, Deduct</i>	-76.70	
			<i>For >40, Deduct</i>	-161.41	
26 56	13 00-0563	EA	16' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,255.59	206.13
			<i>For >10 To 20, Deduct</i>	-44.04	
			<i>For >20 To 40, Deduct</i>	-79.65	
			<i>For >40, Deduct</i>	-167.73	
26 56	13 00-0564	EA	18' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,330.34	223.30
			<i>For >10 To 20, Deduct</i>	-46.51	
			<i>For >20 To 40, Deduct</i>	-84.19	
			<i>For >40, Deduct</i>	-177.22	
26 56	13 00-0565	EA	20' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,405.11	240.48
			<i>For >10 To 20, Deduct</i>	-48.99	
			<i>For >20 To 40, Deduct</i>	-88.74	
			<i>For >40, Deduct</i>	-186.72	
26 56	13 00-0566	EA	22' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,479.86	257.65
			<i>For >10 To 20, Deduct</i>	-51.46	
			<i>For >20 To 40, Deduct</i>	-93.28	
			<i>For >40, Deduct</i>	-196.21	
26 56	13 00-0567	EA	24' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,593.32	274.83
			<i>For >10 To 20, Deduct</i>	-55.49	
			<i>For >20 To 40, Deduct</i>	-100.54	
			<i>For >40, Deduct</i>	-211.52	
26 56	13 00-0568	EA	26' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,749.87	274.83
			<i>For >10 To 20, Deduct</i>	-61.75	
			<i>For >20 To 40, Deduct</i>	-111.50	
			<i>For >40, Deduct</i>	-235.00	
26 56	13 00-0569	EA	28' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,942.46	292.01
			<i>For >10 To 20, Deduct</i>	-68.94	
			<i>For >20 To 40, Deduct</i>	-124.29	
			<i>For >40, Deduct</i>	-262.17	
26 56	13 00-0570	EA	30' High, 4.5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	2,133.37	309.18
			<i>For >10 To 20, Deduct</i>	-76.06	
			<i>For >20 To 40, Deduct</i>	-136.97	
			<i>For >40, Deduct</i>	-289.09	
26 56	13 00-0571	EA	10' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,200.36	171.77
			<i>For >10 To 20, Deduct</i>	-42.86	
			<i>For >20 To 40, Deduct</i>	-77.15	
			<i>For >40, Deduct</i>	-162.88	
26 56	13 00-0572	EA	12' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,265.00	188.95
			<i>For >10 To 20, Deduct</i>	-44.93	
			<i>For >20 To 40, Deduct</i>	-80.99	
			<i>For >40, Deduct</i>	-170.86	
26 56	13 00-0573	EA	14' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,327.97	206.13
			<i>For >10 To 20, Deduct</i>	-46.94	
			<i>For >20 To 40, Deduct</i>	-84.71	
			<i>For >40, Deduct</i>	-178.58	
26 56	13 00-0574	EA	16' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,356.59	206.13
			<i>For >10 To 20, Deduct</i>	-48.08	
			<i>For >20 To 40, Deduct</i>	-86.72	
			<i>For >40, Deduct</i>	-162.88	
26 56	13 00-0575	EA	18' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,419.55	223.30
			<i>For >10 To 20, Deduct</i>	-50.08	
			<i>For >20 To 40, Deduct</i>	-90.44	
			<i>For >40, Deduct</i>	-190.60	
26 56	13 00-0576	EA	20' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,484.22	240.48
			<i>For >10 To 20, Deduct</i>	-52.15	
			<i>For >20 To 40, Deduct</i>	-94.28	
			<i>For >40, Deduct</i>	-198.59	
26 56	13 00-0577	EA	22' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,606.11	257.65
			<i>For >10 To 20, Deduct</i>	-56.51	
			<i>For >20 To 40, Deduct</i>	-102.12	
			<i>For >40, Deduct</i>	-215.15	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 13 00-0578	EA		24' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,748.19	274.83
			<i>For >10 To 20, Deduct</i>	-61.68	
			<i>For >20 To 40, Deduct</i>	-111.38	
			<i>For >40, Deduct</i>	-234.75	
26 56 13 00-0579	EA		26' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,845.82	274.83
			<i>For >10 To 20, Deduct</i>	-65.59	
			<i>For >20 To 40, Deduct</i>	-118.21	
			<i>For >40, Deduct</i>	-249.39	
26 56 13 00-0580	EA		28' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	1,979.49	292.01
			<i>For >10 To 20, Deduct</i>	-70.42	
			<i>For >20 To 40, Deduct</i>	-126.88	
			<i>For >40, Deduct</i>	-267.72	
26 56 13 00-0581	EA		30' High, 5" Top OD, Round Tapered, Fiberglass Area Light Pole, Direct Burial.....	2,113.17	309.18
			<i>For >10 To 20, Deduct</i>	-75.25	
			<i>For >20 To 40, Deduct</i>	-135.55	
			<i>For >40, Deduct</i>	-286.06	
26 56 13 00-0582			Factory Accessories For Fiberglass Area Light Poles (26 56 13 00-0510)		
26 56 13 00-0583	EA		Open Or Capped Top For Fiberglass Area Light Poles.....	59.68	
26 56 13 00-0584	EA		Factory Side Drilling Up To Four Fixtures On Fiberglass Area Light Poles.....	59.68	
26 56 13 00-0585	EA		Smooth Shaft Finish For Fiberglass Area Light Poles.....	113.24	
26 56 13 00-0586	EA		Vibration Dampener For Fiberglass Area Light Poles.....	149.97	
26 56 13 00-0587			Concrete Area Light Poles (26 56 13 00-0177)		
26 56 13 00-0588			Octagonal Tapered, Spun Concrete Area Light Poles, Anchor Base (26 56 13 00-0587)		
26 56 13 00-0589	EA		28' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	2,342.96	584.01
26 56 13 00-0590	EA		30' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	2,470.41	618.37
26 56 13 00-0591	EA		33' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	2,562.15	635.54
26 56 13 00-0592	EA		36' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	3,175.49	652.72
26 56 13 00-0593	EA		38' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	3,524.69	687.07
26 56 13 00-0594	EA		43' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	4,365.79	893.20
26 56 13 00-0595	EA		47' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	5,232.40	1,099.32
26 56 13 00-0596	EA		27' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	5,036.30	584.01
			Note: Polished brown with acrylic coating finish.		
26 56 13 00-0597	EA		30' High, Octagonal Tapered, Spun Concrete Area Light Pole, Anchor Base.....	5,808.34	618.37
			Note: Polished brown with acrylic coating finish.		
26 56 13 00-0598	EA		Pole Adapter Base Plate, Galvanized Steel, 1" Thick For Adapting Up To 40'.....	698.10	206.13
26 56 13 00-0599	EA		13' High Concrete Octagonal Area Light Pole, Pink With Acrylic Coating, Finish Design.....	3,017.62	412.11
26 56 13 00-0600	EA		Pole Base Cover For All Octagon Poles.....	270.36	84.10
26 56 13 00-0601	EA		Pole Arms 24" Long, Square, 250 Watt Fixture, Dark, Architectural Bronze.....	554.89	168.19
26 56 13 00-0602			Tapered, Spun Concrete Area Light Poles, Direct Burial (26 56 13 00-0587)		
			Note: Round or square.		
26 56 13 00-0603	EA		13' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	2,490.50	274.83
26 56 13 00-0604	EA		16' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	2,816.67	343.54
26 56 13 00-0605	EA		18' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	3,112.71	412.24
26 56 13 00-0606	EA		30' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	4,340.43	618.37
26 56 13 00-0607	EA		35' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	5,000.67	652.72
26 56 13 00-0608	EA		40' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	5,714.36	687.07
26 56 13 00-0609	EA		45' High, Tapered, Spun Concrete Area Light Pole, Direct Burial.....	6,631.53	893.20
26 56 13 00-0610			Round Tapered, Spun Concrete Area Light Poles, Direct Burial (26 56 13 00-0587)		
26 56 13 00-0611	EA		60' High, Round Tapered, Spun Concrete Area Light Pole, Direct Burial (Lithonia SPRTC C2 60 9-22).....	18,625.60	1,545.92
26 56 13 00-0612	EA		70' High, Round Tapered, Spun Concrete Area Light Pole, Direct Burial (Lithonia SPRTC C2 70 9-24).....	22,190.92	1,894.04
26 56 13 00-0613	EA		80' High, Round Tapered, Spun Concrete Area Light Pole, Direct Burial (Lithonia SPRTC C1 80 9-26).....	26,326.02	2,558.61
26 56 13 00-0614			Cast Iron Decorative Light Posts (26 56 13 00-0177)		
26 56 13 00-0615			Round Tapered, Cast Iron Decorative Light Post, Anchor Base (26 56 13 00-0614)		
			Note: As manufactured by Hadco and King Luminaries or an approved equal.		
26 56 13 00-0616	EA		10' High, Round Tapered, Cast Iron Decorative Light Post, Anchor Base.....	1,566.32	171.77
26 56 13 00-0617	EA		12' High, Round Tapered, Cast Iron Decorative Light Post, Anchor Base.....	1,651.02	197.88
26 56 13 00-0618	EA		14' High, Round Tapered, Cast Iron Decorative Light Post, Anchor Base.....	1,790.76	206.13
26 56 13 00-0619	EA		16' High, Round Tapered, Cast Iron Decorative Light Post, Anchor Base.....	2,200.86	240.48
26 56 13 00-0620	EA		18' High, Round Tapered, Cast Iron Decorative Light Post, Anchor Base.....	2,571.46	261.09
26 56 13 00-0621	EA		20' High, Round Tapered, Cast Iron Decorative Light Post, Anchor Base.....	2,960.05	281.71
26 56 13 00-0622			Landscape Light Poles (26 56 13 00-0001)		
			Note: Excludes lighting fixtures.		
26 56 13 00-0623			Aluminum Landscape Light Poles (26 56 13 00-0622)		
			Note: Includes painted finish.		
26 56 13 00-0624			Round Straight, Aluminum Landscape Light Poles (26 56 13 00-0623)		
26 56 13 00-0625			Round Straight, Aluminum Landscape Light Poles, Anchor Base (26 56 13 00-0624)		

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 56 13 00-0626	EA	7' High, 3" OD, Round Straight, Aluminum Landscape Light Pole, Anchor Base.....	513.79		206.13
26 56 13 00-0627	EA	12' High, 3" OD, Round Straight, Aluminum Landscape Light Pole, Anchor Base.....	871.05		274.83
26 56 13 00-0628		Round Straight, Aluminum Landscape Light Poles, Direct Burial (26 56 13 00-0624)			
26 56 13 00-0629	EA	7' High, 3" OD, Round Straight, Aluminum Landscape Light Pole, Direct Burial.....	466.00		206.13
26 56 13 00-0630	EA	12' High, 3" OD, Round Straight, Aluminum Landscape Light Pole, Direct Burial.....	823.26		274.83
26 56 13 00-0631		Steel Landscape Light Poles (26 56 13 00-0622)			
		Note: Includes painted finish.			
26 56 13 00-0632		Round Straight, Steel Landscape Light Poles (26 56 13 00-0631)			
26 56 13 00-0633		Round Straight, Steel Landscape Light Poles, Anchor Base (26 56 13 00-0632)			
26 56 13 00-0634	EA	6'-8" High, 3" OD, Round Straight, Steel Landscape Light Pole, Anchor Base.....	596.40		206.13
26 56 13 00-0635		Round Straight, Steel Landscape Light Poles, Direct Burial (26 56 13 00-0632)			
26 56 13 00-0636	EA	6'-8" High, 3" OD, Round Straight, Steel Landscape Light Pole, Direct Burial.....	555.15		206.13
26 56 13 00-0637		Light Pole Brackets And Arms (26 56 13 00-0001)			
26 56 13 00-0638		Light Pole Brackets (26 56 13 00-0637)			
26 56 13 00-0639		Bullhorn Style, Pole Top Area Light Brackets (26 56 13 00-0638)			
26 56 13 00-0640		Round Bullhorn Style, Pole Top Area Light Brackets (26 56 13 00-0639)			
26 56 13 00-0641		Steel, Round Bullhorn Style, Pole Top Area Light Brackets (26 56 13 00-0640)			
		Note: Includes powdercoat finish.			
26 56 13 00-0642	EA	Two Tenons At 180 Degrees, Steel, Round Bullhorn Style, Pole Top Area Light Bracket.....	820.97		41.23
		For Galvanized Finish, Add	73.85		
26 56 13 00-0643	EA	Three Tenons At 180 Degrees, Steel, Round Bullhorn Style, Pole Top Area Light Bracket.....	1,043.79		41.23
		For Galvanized Finish, Add	96.14		
26 56 13 00-0644	EA	Three Tenons At 120 Degrees, Steel, Round Bullhorn Style, Pole Top Area Light Bracket.....	1,111.81		41.23
		For Galvanized Finish, Add	102.94		
26 56 13 00-0645	EA	Four Tenons At 90 Degrees, Steel, Round Bullhorn Style, Pole Top Area Light Bracket.....	1,531.66		41.23
		For Galvanized Finish, Add	144.92		
26 56 13 00-0646	EA	Four Tenons At 180 Degrees, Steel, Round Bullhorn Style, Pole Top Area Light Bracket.....	1,597.04		41.23
		For Galvanized Finish, Add	151.46		
26 56 13 00-0647		Aluminum, Round Bullhorn Style, Pole Top Area Light Brackets (26 56 13 00-0640)			
		Note: Includes satin brushed or painted finish.			
26 56 13 00-0648	EA	Two Tenons At 180 Degrees, Aluminum, Round Bullhorn Style, Pole Top Area Light Bracket.....	268.45		41.23
		For Bronze Or Satin Anodized Finish, Add	18.60		
		For Black Anodized Finish, Add	37.20		
26 56 13 00-0649	EA	Three Tenons At 120 Degrees, Aluminum, Round Bullhorn Style, Pole Top Area Light Bracket.....	327.79		41.23
		For Bronze Or Satin Anodized Finish, Add	24.54		
		For Black Anodized Finish, Add	49.07		
26 56 13 00-0650	EA	Three Tenons At 180 Degrees, Aluminum, Round Bullhorn Style, Pole Top Area Light Bracket.....	343.76		41.23
		For Bronze Or Satin Anodized Finish, Add	26.13		
		For Black Anodized Finish, Add	52.26		
26 56 13 00-0651	EA	Four Tenons At 90 Degrees, Aluminum, Round Bullhorn Style, Pole Top Area Light Bracket.....	399.68		41.23
		For Bronze Or Satin Anodized Finish, Add	31.72		
		For Black Anodized Finish, Add	63.45		
26 56 13 00-0652	EA	Four Tenons At 180 Degrees, Aluminum, Round Bullhorn Style, Pole Top Area Light Bracket.....	411.09		41.23
		For Bronze Or Satin Anodized Finish, Add	32.87		
		For Black Anodized Finish, Add	65.73		
26 56 13 00-0653		Square Bullhorn Style, Pole Top Area Light Brackets (26 56 13 00-0639)			
26 56 13 00-0654		Steel, Square Bullhorn Style, Pole Top Area Light Brackets (26 56 13 00-0653)			
		Note: Includes powdercoat finish.			
26 56 13 00-0655	EA	Two Tenons At 180 Degrees, Steel, Square Bullhorn Style, Pole Top Area Light Bracket.....	884.60		41.23
		For Galvanized Finish, Add	80.22		
26 56 13 00-0656	EA	Three Tenons At 180 Degrees, Steel, Square Bullhorn Style, Pole Top Area Light Bracket.....	1,098.03		41.23
		For Galvanized Finish, Add	101.56		
26 56 13 00-0657	EA	Four Tenons At 180 Degrees, Steel, Square Bullhorn Style, Pole Top Area Light Bracket.....	1,348.71		41.23
		For Galvanized Finish, Add	126.63		
26 56 13 00-0658	EA	Four Tenons At 90 Degrees, Steel, Square Bullhorn Style, Pole Top Area Light Bracket.....	1,600.55		41.23
		For Galvanized Finish, Add	151.81		
26 56 13 00-0659		Wood Pole Clamp On Style, Pole Top Area Light Brackets (26 56 13 00-0638)			
26 56 13 00-0660		Steel, Wood Pole Clamp On Style, Pole Top Area Light Brackets (26 56 13 00-0659)			
		Note: Includes powdercoat finish.			
26 56 13 00-0661	EA	One Tenon, Steel, Wood Pole Clamp On Style, Pole Top Area Light Bracket.....	820.53		68.71
26 56 13 00-0662	EA	Two Tenons At 90, 120 Or 180 Degrees, Steel, Wood Pole Clamp On Style, Pole Top Area Light Bracket.....	1,257.38		68.71
26 56 13 00-0663	EA	Three Tenons At 120 Degrees, Steel, Wood Pole Clamp On Style, Pole Top Area Light Bracket.....	1,774.26		68.71
26 56 13 00-0664	EA	Four Tenons At 90 Degrees, Steel, Wood Pole Clamp On Style, Pole Top Area Light Bracket.....	1,944.31		68.71



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 56 13 00-0665	Light Pole Arms <small>(26 56 13 00-0637)</small>		
26 56 13 00-0666	Wood Pole Streetlight Arms <small>(26 56 13 00-0665)</small>		
26 56 13 00-0667	Steel, Wood Pole Streetlight Arms <small>(26 56 13 00-0666)</small>		
26 56 13 00-0668	EA 1-1/4" Arm Diameter, 2-1/2' Arm Length, Galvanized Steel, Wood Pole Streetlight Arm, Bolt Mount.....	464.35	61.84
26 56 13 00-0669	EA 1-1/4" Arm Diameter, 3-1/2' Arm Length, Galvanized Steel, Wood Pole Streetlight Arm, Bolt Mount.....	489.53	68.71
26 56 13 00-0670	EA 1-1/4" Arm Diameter, 5-1/2' Arm Length, Galvanized Steel, Wood Pole Streetlight Arm, Bolt Mount.....	564.05	85.88
26 56 13 00-0671	EA 2" Arm Diameter, 3-1/2' Arm Length, Galvanized Steel, Wood Pole Streetlight Arm, Bolt Mount.....	698.86	68.71
26 56 13 00-0672	EA 2" Arm Diameter, 5-1/2' Arm Length, Galvanized Steel, Wood Pole Streetlight Arm, Bolt Mount.....	772.80	85.88
26 56 13 00-0673	EA 2" Arm Diameter, 7-1/2' Arm Length, Galvanized Steel, Wood Pole Streetlight Arm, Bolt Mount.....	938.80	103.06
26 56 13 00-0674	Aluminum, Wood Pole Streetlight Arms <small>(26 56 13 00-0666)</small>		
26 56 13 00-0675	EA 1-1/4" Arm Diameter, 42" Arm Length, Aluminum Arm, Wood Pole Streetlight Arm, Bolt Mount.....	265.19	68.71
26 56 13 00-0676	EA 2" Arm Diameter, 42" Arm Length, Aluminum Arm, Wood Pole Streetlight Arm, Bolt Mount.....	330.73	68.71
26 56 13 00-0677	EA 2" Arm Diameter, 66" Arm Length, Aluminum Arm, Wood Pole Streetlight Arm, Bolt Mount.....	442.94	85.88
26 56 13 00-0678	EA 2" Arm Diameter, 90" Arm Length, Aluminum Arm, Wood Pole Streetlight Arm, Bolt Mount.....	582.32	103.06
26 56 13 00-0679	Area Light Arms <small>(26 56 13 00-0665)</small>		
26 56 13 00-0680	Steel Area Light Arms <small>(26 56 13 00-0679)</small>		
26 56 13 00-0681	EA Single, 2.38" Arm Diameter, 4' Arm Length, Upsweep Style, Steel Area Light Arm, Hub Mount.....	916.29	68.71
26 56 13 00-0682	EA Two, 2.38" Arm Diameter, 4' Arm Length, Upsweep Style, Steel Area Light Arms, Hub Mount.....	1,456.39	75.58
26 56 13 00-0683	EA Three, 2.38" Arm Diameter, 4' Arm Length, Upsweep Style, Steel Area Light Arms, Hub Mount.....	1,619.21	82.44
26 56 13 00-0684	EA Four, 2.38" Arm Diameter, 4' Arm Length, Upsweep Style, Steel Area Light Arms, Hub Mount.....	1,928.07	89.32
26 56 13 00-0685	EA Single, 2.38" Arm Diameter, 6' Arm Length, Upsweep Style, Steel Area Light Arm, Hub Mount.....	1,090.60	85.88
26 56 13 00-0686	EA Two, 2.38" Arm Diameter, 6' Arm Length, Upsweep Style, Steel Area Light Arms, Hub Mount.....	1,575.93	92.76
26 56 13 00-0687	Aluminum Area Light Arms <small>(26 56 13 00-0679)</small>		
26 56 13 00-0688	EA Single, 4' Arm Length, Mast Style, Aluminum Area Light Arm, Bolt Mount.....	323.42	68.71
26 56 13 00-0689	EA Single, 6' Arm Length, Mast Style, Aluminum Area Light Arm, Bolt Mount.....	398.86	85.88
26 56 13 00-0690	EA Single, 8' Arm Length, Mast Style, Aluminum Area Light Arm, Bolt Mount.....	476.58	103.06
26 56 13 00-0691	EA Single, 4' Arm Length, Mast Style, Aluminum Area Light Arm, Hub Mount.....	321.13	68.71
26 56 13 00-0692	EA Two, 4' Arm Length, Mast Style, Aluminum Area Light Arms, Hub Mount.....	458.13	75.58
26 56 13 00-0693	EA Single, 6' Arm Length, Mast Style, Aluminum Area Light Arm, Hub Mount.....	394.29	85.88
26 56 13 00-0694	EA Two, 6' Arm Length, Mast Style, Aluminum Area Light Arms, Hub Mount.....	558.66	92.76
26 56 13 00-0695	EA Single, 8' Arm Length, Mast Style, Aluminum Area Light Arm, Hub Mount.....	478.86	103.06
26 56 13 00-0696	EA Two, 8' Arm Length, Mast Style, Aluminum Area Light Arms, Hub Mount.....	678.60	109.93
26 56 13 00-0697	Removal And Reinstallation Of Lighting Pole <small>(26 56 13 00-0001)</small>		
26 56 13 00-0698	EA Removal And Relocation Of Up To 45' Lighting Pole And Standards With One Or Two Arms.....	2,267.58	
26 56 13 00-0699	High Mast Lighting <small>(26 56 13 00-0001)</small>		
26 56 13 00-0700	High Mast Lighting Assemblies <small>(26 56 13 00-0699)</small>		
Note: Includes non-latching system, ring assembly with internal bumper, acrylic top cover, pulley supports, cast arm filter for pipe tension, transition assembly, standard head frame assembly, standard hoist, and powder coated pole.			
26 56 13 00-0701	EA 60' High Mast Lighting Assembly.....	57,116.50	2,102.45
26 56 13 00-0702	EA 70' High Mast Lighting Assembly.....	60,334.01	2,202.00
26 56 13 00-0703	EA 80' High Mast Lighting Assembly.....	63,584.81	2,345.81
26 56 13 00-0704	EA 90' High Mast Lighting Assembly.....	66,866.97	2,533.89
26 56 13 00-0705	EA 100' High Mast Lighting Assembly.....	70,165.81	2,766.13
26 56 13 00-0706	EA 110' High Mast Lighting Assembly.....	74,410.81	3,042.96
26 56 13 00-0707	EA 120' High Mast Lighting Assembly.....	77,837.60	3,319.54
26 56 13 00-0708	EA 130' High Mast Lighting Assembly.....	81,001.06	3,596.14
26 56 13 00-0709	EA 140' High Mast Lighting Assembly.....	84,427.84	3,872.87
26 56 13 00-0710	EA 150' High Mast Lighting Assembly.....	88,599.67	4,149.46
26 56 13 00-0711	High Mast Light Poles <small>(26 56 13 00-0699)</small>		
26 56 13 00-0712	EA 60' High Mast Light Poles.....	21,662.70	1,262.69
26 56 13 00-0713	EA 70' High Mast Light Poles.....	24,850.31	1,322.50
26 56 13 00-0714	EA 80' High Mast Light Poles.....	28,057.92	1,408.90
26 56 13 00-0715	EA 90' High Mast Light Poles.....	31,283.59	1,521.87
26 56 13 00-0716	EA 100' High Mast Light Poles.....	34,529.27	1,661.44
26 56 13 00-0717	EA 110' High Mast Light Poles.....	37,794.96	1,827.58
26 56 13 00-0718	EA 120' High Mast Light Poles.....	40,260.98	1,993.72
26 56 13 00-0719	EA 130' High Mast Light Poles.....	40,301.88	3,695.03
26 56 13 00-0720	EA 140' High Mast Light Poles.....	44,927.78	2,326.01
26 56 13 00-0721	EA 150' High Mast Light Poles.....	47,659.06	2,492.15
26 56 13 00-0722	High Mast Lighting Accessories <small>(26 56 13 00-0699)</small>		

26	26	Electrical
	26 50	Lighting
	26 56	Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 56	13 00-0723	EA	Bottom Latching System For High Mast Lighting	1,005.77	
26 56	13 00-0724	EA	Top Latching System For High Mast Lighting	2,848.47	
26 56	13 00-0725	EA	Centering Springs For High Mast Lighting	2,157.32	
26 56	13 00-0726	EA	Electric Power Cord For High Mast Lighting	906.40	
26 56	13 00-0727	EA	Aircraft Warning Lights For High Mast Lighting.....	1,688.05	
26 56	13 00-0728	EA	Internal Motorized Hoist For High Mast Lighting	18,449.71	
26 56	13 00-0729	EA	Portable Hoist Motor With Step Down Transformer For High Mast Lighting	18,555.57	

26 56 13 00-0730 Concrete Bases (26 56 13 00-0001)

26 56 13 00-0731 Concrete Bases, Cast In Place (26 56 13 00-0730)

Note: Includes excavation/drilling, concrete, reinforcement, forms for exposed base, anchors/supports and backfill. Excludes conduit.

26 56	13 00-0732	EA	Cast In Place Concrete Base For Poles Minimum Charge	390.96	
Note: For projects where the cast in place concrete base for poles charge is less than the minimum charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.					
26 56	13 00-0733	VLF	1-1/2' Diameter Concrete Base For Poles	67.52	
26 56	13 00-0734	VLF	2' Diameter Concrete Base For Poles.....	94.62	
26 56	13 00-0735	VLF	2-1/2' Diameter Concrete Base For Poles	127.66	
26 56	13 00-0736	VLF	3' Diameter Concrete Base For Poles.....	167.68	
26 56	13 00-0737	VLF	3-1/2' Diameter Concrete Base For Poles	223.93	
26 56	13 00-0738	VLF	4' Diameter Concrete Base For Poles.....	281.56	
26 56	13 00-0739	VLF	5' Diameter Concrete Base For Poles.....	408.98	
26 56	13 00-0740	VLF	6' Diameter Concrete Base For Poles.....	562.68	

26 56 18 Incandescent Exterior Lighting (26 56)

26 56 18 00-0001 Exterior Globe (26 56 18)

26 56 18 00-0002 Incandescent, Exterior Globe (26 56 18 00-0001)

26 56	18 00-0003	EA	100 Watt Incandescent, Enclosed And Gasketed, Exterior Wall Fixture.....	59.50	22.35
26 56	18 00-0004	EA	150 To 200 Watt Incandescent, Enclosed And Gasketed, Exterior Wall Fixture.....	90.10	22.35
26 56	18 00-0005	EA	100 Watt Incandescent, Enclosed And Gasketed With Guard, Exterior Wall Fixture.....	69.25	22.35
26 56	18 00-0006	EA	150 To 200 Watt Incandescent, Enclosed And Gasketed With Guard, Exterior Wall Fixture.....	93.86	22.35

26 56 18 00-0007 Compact Fluorescent And Incandescent, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixtures (26 56 18)

Note: Includes cast aluminum powder coated housing, polycarbonate lens and tamperproof screws.

26 56	18 00-0008	EA	7 Watt Fluorescent, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture.....	265.57	89.37
26 56	18 00-0009	EA	9 Watt Fluorescent, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture.....	276.78	94.96
26 56	18 00-0010	EA	13 Or 14 Watt Fluorescent, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture.....	304.96	100.54
26 56	18 00-0011	EA	75 Watt Incandescent, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	295.37	111.72
26 56	18 00-0012	EA	100 Watt Incandescent, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	332.38	128.47

26 56 19 LED Exterior Lighting (26 56)

26 56 19 00-0001 LED, Roadway Lighting (26 56 19)

26 56 19 00-0002 LED Roadway Lighting (Philips Lumec) (26 56 19 00-0001)

26 56 19 00-0003 Horizontal Tenon Mount, LED Cobra Head Street Lights (Philips Lumec GPL Series) (26 56 19 00-0002)

Note: UL wet listed. Includes 4,000K color temperature, 120-480 voltage, 570mA driver, die-cast extruded aluminum housing assembly and powder coat finish. Excludes sensors.

26 56	19 00-0004	EA	49 LEDs, 102 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (Philips Lumec GPLS Series).....	1,449.56	165.14
For >50 To 100, Deduct				-72.48	
For >100 To 250, Deduct				-108.72	
For >250 To 500, Deduct				-172.94	
For >500 To 1000, Deduct				-237.16	
For >1000, Deduct				-301.38	
26 56	19 00-0005	EA	98 LEDs, 204 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (Philips Lumec GPLM Series)	2,248.98	169.60
For >50 To 100, Deduct				-112.45	
For >100 To 250, Deduct				-168.67	
For >250 To 500, Deduct				-272.64	
For >500 To 1000, Deduct				-376.61	
For >1000, Deduct				-480.58	

26 56 19 00-0006 Horizontal Tenon Mount, LED Cobra Head Street Lights (Philips Lumec RFM Series) (26 56 19 00-0002)

Note: UL wet listed. Includes 3,000 to 4,000K color temperature, 120-277 voltage, up to 1050mA driver, die-cast extruded aluminum housing assembly and powder coat finish. Excludes sensors.

26 56	19 00-0007	EA	48 LEDs, 55 Watt, Type III Medium, 120-277 Volt, Horizontal Tenon Mount, LED Cobra Head Street Light (Philips Lumec RFM Series).....	1,168.25	165.14
For >50 To 100, Deduct				-58.41	
For >100 To 250, Deduct				-87.62	
For >250 To 500, Deduct				-137.77	
For >500 To 1000, Deduct				-187.93	
For >1000, Deduct				-238.09	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0008	EA 48 LEDs, 80 Watt, Type III Medium, 120-277 Volt, RoadFocus Roadway, LED Cobra Head Luminaire (Philips Lumec RFM Series).....	1,252.05	165.14
	<i>For >50 To 100, Deduct</i>	-62.60	
	<i>For >100 To 250, Deduct</i>	-93.90	
	<i>For >250 To 500, Deduct</i>	-148.25	
	<i>For >500 To 1000, Deduct</i>	-202.60	
	<i>For >1000, Deduct</i>	-256.94	
26 56 19 00-0009	EA 48 LEDs, 108 Watt, Type III Medium, 120-277 Volt, RoadFocus Roadway, LED Cobra Head Luminaire (Philips Lumec RFM Series).....	1,335.85	165.14
	<i>For >50 To 100, Deduct</i>	-66.79	
	<i>For >100 To 250, Deduct</i>	-100.19	
	<i>For >250 To 500, Deduct</i>	-158.72	
	<i>For >500 To 1000, Deduct</i>	-217.26	
	<i>For >1000, Deduct</i>	-275.80	
26 56 19 00-0010	LED Roadway Lighting (Lithonia) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0011	Horizontal Tenon Mount, LED Cobra Head Street Lights (Lithonia CSX1 Series) <small>(26 56 19 00-0010)</small>		
	Note: UL wet listed. Includes 4,000K color temperature, 120-480 voltage, 700mA driver, die-cast extruded aluminum housing assembly and bronze powder coat finish. Excludes sensors.		
26 56 19 00-0012	EA 30 LEDs, 74 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (Lithonia CSX1 Series).....	2,353.57	156.21
	<i>For >50 To 100, Deduct</i>	-117.68	
	<i>For >100 To 250, Deduct</i>	-176.52	
	<i>For >250 To 500, Deduct</i>	-286.39	
	<i>For >500 To 1000, Deduct</i>	-396.25	
	<i>For >1000, Deduct</i>	-506.12	
26 56 19 00-0013	EA 60 LEDs, 146 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (Lithonia CSX1 Series).....	3,902.27	160.67
	<i>For >50 To 100, Deduct</i>	-195.11	
	<i>For >100 To 250, Deduct</i>	-292.67	
	<i>For >250 To 500, Deduct</i>	-479.75	
	<i>For >500 To 1000, Deduct</i>	-666.83	
	<i>For >1000, Deduct</i>	-853.91	
26 56 19 00-0014	LED Roadway Lighting (CREE® BetaLED®) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0015	Horizontal Tenon Mount, LED Cobra Head Street Lights (CREE® BetaLED® LEDway® STR-LWY) <small>(26 56 19 00-0014)</small>		
	Note: UL wet listed. Includes 6,000K color temperature, 120-480 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Includes Type II Medium, Type II Short or Type III Medium optic. Excludes sensors.		
26 56 19 00-0016	EA 20 LEDs, 25 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	955.81	151.74
	<i>For >50 To 100, Deduct</i>	-47.79	
	<i>For >100 To 250, Deduct</i>	-71.69	
	<i>For >250 To 500, Deduct</i>	-111.89	
	<i>For >500 To 1000, Deduct</i>	-152.09	
	<i>For >1000, Deduct</i>	-192.29	
26 56 19 00-0017	EA 30 LEDs, 35 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,075.35	156.21
	<i>For >50 To 100, Deduct</i>	-53.77	
	<i>For >100 To 250, Deduct</i>	-80.65	
	<i>For >250 To 500, Deduct</i>	-126.61	
	<i>For >500 To 1000, Deduct</i>	-172.57	
	<i>For >1000, Deduct</i>	-218.52	
26 56 19 00-0018	EA 40 LEDs, 45 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,219.69	160.67
	<i>For >50 To 100, Deduct</i>	-60.98	
	<i>For >100 To 250, Deduct</i>	-91.48	
	<i>For >250 To 500, Deduct</i>	-144.43	
	<i>For >500 To 1000, Deduct</i>	-197.38	
	<i>For >1000, Deduct</i>	-250.33	
26 56 19 00-0019	EA 50 LEDs, 55 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,341.15	165.14
	<i>For >50 To 100, Deduct</i>	-67.06	
	<i>For >100 To 250, Deduct</i>	-100.59	
	<i>For >250 To 500, Deduct</i>	-159.39	
	<i>For >500 To 1000, Deduct</i>	-218.19	
	<i>For >1000, Deduct</i>	-276.99	
26 56 19 00-0020	EA 60 LEDs, 65 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,462.61	169.60
	<i>For >50 To 100, Deduct</i>	-73.13	
	<i>For >100 To 250, Deduct</i>	-109.70	
	<i>For >250 To 500, Deduct</i>	-174.35	
	<i>For >500 To 1000, Deduct</i>	-239.00	
	<i>For >1000, Deduct</i>	-303.65	
26 56 19 00-0021	EA 70 LEDs, 75 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,751.92	174.06
	<i>For >50 To 100, Deduct</i>	-87.60	
	<i>For >100 To 250, Deduct</i>	-131.39	
	<i>For >250 To 500, Deduct</i>	-210.29	
	<i>For >500 To 1000, Deduct</i>	-289.18	
	<i>For >1000, Deduct</i>	-368.07	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
26 56 19 00-0022	EA	80 LEDs, 86 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,873.37		178.53
		<i>For >50 To 100, Deduct</i>	-93.67		
		<i>For >100 To 250, Deduct</i>	-140.50		
		<i>For >250 To 500, Deduct</i>	-225.25		
		<i>For >500 To 1000, Deduct</i>	-309.99		
		<i>For >1000, Deduct</i>	-394.73		
26 56 19 00-0023	EA	90 LEDs, 96 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	1,992.93		182.99
		<i>For >50 To 100, Deduct</i>	-99.65		
		<i>For >100 To 250, Deduct</i>	-149.47		
		<i>For >250 To 500, Deduct</i>	-239.97		
		<i>For >500 To 1000, Deduct</i>	-330.46		
		<i>For >1000, Deduct</i>	-420.96		
26 56 19 00-0024	EA	100 LEDs, 111 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	2,226.92		187.45
		<i>For >50 To 100, Deduct</i>	-111.35		
		<i>For >100 To 250, Deduct</i>	-167.02		
		<i>For >250 To 500, Deduct</i>	-268.99		
		<i>For >500 To 1000, Deduct</i>	-370.97		
		<i>For >1000, Deduct</i>	-472.94		
26 56 19 00-0025	EA	110 LEDs, 122 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	2,348.38		191.92
		<i>For >50 To 100, Deduct</i>	-117.42		
		<i>For >100 To 250, Deduct</i>	-176.13		
		<i>For >250 To 500, Deduct</i>	-283.95		
		<i>For >500 To 1000, Deduct</i>	-391.77		
		<i>For >1000, Deduct</i>	-499.60		
26 56 19 00-0026	EA	120 LEDs, 133 Watt, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® BetaLED® LEDway® STR-LWY).....	2,469.84		196.38
		<i>For >50 To 100, Deduct</i>	-123.49		
		<i>For >100 To 250, Deduct</i>	-185.24		
		<i>For >250 To 500, Deduct</i>	-298.91		
		<i>For >500 To 1000, Deduct</i>	-412.58		
		<i>For >1000, Deduct</i>	-526.26		
26 56 19 00-0027		Surface Mount, LED Transportation Fixtures (CREE® BetaLED® Edge® TSP-EDG) ^(26 56 19 00-0014)			
		Note: Direct, cantenary or pendant mount. UL wet listed. Includes 5,700K color temperature, 120-480 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.			
26 56 19 00-0028	EA	40 LEDs, 47 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	1,915.86		160.67
		<i>For Multi-Level Drive Currents, Add</i>	267.03		
		<i>For >50 To 100, Deduct</i>	-95.79		
		<i>For >100 To 250, Deduct</i>	-143.69		
		<i>For >250 To 500, Deduct</i>	-231.45		
		<i>For >500 To 1000, Deduct</i>	-319.21		
		<i>For >1000, Deduct</i>	-406.97		
26 56 19 00-0029	EA	60 LEDs, 68 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	2,214.10		169.60
		<i>For Multi-Level Drive Currents, Add</i>	267.03		
		<i>For >50 To 100, Deduct</i>	-110.71		
		<i>For >100 To 250, Deduct</i>	-166.06		
		<i>For >250 To 500, Deduct</i>	-268.28		
		<i>For >500 To 1000, Deduct</i>	-370.51		
		<i>For >1000, Deduct</i>	-472.73		
26 56 19 00-0030	EA	80 LEDs, 90 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	2,512.33		178.53
		<i>For Multi-Level Drive Currents, Add</i>	267.03		
		<i>For >50 To 100, Deduct</i>	-125.62		
		<i>For >100 To 250, Deduct</i>	-188.42		
		<i>For >250 To 500, Deduct</i>	-305.12		
		<i>For >500 To 1000, Deduct</i>	-421.81		
		<i>For >1000, Deduct</i>	-538.50		
26 56 19 00-0031	EA	100 LEDs, 111 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	2,810.56		187.45
		<i>For Multi-Level Drive Currents, Add</i>	267.03		
		<i>For >50 To 100, Deduct</i>	-140.53		
		<i>For >100 To 250, Deduct</i>	-210.79		
		<i>For >250 To 500, Deduct</i>	-341.95		
		<i>For >500 To 1000, Deduct</i>	-473.10		
		<i>For >1000, Deduct</i>	-604.26		
26 56 19 00-0032	EA	120 LEDs, 132 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	3,703.88		196.38
		<i>For Multi-Level Drive Currents, Add</i>	267.03		
		<i>For >50 To 100, Deduct</i>	-185.19		
		<i>For >100 To 250, Deduct</i>	-277.79		
		<i>For >250 To 500, Deduct</i>	-453.17		
		<i>For >500 To 1000, Deduct</i>	-628.54		
		<i>For >1000, Deduct</i>	-803.92		
26 56 19 00-0033	EA	140 LEDs, 157 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	4,002.10		205.31
		<i>For Multi-Level Drive Currents, Add</i>	267.03		
		<i>For >50 To 100, Deduct</i>	-200.11		
		<i>For >100 To 250, Deduct</i>	-300.16		
		<i>For >250 To 500, Deduct</i>	-490.00		
		<i>For >500 To 1000, Deduct</i>	-679.84		
		<i>For >1000, Deduct</i>	-869.68		



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0034 EA 160 LEDs, 179 Watt, Surface Mount, LED Transportation Fixture (CREE® BetaLED® Edge® TSP-EDG).....	4,300.33	214.24
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-215.02	
For >100 To 250, Deduct	-322.52	
For >250 To 500, Deduct	-526.83	
For >500 To 1000, Deduct	-731.13	
For >1000, Deduct	-935.44	
26 56 19 00-0035 Horizontal Tenon Mount, LED Cobra Head Street Lights (CREE® BetaLED® XSP) <small>(26 56 19 00-0014)</small>		
Note: UL wet listed. Includes 120-277 voltage, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0036 EA 4,806 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP1™ BXSP-B- HT-XXX-A).....	791.38	160.67
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Backlight Control Shield, Add	37.34	
For Field Adjustable Output, Add	33.75	
For Bird Spikes, Add	58.58	
For Field Adjustable Output And Utility Label, Add	44.99	
For Fuse, Add	67.48	
For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	67.48	
For 480 Volt, Add	101.23	
For Multi-Level, Add	146.21	
For >50 To 100, Deduct	-39.57	
For >100 To 250, Deduct	-59.35	
For >250 To 500, Deduct	-90.89	
For >500 To 1000, Deduct	-122.42	
For >1000, Deduct	-153.96	
26 56 19 00-0037 EA 5,340 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP1™ BXSP-B-HT- XXX-A).....	791.38	160.67
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Backlight Control Shield, Add	37.34	
For Field Adjustable Output, Add	33.75	
For Bird Spikes, Add	58.58	
For Field Adjustable Output And Utility Label, Add	44.99	
For Fuse, Add	67.48	
For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	67.48	
For 480 Volt, Add	101.23	
For Multi-Level, Add	146.21	
For >50 To 100, Deduct	-39.57	
For >100 To 250, Deduct	-59.35	
For >250 To 500, Deduct	-90.89	
For >500 To 1000, Deduct	-122.42	
For >1000, Deduct	-153.96	
26 56 19 00-0038 EA 8,407 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP1™ BXSP-C- HT-XXX-E).....	876.41	160.67
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Backlight Control Shield, Add	37.34	
For Field Adjustable Output, Add	33.75	
For Bird Spikes, Add	58.58	
For Field Adjustable Output And Utility Label, Add	44.99	
For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	67.48	
For 480 Volt, Add	101.23	
For >50 To 100, Deduct	-43.82	
For >100 To 250, Deduct	-65.73	
For >250 To 500, Deduct	-101.52	
For >500 To 1000, Deduct	-137.30	
For >1000, Deduct	-173.09	
26 56 19 00-0039 EA 8,820 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP1™ BXSP-C-HT- XXX-E).....	876.41	160.67
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Backlight Control Shield, Add	37.34	
For Field Adjustable Output, Add	33.75	
For Bird Spikes, Add	58.58	
For Field Adjustable Output And Utility Label, Add	44.99	
For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	67.48	
For 480 Volt, Add	101.23	
For >50 To 100, Deduct	-43.82	
For >100 To 250, Deduct	-65.73	
For >250 To 500, Deduct	-101.52	
For >500 To 1000, Deduct	-137.30	
For >1000, Deduct	-173.09	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0040	EA 9,612 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP2™ BXSP-B-HT-XXX-B).....	1,027.57	160.67
	<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
	<i>For Field Adjustable Output, Add</i>	33.75	
	<i>For Backlight Control Shield, Add</i>	53.85	
	<i>For Field Adjustable Output And Utility Label, Add</i>	44.99	
	<i>For Fuse, Add</i>	67.48	
	<i>For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	67.48	
	<i>For Bird Spikes, Add</i>	96.39	
	<i>For 480 Volt, Add</i>	101.23	
	<i>For Multi-Level, Add</i>	146.21	
	<i>For >50 To 100, Deduct</i>	-51.38	
	<i>For >100 To 250, Deduct</i>	-77.07	
	<i>For >250 To 500, Deduct</i>	-120.41	
	<i>For >500 To 1000, Deduct</i>	-163.76	
	<i>For >1000, Deduct</i>	-207.10	
26 56 19 00-0041	EA 10,680 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP2™ BXSP-B-HT-XXX-B).....	1,027.57	160.67
	<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
	<i>For Field Adjustable Output, Add</i>	33.75	
	<i>For Backlight Control Shield, Add</i>	53.85	
	<i>For Field Adjustable Output And Utility Label, Add</i>	44.99	
	<i>For Fuse, Add</i>	67.48	
	<i>For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	67.48	
	<i>For Bird Spikes, Add</i>	96.39	
	<i>For 480 Volt, Add</i>	101.23	
	<i>For Multi-Level, Add</i>	146.21	
	<i>For >50 To 100, Deduct</i>	-51.38	
	<i>For >100 To 250, Deduct</i>	-77.07	
	<i>For >250 To 500, Deduct</i>	-120.41	
	<i>For >500 To 1000, Deduct</i>	-163.76	
	<i>For >1000, Deduct</i>	-207.10	
26 56 19 00-0042	EA 13,732 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP2™ BXSP-C-HT-XXX-F).....	1,169.30	160.67
	<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
	<i>For Field Adjustable Output, Add</i>	33.75	
	<i>For Backlight Control Shield, Add</i>	53.85	
	<i>For Field Adjustable Output And Utility Label, Add</i>	44.99	
	<i>For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	67.48	
	<i>For Bird Spikes, Add</i>	96.39	
	<i>For 480 Volt, Add</i>	101.23	
	<i>For >50 To 100, Deduct</i>	-58.47	
	<i>For >100 To 250, Deduct</i>	-87.70	
	<i>For >250 To 500, Deduct</i>	-138.13	
	<i>For >500 To 1000, Deduct</i>	-188.56	
	<i>For >1000, Deduct</i>	-238.99	
26 56 19 00-0043	EA 14,408 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSP2™ BXSP-C-HT-XXX-F).....	1,169.30	160.67
	<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
	<i>For Field Adjustable Output, Add</i>	33.75	
	<i>For Backlight Control Shield, Add</i>	53.85	
	<i>For Field Adjustable Output And Utility Label, Add</i>	44.99	
	<i>For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	67.48	
	<i>For Bird Spikes, Add</i>	96.39	
	<i>For 480 Volt, Add</i>	101.23	
	<i>For >50 To 100, Deduct</i>	-58.47	
	<i>For >100 To 250, Deduct</i>	-87.70	
	<i>For >250 To 500, Deduct</i>	-138.13	
	<i>For >500 To 1000, Deduct</i>	-188.56	
	<i>For >1000, Deduct</i>	-238.99	
26 56 19 00-0044	EA 2,529 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSPR™ BXSPR-A-O-X-X-G).....	640.21	160.67
	<i>For Utility Label, Add</i>	11.24	
	<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
	<i>For Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	33.75	
	<i>For 0 To 10 Volt Dimming, Add</i>	67.48	
	<i>For >50 To 100, Deduct</i>	-32.01	
	<i>For >100 To 250, Deduct</i>	-48.02	
	<i>For >250 To 500, Deduct</i>	-71.99	
	<i>For >500 To 1000, Deduct</i>	-95.97	
	<i>For >1000, Deduct</i>	-119.95	
26 56 19 00-0045	EA 2,722 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSPR™ BXSPR-A-O-X-X-G).....	640.21	160.67
	<i>For Utility Label, Add</i>	11.24	
	<i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	22.49	
	<i>For Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add</i>	33.75	
	<i>For 0 To 10 Volt Dimming, Add</i>	67.48	
	<i>For >50 To 100, Deduct</i>	-32.01	
	<i>For >100 To 250, Deduct</i>	-48.02	
	<i>For >250 To 500, Deduct</i>	-71.99	
	<i>For >500 To 1000, Deduct</i>	-95.97	
	<i>For >1000, Deduct</i>	-119.95	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0046	EA 3,819 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSPR™BXSPR-A-O-X-X-C)	675.64	160.67
	For Utility Label, Add	11.24	
	For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
	For Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	33.75	
	For 0 To 10 Volt Dimming, Add	67.48	
	For >50 To 100, Deduct	-33.78	
	For >100 To 250, Deduct	-50.67	
	For >250 To 500, Deduct	-76.42	
	For >500 To 1000, Deduct	-102.17	
	For >1000, Deduct	-127.92	
26 56 19 00-0047	EA 4,109 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSPR™BXSPR-A-O-X-X-C)	675.64	160.67
	For Utility Label, Add	11.24	
	For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
	For Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	33.75	
	For 0 To 10 Volt Dimming, Add	67.48	
	For >50 To 100, Deduct	-33.78	
	For >100 To 250, Deduct	-50.67	
	For >250 To 500, Deduct	-76.42	
	For >500 To 1000, Deduct	-102.17	
	For >1000, Deduct	-127.92	
26 56 19 00-0048	EA 4,548 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSPR™ BXSPR-B-HT-XXX-A)	687.45	160.67
	For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
	For Field Adjustable Output, Add	33.75	
	For Field Adjustable Output And Utility Label, Add	44.99	
	For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	67.48	
	For 0 To 10 Volt Dimming, Add	67.48	
	For >50 To 100, Deduct	-34.37	
	For >100 To 250, Deduct	-51.56	
	For >250 To 500, Deduct	-77.90	
	For >500 To 1000, Deduct	-104.24	
	For >1000, Deduct	-130.58	
26 56 19 00-0049	EA 4,627 Lumens, 5700K, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® XSPR™ BXSPR-B-HT-XXX-A)	687.45	160.67
	For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
	For Field Adjustable Output, Add	33.75	
	For Field Adjustable Output And Utility Label, Add	44.99	
	For Field Adjustable Output, Utility Label And 3 Or 7-Pin NEMA Photocell Receptacle, Add	67.48	
	For 0 To 10 Volt Dimming, Add	67.48	
	For >50 To 100, Deduct	-34.37	
	For >100 To 250, Deduct	-51.56	
	For >250 To 500, Deduct	-77.90	
	For >500 To 1000, Deduct	-104.24	
	For >1000, Deduct	-130.58	
26 56 19 00-0050	Horizontal Tenon Mount, LED Cobra Head Street Lights (CREE® RSW™) <small>(26 56 19 00-0014)</small> Note: UL wet listed. Includes 120-277 voltage, die-cast extruded aluminum housing assembly and gray powder coat finish. Includes utility label and NEMA® photocell receptacle. Excludes sensors.		
26 56 19 00-0051	EA 3,300 Lumens, 3000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® RSW-HT-XXX-30W-30K-UL-GY-N)	663.84	160.67
	For Field Adjustable Output, Add	33.75	
	For Backlight Control Shield, Add	72.31	
	For Bird Spikes, Add	97.05	
	For >50 To 100, Deduct	-33.19	
	For >100 To 250, Deduct	-49.79	
	For >250 To 500, Deduct	-74.95	
	For >500 To 1000, Deduct	-100.11	
	For >1000, Deduct	-125.26	
26 56 19 00-0052	EA 3,300 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® RSW-HT-XXX-30W-40K-UL-GY-N)	663.84	160.67
	For Field Adjustable Output, Add	33.75	
	For Backlight Control Shield, Add	72.31	
	For Bird Spikes, Add	97.05	
	For >50 To 100, Deduct	-33.19	
	For >100 To 250, Deduct	-49.79	
	For >250 To 500, Deduct	-74.95	
	For >500 To 1000, Deduct	-100.11	
	For >1000, Deduct	-125.26	
26 56 19 00-0053	EA 5,000 Lumens, 3000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® RSW-HT-2ME-50W-30K-UL-GY-N)	687.45	160.67
	For Field Adjustable Output, Add	33.75	
	For Backlight Control Shield, Add	72.31	
	For Bird Spikes, Add	97.05	
	For >50 To 100, Deduct	-34.37	
	For >100 To 250, Deduct	-51.56	
	For >250 To 500, Deduct	-77.90	
	For >500 To 1000, Deduct	-104.24	
	For >1000, Deduct	-130.58	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0054	EA		5,000 Lumens, 4000K CCT, Horizontal Tenon Mount, LED Cobra Head Street Light (CREE® RSW-HT-2ME-50W-40K-UL-GY-N).....	687.45	160.67
			<i>For Field Adjustable Output, Add</i>	33.75	
			<i>For Backlight Control Shield, Add</i>	72.31	
			<i>For Bird Spikes, Add</i>	97.05	
			<i>For >50 To 100, Deduct</i>	-34.37	
			<i>For >100 To 250, Deduct</i>	-51.56	
			<i>For >250 To 500, Deduct</i>	-77.90	
			<i>For >500 To 1000, Deduct</i>	-104.24	
			<i>For >1000, Deduct</i>	-130.58	
26 56 19 00-0055			LED Roadway Lighting (Cooper Lighting) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0056			Horizontal Tenon Mount, LED Roadway Fixtures (Cooper Lighting Streetworks NVN™) <small>(26 56 19 00-0055)</small>		
			Note: UL wet listed. Includes 4,000K color temperature, 120-480 voltage, die-cast extruded aluminum housing assembly and powder coat finish. Excludes sensors.		
26 56 19 00-0057	EA		1 LED Light Square, 51 Watt, Horizontal Tenon Mount, LED Roadway Fixture (Cooper Lighting Streetworks™ NVN-AA).....	1,023.25	160.67
			<i>For >50 To 100, Deduct</i>	-51.16	
			<i>For >100 To 250, Deduct</i>	-76.74	
			<i>For >250 To 500, Deduct</i>	-119.87	
			<i>For >500 To 1000, Deduct</i>	-163.00	
			<i>For >1000, Deduct</i>	-206.13	
26 56 19 00-0058	EA		2 LED Light Squares, 103 Watt, Horizontal Tenon Mount, LED Roadway Fixture (Cooper Lighting Streetworks™ NVN-AA).....	1,391.29	178.53
			<i>For >50 To 100, Deduct</i>	-69.56	
			<i>For >100 To 250, Deduct</i>	-104.35	
			<i>For >250 To 500, Deduct</i>	-164.99	
			<i>For >500 To 1000, Deduct</i>	-225.62	
			<i>For >1000, Deduct</i>	-286.26	
26 56 19 00-0059	EA		3 LED Light Squares, 154 Watt, Horizontal Tenon Mount, LED Roadway Fixture (Cooper Lighting Streetworks™ NVN-AA).....	1,490.83	205.31
			<i>For >50 To 100, Deduct</i>	-74.54	
			<i>For >100 To 250, Deduct</i>	-111.81	
			<i>For >250 To 500, Deduct</i>	-176.09	
			<i>For >500 To 1000, Deduct</i>	-240.36	
			<i>For >1000, Deduct</i>	-304.64	
26 56 19 00-0060	EA		4 LED Light Squares, 206 Watt, Horizontal Tenon Mount, LED Roadway Fixture (Cooper Lighting Streetworks™ NVN-AA).....	2,227.37	223.16
			<i>For >50 To 100, Deduct</i>	-111.37	
			<i>For >100 To 250, Deduct</i>	-167.05	
			<i>For >250 To 500, Deduct</i>	-267.26	
			<i>For >500 To 1000, Deduct</i>	-367.47	
			<i>For >1000, Deduct</i>	-467.68	
26 56 19 00-0061	EA		6 LED Light Squares, 309 Watt, Horizontal Tenon Mount, LED Roadway Fixture (Cooper Lighting Streetworks™ NVN-AA).....	2,925.61	254.05
			<i>For >50 To 100, Deduct</i>	-146.28	
			<i>For >100 To 250, Deduct</i>	-219.42	
			<i>For >250 To 500, Deduct</i>	-353.00	
			<i>For >500 To 1000, Deduct</i>	-486.58	
			<i>For >1000, Deduct</i>	-620.15	
26 56 19 00-0062			LED Roadway Lighting (PlanLED) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0063			Horizontal Tenon Mount, LED Roadway Fixtures (PlanLED GigaTera HERA) <small>(26 56 19 00-0062)</small>		
			Note: UL wet listed. Includes 3,000K, 4,000K or 5,000K color temperature, 120-277 voltage, integral 20kV surge suppression, die-cast extruded aluminum housing assembly and powder coat finish. Excludes sensors.		
26 56 19 00-0064	EA		8,500 Lumens, 85 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera HERA 85W).....	1,233.94	156.21
			<i>For >50 To 100, Deduct</i>	-61.70	
			<i>For >100 To 250, Deduct</i>	-92.55	
			<i>For >250 To 500, Deduct</i>	-146.43	
			<i>For >500 To 1000, Deduct</i>	-200.32	
			<i>For >1000, Deduct</i>	-254.21	
26 56 19 00-0065	EA		11,000 Lumens, 110 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera HERA 110W).....	1,343.53	157.93
			<i>For >50 To 100, Deduct</i>	-67.18	
			<i>For >100 To 250, Deduct</i>	-100.76	
			<i>For >250 To 500, Deduct</i>	-160.05	
			<i>For >500 To 1000, Deduct</i>	-219.33	
			<i>For >1000, Deduct</i>	-278.61	
26 56 19 00-0066	EA		15,000 Lumens, 150 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera HERA 150W).....	1,429.71	160.67
			<i>For >50 To 100, Deduct</i>	-71.49	
			<i>For >100 To 250, Deduct</i>	-107.23	
			<i>For >250 To 500, Deduct</i>	-170.68	
			<i>For >500 To 1000, Deduct</i>	-234.13	
			<i>For >1000, Deduct</i>	-297.58	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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26 56 19 00-0067	Horizontal Tenon Mount, LED Roadway Fixtures (PlanLED GigaTera SETA) <small>(26 56 19 00-0062)</small> Note: UL wet listed. Includes 3,000K, 3,500K, 4,000K or 5,000K color temperature, 120-277 voltage, integral 20kV surge suppression, die-cast extruded aluminum housing assembly and powder coat finish. Excludes sensors.		
26 56 19 00-0068	EA 7,200 Lumens, 60 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera SETA SET060)	808.09	152.44
	<i>For >50 To 100, Deduct</i>	-40.40	
	<i>For >100 To 250, Deduct</i>	-60.61	
	<i>For >250 To 500, Deduct</i>	-93.39	
	<i>For >500 To 1000, Deduct</i>	-126.17	
	<i>For >1000, Deduct</i>	-158.96	
26 56 19 00-0069	EA 10,000 Lumens, 80 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera SETA SET080)	866.67	155.18
	<i>For >50 To 100, Deduct</i>	-43.33	
	<i>For >100 To 250, Deduct</i>	-65.00	
	<i>For >250 To 500, Deduct</i>	-100.57	
	<i>For >500 To 1000, Deduct</i>	-136.15	
	<i>For >1000, Deduct</i>	-171.72	
26 56 19 00-0070	EA 12,500 Lumens, 100 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera SETA SET100)	959.21	157.93
	<i>For >50 To 100, Deduct</i>	-47.96	
	<i>For >100 To 250, Deduct</i>	-71.94	
	<i>For >250 To 500, Deduct</i>	-112.01	
	<i>For >500 To 1000, Deduct</i>	-152.07	
	<i>For >1000, Deduct</i>	-192.13	
26 56 19 00-0071	Horizontal Tenon Mount, LED Roadway Fixtures (PlanLED GigaTera META) <small>(26 56 19 00-0062)</small> Note: UL wet listed. Includes 3,000K, 4,000K or 5,000K color temperature, 120-277 voltage, integral 20kV surge suppression, die-cast extruded aluminum housing assembly and powder coat finish. Excludes sensors.		
26 56 19 00-0072	EA 13,000 Lumens, 100 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera META MT100)	1,020.79	157.93
	<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
	<i>For 480 Volt, Add</i>	91.72	
	<i>For >50 To 100, Deduct</i>	-51.04	
	<i>For >100 To 250, Deduct</i>	-76.56	
	<i>For >250 To 500, Deduct</i>	-119.70	
	<i>For >500 To 1000, Deduct</i>	-162.85	
	<i>For >1000, Deduct</i>	-205.99	
26 56 19 00-0073	EA 16,900 Lumens, 130 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera META MT130)	1,133.95	159.30
	<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
	<i>For 480 Volt, Add</i>	27.67	
	<i>For >50 To 100, Deduct</i>	-56.70	
	<i>For >100 To 250, Deduct</i>	-85.05	
	<i>For >250 To 500, Deduct</i>	-133.78	
	<i>For >500 To 1000, Deduct</i>	-182.51	
	<i>For >1000, Deduct</i>	-231.24	
26 56 19 00-0074	EA 19,500 Lumens, 150 Watt, Horizontal Tenon Mount, LED Roadway Fixture (PlanLED GigaTera META MT150)	1,221.62	160.67
	<i>For 0 To 10 Volt Dimming, Add</i>	91.72	
	<i>For 480 Volt, Add</i>	114.64	
	<i>For >50 To 100, Deduct</i>	-61.08	
	<i>For >100 To 250, Deduct</i>	-91.62	
	<i>For >250 To 500, Deduct</i>	-144.67	
	<i>For >500 To 1000, Deduct</i>	-197.72	
	<i>For >1000, Deduct</i>	-250.76	
26 56 19 00-0075	LED Roadway Lighting (General Electric) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0076	Horizontal Tenon Mount, LED Cobra Head Street Lights (General Electric) <small>(26 56 19 00-0075)</small> Note: UL wet listed. Includes 4,000K or 5,700K color temperature, 120-480 voltage, die-cast extruded aluminum housing assembly and black or gray powder coat finish. Excludes sensors.		
26 56 19 00-0077	EA 2,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 02XX 40 A GRAY)	613.61	151.74
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-30.68	
	<i>For >100 To 250, Deduct</i>	-46.02	
	<i>For >250 To 500, Deduct</i>	-69.11	
	<i>For >500 To 1000, Deduct</i>	-92.21	
	<i>For >1000, Deduct</i>	-115.30	
26 56 19 00-0078	EA 3,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 03XX 40 A GRAY)	617.73	153.80
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-30.89	
	<i>For >100 To 250, Deduct</i>	-46.33	
	<i>For >250 To 500, Deduct</i>	-69.53	
	<i>For >500 To 1000, Deduct</i>	-92.72	
	<i>For >1000, Deduct</i>	-115.92	
26 56 19 00-0079	EA 4,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 04XX 40 A GRAY)	643.99	156.21
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-32.20	
	<i>For >100 To 250, Deduct</i>	-48.30	
	<i>For >250 To 500, Deduct</i>	-72.69	
	<i>For >500 To 1000, Deduct</i>	-97.08	
	<i>For >1000, Deduct</i>	-121.47	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0080	EA 5,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 05XX 40 A GRAY).....	670.82	157.93
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-33.54	
	<i>For >100 To 250, Deduct</i>	-50.31	
	<i>For >250 To 500, Deduct</i>	-75.96	
	<i>For >500 To 1000, Deduct</i>	-101.60	
	<i>For >1000, Deduct</i>	-127.25	
26 56 19 00-0081	EA 7,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 07XX 40 A GRAY).....	742.06	161.36
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-37.10	
	<i>For >100 To 250, Deduct</i>	-55.65	
	<i>For >250 To 500, Deduct</i>	-84.69	
	<i>For >500 To 1000, Deduct</i>	-113.72	
	<i>For >1000, Deduct</i>	-142.76	
26 56 19 00-0082	EA 8,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 08XX 40 A GRAY).....	779.91	162.73
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-39.00	
	<i>For >100 To 250, Deduct</i>	-58.49	
	<i>For >250 To 500, Deduct</i>	-89.35	
	<i>For >500 To 1000, Deduct</i>	-120.21	
	<i>For >1000, Deduct</i>	-151.07	
26 56 19 00-0083	EA 9,800 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL1 0 10XX 40 A GRAY).....	851.03	165.14
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-42.55	
	<i>For >100 To 250, Deduct</i>	-63.83	
	<i>For >250 To 500, Deduct</i>	-98.12	
	<i>For >500 To 1000, Deduct</i>	-132.42	
	<i>For >1000, Deduct</i>	-166.71	
26 56 19 00-0084	EA 13,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERLH 0 13XX 40 A GRAY).....	1,002.34	169.60
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-50.12	
	<i>For >100 To 250, Deduct</i>	-75.18	
	<i>For >250 To 500, Deduct</i>	-116.81	
	<i>For >500 To 1000, Deduct</i>	-158.45	
	<i>For >1000, Deduct</i>	-200.09	
26 56 19 00-0085	EA 19,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (General Electric ERL2 0 19XX 40 A GRAY).....	1,176.22	178.53
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For >50 To 100, Deduct</i>	-58.81	
	<i>For >100 To 250, Deduct</i>	-88.22	
	<i>For >250 To 500, Deduct</i>	-138.10	
	<i>For >500 To 1000, Deduct</i>	-187.99	
	<i>For >1000, Deduct</i>	-237.87	
26 56 19 00-0086	LED Roadway Lighting (Acuity AEL Autobahn) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0087	Horizontal Tenon Mount, LED Cobra Head Street Lights (Acuity AEL Autobahn) <small>(26 56 19 00-0086)</small>		
	Note: UL wet listed. Includes 4,000K or 5,000K color temperature, 120-480 voltage, integral 10kV surge suppression, 0-10V dimming, die-cast extruded aluminum housing assembly and white, black, gray, graphite or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0088	EA 4,200 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Acuity AEL Autobahn ATB0 20ALEDE70).....	1,195.72	156.21
	<i>For >50 To 100, Deduct</i>	-59.79	
	<i>For >100 To 250, Deduct</i>	-89.68	
	<i>For >250 To 500, Deduct</i>	-141.65	
	<i>For >500 To 1000, Deduct</i>	-193.63	
	<i>For >1000, Deduct</i>	-245.61	
26 56 19 00-0089	EA 6,700 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Acuity AEL Autobahn ATB0 30BLEDE70).....	1,487.89	160.67
	<i>For >50 To 100, Deduct</i>	-74.39	
	<i>For >100 To 250, Deduct</i>	-111.59	
	<i>For >250 To 500, Deduct</i>	-177.95	
	<i>For >500 To 1000, Deduct</i>	-244.31	
	<i>For >1000, Deduct</i>	-310.67	
26 56 19 00-0090	EA 9,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Acuity AEL Autobahn ATB2 40BLEDE70).....	2,080.24	165.14
	<i>For >50 To 100, Deduct</i>	-104.01	
	<i>For >100 To 250, Deduct</i>	-156.02	
	<i>For >250 To 500, Deduct</i>	-251.77	
	<i>For >500 To 1000, Deduct</i>	-347.53	
	<i>For >1000, Deduct</i>	-443.28	
26 56 19 00-0091	EA 13,500 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Acuity AEL Autobahn ATB2 60BLEDE70).....	2,676.55	171.66
	<i>For >50 To 100, Deduct</i>	-133.83	
	<i>For >100 To 250, Deduct</i>	-200.74	
	<i>For >250 To 500, Deduct</i>	-325.99	
	<i>For >500 To 1000, Deduct</i>	-451.23	
	<i>For >1000, Deduct</i>	-576.47	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0092	EA 17,800 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Acuity AEL Autobahn ATB2 80BLEDE70).....	3,259.48	176.47
	<i>For >50 To 100, Deduct</i>	-162.97	
	<i>For >100 To 250, Deduct</i>	-244.46	
	<i>For >250 To 500, Deduct</i>	-398.61	
	<i>For >500 To 1000, Deduct</i>	-552.76	
	<i>For >1000, Deduct</i>	-706.91	
26 56 19 00-0093	LED Roadway Lighting (Leotek) <small>(26 56 19 00-0001)</small>		
26 56 19 00-0094	Horizontal Tenon Mount, LED Cobra Head Street Lights (Leotek) <small>(26 56 19 00-0093)</small> Note: UL wet listed. Includes 4,000K color temperature, 120-277 voltage, integral surge protector, die-cast and extruded aluminum housing assembly and gray powder coat finish. Excludes sensors.		
26 56 19 00-0095	EA Up To 3,900 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC1-4M2-MV-NW-X-GY-XXX-WL).....	627.80	156.21
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For Twist Lock Shorting Cap, Add</i>	9.75	
	<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
	<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
	<i>For >50 To 100, Deduct</i>	-31.39	
	<i>For >100 To 250, Deduct</i>	-47.09	
	<i>For >250 To 500, Deduct</i>	-70.66	
	<i>For >500 To 1000, Deduct</i>	-94.24	
	<i>For >1000, Deduct</i>	-117.82	
26 56 19 00-0096	EA Up To 5,150 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC1-4M2-MV-NW-X-GY-1AMP-WL).....	641.47	157.93
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For Twist Lock Shorting Cap, Add</i>	9.75	
	<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
	<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
	<i>For >50 To 100, Deduct</i>	-32.07	
	<i>For >100 To 250, Deduct</i>	-48.11	
	<i>For >250 To 500, Deduct</i>	-72.29	
	<i>For >500 To 1000, Deduct</i>	-96.46	
	<i>For >1000, Deduct</i>	-120.64	
26 56 19 00-0097	EA Up To 5,950 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC1-6M2-MV-NW-X-GY-XXX-WL).....	684.50	158.96
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For Twist Lock Shorting Cap, Add</i>	9.75	
	<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
	<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
	<i>For >50 To 100, Deduct</i>	-34.23	
	<i>For >100 To 250, Deduct</i>	-51.34	
	<i>For >250 To 500, Deduct</i>	-77.61	
	<i>For >500 To 1000, Deduct</i>	-103.89	
	<i>For >1000, Deduct</i>	-130.17	
26 56 19 00-0098	EA Up To 9,550 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC3-10M2-MV-NW-X-GY-XXX-WL).....	795.15	165.14
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For Twist Lock Shorting Cap, Add</i>	9.75	
	<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
	<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
	<i>For >50 To 100, Deduct</i>	-39.76	
	<i>For >100 To 250, Deduct</i>	-59.64	
	<i>For >250 To 500, Deduct</i>	-91.14	
	<i>For >500 To 1000, Deduct</i>	-122.64	
	<i>For >1000, Deduct</i>	-154.14	
26 56 19 00-0099	EA Up To 11,450 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC4-12M2-MV-NW-X-GY-XXX-WL).....	931.05	169.60
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For Twist Lock Shorting Cap, Add</i>	9.75	
	<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
	<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
	<i>For >50 To 100, Deduct</i>	-46.55	
	<i>For >100 To 250, Deduct</i>	-69.83	
	<i>For >250 To 500, Deduct</i>	-107.90	
	<i>For >500 To 1000, Deduct</i>	-145.97	
	<i>For >1000, Deduct</i>	-184.05	
26 56 19 00-0100	EA Up To 14,550 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC4-15M2-MV-NW-X-GY-XXX-WL).....	936.54	172.35
	<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
	<i>For Twist Lock Shorting Cap, Add</i>	9.75	
	<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
	<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
	<i>For >50 To 100, Deduct</i>	-46.83	
	<i>For >100 To 250, Deduct</i>	-70.24	
	<i>For >250 To 500, Deduct</i>	-108.45	
	<i>For >500 To 1000, Deduct</i>	-146.66	
	<i>For >1000, Deduct</i>	-184.87	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0101	EA	Up To 16,900 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC7-18M2-MV-NW-X-GY-XXX-WL)	1,148.87	175.09
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-57.44	
		<i>For >100 To 250, Deduct</i>	-86.17	
		<i>For >250 To 500, Deduct</i>	-134.85	
		<i>For >500 To 1000, Deduct</i>	-183.54	
		<i>For >1000, Deduct</i>	-232.23	
26 56 19 00-0102	EA	Up To 18,750 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC7-20M2-MV-NW-X-GY-XXX-WL)	1,204.89	178.53
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-60.24	
		<i>For >100 To 250, Deduct</i>	-90.37	
		<i>For >250 To 500, Deduct</i>	-141.69	
		<i>For >500 To 1000, Deduct</i>	-193.00	
		<i>For >1000, Deduct</i>	-244.32	
26 56 19 00-0103	EA	Up To 22,700 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC7-24M2-MV-NW-X-GY-XXX-WL)	1,345.55	181.28
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-67.28	
		<i>For >100 To 250, Deduct</i>	-100.92	
		<i>For >250 To 500, Deduct</i>	-159.13	
		<i>For >500 To 1000, Deduct</i>	-217.34	
		<i>For >1000, Deduct</i>	-275.56	
26 56 19 00-0104	EA	Up To 29,150 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® EC9-30M2-MV-NW-X-GY-XXX-WL)	1,443.20	184.02
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-72.16	
		<i>For >100 To 250, Deduct</i>	-108.24	
		<i>For >250 To 500, Deduct</i>	-171.20	
		<i>For >500 To 1000, Deduct</i>	-234.16	
		<i>For >1000, Deduct</i>	-297.12	
26 56 19 00-0105	EA	Up To 4,800 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC1-20F-MV-NW-X-GY-XXX-WL).....	727.48	157.93
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-36.37	
		<i>For >100 To 250, Deduct</i>	-54.56	
		<i>For >250 To 500, Deduct</i>	-83.04	
		<i>For >500 To 1000, Deduct</i>	-111.52	
		<i>For >1000, Deduct</i>	-139.99	
26 56 19 00-0106	EA	Up To 7,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC1-30F-MV-NW-X-GY-XXX-WL).....	799.22	162.05
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-39.96	
		<i>For >100 To 250, Deduct</i>	-59.94	
		<i>For >250 To 500, Deduct</i>	-91.80	
		<i>For >500 To 1000, Deduct</i>	-123.66	
		<i>For >1000, Deduct</i>	-155.52	
26 56 19 00-0107	EA	Up To 9,300 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC1-40F-MV-NW-X-GY-XXX-WL).....	862.73	165.14
		<i>For LightGrid™ Wireless Outdoor Controller, Add</i>	20.00	
		<i>For Twist Lock Shorting Cap, Add</i>	9.75	
		<i>For ANSI 7-wire Photocontrol Receptacle, Add</i>	29.26	
		<i>For Ripley Long-Life Twist Lock Photocontrol, Add</i>	52.35	
		<i>For >50 To 100, Deduct</i>	-43.14	
		<i>For >100 To 250, Deduct</i>	-64.70	
		<i>For >250 To 500, Deduct</i>	-99.58	
		<i>For >500 To 1000, Deduct</i>	-134.46	
		<i>For >1000, Deduct</i>	-169.34	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0108	EA Up To 12,300 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC1-40F-MV-NW-X-GY-1AMP-WL)	917.38	168.92
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-45.87	
	For >100 To 250, Deduct	-68.80	
	For >250 To 500, Deduct	-106.23	
	For >500 To 1000, Deduct	-143.65	
	For >1000, Deduct	-181.07	
26 56 19 00-0109	EA Up To 13,400 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC1-60F-MV-NW-X-GY-XXX-WL)	973.38	170.28
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-48.67	
	For >100 To 250, Deduct	-73.00	
	For >250 To 500, Deduct	-113.16	
	For >500 To 1000, Deduct	-153.31	
	For >1000, Deduct	-193.47	
26 56 19 00-0110	EA Up To 17,700 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC1-80F-MV-NW-X-GY-XXX-WL)	1,159.82	176.47
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-57.99	
	For >100 To 250, Deduct	-86.99	
	For >250 To 500, Deduct	-136.15	
	For >500 To 1000, Deduct	-185.32	
	For >1000, Deduct	-234.49	
26 56 19 00-0111	EA Up To 19,800 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC2-90F-MV-NW-X-GY-XXX-WL)	1,312.08	179.90
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-65.60	
	For >100 To 250, Deduct	-98.41	
	For >250 To 500, Deduct	-155.02	
	For >500 To 1000, Deduct	-211.62	
	For >1000, Deduct	-268.23	
26 56 19 00-0112	EA Up To 22,000 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC2-100F-MV-NW-X-GY-XXX-WL)	1,395.37	180.59
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-69.77	
	For >100 To 250, Deduct	-104.65	
	For >250 To 500, Deduct	-165.39	
	For >500 To 1000, Deduct	-226.13	
	For >1000, Deduct	-286.87	
26 56 19 00-0113	EA Up To 26,400 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek GC2-120F-MV-NW-X-GY-XXX-WL)	1,475.27	182.64
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-73.76	
	For >100 To 250, Deduct	-110.65	
	For >250 To 500, Deduct	-175.28	
	For >500 To 1000, Deduct	-239.91	
	For >1000, Deduct	-304.54	
26 56 19 00-0114	EA Up To 11,720 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCM2-30H-MV-NW-X-GY-1AMP)	780.90	172.35
	For LightGrid™ Wireless Outdoor Controller, Add	20.00	
	For Twist Lock Shorting Cap, Add	9.75	
	For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
	For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
	For >50 To 100, Deduct	-39.05	
	For >100 To 250, Deduct	-58.57	
	For >250 To 500, Deduct	-89.00	
	For >500 To 1000, Deduct	-119.42	
	For >1000, Deduct	-149.85	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56	19 00-0115	EA Up To 15,430 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCM2-40H-MV-NW-X-GY-1AMP)	845.77	174.06
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-42.29	
		For >100 To 250, Deduct	-63.43	
		For >250 To 500, Deduct	-97.02	
		For >500 To 1000, Deduct	-130.60	
		For >1000, Deduct	-164.19	
26 56	19 00-0116	EA Up To 4,180 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCJ0-15H-MV-NW-X-GY-XXX-WL)	599.83	157.58
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-29.99	
		For >100 To 250, Deduct	-44.99	
		For >250 To 500, Deduct	-67.10	
		For >500 To 1000, Deduct	-89.21	
		For >1000, Deduct	-111.32	
26 56	19 00-0117	EA Up To 5,510 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCJ1-20H-MV-NW-X-GY-XXX-WL)	610.77	158.96
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-30.54	
		For >100 To 250, Deduct	-45.81	
		For >250 To 500, Deduct	-68.40	
		For >500 To 1000, Deduct	-90.99	
		For >1000, Deduct	-113.58	
26 56	19 00-0118	EA Up To 7,430 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCJ2-20H-MV-NW-X-GY-1AMP-WL)	664.05	162.05
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-33.20	
		For >100 To 250, Deduct	-49.80	
		For >250 To 500, Deduct	-74.90	
		For >500 To 1000, Deduct	-100.00	
		For >1000, Deduct	-125.10	
26 56	19 00-0119	EA Up To 16,400 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCL1-60G-MV-NW-X-GY-XXX-WL)	1,023.95	175.09
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-51.20	
		For >100 To 250, Deduct	-76.80	
		For >250 To 500, Deduct	-119.24	
		For >500 To 1000, Deduct	-161.68	
		For >1000, Deduct	-204.13	
26 56	19 00-0120	EA Up To 22,100 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCL1-80G-MV-NW-X-GY-XXX-WL)	1,338.03	180.59
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-66.90	
		For >100 To 250, Deduct	-100.35	
		For >250 To 500, Deduct	-158.22	
		For >500 To 1000, Deduct	-216.10	
		For >1000, Deduct	-273.97	
26 56	19 00-0121	EA Up To 22,900 Lumens, Horizontal Tenon Mount, LED Cobra Head Street Light (Leotek® GCL2-60G-MV-NW-X-GY-1AMP-WL)	1,191.96	181.28
		For LightGrid™ Wireless Outdoor Controller, Add	20.00	
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-59.60	
		For >100 To 250, Deduct	-89.40	
		For >250 To 500, Deduct	-139.93	
		For >500 To 1000, Deduct	-190.47	
		For >1000, Deduct	-241.00	
26 56	19 00-0122	EA Up To 5,484 Lumens, Horizontal Tenon Mount, LED Security Light (Leotek® SafeGuard™ SG1-01-MV-NW-5-GY)	575.94	157.93
		For Twist Lock Shorting Cap, Add	9.75	
		For ANSI 7-wire Photocontrol Receptacle, Add	29.26	
		For Ripley Long-Life Twist Lock Photocontrol, Add	52.35	
		For >50 To 100, Deduct	-28.80	
		For >100 To 250, Deduct	-43.20	
		For >250 To 500, Deduct	-64.10	
		For >500 To 1000, Deduct	-85.00	
		For >1000, Deduct	-105.90	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0123 LED, Wall Packs <small>(26 56 19)</small>		
26 56 19 00-0124 Full Cutoff, LED Wall Packs <small>(26 56 19 00-0123)</small>		
26 56 19 00-0125 Full Cutoff, LED Wall Packs (Lithonia) <small>(26 56 19 00-0124)</small>		
26 56 19 00-0126 EA 30 LEDs, 57 Watt, 530 mA Drive Current, Full Cutoff, LED Wall Pack (Lithonia CSXW LED)	967.90	120.16
For >50 To 100, Deduct	-48.40	
For >100 To 250, Deduct	-72.59	
For >250 To 500, Deduct	-114.98	
For >500 To 1000, Deduct	-157.37	
For >1000, Deduct	-199.75	
26 56 19 00-0127 EA 30 LEDs, 35 Watt, 350 mA Drive Current, Full Cutoff, LED Wall Pack (Lithonia CSXW LED)	1,046.88	120.16
For >50 To 100, Deduct	-52.34	
For >100 To 250, Deduct	-78.52	
For >250 To 500, Deduct	-124.85	
For >500 To 1000, Deduct	-171.19	
For >1000, Deduct	-217.52	
26 56 19 00-0128 Full Cutoff, LED Wall Packs (CREE® BetaLED®) <small>(26 56 19 00-0124)</small>		
26 56 19 00-0129 Wall Mount, Full Cutoff, LED Wall Packs (CREE® BetaLED® Edge® SEC-EDG) <small>(26 56 19 00-0128)</small>		
Note: UL wet listed. Includes 4,000K or 5,700K color temperature, 120-277 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0130 EA 20 LEDs, 26 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® Edge® SEC-EDG)	1,048.35	116.73
Note: Includes 350mA or 525mA driver.		
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Bird Spikes, Add	54.18	
For Fuse, Add	67.48	
For 0 To 10 Volt Dimming, Add	67.48	
For 480 Volt, Add	101.23	
For Multi-Level, Add	146.21	
For >50 To 100, Deduct	-52.42	
For >100 To 250, Deduct	-78.63	
For >250 To 500, Deduct	-125.21	
For >500 To 1000, Deduct	-171.79	
For >1000, Deduct	-218.37	
26 56 19 00-0131 EA 40 LEDs, 47 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® Edge® SEC-EDG)	1,357.33	123.60
Note: Includes 350mA or 525mA driver.		
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Bird Spikes, Add	54.87	
For Fuse, Add	67.48	
For 0 To 10 Volt Dimming, Add	67.48	
For 480 Volt, Add	101.23	
For Multi-Level, Add	146.21	
For >50 To 100, Deduct	-67.87	
For >100 To 250, Deduct	-101.80	
For >250 To 500, Deduct	-163.49	
For >500 To 1000, Deduct	-225.17	
For >1000, Deduct	-286.86	
26 56 19 00-0132 EA 60 LEDs, 68 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® Edge® SEC-EDG)	1,523.57	130.47
Note: Includes 350mA or 525mA driver.		
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Bird Spikes, Add	55.56	
For Fuse, Add	67.48	
For 0 To 10 Volt Dimming, Add	67.48	
For 480 Volt, Add	101.23	
For Multi-Level, Add	146.21	
For >50 To 100, Deduct	-76.18	
For >100 To 250, Deduct	-114.27	
For >250 To 500, Deduct	-183.92	
For >500 To 1000, Deduct	-253.58	
For >1000, Deduct	-323.23	
26 56 19 00-0133 EA 80 LEDs, 90 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® Edge® SEC-EDG)	1,975.31	137.32
Note: Includes 350mA or 525mA driver.		
For 3 Or 7-Pin NEMA Photocell Receptacle, Add	22.49	
For Bird Spikes, Add	56.24	
For Fuse, Add	67.48	
For 0 To 10 Volt Dimming, Add	67.48	
For 480 Volt, Add	101.23	
For Multi-Level, Add	146.21	
For >50 To 100, Deduct	-98.77	
For >100 To 250, Deduct	-148.15	
For >250 To 500, Deduct	-240.05	
For >500 To 1000, Deduct	-331.95	
For >1000, Deduct	-423.85	



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0134	EA 100 LEDs, 111 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® Edge® SEC-EDG) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For Bird Spikes, Add</i> <i>For Fuse, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	2,284.29 22.49 56.93 67.48 67.48 101.23 146.21 -114.21 -171.32 -278.33 -385.33 -492.34	144.19
26 56 19 00-0135	EA 120 LEDs, 132 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® Edge® SEC-EDG) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For Bird Spikes, Add</i> <i>For Fuse, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	2,593.28 22.49 57.62 67.48 67.48 101.23 146.21 -129.66 -194.50 -316.61 -438.72 -560.83	151.06
26 56 19 00-0136	Wall Mount, Full Cutoff, LED Wall Packs (CREE® BetaLED® XSPW™) ^(26 56 19 00-0128) <small>Note: UL wet listed. Includes 4,000K or 5,700K color temperature, 120-277 voltage, Class 2 driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.</small>		
26 56 19 00-0137	EA 25 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® XSPW™) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For Multi-Level, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	609.91 22.49 67.48 67.48 -30.50 -45.74 -70.40 -95.06 -119.72	116.73
26 56 19 00-0138	EA 42 Watt, Wall Mount, Full Cutoff, LED Wall Pack (CREE® BetaLED® XSPW™) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For Multi-Level, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	711.47 22.49 67.48 67.48 -35.57 -53.36 -82.75 -112.15 -141.54	123.60
26 56 19 00-0139	Full Cutoff, LED Wall Packs (McGraw-Edison) ^(26 56 19 00-0124)		
26 56 19 00-0140	EA One 7 LED Light Bar, 27 System Watts, 1 A Drive Current, Full Cutoff, LED Wall Pack (McGraw-Edison IST).....	1,295.19	116.73
26 56 19 00-0141	EA Two 7 LED Light Bars, 54 System Watts, 1 A Drive Current, Full Cutoff, LED Wall Pack (McGraw-Edison IST).....	1,610.37	123.60
26 56 19 00-0142	EA One 21 LED Light Bar, 27 System Watts, 350 mA Drive Current, Full Cutoff, LED Wall Pack (McGraw-Edison IST).....	1,310.70	116.73
26 56 19 00-0143	EA Two 21 LED Light Bars, 51 System Watts, 350 mA Drive Current, Full Cutoff, LED Wall Pack (McGraw-Edison IST).....	1,752.23	123.60
26 56 19 00-0144	Open Face LED Wall Pack ^(26 56 19 00-0123) <small>Note: Heavy-duty cast aluminum housing is polyester powder coated to be rust and corrosion proof, High-quality shatter-resistant glass</small>		
26 56 19 00-0145	EA 3,640 Lumens, 28 Watt, Open Face LED Wall Pack, With Motion Sensor (Maxlite WP-OP28U-50B-MS)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	750.58 -37.53 -56.29 -84.65 -113.01 -141.37	122.28
26 56 19 00-0146	EA 5,540 Lumens, 40 Watt, Open Face LED Wall Pack, With Motion Sensor (Maxlite WP-OP40U-50B-MS)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	807.35 -40.37 -60.55 -91.75 -122.94 -154.14	122.28
26 56 19 00-0147	EA 7,065 Lumens, 50 Watt, Open Face LED Wall Pack, With Motion Sensor (Maxlite WP-OP50U-50B-MS)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	837.08 -41.85 -62.78 -95.46 -128.15 -160.83	122.28
26 56 19 00-0148	EA 11,375 Lumens, 80 Watt, Open Face LED Wall Pack, With Motion Sensor (Maxlite WP-OP80U-50B-MS)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	861.20 -43.06 -64.59 -98.48 -132.37 -166.26	122.28



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0149	EA 16,945 Lumens, 120 Watt, Open Face LED Wall Pack, With Motion Sensor (Maxlite WP-OP120U-50B-MS).....	1,042.07	122.28
	<i>For >50 To 100, Deduct</i>	-52.10	
	<i>For >100 To 250, Deduct</i>	-78.16	
	<i>For >250 To 500, Deduct</i>	-121.09	
	<i>For >500 To 1000, Deduct</i>	-164.02	
	<i>For >1000, Deduct</i>	-206.95	
26 56 19 00-0150	Wall Pack Accessories <small>(26 56 19 00-0123)</small>		
26 56 19 00-0151	EA Photocell For Wall Pack.....	139.26	30.57
26 56 19 00-0152	EA Wire Guard For Mini And Small Wall Pack	155.59	30.57
26 56 19 00-0153	EA Wire Guard For Medium And Large Wall Pack.....	223.88	30.57
26 56 19 00-0154	EA Clear Polycarbonate Vandal Guard For Wall Packs	322.43	30.57
26 56 19 00-0155	EA Full Cutoff Visor For Wall Pack.....	151.14	30.57
26 56 19 00-0156	LED, Area Fixtures <small>(26 56 19)</small>		
26 56 19 00-0157	Pole Mount, LED Area Fixtures <small>(26 56 19 00-0156)</small>		
26 56 19 00-0158	Pole Mount, Rectangular, LED Architectural Area Fixtures (Lithonia DSX) <small>(26 56 19 00-0157)</small>		
	Note: UL wet listed. Includes 4,000K color temperature, 480 voltage, 700mA remote driver, die-cast extruded aluminum housing assembly and white, black, aluminum or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0159	EA 20 LEDs, 49 Watt, Pole Mount, LED Architectural Area Fixture (Lithonia DSXO LED)	2,492.76	116.73
	<i>For >50 To 100, Deduct</i>	-124.64	
	<i>For >100 To 250, Deduct</i>	-186.96	
	<i>For >250 To 500, Deduct</i>	-305.76	
	<i>For >500 To 1000, Deduct</i>	-424.56	
	<i>For >1000, Deduct</i>	-543.36	
26 56 19 00-0160	EA 40 LEDs, 89 Watt, Pole Mount, LED Architectural Area Fixture (Lithonia DSXO LED)	2,687.24	123.60
	<i>For >50 To 100, Deduct</i>	-134.36	
	<i>For >100 To 250, Deduct</i>	-201.54	
	<i>For >250 To 500, Deduct</i>	-329.73	
	<i>For >500 To 1000, Deduct</i>	-457.91	
	<i>For >1000, Deduct</i>	-586.09	
26 56 19 00-0161	EA 80 LEDs, 188 Watt, Pole Mount, LED Architectural Area Fixture (Lithonia DSX2 LED)	2,895.45	137.32
	<i>For >50 To 100, Deduct</i>	-144.77	
	<i>For >100 To 250, Deduct</i>	-217.16	
	<i>For >250 To 500, Deduct</i>	-355.06	
	<i>For >500 To 1000, Deduct</i>	-492.97	
	<i>For >1000, Deduct</i>	-630.88	
26 56 19 00-0162	EA 100 LEDs, 218 Watt, Pole Mount, LED Architectural Area Fixture (Lithonia DSX2 LED)	2,909.18	144.19
	<i>For >50 To 100, Deduct</i>	-145.46	
	<i>For >100 To 250, Deduct</i>	-218.19	
	<i>For >250 To 500, Deduct</i>	-356.44	
	<i>For >500 To 1000, Deduct</i>	-494.69	
	<i>For >1000, Deduct</i>	-632.94	
26 56 19 00-0163	Arm Mount, Rectangular, LED Area Fixtures (CREE® BetaLED® Edge® ARE-EDG) <small>(26 56 19 00-0157)</small>		
	Note: UL wet listed. Includes 4,000K or 5,700K color temperature, 120/277 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Includes Type III Medium optic. Excludes sensors. All fixtures without the backlight control shield are DLC qualified		
26 56 19 00-0164	EA 40 LEDs, 47 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG)	1,414.47	123.60
	<i>For Backlight Shielding, Add</i>	26.70	
	<i>For Type II Medium Optic, Add</i>	44.42	
	<i>For 480 Volt, Add</i>	107.78	
	<i>For Multi-Level Drive Currents, Add</i>	267.03	
	<i>For >50 To 100, Deduct</i>	-70.72	
	<i>For >100 To 250, Deduct</i>	-106.09	
	<i>For >250 To 500, Deduct</i>	-170.63	
	<i>For >500 To 1000, Deduct</i>	-235.17	
	<i>For >1000, Deduct</i>	-299.72	
26 56 19 00-0165	EA 60 LEDs, 68 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG)	1,708.58	130.47
	<i>For Backlight Shielding, Add</i>	26.70	
	<i>For Type II Medium Optic, Add</i>	45.11	
	<i>For 480 Volt, Add</i>	107.78	
	<i>For Multi-Level Drive Currents, Add</i>	267.03	
	<i>For >50 To 100, Deduct</i>	-85.43	
	<i>For >100 To 250, Deduct</i>	-128.14	
	<i>For >250 To 500, Deduct</i>	-207.05	
	<i>For >500 To 1000, Deduct</i>	-285.96	
	<i>For >1000, Deduct</i>	-364.86	
26 56 19 00-0166	EA 80 LEDs, 90 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG)	2,115.23	137.32
	<i>For Backlight Shielding, Add</i>	26.70	
	<i>For Type II Medium Optic, Add</i>	45.79	
	<i>For 480 Volt, Add</i>	107.78	
	<i>For Multi-Level Drive Currents, Add</i>	267.03	
	<i>For >50 To 100, Deduct</i>	-105.76	
	<i>For >100 To 250, Deduct</i>	-158.64	
	<i>For >250 To 500, Deduct</i>	-257.54	
	<i>For >500 To 1000, Deduct</i>	-356.43	
	<i>For >1000, Deduct</i>	-455.33	

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
26 56 19 00-0167	EA 100 LEDs, 111 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG) <i>For Backlight Shielding, Add</i> <i>For Type II Medium Optic, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level Drive Currents, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	2,409.34 26.70 46.48 107.78 267.03 -120.47 -180.70 -293.96 -407.22 -520.47	144.19
26 56 19 00-0168	EA 120 LEDs, 132 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG) <i>For Backlight Shielding, Add</i> <i>For Type II Medium Optic, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level Drive Currents, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	2,703.44 26.70 47.17 107.78 267.03 -135.17 -202.76 -330.38 -458.00 -585.62	151.06
26 56 19 00-0169	EA 140 LEDs, 157 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG) <i>For Backlight Shielding, Add</i> <i>For Type II Medium Optic, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level Drive Currents, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	3,087.19 26.70 47.85 107.78 267.03 -154.36 -231.54 -378.00 -524.47 -670.93	157.93
26 56 19 00-0170	EA 160 LEDs, 179 Watt, Arm Mount, Rectangular, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDG) <i>For Backlight Shielding, Add</i> <i>For Type II Medium Optic, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level Drive Currents, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	3,381.31 26.70 48.54 107.78 267.03 -169.07 -253.60 -414.42 -575.25 -736.08	164.79
26 56 19 00-0171	Direct Or Arm Mount, Rectangular, High Output, LED Area Fixtures (CREE® BetaLED® Edge® ARE-EHO) <small>(26 56 19 00-0157)</small> Note: UL wet listed. Includes 5,700K color temperature, 120/277 voltage, 700mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0172	EA 120 LEDs, 267 System Watts, Direct Or Arm Mount, Rectangular, High Output, LED Area Fixture (CREE® BetaLED® Edge® ARE-EHO) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For Bird Spikes, Add</i> <i>For 5,000K Color Temperature, Add</i> <i>For Fuse, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For 480 Volt, Add</i> <i>For Multi-Level, Add</i> <i>For 1,000mA Driver, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	2,496.42 22.49 50.55 56.24 67.48 67.48 101.23 146.21 188.98 -124.82 -187.23 -304.50 -421.77 -539.04	151.06
26 56 19 00-0173	EA 240 LEDs, 533 System Watts, Direct Or Arm Mount, Rectangular, High Output, LED Area Fixture (CREE® BetaLED® Edge® ARE-EHO) <i>For 3 Or 7-Pin NEMA Photocell Receptacle, Add</i> <i>For 5,000K Color Temperature, Add</i> <i>For Fuse, Add</i> <i>For 0 To 10 Volt Dimming, Add</i> <i>For Bird Spikes, Add</i> <i>For Multi-Level, Add</i> <i>For 1,000mA Driver, Add</i> <i>For 480 Volt, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	4,218.51 22.49 56.24 67.48 67.48 75.24 146.21 188.96 202.45 -210.93 -316.39 -518.04 -719.70 -921.36	185.40
26 56 19 00-0174	Wall Mount, LED Area Fixtures <small>(26 56 19 00-0156)</small>		
26 56 19 00-0175	Wall Mount, LED Architectural Area Fixtures (Lithonia DSXW) <small>(26 56 19 00-0174)</small> Note: UL wet listed. Includes 277 voltage, 700mA remote driver, die-cast extruded aluminum housing assembly and white, black, aluminum or bronze powder coat finish. Excludes sensors.		



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0176 EA 20 LEDs, 47 Watt, 4000K CCT, Wall Mount, LED Architectural Area Fixture (Lithonia DSXW2 LED)	1,102.84	116.73
For >50 To 100, Deduct	-55.14	
For >100 To 250, Deduct	-82.71	
For >250 To 500, Deduct	-132.02	
For >500 To 1000, Deduct	-181.32	
For >1000, Deduct	-230.63	
26 56 19 00-0177 EA 30 LEDs, 71 Watt, 4000K CCT, Wall Mount, LED Architectural Area Fixture (Lithonia DSXW2 LED)	1,130.30	130.47
For >50 To 100, Deduct	-56.52	
For >100 To 250, Deduct	-84.77	
For >250 To 500, Deduct	-134.76	
For >500 To 1000, Deduct	-184.76	
For >1000, Deduct	-234.75	
26 56 19 00-0178 Surface Mount, LED Parking Structure Fixtures (26 56 19 00-0156)		
26 56 19 00-0179 Surface Mount, Rectangular, LED Parking Structure Fixtures (CREE® BetaLED® Edge® PKG-EDG) (26 56 19 00-0178)		
Note: Direct or pendant mount. UL wet listed. Includes 5,700K color temperature, 120-480 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0180 EA 40 LEDs, 47 Watt, Surface Mount, Rectangular, LED Parking Structure Fixture (CREE® BetaLED® Edge® PKG-EDG)	1,246.63	123.60
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-62.33	
For >100 To 250, Deduct	-93.50	
For >250 To 500, Deduct	-149.65	
For >500 To 1000, Deduct	-205.80	
For >1000, Deduct	-261.95	
26 56 19 00-0181 EA 60 LEDs, 68 Watt, Surface Mount, Rectangular, LED Parking Structure Fixture (CREE® BetaLED® Edge® PKG-EDG)	1,540.74	130.47
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-77.04	
For >100 To 250, Deduct	-115.56	
For >250 To 500, Deduct	-186.07	
For >500 To 1000, Deduct	-256.58	
For >1000, Deduct	-327.10	
26 56 19 00-0182 EA 80 LEDs, 90 Watt, Surface Mount, Rectangular, LED Parking Structure Fixture (CREE® BetaLED® Edge® PKG-EDG)	1,834.85	137.32
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-91.74	
For >100 To 250, Deduct	-137.61	
For >250 To 500, Deduct	-222.49	
For >500 To 1000, Deduct	-307.37	
For >1000, Deduct	-392.24	
26 56 19 00-0183 EA 100 LEDs, 111 Watt, Surface Mount, Rectangular, LED Parking Structure Fixture (CREE® BetaLED® Edge® PKG-EDG)	2,128.96	144.19
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-106.45	
For >100 To 250, Deduct	-159.67	
For >250 To 500, Deduct	-258.91	
For >500 To 1000, Deduct	-358.15	
For >1000, Deduct	-457.39	
26 56 19 00-0184 Surface Mount, Square, LED Parking Structure Fixtures (CREE® BetaLED® Edge® PKG-304) (26 56 19 00-0178)		
Note: Direct or pendant mount. UL wet listed. Includes 5,700K color temperature, 120-480 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0185 EA 40 LEDs, 47 Watt, Surface Mount, Square, LED Parking Structure Fixture (CREE® BetaLED® Edge® PKG-304)	1,200.85	123.60
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-60.04	
For >100 To 250, Deduct	-90.06	
For >250 To 500, Deduct	-143.93	
For >500 To 1000, Deduct	-197.79	
For >1000, Deduct	-251.65	
26 56 19 00-0186 EA 60 LEDs, 68 Watt, Surface Mount, Square, LED Parking Structure Fixture (CREE® BetaLED® Edge® PKG-304)	1,327.11	130.47
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-66.36	
For >100 To 250, Deduct	-99.53	
For >250 To 500, Deduct	-159.37	
For >500 To 1000, Deduct	-219.20	
For >1000, Deduct	-279.03	
26 56 19 00-0187 Surface Mount, Square, LED Parking Structure Fixtures (CREE® BetaLED® VG) (26 56 19 00-0178)		
Note: UL wet listed. Includes 4,000K color temperature, 120-277 voltage, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

26 56 19 00-0188	EA	3,700 Lumens, 50 Watt, Surface Mount, Square, LED Parking Structure Fixtures (CREE® BetaLED® VGADM5MA40KUL).....	1,005.21	123.60
		<i>For >50 To 100, Deduct</i>	-50.26	
		<i>For >100 To 250, Deduct</i>	-75.39	
		<i>For >250 To 500, Deduct</i>	-119.47	
		<i>For >500 To 1000, Deduct</i>	-163.55	
		<i>For >1000, Deduct</i>	-207.63	
26 56 19 00-0189		Surface Mount, Rectangular, LED Parking Structure Fixtures (Philips Gardco ELG) <small>(26 56 19 00-0178)</small>		
		Note: Direct or pendant mount. UL wet listed. Includes 4,000K color temperature, 120-277 voltage, die-cast extruded aluminum housing assembly and aluminum finish. Excludes sensors.		
26 56 19 00-0190	EA	70 Watt, Surface Mount, Rectangular, LED Parking Structure Fixture (Philips Gardco ELG).....	1,999.33	130.47
		<i>For >50 To 100, Deduct</i>	-99.97	
		<i>For >100 To 250, Deduct</i>	-149.95	
		<i>For >250 To 500, Deduct</i>	-243.39	
		<i>For >500 To 1000, Deduct</i>	-336.84	
		<i>For >1000, Deduct</i>	-430.28	
26 56 19 00-0191	EA	110 Watt, Surface Mount, Rectangular, LED Parking Structure Fixture (Philips Gardco ELG).....	2,026.80	144.19
		<i>For >50 To 100, Deduct</i>	-101.34	
		<i>For >100 To 250, Deduct</i>	-152.01	
		<i>For >250 To 500, Deduct</i>	-246.14	
		<i>For >500 To 1000, Deduct</i>	-340.27	
		<i>For >1000, Deduct</i>	-434.40	
26 56 19 00-0192		Surface Mount, LED Canopy Fixtures <small>(26 56 19 00-0156)</small>		
26 56 19 00-0193		Surface Mount, Rectangular, LED Canopy Fixtures (CREE® BetaLED® Edge® CAN-EDG) <small>(26 56 19 00-0192)</small>		
		Note: Direct or pendant mount. UL wet listed. Includes 6,000K color temperature, 120-480 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0194	EA	40 LEDs, 47 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	1,448.80	123.60
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-72.44	
		<i>For >100 To 250, Deduct</i>	-108.66	
		<i>For >250 To 500, Deduct</i>	-174.92	
		<i>For >500 To 1000, Deduct</i>	-241.18	
		<i>For >1000, Deduct</i>	-307.44	
26 56 19 00-0195	EA	60 LEDs, 68 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	1,742.91	130.47
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-87.15	
		<i>For >100 To 250, Deduct</i>	-130.72	
		<i>For >250 To 500, Deduct</i>	-211.34	
		<i>For >500 To 1000, Deduct</i>	-291.96	
		<i>For >1000, Deduct</i>	-372.59	
26 56 19 00-0196	EA	80 LEDs, 90 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	2,037.03	137.32
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-101.85	
		<i>For >100 To 250, Deduct</i>	-152.78	
		<i>For >250 To 500, Deduct</i>	-247.76	
		<i>For >500 To 1000, Deduct</i>	-342.75	
		<i>For >1000, Deduct</i>	-437.73	
26 56 19 00-0197	EA	100 LEDs, 111 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	2,331.14	144.19
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-116.56	
		<i>For >100 To 250, Deduct</i>	-174.84	
		<i>For >250 To 500, Deduct</i>	-284.18	
		<i>For >500 To 1000, Deduct</i>	-393.53	
		<i>For >1000, Deduct</i>	-502.88	
26 56 19 00-0198	EA	120 LEDs, 132 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	2,625.24	151.06
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-131.26	
		<i>For >100 To 250, Deduct</i>	-196.89	
		<i>For >250 To 500, Deduct</i>	-320.60	
		<i>For >500 To 1000, Deduct</i>	-444.31	
		<i>For >1000, Deduct</i>	-568.02	
26 56 19 00-0199	EA	140 LEDs, 157 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	3,031.88	157.93
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-151.59	
		<i>For >100 To 250, Deduct</i>	-227.39	
		<i>For >250 To 500, Deduct</i>	-371.09	
		<i>For >500 To 1000, Deduct</i>	-514.79	
		<i>For >1000, Deduct</i>	-658.48	
26 56 19 00-0200	EA	160 LEDs, 179 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	3,326.00	164.79
		<i>For Multi-Level Drive Currents, Add</i>	267.03	
		<i>For >50 To 100, Deduct</i>	-166.30	
		<i>For >100 To 250, Deduct</i>	-249.45	
		<i>For >250 To 500, Deduct</i>	-407.51	
		<i>For >500 To 1000, Deduct</i>	-565.57	
		<i>For >1000, Deduct</i>	-723.63	



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0201 EA 200 LEDs, 221 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	3,914.21	178.53
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-195.71	
For >100 To 250, Deduct	-293.57	
For >250 To 500, Deduct	-480.35	
For >500 To 1000, Deduct	-667.13	
For >1000, Deduct	-853.92	
26 56 19 00-0202 EA 240 LEDs, 264 Watt, Surface Mount, Rectangular, LED Canopy Fixture (CREE® BetaLED® Edge® CAN-EDG).....	4,488.70	185.40
For Multi-Level Drive Currents, Add	267.03	
For >50 To 100, Deduct	-224.44	
For >100 To 250, Deduct	-336.65	
For >250 To 500, Deduct	-551.82	
For >500 To 1000, Deduct	-766.98	
For >1000, Deduct	-982.15	
26 56 19 00-0203 Surface Mount, Square, LED Canopy/Soffit Fixtures (CREE® BetaLED® CPY250) <small>(26 56 19 00-0192)</small>		
Note: UL wet listed. Includes 5,700K color temperature, 120-277 voltage, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0204 EA 8,000 Lumens, 82 Watt, Surface Mount, Square, LED Canopy/Soffit Fixture (CREE® BetaLED® CPY250)	993.72	137.32
For >50 To 100, Deduct	-49.69	
For >100 To 250, Deduct	-74.53	
For >250 To 500, Deduct	-117.35	
For >500 To 1000, Deduct	-160.17	
For >1000, Deduct	-202.99	
26 56 19 00-0205 Recessed Mount, LED Soffit Fixtures <small>(26 56 19 00-0156)</small>		
26 56 19 00-0206 Recessed Mount, Square, LED Soffit Fixtures (CREE® BetaLED® SFT-304) <small>(26 56 19 00-0205)</small>		
Note: UL wet listed. Includes 5,700K color temperature, 120/277 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0207 EA 40 LEDs, 47 Watt, Recessed Mount, Square, LED Soffit Fixture (CREE® BetaLED® SFT-304)	1,223.74	123.60
For >50 To 100, Deduct	-61.19	
For >100 To 250, Deduct	-91.78	
For >250 To 500, Deduct	-146.79	
For >500 To 1000, Deduct	-201.80	
For >1000, Deduct	-256.80	
26 56 19 00-0208 EA 60 LEDs, 68 Watt, Recessed Mount, Square, LED Soffit Fixture (CREE® BetaLED® SFT-304)	1,350.00	130.47
For >50 To 100, Deduct	-67.50	
For >100 To 250, Deduct	-101.25	
For >250 To 500, Deduct	-162.23	
For >500 To 1000, Deduct	-223.20	
For >1000, Deduct	-284.18	
26 56 19 00-0209 Surface Mount, LED Area Fixtures <small>(26 56 19 00-0156)</small>		
26 56 19 00-0210 Surface Mount, Square, LED Multi-Purpose Area Fixtures (LSI Industries® Crossover® XPG) <small>(26 56 19 00-0209)</small>		
Note: UL wet listed. Includes 5,300K color temperature, 120/277 voltage, 350mA driver, die-cast extruded aluminum housing assembly and white, black or silver powder coat finish. Excludes sensors.		
26 56 19 00-0211 EA 50 LEDs, 59 Watt, Surface Mount, Square, LED Multi-Purpose Area Fixture (LSI Industries® Crossover® XPG)	651.66	123.60
For >50 To 100, Deduct	-32.58	
For >100 To 250, Deduct	-48.87	
For >250 To 500, Deduct	-75.28	
For >500 To 1000, Deduct	-101.68	
For >1000, Deduct	-128.08	
26 56 19 00-0212 EA 50 LEDs, 59 Watt, Pendant Mount, Square, LED Multi-Purpose Area Fixture (LSI Industries® Crossover® XPG)	1,456.61	123.60
For >50 To 100, Deduct	-72.83	
For >100 To 250, Deduct	-109.25	
For >250 To 500, Deduct	-175.90	
For >500 To 1000, Deduct	-242.55	
For >1000, Deduct	-309.20	
26 56 19 00-0213 EA 68 LEDs, 79 Watt, Surface Mount, Square, LED Multi-Purpose Area Fixture (LSI Industries® Crossover® XPG)	1,210.49	137.32
For >50 To 100, Deduct	-60.52	
For >100 To 250, Deduct	-90.79	
For >250 To 500, Deduct	-144.44	
For >500 To 1000, Deduct	-198.10	
For >1000, Deduct	-251.76	
26 56 19 00-0214 EA 68 LEDs, 79 Watt, Pendant Mount, Square, LED Multi-Purpose Area Fixture (LSI Industries® Crossover® XPG)	1,499.27	137.32
For >50 To 100, Deduct	-74.96	
For >100 To 250, Deduct	-112.45	
For >250 To 500, Deduct	-180.54	
For >500 To 1000, Deduct	-248.64	
For >1000, Deduct	-316.74	
26 56 19 00-0215 Surface Mount, LED Multi-Purpose Area Fixture (Lumark Crosstour®) <small>(26 56 19 00-0209)</small>		
Note: Wall, inverted, post, bollard, floodlight trunnion, or floodlight knuckle mount. UL wet listed. Includes 5,000K color temperature, 120/277 voltage, die-cast extruded aluminum housing assembly and white or bronze powder coat finish. Excludes sensors.		

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0216	EA		13 Watt, Surface Mount, LED Multi-Purpose Area Fixture (Lumark Crosstour® XTOR1A).....	209.80	44.02
			<i>For Knuckle Mount Or Trunnion Mount Base, Add</i>	45.00	
			<i>For >50 To 100, Deduct</i>	-10.49	
			<i>For >100 To 250, Deduct</i>	-15.74	
			<i>For >250 To 500, Deduct</i>	-24.39	
			<i>For >500 To 1000, Deduct</i>	-33.05	
			<i>For >1000, Deduct</i>	-41.70	
26 56 19 00-0217	EA		20 Watt, Surface Mount, LED Multi-Purpose Area Fixture (Lumark Crosstour® XTOR2A).....	238.74	44.02
			<i>For Knuckle Mount Or Trunnion Mount Base, Add</i>	45.00	
			<i>For >50 To 100, Deduct</i>	-11.94	
			<i>For >100 To 250, Deduct</i>	-17.91	
			<i>For >250 To 500, Deduct</i>	-28.01	
			<i>For >500 To 1000, Deduct</i>	-38.11	
			<i>For >1000, Deduct</i>	-48.21	
26 56 19 00-0218	EA		30 Watt, Surface Mount, LED Multi-Purpose Area Fixture (Lumark Crosstour® XTOR3A).....	293.86	44.02
			<i>For Knuckle Mount Or Trunnion Mount Base, Add</i>	45.00	
			<i>For >50 To 100, Deduct</i>	-14.69	
			<i>For >100 To 250, Deduct</i>	-22.04	
			<i>For >250 To 500, Deduct</i>	-34.90	
			<i>For >500 To 1000, Deduct</i>	-47.76	
			<i>For >1000, Deduct</i>	-60.62	
26 56 19 00-0219			Surface Mount, LED Facade Fixtures (26 56 19 00-0156)		
26 56 19 00-0220			Surface Mount, LED Facade Fixtures (lumenpulse™ lumenfacade™) (26 56 19 00-0219)		
26 56 19 00-0221	EA		12" Length, Fixed Surface Mount, LED Façade Fixture (lumenpulse™ lumenfacade™).....	759.76	51.39
			<i>For >50 To 100, Deduct</i>	-37.99	
			<i>For >100 To 250, Deduct</i>	-56.98	
			<i>For >250 To 500, Deduct</i>	-93.02	
			<i>For >500 To 1000, Deduct</i>	-129.05	
			<i>For >1000, Deduct</i>	-165.08	
26 56 19 00-0222	EA		24" Length, Fixed Surface Mount, LED Façade Fixture (lumenpulse™ lumenfacade™).....	1,240.13	46.92
			<i>For >50 To 100, Deduct</i>	-62.01	
			<i>For >100 To 250, Deduct</i>	-93.01	
			<i>For >250 To 500, Deduct</i>	-153.34	
			<i>For >500 To 1000, Deduct</i>	-213.67	
			<i>For >1000, Deduct</i>	-274.00	
26 56 19 00-0223	EA		36" Length, Fixed Surface Mount, LED Façade Fixture (lumenpulse™ lumenfacade™).....	1,584.84	39.10
			<i>For >50 To 100, Deduct</i>	-79.24	
			<i>For >100 To 250, Deduct</i>	-118.86	
			<i>For >250 To 500, Deduct</i>	-196.71	
			<i>For >500 To 1000, Deduct</i>	-274.55	
			<i>For >1000, Deduct</i>	-352.40	
26 56 19 00-0224	EA		48" Length, Fixed Surface Mount, LED Façade Fixture (lumenpulse™ lumenfacade™).....	1,929.51	31.28
			<i>For >50 To 100, Deduct</i>	-96.48	
			<i>For >100 To 250, Deduct</i>	-144.71	
			<i>For >250 To 500, Deduct</i>	-240.07	
			<i>For >500 To 1000, Deduct</i>	-335.43	
			<i>For >1000, Deduct</i>	-430.79	
26 56 19 00-0225			Post Top, LED Area Fixtures (26 56 19 00-0156)		
26 56 19 00-0226			Post Top, LED Area Fixtures (Cooper Lighting Invue® MSA) (26 56 19 00-0225)		
			Note: UL wet listed. Includes 4,000K color temperature, 120-480 voltage, 350mA remote driver, die-cast extruded aluminum housing assembly and white, black, grey, dark platinum, graphite metallic or bronze powder coat finish. Excludes sensors.		
26 56 19 00-0227	EA		1,800 Lumens, 27 Watt, Post Top Mount, Acorn Style LED Area Fixture (Cooper Lighting Invue® MSA-CO1).....	2,126.76	188.83
			<i>For >50 To 100, Deduct</i>	-106.34	
			<i>For >100 To 250, Deduct</i>	-159.51	
			<i>For >250 To 500, Deduct</i>	-256.40	
			<i>For >500 To 1000, Deduct</i>	-353.30	
			<i>For >1000, Deduct</i>	-450.20	
26 56 19 00-0228	EA		3,400 Lumens, 54 Watt, Post Top Mount, Acorn Style LED Area Fixture (Cooper Lighting Invue® MSA-CO2).....	2,349.94	188.83
			<i>For >50 To 100, Deduct</i>	-117.50	
			<i>For >100 To 250, Deduct</i>	-176.25	
			<i>For >250 To 500, Deduct</i>	-284.30	
			<i>For >500 To 1000, Deduct</i>	-392.36	
			<i>For >1000, Deduct</i>	-500.41	
26 56 19 00-0229	EA		77 Watt, Post Top Mount, Acorn Style LED Area Fixture (Cooper Lighting Invue® MSA-CO3).....	2,526.35	188.83
			<i>For >50 To 100, Deduct</i>	-126.32	
			<i>For >100 To 250, Deduct</i>	-189.48	
			<i>For >250 To 500, Deduct</i>	-306.35	
			<i>For >500 To 1000, Deduct</i>	-423.23	
			<i>For >1000, Deduct</i>	-540.11	
26 56 19 00-0230			Post Top, LED Area Fixtures (General Electric EPAS) (26 56 19 00-0225)		
			Note: UL wet listed. Includes 4,100K color temperature, 120-480 voltage, die-cast extruded aluminum housing assembly and black, green or bronze powder coat finish. Includes photocontrol sensor.		



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0231 EA 3,200 Lumens, 45 Watt, Post Top Mount, Acorn Style LED Area Fixture (General Electric EPAS 0 E5/E3).....	2,509.53	188.83
For >50 To 100, Deduct	-125.48	
For >100 To 250, Deduct	-188.21	
For >250 To 500, Deduct	-304.25	
For >500 To 1000, Deduct	-420.29	
For >1000, Deduct	-536.32	
26 56 19 00-0232 EA 6,515 Lumens, 80 Watt, Post Top Mount, Acorn Style LED Area Fixture (General Electric EPAS 0 C5/C3)	2,566.88	188.83
For >50 To 100, Deduct	-128.34	
For >100 To 250, Deduct	-192.52	
For >250 To 500, Deduct	-311.42	
For >500 To 1000, Deduct	-430.32	
For >1000, Deduct	-549.22	
26 56 19 00-0233 Post Top, LED Area Fixtures (General Electric EPTC) <small>(26 56 19 00-0225)</small>		
Note: UL wet listed. Includes 4,100K color temperature, 120-480 voltage, die-cast extruded aluminum housing assembly and black, gray or dark bronze powder coat finish. Includes photocontrol sensor.		
26 56 19 00-0234 EA 3,200 Lumens, 45 Watt, Post Top Mount, Contemporary Twin Support Style LED Area Fixture (General Electric EPTC 0 E5/E3).....	1,733.18	188.83
For >50 To 100, Deduct	-86.66	
For >100 To 250, Deduct	-129.99	
For >250 To 500, Deduct	-207.21	
For >500 To 1000, Deduct	-284.42	
For >1000, Deduct	-361.64	
26 56 19 00-0235 EA 6,150 Lumens, 80 Watt, Post Top Mount, Contemporary Twin Support Style LED Area Fixture (General Electric EPTC 0 C5/C3).....	1,819.00	188.83
For >50 To 100, Deduct	-90.95	
For >100 To 250, Deduct	-136.43	
For >250 To 500, Deduct	-217.93	
For >500 To 1000, Deduct	-299.44	
For >1000, Deduct	-380.95	
26 56 19 00-0236 Post Top, LED Area Fixtures (General Electric EPST) <small>(26 56 19 00-0225)</small>		
Note: UL wet listed. Includes 4,100K color temperature, 120-480 voltage, die-cast extruded aluminum housing assembly and black or dark bronze powder coat finish. Includes photocontrol sensor.		
26 56 19 00-0237 EA 3,135 Lumens, 45 Watt, Post Top Mount, Utility Carriage Style LED Area Fixture (General Electric EPST 0 E5/E3).....	1,343.10	188.83
For >50 To 100, Deduct	-67.16	
For >100 To 250, Deduct	-100.73	
For >250 To 500, Deduct	-158.45	
For >500 To 1000, Deduct	-216.16	
For >1000, Deduct	-273.87	
26 56 19 00-0238 EA 6,115 Lumens, 80 Watt, Post Top Mount, Utility Carriage Style LED Area Fixture (General Electric EPST 0 C5/C3).....	1,428.92	188.83
For >50 To 100, Deduct	-71.45	
For >100 To 250, Deduct	-107.17	
For >250 To 500, Deduct	-169.17	
For >500 To 1000, Deduct	-231.18	
For >1000, Deduct	-293.18	
26 56 19 00-0239 Post Top, LED Area Fixtures (CREE® BetaLED® Edge® ARE-EDR) <small>(26 56 19 00-0225)</small>		
Note: UL wet listed. Includes 4,000K color temperature, 120/277 voltage, die-cast extruded aluminum housing assembly and white, black, silver or bronze powder coat finish. Includes Type V Medium optic. Excludes sensors.		
26 56 19 00-0240 EA 13,800 Lumens, 130 Watt, Post Top Mount, LED Area Fixture (CREE® BetaLED® Edge® ARE-EDR).....	3,284.41	188.83
For >50 To 100, Deduct	-164.22	
For >100 To 250, Deduct	-246.33	
For >250 To 500, Deduct	-401.11	
For >500 To 1000, Deduct	-555.89	
For >1000, Deduct	-710.67	
26 56 19 00-0241 LED Retrofit For Post Top, Traditional Area Fixtures (CREE® BetaLED® BXRA) <small>(26 56 19 00-0225)</small>		
Note: Includes 2,700K or 4,000K color temperature and 120/277 voltage retrofit assembly. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		
26 56 19 00-0242 EA LED Retrofit For Post Top, Holophane® Utility Granville Acorn Area Fixtures (CREE® BetaLED® BXRAAH53)	902.79	103.00
For 0 To 10 Volt Dimming, Add	67.48	
For >50 To 100, Deduct	-45.14	
For >100 To 250, Deduct	-67.71	
For >250 To 500, Deduct	-107.70	
For >500 To 1000, Deduct	-147.69	
For >1000, Deduct	-187.68	
26 56 19 00-0243 LED Retrofit For Post Top, Decorative Area Fixtures (CREE® DPT) <small>(26 56 19 00-0225)</small>		
Note: Includes 3,000K color temperature and 120/277 voltage retrofit assembly. Excludes recycling or disposal of lamps and ballasts. See CSI section 02 84 16 00-0003 for ballast recycling.		

26	Electrical
26 50	Lighting
26 56	Exterior Lighting



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 19 00-0244	EA		LED Retrofit For Post Top, Decorative Area Fixtures (CREE® DPT) <i>For Backlight Control Shield, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	569.74 44.54 -28.49 -42.73 -69.02 -95.31 -121.60	21.97
26 56 19 00-0245			Pole Mount, LED Area Fixtures (ALED20 Area Lights) (26 56 19 00-0156) Note: UL wet listed. Includes 5,000K color temperature, 120 voltage.		
26 56 19 00-0246	EA		20 Watts, Pole Mount, LED Area Fixtures (ALED20 Area Lights).....	802.91	116.73
26 56 19 00-0247			Surface Mount, LED Strip Fixtures (Sylvania) (26 56 19 00-0156)		
26 56 19 00-0248	EA		4' Long, 5,200 Lumens, 40 Watt, Vapor Tight Dimmable LED Fixture (Sylvania VAPOR1B/040UNVD840/48EC/GR/D)..... <i>For >50 To 100, Deduct</i> <i>For >100 To 250, Deduct</i> <i>For >250 To 500, Deduct</i> <i>For >500 To 1000, Deduct</i> <i>For >1000, Deduct</i>	524.77 -26.24 -39.36 -64.06 -88.76 -113.47	40.89
26 56 21			HID Exterior Lighting (26 56)		
26 56 21 00-0001			High Mast Fixtures (26 56 21)		
26 56 21 00-0002			Metal Halide, High Mast Fixtures (26 56 21 00-0001)		
26 56 21 00-0003	EA		400 W High Mast Metal Halide Fixture (VA 25 Type V) As Manufactured By Metrolux	1,980.56	170.01
26 56 21 00-0004	EA		400 W High Mast Metal Halide Fixture (VA 25 Type VS, VF 1 And 3) As Manufactured By Metrolux	2,117.03	170.01
26 56 21 00-0005	EA		750 W High Mast Metal Halide Fixture (VA 25 Type V) As Manufactured By Metrolux	2,098.29	194.22
26 56 21 00-0006	EA		750 W High Mast Metal Halide Fixture (VA 25 Type VS, VF 1 And 3) As Manufactured By Metrolux	2,180.17	194.22
26 56 21 00-0007	EA		1,000 W High Mast Metal Halide Fixture (VA 25 Type V) As Manufactured By Metrolux	2,203.96	242.77
26 56 21 00-0008	EA		1,000 W High Mast Metal Halide Fixture (VA 25 Type VS, VF 1 And 3) As Manufactured By Metrolux	2,285.84	242.77
26 56 21 00-0009			High Pressure Sodium, High Mast Fixtures (26 56 21 00-0001)		
26 56 21 00-0010	EA		400 W High Mast HPS Fixture (VA 25 Type V) As Manufactured By Metrolux.....	2,046.52	170.01
26 56 21 00-0011	EA		400 W High Mast HPS Fixture (VA 25 Type VS, VF 1 And 3) As Manufactured By Metrolux.....	2,128.40	170.01
26 56 21 00-0012	EA		600 Watt High Mast HPS Fixture (VA 25 Type V, VS, VF 1 And 3) As Manufactured By Metrolux	2,476.93	179.72
26 56 21 00-0013	EA		750 Watt High Mast HPS Fixture (VA 25 Type V, VS, VF 1 And 3) As Manufactured By Metrolux	2,537.30	194.22
26 56 21 00-0014	EA		1,000 Watt High Mast HPS Fixture (VA 25 Type V, VS, VF 1 And 3) As Manufactured By Metrolux	2,683.91	242.77
26 56 21 00-0015			HID, Pole Mounted (26 56 21)		
26 56 21 00-0016			Metal Halide, Pole Mounted (26 56 21 00-0015)		
26 56 21 00-0017	EA		175 Watt Metal Halide, Enclosed And Gasketed, Exterior Roadway Fixture	681.75	277.21
26 56 21 00-0018	EA		250 Watt Metal Halide, Enclosed And Gasketed, Exterior Roadway Fixture	765.60	300.91
26 56 21 00-0019	EA		400 Watt Metal Halide, Enclosed And Gasketed, Exterior Roadway Fixture	889.99	323.69
26 56 21 00-0020	EA		1,000 Watt Metal Halide, Enclosed And Gasketed, Exterior Roadway Fixture	1,134.28	379.37
26 56 21 00-0021			High Pressure Sodium, Pole Mounted (26 56 21 00-0015)		
26 56 21 00-0022	EA		100 Watt High Pressure Sodium, Enclosed And Gasketed, Exterior Roadway Fixture	840.32	323.69
26 56 21 00-0023	EA		150 Watt High Pressure Sodium, Enclosed And Gasketed, Exterior Roadway Fixture	865.83	323.69
26 56 21 00-0024	EA		175 Watt High Pressure Sodium, Enclosed And Gasketed, Exterior Roadway Fixture	905.98	323.69
26 56 21 00-0025	EA		250 Watt High Pressure Sodium, Enclosed And Gasketed, Exterior Roadway Fixture	1,012.95	323.69
26 56 21 00-0026	EA		400 Watt High Pressure Sodium, Enclosed And Gasketed, Exterior Roadway Fixture	1,169.23	323.69
26 56 21 00-0027	EA		1,000 Watt High Pressure Sodium, Enclosed And Gasketed, Exterior Roadway Fixture	1,095.21	323.69
26 56 21 00-0028			Low Pressure Sodium, Pole Mounted (26 56 21 00-0015)		
26 56 21 00-0029	EA		135 Watt Low Pressure Sodium Exterior Roadway Fixture, Enclosed And Gasketed	698.99	176.09
26 56 21 00-0030	EA		135 Watt Low Pressure Sodium Fixture, Enclosed And Gasketed	767.55	258.96
26 56 21 00-0031	EA		180 Watt Low Pressure Sodium Fixture, Enclosed And Gasketed	899.96	258.96
26 56 21 00-0032			Metal Halide, Area Fixtures (26 56 21)		
26 56 21 00-0033			Metal Halide, Pole Mount, Area Fixtures (26 56 21 00-0032) Note: Includes pulse start ballast.		
26 56 21 00-0034	EA		150 Watt, Metal Halide Area Fixture, Pole Mount.....	1,152.05	171.77
26 56 21 00-0035	EA		175 Watt, Metal Halide Area Fixture, Pole Mount.....	1,264.21	188.95
26 56 21 00-0036	EA		250 Watt, Metal Halide Area Fixture, Pole Mount.....	1,398.35	206.13
26 56 21 00-0037	EA		400 Watt, Metal Halide Area Fixture, Pole Mount.....	1,476.94	240.48
26 56 21 00-0038			High Pressure Sodium, Area Fixtures (26 56 21)		
26 56 21 00-0039			Pole Mount, High Pressure Sodium Area Fixtures (26 56 21 00-0038)		



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 21 00-0040	EA	100 Watt, High Pressure Sodium Area Fixture, Pole Mount	957.56	137.41
26 56 21 00-0041	EA	150 Watt, High Pressure Sodium Area Fixture, Pole Mount	1,040.19	171.77
26 56 21 00-0042	EA	250 Watt, High Pressure Sodium Area Fixture, Pole Mount	1,126.53	206.13
26 56 21 00-0043	EA	400 Watt, High Pressure Sodium Area Fixture, Pole Mount	1,185.66	240.48
26 56 21 00-0044		Surface Mounted, Rectangular Exterior Area Fixture <small>(26 56 21)</small>		
26 56 21 00-0045		Metal Halide, Surface Mounted, Rectangular Exterior Area Fixture <small>(26 56 21 00-0044)</small>		
26 56 21 00-0046	EA	175 Watt Metal Halide, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	643.12	258.96
26 56 21 00-0047	EA	250 Watt Metal Halide, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	729.90	291.33
26 56 21 00-0048	EA	400 Watt Metal Halide, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	870.32	323.69
26 56 21 00-0049	EA	1,000 Watt Metal Halide, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	1,115.99	379.37
26 56 21 00-0050		High Pressure Sodium, Surface Mounted, Rectangular Exterior Area Fixture <small>(26 56 21 00-0044)</small>		
26 56 21 00-0051	EA	70 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture (LumaPro).....	613.83	221.40
26 56 21 00-0052	EA	100 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture (LumaPro).....	665.95	235.65
26 56 21 00-0053	EA	150 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture (LumaPro).....	716.72	248.60
26 56 21 00-0054	EA	175 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	740.89	258.96
26 56 21 00-0055	EA	250 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	821.24	291.33
26 56 21 00-0056	EA	400 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	885.49	323.69
26 56 21 00-0057	EA	1,000 Watt High Pressure Sodium, Surface Mounted, Enclosed And Gasketed, Rectangular Exterior Area Fixture	1,225.63	379.37
26 56 21 00-0058		Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixtures <small>(26 56 21)</small>		
26 56 21 00-0059		High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixtures <small>(26 56 21 00-0058)</small>		
Note: Includes cast aluminum powder coated housing, polycarbonate lens and tamperproof screws.				
26 56 21 00-0060	EA	35 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	823.92	174.79
26 56 21 00-0061	EA	50 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	853.50	194.22
26 56 21 00-0062	EA	70 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	910.92	221.40
26 56 21 00-0063	EA	100 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	935.45	235.65
26 56 21 00-0064	EA	150 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	960.83	248.60
26 56 21 00-0065	EA	175 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,006.88	258.96
26 56 21 00-0066	EA	250 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,103.85	291.33
26 56 21 00-0067	EA	400 Watt High Pressure Sodium, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,344.03	323.69
26 56 21 00-0068		Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixtures <small>(26 56 21 00-0058)</small>		
Note: Includes cast aluminum powder coated housing, polycarbonate lens and tamperproof screws.				
26 56 21 00-0069	EA	50 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	906.79	194.22
26 56 21 00-0070	EA	70 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	956.13	221.40
26 56 21 00-0071	EA	100 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	988.19	235.65
26 56 21 00-0072	EA	150 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,029.82	248.60
26 56 21 00-0073	EA	175 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,052.16	258.96
26 56 21 00-0074	EA	250 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,151.47	291.33
26 56 21 00-0075	EA	400 Watt Metal Halide, Vandal Resistant, Surface Mounted, Rectangular Exterior Area Fixture	1,470.51	323.69
26 56 21 00-0076		Wall Packs <small>(26 56 21)</small>		
26 56 21 00-0077		Non-Cutoff, Polycarbonate Lens, Mini Wall Packs <small>(26 56 21 00-0076)</small>		
Note: Polycarbonate body and aluminum reflector. 11" x 6-1/2" x 5-1/4". Lithonia TWS.				
26 56 21 00-0078	EA	13 Watt Compact Fluorescent, Non-Cutoff, Polycarbonate Lens, Mini Wall Pack	367.03	61.14
26 56 21 00-0079	EA	50 Watt Metal Halide, Non-Cutoff, Polycarbonate Lens, Mini Wall Pack	394.00	61.14
26 56 21 00-0080	EA	35 Watt High Pressure Sodium, Non-Cutoff, Polycarbonate Lens, Mini Wall Pack	394.00	61.14
26 56 21 00-0081	EA	70 Watt High Pressure Sodium, Non-Cutoff, Polycarbonate Lens, Mini Wall Pack	524.78	61.14
26 56 21 00-0082		Semi Cutoff, Polycarbonate Lens, Mini Wall Packs <small>(26 56 21 00-0076)</small>		
Note: Polycarbonate body and diffused aluminum reflector. 10" x 11-1/2" x 8-15/16". Lithonia TWA.				
26 56 21 00-0083	EA	42 Watt Compact Fluorescent, Semi Cutoff, Polycarbonate Lens, Mini Wall Pack	735.88	61.14
26 56 21 00-0084	EA	50 Watt Metal Halide, Semi Cutoff, Polycarbonate Lens, Mini Wall Pack	745.58	61.14
26 56 21 00-0085	EA	70 Watt Metal Halide, Semi Cutoff, Polycarbonate Lens, Mini Wall Pack	753.97	61.14
26 56 21 00-0086	EA	100 Watt Metal Halide, Semi Cutoff, Polycarbonate Lens, Mini Wall Pack	738.67	61.14
26 56 21 00-0087	EA	70 Watt High Pressure Sodium, Semi Cutoff, Polycarbonate Lens, Mini Wall Pack	675.73	61.14
26 56 21 00-0088	EA	100 Watt High Pressure Sodium, Semi Cutoff, Polycarbonate Lens, Mini Wall Pack	641.16	61.14
26 56 21 00-0089		Cutoff, Polycarbonate Lens, Mini Wall Packs <small>(26 56 21 00-0076)</small>		
Note: Polycarbonate body and diffused aluminum reflector. 10" x 11-1/2" x 8-15/16". Lithonia TWAC.				
26 56 21 00-0090	EA	50 Watt Metal Halide, Cutoff, Polycarbonate Lens, Mini Wall Pack	775.70	61.14
26 56 21 00-0091	EA	70 Watt Metal Halide, Cutoff, Polycarbonate Lens, Mini Wall Pack	784.54	61.14

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
26 56 21 00-0092	EA	100 Watt Metal Halide, Cutoff, Polycarbonate Lens, Mini Wall Pack.....	769.26	61.14
26 56 21 00-0093	EA	70 Watt High Pressure Sodium, Cutoff, Polycarbonate Lens, Mini Wall Pack	781.56	61.14
26 56 21 00-0094	EA	100 Watt High Pressure Sodium, Cutoff, Polycarbonate Lens, Mini Wall Pack	781.56	61.14
26 56 21 00-0095		Non-Cutoff, Borosilicate Glass Lens, Small Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Aluminum body and reflector. 9" x 13" x 7-3/8". Lithonia TWR1.		
26 56 21 00-0096	EA	70 Watt Metal Halide, Non-Cutoff, Borosilicate Glass Lens, Small Wall Pack	735.15	81.44
26 56 21 00-0097	EA	100 Watt Metal Halide, Non-Cutoff, Borosilicate Glass Lens, Small Wall Pack	735.15	81.44
26 56 21 00-0098	EA	175 Watt Metal Halide, Non-Cutoff, Borosilicate Glass Lens, Small Wall Pack	687.78	81.44
26 56 21 00-0099	EA	70 Watt High Pressure Sodium, Non-Cutoff, Borosilicate Glass Lens, Small Wall Pack	705.93	81.44
26 56 21 00-0100	EA	100 Watt High Pressure Sodium, Non-Cutoff, Borosilicate Glass Lens, Small Wall Pack	705.93	81.44
26 56 21 00-0101	EA	150 Watt High Pressure Sodium, Non-Cutoff, Borosilicate Glass Lens, Small Wall Pack	653.42	81.44
26 56 21 00-0102		Cutoff, Borosilicate Glass Lens, Small Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Aluminum body and reflector. 10-1/4" x 13" x 8-15/32". Lithonia TWR1C.		
26 56 21 00-0103	EA	70 Watt Metal Halide, Cutoff, Borosilicate Glass Lens, Small Wall Pack	763.21	81.44
26 56 21 00-0104	EA	100 Watt Metal Halide, Cutoff, Borosilicate Glass Lens, Small Wall Pack	763.21	81.44
26 56 21 00-0105	EA	175 Watt Metal Halide, Cutoff, Borosilicate Glass Lens, Small Wall Pack	763.21	81.44
26 56 21 00-0106	EA	70 Watt High Pressure Sodium, Cutoff, Borosilicate Glass Lens, Small Wall Pack	735.35	81.44
26 56 21 00-0107	EA	100 Watt High Pressure Sodium, Cutoff, Borosilicate Glass Lens, Small Wall Pack	735.35	81.44
26 56 21 00-0108	EA	150 Watt High Pressure Sodium, Cutoff, Borosilicate Glass Lens, Small Wall Pack	735.35	81.44
26 56 21 00-0109		Full Cutoff, Tempered Glass Lens, Small Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Aluminum body and reflector. 9-3/8" x 14-3/8" x 8-3/4". Meets Nighttime Friendly criteria. Lithonia TWR1S.		
26 56 21 00-0110	EA	175 Watt Metal Halide, Full Cutoff, Tempered Glass Lens, Small Wall Pack	989.92	81.44
26 56 21 00-0111		Cutoff, Borosilicate Glass Lens, Medium Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Aluminum body and reflector. Lithonia TWR2.		
26 56 21 00-0112	EA	250 Watt Metal Halide, Cutoff, Borosilicate Glass Lens, Medium Wall Pack	926.62	100.88
		Note: 9-1/4" x 17-7/8" x 9-3/8".		
26 56 21 00-0113	EA	400 Watt Metal Halide, Cutoff, Borosilicate Glass Lens, Medium Wall Pack	990.83	100.88
		Note: 9-1/4" x 17-7/8" x 12-1/2".		
26 56 21 00-0114	EA	250 Watt High Pressure Sodium, Cutoff, Borosilicate Glass Lens, Medium Wall Pack	1,067.39	100.88
		Note: 9-1/4" x 17-7/8" x 9-3/8".		
26 56 21 00-0115	EA	400 Watt High Pressure Sodium, Cutoff, Borosilicate Glass Lens, Medium Wall Pack	1,088.46	100.88
		Note: 9-1/4" x 17-7/8" x 12-1/2".		
26 56 21 00-0116		Cutoff, Tempered Glass Lens, Medium Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Aluminum body and reflector. 10" x 17-1/8" x 14-1/2". Lithonia TWR2C.		
26 56 21 00-0117	EA	250 Watt Metal Halide, Cutoff, Tempered Glass Lens, Medium Wall Pack	1,009.21	100.88
26 56 21 00-0118	EA	400 Watt Metal Halide, Cutoff, Tempered Glass Lens, Medium Wall Pack	1,081.36	100.88
26 56 21 00-0119		Non-Cutoff, Polycarbonate Lens, Large Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Polycarbonate body and powder coated reflector. 15-7/16" x 16-1/8" x 7-3/4". Lithonia TWP.		
26 56 21 00-0120	EA	100 Watt Metal Halide, Non-Cutoff, Polycarbonate Lens, Large Wall Pack.....	927.19	122.28
26 56 21 00-0121	EA	175 Watt Metal Halide, Non-Cutoff, Polycarbonate Lens, Large Wall Pack.....	850.77	122.28
26 56 21 00-0122	EA	70 Watt High Pressure Sodium, Non-Cutoff, Polycarbonate Lens, Large Wall Pack	909.50	122.28
26 56 21 00-0123	EA	100 Watt High Pressure Sodium, Non-Cutoff, Polycarbonate Lens, Large Wall Pack	915.35	122.28
26 56 21 00-0124	EA	150 Watt High Pressure Sodium, Non-Cutoff, Polycarbonate Lens, Large Wall Pack.....	921.48	122.28
26 56 21 00-0125		Non-Cutoff, Borosilicate Glass Lens, Large Wall Packs <small>(26 56 21 00-0076)</small>		
		Note: Aluminum body and reflector. 15-3/4" x 16-1/4" x 8". Lithonia TWH.		
26 56 21 00-0126	EA	175 Watt Metal Halide, Non-Cutoff, Borosilicate Glass Lens, Large Wall Pack	927.21	122.28
26 56 21 00-0127	EA	250 Watt Metal Halide, Non-Cutoff, Borosilicate Glass Lens, Large Wall Pack	952.71	122.28
26 56 21 00-0128	EA	400 Watt Metal Halide, Non-Cutoff, Borosilicate Glass Lens, Large Wall Pack	1,029.12	122.28
26 56 21 00-0129	EA	150 Watt High Pressure Sodium, Non-Cutoff, Borosilicate Glass Lens, Large Wall Pack	978.19	122.28
26 56 21 00-0130	EA	250 Watt High Pressure Sodium, Non-Cutoff, Borosilicate Glass Lens, Large Wall Pack	1,003.69	122.28
26 56 21 00-0131	EA	400 Watt High Pressure Sodium, Non-Cutoff, Borosilicate Glass Lens, Large Wall Pack	1,054.58	122.28
26 56 21 00-0132		Semi Cutoff, Induction Wall Packs <small>(26 56 21 00-0076)</small>		
26 56 21 00-0133		Semi Cutoff, Induction Wall Packs (Everlast®) <small>(26 56 21 00-0132)</small>		
		Note: UL wet listed. Includes bi-level ballast, die-cast aluminum housing assembly and bronze powder coat finish. Excludes sensors.		
26 56 21 00-0134	EA	70 Watt, Wall Mount, Semi Cutoff, Bi-Level Induction Wall Pack (Everlast® EOF-ED-70)	1,209.67	116.73
26 56 21 00-0135	EA	80 Watt, Wall Mount, Semi Cutoff, Bi-Level Induction Wall Pack (Everlast® EOF-ED-80)	1,234.27	123.60
26 56 21 00-0136	EA	100 Watt, Wall Mount, Semi Cutoff, Bi-Level Induction Wall Pack (Everlast® EOF-ED-100)	1,258.88	130.47
26 56 21 00-0137	EA	120 Watt, Wall Mount, Semi Cutoff, Bi-Level Induction Wall Pack (Everlast® EOF-ED-120)	1,403.14	137.32
26 56 21 00-0138		Non-Cutoff, Polycarbonate Lens, Small Wall Packs <small>(26 56 21 00-0076)</small>		
26 56 21 00-0139	EA	15 Watt, Exterior, Non-Cutoff Small Wall Pack (Sylvania 60066-SMWLPAK1N/015UNV740/NC/BZ/P)	378.90	61.14



Electrical	26	26
Lighting	26 50	
Exterior Lighting	26 56	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
26 56 21 00-0140 Induction, Roadway Lighting <small>(26 56 21)</small>		
26 56 21 00-0141 Induction Roadway Lighting (US Lighting Tech) <small>(26 56 21 00-0140)</small>		
Note: Includes gray powder coat finish heavy duty die cast aluminum body and flat glass lens.		
26 56 21 00-0142 EA 40 Watt Induction, Horizontal Tenon Mount, Street Light (US Lighting Tech Jersey HR, 511).....	663.72	205.99
26 56 21 00-0143 EA 70 Watt Induction, Horizontal Tenon Mount, Street Light (US Lighting Tech Jersey HR, 511).....	726.82	212.86
26 56 21 00-0144 EA 100 Watt Induction, Horizontal Tenon Mount, Street Light (US Lighting Tech Jersey HR, 511).....	754.29	226.59
26 56 21 00-0145 EA 150 Watt Induction, Horizontal Tenon Mount, Street Light (US Lighting Tech Jersey HR, 511).....	781.75	240.33
26 56 21 00-0146 EA 200 Watt Induction, Horizontal Tenon Mount, Street Light (US Lighting Tech Jersey HR, 511).....	909.01	247.19
26 56 21 00-0147 EA 250 Watt Induction, Horizontal Tenon Mount, Street Light (US Lighting Tech Jersey HR, 511).....	926.69	254.05
26 56 21 00-0148 EA 40 Watt Induction, Horizontal Tenon Mount, Cobra Head Street Light (US Lighting Tech Cobra 100, 512).....	622.26	205.99
26 56 21 00-0149 EA 70 Watt Induction, Horizontal Tenon Mount, Cobra Head Street Light (US Lighting Tech Cobra 100, 512).....	691.28	212.86
26 56 21 00-0150 EA 100 Watt Induction, Horizontal Tenon Mount, Cobra Head Street Light (US Lighting Tech Cobra 100, 512).....	718.75	226.59
26 56 21 00-0151 EA 150 Watt Induction, Horizontal Tenon Mount, Cobra Head Street Light (US Lighting Tech Cobra 100, 512).....	746.21	240.33
26 56 21 00-0152 Induction, Area Fixtures <small>(26 56 21)</small>		
26 56 21 00-0153 Post Top, Induction Area Fixtures <small>(26 56 21 00-0152)</small>		
26 56 21 00-0154 Post Top, Induction Area Fixtures (US Lighting Tech) <small>(26 56 21 00-0153)</small>		
Note: Includes black powder coat finish heavy duty die cast aluminum body and no-lite lid acrylic lens.		
26 56 21 00-0155 EA 40 Watt Induction, Post Top Mount, Acorn Style Area Fixture (US Lighting Tech Acorn, 571).....	734.03	188.83
26 56 21 00-0156 EA 70 Watt Induction, Post Top Mount, Acorn Style Area Fixture (US Lighting Tech Acorn, 571).....	791.29	188.83
26 56 21 00-0157 EA 100 Watt Induction, Post Top Mount, Acorn Style Area Fixture (US Lighting Tech Acorn, 571).....	791.29	188.83
26 56 21 00-0158 EA 150 Watt Induction, Post Top Mount, Acorn Style Area Fixture (US Lighting Tech Acorn, 571).....	791.29	188.83
26 56 21 00-0159 Surface Mount, Induction Parking Structure Fixtures <small>(26 56 21 00-0152)</small>		
26 56 21 00-0160 Surface Mount, Induction Parking Structure Fixtures (Everlast®) <small>(26 56 21 00-0159)</small>		
26 56 21 00-0161 EA 40 Watt Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	667.17	171.66
26 56 21 00-0162 EA 55 Watt Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	707.59	175.09
26 56 21 00-0163 EA 70 Watt Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	718.41	178.53
26 56 21 00-0164 EA 80 Watt Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	729.23	181.96
26 56 21 00-0165 EA 100 Watt Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	740.05	185.40
26 56 21 00-0166 EA 120 Watt Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	754.81	188.83
26 56 21 00-0167 EA 70/28 Watt Bi-Level Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	775.67	178.53
26 56 21 00-0168 EA 80/32 Watt Bi-Level Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	786.49	181.96
26 56 21 00-0169 EA 100/40 Watt Bi-Level Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	797.31	185.40
26 56 21 00-0170 EA 120/48 Watt Bi-Level Induction, Surface Mount, Round, Parking Structure Fixture (Everlast® Davenport EGFUS-EC).....	828.85	188.83
26 56 21 00-0171 Pole Mount, Induction Area Fixtures <small>(26 56 21 00-0152)</small>		
26 56 21 00-0172 Pole Mount, Bi-Level Induction Area Fixtures (Everlast® ESB-ED) <small>(26 56 21 00-0171)</small>		
Note: UL wet listed. Includes bi-level ballast, die-cast aluminum housing assembly and bronze powder coat finish. Excludes sensors.		
26 56 21 00-0173 EA 70 Watt, Pole Mount, Bi-Level Induction Area Fixture (Everlast® ESB-ED-70).....	1,264.05	116.73
26 56 21 00-0174 EA 80 Watt, Pole Mount, Bi-Level Induction Area Fixture (Everlast® ESB-ED-80).....	1,299.53	123.60
26 56 21 00-0175 EA 100 Watt, Pole Mount, Bi-Level Induction Area Fixture (Everlast® ESB-ED-100).....	1,335.02	130.47

END OF SECTION 26

26	26	Electrical
	26 50	Lighting
	26 56	Exterior Lighting



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 Communications

Note: Termination costs are included with all communication equipment, panel boards, and devices. Terminations are not included with patch panels.

27 05 Common Work Results for Communications ⁽²⁷⁾

27 05 26 Grounding and Bonding for Communications Systems ^(27 05)

See CSI section 26 05 26 00-0000 for grounding.

27 05 26 00-0001	EA	25 Pair Outdoor, Enclosed Building Entrance Terminal (ADC 6649 1 720-00).....	1,048.66	125.18
		Note: Excludes terminations.		
27 05 26 00-0002	EA	50 Pair Outdoor, Enclosed Building Entrance Terminal (ADC 6649 1 820-00).....	1,340.07	166.94
		Note: Excludes terminations.		
27 05 26 00-0003	EA	100 Pair Outdoor, Enclosed Building Entrance Terminal (ADC 6649 1 630-00).....	2,123.23	250.34
		Note: Excludes terminations.		
27 05 26 00-0004	EA	Lucent 3B1-EW, Gas Tube Protector Unit.....	12.67	1.84
27 05 26 00-0005	EA	44 Terminal Copper Ground Bus Bar (Siemens ECGK).....	82.29	33.07
27 05 26 00-0006	EA	2" x 1/4" x 12", G Pattern, Grounding Bus Bar.....	186.02	33.07
27 05 26 00-0007	EA	2" x 1/4" x 12", TGB Pattern, Grounding Bus Bar.....	200.50	33.07
27 05 26 00-0008	EA	4" x 1/4" x 12", TMGB Pattern, Grounding Bus Bar.....	381.26	33.07
27 05 26 00-0009	EA	#6 AWG, Cable Runway Ground Strap.....	75.94	6.12
27 05 26 00-0010	EA	1/4" Screw Size, #6 AWG Compression Lug.....	26.40	6.12
27 05 26 00-0011	EA	3/8" Screw Size, #6 AWG Compression Lug.....	28.15	6.12
27 05 26 00-0012	EA	Two Mounting Hole, Ground Terminal Block.....	31.38	6.12

27 05 29 Hangers and Supports for Communications Systems ^(27 05)

See CSI section 26 05 29 00-0000 for hangers and supports.

27 05 29 00-0001 Communications And Low Voltage Cable Hooks (J-Hooks) ^(27 05 29)

27 05 29 00-0002 Screw On Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) ^(27 05 29 00-0001)

Note: Includes screw.

27 05 29 00-0003	EA	3/4" Hook Size, Pre-Galvanized Finish, Screw On, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH12).....	9.64	3.06
		<i>For >50 To 100, Deduct</i>	-0.39	
		<i>For >100 To 250, Deduct</i>	-0.79	
		<i>For >250 To 500, Deduct</i>	-1.49	
		<i>For >500, Deduct</i>	-2.19	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
		<i>For Work In Restricted Working Space, Add</i>	1.84	
		<i>For Painted Powder Coated Finish, Add</i>	0.72	
27 05 29 00-0004	EA	1-5/16" Hook Size, Pre-Galvanized Finish, Screw On, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21).....	10.19	3.06
		<i>For >50 To 100, Deduct</i>	-0.41	
		<i>For >100 To 250, Deduct</i>	-0.82	
		<i>For >250 To 500, Deduct</i>	-1.53	
		<i>For >500, Deduct</i>	-2.24	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
		<i>For Work In Restricted Working Space, Add</i>	1.84	
		<i>For Painted Powder Coated Finish, Add</i>	2.51	
		<i>For Low Friction Xylan® Coated Finish, Add</i>	8.94	
27 05 29 00-0005	EA	2" Hook Size, Pre-Galvanized Finish, Screw On, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32).....	11.03	3.06
		<i>For >50 To 100, Deduct</i>	-0.43	
		<i>For >100 To 250, Deduct</i>	-0.86	
		<i>For >250 To 500, Deduct</i>	-1.59	
		<i>For >500, Deduct</i>	-2.33	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
		<i>For Work In Restricted Working Space, Add</i>	1.84	
		<i>For Painted Powder Coated Finish, Add</i>	3.08	
		<i>For Low Friction Xylan® Coated Finish, Add</i>	11.11	
27 05 29 00-0006	EA	4" Hook Size, Pre-Galvanized Finish, Screw On, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH64).....	18.34	3.06
		<i>For >50 To 100, Deduct</i>	-0.61	
		<i>For >100 To 250, Deduct</i>	-1.22	
		<i>For >250 To 500, Deduct</i>	-2.14	
		<i>For >500, Deduct</i>	-3.06	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
		<i>For Work In Restricted Working Space, Add</i>	1.84	
		<i>For Painted Powder Coated Finish, Add</i>	1.64	
		<i>For Low Friction Xylan® Coated Finish, Add</i>	9.84	

27 05 29 00-0007 Screw On Angle Bracket Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) ^(27 05 29 00-0001)

Note: Includes screw.

27 Communications**27 05 Common Work Results for Communications****27 05 29 Hangers and Supports for Communications Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 05 29 00-0008	EA		3/4" Hook Size, Pre-Galvanized Finish, Screw On Angle Bracket Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH12-RB)	10.93	3.06
			<i>For >50 To 100, Deduct</i>	-0.43	
			<i>For >100 To 250, Deduct</i>	-0.85	
			<i>For >250 To 500, Deduct</i>	-1.58	
			<i>For >500, Deduct</i>	-2.32	
			<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0009	EA		1-5/16" Hook Size, Pre-Galvanized Finish, Screw On Angle Bracket Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21-RB)	14.21	3.06
			<i>For >50 To 100, Deduct</i>	-0.51	
			<i>For >100 To 250, Deduct</i>	-1.02	
			<i>For >250 To 500, Deduct</i>	-1.83	
			<i>For >500, Deduct</i>	-2.65	
			<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0010	EA		2" Hook Size, Pre-Galvanized Finish, Screw On Angle Bracket Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32-RB)	15.81	3.06
			<i>For >50 To 100, Deduct</i>	-0.55	
			<i>For >100 To 250, Deduct</i>	-1.10	
			<i>For >250 To 500, Deduct</i>	-1.95	
			<i>For >500, Deduct</i>	-2.81	
			<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0011	EA		4" Hook Size, Pre-Galvanized Finish, Screw On Angle Bracket Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH64-RB)	21.55	3.06
			<i>For >50 To 100, Deduct</i>	-0.69	
			<i>For >100 To 250, Deduct</i>	-1.38	
			<i>For >250 To 500, Deduct</i>	-2.38	
			<i>For >500, Deduct</i>	-3.38	
			<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	1.63	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0012			Strut Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) <small>(27 05 29 00-0001)</small>		
			Note: Excludes strut.		
27 05 29 00-0013	EA		3/4" Hook Size, Pre-Galvanized Finish, Strut Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH12-SC4)	11.54	3.06
			<i>For >50 To 100, Deduct</i>	-0.44	
			<i>For >100 To 250, Deduct</i>	-0.88	
			<i>For >250 To 500, Deduct</i>	-1.63	
			<i>For >500, Deduct</i>	-2.38	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0014	EA		1-5/16" Hook Size, Pre-Galvanized Finish, Strut Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21-SC4)	13.73	3.06
			<i>For >50 To 100, Deduct</i>	-0.50	
			<i>For >100 To 250, Deduct</i>	-0.99	
			<i>For >250 To 500, Deduct</i>	-1.79	
			<i>For >500, Deduct</i>	-2.60	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0015	EA		2" Hook Size, Pre-Galvanized Finish, Strut Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32-SC4)	14.87	3.06
			<i>For >50 To 100, Deduct</i>	-0.52	
			<i>For >100 To 250, Deduct</i>	-1.05	
			<i>For >250 To 500, Deduct</i>	-1.88	
			<i>For >500, Deduct</i>	-2.71	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0016	EA		4" Hook Size, Pre-Galvanized Finish, Strut Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH64-SC4)	20.28	3.06
			<i>For >50 To 100, Deduct</i>	-0.66	
			<i>For >100 To 250, Deduct</i>	-1.32	
			<i>For >250 To 500, Deduct</i>	-2.29	
			<i>For >500, Deduct</i>	-3.25	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0017			T-Bar Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) <small>(27 05 29 00-0001)</small>		
			Note: Excludes T-Bar.		
27 05 29 00-0018	EA		3/4" Hook Size, Pre-Galvanized Finish, T-Bar Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH12-A28)	13.94	3.06
			<i>For >50 To 100, Deduct</i>	-0.50	
			<i>For >100 To 250, Deduct</i>	-1.00	
			<i>For >250 To 500, Deduct</i>	-1.81	
			<i>For >500, Deduct</i>	-2.62	
			<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0019	EA		1-5/16" Hook Size, Pre-Galvanized Finish, T-Bar Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21-A28)	17.65	3.06
			<i>For >50 To 100, Deduct</i>	-0.59	
			<i>For >100 To 250, Deduct</i>	-1.19	
			<i>For >250 To 500, Deduct</i>	-2.09	
			<i>For >500, Deduct</i>	-2.99	
			<i>For Work In Restricted Working Space, Add</i>	1.84	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
27 05 29 00-0020 EA 2" Hook Size, Pre-Galvanized Finish, T-Bar Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32-A28).....	18.62	3.06
<i>For >50 To 100, Deduct</i>	-0.62	
<i>For >100 To 250, Deduct</i>	-1.24	
<i>For >250 To 500, Deduct</i>	-2.16	
<i>For >500, Deduct</i>	-3.09	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0021 Plain Or Threaded Rod Clip-On Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) (27 05 29 00-0001)		
Note: Excludes threaded rod. See CSI section 26 05 29 00-0198 for threaded rod.		
27 05 29 00-0022 EA 3/4" Hook Size, Pre-Galvanized Finish, Plain Or Threaded Rod Clip-On Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH12-W6).....	11.24	3.06
<i>For >50 To 100, Deduct</i>	-0.43	
<i>For >100 To 250, Deduct</i>	-0.87	
<i>For >250 To 500, Deduct</i>	-1.61	
<i>For >500, Deduct</i>	-2.35	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0023 EA 1-5/16" Hook Size, Pre-Galvanized Finish, Plain Or Threaded Rod Clip-On Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21-W6).....	11.75	3.06
<i>For >50 To 100, Deduct</i>	-0.45	
<i>For >100 To 250, Deduct</i>	-0.89	
<i>For >250 To 500, Deduct</i>	-1.65	
<i>For >500, Deduct</i>	-2.40	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0024 EA 2" Hook Size, Pre-Galvanized Finish, Plain Or Threaded Rod Clip-On Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32-W6).....	14.32	3.06
<i>For >50 To 100, Deduct</i>	-0.51	
<i>For >100 To 250, Deduct</i>	-1.02	
<i>For >250 To 500, Deduct</i>	-1.84	
<i>For >500, Deduct</i>	-2.66	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0025 Threaded Rod Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) (27 05 29 00-0001)		
Note: Excludes threaded rod, nuts and washers. See CSI section 26 05 29 00-0198 for threaded rod, nuts and washers.		
27 05 29 00-0026 EA 1-5/16" Hook Size, Pre-Galvanized Finish, Threaded Rod Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21-AB).....	14.02	3.06
<i>For >50 To 100, Deduct</i>	-0.50	
<i>For >100 To 250, Deduct</i>	-1.01	
<i>For >250 To 500, Deduct</i>	-1.82	
<i>For >500, Deduct</i>	-2.63	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0027 EA 2" Hook Size, Pre-Galvanized Finish, Threaded Rod Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32-AB).....	15.22	3.06
<i>For >50 To 100, Deduct</i>	-0.53	
<i>For >100 To 250, Deduct</i>	-1.07	
<i>For >250 To 500, Deduct</i>	-1.91	
<i>For >500, Deduct</i>	-2.75	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0028 EA 4" Hook Size, Pre-Galvanized Finish, Threaded Rod Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH64-AB).....	21.21	3.06
<i>For >50 To 100, Deduct</i>	-0.68	
<i>For >100 To 250, Deduct</i>	-1.37	
<i>For >250 To 500, Deduct</i>	-2.36	
<i>For >500, Deduct</i>	-3.35	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0029 Beam Clamp Attachment, Communications And Low Voltage Cable Hooks (J-Hooks) (27 05 29 00-0001)		
27 05 29 00-0030 EA 3/4" Hook Size, Pre-Galvanized Finish, Beam Clamp Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH12-C442A).....	13.85	3.06
<i>For >50 To 100, Deduct</i>	-0.50	
<i>For >100 To 250, Deduct</i>	-1.00	
<i>For >250 To 500, Deduct</i>	-1.80	
<i>For >500, Deduct</i>	-2.61	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0031 EA 1-5/16" Hook Size, Pre-Galvanized Finish, Beam Clamp Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH21-C442A).....	16.00	3.06
<i>For >50 To 100, Deduct</i>	-0.55	
<i>For >100 To 250, Deduct</i>	-1.11	
<i>For >250 To 500, Deduct</i>	-1.97	
<i>For >500, Deduct</i>	-2.82	
<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0032 EA 2" Hook Size, Pre-Galvanized Finish, Beam Clamp Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH32-C442A).....	17.14	3.06
<i>For >50 To 100, Deduct</i>	-0.58	
<i>For >100 To 250, Deduct</i>	-1.16	
<i>For >250 To 500, Deduct</i>	-2.05	
<i>For >500, Deduct</i>	-2.94	
<i>For Work In Restricted Working Space, Add</i>	1.84	

27 Communications**27 05 Common Work Results for Communications****27 05 29 Hangers and Supports for Communications Systems**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 05 29 00-0033	EA	4" Hook Size, Pre-Galvanized Finish, Beam Clamp Attachment, Communications And Low Voltage Cable Hook (J-Hook) (Cooper B-line BCH64-C442A).....	23.38	3.06
		<i>For >50 To 100, Deduct</i>	-0.74	
		<i>For >100 To 250, Deduct</i>	-1.48	
		<i>For >250 To 500, Deduct</i>	-2.52	
		<i>For >500, Deduct</i>	-3.56	
		<i>For Work In Restricted Working Space, Add</i>	1.84	
27 05 29 00-0034		Adjustable Cable Supports (Caddy® CableCat CAT425) ^(27 05 29)		
27 05 29 00-0035	EA	Wall Mount, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	39.68	4.04
		<i>For >50 To 100, Deduct</i>	-1.30	
		<i>For >100 To 250, Deduct</i>	-2.60	
		<i>For >250 To 500, Deduct</i>	-4.50	
		<i>For >500, Deduct</i>	-6.41	
		<i>For Installation On Concrete (Includes Drilling And Fastener), Add</i>	3.16	
		<i>For Work In Restricted Working Space, Add</i>	3.67	
27 05 29 00-0036	EA	Threaded Rod Or Horizontal Surface Mount, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	40.49	4.04
		<i>For >50 To 100, Deduct</i>	-1.32	
		<i>For >100 To 250, Deduct</i>	-2.64	
		<i>For >250 To 500, Deduct</i>	-4.57	
		<i>For >500, Deduct</i>	-6.50	
		<i>For Work In Restricted Working Space, Add</i>	3.67	
27 05 29 00-0037	EA	Up To 1/4" Flange, Hammer On Flange Clip, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	44.67	4.04
		<i>For >50 To 100, Deduct</i>	-1.42	
		<i>For >100 To 250, Deduct</i>	-2.85	
		<i>For >250 To 500, Deduct</i>	-4.88	
		<i>For >500, Deduct</i>	-6.91	
		<i>For Work In Restricted Working Space, Add</i>	3.67	
27 05 29 00-0038	EA	>1/4" To 3/4" Flange, Hammer On Flange Clip, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	39.55	4.04
		<i>For >50 To 100, Deduct</i>	-1.29	
		<i>For >100 To 250, Deduct</i>	-2.59	
		<i>For >250 To 500, Deduct</i>	-4.50	
		<i>For >500, Deduct</i>	-6.40	
		<i>For Work In Restricted Working Space, Add</i>	3.67	
27 05 29 00-0039	EA	Up To 1/2" Flange, Beam Clamp, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	41.49	4.04
		<i>For >50 To 100, Deduct</i>	-1.34	
		<i>For >100 To 250, Deduct</i>	-2.69	
		<i>For >250 To 500, Deduct</i>	-4.64	
		<i>For >500, Deduct</i>	-6.60	
		<i>For Work In Restricted Working Space, Add</i>	3.67	
27 05 29 00-0040	EA	>1/2" To 5/8" Flange, Beam Clamp, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	43.40	4.04
		<i>For >50 To 100, Deduct</i>	-1.39	
		<i>For >100 To 250, Deduct</i>	-2.78	
		<i>For >250 To 500, Deduct</i>	-4.78	
		<i>For >500, Deduct</i>	-6.79	
		<i>For Work In Restricted Working Space, Add</i>	3.67	
27 05 29 00-0041	EA	Up To 1/4" Flange, Hammer On Purlin Clip, 4" To 6" Diameter Loop, Adjustable Cable Support (Caddy® CableCat CAT425).....	40.84	4.04
		<i>For >50 To 100, Deduct</i>	-1.33	
		<i>For >100 To 250, Deduct</i>	-2.65	
		<i>For >250 To 500, Deduct</i>	-4.59	
		<i>For >500, Deduct</i>	-6.53	
		<i>For Work In Restricted Working Space, Add</i>	3.67	

27 05 33 Conduits and Backboxes for Communications Systems ^(27 05)

See CSI section 26 05 33 00-0000 for conduit and boxes.

27 05 36 Cable Trays for Communications Systems ^(27 05)

See CSI section 26 05 36 00-0000 for cable trays.

27 05 39 Surface Raceways for Communications Systems ^(27 05)

See CSI section 26 05 33 00-0000 for surface raceways.

27 05 43 Underground Ducts and Raceways for Communications Systems ^(27 05)

See CSI section 26 05 43 00-0000 for underground ducts and raceways.

27 05 53 Identification for Communications Systems ^(27 05)

See CSI section 26 05 53 00-0000 for identification.

27 10 Structured Cabling ⁽²⁷⁾

Note: Includes identifying, tagging and testing.

27 11 Communications Equipment Room Fittings ^(27 10)**27 11 16 Communications Cabinets, Racks, Frames, and Enclosures** ^(27 11)**27 11 16 00-0001 3/4" Fire Retardant Plywood Backboards** ^(27 11 16)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 11 16 00-0002 EA 4' x 4' x 3/4" Fire Retardant Plywood Backboard <i>For Two Coats Of Non-Conductive, Fire Retardant Paint, Add</i>	102.70 50.47	31.79
27 11 16 00-0003 EA 4' x 8' x 3/4" Fire Retardant Plywood Backboard <i>For Two Coats Of Non-Conductive, Fire Retardant Paint, Add</i>	205.40 100.94	63.59
27 11 16 00-0004 Terminal Cabinets (27 11 16)		
27 11 16 00-0005 EA 12" x 12" x 4" Phone Terminal Cabinet With Wood Backboard	387.16	91.71
27 11 16 00-0006 EA 18" x 12" x 4" Phone Terminal Cabinet With Wood Backboard	492.83	100.88
27 11 16 00-0007 EA 24" x 12" x 4" Phone Terminal Cabinet With Wood Backboard	567.06	116.16
27 11 16 00-0008 EA 18" x 18" x 4" Phone Terminal Cabinet With Wood Backboard	588.77	119.22
27 11 16 00-0009 EA 24" x 18" x 4" Phone Terminal Cabinet With Wood Backboard	725.90	122.28
27 11 16 00-0010 EA 26" x 36" x 4" Phone Terminal Cabinet With Wood Backboard	902.14	137.56
27 11 16 00-0011 EA 24" x 24" x 6" Phone Terminal Cabinet With Wood Backboard	925.12	134.50
27 11 16 00-0012 EA 30" x 24" x 6" Phone Terminal Cabinet With Wood Backboard	1,184.12	191.61
27 11 16 00-0013 EA 36" x 24" x 6" Phone Terminal Cabinet With Wood Backboard	1,265.32	210.56
27 11 16 00-0014 EA 42" x 24" x 6" Phone Terminal Cabinet With Wood Backboard	1,536.57	222.43
27 11 16 00-0015 EA 30" x 30" x 6" Phone Terminal Cabinet With Wood Backboard	1,269.18	183.42
27 11 16 00-0016 EA 36" x 30" x 6" Phone Terminal Cabinet With Wood Backboard	1,372.52	198.71
27 11 16 00-0017 EA 48" x 30" x 6" Phone Terminal Cabinet With Wood Backboard	1,709.40	254.71
27 11 16 00-0018 EA 54" x 30" x 6" Phone Terminal Cabinet With Wood Backboard	2,049.50	318.42
27 11 16 00-0019 EA 48" x 36" x 6" Phone Terminal Cabinet With Wood Backboard	2,335.58	314.87
27 11 16 00-0020 EA 60" x 36" x 6" Phone Terminal Cabinet With Wood Backboard	2,677.35	383.10
27 11 16 00-0021 Equipment Racks And Cable Managers (27 11 16)		
27 11 16 00-0022 Equipment Racks (27 11 16 00-0021) Note: Electronics Industries Association EIA-310-D compliant. Includes aluminum construction with clear grained aluminum or black epoxy-polyester hybrid powder coat finish.		
27 11 16 00-0023 Standard Equipment Racks (27 11 16 00-0022)		
27 11 16 00-0024 19" Width, Standard Equipment Racks (27 11 16 00-0023)		
27 11 16 00-0025 EA 84" Height, 19" Width, 3" Depth, 45U, Standard Equipment Rack (Chatsworth 55053-X03)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	593.68 10.12	195.65
27 11 16 00-0026 EA 96" Height, 19" Width, 3" Depth, 51U, Standard Equipment Rack (Chatsworth 55053-X15)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	815.11 19.97	207.88
27 11 16 00-0027 EA 108" Height, 19" Width, 3" Depth, 58U, Standard Equipment Rack (Chatsworth 55053-X08)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	879.89 21.98	220.10
27 11 16 00-0028 Universal Equipment Racks (27 11 16 00-0028)		
27 11 16 00-0029 Universal Equipment Racks (27 11 16 00-0029)		
27 11 16 00-0030 19" Width, EIA Universal Equipment Racks (27 11 16 00-0029)		
27 11 16 00-0031 EA 36" Height, 19" Width, 3" Depth, 17U, EIA Universal Equipment Rack (Chatsworth 46353-X31)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	760.88 20.93	171.20
27 11 16 00-0032 EA 48" Height, 19" Width, 3" Depth, 24U, EIA Universal Equipment Rack (Chatsworth 46353-X20)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	829.69 24.06	174.25
27 11 16 00-0033 EA 60" Height, 19" Width, 3" Depth, 31U, EIA Universal Equipment Rack (Chatsworth 46353-X19)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	829.07 23.72	177.31
27 11 16 00-0034 EA 66" Height, 19" Width, 3" Depth, 34U, EIA Universal Equipment Rack (Chatsworth 46353-X00)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	850.15 24.47	180.37
27 11 16 00-0035 EA 72" Height, 19" Width, 3" Depth, 38U, EIA Universal Equipment Rack (Chatsworth 46353-X01)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	871.01 25.21	183.42
27 11 16 00-0036 EA 78" Height, 19" Width, 3" Depth, 41U, EIA Universal Equipment Rack (Chatsworth 46353-X02)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	893.57 26.03	186.48
27 11 16 00-0037 EA 84" Height, 19" Width, 3" Depth, 45U, EIA Universal Equipment Rack (Chatsworth 46353-X03)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	765.56 19.32	189.54
27 11 16 00-0038 EA 90" Height, 19" Width, 3" Depth, 48U, EIA Universal Equipment Rack (Chatsworth 46353-X05)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	937.43 27.61	192.59
27 11 16 00-0039 EA 96" Height, 19" Width, 3" Depth, 51U, EIA Universal Equipment Rack (Chatsworth 46353-X15)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	970.10 28.94	195.65
27 11 16 00-0040 EA 102" Height, 19" Width, 3" Depth, 55U, EIA Universal Equipment Rack (Chatsworth 46353-X17)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	998.67 30.06	198.71
27 11 16 00-0041 EA 108" Height, 19" Width, 3" Depth, 58U, EIA Universal Equipment Rack (Chatsworth 46353-X08)..... <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	1,005.92 30.12	201.76
27 11 16 00-0042 23" Width, Universal Equipment Racks (27 11 16 00-0029)		
27 11 16 00-0043 EA 36" Height, 23" Width, 3" Depth, 17U, Universal Equipment Rack (Chatsworth 46383-X31) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	803.82 23.07	171.20
27 11 16 00-0044 EA 48" Height, 23" Width, 3" Depth, 24U, Universal Equipment Rack (Chatsworth 46383-X20) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	831.29 24.14	174.25
27 11 16 00-0045 EA 60" Height, 23" Width, 3" Depth, 31U, Universal Equipment Rack (Chatsworth 46383-X19) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	855.51 25.05	177.31
27 11 16 00-0046 EA 66" Height, 23" Width, 3" Depth, 34U, Universal Equipment Rack (Chatsworth 46383-X00) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	900.45 26.99	180.37
27 11 16 00-0047 EA 72" Height, 23" Width, 3" Depth, 38U, Universal Equipment Rack (Chatsworth 46383-X01) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	922.79 27.80	183.42
27 11 16 00-0048 EA 78" Height, 23" Width, 3" Depth, 41U, Universal Equipment Rack (Chatsworth 46383-X02) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	947.07 28.71	186.48

27 Communications**27 10 Structured Cabling****27 11 Communications Equipment Room Fittings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 11 16 00-0049	EA		84" Height, 23" Width, 3" Depth, 45U, Universal Equipment Rack (Chatsworth 46383-X03)	819.67	189.54
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	22.03	
27 11 16 00-0050	EA		90" Height, 23" Width, 3" Depth, 48U, Universal Equipment Rack (Chatsworth 46383-X05)	994.20	192.59
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	30.45	
27 11 16 00-0051	EA		96" Height, 23" Width, 3" Depth, 51U, Universal Equipment Rack (Chatsworth 46383-X15)	1,029.56	195.65
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	31.91	
27 11 16 00-0052	EA		102" Height, 23" Width, 3" Depth, 55U, Universal Equipment Rack (Chatsworth 46383-X17)	1,060.48	198.71
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	33.15	
27 11 16 00-0053	EA		108" Height, 23" Width, 3" Depth, 58U, Universal Equipment Rack (Chatsworth 46383-X08)	1,067.82	201.76
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	33.22	
27 11 16 00-0054			35" Width, Universal Equipment Racks <small>(27 11 16 00-0029)</small>		
27 11 16 00-0055	EA		72" Height, 35" Width, 3" Depth, 38U, Universal Equipment Rack (Chatsworth 46363-X01)	995.59	183.42
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	31.44	
27 11 16 00-0056	EA		84" Height, 35" Width, 3" Depth, 45U, Universal Equipment Rack (Chatsworth 46363-X03)	1,047.95	189.54
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	33.44	
27 11 16 00-0057			UL Listed Universal Equipment Racks <small>(27 11 16 00-0028)</small>		
			Note: UL listed as a communications circuit accessory.		
27 11 16 00-0058			19" Width, UL Listed Universal Equipment Racks <small>(27 11 16 00-0057)</small>		
27 11 16 00-0059	EA		36" Height, 19" Width, 3" Depth, 17U, UL Listed Universal Equipment Rack (Chatsworth 48353-X31)	802.74	171.20
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	23.02	
27 11 16 00-0060	EA		48" Height, 19" Width, 3" Depth, 24U, UL Listed Universal Equipment Rack (Chatsworth 48353-X20)	866.32	174.25
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	25.89	
27 11 16 00-0061	EA		60" Height, 19" Width, 3" Depth, 31U, UL Listed Universal Equipment Rack (Chatsworth 48353-X19)	879.65	177.31
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	26.25	
27 11 16 00-0062	EA		66" Height, 19" Width, 3" Depth, 34U, UL Listed Universal Equipment Rack (Chatsworth 48353-X00)	899.13	180.37
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	26.92	
27 11 16 00-0063	EA		72" Height, 19" Width, 3" Depth, 38U, UL Listed Universal Equipment Rack (Chatsworth 48353-X01)	921.42	183.42
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	27.73	
27 11 16 00-0064	EA		78" Height, 19" Width, 3" Depth, 41U, UL Listed Universal Equipment Rack (Chatsworth 48353-X02)	945.63	186.48
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	28.63	
27 11 16 00-0065	EA		84" Height, 19" Width, 3" Depth, 45U, UL Listed Universal Equipment Rack (Chatsworth 48353-X03)	968.90	189.54
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	29.49	
27 11 16 00-0066	EA		90" Height, 19" Width, 3" Depth, 48U, UL Listed Universal Equipment Rack (Chatsworth 48353-X05)	992.68	192.59
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	30.38	
27 11 16 00-0067	EA		96" Height, 19" Width, 3" Depth, 51U, UL Listed Universal Equipment Rack (Chatsworth 48353-X15)	1,028.00	195.65
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	31.84	
27 11 16 00-0068	EA		102" Height, 19" Width, 3" Depth, 55U, UL Listed Universal Equipment Rack (Chatsworth 48353-X17)	1,058.84	198.71
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	33.07	
27 11 16 00-0069	EA		108" Height, 19" Width, 3" Depth, 58U, UL Listed Universal Equipment Rack (Chatsworth 48353-X08)	1,066.11	201.76
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	33.13	
27 11 16 00-0070			23" Width, UL Listed Universal Equipment Racks <small>(27 11 16 00-0057)</small>		
27 11 16 00-0071	EA		36" Height, 23" Width, 3" Depth, 17U, UL Listed Universal Equipment Rack (Chatsworth 48383-X31)	850.02	171.20
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	25.38	
27 11 16 00-0072	EA		48" Height, 23" Width, 3" Depth, 24U, UL Listed Universal Equipment Rack (Chatsworth 48383-X20)	930.44	174.25
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	29.10	
27 11 16 00-0073	EA		60" Height, 23" Width, 3" Depth, 31U, UL Listed Universal Equipment Rack (Chatsworth 48383-X19)	942.41	177.31
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	29.39	
27 11 16 00-0074	EA		66" Height, 23" Width, 3" Depth, 34U, UL Listed Universal Equipment Rack (Chatsworth 48383-X00)	954.41	180.37
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	29.68	
27 11 16 00-0075	EA		72" Height, 23" Width, 3" Depth, 38U, UL Listed Universal Equipment Rack (Chatsworth 48383-X01)	978.38	183.42
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	30.58	
27 11 16 00-0076	EA		78" Height, 23" Width, 3" Depth, 41U, UL Listed Universal Equipment Rack (Chatsworth 48383-X02)	1,004.48	186.48
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	31.58	
27 11 16 00-0077	EA		84" Height, 23" Width, 3" Depth, 45U, UL Listed Universal Equipment Rack (Chatsworth 48383-X03)	1,029.49	189.54
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	32.52	
27 11 16 00-0078	EA		90" Height, 23" Width, 3" Depth, 48U, UL Listed Universal Equipment Rack (Chatsworth 48383-X05)	1,055.08	192.59
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	33.50	
27 11 16 00-0079	EA		96" Height, 23" Width, 3" Depth, 51U, UL Listed Universal Equipment Rack (Chatsworth 48383-X15)	1,093.37	195.65
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	35.10	
27 11 16 00-0080	EA		102" Height, 23" Width, 3" Depth, 55U, UL Listed Universal Equipment Rack (Chatsworth 48383-X17)	1,126.79	198.71
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	36.47	
27 11 16 00-0081	EA		108" Height, 23" Width, 3" Depth, 58U, UL Listed Universal Equipment Rack (Chatsworth 48383-X08)	1,134.35	201.76
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	36.54	
27 11 16 00-0082			4-Post Equipment Racks And Server Frames <small>(27 11 16 00-0022)</small>		
27 11 16 00-0083			4-Post Equipment Racks <small>(27 11 16 00-0082)</small>		
27 11 16 00-0084	EA		19" Width, 29" Depth, 84" Height, 4-Post Equipment Rack (Chatsworth 50120-X03)	1,617.14	305.70
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	50.29	
27 11 16 00-0085	EA		19" Width, 29" Depth, 96" Height, 4-Post Equipment Rack (Chatsworth 50120-X15)	1,763.65	317.93
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	56.39	
27 11 16 00-0086	EA		19" Width, 29" Depth, 108" Height, 4-Post Equipment Rack (Chatsworth 50120-X08)	1,901.94	330.15
			<i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	62.08	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 11 16 00-0087 4-Post Server Frame (27 11 16 00-0082)		
27 11 16 00-0088 EA 19" Width, 29" Depth, 84" Height, Server Frame (Chatsworth 15053-X03) <i>For Gray Or Computer Beige Epoxy-Polyester Hybrid Powder Coat Finish, Add</i>	1,661.37 52.50	305.70
27 11 16 00-0089 Cable Managers (27 11 16 00-0021)		
27 11 16 00-0090 Horizontal Cable Managers (27 11 16 00-0089)		
27 11 16 00-0091 Single-Sided, Horizontal Cable Managers (27 11 16 00-0090)		
27 11 16 00-0092 EA 1U Height, 19" Width, 4.96" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 30139-719)	92.90	12.23
27 11 16 00-0093 EA 1U Height, 23" Width, 4.96" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 30139-723)	103.28	12.23
27 11 16 00-0094 EA 1U Height, 19" Width, 5.9" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 13930-701)	77.80	12.23
27 11 16 00-0095 EA 2U Height, 19" Width, 5.14" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 30130-719)	94.46	12.23
27 11 16 00-0096 EA 2U Height, 23" Width, 5.14" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 30130-723)	110.53	12.23
27 11 16 00-0097 EA 2U Height, 19" Width, 5.9" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 13930-702)	86.01	12.23
27 11 16 00-0098 EA 3U Height, 19" Width, 5.14" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 30131-719)	126.84	12.23
27 11 16 00-0099 EA 3U Height, 23" Width, 5.14" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 30131-723)	144.18	12.23
27 11 16 00-0100 EA 3U Height, 19" Width, 5.9" Depth, Single-Sided, Horizontal Cable Manager (Chatsworth 13930-703)	102.42	12.23
27 11 16 00-0101 Double-Sided, Horizontal Cable Managers (27 11 16 00-0090)		
27 11 16 00-0102 EA 1U Height, 19" Width, 11.73" Depth, Double-Sided, Horizontal Cable Manager (Chatsworth 30529-719)	115.02	12.23
27 11 16 00-0103 EA 1U Height, 23" Width, 11.73" Depth, Double-Sided, Horizontal Cable Manager (Chatsworth 30529-723)	128.71	12.23
27 11 16 00-0104 EA 2U Height, 19" Width, 11.73" Depth, Double-Sided, Horizontal Cable Manager (Chatsworth 30530-719)	120.95	12.23
27 11 16 00-0105 EA 2U Height, 23" Width, 11.73" Depth, Double-Sided, Horizontal Cable Manager (Chatsworth 30530-723)	140.55	12.23
27 11 16 00-0106 EA 3U Height, 19" Width, 11.73" Depth, Double-Sided, Horizontal Cable Manager (Chatsworth 30531-719)	156.08	12.23
27 11 16 00-0107 EA 3U Height, 23" Width, 11.73" Depth, Double-Sided, Horizontal Cable Manager (Chatsworth 30531-723)	174.61	12.23
27 11 16 00-0108 Vertical Cable Managers (27 11 16 00-0089)		
27 11 16 00-0109 Single-Sided, Vertical Cable Managers (27 11 16 00-0108)		
27 11 16 00-0110 EA 3.6" Width, 9.7" Depth, 70" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13901-701)	206.99	18.34
27 11 16 00-0111 EA 6" Width, 9.8" Depth, 70" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13902-701)	291.11	18.34
27 11 16 00-0112 EA 10" Width, 10.3" Depth, 70" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13904-701)	467.58	18.34
27 11 16 00-0113 EA 12" Width, 10.4" Depth, 70" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13905-701)	529.13	18.34
27 11 16 00-0114 EA 3.6" Width, 9.7" Depth, 80.5" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13901-703)	221.35	18.34
27 11 16 00-0115 EA 6" Width, 9.8" Depth, 80.5" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13902-703)	313.68	18.34
27 11 16 00-0116 EA 10" Width, 10.3" Depth, 80.5" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13904-703)	508.61	18.34
27 11 16 00-0117 EA 12" Width, 10.4" Depth, 80.5" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13905-703)	570.17	18.34
27 11 16 00-0118 EA 3.6" Width, 9.7" Depth, 91" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13901-715)	250.08	18.34
27 11 16 00-0119 EA 6" Width, 9.8" Depth, 91" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13902-715)	344.46	18.34
27 11 16 00-0120 EA 10" Width, 10.3" Depth, 91" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13904-715)	570.17	18.34
27 11 16 00-0121 EA 12" Width, 10.4" Depth, 91" Height, Single-Sided, Vertical Cable Manager (Chatsworth 13905-715)	631.73	18.34
27 11 16 00-0122 Double-Sided, Vertical Cable Managers (27 11 16 00-0108)		
27 11 16 00-0123 EA 3.6" Width, 16.4" Depth, 70" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13911-701)	299.32	18.34
27 11 16 00-0124 EA 6" Width, 16.6" Depth, 70" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13912-701)	352.67	18.34
27 11 16 00-0125 EA 10" Width, 17.5" Depth, 70" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13914-701)	570.17	18.34
27 11 16 00-0126 EA 12" Width, 17.8" Depth, 70" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13915-701)	672.76	18.34
27 11 16 00-0127 EA 3.6" Width, 16.4" Depth, 80.5" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13911-703)	323.94	18.34
27 11 16 00-0128 EA 6" Width, 16.6" Depth, 80.5" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13912-703)	377.29	18.34
27 11 16 00-0129 EA 10" Width, 17.5" Depth, 80.5" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13914-703)	611.21	18.34
27 11 16 00-0130 EA 12" Width, 17.8" Depth, 80.5" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13915-703)	713.80	18.34
27 11 16 00-0131 EA 3.6" Width, 16.4" Depth, 91" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13911-715)	356.77	18.34
27 11 16 00-0132 EA 6" Width, 16.6" Depth, 91" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13912-715)	410.12	18.34
27 11 16 00-0133 EA 10" Width, 17.5" Depth, 91" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13914-715)	672.76	18.34
27 11 16 00-0134 EA 12" Width, 17.8" Depth, 91" Height, Double-Sided, Vertical Cable Manager (Chatsworth 13915-715)	775.36	18.34
27 11 16 00-0135 Accessories For Vertical Cable Managers (27 11 16 00-0108)		
27 11 16 00-0136 EA Cable Ring Kit For 3.6" Width x 70" Height, Vertical Cable Managers (Chatsworth 13934-716)	127.04	12.23
27 11 16 00-0137 EA Cable Ring Kit For 3.6" Width x 80.5" Height, Vertical Cable Managers (Chatsworth 13934-717)	135.25	12.23
27 11 16 00-0138 EA Cable Ring Kit For 3.6" Width x 91" Height, Vertical Cable Managers (Chatsworth 13934-718)	143.46	12.23
27 11 16 00-0139 EA Cable Ring Kit For 6" Width x 70" Height, Vertical Cable Managers (Chatsworth 13934-726)	131.15	12.23
27 11 16 00-0140 EA Cable Ring Kit For 6" Width x 80.5" Height, Vertical Cable Managers (Chatsworth 13934-727)	143.46	12.23
27 11 16 00-0141 EA Cable Ring Kit For 6" Width x 91" Height, Vertical Cable Managers (Chatsworth 13934-728)	155.77	12.23
27 11 16 00-0142 EA Cable Ring Kit For 10" Width x 70" Height, Vertical Cable Managers (Chatsworth 13934-746)	147.56	12.23
27 11 16 00-0143 EA Cable Ring Kit For 10" Width x 80.5" Height, Vertical Cable Managers (Chatsworth 13934-747)	159.87	12.23
27 11 16 00-0144 EA Cable Ring Kit For 10" Width x 91" Height, Vertical Cable Managers (Chatsworth 13934-748)	172.19	12.23
27 11 16 00-0145 EA Cable Ring Kit For 12" Width x 70" Height, Vertical Cable Managers (Chatsworth 13934-756)	155.77	12.23
27 11 16 00-0146 EA Cable Ring Kit For 12" Width x 80.5" Height, Vertical Cable Managers (Chatsworth 13934-757)	172.19	12.23
27 11 16 00-0147 EA Cable Ring Kit For 12" Width x 91" Height, Vertical Cable Managers (Chatsworth 13934-758)	184.50	12.23
27 11 16 00-0148 EA Cable Lashing Bar Kit For Vertical Cable Managers (Chatsworth 13928-001)	106.53	12.23
27 11 16 00-0149 EA Cable Spool Kit For Vertical Cable Managers (Chatsworth 13935-701)	122.94	12.23
27 11 16 00-0150 EA Cable Distribution Spools For Vertical Cable Managers (Chatsworth 15008-001)	128.48	12.23
27 11 16 00-0151 EA Cable Distribution Spool Spacer Kit For Vertical Cable Managers (Chatsworth 35505-001)	81.90	12.23

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 11 19 Communications Termination Blocks and Patch Panels (27 11)

Note: The terminating, testing, and labeling of the cables in question should be done according to the task description as well as the current contract specifications. See CSI section 26 05 53 00-0020 for labeling.

27 11 19 00-0001	Computer Network Components (27 11 19)		
27 11 19 00-0002	Ethernet Patch Panels (27 11 19 00-0001)		
27 11 19 00-0003	EA 12 Port, Category 5E Patch Panel	303.48	61.14
27 11 19 00-0004	EA 24 Port, Category 5E Patch Panel	458.08	61.14
27 11 19 00-0005	EA 32 Port, Category 5E Patch Panel	604.37	61.14
27 11 19 00-0006	EA 48 Port, Category 5E Patch Panel	740.68	61.14
27 11 19 00-0007	EA 64 Port, Category 5E Patch Panel	826.62	76.43
27 11 19 00-0008	EA 96 Port, Category 5E Patch Panel	1,373.68	91.71
27 11 19 00-0009	EA 12 Port, Category 6 Patch Panel	377.79	61.14
27 11 19 00-0010	EA 24 Port, Category 6 Patch Panel	468.05	61.14
27 11 19 00-0011	EA 48 Port, Category 6 Patch Panel	813.83	61.14
27 11 19 00-0012	EA 96 Port, Category 6 Patch Panel	1,513.32	91.71
27 11 19 00-0013	EA 16" x 12" x 8" Steel Enclosure, Type 12, Hinged, Lockable (Hoffman A161208LP)	774.71	91.71
27 11 19 00-0014	EA 16" x 16" x 6" Steel Enclosure, Type 12, Hinged, Lockable (Hoffman A161606LP)	814.20	91.71
27 11 19 00-0015	EA 12 Port, Category 6 Modular to 110 Mini Patch Panel (Ortronics-Legrand OR-PMP61289)	318.02	61.14
27 11 19 00-0016	EA Terminate One End Of A 4 Pair Cable To Category "X" Specifications	43.32	
	For >5 To 10 Cables, Deduct	-7.80	
	For >10 Cables, Deduct	-17.33	
27 11 19 00-0017	EA Terminate One End Of A Twisted Pair Of Wires	11.91	
	Note: Per each pair		
	For >20 To 40 Pairs, Deduct	-1.91	
	For >40 Pairs, Deduct	-4.53	
27 11 19 00-0018	Fiber Optic Cable Patch Panels And Enclosures (27 11 19 00-0001)		
27 11 19 00-0019	Fiber Optic Cable Connector Housings (27 11 19 00-0018)		
27 11 19 00-0020	Wall Mount, Fiber Optic Cable Connector Housings (27 11 19 00-0019)		
	Note: Includes mounting hardware. Excludes connector panels. See CSI section 27 11 19 00-0048 for connector panels.		
27 11 19 00-0021	EA 1-Panel Capacity, Wall Mount, Fiber Optic Cable Connector Housing	166.04	27.51
27 11 19 00-0022	EA 2-Panel Capacity, Wall Mount, Fiber Optic Cable Connector Housing	252.44	27.51
27 11 19 00-0023	EA 4-Panel Capacity, Wall Mount, Fiber Optic Cable Connector Housing	380.26	27.51
27 11 19 00-0024	EA 6-Panel Capacity, Wall Mount, Fiber Optic Cable Connector Housing	559.29	45.85
27 11 19 00-0025	EA 12-Panel Capacity, Wall Mount, Fiber Optic Cable Connector Housing	786.87	45.85
27 11 19 00-0026	Rack Mount, Fiber Optic Cable Connector Housings (27 11 19 00-0019)		
	Note: Includes mounting hardware. Excludes connector panels. See CSI section 27 11 19 00-0048 for connector panels.		
27 11 19 00-0027	EA 2-Panel Capacity, Rack Mount, Fiber Optic Cable Connector Housing	582.63	45.85
27 11 19 00-0028	EA 4-Panel Capacity, Rack Mount, Fiber Optic Cable Connector Housing	669.39	45.85
27 11 19 00-0029	EA 6-Panel Capacity, Rack Mount, Fiber Optic Cable Connector Housing	722.46	45.85
27 11 19 00-0030	EA 12-Panel Capacity, Rack Mount, Fiber Optic Cable Connector Housing	850.70	45.85
27 11 19 00-0031	Rack Mount, Fiber Optic Cable Pretium® Connector Housings (27 11 19 00-0019)		
	Note: Includes mounting hardware. Excludes connector panels. See CSI section 27 11 19 00-0048 for connector panels.		
27 11 19 00-0032	EA 2-Panel Capacity, Rack Mount, Fiber Optic Cable Pretium® Connector Housing	731.33	45.85
	For Splice Tray Bracket, Add	80.33	
27 11 19 00-0033	EA 4-Panel Capacity, Rack Mount, Fiber Optic Cable Pretium® Connector Housing	860.40	45.85
	For Splice Tray Bracket, Add	87.84	
27 11 19 00-0034	EA 12-Panel Capacity, Rack Mount, Fiber Optic Cable Pretium® Connector Housing	1,077.92	45.85
	For Splice Tray Bracket, Add	320.02	
27 11 19 00-0035	Rack Mount, Fiber Optic Cable Pretium Edge® Connector Housings (27 11 19 00-0019)		
	Note: Includes mounting hardware. Excludes connector panels. See CSI section 27 11 19 00-0048 for connector panels.		
27 11 19 00-0036	EA 8 Pretium Edge® Module Or Panel Capacity, Rack Mount, Fiber Optic Cable Pretium Edge® Connector Housing	934.38	45.85
27 11 19 00-0037	EA 12 Pretium Edge® Module Or Panel Capacity, Rack Mount, Fiber Optic Cable Pretium Edge® Connector Housing	1,200.69	45.85
27 11 19 00-0038	EA 24 Pretium Edge® Module Or Panel Capacity, Rack Mount, Fiber Optic Cable Pretium Edge® Connector Housing	1,362.12	45.85
27 11 19 00-0039	EA 48 Pretium Edge® Module Or Panel Capacity, Rack Mount, Fiber Optic Cable Pretium Edge® Connector Housing	1,773.84	45.85
27 11 19 00-0040	Wall Mount, Fiber Optic Cable Industrial Connector Housings (27 11 19 00-0019)		
	Note: Includes powder-coat finish, pad lockable outer door and mounting hardware. Excludes connector panels. See CSI section 27 11 19 00-0048 for connector panels.		
27 11 19 00-0041	EA 2-Panel Capacity, Wall Mount, Fiber Optic Cable Industrial Connector Housing	840.02	27.51
27 11 19 00-0042	EA 6-Panel Capacity, Wall Mount, Fiber Optic Cable Industrial Connector Housing	1,158.34	45.85
27 11 19 00-0043	EA 12-Panel Capacity, Wall Mount, Fiber Optic Cable Industrial Connector Housing	1,216.61	45.85
27 11 19 00-0044	Wall Mount, Fiber Optic Cable Environmental Connector Housings (27 11 19 00-0019)		
	Note: Includes NEMA 4X enclosure, pad lockable outer door and mounting hardware. Excludes connector panels. See CSI section 27 11 19 00-0048 for connector panels.		



Communications	27	27
Structured Cabling	27 10	
Communications Equipment Room Fittings	27 11	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
27 11 19 00-0045	EA	2-Panel Capacity, Wall Mount, Fiber Optic Cable Environmental Connector Housing	880.29		27.51
27 11 19 00-0046	EA	6-Panel Capacity, Wall Mount, Fiber Optic Cable Environmental Connector Housing	1,157.63		45.85
27 11 19 00-0047	EA	12-Panel Capacity, Wall Mount, Fiber Optic Cable Environmental Connector Housing	1,363.79		45.85
27 11 19 00-0048		Fiber Optic Cable Connector Panels (27 11 19 00-0018)			
27 11 19 00-0049		SC Simplex, Fiber Optic Cable Connector Panels (27 11 19 00-0048)			
27 11 19 00-0050	EA	6-Fiber, Multimode, SC Simplex, Fiber Optic Cable Connector Panel.....	114.53		6.11
27 11 19 00-0051	EA	6-Fiber, Singlemode, SC Simplex, Fiber Optic Cable Connector Panel	124.54		6.11
27 11 19 00-0052	EA	8-Fiber, Multimode, SC Simplex, Fiber Optic Cable Connector Panel.....	140.06		6.11
27 11 19 00-0053	EA	8-Fiber, Singlemode, SC Simplex, Fiber Optic Cable Connector Panel	153.39		6.11
27 11 19 00-0054	EA	12-Fiber, Multimode, SC Simplex, Fiber Optic Cable Connector Panel.....	191.15		6.11
27 11 19 00-0055	EA	12-Fiber, Singlemode, SC Simplex, Fiber Optic Cable Connector Panel	211.09		6.11
27 11 19 00-0056		SC Duplex, Fiber Optic Cable Connector Panels (27 11 19 00-0048)			
27 11 19 00-0057	EA	6-Fiber, Multimode, SC Duplex, Fiber Optic Cable Connector Panel	110.11		6.11
27 11 19 00-0058	EA	6-Fiber, Singlemode, SC Duplex, Fiber Optic Cable Connector Panel	112.46		6.11
27 11 19 00-0059	EA	8-Fiber, Multimode, SC Duplex, Fiber Optic Cable Connector Panel	134.20		6.11
27 11 19 00-0060	EA	8-Fiber, Singlemode, SC Duplex, Fiber Optic Cable Connector Panel	137.32		6.11
27 11 19 00-0061	EA	12-Fiber, Multimode, SC Duplex, Fiber Optic Cable Connector Panel	182.36		6.11
27 11 19 00-0062	EA	12-Fiber, Singlemode, SC Duplex, Fiber Optic Cable Connector Panel.....	187.01		6.11
27 11 19 00-0063		LC Duplex, Fiber Optic Cable Connector Panels (27 11 19 00-0048)			
27 11 19 00-0064	EA	6-Fiber, Multimode, LC Duplex, Fiber Optic Cable Connector Panel.....	119.14		6.11
27 11 19 00-0065	EA	6-Fiber, Singlemode, LC Duplex, Fiber Optic Cable Connector Panel	130.92		6.11
27 11 19 00-0066	EA	8-Fiber, Multimode, LC Duplex, Fiber Optic Cable Connector Panel	146.19		6.11
27 11 19 00-0067	EA	8-Fiber, Singlemode, LC Duplex, Fiber Optic Cable Connector Panel	161.91		6.11
27 11 19 00-0068	EA	12-Fiber, Multimode, LC Duplex, Fiber Optic Cable Connector Panel	200.36		6.11
27 11 19 00-0069	EA	12-Fiber, Singlemode, LC Duplex, Fiber Optic Cable Connector Panel	223.90		6.11
27 11 19 00-0070	EA	16-Fiber, Multimode, LC Duplex, Fiber Optic Cable Connector Panel	254.51		6.11
27 11 19 00-0071	EA	16-Fiber, Singlemode, LC Duplex, Fiber Optic Cable Connector Panel	285.89		6.11
27 11 19 00-0072	EA	24-Fiber, Multimode, LC Duplex, Fiber Optic Cable Connector Panel.....	362.78		6.11
27 11 19 00-0073	EA	24-Fiber, Singlemode, LC Duplex, Fiber Optic Cable Connector Panel	373.72		6.11
27 11 19 00-0074		ST Simplex, Fiber Optic Cable Connector Panels (27 11 19 00-0048)			
27 11 19 00-0075	EA	6-Fiber, Multimode, ST Simplex, Fiber Optic Cable Connector Panel	94.73		6.11
27 11 19 00-0076	EA	6-Fiber, Singlemode, ST Simplex, Fiber Optic Cable Connector Panel.....	102.30		6.11
27 11 19 00-0077	EA	8-Fiber, Multimode, ST Simplex, Fiber Optic Cable Connector Panel	113.67		6.11
27 11 19 00-0078	EA	8-Fiber, Singlemode, ST Simplex, Fiber Optic Cable Connector Panel.....	123.76		6.11
27 11 19 00-0079	EA	12-Fiber, Multimode, ST Simplex, Fiber Optic Cable Connector Panel	151.52		6.11
27 11 19 00-0080	EA	12-Fiber, Singlemode, ST Simplex, Fiber Optic Cable Connector Panel.....	166.68		6.11
27 11 19 00-0081		MT-RJ, Fiber Optic Cable Connector Panels (27 11 19 00-0048)			
27 11 19 00-0082	EA	12-Fiber, Multimode, MT-RJ, Fiber Optic Cable Connector Panel.....	118.43		6.11
27 11 19 00-0083	EA	12-Fiber, Singlemode, MT-RJ, Fiber Optic Cable Connector Panel	178.60		6.11
27 11 19 00-0084		Fiber Optic Cable Pretium Edge® Modules (27 11 19 00-0048)			
27 11 19 00-0085	EA	12-Fiber, Singlemode, LC Duplex To MTP, Fiber Optic Cable Pretium Edge® Module	1,041.72		6.11
27 11 19 00-0086	EA	12-Fiber, Multimode, LC Duplex To MTP, Fiber Optic Cable Pretium Edge® Module.....	1,045.35		6.11
27 11 19 00-0087		Fiber Optic Cable Splice Housings (27 11 19 00-0018)			
27 11 19 00-0088		Wall Mount, Fiber Optic Cable Splice Housings (27 11 19 00-0087)			
		Note: Includes mounting hardware. Excludes splice trays.			
27 11 19 00-0089	EA	12 Splice Tray Capacity, Wall Mount, Fiber Optic Splice Housing With Locking Door.....	390.48		61.14
27 11 19 00-0090		Rack Mount, Fiber Optic Cable Splice Housings (27 11 19 00-0087)			
		Note: Includes mounting hardware. Excludes splice trays.			
27 11 19 00-0091	EA	12 Splice Tray Capacity, Rack Mount, Fiber Optic Cable Splice Housing	605.46		45.85
27 11 19 00-0092	EA	22 Splice Tray Capacity, Rack Mount, Fiber Optic Cable Splice Housing	614.89		45.85
27 11 19 00-0093		Fiber Optic Cable Splice Trays (27 11 19 00-0087)			
27 11 19 00-0094	EA	Fiber Optic Cable Splice Tray.....	112.64		15.28
27 11 19 00-0095		Fiber Optic Cable Jumper Management Panels (27 11 19 00-0018)			
		Note: Includes mounting hardware.			
27 11 19 00-0096	EA	Rack Mount, Fiber Optic Cable Jumper Management Panel.....	211.62		45.85
27 11 19 00-0097		Miscellaneous Accessories (27 11 19 00-0001)			

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 11 19 00-0098	EA	Wall Mount Bracket For 12 Or 24 Port Patch Panel.....	79.21	
27 11 19 00-0099	EA	Wall Mount Bracket For 32 Or 48 Port Patch Panel.....	106.41	
27 11 19 00-0100	EA	Wall Mount Bracket For 64 Or 72 Port Patch Panel.....	115.57	
27 11 19 00-0101	EA	Wall Mount Bracket For 96 Port Patch Panel.....	128.52	
27 11 19 00-0102	EA	Lightning Protection Plus Stainless Steel Modules, Siemon.....	529.90	61.14
27 11 19 00-0103		Telephone Components (27 11 19)		
27 11 19 00-0104		Terminal Blocks With Wide Range Of 22-8 AWG (27 11 19 00-0103)		
27 11 19 00-0105	EA	Terminal Block, Circuit Isolation Switch With Wire Range 22-8 AWG.....	36.28	12.25
27 11 19 00-0106	EA	Terminal Block, Fuse Holder 600 Volt, 6.3 Amperes With Wire Range 22-8 AWG.....	69.72	12.25
27 11 19 00-0107	EA	Terminal Block, Fuse Holder 600 Volt, 10 Amperes With Wire Range 22-8 AWG.....	56.04	12.25
27 11 19 00-0108	EA	Terminal Block, Solderless Box With Lugs And Wire Range 22-8 AWG.....	27.87	12.25
27 11 19 00-0109	EA	Flat Terminal Block Connection With Wire Range 22-8 AWG.....	19.76	8.57
27 11 19 00-0110	EA	Ground Terminal Block With Wire Range 22-8 AWG.....	37.73	12.25
27 11 19 00-0111	EA	Terminal Block, Solderless Box With Lug 600 Volt, 60 Amperes With Wire Range 22-8 AWG.....	27.87	12.25
27 11 19 00-0112	EA	Terminal Block, Mini Box Lug 300 Volt, 30 Amperes With Wire Range 22-8 AWG.....	19.55	8.57
27 11 19 00-0113	EA	Flat Terminal Block Connection 300 Volt, 20 Amperes With Wire Range 22-8 AWG.....	19.40	8.57
27 11 19 00-0114	EA	Self Lifting Terminal Block, 300 Volt, 40 Amperes, Wire Connection With Wire Range 22-12 AWG.....	20.06	8.57
27 11 19 00-0115		Terminal Block Mounting Channel (27 11 19 00-0103)		
27 11 19 00-0116	EA	Terminal Block Mounting Channel, .5 M Galvanized Steel.....	19.20	6.12
27 11 19 00-0117	EA	Terminal Block Mounting Channel, 1 M Galvanized Steel.....	24.82	6.12
27 11 19 00-0118	EA	Terminal Block Mounting Channel, 2 M Galvanized Steel.....	34.73	6.12
27 11 19 00-0119	EA	Terminal Block Mounting Channel, .5 M Bi-Chrome Zinc.....	24.62	7.35
27 11 19 00-0120	EA	Terminal Block Mounting Channel, 1 M Bi-Chrome Zinc.....	33.98	7.35
27 11 19 00-0121	EA	Terminal Block Mounting Channel, 2 M Bi-Chrome Zinc.....	49.45	7.35
27 11 19 00-0122		Outlet Termination Hardware (27 11 19 00-0103)		
27 11 19 00-0123	EA	Telephone Outlet Blocks.....	37.32	6.12
27 11 19 00-0124	EA	Phone Outlet Block For Floor Box.....	102.97	46.46
		Note: Excludes box.		
27 11 19 00-0125	EA	Fiber Optic "SC" Type Modular Bulkhead.....	91.29	27.51
27 11 19 00-0126	EA	Fiber Optic "ST" Type Modular Bulkhead.....	91.29	27.51
27 11 19 00-0127	EA	Type "F" Coaxial Connector Male.....	53.30	18.34
27 11 19 00-0128	EA	Modular Plate For 3-RJ-45, 4 - "SC" And 1 -"F" Connector.....	138.19	30.57
27 11 19 00-0129	EA	Modular Plate For 3-RJ-45, 4 - "ST" And 1 -"F" Connector.....	138.19	30.57
27 11 19 00-0130	EA	Access Floor Box With 3-RJ-45, 4 - "SC" And 1 -"F" Connector.....	166.89	30.57
27 11 19 00-0131	EA	Access Floor Box With 3-RJ-45, 4 - "ST" And 1 -"F" Connector.....	166.89	30.57
27 11 19 00-0132	EA	Access Floor Box With 2-RJ-45, 4 - "SC" And 1 -25 Pin Connector.....	151.79	30.57
27 11 19 00-0133	EA	Terminal Type - Punch Down Block 110 Type - 300 Pair Category 5.....	1,320.91	152.84
27 11 19 00-0134	EA	Wiring (Punch Down) Block with Stand-Off Legs, 100 Pair, Category V.....	64.58	12.23
		Note: Excludes cable terminations.		
27 11 19 00-0135	EA	5-Pair, Connecting Block.....	3.86	1.22
27 11 19 00-0136	EA	4-Pair, Connecting Block.....	4.18	1.22
27 11 19 00-0137	EA	Plastic Label Holder, Transparent.....	15.61	3.06
27 11 19 00-0138	EA	Marked Label, White, 5-Pair.....	4.22	
27 11 19 00-0139	EA	Marked Label, Blue, 4-Pair.....	4.22	
27 11 19 00-0140		Terminations in Manhole or Junction Box (27 11 19 00-0103)		
27 11 19 00-0141	EA	25 Pair Cable Termination In Manhole Or Junction Box.....	195.65	
27 11 19 00-0142	EA	50 Pair Cable Termination In Manhole Or Junction Box.....	391.30	
27 11 19 00-0143	EA	100 Pair Cable Termination In Manhole Or Junction Box.....	782.58	
27 11 19 00-0144	EA	150 Pair Cable Termination In Manhole Or Junction Box.....	1,173.88	
27 11 19 00-0145	EA	200 Pair Cable Termination In Manhole Or Junction Box.....	1,373.20	
27 11 19 00-0146	EA	300 Pair Cable Termination In Manhole Or Junction Box.....	2,059.18	
27 11 19 00-0147	EA	400 Pair Cable Termination In Manhole Or Junction Box.....	2,589.87	
27 11 19 00-0148	EA	500 Pair Cable Termination In Manhole Or Junction Box.....	3,237.95	
27 11 19 00-0149	EA	750 Pair Cable Termination In Manhole Or Junction Box.....	4,856.90	
27 11 19 00-0150	EA	1,000 Pair Cable Termination In Manhole Or Junction Box.....	5,890.14	
27 11 19 00-0151	EA	1,200 Pair Cable Termination In Manhole Or Junction Box.....	6,713.18	
27 11 23		Communications Cable Management and Ladder Rack (27 11)		
27 11 23 00-0001		Equipment Supports (27 11 23)		
27 11 23 00-0002	EA	12" x 5'-11" Tubular Runway.....	124.31	29.34
27 11 23 00-0003	EA	12" x 9'-11" Tubular Runway.....	214.26	48.91
27 11 23 00-0004	EA	Shelf Bracket Support For Tubular Runway.....	39.33	9.17
27 11 23 00-0005	EA	Straight Clamp Hardware For Tubular Runway.....	16.57	6.11
27 11 23 00-0006	EA	Corner Clamp Hardware For Tubular Runway.....	17.64	6.11
27 11 23 00-0007	EA	90 Degree Edge Clamp Hardware For Tubular Runway.....	40.84	11.00
27 11 23 00-0008	EA	Wall Angle Assembly Hardware For 12" Wide Tubular Runway.....	87.56	18.34
27 11 23 00-0009	EA	J-Bolt Hardware For Tubular Runway.....	7.86	2.69
27 11 23 00-0010	EA	T Bracket Hardware For Tubular Runway.....	44.62	15.28
27 11 23 00-0011	EA	110 Jumper Trough (Commscope 107831133).....	35.86	6.11
27 11 23 00-0012	LF	Velcro CMP.....	2.96	1.22



Communications	27	27
Structured Cabling	27 10	
Communications Equipment Room Fittings	27 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 13 Communications Backbone Cabling (27 10)

27 13 13 Communications Copper Backbone Cabling (27 13)

27 13 13 13 Communications Copper Cable Splicing and Terminations (27 13 13)

27 13 13 13-0001	Building Entrance Terminals (27 13 13 13)		
27 13 13 13-0002	EA 25 Pair Gas Protective Unit Assembly Complete With Gas Protector.....	2,935.97	268.11
27 13 13 13-0003	EA 50 Pair Gas Protective Unit Assembly Complete With Gas Protector.....	3,875.02	446.86
27 13 13 13-0004	EA 100 Pair Gas Protective Unit Assembly Complete With Gas Protector.....	5,443.17	715.54

27 13 13 13-0005 Modular Plugs For Copper Communications Cable (27 13 13 13)

27 13 13 13-0006	EA Modular Plug For Non Shielded Copper Communications Cable	30.04	
	Note: Up to 8-position/8-contact non-shielded modular plug for solid or stranded wire. Includes termination.		
	For >10, Deduct	-7.32	
	For >5 To 10, Deduct	-3.66	
27 13 13 13-0007	EA Modular Plug For Shielded Copper Communications Cable.....	34.29	
	Note: Up to 8-position/8-contact shielded modular plug for solid or stranded wire. Includes termination.		
	For >10, Deduct	-8.24	
	For >5 To 10, Deduct	-4.12	

27 13 13 13-0008 Testing And Certification Of Copper Communications Cable (27 13 13 13)

	Note: Use for existing systems.		
27 13 13 13-0009	EA Test 1-Pair Of A Copper Communications Cable For Continuity	6.11	
	For >25-Pair, Deduct	-2.44	
27 13 13 13-0010	EA Certify 1-Pair Of A Copper Communications Cable	9.17	
	For >25-Pair, Deduct	-3.66	
27 13 13 13-0011	EA Certify And Document 1-Pair Of A Copper Communications Cable	14.67	
	For >25-Pair, Deduct	-5.86	
27 13 13 13-0012	EA Test 4-Pair Category 5-7 Telecommunications Cable For Continuity	24.45	
	For >25-Pair, Deduct	-9.76	
27 13 13 13-0013	EA Certify 4-Pair Category 5-7 Telecommunications Cable	36.68	
	For >25-Pair, Deduct	-14.64	
27 13 13 13-0014	EA Certify And Document 4-Pair Category 5-7 Telecommunications Cable	58.70	
	For >25-Pair, Deduct	-23.43	

27 13 13 13-0015 Communications Termination Blocks (27 13 13 13)

27 13 13 13-0016	EA 100-Pair, 110 Block With Legs.....	61.72	15.28
27 13 13 13-0017	EA 300-Pair, 110 Block With Legs.....	107.02	15.28
27 13 13 13-0018	EA Clear Label Holder For 110 Wiring Block.....	13.11	6.11
27 13 13 13-0019	EA 4-Pair, 110C Connecting Block.....	7.48	3.06
27 13 13 13-0020	EA 5-Pair, 110C Connecting Block.....	7.65	3.06
27 13 13 13-0021	EA 100-Pair, 110 Jack Panel System.....	348.82	18.34
	Note: Includes twelve 8-pin modular jacks and mounting legs.		
27 13 13 13-0022	EA 300-Pair, 110 Jack Panel System.....	657.27	18.34
	Note: Includes twelve 8-pin modular jacks and mounting legs.		

27 13 23 Communications Optical Fiber Backbone Cabling (27 13)

27 13 23 13 Communications Optical Fiber Splicing and Terminations (27 13 23)

27 13 23 13-0001 Fiber Optic Cable Connectors (27 13 23 13)

27 13 23 13-0002	EA ST Connector For Multimode Fiber Optic Cable.....	35.30	
27 13 23 13-0003	EA ST Connector For Singlemode Fiber Optic Cable.....	40.70	
27 13 23 13-0004	EA SC Connector For Multimode Fiber Optic Cable	39.30	
27 13 23 13-0005	EA SC Connector For Singlemode Fiber Optic Cable	46.18	
27 13 23 13-0006	EA LC Connector For Multimode Fiber Optic Cable.....	53.70	
27 13 23 13-0007	EA LC Connector For Singlemode Fiber Optic Cable.....	55.30	
27 13 23 13-0008	EA MT-RJ Connector For Multimode Fiber Optic Cable.....	80.16	

27 13 23 13-0009 Fiber Optic Cable Fan Out Kits (27 13 23 13)

27 13 23 13-0010 Buffer Tube Fan Out Kits For Fiber Optic Cable (27 13 23 13-0009)

27 13 23 13-0011	EA 6-Fiber, Indoor Buffer Tube Fan Out Kit For Fiber Optic Cable	268.02	
27 13 23 13-0012	EA 12-Fiber, Indoor Buffer Tube Fan Out Kit For Fiber Optic Cable	272.50	
27 13 23 13-0013	EA 6-Fiber, Outdoor Buffer Tube Fan Out Kit For Fiber Optic Cable.....	310.36	
27 13 23 13-0014	EA 12-Fiber, Outdoor Buffer Tube Fan Out Kit For Fiber Optic Cable.....	338.75	

27 13 23 13-0015 Spider Fan Out Kits For Fiber Optic Cable (27 13 23 13-0009)

	Note: For tight buffered or loose tube non-armored cables. Includes aramid yarn strength member, outer protective PVDF jacket and one meter fan out lengths.		
27 13 23 13-0016	EA 6-Fiber, Spider Fan Out Kit For Fiber Optic Cable.....	323.24	
27 13 23 13-0017	EA 12-Fiber, Spider Fan Out Kit For Fiber Optic Cable.....	353.32	
27 13 23 13-0018	EA 18-Fiber, Spider Fan Out Kit For Fiber Optic Cable.....	514.92	
27 13 23 13-0019	EA 24-Fiber, Spider Fan Out Kit For Fiber Optic Cable.....	667.28	

27	Communications
27 10	Structured Cabling
27 13	Communications Backbone Cabling

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 13 23 13-0020	Fiber Optic Cable Splice Closures <small>(27 13 23 13)</small>		
	Note: Includes mounting hardware. Excludes splicing and splice trays.		
27 13 23 13-0021	EA Up To 144-Fiber Capacity, Pedestal Fiber Optic Cable Splice Closure	983.17	122.28
27 13 23 13-0022	EA Up To 144-Fiber Capacity, Underground Fiber Optic Cable Splice Closure	1,227.73	244.56
27 13 23 13-0023	EA Up To 144-Fiber Capacity, Aerial Fiber Optic Cable Splice Closure	1,227.73	244.56
27 13 23 13-0024	EA Up To 288-Fiber Capacity, Pedestal Fiber Optic Cable Splice Closure	1,651.49	122.28
27 13 23 13-0025	EA Up To 288-Fiber Capacity, Underground Fiber Optic Cable Splice Closure	1,896.05	244.56
27 13 23 13-0026	EA Up To 288-Fiber Capacity, Aerial Fiber Optic Cable Splice Closure	1,896.05	244.56
27 13 23 13-0027	EA Splice Tray For Fiber Optic Cable Splice Closure	67.80	15.28
	Note: Up to 12-fiber, mechanical or fusion splice tray. Excludes splice.		
27 13 23 13-0028	Fiber Optic Cable Testing <small>(27 13 23 13)</small>		
	Note: Price based on testing one wavelength.		
27 13 23 13-0029	Fiber Optic Cable Testing Using An OTDR <small>(27 13 23 13-0028)</small>		
	Note: Testing using an optical time domain reflectometer.		
27 13 23 13-0030	EA Test 1-Strand Of Fiber Optic Cable Using A Single Directional OTDR Test	24.45	
	For >12 To 48 Strands, Deduct	-1.83	
	For >48 Strands, Deduct	-2.45	
27 13 23 13-0031	EA Test 1-Strand Of Fiber Optic Cable Using A Multi-Directional OTDR Test	36.68	
	For >12 To 48 Strands, Deduct	-2.75	
	For >48 Strands, Deduct	-3.67	
27 13 23 13-0032	EA Test 1-Strand Of Fiber Optic Cable Using A Single Directional OTDR Test With Documentation	61.14	
	For >12 To 48 Strands, Deduct	-4.59	
	For >48 Strands, Deduct	-6.11	
27 13 23 13-0033	EA Test 1-Strand Of Fiber Optic Cable Using A Multi-Directional OTDR Test With Documentation	91.71	
	For >12 To 48 Strands, Deduct	-6.88	
	For >48 Strands, Deduct	-9.17	
27 13 23 13-0034	Fiber Optic Cable Testing Using A Power Meter <small>(27 13 23 13-0028)</small>		
27 13 23 13-0035	EA Test 1-Strand Of Fiber Optic Cable Using A Single Directional Power Meter Test	24.45	
	For >12 To 48 Strands, Deduct	-1.83	
	For >48 Strands, Deduct	-2.45	
27 13 23 13-0036	EA Test 1-Strand Of Fiber Optic Cable Using A Multi-Directional Power Meter Test	36.68	
	For >12 To 48 Strands, Deduct	-2.75	
	For >48 Strands, Deduct	-3.67	
27 13 23 13-0037	Fiber Optic Cable Light Source/Continuity Testing <small>(27 13 23 13-0028)</small>		
27 13 23 13-0038	EA Test 1-Strand Of Fiber Optic Cable Using A Light Source/Continuity Test	24.45	
	For >12 To 48 Strands, Deduct	-1.83	
	For >48 Strands, Deduct	-2.45	
27 13 23 13-0039	Fiber Optic Cable Splicing <small>(27 13 23 13)</small>		
27 13 23 13-0040	EA Single Strand, Fusion Splice Of Fiber Optic Cable	36.68	
27 13 23 13-0041	EA 12-Strand Ribbon, Fusion Splice Of Fiber Optic Cable	122.28	
27 13 23 13-0042	Other Fiber Optic Cable Splicing <small>(27 13 23 13)</small>		
27 13 23 13-0043	EA Fiber Optic Finger Splice	43.33	22.99
27 13 23 13-0044	EA Fiber Optic Splice Box - Manholes	7,150.97	

27 15 Communications Horizontal Cabling (27 10)

27 15 01 Communications Horizontal Cabling Applications (27 15)

27 15 01 13 Video Surveillance Communications Conductors and Cables (27 15 01)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc. See CSI section 26 05 19 00-0000 for low-voltage electrical power cable, 26 05 23 00-0000 for control-voltage electrical power cable, 27 13 00 00-0000 for conductors and cables.

27 15 01 15 Access Control Communications Conductors and Cables (27 15 01)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc. See CSI section 26 05 19 00-0000 for low-voltage electrical power cable, 26 05 23 00-0000 for control-voltage electrical power cable, 27 13 00 00-0000 for conductors and cables.

27 15 01 16 Voice Communications Horizontal Cabling (27 15 01)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc. See CSI section 26 05 19 00-0000 for low-voltage electrical power cable, 26 05 23 00-0000 for control-voltage electrical power cable, 27 13 00 00-0000 for conductors and cables.

27 15 01 17 Intrusion Detection Communications Conductors and Cables (27 15 01)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc. See CSI section 26 05 19 00-0000 for low-voltage electrical power cable, 26 05 23 00-0000 for control-voltage electrical power cable, 27 13 00 00-0000 for conductors and cables, 27 15 01 19-0000 for Type FPLP Cable.



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 15 01 19 Fire Alarm Communications Conductors and Cables (27 15 01)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc.

27 15 01 19-0001	Fire Alarm/Life Safety Cable (27 15 01 19)		
27 15 01 19-0002	Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable (27 15 01 19-0001)		
27 15 01 19-0003	Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit (27 15 01 19-0002)		
27 15 01 19-0004	MLF 1-Pair, 18 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,957.40	831.98
27 15 01 19-0005	MLF 2-Pair, 18 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,385.97	862.07
27 15 01 19-0006	MLF 1-Pair, 16 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,231.66	945.71
27 15 01 19-0007	MLF 2-Pair, 16 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,913.28	979.46
27 15 01 19-0008	MLF 1-Pair, 14 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,560.83	1,058.69
27 15 01 19-0009	MLF 2-Pair, 14 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	3,530.57	1,096.84
27 15 01 19-0010	MLF 1-Pair, 12 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	3,264.29	1,210.56
27 15 01 19-0011	MLF 2-Pair, 12 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	4,769.18	1,253.73
27 15 01 19-0012	Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed (27 15 01 19-0002)		
27 15 01 19-0013	MLF 1-Pair, 18 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,344.05	1,664.22
27 15 01 19-0014	MLF 2-Pair, 18 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,822.76	1,724.14
27 15 01 19-0015	MLF 1-Pair, 16 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,807.84	1,891.66
27 15 01 19-0016	MLF 2-Pair, 16 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	4,545.70	1,958.91
27 15 01 19-0017	MLF 1-Pair, 14 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	4,325.32	2,117.88
27 15 01 19-0018	MLF 2-Pair, 14 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	5,358.64	2,193.69
27 15 01 19-0019	MLF 1-Pair, 12 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	5,281.89	2,421.12
27 15 01 19-0020	MLF 2-Pair, 12 AWG, Twisted Pair, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	6,858.94	2,507.95
27 15 01 19-0021	Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit (27 15 01 19-0001)		
27 15 01 19-0022	MLF 2 Conductors, #22 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,258.90	680.85
27 15 01 19-0023	MLF 4 Conductors, #22 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,357.91	705.06
27 15 01 19-0024	MLF 2 Conductors, #18 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,531.93	831.98
27 15 01 19-0025	MLF 3 Conductors, #18 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,629.41	847.03
27 15 01 19-0026	MLF 4 Conductors, #18 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,689.14	862.07
27 15 01 19-0027	MLF 6 Conductors, #18 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,879.95	892.14
27 15 01 19-0028	MLF 8 Conductors, #18 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,152.28	922.23
27 15 01 19-0029	MLF 2 Conductors, #16 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,784.50	945.71
27 15 01 19-0030	MLF 4 Conductors, #16 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	1,997.55	979.46
27 15 01 19-0031	MLF 2 Conductors, #14 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,063.05	1,058.69
27 15 01 19-0032	MLF 4 Conductors, #14 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,394.23	1,096.84
27 15 01 19-0033	MLF 2 Conductors, #12 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	2,508.73	1,210.56
27 15 01 19-0034	MLF 4 Conductors, #12 AWG, Shielded, Non-Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit	3,040.79	1,253.73
27 15 01 19-0035	Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable (27 15 01 19-0001)		

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 01 19-0036			Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit <small>(27 15 01 19-0035)</small>		
27 15 01 19-0037	MLF		2/c #22 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,249.13	680.85
27 15 01 19-0038	MLF		2/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,525.59	831.98
27 15 01 19-0039	MLF		3/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,690.76	847.03
27 15 01 19-0040	MLF		4/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,706.12	862.07
27 15 01 19-0041	MLF		6/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,968.61	892.14
27 15 01 19-0042	MLF		2/c #16 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,774.91	945.71
27 15 01 19-0043	MLF		4/c #16 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,019.07	979.46
27 15 01 19-0044	MLF		2/c #14 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,019.88	1,058.69
27 15 01 19-0045	MLF		4/c #14 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,565.81	1,096.84
27 15 01 19-0046	MLF		2/c #12 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,494.62	1,210.56
27 15 01 19-0047	MLF		4/c #12 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	3,301.27	1,253.73
27 15 01 19-0048			Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed <small>(27 15 01 19-0035)</small>		
27 15 01 19-0049	MLF		2/c #22 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	2,383.88	1,362.19
27 15 01 19-0050	MLF		2/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	2,912.24	1,664.22
27 15 01 19-0051	MLF		3/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	3,101.87	1,693.57
27 15 01 19-0052	MLF		4/c #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	3,142.91	1,724.14
27 15 01 19-0053	MLF		6 Conductors, #18 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	3,455.53	1,784.06
27 15 01 19-0054	MLF		2 Conductors, #16 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	3,351.09	1,891.66
27 15 01 19-0055	MLF		4/c #16 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	3,651.49	1,958.91
27 15 01 19-0056	MLF		2 Conductors, #14 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	3,784.37	2,117.88
27 15 01 19-0057	MLF		4 Conductors, #14 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	4,393.88	2,193.69
27 15 01 19-0058	MLF		2 Conductors, #12 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	4,512.22	2,421.12
27 15 01 19-0059	MLF		4 Conductors, #12 AWG, Non-Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed.....	5,391.03	2,507.95
27 15 01 19-0060			Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable <small>(27 15 01 19-0001)</small>		
27 15 01 19-0061			Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit <small>(27 15 01 19-0060)</small>		
27 15 01 19-0062	MLF		2 Conductors, #22 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,289.35	680.85
27 15 01 19-0063	MLF		2 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,554.31	831.98
27 15 01 19-0064	MLF		3 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,797.38	847.03
27 15 01 19-0065	MLF		4 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,735.52	862.07
27 15 01 19-0066	MLF		6 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,998.67	892.14
27 15 01 19-0067	MLF		2 Conductors, #16 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,840.92	945.71
27 15 01 19-0068	MLF		4 Conductors, #16 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,049.60	979.46
27 15 01 19-0069	MLF		2 Conductors, #14 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,162.25	1,058.69
27 15 01 19-0070	MLF		4 Conductors, #14 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,494.42	1,096.84
27 15 01 19-0071	MLF		2 Conductors, #12 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,599.98	1,210.56
27 15 01 19-0072	MLF		4 Conductors, #12 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	3,084.52	1,253.73



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 01 19-0073 Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed <small>(27 15 01 19-0060)</small>		
27 15 01 19-0074 MLF 2 Conductors, #22 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	2,424.10	1,362.19
27 15 01 19-0075 MLF 2 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	2,940.96	1,664.22
27 15 01 19-0076 MLF 3 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,208.49	1,693.57
27 15 01 19-0077 MLF 4 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,172.31	1,724.14
27 15 01 19-0078 MLF 6 Conductors, #18 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,485.59	1,784.06
27 15 01 19-0079 MLF 2/c #16 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,417.10	1,891.66
27 15 01 19-0080 MLF 4/c #16 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,682.02	1,958.91
27 15 01 19-0081 MLF 2/c #14 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,926.74	2,117.88
27 15 01 19-0082 MLF 4 Conductors, #14 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	4,322.49	2,193.69
27 15 01 19-0083 MLF 2 Conductors, #12 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	4,617.58	2,421.12
27 15 01 19-0084 MLF 4 Conductors, #12 AWG, Shielded, Plenum Rated, Solid Type FPLP (Red), Fire Alarm/Life Safety Cable, Installed Exposed	5,174.28	2,507.95
27 15 01 19-0085 Non-Shielded, Riser Rated, FPLR (Red), Fire Alarm/Life Safety Cable <small>(27 15 01 19-0001)</small>		
27 15 01 19-0086 Non-Shielded, Riser Rated, FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit <small>(27 15 01 19-0085)</small>		
27 15 01 19-0087 MLF 2 Conductors, #22 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,261.89	680.85
27 15 01 19-0088 MLF 2 Conductors, #18 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,587.72	831.98
27 15 01 19-0089 MLF 3 Conductors, #18 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,712.32	847.03
27 15 01 19-0090 MLF 4 Conductors, #18 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,817.13	862.07
27 15 01 19-0091 MLF 6 Conductors, #18 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,046.56	892.14
27 15 01 19-0092 MLF 2 Conductors, #16 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	1,831.18	945.71
27 15 01 19-0093 MLF 4 Conductors, #16 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,144.57	979.46
27 15 01 19-0094 MLF 2 Conductors, #14 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,142.88	1,058.69
27 15 01 19-0095 MLF 4 Conductors, #14 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,705.39	1,096.84
27 15 01 19-0096 MLF 2 Conductors, #12 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed In Conduit.....	2,575.28	1,210.56
27 15 01 19-0097 Non-Shielded, Riser Rated, FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed <small>(27 15 01 19-0085)</small>		
27 15 01 19-0098 MLF 2 Conductors, #22 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	2,396.64	1,362.19
27 15 01 19-0099 MLF 2 Conductors, #18 AWG, Non-Shielded, Riser Rated, Solid Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	2,974.37	1,664.22
27 15 01 19-0100 MLF 3 Conductors, #18 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,123.43	1,693.57
27 15 01 19-0101 MLF 4 Conductors, #18 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,253.92	1,724.14
27 15 01 19-0102 MLF 6 Conductors, #18 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,533.48	1,784.06
27 15 01 19-0103 MLF 2 Conductors, #16 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,407.36	1,891.66
27 15 01 19-0104 MLF 4 Conductors, #16 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,776.99	1,958.91
27 15 01 19-0105 MLF 2 Conductors, #14 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	3,907.37	2,117.88
27 15 01 19-0106 MLF 4 Conductors, #14 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	4,533.46	2,193.69
27 15 01 19-0107 MLF 2 Conductors, #12 AWG, Non-Shielded, Riser Rated, Stranded Type FPLR (Red), Fire Alarm/Life Safety Cable, Installed Exposed	4,592.88	2,421.12
27 15 13 Communications Copper Horizontal Cabling <small>(27 15)</small>		
<small>Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc.</small>		
27 15 13 00-0001 Solid Conductor Low Voltage Cable <small>(27 15 13)</small>		
27 15 13 00-0002 Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0001)</small>		

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 15 13 00-0003	#14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0002)</small>		
27 15 13 00-0004	MLF 1 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,865.34	967.47
	<i>For Work In Restricted Working Space, Add</i>	483.62	
27 15 13 00-0005	MLF 2 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,137.51	1,002.09
	<i>For Work In Restricted Working Space, Add</i>	501.05	
27 15 13 00-0006	MLF 3 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,379.38	1,036.73
	<i>For Work In Restricted Working Space, Add</i>	518.48	
27 15 13 00-0007	MLF 4 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,633.92	1,072.48
	<i>For Work In Restricted Working Space, Add</i>	536.24	
27 15 13 00-0008	MLF 5 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,938.33	1,145.09
	<i>For Work In Restricted Working Space, Add</i>	572.43	
27 15 13 00-0009	MLF 6 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	3,219.71	1,216.59
	<i>For Work In Restricted Working Space, Add</i>	607.96	
27 15 13 00-0010	MLF 8 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	3,524.32	1,360.71
	<i>For Work In Restricted Working Space, Add</i>	680.35	
27 15 13 00-0011	MLF 12 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	4,663.72	1,793.05
	<i>For Work In Restricted Working Space, Add</i>	896.52	
27 15 13 00-0012	MLF 24 Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	6,928.00	2,648.80
	<i>For Work In Restricted Working Space, Add</i>	1,324.51	
27 15 13 00-0013	#16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0002)</small>		
27 15 13 00-0014	MLF 1 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,663.04	863.56
	<i>For Work In Restricted Working Space, Add</i>	432.01	
27 15 13 00-0015	MLF 2 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,849.29	894.85
	<i>For Work In Restricted Working Space, Add</i>	447.42	
27 15 13 00-0016	MLF 3 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,116.19	926.13
	<i>For Work In Restricted Working Space, Add</i>	462.84	
27 15 13 00-0017	MLF 4 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,341.82	957.41
	<i>For Work In Restricted Working Space, Add</i>	478.93	
27 15 13 00-0018	MLF 5 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,610.89	1,022.20
	<i>For Work In Restricted Working Space, Add</i>	511.10	
27 15 13 00-0019	MLF 6 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,860.52	1,085.88
	<i>For Work In Restricted Working Space, Add</i>	542.94	
27 15 13 00-0020	MLF 7 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,995.65	1,150.68
	<i>For Work In Restricted Working Space, Add</i>	575.12	
27 15 13 00-0021	MLF 8 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	3,131.88	1,215.48
	<i>For Work In Restricted Working Space, Add</i>	607.63	
27 15 13 00-0022	MLF 9 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	3,444.76	1,292.56
	<i>For Work In Restricted Working Space, Add</i>	646.17	
27 15 13 00-0023	MLF 12 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	4,143.62	1,600.90
	<i>For Work In Restricted Working Space, Add</i>	800.50	
27 15 13 00-0024	MLF 24 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	6,154.83	2,365.03
	<i>For Work In Restricted Working Space, Add</i>	1,182.57	
27 15 13 00-0025	#18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0002)</small>		
27 15 13 00-0026	MLF 1 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,424.34	760.79
	<i>For Work In Restricted Working Space, Add</i>	380.06	
27 15 13 00-0027	MLF 2 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,603.26	787.60
	<i>For Work In Restricted Working Space, Add</i>	393.80	
27 15 13 00-0028	MLF 3 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,763.33	814.41
	<i>For Work In Restricted Working Space, Add</i>	407.54	
27 15 13 00-0029	MLF 4 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,930.60	842.34
	<i>For Work In Restricted Working Space, Add</i>	421.28	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0030 MLF 5 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,139.81	899.31
<i>For Work In Restricted Working Space, Add</i>	449.77	
27 15 13 00-0031 MLF 6 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,334.98	955.17
<i>For Work In Restricted Working Space, Add</i>	477.92	
27 15 13 00-0032 MLF 8 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,563.14	1,069.13
<i>For Work In Restricted Working Space, Add</i>	534.56	
27 15 13 00-0033 MLF 12 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,389.95	1,408.75
<i>For Work In Restricted Working Space, Add</i>	704.48	
27 15 13 00-0034 MLF 24 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,031.31	2,081.28
<i>For Work In Restricted Working Space, Add</i>	1,040.63	
27 15 13 00-0035 #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0002)</small>		
27 15 13 00-0036 MLF 1 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,272.82	691.52
<i>For Work In Restricted Working Space, Add</i>	345.54	
27 15 13 00-0037 MLF 2 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,417.11	716.10
<i>For Work In Restricted Working Space, Add</i>	357.94	
27 15 13 00-0038 MLF 3 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,545.60	741.24
<i>For Work In Restricted Working Space, Add</i>	370.34	
27 15 13 00-0039 MLF 4 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,680.26	766.38
<i>For Work In Restricted Working Space, Add</i>	383.07	
27 15 13 00-0040 MLF 5 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,854.65	817.77
<i>For Work In Restricted Working Space, Add</i>	408.71	
27 15 13 00-0041 MLF 6 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,017.98	869.16
<i>For Work In Restricted Working Space, Add</i>	434.35	
27 15 13 00-0042 MLF 8 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,229.01	971.94
<i>For Work In Restricted Working Space, Add</i>	485.97	
27 15 13 00-0043 MLF 12 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,935.41	1,281.39
<i>For Work In Restricted Working Space, Add</i>	640.47	
27 15 13 00-0044 MLF 24 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,354.52	1,892.47
<i>For Work In Restricted Working Space, Add</i>	946.13	
27 15 13 00-0045 MLF 25 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,564.88	1,937.17
<i>For Work In Restricted Working Space, Add</i>	968.58	
27 15 13 00-0046 MLF 36 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,396.69	2,255.56
<i>For Work In Restricted Working Space, Add</i>	1,127.78	
27 15 13 00-0047 MLF 40 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,785.64	2,414.20
<i>For Work In Restricted Working Space, Add</i>	1,207.20	
27 15 13 00-0048 MLF 50 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	7,023.35	3,017.47
<i>For Work In Restricted Working Space, Add</i>	1,508.50	
27 15 13 00-0049 MLF 100 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	9,443.41	3,972.64
<i>For Work In Restricted Working Space, Add</i>	1,986.08	
27 15 13 00-0050 #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0002)</small>		
27 15 13 00-0051 MLF 1 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,100.04	622.26
<i>For Work In Restricted Working Space, Add</i>	311.02	
27 15 13 00-0052 MLF 2 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,160.22	644.60
<i>For Work In Restricted Working Space, Add</i>	322.08	
27 15 13 00-0053 MLF 3 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,230.42	666.95
<i>For Work In Restricted Working Space, Add</i>	333.47	
27 15 13 00-0054 MLF 4 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,305.05	689.30
<i>For Work In Restricted Working Space, Add</i>	344.87	
27 15 13 00-0055 MLF 5 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,426.12	736.21
<i>For Work In Restricted Working Space, Add</i>	368.00	
27 15 13 00-0056 MLF 6 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,546.45	779.78
<i>For Work In Restricted Working Space, Add</i>	390.11	

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0057			Triad <small>(27 15 13 00-0002)</small>		
27 15 13 00-0058	MLF	1	Triad #16 AWG, Stranded, Low Voltage, Installed In Conduit	3,084.40	926.13
27 15 13 00-0059	MLF	4	Triad #20 AWG, Stranded, Low Voltage, Installed In Conduit	3,988.72	1,281.39
27 15 13 00-0060	MLF	8	Triad #20 AWG, Stranded, Low Voltage, Installed In Conduit	6,275.98	1,892.47
27 15 13 00-0061	MLF	12	Triad #20 AWG, Stranded, Low Voltage, Installed In Conduit	7,857.20	2,255.56
27 15 13 00-0062	MLF	24	Triad #20 AWG, Stranded, Low Voltage, Installed In Conduit	12,946.35	3,494.49
27 15 13 00-0063	MLF	36	Triad #20 AWG, Stranded, Low Voltage, Installed In Conduit	14,913.70	3,972.64
27 15 13 00-0064			Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0001)</small>		
27 15 13 00-0065			#12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0066	MLF	1	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,952.02	2,211.99
			<i>For Work In Restricted Working Space, Add</i>	1,106.09	
			<i>For #10 AWG, Add</i>	824.86	
27 15 13 00-0067	MLF	2	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,307.25	2,290.19
			<i>For Work In Restricted Working Space, Add</i>	1,145.43	
			<i>For #10 AWG, Add</i>	925.04	
27 15 13 00-0068	MLF	3	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,631.39	2,370.63
			<i>For Work In Restricted Working Space, Add</i>	1,184.97	
			<i>For #10 AWG, Add</i>	1,014.87	
27 15 13 00-0069	MLF	4	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,972.26	2,451.06
			<i>For Work In Restricted Working Space, Add</i>	1,225.91	
			<i>For #10 AWG, Add</i>	1,109.62	
27 15 13 00-0070	MLF	5	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	5,440.19	2,616.40
			<i>For Work In Restricted Working Space, Add</i>	1,308.59	
			<i>For #10 AWG, Add</i>	1,228.21	
27 15 13 00-0071	MLF	6	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	5,882.52	2,779.51
			<i>For Work In Restricted Working Space, Add</i>	1,390.12	
			<i>For #10 AWG, Add</i>	1,338.85	
27 15 13 00-0072	MLF	8	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	6,497.71	3,110.19
			<i>For Work In Restricted Working Space, Add</i>	1,554.80	
			<i>For #10 AWG, Add</i>	1,470.50	
27 15 13 00-0073	MLF	12	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	8,585.40	4,099.99
			<i>For Work In Restricted Working Space, Add</i>	2,049.60	
			<i>For #10 AWG, Add</i>	1,945.02	
27 15 13 00-0074	MLF	24	Pair #12 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	12,719.21	6,055.03
			<i>For Work In Restricted Working Space, Add</i>	3,026.74	
			<i>For #10 AWG, Add</i>	2,885.75	
27 15 13 00-0075			#14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0076	MLF	1	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,477.41	1,934.93
			<i>For Work In Restricted Working Space, Add</i>	967.24	
27 15 13 00-0077	MLF	2	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,807.68	2,004.20
			<i>For Work In Restricted Working Space, Add</i>	1,002.10	
27 15 13 00-0078	MLF	3	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,107.64	2,073.46
			<i>For Work In Restricted Working Space, Add</i>	1,036.95	
27 15 13 00-0079	MLF	4	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,421.39	2,144.96
			<i>For Work In Restricted Working Space, Add</i>	1,072.48	
27 15 13 00-0080	MLF	5	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,846.46	2,290.19
			<i>For Work In Restricted Working Space, Add</i>	1,144.87	
27 15 13 00-0081	MLF	6	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	5,246.25	2,433.18
			<i>For Work In Restricted Working Space, Add</i>	1,215.92	
27 15 13 00-0082	MLF	8	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	5,792.17	2,721.41
			<i>For Work In Restricted Working Space, Add</i>	1,360.71	
27 15 13 00-0083	MLF	12	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	7,652.12	3,586.10
			<i>For Work In Restricted Working Space, Add</i>	1,793.04	
27 15 13 00-0084	MLF	24	Pair #14 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	11,343.04	5,297.60
			<i>For Work In Restricted Working Space, Add</i>	2,649.02	



Communications	27	
Structured Cabling	27 10	27
Communications Horizontal Cabling	27 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0085 #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0086 MLF 1 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,103.07	1,727.14
For Work In Restricted Working Space, Add	864.02	
27 15 13 00-0087 MLF 2 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,340.71	1,789.70
For Work In Restricted Working Space, Add	894.85	
27 15 13 00-0088 MLF 3 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,659.00	1,852.26
For Work In Restricted Working Space, Add	925.68	
27 15 13 00-0089 MLF 4 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,938.25	1,914.82
For Work In Restricted Working Space, Add	957.86	
27 15 13 00-0090 MLF 5 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	4,314.56	2,044.41
For Work In Restricted Working Space, Add	1,022.21	
27 15 13 00-0091 MLF 6 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	4,670.32	2,171.77
For Work In Restricted Working Space, Add	1,085.88	
27 15 13 00-0092 MLF 7 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	4,912.70	2,301.36
For Work In Restricted Working Space, Add	1,150.23	
27 15 13 00-0093 MLF 8 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	5,157.30	2,430.95
For Work In Restricted Working Space, Add	1,215.25	
27 15 13 00-0094 MLF 9 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	5,598.65	2,585.12
For Work In Restricted Working Space, Add	1,292.33	
27 15 13 00-0095 MLF 12 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	6,811.97	3,201.79
For Work In Restricted Working Space, Add	1,601.01	
27 15 13 00-0096 MLF 24 Pair #16 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	10,096.75	4,730.08
For Work In Restricted Working Space, Add	2,365.15	
27 15 13 00-0097 #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0098 MLF 1 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,691.21	1,521.58
For Work In Restricted Working Space, Add	760.12	
27 15 13 00-0099 MLF 2 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,915.94	1,575.21
For Work In Restricted Working Space, Add	787.60	
27 15 13 00-0100 MLF 3 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,121.80	1,628.83
For Work In Restricted Working Space, Add	815.08	
27 15 13 00-0101 MLF 4 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,334.87	1,684.68
For Work In Restricted Working Space, Add	842.57	
27 15 13 00-0102 MLF 5 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,639.05	1,798.64
For Work In Restricted Working Space, Add	899.54	
27 15 13 00-0103 MLF 6 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,928.05	1,910.35
For Work In Restricted Working Space, Add	955.85	
27 15 13 00-0104 MLF 8 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	4,345.01	2,138.25
For Work In Restricted Working Space, Add	1,069.13	
27 15 13 00-0105 MLF 12 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	5,738.24	2,817.49
For Work In Restricted Working Space, Add	1,408.97	
27 15 13 00-0106 MLF 24 Pair #18 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	8,500.09	4,162.56
For Work In Restricted Working Space, Add	2,081.27	
27 15 13 00-0107 #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0108 MLF 1 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,424.61	1,383.05
For Work In Restricted Working Space, Add	691.08	
27 15 13 00-0109 MLF 2 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,610.25	1,432.21
For Work In Restricted Working Space, Add	715.88	
27 15 13 00-0110 MLF 3 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,780.07	1,482.48
For Work In Restricted Working Space, Add	740.68	
27 15 13 00-0111 MLF 4 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,957.19	1,532.75
For Work In Restricted Working Space, Add	766.15	

27 Communications

27 10 Structured Cabling

27 15 Communications Horizontal Cabling



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0112	MLF		5 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,217.03	1,635.53
			<i>For Work In Restricted Working Space, Add</i>	817.43	
27 15 13 00-0113	MLF		6 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,465.83	1,738.31
			<i>For Work In Restricted Working Space, Add</i>	868.71	
27 15 13 00-0114	MLF		8 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,848.90	1,943.86
			<i>For Work In Restricted Working Space, Add</i>	971.93	
27 15 13 00-0115	MLF		12 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	5,070.31	2,562.77
			<i>For Work In Restricted Working Space, Add</i>	1,280.94	
27 15 13 00-0116	MLF		24 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	7,508.26	3,784.96
			<i>For Work In Restricted Working Space, Add</i>	1,892.25	
27 15 13 00-0117	MLF		25 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	7,793.46	3,874.32
			<i>For Work In Restricted Working Space, Add</i>	1,937.15	
27 15 13 00-0118	MLF		36 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	9,155.96	4,511.11
			<i>For Work In Restricted Working Space, Add</i>	2,255.56	
27 15 13 00-0119	MLF		40 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	9,809.66	4,828.38
			<i>For Work In Restricted Working Space, Add</i>	2,414.41	
27 15 13 00-0120	MLF		50 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	12,051.68	6,034.92
			<i>For Work In Restricted Working Space, Add</i>	3,017.00	
27 15 13 00-0121	MLF		100 Pair #20 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	16,063.67	7,945.27
			<i>For Work In Restricted Working Space, Add</i>	3,972.16	
27 15 13 00-0122			#22 AWG, Shielded, Low Voltage Cable, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0123	MLF		1 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	2,136.77	1,244.52
			<i>For Work In Restricted Working Space, Add</i>	622.04	
27 15 13 00-0124	MLF		2 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	2,233.82	1,289.21
			<i>For Work In Restricted Working Space, Add</i>	644.16	
27 15 13 00-0125	MLF		3 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	2,342.00	1,333.90
			<i>For Work In Restricted Working Space, Add</i>	666.95	
27 15 13 00-0126	MLF		4 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	2,454.62	1,378.58
			<i>For Work In Restricted Working Space, Add</i>	689.74	
27 15 13 00-0127	MLF		5 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	2,652.77	1,472.43
			<i>For Work In Restricted Working Space, Add</i>	735.99	
27 15 13 00-0128	MLF		6 Pair #22 AWG, Solid, Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	2,846.83	1,559.57
			<i>For Work In Restricted Working Space, Add</i>	780.23	
27 15 13 00-0129			Triad, Installed Exposed <small>(27 15 13 00-0064)</small>		
27 15 13 00-0130	MLF		1 Triad, #16 AWG, Stranded, Low Voltage Copper Communication Cable, Installed Exposed.....	3,084.40	926.13
27 15 13 00-0131	MLF		4 Triad, #20 AWG, Stranded, Low Voltage Copper Communication Cable, Installed Exposed.....	3,988.72	1,281.39
27 15 13 00-0132	MLF		8 Triad, #20 AWG, Stranded, Low Voltage Copper Communication Cable, Installed Exposed.....	6,275.98	1,892.47
27 15 13 00-0133	MLF		12 Triad, #20 AWG, Stranded, Low Voltage Copper Communication Cable, Installed Exposed.....	7,857.20	2,255.56
27 15 13 00-0134	MLF		24 Triad, #20 AWG, Stranded, Low Voltage Copper Communication Cable, Installed Exposed.....	12,946.35	3,494.49
27 15 13 00-0135	MLF		36 Triad, #20 AWG, Stranded, Low Voltage Copper Communication Cable, Installed Exposed.....	14,913.70	3,972.64
27 15 13 00-0136			Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0001)</small>		
27 15 13 00-0137			#14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0136)</small>		
27 15 13 00-0138	MLF		1 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,826.20	967.47
			<i>For Work In Restricted Working Space, Add</i>	483.62	
27 15 13 00-0139	MLF		2 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,065.30	1,002.09
			<i>For Work In Restricted Working Space, Add</i>	501.05	
27 15 13 00-0140	MLF		3 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,278.77	1,036.73
			<i>For Work In Restricted Working Space, Add</i>	518.48	
27 15 13 00-0141	MLF		4 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,503.12	1,072.48
			<i>For Work In Restricted Working Space, Add</i>	536.24	
27 15 13 00-0142	MLF		5 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,776.91	1,143.98
			<i>For Work In Restricted Working Space, Add</i>	571.76	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0143 MLF 6 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	3,034.22 607.63	1,215.48
27 15 13 00-0144 MLF 8 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	3,330.16 680.35	1,360.71
27 15 13 00-0145 MLF 12 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	4,404.84 896.52	1,793.05
27 15 13 00-0146 MLF 24 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	6,539.68 1,324.51	2,648.80
27 15 13 00-0147 #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0136)</small>		
27 15 13 00-0148 MLF 1 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	1,628.58 432.01	863.56
27 15 13 00-0149 MLF 2 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	1,839.37 447.42	894.85
27 15 13 00-0150 MLF 3 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,027.58 462.84	926.13
27 15 13 00-0151 MLF 4 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,226.64 478.93	957.41
27 15 13 00-0152 MLF 5 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,469.59 510.77	1,021.09
27 15 13 00-0153 MLF 6 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,698.16 542.94	1,085.88
27 15 13 00-0154 MLF 7 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,828.98 575.12	1,150.68
27 15 13 00-0155 MLF 8 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	3,021.37 607.63	1,215.48
27 15 13 00-0156 MLF 9 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	3,315.72 646.13	1,292.56
27 15 13 00-0157 MLF 12 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	3,915.66 800.51	1,600.90
27 15 13 00-0158 MLF 24 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	5,813.42 1,182.74	2,365.03
27 15 13 00-0159 #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0136)</small>		
27 15 13 00-0160 MLF 1 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	1,424.23 380.06	759.67
27 15 13 00-0161 MLF 2 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	1,594.85 393.80	787.60
27 15 13 00-0162 MLF 3 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	1,705.77 407.54	815.53
27 15 13 00-0163 MLF 4 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	1,849.27 421.28	842.34
27 15 13 00-0164 MLF 5 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,031.04 449.77	899.31
27 15 13 00-0165 MLF 6 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,211.72 477.92	956.30
27 15 13 00-0166 MLF 8 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	2,628.44 534.56	1,069.13
27 15 13 00-0167 MLF 12 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	3,422.11 704.48	1,408.75
27 15 13 00-0168 MLF 24 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit..... <i>For Work In Restricted Working Space, Add</i>	4,641.64 1,040.63	2,081.28
27 15 13 00-0169 #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0136)</small>		

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0170 MLF 1 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,262.89	691.52
<i>For Work In Restricted Working Space, Add</i>	345.54	
27 15 13 00-0171 MLF 2 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,382.50	716.10
<i>For Work In Restricted Working Space, Add</i>	357.94	
27 15 13 00-0172 MLF 3 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,621.52	815.53
<i>For Work In Restricted Working Space, Add</i>	407.54	
27 15 13 00-0173 MLF 4 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,769.88	857.31
<i>For Work In Restricted Working Space, Add</i>	428.66	
27 15 13 00-0174 MLF 5 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,915.43	899.31
<i>For Work In Restricted Working Space, Add</i>	449.77	
27 15 13 00-0175 MLF 6 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,075.11	956.30
<i>For Work In Restricted Working Space, Add</i>	477.92	
27 15 13 00-0176 MLF 8 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,289.05	1,064.21
<i>For Work In Restricted Working Space, Add</i>	532.22	
27 15 13 00-0177 MLF 12 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,811.71	1,281.39
<i>For Work In Restricted Working Space, Add</i>	640.47	
27 15 13 00-0178 MLF 24 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,168.97	1,892.47
<i>For Work In Restricted Working Space, Add</i>	946.13	
27 15 13 00-0179 MLF 25 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,358.39	1,937.17
<i>For Work In Restricted Working Space, Add</i>	968.58	
27 15 13 00-0180 MLF 36 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,143.66	2,255.56
<i>For Work In Restricted Working Space, Add</i>	1,127.78	
27 15 13 00-0181 MLF 40 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,513.42	2,414.20
<i>For Work In Restricted Working Space, Add</i>	1,207.20	
27 15 13 00-0182 MLF 50 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,715.07	3,017.47
<i>For Work In Restricted Working Space, Add</i>	1,508.50	
27 15 13 00-0183 MLF 100 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	9,007.16	3,972.64
<i>For Work In Restricted Working Space, Add</i>	1,986.08	
27 15 13 00-0184 #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0136)</small>		
27 15 13 00-0185 MLF 1 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,110.38	622.26
<i>For Work In Restricted Working Space, Add</i>	311.02	
27 15 13 00-0186 MLF 2 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,174.37	644.60
<i>For Work In Restricted Working Space, Add</i>	322.08	
27 15 13 00-0187 MLF 3 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,254.88	666.95
<i>For Work In Restricted Working Space, Add</i>	333.47	
27 15 13 00-0188 MLF 4 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,341.67	689.30
<i>For Work In Restricted Working Space, Add</i>	344.87	
27 15 13 00-0189 MLF 5 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,464.43	736.21
<i>For Work In Restricted Working Space, Add</i>	368.00	
27 15 13 00-0190 MLF 6 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,593.70	779.78
<i>For Work In Restricted Working Space, Add</i>	390.11	
27 15 13 00-0191 Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0001)</small>		
27 15 13 00-0192 #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0191)</small>		
27 15 13 00-0193 MLF 1 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,438.27	1,934.93
<i>For Work In Restricted Working Space, Add</i>	967.24	
27 15 13 00-0194 MLF 2 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	3,735.46	2,004.20
<i>For Work In Restricted Working Space, Add</i>	1,002.10	
27 15 13 00-0195 MLF 3 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,007.03	2,073.46
<i>For Work In Restricted Working Space, Add</i>	1,036.95	
27 15 13 00-0196 MLF 4 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed.....	4,290.59	2,144.96
<i>For Work In Restricted Working Space, Add</i>	1,072.48	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0197 MLF 5 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	4,682.80 1,143.53	2,287.95
27 15 13 00-0198 MLF 6 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,059.64 1,215.25	2,430.95
27 15 13 00-0199 MLF 8 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,598.01 1,360.71	2,721.41
27 15 13 00-0200 MLF 12 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	7,393.24 1,793.04	3,586.10
27 15 13 00-0201 MLF 24 Pair #14 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	10,954.72 2,649.02	5,297.60
27 15 13 00-0202 #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0191)</small>		
27 15 13 00-0203 MLF 1 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,068.61 864.02	1,727.14
27 15 13 00-0204 MLF 2 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,330.79 894.85	1,789.70
27 15 13 00-0205 MLF 3 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,570.39 925.68	1,852.26
27 15 13 00-0206 MLF 4 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,823.07 957.86	1,914.82
27 15 13 00-0207 MLF 5 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	4,172.15 1,021.54	2,042.18
27 15 13 00-0208 MLF 6 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	4,507.96 1,085.88	2,171.77
27 15 13 00-0209 MLF 7 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	4,746.03 1,150.23	2,301.36
27 15 13 00-0210 MLF 8 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,046.79 1,215.25	2,430.95
27 15 13 00-0211 MLF 9 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,469.50 1,292.27	2,585.12
27 15 13 00-0212 MLF 12 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	6,584.00 1,601.01	3,201.79
27 15 13 00-0213 MLF 24 Pair #16 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	9,755.88 2,365.48	4,730.08
27 15 13 00-0214 #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <small>(27 15 13 00-0191)</small>		
27 15 13 00-0215 MLF 1 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	2,691.10 760.12	1,519.34
27 15 13 00-0216 MLF 2 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	2,907.53 787.60	1,575.21
27 15 13 00-0217 MLF 3 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,064.24 815.08	1,631.06
27 15 13 00-0218 MLF 4 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,253.54 842.57	1,684.68
27 15 13 00-0219 MLF 5 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,530.28 899.54	1,798.64
27 15 13 00-0220 MLF 6 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,804.79 955.85	1,912.58
27 15 13 00-0221 MLF 8 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	4,410.31 1,069.13	2,138.25
27 15 13 00-0222 MLF 12 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,770.40 1,408.97	2,817.49
27 15 13 00-0223 MLF 24 Pair #18 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	8,110.42 2,081.27	4,162.56

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0224			#20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed (27 15 13 00-0191)		
27 15 13 00-0225	MLF	1 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,414.68	1,383.05	
		<i>For Work In Restricted Working Space, Add</i>	691.08		
27 15 13 00-0226	MLF	2 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,575.64	1,432.21	
		<i>For Work In Restricted Working Space, Add</i>	715.88		
27 15 13 00-0227	MLF	3 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,979.99	1,631.06	
		<i>For Work In Restricted Working Space, Add</i>	815.08		
27 15 13 00-0228	MLF	4 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,198.72	1,714.63	
		<i>For Work In Restricted Working Space, Add</i>	857.31		
27 15 13 00-0229	MLF	5 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,414.67	1,798.64	
		<i>For Work In Restricted Working Space, Add</i>	899.54		
27 15 13 00-0230	MLF	6 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	3,668.18	1,912.58	
		<i>For Work In Restricted Working Space, Add</i>	955.85		
27 15 13 00-0231	MLF	8 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	4,063.10	2,128.42	
		<i>For Work In Restricted Working Space, Add</i>	1,064.43		
27 15 13 00-0232	MLF	12 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	4,946.61	2,562.77	
		<i>For Work In Restricted Working Space, Add</i>	1,280.94		
27 15 13 00-0233	MLF	24 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	7,322.71	3,784.96	
		<i>For Work In Restricted Working Space, Add</i>	1,892.25		
27 15 13 00-0234	MLF	25 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	7,586.97	3,874.32	
		<i>For Work In Restricted Working Space, Add</i>	1,937.15		
27 15 13 00-0235	MLF	36 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	8,902.93	4,511.11	
		<i>For Work In Restricted Working Space, Add</i>	2,255.56		
27 15 13 00-0236	MLF	40 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	9,537.44	4,828.38	
		<i>For Work In Restricted Working Space, Add</i>	2,414.41		
27 15 13 00-0237	MLF	50 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	11,743.40	6,034.92	
		<i>For Work In Restricted Working Space, Add</i>	3,017.00		
27 15 13 00-0238	MLF	100 Pair #20 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	15,627.42	7,945.27	
		<i>For Work In Restricted Working Space, Add</i>	3,972.16		
27 15 13 00-0239			#22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed (27 15 13 00-0191)		
27 15 13 00-0240	MLF	1 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,147.11	1,244.52	
		<i>For Work In Restricted Working Space, Add</i>	622.04		
27 15 13 00-0241	MLF	2 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,247.97	1,289.21	
		<i>For Work In Restricted Working Space, Add</i>	644.16		
27 15 13 00-0242	MLF	3 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,366.46	1,333.90	
		<i>For Work In Restricted Working Space, Add</i>	666.95		
27 15 13 00-0243	MLF	4 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,491.24	1,378.58	
		<i>For Work In Restricted Working Space, Add</i>	689.74		
27 15 13 00-0244	MLF	5 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,691.08	1,472.43	
		<i>For Work In Restricted Working Space, Add</i>	735.99		
27 15 13 00-0245	MLF	6 Pair #22 AWG, Solid, Non-Shielded, Non-Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed Exposed	2,894.08	1,559.57	
		<i>For Work In Restricted Working Space, Add</i>	780.23		
27 15 13 00-0246			Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit (27 15 13 00-0001)		
27 15 13 00-0247	MLF	1 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	1,660.34	863.56	
27 15 13 00-0248	MLF	2 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,011.19	894.85	
27 15 13 00-0249	MLF	3 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,258.02	926.13	
27 15 13 00-0250	MLF	4 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,389.62	957.41	
27 15 13 00-0251	MLF	5 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	2,873.19	1,021.09	
27 15 13 00-0252	MLF	6 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit	3,109.27	1,085.88	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0253 MLF 8 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,896.64	1,215.48
27 15 13 00-0254 MLF 12 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,837.38	1,600.90
27 15 13 00-0255 MLF 24 Pair #16 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	7,347.04	2,365.03
27 15 13 00-0256 MLF 1 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,433.93	759.67
27 15 13 00-0257 MLF 2 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,721.95	787.60
27 15 13 00-0258 MLF 3 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,960.08	815.53
27 15 13 00-0259 MLF 4 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,077.61	842.34
27 15 13 00-0260 MLF 5 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,490.63	899.31
27 15 13 00-0261 MLF 6 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,798.89	956.30
27 15 13 00-0262 MLF 8 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,161.82	1,069.13
27 15 13 00-0263 MLF 12 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,084.42	1,408.75
27 15 13 00-0264 MLF 24 Pair #18 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,531.47	2,081.28
27 15 13 00-0265 MLF 1 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,266.15	691.52
27 15 13 00-0266 MLF 2 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,448.86	716.10
27 15 13 00-0267 MLF 3 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,625.92	740.68
27 15 13 00-0268 MLF 4 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,737.44	766.38
27 15 13 00-0269 MLF 5 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,892.55	817.77
27 15 13 00-0270 MLF 6 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,067.29	869.16
27 15 13 00-0271 MLF 8 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,315.36	971.94
27 15 13 00-0272 MLF 12 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,195.26	1,281.39
27 15 13 00-0273 MLF 24 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,857.06	1,892.47
27 15 13 00-0274 MLF 25 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,124.00	1,937.17
27 15 13 00-0275 MLF 36 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,049.58	2,255.56
27 15 13 00-0276 MLF 40 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,522.93	2,414.20
27 15 13 00-0277 MLF 50 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	7,858.30	3,017.47
27 15 13 00-0278 MLF 100 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	10,624.94	3,972.64
27 15 13 00-0279 MLF 250 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	20,548.98	7,317.43
27 15 13 00-0280 MLF 500 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	31,062.67	9,683.58
27 15 13 00-0281 MLF 750 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	41,613.96	12,202.79
27 15 13 00-0282 MLF 1200 Pair #20 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	58,617.56	16,738.48
27 15 13 00-0283 MLF 1 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,224.95	691.52
27 15 13 00-0284 MLF 2 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,356.71	716.10
27 15 13 00-0285 MLF 3 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,484.87	740.68
27 15 13 00-0286 MLF 4 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,571.50	766.38
27 15 13 00-0287 MLF 5 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,701.72	817.77
27 15 13 00-0288 MLF 6 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,844.08	869.16
27 15 13 00-0289 MLF 8 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,064.76	971.94
27 15 13 00-0290 MLF 12 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,813.19	1,281.39
27 15 13 00-0291 MLF 24 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,243.32	1,892.47
27 15 13 00-0292 MLF 25 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,441.05	1,937.17
27 15 13 00-0293 MLF 36 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,245.05	2,255.56
27 15 13 00-0294 MLF 40 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,622.51	2,414.20

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0295	MLF	50 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,838.59	3,017.47
27 15 13 00-0296	MLF	100 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	9,181.98	3,972.64
27 15 13 00-0297	MLF	250 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	17,495.28	7,317.43
27 15 13 00-0298	MLF	500 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	25,671.31	9,683.58
27 15 13 00-0299	MLF	750 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	33,929.17	12,202.79
27 15 13 00-0300	MLF	1200 Pair #22 AWG, Solid, Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	47,523.15	16,738.48
27 15 13 00-0301		Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit <small>(27 15 13 00-0001)</small>		
27 15 13 00-0302	MLF	1 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,685.55	863.56
27 15 13 00-0303	MLF	2 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,931.67	894.85
27 15 13 00-0304	MLF	3 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,084.66	926.13
27 15 13 00-0305	MLF	4 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,289.57	957.41
27 15 13 00-0306	MLF	5 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,533.41	1,021.09
27 15 13 00-0307	MLF	6 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,775.00	1,085.88
27 15 13 00-0308	MLF	8 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,346.21	1,215.48
27 15 13 00-0309	MLF	12 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,345.29	1,600.90
27 15 13 00-0310	MLF	24 Pair #16 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,482.44	2,365.03
27 15 13 00-0311	MLF	1 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,475.57	759.67
27 15 13 00-0312	MLF	2 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,686.88	787.60
27 15 13 00-0313	MLF	3 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,819.05	815.53
27 15 13 00-0314	MLF	4 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,994.41	842.34
27 15 13 00-0315	MLF	5 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,204.50	899.31
27 15 13 00-0316	MLF	6 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,413.50	956.30
27 15 13 00-0317	MLF	8 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,904.55	1,069.13
27 15 13 00-0318	MLF	12 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,773.21	1,408.75
27 15 13 00-0319	MLF	24 Pair #18 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,627.76	2,081.28
27 15 13 00-0320	MLF	1 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,299.12	691.52
27 15 13 00-0321	MLF	2 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,480.99	716.10
27 15 13 00-0322	MLF	3 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,608.69	740.68
27 15 13 00-0323	MLF	4 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,839.75	766.38
27 15 13 00-0324	MLF	5 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,043.65	817.77
27 15 13 00-0325	MLF	6 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,434.03	869.16
27 15 13 00-0326	MLF	8 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,720.55	971.94
27 15 13 00-0327	MLF	12 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	3,438.76	1,281.39
27 15 13 00-0328	MLF	24 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,185.73	1,892.47
27 15 13 00-0329	MLF	25 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,488.55	1,937.17
27 15 13 00-0330	MLF	36 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	6,528.72	2,255.56
27 15 13 00-0331	MLF	40 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	7,003.55	2,414.20
27 15 13 00-0333	MLF	100 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	11,395.17	3,972.64
27 15 13 00-0334	MLF	250 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	22,179.73	7,317.43
27 15 13 00-0335	MLF	500 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	33,941.45	9,683.58

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0336 MLF 750 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	45,716.83	12,202.79
27 15 13 00-0337 MLF 1200 Pair #20 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	64,540.76	16,737.35
27 15 13 00-0338 MLF 1 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,246.03	691.52
27 15 13 00-0339 MLF 2 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,377.27	716.10
27 15 13 00-0340 MLF 3 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,473.86	740.68
27 15 13 00-0341 MLF 4 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	1,636.95	766.38
27 15 13 00-0342 MLF 5 Pair #22 AWG, Solid, Low Voltage, Plenum Rated, Non-Shielded, Installed In Conduit.....	1,798.38	817.77
27 15 13 00-0343 MLF 6 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,078.69	869.16
27 15 13 00-0344 MLF 8 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,323.96	971.94
27 15 13 00-0345 MLF 12 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	2,968.95	1,281.39
27 15 13 00-0346 MLF 24 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,453.56	1,892.47
27 15 13 00-0347 MLF 25 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	4,674.24	1,937.17
27 15 13 00-0348 MLF 36 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,530.81	2,255.56
27 15 13 00-0349 MLF 40 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	5,929.96	2,414.20
27 15 13 00-0350 MLF 50 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	7,186.76	3,017.47
27 15 13 00-0351 MLF 100 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	9,674.67	3,972.64
27 15 13 00-0352 MLF 250 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	18,538.36	7,317.43
27 15 13 00-0353 MLF 500 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	27,512.88	9,683.58
27 15 13 00-0354 MLF 750 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	36,554.24	12,202.79
27 15 13 00-0355 MLF 1200 Pair #22 AWG, Solid, Non-Shielded, Plenum Rated, Low Voltage, Alarm And Communications Cable, Installed In Conduit.....	51,313.14	16,738.48
 27 15 13 00-0356 Copper Telecommunications Cable (27 15 13)		
27 15 13 00-0357 Indoor Telecommunications Cable (27 15 13 00-0356) Note: Shielded twisted pair cables (STP) includes a metallic foil wrap. Un-shielded twisted pair cables (UTP) excludes any shielding.		
27 15 13 00-0358 Category 3, Indoor Telecommunications Cable (27 15 13 00-0357) Note: Un-shielded twisted pair cables (UTP).		
27 15 13 00-0359 Category 3, Indoor Telecommunications Riser Cable (27 15 13 00-0358)		
27 15 13 00-0360 24 AWG, Category 3, Indoor Telecommunications Riser Cable (27 15 13 00-0359)		
27 15 13 00-0361 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit (27 15 13 00-0360)		
27 15 13 00-0362 MLF 2-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	963.54	513.58
27 15 13 00-0363 MLF 3-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,009.45	513.58
27 15 13 00-0364 MLF 4-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,025.68	513.58
27 15 13 00-0365 MLF 6-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,239.30	586.94
27 15 13 00-0366 MLF 12-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,577.27	586.94
27 15 13 00-0367 MLF 25-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	2,113.90	586.94
27 15 13 00-0368 MLF 50-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	3,373.08	733.68
27 15 13 00-0369 MLF 100-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	6,102.32	1,173.88
27 15 13 00-0370 MLF 150-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	8,266.30	1,320.61
27 15 13 00-0371 MLF 200-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	10,986.88	1,467.36
27 15 13 00-0372 MLF 300-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	16,071.03	2,054.29
27 15 13 00-0373 MLF 400-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	21,066.35	2,538.52
27 15 13 00-0374 MLF 600-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	33,388.50	3,521.65
27 15 13 00-0375 MLF 900-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	54,213.90	7,043.28
27 15 13 00-0376 MLF 1,200-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	73,693.21	10,564.93
 27 15 13 00-0377 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed (27 15 13 00-0360)		
27 15 13 00-0378 MLF 2-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,819.49 513.57	1,027.15
27 15 13 00-0379 MLF 3-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,865.40 513.57	1,027.15
27 15 13 00-0380 MLF 4-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,881.63 513.57	1,027.15
27 15 13 00-0381 MLF 6-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,972.98 513.57	1,027.15

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0382	MLF		12-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	2,310.95	1,027.15
			<i>For Work In Restricted Working Space, Add</i>	513.57	
27 15 13 00-0383	MLF		25-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	3,092.14	1,173.88
			<i>For Work In Restricted Working Space, Add</i>	586.94	
27 15 13 00-0384	MLF		50-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	4,595.88	1,467.36
			<i>For Work In Restricted Working Space, Add</i>	733.68	
27 15 13 00-0385	MLF		100-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	7,080.55	1,760.82
			<i>For Work In Restricted Working Space, Add</i>	880.41	
27 15 13 00-0386	MLF		150-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	9,366.82	1,980.92
			<i>For Work In Restricted Working Space, Add</i>	990.46	
27 15 13 00-0387	MLF		200-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	12,209.67	2,201.02
			<i>For Work In Restricted Working Space, Add</i>	1,100.51	
27 15 13 00-0388	MLF		300-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	17,782.94	3,081.44
			<i>For Work In Restricted Working Space, Add</i>	1,540.72	
27 15 13 00-0389	MLF		400-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	23,194.01	3,815.11
			<i>For Work In Restricted Working Space, Add</i>	1,907.56	
27 15 13 00-0390	MLF		600-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	36,323.21	5,282.46
			<i>For Work In Restricted Working Space, Add</i>	2,641.23	
27 15 13 00-0391	MLF		900-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	60,083.30	10,564.93
			<i>For Work In Restricted Working Space, Add</i>	5,282.46	
27 15 13 00-0392	MLF		1,200-Pair 24 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	82,497.32	15,847.39
			<i>For Work In Restricted Working Space, Add</i>	7,923.70	
27 15 13 00-0393			22 AWG, Category 3, Indoor Telecommunications Riser Cable (27 15 13 00-0393)		
27 15 13 00-0394			22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit (27 15 13 00-0393)		
27 15 13 00-0395	MLF		25-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	3,450.52	586.94
27 15 13 00-0396	MLF		50-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	5,147.24	733.68
27 15 13 00-0397	MLF		100-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	9,409.52	1,173.88
27 15 13 00-0398	MLF		200-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	16,747.40	1,467.36
27 15 13 00-0399	MLF		300-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	24,637.78	2,054.29
27 15 13 00-0400	MLF		400-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	32,100.13	2,538.52
27 15 13 00-0401	MLF		600-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed In Conduit.....	47,607.17	3,521.65
27 15 13 00-0402			22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed (27 15 13 00-0393)		
27 15 13 00-0403	MLF		25-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	4,428.76	1,173.88
			<i>For Work In Restricted Working Space, Add</i>	586.94	
27 15 13 00-0404	MLF		50-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	6,370.04	1,467.36
			<i>For Work In Restricted Working Space, Add</i>	733.68	
27 15 13 00-0405	MLF		100-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	10,387.75	1,760.82
			<i>For Work In Restricted Working Space, Add</i>	880.41	
27 15 13 00-0406	MLF		200-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	17,970.19	2,201.02
			<i>For Work In Restricted Working Space, Add</i>	1,100.51	
27 15 13 00-0407	MLF		300-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	26,349.69	3,081.44
			<i>For Work In Restricted Working Space, Add</i>	1,540.72	
27 15 13 00-0408	MLF		400-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	34,227.79	3,815.11
			<i>For Work In Restricted Working Space, Add</i>	1,907.56	
27 15 13 00-0409	MLF		600-Pair 22 AWG, Category 3, Indoor Telecommunications Riser Cable, Installed Exposed.....	50,541.88	5,282.46
			<i>For Work In Restricted Working Space, Add</i>	2,641.23	
27 15 13 00-0410			Category 3, Indoor Telecommunications Plenum Cable (27 15 13 00-0358)		
27 15 13 00-0411			24 AWG, Category 3, Indoor Telecommunications Plenum Cable (27 15 13 00-0410)		
27 15 13 00-0412			24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit (27 15 13 00-0411)		
27 15 13 00-0413	MLF		2-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,000.67	513.58
27 15 13 00-0414	MLF		3-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,046.40	513.58
27 15 13 00-0415	MLF		4-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,080.59	513.58
27 15 13 00-0416	MLF		6-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,300.97	586.94
27 15 13 00-0417	MLF		12-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,669.37	586.94
27 15 13 00-0418	MLF		25-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	2,668.01	586.94
27 15 13 00-0419	MLF		50-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	4,501.20	733.68
27 15 13 00-0420	MLF		100-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	8,466.02	1,173.88
27 15 13 00-0421	MLF		200-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	14,690.94	1,467.36
27 15 13 00-0422	MLF		300-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	22,023.99	2,054.29
27 15 13 00-0423			24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed (27 15 13 00-0411)		
27 15 13 00-0424	MLF		2-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed.....	1,856.62	1,027.15
			<i>For Work In Restricted Working Space, Add</i>	513.57	
27 15 13 00-0425	MLF		3-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed.....	1,902.35	1,027.15
			<i>For Work In Restricted Working Space, Add</i>	513.57	
27 15 13 00-0426	MLF		4-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed.....	1,936.54	1,027.15
			<i>For Work In Restricted Working Space, Add</i>	513.57	



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0427 MLF 6-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,034.65 513.57	1,027.15
27 15 13 00-0428 MLF 12-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,403.05 513.57	1,027.15
27 15 13 00-0429 MLF 25-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	3,646.25 586.94	1,173.88
27 15 13 00-0430 MLF 50-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	5,724.00 733.68	1,467.36
27 15 13 00-0431 MLF 100-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	9,444.25 880.41	1,760.82
27 15 13 00-0432 MLF 200-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	15,913.73 1,100.51	2,201.02
27 15 13 00-0433 MLF 300-Pair 24 AWG, Category 3, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	23,735.90 1,540.72	3,081.44
27 15 13 00-0434 Category 5E, Indoor Telecommunications Cable <small>(27 15 13 00-0357)</small>		
27 15 13 00-0435 Category 5E, Indoor Telecommunications Riser Cable <small>(27 15 13 00-0434)</small>		
27 15 13 00-0436 Category 5E, Indoor Telecommunications Riser Cable, Installed In Conduit <small>(27 15 13 00-0435)</small>		
27 15 13 00-0437 MLF 4-Pair Solid UTP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed In Conduit.....	986.67	513.58
27 15 13 00-0438 MLF 4-Pair Stranded UTP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,017.29	513.58
27 15 13 00-0439 MLF 4-Pair Solid STP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,140.14	586.94
27 15 13 00-0440 MLF 4-Pair Stranded STP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,170.75	586.94
27 15 13 00-0441 Category 5E, Indoor Telecommunications Riser Cable, Installed Exposed <small>(27 15 13 00-0435)</small>		
27 15 13 00-0442 MLF 4-Pair Solid UTP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,842.62 513.57	1,027.15
27 15 13 00-0443 MLF 4-Pair Stranded UTP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,873.24 513.57	1,027.15
27 15 13 00-0444 MLF 4-Pair Solid STP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,118.38 586.94	1,173.88
27 15 13 00-0445 MLF 4-Pair Stranded STP, 24 AWG, Category 5E, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,148.99 586.94	1,173.88
27 15 13 00-0446 Category 5E, Indoor Telecommunications Plenum Cable <small>(27 15 13 00-0434)</small>		
27 15 13 00-0447 Category 5E, Indoor Telecommunications Plenum Cable, Installed In Conduit <small>(27 15 13 00-0446)</small>		
27 15 13 00-0448 MLF 4-Pair Solid UTP, 24 AWG, Category 5E, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,099.26	513.58
27 15 13 00-0449 MLF 4-Pair Solid STP, 24 AWG, Category 5E, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,460.76	586.94
27 15 13 00-0450 Category 5E, Indoor Telecommunications Plenum Cable, Installed Exposed <small>(27 15 13 00-0446)</small>		
27 15 13 00-0451 MLF 4-Pair Solid UTP, 24 AWG, Category 5E, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,955.21 513.57	1,027.15
27 15 13 00-0452 MLF 4-Pair Solid STP, 24 AWG, Category 5E, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,439.00 586.94	1,173.88
27 15 13 00-0453 Category 6, Indoor Telecommunications Cable <small>(27 15 13 00-0357)</small>		
27 15 13 00-0454 Category 6, Indoor Telecommunications Riser Cable <small>(27 15 13 00-0453)</small>		
27 15 13 00-0455 Category 6, Indoor Telecommunications Riser Cable, Installed In Conduit <small>(27 15 13 00-0454)</small>		
27 15 13 00-0456 MLF 4-Pair Solid UTP, 23 AWG, Category 6, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,210.58	513.58
27 15 13 00-0457 MLF 4-Pair Stranded UTP, 23 AWG, Category 6, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,250.24	513.58
27 15 13 00-0458 Category 6, Indoor Telecommunications Riser Cable, Installed Exposed <small>(27 15 13 00-0454)</small>		
27 15 13 00-0459 MLF 4-Pair Solid UTP, 23 AWG, Category 6, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,066.53 513.57	1,027.15
27 15 13 00-0460 MLF 4-Pair Stranded UTP, 23 AWG, Category 6, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,106.19 513.57	1,027.15
27 15 13 00-0461 Category 6, Indoor Telecommunications Plenum Cable <small>(27 15 13 00-0453)</small>		
27 15 13 00-0462 Category 6, Indoor Telecommunications Plenum Cable, Installed In Conduit <small>(27 15 13 00-0461)</small>		
27 15 13 00-0463 MLF 4-Pair Solid UTP, 23 AWG, Category 6, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,449.35	513.58
27 15 13 00-0464 Category 6, Indoor Telecommunications Plenum Cable, Installed Exposed <small>(27 15 13 00-0461)</small>		
27 15 13 00-0465 MLF 4-Pair Solid UTP, 23 AWG, Category 6, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,305.30 513.57	1,027.15

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 15 13 00-0466	Category 6A, Indoor Telecommunications Cable <small>(27 15 13 00-0357)</small>		
27 15 13 00-0467	Category 6a, Indoor Telecommunications Riser Cable <small>(27 15 13 00-0466)</small>		
27 15 13 00-0468	Category 6a Indoor Telecommunications Riser Cable, Installed In Conduit <small>(27 15 13 00-0467)</small>		
27 15 13 00-0469	MLF 4-Pair Solid UTP, 23 AWG, Category 6A, Indoor Telecommunications Riser Cable, Installed In Conduit.....	1,273.94	513.58
27 15 13 00-0470	Category 6a, Indoor Telecommunications Riser Cable, Installed Exposed <small>(27 15 13 00-0467)</small>		
27 15 13 00-0471	MLF 4-Pair Solid UTP, 23 AWG, Category 6A, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,129.89 513.57	1,027.15
27 15 13 00-0472	Category 6A, Indoor Telecommunications Plenum Cable <small>(27 15 13 00-0466)</small>		
27 15 13 00-0473	Category 6A, Indoor Telecommunications Plenum Cable, Installed In Conduit <small>(27 15 13 00-0472)</small>		
27 15 13 00-0474	MLF 4-Pair Solid UTP, 23 AWG, Category 6A, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	1,603.57	513.58
27 15 13 00-0475	Category 6a, Indoor Telecommunications Plenum Cable, Installed Exposed <small>(27 15 13 00-0472)</small>		
27 15 13 00-0476	MLF 4-Pair Solid UTP, 23 AWG, Category 6A, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,459.52 513.57	1,027.15
27 15 13 00-0477	Category 7, Indoor Telecommunications Cable <small>(27 15 13 00-0357)</small>		
27 15 13 00-0478	Category 7, Indoor Telecommunications Cable, Installed In Conduit <small>(27 15 13 00-0477)</small>		
27 15 13 00-0479	MLF 4-Pair Solid STP, 22 AWG, Category 7, Indoor Telecommunications Riser Cable, Installed In Conduit.....	2,589.57	586.94
27 15 13 00-0480	MLF 4-Pair Solid STP, 22 AWG, Category 7, Indoor Telecommunications Plenum Cable, Installed In Conduit.....	4,213.22	586.94
27 15 13 00-0481	Category 7, Indoor Telecommunications Cable, Installed Exposed <small>(27 15 13 00-0477)</small>		
27 15 13 00-0482	MLF 4-Pair Solid STP, 22 AWG, Category 7, Indoor Telecommunications Riser Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	3,567.81 586.94	1,173.88
27 15 13 00-0483	MLF 4-Pair Solid STP, 22 AWG, Category 7, Indoor Telecommunications Plenum Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	5,191.46 586.94	1,173.88
27 15 13 00-0484	Outdoor Telecommunications Cable <small>(27 15 13 00-0356)</small> Note: Cable buried in trench excludes excavation.		
27 15 13 00-0485	PE-89 Outdoor Telecommunications Cable <small>(27 15 13 00-0484)</small> Note: Includes foam-skin polyolefin insulated conductors.		
27 15 13 00-0486	24 AWG, PE-89 Outdoor Telecommunications Cable <small>(27 15 13 00-0485)</small>		
27 15 13 00-0487	24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit <small>(27 15 13 00-0486)</small>		
27 15 13 00-0488	MLF 6-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	1,847.21	586.94
27 15 13 00-0489	MLF 12-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	2,214.76	1,027.15
27 15 13 00-0490	MLF 25-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	3,128.82	660.31
27 15 13 00-0491	MLF 50-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	4,759.49	733.68
27 15 13 00-0492	MLF 75-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	6,747.85	1,027.15
27 15 13 00-0493	MLF 100-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	8,495.15	1,173.88
27 15 13 00-0494	MLF 200-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	14,608.59	1,320.61
27 15 13 00-0495	MLF 300-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	21,476.21	1,907.56
27 15 13 00-0496	MLF 400-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	28,458.05	2,494.50
27 15 13 00-0497	MLF 600-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	38,649.24	3,374.90
27 15 13 00-0498	MLF 900-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	60,992.04	6,749.81
27 15 13 00-0499	MLF 1,200-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit.....	83,341.61	9,977.98
27 15 13 00-0500	24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench <small>(27 15 13 00-0486)</small>		
27 15 13 00-0501	MLF 6-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	1,663.79	
27 15 13 00-0502	MLF 12-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	2,031.34	
27 15 13 00-0503	MLF 25-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	2,884.27	
27 15 13 00-0504	MLF 50-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	4,514.93	
27 15 13 00-0505	MLF 75-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	6,381.01	
27 15 13 00-0506	MLF 100-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	7,883.75	
27 15 13 00-0507	MLF 200-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	14,364.04	
27 15 13 00-0508	MLF 300-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	20,742.54	
27 15 13 00-0509	MLF 400-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	26,929.56	
27 15 13 00-0510	MLF 600-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	35,959.10	
27 15 13 00-0511	MLF 900-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	53,655.28	
27 15 13 00-0512	MLF 1,200-Pair 24 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench.....	72,581.03	



Communications	27	27
Structured Cabling	27 10	
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 13 00-0513 22 AWG, PE-89 Outdoor Telecommunications Cable <small>(27 15 13 00-0485)</small>		
27 15 13 00-0514 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit <small>(27 15 13 00-0513)</small>		
27 15 13 00-0515 MLF 6-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	2,080.88	586.94
27 15 13 00-0516 MLF 12-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	2,651.32	586.94
27 15 13 00-0517 MLF 25-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	4,022.42	660.31
27 15 13 00-0518 MLF 50-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	6,349.99	733.68
27 15 13 00-0519 MLF 75-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	9,233.36	1,027.15
27 15 13 00-0520 MLF 100-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	11,874.14	1,173.88
27 15 13 00-0521 MLF 200-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	21,127.13	1,320.61
27 15 13 00-0522 MLF 300-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	30,772.96	1,907.56
27 15 13 00-0523 MLF 400-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	40,990.87	2,494.50
27 15 13 00-0524 MLF 600-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	60,535.49	3,374.90
27 15 13 00-0525 MLF 900-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	88,632.57	6,749.81
27 15 13 00-0526 MLF 1,200-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	124,694.38	9,977.98
27 15 13 00-0527 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench <small>(27 15 13 00-0513)</small>		
27 15 13 00-0528 MLF 6-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	1,897.46	
27 15 13 00-0529 MLF 12-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	2,467.90	
27 15 13 00-0530 MLF 25-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	3,777.87	
27 15 13 00-0531 MLF 50-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	6,105.43	
27 15 13 00-0532 MLF 75-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	8,866.52	
27 15 13 00-0533 MLF 100-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	11,507.30	
27 15 13 00-0534 MLF 200-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	20,882.58	
27 15 13 00-0535 MLF 300-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	30,039.29	
27 15 13 00-0536 MLF 400-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	39,462.38	
27 15 13 00-0537 MLF 600-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	57,845.35	
27 15 13 00-0538 MLF 900-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	81,295.81	
27 15 13 00-0539 MLF 1,200-Pair 22 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	113,933.80	
27 15 13 00-0540 19 AWG, PE-89 Outdoor Telecommunications Cable <small>(27 15 13 00-0485)</small>		
27 15 13 00-0541 19 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit <small>(27 15 13 00-0540)</small>		
27 15 13 00-0542 MLF 25-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	6,777.19	660.31
27 15 13 00-0543 MLF 50-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	11,734.68	733.68
27 15 13 00-0544 MLF 75-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	18,811.74	1,027.15
27 15 13 00-0545 MLF 100-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Installed In Conduit	22,539.66	1,173.88
27 15 13 00-0546 19 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench <small>(27 15 13 00-0540)</small>		
27 15 13 00-0547 MLF 25-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	6,532.64	
27 15 13 00-0548 MLF 50-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	11,490.12	
27 15 13 00-0549 MLF 75-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	18,444.90	
27 15 13 00-0550 MLF 100-Pair 19 AWG, PE-89 Outdoor Telecommunications Cable, Buried In Trench	22,172.82	
27 15 13 00-0551 PE-39 Outdoor Telecommunications Cable <small>(27 15 13 00-0484)</small>		
Note: Includes solid polyolefin insulated conductors.		
27 15 13 00-0552 24 AWG, PE-39 Outdoor Telecommunications Cable <small>(27 15 13 00-0551)</small>		
27 15 13 00-0553 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit <small>(27 15 13 00-0552)</small>		
27 15 13 00-0554 MLF 6-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	2,613.75	1,027.15
27 15 13 00-0555 MLF 12-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	3,063.41	1,027.15
27 15 13 00-0556 MLF 25-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	3,970.59	1,027.15
27 15 13 00-0557 MLF 50-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	5,604.23	1,027.15
27 15 13 00-0558 MLF 100-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	8,917.51	1,027.15
27 15 13 00-0559 MLF 200-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	16,133.82	1,320.61
27 15 13 00-0560 MLF 300-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	23,556.69	1,907.56
27 15 13 00-0561 MLF 400-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	30,993.09	2,494.50
27 15 13 00-0562 MLF 600-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	42,350.59	3,374.90
27 15 13 00-0563 MLF 900-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	65,778.81	6,749.81
27 15 13 00-0564 MLF 1,200-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	95,756.56	9,977.98
27 15 13 00-0565 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench <small>(27 15 13 00-0552)</small>		
27 15 13 00-0566 MLF 6-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	2,246.91	
27 15 13 00-0567 MLF 12-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	2,696.57	
27 15 13 00-0568 MLF 25-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	3,603.75	
27 15 13 00-0569 MLF 50-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	5,237.39	
27 15 13 00-0570 MLF 100-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	8,550.67	
27 15 13 00-0571 MLF 200-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	15,889.27	
27 15 13 00-0572 MLF 300-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	22,823.02	
27 15 13 00-0573 MLF 400-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	29,464.60	
27 15 13 00-0574 MLF 600-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	39,660.45	
27 15 13 00-0575 MLF 900-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	58,442.05	

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 15 13 00-0576	MLF 1,200-Pair 24 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	84,995.98	
27 15 13 00-0577	22 AWG, PE-39 Outdoor Telecommunications Cable (27 15 13 00-0551)		
27 15 13 00-0578	22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit (27 15 13 00-0577)		
27 15 13 00-0579	MLF 6-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	2,873.71	1,027.15
27 15 13 00-0580	MLF 12-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	3,534.47	1,027.15
27 15 13 00-0581	MLF 25-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	4,940.60	1,027.15
27 15 13 00-0582	MLF 50-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	7,527.38	1,027.15
27 15 13 00-0583	MLF 100-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	12,925.65	1,027.15
27 15 13 00-0584	MLF 200-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	23,847.41	1,320.61
27 15 13 00-0585	MLF 300-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	34,942.90	1,907.56
27 15 13 00-0586	MLF 400-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	44,764.49	2,494.50
27 15 13 00-0587	MLF 600-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	62,528.86	3,374.90
27 15 13 00-0588	MLF 900-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	98,452.11	6,749.81
27 15 13 00-0589	22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench (27 15 13 00-0577)		
27 15 13 00-0590	MLF 6-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	2,506.87	
27 15 13 00-0591	MLF 12-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	3,167.63	
27 15 13 00-0592	MLF 25-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	4,573.76	
27 15 13 00-0593	MLF 50-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	7,160.54	
27 15 13 00-0594	MLF 100-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	12,558.81	
27 15 13 00-0595	MLF 200-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	23,602.86	
27 15 13 00-0596	MLF 300-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	34,209.23	
27 15 13 00-0597	MLF 400-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	43,236.00	
27 15 13 00-0598	MLF 600-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	59,838.72	
27 15 13 00-0599	MLF 900-Pair 22 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	91,115.35	
27 15 13 00-0600	19 AWG, PE-39 Outdoor Telecommunications Cable (27 15 13 00-0551)		
27 15 13 00-0601	19 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit (27 15 13 00-0600)		
27 15 13 00-0602	MLF 25-Pair 19 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	8,055.51	1,027.15
27 15 13 00-0603	MLF 50-Pair 19 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	13,301.84	1,027.15
27 15 13 00-0604	MLF 100-Pair 19 AWG, PE-39 Outdoor Telecommunications Cable, Installed In Conduit	24,180.88	1,027.15
27 15 13 00-0605	19 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench (27 15 13 00-0600)		
27 15 13 00-0606	MLF 25-Pair 19 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	7,688.67	
27 15 13 00-0607	MLF 50-Pair 19 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	12,935.00	
27 15 13 00-0608	MLF 100-Pair 19 AWG, PE-39 Outdoor Telecommunications Cable, Buried In Trench	23,814.04	
27 15 13 00-0609	(Aerial) Outdoor Telecommunications Cable (27 15 13 00-0484)		
	Note: Includes support wire.		
27 15 13 00-0610	24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles (27 15 13 00-0609)		
27 15 13 00-0611	MLF 6-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	7,646.20	2,071.65
27 15 13 00-0612	MLF 12-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	8,020.34	2,071.65
27 15 13 00-0613	MLF 25-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	8,949.26	2,071.65
27 15 13 00-0614	MLF 50-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	10,669.13	2,071.65
27 15 13 00-0615	MLF 100-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	13,991.05	2,071.65
27 15 13 00-0616	MLF 200-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	21,077.04	2,278.82
27 15 13 00-0617	MLF 300-Pair 24 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	28,204.13	2,485.98
27 15 13 00-0618	22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles (27 15 13 00-0609)		
27 15 13 00-0619	MLF 6-Pair 22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	8,093.82	2,071.65
27 15 13 00-0620	MLF 12-Pair 22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	8,646.59	2,071.65
27 15 13 00-0621	MLF 25-Pair 22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	9,978.00	2,071.65
27 15 13 00-0622	MLF 50-Pair 22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	12,608.31	2,071.65
27 15 13 00-0623	MLF 100-Pair 22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	18,491.09	2,071.65
27 15 13 00-0624	MLF 200-Pair 22 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	29,092.42	2,278.82
27 15 13 00-0625	19 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles (27 15 13 00-0609)		
27 15 13 00-0626	MLF 6-Pair 19 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	8,685.61	2,071.65
27 15 13 00-0627	MLF 12-Pair 19 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	9,935.68	2,071.65
27 15 13 00-0628	MLF 25-Pair 19 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	12,393.52	2,071.65
27 15 13 00-0629	MLF 50-Pair 19 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	17,309.24	2,071.65
27 15 13 00-0630	MLF 100-Pair 19 AWG, (Aerial) Outdoor Telecommunications Cable, Installed On Poles	27,280.63	2,071.65

27 15 23 Communications Optical Fiber Horizontal Cabling (27 15)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc.



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 15 23 00-0001	Indoor Fiber Optic Cable <small>(27 15 23)</small> Note: Distribution cables contain multiple tight-buffered fibers bundled under the same jacket with Kevlar strength members. Break-out cables contain multiple individually reinforced and jacketed simplex cables bundled together.		
27 15 23 00-0002	Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0001)</small> Note: Excludes conduit or innerduct.		
27 15 23 00-0003	Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0002)</small>		
27 15 23 00-0004	Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0003)</small>		
27 15 23 00-0005	Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0004)</small>		
27 15 23 00-0006	MLF 1-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,056.82	440.20
27 15 23 00-0007	MLF 2-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,154.20	440.20
27 15 23 00-0008	MLF 4-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,186.72	440.20
27 15 23 00-0009	MLF 6-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,302.51	440.20
	<i>For Aluminum Armored Cable, Add</i>	1,283.52	
	<i>For Steel Armored Cable, Add</i>	1,466.02	
27 15 23 00-0010	MLF 8-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,335.71	440.20
27 15 23 00-0011	MLF 12-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,536.40	440.20
	<i>For Aluminum Armored Cable, Add</i>	1,412.60	
	<i>For Steel Armored Cable, Add</i>	1,518.20	
27 15 23 00-0012	MLF 18-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,630.04	513.58
27 15 23 00-0013	MLF 24-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,702.07	513.58
	<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,839.80	
	<i>For Steel Armored Cable, Add</i>	1,878.60	
27 15 23 00-0014	MLF 36-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	4,516.81	513.58
	<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,939.49	
	<i>For Steel Armored Cable, Add</i>	1,610.56	
27 15 23 00-0015	MLF 48-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	4,674.83	513.58
	<i>For Aluminum Armored Cable With Sub-Units, Add</i>	2,034.91	
	<i>For Steel Armored Cable, Add</i>	1,688.23	
27 15 23 00-0016	MLF 60-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,671.32	513.58
27 15 23 00-0017	MLF 72-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,936.32	513.58
27 15 23 00-0018	MLF 96-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,330.21	513.58
27 15 23 00-0019	MLF 120-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,848.63	586.94
27 15 23 00-0020	MLF 144-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	11,749.43	586.94
27 15 23 00-0021	50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0004)</small>		
27 15 23 00-0022	MLF 1-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,084.86	440.20
27 15 23 00-0023	MLF 2-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,207.70	440.20
27 15 23 00-0024	MLF 4-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,489.14	440.20
27 15 23 00-0025	MLF 6-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,785.40	440.20
	<i>For Aluminum Armored Cable, Add</i>	937.78	
	<i>For Steel Armored Cable, Add</i>	1,242.26	
27 15 23 00-0026	MLF 8-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,066.85	440.20
27 15 23 00-0027	MLF 12-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,644.56	440.20
	<i>For Aluminum Armored Cable, Add</i>	902.31	
	<i>For Steel Armored Cable, Add</i>	1,299.04	
27 15 23 00-0028	MLF 18-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,914.97	513.58
27 15 23 00-0029	MLF 24-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,003.60	513.58
	<i>For Aluminum Armored Cable With Sub-Units, Add</i>	952.11	
	<i>For Steel Armored Cable, Add</i>	952.11	
27 15 23 00-0030	MLF 36-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,077.42	513.58
27 15 23 00-0031	MLF 48-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,151.24	513.58
	<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,699.05	
27 15 23 00-0032	MLF 60-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	11,225.06	513.58
27 15 23 00-0033	MLF 72-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	13,298.88	513.58
27 15 23 00-0034	MLF 96-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	17,461.33	513.58
	<i>For Aluminum Armored Cable With Sub-Units, Add</i>	7,317.62	
27 15 23 00-0035	MLF 120-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	21,731.24	586.94
27 15 23 00-0036	MLF 144-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	25,878.88	586.94

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
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27 15 23 00-0037	62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0004)</small>		
27 15 23 00-0038	MLF 1-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,102.42	440.20
27 15 23 00-0039	MLF 2-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,231.40	440.20
27 15 23 00-0040	MLF 4-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,526.92	440.20
27 15 23 00-0041	MLF 6-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,837.99	440.20
27 15 23 00-0042	MLF 8-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,133.51	440.20
27 15 23 00-0043	MLF 12-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,740.10	440.20
27 15 23 00-0044	MLF 18-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,017.92	513.58
27 15 23 00-0045	MLF 24-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,210.98	513.58
27 15 23 00-0046	MLF 36-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,388.49	513.58
27 15 23 00-0047	MLF 48-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,566.00	513.58
27 15 23 00-0048	MLF 60-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	11,743.52	513.58
27 15 23 00-0049	MLF 72-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	13,921.03	513.58
27 15 23 00-0050	MLF 96-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	18,291.60	513.58
27 15 23 00-0051	MLF 120-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	22,768.89	586.94
27 15 23 00-0052	MLF 144-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	27,123.92	586.94
27 15 23 00-0053	Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0003)</small>		
27 15 23 00-0054	Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0053)</small>		
27 15 23 00-0055	MLF 2-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,959.40	440.20
27 15 23 00-0056	MLF 4-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,322.60	440.20
27 15 23 00-0057	MLF 6-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,121.60	440.20
27 15 23 00-0058	MLF 8-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,502.92	440.20
27 15 23 00-0059	MLF 12-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	6,100.69	440.20
27 15 23 00-0060	MLF 18-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	6,439.88	513.58
27 15 23 00-0061	MLF 24-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	8,113.54	513.58
27 15 23 00-0062	MLF 36-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	11,433.61	513.58
27 15 23 00-0063	MLF 48-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	14,021.29	513.58
27 15 23 00-0064	50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0053)</small>		
27 15 23 00-0065	MLF 2-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,338.36	440.20
27 15 23 00-0066	MLF 4-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,844.31	440.20
27 15 23 00-0067	MLF 6-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,678.50	440.20
27 15 23 00-0068	MLF 8-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	4,918.35	440.20
27 15 23 00-0069	MLF 12-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,433.22	440.20
27 15 23 00-0070	MLF 18-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,264.06	513.58
27 15 23 00-0071	MLF 24-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,122.18	513.58
27 15 23 00-0072	MLF 36-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	10,392.57	513.58
27 15 23 00-0073	MLF 48-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	15,846.72	513.58
27 15 23 00-0074	62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0053)</small>		
27 15 23 00-0075	MLF 2-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,418.59	440.20
27 15 23 00-0076	MLF 4-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,949.84	440.20
27 15 23 00-0077	MLF 6-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,825.75	440.20
27 15 23 00-0078	MLF 8-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,127.59	440.20
27 15 23 00-0079	MLF 12-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,668.20	440.20



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0080	MLF		18-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,584.47	513.58
27 15 23 00-0081	MLF		24-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,535.49	513.58
27 15 23 00-0082	MLF		36-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	10,869.40	513.58
27 15 23 00-0083	MLF		48-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	16,596.25	513.58
27 15 23 00-0084			Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <i>(27 15 23 00-0082)</i>		
27 15 23 00-0085			Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <i>(27 15 23 00-0084)</i>		
27 15 23 00-0086			Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <i>(27 15 23 00-0085)</i>		
27 15 23 00-0087	MLF		1-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,096.06	440.20
27 15 23 00-0088	MLF		2-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,101.53	440.20
27 15 23 00-0089	MLF		4-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,388.61	440.20
27 15 23 00-0090	MLF		6-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,422.20	440.20
			<i>For Aluminum Armored Cable, Add</i>	1,256.02	
			<i>For Steel Armored Cable, Add</i>	4,973.19	
27 15 23 00-0091	MLF		8-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,591.31	440.20
27 15 23 00-0092	MLF		12-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,622.94	440.20
			<i>For Aluminum Armored Cable, Add</i>	1,326.10	
			<i>For Steel Armored Cable, Add</i>	5,309.90	
27 15 23 00-0093	MLF		18-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,755.00	513.58
27 15 23 00-0094	MLF		24-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	4,842.14	513.58
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,084.57	
			<i>For Steel Armored Cable, Add</i>	5,001.91	
27 15 23 00-0095	MLF		36-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,719.67	513.58
27 15 23 00-0096	MLF		48-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,922.37	513.58
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,662.87	
			<i>For Steel Armored Cable, Add</i>	5,865.24	
27 15 23 00-0097	MLF		60-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,571.92	513.58
27 15 23 00-0098	MLF		72-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	11,333.13	513.58
27 15 23 00-0099	MLF		96-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	14,993.26	513.58
27 15 23 00-0100			50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <i>(27 15 23 00-0085)</i>		
27 15 23 00-0101	MLF		1-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,082.97	440.20
27 15 23 00-0102	MLF		2-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,706.55	440.20
27 15 23 00-0103	MLF		4-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,302.53	440.20
27 15 23 00-0104	MLF		6-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,910.47	440.20
			<i>For Aluminum Armored Cable, Add</i>	-184.38	
			<i>For Steel Armored Cable, Add</i>	187.44	
27 15 23 00-0105	MLF		8-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,492.99	440.20
27 15 23 00-0106	MLF		12-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,999.11	440.20
			<i>For Aluminum Armored Cable, Add</i>	-477.57	
			<i>For Steel Armored Cable, Add</i>	-55.49	
27 15 23 00-0107	MLF		18-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,117.56	513.58
27 15 23 00-0108	MLF		24-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,440.48	513.58
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	2,550.22	
			<i>For Steel Armored Cable, Add</i>	5,947.85	
27 15 23 00-0109	MLF		36-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	13,732.74	513.58
27 15 23 00-0110	MLF		48-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	18,025.00	513.58
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	7,572.77	
27 15 23 00-0111	MLF		60-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	22,317.26	513.58
27 15 23 00-0112	MLF		72-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	26,609.52	513.58
27 15 23 00-0113	MLF		96-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	35,224.70	513.58
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	15,145.55	
27 15 23 00-0114			62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit <i>(27 15 23 00-0085)</i>		
27 15 23 00-0115	MLF		1-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,100.44	440.20

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0116 MLF 2-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	1,755.20	440.20
27 15 23 00-0117 MLF 4-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	2,380.97	440.20
27 15 23 00-0118 MLF 6-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,019.31	440.20
27 15 23 00-0119 MLF 8-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,630.96	440.20
27 15 23 00-0120 MLF 12-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	4,162.38	440.20
27 15 23 00-0121 MLF 18-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,330.64	513.58
27 15 23 00-0122 MLF 24-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	9,869.71	513.58
27 15 23 00-0123 MLF 36-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	14,376.58	513.58
27 15 23 00-0124 MLF 48-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	18,883.45	513.58
27 15 23 00-0125 MLF 60-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	23,390.32	513.58
27 15 23 00-0126 MLF 72-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	27,897.20	513.58
27 15 23 00-0127 MLF 96-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	36,943.14	513.58
27 15 23 00-0128 Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit (27 15 23 00-0084)		
27 15 23 00-0129 Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit (27 15 23 00-0128)		
27 15 23 00-0130 MLF 2-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,070.13	440.20
27 15 23 00-0131 MLF 4-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	3,512.02	440.20
27 15 23 00-0132 MLF 6-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	4,574.32	440.20
27 15 23 00-0133 MLF 8-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	5,615.42	440.20
27 15 23 00-0134 MLF 12-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,276.98	440.20
27 15 23 00-0135 MLF 18-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	10,371.30	513.58
27 15 23 00-0136 MLF 24-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	14,946.82	513.58
27 15 23 00-0137 MLF 36-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	18,076.83	513.58
27 15 23 00-0138 MLF 48-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	22,550.02	513.58
27 15 23 00-0139 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit (27 15 23 00-0128)		
27 15 23 00-0140 MLF 2-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	6,232.95	440.20
27 15 23 00-0141 MLF 4-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	7,838.90	440.20
27 15 23 00-0142 MLF 6-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	10,705.46	440.20
27 15 23 00-0143 MLF 8-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	12,166.42	440.20
27 15 23 00-0144 MLF 12-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	14,432.83	440.20
27 15 23 00-0145 MLF 18-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	19,803.22	513.58
27 15 23 00-0146 MLF 24-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	23,308.80	513.58
27 15 23 00-0147 MLF 36-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	25,742.76	513.58
27 15 23 00-0148 MLF 48-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	41,325.84	513.58
27 15 23 00-0149 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit (27 15 23 00-0128)		
27 15 23 00-0150 MLF 2-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	6,507.92	440.20
27 15 23 00-0151 MLF 4-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	8,194.16	440.20
27 15 23 00-0152 MLF 6-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	11,204.05	440.20
27 15 23 00-0153 MLF 8-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	12,738.06	440.20
27 15 23 00-0154 MLF 12-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	15,117.78	440.20
27 15 23 00-0155 MLF 18-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	20,750.59	513.58
27 15 23 00-0156 MLF 24-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	24,431.44	513.58
27 15 23 00-0157 MLF 36-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit.....	26,987.10	513.58



Communications	27	27
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Communications Horizontal Cabling	27 15	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0158	MLF		48-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed In Conduit	43,349.33	513.58
27 15 23 00-0159			Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0001)</small> Note: For non-conduit installations such as cable trays, surface runways, etc.		
27 15 23 00-0160			Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0159)</small>		
27 15 23 00-0161			Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0160)</small>		
27 15 23 00-0162			Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0161)</small>		
27 15 23 00-0163	MLF		1-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,301.37 293.47	586.94
27 15 23 00-0164	MLF		2-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,398.75 293.47	586.94
27 15 23 00-0165	MLF		4-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,431.27 293.47	586.94
27 15 23 00-0166	MLF		6-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,547.06 1,283.52 1,466.02 293.47	586.94
27 15 23 00-0167	MLF		8-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,580.26 293.47	586.94
27 15 23 00-0168	MLF		12-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,780.95 1,412.60 1,518.20 293.47	586.94
27 15 23 00-0169	MLF		18-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	2,874.59 330.15	660.31
27 15 23 00-0170	MLF		24-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable With Sub-Units, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	3,946.62 1,839.80 1,878.60 330.15	660.31
27 15 23 00-0171	MLF		36-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable With Sub-Units, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,761.36 1,939.49 1,610.56 330.15	660.31
27 15 23 00-0172	MLF		48-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable With Sub-Units, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	4,919.38 2,034.91 1,688.23 330.15	660.31
27 15 23 00-0173	MLF		60-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,915.87 330.15	660.31
27 15 23 00-0174	MLF		72-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	6,180.87 330.15	660.31
27 15 23 00-0175	MLF		96-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	7,574.76 330.15	660.31
27 15 23 00-0176	MLF		120-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	10,093.19 366.84	733.68
27 15 23 00-0177	MLF		144-Fiber, Singlemode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	11,993.99 366.84	733.68
27 15 23 00-0178			50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0161)</small>		
27 15 23 00-0179	MLF		1-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,329.41 293.47	586.94
27 15 23 00-0180	MLF		2-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,452.25 293.47	586.94
27 15 23 00-0181	MLF		4-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,733.69 293.47	586.94
27 15 23 00-0182	MLF		6-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,029.95 937.78 1,242.26 293.47	586.94
27 15 23 00-0183	MLF		8-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	2,311.40 293.47	586.94
27 15 23 00-0184	MLF		12-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	2,889.11 902.31 1,299.04 293.47	586.94
27 15 23 00-0185	MLF		18-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,159.52 330.15	660.31
27 15 23 00-0186	MLF		24-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable With Sub-Units, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	5,248.15 952.11 952.11 330.15	660.31
27 15 23 00-0187	MLF		36-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	7,321.97 330.15	660.31

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0188	MLF		48-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable With Sub-Units, Add</i> <i>For Work In Restricted Working Space, Add</i>	9,395.79 1,699.05 330.15	660.31
27 15 23 00-0189	MLF		60-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed ... <i>For Work In Restricted Working Space, Add</i>	11,469.61 330.15	660.31
27 15 23 00-0190	MLF		72-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed ... <i>For Work In Restricted Working Space, Add</i>	13,543.43 330.15	660.31
27 15 23 00-0191	MLF		96-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed ... <i>For Aluminum Armored Cable With Sub-Units, Add</i> <i>For Work In Restricted Working Space, Add</i>	17,705.88 7,317.62 330.15	660.31
27 15 23 00-0192	MLF		120-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	21,975.80 366.84	733.68
27 15 23 00-0193	MLF		144-Fiber, 50 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	26,123.44 366.84	733.68
27 15 23 00-0194			62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0161)</small>		
27 15 23 00-0195	MLF		1-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,346.97 293.47	586.94
27 15 23 00-0196	MLF		2-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,475.95 293.47	586.94
27 15 23 00-0197	MLF		4-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	1,771.47 293.47	586.94
27 15 23 00-0198	MLF		6-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,082.54 293.47	586.94
27 15 23 00-0199	MLF		8-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,378.06 293.47	586.94
27 15 23 00-0200	MLF		12-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,984.65 293.47	586.94
27 15 23 00-0201	MLF		18-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	3,262.47 330.15	660.31
27 15 23 00-0202	MLF		24-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	5,455.53 330.15	660.31
27 15 23 00-0203	MLF		36-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	7,633.04 330.15	660.31
27 15 23 00-0204	MLF		48-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	9,810.55 330.15	660.31
27 15 23 00-0205	MLF		60-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	11,988.07 330.15	660.31
27 15 23 00-0206	MLF		72-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	14,165.58 330.15	660.31
27 15 23 00-0207	MLF		96-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	18,536.15 330.15	660.31
27 15 23 00-0208	MLF		120-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	23,013.45 366.84	733.68
27 15 23 00-0209	MLF		144-Fiber, 62.5 Micron Multimode, Distribution Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	27,368.48 366.84	733.68
27 15 23 00-0210			Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0160)</small>		
27 15 23 00-0211			Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0210)</small>		
27 15 23 00-0212	MLF		2-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,203.95 293.47	586.94
27 15 23 00-0213	MLF		4-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	2,567.15 293.47	586.94
27 15 23 00-0214	MLF		6-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	3,366.15 293.47	586.94
27 15 23 00-0215	MLF		8-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	3,747.47 293.47	586.94
27 15 23 00-0216	MLF		12-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	6,345.24 293.47	586.94
27 15 23 00-0217	MLF		18-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed..... <i>For Work In Restricted Working Space, Add</i>	6,684.43 330.15	660.31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0218 MLF 24-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	8,358.09 330.15	660.31
27 15 23 00-0219 MLF 36-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	11,678.16 330.15	660.31
27 15 23 00-0220 MLF 48-Fiber, Singlemode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	14,265.84 330.15	660.31
27 15 23 00-0221 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0210)</small>		
27 15 23 00-0222 MLF 2-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	2,582.91 293.47	586.94
27 15 23 00-0223 MLF 4-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,088.86 293.47	586.94
27 15 23 00-0224 MLF 6-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,923.05 293.47	586.94
27 15 23 00-0225 MLF 8-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,162.90 293.47	586.94
27 15 23 00-0226 MLF 12-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,677.77 293.47	586.94
27 15 23 00-0227 MLF 18-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	7,508.61 330.15	660.31
27 15 23 00-0228 MLF 24-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	9,366.73 330.15	660.31
27 15 23 00-0229 MLF 36-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	10,637.12 330.15	660.31
27 15 23 00-0230 MLF 48-Fiber, 50 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	16,091.27 330.15	660.31
27 15 23 00-0231 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0210)</small>		
27 15 23 00-0232 MLF 2-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	2,663.14 293.47	586.94
27 15 23 00-0233 MLF 4-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,194.39 293.47	586.94
27 15 23 00-0234 MLF 6-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	4,070.30 293.47	586.94
27 15 23 00-0235 MLF 8-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,372.14 293.47	586.94
27 15 23 00-0236 MLF 12-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	5,912.75 293.47	586.94
27 15 23 00-0237 MLF 18-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	7,829.02 330.15	660.31
27 15 23 00-0238 MLF 24-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	9,780.04 330.15	660.31
27 15 23 00-0239 MLF 36-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	11,113.95 330.15	660.31
27 15 23 00-0240 MLF 48-Fiber, 62.5 Micron Multimode, Break-Out Riser Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	16,840.80 330.15	660.31
27 15 23 00-0241 Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0159)</small>		
27 15 23 00-0242 Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0241)</small>		
27 15 23 00-0243 Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0242)</small>		
27 15 23 00-0244 MLF 1-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,340.61 293.47	586.94
27 15 23 00-0245 MLF 2-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,346.08 293.47	586.94
27 15 23 00-0246 MLF 4-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,633.16 293.47	586.94
27 15 23 00-0247 MLF 6-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,666.75 1,256.02 4,973.19 293.47	586.94
27 15 23 00-0248 MLF 8-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	1,835.86 293.47	586.94
27 15 23 00-0249 MLF 12-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Aluminum Armored Cable, Add</i> <i>For Steel Armored Cable, Add</i> <i>For Work In Restricted Working Space, Add</i>	1,867.49 1,326.10 5,309.90 293.47	586.94
27 15 23 00-0250 MLF 18-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <i>For Work In Restricted Working Space, Add</i>	3,999.55 330.15	660.31

27 Communications

27 10 Structured Cabling

27 15 Communications Horizontal Cabling



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0251	MLF		24-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	5,086.69	660.31
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,084.57	
			<i>For Steel Armored Cable, Add</i>	5,001.91	
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0252	MLF		36-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	7,964.22	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0253	MLF		48-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	8,166.92	660.31
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	1,662.87	
			<i>For Steel Armored Cable, Add</i>	5,865.24	
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0254	MLF		60-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	9,816.47	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0255	MLF		72-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	11,577.68	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0256	MLF		96-Fiber, Singlemode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	15,237.81	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0257			50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0242)</small>		
27 15 23 00-0258	MLF		1-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	1,327.52	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0259	MLF		2-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	1,951.10	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0260	MLF		4-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	2,547.08	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0261	MLF		6-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	3,155.02	586.94
			<i>For Aluminum Armored Cable, Add</i>	-184.38	
			<i>For Steel Armored Cable, Add</i>	187.44	
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0262	MLF		8-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	3,737.54	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0263	MLF		12-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	4,243.66	586.94
			<i>For Aluminum Armored Cable, Add</i>	-477.57	
			<i>For Steel Armored Cable, Add</i>	-55.49	
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0264	MLF		18-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	5,362.11	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0265	MLF		24-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	9,685.03	660.31
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	2,550.22	
			<i>For Steel Armored Cable, Add</i>	5,947.85	
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0266	MLF		36-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	13,977.29	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0267	MLF		48-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	18,269.55	660.31
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	7,572.77	
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0268	MLF		60-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	22,561.81	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0269	MLF		72-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	26,854.07	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0270	MLF		96-Fiber, 50 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	35,469.25	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
			<i>For Aluminum Armored Cable With Sub-Units, Add</i>	15,145.55	
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0271			62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0242)</small>		
27 15 23 00-0272	MLF		1-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	1,344.99	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0273	MLF		2-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	1,999.75	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0274	MLF		4-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	2,625.52	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0275	MLF		6-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	3,263.86	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0276	MLF		8-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	3,875.51	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0277	MLF		12-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	4,406.93	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0278	MLF		18-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	5,575.19	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0279	MLF		24-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	10,114.26	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0280	MLF		36-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	14,621.13	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0281	MLF		48-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	19,128.00	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0282	MLF		60-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	23,634.87	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0283	MLF		72-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	28,141.75	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0284	MLF		96-Fiber, 62.5 Micron Multimode, Distribution Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	37,187.69	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0285			Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0241)</small>		
27 15 23 00-0286			Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0285)</small>		
27 15 23 00-0287	MLF		2-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	3,314.68	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0288	MLF		4-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	3,756.57	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0289	MLF		6-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	4,818.87	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0290	MLF		8-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	5,859.97	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0291	MLF		12-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	7,521.53	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0292	MLF		18-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	10,615.85	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0293	MLF		24-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	15,191.37	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0294	MLF		36-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	18,321.38	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0295	MLF		48-Fiber, Singlemode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	22,794.57	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0296			50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed <small>(27 15 23 00-0285)</small>		
27 15 23 00-0297	MLF		2-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	6,477.50	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0298	MLF		4-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	8,083.45	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0299	MLF		6-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	10,950.01	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0300	MLF		8-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	12,410.97	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0301	MLF		12-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	14,677.38	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0302	MLF		18-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	20,047.77	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0303	MLF		24-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	23,553.35	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0304	MLF		36-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	25,987.31	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0305	MLF		48-Fiber, 50 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed	41,570.39	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
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27 15 23 00-0306	62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed ^(27 15 23 00-0285)		
27 15 23 00-0307	MLF 2-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	6,752.47	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0308	MLF 4-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	8,438.71	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0309	MLF 6-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	11,448.60	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0310	MLF 8-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	12,982.61	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0311	MLF 12-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	15,362.33	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0312	MLF 18-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	20,995.14	660.31
	<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0313	MLF 24-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	24,675.99	660.31
	<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0314	MLF 36-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	27,231.65	660.31
	<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0315	MLF 48-Fiber, 62.5 Micron Multimode, Break-Out Plenum Rated, Tight Buffer, Indoor Fiber Optic Cable, Installed Exposed.....	43,593.88	660.31
	<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0316	Hybrid, Indoor Fiber Optic Cable, Installed In Conduit ^(27 15 23 00-0001) Note: Singlemode and multimode combination cable. Excludes conduit or innerduct.		
27 15 23 00-0317	Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit ^(27 15 23 00-0316)		
27 15 23 00-0318	MLF 6-Fiber, 2 Singlemode/4 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	1,525.12	440.20
27 15 23 00-0319	MLF 12-Fiber, 6 Singlemode/6 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	2,595.51	440.20
27 15 23 00-0320	MLF 24-Fiber, 12 Singlemode/12 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	6,013.67	513.58
27 15 23 00-0321	MLF 48-Fiber, 24 Singlemode/24 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	9,492.19	513.58
27 15 23 00-0322	Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit ^(27 15 23 00-0316)		
27 15 23 00-0323	MLF 6-Fiber, 2 Singlemode/4 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	1,821.24	440.20
27 15 23 00-0324	MLF 12-Fiber, 6 Singlemode/6 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	2,637.18	440.20
27 15 23 00-0325	MLF 24-Fiber, 12 Singlemode/12 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	7,141.68	513.58
27 15 23 00-0326	MLF 48-Fiber, 24 Singlemode/24 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed In Conduit.....	12,334.63	513.58
27 15 23 00-0327	Hybrid, Indoor Fiber Optic Cable, Installed Exposed ^(27 15 23 00-0001) Note: Singlemode and multimode combination cable. For non-conduit installations such as cable trays, surface runways, etc.		
27 15 23 00-0328	Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed ^(27 15 23 00-0327)		
27 15 23 00-0329	MLF 6-Fiber, 2 Singlemode/4 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed.....	1,769.67	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0330	MLF 12-Fiber, 6 Singlemode/6 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed.....	2,840.06	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0331	MLF 24-Fiber, 12 Singlemode/12 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed.....	6,258.22	660.31
	<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0332	MLF 48-Fiber, 24 Singlemode/24 Multimode, Distribution Riser Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed.....	9,736.74	660.31
	<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0333	Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed ^(27 15 23 00-0327)		
27 15 23 00-0334	MLF 6-Fiber, 2 Singlemode/4 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed.....	2,065.79	586.94
	<i>For Work In Restricted Working Space, Add</i>	293.47	



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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0335	MLF		12-Fiber, 6 Singlemode/6 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed	2,881.73	586.94
			<i>For Work In Restricted Working Space, Add</i>	293.47	
27 15 23 00-0336	MLF		24-Fiber, 12 Singlemode/12 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed	7,386.23	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0337	MLF		48-Fiber, 24 Singlemode/24 Multimode, Distribution Plenum Rated, Hybrid, Indoor Fiber Optic Cable, Installed Exposed	12,579.18	660.31
			<i>For Work In Restricted Working Space, Add</i>	330.15	
27 15 23 00-0338			Outdoor Fiber Optic Cable <small>(27 15 23)</small> Note: Cable buried in trench excludes excavation.		
27 15 23 00-0339			Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0338)</small> Note: Excludes conduit or innerduct.		
27 15 23 00-0340			Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0339)</small>		
27 15 23 00-0341			Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0340)</small>		
27 15 23 00-0342	MLF		2-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,047.31	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	283.28	
27 15 23 00-0343	MLF		4-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,082.57	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	285.63	
27 15 23 00-0344	MLF		6-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,117.89	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	287.90	
27 15 23 00-0345	MLF		8-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,153.18	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	290.66	
27 15 23 00-0346	MLF		12-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,223.31	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	263.01	
27 15 23 00-0347	MLF		18-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,366.76	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	293.03	
27 15 23 00-0348	MLF		24-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,440.49	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	230.68	
27 15 23 00-0349	MLF		36-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,463.24	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	269.63	
27 15 23 00-0350	MLF		48-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,885.24	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	296.64	
27 15 23 00-0351	MLF		60-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,117.90	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	296.61	
27 15 23 00-0352	MLF		72-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,419.76	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	350.57	
27 15 23 00-0353	MLF		96-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,951.17	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	336.58	
27 15 23 00-0354	MLF		120-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	4,531.82	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	408.71	
27 15 23 00-0355	MLF		144-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	5,139.52	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	273.59	
27 15 23 00-0356			50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0340)</small>		
27 15 23 00-0357	MLF		2-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,865.96	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-4.10	
27 15 23 00-0358	MLF		4-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	2,945.34	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	41.65	
27 15 23 00-0359	MLF		6-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,111.66	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	107.74	
27 15 23 00-0360	MLF		8-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,338.46	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-65.42	
27 15 23 00-0361	MLF		12-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,432.96	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-34.76	
27 15 23 00-0362	MLF		18-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	3,754.26	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-16.39	
27 15 23 00-0363	MLF		24-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	4,434.66	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-88.94	
27 15 23 00-0364	MLF		36-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	5,436.36	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-0.08	
27 15 23 00-0365	MLF		48-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	6,551.46	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-203.39	
27 15 23 00-0366	MLF		60-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	7,326.36	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-102.28	
27 15 23 00-0367	MLF		72-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	8,328.06	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	469.28	
27 15 23 00-0368	MLF		96-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	10,652.76	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-210.64	
27 15 23 00-0369	MLF		120-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	12,958.56	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-281.69	
27 15 23 00-0370	MLF		144-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit	15,264.36	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-334.85	

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0371			62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0340)</small>		
27 15 23 00-0372	MLF		2-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	1,802.60	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	121.14	
27 15 23 00-0373	MLF		4-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	1,919.07	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	129.91	
27 15 23 00-0374	MLF		6-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,035.36	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	138.47	
27 15 23 00-0375	MLF		8-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,179.02	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	157.64	
27 15 23 00-0376	MLF		12-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,384.76	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	164.38	
27 15 23 00-0377	MLF		18-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,748.51	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	175.19	
27 15 23 00-0378	MLF		24-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,093.08	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	201.47	
27 15 23 00-0379	MLF		36-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,752.53	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	223.88	
27 15 23 00-0380	MLF		48-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	4,523.86	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	257.42	
27 15 23 00-0381	MLF		60-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	5,236.28	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	277.00	
27 15 23 00-0382	MLF		72-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	5,988.21	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	313.52	
27 15 23 00-0383	MLF		96-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	7,509.00	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	352.51	
27 15 23 00-0384	MLF		120-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	9,054.21	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	400.06	
27 15 23 00-0385	MLF		144-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	10,623.27	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	367.48	
27 15 23 00-0386			Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0339)</small>		
27 15 23 00-0387			Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0386)</small>		
27 15 23 00-0388	MLF		2-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,249.27	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	223.86	
27 15 23 00-0389	MLF		4-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,318.04	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	321.31	
27 15 23 00-0390	MLF		6-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,338.69	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	307.93	
27 15 23 00-0391	MLF		8-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,421.07	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	256.34	
27 15 23 00-0392	MLF		12-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,446.78	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	306.37	
27 15 23 00-0393	MLF		18-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,562.23	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	290.57	
27 15 23 00-0394	MLF		24-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,665.75	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	294.02	
27 15 23 00-0395	MLF		36-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,830.89	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	372.85	
27 15 23 00-0396	MLF		48-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,063.55	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	377.71	
27 15 23 00-0397	MLF		60-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,295.31	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	391.31	
27 15 23 00-0398	MLF		72-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,609.51	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	336.59	
27 15 23 00-0399	MLF		96-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	4,117.75	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	438.97	
27 15 23 00-0400	MLF		120-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	4,782.66	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	432.24	
27 15 23 00-0401	MLF		144-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	5,326.77	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	345.27	
27 15 23 00-0402			50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0386)</small>		
27 15 23 00-0403	MLF		2-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,481.12	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	316.80	
27 15 23 00-0404	MLF		4-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	2,721.89	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	177.41	
27 15 23 00-0405	MLF		6-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,038.69	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	38.02	
27 15 23 00-0406	MLF		8-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,190.75	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	63.36	
27 15 23 00-0407	MLF		12-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,342.82	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	63.36	
27 15 23 00-0408	MLF		18-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	3,697.63	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	76.03	
27 15 23 00-0409	MLF		24-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit.....	4,014.43	880.41
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	291.46	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0410 MLF 36-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	4,698.72 570.24	880.41
27 15 23 00-0411 MLF 48-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,383.01 950.40	880.41
27 15 23 00-0412 MLF 60-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,953.25 1,045.44	880.41
27 15 23 00-0413 MLF 72-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	6,700.90 1,330.56	880.41
27 15 23 00-0414 MLF 96-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	8,259.55 1,964.16	880.41
27 15 23 00-0415 MLF 120-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,045.22 1,482.62	880.41
27 15 23 00-0416 MLF 144-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	11,060.06 3,611.52	880.41
27 15 23 00-0417 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0386)</small>		
27 15 23 00-0418 MLF 2-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,881.24 152.06	880.41
27 15 23 00-0419 MLF 4-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,995.29 164.38	880.41
27 15 23 00-0420 MLF 6-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,109.15 176.68	880.41
27 15 23 00-0421 MLF 8-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,223.20 188.97	880.41
27 15 23 00-0422 MLF 12-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,518.63 203.26	880.41
27 15 23 00-0423 MLF 18-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,808.33 238.19	880.41
27 15 23 00-0424 MLF 24-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,163.30 258.71	880.41
27 15 23 00-0425 MLF 36-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,850.39 319.65	880.41
27 15 23 00-0426 MLF 48-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	4,550.33 366.23	880.41
27 15 23 00-0427 MLF 60-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,252.68 407.82	880.41
27 15 23 00-0428 MLF 72-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,991.18 454.78	880.41
27 15 23 00-0429 MLF 96-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	7,489.81 536.25	880.41
27 15 23 00-0430 MLF 120-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,424.11 554.35	880.41
27 15 23 00-0431 MLF 144-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Installed In Conduit <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,557.68 572.27	880.41
27 15 23 00-0432 Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0338)</small>		
Note: Excludes trenching.		
27 15 23 00-0433 Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0432)</small>		
27 15 23 00-0434 Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0433)</small>		
27 15 23 00-0435 MLF 2-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,925.02 283.28	
27 15 23 00-0436 MLF 4-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,960.28 285.63	
27 15 23 00-0437 MLF 6-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,995.60 287.90	
27 15 23 00-0438 MLF 8-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,030.89 290.66	
27 15 23 00-0439 MLF 12-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,101.02 263.01	
27 15 23 00-0440 MLF 18-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,244.47 293.03	
27 15 23 00-0441 MLF 24-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,318.20 230.68	
27 15 23 00-0442 MLF 36-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,340.95 269.63	
27 15 23 00-0443 MLF 48-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,762.95 296.64	
27 15 23 00-0444 MLF 60-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,292.22 296.61	
27 15 23 00-0445 MLF 72-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,648.04 350.57	
27 15 23 00-0446 MLF 96-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,828.88 336.58	
27 15 23 00-0447 MLF 120-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	4,409.53 408.71	
27 15 23 00-0448 MLF 144-Fiber, Singlemode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,017.23 273.59	

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0449			50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0433)</small>		
27 15 23 00-0450	MLF		2-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,743.67	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-4.10	
27 15 23 00-0451	MLF		4-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,823.05	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	41.65	
27 15 23 00-0452	MLF		6-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,989.37	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	107.74	
27 15 23 00-0453	MLF		8-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	3,216.17	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-65.42	
27 15 23 00-0454	MLF		12-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	3,310.67	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-34.76	
27 15 23 00-0455	MLF		18-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	3,631.97	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-16.39	
27 15 23 00-0456	MLF		24-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	4,312.37	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-88.94	
27 15 23 00-0457	MLF		36-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	5,314.07	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-0.08	
27 15 23 00-0458	MLF		48-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	6,429.17	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-203.39	
27 15 23 00-0459	MLF		60-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	7,204.07	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-102.28	
27 15 23 00-0460	MLF		72-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	8,205.77	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	469.28	
27 15 23 00-0461	MLF		96-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	10,530.47	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-210.64	
27 15 23 00-0462	MLF		120-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	12,836.27	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-281.69	
27 15 23 00-0463	MLF		144-Fiber, 50 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	15,142.07	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	-334.85	
27 15 23 00-0464			62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0433)</small>		
27 15 23 00-0465	MLF		2-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	1,680.31	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	121.14	
27 15 23 00-0466	MLF		4-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	1,796.78	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	129.91	
27 15 23 00-0467	MLF		6-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	1,913.07	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	138.47	
27 15 23 00-0468	MLF		8-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,056.73	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	157.64	
27 15 23 00-0469	MLF		12-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,262.47	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	164.38	
27 15 23 00-0470	MLF		18-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,626.22	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	175.19	
27 15 23 00-0471	MLF		24-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,970.79	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	201.47	
27 15 23 00-0472	MLF		36-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	3,630.24	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	223.88	
27 15 23 00-0473	MLF		48-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	4,401.57	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	257.42	
27 15 23 00-0474	MLF		60-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	5,113.99	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	277.00	
27 15 23 00-0475	MLF		72-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	5,865.92	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	313.52	
27 15 23 00-0476	MLF		96-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	7,386.71	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	352.51	
27 15 23 00-0477	MLF		120-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	8,931.92	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	400.06	
27 15 23 00-0478	MLF		144-Fiber, 62.5 Micron Multimode, Single Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	10,500.98	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	367.48	
27 15 23 00-0479			Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0432)</small>		
27 15 23 00-0480			Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0479)</small>		
27 15 23 00-0481	MLF		2-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,126.98	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	223.86	
27 15 23 00-0482	MLF		4-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,195.75	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	321.31	
27 15 23 00-0483	MLF		6-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,216.40	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	307.93	
27 15 23 00-0484	MLF		8-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,298.78	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	256.34	
27 15 23 00-0485	MLF		12-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,324.49	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	306.37	
27 15 23 00-0486	MLF		18-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench	2,439.94	
			<i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	290.57	



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 15 23 00-0487	MLF		24-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,543.46 294.02	
27 15 23 00-0488	MLF		36-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,708.60 372.85	
27 15 23 00-0489	MLF		48-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,941.26 377.71	
27 15 23 00-0490	MLF		60-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,173.02 391.31	
27 15 23 00-0491	MLF		72-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,487.22 336.59	
27 15 23 00-0492	MLF		96-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,995.46 438.97	
27 15 23 00-0493	MLF		120-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	4,660.37 432.24	
27 15 23 00-0494	MLF		144-Fiber, Singlemode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,204.48 345.27	
27 15 23 00-0495			50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0479)</small>		
27 15 23 00-0496	MLF		2-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,358.83 316.80	
27 15 23 00-0497	MLF		4-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,599.60 177.41	
27 15 23 00-0498	MLF		6-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,916.40 38.02	
27 15 23 00-0499	MLF		8-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,068.46 63.36	
27 15 23 00-0500	MLF		12-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,220.53 63.36	
27 15 23 00-0501	MLF		18-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,575.34 76.03	
27 15 23 00-0502	MLF		24-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,892.14 291.46	
27 15 23 00-0503	MLF		36-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	4,576.43 570.24	
27 15 23 00-0504	MLF		48-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,260.72 950.40	
27 15 23 00-0505	MLF		60-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,830.96 1,045.44	
27 15 23 00-0506	MLF		72-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	6,578.61 1,330.56	
27 15 23 00-0507	MLF		96-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	8,137.26 1,964.16	
27 15 23 00-0508	MLF		120-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	8,922.93 1,482.62	
27 15 23 00-0509	MLF		144-Fiber, 50 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,937.77 3,611.52	
27 15 23 00-0510			62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0479)</small>		
27 15 23 00-0511	MLF		2-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,758.95 152.06	
27 15 23 00-0512	MLF		4-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,873.00 164.38	
27 15 23 00-0513	MLF		6-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	1,986.86 176.68	
27 15 23 00-0514	MLF		8-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,100.91 188.97	
27 15 23 00-0515	MLF		12-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,396.34 203.26	
27 15 23 00-0516	MLF		18-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	2,686.04 238.19	
27 15 23 00-0517	MLF		24-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,041.01 258.71	
27 15 23 00-0518	MLF		36-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	3,728.10 319.65	
27 15 23 00-0519	MLF		48-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	4,428.04 366.23	
27 15 23 00-0520	MLF		60-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,130.39 407.82	
27 15 23 00-0521	MLF		72-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	5,868.89 454.78	
27 15 23 00-0522	MLF		96-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	7,367.52 536.25	
27 15 23 00-0523	MLF		120-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	8,964.16 554.35	
27 15 23 00-0524	MLF		144-Fiber, 62.5 Micron Multimode, Double Jacket Loose Tube, Outdoor Fiber Optic Cable, Buried In Trench..... <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,435.39 572.27	
27 15 23 00-0525			(Aerial) Outdoor Fiber Optic Cable, Installed On Poles <small>(27 15 23 00-0338)</small>		

27 Communications**27 10 Structured Cabling****27 15 Communications Horizontal Cabling**MINOR
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27 15 23 00-0526	Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <small>(27 15 23 00-0525)</small>		
27 15 23 00-0527	Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <small>(27 15 23 00-0526)</small>		
27 15 23 00-0528	MLF 2-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,606.66 189.47	3,297.96
27 15 23 00-0529	MLF 4-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,641.70 194.38	3,297.96
27 15 23 00-0530	MLF 6-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,677.21 199.15	3,297.96
27 15 23 00-0531	MLF 8-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,712.26 195.34	3,297.96
27 15 23 00-0532	MLF 12-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,782.37 227.73	3,297.96
27 15 23 00-0533	MLF 18-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	9,920.83 236.75	3,297.96
27 15 23 00-0534	MLF 24-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,026.42 261.68	3,297.96
27 15 23 00-0535	MLF 36-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,277.48 250.91	3,297.96
27 15 23 00-0536	MLF 48-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,497.03 291.49	3,297.96
27 15 23 00-0537	MLF 60-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,678.53 279.52	3,297.96
27 15 23 00-0538	MLF 72-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	10,904.95 319.58	3,297.96
27 15 23 00-0539	MLF 96-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	11,499.17 324.58	3,297.96
27 15 23 00-0540	MLF 120-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	12,136.71 387.31	3,297.96
27 15 23 00-0541	MLF 144-Fiber, Singlemode, Single Jacket Loose Tube, (Aerial) Outdoor Fiber Optic Cable, Installed On Poles <i>For Corrugated Coated Steel Tape Armored Cable, Add</i>	12,289.55 415.88	3,297.96
27 15 23 00-0542	Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0338)</small> Note: Singlemode and multimode combination cable. Excludes conduit or innerduct.		
27 15 23 00-0543	Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0542)</small>		
27 15 23 00-0544	MLF 12-Fiber, 6 Singlemode/6 Multimode, Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit.....	3,915.26	733.68
27 15 23 00-0545	MLF 24-Fiber, 12 Singlemode/12 Multimode, Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit.....	4,941.20	733.68
27 15 23 00-0546	MLF 48-Fiber, 24 Singlemode/24 Multimode, Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit.....	7,226.63	733.68
27 15 23 00-0547	Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit <small>(27 15 23 00-0542)</small>		
27 15 23 00-0548	MLF 12-Fiber, 6 Singlemode/6 Multimode, Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit.....	5,223.80	733.68
27 15 23 00-0549	MLF 24-Fiber, 12 Singlemode/12 Multimode, Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit.....	5,806.82	733.68
27 15 23 00-0550	MLF 48-Fiber, 24 Singlemode/24 Multimode, Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Installed In Conduit.....	8,357.14	733.68
27 15 23 00-0551	Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0338)</small> Note: Singlemode and multimode combination cable. Excludes trenching.		
27 15 23 00-0552	Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0551)</small>		
27 15 23 00-0553	MLF 12-Fiber, 6 Singlemode/6 Multimode, Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench.....	3,792.97	672.53
27 15 23 00-0554	MLF 24-Fiber, 12 Singlemode/12 Multimode, Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench.....	4,818.91	672.53
27 15 23 00-0555	MLF 48-Fiber, 24 Singlemode/24 Multimode, Riser Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench.....	7,104.34	672.53
27 15 23 00-0556	Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench <small>(27 15 23 00-0551)</small>		
27 15 23 00-0557	MLF 12-Fiber, 6 Singlemode/6 Multimode, Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench.....	5,101.51	672.53
27 15 23 00-0558	MLF 24-Fiber, 12 Singlemode/12 Multimode, Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench.....	5,684.53	672.53
27 15 23 00-0559	MLF 48-Fiber, 24 Singlemode/24 Multimode, Plenum Rated, Hybrid, Indoor/Outdoor Fiber Optic Cable, Buried In Trench.....	8,234.85	672.53
27 15 33	Communications Coaxial Horizontal Cabling <small>(27 15)</small> Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc.		
27 15 33 00-0001	Indoor Coaxial Cable <small>(27 15 33)</small>		
27 15 33 00-0002	Coaxial, Indoor Telecommunications Cable <small>(27 15 33 00-0001)</small>		
27 15 33 00-0003	Coaxial, Indoor Telecommunications Cable, Installed In Conduit <small>(27 15 33 00-0002)</small>		



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27 15 33 00-0004 MLF RG 59/U Coaxial, Indoor Telecommunications Cable, Installed In Conduit (Belden 9108).....	1,856.66	513.58
27 15 33 00-0005 MLF RG 59/U Plenum Coaxial, Indoor Telecommunications Cable, Installed In Conduit (Belden 82108).....	4,710.98	513.58
27 15 33 00-0006 MLF RG 6/U Coaxial, Indoor Telecommunications Cable, Installed In Conduit (Belden 9114).....	1,460.11	586.94
27 15 33 00-0007 MLF RG 6/U Plenum Coaxial, Indoor Telecommunications Cable, Installed In Conduit (Belden 82120)	5,957.64	586.94
27 15 33 00-0008 Coaxial, Indoor Telecommunications Cable, Installed Exposed <small>(27 15 33 00-0002)</small>		
27 15 33 00-0009 MLF RG 59/U Coaxial, Indoor Telecommunications Cable, Installed Exposed (Belden 9108).....	2,712.61	1,027.15
<i>For Work In Restricted Working Space, Add</i>	<i>513.57</i>	
27 15 33 00-0010 MLF RG 59/U Plenum Coaxial, Indoor Telecommunications Cable, Installed Exposed (Belden 82108).....	5,566.93	1,027.15
<i>For Work In Restricted Working Space, Add</i>	<i>513.57</i>	
27 15 33 00-0011 MLF RG 6/U Coaxial, Indoor Telecommunications Cable, Installed Exposed (Belden 9114).....	2,438.35	1,173.88
<i>For Work In Restricted Working Space, Add</i>	<i>586.94</i>	
27 15 33 00-0012 MLF RG 6/U Plenum Coaxial, Indoor Telecommunications Cable, Installed Exposed (Belden 82120).....	6,935.88	1,173.88
<i>For Work In Restricted Working Space, Add</i>	<i>586.94</i>	
27 15 43 Communications Faceplates and Connectors <small>(27 15)</small>		
27 15 43 00-0001 Wall Mounted Telephone Faceplates <small>(27 15 43)</small>		
<i>Note: Includes standard telephone mounting studs.</i>		
27 15 43 00-0002 Plastic Faceplates For Wall Mounted Telephones <small>(27 15 43 00-0001)</small>		
27 15 43 00-0003 EA Single Gang, 6-Position RJ25 Jack, Flush, Plastic Faceplate For Wall Mounted Telephones.....	43.65	15.28
27 15 43 00-0004 Stainless Steel Faceplates For Wall Mounted Telephones <small>(27 15 43 00-0001)</small>		
27 15 43 00-0005 EA Single Gang, Keystone Opening, Flush, Stainless Steel Faceplate For Wall Mounted Telephones.....	34.69	6.11
<i>Note: Requires one snap-in modular jack.</i>		
27 15 43 00-0006 EA Single Gang, 6-Position RJ25 Jack, Flush, Stainless Steel Faceplate For Wall Mounted Telephones.....	60.90	15.28
27 15 43 00-0007 EA Single Gang, 8-Position RJ45 Jack, Flush, Stainless Steel Faceplate For Wall Mounted Telephones.....	70.95	18.34
27 15 43 00-0008 EA Single Gang, Keystone Opening, Recessed, Stainless Steel Faceplate For Wall Mounted Telephones.....	33.38	6.11
<i>Note: Requires one snap-in modular jack.</i>		
27 15 43 00-0009 EA Single Gang, 6-Position RJ25 Jack, Recessed, Stainless Steel Faceplate For Wall Mounted Telephones	55.36	15.28
27 15 43 00-0010 EA Single Gang, 8-Position RJ45 Jack, Recessed, Stainless Steel Faceplate For Wall Mounted Telephones	65.56	18.34
27 15 43 00-0011 Plastic Communications Faceplates <small>(27 15 43)</small>		
<i>Note: Excludes modular jacks. See CSI section 27 15 43 00-0051 for modular jacks.</i>		
27 15 43 00-0012 EA One Port, Single Gang, Plastic Communication Faceplate With Station ID	9.73	3.06
27 15 43 00-0013 EA Two Port, Single Gang, Plastic Communication Faceplate With Station ID	9.73	3.06
27 15 43 00-0014 EA Three Port, Single Gang, Plastic Communication Faceplate With Station ID	9.73	3.06
27 15 43 00-0015 EA Four Port, Single Gang, Plastic Communication Faceplate With Station ID	9.73	3.06
27 15 43 00-0016 EA Six Port, Single Gang, Plastic Communication Faceplate With Station ID	9.73	3.06
27 15 43 00-0017 EA Four Port, Double Gang, Plastic Communications Faceplate With Station ID	17.09	3.06
27 15 43 00-0018 EA Six Port, Double Gang, Plastic Communication Faceplate With Station ID	17.09	3.06
27 15 43 00-0019 EA Eight Port, Double Gang, Plastic Communication Faceplate With Station ID	17.09	3.06
27 15 43 00-0020 EA Nine Port, Double Gang, Plastic Communication Faceplate With Station ID	17.09	3.06
27 15 43 00-0021 EA Twelve Port, Double Gang, Plastic Communication Faceplate With Station ID	17.09	3.06
27 15 43 00-0022 Stainless Steel Communications Faceplates <small>(27 15 43)</small>		
<i>Note: Excludes modular jacks. See CSI section 27 15 43 00-0051 for modular jacks.</i>		
27 15 43 00-0023 Stainless Steel Communications Faceplates <small>(27 15 43 00-0022)</small>		
27 15 43 00-0024 EA One Port, Single Gang, Stainless Steel Communications Faceplate.....	18.47	3.06
27 15 43 00-0025 EA Two Port, Single Gang, Stainless Steel Communications Faceplate.....	18.47	3.06
27 15 43 00-0026 EA Three Port, Single Gang, Stainless Steel Communications Faceplate	18.47	3.06
27 15 43 00-0027 EA Four Port, Single Gang, Stainless Steel Communications Faceplate	19.76	3.06
27 15 43 00-0028 EA Six Port, Single Gang, Stainless Steel Communications Faceplate.....	19.76	3.06
27 15 43 00-0029 EA Four Port, Double Gang, Stainless Steel Communications Faceplate.....	26.65	3.06
27 15 43 00-0030 EA Six Port, Double Gang, Stainless Steel Communications Faceplate	27.46	3.06
27 15 43 00-0031 EA Eight Port, Double Gang, Stainless Steel Communications Faceplate	31.79	3.06
27 15 43 00-0032 EA Nine Port, Double Gang, Stainless Steel Communication Faceplate.....	31.79	3.06
27 15 43 00-0033 EA Twelve Port, Double Gang, Stainless Steel Communications Faceplate.....	31.79	3.06
27 15 43 00-0034 Stainless Steel Communications Faceplates With Station ID <small>(27 15 43 00-0022)</small>		
27 15 43 00-0035 EA One Port, Single Gang, Stainless Steel Communications Faceplate With Station ID	26.49	3.06
27 15 43 00-0036 EA Two Port, Single Gang, Stainless Steel Communications Faceplate With Station ID	26.49	3.06
27 15 43 00-0037 EA Three Port, Single Gang, Stainless Steel Communications Faceplate With Station ID	26.49	3.06
27 15 43 00-0038 EA Four Port, Single Gang, Stainless Steel Communications Faceplate With Station ID	26.49	3.06
27 15 43 00-0039 EA Six Port, Single Gang, Stainless Steel Communications Faceplate With Station ID	26.49	3.06
27 15 43 00-0040 EA Four Port, Double Gang, Stainless Steel Communications Faceplate With Station ID	57.13	3.06
27 15 43 00-0041 EA Six Port, Double Gang, Stainless Steel Communications Faceplate With Station ID	57.13	3.06
27 15 43 00-0042 EA Eight Port, Double Gang, Stainless Steel Communications Faceplate With Station ID	57.13	3.06
27 15 43 00-0043 EA Nine Port, Double Gang, Stainless Steel Communication Faceplate With Station ID	57.13	3.06
27 15 43 00-0044 EA Twelve Port, Double Gang, Stainless Steel Communications Faceplate With Station ID	57.13	3.06
27 15 43 00-0045 Surface Mount Plastic Communication Boxes <small>(27 15 43)</small>		
<i>Note: Excludes modular jacks. See CSI section 27 15 43 00-0051 for modular jacks.</i>		

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27 15 43 00-0046	EA	One Port, Surface Mount Plastic Communication Box With Station ID	35.19	15.31
27 15 43 00-0047	EA	Two Port, Surface Mount Plastic Communication Box With Station ID	35.99	15.31
27 15 43 00-0048	EA	Four Port, Surface Mount Plastic Communication Box With Station ID	41.53	15.31
27 15 43 00-0049	EA	Six Port, Surface Mount Plastic Communication Box With Station ID	48.11	15.31
27 15 43 00-0050	EA	Twelve Port, Surface Mount Plastic Communication Box With Station ID	55.00	15.31

27 15 43 00-0051 Snap-In Modular Jacks (27 15 43)

Note: Includes termination.

27 15 43 00-0052	EA	Cat 3, Snap-In Modular Jack	33.63	12.25
27 15 43 00-0053	EA	Category 5E, Snap-In Modular Jack	35.40	12.25
27 15 43 00-0054	EA	Category 5E Shielded, Snap-In Modular Jack	40.69	12.25
27 15 43 00-0055	EA	Cat 6, Snap-In Modular Jack	40.69	12.25
27 15 43 00-0056	EA	Cat 6 Shielded, Snap-In Modular Jack	46.63	12.25
27 15 43 00-0057	EA	Cat 6A, Snap-In Modular Jack	47.53	12.25
27 15 43 00-0058	EA	Voice, RJ-11, Snap-In Modular Jack	24.83	6.12
27 15 43 00-0059	EA	SC Type Fiber Optic, Snap-In Modular Jack	37.64	12.25
27 15 43 00-0060	EA	ST Type Fiber Optic, Snap-In Modular Jack	42.14	12.25
27 15 43 00-0061	EA	LC Type Fiber Optic, Snap-In Modular Jack	50.96	12.25
27 15 43 00-0062	EA	Blank Fill In, Snap-In Modular Jack	6.95	3.06
27 15 43 00-0063	EA	Open Cable Pass Through Insert, Snap-In Modular Jack	8.33	3.06
27 15 43 00-0064	EA	Coaxial F-Type Coupler, Snap-In Modular Jack	28.16	9.18
		Note: Includes female to female connection.		
		<i>For Gold Bulkhead, Add</i>	1.71	
27 15 43 00-0065	EA	RCA Jack Pass-Through Coupler, Snap-In Modular Jack	28.48	9.18
		Note: Includes female to female connection.		
27 15 43 00-0066	EA	RCA Solder Coupler, Snap-In Modular Jack	56.53	12.25
27 15 43 00-0067	EA	RCA Jack With 110 Punch Down, Snap-In Modular Jack	69.52	12.25
27 15 43 00-0068	EA	3.5 m Mini Stereo Jack, Snap-In Modular Jack	34.92	12.25
27 15 43 00-0069	EA	MT-RJ Pass-Through Coupler, Snap-In Modular Jack	37.08	6.12
27 15 43 00-0070	EA	BNC Connector, Snap-In Modular Jack	40.21	12.25
27 15 43 00-0071	EA	S-Video With 110 Punch Down, Snap-In Modular Jack	45.02	12.25
27 15 43 00-0072	PR	Speaker Connectors, Snap-In Modular Jack	63.49	18.37
		Note: Includes a pair of binding posts, banana jacks or spring clip connectors. Requires two open ports.		
27 15 43 00-0073	EA	USB Audio Video Connector, Snap-In Modular Jack	67.16	12.25

27 15 53 Communications Cable Innerduct (27 15)

Note: Cable installed in conduit includes pull wires and installation in conduit, innerduct, wiremold, etc. Cable installed exposed includes installation on exposed surfaces, uncovered wireways, cable trays, etc.

27 15 53 00-0001 Indoor Innerduct (27 15 53)**27 15 53 00-0002 Indoor Innerduct, Installed In Conduit (27 15 53 00-0001)****27 15 53 00-0003 Riser Rated, Indoor Innerduct, Installed In Conduit (27 15 53 00-0002)**

27 15 53 00-0004	MLF	1" Riser Rated, Indoor Innerduct, Installed In Conduit	4,866.40	1,834.19
27 15 53 00-0005	MLF	1-1/4" Riser Rated, Indoor Innerduct, Installed In Conduit	6,293.11	2,445.59
27 15 53 00-0006	MLF	1-1/2" Riser Rated, Indoor Innerduct, Installed In Conduit	8,382.56	3,056.98
27 15 53 00-0007	MLF	2" Riser Rated, Indoor Innerduct, Installed In Conduit	9,783.78	3,668.38

27 15 53 00-0008 Plenum Rated, Indoor Innerduct, Installed In Conduit (27 15 53 00-0002)

27 15 53 00-0009	MLF	3/4" Plenum Rated, Indoor Innerduct, Installed In Conduit	7,272.56	1,222.79
27 15 53 00-0010	MLF	1" Plenum Rated, Indoor Innerduct, Installed In Conduit	8,142.45	1,834.19
27 15 53 00-0011	MLF	1-1/4" Plenum Rated, Indoor Innerduct, Installed In Conduit	10,279.09	2,445.59
27 15 53 00-0012	MLF	1-1/2" Plenum Rated, Indoor Innerduct, Installed In Conduit	13,215.37	3,056.98
27 15 53 00-0013	MLF	2" Plenum Rated, Indoor Innerduct, Installed In Conduit	15,904.13	3,668.38

27 15 53 00-0014 Indoor Innerduct, Installed Exposed (27 15 53 00-0001)**27 15 53 00-0015 Riser Rated, Indoor Innerduct, Installed Exposed (27 15 53 00-0014)**

27 15 53 00-0016	MLF	1" Riser Rated, Indoor Innerduct, Installed Exposed	6,089.19	2,445.59
		<i>For Work In Restricted Working Space, Add</i>	1,467.35	
27 15 53 00-0017	MLF	1-1/4" Riser Rated, Indoor Innerduct, Installed Exposed	7,515.91	3,056.98
		<i>For Work In Restricted Working Space, Add</i>	1,834.19	
27 15 53 00-0018	MLF	1-1/2" Riser Rated, Indoor Innerduct, Installed Exposed	9,605.35	3,668.38
		<i>For Work In Restricted Working Space, Add</i>	2,201.03	
27 15 53 00-0019	MLF	2" Riser Rated, Indoor Innerduct, Installed Exposed	11,006.56	4,279.78
		<i>For Work In Restricted Working Space, Add</i>	2,567.86	

27 15 53 00-0020 Plenum Rated, Indoor Innerduct, Installed Exposed (27 15 53 00-0014)

27 15 53 00-0021	MLF	3/4" Plenum Rated, Indoor Innerduct, Installed Exposed	8,495.36	1,834.19
27 15 53 00-0022	MLF	1" Plenum Rated, Indoor Innerduct, Installed Exposed	9,365.24	2,445.59
		<i>For Work In Restricted Working Space, Add</i>	1,467.35	
27 15 53 00-0023	MLF	1-1/4" Plenum Rated, Indoor Innerduct, Installed Exposed	11,501.89	3,056.98
		<i>For Work In Restricted Working Space, Add</i>	1,834.19	
27 15 53 00-0024	MLF	1-1/2" Plenum Rated, Indoor Innerduct, Installed Exposed	14,438.16	3,668.38
		<i>For Work In Restricted Working Space, Add</i>	2,201.03	
27 15 53 00-0025	MLF	2" Plenum Rated, Indoor Innerduct, Installed Exposed	17,126.91	4,279.78
		<i>For Work In Restricted Working Space, Add</i>	2,567.86	



Communications	27	27
Structured Cabling	27 10	
Communications Horizontal Cabling	27 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 15 53 00-0026	Outdoor Innerduct <small>(27 15 53)</small>		
27 15 53 00-0027	Outdoor Innerduct, Installed In Conduit <small>(27 15 53 00-0026)</small>		
27 15 53 00-0028	MLF 1" Outdoor Innerduct, Installed In Conduit.....	4,560.52	1,834.19
27 15 53 00-0029	MLF 1-1/4" Outdoor Innerduct, Installed In Conduit.....	5,842.05	2,445.59
27 15 53 00-0030	MLF 1-1/2" Outdoor Innerduct, Installed In Conduit.....	7,470.53	3,056.98
27 15 53 00-0031	MLF 2" Outdoor Innerduct, Installed In Conduit.....	8,920.69	3,668.38
27 15 53 00-0032	Outdoor Innerduct, Buried In Trench <small>(27 15 53 00-0026)</small>		
27 15 53 00-0033	MLF 1" Outdoor Innerduct, Buried In Trench.....	3,337.73	
27 15 53 00-0034	MLF 1-1/4" Outdoor Innerduct, Buried In Trench.....	4,619.26	
27 15 53 00-0035	MLF 1-1/2" Outdoor Innerduct, Buried In Trench.....	6,247.73	
27 15 53 00-0036	MLF 2" Outdoor Innerduct, Buried In Trench.....	7,697.90	

27 16 Communications Connecting Cords, Devices, and Adapters (27 16)

27 16 16 Communications Media Converters, Adapters, and Transceivers (27 16)

27 16 16 00-0001	Fiber Optic Receivers <small>(27 16 16)</small>		
27 16 16 00-0002	EA Fiber Optic Receiver, Range 6.2 Miles.....	1,004.00	61.14
27 16 16 00-0003	Fiber Optic Transmitters <small>(27 16 16)</small>		
27 16 16 00-0004	EA Fiber Optic Transmitter, Range 6.2 Miles.....	1,003.99	61.14
27 16 16 00-0005	Fiber Optic Repeaters <small>(27 16 16)</small>		
	Note: Consist of transmitter and receiver, back-to-back. Excludes power source.		
27 16 16 00-0006	EA Fiber Optic Repeater, 6.2 Miles Transmitter And Receiver Back-Back, No Power.....	1,126.27	122.28
27 16 16 00-0007	EA Fiber Optic Digital Repeater, 2,000 Miles Transmitter And Receiver Back-Back, No Power.....	1,760.75	244.56
27 16 16 00-0008	Fiber Optic Transceivers <small>(27 16 16)</small>		
27 16 16 00-0009	EA Fiber Optic Transceivers, 3,000 Miles Range.....	1,162.65	244.56
27 16 16 00-0010	EA Fiber Optic Transceivers, Digital 2,000 Miles Range.....	1,162.65	244.56
27 16 16 00-0011	EA Fiber Optic Ethernet Transceiver.....	1,530.10	366.83
27 16 16 00-0012	EA Transceiver (Low Cost Bi- Directional).....	561.83	91.71

27 16 19 Communications Patch Cords, Station Cords, and Cross Connect Wire (27 16)

27 16 19 00-0001	Cross Connect Wire <small>(27 16 19)</small>		
	Note: Up to 20' length.		
27 16 19 00-0002	EA 2-Pair Cross Connect Wire.....	19.35	
27 16 19 00-0003	EA 3-Pair Cross Connect Wire.....	25.90	
27 16 19 00-0004	EA 4-Pair Cross Connect Wire.....	32.39	
27 16 19 00-0005	Fiber Optic Patch Cords <small>(27 16 19)</small>		
27 16 19 00-0006	Simplex Fiber Optic Patch Cables <small>(27 16 19 00-0005)</small>		
27 16 19 00-0007	Singlemode, Simplex Fiber Optic Patch Cables <small>(27 16 19 00-0005)</small>		
27 16 19 00-0008	EA ST To ST Connectors, 1 Meter Length, Singlemode, Simplex Fiber Optic Patch Cable.....	55.95	
	For Each Additional Meter In Length, Add	0.26	
27 16 19 00-0009	EA ST To SC Connectors, 1 Meter Length, Singlemode, Simplex Fiber Optic Patch Cable.....	45.39	
	For Each Additional Meter In Length, Add	0.26	
27 16 19 00-0010	EA ST To LC Connectors, 1 Meter Length, Singlemode, Simplex Fiber Optic Patch Cable.....	59.12	
	For Each Additional Meter In Length, Add	0.26	
27 16 19 00-0011	EA SC To SC Connectors, 1 Meter Length, Singlemode, Simplex Fiber Optic Patch Cable.....	47.80	
	For Each Additional Meter In Length, Add	0.26	
27 16 19 00-0012	EA SC To LC Connectors, 1 Meter Length, Singlemode, Simplex Fiber Optic Patch Cable.....	55.51	
	For Each Additional Meter In Length, Add	0.26	
27 16 19 00-0013	EA LC To LC Connectors, 1 Meter Length, Singlemode, Simplex Fiber Optic Patch Cable.....	54.65	
	For Each Additional Meter In Length, Add	0.26	
27 16 19 00-0014	Duplex Fiber Optic Patch Cables <small>(27 16 19 00-0005)</small>		
27 16 19 00-0015	Singlemode, Duplex Fiber Optic Patch Cables <small>(27 16 19 00-0014)</small>		
27 16 19 00-0016	EA ST To ST Connectors, 1 Meter Length, Singlemode, Duplex Fiber Optic Patch Cable.....	98.39	
	For Each Additional Meter In Length, Add	0.51	
27 16 19 00-0017	EA ST To SC Connectors, 1 Meter Length, Singlemode, Duplex Fiber Optic Patch Cable.....	95.42	
	For Each Additional Meter In Length, Add	0.51	
27 16 19 00-0018	EA ST To LC Connectors, 1 Meter Length, Singlemode, Duplex Fiber Optic Patch Cable.....	106.00	
	For Each Additional Meter In Length, Add	0.51	
27 16 19 00-0019	EA SC To SC Connectors, 1 Meter Length, Singlemode, Duplex Fiber Optic Patch Cable.....	82.13	
	For Each Additional Meter In Length, Add	0.51	

27 Communications**27 10 Structured Cabling****27 16 Communications Connecting Cords, Devices, and Adapters**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 16 19 00-0020	EA	SC To LC Connectors, 1 Meter Length, Singlemode, Duplex Fiber Optic Patch Cable	97.52	
		<i>For Each Additional Meter In Length, Add</i>	0.51	
27 16 19 00-0021	EA	LC To LC Connectors, 1 Meter Length, Singlemode, Duplex Fiber Optic Patch Cable	95.83	
		<i>For Each Additional Meter In Length, Add</i>	0.51	
27 16 19 00-0022		Multimode, Duplex Fiber Optic Patch Cables <small>(27 16 19 00-0014)</small>		
27 16 19 00-0023	EA	ST To ST Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable.....	73.99	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0024	EA	ST To SC Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable	80.89	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0025	EA	ST To MTRJ Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable.....	81.60	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0026	EA	ST To LC Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable.....	83.81	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0027	EA	SC To SC Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable	74.28	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0028	EA	SC To MTRJ Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable	84.20	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0029	EA	SC To LC Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable	99.17	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0030	EA	MTRJ To MTRJ Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable.....	67.92	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0031	EA	LC To LC Connectors, 1 Meter Length, Multimode, Duplex Fiber Optic Patch Cable.....	82.91	
		<i>For Each Additional Meter In Length, Add</i>	1.48	
27 16 19 00-0032		Fiber Optic Cable Pig Tail <small>(27 16 19)</small>		
27 16 19 00-0033	EA	Simplex Fiber Optic Cable Pig Tail	85.34	42.79
27 16 19 00-0034	EA	Duplex Fiber Optic Cable Pig Tail.....	110.39	42.79
27 16 19 00-0035		Ethernet Patch Cords <small>(27 16 19)</small>		
27 16 19 00-0036	EA	3' Category 5E Patch Cables With Boots.....	16.43	
27 16 19 00-0037	EA	5' Category 5E Patch Cables With Boots.....	17.96	
27 16 19 00-0038	EA	7' Category 5E Patch Cables With Boots.....	19.50	
27 16 19 00-0039	EA	10' Category 5E Patch Cables With Boots.....	28.36	
27 16 19 00-0040	EA	15' Category 5E Patch Cables With Boots.....	35.59	
27 16 19 00-0041	EA	25' Category 5E Patch Cables With Boots.....	47.23	
27 16 19 00-0042	EA	3' Category 6 Patch Cables With Boots	18.25	
27 16 19 00-0043	EA	5' Category 6 Patch Cables With Boots	22.13	
27 16 19 00-0044	EA	7' Category 6 Patch Cables With Boots	22.20	
27 16 19 00-0045	EA	10' Category 6 Patch Cables With Boots	26.52	
27 16 19 00-0046	EA	15' Category 6 Patch Cables With Boots	35.01	
27 16 19 00-0047	EA	25' Category 6 Patch Cables With Boots	44.08	
27 16 19 00-0048	EA	50' Category 6 Patch Cables With Boots.....	69.60	
27 16 19 00-0049	EA	100' Category 6 Patch Cables With Boots	121.55	
27 16 19 00-0050	EA	3' Category 6A Patch Cables With Boots.....	22.40	
27 16 19 00-0051	EA	5' Category 6A Patch Cables With Boots.....	23.75	
27 16 19 00-0052	EA	7' Category 6A Patch Cables With Boots.....	24.75	
27 16 19 00-0053	EA	10' Category 6A Patch Cables With Boots.....	29.32	
27 16 19 00-0054	EA	15' Category 6A Patch Cables With Boots.....	36.07	
27 16 19 00-0055	EA	25' Category 6A Patch Cables With Boots.....	44.74	
27 16 19 00-0056	EA	50' Category 6A Patch Cables With Boots.....	64.20	
27 16 19 00-0057	EA	100' Category 6A Patch Cables With Boots.....	112.20	
27 16 19 00-0058	EA	3' Category 5E Patch Cables With Plastic Arch	16.43	
27 16 19 00-0059	EA	5' Category 5E Patch Cables With Plastic Arch	17.96	
27 16 19 00-0060	EA	7' Category 5E Patch Cables With Plastic Arch	19.50	
27 16 19 00-0061	EA	10' Category 5E Patch Cables With Plastic Arch	28.36	
27 16 19 00-0062	EA	15' Category 5E Patch Cables With Plastic Arch	35.59	
27 16 19 00-0063	EA	25' Category 5E Patch Cables With Plastic Arch	47.23	
27 16 19 00-0064	EA	3' Category 6 Patch Cables With Plastic Arch	18.25	
27 16 19 00-0065	EA	5' Category 6 Patch Cables With Plastic Arch	22.13	
27 16 19 00-0066	EA	7' Category 6 Patch Cables With Plastic Arch	22.20	
27 16 19 00-0067	EA	10' Category 6 Patch Cables With Plastic Arch	26.52	
27 16 19 00-0068	EA	15' Category 6 Patch Cables With Plastic Arch	35.01	
27 16 19 00-0069	EA	25' Category 6 Patch Cables With Plastic Arch	44.08	
27 16 19 00-0070	EA	3' Category 6A Patch Cables With Plastic Arch	34.03	
27 16 19 00-0071	EA	5' Category 6A Patch Cables With Plastic Arch	36.33	
27 16 19 00-0072	EA	7' Category 6A Patch Cables With Plastic Arch	38.06	
27 16 19 00-0073	EA	10' Category 6A Patch Cables With Plastic Arch	43.70	
27 16 19 00-0074	EA	15' Category 6A Patch Cables With Plastic Arch	53.08	
27 16 19 00-0075	EA	25' Category 6A Patch Cables With Plastic Arch	67.94	

27 20 Data Communications (27)**27 21 Data Communications Network Equipment** (27 20)

Note: Includes testing of new devices and certification.

27 21 16 Data Communications Routers, CSU/DSU, Multiplexers, Codecs, and Modems(27 21)



Communications	27	27
Data Communications	27 20	
Data Communications Network Equipment	27 21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 21 16 00-0001 Fiber Optic Modems <small>(27 21 16)</small>		
27 21 16 00-0002 EA Fiber Optic Modems, Range 6.2 Miles.....	1,958.64	244.56
27 21 16 00-0003 EA Fiber Optic Modem, Range 3.1 Miles, 12 Channel.....	3,795.55	244.56
27 21 16 00-0004 Ethernet Hubs and Switches <small>(27 21 16)</small>		
27 21 16 00-0005 EA 16 Port Managed Hub With Fiberport And Standard Management.....	4,112.78	183.72
27 21 16 00-0006 EA 16 Port Unmanaged Hub.....	616.83	122.48
27 21 16 00-0007 EA 8 Port, Hardened POE Network Switch (Etherwan EX17082A).....	858.68	
27 21 16 00-0008 EA 16 Port, Hardened POE Network Switch (Etherwan EX17162A).....	1,153.91	
27 21 16 00-0009 EA 12 Port, Industrial Ethernet Switch (Cisco IE-4000-4GC4GP4G-E).....	5,671.87	122.48
27 21 16 00-0010 EA Power Supply (Cisco PWR-IE170W-PC-AC).....	1,678.02	61.24
27 21 16 00-0011 Network Equipment <small>(27 21 16)</small>		
27 21 16 00-0012 Communications Entrance Protection <small>(27 21 16 00-0011)</small>		
27 21 16 00-0013 EA 100-Pair, 5 Pin Configuration, 110 Termination, Building Entrance Terminal With Cover (Porta 24100-110-M110C).....	1,170.00	91.86
27 21 16 00-0014 EA Solid State Protector Module With 4 OHM Heat Coils (CommScope 4C1S).....	14.10	1.22
27 21 16 00-0015 Communications Cabinets, Racks, Frames And Enclosures <small>(27 21 16 00-0011)</small>		
27 21 16 00-0016 EA 19" Width x 36" Height x 24" Depth, Wall Mounted Telecommunications Enclosure (Chatsworth 11840-736).....	1,422.54	91.86
For Fan Kit (Chatsworth 12804-701), Add	199.00	
27 21 16 00-0017 EA 10 Outlet, 125 Volt, 20 Amperes, Telecommunications Cabinet Power Strip (Chatsworth 13239-757).....	1,305.52	6.12
27 21 16 00-0018 EA 26" Width x 36" Height x 8.5" Depth, Wall Mounted Enclosure (Chatsworth 13050-722).....	1,359.97	
For Fan Kit (Chatsworth 13051-001), Add	242.65	
27 21 16 00-0019 Communications Termination Blocks And Patch Panels <small>(27 21 16 00-0011)</small>		
27 21 16 00-0020 Communications Termination Blocks <small>(27 21 16 00-0019)</small>		
27 21 16 00-0021 EA 4-Pair, 300-Pair Count, 110 Patch Panel System Terminal Block (CommScope 107058810).....	363.06	18.34
27 21 16 00-0022 EA 5-Pair, 300-Pair Count, 110 Patch Panel System Terminal Block (CommScope 107058802).....	337.79	18.34
27 21 16 00-0023 EA 4-Pair, 900-Pair Count, 110 Patch Panel System Terminal Block (CommScope 107058869).....	811.54	18.34
27 21 16 00-0024 EA 5-Pair, 900-Pair Count, 110 Patch Panel System Terminal Block (CommScope 107058851).....	754.70	18.34
27 21 16 00-0025 EA 110 Connector System Mounting Brackets (CommScope 107535593).....	112.90	18.34
27 21 16 00-0026 EA 110 Connector System Mounting Brackets (CommScope 107535585).....	122.09	18.34
27 21 16 00-0027 EA 110 Connector System Mounting Brackets (CommScope 107098816).....	139.27	18.34
27 21 16 00-0028 Communications Copper Patch Panels <small>(27 21 16 00-0019)</small>		
Note: Excludes cabinet and terminations.		
27 21 16 00-0029 EA 24 Port, Category 5E Patch Panel (CommScope 108208919).....	357.13	39.80
27 21 16 00-0030 EA 48 Port, Category 5E Patch Panel (CommScope 108208935).....	653.02	48.99
27 21 16 00-0031 EA 24 Port, Category 6 Patch Panel (CommScope 760062372).....	530.27	39.80
27 21 16 00-0032 EA 48 Port, Category 6 Patch Panel (CommScope 760062380).....	992.09	48.99
27 21 16 00-0033 Communications Optical Fiber Patch Panels <small>(27 21 16 00-0019)</small>		
27 21 16 00-0034 Closet Connector Housings <small>(27 21 16 00-0033)</small>		
27 21 16 00-0035 EA 48 Fiber Total Capacity, Closet Connector Housing (Corning CCH-01U).....	512.67	24.49
Note: Accepts up to 2 closet connector housing panels. Excludes panels.		
27 21 16 00-0036 EA 96 Fiber Total Capacity, Closet Connector Housing (Corning CCH-02U).....	600.37	24.49
Note: Accepts up to 4 closet connector housing panels. Excludes panels.		
27 21 16 00-0037 EA 288 Fiber Total Capacity, Closet Connector Housing (Corning CCH-04U).....	751.58	24.49
Note: Accepts up to 12 closet connector housing panels. Excludes panels.		
27 21 16 00-0038 EA SC Duplex Multimode, 62.5 Micron, 12 Fiber, Closet Connector Housing Panel (Corning CCH-CP-91).....	128.46	12.25
27 21 16 00-0039 EA SC Duplex Singlemode, 12 Fiber, Closet Connector Housing Panel (Corning CCH-CP-59).....	174.97	12.25
27 21 16 00-0040 EA SC Simplex Multimode, 62.5 Micron, 12 Fiber, Closet Connector Housing Panel (Corning CCH-CP-56).....	144.88	12.25
27 21 16 00-0041 EA SC Simplex Singlemode, 12 Fiber, Closet Connector Housing Panel (Corning CCH-CP-3C).....	190.00	12.25
27 21 16 00-0042 Communications Cable Management <small>(27 21 16 00-0011)</small>		
27 21 16 00-0043 Horizontal Communication Cable Management <small>(27 21 16 00-0042)</small>		
27 21 16 00-0044 EA 1.7" Height, 19" Width, 3.7" Depth, 1 RU, Front Only, Horizontal Cable Manager (Panduit WMPFSE).....	160.14	24.49
27 21 16 00-0045 EA 3-1/2" Height, 19" Width, 3.7" Depth, Horizontal Cable Manager (Panduit WMPF1E).....	165.90	24.49
27 21 16 00-0046 Vertical Communication Cable Management <small>(27 21 16 00-0042)</small>		
27 21 16 00-0047 EA 6" Width x 84" Height, Double-Sided Vertical Cabling Section (Chatsworth 11729-703).....	996.79	61.24
27 21 16 00-0048 EA 19" Width x 84" Height, Universal Rack (Chatsworth 48353-703).....	1,034.08	61.24
27 21 16 00-0049 EA 23" Width x 84" Height, Universal Rack (Chatsworth 48383-703).....	1,117.98	61.24
27 21 16 00-0050 Communications Patch Cords, Station Cords, And Cross Connect Wire <small>(27 21 16 00-0011)</small>		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 21 16 00-0051			Premise Cross-Connect Wire (27 21 16 00-0050)		
27 21 16 00-0052	LF		1-Pair, 22 AWG Premise Cross-Connect Wire (General Cable 7041973).....	1.26	0.61
27 21 16 00-0053			Pathways For Communications Systems (27 21 16 00-0011)		
27 21 16 00-0054			Conduits And Backboxes For Communication Systems (27 21 16 00-0053)		
27 21 16 00-0055			Flexible Conduit For Communication Systems (27 21 16 00-0054)		
27 21 16 00-0056	CLF		1" Diameter, Riser Rated, Non-Metallic Flexible Conduit With Pull Tape (Carlton DF4X1C).....	551.26	220.10
27 21 16 00-0057	CLF		1" Diameter, Plenum Rated, Non-Metallic Flexible Conduit With Pull Tape (Carlton CF4X1C).....	852.52	220.10
27 21 16 00-0058			Tube Cables For Communication Systems (27 21 16 00-0054)		
27 21 16 00-0059			Outdoor/All-Dielectric Tube Cables (27 21 16 00-0058)		
27 21 16 00-0060	CLF		Two Tube, Outdoor/All-Dielectric Tube Cable (Sumitomo TC02TOX).....	442.74	146.73
27 21 16 00-0061	CLF		Seven Tube, Outdoor/All-Dielectric Tube Cable (Sumitomo TC07TOX).....	665.85	183.42
27 21 16 00-0062	CLF		Nineteen Tube, Outdoor/All-Dielectric Tube Cable (Sumitomo TC19TOX).....	1,119.51	220.10
27 21 16 00-0063			Indoor/Riser Rated Tube Cables (27 21 16 00-0058)		
27 21 16 00-0064	CLF		Two Tube, Indoor/Riser Rated Tube Cable (Sumitomo TC02TRX).....	511.33	146.73
27 21 16 00-0065	CLF		Four Tube, Indoor/Riser Rated Tube Cable (Sumitomo TC04TRX).....	627.65	165.08
27 21 16 00-0066	CLF		Seven Tube, Indoor/Riser Rated Tube Cable (Sumitomo TC07TRX).....	713.48	183.42
27 21 16 00-0067	CLF		Nineteen Tube, Indoor/Riser Rated Tube Cable (Sumitomo TC19TRX).....	1,334.84	220.10
27 21 16 00-0068			Indoor/Plenum Rated Tube Cables (27 21 16 00-0058)		
27 21 16 00-0069	CLF		Single Tube, Indoor/Plenum Rated Tube Cable (Sumitomo TC01TPX).....	368.42	146.73
27 21 16 00-0070	CLF		Two Tube, Indoor/Plenum Rated Tube Cable (Sumitomo TC02TP2).....	543.73	146.73
27 21 16 00-0071	CLF		Four Tube, Indoor/Plenum Rated Tube Cable (Sumitomo TC04TP2).....	848.69	165.08
27 21 16 00-0072	CLF		Seven Tube, Indoor/Plenum Rated Tube Cable (Sumitomo TC07TP2).....	1,245.13	183.42
27 21 16 00-0073	CLF		Nineteen Tube, Indoor/Plenum Rated Tube Cable (Sumitomo TC19TP2).....	3,935.89	220.10
27 21 16 00-0074			Unjacketed Single Tube Cables (27 21 16 00-0058)		
27 21 16 00-0075	CLF		Single Tube, Unjacketed Single Tube Cable (Sumitomo TC01TGX).....	315.06	146.73
27 21 16 00-0076			Multimode Fiber Bundles (27 21 16 00-0058)		
			Note: Includes optical fiber cables.		
27 21 16 00-0077	CLF		2-Fiber, 62.5 Micron, Multimode Fiber Bundle (Sumitomo FR02M6).....	138.16	44.02
27 21 16 00-0078	CLF		4-Fiber, 62.5 Micron, Multimode Fiber Bundle (Sumitomo FB04M6).....	212.47	44.02
27 21 16 00-0079	CLF		6-Fiber, 62.5 Micron, Multimode Fiber Bundle (Sumitomo FB06M6).....	292.51	44.02
27 21 16 00-0080	CLF		12-Fiber, 62.5 Micron, Multimode Fiber Bundle (Sumitomo FB12M6).....	536.41	44.02
27 21 16 00-0081	CLF		18-Fiber, 62.5 Micron, Multimode Fiber Bundle (Sumitomo FB18M6).....	779.21	51.35
27 21 16 00-0082	CLF		24-Fiber, 62.5 Micron, Multimode Fiber Bundle (Sumitomo FB24M6).....	1,023.12	51.35
27 21 16 00-0083			Singlemode Fiber Bundles (27 21 16 00-0058)		
			Note: Includes optical fiber cables.		
27 21 16 00-0084	CLF		2-Fiber, Singlemode Fiber Bundle (Sumitomo FR02SX).....	122.91	44.02
27 21 16 00-0085	CLF		4-Fiber, Singlemode Fiber Bundle (Sumitomo FB04SX).....	155.31	44.02
27 21 16 00-0086	CLF		6-Fiber, Singlemode Fiber Bundle (Sumitomo FB06SX).....	181.99	44.02
27 21 16 00-0087	CLF		12-Fiber, Singlemode Fiber Bundle (Sumitomo FB12SX).....	233.43	44.02
27 21 16 00-0088	CLF		18-Fiber, Singlemode Fiber Bundle (Sumitomo FB18SX).....	360.00	51.35
27 21 16 00-0089	CLF		24-Fiber, Singlemode Fiber Bundle (Sumitomo FB24SX).....	476.23	51.35
27 21 16 00-0090			Tube Distribution Cabinets (27 21 16 00-0058)		
27 21 16 00-0091	EA		Modular Tube Distribution Cabinet (Sumitomo DE06MDU).....	270.67	61.24
			Note: Up to six 7-tube cables or two 19-tube cables.		
27 21 16 00-0092			Modular Fiber Termination Cabinets (27 21 16 00-0058)		
27 21 16 00-0093	EA		24-Fiber Capacity, Wall Mount, Modular Fiber Termination Cabinet (Sumitomo FT24WFM).....	345.39	61.24
27 21 16 00-0094	EA		48-Fiber Capacity, Wall Mount, Modular Fiber Termination Cabinet (Sumitomo FT48WFM).....	369.02	61.24
27 21 16 00-0095			Tube Distribution Accessories (27 21 16 00-0058)		
27 21 16 00-0096	EA		Plastic Push/Pull Quick Release Pneumatic Cap For 8 mm Tube (Sumitomo DE08MA).....	14.90	6.12
27 21 16 00-0097	EA		Plastic Push/Pull Quick Release Pneumatic Coupling For 8 mm Tube (Sumitomo DE08MC2).....	16.56	6.12
27 21 16 00-0098	EA		Brass Push/Pull Quick Release Pneumatic Coupling For 8 mm Bulkhead Tube (Sumitomo DE08MB).....	20.82	6.12
27 21 16 00-0099			Communications Optical Fiber Cabling (27 21 16 00-0011)		
27 21 16 00-0100			Communications Optical Fiber Cable Splicing And Terminations (27 21 16 00-0099)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 21 16 00-0101 Field Installed Fiber Connectors <small>(27 21 16 00-0100)</small>		
27 21 16 00-0102 EA SC Type, Singlemode, Field Installed Fiber Connector (Corning 95-200-42)	45.20	9.18
27 21 16 00-0103 EA SC Type, 62.5 Micron Multimode, Field Installed Fiber Connector (Corning 95-000-41)	39.73	9.18
27 21 16 00-0104 Buffer Tube Fan-Out Kits <small>(27 21 16 00-0100)</small>		
27 21 16 00-0105 Buffer Tube Breakout Kits (Sumitomo) <small>(27 21 16 00-0104)</small>		
Note: Includes 900 micron tubing.		
27 21 16 00-0106 EA 2-Fiber Breakout Kit (Sumitomo FTFLD02)	267.43	122.28
27 21 16 00-0107 EA 4-Fiber Breakout Kit (Sumitomo FTFLD04)	273.14	122.28
27 21 16 00-0108 EA 6-Fiber Breakout Kit (Sumitomo FTFLD06)	278.19	122.28
27 21 16 00-0109 EA 12-Fiber Breakout Kit (Sumitomo FTFLD12)	293.88	122.28
27 21 16 00-0110 EA 18-Fiber Breakout Kit (Sumitomo FTFLD18)	315.33	122.28
27 21 16 00-0111 EA 24-Fiber Breakout Kit (Sumitomo FTFLD24)	331.26	122.28
27 21 16 00-0112 Buffer Tube Fan-Out Kits (Corning) <small>(27 21 16 00-0104)</small>		
27 21 16 00-0113 EA 12 Fiber, 25" Tube Length, Indoor Buffer Tube Fan-Out Kit (Corning Fan-BT25-12)	270.08	122.28
27 21 16 00-0114 EA 12 Fiber, 25" Tube Length, Outdoor Buffer Tube Fan-Out Kit (Corning Fan-OD25-12)	326.69	122.28
27 21 16 00-0115 Communications Copper Cabling <small>(27 21 16 00-0011)</small>		
27 21 16 00-0116 Copper Communications Cable Splicing And Terminations <small>(27 21 16 00-0115)</small>		
27 21 16 00-0117 Copper Communications Cable Splice Cases <small>(27 21 16 00-0116)</small>		
27 21 16 00-0118 EA 6.5" x 28.4" Copper Communications Cable Splice Case (Preformed Line Products 8000626)	1,224.12	244.56
27 21 16 00-0119 EA 9.5" x 28.4" Copper Communications Cable Splice Case (Preformed Line Products 8000630)	1,434.20	244.56
27 21 16 00-0120 EA 12.5" x 28.4" Copper Communications Cable Splice Case (Preformed Line Products 8006219)	2,132.24	244.56
27 21 16 00-0121 Modular Splice Connectors <small>(27 21 16 00-0116)</small>		
27 21 16 00-0122 EA 25-Pair, Straight Body Only, 26-24 Gauge Cable, Filled Modular Splice Connector (3M 710-SC1-25)	132.47	61.14
27 21 16 00-0123 EA 25-Pair, Straight/Half Tap Body, 26-24 Gauge Cable, Dry Modular Splice Connector (3M 710-SD1-25)	130.20	61.14
27 21 16 00-0124 EA 25-Pair, Straight/Half Tap Body, 26-24 Gauge Cable, Filled Modular Splice Connector (3M 710-TC1-25)	132.52	61.14
27 21 16 00-0125 EA 25-Pair, Bridge Body, 26-22 Gauge Cable, Filled Modular Splice Connector (3M 710-BC1-25)	132.20	61.14
27 21 26 Data Communications Network Management <small>(27 21)</small>		
27 21 26 00-0001 Data Communications Network Management <small>(27 21 26)</small>		
27 21 26 00-0002 EA 3 Port, Terminal/Serial Device Server (Control 99560-9)	692.87	30.57
27 21 26 00-0003 EA 2 Port, Terminal/Serial Device Server (Control 99550-0)	531.94	30.57
27 21 26 00-0004 EA 4 Port, DB9 Terminal/Serial Device Server (Control 99445-9)	744.55	30.57
27 21 26 00-0005 EA 4 Port, DB9 Terminal/Serial Device Server (Control 99448-0)	1,170.88	30.57
27 21 26 00-0006 EA 24 Watt, Din Rail Mountable, Power Adapter (Control PS1020)	108.22	
27 21 26 00-0007 EA Remote Data Port, Spectra Positioning System (Pelco IPS_RDPE_2)	516.48	18.34
27 21 26 00-0008 EA Sennetech Code Translator (Pelco SCT_100_AD232)	858.44	30.57
27 21 26 00-0009 EA VPN Router (Cisco 819HG)	5,072.63	391.93
27 21 26 00-0010 EA Cisco Catalyst 3000 Series Switches (Cisco IE-3000 - 8TC)	3,613.17	391.93
27 21 26 00-0011 EA WS-C4507R+E Chassis, Two WS-X4648-RJ45V+E, Sup7L-E, LAN Base (Cisco WS-C4507RE+96V+)	19,062.41	146.73
27 21 26 00-0012 EA SMARTnet Extended Service Agreement, SNTC-8X5XNBD WS-C4507R+E Chassis, 2 WS-X4648-RJ45V+E (Cisco CON-SNT-C4507REV)	601.43	
27 21 26 00-0013 EA Sup8-E And WS-X4748-RJ45V+E Upgrade For Bundle (Cisco C4500E-S7L-S8)	13,000.37	146.73
27 21 26 00-0014 EA Catalyst 4500 E-Series Redundant Supervisor 8-E (Cisco WS-X45-SUP8-E/2)	28,273.46	146.73
27 21 26 00-0015 EA Catalyst 4500 2GB SD Memory Card (Cisco SD-X45-2GB-E)	666.54	12.25
27 21 26 00-0016 EA Catalyst 4500 4200W AC Dual Input Power Supply (Data + PoE) (Cisco PWR-C45-4200ACV)	4,889.91	15.28
27 21 26 00-0017 EA Catalyst 4500 4200W AC Dual Input Power Supply (Data + PoE) (Cisco PWR-C45-4200ACV/2)	4,240.54	15.28
27 21 26 00-0018 EA 13', NEMA 6-20 To IEC-C19 Power Cable (Cisco CAB-US620P-C19-US)	75.56	6.12
27 21 26 00-0019 EA 1000BASE-SX SFP Transceiver Module, MMF, 850nm, DOM (Cisco GLC-SX-MMD=)	240.98	61.14
27 21 26 00-0020 EA Cisco Catalyst 3850 24 Port Data IP Base (Cisco WS-C3850--24TS)	3,699.87	146.73
27 21 26 00-0021 EA SMARTnet Extended Service Agreement, 8X5XNBD Cisco Catalyst 3850 24 Port Data IP Base (Cisco CON-SNT-WSC384TS)	791.33	
27 21 26 00-0022 EA North America AC Type A Power Cable (Cisco CAB-TA-NA)	25.01	6.12
27 21 26 00-0023 EA 350 Watt AC Power Supply (Cisco PWR-C1-350WAC)	329.70	15.28
27 21 26 00-0024 EA Cisco Catalyst 3850 4x1GE Network Module (Cisco C3850-NM-4-1G)	821.97	15.31
27 21 26 00-0025 EA 1' (30cm), Catalyst 3750X Stack Power Cable (Cisco CAB-SPWR-30CM)	120.25	6.12
27 21 26 00-0026 EA Rack Mount Switch 16 100 SFP 8 10/100 PoE 2 Geuplinks (Cisco IE-3010-16S-8PC)	4,388.95	146.73
27 21 26 00-0027 EA SMARTnet Extended Service Agreement, 8X5XNBD IA Rack Mount Switch 16 100 SFP 8 10/10 (Cisco CON-SNT-301016S8)	794.50	
27 21 26 00-0028 EA IE 3010 Power Supply (Cisco PWR-RGD-AC-DC/IA)	703.22	15.28
27 21 26 00-0029 EA IE 3010 AC-DC Redundant Power Supply (Cisco PWR-RGD-AC-DC/IA)	714.30	15.28
27 21 26 00-0030 EA 4 Ethernet 10/100 Ports And 2 Dual-Purpose Uplinks, Industrial Ethernet Switch (Cisco IE-3000-4TC)	1,511.15	146.73
27 21 26 00-0031 EA Expansion Power Module For Cisco IE-3000-4TC (Cisco PWR-IE50W-AC-IEC)	386.73	15.31
27 21 26 00-0032 EA 4 Port, Expansion SFP Module for IE-3000-4TC (Cisco IEM-3000-4SM)	1,819.07	15.31
27 21 26 00-0033 EA Router (CISCO IR829)	1,626.04	61.24
27 21 29 Data Communications Switches and Hubs <small>(27 21)</small>		

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 21 29 00-0001		Data Communications Multimedia Modular Patch Panels ^(27 21 29)		
Note: Unloaded multimedia patch panels that accept modular jacks for category 3, 5e, 6, fiber optic, etc. Excludes rack, modular jacks and terminations. See CSI section 27 15 43 00-0051 for modular jacks.				
27 21 29 00-0002	EA	12 Port, Wall Mount Multimedia Modular Patch Panel, Unloaded.....	141.45	6.11
27 21 29 00-0003	EA	16 Port, Rack Mount Multimedia Modular Patch Panel, Unloaded.....	156.44	6.11
27 21 29 00-0004	EA	24 Port, Rack Mount Multimedia Modular Patch Panel, Unloaded.....	185.46	6.11
27 21 29 00-0005	EA	36 Port, Rack Mount Multimedia Modular Patch Panel, Unloaded.....	194.37	6.11
27 21 29 00-0006	EA	48 Port, Rack Mount Multimedia Modular Patch Panel, Unloaded.....	212.09	7.65
27 21 29 00-0007	EA	24 Port, Rack Mount Multimedia Angled Patch Panel, Unloaded.....	201.75	6.11
27 21 29 00-0008	EA	48 Port, Rack Mount Multimedia Angled Patch Panel, Unloaded.....	253.21	7.65
27 21 29 00-0009	EA	Rack Mount Rear Cable Management Bar.....	67.04	7.65

27 21 33 Data Communications Wireless Access Points ^(27 21)

27 21 33 00-0001		Data Communications Wireless Access Points ^(27 21 33)		
27 21 33 00-0002	EA	Base Station Unit, 300 Mbps, MIMO 2x2, Type-N Connectors US PoE (Proxim Wireless MP-8200-BSU).....	4,990.45	183.42
27 21 33 00-0003	EA	Base Station Unit, 300 Mbps, MIMO 2x2, 23 dBi, 10° Panel Antenna - US PoE (Proxim Wireless MP-8250-BS1).....	11,998.01	183.42
27 21 33 00-0004	EA	Base Station Unit, 300 Mbps, MIMO 2x2, 16 dBi, 90 Degree Sector Antenna US PoE (Proxim Wireless MP-8250-BS9).....	11,998.01	183.42
27 21 33 00-0005	EA	Subscriber Unit, 300 Mbps, MIMO 2x2, Type-N Connectors US PoE (Proxim Wireless MP-8200-SUA).....	1,949.15	183.42
27 21 33 00-0006	EA	Subscriber Unit, 300 Mbps, MIMO 2x2, 23 dBi, Panel Antenna US PoE (Proxim Wireless MP-8250-SUR).....	2,288.62	205.99
27 21 33 00-0007	EA	Base Station Unit, 300 Mbps, MIMO 3x3, GPS Sync Ready, Type-N Connectors - US PoE (Proxim Wireless MP-8200-BSU-G).....	6,417.19	205.99
27 21 33 00-0008	EA	Base Station Unit, 300 Mbps, MIMO 2x2, GPS Sync Ready, 23 dBi, 10° Panel Antenna - US PoE (Proxim Wireless MP-8250-BS1-G).....	9,754.15	205.99
27 21 33 00-0009	EA	Base Station Unit, 300 Mbps, MIMO 2x2, GPS Sync Ready, 16 dBi, 90° Sector Antenna - US PoE (Proxim Wireless MP-8250-BS9-G).....	9,754.15	205.99
27 21 33 00-0010	EA	50 Mbps (upgradable to 100 Mbps), MIMO 2x2, 15 dBi integrated antenna - US PoE (Proxim Wireless QB-825-LNK-50).....	1,999.95	68.67
27 21 33 00-0011	EA	100 Mbps, MIMO 2x2, 15 dBi integrated antenna - US PoE (Proxim Wireless QB-825-LNK-100).....	2,027.97	68.67
27 21 33 00-0012	EA	Surge, Gigabit Surge Protector With Shielded RJ45 (Proxim Wireless ETH-SURGE-1G).....	187.81	34.33
27 21 33 00-0013	EA	FlexPort uWave AdaptRate And Modulation Feature Upgrade (BridgeWave Communications FPUWAVE-UPG-ARM).....	1,740.97	
27 21 33 00-0014	EA	1' High Performance Dish Antenna, Low Profile, 21.2-23.6 GHz, WR42 Flange, SOI (Radio Waves HPLP1-23RR).....	619.25	61.14
27 21 33 00-0015	EA	Cellular Phone / Wi-Fi Antenna (Sierra Wireless AP-CWG-Q-S222-WH).....	512.81	61.14
27 21 33 00-0016	EA	Cell LTE MIMO Antenna (Sierra Wireless 1810075).....	90.37	24.45
27 21 33 00-0017	EA	AirLink GX400 Power Adapter (Sierra Wireless 2700384).....	80.28	
27 21 33 00-0018	EA	AirLink GX400 Power Cable (Sierra Wireless 2000380).....	46.75	
27 21 33 00-0019	EA	Cellular/PCS/LTE, Hockey Puck Antenna (Sierra Wireless AP-C-Q-S2-BL).....	327.93	61.14
27 21 33 00-0020	EA	Cellular/PCS/LTE/GPS, Multi-Band Antenna (Sierra Wireless AP-CG-Q-S22-BL).....	329.99	61.14
27 21 33 00-0021	EA	2 Way, RF Power Divider, 790-920 MHz (Telewave ANTPD28D).....	451.36	61.24
27 21 33 00-0022	EA	Wireless Cellular Modem (Sierra Wireless AirLink GX400 EVDO/GPS).....	1,143.16	91.86
27 21 33 00-0023	EA	Wireless Cellular Modem (Sierra Wireless AirLink GX450 Rugged).....	1,463.52	91.86
27 21 33 00-0024	EA	Magnetic Mount Cellular Antenna (Wilson Electronics 301125).....	81.55	18.34
27 21 33 00-0025	EA	Yagi Antenna, 890-960 MHz, 10 dBd Gain (PCTEL Bluewave Antennas BGYD890K).....	308.99	68.67
27 21 33 00-0026	EA	Andrew® Omni Antenna, 890-960 MHz, 360° Horizontal Beamwidth, Fixed Electrical Tilt, Fits On 38-51 mm (1-1/2 to 2 in) OD Pipe (Commscope DB583-Y).....	1,018.64	68.67
27 21 33 00-0027	EA	Single Channel Bluetooth Sensor With Bluetooth Module And Antenna (DeepBlue SC).....	5,020.94	61.24
27 21 33 00-0028	EA	Point-to-Point Wireless Bridge (Proxim Tsunami® QB-10150).....	2,548.67	61.14

27 30 Voice Communications ⁽²⁷⁾

27 32 Voice Communications Terminal Equipment ^(27 30)

Note: Includes testing of new devices and certification.

27 32 13 Telephone Sets ^(27 32)

27 32 13 00-0001		Interior Telephone Components ^(27 32 13)		
27 32 13 00-0002	EA	Solid State Exchange Unit With Power Supply.....	7,697.04	1,117.39
27 32 13 00-0003	EA	Dial Telephone - Handset In Cabinet.....	926.13	91.34
27 32 13 00-0004	EA	Elevator Cab Telephone With Trailer Cable.....	467.34	97.94
27 32 13 00-0005	EA	Loud Ring Bell, 6".....	365.90	90.85
27 32 13 00-0006	EA	Audio/Visual Indicator.....	467.96	85.60
27 32 13 00-0007	EA	Administrative Telephone With Digital Display.....	488.13	76.79
27 32 13 00-0008	EA	Processing Unit For 16 Station System.....	2,404.72	626.43
27 32 13 00-0009	EA	Handset For 16 Station System.....	343.70	62.37
27 32 13 00-0010	EA	Handset In Cabinet, For 16 Station System.....	465.60	84.12
27 32 13 00-0011	MLF	20 Conductor Unshielded Cable, #22.....	3,065.96	1,348.37
27 32 13 00-0012	EA	Power Supply For 16 Station System.....	427.16	166.42
27 32 13 00-0013	EA	Intercom Terminal Board.....	375.16	187.33
27 32 13 00-0014	EA	Power Supply For Five Station System, 24 Volt DC.....	444.41	166.42
27 32 13 00-0015	EA	Telephone Communication Board, Insulated Blueboard 24" x 24" x 1/2" Thick.....	217.47	68.37
27 32 13 00-0016	EA	Telephone Cabinet With Backboard 24" High x 24" Wide x 6" Deep.....	683.89	150.48
27 32 13 00-0017	EA	Telephone Cabinet With Backboard 30" High x 24" Wide x 6" Deep.....	808.04	171.04
27 32 13 00-0018	EA	Telephone Cabinet With Backboard 30" High x 30" Wide x 6" Deep.....	980.29	202.43
27 32 13 00-0019	EA	Telephone Cabinet With Backboard 36" High x 30" Wide x 6" Deep.....	1,158.16	218.85
27 32 13 00-0020	EA	Telephone Cabinet With Backboard 48" High x 30" Wide x 6" Deep.....	1,811.61	249.02
27 32 13 00-0021	EA	Ring Rung 3".....	13.25	6.82
27 32 13 00-0022	EA	G66B50 Telephone Blocks Including 50 Terminators, Exterior Ring, Marking, ID.....	33.32	12.11



Communications	27	27
Voice Communications	27 30	
Voice Communications Terminal Equipment	27 32	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 32 13 00-0023	EA	G110 Data Blocks Including Terminator, Exterior Ring, Marking, ID And Testing	60.32	24.82
27 32 13 00-0024 Interior Telephone Accessories (27 32 13)				
27 32 13 00-0025	EA	Blank Telephone Receptacle, Exposed Devices - Complete	13.68	6.60
27 32 13 00-0026	EA	4-Pin Telephone Receptacle, Exposed Devices - Complete	29.75	25.44
27 32 13 00-0027	EA	Dual Flush Mounted, Level 5, RJ-45 Jack, Complete	73.58	27.93
27 32 13 00-0028	EA	Wall Mount, Level 5, RJ-45 Jack, Complete	69.64	27.93
27 32 13 00-0029	EA	Terminating Strips, Inside	141.25	55.86
27 32 13 00-0030	EA	Dual Outlet, 4-Pin Telephone Receptacle, Concealed Type RJ-45 - Complete.....	62.02	28.73
27 32 13 00-0031	EA	Ready Access Closure 3 To 25 Pair	170.72	67.38
27 32 13 00-0032	EA	Ready Access Closure 25 To 100 Pair	199.69	75.32
27 32 13 00-0033	EA	Termination Block With Bracket 25 Pair	64.58	22.62
27 32 13 00-0034	EA	RJ-11 Telephone Receptacle, Concealed Devices - Complete	60.88	28.37
27 32 13 00-0035	EA	Interior Protected Terminal 25 Pair	736.60	163.37
27 32 13 00-0036	EA	Interior Protected Terminal 50 Pair	873.58	165.93
27 32 13 00-0037	EA	Pedestal 6" x 6" x 50" 3 To 100 Pair	293.27	67.99
27 32 13 00-0038	EA	Pedestal 8" x 8" x 50" 100 To 300 Pair	302.71	67.99
27 32 13 00-0039	EA	Pedestal 10" x 10" x 43" 300 To 600 Pair	399.79	86.94
27 32 13 00-0040	EA	Pedestal 10" x 16" x 439 600 Pair	829.89	156.64
27 32 13 00-0041	EA	Entrance Protector Terminal 100 Pair	1,148.81	178.77
27 32 13 00-0042	EA	Gas Protection Module	17.76	6.11
27 32 13 00-0043	EA	Terminating Boxes, Outside With 3 Element Protectors, Per Pair	30.86	5.58

27 32 26 Ring-Down Emergency Telephones (27 32)

27 32 26 00-0001 Emergency Telephone (27 32 26)				
Note: Includes CB3000 speakerphone, 3 auxiliary inputs, 2 auxiliary outputs, phone line surge suppressor, analog telephone connection, 70 watt area light with blue beacon, high power strobe, lighted faceplate, 110VAC power, ultra weather resistant finish, vandal resistant hardware, UV resistant lens, dome vent; flat area for directory, access control or other options; 12.75" diameter/8'-6" height, 1/4" thick steel construction, foundation anchor kit, ADA compliant.				
27 32 26 00-0002	EA	Code Blue 1-Standard Emergency Telephone Pedestal Unit (CB 1-s).....	11,492.75	502.25
Note: Includes IA4100 FP1 analog speakerphone with single red 'Push For Help' button, 'Push For Help' bezel, hard wire phone line, passive vent at top, 24V AC, and standard color.				
27 32 26 00-0003	EA	Code Blue 1-Dual Emergency Telephone Pedestal Unit (CB 1-d).....	12,092.18	502.25
Note: Includes IA4100 FP1 analog speakerphone with single red 'Push For Help' button, 'Push For Help' bezel, blank stainless steel plate second opening, hard wire phone line, passive vent at top, 24V AC, and standard color.				
27 32 26 00-0004	EA	Analog Speakerphone With Black Info Button And Red Push For Help Button Code Blue Option (Code Blue IA4100 FP2)	199.81	
27 32 26 00-0005	EA	Analog Speakerphone With Black Call Button, Keypad And Red Push For Help Button Code Blue Option (Code Blue IA4100 FP2-K).....	299.72	
27 32 26 00-0006	EA	IP Speakerphone With Single Red Push For Help Button Code Blue Option (Code Blue IP5000 FP1)	749.29	
27 32 26 00-0007	EA	IP Speakerphone With Back Info Button And Red Push For Help Button Code Blue Option (Code Blue IP5000 FP2).....	1,019.03	
27 32 26 00-0008	EA	IP Speakerphone With Black Call Button, Keypad And Red Push For Help Button Code Blue Option (Code Blue IP5000 FP2-K).....	1,118.94	
27 32 26 00-0009	EA	EMERGENCY (Raised Letters With Braille) Main Bezel Code Blue Option	19.98	
27 32 26 00-0010	EA	EMERGENCIA/EMERGENCIA (Raised Letters With Braille) Main Bezel Code Blue Option	19.98	
27 32 26 00-0011	EA	Directory, Second Opening Code Blue Option	179.83	
27 32 26 00-0012	EA	Camera Enclosure With Color IP Camera, Second Opening Code Blue Option	1,898.20	
27 32 26 00-0013	EA	HID Card Reader, Second Opening Code Blue Option	879.17	
27 32 26 00-0014	EA	HID Card Reader And Color IP Camera, Second Opening Code Blue Option	2,847.30	
27 32 26 00-0015	EA	IP Wireless Communication Code Blue Option	5,984.32	
Note: 802.11g or secure mesh 5.8. (system UPS backup or unit Night Charge recommended); IP5000 VoIP Speakerphone option must be ordered when selecting IP Wireless Communications. Requires Base Unit(s) and site survey.				
27 32 26 00-0016	EA	Active Venting Code Blue Option.....	319.70	
27 32 26 00-0017	EA	Night Charge Power Code Blue Option	2,787.36	
Note: Requires 120V AC external power supplied to Code Blue unit.				
27 32 26 00-0018	EA	Power Transformer Kit, Alternate Incoming Power Code Blue Option.....	699.34	
27 32 26 00-0019	EA	Overhead Camera Mount Code Blue Option	1,588.49	
Note: Excludes camera.				
27 32 26 00-0020	EA	Custom Color For Overhead Camera Mount Code Blue Option	69.93	
27 32 26 00-0021 City Police Call System (27 32 26)				
27 32 26 00-0022 Components (27 32 26 00-0021)				
27 32 26 00-0023	EA	City Police Call System.....	894.62	142.58
27 32 26 00-0024	EA	Concrete Foundation For Police Department Telephone Post	795.11	206.53

27 40 Audio-Video Communications (27)

27 41 Audio-Video Systems (27 40)

27 41 16 Integrated Audio-Video Systems and Equipment (27 41)

Note: Includes testing of new devices and certification.

27	Communications
27 40	Audio-Video Communications
27 41	Audio-Video Systems



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

27 41 16 00-0001		Television Distribution System (27 41 16)		
		See CSI section 26 05 13 16-0001 for basic wiring.		
27 41 16 00-0002		Mounted Television Support (27 41 16 00-0001)		
27 41 16 00-0003	EA	Ceiling Mounted Television Support, 19" To 20".....	490.69	137.17
27 41 16 00-0004	EA	Ceiling Mounted Television Support, 19" To 20" With Rack	635.88	153.09
27 41 16 00-0005	EA	Ceiling Mounted Television Support, 25" To 27".....	512.88	137.17
27 41 16 00-0006	EA	Ceiling Mounted Television Support, 25" To 27" With Rack	658.06	153.09
27 41 16 00-0007	EA	Wall Mounted Television Support, 13".....	388.99	110.23
27 41 16 00-0008	EA	Wall Mounted Television Support, 13" With Rack.....	534.15	122.48
27 41 16 00-0009	EA	Wall Mounted Television Support, 19" To 20".....	418.10	110.23
27 41 16 00-0010	EA	Wall Mounted Television Support, 19" To 20" With Rack	563.26	122.48
27 41 16 00-0011	EA	Wall Mounted Television Support, 25" To 27".....	447.21	110.23
27 41 16 00-0012	EA	Wall Mounted Television Support, 25" To 27" With Rack	592.37	122.48
27 41 16 00-0013		Distribution System (27 41 16 00-0001)		
		See CSI section 26 05 13 16-0001 for wire and cabling.		
27 41 16 00-0014		TV Distribution Rack (27 41 16 00-0013)		
27 41 16 00-0015	EA	Steel Rack Cabinet With Shelves	1,748.96	224.87
27 41 16 00-0016	EA	Switch And Pilot Light	266.79	99.90
27 41 16 00-0017	LF	Surface Raceway With Outlets	31.79	13.57
27 41 16 00-0018	EA	Service Label	37.50	18.71
27 41 16 00-0019		Head End Amplifier (27 41 16 00-0013)		
27 41 16 00-0020	EA	Head End Amplifier.....	1,166.87	149.67
27 41 16 00-0021		UHF In-Line Booster Amplifier And Power Supply (27 41 16 00-0013)		
27 41 16 00-0022	EA	UHF In-Line Booster	676.36	149.67
27 41 16 00-0023		Preamplifiers (27 41 16 00-0013)		
27 41 16 00-0024	EA	VHF Preamplifier	849.08	149.67
27 41 16 00-0025	EA	UHF Preamplifier	676.36	149.67
27 41 16 00-0026		Power Supplies (27 41 16 00-0013)		
27 41 16 00-0027	EA	Common Power Supply	1,212.97	213.87
27 41 16 00-0028		Line Splitter And Mixer (27 41 16 00-0013)		
27 41 16 00-0029	EA	Line Splitter	102.31	49.89
27 41 16 00-0030	EA	Two-Way Splitter	116.06	49.89
27 41 16 00-0031	EA	Frequency Filter	260.52	74.95
27 41 16 00-0032	EA	Line Splitter And Mixer.....	312.54	110.05
27 41 16 00-0033		Power Line Filters (27 41 16 00-0013)		
27 41 16 00-0034	EA	120-Volt Power Supply Line Filter.....	508.59	99.90
27 41 16 00-0035		Wall Box And Receiver Outlets (27 41 16 00-0013)		
27 41 16 00-0036	EA	Wall Box With Lockable Cover, Excluding Outlet Plug.....	260.52	74.95
27 41 16 00-0037	EA	TV Receiver Outlet Plug	116.06	49.89
27 41 16 00-0038	EA	TV Camera Outlet Plug.....	116.06	49.89
27 41 16 00-0039	EA	Audio Outlet Plug.....	98.83	49.89
27 41 16 00-0040	EA	12 Ft RG 6U Cable With G-59 And TV Set Fittings.....	206.33	99.90
27 41 16 00-0041	EA	Male Plug PL-259	116.06	49.89
27 41 16 00-0042	EA	Wall Box And Receiver Outlet Television Outlets	135.93	52.33
27 41 33		Master Antenna Television Systems (27 41)		
27 41 33 00-0001		Antenna Systems (27 41 33)		
27 41 33 00-0002		Antenna (27 41 33 00-0001)		
27 41 33 00-0003	EA	Amateur Radio Antenna.....	1,103.28	183.42
27 41 33 00-0004	EA	Multi-Band Radio Antenna.....	855.85	183.42
27 41 33 00-0005		Receptacles (27 41 33 00-0001)		
27 41 33 00-0006	EA	Amateur Radio Antenna System Receptacle With Mating Plugs And Adapter.....	243.27	74.95
27 41 33 00-0007	EA	Multi-Band Radio Antenna System Receptacle With Mating Plugs	243.27	74.95

27 50 Distributed Communications and Monitoring Systems (27)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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27 51 Distributed Audio-Video Communications Systems (27 50)

27 51 17 Video Intercom and Exterior Gate Control System (27 51)

27 51 17 00-0001 Video Intercom And Exterior Gate Control System (27 51 17)			
27 51 17 00-0002 EA Audio Video Master Control Station With Handset, White Finish (Aiphone IX-MV7-HW)	1,522.38	153.09	
27 51 17 00-0003 EA Audio Video Master Control Station (Aiphone AX-8MV)	1,223.86	153.09	
27 51 17 00-0004 EA 16-call Add-on Selector For AX Masters (Aiphone AX-16SW)	513.50	153.09	
27 51 17 00-0005 EA Central Exchange Unit (Aiphone AX-084C)	1,450.83	76.55	
27 51 17 00-0006 EA Central Exchange Unit (Aiphone AX-248C)	1,977.38	76.55	
27 51 17 00-0007 EA Touch Tone Programmable Dialer (Viking K-1900-5)	149.05	30.62	
27 51 17 00-0008 EA Surface Mount Audio/Video Door Station (Aiphone IX-DV)	1,045.90	30.62	
27 51 17 00-0009 EA Surface Or Flush Wall Mount Audio/Video Door Station (Aiphone IX-DVF)	1,437.75	30.62	
27 51 17 00-0010 EA Surface Mount Audio/Video Door Station (Aiphone AX-DV)	466.17	30.62	
27 51 17 00-0011 EA Flush Mount Audio/Video Door Station (Aiphone AX-DVF)	525.60	30.62	
27 51 17 00-0012 EA 12 Volt, 2.5 Amperes, DC Power Supply (Aiphone PS-1225UL) Note: UL Listed	142.56	15.31	
27 51 17 00-0013 EA 24 Volt, 2 Amperes, DC Power Supply (Aiphone PS-2420UL) Note: UL Listed	155.01	15.31	
27 51 17 00-0014 EA IP Video Master Station (Aiphone IX-MV)	1,859.22	153.09	
27 51 17 00-0015 EA Handset Only For IX-MV (Aiphone 285999)	63.63	6.12	
27 51 17 00-0016 EA Hands Free Sub Master Video Monitor (Aiphone JF-2HD)	788.52	153.09	
27 51 17 00-0017 EA Stainless Steel Video Door Station With HID ProxPoint Plus Reader, Flush Mount (Aiphone AX-DVF-P)	748.11	30.62	
27 51 17 00-0018 EA Stainless Steel Surface Mount Box For IS-SS, IS-DVF, IS-IPDVF, IX-DF(SS) (Aiphone SBX-IDVF)	227.08	30.62	
27 51 17 00-0019 EA Stainless Steel Surface Mount Box For AX-DVF (Aiphone SBX-AXDVF)	253.35	30.62	
27 51 17 00-0020 EA Stainless Steel Security Lock Box For IS-DV, IS-DVF, IX-DF, IX-SS, IX-DF-HID, And IX-DF-RP10 (Aiphone LB-SDVF/A)	310.23	45.92	
27 51 17 00-0021 EA Front Case With Lens Cover For AX-DV And AX-DVF Cameras (Aiphone 240880)	69.06	15.31	

27 51 43 Sound Reinforcement (27 51)

Note: Includes testing of new devices and certification.

27 51 43 00-0001 Amplifiers (27 51 43)

27 51 43 00-0002 EA 10 Watt PA/Paging System Amplifier, 70 Volt (Bogen C10)	558.43	122.48	
27 51 43 00-0003 EA 35 Watt PA/Paging System Amplifier, 70 Volt (Bogen C35)	793.42	122.48	
27 51 43 00-0004 EA 60 Watt PA/Paging System Amplifier, 70 Volt (Bogen C60)	944.26	122.48	
27 51 43 00-0005 EA 100 Watt PA/Paging System Amplifier, 70 Volt (Bogen 100)	1,051.88	122.48	
27 51 43 00-0006 EA 150 Watt PA/Paging System Amplifier, 70 Volt (Bogen GS150)	1,312.66	122.48	
27 51 43 00-0007 EA 250 Watt PA/Paging System Amplifier, 70 Volt (Bogen GS250)	1,702.62	122.48	
27 51 43 00-0008 EA Rack Mount Kit For PA/Paging System Amplifiers (Bogen GSRPK)	67.45	6.12	

27 51 43 00-0009 Splitters (27 51 43)

27 51 43 00-0010 EA 24 Watt, 5 Output, Isolated Splitter (Doug Fleenor 125EE)	3,407.29	91.71	
27 51 43 00-0011 EA 1-in/11-out Splitter (Doug Fleenor DMX)	3,073.06	91.71	

27 51 43 00-0012 Speakers (27 51 43)

27 51 43 00-0013 EA 8", 5 Watt Recessed Ceiling Mounted Speaker With Transformer And Baffle (Atlas Sound FD72W)	216.14	32.77	
27 51 43 00-0014 EA 8" Steel Baffle (Atlas Sound 51-8)	69.81	6.11	
27 51 43 00-0015 EA T-Bar Support (Atlas Sound EZ95-8)	78.02	6.11	
27 51 43 00-0016 EA 8" Cylindrical Enclosure With Undercoating (Atlas Sound Q408)	122.00	6.11	
27 51 43 00-0017 EA Plate Mounted 10 Watt Attenuator With Priority Relay (Atlas Sound AT10-PA)	112.40	11.00	

27 51 43 00-0018 Accessories (27 51 43)

27 51 43 00-0019 EA Microphone And Stand For Audio/Video System (Bogen MBS-1000A)	329.04	15.31	
27 51 43 00-0020 EA 5 Disk CD Player For Audio/Video System (Bogen DCM290-P)	740.44	15.31	
27 51 43 00-0021 EA Weather Proof Horn For Audio/Video System (Bogen SPT5A)	186.10	30.62	
27 51 43 00-0022 EA Trumpet Driver And Line Matching Transformer For Audio/Video System (Atlas PD-60A)	346.13	30.62	
27 51 43 00-0023 EA Headset Microphone For Audio/Video System (Audio Technica Pro8Hex)	252.57	30.57	
27 51 43 00-0024 EA Microphone Jack For Audio/Video System	115.97	30.62	
27 51 43 00-0025 EA Terminal Cabinet For Audio/Video System (Atlas 121-18)	988.14	122.48	
27 51 43 00-0026 EA Volume Control For Audio/Video System (Bogen AT10A)	110.79	30.62	
27 51 43 00-0027 EA Round Bridge for 8" (S86/S810) Recessed Speakers (Bogen Communications TB8)	77.22	30.62	

27 51 43 00-0028 Removal And Reinstallation Of Speakers (27 51 43)

Note: Includes storage, cleaning and supply materials.

27 51 43 00-0029 EA Removal And Reinstallation Of Ceiling Mounted Speaker	171.20		
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27 53 Distributed Systems (27 50)

27 53 13 Clock Systems (27 53)

27 53 13 13 Wireless Clock Systems (27 53 13)

27 53 13 13-0001 Wireless Synchronized GPS Clock System (Sapling) (27 53 13 13)

27 Communications**27 50 Distributed Communications and Monitoring Systems****27 53 Distributed Systems**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 53 13 13-0002			Master Clock (Sapling SMA 2000 Series) ^(27 53 13 13-0001) Note: Includes Sapling standard 2 year "material" warranty and applies to Master Clocks, Analog Clocks, Digital Clocks and Converter Boxes.		
27 53 13 13-0003	EA		Master Clock, 900 MHz Transmitter, GPS, Surface Wall Mount (Sapling SMA-2S0-1100-1)	8,045.37	91.71
27 53 13 13-0004	EA		Master Clock, 900 MHz Transmitter, GPS, Rack Mount And Wall Mount Antenna (Sapling SMA-2R0-1100-1)	8,507.84	91.71
27 53 13 13-0005	EA		Master Clock, 900 MHz Transmitter, Surface Wall Mount (Sapling SMA-2S0-1000-1)	4,576.86	91.71
27 53 13 13-0006	EA		Master Clock, 900 MHz Transmitter, Rack Mount And Wall Mount Antenna (Sapling SMA-2R0-1000-1)	5,039.33	91.71
27 53 13 13-0007	EA		NTP Server Upgrade (Sapling SMA-000-SERV-0)	3,165.40	
27 53 13 13-0008			Wireless Repeaters (Sapling) ^(27 53 13 13-0001)		
27 53 13 13-0009	EA		Wireless Repeater, 900 MHz, RS485 Input, Surface Wall Mount (Sapling SMA-1SR-0000-1)	1,966.65	61.14
27 53 13 13-0010	EA		Wireless Network Repeater, 900 MHz, 110 VAC - 230 VAC, With TCP/IP For Campus Environments, Surface Wall Mount (Sapling SMA-1SM-0000-1)	2,203.39	61.14
27 53 13 13-0011			Wireless Round Analog Clocks (Sapling SAL-4 Series) ^(27 53 13 13-0001) Note: Includes Sapling standard 2 year "material" warranty and applies to Master Clocks, Analog Clocks, Digital Clocks and Converter Boxes.		
27 53 13 13-0012	EA		Analog, Wireless Slim Line, 900 MHz, 12" Round, Battery-Operated, Surface Wall Mount, Black Case (Sapling SAL-4BS-12R-0)	425.66	30.57
27 53 13 13-0013	EA		Double Mount Housing With Metal Pole For Slim Line 12" Round Analog Clock, Black (Sapling SAH-1BD-12R-0)	268.78	30.57
27 53 13 13-0014	EA		Analog, Wireless Slim Line, 900 MHz, 16" Round, Battery-Operated, Surface Wall Mount, Black Case (Sapling SAL-4BS-16R-0)	508.99	30.57
27 53 13 13-0015	EA		Double Mount Housing With Metal Pole For Slim Line 16" Round Analog Clock, Black (Sapling SAH-1BD-16R-0)	303.39	30.57
27 53 13 13-0016			Wireless GPS Accesories (Sapling) ^(27 53 13 13-0001)		
27 53 13 13-0017	EA		GPS Mounting Kit (Sapling M-GPS-MTG-KIT-1)	83.73	24.45
27 53 13 13-0018	EA		Wall Mount, L-Shape, GPS Mounting Kit (Sapling M-GPS-MTG90-KIT-1)	118.55	24.45
27 53 13 13-0019	EA		GPS Antenna Cable, 150 Foot (45.7 Meters) Length (Sapling E-ANT-CBL150F-1)	1,021.00	53.50
27 53 13 13-0020	EA		GPS Antenna Cable, 300 Foot (91.4 Meters) Length (Sapling E-ANT-CBL300F-1)	1,814.68	76.43
27 53 13 13-0021	EA		GPS Surge Protector/Arrestor (Sapling E-GPS-SURGE-1)	635.42	6.11
27 53 13 13-0022			2.4 GHz, 2.5", 6-Digit, Digital Messaging Wireless Clock System (Sapling SLDG 3000 Series) ^(27 53 13 13) Note: Includes Sapling standard 2 year "material" warranty and applies to Master Clocks, Analog Clocks, Digital Clocks and Converter Boxes. Quantities over 25 for all digital clocks are Non-Cancelable, Non-Returnable (NCNR). (50) Clock Minimum Quantity Required Per System order for SDLG-32S-256-4R. (25) Clock Minimum Quantity Required Per System order for SDLG-32S-256-1R. All digital clocks are available without bezel or without the housing. Contact Sapling for details. Contact Sapling for Factory Customized Message Options. All digital clocks are pre-loaded and shipped with the following messages below: (1) Tornado Warning (2) Inclement Weather (3) Take Cover (4) Evacuate (5) Lockdown (6) Fire (7) Early Dismissal (8) Flood Warning (9) Earthquake (10) Code Blue (11) All Clear (12) Operation in Progress (13) Test in Progress (14) Lunch Break (15) Shift Break.		
27 53 13 13-0023	EA		3200 Digital Messaging Wireless Clock, 2.4 GHz, 2.5", Dot Matrix Red Display, 24 VAC/VDC, Surface Wall Mount (Sapling SDLG-32S-256-4R)	1,346.54	91.71
27 53 13 13-0024	EA		3200 Digital Messaging Wireless Clock, 2.4 GHz, 2.5", Dot Matrix Red Display, 110 Volt, Surface Wall Mount (Sapling SDLG-32S-256-1R)	1,377.28	91.71
27 53 13 13-0025	EA		3300 Digital Messaging Wireless Clock, 2.4 GHz, 2.5", Dot Matrix Red Display, 24 VAC/VDC, Surface Wall Mount And Relay Output/Input (Sapling SDLG-33S-256-4R)	1,649.44	91.71
27 53 13 13-0026	EA		3300 Digital Messaging Wireless Clock, 2.4 GHz, 2.5", Dot Matrix Red Display, 110 Volt, Surface Wall Mount And Relay Output/Input (Sapling SDLG-33S-256-1R)	1,680.18	91.71
27 53 13 13-0027	EA		Short Metal Pole For Ceiling Mount Only For Double/Flag Mount, 8.5", Digital Or Square Analog Clock, Black (Sapling SAB-1BD-01S-0)	181.11	24.45
27 53 13 13-0028	EA		Metal Pole For Double/Flag Mount, Wall Or Ceiling, 13.5", Digital Or Square Analog Clock, Black (Sapling SAB-1BD-00S-0)	181.11	24.45
27 53 13 13-0029	EA		Clock Message Setup Fee, Per Clock (Sapling CLK-MSG-SETUP)	31.65	
27 53 13 13-0030	EA		USB Programming Cable + Software For 3200/3300 Digital Clocks (Sapling D-USB485-INTF-1)	255.39	3.06
27 53 13 13-0031	EA		Elapsed Timer Control Panel For 3200/3300 Clock Model (Sapling SBD-ELT-001-0)	510.78	6.11
27 53 13 13-0032	EA		Elapsed Timer Specialty Buttons Kit (Sapling SBD-ELT-BUT-0)	93.16	3.06
27 53 13 13-0033	EA		Elapsed Timer Clear Protective Cover - Set of 2 Covers (Sapling A-ELT-CLR-GUARD-1)	18.63	0.61
27 53 13 13-0034	EA		Temperature Sensor for 3200/3300 Digital Clock Model (Sapling SBD-TEMP-000-0)	116.69	6.11
27 53 13 13-0035			2.4 GHz Wireless Message System/Master Clock And Transmitter (Sapling SMM 3000 Series) ^(27 53 13 13) Note: Includes Sapling standard 2 year "material" warranty and applies to Master Clocks, Analog Clocks, Digital Clocks and Converter Boxes.		
27 53 13 13-0036	EA		Master Clock With 2.4 GHz Transmitter For Time Data And Messages, Rack Mount And Wall Remote Mount Antenna, 8 Programmable Relays/Zones (Sapling SMM-3R0-G008-1)	6,677.87	91.71
27 53 13 13-0037	EA		Master Clock With 2.4 GHz Transmitter And GPS For Time Data And Messages, Rack Mount And Wall Remote Mount Antenna, 8 Programmable Relays/Zones (Sapling SMM-3R0-G108-1)	9,190.57	91.71
27 53 13 13-0038	EA		Message Input Box, 16 Inputs, Rack Mount, For SMM Master Clock (Sapling SMI-000-0016-0)	2,947.40	61.14
27 53 13 13-0039	EA		Wireless Network Repeater, 2.4 GHz, 110 VAC - 230 VAC, with TCP/IP for Campus Environments, Surface Wall Mount (Sapling SMA-1SM-G000-1)	1,692.71	61.14
27 53 13 13-0040	EA		NTP Server Upgrade (Sapling SMA-000-SERV-0)	3,165.40	



Communications	27
Distributed Communications and Monitoring Systems	27 50
Distributed Systems	27 53

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 53 13 13-0041 EA Countdown Feature Upgrade (Sapling SMA-000-CDOW-0).....	1,566.87	
27 53 13 13-0042 Clear Polycarbonate Protective Covers For Wireless Clocks (Sapling) (27 53 13 13)		
Note: For applications requiring defense against constant moisture or fine dust, a silicone sealant between the cover and wall is recommended.		
27 53 13 13-0043 EA Clear Polycarbonate Protective Cover For 9" Square And 12" Round Analog Clock (Sapling SAG-CLR-COVR-12).....	429.41	15.28
27 53 13 13-0044 EA Clear Polycarbonate Protective Cover For 2.5" Digital Clock (Sapling SDG-CLR-COVR-25)	429.41	15.28
27 53 13 13-0045 Wire Guards For Wireless Synchronized Clocks (Sapling) (27 53 13 13)		
27 53 13 13-0046 EA Wire Guard For Round Or Square Analog Clocks (Sapling SAG-1200)	237.75	15.28
27 53 13 13-0047 EA Wire Guard for 2.5" or 4.0" Digital Clocks (Sapling SDG-2017).....	331.17	15.28
27 53 13 13-0048 Wireless Synchronized Clock Transmitters (27 53 13 13)		
27 53 13 13-0049 Analog, Wireless Synchronized Clocks (Primex Traditional Series) (27 53 13 13-0048)		
27 53 13 13-0050 EA 12.5", Battery Operated, Single Sided, Analog, Wireless Synchronized Clock.....	331.64	30.57
For >100 To 250, Deduct	-57.84	
For >250, Deduct	-68.66	
27 53 13 13-0051 EA 12.5", Battery Operated, Dual Sided, Analog, Wireless Synchronized Clock	602.13	30.57
For >100 To 250, Deduct	-38.91	
For >250, Deduct	-47.02	
27 53 13 13-0052 EA 16", Battery Operated, Single Sided, Analog, Wireless Synchronized Clock.....	387.60	30.57
For >100 To 250, Deduct	-67.91	
For >250, Deduct	-80.97	
27 53 13 13-0053 EA 12.5", Electric, Single Sided, Analog, Wireless Synchronized Clock	378.27	30.57
For >100 To 250, Deduct	-66.23	
For >250, Deduct	-78.92	
27 53 13 13-0054 EA 12.5", Electric, Dual Sided, Analog, Wireless Synchronized Clock.....	695.41	30.57
For >100 To 250, Deduct	-44.04	
For >250, Deduct	-53.55	
27 53 13 13-0055 EA 16", Electric, Single Sided, Analog, Wireless Synchronized Clock	434.24	30.57
For >100 To 250, Deduct	-50.19	
For >250, Deduct	-65.12	
27 53 13 13-0056 Digital, Wireless Synchronized Clocks (Primex Digital Series) (27 53 13 13-0048)		
27 53 13 13-0057 4-Digit, Digital, Wireless Synchronized Clocks (27 53 13 13-0056)		
27 53 13 13-0058 EA 2.5", Single Sided, 4-Digit, Red LED Digital, Wireless Synchronized Clock	490.20	30.57
For Green LED, Add	42.91	
For >100 To 250, Deduct	-43.48	
For >250, Deduct	-64.93	
27 53 13 13-0059 EA 2.5", Dual Sided, 4-Digit, Red LED Digital, Wireless Synchronized Clock	919.27	30.57
For Green LED, Add	85.81	
For >100 To 250, Deduct	-94.96	
For >250, Deduct	-240.85	
27 53 13 13-0060 EA 4", Single Sided, 4-Digit, Red LED Digital, Wireless Synchronized Clock	546.17	30.57
For Green LED, Add	48.50	
For >100 To 250, Deduct	-30.98	
For >250, Deduct	-45.53	
27 53 13 13-0061 EA 4", Dual Sided, 4-Digit, Red LED Digital, Wireless Synchronized Clock.....	1,031.19	30.57
For Green LED, Add	97.01	
For >100 To 250, Deduct	-86.76	
For >250, Deduct	-271.07	
27 53 13 13-0062 6-Digit, Digital, Wireless Synchronized Clocks (27 53 13 13-0056)		
27 53 13 13-0063 EA 2.5", Single Sided, 6-Digit, Red LED Digital, Wireless Synchronized Clock	546.17	30.57
For Green LED, Add	48.50	
For >100 To 250, Deduct	-35.83	
For >250, Deduct	-51.35	
27 53 13 13-0064 EA 2.5", Dual Sided, 6-Digit, Red LED Digital, Wireless Synchronized Clock	1,031.19	30.57
For Green LED, Add	97.01	
For >100 To 250, Deduct	-78.03	
For >250, Deduct	-183.76	
27 53 13 13-0065 EA 2.5", Flush Mount, 6-Digit, Red LED Digital, Wireless Synchronized Clock.....	639.44	30.57
For Green LED, Add	57.83	
For >100 To 250, Deduct	-29.39	
For >250, Deduct	-43.85	
27 53 13 13-0066 Wire Guards For Wireless Synchronized Clocks (27 53 13 13-0048)		
27 53 13 13-0067 EA 18" x 18" Analog Clock Wire Guard For 16" Wireless Synchronized Clocks	170.48	15.28
27 53 13 13-0068 EA Digital Clock Wire Guard For 2.5" Wireless Synchronized Clocks.....	77.21	15.28
27 53 13 13-0069 EA Digital Clock Wire Guard For 4" Wireless Synchronized Clocks.....	86.53	15.28
27 53 13 13-0070 Wireless Synchronized Clock Transmitters (27 53 13 13-0048)		
Note: Includes 16 channel transmitter with daylight savings bypass and time zone switch, GPS receiver, 16' cable and window installation hardware.		

27 Communications**27 50 Distributed Communications and Monitoring Systems****27 53 Distributed Systems**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 53 13 13-0071	EA		Internal Antenna, One Watt GPS Wireless Clock Transmitter (Primex 14000).....	3,718.52	91.71
			<i>For Roof Mounted GPS Receiver, Add</i>	536.53	
27 53 13 13-0072	EA		External Antenna, One Watt GPS Wireless Clock Transmitter (Primex 14000-E).....	6,059.71	91.71
			Note: Includes 100' antenna cable, 29.4" high x 41.5" wide ground plane antenna with direct ground lightning protection.		
			<i>For Roof Mounted GPS Receiver, Add</i>	770.65	
27 53 13 13-0073	EA		Repeater, Satellite Transmitter (Primex 14006).....	3,657.38	61.14
			Note: Includes 100' antenna cable, 29.4" high x 41.5" wide ground plane antenna with direct ground lightning protection.		
27 53 13 13-0074			Accessories For Wireless Synchronized Clock Transmitters (27 53 13 13-0048)		
27 53 13 13-0075	EA		External Antenna Mounting Kit For Wireless Synchronized Clock Transmitters	328.73	24.45
27 53 13 13-0076	EA		Transmitter Rack For Wireless Synchronized Clock Transmitters	145.92	24.45
27 53 13 13-0077	EA		Surge Protector And Battery Back Up For Wireless Synchronized Clock Transmitters	221.16	12.23
27 53 13 13-0078	EA		50' GPS Receiver Cable For Wireless Synchronized Clock Transmitters.....	186.13	30.57
27 53 13 13-0079	EA		100' GPS Receiver Cable For Wireless Synchronized Clock Transmitters.....	259.60	45.85
27 53 13 13-0080	EA		200' GPS Receiver Cable For Wireless Synchronized Clock Transmitters.....	383.45	61.14
27 53 13 16			Wired Clock Systems (27 53 13)		
27 53 13 16-0001			Wired Self-Corrective Clock Systems (27 53 13 16)		
27 53 13 16-0002			Wired Self-Corrective Clocks (27 53 13 16-0001)		
27 53 13 16-0003			Analog, Wired Self-Corrective Clocks (Telecor) (27 53 13 16-0002)		
27 53 13 16-0004			24 Volt AC, Analog, Wired Self-Corrective Clocks (27 53 13 16-0003)		
27 53 13 16-0005	EA		12", Single Sided, 24 Volt AC, Analog, Wired Self-Corrective Clock, Semi-Flush Mount	282.20	30.57
			<i>For >50 To 100, Deduct</i>	-17.99	
			<i>For >100, Deduct</i>	-26.84	
27 53 13 16-0006	EA		12", Dual Sided, 24 Volt AC, Analog, Wired Self-Corrective Clock, Surface Mount.....	676.75	30.57
			<i>For >50 To 100, Deduct</i>	-33.78	
			<i>For >100, Deduct</i>	-58.40	
27 53 13 16-0007	EA		16", Single Sided, 24 Volt AC, Analog, Wired Self-Corrective Clock, Semi-Flush Mount	354.95	30.57
			<i>For >50 To 100, Deduct</i>	-23.84	
			<i>For >100, Deduct</i>	-35.59	
27 53 13 16-0008	EA		16", Dual Sided, 24 Volt AC, Analog, Wired Self-Corrective Clock, Surface Mount.....	895.01	30.57
			<i>For >50 To 100, Deduct</i>	-92.54	
			<i>For >100, Deduct</i>	-125.89	
27 53 13 16-0009			120 Volt AC, Analog, Wired Self-Corrective Clocks (27 53 13 16-0003)		
27 53 13 16-0010	EA		12", Single Sided, 120 Volt AC, Analog, Wired Self-Corrective Clock, Semi-Flush Mount	282.20	30.57
			<i>For >50 To 100, Deduct</i>	-17.99	
			<i>For >100, Deduct</i>	-26.84	
27 53 13 16-0011	EA		12", Dual Sided, 120 Volt AC, Analog, Wired Self-Corrective Clock, Surface Mount.....	676.75	30.57
			<i>For >50 To 100, Deduct</i>	-33.78	
			<i>For >100, Deduct</i>	-58.40	
27 53 13 16-0012	EA		16", Single Sided, 120 Volt AC, Analog, Wired Self-Corrective Clock, Semi-Flush Mount	354.95	30.57
			<i>For >50 To 100, Deduct</i>	-23.84	
			<i>For >100, Deduct</i>	-35.59	
27 53 13 16-0013	EA		16", Dual Sided, 120 Volt AC, Analog, Wired Self-Corrective Clock, Surface Mount.....	895.01	30.57
			<i>For >50 To 100, Deduct</i>	-92.54	
			<i>For >100, Deduct</i>	-125.89	
27 53 13 16-0014			Accessories For Analog Wired Self-Corrective Clocks (27 53 13 16-0003)		
27 53 13 16-0015	EA		Wire Guards For 12", 15" Or 16" Analog Wired Self-Corrective Clocks	233.44	15.28
27 53 13 16-0016	EA		Back Box For 10", 12" Or 15" Flush Mount Analog Wired Self-Corrective Clocks	58.55	15.28
27 53 13 16-0017	EA		Surface Mounting Rings For 12" Analog Wired Self-Corrective Clocks	74.65	15.28
27 53 13 16-0018	EA		Surface Mounting Rings For 15" Analog Wired Self-Corrective Clocks	91.44	15.28
27 53 13 16-0019	EA		Combination Back Box For Speaker And Clock.....	158.47	24.45
27 53 13 16-0020			Digital, Wired Self-Corrective Clocks (Telecor) (27 53 13 16-0002)		
27 53 13 16-0021			24 Volt AC, Digital, Wired Self-Corrective Clocks (27 53 13 16-0020)		
27 53 13 16-0022	EA		2.5", 24 Volt AC, Digital, Wired Self-Corrective Clock, Flush Mount.....	349.36	30.57
			<i>For Surface Mount, Add</i>	57.64	
			<i>For >50 To 100, Deduct</i>	-17.29	
			<i>For >100, Deduct</i>	-28.82	
27 53 13 16-0023	EA		4", 24 Volt AC, Digital, Wired Self-Corrective Clock, Flush Mount.....	539.64	30.57
			<i>For Surface Mount, Add</i>	95.70	
			<i>For >50 To 100, Deduct</i>	-28.71	
			<i>For >100, Deduct</i>	-47.85	
27 53 13 16-0024			120 Volt AC, Digital, Wired Self-Corrective Clocks (27 53 13 16-0020)		
27 53 13 16-0025	EA		2.5", 120 Volt AC, Digital, Wired Self-Corrective Clock, Flush Mount.....	349.36	30.57
			<i>For Surface Mount, Add</i>	57.64	
			<i>For >50 To 100, Deduct</i>	-17.29	
			<i>For >100, Deduct</i>	-28.82	



Communications	27
Distributed Communications and Monitoring Systems	27 50
Distributed Systems	27 53

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
27 53 13 16-0026	EA		4", 120 Volt AC, Digital, Wired Self-Corrective Clock, Flush Mount..... <i>For Surface Mount, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	539.64 95.70 -28.71 -47.85	30.57
27 53 13 16-0027			Replacement Modules For 24 Volt AC, Digital, Wired Self-Corrective Clocks <i>(27 53 13 16-0020)</i>		
27 53 13 16-0028	EA		2.5", Replacement Module For 24 Volt AC, Digital, Wired Self-Corrective Clocks..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	298.30 -14.23 -23.72	30.57
27 53 13 16-0029	EA		4" Replacement Module For 24 Volt AC, Digital, Wired Self-Corrective Clocks..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	493.47 -25.94 -43.23	30.57
27 53 13 16-0030			Replacement Modules For 120 Volt AC, Digital, Wired Self-Corrective Clocks <i>(27 53 13 16-0020)</i>		
27 53 13 16-0031	EA		2.5", Replacement Module For 120 Volt AC, Digital, Wired Self-Corrective Clocks..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	298.30 -14.23 -23.72	30.57
27 53 13 16-0032	EA		4" Replacement Module For 120 Volt AC, Digital, Wired Self-Corrective Clocks..... <i>For >50 To 100, Deduct</i> <i>For >100, Deduct</i>	493.47 -25.94 -43.23	30.57
27 53 13 16-0033			Accessories For Digital Wired Self-Corrective Clocks <i>(27 53 13 16-0020)</i>		
27 53 13 16-0034	EA		Wire Guard For 4" Surface Mount Analog Wired Self-Corrective Clocks.....	318.79	15.28
27 53 13 16-0035	EA		2.5", Recessed Back Box For Flush Mount Digital Wired Self-Corrective Clocks.....	75.34	15.28
27 53 13 16-0036	EA		4", Recessed Back Box For Flush Mount Digital Wired Self-Corrective Clocks.....	104.72	15.28
27 53 13 16-0037	EA		Dual Mounting Kit For Surface Mount Digital Wired Self-Corrective Clocks.....	278.21	15.28
27 53 13 16-0038	EA		4 Gang Extension Ring For Surface Mount Digital Wired Self-Corrective Clocks.....	77.45	15.28
27 53 13 16-0039			Wired Self-Corrective Master Clocks <i>(27 53 13 16-0001)</i>		
27 53 13 16-0040			Wired Self-Corrective Master Clocks <i>(27 53 13 16-0039)</i>		
27 53 13 16-0041	EA		24 Volt AC, Wired Self-Corrective Master Clock, Surface Mount (Telecor 2400-S-24).....	3,281.76	244.56
27 53 13 16-0042	EA		120 Volt AC, Wired Self-Corrective Master Clock, Surface Mount (Telecor 2400-S-120).....	3,491.63	244.56
27 53 13 16-0043			Accessories For Wired Self-Corrective Master Clocks <i>(27 53 13 16-0039)</i>		
27 53 13 16-0044	EA		5 Amperes Power Transformer For 24 Volt AC, Wired Self-Corrective Clock Systems (Telecor 2405).....	334.26	61.14
27 53 13 16-0045	EA		10 Amperes Power Transformer For 24 Volt AC, Wired Self-Corrective Clock Systems (Telecor 2406).....	378.32	61.14
27 53 13 16-0046			Other Clock And Program Systems <i>(27 53 13 16)</i>		
27 53 13 16-0047	EA		4 Circuit Master Clock And Signal Control (Lathem LTR4-512).....	1,987.80	122.28
27 53 13 16-0048	EA		8 Circuit Master Clock And Signal Control (Lathem LTR8-512).....	2,397.65	244.56
27 53 13 16-0049	EA		Program Bell (Lathem 906-6).....	290.15	61.14
27 53 13 16-0050	EA		Combination Clock And Speaker.....	657.87	152.84

END OF SECTION 27

27	27	Communications
	27 50	Distributed Communications and Monitoring Systems
	27 53	Distributed Systems



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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28 Electronic Safety and Security

Note: Termination costs are included with all safety and security equipment, panel boards, and devices. Terminations are not included with patch panels.

28 05 Common Work Results for Electronic Safety and Security ⁽²⁸⁾

28 05 26 Grounding and Bonding for Electronic Safety and Security ^(28 05)

See CSI section 26 05 26 00-0000 for grounding and bonding.

28 05 53 Identification for Electronic Safety and Security ^(28 05)

See CSI section 26 05 53 00-0000 for identification.

28 10 Access Control ⁽²⁸⁾

Note: Includes testing of new devices and certification.

28 15 Integrated Access Control Hardware Devices ^(28 10)

28 15 11 Integrated Credential Readers and Field Entry Management ^(28 15)

28 15 11 13 Keypads ^(28 15 11)

28 15 11 13-0001 Vindicator Security Alarm System ^(28 15 11 13)

28 15 11 13-0002	EA	Switch, Balanced Magnetic Door (Security) Vindicator #192-30894-00.....	1,652.42	254.95
28 15 11 13-0003	EA	Detector, Passive Infrared (Security) Vindicator #316-30812-00.....	2,088.99	331.38
28 15 11 13-0004	EA	Premise Control Unit (Security) Vindicator #548-32004-01.....	11,548.71	726.34
28 15 11 13-0005	EA	Access Manager (Security Key Pad) Vindicator #548-31894-01.....	5,475.36	618.98
28 15 11 13-0006	EA	ALS Duress Switch (Security) Vindicator #192-30810-00.....	1,321.76	338.59

28 16 Access Control Interfaces ^(28 10)

28 16 11 Access Control Interfaces to Access Control Hardware ^(28 16)

28 16 11 00-0001 Stand Alone Access Controls ^(28 16 11)

28 16 11 00-0002 Push Button Controls, Stand Alone Access Controls ^(28 16 11 00-0001)

28 16 11 00-0003 Interior Mount, Push Button Controls, Stand Alone Access Controls ^(28 16 11 00-0002)

28 16 11 00-0004	EA	Exit Push Button, Push Button Controls, Interior Stand Alone Access Controls.....	143.57	30.57
		Note: Controls mount to a standard mullion.		
28 16 11 00-0005	EA	Exit Push Button, Push Button Controls, Interior Stand Alone Access Controls.....	150.43	30.57
		Note: Controls mount into a single gang electrical box. Excludes electrical box.		
28 16 11 00-0006	EA	Three Button, Push Button Controls, Interior Stand Alone Access Controls For Gate Operators.....	189.93	30.57
		Note: Controls mount into a single gang electrical box. Excludes electrical box.		

28 16 11 00-0007 Exterior Mount, Push Button Controls, Stand Alone Access Controls ^(28 16 11 00-0002)

Note: Includes a lockable, gasketed 16 gauge steel enclosure. Excludes mounting posts.

28 16 11 00-0008	EA	Handicap/Push To Open, Push Button Controls, Exterior Stand Alone Access Controls.....	180.20	30.57
		Note: Controls mount into a single gang electrical box. Excludes electrical box.		
28 16 11 00-0009	EA	42" High Aluminum Post With Handicap/Push To Open, Push Button Controls, Exterior Stand Alone Access Controls.....	868.01	91.71
		Note: Includes post, mounting base and push button control. Excludes concrete foundation.		
28 16 11 00-0010	EA	Three Button, Exterior Stand Alone Access Controls For Gate Operators.....	292.96	30.57
		Note: Includes open, close and stop controls.		

28 16 11 00-0011 Key Controls, Stand Alone Access Controls ^(28 16 11 00-0001)

28 16 11 00-0012 Interior Mount, Key Controls, Stand Alone Access Controls ^(28 16 11 00-0011)

28 16 11 00-0013	EA	Standard Mortise Key, Key Controls, Interior Stand Alone Access Controls.....	202.81	30.57
		Note: Controls mount into a single gang electrical box. Excludes electrical box.		

28 16 11 00-0014 Exterior Mount, Key Controls, Stand Alone Access Controls ^(28 16 11 00-0011)

Note: Includes a lockable NEMA rain resistant steel enclosure. Excludes mounting posts.

28 16 11 00-0015	EA	Postal Or Fire Department Lock Box, Key Controls, Exterior Stand Alone Access Controls.....	311.17	61.14
		Note: Opens door or gate with a postal or fire department key.		
28 16 11 00-0016	EA	Standard Mortise Key, Key Controls, Exterior Stand Alone Access Controls.....	493.20	61.14
28 16 11 00-0017	EA	Ace Key, Key Controls, Exterior Stand Alone Access Controls.....	493.20	61.14
28 16 11 00-0018	EA	Standard Mortise Key And Push Button Intercom, Key Controls, Exterior Stand Alone Access Controls.....	754.21	61.14

28 16 11 00-0019 Keypad Controls, Stand Alone Access Controls ^(28 16 11 00-0001)

28 16 11 00-0020 Interior Mount, Keypad Controls, Stand Alone Access Controls ^(28 16 11 00-0019)

28 16 11 00-0021	EA	One Code Memory, Keypad Control, Interior Stand Alone Access Controls.....	284.38	30.57
		Note: Stores one 4-digit entry code and one 4-digit hold code. Controls mount into a single gang electrical box. Excludes electrical box.		

28 Electronic Safety and Security**28 10 Access Control****28 16 Access Control Interfaces**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 16 11 00-0022	Exterior Mount, Keypad Controls, Stand Alone Access Controls (28 16 11 00-0019) Note: Includes a surface mounted lockable NEMA rain resistant steel enclosure. Excludes mounting posts.		
28 16 11 00-0023	Keypad Controls, Exterior Stand Alone Access Controls (28 16 11 00-0022)		
28 16 11 00-0024	EA 1000 Code Memory, Keypad Control, Exterior Stand Alone Access Controls Note: Includes lighted keypad. Stores one thousand 4-digit entry codes and six 5-digit entry codes. <i>For Flush Mount, Add</i>	1,189.02 212.50	122.28
28 16 11 00-0025	Keypad Controls With Push Button Intercom, Exterior Stand Alone Access Controls (28 16 11 00-0022) Note: Includes intercom sub-station. Excludes additional receiving intercoms.		
28 16 11 00-0026	EA 1000 Code Memory, Keypad Controls With Push Button Intercom, Exterior Stand Alone Access Controls Note: Includes lighted keypad. Stores one thousand 4-digit entry codes and six 5-digit entry codes. <i>For Flush Mount, Add</i>	1,442.83 262.73	137.56
28 16 11 00-0027	RF Controls, Stand Alone Access Controls (28 16 11 00-0001)		
28 16 11 00-0028	Exterior Mount, RF Controls, Stand Alone Access Controls (28 16 11 00-0027) Note: Includes a lockable NEMA rain resistant steel enclosure. Excludes mounting posts and transmitters.		
28 16 11 00-0029	RF Receivers, RF Controls, Exterior Stand Alone Access Controls (28 16 11 00-0028) Note: Includes a lockable NEMA rain resistant steel enclosure. Excludes mounting posts and transmitters.		
28 16 11 00-0030	EA 50 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	708.20	122.28
28 16 11 00-0031	EA 100 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	800.93	122.28
28 16 11 00-0032	EA 250 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	890.23	122.28
28 16 11 00-0033	EA 500 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	986.39	122.28
28 16 11 00-0034	EA 1000 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	1,075.68	122.28
28 16 11 00-0035	EA 5000 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	1,171.85	122.28
28 16 11 00-0036	EA 16000 Code Memory, RF Receiver, RF Controls, Exterior Stand Alone Access Controls	1,261.14	122.28
28 16 11 00-0037	RF Transmitters, RF Controls, Exterior Stand Alone Access Controls (28 16 11 00-0028)		
28 16 11 00-0038	EA 1 Button, RF Transmitter, RF Controls, Exterior Stand Alone Access Controls <i>For >40 To 110, Deduct</i> <i>For >110, Deduct</i> <i>For Built In Proximity Tags, Add</i>	58.38 -2.92 -5.84 11.68	
28 16 11 00-0039	EA 2 Button, RF Transmitter, RF Controls, Exterior Stand Alone Access Controls <i>For >40 To 110, Deduct</i> <i>For >110, Deduct</i> <i>For Built In Proximity Tags, Add</i>	61.82 -3.09 -6.18 12.36	
28 16 11 00-0040	EA 3 Button, RF Transmitter, RF Controls, Exterior Stand Alone Access Controls <i>For >40 To 110, Deduct</i> <i>For >110, Deduct</i> <i>For Built In Proximity Tags, Add</i>	65.25 -3.26 -6.53 13.05	
28 16 11 00-0041	Accessories For RF Receivers, Exterior Stand Alone Access Controls (28 16 11 00-0028)		
28 16 11 00-0042	EA Coax Antenna Kit For RF Receivers, Exterior Stand Alone Access Controls Note: Includes 15' of coax cable.	265.85	91.71
28 16 11 00-0043	EA Antenna Amplifier For RF Receivers, Exterior Stand Alone Access Controls Note: Includes 20' of coax cable.	526.86	91.71
28 16 11 00-0044	EA Yagi High-Gain Antenna Kit For RF Receivers, Exterior Stand Alone Access Controls..... Note: Includes 15' of coax cable.	478.78	91.71
28 16 11 00-0045	Proximity Card Controls, Stand Alone Access Controls (28 16 11 00-0001)		
28 16 11 00-0046	Exterior Mount, Proximity Card Controls, Stand Alone Access Controls (28 16 11 00-0045) Note: Includes a lockable NEMA rain resistant steel enclosure. Excludes mounting posts.		
28 16 11 00-0047	DKS Proximity Card Controls, Exterior Stand Alone Access Controls (28 16 11 00-0046)		
28 16 11 00-0048	DKS Proximity Card Readers, Exterior Stand Alone Access Controls (28 16 11 00-0047)		
28 16 11 00-0049	EA DKS Proximity Card Reader, Exterior Stand Alone Access Controls.....	1,360.74	122.28
28 16 11 00-0050	AWID Proximity Card Controls, Exterior Stand Alone Access Controls (28 16 11 00-0046)		
28 16 11 00-0051	AWID Proximity Card Readers, Exterior Stand Alone Access Controls (28 16 11 00-0050)		
28 16 11 00-0052	EA AWID Proximity Card Reader, Exterior Stand Alone Access Controls.....	1,480.94	122.28
28 16 11 00-0053	HID Proximity Card Controls, Exterior Stand Alone Access Controls (28 16 11 00-0046)		
28 16 11 00-0054	HID Proximity Card Readers, Exterior Stand Alone Access Controls (28 16 11 00-0053)		
28 16 11 00-0055	EA HID Proximity Card Reader, Exterior Stand Alone Access Controls.....	1,755.70	122.28



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 16 11 00-0056				Magnetic Stripe Card Controls, Stand Alone Access Controls <small>(28 16 11 00-0001)</small>		
28 16 11 00-0057				Interior Mount, Magnetic Stripe Card Controls, Stand Alone Access Controls <small>(28 16 11 00-0056)</small>		
28 16 11 00-0058	EA			Magnetic Stripe Reader, Interior Stand Alone Access Controls.....	811.24	122.28
28 16 11 00-0059				Exterior Mount, Magnetic Stripe Card Controls, Stand Alone Access Controls <small>(28 16 11 00-0056)</small>		
				<small>Note: Includes a lockable NEMA rain resistant steel enclosure. Excludes mounting posts.</small>		
28 16 11 00-0060	EA			Magnetic Stripe Reader, Exterior Stand Alone Access Controls.....	1,005.17	122.28
28 16 11 00-0061				Other Stand Alone Access Controls <small>(28 16 11 00-0001)</small>		
28 16 11 00-0062	EA			Toggle Switch, Interior Access Controls For Gate Operators	138.41	30.57
				<small>Note: Controls mount into a single gang electrical box. Excludes electrical box.</small>		
28 16 11 00-0063	EA			Request To Exit Motion Detector (Bosch Security Systems DS160)	149.78	24.45
28 16 11 00-0064				Wiegand Output Access Controls <small>(28 16 11)</small>		
				<small>Note: Excludes controllers.</small>		
28 16 11 00-0065				Proximity Card Controls, Wiegand Output Access Controls <small>(28 16 11 00-0064)</small>		
28 16 11 00-0066				DKS, Proximity Card Controls, Wiegand Output Access Controls <small>(28 16 11 00-0065)</small>		
28 16 11 00-0067				DKS, Proximity Cards <small>(28 16 11 00-0066)</small>		
28 16 11 00-0068	EA			Clamshell Type, DKS Proximity Card (DKS 170).....	9.14	
28 16 11 00-0069	EA			ISO Compliant Graphics Card, DKS Proximity Card (DKS 80).....	15.07	
28 16 11 00-0070	EA			DKS Proximity Key Fob (DKS 50).....	15.87	
28 16 11 00-0071	EA			Active Tag, DKS Proximity Tag (DKS 150).....	89.75	
				<small>Note: Battery powered tag to boost signal.</small>		
28 16 11 00-0072	EA			Active Tag, DKS Proximity Tag (DKS 200).....	117.00	
				<small>Note: Battery powered tag to boost signal.</small>		
28 16 11 00-0073				DKS, Proximity Card Readers, Wiegand Output Access Controls <small>(28 16 11 00-0066)</small>		
28 16 11 00-0074	EA			Up To 2" Read Range, 12 Volt DC, DKS Proximity Card Reader, Wiegand Output Access Controls (DKS Small).....	488.41	152.84
28 16 11 00-0075	EA			Up To 3" Read Range, 12 Volt DC, DKS Proximity Card Reader, Wiegand Output Access Controls (DKS Mullion).....	488.41	152.84
28 16 11 00-0076	EA			Up To 4" Read Range, 12 Volt DC, DKS Proximity Card Reader, Wiegand Output Access Controls (DKS Single Gang).....	488.41	152.84
28 16 11 00-0077	EA			Up To 30" Read Range, 12 Volt DC, DKS Proximity Card Reader, Wiegand Output Access Controls (DKS).....	1,344.26	152.84
				<small>Note: Includes mounting bracket and 12 Volt DC regulated power supply.</small>		
28 16 11 00-0078				AWID, Proximity Card Controls, Wiegand Output Access Controls <small>(28 16 11 00-0065)</small>		
28 16 11 00-0079				AWID, Proximity Cards <small>(28 16 11 00-0078)</small>		
28 16 11 00-0080	EA			Clamshell Type, AWID Proximity Card (AWID Prox-Linc CS)	7.69	
28 16 11 00-0081	EA			ISO Compliant Graphics Card, AWID Proximity Card (AWID Prox-Linc GR)	12.02	
28 16 11 00-0082	EA			AWID Proximity Key Fob (AWID Prox-Linc KT).....	12.82	
28 16 11 00-0083	EA			Windshield Tag For LR 2000 Readers, AWID Proximity Tag	44.88	
28 16 11 00-0084	EA			Metal Mount Tag For LR 2000 Readers, AWID Proximity Tag	44.88	
28 16 11 00-0085				AWID, Proximity Card Readers, Wiegand Output Access Controls <small>(28 16 11 00-0078)</small>		
28 16 11 00-0086	EA			Up To 4" Read Range, 5-12 Volt DC, AWID Proximity Card Reader, Wiegand Output Access Controls (AWID SR 2400).....	594.19	152.84
				<small>Note: For mullion mounting.</small>		
28 16 11 00-0087	EA			Up To 8" Read Range, 5-12 Volt DC, AWID Proximity Card Reader, Wiegand Output Access Controls (AWID MM 6800).....	824.98	152.84
				<small>Note: For mullion mounting.</small>		
28 16 11 00-0088	EA			Up To 8" Read Range, 5-12 Volt DC, AWID Proximity Card Reader, Wiegand Output Access Controls (AWID MM 6820).....	824.98	152.84
				<small>Note: For single gang electrical box mounting.</small>		
28 16 11 00-0089	EA			Up To 24" Read Range, 5-12 Volt DC, AWID Proximity Card Reader, Wiegand Output Access Controls (AWID MR 1824).....	1,347.47	152.84
				<small>Note: Includes 12 Volt DC regulated power supply.</small>		
28 16 11 00-0090	EA			Up To 11' Read Range, 12 Volt DC, AWID Proximity Card Reader, Wiegand Output Access Controls (AWID LR 2000).....	7,617.31	152.84
				<small>Note: Includes mounting bracket and 12 Volt DC regulated power supply.</small>		
28 16 11 00-0091				HID, Proximity Card Controls, Wiegand Output Access Controls <small>(28 16 11 00-0065)</small>		
28 16 11 00-0092				HID, Proximity Cards <small>(28 16 11 00-0091)</small>		
28 16 11 00-0093	EA			Clamshell Type, HID Proximity Card (HID ProxCard II).....	18.47	
28 16 11 00-0094	EA			ISO Compliant Graphics Card, HID Proximity Card (HID ISOProx II).....	24.24	
28 16 11 00-0095	EA			HID Proximity Key Fob (HID ProxKey II)	24.88	

28 Electronic Safety and Security**28 10 Access Control****28 16 Access Control Interfaces**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 16 11 00-0096		HID, Proximity Card Readers, Wiegand Output Access Controls (28 16 11 00-0091)		
28 16 11 00-0097	EA	Up To 3" Read Range, 5-16 Volt DC, HID Proximity Card Reader, Wiegand Output Access Controls (HID ProxPoint Plus).....	552.08	152.84
		Note: For mullion mounting. (HID P/N 6005).		
28 16 11 00-0098	EA	Up To 5" Read Range, 5-16 Volt DC, HID Proximity Card Reader, Wiegand Output Access Controls (HID ThinLine II).....	651.63	152.84
		Note: For single gang electrical box mounting. (HID P/N 5395).		
28 16 11 00-0099	EA	Up To 5" Read Range, 5-16 Volt DC, HID Proximity Card Reader, Wiegand Output Access Controls (HID MiniProx).....	726.29	152.84
		Note: For mullion mounting. (HID P/N 5365).		
28 16 11 00-0100	EA	EntryProx Single-Door Proximity Access Control Note: (HID P/N 4045) Stores up to 2,000 users and 1,000 time-stamped transactions 12 position keypad for Pin entry or programming optional use with card/key fob, code only or card plus pin code Wiegand output mode. Continental Instrument CICR2358P.	927.88	152.84
28 16 11 00-0101		Contactless Smart Card Controls, Wiegand Output Access Controls (28 16 11 00-0064)		
28 16 11 00-0102		HID, Contactless Smart Cards (28 16 11 00-0101)		
28 16 11 00-0103	EA	2K Bits, Clamshell Type, HID iClass, Contactless Smart Card.....	14.10	
28 16 11 00-0104	EA	16K Bits, ISO Compliant Graphics Card, HID iClass, Contactless Smart Card.....	15.40	
28 16 11 00-0105	EA	16K Bits, Contactless Smartcard Key Fob, HID iClass, Contactless Smart Card.....	20.15	
28 16 11 00-0106	EA	16K Bits, Contactless Smartcard Tag, HID iClass, Contactless Smart Card..... Note: Battery powered tag to boost signal.	10.91	
28 16 11 00-0107		HID, Contactless Smart Card Readers, Wiegand Output Access Controls (28 16 11 00-0101)		
28 16 11 00-0108	EA	Up To 3-1/4" Read Range, 5-16 Volt DC, HID iClass Contactless Smart Card Reader, Wiegand Output Access Controls (HID R10)..... Note: For mullion mounting.	560.07	152.84
28 16 11 00-0109	EA	Up To 4-1/4" Read Range, 5-12 Volt DC, HID iClass Contactless Smart Card Reader, Wiegand Output Access Controls (HID R40)..... Note: For mullion mounting.	771.63	152.84
28 16 11 00-0110	EA	Up To 4-1/4" Read Range, 5-12 Volt DC, HID iClass Contactless Smart Card Reader With Keypad, Wiegand Output Access Controls (HID RK40)..... Note: For mullion mounting.	1,247.64	152.84
28 16 11 00-0111		HID, Contactless Smart Card Programmer, Wiegand Output Access Controls (28 16 11 00-0101)		
28 16 11 00-0112	EA	HID iClass Contactless Smart Card Programmer, Wiegand Output Access Controls (HID CP400)..... Note: For mullion mounting.	3,924.87	152.84
28 16 11 00-0113		Call Station Controls, Wiegand Output Access Controls (28 16 11 00-0064)		
		Note: Includes intercom sub-station. Excludes additional receiving intercoms.		
28 16 11 00-0114	EA	Call Station With Entry Keypad, Exterior Wiegand Output Access Controls..... Note: For mullion mounting.	1,542.08	152.84
28 16 11 00-0115	EA	Call Station With Proximity Card Reader, Exterior Wiegand Output Access Controls..... Note: For mullion mounting.	1,284.50	152.84
28 16 11 00-0116		Biometrics Readers, Wiegand Output Access Controls (28 16 11 00-0064)		
28 16 11 00-0117	EA	Palm Reader Recognition System, Biometrics Readers, Wiegand Output Access Controls.....	6,834.08	122.28
28 16 11 00-0118	EA	CCD Camera, Face Image, Biometrics Readers, Wiegand Output Access Controls.....	8,348.30	122.28
28 16 11 00-0119	EA	Video Grabber Card For DFR Reader, Biometrics Readers, Wiegand Output Access Controls.....	3,288.22	122.28
28 16 11 00-0120	EA	Fingerprint Reader, Biometrics Readers, Wiegand Output Access Controls (Bioscrypt V-Pass).....	1,994.96	122.28
28 16 11 00-0121	EA	Fingerprint Reader With HID Card Reader, Biometrics Readers, Wiegand Output Access Controls (Bioscrypt V-Prox).....	2,221.63	122.28
28 16 11 00-0122	EA	Fingerprint Reader With Contactless Smart Card Reader, Biometrics Readers, Wiegand Output Access Controls (Bioscrypt V-Smart).....	1,994.96	122.28
28 16 11 00-0123		Exterior Mounting Posts For Gate Operator Access Controls (28 16 11)		
		Note: Includes mounting plate for access controls, baked on enamel finish and mounting bolt covers. Excludes concrete pads and electrical connections.		
28 16 11 00-0124		2" x 2" Steel, Exterior Mounting Posts For Gate Operator Access Controls (28 16 11 00-0123)		
28 16 11 00-0125	EA	44" Tall, Gooseneck Style, Single Mount, 2" x 2" Steel, Exterior Mounting Post For Gate Operator Access Controls..... Note: Includes a 5" x 5" base plate.	464.69	48.61
28 16 11 00-0126	EA	73" Tall, Gooseneck Style, Dual Mount, 2" x 2" Steel, Exterior Mounting Post For Gate Operator Access Controls..... Note: Includes an 8" x 8" base plate.	869.95	48.61
28 16 11 00-0127	EA	Anchor Post For 2" x 2" Steel, Exterior Mounting Post For Gate Operator Access Controls..... Note: Includes a 24" in-ground post with matching base plate, conduit access and mounting hardware.	423.48	48.61
28 16 11 00-0128		4" x 4" Steel, Exterior Mounting Posts For Gate Operator Access Controls (28 16 11 00-0123)		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 16 11 00-0129 EA 59" Tall, Straight Style, Single Mount, 4" x 4" Steel, Exterior Mounting Post For Vehicular Gate Operator Access Controls Note: Includes an 8" x 8" base plate.	824.15	58.33
28 16 11 00-0130 EA 49" Tall, Offset Style, Single Mount, 4" x 4" Steel, Exterior Mounting Post For Vehicular Gate Operator Access Controls Note: Includes an 8" x 8" base plate and a 14" offset from back of post.	975.26	58.33
28 16 11 00-0131 EA Anchor Post For 4" x 4" Steel, Exterior Mounting Post For Vehicular Gate Operator Access Controls Note: Includes a 24" in-ground post with matching base plate, conduit access and mounting hardware.	614.65	58.33
28 16 11 00-0132 4" x 8" Steel, Exterior Mounting Posts For Gate Operator Access Controls ^(28 16 11)		
28 16 11 00-0133 EA 59" Tall, Straight Style, Single Mount, 4" x 8" Steel, Exterior Mounting Post For Gate Operator Access Controls Note: Includes a 11" x 13" base plate.	2,601.42	72.92
28 16 11 00-0134 EA 50" Tall, Offset Style, Single Mount, 4" x 8" Steel, Exterior Mounting Post For Gate Operator Access Controls Note: Includes a 10" x 14" base plate and a 14" offset from back of post.	2,721.62	72.92
28 16 11 00-0135 EA Anchor Post For 4" x 8" Steel, Exterior Mounting Post For Gate Operator Access Controls Note: Includes a 24" in-ground post with matching base plate, conduit access and mounting hardware.	1,158.97	24.31
28 16 11 00-0136 EA 48" Light Tower For 4" x 8" Steel, Exterior Mounting Post For Gate Operator Access Controls	1,811.50	72.92
28 16 11 00-0137 Access Control Accessories ^(28 16 11)		
28 16 11 00-0138 EA 6 Volt DC, 12 Volt DC, Or 24 Volt DC, At 4 Amperes, Power Supply/Charger (Altronix SMP-5)	650.54	
28 16 11 00-0139 EA 7 Amperes, 12 Volt, Battery	86.05	
28 16 11 00-0140 EA 18 Amperes, 12 Volt, Battery	191.81	
28 16 11 00-0141 EA Door Personality Module (Sensormatic RM-4)	708.81	30.57
28 16 11 00-0142 EA Mini-Alert Door Ajar Sounder (System Sensor PA400)	285.93	61.14
28 16 11 00-0143 EA Recessed Contact For Steel Doors, Door Monitor Switch (Sentrol 1078C)	86.07	36.68
28 16 11 00-0144 EA Access Control Systems Power Supply (Altronix AL400ULACMCB)	783.03	24.45
28 16 11 00-0145 EA Surge Suppressor (Tripp-Lite IBAR4)	118.01	6.12
28 16 11 00-0146 EA Door Strike Relay (Altronix RBSN-TTL)	81.55	24.45
28 16 11 00-0147 EA 4" Diameter x 74" High, Powder Coated Steel, Burial Mount Gooseneck For Access Control Devices (GNB-1) Note: Set in concrete.	489.79	
28 16 11 00-0148 EA 16-Zone Input, Door Controller Expansion Module With 16" SPI Cable (Kantech KT-MOD-INP16)	691.91	152.84
28 16 11 00-0149 Access Controllers ^(28 16 11)		
28 16 11 00-0150 Microterm Controller ^(28 16 11 00-0149)		
28 16 11 00-0151 EA Microterm Stand Alone One Or Two Door Processing Panel (Continental Instruments CICIP1100) Note: Up to 1,000 card capacity. Includes 2 alarm inputs, tamper alarm, and 3 relay outputs.	1,798.41	152.84
28 16 11 00-0152 EA Microterm PC Board (Continental Instruments CICIP1100PCB)	1,302.27	91.71
28 16 11 00-0153 EA Battery Standby For Microterm (Continental Instruments CICIP1100BAT-2) Note: Input 120 Volt AC, output 12 Volt DC to temporarily power the Microterm only.	621.26	
28 16 11 00-0154 Miniterm Controller ^(28 16 11 00-0149)		
28 16 11 00-0155 EA Miniterm Two Reader Processing Panel (Continental Instrument CICIP1200) Note: Up to 3,000 card capacity. Includes 8 EOL Class A supervised alarm inputs, tamper alarm, and 5 relay outputs. Complete in a lockable steel enclosure with battery standby for memory and system operation.	2,823.23	152.84
28 16 11 00-0156 EA Miniterm PC Board (Continental Instrument CICIP1200PCB)	2,139.89	91.71
28 16 11 00-0157 Super-2 Controller ^(28 16 11 00-0149)		
28 16 11 00-0158 EA Super-Two - Two Reader Processing Panel (Continental Instruments CICIP1300) Note: For use with CA3000 V2.0.25 and above. Up to a 125,000 card capacity, 8 EOL supervised alarm inputs, tamper, 5 relay outputs. Support for on-board LAN adapter, 57,600 baud rate, 6 access groups per card-holder and compressed data mode. Complete in a lockable steel enclosure with battery standby for memory and system operation.	2,086.44	152.84
28 16 11 00-0159 EA Super-Two - PC Board (Continental Instruments CICIP1300BD)	1,435.70	91.71
28 16 11 00-0160 EA Network Interface Board For Super-2 (Continental Instruments CICIP1300NETBD) Note: Optional on-board adapter allows for communication over TCP/IP.	392.51	91.71
28 16 11 00-0161 Smarterm Controller ^(28 16 11 00-0149)		
28 16 11 00-0162 EA Smarterm Four Reader Processing Panel (Continental Instrument CICIP1400) Note: Card capacity up to 2,500. Includes 16 alarm inputs, tamper alarm, and 9 relay outputs. Complete in a lockable steel enclosure with battery standby for memory and system operation.	5,941.72	183.42
28 16 11 00-0163 EA Smarterm PC Board (Continental Instrument CICIP1400PCB)	4,581.44	91.71
28 16 11 00-0164 EA Smarterm Memory Board - 256K (Continental Instrument CICIP1400MB256-1) Note: Up to 10,000 cardholders.	1,778.52	91.71
28 16 11 00-0165 EA Smarterm Memory Board - 2MB (Continental Instrument CICIP1400MB2-1) Note: Up to 50,000 cardholders.	2,531.40	91.71
28 16 11 00-0166 EA Smarterm Relay Expander Board (Continental Instrument CICIP1400RB) Note: 16 Output relays, 8 alarm inputs.	1,967.25	91.71
28 16 11 00-0167 EA Smarterm Alarm Expander Board (Continental Instrument CICIP1400RB) Note: (Supervised) 16 alarm inputs.	1,967.25	91.71
28 16 11 00-0168 Superterm-4 Controller ^(28 16 11 00-0149)		

28 Electronic Safety and Security**28 10 Access Control****28 16 Access Control Interfaces**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 16 11 00-0169 EA Superterm-4 - Four Reader Processing Panel (Continental Instrument CICIP1400UL) Note: 20,000 card capacity, 12 supervised alarm inputs, tamper alarm, and 9 relay outputs. Complete in a painted steel enclosure with 7 AH battery standby for system operation.	5,482.29	183.42
28 16 11 00-0170 EA Superterm-4 PC Board (Continental Instrument CICIP1400ULPCB).....	4,504.21	91.71
28 16 11 00-0171 Superterm-8 Controller (28 16 11 00-0149)		
28 16 11 00-0172 EA Superterm-8 - Eight Reader Processing Panel (Continental Instrument CICIP1800) Note: Up to 20,000 card capacity, 24 supervised alarm inputs, tamper alarm, and 17 relay outputs. Complete in a steel enclosure including 7 AH battery standby for memory and system operation.	7,290.48	305.70
28 16 11 00-0173 EA Superterm-8 - Eight Reader Processing Panel, Expanded Power (Continental Instrument CICIP1800EXP)..... Note: With expanded power supply. (required if more than 1 relay expander board is used.) Up to 20,000 card capacity, 24 supervised alarm inputs, tamper alarm, and 17 relay outputs. Complete in a steel enclosure including 7 AH battery standby for memory and system operation.	7,917.87	305.70
28 16 11 00-0174 EA Superterm-8 PC Board (Continental Instrument CICIP1800PCB).....	6,067.82	91.71
28 16 11 00-0175 Turbo Superterm-4 Controller (28 16 11 00-0149)		
28 16 11 00-0176 EA Turbo Superterm-4 - Four Reader Processing Panel (Continental Instrument CICIP1400ULT)..... Note: 20,000 Card capacity, 12 supervised alarm inputs, tamper alarm, and 9 relay outputs. Complete in a painted steel enclosure with 7 AH battery standby for system operation.	5,482.29	183.42
28 16 11 00-0177 EA Turbo Superterm-4 PC Board (Continental Instrument CICIP1400ULTPCB).....	4,504.21	91.71
28 16 11 00-0178 Turbo Superterm-8 Controller (28 16 11 00-0149)		
28 16 11 00-0179 EA Turbo Superterm-8 - Eight Reader Processing Panel (Continental Instrument CICIP1800T)..... Note: For use with CA3000 V2.0.25 and above. Up to 40,000 card capacity, 24 supervised alarm inputs, tamper alarm, and 17 relay outputs. Complete in a steel enclosure including a 7 AH battery standby for memory and system operation.	7,290.48	305.70
28 16 11 00-0180 EA Turbo Superterm-8 -Eight Reader Processing Panel, Expanded Power (Continental Instrument CICIP1800TEXP) Note: Required if more than one relay expander board is used. Up to 40,000 card capacity, 24 supervised alarm inputs, tamper alarm, and 17 relay outputs. Complete in a steel enclosure including a 7 AH battery standby for memory and system operation.	7,917.87	305.70
28 16 11 00-0181 EA Turbo Superterm-8 PC Board (Continental Instrument CICIP1800TPCB).....	6,067.82	91.71
28 16 11 00-0182 EA Superterm Memory Board - 2MB (Continental Instrument CICIP1800MB2)..... Note: Up to 140,000 cardholders.	2,531.40	91.71
28 16 11 00-0183 EA Turbo/Superterm-8 Memory Board - 2MB (Continental Instrument CICIP1800MB2X2)..... Note: Up to 140,000 cardholders.	2,129.85	91.71
28 16 11 00-0184 EA Turbo Superterm-8 Relay Expander Board (Continental Instrument CICIP1800RB)..... Note: 16 Output relays, 8 alarm inputs.	1,969.27	91.71
28 16 11 00-0185 EA Turbo Superterm-8 Alarm Expander Board (Continental Instrument CICIP1800RB)..... Note: (Supervised) 16 Alarm inputs.	1,969.27	91.71
28 16 11 00-0186 EA Expanded Power Supply For Superterm Or Turbo Superterm (Continental Instrument CICPEXPWS).....	804.74	
28 16 11 00-0187 Intelligent Controller (28 16 11 00-0149)		
28 16 11 00-0188 EA Intelligent Controller With Paired Reader Interface for One Physical Barrier (Mercury Security EP-1501).....	1,409.63	91.71
28 16 11 00-0189 EA Up To 64 Doors, Access Controller (Mercury Security EP-1502).....	2,430.75	152.84
28 16 11 00-0190 Access Control Bundled System (28 16 11)		
28 16 11 00-0191 EA CA 3000 Bundled System, Supports 25 Users (Continental Instrument CA3B250P4O3V0R0)..... Note: System includes PC, monitor, keyboard, mouse, OS, Card Access 3000 file server software, MS SQL 2000, 1 SQL host license, and security key.	39,820.38	
28 16 11 00-0192 Magnetic Locks (28 16 11) Note: Excludes access controls.		
28 16 11 00-0193 Magnetic Door Locks (28 16 11 00-0192)		
28 16 11 00-0194 300 LB Magnetic Door Locks (28 16 11 00-0193)		
28 16 11 00-0195 EA Single Door, Surface Mount, 300 LB Magnetic Door Lock.....	653.25	122.28
28 16 11 00-0196 600 LB Magnetic Door Locks (28 16 11 00-0193)		
28 16 11 00-0197 EA 600 LB, Single Door, Surface Mount, Magnetic Door Lock..... For LED Status Indicator And Signal Relay, Add 86.50 For LED Status Indicator, Signal Relay And Built-In Delay Timer, Add 173.01 For Mortise Mount, Deduct -138.41	936.59	122.28
28 16 11 00-0198 EA 600 LB, Dual Doors, Surface Mount, Magnetic Door Lock..... For LED Status Indicator And Signal Relay, Add 144.67 For LED Status Indicator, Signal Relay And Built-In Delay Timer, Add 289.35	1,401.95	122.28
28 16 11 00-0199 1,200 LB Magnetic Door Locks (28 16 11 00-0193)		
28 16 11 00-0200 EA 1,200 LB, Single Door, Surface Mount, Magnetic Door Lock..... For LED Status Indicator And Signal Relay, Add 169.04 For LED Status Indicator, Signal Relay And Built-In Delay Timer, Add 220.49	979.52	122.28
28 16 11 00-0201 EA Dual Doors, Surface Mount, 1,200 LB Magnetic Door Lock..... For LED Status Indicator And Signal Relay, Add 287.53 For LED Status Indicator, Signal Relay And Built-In Delay Timer, Add 375.04	1,494.68	122.28



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 16 11 00-0202 2,000 LB Shear Lock, Magnetic And Mechanical Locks <small>(28 16 11 00-0193)</small> Note: Includes LED status indicator and built-in signal relay.		
28 16 11 00-0203 EA Single Door, Mortise Mount, 2,000 LB Shear Lock, Magnetic And Mechanical Door Lock.....	1,025.89	122.28
28 16 11 00-0204 Magnetic Gate Locks <small>(28 16 11 00-0192)</small>		
28 16 11 00-0205 600 LB Magnetic Gate Locks <small>(28 16 11 00-0204)</small>		
28 16 11 00-0206 EA 600 LB Magnetic Gate Lock	766.59	122.28
28 16 11 00-0207 1,200 LB Magnetic Gate Locks <small>(28 16 11 00-0204)</small>		
28 16 11 00-0208 EA 1,200 LB Magnetic Gate Lock	922.85	122.28
For LED Status Indicator And Signal Relay, Add	84.79	
For LED Status Indicator, Signal Relay And Built-In Delay Timer, Add	169.57	
For Mortise Mount, Deduct	-135.66	
28 16 11 00-0209 Magnetic Lock Power Supply And Chargers <small>(28 16 11 00-0192)</small> Note: Includes lockable metal enclosure, batteries, battery charger and electronically regulated outputs.		
28 16 11 00-0210 EA 12/24 Volt DC At 1 Ampere, Magnetic Lock Backup Power Supply And Charger	566.67	122.28
28 16 11 00-0211 EA 12/24 Volt DC At 2-1/2 Amperes, Magnetic Lock Backup Power Supply And Charger	722.36	122.28
28 16 11 00-0212 EA 12 Volt DC At 4 Amperes And 24 Volt DC At 3 Amperes, Magnetic Lock Backup Power Supply And Charger	813.94	122.28
28 16 11 00-0213 EA 12/24 Volt DC At 6 Amperes, Magnetic Lock Backup Power Supply And Charger.....	1,024.59	122.28
28 16 11 00-0214 Master Door Buzzer Stations <small>(28 16 11)</small>		
28 16 11 00-0215 Master Stations <small>(28 16 11 00-0214)</small>		
28 16 11 00-0216 EA Master Stations, 5 Station Intercommunication Equipment	1,176.88	190.76
28 16 11 00-0217 EA Master Stations, 10 Station Intercommunication Equipment	1,762.90	369.28
28 16 11 00-0218 EA Master Station, Desk Style Remote Intercommunication Equipment.....	504.96	95.38
28 16 11 00-0219 EA Master Station, Flush Wall Remote Intercommunication Equipment	643.74	158.96
28 16 11 00-0220 EA Sound System Outlet, Protector	163.83	62.24
28 16 11 00-0221 EA Sound System Microphone Outlet.....	285.34	127.42
28 16 11 00-0222 EA Ceiling Or Wall, Sound System Speaker	220.66	62.24
28 16 11 00-0223 EA Sound System Monitor Panel	648.29	127.42
28 16 11 00-0224 EA Sound System Volume Control.....	190.04	62.24
28 16 11 00-0225 EA 250 Watt, Sound System Amplifier	3,004.60	509.54
28 16 11 00-0226 EA Sound System Cabinet.....	1,740.47	509.54
28 16 11 00-0227 Master Door Stations <small>(28 16 11 00-0214)</small>		
28 16 11 00-0228 EA Master Door Stations, Button Buzzer Type, 25 Station.....	2,558.25	
For Intercom Type Master Door Station, Add	218.32	
28 16 11 00-0229 EA Master Door Stations, Button Buzzer Type, 50 Station.....	4,235.89	
For Intercom Type Master Door Station, Add	353.67	
28 16 11 00-0230 EA Master Door Stations, Button Buzzer Type, 75 Station.....	5,809.70	
For Intercom Type Master Door Station, Add	458.47	
28 16 11 00-0231 EA Master Door Stations, Button Buzzer Type, 100 Station.....	6,642.55	
For Intercom Type Master Door Station, Add	537.06	
28 16 11 00-0232 EA Master Door Stations, Button Buzzer Type, 150 Station.....	8,078.70	
For Intercom Type Master Door Station, Add	785.94	
28 16 11 00-0233 EA Master Door Stations, Button Buzzer Type, 200 Station.....	9,490.61	
For Intercom Type Master Door Station, Add	1,012.99	
28 16 11 00-0234 EA Master Door Stations, Button Buzzer Type, 250 Station.....	11,951.91	
For Intercom Type Master Door Station, Add	1,309.91	
28 16 11 00-0235 EA Master Door Stations, Button Buzzer Type, 300 Station.....	14,270.33	
For Intercom Type Master Door Station, Add	1,502.03	
28 16 11 00-0236 EA Transformer	179.04	
28 16 11 00-0237 EA Door Opener	264.89	
28 16 11 00-0238 EA Buzzer With Door Release And Plate	326.07	
28 16 11 00-0239 EA Amplifier For Intercom Type Unit	540.45	
28 16 11 00-0240 EA Speaker With Door Release	226.34	

28 20 Video Surveillance (28)

Note: Includes testing of new devices and certification.

28 21 Surveillance Cameras (28 20)

28 21 31 Proprietary Surveillance Camera Systems (28 21)

Note: Includes programming of equipment, testing and certification of new devices.

28 21 31 00-0001	Closed Circuit Television And Surveillance Systems <small>(28 21 31)</small>		
28 21 31 00-0002	Cameras And Accessories <small>(28 21 31 00-0001)</small>		
28 21 31 00-0003	Cameras <small>(28 21 31 00-0002)</small>		
28 21 31 00-0004	General Use Video Camera <small>(28 21 31 00-0003)</small>		

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 21 31 00-0005	EA	Camera, Day/Night With Auto Iris Lens (Samsung SHC-721A).....	1,605.63	120.43
28 21 31 00-0006	EA	Camera With Auto Iris Lens (Panasonic WV-CW 474S).....	713.80	120.43
28 21 31 00-0007	EA	Camera With Auto Iris Lens (Panasonic CW244).....	1,400.47	120.43
28 21 31 00-0008	EA	Dome (Panasonic WC-CW-244).....	1,167.25	120.43
28 21 31 00-0009	EA	Camera, Zoom Day Night Pole Mounted (Pelco PTZ 23X).....	3,235.99	120.43
28 21 31 00-0010	EA	Arecont Vision AV8365 8 Megapixel 360 Degree IP Camera.....	3,515.25	120.43
28 21 31 00-0011	EA	Arecont Vision AV8155 8 Megapixel 360 Degree IP Camera.....	6,261.37	120.43
28 21 31 00-0012	EA	Arecont Vision 8 Megapixel 180 Degree IP Camera.....	3,510.72	120.43
28 21 31 00-0013	EA	Arecont Vision AV3155 3 Megapixel Day/Night Camera.....	2,508.56	120.43
28 21 31 00-0014	EA	Arecont Vision AV5155 5 Megapixel Day/Night Camera.....	2,649.81	120.43
28 21 31 00-0015	EA	JVC 920U Hi-Res Day/Night Camera.....	541.17	120.43
28 21 31 00-0016	EA	NUVICO Vandal Dome Camera D/N 580TVL 2.8-10MM 12/24.....	543.42	120.43
28 21 31 00-0017	EA	NUVICO Indoor Dome Camera 580TVL 2.8-10MM, 12/24.....	516.40	120.43
28 21 31 00-0018	EA	Fixed Dome Network Camera, 2048 x 1536 Max Resolution, Remote Focus, Extreme Weather (Vivitek FD9371-EHTV).....	1,791.94	120.43
28 21 31 00-0019		Camera Power Supply (28 21 31 00-0003)		
28 21 31 00-0020	EA	100 VA Outdoor Power Supply.....	450.11	60.21
28 21 31 00-0021	EA	Surge Protector, Isolated Coax Protector For CCTV.....	202.79	29.72
28 21 31 00-0022	EA	Altronics Power Supply With 8 Fused Outputs.....	953.59	120.43
28 21 31 00-0023		Camera Mounting (28 21 31 00-0002)		
28 21 31 00-0024		Camera Wall Mounts (28 21 31 00-0023)		
28 21 31 00-0025	EA	Parapet Camera Wall Mount, 1.5" Diameter Pipe.....	996.87	120.28
28 21 31 00-0026	EA	Spectra Wall Mount, Gray.....	225.58	60.21
28 21 31 00-0027	EA	Spectra Wall Mount Pole Adapter For SWM-GY.....	182.98	60.21
28 21 31 00-0028	EA	Wall Mount Bracket For Exterior CCTV.....	737.66	120.43
28 21 31 00-0029		Video Monitor (28 21 31 00-0002)		
28 21 31 00-0030	EA	17" Color Video Monitor..... Note: JVC model number TM-H1700GU.	2,039.01	244.56
28 21 31 00-0031		Digital Video Recorders (28 21 31 00-0002)		
28 21 31 00-0032	EA	Dedicated Micros 16 Channel 500 GB HD; DMSP 16MINA.....	5,734.18	
28 21 31 00-0033	EA	Dedicated Micros 4 Channel 80 GB HD; D4A-DX4C.....	1,457.44	
28 21 31 00-0034	EA	Dedicated Micros Digital Sprite 2; DS2PD 16500.....	6,687.40	
28 21 31 00-0035	EA	Enterprise Class Timesight NVR, Video Lifecycle Management Server; DM-SDEXC16MAX-A..... Note: (Hybrid NVR/DVR 8 Analog & 4 IP Channels)	11,246.98	
28 21 31 00-0036	EA	Enterprise Class Timesight NVR, Video Lifecycle Management Server; DM-SDACP32MAX-A..... Note: (Hybrid NVR/DVR 8 Analog & 4 IP Channels)	944.95	
28 21 31 00-0037	EA	Enterprise Class Timesight NVR, Video Lifecycle Management Server; DM-SDACP16MAX-A..... Note: (Hybrid NVR/DVR 8 Analog & 4 IP Channels)	9,270.88	
28 21 31 00-0038	EA	Enterprise Class Timesight NVR, Video Lifecycle Management Server; DM-SDACP16MIN-A..... Note: (Hybrid NVR/DVR 8 Analog & 4 IP Channels)	7,362.11	
28 21 31 00-0039	EA	Enterprise Class Timesight NVR, Video Lifecycle Management Server; DM-SDACP08MIN-A..... Note: (Hybrid NVR/DVR 8 Analog & 4 IP Channels)	6,258.81	
28 21 31 00-0040	EA	Prodigy 8 Channel 1000 GB HD.....	4,556.33	
28 21 31 00-0041		Wireless Hardware (28 21 31 00-0002)		
28 21 31 00-0042	EA	MIMO PB24M24 Outdoor Wireless Box.....	1,846.13	
28 21 31 00-0043	EA	VLRM24 Wireless 2.4GHz MIMO Access Point.....	1,148.90	
28 21 31 00-0044		Network Video Recorders (28 21 31 00-0002)		
28 21 31 00-0045	EA	16-Channel 2U Rack-Mountable, Network Video Recorder (NUUO TP-8160R Titan Pro).....	9,461.62	
28 21 31 00-0046		Closed Circuit Television And Surveillance Systems (Pelco) (28 21 31)		
28 21 31 00-0047		Cameras And Accessories (28 21 31 00-0046)		
28 21 31 00-0048		Cameras (28 21 31 00-0047)		
28 21 31 00-0049		Compact, 1/3" Format Cameras (28 21 31 00-0048)		
28 21 31 00-0050		High Resolution Color, Compact, 1/3" Format Cameras (28 21 31 00-0049)		
28 21 31 00-0051	EA	High Resolution Day/Night, Compact, 1/3" Format Camera (Pelco C10DN-6).....	632.15	30.62
28 21 31 00-0052		Day/Night, Compact, 1/3" Format Cameras (28 21 31 00-0049)		
28 21 31 00-0053	EA	High Resolution Color, Compact, 1/3" Format Camera (Pelco C10CH-6).....	373.21	30.62
28 21 31 00-0054		Camerapaks (28 21 31 00-0047) Note: Includes camera and lens.		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0055 Camerapaks (28 21 31 00-0054)		
28 21 31 00-0056 High Resolution Color, Camerapaks (28 21 31 00-0055)		
28 21 31 00-0057 Fixed Focus, High Resolution Color, Camerapaks (28 21 31 00-0056)		
28 21 31 00-0058 Manual Iris, Fixed Focus, High Resolution Color, Camerapaks (28 21 31 00-0057)		
28 21 31 00-0059 EA 2.3 mm, Manual Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F2.3)	485.52	30.62
28 21 31 00-0060 EA 2.8 mm, Manual Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F2.8)	456.40	30.62
28 21 31 00-0061 EA 4 mm, Manual Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F4)	442.88	30.62
28 21 31 00-0062 EA 8 mm, Manual Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F8)	439.76	30.62
28 21 31 00-0063 Direct Drive Auto Iris, Fixed Focus, High Resolution Color, Camerapaks (28 21 31 00-0057)		
28 21 31 00-0064 EA 2.3 mm, Direct Drive Auto Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F2.3A)	529.20	30.62
28 21 31 00-0065 EA 2.8 mm, Direct Drive Auto Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F2.8A)	485.52	30.62
28 21 31 00-0066 EA 4 mm, Direct Drive Auto Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F4A)	475.12	30.62
28 21 31 00-0067 EA 8 mm, Direct Drive Auto Iris, Fixed Focus, High Resolution Color, Camerapak (Pelco C10CH-6F8A)	466.80	30.62
28 21 31 00-0068 Varifocal, High Resolution Color, Camerapaks (28 21 31 00-0056)		
28 21 31 00-0069 Manual Iris, Varifocal, High Resolution Color, Camerapaks (28 21 31 00-0068)		
28 21 31 00-0070 EA 1-3 mm, Manual Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V1)	571.83	30.62
28 21 31 00-0071 EA 2.5-6 mm, Manual Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V2)	515.68	30.62
28 21 31 00-0072 EA 2.8-12 mm, Manual Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V21)	469.92	30.62
28 21 31 00-0073 EA 3-8 mm, Manual Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V3)	451.20	30.62
28 21 31 00-0074 EA 5-40 mm, Manual Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V5)	520.88	30.62
28 21 31 00-0075 Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapaks (28 21 31 00-0068)		
28 21 31 00-0076 EA 1-3 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V1A)	617.59	30.62
28 21 31 00-0077 EA 2.5-6 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V2A)	579.11	30.62
28 21 31 00-0078 EA 2.8-12 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V21A)	513.60	30.62
28 21 31 00-0079 EA 3-8 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V3A)	458.48	30.62
28 21 31 00-0080 EA 5-40 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V5A)	542.71	30.62
28 21 31 00-0081 EA 5-50 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V50A)	613.43	30.62
28 21 31 00-0082 EA 5.5-82.5 mm, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6V55A)	703.90	30.62
28 21 31 00-0083 Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapaks (28 21 31 00-0068)		
28 21 31 00-0084 EA 3-8.5 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6R3A)	482.40	30.62
28 21 31 00-0085 EA 7.5-50 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Color, Camerapak (Pelco C10CH-6R75A)	577.03	30.62
28 21 31 00-0086 High Resolution Day/Night, Camerapaks (28 21 31 00-0055)		
28 21 31 00-0087 Varifocal, High Resolution Day/Night, Camerapaks (28 21 31 00-0086)		
28 21 31 00-0088 Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapaks (28 21 31 00-0087)		
28 21 31 00-0089 EA 2.5-6 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6V2A)	976.35	30.62
28 21 31 00-0090 EA 2.8-12 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6V21A)	910.84	30.62
28 21 31 00-0091 EA 3-8 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6V3A)	855.72	30.62
28 21 31 00-0092 EA 5-40 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6V5A)	939.96	30.62
28 21 31 00-0093 EA 5-50 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6V50A)	1,010.67	30.62
28 21 31 00-0094 EA 5.5-82.5 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6V55A)	1,100.10	30.62
28 21 31 00-0095 Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapaks (28 21 31 00-0087)		
28 21 31 00-0096 EA 3-8.5 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6R3A)	879.64	30.62
28 21 31 00-0097 EA 7.5-50 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Camerapak (Pelco C1390H-6R75A)	974.27	30.62
28 21 31 00-0098 Compact Camerapaks (28 21 31 00-0054)		
28 21 31 00-0099 High Resolution Color, Compact Camerapaks (28 21 31 00-0098)		
28 21 31 00-0100 DSS, High Resolution Color, Compact Camerapaks (28 21 31 00-0099)		
28 21 31 00-0101 Fixed Focus, DSS, High Resolution Color, Camerapaks (28 21 31 00-0100)		
28 21 31 00-0102 Manual Iris, Fixed Focus, DSS, High Resolution Color, Camerapaks (28 21 31 00-0101)		
28 21 31 00-0103 EA 2.3 mm, Manual Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F2.3)	756.93	30.62
28 21 31 00-0104 EA 2.8 mm, Manual Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F2.8)	727.82	30.62

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
28 21 31 00-0105	EA	4 mm, Manual Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F4)	713.26		30.62
28 21 31 00-0106	EA	8 mm, Manual Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F8)	710.14		30.62
28 21 31 00-0107		Direct Drive Auto Iris, Fixed Focus, DSS, High Resolution Color, Camerapaks <small>(28 21 31 00-0101)</small>			
28 21 31 00-0108	EA	2.3 mm, Direct Drive Auto Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F2.3A)	799.57		30.62
28 21 31 00-0109	EA	2.8 mm, Direct Drive Auto Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F2.8A)	756.93		30.62
28 21 31 00-0110	EA	4 mm, Direct Drive Auto Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F4A)	746.53		30.62
28 21 31 00-0111	EA	8 mm, Direct Drive Auto Iris, Fixed Focus, DSS, High Resolution Color, Camerapak (Pelco C3751H-2F8A)	738.21		30.62
28 21 31 00-0112		Varifocal, DSS, High Resolution Color, Camerapaks <small>(28 21 31 00-0100)</small>			
28 21 31 00-0113		Manual Iris, Varifocal, DSS, High Resolution Color, Camerapaks <small>(28 21 31 00-0112)</small>			
28 21 31 00-0114	EA	1-3 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V1)	843.24		30.62
28 21 31 00-0115	EA	2.5-6 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V2)	786.05		30.62
28 21 31 00-0116	EA	2.8-12 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V21)	741.33		30.62
28 21 31 00-0117	EA	3-8 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V3)	722.62		30.62
28 21 31 00-0118	EA	5-40 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V5)	791.25		30.62
28 21 31 00-0119	EA	5-50 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V50)	835.97		30.62
28 21 31 00-0120	EA	5.5-82.5 mm, Manual Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V55)	942.04		30.62
28 21 31 00-0121		Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapaks <small>(28 21 31 00-0112)</small>			
28 21 31 00-0122	EA	1-3 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V1A)	887.96		30.62
28 21 31 00-0123	EA	2.5-6 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V2A)	850.52		30.62
28 21 31 00-0124	EA	2.8-12 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V21A)	785.01		30.62
28 21 31 00-0125	EA	3-8 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V3A)	728.86		30.62
28 21 31 00-0126	EA	5-40 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V5A)	814.13		30.62
28 21 31 00-0127	EA	5-50 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V50A)	884.84		30.62
28 21 31 00-0128	EA	5.5-82.5 mm, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2V55A)	974.27		30.62
28 21 31 00-0129		Infrared Corrected, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapaks <small>(28 21 31 00-0112)</small>			
28 21 31 00-0130	EA	3-8.5 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2R3A)	753.81		30.62
28 21 31 00-0131	EA	7.5-50 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, DSS, High Resolution Color, Camerapak (Pelco C3751H-2R75A)	848.44		30.62
28 21 31 00-0132		EDR, High Resolution Color, Compact Camerapaks <small>(28 21 31 00-0099)</small>			
28 21 31 00-0133		Fixed Focus, EDR, High Resolution Color, Camerapaks <small>(28 21 31 00-0132)</small>			
28 21 31 00-0134		Manual Iris, Fixed Focus, EDR, High Resolution Color, Camerapaks <small>(28 21 31 00-0133)</small>			
28 21 31 00-0135	EA	2.3 mm, Manual Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F2.3)	756.93		30.62
28 21 31 00-0136	EA	2.8 mm, Manual Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F2.8)	565.59		30.62
28 21 31 00-0137	EA	4 mm, Manual Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F4)	551.03		30.62
28 21 31 00-0138	EA	8 mm, Manual Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F8)	547.91		30.62
28 21 31 00-0139		Direct Drive Auto Iris, Fixed Focus, EDR, High Resolution Color, Camerapaks <small>(28 21 31 00-0133)</small>			
28 21 31 00-0140	EA	2.3 mm, Direct Drive Auto Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F2.3A)	637.34		30.62
28 21 31 00-0141	EA	2.8 mm, Direct Drive Auto Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F2.8A)	594.71		30.62
28 21 31 00-0142	EA	4 mm, Direct Drive Auto Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F4A)	584.31		30.62
28 21 31 00-0143	EA	8 mm, Direct Drive Auto Iris, Fixed Focus, EDR, High Resolution Color, Camerapak (Pelco C3701H-2F8A)	584.31		30.62
28 21 31 00-0144		Varifocal, EDR, High Resolution Color, Camerapaks <small>(28 21 31 00-0132)</small>			
28 21 31 00-0145		Manual Iris, Varifocal, EDR, High Resolution Color, Camerapaks <small>(28 21 31 00-0144)</small>			
28 21 31 00-0146	EA	1-3 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V1)	681.02		30.62
28 21 31 00-0147	EA	2.5-6 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V2)	623.83		30.62
28 21 31 00-0148	EA	2.8-12 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V21)	579.11		30.62
28 21 31 00-0149	EA	3-8 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V3)	560.39		30.62
28 21 31 00-0150	EA	5-40 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V5)	629.03		30.62
28 21 31 00-0151	EA	5-50 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V50)	673.74		30.62
28 21 31 00-0152	EA	5.5-82.5 mm, Manual Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V55)	779.81		30.62
28 21 31 00-0153		Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapaks <small>(28 21 31 00-0144)</small>			
28 21 31 00-0154	EA	1-3 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V1A)	725.74		30.62
28 21 31 00-0155	EA	2.5-6 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V2A)	688.30		30.62
28 21 31 00-0156	EA	2.8-12 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V21A)	621.75		30.62
28 21 31 00-0157	EA	3-8 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V3A)	566.63		30.62
28 21 31 00-0158	EA	5-40 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V5A)	651.90		30.62



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0159 EA 5-50 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V50A).....	722.62	30.62
28 21 31 00-0160 EA 5.5-82.5 mm, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2V55A).....	812.05	30.62
28 21 31 00-0161 Infrared Corrected, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapaks (28 21 31 00-0144)		
28 21 31 00-0162 EA 3-8.5 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2R3A).....	591.59	30.62
28 21 31 00-0163 EA 7.5-50 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, EDR, High Resolution Color, Camerapak (Pelco C3701H-2R75A).....	686.22	30.62
28 21 31 00-0164 High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0098)		
28 21 31 00-0165 Fixed Focus, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0164)		
28 21 31 00-0166 Manual Iris, Fixed Focus, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0165)		
28 21 31 00-0167 EA 8 mm, Manual Iris, Fixed Focus, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6F8).....	698.70	30.62
28 21 31 00-0168 DC-Drive Auto Iris, Fixed Focus, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0165)		
28 21 31 00-0169 EA 2.3 mm, Direct Drive Auto Iris, Fixed Focus, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6F2.3A).....	788.13	30.62
28 21 31 00-0170 EA 2.8 mm, Direct Drive Auto Iris, Fixed Focus, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6F2.8A).....	744.45	30.62
28 21 31 00-0171 Varifocal, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0164)		
28 21 31 00-0172 Manual Iris, Varifocal, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0171)		
28 21 31 00-0173 EA 2.8-12 mm, Manual Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V21).....	728.86	30.62
28 21 31 00-0174 EA 3-8 mm, Manual Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V3).....	710.14	30.62
28 21 31 00-0175 EA 5-50 mm, Manual Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V50).....	824.53	30.62
28 21 31 00-0176 Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0171)		
28 21 31 00-0177 EA 2.5-6 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V2A).....	838.05	30.62
28 21 31 00-0178 EA 2.8-12 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V21A).....	772.53	30.62
28 21 31 00-0179 EA 3-8 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V3A).....	717.42	30.62
28 21 31 00-0180 EA 5-40 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V5A).....	801.65	30.62
28 21 31 00-0181 EA 5-50 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V50A).....	872.36	30.62
28 21 31 00-0182 EA 5.5-82.5 mm, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6V55A).....	962.83	30.62
28 21 31 00-0183 Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapaks (28 21 31 00-0171)		
28 21 31 00-0184 EA 3-8.5 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6R3A).....	741.33	30.62
28 21 31 00-0185 EA 7.5-50 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal, High Resolution Day/Night, Compact Camerapak (Pelco C10DN-6R75A).....	835.97	30.62
28 21 31 00-0186 Camera Systems (28 21 31 00-0047)		
28 21 31 00-0187 Camera Dome Systems (28 21 31 00-0186)		
28 21 31 00-0188 Spectra®, Pan/Tilt Camera Dome Systems (28 21 31 00-0187)		
28 21 31 00-0189 Spectra®, Pan/Tilt Camera Dome Systems (28 21 31 00-0188)		
Note: Includes dome drive, camera, lens, back box, clear or smoked lower dome and mounting hardware.		
28 21 31 00-0190 Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0189)		
28 21 31 00-0191 Black And White, Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0190)		
28 21 31 00-0192 EA 22X, Surface Mount, Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4M22-SMB).....	3,100.29	183.72
28 21 31 00-0193 EA 22X, In-Ceiling Mount, Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4M22-F).....	3,526.65	183.72
28 21 31 00-0194 EA 22X, Pendant Mount, Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4M22-PB).....	3,717.99	183.72
28 21 31 00-0195 EA 22X, Environmental Pendant Mount, Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4M22-PG-E).....	5,148.89	183.72
28 21 31 00-0196 Color, Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0190)		
28 21 31 00-0197 EA 16X, Surface Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-SMB).....	2,616.73	183.72
28 21 31 00-0198 EA 16X, In-Ceiling Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-F).....	2,831.99	183.72

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31	00-0199	EA	16X, Pendant Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-PB).....	3,024.37	183.72
28 21 31	00-0200	EA	16X, Environmental In-Ceiling Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-F-E).....	3,134.60	183.72
28 21 31	00-0201	EA	16X, Environmental Pendant Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-PG-E).....	3,134.60	183.72
28 21 31	00-0202	EA	22X, Surface Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-SMB).....	3,283.31	183.72
28 21 31	00-0203	EA	22X, In-Ceiling Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-F).....	3,710.71	183.72
28 21 31	00-0204	EA	22X, Pendant Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-PB).....	3,903.09	183.72
28 21 31	00-0205	EA	22X, Environmental In-Ceiling Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-F-E).....	4,013.32	183.72
28 21 31	00-0206	EA	22X, Environmental Pendant Mount, Color, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-PG-E).....	4,013.32	183.72
28 21 31	00-0207		Color/Black And White, Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0190)		
28 21 31	00-0208	EA	23X, Surface Mount, Color/Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4CBW-SMB).....	3,816.78	183.72
28 21 31	00-0209	EA	23X, In-Ceiling Mount, Color/Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4CBW-F).....	4,244.18	183.72
28 21 31	00-0210	EA	23X, Pendant Mount, Color/Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4CBW-PB).....	4,436.56	183.72
28 21 31	00-0211	EA	23X, Environmental In-Ceiling Mount, Color/Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4CBW-F-E).....	4,546.79	183.72
28 21 31	00-0212	EA	23X, Environmental Pendant Mount, Color/Black And White, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4CBW-PG-E).....	4,546.79	183.72
28 21 31	00-0213		Day/Night, Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0190)		
28 21 31	00-0214	EA	18X, Surface Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-SMB).....	3,467.37	183.72
28 21 31	00-0215	EA	18X, In-Ceiling Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-F).....	3,683.67	183.72
28 21 31	00-0216	EA	18X, Pendant Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-PB).....	3,875.01	183.72
28 21 31	00-0217	EA	18X, Environmental In-Ceiling Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-F-E).....	3,985.24	183.72
28 21 31	00-0218	EA	18X, Environmental Pendant Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-PG-E).....	3,985.24	183.72
28 21 31	00-0219	EA	35X, Surface Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-SMB).....	4,167.22	183.72
28 21 31	00-0220	EA	35X, In-Ceiling Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-F).....	4,507.27	183.72
28 21 31	00-0221	EA	35X, Pendant Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-PB).....	4,698.61	183.72
28 21 31	00-0222	EA	35X, Environmental In-Ceiling Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-F-E).....	4,808.84	183.72
28 21 31	00-0223	EA	35X, Environmental Pendant Mount, Day/Night, Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-PG-E).....	4,808.84	183.72
28 21 31	00-0224		Heavy Duty Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0189)		
28 21 31	00-0225		Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0224)		
28 21 31	00-0226	EA	16X, In-Ceiling Mount, Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-HF).....	3,393.54	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0227	EA	16X, Pendant Mount, Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-HP).....	3,578.64	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0228	EA	16X, Environmental Pendant Mount, Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-HPE).....	3,726.31	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0229	EA	22X, In-Ceiling Mount, Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-HF).....	4,207.78	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0230	EA	22X, Pendant Mount, Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-HP).....	4,392.88	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0231	EA	22X, Environmental Pendant Mount, Color, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-HPE).....	4,541.59	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0232		Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0224)		
28 21 31	00-0233	EA	18X, In-Ceiling Mount, Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-HF).....	4,244.18	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0234	EA	18X, Pendant Mount, Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-HP).....	4,429.28	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0235	EA	18X, Environmental Pendant Mount, Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-HPE).....	4,577.99	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0236	EA	35X, In-Ceiling Mount, Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-HF).....	5,004.34	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0237	EA	35X, Pendant Mount, Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-HP).....	5,188.41	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0238	EA	35X, Environmental Pendant Mount, Day/Night, Heavy Duty Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-HPE).....	5,337.11	183.72
			<i>For Protective Lower Dome Cage, Add</i>	34.65	
28 21 31	00-0239		Pressurized Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0189)		
28 21 31	00-0240		Day/Night, Pressurized Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0239)		
28 21 31	00-0241	EA	18X, Environmental Pendant Mount, Day/Night, Pressurized Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-PRE).....	5,609.57	183.72
28 21 31	00-0242	EA	35X, Environmental Pendant Mount, Day/Night, Pressurized Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-PRE).....	6,369.73	183.72
28 21 31	00-0243		Stainless Steel Spectra® IV, Pan/Tilt Camera Dome Systems (28 21 31 00-0189)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0244 Black And White, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0243)</small>		
28 21 31 00-0245 EA 22X, Environmental Pendant Mount, Black And White, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4M22-PSGE)	4,879.56	183.72
28 21 31 00-0246 Color, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0243)</small>		
28 21 31 00-0247 EA 16X, Environmental Pendant Mount, Color, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4TC-PSGE)	4,249.38	183.72
28 21 31 00-0248 EA 22X, Environmental Pendant Mount, Color, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4C22-PSGE).....	5,064.66	183.72
28 21 31 00-0249 Color/Black And White, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0243)</small>		
28 21 31 00-0250 EA 23X, Environmental Pendant Mount, Color/Black And White, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD4CBW-PSGE).....	5,598.13	183.72
28 21 31 00-0251 Day/Night, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0243)</small>		
28 21 31 00-0252 EA 18X, Environmental Pendant Mount, Day/Night, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD418-PSGE).....	5,101.05	183.72
28 21 31 00-0253 EA 35X, Environmental Pendant Mount, Day/Night, Stainless Steel Spectra® IV, Pan/Tilt Camera Dome System (Pelco SD435-PSGE).....	5,860.18	183.72
28 21 31 00-0254 Miniature Spectra®, Mini Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0189)</small>		
28 21 31 00-0255 Color, Miniature Spectra®, Mini Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0254)</small>		
28 21 31 00-0256 EA 10X, In-Ceiling Mount, Color, Miniature Spectra®, Mini Pan/Tilt Camera Dome System (Pelco SD4-B)	1,965.76	183.72
28 21 31 00-0257 Spectra® IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0188)</small>		
<small>Note: Includes simultaneous IP and analog video and control, dome drive, camera, lens, back box, clear or smoked lower dome and mounting hardware.</small>		
28 21 31 00-0258 Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0257)</small>		
28 21 31 00-0259 Color, Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0258)</small>		
28 21 31 00-0260 EA 16X, In-Ceiling Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NTC-F).....	3,608.80	183.72
28 21 31 00-0261 EA 16X, Pendant Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NTC-PB).....	3,801.18	183.72
28 21 31 00-0262 EA 16X, Environmental In-Ceiling Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NTC-F-E)	3,911.41	183.72
28 21 31 00-0263 EA 16X, Environmental Pendant Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NTC-PG-E).....	3,911.41	183.72
28 21 31 00-0264 EA 22X, In-Ceiling Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NC22-F1).....	4,487.51	183.72
28 21 31 00-0265 EA 22X, Pendant Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NC22-PB-1).....	4,679.90	183.72
28 21 31 00-0266 EA 22X, Environmental In-Ceiling Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NC22-F-E1)	4,790.12	183.72
28 21 31 00-0267 EA 22X, Environmental Pendant Mount, Color, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NC22-PG-E1)	4,790.12	183.72
28 21 31 00-0268 Color/Black And White, Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0258)</small>		
28 21 31 00-0269 EA 23X, In-Ceiling Mount, Color/Black And White, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NCBW-F1).....	5,020.98	183.72
28 21 31 00-0270 EA 23X, Pendant Mount, Color/Black And White, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NCBW-PB-1)	5,213.36	183.72
28 21 31 00-0271 EA 23X, Environmental In-Ceiling Mount, Color/Black And White, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NCBW-F-E1)	5,323.59	183.72
28 21 31 00-0272 EA 23X, Environmental Pendant Mount, Color/Black And White, Spectra® IV IP Network, Pan/Tilt Camera Dome System (Pelco SD4NCBW-PG-E1)	5,323.59	183.72
28 21 31 00-0273 Heavy Duty Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0257)</small>		
28 21 31 00-0274 Color, Heavy Duty Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0273)</small>		
28 21 31 00-0275 EA 16X, In-Ceiling Mount, Color, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4NTC-HF1).....	4,170.34	183.72
For Protective Lower Dome Cage, Add	34.65	
28 21 31 00-0276 EA 16X, Pendant Mount, Color, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4NTC-HP1)	4,355.45	183.72
For Protective Lower Dome Cage, Add	34.65	
28 21 31 00-0277 EA 16X, Environmental Pendant Mount, Color, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4NTC-HPE1)	4,503.11	183.72
For Protective Lower Dome Cage, Add	34.65	
28 21 31 00-0278 EA 22X, In-Ceiling Mount, Color, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4NC22-HF1).....	4,984.59	183.72
For Protective Lower Dome Cage, Add	34.65	
28 21 31 00-0279 EA 22X, Pendant Mount, Color, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4NC22-HP1).....	5,169.69	183.72
For Protective Lower Dome Cage, Add	34.65	

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
28 21 31 00-0280	EA	22X, Environmental Pendant Mount, Color, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4NC22-HPE1).....	5,318.39	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0281		Day/Night, Heavy Duty Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0273)</small>			
28 21 31 00-0282	EA	18X, In-Ceiling Mount, Day/Night, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4N18-HF1).....	5,020.98	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0283	EA	18X, Pendant Mount, Day/Night, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4N18-HP1).....	5,206.08	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0284	EA	18X, Environmental Pendant Mount, Day/Night, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4N18-HPE1).....	5,354.79	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0285	EA	35X, In-Ceiling Mount, Day/Night, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4N35-HF1).....	5,781.15	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0286	EA	35X, Pendant Mount, Day/Night, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4N35-HP1).....	5,965.21	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0287	EA	35X, Environmental Pendant Mount, Day/Night, Heavy Duty Spectra® IV IP Network, Camera Dome System (Pelco SD4N35-HPE1).....	6,113.92	183.72	
		<i>For Protective Lower Dome Cage, Add</i>	34.65		
28 21 31 00-0288		Stainless Steel Spectra® IV IP Network, Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0257)</small>			
28 21 31 00-0289		Color, Stainless Steel Spectra® IV IP Network, Camera Dome Systems <small>(28 21 31 00-0288)</small>			
28 21 31 00-0290	EA	16X, Environmental Pendant Mount, Color, Stainless Steel Spectra® IV IP Network, Camera Dome System (Pelco SD4NTC-PSGE1).....	5,026.18	183.72	
28 21 31 00-0291	EA	22X, Environmental Pendant Mount, Color, Stainless Steel Spectra® IV IP Network, Camera Dome System (Pelco SD4NC22-PSGE1).....	5,841.46	183.72	
28 21 31 00-0292		Color/Black And White, Stainless Steel Spectra® IV IP Network, Camera Dome Systems <small>(28 21 31 00-0288)</small>			
28 21 31 00-0293	EA	23X, Environmental Pendant Mount, Color/Black And White, Stainless Steel Spectra® IV IP Network, Camera Dome System (Pelco SD4N35-PSGE1).....	6,374.93	183.72	
28 21 31 00-0294		Day/Night, Stainless Steel Spectra® IV IP Network, Camera Dome Systems <small>(28 21 31 00-0288)</small>			
28 21 31 00-0295	EA	18X, Environmental Pendant Mount, Day/Night, Stainless Steel Spectra® IV IP Network, Camera Dome System (Pelco SD4N18-PSGE1).....	5,877.86	183.72	
28 21 31 00-0296	EA	35X, Environmental Pendant Mount, Day/Night, Stainless Steel Spectra® IV IP Network, Camera Dome System (Pelco SD4N35-PSGE1).....	6,636.99	183.72	
28 21 31 00-0297		Miniature Spectra® IP Network, Mini Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0257)</small>			
28 21 31 00-0298		Color, Miniature Spectra® IP Network, Mini Camera Dome Systems <small>(28 21 31 00-0297)</small>			
28 21 31 00-0299	EA	10X, In-Ceiling Mount, Color, Miniature Spectra® IP Network, Black Mini Camera Dome System (Pelco SD4N-W1).....	2,466.99	183.72	
28 21 31 00-0300		Spectra®, Pan/Tilt Dome Drives <small>(28 21 31 00-0188)</small>			
		Note: Includes dome drive, camera and lens.			
28 21 31 00-0301	EA	10X, Color Camera, Spectra® Mini Dome Drive (Pelco DD4).....	1,826.52	153.09	
28 21 31 00-0302	EA	10X, Color Camera, Spectra® IP Network, Mini Dome Drive (Pelco DD4N).....	2,325.68	153.09	
28 21 31 00-0303	EA	22X, Black And White Camera, Spectra® IV Dome Drive (Pelco DD4M22).....	2,942.34	153.09	
28 21 31 00-0304	EA	16X, Color Camera, Spectra® IV Dome Drive (Pelco DD4TC16).....	2,312.16	153.09	
28 21 31 00-0305	EA	22X, Color Camera, Spectra® IV Dome Drive (Pelco DD4C22).....	3,126.40	153.09	
28 21 31 00-0306	EA	18X, Day/Night Camera, Spectra® IV Dome Drive (Pelco DD4CBW18).....	3,162.80	153.09	
28 21 31 00-0307	EA	23X, Day/Night Camera, Spectra® IV Dome Drive (Pelco DD4CBW23).....	3,659.87	153.09	
28 21 31 00-0308	EA	35X, Day/Night Camera, Spectra® IV Dome Drive (Pelco DD4CBW35).....	3,922.96	153.09	
28 21 31 00-0309	EA	35X, Color/Black And White Camera, Spectra® IV Horizon Dome Drive (Pelco DD4H35).....	3,922.96	153.09	
28 21 31 00-0310		Accessories For Spectra® Pan/Tilt Camera Dome Systems <small>(28 21 31 00-0188)</small>			
28 21 31 00-0311	EA	Upgrade To Chrome Lower Dome (Pelco Spectra).....	146.63		
28 21 31 00-0312	EA	Upgrade To Gold Lower Dome (Pelco Spectra).....	191.34		
28 21 31 00-0313	EA	Wall Mount For Spectra® Systems (Pelco IWM-BK).....	159.57	15.31	
28 21 31 00-0314	EA	24 Volt Out, Wall Mount For Spectra® Systems (Pelco IWM24-BK).....	401.86	15.31	
28 21 31 00-0315	EA	Wall Arm Mount For Spectra® Systems (Pelco IDM4018).....	155.41	15.31	
28 21 31 00-0316	EA	Wall Arm Mount With Feed Through For Stainless Steel Spectra® IV Systems (Pelco IDM4012SS).....	306.69	15.31	
28 21 31 00-0317	EA	Pole Mount Adapter For Spectra® Systems (Pelco PA402).....	81.74	9.11	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0318				Camclosure® , Camera Dome Systems <small>(28 21 31 00-0187)</small>		
28 21 31 00-0319				Camclosure® IS Integrated, Camera Dome Systems <small>(28 21 31 00-0318)</small>		
28 21 31 00-0320				Camclosure® IS Integrated, Camera Dome Systems <small>(28 21 31 00-0319)</small>		
28 21 31 00-0321				High Resolution Color, Camclosure® IS Integrated, Camera Dome Systems <small>(28 21 31 00-0320)</small>		
28 21 31 00-0322	EA			12 mm, Indoor Surface/In-Ceiling Mount, High Resolution Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS90-CH12)	736.59	183.72
28 21 31 00-0323	EA			9-22 mm, Indoor Surface/In-Ceiling Mount, High Resolution Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS90-CHV22)	798.99	183.72
28 21 31 00-0324	EA			12 mm, Environmental Surface Mount, High Resolution Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS110-CH12).....	887.38	183.72
28 21 31 00-0325	EA			12 mm, Environmental In-Ceiling Mount, High Resolution Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS150-CH12).....	887.38	183.72
28 21 31 00-0326				Wide Dynamic Range Color, Camclosure® IS Integrated, Camera Dome Systems <small>(28 21 31 00-0320)</small>		
28 21 31 00-0327	EA			9-22 mm, Indoor Surface/In-Ceiling Mount, Wide Dynamic Range Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS90B-CWV22)	898.82	183.72
28 21 31 00-0328	EA			9-22 mm, Environmental Surface Mount, Wide Dynamic Range Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS111-CWV22)	979.93	183.72
28 21 31 00-0329	EA			9-22 mm, Environmental In-Ceiling Mount, Wide Dynamic Range Color, Camclosure® IS Integrated, Camera Dome System (Pelco IS151-CWV22).....	979.93	183.72
28 21 31 00-0330				Day/Night, Camclosure® IS Integrated, Camera Dome Systems <small>(28 21 31 00-0320)</small>		
28 21 31 00-0331	EA			9-22 mm, Indoor Surface/In-Ceiling Mount, Day/Night, Camclosure® IS Integrated, White Camera Dome System (Pelco IS90-DNV22)	1,029.85	183.72
28 21 31 00-0332	EA			9-22 mm, Environmental Surface Mount, Day/Night, Camclosure® IS Integrated, Camera Dome System (Pelco IS111-DNV22)	1,230.55	183.72
28 21 31 00-0333	EA			9-22 mm, Environmental In-Ceiling Mount, Day/Night, Camclosure® IS Integrated, Camera Dome System (Pelco IS151-DNV22)	1,230.55	183.72
28 21 31 00-0334				Wide Dynamic Range Day/Night, Camclosure® IS Integrated, Camera Dome Systems <small>(28 21 31 00-0320)</small>		
28 21 31 00-0335	EA			9-22 mm, Indoor Surface/In-Ceiling Mount, Wide Dynamic Range Day/Night, Camclosure® IS Integrated, Camera Dome System (Pelco IS90-DWV22).....	1,125.52	183.72
28 21 31 00-0336	EA			9-22 mm, Environmental In-Ceiling Mount, Wide Dynamic Range Day/Night, Camclosure® IS Integrated, Camera Dome System (Pelco IS151-DWV22).....	1,254.46	183.72
28 21 31 00-0337				Camclosure® IS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0319)</small>		
28 21 31 00-0338				High Resolution Color, Camclosure® IS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0337)</small>		
28 21 31 00-0339	EA			3.6 mm, Wall/Ceiling Mount, High Resolution Color, Camclosure® IS Integrated, Bullet Style Camera System (Pelco IS310-CH3.6)	810.66	122.48
28 21 31 00-0340				Wide Dynamic Range Color, Camclosure® IS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0337)</small>		
28 21 31 00-0341	EA			9-22 mm, Wall/Ceiling Mount, Wide Dynamic Range Color, Camclosure® IS Integrated, Bullet Style Camera System (Pelco IS310-CWV22)	928.16	122.48
28 21 31 00-0342				Day/Night, Camclosure® IS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0337)</small>		
28 21 31 00-0343	EA			9-22 mm, Wall/Ceiling Mount, Day/Night, Camclosure® IS Integrated, Bullet Style Camera System (Pelco IS310-DNV22).....	1,021.76	122.48
28 21 31 00-0344				Wide Dynamic Range Day/Night, Camclosure® IS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0337)</small>		
28 21 31 00-0345	EA			9-22 mm, Wall/Ceiling Mount, Wide Dynamic Range Day/Night, Camclosure® IS Integrated, Bullet Style Camera System (Pelco IS310-DWV22)	1,068.55	122.48
28 21 31 00-0346				Camclosure® IS Integrated Cameras <small>(28 21 31 00-0319)</small>		
28 21 31 00-0347	EA			12 mm, High Resolution Color, Camclosure® IS Integrated Camera (Pelco IS-CH12)	571.48	122.48
28 21 31 00-0348	EA			9-22 mm, High Resolution Color, Camclosure® IS Integrated Camera (Pelco IS-CHV22)	571.48	122.48
28 21 31 00-0349	EA			9-22 mm, Wide Dynamic Range Color, Camclosure® IS Integrated Camera (Pelco IS-CWV22)	664.03	122.48
28 21 31 00-0350	EA			9-22 mm, Day/Night, Camclosure® IS Integrated Camera (Pelco IS-DNV22).....	914.65	122.48
28 21 31 00-0351	EA			9-22 mm, Wide Dynamic Range Day/Night, Camclosure® IS Integrated Camera (Pelco IS-DWV22)	938.56	122.48
28 21 31 00-0352				Camclosure® ICS Integrated, Camera Dome Systems <small>(28 21 31 00-0318)</small>		

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
28 21 31 00-0353		Camclosure® ICS Integrated, Camera Dome Systems <small>(28 21 31 00-0352)</small>			
28 21 31 00-0354		Standard Resolution Color, Camclosure® ICS Integrated, Camera Dome Systems <small>(28 21 31 00-0353)</small>			
28 21 31 00-0355	EA	12 mm, Indoor Surface/In-Ceiling Mount, Standard Resolution Color, Camclosure® ICS Integrated, Camera Dome System (Pelco ICS090B-CA12)	633.64		183.72
28 21 31 00-0356	EA	12 mm, UTP, Indoor Surface/In-Ceiling Mount, Standard Resolution Color, Camclosure® ICS Integrated, Camera Dome System (Pelco ICS090B-CA12T)	678.36		183.72
28 21 31 00-0357	EA	12 mm, Environmental Surface Mount, Standard Resolution Color, Camclosure® ICS Integrated, Camera Dome System (Pelco ICS110-CA12)	857.22		183.72
28 21 31 00-0358	EA	12 mm, Environmental In-Ceiling Mount, Standard Resolution Color, Camclosure® ICS Integrated, Camera Dome System (Pelco ICS150-CA12)	857.22		183.72
28 21 31 00-0359		High Resolution Color, Camclosure® ICS Integrated, Camera Dome Systems <small>(28 21 31 00-0353)</small>			
28 21 31 00-0360	EA	3-9 mm, Environmental In-Ceiling Mount, High Resolution Color, Camclosure® ICS Integrated, Camera Dome System (Pelco ICS151-CDV39A)	1,057.92		183.72
28 21 31 00-0361		Camclosure® ICS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0352)</small>			
28 21 31 00-0362		Standard Resolution, Camclosure® ICS Integrated, Bullet Style Camera Systems <small>(28 21 31 00-0361)</small>			
28 21 31 00-0363	EA	12 mm, Wall/Ceiling Mount, Standard Resolution, Camclosure® ICS Integrated, Bullet Style Camera System (Pelco ICS310-CA12)	734.74		122.48
28 21 31 00-0364		Camclosure® ICS Integrated, Wedge Style Camera Systems <small>(28 21 31 00-0352)</small>			
28 21 31 00-0365		High Resolution Color, Camclosure® ICS Integrated, Wedge Style Camera Systems <small>(28 21 31 00-0364)</small>			
28 21 31 00-0366	EA	9-22 mm, High Resolution, Camclosure® ICS Integrated, Wedge Style Camera System (Pelco IS210-CHV22)	979.93		183.72
28 21 31 00-0367		Wide Dynamic Range Color, Camclosure® ICS Integrated, Wedge Style Camera Systems <small>(28 21 31 00-0364)</small>			
28 21 31 00-0368	EA	9-22 mm, Wide Dynamic Range, Camclosure® ICS Integrated, Wedge Style Camera System (Pelco IS210-CWV22)	1,073.52		183.72
28 21 31 00-0369		Day/Night, Camclosure® ICS Integrated, Wedge Style Camera Systems <small>(28 21 31 00-0364)</small>			
28 21 31 00-0370	EA	9-22 mm, Day/Night, Camclosure® ICS Integrated, Wedge Style Camera System (Pelco IS210-DNV22)	1,191.03		183.72
28 21 31 00-0371		Wide Dynamic Range Day/Night, Camclosure® ICS Integrated, Wedge Style Camera Systems <small>(28 21 31 00-0364)</small>			
28 21 31 00-0372	EA	9-22 mm, Wide Dynamic Range Day/Night, Camclosure® ICS Integrated, Wedge Style Camera System (Pelco IS210-DWV22)	1,237.83		183.72
28 21 31 00-0373		Camclosure® IP Network, Camera Dome Systems <small>(28 21 31 00-0318)</small>			
28 21 31 00-0374		Camclosure® IP Network, Camera Dome Systems <small>(28 21 31 00-0373)</small>			
28 21 31 00-0375		High Resolution Color, Camclosure® IP Network, Camera Dome Systems <small>(28 21 31 00-0374)</small>			
28 21 31 00-0376	EA	3-9.5 mm, Environmental Surface Mount, High Resolution Color, Camclosure® IP Network, Camera Dome System (Pelco IP111-CHV9)	1,753.62		183.72
28 21 31 00-0377	EA	9-22 mm, Environmental Surface Mount, High Resolution Color, Camclosure® IP Network, Camera Dome System (Pelco IP111-CHV22)	1,753.62		183.72
28 21 31 00-0378		Wide Dynamic Range Color, Camclosure® IP Network, Camera Dome Systems <small>(28 21 31 00-0374)</small>			
28 21 31 00-0379	EA	3-9.5 mm, Environmental Surface Mount, Wide Dynamic Range Color, Camclosure® IP Network, Camera Dome System (Pelco IP111-CWV9)	1,882.56		183.72
28 21 31 00-0380	EA	9-22 mm, Environmental Surface Mount, Wide Dynamic Range Color, Camclosure® IP Network, Camera Dome System (Pelco IP111-CWV22)	1,882.56		183.72
28 21 31 00-0381		Day/Night, Camclosure® IP Network, Camera Dome Systems <small>(28 21 31 00-0374)</small>			
28 21 31 00-0382	EA	3-9.5 mm, Environmental Surface Mount, Day/Night, Camclosure® IP Network, Camera Dome System (Pelco IP111-DNV9)	2,081.19		183.72
28 21 31 00-0383	EA	9-22 mm, Environmental Surface Mount, Day/Night, Camclosure® IP Network, Camera Dome System (Pelco IP111-DNV22)	2,081.19		183.72

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0384				Wide Dynamic Range Day/Night, Camclosure® IP Network, Camera Dome Systems <small>(28 21 31 00-0374)</small>		
28 21 31 00-0385	EA			3-9.5 mm, Environmental Surface Mount, Wide Dynamic Range Day/Night, Camclosure® IP Network, Camera Dome System (Pelco IP110-DWV9).....	2,221.57	183.72
28 21 31 00-0386	EA			9-22 mm, Environmental Surface Mount, Wide Dynamic Range Day/Night, Camclosure® IP Network, Camera Dome System (Pelco IP110-DWV22).....	2,221.57	183.72
28 21 31 00-0387				Accessories For Camclosure® Camera Dome Systems <small>(28 21 31 00-0318)</small>		
28 21 31 00-0388	EA			4S Gangbox Adapter Plate For ICS110 Camclosure® Systems (Pelco ICS110-AP).....	37.09	9.18
28 21 31 00-0389	EA			4S Adapter Plate For ICS310 Camclosure® Systems (Pelco ICS310-AP).....	37.09	9.18
28 21 31 00-0390	EA			Sun Shield For ICS310 Camclosure® Systems (Pelco ICS310-SS).....	49.34	15.31
28 21 31 00-0391	EA			Conduit Adapter For ICS310 Camclosure® Systems (Pelco ICS310-COND).....	78.46	15.31
28 21 31 00-0392	EA			2' x 2' Ceiling Panel For ICS150 Camclosure® Systems (Pelco ICS150-P).....	80.76	9.18
28 21 31 00-0393	EA			Pendant Mount Adapter For Camclosure® ICS110 Systems (Pelco ICS110-PG).....	78.46	15.31
28 21 31 00-0394	EA			Corner Mount Adapter For ICS200 Camclosure® Systems (Pelco ICS210-CM).....	99.25	15.31
28 21 31 00-0395	EA			Smoked, Surface Mount, Dome For Camclosure® ICS Systems (Pelco ICS-DO110A).....	265.06	30.62
28 21 31 00-0396	EA			Clear, Surface Mount, Dome For Camclosure® ICS Systems (Pelco ICS-DO111A).....	265.06	30.62
28 21 31 00-0397	EA			Smoked, In-Ceiling Mount, Dome For Camclosure® ICS Systems (Pelco ICS-DO150A).....	265.06	30.62
28 21 31 00-0398	EA			Clear, In-Ceiling Mount, Dome For Camclosure® ICS Systems (Pelco ICS-DO151A).....	265.06	30.62
28 21 31 00-0399	EA			Pendant Mount Adapter For Camclosure® IP Systems (Pelco IP110-P).....	94.05	15.31
28 21 31 00-0400	EA			Smoked Lower Dome For Surface Mount Camclosure® IP Systems (Pelco IP110-LD).....	108.04	30.62
28 21 31 00-0401	EA			Clear Lower Dome For Surface Mount Camclosure® IP Systems (Pelco IP111-LD).....	108.04	30.62
28 21 31 00-0402	EA			Smoked Lower Dome For Surface Mount Camclosure® IS Systems (Pelco IS110-LD).....	108.04	30.62
28 21 31 00-0403	EA			Clear Lower Dome For Surface Mount Camclosure® IS Systems (Pelco IS111-LD).....	108.04	30.62
28 21 31 00-0404	EA			Smoked Lower Dome For Ceiling Mount Camclosure® IS Systems (Pelco IS150-LD).....	108.04	30.62
28 21 31 00-0405	EA			Clear Lower Dome For Ceiling Mount Camclosure® IS Systems (Pelco IS151-LD).....	108.04	30.62
28 21 31 00-0406	EA			Ceiling Mount Enclosure Only, Environmental, Camclosure® IS Systems (Pelco IS150-ENC).....	313.91	41.82
28 21 31 00-0407	EA			Black Pendant Mount For Indoor Camclosure® IS Systems (Pelco IS90B-P).....	67.02	15.31
28 21 31 00-0408	EA			Black Pendant Wall Mount For Indoor Camclosure® IS Systems (Pelco IS90B-PW).....	113.81	15.31
28 21 31 00-0409	EA			White Pendant Mount For Indoor Camclosure® IS Systems (Pelco IS90-P).....	67.02	15.31
28 21 31 00-0410	EA			White Pendant Wall Mount For Indoor Camclosure® IS Systems (Pelco IS90-PW).....	113.81	15.31
28 21 31 00-0411	EA			Surface Mount Enclosure Only, Environmental, IP Camclosure® (Pelco IP110-ENC).....	1,636.11	183.72
28 21 31 00-0412				Pan/Tilt Camera Systems <small>(28 21 31 00-0186)</small>		
28 21 31 00-0413				Esprit® CBZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0412)</small>		
				Note: Includes powder coated aluminum pan/tilt enclosure, receiver, camera, lens, built in heater, window defroster/defogger, sun shroud, insulation blanket, 24V power supply and mounting hardware.		
28 21 31 00-0414				EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0413)</small>		
28 21 31 00-0415				Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0414)</small>		
28 21 31 00-0416	EA			10X, Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ10N).....	4,620.28	275.58
28 21 31 00-0417	EA			20X, Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ20N).....	5,245.26	275.58
28 21 31 00-0418	EA			30X, Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ30N).....	6,111.50	275.58
28 21 31 00-0419	EA			10X, Preset Positioning, Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ10PN).....	4,754.43	275.58
28 21 31 00-0420	EA			20X, Preset Positioning, Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ20PN).....	5,407.48	275.58
28 21 31 00-0421	EA			30X, Preset Positioning, Pedestal Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ30PN).....	6,273.72	275.58
28 21 31 00-0422				Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0414)</small>		
28 21 31 00-0423	EA			10X, Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ10W).....	4,662.91	275.58
28 21 31 00-0424	EA			20X, Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ20W).....	5,287.89	275.58
28 21 31 00-0425	EA			30X, Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ30W).....	6,154.13	275.58
28 21 31 00-0426	EA			10X, Preset Positioning, Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ10PW).....	4,798.10	275.58
28 21 31 00-0427	EA			20X, Preset Positioning, Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ20PW).....	5,450.12	275.58
28 21 31 00-0428	EA			30X, Preset Positioning, Wall Mount, EDR, High Resolution Color, Esprit® CBZ, Pan/Tilt Camera System (Pelco ES3012-2CBZ30PW).....	6,316.36	275.58
28 21 31 00-0429				Esprit® CLZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0412)</small>		
28 21 31 00-0430				DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0429)</small>		
28 21 31 00-0431				Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0430)</small>		
28 21 31 00-0432	EA			10X, Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ10N).....	4,782.50	275.58

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0433	EA		20X, Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ20N).....	5,407.48	275.58
28 21 31 00-0434	EA		30X, Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ30N).....	6,273.72	275.58
28 21 31 00-0435	EA		10X, Preset Positioning, Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ10PN).....	4,916.65	275.58
28 21 31 00-0436	EA		20X, Preset Positioning, Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ20PN).....	5,569.71	275.58
28 21 31 00-0437	EA		30X, Preset Positioning, Pedestal Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ30PN).....	6,435.94	275.58
28 21 31 00-0438			Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0430)</small>		
28 21 31 00-0439	EA		10X, Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ10W).....	4,825.14	275.58
28 21 31 00-0440	EA		20X, Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ20W).....	5,450.12	275.58
28 21 31 00-0441	EA		30X, Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ30W).....	6,316.36	275.58
28 21 31 00-0442	EA		10X, Preset Positioning, Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ10PW).....	4,960.33	275.58
28 21 31 00-0443	EA		20X, Preset Positioning, Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ20PW).....	5,612.34	275.58
28 21 31 00-0444	EA		30X, Preset Positioning, Wall Mount, DSS, High Resolution Color, Esprit® CLZ, Pan/Tilt Camera System (Pelco ES3012-2CLZ30PW).....	6,478.58	275.58
28 21 31 00-0445			Esprit® AJZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0412)</small>		
28 21 31 00-0446			High Resolution Color, Esprit® AJZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0445)</small>		
28 21 31 00-0447			Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0446)</small>		
28 21 31 00-0448	EA		6 x 10, Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ10N).....	4,511.09	275.58
28 21 31 00-0449	EA		5.6 x 20, Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ20N).....	5,136.07	275.58
28 21 31 00-0450	EA		5.5 x 30, Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ30N).....	6,002.31	275.58
28 21 31 00-0451	EA		6 x 10, Preset Positioning, Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ10PN).....	4,646.28	275.58
28 21 31 00-0452	EA		5.6 x 20, Preset Positioning, Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ20PN).....	5,298.29	275.58
28 21 31 00-0453	EA		5.5 x 30, Preset Positioning, Preset Positioning, Pedestal Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ30PN).....	6,164.53	275.58
28 21 31 00-0454			Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0446)</small>		
28 21 31 00-0455	EA		6 x 10, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ10W).....	4,554.77	275.58
28 21 31 00-0456	EA		5.6 x 20, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ20W).....	5,178.71	275.58
28 21 31 00-0457	EA		5.5 x 30, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ30W).....	6,045.98	275.58
28 21 31 00-0458	EA		6 x 8, Preset Positioning, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ8PW).....	4,584.92	275.58
28 21 31 00-0459	EA		6 x 10, Preset Positioning, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ10PW).....	4,688.91	275.58
28 21 31 00-0460	EA		5.6 x 20, Preset Positioning, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ20PW).....	5,340.93	275.58
28 21 31 00-0461	EA		5.5 x 30, Preset Positioning, Wall Mount, High Resolution Color, Esprit® AJZ, Pan/Tilt Camera System (Pelco ES3012-2AJZ30PW).....	6,208.21	275.58
28 21 31 00-0462			Esprit® AMZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0412)</small>		
28 21 31 00-0463			Day/Night, Esprit® AMZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0462)</small>		
28 21 31 00-0464			Pedestal Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0463)</small>		
28 21 31 00-0465	EA		5.6 x 20, Pedestal Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ20N).....	5,395.00	275.58
28 21 31 00-0466	EA		5.5 x 30, Pedestal Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ30N).....	6,261.24	275.58
28 21 31 00-0467	EA		6 x 10, Preset Positioning, Pedestal Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ10PN).....	4,905.21	275.58
28 21 31 00-0468	EA		5.6 x 20, Preset Positioning, Pedestal Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ20PN).....	5,557.23	275.58
28 21 31 00-0469	EA		5.5 x 30, Preset Positioning, Pedestal Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ30PN).....	6,423.47	275.58
28 21 31 00-0470			Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera Systems <small>(28 21 31 00-0463)</small>		
28 21 31 00-0471	EA		6 x 10, Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ10W).....	4,813.70	275.58
28 21 31 00-0472	EA		5.6 x 20, Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ20W).....	5,437.64	275.58
28 21 31 00-0473	EA		5.5 x 30, Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ30W).....	6,304.92	275.58
28 21 31 00-0474	EA		6 x 10, Preset Positioning, Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ10PW).....	4,947.85	275.58
28 21 31 00-0475	EA		5.6 x 20, Preset Positioning, Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ20PW).....	5,599.86	275.58



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0476 EA 5.5 x 30, Preset Positioning, Wall Mount, Day/Night, Esprit® AMZ, Pan/Tilt Camera System (Pelco ES3012-2AMZ30PW).....	6,467.14	275.58
28 21 31 00-0477 Esprit® KWZ, Pan/Tilt Camera Systems (28 21 31 00-0412)		
28 21 31 00-0478 Day/Night, Esprit® KWZ, Pan/Tilt Camera Systems (28 21 31 00-0477)		
28 21 31 00-0479 Pedestal Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera Systems (28 21 31 00-0478)		
28 21 31 00-0480 EA 5.5 x 30, Pedestal Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ30N)	6,399.55	275.58
28 21 31 00-0481 EA 6 x 10, Preset Positioning, Pedestal Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ10PN)	5,042.48	275.58
28 21 31 00-0482 EA 5.5 x 30, Preset Positioning, Pedestal Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ30PN)	6,561.77	275.58
28 21 31 00-0483 Wall Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera Systems (28 21 31 00-0478)		
28 21 31 00-0484 EA 6 x 10, Wall Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ10W)	4,950.97	275.58
28 21 31 00-0485 EA 5.5 x 30, Wall Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ30W)	6,443.22	275.58
28 21 31 00-0486 EA 6 x 10, Preset Positioning, Wall Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ10PW)	5,086.15	275.58
28 21 31 00-0487 EA 5.6 x 20, Preset Positioning, Wall Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ20PW)	5,738.17	275.58
28 21 31 00-0488 EA 5.5 x 30, Preset Positioning, Wall Mount, Day/Night, Esprit® KWZ, Pan/Tilt Camera System (Pelco ES3012-2KWZ30PW).....	6,605.45	275.58
28 21 31 00-0489 Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0412)		
28 21 31 00-0490 Standard Resolution Color, Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0489)		
28 21 31 00-0491 Pedestal Mount, Standard Resolution Color, Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0490)		
28 21 31 00-0492 EA 16X, Pedestal Mount, Standard Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PC16-2N).....	5,386.69	275.58
28 21 31 00-0493 Wall Mount, Standard Resolution Color, Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0490)		
28 21 31 00-0494 EA 16X, Wall Mount, Standard Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PC16-2W)	5,429.32	275.58
28 21 31 00-0495 High Resolution Color, Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0489)		
28 21 31 00-0496 Pedestal Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0495)		
28 21 31 00-0497 EA 22X, Pedestal Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PC22-2N)	6,399.55	275.58
28 21 31 00-0498 EA 24X, Pedestal Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PCBW24-2N)	6,187.41	275.58
28 21 31 00-0499 EA 35X, Pedestal Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PCBW35-2N)	7,034.93	275.58
28 21 31 00-0500 Wall Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera Systems (28 21 31 00-0495)		
28 21 31 00-0501 EA 22X, Wall Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PC22-2W)	6,441.14	275.58
28 21 31 00-0502 EA 24X, Wall Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PCBW24-2W).....	6,187.41	275.58
28 21 31 00-0503 EA 35X, Wall Mount, High Resolution Color, Esprit® IOC, Pan/Tilt Camera System (Pelco ES30PCBW35-2W).....	7,081.72	275.58
28 21 31 00-0504 Esprit® IOP, Pan/Tilt Camera Systems (28 21 31 00-0412)		
28 21 31 00-0505 High Resolution Color, Esprit® IOP, Pan/Tilt Camera Systems (28 21 31 00-0504)		
28 21 31 00-0506 Pedestal Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera Systems (28 21 31 00-0505)		
28 21 31 00-0507 EA 16X, Pedestal Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30C16-2N).....	4,139.84	275.58
28 21 31 00-0508 EA 22X, Pedestal Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30C22-2N).....	5,153.75	275.58
28 21 31 00-0509 EA 24X, Pedestal Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30CBW24-2N).....	4,944.73	275.58
28 21 31 00-0510 EA 35X, Pedestal Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30CBW35-2N).....	5,605.06	275.58
28 21 31 00-0511 Wall Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera Systems (28 21 31 00-0505)		
28 21 31 00-0512 EA 16X, Wall Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30C16-2W).....	4,181.44	275.58
28 21 31 00-0513 EA 22X, Wall Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30C22-2W).....	5,196.38	275.58
28 21 31 00-0514 EA 24X, Wall Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30CBW24-2W).....	4,987.36	275.58
28 21 31 00-0515 EA 35X, Wall Mount, High Resolution Color, Esprit® IOP, Pan/Tilt Camera System (Pelco ES30CBW35-2W).....	5,651.86	275.58
28 21 31 00-0516 Esprit® Thermal, Pan/Tilt Camera Systems (28 21 31 00-0412)		
28 21 31 00-0517 Esprit® Thermal, Pan/Tilt Camera Systems (28 21 31 00-0516)		
28 21 31 00-0518 Pedestal Mount, Esprit® Thermal, Pan/Tilt Camera Systems (28 21 31 00-0517)		

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
28 21 31 00-0519	EA	14.25 mm, Pedestal Mount, Esprit® Thermal, Pan/Tilt Camera System (Pelco ES3014TI-2N)	26,659.92		275.58
28 21 31 00-0520	EA	35 mm, Pedestal Mount, Esprit® Thermal, Pan/Tilt Camera System (Pelco ES3035TI-2N)	28,670.05		275.58
28 21 31 00-0521	EA	50 mm, Pedestal Mount, Esprit® Thermal, Pan/Tilt Camera System (Pelco ES3050TI-2N)	29,344.94		275.58
28 21 31 00-0522		Wall Mount, Esprit® Thermal, Pan/Tilt Camera Systems (28 21 31 00-0517)			
28 21 31 00-0523	EA	14.25 mm, Wall Mount, Esprit® Thermal, Pan/Tilt Camera System (Pelco ES3014TI-2W)	26,703.60		275.58
28 21 31 00-0524	EA	35 mm, 30 Hertz, Wall Mount, Esprit® Thermal, Pan/Tilt Camera System (Pelco ES3035TI-2W)	28,712.68		275.58
28 21 31 00-0525	EA	50 mm, Wall Mount, Esprit® Thermal, Pan/Tilt Camera System (Pelco ES3050TI-2W)	29,387.58		275.58
28 21 31 00-0526		Accessories For Esprit® Pan/Tilt Camera Systems (28 21 31 00-0412)			
28 21 31 00-0527	EA	Wiper Blade Replacement For Esprit® Systems (Pelco ES-REPLBLADE)	11.63		3.06
28 21 31 00-0528	EA	Marine Mounting Kit For Esprit® Systems (Pelco ES-MKIT)	67.02		15.31
28 21 31 00-0529	EA	Indoor/Outdoor Wall Mount For Esprit® Systems (Pelco EWM)	104.45		15.31
28 21 31 00-0530	EA	Wall Mount For High Security Enclosures (Pelco HSWM12)	132.53		15.31
28 21 31 00-0531	EA	Ground Isolation Transformer (Pelco GIT100)	386.70		41.82
28 21 31 00-0532	EA	High Security, Indoor Wedge Style Enclosure (Pelco HS2100)	586.44		41.82
28 21 31 00-0533	EA	High Security, Indoor 10" Length Enclosure (Pelco HS3000)	462.61		41.82
28 21 31 00-0534	EA	High Security, Indoor Medium Corner Mount Enclosure (Pelco HS1500)	682.39		41.82
28 21 31 00-0535	EA	High Security, Ceiling Mount, Lexan Window, Aluminum Enclosure (Pelco HS8080)	358.62		41.82
28 21 31 00-0536	EA	High Security, Ceiling Mount, Lexan Window, Steel Enclosure (Pelco HS8134)	982.03		41.82
28 21 31 00-0537	EA	Bullet-Resistant, Outdoor Enclosure (Pelco HS4514)	1,441.16		41.82
28 21 31 00-0538	EA	Bullet-Resistant, Outdoor Enclosure With Mount (Pelco HS4514/MT)	1,712.57		41.82
28 21 31 00-0539	EA	24X, Color/Black And White, Esprit® Camera Module (Pelco ESIOPCBW24)	1,773.93		41.82
28 21 31 00-0540	EA	35X, Color/Black And White, Esprit® Camera Module (Pelco ESIOPCBW35)	1,870.64		41.82
28 21 31 00-0541	EA	24 Volt AC, Esprit® Pan Tilt Enclosure Receiver (Pelco ES3012-2)	2,523.98		41.83
28 21 31 00-0542	EA	24 Volt AC, Pedestal Mount, Esprit® Pan/Tilt Enclosure Receiver (Pelco ES3012-2N)	2,554.04		41.82
28 21 31 00-0543	EA	24 Volt AC, Wall Mount, Esprit® Pan/Tilt Enclosure Receiver (Pelco ES3012-2W)	2,582.90		41.82
28 21 31 00-0544	EA	30X, 24 Volt AC, DSS, Color High Resolution, Esprit® CLZ Pan/Tilt Camera System (Pelco ES3012-2CLZ30)	5,858.65		41.82
28 21 31 00-0545	EA	30X, 24 Volt AC, Preset Positioning, DSS, Color High Resolution, Esprit® CLZ Pan/Tilt Camera System (Pelco ES3012-2CLZ30P)	6,020.88		41.82
28 21 31 00-0546	EA	Esprit® Camera Pole Mount Adapter (Pelco EPM)	114.31		9.85
28 21 31 00-0547	EA	Pole Mount Adapter For Esprit® Systems (Pelco EPM)	114.31		9.85
28 21 31 00-0548		Camera Lenses (28 21 31 00-0047)			
28 21 31 00-0549		Fixed Focus Camera Lenses (28 21 31 00-0548)			
		Note: 1/3" format and manual focus.			
28 21 31 00-0550		Manual Iris, Fixed Focus Camera Lenses (28 21 31 00-0549)			
28 21 31 00-0551	EA	2.3 mm, Manual Iris, Fixed Focus Camera Lens (Pelco 13FA2.3)	169.79		14.37
28 21 31 00-0552	EA	2.8 mm, Manual Iris, Fixed Focus Camera Lens (Pelco 13FA2.8)	140.67		14.37
28 21 31 00-0553	EA	4 mm, Manual Iris, Fixed Focus Camera Lens (Pelco 13FA4)	126.11		14.37
28 21 31 00-0554	EA	8 mm, Manual Iris, Fixed Focus Camera Lens (Pelco 13FA8)	122.99		14.37
28 21 31 00-0555		Direct Drive Auto Iris, Fixed Focus Camera Lenses (28 21 31 00-0549)			
		Note: Includes spot filter. Excludes amplifier.			
28 21 31 00-0556	EA	2.3 mm, Direct Drive Auto Iris, Fixed Focus Camera Lens (Pelco 13FD2.3)	212.43		14.37
28 21 31 00-0557	EA	2.8 mm, Direct Drive Auto Iris, Fixed Focus Camera Lens (Pelco 13FD2.8)	169.79		14.37
28 21 31 00-0558	EA	4 mm, Direct Drive Auto Iris, Fixed Focus Camera Lens (Pelco 13FD4)	159.39		14.37
28 21 31 00-0559	EA	8 mm, Direct Drive Auto Iris, Fixed Focus Camera Lens (Pelco 13FD8)	113.63		14.37
28 21 31 00-0560		Video Drive Auto Iris, Fixed Focus Camera Lenses (28 21 31 00-0549)			
		Note: Includes LDC100 adapter to convert DC auto iris to video drive.			
28 21 31 00-0561	EA	2.3 mm, Video Drive Auto Iris, Fixed Focus Camera Lenses (Pelco 13FV2.3S)	250.90		14.37
28 21 31 00-0562	EA	2.8 mm, Video Drive Auto Iris, Fixed Focus Camera Lenses (Pelco 13FV2.8S)	207.23		14.37
28 21 31 00-0563	EA	4 mm, Video Drive Auto Iris, Fixed Focus Camera Lenses (Pelco 13FV4S)	196.83		14.37
28 21 31 00-0564	EA	8 mm, Video Drive Auto Iris, Fixed Focus Camera Lenses (Pelco 13FV8S)	188.51		14.37
28 21 31 00-0565		Varifocal Camera Lenses (28 21 31 00-0548)			
		Note: 1/3" format and manual focus and zoom.			
28 21 31 00-0566		Manual Iris, Varifocal Camera Lenses (28 21 31 00-0565)			
28 21 31 00-0567	EA	1.6-3.4 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA1-3)	246.02		14.37
28 21 31 00-0568	EA	2.5-6 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA2.5-6)	198.91		14.37
28 21 31 00-0569	EA	2.8-12 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA2.8-12)	154.19		14.37
28 21 31 00-0570	EA	3-8 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA3-8)	135.47		14.37
28 21 31 00-0571	EA	5.5-82.5 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA5.5-82.5)	354.89		14.37
28 21 31 00-0572	EA	5-40 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA5-40)	190.47		14.37
28 21 31 00-0573	EA	5-50 mm, Manual Iris, Varifocal Camera Lens (Pelco 13VA5-50)	203.09		14.37
28 21 31 00-0574		Direct Drive Auto Iris, Varifocal Camera Lenses (28 21 31 00-0565)			
		Note: Includes spot filter.			
28 21 31 00-0575	EA	1.6-3.4 mm, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VD1-3)	241.81		14.37
28 21 31 00-0576	EA	2.5-6 mm, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VD2.5-6)	213.19		14.37
28 21 31 00-0577	EA	2.8-12 mm, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VD2.8-12)	162.69		14.37



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0578 EA 3-8 mm, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VD3-8).....	120.61	14.37
28 21 31 00-0579 EA 5.5-82.5 mm, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VD5.5-82.5).....	387.13	14.37
28 21 31 00-0580 EA 5-50 mm, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VD5-50).....	239.28	14.37
28 21 31 00-0581 Video Drive Auto Iris, Varifocal Camera Lenses (28 21 31 00-0565)		
Note: Includes spot filter.		
28 21 31 00-0582 EA 1.6-3.4 mm, Video Drive Auto Iris, Varifocal Camera Lens (Pelco 13VV1-3S).....	339.29	14.37
28 21 31 00-0583 EA 2.5-6 mm, Video Drive Auto Iris, Varifocal Camera Lens (Pelco 13VV2.5-6S).....	300.82	14.37
28 21 31 00-0584 EA 3-8 mm, Video Drive Auto Iris, Varifocal Camera Lens (Pelco 13VV3-8S).....	180.19	14.37
28 21 31 00-0585 EA 5-50 mm, Video Drive Auto Iris, Varifocal Camera Lens (Pelco 13VV5-50S).....	335.13	14.37
28 21 31 00-0586 Infrared Corrected, Direct Drive Auto Iris, Varifocal Camera Lenses (28 21 31 00-0565)		
28 21 31 00-0587 EA 3-8.5 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VDIR3-8.5).....	139.96	14.37
28 21 31 00-0588 EA 7.5-50 mm, Infrared Corrected, Direct Drive Auto Iris, Varifocal Camera Lens (Pelco 13VDIR7.5-50).....	211.51	14.37
28 21 31 00-0589 Motorized Zoom Camera Lenses (28 21 31 00-0548)		
Note: 1/3" format.		
28 21 31 00-0590 Manual Iris, Motorized Zoom Camera Lenses (28 21 31 00-0589)		
28 21 31 00-0591 EA 8X Zoom, 6-48 mm, Manual Iris, Motorized Zoom Camera Lens (Pelco 13ZM6X8).....	616.95	14.37
28 21 31 00-0592 EA 10X Zoom, 6-60 mm, Manual Iris, Motorized Zoom Camera Lens (Pelco 13ZM6X10).....	770.85	14.37
28 21 31 00-0593 EA 15X Zoom, 6-90 mm, Manual Iris, Motorized Zoom Camera Lens (Pelco 13ZM6X15).....	821.81	14.37
28 21 31 00-0594 Direct Drive Auto Iris, Motorized Zoom Camera Lenses (28 21 31 00-0589)		
Note: Includes spot filter.		
28 21 31 00-0595 EA 6X Zoom, 6-48 mm, Direct Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZD6X8).....	565.85	14.37
28 21 31 00-0596 EA 10X Zoom, 6-60 mm, Direct Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZD6X10).....	654.23	14.37
28 21 31 00-0597 EA 15X Zoom, 6-90 mm, Direct Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZD6X15).....	908.12	14.37
28 21 31 00-0598 EA 20X Zoom, 5.6-112 mm, Direct Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZD5.6X20).....	1,123.89	14.37
28 21 31 00-0599 EA 30X Zoom, 5.5-165 mm, Direct Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZD5.5X30).....	2,232.38	14.37
28 21 31 00-0600 Video Drive Auto Iris, Motorized Zoom Camera Lenses (28 21 31 00-0589)		
Note: Includes spot filter.		
28 21 31 00-0601 EA 8X Zoom, 6-48 mm, Video Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZV6X8S).....	632.54	14.37
28 21 31 00-0602 EA 10X Zoom, 6-60 mm, Video Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZV6X10S).....	753.17	14.37
28 21 31 00-0603 EA 15X Zoom, 6-90 mm, Video Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZV6X15S).....	946.59	14.37
28 21 31 00-0604 EA 20X Zoom, 5.6-112 mm, Video Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZV5.6X20S).....	1,378.15	14.37
28 21 31 00-0605 EA 30X Zoom, 5.5-165 mm, Video Drive Auto Iris, Motorized Zoom Camera Lens (Pelco 13ZV5.5X30S).....	2,244.39	14.37
28 21 31 00-0606 Camera Power Supplies (28 21 31 00-0047)		
28 21 31 00-0607 EA 20 VA, 24 Volt AC, Camera Power Transformer (Pelco TF2000).....	43.21	12.25
28 21 31 00-0608 EA 50 VA, 24 Volt AC, Camera Power Transformer (Pelco TF9000).....	74.41	12.25
28 21 31 00-0609 EA 2 Amperes, 4 Outputs, Camera Power Supply (Pelco MCS4-2).....	322.54	24.49
28 21 31 00-0610 EA 5 Amperes, 8 Outputs, Camera Power Supply (Pelco MCS8-5).....	372.29	36.74
28 21 31 00-0611 EA 10 Amperes, 16 Outputs, Camera Power Supply (Pelco MCS16-10).....	419.50	48.99
For Switchable Outputs, Add		192.91
28 21 31 00-0612 EA 20 Amperes, 16 Outputs, Camera Power Supply (Pelco MCS16-20).....	469.25	61.24
For Switchable Outputs, Add		208.06
28 21 31 00-0613 Camera Illuminators (28 21 31 00-0047)		
28 21 31 00-0614 Camera Illuminators (28 21 31 00-0613)		
Note: Includes lamp and mounting bracket.		
28 21 31 00-0615 EA Narrow Spot Lamp, Low Light Level Camera Illuminator (Pelco LL27MF).....	1,642.12	24.49
28 21 31 00-0616 EA Infrared Narrow Spot Lamp, Low Light Level Camera Illuminator (Pelco LL27NS).....	1,642.12	24.49
28 21 31 00-0617 EA Flood Lamp, Low Light Level Camera Illuminator (Pelco LL27WF).....	1,642.12	24.49
28 21 31 00-0618 Camera Illuminator Accessories (28 21 31 00-0613)		
28 21 31 00-0619 EA Removal And Replacement Of Lamp For Low Light Level Camera Illuminator (Pelco PAR56).....	137.38	24.49
28 21 31 00-0620 Camera Receivers (28 21 31 00-0047)		
28 21 31 00-0621 EA 24 Volt AC, Coaxitron® Outdoor Camera Receiver With Preset Positioning (Pelco CX9024RX-PP).....	1,595.06	41.82
28 21 31 00-0622 EA 120 Volt AC, Coaxitron® Outdoor Camera Receiver With Preset Positioning (Pelco CX9115RX-PP).....	1,595.06	41.82
28 21 31 00-0623 Pan And Tilt Drives (28 21 31 00-0047)		
28 21 31 00-0624 EA 15 LB Load, 24 Volt AC, Outdoor Pan And Tilt Drive (Pelco PT270-24P).....	1,133.15	91.86
28 21 31 00-0625 EA 40 LB Load, 24/120 Volt AC, Outdoor Pan And Tilt Drive (Pelco PT570-24P).....	1,436.80	91.86
For Preset Positioning, Add		165.00
28 21 31 00-0626 EA 100 LB Load, 120 Volt AC, Outdoor Pan And Tilt Drive (Pelco PT1250P).....	3,029.93	91.86
For Preset Positioning, Add		165.00

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0627	EA		100 LB Load, 120 Volt DC, Outdoor Pan And Tilt Drive (Pelco PT1250DC)..... <i>For Preset Positioning, Add</i>	3,461.48 165.00	91.86
28 21 31 00-0628	EA		100 LB Load, 120 Volt DC, 360 Degree Outdoor Pan And Tilt Drive (Pelco PT1280SL)..... <i>For Preset Positioning, Add</i>	4,004.31 165.00	91.86
28 21 31 00-0629	EA		100 LB Load, 120 Volt DC, Explosion Proof Outdoor Pan And Tilt Drive (Pelco PT1260EX)..... <i>For Preset Positioning, Add</i>	5,158.60 165.00	91.86
28 21 31 00-0630			Scanners <small>(28 21 31 00-0047)</small>		
28 21 31 00-0631	EA		35 LB Load, 24 Volt AC, Indoor/Outdoor Scanner (Pelco PS20-24)..... <i>For Wall Mount, Add</i> <i>For Pressure Sensor Alarm, Add</i>	1,292.25 39.05 51.15	91.86
28 21 31 00-0632	EA		35 LB Load, 120 Volt AC, Indoor/Outdoor Scanner (Pelco PS20)..... <i>For Wall Mount, Add</i> <i>For Pressure Sensor Alarm, Add</i>	1,357.77 39.05 51.15	91.86
28 21 31 00-0633			Camera Monitors <small>(28 21 31 00-0046)</small>		
28 21 31 00-0634			Camera Monitors <small>(28 21 31 00-0633)</small>		
28 21 31 00-0635			Monochrome Camera Monitors <small>(28 21 31 00-0634)</small>		
28 21 31 00-0636	EA		9" Monochrome Camera Monitor (Pelco PMM9A).....	252.00	18.37
28 21 31 00-0637	EA		12" Monochrome Camera Monitor (Pelco PMM12A).....	288.40	18.37
28 21 31 00-0638	EA		15" Monochrome Camera Monitor (Pelco PMM15A).....	442.30	18.37
28 21 31 00-0639	EA		20" Monochrome Camera Monitor (Pelco PMM20A).....	711.64	18.37
28 21 31 00-0640			Color Camera Monitors <small>(28 21 31 00-0634)</small>		
28 21 31 00-0641	EA		9", High Resolution Color, Camera Monitor (Pelco PMC9A).....	803.15	18.37
28 21 31 00-0642	EA		15", High Resolution Color, Camera Monitor (Pelco PMCS15A).....	651.32	18.37
28 21 31 00-0643	EA		17", High Resolution Color, Camera Monitor (Pelco PMCS17A).....	946.65	18.37
28 21 31 00-0644	EA		19", High Resolution Color, Camera Monitor (Pelco PMCS19A).....	1,258.62	18.37
28 21 31 00-0645			LCD Camera Monitors <small>(28 21 31 00-0633)</small>		
28 21 31 00-0646			VGA Signal, Color LCD Camera Monitors (Pelco 200 Series) <small>(28 21 31 00-0645)</small> Note: Displays VGA computer signals.		
28 21 31 00-0647	EA		17", VGA Signal, High Resolution Color, LCD Camera Monitor (Pelco PMCL217).....	908.18	18.37
28 21 31 00-0648	EA		19", VGA Signal, High Resolution Color, LCD Camera Monitor (Pelco PMCL219).....	1,182.71	18.37
28 21 31 00-0649			Multimode, Color LCD Camera Monitors (Pelco 300 Series) <small>(28 21 31 00-0645)</small> Note: Displays VGA computer signals and/or composite video signals.		
28 21 31 00-0650	EA		15", Multimode, High Resolution Color, LCD Camera Monitor (Pelco PMCL315).....	1,032.96	18.37
28 21 31 00-0651	EA		17", Multimode, High Resolution Color, LCD Camera Monitor (Pelco PMCL317).....	1,236.78	18.37
28 21 31 00-0652	EA		19", Multimode, High Resolution Color, LCD Camera Monitor (Pelco PMCL319).....	1,521.72	18.37
28 21 31 00-0653			Multimode With PIP, Color LCD Camera Monitors (Pelco 400 Series) <small>(28 21 31 00-0645)</small> Note: Displays VGA computer signals and/or composite video signals. Includes picture in picture option.		
28 21 31 00-0654	EA		15", Multimode With PIP, High Resolution Color, LCD Camera Monitor (Pelco PMCL415).....	1,326.22	18.37
28 21 31 00-0655	EA		17", Multimode With PIP, High Resolution Color, LCD Camera Monitor (Pelco PMCL417).....	1,538.36	18.37
28 21 31 00-0656	EA		19", Multimode With PIP, High Resolution Color, LCD Camera Monitor (Pelco PMCL419).....	1,930.40	18.37
28 21 31 00-0657			Camera Monitor Mounting Accessories <small>(28 21 31 00-0633)</small>		
28 21 31 00-0658			Camera Monitor Mounts <small>(28 21 31 00-0657)</small>		
28 21 31 00-0659	EA		Up To 14", Camera Monitor Mount (Pelco).....	308.97	24.49
28 21 31 00-0660	EA		>14" To 17", Camera Monitor Mount (Pelco).....	359.92	24.49
28 21 31 00-0661	EA		>17" To 21", Camera Monitor Mount (Pelco).....	422.31	24.49
28 21 31 00-0662			Camera Monitor Rack Mount Kits <small>(28 21 31 00-0657)</small>		
28 21 31 00-0663	EA		Camera Monitor Rack Mount Kit (Pelco PMCL-RM).....	187.30	24.49
28 21 31 00-0664			Video Transmission Equipment <small>(28 21 31 00-0046)</small>		
28 21 31 00-0665			UTP Cable, Video Transmission Equipment <small>(28 21 31 00-0664)</small>		
28 21 31 00-0666			UTP Cable, Active Video Receivers <small>(28 21 31 00-0665)</small>		
28 21 31 00-0667	EA		Single Channel, UTP Cable, Active Video Receiver (Pelco TW3001AR).....	388.81	30.62
28 21 31 00-0668	EA		Four Channel, UTP Cable, Active Video Receiver (Pelco TW3004AR).....	1,338.24	30.62
28 21 31 00-0669	EA		Eight Channel, 4 Outputs, UTP Cable, Active Video Receiver (Pelco TW3008AR-4-US).....	2,632.91	30.62
28 21 31 00-0670	EA		Sixteen Channel, UTP Cable, Active Video Receiver (Pelco TW3016AR1-US).....	4,324.83	30.62
28 21 31 00-0671	EA		Sixteen Channel, 2 Outputs, UTP Cable, Active Video Receiver (Pelco TW3016AR-2-US).....	5,049.64	30.62



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0672 UTP Cable, Passive Video Transceivers <small>(28 21 31 00-0665)</small>		
28 21 31 00-0673 EA Single Channel, UTP Cable, Passive Video Transceiver (Pelco TW3001P)	114.27	30.62
28 21 31 00-0674 EA Four Channel, UTP Cable, Passive Video Transceiver (Pelco TW3004P)	388.81	30.62
28 21 31 00-0675 EA Eight Channel, UTP Cable, Passive Video Transceiver (Pelco TW3008P)	717.42	30.62
28 21 31 00-0676 EA Sixteen Channel, UTP Cable, Passive Video Transceiver (Pelco TW3016P)	1,364.23	30.62
28 21 31 00-0677 EA Thirty Two Channel, UTP Cable, Passive Video Transceiver (Pelco TW3032P).....	2,668.27	30.62
28 21 31 00-0678 UTP Cable, Active Video Transmitters <small>(28 21 31 00-0665)</small>		
28 21 31 00-0679 EA Single Channel, UTP Cable, Active Video Transmitter (Pelco TW3001AT).....	406.49	30.62
28 21 31 00-0680 Fiber Optics, Video Transmission Equipment <small>(28 21 31 00-0664)</small>		
28 21 31 00-0681 Data Only, Fiber Optics Transmission Equipment <small>(28 21 31 00-0680)</small>		
28 21 31 00-0682 Bidirectional Data, Fiber Optics Transmitters <small>(28 21 31 00-0681)</small>		
28 21 31 00-0683 EA Single-Channel, Single Mode, Bidirectional Data, Fiber Optics Transmitter (Pelco FT8101AS).....	2,356.19	61.24
28 21 31 00-0684 EA Single-Channel, Multimode, Bidirectional Data, Fiber Optics Transmitter (Pelco FT8101AM)	964.80	61.24
28 21 31 00-0685 EA Four-Channel, Single Mode, Bidirectional Data, Fiber Optics Transmitter (Pelco FT8104S).....	1,722.89	61.24
28 21 31 00-0686 EA Four-Channel, Multimode, Bidirectional Data, Fiber Optics Transmitter (Pelco FT8104M)	1,189.42	61.24
28 21 31 00-0687 Bidirectional Data, Fiber Optics Receivers <small>(28 21 31 00-0681)</small>		
28 21 31 00-0688 EA Single-Channel, Single Mode, Bidirectional Data, Fiber Optics Receiver (Pelco FR8101AS)	2,356.19	61.24
28 21 31 00-0689 EA Single-Channel, Multimode, Bidirectional Data, Fiber Optics Receiver (Pelco FR8101AM)	964.80	61.24
28 21 31 00-0690 EA Four-Channel, Single Mode, Bidirectional Data, Fiber Optics Receiver (Pelco FR8104S)	1,722.89	61.24
28 21 31 00-0691 EA Four-Channel, Multimode, Bidirectional Data, Fiber Optics Receiver (Pelco FR8104M)	1,189.42	61.24
28 21 31 00-0692 Video Only, Fiber Optics Transmission Equipment <small>(28 21 31 00-0680)</small>		
28 21 31 00-0693 Digitally Encoded Video, Fiber Optics Transmitters <small>(28 21 31 00-0692)</small>		
28 21 31 00-0694 EA Single-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8301AS).....	1,047.99	61.24
28 21 31 00-0695 EA Single-Channel, Multimode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8301AM).....	459.41	61.24
28 21 31 00-0696 EA Four-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8304S).....	2,897.97	61.24
28 21 31 00-0697 EA Four-Channel, Multimode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8304M).....	1,743.68	61.24
28 21 31 00-0698 EA Eight-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8308S).....	4,744.84	61.24
28 21 31 00-0699 EA Eight-Channel, Multimode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8308M).....	3,946.19	61.24
28 21 31 00-0700 EA Sixteen-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8316S)	11,774.56	61.24
28 21 31 00-0701 EA Sixteen-Channel, Multimode, Digitally Encoded Video, Fiber Optics Transmitter (Pelco FT8316M).....	10,479.88	61.24
28 21 31 00-0702 Digitally Encoded Video, Fiber Optics Receivers <small>(28 21 31 00-0692)</small>		
28 21 31 00-0703 EA Single-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8301AS).....	1,047.99	61.24
28 21 31 00-0704 EA Single-Channel, Multimode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8301AM)	459.41	61.24
28 21 31 00-0705 EA Two-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8302AS).....	1,786.32	61.24
28 21 31 00-0706 EA Two-Channel, Multimode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8302AM).....	726.66	61.24
28 21 31 00-0707 EA Four-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8304S)	2,897.97	61.24
28 21 31 00-0708 EA Four-Channel, Multimode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8304M)	1,743.68	61.24
28 21 31 00-0709 EA Eight-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8308S).....	4,744.84	61.24
28 21 31 00-0710 EA Eight-Channel, Multimode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8308M).....	3,946.19	61.24
28 21 31 00-0711 EA Sixteen-Channel, Single Mode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8316S).....	11,774.56	61.24
28 21 31 00-0712 EA Sixteen-Channel, Multimode, Digitally Encoded Video, Fiber Optics Receiver (Pelco FR8316M).....	10,479.88	61.24
28 21 31 00-0713 Video And Data, Fiber Optics Transmission Equipment <small>(28 21 31 00-0680)</small>		
28 21 31 00-0714 Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitters <small>(28 21 31 00-0713)</small>		
28 21 31 00-0715 EA Single-Channel, Single Mode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitter (Pelco FT85011AS).....	1,804.00	61.24
28 21 31 00-0716 EA Single-Channel, Multimode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitter (Pelco FT85011AM).....	1,077.11	61.24
28 21 31 00-0717 EA Four-Channel, Single Mode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitter (Pelco FT85041S).....	4,194.73	61.24
28 21 31 00-0718 EA Four-Channel, Multimode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitter (Pelco FT85041M).....	3,632.14	61.24
28 21 31 00-0719 EA Eight-Channel, Single Mode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitter (Pelco FT85081S).....	6,787.20	61.24
28 21 31 00-0720 EA Eight-Channel, Multimode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Transmitter (Pelco FT85081M).....	4,921.62	61.24
28 21 31 00-0721 Digitally Encoded Video With Bidirectional Data, Fiber Optics Receivers <small>(28 21 31 00-0713)</small>		
28 21 31 00-0722 EA Single-Channel, Single Mode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Receiver (Pelco FR85011AS).....	1,804.00	61.24
28 21 31 00-0723 EA Single-Channel, Multimode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Receiver (Pelco FR85011AM)	1,077.11	61.24
28 21 31 00-0724 EA Four-Channel, Single Mode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Receiver (Pelco FR85041S).....	4,194.73	61.24

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0725 EA Four-Channel, Multimode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Receiver (Pelco FR85041M).....	3,632.14	61.24
28 21 31 00-0726 EA Eight-Channel, Single Mode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Receiver (Pelco FR85081S)	6,787.20	61.24
28 21 31 00-0727 EA Eight-Channel, Multimode, Digitally Encoded Video With Bidirectional Data, Fiber Optics Receiver (Pelco FR85081M).....	4,921.62	61.24
28 21 31 00-0728 Video, Audio And Data, Fiber Optics Transmission Equipment (28 21 31 00-0680)		
28 21 31 00-0729 Digitally Encoded Video With Bidirectional Audio, Data And Contact Closure, Fiber Optics Transmitters (28 21 31 00-0728)		
28 21 31 00-0730 EA Single-Channel, Single Mode, Digitally Encoded Video With Bidirectional Audio, Data And Contact Closure, Fiber Optics Transmitter (Pelco FT86011S).....	2,322.91	61.24
28 21 31 00-0731 EA Single-Channel, Multimode, Digitally Encoded Video With Bidirectional Audio, Data And Contact Closure, Fiber Optics Transmitter (Pelco FT86011M).....	1,848.71	61.24
28 21 31 00-0732 Digitally Encoded Video With Bidirectional Audio, Data And Contact Closure, Fiber Optics Receivers (28 21 31 00-0728)		
28 21 31 00-0733 EA Single-Channel, Single Mode, Digitally Encoded Video With Bidirectional Audio, Data And Contact Closure, Fiber Optics Receiver (Pelco FR86011S).....	2,322.91	61.24
28 21 31 00-0734 EA Single-Channel, Multimode, Digitally Encoded Video With Bidirectional Audio, Data And Contact Closure, Fiber Optics Receiver (Pelco FR86011M)	1,848.71	61.24
28 21 31 00-0735 Video Amplifiers (28 21 31 00-0664)		
28 21 31 00-0736 Video Distribution Amplifiers (28 21 31 00-0735)		
28 21 31 00-0737 EA 1 Input, 4 Outputs, Video Distribution Amplifier (Pelco DA104DT)	287.48	15.31
28 21 31 00-0738 EA 16 Channel, Master, Video Distribution Amplifier (Pelco CM9760-MDA).....	2,329.84	15.31
Note: Inserts time-date and title on up to 16 video inputs.		
28 21 31 00-0739 Video Equalizing Amplifiers (28 21 31 00-0735)		
28 21 31 00-0740 EA Video Equalizing Amplifier (Pelco EA2010)	312.43	15.31
28 21 31 00-0741 EA Half-Duplex, Video Equalizing Amplifier (Pelco EA2000).....	490.26	15.31
28 21 31 00-0742 Network Video Equipment (28 21 31 00-0046)		
28 21 31 00-0743 Video Encoders/Decoders (28 21 31 00-0742)		
28 21 31 00-0744 EA MPEG4 IP Video Receiver (Pelco NET300R).....	1,158.22	30.62
28 21 31 00-0745 EA MPEG4 IP Video Transmitter (Pelco NET300T)	1,158.22	30.62
28 21 31 00-0746 EA MPEG4 IP Video Receiver With Audio (Pelco NET350R)	1,332.92	30.62
28 21 31 00-0747 EA MPEG4 IP Video Transmitter With Audio And Local Storage (Pelco NET350T)	1,332.92	30.62
28 21 31 00-0748 Network Video Recorders (28 21 31 00-0742)		
28 21 31 00-0749 EA 16 Device Or 100MBPS, Network Video Recorder (Pelco NVR316).....	7,324.83	61.24
28 21 31 00-0750 EA 32 Device Or 100MBPS, Network Video Recorder (Pelco NVR332).....	8,523.83	61.24
28 21 31 00-0751 EA 64 Device Or 100MBPS, Network Video Recorder (Pelco NVR364)	10,923.92	61.24
28 21 31 00-0752 EA 64 Device Or 100MBPS, PelcoNet Network Video Recorder (Pelco NVR300).....	7,234.36	61.24
28 21 31 00-0753 Network Video Recorder Software (28 21 31 00-0742)		
28 21 31 00-0754 EA 10 User, License Pack (Pelco VMX300-LIC-10)	723.77	
28 21 31 00-0755 EA 20 User, License Pack (Pelco VMX300-LIC-20)	1,305.07	
28 21 31 00-0756 EA 50 User, License Pack (Pelco VMX300-LIC-50)	2,898.20	
28 21 31 00-0757 EA 100 User, License Pack (Pelco VMX300-LIC-100)	5,069.51	
28 21 31 00-0758 EA 10 User, Enterprise License Pack (Pelco VMX300-E-LIC10)	1,208.36	
28 21 31 00-0759 EA 20 User, Enterprise License Pack (Pelco VMX300-E-LIC20)	2,173.39	
28 21 31 00-0760 EA 50 User, Enterprise License Pack (Pelco VMX300-E-LIC50)	4,830.34	
28 21 31 00-0761 EA 100 User, Enterprise License Pack (Pelco VMX300-E-LIC100)	8,451.27	
28 21 31 00-0762 EA 200 User, Enterprise License Pack (Pelco VMX300-E-LIC200)	14,486.85	
28 21 31 00-0763 EA 500 User, Enterprise License Pack (Pelco VMX300-E-LIC500)	30,179.98	
28 21 31 00-0764 EA 0 Analog Inputs, No Monitors, Video Management Client Software Installed On Pelco Workstation (Pelco VMX300-CL-0).....	6,519.47	
28 21 31 00-0765 EA 1 Analog Inputs, No Monitors, Video Management Client Software Installed On Pelco Workstation (Pelco VMX300-CL-1).....	6,921.92	
28 21 31 00-0766 EA 4 Analog Inputs, No Monitors, Video Management Client Software Installed On Pelco Workstation (Pelco VMX300-CL-4).....	10,947.37	
28 21 31 00-0767 EA 0 Analog Inputs, No Monitors, Video Management Client/Server Software Installed On Pelco Workstation (Pelco VMX300-CSVR-0)	7,244.29	
28 21 31 00-0768 EA 1 Analog Input, No Monitors, Video Management Client/Server Software Installed On Pelco Workstation (Pelco VMX300-CSVR-1)	7,646.73	
28 21 31 00-0769 EA 4 Analog Inputs, No Monitors, Video Management Client/Server Software Installed On Pelco Workstation (Pelco VMX300-CSVR-4)	11,670.10	
28 21 31 00-0770 EA 0 Analog Inputs, No Monitors, Enterprise Video Management Client Software Installed On Pelco Enterprise Workstation (Pelco VMX300-E-CL-0).....	7,003.03	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0771 EA 1 Analog Input, No Monitors, Enterprise Video Management Client Software Installed On Pelco Enterprise Workstation (Pelco VMX300-E-CL-1).....	7,406.51	
28 21 31 00-0772 EA 4 Analog Inputs, No Monitors, Enterprise Video Management Client Software Installed On Pelco Enterprise Workstation (Pelco VMX300-E-CL-4).....	11,430.92	
28 21 31 00-0773 EA 0 Analog Inputs, No Monitors, Enterprise Video Management Client/Server Software Installed On Pelco Enterprise Workstation (Pelco VMX300-E-CSVR-0).....	8,209.31	
28 21 31 00-0774 EA 1 Analog Input, No Monitors, Enterprise Video Management Client/Server Software Installed On Pelco Enterprise Workstation (Pelco VMX300-E-CSVR-1).....	8,611.75	
28 21 31 00-0775 EA 4 Analog Inputs, No Monitors, Enterprise Video Management Client/Server Software Installed On Pelco Enterprise Workstation (Pelco VMX300-E-CSVR-4).....	12,637.21	
28 21 31 00-0776 Video Recording Equipment (28 21 31 00-0046)		
28 21 31 00-0777 Digital Video Recorders (28 21 31 00-0776)		
28 21 31 00-0778 EA 8 Channel, 1TB Hard Drive, 8 Channel Audio, Digital Video Recorder With DVD (Pelco DX8108-1000A).....	11,468.83	61.24
28 21 31 00-0779 EA 8 Channel, 2 TB Hard Drive, 8 Channel Audio, Digital Video Recorder With DVD (Pelco DX8108-2000A).....	15,726.18	61.24
28 21 31 00-0780 EA 8 Channel, 3 TB Hard Drive, 8 Channel Audio, Digital Video Recorder With DVD (Pelco DX8108-3000A).....	19,984.57	61.24
28 21 31 00-0781 EA 16 Channel, 1 TB Hard Drive, 16 Channel Audio, Digital Video Recorder With DVD (Pelco DX8116-1000A).....	13,807.56	61.24
28 21 31 00-0782 EA 16 Channel, 2 TB Hard Drive, 16 Channel Audio, Digital Video Recorder With DVD (Pelco DX8116-2000A).....	18,064.91	61.24
28 21 31 00-0783 EA 16 Channel, 3 TB Hard Drive, 16 Channel Audio, Digital Video Recorder With DVD (Pelco DX8116-3000A).....	22,323.31	61.24
28 21 31 00-0784 EA 24 Channel, 1 TB Hard Drive, 24 Channel Audio, Digital Video Recorder With DVD (Pelco DX8124-1000A).....	15,093.92	61.24
28 21 31 00-0785 EA 24 Channel, 2 TB Hard Drive, 24 Channel Audio, Digital Video Recorder With DVD (Pelco DX8124-2000A).....	19,351.27	61.24
28 21 31 00-0786 EA 24 Channel, 3 TB Hard Drive, 24 Channel Audio, Digital Video Recorder With DVD (Pelco DX8124-3000A).....	23,609.66	61.24
28 21 31 00-0787 EA 32 Channel, 1 TB Hard Drive, 32 Channel Audio, Digital Video Recorder With DVD (Pelco DX8132-1000A).....	17,432.66	61.24
28 21 31 00-0788 EA 32 Channel, 2 TB Hard Drive, 32 Channel Audio, Digital Video Recorder With DVD (Pelco DX8132-2000A).....	21,690.01	61.24
28 21 31 00-0789 EA 32 Channel, 3 TB Hard Drive, 32 Channel Audio, Digital Video Recorder With DVD (Pelco DX8132-3000A).....	25,948.40	61.24
28 21 31 00-0790 EA 16 Channel, 30 IPS, Digital Video Recorder (Pelco DX9116F-1500).....	12,659.83	61.24
28 21 31 00-0791 Digital Video Recorder Accessories (28 21 31 00-0776)		
28 21 31 00-0792 EA 16 Channel, Multiplexed Analog Output Display Card (Pelco DX8000-MUX16).....	1,120.78	30.62
28 21 31 00-0793 Matrix Systems And Controls (28 21 31 00-0046)		
28 21 31 00-0794 Video Multiplexers (28 21 31 00-0793)		
28 21 31 00-0795 Monochrome Duplex, Video Multiplexers (28 21 31 00-0794)		
28 21 31 00-0796 EA 9 Channel, Monochrome Duplex, Video Multiplexer (Pelco MX4009MD).....	2,112.85	61.24
28 21 31 00-0797 EA 16 Channel, Monochrome Duplex, Video Multiplexer (Pelco MX4016MD).....	1,997.42	61.24
28 21 31 00-0798 Color Duplex, Video Multiplexers (28 21 31 00-0794)		
28 21 31 00-0799 EA 4 Channel, Color Duplex, Video Multiplexer (Pelco MX4004CD).....	1,429.63	61.24
28 21 31 00-0800 EA 9 Channel, Color Duplex, Video Multiplexer (Pelco MX4009CD).....	2,720.15	61.24
28 21 31 00-0801 EA 16 Channel, Color Duplex, Video Multiplexer (Pelco MX4016CD).....	2,947.89	61.24
28 21 31 00-0802 Color Simplex, Video Multiplexers (28 21 31 00-0794)		
28 21 31 00-0803 EA 9 Channel, Monochrome Simplex, Video Multiplexer (Pelco MX4009CS).....	2,287.55	61.24
28 21 31 00-0804 EA 16 Channel, Monochrome Simplex, Video Multiplexer (Pelco MX4016CS).....	2,670.24	61.24
28 21 31 00-0805 Video Multiplexer Accessories (28 21 31 00-0794)		
28 21 31 00-0806 EA Pushbutton/Joystick Desktop Controls For PTZ, Fixed/Variable-Speed, Multiplexer Controller (Pelco KBD4000).....	1,265.41	41.82
28 21 31 00-0807 EA Pushbutton Desktop Controls For PTZ, Fixed/Variable-Speed, Multiplexer Controller (Pelco KBD4002).....	747.54	41.82
28 21 31 00-0808 EA Video Multiplexer Server (Pelco MX4000SVR).....	2,112.85	61.24
28 21 31 00-0809 Quad Video Processor (28 21 31 00-0793)		
28 21 31 00-0810 EA Monochrome, Quad Video Processor (Pelco QD104M).....	655.02	30.62
28 21 31 00-0811 EA Color, Quad Video Processor (Pelco QD104C).....	1,070.98	30.62
28 21 31 00-0812 Switcher (28 21 31 00-0793)		
28 21 31 00-0813 Terminating Manual Switchers (28 21 31 00-0812)		
28 21 31 00-0814 Terminating Manual Switchers (28 21 31 00-0813)		
28 21 31 00-0815 EA 4 Inputs, Terminating Manual Switcher (Pelco MS504DT).....	228.89	24.49
28 21 31 00-0816 EA 8 Inputs, Terminating Manual Switcher (Pelco MS508DT).....	310.00	24.49
28 21 31 00-0817 EA 12 Inputs, Terminating Manual Switcher (Pelco MS512DT).....	376.56	24.49
28 21 31 00-0818 EA 18 Inputs, Terminating Manual Switcher (Pelco MS518DT).....	614.70	24.49
28 21 31 00-0819 Audio Follow, Terminating Manual Switchers (28 21 31 00-0813)		
28 21 31 00-0820 EA 4 Inputs, Audio Follow, Terminating Manual Switcher (Pelco MS504AF).....	295.45	24.49
28 21 31 00-0821 EA 8 Inputs, Audio Follow, Terminating Manual Switcher (Pelco MS508AF).....	519.02	24.49
28 21 31 00-0822 EA 18 Inputs, Audio Follow, Terminating Manual Switcher (Pelco MS518AF).....	904.83	24.49

28 Electronic Safety and Security**28 20 Video Surveillance****28 21 Surveillance Cameras**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0823			Balanced Audio Follow, Terminating Manual Switchers (28 21 31 00-0813)		
28 21 31 00-0824	EA		4 Inputs, Balanced Audio Follow, Terminating Manual Switcher (Pelco MS504BAF).....	394.24	24.49
28 21 31 00-0825	EA		8 Inputs, Balanced Audio Follow, Terminating Manual Switcher (Pelco MS508BAF).....	720.77	24.49
28 21 31 00-0826			Looping Manual Switchers (28 21 31 00-0812)		
28 21 31 00-0827			Looping Manual Switchers (28 21 31 00-0826)		
28 21 31 00-0828	EA		4 Inputs, Looping Manual Switcher (Pelco MS504LDT)	255.93	24.49
28 21 31 00-0829	EA		8 Inputs, Looping Manual Switcher (Pelco MS508LDT)	350.56	24.49
28 21 31 00-0830	EA		12 Inputs, Looping Manual Switcher (Pelco MS512LDT)	446.23	24.49
28 21 31 00-0831	EA		18 Inputs, Looping Manual Switcher (Pelco MS518LDT)	734.28	24.49
28 21 31 00-0832			Audio Follow, Looping Manual Switchers (28 21 31 00-0826)		
28 21 31 00-0833	EA		4 Inputs, Audio Follow, Looping Manual Switcher (Pelco MS504AFL)	318.32	24.49
28 21 31 00-0834	EA		8 Inputs, Audio Follow, Looping Manual Switcher (Pelco MS508AFL)	554.38	24.49
28 21 31 00-0835	EA		12 Inputs, Audio Follow, Looping Manual Switcher (Pelco MS512AFL)	760.28	24.49
28 21 31 00-0836			Balanced Audio Follow, Looping Manual Switchers (28 21 31 00-0826)		
28 21 31 00-0837	EA		4 Inputs, Balanced Audio Follow, Looping Manual Switcher (Pelco MS504BAFL).....	422.31	24.49
28 21 31 00-0838	EA		8 Inputs, Balanced Audio Follow, Looping Manual Switcher (Pelco MS508BAFL).....	763.40	24.49
28 21 31 00-0839	EA		12 Inputs, Balanced Audio Follow, Looping Manual Switcher (Pelco MS512BAFL).....	959.94	24.49
28 21 31 00-0840			Sequential Switchers (28 21 31 00-0812)		
28 21 31 00-0841			Single Output, Sequential Switchers (28 21 31 00-0840)		
28 21 31 00-0842	EA		4 Inputs, Single Output, Sequential Desktop Switcher (Pelco VA6104).....	447.27	24.49
28 21 31 00-0843	EA		8 Inputs, Single Output, Sequential Desktop Switcher (Pelco VA6108).....	665.65	24.49
28 21 31 00-0844			Dual Outputs, Sequential Switchers (28 21 31 00-0840)		
28 21 31 00-0845	EA		4 Inputs, Dual Outputs, Sequential Desktop Switcher (Pelco VA6204)	558.54	24.49
28 21 31 00-0846	EA		8 Inputs, Dual Outputs, Sequential Desktop Switcher (Pelco VA6208)	772.76	24.49
28 21 31 00-0847			Controls (28 21 31 00-0793)		
28 21 31 00-0848			Direct/Multi-Cable Controls (28 21 31 00-0847)		
28 21 31 00-0849	EA		Scanner Control Module (Pelco MPS524DT)	388.69	61.24
28 21 31 00-0850	EA		120 Volt AC Pan/Tilt Control Module (Pelco MPT115DT).....	414.69	61.24
28 21 31 00-0851	EA		24 Volt AC Pan/Tilt Control Module (Pelco MPT24DT).....	459.41	61.24
28 21 31 00-0852	EA		Motorized Zoom Lens Control Module (Pelco MLZ6DT).....	480.21	61.24
28 21 31 00-0853	EA		120 Volt AC Pan/Tilt, Scanner And Lens Control Module (Pelco MPTAZ115DT).....	754.74	61.24
28 21 31 00-0854	EA		24 Volt AC Pan/Tilt, Scanner And Lens Control Module (Pelco MPTAZ24DT).....	830.65	61.24
28 21 31 00-0855			Coaxitron Controls (28 21 31 00-0847)		
28 21 31 00-0856	EA		Desktop Keyboard, Fixed Speed Coaxitron Controller And Transmitter (Pelco KBD9000).....	554.12	41.82
28 21 31 00-0857	EA		8 Position Joystick Pan/Tilt Controls, Switch Camera Lens Controls, Desktop Coaxitron Controller And Transmitter (Pelco MPT9000).....	1,043.92	41.82
28 21 31 00-0858	EA		Integral Switcher, 8 Position Joystick Pan/Tilt Controls, Switch Camera Lens Controls, Desktop Coaxitron Controller And Transmitter (Pelco MPT9008).....	1,184.30	41.82
28 21 31 00-0859			Digital Controls (28 21 31 00-0847)		
28 21 31 00-0860	EA		Pushbutton Desktop Controls For Pan/Tilt/Zoom, Fixed/Variable-Speed, Digital Controller (Pelco KBD200A).....	742.34	41.82
28 21 31 00-0861	EA		Pushbutton/Joystick Desktop Controls For Pan/Tilt/Zoom, Fixed/Variable-Speed, Digital Controller (Pelco KBD300A).....	1,255.02	41.82
28 21 31 00-0862			Lock Boxes (28 21 31 00-0793)		
28 21 31 00-0863	EA		VCR Lock Box (Pelco LB1000).....	454.79	45.92
			For Wall Mount, Add	165.00	
28 21 31 00-0864	EA		Computer Disk Drive Lock Box (Pelco LB2000)	465.18	45.92
28 21 31 00-0865	EA		VCR And Multiplexer Lock Box (Pelco LB3000)	849.95	45.92
			Note: Includes storage for 32 VCR tapes.		
28 21 31 00-0866			Closed Circuit Television Cameras And Accessories (28 21 31)		
28 21 31 00-0867	EA		Camera (Hikvision DS-2CD2143G0-I 2.8 DM IP 67 4MP2.8MM WDR POE/12)	370.96	61.14
28 21 31 00-0868	EA		Camera (Hikvision DS-2CD6986F-H OUTDOOR DARKFIGHTER 8MP 180 Degree Multi-Imager (4X2MP) WDR).....	1,706.35	110.05
28 21 31 00-0869	EA		Network Video Recorder (ExacqVision IP04-30T-R2A IP 2U).....	11,870.29	30.57
			Note: Includes recorder with 4 IP cameras licenses. ExacqVision Professional, 30 TB, client, web/mobile software pre-installed with 3 years software upgrades and hardware warranty. Win10 or Ubuntu Linux 16.04 on SSD. HDMI, DVI-D, DisplayPort (2 max simultaneous), Dual GB NICs. Keyboard and mouse included. ***** 30 TB version *** 30 days recording, based on 5 MP cameras, 24/7 - 10 fps		
28 21 31 00-0870	EA		License (ExacqVision EXQ-EVIP-01 Exacq NVR).....	296.06	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 21 31 00-0871 EA POE Switch UniFi Switch PoE+ 24 (Ubiquiti US-24-250W).....	1,032.06	30.57
28 21 31 00-0872 EA Transmitter/Receiver Antenna (Ubiquiti AF-5XHD).....	1,189.63	61.14
28 21 31 00-0873 Test And Certification Of Surveillance Camera System (28 21 31)		
28 21 31 00-0874 DAY Test And Certification Of Surveillance Camera System To Tie Into Existing Systems	972.09	
28 21 31 00-0875 HR Test And Certification Of Surveillance Camera System.....	303.78	
28 21 31 00-0876 Programming Of Surveillance Camera System (28 21 31)		
28 21 31 00-0877 HR Programming Of Surveillance Camera System	364.53	
28 21 31 00-0878 Removal And Reinstallation Of Cameras (28 21 31)		
Note: Includes storage, cleaning and supply materials.		
28 21 31 00-0879 EA Removal And Reinstallation Of Camera System	551.15	

28 40 Life Safety (28)

Note: Includes testing of new devices and certification.

28 42 Gas Detection and Alarm (28 40)

28 42 11 Gas Detection and Alarm Control, GUI, and Logic Systems (28 42)

28 42 11 00-0001 Monitoring System For Underground Tanks (28 42 11)

28 42 11 00-0002 Continuous Leak Detection System (28 42 11 00-0001)

Note: Includes calibration, electronic control module and probes. Excludes sample wells, electrical power supply and sensor cable.

28 42 11 00-0003 EA Single Channel Underground Tank Monitoring System	17,032.81	501.35
28 42 11 00-0004 EA 2 Channel Underground Tank Monitoring System	22,999.03	668.87
28 42 11 00-0005 EA 3 Channel Underground Tank Monitoring System	33,052.77	716.56
28 42 11 00-0006 EA 4 Channel Underground Tank Monitoring System	34,931.48	1,002.69
28 42 11 00-0007 EA Control Panel, 1-8 Tanks, Single Wall Tank Monitoring System	25,924.42	85.60
28 42 11 00-0008 EA Control Panel, 1-4 Tanks, Double Wall Tank Monitoring System	23,380.26	76.43
28 42 11 00-0009 EA Control Panel, 1-8 Tanks, Double Wall Tank Monitoring System	30,777.52	85.60
28 42 11 00-0010 EA Tank Leak Detection Probe	9,545.24	18.34
28 42 11 00-0011 EA Secondary Containment Collar Probe	1,153.84	7.34
28 42 11 00-0012 EA Interstitial Leak Detection Probe	2,110.84	15.28
28 42 11 00-0013 EA Liquid Phase Detection	6,976.30	45.85
28 42 11 00-0014 EA Hydrocarbon Vapor, Fixed.....	6,431.56	45.85
28 42 11 00-0015 EA Hydrocarbon Vapor, Float Mounted	7,526.82	51.96
28 42 11 00-0016 EA Liquid And Vapor Hydrocarbon	8,616.29	51.96

28 42 15 Gas Detection Sensors (28 42)

28 42 15 00-0001 Hydrogen Gas Detection (28 42 15)

28 42 15 00-0002 EA Hydrogen Gas Detector Sensor, 1% Fan Relay, 2% Alarm (SBS HGDI-DR)	2,014.77	45.92
28 42 15 00-0003 EA Hydrogen Gas Detector Junction Box (SBS HGDI-JB)	105.82	15.31
28 42 15 00-0004 EA Remote Display With 25' Cable For Hydrogen Gas Detector (SBS HGDI-REM)	510.82	45.92

28 43 Fuel Oil Detection and Alarm (28 40)

See CSI section 28 42 00 00-0000 for detection and alarms.

28 46 Fire Detection and Alarm (28 40)

28 46 13 Fire-Alarm Systems (28 46)

28 46 13 31 Proprietary Supervising-Station Fire-Alarm Systems (28 46 13)

Note: Includes programming of equipment, testing and certification of new devices.

28 46 13 31-0001 Edwards Fire Alarm (28 46 13 31)

28 46 13 31-0002 EST3 Life Safety And Security Control (28 46 13 31-0001)

28 46 13 31-0003 EST3 Network (28 46 13 31-0002)

28 46 13 31-0004 Remote Annunciators (28 46 13 31-0003)

28 46 13 31-0005 EA Remote LCD Command Module Annunciator (EST3 3-LCDANN).....	1,625.43	91.86
Note: Includes LCD display, CPU and doors. Order surface or semi-flush mount wallbox separately.		
28 46 13 31-0006 EA Six Position Base Annunciator (EST3 3-6ANN).....	1,323.84	91.86
Note: Includes door, CPU card, two annunciator support modules and five blank filler plates. Space provided for up to four Control/Display Modules and one 3-LCD Liquid Crystal Display Module.		
28 46 13 31-0007 EA Ten Position Base Annunciator (EST3 3-10ANN).....	1,675.51	91.86
Note: Includes door, CPU card, two annunciator support modules and nine blank filler plates. Space provided for up to eight Control/Display Modules and one 3-LCD Liquid Crystal Display Module.		
28 46 13 31-0008 EA Annunciator CPU (EST3 3-ANNCPU3)	1,066.40	91.86
Note: One Required per graphic annunciator.		
28 46 13 31-0009 EA Annunciator Support Module (EST3 3-ANNSM).....	195.56	30.62
Note: Takes one space in Annunciator box. Supports one Control/Display module.		

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
28 46 13 31-0010	EA	Liquid Crystal Display Module (EST3 3-LCD).....	684.06		91.86
		Note: Mounts over 3-CPU(1).			
28 46 13 31-0011	EA	Liquid Crystal Display Module (EST3 3-LCDXL).....	688.26		91.86
		Note: Mounts over 3-ANNCPU plus two spaces.			
28 46 13 31-0012	EA	LED/SWITCH Driver Module Assembly For Third Part Graphics (EST3 3-EVDVRA)	772.22		91.86
		Note: Assembled version of 3-EVDVR, comes packaged with cables, mounting hardware installation instructions used for third party graphics. Mounts in 3-EVDVRX.			
28 46 13 31-0013	EA	Power Supply Assembly With 19" Rail Mounting Chassis Assembly (EST3 3-EVPWRA).....	902.21		61.24
		Note: Assembled version of 3-EVPWR, comes packaged with cables, mounting hardware and mounting plate for 3-ANNCPU1. Used for third party graphics.			
28 46 13 31-0014	EA	Plastic Mounting Extrusion 19" Mounting (EST3 3-EVDVRX)	135.69		30.62
		Note: Mounts up to three 3-EVDVRA modules.			
28 46 13 31-0015	EA	Central Processor Unit Module (EST3 3-CPU3)	1,925.74		91.86
		Note: Includes LCD display, CPU and doors. Order surface or semi-flush mount wallbox separately.			
28 46 13 31-0016	EA	120 Volt AC, 50/60 Hertz, Primary Power Supply With Local Rail Module (EST3 3-CPU3)	1,701.94		30.62
		Note: Includes LCD display, CPU and doors. Order surface or semi-flush mount wallbox separately.			
28 46 13 31-0017		Remote Annunciators Cabinets (28 46 13 31-0003)			
28 46 13 31-0018	EA	Remote LCD Command Module Flush Mount LCD Wallbox (EST3 RLCM/B).....	146.39		30.62
28 46 13 31-0019	EA	Remote LCD Command Module Surface Mount LCD Wallbox (EST3 RLCM/B-S)	134.14		24.49
28 46 13 31-0020	EA	Six Position LED/LCD Flush Wallbox (EST3 6ANN/B)	165.29		30.62
28 46 13 31-0021	EA	Six Position LED/LCD Surface Wallbox (EST3 6ANN/B-S).....	153.04		24.49
28 46 13 31-0022	EA	Ten Position LED/LCD Flush Wallbox (EST3 10ANN/B).....	183.02		30.62
28 46 13 31-0023	EA	Ten Position LED/LCD Surface Wallbox (EST3 10ANN/B-S).....	170.77		24.49
28 46 13 31-0024		Audio And Telephone Masters (28 46 13 31-0003)			
28 46 13 31-0025	EA	Audio Source Unit With Local Microphone And Firefighters' Telephone (EST3 3-ASU/FT).....	5,305.59		122.48
28 46 13 31-0026	EA	Audio Source Unit With Local Microphone (Provides Four Local Rail Spaces) (EST3 3-ASU/4).....	2,951.87		122.48
28 46 13 31-0027	EA	Audio Source Unit With Local Microphone And Inner Door Filler Plate (EST3 3-ASU).....	1,900.43		122.48
28 46 13 31-0028	EA	Fire Fighters Telephone Control Unit With Inner Door Filler Plate (EST3 3-FTCU)	2,790.04		122.48
28 46 13 31-0029	EA	Audio Source Unit Memory Expansion, 100 Minutes (EST3 3-ASUMX/100).....	3,187.17		122.48
28 46 13 31-0030	EA	Zoned Amplifier, 95 Watt, Class B. 95 Watt Selectable For 25 Or 70 Vrms Class B Output. Mounts In 2 LRM Spaces (EST3 3-ZA95).....	1,864.25		61.24
28 46 13 31-0031		Battery Distribution Unit (28 46 13 31-0003)			
28 46 13 31-0032	EA	Battery Distribution Unit (EST3 3-BTSEN).....	580.38		457.91
28 46 13 31-0033		Remote Booster Power Supply (28 46 13 31-0003)			
28 46 13 31-0034	EA	6.5 Amperes, 120 Volt AC, Booster Power Supply (EST3 BPS6A)	919.36		91.86
28 46 13 31-0035	EA	10 Amperes, 110 Volt AC Booster Power Supply (EST3 BPS10).....	1,050.25		91.86
28 46 13 31-0036	EA	10 Amperes, 220 Volt AC Booster Power Supply (EST3 BPS10220).....	1,146.69		91.86
28 46 13 31-0037	EA	Tamper Switch - For CAB7, 14 And 21 Series Cabinets (EST3 3-TAMP)	149.56		30.62
28 46 13 31-0038		Batteries And Battery Cabinets (28 46 13 31-0003)			
28 46 13 31-0039	EA	1.2 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V1A2 (1.2 Ampere Hours)).....	113.62		30.62
28 46 13 31-0040	EA	4 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V4A (4.5 Ampere Hours)).....	142.05		30.62
28 46 13 31-0041	EA	24 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V24A (26 Ampere Hours)).....	338.23		30.62
28 46 13 31-0042	EA	6.5 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V6A5 (7.2 Ampere Hours)).....	153.44		30.62
28 46 13 31-0043	EA	40 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V40A (40 Ampere Hours)).....	429.30		30.62
28 46 13 31-0044	EA	10 Amperes Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V10A (11 Ampere Hours)).....	240.78		30.62
28 46 13 31-0045	EA	50 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V50A (50 Ampere Hours)).....	873.02		30.62
28 46 13 31-0046	EA	17 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V17A (18 Ampere Hours)).....	246.65		30.62
28 46 13 31-0047	EA	65 Ampere Hours, 12 Volt DC, Sealed Lead Acid Battery (EST3 12V65A (65 Amp Hours)).....	1,051.42		30.62
28 46 13 31-0048	EA	8 Ampere Hours, 6 Volt DC, Sealed Lead Acid Battery (EST3 6V8A (8 Amp Hours)).....	136.51		30.62
28 46 13 31-0049	EA	10 Ampere Hours, 6 Volt DC, Sealed Lead Acid Battery (EST3 6V10A (12 Amp Hours)).....	122.31		30.62
28 46 13 31-0050	EA	14" x 18-1/4" x 7-1/4" Free Standing Battery Cabinet With Key Lock (EST3 BC-1).....	439.71		61.24
		Note: Supports up to 40 Ah batteries will hold up to two 12V24A batteries.			
28 46 13 31-0051	EA	22" x 15" x 3-3/4" Grey Battery Cabinet (EST3 BC-2)	363.13		61.24
		Note: Holds up to two 12V17A batteries.			
28 46 13 31-0052	EA	Remote Closet Enclosure (EST3 3-RCC7R)	1,245.42		122.48
28 46 13 31-0053	EA	Remote Closet Enclosure (EST3 3-RCC14R)	1,546.92		122.48
28 46 13 31-0054	EA	Remote Closet Enclosure (EST3 3-RCC21R)	2,172.14		122.48
28 46 13 31-0055		Serial Printer (28 46 13 31-0003)			
28 46 13 31-0056	EA	System Printer - Desk Top Style (EST3 PT-1S)	974.22		30.62
28 46 13 31-0057		Intelligent Analog Initiating Devices (28 46 13 31-0002)			
28 46 13 31-0058		Detectors, Signature (28 46 13 31-0057)			
28 46 13 31-0059	EA	Intelligent 4D Multisensor Detector For Ionization, Photoelectric, And Heat (EST3 SIGA-IPHS).....	263.37		45.92
28 46 13 31-0060	EA	Black, Intelligent 4D Multisensor Detector For Ionization, Photoelectric, And Heat (EST3 SIGA-IPHSB).....	296.47		45.92
28 46 13 31-0061	EA	Intelligent 3D Multisensor Detector For Photoelectric And Heat (EST3 SIGA-PHS).....	253.51		45.92
28 46 13 31-0062	EA	Intelligent Photoelectric Smoke Detector (EST3 SIGA-PS)	223.92		45.92
28 46 13 31-0063	EA	Intelligent Ionization Smoke Detector (EST3 SIGA-IS).....	233.78		45.92



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0064 EA 135 Degrees Fahrenheit, 15 Degrees Fahrenheit Per Minute, Intelligent Fixed Temperature/Rate-of-Rise Heat Detector (EST3 SIGA-HRS)	190.94	45.92
28 46 13 31-0065 EA 135 Degree Fahrenheit, Intelligent Fixed Temperature Heat Detector (EST3 SIGA-HFS)	190.94	45.92
28 46 13 31-0066 EA Passive Infrared Motion Detector (EST3 SIGA-MD)	305.28	45.92
28 46 13 31-0067 EA Passive Infrared Motion Detector With Swivel Mount For Single Gang Boxes (EST3 SIGA-MDS)	337.58	45.92
28 46 13 31-0068 EA Intelligent Photoelectric Smoke Detector (EST3 SIGA2-PS)	284.12	45.92
28 46 13 31-0069 EA Intelligent Combination Photo Electric And CO Sensor (EST3 SIGA2-PCOS)	412.37	45.92
28 46 13 31-0070 EA 135 Degree Fahrenheit, Intelligent Fixed Temperature Heat Detector (EST3 SIGA2-HFS)	236.26	45.92
28 46 13 31-0071 EA 135 Degrees Fahrenheit, 15 Degrees Fahrenheit Per Minute, Intelligent Fixed Temperature/Rate-of-Rise Heat Detector (EST3 SIGA2-HRS)	236.26	45.92
28 46 13 31-0072 EA Photoelectric, Heat, Intelligent 3D Multisensor Detector (EST3 SIGA2-PHS)	327.22	45.92
28 46 13 31-0073 Detectors, Duct Housings and Accessories, Signature <small>(28 46 13 31-0057)</small>		
28 46 13 31-0074 EA Superduct, Signature Duct Smoke Detector (EST3 SIGA-SD)	534.14	76.55
28 46 13 31-0075 EA Superduct, Test Magnet Kit (EST3 SD-MAG)	22.67	
28 46 13 31-0076 EA Superduct, 120" Air Sample Tube (EST3 SD-T120)	69.56	18.37
28 46 13 31-0077 EA Superduct, Remote Test Station, Keyed, 2-Wire And SIGA (EST3 SD-TRK)	139.15	24.49
28 46 13 31-0078 EA Duct Smoke Detector Test Station, 2-Gang Plastic Plate With Key Switch, 2 Keys, Use With Duct Detector Only (EST3 SIGA-DTS)	189.20	24.49
28 46 13 31-0079 EA High Temp Heat Detector, 194 Degree F, Combination Rate-Of-Rise And Fixed Temperature (EST3 282B-PL)	82.04	24.49
28 46 13 31-0080 Modules, Signature <small>(28 46 13 31-0057)</small>		
28 46 13 31-0081 EA Universal Class A/B Module - UIO Mount (EST3 SIGA-MAB)	249.20	30.62
28 46 13 31-0082 EA Class B Single Input Module (One Gang Standard Mount) (EST3 SIGA-CT1)	116.81	30.62
28 46 13 31-0083 EA Class B Dual Input Module (One Gang Standard Mount) (EST3 SIGA-CT2)	155.57	30.62
28 46 13 31-0084 EA Class B Dual Input UIO (Plug In) Module (EST3 SIGA-MCT2)	222.82	30.62
28 46 13 31-0085 EA Single Input (Riser) Module, Features A Built-In Ring Tone Generator, Use For Switching A Single Signal Or Audio Circuit (EST3 SIGA-CC1)	170.19	30.62
28 46 13 31-0086 EA Dual Input (Riser) Module, Use For Switching (Selecting) Either Of Two Signal Or Audio Input Circuits To One Signal Output Circuit (EST3 SIGA-CC2)	178.24	30.62
28 46 13 31-0087 EA Control Relay Module (One Gang Standard Mount) (EST3 SIGA-CR)	137.29	30.62
Note: Select for either N.O. or N.C. operation. Rated at 2 amperes (24 Volt DC).		
28 46 13 31-0088 EA Control Relay UIO (Plug In) Module (EST3 SIGA-MCR)	193.30	30.62
28 46 13 31-0089 EA Single Input (Riser) Module With Strobe Synchronization Output (EST3 SIGA-CC1S)	259.23	30.62
28 46 13 31-0090 EA Universal Input/Output Module - Input With Programmable Output (EST3 SIGA-IO)	252.61	30.62
28 46 13 31-0091 EA Input/Output Module - UIO Mount, Multifunction Module With Input And Program (EST3 SIGA-MIO)	242.75	30.62
28 46 13 31-0092 EA Waterflow/Tamper Module (One Gang Standard Mount) (EST3 SIGA-WTM)	222.30	191.68
28 46 13 31-0093 EA Monitor Module (One Gang Standard Mount) (EST3 SIGA-MM1)	161.87	30.62
Note: Factory programmed for non-latching monitor operation.		
28 46 13 31-0094 EA Single Input (Riser) Module, With Synchronization Output (EST3 SIGA-MCC1S)	260.32	30.62
28 46 13 31-0095 Module Accessories, Signature <small>(28 46 13 31-0057)</small>		
Note: Universal I/O motherboards are required for UIO plug-in modules. Module mounting plates can be used to mount multiple 1 and 2-gang modules.		
28 46 13 31-0096 EA Module Mounting Bracket - For 4" Square Box, Mounting Kit Allows Installing 2 Single Gang Signature Modules Into A Single 4" Square Box (EST3 SIGA-MB4)	63.75	15.31
28 46 13 31-0097 EA Universal Input/Output Module Motherboard - 6 Position, Use For M Series Modules (EST3 SIGA-UIO6)	219.62	30.62
28 46 13 31-0098 EA Transient Protector - For Bell And Horn Circuits, Provides Transient Protection To -CC1, -MCC1, -CC2, -MCC2, -UM And -MAB Modules (EST3 235196P)	23.30	9.18
28 46 13 31-0099 EA Signature Module Mounting Plate, 1 Footprint, Space For Up To Four 2-Gang Signature Modules Or Eight 1-Gang Signature Modules (EST3 SIGA-MP1)	75.16	15.31
28 46 13 31-0100 EA Signature Module Mounting Plate, 1/2 Footprint, Space For Up To Two 2-Gang Signature Modules Or Four 1-Gang Signature Modules (EST3 SIGA-MP2)	66.96	15.31
28 46 13 31-0101 EA Signature Module Mounting Plate, 1/2 Extended Footprint, Space For Up To Three 2-Gang Signature Modules Or Six 1-Gang Signature Modules (EST3 SIGA-MP2L)	70.20	15.31
28 46 13 31-0102 Single Action Pull Stations, Signature <small>(28 46 13 31-0057)</small>		
28 46 13 31-0103 EA One Stage Fire Alarm Station, English Markings (EST3 SIGA-270)	271.00	63.69
28 46 13 31-0104 EA Two Stage (Pre Signal) Fire Alarm Station, English Markings (EST3 SIGA-270P)	320.47	63.69
28 46 13 31-0105 EA GA Key - For Pre Signal Station (EST3 276-K2)	37.37	31.24
28 46 13 31-0106 EA 20 Glass Rods For SIGA-270 Series Stations (EST3 270-GLR)	46.90	40.77
28 46 13 31-0107 EA Surface Mount Box, Red - For SIGA-270 Series (EST3 276B-RSB)	70.35	45.85
28 46 13 31-0108 Double Action Pull Stations, Signature <small>(28 46 13 31-0057)</small>		
28 46 13 31-0109 EA Double Action (One Stage) Fire Alarm Station, English Markings (EST3 SIGA-278)	209.50	63.69
28 46 13 31-0110 EA 12 Glass Rods For SIGA-278 Series (EST3 276-GLR)	47.61	6.12
28 46 13 31-0111 Detector Bases and Accessories, Signature <small>(28 46 13 31-0057)</small>		
Note: For raised floor and plenum applications. Order detector mounting base and detector separately. Compatible with -PS, and -PHS detectors and -SB, -RB and -IB bases.		
28 46 13 31-0112 EA Audible (Sounder) Base (EST3 SIGA-AB4G)	136.93	15.31
28 46 13 31-0113 EA Surface Box - For Sounder Base, Use With -AB4G Models Only (EST3 AB4G-SB)	50.51	15.31
28 46 13 31-0114 EA Audible (Sounder) Base, Mounts To 4" Square, 2-1/8" Deep Box (EST3 SIGA-AB4)	171.25	15.31
28 46 13 31-0115 EA Detector (Smoke) Guard, Covers Detectors Mounted To Flush Boxes, Compatible With -IPHS And -PS Signature Detectors (EST3 SIGA-DG)	96.71	15.31

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
28 46 13 31-0116	EA	Detector (Smoke) Guard Surface Box - For SIGA-DG (EST3 SIGA-DGSB).....	113.19		15.31
28 46 13 31-0117	EA	Detector Mounting Plate (EST3 SIGA-DMP) Note: For raised floor and plenum applications. Order detector mounting base and detector separately. Compatible with -PS, -PHS and -IPHS detectors and -SB, -RB and -IB bases. SIGA-IPHS 4D detector is limited to operation in air velocities less than 500 feet per minute.	179.14		15.31
28 46 13 31-0118	EA	Remote Alarm LED, Use With -SB And -SB4 Standard Base Only (EST3 SIGA-LED)	63.75		15.31
28 46 13 31-0119	EA	Trim Skirt/Ring - For Octagon Box (EST3 SIGA-TS)	23.44		9.18
28 46 13 31-0120	EA	Trim Skirt/Ring - For 4" Square Box, Use To Hide Imperfections Around Electric Boxes Not Completely Hidden By Standard Bases, With All 4" Bases (EST3 SIGA-TS4)	23.44		9.18
28 46 13 31-0121	EA	Detector (Smoke) Guard Mounting Flange, Provides Secure Mounting While Offering Easy Guard Removal, With Tamper Hardware (EST3 SIGA-DGMF)	67.98		9.18
28 46 13 31-0122	EA	Detector Base With Isolator (EST3 SIGA-IB).....	111.53		15.31
28 46 13 31-0123	EA	Detector Base With Isolator - For 4" Square Box, With TS4 Skirt (EST3 SIGA-IB4).....	118.59		15.31
28 46 13 31-0124	EA	Detector Base With Form 'C' Relay (EST3 SIGA-RB).....	68.64		15.31
28 46 13 31-0125	EA	Detector Base With Form 'C' Relay - For 4" Square Box, With TS4 Skirt (EST3 SIGA-RB4)	99.20		15.31
28 46 13 31-0126	EA	Detector Base - Standard, For 4" Square Box, With TS4 Skirt (EST3 SIGA-SB4).....	43.05		15.31
28 46 13 31-0127		Controllers, Signature (28 46 13 31-0057)			
28 46 13 31-0128	EA	Signature Dual Driver Controller (EST3 3-SDDC1)	3,804.85		91.86
28 46 13 31-0129	EA	Single Signature Loop Controller (EST3 3-SSDC1).....	2,179.24		91.86
28 46 13 31-0130	EA	Signature Loop Controller (EST3 3-SDC1).....	1,957.35		91.86
28 46 13 31-0131	EA	Analog Addressable Loop Controller (EST3 3-AADC1).....	3,139.76		91.86
28 46 13 31-0132		Relays And Accessories (28 46 13 31-0057)			
28 46 13 31-0133	EA	Multi Voltage Relay (EST3 MR101).....	200.82		30.62
28 46 13 31-0134	EA	Single SPDT Auxiliary Relay With LED Track Mounting (EST3 MR101/T).....	59.54		15.31
28 46 13 31-0135		Notification Appliances (28 46 13 31-0002)			
28 46 13 31-0136		Wall Strobes, Horns And Chimes (28 46 13 31-0135)			
28 46 13 31-0137	EA	Strobe (15, 30, 75, Or 110 cd Output), White (EST3 G1-VM).....	162.36		45.92
28 46 13 31-0138	EA	Strobe (15, 30, 75, Or 110 cd Output), Red (EST3 G1R-VM).....	162.36		45.92
28 46 13 31-0139	EA	Hom-Strobe (15, 30, 75, Or 110 cd Output, High Or Low dB Output), White (EST3 G1-HDVM).....	185.33		45.92
28 46 13 31-0140	EA	Temporal Horn (Selectable High Or Low dB Output), White (EST3 G1-HD)	136.49		45.92
28 46 13 31-0141	EA	Temporal Horn (Selectable High Or Low dB Output), Red (EST3 G1R-HD)	136.49		45.92
28 46 13 31-0142	EA	Temporal Horn, Hi/Low dB Output, 24 Volt DC, White, With The Word "FIRE" On Housing (EST3 G1F-HD)	136.49		45.92
28 46 13 31-0143	EA	Temporal Horn, Hi/Low dB Output, 24 Volt DC, Red, With The Word "FIRE" On Housing (EST3 G1RF-HD)	136.49		45.92
28 46 13 31-0144	EA	Horn (Steady Tone), 24 Volt DC, White, Not Compatible With Signal Master (EST3 G1-P).....	114.75		45.92
28 46 13 31-0145	EA	Horn (Steady Tone) - 24 Volt DC, Red, Not Compatible With Signal Master (EST3 G1R-P).....	114.75		45.92
28 46 13 31-0146	EA	Horn (Steady Tone), 24 Volt DC, Red, With The Word "FIRE" On Housing, Not Compatible With Signal Master (EST3 G1RF-P).....	114.75		45.92
28 46 13 31-0147	EA	Genesis Chime-Strobe (15, 30, 75, Or 110 cd Output, High Or Low dB Output), White (EST3 G1-CVM).....	279.05		45.92
28 46 13 31-0148	EA	Genesis Chime-Strobe (15, 30, 75, Or 110 cd Output, High Or Low dB Output), Red (EST3 G1R-CVM).....	279.05		45.92
28 46 13 31-0149	EA	Genesis Chime (Selectable High Or Low dB Output), White (EST3 G1-C)	182.53		45.92
28 46 13 31-0150	EA	Genesis Chime (Selectable High Or Low dB Output), Red (EST3 G1R-C)	182.53		45.92
28 46 13 31-0151	EA	Wall Strobe, 15/75 cd, White, With The Word "FIRE" On Housing (EST3 G1F-V1575).....	162.36		45.92
28 46 13 31-0152	EA	Multi-cd Strobe, 24 Volt DC, White, With The Word "FIRE" On Housing (EST3 G1F-VM).....	162.36		45.92
28 46 13 31-0153	EA	Multi-Candela Strobe, 24 Volt DC, Red, With The Word "FIRE" On Housing (EST3 G1RF-VM).....	162.36		45.92
28 46 13 31-0154	EA	Wall Strobe, 15/75 cd, Red, With The Word "FIRE" On Housing (EST3 G1RF-V1575).....	162.36		45.92
28 46 13 31-0155	EA	Genesis Ceiling Strobe, 15-95 Multi-cd, FIRE Marking, Mounts To 4" Square x 2-1/8" Box (EST3 GCF-VM).....	168.82		45.92
28 46 13 31-0156	EA	Genesis Ceiling Strobe, 15-95 Multi-cd, FIRE Marking, Mounts To 4" Square x 2-1/8" Box (EST3 GCFR-VM).....	168.82		45.92
28 46 13 31-0157	EA	Genesis Ceiling Strobe, 95-177 Multi-cd, FIRE Marking, Mounts To 4" Square x 2-1/8" Box (EST GCF-VMH).....	183.92		45.92
28 46 13 31-0158	EA	Genesis Ceiling Strobe, 15-95 Multi-cd, Mounts To 4" Square x 2-1/8" Box (EST3 GC-VM).....	168.82		45.92
28 46 13 31-0159	EA	Genesis Ceiling Strobe, 95-177 Multi-cd, Mounts To 4" Square x 2-1/8" Box (EST3 GC-VMH).....	168.82		45.92
28 46 13 31-0160	EA	Genesis Trim Plate (For Two-Gang Or 4" Square Boxes) With "FIRE" Markings, White (EST3 G1T-FIRE)	100.62		45.92
28 46 13 31-0161	EA	Genesis Trim Plate (For Two-Gang Or 4" Square Boxes) With "FIRE" Markings, Red (EST3 G1RT-FIRE)	100.62		45.92
28 46 13 31-0162		Wall Speakers And Speaker Strobes (28 46 13 31-0135)			
28 46 13 31-0163	EA	Multi-Wattage 25 VRMS Speaker (EST3 G4-S2)	134.54		45.92
28 46 13 31-0164	EA	Multi-Candela/Wattage 25 VRMS Speaker-Strobe (EST3 G4-S2VM).....	207.37		45.92
28 46 13 31-0165	EA	Multi-Wattage 70 VRMS Speaker (EST3 G4-S7)	134.54		45.92
28 46 13 31-0166	EA	Multi-Candela/Wattage 70 VRMS Speaker-Strobe (EST3 G4-S7VM).....	207.37		45.92
28 46 13 31-0167	EA	Surface Box, White, For Genesis Speaker (EST3 G4B).....	66.74		24.49
28 46 13 31-0168	EA	Surface Box, Red, For Genesis Speaker (EST3 G4RB).....	66.74		24.49
28 46 13 31-0169		Ceiling Speakers And Speaker Strobes (28 46 13 31-0135)			
28 46 13 31-0170	EA	Genesis Ceiling Speaker, 70 VRMS, Mounts To 4" Square x 2-1/8" Box (EST3 GC-S7).....	160.96		45.92
28 46 13 31-0171	EA	Genesis Ceiling Speaker/Strobe, 70 VRMS, 15-95 Multi-cd, Mounts To 4" Square x 2-1/8" Box (EST3 GC-S7VM).....	207.37		45.92
28 46 13 31-0172	EA	Genesis Ceiling Speaker/Strobe, 70 VRMS, 95-177 Multi-cd, Mounts To 4" Square x 2-1/8" Box (EST3 GC-S7VMH).....	222.07		45.92
28 46 13 31-0173		Harsh Environment Signals (28 46 13 31-0135)			
28 46 13 31-0174	EA	Temporal Horn, Self-Synchronized, 24 Volt DC (EST3 757-1A-T)	142.88		45.92
28 46 13 31-0175	EA	15/75 Candela Temporal Horn/Strobe, 24 Volt DC (EST3 757-7A-T).....	200.84		45.92
28 46 13 31-0176	EA	110 Candela Temporal Horn/Strobe, 24 Volt DC (EST3 757-8A-T).....	200.84		45.92



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0177 EA 15 Candela Synchronized, 24 Volt DC, Strobe (EST3 405-5A-T).....	183.61	45.92
28 46 13 31-0178 EA 15/75 Candela Synchronized, 24 Volt DC, Strobe (EST3 405-7A-T).....	172.15	45.92
28 46 13 31-0179 EA 30 Candela Synchronized, 24 Volt DC, Strobe (EST3 405-3A-T).....	183.61	45.92
28 46 13 31-0180 EA 60 Candela Synchronized, 24 Volt DC, Strobe (EST3 405-6A-T).....	183.61	45.92
28 46 13 31-0181 EA 110 Candela Synchronized, 24 Volt DC, Strobe (EST3 405-8A-T).....	183.61	45.92
28 46 13 31-0182 EA 15/75 Candela Synchronized, 24 Volt DC, Red, Outdoor Listed, Strobe (EST3 CS405-7A-T).....	202.98	52.05
28 46 13 31-0183 EA 110 Candela Synchronized, 24 Volt DC, Red, Outdoor Listed, Strobe (EST3 CS405-8A-T).....	202.98	52.05
28 46 13 31-0184 EA 15 Candela Temporal Horn/Strobe, 24 Volt DC (EST3 757-5A-T).....	149.87	45.92
28 46 13 31-0185 EA 30 Candela Temporal Horn/Strobe, 24 Volt DC (EST3 757-3A-T).....	195.35	45.92
28 46 13 31-0186 Fire Alarm Bells (28 46 13 31-0135)		
28 46 13 31-0187 EA 10" Single Stroke Fire Alarm Bells, 24 Volt DC (EST3 323D-10AW).....	216.93	45.92
28 46 13 31-0188 EA 6" Vibrating Fire Alarm Bells, 24 Volt DC (EST3 439D-6AW).....	173.63	45.92
28 46 13 31-0189 EA 10" Vibrating Fire Alarm Bells, 24 Volt DC (EST3 439D-10AW).....	192.11	45.92
28 46 13 31-0190 Multiple Tone Signal (28 46 13 31-0135)		
28 46 13 31-0191 EA 27 Tone Selectable Signal, 24 Volt DC (EST3 5530MD-24AW).....	1,390.90	1,344.96
28 46 13 31-0192 Multi-Purpose Loudspeaker (28 46 13 31-0135)		
28 46 13 31-0193 EA 15 Watt Loudspeaker, Gray (EST3 HPSA15G2570).....	285.98	45.92
28 46 13 31-0194 EA 15 Watt Loudspeaker, Red (EST3 HPSA15R2570).....	285.98	45.92
28 46 13 31-0195 Bell/Strobe Plate (28 46 13 31-0135)		
28 46 13 31-0196 EA Bell/Strobe Plate - 15cd (EST3 403-5A-R).....	144.66	24.49
28 46 13 31-0197 Mounting Accessories (28 46 13 31-0135)		
28 46 13 31-0198 EA Surface Mount Box - Indoor, Red, 1-Gang (EST3 27193-11).....	68.08	24.49
28 46 13 31-0199 EA One Gang Surface Mount Box, Red, No Bottom KO (EST3 27193-11-NY).....	68.08	24.49
28 46 13 31-0200 EA Surface Mount Box - Indoor, White, 1-Gang (EST3 27193-16).....	68.08	24.49
28 46 13 31-0201 EA Surface Mount Box - Indoor, Red, 2-Gang (EST3 27193-21).....	68.08	24.49
28 46 13 31-0202 EA Surface Mount Box - Indoor, White, 2-Gang (EST3 27193-26).....	68.08	24.49
28 46 13 31-0203 Firefighters' Telephones (28 46 13 31-0135)		
28 46 13 31-0204 EA Remote Telephone Warden Station - Flush, Red, 5' Armored Cable, Hinged Door With Magnetic Latch, 4-State (EST3 6830-NY-F4).....	1,245.78	76.55
28 46 13 31-0205 EA Four State Remote Telephone Warden Station - Surface, Armored Cord (EST3 6830-NY-S4).....	699.45	76.55
28 46 13 31-0206 EA Remote Telephone Warden Station - Flush, Armored Cord (EST3 6830-NY-F).....	502.70	76.55
28 46 13 31-0207 EA Telephone Handset Assembly - Red c/w 60" Coiled Cord (EST3 6830-1).....	365.54	76.55
28 46 13 31-0208 EA Remote Telephone Handset Station - 4-State, Red, 5' Coiled Cord (EST3 6830-4).....	674.96	76.55
28 46 13 31-0209 EA Three State Telephone Handset Assembly - Red, 60" Coiled Cord, Push To Talk Button (EST3 6830-5A).....	414.49	76.55
28 46 13 31-0210 EA Remote Telephone Handset Station - 4-State, Red, 'Push To Talk' Button, 5' Coiled Cord (EST3 6830-5A-4).....	761.66	76.55
28 46 13 31-0211 EA Three State Telephone Handset Assembly - Red, 60" Armored Cord, Push To Talk Button (EST3 6830-6A).....	430.81	76.55
28 46 13 31-0212 EA Remote Telephone Handset Station - 4-State, Red, 'Push To Talk' Button, 5' Armored Cable (EST3 6830-6A-4).....	872.69	76.55
28 46 13 31-0213 EA Portable Handset Receptacle, 1 Gang Stainless Steel Faceplate (EST3 6833-1).....	94.77	24.49
28 46 13 31-0214 EA Portable Telephone Receptacle - 1-Gang, SS, 4-State (EST3 6833-4).....	108.98	24.49
28 46 13 31-0215 EA Portable Telephone Handset - Black, Coiled Cord (EST3 6830-3).....	153.54	
28 46 13 31-0216 EA Portable Telephone Handset - Red, Coiled Cord (EST3 6700-0061).....	153.54	
28 46 13 31-0217 EA Frontplate - Flush Mount, Red Finish, Break Glass Type, With Two Keys (EST3 6831-1).....	231.69	30.62
28 46 13 31-0218 EA Frontplate - Flush Mount, Red Finish, Non-Break Glass Type With Two Keys (EST3 6831-2).....	288.23	30.62
28 46 13 31-0219 EA Frontplate - Surface Mount, Red Finish, Break Glass Type, With Two Keys (EST3 6831-3).....	203.42	30.62
28 46 13 31-0220 EA Frontplate - Surface Mount, Red Finish, Non-Break Glass Type, With Two Keys (EST3 6831-4).....	195.11	30.62
28 46 13 31-0221 EA Wallbox - Flush Or Surface Mount, Red Finish, 14" x 8-1/2" x 3-1/2" (EST3 6832-1).....	143.51	45.92
28 46 13 31-0222 EA Portable Handset Storage Cabinet, Surface Mount, With Keylock, Red Finish (EST3 TCS-6).....	1,286.54	61.24
28 46 13 31-0223 Mass Notification EC Appliances (28 46 13 31-0135)		
28 46 13 31-0224 EA G1 Wall, Strobe, White Housing, Alert Markings, Amber Lens (EST3 G1WA-VMA).....	168.87	45.92
28 46 13 31-0225 EA G1 Wall, Strobe, White Housing, Alert Markings, Clear Lens (EST3 G1WA-VMC).....	163.00	45.92
28 46 13 31-0226 EA G1 Wall, Strobe, White Housing, No Markings, Amber Lens (EST3 G1WN-VMA).....	168.87	45.92
28 46 13 31-0227 EA G1 Wall, Strobe, White Housing, No Markings, Clear Lens (EST3 G1WN-VMC).....	163.00	45.92
28 46 13 31-0228 EA G1 Wall, White Trim Ring, Alert Marking (EST3 G1WT-ALERT).....	25.39	9.18
28 46 13 31-0229 Hazardous Location Devices (28 46 13 31-0002)		
28 46 13 31-0230 Detectors, Rate Compensation Heat, For Explosion/Weather/Moisture Proof And Ordinary Location (28 46 13 31-0229)		
28 46 13 31-0231 EA Heat Detector, Rate Compensation, Interior Vertical Surface Mount FM And UL, 135 Degree F (EST3 302-135).....	150.44	45.92
28 46 13 31-0232 EA Heat Detector, Rate Compensation, Interior Vertical Surface Mount FM And UL, 194 Degree F (EST3 302-194).....	150.44	45.92
28 46 13 31-0233 EA Heat Detector - Rate Compensation, All-Weather Vertical Mounting, FM And UL, 135 Degree F (EST3 302-AW-135).....	156.75	45.92
28 46 13 31-0234 EA Heat Detector - Rate Compensation, All-Weather Vertical Mounting, FM And UL, 194 Degree F (EST3 302-AW-194).....	156.75	45.92

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0235	EA		Heat Detector, Rate Compensation, Explosion Proof Mounting, Interior Vertical Surface Mount FM And UL, 135 Degree F, Requires JALX-11 Or Equal (EST3 302-EPM-135).....	215.10	45.92
28 46 13 31-0236	EA		Heat Detector, Rate Compensation, Explosion Proof Mounting, Interior Vertical Surface Mount FM And UL, 194 Degree F, Requires JALX-11 Or Equal (EST3 302-EPM-194).....	215.10	45.92
28 46 13 31-0237	EA		Heat Detector, Rate Compensation, All-Weather Vertical, Box Mount (1/2" NPT), FM And UL, 135 Degree F, Requires STONCO27 Or Equal (EST3 302-ET-135).....	156.75	45.92
28 46 13 31-0238	EA		Heat Detector, Rate Compensation, All-Weather Vertical, Box Mount (1/2" NPT), FM And UL, 194 Degree F, Requires STONCO27 Or Equal (EST3 302-ET-194).....	156.75	45.92
28 46 13 31-0239			Hazardous Locations Fire Alarm Station (28 46 13 31-0229)		
28 46 13 31-0240	EA		Hazardous Location Fire Alarm Station (EST3 XAL53).....	1,319.85	76.55
28 46 13 31-0241	EA		Explosion Proof, Weatherproof, Fire Alarm Station, Single Action, Cat 45 Key Reset, Terminal Connections, DPDT (EST3 MPSR1-D45WX-GE).....	1,256.46	76.55
28 46 13 31-0242			Hazardous Location Strobes (28 46 13 31-0229)		
28 46 13 31-0243	EA		Explosion Proof Strobe (EST3 116DEXSTC-FJ).....	1,962.47	45.92
28 46 13 31-0244	EA		Wall Bracket Mounting Elbow (EST3 116EX-B).....	366.19	15.31
28 46 13 31-0245	EA		Ceiling / Wall Mounting Module (EST3 116EX-C).....	479.09	18.37
28 46 13 31-0246	EA		Pendant Mounting Module (EST3 116EX-P).....	351.51	18.37
28 46 13 31-0247			Hazardous Location Bells (28 46 13 31-0229)		
28 46 13 31-0248	EA		6" Hazardous Location Bells, 24 Volt DC (EST3 439DEX-6AW).....	1,416.02	45.92
28 46 13 31-0249	EA		8" Hazardous Location Bells, 24 Volt DC (EST3 439DEX-8AW).....	1,452.72	45.92
28 46 13 31-0250	EA		10" Hazardous Location Bells, 24 Volt DC (EST3 439DEX-10AW).....	1,465.93	45.92
28 46 13 31-0251			Hazardous Location Horns (28 46 13 31-0229)		
28 46 13 31-0252	EA		Hazardous Location Horns (EST3 888D-N5).....	1,384.39	45.92
28 46 13 31-0253	EA		Explosion Proof Horn, Diode Polarized, 24 Volt DC (EST3 889D-AW).....	1,130.46	45.92
28 46 13 31-0254			Door Holders And Relays (28 46 13 31-0002)		
28 46 13 31-0255			Electromagnetic Door Holders (28 46 13 31-0254)		
28 46 13 31-0256	EA		24 Volt AC / 24 Volt DC / 120 Volt AC, Door Holder, Single, Floor Mount (EST3 1501-AQN5).....	247.17	45.92
28 46 13 31-0257	EA		24 Volt AC / 24 Volt DC / 120 Volt AC, Door Holder, Double, Floor Mount (EST3 1502-AQN5).....	320.82	45.92
28 46 13 31-0258	EA		24 Volt AC / 24 Volt DC / 120 Volt AC, Door Holder, Flush, Wall Mount (EST3 1504-AQN5).....	209.56	45.92
28 46 13 31-0259	EA		24 Volt AC / 24 Volt DC / 120 Volt AC, Door Holder, Flush, Wall Mount, Short Catch Plate (EST3 1505-AQN5).....	209.56	45.92
28 46 13 31-0260	EA		24 Volt AC / 24 Volt DC / 120 Volt AC, Door Holder, Surface, Wall Mount (EST3 1508-AQN5).....	212.96	45.92
28 46 13 31-0261	EA		24 Volt AC / 24 Volt DC / 120 Volt AC, Door Holder, Completely Flush, Wall Mount (EST3 1509-AQN5).....	216.20	45.92
28 46 13 31-0262			Control Relays, Multi-Voltage (28 46 13 31-0254)		
28 46 13 31-0263	EA		Single SPDT With LED, Adhesive Tape Mounting (EST3 PAM1).....	49.97	9.18
28 46 13 31-0264			FireShield Plus (28 46 13 31-0002)		
28 46 13 31-0265			3 Zone System (28 46 13 31-0264)		
28 46 13 31-0266	EA		Conventional Fire Alarm Control Panel, 3 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Red Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries (EST3 FSP302R).....	1,336.49	367.43
28 46 13 31-0267	EA		Conventional Fire Alarm Control Panel, 3 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Red Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries, With Upload/Download DACT (EST3 FSP302RD).....	1,948.29	489.91
28 46 13 31-0268	EA		Conventional Fire Alarm Control Panel, 3 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Gray Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries (EST3 FSP302G).....	1,336.49	367.43
28 46 13 31-0269	EA		Conventional Fire Alarm Control Panel, 3 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Gray Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries, With Upload/Download DACT (EST3 FSP302GD).....	1,948.29	489.91
28 46 13 31-0270	EA		Semi Flush Trim Kit For 3 Or 5 Zone Enclosures, Gray (EST3 F-TRIM35G).....	94.08	15.31
28 46 13 31-0271	EA		Semi Flush Trim Kit For 3 Or 5 Zone Enclosures, Red (EST3 F-TRIM35R).....	94.08	15.31
28 46 13 31-0272			5 Zone System (28 46 13 31-0264)		
28 46 13 31-0273	EA		Conventional Fire Alarm Control Panel, 5 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Red Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries (EST3 FSP502R).....	1,439.21	367.43
28 46 13 31-0274	EA		Conventional Fire Alarm Control Panel, 5 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Red Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries, With Upload/Download DACT (EST3 FSP502RD).....	2,045.13	489.91
28 46 13 31-0275	EA		Conventional Fire Alarm Control Panel, 5 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Gray Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries (EST3 FSP502G).....	1,439.21	367.43
28 46 13 31-0276	EA		Conventional Fire Alarm Control Panel, 5 Class B IDC Zones, 2 Class B NAC's, 3.5 Amperes NAC Power, Gray Enclosure, 120 Volt AC, Capacity For (2) 10 Amp Hours Batteries, With Upload/Download DACT (EST3 FSP502GD).....	2,045.13	489.91
28 46 13 31-0277	EA		Semi Flush Trim Kit For 3 Or 5 Zone Enclosures, Gray (EST3 F-TRIM35G).....	94.08	15.31
28 46 13 31-0278	EA		Semi Flush Trim Kit For 3 Or 5 Zone Enclosures, Red (EST3 F-TRIM35R).....	94.08	15.31

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0279				10 Zone System <small>(28 46 13 31-0264)</small>		
	EA			Conventional Fire Alarm Control Panel, 10 Class B IDC Zones, 4 Class B NAC's, 3.5 Amperes NAC Power, Red Enclosure, 120 Volt AC, Capacity For (2) 17 Amp Hours Batteries (EST3 FSP1004R).....	2,080.35	489.91
	EA			Conventional Fire Alarm Control Panel, 10 Class B IDC Zones, 4 Class B NAC's, 3.5 Amperes NAC Power, Red Enclosure, 120 Volt AC, Capacity For (2) 17 Amp Hours Batteries, With Upload/Download DACT (EST3 FSP1004RD).....	2,692.15	612.39
	EA			Conventional Fire Alarm Control Panel, 10 Class B IDC Zones, 4 Class B NAC's, 3.5 Amperes NAC Power, Gray Enclosure, 120 Volt AC, Capacity For (2) 17 Amp Hours Batteries (EST3 FSP1004G).....	2,036.33	489.91
	EA			Conventional Fire Alarm Control Panel, 10 Class B IDC Zones, 4 Class B NAC's, 3.5 Amperes NAC Power, Gray Enclosure, 120 Volt AC, Capacity For (2) 17 Amp Hours Batteries, With Upload/Download DACT (EST3 FSP1004GD).....	2,692.15	612.39
	EA			Semi Flush Trim Kit For 10 Zone Enclosures, Gray (EST3 F-TRIM10G).....	109.98	15.31
	EA			NAC Power Expansion Transformer, 120 Volt AC, Increases 10 Zone FACP NAC (EST3 F-XTR120).....	200.98	30.62
28 46 13 31-0286				FireShield Plus Off Premise Communication Options <small>(28 46 13 31-0264)</small>		
	EA			F-Series Upload/Download DACT And Modem, Dual Line, With 2x16 LCD (EST3 F-DACT).....	442.76	30.62
28 46 13 31-0288				FireShield Plus Remote LED Annunciators <small>(28 46 13 31-0264)</small>		
	EA			Remote System Indicator, Power, Alarm, Supervisory, Trouble And Ground Fault LED's With Local Buzzer, Single Gang, And White Trim Plate (EST3 FSRSI).....	187.09	45.92
	EA			Remote Zone Indicator, Contains 5 Red LED's For Alarm Zone Indication, With Jumper Selectable Zone Settings, Single Gang, And White Trim Plate (EST3 FSRZI-A).....	187.09	45.92
	EA			Remote Zone Indicator, Contains 5 Bi-Color LED's (Red/Yellow) For Alarm Or Supervisory Zone Indication, With Jumper Selectable Zone Settings, Single Gang, And White Trim Plate (EST3 FSRZI-SA).....	194.58	45.92
	EA			Remote Annunciator Trim Plate - 2 Gang - White (EST3 FSAT2).....	37.46	9.18
	EA			Remote Annunciator Trim Plate - 3 Gang - White (EST3 FSAT3).....	47.04	9.18
	EA			Remote Annunciator Trim Plate - 4 Gang - White (EST3 FSAT4).....	70.05	9.18
28 46 13 31-0295				FireShield Plus Remote 10 Zone LED Annunciators <small>(28 46 13 31-0264)</small>		
	EA			Remote LED Annunciator, With Common System Indicators, 10 Zone Indicators, White Housing, Mounts To 4" Electrical Box, For Use With 10 Zone Panels Only (EST3 FSRA10).....	590.77	45.92
	EA			Remote LED Annunciator, With Common System Indicators, 10 Zone Indicators And Common Control Switches, White Housing, Mounts To 4" Electrical Box, For Use With 10 Zone Panels Only (EST3 FSRA10C).....	649.46	45.92
	EA			Single Unit Remote Annunciator Enclosure, 4" Box Mount, Key Locked Door, Plexiglas Window, Gray (EST3 RA-ENC1).....	207.98	30.62
28 46 13 31-0299				FireShield Plus Remote Relays And Interfaces <small>(28 46 13 31-0264)</small>		
	EA			Remote Relay Module, 5 Form C Contacts, Jumper Selectable Operation, With Mounting Track (EST3 FSRRM24).....	219.95	30.62
	EA			11" Snap Track Holds 2-4 RRM's, Used To Mount FSRRMs In MFC-A Or Other Listed Enclosure, MFC-A Will Hold Two FSRRM-11S (EST3 FSRRM-S11).....	90.81	18.37
	EA			Common Function Graphic Driver/Interface - 9 Relays And 5 Switch Inputs For Common System Indicators And Controls (EST3 FSUIM).....	351.78	30.62
28 46 13 31-0303				FireShield Plus Accessories <small>(28 46 13 31-0264)</small>		
	EA			Resistor Kit With 1-3.6K And 1-1.1K (46071-0409) (EST3 EOL3.6-1.1).....	20.40	
	EA			4.7k UL End Of Line Resistor With FireShield Panels (EST3 EOL47PK7).....	12.37	
28 46 13 31-0306				iO Series Fire Control Panels <small>(28 46 13 31-0002)</small>		
28 46 13 31-0307				Intelligent Analog Control Panels <small>(28 46 13 31-0306)</small>		
	EA			FACP, 1 Intelligent Loop Supporting 125 Detectors/125 Modules, 2nd Loop Optional, 4 Class B NAC's, 6.5 Amperes Power Supply, Gray Door, 115 Volt AC, Capacity For Up (2) 18a/h Batteries, English (EST3 iO500G).....	3,999.10	612.39
	EA			FACP, 1 Intelligent Loop Supporting 125 Detectors/125 Modules, 2nd Loop Optional, 4 Class B NAC's, 6.5 Amperes Power Supply, Gray Door, 115 Volt AC, Capacity For Up (2) 18 Amp/hour Batteries, With Dual Line Dialer/Modem, English (EST3 iO500GD).....	4,283.77	612.39
	EA			FACP, 1 Loop, 64 Intelligent Devices Max, 2 Class B NAC's, 4.25 Amperes Power Supply, Gray Door, 115 Volt AC, Capacity For Up (2) 10 Amp/hour Batteries, English (EST3 iO64G).....	3,192.24	489.91
	EA			FACP, 1 Loop, 64 Intelligent Devices Max, 2 Class B NAC's, 4.25 Amperes Power Supply, Gray Door, 115 Volt AC, Capacity For Up (2) 10 Amp/hour Batteries, With Dual Line Dialer/Modem, English (EST3 iO64GD).....	3,324.30	489.91
28 46 13 31-0312				Option Modules And Accessories For iO Series <small>(28 46 13 31-0306)</small>		
	EA			16 Zone LED Annunciator, 2 LED's Per Zone, Customizable Insert Labels, Left Side Mounting, Zones 1-16 (EST3 D16L-iO-1).....	385.34	45.92
	EA			16 Zone LED Annunciator, 2 LED's Per Zone, Customizable Insert Labels, Right Side Mounting, Zones 17-32, Requires D16L-iO-1 (EST3 D16L-iO-2).....	238.60	45.92
	EA			Serial Interface, RS232, 4 Terminal Connections For Supervised/Unsupervised Printers And Connection To PC's (EST3 SA-232).....	238.60	45.92
	EA			Class A NAC Module, For 64 Point Systems Only, Mounts To Main Board (EST3 SA-CLA).....	207.98	30.62
	EA			Dialer/Modem, Two Telephone Line Connections, RJ31, Mounts To Base Plate (EST3 SA-DACT).....	430.51	24.49
	EA			Ethernet Port Interface, RJ45, Mounts To Base Plate (EST3 SA-ETH).....	782.68	24.49
	EA			Trim Kit For Semi-Flush Mounting 64 Point Systems (EST3 SA-TRIM1).....	92.25	15.31
	EA			Trim Kit For Semi-Flush Mounting 500 Point Systems (EST3 SA-TRIM2).....	106.92	15.31
	EA			Expansion Loop For iO500 Systems, 125 Detectors/125 Modules, Mounts On Main Board (EST3 XAL250).....	1,443.12	61.24

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 46 13 31-0322	Remote Annunciators For iO Series (28 46 13 31-0306)		
28 46 13 31-0323	EA Remote Annunciator, 80 Character LCD, Common System Indicators, Beige Housing, Mounts To 4" Box With Supplied Ring (EST3 RLCD)	788.85	45.92
28 46 13 31-0324	EA Remote Annunciator, 80 Character LCD, Common System Indicators And Controls, Beige Housing, Mounts To 4" Box With Supplied Ring (EST3 RLCD-C)	825.55	45.92
28 46 13 31-0325	Remote Annunciator Accessories (28 46 13 31-0306)		
28 46 13 31-0326	EA 24 Expander Cable Assembly, With Cable And Hardware (EST3 730073)	89.32	15.31
28 46 13 31-0327	EA 12 Expander Cable (Cable Only) (EST3 7120313-01)	59.97	15.31
28 46 13 31-0328	EA 24 Expander Cable (Cable Only) (EST3 7120313-02)	81.97	15.31
28 46 13 31-0329	EA Single Unit Remote Annunciator Enclosure, 4" Box Mount, Key Locked Door, Plexiglas Window, Beige (EST3 RA-ENC1)	238.60	45.92
28 46 13 31-0330	EA Dual Unit Remote Annunciator Enclosure, 4" Box Mount, Key Locked Door, Plexiglas Window, Beige (EST3 RA-ENC2)	275.27	45.92
28 46 13 31-0331	EA Three Unit Remote Annunciator Enclosure, 4" Box Mount, Key Locked Door, Plexiglas Window, Beige (EST3 RA-ENC3)	311.97	45.92
28 46 13 31-0332	EA Blank Zone Card Insert For RLEDx Controllers (EST3 RA-LED16ZC)	59.97	15.31
28 46 13 31-0333	EA Blank Zone Card Insert For RLED24x Controllers (EST3 RA-LED24ZC)	59.97	15.31
28 46 13 31-0334	EA Remote Key Switch, Single Gang Mount, Provides Keyed Control To Enable/Disable Common Control Switches On Remote Annunciators (EST3 RKEY)	124.09	15.31
28 46 13 31-0335	System Accessories (28 46 13 31-0306)		
28 46 13 31-0336	EA Battery Cabinet, 14" x 18.25" x 7.25" Free Standing Cabinet With Key Lock, Supports Up To 40 Amp Hours Batteries, Will Hold Up To Two 12 Volt DC, 24 Ampere Batteries (EST3 BC-1)	439.71	61.24
28 46 13 31-0337	EA Isolator Module - RS232, For Use With Short Haul Modems, VDU-3, CCA Series, CGP Series And FCOM-232, Requires 1/2 Size Cabinet Footprint (EST3 IOP3A)	1,981.16	489.91
28 46 13 31-0338	Conventional Initiating Devices (28 46 13 31-0002)		
28 46 13 31-0339	Detectors, Heat, Double Pole (28 46 13 31-0338)		
	Note: WARNING, Heat detectors are not Life Safety Devices, use for property protection only.		
28 46 13 31-0340	EA Heat Detector, 135 Degree F Fixed Temperature (CF135-2)	170.93	45.92
28 46 13 31-0341	EA Heat Detector, 200 Degree F Fixed Temperature (CF200-2)	170.93	45.92
28 46 13 31-0342	EA Heat Detector, 135 Degree F ROR/Fixed Temperature (CR135-2)	170.93	45.92
28 46 13 31-0343	EA Heat Detector, 200 Degree F ROR/Fixed Temperature (CR200-2)	170.93	45.92
28 46 13 31-0344	Detectors, Rate Compensation Heat, Accessories (28 46 13 31-0338)		
28 46 13 31-0345	EA Heat Detector, Rate Compensation, Adapter Plate For Mounting 302 And 302-AW To Any 3 Outlet Box Or 4" Octagon Outlet Box (GE AP-P)	104.90	45.92
28 46 13 31-0346	EA Explosion Proof Outlet Body With Cover, 1/2" Threaded Hubs On Back, Four Sides And Cover (GE JALX11)	288.86	24.49
28 46 13 31-0347	EA 4" Weatherproof, Octagon Backbox And Cover, 1/2" Threaded Hubs On Back, Four Sides And Cover (GE STONCO27)	89.84	30.62
28 46 13 31-0348	Detectors, Heat, Fire-Lite (28 46 13 31-0338)		
	Note: WARNING, Heat detectors are not Life Safety Devices, use for property protection only.		
28 46 13 31-0349	EA Explosion Heat Detector, 135 Degree F Fixed Temperature, Rate-Anticipation Heat Detector, All-Weather Vertical Mounting (302-EPM-135)	159.65	45.92
28 46 13 31-0350	EA Explosion Heat Detector, 194 Degree F Fixed Temperature, Rate-Anticipation Heat Detector, All-Weather Vertical Mounting (302-EPM-194)	159.65	45.92
28 46 13 31-0351	Audio Notification Systems (Standalone Voice Evacuation) (28 46 13 31-0002)		
28 46 13 31-0352	Audio Notification Panels (28 46 13 31-0351)		
28 46 13 31-0353	EA Audio Notification Panel, 100 Watt Amplifier, DMR, Temporal Pattern, Power Supply And Battery Charger, Standard Message, Microphone, And 14.5" x 18" x 4" Gray Cabinet (GE ANS100MDG)	5,582.87	612.39
28 46 13 31-0354	EA Audio Notification Panel, 100 Watt Amplifier, DMR, Temporal Pattern, Power Supply And Battery Charger, Standard Message, Microphone, And 14.5" x 18" x 4" Red Cabinet (GE ANS100MDR)	5,582.87	612.39
28 46 13 31-0355	EA Audio Notification Panel, 25 Watt Amplifier, DMR, Temporal Pattern, Power Supply And Battery Charger, Standard Message, Microphone, And 14.5" x 18" x 4" Gray Cabinet (GE ANS25MDG)	4,159.52	612.39
28 46 13 31-0356	EA Audio Notification Panel, 25 Watt Amplifier, DMR, Temporal Pattern, Power Supply And Battery Charger, Standard Message, Microphone, And 14.5" x 18" x 4" Red Cabinet (GE ANS25MDR)	4,159.52	612.39
28 46 13 31-0357	EA Audio Notification Panel, 50 Watt Amplifier, DMR, Temporal Pattern, Power Supply And Battery Charger, Standard Message, Microphone, And 14.5" x 18" x 4" Gray Cabinet (GE ANS50MDG)	4,863.86	612.39
28 46 13 31-0358	EA Audio Notification Panel, 50 Watt Amplifier, DMR, Temporal Pattern, Power Supply And Battery Charger, Standard Message, Microphone, And 14.5" x 18" x 4" Red Cabinet (GE ANS50MDR)	4,863.86	612.39
28 46 13 31-0359	Audio Notification Expander Panels (28 46 13 31-0351)		
28 46 13 31-0360	EA Audio Expander Panel, 100W With Out DMR Or Microphone, Power Supply And Battery Charger, 14.5" x 18" x 4" Gray Cabinet (GE ANS100XG)	4,276.91	612.39
28 46 13 31-0361	EA Audio Expander Panel, 100W With Out DMR Or Microphone, Power Supply And Battery Charger, 14.5" x 18" x 4" Red Cabinet (GE ANS100XR)	4,276.91	612.39
28 46 13 31-0362	EA Audio Expander Panel, 25 Watt Without DMR Or Microphone, Power Supply And Battery Charger, 14.5" x 18" x 4" Gray Cabinet (GE ANS25XG)	2,897.58	612.39



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0363 EA Audio Expander Panel, 25 Watt Without DMR Or Microphone, Power Supply And Battery Charger, 14.5" x 18" x 4" Red Cabinet (GE ANS25XR)	2,897.58	612.39
28 46 13 31-0364 EA Audio Expander Panel, 50W With Out DMR Or Microphone, Power Supply And Battery Charger, 14.5" x 18" x 4" Gray Cabinet (GE ANS50XG)	3,704.63	612.39
28 46 13 31-0365 EA Audio Expander Panel, 50W With Out DMR Or Microphone, Power Supply And Battery Charger, 14.5" x 18" x 4" Red Cabinet (GE ANS50XR).....	3,704.63	612.39
28 46 13 31-0366 Audio Notification Output Accessories (28 46 13 31-0351)		
28 46 13 31-0367 EA Zone Adapter, 1 Circuit To 2 Circuit's (GE ANSZC2B)	162.68	15.31
28 46 13 31-0368 EA Zone Splitter, 2 Class A Circuits With Zone Selection Switches And All-Call Switch (GE ANSZS2A).....	721.56	30.62
28 46 13 31-0369 EA Zone Splitter, 4 Class B Circuits With Zone Selection Switches And All-Call Switch (GE ANSZS4B).....	721.56	30.62
28 46 13 31-0370 EA Class A Converter (GE ANSZSC4A)	516.13	30.62
28 46 13 31-0371 Audio Notification Remote Microphone (28 46 13 31-0351)		
28 46 13 31-0372 EA Microphone (GE ANSMIKE)	193.30	30.62
28 46 13 31-0373 EA Remote Microphone, Supervised In Surface/Semi-Flush Gray Cabinet, Requires EVX-SC Card In Evacuation Panel (GE ANSREMG).....	794.93	30.62
28 46 13 31-0374 EA Remote Microphone, Supervised In Surface/Semi-Flush Red Cabinet, Requires EVX-SC Card In Evacuation Panel (GE ANSREMR).....	794.93	30.62
28 46 13 31-0375 EA Remote Microphone Supervisory Card, One Per System, Supervises Up To 5 Remote Microphones (GE ANSREMSUP).....	177.36	15.31
28 46 13 31-0376 EA Relay Card For Supervision/Zone Splitter To Remote Microphone (GE ANSZSR)	96.64	15.31
28 46 13 31-0377 Audio Notification Accessories (28 46 13 31-0351)		
28 46 13 31-0378 EA Audio Matching - Line Input/Output Card (GE ANSAUX)	325.37	30.62
28 46 13 31-0379 EA Class B Backup Amplifier Switching Module (GE ANSBKUP).....	325.37	30.62
28 46 13 31-0380 EA Class A Backup Amplifier Switching Module (GE ANSBKUPA).....	325.37	30.62
28 46 13 31-0381 EA Eight Input Remote Serial Interface Module, Accepts Dry Contact Interface To Control Up To 8 Messages, Message Recording Included With Module, For Industrial Signaling Only, Not UL Listed For Fire Alarm / Life Safety Applications (GE ANRSI8)	721.56	30.62
28 46 13 31-0382 Audio Notification Modules, Without Cabinet And Transformer (28 46 13 31-0351)		
28 46 13 31-0383 EA 100W Expander Module (No Microphone OR DMR), Requires Transformer Ordered Separately (GE ANS100A)	2,631.69	61.24
28 46 13 31-0384 EA 100W Expander Module With Microphone (No DMR), Requires Transformer Ordered Separately (GE ANS100AM).....	2,763.76	61.24
28 46 13 31-0385 EA 100W Audio Notification Module With DMR And Microphone, Requires Transformer Ordered Separately (GE ANS100AMD)	3,820.26	61.24
28 46 13 31-0386 EA 25 Watt Expander Module (No Microphone Or DMR), Requires Transformer Ordered Separately (GE ANS25A)	1,443.12	61.24
28 46 13 31-0387 EA 25 Watt Expander Module With Microphone (No DMR), Requires Transformer (GE ANS25AM)	1,443.12	61.24
28 46 13 31-0388 EA 25 Watt Audio Notification Module With DMR And Microphone, Requires Transformer Ordered Separately (GE ANS25AMD).....	2,631.69	61.24
28 46 13 31-0389 EA 50W Expander Module (No Microphone Or DMR) (GE ANS50A)	2,103.44	61.24
28 46 13 31-0390 EA 50W Expander Module With Microphone (No DMR) (GE ANS50AM)	2,235.50	61.24
28 46 13 31-0391 EA 50W Audio Notification Module With DMR And Microphone (GE ANS50AMD).....	3,292.01	61.24
28 46 13 31-0392 EA Power Transformer, Open Frame, 28 Volt AC At 180 VA (EVAX 50/100) (GE ANST28180)	162.68	15.31
28 46 13 31-0393 EA Power Transformer, Open Frame, 28 Volt AC At 100 VA (EVAX 25) (GE ANST2885).....	120.19	15.31
28 46 13 31-0394 Simplex Fire Alarm (28 46 13 31)		
28 46 13 31-0395 4100 Fire Alarm Control Panel (28 46 13 31-0394)		
28 46 13 31-0396 EA 4100U Master Controller Assembly With LCD And Operator Interface, 9 Amperes System Power Supply/Battery Charger (SPS), 250 Point IDNet Interface, 3 NACs, Auxiliary Relay And External RUI Communications Interface, 120 Volt AC Input (Simplex 4100-9111)	6,894.40	611.40
28 46 13 31-0397 EA 4100ES NDU With Master Controller, LCD And Operator Interface, Network Interface Module (Select Media Card Separately), 9 Amperes System Power Supply/Battery Charger, And External RUI Communications Interface (Power Supply/Battery Charger Is An SPS With Its IDNet Channel And NACs Disabled), 120 Volt AC Input (Simplex 4100-9141)	7,531.69	611.40
28 46 13 31-0398 EA 4100ES NDU With VCC Includes The First Bay Equipment Described For The NDU And A Second Bay Assembly With Separate: Master Controller For Voice Functions, Network Interface (Select Media Card Separately), And A Standard SPS With 250 Point IDNet Channel; And 3, 3 A Class A/B NACs Capable Of SmartSync Two-Wire Operation, 120 V Input (Simplex 4100-9142)	10,869.47	611.40
28 46 13 31-0399 EA Up To 127 Points, IDNet Module, (Simplex 4100-3104).....	4,390.00	611.40
28 46 13 31-0400 EA Up To 64 Points, IDNet Module, (Simplex 4100-3105).....	3,418.11	611.40
28 46 13 31-0401 EA Expansion Power Supply, 3 NACs, 120 Volt AC (Simplex 4100-5101)	2,212.97	152.84
28 46 13 31-0402 EA Alarm Relay, 3 Form C Relays, 2 Amperes At 32 Volt DC, For SPS Or RPS (Simplex 4100-6033)	463.02	30.57

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0403	EA		Dual Port RS-232 Interface Card (Simplex 4100-6038)..... Note: Add-on module.	1,332.67	30.57
28 46 13 31-0404			4100U Backbox (28 46 13 31-0394)		
28 46 13 31-0405	EA		2 Bay Backbox With Glass Door And Dress Panel (Simplex 2975-9425)..... Note: 24" x 40" beige backbox.	2,306.63	122.28
28 46 13 31-0406	EA		3 Bay Backbox With Glass Door And Dress Panel (Simplex 2975-9443)..... Note: 24" x 56" beige backbox.	3,252.16	122.28
28 46 13 31-0407			DACT (Digital Alarm Communicator Transmitter) (28 46 13 31-0394)		
28 46 13 31-0408	EA		6 Zone Fire Control Communicator (Silent Knight SK-5104)	1,263.35	61.14
28 46 13 31-0409			4010 Fire Alarm Control Panel (28 46 13 31-0394)		
28 46 13 31-0410	EA		120 Volt AC Fire Alarm Control Panel With Door, Cabinet, Power Supply/Battery Charger, IDNet Interface, 4 NACs, 2 Programmable Auxiliary Relays, External N2 Communications Interface, And Internal Common Event Reporting DACT (Simplex 4010-9101)	6,503.74	611.40
28 46 13 31-0411	EA		240 Volt AC Fire Alarm Control Panel With Door, Cabinet, Power Supply/Battery Charger, IDNet Interface, 4 NACs, 2 Programmable Auxiliary Relays, And External N2 Communications Interface (Simplex 4010-9201).....	6,309.88	611.40
28 46 13 31-0412	EA		Dual Circuit Class A NAC Adapter Module (Simplex 4010-9806)	237.11	30.57
28 46 13 31-0413	EA		Dual RS-232 Interface Module Expansion Slot Option (Simplex 4010-9811)	1,037.56	30.57
28 46 13 31-0414	EA		Single RS-232 Interface Module With Service Modem Connection Expansion Slot Option (Simplex 4010-9812).....	1,427.44	30.57
28 46 13 31-0415	EA		120 Volt AC, 4 Amperes, Expansion Power Supply Expansion Module (Simplex 4010-9813)	732.23	30.57
28 46 13 31-0416	EA		240 Volt AC, 4 Amperes, Expansion Power Supply Expansion Module (Simplex 4010-9823)	792.58	30.57
28 46 13 31-0417	EA		Battery Meter Module Expansion Module (Simplex 4010-9820)	295.76	30.57
28 46 13 31-0418			Printer (28 46 13 31-0394)		
28 46 13 31-0419	EA		24 Pin Dot Matrix Printer (Simplex 4190-9013).....	2,300.52	30.57
28 46 13 31-0420			NAC Panel / Power Booster (28 46 13 31-0394)		
28 46 13 31-0421	EA		120 Volt AC, IDNet NAC Extender With 4, Class B (Style Y) NACs And 8 Amperes Power Supply (Simplex 4009-9201)	1,476.65	152.84
			Note: Power supply for horns and strobes.		
28 46 13 31-0422			Battery (28 46 13 31-0394)		
28 46 13 31-0423	EA		50 Ampere Hours Sealed Lead Acid Battery (Simplex 2081-9296)	928.79	30.57
			Note: Two required for 24 volt DC.		
28 46 13 31-0424	EA		33 Ampere Hours Sealed Lead Acid Battery (Simplex 2081-9276)	616.12	30.57
			Note: Two required for 24 volt DC.		
28 46 13 31-0425	EA		6.2 Ampere Hours Sealed Lead Acid Battery (Simplex 2081-9272)	220.09	30.57
			Note: Two required for 24 volt DC.		
28 46 13 31-0426			Interface Modules (28 46 13 31-0394)		
28 46 13 31-0427	EA		Supervised Individual Addressable Modules (Simplex 4090-9001)	177.12	30.57
			Note: Monitor modules for waterflow / tamper, etc.		
28 46 13 31-0428	EA		Relay Individual Addressable Modules (Simplex 4090-9002)	370.12	30.57
			Note: Control modules for gas shutdown, door holders, etc.		
28 46 13 31-0429	EA		Relay SPDT With LED MR-801/T (Simplex 2088-9032)	86.19	30.57
			Note: Interface relay for 120VAC		
28 46 13 31-0430	EA		SmartSync™ Adapter Module For Non-Addressable Notification Appliance Circuits (NACs) (Simplex 4905-9815)	179.24	30.57
28 46 13 31-0431	EA		Surface Mount Cover Plate For SmartSync Adapter Module (Simplex 4905-9817).....	79.60	15.28
28 46 13 31-0432	EA		Flush Mount Cover Plate For SmartSync Adapter Module (Simplex 4905-9818)	75.52	15.28
28 46 13 31-0433			Pull Stations (28 46 13 31-0394)		
28 46 13 31-0434	EA		Addressable Single Action Manual Pull Station (Simplex 4099-9001)	218.52	30.57
28 46 13 31-0435	EA		N.O. Contacts, Single Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9101)	155.14	30.57
28 46 13 31-0436	EA		N.C. Contacts, Single Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9102)	167.38	30.57
28 46 13 31-0437	EA		Break-Glass, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9103)	149.62	30.57
28 46 13 31-0438	EA		N.O. Contacts, Break-Glass, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9104)	175.57	30.57
28 46 13 31-0439	EA		N.C. Contacts, Break-Glass, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9105)	268.81	30.57
28 46 13 31-0440	EA		Single Action, Pre-Signal, N.O. Contacts, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9107)	224.60	30.57
28 46 13 31-0441	EA		Break-Glass, Pre-Signal, N.O. Contacts, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9108)	265.46	30.57
28 46 13 31-0442	EA		Single Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9754)	121.08	30.57
28 46 13 31-0443	EA		Local Alarm Cover, Single Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9755).....	128.56	30.57
28 46 13 31-0444	EA		Push, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9756).....	152.64	30.57
28 46 13 31-0445	EA		N.C. Contacts, Push, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9758).....	240.17	30.57
28 46 13 31-0446	EA		Pre-Signal, N.O. Contacts, Push, Double Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9759)	419.19	30.57
28 46 13 31-0447	EA		Institutional Cover, Single Action, Non-Coded, Non-Addressable Manual Pull Stations (Simplex 2099-9762).....	134.70	30.57
28 46 13 31-0448	EA		Surface Mount Steel Box For Manual Pull Station (Simplex 2975-9178)	83.70	15.28



	MINOR							TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	CSI	UOM	DESCRIPTION						
28 46 13 31-0449			Weatherproof Pull Stations <small>(28 46 13 31-0394)</small>						
28 46 13 31-0450	EA		Weather Proof Single Action Pull Station, Cast Metal, B Lock, SPST (Simplex 2099-9138)				212.33		36.68
28 46 13 31-0451	EA		Surface Mount Cast Aluminum Box For Exterior Pull Station (Simplex 2975-9211)				137.99		15.28
28 46 13 31-0452			Heat / Smoke Sensor <small>(28 46 13 31-0394)</small>						
28 46 13 31-0453	EA		32 To 122 Degree F Heat Sensor (Simplex 4098-9733)				212.09		45.85
28 46 13 31-0454	EA		Photoelectric Smoke Sensor (Simplex 4098-9714)				312.40		45.85
28 46 13 31-0455	EA		Sensor Base With Relay Driver (Simplex 4098-9791)				621.00		15.28
28 46 13 31-0456	EA		Standard Sensor Base (Simplex 4098-9792)				314.34		15.28
28 46 13 31-0457	EA		Remote Supervised Relay Accessory For Sensor Base With Relay Driver (Simplex 2098-9737)				177.87		30.57
			Note: Relay for 4098-9791						
28 46 13 31-0458			Explosion Proof Heat Detector <small>(28 46 13 31-0394)</small>						
28 46 13 31-0459	EA		135 Degree F Explosion Proof Heat Detector (Simplex 2098-9488)				224.92		45.85
28 46 13 31-0460	EA		Explosion Proof Backbox (Killark JLX-21)				149.10		15.28
28 46 13 31-0461	EA		Explosion Proof Backbox Plugs (Killark CUP-2)				13.35		3.06
28 46 13 31-0462			Weatherproof Heat Detector <small>(28 46 13 31-0394)</small>						
28 46 13 31-0463	EA		194 Degree F Fixed Hardwired Weatherproof Heat Detector (Simplex 2098-9490)				160.46		45.85
28 46 13 31-0464			200 Degree F Heat Detector <small>(28 46 13 31-0394)</small>						
28 46 13 31-0465	EA		194 Degree F Heat Detector, ROR/Fixed Temperature (Simplex 5604)				131.65		45.85
			Note: Used in kiln rooms and kitchens.						
28 46 13 31-0466			Duct Smoke Sensor <small>(28 46 13 31-0394)</small>						
28 46 13 31-0467	EA		Duct Sensor Housing (Simplex 4098-9755)				500.14		24.45
28 46 13 31-0468	EA		Duct Sensor Housing With Supervised Output For Multiple Remote Relays, 4-Wire (Simplex 4098-9756)				670.89		55.03
			Note: Relay output for AHU shutdown.						
28 46 13 31-0469	EA		46" To 71" Duct Sampling Tube (Simplex 2098-9798)				73.20		15.28
			Note: 25", 49", 73" or 97" sampling tube length.						
28 46 13 31-0470	EA		Remote Duct Test Station With Key Switch And Red LED Status Indicator (Simplex 2098-9806)				172.62		45.85
28 46 13 31-0471			Interior Horn <small>(28 46 13 31-0394)</small>						
28 46 13 31-0472	EA		Red With White FIRE Lettering, TrueAlert Addressable Electronic Horn (Simplex 4901-9850)				159.22		45.85
28 46 13 31-0473	EA		White With Red FIRE Lettering, TrueAlert Addressable Electronic Horn (Simplex 4901-9853)				159.22		45.85
28 46 13 31-0474			Interior Horn Strobe <small>(28 46 13 31-0394)</small>						
28 46 13 31-0475	EA		75Cd, Wall Mounted Horn Strobe, Red (Simplex 4903-9426)				222.96		45.85
28 46 13 31-0476	EA		110Cd, Wall Mounted Horn Strobe, Red (Simplex 4903-9427)				222.96		45.85
28 46 13 31-0477	EA		Wall Mount, Red Housing, White Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9127)				208.42		45.85
28 46 13 31-0478	EA		Ceiling Mount, Red Housing, White Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9128)				208.42		45.85
28 46 13 31-0479	EA		Wall Mount, White Housing, Red Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9129)				208.42		45.85
28 46 13 31-0480	EA		Ceiling Mount, White Housing, Red Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9130)				208.42		45.85
28 46 13 31-0481	EA		Weatherproof, Red Housing, White Lettering, Horn And Intensity Selectable (15, 60 Or 75 Candela) Multi-Candela Strobe (Simplex 4906-9131)				213.29		45.85
28 46 13 31-0482	EA		Weatherproof, White Housing, Red Lettering, Horn And Intensity Selectable (15, 60 Or 75 Candela) Multi-Candela Strobe (Simplex 4906-9132)				213.29		45.85
28 46 13 31-0483	EA		Wall Mount, Red Housing, White Lettering, Horn And Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9139)				221.87		45.85
28 46 13 31-0484	EA		Ceiling Mount, Red Housing, White Lettering, Horn And Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9140)				217.91		45.85
28 46 13 31-0485	EA		Wall Mount, White Housing, Red Lettering, Horn And Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9141)				221.87		45.85
28 46 13 31-0486	EA		Ceiling Mount, White Housing, Red Lettering, Horn And Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9142)				217.91		45.85
28 46 13 31-0487	EA		Wall Mount, Red Housing, White Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9227)				208.42		45.85
28 46 13 31-0488	EA		Ceiling Mount, Red Housing, White Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9228)				208.42		45.85
28 46 13 31-0489	EA		Wall Mount, White Housing, Red Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9229)				208.42		45.85
28 46 13 31-0490	EA		Ceiling Mount, White Housing, Red Lettering, Horn And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9230)				208.42		45.85
28 46 13 31-0491			Interior Strobe <small>(28 46 13 31-0394)</small>						
28 46 13 31-0492	EA		Wall Mount, Red Housing, White Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9101)				177.52		45.85

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0493	EA		Ceiling Mount, Red Housing, White Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9102).....	177.52	45.85
28 46 13 31-0494	EA		Wall Mount, White Housing, Red Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9103).....	177.46	45.85
28 46 13 31-0495	EA		Ceiling Mount, White Housing, Red Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9104).....	177.52	45.85
28 46 13 31-0496	EA		Weatherproof, Red Housing, White Lettering, Intensity Selectable (15, 60 Or 75 Candela) Multi-Candela Strobe (Simplex 4906-9105).....	196.00	45.85
28 46 13 31-0497	EA		Weatherproof, White Housing, Red Lettering, Intensity Selectable (15, 60 Or 75 Candela) Multi-Candela Strobe (Simplex 4906-9106).....	196.00	45.85
28 46 13 31-0498	EA		Wall Mount, Red Housing, White Lettering, Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9109).....	197.18	45.85
28 46 13 31-0499	EA		Ceiling Mount, Red Housing, White Lettering, Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9110).....	200.40	45.85
28 46 13 31-0500	EA		Wall Mount, White Housing, Red Lettering, Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9111).....	200.40	45.85
28 46 13 31-0501	EA		Ceiling Mount, White Housing, Red Lettering, Intensity Selectable (135, 177 Or 185 Candela) Multi-Candela Strobe (Simplex 4906-9112).....	200.40	45.85
28 46 13 31-0502	EA		Wall Mount, Red Housing, White Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9201).....	177.52	45.85
28 46 13 31-0503	EA		Ceiling Mount, Red Housing, White Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9202).....	177.52	45.85
28 46 13 31-0504	EA		Wall Mount, White Housing, Red Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9203).....	177.52	45.85
28 46 13 31-0505	EA		Ceiling Mount, White Housing, Red Lettering, Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Addressable Strobe (Simplex 4906-9204).....	177.52	45.85
28 46 13 31-0506			Interior Speakers (28 46 13 31-0394)		
28 46 13 31-0507	EA		Red With White FIRE Lettering, Wall Mount Speaker, Rectangular Housing (Simplex 4902-9716).....	143.57	45.85
28 46 13 31-0508	EA		White With Red FIRE Lettering, Wall Mount Speaker, Rectangular Housing (Simplex 4902-9717).....	143.57	45.85
28 46 13 31-0509	EA		Ceiling Or Wall Mount, Round Housing Speaker (Simplex 4902-9721).....	143.57	45.85
28 46 13 31-0510			Interior Speaker Strobe (28 46 13 31-0394)		
28 46 13 31-0511	EA		Red Housing, White Lettering, Multi-Tapped Speaker And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9151).....	237.36	45.85
28 46 13 31-0512	EA		White Housing, Red Lettering, Multi-Tapped Speaker And Intensity Selectable (15, 30, 75 Or 110 Candela) Multi-Candela Strobe (Simplex 4906-9153).....	237.36	45.85
28 46 13 31-0513			Surge Suppressors (28 46 13 31-0394)		
28 46 13 31-0514	EA		Overvoltage Suppressor (Simplex 2081-9044).....	155.91	9.17
28 46 13 31-0515	EA		Isolated Loop Circuit Protector (Simplex 2081-9028).....	99.30	9.17
28 46 13 31-0516	EA		120 Volt AC, 20 Amperes, Multi Stage Hybrid Surge Protector With EMI/RFI Filtering (Ditek 120S20A).....	335.29	9.17
28 46 13 31-0517	EA		24 Volt AC, Data And Loop Circuit Surge Protector (Ditek DTK-2MHL24B).....	113.88	9.17
28 46 13 31-0518	EA		Mounting Base For Two DTK-2MHL (Ditek DTK-2MB).....	171.44	15.28
28 46 13 31-0519	EA		120 Volt AC, 22,500 Amperes, Equipment Panel/Dedicated Circuit Surge Protector (Ditek DTK-120HW).....	116.78	9.17
28 46 13 31-0520	EA		<105 Volt AC, 9,000 Amperes, RJ31 Connection, Alarm Dialer Surge Protection (Ditek DTK-MRJ31SCWP).....	87.60	9.17
28 46 13 31-0521			Boxes And Adapters (28 46 13 31-0394)		
28 46 13 31-0522	EA		Semi-Flush Mount Modular Adapter Using Standard 4" Square Electrical Box (Simplex 4905-9921).....	75.52	15.28
28 46 13 31-0523	EA		Surface Mount Modular Adapter Using Simplex Box (Simplex 4905-9925).....	71.43	15.28
28 46 13 31-0524	EA		Red, Surface Mount Adapter Skirt (Simplex 4905-9937).....	63.42	15.28
28 46 13 31-0525	EA		White, Surface Mount Adapter Skirt (Simplex 4905-9940).....	52.05	15.28
28 46 13 31-0526			Accessories (28 46 13 31-0394)		
28 46 13 31-0527	EA		End-Of-Line Resistor Harness, 10 k Ohms, 1/2 Watt, Two Required, One Each For Audible And Visible Output (Simplex 4081-9008).....	35.32	15.28
28 46 13 31-0528			Siemens Fire Alarm (28 46 13 31)		
28 46 13 31-0529			Conventional Control Panels (28 46 13 31-0528)		
28 46 13 31-0530			SXL Batteries And Power Supplies (28 46 13 31-0529)		
28 46 13 31-0531	EA		6 Amperes Notification Appliance Circuit Expander With Built-In Auxiliary Power Output (Siemens PAD-3).....	1,319.66	61.14
28 46 13 31-0532	EA		Main Board Only For PAD-3 (Siemens PAD-3-MB).....	1,061.40	61.14
28 46 13 31-0533			Digital Fire Communicators (28 46 13 31-0529)		
28 46 13 31-0534	EA		Four Channel Digital Slave Fire Communicator (Siemens 5129).....	1,027.36	61.14
28 46 13 31-0535			Addressable Control Panels (28 46 13 31-0528)		
28 46 13 31-0536			Fireseeker Equipment (28 46 13 31-0535)		
28 46 13 31-0537			FS-250 System Panels (28 46 13 31-0536)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0538 EA FS-250 Electronics Package Including One FS-250-CON And Two FS-NPE, Excludes Enclosure (Siemens FS-250-EKIT).....	3,119.81	611.40
Note: FS-250-CON is an electronics package for releasing water or agent. FS-NPE is a system transformer.		
28 46 13 31-0539 EA FS-250 Electronics Package Including One FS-250-CON, Two FS-NPE, One FS-RPT And One FS-REL, Excludes Enclosure (Siemens FS-250-REL-EKIT).....	3,908.67	611.40
Note: FS-250-CON is an electronics package for releasing water or agent. FS-NPE is a system transformer. FS-RPT is a releasing power transformer. FS-REL is a Releasing Module.		
28 46 13 31-0540 EA FS-250-SRX Releasing Electronics Package Including One FS-250-CON2-SRX, Two FS-NPE, One FS-RPT And One FS-REL, Excludes Enclosure (Siemens FS-250-SRX-EKIT).....	2,316.48	489.12
Note: FS-250-CON2-SRX is an electronics package for releasing water or agent. FS-NPE is a system transformer. FS-RPT is a releasing power transformer. FS-REL is a Releasing Module.		
28 46 13 31-0541 EA Electronics Package For Releasing Water Or Agent (Siemens FS-250-CON).....	3,124.51	611.40
28 46 13 31-0542 FS-250 Optional Modules <small>(28 46 13 31-0536)</small>		
28 46 13 31-0543 EA Main Board Module (Siemens FS-MB2).....	1,329.05	61.14
28 46 13 31-0544 EA Display Board Module (Siemens FS-DB2).....	1,037.82	30.57
28 46 13 31-0545 EA Device Loop Card (Siemens FS-DLC).....	850.00	30.57
28 46 13 31-0546 EA Releasing Module (Siemens FS-REL).....	375.75	30.57
28 46 13 31-0547 EA Remote LCD Annunciator (Siemens FS-RD2).....	844.13	30.57
28 46 13 31-0548 EA Relay Processor Card (Siemens FS-RU2).....	732.61	30.57
28 46 13 31-0549 EA Relay Expander Board (Siemens FS-RE8).....	624.61	30.57
28 46 13 31-0550 EA Serial Annunciator Processor Card (Siemens FS-SAU2).....	844.13	30.57
28 46 13 31-0551 EA 16 Output Annunciator Extender (Siemens FS-SAE16).....	657.48	30.57
28 46 13 31-0552 EA Digital Alarm Communication Transmitter (Siemens FS-DACT).....	597.61	30.57
28 46 13 31-0553 EA Municipal Tie Module (Siemens FS-MT).....	507.22	30.57
28 46 13 31-0554 EA Configuration Tool Including Laptop To FS-250 Cable And Software (Siemens FS-CT2).....	459.19	
28 46 13 31-0555 EA Programming Cable Kit (Siemens CBL-UD).....	120.96	15.28
28 46 13 31-0556 EA Notification Appliance Circuit Power Expander Transformer (Siemens FS-NPE).....	217.27	30.57
28 46 13 31-0557 EA Releasing Power Transformer (Siemens FS-RPT-A).....	220.79	30.57
28 46 13 31-0558 EA Surface Mounted Box For Remote LCD Annunciator (Siemens FS-RD-SB).....	250.82	24.45
28 46 13 31-0559 EA Cabinet Trim Kit (Siemens RD-CAB-TK).....	410.91	15.28
28 46 13 31-0560 Firefinder Systems <small>(28 46 13 31-0535)</small>		
28 46 13 31-0561 XLS Basic Fire System Packages Without Backbox <small>(28 46 13 31-0560)</small>		
28 46 13 31-0562 EA 500 Point Firefinder Package Including Two DLC, One PMI, One ZIC-4A, One CC-5, One PSC-12 And One ID-SP (Siemens XLS-500-ID-SP).....	11,077.28	611.40
Note: DLC is a device loop card. PMI is a person machine interface. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module. ID-SP is an inner door blank single plate.		
28 46 13 31-0563 EA 250 Point Firefinder Package Including One DLC, One PMI, One ZIC-4A, One CC-5, One PSC-12 And One ID-SP (Siemens XLS-250-ID-SP).....	9,736.68	611.40
Note: DLC is a device loop card. PMI is a person machine interface. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module. ID-SP is an inner door blank single plate.		
28 46 13 31-0564 EA 250 Point Firefinder Package Including One DLC, One PMI-INT, One ZIC-4A, One CC-5, One PSC-12 And One ID-SP (Siemens XLS-250-INT-ID-SP).....	9,736.68	611.40
Note: DLC is a device loop card. PMI-INT is a person machine interface with multilingual overlays. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module. ID-SP is an inner door blank single plate.		
28 46 13 31-0565 EA 250 Point Firefinder Package Including One DLC, One PMI, One ZIC-4A, One CC-5, One PSC-12, One CAB2-BD And One OD-LP (Siemens XLS-250-CAB2-BD).....	16,399.74	611.40
Note: DLC is a device loop card. PMI is a person machine interface. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module. CAB2-BD is a two row inner and outer door set. OD-LP is an outer door clear plastic lens plate.		
28 46 13 31-0566 EA 250 Point Firefinder Package Including One DLC, One PMI, One ZIC-4A, One CC-5, One PSC-12, One CAB3-BD, One BCL, One ID-SP And One OD-LP (Siemens XLS-250-CAB3-BD).....	16,956.17	611.40
Note: DLC is a device loop card. PMI is a person machine interface. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module. CAB3-BD is a three row inner and outer door set. ID-SP is an inner door blank single plate. OD-LP is an outer door clear plastic lens plate.		
28 46 13 31-0567 EA 250 Point Firefinder Package Including One DLC, One PMI, One ZIC-4A, One CC-5, And One PSC-12 (Siemens XLS-250-ZIC4A-EP).....	9,601.68	611.40
Note: DLC is a device loop card. PMI is a person machine interface. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module.		
28 46 13 31-0568 EA 250 Point Firefinder Package Including One DLC, One PMI-INT, One ZIC-4A, One CC-5, And One PSC-12 (Siemens XLS-250-ZIC4A-INT-EP).....	9,601.68	611.40
Note: DLC is a device loop card. PMI-INT is a person machine interface with multilingual overlays. ZIC-4A is a four circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module.		
28 46 13 31-0569 EA 250 Point Firefinder Package Including One DLC, One PMI, One ZIC-8B, One CC-5, And One PSC-12 (Siemens XLS-250-ZIC8B-EP).....	11,170.01	611.40
Note: DLC is a device loop card. PMI is a person machine interface. ZIC-8B is an eight circuit zone indicating card. CC-5 is a five slot card cage. PSC-12 is a 12 Amp power supply charger module.		
28 46 13 31-0570 Firefinder - XLS Basic System Equipment <small>(28 46 13 31-0560)</small>		
28 46 13 31-0571 EA Person Machine Interface With Central Processor (Siemens PMI).....	5,135.40	611.40
Note: Includes inner door.		
28 46 13 31-0572 EA Person Machine Interface With Central Processor, DE-2 And DPU (Siemens PMI-DPU-ENC).....	8,599.58	611.40
Note: Includes inner door.		
28 46 13 31-0573 EA Person Machine Interface With Multilingual Overlays And Central Processor (Siemens PMI-INT).....	5,135.40	611.40
Note: Includes inner door.		

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
28 46 13 31-0574	EA	Two Slot Card Cage (Siemens CC-2).....	643.39	30.57
28 46 13 31-0575	EA	Five Slot Card Cage (Siemens CC-5).....	1,090.65	30.57
28 46 13 31-0576	EA	Four Circuit Zone Indicating Card (Siemens ZIC-4A).....	1,560.21	30.57
28 46 13 31-0577	EA	Eight Circuit Zone Indicating Card (Siemens ZIC-8B).....	1,629.47	30.57
28 46 13 31-0578	EA	Two Channel Adapter Card For ZIC-8B (Siemens ZIC-2C).....	511.92	30.57
28 46 13 31-0579	EA	Device Loop Card (Siemens DLC).....	1,850.16	30.57
		Note: Interfaces with up to 252 detectors and devices.		
28 46 13 31-0580	EA	Controllable Relay Card (Siemens CRC-6).....	1,046.04	30.57
		Note: Provides six programmable relays.		
28 46 13 31-0581	EA	12 Amperes Power Supply Charger Module (Siemens PSC-12).....	3,973.75	30.57
28 46 13 31-0582	EA	Person Machine Interface With Central Processor And GPMI-UK Software Upgrade Kit (Siemens GPMI).....	6,701.38	611.40
		Note: Software kit provides interface with multiple FireFinder XLS and MXL systems.		
28 46 13 31-0583	EA	Network Interface Card (Siemens NIC-C).....	1,224.47	30.57
		Note: Provides HNET Or XNET communication between enclosures.		
28 46 13 31-0584	EA	12 Amperes Power Supply Extender (Siemens PSX-12).....	3,304.63	30.57
		Note: Extends PSC-12 with an additional 24 volt DC.		
28 46 13 31-0585	EA	Power Termination Board (Siemens PTB).....	554.18	30.57
		Note: Used with systems requiring more than one PSX-12.		
28 46 13 31-0586	EA	Conventional Detector Card (Siemens CDC-4).....	1,179.87	30.57
28 46 13 31-0587	EA	Multi-Mode Network Fiber Optic Interface Module (Siemens D2300CPS).....	2,315.03	30.57
28 46 13 31-0588	EA	Single-Mode Network Fiber Optic Interface Module (Siemens D2325CPS).....	8,334.79	30.57
28 46 13 31-0589		Remote Lobby Enclosure (28 46 13 31-0560)		
28 46 13 31-0590	EA	14-1/2" x 18-1/2" x 5" Two Module Remote Enclosure (Siemens REMBOX2).....	1,520.59	122.28
		Note: Flush mounted. Includes clear lens plate on cover.		
28 46 13 31-0591	EA	24" x 18-1/2" x 5" Four Module Remote Enclosure (Siemens REMBOX4).....	1,966.67	122.28
		Note: Flush mounted. Includes clear lens plate on cover.		
28 46 13 31-0592	EA	Optional Mounting Plate For REMBOX2 (Siemens REMBOX2-MP).....	240.75	30.57
		Note: Required to mount up to four SIM-16 or OCM-16 modules.		
28 46 13 31-0593	EA	Optional Mounting Plate For REMBOX4 (Siemens REMBOX4-MP).....	263.05	30.57
		Note: Required to mount up to eight SIM-16 or OCM-16 modules.		
28 46 13 31-0594		Battery Enclosures (28 46 13 31-0560)		
28 46 13 31-0595	EA	Enclosure For 100 Ampere Hours Batteries (Siemens CAB-BATT).....	938.33	122.28
28 46 13 31-0596		Graphic Annunciator Output Drivers And Inputs (28 46 13 31-0560)		
28 46 13 31-0597	EA	Output Control Module (Siemens OCM-16).....	754.91	30.57
28 46 13 31-0598	EA	Supervised Input Module (Siemens SIM-16).....	754.91	30.57
28 46 13 31-0599		Remote LCD Displays (28 46 13 31-0560)		
28 46 13 31-0600	EA	Remote LED/LCD System Status Display (Siemens SSD).....	1,748.23	91.71
		Note: No control or menu capability.		
28 46 13 31-0601	EA	Remote LED/LCD System Status Display, Buttons To Acknowledge Events, Silence Audible Circuits And Resetting (Siemens SSD-C).....	1,972.44	91.71
28 46 13 31-0602		Voice Equipment (28 46 13 31-0560)		
28 46 13 31-0603	EA	40 Watts Zone Amplifier Card (Siemens ZAC-40).....	1,742.16	30.57
28 46 13 31-0604	EA	180 Watts Zone Amplifier Module (Siemens ZAM-180).....	3,863.40	30.57
28 46 13 31-0605	EA	Live Voice Module (Siemens LVM).....	1,625.95	30.57
		Note: Includes a dynamic microphone with a push-to-talk switch and ready-to-page indicator light, as well as a small local speaker and volume control for monitoring audio signals.		
28 46 13 31-0606		MXL Series Equipment (28 46 13 31-0535)		
28 46 13 31-0607		MXL Optional Equipment (28 46 13 31-0606)		
28 46 13 31-0608	EA	Two Circuit Analog Loop Driver (Siemens ALD-2I).....	1,873.74	61.14
28 46 13 31-0609	EA	CXL/MXL Interface Module (Siemens CMI-300).....	4,850.65	30.57
28 46 13 31-0610	EA	Four Relay Programmable Relay Module (Siemens CRM-4).....	831.22	30.57
28 46 13 31-0611	EA	Two Circuit Controllable Signal/Releasing Module (Siemens CSM-4).....	1,003.78	30.57
28 46 13 31-0612	EA	Remote Conventional Zone Module (Siemens CZM-1B6).....	376.92	30.57
28 46 13 31-0613	EA	Short Circuit Line Isolator Module (Siemens Model LIM-1).....	232.53	30.57
28 46 13 31-0614	EA	Four Circuit Conventional Zone Module (Siemens CZM-4).....	976.78	30.57
28 46 13 31-0615	EA	12" x 16" x 3" Enclosure For PAD-3 (Siemens EN-PAD).....	349.97	45.85
28 46 13 31-0616	EA	Lexan Window For RCC (Siemens GENBOX-WD).....	237.91	24.45
28 46 13 31-0617	EA	Input Driver Module (Siemens MID-16).....	639.87	30.57
28 46 13 31-0618	EA	Programmable Output Driver Module (Siemens MOD-16).....	639.87	30.57
28 46 13 31-0619	EA	MXL Output/Input Module (Siemens MOI-7).....	1,024.91	30.57
28 46 13 31-0620	EA	Two Slot Network Option Module Card Cage (Siemens MOM-2).....	544.79	30.57
28 46 13 31-0621	EA	Four Slot Network Option Module Card Cage (Siemens MOM-4).....	858.22	30.57
28 46 13 31-0622	EA	12 Amperes, 220 Volt AC, Power Supply For MXL (Siemens MPS-12/220).....	2,109.79	91.71
28 46 13 31-0623	EA	12 Amperes, 240 Volt AC, Power Supply For MXL (Siemens MPS-12/240).....	2,109.79	91.71
28 46 13 31-0624	EA	Network Interface Module (Siemens NIM-1W).....	1,529.69	30.57
28 46 13 31-0625	EA	U.L. Listed Parallel Printer (Siemens PAL-1).....	4,001.04	122.28
28 46 13 31-0626	EA	Peripheral Interface Module, Model PIM-1 (Siemens 500-691324).....	447.35	30.57
28 46 13 31-0627	EA	Surface Mounted Remote Command Center (Siemens RCC-1).....	4,351.23	611.40



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0628 EA Enclosure And Door With Lens For RCC-1 (Siemens RCC-1DL).....	536.67	61.14
28 46 13 31-0629 EA Flush Mounted Remote Command Center (Siemens RCC-1F).....	4,351.23	611.40
28 46 13 31-0630 EA Enclosure And Door With Lens For RCC-1F (Siemens RCC-1FDL).....	550.75	61.14
28 46 13 31-0631 EA Remote Control Center With System Control Functions And Sequential Event Display (Siemens RCC-2).....	3,335.81	611.40
28 46 13 31-0632 EA MXL/MXLV Remote Annunciator/Keyboard With Enhanced Display (Siemens RCC-3).....	5,013.31	611.40
28 46 13 31-0633 EA RCC-2/RSE-1 Trim Ring (Siemens RCF-1).....	83.40	15.28
28 46 13 31-0634 EA Remote Diagnostics Module For MXL (Siemens RDM-MXL).....	6,226.56	61.14
28 46 13 31-0635 EA Remote Diagnostics Module For PC (Siemens RDM-PC).....	13,266.44	61.14
28 46 13 31-0636 EA Releasing End Of Line Module (Siemens REL-EOL).....	189.10	30.57
28 46 13 31-0637 EA 36 Zone Tabular Graphic Annunciator With Restart System Key (Siemens RSA-MBSC).....	3,969.15	61.14
28 46 13 31-0638 EA 36 Zone Tabular Graphic Annunciator (Siemens RSA-MBTL).....	3,789.54	61.14
28 46 13 31-0639 EA 8-3/8" x 6-1/4" Remote Control Enclosure (Siemens RSE-1).....	2,006.58	122.28
28 46 13 31-0640 Complete MXL And MXLV System Packages Without Enclosure (28 46 13 31-0606)		
28 46 13 31-0641 EA MXL System Electronics Package Including One MMB-3, One Display/Control Keyboard, One MDL-1, One MKB-2, One Mps-6, One MOM-2, One ALD-2I And One PIM-1 (Siemens MXL-SS-EP).....	14,475.72	611.40
Note: MMB-3 is a MXL/MXLV main control board. MDL-1 is a clear lens. MKB-2 is a MXL/MXLV display/keyboard module with hinged frame. MPS-6 is a 6 Amp power supply for MXL. MOM-2 is a two slot network option module card cage. ALD-2I is a two circuit analog loop driver. PIM-1 is a peripheral interface module.		
28 46 13 31-0642 EA MXL Voice System Electronics Package Including One MMB-3, One MKB-2, One MPS-6, One ACM-1, One TBM-2, One MMM-1, One OMM-2, One ZAC-30, One OCC-1, One MHD-5, One VSM-1 And Four VSB-1 (Siemens MXLV-SS-EP).....	18,875.49	611.40
Note: MMB-3 is a MXL/MXLV main control board. MKB-2 is a MXL/MXLV display/keyboard module with hinged frame. MPS-6 is a 6 Amp power supply for MXL. ACM-1 is an audio control module. TBM-2 is a voice terminal module. MMM-1 is a master microphone module. OMM-2 is a two half width slot card cage. ZAC-30 is a MXLV zone amplifier card. OCC-1 is a MXLV output control card. MHD-5 is a deadfront panel for MSE-2 backbox. VSM-1 is an eight switch module. VSB-1 is a module blank with overlay.		
28 46 13 31-0643 EA MXLV Demonstration Panel (Siemens MXLV DEMO).....	39,423.44	611.40
28 46 13 31-0644 MXL Basic System (28 46 13 31-0606)		
28 46 13 31-0645 EA MXL/MXLV Main Control Board (Siemens MMB-3).....	8,939.60	611.40
28 46 13 31-0646 EA MXL System Electronics Package Including One MMB-3, One DE-2 And One DPU (Siemens MMB-DPU-ENCL).....	11,567.97	611.40
Note: MMB-3 is a MXL/MXLV main control board. DE-2 is an enclosure for document storage. DPU is a handheld device programming and testing unit.		
28 46 13 31-0647 EA MXL/MXLV Display/Keyboard Module With Hinged Frame (Siemens MKB-2).....	3,346.98	61.14
28 46 13 31-0648 EA MXL/MXLV Keyboard With Enhanced Display With Hinged Frame (Siemens MKB-5).....	4,194.54	61.14
28 46 13 31-0649 EA 6 Amperes Power Supply For MXL (Siemens MPS-6).....	1,451.23	91.71
28 46 13 31-0650 EA 220/240 Volt AC Adapter Cable (Siemens CIA-12).....	106.87	15.28
28 46 13 31-0651 MXL/MXLV System Expansion Accessories (28 46 13 31-0606)		
28 46 13 31-0652 EA MXL Remote Power Supply Module (Siemens PSR-1).....	1,783.45	91.71
28 46 13 31-0653 EA Style 4 Communication Module (Siemens NET-4).....	365.18	30.57
28 46 13 31-0654 EA Style 7 Communication Module (Siemens NET-7).....	666.87	30.57
28 46 13 31-0655 EA MXL/MXLV Intelligent Control Point, B6 Chip (Siemens ICP-B6).....	399.22	30.57
28 46 13 31-0656 Peripheral Devices (28 46 13 31-0535)		
28 46 13 31-0657 Thermal Detectors (28 46 13 31-0656)		
28 46 13 31-0658 EA Rate Of Rise And 135 Degree F Fixed Temperature Thermal Detector (Siemens DT-135R).....	149.23	45.85
28 46 13 31-0659 EA Rate Of Rise And 200 Degree F Fixed Temperature Thermal Detector (Siemens DT-200R).....	149.23	45.85
28 46 13 31-0660 EA 135 Degree F Fixed Temperature Thermal Detector (Siemens DT-135F).....	149.23	45.85
28 46 13 31-0661 EA 200 Degree F Fixed Temperature Thermal Detector (Siemens DT-200F).....	149.23	45.85
28 46 13 31-0662 EA Weatherproof 135 Degree F Rate Compensation/Fixed Temperature Thermal Detector (Siemens DT-135WP).....	237.27	45.85
28 46 13 31-0663 EA Weatherproof 200 Degree F Rate Compensation/Fixed Temperature Thermal Detector (Siemens DT-200WP).....	237.27	45.85
28 46 13 31-0664 EA Explosion Proof 190 Degree F Rate Compensation/Fixed Temperature Thermal Detector (Siemens DT-190EP).....	592.97	45.85
28 46 13 31-0665 Beam Smoke Detector (28 46 13 31-0656)		
28 46 13 31-0666 EA Linear Beam Smoke Detector (Siemens PBA-1191).....	2,820.19	45.85
28 46 13 31-0667 EA Base For Linear Beam Smoke Detector (Siemens PBB-1191).....	321.70	15.28
28 46 13 31-0668 EA 20cm x 20cm Flat Reflector For Linear Beam Smoke Detector (Siemens PBR-1192).....	325.22	15.28
28 46 13 31-0669 EA 10cm x 10cm Flat Reflector For Linear Beam Smoke Detector (Siemens PBR-1193).....	165.57	15.28
28 46 13 31-0670 Bases For Detectors (28 46 13 31-0656)		
28 46 13 31-0671 EA Detector Base (Siemens DB-11).....	48.18	15.28
28 46 13 31-0672 EA Universal Base (Siemens DB-3S).....	44.66	15.28
28 46 13 31-0673 Manual Stations (28 46 13 31-0656)		
28 46 13 31-0674 EA Weatherproof Metal Manual Pull Station With Key (Siemens MSM-K-WP).....	353.93	36.68
28 46 13 31-0675 Addressable Devices (28 46 13 31-0535)		
28 46 13 31-0676 Intelligent Detectors And Devices For Firefinder XLS And FS-250 (28 46 13 31-0675)		

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 46 13 31-0677	EA	Addressable Fireprint Fire Detector (Siemens HFP-11).....	293.62	45.85
28 46 13 31-0678	EA	Addressable Thermal Fire Detector (Siemens HFPT-11).....	252.53	45.85
28 46 13 31-0679	EA	Relay Base For H-Series Intelligent Detectors (Siemens DB-HR).....	204.40	45.85
28 46 13 31-0680	EA	Ceiling Mounted Remote Alarm Indicator (Siemens RL-HC).....	135.14	45.85
28 46 13 31-0681	EA	Wall Mounted Remote Alarm Indicator (Siemens RL-HW).....	135.14	45.85
28 46 13 31-0682	EA	Addressable Single Action Manual Pull Station (Siemens HMS-S).....	308.83	30.57
28 46 13 31-0683	EA	Addressable Double Action Manual Pull Station (Siemens HMS-D).....	294.75	30.57
28 46 13 31-0684	EA	Single Input Intelligent Initiating Devices Interface Module (Siemens HTRI-S).....	232.53	30.57
28 46 13 31-0685	EA	Dual Input Intelligent Initiating Devices Interface Module (Siemens HTRI-D).....	285.35	30.57
28 46 13 31-0686	EA	Single Input Intelligent Initiating Devices Interface Module With Relay (Siemens HTRI-R).....	285.35	30.57
28 46 13 31-0687	EA	Mini Single Input Intelligent Initiating Devices Interface Module (Siemens HTRI-M).....	214.92	30.57
28 46 13 31-0688	EA	Line Isolator Module (Siemens HLIM).....	221.96	30.57
28 46 13 31-0689	EA	Remote Convention Zone Module (Siemens HZM).....	329.96	30.57
28 46 13 31-0690	EA	Intelligent Control Point Module (Siemens HCP).....	419.18	30.57
28 46 13 31-0691	EA	Handheld Programming And Testing Unit (Siemens DPU).....	1,861.85	
28 46 13 31-0692	EA	DPU Carrying Case (Siemens DPU-C1).....	285.99	
28 46 13 31-0693	EA	Label Printer And Carrying Case (Siemens DPU-PRT).....	3,188.41	30.57

28 46 13 31-0694 Air Duct Housings And Detectors (28 46 13 31-0675)

28 46 13 31-0695	EA	Air-Duct Housing (Siemens AD2-P).....	338.86	24.45
28 46 13 31-0696	EA	Air-Duct Housing With Relay (Siemens AD2-XHR).....	383.47	24.45
28 46 13 31-0697	EA	Weatherproof Enclosure For Duct Housing (Siemens WP-2000).....	306.49	30.57
28 46 13 31-0698	EA	6" To 1' Duct Sampling Tube (Siemens ST-10).....	41.82	9.17
28 46 13 31-0699	EA	>1' To 3' Duct Sampling Tube (Siemens ST-25).....	51.45	12.23
28 46 13 31-0700	EA	>3' To 5' Duct Sampling Tube (Siemens ST-50).....	64.61	15.28
28 46 13 31-0701	EA	>5' To 10' Duct Sampling Tube (Siemens ST-100).....	75.42	18.34

28 46 13 31-0702 Intelligent Initiating Devices For MXL, MXL-LQ And MXLV (28 46 13 31-0675)

28 46 13 31-0703	EA	Addressable Fireprint Fire Detector (Siemens FP-11).....	306.53	45.85
28 46 13 31-0704	EA	Addressable Thermal Fire Detector (Siemens FPT-11).....	263.10	45.85
28 46 13 31-0705	EA	Intelligent Ionization Smoke Detector (Siemens ILI-1).....	339.40	45.85
28 46 13 31-0706	EA	Addressable Single Action Manual Pull Station (Siemens MSI-10B).....	300.62	30.57
28 46 13 31-0707	EA	Addressable Double Action Manual Pull Station (Siemens MSI-20B).....	332.31	30.57
28 46 13 31-0708	EA	Single Input Intelligent Initiating Devices Interface Module (Siemens TRI-S).....	304.14	30.57
28 46 13 31-0709	EA	Dual Input Intelligent Initiating Devices Interface Module (Siemens TRI-D).....	337.01	30.57
28 46 13 31-0710	EA	Single Input Intelligent Initiating Devices Interface Module With Relay (Siemens TRI-R).....	337.01	30.57

28 46 13 31-0711 Detector Universal Bases (28 46 13 31-0675)

28 46 13 31-0712	EA	Detector Base With Relay (Siemens DB-X11RS).....	142.09	15.28
28 46 13 31-0713	EA	PE-11 To DB-3 Base Adapter (Siemens DB-ADPT).....	71.66	15.28
28 46 13 31-0714	EA	Locking Kit (Siemens LK-11).....	13.17	
28 46 13 31-0715	EA	Detector Base With Relay (Siemens DB-X3RS).....	142.09	15.28
28 46 13 31-0716	EA	Audible Base For Addressable Fireprint Fire Detector (Siemens ADBX-11).....	165.57	15.28
28 46 13 31-0717	EA	Retrofit Adapter Box For Audible Bases Ionization Detector Air Duct (Siemens ADB-BOX).....	68.13	15.28
28 46 13 31-0718	EA	Flush Trim Ring For Bases (Siemens RA-ADB).....	32.43	9.17
28 46 13 31-0719	EA	Seal For DB-11 (Siemens DB11-SEAL).....	16.00	
28 46 13 31-0720	EA	Gasket For DB-11 (Siemens DB-SEAL).....	17.55	
28 46 13 31-0721	EA	Detector Guard Housing (Siemens DGH-11).....	209.00	15.28
28 46 13 31-0722	EA	Small Detector Base (Siemens DB-11E).....	52.87	15.28
28 46 13 31-0723	EA	Audible Base For Series 3 (Siemens ADBI-60A).....	186.70	15.28
28 46 13 31-0724	EA	Base Plug (Siemens DB-11-DP).....	13.12	

28 46 13 31-0725 Air Duct Smoke Detectors (28 46 13 31-0675)

28 46 13 31-0726	EA	Intelligent Remote Duct Relay Module (Siemens DA-X3SR).....	156.23	30.57
28 46 13 31-0727	EA	Weatherproof Enclosure For Duct Housing (Siemens EAD-3).....	820.65	30.57

28 46 13 31-0728 Notification Devices (28 46 13 31-0535)**28 46 13 31-0729 Synchronization Control Devices** (28 46 13 31-0728)

28 46 13 31-0730	EA	Dual Synchronization Control Module (Siemens DSC).....	232.53	30.57
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28 46 13 31-0731 Stand Alone Strobes (28 46 13 31-0728)

28 46 13 31-0732	EA	Wall Mounted Multi-Candela Strobe (Siemens ZR-MC-R).....	191.49	45.85
28 46 13 31-0733	EA	Wall Mounted High, Multi-Candela Strobe (Siemens ZR-HMC-R).....	209.10	45.85
28 46 13 31-0734	EA	Ceiling Mounted Multi-Candela Strobe (Siemens ZR-MC-CR).....	191.49	45.85
28 46 13 31-0735	EA	Ceiling Mounted High, Multi-Candela Strobe (Siemens ZR-HMC-CR).....	209.10	45.85
28 46 13 31-0736	EA	Ceiling Mounted High Multi-Candela Strobe (Siemens ST-HMC-CW).....	209.10	45.85
28 46 13 31-0737	EA	Ceiling Mounted Multi-Candela Strobe (Siemens ST-MC-CW).....	191.49	45.85
28 46 13 31-0738	EA	Retrofit Plate Multi-Candela Strobe (Siemens ST-MC-RETRO-R).....	222.01	45.85
28 46 13 31-0739	EA	Weatherproof Ceiling Mounted Strobe (Siemens ST-75-CR-WP).....	212.62	45.85
28 46 13 31-0740	EA	Weatherproof Wall Mounted Strobe (Siemens ST-75-R-WP).....	212.62	45.85
28 46 13 31-0741	EA	Weatherproof Ceiling Mounted High Multi-Candela Strobe (Siemens ST-HMC-CR-WP).....	227.88	45.85
28 46 13 31-0742	EA	Weatherproof Wall Mounted High Multi-Candela Strobe (Siemens ST-HMC-R-WP).....	227.88	45.85

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0743 Horns And Strobes <small>(28 46 13 31-0728)</small>						
	EA			Wall Mounted Multi-Candela Horn/Strobe (Siemens SE-MC-R).....	260.75	45.85
	EA			Wall Mounted High Multi-Candela Horn/Strobe (Siemens SE-HMC-R).....	276.01	45.85
	EA			Wall Mounted Horn (Siemens SE-R).....	149.23	45.85
	EA			Ceiling Mounted Multi-Candela Horn/Strobe (Siemens SE-MC-CR).....	260.75	45.85
	EA			Ceiling Mounted High Multi-Candela Horn/Strobe (Siemens SE-HMC-CR).....	276.01	45.85
	EA			Ceiling Mounted Horn (Siemens SEC-R).....	156.27	45.85
	EA			Wall Mounted Low Profile Multi-Candela Horn/Strobe (Siemens SEF-MC-R).....	260.75	45.85
	EA			Wall Mounted Low Profile High Multi-Candela Horn/Strobe (Siemens SEF-HMC-R).....	276.01	45.85
	EA			Wall Mounted Low Profile Horn (Siemens SEF-R).....	149.23	45.85
	EA			Ceiling Mounted Low Profile Multi-Candela Horn/Strobe (Siemens SEF-MC-CW).....	260.75	45.85
	EA			Ceiling Mounted Low Profile High Multi-Candela Horn/Strobe (Siemens SEF-HMC-CW).....	276.01	45.85
	EA			Ceiling Mounted Low Profile Horn (Siemens SEF-CR).....	156.27	45.85
	EA			Mini Horn (Siemens MH-R).....	123.41	45.85
	EA			Indoor/Outdoor Multi Tone Horn (Siemens MTH-R).....	158.62	45.85
	EA			Indoor/Outdoor Multi Tone, Multi-Candela Horn/Strobe (Siemens MTH-MC-R).....	245.49	45.85
	EA			Industrial Tri-Tone Horn (Siemens ASR).....	708.01	45.85
	EA			Wall Mounted Horn (Siemens HS-R).....	158.62	45.85
	EA			Wall Mounted Multi-Candela Horn/Strobe (Siemens HS-MC-R).....	246.66	45.85
	EA			Wall Mounted High Multi-Candela Horn/Strobe (Siemens HS-HMC-R).....	265.45	45.85
	EA			6" Motor Bell (Siemens MBDC-6).....	182.10	45.85
	EA			10" Motor Bell (Siemens MBDC-10).....	199.71	45.85
28 46 13 31-0765 Mounting Accessories <small>(28 46 13 31-0728)</small>						
	EA			Concealed Conduit Adapter Plate (Siemens APS-R).....	44.66	15.28
	EA			4" x 1-1/2" Surface Mounted Back Box (Siemens BBS-R).....	44.66	15.28
	EA			4" x 2-1/8" Surface Mounted Back Box (Siemens DBBS-R).....	45.83	15.28
	EA			Red Weatherproof Surface Mount Backbox (Siemens MT-SUR-BOX).....	74.00	15.28
	EA			White Weatherproof Surface Mount Backbox (Siemens MT-SUR-BOX-W).....	58.74	15.28
	EA			Surface Mounted Speaker Backbox (Siemens SBBS-R).....	62.27	15.28
	EA			Surface Mounted Speaker Backbox (Siemens SBL2S-R).....	66.96	15.28
	EA			Square Semi-Flush Extension Ring (Siemens SERS-R).....	52.87	15.28
	EA			Semi-Flush Plate (Siemens SFPS-R).....	43.48	15.28
	EA			Square Surface Backbox (Siemens SHBBS-R).....	52.87	15.28
	EA			Horn Adapter Plate (Siemens SHMPS-R).....	50.53	15.28
	EA			Ceiling Speaker Extension Ring (Siemens SPEXT-R).....	44.66	15.28
	EA			Wall Mounted Surface Mounted Speaker Backbox (Siemens SPSB-R).....	58.74	15.28
	EA			Wall Mounted Surface Mounted Speaker/Strobe Backbox (Siemens SPSSB-R).....	62.27	15.28
	EA			Weatherproof Speaker Backbox (Siemens WBBS-R).....	59.92	15.28
	EA			Weatherproof Speaker Backbox With 3/4" Knockout (Siemens WBBS-R-3/4T-3/4B).....	66.96	15.28
	EA			Weatherproof Flush Plate (Siemens WFPAS-R).....	66.96	15.28
	EA			Weatherproof Horn Flush Plate (Siemens WFPS-R).....	66.96	15.28
	EA			Weatherproof Horn Backbox (Siemens WPBBS-R).....	62.27	15.28
	EA			Weatherproof Strobe Backbox (Siemens WPSBBS-R).....	62.27	15.28
	EA			Surface Mounted Weatherproof Backbox Kit (Siemens WPS-KIT).....	44.66	15.28
	EA			Z Series Backbox (Siemens ZBB-R).....	50.53	15.28
28 46 13 31-0788 Door Holders <small>(28 46 13 31-0728)</small>						
	EA			120 Volt AC Concealed Wiring Fire Door Holder (Siemens SDH-2A).....	394.58	45.85
	EA			24 Volt DC Concealed Wiring Fire Door Holder (Siemens SDH-2D).....	394.58	45.85
28 46 13 31-0791 Voice Equipment <small>(28 46 13 31-0535)</small>						
28 46 13 31-0792 Voicecom <small>(28 46 13 31-0791)</small>						
	EA			Emergency Voice Alarm Communication System, 3.5 Amp Power Supply And Battery Charger, 50W Amplifier, Battery Cables, Main Control Board With One Speaker Circuit, Paging Microphone And Enclosure With Deadfront And Space For Five Modules (Siemens VOICECOM).....	6,053.39	611.40
	EA			Emergency Voice Alarm Communication System, 3.5 Amp Power Supply And Battery Charger, Two 50W Amplifier, Battery Cables, Main Control Board With One Speaker Circuit, Paging Microphone, Enclosure With Deadfront And Space For 11 Modules, Auxiliary Power Supply, Four PS-AUX Strobe Zone Cables And One AM-25-50 Speaker Zone Cables (Siemens VOICECOM-L).....	9,633.78	611.40
28 46 13 31-0795 Johnson Controls Fire Alarm <small>(28 46 13 31)</small>						
	EA			Intelligent Addressable ION Detector; With FlashScan. (Johnson Controls, Inc. #1951J).....	228.55	45.85
	EA			Intelligent Addressable Photo Detector; With FlashScan. (Johnson Controls, Inc. #2951J).....	226.00	45.85
	EA			Intelligent Addressable Photo/Thermal Detector; With FlashScan. (Johnson Controls, Inc. #2951TJ).....	284.29	45.85
	EA			Acclimate™ Intelligent Photo Thermal Detector; With FlashScan. (Johnson Controls, Inc. #2951TMJ).....	283.48	45.85
	EA			411UD, 4 Channel Dual. (Johnson Controls, Inc. #411UD).....	791.38	61.14
	EA			Intelligent Addressable High Temperature Heat Detector; With FlashScan. (Johnson Controls, Inc. #5951HJ).....	215.55	45.85
	EA			Intelligent Addressable High Temperature Heat Detector; With FlashScan. (Johnson Controls, Inc. #5951J).....	191.43	45.85
	EA			Intelligent Addressable Rate-of-Rise Thermal Detector; With FlashScan. (Johnson Controls, Inc. #5951RJ).....	186.32	45.85
	EA			Intelligent Addressable Laser Detector; Low Profile, Use With IFC Series Panels Only. (Johnson Controls, Inc. #7351J).....	579.40	45.85
	EA			100 Watts Audio Amplifier At 70.7 VRMS With Built-in Tone Generator, 120 Volt AC (Johnson Controls, Inc. #AA-100).....	2,842.27	91.71
	EA			AUDIO Amplifier, 100 Watts, 230 Voltage AC (Johnson Controls, Inc. #AA-100E).....	2,753.36	91.71

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46	13 31-0807	EA	120 Watts Audio Amplifier At 25 VRMS With Built-in Tone Generator, 120 Voltage AC (Johnson Controls, Inc. #AA-120).....	2,801.33	91.71
28 46	13 31-0808	EA	AUDIO Amplifier, 120 Watts, 230 Voltage AC (Johnson Controls, Inc. #AA-120E).....	2,681.56	91.71
28 46	13 31-0809	EA	30 Watts Audio Amplifier At 25 VRMS, 120 Voltage AC (Johnson Controls, Inc. #AA-30).....	1,297.92	91.71
28 46	13 31-0810	EA	AUDIO Amplifier, 30 Watts, 230 Voltage AC (Johnson Controls, Inc. #AA-30E).....	1,297.92	91.71
28 46	13 31-0811	EA	Annunciator Control Module With; 16 Red Alarm LED's, 16 Yellow Trouble LED's, And 16 Control Switches, On-line, System Trouble Led, And Local Sounder, Local Acknowledge And Lamp Test Switch, Supports 1, 2 Or 3 AEM-16AT Expander Modules. (Johnson Controls, Inc. #ACM-16AT).....	1,310.22	30.57
28 46	13 31-0812	EA	IFC Series ACS Annunciator; Up To 96 Points Of Annunciation With Alarm Or Active LED, Trouble LED And Switch Per Circuit. Active/Alarm LEDs Can Be Programmed (By Powered Up Switch Selection) By Point To Be Red, Green Or Yellow And The Trouble LED Is Always Yellow. Expandable With One, Two Or Three AEM-24AT's. (Johnson Controls, Inc. #ACM-24AT).....	1,363.01	30.57
28 46	13 31-0813	EA	Annunciator Control Module; Includes 32 Red Alarm LED's, System Trouble LED And On-line LED, Local Acknowledge, Lamp Test Switch, And Local Piezo Sounder, Supports One AEM-32A Expander Module. (Johnson Controls, Inc. #ACM-32A).....	999.75	30.57
28 46	13 31-0814	EA	IFC Series ACS Annunciator; Up To 96 Points Of Annunciation With Alarm Or Active LED Per Circuit. Active/Alarm LEDs Can Be Programmed (By Powered Up Switch Selection) In Groups Of 24 To Be Red, Green Or Yellow. Expandable To 96 Points With One AEM-48A. (Johnson Controls, Inc. #ACM-48A).....	999.75	30.57
28 46	13 31-0815	EA	Annunciator, Relay, Form C. (Johnson Controls, Inc. #ACM-8R).....	703.64	30.57
28 46	13 31-0816	EA	Charger Power Supply - 6 Or 10 Amperes; Mounts In CAB-PS1, CAB-3/4, EQ Cabx, BB-25, Or CHS-PS1; Comes With The PK-PPS Programming Utility. Windows® PC And USB Cable Required For Programming. (Johnson Controls, Inc. #ACPS-610).....	2,275.85	61.14
28 46	13 31-0817	EA	Annunciator Expander Module With: 16 Red Alarm LED's, 16 Yellow Trouble LED's, 16 Control Switches, Cable For Connection To The ACM-16AT Master. (Johnson Controls, Inc. #AEM-16AT).....	999.75	30.57
28 46	13 31-0818	EA	Annunciator Expander Module; 24 Alarm And Trouble LEDs, Expands The ACM-24AT To 48, 72 Or 96 Points. (Johnson Controls, Inc. #AEM-24AT).....	1,039.43	30.57
28 46	13 31-0819	EA	Annunciator Expander Module With: 32 Red Alarm LED's, Cable For Connection To The ACM-32A Master. (Johnson Controls, Inc. #AEM-32A).....	895.63	30.57
28 46	13 31-0820	EA	Annunciator Expander Module; 48 Alarm LEDs, Expands The ACM-48A To 96 Points. (Johnson Controls, Inc. #AEM-48A).....	895.63	30.57
28 46	13 31-0821	EA	Back Box, Flush Or Surface Mount; Requires A Door And Telephone Chassis. (Johnson Controls, Inc. #AFAWS-BX).....	146.56	27.51
28 46	13 31-0822	EA	Receiver, Multimode Fiber. (Johnson Controls, Inc. #AFL-RM).....	1,367.78	61.14
28 46	13 31-0823	EA	Receiver, Singlemode Fiber. (Johnson Controls, Inc. #AFL-RS).....	2,993.71	61.14
28 46	13 31-0824	EA	Transmit, Multimode Fiber. (Johnson Controls, Inc. #AFL-TM).....	1,367.78	61.14
28 46	13 31-0825	EA	Transmit, Singlemode Fiber. (Johnson Controls, Inc. #AFL-TS).....	2,993.71	61.14
28 46	13 31-0826	EA	Base, Smoke Detector, 2 Wire. (Johnson Controls, Inc. #B110LP).....	52.10	15.28
28 46	13 31-0827	EA	Base, Smoke Detector, Intelligent. (Johnson Controls, Inc. #B224BI).....	144.73	15.28
28 46	13 31-0828	EA	Base, Smoke Detector, Intelligent. (Johnson Controls, Inc. #B224RB).....	136.35	15.28
28 46	13 31-0829	EA	Base, Smoke Detector, 2 Wire. (Johnson Controls, Inc. #B401).....	55.68	15.28
28 46	13 31-0830	EA	Intelligent Detector Base, Without Flange. (Johnson Controls, Inc. #B501J).....	49.74	15.28
28 46	13 31-0831	EA	Battery Cabinet, Lockable. (Johnson Controls, Inc. #BB-100).....	994.56	61.14
28 46	13 31-0832	EA	Projected Beam Smoke Detector, Single-ended Reflected Type, Includes Trouble Relay, Transmitter/Receiver In One Unit. (Johnson Controls, Inc. #Beam1224).....	2,336.99	91.71
28 46	13 31-0833	EA	Same As Beam1224 With Built-in Sensitivity Test Filter. (Johnson Controls, Inc. #Beam1224S).....	2,471.60	91.71
28 46	13 31-0834	EA	Mounting Kit, Long RG, Beam. (Johnson Controls, Inc. #BeamLRK).....	272.85	15.28
28 46	13 31-0835	EA	Mounting Kit, Beam Detect. (Johnson Controls, Inc. #BeamMMK).....	183.13	15.28
28 46	13 31-0836	EA	Digital Audio Amplifier, 50 Watts, 25 VRMS (Johnson Controls, Inc. #DAA-5025).....	2,338.97	91.71
28 46	13 31-0837	EA	Digital Audio Amplifier, 50 Watts, 25 VRMS, Multi-Fiber (Johnson Controls, Inc. #DAA-5025F).....	2,157.52	91.71
28 46	13 31-0838	EA	Digital Audio Amplifier, 50 Watts, 25 VRMS, Single-Fiber (Johnson Controls, Inc. #DAA-5025SF).....	2,157.52	91.71
28 46	13 31-0839	EA	Digital Audio Amplifier, 50 Watts, 70 VRMS (Johnson Controls, Inc. #DAA-5070).....	2,534.97	91.71
28 46	13 31-0840	EA	Amplifier, Digital Audio. (Johnson Controls, Inc. #DAA-5070E).....	2,336.99	91.71
28 46	13 31-0841	EA	Digital Audio Amplifier, 50 Watts, 70 VRMS, Multi-Fiber (Johnson Controls, Inc. #DAA-5070F).....	2,336.99	91.71
28 46	13 31-0842	EA	Digital Audio Amplifier, 50 Watts, 70 VRMS, Single-Fiber (Johnson Controls, Inc. #DAA-5070SF).....	2,336.99	91.71
28 46	13 31-0843	EA	Digital Audio Amplifier, 75 Watts, 25 VRMS (Johnson Controls, Inc. #DAA-7525).....	2,798.47	91.71
28 46	13 31-0844	EA	Digital Audio Amplifier, 75 Watts, 25 VRMS, Multi Fiber (Johnson Controls, Inc. #DAA-7525F).....	2,798.47	91.71
28 46	13 31-0845	EA	Digital Audio Amplifier, 75 Watts, 25 VRMS, Single Fiber (Johnson Controls, Inc. #DAA-7525SF).....	2,798.47	91.71
28 46	13 31-0846	EA	Innovairflex Intelligent. (Johnson Controls, Inc. #DNR).....	287.39	30.57
28 46	13 31-0847	EA	Innovairflex Duct Detect. (Johnson Controls, Inc. #DNRW).....	444.31	30.57
28 46	13 31-0848	EA	Innovairflex Sample Tube. (Johnson Controls, Inc. #DST1).....	38.75	12.23
28 46	13 31-0849	EA	Innovairflex Sample Tube. (Johnson Controls, Inc. #DST1.5).....	42.44	12.23
28 46	13 31-0850	EA	Innovairflex Sample Tube. (Johnson Controls, Inc. #DST10).....	105.71	18.34
28 46	13 31-0851	EA	Innovairflex Sample Tube. (Johnson Controls, Inc. #DST3).....	50.71	12.23
28 46	13 31-0852	EA	Innovairflex Sample Tube. (Johnson Controls, Inc. #DST5).....	62.59	15.28
28 46	13 31-0853	EA	Digital Voice Command, Analog Output. (Johnson Controls, Inc. #DVC-AO).....	446.97	30.57
28 46	13 31-0854	EA	Digital Voice Command, Keypad. (Johnson Controls, Inc. #DVC-KD).....	741.45	61.14
28 46	13 31-0855	EA	Equipment Cabinet Used To House DAA Digital Amplifiers, XP10/6 Series Transponders, AA-Amplifiers, ACPS-610 Or Amperes-24; B Size, Black. (Johnson Controls, Inc. #EQBB-B4).....	609.04	91.71
28 46	13 31-0856	EA	Equipment Cabinet Used To House DAA Digital Amplifiers, XP10/6 Series Transponders, AA-Amplifiers, ACPS-610 Or Amperes-24; C Size, Black. (Johnson Controls, Inc. #EQBB-C4).....	850.72	91.71
28 46	13 31-0857	EA	Equipment Cabinet Used To House DAA Digital Amplifiers, XP10/6 Series Transponders, AA-Amplifiers, ACPS-610 Or AMPs-24; D Size, Black. (Johnson Controls, Inc. #EQBB-D4).....	931.48	91.71
28 46	13 31-0858	EA	Equipment Cabinet Door; B Size Black. (Johnson Controls, Inc. #EQDR-B4).....	498.76	12.23
28 46	13 31-0859	EA	Equipment Cabinet Door; C Size Black. (Johnson Controls, Inc. #EQDR-C4).....	753.05	12.23
28 46	13 31-0860	EA	Equipment Cabinet Door; D Size Black. (Johnson Controls, Inc. #EQDR-D4).....	827.84	12.23
28 46	13 31-0861	EA	6.0 Amperes, 120 Volt AC Remote Charger Power Supply (Johnson Controls, Inc. #FCPS-24S6)..... Note: Includes Main Printed Circuit Board, Transformers And Installation Instructions	982.31	122.28
28 46	13 31-0862	EA	8 Amperes, 120 Volt AC Remote Charger Power Supply (Johnson Controls, Inc. #FCPS-24S8)..... Note: Includes Main Printed Circuit Board, Transformers And Installation Instructions	1,295.62	122.28
28 46	13 31-0863	EA	80 Character Display Annunciator. "Security Keypad" Mechanical Design. For Use With The IFC-320, JCPU2-640, JCPU-640 And IFC-400/300 (Rev 3.62+) Only. (Johnson Controls, Inc. #FDU-80G).....	1,233.30	91.71
28 46	13 31-0864	EA	Fireman's Telephone Hand Set. (Johnson Controls, Inc. #FHS).....	227.99	15.28
28 46	13 31-0865	EA	Fire Phone Storage Cabinet, Recessed, Holds 6 Phones. (Johnson Controls, Inc. #FHSC-R).....	647.99	30.57

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0866 EA Door Holder, Magnetic, Floor. (Johnson Controls, Inc. #FM980).....	337.41	45.85
28 46 13 31-0867 EA Door Holder, Magnetic, Wall. (Johnson Controls, Inc. #FM996).....	273.77	45.85
28 46 13 31-0868 EA Door Holder, Magnetic, Wall. (Johnson Controls, Inc. #FM998).....	288.25	45.85
28 46 13 31-0869 EA Addressable Beam Detector. (Johnson Controls, Inc. #FSB-200).....	2,386.54	61.14
28 46 13 31-0870 EA Addressable Beam Detector With Remote Test Feature. (Johnson Controls, Inc. #FSB-200S).....	2,917.68	61.14
28 46 13 31-0871 EA Intelligent Addressable HARSH (Hostile Area Smoke Head) Detector; Photo, Requires B501B-FTXJ Base. (Johnson Controls, Inc. #FTX-P2J).....	879.37	30.57
28 46 13 31-0872 EA IFC-320 Intelligent Fire Alarm Panel; Single Printed Circuit Board With One SLC Loop (318 Devices), Back-lit, 80 Character Display, System And Programming Keypad And 6.0 Amperes Power Supply, 120 Volt AC, (Johnson Controls, Inc. #IFC-320).....	5,935.57	489.12
Note: Includes Door, Dress Panel And Back Box, Black		
28 46 13 31-0873 EA Upgrade Kit, ORG BLD, 640. (Johnson Controls, Inc. #IFC-640UG).....	2,943.46	61.14
28 46 13 31-0874 EA Workstation Only Workstation GUI Software And Hardware Package. (Johnson Controls, Inc. #IFI).....	38,827.59	733.68
28 46 13 31-0875 EA Workstation With NFN Fiber PC Card Workstation GUI Software And Hardware Package. Includes NFN Gateway (JNFN-GW-PC-F) Fiber Version. (Johnson Controls, Inc. #IFI-F).....	42,416.87	733.68
28 46 13 31-0876 EA Workstation With Echelon Wire PC Card Workstation GUI Software And Hardware Package For Building Systems Integration, WSSUP Workstation Supervisor. Includes Echelon® Gateway (ECH-GW-PC-W) Wire Version. (Johnson Controls, Inc. #IFI-IP).....	47,800.81	733.68
28 46 13 31-0877 EA Workstation With NFN Wire PC Card Workstation GUI Software And Hardware Package. Includes NFN Gateway (JNFN-GW-PC-W) Wire Version. (Johnson Controls, Inc. #IFI-W).....	42,416.87	733.68
28 46 13 31-0878 EA Annunciator Flush Box. Mounts One Annunciator Module. (Johnson Controls, Inc. #JABF-1B).....	284.34	18.34
28 46 13 31-0879 EA Annunciator Flush Box. One Module. Attractive Glass Door And Key Lock. (Johnson Controls, Inc. #JABF-1DB).....	320.24	18.34
28 46 13 31-0880 EA Annunciator Flush Box. Mounts Two Annunciator Modules. (Johnson Controls, Inc. #JABF-2B).....	348.96	18.34
28 46 13 31-0881 EA Annunciator Flush Box. Mounts Four Annunciator Modules. (Johnson Controls, Inc. #JABF-4B).....	654.05	18.34
28 46 13 31-0882 EA Annunciator Surface Box. Deep With Trim Cover. (Johnson Controls, Inc. #JABS-1TB).....	211.08	12.23
28 46 13 31-0883 EA Surface (or Semi-flush) Mount Backbox. Used With The INA, ACS Annunciators, SCS Series, JNCA And JNCA-2 Black. (Johnson Controls, Inc. #JABS-2D).....	328.41	27.51
28 46 13 31-0884 EA Surface (or Semi-flush) Mount Backbox. Used With The INA, ACS Annunciators, SCS Series, JNCA And JNCA-2 Red. (Johnson Controls, Inc. #JABS-2DR).....	349.00	27.51
28 46 13 31-0885 EA Surface (or Semi-flush) Mount INA, ACS, Or SCS Backbox, Black. (Johnson Controls, Inc. #JABS-4D).....	643.66	27.51
28 46 13 31-0886 EA Audio Command Door For CAB-B4, Black; Required When Using CA-2. (Johnson Controls, Inc. #JADDR-B4).....	643.62	12.23
28 46 13 31-0887 EA Audio Command Door For CAB-C4, Black; Required When Using CA-2. (Johnson Controls, Inc. #JADDR-C4).....	867.95	12.23
28 46 13 31-0888 EA Audio Command Door For CAB-D4, Black; Required When Using CA-2. (Johnson Controls, Inc. #JADDR-D4).....	1,074.33	12.23
28 46 13 31-0889 EA Addressable Pull Station; With FlashScan. (Johnson Controls, Inc. #JBG-12LX).....	299.23	30.57
28 46 13 31-0890 EA Battery Dress Panel For CAB-4 Series; For Use With The JCPU2-3030, JCPU2-640, JNCA-2, And DVC Systems. (Johnson Controls, Inc. #JBP2-4).....	139.87	12.23
28 46 13 31-0891 EA JCPU2-3030 CPU With 640-character Display; Required For Single Panel (One CPU2-3030) Systems. Includes: CPU, 640-Character Backlit LCD Display, QWERTY Programming And Control Keypad, Installation, Programming And Operating Manuals. Supports One To 10 Signaling Line Circuits (Up To Five LCM-320 And Five LEM-320). Order One Per System Or As Necessary (Up To 103 Network Nodes) For A Networked System. Requires Top Row Of A Cabinet. (Johnson Controls, Inc. #JCPU2-3030D).....	5,921.99	489.12
28 46 13 31-0892 EA Central Processing Unit For The JCPU2-640 With Integral 120 Volt AC Power Supply (Johnson Controls, Inc. #JCPU2-640).....	4,273.80	366.83
Note: Includes CHS2-M2 Chassis		
28 46 13 31-0893 EA Main Board, CPU, IFC3030, DI. (Johnson Controls, Inc. #JCPU-3030D).....	7,703.72	489.12
28 46 13 31-0894 EA Main Board, CPU, IFC640. (Johnson Controls, Inc. #JCPU-640).....	7,409.90	366.83
28 46 13 31-0895 EA Main Board, CPU, IFC640, EUR. (Johnson Controls, Inc. #JCPU-640E).....	5,328.48	366.83
28 46 13 31-0896 EA Digital Voice Command, Extended Memory. (Johnson Controls, Inc. #JDVC-EM).....	2,933.18	45.85
28 46 13 31-0897 EA Digital Voice Command, Extended Memory, Multi-Fiber. (Johnson Controls, Inc. #JDVC-EMF).....	2,963.14	45.85
28 46 13 31-0898 EA Digital Voice Command, Extended Memory, Single-Fiber. (Johnson Controls, Inc. #JDVC-EMSF).....	2,963.14	45.85
28 46 13 31-0899 EA Annunciator, Network Control. (Johnson Controls, Inc. #JNCA).....	3,506.11	61.14
28 46 13 31-0900 EA Network Control Annunciator-2, 640-characters; On Single Panel (one JCPU2-640) JCPU2-640 Systems, The JNCA-2 Can Be The Primary Display For The Panel And Connects Directly To The JCPU2-640. On Network Systems (Two Or More JCPU2-640's), One Network Display (Either JNCA-2 Or IFW) Is Required For Every System And Each JNCA-2 Connects To And Requires An NCM Network Control Module. Mounts In A Row Of FACP Node Or In Two Annunciator Module Positions. (Johnson Controls, Inc. #JNCA-2).....	2,970.38	61.14
Note: Mounting Includes: NCA/640-2-Kit (directly Mounting To The CHS2-M2), CA-2, ADP-4B, Or In An Annunciator Box, Such As The ABS-2DB (requires The CHS-2D).		
28 46 13 31-0901 EA Mass Notification Voice Paging; Requires JNOTIFY-PAA Hardware Package (Sold Separately). (Johnson Controls, Inc. #JNOTIFY-IP).....	2,528.33	366.83
28 46 13 31-0902 EA 160 Character Display Annunciator; For Use With JCPU-3030 And JCPU2-3030. (Johnson Controls, Inc. #LCD- 160).....	2,108.27	61.14
28 46 13 31-0903 EA 80 Character LCD Annunciator. Mounts In ABS-1T, ABF-1D, ABF-2D, Or Flush Back Box. (Johnson Controls, Inc. #LCD-80).....	1,733.12	61.14
28 46 13 31-0904 EA Loop Control Module. Each LCM May Be Expanded To Two Loops By Adding A LEM-320. IFC2- 3030 And IFC- 3030 Only. (Johnson Controls, Inc. #LCM-320).....	2,793.41	61.14
28 46 13 31-0905 EA Lamp Driver Annunciator Control Module. For Use With Custom Graphic Annunciators. 32 Points. (Johnson Controls, Inc. #LDM-32).....	865.06	15.28
28 46 13 31-0906 EA Cable 24": LDM TO Annunciator. (Johnson Controls, Inc. #LDM-CBL24).....	277.47	12.23
28 46 13 31-0907 EA Cable 48": LDM TO Annunciator. (Johnson Controls, Inc. #LDM-CBL48).....	342.09	12.23
28 46 13 31-0908 EA Lamp Driver Annunciator Expander Module. For Use With Custom Graphic Annunciators. 32 Points. (Johnson Controls, Inc. #LDM-E32).....	696.40	15.28
28 46 13 31-0909 EA Relay Module. 32 Form-A Contacts. Connects To LDM-32 Or LDM-E32. (Johnson Controls, Inc. #LDM-R32).....	1,279.65	15.28
28 46 13 31-0910 EA Loop Expander Module. Mounts As Daughter Board To LCM-320 To Provide Even Numbered SLC Loops. (Johnson Controls, Inc. #LEM-320).....	2,320.12	15.28
28 46 13 31-0911 EA Addressable Control Module With FlashScan; Configured For One Class A Or Class B NAC. (Johnson Controls, Inc. #M300CJ).....	180.22	15.28
28 46 13 31-0912 EA Addressable Dual Monitor Module; With FlashScan, Two Class B Circuits. (Johnson Controls, Inc. #M300DJ).....	288.26	15.28
28 46 13 31-0913 EA Addressable Monitor Module; With FlashScan; Supervises Either A Class A Or Class B Circuit Of N.D. Dry- contact Input Devices. (Johnson Controls, Inc. #M300MJ).....	141.08	15.28
28 46 13 31-0914 EA Addressable Relay Module With FlashScan; Provides Two Form-C Dry Contacts That Switch Together. (Johnson Controls, Inc. #M300RJ).....	198.71	15.28
28 46 13 31-0915 EA Addressable Mini Module With FlashScan; Supervises A Class B Circuit Of N.D. Dry-contact Devices. (Johnson Controls, Inc. #M301MJ).....	156.21	15.28

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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28 46 13 31-0916	EA		Addressable 2-Wire Detector Monitor Module; With FlashScan. (Johnson Controls, Inc. #M302MJ).....	255.89	15.28
28 46 13 31-0917	EA		Addressable Firephone Control Module With Flashscan. (Johnson Controls, Inc. #M500FPJ).....	292.08	15.28
28 46 13 31-0918	EA		SLC Loop Isolator Module; Isolates Against Short Circuits On The SLC. (Johnson Controls, Inc. #M500XJ).....	163.92	15.28
28 46 13 31-0919	EA		Network INTFC, P2P, Wire. (Johnson Controls, Inc. #MIB-W).....	2,446.28	45.85
28 46 13 31-0920	EA		Network Adapter, Fiber. (Johnson Controls, Inc. #NAM-232F).....	2,177.01	30.57
28 46 13 31-0921	EA		Network Adapter, Wire. (Johnson Controls, Inc. #NAM-232W).....	2,011.91	30.57
28 46 13 31-0922	EA		Plate, Retrofit, NCA-2. (Johnson Controls, Inc. #NCA-2RETRO).....	75.04	6.11
28 46 13 31-0923	EA		Network Control Module - Multi Mode Fiber; Order One NCM Per Network Node (JCPU-640/3030, JNCA, JCPU2-640/3030, JNCA-2, DVC, Etc). (Johnson Controls, Inc. #NCM-F).....	1,759.61	30.57
28 46 13 31-0924	EA		Network Control Module - Wire; Order One NCM Per Network Node (JCPU-640/3030, JNCA, JCPU2-640/3030, JNCA-2, DVC, Etc). (Johnson Controls, Inc. #NCM-W).....	1,675.38	30.57
28 46 13 31-0925	EA		NFV-25/50. (Johnson Controls, Inc. #NFV-25/50).....	4,279.30	61.14
28 46 13 31-0926	EA		NU-RPT101-1U RS485. (Johnson Controls, Inc. #NU-RPT101-1U).....	1,187.12	30.57
28 46 13 31-0927	EA		Key Switch, Remote Control. (Johnson Controls, Inc. #RKS-S).....	324.14	12.23
28 46 13 31-0928	EA		Microphone Assembly For Mounting To An ADP-4 Dress Panel. (Johnson Controls, Inc. #RM-1).....	748.50	30.57
28 46 13 31-0929	EA		Microphone Assembly For Mounting In An CAB-RM Cabinet. (Johnson Controls, Inc. #RM-1SA).....	748.50	30.57
28 46 13 31-0930	EA		Remote Page Jack. Allows Remote All-Call Paging. (Johnson Controls, Inc. #RPJ-1).....	200.34	12.23
28 46 13 31-0931	EA		SA-WBB, Weatherproof. (Johnson Controls, Inc. #SA-WBB).....	52.81	6.11
28 46 13 31-0932	EA		SA-WBBC, Weatherproof. (Johnson Controls, Inc. #SA-WBBC).....	52.81	6.11
28 46 13 31-0933	EA		Strobe, Standard, 12/24 Volt DC, Red (Johnson Controls, Inc. #SCR).....	199.41	45.85
28 46 13 31-0934	EA		Strobe, HI, 12/24 Volt DC, Red (Johnson Controls, Inc. #SCRH).....	224.52	45.85
28 46 13 31-0935	EA		Strobe, HI, Outdoor, Red. (Johnson Controls, Inc. #SCRHK).....	265.46	51.96
28 46 13 31-0936	EA		Strobe, Standard, Outdoor, Red. (Johnson Controls, Inc. #SCRK).....	261.86	51.96
28 46 13 31-0937	EA		Smoke Control Master; Includes Eight On/off/auto Switches. Supports One SCE-8. Includes Manual, Slide-in Labels. Mounts In ADP-4 Or ABS-4D. (Johnson Controls, Inc. #SCS-8).....	1,786.17	122.28
28 46 13 31-0938	EA		Smoke Control Lamp Driver. Outputs For 8 On/off/auto Switches With LED's. Intended For Custom Built Smoke Control Stations. Support One SCE-8L. (Johnson Controls, Inc. #SCS-8L).....	1,391.33	122.28
28 46 13 31-0939	EA		Strobe, Standard, 12/24 Volt DC, White (Johnson Controls, Inc. #SCW).....	199.41	45.85
28 46 13 31-0940	EA		Strobe, HI, 12/24 Volt DC, Red (Johnson Controls, Inc. #SCWH).....	224.52	45.85
28 46 13 31-0941	EA		Strobe, Standard, 12/24 Volt DC, White (Johnson Controls, Inc. #SCW-P).....	199.41	45.85
28 46 13 31-0942	EA		Mounting Kit, M300/M500. (Johnson Controls, Inc. #SMB500).....	35.85	12.23
28 46 13 31-0943	EA		SMK-MOV Kit-LON. (Johnson Controls, Inc. #SMK-MOVKit-LON).....	41.03	6.11
28 46 13 31-0944	EA		SMK-MOV Kit-MSTP. (Johnson Controls, Inc. #SMK-MOVKit-MSTP).....	46.80	6.11
28 46 13 31-0945	EA		SPBBS, Wall, Back Box. (Johnson Controls, Inc. #SPBBS).....	41.08	6.11
28 46 13 31-0946	EA		Strobe, Standard, 12/24 Volt DC, Red (Johnson Controls, Inc. #SR).....	182.09	45.85
28 46 13 31-0947	EA		Strobe, HI, 12/24 Volt DC, Red (Johnson Controls, Inc. #SRH).....	224.52	45.85
28 46 13 31-0948	EA		Strobe, HI, Outdoor, Red. (Johnson Controls, Inc. #SRHK).....	265.46	51.96
28 46 13 31-0949	EA		Strobe, HI, 12/24 Volt DC, Red (Johnson Controls, Inc. #SRH-P).....	224.52	45.85
28 46 13 31-0950	EA		Strobe, Standard, Outdoor, Red. (Johnson Controls, Inc. #SRK).....	261.86	51.96
28 46 13 31-0951	EA		Strobe, Standard, 12/24 Volt DC, Red (Johnson Controls, Inc. #SR-P).....	199.41	45.85
28 46 13 31-0952	EA		Strobe, Standard, 12/24 Volt DC, White (Johnson Controls, Inc. #SW).....	199.41	45.85
28 46 13 31-0953	EA		Strobe, HI, 12/24 Volt DC, White (Johnson Controls, Inc. #SWH).....	224.52	45.85
28 46 13 31-0954	EA		Strobe, HI, 12/24 Volt DC, White (Johnson Controls, Inc. #SWH-P).....	224.52	45.85
28 46 13 31-0955	EA		Strobe, Standard, 12/24 Volt DC, White (Johnson Controls, Inc. #SW-P).....	199.41	45.85
28 46 13 31-0956	EA		Firefighter's Telephone Handset Only. (Johnson Controls, Inc. #TELH-1).....	280.01	15.28
28 46 13 31-0957	EA		Universal Digital Alarm Communicator Transmitter. (Johnson Controls, Inc. #UDACT).....	1,236.28	61.14
28 46 13 31-0958	EA		Speaker Strobe, Ceiling, White, 2 W (MAX), Dual Voltage, Multi (Johnson Controls, Inc. #SPSCW).....	296.19	61.14
28 46 13 31-0959	EA		Speaker, White, Ceiling Mount. (Johnson Controls, Inc. #SPCW).....	126.27	30.57
28 46 13 31-0960	EA		Speaker, White, Ceiling Mount, High Db. (Johnson Controls, Inc. #SPCWV).....	126.27	30.57
28 46 13 31-0961	EA		Speaker Strobe, Red, Ceiling Mount, Standard Candela. (Johnson Controls, Inc. #SPSCR).....	235.05	30.57
28 46 13 31-0962	EA		Speaker Strobe, Red, Ceiling Mount, High Candela. (Johnson Controls, Inc. #SPSCRH).....	255.86	30.57
28 46 13 31-0963	EA		Speaker Strobe, Red, Ceiling Mount, High Candela, High Db. (Johnson Controls, Inc. #SPSCRHV).....	255.86	30.57
28 46 13 31-0964	EA		Speaker Strobe, White, Ceiling Mount, High Db. (Johnson Controls, Inc. #SPSCWV).....	226.78	30.57
28 46 13 31-0965	EA		Speaker Strobe Wall, WP, White, 2W (MAX), Dual Volt, Multi D (Johnson Controls, Inc. #SPSWK).....	310.09	30.57
28 46 13 31-0966	EA		Speaker Strobe, Wall, White, Standard Candela. (Johnson Controls, Inc. #SPSW).....	235.05	30.57
28 46 13 31-0967	EA		Wall Mount Speaker, White. (Johnson Controls, Inc. #SPW).....	126.27	30.57
28 46 13 31-0968	EA		Wall Mount Speaker, Red. (Johnson Controls, Inc. #SPR).....	126.27	30.57
28 46 13 31-0969	EA		Speaker Strobe, Wall, White, High Cd. (Johnson Controls, Inc. #SPSWH).....	255.86	30.57
28 46 13 31-0970	EA		Speaker Strobe, Wall, Red, High Cd. (Johnson Controls, Inc. #SPSR).....	235.05	30.57
28 46 13 31-0971	EA		Speaker Strobe, Wall, Red, High Db, High Candela. (Johnson Controls, Inc. #SPSRV).....	235.05	30.57

28 46 13 31-0972 Honeywell Fire Alarm (28 46 13 31)

28 46 13 31-0973 Notifier Fire Alarm (28 46 13 31-0972)

28 46 13 31-0974 Fire Alarm Control Panel And Accessories (28 46 13 31-0973)

28 46 13 31-0975	EA		NFS2-3030 CPU For Intelligent Fire Alarm Control Panel (Notifier CPU2-3030D).....	6,075.38	611.40
28 46 13 31-0976	EA		NFS2-640 CPU For Intelligent Fire Alarm Control Panel (Notifier CPU2-640).....	5,023.16	611.40
28 46 13 31-0977	EA		Central Processing Unit for NFS2-640 With Integral 240 Volt Power Supply Includes Chassis (Notifier CPU2-640E).....	4,740.74	611.40
28 46 13 31-0978	EA		Black, 120 Volt AC, Intelligent Fire Alarm Control Panel (Notifier NFS-320).....	6,063.00	611.40
28 46 13 31-0979	EA		Supports Installation Of Optional ACM-Series Annunciator In Same Cabinet, Black, 120 Volt AC, Intelligent Fire Alarm Control Panel (Notifier NFS-320C).....	6,112.95	611.40
28 46 13 31-0980	EA		Black, 240 Volt AC, Intelligent Fire Alarm Control Panel (Notifier NFS-320E).....	5,954.58	611.40
28 46 13 31-0981	EA		Red, 120 Volt AC, Intelligent Fire Alarm Control Panel (Notifier NFS-320R).....	5,803.36	611.40
28 46 13 31-0982	EA		Two-Tone Sequential Module (Notifier 2TTM).....	393.35	30.57
28 46 13 31-0983	EA		5', Not Low Loss, Antenna Cable (Notifier 7626-5C).....	99.15	6.11
28 46 13 31-0984	EA		25', Low Loss, Antenna Cable (Notifier 7626-25HC).....	189.96	12.23
28 46 13 31-0985	EA		50', Low Loss, Antenna Cable (Notifier 7626-50HC).....	288.51	18.34
28 46 13 31-0986	EA		IPGSM-COM, IPGSM-COMa Handheld Programmer (Notifier 7720P).....	461.99	
28 46 13 31-0987	EA		RJ45-DB9F Serial Programming Cable (Notifier ALMSC-119).....	77.65	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-0988 EA 120 Volt AC Power Supply, Chassis, 80-Character Display, Keypad, NFS-320SYS CPU (Notifier CPU-320SYS).....	5,684.29	611.40
28 46 13 31-0989 EA 240 Volt AC Power Supply, Chassis, 80-Character Display, Keypad, NFS-320SYS CPU (Notifier CPU-320SYSE).....	5,742.64	611.40
28 46 13 31-0990 EA 3 dB Gain External/Remote Antenna (Notifier GSM-ANT3dB).....	246.80	6.11
28 46 13 31-0991 EA Plug In Transformer Box For IPGSM Communicator (Notifier HPTCOVER).....	75.34	6.11
28 46 13 31-0992 EA Mounting Bracket Kit For SFB-5UD, SFB-10UD, NFW2-100 And NFW-50 (Notifier IPBRKT).....	106.31	12.23
28 46 13 31-0993 EA Chassis To Mount IP Communicator In CHSA Series Chassis (Notifier IPCHSKIT).....	104.39	15.28
28 46 13 31-0994 EA IP Communicator (Notifier IPDACT-2).....	799.37	30.57
28 46 13 31-0995 EA IP Communicator With Upload/Download Capability (Notifier IPDACT-2UD).....	927.97	30.57
28 46 13 31-0996 EA Red, IP Communicator External Mounting Enclosure (Notifier IPENC).....	213.55	30.57
Note: Includes IPBRKT.		
28 46 13 31-0997 EA Black, IP Communicator External Mounting Enclosure (Notifier IPENC-B).....	212.95	30.57
Note: Includes IPBRKT		
28 46 13 31-0998 EA Dual 8TPC To Single 8TPC Y-Splitter With Two 9" Cables For Combining Panel Phone Jacks To One IPDACT Input (Notifier IPSPLT).....	53.86	12.23
28 46 13 31-0999 EA Loop Control Module (Notifier LCM-320).....	2,197.82	61.14
28 46 13 31-1000 EA Loop Expander Module (Notifier LEM-320).....	1,834.51	61.14
28 46 13 31-1001 EA Keyboard Display Module For CPU2-640 (Notifier KDM-R2).....	1,668.27	61.14
28 46 13 31-1002 EA 7' DACT Phone Cord (Notifier MCBL-7).....	26.16	
28 46 13 31-1003 EA Backbox For UDACT, With Viewing Window And Optional Relay Mount (Notifier UBS-1).....	228.82	15.28
28 46 13 31-1004 EA Red, Metal Enclosure With Solid Door For Remote Mounting Of The UDACT-2 (Notifier UBS-1R).....	259.39	30.57
28 46 13 31-1005 EA Black, Metal Enclosure With Solid Door For Remote Mounting Of The UDACT-2 (Notifier UBS-1B).....	259.39	30.57
28 46 13 31-1006 EA Universal Digital Alarm Communicator Transmitter (Notifier UDACT-2).....	837.89	30.57
28 46 13 31-1007 EA Universal Zone Coder (Notifier UZC-256).....	1,167.03	30.57
28 46 13 31-1008 EA Hardware Kit To Connect UZC-256 To A PC (Notifier UZC-HI).....	364.40	
Note: Includes null modem cable, AC power adapter, and 9-pin to 25-pin converter.		
28 46 13 31-1009 EA Programming Software For ONYX Series Products, DVC And Associated Amplifiers, DVC-RPU And UDACT-2 (Notifier VERIFIRE-TCD).....	917.55	
28 46 13 31-1010 EA ONYX Series Verifire Tools Upgrade (Notifier VERIFIREUG-TCD).....	581.05	
28 46 13 31-1011 EA Central Station Receiver For Fire And Security (Notifier VISORALARM-PLUS).....	5,182.13	18.34
28 46 13 31-1012 EA Surface Back Box For NBG-12LRA (Notifier SBA-10).....	56.88	15.28
28 46 13 31-1013 EA Up To 50 Addressable Devices Supported, Addressable Fire Alarm Control Panel (Notifier NFW-50X).....	2,465.82	611.40
28 46 13 31-1014 EA Up To 198 Addressable Devices Supported, Addressable Fire Alarm Control Panel (Notifier NFW-100X).....	3,611.51	611.40
28 46 13 31-1015 ONYX Cabinets <small>(28 46 13 31-0973)</small>		
28 46 13 31-1016 EA Red, Two Tier Door For CA-2 Chassis Configuration (Notifier ADDR-B4R).....	624.29	15.28
28 46 13 31-1017 EA Red, Three Tier Door For CA-2 Chassis Configuration (Notifier ADDR-C4R).....	837.83	15.28
28 46 13 31-1018 EA Red, Four Tier Door For CA-2 Chassis Configuration (Notifier ADDR-D4R).....	1,035.20	15.28
28 46 13 31-1019 EA Battery Dress Plate For NFS-640 And NFS-3030 (Notifier BP-4).....	135.51	18.34
28 46 13 31-1020 EA Chassis Bridge (Notifier CB-1).....	123.15	15.28
28 46 13 31-1021 EA Four Position Chassis (Notifier CHS-4).....	207.39	15.28
28 46 13 31-1022 EA Low Profile 1st Row Chassis Assembly For CPU-640 / CPU-640E (Notifier CHS-M2).....	223.44	30.57
28 46 13 31-1023 EA Black, Dress Panel Blank, Covers Unused Cabinet Row(s) (Notifier DP-1B).....	119.43	18.34
28 46 13 31-1024 EA Dress Plate For Top Row With CPU2-3030D (Notifier DP-DISP).....	151.88	18.34
28 46 13 31-1025 EA One Tier, "A" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-A4).....	413.25	30.57
28 46 13 31-1026 EA One Tier, "A" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-A4B).....	263.33	30.57
28 46 13 31-1027 EA Two Tier, "B" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-B4).....	523.60	45.85
28 46 13 31-1028 EA Two Tier, "B" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-B4B).....	324.16	45.85
28 46 13 31-1029 EA Three Tier, "C" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-C4).....	781.12	61.14
28 46 13 31-1030 EA Three Tier, "C" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-C4B).....	477.14	61.14
28 46 13 31-1031 EA Four Tier, "D" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-D4).....	947.84	76.43
28 46 13 31-1032 EA Four Tier, "D" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-D4B).....	554.47	76.43
28 46 13 31-1033 EA Black, One Tier, "AA" Size Door Assembly With Window, Lock And Keys (Notifier DR-AA4).....	328.25	15.28
28 46 13 31-1034 EA Black, One Tier, "AA" Size Door Assembly, Lock And Keys (Notifier DR-AA4B).....	225.84	15.28
28 46 13 31-1035 EA Red, One Tier, "AA" Size Door Assembly, Lock And Keys (Notifier DR-AA4BR).....	225.84	15.28
28 46 13 31-1036 EA Red, One Tier, "AA" Size Door Assembly With Window, Lock And Keys (Notifier DR-AA4R).....	334.20	15.28
28 46 13 31-1037 EA Red, One Tier, "A" Size Blank Door Assembly, Lock And Keys (Notifier DR-A4BR).....	254.42	15.28
28 46 13 31-1038 EA Red, One Tier, "A" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-A4R).....	423.50	15.28
28 46 13 31-1039 EA Red, Two Tier, "B" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-B4BR).....	289.55	15.28
28 46 13 31-1040 EA Red, Two Tier, "B" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-B4R).....	504.47	15.28
28 46 13 31-1041 EA Red, Three Tier, "C" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-C4BR).....	416.36	15.28
28 46 13 31-1042 EA Red, Three Tier, "C" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-C4R).....	748.56	15.28
28 46 13 31-1043 EA Red, Four Tier, "D" Size Door Assembly, Solid Door, Lock And Keys (Notifier DR-D4BR).....	466.37	15.28
28 46 13 31-1044 EA Red, Four Tier, "D" Size Door Assembly, Lexan Window, Lock And Keys (Notifier DR-D4R).....	896.21	15.28
28 46 13 31-1045 EA Black, Two Tiers, Equipment Backbox Assembly (Notifier EQBB-B4).....	431.45	30.57
28 46 13 31-1046 EA Black, Three Tiers, Equipment Backbox Assembly (Notifier EQBB-C4).....	636.25	30.57
28 46 13 31-1047 EA Black, Four Tiers, Equipment Backbox Assembly (Notifier EQBB-D4).....	745.79	30.57
28 46 13 31-1048 EA Black, Vented, Two Tiers, Equipment Door Assembly (Notifier EQDR-B4).....	451.69	30.57
28 46 13 31-1049 EA Black, Vented, Three Tiers, Equipment Door Assembly (Notifier EQDR-C4).....	681.49	30.57
28 46 13 31-1050 EA Black, Vented, Four Tiers, Equipment Door Assembly (Notifier EQDR-D4).....	795.80	30.57
28 46 13 31-1051 EA Red, Two Tiers, Equipment Backbox Assembly (Notifier EQBB-B4R).....	435.02	30.57
28 46 13 31-1052 EA Red, Three Tiers, Equipment Backbox Assembly (Notifier EQBB-C4R).....	636.25	30.57
28 46 13 31-1053 EA Red, Four Tiers, Equipment Backbox Assembly (Notifier EQBB-D4R).....	755.32	30.57
28 46 13 31-1054 EA Red, Vented, Two Tiers, Equipment Door Assembly (Notifier EQDR-B4R).....	473.12	30.57
28 46 13 31-1055 EA Red, Vented, Three Tiers, Equipment Door Assembly (Notifier EQDR-C4R).....	681.49	30.57
28 46 13 31-1056 EA Red, Vented, Four Tiers, Equipment Door Assembly (Notifier EQDR-D4R).....	795.80	30.57
28 46 13 31-1057 EA Backbox With Door For ONYX Firstvision™ (Notifier FIRSTVISION-ENC).....	3,518.74	152.84
28 46 13 31-1058 EA CAB-4 Series Mounting Kit (Notifier P40-KITB).....	405.25	30.57
Note: Includes chassis, hinged dress plate, and mounting hardware.		
28 46 13 31-1059 EA Black, One Tier Backbox Assembly (Notifier SBB-A4).....	417.24	91.71
28 46 13 31-1060 EA Black, Two Tier Backbox Assembly (Notifier SBB-B4).....	589.80	122.28

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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28 46	13 31-1061	EA	Black, Three Tier Backbox Assembly (Notifier SBB-C4).....	775.48	122.28
28 46	13 31-1062	EA	Black, Four Tier Backbox Assembly (Notifier SBB-D4).....	943.90	152.84
28 46	13 31-1063	EA	Black, Mini, One Tier, Backbox (Notifier SBB-AA4).....	255.22	30.57
28 46	13 31-1064	EA	Red, Mini, One Tier, Backbox (Notifier SBB-AA4R).....	255.22	30.57
28 46	13 31-1065	EA	Red, One Tier Backbox Assembly (Notifier SBB-A4R).....	310.00	30.57
28 46	13 31-1066	EA	Red, Two Tier Backbox Assembly (Notifier SBB-B4R).....	430.26	30.57
28 46	13 31-1067	EA	Red, Three Tier Backbox Assembly (Notifier SBB-C4R).....	629.10	30.57
28 46	13 31-1068	EA	Red, Four Tier Backbox Assembly (Notifier SBB-D4R).....	743.41	30.57
28 46	13 31-1069	EA	Trim Ring For NFS-320 Cabinet (Notifier TR-320).....	245.65	18.34
28 46	13 31-1070	EA	Red, Trim Ring For NFS-320 Cabinet (Notifier TR-320R).....	245.65	18.34
28 46	13 31-1071	EA	Black, AA Size Trim Ring For CAB-4 Or CAB-3 Series Cabinet (Notifier TR-AA4).....	330.78	18.34
28 46	13 31-1072	EA	Black, A Size Trim Ring For CAB-4 Or CAB-3 Series Cabinet (Notifier TR-A4).....	261.72	18.34
28 46	13 31-1073	EA	Black, B Size Trim Ring For CAB-4 Or CAB-3 Series Cabinet (Notifier TR-B4).....	263.51	18.34
28 46	13 31-1074	EA	Black, C Size Trim Ring For CAB-4 Or CAB-3 Series Cabinet (Notifier TR-C4).....	260.53	18.34
28 46	13 31-1075	EA	Black, D Size Trim Ring For CAB-4 Or CAB-3 Series Cabinet (Notifier TR-D4).....	267.08	18.34
28 46	13 31-1076	EA	2" Filler Dress Plate For ADP-4B Installed In The Top Row Of A CAB-4 Series Backbox (Notifier VP-2B).....	95.50	18.34
28 46	13 31-1077	EA	Wire Trays For Routing Wire In A CAB-4 Series Backbox (Notifier WC-2).....	66.05	6.11

28 46 13 31-1078 NFS2-3030/640 Cabinet Mechanicals (28 46 13 31-0973)

28 46	13 31-1079	EA	Dress Plate For Middle Rows With CPU2-640 (Notifier ADP2-640).....	137.09	18.34
28 46	13 31-1080	EA	Blank Module Dress Plate (Notifier BM-1B).....	113.70	18.34
28 46	13 31-1081	EA	Battery Dress Plate For NFS2-3030, NFS2-640, NCA-2 And DVC System (Notifier BP2-4).....	128.83	18.34
28 46	13 31-1082	EA	Four Position Expansion Chassis (Notifier CHS-4MB).....	322.29	15.28
28 46	13 31-1083	EA	Standard 1st Row Chassis Assembly For CPU-3030 (Notifier CHS-M3).....	289.77	45.85
28 46	13 31-1084	EA	Dress Plate For Top Row With CPU2-640 (Notifier DP-DISP2).....	142.59	18.34

28 46 13 31-1085 NFS-3030/640 Cabinet Mechanicals (28 46 13 31-0973)

28 46	13 31-1086	EA	Annunciator Dress Plate (Notifier ADP-4B).....	130.21	18.34
28 46	13 31-1087	EA	Blank Module Dress Plate (Notifier BMP-1).....	82.07	18.34
28 46	13 31-1088	EA	Low Profile Four Position Chassis For AA-30 Or LDM (Notifier CHS-4L).....	184.24	30.57
28 46	13 31-1089	EA	Module Dress Plate (Notifier MP-1B).....	131.59	18.34

28 46 13 31-1090 Battery Cabinets (28 46 13 31-0973)

28 46	13 31-1091	EA	Six Position Chassis (Notifier CHS-6).....	119.32	30.57
28 46	13 31-1092	EA	Black, 24" x 14" x 7-3/4" Battery Backbox (Notifier NFS-LBB).....	587.80	91.71

28 46 13 31-1093 Digital Voice (28 46 13 31-0973)

28 46	13 31-1094	EA	Chassis Used With BB-XP (Notifier 18439).....	60.93	15.28
28 46	13 31-1095	EA	220 Volt AC, 100 Watt, 70.7 VRMS, Tone Generator, Audio Amplifier (Notifier AA-100E).....	2,383.57	45.85
28 46	13 31-1096	EA	220 Volt AC, 120 Watt, 25 VRMS, Tone Generator, Audio Amplifier (Notifier AA-120E).....	2,316.65	45.85
28 46	13 31-1097	EA	220 Volt AC, 30 Watt, 25 VRMS Audio Amplifier (Notifier AA-30E).....	1,165.78	45.85
28 46	13 31-1098	EA	Black, Two Tier Door For CA-2 Chassis Configuration (Notifier ADDR-B4).....	596.50	45.85
28 46	13 31-1099	EA	Black, Three Tier Door For CA-2 Chassis Configuration (Notifier ADDR-C4).....	808.62	61.14
28 46	13 31-1100	EA	Black, Four Tier Door For CA-2 Chassis Configuration (Notifier ADDR-D4).....	1,006.99	76.43
28 46	13 31-1101	EA	Multimode Audio Fiber Link Receiver (Notifier AFL-RM).....	1,012.33	30.57
28 46	13 31-1102	EA	Multimode Audio Fiber Link Transmitter (Notifier AFL-TM).....	1,012.33	30.57
28 46	13 31-1103	EA	Single Mode Audio Fiber Link Transmitter (Notifier AFL-TS).....	2,168.69	30.57
28 46	13 31-1104	EA	15" x 8-3/8" x 3-3/8", Flush Or Surface Mounted Backbox (Notifier AFAWS-BX).....	127.91	15.28
28 46	13 31-1105	EA	Flush Mounted, Key Lock, Door (Notifier AFAWS-KR).....	216.32	15.28
28 46	13 31-1106	EA	Surface Mounted, Key Lock, Door (Notifier AFAWS-KS).....	217.51	15.28
28 46	13 31-1107	EA	Flush Mounted, Latch Style Lock, Door (Notifier AFAWS-LR).....	210.37	15.28
28 46	13 31-1108	EA	Surface Mounted, Latch Style Lock, Door (Notifier AFAWS-LS).....	212.75	15.28
28 46	13 31-1109	EA	Armored Coil Cord, Telephone Chassis (Notifier AFAWS-TELA).....	434.22	15.28
28 46	13 31-1110	EA	Coil Cord, Telephone Chassis (Notifier AFAWS-TELC).....	331.82	15.28
28 46	13 31-1111	EA	Hammer Attached To Chain, Breakglass Insert (Notifier BRKG-B).....	136.06	
28 46	13 31-1112	EA	For 25 VRMS DAX Or DAA2 Series, Back-Up Digital Amplifier (Notifier BDA-25V).....	604.21	30.57
28 46	13 31-1113	EA	For 70 VRMS DAX Or DAA2 Series, Back-Up Digital Amplifier (Notifier BDA-70V).....	609.70	30.57
28 46	13 31-1114	EA	Blank Dress Plate For CA-2 (Notifier BP-CA2).....	126.12	15.28
28 46	13 31-1115	EA	One Tier Chassis For Digital Voice Command Panel (Notifier CA-1).....	160.17	30.57
28 46	13 31-1116	EA	Two Tier Chassis For Digital Voice Command Panel, With MIC-1 (Notifier CA-2).....	496.09	45.85
28 46	13 31-1117	EA	Black, 6.08" x 8.301" x 3.655", Remote Cabinet (Notifier CAB-RM).....	253.44	30.57
28 46	13 31-1118	EA	Red, 6.08" x 8.301" x 3.655", Remote Cabinet (Notifier CAB-RMR).....	253.44	30.57
28 46	13 31-1119	EA	Chassis, Phone Well, TELH-1 And Hardware (Notifier CFFT-1).....	328.25	15.28
28 46	13 31-1120	EA	Chassis With Paging Microphone With Well (Notifier CMIC-1).....	324.67	15.28
28 46	13 31-1121	EA	120 Volt AC, 50 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA-5025).....	2,039.02	30.57
28 46	13 31-1122	EA	Multi-Mode Fiber-Optic Media 50 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA-5025SF).....	1,920.60	30.57
28 46	13 31-1123	EA	Single-Mode Fiber-Optic Media 50 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA-5025SF).....	1,920.60	30.57
28 46	13 31-1124	EA	120 Volt AC, 50 Watt, 70 VRMS Digital Audio Amplifier (Notifier DAA-5070).....	2,105.04	30.57
28 46	13 31-1125	EA	Multi-Mode Fiber-Optic Media 50 Watt, 70 VRMS Digital Audio Amplifier (Notifier DAA-5070F).....	2,089.64	30.57
28 46	13 31-1126	EA	120 Volt AC, 75 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA-7525).....	2,186.19	30.57
28 46	13 31-1127	EA	Single-Mode Fiber-Optic Media 75 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA-7525SF).....	2,512.24	30.57
28 46	13 31-1128	EA	Single-Mode Fiber-Optic Media 75 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA-7525SF).....	2,512.24	30.57
28 46	13 31-1129	EA	220-240 Volt AC, 50 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA2-5025E).....	1,938.30	30.57
28 46	13 31-1130	EA	220-240 Volt AC, 50 Watt, 70 VRMS Digital Audio Amplifier (Notifier DAA2-5070E).....	1,993.15	30.57
28 46	13 31-1131	EA	220-240 Volt AC, 75 Watt, 25 VRMS Digital Audio Amplifier (Notifier DAA2-7525E).....	2,078.73	30.57
28 46	13 31-1132	EA	120 Volt AC, 35 Watt, 25 VRMS, Digital Audio Amplifier (Notifier DAX-3525).....	1,316.23	30.57

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1133 EA 220-240 Volt AC, 35 Watt, 25 VRMS, Digital Audio Amplifier (Notifier DAX-3525E)	1,351.34	30.57
28 46 13 31-1134 EA 120 Volt AC, 35 Watt, 70 VRMS, Digital Audio Amplifier (Notifier DAX-3570)	1,383.16	30.57
28 46 13 31-1135 EA 220-240 Volt AC, 35 Watt, 70 VRMS, Digital Audio Amplifier (Notifier DAX-3570E)	1,429.24	30.57
28 46 13 31-1136 EA 120 Volt AC, 50 Watt, 25 VRMS, Digital Audio Amplifier (Notifier DAX-5025)	1,439.11	30.57
28 46 13 31-1137 EA 220-240 Volt AC, 50 Watt, 25 VRMS, Digital Audio Amplifier (Notifier DAX-5025E)	1,481.90	30.57
28 46 13 31-1138 EA 120 Volt AC, 50 Watt, 70 VRMS, Digital Audio Amplifier (Notifier DAX-5070)	1,524.68	30.57
28 46 13 31-1139 EA 220-240 Volt AC, 50 Watt, 70 VRMS, Digital Audio Amplifier (Notifier DAX-5070E)	1,601.48	30.57
28 46 13 31-1140 EA Dress Plate For CFFT-1 (Notifier DP-CFFT)	146.37	15.28
28 46 13 31-1141 EA Dress Panel For One Tier Chassis For Digital Voice Command Panel (Notifier DPA-1)	123.33	18.34
28 46 13 31-1142 EA Dress Panel For One Tier Chassis For Digital Voice Command Panel, Supports Keypad (Notifier DPA-1A4)	142.59	18.34
28 46 13 31-1143 EA Dress Panel For Two Tier Chassis For Digital Voice Command Panel (Notifier DPA-2B)	245.75	18.34
28 46 13 31-1144 EA WPS Power Amplifier (Notifier DPA3204P)	717.21	30.57
28 46 13 31-1145 EA WPS Power Amplifier (Notifier DPA4001P)	604.21	30.57
28 46 13 31-1146 EA Modem Interface For Direct Wire (No Dial-Up Capabilities) For Interconnecting Panels (Notifier DPI-232)	1,367.80	30.57
28 46 13 31-1147 EA 120 Volt AC, 125 Watt, 25 VRMS Digital Series Amplifier (Notifier DS-AMP)	1,022.21	30.57
Note: Can Be Converted To 70 VRMS, 100 Watts With A DS-XF70V		
28 46 13 31-1148 EA 220-240 Volt AC, 125 Watt, 25 VRMS Digital Series Amplifier (Notifier DS-AMPE)	1,034.28	30.57
Note: Can Be Converted To 70 VRMS, 100 Watts With A DS-XF70V		
28 46 13 31-1149 EA Digital Series Distribution Board, Supports One To Four DS-AMP Or DS-AMPE (Notifier DS-DB)	1,725.46	30.57
28 46 13 31-1150 EA 125 Watt, 25 VRMS DS Series Backup Amplifier Board (Can Be Converted To 70 VRMS, 100 Watt Amplifier With A DS-XF70V) (Notifier DS-BDA)	670.04	30.57
28 46 13 31-1151 EA Converts One DAX Or DAA2 DAL Port To Multi-Mode Fiber, Fiber Option Module (Notifier DS-FM)	380.25	30.57
28 46 13 31-1152 EA Converts One DAX Or DAA2 Port To ST Style Multi-Mode Fiber (For Connection To DVC-EMF Or DAA-XXXX Series Amplifier), Fiber Option Module (Notifier DS-RFM)	380.25	30.57
28 46 13 31-1153 EA Converts One DAX Or DAA2 DAL Port To Single-Mode Fiber, Fiber Option Module (Notifier DS-SFM)	380.25	30.57
28 46 13 31-1154 EA Converts DS-AMP, DS-AMPE, Or DS-BDA To 70 VRMS, 100 Watt, DS Series Transformer (Notifier DS-XF70V)	160.27	30.57
28 46 13 31-1155 EA Analog Output Board For Digital Voice Command (Notifier DVC-AO)	356.86	30.57
28 46 13 31-1156 EA Extended Memory For Digital Voice Command (Notifier DVC-EM)	2,055.53	30.57
28 46 13 31-1157 EA Keypad For Digital Voice Command (Notifier DVC-KD)	596.81	61.14
28 46 13 31-1158 EA Microphone For NFC-50/100, NFC-LOC, NFC-RPU And NFC-RM (Notifier ECC-MICROPHONE)	303.95	
28 46 13 31-1159 EA Portable Fireman's Telephone Handset (Notifier FHS)	181.90	
28 46 13 31-1160 EA Red, Fireman's Telephone Handset (Notifier FHS-F)	211.08	
28 46 13 31-1161 EA Recessed, Fireman's Handset Storage Cabinet, Holds Six Handsets (Notifier FHSC-R)	525.51	30.57
28 46 13 31-1162 EA Surface Mounted, Fireman's Handset Storage Cabinet, Holds Six Handsets (Notifier FHSC-S)	525.51	30.57
28 46 13 31-1163 EA Fireman's Phone Jack On A Single Gang Plate (Notifier FPJ)	85.26	9.17
28 46 13 31-1164 EA Paging Microphone Only (Notifier MIC-1)	241.32	30.57
28 46 13 31-1165 EA Firefighter's Telephone Handset (Notifier TELH-1)	208.10	
28 46 13 31-1166 EA Remote Microphone Assembly For Mounting On An ADP-4 Dress Plate (Notifier RM-1)	596.19	30.57
28 46 13 31-1167 EA Remote Microphone Assembly For Mounting In A Stand Alone Cabinet (Notifier RM-1SA)	596.19	30.57
28 46 13 31-1168 Amplifiers (28 46 13 31-0973)		
28 46 13 31-1169 EA 30 Watt Audio Amplifier At 25 VRMS, 120 Volt AC (Notifier AA-30)	1,146.36	30.57
28 46 13 31-1170 EA 100 Watt Audio Amplifier At 70.7 VRMS, 120 Volt AC, Tone Generator (Notifier AA-100)	2,501.17	30.57
28 46 13 31-1171 EA 120 Watt Audio Amplifier At 25 VRMS, 120 Volt AC, Tone Generator (Notifier AA-120)	2,429.65	30.57
28 46 13 31-1172 EA Audio Coupling Transformer (Notifier ACT-1)	175.30	30.57
28 46 13 31-1173 EA Audio Coupling Transformer For DVC-AO (Notifier ACT-4)	205.56	30.57
28 46 13 31-1174 EA Audio Coupling Transformer For DAA-5025 (Notifier ACT-25)	205.56	30.57
28 46 13 31-1175 EA Audio Coupling Transformer For DAA-5070 (Notifier ACT-70)	205.56	30.57
28 46 13 31-1176 EA 50 Watt, 25 Volt, 120 VAC Digital Amplifier (Notifier DAA2-5025)	1,856.01	30.57
28 46 13 31-1177 EA 50 Watt, 70 Volt, 120 VAC Digital Amplifier (Notifier DAA2-5070)	1,919.64	30.57
28 46 13 31-1178 EA 75 Watt, 25 Volt, 120 VAC Digital Amplifier (Notifier DAA2-7525)	1,994.25	30.57
28 46 13 31-1179 EA Distributed Amplifier With Backup Capability (Notifier NFC-50/100DA)	3,637.72	30.57
Note: Requires NFC-BDA-BU		
28 46 13 31-1180 EA 50 Watt, 25 Volt Amplifier For A Second Speaker Circuit Or Backup (Notifier NFC-BDA-25V)	724.89	30.57
Note: Requires NFC-BDA-BU		
28 46 13 31-1181 EA 50 Watt, 70 Volt Amplifier For A Second Speaker Circuit Or Backup (Notifier NFC-BDA-70V)	728.18	30.57
Note: Requires NFC-BDA-BU		
28 46 13 31-1182 FireVoice-25/50 Emergency Voice Evacuation Control Panels (28 46 13 31-0973)		
28 46 13 31-1183 EA 25 Watt, 25 VRMS Voice Evacuation Control Panel (Notifier NFV-25/50)	5,119.20	611.40
28 46 13 31-1184 EA Single Channel 25 Watt, 25 VRMS Voice Evacuation Control Panel (Notifier NFV-25/50DA)	3,589.37	611.40
28 46 13 31-1185 EA Single Channel 25 Watt, 25 VRMS Voice Evacuation Control Panel Used With NFV-25/50ZS (Notifier NFV-25/50DAZS)	4,688.14	611.40
28 46 13 31-1186 EA Zoned System 25 Watt, 25 VRMS Voice Evacuation Control Panel (Notifier NFV-25/50ZS)	6,125.00	611.40
28 46 13 31-1187 EA Zoned System With Telephone 25 Watt, 25 VRMS Voice Evacuation Control Panel (Notifier NFV-25/50ZST)	6,784.26	611.40
28 46 13 31-1188 System Printer (28 46 13 31-0973)		
28 46 13 31-1189 EA 80 Column, 120 Volt AC, Desktop Printer (Notifier PRN-6)	2,484.67	30.57
28 46 13 31-1190 Batteries (28 46 13 31-0973)		
28 46 13 31-1191 EA 5 Ampere Hours, 12 Volt DC, Sealed Battery Pack (Notifier BAT-1250-BP)	681.49	30.57
28 46 13 31-1192 EA 7 Ampere Hours, 12 Volt DC, Sealed Battery Pack (Notifier BAT-1270-BP)	531.54	30.57
28 46 13 31-1193 EA 12 Ampere Hours, 12 Volt DC, Sealed Battery Pack (Notifier BAT-12120-BP)	699.34	30.57
28 46 13 31-1194 EA 18 Ampere Hours, 12 Volt DC, Sealed Battery Pack (Notifier BAT-12180-BP)	407.75	30.57
28 46 13 31-1195 EA 26 Ampere Hours, 12 Volt DC, Sealed Battery Pack (Notifier BAT-12260-BP)	570.05	30.57
28 46 13 31-1196 EA 55 Ampere Hours, 12 Volt DC, Sealed Battery (Notifier BAT-12550)	568.68	30.57
28 46 13 31-1197 EA 100 Ampere Hours, 12 Volt DC, Sealed Battery (Notifier BAT-121000)	905.39	30.57

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1198			Battery Backboxes And Miscellaneous Mechanicals <small>(28 46 13 31-0973)</small>		
28 46 13 31-1199	EA		14-1/2" x 8-1/4" x 4-3/4", Holds Up To Two BAT-12180 Batteries, Battery Backbox (Notifier BB-17).....	185.25	24.45
28 46 13 31-1200	EA		24" x 12.55" x 5.218", Mounts Up To Six XP6 Boards Or ACPS-610, Cabinet (Notifier BB-25)	313.25	24.45
			Note: XP6 modules require a CHS-6.		
28 46 13 31-1201	EA		15.6" x 15.5" x 5.152", Mounts Up To Two 26 Ampere Hours And Charger, Battery Backbox (Notifier BB-26).....	461.88	122.28
28 46 13 31-1202	EA		Holds Up To Two BAT-12120 12 Ampere Hours Batteries, Battery Holder (Notifier CHS-BH).....	232.42	61.14
28 46 13 31-1203	EA		Holds Up To Two BAT-12120 12 Ampere Hours Batteries, Battery Holder (Notifier CHS-BH1).....	133.57	15.28
28 46 13 31-1204	EA		Battery Bracket For Two 26 Ampere Hours Batteries (Notifier SEISKIT-BB25).....	338.49	24.45
28 46 13 31-1205	EA		Two 26 Ampere Hours Battery Bracket Seismic Kit For CAB-4 Series Cabinets (Notifier SEISKIT-CAB).....	248.95	24.45
28 46 13 31-1206	EA		Two 12 Ampere Hours Battery Bracket Seismic Kit For DAX, DAA, And DAA2 Series Amplifiers (Notifier SEISKIT-DAA).....	276.93	24.45
28 46 13 31-1207	EA		Two 55 Ampere Hours Battery Bracket Seismic Kit For NFS-LBB (Notifier SEISKIT-LBB).....	295.38	24.45
28 46 13 31-1208	EA		Two 7, 12, Or 18 Ampere Hour Battery Bracket Seismic Kit For FIREVOICE 25/50 Series (Notifier SEISKIT-2550).....	440.65	24.45
28 46 13 31-1209	EA		Two 26 Ampere Hour Battery Bracket Seismic Kit For NFS-320 And BB-26 Series (Notifier SEISKIT-320/B26).....	259.66	24.45
28 46 13 31-1210	EA		Two 100 Ampere Hour Battery Bracket Seismic Kit For BB-100 And BB-200 Series (Notifier SEISKIT-BB100).....	369.21	24.45
			Note: Two kits are required for the BB-200		
28 46 13 31-1211	EA		Two 18 Ampere Hour Battery Bracket Seismic Kit For BB-17 Series (Notifier SEISKIT-BB17).....	319.20	24.45
			Note: Two kits are required for the BB-200		
28 46 13 31-1212	EA		Two 26 Ampere Hour Battery Bracket Seismic Kit For BB-25 Series (Notifier SEISKIT-BB25).....	326.34	24.45
			Note: Two kits are required for the BB-200		
28 46 13 31-1213	EA		Two 7, 12, Or 18 Ampere Hour Battery Bracket Seismic Kit For SFP-5UD, SFP-10UD, Firewarden 100-2, RP-2001, And RP-2002 Series (Notifier SEISKIT-COMMENC).....	284.67	24.45
			Note: Two kits are required for the BB-200		
28 46 13 31-1214	EA		Two 7 Or 12 Ampere Hour Battery Bracket Seismic Kit For FCPS-24S6/8, CAB-PS1, SFP-2402 And SFP-2404 Series (Notifier SEISKIT-PS/2/4).....	266.81	24.45
			Note: Two kits are required for the BB-200		
28 46 13 31-1215			Power Supplies And Chargers <small>(28 46 13 31-0973)</small>		
28 46 13 31-1216	EA		120 Volt AC, 6 Or 10 Amperes, Addressable Charging Power Supply (Notifier ACPS-610).....	1,603.53	45.85
28 46 13 31-1217	EA		220/240 Volt AC, 6 Or 10 Amperes, Addressable Charging Power Supply (Notifier ACPS-610E).....	1,682.52	45.85
28 46 13 31-1218	EA		Addressable Power Supply, 120 Volt AC For NFS-3030, NFS2-3030 And NCA-2 (Notifier AMPS-24).....	1,751.56	30.57
28 46 13 31-1219	EA		6A Auxiliary Power Supply (Notifier APS-6R).....	1,029.75	30.57
28 46 13 31-1220	EA		10 Amperes Battery Charger (Notifier BC10A).....	1,227.64	45.85
28 46 13 31-1221	EA		33.34" x 22.5" x 7.5", Combination Power Supply And Battery Enclosure For NFS-3030 Or NFS2-3030 (Notifier BB-100).....	672.29	36.68
			Note: Holds four 55 ampere hour or two 100 ampere hour batteries		
28 46 13 31-1222	EA		Red, 33.34" x 22.5" x 7.5", Combination Power Supply And Battery Enclosure For NFS-3030 Or NFS2-3030 (Notifier BB-100R).....	680.63	36.68
			Note: Holds four 55 ampere hour or two 100 ampere hour batteries		
28 46 13 31-1223	EA		30.34" x 36.5" x 7.5", Combination Power Supply And Battery Enclosure For NFS2-3030 (Notifier BB-200).....	945.57	36.68
			Note: Holds four 55 ampere hour or four 100 ampere hour batteries		
28 46 13 31-1224	EA		30.34" x 36.5" x 7.5", Holds Four 55 Ampere Hours Or Four 100 Ampere Hours Batteries, For NFS2-3030, Red, Combination Power Supply And Battery Enclosure (Notifier BB-200R).....	945.57	36.68
28 46 13 31-1225	EA		15.218" x 14.5" x 3.562" ACPS Stand-Alone Cabinet (Notifier CAB-PS1).....	232.60	30.57
28 46 13 31-1226	EA		25 To 120 Ampere Hours Battery Charger (Notifier CHG-120).....	1,349.93	30.57
28 46 13 31-1227	EA		Mounts XPIQ-Ps And/or CHS-BH In A CAB-3/4 Row, Also Mount One ACPS-610 In CAB-3 Row, Chassis Assembly (Notifier CHS-PS).....	104.39	15.28
28 46 13 31-1228	EA		Door Used For Mounting ACPS-610 (E) In A CAB-PS1 Cabinet When Replacing ACPS-2406 (Notifier DR-PS1).....	165.71	15.28
28 46 13 31-1229	EA		8 Amperes, 120 Volt AC Remote Charger Power Supply (Notifier FCPS-24S8).....	894.66	30.57
28 46 13 31-1230	EA		8.0 Amperes, 240 Volt AC Remote Charger Power Supply (Notifier FCPS-24S8E).....	942.62	91.71
28 46 13 31-1231	EA		Red, 8 Amperes, 240 Volt AC Remote Charger Power Supply (Notifier FCPS-24S8R).....	902.03	91.71
28 46 13 31-1232	EA		8 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPFF8).....	1,043.55	91.71
28 46 13 31-1233	EA		8 Amperes, 24 Volt DC, 220 Volt AC, NAC Fire Alarm Power Supply (Notifier HPFF8E).....	1,034.78	91.71
28 46 13 31-1234	EA		Chassis Mounted, 8 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPFF8CM).....	1,008.89	45.85
28 46 13 31-1235	EA		Chassis Mounted, 8 Amperes, 24 Volt DC, 220 Volt AC, NAC Fire Alarm Power Supply (Notifier HPFF8CME).....	1,008.89	45.85
28 46 13 31-1236	EA		12 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPFF12).....	1,251.36	45.85
28 46 13 31-1237	EA		12 Amperes, 24 Volt DC, 220 Volt AC, NAC Fire Alarm Power Supply (Notifier HPFF12E).....	1,195.40	45.85
28 46 13 31-1238	EA		12 Amperes, 24 Volt DC, 120 Volt AC, Chassis Mounted, NAC Fire Alarm Power Supply (Notifier HPFF12CM).....	1,270.01	91.71
28 46 13 31-1239	EA		12 Amperes, 24 Volt DC, 220 Volt AC, Chassis Mounted, NAC Fire Alarm Power Supply (Notifier HPFF12CME).....	1,270.01	91.71
28 46 13 31-1240	EA		6 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPF24S6).....	882.28	91.71
28 46 13 31-1241	EA		6 Amperes, 24 Volt DC, 220 Volt AC, NAC Fire Alarm Power Supply (Notifier HPF24S6E).....	882.28	91.71
28 46 13 31-1242	EA		8 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPF24S8).....	952.49	91.71
28 46 13 31-1243	EA		8 Amperes, 24 Volt DC, 220 Volt AC, NAC Fire Alarm Power Supply (Notifier HPF24S8E).....	952.49	91.71
28 46 13 31-1244	EA		6 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPF602ULADA).....	764.89	91.71
28 46 13 31-1245	EA		9 Amperes, 24 Volt DC, 120 Volt AC, NAC Fire Alarm Power Supply (Notifier HPF902ULADA).....	902.03	91.71
28 46 13 31-1246	EA		Class A Adapter HPFF8/HPFF12 (Notifier HPP31076).....	194.04	15.28
28 46 13 31-1247	EA		Up To 3 Amperes, Main Power Supply And Charger (Notifier MPS-24A).....	1,497.99	30.57
28 46 13 31-1248	EA		Class A (Style Y) NAC Option Module For FCPS-2406 And FCPS-2408 (Notifier ZNAC-4).....	230.22	30.57
28 46 13 31-1249	EA		240 Volt AC Addressable Power Supply (Notifier AMPS-24E).....	1,840.05	30.57
28 46 13 31-1250	EA		6 Amperes, 120 Volt AC Auxiliary Power Supply (Notifier APS2-6R).....	914.10	91.71
28 46 13 31-1251	EA		6 Amperes, 220-240 Volt AC Auxiliary Power Supply (Notifier APS2-6RE).....	952.49	91.71
28 46 13 31-1252	EA		25 To 75 Ampere Hour Sealed Lead Acid Battery Charger (Notifier CHG-75).....	868.61	30.57
28 46 13 31-1253	EA		6 Amperes, 240 Volt AC Remote Charger Power Supply (Notifier FCPS-24S6E).....	881.18	91.71
28 46 13 31-1254	EA		6 Amperes, 120 Volt AC Remote Charger Power Supply (Notifier FCPS-24S6R).....	860.34	91.71
28 46 13 31-1255			Network Control Annunciators <small>(28 46 13 31-0973)</small>		
28 46 13 31-1256	EA		Network Control Annunciator For NFS2-3030, NFS-3030, NFS-320, NFS-640 And NFS2-640 (Notifier NCA-2).....	2,452.90	91.71
28 46 13 31-1257	EA		Retro-Fit Plate For Mounting NCA2 (Notifier NCA-2RETRO).....	93.07	18.34



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1258 EA Kit For Mounting NCA-2 To CHS-M2 (Notifier NCA/640-2-Kit).....	66.94	18.34
28 46 13 31-1259 FIRSTVISION Firefighter's Display (28 46 13 31-0973)		
28 46 13 31-1260 EA ONYX Firstvision™ Touchscreen Assembly (Notifier FIRSTVISION-LCD).....	18,950.87	611.40
28 46 13 31-1261 FlashScan Addressable Modules (28 46 13 31-0973)		
28 46 13 31-1262 EA Intelligent Addressable Control Module (Notifier FCM-1).....	211.06	30.57
28 46 13 31-1263 EA Addressable Dual Monitor Module (Notifier FDM-1).....	235.82	30.57
28 46 13 31-1264 EA Intelligent Addressable Monitor Module (Notifier FMM-1).....	175.30	30.57
28 46 13 31-1265 EA Intelligent Addressable Miniature Monitor Module (Notifier FMM-101).....	156.05	30.57
28 46 13 31-1266 EA Intelligent Addressable 4 - 20mA Analog Input Module (Notifier FMM-4-20).....	322.47	30.57
28 46 13 31-1267 EA Intelligent Addressable Relay Module (Notifier FRM-1).....	193.61	30.57
28 46 13 31-1268 EA Intelligent Addressable 2-Wire Detector Monitor Module (Notifier FZM-1).....	266.08	30.57
28 46 13 31-1269 EA SLC Loop Powered Fault Isolator Module (Notifier ISO-X).....	172.55	30.57
28 46 13 31-1270 Addressable Device Bases And Accessories (28 46 13 31-0973)		
28 46 13 31-1271 EA Intelligent Detector Base With Flange (Notifier B710LP).....	62.69	15.28
28 46 13 31-1272 EA Weatherproof Device Housing (Notifier DH400OE-1).....	543.92	30.57
28 46 13 31-1273 EA Detector Base For All Wireless Smoke And Heat Detectors (Notifier B210W).....	60.93	15.28
28 46 13 31-1274 EA Swift AV Base Ceiling (Notifier WAV-CRL).....	338.96	15.28
28 46 13 31-1275 EA Swift AV Base Wall (Notifier WAV-RL).....	338.96	15.28
28 46 13 31-1276 XP6/XP10 Transponder (28 46 13 31-0973)		
28 46 13 31-1277 EA Synchronization Daughter Module For XP6-C (Notifier SYNC-1).....	155.36	30.57
28 46 13 31-1278 EA Six Circuit Supervised Control Module (Notifier XP6-C).....	781.87	30.57
28 46 13 31-1279 EA Six Zone Intelligent To Conventional Interface Module (Notifier XP6-MA).....	946.92	30.57
28 46 13 31-1280 EA Six Relay Control Module (Notifier XP6-R).....	751.61	30.57
28 46 13 31-1281 EA Ten Input Monitor Module (Notifier XP10-M).....	905.66	30.57
28 46 13 31-1282 LCD Display Annunciators (28 46 13 31-0973)		
28 46 13 31-1283 EA 80 Character LCD Fire Annunciator For FireWarden-100-2, NFS-640, NFS2-640 And NFS-320 (Notifier FDU-80).....	1,001.81	91.71
28 46 13 31-1284 EA 80 Character LCD Annunciator For NFS-640, NFS-3030, NFS2-640, NFS2-3030 And NFS-320 (Notifier LCD-80).....	1,407.56	91.71
28 46 13 31-1285 EA 640 Character LCD Annunciator For NFS-3030 And NFS2-3030 (Notifier LCD-160).....	1,457.08	91.71
28 46 13 31-1286 EA 8 To 16 Switch Smoke Control Expander (Notifier SCE-8).....	970.83	30.57
28 46 13 31-1287 EA 8 To 16 Switch Smoke Control Lamp Driver Expander (Notifier SCE-8L).....	512.42	30.57
28 46 13 31-1288 EA Eight Switch Smoke Control Master Module (Notifier SCS-8).....	1,258.98	30.57
28 46 13 31-1289 EA White, 80 Character Display, Remote LCD Annunciator (Notifier N-ANN-80-W).....	631.04	91.71
28 46 13 31-1290 ONYX ACM And AEM Series LED Annunciators (28 46 13 31-0973)		
28 46 13 31-1291 EA Remote, Eight Form C Relay Module (Notifier ACM-8R).....	554.09	30.57
28 46 13 31-1292 EA 16 Alarm LEDs, 16 Trouble LEDs, 16 Controls Switches, Annunciator Control Module (Notifier ACM-16AT).....	1,036.33	30.57
28 46 13 31-1293 EA 16 Alarm LEDs, 16 Trouble LEDs, 16 Control Switches, Annunciator Expander Module (Notifier AEM-16AT).....	792.87	30.57
28 46 13 31-1294 EA 24 Alarm LEDs, 24 Trouble LEDs, 24 Control Switches, Annunciator Control Module (Notifier ACM-24AT).....	1,036.33	30.57
28 46 13 31-1295 EA 24 Alarm LEDs, 24 Trouble LEDs, 24 Control Switches, Annunciator Expander Module (Notifier AEM-24AT).....	792.87	30.57
28 46 13 31-1296 EA 32 Alarm LEDs And 1 Trouble LED, Control Module (Notifier ACM-32A).....	792.87	30.57
28 46 13 31-1297 EA 32 Alarm And 1 Trouble LED, Annunciator Expander Module (Notifier AEM-32A).....	710.35	30.57
28 46 13 31-1298 EA 48 Alarm And 1 Trouble LED Annunciator Control Module (Notifier ACM-48A).....	792.87	30.57
28 46 13 31-1299 EA 48 Alarm And 1 Trouble LED, Annunciator Expander Module (Notifier AEM-48A).....	710.35	30.57
28 46 13 31-1300 Graphic Annunciator - Lamp Driver Modules (28 46 13 31-0973)		
28 46 13 31-1301 EA Single Annunciator Flush Mounted Backbox (Notifier ABF-1B).....	323.09	61.14
28 46 13 31-1302 EA Single Annunciator Flush Mounted Backbox With Glass Door And Key Lock (Notifier ABF-1DB).....	351.98	61.14
28 46 13 31-1303 EA Two Annunciator Flush Mounted Backbox (Notifier ABF-2B).....	404.55	76.43
28 46 13 31-1304 EA Two Annunciator Flush Mounted Backbox With Glass Door And Key Lock (Notifier ABF-2DB).....	441.68	76.43
28 46 13 31-1305 EA Four Annunciator Flush Mounted Backbox (Notifier ABF-4B).....	711.90	106.99
28 46 13 31-1306 EA Annunciator Blank Plate Used With ACM-32A/ACM-16AT (Notifier ABM-1).....	126.77	18.34
28 46 13 31-1307 EA Single Annunciator Surface Mounted Backbox (Notifier ABS-1B).....	205.49	61.14
28 46 13 31-1308 EA Single Annunciator Surface Mounted Backbox With Trim (Notifier ABS-1TB).....	206.91	15.28
28 46 13 31-1309 EA Two Annunciator Surface Mounted Backbox (Notifier ABS-2B).....	258.45	61.14
28 46 13 31-1310 EA 12" x 12" x 3-3/4" Surface Or Semi-Flush Mount Backbox (Notifier ABS-2D).....	460.94	76.43
28 46 13 31-1311 EA Red, Surface (Or Semi-Flush) Mounted Backbox For ACS Annunciators, SCS Series, NCA And NCA-2 (Notifier ABS-2DR).....	392.95	15.28
28 46 13 31-1312 EA Black, 12" x 20" x 3-1/2" Surface Or Semi-Flush Backbox (Notifier ABS-4D).....	749.04	106.99
28 46 13 31-1313 EA Red, 12" x 20" x 3-1/2" Surface Or Semi-Flush Backbox (Notifier ABS-4DR).....	665.99	18.34
28 46 13 31-1314 EA Black, 9-15/16" x 4-5/8" x 2-1/2" Surface Backbox (Notifier ABS-8RB).....	247.89	24.45
28 46 13 31-1315 EA Annunciator Key Switch (Notifier AKS-1B).....	119.85	9.17
28 46 13 31-1316 EA Chassis Used To Mount NCA-2 In ABS-2D (Notifier CHS-2D).....	119.60	30.57
28 46 13 31-1317 EA 32 Alarm Lamp Driver Annunciator Control Module (Notifier LDM-32).....	710.35	30.57
28 46 13 31-1318 EA 24" Lamp Driver Annunciator Cable (Notifier LDM-CBL24).....	211.67	6.11
28 46 13 31-1319 EA 48" Lamp Driver Annunciator Cable (Notifier LDM-CBL48).....	265.25	6.11
28 46 13 31-1320 EA 32 Alarm Lamp Driver Annunciator Expander Module (Notifier LDM-E32).....	585.18	30.57
28 46 13 31-1321 EA Lamp Driver Module (Notifier LDM-R32).....	1,031.56	30.57
28 46 13 31-1322 EA Eight Switch Smoke Control Lamp Driver Master Module (Notifier SCS-8L).....	956.55	30.57

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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28 46	13 31-1323	EA	48" Cable Assembly For Smoke Control Lamp Driver (Notifier SCS8L-CBL48).....	272.40	6.11
28 46	13 31-1324	EA	Black, Trim Ring For ABS-2D Cabinet (Notifier TR-ABS2D).....	243.27	18.34
28 46	13 31-1325	EA	Black, Trim Ring For ABS-4D Cabinet (Notifier TR-ABS4D).....	148.31	18.34
28 46	13 31-1326	EA	Red, Trim Ring For ABS-4D Cabinet (Notifier TR-ABS4DR).....	148.31	18.34
28 46	13 31-1327	EA	Graphic Annunciator Dress Plate (Notifier DP-GDIS1).....	232.55	18.34
28 46	13 31-1328	EA	Graphic Annunciator Dress Plate (Notifier DP-GDIS2).....	232.55	18.34
28 46	13 31-1329	EA	Input/Output Module For Driving Graphic Annunciators Or Relays (Notifier N-ANN-RLED).....	572.99	30.57

28 46 13 31-1330 Network Gateways (28 46 13 31-0973)

28 46	13 31-1331	EA	Common Alerting Protocol Gateway (Notifier CAP-GW).....	3,462.18	30.57
28 46	13 31-1332	EA	Fiber-Optic Cable Interface (Multi-Mode), High-Speed Network Communications Module (Notifier HS-NCM-MF).....	2,575.72	30.57
28 46	13 31-1333	EA	Fiber-Optic Cable Interface (Multi-Mode Fiber To Single-Mode Fiber), High-Speed Network Communications Module (Notifier HS-NCM-MFSF).....	2,902.65	30.57
28 46	13 31-1334	EA	Fiber-Optic Cable Interface (Single-Mode), High-Speed Network Communications Module (Notifier HS-NCM-SF).....	3,198.87	30.57
28 46	13 31-1335	EA	Twisted-Pair Wire Interface, High-Speed Network Communications Module (Notifier HS-NCM-W).....	2,598.76	30.57
28 46	13 31-1336	EA	Wire And Fiber-Optic Cable Interface, High-Speed Network Communications Module (Multi-Mode) (Notifier HS-NCM-WMF).....	2,528.54	30.57
28 46	13 31-1337	EA	Wire And Fiber-Optic Cable Interface (Single-Mode), High-Speed Network Communications Module (Notifier HS-NCM-WSF).....	2,847.80	30.57
28 46	13 31-1338	EA	Modbus Gateway (Notifier MODBUS-GW).....	2,836.83	30.57
28 46	13 31-1339	EA	22" Widescreen HD LED Color Monitor With Speakers (Notifier MON-22LCDW).....	3,284.27	20.17
28 46	13 31-1340	EA	Capacitive Touch-Screen, 22" Widescreen HD LED Color Monitor With Speakers (Notifier MON-22LCDW-TS).....	4,886.05	20.17
28 46	13 31-1341	EA	1920x1080P Wide Screen (Notifier MON-42LCDW).....	15,495.11	20.17
28 46	13 31-1342	EA	Single Monitor, Wall Mounted, Horizontal, Tilt, Bracket (Notifier MON-42HORZ-SD).....	803.52	45.85
28 46	13 31-1343	EA	Single Monitor, Vertical Mounted, Bracket (Notifier MON-42VERT-SD).....	1,491.07	45.85
28 46	13 31-1344	EA	Dual Monitors, Vertical Wall Mounted, Fixed Position, Bracket (Notifier MON-42VERT-DD).....	2,186.71	45.85
28 46	13 31-1345	EA	Mass Notification Voice Paging (Notifier NOTIFY-IP).....	1,298.98	
28 46	13 31-1346	EA	Embedded NFN Gateway (Notifier NFN-GW-EM).....	3,004.58	30.57
28 46	13 31-1347	EA	NFN Gateway PC Card With Fiber (Notifier NFN-GW-PC-F).....	3,004.58	30.57
28 46	13 31-1348	EA	High Speed NFN Gateway PC Card For Multimode Fiber (Included With ONYXworks-HNMF) (Notifier NFN-GW-PC-HNMF).....	3,933.94	30.57
28 46	13 31-1349	EA	High Speed NFN Gateway PC Card For Single Mode Fiber (Included With ONYXworks-HNSF) (Notifier NFN-GW-PC-HNSF).....	4,581.23	30.57
28 46	13 31-1350	EA	High Speed NFN Gateway PC Card For Wire (Included With ONYXworks-HNW) (Notifier NFN-GW-PC-HNW).....	3,933.94	30.57
28 46	13 31-1351	EA	NFN Gateway PC Card With Wire (Notifier NFN-GW-PC-W).....	3,004.58	30.57
28 46	13 31-1352	EA	Alpha-Numeric Pager Option For ONYXworks (Notifier ONYX-PAGER).....	1,698.65	
28 46	13 31-1353	EA	ONYXWorks Workstation (Notifier ONYXWORKS-WS).....	29,067.86	733.68
28 46	13 31-1354	EA	Fiber Network Graphical User Interface (Notifier ONYXWorks-Lite OW-LITE-NW)..... Note: Includes PC slot network fiber card, workstation software and security key with a four node license. Excludes PC workstation.	6,715.60	
28 46	13 31-1355	EA	Wired Network Graphical User Interface (Notifier ONYXWorks-Lite OW-LITE-NF)..... Note: Includes PC slot network fiber card, workstation software and security key with a four node license. Excludes PC workstation.	6,715.60	
28 46	13 31-1356	EA	Fiber Optics, Standard Network Repeater Board (Notifier RPT-F).....	1,202.13	30.57
28 46	13 31-1357	EA	Wire, Standard Network Repeater Board (Notifier RPT-W).....	979.42	30.57
28 46	13 31-1358	EA	Wire To Fiber Optics, Standard Network Repeater Board (Notifier RPT-WF).....	1,164.83	30.57
28 46	13 31-1359	EA	Signaling Line Circuit Integration Module (Notifier SLC-IM).....	1,299.78	30.57
28 46	13 31-1360	EA	VESDA Gateway That Provides A Communication Link Between The Noti-Fire-Net™ Network And Vesda™ Detectors On The Vesdanet™ (Notifier VESDA-HLI-GW).....	2,705.18	30.57
28 46	13 31-1361	EA	Vesda™ High Level Interface Card Used With SLC-IM And Vesda-HLI-GW To Provide A Communication Link Between The Noti-Fire-Net™ Network And Vesda™ Detectors On The Vesdanet™ (Notifier VHX-1420-HFS).....	2,908.40	30.57
28 46	13 31-1362	EA	Windows Hard Drive Upgrade (Notifier WIN7-JG-US-3).....	3,235.52	
28 46	13 31-1363	EA	Intuitive Color 10" Touch Screen Providing Color Coded Information Of Detailed System Status (Notifier NCD).....	1,667.13	20.17
28 46	13 31-1364	EA	SWIFT Wireless Gateway With Flashscan (Notifier FWGS).....	493.47	30.57

28 46 13 31-1365 NOTI-FIRE-NET Network Components (28 46 13 31-0973)

28 46	13 31-1366	EA	Interface Between NOTI-FIRE-NET 50 And BACnet (Notifier BACNET-GW-3).....	3,004.58	30.57
28 46	13 31-1367	EA	Fiber Optic Network Communications Module (Notifier NCM-F).....	1,336.17	30.57
28 46	13 31-1368	EA	NOTI-FIRE-NET Web Server (Notifier NWS).....	3,004.58	30.57
28 46	13 31-1369	EA	Wired Network Communications Module (Notifier NCM-W).....	1,272.90	30.57
28 46	13 31-1370	EA	Fiber Optic Converter Module Mounting Kit (Notifier SMF-Kit).....	135.38	15.28

28 46 13 31-1371 FireWarden Addressable Fire Panels (28 46 13 31-0973)

28 46	13 31-1372	EA	50 Point, Addressable Fire Alarm Control Panel With Digital Alarm Communicator/Transmitter (Notifier NFW-50).....	2,536.34	611.40
28 46	13 31-1373	EA	Black, One SLC Loop, 120 Volt AC, 198 Point Addressable Fire Alarm Control Panel With Digital Alarm Communicator/Transmitter (Notifier NFW2-100).....	3,024.62	611.40
28 46	13 31-1374	EA	Black, One DC Loop, 120 Volt AC, 198 Point Addressable Fire Alarm Control Panel With Digital Alarm Communicator/Transmitter (Notifier NFW2-100C).....	3,094.46	305.70
28 46	13 31-1375	EA	Black, One SLC Loop, 240 Volt AC, 198 Point Addressable Fire Alarm Control Panel With Digital Alarm Communicator/Transmitter (Notifier NFW2-100E).....	3,094.46	305.70
28 46	13 31-1376	EA	Red, One SLC Loop, 120 Volt AC, 198 Point Addressable Fire Alarm Control Panel With Digital Alarm Communicator/Transmitter (Notifier NFW2-100R).....	3,081.29	305.70
28 46	13 31-1377	EA	Black, Built In Digital Alarm Communicator/Transmitter (DACT) With Modem For Remote Upload/Download, Built In Annunciator, 50 Point Addressable Fire Alarm Control Panel (Notifier NFW-50C).....	3,531.11	305.70
28 46	13 31-1378	EA	Red, Built In Digital Alarm Communicator/Transmitter (DACT) With Modem For Remote Upload/Download, 50 Point Addressable Fire Alarm Control Panel (NFW-50R).....	2,548.10	305.70

28 46 13 31-1379 FireWarden Accessories (28 46 13 31-0973)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1380 EA Intelligent Multicriteria Photo/Thermal Detector With Base (Notifier NP-A100).....	232.21	45.85
28 46 13 31-1381 EA Intelligent Addressable Photo/Thermal Detector With Base (Notifier NP-100T).....	220.31	45.85
28 46 13 31-1382 FireWarden Devices (28 46 13 31-0973)		
28 46 13 31-1383 EA SLC Loop Powered Fault Isolator Module (Notifier N100-ISO).....	171.18	30.57
28 46 13 31-1384 EA Intelligent Addressable Control Module (Notifier NC-100).....	204.19	30.57
28 46 13 31-1385 EA Intelligent Addressable Relay Module (Notifier NC-100R).....	195.93	30.57
28 46 13 31-1386 EA Intelligent Addressable Low Flow Duct Photoelectric Smoke Detector (Notifier ND-100).....	478.82	45.85
28 46 13 31-1387 EA Intelligent Addressable Low Flow Duct Photoelectric Smoke Detector With DPDT Relay (Notifier ND-100R).....	580.24	45.85
28 46 13 31-1388 EA Two Zone Intelligent Addressable, Two Wire Detector Monitor Module (Notifier NDM-100).....	195.93	30.57
28 46 13 31-1389 EA Intelligent Addressable Thermal Detector With Base (Notifier NH-100).....	198.99	45.85
28 46 13 31-1390 EA Intelligent Addressable High Temperature Thermal Detector With Base (Notifier NH-100H).....	198.99	45.85
28 46 13 31-1391 EA Intelligent Addressable Rate-Of-Rise Thermal Detector With Base (Notifier NH-100R).....	198.99	45.85
28 46 13 31-1392 EA Intelligent Addressable Ionization Smoke Detector With Base (Notifier NI-100).....	270.52	45.85
28 46 13 31-1393 EA Intelligent Addressable Monitor Module (Notifier NMM-100).....	168.42	30.57
28 46 13 31-1394 EA Intelligent Addressable Mini Monitor Module (Notifier NMM-100P).....	152.61	30.57
28 46 13 31-1395 EA Intelligent Addressable Manual Pull Station (Notifier NOT-BG12LX).....	229.63	30.57
28 46 13 31-1396 EA Intelligent Addressable Photoelectric Smoke Detector With Base (Notifier NP-100).....	208.62	45.85
28 46 13 31-1397 EA Intelligent Addressable 2-Wire Detector Monitor Module (Notifier NZM-100).....	257.83	30.57
28 46 13 31-1398 EA Six Zone Intelligent Addressable 2-Wire Detector Monitor Module (Notifier NZM-100-6).....	924.92	30.57
28 46 13 31-1399 SFP-2402 And SFP-2404 2 And 4-Zone Control Panels And Accessories (28 46 13 31-0973)		
28 46 13 31-1400 EA 120 Volt AC, Two Zone Conventional Fire Alarm Control Panel (Notifier SFP-2402).....	1,665.95	489.12
28 46 13 31-1401 EA 120 Volt AC, Four Zone Conventional Fire Alarm Control Panel (Notifier SFP-2404).....	1,843.38	489.12
28 46 13 31-1402 EA 240 Volt AC, Two Zone Conventional Fire Alarm Control Panel (Notifier SFP-2402E).....	1,285.03	152.84
28 46 13 31-1403 EA 240 Volt AC, Four Zone Conventional Fire Alarm Control Panel (Notifier SFP-2404E).....	1,459.47	152.84
28 46 13 31-1404 EA Class A Converter Module (Notifier CAC-4).....	457.64	30.57
28 46 13 31-1405 EA Internal Dress Plate, Required For FM And ULC (Notifier DP-4X).....	165.57	18.34
28 46 13 31-1406 EA Remote Zone Annunciator (Notifier RZA-4X).....	238.17	45.85
28 46 13 31-1407 EA Red, Dress Panel (Notifier DP-51050).....	200.40	18.34
28 46 13 31-1408 EA Black, Dress Panel (Notifier DP-51050B).....	202.78	18.34
28 46 13 31-1409 SFP-5UD 5 Zone Control Panels And Accessories (28 46 13 31-0973)		
28 46 13 31-1410 EA 120 Volt AC, Five Zone Conventional Fire Alarm Control Panel (Notifier SFP-5UD).....	2,591.35	611.40
28 46 13 31-1411 EA 120 Volt AC, Five Zone Conventional Fire Alarm Control Panel (Notifier SFB-5UDC).....	4,293.19	458.54
28 46 13 31-1412 EA 240 Volt AC, Five Zone Conventional Fire Alarm Control Panel (Notifier SFB-5UDE).....	2,832.46	305.70
28 46 13 31-1413 EA Red, 120 Volt AC, Five Zone Conventional Fire Alarm Control Panel (Notifier SFB-5UDR).....	2,832.46	305.70
28 46 13 31-1414 EA Class A Converter Module (Notifier N-CAC-5X).....	474.31	30.57
28 46 13 31-1415 EA Red, Trim Ring For NFW2-100, NFW-50, SFB-5UD, SFB-10UD, RP-2001, RP-2002 Cabinet (Notifier TR-CE).....	179.56	18.34
28 46 13 31-1416 EA Five Zone Conventional Fire Control Panel With DACT And 7 Amperes Power Supply, ULC/UL Listed (Notifier SFP-5UDC).....	3,853.97	458.54
Note: Includes internal dress panel with built-in annunciator module		
28 46 13 31-1417 EA 240 Volt AC, Five Zone Conventional Fire Control Panel With DACT And 3 Amperes Power Supply (Notifier SFP-5UDE).....	2,552.49	305.70
28 46 13 31-1418 EA Red, 120 Volt AC, Five Zone Conventional Fire Control Panel With DACT And 3 Amperes Power Supply (Notifier SFP-5UDR).....	2,529.45	305.70
28 46 13 31-1419 SFP-10UD 10 Zone Control Panels And Accessories (28 46 13 31-0973)		
28 46 13 31-1420 EA 120 Volt AC, 10 Zone Conventional Fire Alarm Control Panel With Built-In Digital Alarm Communicator Transmitter (Notifier SFB-10UDC).....	5,220.05	611.40
28 46 13 31-1421 EA 240 Volt AC, 10 Zone Conventional Fire Alarm Control Panel With Built-In Digital Alarm Communicator Transmitter (Notifier SFB-10UDE).....	3,903.31	458.54
28 46 13 31-1422 EA 120 Volt AC, 10 Zone Conventional Fire Alarm Control Panel With Built-In Digital Alarm Communicator Transmitter (Notifier SFP-10UD).....	2,976.48	611.40
28 46 13 31-1423 EA Red, 120 Volt AC, 10 Zone Conventional Fire Alarm Control Panel With Built-In Digital Alarm Communicator Transmitter (Notifier SFB-10UDR).....	4,514.71	611.40
28 46 13 31-1424 EA Four Channel, Dual Line, Stand Alone Fire Alarm Communicator (Fire-Lite 411UDAC).....	772.11	91.71
28 46 13 31-1425 EA 10 Zone Conventional Fire Control Panel With DACT And 7 Amperes Power Supply, ULC/UL Listed (Notifier SFP-10UDC).....	4,729.77	611.40
Note: Includes internal dress panel with built-in annunciator module		
28 46 13 31-1426 EA 240 Volt AC, 10 Zone Conventional Fire Control Panel With DACT And 7 Amperes Power Supply (Notifier SFP-10UDE).....	3,528.13	458.54
28 46 13 31-1427 EA Red, 10 Zone Conventional Fire Control Panel With DACT And 7 Amperes Power Supply (Notifier SFP-10UDR).....	4,112.10	611.40
28 46 13 31-1428 Smoke Detectors (28 46 13 31-0973)		
28 46 13 31-1429 EA Low Profile Intelligent Addressable Ionization Smoke Detector (Notifier FSI-851).....	289.77	45.85
28 46 13 31-1430 EA Intelligent Addressable Laser Smoke Detector (Notifier FSL-751).....	490.59	45.85
28 46 13 31-1431 EA Intelligent Addressable Laser Duct Smoke Detector (Notifier FSL-751D).....	1,444.04	45.85
28 46 13 31-1432 EA Remote Test Capable Intelligent Addressable Photo Detector (Notifier NP-100R).....	207.21	45.85
Note: For use with DNR(W) duct detector housing.		
28 46 13 31-1433 EA Filters For Harsh Detector (Notifier RF-FTX).....	25.13	
28 46 13 31-1434 EA Key Activated Remote Test Station For Duct Smoke Detector (Notifier RTS151KEY).....	174.96	30.57
28 46 13 31-1435 EA Addressable Beam Detector With Reflector, UL Listed (Notifier FS-OSI-RI).....	1,897.55	45.85
28 46 13 31-1436 EA Intelligent Addressable Photo Detector With Flashscan, White (Notifier FSP-951).....	215.84	45.85
28 46 13 31-1437 EA Intelligent Addressable Photo Detector With Flashscan And Clip, Ivory (Notifier FSP-951-IV).....	235.49	45.85

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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28 46 13 31-1438	EA		Remote Test Capable Intelligent Photo Detector With Flashscan, White (Notifier FSP-951R).....	225.66	45.85
28 46 13 31-1439	EA		Remote Test Capable Intelligent Photo Detector With Flashscan And Clip, Ivory (Notifier FSP-951R-IV)	243.52	45.85
28 46 13 31-1440	EA		Intelligent Addressable Photo/Thermal Detector With Flashscan, White (Notifier FSP-951T)	226.85	45.85
28 46 13 31-1441	EA		Intelligent Addressable Photo/Thermal Detector With Flashscan, Ivory (Notifier FSP-951T-IV)	244.71	45.85
28 46 13 31-1442	EA		Intelligent Addressable 135 Degree Thermal Detector With Flashscan, White (Notifier FST-951)	184.58	45.85
28 46 13 31-1443	EA		Intelligent Addressable High Temperature 190 Degree Heat Detector With Flashscan (Notifier FST-951H).....	184.58	45.85
28 46 13 31-1444	EA		Intelligent Addressable High Temperature 190 Degree Heat Detector With Flashscan And Clip, Ivory (Notifier FST-951H-IV)	201.25	45.85
28 46 13 31-1445	EA		Intelligent Addressable 135 Degree Thermal Detector With Flashscan And Clip, Ivory (Notifier FST-951-IV).....	201.25	45.85
28 46 13 31-1446	EA		Intelligent Addressable Rate-of-Rise Thermal Detector With Flashscan, White (Notifier FST-951R)	184.58	45.85
28 46 13 31-1447	EA		Intelligent Addressable Rate-of-Rise Thermal Detector With Flashscan And Clip, Ivory (Notifier FST-951R-IV).....	201.25	45.85
28 46 13 31-1448	EA		Low Profile Intelligent Addressable High Sensitivity Detector With Flashscan, White (Notifier FSV-951R)	494.17	45.85
28 46 13 31-1449	EA		Low Profile Intelligent Addressable High Sensitivity Detector With Flashscan, Ivory (Notifier FSV-951R-IV).....	529.89	45.85
28 46 13 31-1450	EA		Wireless Photo-Heat Detector, Acclimate, With Flashscan (Notifier FWD-200ACCLIMATE).....	492.98	45.85
			Note: Requires B210W base, ordered separately		
28 46 13 31-1451	EA		Wireless Photo Detector With Flashscan (Notifier FWD-200P)	453.68	45.85
			Note: Requires B210W base, ordered separately		
28 46 13 31-1452	EA		Wireless Fixed Temp Heat Detector, 135 Degree, With Flashscan (Notifier FWH-200FIX135).....	412.01	45.85
			Note: Requires B210W base, ordered separately		
28 46 13 31-1453	EA		Wireless ROR Heat Detector, 135 Degree, With Flashscan (Notifier FWH-200ROR135)	412.01	45.85
			Note: Requires B210W base, ordered separately		
28 46 13 31-1454	EA		Intelligent Addressable Carbon Monoxide Detector With Flashscan (Notifier FPC-951)	300.08	45.85
28 46 13 31-1455	EA		Built In Circular Display, 3 Alarm Levels, Smoke Detector (Notifier VLF-250)	2,918.96	45.85
			Note: Use for areas up to 2,500 square feet. Adjustable sensitivity range is 0.008 - 6% ro 6.4 /Ft. Obs.		
28 46 13 31-1456	EA		Built In Circular Display, 3 Alarm Levels, Smoke Detector (Notifier VLF-500)	3,577.34	45.85
			Note: Use for areas up to 2,500 square feet. Adjustable sensitivity range is 0.008 - 6% ro 6.4 /Ft. Obs.		

28 46 13 31-1457 Pull Stations (28 46 13 31-0973)

28 46 13 31-1458	EA		Trim Ring For NBG12 Series Pull Station (Notifier BG12TR)	37.00	6.11
28 46 13 31-1459	EA		One End Tapped For 1/2" Conduit, Aluminum, Surface Mounted Backbox (Notifier BG-2).....	88.81	15.28
28 46 13 31-1460	EA		Red, One End Tapped For 1/2" Conduit, Aluminum, Surface Mounted Backbox (Notifier BG-2R).....	80.10	15.28
28 46 13 31-1461	EA		Red Letters, Spring Retainer, Aluminum Single Action Pull Station (Notifier BNG-1)	116.95	30.57
28 46 13 31-1462	EA		DPDT Switch, Red Letters, Spring Retainer, Aluminum Single Action Pull Station (Notifier BNG-1F).....	129.09	30.57
28 46 13 31-1463	EA		Terminal Switch, DPDT Switch, Red Letters, Spring Retainer, Aluminum Single Action Pull Station (Notifier BNG-1FTS).....	176.81	30.57
28 46 13 31-1464	EA		Red Body, Silver Letters, Spring Retainer, Aluminum Single Action Pull Station (Notifier BNG-1R)	116.95	30.57
28 46 13 31-1465	EA		Red Letters, Spring Retainer, Aluminum Single Action Pull Station With Terminal Strip (Notifier BNG-1TS).....	134.75	30.57
28 46 13 31-1466	EA		Standard Local Style Red Letters, Spring Retainer, Aluminum Single Action Pull Station With Terminal Strip (Notifier BNG-1TSL)	134.75	30.57
28 46 13 31-1467	EA		Terminal Strip, Red Body, Red Letters, Spring Retainer, Aluminum Single Action Pull Station (Notifier BNG-1TSR).....	134.75	30.57
28 46 13 31-1468	EA		Red Letters, Breakglass, Aluminum Single Action Pull Station (Notifier BRG-1)	127.47	30.57
28 46 13 31-1469	EA		Red Body, Silver Letters, Breakglass, Aluminum Single Action Pull Station (Notifier BRG-1R).....	137.98	30.57
28 46 13 31-1470	EA		Hazardous, Non-Hazardous, Weatherproof, Harsh Locations Fire Alarm Pull Station (Notifier HAZ-WP-PULL).....	968.61	36.68
28 46 13 31-1471	EA		Red, Single Action Fire Alarm Pull Station (Notifier NBG-12S).....	105.32	30.57
28 46 13 31-1472	EA		Red, Dual Action Fire Alarm Pull Station (Notifier NBG-12).....	110.44	30.57
28 46 13 31-1473	EA		Red, Key Lock, Dual Action Fire Alarm Pull Station (Notifier NBG-12L).....	117.88	30.57
28 46 13 31-1474	EA		Red, Outdoor, Key Lock, Dual Action Fire Alarm Pull Station (Notifier NBG-12LOB).....	272.81	36.68
28 46 13 31-1475	EA		Red, Presignal, Key Lock, Dual Action Fire Alarm Pull Station (Notifier NBG-12LPS)	166.81	30.57
28 46 13 31-1476	EA		Red, Agent Releasing, Key Lock, Dual Action Fire Alarm Pull Station (Notifier NBG-12LR)	139.73	30.57
28 46 13 31-1477	EA		Addressable Manual Dual Action Fire Alarm Pull Station (Notifier NBG-12LX)	231.01	30.57
28 46 13 31-1478	EA		Pull Station Trim Plate For New York City, For Use With All NBG Series Pull Stations (Notifier NY-PLATE).....	65.62	6.11
28 46 13 31-1479	EA		Dual Action, Wireless Pull Station (Notifier NBG-12WL).....	484.16	36.68

28 46 13 31-1480 Rate Compensation Heat Detectors (28 46 13 31-0973)

28 46 13 31-1481	EA		135 Degree F Explosion Proof Rate Compensation Heat Detectors (Edwards Signaling 302-EPM-135)	212.75	45.85
28 46 13 31-1482	EA		194 Degree F Explosion Proof Rate Compensation Heat Detectors (Edwards Signaling 302-EPM-194)	212.75	45.85

28 46 13 31-1483 FM Series Door Releases (28 46 13 31-0973)

28 46 13 31-1484	EA		1/2" Door Holder Spacer (Notifier FM900-50).....	34.85	9.17
28 46 13 31-1485	EA		3/4" Door Holder Spacer (Notifier FM900-75)	34.85	9.17
28 46 13 31-1486	EA		1" Door Holder Spacer (Notifier FM900-100).....	34.85	9.17
28 46 13 31-1487	EA		Door Holder Extension Kit (Notifier FM900).....	36.91	9.17
28 46 13 31-1488	EA		90 Degree Door Holder Extension Kit (Notifier FM900-Z).....	37.60	9.17
28 46 13 31-1489	EA		12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Floor Mounted, Door Holder (Notifier FM980)	258.14	45.85
28 46 13 31-1490	EA		12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Surface Mounted, Door Holder (Notifier FM996).....	223.75	45.85
28 46 13 31-1491	EA		12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Recessed Mounted, Concealed Wiring, Door Holder (Notifier FM998)	223.75	45.85

28 46 13 31-1492 Multicriteria Fire Detector (28 46 13 31-0973)

28 46 13 31-1493	EA		Intelligent Addressable Combination Multi-Criteria Fire/Carbon Monoxide Detector With Flashscan (Notifier FCO-851)	359.62	45.85
28 46 13 31-1494	EA		Intelligent Addressable Multicriteria Fire Detector (Notifier FSC-851).....	358.43	45.85
			Note: Detects fire, thermal, photo, CO and IR, with Flashscan.		
28 46 13 31-1495	EA		Multi-Criteria Photo/Temp/Infrared Detector, White (Notifier FPTI-951).....	232.21	45.85
28 46 13 31-1496	EA		Multi-Criteria Photo/Temp/Infrared Detector, Ivory (Notifier FPTI-951-IV)	240.55	45.85
28 46 13 31-1497	EA		Intelligent Addressable Combination Multi-Criteria Photoelectric And Carbon Monoxide Detector With Flashscan (Notifier FSCO-951).....	359.62	45.85

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1498				Modules <small>(28 46 13 31-0973)</small>		
	EA			Intelligent Addressable Dual Monitor/Dual Relay Module (Notifier FDRM-1).....	431.45	30.57
	EA			Addressable Firephone Control Module (Notifier FTM-1)	265.94	30.57
	EA			Wireless Monitor Module With Flashscan (Notifier FW-MM)	417.16	30.57
	EA			Wireless Relay Module With Flashscan (Notifier FW-RM).....	482.65	30.57
	EA			Wireless Sync Module (Notifier W-SYNC).....	459.39	30.57
28 46 13 31-1504				DH Series Door Releases <small>(28 46 13 31-0973)</small>		
	EA			Semi-Flush, Powder Coated Chrome, Electromagnetic Door Holder (Notifier DH24120FPC).....	220.01	45.85
	EA			Semi-Flush, Plated Brass, Electromagnetic Door Holder (Notifier DH24120FB)	234.59	45.85
	EA			Semi-Flush, Powder Coated Dark Bronze, Electromagnetic Door Holder (Notifier DH24120FD).....	248.29	45.85
	EA			Surface Mounted, Powder Coated Chrome, Electromagnetic Door Holder (Notifier DH24120SPC).....	244.71	45.85
	EA			Surface Mounted, Plated Brass, Electromagnetic Door Holder (Notifier DH24120SB).....	256.62	45.85
	EA			Surface Mounted, Powder Coated Dark Bronze, Electromagnetic Door Holder (Notifier DH24120SPD).....	266.74	45.85
	EA			Recessed, Powder Coated Chrome, Electromagnetic Door Holder (Notifier DH24120WPC).....	220.01	45.85
	EA			Recessed, Plated Brass, Electromagnetic Door Holder (Notifier DH24120WB).....	232.81	45.85
	EA			Recessed, Powder Coated Dark Bronze, Electromagnetic Door Holder (Notifier DH24120WD).....	248.29	45.85
	EA			Floor Mounted, Single Door, Powder Coated Chrome, Electromagnetic Door Holder (Notifier DH24120GPC1)	281.03	45.85
	EA			Floor Mounted, Single Door, Plated Brass, Electromagnetic Door Holder (Notifier DH24120GB1).....	300.08	45.85
	EA			Floor Mounted, Single Door, Powder Coated Dark Bronze, Electromagnetic Door Holder (Notifier DH24120GPD1).....	322.11	45.85
	EA			Floor Mounted, Double Door, Powder Coated Chrome, Electromagnetic Door Holder (Notifier DH24120GPC2).....	327.47	45.85
	EA			Floor Mounted, Double Door, Plated Brass, Electromagnetic Door Holder (Notifier DH24120GB2).....	350.09	45.85
	EA			Floor Mounted, Double Door, Powder Coated Dark Bronze, Electromagnetic Door Holder (Notifier DH24120GPD2).....	377.48	45.85
	EA			0.5" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE.5PC).....	25.27	6.11
	EA			0.5" Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE.5B).....	25.27	6.11
	EA			0.5" Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE.5D).....	27.71	6.11
	EA			1" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE1PC).....	25.27	6.11
	EA			1" Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE1B).....	25.27	6.11
	EA			1" Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE1D).....	27.71	6.11
	EA			1.5" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE1.5PC).....	26.52	6.11
	EA			1.5" Adjustable Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE1.5APC).....	26.52	6.11
	EA			1.5" Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE1.5B).....	27.71	6.11
	EA			1.5" Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE1.5D).....	29.08	6.11
	EA			2" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE2PC).....	29.08	6.11
	EA			2" Adjustable Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE2APC).....	29.08	6.11
	EA			2" Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE2B).....	30.33	6.11
	EA			2" Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE2D).....	30.33	6.11
	EA			3" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE3PC).....	30.33	6.11
	EA			3" Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE3B).....	31.70	6.11
	EA			3" Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE3D).....	31.70	6.11
	EA			4" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE4PC).....	32.95	6.11
	EA			4" Adjustable Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE4APC).....	32.95	6.11
	EA			4" Adjustable Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE4AB).....	34.32	6.11
	EA			4" Adjustable Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE4AD).....	38.19	6.11
	EA			5" Extension Rod, Powder Coated Chrome, Electromagnetic Door Holder Extension (Notifier DHE5PC).....	36.88	6.11
	EA			5" Extension Rod, Plated Brass, Electromagnetic Door Holder Extension (Notifier DHE5B).....	35.57	6.11
	EA			5" Extension Rod, Powder Coated Dark Bronze, Electromagnetic Door Holder Extension (Notifier DHE5D).....	38.19	6.11
	EA			Catch Plate, Powder Coated Chrome For Electromagnetic Door Holder (Notifier DHCP).....	35.19	9.17
	EA			Catch Plate, Plated Brass For Electromagnetic Door Holder (Notifier DHCPB).....	36.44	9.17
	EA			Catch Plate, Powder Coated Dark Bronze For Electromagnetic Door Holder (Notifier DHCPD).....	40.43	9.17
	EA			Swivel Base, Powder Coated Chrome, For Electromagnetic Door Holder (Notifier DHSBPC).....	66.33	9.17
	EA			Swivel Base, Plated Brass, For Electromagnetic Door Holder (Notifier DHSBB).....	70.14	9.17
	EA			Swivel Base, Powder Coated Dark Bronze, For Electromagnetic Door Holder (Notifier DHSBD).....	73.95	9.17
	EA			Surface Mounted Backbox, Powder Coated Chrome For Electromagnetic Door Holder (Notifier DHBBPC).....	60.34	15.28
	EA			Surface Mounted Backbox, Plated Brass For Electromagnetic Door Holder (Notifier DHBBB).....	62.96	15.28
	EA			Surface Mounted Backbox, Powder Coated Dark Bronze For Electromagnetic Door Holder (Notifier DHBBD).....	68.20	15.28
	EA			Swivel Base Mounting Drill Fixture For Electromagnetic Door Holder (Notifier DHDF).....	367.93	
28 46 13 31-1554				First Command <small>(28 46 13 31-0973)</small>		
	EA			Black, 120 Volt AC, 50 Watt, 25 VRMS, One Class A/B Speaker Circuit, Primary Operating Console (Notifier NFC-50/100).....	6,644.53	764.24
	EA			Black, 220-240 Volt AC, 50 Watt, 25 VRMS, One Class A/B Speaker Circuit, Primary Operating Console (Notifier NFC-50/100E).....	6,710.36	764.24
	EA			Black, 120 Volt AC, 50 Watt, 25 VRMS Or 70 VRMS), Four Class A/B Speaker Circuits, Distributed (Remote) Audio Amplifier (Notifier NFC-50DA).....	1,845.24	61.14
	EA			Black, 220-240 Volt AC, 50 Watt, 25 VRMS Or 70 VRMS), Four Class A/B Speaker Circuits, Distributed (Remote) Audio Amplifier (Notifier NFC-50DAE).....	1,894.61	61.14
	EA			Black, 120 Volt AC, 125 Watt, 25 VRMS, Four Class A/B Speaker Outputs, Distributed Audio Amplifier (Notifier NFC-125DA).....	3,382.29	61.14
	EA			Black, , 220-240 Volt AC, 125 Watt, 25 VRMS, Four Class A/B Speaker Outputs, Distributed Audio Amplifier (Notifier NFC-125DAE).....	3,492.01	61.14
	EA			50 Watt, 25 VRMS Audio Amplifier Module For A Second Speaker Circuit Or Backup (Notifier NFC-BDA-25 Volt).....	910.46	30.57
	EA			50 Watt, 70 VRMS Audio Amplifier Module For A Second Speaker Circuit Or Backup (Notifier NFC-BDA-70 Volt).....	910.46	30.57
	EA			Circuit Expander Module For NFC-50/125DA(E), Four Additional Class A/B Speaker Circuits (Notifier NFC-CE4).....	542.18	30.57

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28 46 13 31-1564	EA	Circuit Expander Module For NFC-50/100(E), Six Additional Class A/B Speaker Circuits (Notifier NFC-CE6)	707.34	30.57
28 46 13 31-1565	EA	Standalone Firefighter Telephone System (Notifier NFC-FFT)	2,499.12	61.14
		Note: Includes onboard SLC supports up to 24 monitor modules, built-in handset, black.		
28 46 13 31-1566	EA	Local Operator Console (Notifier NFC-LOC)	2,446.46	61.14
		Note: Includes built-in microphone, message and zone control switches, black.		
28 46 13 31-1567	EA	Black, Remote Microphone (Notifier NFC-RM)	714.38	
28 46 13 31-1568	EA	Remote Page Unit (Notifier NFC-RPU)	2,067.96	61.14
		Note: Includes built-in microphone, message control switches, black.		
28 46 13 31-1569	EA	70 V Conversion Module For NFC-50/100 (Notifier NFC-XRM-70V)	410.02	30.57
28 46 13 31-1570	EA	Firefighters Phone Jack (Notifier N-FPJ)	188.01	9.17
28 46 13 31-1571	EA	Thumbslash Option For NFC-LOC And NFC-RPU (Notifier THUMBLSCH)	51.20	9.17
28 46 13 31-1572	EA	Black, Trim Ring For NFC-RPU Cabinet (Notifier TR-6-B)	166.76	18.34
28 46 13 31-1573		LED Displays <small>(28 46 13 31-0973)</small>		
28 46 13 31-1574	EA	2.1" x 27" Programmable LED Indoor Display (Notifier ALPHA-215)	1,951.62	36.68
28 46 13 31-1575	EA	Instant And Integrated Emergency Notification System (Notifier LEDSIGN-GW)	2,742.95	48.91
28 46 13 31-1576	EA	4" x 45-1/2" Programmable LED Array, Mass Notification Device (Notifier MEGADOT)	2,774.77	48.91
28 46 13 31-1577	EA	8 Messages, FACP Interface For LED Arrays (Notifier MNS-CONTROL8)	2,665.06	48.91
28 46 13 31-1578	EA	16 Messages, FACP Interface For LED Arrays (Notifier MNS-CONTROL16)	3,729.25	48.91
28 46 13 31-1579	EA	LED Sign, Instant And Integrated Emergency Notification System (Notifier OAX2-24V)	2,829.62	48.91
28 46 13 31-1580		Control Relays <small>(28 46 13 31-0973)</small>		
28 46 13 31-1581	EA	Single SPDT Relay With LED With Metal Backbox And Red Plastic Cover (Notifier MR-101/CR)	81.41	15.28
28 46 13 31-1582	EA	Single SPDT Relay With LED With Track Mounting Hardware (Notifier MR-101/T)	61.29	15.28
28 46 13 31-1583	EA	Four Position SPDT Relay With LEDs With Metal Backbox And Red Plastic Cover (Notifier MR-104/CR)	224.86	30.57
28 46 13 31-1584	EA	Four Position SPDT Relay With LED With Track Mounting Hardware (Notifier MR-104/T)	126.12	15.28
28 46 13 31-1585	EA	Four Position DSPDT Relay With LED With Track Mounting Hardware (Notifier MR-204/T)	150.83	15.28
28 46 13 31-1586	EA	24 Volt DC, 30 Amperes Contacts, DPDT Relay In Steel Enclosure (Notifier MR-199X-13C)	231.41	30.57
28 46 13 31-1587	EA	120 Volt AC, 30 Amperes Contacts, DPDT Relay In Steel Enclosure (Notifier MR-199X-14C)	231.41	30.57
28 46 13 31-1588	EA	Single DPDT Relay With LED With Metal Backbox And Red Plastic Cover (Notifier MR-201/CR)	115.91	30.57
28 46 13 31-1589	EA	Single DPDT Relay With LED With Track Mounting Hardware (Notifier MR-201/T)	66.53	15.28
28 46 13 31-1590	EA	Four Position DPDT Relay With LEDs With Metal Backbox And Red Plastic Cover (Notifier MR-204/CR)	246.29	30.57
28 46 13 31-1591	EA	24 Volt DC / 24 Volt AC / 115 Volt AC, 10 Amperes, Form C, Multi-Voltage Relay Module (Notifier PAM-1)	82.81	30.57
28 46 13 31-1592	EA	12/24 Volt DC, 7 Amperes, Form C, Multi-Voltage Relay Module (Notifier PAM-2)	82.81	30.57
28 46 13 31-1593	EA	9 To 40 Volt DC, 10 Amperes, Form C, Multi-Voltage Relay Module (Notifier PAM-4)	82.81	30.57
28 46 13 31-1594		Gamewell-FCI Fire Control Instruments <small>(28 46 13 31-0973)</small>		
28 46 13 31-1595		7100 Series And NetSOLO® <small>(28 46 13 31-1594)</small>		
28 46 13 31-1596		7100 Compact Analog Addressable Fire Alarm Control Panels <small>(28 46 13 31-1595)</small>		
28 46 13 31-1597	EA	Enclosure With Metal Door (Gamewell-FCI 7100-ENCL-M)	1,134.68	366.83
28 46 13 31-1598	EA	Basic Systems Kit, 2 Signaling Line Circuits (SLC) (Gamewell-FCI BK-7100-2)	4,904.21	611.40
28 46 13 31-1599	EA	Basic Systems Kit, With Digital Alarm Communicator Transmitter (DACT), 2 Signaling Line Circuits (SLC) (Gamewell-FCI BK-7100-2D)	5,370.95	611.40
28 46 13 31-1600	EA	Basic Systems Kit, 2 Signaling Line Circuits (SLC), 240 Volt AC (Gamewell-FCI BK-7100-2-E)	4,904.21	611.40
28 46 13 31-1601	EA	Basic Systems Kit, With Digital Alarm Communicator Transmitter (DACT), 2 Signaling Line Circuits (SLC), 240 Volt AC (Gamewell-FCI BK-7100-2D-E)	5,370.95	611.40
28 46 13 31-1602	EA	Removal And Replacement Of Board For 7100-1D (Gamewell-FCI BSM-7100-1)	1,560.31	
28 46 13 31-1603	EA	Removal And Replacement Of Board For 7100-2 (Gamewell-FCI BSM-7100-1D)	1,872.56	
28 46 13 31-1604	EA	Analog Loop Unit (Gamewell-FCI ALU)	1,872.56	61.14
28 46 13 31-1605		NetSOLO® Intelligent Network <small>(28 46 13 31-1595)</small>		
28 46 13 31-1606	EA	Intelligent Network Interface Module, Fiber Optic (Gamewell-FCI INI-7100-FO)	2,078.00	61.14
		Note: Mounted in 7100 panel.		
28 46 13 31-1607	EA	Intelligent Network Interface Module, Unshielded Twisted Pair (Gamewell-FCI INI-7100-UTP)	1,649.05	61.14
		Note: Mounted in 7100 panel.		
28 46 13 31-1608		Components And Accessories <small>(28 46 13 31-1595)</small>		
28 46 13 31-1609	EA	Remote Serial Annunciator, LCD Display (Gamewell-FCI LCD-7100)	1,021.91	45.85
28 46 13 31-1610	EA	Remote LED Driver Module, Outputs For Remote Panel Switches And 33 Remote LEDs (Gamewell-FCI LDM-7100)	773.09	61.14
28 46 13 31-1611	EA	Fiber Optic Line Driver Module (Gamewell-FCI FLD-1)	1,425.54	61.14
28 46 13 31-1612	EA	Class "A" Optional Module For Both Signaling Line Circuits (SLC) (Gamewell-FCI CAOM)	569.30	61.14
28 46 13 31-1613	EA	Enclosure Box (Gamewell-FCI EN-7100)	453.28	122.28
28 46 13 31-1614	EA	Serial Printer (Order RJAA To Db25 Connector Separately) (Gamewell-FCI P7200-TR-2)	1,494.24	30.57
28 46 13 31-1615		E3 Series® Basic System <small>(28 46 13 31-1594)</small>		
28 46 13 31-1616	EA	Intelligent Loop Interface, Mother Board (Gamewell-FCI ILI-MB-E3)	1,362.55	61.14
28 46 13 31-1617	EA	Intelligent Loop Interface, Supplemental (Gamewell-FCI ILI-S-E3)	1,169.30	61.14
28 46 13 31-1618	EA	Intelligent Loop Interface, Mother Board, XP95 Protocol (Gamewell-FCI ILI95-MB-E3)	1,362.55	61.14
28 46 13 31-1619	EA	Intelligent Loop Interface, Supplemental, XP95 Protocol (Gamewell-FCI ILI95-S-E3)	1,169.30	61.14
28 46 13 31-1620	EA	LCD Keypad Display (Gamewell-FCI LCD-E3)	868.50	61.14
28 46 13 31-1621	EA	Power Supply Module (Gamewell-FCI PM-9)	1,140.05	61.14
28 46 13 31-1622	EA	Transponder 9 Amperes Power Supply (Gamewell-FCI PM-9 INX)	958.43	61.14

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28 46 13 31-1623 EA Power Supply And Charger, 120/220 Volt AC (Gamewell-FCI PM-9G 9A)	952.32	30.57
28 46 13 31-1624 EA Digital Alarm Communication Transmitter (Gamewell-FCI DACT-E3)	541.02	61.14
28 46 13 31-1625 EA Network Repeater, Fiber Optic (Gamewell-FCI RPT-E3-FO)	1,464.43	61.14
28 46 13 31-1626 EA Network Repeater, Unshielded Twisted Pair (Gamewell-FCI RPT-E3-UTP)	1,225.51	61.14
28 46 13 31-1627 EA Local Operating Console (Gamewell-FCI 1100-0455)	817.36	45.85
28 46 13 31-1628 EA Network Graphic Annunciator (Gamewell-FCI 1100-0505)	2,649.35	45.85
28 46 13 31-1629 EA 70.7 VRMS Audio Output Series Amplifier Module (Gamewell-FCI AM-50-70)	1,045.27	61.14
28 46 13 31-1630 EA INI-VGE-UJP Classic Enabled Voice Gateway Module (Gamewell-FCI 1100-1326)	3,203.56	61.14
28 46 13 31-1631 EA 8-1/4" Wide x 10" High x 4-1/2" Deep Cabinet (Gamewell-FCI E3BB-BAA1)	724.70	122.28
28 46 13 31-1632 EA C Size, Black, Command Center Enclosure (Gamewell-FCI E3BB-BC/INCC)	528.91	122.28
28 46 13 31-1633 EA Double Size, Blank, Inner Door Panel (Gamewell-FCI E3-BP)	115.52	30.57
28 46 13 31-1634 EA Programmable Switch Module (Gamewell-FCI ASM-16)	730.26	61.14
28 46 13 31-1635 EA LED Driver module (Gamewell-FCI ANU-48)	730.26	61.14
28 46 13 31-1636 EA Network Graphic Annunciator (Gamewell-FCI NGA)	2,220.34	45.85
28 46 13 31-1637 Addressable Devices, Module, Pulls And Accessories (28 46 13 31-1594)		
28 46 13 31-1638 Velociti® Series Sensors And Bases (28 46 13 31-1637)		
28 46 13 31-1639 EA Analog Addressable Plug-In Ionization Smoke Sensor (Gamewell-FCI ASD-IL2F)	226.47	45.85
28 46 13 31-1640 EA Analog Addressable Plug-In Photoelectric Smoke Sensor (Gamewell-FCI ASD-PL2F)	231.40	45.85
28 46 13 31-1641 EA Analog Addressable Plug-In Photoelectric Smoke Sensor With 135 Degree F Fixed Temperature Thermal Sensing (Gamewell-FCI ASD-PTL2F)	246.20	45.85
28 46 13 31-1642 EA Addressable Plug-In Thermal Sensor, 15 Degree F Rate Of Rise, 135 Degree F (Gamewell-FCI ATD-RL2F)	187.03	45.85
28 46 13 31-1643 EA Addressable Plug-In Thermal Sensor, 190 Degree F (Gamewell-FCI ATD-HL2F)	195.25	45.85
28 46 13 31-1644 EA Addressable Plug-In Thermal Sensor, 135 Degree F (Gamewell-FCI ATD-L2F)	187.03	45.85
28 46 13 31-1645 EA Addressable Plug-In Multi-Criteria Analog Sensor (Gamewell-FCI MCS-ACCLIMATE2F)	280.71	45.85
28 46 13 31-1646 EA Analog Addressable Laser Smoke Sensor, Low Profile (Gamewell-FCI ASD-LS)	625.83	45.85
28 46 13 31-1647 EA Analog Addressable Low Flow Photoelectric Smoke Duct Detector Without Relay (Gamewell-FCI ADPF)	522.62	76.43
28 46 13 31-1648 EA Analog Addressable Low Flow Photoelectric Smoke Duct Detector With Relay (Gamewell-FCI ADPRF)	588.36	76.43
28 46 13 31-1649 EA Removal And Replacement Of Duct Detector Board (Gamewell-FCI ADP-F-SB)	279.39	
28 46 13 31-1650 EA Flanged Mounting Base, For Use With Analog Sensor Or Velociti Sensors (Gamewell-FCI ADB-FLF)	56.87	15.28
28 46 13 31-1651 EA Harsh Environment Analog Addressable Photoelectric Smoke Sensor (Gamewell-FCI ASD-FILTREX-F)	675.14	45.85
28 46 13 31-1652 EA Flanged Mounting Base, For Use With ASD-FILTREX Or ASD-FILTREX-F (Gamewell-FCI ADB-FILTREXF)	133.29	15.28
28 46 13 31-1653 EA Addressable Single-Ended Reflected Beam Smoke Sensor (Gamewell-FCI ABD-2F)	2,402.09	91.71
28 46 13 31-1654 Velociti® Series Modules And Pull Station (28 46 13 31-1637)		
28 46 13 31-1655 EA Style B, Class B Addressable Monitor Module (Gamewell-FCI AMM-2F)	165.50	30.57
28 46 13 31-1656 EA Dual Style B, Class B Addressable Monitor Module (Gamewell-FCI AMM-2IF)	269.86	30.57
28 46 13 31-1657 EA Style D, Class A Addressable Monitor Module (Gamewell-FCI AMM-4F)	181.93	30.57
28 46 13 31-1658 EA Subloop Style D, Class A Addressable Monitor Module (Gamewell-FCI AMM-4SF)	258.36	30.57
28 46 13 31-1659 EA Addressable Output Relay Control Module (Gamewell-FCI AOM-2RF)	214.80	30.57
28 46 13 31-1660 EA Addressable Output Supervised Module (Gamewell-FCI AOM-2SF)	223.02	30.57
28 46 13 31-1661 EA Addressable Double Action Station, With AMM-2SF Mini-Mod (Gamewell-FCI MS-7AF)	308.81	61.14
28 46 13 31-1662 EA Addressable Single Action Pull Station (Gamewell-FCI MS-7ASF)	230.42	30.57
28 46 13 31-1663 EA Telephone Filters (Gamewell-FCI AOM-TEL-FL)	36.88	6.11
28 46 13 31-1664 Components And Accessories (28 46 13 31-1637)		
28 46 13 31-1665 EA Remote LED Annunciator Alarm (Gamewell-FCI RA400Z)	90.00	24.45
Note: Mounts on single gang box.		
28 46 13 31-1666 EA Up To 2' Wide Ducts Metal Sampling Tube (Gamewell-FCI ST-1.5)	44.99	12.23
28 46 13 31-1667 EA >2' To 4' Wide Ducts Metal Sampling Tube (Gamewell-FCI ST-3)	48.28	12.23
28 46 13 31-1668 EA >4' To 8' Wide Ducts Metal Sampling Tube (Gamewell-FCI ST-5)	57.69	15.28
28 46 13 31-1669 EA >8' To 10' Wide Ducts Metal Sampling Tube (Gamewell-FCI ST-10)	94.20	18.34
28 46 13 31-1670 EA Remote Test Station With LED Alarm And Magnet Test Switch (Gamewell-FCI RTS451)	140.94	24.45
Note: Mounts on single gang box.		
28 46 13 31-1671 Fixed And Rate of Rise Heat Detectors (28 46 13 31-1637)		
28 46 13 31-1672 EA 135 Degree F Fixed Temperature And Rate Of Rise Heat Detector (Gamewell-FCI 5601P)	119.65	45.85
28 46 13 31-1673 EA 194 Degree F Fixed Temperature And Rate Of Rise Heat Detector (Gamewell-FCI 5602)	119.65	45.85
28 46 13 31-1674 EA 135 Degree F Fixed Temperature Heat Detector (Gamewell-FCI 5603)	119.93	45.85
28 46 13 31-1675 EA 194 Degree F Fixed Temperature Heat Detector (Gamewell-FCI 5604)	119.93	45.85
28 46 13 31-1676 NAC Expander/Power Supply (28 46 13 31-1637)		
28 46 13 31-1677 EA FireForce 8 NAC Expander/Power Supply, 12/24 Volt DC, 8 Amperes, 4 Notification Appliance Circuits, Built-in Synchronization Protocols For Gamewell, Wheelock, Gentex, Faraday, And System Sensor (Gamewell-FCI FF8)	2,161.52	489.12
28 46 13 31-1678 EA 6A Supplementary Notification Appliance Circuit Power Supply With Sync (Gamewell-FCI GFPS-6)	1,849.26	489.12
28 46 13 31-1679 EA 9A Supplementary Notification Appliance Circuit Power Supply With Sync (Gamewell-FCI GFPS-9)	2,005.39	489.12
28 46 13 31-1680 Batteries And Accessories (28 46 13 31-1594)		
28 46 13 31-1681 EA B-17R, 12 Volt DC, 17 Ampere Hours Sealed Lead Acid Battery (Gamewell-FCI 100-2010A)	343.82	30.57
28 46 13 31-1682 EA B-55R, 12 Volt DC, 55 Ampere Hours Sealed Lead Acid Battery (Gamewell-FCI 100-2710A)	879.58	30.57
28 46 13 31-1683 EA B-7R, 12 Volt DC, 7 Ampere Hours Sealed Lead Acid Battery (Gamewell-FCI 100-2311A)	179.47	30.57
28 46 13 31-1684 EA BC-1, Battery Cabinet, Beige (Gamewell-FCI 1100-0653)	419.75	61.14
28 46 13 31-1685 EA BC-1R, Battery Cabinet, Red (Gamewell-FCI 1100-0654)	419.75	61.14

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28 46 13 31-1686	EA	12" High x 12" Wide x 24" Length Vented Steel Battery Cabinet With Hinged Key Lockable Cover (Gamewell-FCI GW70970)	372.09	61.14
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28 46 13 31-1687 Electronic Door Holders (28 46 13 31-1594)

Note: Rixson products.

28 46 13 31-1688	EA	XK-996, Door Holder Extender Kit, 1-1/2" Spacer (Gamewell-FCI 140-30000)	60.55	6.11
28 46 13 31-1689	EA	FM-980, 12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Floor Mount Door Holder(Gamewell-FCI 140-90000)	486.14	45.85
28 46 13 31-1690	EA	FM-981, 12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Floor Mount Holder For Double Doors (Gamewell-FCI 140-90001)	665.28	45.85
28 46 13 31-1691	EA	FM-990, 12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Low Profile Mount Door Holder (Gamewell-FCI 140-90002)	307.66	45.85
28 46 13 31-1692	EA	FM-996, 12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Surface Mount Door Holder (Gamewell-FCI 140-90003)	292.87	45.85
28 46 13 31-1693	EA	FM-997, 12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Recessed Mount Door Holder (Gamewell-FCI 140-90004)	307.66	45.85
28 46 13 31-1694	EA	FM-998, 12 Volt DC, 24 Volt AC/DC Or 120 Volt AC, Recessed Mount Door Holder With Concealed Wiring (Gamewell-FCI 140-90005)	307.00	45.85

28 46 13 31-1695 Fire Alarm Programming (28 46 13 31-1594)

Note: For device replacement projects only. Tasks not to be used on projects where a fire alarm panel is replaced.

28 46 13 31-1696	EA	Program And Test Up To 5 Total Fire Alarm Devices	500.00	
28 46 13 31-1697	EA	Program And Test >5 To 20 Total Fire Alarm Devices	1,000.00	
28 46 13 31-1698	EA	Program And Test >20 To 50 Total Fire Alarm Devices	2,000.00	

28 46 13 31-1699 Fire-Lite Fire Alarm (28 46 13 31-0972)**28 46 13 31-1700 Addressable Control Panels** (28 46 13 31-1699)

28 46 13 31-1701	EA	25 Point Intelligent Control (Fire Lite MS-25)	2,168.52	611.40
28 46 13 31-1702	EA	50 Point Intelligent Control (Fire Lite MS-9050UD)	1,663.75	611.40
28 46 13 31-1703	EA	198-Point Intelligent Control (Fire Lite MS-9200UDLS)	3,364.67	611.40
28 46 13 31-1704	EA	636-Point Intelligent Control (Fire Lite MS-9600LS)	4,985.12	611.40
28 46 13 31-1705	EA	636-Point Intelligent Control (Fire Lite MS-9600UDLS)	4,765.58	611.40
28 46 13 31-1706	EA	IP And 4G Cellular Fire Alarm Communicator For Fire Alarm Control Panel (Fire-Lite IPGSM-4G)	672.40	

28 46 13 31-1707 Silent Knight Fire Alarm (28 46 13 31-0972)

28 46 13 31-1708	EA	Addressable Fire Alarm Control Panel With Integrated Emergency Communication System (Silent Knight 5820XL-EVS)	5,759.25	305.70
28 46 13 31-1709	EA	Supervised Remote Command Unit (Silent Knight EVS-RCU)	2,369.29	183.42
28 46 13 31-1710	EA	50 Watt Amplifier (Silent Knight EVS-50W)	1,663.75	122.28
28 46 13 31-1711	EA	125 Watt Amplifier (Silent Knight EVS-125W)	2,997.94	122.28
28 46 13 31-1712	EA	Voice Evacuation System (Silent Knight SKE-450)	2,865.70	122.28
28 46 13 31-1713	EA	Fire Fighters Telephone (Silent Knight SK-FFT)	2,369.80	122.28
28 46 13 31-1714	EA	Multi-Loop Addressable Fire Alarm Control/Communicator System (Silent Knight 5820XL)	2,404.70	183.42
28 46 13 31-1715	EA	Single Loop Addressable Fire Alarm Control/Communicator System (Silent Knight 5808)	1,793.62	122.28
28 46 13 31-1716	EA	Single Loop Addressable Fire Alarm Control/Communicator System (Silent Knight 5700)	1,360.44	122.28
28 46 13 31-1717	EA	Hybrid Conventional Fire Alarm Control/Communicator System (Silent Knight 5600)	1,166.89	122.28
28 46 13 31-1718	EA	Combination Fire And CO Detector (Silent Knight SK-FIRE-CO)	369.79	45.85
28 46 13 31-1719	EA	Photoelectric Detector (Silent Knight SK-PHOTO)	203.65	45.85
28 46 13 31-1720	EA	Photoelectric Thermal Detector (Silent Knight SK-PHOTO-T)	215.21	45.85
28 46 13 31-1721	EA	Ionization Smoke Detector (Silent Knight SK-ION)	216.52	45.85
28 46 13 31-1722	EA	135 Degree Fixed Temperature Detector (Silent Knight SK-HEAT)	186.63	45.85
28 46 13 31-1723	EA	190 Degree Fixed Temperature Detector (Silent Knight SK-HEAT-HT)	197.19	45.85
28 46 13 31-1724	EA	135 Degree Fixed Temperature Rate-of-Rise Detector (Silent Knight SK-HEAT-ROR)	201.08	45.85
28 46 13 31-1725	EA	Sounder Base (Silent Knight B200SR)	125.75	15.28
28 46 13 31-1726	EA	Intelligent Sounder Base (Silent Knight B200S)	133.48	15.28
28 46 13 31-1727	EA	Isolator Base (Silent Knight B224BI)	103.91	15.28
28 46 13 31-1728	EA	Relay Base (Silent Knight B224RB)	105.18	15.28
28 46 13 31-1729	EA	Multi-Criteria Photoelectric Detector With Thermal Sensing (Silent Knight SK-ACCLIMATE)	220.55	45.85
28 46 13 31-1730	EA	Photoelectric Duct Detector (Silent Knight SK-DUCT)	364.95	45.85
28 46 13 31-1731	EA	Single-Ended Reflected Beam Smoke Detector (Silent Knight SK-BEAM)	1,329.07	45.85
28 46 13 31-1732	EA	Single-Ended Reflected Beam Smoke Detector (Silent Knight SK-BEAM-T)	1,520.33	45.85
28 46 13 31-1733	EA	Dual Monitor Module (Silent Knight SK-MONITOR-2)	265.15	45.85
28 46 13 31-1734	EA	Supervised Control Module (Silent Knight SK-CONTROL)	218.06	45.85
28 46 13 31-1735	EA	Six Circuit Supervised Control Module (Silent Knight SK-CONTROL-6)	767.43	61.14
28 46 13 31-1736	EA	Relay Control Module (Silent Knight SK-RELAY)	189.98	30.57
28 46 13 31-1737	EA	Six Relay Control Module (Silent Knight SK-RELAY-6)	741.14	61.14
28 46 13 31-1738	EA	Zone Interface Module (Silent Knight SK-ZONE)	223.02	45.85
28 46 13 31-1739	EA	Six Zone Interface Module (Silent Knight SK-ZONE-6)	891.68	61.14
28 46 13 31-1740	EA	Monitor Module (Silent Knight SK-MONITOR)	189.48	45.85
28 46 13 31-1741	EA	10 Input Monitor Module (Silent Knight SK-MON-10)	863.02	61.14
28 46 13 31-1742	EA	Monitor Module (Silent Knight SK-MINIMON)	175.35	45.85
28 46 13 31-1743	EA	Fault Isolator Module (Silent Knight SK-ISO)	197.19	45.85
28 46 13 31-1744	EA	Addressable Heat Sensor (Silent Knight SD505-AHS)	193.35	45.85
28 46 13 31-1745	EA	Analog Ionization Smoke Detector (Silent Knight SD505-AIS)	211.58	45.85
28 46 13 31-1746	EA	Addressable Photoelectric Smoke Detector (Silent Knight SD505-APS)	197.19	45.85
28 46 13 31-1747	EA	6" Addressable Sounder Base (Silent Knight SD505-6SB)	155.38	15.28
28 46 13 31-1748	EA	6" Addressable Relay Base (Silent Knight SD505-6RB)	146.35	15.28
28 46 13 31-1749	EA	6" Isolator Base (Silent Knight SD505-6IB)	132.21	15.28
28 46 13 31-1750	EA	Addressable Input Module (Silent Knight SD500-AIM)	195.92	45.85

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1751 EA Addressable Notification Module (Silent Knight SD500-ANM).....	245.32	45.85
28 46 13 31-1752 EA Addressable Relay Module (Silent Knight SD500-ARM).....	218.06	45.85
28 46 13 31-1753 EA SLC Annunciator Driver Module (Silent Knight SD500-LED).....	878.75	91.71
28 46 13 31-1754 EA Loop Isolation Module (Silent Knight SD500-LIM).....	204.92	45.85
28 46 13 31-1755 EA Addressable Mini Input Module (Silent Knight SD500-MIM).....	162.78	30.57
28 46 13 31-1756 EA Single Action Addressable Pull Station (Silent Knight SD500-PS).....	212.28	30.57
28 46 13 31-1757 EA Dual Action Addressable Pull Station (Silent Knight SD500-PSDA).....	202.37	30.57
28 46 13 31-1758 EA Back Box (Silent Knight SK-PSSMBB).....	90.40	24.45
28 46 13 31-1759 EA Smoke Detector Module (Silent Knight SD500-SDM).....	230.45	45.85
28 46 13 31-1760 EA Addressable Smoke 4" Detector Base (Silent Knight SD505-4AB).....	54.09	15.28
28 46 13 31-1761 EA Addressable Smoke 6" Detector Base (Silent Knight SD505-6AB).....	54.09	15.28
28 46 13 31-1762 EA Addressable Duct Housing (Silent Knight SD505-DUCT).....	381.89	45.85
28 46 13 31-1763 EA Addressable Duct Housing With Built-In Relay (Silent Knight SD505-DUCTR).....	500.38	45.85
28 46 13 31-1764 EA Addressable Duct Detector Test Switch (Silent Knight SD505-DTS).....	202.35	45.85
28 46 13 31-1765 EA Intelligent Power Module (Silent Knight 5895XL).....	1,269.64	122.28
28 46 13 31-1766 EA Addressable Power Supply (Silent Knight 5496).....	883.53	91.71
28 46 13 31-1767 EA Relay Interface Board (Silent Knight 5883).....	339.22	30.57
28 46 13 31-1768 EA Remote LED Annunciator (Silent Knight 5865-3).....	698.13	61.14
28 46 13 31-1769 EA Remote LED Annunciator (Silent Knight 5865-4).....	793.26	61.14
28 46 13 31-1770 EA Remote LCD Annunciator (Silent Knight SK-5860).....	742.55	91.71
28 46 13 31-1771 EA Serial/Parallel Printer Interface (Silent Knight 5824).....	489.16	30.57
28 46 13 31-1772 EA LED Input/Output Module (Silent Knight / IntelliKnight 5880).....	571.97	45.85
28 46 13 31-1773 EA Addressable Pull Station (Silent Knight SK-Pull-DA/SA).....	202.37	30.57
28 46 13 31-1774 EA Digital Fire Communicator with Cabinet (Silent Knight SK-5104).....	709.09	91.71
28 46 13 31-1775 EA Communicator (Silent Knight IPGSM-4G).....	1,068.67	61.14
28 46 13 31-1776 EA Ten Zone Conventional Fire Alarm Control Panel (Silent Knight SK-5208).....	1,682.64	122.28
28 46 13 31-1777 EA 10 Zone Expander (Silent Knight SK-5217).....	472.23	30.57
28 46 13 31-1778 EA Remote Annunciator (Silent Knight SK-5235).....	465.65	61.14
28 46 13 31-1779 EA Status Display Module (Silent Knight 5280).....	131.91	30.57
28 46 13 31-1780 EA Serial/Parallel Module (Silent Knight 5824).....	550.30	61.14
28 46 13 31-1781 EA Four Zone Conventional Fire Alarm Control Panel (Silent Knight SK-4).....	944.67	122.28
28 46 13 31-1782 EA Four Zone Conventional Fire Alarm Control Panel (Silent Knight SK-4E).....	963.78	122.28
28 46 13 31-1783 EA Dress Panel (Silent Knight SK-DP2/4).....	176.92	30.57
28 46 13 31-1784 EA Class A Converter (Silent Knight SK-CAC4).....	468.94	45.85
28 46 13 31-1785 EA Transmitter Module (Silent Knight SK-4XTM).....	242.85	45.85
28 46 13 31-1786 EA LED Interface Module (Silent Knight SK-4XLM).....	223.02	45.85
28 46 13 31-1787 EA 110 Volt AC, 3-6 Amperes, Transformer (Silent Knight SK-XRM24).....	232.09	30.57
28 46 13 31-1788 EA Remote Annunciator (Silent Knight SK-RZA4).....	223.02	45.85
28 46 13 31-1789 EA Zone Relay Module (Silent Knight SK-4XZM).....	240.36	45.85
28 46 13 31-1790 EA Two Zone Conventional Fire Alarm Control Panel (Silent Knight SK-2).....	813.24	122.28
28 46 13 31-1791 EA Remote Battery Box Accessory Cabinet (Silent Knight RBB).....	202.37	30.57
28 46 13 31-1792 EA Manual Pull Station (single action) (Silent Knight PS-SATK).....	109.11	30.57
28 46 13 31-1793 EA Manual Pull Station (dual action) (Silent Knight PS-DATK).....	118.69	30.57
28 46 13 31-1794 EA Manual Pull Station (dual action) (Silent Knight PS-DA).....	116.00	30.57
28 46 13 31-1795 EA Dual Action Manual Pull Station, Hex Key (Silent Knight PS-DAH).....	102.87	30.57
28 46 13 31-1796 EA Dual Action Listed Outdoor Manual Pull Station With Black Box (Silent Knight PS-DALOB).....	236.90	36.68
28 46 13 31-1797 EA 6 Amperes, 24 Volt DC, Distributed Power Module (with cabinet) (Silent Knight SK-5495).....	828.57	91.71
28 46 13 31-1798 EA 9 Amperes, 24 Volt DC, Distributed Power Module (with cabinet) (Silent Knight SK-5499).....	933.71	91.71
28 46 13 31-1799 EA Detector (Silent Knight IDP-PhotoR).....	292.25	45.85
28 46 13 31-1800 EA Monitoring Module (Silent Knight IDP).....	292.43	45.85
28 46 13 31-1801 EA Cabinet (Silent Knight SK-5207).....	394.52	91.71
28 46 13 31-1802 EA Innovair IDP-Product (Silent Knight Innovair IDP-Pduct).....	588.89	30.57
28 46 13 31-1803 EA I/O Input-Output Module (Silent Knight SK-2880).....	799.99	30.57
28 46 13 31-1804 EA Remote Annunciator (Silent Knight RA-2000).....	2,294.42	91.71
28 46 13 31-1805 EA Power Supply (Silent Knight 5195/96).....	1,433.29	30.57
28 46 13 31-1806 EA 8 Zone Expander (Silent Knight SK-5210).....	1,116.64	30.57
28 46 13 31-1807 EA LCD Remote Annunciator (Silent Knight SK-5230).....	441.46	61.14
28 46 13 31-1808 EA Ionization Smoke Detector (Silent Knight SK-ION).....	216.52	45.85
28 46 13 31-1809 EA Addressable Relay Module (Silent Knight IDP-Relay).....	250.03	45.85
28 46 13 31-1810 EA Telephone Line Monitor (Silent Knight SK-7150).....	156.14	30.57
28 46 13 31-1811 EA Serial Driver Board (Silent Knight SK-2884).....	295.46	30.57
28 46 13 31-1812 EA Smoke Detector Base (Silent Knight IDP-6AB).....	83.35	15.28
28 46 13 31-1813 EA Mini Input Module (Silent Knight IDP-MINIMON).....	219.46	30.57
28 46 13 31-1814 EA Status Display Module (Silent Knight SK-4180).....	821.10	30.57
28 46 13 31-1815 EA 8-Channel Digital Communicator (Silent Knight SK-1420).....	483.34	30.57
28 46 13 31-1816 EA Serial Parallel Module (Silent Knight SK-4824).....	441.12	30.57
28 46 13 31-1817 EA Power Supply (Silent Knight SK-5197 / SK-5198).....	1,644.39	30.57
28 46 13 31-1818 EA 4-Zone Fire Alarm Control Panel, Complete (Silent Knight SK-5204).....	2,777.76	122.28
28 46 13 31-1819 EA Intelligent Ionization Smoke Detector (Silent Knight IDP-ION).....	302.81	45.85
28 46 13 31-1820 EA Intelligent Photoelectric Smoke Detector (Silent Knight IDP-Photo).....	250.03	45.85
28 46 13 31-1821 EA Fire Slave Communicator Dialer (Silent Knight SK-5128).....	521.46	30.57
28 46 13 31-1822 EA Intelligent Power Module (with cabinet) (Silent Knight SK-5496).....	883.53	91.71
28 46 13 31-1823 Alerton Fire Alarm <small>(28 46 13 31)</small>		
28 46 13 31-1824 EA UL Listed Surge Protector In CHS-M3 Or CPU2-640 Chassis (Alerton ESD-100).....	639.89	9.17
28 46 13 31-1825 Cooper Fire Alarm <small>(28 46 13 31)</small>		
28 46 13 31-1826 EA Single Circuit Class A / Multiple B, 12 Or 24 Volt DC, Sync Module (Cooper DSM-12/24-R).....	207.60	30.57
28 46 13 31-1827 EA Red Lens, 21 Joules, 24 Volt DC, Class I, Div 1, Groups C, D, NEMA 4X And 6, Strobe (Cooper EP109205-001).....	4,567.63	51.96

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1828	EA		Red, 100 dB, 24 Volt DC, Class I, Div 1, Groups C, D, NEMA 4X, Multitone Horn (Cooper EP109206-002).....	6,013.62	51.96
28 46 13 31-1829	EA		Red Lens, 5 Joules, 24 Volt DC, Red Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109201-001).....	2,188.16	61.14
28 46 13 31-1830	EA		Clear Lens, 5 Joules, 24 Volt DC, Red Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109201-002).....	2,201.10	61.14
28 46 13 31-1831	EA		Amber Lens, 5 Joules, 110 Volt AC, Red Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109201-007).....	2,201.10	61.14
28 46 13 31-1832	EA		Red Lens, 10 Joules, 24 Volt DC, Wire Guard, Black Finish, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-001).....	1,628.41	61.14
28 46 13 31-1833	EA		Amber Lens, 10 Joules, 120 Volt AC, Wire Guard, Black Finish, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-003).....	1,628.41	61.14
28 46 13 31-1834	EA		Red Lens, 10 Joules, 120 Volt AC, Wire Guard, Black Finish, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-004).....	1,628.41	61.14
28 46 13 31-1835	EA		Amber Lens, 15 Joules, 120 Volt AC, Wire Guard, Black Finish, Backstrap, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-005).....	2,201.10	61.14
28 46 13 31-1836	EA		Amber Lens, 15 Joules, 120 Volt AC, Wire Guard, Black Finish, Pendant Mounted, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-006).....	2,201.10	61.14
28 46 13 31-1837	EA		Red Lens, 15 Joules, 120 Volt AC, Wire Guard, Black Finish, Backstrap, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-007).....	2,201.10	61.14
28 46 13 31-1838	EA		Red Lens, 15 Joules, 120 Volt AC, Wire Guard, Black Finish, Pendant Mounted, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109202-008).....	2,201.10	61.14
28 46 13 31-1839	EA		Red Lens, 15 Joules, 24 Volt DC, Wire Guard, Backstrap, Black Finish, Class I, Div 2, Groups A, B, C And D, NEMA 4X And 6, Strobe (Cooper HL109203-002).....	2,201.10	61.14
28 46 13 31-1840	EA		Red Lens, 21 Joules, 24 Volt DC, Red Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109204-001).....	2,535.98	61.14
28 46 13 31-1841	EA		Red Lens, 21 Joules, 24 Volt DC, Black Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109204-003).....	2,354.79	61.14
28 46 13 31-1842	EA		Amber Lens, 21 Joules, 110 Volt AC, Red Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109204-005).....	2,354.79	61.14
28 46 13 31-1843	EA		Red Lens, 21 Joules, 110 Volt AC, Red Finish, Class I, Div 2, Groups C And D, NEMA 4X And 6, Strobe (Cooper HL109204-006).....	2,354.79	61.14
28 46 13 31-1844			Light Engineered Displays Message Boards (28 46 13 31)		
28 46 13 31-1845	EA		Two Message Sign, Announcement And Evacuate (LED SP-2/MNS).....	938.36	36.68
28 46 13 31-1846	EA		Four Message Sign, Fire, Weather, Announcement, E Voltuate (LED SP-4).....	827.02	36.68
28 46 13 31-1847			Safety Technology International Fire Alarm (28 46 13 31)		
28 46 13 31-1848			Enclosures (28 46 13 31-1847)		
28 46 13 31-1849	EA		6" Height x 6" Width x 4" Depth, Opaque, Fiberglass Enclosure (STI EF060604-O).....	166.49	18.34
28 46 13 31-1850	EA		6" Height x 6" Width x 4" Depth, Opaque, Fiberglass Enclosure With Window (STI EF060604-W).....	218.64	18.34
28 46 13 31-1851	EA		8" Height x 6" Width x 4" Depth, Opaque, Fiberglass Enclosure (STI EF080604-O).....	169.96	18.34
28 46 13 31-1852	EA		8" Height x 6" Width x 4" Depth, Opaque, Fiberglass Enclosure With Window (STI EF080604-W).....	219.80	18.34
28 46 13 31-1853	EA		8" Height x 8" Width x 4" Depth, Opaque, Fiberglass Enclosure (STI EF080804-O).....	174.60	18.34
28 46 13 31-1854	EA		8" Height x 8" Width x 4" Depth, Opaque, Fiberglass Enclosure With Window (STI EF080804-W).....	254.57	18.34
28 46 13 31-1855	EA		10" Height x 8" Width x 6" Depth, Opaque, Fiberglass Enclosure (STI EF100806-O).....	182.71	18.34
28 46 13 31-1856	EA		10" Height x 8" Width x 6" Depth, Opaque, Fiberglass Enclosure With Window (STI EF100806-W).....	253.41	18.34
28 46 13 31-1857	EA		12" Height x 10" Width x 6" Depth, Opaque, Fiberglass Enclosure (STI EF121006-O).....	196.62	18.34
28 46 13 31-1858	EA		12" Height x 10" Width x 6" Depth, Opaque, Fiberglass Enclosure With Window (STI EF121006-W).....	275.43	18.34
28 46 13 31-1859	EA		14" Height x 12" Width x 6" Depth, Opaque, Fiberglass Enclosure (STI EF141206-O).....	234.87	18.34
28 46 13 31-1860	EA		14" Height x 12" Width x 6" Depth, Opaque, Fiberglass Enclosure With Window (STI EF141206-W).....	358.88	18.34
28 46 13 31-1861	EA		14" Height x 12" Width x 8" Depth, Opaque, Fiberglass Enclosure (STI EF141208-O).....	253.41	18.34
28 46 13 31-1862	EA		14" Height x 12" Width x 8" Depth, Opaque, Fiberglass Enclosure With Window (STI EF141208-W).....	453.92	18.34
28 46 13 31-1863	EA		16" Height x 14" Width x 8" Depth, Opaque, Fiberglass Enclosure (STI EF161408-O).....	269.64	18.34
28 46 13 31-1864	EA		16" Height x 14" Width x 8" Depth, Opaque, Fiberglass Enclosure With Window (STI EF161408-W).....	467.82	18.34
28 46 13 31-1865	EA		18" Height x 16" Width x 10" Depth, Opaque, Fiberglass Enclosure (STI EF181610-O).....	321.79	18.34
28 46 13 31-1866	EA		18" Height x 16" Width x 10" Depth, Opaque, Fiberglass Enclosure With Window (STI EF181610-W).....	480.57	18.34
28 46 13 31-1867	EA		20" Height x 16" Width x 10" Depth, Opaque, Fiberglass Enclosure (STI EF201610-O).....	467.82	18.34
28 46 13 31-1868	EA		20" Height x 16" Width x 10" Depth, Opaque, Fiberglass Enclosure With Window (STI EF201610-W).....	697.30	18.34
28 46 13 31-1869	EA		6" Height x 6" Width x 5" Depth, Opaque, Polycarbonate Enclosure (STI EP060605-O).....	122.45	18.34
28 46 13 31-1870	EA		6" Height x 6" Width x 5" Depth, Tinted, Polycarbonate Enclosure (STI EP060605-T).....	134.04	18.34
28 46 13 31-1871	EA		8" Height x 6" Width x 5" Depth, Opaque, Polycarbonate Enclosure (STI EP080605-O).....	127.66	18.34
28 46 13 31-1872	EA		8" Height x 6" Width x 5" Depth, Tinted, Polycarbonate Enclosure (STI EP080605-T).....	137.51	18.34
28 46 13 31-1873	EA		8" Height x 8" Width x 5" Depth, Opaque, Polycarbonate Enclosure (STI EP080805-O).....	132.30	18.34
28 46 13 31-1874	EA		8" Height x 8" Width x 5" Depth, Tinted, Polycarbonate Enclosure (STI EP080805-T).....	143.89	18.34
28 46 13 31-1875	EA		10" Height x 8" Width x 6" Depth, Opaque, Polycarbonate Enclosure (STI EP100806-O).....	134.04	18.34
28 46 13 31-1876	EA		10" Height x 8" Width x 6" Depth, Tinted, Polycarbonate Enclosure (STI EP100806-T).....	157.79	18.34
28 46 13 31-1877	EA		10" Height x 8" Width x 7" Depth, Opaque, Polycarbonate Enclosure (STI EP100807-O).....	140.99	18.34
28 46 13 31-1878	EA		10" Height x 8" Width x 7" Depth, Tinted, Polycarbonate Enclosure (STI EP100807-T).....	162.43	18.34
28 46 13 31-1879	EA		10" Height x 10" Width x 6" Depth, Opaque, Polycarbonate Enclosure (STI EP101006-O).....	147.36	18.34
28 46 13 31-1880	EA		10" Height x 10" Width x 6" Depth, Tinted, Polycarbonate Enclosure (STI EP101006-T).....	165.33	18.34
28 46 13 31-1881	EA		12" Height x 10" Width x 7" Depth, Opaque, Polycarbonate Enclosure (STI EP121007-O).....	149.10	18.34
28 46 13 31-1882	EA		12" Height x 10" Width x 7" Depth, Tinted, Polycarbonate Enclosure (STI EP121007-T).....	171.12	18.34
28 46 13 31-1883	EA		14" Height x 12" Width x 7" Depth, Opaque, Polycarbonate Enclosure (STI EP141207-O).....	175.76	18.34
28 46 13 31-1884	EA		14" Height x 12" Width x 7" Depth, Tinted, Polycarbonate Enclosure (STI EP141207-T).....	219.80	18.34
28 46 13 31-1885	EA		16" Height x 14" Width x 9" Depth, Opaque, Polycarbonate Enclosure (STI EP161409-O).....	194.30	18.34
28 46 13 31-1886	EA		16" Height x 14" Width x 9" Depth, Tinted, Polycarbonate Enclosure (STI EP161409-T).....	263.84	18.34
28 46 13 31-1887	EA		18" Height x 16" Width x 5" Depth, Opaque, Polycarbonate Enclosure (STI EP181604-O).....	216.32	18.34
28 46 13 31-1888	EA		18" Height x 16" Width x 5" Depth, Tinted, Polycarbonate Enclosure (STI EP181604-T).....	283.54	18.34
28 46 13 31-1889	EA		18" Height x 16" Width x 11" Depth, Opaque, Polycarbonate Enclosure (STI EP181611-O).....	246.46	18.34

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1890 EA 18" Height x 16" Width x 11" Depth, Tinted, Polycarbonate Enclosure (STI EP181611-T).....	333.38	18.34
28 46 13 31-1891 EA 20" Height x 16" Width x 9" Depth, Opaque, Polycarbonate Enclosure (STI EP201608-O).....	395.97	18.34
28 46 13 31-1892 EA 20" Height x 16" Width x 9" Depth, Tinted, Polycarbonate Enclosure (STI EP201608-T).....	414.51	18.34
28 46 13 31-1893 EA 24" Height x 24" Width x 10" Depth, Opaque, Polycarbonate Enclosure (STI EP242410-O).....	599.95	18.34
28 46 13 31-1894 EA 24" Height x 24" Width x 10" Depth, Tinted, Polycarbonate Enclosure (STI EP242410-T).....	696.15	18.34
28 46 13 31-1895 STI® Fire Alarm Devices <small>(28 46 13 31-1847)</small>		
28 46 13 31-1896 EA Pull Station Polycarbonate Cover, Semi Flush With Horn (STI-1100)..... Note: Includes 9 Volt DC self contained battery.	200.68	18.34
28 46 13 31-1897 EA Surface Mounted, Manual Pull Station Polycarbonate Cover With Horn (STI-1130).....	219.80	18.34
28 46 13 31-1898 EA Flush Mounted, Manual Pull Station Polycarbonate Cover (STI-1200).....	126.21	18.34
28 46 13 31-1899 EA Surface Mounted, Horn Strobe Polycarbonate Cover (STI-1210D)..... Note: For surface mounted horn strobes.	127.37	18.34
28 46 13 31-1900 EA Flush Mounted, Horn Strobe Polycarbonate Cover (STI-1210E).....	112.30	18.34
28 46 13 31-1901 EA Strobe Damage Stopper And Open Backbox With Conduit Knockout (STI-1221D)..... Note: For surface mounted strobe.	127.37	18.34
28 46 13 31-1902 EA Strobe Damage Stopper And Open Backbox, Semi Flush (STI-1221E).....	101.00	18.34
28 46 13 31-1903 EA NEMA 4X Rated Polycarbonate Dome Cover (STI-1229).....	248.78	18.34
28 46 13 31-1904 EA Surface Mounted, Manual Pull Station Polycarbonate Cover (STI-1230)..... Note: For surface mounted pull stations.	163.01	18.34
28 46 13 31-1905 EA Backplate For Polycarbonate Cover (STI-1280).....	73.30	18.34
28 46 13 31-1906 EA Conduit Gasket For Polycarbonate Cover (STI-3003).....	50.59	18.34
28 46 13 31-1907 EA Conduit Spacer For Surface Mounted Polycarbonate Cover (STI-3100).....	74.58	18.34
28 46 13 31-1908 EA Weather Resistant, Surface Mounted, Manual Pull Station Polycarbonate Cover (STI-3150).....	183.29	18.34
28 46 13 31-1909 EA 8.5" x 6.5" x 4.6", Thumb Lock, Lockable Enclosure (STI-7511A).....	150.26	18.34
28 46 13 31-1910 EA Flush Mounted, Smoke Detector Polycarbonate Cover (STI-8100).....	108.54	18.34
28 46 13 31-1911 EA Flush Mounted, Low Profile, Smoke Detector Steel Wire Cover (STI-9601).....	102.16	18.34
28 46 13 31-1912 EA Surface Mounted, Low Profile, Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9602).....	98.40	18.34
28 46 13 31-1913 EA Flush Mounted, Mini Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9604).....	102.16	18.34
28 46 13 31-1914 EA Surface Mounted, Mini Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9605).....	98.40	18.34
28 46 13 31-1915 EA Flush Mounted, High Profile, Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9609).....	102.16	18.34
28 46 13 31-1916 EA Surface Mounted, High Profile, Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9610).....	98.40	18.34
28 46 13 31-1917 EA Beam Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9625).....	201.84	18.34
28 46 13 31-1918 EA White, Flush Mounted, Horn/Strobe/Speaker, Polyester Shell, Steel Wire Cover (STI-9705).....	90.80	18.34
28 46 13 31-1919 EA Red, Flush Mounted, Horn/Strobe/Speaker, Polyester Shell, Steel Wire Cover (STI-9705-R).....	106.24	18.34
28 46 13 31-1920 EA Flush Mounted, Beam Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9706).....	142.73	18.34
28 46 13 31-1921 EA Surface Mounted, Beam Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9707).....	142.73	18.34
28 46 13 31-1922 EA White, Surface Mounted, Horn/Strobe/Speaker, Polyester Shell, Steel Wire Cover (STI-9708).....	101.00	18.34
28 46 13 31-1923 EA Red, Surface Mounted, Horn/Strobe/Speaker, Polyester Shell, Steel Wire Cover (STI-9708-R).....	101.00	18.34
28 46 13 31-1924 EA White, Flush Mounted, Horn/Strobe/Speaker, Polyester Shell, Steel Wire Cover (STI-9711).....	90.80	18.34
28 46 13 31-1925 EA Flush Mounted, Smoke Detector, Polyester Shell, Steel Wire Cover (STI-9713).....	101.00	18.34
28 46 13 31-1926 EA White, Surface Mounted, Horn/Strobe/Speaker, Polyester Shell, Steel Wire Cover (STI-9714).....	101.00	18.34
28 46 13 31-1927 EA Yellow, High Threat, Push Button Station (STI SS-2201).....	129.56	9.17
28 46 13 31-1928 EA Gasket Kit For STI Covers (STI SUB-121).....	53.56	
28 46 13 31-1929 EA Universal Cover With Horn, Flush Mount, Momentary Button, Exit Label, Green Stopper Station (STI SS-2144XT).....	263.84	18.34
28 46 13 31-1930 EA No Cover, Push And Turn-To-Reset Button, Evacuation Label, Yellow Stopper Station (STI SS-2201EV).....	140.41	18.34
28 46 13 31-1931 EA No Cover, Push And Key-To-Rest Button, Emergency Label, Blue Stopper Station (STI SS-2400EM).....	140.41	18.34
28 46 13 31-1932 EA Universal Cover With Horn, Flush Mount, Push And Key-To-Reset Button, Emergency Label, Blue Stopper Station (STI SS-2440EM).....	263.84	18.34
28 46 13 31-1933 EA Flush Mounted, Weather Stopper II (STI-1250).....	151.71	18.34
28 46 13 31-1934 EA Flush Mounted, Clear, Universal Stopper (STI-1300NC).....	98.40	18.34
28 46 13 31-1935 EA Flush Mounted, Universal, Fire Label, Red, Stopper With Horn (STI-13020FR).....	174.02	18.34
28 46 13 31-1936 EA Surface Mounted, Clear, Universal Stopper (STI-13200NC).....	120.13	18.34
28 46 13 31-1937 EA Surface Mounted, Fire Label, Red, Universal Stopper (STI-13210FR).....	131.72	18.34
28 46 13 31-1938 EA Surface Mounted, No Label, White, Universal Stopper (STI-13210NW).....	143.89	18.34
28 46 13 31-1939 EA Surface Mounted, No Label, Yellow, Universal Stopper (STI-13210NY).....	143.89	18.34
28 46 13 31-1940 EA Surface Mounted, Fire Label, Red, Universal Stopper With Horn (STI-13220FR).....	195.46	18.34
28 46 13 31-1941 EA Surface Mounted, No Label, Yellow, Universal Stopper With Horn (STI-13220NY).....	207.05	18.34
28 46 13 31-1942 EA Surface Mounted, Fire Label, Red, Universal Stopper With Horn And Relay (STI-13230FR).....	247.62	18.34
28 46 13 31-1943 EA Stopper II, Weather Gasket (STI-3002).....	49.37	18.34
28 46 13 31-1944 EA Large, Break Glass Stopper (STI-4100).....	142.73	18.34
28 46 13 31-1945 EA Stopper "G" Standard Break Glass Cover (STI-6100).....	137.51	18.34
28 46 13 31-1946 EA Clear, Polycarbonate Enclosure With Deep Back Box And Exterior Key Lock (STI-7510A).....	132.59	18.34
28 46 13 31-1947 EA Polycarbonate Multi-Purpose Enclosure With Backplate And Key Lock (STI-7530).....	365.83	18.34
28 46 13 31-1948 EA Heated, Metal, Protective Cabinet (STI-7560AH).....	5,205.78	18.34
28 46 13 31-1949 EA Stainless Steel Guard (STI-9604SS).....	93.47	18.34
28 46 13 31-1950 EA 5-3/4" Width x 4-1/2" Depth, Motion Detector Guard (STI-9621).....	83.33	18.34
28 46 13 31-1951 System Sensor Fire Alarm <small>(28 46 13 31)</small>		
28 46 13 31-1952 Smoke Detectors <small>(28 46 13 31-1951)</small>		
28 46 13 31-1953 EA Beam Detector Heater Kit (System Sensor BEAMHK).....	65.22	6.11
28 46 13 31-1954 EA Reflectors, Beam Detector Heater Kit (System Sensor BEAMHKR)..... Note: Four used with long range kit.	277.76	6.11
28 46 13 31-1955 EA Projected Beam Smoke Detector Long Range Kit (System Sensor BEAMLRK).....	329.46	61.14
28 46 13 31-1956 EA Wall Or Ceiling Mounted, Projected Beam Smoke Detector Multi-Mount Kit (System Sensor BEAMMMK).....	238.37	61.14
28 46 13 31-1957 EA Projected Beam Smoke Detector Surface Mounted Kit (System Sensor BEAMSMK).....	191.94	61.14
28 46 13 31-1958 EA Two Wire, Photoelectric Smoke Detector (System Sensor 2W-B).....	181.11	45.85
28 46 13 31-1959 EA Two Wire, Photoelectric Smoke Detector With Thermal Sensor (System Sensor 2WT-B).....	178.33	45.85
28 46 13 31-1960 EA Two Wire, Photoelectric Smoke Detector With Thermal Sensor And Built In Sounder (System Sensor 2WTA-B).....	190.74	45.85

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-1961	EA		Four Wire, Photoelectric Smoke Detector (System Sensor 4W-B).....	184.21	45.85
28 46 13 31-1962	EA		Four Wire, Photoelectric Smoke Detector With Thermal Sensor, 12/24 Volt DC (System Sensor 4WT-B).....	190.24	45.85
28 46 13 31-1963	EA		Four Wire, Photoelectric Smoke Detector With Thermal Sensor And Built In Sounder (System Sensor 4WTA-B).....	195.56	45.85
28 46 13 31-1964	EA		Four Wire, Photoelectric Smoke Detector With Isolated Thermal Sensor, Built In Sounder, Form C Relay (System Sensor 4WITAR-B).....	266.43	45.85
28 46 13 31-1965	EA		Photoelectric, Low-Profile, Smoke Detector Head (System Sensor 2151).....	154.97	30.57
28 46 13 31-1966	EA		Photoelectric With Thermal Sensor, Low-Profile, Smoke Detector Head (System Sensor 2151T)..... Note: Requires B100 series base.	177.62	30.57
28 46 13 31-1967	EA		Heavy Duty Multi-Mount Kit (System Sensor 6500-MMK).....	318.72	15.28
28 46 13 31-1968	EA		Surface-Mount Kit For Use With Beam1224 And FSB-200 When Using 6500-MMK Heavy Duty Multi-Mount Kit (System Sensor 6500-SMK).....	107.07	15.28
28 46 13 31-1969	EA		Four Wire, Low Profile, Plug In Detector (System Sensor 2D51).....	203.92	45.85
28 46 13 31-1970			Duct Smoke Detectors (28 46 13 31-1951)		
28 46 13 31-1971	EA		Two Wire Conventional Photoelectric Duct Detector (Includes 2151 Detector) (System Sensor D2).....	403.67	45.85
28 46 13 31-1972	EA		Four Wire Conventional Photoelectric Duct Detector (Includes 2D51 Detector) (System Sensor D4120).....	400.10	45.85
28 46 13 31-1973	EA		Watertight, Four Wire Conventional Photoelectric Duct Detector (Includes 2D51 Detector) (System Sensor D4120W).....	526.64	51.96
28 46 13 31-1974	EA		Sensor Only, Four Wire Conventional Photoelectric Duct Detector (System Sensor D4S).....	263.56	30.57
28 46 13 31-1975	EA		Duct Accessory Coil (Required On DNR If A Remote Test Station Is Used) (System Sensor DCOIL).....	71.33	9.17
28 46 13 31-1976	EA		Intelligent, Non-Relay, Duct Smoke Detector Housing (System Sensor DNR).....	226.32	24.45
28 46 13 31-1977	EA		Watertight, Intelligent, Non-Relay, Duct Smoke Detector Housing (System Sensor DNRW).....	369.53	30.57
28 46 13 31-1978	EA		1' Steel Sampling Tube (System Sensor DST1).....	39.81	12.23
28 46 13 31-1979	EA		1.5' Steel Sampling Tube (System Sensor DST1.5).....	43.86	12.23
28 46 13 31-1980	EA		3' Steel Sampling Tube (System Sensor DST3).....	49.99	12.23
28 46 13 31-1981	EA		5' Steel Sampling Tube (System Sensor DST5).....	58.77	15.28
28 46 13 31-1982	EA		10' Steel Sampling Tube (System Sensor DST10).....	96.10	18.34
28 46 13 31-1983	EA		1' Steel, Exhaust Tube Duct (System Sensor ETX).....	45.53	12.23
28 46 13 31-1984	EA		Remote Test Station For Duct Smoke Detector (System Sensor RTS151).....	106.77	15.28
28 46 13 31-1985	EA		Detector Installation/Removal Tool Kit For 700 Series Detectors (System Sensor XR2).....	238.74	
28 46 13 31-1986	EA		Detector Installation/Removal Tool Kit For 800 And 355 Series Detectors (System Sensor XR2B).....	256.60	
28 46 13 31-1987			Heat Detectors (28 46 13 31-1951)		
28 46 13 31-1988	EA		Single Circuit, 135 Degree F, Fixed And Rate-Of-Rise, Heat Detector (System Sensor 5601P).....	120.59	45.85
28 46 13 31-1989	EA		Single Circuit, 194 Degree F, Fixed And Rate-Of-Rise, Heat Detector (System Sensor 5602).....	119.93	45.85
28 46 13 31-1990	EA		Dual Circuit, 135 Degree F, Fixed And Rate-Of-Rise, Heat Detector (System Sensor 5621).....	141.12	45.85
28 46 13 31-1991	EA		Dual Circuit, 194 Degree F, Fixed And Rate-Of-Rise, Heat Detector (System Sensor 5622).....	141.12	45.85
28 46 13 31-1992	EA		Dual Circuit, 135 Degree F, Fixed Temperature Heat Detector (System Sensor 5623).....	149.74	45.85
28 46 13 31-1993	EA		Dual Circuit, 194 Degree F, Fixed Temperature Heat Detector (System Sensor 5624).....	149.74	45.85
28 46 13 31-1994			Horns (28 46 13 31-1951)		
28 46 13 31-1995	EA		Red, Mini Horn (System Sensor MHR).....	129.51	45.85
28 46 13 31-1996	EA		White, Mini Horn (System Sensor MHW).....	129.51	45.85
28 46 13 31-1997	EA		White, 12/24 Volt DC, Wall Mounted Horn Only (System Sensor HWL).....	131.36	45.85
28 46 13 31-1998	EA		Red, Outdoor, Wall Mounted Replacement Horn (System Sensor HRK-R).....	166.21	51.96
28 46 13 31-1999	EA		Red, Indoor, Wall Mounted, Horn (System Sensor HRL).....	131.36	45.85
28 46 13 31-2000	EA		Red, Outdoor, Wall Mounted, Horn (System Sensor HRK).....	181.11	45.85
28 46 13 31-2001	EA		White, Indoor, Wall Mounted, Compact Horn (System Sensor HGRL).....	131.96	45.85
28 46 13 31-2002	EA		Red, Indoor, Wall Mounted, Compact Horn (System Sensor HGWL).....	131.96	45.85
28 46 13 31-2003			Wall Mounted Horns/Strobes (28 46 13 31-1951)		
28 46 13 31-2004	EA		Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2RL).....	181.01	45.85
28 46 13 31-2005	EA		Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2RH).....	224.37	45.85
28 46 13 31-2006	EA		Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2RHK).....	270.64	51.96
28 46 13 31-2007	EA		Plain, Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2RHK-P).....	264.09	51.96
28 46 13 31-2008	EA		Outdoor Backbox, Red, 120 Volt AC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2RHK-120).....	276.89	51.96
28 46 13 31-2009	EA		Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2RK).....	269.74	51.96
28 46 13 31-2010	EA		Plain, Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2RK-P).....	255.75	51.96
28 46 13 31-2011	EA		Outdoor, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2RK-R).....	222.39	45.85
28 46 13 31-2012	EA		Plain, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2RL-P).....	176.85	45.85
28 46 13 31-2013	EA		White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2WL).....	181.01	45.85
28 46 13 31-2014	EA		White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2WH).....	225.98	45.85
28 46 13 31-2015	EA		Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2WHK).....	261.71	51.96
28 46 13 31-2016	EA		Plain, Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2WHK-P).....	264.09	51.96

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2017 EA Plain, White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P2WH-P).....	224.37	45.85
28 46 13 31-2018 EA Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2WK).....	278.68	51.96
28 46 13 31-2019 EA Plain, Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2WK-P).....	255.75	51.96
28 46 13 31-2020 EA Plain, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P2WL-P).....	175.95	45.85
28 46 13 31-2021 EA Red, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P4RL).....	218.52	45.85
28 46 13 31-2022 EA Red, Four Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor P4RH).....	230.63	45.85
28 46 13 31-2023 EA Outdoor Backbox, Red, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P4RK).....	266.24	51.96
28 46 13 31-2024 EA Outdoor, Red, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P4RK-R).....	249.80	51.96
28 46 13 31-2025 EA White, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P4WL).....	218.52	45.85
28 46 13 31-2026 EA Outdoor Backbox, White, Four Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Horn/Strobe (System Sensor PC4WHK).....	285.13	51.96
28 46 13 31-2027 EA Outdoor Backbox, White, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Horn/Strobe (System Sensor P4WK).....	264.68	51.96
28 46 13 31-2028 EA Red, 24 Volt DC, Low-frequency, Selectable Intensity (15, 30, 75, 95, 110, 135 And 185 Candela) Multi-Candela, Wall Mounted, Horn/Strobe (System Sensor P2RL-LF).....	270.31	45.85
28 46 13 31-2029 EA White, 24 Volt DC, Low-frequency, Selectable Intensity (15, 30, 75, 95, 110, 135 And 185 Candela) Multi-Candela, Wall Mounted, Horn/Strobe (System Sensor P2WL-LF).....	270.31	45.85
28 46 13 31-2030 EA Red, 12/24 Volt DC, Two Wire, Selectable Intensity (15, 30, 75, 95, 110, 135 And 185 Candela) Multi-Candela, Wall Mounted, Compact Horn Strobe (System Sensor P2GRL).....	180.42	45.85
28 46 13 31-2031 EA White, 12/24 Volt DC, Two Wire, Selectable Intensity (15, 30, 75, 95, 110, 135 And 185 Candela) Multi-Candela, Wall Mounted, Compact Horn Strobe (System Sensor P2GWL).....	180.42	45.85
28 46 13 31-2032 Ceiling Mounted Horns/Strobes (28 46 13 31-1951)		
28 46 13 31-2033 EA Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2RL).....	183.99	45.85
28 46 13 31-2034 EA Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2RH).....	227.60	45.85
28 46 13 31-2035 EA Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2RHK).....	261.71	51.96
28 46 13 31-2036 EA Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2RK).....	253.97	51.96
28 46 13 31-2037 EA Plain, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2R-P).....	216.28	45.85
28 46 13 31-2038 EA White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2WL).....	183.99	45.85
28 46 13 31-2039 EA White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2WH).....	227.60	45.85
28 46 13 31-2040 EA Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2WHK).....	261.71	51.96
28 46 13 31-2041 EA Plain, White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2WH-P).....	227.60	45.85
28 46 13 31-2042 EA Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2WK).....	253.97	51.96
28 46 13 31-2043 EA Plain, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC2W-P).....	214.66	45.85
28 46 13 31-2044 EA Red, Ceiling Mounted, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Horn/Strobe (System Sensor PC4RL).....	220.01	45.85
28 46 13 31-2045 EA Red, Ceiling Mounted, Four Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Horn/Strobe (System Sensor PC4RH).....	230.63	45.85
28 46 13 31-2046 EA White, Four Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Horn/Strobe (System Sensor PC4WL).....	220.01	45.85
28 46 13 31-2047 Wall Mounted Strobes (28 46 13 31-1951)		
28 46 13 31-2048 EA White Strobe Expander Plate Backbox Skirt (System Sensor SEP-BBSW).....	84.03	15.28
28 46 13 31-2049 EA White Strobe Expander Plate With Standard Candela (System Sensor SEP-SW).....	164.23	15.28
28 46 13 31-2050 EA Red, Selectable Candela (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SRL).....	162.85	45.85
28 46 13 31-2051 EA Red, Selectable Candela (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Strobe (System Sensor SRH).....	194.87	45.85
28 46 13 31-2052 EA Red, Outdoor, Selectable Candela (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Strobe (System Sensor SRHK).....	237.36	51.96
28 46 13 31-2053 EA Red, Outdoor, Selectable Candela (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SRK).....	234.61	51.96
28 46 13 31-2054 EA Red, Plain, Outdoor, Selectable Candela (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SRK-P).....	234.32	51.96
28 46 13 31-2055 EA Red, Outdoor, Selectable Candela (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SRK-R).....	205.15	51.96
28 46 13 31-2056 EA Red, Plain, Selectable Candela (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SRL-P).....	161.37	45.85
28 46 13 31-2057 EA White, 12/24 Volt DC, Selectable (15, 15 /75, 30, 75 , 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SWL).....	162.26	45.85
28 46 13 31-2058 EA White, Amber Lens, 12/24 Volt DC, Selectable (15, 15 /75, 30, 75 , 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SWL-ALERT).....	176.25	45.85

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2059	EA		White, Clear Lens, 12/24 Volt DC, Selectable (15, 15 /75, 30, 75 , 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SWL-CLR-ALERT).....	203.34	45.85
28 46 13 31-2060	EA		White, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Strobe (System Sensor SWH).....	213.04	45.85
28 46 13 31-2061	EA		White, Amber Lens, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Strobe (System Sensor SWH-ALERT).....	211.42	45.85
28 46 13 31-2062	EA		White, Plain, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Strobe (System Sensor SWH-P).....	211.42	45.85
28 46 13 31-2063	EA		Red, Plain, Outdoor, Selectable Candela (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Strobe (System Sensor SRHK-P).....	237.89	51.96
28 46 13 31-2064	EA		White, Outdoor, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Strobe (System Sensor SWHK).....	235.21	51.96
28 46 13 31-2065	EA		White, Plain, Outdoor, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Strobe (System Sensor SWHK-P).....	237.30	51.96
28 46 13 31-2066	EA		Red, Outdoor, Selectable Candela (135, 150, 177, 185 Candela) High-Candela, Wall Mounted Strobe (System Sensor SRHK-R).....	228.51	51.96
28 46 13 31-2067	EA		White, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Strobe (System Sensor SWK).....	232.83	51.96
28 46 13 31-2068	EA		White, Plain, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Strobe (System Sensor SWK-P).....	234.02	51.96
28 46 13 31-2069	EA		White, Plain, 12/24 Volt DC, Selectable (15, 15 /75, 30, 75 , 110, 115 Candela) Multi-Candela, Wall Mounted Strobe (System Sensor SWL-P).....	161.07	45.85
28 46 13 31-2070	EA		Amber, Wall Strobe Lens Attachment (System Sensor LENS-A).....	28.60	6.11
28 46 13 31-2071	EA		Blue, Wall Strobe Lens Attachment (System Sensor LENS-B).....	28.60	6.11
28 46 13 31-2072	EA		Green, Wall Strobe Lens Attachment (System Sensor LENS-G).....	28.60	6.11
28 46 13 31-2073	EA		Red, Wall Strobe Lens Attachment (System Sensor LENS-R).....	28.60	6.11
28 46 13 31-2074	EA		Red, 12/24 Volt DC, Wall Mounted, L-Series Compact Strobe (System Sensor SGRL).....	165.24	45.85
28 46 13 31-2075	EA		White, 12/24 Volt DC, Wall Mounted, L-Series Compact Strobe (System Sensor SGWL).....	161.96	45.85
28 46 13 31-2076	EA		L-Series, Amber, Wall Strobe Lens Attachment (System Sensor LENS-A2, AC2).....	28.60	6.11
28 46 13 31-2077	EA		L-Series, Blue, Wall Strobe Lens Attachment (System Sensor LENS-B2, BC2).....	28.60	6.11
28 46 13 31-2078	EA		L-Series, Green, Wall Strobe Lens Attachment (System Sensor LENS-G2, GC2).....	28.60	6.11
28 46 13 31-2079	EA		L-Series, Red, Wall Strobe Lens Attachment (System Sensor LENS-R2, RC2).....	28.60	6.11
28 46 13 31-2080	EA		Red, 8 Multi-tone, 12 VDC, 1575CD, Wall Mounted Strobe (Wheelock MT-121575W-FR).....	241.54	45.85
28 46 13 31-2081	EA		White, 8 Multi-tone, 12 VDC, 1575CD, No Lettering, Wall Mounted Strobe (Wheelock MT-121575W-NW).....	241.54	45.85
28 46 13 31-2082			Ceiling Mounted Strobes (28 46 13 31-1951)		
28 46 13 31-2083	EA		Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Strobe (System Sensor SCRL).....	166.13	45.85
28 46 13 31-2084	EA		Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Strobe (System Sensor SCRH).....	197.62	45.85
28 46 13 31-2085	EA		Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Strobe (System Sensor SCRHK).....	237.36	51.96
28 46 13 31-2086	EA		Outdoor Backbox, Red, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Strobe (System Sensor SCRK).....	237.36	51.96
28 46 13 31-2087	EA		White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Strobe (System Sensor SCWL).....	166.13	45.85
28 46 13 31-2088	EA		Clear Lens, White, Two Wire, 12/24 Volt DC, Standard Candela, Ceiling Mounted Strobe (System Sensor SCWL-CLR-ALERT).....	178.04	45.85
28 46 13 31-2089	EA		White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Strobe (System Sensor SCWH).....	216.28	45.85
28 46 13 31-2090	EA		Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (135, 150, 177, 185 Candela) High-Candela, Ceiling Mounted Strobe (System Sensor SCWHK).....	235.21	51.96
28 46 13 31-2091	EA		Outdoor Backbox, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Strobe (System Sensor SCWK).....	232.83	51.96
28 46 13 31-2092	EA		Plain, White, Two Wire, 12/24 Volt DC, Selectable Intensity (15, 15/75, 30, 75, 110, 115 Candela) Multi-Candela, Ceiling Mounted Strobe (System Sensor SCW-P).....	192.01	45.85
28 46 13 31-2093	EA		Blue, Ceiling Strobe Lens Attachment (System Sensor LENS-BC).....	28.60	6.11
28 46 13 31-2094	EA		Red, Ceiling Strobe Lens Attachment (System Sensor LENS-RC).....	28.60	6.11
28 46 13 31-2095	EA		Green, Ceiling Strobe Lens Attachment (System Sensor LENS-GC).....	28.60	6.11
28 46 13 31-2096	EA		Amber, Ceiling Strobe Lens Attachment (System Sensor LENS-AC).....	28.60	6.11
28 46 13 31-2097			Wall Mounted Speakers (28 46 13 31-1951)		
28 46 13 31-2098	EA		24 Volt DC, 4 Field Selectable Sound Pulse Patterns, Directional Sound Speaker With Voice And Integral Audio Amplifier (System Sensor PF24V).....	438.20	45.85
28 46 13 31-2099	EA		Red, Wall Mounted Speaker (System Sensor SPRL).....	138.74	45.85
28 46 13 31-2100	EA		Red, Outdoor, Wall Mounted Speaker (System Sensor SPRK).....	225.66	45.85
28 46 13 31-2101	EA		Red, Outdoor, Wall Mounted Speaker (System Sensor SPRK-R).....	186.10	51.96
28 46 13 31-2102	EA		Red, High dB, Wall Mounted Speaker (System Sensor SPRV).....	160.48	45.85
28 46 13 31-2103	EA		White, Wall Mounted Speaker (System Sensor SPWL).....	138.74	45.85
28 46 13 31-2104	EA		White, Outdoor, Wall Mounted Speaker (System Sensor SPWK).....	236.70	51.96
28 46 13 31-2105	EA		White, High dB, Wall Mounted Speaker (System Sensor SPWV).....	157.08	45.85
28 46 13 31-2106			Ceiling Mounted Speakers (28 46 13 31-1951)		
28 46 13 31-2107	EA		Red, Ceiling Mounted Speaker (System Sensor SPCRL).....	135.47	45.85
28 46 13 31-2108	EA		Outdoor, Ceiling Mounted Speaker (System Sensor SPCRK).....	216.19	45.85
28 46 13 31-2109	EA		Red, High dB, Ceiling Mounted Speaker (System Sensor SPCRV).....	160.48	45.85
28 46 13 31-2110	EA		White, Ceiling Mounted Speaker (System Sensor SPCWL).....	138.15	45.85
28 46 13 31-2111	EA		White, High dB, Ceiling Mounted Speaker (System Sensor SPCWV).....	172.60	45.85
28 46 13 31-2112	EA		White, Outdoor, Ceiling Mounted Speaker (System Sensor SPCWK).....	237.89	51.96

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2113		Wall Mounted Speakers/Strobes <small>(28 46 13 31-1951)</small>		
28 46 13 31-2114	EA	White Speaker Strobe Expander Plate With Standard Candela (System Sensor SEP-SPSWL).....	162.14	15.28
28 46 13 31-2115	EA	White Speaker Strobe Expander Plate Backbox Skirt (System Sensor SPSEP-BBSWL).....	80.46	15.28
28 46 13 31-2116	EA	Red, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRL).....	228.64	45.85
28 46 13 31-2117	EA	Red, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRH).....	247.13	45.85
28 46 13 31-2118	EA	Red, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRK).....	329.51	51.96
28 46 13 31-2119	EA	Red, Plain, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRK-P).....	329.58	51.96
28 46 13 31-2120	EA	Red, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRK-R).....	280.16	51.96
28 46 13 31-2121	EA	Red, Plain, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRL-P).....	225.96	45.85
28 46 13 31-2122	EA	Red, High dB, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSRV).....	238.88	45.85
28 46 13 31-2123	EA	White, Amber Lens, Wall Mounted, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWL-ALERT).....	229.83	45.85
28 46 13 31-2124	EA	White, Clear Lens, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWK-CLR-ALERT).....	333.75	51.96
28 46 13 31-2125	EA	White, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWL).....	228.64	45.85
28 46 13 31-2126	EA	White, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWH).....	274.52	45.85
28 46 13 31-2127	EA	White, Plain, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWH-P).....	274.52	45.85
28 46 13 31-2128	EA	White, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWK).....	345.65	51.96
28 46 13 31-2129	EA	White, Plain, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWK-P).....	328.39	51.96
28 46 13 31-2130	EA	White, Plain, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWL-P).....	224.77	45.85
28 46 13 31-2131	EA	White, High dB, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWV).....	264.81	45.85
28 46 13 31-2132	EA	White, Plain, High dB, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWV-P).....	264.81	45.85
28 46 13 31-2133	EA	L-Series, White, Clear Lens, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Wall Mounted Speaker/Strobe (System Sensor SPSWL-CLR-ALERT).....	239.08	51.96
28 46 13 31-2134		Ceiling Mounted Speakers/Strobes <small>(28 46 13 31-1951)</small>		
28 46 13 31-2135	EA	Red, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCRL).....	212.57	45.85
28 46 13 31-2136	EA	Red, Selectable Candela (135, 150, 177, 185) Candela, High-Candela, Ceiling Mounted Speaker/Strobe (System Sensor SPSCRH).....	249.89	45.85
28 46 13 31-2137	EA	Red, High dB, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115), Ceiling Mounted Speaker/Strobe (System Sensor SPSCRV).....	238.88	45.85
28 46 13 31-2138	EA	White, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWL).....	212.57	45.85
28 46 13 31-2139	EA	White, Clear Lens, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWL-CLR-ALERT).....	227.45	45.85
28 46 13 31-2140	EA	White, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWH).....	274.52	45.85
28 46 13 31-2141	EA	White, Outdoor, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWHK).....	347.44	51.96
28 46 13 31-2142	EA	White, Plain, High-Candela, Selectable Candela (135, 150, 177, 185 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWH-P).....	274.52	45.85
28 46 13 31-2143	EA	White, Outdoor, Clear Lens, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWK-CLR-ALERT).....	334.34	51.96
28 46 13 31-2144	EA	White, Outdoor, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWK).....	345.65	51.96
28 46 13 31-2145	EA	White, Plain, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWL-P).....	212.57	45.85
28 46 13 31-2146	EA	White, High dB, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWV).....	264.81	45.85
28 46 13 31-2147	EA	White, High-Candela/High dB, Selectable Candela (135, 150, 177, 185 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWVH).....	274.52	45.85
28 46 13 31-2148	EA	White, Plain, High dB, Selectable Candela (15, 15/75, 30, 75, 95, 110, 115 Candela), Ceiling Mounted Speaker/Strobe (System Sensor SPSCWV-P).....	264.81	45.85
28 46 13 31-2149	EA	High-Candela/High dB, Ceiling Mounted Speaker/Strobe (System Sensor SPSCRVH).....	274.27	45.85
28 46 13 31-2150		Electric Alarm Bells <small>(28 46 13 31-1951)</small>		
28 46 13 31-2151	EA	6" Diameter, 24 Volt DC Alarm Bell (System Sensor SSM24-6).....	173.57	45.85
28 46 13 31-2152	EA	8" Diameter, 24 Volt DC Alarm Bell (System Sensor SSM24-8).....	188.16	45.85
28 46 13 31-2153	EA	10" Diameter, 24 Volt DC Alarm Bell (System Sensor SSM24-10).....	204.23	45.85
28 46 13 31-2154	EA	6" 120 Volt AC Alarm Bell (System Sensor SSV120-6).....	183.93	46.46
28 46 13 31-2155	EA	8" 120 Volt AC Alarm Bell (System Sensor SSV120-8).....	186.06	46.46
28 46 13 31-2156	EA	10" 120 Volt AC Alarm Bell (System Sensor SSV120-10).....	199.53	46.46

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2157			Device Bases <small>(28 46 13 31-1951)</small>		
28 46 13 31-2158	EA		High Or Low Volume Output, Code 3 Or 4, Continuous, March Or Custom Tone, Intelligent, Addressable, Programmable Plug-In Sounder Base (System Sensor B200S).....	138.03	15.28
28 46 13 31-2159	EA		Code 3 Or Continuous Tone, Intelligent Plug-In Sounder Base (System Sensor B200SR).....	133.57	15.28
28 46 13 31-2160	EA		Intelligent Isolator Base (System Sensor B224BI).....	109.45	15.28
28 46 13 31-2161	EA		Intelligent Relay Base (System Sensor B224RB).....	110.64	15.28
28 46 13 31-2162	EA		Flangeless, Intelligent Detector Base (System Sensor B501).....	67.72	15.28
28 46 13 31-2163	EA		High Or Low Volume Output, Code 3 Or 4, Continuous, March Or Custom Tone, Intelligent, Addressable, Programmable Plug-In Sounder Base, Ivory (System Sensor B200S-IV).....	138.03	15.28
28 46 13 31-2164	EA		Code 3 Or Continuous Tone, Intelligent Plug-In Sounder Base, Ivory (System Sensor B200SR-IV).....	133.57	15.28
28 46 13 31-2165	EA		Low-Frequency, Code 3 Or Continuous Tone, Intelligent Plug-In Sounder Base (System Sensor B200SR-LF).....	200.84	15.28
28 46 13 31-2166	EA		Low-Frequency, Code 3 Or Continuous Tone, Intelligent Plug-In Sounder Base, Ivory (System Sensor B200SR-LF-IV).....	200.84	15.28
28 46 13 31-2167	EA		Low-Frequency, Code 3 Or Continuous Tone, Intelligent Plug-In Sounder Base, White (System Sensor B200SR-LF-WH).....	194.29	15.28
28 46 13 31-2168	EA		Code 3 Or Continuous Tone, Intelligent Plug-In Sounder Base, White (System Sensor B200SR-WH).....	143.48	15.28
28 46 13 31-2169	EA		High Or Low Volume Output, Code 3 Or 4, Continuous, March Or Custom Tone, Intelligent, Addressable, Programmable Plug-In Sounder Base, White (System Sensor B200S-WH).....	130.89	15.28
28 46 13 31-2170	EA		Intelligent Isolator Base, Ivory (System Sensor B224BI-IV).....	109.45	15.28
28 46 13 31-2171	EA		Intelligent Isolator Base, White (System Sensor B224BI-WH).....	102.31	15.28
28 46 13 31-2172	EA		Intelligent Relay Base, Ivory (System Sensor B224RB-IV).....	110.64	15.28
28 46 13 31-2173	EA		Intelligent Relay Base, White (System Sensor B224RB-WH).....	103.80	15.28
28 46 13 31-2174	EA		Flangeless, Intelligent Detector Base, Black (System Sensor B501-BL).....	67.72	15.28
28 46 13 31-2175	EA		Flangeless, Intelligent Detector Base, Ivory (System Sensor B501-IV).....	67.72	15.28
28 46 13 31-2176	EA		Flangeless, Intelligent Detector Base, White (System Sensor B501-WHITE).....	59.98	15.28
28 46 13 31-2177	EA		Intelligent, Addressable, Programmable Low Frequency Plug-In Sounder Base (System Sensor B200S-LF).....	204.41	15.28
28 46 13 31-2178	EA		Intelligent, Addressable, Programmable Low Frequency Plug-In Sounder Base, Ivory (System Sensor B200S-LF-IV).....	204.41	15.28
28 46 13 31-2179	EA		Intelligent, Addressable, Programmable Low Frequency Plug-In Sounder Base, White (System Sensor B200S-LF-WH).....	196.67	15.28
28 46 13 31-2180	EA		6" Intelligent Flanged Mounting Base (System Sensor B300-6).....	52.90	15.28
28 46 13 31-2181	EA		6" Intelligent Flanged Mounting Base, Ivory (System Sensor B300-6-IV).....	60.34	15.28
28 46 13 31-2182	EA		Two Wire, Flanged, 12/24 Volt DC, Low-Profile, Adapter Base (System Sensor B110LP).....	57.26	15.28
28 46 13 31-2183	EA		Four Wire, Form A And C, 24 Volt DC Low-Profile, Adapter Base (System Sensor B112LP).....	115.14	18.34
28 46 13 31-2184			Boxes, Plates And Decals <small>(28 46 13 31-1951)</small>		
28 46 13 31-2185	EA		120 Volt AC, Mounting Plate, For Spectralert Advance Devices (System Sensor MP120K).....	60.58	15.28
28 46 13 31-2186	EA		Red, Wall Mounted, Metal, Weatherproof Backbox (System Sensor MWBB).....	92.84	15.28
28 46 13 31-2187	EA		White, Ceiling Mounted, Metal, Weatherproof Backbox (System Sensor MWBBCW).....	101.42	15.28
28 46 13 31-2188	EA		White, Wall Mounted, Metal, Weatherproof Backbox (System Sensor MWBBW).....	92.84	15.28
28 46 13 31-2189	EA		Red Retrofit Plate (System Sensor RFP).....	42.39	9.17
28 46 13 31-2190	EA		White Retrofit Plate (System Sensor RFPW).....	42.03	9.17
28 46 13 31-2191	EA		Red, Wall Mounted, Weatherproof Backbox (System Sensor SA-WBB).....	77.96	15.28
28 46 13 31-2192	EA		Red, Ceiling Mounted, Weatherproof Backbox (System Sensor SA-WBBC).....	88.20	15.28
28 46 13 31-2193	EA		Red, Ceiling Mounted, Surface Mounted, Backbox (System Sensor SBBCLR).....	61.29	15.28
28 46 13 31-2194	EA		White, Ceiling Mounted, Surface Mounted, Backbox (System Sensor SBBGWL).....	61.29	15.28
28 46 13 31-2195	EA		Red, Wall Mounted, Surface Mounted, Backbox (System Sensor SBBRL).....	52.60	15.28
28 46 13 31-2196	EA		Red, Wall Mounted, Surface Mounted, Backbox For Speaker (System Sensor SBBSPRL).....	59.15	15.28
28 46 13 31-2197	EA		White, Wall Mounted, Surface Mounted, Backbox For Speaker (System Sensor SBBSPWL).....	59.15	15.28
28 46 13 31-2198	EA		White, Wall Mounted, Surface Mounted, Backbox (System Sensor SBBWL).....	52.60	15.28
28 46 13 31-2199	EA		Surface Mounted Box For Intelligent Control Or Monitor Modules (System Sensor SMB500).....	56.45	15.28
28 46 13 31-2200	EA		Surface Mounted Box For 400 And 500 Series Detectors And Sounder Bases (System Sensor SMB600).....	52.90	15.28
28 46 13 31-2201	EA		Red, Wall Mounted Horn/Strobe Trim Ring (System Sensor TR-HS).....	19.04	6.11
28 46 13 31-2202	EA		Red Decals, Two Pack, Spectralert Advance Wall Products (System Sensor DECAL-R).....	28.84	
28 46 13 31-2203	EA		Red Decals, Three Pack, Spectralert Advance Ceiling Products (System Sensor DECAL-RC).....	40.28	
28 46 13 31-2204	EA		White Decals, Two Pack, Spectralert Advance Wall Products (System Sensor DECAL-W).....	28.84	
28 46 13 31-2205	EA		White Decals, Three Pack, Spectralert Advance Wall Products (System Sensor DECAL-WC).....	40.28	
28 46 13 31-2206	EA		Red, Wall Mounted, L-Series Trim Ring, Pack Of 5 (System Sensor TR-2).....	21.21	6.11
28 46 13 31-2207	EA		White, Wall Mounted, L-Series Trim Ring, Pack Of 5 (System Sensor TR-2W).....	21.21	6.11
28 46 13 31-2208	EA		Red, Ceiling Mounted, L-Series Trim Ring, Pack Of 5 (System Sensor TRC-2).....	21.21	6.11
28 46 13 31-2209	EA		White, Ceiling Mounted, L-Series Trim Ring, Pack Of 5 (System Sensor TRC-2W).....	21.21	6.11
28 46 13 31-2210	EA		Red, Wall/Surface Mounted, L-Series Compact Back Box (System Sensor SBBGRL).....	52.60	15.28
28 46 13 31-2211	EA		White, Wall/Surface Mounted, L-Series Compact Back Box (System Sensor SBBGWL).....	52.60	15.28
28 46 13 31-2212	EA		Red, AGENT Lettering, Compact, L-Series Wall Mounted Bezel (System Sensor BZGR-AG).....	25.92	6.11
28 46 13 31-2213	EA		Red, ALERT Lettering, Compact, L-Series Wall Mounted Bezel (System Sensor BZGR-AL).....	25.92	6.11
28 46 13 31-2214	EA		Red, EVAC Lettering, Compact, L-Series Wall Mounted Bezel (System Sensor BZGR-EV).....	25.92	6.11
28 46 13 31-2215	EA		Red, FIRE Lettering, Compact, L-Series Wall Mounted Bezel (System Sensor BZGR-F).....	25.92	6.11
28 46 13 31-2216	EA		White, AGENT Lettering, L-Series Wall Mounted Bezel (System Sensor BZGW-AG).....	25.92	6.11
28 46 13 31-2217	EA		White, ALERT Lettering, L-Series Wall Mounted Bezel (System Sensor BZGW-AL).....	25.92	6.11
28 46 13 31-2218	EA		White, EVAC Marking, L-Series Wall Mounted Bezel (System Sensor BZGW-EV).....	25.92	6.11
28 46 13 31-2219	EA		White, FIRE Marking, L-Series Wall Mounted Bezel (System Sensor BZGW-F).....	25.92	6.11
28 46 13 31-2220	EA		Red, Plain, L-Series Wall Mounted Bezel (System Sensor BZGR-P).....	25.92	6.11
28 46 13 31-2221	EA		White, Plain, L-Series Wall Mounted Bezel (System Sensor BZGW-P).....	25.92	6.11
28 46 13 31-2222	EA		Red, AGENT Marking, L-Series Wall Mounted Bezel (System Sensor BZR-AG).....	25.92	6.11
28 46 13 31-2223	EA		Red, ALERT Marking, L-Series Wall Mounted Bezel (System Sensor BZR-AL).....	25.92	6.11
28 46 13 31-2224	EA		Red, AGENT Marking, L-Series Ceiling Mounted Bezel (System Sensor BZRC-AG).....	28.42	6.11
28 46 13 31-2225	EA		Red, ALERT Marking, L-Series Ceiling Mounted Bezel (System Sensor BZRC-AL).....	28.42	6.11
28 46 13 31-2226	EA		Red, EVAC Marking, L-Series Ceiling Mounted Bezel (System Sensor BZRC-EV).....	28.42	6.11

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2227 EA Red, FIRE Marking, L-Series Ceiling Mounted Bezel, Pack Of 5 (System Sensor BZRC-F).....	28.42	6.11
28 46 13 31-2228 EA Red, PLAIN Marking, L-Series Ceiling Mounted Bezel (System Sensor BZRC-P).....	28.42	6.11
28 46 13 31-2229 EA Red, EVAC Marking, L-Series Wall Mounted Bezel (System Sensor BZR-EV).....	25.92	6.11
28 46 13 31-2230 EA Red, FIRE Marking, L-Series Wall Mounted Bezel (System Sensor BZR-F).....	25.92	6.11
28 46 13 31-2231 EA Red, PLAIN Marking, L-Series Wall Mounted Bezel (System Sensor BZR-P).....	25.92	6.11
28 46 13 31-2232 EA Red, AGENT Marking, L-Series Wall Mounted Bezel (System Sensor BZR-AG).....	25.92	6.11
28 46 13 31-2233 EA White, AGENT Marking, L-Series Wall Mounted Bezel (System Sensor BZSPW-AG).....	25.92	6.11
28 46 13 31-2234 EA White, ALERT Marking, L-Series Wall Mounted Bezel (System Sensor BZSPW-AL).....	25.92	6.11
28 46 13 31-2235 EA White, AGENT Marking, L-Series Ceiling Mounted Bezel (System Sensor BZSPWC-AG).....	28.42	6.11
28 46 13 31-2236 EA White, ALERT Marking, L-Series Ceiling Mounted Bezel (System Sensor BZSPWC-AL).....	28.42	6.11
28 46 13 31-2237 EA White, EVAC Marking, L-Series Ceiling Mounted Bezel (System Sensor BZSPWC-EV).....	28.42	6.11
28 46 13 31-2238 EA White, FIRE Marking, L-Series Ceiling Mounted Bezel (System Sensor BZSPWC-F).....	28.42	6.11
28 46 13 31-2239 EA White, PLAIN Marking, L-Series Ceiling Mounted Bezel (System Sensor BZSPWC-P).....	28.42	6.11
28 46 13 31-2240 EA White, EVAC Marking, L-Series Wall Mounted Bezel (System Sensor BZSPW-EV).....	25.92	6.11
28 46 13 31-2241 EA White, FIRE Marking, L-Series Wall Mounted Bezel (System Sensor BZSPW-F).....	25.92	6.11
28 46 13 31-2242 EA Replacement Dust Cover For Low Profile Detectors (System Sensor C58-227-01).....	5.30	
28 46 13 31-2243 EA Control Module Barrier (System Sensor CB500).....	38.82	9.17
28 46 13 31-2244 EA White Detector Conversion Kit For SSD Intelligent Low Profile Photo, Ion, And Laser Detectors (System Sensor CK300).....	35.61	9.17
28 46 13 31-2245 EA Black Detector Conversion Kit For SSD Intelligent Low Profile Photo, Ion, And Laser Detectors (System Sensor CK300-BL).....	43.29	9.17
28 46 13 31-2246 EA PTIR Color Kit, White (System Sensor CK-300-IR).....	165.99	9.17
Note: Includes cover and trim ring		
28 46 13 31-2247 EA PTIR Color Kit, Black (System Sensor CK-300-IR-BL).....	241.60	9.17
Note: Includes cover and trim ring		
28 46 13 31-2248 EA PTIR Color Kit, Ivory (System Sensor CK-300-IR-IV).....	241.60	9.17
Note: Includes cover and trim ring		
28 46 13 31-2249 EA Accessory Flange Ring For B210LP Base (System Sensor F210).....	28.88	9.17
Note: Includes cover and trim ring		
28 46 13 31-2250 EA Black Faceplate (System Sensor FP-BLACK-BP).....	28.01	9.17
28 46 13 31-2251 EA White Faceplate, 2 In/2 Out (System Sensor FP-WHITE-2-BP).....	28.46	9.17
28 46 13 31-2252 EA White Faceplate (System Sensor FP-WHITE-BP).....	27.00	9.17
28 46 13 31-2253 EA White, Back Box (System Sensor SMB500-WH).....	49.80	15.28
28 46 13 31-2254 EA Accessory Flange Ring For B210LP Base, White (System Sensor TR300).....	19.67	6.11
28 46 13 31-2255 EA Accessory Flange Ring For B210LP Base, Ivory (System Sensor TR300-IV).....	28.36	6.11
28 46 13 31-2256 EA White Faceplate Swift (System Sensor FP-WHITE-SWIFT-BP).....	29.86	9.17
28 46 13 31-2257 EA Red, ALERT Marking, L-Series Wall Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPR-AL).....	25.92	6.11
28 46 13 31-2258 EA Red, AGENT Marking, L-Series Ceiling Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPRC-AG).....	28.42	6.11
28 46 13 31-2259 EA Red, ALERT Marking, L-Series Ceiling Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPRC-AL).....	28.42	6.11
28 46 13 31-2260 EA Red, EVAC Marking, L-Series Ceiling Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPRC-EV).....	28.42	6.11
28 46 13 31-2261 EA Red, FIRE Marking, L-Series Ceiling Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPRC-F).....	28.42	6.11
28 46 13 31-2262 EA Red, Plain, L-Series Ceiling Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPRC-P).....	28.42	6.11
28 46 13 31-2263 EA Red, EVAC Marking, L-Series Wall Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPR-EV).....	25.92	6.11
28 46 13 31-2264 EA Red, FIRE Marking, L-Series Wall Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPR-F).....	25.92	6.11
28 46 13 31-2265 EA Red, Plain, L-Series Wall Mounted Bezel For Speakers And Speaker Strobes (System Sensor BZSPR-P).....	25.92	6.11
28 46 13 31-2266 EA L Series, 120 VAC Adapter Mounting Plate (System Sensor MP120KL).....	78.44	15.28
28 46 13 31-2267 EA White, Amber Lens, Universal Expander Plate (System Sensor SEP-SPSWL-P).....	157.08	15.28
28 46 13 31-2268 Chimes <small>(28 46 13 31-1951)</small>		
28 46 13 31-2269 EA Red, 12/24 Volt DC, Ceiling Or Wall Mounted Chime (System Sensor CHRL).....	161.38	45.85
28 46 13 31-2270 EA White, 12/24 Volt DC, Ceiling Or Wall Mounted Chime (System Sensor CHWL).....	167.32	45.85
28 46 13 31-2271 Chime/Strobes <small>(28 46 13 31-1951)</small>		
28 46 13 31-2272 EA Red, 15, 15/75, 30, 75, 110 Multi-Candela, 24 Volt DC, Ceiling Or Wall Mounted Chime/Strobe (System Sensor CHSRL).....	246.50	45.85
28 46 13 31-2273 EA White, 15, 15/75, 30, 75, 110 Multi-Candela, 24 Volt DC, Ceiling Or Wall Mounted Chime/Strobe (System Sensor CHSWL).....	246.50	45.85
28 46 13 31-2274 EA L-Series, Red, 15, 30, 75, 95, 115, 150, 177 Multi-Candela, 24 Volt DC, Ceiling Mounted Chime/Strobe (System Sensor CHSCRL).....	248.29	45.85
28 46 13 31-2275 EA L-Series, White, 15, 30, 75, 95, 115, 150, 177 Multi-Candela, 24 Volt DC, Ceiling Mounted Chime/Strobe (System Sensor CHSCWL).....	248.29	45.85
28 46 13 31-2276 Carbon Monoxide Detectors <small>(28 46 13 31-1951)</small>		
28 46 13 31-2277 EA Conventional Carbon Monoxide Detector (System Sensor CO1224).....	296.27	61.14
28 46 13 31-2278 EA Round, Sounder And Trouble Relay With Test Function, 12/24 Volt DC, Conventional Carbon Monoxide Detector (System Sensor CO1224TR).....	244.12	45.85
28 46 13 31-2279 EA CO Detector Plate For Replacing Round CO Detectors With The CO1224T (System Sensor CO-PLATE).....	19.42	6.11
28 46 13 31-2280 EA Intelligrad Plus Intelligent Addressable Combination Multi-Criteria Fire And Carbon Monoxide Detector With Flashscan (System Sensor FCO-951).....	369.14	45.85
28 46 13 31-2281 EA 12/24 VDC, Conventional Carbon Monoxide Detector With Sounder And Trouble Relay With Test Function, UL2075 Listed (System Sensor CO1224T).....	274.69	61.14

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2282	EA		Intelliquad Plus Intelligent Addressable Combination Multi-Criteria Fire And Carbon Monoxide Detector With Flashscan, Ivory (System Sensor FCO-951-IV).....	382.24	45.85
28 46 13 31-2283			Switches (28 46 13 31-1951)		
28 46 13 31-2284	EA		SPDT Switch, 4 - 20 PSI, Waterflow Alarm Pressure Switch (System Sensor EPS10-1).....	225.13	24.45
28 46 13 31-2285	EA		Two SPDT Switches, 4 - 20 PSI, Waterflow Alarm Pressure Switch (System Sensor EPS10-2)	251.92	24.45
28 46 13 31-2286	EA		SPDT Switch, 10 - 100 PSI, Waterflow Alarm Pressure Switch (System Sensor EPS40-1).....	225.13	24.45
28 46 13 31-2287	EA		Two SPDT Switches, 10 - 100 PSI, Waterflow Alarm Pressure Switch (System Sensor EPS40-2)	251.92	24.45
28 46 13 31-2288	EA		Outside Screw And Yoke Valve, Two SPDT, Supervisory Switch (System Sensor OSY2)	234.66	24.45
28 46 13 31-2289	EA		Post Indicator Butterfly Valve, SPDT, Supervisory Switch (System Sensor PIBV2)	219.18	24.45
28 46 13 31-2290			Low Frequency Sounders (28 46 13 31-1951)		
28 46 13 31-2291	EA		Red, Low Frequency Sounder (System Sensor HR-LF)	217.90	45.85
28 46 13 31-2292	EA		White, Low Frequency Sounder (System Sensor HW-LF).....	217.90	45.85
28 46 13 31-2293	EA		Red, Ceiling Mounted, Low-frequency Compact Sounder (System Sensor HCRL-LF)	200.36	45.85
28 46 13 31-2294	EA		White, Ceiling Mounted, Low-frequency Compact Sounder (System Sensor HCWL-LF)	200.36	45.85
28 46 13 31-2295	EA		Red, Wall Mounted, Low-frequency Compact Sounder (System Sensor HGRL-LF)	198.87	45.85
28 46 13 31-2296	EA		White, Wall Mounted, Low-frequency Compact Sounder (HGWL-LF)	198.87	45.85
28 46 13 31-2297			Sync Modules (28 46 13 31-1951)		
28 46 13 31-2298	EA		Red, 12/24 Volt DC, Sync Module (System Sensor MDL3R).....	177.23	30.57
28 46 13 31-2299	EA		White, 12/24 Volt DC, Sync Module (System Sensor MDL3W)	174.26	30.57
28 46 13 31-2300			Relays (28 46 13 31-1951)		
28 46 13 31-2301	EA		Metal Enclosure, SPDT, Track Mounted, Multivoltage, Relay (System Sensor R-10E).....	99.16	24.45
28 46 13 31-2302	EA		SPDT, Track Mounted, Multivoltage, Relay (System Sensor R-10T).....	64.03	15.28
28 46 13 31-2303	EA		4-Gang Relay, Metal Enclosure, SPDT, Track Mounted, Multivoltage, Relay (System Sensor R-14E)	191.31	15.28
28 46 13 31-2304	EA		4-Gang Relay, SPDT, Track Mounted, Multivoltage, Relay (System Sensor R-14T).....	140.11	15.28
28 46 13 31-2305	EA		Metal Enclosure, DPDT, Track Mounted, Multivoltage, Relay (System Sensor R-20E).....	107.14	24.45
28 46 13 31-2306	EA		DPDT, Track Mounted, Multivoltage, Relay (System Sensor R-20T).....	66.17	15.28
28 46 13 31-2307	EA		4-Gang Relay, Metal Enclosure, DPDT, Track Mounted, Multivoltage, Relay (System Sensor R-24E).....	215.72	15.28
28 46 13 31-2308	EA		4-Gang Relay, DPDT, Track Mounted, Multivoltage, Relay (System Sensor R-24T)	160.65	15.28
28 46 13 31-2309	EA		18 To 35 Volt DC, 18 To 35 Volt AC, 120 Volt AC, SPDT Multivoltage Relay (System Sensor PR-1).....	55.34	15.28
28 46 13 31-2310	EA		10 To 40 Volt DC, SPDT Multivoltage Relay (System Sensor PR-2).....	55.34	15.28
28 46 13 31-2311	EA		Redundant Power Input, 10 To 40 Volt DC, SPDT Multivoltage Relay (System Sensor PR-3)	55.34	15.28
28 46 13 31-2312			Remote Annunciator (28 46 13 31-1951)		
28 46 13 31-2313	EA		Remote Annunciator (System Sensor RA100Z)	129.22	45.85
28 46 13 31-2314	EA		Remote LED Annunciator (System Sensor RA100ZA).....	123.07	45.85
28 46 13 31-2315	EA		Remote Annunciator With Piezo Alarm (System Sensor APA151)	153.75	45.85
28 46 13 31-2316			Remote Test Station (28 46 13 31-1951)		
28 46 13 31-2317	EA		Remote Test Station With Key (System Sensor RTS151KEY).....	206.61	45.85
28 46 13 31-2318			Fire Alarm Digital Cellular Communicator (28 46 13 31)		
28 46 13 31-2319	EA		Digital Cellular Communicator With Antenna And Red Enclosure (Telular Telguard TG-7FS).....	756.90	61.14
28 46 13 31-2320			Wheelock Fire Alarm (28 46 13 31)		
28 46 13 31-2321			Ceiling Mounted Chimes/Strobes (28 46 13 31-2320)		
28 46 13 31-2322	EA		White, Round, Selectable Candela (15, 30, 75, 100 Candela), 24 Volt DC, Ceiling Mounted Chime/Strobe (Wheelock CH90-24MCC-FW).....	270.25	45.85
28 46 13 31-2323			Wall Mounted Chimes/Strobes (28 46 13 31-2320)		
28 46 13 31-2324	EA		Red, Selectable Candela (15, 30, 75, 110 Candela), 24 Volt DC, Wall Mounted Chime/Strobe (Wheelock CH70-24MCW-FR)	270.25	45.85
28 46 13 31-2325	EA		White, Selectable Candela (15, 30, 75, 110 Candela), 24 Volt DC, Wall Mounted Chime/Strobe (Wheelock CH70-24MCW-FW).....	270.25	45.85
28 46 13 31-2326			Ceiling Mounted Horns/Strobes (28 46 13 31-2320)		
28 46 13 31-2327	EA		Red, Two Wire, 12/24 Volt DC, Multi-Candela, Ceiling Mounted Horn/Strobe (Wheelock HSRC).....	173.80	45.85
28 46 13 31-2328	EA		White, Two Wire, 12/24 Volt DC, Multi-Candela, Ceiling Mounted Horn/Strobe (Wheelock HSWC)	200.66	45.85
28 46 13 31-2329			Wall Mounted Horns/Strobes (28 46 13 31-2320)		
28 46 13 31-2330	EA		Red, Weatherproof, 24 Volt DC, 75 Candela, Wall Mounted, Horn/Strobe (Wheelock ASWP-2475W-FR).....	177.62	45.85
28 46 13 31-2331	EA		Red, 24 Volt DC, 15/75 Candela, Continuous Or Code 3 Tone, Wall Mounted Horn/Strobe (Wheelock HS4-241575 Watt-FR).....	276.13	45.85

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2332 EA Red, 24 Volt DC, Selectable Candela (15, 30, 75, 110 Candela), Wall Mounted Horn/Strobe (Wheelock HS4-24MCW-FR).....	242.33	45.85
28 46 13 31-2333 EA White, 24 Volt DC, Selectable Candela (15, 30, 75, 110 Candela), Wall Mounted Horn/Strobe (Wheelock HS4-24MCW-FW).....	242.33	45.85
28 46 13 31-2334 EA Red, Flush, 24 Volt AC, 15/75 Candela, Sync/Non-Sync, Wall Mounted Horn/Strobe (Wheelock MT-241575 Watt-FR).....	261.57	45.85
28 46 13 31-2335 EA Red, 24 Volt AC, Multi-Candela, Wall Mounted Horn/Strobe (Wheelock MT-24MCW-FR).....	199.37	45.85
28 46 13 31-2336 EA Red, 115 Volt AC, Wall Mounted Horn/Strobe (Wheelock MT4-115-WH-VFR).....	197.13	45.85
28 46 13 31-2337 EA Red, Weatherproof, 24 Volt DC, 75 Candela, Wall Mounted Horn/Strobe (Wheelock MTWP-2475W-FR).....	217.43	51.96
28 46 13 31-2338 EA Red, Two Wire, 12/24 Volt DC, Multi-Candela, Wall Mounted Horn/Strobe (Wheelock HSR).....	176.72	45.85
28 46 13 31-2339 EA White, Two Wire, 12/24 Volt DC, Multi-Candela, Wall Mounted Horn/Strobe (Wheelock HSW).....	176.72	45.85
28 46 13 31-2340 EA White, 24 Volt AC, Multi-Candela, Wall Mounted Horn/Strobe (Wheelock MT-24MCW-FW).....	196.23	45.85
28 46 13 31-2341 EA Red, 24 Volt DC, 15/30/75/110 Selectable Candela, Wall Mounted Horn/Strobe (Wheelock HS4-24MCW-FR).....	242.33	45.85
28 46 13 31-2342 EA White, 24 Volt DC, 15/30/75/110 Selectable Candela, Wall Mounted Horn/Strobe (Wheelock HS4-24MCW-FW).....	242.33	45.85
28 46 13 31-2343 Ceiling Mounted Strobes (28 46 13 31-2320)		
28 46 13 31-2344 EA Red, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Strobe (Wheelock RSS-24MCC-FR).....	165.73	45.85
28 46 13 31-2345 EA White, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Strobe (Wheelock RSS-24MCC-FW).....	165.73	45.85
28 46 13 31-2346 EA Red, Two Wire, 12/24 Volt DC, Multi-Candela, Ceiling Mounted Strobe (Wheelock STRC).....	181.01	45.85
28 46 13 31-2347 EA White, Two Wire, 12/24 Volt DC, Multi-Candela, Ceiling Mounted Strobe (Wheelock STWC).....	159.00	45.85
28 46 13 31-2348 EA White, 24 Volt DC, Amber Lens, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Strobe, No Lettering (Wheelock RSSA-24MCC-NW).....	177.39	45.85
28 46 13 31-2349 EA White, 24 Volt DC, Amber Lens, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Strobe, Red ALERT Lettering (Wheelock RSSA-24MCC-ALW).....	178.96	45.85
28 46 13 31-2350 EA White, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Strobe With Fire Lettering (Wheelock RSS-24MCC-FW).....	179.63	45.85
28 46 13 31-2351 EA Red, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Weatherproof Strobe With Fire Lettering (Wheelock RSSWP-2475C-FR).....	190.24	45.85
28 46 13 31-2352 Wall Mounted Strobes (28 46 13 31-2320)		
28 46 13 31-2353 EA Red, Multi-Candela, 24 Volt DC, Wall Mounted Strobe (Wheelock AMT-24MCW-FR).....	253.65	45.85
28 46 13 31-2354 EA Red, Retrofit Plate, 12 Volt DC, 15/75 Candela, Wall Mounted Strobe (Wheelock RSP-121575W-FR).....	202.96	45.85
28 46 13 31-2355 EA Red, 24 Volt DC, 15/75 Candela, Wall Mounted Strobe (Wheelock RSS-241575W-FR).....	219.51	45.85
28 46 13 31-2356 EA Red, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Wall Mounted Strobe (Wheelock RSS-24MCW-FR).....	163.93	45.85
28 46 13 31-2357 EA White, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Wall Mounted Strobe (Wheelock RSS-24MCW-FW).....	163.93	45.85
28 46 13 31-2358 EA Red, Retrofit Plate, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Wall Mounted Strobe (Wheelock RSP-24MCW-FR).....	175.60	45.85
28 46 13 31-2359 EA Outdoor, Red, 24 Volt DC, 75 Candela, Wall Mounted Strobe (Wheelock RSSWP-2475W-FR)..... Note: Requires WPSBB-R.	182.89	51.96
28 46 13 31-2360 EA Red, Two Wire, 12/24 Volt DC, Multi-Candela, Wall Mounted Strobe (Wheelock STR).....	160.12	45.85
28 46 13 31-2361 EA White, Two Wire, 12/24 Volt DC, Multi-Candela, Wall Mounted Strobe (Wheelock STW).....	160.12	45.85
28 46 13 31-2362 EA Interior, White, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Strobe, No Lettering (Wheelock RSS-24MCC-NW).....	191.30	45.85
28 46 13 31-2363 EA White, 24 Volt DC, Multi-Candela (15, 30, 75, 110 Candela), Wall Mounted Strobe, No Lettering (Wheelock RSS-24MCW-NW).....	165.95	45.85
28 46 13 31-2364 EA Weatherproof, White, 24 Volt DC, 75 Candela, Wall Mounted Strobe (Wheelock RSSWP-2475W-FW)..... Note: Requires WPSBB-R.	206.34	51.96
28 46 13 31-2365 EA Interior, White, 24 Volt DC, Multi-Candela 135/185, Weatherproof Wall Mounted Strobe (Wheelock RSSWP-24MCC-NW).....	204.53	45.85
28 46 13 31-2366 Ceiling Mounted Speakers/Strobes (28 46 13 31-2320)		
28 46 13 31-2367 EA Red, 24 Volt DC, Selectable Candela (15, 30, 75, 110 Candela), Ceiling Mounted Speaker/Strobe (Wheelock E60-24MCC-FR).....	202.96	45.85
28 46 13 31-2368 EA White, 24 Volt DC, Selectable Candela (15, 30, 75, 110 Candela), Ceiling Mounted Speaker/Strobe (Wheelock E60-24MCC-FW).....	202.96	45.85
28 46 13 31-2369 EA White, 24 Volt DC, Selectable Candela (15, 30, 75, 110 Candela), Ceiling Mounted Speaker/Strobe (Wheelock E70-24MCC-FW).....	202.96	45.85
28 46 13 31-2370 EA White, 24 Volt DC, Multi-Candela (15, 30, 75, 110 Candela), Ceiling Mounted Speaker/Strobe (Wheelock E90-24MCC-FW).....	205.20	45.85
28 46 13 31-2371 EA White, 24 Volt DC, Multi-Candela 115/177, Ceiling Mounted Speaker/Strobe (Wheelock E90-24MCC-FW).....	217.77	45.85
28 46 13 31-2372 EA White, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Speaker/Strobe (Wheelock ET90-24MCC-FW).....	235.26	45.85
28 46 13 31-2373 EA Red, 24 Volt DC, Multi-Candela (15, 30, 75, 95 Candela), Ceiling Mounted Speaker/Strobe (Wheelock ET90-24MCC-FR).....	235.26	45.85
28 46 13 31-2374 EA Red, 24 Volt DC, Multi-Candela (15, 30, 75, 110 Candela), Ceiling Mounted Speaker/Strobe (Wheelock E90-24MCC-FR).....	207.00	45.85
28 46 13 31-2375 EA White, 2 Watts, 24 Volt DC, 15/30/75/95 Candela, Square, No Lettering, Ceiling Mounted Speaker/Strobe (Wheelock E70-24MCC-NW).....	230.43	45.85
28 46 13 31-2376 EA Round, 2 Watt, 24 Volt DC, 15/30/75/95CD, No Lettering, Ceiling Mounted Speaker/Strobe (Wheelock E90-24MCC-NW).....	244.71	45.85
28 46 13 31-2377 EA White, 8 Watts, 24 Volt DC, 75 Candela, Weatherproof, Ceiling Mounted, Speaker/Strobe (Wheelock ET70WP-2475C-FW).....	259.00	45.85
28 46 13 31-2378 Wall Mounted Speakers/Strobes (28 46 13 31-2320)		
28 46 13 31-2379 EA Red, Square, 24 Volt DC, 15/75 Candela, 25/70.7 VRMS, Wall Mounted Speaker/Strobe (Wheelock E50-241575 Watt-FR).....	303.64	45.85
28 46 13 31-2380 EA White, Square, 24 Volt DC, 15/75 Candela, 25/70.7 VRMS, Wall Mounted Speaker/Strobe (Wheelock E50-241575 Watt-FW).....	303.64	45.85

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46	13 31-2381	EA	Red, 24 Volt DC, Multi-Candela 115/177, Wall Mounted Speaker/Strobe (Wheelock E60-24MCCH-FR).....	217.77	45.85
28 46	13 31-2382	EA	White, 24 Volt DC, Multi-Candela 115/177, Wall Mounted Speaker/Strobe (Wheelock E60-24MCCH-FW).....	217.77	45.85
28 46	13 31-2383	EA	Red, Square, 24 Volt DC, Selectable Candela 15/30/75/110, Wall Mounted Speaker/Strobe (Wheelock E50-24MCW-FR)	202.96	45.85
28 46	13 31-2384	EA	White, Square, 24 Volt DC, Selectable Candela 15/30/75/110, Wall Mounted Speaker/Strobe (Wheelock E50-24MCW-FW).....	199.37	45.85
28 46	13 31-2385	EA	Red, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Speaker/Strobe (Wheelock E50-24MCWH-FR)	217.77	45.85
28 46	13 31-2386	EA	White, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Speaker/Strobe (Wheelock E50-24MCWH-FW)	217.77	45.85
28 46	13 31-2387	EA	Red, Square, 24 Volt DC, 15/75 Candela, 25/70.7 VRMS, Wall Mounted Speaker/Strobe (Wheelock E70-241575 Watt-FR).....	300.40	45.85
28 46	13 31-2388	EA	Red, Square, 24 Volt DC, Selectable Candela 15/30/75/110, Wall Mounted Speaker/Strobe (Wheelock E70-24MCW-FR)	205.20	45.85
28 46	13 31-2389	EA	White, Square, 24 Volt DC, Selectable Candela 15/30/75/110, Wall Mounted Speaker/Strobe (Wheelock E70-24MCW-FW).....	203.41	45.85
28 46	13 31-2390	EA	Red, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Speaker/Strobe (Wheelock E70-24MCWH-FR).....	293.12	45.85
28 46	13 31-2391	EA	White, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Speaker/Strobe (Wheelock E70-24MCWH-FW).....	300.40	45.85
28 46	13 31-2392	EA	Red, 24 Volt DC, Selectable Candela 15/30/75/110, Wall Mounted Speaker/Strobe (Wheelock ET70-24MCW-FR).....	235.26	45.85
28 46	13 31-2393	EA	White, 24 Volt DC, Selectable Candela 15/30/75/110, Wall Mounted Speaker/Strobe (Wheelock ET70-24MCW-FW).....	235.26	45.85
28 46	13 31-2394	EA	Weatherproof, Red, 24 Volt DC, 75 Candela, Wall Mounted Speaker Strobe/(Wheelock ET70WP-2475 W-FR)..... Note: Requires weatherproof backbox (IOB).	326.38	51.96
28 46	13 31-2395	EA	Interior, Red, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Speaker/Strobe (Wheelock RSS-24MCWH-FR)	186.36	45.85
28 46	13 31-2396	EA	Interior, White, 24 Volt DC, Multi-Candela 135/185, Wall Mounted Speaker/Strobe (Wheelock RSS-24MCWH-FW).....	179.63	45.85
28 46	13 31-2397	EA	White, 2 Watts, 24 Volt DC, 15/30/75/95 Candela, Round, Wall Mounted Speaker/Strobe (Wheelock E60-24MCW-FW).....	244.71	45.85
28 46	13 31-2398	EA	Red, 24 Volt DC, 135/185 Multi-Candela, Wall Mounted Speaker/Strobe (Wheelock E70-24MCWH-FR)	259.00	45.85
28 46	13 31-2399	EA	White, 24 Volt DC, 135/185 Multi-Candela, Wall Mounted Speaker/Strobe (Wheelock E70-24MCWH-FW)	264.36	45.85
28 46	13 31-2400	EA	White, 8 Watt, 24 VDC, 15/30/75/110 Candela, No Lettering, Wall Mounted, Speaker/Strobe (Wheelock ET70-24MCW-NW).....	273.29	45.85
28 46	13 31-2401	EA	Red, 8 Watts, Weatherproof, 185 Candela, Wall Mounted, Speaker/Strobe (Wheelock ET70WP-24185W-FR).....	279.84	45.85
28 46	13 31-2402	EA	Red, 24 Volt DC, 75 Candela, Weatherproof, Wall Mounted, Speaker/Strobe (Wheelock ET70WP-2475W-FR)..... Note: Requires IOB	275.67	45.85
28 46	13 31-2403	EA	White, 8 Watts, 24 Volt DC, 75 Candela, Weatherproof, Wall Mounted, Speaker/Strobe (Wheelock ET70WP-2475W-FW)..... Note: Requires IOB	273.29	45.85
28 46	13 31-2404		Electric Alarm Bells <small>(28 46 13 31-2320)</small>		
28 46	13 31-2405	EA	6" Diameter, 24 Volt DC, Red, Vibrating Bell (Wheelock 43T-G6-24-R).....	197.58	45.85
28 46	13 31-2406	EA	6" Diameter, 115 Volt AC, Red, Vibrating Bell (Wheelock 43T-G6-115-R)	190.40	45.85
28 46	13 31-2407	EA	10" Diameter, 115 Volt AC, Red, Vibrating Bell (Wheelock 43T-G10-115-R)	238.40	45.85
28 46	13 31-2408	EA	10" Diameter, 115 Volt AC, Single Stroke, Red, Explosion Proof Bell (Wheelock CSX10-115-R).....	1,894.73	51.96
28 46	13 31-2409	EA	10" Diameter, Outdoor, 115 Volt AC, Single Stroke, Red, Explosion Proof Bell (Wheelock CSXG10-115-R)	3,064.67	51.96
28 46	13 31-2410	EA	10" Diameter, Vibrating, Outdoor, 115 Volt AC, Single Stroke, Red, Explosion Proof Bell (Wheelock CVXG10-115-R).....	3,299.02	51.96
28 46	13 31-2411	EA	6", ADA, 24 Volt DC, Red, Motor Bell (Wheelock MB-G6-24-R).....	156.98	45.85
28 46	13 31-2412	EA	10", ADA, 24 Volt DC, Red, Motor Bell (Wheelock MB-G10-24-R)	215.54	45.85
28 46	13 31-2413	EA	6", ADA, 12 Volt DC, Red, Motor Bell (Wheelock MB-G6-12-R).....	159.67	45.85
28 46	13 31-2414	EA	10", ADA, 12 Volt DC, Red, Indoor/Outdoor Motor Bell (Wheelock MB-G10-12-R).....	213.46	45.85
28 46	13 31-2415		Horns <small>(28 46 13 31-2320)</small>		
28 46	13 31-2416	EA	Two Wire, 24 Volt DC, Indoor Or Outdoor, Continuous Or Code 3, Sync Or Non-Sync Horn (Wheelock AH-24WP-R).....	156.42	45.85
28 46	13 31-2417	EA	Red, Two Wire, 12/24 Volt DC, Wall Mounted Horn (Wheelock HNR).....	131.72	45.85
28 46	13 31-2418	EA	White, Two Wire, 12/24 Volt DC, Wall Mounted Horn (Wheelock HNW)	131.72	45.85
28 46	13 31-2419	EA	Red, Two Wire, 12/24 Volt DC, Ceiling Mounted Horn (Wheelock HNRC).....	132.71	45.85
28 46	13 31-2420	EA	White, Two Wire, 12/24 Volt DC, Ceiling Mounted Horn (Wheelock HNWC).....	132.71	45.85
28 46	13 31-2421	EA	Red, 24 Volt DC, Sync With Built-In Temporal, Mini-Horn (Wheelock MIZ-24S-R).....	116.11	45.85
28 46	13 31-2422	EA	White, 24 Volt DC, Sync With Built-In Temporal, Mini-Horn (Wheelock MIZ-24S-W)	116.11	45.85
28 46	13 31-2423	EA	Red, Flush, 12/24 Volt AC, Horn (Wheelock MT-12/24-R).....	132.71	45.85
28 46	13 31-2424	EA	Red, 24 Volt DC, Four Wire, Wall Mounted Horn (Wheelock HS-24-R).....	159.58	45.85
28 46	13 31-2425		Speakers <small>(28 46 13 31-2320)</small>		
28 46	13 31-2426	EA	Red, Square, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Wall Mounted Speaker (Wheelock E50-R).....	135.58	45.85
28 46	13 31-2427	EA	White, Square, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Wall Mounted Speaker (Wheelock E50-W)	135.58	45.85
28 46	13 31-2428	EA	Red, Square, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Ceiling Mounted Speaker (Wheelock E60-R).....	135.58	45.85
28 46	13 31-2429	EA	White, Square, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Ceiling Mounted Speaker (Wheelock E60-W)	133.61	45.85
28 46	13 31-2430	EA	Red, Flush, Square, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Wall Or Ceiling Mounted Speaker (Wheelock E70-R)	135.58	45.85
28 46	13 31-2431	EA	White, Flush, Square, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Wall Or Ceiling Mounted Speaker (Wheelock E70-W).....	135.58	45.85
28 46	13 31-2432	EA	Red, Round, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Wall Or Ceiling Mounted Speaker (Wheelock E90-R).....	135.58	45.85
28 46	13 31-2433	EA	White, Round, 25 Or 70.7 VRMS, 1/8 To 2 Watt, Wall Or Ceiling Mounted Speaker (Wheelock E90-W).....	135.58	45.85
28 46	13 31-2434	EA	Red, Flush Or Surface, Square, 1/8 - 8 Watt, Wall Mounted Speaker (Wheelock ET70-R).....	157.20	45.85
28 46	13 31-2435	EA	White, Flush Or Surface, Square, 1/8 - 8 Watt, Wall Mounted Speaker (Wheelock ET70-W)	157.20	45.85
28 46	13 31-2436	EA	White, Round, 25 Or 70.7 VRMS, 1/8 - 8 Watt Ceiling Mounted Speaker (Wheelock ET90-W).....	159.00	45.85
28 46	13 31-2437	EA	Red, Surface Mounted, Vandal Resistant, Square, 1/8 - 8 Watt, Wall Or Ceiling Mounted Speaker (Wheelock ET-1010-R).....	214.95	45.85
28 46	13 31-2438	EA	Red, Flush Mounted, Vandal Resistant, Square, 1/8 - 8 Watt, Wall Or Ceiling Mounted Speaker (Wheelock ET-1080-R).....	194.11	45.85
28 46	13 31-2439	EA	Grey, 1 To 15 Watt, 25/70/100 Volt Transformer, Loud Speaker (Wheelock STH-15S).....	298.06	45.85
28 46	13 31-2440	EA	Red, 1 To 15 Watt, 25/70/100 Volt Transformer, Loud Speaker (Wheelock STH-15SR).....	298.06	45.85

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 13 31-2441 EA Red, 1/8 To 8 Watts, Square, Surface Mounted, Vandal Resistant Speaker (Wheelock ET-1010-R)	214.95	45.85
28 46 13 31-2442 EA White, 8 Watts, Wall/Ceiling Mounted, Vandal Resistant Speaker (Wheelock ET-1010-W)	217.33	45.85
28 46 13 31-2443 EA Red, 1/8 To 8 Watts, Square, Flush Mounted, Vandal Resistant Speaker (Wheelock ET-1080-R)	194.11	45.85
28 46 13 31-2444 EA White, 8", 25/70 Volt, 15/30/75/95 Candela, Round, Ceiling Mounted, Speaker (Wheelock S8-24MCC-FW)	288.77	45.85
28 46 13 31-2445 EA White, 8", 25/70 Volt, Round, Ceiling Mounted, Speaker (Wheelock S8-70/25)	208.40	45.85
28 46 13 31-2446 Sync Modules <small>(28 46 13 31-2320)</small>		
28 46 13 31-2447 EA 12 Or 24 Volt DC, Single Circuit Class B, Sync Module (Wheelock SM-12/24-R)	187.33	30.57
28 46 13 31-2448 Boxes, Plates And Rings <small>(28 46 13 31-2320)</small>		
28 46 13 31-2449 EA 4" Square, Red, Surface Backbox (Wheelock BB-R)	40.39	15.28
28 46 13 31-2450 EA Standard 4" Square Box (Wheelock BB-STD)	39.86	15.28
28 46 13 31-2451 EA Black, Backbox For UZC-256 (Wheelock BB-UZC)	253.44	30.57
28 46 13 31-2452 EA Red, Backbox For UZC-256 (Wheelock BB-UZC-R)	253.44	30.57
28 46 13 31-2453 EA 9" x 12" x 2.75", For Two XP Boards, Surface Mounted Cabinet (Wheelock BB-XP)	195.37	24.45
28 46 13 31-2454 EA Red, Extender Ring For E60 Series (Wheelock E60EXT-R)	21.02	6.11
28 46 13 31-2455 EA White, Extender Ring For E60 Series (Wheelock E60EXT-W)	21.02	6.11
28 46 13 31-2456 EA Red, Surface Mounted Backbox For E50 Speakers (Wheelock E50SB-R)	51.03	15.28
28 46 13 31-2457 EA White, Surface Mounted Backbox For E50 Speakers (Wheelock E50SB-W)	48.15	15.28
28 46 13 31-2458 EA Red, Surface Mounted Backbox For E50 Speaker Strobe (Wheelock E50SSB-R)	51.03	15.28
28 46 13 31-2459 EA White, Surface Mounted Backbox For E50 Speaker Strobe (Wheelock E50SSB-W)	51.03	15.28
28 46 13 31-2460 EA 4" Square Backbox (Wheelock DBB-R)	42.23	15.28
28 46 13 31-2461 EA Red, Surface Backbox (Wheelock IOB-R)	49.14	15.28
28 46 13 31-2462 EA White, Surface, Backbox (Wheelock IOB-W)	49.14	15.28
28 46 13 31-2463 EA White, Indoor, Surface Extender (Wheelock ISP2-W)	20.08	6.11
28 46 13 31-2464 EA Red, RS/RSS Strobe Trim Plate (Wheelock NATP-R)	25.98	6.11
28 46 13 31-2465 EA White, RS/RSS Strobe Trim Plate (Wheelock NATP-W)	25.98	6.11
28 46 13 31-2466 EA Red Retrofit Plate (Wheelock RP-R)	23.89	6.11
28 46 13 31-2467 EA 4" Speaker/Strobe Ceiling Tile Support Bracket (Wheelock SSB-4)	42.35	6.11
28 46 13 31-2468 EA Red, Surface Mounted, Backbox For Chimes, Speakers (Wheelock SBB-R)	51.47	15.28
28 46 13 31-2469 EA White, Surface Mounted, Backbox For Chimes, Speaker (Wheelock SBB-W)	52.10	15.28
28 46 13 31-2470 EA Red, Surface Mounted, Backbox For With RSSP (Wheelock SBL2-R)	55.42	15.28
28 46 13 31-2471 EA Red, Semi-Flush Plate (Wheelock SFB-R)	27.19	6.11
28 46 13 31-2472 EA White, Semi-Flush Plate (Wheelock SFB-W)	27.19	6.11
28 46 13 31-2473 EA Red, Shallow Surface Mounted, Backbox (Wheelock SHBB-R)	45.24	15.28
28 46 13 31-2474 EA White, Shallow Surface Mounted, Backbox (Wheelock SHBB-W)	45.24	15.28
28 46 13 31-2475 EA Red, Adapter Plate For Mounting Sth-15S And Sth-15SR (Wheelock SHMP-R)	29.81	6.11
28 46 13 31-2476 EA Red, Weather Resistant Backbox (Wheelock WBB-R)	50.67	15.28
28 46 13 31-2477 EA Silver, Weather Resistant Backbox (Wheelock WBB-S)	50.67	15.28
28 46 13 31-2478 EA White, Weather Resistant Backbox (Wheelock WBB-W)	50.67	15.28
28 46 13 31-2479 EA Red, Flush Outdoor Mounting Plate For RS, ET, AH And MT Series (Wheelock WFP-R)	36.63	6.11
28 46 13 31-2480 EA White, Flush Outdoor Mounting Plate For RS, ET, AH And MT Series (Wheelock WFP-W)	36.63	6.11
28 46 13 31-2481 EA Red, Flush Outdoor Mounting Plate For ASWP Series (Wheelock WFPA-R)	36.63	6.11
28 46 13 31-2482 EA White, Flush Outdoor Mounting Plate For ASWP Series (Wheelock WFPA-W)	36.63	6.11
28 46 13 31-2483 EA Gasket Kit For Rear Wiring To Outdoor Backbox (Wheelock WP-KIT)	25.27	6.11
28 46 13 31-2484 EA Weather Resistant Backbox For ASWP (Wheelock WPBB-R)	62.96	15.28
28 46 13 31-2485 EA Weather Resistant Backbox For RSSWP (Wheelock WPSBB-R)	57.72	15.28
28 46 13 31-2486 EA Red Plate For RSS (Wheelock RSSCP-R)	20.08	6.11
28 46 13 31-2487 EA White Plate For RSS (Wheelock RSSCP-W)	20.08	6.11
28 46 13 31-2488 EA Red Fire Plate For RSS (Wheelock RSSCPW-FR)	21.02	6.11
28 46 13 31-2489 EA White Fire Plate For RSS (Wheelock RSSCPW-FW)	21.02	6.11
28 46 13 31-2490 EA Red, Indoor, Surface Extender (Wheelock ISP2-R)	20.48	6.11
28 46 13 31-2491 EA Red, 24 Volt DC, 135/185 Candela, Wall Mounted Strobe Plate (Wheelock RSSP-24MCHW-FR)	155.11	6.11
28 46 13 31-2492 EA White, 24 Volt DC, 15/30/75/110 Candela, Amber Lens, Ceiling Mounted Strobe Plate (Wheelock RSSPA-24MCC-ALW)	139.04	6.11
28 46 13 31-2493 EA White, 24 Volt DC, 15/30/75/110 Candela, Amber Lens, No Lettering, Ceiling Mounted Strobe Plate (Wheelock RSSPA-24MCC-NW)	136.66	6.11
28 46 13 31-2494 EA White, 24 Volt DC, 15/30/75/110 Candela, Amber Lens, ALERT Lettering, Wall Mounted Strobe Plate (Wheelock RSSPA-24MCW-ALW)	139.04	6.11
28 46 13 31-2495 EA Red, Square Grill Plate For CH70, E70, ET70 (Wheelock ECHG70-R)	23.36	6.11
28 46 13 31-2496 EA White, Square Grill Plate For CH70, E70, ET70 (Wheelock ECHG70-W)	22.65	6.11
28 46 13 31-2497 EA Red, Round Grill Plate For CH70, E70, ET70 (Wheelock ECHG90-R)	23.90	6.11
28 46 13 31-2498 EA White, Round Grill Plate For CH70, E70, ET70 (Wheelock ECHG90-W)	23.90	6.11
28 46 13 31-2499 EA White, Fire Lettered, Grill Plate For E50 Speaker/Strobe (Wheelock ECHSG50-FW)	22.65	6.11
28 46 13 31-2500 EA Red, Square, Fire Lettered, Grill Plate For CH70,E70,ET70 Speaker/Strobe (Wheelock ECHSG70W-FR)	23.78	6.11
28 46 13 31-2501 EA White, Square, Fire Lettered, Grill Plate For CH70,E70,ET70 Speaker/Strobe (Wheelock ECHSG70W-FW)	23.78	6.11
28 46 13 31-2502 EA Red, Round, Fire Lettered, Grill Plate For CH70, E70, ET70 Speaker Strobe (Wheelock ECHSG90-R)	22.65	6.11
28 46 13 31-2503 EA White, Round, Fire Lettered, Grill Plate For CH70, E70, ET70 Speaker Strobe (Wheelock ECHSG90-W)	22.65	6.11
28 46 13 31-2504 EA Red, Surface Mounted, Extender Ring (Wheelock SER-R)	31.70	6.11
28 46 13 31-2505 EA White, Surface Mounted, Extender Ring (Wheelock SER-W)	32.06	6.11
28 46 13 31-2506 EA Red, Semi-Flush, Plate (Wheelock SFP-R)	25.27	6.11
28 46 13 31-2507 EA Silver, Semi-Flush, Plate (Wheelock SFP-S)	23.90	6.11
28 46 13 31-2508 EA White, Semi-Flush, Plate (Wheelock SFP-W)	25.27	6.11
28 46 13 31-2509 EA Red, Weather Resistant Back Box For ASWP (Wheelock WPBB-R)	62.96	15.28
28 46 13 31-2510 EA Red, Weather Resistant Back Box For RSSWP (Wheelock WPSBB-R)	57.72	15.28
28 46 13 31-2511 EA White, Weather Resistant Back Box For RSSWP Series (Wheelock WPSBB-W)	57.72	15.28
28 46 13 31-2512 Manual Pull Station <small>(28 46 13 31-2320)</small>		

28 Electronic Safety and Security**28 40 Life Safety****28 46 Fire Detection and Alarm**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 46 13 31-2513	EA	SPST, Single Action, Manual Pull Station (Eaton Wheelock MPS-100)	136.23	30.57
28 46 13 31-2514	EA	SPST, Double Action, Manual Pull Station (Eaton Wheelock MPS-200)	136.23	30.57
28 46 13 31-2515	EA	Explosion Proof, Single Action Manual Pull Station (Eaton Wheelock MPS-400X)	1,195.00	30.57
28 46 13 31-2516		Potter Fire Alarm (28 46 13 31)		
28 46 13 31-2517		Electric Alarm Bells (28 46 13 31-2516)		
28 46 13 31-2518	EA	6" Alarm Bell, 12 Volt DC (Potter MBA-6-12)	130.62	45.85
28 46 13 31-2519	EA	8" Alarm Bell, 12 Volt DC (Potter MBA-8-12)	142.91	45.85
28 46 13 31-2520	EA	10" Alarm Bell, 12 Volt DC (Potter MBA-10-12)	149.05	45.85
28 46 13 31-2521	EA	6" Alarm Bell, 24 Volt DC (Potter MBA-6-24)	130.62	45.85
28 46 13 31-2522	EA	8" Alarm Bell, 24 Volt DC (Potter MBA-8-24)	142.91	45.85
28 46 13 31-2523	EA	10" Alarm Bell, 24 Volt DC (Potter MBA-10-24)	149.05	45.85
28 46 13 31-2524	EA	6" Alarm Bell, 24 Volt AC (Potter PBA246)	141.05	45.85
28 46 13 31-2525	EA	8" Alarm Bell, 24 Volt AC (Potter PBA248)	146.95	45.85
28 46 13 31-2526	EA	10" Alarm Bell, 24 Volt AC (Potter PBA2410)	181.69	45.85
28 46 13 31-2527	EA	6" Alarm Bell, 120 Volt AC (Potter PBA1206)	132.39	45.85
28 46 13 31-2528	EA	8" Alarm Bell, 120 Volt AC (Potter PBA1208)	146.95	45.85
28 46 13 31-2529	EA	10" Alarm Bell, 120 Volt AC (Potter PBA12010)	159.12	45.85
28 46 13 31-2530		Manual Pull Station (28 46 13 31-2516)		
28 46 13 31-2531	EA	SPST, Single Action, Manual Pull Station (Potter P32-1T)	95.97	30.57
28 46 13 31-2532	EA	DPST, Single Action, Manual Pull Station (Potter RMS-2T)	101.55	30.57
28 46 13 31-2533	EA	DPST, Single Action, Manual Pull Station (Potter RMS-6T)	164.36	30.57
28 46 13 31-2534	EA	DPST, Single Action, Key Reset Manual Pull Station (Potter RMS-1T-KL)	105.02	30.57
28 46 13 31-2535	EA	SPST, Dual Action, Manual Pull Station (Potter P32-1T-LP)	99.13	30.57
28 46 13 31-2536	EA	SPST, Weather Proof, Manual Pull Station (Potter RMS-1T-WP)	184.00	30.57
28 46 13 31-2537	EA	SPST, Weather Proof Dual Action, Manual Pull Station (Potter RMS-1T-WP-LP)	230.84	30.57
28 46 13 31-2538		Fire Alarm Terminal Cabinets (28 46 13 31)		
28 46 13 31-2539	EA	18 Point Lockable Fire Alarm Terminal Cabinet	253.62	61.24
28 46 13 31-2540	EA	32 Point Lockable Fire Alarm Terminal Cabinet	332.33	61.24
28 46 13 31-2541	EA	64 Point Lockable Fire Alarm Terminal Cabinet	489.73	61.24
28 46 13 31-2542	EA	128 Point Lockable Fire Alarm Terminal Cabinet	647.08	61.24
28 46 13 31-2543		Test And Certification Of Fire Alarm System To Tie In To Existing Systems (28 46 13 31)		
28 46 13 31-2544	DAY	Test And Certification Of Fire Alarm System To Tie Into Existing Systems	972.09	
28 46 13 31-2545	HR	Test And Certification Of Fire Alarm System To Tie In To Existing Systems	303.78	
28 46 13 31-2546		Programming Of Existing Fire Alarm System (28 46 13 31)		
28 46 13 31-2547	HR	Programming Of Existing Fire Alarm System	364.53	
28 46 13 31-2548		Removal And Reinstallation Of Smoke Detector (28 46 13 31)		
		Note: Includes storage, cleaning and supply materials.		
28 46 13 31-2549	EA	Removal And Reinstallation Of Ceiling Mounted Smoke Detector	171.20	
28 46 13 31-2550	EA	Removal And Reinstallation Of Wall Mounted Smoke Detector	137.56	
28 46 13 31-2551		Kidde Fire Safety Equipment (28 46 13 31)		
28 46 13 31-2552		Smoke Detectors (28 46 13 31-2551)		
28 46 13 31-2553	EA	Combination Smoke And Carbon Monoxide Detector, Intelligent Sensor, 120 Volt Hardwired, With 10 Year Sealed Battery Back-up (Kidde P4010ACS-CO)	160.43	45.85
28 46 13 31-2554	EA	Combination Smoke And Carbon Monoxide Detector, 120 Volt Wired, With 10 Year Sealed Battery Back-up (Kidde i12010SCO)	141.05	45.85
28 46 13 31-2555	EA	Combination Smoke And Carbon Monoxide Detector, With 10 Year Sealed Battery (Kidde P3010K-CO)	131.31	45.85
28 46 31		Fire-Alarm Initiating Devices (28 46)		
28 46 31 11		Heat-Sensing Fire Detectors (28 46 31)		
28 46 31 11-0001		Protectowire Fire Alarm (28 46 31 11)		
28 46 31 11-0002		Linear Heat Detector Cable (28 46 31 11-0001)		
28 46 31 11-0003	LF	Multi-Purpose Linear Heat Detector, EPC Type, 155 To 220 Degree F (Protectowire PHSC-EPC)	5.77	
28 46 31 11-0004	LF	Multi-Purpose Linear Heat Detector With Messenger Wire, EPC Type, 155 To 220 Degree F (Protectowire PHSC-EPC-M)	6.25	
28 46 31 11-0005	LF	High Performance Linear Heat Detector, XCR Type, 155 To 220 Degree F (Protectowire PHSC-XCR)	6.25	
28 46 31 11-0006	LF	High Performance Linear Heat Detector With Messenger Wire, XCR Type, 155 To 220 Degree F (Protectowire PHSC-XCR-M)	6.74	
28 46 31 11-0007	LF	Multi-Purpose Linear Heat Detector, XLT Type, 135 Degree F (Protectowire PHSC-XLT)	7.31	
28 46 31 11-0008	LF	Multi-Purpose Linear Heat Detector With Messenger Wire, XLT Type, 135 Degree F (Protectowire PHSC-XLT-M)	7.80	
28 46 31 11-0009	EA	Flexible Lead Connector For Linear Heat Detector (Protectowire PFL)	71.91	
28 46 31 11-0010	EA	Splicing Connector For Linear Heat Detector (Protectowire PWSC)	28.58	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 46 31 11-0011 EA Cable Tray Clip For Linear Heat Detector (Protectowire CC-2N And CC-2W)	9.51	
28 46 31 11-0012 EA Cable Tray Spring Clip For Linear Heat Detector (Protectowire HPC-2)	9.51	
28 46 31 11-0013 EA Adhesive Cable Mount For Linear Heat Detector (Protectowire EMS-A-CO)	10.54	
28 46 31 11-0014 EA Beam Clamp For Linear Heat Detector (Protectowire BC-2)	16.44	
28 46 31 11-0015 EA Beam Clamp With Polypropylene Clip For Linear Heat Detector (Protectowire BC-3P)	17.08	
28 46 31 11-0016 EA Pipe Mounting Straps Nylon (3/4" to 2" Pipe) (Protectowire PM-3A)	1.65	
28 46 31 11-0017 EA Pipe Mounting Straps Nylon (2-1/2" to 3-1/2" Pipe) (Protectowire PM-3B)	2.24	
28 46 31 11-0018 EA Pipe Mounting Straps Nylon (4" to 6" Pipe) (Protectowire PM-3C)	9.88	
28 46 41 Fire-Alarm Notification Appliances (28 46)		
28 46 41 11 Audible Fire-Alarm Notification Appliances (28 46 41)		
See CSI section 28 46 13 31-0000 for fire alarm speakers.		
28 46 41 31 Combination Fire-Alarm Notification Appliances (28 46 41)		
See CSI section 28 46 13 31-0000 for fire alarm horns and strobes.		
28 47 Mass Notification (28 40)		
28 47 15 Mass Notification Control Panels (28 47)		
28 47 15 00-0001 Central Station Controls (28 47 15)		
28 47 15 00-0002 EA Desktop 18 Function Base Station Control/Encoder (Whelen E747)	955.50	
28 47 15 00-0003 EA Desktop 35 Function Base Station Control/Encoder (Whelen E969)	1,553.77	
28 47 15 00-0004 EA Desktop Central Station Control Encoder/Decoder (Whelen E2010)	4,554.18	
28 47 15 00-0005 EA Siren Status Printer And Cable Option For E2010 (Whelen E2010P)	1,420.06	30.57
28 47 15 00-0006 EA Rack Mounted Central Station Control Encoder/Decoder (Whelen E2010R)	5,237.97	30.57
28 47 15 00-0007 EA Internal Option To Convert E2010 To FSK Format (Whelen E2010FSK)	789.13	30.57
28 47 15 00-0008 EA Option To Convert Activation Controls To FSK Format (Whelen FSKCEO)	846.60	30.57
28 47 17 Notification Devices and Methods (28 47)		
28 47 17 17 Notification Appliances and Methods Public Methods (28 47 17)		
28 47 17 17-0001 Voice Capable Omni-Directional Speakers (28 47 17 17)		
28 47 17 17-0002 EA 1 Cell, 109 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2901A)	13,376.43	790.14
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0003 EA 2 Cells, 115 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2902A)	16,340.04	824.49
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0004 EA 3 Cells, 119 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2903A)	19,266.94	858.84
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0005 EA 4 Cells, 121 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2904A)	22,193.85	893.20
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0006 EA 5 Cells, 123 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2905A)	25,194.16	927.55
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0007 EA 6 Cells, 125 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2906A)	30,213.18	961.90
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0008 EA 7 Cells, 126 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2907A)	33,176.79	996.26
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0009 EA 8 Cells, 127 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2908A)	36,739.89	1,030.61
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0010 EA 9 Cells, 128 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2909A)	39,666.79	1,064.97
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0011 EA 10 Cells, 129 dB, Voice Capable Omni-Directional Speaker (Whelen WPS2910A)	42,630.39	1,099.32
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0012 EA 3 Cells, 127 dB, Voice Capable Rotating Directional Speaker (Whelen WPS4003)	29,112.07	961.90
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0013 EA 4 Cells, 129 dB, Voice Capable Rotating Directional Speaker (Whelen WPS4004)	31,011.26	996.26
Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0014 EA One-Way Control, 10 Digit DTMF Landline (Whelen D2030LL)	560.04	30.57
28 47 17 17-0015 EA VHF High-Band Narrow-Band, One-Way Control, 10 Digit DTMF (Whelen D2030NV)	2,165.49	30.57
28 47 17 17-0016 EA UHF Narrow-Band, One-Way Control, 10 Digit DTMF (Whelen D2030NU)	2,165.49	30.57
28 47 17 17-0017 EA UHF Wide Band, One-Way Control, 10 Digit DTMF (Whelen D2030WU)	1,957.50	30.57
28 47 17 17-0018 EA VHF High-Band Wide Band, One-Way Control, 10 Digit DTMF (Whelen D2030WV)	1,896.33	30.57
28 47 17 17-0019 EA Two-Tone Sequential Option (Whelen WPSTT)	517.18	30.57
28 47 17 17-0020 EA Full Function Auxiliary/Status Board For Contact Closure Activation (Two Way) (Whelen AUXCS)	663.63	30.57
28 47 17 17-0021 EA Landline, 10 Digit DTMF (Whelen C2030LL)	689.83	30.57
28 47 17 17-0022 EA VHF High-Band Narrow-Band, Two-Way Control, 10 Digit DTMF (Whelen C2030NV)	3,084.83	30.57
28 47 17 17-0023 EA UHF Narrow-Band, Two-Way Control, 10 Digit DTMF (Whelen C2030NU)	2,373.48	30.57
28 47 17 17-0024 EA UHF Wide-Band, 10 Digit DTMF (Whelen C2030WU)	2,373.48	30.57
28 47 17 17-0025 EA VHF High-Wide Band, 10 Digit DTMF (Whelen C2030WV)	2,373.48	30.57
28 47 17 17-0026 EA Option To Convert WPS Activation Controls To FSK Format (Whelen FSKXMOD)	846.60	30.57
28 47 17 17-0027 EA Cabinet Window LED Status Indicator (Whelen STATUS)	586.91	30.57
28 47 17 17-0028 EA Paging Interface Whelen Tones With Existing In-Plant Systems (Whelen PGINT)	424.30	30.57
28 47 17 17-0029 EA Intrusion Alarm (Whelen INTRUWPS)	320.71	30.57
28 47 17 17-0030 EA Custom Pre-Recorded Messages (One Time Set-Up Charge Per Message) (Whelen MSGPROG)	227.42	
28 47 17 17-0031 EA Whelen Library Messages (Whelen MSGPROGL)	45.54	
28 47 17 17-0032 EA Noise Cancelling Microphone Includes Local Microphone Input Harness (Whelen WPSNMCIC)	171.28	30.57
28 47 17 17-0033 EA One Pair Of Whelen Approved Batteries (Whelen WPSBATT)	1,109.63	45.85
28 47 17 17-0034 EA WPS And OA Series, Roof Top Mounted (Whelen RTM)	10,474.00	755.78
28 47 17 17-0035 EA Two 80 Watt Panels, Solar Power System (Whelen SBC280)	4,367.54	183.42
Note: Includes mounting bracket and regulator.		

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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28 47 17 17-0036	EA		Amber, 6 LED Lights For The Base Of WPS Series (Whelen VALERTA)	2,220.53	45.85
28 47 17 17-0037	EA		Blue, 6 LED Lights For The Base Of WPS Series (Whelen VALERTB).....	2,220.53	45.85
28 47 17 17-0038	EA		Clear, 6 LED Lights For The Base Of WPS Series (Whelen VALERTC).....	2,220.53	45.85
28 47 17 17-0039	EA		Green, 6 LED Lights For The Base Of WPS Series (Whelen VALERTG).....	2,220.53	45.85
28 47 17 17-0040	EA		Red, 6 LED Lights For The Base Of WPS Series Products (Whelen VALERTR).....	2,220.53	45.85
28 47 17 17-0041	EA		Amber, 24 Volt DC, LED, Beacon (Whelen L31HAF4)	839.47	45.85
28 47 17 17-0042	EA		Blue, 24 Volt DC, LED, Beacon (Whelen L31HBF4).....	839.47	45.85
28 47 17 17-0043	EA		Red, 24 Volt DC, LED, Beacon (Whelen L31HRF4).....	839.47	45.85
28 47 17 17-0044	EA		Amber, 24 Volt DC, Strobe (Whelen ISB24A).....	654.91	45.85
28 47 17 17-0045	EA		Blue, 24 Volt DC, Strobe (Whelen ISB24B).....	654.91	45.85
28 47 17 17-0046	EA		Clear, 24 Volt DC, Strobe (Whelen ISB24C).....	654.91	45.85
28 47 17 17-0047	EA		Green, 24 Volt DC, Strobe (Whelen ISB24G).....	654.91	45.85
28 47 17 17-0048	EA		Red, 24 Volt DC, Strobe (Whelen ISB24R).....	654.91	45.85
28 47 17 17-0049	EA		Strobe/LED Controller With Mounting Plate, Hardware And Harnessing For ISB24 (Whelen SCWPS)	860.06	30.57
28 47 17 17-0050	EA		Strobe Controller (Whelen STCTRL)	695.78	30.57
28 47 17 17-0051	EA		LED Controller (Whelen LEDCTRL).....	695.78	30.57
28 47 17 17-0052	EA		Speaker Driver Handle/Plate Assembly Only (Less Speaker Driver) (Whelen EZ-PULL).....	415.26	45.85
28 47 17 17-0053	EA		Siren Diagnostic and Programming Software In CD Format (Whelen SDPTS)	568.43	
28 47 17 17-0054	EA		400 Watt Speaker Driver (Whelen SPKDRV)	967.26	30.57
28 47 17 17-0055	EA		Cabinet Window LED Status Indicator (Whelen STATUS)	482.65	30.57
28 47 17 17-0056	EA		Noise Cancelling Microphone Option For Encoder (Whelen WPSMIC).....	171.28	30.57
28 47 17 17-0057	EA		Notifier/Whelen Interface Board (Whelen NAUXCS)	956.55	30.57

28 47 17 17-0058 Tone Only, Omni-Alert Sirens (28 47 17 17)

28 47 17 17-0059	EA		One Cell, Tone Only, Omni-Alert Siren (Whelen OA1).....	10,804.34	755.78
			Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0060	EA		Two Cell, Tone Only, Omni-Alert Siren (Whelen OA2).....	13,498.78	790.14
			Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0061	EA		Three Cell, Tone Only, Omni-Alert Siren (Whelen OA3).....	16,168.76	824.49
			Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0062	EA		Four Cell, Tone Only, Omni-Alert Siren (Whelen OA4).....	18,899.90	858.84
			Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0063	EA		One Way Controls, Auxiliary Board For Contact Closure Activation (Whelen OAUXIN).....	308.28	30.57
28 47 17 17-0064	EA		One Way Landline Activation, 10 Digit DTMF (Whelen OD2030LL).....	560.04	30.57
28 47 17 17-0065	EA		VHF High-Narrow Band, 10 Digit DTMF (Whelen OD230NV)	2,165.49	30.57
28 47 17 17-0066	EA		UHF Narrow-Band, 10 Digit DTMF (Whelen OD230NU)	2,165.49	30.57
28 47 17 17-0067	EA		UHF Wide-Band, 10 Digit DTMF (Whelen OD230WU)	1,957.50	30.57
28 47 17 17-0068	EA		VHF High-Wide Band, 10 Digit DTMF (Whelen OD230WV).....	1,896.33	30.57
28 47 17 17-0069	EA		One-Way Control Two-Tone Sequential Option (Whelen OTT)	450.50	30.57
28 47 17 17-0070	EA		Two Way Controls, Contact Closure Activation Board (Whelen OAUXCS)	680.21	30.57
28 47 17 17-0071	EA		Two Way Landline Activation (Whelen OC2030LL).....	707.13	30.57
28 47 17 17-0072	EA		VHF High-Narrow Band, 10 Digit DTMF (Whelen OC230NV)	2,373.48	30.57
28 47 17 17-0073	EA		UHF Narrow-Band, 10 Digit DTMF (Whelen OC230NU)	2,373.48	30.57
28 47 17 17-0074	EA		UHF, 10 Digit DTMF (Whelen OC230WU).....	2,373.48	30.57
28 47 17 17-0075	EA		VHF High Band, 10 Digit DTMF (Whelen OC230WV).....	2,373.48	30.57
28 47 17 17-0076	EA		Converts The Omni-Alert Siren Activation Controls To FSK Format (Whelen OFSKXMOD).....	846.60	30.57
28 47 17 17-0077	EA		Paging Interface To Interface Whelen Tones With Existing In-Plant Systems (Whelen OPGINT).....	424.30	30.57
28 47 17 17-0078	EA		Cabinet Window LED Status Indicator (Whelen OSTATUS).....	482.65	30.57
28 47 17 17-0079	EA		Intrusion Alarm (Whelen OINTRU)	256.41	30.57
28 47 17 17-0080	EA		80 Watt Solar Power Option (Whelen OSBC280).....	4,367.54	183.42
28 47 17 17-0081	EA		One Pair Of Whelen Approved Batteries For OmniaAlert (Whelen BSETO).....	982.35	45.85

28 47 17 17-0082 Tone-Only Rotating Directional Speakers (28 47 17 17)

28 47 17 17-0083	EA		3 Cells, 127 dB, Tone-Only Rotating Directional Speaker (Whelen VORTEXR3).....	22,438.54	893.20
			Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0084	EA		4 Cells, 129 dB, Tone-Only Rotating Directional Speaker (Whelen VORTEXR4).....	23,799.41	927.55
			Note: Includes amplifiers, controller box with power supply and battery charger. Excludes batteries.		
28 47 17 17-0085	EA		Limited Function Auxiliary Board For Contact Closure Activation (Whelen VAUXIN)	301.66	30.57
28 47 17 17-0086	EA		Landline, 10 Digit DTMF (Whelen VD2030LL).....	573.77	30.57
28 47 17 17-0087	EA		VHF High-Narrow Band, 10 Digit DTMF (Whelen VD230NV).....	2,165.49	30.57
28 47 17 17-0088	EA		UHF Narrow-Band, 10 Digit DTMF (Whelen VD230NU).....	2,165.49	30.57
28 47 17 17-0089	EA		UHF Wide-Band, 10 Digit DTMF (Whelen VD230WU)	1,957.50	30.57
28 47 17 17-0090	EA		VHF High-Wide Band, 10 Digit DTMF (Whelen VD230WV)	1,896.33	30.57
28 47 17 17-0091	EA		Two-Tone Sequential Option (Order One-Way Control Option, Above, VD2020LI, VD2020H, VD2020U) (Whelen VORTT)	450.50	30.57
28 47 17 17-0092	EA		Full Function Auxiliary/Status Control Board For Contact Closure Activation (Whelen VAUXCS).....	666.75	30.57
28 47 17 17-0093	EA		Landline, 10 Digit DTMF (Whelen VC2030LL).....	707.13	30.57
28 47 17 17-0094	EA		VHF High-Narrow Band, 10 Digit DTMF (Whelen VC230NV).....	2,373.48	30.57
28 47 17 17-0095	EA		UHF Narrow-Band, 10 Digit DTMF (Whelen VC230NU).....	2,373.48	30.57
28 47 17 17-0096	EA		UHF, 10 Digit DTMF (Whelen VC230WU)	2,373.48	30.57
28 47 17 17-0097	EA		VHF High Band, 10 Digit DTMF (Whelen VC230WV).....	2,373.48	30.57
28 47 17 17-0098	EA		Option To Convert The Vortex Activation Controls To FSK Format (Whelen VFASKXMOD)	846.60	30.57
28 47 17 17-0099	EA		Cabinet Window LED Status Indicator (Whelen VSTATUS).....	494.24	30.57
28 47 17 17-0100	EA		Paging Interface To Interface Whelen Tones With Existing In-Plant Systems (Whelen VPGINT)	424.30	30.57
28 47 17 17-0101	EA		Vortex Intrusion Alarm (Whelen VINTRU)	256.41	30.57
28 47 17 17-0102	EA		Speaker Pole Top Bracket (Whelen VPTB)	680.21	30.57
28 47 17 17-0103	EA		80 Watt Solar Power Option (Whelen VSBC280)	4,367.54	183.42
28 47 17 17-0104	EA		One Pair Of Whelen Approved Batteries For Vortex Series (Whelen BSETVOR)	982.35	45.85
28 47 17 17-0105	EA		Program Charge For Custom VROM Message (Whelen VPROG).....	3,605.99	



MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
28 47 17 17-0106	Uni-Directional Rotating Speakers (28 47 17 17)		
28 47 17 17-0107	EA 118 dB, Uni-Directional Rotating Speaker (Whelen HORNET).....	14,306.26	790.14
28 47 17 17-0108	EA One Way Contact Closure Activation Control Board (Whelen HAUXIN).....	301.66	30.57
28 47 17 17-0109	EA Landline, One Way Control, 10 Digit DTMF (Whelen HD2030LL).....	573.77	30.57
28 47 17 17-0110	EA VHF High-Narrow Band, One Way Control, 10 Digit DTMF (Whelen HD230NV).....	2,165.49	30.57
28 47 17 17-0111	EA UHF Narrow-Band, One Way Control, 10 Digit DTMF (Whelen HD230NU).....	2,165.49	30.57
28 47 17 17-0112	EA UHF Wide-Band, One Way Control, 10 Digit DTMF (Whelen HD230WU).....	1,957.50	30.57
28 47 17 17-0113	EA VHF High-Wide Band, One Way Control, 10 Digit DTMF (Whelen HD230VW).....	1,896.33	30.57
28 47 17 17-0114	EA Two-Tone Sequential Option For Hornet (Whelen HORTT).....	461.21	30.57
28 47 17 17-0115	EA Two Way Contact Closure Activation And Status Control Board (Whelen HAUXCS).....	650.54	30.57
28 47 17 17-0116	EA Landline, Two Way Control, 10 Digit DTMF (Whelen HC2030LL).....	689.83	30.57
28 47 17 17-0117	EA VHF High-Narrow Band, Two Way Control, 10 Digit DTMF (Whelen HC230NV).....	2,373.48	30.57
28 47 17 17-0118	EA UHF Narrow-Band, Two Way Control, 10 Digit DTMF (Whelen HC230NU).....	2,373.48	30.57
28 47 17 17-0119	EA UHF, Two Way Control, 10 Digit DTMF (Whelen HC230WU).....	2,373.48	30.57
28 47 17 17-0120	EA VHF High Band, Two Way Control, 10 Digit DTMF (Whelen HC230VW).....	2,373.48	30.57
28 47 17 17-0121	EA Converts Siren Activation Controls To FSK Format (Whelen HFSKXMOD).....	846.60	30.57
28 47 17 17-0122	EA LED Status Indicator (Whelen HSTATUS).....	482.65	30.57
28 47 17 17-0123	EA Option For Paging Interface (Whelen HPGINT).....	424.30	30.57
28 47 17 17-0124	EA Intrusion Alarm (Whelen HINTRU).....	256.41	30.57
28 47 17 17-0125	EA Solar Power Option (Whelen HSBC280).....	4,367.54	183.42
28 47 17 17-0126	EA Pole Top Bracket For Speaker (Whelen HPTB).....	686.26	30.57
28 47 17 17-0127	EA One Pair Of Whelen Approved Batteries (Whelen BSETF).....	982.35	45.85

28 47 17 17-0128	All Hazard In-Plant Personnel Warning System (28 47 17 17)		
28 47 17 17-0129	EA 400 Watt, Voice Capable, In-Plant Personnel Warning System (Whelen IPS400).....	7,143.94	978.23
28 47 17 17-0130	EA 800 Watt, Voice Capable, In-Plant Personnel Warning System (Whelen IPS800).....	8,673.12	1,100.51
28 47 17 17-0131	EA 15 Watt, Wide Angle Speaker (Whelen WS15T).....	428.68	45.85
28 47 17 17-0132	EA Recess Mounted, 15 Watt Speaker (Whelen WS15TR).....	409.63	45.85
28 47 17 17-0133	EA With Grill, Recess Mounted, 15 Watt Speaker (Whelen WS15TEN).....	790.65	45.85
28 47 17 17-0134	EA 30 Watt, Wide Angle Speaker (Whelen WS30T).....	537.03	45.85
28 47 17 17-0135	EA 60 Watt, Wide Angle Speaker (Whelen WS60T).....	1,094.28	45.85
28 47 17 17-0136	EA Explosion-Proof, 60 Watt, Wide Angle Speaker (Whelen WSXPL6T).....	1,731.14	51.96
28 47 17 17-0137	EA 100 Watt, Wide Angle Speaker (Whelen WS100).....	694.20	45.85
28 47 17 17-0138	EA Weatherproof Housing, 100 Watt, Wide Angle Speaker (Whelen WS100TCH).....	1,087.46	51.96
28 47 17 17-0139	EA Intrusion Alarm For Whelen Outdoor Speaker Cabinets (Whelen INTRU).....	256.41	30.57

28 47 17 17-0140	Firehouse Siren (28 47 17 17)		
28 47 17 17-0141	EA Auxiliary Board Contact Closure (Whelen FAUXIN).....	301.66	30.57
28 47 17 17-0142	EA Two-Tone Sequential Option (Whelen FTT).....	450.50	30.57
28 47 17 17-0143	EA Auxiliary/Status Control Board (Whelen FAUXCS).....	666.75	30.57
28 47 17 17-0144	EA Landline, 10 Digit DTMF (Whelen FC2030LL).....	689.83	30.57
28 47 17 17-0145	EA VHF High-Narrow Band, 10 Digit DTMF (Whelen FC230NV).....	2,373.48	30.57
28 47 17 17-0146	EA UHF Narrow-Band, 10 Digit DTMF (Whelen FC230NU).....	2,373.48	30.57
28 47 17 17-0147	EA UHF, 10 Digit DTMF (Whelen FC230WU).....	2,373.48	30.57
28 47 17 17-0148	EA VHF High Band, 10 Digit DTMF (Whelen FC230VW).....	2,373.48	30.57
28 47 17 17-0149	EA Paging Interface Control Option (Whelen FPGINT).....	424.30	30.57
28 47 17 17-0150	EA Intrusion Alarm Control Option (Whelen FINTRU).....	256.41	30.57
28 47 17 17-0151	EA Solar Power Option (Whelen FSBC280).....	4,367.54	183.42
	Note: Two 80 watt panels, with brackets and solar regulator.		

28 47 17 17-0152	Alert Monitor And Message Display (28 47 17 17)		
28 47 17 17-0153	EA Alert Monitor With Radio Receiver VHF High Band (Whelen V2000H).....	1,981.97	30.57
28 47 17 17-0154	EA Alert Monitor VHF High-Narrow Band (Whelen V2000NH).....	1,981.97	30.57
28 47 17 17-0155	EA Alert Monitor UHF Narrow-Band (Whelen V2000NU).....	1,981.97	30.57
28 47 17 17-0156	EA Alert Monitor With Radio Receiver UHF (Whelen V2000U).....	1,981.97	30.57
28 47 17 17-0157	EA Internal Battery And Charger For VA2000 Series (Whelen VA2BATT).....	266.74	45.85
28 47 17 17-0158	EA Mounting Bracket For Under Cabinet Or Vehicle Mounting - VA2000 Series (Whelen VA2MTG).....	74.24	30.57
28 47 17 17-0159	EA Factory Programming Of 1 To 15 VA2000 Display Messages (Whelen VA2PROGA).....	169.08	
28 47 17 17-0160	EA Factory Programming Of 16 To 45 VA2000 Display Messages (Whelen VA2PROGB).....	265.53	

28 47 17 17-0161	Portable Test Set (28 47 17 17)		
28 47 17 17-0162	EA VHF High Band, Portable Test Set (Whelen PT2010H).....	7,989.19	
28 47 17 17-0163	EA VHF Low Band, Portable Test Set (Whelen PT2010L).....	7,989.19	
28 47 17 17-0164	EA UHF, Portable Test Set (Whelen PT2010U).....	7,989.19	

28 47 17 17-0165	Replacement Warning Lights (28 47 17 17)		
28 47 17 17-0166	EA Amber, Incandescent, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024IA).....	421.69	48.91
28 47 17 17-0167	EA Blue, Incandescent, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024IB).....	421.69	48.91
28 47 17 17-0168	EA Clear, Incandescent, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024IC).....	421.69	48.91
28 47 17 17-0169	EA Green, Incandescent, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024IG).....	421.69	48.91
28 47 17 17-0170	EA Red, Incandescent, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024IR).....	421.69	48.91
28 47 17 17-0171	EA Amber, Incandescent, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120IA).....	453.84	48.91
28 47 17 17-0172	EA Blue, Incandescent, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120IB).....	293.09	48.91

28 Electronic Safety and Security**28 40 Life Safety****28 47 Mass Notification**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

28 47 17 17-0173	EA	Clear, Incandescent, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120IC)	449.08	48.91
28 47 17 17-0174	EA	Green, Incandescent, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120IG)	449.08	48.91
28 47 17 17-0175	EA	Red, Incandescent, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120IR)	449.08	48.91
28 47 17 17-0176	EA	Amber, Halogen, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024HA)	421.69	48.91
28 47 17 17-0177	EA	Blue, Halogen, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024HB)	421.69	48.91
28 47 17 17-0178	EA	Clear, Halogen, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024HC)	421.69	48.91
28 47 17 17-0179	EA	Green, Halogen, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024HG)	421.69	48.91
28 47 17 17-0180	EA	Red, Halogen, 24 Volt DC, Industrial Rotating Warning Light (Whelen IR3024HR)	421.69	48.91
28 47 17 17-0181	EA	Amber, Halogen, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120HA)	472.89	48.91
28 47 17 17-0182	EA	Blue, Halogen, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120HB)	472.89	48.91
28 47 17 17-0183	EA	Clear, Halogen, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120HC)	305.00	48.91
28 47 17 17-0184	EA	Green, Halogen, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120HG)	305.00	48.91
28 47 17 17-0185	EA	Red, Halogen, 120 Volt AC, Industrial Rotating Warning Light (Whelen IR3120HR)	305.00	48.91

28 47 17 17-0186**Antenna** (28 47 17 17)

28 47 17 17-0187	EA	50' Antenna Cable (Honeywell Ademco 7626-50HC)	307.42	
28 47 17 17-0188	EA	External/Remote Weatherproof Antenna (Honeywell Ademco GSM-ANT3DB)	274.55	
28 47 17 17-0189	EA	80GHz Millimeter Wave Radio (BridgeWave Flex4G-1000)	15,097.74	

28 49 Electronic Personal Protection Systems (28 49)**28 49 11 Electronic Personal Safety Detection Systems** (28 49)**28 49 11 00-0001****Personnel Alarm Locating System** (28 49 11)

Note: Includes a central computer, 17" VGA color monitor, keyboard and mouse, personal alarm locating software, a printer, interface cards and panels, eighty (80) personal alarm transmitters with lithium batteries, eighty (80) lapel readers, two hundred fifty (250) IR locators, twenty one (21) repeaters and receivers, back boxes, cables.

28 49 11 00-0002	EA	Personnel Alarm Locating System	23,794.53	981.41
		Note: Includes Pentium III central computer, 17" VGA color monitor, keyboard and mouse, personal alarm locating software, a printer, interface cards and panels.		
28 49 11 00-0003	EA	Personnel Alarm Transmitters With Lithium Batteries	189.21	
28 49 11 00-0004	EA	Lapel Reader	72.77	
28 49 11 00-0005	EA	IR Locator	262.67	36.74
28 49 11 00-0006	EA	Repeaters And Receivers	637.92	122.48

28 49 17 Electronic Personal Safety Emergency Aid Devices (28 49)**28 49 17 00-0001****Electronic Personal Safety Emergency Aid Devices (Edwards Signaling)** (28 49 17)**28 49 17 00-0002****Call For Assistance Kits, Emergency Aid Devices (Edwards Signaling)** (28 49 17 00-0001)

28 49 17 00-0003	EA	Pull Cord Call For Assistance Kit With Strobe/Buzzer, Emergency Aid Devices (Edwards Signaling 7008B-N5)	339.56	73.49
		Note: Includes 1 high intensity strobe/buzzer (7007B-N5) and 1 emergency pull cord station (6537).		
28 49 17 00-0004	EA	Push Button Call For Assistance Kit With Strobe/Horn, Emergency Aid Devices (Edwards Signaling 7005-G5)	403.04	85.74
		Note: Includes 1 high intensity strobe/horn (6536-G5), 1 emergency pull cord station (6537), and 1 transformer 592.		
28 49 17 00-0005	EA	Pull Cord Call For Assistance Kit With Strobe/Horn, Emergency Aid Devices (Edwards Signaling 6538-G5)	406.09	85.74
		Note: Includes 1 high intensity strobe/horn (6536-G5), 1 wall mounted push button (620/147-10), and 1 transformer 592.		

28 49 17 00-0006**Audible/Visual Signaling Devices, Emergency Aid Devices (Edwards Signaling)** (28 49 17 00-0001)

28 49 17 00-0007	EA	High Intensity Strobe/Buzzer, Emergency Aid Devices (Edwards Signaling 7007B-N5)	250.61	45.92
28 49 17 00-0008	EA	High Intensity Strobe/Horn, Emergency Aid Devices (Edwards Signaling 6536-G5)	244.76	36.74
28 49 17 00-0009	EA	Transformer For High Intensity Strobe/Horns, Emergency Aid Devices (Edwards Signaling 592)	111.91	36.74
28 49 17 00-0010	EA	1 Lamp, Dome Station, Emergency Aid Devices (Edwards Signaling 7641-1N5)	197.59	36.74
28 49 17 00-0011	EA	2 Lamp, Dome Station, Emergency Aid Devices (Edwards Signaling 7641-2N5)	228.22	36.74
28 49 17 00-0012	EA	4 Lamp, Dome Station, Emergency Aid Devices (Edwards Signaling 7641-4G5)	260.01	36.74
28 49 17 00-0013	EA	2 Lamp, Dome Station/Buzzer, Emergency Aid Devices (Edwards Signaling 7633-2)	362.20	36.74
28 49 17 00-0014	EA	4 Lamp, Dome Station/Buzzer, Emergency Aid Devices (Edwards Signaling 7633-4)	406.17	36.74

28 49 17 00-0015**Call Activation Devices, Emergency Aid Devices (Edwards Signaling)** (28 49 17 00-0001)

28 49 17 00-0016	EA	Double Pole Single Throw Switch, Pull Cord Station With Stainless Steel Face Plate, Emergency Aid Devices (Edwards Signaling 6537)	150.35	36.74
28 49 17 00-0017	EA	Pushbutton Wall Station/Indicator Lamp With Stainless Steel Face Plate, Emergency Aid Devices (Edwards Signaling 7603E)	223.37	36.74
28 49 17 00-0018	EA	Pushbutton Wall Station/Indicator Lamp With Stainless Steel Face Plate, Emergency Aid Devices (Edwards Signaling 7613E)	293.87	36.74
28 49 17 00-0019	EA	3 Maintained Contacts, Pull Cord Station With Stainless Steel Face Plate, Emergency Aid Devices (Edwards Signaling 7302)	317.31	12.25
28 49 17 00-0020	EA	Beside Wall Station Receptacle, Emergency Aid Devices (Edwards Signaling 7930)	229.89	36.74
28 49 17 00-0021	EA	Beside Wall Station Receptacle With Lamp, Emergency Aid Devices (Edwards Signaling 7930L)	272.06	36.74
28 49 17 00-0022	EA	Locking Button, Pull Cord Station With Stainless Steel Face Plate, Emergency Aid Devices (Edwards Signaling 7932L)	464.19	36.74
28 49 17 00-0023	EA	Pendant Push Button, Emergency Aid Devices (Edwards Signaling 7620)	218.30	36.74



Electronic Safety and Security	28	28
Life Safety	28 40	
Electronic Personal Protection Systems	28 49	

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
28 49 17 00-0024	EA	Single 6' Calling Cord Set For Bedside Wall Station Receptacles, Emergency Aid Devices (Edwards Signaling 7675)	268.04	12.25
28 49 17 00-0025	EA	Double 6' Calling Cord Set For Bedside Wall Station Receptacles, Emergency Aid Devices (Edwards Signaling 7676)	415.19	12.25
28 49 17 00-0026	EA	Single 15' Calling Cord Set For Bedside Wall Station Receptacles, Emergency Aid Devices (Edwards Signaling 7685)	424.24	12.25
28 49 17 00-0027	EA	Double 15' Calling Cord Set For Bedside Wall Station Receptacles, Emergency Aid Devices (Edwards Signaling 7686)	559.37	12.25

END OF SECTION 28

28	28	Electronic Safety and Security
	28 40	Life Safety
	28 49	Electronic Personal Protection Systems



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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Earthwork	31	13
Maintenance of Earthwork	31 01	
Maintenance of Earth Moving	31 01 20	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 Earthwork

31 01 Maintenance of Earthwork ⁽³¹⁾

31 01 20 Maintenance of Earth Moving ^(31 01)

31 01 20 00-0001	Rip Settling Basins ^(31 01 20)	
	Note: Rip through light soil and sand in settling basin. 8' on center (machine width).	
31 01 20 00-0002	ACR Rip Light Soil And Sand, By Dozer	716.31
31 01 20 00-0003	ACR Rip Light Soil And Sand, By Grader With Rear Ripper	1,123.50
31 01 20 00-0004	ACR Rip Light Soil And Sand, By Rubber Tire Front End Loader	966.59

31 05 Common Work Results for Earthwork ⁽³¹⁾

31 05 13 Soils for Earthwork ^(31 05)

Note: Includes delivery up to 15 miles from the closest approved source and dumping. Excludes spreading or backfilling. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

31 05 13 00-0001	Fill Material (Loose, Purchased Material) ^(31 05 13)	
	Note: Includes delivery up to 15 miles from the closest approved source, loading and dumping. Excludes spreading or backfilling. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.	
31 05 13 00-0002	CY Bank Run/Fill Sand	36.03
	For Up To 8, Add	7.21
	For >8 To 16, Add	3.60
	For >48 To 64, Deduct	-2.65
	For >64 To 96, Deduct	-4.45
	For >96, Deduct	-6.26
31 05 13 00-0003	CY Screened/Washed Filter/Septic Sand	42.58
	For Up To 8, Add	8.52
	For >8 To 16, Add	4.26
	For >48 To 64, Deduct	-2.98
	For >64 To 96, Deduct	-5.11
	For >96, Deduct	-7.24
31 05 13 00-0004	CY 3/8" Minus, ASTM C33, Screened/Washed Bedding Sand	58.30
	For Up To 8, Add	11.66
	For >8 To 16, Add	5.83
	For >48 To 64, Deduct	-3.77
	For >64 To 96, Deduct	-6.68
	For >96, Deduct	-9.60
31 05 13 00-0005	CY 3/16" Minus, Screened/Washed Concrete Sand	52.41
	For Up To 8, Add	10.48
	For >8 To 16, Add	5.24
	For >48 To 64, Deduct	-3.47
	For >64 To 96, Deduct	-6.09
	For >96, Deduct	-8.71
31 05 13 00-0006	CY 3/32" Minus, Screened/Washed Masonry/Mortar Sand	93.03
	For Up To 8, Add	18.61
	For >8 To 16, Add	9.30
	For >48 To 64, Deduct	-5.50
	For >64 To 96, Deduct	-10.15
	For >96, Deduct	-14.81
31 05 13 00-0007	CY Common Fill, Native Soil/Dirt	38.74
	For Up To 8, Add	7.75
	For >8 To 16, Add	3.87
	For >48 To 64, Deduct	-2.79
	For >64 To 96, Deduct	-4.73
	For >96, Deduct	-6.66
31 05 13 00-0008	CY Lime Rock Screening	42.23
	For Up To 8, Add	8.45
	For >8 To 16, Add	4.22
	For >48 To 64, Deduct	-2.96
	For >64 To 96, Deduct	-5.07
	For >96, Deduct	-7.19
31 05 13 00-0009	CY Crushed Lime Rock Maximum 3-1/2"	42.23
	For Up To 8, Add	8.45
	For >8 To 16, Add	4.22
	For >48 To 64, Deduct	-2.96
	For >64 To 96, Deduct	-5.07
	For >96, Deduct	-7.19
31 05 13 00-0010	CY Sand/Clay	39.75
	For Up To 8, Add	7.95
	For >8 To 16, Add	3.98
	For >48 To 64, Deduct	-2.84
	For >64 To 96, Deduct	-4.83
	For >96, Deduct	-6.81
31 05 13 00-0011	CY Recycled Concrete Aggregate	37.85
	For Up To 8, Add	7.57
	For >8 To 16, Add	3.79
	For >48 To 64, Deduct	-2.74
	For >64 To 96, Deduct	-4.64
	For >96, Deduct	-6.53

31 Earthwork
31 05 Common Work Results for Earthwork
31 05 13 Soils for Earthwork



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	31 05 13 00-0012	CY	Pitrun Clay	54.25	
			For Up To 8, Add	10.85	
			For >8 To 16, Add	5.43	
			For >48 To 64, Deduct	-3.56	
			For >64 To 96, Deduct	-6.28	
			For >96, Deduct	-8.99	
	31 05 13 00-0013	CY	Light Clay / Loam	44.90	
			For Up To 8, Add	8.98	
			For >8 To 16, Add	4.49	
			For >48 To 64, Deduct	-3.10	
			For >64 To 96, Deduct	-5.34	
			For >96, Deduct	-7.59	
	31 05 13 00-0014	CY	Heavy Clay	54.25	
			For Up To 8, Add	10.85	
			For >8 To 16, Add	5.43	
			For >48 To 64, Deduct	-3.56	
			For >64 To 96, Deduct	-6.28	
			For >96, Deduct	-8.99	

31 05 16 Aggregates for Earthwork (31 05 16)

See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

31 05 16 00-0001 Aggregate (Loose, Purchased Material) (31 05 16)

Note: Includes delivery up to 15 miles from the closest approved source, loading and dumping. Excludes spreading or backfilling. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

	31 05 16 00-0002	CY	#2 Stone Aggregate Fill (1-1/2" To 2-1/2" Clean)	56.56	
			For Up To 8, Add	11.31	
			For >8 To 16, Add	5.66	
			For >48 To 64, Deduct	-3.68	
			For >64 To 96, Deduct	-6.51	
			For >96, Deduct	-9.34	
	31 05 16 00-0003	CY	#3 Stone Aggregate Fill (1" To 2" Clean)	58.88	
			For Up To 8, Add	11.78	
			For >8 To 16, Add	5.89	
			For >48 To 64, Deduct	-3.80	
			For >64 To 96, Deduct	-6.74	
			For >96, Deduct	-9.68	
	31 05 16 00-0004	CY	#4 Stone Aggregate Fill (3/4" To 1-1/2" Clean)	56.56	
			For Up To 8, Add	11.31	
			For >8 To 16, Add	5.66	
			For >48 To 64, Deduct	-3.68	
			For >64 To 96, Deduct	-6.51	
			For >96, Deduct	-9.34	
	31 05 16 00-0005	CY	#5 Stone Aggregate Fill (1/2" To 1" Clean)	60.56	
			For Up To 8, Add	12.11	
			For >8 To 16, Add	6.06	
			For >48 To 64, Deduct	-3.88	
			For >64 To 96, Deduct	-6.91	
			For >96, Deduct	-9.94	
	31 05 16 00-0006	CY	#6 Stone Aggregate Fill (3/8" To 3/4" Clean)	62.91	
			For Up To 8, Add	12.58	
			For >8 To 16, Add	6.29	
			For >48 To 64, Deduct	-4.00	
			For >64 To 96, Deduct	-7.14	
			For >96, Deduct	-10.29	
	31 05 16 00-0007	CY	#56 Stone Aggregate Fill (3/8" To 1")	60.92	
			For Up To 8, Add	12.18	
			For >8 To 16, Add	6.09	
			For >48 To 64, Deduct	-3.90	
			For >64 To 96, Deduct	-6.94	
			For >96, Deduct	-9.99	
	31 05 16 00-0008	CY	#57 Stone Aggregate Fill (3/8" To 1")	65.03	
			For Up To 8, Add	13.01	
			For >8 To 16, Add	6.50	
			For >48 To 64, Deduct	-4.10	
			For >64 To 96, Deduct	-7.35	
			For >96, Deduct	-10.61	
	31 05 16 00-0009	CY	#67 Or #68 Stone Aggregate Fill (3/16" To 3/4")	58.75	
			For Up To 8, Add	11.75	
			For >8 To 16, Add	5.88	
			For >48 To 64, Deduct	-3.79	
			For >64 To 96, Deduct	-6.73	
			For >96, Deduct	-9.66	
	31 05 16 00-0010	CY	#7 Stone Aggregate Fill (3/8" To 1/2")	59.89	
			For Up To 8, Add	11.98	
			For >8 To 16, Add	5.99	
			For >48 To 64, Deduct	-3.85	
			For >64 To 96, Deduct	-6.84	
			For >96, Deduct	-9.84	
	31 05 16 00-0011	CY	#78 Stone Aggregate Fill (3/32" To 1/2")	60.39	
			For Up To 8, Add	12.08	
			For >8 To 16, Add	6.04	
			For >48 To 64, Deduct	-3.87	
			For >64 To 96, Deduct	-6.89	
			For >96, Deduct	-9.91	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 05 16 00-0012 CY #8 Stone Aggregate Fill (3/32" To 3/8")	62.91	
<i>For Up To 8, Add</i>	12.58	
<i>For >8 To 16, Add</i>	6.29	
<i>For >48 To 64, Deduct</i>	-4.00	
<i>For >64 To 96, Deduct</i>	-7.14	
<i>For >96, Deduct</i>	-10.29	
31 05 16 00-0013 CY #89 Stone Aggregate Fill (1/16" To 3/8")	63.62	
<i>For Up To 8, Add</i>	12.72	
<i>For >8 To 16, Add</i>	6.36	
<i>For >48 To 64, Deduct</i>	-4.03	
<i>For >64 To 96, Deduct</i>	-7.21	
<i>For >96, Deduct</i>	-10.39	
31 05 16 00-0014 CY #9 Stone Aggregate Fill (3/32" To 3/16")	62.91	
<i>For Up To 8, Add</i>	12.58	
<i>For >8 To 16, Add</i>	6.29	
<i>For >48 To 64, Deduct</i>	-4.00	
<i>For >64 To 96, Deduct</i>	-7.14	
<i>For >96, Deduct</i>	-10.29	
31 05 16 00-0015 CY #10 Stone Aggregate Fill (1/16" To 3/16")	64.37	
<i>For Up To 8, Add</i>	12.87	
<i>For >8 To 16, Add</i>	6.44	
<i>For >48 To 64, Deduct</i>	-4.07	
<i>For >64 To 96, Deduct</i>	-7.29	
<i>For >96, Deduct</i>	-10.51	
31 05 16 00-0016 CY #610 Modified Stone Aggregate Fill (1/16" To 3/4")	63.62	
<i>For Up To 8, Add</i>	12.72	
<i>For >8 To 16, Add</i>	6.36	
<i>For >48 To 64, Deduct</i>	-4.03	
<i>For >64 To 96, Deduct</i>	-7.21	
<i>For >96, Deduct</i>	-10.39	
31 05 16 00-0017 CY Screenings Stone Aggregate Fill (3/16" Max)	53.31	
<i>For Up To 8, Add</i>	10.66	
<i>For >8 To 16, Add</i>	5.33	
<i>For >48 To 64, Deduct</i>	-3.52	
<i>For >64 To 96, Deduct</i>	-6.18	
<i>For >96, Deduct</i>	-8.85	
31 05 16 00-0018 CY Over 6" To 12" Stone Aggregate Fill, Random Size	57.97	
<i>For Up To 8, Add</i>	11.59	
<i>For >8 To 16, Add</i>	5.80	
<i>For >48 To 64, Deduct</i>	-3.75	
<i>For >64 To 96, Deduct</i>	-6.65	
<i>For >96, Deduct</i>	-9.55	
31 05 16 00-0019 CY Over 6" To 12" Graded Stone Aggregate Fill	57.97	
<i>For Up To 8, Add</i>	11.59	
<i>For >8 To 16, Add</i>	5.80	
<i>For >48 To 64, Deduct</i>	-3.75	
<i>For >64 To 96, Deduct</i>	-6.65	
<i>For >96, Deduct</i>	-9.55	
31 05 16 00-0020 CY 3" To 7" Surge Stone Aggregate Fill, Random Size	62.63	
<i>For Up To 8, Add</i>	12.53	
<i>For >8 To 16, Add</i>	6.26	
<i>For >48 To 64, Deduct</i>	-3.98	
<i>For >64 To 96, Deduct</i>	-7.11	
<i>For >96, Deduct</i>	-10.25	
31 05 16 00-0021 CY 3" To 7" Surge Stone Graded Aggregate Fill	65.95	
<i>For Up To 8, Add</i>	13.19	
<i>For >8 To 16, Add</i>	6.60	
<i>For >48 To 64, Deduct</i>	-4.15	
<i>For >64 To 96, Deduct</i>	-7.45	
<i>For >96, Deduct</i>	-10.74	
31 05 16 00-0022 CY Crusher Run Aggregate Fill (2-1/2" Minus)	37.09	
<i>For Up To 8, Add</i>	7.42	
<i>For >8 To 16, Add</i>	3.71	
<i>For >48 To 64, Deduct</i>	-2.71	
<i>For >64 To 96, Deduct</i>	-4.56	
<i>For >96, Deduct</i>	-6.42	
31 05 16 00-0023 CY Crusher Run Aggregate Fill (1-1/2" Minus)	40.75	
<i>For Up To 8, Add</i>	8.15	
<i>For >8 To 16, Add</i>	4.08	
<i>For >48 To 64, Deduct</i>	-2.89	
<i>For >64 To 96, Deduct</i>	-4.93	
<i>For >96, Deduct</i>	-6.96	
31 05 16 00-0024 CY Crusher Run Aggregate Fill (3/4" Minus)	38.38	
<i>For Up To 8, Add</i>	7.68	
<i>For >8 To 16, Add</i>	3.84	
<i>For >48 To 64, Deduct</i>	-2.77	
<i>For >64 To 96, Deduct</i>	-4.69	
<i>For >96, Deduct</i>	-6.61	
31 05 16 00-0025 CY Miscellaneous Crushed Base, Processed Concrete, Paving	64.82	
<i>For Up To 8, Add</i>	12.96	
<i>For >8 To 16, Add</i>	6.48	
<i>For >48 To 64, Deduct</i>	-4.09	
<i>For >64 To 96, Deduct</i>	-7.33	
<i>For >96, Deduct</i>	-10.57	

31	31 Earthwork
	31 05 Common Work Results for Earthwork
	31 05 36 Equipment Delivery, Pickup, Mobilization and Demobilization



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

31 05 36 Equipment Delivery, Pickup, Mobilization and Demobilization ⁽³¹⁾

⁽⁰⁵⁾
See CSI section 01 71 13 00-0001 for equipment delivery, pickup, mobilization and demobilization.

31 10 Site Clearing ⁽³¹⁾

31 11 Clearing and Grubbing ^(31 10)

31 11 00 00-0001	Clear And Grub Roots And Stumps ^(31 11)	
	Note: Tree diameter (diameter at breast height) is the diameter of the tree trunk measured at 4.5' above ground level. Based on tree density (light, medium or heavy) to be removed. Excludes loading. See CSI section 31 13 13 00-0001 for small areas or individual trees removal.	
31 11 00 00-0002	ACR Clear And Grub Light Trees Up To 6" Diameter, Cut And Chip	7,999.33
	Note: Includes grub and removal of stump	
31 11 00 00-0003	ACR Clear And Grub Light Stumps Only Up To 6" Diameter	2,267.68
31 11 00 00-0004	ACR Clear And Grub Medium Trees Up To 10" Diameter, Cut And Chip	10,665.77
	Note: Includes grub and removal of stump	
31 11 00 00-0005	ACR Clear And Grub Medium Stumps Only Up To 10" Diameter	3,779.47
31 11 00 00-0006	ACR Clear And Grub Heavy Trees Up To 16" Diameter, Cut And Chip	14,665.43
	Note: Includes grub and removal of stump	
31 11 00 00-0007	ACR Clear And Grub Heavy Stumps Only Up To 16" Diameter	5,669.21
31 11 00 00-0008	ACR Clear And Grub Heavy Trees Up To 24" Diameter, Cut And Chip	21,331.54
	Note: Includes grub and removal of stump	
31 11 00 00-0009	ACR Clear And Grub Heavy Stumps Only Up To 24" Diameter	7,936.89
31 11 00 00-0010	ACR Clearing By Machine - Light Brush Without Grub	358.48
31 11 00 00-0011	ACR Clearing By Machine - Medium Brush Without Grub	740.58
31 11 00 00-0012	ACR Clearing By Machine - Heavy Brush Without Grub	1,048.44
31 11 00 00-0013	ACR Chipping - Light Brush	2,844.71
31 11 00 00-0014	ACR Chipping - Medium Brush	3,657.67
31 11 00 00-0015	ACR Chipping - Heavy Brush	5,121.20

31 11 00 00-0016	Loading Of Cleared And Grubbed Material ^(31 11)	
	See CSI section 01 74 19 00-0040 for hauling.	
31 11 00 00-0017	CY Machine Loading Of Cleared And Grubbed Material	12.32
31 11 00 00-0018	CY Chute Loading Of Cleared And Grubbed Material	14.79
31 11 00 00-0019	CY Hand Loading Of Cleared And Grubbed Material	44.19
31 11 00 00-0020	CY Wheel And Ramp Loading Of Cleared And Grubbed Material	34.72

31 13 Selective Tree and Shrub Removal and Trimming ^(31 10)

31 13 13 Selective Tree and Shrub Removal ^(31 13)

31 13 13 00-0001	Individual Tree Removal ^(31 13 13)	
	Note: Includes sawing and chipping branches. Tree diameter, D.B.H. (Diameter At Breast Height) is the diameter of the tree trunk measured at 4.5' above ground elevation. Excludes stump removal or grinding.	
31 13 13 00-0002	EA Up To 6" D.B.H. (Diameter At Breast Height) Tree Removal	666.61
	Note: Includes cutting up tree, chipping and loading.	
	<i>For >25, Deduct</i>	-83.33
31 13 13 00-0003	EA >6" To 12" D.B.H. (Diameter At Breast Height) Tree Removal	999.92
	Note: Includes cutting up tree, chipping and loading.	
	<i>For >25, Deduct</i>	-124.99
31 13 13 00-0004	EA >12" To 24" D.B.H. (Diameter At Breast Height) Tree Removal	1,333.22
	Note: Includes cutting up tree, chipping and loading.	
	<i>For >10, Deduct</i>	-133.32
31 13 13 00-0005	EA >24" To 36" D.B.H. (Diameter At Breast Height) Tree Removal	1,999.83
	Note: Includes cutting up tree, chipping and loading.	
	<i>For >10, Deduct</i>	-199.98
31 13 13 00-0006	EA >36" To 48" D.B.H. (Diameter At Breast Height) Tree Removal	2,666.44
	Note: Includes cutting up tree, chipping and loading.	
	<i>For >10, Deduct</i>	-266.64

31 13 13 00-0007	Stump Removal ^(31 13 13)	
	Note: Measured by diameter of stump.	
31 13 13 00-0008	Stump Removal By Machine ^(31 13 13 00-0007)	
31 13 13 00-0009	EA Up To 6" Diameter Stump Removal	113.38
	Note: Includes excavation necessary to remove stump and loading.	
	<i>For >10, Deduct</i>	-17.01
31 13 13 00-0010	EA >6" To 12" Diameter Stump Removal	217.32
	Note: Includes excavation necessary to remove stump and loading.	
	<i>For >10, Deduct</i>	-32.60
31 13 13 00-0011	EA >12" To 24" Diameter Stump Removal	283.46
	Note: Includes excavation necessary to remove stump and loading.	
	<i>For >10, Deduct</i>	-42.52
31 13 13 00-0012	EA >24" To 36" Diameter Stump Removal	425.20
	Note: Includes excavation necessary to remove stump and loading.	
	<i>For >10, Deduct</i>	-63.78
31 13 13 00-0013	EA >36" To 48" Diameter Stump Removal	500.82
	Note: Includes excavation necessary to remove stump and loading.	
	<i>For >10, Deduct</i>	-75.12

Earthwork	31	13
Site Clearing	31 10	
Selective Tree and Shrub Removal and Trimming	31 13	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 13 13 00-0014 Stump Removal By Hand <small>(31 13 13 00-0007)</small>		
31 13 13 00-0015 EA Up To 6" Diameter Stump Removal By Hand Note: Where stump removal is inaccessible by machine. Includes excavation necessary to remove stump and loading.	694.68	
31 13 13 00-0016 EA >6" To 12" Diameter Stump Removal By Hand Note: Where stump removal is inaccessible by machine. Includes excavation necessary to remove stump and loading.	868.34	
31 13 13 00-0017 EA >12" To 24" Diameter Stump Removal By Hand Note: Where stump removal is inaccessible by machine. Includes excavation necessary to remove stump and loading.	1,273.58	
31 13 13 00-0018 EA >24" To 36" Diameter Stump Removal By Hand Note: Where stump removal is inaccessible by machine. Includes excavation necessary to remove stump and loading.	1,736.69	
31 13 13 00-0019 EA >36" To 48" Diameter Stump Removal By Hand Note: Where stump removal is inaccessible by machine. Includes excavation necessary to remove stump and loading.	2,315.59	
31 13 13 00-0020 Stump Grinding <small>(31 13 13)</small> Note: Measured by diameter of stump.		
31 13 13 00-0021 Stump Grinding, 18" Deep Below Surface Of Soil <small>(31 13 13 00-0020)</small> Note: Level soil to match existing surface area.		
31 13 13 00-0022 EA Stump Grinding Up To 6" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	133.14 26.63 -16.64	
31 13 13 00-0023 EA Stump Grinding >6" To 12" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	166.42 33.28 -20.80	
31 13 13 00-0024 EA Stump Grinding >12" To 15" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	199.71 39.94 -24.96	
31 13 13 00-0025 EA Stump Grinding >15" To 18" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	221.89 44.38 -27.74	
31 13 13 00-0026 EA Stump Grinding >18" To 21" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	238.54 47.71 -29.82	
31 13 13 00-0027 EA Stump Grinding >21" To 24" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	255.18 51.04 -31.90	
31 13 13 00-0028 EA Stump Grinding >24" To 27" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	277.37 55.47 -34.67	
31 13 13 00-0029 EA Stump Grinding >27" To 30" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	302.51 60.50 -37.81	
31 13 13 00-0030 EA Stump Grinding >30" To 33" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	336.12 67.22 -42.02	
31 13 13 00-0031 EA Stump Grinding >33" To 36" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	369.73 73.95 -46.22	
31 13 13 00-0032 EA Stump Grinding >36" To 42" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	403.34 80.67 -50.42	
31 13 13 00-0033 EA Stump Grinding >42" To 48" Tree <i>For 24" Depth, Add</i> <i>For >10, Deduct</i>	448.16 89.63 -56.02	
31 13 13 00-0034 Shrub Removal <small>(31 13 13)</small>		
31 13 13 00-0035 EA Removal Of 18" To 24" Shrub, Broadleaf Evergreen	50.77	
31 13 13 00-0036 EA Removal Of 2' To 3' Shrub, Broadleaf Evergreen	79.61	
31 13 13 00-0037 EA Removal Of 3' To 4' Shrub, Broadleaf Evergreen	92.30	
31 13 13 00-0038 EA Removal Of 4' To 5' Shrub, Broadleaf Evergreen	138.46	
31 13 13 00-0039 EA Removal Of 12" To 15" Shrub, Deciduous	25.38	
31 13 13 00-0040 EA Removal Of 18" To 24" Shrub, Deciduous	39.22	
31 13 13 00-0041 EA Removal Of 2' To 3' Shrub, Deciduous	50.77	
31 13 13 00-0042 EA Removal Of 3' To 4' Shrub, Deciduous	55.38	
31 13 13 00-0043 EA Removal Of 18" To 24" Shrub, Evergreen	50.77	
31 13 13 00-0044 EA Removal Of 24" To 30" Shrub, Evergreen	55.38	
31 13 13 00-0045 EA Removal Of 30" To 36" Shrub, Evergreen	79.61	
31 13 13 00-0046 EA Removal Of 36" To 42" Shrub, Evergreen	138.45	
31 13 13 00-0047 Fallen Tree Removal <small>(31 13 13)</small> Note: Includes sawing and chipping branches. Tree diameter, D.B.H. (Diameter At Breast Height) is the diameter of the tree trunk measured at 4.5' above ground elevation. Excludes stump removal or grinding. Excludes removing tree from ground.		

31	31 Earthwork
	31 10 Site Clearing
	31 13 Selective Tree and Shrub Removal and Trimming



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 13 13 00-0048	EA	Up To 6" D.B.H. (Diameter At Breast Height) Fallen Tree Removal	533.29	
		Note: Includes cutting up tree, chipping and loading.		
		<i>For >25, Deduct</i>	-66.66	
		<i>For Tree Removal Without Chipping Or Cutting Up Tree Into Smaller Pieces, Deduct</i>	-133.32	
31 13 13 00-0049	EA	>6" To 12" D.B.H. (Diameter At Breast Height) Fallen Tree Removal	799.93	
		Note: Includes cutting up tree, chipping and loading.		
		<i>For >25, Deduct</i>	-99.99	
		<i>For Tree Removal Without Chipping Or Cutting Up Tree Into Smaller Pieces, Deduct</i>	-199.98	
31 13 13 00-0050	EA	>12" To 24" D.B.H. (Diameter At Breast Height) Fallen Tree Removal	1,066.58	
		Note: Includes cutting up tree, chipping and loading.		
		<i>For >10, Deduct</i>	-106.66	
		<i>For Tree Removal Without Chipping Or Cutting Up Tree Into Smaller Pieces, Deduct</i>	-266.65	
31 13 13 00-0051	EA	>24" To 36" D.B.H. (Diameter At Breast Height) Fallen Tree Removal	1,599.87	
		Note: Includes cutting up tree, chipping and loading.		
		<i>For >10, Deduct</i>	-159.99	
		<i>For Tree Removal Without Chipping Or Cutting Up Tree Into Smaller Pieces, Deduct</i>	-399.97	
31 13 13 00-0052	EA	>36" To 48" D.B.H. (Diameter At Breast Height) Fallen Tree Removal	2,133.15	
		Note: Includes cutting up tree, chipping and loading.		
		<i>For >10, Deduct</i>	-213.32	
		<i>For Tree Removal Without Chipping Or Cutting Up Tree Into Smaller Pieces, Deduct</i>	-533.29	
31 13 13 00-0053	EA	>48" To 60" D.B.H. (Diameter At Breast Height) Fallen Tree Removal	2,666.44	
		Note: Includes cutting up tree, chipping and loading.		
		<i>For >10, Deduct</i>	-266.64	
		<i>For Tree Removal Without Chipping Or Cutting Up Tree Into Smaller Pieces, Deduct</i>	-666.61	

31 13 16 Selective Tree and Shrub Trimming (31 13)

See CSI section 32 01 90 23-0000 for tree pruning.

31 13 16 00-0001		Tree Trimming For Pole Line Construction And Maintenance (31 13 16)		
		Note: Area to be vertical cleared (including overhanging limbs) is minimum 20' wide (10' each side of structure) and 16' above ground. All materials to 6" D.B.H. (Diameter At Breast Height) to be chipped in place. Larger material may be chipped or disposed. Trees greater than 18" diameter use individual tree removal tasks. Quantity based on running foot of power line to be cleared.		
31 13 16 00-0002	LF	Tree Trimming, Light Cutting To 6" Diameter For Pole Line Construction	2.21	
31 13 16 00-0003	LF	Tree Trimming, Medium Cutting >6" To 12" Diameter For Pole Line Construction	3.30	
31 13 16 00-0004	LF	Tree Trimming, Heavy Cutting >12" To 18" Diameter For Pole Line Construction	3.89	

31 13 16 00-0005 Tree Branch Trimming And Removal For Maintenance Along Building Or Structure (31 13 16)

Note: Includes pick-up and placement of cut branches into chipper for removal. Excludes transportation from site or disposal fee. See CSI section 01 22 23 00-0105 for bucket truck where required for additional height.

31 13 16 00-0006	EA	Trim Tree Branch Minimum Charge.....	805.86	
31 13 16 00-0007	EA	Up To 1" Diameter Branch, Up To 5' Length And Up To 10' From Ground, Trim Tree Branch From Building Or Structure	20.15	
31 13 16 00-0008	EA	>1" To 2" Diameter Branch, Up To 5' Length And Up To 10' From Ground, Trim Tree Branch From Building Or Structure	22.66	
31 13 16 00-0009	EA	>2" To 3" Diameter Branch, Up To 5' Length And Up To 10' From Ground, Trim Tree Branch From Building Or Structure	27.70	
31 13 16 00-0010	EA	Up To 1" Diameter Branch, >5' To 10' Length And Up To 10' From Ground, Trim Tree Branch From Building Or Structure	25.19	
31 13 16 00-0011	EA	>1" To 2" Diameter Branch, >5' To 10' Length And Up To 10' From Ground, Trim Tree Branch From Building Or Structure	28.33	
31 13 16 00-0012	EA	>2" To 3" Diameter Branch, >5' To 10' Length And Up To 10' From Ground, Trim Tree Branch From Building Or Structure	34.63	

31 20 Earth Moving (31)

Note: Per OSHA -Soil Classification - 1926 Subpart P App A. Light material: Class A site material, normally referred to as "easy digging". Consisting of loose, soft, free running materials. Close lying, which will fill blade, digger or bucket to capacity, and frequently provide a heaped load. Materials such as dry sand, small gravel, unpacked earth, loam, etc., would fall into this category. Medium material: Class B site material, normally referred to as "medium and tough, wet and sticky clay would be examples of this medium digging", consisting of harder materials that are not difficult to dig without assistance such as ripping, blasting, etc. Material break up with some bulkiness causing voids in digger or bucket. Materials such as packed earth, common earth with some clay, soil with less than 25% rock content would be examples of this category. Heavy/wet material: Class C site material, normally referred to as "hard digging", consisting of materials which may require some assistance in breaking up. Bulky and somewhat hard to penetrate materials would be found in this category and voids in dipper or bucket would be common. Materials such as very hard packed soil, with up to 50% to 70% rock content and hard category. Soil conditions will be determined by soil analysis to provide appropriate percentage (%) for the various types of soil conditions. Apply the percentages to the various soil types to generate an appropriate representation of the soil condition.

31 22 Grading (31 20)

31 22 13		Rough Grading (31 22)		
		See CSI section 31 23 16 00-0000 for rough grading.		
31 22 16		Fine Grading (31 22)		
31 22 16 13		Roadway Subgrade Reshaping (31 22 16)		
		See CSI section 31 23 16 00-0000 for bulk shaping and grading, 31 24 13 00-0000 for roadway shaping and grading.		
31 22 19		Finish Grading (31 22)		
31 22 19 13		Spreading and Grading Topsoil (31 22 19)		



Earthwork	31	13
Earth Moving	31 20	
Grading	31 22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 22 19 13-0001	Site Grading For Areas Outside Of Structures And Slabs <small>(31 22 19 13)</small>	
	Note: Use of bobcat type equipment or hand for finish grading for positive drainage.	
31 22 19 13-0002	Hand Digging And Grading <small>(31 22 19 13-0001)</small>	
31 22 19 13-0003	SF Trim And Shape Machine Excavated Area By Hand Finish Grade	1.21
31 22 19 13-0004	SF Trim And Shape Area On Grade By Hand, Finish Grade	1.10
31 22 19 13-0005	SF Fine Grade Gravel Bedding By Hand Finish Grade	1.15
31 22 19 13-0006	SF Fine Grade Gravel By Hand Finish Grade	0.96
31 22 19 13-0007	Machine Operations <small>(31 22 19 13-0001)</small>	
31 22 19 13-0008	Machine Operations With Grader <small>(31 22 19 13-0007)</small>	
31 22 19 13-0009	CSY Semi Grade, 2 Passes With Grader.....	450.39
31 22 19 13-0010	CSY Fine Grade, 3 Passes With Grader.....	625.55

31 23 Excavation and Fill (31 20)

31 23 16 Excavation (31 23)

31 23 16 13 Trenching (31 23 16)

Note: Use this section for trenching operations even if the total project volume exceeds 500 CY. Use tasks for work by hand only for areas not accessible by machine.

31 23 16 13-0001	Excavation For Trenching By Machine <small>(31 23 16 13)</small>	
	Note: Includes stockpiling excess materials and trimming sides and bottom of trench.	
31 23 16 13-0002	CY 12" Wide or Less, Excavation for Trenching by Machine in Soil	11.97
	For Up To 20, Add	11.97
	For >20 To 50, Add	8.98
	For >50 To 250, Add	4.79
	For Excavation In Light Material (Class A), Deduct	-1.50
	For Excavation In Heavy/Wet Material (Class C), Add	4.79
	For >250 To 500, Add	1.80
	For >1,000, Deduct	-1.80
31 23 16 13-0003	CY Over 12" Wide, Excavation for Trenching by Machine in Soil	7.74
	For Up To 20, Add	7.74
	For >20 To 50, Add	5.81
	For >50 To 250, Add	3.10
	For Excavation In Light Material (Class A), Deduct	-0.97
	For Excavation In Heavy/Wet Material (Class C), Add	3.10
	For >250 To 500, Add	1.16
	For >1,000, Deduct	-1.16
31 23 16 13-0004	CY 12" Wide or Less, Excavation for Trenching by Machine in Loose Rock	19.81
	Note: Includes compacted aggregate	
	For Up To 20, Add	19.81
	For >20 To 50, Add	14.86
	For >50 To 250, Add	7.92
	For >250 To 500, Add	2.97
	For >1,000, Deduct	-2.97
31 23 16 13-0005	CY Over 12" Wide, Excavation for Trenching by Machine in Loose Rock	13.75
	Note: Includes compacted aggregate	
	For Up To 20, Add	13.75
	For >20 To 50, Add	10.31
	For >50 To 250, Add	5.50
	For >250 To 500, Add	2.06
	For >1,000, Deduct	-2.06
31 23 16 13-0006	Excavation For Trenching By Hand <small>(31 23 16 13)</small>	
31 23 16 13-0007	CY Excavation For Trenching By Hand In Soil	145.81
	Note: Includes stockpiling excess materials and trimming sides and bottom of trench.	
31 23 16 13-0008	CY Excavation For Trenching By Hand In Loose Rock Or Compacted Aggregate.....	250.11
	Note: Includes stockpiling excess materials and trimming sides and bottom of trench.	
31 23 16 13-0009	Backfilling Or Placing Subbase For Trenches <small>(31 23 16 13)</small>	
	Note: With imported or stockpiled materials.	
31 23 16 13-0010	CY Backfilling or Placing Subbase for Trenches with Imported or Stockpiled Materials by Machine.....	4.32
	For Up To 20, Add	4.32
	For >20 To 50, Add	3.24
	For >50 To 250, Add	1.73
	For >250 To 500, Add	0.65
	For >1,000, Deduct	-0.65
31 23 16 13-0011	CY Backfilling or Placing Subbase for Trenches with Imported or Stockpiled Materials by Hand.....	40.51
31 23 16 13-0012	Compaction Of Fill Or Subbase For Trenches <small>(31 23 16 13)</small>	
	Note: Includes restoration of final grade.	
31 23 16 13-0013	CY Compaction of Fill or Subbase for Trenches by Vibratory Plate, Air Tamper, Etcetera.....	8.45
	For Up To 20, Add	8.45
	For >20 To 50, Add	6.34
	For >50 To 250, Add	3.38
	For >250 To 500, Add	1.27
	For >1,000, Deduct	-1.27

31	31	Earthwork
	31 20	Earth Moving
	31 23	Excavation and Fill



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 23 16 13-0014	CY	Compaction of Fill or Subbase for Trenches by Hand	45.69
31 23 16 13-0015		Loading Excess Material For Removal From Excavation For Trenches <small>(31 23 16 13)</small>	
		<small>13)</small> Note: Includes hand work by laborer for clean-up. Not to be used when excavated material can be loaded directly into truck instead of stock-piling. See CSI section 01 74 19 00-0040 for hauling.	
31 23 16 13-0016	CY	Load Excess Material by Machine for Removal from Excavation for Trenching	7.52
		<i>For Up To 20, Add</i>	7.52
		<i>For >20 To 50, Add</i>	5.64
		<i>For >50 To 250, Add</i>	3.01
		<i>For >250 To 500, Add</i>	1.13
		<i>For >1,000, Deduct</i>	-1.13
31 23 16 13-0017	CY	Load Excess Material by Hand for Removal from Excavation for Trenching	106.92
31 23 16 13-0018		Spread Excess Or Imported Material For Trenches <small>(31 23 16 13)</small>	
		Note: Includes hand work by laborer for clean-up.	
31 23 16 13-0019	CY	Spread Excess Or Imported Material On Site With Machine	3.51
		<i>For Up To 20, Add</i>	3.51
		<i>For >20 To 50, Add</i>	2.63
		<i>For >50 To 250, Add</i>	1.40
		<i>For >250 To 500, Add</i>	0.53
		<i>For >1,000, Deduct</i>	-0.53
31 23 16 13-0020		Direct Burial (Plowed-in) Cable Or Piping By Machine <small>(31 23 16 13)</small>	
		Note: Includes trench, backfill, compaction and restoration of final grade.	
31 23 16 13-0021	LF	Direct Burial of Cable or Piping up to 12" Deep	2.59
31 23 16 13-0022	LF	Direct Burial of Cable or Piping >12" to 24" Deep	2.85
31 23 16 13-0023	LF	Direct Burial of Cable or Piping >24" to 36" Deep	4.06
31 23 16 13-0024	LF	Direct Burial of Cable or Piping >36" to 48" Deep	4.58
31 23 16 13-0025		Utility Chain Trencher <small>(31 23 16 13)</small>	
31 23 16 13-0026		Utility Trench, Chain Trencher <small>(31 23 16 13-0025)</small>	
		Note: Earth left adjacent to trench.	
31 23 16 13-0027	LF	4" Wide, 12" Deep Trench, Medium Soil, Chain Trencher	1.45
		<i>For >100 To 250, Deduct</i>	-0.10
		<i>For >250 To 500, Deduct</i>	-0.22
		<i>For >500, Deduct</i>	-0.44
31 23 16 13-0028	LF	4" Wide, 18" Deep Trench, Medium Soil, Chain Trencher	1.59
		<i>For >100 To 250, Deduct</i>	-0.11
		<i>For >250 To 500, Deduct</i>	-0.24
		<i>For >500, Deduct</i>	-0.48
31 23 16 13-0029	LF	4" Wide, 24" Deep Trench, Medium Soil, Chain Trencher	1.65
		<i>For >100 To 250, Deduct</i>	-0.12
		<i>For >250 To 500, Deduct</i>	-0.25
		<i>For >500, Deduct</i>	-0.50
31 23 16 13-0030	LF	6" Wide, 12" Deep Trench, Medium Soil, Chain Trencher	1.74
		<i>For >100 To 250, Deduct</i>	-0.12
		<i>For >250 To 500, Deduct</i>	-0.26
		<i>For >500, Deduct</i>	-0.52
31 23 16 13-0031	LF	6" Wide, 18" Deep Trench, Medium Soil, Chain Trencher	1.90
		<i>For >100 To 250, Deduct</i>	-0.13
		<i>For >250 To 500, Deduct</i>	-0.29
		<i>For >500, Deduct</i>	-0.57
31 23 16 13-0032	LF	6" Wide, 24" Deep Trench, Medium Soil, Chain Trencher	2.17
		<i>For >100 To 250, Deduct</i>	-0.15
		<i>For >250 To 500, Deduct</i>	-0.33
		<i>For >500, Deduct</i>	-0.65
31 23 16 13-0033	LF	6" Wide, 36" Deep Trench, Medium Soil, Chain Trencher	2.60
		<i>For >100 To 250, Deduct</i>	-0.18
		<i>For >250 To 500, Deduct</i>	-0.39
		<i>For >500, Deduct</i>	-0.78
31 23 16 13-0034	LF	8" Wide, 12" Deep Trench, Medium Soil, Chain Trencher	2.46
		<i>For >100 To 250, Deduct</i>	-0.17
		<i>For >250 To 500, Deduct</i>	-0.37
		<i>For >500, Deduct</i>	-0.74
31 23 16 13-0035	LF	8" Wide, 18" Deep Trench, Medium Soil, Chain Trencher	2.89
		<i>For >100 To 250, Deduct</i>	-0.20
		<i>For >250 To 500, Deduct</i>	-0.43
		<i>For >500, Deduct</i>	-0.87
31 23 16 13-0036	LF	8" Wide, 24" Deep Trench, Medium Soil, Chain Trencher	3.29
		<i>For >100 To 250, Deduct</i>	-0.23
		<i>For >250 To 500, Deduct</i>	-0.49
		<i>For >500, Deduct</i>	-0.99
31 23 16 13-0037	LF	8" Wide, 36" Deep Trench, Medium Soil, Chain Trencher	3.90
		<i>For >100 To 250, Deduct</i>	-0.27
		<i>For >250 To 500, Deduct</i>	-0.59
		<i>For >500, Deduct</i>	-1.17
31 23 16 13-0038		Backfill Trenches With Compaction <small>(31 23 16 13-0025)</small>	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 23 16 13-0039 LF Backfill 4" Wide, 12" Deep Trench, With Compaction.....	0.22	
For >100 To 250, Deduct	-0.02	
For >250 To 500, Deduct	-0.03	
For >500, Deduct	-0.07	
31 23 16 13-0040 LF Backfill 4" Wide, 18" Deep Trench, With Compaction.....	0.35	
For >100 To 250, Deduct	-0.02	
For >250 To 500, Deduct	-0.05	
For >500, Deduct	-0.11	
31 23 16 13-0041 LF Backfill 4" Wide, 24" Deep Trench, With Compaction.....	0.48	
For >100 To 250, Deduct	-0.03	
For >250 To 500, Deduct	-0.07	
For >500, Deduct	-0.14	
31 23 16 13-0042 LF Backfill 6" Wide, 12" Deep Trench, With Compaction.....	0.35	
For >100 To 250, Deduct	-0.02	
For >250 To 500, Deduct	-0.05	
For >500, Deduct	-0.11	
31 23 16 13-0043 LF Backfill 6" Wide, 18" Deep Trench, With Compaction.....	0.48	
For >100 To 250, Deduct	-0.03	
For >250 To 500, Deduct	-0.07	
For >500, Deduct	-0.14	
31 23 16 13-0044 LF Backfill 6" Wide, 24" Deep Trench, With Compaction.....	0.71	
For >100 To 250, Deduct	-0.05	
For >250 To 500, Deduct	-0.11	
For >500, Deduct	-0.21	
31 23 16 13-0045 LF Backfill 6" Wide, 36" Deep Trench, With Compaction.....	1.01	
For >100 To 250, Deduct	-0.07	
For >250 To 500, Deduct	-0.15	
For >500, Deduct	-0.30	
31 23 16 13-0046 LF Backfill 8" Wide, 12" Deep Trench, With Compaction.....	0.48	
For >100 To 250, Deduct	-0.03	
For >250 To 500, Deduct	-0.07	
For >500, Deduct	-0.14	
31 23 16 13-0047 LF Backfill 8" Wide, 18" Deep Trench, With Compaction.....	0.71	
For >100 To 250, Deduct	-0.05	
For >250 To 500, Deduct	-0.11	
For >500, Deduct	-0.21	
31 23 16 13-0048 LF Backfill 8" Wide, 24" Deep Trench, With Compaction.....	0.94	
For >100 To 250, Deduct	-0.07	
For >250 To 500, Deduct	-0.14	
For >500, Deduct	-0.28	
31 23 16 13-0049 LF Backfill 8" Wide, 36" Deep Trench, With Compaction.....	1.42	
For >100 To 250, Deduct	-0.10	
For >250 To 500, Deduct	-0.21	
For >500, Deduct	-0.43	

31 23 16 16 Structural Excavation for Minor Structures (31 23 16)

31 23 16 16-0001	Post Holes (31 23 16 16)	
	Note: Excludes spreading of excess material on site or loading and removal of excavated material from site.	
31 23 16 16-0002	Drilling Post Hole In Soil (31 23 16 16-0001)	
	Note: Auger by machine unless otherwise notified by owner.	
31 23 16 16-0003	VLF Up To 2-1/2" Diameter Hole, Auger By Machine Post Hole In Soil.....	10.58
31 23 16 16-0004	VLF 2-1/2" Diameter Hole, Auger By Machine Post Hole In Soil.....	11.90
31 23 16 16-0005	VLF 3" Diameter Hole, Auger By Machine Post Hole In Soil.....	14.11
31 23 16 16-0006	VLF 4" Diameter Hole, Auger By Machine Post Hole In Soil.....	15.87
31 23 16 16-0007	VLF 6" Diameter Hole, Auger By Machine Post Hole In Soil.....	17.31
31 23 16 16-0008	VLF 8" Diameter Hole, Auger By Machine Post Hole In Soil.....	19.05
31 23 16 16-0009	VLF 10" Diameter Hole, Auger By Machine Post Hole In Soil.....	21.15
31 23 16 16-0010	VLF 12" Diameter Hole, Auger By Machine Post Hole In Soil.....	23.81
31 23 16 16-0011	VLF 18" Diameter Hole, Auger By Machine Post Hole In Soil.....	27.21
31 23 16 16-0012	VLF 24" Diameter Hole, Auger By Machine Post Hole In Soil.....	31.74
31 23 16 16-0013	VLF 30" Diameter Hole, Auger By Machine Post Hole In Soil.....	38.08
31 23 16 16-0014	VLF 36" Diameter Hole, Auger By Machine Post Hole In Soil.....	47.60
31 23 16 16-0015	Drilling Post Hole In Rock (31 23 16 16-0001)	
31 23 16 16-0016	CF Jackhammer Post Hole, Rock.....	80.35
31 23 16 16-0017	CF Rock Drill Post Hole, Rock.....	21.99
31 23 16 16-0018	Post Hole Fill (31 23 16 16-0001)	
31 23 16 16-0019	Concrete Fill (31 23 16 16-0018)	
31 23 16 16-0020	VLF Concrete Fill, Up To 2-1/2" Diameter Hole.....	6.44
31 23 16 16-0021	VLF Concrete Fill, 2-1/2" Diameter Hole.....	8.27
31 23 16 16-0022	VLF Concrete Fill, 3" Diameter Hole.....	9.11
31 23 16 16-0023	VLF Concrete Fill, 4" Diameter Hole.....	10.47
31 23 16 16-0024	VLF Concrete Fill, 6" Diameter Hole.....	14.75
31 23 16 16-0025	VLF Concrete Fill, 8" Diameter Hole.....	19.70
31 23 16 16-0026	VLF Concrete Fill, 10" Diameter Hole.....	24.09
31 23 16 16-0027	VLF Concrete Fill, 12" Diameter Hole.....	28.10
31 23 16 16-0028	VLF Concrete Fill, 18" Diameter Hole.....	38.27

31	31	Earthwork
	31 20	Earth Moving
	31 23	Excavation and Fill



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 23 16 16-0029 VLF Concrete Fill, 24" Diameter Hole.....	47.49	
31 23 16 16-0030 VLF Concrete Fill, 30" Diameter Hole.....	56.47	
31 23 16 16-0031 VLF Concrete Fill, 36" Diameter Hole.....	65.80	
31 23 16 16-0032 Grout Fill <small>(31 23 16 16-0018)</small>		
31 23 16 16-0033 VLF Grout Fill, Up To 2-1/2" Diameter Hole.....	7.63	
31 23 16 16-0034 VLF Grout Fill, 2-1/2" Diameter Hole.....	9.82	
31 23 16 16-0035 VLF Grout Fill, 3" Diameter Hole.....	10.70	
31 23 16 16-0036 VLF Grout Fill, 4" Diameter Hole.....	12.03	
31 23 16 16-0037 VLF Grout Fill, 6" Diameter Hole.....	16.80	
31 23 16 16-0038 VLF Grout Fill, 8" Diameter Hole.....	22.42	
31 23 16 16-0039 VLF Grout Fill, 10" Diameter Hole.....	27.33	
31 23 16 16-0040 VLF Grout Fill, 12" Diameter Hole.....	31.71	
31 23 16 16-0041 VLF Grout Fill, 18" Diameter Hole.....	42.41	
31 23 16 16-0042 VLF Grout Fill, 24" Diameter Hole.....	51.83	
31 23 16 16-0043 VLF Grout Fill, 30" Diameter Hole.....	60.93	
31 23 16 16-0044 VLF Grout Fill, 36" Diameter Hole.....	70.27	
31 23 16 16-0045 Earth Fill, Compacted <small>(31 23 16 16-0018)</small>		
31 23 16 16-0046 VLF Earth Fill, Up To 2-1/2" Diameter Hole.....	5.41	
31 23 16 16-0047 VLF Earth Fill, 2-1/2" Diameter Hole.....	7.04	
31 23 16 16-0048 VLF Earth Fill, 3" Diameter Hole.....	7.36	
31 23 16 16-0049 VLF Earth Fill, 4" Diameter Hole.....	7.58	
31 23 16 16-0050 VLF Earth Fill, 6" Diameter Hole.....	10.12	
31 23 16 16-0051 VLF Earth Fill, 8" Diameter Hole.....	13.50	
31 23 16 16-0052 VLF Earth Fill, 10" Diameter Hole.....	16.20	
31 23 16 16-0053 VLF Earth Fill, 12" Diameter Hole.....	18.37	
31 23 16 16-0054 VLF Earth Fill, 18" Diameter Hole.....	22.38	
31 23 16 16-0055 VLF Earth Fill, 24" Diameter Hole.....	25.12	
31 23 16 16-0056 VLF Earth Fill, 30" Diameter Hole.....	27.54	
31 23 16 16-0057 VLF Earth Fill, 36" Diameter Hole.....	29.71	
31 23 16 33 Bulk Excavation <small>(31 23 16)</small>		
Note: For excavations where the total quantity for a project is greater than 500 cubic yards. See CSI section 31 05 16 00-0000 for imported material, 31 23 16 36-0000 for For less than 500 CY excavation.		
31 23 16 33-0001 Excavation <small>(31 23 16 33)</small>		
Note: For bulk excavation. Includes stockpiling excavated materials within 100' of point of excavation.		
31 23 16 33-0002 CY Bulk Excavation by Dozer in Soil.....	10.99	
<i>For Excavation In Light Material (Class A), Deduct</i>		
	-1.37	
<i>For Excavation In Heavy/Wet Material (Class C), Add</i>		
	4.40	
<i>For >1,000, Deduct</i>		
	-1.65	
31 23 16 33-0003 CY Bulk Excavation by Hydraulic Excavator, Front End Loader, Backhoe in Soil.....	6.25	
<i>For Excavation In Light Material (Class A), Deduct</i>		
	-0.78	
<i>For Excavation In Heavy/Wet Material (Class C), Add</i>		
	2.50	
<i>For >1,000, Deduct</i>		
	-0.94	
31 23 16 33-0004 CY Bulk Excavation by Dozer in Loose Rock.....	13.53	
Note: Includes compacted aggregate		
	-2.03	
31 23 16 33-0005 CY Bulk Excavation by Hydraulic Excavator, Front End Loader, Backhoe in Loose Rock.....	7.69	
Note: Includes compacted aggregate		
	-1.15	
31 23 16 33-0006 Spreading, Shaping And Rough Grading <small>(31 23 16 33)</small>		
Note: Imported or stockpiled material for bulk excavation.		
31 23 16 33-0007 CY Spreading, Shaping, and Rough Grading Imported or Stockpiled Material for Bulk Excavation by Machine.....	6.79	
<i>For >1,000, Deduct</i>		
	-1.02	
31 23 16 33-0008 Cutting, Shaping and Rough Grading Of Existing Elevations <small>(31 23 16 33)</small>		
31 23 16 33-0009 CY Cutting, Shaping and Rough Grading Existing Elevations For Bulk Excavation by Machine.....	7.54	
<i>For >1,000, Deduct</i>		
	-1.13	
31 23 16 33-0010 Relocating On Site Excavated Material From Excavation <small>(31 23 16 33)</small>		
Note: For bulk excavation.		
31 23 16 33-0011 CY Relocating On Site Excavated Material From Bulk Excavation >100' to 300'.....	6.03	
<i>For >1,000, Deduct</i>		
	-0.90	
31 23 16 33-0012 CY Relocating On Site Excavated Material From Bulk Excavation >300' to 500'.....	9.05	
<i>For >1,000, Deduct</i>		
	-1.36	
31 23 16 33-0013 CY Relocating On Site Excavated Material From Bulk Excavation >500' To 1,000'.....	13.58	
<i>For >1,000, Deduct</i>		
	-2.04	
31 23 16 33-0014 CY Relocating On Site Excavated Material From Bulk Excavation >1,000'.....	18.10	
<i>For >1,000, Deduct</i>		
	-2.72	
31 23 16 33-0015 Finish Grading For Bulk Excavation <small>(31 23 16 33)</small>		
31 23 16 33-0016 SY Finish Grading for Bulk Excavation by Machine.....	0.75	



Earthwork	31	13
Earth Moving	31 20	
Excavation and Fill	31 23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 23 16 33-0017 Compaction Of Fill Or Subbase, Per Lift <small>(31 23 16 33)</small> Note: For bulk excavation.		
31 23 16 33-0018 SY Compaction of Fill or Subbase for Bulk Excavation by Machine Note: Per Lift	0.76	
31 23 16 33-0019 Loading Excess Material For Removal From Excavation <small>(31 23 16 33)</small> Note: For bulk excavation. Includes hand work by laborer for clean-up. Not to be used when excavated material can be loaded directly into truck instead of stock-piling. See CSI section 01 74 19 00-0040 for hauling.		
31 23 16 33-0020 CY Loading Excess Material For Removal From Bulk Excavation For >1,000, Deduct	6.24 -0.94	
31 23 16 36 Excavation for Building Foundations and Other Structures <small>(31 23 16)</small> Note: Use of a Bobcat is limited to access restricted areas and by owner's approval. See CSI section 31 05 16 00-0000 for imported material, 31 23 16 33-0000 for bulk excavation operations over 500 CY.		
31 23 16 36-0001 Excavation <small>(31 23 16 36)</small> Note: For building foundations and other structures by machine. Includes stockpiling of excess materials on ground in reach of excavated area.		
31 23 16 36-0002 Excavation For Building Foundations And Other Structures By Skid-Steer Loader <small>(31 23 16 36-0001)</small>		
31 23 16 36-0003 CY Excavation For Building Foundations And Other Structures By Skid-Steer Loader In Soil For Excavation In Light Material (Class A), Deduct For Excavation In Heavy/Wet Material (Class C), Add For Up To 20, Add For >20 To 50, Add For >50 To 250, Add For >250 To 500, Add	10.06 -1.26 4.02 10.06 7.55 4.02 1.51	
31 23 16 36-0004 CY Excavation For Building Foundations And Other Structures By Skid-Steer Loader In Loose Rock Note: Includes compacted aggregate For Up To 20, Add For >20 To 50, Add For >50 To 250, Add For >250 To 500, Add	12.49 12.49 9.37 5.00 1.87	
31 23 16 36-0005 Excavation For Building Foundations And Other Structures By Hydraulic Excavator, Backhoe, Loader <small>(31 23 16 36-0001)</small>		
31 23 16 36-0006 CY Excavation For Building Foundations And Other Structures By Hydraulic Excavator, Backhoe, Loader in Soil For Excavation In Light Material (Class A), Deduct For Excavation In Heavy/Wet Material (Class C), Add For Up To 20, Add For >20 To 50, Add For >50 To 250, Add For >250 To 500, Add	7.50 -0.94 3.00 7.50 5.63 3.00 1.13	
31 23 16 36-0007 CY Excavation For Building Foundations And Other Structures By Hydraulic Excavator, Backhoe, Loader in Loose Rock Note: Includes compacted aggregate For Up To 20, Add For >20 To 50, Add For >50 To 250, Add For >250 To 500, Add	8.93 8.93 6.70 3.57 1.34	
31 23 16 36-0008 Excavation For Building Foundations And Other Structures By Hand <small>(31 23 16 36-0001)</small> Note: For areas not accessible by machine and only with owner's approval.		
31 23 16 36-0009 CY Excavation For Building Foundations And Other Structures By Hand in Soil For Excavation In Light Material (Class A), Deduct For Excavation In Heavy/Wet Material (Class C), Add	145.81 -18.23 58.32	
31 23 16 36-0010 CY Excavation For Building Foundations And Other Structures By Hand in Loose Rock Note: Includes compacted aggregate	250.11	
31 23 16 36-0011 Relocating On Site Excavated Stockpiled Material From Excavation <small>(31 23 16 36)</small> Note: For building foundations and other structures.		
31 23 16 36-0012 CY Relocating On Site Excavated Stockpiled Material With Dozer From Excavation For Building Foundations and Other Structures >100' to 300' For Up To 20, Add For >20 To 50, Add For >50 To 250, Add For >250 To 500, Add	6.03 6.03 4.52 2.41 0.90	
31 23 16 36-0013 CY Relocating On Site Excavated Stockpiled Material With Dozer From Excavation For Building Foundations and Other Structures >300' to 500' For Up To 20, Add For >20 To 50, Add For >50 To 250, Add For >250 To 500, Add	9.05 9.05 6.79 3.62 1.36	

31	31	Earthwork
	31 20	Earth Moving
	31 23	Excavation and Fill



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
31 23 16 36-0014	CY	Relocating On Site Excavated Stockpiled Material With Dozer From Excavation For Building Foundations and Other Structures >500' to 1,000'	13.58	
		<i>For Up To 20, Add</i>	13.58	
		<i>For >20 To 50, Add</i>	10.19	
		<i>For >50 To 250, Add</i>	5.43	
		<i>For >250 To 500, Add</i>	2.04	
31 23 16 36-0015	CY	Relocating On Site Excavated Stockpiled Material With Dozer From Excavation For Building Foundations and Other Structures >1,000'	18.10	
		<i>For Up To 20, Add</i>	18.10	
		<i>For >20 To 50, Add</i>	13.58	
		<i>For >50 To 250, Add</i>	7.24	
		<i>For >250 To 500, Add</i>	2.72	
31 23 16 36-0016		Backfilling <small>(31 23 16 36)</small>		
		Note: For building foundations and other structures with imported or stockpiled materials. Includes rough grading each backfill lift.		
31 23 16 36-0017	CY	Backfilling Around Building Foundations And Other Structures By Skid-Steer Loader	4.96	
		<i>For Up To 20, Add</i>	4.96	
		<i>For >20 To 50, Add</i>	3.72	
		<i>For >50 To 250, Add</i>	1.98	
		<i>For >250 To 500, Add</i>	0.74	
31 23 16 36-0018	CY	Backfilling Around Building Foundations And Other Structures By Hydraulic Excavator, Backhoe, Loader	5.81	
		<i>For Up To 20, Add</i>	5.81	
		<i>For >20 To 50, Add</i>	4.36	
		<i>For >50 To 250, Add</i>	2.32	
		<i>For >250 To 500, Add</i>	0.87	
31 23 16 36-0019	CY	Backfilling Around Building Foundations And Other Structures By Hand	69.43	
31 23 16 36-0020		Compaction Of Fill Or Subbase <small>(31 23 16 36)</small>		
		Note: For building foundations and other structures.		
31 23 16 36-0021	CY	Compaction Of Fill Or Subbase For Building Foundations and Other Structures by Vibratory Plate, Air Tamper, Etcetera	13.39	
		<i>For Up To 20, Add</i>	13.39	
		<i>For >20 To 50, Add</i>	10.04	
		<i>For >50 To 250, Add</i>	5.36	
		<i>For >250 To 500, Add</i>	2.01	
31 23 16 36-0022	CY	Compaction Of Fill Or Subbase For Building Foundations and Other Structures by Hand	45.68	
31 23 16 36-0023		Grading For Building Foundations And Other Structures <small>(31 23 16 36)</small>		
31 23 16 36-0024	SY	Rough Grading For Building Foundations And Other Structures by Machine	1.30	
31 23 16 36-0025	SY	Finish Grading For Building Foundations And Other Structures by Machine	2.09	
31 23 16 36-0026	SY	Finish Grading For Building Foundations And Other Structures by Hand	13.50	
31 23 16 36-0027		Loading Excess Material For Removal From Excavation <small>(31 23 16 36)</small>		
		Note: For building foundations and other structures. Includes hand work by laborer for clean-up. Not to be used when excavated material can be loaded directly into truck instead of stock-piling. See CSI section 01 74 19 00-0040 for hauling.		
31 23 16 36-0028	CY	Load Excess Material For Removal From Excavation For Building Foundations and Other Structures by Machine	6.50	
		<i>For Up To 20, Add</i>	6.50	
		<i>For >20 To 50, Add</i>	4.88	
		<i>For >50 To 250, Add</i>	2.60	
		<i>For >250 To 500, Add</i>	0.98	
31 23 16 36-0029	CY	Load Excess Material For Removal From Excavation For Building Foundations and Other Structures by Hand	106.92	
31 23 16 36-0030		Spread Excess Or Imported Material And Grade On Site <small>(31 23 16 36)</small>		
		Note: For building foundations and other structures.		
31 23 16 36-0031	CY	Spread Excess Or Imported Material And Rough Grade On Site By Machine	3.51	
		<i>For Up To 20, Add</i>	3.51	
		<i>For >20 To 50, Add</i>	2.63	
		<i>For >50 To 250, Add</i>	1.40	
		<i>For >250 To 500, Add</i>	0.53	
31 23 16 36-0032	CY	Spread Excess Or Imported Material And Rough Grade On Site By Hand	59.00	
31 23 23		Fill <small>(31 23)</small>		
31 23 23 23		Compaction <small>(31 23 23)</small>		
31 23 23 23-0001		Compaction Water, Water Truck And Operator <small>(31 23 23 23)</small>		
31 23 23 23-0002	MGL	Compaction Water, Water Truck And Operator	295.68	
		Note: Use this task in situations where earth fill, base material, etc. requires additional moisture to comply with the compaction specification. Includes delivery up to 15 miles. (Per each 1,000 gallons of water)		
31 23 23 33		Flowable Fill <small>(31 23 23)</small>		
31 23 23 33-0001		Flowable Fill (Fly Ash) Cement Backfill For Trenches <small>(31 23 23 33)</small>		
		Note: Includes compaction and restoration of final grade.		



Earthwork	31	13
Earth Moving	31 20	
Excavation and Fill	31 23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 23 23 33-0002 CY Flowable Fill (Fly Ash) Cement Backfill for Trenches.....	146.11	
For Up To 20, Add	60.32	
For >20 To 50, Add	39.12	
For >50 To 250, Add	19.56	
For >500 To 1,000, Deduct	-10.60	
For >1,000, Deduct	-21.21	
31 24 Embankments <small>(31 20)</small>		
31 24 13 Roadway Embankments <small>(31 24)</small>		
31 24 13 00-0001 Roadway, Parking Areas, Landscaping And Embankment Excavation And Shaping Operations <small>(31 24 13)</small>		
Note: Use this section for excavation and shaping operations even if the total quantity for the project exceeds 500 CY.		
31 24 13 00-0002 Cutting, Shaping And Rough Grading <small>(31 24 13 00-0001)</small>		
Note: For roadways, parking areas, landscaping, and embankments. Includes loading or stockpiling excess materials within 300' of initial cut.		
31 24 13 00-0003 Cutting, Shaping, And Rough Grading <small>(31 24 13 00-0002)</small>		
31 24 13 00-0004 CY Cut, Shape, and Rough Grading for Roadways, Parking Areas, Landscaping and Embankments by Machine in Soil.....	7.54	
For Up To 20, Add	7.54	
For >20 To 50, Add	5.66	
For >50 To 250, Add	3.02	
For >250 To 500, Add	1.13	
For >1,000, Deduct	-1.13	
31 24 13 00-0005 CY Cut, Shape, and Rough Grading for Roadways, Parking Areas, Landscaping and Embankments by Machine in Loose Rock.....	9.35	
Note: Includes compacted aggregate		
For Up To 20, Add	9.35	
For >20 To 50, Add	7.01	
For >50 To 250, Add	3.74	
For >250 To 500, Add	1.40	
For >1,000, Deduct	-1.40	
31 24 13 00-0006 Cutting, Shaping, And Rough Grading By Hand <small>(31 24 13 00-0002)</small>		
31 24 13 00-0007 SY Shape Embankment/Slope By Hand Up To 1 On 4 Slope.....	7.47	
31 24 13 00-0008 SY Shape Embankment/Slope By Hand Greater Than 1 On 4 Slope.....	9.72	
31 24 13 00-0009 Scarify Soil <small>(31 24 13 00-0001)</small>		
Note: For roadways, parking areas, landscaping and embankments by machine.		
31 24 13 00-0010 CSF Scarify Soil For Roadways, Parking Areas, Landscaping And Embankments By Machine.....	6.99	
For Up To 20, Add	3.50	
For >20 To 50, Add	1.75	
For >250 To 500, Deduct	-0.70	
For >500, Deduct	-1.40	
31 24 13 00-0011 Relocating On Site Excavated Material <small>(31 24 13 00-0001)</small>		
31 24 13 00-0012 CY >500' To 1,000', Relocating On Site Excavated Material For Roadways, Parking Areas, Landscaping And Embankments By Machine.....	13.58	
For Up To 20, Add	13.58	
For >20 To 50, Add	10.19	
For >50 To 250, Add	5.43	
For >250 To 500, Add	2.04	
For >1,000, Deduct	-2.04	
31 24 13 00-0013 CY >1,000', Relocating On Site Excavated Material For Roadways, Parking Areas, Landscaping And Embankments By Machine.....	18.10	
For Up To 20, Add	18.10	
For >20 To 50, Add	13.58	
For >50 To 250, Add	7.24	
For >250 To 500, Add	2.72	
For >1,000, Deduct	-2.72	
31 24 13 00-0014 Spread And Shape Imported Or Stockpiled Material <small>(31 24 13 00-0001)</small>		
Note: For roadways, parking areas, landscaping and embankments. See CSI section 31 23 16 36-0032 for spreading material by hand.		
31 24 13 00-0015 CY Spread And Shape Imported Or Stockpiled Material For Roadways, Parking Areas, Landscaping and Embankments By Machine.....	8.30	
For Up To 20, Add	8.30	
For >20 To 50, Add	6.23	
For >50 To 250, Add	3.32	
For >250 To 500, Add	1.25	
For >1,000, Deduct	-1.25	
31 24 13 00-0016 Grading <small>(31 24 13 00-0001)</small>		
Note: For roadways, parking areas, landscaping and embankments by machine.		
31 24 13 00-0017 SY Rough Grade Roadway, Parking Areas, Landscaping And Embankments By Machine.....	0.85	

31	31 Earthwork
	31 20 Earth Moving
	31 24 Embankments



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 24 13 00-0018	SY	Finish Grade Roadway, Parking Areas, Landscaping And Embankments By Machine	1.13
31 24 13 00-0019	LF	Finish Grade For Curb	1.28
31 24 13 00-0020	LF	Finish Grade For Curb And Gutter	1.57

31 24 13 00-0021 Compaction Of Fill Or Subbase <small>(31 24 13 00-0001)</small>			
Note: For roadways, parking areas, landscaping and embankments by machine, per lift.			
31 24 13 00-0022	SY	Compaction Of Fill Or Subbase For Roadways, Parking Areas, Landscaping And Embankments By Machine Per Lift.....	0.76
		<i>For Up To 250, Add</i>	<i>0.76</i>
		<i>For >250 To 500, Add</i>	<i>0.57</i>
		<i>For >500 To 1,000, Add</i>	<i>0.30</i>
		<i>For >5,000, Deduct</i>	<i>-0.11</i>

31 24 13 00-0023 Loading Excess Material For Removal From Excavation <small>(31 24 13 00-0001)</small>			
Note: For roadways, parking areas, landscaping and embankments by machine. Includes hand work by laborer for clean-up.			
31 24 13 00-0024	CY	Load Excess Material For Removal For Roadways, Parking Areas, Landscaping and Embankments by Machine	6.24
		<i>For Up To 20, Add</i>	<i>6.24</i>
		<i>For >20 To 50, Add</i>	<i>4.68</i>
		<i>For >50 To 250, Add</i>	<i>2.50</i>
		<i>For >250 To 500, Add</i>	<i>0.94</i>
		<i>For >1,000, Deduct</i>	<i>-0.94</i>

31 25 Erosion and Sedimentation Controls (31 20)

31 25 14 Stabilization Measures for Erosion and Sedimentation Control (31 25)

31 25 14 13 Hydraulically-Applied Erosion Control (31 25 14)

31 25 14 13-0001 Bonded Fiber Matrix <small>(31 25 14 13)</small>			
31 25 14 13-0002	MSF	Up To 25,000 SF Bonded Fiber Matrix, Hydraulically Applied	64.11
31 25 14 13-0003	MSF	>25,000 To 50,000 SF Bonded Fiber Matrix, Hydraulically Applied	58.79
31 25 14 13-0004	MSF	>50,000 To 100,000 SF Bonded Fiber Matrix, Hydraulically Applied	54.27
31 25 14 13-0005	MSF	>100,000 Bonded Fiber Matrix, Hydraulically Applied	51.69

31 25 14 16 Rolled Erosion Control Mats and Blankets (31 25 14)

Note: Includes all staples and stakes for erosion control blankets and turf reinforcement mats.

31 25 14 16-0001 Erosion Control Blankets And Turf Reinforcement Mats <small>(31 25 14 16)</small>			
31 25 14 16-0002 Erosion Control Blankets, Short Term, Light Duty <small>(31 25 14 16-0001)</small>			
31 25 14 16-0003	SY	S75 Single Net Erosion Control Blanket	3.59
		Note: Straw matrix with degradable thread to a single standard photodegradable polypropylene netting as manufactured by North American Green.	
31 25 14 16-0004	SY	S75BN Single Net Erosion Control Blanket	4.67
		Note: Straw Matrix with Biodegradable Thread to a Single Natural Fiber Netting as manufactured by North American Green.	
31 25 14 16-0005	SY	Curlex 1, Single Net Erosion Control Blanket	3.40
		Note: As manufactured by American Excelsior.	
31 25 14 16-0006	SY	Curlex 1, Single Net Erosion Control Blanket	3.59
		Note: As manufactured by American Green.	
31 25 14 16-0007	SY	Futerra Erosion Control Blanket, Wood Fibers With Biodegradable Netting	3.17
31 25 14 16-0008 Erosion Control Blankets, Intermediate Duration <small>(31 25 14 16-0001)</small>			
31 25 14 16-0009	SY	S150 Double Net Erosion Control Blanket	4.64
		Note: Straw matrix with degradable thread to a double standard photodegradable polypropylene netting as manufactured by North American Green.	
31 25 14 16-0010	SY	S150 BN Double Net Erosion Control Blanket	6.32
		Note: Straw matrix with biodegradable thread to a double natural fiber netting as manufactured by North American Green.	
31 25 14 16-0011	SY	Curlex II, Double Net Erosion Control Blanket, Natural	3.84
		Note: As manufactured by American Excelsior.	
31 25 14 16-0012	SY	Curlex II, Double Net Erosion Control Blanket, Green	4.03
		Note: As manufactured by American Excelsior.	
31 25 14 16-0013	SY	Enforcer Double Net Erosion Control Blanket	4.31
		Note: As manufactured by American Excelsior.	
31 25 14 16-0014 Turf Reinforcement Mats (TRM) <small>(31 25 14 16-0001)</small>			
		Note: Permanent, UV stabilized.	
31 25 14 16-0015	SY	P300 Permanent Polypropylene Turf Reinforcement Mat	14.90
		Note: 100% synthetic, UV stabilized, two layer netting.	
31 25 14 16-0016	SY	C350 Permanent Turf Reinforcement Mat	13.73
		Note: 100% synthetic, UV stabilized netting incorporating natural coconut fibers as manufactured by North American Green.	
31 25 14 16-0017	SY	Recyclex TRM, Permanent Turf Reinforcement Mat	19.32
		Note: As manufactured by American Excelsior, 100% recycled	



Earthwork	31	15
Earth Moving	31 20	
Erosion and Sedimentation Controls	31 25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 25 14 16-0018 Jute Mesh Erosion Control Blankets (31 25 14 16-0001)		
31 25 14 16-0019 SY Jute Mesh, Open Uniform Weave.....	5.99	
31 25 14 16-0020 Revegetation Mat (31 25 14 16-0001)		
31 25 14 16-0021 SY 3-Dimensional Webbed Revegetation Mat, Polyolefin Fiber.....	11.45	
Note: Polyolefin fibers oriented and mechanically bonded between two nets. Landlok TRM 450 or equal.		
31 25 14 16-0022 SY Webbed Revegetation Mat, Polypropylene Fiber.....	16.36	
Note: Polypropylene fibers positioned between two high strength biaxially oriented nets and mechanically held together by parallel stitching with polypropylene thread. Landlok TRM 1060 or equal.		
31 25 14 23 Stabilization Measures for Erosion Control (31 25 14)		
See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.		
31 25 14 23-0001 Sand Bags (31 25 14 23)		
Note: Bags filled on site with delivered material. Includes material and placement of bags.		
31 25 14 23-0002 BAG 50 LB Capacity Sand Bag With Sand	7.27	3.07
For >2,500 To 5,000, Deduct		
	-0.61	
For >5,000, Deduct		
	-1.34	
31 25 14 23-0003 BAG 75 LB Capacity Sand Bag With Sand	9.37	3.82
For >2,500 To 5,000, Deduct		
	-0.76	
For >5,000, Deduct		
	-1.70	
31 25 14 23-0004 BAG 100 LB Capacity Sand Bag With Sand	11.79	4.56
For >2,500 To 5,000, Deduct		
	-0.91	
For >5,000, Deduct		
	-2.09	
31 25 14 23-0005 BAG 125 LB Capacity Sand Bag With Sand	14.51	5.71
For >2,500 To 5,000, Deduct		
	-1.14	
For >5,000, Deduct		
	-2.59	
31 25 14 23-0006 BAG 150 LB Capacity Sand Bag With Sand	17.66	6.84
For >2,500 To 5,000, Deduct		
	-1.37	
For >5,000, Deduct		
	-3.14	
31 25 14 23-0007 BAG 175 LB Capacity Sand Bag With Sand	20.56	7.78
For >2,500 To 5,000, Deduct		
	-1.56	
For >5,000, Deduct		
	-3.61	
31 25 14 23-0008 BAG 2,000 LB Capacity Sand Bag With Sand	160.18	53.27
For >2,500 To 5,000, Deduct		
	-9.64	
For >5,000, Deduct		
	-25.66	
31 25 14 23-0009 BAG 3,000 LB Capacity Sand Bag With Sand	206.95	58.60
For >2,500 To 5,000, Deduct		
	-10.61	
For >5,000, Deduct		
	-31.30	
31 25 14 23-0010 Gravel Bags (31 25 14 23)		
Note: Bags filled on site with delivered material. Includes material and placement of bags.		
31 25 14 23-0011 BAG 30 LB Capacity Gravel Bag With Gravel	6.74	2.04
For >2,500 To 5,000, Deduct		
	-0.41	
For >5,000, Deduct		
	-1.08	
31 25 14 23-0012 BAG 50 LB Capacity Gravel Bag With Gravel	12.04	3.07
For >2,500 To 5,000, Deduct		
	-0.61	
For >5,000, Deduct		
	-1.82	
31 25 14 23-0013 Floating Turbidity Curtain (31 25 14 23)		
Note: Type 2 DOT fabric - 18 oz. nominal laminated vinyl/polyester. EPS flotation, 6 in. x 6 in., 13.5 lb./ft. buoyancy in fresh water and 14.4 lb./ft buoyancy in saltwater.		
31 25 14 23-0014 LF 3' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	27.96	
For Type 1, Deduct		
	-4.23	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-2.58	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	3.13	
31 25 14 23-0015 LF 4' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	30.28	
For Type 1, Deduct		
	-4.66	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-2.84	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	3.44	
31 25 14 23-0016 LF 5' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	33.48	
For Type 1, Deduct		
	-5.28	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-3.21	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	3.90	
31 25 14 23-0017 LF 6' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	36.22	
For Type 1, Deduct		
	-5.79	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-3.52	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	4.28	
31 25 14 23-0018 LF 7' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	38.01	
For Type 1, Deduct		
	-6.07	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-3.69	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	4.49	
31 25 14 23-0019 LF 8' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	39.81	
For Type 1, Deduct		
	-6.35	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-3.87	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	4.70	
31 25 14 23-0020 LF 9' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	41.89	
For Type 1, Deduct		
	-6.69	
For 13 Oz PVC Fabric, Type 2, Deduct		
	-4.07	
For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add		
	4.95	

31	31	Earthwork
	31 20	Earth Moving
	31 25	Erosion and Sedimentation Controls



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
31 25 14 23-0021	LF	10' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	44.74	
		<i>For Type 1, Deduct</i>	-7.20	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-4.38	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	5.32	
31 25 14 23-0022	LF	12' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	47.01	
		<i>For Type 1, Deduct</i>	-7.57	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-4.61	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	5.59	
31 25 14 23-0023	LF	13' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	50.04	
		<i>For Type 1, Deduct</i>	-8.10	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-4.93	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	5.99	
31 25 14 23-0024	LF	14' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	52.87	
		<i>For Type 1, Deduct</i>	-8.58	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-5.22	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	6.34	
31 25 14 23-0025	LF	15' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	55.62	
		<i>For Type 1, Deduct</i>	-9.03	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-5.50	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	6.68	
31 25 14 23-0026	LF	16' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	60.48	
		<i>For Type 1, Deduct</i>	-9.97	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-6.07	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	7.37	
31 25 14 23-0027	LF	17' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	63.42	
		<i>For Type 1, Deduct</i>	-10.45	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-6.36	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	7.72	
31 25 14 23-0028	LF	18' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	66.29	
		<i>For Type 1, Deduct</i>	-10.90	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-6.63	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	8.05	
31 25 14 23-0029	LF	19' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	69.32	
		<i>For Type 1, Deduct</i>	-11.38	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-6.93	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	8.41	
31 25 14 23-0030	LF	20' High, 18 Oz PVC Coated Polyester, Type 2 DOT Turbidity Curtain.....	72.28	
		<i>For Type 1, Deduct</i>	-11.83	
		<i>For 13 Oz PVC Fabric, Type 2, Deduct</i>	-7.20	
		<i>For 22 Oz PVC Fabric, Type 2 Heavy Duty, Add</i>	8.74	
31 25 14 23-0031		Turbidity Curtain Anchors <small>(31 25 14 23)</small>		
31 25 14 23-0032	EA	14 LB, Turbidity Curtain Anchor System.....	738.78	
		Note: Includes anchor, anchor chain, and marker buoy and rope.		
31 25 14 23-0033	EA	25 LB, Turbidity Curtain Anchor System.....	1,011.36	
		Note: Includes anchor, anchor chain, and marker buoy and rope.		
31 25 14 23-0034	EA	40 LB, Turbidity Curtain Anchor System.....	1,285.13	
		Note: Includes anchor, anchor chain, and marker buoy and rope.		
31 25 14 23-0035	EA	65 LB, Turbidity Curtain Anchor System.....	1,679.37	
		Note: Includes anchor, anchor chain, and marker buoy and rope.		
31 25 14 23-0036		Filter Bags <small>(31 25 14 23)</small>		
31 25 14 23-0037		Non-Woven Filter Bags <small>(31 25 14 23-0036)</small>		
31 25 14 23-0038	EA	6' x 15' Non-Woven Filter Bag	251.82	
31 25 14 23-0039	EA	13' x 15' Non-Woven Filter Bag	364.19	
31 25 14 23-0040	EA	15' x 15' Non-Woven Filter Bag	418.94	
31 25 14 23-0041		Monofilament Filter Bags <small>(31 25 14 23-0036)</small>		
31 25 14 23-0042	EA	5' x 15' Monofilament Filter Bag	261.75	
31 25 14 23-0043	EA	10' x 15' Monofilament Filter Bag	362.17	
31 25 14 23-0044		Cable Articulating Concrete Block <small>(31 25 14 23)</small>		
		Note: 4000 PSI Compressive strength, 12 LB/CF maximum absorption. Interlocking block with longitudinal revetment cable. Includes anchoring block to 12" x 12" x 6" concrete pier every 5' with anchor and filling cells with stockpiled material. Excludes site preparation and imported materials.		
31 25 14 23-0045	SF	4.75" Open Cell Articulated Concrete Block With Earth Backfill.....	43.35	
		<i>For Up To 500, Add</i>	9.97	
		<i>For >500 To 1,000, Add</i>	5.58	
31 25 14 23-0046	SF	6" Open Cell Articulated Concrete Block With Earth Backfill	49.28	
		<i>For Up To 500, Add</i>	11.21	
		<i>For >500 To 1,000, Add</i>	6.28	
31 25 14 23-0047	SF	7.5" Open Cell Articulated Concrete Block With Earth Backfill.....	56.12	
		<i>For Up To 500, Add</i>	12.72	
		<i>For >500 To 1,000, Add</i>	7.10	
31 25 14 23-0048	SF	9" Open Cell Articulated Concrete Block With Earth Backfill	63.17	
		<i>For Up To 500, Add</i>	14.29	
		<i>For >500 To 1,000, Add</i>	7.97	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
				31 25 14 23-0049 SF 4.75" Closed Cell Articulated Concrete Block .....46.13 <i>For Up To 500, Add 10.47</i> <i>For >500 To 1,000, Add 5.86</i>		
				31 25 14 23-0050 SF 6" Closed Cell Articulated Concrete Block .....52.61 <i>For Up To 500, Add 11.88</i> <i>For >500 To 1,000, Add 6.62</i>		
				31 25 14 23-0051 SF 7.5" Closed Cell Articulated Concrete Block .....60.06 <i>For Up To 500, Add 13.50</i> <i>For >500 To 1,000, Add 7.50</i>		
				31 25 14 23-0052 SF 9" Closed Cell Articulated Concrete Block .....67.68 <i>For Up To 500, Add 15.19</i> <i>For >500 To 1,000, Add 8.43</i>		
31 25 14 26 Stabilization Measures for Sedimentation Control (31 25 14)						
				31 25 14 26-0001 Silt Fences And Dike Barriers (31 25 14 26) Note: Includes stakes and embedding.		
				31 25 14 26-0002 Silt Fences 2' High (31 25 14 26-0001) See CSI section 31 25 14 26-0014 for removal of silt fence.		
			LF	2' High Silt Fence with Stakes at 4' On Center .....4.27		
			LF	2' High Silt Fence with Stakes at 6' On Center .....3.40		
			LF	2' High Silt Fence with Stakes at 8' On Center .....2.50		
			LF	2' High Silt Fence with Stakes at 10' On Center .....2.23		
				31 25 14 26-0007 Silt Fences 3' High (31 25 14 26-0001) See CSI section 31 25 14 26-0014 for removal of silt fence.		
			LF	3' High Silt Fence with Stakes at 4' On Center .....5.44		
			LF	3' High Silt Fence with Stakes at 6' On Center .....4.49		
			LF	3' High Silt Fence with Stakes at 8' On Center .....3.14		
			LF	3' High Silt Fence with Stakes at 10' On Center .....2.76		
				31 25 14 26-0012 Silt Dike Barrier (31 25 14 26-0001)		
			LF	Silt Dike Barrier With Stakes .....5.75		
				31 25 14 26-0014 Silt Fences Removal (31 25 14 26-0001)		
			LF	Removal Of Silt Fence And Stakes .....0.97		
				31 25 14 26-0016 Hay And Straw Bales (31 25 14 26) Note: Includes trench for placement, and stakes.		
			LF	Place Sterilized Straw Bales .....4.56 Note: Includes securing in ground with stakes. See CSI section 31 25 14 26-0019 for removal of straw bale.		
			LF	Place Hay Bales .....4.34 Note: Includes securing in ground with stakes. See CSI section 31 25 14 26-0019 for removal of hay bale.		
			LF	Removal Of Hay Or Straw Bales .....1.74 Note: Includes removal of stakes.		
				31 25 14 26-0020 Sediment Logs (Degradable) (31 25 14 26)		
				31 25 14 26-0021 Sediment Logs (Degradable) (31 25 14 26-0020) Note: Includes stakes and removal after use. Curlex sediment logs as manufactured by American Excelsior.		
			LF	9" Sediment Fiber Roll Log .....7.70		
			LF	12" Sediment Fiber Roll Log .....8.96		
			LF	20" Sediment Fiber Roll Log .....14.21		
				31 25 14 26-0025 Wattles (Degradable) With UV Stabilized Synthetic Netting (31 25 14 26-0020) Note: Includes trench for placement, 24" wood staking at 4' on-center		
			EA	Wattles (Sterile Straw Filled Rolls), 8" x 25' .....143.13		
			EA	Wattles (Sterile Straw Filled Rolls), 9" x 25' .....151.77		
			EA	Wattles (Sterile Straw Filled Rolls), 12" x 20' .....167.25		
			EA	Wattles (Sterile Straw Filled Rolls), 20" x 10' .....191.74		
				31 25 14 26-0030 Inlet Protection Sediment Bags (31 25 14 26) Note: Includes removal, cleaning, and replacement per each location.		
			EA	2' x 2' x 3' Inlet Protection Sediment Bag .....91.22		
			EA	2' x 3' x 3' Inlet Protection Sediment Bag .....106.90		
			EA	2' x 4' x 3' Inlet Protection Sediment Bag .....116.81		
31 30 Earthwork Methods (31)						
31 31 Soil Treatment (31 30)						
31 31 19 Vegetation Control (31 31)						

31	31	Earthwork
	31 30	Earthwork Methods
	31 31	Soil Treatment



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

31 31 19 13 Chemical Vegetation Control (31 31 19)

31 31 19 13-0001	Soil Sterilants <small>(31 31 19 13)</small>	
31 31 19 13-0002	MSF Soil Sterilant.....	33.40
	Note: Use only in areas where complete control of all vegetation is desired, such as industrial sites, right-of-way, lumberyards, petroleum tank farms, around farm buildings, along fence lines, etc. When applied to the soil, this product usually inhibits plant growth for a year or more.	
	<i>For >45 To 90, Deduct</i>	-0.51
	<i>For >90 To 225, Deduct</i>	-2.69
	<i>For >225, Deduct</i>	-3.70

31 32 Soil Stabilization (31 32)

31 32 13 Soil Mixing Stabilization (31 32)

31 32 13 16 Cement Soil Stabilization (31 32 13)

31 32 13 16-0001	Cementitious Soil Binder <small>(31 32 13 16)</small>	
31 32 13 16-0002	CY Cementitious Soil Binder, 4% Cement Mix By Volume	41.51
31 32 13 16-0003	CY Cementitious Soil Binder, 6% Cement Mix By Volume	47.63
31 32 13 16-0004	CY Cementitious Soil Binder, 9% Cement Mix By Volume	57.71
31 32 13 16-0005	CY Cementitious Soil Binder, 12% Cement Mix By Volume	67.63

31 32 13 19 Lime Soil Stabilization (31 32 13)

Note: Includes delivery up to 15 miles from the closest approved source, the cost for loading, and dumping. The price excludes the cost for spreading or backfilling. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

31 32 13 19-0001	Lime Slurry <small>(31 32 13 19)</small>	
31 32 13 19-0002	LCY Soil Stabilization With Lime Slurry 10% Lime Slurry By Volume.....	37.31
31 32 13 19-0003	TON Cement Stabilized Base Material.....	129.16
31 32 13 19-0004	CWT Lime For Soil Stabilization	20.74
	Note: Excludes the cost for spreading or backfilling	
31 32 13 19-0005	LCY Roller, Grader - Lime Stabilization	19.06
31 32 13 19-0006	LCY Roller, Grader - Cement Stabilization	4.44

31 32 13 19-0007 Lime Stabilized Subgrade (31 32 13 19)

Note: Based on soil weight of 110 LB/CF using lime weight of 5.5 LB/CF (5%).

31 32 13 19-0008	SY 6" Thick Lime Stabilized Subgrade, 25 LB.....	12.90
	<i>For 4% Lime Instead Of 5%, Deduct</i>	-0.37
	<i>For 6% Lime Instead Of 5%, Add</i>	0.37
31 32 13 19-0009	SY 7" Thick Lime Stabilized Subgrade, 29 LB.....	14.96
	<i>For 4% Lime Instead Of 5%, Deduct</i>	-0.42
	<i>For 6% Lime Instead Of 5%, Add</i>	0.42
31 32 13 19-0010	SY 8" Thick Lime Stabilized Subgrade, 33 LB.....	17.07
	<i>For 4% Lime Instead Of 5%, Deduct</i>	-0.48
	<i>For 6% Lime Instead Of 5%, Add</i>	0.48

31 32 13 29 Liquid Soil Stabilization (31 32 13)

31 32 13 29-0001	GAL Polyacrylamide And Calcium Solution	2.86
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31 32 19 Geosynthetic Soil Stabilization and Layer Separation (31 32)

31 32 19 13 Geogrid Soil Stabilization (31 32 19)

31 32 19 13-0001	Geogrid Fabrics <small>(31 32 19 13)</small>	
	Note: For reinforcement of over steepened earth slopes, segmental retaining walls and other mechanically stabilized earth applications.	
31 32 19 13-0002	SY 5.3 Ounce/SY, 1,700 LB/FT Wide Width Tensile Ultimate Bi-Directional Woven Polyester Geogrid Fabric (Carthage Mills GX-150).....	5.45
	<i>For Up To 50, Add</i>	1.21
	<i>For >50 To 150, Add</i>	0.90
	<i>For >150 To 250, Add</i>	0.59
	<i>For >250 To 500, Add</i>	0.29
31 32 19 13-0003	SY 6.9 Ounce/SY, 3,100 LB/FT Wide Width Tensile Ultimate Bi-Directional Woven Polyester Geogrid Fabric (Carthage Mills GX-300).....	6.22
	<i>For Up To 50, Add</i>	1.37
	<i>For >50 To 150, Add</i>	1.02
	<i>For >150 To 250, Add</i>	0.66
	<i>For >250 To 500, Add</i>	0.33
31 32 19 13-0004	SY 8.7 Ounce/SY, 4,280 LB/FT Wide Width Tensile Ultimate Bi-Directional Woven Polyester Geogrid Fabric (Carthage Mills GX-500).....	6.79
	<i>For Up To 50, Add</i>	1.49
	<i>For >50 To 150, Add</i>	1.11
	<i>For >150 To 250, Add</i>	0.72
	<i>For >250 To 500, Add</i>	0.36



Earthwork	31	13
Earthwork Methods	31 30	
Soil Stabilization	31 32	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 32 19 13-0005	SY	12.6 Ounce/SY, 7,315 LB/FT Wide Width Tensile Ultimate Bi-Directional Woven Polyester Geogrid Fabric (Carthage Mills GX-800).....	9.77
		For Up To 50, Add	2.09
		For >50 To 150, Add	1.56
		For >150 To 250, Add	1.02
		For >250 To 500, Add	0.51
31 32 19 13-0006	SY	14.1 Ounce/SY, 9,790 LB/FT Wide Width Tensile Ultimate Bi-Directional Woven Polyester Geogrid Fabric (Carthage Mills GX-1000).....	11.18
		For Up To 50, Add	2.38
		For >50 To 150, Add	1.77
		For >150 To 250, Add	1.17
		For >250 To 500, Add	0.58
31 32 19 13-0007	SY	4.3 Ounce/SY, 1,658 LB/FT Wide Width Tensile Ultimate Bi-Axial Extruded Polypropylene Geogrid Fabric (Carthage Mills Enkagrid Max 20).....	5.54
		For Up To 50, Add	1.23
		For >50 To 150, Add	0.91
		For >150 To 250, Add	0.59
		For >250 To 500, Add	0.30
31 32 19 13-0008	SY	5.9 Ounce/SY, 2,192 LB/FT Wide Width Tensile Ultimate Bi-Axial Extruded Polypropylene Geogrid Fabric (Carthage Mills Enkagrid Max 30).....	8.16
		For Up To 50, Add	1.76
		For >50 To 150, Add	1.31
		For >150 To 250, Add	0.86
		For >250 To 500, Add	0.43

31 32 19 16 Geotextile Soil Stabilization (31 32 19)

31 32 19 16-0001 Nonwoven Polypropylene Geotextiles (31 32 19 16)

Note: For drainage, filtration and separation.

31 32 19 16-0002	SY	3.0 Ounce/SY, 40 Mil, 80 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-30HS).....	1.70
		For Up To 50, Add	0.39
		For >50 To 150, Add	0.29
		For >150 To 250, Add	0.19
		For >250 To 500, Add	0.09
31 32 19 16-0003	SY	3.5 Ounce/SY, 50 Mil, 95 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-35HS).....	1.82
		For Up To 50, Add	0.41
		For >50 To 150, Add	0.31
		For >150 To 250, Add	0.20
		For >250 To 500, Add	0.10
31 32 19 16-0004	SY	4.0 Ounce/SY, 60 Mil, 115 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-40HS).....	1.97
		For Up To 50, Add	0.44
		For >50 To 150, Add	0.33
		For >150 To 250, Add	0.21
		For >250 To 500, Add	0.11
31 32 19 16-0005	SY	4.5 Ounce/SY, 55 Mil, 120 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-45HS).....	2.12
		For Up To 50, Add	0.47
		For >50 To 150, Add	0.35
		For >150 To 250, Add	0.23
		For >250 To 500, Add	0.11
31 32 19 16-0006	SY	6.0 Ounce/SY, 70 Mil, 160 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-60HS).....	2.52
		For Up To 50, Add	0.55
		For >50 To 150, Add	0.41
		For >150 To 250, Add	0.27
		For >250 To 500, Add	0.13
31 32 19 16-0007	SY	7.0 Ounce/SY, 85 Mil, 180 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-70HS).....	2.94
		For Up To 50, Add	0.65
		For >50 To 150, Add	0.48
		For >150 To 250, Add	0.31
		For >250 To 500, Add	0.16
31 32 19 16-0008	SY	8.0 Ounce/SY, 85 Mil, 205 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-80HS).....	3.24
		For Up To 50, Add	0.71
		For >50 To 150, Add	0.52
		For >150 To 250, Add	0.34
		For >250 To 500, Add	0.17
31 32 19 16-0009	SY	10 Ounce/SY, 115 Mil, 250 LB Grab Tensile Nonwoven Polypropylene Geotextile Fabric (Carthage Mills FX-100HS).....	4.00
		For Up To 50, Add	0.86
		For >50 To 150, Add	0.64
		For >150 To 250, Add	0.42
		For >250 To 500, Add	0.21

31 32 19 16-0010 Woven Geotextiles Fabric (31 32 19 16)

31 32 19 16-0011	SY	200 LB Grab Tensile Woven Slit Film Geotextile Fabric (Carthage Mills FX-55).....	2.46
		For Up To 50, Add	0.54
		For >50 To 150, Add	0.40
		For >150 To 250, Add	0.26
		For >250 To 500, Add	0.13
31 32 19 16-0012	SY	315 LB Grab Tensile Woven Slit Film Geotextile Fabric (Carthage Mills FX-66).....	3.45
		For Up To 50, Add	0.74
		For >50 To 150, Add	0.55
		For >150 To 250, Add	0.36
		For >250 To 500, Add	0.18

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31 32 19 16-0013	SY	4 To 6% Open Area, 370 x 250 LB Grab Tensile Woven Monofilament Geotextile Fabric (Carthage Mills Carthage 6%)	6.08
		<i>For Up To 50, Add</i>	1.27
		<i>For >50 To 150, Add</i>	0.95
		<i>For >150 To 250, Add</i>	0.63
		<i>For >250 To 500, Add</i>	0.31
31 32 19 16-0014	SY	11 To 15% Open Area, 370 x 220 LB Grab Tensile Woven Monofilament Geotextile Fabric (Carthage Mills Carthage 15%)	5.93
		<i>For Up To 50, Add</i>	1.24
		<i>For >50 To 150, Add</i>	0.93
		<i>For >150 To 250, Add</i>	0.61
		<i>For >250 To 500, Add</i>	0.31
31 32 19 16-0015	SY	6.9 Oz/SY, 250 LB/IN Wide Width Tensile Ultimate Woven Twill Weave Geotextile Fabric (Carthage Mills FX-250TF)	5.18
		<i>For Up To 50, Add</i>	1.09
		<i>For >50 To 150, Add</i>	0.82
		<i>For >150 To 250, Add</i>	0.54
		<i>For >250 To 500, Add</i>	0.27
31 32 19 16-0016	SY	9.1 Oz/SY, 333 LB/IN Wide Width Tensile Ultimate Woven Twill Weave Geotextile Fabric (Carthage Mills FX-330TF)	5.54
		<i>For Up To 50, Add</i>	1.17
		<i>For >50 To 150, Add</i>	0.87
		<i>For >150 To 250, Add</i>	0.57
		<i>For >250 To 500, Add</i>	0.29
31 32 19 16-0017	SY	12.1 Oz/SY, 400 LB/IN Wide Width Tensile Ultimate Woven Twill Weave Geotextile Fabric (Carthage Mills FX-400TF)	7.08
		<i>For Up To 50, Add</i>	1.47
		<i>For >50 To 150, Add</i>	1.10
		<i>For >150 To 250, Add</i>	0.73
		<i>For >250 To 500, Add</i>	0.36
31 32 19 16-0018	SY	12.1 Oz/SY, 400 LB/IN Wide Width Tensile Ultimate Woven Monofilament And Fibrillated Geotextile Fabric (Carthage Mills FX-400MF)	10.10
		<i>For Up To 50, Add</i>	2.08
		<i>For >50 To 150, Add</i>	1.55
		<i>For >150 To 250, Add</i>	1.03
		<i>For >250 To 500, Add</i>	0.51
31 32 19 16-0019		Geomembranes <small>(31 32 19 16)</small>	
31 32 19 16-0020		Polyvinyl Chloride (PVC) Geomembrane <small>(31 32 19 16-0019)</small>	
31 32 19 16-0021	SF	20 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	1.46
31 32 19 16-0022	SF	30 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	1.69
31 32 19 16-0023	SF	40 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	2.05
31 32 19 16-0024	SF	50 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	2.46
31 32 19 16-0025	SF	60 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	2.81
31 32 19 16-0026	SF	70 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	3.07
31 32 19 16-0027	SF	80 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	3.33
31 32 19 16-0028	SF	90 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	3.68
31 32 19 16-0029	SF	100 Mil Polyvinyl Chloride (PVC) Geomembrane (US Fabrics)	4.02
31 32 19 16-0030		High Density Polyethylene (HDPE) Geomembrane <small>(31 32 19 16-0019)</small>	
31 32 19 16-0031	SF	20 Mil High Density Polyethylene Membrane (US Fabrics)	1.40
31 32 19 16-0032	SF	30 Mil High Density Polyethylene Membrane (US Fabrics)	0.91
31 32 19 16-0033	SF	40 Mil High Density Polyethylene Membrane (US Fabrics)	1.01
31 32 19 16-0034	SF	50 Mil High Density Polyethylene Membrane (US Fabrics)	1.46
31 32 19 16-0035	SF	60 Mil High Density Polyethylene Membrane (US Fabrics)	1.20
31 32 19 16-0036	SF	80 Mil High Density Polyethylene Membrane (US Fabrics)	1.40
31 32 19 16-0037	SF	100 Mil High Density Polyethylene Membrane (US Fabrics)	1.61
31 32 19 16-0038	SF	120 Mil High Density Polyethylene Membrane (US Fabrics)	2.65
31 32 19 16-0039	SF	140 Mil High Density Polyethylene Membrane (US Fabrics)	2.74
31 32 19 26		Geoweb Cellular Confinement System <small>(31 32 19)</small>	
		Note: Includes staples, stakes and filling cells with stockpiled material. Excludes site preparation and imported materials.	
31 32 19 26-0001		Geoweb Cellular Confinement System <small>(31 32 19 26)</small>	
		Note: Includes staples, stakes and filling cells with stockpiled material. Excludes site preparation and imported materials.	
31 32 19 26-0002	SF	4" Geoweb Cellular Confinement System (Presto Geosystems)	7.87
		<i>For >20,000, Deduct</i>	-0.19
		<i>For >2:1 Slope, Add</i>	1.33
31 32 19 26-0003	SF	6" Geoweb Cellular Confinement System (Presto Geosystems)	9.59
		<i>For >20,000, Deduct</i>	-0.28
		<i>For >2:1 Slope, Add</i>	1.33
31 32 19 26-0004	SF	8" Geoweb Cellular Confinement System (Presto Geosystems)	11.64
		<i>For >20,000, Deduct</i>	-0.38
		<i>For >2:1 Slope, Add</i>	1.33
31 32 36		Soil Nailing <small>(31 32)</small>	
31 32 36 11		Soil Nailing Stabilization <small>(31 32 36)</small>	



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Earthwork Methods	31 30	
Soil Stabilization	31 32	

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31 32 36 11-0001	Landslide and Slip-Out Stabilization <small>(31 32 36 11)</small>	<p>Note: Work shall consist of the Contractor stabilizing identified slides by internally reinforcing the soil mass with reinforcing elements (nails) by using one or more of the installation methods specified in this contract. The Owner will identify locations for work to be performed as specified herein. The Contractor shall review all locations with Owner representatives to determine the method to be used. The Contractor will provide all necessary engineering plans and details required to successfully repair slides as noted. These plans shall be stamped by a registered professional engineer with a current California license who is knowledgeable in the design and implementation of slope stabilization with soil nails and related work. The contractor shall furnish all labor, materials, and equipment required to complete the work. Any necessary installation methods and associated costs are the responsibility of the contractor. The Contractor and the Contractor's Engineer will also warrant the stability of the repaired roadway section for a period of 5 years.</p>
31 32 36 11-0002	BioWall® <small>(31 32 36 11-0001)</small>	<p>Note: Furnish and install the BioWall® to integrate with Launched Soil Nails™, SuperNails® or Self Drilling SuperNails®. The BioWall® is a confined soil/compost mass capable of sustaining vegetation at slope angles up to ¼(H):1(V), and is composed of 2 layers of galvanized wire mesh and 2 layers of lightweight geosynthetic encasing a seeded compost and/or topsoil mix, tied to the soil nails by steel plates. Furnish equipment and incidentals necessary to complete the work. BioWall® to soil nail connection details will be determined by the Contractor's Engineer and identified in the Contractor's stamped plans and submittals. Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>
31 32 36 11-0003	SF BioWall® Construction.....	25.00
31 32 36 11-0004	Green Terra Mesh <small>(31 32 36 11-0001)</small>	<p>Note: Furnish and install the Green Terra Mesh. Furnish equipment and incidentals necessary to complete the work. Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>
31 32 36 11-0005	EA Green Terra Mesh.....	635.25
31 32 36 11-0006	GeoSynthetically Confined Soil™ (GCS®) Components <small>(31 32 36 11-0001)</small>	<p>Note: Furnish and install geosynthetic reinforcement, backfill and facing element to construct a Geosynthetically Confined Soil Wall™ (GCS®). Designs shall comply with the Design Standards for Geosynthetically Confined Soil Walls (adapted from the NCHRP Report 556 – Design and Construction Guidelines for Geosynthetic – Reinforced Soil Bridge Abutments with a Flexible Facing) noted below. Reinforcement Selection and Placement: Geosynthetic reinforcement shall consist of high-tenacity geotextiles manufactured for soil reinforcement applications. Geotextiles shall not be exposed to sunlight and extreme temperatures for an extended period of time. Damaged or improperly handled geosynthetic reinforcement shall be rejected. Use a woven polypropylene geotextile with ultimate tensile strength of 2400 lbs/ft (Amoco 2044 or similar) in the cross-machine direction (as per ASTM D4595). The geosynthetic reinforcement perpendicular to the wall face should consist of one continuous piece of material. Overlap of reinforcement in the design strength direction is not permitted. Adjacent sections of geosynthetic reinforcement should be placed so as to ensure that horizontal coverage shown on the plans is provided. Tracked construction equipment shall not be operated directly on the geosynthetic reinforcement. A minimum backfill thickness of 150 mm (6 in.) is required before operation of tracked vehicles over the geosynthetic reinforcement. Turning of tracked vehicles should be kept to a minimum to prevent displacing the fill and damaging or moving the geosynthetic reinforcement. Rubber-tired equipment may pass over the geosynthetic reinforcement at slow speeds less than 17 km/hr (10 miles/hr). Sudden braking and sharp turning should be avoided. Backfill Specifications: Structure backfill material should consist of material free from organic or other unsuitable material as determined by the Contractor's Engineer. Grading of the backfill should be as follows: 100 percent passing 100 mm (4 in.) sieve, 0-60 percent passing No. 40 (0.425 mm) sieve, and 0-15 percent passing No. 200 (0.075mm) sieve; plasticity index (PI) as determined by AASHTO T90, should not exceed 6. The backfill should exhibit an angle of internal friction of not less than 34 degrees, as determined by the standard direct shear test on the portion finer than 2 mm (No.10) sieve, using a sample compacted to 95 percent of AASHTO T-99, Methods C or D, at optimum moisture content. No testing is required for backfills where 80 percent of sizes are greater than 19 mm. The backfill should be substantially free of shale or other soft, poor durability particles and should have an organic content not larger than 1 percent. The backfill should have a pH between 4.5 and 9. Backfill Placement: Reinforced fill should be placed as specified in construction plans in compacted lift thickness of 8in, but in no case in lifts greater than 12in. Reinforced fill should be placed and compacted at or within 2 percent dry of the optimum moisture content. If the reinforced fill is free draining (i.e., with less than 5 percent passing a No. 200 sieve), water content of the fill may be within ±3 percent of the optimum. A minimum density of 90 percent of standard Proctor density is required. Optimum compaction is 100 percent of AASHTO T-99 (or 95 percent of AASHTO T-180) but this may not be possible throughout the wall structure. If significant percentage of the backfill is coarse material (i.e., greater than 30 percent retained on the 19 mm, or ¾ in., sieve), a procedural specification may be used to verify compaction, (no less than two passes with a conventional vibratory plate compaction equipment). Backfill should be placed, spread, and compacted so as to prevent the development of wrinkles or movement of the geosynthetic reinforcement and the wall facing units. Only hand-operated compaction equipment should be allowed within 0.5 m (1.5 ft) of the front of the See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>
31 32 36 11-0007	SF GeoSynthetically Confined Soil™ (GCS®) Wall Construction.....	23.75
31 32 36 11-0008	EA GeoSynthetically Confined Soil™ (GCS®) Wall Galvanized Wire Basket Units (approximately 10" x 120").....	108.50
31 32 36 11-0009	EA GeoSynthetically Confined Soil™ (GCS®) Wall Concrete Masonry Units (approximately 8" x 8" x 16").....	6.50
31 32 36 11-0010	SF GeoSynthetically Confined Soil™ (GCS®) Wall Woven Geotextile.....	0.75
31 32 36 11-0011	Turf <small>(31 32 36 11-0001)</small>	<p>Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>
31 32 36 11-0012	Permanent Turf Reinforcing Mat (TRM) <small>(31 32 36 11-0011)</small>	<p>Note: Furnish a web of mechanically bonded synthetic fibers that are entangled to form a strong and dimensionally stable mat. Place fibers between 2 or 3 high-strength, biaxially oriented nets mechanically bound together by stitching with polyolefin thread. The netting material must be resistant to biological, chemical, and ultra-violet degradation.</p>
31 32 36 11-0013	SF Permanent Turf Reinforcement Mat.....	1.50
	Note: sold per square face foot	

31	31	Earthwork
	31 30	Earthwork Methods
	31 32	Soil Stabilization



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31 32 36 11-0014	Biodegradable Turf Reinforcing Mat (TRM) <small>(31 32 36 11-0011)</small> Note: Furnish a geotextile composed of seed free processed natural fiber matrix mechanically bound together with 100% degradable binding fiber or netting to form a continuous matrix.	
31 32 36 11-0015	SF Biodegradable Turf Reinforcement Mat Note: sold per square face foot	0.75
31 32 36 11-0016	Shotcrete or Gunit <small>(31 32 36 11-0001)</small> Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).	
31 32 36 11-0017	Wet-Mix Shotcrete for use with Launched Soil Nails™, SuperNails®, SuperMicropiles™, Self-Drilling SuperNails® / SuperMicropiles™ <small>(31 32 36 11-0016)</small> Note: Furnish steel reinforced shotcrete to integrate with Launched Soil Nails™, SuperNails®, SuperMicropiles™, Self Drilling SuperMicropiles™ or Self Drilling SuperNails® and complying with the requirements of ACI 506.2, "Specifications for Materials, Proportioning and Application of Shotcrete", except as otherwise specified. Shotcreting consists applying of one or more layers of concrete conveyed through a hose pneumatically projected at a high velocity against a prepared surface. Produce shotcrete by a wet-mix. The wet-mix process consists of thoroughly mixing all the ingredients except accelerating admixtures, but including the mixing water, introducing the mixture into the delivery equipment and delivering it, by positive displacement, to the nozzle. Air jet the wet-mix shotcrete from the nozzle at high velocity onto the surface. For additional descriptive information, refer to the American Concrete Institute ACI 506R "Guide to Shotcrete." The Contractor's Engineer shall provide all necessary details required to successfully construct the temporary or permanent facing and facing drainage system to satisfy the design intent of the facing. Comply with AASHTO Specifications, or accepted industry standards for any specific items that may not be addressed herein or elsewhere in this Contract Document. Use materials for shotcrete conforming to the following requirements: Cement AASHTO M85/ ASTM C150, Type I, II, III or V. Fine Aggregate AASHTO M6/ASTM C33 clean, natural. Coarse Aggregate AASHTO M80, Class B for quality Water Clean and Potable. AASHTO M157/ASTM C94 Chemical Admixtures Accelerator Fluid type, applied at nozzle, meeting requirements of AASHTO M194/ASTM C494/ASTM C1141. Water-reducer and Superplastisizer AASHTO M194/ASTM C494 Type A, C, D, E, F, or G Retarders AASHTO M194/ ASTM C494 Type B or D. Mineral Admixtures Fly Ash AASHTO M295/ASTM C618 Type F or C, cement replacement up to 35 percent by weight of cement. Silica Fume ASTM C1240, 90 percent minimum silicon dioxide solids content, not to exceed 12 percent by weight of cement. Welded Wire Fabric AASHTO M55/ASTM A185 or A497. Double twisted hexagonal ASTM A975-97 guidelines for Double Twisted Hexagonal Mesh Gabions Prepackaged Shotcrete ASTM C928. PVC Drain Pipes: Pipe ASTM 1785 Schedule 40 PVC, solid and perforated wall, cell classification 12454-B or 12354-C, wall thickness SDR 35, with solvent weld or elastomeric gasket joints. Deliver, store and handle materials to prevent contamination, segregation, corrosion or damage. Store liquid admixtures to prevent evaporation and freezing. Use aggregate for shotcrete meeting the strength and durability requirements of AASHTO M6/M80, as applicable, and the following gradation requirements: Sieve Size Percent Passing by Weight 1/2" 100 3/8" 90-100 No. 4 70-85 No. 8 100 Proportion the shotcrete to be pumpable with the concrete pump furnished for the work, with a cementing materials content of at least 390 kilograms per cubic meter and water/cement ratio not greater than 0.50. Do not use admixtures unless approved by the Contractor's Engineer. Thoroughly mix admixtures into the shotcrete at the rate specified by the manufacturer. Use only accelerators compatible with the cement used, non-corrosive to steel, and not promoting other detrimental effects such as cracking or excessive shrinkage. The maximum allowable chloride ion content of all ingredients is 0.10% when tested to AASHTO T260. Air entrainment is not required for temporary shotcrete construction facings. Provide shotcrete with a design compressive strength of 2000 psi in 3 days and 4000 psi in 28 days. Batch aggregate and cement by weight or by volume in accordance with the requirements of ASTM C94 or AASHTO M241/ASTM C685. Use mixing equipment that thoroughly blends the materials in sufficient quantity to maintain placing continuity. Produce ready mix shotcrete complying	
31 32 36 11-0018	SFI Wet-Mix Reinforced Shotcrete Note: sold per inch thickness over one square face foot of area (includes reinforcing steel).	5.50

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31 32 36 11-0019	<p>Dry-Mix Shotcrete for use with Launched Soil Nails™, SuperNails®, SuperMicropiles™, Self-Drilling SuperNails® / SuperMicropiles™ <small>(31 32 36 11-0019)</small></p> <p>Note: Furnish steel reinforced shotcrete to integrate with Launched Soil Nails™, SuperNails®, SuperMicropiles™, Self Drilling SuperMicropiles™ or Self Drilling SuperNails® and complying with the requirements of ACI 506.2, "Specifications for Materials, Proportioning and Application of Shotcrete", except as otherwise specified. Shotcreting consists applying of one or more layers of concrete conveyed through a hose pneumatically projected at a high velocity against a prepared surface. Produce shotcrete by a dry-mix. The dry-mix process consists of thoroughly mixing Portland cement and aggregate (and or synthetic fiber) thoroughly mixed dry, passed through a cement gun and conveyed by air through a flexible tube, hydrated at a nozzle at the end of such flexible tube and deposited by air pressure in its place of final repose. For additional descriptive information, refer to the American Concrete Institute ACI 506R "Guide to Shotcrete." The Contractor's Engineer shall provide all necessary details required to successfully construct the temporary or permanent facing and facing drainage system to satisfy the design intent of the facing. Comply with AASHTO Specifications, or accepted industry standards for any specific items that may not be addressed herein or elsewhere in this Contract Document. Use materials for shotcrete conforming to the following requirements: Cement AASHTO M85/ ASTM C150, Type I, II, or III. Fine Aggregate AASHTO M6/ASTM C33 clean, natural. Coarse Aggregate AASHTO M80, Class B for quality Fiber Reinforcement ASTM C116-00 Water Clean and Potable. AASHTO M157/ASTM C94 and shall be maintained at a uniform pressure which shall be at least 15 pounds per square inch above air pressure at the nozzle. Chemical Admixtures Accelerator Fluid type, applied at nozzle, meeting requirements of AASHTO M194/ASTM C494/ASTM C1141. Water-reducer and Superplasticizer AASHTO M194/ASTM C494 Type A, C, D, E, F, or G Retarders AASHTO M194/ ASTM C494 Type B or D. Mineral Admixtures Fly Ash AASHTO M295/ASTM C618 Type F or C, cement replacement up to 35 percent by weight of cement. Silica Fume ASTM C1240, 90 percent minimum silicon dioxide solids content, not to exceed 12 percent by weight of cement. Welded Wire Fabric AASHTO M55/ASTM A185 or A497. Double twisted hexagonal ASTM A975-97 guidelines for Double Twisted Hexagonal Mesh Gabions Prepackaged Shotcrete ASTM C928. PVC Drain Pipes: Pipe ASTM 1785 Schedule 40 PVC, solid and perforated wall, cell classification 12454-B or 12354-C, wall thickness SDR 35, with solvent weld or elastomeric gasket joints. Deliver, store and handle materials to prevent contamination, segregation, corrosion or damage. Store liquid admixtures to prevent evaporation and freezing. Use aggregate for shotcrete meeting the strength and durability requirements of AASHTO M6/M80, as applicable, and the following gradation requirements: Sieve Size Percent Passing by Weight 1/2" 100 3/8" 90-100 No. 4 70-85 No. 8 100 Proportion the shotcrete to be pumpable with the concrete pump furnished for the work, with a cementing materials content of at least 390 kilograms per cubic meter and water/cement ratio not greater than 0.50. Do not use admixtures unless approved by the Contractor's Engineer. Thoroughly mix admixtures into the shotcrete at the rate specified by the manufacturer. Use only accelerators compatible with the cement used, non-corrosive to steel, and not promoting other detrimental effects such as cracking or excessive shrinkage. The maximum allowable chloride ion content of all ingredients is 0.10% when tested to AASHTO T260. Air entrainment is not required for temporary shotcrete construction facings. Provide shotcrete with a design compressive strength of 2000 psi in 3 days and 4000 psi in 28 days. Batch aggregate and cement by weight or by volume in accordance with the requirements of ASTM C94 or AASHTO M241/ASTM C6</p>		
31 32 36 11-0020	SFI Dry-Mix Reinforced Gunite Note: sold per inch thickness over one square face foot of area (includes reinforcing steel).		8.50
31 32 36 11-0021	<p>Steel Fiber Reinforcement for use with Launched Soil Nails™, SuperNails®, SuperMicropiles™, Self-Drilling SuperNails® / SuperMicropiles™ <small>(31 32 36 11-0016)</small></p>		
31 32 36 11-0022	SFI Steel Fiber Reinforcement Note: sold per inch thickness over one square face foot of area		1.25
31 32 36 11-0023	<p>Steel Mesh and Steel Plates for use with Launched Soil Nails™, SuperNails® and Self Drilling SuperNails® <small>(31 32 36 11-0001)</small></p> <p>Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>		
31 32 36 11-0024	<p>Steel Mesh Surface Treatment for use with Launched Soil Nails™, SuperNails® and Self Drilling SuperNails® <small>(31 32 36 11-0023)</small></p> <p>Note: Furnish Galfan® Coated Steel Mesh for use with Launched Soil Nails™, SuperNails®, or Self Drilling SuperNails® that is a double twisted hexagonal galvanized steel wire mesh manufactured according to ASTM A975-97 guidelines for Double Twisted Hexagonal Mesh Gabions. Alternately, the mesh may be a diamond shaped, three dimensional mesh made with high capacity 3-millimeter diameter wire. Furnish steel plates to connect the mesh to the nail systems described herein. Furnish equipment and incidentals necessary to complete the work. Soil Nail to mesh connection details will be determined by the Contractor's Engineer and identified in the Contractor's stamped plans and submittals.</p>		
31 32 36 11-0025	SF High Capacity Diamond Mesh Note: sold per square face foot		11.00
31 32 36 11-0026	SF Double Twist Wire Mesh Note: sold per square face foot		13.75
31 32 36 11-0027	<p>Steel Plates <small>(31 32 36 11-0023)</small></p>		
31 32 36 11-0028	EA Galvanized Steel Plates (8x8)		35.00
31 32 36 11-0029	EA Galvanized Steel Plates (10x10).....		54.75
31 32 36 11-0030	EA Galvanized Steel Plates (12x12).....		78.75
31 32 36 11-0031	EA Epoxy Coated Steel Plates (8x8).....		76.00
31 32 36 11-0032	EA Epoxy Coated Steel Plates (10x10).....		89.25
31 32 36 11-0033	EA Epoxy Coated Steel Plates (12x12).....		105.25

31	31 Earthwork
	31 30 Earthwork Methods
	31 32 Soil Stabilization



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 32 36 11-0034 Drilled Horizontal Drains (31 32 36 11-0001)
 Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).

31 32 36 11-0035	LF	Drilled PVC Horizontal Drains (up to 2" Diameter).....	26.00
31 32 36 11-0036	LF	Stripdrain - 6" Wide.....	3.25
31 32 36 11-0037	LF	Stripdrain - 12" Wide.....	4.00
31 32 36 11-0038	LF	PVC Drain Collector Pipe System.....	26.75

31 32 36 11-0039 Rockfall Stabilization (31 32 36 11-0001)
 Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).

31 32 36 11-0040	SF	Scaling.....	3.75
31 32 36 11-0041	SF	Trim Blasting.....	155.00
31 32 36 11-0042	SY	Slope Drape - Double Twist Wire Mesh.....	45.00
31 32 36 11-0043	SY	Slope Drape - Cable Net.....	135.00
31 32 36 11-0044	SY	Slope Drape - Tecco Mesh (4mm).....	135.00
31 32 36 11-0045	LF	Temporary Rockfall Barrier.....	500.00
31 32 36 11-0046	LF	Low Reach Drilling (<25 feet).....	25.00
31 32 36 11-0047	LF	High Reach Drilling (>25 feet).....	45.00
31 32 36 11-0048	LF	Limited Access Drilling.....	100.00
31 32 36 11-0049	LF	F&I Rock Dowel - #8 Grade 75 All-Thread Bar (Galvanized).....	18.50
31 32 36 11-0050	LF	F&I Rock Dowel - #8 Grade 75 All-Thread Bar (Epoxy Coated).....	15.25
31 32 36 11-0051	LF	F&I Rock Dowel - #8 Grade 150 All-Thread Bar (Galvanized).....	23.25
31 32 36 11-0052	LF	F&I Rock Dowel - #8 Grade 150 All-Thread Bar (Epoxy Coated).....	17.25
31 32 36 11-0053	LF	F&I Rock Dowel - #10 Grade 75 All-Thread Bar (Galvanized).....	23.50
31 32 36 11-0054	LF	F&I Rock Dowel - #10 Grade 75 All-Thread Bar (Epoxy Coated).....	18.75
31 32 36 11-0055	LF	F&I Rock Dowel - #10 Grade 150 All-Thread Bar (Galvanized).....	26.50
31 32 36 11-0056	LF	F&I Rock Dowel - #10 Grade 150 All-Thread Bar (Epoxy Coated).....	21.00
31 32 36 11-0057	LF	F&I Rock Dowel - #11 Grade 75 All-Thread Bar (Galvanized).....	29.25
31 32 36 11-0058	LF	F&I Rock Dowel - #11 Grade 75 All-Thread Bar (Epoxy Coated).....	21.00
31 32 36 11-0059	LF	F&I Rock Dowel - #11 Grade 150 All-Thread Bar (Galvanized).....	34.50
31 32 36 11-0060	LF	F&I Rock Dowel - #11 Grade 150 All-Thread Bar (Epoxy Coated).....	31.75
31 32 36 11-0061	EA	Rock Anchor Testing.....	825.00

31 32 36 11-0062 Mobilization / Demobilization (31 32 36 11-0001)

31 32 36 11-0063	EA	Mobilization - In State.....	10,000.00
31 32 36 11-0064	EA	Mobilization - Out Of State.....	25,000.00
31 32 36 11-0065	EA	Mobilization - Specialty Equipment Adder.....	9,800.00

31 32 36 11-0066 Daily Crew Rates (DCR) (31 32 36 11-0001)

31 32 36 11-0067	DAY	Soils Stabilization Crew - DCR , Per Workday.....	13,150.00
31 32 36 11-0068	DAY	Rockfall Stabilization Crew - DCR, Per Workday.....	15,200.00
31 32 36 11-0069	DAY	Compaction Grouting Crew - DCR, Per Workday.....	12,925.00
31 32 36 11-0070	DAY	Additional Crew Member/Crew - DCR, Per Workday.....	2,050.00
31 32 36 11-0071	EA	Out of State Crew Rotation.....	4,950.00
31 32 36 11-0072	EA	Spider Excavation.....	5,500.00

31 32 36 13 Driven Soil Nailing (31 32 36)

31 32 36 13-0001 Large Diameter Micropiles (31 32 36 13)
 Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).

31 32 36 13-0002	LF	5" Micropiles (with up to 5.5" steel casing).....	94.50
31 32 36 13-0003	LF	7" Micropiles (with up to 7.625" steel casing).....	130.25
31 32 36 13-0004	LF	10" Micropiles (with up to 9.625" steel casing).....	166.50
31 32 36 13-0005	LF	12" Micropiles (with up to 11.875" steel casing).....	213.25

31 32 36 16 Grouted Soil Nailing (31 32 36)

31 32 36 16-0001 Grouting (31 32 36 16)
 Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).

	Earthwork	31	
	Earthwork Methods	31 30	13
	Soil Stabilization	31 32	

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 32 36 16-0002

Compaction Grouting (31 32 36 16-0001)

Note: A. Furnish compaction grout material manufactured on-site (at the project location) in volumetric batching equipment so that grout rheology can be controlled real-time. The grout shall have a slump of 0.50" to 3.0" depending on the specific requirements of the project and shall conform to the engineering plans developed and submitted by the Contractor. Grout components shall consist of Type I/II cement, potable water and aggregate. Fly Ash may be added to the mix per the engineering plans. All aggregate for the compaction grout material shall meet the following requirements: a. 100% passing the 1/2" sieve b. Less than 2% organics c. No bentonite or other clay of medium to high plasticity shall be used. Site conditions and re-leveling requirements shall determine the exact proportions of cement, water and soil. The grout mix shall generally consist of aggregate with up to 12% cement by weight and water to form a very stiff mortar-like mixture. No admixtures shall be used without the Project Manager's approval, and previous testing. Mix design and test results of grout mixture must be submitted and approved by the Project Manager 15 Days prior to the commencement of the work. A. Gradations of the aggregate material to be utilized shall be submitted as part of the submittal process and prior to any work taking place. B. The compaction grouting mixer shall be of a type to ensure complete mixing of the stiff grout, as approved by the Project Manager. The compaction grout mixer shall be of sufficient capacity to continuously deliver grout having a slump of less than 1.5 inches at pressures up to 1,000 psi, at flow rates ranging from 0.1 to 5.0 cubic feet per minute. Gauges shall be provided at the pump and the grout pipe head to measure pressure the rate of flow. Type and location of gauges shall be as specified by the Contractor. A dial gauge or meter capable of measuring to 0.5 cubic feet or less shall be provided to measure the amount of grout pumped into the hole. A pressure gauge shall be graduated in 10-psi increments or less and used to measure the applied pressure. Compaction grout hose shall have a minimum inside diameter of 2 inches with non-restrictive full flow couplings. The hose shall be of sufficient strength for the pressures anticipated, and shall be in good condition.

31 32 36 16-0003	LF	Compaction Grouting Casing Installation.....	52.75
31 32 36 16-0004	CF	Compaction Grout Injection for Soils Densification.....	55.50
31 32 36 16-0005	CF	Compaction Grout For Void Fill.....	39.00

31 32 36 16-0006

Polyurethane Grouting (31 32 36 16-0001)

Note: The material shall be a two part 1:1 ratio by volume, polyurethane-forming mixture, having a water insoluble diluent, which permits the formation of polyurethanes in excess water. The material shall reach 90% Compressive strength in 30 minutes such that traffic may be returned to roadway within 30 minutes after last injection of material. Polyurethane Free-rise Physical Properties Property I Units ASTM Minimum Maximum Density - lb/cf D 1622 3.0 lb/cf 6.0 lb/cf Tensile Strength - psi D 1623 80 psi Compressive Strength at Yield Point - psi D 1621 60 psi Furnish equipment and incidentals necessary to complete the work. Polyurethane grout shall not be used for deep injection (deeper than 3 ft below bottom of structure) or soils densification, it shall only be used for void filling under structures and for re-leveling. The Contractor shall prepare a profile to determine the areas that require void filling and re-leveling and determine the locations of the injection holes for each treated area. The Contractor shall obtain approval for the final proposed grades and the location of injection holes. The Contractor shall submit a plan for approval of the proposed polyurethane injection methods for the designated project areas. The plan shall include, but not be limited to: proposed diameter of casing (if required), depth of placement, angle of inclination, injection tube spacing, and project staging. The plan shall include monitoring procedures to ensure that damage will not occur to any existing structures due to the injection process. Monitoring devices shall be installed on mechanically stabilized earth retaining systems and between approach slabs and approach slab footings or other components to help prevent damage. The Contractor shall drill a pattern of holes as proposed in his plan. The holes shall be located in a manner that the void filling and structure lifting process does not affect any adjoining structures, such as mechanically stabilized earth retaining walls. Holes shall not be drilled within 4" of the edge of the slab, construction joints or major cracks. No more holes shall be drilled and tubes installed during the day than can be filled during that day. On bridge approach and roadway projects, and as applicable, the initial lift shall be at the sleeper footer. The Contractor shall lift the sleeper footer and the approach slab to the desired elevation by injecting material under the structures with care to assure that polyurethane material is not placed between the sleeper footer and the approach slab. The amount of rise shall be controlled by regulating the rate of injection of the high density polyurethane material. When the nozzle is removed from the hole, any excessive polyurethane material shall be removed from the area.

31 32 36 16-0007	LB	Polyurethane Grouting For Void Fill and Re-Leveling.....	11.50
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31 32 36 19

Corrosion-Protected Soil Nailing (31 32 36)

31 32 36 19-0001

Self-Drilling SuperNails® / SuperMicropiles™ (31 32 36 19)

Note: Furnish Self-Drilling SuperNails® / SuperMicropiles™ that consist of a hollow, threaded bar with a sacrificial drill bit. Multiple bars may be coupled to produce final length. Bar thread pattern should be continuous and conform to the pullout requirements of ASTM A 615 (Williams Form Engineering B7X or Ischebeck Titan bars, or approved equivalent). R-thread bars, bars/couplers made from high carbon (>0.20%) or high phosphorous (>0.06%) steels, or bars/couplers made from steels that do not meet the tensile ductility requirements of ASTM A 615 shall not be used for any tensile applications. Bar outer diameters shall be a minimum of 1.5 inches and up to and 3 inches depending on design load. Corrosion Protection for Self Drilling Nails shall follow current FHWA guidance. Inserted length and spacing of Self-Drilling SuperNails® / SuperMicropiles™ will be determined by the Contractor's Engineer and identified in the Contractor's stamped plans and submittals. Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).

31 32 36 19-0002

Self-Drilling SuperNails® (31 32 36 19-0001)

31 32 36 19-0003	EA	Self Drilling SuperNails® Up To 10 Ft. Length.....	559.00
31 32 36 19-0004	EA	Self Drilling SuperNails® Up To 20 Ft. Length.....	939.25
31 32 36 19-0005	EA	Self Drilling SuperNails® Up To 30 Ft. Length.....	1,305.75
31 32 36 19-0006	EA	Self Drilling SuperNails® Up To 40 Ft. Length.....	1,735.75
31 32 36 19-0007	EA	Self Drilling SuperNails® Up To 50 Ft. Length.....	2,119.75
31 32 36 19-0008	EA	Self Drilling SuperNails® Up To 60 Ft. Length.....	2,459.25
31 32 36 19-0009	EA	Self Drilling SuperNails® Up To 70 Ft. Length.....	2,879.25
31 32 36 19-0010	EA	Self Drilling SuperNails® Up To 80 Ft. Length.....	3,253.50
31 32 36 19-0011	EA	Additional Cost for 10' High Capacity X-51 Bar.....	129.50

31 32 36 19-0012

SuperNail® Testing (31 32 36 19)

Note: Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).

31	31	Earthwork
	31 30	Earthwork Methods
	31 32	Soil Stabilization



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 32 36 19-0013	EA	SuperNail® Proof Testing	769.00
31 32 36 19-0014	EA	SuperNail® Verification Testing	2,339.75

31 32 36 26 Launched Soil Nailing (31 32 36)

31 32 36 26-0001 Launched SuperDrain™ (Horizontal Drains) <small>(31 32 36 26)</small>			
<p>Note: Furnish Launched SuperDrain™ up to 20 feet in length composed of a tube (1.5 inch outside diameter, 0.120 inch wall thickness hot-dipped galvanized 36ksi steel (ASTM A513) that is mechanically deformed or GalvaDized™ to produce a plurality of surficial asperities). Drainage perforations consist of 0.5-inch diameter holes drilled or torch-cut at 6 inch spacing along the distal 5 feet of nail. Every other hole is rotated 90° about the longitudinal axis of the nail. Furnish equipment and incidentals necessary to complete the work. Insert Launched SuperDrain™ with a single stroke at initial velocities in excess of 200 miles per hour. Inserted length and spacing will be determined by the Contractor's Engineer and identified in the Contractor's stamped plans and submittals. Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>			
31 32 36 26-0002	EA	GalvaDized™ SuperDrain™ - Up To 20'	605.00
Note: perforated GalvaDized™ steel tube up to 20 ft. length.			
31 32 36 26-0003	EA	Fiberglass SuperNail® - Up To 20'	621.50
Note: perforated fiberglass tube up to 20 ft. length, pressure grouted with #6 epoxy coated inner Bar.			
31 32 36 26-0004	EA	GalvaDized™ SuperNail® - Up To 20'	478.50
Note: perforated GalvaDized™ steel tube up to 20 ft. length, pressure grouted with #6 epoxy coated inner Bar.			
31 32 36 26-0005	EA	Temporary Launched Soil Nail	379.50
Note: bare steel tube up to 20 ft. length.			
31 32 36 26-0006	EA	Fiberglass SuperDrain™	495.00
Note: perforated fiberglass tube up to 20 ft. length.			
31 32 36 26-0007	EA	GalvaDized™ SuperDrain™	379.50
Note: perforated GalvaDized™ steel tube up to 20 ft. length.			

31 32 36 29 Drilled Soil Nailing (31 32 36)

31 32 36 29-0001 Drilled SuperNails® (Permanently Cased Soil Nails) <small>(31 32 36 29)</small>			
<p>Note: Furnish SuperNails® that are a three stage construction including installation of (1) an outer tube (1.5 inch outside diameter, 0.120 inch wall thickness hot-dipped galvanized steel tube that is mechanically deformed or GalvaDized™ to produce a plurality of surficial asperities); (2) neat cement grout that completely encases and fills the outer tube; and (3) immediately install an epoxy coated, #6 (or greater) grade 75 threadbar as the inner bar. SuperNails® may be in lengths up to 60 feet. Although field adjustments in design may be allowed on certain projects (subject to approval by the Contractor's Engineer and the Owner) bidding an equivalent system is not allowed (i.e. the winning bidder must have the ability to install the above system). Furnish equipment and incidentals necessary to complete the work. Insert SuperNail® outer tubes with a single stroke at initial velocities in excess of 200 miles per hour or by drilling a hole to a prescribed depth and inserting the outer tube. Fill the outer tube with neat cement grout and immediately insert a #6 or larger epoxy coated inner threadbar. Inserted length and spacing will be determined by the Contractor's Engineer and identified in the Contractor's stamped plans and submittals. Unit Pricing excludes Daily Crew Rates for items See CSI section 31 32 36 11-0066 for Daily Crew Rates (DCR).</p>			
31 32 36 29-0002	EA	Drilled GalvaDized™ SuperNail® Up To 10 Ft. Length	602.25
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0003	EA	Drilled GalvaDized™ SuperNail® Up To 20 Ft. Length	693.50
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0004	EA	Drilled GalvaDized™ SuperNail® Up To 30 Ft. Length	921.50
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0005	EA	Drilled GalvaDized™ SuperNail® Up To 40 Ft. Length	1,056.00
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0006	EA	Drilled GalvaDized™ SuperNail® Up To 50 Ft. Length	1,171.50
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0007	EA	Drilled GalvaDized™ SuperNail® Up To 60 Ft. Length	1,376.50
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0008	EA	Drilled GalvaDized™ SuperNail® Up To 70 Ft. Length	1,624.75
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			
31 32 36 29-0009	EA	Drilled GalvaDized™ SuperNail® Up To 80 Ft. Length	1,872.75
Note: GalvaDized™ steel tube, drilled and grouted with #6 epoxy coated inner Bar.			

31 32 36 33 Drilled / Launched Soil Nailing (31 32 36)

31 32 36 33-0001 Drilled / Launched SuperMicropiles™ <small>(31 32 36 33)</small>			
<p>Note: Furnish SuperMicropiles™ that are a three stage construction including installation of (1) an outer tube (1.5 inch outside diameter, 0.120 inch wall thickness hot-dipped galvanized steel tube that is mechanically deformed or GalvaDized™ to produce a plurality of surficial asperities); (2) neat cement grout that completely encases and fills the outer tube; and (3) immediately install an epoxy coated, #6 (or greater) grade 75 threadbar as the inner bar. SuperMicropiles™ may be in lengths up to 60 feet. Although field adjustments in design may be allowed on certain projects (subject to approval by the Contractor's Engineer and the Owner) bidding an equivalent system is not allowed (i.e. the winning bidder must have the ability to install the above system). Furnish equipment and incidentals necessary to complete the work. Insert SuperMicropile™ outer tubes with a single stroke at initial velocities in excess of 200 miles per hour or by drilling a hole to a prescribed depth and inserting the outer tube. Fill the outer tube with neat cement grout and immediately insert a #6 or larger epoxy coated inner threadbar. Inserted length and spacing will be determined by the Contractor's Engineer and identified in the Contractor's stamped plans and submittals.</p>			
31 32 36 33-0002	EA	Drilled / Launched GalvaDized™ SuperMicropiles™ Up To 20 Ft. Length	695.00
Note: GalvaDized™ steel tube, grouted with #6 epoxy coated inner Bar.			
31 32 36 33-0003	EA	Drilled / Launched GalvaDized™ SuperMicropiles™ Up To 30 Ft. Length	1,020.00
Note: GalvaDized™ steel tube, grouted with #6 epoxy coated inner Bar.			
31 32 36 33-0004	EA	Drilled / Launched GalvaDized™ SuperMicropiles™ Up To 40 Ft. Length	1,280.00
Note: GalvaDized™ steel tube, grouted with #6 epoxy coated inner Bar.			
31 32 36 33-0005	EA	Drilled / Launched GalvaDized™ SuperMicropiles™ Up To 50 Ft. Length	1,540.00
Note: GalvaDized™ steel tube, grouted with #6 epoxy coated inner Bar.			



Earthwork	31	13
Earthwork Methods	31 30	
Soil Stabilization	31 32	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 35 Slope Protection (31 30)

31 35 19 Geosynthetic Slope Protection (31 35)

31 35 19 19 Slope Protection with Mulch Control Netting (31 35 19)

31 35 19 19-0001	Erosion Control Fabric <small>(31 35 19 19)</small>	
31 35 19 19-0002	SY 26.6 OZ/SY Erosion Control Fabric (Belton Industries Geocoir 900)	5.41

31 36 Gabions (31 30)

Note: Includes the cost for loading, hauling up to 15 miles from the closest approved source, unloading and placing. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

31 36 13 Gabion Boxes (31 36)

31 36 13 00-0001	Stone Filled Gabion Slope Protection <small>(31 36 13)</small>	
	Note: Machine placed by SY of total top face area for depth indicated.	
31 36 13 00-0002	SY 6" Deep Stone Filled Gabion Slope Protection	78.47
31 36 13 00-0003	SY 9" Deep Stone Filled Gabion Slope Protection	92.72
31 36 13 00-0004	SY 12" Deep Stone Filled Gabion Slope Protection	112.07
31 36 13 00-0005	SY 15" Deep Stone Filled Gabion Slope Protection	132.31
31 36 13 00-0006	SY 18" Deep Stone Filled Gabion Slope Protection	155.32
31 36 13 00-0007	SY 24" Deep Stone Filled Gabion Slope Protection	212.66
31 36 13 00-0008	SY 36" Deep Stone Filled Gabion Slope Protection	268.87

31 37 Riprap (31 30)

Note: Includes the cost for loading, hauling up to 15 miles from the closest approved source, and dumping. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

31 37 13 Machined Riprap (31 37)

31 37 13 00-0001	Random - Filter Stone <small>(31 37 13)</small>	
31 37 13 00-0002	CY 10 To 50 LB Average Pieces Random, Dumped From Truck, Rip Rap	89.95
	<i>For Chinking Material, Add</i>	14.26
31 37 13 00-0003	CY >50 To 100 LB Average Pieces Random, Dumped From Truck, Rip Rap	105.43
	<i>For Chinking Material, Add</i>	14.26
31 37 13 00-0004	CY >100 To 200 LB Average Pieces Random, Dumped From Truck, Rip Rap	112.72
	<i>For Chinking Material, Add</i>	14.26
31 37 13 00-0005	CY >200 To 300 LB Average Pieces Random, Dumped From Truck, Rip Rap	121.02
	<i>For Chinking Material, Add</i>	14.26
31 37 13 00-0006	CY >300 To 600 LB Average Pieces Random, Dumped From Truck, Rip Rap	127.71
	<i>For Chinking Material, Add</i>	14.26
31 37 13 00-0007	CY >600 LB Average Pieces Random, Dumped From Truck, Rip Rap	138.65
31 37 13 00-0008	CY 3/8 To 1/4 CY Pieces Random, Dumped From Truck, Machine Spread And Placed Slope Protection (Keyed) Rip Rap	156.15
31 37 13 00-0009	TON 10 To 50 LB Average Pieces Random, Dumped From Truck, Rip Rap	59.08
31 37 13 00-0010	TON >50 To 100 LB Average Pieces Random, Dumped From Truck, Rip Rap	68.90
31 37 13 00-0011	TON >100 To 200 LB Average Pieces Random, Dumped From Truck, Rip Rap	73.53
31 37 13 00-0012	TON >200 To 300 LB Average Pieces Random, Dumped From Truck, Rip Rap	78.80
31 37 13 00-0013	TON >300 To 600 LB Average Pieces Random, Dumped From Truck, Rip Rap	83.05
31 37 13 00-0014	TON >600 LB Average Pieces Random, Dumped From Truck, Rip Rap	90.08
31 37 13 00-0015	TON 3/8 To 1/4 CY Pieces Random, Dumped From Truck, Machine Spread And Placed Slope Protection (Keyed) Rip Rap	104.38

31 40 Shoring and Underpinning (31)

31 41 Shoring (31 40)

31 41 13 Timber Shoring (31 41)

31 41 13 00-0001	Wood Sheet Piling <small>(31 41 13)</small>	
31 41 13 00-0002	Pull And Salvage <small>(31 41 13 00-0001)</small>	
	Note: Includes soldier beams and lagging (wales, braces and spacers). Excludes tie-backs (rock bolting) where required.	
31 41 13 00-0003	SF 8' Deep Excavation, Wood Shoring, Pull And Salvage	14.26
	<i>For Wood Sheeting Left In Place</i>	-1.59
31 41 13 00-0004	SF 10' Deep Excavation, Wood Shoring, Pull And Salvage	15.44
	<i>For Wood Sheeting Left In Place</i>	-1.84
31 41 13 00-0005	SF 12' Deep Excavation, Wood Shoring, Pull And Salvage	16.75
	<i>For Wood Sheeting Left In Place</i>	-2.09
31 41 13 00-0006	SF 14' Deep Excavation, Wood Shoring, Pull And Salvage	18.15
	<i>For Wood Sheeting Left In Place</i>	-2.39
31 41 13 00-0007	SF 16' Deep Excavation, Wood Shoring, Pull And Salvage	19.68
	<i>For Wood Sheeting Left In Place</i>	-2.70
31 41 13 00-0008	SF 18' Deep Excavation, Wood Shoring, Pull And Salvage	21.34
	<i>For Wood Sheeting Left In Place</i>	-3.06
31 41 13 00-0009	SF 20' Deep Excavation, Wood Shoring, Pull And Salvage	23.15
	<i>For Wood Sheeting Left In Place</i>	-3.44

31	31 Earthwork
	31 40 Shoring and Underpinning
	31 41 Shoring



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

31 41 16 Sheet Piling (31 41)

31 41 16 13 Steel Sheet Piling (31 41 16)

31 41 16 13-0001 Standard Carbon Grade Steel Sheeting - Pull And Salvage (31 41 16 13)

Note: Up to 3 months, 38.5 KSI steel per SF minimum. PSF indicated is for the weight of the material per square foot. Includes soldier beams and lagging (wales, braces and spacers). Excludes tie-backs (rock bolting) where required.

31 41 16 13-0002	TON Driven Steel Sheet Piling, 15' Excavation, 22 PSF Steel Sheeting, Pull And Salvage.....	2,076.85
	<i>For Standard Sheeting Left In Place, Add</i>	1,289.34
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF Left In Place, Add</i>	1,243.70
	<i>For High Strength Sheeting 45,000 To 50,000 PSI Grade, Add</i>	102.70
	<i>For High Strength Sheeting 55,000 PSI Grade, Add</i>	114.11
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF, Add</i>	353.73
	<i>For Each Additional Month >3 Months, Add</i>	57.05
31 41 16 13-0003	TON Driven Steel Sheet Piling, 20' Excavation, 27 PSF Steel Sheeting, Pull And Salvage.....	2,158.00
	<i>For Standard Sheeting Left In Place, Add</i>	1,248.76
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF Left In Place, Add</i>	1,203.12
	<i>For High Strength Sheeting 45,000 To 50,000 PSI Grade, Add</i>	102.70
	<i>For High Strength Sheeting 55,000 PSI Grade, Add</i>	114.11
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF, Add</i>	353.73
	<i>For Each Additional Month >3 Months, Add</i>	57.05
31 41 16 13-0004	TON Driven Steel Sheet Piling, 25' Excavation, 38 PSF Steel Sheeting, Pull And Salvage.....	2,535.29
	<i>For Standard Sheeting Left In Place, Add</i>	1,060.12
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF Left In Place, Add</i>	1,014.48
	<i>For High Strength Sheeting 45,000 To 50,000 PSI Grade, Add</i>	102.70
	<i>For High Strength Sheeting 55,000 PSI Grade, Add</i>	114.11
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF, Add</i>	353.73
	<i>For Each Additional Month >3 Months, Add</i>	57.05
31 41 16 13-0005	TON Driven Steel Sheet Piling, 30' Excavation, 38 PSF Steel Sheeting, Pull And Salvage.....	2,898.34
	<i>For Standard Sheeting Left In Place, Add</i>	878.59
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF Left In Place, Add</i>	832.95
	<i>For High Strength Sheeting 45,000 To 50,000 PSI Grade, Add</i>	102.70
	<i>For High Strength Sheeting 55,000 PSI Grade, Add</i>	114.11
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF, Add</i>	353.73
	<i>For Each Additional Month >3 Months, Add</i>	57.05
31 41 16 13-0006	TON Driven Steel Sheet Piling, 35' Excavation, 38 PSF Steel Sheeting, Pull And Salvage.....	3,111.91
	<i>For Standard Sheeting Left In Place, Add</i>	771.81
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF Left In Place, Add</i>	726.17
	<i>For High Strength Sheeting 45,000 To 50,000 PSI Grade, Add</i>	102.70
	<i>For High Strength Sheeting 55,000 PSI Grade, Add</i>	114.11
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF, Add</i>	353.73
	<i>For Each Additional Month >3 Months, Add</i>	57.05
31 41 16 13-0007	TON Driven Steel Sheet Piling, 40' Excavation, 38 PSF Steel Sheeting, Pull And Salvage.....	3,329.74
	<i>For Standard Sheeting Left In Place, Add</i>	662.89
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF Left In Place, Add</i>	617.25
	<i>For High Strength Sheeting 45,000 To 50,000 PSI Grade, Add</i>	102.70
	<i>For High Strength Sheeting 55,000 PSI Grade, Add</i>	114.11
	<i>For Lightweight Steel Sheeting 8.6 And 9.2 PSF, Add</i>	353.73
	<i>For Each Additional Month >3 Months, Add</i>	57.05

31 41 16 13-0008 Steel Shoring Plates (31 41 16 13)

31 41 16 13-0009	EA 1/2" x 12" x 12" Steel Plate For Shoring	44.78
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31 43 Concrete Raising (31 40)

31 43 13 Pressure Grouting (31 43)

31 43 13 16 Polyurethane Pressure Grouting (31 43 13)

31 43 13 16-0001 PolyLift™ Concrete Injection For Lifting And Leveling (31 43 13 16)

31 43 13 16-0002	EA Mobilization PolyLift™ Concrete Lifting And Leveling Minimum Charge.....	3,639.21
31 43 13 16-0003	LB Up To 1,000 Lbs PolyLift™ Concrete Injection For Lifting And Leveling.....	31.06
	Note: Per pound of material.	
31 43 13 16-0004	LB >1,000 Lbs PolyLift™ Concrete Injection For Lifting And Leveling	26.02
	Note: Per pound of material.	

31 45 Vibroflotation and Densification (31 40)

31 45 13 Vibroflotation (31 45)

31 45 13 00-0001	LCY Soil Stabilization, Vibroflotation.....	18.07
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31 50 Excavation Support and Protection (31)

31 52 Cofferdams (31 50)

31 52 21 Portable Cofferdams (31 52)

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 52 21 00-0001		Portable Cofferdams <small>(31 52 21)</small>		
		Note: Excludes dewatering and pumps.		
31 52 21 00-0002		Portable Cofferdam Rental <small>(31 52 21 00-0001)</small>		
		Note: Excludes delivery and installation.		
31 52 21 00-0003	LF	3' High x 7' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	50.18	
31 52 21 00-0004	LF	4' High x 9' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	64.23	
31 52 21 00-0005	LF	5' High x 11' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	90.32	
31 52 21 00-0006	LF	6' High x 13' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	116.42	
31 52 21 00-0007	LF	8' High x 17' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	150.54	
31 52 21 00-0008	LF	10' High x 21' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	301.08	
31 52 21 00-0009	LF	12' High x 25' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	421.51	
31 52 21 00-0010	LF	16' High x 33' Width, Portable Cofferdam, Rental Per Month Note: Minimum 40'	596.14	
31 52 21 00-0011		Portable Cofferdam Delivery And Set-up <small>(31 52 21 00-0001)</small>		
		Note: Excludes crane usage where required. See CSI section 01 22 23 00-0776 for crane lifting equipment.		
31 52 21 00-0012	LF	Up To 5' High, Portable Cofferdam, Delivery And Set-up In Dynamic (Rivers Or Streams) Water	12.15	
31 52 21 00-0013	LF	6' To 8' High, Portable Cofferdam, Delivery And Set-up In Dynamic (Rivers Or Streams) Water	19.44	
31 52 21 00-0014	LF	10' To 12' High, Portable Cofferdam, Delivery And Set-up In Dynamic (Rivers Or Streams) Water	29.16	
31 52 21 00-0015	LF	16' High, Portable Cofferdam, Delivery And Set-up In Dynamic (Rivers Or Streams) Water	38.89	
31 52 21 00-0016	LF	Up To 5' High, Portable Cofferdam, Delivery And Set-up In Static (Lakes Or Ponds) Water	7.29	
31 52 21 00-0017	LF	6' To 8' High, Portable Cofferdam, Delivery And Set-up In Static (Lakes Or Ponds) Water	12.15	
31 52 21 00-0018	LF	10' To 12' High, Portable Cofferdam, Delivery And Set-up In Static (Lakes Or Ponds) Water	19.44	
31 52 21 00-0019	LF	16' High, Portable Cofferdam, Delivery And Set-up In Static (Lakes Or Ponds) Water	26.74	
31 52 21 00-0020		Portable Cofferdam Repositioning <small>(31 52 21 00-0001)</small>		
31 52 21 00-0021	LF	Up To 5' High, Portable Cofferdam, Repositioning	6.08	
31 52 21 00-0022	LF	6' To 8' High, Portable Cofferdam, Repositioning	9.72	
31 52 21 00-0023	LF	10' To 12' High, Portable Cofferdam, Repositioning	14.59	
31 52 21 00-0024	LF	16' High, Portable Cofferdam, Repositioning	19.44	

31 60 Special Foundations and Load-bearing Elements (31)

31 62 Driven Piles (31 60)

31 62 13 Concrete Piles (31 62)

31 62 13 23 Prestressed Concrete Piles (31 62 13)

31 62 13 23-0001 Square Prestressed Driven Concrete Piles (31 62 13 23)

31 62 13 23-0002	VLF	10" Square Prestressed Driven Concrete Pile	33.93	
		<i>For Piles Driven In Water, Add</i>	15.67	
31 62 13 23-0003	VLF	12" Square Prestressed Driven Concrete Pile	42.82	
		<i>For Piles Driven In Water, Add</i>	17.71	
31 62 13 23-0004	VLF	14" Square Prestressed Driven Concrete Pile	52.15	
		<i>For Piles Driven In Water, Add</i>	19.53	
31 62 13 23-0005	VLF	16" Square Prestressed Driven Concrete Pile	64.16	
		<i>For Piles Driven In Water, Add</i>	21.76	
31 62 13 23-0006	VLF	18" Square Prestressed Driven Concrete Pile	78.15	
		<i>For Piles Driven In Water, Add</i>	24.34	
31 62 13 23-0007	VLF	20" Square Prestressed Driven Concrete Pile	90.57	
		<i>For Piles Driven In Water, Add</i>	26.97	
31 62 13 23-0008	VLF	24" Square Prestressed Driven Concrete Pile	115.92	
		<i>For Piles Driven In Water, Add</i>	31.12	

31 62 13 23-0009 Octagonal Prestressed Driven Concrete Piles (31 62 13 23)

31 62 13 23-0010	VLF	12" Octagonal Prestressed Driven Concrete Pile	38.26	
		<i>For Piles Driven In Water, Add</i>	16.46	
31 62 13 23-0011	VLF	14" Octagonal Prestressed Driven Concrete Pile	47.21	
		<i>For Piles Driven In Water, Add</i>	18.15	
31 62 13 23-0012	VLF	16" Octagonal Prestressed Driven Concrete Pile	56.28	
		<i>For Piles Driven In Water, Add</i>	19.95	
31 62 13 23-0013	VLF	18" Octagonal Prestressed Driven Concrete Pile	67.51	
		<i>For Piles Driven In Water, Add</i>	22.10	
31 62 13 23-0014	VLF	20" Octagonal Prestressed Driven Concrete Pile	71.84	
		<i>For Piles Driven In Water, Add</i>	23.71	
31 62 13 23-0015	VLF	24" Octagonal Prestressed Driven Concrete Pile	76.42	
		<i>For Piles Driven In Water, Add</i>	25.55	

31	31 Earthwork
	31 60 Special Foundations and Load-bearing Elements
	31 62 Driven Piles



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 62 13 23-0016	Straight Cylinder Prestressed Driven Concrete Piles <small>(31 62 13 23)</small>	
31 62 13 23-0017	VLF 12" Diameter, 2-3/8" Wall, Straight Cylinder Prestressed Driven Concrete Pile	55.70
	<i>For Piles Driven In Water, Add</i>	17.50
31 62 13 23-0018	VLF 14" Diameter, 2-1/2" Wall, Straight Cylinder Prestressed Driven Concrete Pile	66.17
	<i>For Piles Driven In Water, Add</i>	19.25
31 62 13 23-0019	VLF 16" Diameter, 3" Wall, Straight Cylinder Prestressed Driven Concrete Pile.....	78.57
	<i>For Piles Driven In Water, Add</i>	21.29
31 62 13 23-0020	VLF 18" Diameter, 3-1/2" Wall, Straight Cylinder Prestressed Driven Concrete Pile	88.99
	<i>For Piles Driven In Water, Add</i>	23.22
31 62 13 23-0021	VLF 20" Diameter, 4" Wall, Straight Cylinder Prestressed Driven Concrete Pile.....	112.14
	<i>For Piles Driven In Water, Add</i>	26.56
31 62 13 23-0022	VLF 24" Diameter, 5" Wall, Straight Cylinder Prestressed Driven Concrete Pile.....	138.86
	<i>For Piles Driven In Water, Add</i>	30.41

31 62 16 Steel Piles (31 62)

31 62 16 16 Steel H Piles (31 62 16)

31 62 16 16-0001	Rolled, Driven Steel H Piles <small>(31 62 16 16)</small>	
31 62 16 16-0002	VLF 8" x 8" x 36 LB/FT, Rolled, Driven Steel H Pile.....	33.88
	<i>For Piles Driven In Water, Add</i>	16.82
31 62 16 16-0003	VLF 10" x 10" x 42 LB/FT, Rolled, Driven Steel H Pile	37.78
	<i>For Piles Driven In Water, Add</i>	17.87
31 62 16 16-0004	VLF 10" x 10" x 57 LB/FT, Rolled, Driven Steel H Pile.....	45.68
	<i>For Piles Driven In Water, Add</i>	18.66
31 62 16 16-0005	VLF 12" x 12" x 53 LB/FT, Rolled, Driven Steel H Pile	44.03
	<i>For Piles Driven In Water, Add</i>	18.91
31 62 16 16-0006	VLF 12" x 12" x 63 LB/FT, Rolled, Driven Steel H Pile.....	49.30
	<i>For Piles Driven In Water, Add</i>	19.44
31 62 16 16-0007	VLF 12" x 12" x 74 LB/FT, Rolled, Driven Steel H Pile.....	56.44
	<i>For Piles Driven In Water, Add</i>	21.37
31 62 16 16-0008	VLF 12" x 12" x 84 LB/FT, Rolled, Driven Steel H Pile	61.71
	<i>For Piles Driven In Water, Add</i>	21.89
31 62 16 16-0009	VLF 14" x 14" x 73 LB/FT, Rolled, Driven Steel H Pile.....	56.34
	<i>For Piles Driven In Water, Add</i>	21.74
31 62 16 16-0010	VLF 14" x 14" x 89 LB/FT, Rolled, Driven Steel H Pile	65.30
	<i>For Piles Driven In Water, Add</i>	22.64
31 62 16 16-0011	VLF 14" x 14" x 102 LB/FT, Rolled, Driven Steel H Pile.....	73.12
	<i>For Piles Driven In Water, Add</i>	24.77
31 62 16 16-0012	VLF 14" x 14" x 117 LB/FT, Rolled, Driven Steel H Pile.....	81.54
	<i>For Piles Driven In Water, Add</i>	25.61

31 62 16 16-0013 Splices, Caps, And Points For H-Piles (31 62 16 16)

31 62 16 16-0014	Rolled Steel H Pile Splices <small>(31 62 16 16-0013)</small>	
31 62 16 16-0015	EA 8" Rolled Steel H Pile Splice	317.92
31 62 16 16-0016	EA 10" Rolled Steel H Pile Splice	355.33
31 62 16 16-0017	EA 12" Rolled Steel H Pile Splice.....	487.99
31 62 16 16-0018	EA 14" Rolled Steel H Pile Splice.....	506.70

31 62 16 16-0019 **Rolled Steel H Driving Caps** (31 62 16 16-0013)

31 62 16 16-0020	EA 8" Rolled Steel H Driving Cap.....	3,114.06
31 62 16 16-0021	EA 10" Rolled Steel H Driving Cap.....	3,114.06
31 62 16 16-0022	EA 12" Rolled Steel H Driving Cap.....	3,173.87
31 62 16 16-0023	EA 14" Rolled Steel H Driving Cap.....	4,763.64

31 62 16 16-0024 **Rolled Steel H Standard Pile Points** (31 62 16 16-0013)

31 62 16 16-0025	EA 8" Rolled Steel H Standard Pile Point	336.63
31 62 16 16-0026	EA 10" Rolled Steel H Standard Pile Point.....	355.33
31 62 16 16-0027	EA 12" Rolled Steel H Standard Pile Point.....	487.99
31 62 16 16-0028	EA 14" Rolled Steel H Standard Pile Point.....	544.10
31 62 16 16-0029	EA 10" Rolled Steel H Standard Pile Point.....	487.99
31 62 16 16-0030	EA 14" Rolled Steel H Standard Pile Point.....	580.33

31 62 16 19 Unfilled Tubular Steel Piles (31 62 16)

31 62 16 19-0001	Unfilled Tubular Driven Steel Piles <small>(31 62 16 19)</small>	
31 62 16 19-0002	VLF 8" Diameter x 29 LB/FT, Unfilled Tubular Driven Steel Pile.....	60.85
	<i>For Piles Driven In Water, Add</i>	23.27
31 62 16 19-0003	VLF 8" Diameter x 36 LB/FT, Unfilled Tubular Driven Steel Pile	71.29
	<i>For Piles Driven In Water, Add</i>	24.31
31 62 16 19-0004	VLF 8" Diameter x 43 LB/FT, Unfilled Tubular Driven Steel Pile.....	82.56
	<i>For Piles Driven In Water, Add</i>	25.44
31 62 16 19-0005	VLF 10" Diameter x 34 LB/FT, Unfilled Tubular Driven Steel Pile	71.29
	<i>For Piles Driven In Water, Add</i>	24.31
31 62 16 19-0006	VLF 10" Diameter x 41 LB/FT, Unfilled Tubular Driven Steel Pile	81.21
	<i>For Piles Driven In Water, Add</i>	25.30

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 62 16 19-0007 VLF 10" Diameter x 55 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	103.13 27.49	
31 62 16 19-0008 VLF 12" Diameter x 42 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	84.60 26.56	
31 62 16 19-0009 VLF 12" Diameter x 50 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	96.21 27.72	
31 62 16 19-0010 VLF 12" Diameter x 54 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	102.66 28.37	
31 62 16 19-0011 VLF 12" Diameter x 65 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	120.72 30.17	
31 62 16 19-0012 VLF 14" Diameter x 46 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	91.33 29.11	
31 62 16 19-0013 VLF 14" Diameter x 55 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	104.47 30.43	
31 62 16 19-0014 VLF 14" Diameter x 64 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	117.60 31.74	
31 62 16 19-0015 VLF 14" Diameter x 72 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	130.74 33.05	
31 62 16 19-0016 VLF 16" Diameter x 52 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	101.60 32.49	
31 62 16 19-0017 VLF 16" Diameter x 63 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	116.96 34.03	
31 62 16 19-0018 VLF 16" Diameter x 83 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	146.90 37.02	
31 62 16 19-0019 VLF 18" Diameter x 59 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	126.66 36.88	
31 62 16 19-0020 VLF 18" Diameter x 71 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	146.61 38.87	
31 62 16 19-0021 VLF 18" Diameter x 93 LB/FT, Unfilled Tubular Driven Steel Pile..... <i>For Piles Driven In Water, Add</i>	184.51 42.66	
31 62 16 19-0022 Splices And Points For Pipe Piles <small>(31 62 16 19)</small>		
31 62 16 19-0023 Steel Pipe Pile Splices <small>(31 62 16 19-0022)</small>		
31 62 16 19-0024 EA 8" Diameter, Steel Pipe Pile Splice.....	507.11	
31 62 16 19-0025 EA 10" Diameter, Steel Pipe Pile Splice.....	576.67	
31 62 16 19-0026 EA 12" Diameter, Steel Pipe Pile Splice.....	719.44	
31 62 16 19-0027 EA 14" Diameter, Steel Pipe Pile Splice.....	788.04	
31 62 16 19-0028 EA 16" Diameter, Steel Pipe Pile Splice.....	997.15	
31 62 16 19-0029 EA 18" Diameter, Steel Pipe Pile Splice.....	1,248.08	
31 62 16 19-0030 Steel Pipe Standard Pile Points <small>(31 62 16 19-0022)</small>		
31 62 16 19-0031 EA 8" Diameter, Steel Pipe Standard Pile Point.....	442.59	
31 62 16 19-0032 EA 10" Diameter, Steel Pipe Standard Pile Point.....	498.30	
31 62 16 19-0033 EA 12" Diameter, Steel Pipe Standard Pile Point.....	577.38	
31 62 16 19-0034 EA 14" Diameter, Steel Pipe Standard Pile Point.....	730.59	
31 62 16 19-0035 EA 16" Diameter, Steel Pipe Standard Pile Point.....	869.87	
31 62 16 19-0036 EA 18" Diameter, Steel Pipe Standard Pile Point.....	991.75	
31 62 16 19-0037 Steel Pipe Heavy Duty Pile Points <small>(31 62 16 19-0022)</small>		
31 62 16 19-0038 EA 10" Diameter, Steel Pipe Heavy Duty Pile Point.....	614.63	
31 62 16 19-0039 EA 12" Diameter, Steel Pipe Heavy Duty Pile Point.....	684.27	
31 62 16 19-0040 EA 14" Diameter, Steel Pipe Heavy Duty Pile Point.....	786.43	
31 62 16 19-0041 EA 16" Diameter, Steel Pipe Heavy Duty Pile Point.....	1,064.99	
31 62 16 19-0042 EA 18" Diameter, Steel Pipe Heavy Duty Pile Point.....	1,266.28	
31 62 19 Timber Piles <small>(31 62)</small>		
31 62 19 00-0001 Friction Or End Bearing, Driven Treated Wood Piles <small>(31 62 19)</small>		
Note: 12 LB Penta-treated/CF.		
31 62 19 00-0002 LF Up To 30', 12" Butt x 8" Tip, Friction Or End Bearing, Driven Treated Wood Pile..... <i>For Piles Driven In Water, Add</i> <i>For Untreated Pile, Deduct</i> <i>For Each Pile Tip Point, Add</i> <i>For Each Pile Butt, Driving Cap, Add</i> <i>For Each Splice For Pile >50', Add</i>	32.01 15.14 -6.94 12.50 20.10 139.40	
31 62 19 00-0003 LF >30' To 39', 12" Butt x 8" Tip, Friction Or End Bearing, Driven Treated Wood Pile..... <i>For Piles Driven In Water, Add</i> <i>For Untreated Pile, Deduct</i> <i>For Each Pile Tip Point, Add</i> <i>For Each Pile Butt, Driving Cap, Add</i> <i>For Each Splice For Pile >50', Add</i>	33.88 16.82 -7.02 12.50 20.10 139.40	
31 62 19 00-0004 LF 39' To 49', 12" Butt x 7" Tip, Friction Or End Bearing, Driven Treated Wood Pile..... <i>For Piles Driven In Water, Add</i> <i>For Untreated Pile, Deduct</i> <i>For Each Pile Tip Point, Add</i> <i>For Each Pile Butt, Driving Cap, Add</i> <i>For Each Splice For Pile >50', Add</i>	35.73 17.89 -7.33 12.50 20.10 139.40	

31 Earthwork**31 60 Special Foundations and Load-bearing Elements****31 62 Driven Piles**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

31 62 19 00-0005	LF >49' To 59', 13" Butt x 7" Tip, Friction Or End Bearing, Driven Treated Wood Pile	38.61	
	<i>For Piles Driven In Water, Add</i>	19.97	
	<i>For Untreated Pile, Deduct</i>	-7.66	
	<i>For Each Pile Tip Point, Add</i>	12.50	
	<i>For Each Pile Butt, Driving Cap, Add</i>	20.10	
	<i>For Each Splice For Pile >50', Add</i>	139.40	
31 62 19 00-0006	LF >59' To 69', 13" Butt x 6" Tip, Friction Or End Bearing, Driven Treated Wood Pile	47.61	
	<i>For Piles Driven In Water, Add</i>	22.67	
	<i>For Untreated Pile, Deduct</i>	-10.25	
	<i>For Each Pile Tip Point, Add</i>	12.50	
	<i>For Each Pile Butt, Driving Cap, Add</i>	20.10	
	<i>For Each Splice For Pile >50', Add</i>	139.40	
31 62 19 00-0007	LF >69' To 79', 13" Butt x 6" Tip, Friction Or End Bearing, Driven Treated Wood Pile	59.31	
	<i>For Piles Driven In Water, Add</i>	27.41	
	<i>For Untreated Pile, Deduct</i>	-13.11	
	<i>For Each Pile Tip Point, Add</i>	12.50	
	<i>For Each Pile Butt, Driving Cap, Add</i>	20.10	
	<i>For Each Splice For Pile >50', Add</i>	139.40	

31 62 23 Composite Piles (31 62)**31 62 23 13 Concrete-Filled Steel Piles (31 62 23)****31 62 23 13-0001 Concrete-Filled Driven Steel Pipe Piles (31 62 23 13)**

Note: Includes 4,000 PSI concrete grout. Excludes reinforcing.

31 62 23 13-0002	VLF 8" Diameter x 29 LB/FT, Concrete-Filled Driven Steel Pipe Pile	64.78	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	7.44	
	<i>For Piles Driven In Water, Add</i>	25.16	
31 62 23 13-0003	VLF 8" Diameter x 36 LB/FT, Concrete-Filled Driven Steel Pipe Pile	75.22	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	8.49	
	<i>For Piles Driven In Water, Add</i>	26.21	
31 62 23 13-0004	VLF 8" Diameter x 43 LB/FT, Concrete-Filled Driven Steel Pipe Pile	86.49	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	9.61	
	<i>For Piles Driven In Water, Add</i>	27.33	
31 62 23 13-0005	VLF 10" Diameter x 34 LB/FT, Concrete-Filled Driven Steel Pipe Pile	77.01	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	10.32	
	<i>For Piles Driven In Water, Add</i>	26.80	
31 62 23 13-0006	VLF 10" Diameter x 41 LB/FT, Concrete-Filled Driven Steel Pipe Pile	86.93	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	11.31	
	<i>For Piles Driven In Water, Add</i>	27.79	
31 62 23 13-0007	VLF 10" Diameter x 55 LB/FT, Concrete-Filled Driven Steel Pipe Pile	108.85	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	13.50	
	<i>For Piles Driven In Water, Add</i>	29.98	
31 62 23 13-0008	VLF 12" Diameter x 42 LB/FT, Concrete-Filled Driven Steel Pipe Pile	92.63	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	13.79	
	<i>For Piles Driven In Water, Add</i>	29.97	
31 62 23 13-0009	VLF 12" Diameter x 50 LB/FT, Concrete-Filled Driven Steel Pipe Pile	104.24	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	14.95	
	<i>For Piles Driven In Water, Add</i>	31.13	
31 62 23 13-0010	VLF 12" Diameter x 54 LB/FT, Concrete-Filled Driven Steel Pipe Pile	110.69	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	15.60	
	<i>For Piles Driven In Water, Add</i>	31.78	
31 62 23 13-0011	VLF 12" Diameter x 65 LB/FT, Concrete-Filled Driven Steel Pipe Pile	128.75	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	17.40	
	<i>For Piles Driven In Water, Add</i>	33.58	
31 62 23 13-0012	VLF 14" Diameter x 46 LB/FT, Concrete-Filled Driven Steel Pipe Pile	102.15	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	16.82	
	<i>For Piles Driven In Water, Add</i>	34.43	
31 62 23 13-0013	VLF 14" Diameter x 55 LB/FT, Concrete-Filled Driven Steel Pipe Pile	115.29	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	18.13	
	<i>For Piles Driven In Water, Add</i>	35.74	
31 62 23 13-0014	VLF 14" Diameter x 64 LB/FT, Concrete-Filled Driven Steel Pipe Pile	128.42	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	19.44	
	<i>For Piles Driven In Water, Add</i>	37.05	
31 62 23 13-0015	VLF 14" Diameter x 72 LB/FT, Concrete-Filled Driven Steel Pipe Pile	141.56	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	20.76	
	<i>For Piles Driven In Water, Add</i>	38.37	
31 62 23 13-0016	VLF 16" Diameter x 52 LB/FT, Concrete-Filled Driven Steel Pipe Pile	113.37	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	20.63	
	<i>For Piles Driven In Water, Add</i>	36.99	
31 62 23 13-0017	VLF 16" Diameter x 63 LB/FT, Concrete-Filled Driven Steel Pipe Pile	128.73	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	22.16	
	<i>For Piles Driven In Water, Add</i>	38.52	
31 62 23 13-0018	VLF 16" Diameter x 83 LB/FT, Concrete-Filled Driven Steel Pipe Pile	158.68	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	25.16	
	<i>For Piles Driven In Water, Add</i>	41.52	
31 62 23 13-0019	VLF 18" Diameter x 59 LB/FT, Concrete-Filled Driven Steel Pipe Pile	140.88	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	26.40	
	<i>For Piles Driven In Water, Add</i>	41.81	
31 62 23 13-0020	VLF 18" Diameter x 71 LB/FT, Concrete-Filled Driven Steel Pipe Pile	160.83	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	28.39	
	<i>For Piles Driven In Water, Add</i>	43.80	
31 62 23 13-0021	VLF 18" Diameter x 93 LB/FT, Concrete-Filled Driven Steel Pipe Pile	198.74	
	<i>For 5,000 PSI Concrete Grout Fill, Add</i>	32.18	
	<i>For Piles Driven In Water, Add</i>	47.59	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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31 62 23 13-0022	7 Gauge, Constant Diameter Concrete-Filled Driven Steel Piles <small>(31 62 23 13)</small> Note: End bearing, with fluted steel casing, up to 50'. Includes 4,000 PSI concrete. Excludes reinforcing.		
31 62 23 13-0023	VLF 12" Diameter, 7 Gauge, Constant Diameter Concrete-Filled Driven Steel Pile.....	87.80	
	<i>For Piles Driven In Water, Add</i>	23.10	
31 62 23 13-0024	VLF 14" Diameter, 7 Gauge, Constant Diameter Concrete-Filled Driven Steel Pile.....	107.33	
	<i>For Piles Driven In Water, Add</i>	26.08	
31 62 23 13-0025	VLF 16" Diameter, 7 Gauge, Constant Diameter Concrete-Filled Driven Steel Pile.....	121.82	
	<i>For Piles Driven In Water, Add</i>	28.71	
31 62 23 13-0026	VLF 18" Diameter, 7 Gauge, Constant Diameter Concrete-Filled Driven Steel Pile.....	132.55	
	<i>For Piles Driven In Water, Add</i>	31.17	

31 62 23 13-0027	Tapered Friction Concrete-Filled Driven Steel Piles <small>(31 62 23 13)</small> Note: With fluted steel casing, up to 50'. Includes 4,000 PSI concrete. Excludes reinforcing.		
31 62 23 13-0028	VLF 12" Diameter, 7 Gauge, Tapered Friction Concrete-Filled Driven Steel Pile.....	86.03	
	<i>For Piles Driven In Water, Add</i>	22.92	
31 62 23 13-0029	VLF 14" Diameter, 7 Gauge, Tapered Friction Concrete-Filled Driven Steel Pile.....	88.05	
	<i>For Piles Driven In Water, Add</i>	24.15	
31 62 23 13-0030	VLF 16" Diameter, 7 Gauge, Tapered Friction Concrete-Filled Driven Steel Pile.....	108.31	
	<i>For Piles Driven In Water, Add</i>	27.36	
31 62 23 13-0031	VLF 18" Diameter, 7 Gauge, Tapered Friction Concrete-Filled Driven Steel Pile.....	125.41	
	<i>For Piles Driven In Water, Add</i>	30.45	

31 62 23 13-0032	Thin Wall Shell Straight Sided Driven Steel Piles <small>(31 62 23 13)</small>		
31 62 23 13-0033	VLF 8" Diameter, 16 Gauge, Thin Wall Shell Straight Sided Driven Steel Pile.....	50.37	
	<i>For Piles Driven In Water, Add</i>	17.12	
	<i>For Thick Wall Shell, Add</i>	0.09	
31 62 23 13-0034	VLF 10" Diameter, 16 Gauge, Thin Wall Shell Straight Sided Driven Steel Pile.....	55.57	
	<i>For Piles Driven In Water, Add</i>	18.99	
	<i>For Thick Wall Shell, Add</i>	0.10	
31 62 23 13-0035	VLF 12" Diameter, 16 Gauge, Thin Wall Shell Straight Sided Driven Steel Pile.....	60.72	
	<i>For Piles Driven In Water, Add</i>	20.84	
	<i>For Thick Wall Shell, Add</i>	0.11	
31 62 23 13-0036	VLF 14" Diameter, 16 Gauge, Thin Wall Shell Straight Sided Driven Steel Pile.....	65.92	
	<i>For Piles Driven In Water, Add</i>	22.70	
	<i>For Thick Wall Shell, Add</i>	0.12	
31 62 23 13-0037	VLF 16" Diameter, 16 Gauge, Thin Wall Shell Straight Sided Driven Steel Pile.....	71.13	
	<i>For Piles Driven In Water, Add</i>	24.57	
	<i>For Thick Wall Shell, Add</i>	0.13	

31 63 Bored Piles (31 60)

31 63 36 Drilled Steel Piles (31 63)

31 63 36 00-0001	Drill Hole <small>(31 63 36)</small> Note: Excludes removal of excess material.		
31 63 36 00-0002	Drilling Mobilization <small>(31 63 36 00-0001)</small>		
31 63 36 00-0003	EA >12" To 24" Diameter Hole, Drilling Mobilization	1,001.26	
31 63 36 00-0004	EA >24" Diameter Hole, Drilling Mobilization.....	1,335.00	

31 63 36 00-0005	Drill Hole In Soil <small>(31 63 36 00-0001)</small>		
31 63 36 00-0006	LF 18" Diameter, Up To 24' Depth, Drilled/Augered Hole	57.54	
31 63 36 00-0007	LF 20" Diameter, Up To 24' Depth, Drilled/Augered Hole	66.91	
31 63 36 00-0008	LF 22" Diameter, Up To 24' Depth, Drilled/Augered Hole	78.61	
31 63 36 00-0009	LF 24" Diameter, Up To 24' Depth, Drilled/Augered Hole	92.67	
31 63 36 00-0010	LF 26" Diameter, Up To 24' Depth, Drilled/Augered Hole	100.16	
31 63 36 00-0011	LF 28" Diameter, Up To 24' Depth, Drilled/Augered Hole	110.19	
31 63 36 00-0012	LF 30" Diameter, Up To 24' Depth, Drilled/Augered Hole	120.69	

31 63 36 00-0013 Steel H Piles (31 63 36)

31 63 36 00-0014	Placed In Drilled Hole, Rolled Steel H-Section Piles <small>(31 63 36 00-0013)</small> Note: Includes guides, bracing and alignment.		
31 63 36 00-0015	VLF 8" x 8" x 36 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile.....	32.22	
	<i>For >2,400 To 3,600, Deduct</i>	-1.14	
	<i>For >3,600 To 4,800, Deduct</i>	-2.27	
	<i>For >4,800 To 6,000, Deduct</i>	-3.89	
	<i>For >6,000, Deduct</i>	-5.50	
31 63 36 00-0016	VLF 10" x 10" x 42 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile.....	36.04	
	<i>For >2,400 To 3,600, Deduct</i>	-1.25	
	<i>For >3,600 To 4,800, Deduct</i>	-2.50	
	<i>For >4,800 To 6,000, Deduct</i>	-4.30	
	<i>For >6,000, Deduct</i>	-6.10	

31 Earthwork**31 60 Special Foundations and Load-bearing Elements****31 63 Bored Piles**

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CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

31 63 36 00-0017	VLF 10" x 10" x 57 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	43.94
	<i>For >2,400 To 3,600, Deduct</i>	-1.45
	<i>For >3,600 To 4,800, Deduct</i>	-2.89
	<i>For >4,800 To 6,000, Deduct</i>	-5.09
	<i>For >6,000, Deduct</i>	-7.29
31 63 36 00-0018	VLF 12" x 12" x 53 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	42.24
	<i>For >2,400 To 3,600, Deduct</i>	-1.41
	<i>For >3,600 To 4,800, Deduct</i>	-2.83
	<i>For >4,800 To 6,000, Deduct</i>	-4.94
	<i>For >6,000, Deduct</i>	-7.05
31 63 36 00-0019	VLF 12" x 12" x 63 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	47.51
	<i>For >2,400 To 3,600, Deduct</i>	-1.55
	<i>For >3,600 To 4,800, Deduct</i>	-3.09
	<i>For >4,800 To 6,000, Deduct</i>	-5.47
	<i>For >6,000, Deduct</i>	-7.84
31 63 36 00-0020	VLF 12" x 12" x 74 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	54.49
	<i>For >2,400 To 3,600, Deduct</i>	-1.75
	<i>For >3,600 To 4,800, Deduct</i>	-3.50
	<i>For >4,800 To 6,000, Deduct</i>	-6.23
	<i>For >6,000, Deduct</i>	-8.95
31 63 36 00-0021	VLF 12" x 12" x 84 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	59.76
	<i>For >2,400 To 3,600, Deduct</i>	-1.88
	<i>For >3,600 To 4,800, Deduct</i>	-3.76
	<i>For >4,800 To 6,000, Deduct</i>	-6.75
	<i>For >6,000, Deduct</i>	-9.74
31 63 36 00-0022	VLF 14" x 14" x 73 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	54.35
	<i>For >2,400 To 3,600, Deduct</i>	-1.76
	<i>For >3,600 To 4,800, Deduct</i>	-3.51
	<i>For >4,800 To 6,000, Deduct</i>	-6.23
	<i>For >6,000, Deduct</i>	-8.95
31 63 36 00-0023	VLF 14" x 14" x 89 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	63.31
	<i>For >2,400 To 3,600, Deduct</i>	-1.98
	<i>For >3,600 To 4,800, Deduct</i>	-3.96
	<i>For >4,800 To 6,000, Deduct</i>	-7.13
	<i>For >6,000, Deduct</i>	-10.29
31 63 36 00-0024	VLF 14" x 14" x 102 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	70.96
	<i>For >2,400 To 3,600, Deduct</i>	-2.21
	<i>For >3,600 To 4,800, Deduct</i>	-4.41
	<i>For >4,800 To 6,000, Deduct</i>	-7.96
	<i>For >6,000, Deduct</i>	-11.51
31 63 36 00-0025	VLF 14" x 14" x 117 LB/FT, Placed In Drilled Hole, Rolled Steel H Pile	79.38
	<i>For >2,400 To 3,600, Deduct</i>	-2.42
	<i>For >3,600 To 4,800, Deduct</i>	-4.83
	<i>For >4,800 To 6,000, Deduct</i>	-8.80
	<i>For >6,000, Deduct</i>	-12.77

31 63 36 00-0026 Welded Steel Stud Pins (31 63 36 00-0013)

Note: Includes welding to steel piles.

31 63 36 00-0027	EA 5/8" Diameter x 2-1/2" Long, Welded Steel Stud Pins	14.90
	<i>For >50 To 150, Deduct</i>	-0.62
	<i>For >150 To 250, Deduct</i>	-1.30
	<i>For >250 To 500, Deduct</i>	-1.99
	<i>For >500, Deduct</i>	-2.67
31 63 36 00-0028	EA 5/8" Diameter x 5" Long, Welded Steel Stud Pins	17.46
	<i>For >50 To 150, Deduct</i>	-0.62
	<i>For >150 To 250, Deduct</i>	-1.37
	<i>For >250 To 500, Deduct</i>	-2.11
	<i>For >500, Deduct</i>	-2.86
31 63 36 00-0029	EA 5/8" Diameter x 7" Long, Welded Steel Stud Pins	19.93
	<i>For >50 To 150, Deduct</i>	-0.62
	<i>For >150 To 250, Deduct</i>	-1.43
	<i>For >250 To 500, Deduct</i>	-2.24
	<i>For >500, Deduct</i>	-3.04
31 63 36 00-0030	EA 3/4" Diameter x 2-1/2" Long, Welded Steel Stud Pins	17.05
	<i>For >50 To 150, Deduct</i>	-0.65
	<i>For >150 To 250, Deduct</i>	-1.40
	<i>For >250 To 500, Deduct</i>	-2.15
	<i>For >500, Deduct</i>	-2.91
31 63 36 00-0031	EA 3/4" Diameter x 5" Long, Welded Steel Stud Pins	20.93
	<i>For >50 To 150, Deduct</i>	-0.65
	<i>For >150 To 250, Deduct</i>	-1.50
	<i>For >250 To 500, Deduct</i>	-2.35
	<i>For >500, Deduct</i>	-3.20
31 63 36 00-0032	EA 3/4" Diameter x 7" Long, Welded Steel Stud Pins	23.65
	<i>For >50 To 150, Deduct</i>	-0.65
	<i>For >150 To 250, Deduct</i>	-1.57
	<i>For >250 To 500, Deduct</i>	-2.48
	<i>For >500, Deduct</i>	-3.40
31 63 36 00-0033	EA 7/8" Diameter x 2-1/2" Long, Welded Steel Stud Pins	19.87
	<i>For >50 To 150, Deduct</i>	-0.68
	<i>For >150 To 250, Deduct</i>	-1.51
	<i>For >250 To 500, Deduct</i>	-2.35
	<i>For >500, Deduct</i>	-3.19

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 63 36 00-0034 EA 7/8" Diameter x 5" Long, Welded Steel Stud Pins	26.19	
<i>For >50 To 150, Deduct</i>	-0.68	
<i>For >150 To 250, Deduct</i>	-1.67	
<i>For >250 To 500, Deduct</i>	-2.67	
<i>For >500, Deduct</i>	-3.66	
31 63 36 00-0035 EA 7/8" Diameter x 7" Long, Welded Steel Stud Pins	29.28	
<i>For >50 To 150, Deduct</i>	-0.68	
<i>For >150 To 250, Deduct</i>	-1.75	
<i>For >250 To 500, Deduct</i>	-2.82	
<i>For >500, Deduct</i>	-3.89	
31 63 36 00-0036 Concrete Fill <small>(31 63 36)</small>		
See CSI section 03 37 16 00-0001 for pumping equipment.		
31 63 36 00-0037 VLF 18" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	46.42	
31 63 36 00-0038 VLF 20" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	51.57	
31 63 36 00-0039 VLF 22" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	56.73	
31 63 36 00-0040 VLF 24" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	61.90	
31 63 36 00-0041 VLF 26" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	67.04	
31 63 36 00-0042 VLF 28" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	72.20	
31 63 36 00-0043 VLF 30" Diameter Hole Pumped Concrete Fill For Drilled Pile.....	84.86	
31 64 Caissons <small>(31 60)</small>		
31 64 13 Box Caissons <small>(31 64)</small>		
31 64 13 00-0001 Caisson In Stable Ground No Casing Or Ground Water <small>(31 64 13)</small>		
Note: Up to 50' deep. See CSI section 31 64 13 00-0070 for equipment set-up.		
31 64 13 00-0002 Caisson In Stable Ground <small>(31 64 13 00-0001)</small>		
Note: Includes 3000 PSI concrete and reinforcing.		
31 64 13 00-0003 VLF 18" Diameter Caisson, No Casing Stable Ground, No Ground Water	60.37	
Note: 0.066 CY Concrete per VLF, 9 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	5.85	
<i>For >100' To 150' Deep, Add</i>	15.09	
<i>For >150' To 200' Deep, Add</i>	20.15	
<i>For Right Angle Drilling, Add</i>	16.04	
31 64 13 00-0004 VLF 24" Diameter Caisson, No Casing Stable Ground, No Ground Water	75.70	
Note: 0.116 CY Concrete per VLF, 14 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	8.03	
<i>For >100' To 150' Deep, Add</i>	18.93	
<i>For >150' To 200' Deep, Add</i>	26.12	
<i>For Right Angle Drilling, Add</i>	17.97	
31 64 13 00-0005 VLF 30" Diameter Caisson, No Casing Stable Ground, No Ground Water	106.94	
Note: 0.182 CY Concrete per VLF, 23 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	11.83	
<i>For >100' To 150' Deep, Add</i>	26.74	
<i>For >150' To 200' Deep, Add</i>	37.52	
<i>For Right Angle Drilling, Add</i>	23.85	
31 64 13 00-0006 VLF 36" Diameter Caisson, No Casing Stable Ground, No Ground Water	141.31	
Note: 0.262 CY Concrete per VLF, 33 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	16.14	
<i>For >100' To 150' Deep, Add</i>	35.33	
<i>For >150' To 200' Deep, Add</i>	50.21	
<i>For Right Angle Drilling, Add</i>	29.93	
31 64 13 00-0007 VLF 42" Diameter Caisson, No Casing Stable Ground, No Ground Water	180.73	
Note: 0.356 CY Concrete per VLF, 48 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	21.39	
<i>For >100' To 150' Deep, Add</i>	45.18	
<i>For >150' To 200' Deep, Add</i>	65.14	
<i>For Right Angle Drilling, Add</i>	35.94	
31 64 13 00-0008 VLF 48" Diameter Caisson No Casing Stable Ground, No Ground Water	217.37	
Note: 0.465 CY Concrete per VLF, 57 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	26.20	
<i>For >100' To 150' Deep, Add</i>	54.34	
<i>For >150' To 200' Deep, Add</i>	78.94	
<i>For Right Angle Drilling, Add</i>	41.75	
31 64 13 00-0009 VLF 54" Diameter Caisson No Casing Stable Ground, No Ground Water	261.92	
Note: 0.589 CY Concrete per VLF, 76 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	32.53	
<i>For >100' To 150' Deep, Add</i>	65.48	
<i>For >150' To 200' Deep, Add</i>	96.32	
<i>For Right Angle Drilling, Add</i>	47.31	
31 64 13 00-0010 VLF 60" Diameter Caisson No Casing Stable Ground, No Ground Water	307.36	
Note: 0.727 CY Concrete per VLF, 93 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	38.99	
<i>For >100' To 150' Deep, Add</i>	76.84	
<i>For >150' To 200' Deep, Add</i>	114.05	
<i>For Right Angle Drilling, Add</i>	52.98	
31 64 13 00-0011 VLF 66" Diameter Caisson No Casing Stable Ground, No Ground Water	358.76	
Note: 0.88 CY Concrete per VLF, 113 lbs rebar per VLF.		
<i>For >50' To 100' Deep, Add</i>	46.25	
<i>For >100' To 150' Deep, Add</i>	89.69	
<i>For >150' To 200' Deep, Add</i>	134.05	
<i>For Right Angle Drilling, Add</i>	59.50	

31 Earthwork**31 60 Special Foundations and Load-bearing Elements****31 64 Caissons**

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TOTAL DIRECT DEMOLITION
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31 64 13 00-0012	VLF 72" Diameter Caisson No Casing Stable Ground, No Ground Water417.70 Note: 1.047 CY Concrete per VLF, 134 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 54.65 <i>For >100' To 150' Deep, Add</i> 104.43 <i>For >150' To 200' Deep, Add</i> 157.07 <i>For Right Angle Drilling, Add</i> 66.79	
31 64 13 00-0013	VLF 78" Diameter Caisson No Casing Stable Ground, No Ground Water .....476.43 Note: 1.229 CY Concrete per VLF, 157 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 63.17 <i>For >100' To 150' Deep, Add</i> 119.11 <i>For >150' To 200' Deep, Add</i> 180.21 <i>For Right Angle Drilling, Add</i> 73.56	
31 64 13 00-0014	VLF 84" Diameter Caisson No Casing Stable Ground, No Ground Water .....539.09 Note: 1.425 CY Concrete per VLF, 183 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 72.32 <i>For >100' To 150' Deep, Add</i> 134.77 <i>For >150' To 200' Deep, Add</i> 204.96 <i>For Right Angle Drilling, Add</i> 80.60	
31 64 13 00-0015	For Bell Excavation And Concrete, Add <small>(31 64 13 00-0001)</small>	
31 64 13 00-0016	EA Bell Excavation And Concrete, 4' Bell Diameter Stable Ground, 24" Shaft, 0.44 CY .....465.95 <i>For >50' To 100' Deep, Add</i> 37.87 <i>For >100' To 150' Deep, Add</i> 116.49 <i>For >150' To 200' Deep, Add</i> 146.35	
31 64 13 00-0017	EA Bell Excavation And Concrete, 6' Bell Diameter Stable Ground, 30" Shaft, 1.57 CY .....1,637.97 <i>For >50' To 100' Deep, Add</i> 133.33 <i>For >100' To 150' Deep, Add</i> 409.49 <i>For >150' To 200' Deep, Add</i> 514.73	
31 64 13 00-0018	EA Bell Excavation And Concrete, 7' Bell Diameter Stable Ground, 36" Shaft, 2.33 CY .....2,477.09 <i>For >50' To 100' Deep, Add</i> 204.81 <i>For >100' To 150' Deep, Add</i> 619.27 <i>For >150' To 200' Deep, Add</i> 782.39	
31 64 13 00-0019	EA Bell Excavation And Concrete, 8' Bell Diameter Stable Ground, 42" Shaft, 3.30 CY .....3,438.36 <i>For >50' To 100' Deep, Add</i> 284.84 <i>For >100' To 150' Deep, Add</i> 859.59 <i>For >150' To 200' Deep, Add</i> 1,086.70	
31 64 13 00-0020	EA Bell Excavation And Concrete, 9' Bell Diameter Stable Ground, 48" Shaft, 4.48 CY .....4,666.76 <i>For >50' To 100' Deep, Add</i> 379.77 <i>For >100' To 150' Deep, Add</i> 1,166.69 <i>For >150' To 200' Deep, Add</i> 1,466.40	
31 64 13 00-0021	EA Bell Excavation And Concrete, 10' Bell Diameter Stable Ground, 60" Shaft, 5.24 CY .....5,487.45 <i>For >50' To 100' Deep, Add</i> 446.36 <i>For >100' To 150' Deep, Add</i> 1,371.86 <i>For >150' To 200' Deep, Add</i> 1,724.04	
31 64 13 00-0022	EA Bell Excavation And Concrete, 12' Bell Diameter Stable Ground, 72" Shaft, 8.74 CY .....9,306.78 <i>For >50' To 100' Deep, Add</i> 755.54 <i>For >100' To 150' Deep, Add</i> 2,326.70 <i>For >150' To 200' Deep, Add</i> 2,922.11	
31 64 13 00-0023	EA Bell Excavation And Concrete, 14' Bell Diameter Stable Ground, 84" Shaft, 13.6 CY .....13,455.18 <i>For >50' To 100' Deep, Add</i> 1,103.30 <i>For >100' To 150' Deep, Add</i> 3,363.80 <i>For >150' To 200' Deep, Add</i> 4,238.36	
31 64 13 00-0024	Caisson In Wet Ground, Casing Pulled <small>(31 64 13)</small> Note: Up to 50' deep. See CSI section 31 64 13 00-0070 for equipment set-up.	
31 64 13 00-0025	Caisson In Wet Ground <small>(31 64 13 00-0024)</small> Note: Includes 3000 PSI concrete and reinforcing.	
31 64 13 00-0026	VLF 18" Diameter Caisson Wet Ground, Casing Pulled .....66.99 Note: 0.066 CY Concrete per VLF, 9 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 6.31 <i>For >100' To 150' Deep, Add</i> 16.75 <i>For >150' To 200' Deep, Add</i> 22.12 <i>For Right Angle Drilling, Add</i> 18.39	
31 64 13 00-0027	VLF 24" Diameter Caisson Wet Ground, Casing Pulled .....112.02 Note: 0.116 CY Concrete per VLF, 14 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 10.57 <i>For >100' To 150' Deep, Add</i> 28.01 <i>For >150' To 200' Deep, Add</i> 37.02 <i>For Right Angle Drilling, Add</i> 30.68	
31 64 13 00-0028	VLF 30" Diameter Caisson Wet Ground, Casing Pulled .....147.83 Note: 0.182 CY Concrete per VLF, 23 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 14.69 <i>For >100' To 150' Deep, Add</i> 36.96 <i>For >150' To 200' Deep, Add</i> 49.78 <i>For Right Angle Drilling, Add</i> 38.16	
31 64 13 00-0029	VLF 36" Diameter Caisson Wet Ground, Casing Pulled .....202.79 Note: 0.262 CY Concrete per VLF, 33 lbs rebar per VLF. <i>For >50' To 100' Deep, Add</i> 20.44 <i>For >100' To 150' Deep, Add</i> 50.70 <i>For >150' To 200' Deep, Add</i> 68.65 <i>For Right Angle Drilling, Add</i> 51.45	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 64 13 00-0030 VLF 42" Diameter Caisson Wet Ground, Casing Pulled.....	256.59	
Note: 0.356 CY Concrete per VLF, 48 lbs rebar per VLF.		
For >50' To 100' Deep, Add	26.70	
For >100' To 150' Deep, Add	64.15	
For >150' To 200' Deep, Add	87.90	
For Right Angle Drilling, Add	62.49	
31 64 13 00-0031 VLF 48" Diameter Caisson Wet Ground, Casing Pulled.....	307.31	
Note: 0.465 CY Concrete per VLF, 57 lbs rebar per VLF.		
For >50' To 100' Deep, Add	32.50	
For >100' To 150' Deep, Add	76.83	
For >150' To 200' Deep, Add	105.92	
For Right Angle Drilling, Add	73.23	
31 64 13 00-0032 VLF 54" Diameter Caisson Wet Ground, Casing Pulled.....	396.57	
Note: 0.589 CY Concrete per VLF, 76 lbs rebar per VLF.		
For >50' To 100' Deep, Add	41.95	
For >100' To 150' Deep, Add	99.14	
For >150' To 200' Deep, Add	136.71	
For Right Angle Drilling, Add	94.44	
31 64 13 00-0033 VLF 60" Diameter Caisson Wet Ground, Casing Pulled.....	485.55	
Note: 0.727 CY Concrete per VLF, 93 lbs rebar per VLF.		
For >50' To 100' Deep, Add	51.46	
For >100' To 150' Deep, Add	121.39	
For >150' To 200' Deep, Add	167.51	
For Right Angle Drilling, Add	115.34	
31 64 13 00-0034 VLF 66" Diameter Caisson Wet Ground, Casing Pulled.....	553.68	
Note: 0.87 CY Concrete per VLF, 113 lbs rebar per VLF.		
For >50' To 100' Deep, Add	59.90	
For >100' To 150' Deep, Add	138.42	
For >150' To 200' Deep, Add	192.53	
For Right Angle Drilling, Add	127.72	
31 64 13 00-0035 VLF 72" Diameter Caisson Wet Ground, Casing Pulled.....	629.31	
Note: 1.047 CY Concrete per VLF, 134 lbs rebar per VLF.		
For >50' To 100' Deep, Add	69.46	
For >100' To 150' Deep, Add	157.33	
For >150' To 200' Deep, Add	220.56	
For Right Angle Drilling, Add	140.85	
31 64 13 00-0036 VLF 78" Diameter Caisson Wet Ground, Casing Pulled.....	715.63	
Note: 1.229 CY Concrete per VLF, 157 lbs rebar per VLF.		
For >50' To 100' Deep, Add	79.92	
For >100' To 150' Deep, Add	178.91	
For >150' To 200' Deep, Add	251.97	
For Right Angle Drilling, Add	157.28	
31 64 13 00-0037 VLF 84" Diameter Caisson Wet Ground, Casing Pulled.....	806.35	
Note: 1.425 CY Concrete per VLF, 183 lbs rebar per VLF.		
For >50' To 100' Deep, Add	91.03	
For >100' To 150' Deep, Add	201.59	
For >150' To 200' Deep, Add	285.14	
For Right Angle Drilling, Add	174.14	
31 64 13 00-0038 For Bell Excavation And Concrete, Add <small>(31 64 13 00-0024)</small>		
31 64 13 00-0039 EA Bell Excavation And Concrete, 4' Bell Diameter Wet Ground 24" Shaft, 0.44 CY.....	537.89	
For >50' To 100' Deep, Add	42.90	
For >100' To 150' Deep, Add	134.47	
For >150' To 200' Deep, Add	167.93	
31 64 13 00-0040 EA Bell Excavation And Concrete, 6' Bell Diameter Wet Ground, 30" Shaft, 1.57 CY.....	1,873.80	
For >50' To 100' Deep, Add	149.84	
For >100' To 150' Deep, Add	468.45	
For >150' To 200' Deep, Add	585.48	
31 64 13 00-0041 EA Bell Excavation And Concrete, 7' Bell Diameter Wet Ground, 36" Shaft, 2.33 CY.....	2,577.91	
For >50' To 100' Deep, Add	192.42	
For >100' To 150' Deep, Add	644.48	
For >150' To 200' Deep, Add	788.33	
31 64 13 00-0042 EA Bell Excavation And Concrete, 8' Bell Diameter Wet Ground, 42" Shaft, 3.3 CY.....	4,116.01	
For >50' To 100' Deep, Add	332.27	
For >100' To 150' Deep, Add	1,029.00	
For >150' To 200' Deep, Add	1,289.99	
31 64 13 00-0043 EA Bell Excavation And Concrete, 9' Bell Diameter Wet Ground, 48" Shaft, 4.48 CY.....	5,338.85	
For >50' To 100' Deep, Add	426.82	
For >100' To 150' Deep, Add	1,334.71	
For >150' To 200' Deep, Add	1,668.03	
31 64 13 00-0044 EA Bell Excavation And Concrete, 10' Bell Diameter Wet Ground, 60" Shaft, 5.24 CY.....	6,278.15	
For >50' To 100' Deep, Add	501.71	
For >100' To 150' Deep, Add	1,569.54	
For >150' To 200' Deep, Add	1,961.25	
31 64 13 00-0045 EA Bell Excavation And Concrete, 12' Bell Diameter Wet Ground, 72" Shaft, 8.74 CY.....	10,650.95	
For >50' To 100' Deep, Add	849.63	
For >100' To 150' Deep, Add	2,662.74	
For >150' To 200' Deep, Add	3,325.36	
31 64 13 00-0046 EA Bell Excavation And Concrete, 14' Bell Diameter Wet Ground, 84" Shaft, 13.6 CY.....	15,375.43	
For >50' To 100' Deep, Add	1,237.72	
For >100' To 150' Deep, Add	3,843.86	
For >150' To 200' Deep, Add	4,814.43	

31 Earthwork**31 60 Special Foundations and Load-bearing Elements****31 64 Caissons**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

31 64 13 00-0047	Caisson In Soft Rock And Medium Hard Shale <small>(31 64 13)</small> Note: Up to 50' deep. See CSI section 31 64 13 00-0070 for equipment set-up.		
31 64 13 00-0048	Caisson In Soft Rock <small>(31 64 13 00-0047)</small> Note: Includes 3000 PSI concrete and reinforcing.		
31 64 13 00-0049	VLF 18" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.066 CY Concrete per VLF, 9 lbs rebar per VLF.	259.27	
	<i>For >50' To 100' Deep, Add</i>	19.77	
	<i>For >100' To 150' Deep, Add</i>	64.82	
	<i>For >150' To 200' Deep, Add</i>	79.80	
	<i>For Right Angle Drilling, Add</i>	85.69	
31 64 13 00-0050	VLF 24" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.116 CY Concrete per VLF, 14 lbs rebar per VLF.	432.54	
	<i>For >50' To 100' Deep, Add</i>	33.01	
	<i>For >100' To 150' Deep, Add</i>	108.14	
	<i>For >150' To 200' Deep, Add</i>	133.17	
	<i>For Right Angle Drilling, Add</i>	142.86	
31 64 13 00-0051	VLF 30" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.182 CY Concrete per VLF, 23 lbs rebar per VLF.	651.92	
	<i>For >50' To 100' Deep, Add</i>	49.98	
	<i>For >100' To 150' Deep, Add</i>	162.98	
	<i>For >150' To 200' Deep, Add</i>	201.01	
	<i>For Right Angle Drilling, Add</i>	214.59	
31 64 13 00-0052	VLF 36" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.262 CY Concrete per VLF, 33 lbs rebar per VLF.	832.97	
	<i>For >50' To 100' Deep, Add</i>	64.56	
	<i>For >100' To 150' Deep, Add</i>	208.24	
	<i>For >150' To 200' Deep, Add</i>	257.70	
	<i>For Right Angle Drilling, Add</i>	272.01	
31 64 13 00-0053	VLF 42" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.356 CY Concrete per VLF, 48 lbs rebar per VLF.	1,073.49	
	<i>For >50' To 100' Deep, Add</i>	83.88	
	<i>For >100' To 150' Deep, Add</i>	268.37	
	<i>For >150' To 200' Deep, Add</i>	332.97	
	<i>For Right Angle Drilling, Add</i>	348.41	
31 64 13 00-0054	VLF 48" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.465 CY Concrete per VLF, 57 lbs rebar per VLF.	1,294.40	
	<i>For >50' To 100' Deep, Add</i>	101.59	
	<i>For >100' To 150' Deep, Add</i>	323.60	
	<i>For >150' To 200' Deep, Add</i>	402.05	
	<i>For Right Angle Drilling, Add</i>	418.71	
31 64 13 00-0055	VLF 54" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.589 CY Concrete per VLF, 76 lbs rebar per VLF.	1,582.89	
	<i>For >50' To 100' Deep, Add</i>	125.00	
	<i>For >100' To 150' Deep, Add</i>	395.72	
	<i>For >150' To 200' Deep, Add</i>	492.61	
	<i>For Right Angle Drilling, Add</i>	509.65	
31 64 13 00-0056	VLF 60" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.727 CY Concrete per VLF, 93 lbs rebar per VLF.	1,871.34	
	<i>For >50' To 100' Deep, Add</i>	148.47	
	<i>For >100' To 150' Deep, Add</i>	467.84	
	<i>For >150' To 200' Deep, Add</i>	583.24	
	<i>For Right Angle Drilling, Add</i>	600.37	
31 64 13 00-0057	VLF 66" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 0.88 CY Concrete per VLF, 113 lbs rebar per VLF.	2,055.43	
	<i>For >50' To 100' Deep, Add</i>	165.02	
	<i>For >100' To 150' Deep, Add</i>	513.86	
	<i>For >150' To 200' Deep, Add</i>	643.06	
	<i>For Right Angle Drilling, Add</i>	653.33	
31 64 13 00-0058	VLF 72" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 1.047 CY Concrete per VLF, 134 lbs rebar per VLF.	2,246.10	
	<i>For >50' To 100' Deep, Add</i>	182.64	
	<i>For >100' To 150' Deep, Add</i>	561.53	
	<i>For >150' To 200' Deep, Add</i>	705.59	
	<i>For Right Angle Drilling, Add</i>	706.73	
31 64 13 00-0059	VLF 78" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 1.229 CY Concrete per VLF, 157 lbs rebar per VLF.	2,301.25	
	<i>For >50' To 100' Deep, Add</i>	190.91	
	<i>For >100' To 150' Deep, Add</i>	575.31	
	<i>For >150' To 200' Deep, Add</i>	727.65	
	<i>For Right Angle Drilling, Add</i>	712.24	
31 64 13 00-0060	VLF 84" Diameter Caisson, Soft Rock Medium Shale, No Casing/Ground Water..... Note: 1.425 CY Concrete per VLF, 183 lbs rebar per VLF.	2,747.97	
	<i>For >50' To 100' Deep, Add</i>	226.95	
	<i>For >100' To 150' Deep, Add</i>	686.99	
	<i>For >150' To 200' Deep, Add</i>	867.63	
	<i>For Right Angle Drilling, Add</i>	853.70	
31 64 13 00-0061	For Bell Excavation And Concrete, Add <small>(31 64 13 00-0047)</small>		
31 64 13 00-0062	EA Bell Excavation And Concrete, 4' Bell Diameter Soft Rock/Shale 24" Shaft 0.44 CY..... <i>For >50' To 100' Deep, Add</i> <i>For >100' To 150' Deep, Add</i> <i>For >150' To 200' Deep, Add</i>	923.47 69.89 230.87 283.61	



Earthwork	31	13
Special Foundations and Load-bearing Elements	31 60	
Caissons	31 64	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
31 64 13 00-0063 EA Bell Excavation And Concrete, 6' Bell Diameter Soft Rock/Shale 30" Shaft 1.57 CY	3,249.60	
For >50' To 100' Deep, Add	246.14	
For >100' To 150' Deep, Add	812.40	
For >150' To 200' Deep, Add	998.22	
31 64 13 00-0064 EA Bell Excavation And Concrete, 7' Bell Diameter Soft Rock/Shale 36" Shaft 2.33 CY	4,868.92	
For >50' To 100' Deep, Add	372.24	
For >100' To 150' Deep, Add	1,217.23	
For >150' To 200' Deep, Add	1,499.94	
31 64 13 00-0065 EA Bell Excavation And Concrete, 8' Bell Diameter Soft Rock/Shale 42" Shaft 3.3 CY	6,932.32	
For >50' To 100' Deep, Add	529.42	
For >100' To 150' Deep, Add	1,733.08	
For >150' To 200' Deep, Add	2,134.89	
31 64 13 00-0066 EA Bell Excavation And Concrete, 9' Bell Diameter Soft Rock/Shale 48" Shaft 4.48 CY	9,163.93	
For >50' To 100' Deep, Add	694.58	
For >100' To 150' Deep, Add	2,290.98	
For >150' To 200' Deep, Add	2,815.55	
31 64 13 00-0067 EA Bell Excavation And Concrete, 10" Bell Diameter Soft Rock/Shale 60" Shaft 5.24 CY	11,167.13	
For >50' To 100' Deep, Add	843.94	
For >100' To 150' Deep, Add	2,791.78	
For >150' To 200' Deep, Add	3,427.94	
31 64 13 00-0068 EA Bell Excavation And Concrete, 12' Bell Diameter Soft Rock/Shale 72" Shaft 8.74 CY	16,884.42	
For >50' To 100' Deep, Add	1,285.97	
For >100' To 150' Deep, Add	4,221.11	
For >150' To 200' Deep, Add	5,195.40	
31 64 13 00-0069 EA Bell Excavation And Concrete, 14' Bell Diameter Soft Rock/Shale 84" Shaft 13.6 CY	25,393.50	
For >50' To 100' Deep, Add	1,938.99	
For >100' To 150' Deep, Add	6,348.38	
For >150' To 200' Deep, Add	7,819.85	
31 64 13 00-0070 Caisson Setup And Removal ^(31 64 13)		
Note: Includes mobilization of equipment, erection, dismantling of equipment, move off of site.		
31 64 13 00-0071 EA Erect, Set Up, Dismantle And Removal Of Caisson 18" To 36" Diameter, Complete	3,803.41	
31 64 13 00-0072 EA Erect, Set Up, Dismantle And Removal Of Caisson 48" To 84" Diameter, Complete	5,368.15	
31 64 13 00-0073 EA Dismantle, Relocate, Erect And Set Up On Site At Different Location (During Same Phase Of Work), Caisson 18" To 36" Diameter	1,790.36	
31 64 13 00-0074 EA Dismantle, Relocate, Erect And Set Up On Site At Different Location (During Same Phase Of Work), Caisson 48" To 84" Diameter	2,387.14	
31 64 13 00-0075 EA Relocate Caisson Equipment To Different Hole On-Site Without Dismantling	149.20	

31 66 Special Foundation ^(31 60)

31 66 15 Helical Foundation Piles ^(31 66)

31 66 15 00-0001 Helical Pier Restoration (Atlas) ^(31 66 15)

31 66 15 00-0002 EA Structural Steel Piers (Atlas Pier System Or Equal)	5,567.76	
Note: Includes heavy duty bracket, pier platform, and 14' of 3.5" diameter pier sections, non-corrosive coating, hydraulic lifting, fasteners, and other related activities and materials. Excludes excavation and core drilling		
31 66 15 00-0003 EA Pressure Injecting Grout For Slab Repairs, Per Location	582.18	
Note: Includes preparation, installing and removing grout injection pipes, and finishing. Excludes grout and core drilling.		
31 66 15 00-0004 CY Pressure Injected Non-Shrink Grout	582.18	

END OF SECTION 31

31	31	Earthwork
	31 60	Special Foundations and Load-bearing Elements
	31 66	Special Foundation



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 Exterior Improvements

32 01 Operation and Maintenance of Exterior Improvements ⁽³²⁾

32 01 11 Paving Cleaning ^(32 01)

32 01 11 53 Paint Removal from Paving ^(32 01 11)

32 01 11 53-0001 Remove Painted Or Epoxy Pavement Markings ^(32 01 11 53)

Note: Includes stripe removal by grinding, vacuuming of removed striped area and containment of debris.

32 01 11 53-0002	LF Removal Of 4" Wide Painted Or Epoxy Pavement Striping		2.41
	For Up To 250, Add		1.21
	For >250 To 1,000, Add		0.60
	For >5,000 To 10,000, Deduct		-0.36
	For >10,000 To 25,000, Deduct		-0.60
	For >25,000 To 50,000, Deduct		-0.84
	For >50,000, Deduct		-0.96
32 01 11 53-0003	LF Removal Of 6" Wide Painted Or Epoxy Pavement Striping		2.90
	For Up To 250, Add		1.45
	For >250 To 1,000, Add		0.73
	For >5,000 To 10,000, Deduct		-0.44
	For >10,000 To 25,000, Deduct		-0.73
	For >25,000 To 50,000, Deduct		-1.02
	For >50,000, Deduct		-1.16
32 01 11 53-0004	LF Removal Of 8" Wide Painted Or Epoxy Pavement Striping		3.47
	For Up To 250, Add		1.74
	For >250 To 1,000, Add		0.87
	For >5,000 To 10,000, Deduct		-0.52
	For >10,000 To 25,000, Deduct		-0.87
	For >25,000 To 50,000, Deduct		-1.21
	For >50,000, Deduct		-1.39
32 01 11 53-0005	LF Removal Of 12" Wide Painted Or Epoxy Pavement Striping		4.16
	For Up To 250, Add		2.08
	For >250 To 1,000, Add		1.04
	For >5,000 To 10,000, Deduct		-0.62
	For >10,000 To 25,000, Deduct		-1.04
	For >25,000 To 50,000, Deduct		-1.46
	For >50,000, Deduct		-1.66
32 01 11 53-0006	SF Removal Of Painted Or Epoxy Pavement Marking, Letters Or Symbols		4.16
	For Up To 250, Add		2.08
	For >250 To 1,000, Add		1.04
	For >5,000 To 10,000, Deduct		-0.62
	For >10,000 To 25,000, Deduct		-1.04
	For >25,000 To 50,000, Deduct		-1.46
	For >50,000, Deduct		-1.66
32 01 11 53-0007	LF Removal Of 4" Wide Thermoplastic Pavement Striping		3.10
	For Up To 250, Add		1.55
	For >250 To 1,000, Add		0.78
	For >5,000 To 10,000, Deduct		-0.47
	For >10,000 To 25,000, Deduct		-0.78
	For >25,000 To 50,000, Deduct		-1.09
	For >50,000, Deduct		-1.24
32 01 11 53-0008	LF Removal Of 6" Wide Thermoplastic Pavement Striping		3.67
	For Up To 250, Add		1.84
	For >250 To 1,000, Add		0.92
	For >5,000 To 10,000, Deduct		-0.55
	For >10,000 To 25,000, Deduct		-0.92
	For >25,000 To 50,000, Deduct		-1.28
	For >50,000, Deduct		-1.47
32 01 11 53-0009	LF Removal Of 8" Wide Thermoplastic Pavement Striping		4.42
	For Up To 250, Add		2.21
	For >250 To 1,000, Add		1.11
	For >5,000 To 10,000, Deduct		-0.66
	For >10,000 To 25,000, Deduct		-1.11
	For >25,000 To 50,000, Deduct		-1.55
	For >50,000, Deduct		-1.77
32 01 11 53-0010	LF Removal Of 12" Wide Thermoplastic Pavement Striping		5.29
	For Up To 250, Add		2.65
	For >250 To 1,000, Add		1.32
	For >5,000 To 10,000, Deduct		-0.79
	For >10,000 To 25,000, Deduct		-1.32
	For >25,000 To 50,000, Deduct		-1.85
	For >50,000, Deduct		-2.12
32 01 11 53-0011	SF Removal Of Thermoplastic Pavement Marking, Letters Or Symbols		5.29
	For Up To 250, Add		2.65
	For >250 To 1,000, Add		1.32
	For >5,000 To 10,000, Deduct		-0.79
	For >10,000 To 25,000, Deduct		-1.32
	For >25,000 To 50,000, Deduct		-1.85
	For >50,000, Deduct		-2.12

32 01 13 Flexible Paving Surface Treatment ^(32 01)

32 Exterior Improvements**32 01 Operation and Maintenance of Exterior Improvements****32 01 13 Flexible Paving Surface Treatment**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**32 01 13 61 Slurry Seal (Latex Modified) (32 01 13)****32 01 13 61-0001 Asphalt Seal Coating, For Roads And Parking Lot (32 01 13 61)**

Note: Includes sweeping and cleaning of area.

32 01 13 61-0002	EA	Asphalt Seal Coating Minimum Charge	893.69
		Note: For projects where the total charges are less than the minimum set-up charge, use this task exclusively. This task should not be used in conjunction with any other tasks in this section.	
32 01 13 61-0003	SY	Up To 500 SY, Type O Asphalt Seal Coating, No Aggregate, Per Coat	3.32
32 01 13 61-0004	SY	>500 To 1,000 SY, Type O Asphalt Seal Coating, No Aggregate, Per Coat.....	3.07
32 01 13 61-0005	SY	>1,000 SY, Type O Asphalt Seal Coating, No Aggregate, Per Coat.....	2.87
32 01 13 61-0006	SY	Up To 500 SY, Type I Slurry Seal Asphalt Coating, Per Coat.....	3.55
		Note: 1/8" thick.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.31
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.37
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.47
		For Each 0.5% Of Latex Addition, Add	0.30
32 01 13 61-0007	SY	>500 To 1,000 SY, Type I Slurry Seal Asphalt Coating, Per Coat	3.35
		Note: 1/8" thick.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.30
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.36
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.46
		For Each 0.5% Of Latex Addition, Add	0.30
32 01 13 61-0008	SY	>1,000 To 5,000 SY, Type I Slurry Seal Asphalt Coating, Per Coat	3.19
		Note: 1/8" thick.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.29
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.35
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.45
		For Each 0.5% Of Latex Addition, Add	0.30
32 01 13 61-0009	SY	>5,000 To 20,000 SY, Type I Slurry Seal Asphalt Coating, Per Coat	3.05
		Note: 1/8" thick.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.28
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.34
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.44
		For Each 0.5% Of Latex Addition, Add	0.30
32 01 13 61-0010	SY	>20,000 To 50,000 SY, Type I Slurry Seal Asphalt Coating, Per Coat	3.05
		Note: 1/8" thick.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.28
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.34
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.44
		For Each 0.5% Of Latex Addition, Add	0.30
32 01 13 61-0011	SY	>50,000 SY, Type I Slurry Seal Asphalt Coating, Per Coat	2.78
		Note: 1/8" thick.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.27
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.33
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.43
		For Each 0.5% Of Latex Addition, Add	0.30
32 01 13 61-0012	SY	Up To 500 SY, Type II Slurry Seal Asphalt Coating, Per Coat.....	4.80
		Note: 1/4" thick, 14 to 18 Lbs/SY.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.33
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.39
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.49
		For Each 0.5% Of Latex Addition, Add	0.45
32 01 13 61-0013	SY	>500 To 1,000 SY, Type II Slurry Seal Asphalt Coating, Per Coat.....	4.48
		Note: 1/4" thick, 14 to 18 Lbs/SY.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.32
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.38
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.48
		For Each 0.5% Of Latex Addition, Add	0.45
32 01 13 61-0014	SY	>1,000 To 5,000 SY, Type II Slurry Seal Asphalt Coating, Per Coat.....	4.23
		Note: 1/4" thick, 14 to 18 Lbs/SY.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.31
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.37
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.47
		For Each 0.5% Of Latex Addition, Add	0.45
32 01 13 61-0015	SY	>5,000 To 20,000 SY, Type II Slurry Seal Asphalt Coating, Per Coat	4.01
		Note: 1/4" thick, 14 to 18 Lbs/SY.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.29
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.35
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.45
		For Each 0.5% Of Latex Addition, Add	0.45
32 01 13 61-0016	SY	>20,000 To 50,000 SY, Type II Slurry Seal Asphalt Coating, Per Coat.....	3.80
		Note: 1/4" thick, 14 to 18 Lbs/SY.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.28
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.34
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.44
		For Each 0.5% Of Latex Addition, Add	0.45
32 01 13 61-0017	SY	>50,000 SY, Type II Slurry Seal Asphalt Coating, Per Coat	3.61
		Note: 1/4" thick, 14 to 18 Lbs/SY.	
		For Tire Rubber Modified Slurry Seal (TRMSS), Add	0.27
		For Rubberized Emulsion Aggregate Slurry (REAS), Add	0.33
		For Rubberized Polymer Modified Emulsion (RPME), Add	0.43
		For Each 0.5% Of Latex Addition, Add	0.45

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 01 13 61-0018 SY Up To 500 SY, Type III Slurry Seal Asphalt Coating, Per Coat .....6.05 Note: 3/8" thick, 25 to 30 Lbs/SY. For Tire Rubber Modified Slurry Seal (TRMSS), Add 0.34 For Rubberized Emulsion Aggregate Slurry (REAS), Add 0.40 For Rubberized Polymer Modified Emulsion (RPME), Add 0.50 For Each 0.5% Of Latex Addition, Add 0.73		
32 01 13 61-0019 SY >500 To 1,000 SY, Type III Slurry Seal Asphalt Coating, Per Coat .....5.71 Note: 3/8" thick, 25 to 30 Lbs/SY. For Tire Rubber Modified Slurry Seal (TRMSS), Add 0.33 For Rubberized Emulsion Aggregate Slurry (REAS), Add 0.39 For Rubberized Polymer Modified Emulsion (RPME), Add 0.49 For Each 0.5% Of Latex Addition, Add 0.73		
32 01 13 61-0020 SY >1,000 To 5,000 SY, Type III Slurry Seal Asphalt Coating, Per Coat .....5.45 Note: 3/8" thick, 25 to 30 Lbs/SY. For Tire Rubber Modified Slurry Seal (TRMSS), Add 0.31 For Rubberized Emulsion Aggregate Slurry (REAS), Add 0.37 For Rubberized Polymer Modified Emulsion (RPME), Add 0.47 For Each 0.5% Of Latex Addition, Add 0.73		
32 01 13 61-0021 SY >5,000 To 20,000 SY, Type III Slurry Seal Asphalt Coating, Per Coat .....5.21 Note: 3/8" thick, 25 to 30 Lbs/SY. For Tire Rubber Modified Slurry Seal (TRMSS), Add 0.30 For Rubberized Emulsion Aggregate Slurry (REAS), Add 0.36 For Rubberized Polymer Modified Emulsion (RPME), Add 0.46 For Each 0.5% Of Latex Addition, Add 0.73		
32 01 13 61-0022 SY >20,000 To 50,000 SY, Type III Slurry Seal Asphalt Coating, Per Coat .....4.98 Note: 3/8" thick, 25 to 30 Lbs/SY. For Tire Rubber Modified Slurry Seal (TRMSS), Add 0.29 For Rubberized Emulsion Aggregate Slurry (REAS), Add 0.35 For Rubberized Polymer Modified Emulsion (RPME), Add 0.45 For Each 0.5% Of Latex Addition, Add 0.73		
32 01 13 61-0023 SY >50,000 SY, Type III Slurry Seal Asphalt Coating, Per Coat .....4.77 Note: 3/8" thick, 25 to 30 Lbs/SY. For Tire Rubber Modified Slurry Seal (TRMSS), Add 0.28 For Rubberized Emulsion Aggregate Slurry (REAS), Add 0.34 For Rubberized Polymer Modified Emulsion (RPME), Add 0.44 For Each 0.5% Of Latex Addition, Add 0.73		

32 01 13 62 Asphalt Surface Treatment (32 01 13)

32 01 13 62-0001 Polymer-Modified, Microsurfacing Emulsion (MSE Microsurfacing) <small>(32 01 13 62)</small> Note: Use a blend of emulsified quick-set polymer-modified emulsion asphalt and latex-based polymer. Includes sweeping and cleaning of area.		
32 01 13 62-0002 SY Up To 200 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....10.86		
32 01 13 62-0003 SY Up To 500 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....10.34		
32 01 13 62-0004 SY >500 To 1,000 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....9.87		
32 01 13 62-0005 SY >1,000 To 5,000 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....9.48		
32 01 13 62-0006 SY >5,000 To 10,000 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....9.13		
32 01 13 62-0007 SY >10,000 To 20,000 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....8.81		
32 01 13 62-0008 SY >20,000 To 50,000 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....8.59		
32 01 13 62-0009 SY >50,000 SY, 3/8" Polymer-Modified Microsurfacing Emulsion (MSE).....8.47		

32 01 16 Flexible Paving Rehabilitation (32 01)

32 01 16 71 Cold Milling Asphalt Pavement (32 01 16)

32 01 16 71-0001 Removal Of Asphalt Surface Course <small>(32 01 16 71)</small> Note: Includes direct loading into truck.		
32 01 16 71-0002 Production Cold Milling Of Roads And Parking Areas <small>(32 01 16 71-0001)</small> Note: For removal of entire lanes of roads or parking areas. Includes work around man holes, scuppers, drainage structures, catch basins, etc. Includes sweeping and loading into truck. See CSI section 01 74 19 00-0040 for hauling.		
32 01 16 71-0003 SY Up To 3" Depth, Production Cold Milling Of Asphalt .....4.78 For Up To 2,500, Add 3.59 For >2,500 To 5,000, Add 1.20 For >10,000 To 25,000, Deduct -0.48 For >25,000, Deduct -0.72		
32 01 16 71-0004 SY >3" To 6" Depth, Production Cold Milling Of Asphalt .....6.37 For Up To 2,500, Add 4.78 For >2,500 To 5,000, Add 1.59 For >10,000 To 25,000, Deduct -0.64 For >25,000, Deduct -0.96		
32 01 16 71-0005 SY >6" To 12" Depth, Production Cold Milling Of Asphalt .....8.47 For Up To 2,500, Add 6.35 For >2,500 To 5,000, Add 2.12 For >10,000 To 25,000, Deduct -0.85 For >25,000, Deduct -1.27		

32 01 16 71-0006 Limited Production Cold Milling <small>(32 01 16 71-0001)</small> Note: For cross sections of roadways, trenching, partial shoulders, and other small or narrow areas. Includes work around man holes, scuppers, drainage structures, catch basins, etc. Includes sweeping and loading into truck. See CSI section 01 74 19 00-0040 for hauling.		
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32 Exterior Improvements**32 01 Operation and Maintenance of Exterior Improvements****32 01 16 Flexible Paving Rehabilitation**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 01 16 71-0007	SY Up To 3" Depth, Limited Cold Milling Of Asphalt..... <i>For >100 To 1,000, Deduct</i>	30.21	-15.11
	<i>For >1,000, Deduct</i>		-22.66
32 01 16 71-0008	SY >3" To 6" Depth, Limited Cold Milling Of Asphalt..... <i>For >100 To 1,000, Deduct</i>	40.00	-20.00
	<i>For >1,000, Deduct</i>		-30.00
32 01 16 71-0009	SY >6" To 12" Depth, Limited Cold Milling Of Asphalt..... <i>For >100 To 1,000, Deduct</i>	53.27	-26.64
	<i>For >1,000, Deduct</i>		-39.95
32 01 16 71-0010	Grind, Leave In-Place Asphalt Grindings (32 01 16 71) Note: For use as subbase material, includes spreading and rolling.		
32 01 16 71-0011	SY Grind, Leave In-Place As Subbase Course, 6-9" Depth	8.06	
32 01 16 74	In Place Hot Reused Asphalt Paving (32 01 16)		
32 01 16 74-0001	Rejuvenate, Respread Asphalt Pavement (32 01 16 74) Note: Includes direct loading into truck.		
32 01 16 74-0002	SY Removal, Rejuvenation, And Respreading Of Asphalt Grindings To 1/2" Deep	11.29	
32 01 16 74-0003	SY Removal, Rejuvenation, And Respreading Of Asphalt Grindings To 1/2" Deep, Previously Sealed Cold Tar	13.47	
32 01 16 74-0004	TON Removal, Rejuvenation, And Respreading Of Asphalt Grindings	205.44	
32 01 16 74-0005	Reclamation, Pulverize And Blending With Existing (32 01 16 74) Note: Includes direct loading into truck.		
32 01 16 74-0006	SY Up To 2" Thick Pavement, Up To 1,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	16.27	
32 01 16 74-0007	SY Up To 2" Thick Pavement, >1,000 To 5,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	8.14	
32 01 16 74-0008	SY Up To 2" Thick Pavement, >5,000 To 15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	4.07	
32 01 16 74-0009	SY Up To 2" Thick Pavement, >15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base	3.86	
32 01 16 74-0010	SY >2" To 3" Thick Pavement, >5,000 To 15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	4.44	
32 01 16 74-0011	SY >2" To 3" Thick Pavement, Up To 1,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	17.75	
32 01 16 74-0012	SY >2" To 3" Thick Pavement, >1,000 To 5,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	8.88	
32 01 16 74-0013	SY >2" To 3" Thick Pavement, >15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base	4.19	
32 01 16 74-0014	SY >3" To 4" Thick Pavement, Up To 1,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	19.53	
32 01 16 74-0015	SY >3" To 4" Thick Pavement, >1,000 To 5,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	9.77	
32 01 16 74-0016	SY >3" To 4" Thick Pavement, >5,000 To 15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	4.88	
32 01 16 74-0017	SY >3" To 4" Thick Pavement, >15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base	4.51	
32 01 16 74-0018	SY >4" To 8" Thick Pavement, Up To 1,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	21.30	
32 01 16 74-0019	SY >4" To 8" Thick Pavement, >1,000 To 5,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	10.65	
32 01 16 74-0020	SY >4" To 8" Thick Pavement, >5,000 To 15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base.....	5.32	
32 01 16 74-0021	SY >4" To 8" Thick Pavement, >15,000 SY, Reclamation, Pulverizing And Blending With Existing Base; Aggregate Base	4.96	
32 01 16 74-0022	EA Mobilization And Demobilization For Reclamation, Pulverizing And Blending Crew.....	1,830.75	
32 01 17	Flexible Paving Repair (32 01)		
	See CSI section 32 12 16 00-0000 for large area resurfacing.		
32 01 17 61	Sealing Cracks in Asphalt Paving (32 01 17) Note: Includes removing loose materials and cleaning.		
32 01 17 61-0001	Hot-Applied, Pourable, Self-Adhesive Asphalt Binder Compounded With Standard Weight Aggregate Longitudinal Crack And Sealing Repair (32 01 17 61) Note: Includes removing loose materials and cleaning.		
32 01 17 61-0002	LF Up To 200 LF Fill Cracks Up To 1/2" x 1/2" With Hot Asphalt Crack Filler..... Note: Includes air cleaning of cracks. Excludes backer rod where required and routing of crack.	1.87	
	<i>For 3/4" x 1/2" Fill, Add</i>		0.54
	<i>For 1" x 1/2" Fill, Add</i>		1.02
	<i>For Backer Rod, Add</i>		1.14
32 01 17 61-0003	LF >200 To 500 LF Fill Cracks Up To 1/2" x 1/2" With Hot Asphalt Crack Filler	1.52	
	Note: Includes air cleaning of cracks. Excludes backer rod where required and routing of crack.		
	<i>For 3/4" x 1/2" Fill, Add</i>		0.45
	<i>For 1" x 1/2" Fill, Add</i>		0.85
	<i>For Backer Rod, Add</i>		1.03

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 01 17 61-0004 LF >500 To 2,000 LF Fill Cracks Up To 1/2" x 1/2" With Hot Asphalt Crack Filler.....	1.21	
Note: Includes air cleaning of cracks. Excludes backer rod where required and routing of crack.		
For 3/4" x 1/2" Fill, Add	0.36	
For 1" x 1/2" Fill, Add	0.69	
For Backer Rod, Add	0.92	
32 01 17 61-0005 LF >2,000 To 5,000 LF Fill Cracks Up To 1/2" x 1/2" With Hot Asphalt Crack Filler.....	1.05	
Note: Includes air cleaning of cracks. Excludes backer rod where required and routing of crack.		
For 3/4" x 1/2" Fill, Add	0.32	
For 1" x 1/2" Fill, Add	0.61	
For Backer Rod, Add	0.86	
32 01 17 61-0006 LF >5,000 To 10,000 LF Fill Cracks Up To 1/2" x 1/2" With Hot Asphalt Crack Filler.....	0.93	
Note: Includes air cleaning of cracks. Excludes backer rod where required and routing of crack.		
For 3/4" x 1/2" Fill, Add	0.28	
For 1" x 1/2" Fill, Add	0.54	
For Backer Rod, Add	0.81	
32 01 17 61-0007 LF >10,000 LF Fill Cracks Up To 1/2" x 1/2" With Hot Asphalt Crack Filler.....	0.86	
Note: Includes air cleaning of cracks. Excludes backer rod where required and routing of crack.		
For 3/4" x 1/2" Fill, Add	0.26	
For 1" x 1/2" Fill, Add	0.49	
For Backer Rod, Add	0.77	
32 01 17 61-0008 LF Up To 200 LF Fill Cracks Up To 1/4" x 1/4" With Cold Pour Rubberized Asphalt Crack Filler.....	3.44	
For 3/8" x 1/4" Fill, Add	0.80	
For 1/2" x 1/4" Fill, Add	1.47	
For 1/2" x 1/2" Fill, Add	3.48	
32 01 17 61-0009 LF >200 To 500 LF Fill Cracks Up To 1/4" x 1/4" With Cold Pour Rubberized Asphalt Crack Filler.....	2.77	
For 3/8" x 1/4" Fill, Add	0.66	
For 1/2" x 1/4" Fill, Add	1.21	
For 1/2" x 1/2" Fill, Add	2.90	
32 01 17 61-0010 LF >500 To 2,000 LF Fill Cracks Up To 1/4" x 1/4" With Cold Pour Rubberized Asphalt Crack Filler.....	2.15	
For 3/8" x 1/4" Fill, Add	0.52	
For 1/2" x 1/4" Fill, Add	0.97	
For 1/2" x 1/2" Fill, Add	2.34	
32 01 17 61-0011 LF >2,000 To 5,000 LF Fill Cracks Up To 1/4" x 1/4" With Cold Pour Rubberized Asphalt Crack Filler.....	1.89	
For 3/8" x 1/4" Fill, Add	0.46	
For 1/2" x 1/4" Fill, Add	0.86	
For 1/2" x 1/2" Fill, Add	2.08	
32 01 17 61-0012 LF >5,000 To 10,000 LF Fill Cracks Up To 1/4" x 1/4" With Cold Pour Rubberized Asphalt Crack Filler.....	1.70	
For 3/8" x 1/4" Fill, Add	0.41	
For 1/2" x 1/4" Fill, Add	0.76	
For 1/2" x 1/2" Fill, Add	1.85	
32 01 17 61-0013 LF >10,000 LF Fill Cracks Up To 1/4" x 1/4" With Cold Pour Rubberized Asphalt Crack Filler.....	1.57	
For 3/8" x 1/4" Fill, Add	0.38	
For 1/2" x 1/4" Fill, Add	0.69	
For 1/2" x 1/2" Fill, Add	1.67	
32 01 17 61-0014 LF For Routing And Cleaning Of Crack, Add Per 1/2" Depth.....	0.57	
32 01 17 61-0015 LF Crack Fill Backer Material, Up To 1" Diameter, As Required.....	1.90	

32 01 17 63 Flexible Pavement Repair (32 01 17 63)

32 01 17 63-0001	Temporary Pot Hole Repair (32 01 17 63)	
	Note: Includes removal of loose material and moisture, bonding agent, compaction, safety cones and hauling up to 15 miles. Excludes signage, barricades, flagmen, field survey or marking. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.	
32 01 17 63-0002	EA Temporary Pot Hole Repairs With Cold Mix Modified, Up To 3 Tons.....	1,788.43
32 01 17 63-0003	TON Temporary Pot Hole Repairs With Cold Mix Modified.....	539.76
	Note: Use for each ton over 3 tons.	
32 01 17 63-0004	EA Temporary Pot Hole Repairs With Cold Mix, Up To 3 Tons.....	1,712.80
32 01 17 63-0005	TON Temporary Pot Hole Repairs With Cold Mix.....	514.55
	Note: Use for each ton over 3 tons.	
32 01 17 63-0006	EA Temporary Pot Hole Repairs With Hot Mix Modified, Up To 3 Tons.....	1,674.99
32 01 17 63-0007	TON Temporary Pot Hole Repairs With Hot Mix Modified.....	501.94
	Note: Use for each ton over 3 tons.	
32 01 17 63-0008	EA Temporary Pot Hole Repairs With Hot Mix, Up To 3 Tons.....	1,637.17
32 01 17 63-0009	TON Temporary Pot Hole Repairs With Hot Mix.....	489.34
	Note: Use for each ton over 3 tons.	
32 01 17 63-0010	Permanent Pot Hole Repair (32 01 17 63)	
	Note: Includes removal of loose material and moisture, saw cutting, chipping, squaring off, bonding agent, compaction and hauling up to 15 miles. Tasks do not include signage, barricades, flagmen, field survey or marking. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.	
32 01 17 63-0011	EA Permanent Pot Hole Repairs With Cold Mix, Up To 3 Tons.....	1,920.12
32 01 17 63-0012	TON Permanent Pot Hole Repairs With Cold Mix.....	623.86
	Note: Use for each ton over 3 tons.	
32 01 17 63-0013	EA Permanent Pot Hole Repairs With Hot Mix Modified, Up To 3 Tons.....	1,882.31
32 01 17 63-0014	TON Permanent Pot Hole Repairs With Hot Mix Modified.....	611.25
	Note: Use for each ton over 3 tons.	
32 01 17 63-0015	EA Permanent Pot Hole Repairs With Hot Mix, Up To 3 Tons.....	1,844.49
32 01 17 63-0016	TON Permanent Pot Hole Repairs With Hot Mix.....	598.65
	Note: Use for each ton over 3 tons.	

32 Exterior Improvements**32 01 Operation and Maintenance of Exterior Improvements****32 01 17 Flexible Paving Repair**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 01 17 63-0017		Asphalt Placement For Small Repairs <small>(32 01 17 63)</small>		
		Note: This section is used for placing up to 100 tons of asphalt after a small area of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc. Includes mobilization of paving equipment such as a roller, placing the asphalt, compaction and hauling up to 15 miles. Excludes saw cutting, demolition of existing pavement, and new subbase material. Use approximately 0.055 tons per square yard per inch of depth. See CSI section 02 41 19 13-0057 for saw cutting, 32 12 16 13-0000 for areas requiring more than 100 tons.		
32 01 17 63-0018	EA	Asphalt Placement For Small Repair Areas, Cold Mix Modified, Up To 3 Tons.....	2,524.76	
		Note: For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0019	TON	Asphalt Placement For Small Repair Areas, Cold Mix Modified	341.70	
		Note: For each ton over 3 to 100 tons. For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0020	EA	Asphalt Placement For Small Repair Areas, Cold Mix, Up To 3 Tons	2,449.13	
		Note: For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0021	TON	Asphalt Placement For Small Repair Areas, Cold Mix	316.49	
		Note: For each ton over 3 to 100 tons. For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0022	EA	Asphalt Placement For Small Repair Areas, Hot Mix Modified, Up To 3 Tons.....	2,411.32	
		Note: For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0023	TON	Asphalt Placement For Small Repair Areas, Hot Mix Modified	303.88	
		Note: For each ton over 3 to 100 tons. For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0024	EA	Asphalt Placement For Small Repair Areas, Hot Mix, Up To 3 Tons	2,373.50	
		Note: For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0025	TON	Asphalt Placement For Small Repair Areas, Hot Mix.....	291.28	
		Note: For each ton over 3 to 100 tons. For small areas of existing asphalt is removed to allow work such as trenching across or in a road, excavating a drainage structure, uncovering a utility line, etc.		
32 01 17 63-0026		Grind Asphalt <small>(32 01 17 63)</small>		
32 01 17 63-0027	SY	Grinding Asphalt To Level Bump Or Raised Area.....	24.25	

32 01 26 Rigid Paving Rehabilitation (32 01)**32 01 26 71 Grooving of Concrete Paving** (32 01 26)

32 01 26 71-0001		Roadway Grooving <small>(32 01 26 71)</small>		
32 01 26 71-0002	EA	First 500 SY Of Pavement Grooving, Concrete, Longitudinal	4,174.10	
32 01 26 71-0003	SY	Each SY Over First 500 SY Of Pavement Grooving, Concrete, Longitudinal	3.86	
32 01 26 71-0004	EA	First 500 SY Of Pavement Grooving, Concrete, Traverse	4,650.10	
32 01 26 71-0005	SY	Each SY Over First 500 SY Of Pavement Grooving, Concrete, Traverse	5.04	

32 01 26 71-0006		Rumble Strips <small>(32 01 26 71)</small>		
32 01 26 71-0007	EA	First 5280 LF Of MIARDS, Rumble Strips, Asphalt.....	4,892.79	
32 01 26 71-0008	LF	Each LF Over First 5280 LF Of MIARDS, Rumble Strips, Asphalt.....	0.89	
32 01 26 71-0009	EA	First 2000 LF Of MIARDS, Rumble Strips, Concrete	5,452.57	
32 01 26 71-0010	LF	Each LF Over First 2000 LF Of MIARDS, Rumble Strips, Concrete	1.00	

32 01 26 73 Milling Of Concrete Paving (32 01 26)

32 01 26 73-0001		Removal Of Concrete <small>(32 01 26 73)</small>		
		Note: Includes direct loading into truck.		
32 01 26 73-0002		Production Milling Of Roads And Parking Areas <small>(32 01 26 73-0001)</small>		
		Note: For removal of entire lanes of roads or parking areas. Includes work around man holes, scuppers, drainage structures, catch basins, etc. Includes sweeping and loading into truck. See CSI section 01 74 19 00-0040 for hauling.		
32 01 26 73-0003	SY	Production Milling Of Concrete Per Inch.....	7.23	
32 01 26 73-0004		Limited Production Milling <small>(32 01 26 73-0001)</small>		
		Note: For cross sections of roadways, trenching, partial shoulders, and other small or narrow areas. Includes work around man holes, scuppers, drainage structures, catch basins, etc. Includes sweeping and loading into truck. See CSI section 01 74 19 00-0040 for hauling.		
32 01 26 73-0005	SY	Limited Production Milling Of Concrete Per Inch	45.40	

32 01 29 Rigid Paving Repair (32 01)**32 01 29 61 Partial Depth Patching of Rigid Paving** (32 01 29)

32 01 29 61-0001		Hot Applied Flexible Concrete Repair <small>(32 01 29 61)</small>		
		Note: Excludes saw cutting (where required), flagmen.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 01 29 61-0002 EA Hot Applied Flexible Concrete Repair Minimum Charge.....	1,274.63	
Note: For projects where the total Hot Applied Flexible Concrete Repair In Asphaltcharge is less than the minimum charge, use task "Minimum Charge For Hot Applied Flexible Concrete Repair" exclusively. Task "Minimum Charge For Hot Applied Flexible Concrete Repair" should not be used in conjunction with any other tasks in this section.		
32 01 29 61-0003 SF Up To 2" Depth, Hot Applied Flexible Concrete Repair	69.75	
For >25 SF Quantity, Deduct	-6.98	
32 01 29 61-0004 SF >2" To 4" Depth, Hot Applied Flexible Concrete Repair.....	130.79	
For >25 SF Quantity, Deduct	-13.08	
32 01 29 61-0005 SF >4" To 6" Depth, Hot Applied Flexible Concrete Repair.....	191.27	
For >25 SF Quantity, Deduct	-19.13	
32 01 29 61-0006 SF >6" To 8" Depth, Hot Applied Flexible Concrete Repair.....	251.75	
For >25 SF Quantity, Deduct	-25.18	
32 01 29 61-0007 SF >8" To 10" Depth, Hot Applied Flexible Concrete Repair.....	312.23	
For >25 SF Quantity, Deduct	-31.22	
32 01 29 61-0008 CF >10" Depth, Hot Applied Flexible Concrete Repair	372.13	

32 01 29 61-0009 Cold Applied Flexible Concrete Repair (32 01 29 61)

32 01 29 61-0010 SF 1/8" To 1/4" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with water).....	6.94	
32 01 29 61-0011 SF 1/4" To 1/2" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with water).....	9.95	
32 01 29 61-0012 SF 1/2" To 3/4" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with water).....	13.07	
32 01 29 61-0013 SF 3/4" To 1" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with water).....	16.31	
32 01 29 61-0014 SF 1" To 1-1/2" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with water)	23.24	
32 01 29 61-0015 SF 1/8" To 1/4" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with SikaLatex R)	7.03	
32 01 29 61-0016 SF 1/4" To 1/2" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with SikaLatex R)	10.03	
32 01 29 61-0017 SF 1/2" To 3/4" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with SikaLatex R)	13.16	
32 01 29 61-0018 SF 3/4" To 1" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with SikaLatex R)	16.40	
32 01 29 61-0019 SF 1" To 1-1/2" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with SikaLatex R)	23.33	
32 01 29 61-0020 SF 1/8" To 1/4" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with diluted SikaLatex R).....	6.99	
32 01 29 61-0021 SF 1/4" To 1/2" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with diluted SikaLatex R).....	9.99	
32 01 29 61-0022 SF 1/2" To 3/4" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with diluted SikaLatex R).....	13.11	
32 01 29 61-0023 SF 3/4" To 1" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with diluted SikaLatex R).....	16.36	
32 01 29 61-0024 SF 1" To 1-1/2" Thick, Portland Cement Concrete Patching (SikaRepair-223 mixed with diluted SikaLatex R)	23.28	

32 01 90 Operation and Maintenance of Planting (32 01)

Note: These tasks are to be used as requested by the owner to maintain existing conditions.

32 01 90 13 Fertilizing (32 01 90)

32 01 90 13-0001 MSF Fertilizer - 2 LB Of Nitrogen/MSF (Granular)	16.31	
32 01 90 13-0002 MSF Fertilizer - 2 LB Of Nitrogen/MSF (Liquid).....	12.08	
32 01 90 13-0003 MSF Fertilizer - 0.5 LB Of Nitrogen/MSF (Granular).....	13.16	
32 01 90 13-0004 MSF Fertilizer - 0.5 LB Of Nitrogen/MSF (Liquid).....	10.85	

32 01 90 19 Mowing (32 01 90)

32 01 90 19-0001 ACR Vegetation Cutting By Bush Hog	214.98	
Note: Includes normal debris removal, cutting, and trimming.		
For <1 Acre, Add		53.75

32 01 90 23 Pruning (32 01 90)

32 01 90 23-0001 Tree Pruning (32 01 90 23)

Note: Types of pruning for mature trees (these standards are established by the ISA - International Society of Arboriculture). Includes loading onto truck or dumpster.

32 01 90 23-0002 Tree Pruning; Crown Cleaning (32 01 90 23-0001)

Note: Crown cleaning or cleaning out is the removal of dead, dying, diseased, crowded, weakly attached, and low-vigor branches and waterspouts from a tree crown.

32 01 90 23-0003 EA 1-1/2" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	34.73	
For >25, Deduct	-4.34	
32 01 90 23-0004 EA 2" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	39.69	
For >25, Deduct	-4.96	
32 01 90 23-0005 EA 2-1/2" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	44.65	
For >25, Deduct	-5.58	
32 01 90 23-0006 EA 3" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	49.61	
For >25, Deduct	-6.20	
32 01 90 23-0007 EA 4" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	75.39	
For >25, Deduct	-9.42	
32 01 90 23-0008 EA 4" Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	123.89	
For >25, Deduct	-15.49	
32 01 90 23-0009 EA 6" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	131.94	
For >25, Deduct	-16.49	
32 01 90 23-0010 EA 6" Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	235.95	
For >25, Deduct	-29.49	
32 01 90 23-0011 EA 9" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	211.28	
For >25, Deduct	-26.41	
32 01 90 23-0012 EA 9" Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	377.44	
For >25, Deduct	-47.18	
32 01 90 23-0013 EA 12" Caliper, Tree Pruning (Crown Cleaning), By Hand.....	244.14	
For >25, Deduct	-30.52	

32 Exterior Improvements**32 01 Operation and Maintenance of Exterior Improvements****32 01 90 Operation and Maintenance of Planting**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 01 90 23-0014	EA	12"	Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	436.49	
			<i>For >25, Deduct</i>	-54.56	
32 01 90 23-0015	EA	18"	Caliper, Tree Pruning (Crown Cleaning), By Hand.....	283.80	
			<i>For >25, Deduct</i>	-28.38	
32 01 90 23-0016	EA	18"	Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	507.26	
			<i>For >25, Deduct</i>	-50.73	
32 01 90 23-0017	EA	24"	Caliper, Tree Pruning (Crown Cleaning), By Hand.....	345.46	
			<i>For >25, Deduct</i>	-34.55	
32 01 90 23-0018	EA	24"	Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	613.55	
			<i>For >25, Deduct</i>	-61.36	
32 01 90 23-0019	EA	30"	Caliper, Tree Pruning (Crown Cleaning), By Hand.....	429.13	
			<i>For >25, Deduct</i>	-42.91	
32 01 90 23-0020	EA	30"	Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	773.25	
			<i>For >25, Deduct</i>	-77.33	
32 01 90 23-0021	EA	36"	Caliper, Tree Pruning (Crown Cleaning), By Hand.....	587.78	
			<i>For >25, Deduct</i>	-58.78	
32 01 90 23-0022	EA	36"	Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	1,048.00	
			<i>For >25, Deduct</i>	-104.80	
32 01 90 23-0023	EA	48"	Caliper, Tree Pruning (Crown Cleaning), By Hand.....	932.48	
			<i>For >25, Deduct</i>	-93.25	
32 01 90 23-0024	EA	48"	Caliper, Tree Pruning (Crown Cleaning), Aerial Lift Equipment.....	1,685.36	
			<i>For >25, Deduct</i>	-168.54	

32 01 90 23-0025**Tree Pruning; Crown Thinning** (32 01 90 23-0001)

Note: Crown thinning includes crown cleaning and the selective removal of branches to increase light penetration and air movement into the crown. Increased light and air stimulates and maintains interior foliage, which in turn improves branch taper and strength. Thinning reduces the wind-sail effect of the crown and the weight of the heavy limbs. Thinning the crown can emphasize the structural beauty of the trunk and branches as well as improve the growth of plants beneath the tree by increasing light penetration. When thinning the crown of mature trees, seldom should more than one-third of the live foliage be removed. At least one-half of the foliage should be on branches that arise in the lower two-thirds of the trees. Likewise, when thinning laterals from a limb, an effort should be made to retain inner lateral branches and leave the same distribution of foliage along the branch. Trees and branches so pruned will have stress more evenly distributed throughout the tree or along a branch.

32 01 90 23-0026	EA	1-1/2"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	42.56	
			<i>For >25, Deduct</i>	-5.32	
32 01 90 23-0027	EA	2"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	48.61	
			<i>For >25, Deduct</i>	-6.08	
32 01 90 23-0028	EA	2-1/2"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	54.67	
			<i>For >25, Deduct</i>	-6.83	
32 01 90 23-0029	EA	3"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	60.82	
			<i>For >25, Deduct</i>	-7.60	
32 01 90 23-0030	EA	4"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	92.37	
			<i>For >25, Deduct</i>	-11.55	
32 01 90 23-0031	EA	4"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	151.71	
			<i>For >25, Deduct</i>	-18.96	
32 01 90 23-0032	EA	6"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	161.62	
			<i>For >25, Deduct</i>	-20.20	
32 01 90 23-0033	EA	6"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	289.04	
			<i>For >25, Deduct</i>	-36.13	
32 01 90 23-0034	EA	9"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	258.85	
			<i>For >25, Deduct</i>	-32.36	
32 01 90 23-0035	EA	9"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	462.35	
			<i>For >25, Deduct</i>	-57.79	
32 01 90 23-0036	EA	12"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	299.04	
			<i>For >25, Deduct</i>	-37.38	
32 01 90 23-0037	EA	12"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	534.67	
			<i>For >25, Deduct</i>	-66.83	
32 01 90 23-0038	EA	18"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	347.65	
			<i>For >25, Deduct</i>	-34.77	
32 01 90 23-0039	EA	18"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	621.38	
			<i>For >25, Deduct</i>	-62.14	
32 01 90 23-0040	EA	24"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	423.15	
			<i>For >25, Deduct</i>	-42.32	
32 01 90 23-0041	EA	24"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	751.62	
			<i>For >25, Deduct</i>	-75.16	
32 01 90 23-0042	EA	30"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	525.65	
			<i>For >25, Deduct</i>	-52.57	
32 01 90 23-0043	EA	30"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	947.22	
			<i>For >25, Deduct</i>	-94.72	
32 01 90 23-0044	EA	36"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	720.01	
			<i>For >25, Deduct</i>	-72.00	
32 01 90 23-0045	EA	36"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	1,283.80	
			<i>For >25, Deduct</i>	-128.38	
32 01 90 23-0046	EA	48"	Caliper, Tree Pruning (Crown Thinning), By Hand.....	1,142.27	
			<i>For >25, Deduct</i>	-114.23	
32 01 90 23-0047	EA	48"	Caliper, Tree Pruning (Crown Thinning), Aerial Lift Equipment.....	2,064.56	
			<i>For >25, Deduct</i>	-206.46	

MINOR	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 01 90 23-0048

Tree Pruning; Crown Raising (32 01 90 23-0001)

Note: Crown raising removes the lower branches of a tree in order to provide clearance for buildings, vehicles, pedestrians, and vistas. It is important that a tree have at least one-half of its foliage on branches that originate in the lower two-thirds of its trunk to ensure a well-formed, tapered structure and to uniformly distribute stress within a tree. When pruning for view, it is preferable to develop "windows" through the foliage of the tree, rather than to severely raise or reduce the crown.

32 01 90 23-0049	EA 1-1/2" Caliper, Tree Pruning (Crown Raising), By Hand	46.93	
	<i>For >25, Deduct</i>	-5.87	
32 01 90 23-0050	EA 2" Caliper, Tree Pruning (Crown Raising), By Hand	53.58	
	<i>For >25, Deduct</i>	-6.70	
32 01 90 23-0051	EA 2-1/2" Caliper, Tree Pruning (Crown Raising), By Hand	60.33	
	<i>For >25, Deduct</i>	-7.54	
32 01 90 23-0052	EA 3" Caliper, Tree Pruning (Crown Raising), By Hand	66.97	
	<i>For >25, Deduct</i>	-8.37	
32 01 90 23-0053	EA 4" Caliper, Tree Pruning (Crown Raising), By Hand	101.80	
	<i>For >25, Deduct</i>	-12.73	
32 01 90 23-0054	EA 4" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	167.28	
	<i>For >25, Deduct</i>	-20.91	
32 01 90 23-0055	EA 6" Caliper, Tree Pruning (Crown Raising), By Hand	178.10	
	<i>For >25, Deduct</i>	-22.26	
32 01 90 23-0056	EA 6" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	318.53	
	<i>For >25, Deduct</i>	-39.82	
32 01 90 23-0057	EA 9" Caliper, Tree Pruning (Crown Raising), By Hand	285.25	
	<i>For >25, Deduct</i>	-35.66	
32 01 90 23-0058	EA 9" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	509.53	
	<i>For >25, Deduct</i>	-63.69	
32 01 90 23-0059	EA 12" Caliper, Tree Pruning (Crown Raising), By Hand	329.59	
	<i>For >25, Deduct</i>	-41.20	
32 01 90 23-0060	EA 12" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	589.28	
	<i>For >25, Deduct</i>	-73.66	
32 01 90 23-0061	EA 18" Caliper, Tree Pruning (Crown Raising), By Hand	383.17	
	<i>For >25, Deduct</i>	-38.32	
32 01 90 23-0062	EA 18" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	684.84	
	<i>For >25, Deduct</i>	-68.48	
32 01 90 23-0063	EA 24" Caliper, Tree Pruning (Crown Raising), By Hand	466.41	
	<i>For >25, Deduct</i>	-46.64	
32 01 90 23-0064	EA 24" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	828.31	
	<i>For >25, Deduct</i>	-82.83	
32 01 90 23-0065	EA 30" Caliper, Tree Pruning (Crown Raising), By Hand	579.32	
	<i>For >25, Deduct</i>	-57.93	
32 01 90 23-0066	EA 30" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	1,043.84	
	<i>For >25, Deduct</i>	-104.38	
32 01 90 23-0067	EA 36" Caliper, Tree Pruning (Crown Raising), By Hand	793.53	
	<i>For >25, Deduct</i>	-79.35	
32 01 90 23-0068	EA 36" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	1,414.76	
	<i>For >25, Deduct</i>	-141.48	
32 01 90 23-0069	EA 48" Caliper, Tree Pruning (Crown Raising), By Hand	1,258.85	
	<i>For >25, Deduct</i>	-125.89	
32 01 90 23-0070	EA 48" Caliper, Tree Pruning (Crown Raising), Aerial Lift Equipment	2,275.27	
	<i>For >25, Deduct</i>	-227.53	

32 01 90 23-0071

Tree Pruning; Crown Reduction (32 01 90 23-0001)

Note: Crown reduction is used to reduce the height and/or spread of a tree. Thinning cuts are most effective in maintaining the structural integrity and natural form of a tree and in delaying the time when it will need to be pruned again. The lateral to which a branch or trunk is cut should be at least one-half the diameter of the cut being made.

32 01 90 23-0072	EA 1-1/2" Caliper, Tree Pruning (Crown Reduction), By Hand	50.41	
	<i>For >25, Deduct</i>	-6.30	
32 01 90 23-0073	EA 2" Caliper, Tree Pruning (Crown Reduction), By Hand	57.54	
	<i>For >25, Deduct</i>	-7.19	
32 01 90 23-0074	EA 2-1/2" Caliper, Tree Pruning (Crown Reduction), By Hand	64.79	
	<i>For >25, Deduct</i>	-8.10	
32 01 90 23-0075	EA 3" Caliper, Tree Pruning (Crown Reduction), By Hand	71.93	
	<i>For >25, Deduct</i>	-8.99	
32 01 90 23-0076	EA 4" Caliper, Tree Pruning (Crown Reduction), By Hand	109.33	
	<i>For >25, Deduct</i>	-13.67	
32 01 90 23-0077	EA 4" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment	179.68	
	<i>For >25, Deduct</i>	-22.46	
32 01 90 23-0078	EA 6" Caliper, Tree Pruning (Crown Reduction), By Hand	191.28	
	<i>For >25, Deduct</i>	-23.91	
32 01 90 23-0079	EA 6" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment	342.12	
	<i>For >25, Deduct</i>	-42.77	
32 01 90 23-0080	EA 9" Caliper, Tree Pruning (Crown Reduction), By Hand	306.38	
	<i>For >25, Deduct</i>	-38.30	
32 01 90 23-0081	EA 9" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment	547.29	
	<i>For >25, Deduct</i>	-68.41	
32 01 90 23-0082	EA 12" Caliper, Tree Pruning (Crown Reduction), By Hand	354.00	
	<i>For >25, Deduct</i>	-44.25	
32 01 90 23-0083	EA 12" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment	632.93	
	<i>For >25, Deduct</i>	-79.12	
32 01 90 23-0084	EA 18" Caliper, Tree Pruning (Crown Reduction), By Hand	411.54	
	<i>For >25, Deduct</i>	-41.15	

32 Exterior Improvements**32 01 Operation and Maintenance of Exterior Improvements****32 01 90 Operation and Maintenance of Planting**

Los Angeles County Development Authority

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 01 90 23-0085	EA		18" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment.....	735.57	
			<i>For >25, Deduct</i>	-73.56	
32 01 90 23-0086	EA		24" Caliper, Tree Pruning (Crown Reduction), By Hand.....	500.94	
			<i>For >25, Deduct</i>	-50.09	
32 01 90 23-0087	EA		24" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment.....	889.65	
			<i>For >25, Deduct</i>	-88.97	
32 01 90 23-0088	EA		30" Caliper, Tree Pruning (Crown Reduction), By Hand.....	622.28	
			<i>For >25, Deduct</i>	-62.23	
32 01 90 23-0089	EA		30" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment.....	1,121.24	
			<i>For >25, Deduct</i>	-112.12	
32 01 90 23-0090	EA		36" Caliper, Tree Pruning (Crown Reduction), By Hand.....	852.27	
			<i>For >25, Deduct</i>	-85.23	
32 01 90 23-0091	EA		36" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment.....	1,519.64	
			<i>For >25, Deduct</i>	-151.96	
32 01 90 23-0092	EA		48" Caliper, Tree Pruning (Crown Reduction), By Hand.....	1,352.11	
			<i>For >25, Deduct</i>	-135.21	
32 01 90 23-0093	EA		48" Caliper, Tree Pruning (Crown Reduction), Aerial Lift Equipment.....	2,443.74	
			<i>For >25, Deduct</i>	-244.37	
32 01 90 23-0094			Tree Pruning; Crown Restoration <small>(32 01 90 23-0001)</small>		
			Note: Crown restoration can improve the structure and appearance of trees that have been topped or severely pruned using heading cuts. One to three sprouts on main branch stubs should be selected to reform a more natural appearing crown. Selected vigorous sprouts may need to be thinned to a lateral, or even headed, to control length growth in order to ensure adequate attachment for the size of the sprout. Restoration may require several pruning's over a number of years.		
32 01 90 23-0095	EA		1-1/2" Caliper, Tree Pruning (Crown Restoration), By Hand.....	57.84	
			<i>For >25, Deduct</i>	-7.23	
32 01 90 23-0096	EA		2" Caliper, Tree Pruning (Crown Restoration), By Hand.....	66.17	
			<i>For >25, Deduct</i>	-8.27	
32 01 90 23-0097	EA		2-1/2" Caliper, Tree Pruning (Crown Restoration), By Hand.....	74.42	
			<i>For >25, Deduct</i>	-9.30	
32 01 90 23-0098	EA		3" Caliper, Tree Pruning (Crown Restoration), By Hand.....	82.65	
			<i>For >25, Deduct</i>	-10.33	
32 01 90 23-0099	EA		4" Caliper, Tree Pruning (Crown Restoration), By Hand.....	125.61	
			<i>For >25, Deduct</i>	-15.70	
32 01 90 23-0100	EA		4" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	206.46	
			<i>For >25, Deduct</i>	-25.81	
32 01 90 23-0101	EA		6" Caliper, Tree Pruning (Crown Restoration), By Hand.....	219.86	
			<i>For >25, Deduct</i>	-27.48	
32 01 90 23-0102	EA		6" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	393.21	
			<i>For >25, Deduct</i>	-49.15	
32 01 90 23-0103	EA		9" Caliper, Tree Pruning (Crown Restoration), By Hand.....	352.12	
			<i>For >25, Deduct</i>	-44.02	
32 01 90 23-0104	EA		9" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	629.05	
			<i>For >25, Deduct</i>	-78.63	
32 01 90 23-0105	EA		12" Caliper, Tree Pruning (Crown Restoration), By Hand.....	406.88	
			<i>For >25, Deduct</i>	-50.86	
32 01 90 23-0106	EA		12" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	727.43	
			<i>For >25, Deduct</i>	-90.93	
32 01 90 23-0107	EA		18" Caliper, Tree Pruning (Crown Restoration), By Hand.....	472.97	
			<i>For >25, Deduct</i>	-47.30	
32 01 90 23-0108	EA		18" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	845.41	
			<i>For >25, Deduct</i>	-84.54	
32 01 90 23-0109	EA		24" Caliper, Tree Pruning (Crown Restoration), By Hand.....	575.75	
			<i>For >25, Deduct</i>	-57.58	
32 01 90 23-0110	EA		24" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	1,022.61	
			<i>For >25, Deduct</i>	-102.26	
32 01 90 23-0111	EA		30" Caliper, Tree Pruning (Crown Restoration), By Hand.....	715.25	
			<i>For >25, Deduct</i>	-71.53	
32 01 90 23-0112	EA		30" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	1,288.76	
			<i>For >25, Deduct</i>	-128.88	
32 01 90 23-0113	EA		36" Caliper, Tree Pruning (Crown Restoration), By Hand.....	979.66	
			<i>For >25, Deduct</i>	-97.97	
32 01 90 23-0114	EA		36" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	1,746.74	
			<i>For >25, Deduct</i>	-174.67	
32 01 90 23-0115	EA		48" Caliper, Tree Pruning (Crown Restoration), By Hand.....	1,554.11	
			<i>For >25, Deduct</i>	-155.41	
32 01 90 23-0116	EA		48" Caliper, Tree Pruning (Crown Restoration), Aerial Lift Equipment.....	2,808.99	
			<i>For >25, Deduct</i>	-280.90	
32 01 90 23-0117			Palm Tree Pruning <small>(32 01 90 23)</small>		
32 01 90 23-0118	EA		Trim Mexican Palm Tree.....	105.19	
			<i>For >25, Deduct</i>	-13.15	
32 01 90 23-0119	EA		Trim Date Palm Tree.....	237.36	
			<i>For >25, Deduct</i>	-29.67	
32 01 90 23-0120	LF		Skin Palm Tree.....	26.97	
			<i>For >25, Deduct</i>	-3.37	
32 01 90 23-0121	EA		Trim And Skin Palm Tree, Up To 30' Height.....	100.28	
			<i>For >25, Deduct</i>	-12.54	
32 01 90 23-0122	EA		Trim And Skin Palm Tree, >30' To 60' Height.....	123.88	
			<i>For >25, Deduct</i>	-15.49	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 01 90 23-0123 EA Trim And Skin Palm Tree, >60' To 80' Height..... <i>For >25, Deduct</i>	138.62	-17.33
32 01 90 23-0124 Shrub Pruning (32 01 90 23)		
32 01 90 23-0125 MSF Shrub Pruning, Prune, Shrub Bed	113.06	
32 01 90 23-0126 EA Shrub Pruning, Prune, Shrub Under 3' Height.....	3.97	
32 01 90 23-0127 EA Shrub Pruning, Prune, Shrub 4' Height.....	8.93	
32 01 90 23-0128 EA Shrub Pruning, Prune, Shrub Over 6'	15.87	
32 01 90 23-0129 EA Shrub Pruning, Prune Trees From Ground.....	39.69	
32 01 90 23-0130 EA Shrub Pruning, Prune Trees From Ground, High Work.....	99.22	
32 01 90 23-0131 Root Pruning (32 01 90 23)		
Note: Cut roots cleanly after excavation with clean, sharp tools, to promote callus formation and wound closure. Wounds to be dressed with a tree rooting hormone compound. Mix soil improvements (e.g., peat moss) with fill soil to promote new root growth. Backfill the excavation and water the soil around the roots to avoid leaving air pockets.		
32 01 90 23-0132 EA Root Pruning, One Side Of Up To 1-1/2" Caliper Tree	19.84	
32 01 90 23-0133 EA Root Pruning, One Side Of 2" Caliper Tree	24.81	
32 01 90 23-0134 EA Root Pruning, One Side Of 2-1/2" Caliper Tree	29.76	
32 01 90 23-0135 EA Root Pruning, One Side Of 3" Caliper Tree	39.69	
32 01 90 23-0136 EA Root Pruning, One Side Of 4" Caliper Tree	59.53	
32 01 90 23-0137 EA Root Pruning, One Side Of >4" To 6" Caliper Tree.....	74.42	
32 01 90 23-0138 EA Root Pruning, One Side Of >6" To 9" Caliper Tree.....	104.18	
32 01 90 23-0139 EA Root Pruning, One Side Of >9" To 12" Caliper Tree.....	119.06	
32 01 90 23-0140 EA Root Pruning, One Side Of >12" To 18" Caliper Tree.....	138.90	
32 01 90 23-0141 EA Root Pruning, One Side Of >18" To 24" Caliper Tree	173.63	
32 01 90 23-0142 EA Root Pruning, One Side Of >24" To 30" Caliper Tree.....	213.32	
32 01 90 23-0143 EA Root Pruning, One Side Of >30" To 36" Caliper Tree.....	248.04	
32 01 90 23-0144 EA Root Pruning, One Side Of >36" To 42" Caliper Tree.....	272.85	
32 01 90 23-0145 EA Root Pruning, One Side Of >42" To 48" Caliper Tree.....	297.65	
32 01 90 26 Watering (32 01 90)		
Note: Includes delivered water. Not to be used as basis if watering with irrigation system or on-site owner provided water from hose or hydrant.		
32 01 90 26-0001 Watering Lawns, Plants And Trees (32 01 90 26)		
Note: Includes delivered water and watering truck. Not to be used as basis if watering with irrigation system or on-site owner provided water from hose or hydrant. These tasks are to be used as requested by the owner for extended watering period for lawns, plants and trees.		
32 01 90 26-0002 MSF Watering Sod/Grass, Per Inch Of Water	48.23	
32 01 90 26-0003 CSF Watering Groundcover.....	7.43	
32 01 90 26-0004 CSF Watering Annuals And Perennials	13.15	
32 01 90 26-0005 EA Watering Trees, 1-1/2" To 5" Diameter By Hand	25.37	
32 01 90 26-0006 EA Watering Trees, 6" To 12" Diameter By Hand	33.37	
32 01 90 26-0007 EA Watering Trees, 13" To 18" Diameter By Hand	41.35	
32 01 90 26-0008 EA Watering Trees, >18" Diameter By Hand.....	50.90	
32 01 90 26-0009 EA Watering Shrub Or Bush By Hand.....	12.76	
32 01 90 36 Weed and Brush Control (32 01 90)		
32 01 90 36-0001 Herbicide, Push Or Hand Spreader Applied (32 01 90 36)		
32 01 90 36-0002 MSF Non-Selective Post Emergent Weed Herbicide (70.4 oz/acre or 1.62 oz/MSF).....	9.10	
<i>For >45 To 90, Deduct</i>	-0.50	
<i>For >90 To 225, Deduct</i>	-1.41	
<i>For >225 To 870, Deduct</i>	-2.32	
<i>For >870, Deduct</i>	-2.81	
32 01 90 36-0003 MSF Non-Selective Post Emergent Woody Brush And Tree Herbicide (128 oz/acre or 2.94 oz/MSF)	9.76	
<i>For >45 To 90, Deduct</i>	-0.56	
<i>For >90 To 225, Deduct</i>	-1.54	
<i>For >225 To 870, Deduct</i>	-2.51	
<i>For >870, Deduct</i>	-3.08	
32 01 90 36-0004 MSF Selective Weed Herbicide (56 oz/Acre or 1.28 oz/MSF).....	9.72	
Note: Includes pre and post emergent.		
<i>For >45 To 90, Deduct</i>	-0.56	
<i>For >90 To 225, Deduct</i>	-1.53	
<i>For >225 To 870, Deduct</i>	-2.50	
<i>For >870, Deduct</i>	-3.06	
32 01 90 36-0005 MSF Selective Woody Brush And Tree Herbicide (72 oz/acre or 1.65 oz/MSF)	10.13	
Note: Includes pre and post emergents.		
<i>For >45 To 90, Deduct</i>	-0.60	
<i>For >90 To 225, Deduct</i>	-1.61	
<i>For >225 To 870, Deduct</i>	-2.62	
<i>For >870, Deduct</i>	-3.22	
32 01 90 39 Pesticides (32 01 90)		
32 01 90 39-0001 MSF Pesticide - Surface Eating	12.53	
32 01 90 39-0002 MSF Pesticide - Subsurface Eating.....	12.57	
32 01 90 39-0003 MSF Pesticide - Fungicide Application	13.50	

32 Exterior Improvements**32 01 Operation and Maintenance of Exterior Improvements****32 01 90 Operation and Maintenance of Planting**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**32 01 90 43 Weed and Cultivate Beds (32 01 90)**

32 01 90 43-0001	MSF	Weed Mulched Bed	48.60
32 01 90 43-0002	MSF	Weed Unmulched Bed	138.86
32 01 90 43-0003	MSF	Cultivate Bed	74.77

32 01 90 46 Hedge Trimming (32 01 90)

32 01 90 46-0001	LF	Trim 0-5' High Hedge, 0-3' Wide	6.41
32 01 90 46-0002	LF	Trim 0-5' High Hedge, 4-6' Wide	9.61
32 01 90 46-0003	LF	Trim 5-10' High Hedge, 0-3' Wide	14.56
32 01 90 46-0004	LF	Trim 5-10' High Hedge, 4-6' Wide	14.83

32 01 90 53 Plant Growth Regulator Application (32 01 90)

32 01 90 53-0001	EA	Plant Growth Regulator Application	6.93
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32 10 Bases, Ballasts, and Paving (32)**32 11 Base Courses (32 10)****32 11 16 Subbase Courses (32 11)****32 11 16 16 Aggregate Subbase Courses (32 11 16)**

32 11 16 16-0001	Base And Subbase Courses For Roadways And Parking Areas (32 11 16 16)		
Note: Includes 3/4" To 1-1/2" aggregate material, hauling up to 15 miles, placement, spreading, grading, compacting and watering. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.			
32 11 16 16-0002	Base And Subbase Courses By The CY (32 11 16 16-0001)		
32 11 16 16-0003	CY	Class II Graded Crushed Aggregate Roadway Base Course	112.34
32 11 16 16-0004	CY	Class III Graded Crushed Aggregate Roadway Base Course	107.60

32 11 23 Aggregate Base Courses (32 11)**32 11 23 16 Aggregate Base Courses (32 11 23)**

32 11 23 16-0001	Base Courses For Sidewalk (Asphalt Or Concrete) (32 11 23 16)		
Note: Includes material, hauling up to 15 miles, placement, spreading, grading, and compaction. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.			
32 11 23 16-0002	SF	2" Crushed Aggregate Base Course For Sidewalks	0.77
		For Up To 1,000, Add	0.21
		For >1,000 To 2,500, Add	0.08
32 11 23 16-0003	SF	3" Crushed Aggregate Base Course For Sidewalks	1.08
		For Up To 1,000, Add	0.30
		For >1,000 To 2,500, Add	0.11
32 11 23 16-0004	SF	4" Crushed Aggregate Base Course For Sidewalks	1.39
		For Up To 1,000, Add	0.38
		For >1,000 To 2,500, Add	0.14
32 11 23 16-0005	SF	5" Crushed Aggregate Base Course For Sidewalks	1.81
		For Up To 1,000, Add	0.50
		For >1,000 To 2,500, Add	0.18
32 11 23 16-0006	SF	6" Crushed Aggregate Base Course For Sidewalks	2.23
		For Up To 1,000, Add	0.61
		For >1,000 To 2,500, Add	0.22
32 11 23 16-0007	SF	7" Crushed Aggregate Base Course For Sidewalks	2.56
		For Up To 1,000, Add	0.70
		For >1,000 To 2,500, Add	0.26
32 11 23 16-0008	SF	8" Crushed Aggregate Base Course For Sidewalks	2.90
		For Up To 1,000, Add	0.80
		For >1,000 To 2,500, Add	0.29

32 11 26 Asphaltic Base Courses (32 11)**32 11 26 19 Bituminous-Stabilized Base Courses (32 11 26)**

32 11 26 19-0001	Bituminous-Stabilized Base Courses (32 11 26 19)		
32 11 26 19-0002	CY	Bituminous Stabilized Base Course	108.59
Note: 3/4" ASTM C33.			

32 12 Flexible Paving (32 10)**32 12 13 Preparatory Coats (32 12)****32 12 13 13 Tack Coats (32 12 13)**



		Exterior Improvements	32
		Bases, Ballasts, and Paving	32 10
		Flexible Paving	32 12

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	32 12 13 13-0001	SY	Tack Coat, 0.04 Gallon/SY	0.65	
			<i>For Up To 150, Add</i>	0.12	
			<i>For >150 To 300, Add</i>	0.07	
			<i>For >300 To 500, Add</i>	0.03	
			<i>For >3,500 To 5,000, Deduct</i>	-0.02	
			<i>For >5,000, Deduct</i>	-0.04	
	32 12 13 13-0002	SY	Tack Coat, 0.05 Gallon/SY	0.72	
			<i>For Up To 150, Add</i>	0.14	
			<i>For >150 To 300, Add</i>	0.07	
			<i>For >300 To 500, Add</i>	0.04	
			<i>For >3,500 To 5,000, Deduct</i>	-0.02	
			<i>For >5,000, Deduct</i>	-0.04	
	32 12 13 13-0003	SY	Tack Coat, 0.07 Gallon/SY	0.85	
			<i>For Up To 150, Add</i>	0.17	
			<i>For >150 To 300, Add</i>	0.09	
			<i>For >300 To 500, Add</i>	0.04	
			<i>For >3,500 To 5,000, Deduct</i>	-0.02	
			<i>For >5,000, Deduct</i>	-0.05	
	32 12 13 13-0004	SY	Tack Coat, 0.08 Gallon/SY	0.92	
			<i>For Up To 150, Add</i>	0.19	
			<i>For >150 To 300, Add</i>	0.09	
			<i>For >300 To 500, Add</i>	0.05	
			<i>For >3,500 To 5,000, Deduct</i>	-0.02	
			<i>For >5,000, Deduct</i>	-0.06	
	32 12 13 13-0005	SY	Tack Coat, 0.10 Gallon/SY	1.06	
			<i>For Up To 150, Add</i>	0.23	
			<i>For >150 To 300, Add</i>	0.11	
			<i>For >300 To 500, Add</i>	0.05	
			<i>For >3,500 To 5,000, Deduct</i>	-0.03	
			<i>For >5,000, Deduct</i>	-0.07	
	32 12 13 13-0006	SY	Tack Coat, 0.11 Gallon/SY	1.12	
			<i>For Up To 150, Add</i>	0.24	
			<i>For >150 To 300, Add</i>	0.11	
			<i>For >300 To 500, Add</i>	0.06	
			<i>For >3,500 To 5,000, Deduct</i>	-0.03	
			<i>For >5,000, Deduct</i>	-0.07	
	32 12 13 19		Prime Coats <small>(32 12 13)</small>		
	32 12 13 19-0001	SY	Surface Prime Coat, 0.26 Gallon/SY	1.88	
			<i>For Up To 150, Add</i>	0.42	
			<i>For >150 To 300, Add</i>	0.19	
			<i>For >300 To 500, Add</i>	0.09	
			<i>For >3,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000, Deduct</i>	-0.13	
	32 12 13 19-0002	SY	Surface Prime Coat, 0.28 Gallon/SY	1.99	
			<i>For Up To 150, Add</i>	0.45	
			<i>For >150 To 300, Add</i>	0.20	
			<i>For >300 To 500, Add</i>	0.10	
			<i>For >3,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000, Deduct</i>	-0.14	
	32 12 13 19-0003	SY	Surface Prime Coat, 0.30 Gallon/SY	2.09	
			<i>For Up To 150, Add</i>	0.48	
			<i>For >150 To 300, Add</i>	0.21	
			<i>For >300 To 500, Add</i>	0.10	
			<i>For >3,500 To 5,000, Deduct</i>	-0.05	
			<i>For >5,000, Deduct</i>	-0.15	
	32 12 16		Asphalt Paving <small>(32 12)</small>		
	32 12 16 13		Plant-Mix Asphalt Paving <small>(32 12 16)</small>		
			Note: Includes delivery up to 15 miles, placement, rolling, finishing and sweeping. Excludes base, tack or price coat, seal coats and roadway fabrics (where required). See CSI section 01 74 19 00-0040 for hauling greater than 15 miles, 32 11 00 00-0000 for base courses, 32 12 13 13-0000 for tack coats, 32 12 13 19-0000 for prime coats, 32 12 16 39-0000 for roadway fabrics, 32 12 36 00-0000 for seal coats.		
	32 12 16 13-0001		Intermediate Binder Courses, Hot Mix Asphalt (HMA) <small>(32 12 16 13)</small>		
			Note: Meets Caltrans requirements.		
	32 12 16 13-0002	TON	Bituminous Hot Mix Intermediate Binder Course 3,954 LB/CY	150.23	
			Note: Includes Type A and Type B with 1/2" to 3/4" course or medium aggregate, placement, rolling, finishing and sweeping. Used for applications not described elsewhere in this section.		
			<i>For PG64-10 Asphalt, Add</i>	17.37	
			<i>For Warm Mix Additive, Add</i>	7.53	
			<i>For Up To 25, Add</i>	21.22	
			<i>For >25 To 50, Add</i>	11.81	
			<i>For >50 To 1,000, Deduct</i>	-6.29	
			<i>For >1,000 To 2,500, Deduct</i>	-11.43	
			<i>For >2,500 To 5,000, Deduct</i>	-17.72	
			<i>For >5,000, Deduct</i>	-25.43	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 12 Flexible Paving**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 12 16 13-0003	SY		1" Thick Bituminous Hot Mix Intermediate Binder Course8.53 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	0.95	
			<i>For Up To 1,000, Add</i>	1.24	
			<i>For >1,000 To 2,000, Add</i>	0.70	
			<i>For >10,000 To 20,000, Deduct</i>	-0.36	
			<i>For >20,000 To 50,000, Deduct</i>	-0.66	
			<i>For >50,000 To 100,000, Deduct</i>	-1.02	
			<i>For >100,000, Deduct</i>	-1.47	
32 12 16 13-0004	SY		1-1/2" Thick Bituminous Hot Mix Intermediate Binder Course .....12.66 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	1.43	
			<i>For Up To 700, Add</i>	1.83	
			<i>For >700 To 1,400, Add</i>	1.02	
			<i>For >7,000 To 14,000, Deduct</i>	-0.54	
			<i>For >14,000 To 32,000, Deduct</i>	-0.98	
			<i>For >32,000 To 64,000, Deduct</i>	-1.52	
			<i>For >64,000, Deduct</i>	-2.19	
32 12 16 13-0005	SY		2" Thick Bituminous Hot Mix Intermediate Binder Course .....16.32 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	1.91	
			<i>For Up To 500, Add</i>	2.28	
			<i>For >500 To 1,000, Add</i>	1.27	
			<i>For >5,000 To 10,000, Deduct</i>	-0.71	
			<i>For >10,000 To 24,000, Deduct</i>	-1.29	
			<i>For >24,000 To 48,000, Deduct</i>	-2.00	
			<i>For >48,000, Deduct</i>	-2.87	
32 12 16 13-0006	SY		2-1/2" Thick Bituminous Hot Mix Intermediate Binder Course .....20.63 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	2.39	
			<i>For Up To 400, Add</i>	2.91	
			<i>For >400 To 800, Add</i>	1.62	
			<i>For >4,000 To 8,000, Deduct</i>	-0.89	
			<i>For >8,000 To 20,000, Deduct</i>	-1.62	
			<i>For >20,000 To 40,000, Deduct</i>	-2.51	
			<i>For >40,000, Deduct</i>	-3.61	
32 12 16 13-0007	SY		3" Thick Bituminous Hot Mix Intermediate Binder Course .....24.75 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	2.86	
			<i>For Up To 340, Add</i>	3.50	
			<i>For >340 To 680, Add</i>	2.90	
			<i>For >3,400 To 6,800, Deduct</i>	-1.07	
			<i>For >6,800 To 17,000, Deduct</i>	-1.94	
			<i>For >17,000 To 34,000, Deduct</i>	-3.01	
			<i>For >34,000, Deduct</i>	-4.33	
32 12 16 13-0008	SY		3-1/2" Thick Bituminous Hot Mix Intermediate Binder Course .....28.88 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	3.34	
			<i>For Up To 280, Add</i>	4.08	
			<i>For >280 To 560, Add</i>	2.27	
			<i>For >2,800 To 5,600, Deduct</i>	-1.25	
			<i>For >5,600 To 14,000, Deduct</i>	-2.27	
			<i>For >14,000 To 28,000, Deduct</i>	-3.51	
			<i>For >28,000, Deduct</i>	-5.05	
32 12 16 13-0009	SY		4" Thick Bituminous Hot Mix Intermediate Binder Course .....32.99 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	3.81	
			<i>For Up To 250, Add</i>	4.66	
			<i>For >250 To 500, Add</i>	2.59	
			<i>For >2,500 To 5,000, Deduct</i>	-1.42	
			<i>For >5,000 To 12,000, Deduct</i>	-2.59	
			<i>For >12,000 To 24,000, Deduct</i>	-4.01	
			<i>For >24,000, Deduct</i>	-5.77	
32 12 16 13-0010	SY		5" Thick Bituminous Hot Mix Intermediate Binder Course .....41.24 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	4.77	
			<i>For Up To 200, Add</i>	5.83	
			<i>For >200 To 400, Add</i>	3.24	
			<i>For >2,000 To 4,000, Deduct</i>	-1.78	
			<i>For >4,000 To 10,000, Deduct</i>	-3.24	
			<i>For >10,000 To 20,000, Deduct</i>	-5.02	
			<i>For >20,000, Deduct</i>	-7.21	
32 12 16 13-0011	SY		6" Thick Bituminous Hot Mix Intermediate Binder Course .....49.50 Note: Includes placement, rolling, finishing and sweeping.		
			<i>For PG64-10 Asphalt, Add</i>	5.72	
			<i>For Up To 160, Add</i>	6.99	
			<i>For >160 To 320, Add</i>	3.89	
			<i>For >1,600 To 3,200, Deduct</i>	-2.13	
			<i>For >3,200 To 8,000, Deduct</i>	-3.89	
			<i>For >8,000 To 16,000, Deduct</i>	-6.02	
			<i>For >16,000, Deduct</i>	-8.65	

32 12 16 13-0012 Surface Wearing Courses, Hot Mix Asphalt (HMA) (32 12 16 13)
Note: Meets Caltrans requirements.



Exterior Improvements	32
Bases, Ballasts, and Paving	32 10
Flexible Paving	32 12

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	32 12 16 13-0013	TON	Bituminous Hot Mix Surface Course 3954 LB/CY.....	153.55	
			Note: Includes Type A and Type B with 1/2" to 3/4" course or medium aggregate, placement, rolling, finishing and sweeping. Used for applications not described elsewhere in this section.		
			For PG64-10 Asphalt, Add	2.76	
			For Warm Mix Additive, Add	7.18	
			For Up To 25, Add	23.10	
			For >25 To 50, Add	13.06	
			For >500 To 1,000, Deduct	-6.16	
			For >1,000 To 2,500, Deduct	-11.21	
			For >2,500 To 5,000, Deduct	-17.36	
			For >5,000, Deduct	-24.94	
	32 12 16 13-0014	TON	Tire Rubber Modified Paving Asphalt (TRMAC) Surface Course (MAC-15TR).....	170.66	
			Note: Includes 1/2" to 3/4" course or medium aggregate, placement, rolling, finishing and sweeping.		
			For Warm Mix Additive, Add	7.83	
			For Up To 25, Add	26.10	
			For >25 To 50, Add	14.81	
			For >500 To 1,000, Deduct	-6.76	
			For >1,000 To 2,500, Deduct	-12.31	
			For >2,500 To 5,000, Deduct	-19.07	
			For >5,000, Deduct	-27.40	
	32 12 16 13-0015	TON	Asphalt Rubberized Hot Mix (ARHM) Surface Course.....	181.71	
			Note: Includes 1/2" to 3/4" course or medium aggregate, placement, rolling, finishing and sweeping.		
			For Warm Mix Additive, Add	8.55	
			For Up To 25, Add	27.21	
			For >25 To 50, Add	15.36	
			For >500 To 1,000, Deduct	-7.31	
			For >1,000 To 2,500, Deduct	-13.30	
			For >2,500 To 5,000, Deduct	-20.61	
			For >5,000, Deduct	-29.61	
	32 12 16 13-0016	SY	1" Thick Bituminous Hot Mix Surface Wearing Course.....	8.39	
			Note: Includes placement, rolling, finishing and sweeping.		
			For PG64-10 Asphalt, Add	0.14	
			For Up To 1,000, Add	1.31	
			For >1,000 To 2,000, Add	0.74	
			For >10,000 To 20,000, Deduct	-0.34	
			For >20,000 To 50,000, Deduct	-0.63	
			For >50,000 To 100,000, Deduct	-0.97	
			For >100,000, Deduct	-1.39	
	32 12 16 13-0017	SY	1-1/2" Thick Bituminous Hot Mix Surface Wearing Course.....	12.41	
			Note: Includes placement, rolling, finishing and sweeping.		
			For PG64-10 Asphalt, Add	0.22	
			For Up To 700, Add	1.91	
			For >700 To 1,400, Add	1.09	
			For >7,000 To 14,000, Deduct	-0.51	
			For >14,000 To 32,000, Deduct	-0.93	
			For >32,000 To 64,000, Deduct	-1.44	
			For >64,000, Deduct	-2.07	
	32 12 16 13-0018	SY	2" Thick Bituminous Hot Mix Surface Wearing Course.....	15.88	
			Note: Includes placement, rolling, finishing and sweeping.		
			For PG64-10 Asphalt, Add	0.29	
			For Up To 500, Add	2.36	
			For >500 To 1,000, Add	1.33	
			For >5,000 To 10,000, Deduct	-0.67	
			For >10,000 To 24,000, Deduct	-1.21	
			For >24,000 To 48,000, Deduct	-1.88	
			For >48,000, Deduct	-2.70	
	32 12 16 13-0019	SY	2-1/2" Thick Bituminous Hot Mix Surface Wearing Course.....	20.11	
			Note: Includes placement, rolling, finishing and sweeping.		
			For PG64-10 Asphalt, Add	0.36	
			For Up To 400, Add	3.02	
			For >400 To 800, Add	1.71	
			For >4,000 To 8,000, Deduct	-0.84	
			For >8,000 To 20,000, Deduct	-1.53	
			For >20,000 To 40,000, Deduct	-2.37	
			For >40,000, Deduct	-3.40	
	32 12 16 13-0020	SY	3" Thick Bituminous Hot Mix Surface Wearing Course.....	24.15	
			Note: Includes placement, rolling, finishing and sweeping.		
			For PG64-10 Asphalt, Add	0.43	
			For Up To 340, Add	3.63	
			For >340 To 680, Add	2.92	
			For >3,400 To 6,800, Deduct	-1.00	
			For >6,800 To 17,000, Deduct	-1.84	
			For >17,000 To 34,000, Deduct	-2.84	
			For >34,000, Deduct	-4.09	
	32 12 16 13-0021	CSF	Type F Asphalt Surface Cap 1/8" To 1/4" Thick For Use Only On Top Concrete Filled Trench.....	96.80	
	32 12 16 13-0022		Hand Placed, Hot Mix Asphalt (HMA) (32 12 16 13)		
	32 12 16 13-0023	TON	Hand Placed Hot Mixed Asphalt 3,954 LB/CY.....	394.77	
			Note: For small areas not reachable by machine. Includes placement, rolling, finishing and sweeping.		
	32 12 16 19		Cold-Mix Asphalt Paving (32 12 16)		
			Note: 0.5 Gal asphalt/SY per inch depth; well graded granular aggregate.		
	32 12 16 19-0001		Cold Mix Asphalt (CMA) Pavement (32 12 16 19)		
			Note: 0.5 Gal asphalt/SY per inch depth; well graded granular aggregate.		

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 12 Flexible Paving**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 12 16 19-0002	SY	Cold Laid Asphalt Pavement, Traveling Plant Mixed In Windrows, Compacted 4" Course.....	13.53	
32 12 16 19-0003	SY	Cold Laid Asphalt Pavement, Rotary Plant Mixed In Place, Compacted 4" Course.....	13.12	
32 12 16 19-0004	SY	Cold Laid Asphalt Pavement, Central Stationary Plant, Mixed, Compacted 4" Course	20.64	
32 12 16 39		Paving Fabrics <small>(32 12 16)</small>		
		See CSI section 31 32 19 16-0000 for geotextile fabric.		
32 12 16 39-0001		Geotextile Paving Fabrics <small>(32 12 16 39)</small>		
32 12 16 39-0002	SY	3.6 Ounce/SY, 90 LB Grab Tensile Nonwoven Polypropylene Geotextile Paving Fabric (Carthage Mills FX-38A/O).....	1.97	
		<i>For Up To 50, Add</i>	0.44	
		<i>For >50 To 150, Add</i>	0.33	
		<i>For >150 To 250, Add</i>	0.21	
		<i>For >250 To 500, Add</i>	0.11	
32 12 16 39-0003	SY	4.1 Ounce/SY, 101 LB Grab Tensile Nonwoven Polypropylene Geotextile Paving Fabric (Carthage Mills FX-42 A/O).....	2.12	
		<i>For Up To 50, Add</i>	0.47	
		<i>For >50 To 150, Add</i>	0.35	
		<i>For >150 To 250, Add</i>	0.23	
		<i>For >250 To 500, Add</i>	0.11	
32 12 16 43		Waterproofing Membranes <small>(32 12 16)</small>		
32 12 16 43-0001		Waterproofing Membranes <small>(32 12 16 43)</small>		
32 12 16 43-0002	SY	Up To 500 SY, Preformed Rubberized Asphalt Membrane	37.63	
32 12 16 43-0003	SY	>500 To 1,000 SY, Preformed Rubberized Asphalt Membrane	28.00	
32 12 16 43-0004	SY	>1,000 SY, Preformed Rubberized Asphalt Membrane	17.08	
32 12 33		Flexible Paving Surface Treatments <small>(32 12)</small>		
32 12 33 00-0001		Bituminous Surface Treatment For Roadways <small>(32 12 33)</small>		
		Note: 0.25 Gal bitumen per SY and 30 lb of gravel/SY.		
32 12 33 00-0002	SY	Single Course Bituminous Treatment, Prepare And Clean Surface Roadway	3.20	
32 12 33 00-0003	SY	Double Course Bituminous Treatment, Prepare And Clean Surface Roadway	5.80	
32 12 33 00-0004		Bituminous Surface Treatment For Trails <small>(32 12 33)</small>		
		Note: 0.25 Gal bitumen per SY and 20 lb of gravel/SY.		
32 12 33 00-0005	SY	Bituminous Surface Treatment, For Trails	2.15	
32 12 36		Seal Coats <small>(32 12)</small>		
		See CSI section 32 01 13 62-0000 for slurry seal.		
32 12 36 13		Asphaltic Seal and Fog Coats <small>(32 12 36)</small>		
32 12 36 13-0001		Asphalt Emulsion Seal Coat (Chip Seal) <small>(32 12 36 13)</small>		
		Note: Includes initial sweeping prior to placement, cleaning of area, rolling and final sweeping. Excludes crack repair, fog sealer, and any additional consecutive days sweeping following final sweeping.		
32 12 36 13-0002		Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal) <small>(32 12 36 13-0001)</small>		
		Note: 12 to 20 Pounds Per SY of 1/4" No. 10 with 0.15 to 0.30 gallons asphalt emulsion per SY.		
32 12 36 13-0003	SY	Up To 200 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.19	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0004	SY	>200 To 500 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.69	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0005	SY	>500 To 1,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.48	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0006	SY	>1,000 To 5,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.21	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0007	SY	>5,000 To 10,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.09	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0008	SY	>10,000 To 20,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	3.98	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0009	SY	>20,000 To 50,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	3.84	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0010	SY	>50,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	3.78	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.57	
32 12 36 13-0011		Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal) <small>(32 12 36 13-0001)</small>		
		Note: 16 to 25 Pounds Per SY of 5/16" No. 8 with 0.25 to 0.35 gallons asphalt emulsion per SY.		
32 12 36 13-0012	SY	Up To 200 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	6.05	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.71	
32 12 36 13-0013	SY	>200 To 500 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.49	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.71	
32 12 36 13-0014	SY	>500 To 1,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.21	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.71	
32 12 36 13-0015	SY	>1,000 To 5,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.05	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	0.71	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 12 36 13-0016 SY >5,000 To 10,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.75	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0017 SY >10,000 To 20,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.55	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0018 SY >20,000 To 50,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.40	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0019 SY >50,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.31	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0020 Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal)		
<small>(32 12 36 13-0001)</small>		
Note: 20 to 30 Pounds Per SY of 3/8" No. 6 with 0.25 to 0.40 gallons asphalt emulsion per SY.		
32 12 36 13-0021 SY Up To 200 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	6.81	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0022 SY >200 To 500 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	6.17	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0023 SY >500 To 1,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.85	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0024 SY >1,000 To 5,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.49	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0025 SY >5,000 To 10,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.30	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0026 SY >10,000 To 20,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.02	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0027 SY >20,000 To 50,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.84	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0028 SY >50,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.75	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0029 Course Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal)		
<small>(32 12 36 13-0001)</small>		
Note: 23 to 35 Pounds Per SY of 1/2" No. 4 with 0.30 to 0.40 gallons asphalt emulsion per SY.		
32 12 36 13-0030 SY Up To 200 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	6.89	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0031 SY >200 To 500 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	6.25	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0032 SY >500 To 1,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.93	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0033 SY >1,000 To 5,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.58	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0034 SY >5,000 To 10,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.38	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0035 SY >10,000 To 20,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	5.20	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0036 SY >20,000 To 50,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.93	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0037 SY >50,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	4.83	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0038 Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal) ⁽³²		
<small>12 36 13-0001)</small>		
Note: First coat 23 to 30 Pounds Per SY of 1/2" No. 4 with 0.20 to 0.35 gallons asphalt emulsion per SY, Second coat 12 to 20 Pounds Per SY of 1/4" No. 10 with 0.20 to 0.30 gallons asphalt emulsion per SY.		
32 12 36 13-0039 SY Up To 200 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	10.40	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0040 SY >200 To 500 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	9.57	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0041 SY >500 To 1,000 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	9.11	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0042 SY >1,000 To 5,000 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	8.57	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0043 SY >5,000 To 10,000 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	8.28	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0044 SY >10,000 To 20,000 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	7.93	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0045 SY >20,000 To 50,000 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	7.65	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0046 SY >50,000 SY, Double Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Chip Seal).....	7.52	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>1.41</i>	
32 12 36 13-0047 Asphalt Emulsion Seal Coat (Scrub Seal) ^(32 12 36 13)		
Note: Includes initial sweeping prior to placement, cleaning of area, towed broom sled of scrub brush and final sweeping. Excludes crack repair, fog sealer, and any additional consecutive days sweeping following final sweeping. See CSI section 32 12 36 13-0084 for fog seal.		
32 12 36 13-0048 Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal) ^{(32 12}		
<small>36 13-0047)</small>		
Note: 12 to 20 Pounds Per SY of 1/4" No. 10 with 0.15 to 0.30 gallons asphalt emulsion per SY.		
32 12 36 13-0049 SY Up To 200 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.71	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	
32 12 36 13-0050 SY >200 To 500 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.42	
<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 12 Flexible Paving**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 12 36 13-0051	SY	>500 To 1,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.22	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	
32 12 36 13-0052	SY	>1,000 To 5,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.00	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	
32 12 36 13-0053	SY	>5,000 To 10,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	3.90	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	
32 12 36 13-0054	SY	>10,000 To 20,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	3.79	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	
32 12 36 13-0055	SY	>20,000 To 50,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	3.68	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	
32 12 36 13-0056	SY	>50,000 SY, Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	3.63	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.57</i>	

32 12 36 13-0057 Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal) (32 12 36 13-0047)

Note: 16 to 25 Pounds Per SY of 5/16" No. 8 with 0.25 to 0.35 gallons asphalt emulsion per SY.

32 12 36 13-0058	SY	Up To 200 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal)	5.59	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0059	SY	>200 To 500 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.25	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0060	SY	>500 To 1,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.03	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0061	SY	>1,000 To 5,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.87	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0062	SY	>5,000 To 10,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.56	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0063	SY	>10,000 To 20,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.38	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0064	SY	>20,000 To 50,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.24	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	
32 12 36 13-0065	SY	>50,000 SY, Medium Fine Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.18	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.71</i>	

32 12 36 13-0066 Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal) (32 12 36 13-0047)

Note: 20 to 30 Pounds Per SY of 3/8" No. 6 with 0.25 to 0.40 gallons asphalt emulsion per SY.

32 12 36 13-0067	SY	Up To 200 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal)	6.40	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0068	SY	>200 To 500 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.97	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0069	SY	>500 To 1,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.66	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0070	SY	>1,000 To 5,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.31	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0071	SY	>5,000 To 10,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.12	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0072	SY	>10,000 To 20,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.85	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0073	SY	>20,000 To 50,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.68	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	
32 12 36 13-0074	SY	>50,000 SY, Medium Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.62	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.85</i>	

32 12 36 13-0075 Course Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal) (32 12 36 13-0047)

Note: 23 to 35 Pounds Per SY of 1/2" No. 4 with 0.30 to 0.40 gallons asphalt emulsion per SY.

32 12 36 13-0076	SY	Up To 200 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	6.49	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0077	SY	>200 To 500 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	6.06	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0078	SY	>500 To 1,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.74	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0079	SY	>1,000 To 5,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.37	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0080	SY	>5,000 To 10,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.20	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0081	SY	>10,000 To 20,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	5.03	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0082	SY	>20,000 To 50,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.78	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	
32 12 36 13-0083	SY	>50,000 SY, Coarse Screenings - PMCRS-2h, Asphalt Emulsion Seal Coat (Scrub Seal).....	4.71	
		<i>For Each Additional 0.5% Latex Additive, Add</i>	<i>0.97</i>	

32 12 36 13-0084 Fog Seal, CQS-1h (32 12 36 13)

Note: A fog seal is a light application of diluted, slow-setting asphalt emulsion without aggregate cover. Includes sweeping and cleaning of area.

32 12 36 13-0085	SY	Up To 200 SY, CQS-1h, Fog Seal.....	1.94	
32 12 36 13-0086	SY	>200 To 500 SY, CQS-1h, Fog Seal.....	1.41	
32 12 36 13-0087	SY	>500 To 1,000 SY, CQS-1h, Fog Seal.....	1.20	



Exterior Improvements		32
Bases, Ballasts, and Paving		32 10
Flexible Paving		32 12

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 12 36 13-0088	SY	>1,000 To 5,000 SY, CQS-1h, Fog Seal.....	1.03	
32 12 36 13-0089	SY	>5,000 To 10,000 SY, CQS-1h, Fog Seal.....	0.93	
32 12 36 13-0090	SY	>10,000 To 20,000 SY, CQS-1h, Fog Seal.....	0.86	
32 12 36 13-0091	SY	>20,000 To 50,000 SY, CQS-1h, Fog Seal.....	0.80	
32 12 36 13-0092	SY	>50,000 SY, CQS-1h, Fog Seal.....	0.77	

32 12 36 13-0093 Sand Sealer (32 12 36 13)

Note: A sand seal is an application of asphalt binder followed by placement of a layer of sand or fine aggregate, and then rolled to embed the sand or fine aggregate into the binder. Includes sweeping and cleaning of area.

32 12 36 13-0094	SY	Up To 200 SY, Sand Seal.....	2.88	
32 12 36 13-0095	SY	>200 To 500 SY, Sand Seal.....	1.91	
32 12 36 13-0096	SY	>500 To 1,000 SY, Sand Seal.....	1.89	
32 12 36 13-0097	SY	>1,000 To 5,000 SY, Sand Seal.....	1.66	
32 12 36 13-0098	SY	>5,000 To 10,000 SY, Sand Seal.....	1.54	
32 12 36 13-0099	SY	>10,000 To 20,000 SY, Sand Seal.....	1.44	
32 12 36 13-0100	SY	>20,000 To 50,000 SY, Sand Seal.....	1.37	
32 12 36 13-0101	SY	>50,000 SY, Sand Seal.....	1.34	

32 12 36 16 Coal Tar Seal Coats (32 12 36)

32 12 36 16-0001 Thermoplastic Coal-Tar Asphalt Seal (32 12 36 16)

Note: Includes sweeping and cleaning of area.

32 12 36 16-0002	SY	Up To 500 SY, Type I Thermoplastic Coal-Tar Asphalt Seal.....	16.09	
32 12 36 16-0003	SY	>500 To 1,000 SY, Type I Thermoplastic Coal-Tar Asphalt Seal.....	15.14	
32 12 36 16-0004	SY	>1,000 To 5,000 SY, Type I Thermoplastic Coal-Tar Asphalt Seal.....	13.35	
32 12 36 16-0005	SY	>5,000 To 20,000 SY, Type I Thermoplastic Coal-Tar Asphalt Seal.....	11.99	
32 12 36 16-0006	SY	>20,000 To 50,000 SY, Type I Thermoplastic Coal-Tar Asphalt Seal.....	10.19	
32 12 36 16-0007	SY	>50,000 SY, Type I Thermoplastic Coal-Tar Asphalt Seal.....	8.40	
32 12 36 16-0008	SY	Up To 500 SY, Type II Thermoplastic Coal-Tar Asphalt Seal.....	19.57	
32 12 36 16-0009	SY	>500 To 1,000 SY, Type II Thermoplastic Coal-Tar Asphalt Seal.....	18.50	
32 12 36 16-0010	SY	>1,000 To 5,000 SY, Type II Thermoplastic Coal-Tar Asphalt Seal.....	16.35	
32 12 36 16-0011	SY	>5,000 To 20,000 SY, Type II Thermoplastic Coal-Tar Asphalt Seal.....	14.74	
32 12 36 16-0012	SY	>20,000 To 50,000 SY, Type II Thermoplastic Coal-Tar Asphalt Seal.....	12.59	
32 12 36 16-0013	SY	>50,000 SY, Type II Thermoplastic Coal-Tar Asphalt Seal.....	10.44	

32 12 36 23 Fuel-Resistant Sealers (32 12 36)

32 12 36 23-0001 Guardtop Seal Coat (32 12 36 23)

Note: Includes sweeping and cleaning of area.

32 12 36 23-0002	SY	GuardTop® Asphalt Based Sealcoat (Two Coats).....	3.26	
		<i>For 3% Polyglass Additive, Add</i>	0.40	
		<i>For 6% Polyglass Additive, Add</i>	0.72	
		<i>For Guardtop Black Sand 60 Mesh Additive (At 3 Pounds Per Gallon), Add</i>	0.27	
32 12 36 23-0003	LF	GuardTop® Cold Pour Crack Filler.....	1.36	
32 12 36 23-0004	LF	GuardTop® Hot Pour Crack Filler.....	1.56	
32 12 36 23-0005	SY	GuardTop® Oil Spot Primer For Asphalt.....	5.97	
32 12 36 23-0006	SY	GuardTop® Ultra, Polymer Modified, Asphalt Based Sealcoat (Two Coats).....	4.34	
		<i>For 3% Polyglass Additive, Add</i>	0.40	
		<i>For 6% Polyglass Additive, Add</i>	0.72	
		<i>For Guardtop Black Sand 60 Mesh Additive (At 3 Pounds Per Gallon), Add</i>	0.27	

32 12 43 Porous Flexible Paving (32 12)

32 12 43 00-0001 Flexible Recycled Plastic Porous Grid (32 12 43)

Note: Includes sand fill in rings. Excludes base, earth work and grass or sod.

32 12 43 00-0002	SY	1" Thick, Recycled Plastic Flexible Pavement With Sand Fill.....	38.19	
		Note: Includes sand fill in rings. Excludes base, earth work and grass or sod. Invisible Structures, Inc.; Grasspave2.		
		<i>For Up To 100, Add</i>	12.65	
		<i>For >100 To 500, Add</i>	3.15	
		<i>For >1,000 To 5,000, Deduct</i>	-1.24	
		<i>For >5,000, Deduct</i>	-2.63	

32 12 73 Asphalt Paving Joint Sealants (32 12)

32 12 73 00-0001 Expansion Joint In Sidewalk (32 12 73)

32 12 73 00-0002	LF	For Hot Asphalt Poured Over Expansion Joint In Sidewalk.....	3.54	
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32 13 Rigid Paving (32 10)

32 13 13 Concrete Paving (32 13)

Note: The following section includes spreading and placing delivered Portland cement concrete mix.

32 13 13 33 Plain Concrete Paving (32 13 13)

32 Exterior Improvements

32 10 Bases, Ballasts, and Paving

32 13 Rigid Paving



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 13 13 33-0001			Concrete Paving Assemblies <small>(32 13 13 33)</small>		
			Note: Includes forms, wire mesh (where necessary), two mat layers #3-#6 reinforcing rods at 12" on center with chairs (where necessary), vapor barrier, concrete, curing, latex or hot asphalt expansion joints, control joints, screed, float and finish. Excludes excavation, base and earthwork. Includes concrete paving machine. To be used for roadways, driveways, parking areas, or other areas of vehicular traffic. See CSI section 03 05 13 00-0001 for color additive.		
32 13 13 33-0002			4,500 PSI Concrete Paving Assembly <small>(32 13 13 33-0001)</small>		
32 13 13 33-0003	SY	4"	4,500 PSI Concrete Paving Assembly.....	64.45	
			<i>For 2,500 PSI Concrete, Deduct</i>	-3.79	
			<i>For 3,000 PSI Concrete, Deduct</i>	-2.47	
			<i>For 3,500 PSI Concrete, Deduct</i>	-1.98	
			<i>For 4,000 PSI Concrete, Deduct</i>	-0.86	
			<i>For 5,000 PSI Concrete, Add</i>	0.53	
			<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	4.29	
			<i>For <12' Wide Pass, Add</i>	11.17	
			<i>For 24' Or Greater Wide Pass, Deduct</i>	-12.89	
			<i>For Air Entrainment, Add</i>	1.65	
			<i>For Slipforming, Deduct</i>	-6.45	
			<i>For Up To 100, Add</i>	25.48	
			<i>For >100 To 250, Add</i>	14.39	
			<i>For >250 To 500, Add</i>	7.19	
			<i>For >1,000 To 2,000, Deduct</i>	-1.65	
			<i>For >2,000 To 5,000, Deduct</i>	-3.26	
			<i>For >5,000 To 10,000, Deduct</i>	-4.87	
			<i>For >10,000 To 20,000, Deduct</i>	-6.48	
			<i>For >20,000, Deduct</i>	-8.09	
32 13 13 33-0004	SY	5"	4,500 PSI Concrete Paving Assembly.....	76.36	
			<i>For 2,500 PSI Concrete, Deduct</i>	-4.76	
			<i>For 3,000 PSI Concrete, Deduct</i>	-3.11	
			<i>For 3,500 PSI Concrete, Deduct</i>	-2.48	
			<i>For 4,000 PSI Concrete, Deduct</i>	-1.08	
			<i>For 5,000 PSI Concrete, Add</i>	0.66	
			<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	5.38	
			<i>For <12' Wide Pass, Add</i>	12.88	
			<i>For 24' Or Greater Wide Pass, Deduct</i>	-15.27	
			<i>For Air Entrainment, Add</i>	2.07	
			<i>For Slipforming, Deduct</i>	-7.64	
			<i>For Up To 100, Add</i>	29.26	
			<i>For >100 To 250, Add</i>	16.70	
			<i>For >250 To 500, Add</i>	8.35	
			<i>For >1,000 To 2,000, Deduct</i>	-2.07	
			<i>For >2,000 To 5,000, Deduct</i>	-3.98	
			<i>For >5,000 To 10,000, Deduct</i>	-5.89	
			<i>For >10,000 To 20,000, Deduct</i>	-7.80	
			<i>For >20,000, Deduct</i>	-9.71	
32 13 13 33-0005	SY	6"	4,500 PSI Concrete Paving Assembly.....	81.55	
			<i>For 2,500 PSI Concrete, Deduct</i>	-5.02	
			<i>For 3,000 PSI Concrete, Deduct</i>	-3.28	
			<i>For 3,500 PSI Concrete, Deduct</i>	-2.62	
			<i>For 4,000 PSI Concrete, Deduct</i>	-1.14	
			<i>For 5,000 PSI Concrete, Add</i>	0.70	
			<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	5.68	
			<i>For <12' Wide Pass, Add</i>	13.84	
			<i>For 24' Or Greater Wide Pass, Deduct</i>	-16.31	
			<i>For Air Entrainment, Add</i>	2.18	
			<i>For Slipforming, Deduct</i>	-8.16	
			<i>For Up To 100, Add</i>	31.46	
			<i>For >100 To 250, Add</i>	17.91	
			<i>For >250 To 500, Add</i>	8.96	
			<i>For >1,000 To 2,000, Deduct</i>	-2.18	
			<i>For >2,000 To 5,000, Deduct</i>	-4.22	
			<i>For >5,000 To 10,000, Deduct</i>	-6.26	
			<i>For >10,000 To 20,000, Deduct</i>	-8.30	
			<i>For >20,000, Deduct</i>	-10.34	
32 13 13 33-0006	SY	7"	4,500 PSI Concrete Paving Assembly.....	97.02	
			<i>For 2,500 PSI Concrete, Deduct</i>	-6.33	
			<i>For 3,000 PSI Concrete, Deduct</i>	-4.13	
			<i>For 3,500 PSI Concrete, Deduct</i>	-3.30	
			<i>For 4,000 PSI Concrete, Deduct</i>	-1.43	
			<i>For 5,000 PSI Concrete, Add</i>	0.88	
			<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	7.16	
			<i>For <12' Wide Pass, Add</i>	15.99	
			<i>For 24' Or Greater Wide Pass, Deduct</i>	-19.40	
			<i>For Air Entrainment, Add</i>	2.75	
			<i>For Slipforming, Deduct</i>	-9.70	
			<i>For Up To 100, Add</i>	36.18	
			<i>For >100 To 250, Add</i>	20.85	
			<i>For >250 To 500, Add</i>	10.42	
			<i>For >1,000 To 2,000, Deduct</i>	-2.75	
			<i>For >2,000 To 5,000, Deduct</i>	-5.18	
			<i>For >5,000 To 10,000, Deduct</i>	-7.60	
			<i>For >10,000 To 20,000, Deduct</i>	-10.03	
			<i>For >20,000, Deduct</i>	-12.46	



Exterior Improvements	32	
Bases, Ballasts, and Paving	32 10	32
Rigid Paving	32 13	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 13 13 33-0007 SY 8" 4,500 PSI Concrete Paving Assembly.....	110.79	
For 2,500 PSI Concrete, Deduct	-6.95	
For 3,000 PSI Concrete, Deduct	-4.53	
For 3,500 PSI Concrete, Deduct	-3.63	
For 4,000 PSI Concrete, Deduct	-1.57	
For 5,000 PSI Concrete, Add	0.97	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	7.86	
For <12' Wide Pass, Add	18.63	
For 24' Or Greater Wide Pass, Deduct	-22.16	
For Air Entrainment, Add	3.02	
For Slipforming, Deduct	-11.08	
For Up To 100, Add	42.30	
For >100 To 250, Add	24.17	
For >250 To 500, Add	12.09	
For >1,000 To 2,000, Deduct	-3.02	
For >2,000 To 5,000, Deduct	-5.79	
For >5,000 To 10,000, Deduct	-8.56	
For >10,000 To 20,000, Deduct	-11.33	
For >20,000, Deduct	-14.10	
32 13 13 33-0008 SY 9" 4,500 PSI Concrete Paving Assembly.....	125.42	
For 2,500 PSI Concrete, Deduct	-8.03	
For 3,000 PSI Concrete, Deduct	-5.24	
For 3,500 PSI Concrete, Deduct	-4.19	
For 4,000 PSI Concrete, Deduct	-1.82	
For 5,000 PSI Concrete, Add	1.12	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	9.08	
For <12' Wide Pass, Add	20.88	
For 24' Or Greater Wide Pass, Deduct	-25.08	
For Air Entrainment, Add	3.49	
For Slipforming, Deduct	-12.54	
For Up To 100, Add	47.32	
For >100 To 250, Add	27.15	
For >250 To 500, Add	13.58	
For >1,000 To 2,000, Deduct	-3.49	
For >2,000 To 5,000, Deduct	-6.63	
For >5,000 To 10,000, Deduct	-9.76	
For >10,000 To 20,000, Deduct	-12.90	
For >20,000, Deduct	-16.03	
32 13 13 33-0009 SY 10" 4,500 PSI Concrete Paving Assembly.....	139.76	
For 2,500 PSI Concrete, Deduct	-8.84	
For 3,000 PSI Concrete, Deduct	-5.76	
For 3,500 PSI Concrete, Deduct	-4.61	
For 4,000 PSI Concrete, Deduct	-2.00	
For 5,000 PSI Concrete, Add	1.23	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	9.99	
For <12' Wide Pass, Add	23.42	
For 24' Or Greater Wide Pass, Deduct	-27.95	
For Air Entrainment, Add	3.84	
For Slipforming, Deduct	-13.98	
For Up To 100, Add	53.12	
For >100 To 250, Add	30.40	
For >250 To 500, Add	15.20	
For >1,000 To 2,000, Deduct	-3.84	
For >2,000 To 5,000, Deduct	-7.34	
For >5,000 To 10,000, Deduct	-10.83	
For >10,000 To 20,000, Deduct	-14.32	
For >20,000, Deduct	-17.82	
32 13 13 33-0010 SY 12" 4,500 PSI Concrete Paving Assembly.....	166.50	
For 2,500 PSI Concrete, Deduct	-10.46	
For 3,000 PSI Concrete, Deduct	-6.82	
For 3,500 PSI Concrete, Deduct	-5.46	
For 4,000 PSI Concrete, Deduct	-2.37	
For 5,000 PSI Concrete, Add	1.46	
For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add	11.83	
For <12' Wide Pass, Add	27.98	
For 24' Or Greater Wide Pass, Deduct	-33.30	
For Air Entrainment, Add	4.55	
For Slipforming, Deduct	-16.65	
For Up To 100, Add	63.51	
For >100 To 250, Add	36.30	
For >250 To 500, Add	18.15	
For >1,000 To 2,000, Deduct	-4.55	
For >2,000 To 5,000, Deduct	-8.71	
For >5,000 To 10,000, Deduct	-12.87	
For >10,000 To 20,000, Deduct	-17.04	
For >20,000, Deduct	-21.20	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 13 Rigid Paving**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 13 13 33-0011	SY	15" 4,500 PSI Concrete Paving Assembly	211.94
		<i>For 2,500 PSI Concrete, Deduct</i>	-12.85
		<i>For 3,000 PSI Concrete, Deduct</i>	-8.38
		<i>For 3,500 PSI Concrete, Deduct</i>	-6.70
		<i>For 4,000 PSI Concrete, Deduct</i>	-2.90
		<i>For 5,000 PSI Concrete, Add</i>	1.79
		<i>For High Sulfate Resistance, Type 5 Cement Concrete ASTM C150, Add</i>	14.52
		<i>For <12' Wide Pass, Add</i>	36.23
		<i>For 24' Or Greater Wide Pass, Deduct</i>	-42.39
		<i>For Air Entrainment, Add</i>	5.59
		<i>For Slipforming, Deduct</i>	-21.19
		<i>For Up To 100, Add</i>	82.48
		<i>For >100 To 250, Add</i>	46.82
		<i>For >250 To 500, Add</i>	23.41
		<i>For >1,000 To 2,000, Deduct</i>	-5.59
		<i>For >2,000 To 5,000, Deduct</i>	-10.88
		<i>For >5,000 To 10,000, Deduct</i>	-16.18
		<i>For >10,000 To 20,000, Deduct</i>	-21.48
		<i>For >20,000, Deduct</i>	-26.78

32 13 16 Decorative Concrete Paving (32 13)**32 13 16 13 Patterned Concrete Paving (32 13 16)**

32 13 16 13-0001	SF	For Patterned (Tactile) Finish In Concrete Sidewalk.....	4.99
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32 13 43 Pervious Concrete Paving (32 13)**32 13 43 00-0001 Pervious Concrete Assemblies (32 13 43)**

Note: Pervious concrete is a special concrete mix with high porosity that allows water to pass through it. For paving and sidewalks.

32 13 43 00-0002	SF	6" Thick, 15-25% Porosity, Minimum 115 PCF, Pervious Concrete Paving.....	18.62
		Note: Includes filter fabric, concrete, curing, finish, and control joints. Excludes excavation, base, forms and expansion joints along existing.	
		<i>For >5,000 To 30,000, Deduct</i>	-1.99
		<i>For >30,000 To 100,000, Deduct</i>	-3.65
		<i>For >100,000, Deduct</i>	-4.53
32 13 43 00-0003	SF	9" Thick, 15-25% Porosity, Minimum 115 PCF, Pervious Concrete Paving.....	23.60
		Note: Includes filter fabric, concrete, curing, finish, and control joints. Excludes excavation, base, forms and expansion joints along existing.	
		<i>For >5,000 To 30,000, Deduct</i>	-2.46
		<i>For >30,000 To 100,000, Deduct</i>	-4.42
		<i>For >100,000, Deduct</i>	-5.49

32 13 73 Concrete Paving Joint Sealants (32 13)**32 13 73 13 Fuel-Resistant Concrete Paving Joint Sealants (32 13 73)****32 13 73 13-0001 Concrete Pavement Joint And Crack Repair (32 13 73 13)**

Note: Includes cutting joint, removal of existing material, sweeping and cleaning area.

32 13 73 13-0002 Silicone Concrete Pavement Joint And Crack Repair (32 13 73 13-0001)

32 13 73 13-0003	CLF	1/4" x 1/4" Joint, Silicone Concrete Pavement Joint And Crack Repair	650.17
		<i>For Custom Match Coloring, Add</i>	21.94
		<i>For 1 Part Mildew Resistant, Add</i>	31.99
		<i>For High-Modulus Non-Acid Curing, Add</i>	18.28
32 13 73 13-0004	CLF	1/4" x 3/8" Joint, Silicone Concrete Pavement Joint And Crack Repair	733.12
		<i>For Custom Match Coloring, Add</i>	32.91
		<i>For 1 Part Mildew Resistant, Add</i>	47.99
		<i>For High-Modulus Non-Acid Curing, Add</i>	27.42
32 13 73 13-0005	CLF	1/4" x 1/2" Joint, Silicone Concrete Pavement Joint And Crack Repair	816.08
		<i>For Custom Match Coloring, Add</i>	43.88
		<i>For 1 Part Mildew Resistant, Add</i>	63.99
		<i>For High-Modulus Non-Acid Curing, Add</i>	36.56
32 13 73 13-0006	CLF	3/8" x 3/8" Joint, Silicone Concrete Pavement Joint And Crack Repair	838.93
		<i>For Custom Match Coloring, Add</i>	49.36
		<i>For 1 Part Mildew Resistant, Add</i>	71.98
		<i>For High-Modulus Non-Acid Curing, Add</i>	41.13
32 13 73 13-0007	CLF	3/8" x 1/2" Joint, Silicone Concrete Pavement Joint And Crack Repair	926.11
		<i>For Custom Match Coloring, Add</i>	65.81
		<i>For 1 Part Mildew Resistant, Add</i>	95.98
		<i>For High-Modulus Non-Acid Curing, Add</i>	54.84
32 13 73 13-0008	CLF	3/8" x 5/8" Joint, Silicone Concrete Pavement Joint And Crack Repair	1,013.30
		<i>For Custom Match Coloring, Add</i>	82.27
		<i>For 1 Part Mildew Resistant, Add</i>	119.97
		<i>For High-Modulus Non-Acid Curing, Add</i>	68.56
32 13 73 13-0009	CLF	3/8" x 3/4" Joint, Silicone Concrete Pavement Joint And Crack Repair	1,119.11
		<i>For Custom Match Coloring, Add</i>	98.72
		<i>For 1 Part Mildew Resistant, Add</i>	143.97
		<i>For High-Modulus Non-Acid Curing, Add</i>	82.27
32 13 73 13-0010	CLF	1/2" x 1/2" Joint, Silicone Concrete Pavement Joint And Crack Repair	1,036.15
		<i>For Custom Match Coloring, Add</i>	87.75
		<i>For 1 Part Mildew Resistant, Add</i>	127.97
		<i>For High-Modulus Non-Acid Curing, Add</i>	73.13

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 13 73 13-0011 CLF 1/2" x 5/8" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,202.05 109.69 159.96 91.41	
32 13 73 13-0012 CLF 1/2" x 3/4" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,330.71 131.63 191.96 109.69	
32 13 73 13-0013 CLF 1/2" x 7/8" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,459.37 153.57 223.95 127.97	
32 13 73 13-0014 CLF 1/2" x 1" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,569.41 175.50 255.94 146.25	
32 13 73 13-0015 CLF 3/4" x 3/4" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	1,679.44 197.44 287.93 164.53	
32 13 73 13-0016 CLF 3/4" x 1" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	2,036.62 274.22 399.91 228.52	
32 13 73 13-0017 CLF 1" x 1" Joint, Silicone Concrete Pavement Joint And Crack Repair <i>For Custom Match Coloring, Add</i> <i>For 1 Part Mildew Resistant, Add</i> <i>For High-Modulus Non-Acid Curing, Add</i>	2,393.80 351.01 511.89 292.51	
32 13 73 16 Field-Molded Concrete Paving Joint Sealants (32 13 73)		
32 13 73 16-0001 Preformed Elastomeric Concrete Pavement Joint And Crack Repair (32 13 73 16) Note: Includes cutting joint, removal of existing material, sweeping and cleaning area.		
32 13 73 16-0002 LF Joint Sealing, Concrete Pavement Preformed Elastomeric	14.23	
32 13 73 19 Compression Concrete Paving Joint Sealants (32 13 73)		
32 13 73 19-0001 Silicone Joint Sealant For Concrete Pavement (32 13 73 19) Note: Installation includes high pressure water wash, sand blast, sweeping, cleaning area, backer rod and Dow Corning 888 silicone sealant. Demolition includes removal of existing material where saw cutting is not required. Excludes saw cutting.		
32 13 73 19-0002 LF 1/4" x 1/4" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	12.00	2.76
32 13 73 19-0003 LF 3/8" x 1/4" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	12.64	2.82
32 13 73 19-0004 LF 1/2" x 1/4" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	13.54	2.88
32 13 73 19-0005 LF 3/4" x 3/8" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	16.49	2.93
32 13 73 19-0006 LF 1" x 1/2" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	19.50	3.00
32 13 73 19-0007 LF 1-1/2" x 1/2" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	25.36	3.05
32 13 73 19-0008 LF 2" x 1/2" Expansion And Contraction Silicone Joint Sealant For Concrete Pavement	38.39	3.12
32 14 Unit Paving (32 10)		
32 14 09 Paver Restraints (32 14)		
32 14 09 00-0001 Paver Restraints (32 14 09) Note: Paver restraints are used along the edge of a group of pavers as a locking border. Flexible or rigid sections. Includes stakes and connecting devices. Excludes pavers, bedding, excavation, base course and compaction.		
32 14 09 00-0002 LF Up To 2" Height, Vinyl Paver Restraint..... <i>For >1,000 To 2,000, Deduct</i> <i>For >2,000 To 4,000, Deduct</i> <i>For >4,000, Deduct</i>	5.26 -0.73 -1.06 -1.35	1.23
32 14 09 00-0003 LF Up To 2" Height, Galvanized Steel Paver Restraint..... <i>For >500 To 1,000, Deduct</i> <i>For >1,000 To 2,000, Deduct</i> <i>For >2,000, Deduct</i>	5.70 -0.19 -0.37 -0.56	1.23
32 14 09 00-0004 LF Up To 1" Height, Aluminum Paver Restraint..... <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000 To 1,500, Deduct</i>	5.48 -0.35 -0.53 -0.88	1.23
32 14 09 00-0005 LF >1" To 2" Height, Aluminum Paver Restraint..... <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000 To 1,500, Deduct</i>	6.47 -0.45 -0.68 -1.13	1.23
32 14 09 00-0006 LF >2" To 3" Height, Aluminum Paver Restraint..... <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000 To 1,500, Deduct</i>	8.36 -0.64 -0.96 -1.60	1.23
32 14 09 00-0007 LF >3" To 4" Height, Aluminum Paver Restraint..... <i>For >250 To 500, Deduct</i> <i>For >500 To 1,000, Deduct</i> <i>For >1,000 To 1,500, Deduct</i>	9.82 -0.79 -1.18 -1.97	1.23

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 14 Unit Paving**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**32 14 11 Bedding for Unit Paving** (32 14)

32 14 11 00-0001	Bedding For Brick, Precast Concrete Paver And Stone Sidewalk <small>(32 14 11)</small>		
	Note: Includes delivery up to 15 miles from the closest approved source, the cost for loading, and dumping. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.		
32 14 11 00-0002	SF 1" To 2" Sand Bedding, Screeded	1.04	
	For Up To 100, Add	0.46	
	For >100 To 500, Add	0.13	
	For >1,000 To 5,000, Deduct	-0.08	
	For >5,000, Deduct	-0.13	
32 14 11 00-0003	SF 1" To 2" Stone Dust Bedding, Screeded	1.24	
	For Up To 100, Add	0.51	
	For >100 To 500, Add	0.14	
	For >1,000 To 5,000, Deduct	-0.08	
	For >5,000, Deduct	-0.13	
32 14 11 00-0004	SF 3" Stone Dust Bedding, Screeded	1.61	
	For Up To 100, Add	0.64	
	For >100 To 500, Add	0.17	
	For >1,000 To 5,000, Deduct	-0.09	
	For >5,000, Deduct	-0.16	
32 14 11 00-0005	SF 4" Stone Dust Bedding, Screeded	2.05	
	For Up To 100, Add	0.80	
	For >100 To 500, Add	0.22	
	For >1,000 To 5,000, Deduct	-0.11	
	For >5,000, Deduct	-0.20	
32 14 11 00-0006	SF 1" Mortar Bedding	3.27	
	For Up To 100, Add	1.46	
	For >100 To 500, Add	0.42	
	For >1,000 To 5,000, Deduct	-0.26	
	For >5,000, Deduct	-0.41	
32 14 11 00-0007	SF 2" Mortar Bedding	4.82	
	For Up To 100, Add	2.07	
	For >100 To 500, Add	0.59	
	For >1,000 To 5,000, Deduct	-0.34	
	For >5,000, Deduct	-0.56	
32 14 11 00-0008	SF Thin-Set Latex Portland Cement Mortar	1.63	
	For Up To 100, Add	0.75	
	For >100 To 500, Add	0.22	
	For >1,000 To 5,000, Deduct	-0.14	
	For >5,000, Deduct	-0.21	

32 14 13 Precast Concrete Unit Paving (32 14)**32 14 13 16 Precast Concrete Unit Paving Slabs** (32 14 13)

32 14 13 16-0001	Precast Concrete Paver Sidewalk <small>(32 14 13 16)</small>		
	Note: Square, rectangular, or interlocking pervious pavers. Includes sand joints and all finishes. Excludes bedding, excavation, base course and compaction. See CSI section 32 11 23 16-0001 for base course, 32 14 11 00-0001 for bedding.		
32 14 13 16-0002	SF 2-3/8" Thick, Up To 32 SI Precast Concrete Paver	12.05	3.22
	Note: Includes 2-1/2" x 5", 4" x 4", 4" x 6", 5" x 5", 4" x 8" and other similar size pavers.		
	For 2-3/4" Concrete Paver, Add	1.16	
	For 3-1/8" Concrete Paver, Add	1.88	
	For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.93	
	For Up To 100, Add	4.63	
	For >100 To 500, Add	1.25	
	For >1,000 To 5,000, Deduct	-0.65	
	For >5,000, Deduct	-1.14	
32 14 13 16-0003	SF 2-3/8" Thick, >32 To 64 SI Precast Concrete Paver	11.47	2.93
	Note: Includes 5" x 7", 6" x 6", 8" x 8" and other similar size pavers.		
	For 2-3/4" Concrete Paver, Add	1.13	
	For 3-1/8" Concrete Paver, Add	1.84	
	For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.87	
	For Up To 100, Add	4.34	
	For >100 To 500, Add	1.16	
	For >1,000 To 5,000, Deduct	-0.59	
	For >5,000, Deduct	-1.05	
32 14 13 16-0004	SF 2-3/8" Thick, >64 To 144 SI Precast Concrete Paver	10.93	2.33
	Note: Includes 6" x 12", 12" x 12" and other similar size pavers.		
	For 2-3/4" Concrete Paver, Add	1.11	
	For 3-1/8" Concrete Paver, Add	1.80	
	For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.81	
	For Up To 100, Add	4.07	
	For >100 To 500, Add	1.08	
	For >1,000 To 5,000, Deduct	-0.53	
	For >5,000, Deduct	-0.97	
32 14 13 16-0005	SF 2-3/8" Thick, >144 SI Precast Concrete Paver	10.44	2.42
	Note: Includes 16" x 16", 12" x 24", 18" x 18", 24" x 24", 24" x 36", 36" x 36" and other similar size pavers.		
	For 2-3/4" Concrete Paver, Add	1.08	
	For 3-1/8" Concrete Paver, Add	1.76	
	For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.76	
	For Up To 100, Add	3.82	
	For >100 To 500, Add	1.01	
	For >1,000 To 5,000, Deduct	-0.48	
	For >5,000, Deduct	-0.89	



		Exterior Improvements	32
		Bases, Ballasts, and Paving	32 10
		Unit Paving	32 14

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	32 14 13 16-0006	SF	2-3/8" Thick, Precast Concrete Paver, Combinations And Patterns Note: Patterns made by combining pavers from two or more size groups.	11.19	2.79
			<i>For 2-3/4" Concrete Paver, Add</i>	1.12	
			<i>For 3-1/8" Concrete Paver, Add</i>	1.82	
			<i>For Cement/Sand Mix Or Polymeric Sand Joints, Add</i>	0.84	
			<i>For Up To 100, Add</i>	4.20	
			<i>For >100 To 500, Add</i>	1.12	
			<i>For >1,000 To 5,000, Deduct</i>	-0.56	
			<i>For >5,000, Deduct</i>	-1.01	
	32 14 13 19		Porous Precast Concrete Unit Paving <small>(32 14 13)</small>		
	32 14 13 19-0001		Turf Block <small>(32 14 13 19)</small> Note: Grass grid, open-cell unit paver, geoblock.		
	32 14 13 19-0002	SF	3-1/8" Thick, Precast Concrete Turf Block	12.26	2.79
			<i>For Up To 100, Add</i>	4.46	
			<i>For >100 To 500, Add</i>	1.17	
			<i>For >1,000 To 5,000, Deduct</i>	-0.56	
			<i>For >5,000, Deduct</i>	-1.04	
	32 14 16		Brick Unit Paving <small>(32 14)</small>		
	32 14 16 00-0001		Brick Paver Sidewalk <small>(32 14 16)</small> Note: Includes sand joints. Excludes bedding, excavation, base course and compaction. See CSI section 32 11 23 16-0001 for base course, 32 14 11 00-0001 for bedding.		
	32 14 16 00-0002	SF	4" x 8" x 2-1/4" Brick Paver, Laid Flat	15.22	3.22
			<i>For 1-3/8" Thick Paver, Deduct</i>	-3.39	
			<i>For 2-3/4" Thick Paver (Vehicular), Add</i>	7.81	
			<i>For Cement/Sand Mix Or Polymeric Sand Joints, Add</i>	1.08	
			<i>For Up To 100, Add</i>	5.42	
			<i>For >100 To 500, Add</i>	1.41	
			<i>For >1,000 To 5,000, Deduct</i>	-0.65	
			<i>For >5,000, Deduct</i>	-1.23	
	32 14 16 00-0003	SF	4" x 8" x 2-1/4" Brick, Laid On Edge	22.93	3.67
			<i>For 1-3/8" Thick Paver, Deduct</i>	-5.82	
			<i>For 2-3/4" Thick Paver (Vehicular), Add</i>	13.67	
			<i>For Cement/Sand Mix Or Polymeric Sand Joints, Add</i>	1.51	
			<i>For Up To 100, Add</i>	7.57	
			<i>For >100 To 500, Add</i>	1.88	
			<i>For >1,000 To 5,000, Deduct</i>	-0.73	
			<i>For >5,000, Deduct</i>	-1.57	
	32 14 33		Plastic Paving <small>(32 14)</small>		
	32 14 33 13		Permeable Plastic Paving <small>(32 14 33)</small>		
	32 14 33 13-0001		Turf Block Plastic Paving <small>(32 14 33 13)</small>		
	32 14 33 13-0002	SF	4" Thick Recycled Polyvinyl Chloride (PVC) Plastic Turf Block	18.82	2.79
			<i>For Up To 100, Add</i>	6.10	
			<i>For >100 To 500, Add</i>	1.50	
			<i>For >1,000 To 5,000, Deduct</i>	-0.56	
			<i>For >5,000, Deduct</i>	-1.24	
	32 14 40		Stone Paving <small>(32 14)</small>		
	32 14 40 00-0001		Slate Paver Sidewalk <small>(32 14 40)</small> Note: Includes sand joints and all finishes. Excludes bedding, excavation, base course and compaction. See CSI section 32 11 23 16-0001 for base course, 32 14 11 00-0001 for bedding.		
	32 14 40 00-0002	SF	1" Thick, Up to 54 SI Slate Paver	16.17	2.67
			Note: Includes 3" x 9", 6" x 6", 6" x 9" and other similar size pavers.		
			<i>For Cement/Sand Mix Or Polymeric Sand Joints, Add</i>	1.08	
			<i>For 1/4" Thick Paver, Deduct</i>	-8.27	
			<i>For 1/2" Thick Paver, Deduct</i>	-5.79	
			<i>For Up To 100, Add</i>	5.38	
			<i>For >100 To 500, Add</i>	1.34	
			<i>For >1,000 To 5,000, Deduct</i>	-0.53	
			<i>For >5,000, Deduct</i>	-1.12	
	32 14 40 00-0003	SF	1" Thick, >54 to 108 SI Slate Paver	15.68	2.42
			Note: Includes 6" x 12", 9" x 9", 6" x 18", 9" x 12" and other similar size pavers.		
			<i>For Cement/Sand Mix Or Polymeric Sand Joints, Add</i>	1.03	
			<i>For 1/4" Thick Paver, Deduct</i>	-8.15	
			<i>For 1/2" Thick Paver, Deduct</i>	-5.71	
			<i>For Up To 100, Add</i>	5.13	
			<i>For >100 To 500, Add</i>	1.27	
			<i>For >1,000 To 5,000, Deduct</i>	-0.48	
			<i>For >5,000, Deduct</i>	-1.05	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 14 Unit Paving**

MINOR		TOTAL DIRECT DEMOLITION		
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 14 40 00-0004	SF	1" Thick, >108 to 216 SI Slate Paver	14.85	2.00
		Note: Includes 12" x 12", 6" x 24", 9" x 18", 9" x 24", 12" x 18" and other similar size pavers.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.94	
		For 1/4" Thick Paver, Deduct	-7.94	
		For 1/2" Thick Paver, Deduct	-5.59	
		For Up To 100, Add	4.72	
		For >100 To 500, Add	1.14	
		For >1,000 To 5,000, Deduct	-0.40	
		For >5,000, Deduct	-0.93	
32 14 40 00-0005	SF	1" Thick, >216 SI Slate Paver	14.48	1.82
		Note: Includes 16" x 16", 12" x 24", 18" x 18", 24" x 24", 24" x 36", 36" x 36" and other similar size pavers.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.91	
		For 1/4" Thick Paver, Deduct	-7.85	
		For 1/2" Thick Paver, Deduct	-5.53	
		For Up To 100, Add	4.53	
		For >100 To 500, Add	1.09	
		For >1,000 To 5,000, Deduct	-0.36	
		For >5,000, Deduct	-0.87	
32 14 40 00-0006	SF	1" Thick, Slate Paver, Combinations And Patterns	15.22	2.19
		Note: Patterns made by combining pavers from two or more size groups.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	0.98	
		For 1/4" Thick Paver, Deduct	-8.03	
		For 1/2" Thick Paver, Deduct	-5.64	
		For Up To 100, Add	4.90	
		For >100 To 500, Add	1.20	
		For >1,000 To 5,000, Deduct	-0.44	
		For >5,000, Deduct	-0.98	
32 14 40 00-0007		Granite Paver Sidewalk ^(32 14 40)		
		Note: Includes sand joints and all finishes. Excludes bedding, excavation, base course and compaction. See CSI section 32 11 23 16-0001 for base course, 32 14 11 00-0001 for bedding.		
32 14 40 00-0008	SF	1" Thick, Up to 54 SI Granite Paver	26.12	2.67
		Note: Includes 3" x 9", 6" x 6", 6" x 9" and other similar size pavers.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	1.57	
		For 2" Granite Paver, Add	1.31	
		For 3" Granite Paver, Add	2.61	
		For 4" Granite Paver, Add	2.88	
		For Up To 100, Add	7.86	
		For >100 To 500, Add	1.84	
		For >1,000 To 5,000, Deduct	-0.53	
		For >5,000, Deduct	-1.42	
32 14 40 00-0009	SF	1" Thick, >54 to 108 SI Granite Paver.....	25.63	2.42
		Note: Includes 6" x 12", 9" x 9", 6" x 18", 9" x 12" and other similar size pavers.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	1.52	
		For 2" Granite Paver, Add	1.28	
		For 3" Granite Paver, Add	2.56	
		For 4" Granite Paver, Add	2.81	
		For Up To 100, Add	7.62	
		For >100 To 500, Add	1.77	
		For >1,000 To 5,000, Deduct	-0.48	
		For >5,000, Deduct	-1.35	
32 14 40 00-0010	SF	1" Thick, >108 to 216 SI Granite Paver.....	24.80	2.00
		Note: Includes 12" x 12", 6" x 24", 9" x 18", 9" x 24", 12" x 18" and other similar size pavers.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	1.44	
		For 2" Granite Paver, Add	1.24	
		For 3" Granite Paver, Add	2.48	
		For 4" Granite Paver, Add	2.68	
		For Up To 100, Add	7.20	
		For >100 To 500, Add	1.64	
		For >1,000 To 5,000, Deduct	-0.40	
		For >5,000, Deduct	-1.23	
32 14 40 00-0011	SF	1" Thick, >216 SI Granite Paver	24.43	1.82
		Note: Includes 16" x 16", 12" x 24", 18" x 18", 24" x 24" and other similar size pavers.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	1.40	
		For 2" Granite Paver, Add	1.22	
		For 3" Granite Paver, Add	2.44	
		For 4" Granite Paver, Add	2.63	
		For Up To 100, Add	7.02	
		For >100 To 500, Add	1.59	
		For >1,000 To 5,000, Deduct	-0.36	
		For >5,000, Deduct	-1.17	
32 14 40 00-0012	SF	1" Thick, Granite Paver, Combinations And Patterns	25.17	2.19
		Note: Patterns made by combining pavers from two or more size groups.		
		For Cement/Sand Mix Or Polymeric Sand Joints, Add	1.48	
		For 2" Granite Paver, Add	1.26	
		For 3" Granite Paver, Add	2.52	
		For 4" Granite Paver, Add	2.74	
		For Up To 100, Add	7.39	
		For >100 To 500, Add	1.70	
		For >1,000 To 5,000, Deduct	-0.44	
		For >5,000, Deduct	-1.28	

32 15 Aggregate Surfacing ^(32 10)



Exterior Improvements	32	32
Bases, Ballasts, and Paving	32 10	
Aggregate Surfacing	32 15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 15 40 Crushed Stone Surfacing ^(32 15) Note: Includes delivery up to 15 miles from supplier, placement, rolling and compaction water. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.		
32 15 40 00-0001 Gravel Surfacing And Spreading ^(32 15 40) Note: Includes delivered material, placement, rolling and compaction water.		
32 15 40 00-0002 CY Gravel Surfacing And Spreading	107.11	
32 15 40 00-0003 Limestone Screenings ^(32 15 40) Note: Includes delivered material, placement, rolling and compaction water. For trail maintenance.		
32 15 40 00-0004 CY Limestone Screenings For Trail	78.26	
32 15 40 00-0005 Decomposed Granite ^(32 15 40) Note: Includes delivered material, placement, rolling and compaction water.		
32 15 40 00-0006 SY 3" To 4" Thick Decomposed Granite Screenings With Stabilizer Pathway	19.66	
Note: Placed in 2 lifts.		
For Additional 2" Lift	9.83	
For >45 To 180, Deduct	-1.32	
For >180 To 450, Deduct	-1.65	
For >450, Deduct	-1.98	
32 16 Curbs, Gutters, Sidewalks, and Driveways ^(32 16)		
32 16 13 Curbs and Gutters ^(32 16) Note: Includes transitions. Demolition Includes two saw cuts (each end) of curbs and gutters for lengths up to 100'. See CSI section 02 41 19 13-0057 for additional saw cuts within the 100'.		
32 16 13 13 Cast-In-Place Concrete Curbs and Gutters ^(32 16 13) Note: Includes concrete, forms, rebar (where required), rebar chairs (where necessary), expansion joints, finish and curing.		
32 16 13 13-0001 Cast In Place Concrete Curbs Assemblies ^(32 16 13 13) Note: Includes delivered concrete, forms, rebar, chairs (where necessary), expansion joints, finish and curing.		
32 16 13 13-0002 LF 6" x 12" Cast In Place Concrete Curb (Type A1-6)	22.21	10.51
For Mountable Curb, Add	1.38	
For Up To 20, Add	12.85	
For >20 To 50, Add	7.26	
For >50 To 100, Add	2.79	
For >500 To 1,000, Deduct	-2.79	
For >1,000, Deduct	-4.74	
32 16 13 13-0003 LF 6" x 12" Cast In Place Concrete Curb - Radius (Type A1-6)	25.23	12.09
For Mountable Curb, Add	1.63	
For Up To 20, Add	14.77	
For >20 To 50, Add	8.36	
For >50 To 100, Add	3.21	
For >500 To 1,000, Deduct	-3.21	
For >1,000, Deduct	-5.44	
32 16 13 13-0004 LF 6" x 14" Cast In Place Concrete Curb (Type A1-8)	24.27	10.51
For Mountable Curb, Add	1.52	
For Up To 20, Add	14.05	
For >20 To 50, Add	7.94	
For >50 To 100, Add	3.05	
For >500 To 1,000, Deduct	-3.05	
For >1,000, Deduct	-5.19	
32 16 13 13-0005 LF 6" x 14" Cast In Place Concrete Curb - Radius (Type A1-8)	27.59	12.09
For Mountable Curb, Add	1.78	
For Up To 20, Add	16.16	
For >20 To 50, Add	9.15	
For >50 To 100, Add	3.51	
For >500 To 1,000, Deduct	-3.51	
For >1,000, Deduct	-5.95	
32 16 13 13-0006 LF 6" x 16" Cast In Place Concrete Curb	26.57	10.51
For Mountable Curb, Add	1.63	
For Up To 20, Add	15.30	
For >20 To 50, Add	8.65	
For >50 To 100, Add	3.33	
For >500 To 1,000, Deduct	-3.33	
For >1,000, Deduct	-5.65	
32 16 13 13-0007 LF 6" x 16" Cast In Place Concrete Curb - Radius	30.12	15.77
For Mountable Curb, Add	1.93	
For Up To 20, Add	17.58	
For >20 To 50, Add	9.95	
For >50 To 100, Add	3.82	
For >500 To 1,000, Deduct	-3.82	
For >1,000, Deduct	-6.48	
32 16 13 13-0008 LF 6" x 18" Cast In Place Concrete Curb	28.39	10.51
For Mountable Curb, Add	1.73	
For Up To 20, Add	16.30	
For >20 To 50, Add	9.21	
For >50 To 100, Add	3.54	
For >500 To 1,000, Deduct	-3.54	
For >1,000, Deduct	-6.03	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 16 Curbs, Gutters, Sidewalks, and Driveways**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 16 13	13-0009	LF	6" x 18" Cast In Place Concrete Curb - Radius.....	31.89	12.09
			<i>For Mountable Curb, Add</i>	1.99	
			<i>For Up To 20, Add</i>	18.47	
			<i>For >20 To 50, Add</i>	10.44	
			<i>For >50 To 100, Add</i>	4.01	
			<i>For >500 To 1,000, Deduct</i>	-4.01	
			<i>For >1,000, Deduct</i>	-6.82	
32 16 13	13-0010	LF	6" x 24" Cast In Place Concrete Curb.....	32.46	11.57
			<i>For Mountable Curb, Add</i>	1.84	
			<i>For Up To 20, Add</i>	18.18	
			<i>For >20 To 50, Add</i>	10.26	
			<i>For >50 To 100, Add</i>	3.96	
			<i>For >500 To 1,000, Deduct</i>	-3.96	
			<i>For >1,000, Deduct</i>	-6.75	
32 16 13	13-0011	LF	6" x 24" Cast In Place Concrete Curb - Radius.....	36.12	13.14
			<i>For Mountable Curb, Add</i>	2.09	
			<i>For Up To 20, Add</i>	20.36	
			<i>For >20 To 50, Add</i>	11.50	
			<i>For >50 To 100, Add</i>	4.43	
			<i>For >500 To 1,000, Deduct</i>	-4.43	
			<i>For >1,000, Deduct</i>	-7.55	
32 16 13	13-0012	LF	12" x 24" Cast In Place Concrete Curb.....	42.00	13.14
			<i>For Mountable Curb, Add</i>	1.76	
			<i>For Up To 20, Add</i>	21.54	
			<i>For >20 To 50, Add</i>	12.08	
			<i>For >50 To 100, Add</i>	4.73	
			<i>For >500 To 1,000, Deduct</i>	-4.73	
			<i>For >1,000, Deduct</i>	-8.14	
32 16 13	13-0013	LF	12" x 24" Cast In Place Concrete Curb - Radius.....	46.57	14.71
			<i>For Mountable Curb, Add</i>	2.00	
			<i>For Up To 20, Add</i>	24.03	
			<i>For >20 To 50, Add</i>	13.49	
			<i>For >50 To 100, Add</i>	5.27	
			<i>For >500 To 1,000, Deduct</i>	-5.27	
			<i>For >1,000, Deduct</i>	-9.07	
32 16 13	13-0014	EA	Additional Finish For Handicap Drop Section In Curb.....	78.83	
32 16 13	13-0015		Cast In Place Concrete Curb And Gutter Assemblies <small>(32 16 13 13)</small>		
			Note: Includes concrete, forms, rebar, chairs (where necessary), transitions, expansion joints, finish and curing.		
32 16 13	13-0016	LF	6" x 12" Cast In Place Concrete Gutter With 6" Curb And Face - Straight.....	29.85	12.69
			<i>For Up To 20, Add</i>	20.13	
			<i>For >20 To 50, Add</i>	11.18	
			<i>For >50 To 100, Add</i>	4.48	
			<i>For >500 To 1,000, Deduct</i>	-3.71	
			<i>For >1,000, Deduct</i>	-6.32	
			<i>For Mountable Or Rolled Curb And Gutter, Add</i>	1.80	
32 16 13	13-0017	LF	6" x 12" Cast In Place Concrete Gutter With 6" Curb And Face - Radius.....	32.40	16.93
			<i>For Up To 20, Add</i>	21.87	
			<i>For >20 To 50, Add</i>	12.15	
			<i>For >50 To 100, Add</i>	4.86	
			<i>For >500 To 1,000, Deduct</i>	-4.05	
			<i>For >1,000, Deduct</i>	-6.89	
			<i>For Mountable Or Rolled Curb And Gutter, Add</i>	1.99	
32 16 13	13-0018	LF	6" x 18" Cast In Place Concrete Gutter With 6" Curb And Face - Straight.....	37.49	14.07
			<i>For Up To 20, Add</i>	25.30	
			<i>For >20 To 50, Add</i>	14.05	
			<i>For >50 To 100, Add</i>	5.62	
			<i>For >500 To 1,000, Deduct</i>	-4.68	
			<i>For >1,000, Deduct</i>	-7.96	
			<i>For Mountable Or Rolled Curb And Gutter, Add</i>	2.28	
32 16 13	13-0019	LF	6" x 18" Cast In Place Concrete Gutter With 6" Curb And Face - Radius.....	41.25	15.66
			<i>For Up To 20, Add</i>	27.87	
			<i>For >20 To 50, Add</i>	15.50	
			<i>For >50 To 100, Add</i>	6.19	
			<i>For >500 To 1,000, Deduct</i>	-5.18	
			<i>For >1,000, Deduct</i>	-8.81	
			<i>For Mountable Or Rolled Curb And Gutter, Add</i>	2.57	
32 16 13	13-0020	LF	6" x 24" Cast In Place Concrete Gutter With 6" Curb And Face - Straight (Type A3-6).....	45.12	16.93
			<i>For Up To 20, Add</i>	30.46	
			<i>For >20 To 50, Add</i>	16.92	
			<i>For >50 To 100, Add</i>	6.77	
			<i>For >500 To 1,000, Deduct</i>	-5.64	
			<i>For >1,000, Deduct</i>	-9.59	
			<i>For Mountable Or Rolled Curb And Gutter, Add</i>	2.76	
32 16 13	13-0021	LF	6" x 24" Cast In Place Concrete Gutter With 6" Curb And Face - Radius (Type A3-6).....	50.08	19.05
			<i>For Up To 20, Add</i>	33.86	
			<i>For >20 To 50, Add</i>	18.83	
			<i>For >50 To 100, Add</i>	7.51	
			<i>For >500 To 1,000, Deduct</i>	-6.31	
			<i>For >1,000, Deduct</i>	-10.72	
			<i>For Mountable Or Rolled Curb And Gutter, Add</i>	3.15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 16 13 13-0022 LF 6" x 30" Cast In Place Concrete Gutter With 6" Curb And Face - Straight.....	53.30	20.10
For Up To 20, Add	36.00	
For >20 To 50, Add	20.01	
For >50 To 100, Add	8.00	
For >500 To 1,000, Deduct	-6.69	
For >1,000, Deduct	-11.36	
For Mountable Or Rolled Curb And Gutter, Add	3.30	
32 16 13 13-0023 LF 6" x 30" Cast In Place Concrete Gutter With 6" Curb And Face - Radius	58.41	22.22
For Up To 20, Add	39.49	
For >20 To 50, Add	21.97	
For >50 To 100, Add	8.76	
For >500 To 1,000, Deduct	-7.36	
For >1,000, Deduct	-12.51	
For Mountable Or Rolled Curb And Gutter, Add	3.67	
32 16 13 13-0024 LF 6" x 36" Cast In Place Concrete Gutter With 6" Curb And Face - Straight.....	61.46	23.27
For Up To 20, Add	41.53	
For >20 To 50, Add	23.09	
For >50 To 100, Add	9.22	
For >500 To 1,000, Deduct	-7.73	
For >1,000, Deduct	-13.13	
For Mountable Or Rolled Curb And Gutter, Add	3.83	
32 16 13 13-0025 LF 6" x 36" Cast In Place Concrete Gutter With 6" Curb And Face - Radius	66.73	25.39
For Up To 20, Add	45.12	
For >20 To 50, Add	25.10	
For >50 To 100, Add	10.01	
For >500 To 1,000, Deduct	-8.41	
For >1,000, Deduct	-14.29	
For Mountable Or Rolled Curb And Gutter, Add	4.20	
32 16 13 13-0026 LF 6" x 42" Cast In Place Concrete Gutter With 6" Curb And Face - Straight.....	69.64	26.44
For Up To 20, Add	47.07	
For >20 To 50, Add	26.18	
For >50 To 100, Add	10.45	
For >500 To 1,000, Deduct	-8.77	
For >1,000, Deduct	-14.90	
For Mountable Or Rolled Curb And Gutter, Add	4.37	
32 16 13 13-0027 LF 6" x 42" Cast In Place Concrete Gutter With 6" Curb And Face - Radius	77.16	29.62
For Up To 20, Add	52.22	
For >20 To 50, Add	29.07	
For >50 To 100, Add	11.57	
For >500 To 1,000, Deduct	-9.78	
For >1,000, Deduct	-16.60	
For Mountable Or Rolled Curb And Gutter, Add	4.94	

32 16 13 14 Machine Formed, Slip Form Curbs (32 16 13)

Note: Includes delivered concrete, steel, expansion joints and finish.

32 16 13 14-0001	Curbs, Machine Formed, Slip Form <small>(32 16 13 14)</small>		
	Note: Includes delivered concrete, steel, expansion joints and finish.		
32 16 13 14-0002	EA Machine Formed Concrete Curb Minimum Set-Up Charge (One Time Per Job).....	1,578.56	
	Note: For projects where the total curbing charge is less than the minimum set-up charge, use this task exclusively. This task shall not be used in conjunction with any other tasks in this section.		
32 16 13 14-0003	LF 6" x 12" Straight Concrete Curb, Machine Formed.....	13.72	
32 16 13 14-0004	LF 6" x 12" Curved Concrete Curb, Machine Formed.....	18.59	
32 16 13 14-0005	LF 6" x 18" Straight Concrete Curb, Machine Formed.....	18.14	
32 16 13 14-0006	LF 6" x 18" Curved Concrete Curb, Machine Formed.....	23.84	

32 16 13 16 Steel Faced Curbs (32 16 13)

Note: Fabrication includes handicap and other curb access cuts.

32 16 13 16-0001	Sidewalk/Curb Facing <small>(32 16 13 16)</small>		
	Note: Fabrication includes handicap and other curb access cuts.		
32 16 13 16-0002	LF 3" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	17.31	5.80
	For Curved Section, Add	3.89	
32 16 13 16-0003	LF 4" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	19.09	6.59
	For Curved Section, Add	4.38	
32 16 13 16-0004	LF 6" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	25.53	7.38
	For Curved Section, Add	5.34	
32 16 13 16-0005	LF 8" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	31.20	8.30
	For Curved Section, Add	6.21	
32 16 13 16-0006	LF 10" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	38.02	9.09
	For Curved Section, Add	7.20	
32 16 13 16-0007	LF 12" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	49.68	11.59
	For Curved Section, Add	9.30	
32 16 13 16-0008	LF 13" Steel Sidewalk/Curb Facing, With Steel Anchor, 12" On Center	57.51	15.02
	For Curved Section, Add	11.36	
32 16 13 16-0009	EA Sidewalk/Curb Steel Facing, Pedestrian Ramps, Two Drops Per Section.....	177.51	

32 16 13 19 Cast-In-Place Concrete Drainage Ditches (32 16 13)

Note: Includes concrete, forms, rebar (where required), rebar chairs (where necessary), expansion joints, finish and curing.

32 16 13 19-0001	Valley Gutter, Cast In Place <small>(32 16 13 19)</small>		
	Note: Includes concrete, forms, rebar, expansion joints, finish and curing.		

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 16 Curbs, Gutters, Sidewalks, and Driveways**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 16 13 19-0002	LF	2' Wide Cast In Place Concrete Valley Gutter, 6" Thick	24.02
		<i>For Up To 20, Add</i>	11.04
		<i>For >20 To 50, Add</i>	6.15
		<i>For >50 To 100, Add</i>	2.45
		<i>For >500 To 1,000, Deduct</i>	-2.45
		<i>For >1,000, Deduct</i>	-4.27
32 16 13 19-0003	LF	2-1/2' Wide Cast In Place Concrete Valley Gutter, 6" Thick	29.45
		<i>For Up To 20, Add</i>	13.40
		<i>For >20 To 50, Add</i>	7.45
		<i>For >50 To 100, Add</i>	2.97
		<i>For >500 To 1,000, Deduct</i>	-2.97
		<i>For >1,000, Deduct</i>	-5.20
32 16 13 19-0004	LF	3' Wide Cast In Place Concrete Valley Gutter, 6" Thick	34.82
		<i>For Up To 20, Add</i>	15.72
		<i>For >20 To 50, Add</i>	8.74
		<i>For >50 To 100, Add</i>	3.49
		<i>For >500 To 1,000, Deduct</i>	-3.49
		<i>For >1,000, Deduct</i>	-6.11
32 16 13 19-0005	LF	3-1/2' Wide Cast In Place Concrete Valley Gutter, 6" Thick	40.17
		<i>For Up To 20, Add</i>	18.02
		<i>For >20 To 50, Add</i>	10.01
		<i>For >50 To 100, Add</i>	4.01
		<i>For >500 To 1,000, Deduct</i>	-4.01
		<i>For >1,000, Deduct</i>	-7.01
32 16 13 19-0006	LF	4' Wide Cast In Place Concrete Valley Gutter, 6" Thick	45.53
		<i>For Up To 20, Add</i>	20.33
		<i>For >20 To 50, Add</i>	11.29
		<i>For >50 To 100, Add</i>	4.52
		<i>For >500 To 1,000, Deduct</i>	-4.52
		<i>For >1,000, Deduct</i>	-7.92
32 16 13 19-0007	LF	5' Wide Cast In Place Concrete Valley Gutter, 6" Thick	54.10
		<i>For Up To 20, Add</i>	23.44
		<i>For >20 To 50, Add</i>	12.98
		<i>For >50 To 100, Add</i>	5.23
		<i>For >500 To 1,000, Deduct</i>	-5.23
		<i>For >1,000, Deduct</i>	-9.20
32 16 13 19-0008	LF	6' Wide Cast In Place Concrete Valley Gutter, 6" Thick	62.36
		<i>For Up To 20, Add</i>	26.34
		<i>For >20 To 50, Add</i>	14.56
		<i>For >50 To 100, Add</i>	5.89
		<i>For >500 To 1,000, Deduct</i>	-5.89
		<i>For >1,000, Deduct</i>	-10.40
32 16 13 19-0009	SF	>6' Wide Cast In Place Concrete Valley Gutter, 6" Thick	10.39
		<i>For Up To 100, Add</i>	4.39
		<i>For >100 To 250, Add</i>	2.43
		<i>For >250 To 500, Add</i>	0.98
		<i>For >2,500 To 5,000, Deduct</i>	-0.98
		<i>For >5,000, Deduct</i>	-1.73
32 16 13 19-0010	LF	2' Wide Cast In Place Concrete Valley Gutter, 7" Thick	26.42
		<i>For Up To 20, Add</i>	11.85
		<i>For >20 To 50, Add</i>	6.58
		<i>For >50 To 100, Add</i>	2.64
		<i>For >500 To 1,000, Deduct</i>	-2.64
		<i>For >1,000, Deduct</i>	-4.61
32 16 13 19-0011	LF	2-1/2' Wide Cast In Place Concrete Valley Gutter, 7" Thick	32.63
		<i>For Up To 20, Add</i>	14.54
		<i>For >20 To 50, Add</i>	8.07
		<i>For >50 To 100, Add</i>	3.23
		<i>For >500 To 1,000, Deduct</i>	-3.23
		<i>For >1,000, Deduct</i>	-5.67
32 16 13 19-0012	LF	3' Wide Cast In Place Concrete Valley Gutter, 7" Thick	38.39
		<i>For Up To 20, Add</i>	16.91
		<i>For >20 To 50, Add</i>	9.38
		<i>For >50 To 100, Add</i>	3.77
		<i>For >500 To 1,000, Deduct</i>	-3.77
		<i>For >1,000, Deduct</i>	-6.61
32 16 13 19-0013	LF	3-1/2' Wide Cast In Place Concrete Valley Gutter, 7" Thick	44.32
		<i>For Up To 20, Add</i>	19.40
		<i>For >20 To 50, Add</i>	10.76
		<i>For >50 To 100, Add</i>	4.32
		<i>For >500 To 1,000, Deduct</i>	-4.32
		<i>For >1,000, Deduct</i>	-7.59
32 16 13 19-0014	LF	4' Wide Cast In Place Concrete Valley Gutter, 7" Thick	50.25
		<i>For Up To 20, Add</i>	21.90
		<i>For >20 To 50, Add</i>	12.13
		<i>For >50 To 100, Add</i>	4.88
		<i>For >500 To 1,000, Deduct</i>	-4.88
		<i>For >1,000, Deduct</i>	-8.58
32 16 13 19-0015	LF	5' Wide Cast In Place Concrete Valley Gutter, 7" Thick	59.84
		<i>For Up To 20, Add</i>	25.29
		<i>For >20 To 50, Add</i>	13.98
		<i>For >50 To 100, Add</i>	5.66
		<i>For >500 To 1,000, Deduct</i>	-5.66
		<i>For >1,000, Deduct</i>	-9.98



Exterior Improvements	32
Bases, Ballasts, and Paving	32 10
Curbs, Gutters, Sidewalks, and Driveways	32 16

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 16 13 19-0016 LF 6' Wide Cast In Place Concrete Valley Gutter, 7" Thick.....	69.12	
For Up To 20, Add	28.46	
For >20 To 50, Add	15.69	
For >50 To 100, Add	6.38	
For >500 To 1,000, Deduct	-6.38	
For >1,000, Deduct	-11.30	
32 16 13 19-0017 SF >6' Wide Cast In Place Concrete Valley Gutter, 7" Thick.....	11.52	
For Up To 100, Add	4.74	
For >100 To 250, Add	2.62	
For >250 To 500, Add	1.06	
For >2,500 To 5,000, Deduct	-1.06	
For >5,000, Deduct	-1.88	
32 16 13 19-0018 LF 2' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	26.58	
For Up To 20, Add	12.23	
For >20 To 50, Add	6.81	
For >50 To 100, Add	2.71	
For >500 To 1,000, Deduct	-2.71	
For >1,000, Deduct	-4.73	
32 16 13 19-0019 LF 2-1/2' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	32.62	
For Up To 20, Add	14.86	
For >20 To 50, Add	8.27	
For >50 To 100, Add	3.30	
For >500 To 1,000, Deduct	-3.30	
For >1,000, Deduct	-5.76	
32 16 13 19-0020 LF 3' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	38.56	
For Up To 20, Add	17.43	
For >20 To 50, Add	9.69	
For >50 To 100, Add	3.87	
For >500 To 1,000, Deduct	-3.87	
For >1,000, Deduct	-6.77	
32 16 13 19-0021 LF 3-1/2' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	44.51	
For Up To 20, Add	20.00	
For >20 To 50, Add	11.11	
For >50 To 100, Add	4.44	
For >500 To 1,000, Deduct	-4.44	
For >1,000, Deduct	-7.78	
32 16 13 19-0022 LF 4' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	50.45	
For Up To 20, Add	22.56	
For >20 To 50, Add	12.53	
For >50 To 100, Add	5.02	
For >500 To 1,000, Deduct	-5.02	
For >1,000, Deduct	-8.79	
32 16 13 19-0023 LF 5' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	59.95	
32 16 13 19-0024 LF 6' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	69.07	
32 16 13 19-0025 SF >6' Wide Cast In Place Concrete Valley Gutter, 8" Thick.....	11.52	
For Up To 100, Add	4.87	
For >100 To 250, Add	2.69	
For >250 To 500, Add	1.09	
For >2,500 To 5,000, Deduct	-1.09	
For >5,000, Deduct	-1.92	

32 16 13 23 Precast Concrete Curbs and Gutters (32 16 13)

32 16 13 23-0001 Precast Concrete Curb (32 16 13 23)		
32 16 13 23-0002 LF 6" x 18" Precast Concrete Curb.....	46.75	11.10
32 16 13 23-0003 LF 6" x 18" Precast Concrete Curb, Radius.....	55.77	12.76
32 16 13 23-0004 LF 6" x 20" Precast Concrete Curb.....	49.56	11.10
32 16 13 23-0005 LF 6" x 20" Precast Concrete Curb, Radius.....	59.48	12.76
32 16 13 23-0006 LF 7" x 18" Precast Concrete Curb.....	50.84	11.10
32 16 13 23-0007 LF 7" x 18" Precast Concrete Curb, Radius.....	60.96	12.76
32 16 13 23-0008 LF 7" x 20" Precast Concrete Curb.....	54.02	11.10
32 16 13 23-0009 LF 7" x 20" Precast Concrete Curb, Radius.....	65.00	12.76

32 16 13 33 Asphalt Curbs (32 16 13)

32 16 13 33-0001 Asphalt Curbs (32 16 13 33)		
32 16 13 33-0002 LF 6" Wide x 6" High Asphalt Curb 64 LF/TON, Bituminous, Plain.....	14.18	5.92
32 16 13 33-0003 LF 8" Wide x 6" High Asphalt Curb 50 LF/TON, Bituminous, Plain.....	15.94	6.59
32 16 13 33-0004 LF 8" Wide x 8" High Asphalt Curb 44 LF/TON, Bituminous, Plain.....	17.56	7.24

32 16 13 43 Stone Curbs (32 16 13)

32 16 13 43-0001 Remove And Reset Stone And Precast Curbing (32 16 13 43)		
Note: Includes storage and cleaning.		
32 16 13 43-0002 LF Removal And Resetting Of Stone Or Precast Curbing.....	36.12	
Note: Includes storage and cleaning.		

32 16 23 Sidewalks (32 16)

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 16 Curbs, Gutters, Sidewalks, and Driveways**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 16 23 00-0001 Cast In Place Concrete Sidewalk Assemblies <small>(32 16 23)</small>		
Note: Includes finish grading, delivered concrete (up to 3500 PSI) by chute, formwork, 1/4" radius joints and edges, polyethylene sheeting, control joints, expansion joints, sealer, screed, broom finish, and curing. Excludes excavation, base, base compaction and welded wire reinforcement. For bar or fiber reinforcing, add bar or fiber reinforcing tasks. See CSI section 02 41 13 13-0000 for sidewalk removal, 03 05 13 00-0001 for color additive, 03 21 00 00-0000 for reinforcing steel, 03 31 13 00-0079 for buggies, 03 31 13 00-0086 for small quantity purchases, 03 37 16 00-0001 for pumping with boom truck, 31 23 16 36-0000 for excavation, 32 11 23 16-0001 for base course.		
32 16 23 00-0002 SF 4" Cast In Place Concrete Sidewalk	9.23	
For Up To 100, Add	3.94	
For >100 To 500, Add	1.11	
For >1,000 To 5,000, Deduct	-0.65	
For >5,000, Deduct	-1.44	
For 3,500 PSI Concrete, Add	0.13	
For 4,000 PSI Concrete, Add	0.22	
For 4,500 PSI Concrete, Add	0.25	
For Welded Wire Reinforcement, Add	0.91	
32 16 23 00-0003 SF 5" Cast In Place Concrete Sidewalk	10.08	
For Up To 100, Add	4.21	
For >100 To 500, Add	1.18	
For >1,000 To 5,000, Deduct	-0.68	
For >5,000, Deduct	-1.52	
For 3,500 PSI Concrete, Add	0.15	
For 4,000 PSI Concrete, Add	0.27	
For 4,500 PSI Concrete, Add	0.31	
For Welded Wire Reinforcement, Add	0.91	
32 16 23 00-0004 SF 6" Cast In Place Concrete Sidewalk	10.94	
For Up To 100, Add	4.48	
For >100 To 500, Add	1.25	
For >1,000 To 5,000, Deduct	-0.70	
For >5,000, Deduct	-1.60	
For 3,500 PSI Concrete, Add	0.18	
For 4,000 PSI Concrete, Add	0.32	
For 4,500 PSI Concrete, Add	0.37	
For Welded Wire Reinforcement, Add	0.91	
32 16 23 00-0005 SF 7" Cast In Place Concrete Sidewalk	12.71	
For Up To 100, Add	5.16	
For >100 To 500, Add	1.43	
For >1,000 To 5,000, Deduct	-0.79	
For >5,000, Deduct	-1.82	
For 3,500 PSI Concrete, Add	0.22	
For 4,000 PSI Concrete, Add	0.38	
For 4,500 PSI Concrete, Add	0.45	
For Welded Wire Reinforcement, Add	0.91	
32 16 23 00-0006 SF 8" Cast In Place Concrete Sidewalk	13.48	
For Up To 100, Add	5.39	
For >100 To 500, Add	1.48	
For >1,000 To 5,000, Deduct	-0.81	
For >5,000, Deduct	-1.88	
For 3,500 PSI Concrete, Add	0.25	
For 4,000 PSI Concrete, Add	0.43	
For 4,500 PSI Concrete, Add	0.50	
For Welded Wire Reinforcement, Add	0.91	
32 16 23 00-0007 SF For Exposed Aggregate Finish In Sidewalk	2.49	
32 16 23 00-0008 EA Finish Concrete Handicap Drop Section In Sidewalk	149.63	
Note: Excludes patterned (tactile) finish.		
32 16 23 00-0009 LF For Hand Trowel Finish At Sidewalk Edges (Picture Frame)	2.49	
32 16 23 00-0010 Bituminous Sidewalk Assemblies <small>(32 16 23)</small>		
Note: Includes finish grading, delivered asphalt, formwork, control joints, expansion joints, and compaction. Excludes excavation, base, and base compaction. See CSI section 32 11 23 16-0001 for base course.		
32 16 23 00-0011 SY 1" Bituminous Sidewalk	9.96	
For Up To 100, Add	3.80	
For >100 To 500, Add	1.02	
For >1,000 To 5,000, Deduct	-0.53	
For >5,000, Deduct	-1.02	
32 16 23 00-0012 SY 1-1/2" Bituminous Sidewalk	12.48	
For Up To 100, Add	4.70	
For >100 To 500, Add	1.25	
For >1,000 To 5,000, Deduct	-0.63	
For >5,000, Deduct	-1.25	
32 16 23 00-0013 SY 2" Bituminous Sidewalk	17.20	
For Up To 100, Add	6.25	
For >100 To 500, Add	1.64	
For >1,000 To 5,000, Deduct	-0.78	
For >5,000, Deduct	-1.64	
32 16 23 00-0014 SY 2-1/2" Bituminous Sidewalk	21.49	
For Up To 100, Add	7.79	
For >100 To 500, Add	2.04	
For >1,000 To 5,000, Deduct	-0.97	
For >5,000, Deduct	-2.04	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 16 23 00-0015 SY 3" Bituminous Sidewalk	24.67	
For Up To 100, Add	8.79	
For >100 To 500, Add	2.28	
For >1,000 To 5,000, Deduct	-1.05	
For >5,000, Deduct	-2.28	
32 16 23 00-0016 SY 3-1/2" Bituminous Sidewalk	28.45	
For Up To 100, Add	10.00	
For >100 To 500, Add	2.58	
For >1,000 To 5,000, Deduct	-1.15	
For >5,000, Deduct	-2.58	
32 16 43 Asphalt Dike (32 16)		
32 16 43 00-0001 Asphalt Dike (32 16 43)		
32 16 43 00-0002 LF Type A, Asphalt Dike, 11" Base, 5" Top, 6" Height.....	7.37	
32 16 43 00-0003 LF Type B, Asphalt Dike, 13" Base, 5" Top, 8" Height.....	10.06	
32 16 43 00-0004 LF Type C-6, Asphalt Dike, 18" Base, 6" Top, 6" Height.....	10.06	
32 16 43 00-0005 LF Type C-8, Asphalt Dike, 22" Base, 6" Top, 8" Height.....	14.35	
32 16 43 00-0006 LF Type C-9, Asphalt Dike, 24" Base, 6" Top, 9" Height.....	16.98	
32 16 43 00-0007 LF Type D, Asphalt Dike, 8" Base, 4" Top, 2" Height.....	3.98	
32 16 43 00-0008 LF Type E, Mountable Asphalt Dike, 16" Base, 12" Top, 2" Height Front, 6" Height Back	10.42	
32 16 43 00-0009 LF Type F, Mountable Asphalt Dike, 26" Base, 20" Top, 2" Height Front, 8" Height Back.....	16.11	
32 16 43 00-0010 LF CALTRANS Type A, Asphalt Dike, 11" Base, 5" Top, 6" Height.....	7.37	
32 16 43 00-0011 LF CALTRANS Type C, Asphalt Dike, 8" Base, 4" Top, 2" Height.....	3.98	
32 16 43 00-0012 LF CALTRANS Type D, Mountable Asphalt Dike, 26" Base, 20" Top, 2" Height Front, 8" Height Back	16.11	
32 16 43 00-0013 LF CALTRANS Type E, Mountable Asphalt Dike, 16" Base, 12" Top, 2" Height Front, 6" Height Back	10.42	
32 16 43 00-0014 LF CALTRANS Type F, Asphalt Dike, 8" Base, 4" Top, 4" Height.....	5.80	
32 17 Paving Specialties (32 10)		
32 17 13 Parking Bumpers (32 17)		
Note: Includes dowels set.		
32 17 13 16 Plastic Parking Bumpers (32 17 13)		
32 17 13 16-0001 EA 4" x 6" x 4' Recycled Plastic Wheel Stop	217.25	8.08
32 17 13 16-0002 EA 4" x 6" x 6' Recycled Plastic Wheel Stop	246.32	8.08
32 17 13 19 Precast Concrete Parking Bumpers (32 17 13)		
32 17 13 19-0001 EA 6" x 8" x 4' Precast Concrete Wheel Stop With Dowels	74.23	24.34
32 17 13 19-0002 EA 6" x 6" x 6' Precast Concrete Wheel Stop With Dowels	84.98	24.34
32 17 13 19-0003 EA 6" x 8" x 6' Precast Concrete Wheel Stop With Dowels	88.14	24.34
32 17 13 19-0004 EA 6" x 10" x 6' Precast Concrete Wheel Stop With Dowels	92.22	24.34
32 17 13 19-0005 EA 4-7/8" x 7-5/8" x 6' Precast Concrete Wheel Stop With Dowels.....	86.17	24.34
32 17 13 19-0006 EA 8" x 13" x 6' Precast Concrete Wheel Stop With Dowels	108.61	24.34
32 17 13 19-0007 EA Removal And Relocation Of Precast Concrete Wheel Stop	38.94	
32 17 13 19-0008 EA Removal And Relocation Of Plastic Or Wood Wheel Stop	25.32	
32 17 13 23 Rubber Parking Bumpers (32 17 13)		
32 17 13 23-0001 EA 3' Recycled Rubber Wheel Stop.....	30.24	8.08
32 17 13 23-0002 EA 4' Recycled Rubber Wheel Stop	34.60	8.08
32 17 13 23-0003 EA 5' Recycled Rubber Wheel Stop	36.35	8.08
32 17 13 23-0004 EA 6' Recycled Rubber Wheel Stop.....	38.97	8.08
32 17 13 26 Wood Parking Bumpers (32 17 13)		
32 17 13 26-0001 LF 4" x 4" Timber Barrier With Saddles For Cars, Pressure Treated.....	10.33	1.95
32 17 13 26-0002 LF 6" x 6" Timber Barriers With Saddle For Trucks, Pressure Treated.....	12.92	1.95
32 17 16 Manufactured Traffic-Calming Devices (32 17)		
32 17 16 00-0001 Modular Rubber Speed Tables (32 17 16)		
Note: 3" high flat topped speed humps, 18" x 42" modular rubber construction. Trafficlogix.		
32 17 16 00-0002 SF Up To 24' Road Width x 7' Run Modular Rubber Speed Table.....	65.61	
Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.		
32 17 16 00-0003 SF Up To 24' Road Width x 14' Run Modular Rubber Speed Table.....	57.32	
Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.		
32 17 16 00-0004 SF Up To 24' Road Width x 21' Run Modular Rubber Speed Table.....	53.85	
Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.		
32 17 16 00-0005 SF >24' To 30' Road Width x 7' Run Modular Rubber Speed Table.....	62.80	
Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.		
32 17 16 00-0006 SF >24' To 30' Road Width x 14' Run Modular Rubber Speed Table.....	55.28	
Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.		

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 17 Paving Specialties**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	32 17 16 00-0007	SF	>24' To 30' Road Width x 21' Run Modular Rubber Speed Table..... Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.	52.22	
	32 17 16 00-0008	SF	>30' To 40' Road Width x 7' Run Modular Rubber Speed Table..... Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.	60.02	
	32 17 16 00-0009	SF	>30' To 40' Road Width x 14' Run Modular Rubber Speed Table..... Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.	53.67	
	32 17 16 00-0010	SF	>30' To 40' Road Width x 21' Run Modular Rubber Speed Table..... Note: Includes drilling in pavement, lag bolts and 3" x 18" x 42" compression molded recycled synthetic and natural rubber composite modular panels.	50.87	
32 17 16 00-0011			Asphalt Speed Table ^(32 17 16) Note: Excludes pavement markings or reflectors.		
	32 17 16 00-0012	LF	Up to 36" Run, Asphalt Speed Table With 3" Center Crown..... Note: Tapered on edges to roadway.	40.64	
	32 17 16 00-0013	LF	>36" To 48" Run, Asphalt Speed Table With 3" Center Crown..... Note: Tapered on edges to roadway.	47.90	
	32 17 16 00-0014	LF	Up to 36" Run, Asphalt Speed Table With 4" Center Crown..... Note: Tapered on edges to roadway.	51.04	
	32 17 16 00-0015	LF	>36" To 48" Run, Asphalt Speed Table With 4" Center Crown..... Note: Tapered on edges to roadway.	60.19	
	32 17 16 00-0016	LF	Up to 36" Run, Asphalt Speed Table With 6" Center Crown..... Note: Tapered on edges to roadway.	62.66	
	32 17 16 00-0017	LF	>36" To 48" Run, Asphalt Speed Table With 6" Center Crown..... Note: Tapered on edges to roadway.	69.91	
32 17 16 00-0018			Speed Bumps ^(32 17 16) Note: Excludes pavement markings or reflectors.		
	32 17 16 00-0019	LF	2-1/4" High x 10-1/2" Wide, Asphalt Speed Bump.....	36.92	1.95
	32 17 16 00-0020	LF	12" x 2-1/4" Recycled Rubber Speed Bump.....	27.69	1.30
	32 17 16 00-0021	LF	12" x 2-5/8" Recycled Plastic Speed Bump.....	198.70	1.30
32 17 23			Pavement Markings ^(32 17)		
32 17 23 13			Painted Pavement Markings ^(32 17 23)		
32 17 23 13-0001			Pavement Striping, Letters, Symbols And Markers For Roads ^(32 17 23 13) Note: Includes primers, adhesive and glass beads where required. For broken line quantities use total lane length. Per Coat.		
32 17 23 13-0002			Epoxy Reflective Pavement Marking ^(32 17 23 13-0001) Note: 15 mil thickness.		
	32 17 23 13-0003	LF	Single 4" Wide Solid Line, Epoxy Reflective Pavement Striping..... <i>For 20 Mil Thickness, Add</i> <i>For Up To 5,000 LF, Add</i> <i>For >25,000 LF, Deduct</i> <i>For Broken Line, Deduct</i>	0.81 0.20 0.16 -0.12 -0.44	
	32 17 23 13-0004	LF	Single 6" Wide Solid Line, Epoxy Reflective Pavement Striping..... <i>For 20 Mil Thickness, Add</i> <i>For Up To 5,000 LF, Add</i> <i>For >25,000 LF, Deduct</i> <i>For Broken Line, Deduct</i>	1.15 0.30 0.23 -0.17 -0.65	
	32 17 23 13-0005	LF	Single 8" Wide Solid Line, Epoxy Reflective Pavement Striping..... <i>For 20 Mil Thickness, Add</i> <i>For Up To 5,000 LF, Add</i> <i>For >25,000 LF, Deduct</i> <i>For Broken Line, Deduct</i>	1.40 0.36 0.28 -0.21 -0.78	
	32 17 23 13-0006	LF	Single 12" Wide Solid Line, Epoxy Reflective Pavement Striping..... <i>For 20 Mil Thickness, Add</i> <i>For Up To 5,000 LF, Add</i> <i>For >25,000 LF, Deduct</i> <i>For Broken Line, Deduct</i>	2.16 0.59 0.43 -0.32 -1.28	
	32 17 23 13-0007	LF	Double 4" Wide Solid Lines, Epoxy Reflective Pavement Striping..... <i>For 20 Mil Thickness, Add</i> <i>For Up To 5,000 LF, Add</i> <i>For >25,000 LF, Deduct</i> <i>For Broken Line On One Side, Deduct</i> <i>For Double Broken Line, Deduct</i>	1.37 0.39 0.27 -0.21 -0.43 -0.86	
	32 17 23 13-0008	LF	Double 6" Wide Solid Lines, Epoxy Reflective Pavement Striping..... <i>For 20 Mil Thickness, Add</i> <i>For Up To 5,000 LF, Add</i> <i>For >25,000 LF, Deduct</i> <i>For Broken Line On One Side, Deduct</i> <i>For Double Broken Line, Deduct</i>	1.98 0.58 0.40 -0.30 -0.64 -1.28	
	32 17 23 13-0009	EA	6" High, Letter/Number, Epoxy Reflective Pavement Marking..... <i>For 20 Mil Thickness, Add</i> <i>For <10, Add</i> <i>For >50 To 100, Deduct</i> <i>For >100 To 200, Deduct</i> <i>For >200, Deduct</i>	4.58 0.58 0.50 -0.25 -0.34 -0.67	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 23 13-0010 EA 12" High, Letter/Number, Epoxy Reflective Pavement Marking.....	9.50	
<i>For 20 Mil Thickness, Add</i>	1.73	
<i>For <10, Add</i>	0.76	
<i>For >50 To 100, Deduct</i>	-0.38	
<i>For >100 To 200, Deduct</i>	-0.51	
<i>For >200, Deduct</i>	-1.01	
32 17 23 13-0011 EA 24" High, Letter/Number, Epoxy Reflective Pavement Marking.....	16.18	
<i>For 20 Mil Thickness, Add</i>	3.01	
<i>For <10, Add</i>	1.26	
<i>For >50 To 100, Deduct</i>	-0.63	
<i>For >100 To 200, Deduct</i>	-0.84	
<i>For >200, Deduct</i>	-1.68	
32 17 23 13-0012 EA 36" High, Letter/Number, Epoxy Reflective Pavement Marking.....	30.47	
<i>For 20 Mil Thickness, Add</i>	5.39	
<i>For <10, Add</i>	2.52	
<i>For >50 To 100, Deduct</i>	-1.26	
<i>For >100 To 200, Deduct</i>	-1.68	
<i>For >200, Deduct</i>	-3.36	
32 17 23 13-0013 EA 48" High, Letter/Number, Epoxy Reflective Pavement Marking.....	36.61	
<i>For 20 Mil Thickness, Add</i>	6.86	
<i>For <10, Add</i>	2.83	
<i>For >50 To 100, Deduct</i>	-1.42	
<i>For >100 To 200, Deduct</i>	-1.89	
<i>For >200, Deduct</i>	-3.77	
32 17 23 13-0014 EA 72" High, Letter/Number, Epoxy Reflective Pavement Marking.....	65.98	
<i>For 20 Mil Thickness, Add</i>	12.48	
<i>For <10, Add</i>	5.04	
<i>For >50 To 100, Deduct</i>	-2.52	
<i>For >100 To 200, Deduct</i>	-3.36	
<i>For >200, Deduct</i>	-6.71	
32 17 23 13-0015 EA 96" High, Letter/Number, Epoxy Reflective Pavement Marking.....	87.72	
<i>For 20 Mil Thickness, Add</i>	16.47	
<i>For <10, Add</i>	6.76	
<i>For >50 To 100, Deduct</i>	-3.38	
<i>For >100 To 200, Deduct</i>	-4.51	
<i>For >200, Deduct</i>	-9.02	
32 17 23 13-0016 EA 120" High, Letter/Number, Epoxy Reflective Pavement Marking.....	151.04	
<i>For 20 Mil Thickness, Add</i>	34.52	
<i>For <10, Add</i>	8.38	
<i>For >50 To 100, Deduct</i>	-4.19	
<i>For >100 To 200, Deduct</i>	-5.59	
<i>For >200, Deduct</i>	-11.17	
32 17 23 13-0017 SF Letter/Number, Epoxy Reflective Pavement Marking.....	8.14	
<i>For 20 Mil Thickness, Add</i>	1.28	
32 17 23 13-0018 SF Symbols, Epoxy Reflective Pavement Marking.....	9.85	
Note: Handicap, railroad, diamond, arrows, etc.		
<i>For 20 Mil Thickness, Add</i>	1.36	
32 17 23 13-0019 Painted Reflective Pavement Marking <small>(32 17 23 13-0001)</small>		
Note: 15 mil thickness.		
32 17 23 13-0020 LF Single 4" Wide Solid Line, Painted Reflective Pavement Striping.....	0.32	
<i>For Up To 5,000 LF, Add</i>	0.06	
<i>For >25,000 LF, Deduct</i>	-0.05	
<i>For Broken Line, Deduct</i>	-0.07	
32 17 23 13-0021 LF Single 6" Wide Solid Line, Painted Reflective Pavement Striping.....	0.41	
<i>For Up To 5,000 LF, Add</i>	0.08	
<i>For >25,000 LF, Deduct</i>	-0.06	
<i>For Broken Line, Deduct</i>	-0.10	
32 17 23 13-0022 LF Single 8" Wide Solid Line, Painted Reflective Pavement Striping.....	0.52	
<i>For Up To 5,000 LF, Add</i>	0.10	
<i>For >25,000 LF, Deduct</i>	-0.08	
<i>For Broken Line, Deduct</i>	-0.12	
32 17 23 13-0023 LF Single 12" Wide Solid Line, Painted Reflective Pavement Striping.....	0.70	
<i>For Up To 5,000 LF, Add</i>	0.14	
<i>For >25,000 LF, Deduct</i>	-0.11	
<i>For Broken Line, Deduct</i>	-0.18	
32 17 23 13-0024 LF Double 4" Wide Solid Lines, Painted Reflective Pavement Striping.....	0.46	
<i>For Up To 5,000 LF, Add</i>	0.09	
<i>For >25,000 LF, Deduct</i>	-0.07	
<i>For Broken Line On One Side, Deduct</i>	-0.06	
<i>For Double Broken Line, Deduct</i>	-0.12	
32 17 23 13-0025 LF Double 6" Wide Solid Lines, Painted Reflective Pavement Striping.....	0.70	
<i>For Up To 5,000 LF, Add</i>	0.14	
<i>For >25,000 LF, Deduct</i>	-0.11	
<i>For Broken Line On One Side, Deduct</i>	-0.09	
<i>For Double Broken Line, Deduct</i>	-0.18	
32 17 23 13-0026 SF Solid Area, Painted Reflective Pavement Striping.....	5.14	
Note: Use this task for: lines >12" wide, stop bars, transverse lines, diagonal lines, crossing lanes, etc.		
32 17 23 13-0027 EA 6" High, Letter/Number, Painted Reflective Pavement Marking.....	3.99	
<i>For <10, Add</i>	0.50	
<i>For >50 To 100, Deduct</i>	-0.25	
<i>For >100 To 200, Deduct</i>	-0.34	
<i>For >200, Deduct</i>	-0.67	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 17 Paving Specialties**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 17 23 13-0028	EA		12" High, Letter/Number, Painted Reflective Pavement Marking.....	7.39	
			<i>For <10, Add</i>	0.76	
			<i>For >50 To 100, Deduct</i>	-0.38	
			<i>For >100 To 200, Deduct</i>	-0.51	
			<i>For >200, Deduct</i>	-1.01	
32 17 23 13-0029	EA		24" High, Letter/Number, Painted Reflective Pavement Marking.....	12.49	
			<i>For <10, Add</i>	1.26	
			<i>For >50 To 100, Deduct</i>	-0.63	
			<i>For >100 To 200, Deduct</i>	-0.84	
			<i>For >200, Deduct</i>	-1.68	
32 17 23 13-0030	EA		36" High, Letter/Number, Painted Reflective Pavement Marking.....	23.97	
			<i>For <10, Add</i>	2.52	
			<i>For >50 To 100, Deduct</i>	-1.26	
			<i>For >100 To 200, Deduct</i>	-1.68	
			<i>For >200, Deduct</i>	-3.36	
32 17 23 13-0031	EA		48" High, Letter/Number, Painted Reflective Pavement Marking.....	28.17	
			<i>For <10, Add</i>	2.83	
			<i>For >50 To 100, Deduct</i>	-1.42	
			<i>For >100 To 200, Deduct</i>	-1.89	
			<i>For >200, Deduct</i>	-3.77	
32 17 23 13-0032	EA		72" High, Letter/Number, Painted Reflective Pavement Marking.....	50.56	
			<i>For <10, Add</i>	5.04	
			<i>For >50 To 100, Deduct</i>	-2.52	
			<i>For >100 To 200, Deduct</i>	-3.36	
			<i>For >200, Deduct</i>	-6.71	
32 17 23 13-0033	EA		96" High, Letter/Number, Painted Reflective Pavement Marking.....	67.44	
			<i>For <10, Add</i>	6.76	
			<i>For >50 To 100, Deduct</i>	-3.38	
			<i>For >100 To 200, Deduct</i>	-4.51	
			<i>For >200, Deduct</i>	-9.02	
32 17 23 13-0034	EA		120" High, Letter/Number, Painted Reflective Pavement Marking.....	105.76	
			<i>For <10, Add</i>	8.38	
			<i>For >50 To 100, Deduct</i>	-4.19	
			<i>For >100 To 200, Deduct</i>	-5.59	
			<i>For >200, Deduct</i>	-11.17	
32 17 23 13-0035	SF		Letter/Number, Painted Reflective Pavement Marking	6.68	
			Note: Includes solvent based and latex paints.		
32 17 23 13-0036	SF		Symbols, Painted Reflective Pavement Marking	7.81	
			Note: Handicap, railroad, diamond, arrows, etc. Includes solvent based and latex paints.		

32 17 23 13-0037 Painted Reflective Pavement Marking (CALTRANS) (32 17 23 13-0001)

Note: Per LF of detail.

32 17 23 13-0038	LF		CALTRANS Detail 1 Centerline, Painted Reflective Pavement Striping	0.26	
			<i>For Up To 5,000 LF, Add</i>	0.05	
			<i>For >25,000 LF, Deduct</i>	-0.04	
32 17 23 13-0039	LF		CALTRANS Detail 2 Centerline, Painted Reflective Pavement Striping	0.43	
			<i>For Up To 5,000 LF, Add</i>	0.09	
			<i>For >25,000 LF, Deduct</i>	-0.06	
32 17 23 13-0040	LF		CALTRANS Detail 4 Centerline	1.07	
			<i>For Up To 5,000 LF, Add</i>	0.21	
			<i>For >25,000 LF, Deduct</i>	-0.16	
32 17 23 13-0041	LF		CALTRANS Detail 5 Centerline, Painted Reflective Pavement Striping	0.25	
			<i>For Up To 5,000 LF, Add</i>	0.05	
			<i>For >25,000 LF, Deduct</i>	-0.04	
32 17 23 13-0042	LF		CALTRANS Detail 6 Centerline, Painted Reflective Pavement Striping	0.44	
			<i>For Up To 5,000 LF, Add</i>	0.09	
			<i>For >25,000 LF, Deduct</i>	-0.07	
32 17 23 13-0043	LF		CALTRANS Detail 7 Centerline	0.77	
			<i>For Up To 5,000 LF, Add</i>	0.15	
			<i>For >25,000 LF, Deduct</i>	-0.12	
32 17 23 13-0044	LF		CALTRANS Detail 8 Lanelines, Painted Reflective Pavement Striping	0.26	
			<i>For Up To 5,000 LF, Add</i>	0.05	
			<i>For >25,000 LF, Deduct</i>	-0.04	
32 17 23 13-0045	LF		CALTRANS Detail 9 Lanelines, Painted Reflective Pavement Striping	0.43	
			<i>For Up To 5,000 LF, Add</i>	0.09	
			<i>For >25,000 LF, Deduct</i>	-0.06	
32 17 23 13-0046	LF		CALTRANS Detail 10 Lanelines	1.07	
			<i>For Up To 5,000 LF, Add</i>	0.21	
			<i>For >25,000 LF, Deduct</i>	-0.16	
32 17 23 13-0047	LF		CALTRANS Detail 11 Lanelines, Painted Reflective Pavement Striping	0.25	
			<i>For Up To 5,000 LF, Add</i>	0.05	
			<i>For >25,000 LF, Deduct</i>	-0.04	
32 17 23 13-0048	LF		CALTRANS Detail 12 Lanelines, Painted Reflective Pavement Striping	0.43	
			<i>For Up To 5,000 LF, Add</i>	0.09	
			<i>For >25,000 LF, Deduct</i>	-0.06	
32 17 23 13-0049	LF		CALTRANS Detail 13 Lanelines	0.77	
			<i>For Up To 5,000 LF, Add</i>	0.15	
			<i>For >25,000 LF, Deduct</i>	-0.12	
32 17 23 13-0050	LF		CALTRANS Detail 14 Lanelines	0.77	
			<i>For Up To 5,000 LF, Add</i>	0.15	
			<i>For >25,000 LF, Deduct</i>	-0.12	
32 17 23 13-0051	LF		CALTRANS Detail 14A Lanelines, Painted Reflective Pavement Striping	0.43	
			<i>For Up To 5,000 LF, Add</i>	0.09	
			<i>For >25,000 LF, Deduct</i>	-0.06	



		Exterior Improvements	32
		Bases, Ballasts, and Paving	32 10
		Paving Specialties	32 17

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 23 13-0052 LF CALTRANS Detail 15 No Passing Zones-One Direction Lanelines, Painted Reflective Pavement Striping	0.35	
For Up To 5,000 LF, Add	0.07	
For >25,000 LF, Deduct	-0.05	
For Broken Line On One Side, Deduct	-0.05	
For Double Broken Line, Deduct	-0.09	
32 17 23 13-0053 LF CALTRANS Detail 16 No Passing Zones-One Direction Lanelines, Painted Reflective Pavement Striping	1.07	
For Up To 5,000 LF, Add	0.21	
For >25,000 LF, Deduct	-0.16	
32 17 23 13-0054 LF CALTRANS Detail 17 No Passing Zones-One Direction Lanelines.....	3.10	
For Up To 5,000 LF, Add	0.62	
For >25,000 LF, Deduct	-0.47	
32 17 23 13-0055 LF CALTRANS Detail 18 No Passing Zones-One Direction Lanelines, Painted Reflective Pavement Striping	0.35	
For Up To 5,000 LF, Add	0.07	
For >25,000 LF, Deduct	-0.05	
For Broken Line On One Side, Deduct	-0.05	
For Double Broken Line, Deduct	-0.09	
32 17 23 13-0056 LF CALTRANS Detail 19 No Passing Zones-One Direction Lanelines, Painted Reflective Pavement Striping	0.89	
For Up To 5,000 LF, Add	0.18	
For >25,000 LF, Deduct	-0.13	
32 17 23 13-0057 LF CALTRANS Detail 20 No Passing Zones-One Direction Lanelines.....	2.63	
For Up To 5,000 LF, Add	0.53	
For >25,000 LF, Deduct	-0.39	
32 17 23 13-0058 LF CALTRANS Detail 21 No Passing Zones-Two Direction Lanelines, Painted Reflective Pavement Striping	0.42	
For Up To 5,000 LF, Add	0.08	
For >25,000 LF, Deduct	-0.06	
For Broken Line On One Side, Deduct	-0.07	
For Double Broken Line, Deduct	-0.14	
32 17 23 13-0059 LF CALTRANS Detail 22 No Passing Zones-Two Direction Lanelines, Painted Reflective Pavement Striping	1.14	
For Up To 5,000 LF, Add	0.23	
For >25,000 LF, Deduct	-0.17	
32 17 23 13-0060 LF CALTRANS Detail 23 No Passing Zones-Two Direction Lanelines.....	3.70	
For Up To 5,000 LF, Add	0.74	
For >25,000 LF, Deduct	-0.56	
32 17 23 13-0061 LF CALTRANS Detail 24 Left Edgelines, Painted Reflective Pavement Striping.....	0.33	
For Up To 5,000 LF, Add	0.07	
For >25,000 LF, Deduct	-0.05	
32 17 23 13-0062 LF CALTRANS Detail 25 Left Edgelines, Painted Reflective Pavement Striping.....	0.50	
For Up To 5,000 LF, Add	0.10	
For >25,000 LF, Deduct	-0.08	
32 17 23 13-0063 LF CALTRANS Detail 25A Left Edgelines, Painted Reflective Pavement Striping	0.69	
For Up To 5,000 LF, Add	0.14	
For >25,000 LF, Deduct	-0.10	
32 17 23 13-0064 LF CALTRANS Detail 26 Left Edgelines.....	0.18	
For Up To 5,000 LF, Add	0.04	
For >25,000 LF, Deduct	-0.03	
32 17 23 13-0065 LF CALTRANS Detail 27 Left Edgelines, Painted Reflective Pavement Striping.....	0.60	
For Up To 5,000 LF, Add	0.12	
For >25,000 LF, Deduct	-0.09	
32 17 23 13-0066 LF CALTRANS Detail 27B Right Edgelines, Painted Reflective Pavement Striping	0.33	
For Up To 5,000 LF, Add	0.07	
For >25,000 LF, Deduct	-0.05	
32 17 23 13-0067 LF CALTRANS Detail 27C Right Edgeline Extension Through Intersections, Painted Reflective Pavement Striping	0.25	
For Up To 5,000 LF, Add	0.05	
For >25,000 LF, Deduct	-0.04	
32 17 23 13-0068 LF CALTRANS Detail 28 Median Islands, Painted Reflective Pavement Striping	0.84	
For Up To 5,000 LF, Add	0.17	
For >25,000 LF, Deduct	-0.13	
For Broken Line On One Side, Deduct	-0.14	
For Double Broken Line, Deduct	-0.29	
32 17 23 13-0069 LF CALTRANS Detail 29 Median Islands, Painted Reflective Pavement Striping	1.56	
For Up To 5,000 LF, Add	0.31	
For >25,000 LF, Deduct	-0.23	
32 17 23 13-0070 LF CALTRANS Detail 30 Median Islands	7.40	
For Up To 5,000 LF, Add	1.48	
For >25,000 LF, Deduct	-1.11	
32 17 23 13-0071 LF CALTRANS Detail 31 Two-Way Left Turn Lanes, Painted Reflective Pavement Striping	0.70	
For Up To 5,000 LF, Add	0.14	
For >25,000 LF, Deduct	-0.11	
For Broken Line On One Side, Deduct	-0.09	
For Double Broken Line, Deduct	-0.18	
32 17 23 13-0072 LF CALTRANS Detail 32 Two-Way Left Turn Lanes, Painted Reflective Pavement Striping	1.59	
For Up To 5,000 LF, Add	0.32	
For >25,000 LF, Deduct	-0.24	
32 17 23 13-0073 LF CALTRANS Detail 33 Two-Way Left Turn Lanes	5.07	
For Up To 5,000 LF, Add	1.01	
For >25,000 LF, Deduct	-0.76	
32 17 23 13-0074 LF CALTRANS Detail 34 Intersection Treatments, Painted Reflective Pavement Striping.....	0.89	
For Up To 5,000 LF, Add	0.18	
For >25,000 LF, Deduct	-0.13	
32 17 23 13-0075 LF CALTRANS Detail 34A Intersection Treatments, Painted Reflective Pavement Striping.....	0.35	
For Up To 5,000 LF, Add	0.07	
For >25,000 LF, Deduct	-0.05	
32 17 23 13-0076 LF CALTRANS Detail 35 Intersection Treatments, Painted Reflective Pavement Striping.....	1.07	
For Up To 5,000 LF, Add	0.21	
For >25,000 LF, Deduct	-0.16	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 17 Paving Specialties**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 23 13-0077 LF CALTRANS Detail 35A Intersection Treatments, Painted Reflective Pavement Striping.....	0.35	
For Up To 5,000 LF, Add	0.07	
For >25,000 LF, Deduct	-0.05	
32 17 23 13-0078 LF CALTRANS Detail 36 Exit Ramp Neutral Area (Gore) Treatment, Painted Reflective Pavement Striping	1.76	
For Up To 5,000 LF, Add	0.35	
For >25,000 LF, Deduct	-0.26	
32 17 23 13-0079 LF CALTRANS Detail 36A Entrance Ramp Neutral Area (Merge) Treatment, Painted Reflective Pavement Striping.....	1.11	
For Up To 5,000 LF, Add	0.22	
For >25,000 LF, Deduct	-0.17	
32 17 23 13-0080 LF CALTRANS Detail 36B Entrance Ramp Neutral Area (Acceleration Lane) Treatment, Painted Reflective Pavement Striping	1.20	
For Up To 5,000 LF, Add	0.24	
For >25,000 LF, Deduct	-0.18	
32 17 23 13-0081 LF CALTRANS Detail 37 Lane Drop At Exit Ramps, Painted Reflective Pavement Striping	1.11	
For Up To 5,000 LF, Add	0.22	
For >25,000 LF, Deduct	-0.17	
32 17 23 13-0082 LF CALTRANS Detail 37A Lane Drop At Exit Ramps.....	2.49	
For Up To 5,000 LF, Add	0.50	
For >25,000 LF, Deduct	-0.37	
32 17 23 13-0083 LF CALTRANS Detail 37B Lane Drop At Intersections, Painted Reflective Pavement Striping.....	1.11	
For Up To 5,000 LF, Add	0.22	
For >25,000 LF, Deduct	-0.17	
32 17 23 13-0084 LF CALTRANS Detail 37C Lane Drop At Intersections.....	2.49	
For Up To 5,000 LF, Add	0.50	
For >25,000 LF, Deduct	-0.37	
32 17 23 13-0085 LF CALTRANS Detail 38 Channelizing Line, Painted Reflective Pavement Striping	1.02	
For Up To 5,000 LF, Add	0.20	
For >25,000 LF, Deduct	-0.15	
32 17 23 13-0086 LF CALTRANS Detail 38A Channelizing Line, Painted Reflective Pavement Striping.....	0.66	
For Up To 5,000 LF, Add	0.13	
For >25,000 LF, Deduct	-0.10	
32 17 23 13-0087 LF CALTRANS Detail 38B Channelizing Line, Painted Reflective Pavement Striping.....	1.38	
For Up To 5,000 LF, Add	0.28	
For >25,000 LF, Deduct	-0.21	
32 17 23 13-0088 LF CALTRANS Detail 38C Channelizing Line.....	3.70	
For Up To 5,000 LF, Add	0.74	
For >25,000 LF, Deduct	-0.56	
32 17 23 13-0089 LF CALTRANS Detail 39 Bike Lane Line, Painted Reflective Pavement Striping.....	0.40	
For Up To 5,000 LF, Add	0.08	
For >25,000 LF, Deduct	-0.06	
32 17 23 13-0090 LF CALTRANS Detail 39A Intersection Line Bike Lane, Painted Reflective Pavement Striping	0.32	
For Up To 5,000 LF, Add	0.06	
For >25,000 LF, Deduct	-0.05	
32 17 23 13-0091 LF CALTRANS Detail 40 Lane Line Extensions Through Intersections, Painted Reflective Pavement Striping.....	0.24	
For Up To 5,000 LF, Add	0.05	
For >25,000 LF, Deduct	-0.04	
32 17 23 13-0092 LF CALTRANS Detail 40A Lane Line Extensions Through Intersections	1.79	
For Up To 5,000 LF, Add	0.36	
For >25,000 LF, Deduct	-0.27	
32 17 23 13-0093 LF CALTRANS Detail 41 Center Line Extensions Through Intersections, Painted Reflective Pavement Striping	0.24	
For Up To 5,000 LF, Add	0.05	
For >25,000 LF, Deduct	-0.04	
32 17 23 13-0094 LF CALTRANS Detail 41A Center Line Extensions Through Intersections.....	1.79	
For Up To 5,000 LF, Add	0.36	
For >25,000 LF, Deduct	-0.27	
32 17 23 13-0095 EA CALTRANS 10' Arrow, Type I, Painted Reflective Pavement Marking	104.81	
For <10, Add	12.25	
For >50 To 100, Deduct	-6.13	
For >100 To 200, Deduct	-8.17	
For >200, Deduct	-16.33	
32 17 23 13-0096 EA CALTRANS 18' Arrow, Type I, Painted Reflective Pavement Marking	184.25	
For <10, Add	21.44	
For >50 To 100, Deduct	-10.72	
For >100 To 200, Deduct	-14.29	
For >200, Deduct	-28.59	
32 17 23 13-0097 EA CALTRANS 24' Arrow, Type I, Painted Reflective Pavement Marking	230.93	
For <10, Add	26.95	
For >50 To 100, Deduct	-13.48	
For >100 To 200, Deduct	-17.97	
For >200, Deduct	-35.94	
32 17 23 13-0098 EA CALTRANS 24' Arrow With Single (L or R) Turn Arrow, Type II, Painted Reflective Pavement Marking	335.74	
For <10, Add	39.20	
For >50 To 100, Deduct	-19.60	
For >100 To 200, Deduct	-26.14	
For >200, Deduct	-52.27	
32 17 23 13-0099 EA CALTRANS 24' Arrow With Both (L and R) Turn Arrows, Type II, Painted Reflective Pavement Marking	440.57	
For <10, Add	51.46	
For >50 To 100, Deduct	-25.73	
For >100 To 200, Deduct	-34.31	
For >200, Deduct	-68.61	
32 17 23 13-0100 EA CALTRANS 24' Arrow Single (L or R) Turn Arrow, Type III, Painted Reflective Pavement Marking.....	310.36	
For <10, Add	36.14	
For >50 To 100, Deduct	-18.07	
For >100 To 200, Deduct	-24.09	
For >200, Deduct	-48.19	



		Exterior Improvements	32
		Bases, Ballasts, and Paving	32 10
		Paving Specialties	32 17

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 23 13-0101 EA CALTRANS 24' Arrow Both (L and R) Turn Arrows, Type III, Painted Reflective Pavement Marking	541.29	
For <10, Add	63.09	
For >50 To 100, Deduct	-31.55	
For >100 To 200, Deduct	-42.06	
For >200, Deduct	-84.13	
32 17 23 13-0102 EA CALTRANS 8' Turn Arrow (L or R), Type IV, Painted Reflective Pavement Marking	110.55	
For <10, Add	12.86	
For >50 To 100, Deduct	-6.43	
For >100 To 200, Deduct	-8.58	
For >200, Deduct	-17.15	
32 17 23 13-0103 EA CALTRANS 24' Arrow, Type V, Painted Reflective Pavement Marking	242.41	
For <10, Add	28.18	
For >50 To 100, Deduct	-14.09	
For >100 To 200, Deduct	-18.79	
For >200, Deduct	-37.57	
32 17 23 13-0104 EA CALTRANS 18' Arrow, Type VI, Painted Reflective Pavement Marking	310.36	
For <10, Add	36.14	
For >50 To 100, Deduct	-18.07	
For >100 To 200, Deduct	-24.09	
For >200, Deduct	-48.19	
32 17 23 13-0105 EA CALTRANS 13' Arrow With Single (L or R) Turn Arrow, Type VII, Painted Reflective Pavement Marking	200.02	
For <10, Add	23.28	
For >50 To 100, Deduct	-11.64	
For >100 To 200, Deduct	-15.52	
For >200, Deduct	-31.04	
32 17 23 13-0106 EA CALTRANS 15' Arrow With Both (L and R) Turn Arrows, Type VIII, Painted Reflective Pavement Marking	263.69	
For <10, Add	30.63	
For >50 To 100, Deduct	-15.31	
For >100 To 200, Deduct	-20.42	
For >200, Deduct	-40.84	
32 17 23 13-0107 EA CALTRANS 5' Arrow, Bike Lane, Painted Reflective Pavement Marking	52.41	
For <10, Add	6.13	
For >50 To 100, Deduct	-3.06	
For >100 To 200, Deduct	-4.08	
For >200, Deduct	-8.17	
32 17 23 13-0108 EA CALTRANS Railroad Crossing Symbol, Painted Reflective Pavement Marking	503.67	
Note: Excludes variable width transverse lines.		
For <10, Add	58.20	
For >50 To 100, Deduct	-29.10	
For >100 To 200, Deduct	-38.80	
For >200, Deduct	-77.59	
32 17 23 13-0109 SF CALTRANS Solid Area, Painted Reflective Pavement Marking	6.64	
32 17 23 13-0110 EA CALTRANS Bike Lane Symbol Without Person, Painted Reflective Pavement Marking	58.73	
Note: Approximate overall dimensions: 4' width x 8' height.		
For <10, Add	4.41	
For >50 To 100, Deduct	-2.21	
For >100 To 200, Deduct	-2.94	
For >200, Deduct	-5.88	
32 17 23 13-0111 EA CALTRANS Bike Lane Symbol With Person, Painted Reflective Pavement Marking	62.42	
Note: Approximate overall dimensions: 4' width x 8' height.		
For <10, Add	4.66	
For >50 To 100, Deduct	-2.33	
For >100 To 200, Deduct	-3.10	
For >200, Deduct	-6.21	
32 17 23 13-0112 EA CALTRANS Diamond Symbol, Painted Reflective Pavement Marking	83.52	
For <10, Add	9.80	
For >50 To 100, Deduct	-4.90	
For >100 To 200, Deduct	-6.53	
For >200, Deduct	-13.07	
32 17 23 13-0113 EA CALTRANS International Symbol Of Accessibility (ISA) Marking, Painted Reflective Pavement Marking	170.34	
For <10, Add	19.85	
For >50 To 100, Deduct	-9.92	
For >100 To 200, Deduct	-13.23	
For >200, Deduct	-26.46	
32 17 23 13-0114 EA CALTRANS Bike Loop Detector Symbol, Painted Reflective Pavement Marking	34.26	
Note: Approximate overall dimensions: 4' width x 8' height.		
For <10, Add	4.66	
For >50 To 100, Deduct	-2.33	
For >100 To 200, Deduct	-3.10	
For >200, Deduct	-6.21	
32 17 23 13-0115 SF CALTRANS Letter/Number, Painted Reflective Pavement Marking	6.72	
32 17 23 13-0116 SF CALTRANS Symbols, Painted Reflective Pavement Marking	7.37	
Note: Handicap, railroad, diamond, arrows, etc.		
32 17 23 13-0117 Pavement Striping, Letters And Symbols For Parking Areas (32 17 23 13)		
Note: Includes primers. Per Coat.		
32 17 23 13-0118 Painted Pavement Marking For Parking Areas (32 17 23 13-0117)		
Note: 15 mil thickness.		
32 17 23 13-0119 LF Single 4" Wide Solid Line, Painted Pavement Striping For Parking Areas	1.18	
32 17 23 13-0120 LF Single 6" Wide Solid Line, Painted Pavement Striping For Parking Areas	1.29	
32 17 23 13-0121 LF Single 8" Wide Solid Line, Painted Pavement Striping For Parking Areas	1.37	
32 17 23 13-0122 LF Single 12" Wide Solid Line, Painted Pavement Striping For Parking Areas	1.55	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 17 Paving Specialties**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 17 23 13-0123	EA		6" High, Letter/Number, Painted Pavement Marking For Parking Areas.....	3.90	
			<i>For Up To 10, Add</i>	0.49	
			<i>For >50 To 100, Deduct</i>	-0.25	
			<i>For >100 To 200, Deduct</i>	-0.33	
			<i>For >200, Deduct</i>	-0.65	
32 17 23 13-0124	EA		12" High, Letter/Number, Painted Pavement Marking For Parking Areas.....	7.17	
			<i>For Up To 10, Add</i>	0.74	
			<i>For >50 To 100, Deduct</i>	-0.37	
			<i>For >100 To 200, Deduct</i>	-0.49	
			<i>For >200, Deduct</i>	-0.98	
32 17 23 13-0125	EA		24" High, Letter/Number, Painted Pavement Marking For Parking Areas.....	12.13	
			<i>For Up To 10, Add</i>	1.22	
			<i>For >50 To 100, Deduct</i>	-0.61	
			<i>For >100 To 200, Deduct</i>	-0.82	
			<i>For >200, Deduct</i>	-1.63	
32 17 23 13-0126	EA		36" High, Letter/Number, Painted Pavement Marking For Parking Areas.....	22.49	
			<i>For Up To 10, Add</i>	2.33	
			<i>For >50 To 100, Deduct</i>	-1.16	
			<i>For >100 To 200, Deduct</i>	-1.55	
			<i>For >200, Deduct</i>	-3.10	
32 17 23 13-0127	EA		42" High, Letter/Number, Painted Pavement Marking For Parking Areas.....	29.26	
			<i>For Up To 10, Add</i>	3.18	
			<i>For >50 To 100, Deduct</i>	-1.59	
			<i>For >100 To 200, Deduct</i>	-2.12	
			<i>For >200, Deduct</i>	-4.25	
32 17 23 13-0128	EA		48" High, Letter/Number/Arrow, Painted Pavement Marking For Parking Areas	35.22	
			<i>For Up To 10, Add</i>	3.92	
			<i>For >50 To 100, Deduct</i>	-1.96	
			<i>For >100 To 200, Deduct</i>	-2.61	
			<i>For >200, Deduct</i>	-5.23	
32 17 23 13-0129	EA		72" High, Letter/Number/Arrow, Painted Pavement Marking For Parking Areas	49.25	
			<i>For Up To 10, Add</i>	4.90	
			<i>For >50 To 100, Deduct</i>	-2.45	
			<i>For >100 To 200, Deduct</i>	-3.27	
			<i>For >200, Deduct</i>	-6.53	
32 17 23 13-0130	EA		Through Lane Arrow, Painted Pavement Marking For Parking Areas	100.07	
			Note: Approximate overall dimensions: 3-1/2' width x 10' height.		
32 17 23 13-0131	EA		Turn Lane Arrow, Painted Pavement Marking For Parking Areas	120.49	
			Note: Approximate overall dimensions: 6' width x 8' height.		
32 17 23 13-0132	EA		Dual Turn Lane Arrow, Painted Pavement Marking For Parking Areas	186.45	
			Note: Approximate overall dimensions: 11' width x 8' height.		
32 17 23 13-0133	EA		Turn And Through Lane Arrow, Painted Pavement Marking For Parking Areas.....	191.16	
			Note: Approximate overall dimensions: 7' width x 13' height.		
32 17 23 13-0134	EA		Dual Turn And Through Lane Arrow, Painted Pavement Marking For Parking Areas	261.92	
			Note: Approximate overall dimensions: 9' width x 15' height.		
32 17 23 13-0135	EA		Handicap Symbol For Standard Parking Stalls, Painted Pavement Marking For Parking Areas	36.10	
			Note: Approximate overall dimensions: 2-2/3' width x 3' height. White or blue symbol. Excludes striping.		
			<i>For Blue Background With White Symbol, Add</i>	34.41	
			<i>For Blue Background With White Symbol And Border, Add</i>	43.01	
32 17 23 13-0136	EA		Handicap Symbol For Van Parking Stalls, Painted Pavement Marking For Parking Areas.....	60.41	
			Note: Approximate overall dimensions: 4-1/3' width x 5' height. White or blue symbol. Excludes striping.		
			<i>For Blue Background With White Symbol, Add</i>	78.45	
			<i>For Blue Background With White Symbol And Border, Add</i>	98.07	

32 17 23 13-0137 Painted Curbs (32 17 23 13)
 Note: All colors.

32 17 23 13-0138	LF		Reflective Painted Curb	3.01	
32 17 23 13-0139	LF		Reflective Painted Curb And Gutter.....	5.80	
32 17 23 13-0140	LF		Painted Curb.....	2.45	
32 17 23 13-0141	LF		Painted Curb And Gutter.....	5.32	

32 17 23 13-0142 Markings For Outdoor Play Areas, Courts (32 17 23 13)

32 17 23 13-0143	LF		2" Wide Marking For Outdoor Play Areas	1.21	
32 17 23 13-0144	LF		3" Wide Marking For Outdoor Play Areas	1.36	
32 17 23 13-0145	LF		4" Wide Marking For Outdoor Play Areas	1.53	
32 17 23 13-0146	LF		6" Wide Marking For Outdoor Play Areas	1.80	
32 17 23 13-0147	EA		Layout And Paint Playground Game Lines And Background On Asphalt Or Concrete (Hop Scotch, 4 Square, Numbers Games, Etcetera).....	304.87	

32 17 23 23 Raised Pavement Markings (32 17 23)
32 17 23 23-0001 Raised Pavement Markers (RPMs) (32 17 23 23)
 Note: White, Red, Yellow/Amber, Green or Blue

32 17 23 23-0002	EA		One-Way Reflective, Raised Pavement Marker (RPM)	8.09	2.94
			Note: Type G, H or R		
			<i>For >100, Deduct</i>	-0.81	
32 17 23 23-0003	EA		Two-Way Reflective, Raised Pavement Marker (RPM)	8.59	2.94
			Note: Type B, C, D, AC, RA or RR		
			<i>For >100, Deduct</i>	-0.86	
32 17 23 23-0004	EA		4" Diameter, Round Reflective, Raised Pavement Marker (RPM).....	10.63	2.94
			<i>For >100, Deduct</i>	-1.06	



Exterior Improvements	32
Bases, Ballasts, and Paving	32 10
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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 23 23-0005 EA 4" Diameter, Non-Reflective, Raised Pavement Marker (RPM)..... Note: Type A or AY For >100, Deduct	7.45 -0.75	2.94
32 17 23 23-0006 Snowplowable Pavement Markers (32 17 23 23)		
32 17 23 23-0007 EA One-Way Reflective, Snowplowable Pavement Marker With Center Rail..... Note: Type G, H or R	81.64	34.93
32 17 23 23-0008 EA Two-Way Reflective, Snowplowable Pavement Marker With Center Rail..... Note: Type B, C, D, AC, RA or RR	82.08	34.93
32 17 23 23-0009 EA Removal And Replacement Of Reflector For One-Way Reflective, Recessed (Plowable) Pavement Marker.....	23.80	
32 17 23 23-0010 EA Removal And Replacement Of Reflectors For Two-Way Reflective, Recessed (Plowable) Pavement Marker.....	30.05	
32 17 23 33 Plastic Pavement Markings (32 17 23)		
32 17 23 33-0001 Thermoplastic Pavement Striping, Letters, Symbols And Markers For Roads (32 17 23 33) Note: Includes primers, adhesive and glass beads where required. For broken line modifier quantity use total lane length.		
32 17 23 33-0002 Thermoplastic Reflective Pavement Marking (32 17 23 33-0001) Note: 90 mil thickness.		
32 17 23 33-0003 LF Single 4" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping..... For Up To 5,000 LF, Add For >25,000 LF, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add For Broken Line, Deduct	1.46 0.29 -0.22 -0.20 0.26 -0.87	
32 17 23 33-0004 LF Single 6" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping..... Note: Includes yellow or white. For Up To 5,000 LF, Add For >25,000 LF, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add For Broken Line, Deduct	2.10 0.42 -0.32 -0.30 0.39 -1.30	
32 17 23 33-0005 LF Single 8" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping..... Note: Includes yellow or white. For Up To 5,000 LF, Add For >25,000 LF, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add For Broken Line, Deduct	2.79 0.56 -0.42 -0.40 0.52 -1.73	
32 17 23 33-0006 LF Single 12" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping..... Note: Includes yellow or white. For Up To 5,000 LF, Add For >25,000 LF, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add For Broken Line, Deduct	4.09 0.82 -0.61 -0.61 0.78 -2.60	
32 17 23 33-0007 LF Double 4" Wide Solid Lines, 90 Mil Thick, Thermoplastic Reflective Pavement Striping..... Note: Includes yellow or white. For Up To 5,000 LF, Add For >25,000 LF, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add For Broken Line On One Side, Deduct For Double Broken Line, Deduct	2.77 0.55 -0.42 -0.40 0.52 -0.87 -1.73	
32 17 23 33-0008 LF Double 6" Wide Solid Lines, 90 Mil Thick, Thermoplastic Reflective Pavement Striping..... Note: Includes yellow or white. For Up To 5,000 LF, Add For >25,000 LF, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add For Broken Line On One Side, Deduct For Double Broken Line, Deduct	4.09 0.82 -0.61 -0.61 0.78 -1.30 -2.60	
32 17 23 33-0009 SF Solid Area, 90 Mil Thick, Thermoplastic Reflective Pavement Marking..... Note: Includes yellow or white. For 60 mils Thick, Deduct For 125 mils Thick, Add	8.35 -0.60 0.78	
32 17 23 33-0010 EA 6" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking..... For Up To 10, Add For >50 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add	5.60 0.55 -0.28 -0.37 -0.74 -0.34 0.43	
32 17 23 33-0011 EA 12" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking..... For Up To 10, Add For >50 To 100, Deduct For >100 To 200, Deduct For >200, Deduct For 60 mils Thick, Deduct For 125 mils Thick, Add	12.51 0.83 -0.42 -0.56 -1.11 -1.22 1.57	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 17 Paving Specialties**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 17 23 33-0012	EA	24" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	21.40	
		<i>For Up To 10, Add</i>	1.38	
		<i>For >50 To 100, Deduct</i>	-0.69	
		<i>For >100 To 200, Deduct</i>	-0.92	
		<i>For >200, Deduct</i>	-1.85	
		<i>For 60 mils Thick, Deduct</i>	-2.13	
		<i>For 125 mils Thick, Add</i>	2.74	
32 17 23 33-0013	EA	36" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	39.94	
		<i>For Up To 10, Add</i>	2.78	
		<i>For >50 To 100, Deduct</i>	-1.39	
		<i>For >100 To 200, Deduct</i>	-1.85	
		<i>For >200, Deduct</i>	-3.71	
		<i>For 60 mils Thick, Deduct</i>	-3.75	
		<i>For 125 mils Thick, Add</i>	4.82	
32 17 23 33-0014	EA	48" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	48.56	
		<i>For Up To 10, Add</i>	3.11	
		<i>For >50 To 100, Deduct</i>	-1.56	
		<i>For >100 To 200, Deduct</i>	-2.07	
		<i>For >200, Deduct</i>	-4.15	
		<i>For 60 mils Thick, Deduct</i>	-4.87	
		<i>For 125 mils Thick, Add</i>	6.26	
32 17 23 33-0015	EA	72" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	87.75	
		<i>For Up To 10, Add</i>	5.54	
		<i>For >50 To 100, Deduct</i>	-2.77	
		<i>For >100 To 200, Deduct</i>	-3.69	
		<i>For >200, Deduct</i>	-7.38	
		<i>For 60 mils Thick, Deduct</i>	-8.90	
		<i>For 125 mils Thick, Add</i>	11.44	
32 17 23 33-0016	EA	96" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	116.46	
		<i>For Up To 10, Add</i>	7.44	
		<i>For >50 To 100, Deduct</i>	-3.72	
		<i>For >100 To 200, Deduct</i>	-4.96	
		<i>For >200, Deduct</i>	-9.92	
		<i>For 60 mils Thick, Deduct</i>	-11.70	
		<i>For 125 mils Thick, Add</i>	15.05	
32 17 23 33-0017	EA	120" High, Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	210.69	
		<i>For Up To 10, Add</i>	9.21	
		<i>For >50 To 100, Deduct</i>	-4.61	
		<i>For >100 To 200, Deduct</i>	-6.14	
		<i>For >200, Deduct</i>	-12.28	
		<i>For 60 mils Thick, Deduct</i>	-26.12	
		<i>For 125 mils Thick, Add</i>	33.59	
32 17 23 33-0018	SF	Letter/Number, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	10.37	
		<i>For 60 mils Thick, Deduct</i>	-0.84	
		<i>For 125 mils Thick, Add</i>	1.08	
32 17 23 33-0019	SY	Cross Hatch, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	28.18	
		Note: Per SY of area.		
		<i>For 60 mils Thick, Deduct</i>	-1.36	
		<i>For 125 mils Thick, Add</i>	1.75	
32 17 23 33-0020	EA	Handicap Symbol, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	266.67	
		<i>For 60 mils Thick, Deduct</i>	-19.38	
		<i>For 125 mils Thick, Add</i>	24.92	
32 17 23 33-0021	EA	Railroad Symbol, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	794.44	
		<i>For 60 mils Thick, Deduct</i>	-58.99	
		<i>For 125 mils Thick, Add</i>	75.84	
32 17 23 33-0022	EA	Bike Lane Symbol, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	185.37	
		Note: Approximate overall dimensions: 4' width x 8' height.		
		<i>For 60 mils Thick, Deduct</i>	-26.72	
		<i>For 125 mils Thick, Add</i>	34.36	
32 17 23 33-0023	EA	Diamond Symbol, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	127.54	
		<i>For 60 mils Thick, Deduct</i>	-9.27	
		<i>For 125 mils Thick, Add</i>	11.92	
32 17 23 33-0024	SF	Symbols, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	11.60	
		Note: Handicap, railroad, diamond, arrows, etc.		
		<i>For 60 mils Thick, Deduct</i>	-0.84	
		<i>For 125 mils Thick, Add</i>	1.08	
32 17 23 33-0025	EA	10' Arrow, Type I, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	162.31	
		<i>For 60 mils Thick, Deduct</i>	-11.80	
		<i>For 125 mils Thick, Add</i>	15.17	
32 17 23 33-0026	EA	18' Arrow, Type I, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	289.86	
		<i>For 60 mils Thick, Deduct</i>	-21.07	
		<i>For 125 mils Thick, Add</i>	27.09	
32 17 23 33-0027	EA	24' Arrow, Type I, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	359.43	
		<i>For 60 mils Thick, Deduct</i>	-26.12	
		<i>For 125 mils Thick, Add</i>	33.59	
32 17 23 33-0028	EA	24' Arrow With Single (L or R) Turn Arrow, Type II, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	521.74	
		<i>For 60 mils Thick, Deduct</i>	-37.92	
		<i>For 125 mils Thick, Add</i>	48.75	
32 17 23 33-0029	EA	24' Arrow With Both (L and R) Turn Arrows, Type II, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	684.07	
		<i>For 60 mils Thick, Deduct</i>	-49.72	
		<i>For 125 mils Thick, Add</i>	63.92	
32 17 23 33-0030	EA	24' Arrow Single (L or R) Turn Arrow, Type III, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	486.96	
		<i>For 60 mils Thick, Deduct</i>	-35.39	
		<i>For 125 mils Thick, Add</i>	45.50	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 23 33-0031 EA 24' Arrow Both (L and R) Turn Arrows, Type III, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	846.39	
<i>For 60 mils Thick, Deduct</i>	-61.51	
<i>For 125 mils Thick, Add</i>	79.09	
32 17 23 33-0032 EA 8' Turn Arrow (L or R), Type IV, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	173.92	
<i>For 60 mils Thick, Deduct</i>	-12.64	
<i>For 125 mils Thick, Add</i>	16.25	
32 17 23 33-0033 EA 24' Arrow, Type V, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	382.61	
<i>For 60 mils Thick, Deduct</i>	-27.81	
<i>For 125 mils Thick, Add</i>	35.75	
32 17 23 33-0034 EA 18' Arrow, Type VI, 90 Mil Thick, Thermoplastic Reflective Pavement Marking	486.96	
<i>For 60 mils Thick, Deduct</i>	-35.39	
<i>For 125 mils Thick, Add</i>	45.50	
32 17 23 33-0035 EA 13' Arrow With Single (L or R) Turn Arrow, Type VII, 90 Mil Thick, Thermoplastic Reflective Pavement Marking.....	313.05	
<i>For 60 mils Thick, Deduct</i>	-22.75	
<i>For 125 mils Thick, Add</i>	29.25	
32 17 23 33-0036 EA 15' Arrow With Both (L and R) Turn Arrows, Type VIII, 90 Mil Thick, Thermoplastic Reflective Pavement Marking.....	417.40	
<i>For 60 mils Thick, Deduct</i>	-30.34	
<i>For 125 mils Thick, Add</i>	39.00	
32 17 23 33-0037 EA 5' Arrow, Bike Lane, 90 Mil Thick, Thermoplastic Reflective Pavement Marking.....	81.17	
<i>For 60 mils Thick, Deduct</i>	-5.90	
<i>For 125 mils Thick, Add</i>	7.58	
32 17 23 33-0038 Thermoplastic Reflective Pavement Striping By Hand For Repairs (32 17 23 33-0001)		
32 17 23 33-0039 LF Single 4" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping By Hand For Repairs	2.89	
<i>For 60 mils Thick, Deduct</i>	-0.20	
<i>For 125 mils Thick, Add</i>	0.26	
32 17 23 33-0040 LF Single 6" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping By Hand For Repairs	3.70	
<i>For 60 mils Thick, Deduct</i>	-0.30	
<i>For 125 mils Thick, Add</i>	0.39	
32 17 23 33-0041 LF Single 8" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping By Hand For Repairs	4.60	
<i>For 60 mils Thick, Deduct</i>	-0.40	
<i>For 125 mils Thick, Add</i>	0.52	
32 17 23 33-0042 LF Single 12" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping By Hand For Repairs	6.65	
<i>For 60 mils Thick, Deduct</i>	-0.61	
<i>For 125 mils Thick, Add</i>	0.78	
32 17 23 33-0043 LF Single 24" Wide Solid Line, 90 Mil Thick, Thermoplastic Reflective Pavement Striping By Hand For Repairs	12.10	
<i>For 60 mils Thick, Deduct</i>	-1.21	
<i>For 125 mils Thick, Add</i>	1.56	
32 17 23 33-0044 Preformed, Patterned Reflective Pavement Marking Tape (32 17 23 33-0001)		
Note: Applied with pressure sensitive adhesive. Includes adhesive. 60 mil thickness. (3M Stamark 380 Series).		
32 17 23 33-0045 LF Single 4" Wide Solid Line, 60 Mil Thick, Preformed Patterned Thermoplastic Reflective Pavement Striping	3.15	
Note: Includes yellow or white.		
<i>For Up To 5,000 LF, Add</i>	0.63	
<i>For >25,000 LF, Deduct</i>	-0.47	
32 17 23 33-0046 LF Single 6" Wide Solid Line, 60 Mil Thick, Preformed Patterned Thermoplastic Reflective Pavement Striping	4.67	
Note: Includes yellow or white.		
<i>For Up To 5,000 LF, Add</i>	0.93	
<i>For >25,000 LF, Deduct</i>	-0.70	
32 17 23 33-0047 LF Single 8" Wide Solid Line, 60 Mil Thick, Preformed Patterned Thermoplastic Reflective Pavement Striping	6.21	
Note: Includes yellow or white.		
<i>For Up To 5,000 LF, Add</i>	1.24	
<i>For >25,000 LF, Deduct</i>	-0.93	
32 17 23 33-0048 LF Single 12" Wide Solid Line, 60 Mil Thick, Preformed Patterned Thermoplastic Reflective Pavement Striping	9.22	
Note: Includes yellow or white.		
<i>For Up To 5,000 LF, Add</i>	1.84	
<i>For >25,000 LF, Deduct</i>	-1.38	
32 17 23 33-0049 SF Solid Area, 60 Mil Thick, Preformed Patterned Thermoplastic Reflective Pavement Marking Tape	24.63	
Note: Includes yellow or white.		
32 17 23 33-0050 EA 6" High, Preformed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	36.72	
<i>For <10, Add</i>	1.01	
<i>For >50 To 100, Deduct</i>	-0.50	
<i>For >100 To 200, Deduct</i>	-0.67	
<i>For >200, Deduct</i>	-1.34	
32 17 23 33-0051 EA 12" High, Preformed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	65.63	
<i>For <10, Add</i>	1.28	
<i>For >50 To 100, Deduct</i>	-0.64	
<i>For >100 To 200, Deduct</i>	-0.85	
<i>For >200, Deduct</i>	-1.70	
32 17 23 33-0052 EA 24" High, Preformed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	112.20	
<i>For <10, Add</i>	2.52	
<i>For >50 To 100, Deduct</i>	-1.26	
<i>For >100 To 200, Deduct</i>	-1.68	
<i>For >200, Deduct</i>	-3.36	
32 17 23 33-0053 EA 36" High, Preformed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	159.73	
<i>For <10, Add</i>	5.05	
<i>For >50 To 100, Deduct</i>	-2.52	
<i>For >100 To 200, Deduct</i>	-3.37	
<i>For >200, Deduct</i>	-6.73	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 17 Paving Specialties**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 17 23 33-0054	EA		48" High, Prefomed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	187.63	
			<i>For <10, Add</i>	5.66	
			<i>For >50 To 100, Deduct</i>	-2.83	
			<i>For >100 To 200, Deduct</i>	-3.77	
			<i>For >200, Deduct</i>	-7.55	
32 17 23 33-0055	EA		72" High, Prefomed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	235.63	
			<i>For <10, Add</i>	10.07	
			<i>For >50 To 100, Deduct</i>	-5.04	
			<i>For >100 To 200, Deduct</i>	-6.71	
			<i>For >200, Deduct</i>	-13.43	
32 17 23 33-0056	EA		96" High, Prefomed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	299.33	
			<i>For <10, Add</i>	13.53	
			<i>For >50 To 100, Deduct</i>	-6.76	
			<i>For >100 To 200, Deduct</i>	-9.02	
			<i>For >200, Deduct</i>	-18.03	
32 17 23 33-0057	EA		120" High, Prefomed Letter/Number, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	375.50	
			<i>For <10, Add</i>	16.76	
			<i>For >50 To 100, Deduct</i>	-8.38	
			<i>For >100 To 200, Deduct</i>	-11.17	
			<i>For >200, Deduct</i>	-22.35	
32 17 23 33-0058	SF		Prefomed Arrow, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape	25.28	
32 17 23 33-0059	SF		Prefomed Symbol, 60 Mil Thick, Patterned Thermoplastic Reflective Pavement Marking Tape.....	26.51	
			Note: Handicap, railroad, diamond symbol, etc.		

32 17 23 33-0060 Prefomed, Thermoplastic Reflective Pavement Marking (32 17 23 33-0001)

Note: Heat applied. (Flint PreMark or HotTape Series).

32 17 23 33-0061	EA		Prefomed Bike Lane Symbol, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	402.27	
			Note: Approximate overall dimensions: 4' width x 8' height.		
32 17 23 33-0062	EA		Prefomed Railroad Crossing Symbol, 125 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	1,068.43	
			Note: Approximate overall dimensions: 8' width x 20' height. Excludes transverse lines.		
32 17 23 33-0063	EA		Prefomed Preferential Lane Symbol (Diamond), 125 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	206.21	
			Note: Approximate overall dimensions: 3-1/4' width x 13' height.		
32 17 23 33-0064	EA		6' Height, Prefomed Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	171.18	
			Note: Approximate overall dimensions: 2' width x 6' height.		
32 17 23 33-0065	EA		9-1/2' Height, Prefomed Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	344.34	
			Note: Approximate overall dimensions: 3-1/4' width x 9-1/2' height.		
32 17 23 33-0066	EA		4' Height, Prefomed Turn Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	200.72	
			Note: Approximate overall dimensions: 3' width x 4' height.		
32 17 23 33-0067	EA		8' Height, Prefomed Turn Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	384.99	
			Note: Approximate overall dimensions: 6' width x 8' height.		
32 17 23 33-0068	EA		Prefomed Turn And Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	667.19	
			Note: Approximate overall dimensions: 7-1/4' width x 12-3/4' height.		
32 17 23 33-0069	EA		Prefomed Dual Turn And Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	1,011.80	
			Note: Approximate overall dimensions: 11-1/4' width x 13-1/4' height.		
32 17 23 33-0070	EA		Prefomed Elongated Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	352.35	
			Note: Approximate overall dimensions: 1-2/3' width x 12' height.		
32 17 23 33-0071	EA		Prefomed Elongated Turn Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	393.00	
			Note: Approximate overall dimensions: 3' width x 12' height.		
32 17 23 33-0072	EA		Prefomed Elongated Dual Turn Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	736.98	
			Note: Approximate overall dimensions: 5-1/2' width x 12' height.		
32 17 23 33-0073	EA		Prefomed Elongated Turn And Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	676.17	
			Note: Approximate overall dimensions: 3-1/2' width x 20' height.		
32 17 23 33-0074	EA		Prefomed Elongated Dual Turn And Through Lane Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	678.62	
			Note: Approximate overall dimensions: 5-1/2' width x 20' height.		
32 17 23 33-0075	EA		Prefomed Lane-Reduction Arrow, 90 Mil Thick, Thermoplastic Reflective Pavement Marking Tape	942.17	
			Note: Approximate overall dimensions: 5-1/2' width x 18' height.		

32 17 23 33-0076 Thermoplastic Pavement Striping, Letters And Symbols For Parking Areas(32 17 23 33)**32 17 23 33-0077 Thermoplastic Pavement Marking Symbols For Parking Areas** (32 17 23 33-0076)

Note: Heat applied. (Flint PreMark Series).

32 17 23 33-0078	EA		28" Handicap Symbol For Standard Parking Stalls, 90 Mil Thick, Thermoplastic Pavement Marking Tape For Parking Areas	134.19	
			Note: White or blue symbol. Excludes striping.		
32 17 23 33-0079	EA		39" Handicap Symbol For Standard Parking Stalls, 90 Mil Thick, Thermoplastic Pavement Marking Tape For Parking Areas	520.06	
32 17 23 33-0080	EA		40" x 40" Handicap Symbol For Van Parking Stalls, 90 Mil Thick, Thermoplastic Pavement Marking Tape For Parking Areas	291.35	
			Note: White symbol on blue background. Excludes striping.		
32 17 23 33-0081	EA		45" x 45" Handicap Symbol For Van Parking Stalls, 90 Mil Thick, Thermoplastic Pavement Marking Tape For Parking Areas	351.00	
			Note: White symbol on blue background. Excludes striping.		
32 17 23 33-0082	EA		48" x 48" Handicap Symbol For Van Parking Stalls, 90 Mil Thick, Thermoplastic Pavement Marking Tape For Parking Areas	368.03	

32 17 26 Tactile Warning Surfaces (32 17)**32 17 26 00-0001 Vitrifed Polymer Composite (VPC); (Armor Tile)** (32 17 26)

Note: Truncated dome, raised strips or directional bars. All colors.

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 17 26 00-0002 SF Surface Applied VPC Truncated Dome Detectable Warning Surface.....	64.87	9.25
Note: Includes adhesive, fasteners and sealant at perimeter. Also raised strips or directional bars. All colors.		
32 17 26 00-0003 SF Embedded, VPC Truncated Dome Detectable Warning Surface.....	52.84	9.25
Note: Also raised strips or directional bars. All colors.		
32 17 26 00-0004 Fiber-Reinforced, Polymermodified Cement And Coated With Acrylic Resin Emulsion (SatetyStep TD) (32 17 26)		
Note: Pre-molded tactile dome sheet. All colors.		
32 17 26 00-0005 SF Up To 15 SF, Surface Applied Pre-Molded Tactile Warning Mat (SSTD-MAT).....	78.02	9.25
Note: Includes surface preparation, SSTD-589 adhesive, SSTD-100 topcoat sealer and SSTD-1250 finish . All colors. 2' or 3' width.		
32 17 26 00-0006 SF >15 To 36 SF, Surface Applied Pre-Molded Tactile Warning Mat (SSTD-MAT).....	69.69	9.25
Note: Includes surface preparation, SSTD-589 adhesive, SSTD-100 top coat sealer and SSTD-1250 finish . All colors. 2' or 3' width.		
32 18 Athletic and Recreational Surfacing (32 10)		
32 18 16 Synthetic Resilient Surfacing (32 18)		
32 18 16 13 Playground Protective Surfacing (32 18 16)		
32 18 16 13-0001 Tile Playground Surface Material (32 18 16 13)		
Note: Black. With or without channel bottom. Includes transition section and curbs. Excludes sub base.		
32 18 16 13-0002 SF 1-3/4" Thick, Resilient Rubber Tile Playground Surfacing	24.21	2.66
For Manufacturer's Standard Colors, Add	1.46	
For Interlocking Tiles, Add	3.25	
For Mechanically Fastened, Add	1.99	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0003 SF 2" Thick, Resilient Rubber Tile Playground Surfacing.....	24.71	2.81
For Manufacturer's Standard Colors, Add	1.46	
For Interlocking Tiles, Add	3.25	
For Mechanically Fastened, Add	2.09	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0004 SF 2-1/4" Thick, Resilient Rubber Tile Playground Surfacing	25.71	3.14
For Manufacturer's Standard Colors, Add	1.46	
For Interlocking Tiles, Add	3.25	
For Mechanically Fastened, Add	2.29	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0005 SF 2-1/2" Thick, Resilient Rubber Tile Playground Surfacing	26.70	3.48
For Manufacturer's Standard Colors, Add	1.46	
For Interlocking Tiles, Add	3.25	
For Mechanically Fastened, Add	2.49	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0006 SF 2-3/4" Thick, Resilient Rubber Tile Playground Surfacing	29.79	3.81
For Manufacturer's Standard Colors, Add	1.10	
For Interlocking Tiles, Add	3.67	
For Mechanically Fastened, Add	2.69	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0007 SF 3" Thick, Resilient Rubber Tile Playground Surfacing.....	30.89	4.18
For Manufacturer's Standard Colors, Add	1.10	
For Interlocking Tiles, Add	3.67	
For Mechanically Fastened, Add	2.91	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0008 SF 3-1/4" Thick, Resilient Rubber Tile Playground Surfacing	32.03	4.55
For Manufacturer's Standard Colors, Add	1.10	
For Interlocking Tiles, Add	3.67	
For Mechanically Fastened, Add	3.14	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0009 SF 3-1/2" Thick, Resilient Rubber Tile Playground Surfacing	35.21	4.87
For Manufacturer's Standard Colors, Add	0.61	
For Interlocking Tiles, Add	4.10	
For Mechanically Fastened, Add	3.35	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0010 SF 3-3/4" Thick, Resilient Rubber Tile Playground Surfacing	36.20	5.27
For Manufacturer's Standard Colors, Add	0.61	
For Interlocking Tiles, Add	4.10	
For Mechanically Fastened, Add	3.54	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0011 SF 4" Thick, Resilient Rubber Tile Playground Surfacing.....	37.30	5.57
For Manufacturer's Standard Colors, Add	0.61	
For Interlocking Tiles, Add	4.10	
For Mechanically Fastened, Add	3.76	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0012 SF 4-1/2" Thick, Resilient Rubber Tile Playground Surfacing	42.91	6.27
For Manufacturer's Standard Colors, Add	0.60	
For Interlocking Tiles, Add	4.80	
For Mechanically Fastened, Add	4.18	
For Ethylene Propylene Diene Monomer (EPDM) Top Wearing Surface, Add	1.50	
32 18 16 13-0013 Loose Laid Playground Surface Material (32 18 16 13)		
Note: Excludes sub base.		
32 18 16 13-0014 SF 3" Loose Laid Wood Fiber Safety Playground Surfacing	2.00	0.40

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 18 Athletic and Recreational Surfacing**

MINOR		TOTAL DIRECT DEMOLITION		
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 18 16 13-0015	SF	6" Loose Laid Wood Fiber Safety Playground Surfacing	2.69	0.49
32 18 16 13-0016	SF	9" Loose Laid Wood Fiber Safety Playground Surfacing	3.45	0.60
32 18 16 13-0017	SF	12" Loose Laid Wood Fiber Safety Playground Surfacing	4.87	0.90
32 18 16 13-0018	SF	3" Loose Laid Synthetic Fiber Safety Playground Surfacing	3.13	0.40
32 18 16 13-0019	SF	6" Loose Laid Synthetic Fiber Safety Playground Surfacing	3.88	0.49
32 18 16 13-0020	SF	9" Loose Laid Synthetic Fiber Safety Playground Surfacing	6.05	0.60
32 18 16 13-0021	SF	12" Loose Laid Synthetic Fiber Safety Playground Surfacing	7.50	0.90
32 18 16 13-0022	SF	8" FIBAR System Playground Surfacing..... Note: Includes drainage system on 6" centers, felt, edge railing and 8" wood fiber.	12.69	1.49
32 18 16 13-0023	SF	12" FIBAR System Playground Surfacing..... Note: Includes drainage system on 6" centers, felt, edge railing and 12" wood fiber.	16.10	1.99
32 18 16 13-0024		Poured In Place Playground Surfacing <small>(32 18 16 13)</small> Note: Includes SBR base mat, 100% color ethylene propylene diene monomer (EPDM) top surface and 5 year warranty. Includes primer for base mat and top surface. Includes all colors. Excludes base preparation.		
32 18 16 13-0025	SF	1-3/4" Thick, Up To 4' Critical Fall Height, Poured In Place Rubber Playground Surfacing	19.06	2.87
		<i>For Up To 2,000, Add</i>	3.86	
		<i>For >2,000 To 3,000, Add</i>	2.72	
		<i>For >3,000 To 4,000, Add</i>	1.85	
		<i>For >4,000 To 5,000, Add</i>	1.18	
		<i>For >5,000 To 7,000, Add</i>	0.49	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0026	SF	2" Thick, 5' Critical Fall Height, Poured In Place Rubber Playground Surfacing	19.66	3.18
		<i>For Up To 2,000, Add</i>	3.98	
		<i>For >2,000 To 3,000, Add</i>	2.81	
		<i>For >3,000 To 4,000, Add</i>	1.91	
		<i>For >4,000 To 5,000, Add</i>	1.22	
		<i>For >5,000 To 7,000, Add</i>	0.51	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0027	SF	2-1/2" Thick, 6' Critical Fall Height, Poured In Place Rubber Playground Surfacing	21.22	3.63
		<i>For Up To 2,000, Add</i>	4.30	
		<i>For >2,000 To 3,000, Add</i>	3.03	
		<i>For >3,000 To 4,000, Add</i>	2.06	
		<i>For >4,000 To 5,000, Add</i>	1.32	
		<i>For >5,000 To 7,000, Add</i>	0.55	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0028	SF	3" Thick, 7' Critical Fall Height, Poured In Place Rubber Playground Surfacing	22.93	3.87
		<i>For Up To 2,000, Add</i>	4.65	
		<i>For >2,000 To 3,000, Add</i>	3.28	
		<i>For >3,000 To 4,000, Add</i>	2.23	
		<i>For >4,000 To 5,000, Add</i>	1.42	
		<i>For >5,000 To 7,000, Add</i>	0.59	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0029	SF	3-1/2" Thick, 8' Critical Fall Height, Poured In Place Rubber Playground Surfacing	24.62	4.07
		<i>For Up To 2,000, Add</i>	4.99	
		<i>For >2,000 To 3,000, Add</i>	3.52	
		<i>For >3,000 To 4,000, Add</i>	2.39	
		<i>For >4,000 To 5,000, Add</i>	1.53	
		<i>For >5,000 To 7,000, Add</i>	0.64	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0030	SF	4" Thick, 9' Critical Fall Height, Poured In Place Rubber Playground Surfacing	26.06	4.30
		<i>For Up To 2,000, Add</i>	5.28	
		<i>For >2,000 To 3,000, Add</i>	3.72	
		<i>For >3,000 To 4,000, Add</i>	2.53	
		<i>For >4,000 To 5,000, Add</i>	1.62	
		<i>For >5,000 To 7,000, Add</i>	0.67	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0031	SF	4-1/2" Thick, 10' Critical Fall Height, Poured In Place Rubber Playground Surfacing	27.75	4.54
		<i>For Up To 2,000, Add</i>	5.62	
		<i>For >2,000 To 3,000, Add</i>	3.96	
		<i>For >3,000 To 4,000, Add</i>	2.70	
		<i>For >4,000 To 5,000, Add</i>	1.72	
		<i>For >5,000 To 7,000, Add</i>	0.72	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0032	SF	5-1/2" Thick, 12' Critical Fall Height, Poured In Place Rubber Playground Surfacing	31.14	5.09
		<i>For Up To 2,000, Add</i>	6.31	
		<i>For >2,000 To 3,000, Add</i>	4.45	
		<i>For >3,000 To 4,000, Add</i>	3.03	
		<i>For >4,000 To 5,000, Add</i>	1.93	
		<i>For >5,000 To 7,000, Add</i>	0.80	
		<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
		<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	



Exterior Improvements		32
Bases, Ballasts, and Paving		32 10
Athletic and Recreational Surfacing		32 18

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 18 16 13-0033	SF		1/2" Top Only, Poured In Place Playground Surfacing Note: Not used with new surfacing system tasks.	12.45	
			<i>For Up To 2,000, Add</i>	3.81	
			<i>For >2,000 To 3,000, Add</i>	2.46	
			<i>For >3,000 To 4,000, Add</i>	1.50	
			<i>For >4,000 To 5,000, Add</i>	0.91	
			<i>For >5,000 To 7,000, Add</i>	0.41	
			<i>For Aliphatic (Non-Yellowing) Binder, Add</i>	4.28	
			<i>For Each 10% Of Area In Black Instead Of Color, Deduct</i>	-0.58	
32 18 16 13-0034	EA		Simple Graphics Including Hopscotch, Four Square Or Geometric Shapes (5 Per 1,000 SF) For Poured In Place Playground Surfacing	2,826.54	
32 18 16 13-0035			Synthetic Playground Turf (Sporturf) <small>(32 18 16 13)</small> Note: Excludes base preparation, aggregate, or drainage.		
32 18 16 13-0036	SF		60 OZ/SY Face Weight, Tufted Polyethylene Monofilament Classic Spine/ Texturized Polypropylene Synthetic Turf (Sporturf PL929).....	10.71	
32 18 16 13-0037	SF		71 OZ/SY Face Weight, Tufted Polyethylene Monofilament Classic Spine/ Texturized Polypropylene Synthetic Turf (Mirage PL906)	9.44	
32 18 16 13-0038	SF		2" Foam Padding (Sporturf).....	6.11	
32 18 16 13-0039	CF		Sand/Ruber Infill (Sporturf).....	58.83	
32 18 23			Athletic Surfacing <small>(32 18)</small>		
32 18 23 29			Synthetic Field Sport Surfacing <small>(32 18 23)</small>		
32 18 23 29-0001			Synthetic Field Sport Surfacing <small>(32 18 23 29)</small>		
32 18 23 29-0002			Synthetic Turf (AstroTurf) <small>(32 18 23 29-0001)</small> Note: Includes labor, equipment and material required to install the task.		
32 18 23 29-0003			Tufted Monofilament Polyethylene Synthetic Turf (AstroTurf® GameDay Grass™ MT) <small>(32 18 23 29-0002)</small>		
32 18 23 29-0004			38 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf (AstroTurf® GameDay Grass™ MT 38) <small>(32 18 23 29-0003)</small>		
32 18 23 29-0005	SF		38 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Ambient Rubber Infill (AstroTurf® GameDay Grass™ MT 38)	8.47	
			<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
			<i>For Cryo Rubber Infill, Add</i>	0.26	
			<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.31	
			<i>For Cryo Rubber And Sand Infill, Add</i>	0.36	
32 18 23 29-0006	EA		Football Markings For AstroTurf® GameDay Grass™ MT 38 Fields	27,453.10	
32 18 23 29-0007	EA		Baseball Markings For AstroTurf® GameDay Grass™ MT 38 Fields.....	22,376.87	
32 18 23 29-0008	EA		Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ MT 38 Fields..... Note: Per sport.	6,733.78	
32 18 23 29-0009	EA		Endzone Lettering For AstroTurf® GameDay Grass™ MT 38 Fields	2,486.32	
			Note: Per letter. Excludes outline.		
32 18 23 29-0010	EA		Colored Endzone For AstroTurf® GameDay Grass™ MT 38 Fields.....	2,382.72	
			Note: Per endzone.		
32 18 23 29-0011	EA		Simple Logo For AstroTurf® GameDay Grass™ MT 38 Fields	20,719.32	
			Note: Block letter.		
32 18 23 29-0012	EA		Deluxe Logo For AstroTurf® GameDay Grass™ MT 38 Fields	30,043.01	
			Note: Graphic.		
32 18 23 29-0013			41 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf (AstroTurf® GameDay Grass™ MT 41) <small>(32 18 23 29-0003)</small>		
32 18 23 29-0014	SF		41 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Ambient Rubber Infill (AstroTurf® GameDay Grass™ MT 41)	9.72	
			<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
			<i>For Cryo Rubber Infill, Add</i>	0.26	
			<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.31	
			<i>For Cryo Rubber And Sand Infill, Add</i>	0.36	
32 18 23 29-0015	EA		Football Markings For AstroTurf® GameDay Grass™ MT 41 Fields	27,971.25	
32 18 23 29-0016	EA		Baseball Markings For AstroTurf® GameDay Grass™ MT 41 Fields.....	23,205.78	
32 18 23 29-0017	EA		Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ MT 41 Fields..... Note: Per sport.	7,251.81	
32 18 23 29-0018	EA		Endzone Lettering For AstroTurf® GameDay Grass™ MT 41 Fields	2,693.53	
			Note: Per letter. Excludes outline.		
32 18 23 29-0019	EA		Colored Endzone For AstroTurf® GameDay Grass™ MT 41 Fields.....	2,486.33	
			Note: Per endzone.		
32 18 23 29-0020	EA		Simple Logo For AstroTurf® GameDay Grass™ MT 41 Fields	21,755.42	
			Note: Block letter.		
32 18 23 29-0021	EA		Deluxe Logo For AstroTurf® GameDay Grass™ MT 41 Fields	31,545.35	
			Note: Graphic.		
32 18 23 29-0022			45 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf (AstroTurf® GameDay Grass™ MT 45) <small>(32 18 23 29-0003)</small>		

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 18 Athletic and Recreational Surfacing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 18 23 29-0023	SF	45 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Ambient Rubber Infill (AstroTurf® GameDay Grass™ MT 45).....	9.90	
		<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
		<i>For Cryo Rubber Infill, Add</i>	0.26	
		<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.31	
		<i>For Cryo Rubber And Sand Infill, Add</i>	0.36	
32 18 23 29-0024	EA	Football Markings For AstroTurf® GameDay Grass™ MT 45 Fields.....	28,489.24	
32 18 23 29-0025	EA	Baseball Markings For AstroTurf® GameDay Grass™ MT 45 Fields.....	25,070.53	
32 18 23 29-0026	EA	Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ MT 45 Fields.....	7,769.79	
		Note: Per sport.		
32 18 23 29-0027	EA	Endzone Lettering For AstroTurf® GameDay Grass™ MT 45 Fields.....	2,900.72	
		Note: Per letter. Excludes outline.		
32 18 23 29-0028	EA	Colored Endzone For AstroTurf® GameDay Grass™ MT 45 Fields.....	2,589.93	
		Note: Per endzone.		
32 18 23 29-0029	EA	Simple Logo For AstroTurf® GameDay Grass™ MT 45 Fields.....	22,791.39	
		Note: Block letter.		
32 18 23 29-0030	EA	Deluxe Logo For AstroTurf® GameDay Grass™ MT 45 Fields.....	33,047.51	
		Note: Graphic.		
32 18 23 29-0031		Tufted Monofilament Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ 3D) <small>(32 18 23 29-0002)</small>		
32 18 23 29-0032		52 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ 3DX 52) <small>(32 18 23 29-0031)</small>		
32 18 23 29-0033	SF	52 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® GameDay Grass™ 3DX 52).....	11.07	
		<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
		<i>For Cryo Rubber Infill, Add</i>	0.20	
		<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.25	
		<i>For Cryo Rubber And Sand Infill, Add</i>	0.30	
32 18 23 29-0034	EA	Football Markings For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	29,525.03	
32 18 23 29-0035	EA	Baseball Markings For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	31,493.37	
32 18 23 29-0036	EA	Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	8,805.71	
		Note: Per sport.		
32 18 23 29-0037	EA	Endzone Lettering For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	3,315.09	
		Note: Per letter. Excludes outline.		
32 18 23 29-0038	EA	Colored Endzone For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	2,797.11	
		Note: Per endzone.		
32 18 23 29-0039	EA	Simple Logo For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	24,863.18	
		Note: Block letter.		
32 18 23 29-0040	EA	Deluxe Logo For AstroTurf® GameDay Grass™ 3DX 52 Fields.....	36,051.62	
		Note: Graphic.		
32 18 23 29-0041		60 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ 3DX 60) <small>(32 18 23 29-0031)</small>		
32 18 23 29-0042	SF	60 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® GameDay Grass™ 3DX 60).....	11.45	
		<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
		<i>For Cryo Rubber Infill, Add</i>	0.20	
		<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.25	
		<i>For Cryo Rubber And Sand Infill, Add</i>	0.30	
32 18 23 29-0043	EA	Football Markings For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	30,043.01	
32 18 23 29-0044	EA	Baseball Markings For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	35,015.65	
32 18 23 29-0045	EA	Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	9,323.69	
		Note: Per sport.		
32 18 23 29-0046	EA	Endzone Lettering For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	3,522.28	
		Note: Per letter. Excludes outline.		
32 18 23 29-0047	EA	Colored Endzone For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	2,900.70	
		Note: Per endzone.		
32 18 23 29-0048	EA	Simple Logo For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	25,899.15	
		Note: Block letter.		
32 18 23 29-0049	EA	Deluxe Logo For AstroTurf® GameDay Grass™ 3DX 60 Fields.....	37,553.77	
		Note: Graphic.		
32 18 23 29-0050		52 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ 3D 52) <small>(32 18 23 29-0031)</small>		
32 18 23 29-0051	SF	52 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® GameDay Grass™ 3D 52).....	11.47	
		<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
		<i>For Cryo Rubber Infill, Add</i>	0.20	
		<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.25	
		<i>For Cryo Rubber And Sand Infill, Add</i>	0.30	
32 18 23 29-0052	EA	Football Markings For AstroTurf® GameDay Grass™ 3D 52 Fields.....	30,561.00	
32 18 23 29-0053	EA	Baseball Markings For AstroTurf® GameDay Grass™ 3D 52 Fields.....	35,222.84	
32 18 23 29-0054	EA	Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ 3D 52 Fields.....	9,841.68	
		Note: Per sport.		
32 18 23 29-0055	EA	Endzone Lettering For AstroTurf® GameDay Grass™ 3D 52 Fields.....	3,729.48	
		Note: Per letter. Excludes outline.		
32 18 23 29-0056	EA	Colored Endzone For AstroTurf® GameDay Grass™ 3D 52 Fields.....	3,004.30	
		Note: Per endzone.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 18 23 29-0057 EA Simple Logo For AstroTurf® GameDay Grass™ 3D 52 Fields..... Note: Block letter.	26,935.12	
32 18 23 29-0058 EA Deluxe Logo For AstroTurf® GameDay Grass™ 3D 52 Fields..... Note: Graphic.	39,055.92	
32 18 23 29-0059 60 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ 3D 60) (32 18 23 29-0031)		
32 18 23 29-0060 SF 60 Oz/SY Face Weight, Tufted Monofilament Polyethylene Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® GameDay Grass™ 3D 60).....	11.68	
<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
<i>For Cryo Rubber Infill, Add</i>	0.20	
<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.25	
<i>For Cryo Rubber And Sand Infill, Add</i>	0.30	
32 18 23 29-0061 EA Football Markings For AstroTurf® GameDay Grass™ 3D 60 Fields	31,078.98	
32 18 23 29-0062 EA Baseball Markings For AstroTurf® GameDay Grass™ 3D 60 Fields	37,501.97	
32 18 23 29-0063 EA Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ 3D 60 Fields..... Note: Per sport.	10,359.66	
32 18 23 29-0064 EA Endzone Lettering For AstroTurf® GameDay Grass™ 3D 60 Fields..... Note: Per letter. Excludes outline.	4,143.86	
32 18 23 29-0065 EA Colored Endzone For AstroTurf® GameDay Grass™ 3D 60 Fields..... Note: Per endzone.	3,107.90	
32 18 23 29-0066 EA Simple Logo For AstroTurf® GameDay Grass™ 3D 60 Fields..... Note: Block letter.	27,971.08	
32 18 23 29-0067 EA Deluxe Logo For AstroTurf® GameDay Grass™ 3D 60 Fields..... Note: Graphic.	40,558.07	
32 18 23 29-0068 Tufted Monofilament Polyethylene Synthetic Turf (AstroTurf® GameDay Grass™ XPe) (32 18 23 29-0002)		
32 18 23 29-0069 38 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ XPe 38) (32 18 23 29-0068)		
32 18 23 29-0070 SF 38 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® GameDay Grass™ XPe 38).....	9.34	
<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
<i>For Cryo Rubber Infill, Add</i>	0.26	
<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.31	
<i>For Cryo Rubber And Sand Infill, Add</i>	0.36	
32 18 23 29-0071 EA Football Markings For AstroTurf® GameDay Grass™ XPe 38 Fields	26,417.29	
32 18 23 29-0072 EA Baseball Markings For AstroTurf® GameDay Grass™ XPe 38 Fields	19,476.28	
32 18 23 29-0073 EA Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ XPe 38 Fields..... Note: Per sport.	5,697.85	
32 18 23 29-0074 EA Endzone Lettering For AstroTurf® GameDay Grass™ XPe 38 Fields..... Note: Per letter. Excludes outline.	2,071.94	
32 18 23 29-0075 EA Colored Endzone For AstroTurf® GameDay Grass™ XPe 38 Fields..... Note: Per endzone.	2,175.54	
32 18 23 29-0076 EA Simple Logo For AstroTurf® GameDay Grass™ XPe 38 Fields..... Note: Block letter.	18,647.50	
32 18 23 29-0077 EA Deluxe Logo For AstroTurf® GameDay Grass™ XPe 38 Fields	27,038.87	
Note: Graphic.		
32 18 23 29-0078 42 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone (AstroTurf® GameDay Grass™ XPe 42) (32 18 23 29-0068)		
32 18 23 29-0079 SF 42 Oz/SY Face Weight, Tufted Slit-Film Polyethylene Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® GameDay Grass™ XPe 42).....	8.21	
<i>For Ambient Rubber And Sand Infill, Add</i>	0.10	
<i>For Cryo Rubber Infill, Add</i>	0.26	
<i>For Ethylene Propylene Diene Monomer (EPDM) Rubber Infill, Add</i>	0.31	
<i>For Cryo Rubber And Sand Infill, Add</i>	0.36	
32 18 23 29-0080 EA Football Markings For AstroTurf® GameDay Grass™ XPe 42 Fields	26,935.12	
32 18 23 29-0081 EA Baseball Markings For AstroTurf® GameDay Grass™ XPe 42 Fields	20,719.32	
32 18 23 29-0082 EA Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® GameDay Grass™ XPe 42 Fields..... Note: Per sport.	6,215.80	
32 18 23 29-0083 EA Endzone Lettering For AstroTurf® GameDay Grass™ XPe 42 Fields..... Note: Per letter. Excludes outline.	2,279.13	
32 18 23 29-0084 EA Colored Endzone For AstroTurf® GameDay Grass™ XPe 42 Fields..... Note: Per endzone.	2,279.13	
32 18 23 29-0085 EA Simple Logo For AstroTurf® GameDay Grass™ XPe 42 Fields..... Note: Block letter.	19,683.35	
32 18 23 29-0086 EA Deluxe Logo For AstroTurf® GameDay Grass™ XPe 42 Fields	28,540.86	
Note: Graphic.		
32 18 23 29-0087 Tufted Monofilament Nylon Synthetic Turf With Nylon Root Zone And Attached Pad (AstroTurf® PureGrass®) (32 18 23 29-0002)		
32 18 23 29-0088 SF Tufted Monofilament Nylon Synthetic Turf With Nylon Root Zone And Attached Pad (AstroTurf® PureGrass®).....	18.33	
32 18 23 29-0089 SF Tufted Monofilament Nylon Synthetic Turf With Nylon Root Zone And Ambient Rubber Infill (AstroTurf® PureGrass®).....	16.42	
32 18 23 29-0090 EA Football Markings For AstroTurf® PureGrass® Fields	51,118.17	
32 18 23 29-0091 EA Baseball Markings For AstroTurf® PureGrass® Fields	60,730.13	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 18 Athletic and Recreational Surfacing**

Los Angeles County Development Authority

MINOR			TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 18 23 29-0092	EA	Soccer, Lacrosse, Softball Or Field Hockey Markings For AstroTurf® PureGrass® Fields Note: Per sport.	14,854.85	
32 18 23 29-0093	EA	Endzone Lettering For AstroTurf® PureGrass® Fields..... Note: Per letter. Excludes outline.	5,679.80	
32 18 23 29-0094	EA	Colored Endzone For AstroTurf® PureGrass® Fields Note: Per endzone.	4,215.93	
32 18 23 29-0095	EA	Simple Logo For AstroTurf® PureGrass® Fields Note: Block letter.	37,943.38	
32 18 23 29-0096	EA	Deluxe Logo For AstroTurf® PureGrass® Fields..... Note: Graphic.	55,705.69	
32 18 23 29-0097		Synthetic Turf (G9 Turf) <small>(32 18 23 29-0001)</small> Note: Includes labor, equipment and material required to install the task.		
32 18 23 29-0098	SF	2-1/2" Height, 53 Ounce, Tufted 3/8" Gauge Monofilament Synthetic Turf With Thatch Layer And Ethylene Propylene Diene Monomer (EPDM) Infill (G9 Turf Playmaker Turf) Note: For football and multi-sport fields. Excludes preparation of sub-base, grooming, sports lines and logos. <i>For >35,000, Deduct</i>	10.15	-0.92
32 18 23 29-0099	SF	2" Height, 48 Ounce, Tufted 3/8" Gauge Monofilament Synthetic Turf With Thatch Layer And Ethylene Propylene Diene Monomer (EPDM) Infill (G9 Turf Striker Turf) Note: For all sports other than football. Excludes preparation of sub-base, grooming, sports lines and logos. <i>For >35,000, Deduct</i>	10.06	-0.91
32 18 23 29-0100	SF	1-3/4" Height, 72 Ounce, Tufted 3/8" Gauge, Two-Color Monofilament Synthetic Turf With Thatch Layer And Acrylic Coated Sand Infill (G9 Turf Perennial Turf) Note: For landscaped areas or playgrounds. Excludes preparation of sub-base, grooming, sports lines and logos.	10.51	
32 18 23 29-0101	EA	Football Inlays For G9 Synthetic Turf..... Note: Includes field grid, numbers, arrows, coach's box and kick off lines.	70,684.04	
32 18 23 29-0102	EA	Soccer Inlays For G9 Synthetic Turf	30,629.75	
32 18 23 29-0103	EA	Boys Lacrosse Inlays For G9 Synthetic Turf.....	30,629.75	
32 18 23 29-0104	EA	Girls Lacrosse Inlays For G9 Synthetic Turf	30,629.75	
32 18 23 29-0105	EA	Field Hockey Inlays For G9 Synthetic Turf.....	30,629.75	
32 18 23 29-0106	EA	Endzone Lettering For G9 Synthetic Turf..... Note: Priced per letter. Includes single color outlining.	3,534.20	
32 18 23 29-0107	SF	Ethylene Propylene Diene Monomer (EPDM) Black Infill For G9 Synthetic Turf	3.31	
32 18 23 29-0108	SF	Ethylene Propylene Diene Monomer (EPDM) Color Infill For G9 Synthetic Turf.....	8.64	
32 18 23 29-0109	SF	Styrene-Butadiene Rubber (SBR) Infill For G9 Synthetic Turf	2.47	
32 18 23 29-0110	SF	Sand Infill For G9 Synthetic Turf.....	1.24	
32 18 23 29-0111	SF	Acrylic Coated Sand Infill For G9 Synthetic Turf.....	2.04	
32 18 23 29-0112	EA	Gmax Compaction And Hardness Test For G9 Synthetic Turf	2,356.13	
32 18 23 29-0113	EA	Safety Bridge Over Track For G9 Synthetic Turf	23,561.35	
32 18 23 29-0114	SF	Clean And Groom Synthetic Turf..... Note: Includes using equipment to pick up metal particles in the field, air vacuum the top 2-5 mm of infill, clean and screen to remove broken strands, dirt, bandage, etc. <i>For >10,000 To 30,000, Deduct</i> <i>For >30,000 To 60,000, Deduct</i> <i>For >60,000, Deduct</i>	0.77	-0.31 -0.54 -0.59
32 18 23 29-0115	SF	Rejuvenate Synthetic Turf And Reinstall Existing Infill..... Note: Includes using equipment to extract 10 to 20 mm of infill by delivering high pressure air into the carpet, decompacting the surface and driving out the infill leaving the fiber standing straight up. Includes reinstalling the old infill that was removed.	5.28	
32 18 23 29-0116	SF	Rejuvenate Synthetic Turf For Installation Of New Infill..... Note: Includes using equipment to extract 10 to 20 mm of infill by delivering high pressure air into the carpet, decompacting the surface and driving out the infill leaving the fiber standing straight up. Includes disposing of the old infill. Excludes new infill.	5.87	
32 18 23 29-0117	SF	Drainage Layer For G9 Synthetic Turf..... Note: Used for drainage over asphalt or on roof tops.	4.81	
32 18 23 29-0118	SF	15 mm, Shock Pad For G9 Synthetic Turf	2.96	
32 18 23 29-0119	EA	Single Visit Repair Call To Repair Up To 300 LF Of Inlay Lines Or Seams On G9 Synthetic Turf	4,695.60	
32 18 23 29-0120	LF	Repair Inlay Lines Or Seams On G9 Synthetic Turf	12.91	
32 18 23 29-0121	LF	Note: Linear foot price for repairs over the initial repair call maximum of 300 LF.		
32 18 23 29-0122	SF	Nailer Used To Attach G9 Synthetic Turf.....	5.17	
		Removal And Recycling Of Existing Field..... Note: Includes removal, shipping and recycling of infill, fibers and backing.	3.64	
32 18 23 33		Running Track Surfacing <small>(32 18 23)</small>		
32 18 23 33-0001		Running Track Surfacing <small>(32 18 23 33)</small>		
32 18 23 33-0002	SY	2-1/2" Asphaltic Concrete Running Track Surfacing.....	34.21	
32 18 23 33-0003		Running Track Seal And Colored Surfaces <small>(32 18 23 33)</small>		
32 18 23 33-0004	SY	1 Seal Coat, Striping Of Track..... Note: Includes certification.	15.80	
32 18 23 39		Synthetic Running Track Surfacing <small>(32 18 23)</small>		
32 18 23 39-0001		Synthetic Running Track Surfacing And Striping <small>(32 18 23 39)</small> Note: Includes labor, equipment and material required to install the task. Excludes asphalt base.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 18 23 39-0002 SY Paved-In-Place Styrene-Butadiene Rubber (SBR) Or Ethylene Propylene Diene Monomer (EPDM) Rubber Granule Base Mat With Polyurethane Binder, Synthetic Running Track Surfacing.....	84.03	7.47
<i>For >5,500, Deduct</i>	-6.50	
<i>For Up To 4,000, Add</i>	20.69	
32 18 23 39-0003 SY Paved-In-Place Styrene-Butadiene Rubber (SBR) Granule Base Mat With Polyurethane Binder Finished With A Textured And Pigmented Polyurethane And Ethylene Propylene Diene Monomer (EPDM) Rubber Structural Spray Coat, Synthetic Running Track Surfacing.....	105.31	7.47
<i>For >5,500, Deduct</i>	-8.72	
<i>For Up To 4,000, Add</i>	27.76	
<i>For Custom Color Upgrade, Add</i>	7.53	
<i>For Aliphatic Top Coating, Add</i>	14.28	
32 18 23 39-0004 SY Paved-In-Place Ethylene Propylene Diene Monomer (EPDM) Rubber Granule Base Mat With Polyurethane Binder, Two-Component Polyurethane Sealer Layer And Two-Component Polyurethane Wearing Layer With Embedded Ethylene Propylene Diene Monomer (EPDM) Rubber, Synthetic Running Track Surfacing.....	172.30	7.47
<i>For >5,500, Deduct</i>	-8.00	
<i>For Up To 4,000, Add</i>	46.65	
<i>For Custom Color Upgrade, Add</i>	10.26	
<i>For Aliphatic Top Coating, Add</i>	19.06	
32 18 23 39-0005 SY Full Pour Two-Component Polyurethane Track System With Embedded Ethylene Propylene Diene Monomer (EPDM) Rubber Surface, Synthetic Running Track Surfacing.....	223.93	7.47
<i>For >5,500, Deduct</i>	-10.33	
<i>For Up To 4,000, Add</i>	60.26	
<i>For Custom Color Upgrade, Add</i>	13.43	
<i>For Aliphatic Top Coating, Add</i>	19.63	
32 18 23 39-0006 SY Latex Binder, Synthetic Running Track Surfacing.....	75.74	
<i>For >5,500, Deduct</i>	-10.98	
<i>For Up To 4,000, Add</i>	26.51	
32 18 23 39-0007 SY Spray Retop Running Tracks.....	66.53	
<i>For Up To 4,000, Add</i>	23.29	
<i>For >5,500, Deduct</i>	-6.51	
32 18 23 39-0008 SY Sandwich Retop Running Tracks.....	128.78	
<i>For Up To 4,000, Add</i>	45.07	
<i>For >5,500, Deduct</i>	-13.57	
32 18 23 53 Tennis Court Surfacing (32 18 23)		
32 18 23 53-0001 Tennis Court Surfacing (32 18 23 53) See CSI section 32 18 23 61-0000 for 100% acrylic tennis court surfacing.		
32 18 23 53-0002 SY Tennis Court Bituminous Pavement, 2-1/2" Thick.....	34.10	
32 18 23 53-0003 Tennis Court Markings (32 18 23 53)		
32 18 23 53-0004 EA Paint Markings On Asphalt Tennis Court 2 Coats.....	523.27	
32 18 23 56 Natural Tennis Court Surfacing (32 18 23)		
32 18 23 56-0001 SY Clay Tennis Court.....	47.03	
32 18 23 56-0002 SY Tennis Court, Pulverized Natural Greenstone, Fast Dry..... Note: Includes 4" base.	52.22	
32 18 23 56-0003 SY Tennis Court, Rubber-Cork Base Resilient Pavement.....	19.29	
32 18 23 56-0004 SY Resurface Clay Tennis Court.....	14.08	
32 18 23 56-0005 SY Resurface Tennis Court, Pulverized Natural Greenstone.....	12.04	
32 18 23 56-0006 SY Resurface Tennis Court, Resilient Pavement.....	8.55	
32 18 23 61 Multi-Use, Tennis Court, Basketball Court Athletic Surfacing (32 18 23)		
32 18 23 61-0001 100% Acrylic Athletic Surfacing System (Plexipave®) (32 18 23 61) Note: Excludes asphalt or concrete sub base and repairs of sub base.		
32 18 23 61-0002 Surface Preparation For Athletic Surfacing System (Plexipave®) (32 18 23 61-0001)		
32 18 23 61-0003 SY 100% Acrylic Resurfacer, Athletic Surfacing System (California Products Plexipave® Acrylic Resurfacer), Per Coat..... Note: Includes ultra fine silica sand. Applied with rubber squeegee.	1.86	
32 18 23 61-0004 SY Acid Etching Concrete Pre-Treatment For Plexipave® Athletic Surfacing System (California Products Plexipave® Concrete Preparer®), Per Coat..... Note: For previously uncoated portland cement concrete. Applied with broom.	1.04	
32 18 23 61-0005 SY Two-Part, Water Based Epoxy Primer For Plexipave® Athletic Surfacing System (California Products Plexipave® Ti-Coat®), Per Coat..... Note: For new or uncoated portland cement concrete. Applied with a short nap phenolic roller.	2.70	
32 18 23 61-0006 SY Up To 1/2" Thick, Acrylic Latex Patching Compound, Athletic Surfacing System (California Products Plexipave® Court Patch Binder), Per Coat..... Note: For patching depressions and uneven texture in new or existing asphalt or concrete surfaces. Includes ultra fine silica sand and portland cement. Applied with trowel or metal screed.	112.04	
32 18 23 61-0007 Surface Coatings For Athletic Surfacing System (Plexipave®) (32 18 23 61-0001) Note: Standard color includes dark green, Florida green, light green, maroon, Sahara sand, brown, California red, and cape gray.		
32 18 23 61-0008 SY 100% Acrylic Emulsion Color Coating, Athletic Surfacing System (California Products Fortified Plexipave®), First Coat..... Note: Includes ultra fine silica sand. Applied with rubber squeegee.	4.17	
<i>For Pacific Blue, Add</i>	0.25	
<i>For US Open Blue, Add</i>	0.87	

32 Exterior Improvements**32 10 Bases, Ballasts, and Paving****32 18 Athletic and Recreational Surfacing**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 18 23 61-0009	SY	100% Acrylic Emulsion Color Coating, Athletic Surfacing System (California Products Fortified Plexipave®), Second Coat.....		3.33	
		Note: Includes ultra fine silica sand. Applied with rubber squeegee.			
		For Pacific Blue, Add		0.18	
		For US Open Blue, Add		0.62	
32 18 23 61-0010	SY	100% Acrylic Emulsion Color Coating, Athletic Surfacing System (California Products Fortified Plexipave®), Third Coat.....		2.86	
		Note: Price per coat for third or additional coats. Includes ultra fine silica sand. Applied with rubber squeegee.			
		For Pacific Blue, Add		0.14	
		For US Open Blue, Add		0.49	
32 18 23 61-0011	SY	Non-Textured, 100% Acrylic Emulsion Color Coating Finish, Athletic Surfacing System (California Products Plexipave® Plexichrome®), Per Coat.....		3.04	
		Note: Non-textured finish coat over Plexipave® for faster playing surfaces. Applied with rubber squeegee followed by wide hair-type push broom.			
		For Pacific Blue, Add		0.08	
		For US Open Or Australian Open Blue, Add		0.57	
		For Pro Purple, Add		1.47	
32 18 23 61-0012		Line Striping For Athletic Surfacing System (Plexipave®) (32 18 23 61-0001)			
32 18 23 61-0013	SY	Tennis Or Basketball Court Line Striping For Athletic Surfacing System, Per SY Of Court (California Products Plexipave® Hi-Hide Plexicolor®).....		1.71	
		Note: Textured or non-textured highly reflective line marking paint.			
32 18 23 61-0014		Cushion Coatings For Athletic Surfacing System (Plexipave® Plexicushion®) (32 18 23 61-0001)			
32 18 23 61-0015	SY	Resilient Latex Undercoating Base Coat, Athletic Surfacing System (California Products Plexipave® Plexicushion® Base Coat), First Coat.....		7.07	
		Note: Applied with rubber squeegee.			
32 18 23 61-0016	SY	Resilient Latex Undercoating Base Coat, Athletic Surfacing System (California Products Plexipave® Plexicushion® Base Coat), Second Coat.....		9.80	
		Note: Applied with rubber squeegee.			
32 18 23 61-0017	SY	Resilient Latex Undercoating Base Coat, Athletic Surfacing System (California Products Plexipave® Plexicushion® Base Coat), Third Coat.....		8.37	
		Note: Price per coat for third or additional coats. Applied with rubber squeegee.			
32 18 23 61-0018	SY	Resilient Latex Undercoating, Athletic Surfacing System (California Products Plexipave® Plexicushion®), First Coat.....		6.17	
		Note: Applied with rubber squeegee.			
32 18 23 61-0019	SY	Resilient Latex Undercoating, Athletic Surfacing System (California Products Plexipave® Plexicushion®), Second Coat.....		4.61	
		Note: Price per coat for second or additional coats. Applied with rubber squeegee.			
32 18 23 61-0020		Resurface Athletic Court (32 18 23 61)			
		Note: Excludes asphalt or concrete sub base and repairs of sub base.			
32 18 23 61-0021	SY	Court Resurfacing System, 2 Coats Resurfacer, 2 Coats Color, And Sand (SealMaster).....		2.81	
32 30 Site Improvements					
32 31 Fences and Gates					
32 31 11 Gate Operators					
32 31 11 00-0001		Gate Operators (32 31 11)			
		Note: Excludes gates, electrical connections, access controls and concrete foundation.			
32 31 11 00-0002		Gate Operators (DKS™ DoorKing®) (32 31 11 00-0001)			
32 31 11 00-0003		Swing Gate Actuator (DKS™ DoorKing®) (32 31 11 00-0002)			
32 31 11 00-0004		Single Gate, Swing Gate Actuator (32 31 11 00-0003)			
32 31 11 00-0005	EA	Up To 10' Wide Gate, 1/2 HP Motor, 115 Volt AC, Single Gate, Swing Gate Actuator (DKS™ DoorKing® 6003).....		2,031.55	243.04
		Note: Includes one primary operator with a 10' wide gate capacity.			
32 31 11 00-0006	EA	Up To 14' Wide Gate, 1/2 HP Motor, 115 Volt AC, Single Gate, Swing Gate Actuator (DKS™ DoorKing® 6002).....		2,701.26	243.04
		Note: Includes one primary operator with a 14' wide gate capacity.			
32 31 11 00-0007		Dual Gate, Swing Gate Actuator (32 31 11 00-0003)			
32 31 11 00-0008	EA	Up To 10' Wide Gates, 1/2 HP Motor, 115 Volt AC, Dual Gate, Swing Gate Actuator (DKS™ DoorKing® 6003).....		4,063.12	486.07
		Note: Includes one primary and one secondary operator each with a 10' wide gate capacity.			
32 31 11 00-0009	EA	Up To 14' Wide Gates, 1/2 HP Motor, 115 Volt AC, Dual Gate, Swing Gate Actuator (DKS™ DoorKing® 6002).....		5,402.54	486.07
		Note: Includes one primary and one secondary operator each with a 14' wide gate capacity.			
32 31 11 00-0010		Swing Gate Operators (DKS™ DoorKing®) (32 31 11 00-0002)			
32 31 11 00-0011		Single Gate, Swing Gate Operators (32 31 11 00-0010)			
32 31 11 00-0012	EA	400 LB Capacity, Up To 10' Wide Gate, 1/2 HP Motor, 115 Volt AC, Single Gate, Swing Gate Operator (DKS™ DoorKing® 6050).....		4,126.53	243.04
		Note: Includes one primary operator with a 10' wide and 400 LB gate capacity.			



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
32 31 11 00-0013	EA	500 LB Capacity, Up To 14' Wide Gate, 1/2 HP Motor, 115 Volt AC, Single Gate, Swing Gate Operator (DKS™ DoorKing® 6100).....	4,487.15		243.04
		Note: Includes one primary operator with a 14' wide and 500 LB gate capacity.			
32 31 11 00-0014	EA	700 LB Capacity, Up To 18' Wide Gate, 1/2 HP Motor, 115 Volt AC, Single Gate, Swing Gate Operator (DKS™ DoorKing® 6500).....	6,084.14		243.04
		Note: Includes one primary operator with an 18' wide and 700 LB gate capacity.			
		For 208/230/460 Volt AC, Add	322.50		
32 31 11 00-0015	EA	800 LB Capacity, Up To 22' Wide Gate, 1 HP Motor, 115 Volt AC, Single Gate, Swing Gate Operator (DKS™ DoorKing® 6500).....	6,891.23		243.04
		Note: Includes one primary operator with a 22' wide and 800 LB gate capacity.			
		For 208/230/460 Volt AC, Add	322.50		
32 31 11 00-0016		Dual Gate, Swing Gate Operators (32 31 11 00-0010)			
32 31 11 00-0017	EA	400 LB Capacity, Up To 10' Wide Gates, 1/2 HP Motor, 115 Volt AC, Dual Gate, Swing Gate Operator (DKS™ DoorKing® 6050).....	7,308.63		486.07
		Note: Includes one primary and one secondary operator each with a 10' wide and 400 LB gate capacity.			
32 31 11 00-0018	EA	500 LB Capacity, Up To 14' Wide Gates, 1/2 HP Motor, 115 Volt AC, Dual Gate, Swing Gate Operator (DKS™ DoorKing® 6100).....	8,029.85		486.07
		Note: Includes one primary and one secondary operator each with a 14' wide and 500 LB gate capacity.			
32 31 11 00-0019	EA	700 LB Capacity, Up To 14' Wide Gates, 1/2 HP Motor, 115 Volt AC, Dual Gate, Swing Gate Operator (DKS™ DoorKing® 6500).....	11,206.67		486.07
		Note: Includes one primary and one secondary operator each with an 18' wide and 700 LB gate capacity.			
		For 208/230/460 Volt AC, Add	322.50		
32 31 11 00-0020	EA	800 LB Capacity, Up To 22' Wide Gates, 1 HP Motor, 115 Volt AC, Dual Gate, Swing Gate Operator (DKS™ DoorKing® 6500).....	12,975.39		486.07
		Note: Includes one primary and one secondary operator each with a 22' wide and 800 LB gate capacity.			
		For 208/230/460 Volt AC, Add	322.50		
32 31 11 00-0021		Sliding Gate Operators (DKS™ DoorKing®) (32 31 11 00-0002)			
		Note: Includes 20' of chain. See CSI section 32 31 11 00-0030 for additional chain over 20'.			
32 31 11 00-0022	EA	300 LB Capacity, Up To 16' Wide Gate, 1/2 HP Motor, 115 Volt AC, Sliding Gate Operator (DKS™ DoorKing® 9050).....	1,945.08		243.04
		Note: Includes operator, chain brackets, hardware and 20' of #41 chain.			
32 31 11 00-0023	EA	1,000 LB Capacity, Up To 30' Wide Gate, 1/2 HP Motor, 115 Volt AC, Sliding Gate Operator (DKS™ DoorKing® 9100).....	2,705.49		291.64
		Note: Includes operator, chain brackets, hardware and 20' of #41 chain.			
32 31 11 00-0024	EA	1,500 LB Capacity, Up To 45' Wide Gate, 1 HP Motor, 115 Volt AC, Sliding Gate Operator (DKS™ DoorKing® 9150).....	3,324.47		291.64
		Note: Includes operator, chain brackets, hardware and 20' of #40 chain.			
32 31 11 00-0025	EA	3,000 LB Capacity, Up To 100' Wide Gate, 1 HP Motor, 115 Volt AC, Sliding Gate Operator (DKS™ DoorKing® 9210).....	4,328.04		340.25
		Note: Includes operator, chain brackets, hardware and 20' of #50 chain.			
32 31 11 00-0026	EA	2,000 LB Capacity, Up To 100' Wide Gate, 1 HP Motor, 208/230 Volt AC, Variable Speed, Sliding Gate Operator (DKS™ DoorKing® 9220).....	5,283.03		340.25
		Note: Includes operator, chain brackets, hardware and 20' of #50 chain.			
32 31 11 00-0027	EA	5,000 LB Capacity, Up To 100' Wide Gate, 3 HP Motor, 208/230 Volt AC, Variable Speed, Sliding Gate Operator (DKS™ DoorKing® 9230).....	7,184.12		388.86
		Note: Includes operator, chain brackets, hardware and 20' of #60 chain.			
32 31 11 00-0028	EA	5,000 LB Capacity, Up To 100' Wide Gate, 3 HP Motor, 208/230 Volt AC, High Speed, Sliding Gate Operator (DKS™ DoorKing® 9530).....	11,919.28		388.86
		Note: Includes operator, chain brackets, hardware and 20' of #60 chain.			
32 31 11 00-0029	EA	10,000 LB Capacity, Up To 160' Wide Gate, 5 HP Motor, 208/230 Volt AC, High Speed, Sliding Gate Operator (DKS™ DoorKing® 9550).....	20,133.90		437.47
		Note: Includes operator, chain brackets, hardware and 20' of #60 chain.			
32 31 11 00-0030		Accessories For Gate Actuators And Operators (DKS™ DoorKing®) (32 31 11 00-0002)			
32 31 11 00-0031	EA	Single Channel Detector Loop For Gate Actuators And Operators (DKS™ DoorKing® 9410).....	682.83		
32 31 11 00-0032	EA	Two Channel Detector Loop For Gate Actuators And Operators (DKS™ DoorKing® 9409).....	1,329.61		
32 31 11 00-0033	EA	Heater Kit For Gate Actuators And Operators (DKS™ DoorKing® 1601).....	881.31		
32 31 11 00-0034	EA	Photoelectric Eye For Gate Actuators And Operators (DKS™ DoorKing® 8080-031).....	961.35		
32 31 11 00-0035	EA	Reversing Edge Sensor For Gate Actuators And Operators (DKS™ DoorKing® 8080-020).....	858.32		
32 31 11 00-0036	EA	Post Mount Base Plate For Gate Actuators And Operators (DKS™ DoorKing® 9310).....	609.32		
32 31 11 00-0037	LF	#40 Chain For Sliding Gate Operators.....	6.04		
32 31 11 00-0038	LF	#41 Chain For Sliding Gate Operators.....	6.30		
32 31 11 00-0039	LF	#50 Chain For Sliding Gate Operators.....	8.02		
32 31 11 00-0040	LF	#60 Chain For Sliding Gate Operators.....	12.27		
32 31 11 00-0041	EA	Exterior Keypad Gate Operator (Linear AK-11).....	729.79		153.09
32 31 11 00-0042		Sliding Gate Operator (LiftMaster) (32 31 11 00-0001)			
32 31 11 00-0043	EA	Up To 1,500 LB Capacity, 120/230 Volt, Single Phase, Sliding Gate Operator With 24 Volt DC Motor (Liftmaster® CSL24U).....	2,904.11		297.65
		Note: Includes 30' Chain, Retro-Reflective Photoelectric Sensor and Reflector Hoods (LMRRUL) and 5' Resistive Safety Edge (S505AL).			
		For Monitored Wireless Edge Receiver And Transmitter Option (Liftmaster LMWEKITU), Add	191.03		
		For Plug-In Loop Detector Option (Liftmaster LOOPDETLM), Add	136.74		
		For LED Strobe Light With Siren (Liftmaster SL-1301-SAQ), Add	67.34		
		For 10 Watt Solar Panel (Liftmaster SP10W12V), Add	270.67		
		For Each Additional 10' Chain, Add	40.54		

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**32 31 13 Chain Link Fences and Gates (32 31)****32 31 13 13 Chain Link Fences and Gates (32 31 13)****32 31 13 13-0001 Post Holes (32 31 13 13)**

Note: Excludes spreading of excess material on site or loading and removal of excavated material from site. See CSI section 02 41 19 13-0081 for core drilling in concrete, 02 41 19 13-0219 for core drilling in asphalt.

32 31 13 13-0002 Auger By Machine Fence Post Hole In Soil (32 31 13 13-0001)

32 31 13 13-0003	VLF	Up To 2-1/2" Diameter Hole, Auger By Machine Fence Post Hole In Soil	10.58
32 31 13 13-0004	VLF	2-1/2" Diameter Hole, Auger By Machine Fence Post Hole In Soil	11.90
32 31 13 13-0005	VLF	3" Diameter Hole, Auger By Machine Fence Post Hole In Soil	14.11
32 31 13 13-0006	VLF	4" Diameter Hole, Auger By Machine Fence Post Hole In Soil	15.87
32 31 13 13-0007	VLF	6" Diameter Hole, Auger By Machine Fence Post Hole In Soil	17.31
32 31 13 13-0008	VLF	8" Diameter Hole, Auger By Machine Fence Post Hole In Soil	19.05
32 31 13 13-0009	VLF	10" Diameter Hole, Auger By Machine Fence Post Hole In Soil	21.15
32 31 13 13-0010	VLF	12" Diameter Hole, Auger By Machine Fence Post Hole In Soil	23.81
32 31 13 13-0011	VLF	18" Diameter Hole, Auger By Machine Fence Post Hole In Soil	27.21
32 31 13 13-0012	VLF	24" Diameter Hole, Auger By Machine Fence Post Hole In Soil	31.74
32 31 13 13-0013	VLF	30" Diameter Hole, Auger By Machine Fence Post Hole In Soil	38.08
32 31 13 13-0014	VLF	36" Diameter Hole, Auger By Machine Fence Post Hole In Soil	47.60

32 31 13 13-0015 Post Hole In Rock (32 31 13 13-0001)

32 31 13 13-0016	CF	Jackhammer Post Hole In Rock	80.35
32 31 13 13-0017	CF	Rock Drill Post Hole In Rock	21.99

32 31 13 13-0018 Fill For Post Holes (32 31 13 13-0001)**32 31 13 13-0019 Concrete Fill For Post Holes (32 31 13 13-0018)**

32 31 13 13-0020	VLF	Up To 2-1/2" Diameter, Concrete Fill For Post Hole	6.44
32 31 13 13-0021	VLF	2-1/2" Diameter, Concrete Fill For Post Hole	8.27
32 31 13 13-0022	VLF	3" Diameter, Concrete Fill For Post Hole	9.11
32 31 13 13-0023	VLF	4" Diameter, Concrete Fill For Post Hole	10.47
32 31 13 13-0024	VLF	6" Diameter, Concrete Fill For Post Hole	14.75
32 31 13 13-0025	VLF	8" Diameter, Concrete Fill For Post Hole	19.70
32 31 13 13-0026	VLF	10" Diameter, Concrete Fill For Post Hole	24.09
32 31 13 13-0027	VLF	12" Diameter, Concrete Fill For Post Hole	28.10
32 31 13 13-0028	VLF	18" Diameter, Concrete Fill For Post Hole	38.27
32 31 13 13-0029	VLF	24" Diameter, Concrete Fill For Post Hole	47.49
32 31 13 13-0030	VLF	30" Diameter, Concrete Fill For Post Hole	56.47
32 31 13 13-0031	VLF	36" Diameter, Concrete Fill For Post Hole	65.80

32 31 13 13-0032 Grout Fill For Post Holes (32 31 13 13-0018)

32 31 13 13-0033	VLF	Up To 2-1/2" Diameter, Grout Fill For Post Hole	7.63
32 31 13 13-0034	VLF	2-1/2" Diameter, Grout Fill For Post Hole	9.82
32 31 13 13-0035	VLF	3" Diameter, Grout Fill For Post Hole	10.70
32 31 13 13-0036	VLF	4" Diameter, Grout Fill For Post Hole	12.03
32 31 13 13-0037	VLF	6" Diameter, Grout Fill For Post Hole	16.80
32 31 13 13-0038	VLF	8" Diameter, Grout Fill For Post Hole	22.42
32 31 13 13-0039	VLF	10" Diameter, Grout Fill For Post Hole	27.33
32 31 13 13-0040	VLF	12" Diameter, Grout Fill For Post Hole	31.71
32 31 13 13-0041	VLF	18" Diameter, Grout Fill For Post Hole	42.41
32 31 13 13-0042	VLF	24" Diameter, Grout Fill For Post Hole	51.83
32 31 13 13-0043	VLF	30" Diameter, Grout Fill For Post Hole	60.93
32 31 13 13-0044	VLF	36" Diameter, Grout Fill For Post Hole	70.27

32 31 13 13-0045 Compacted Earth Fill For Post Holes (32 31 13 13-0018)

32 31 13 13-0046	VLF	Up To 2-1/2" Diameter, Compacted Earth Fill For Post Hole	5.41
32 31 13 13-0047	VLF	2-1/2" Diameter, Compacted Earth Fill For Post Hole	7.04
32 31 13 13-0048	VLF	3" Diameter, Compacted Earth Fill For Post Hole	7.36
32 31 13 13-0049	VLF	4" Diameter, Compacted Earth Fill For Post Hole	7.58
32 31 13 13-0050	VLF	6" Diameter, Compacted Earth Fill For Post Hole	10.12
32 31 13 13-0051	VLF	8" Diameter, Compacted Earth Fill For Post Hole	13.50
32 31 13 13-0052	VLF	10" Diameter, Compacted Earth Fill For Post Hole	16.20
32 31 13 13-0053	VLF	12" Diameter, Compacted Earth Fill For Post Hole	18.37
32 31 13 13-0054	VLF	18" Diameter, Compacted Earth Fill For Post Hole	22.38
32 31 13 13-0055	VLF	24" Diameter, Compacted Earth Fill For Post Hole	25.12
32 31 13 13-0056	VLF	30" Diameter, Compacted Earth Fill For Post Hole	27.54
32 31 13 13-0057	VLF	36" Diameter, Compacted Earth Fill For Post Hole	29.71

32 31 13 13-0058 Fence Posts (32 31 13 13)

Note: Demolition excludes concrete footing removal on posts and excavation. See CSI section 31 23 16 36-0009 for hand excavation for footing removal (where required), 32 31 13 13-0001 for drilling for augering holes and backfill.

32 31 13 13-0059 Fence Posts (32 31 13 13-0058)



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 31 13 13-0060	1-7/8" H-Beam Post Without Top Rail Fitting, Galvanized Steel <small>(32 31 13 13-0059)</small>		
	Note: Includes cap and accessories.		
32 31 13 13-0061	LF 1-7/8" Galvanized H-beam Post, Up To 6' In Length	20.57	3.13
	For Each Top Rail Fitting, Add	0.85	
32 31 13 13-0062	LF 1-7/8" Galvanized H-beam Post, 7' To 10' In Length	19.69	2.66
	For Each Top Rail Fitting, Add	0.85	
32 31 13 13-0063	LF 1-7/8" Galvanized H-beam Post, 11' To 15' In Length	18.60	2.21
	For Each Top Rail Fitting, Add	0.85	
32 31 13 13-0064	LF 1-7/8" Galvanized H-beam Post, 16' To 20' In Length	17.73	1.74
	For Each Top Rail Fitting, Add	0.85	
32 31 13 13-0065	LF 1-7/8" Galvanized H-beam Post, 21' To 24' In Length	17.15	1.51
	For Each Top Rail Fitting, Add	0.85	
32 31 13 13-0066	LF 1-7/8" Galvanized H-beam Post, >24' In Length	16.24	1.04
	For Each Top Rail Fitting, Add	0.85	
32 31 13 13-0067	Post Without Top Rail Fitting, Galvanized Steel (1.66" Nominal) <small>(32 31 13 13-0059)</small>		
	Note: 1-5/8" outside diameter, Schedule 40. Includes cap and accessories.		
32 31 13 13-0068	LF Up To 6' In Length, 1-5/8" Outside Diameter Galvanized Steel Post	14.07	2.90
	For Each Top Rail Fitting, Add	0.85	
	For Each Single Barbed Wire Arm, Add	1.90	
	For Each Double Barbed Wire Arm, Add	3.40	
	For SS40 (Hot-Dip Galvanized And Chromated), Add	2.07	
	For Vinyl Coated, Add	4.96	
	For Powder Coated, Add	6.62	
	For Aluminum Coated, Add	10.34	
	For Schedule 20, Deduct	-1.65	
	For Schedule 80, Add	4.55	
32 31 13 13-0069	LF 7' To 10' In Length, 1-5/8" Outside Diameter Galvanized Steel Post	13.05	2.44
	For Each Top Rail Fitting, Add	0.85	
	For Each Single Barbed Wire Arm, Add	1.90	
	For Each Double Barbed Wire Arm, Add	3.40	
	For SS40 (Hot-Dip Galvanized And Chromated), Add	2.04	
	For Vinyl Coated, Add	4.89	
	For Powder Coated, Add	6.52	
	For Aluminum Coated, Add	10.19	
	For Schedule 20, Deduct	-1.63	
	For Schedule 80, Add	4.40	
32 31 13 13-0070	LF 11' To 15' In Length, 1-5/8" Outside Diameter Galvanized Steel Post	11.99	1.97
	For Each Top Rail Fitting, Add	0.85	
	For Each Single Barbed Wire Arm, Add	1.90	
	For Each Double Barbed Wire Arm, Add	3.40	
	For SS40 (Hot-Dip Galvanized And Chromated), Add	2.02	
	For Vinyl Coated, Add	4.85	
	For Powder Coated, Add	6.47	
	For Aluminum Coated, Add	10.11	
	For Schedule 20, Deduct	-1.62	
	For Schedule 80, Add	4.27	
32 31 13 13-0071	LF 16' To 20' In Length, 1-5/8" Outside Diameter Galvanized Steel Post	11.19	1.51
	For Each Top Rail Fitting, Add	0.85	
	For Each Single Barbed Wire Arm, Add	1.90	
	For Each Double Barbed Wire Arm, Add	3.40	
	For SS40 (Hot-Dip Galvanized And Chromated), Add	2.02	
	For Vinyl Coated, Add	4.84	
	For Powder Coated, Add	6.45	
	For Aluminum Coated, Add	10.08	
	For Schedule 20, Deduct	-1.61	
	For Schedule 80, Add	4.18	
32 31 13 13-0072	LF 21' To 24' In Length, 1-5/8" Outside Diameter Galvanized Steel Post	10.67	1.28
	For Each Top Rail Fitting, Add	0.85	
	For Each Single Barbed Wire Arm, Add	1.90	
	For Each Double Barbed Wire Arm, Add	3.40	
	For SS40 (Hot-Dip Galvanized And Chromated), Add	2.01	
	For Vinyl Coated, Add	4.83	
	For Powder Coated, Add	6.44	
	For Aluminum Coated, Add	10.06	
	For Schedule 20, Deduct	-1.61	
	For Schedule 80, Add	4.13	
32 31 13 13-0073	LF >24' In Length, 1-5/8" Outside Diameter Galvanized Steel Post	10.09	1.04
	For Each Top Rail Fitting, Add	0.85	
	For Each Single Barbed Wire Arm, Add	1.90	
	For Each Double Barbed Wire Arm, Add	3.40	
	For SS40 (Hot-Dip Galvanized And Chromated), Add	2.01	
	For Vinyl Coated, Add	4.83	
	For Powder Coated, Add	6.44	
	For Aluminum Coated, Add	10.06	
	For Schedule 20, Deduct	-1.61	
	For Schedule 80, Add	4.07	
32 31 13 13-0074	Post Without Top Rail Fitting, Galvanized Steel (1.90" Nominal) <small>(32 31 13 13-0059)</small>		
	Note: 2" outside diameter, Schedule 40. Includes cap and accessories.		

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 13 13-0075	LF 2" Outside Diameter Galvanized Steel Post, Up To 6' In Length	16.11	3.02
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	2.53	
	<i>For Vinyl Coated, Add</i>	6.07	
	<i>For Powder Coated, Add</i>	8.09	
	<i>For Aluminum Coated, Add</i>	12.64	
	<i>For Schedule 20, Deduct</i>	-2.02	
	<i>For Schedule 80, Add</i>	5.45	
32 31 13 13-0076	LF 2" Outside Diameter Galvanized Steel Post, 7' To 10' In Length	15.16	2.55
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	2.49	
	<i>For Vinyl Coated, Add</i>	5.98	
	<i>For Powder Coated, Add</i>	7.98	
	<i>For Aluminum Coated, Add</i>	12.46	
	<i>For Schedule 20, Deduct</i>	-1.99	
	<i>For Schedule 80, Add</i>	5.30	
32 31 13 13-0077	LF 2" Outside Diameter Galvanized Steel Post, 11' To 15' In Length	14.03	2.09
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	2.47	
	<i>For Vinyl Coated, Add</i>	5.93	
	<i>For Powder Coated, Add</i>	7.91	
	<i>For Aluminum Coated, Add</i>	12.36	
	<i>For Schedule 20, Deduct</i>	-1.98	
	<i>For Schedule 80, Add</i>	5.16	
32 31 13 13-0078	LF 2" Outside Diameter Galvanized Steel Post, 16' To 20' In Length	13.17	1.62
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	2.46	
	<i>For Vinyl Coated, Add</i>	5.91	
	<i>For Powder Coated, Add</i>	7.88	
	<i>For Aluminum Coated, Add</i>	12.31	
	<i>For Schedule 20, Deduct</i>	-1.97	
	<i>For Schedule 80, Add</i>	5.06	
32 31 13 13-0079	LF 2" Outside Diameter Galvanized Steel Post, 21' To 24' In Length	12.60	1.39
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	2.46	
	<i>For Vinyl Coated, Add</i>	5.90	
	<i>For Powder Coated, Add</i>	7.87	
	<i>For Aluminum Coated, Add</i>	12.30	
	<i>For Schedule 20, Deduct</i>	-1.97	
	<i>For Schedule 80, Add</i>	5.00	
32 31 13 13-0080	LF 2" Outside Diameter Galvanized Steel Post, >24' In Length	12.07	1.16
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	2.46	
	<i>For Vinyl Coated, Add</i>	5.90	
	<i>For Powder Coated, Add</i>	7.86	
	<i>For Aluminum Coated, Add</i>	12.29	
	<i>For Schedule 20, Deduct</i>	-1.97	
	<i>For Schedule 80, Add</i>	4.94	
32 31 13 13-0081	Post Without Top Rail Fitting, Galvanized Steel (2.375" Nominal) <small>(32 31 13 13-0059)</small>		
	Note: 2-1/2" outside diameter, Schedule 40. Includes cap and accessories.		
32 31 13 13-0082	LF 2-1/2" Outside Diameter Galvanized Steel Post, Up To 6' In Length	19.69	3.25
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	3.34	
	<i>For Vinyl Coated, Add</i>	8.02	
	<i>For Powder Coated, Add</i>	10.70	
	<i>For Aluminum Coated, Add</i>	16.71	
	<i>For Schedule 20, Deduct</i>	-2.67	
	<i>For Schedule 80, Add</i>	7.05	
32 31 13 13-0083	LF 2-1/2" Outside Diameter Galvanized Steel Post, 7' To 10' In Length	18.64	2.78
	<i>For Each Top Rail Fitting, Add</i>	1.35	
	<i>For Each Single Barbed Wire Arm, Add</i>	2.65	
	<i>For Each Double Barbed Wire Arm, Add</i>	4.88	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	3.30	
	<i>For Vinyl Coated, Add</i>	7.92	
	<i>For Powder Coated, Add</i>	10.56	
	<i>For Aluminum Coated, Add</i>	16.50	
	<i>For Schedule 20, Deduct</i>	-2.64	
	<i>For Schedule 80, Add</i>	6.88	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0084 LF 2-1/2" Outside Diameter Galvanized Steel Post, 11' To 15' In Length.....	17.46	2.21
For Each Top Rail Fitting, Add	1.35	
For Each Single Barbed Wire Arm, Add	2.65	
For Each Double Barbed Wire Arm, Add	4.88	
For SS40 (Hot-Dip Galvanized And Chromated), Add	3.28	
For Vinyl Coated, Add	7.87	
For Powder Coated, Add	10.49	
For Aluminum Coated, Add	16.39	
For Schedule 20, Deduct	-2.62	
For Schedule 80, Add	6.73	
32 31 13 13-0085 LF 2-1/2" Outside Diameter Galvanized Steel Post, 16' To 20' In Length.....	16.55	1.74
For Each Top Rail Fitting, Add	1.35	
For Each Single Barbed Wire Arm, Add	2.65	
For Each Double Barbed Wire Arm, Add	4.88	
For SS40 (Hot-Dip Galvanized And Chromated), Add	3.27	
For Vinyl Coated, Add	7.84	
For Powder Coated, Add	10.46	
For Aluminum Coated, Add	16.34	
For Schedule 20, Deduct	-2.61	
For Schedule 80, Add	6.62	
32 31 13 13-0086 LF 2-1/2" Outside Diameter Galvanized Steel Post, 21 To 24' In Length.....	15.95	1.51
For Each Top Rail Fitting, Add	1.35	
For Each Single Barbed Wire Arm, Add	2.65	
For Each Double Barbed Wire Arm, Add	4.88	
For SS40 (Hot-Dip Galvanized And Chromated), Add	3.26	
For Vinyl Coated, Add	7.83	
For Powder Coated, Add	10.44	
For Aluminum Coated, Add	16.31	
For Schedule 20, Deduct	-2.61	
For Schedule 80, Add	6.55	
32 31 13 13-0087 LF 2-1/2" Outside Diameter Galvanized Steel Post, >24' In Length.....	15.40	1.16
For Each Top Rail Fitting, Add	1.35	
For Each Single Barbed Wire Arm, Add	2.65	
For Each Double Barbed Wire Arm, Add	4.88	
For SS40 (Hot-Dip Galvanized And Chromated), Add	3.26	
For Vinyl Coated, Add	7.83	
For Powder Coated, Add	10.44	
For Aluminum Coated, Add	16.31	
For Schedule 20, Deduct	-2.61	
For Schedule 80, Add	6.50	
32 31 13 13-0088 Post Without Top Rail Fitting, Galvanized Steel (2.875" Nominal) <small>(32 31 13 13-0059)</small>		
Note: 3" outside diameter, Schedule 40. Includes cap and accessories.		
32 31 13 13-0089 LF 3" Outside Diameter Galvanized Steel Post, Up To 6' In Length.....	27.19	3.48
For Each Top Rail Fitting, Add	1.85	
For Each Single Barbed Wire Arm, Add	3.85	
For Each Double Barbed Wire Arm, Add	7.05	
For SS40 (Hot-Dip Galvanized And Chromated), Add	5.06	
For Vinyl Coated, Add	12.14	
For Powder Coated, Add	16.18	
For Aluminum Coated, Add	25.29	
For Schedule 20, Deduct	-4.05	
For Schedule 80, Add	10.41	
32 31 13 13-0090 LF 3" Outside Diameter Galvanized Steel Post, 7' To 10' In Length.....	25.88	3.02
For Each Top Rail Fitting, Add	1.85	
For Each Single Barbed Wire Arm, Add	3.85	
For Each Double Barbed Wire Arm, Add	7.05	
For SS40 (Hot-Dip Galvanized And Chromated), Add	4.97	
For Vinyl Coated, Add	11.93	
For Powder Coated, Add	15.90	
For Aluminum Coated, Add	24.85	
For Schedule 20, Deduct	-3.98	
For Schedule 80, Add	10.14	
32 31 13 13-0091 LF 3" Outside Diameter Galvanized Steel Post, 11' To 15' In Length.....	24.54	2.44
For Each Top Rail Fitting, Add	1.85	
For Each Single Barbed Wire Arm, Add	3.85	
For Each Double Barbed Wire Arm, Add	7.05	
For SS40 (Hot-Dip Galvanized And Chromated), Add	4.93	
For Vinyl Coated, Add	11.82	
For Powder Coated, Add	15.76	
For Aluminum Coated, Add	24.63	
For Schedule 20, Deduct	-3.94	
For Schedule 80, Add	9.94	
32 31 13 13-0092 LF 3" Outside Diameter Galvanized Steel Post, 16' To 20' In Length.....	23.48	1.97
For Each Top Rail Fitting, Add	1.85	
For Each Single Barbed Wire Arm, Add	3.85	
For Each Double Barbed Wire Arm, Add	7.05	
For SS40 (Hot-Dip Galvanized And Chromated), Add	4.91	
For Vinyl Coated, Add	11.77	
For Powder Coated, Add	15.70	
For Aluminum Coated, Add	24.53	
For Schedule 20, Deduct	-3.92	
For Schedule 80, Add	9.80	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

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MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0093	LF 3" Outside Diameter Galvanized Steel Post, 21' To 24' In Length	22.79	1.62
	<i>For Each Top Rail Fitting, Add</i>	1.85	
	<i>For Each Single Barbed Wire Arm, Add</i>	3.85	
	<i>For Each Double Barbed Wire Arm, Add</i>	7.05	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	4.89	
	<i>For Vinyl Coated, Add</i>	11.74	
	<i>For Powder Coated, Add</i>	15.66	
	<i>For Aluminum Coated, Add</i>	24.46	
	<i>For Schedule 20, Deduct</i>	-3.91	
	<i>For Schedule 80, Add</i>	9.72	
32 31 13 13-0094	LF 3" Outside Diameter Galvanized Steel Post, >24' In Length	22.18	1.28
	<i>For Each Top Rail Fitting, Add</i>	1.85	
	<i>For Each Single Barbed Wire Arm, Add</i>	3.85	
	<i>For Each Double Barbed Wire Arm, Add</i>	7.05	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	4.89	
	<i>For Vinyl Coated, Add</i>	11.74	
	<i>For Powder Coated, Add</i>	15.65	
	<i>For Aluminum Coated, Add</i>	24.45	
	<i>For Schedule 20, Deduct</i>	-3.91	
	<i>For Schedule 80, Add</i>	9.65	
32 31 13 13-0095	Post Without Top Rail Fitting, Galvanized Steel, (4.00" Nominal) <small>(32 31 13 13-0059)</small>		
	Note: 4" outside diameter, Schedule 40. Includes cap and accessories.		
32 31 13 13-0096	LF 4" Outside Diameter Galvanized Steel Post, Up To 6' In Length	40.35	3.71
	<i>For Each Top Rail Fitting, Add</i>	2.60	
	<i>For Each Single Barbed Wire Arm, Add</i>	5.10	
	<i>For Each Double Barbed Wire Arm, Add</i>	11.25	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	8.26	
	<i>For Vinyl Coated, Add</i>	19.82	
	<i>For Powder Coated, Add</i>	26.42	
	<i>For Aluminum Coated, Add</i>	41.29	
	<i>For Schedule 20, Deduct</i>	-6.61	
	<i>For Schedule 80, Add</i>	16.59	
32 31 13 13-0097	LF 4" Outside Diameter Galvanized Steel Post, 7' To 10' In Length	38.50	3.02
	<i>For Each Top Rail Fitting, Add</i>	2.60	
	<i>For Each Single Barbed Wire Arm, Add</i>	5.10	
	<i>For Each Double Barbed Wire Arm, Add</i>	11.25	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	8.10	
	<i>For Vinyl Coated, Add</i>	19.44	
	<i>For Powder Coated, Add</i>	25.92	
	<i>For Aluminum Coated, Add</i>	40.50	
	<i>For Schedule 20, Deduct</i>	-6.48	
	<i>For Schedule 80, Add</i>	16.16	
32 31 13 13-0098	LF 4" Outside Diameter Galvanized Steel Post, 11' To 15' In Length	37.16	2.55
	<i>For Each Top Rail Fitting, Add</i>	2.60	
	<i>For Each Single Barbed Wire Arm, Add</i>	5.10	
	<i>For Each Double Barbed Wire Arm, Add</i>	11.25	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	8.02	
	<i>For Vinyl Coated, Add</i>	19.25	
	<i>For Powder Coated, Add</i>	25.66	
	<i>For Aluminum Coated, Add</i>	40.10	
	<i>For Schedule 20, Deduct</i>	-6.42	
	<i>For Schedule 80, Add</i>	15.91	
32 31 13 13-0099	LF 4" Outside Diameter Galvanized Steel Post, 16' To 20' In Length	35.99	2.09
	<i>For Each Top Rail Fitting, Add</i>	2.60	
	<i>For Each Single Barbed Wire Arm, Add</i>	5.10	
	<i>For Each Double Barbed Wire Arm, Add</i>	11.25	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	7.98	
	<i>For Vinyl Coated, Add</i>	19.15	
	<i>For Powder Coated, Add</i>	25.54	
	<i>For Aluminum Coated, Add</i>	39.90	
	<i>For Schedule 20, Deduct</i>	-6.38	
	<i>For Schedule 80, Add</i>	15.73	
32 31 13 13-0100	LF 4" Outside Diameter Galvanized Steel Post, 21' To 24' In Length	35.92	2.09
	<i>For Each Top Rail Fitting, Add</i>	2.60	
	<i>For Each Single Barbed Wire Arm, Add</i>	5.10	
	<i>For Each Double Barbed Wire Arm, Add</i>	11.25	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	7.96	
	<i>For Vinyl Coated, Add</i>	19.11	
	<i>For Powder Coated, Add</i>	25.48	
	<i>For Aluminum Coated, Add</i>	39.81	
	<i>For Schedule 20, Deduct</i>	-6.37	
	<i>For Schedule 80, Add</i>	15.70	
32 31 13 13-0101	LF 4" Outside Diameter Galvanized Steel Post, >24' In Length	34.73	1.51
	<i>For Each Top Rail Fitting, Add</i>	2.60	
	<i>For Each Single Barbed Wire Arm, Add</i>	5.10	
	<i>For Each Double Barbed Wire Arm, Add</i>	11.25	
	<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	7.96	
	<i>For Vinyl Coated, Add</i>	19.10	
	<i>For Powder Coated, Add</i>	25.46	
	<i>For Aluminum Coated, Add</i>	39.79	
	<i>For Schedule 20, Deduct</i>	-6.37	
	<i>For Schedule 80, Add</i>	15.57	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0102 Post Without Top Rail Fitting, Galvanized Steel (6.625" Nominal) <small>(32 31 13 13-0059)</small>		
<small>Note: 6-5/8" outside diameter, Schedule 40. Includes cap and accessories.</small>		
32 31 13 13-0103 LF 6-5/8" Outside Diameter Galvanized Steel Post, Up To 6' In Length	80.79	4.06
<i>For Each Top Rail Fitting, Add</i>	4.55	
<i>For Each Single Barbed Wire Arm, Add</i>	7.15	
<i>For Each Double Barbed Wire Arm, Add</i>	14.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	18.17	
<i>For Vinyl Coated, Add</i>	43.60	
<i>For Powder Coated, Add</i>	58.13	
<i>For Aluminum Coated, Add</i>	90.83	
<i>For Schedule 20, Deduct</i>	-14.53	
<i>For Schedule 80, Add</i>	35.69	
32 31 13 13-0104 LF 6-5/8" Outside Diameter Galvanized Steel Post, 7' To 10' In Length	77.10	3.36
<i>For Each Top Rail Fitting, Add</i>	4.55	
<i>For Each Single Barbed Wire Arm, Add</i>	7.15	
<i>For Each Double Barbed Wire Arm, Add</i>	14.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	17.57	
<i>For Vinyl Coated, Add</i>	42.17	
<i>For Powder Coated, Add</i>	56.22	
<i>For Aluminum Coated, Add</i>	87.85	
<i>For Schedule 20, Deduct</i>	-14.06	
<i>For Schedule 80, Add</i>	34.42	
32 31 13 13-0105 LF 6-5/8" Outside Diameter Galvanized Steel Post, 11' To 15' In Length	74.74	2.78
<i>For Each Top Rail Fitting, Add</i>	4.55	
<i>For Each Single Barbed Wire Arm, Add</i>	7.15	
<i>For Each Double Barbed Wire Arm, Add</i>	14.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	17.27	
<i>For Vinyl Coated, Add</i>	41.45	
<i>For Powder Coated, Add</i>	55.26	
<i>For Aluminum Coated, Add</i>	86.35	
<i>For Schedule 20, Deduct</i>	-13.82	
<i>For Schedule 80, Add</i>	33.72	
32 31 13 13-0106 LF 6-5/8" Outside Diameter Galvanized Steel Post, 16' To 20' In Length	73.00	2.21
<i>For Each Top Rail Fitting, Add</i>	4.55	
<i>For Each Single Barbed Wire Arm, Add</i>	7.15	
<i>For Each Double Barbed Wire Arm, Add</i>	14.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	17.12	
<i>For Vinyl Coated, Add</i>	41.09	
<i>For Powder Coated, Add</i>	54.79	
<i>For Aluminum Coated, Add</i>	85.61	
<i>For Schedule 20, Deduct</i>	-13.70	
<i>For Schedule 80, Add</i>	33.33	
32 31 13 13-0107 LF 6-5/8" Outside Diameter Galvanized Steel Post, 21' To 24' In Length	72.05	1.97
<i>For Each Top Rail Fitting, Add</i>	4.55	
<i>For Each Single Barbed Wire Arm, Add</i>	7.15	
<i>For Each Double Barbed Wire Arm, Add</i>	14.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	17.05	
<i>For Vinyl Coated, Add</i>	40.91	
<i>For Powder Coated, Add</i>	54.55	
<i>For Aluminum Coated, Add</i>	85.24	
<i>For Schedule 20, Deduct</i>	-13.64	
<i>For Schedule 80, Add</i>	33.12	
32 31 13 13-0108 LF 6-5/8" Outside Diameter Galvanized Steel Post, >24' In Length	71.35	1.62
<i>For Each Top Rail Fitting, Add</i>	4.55	
<i>For Each Single Barbed Wire Arm, Add</i>	7.15	
<i>For Each Double Barbed Wire Arm, Add</i>	14.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	17.03	
<i>For Vinyl Coated, Add</i>	40.88	
<i>For Powder Coated, Add</i>	54.50	
<i>For Aluminum Coated, Add</i>	85.16	
<i>For Schedule 20, Deduct</i>	-13.63	
<i>For Schedule 80, Add</i>	33.02	
32 31 13 13-0109 Post Without Top Rail Fitting, Galvanized Steel (8.625" Nominal) <small>(32 31 13 13-0059)</small>		
<small>Note: 8-5/8" outside diameter, Schedule 40. Includes cap and accessories.</small>		
32 31 13 13-0110 LF 8-5/8" Outside Diameter Galvanized Steel Post, Up To 6' In Length	157.55	4.53
<i>For Each Top Rail Fitting, Add</i>	7.50	
<i>For Each Single Barbed Wire Arm, Add</i>	9.15	
<i>For Each Double Barbed Wire Arm, Add</i>	18.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	37.13	
<i>For Vinyl Coated, Add</i>	89.11	
<i>For Powder Coated, Add</i>	118.82	
<i>For Aluminum Coated, Add</i>	185.65	
<i>For Schedule 20, Deduct</i>	-29.70	
<i>For Schedule 80, Add</i>	72.19	
32 31 13 13-0111 LF 8-5/8" Outside Diameter Galvanized Steel Post, 7' To 10' In Length	151.34	3.83
<i>For Each Top Rail Fitting, Add</i>	7.50	
<i>For Each Single Barbed Wire Arm, Add</i>	9.15	
<i>For Each Double Barbed Wire Arm, Add</i>	18.95	
<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	35.95	
<i>For Vinyl Coated, Add</i>	86.27	
<i>For Powder Coated, Add</i>	115.02	
<i>For Aluminum Coated, Add</i>	179.73	
<i>For Schedule 20, Deduct</i>	-28.76	
<i>For Schedule 80, Add</i>	69.77	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	32 31 13 13-0112	LF	8-5/8" Outside Diameter Galvanized Steel Post, 11' To 15' In Length	147.68	3.13
			<i>For Each Top Rail Fitting, Add</i>	7.50	
			<i>For Each Single Barbed Wire Arm, Add</i>	9.15	
			<i>For Each Double Barbed Wire Arm, Add</i>	18.95	
			<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	35.35	
			<i>For Vinyl Coated, Add</i>	84.85	
			<i>For Powder Coated, Add</i>	113.13	
			<i>For Aluminum Coated, Add</i>	176.76	
			<i>For Schedule 20, Deduct</i>	-28.28	
			<i>For Schedule 80, Add</i>	68.50	
	32 31 13 13-0113	LF	8-5/8" Outside Diameter Galvanized Steel Post, 16' To 20' In Length	145.19	2.44
			<i>For Each Top Rail Fitting, Add</i>	7.50	
			<i>For Each Single Barbed Wire Arm, Add</i>	9.15	
			<i>For Each Double Barbed Wire Arm, Add</i>	18.95	
			<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	35.06	
			<i>For Vinyl Coated, Add</i>	84.13	
			<i>For Powder Coated, Add</i>	112.18	
			<i>For Aluminum Coated, Add</i>	175.28	
			<i>For Schedule 20, Deduct</i>	-28.04	
			<i>For Schedule 80, Add</i>	67.80	
	32 31 13 13-0114	LF	8-5/8" Outside Diameter Galvanized Steel Post, 21' To 24' In Length	143.92	2.09
			<i>For Each Top Rail Fitting, Add</i>	7.50	
			<i>For Each Single Barbed Wire Arm, Add</i>	9.15	
			<i>For Each Double Barbed Wire Arm, Add</i>	18.95	
			<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	34.91	
			<i>For Vinyl Coated, Add</i>	83.78	
			<i>For Powder Coated, Add</i>	111.70	
			<i>For Aluminum Coated, Add</i>	174.54	
			<i>For Schedule 20, Deduct</i>	-27.93	
			<i>For Schedule 80, Add</i>	67.45	
	32 31 13 13-0115	LF	8-5/8" Outside Diameter Galvanized Steel Post, >24' In Length	143.09	1.74
			<i>For Each Top Rail Fitting, Add</i>	7.50	
			<i>For Each Single Barbed Wire Arm, Add</i>	9.15	
			<i>For Each Double Barbed Wire Arm, Add</i>	18.95	
			<i>For SS40 (Hot-Dip Galvanized And Chromated), Add</i>	34.88	
			<i>For Vinyl Coated, Add</i>	83.71	
			<i>For Powder Coated, Add</i>	111.61	
			<i>For Aluminum Coated, Add</i>	174.39	
			<i>For Schedule 20, Deduct</i>	-27.90	
			<i>For Schedule 80, Add</i>	67.32	
	32 31 13 13-0116		Driven Post Supports <small>(32 31 13 13)</small>		
			Note: OZ-Post.		
	32 31 13 13-0117		Driven Post Support For Round Chain Link Fence Posts <small>(32 31 13 13-0116)</small>		
	32 31 13 13-0118	EA	26" Driven Post Support For 1-5/8" Round Chain Link Fence Post	74.94	
			Note: OZ-Post GB-700.		
	32 31 13 13-0119	EA	26" Driven Post Support For 1-7/8" To 2" Round Chain Link Fence Post.....	74.94	
			Note: OZ-Post HB-700.		
	32 31 13 13-0120	EA	26" Driven Post Support For 2-3/8" To 2-1/2" Round Chain Link Fence Post.....	76.97	
			Note: OZ-Post IS-600.		
	32 31 13 13-0121	EA	32" Driven Post Support For 2-3/8" To 2-1/2" Round Chain Link Fence Post.....	92.37	
			Note: OZ-Post ISW-850.		
	32 31 13 13-0122		Driven Post Support For Square Ornamental Fence Posts <small>(32 31 13 13-0116)</small>		
	32 31 13 13-0123	EA	34" Driven Post Support For 1-3/4" Square Ornamental Fence Post.....	86.28	
			Note: OZ-Post C175-850.		
	32 31 13 13-0124	EA	24" Driven Post Support For 2" Square Ornamental Fence Post.....	83.23	
			Note: OZ-Post I2-600.		
	32 31 13 13-0125	EA	34" Driven Post Support For 2" Square Ornamental Fence Post.....	86.89	
			Note: OZ-Post I2-850.		
	32 31 13 13-0126	EA	34" Driven Post Support For 2-1/2" Square Ornamental Fence Post.....	92.37	
			Note: OZ-Post I25-850.		
	32 31 13 13-0127	EA	34" Driven Post Support For 3" Square Ornamental Fence Post.....	92.37	
			Note: OZ-Post I3-850.		
	32 31 13 13-0128		Driven Post Support For Wooden Fence Posts <small>(32 31 13 13-0116)</small>		
	32 31 13 13-0129	EA	24" Driven Post Support For 3-1/2" Square Wooden Fence Post.....	85.77	
			Note: OZ-Post T4-600.		
	32 31 13 13-0130	EA	34" Driven Post Support For 3-1/2" Square Wooden Fence Post.....	89.32	
			Note: OZ-Post T4-850.		
	32 31 13 13-0131	EA	34" Driven Post Support For 3-3/4" Square Wooden Fence Post.....	96.44	
			Note: OZ-Post C4-850.		
	32 31 13 13-0132	EA	34" Driven Post Support For 4" Square Wooden Fence Post.....	96.44	
			Note: OZ-Post P4-850.		
	32 31 13 13-0133	EA	36" Driven Post Support For 4" x 6" Wooden Fence Post.....	109.65	
			Note: OZ-Post T46-850.		
	32 31 13 13-0134	EA	36" Driven Post Support For 6" Square Wooden Fence Post.....	118.99	
			Note: OZ-Post T6-850.		
	32 31 13 13-0135		Driven Post Support For Vinyl Fence Posts <small>(32 31 13 13-0116)</small>		



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 31 13 13-0136	EA	24" Driven Post Support For 3-1/2" Square Vinyl Fence Post Note: OZ-Post T4-600.		85.77	
32 31 13 13-0137	EA	34" Driven Post Support For 3-1/2" Square Vinyl Fence Post Note: OZ-Post T4-850.		89.32	
32 31 13 13-0138	EA	34" Driven Post Support For 4" Square Vinyl Fence Post Note: OZ-Post P4-850.		96.44	
32 31 13 13-0139	EA	34" Driven Post Support For 5" Square Vinyl Fence Post Note: OZ-Post P4-850.		98.06	
32 31 13 13-0140		Chain Link Fence Assemblies (32 31 13 13)			
32 31 13 13-0141		Chain Link Fence Assembly With 2-1/2" Line Post And 3" Corner Posts (32 31 13 13-0140) Note: Includes 2" 9 gauge coiled spring mesh (knuckled selvage), tension bars, post tension bands, wire ties, truss rod (at corners or posts), 1-5/8" top rail, 1-5/8" bottom rail, 2-1/2" line post and 3" corner posts. Posts exclude drilling or augering in soil or rock, concrete or soil fill. Heights indicated are from ground to top of installed pole. Minimum 2' bury with up to one third of exposed post height to be buried in ground. Excludes grounding. Demolition excludes concrete footing removal on posts and excavation. See CSI section 26 05 26 00-0000 for grounding, 31 23 16 36-0009 for hand excavation for footing removal (where required), 32 31 13 13-0654 for barb wire attachments.			
32 31 13 13-0142		Galvanized (32 31 13 13-0141)			
32 31 13 13-0143	LF	3' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post <i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i> <i>For 13 Gauge Fabric, Deduct</i> <i>For 11 Gauge Fabric, Deduct</i> <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 2-3/8" Mesh Fabric, Deduct</i> <i>For Posts 8' On Centers, Add</i> <i>For Posts 5' On Centers, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000, Deduct</i> <i>For 3/8" Non-Climbable Mesh, Add</i>		39.85	3.94
32 31 13 13-0144	LF	3'-6" Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post <i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i> <i>For 13 Gauge Fabric, Deduct</i> <i>For 11 Gauge Fabric, Deduct</i> <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 2-3/8" Mesh Fabric, Deduct</i> <i>For Posts 8' On Centers, Add</i> <i>For Posts 5' On Centers, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000, Deduct</i> <i>For 3/8" Non-Climbable Mesh, Add</i>		41.85	3.94
32 31 13 13-0145	LF	4' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post <i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i> <i>For 13 Gauge Fabric, Deduct</i> <i>For 11 Gauge Fabric, Deduct</i> <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 2-3/8" Mesh Fabric, Deduct</i> <i>For Posts 8' On Centers, Add</i> <i>For Posts 5' On Centers, Add</i> <i>For Up To 100, Add</i> <i>For >100 To 250, Add</i> <i>For >2,500 To 5,000, Deduct</i> <i>For >5,000, Deduct</i> <i>For 3/8" Non-Climbable Mesh, Add</i>		42.85	3.94

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 13 13-0146	LF	5' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	46.13	3.94
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.13	
		<i>For 13 Gauge Fabric, Deduct</i>	-10.32	
		<i>For 11 Gauge Fabric, Deduct</i>	-6.03	
		<i>For 6 Gauge Fabric, Add</i>	9.47	
		<i>For 1" Mesh Fabric, Add</i>	12.92	
		<i>For 1-3/4" Mesh Fabric, Add</i>	5.17	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.58	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.44	
		<i>For Posts 8' On Centers, Add</i>	2.50	
		<i>For Posts 5' On Centers, Add</i>	9.37	
		<i>For Up To 100, Add</i>	8.56	
		<i>For >100 To 250, Add</i>	3.13	
		<i>For >2,500 To 5,000, Deduct</i>	-1.56	
		<i>For >5,000, Deduct</i>	-3.13	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	49.43	
32 31 13 13-0147	LF	6' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	49.98	3.94
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.37	
		<i>For 13 Gauge Fabric, Deduct</i>	-11.29	
		<i>For 11 Gauge Fabric, Deduct</i>	-6.59	
		<i>For 6 Gauge Fabric, Add</i>	10.36	
		<i>For 1" Mesh Fabric, Add</i>	14.13	
		<i>For 1-3/4" Mesh Fabric, Add</i>	5.65	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.83	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.77	
		<i>For Posts 8' On Centers, Add</i>	2.71	
		<i>For Posts 5' On Centers, Add</i>	10.13	
		<i>For Up To 100, Add</i>	9.25	
		<i>For >100 To 250, Add</i>	3.37	
		<i>For >2,500 To 5,000, Deduct</i>	-1.69	
		<i>For >5,000, Deduct</i>	-3.37	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	58.27	
32 31 13 13-0148	LF	7' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	51.87	5.91
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.50	
		<i>For 13 Gauge Fabric, Deduct</i>	-11.71	
		<i>For 11 Gauge Fabric, Deduct</i>	-6.84	
		<i>For 6 Gauge Fabric, Add</i>	10.75	
		<i>For 1" Mesh Fabric, Add</i>	14.66	
		<i>For 1-3/4" Mesh Fabric, Add</i>	5.86	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.93	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.91	
		<i>For Posts 8' On Centers, Add</i>	2.81	
		<i>For Posts 5' On Centers, Add</i>	10.52	
		<i>For Up To 100, Add</i>	9.60	
		<i>For >100 To 250, Add</i>	3.50	
		<i>For >2,500 To 5,000, Deduct</i>	-1.75	
		<i>For >5,000, Deduct</i>	-3.50	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	67.24	
32 31 13 13-0149	LF	8' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	58.95	6.90
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.92	
		<i>For 13 Gauge Fabric, Deduct</i>	-13.76	
		<i>For 11 Gauge Fabric, Deduct</i>	-8.04	
		<i>For 6 Gauge Fabric, Add</i>	12.63	
		<i>For 1" Mesh Fabric, Add</i>	17.23	
		<i>For 1-3/4" Mesh Fabric, Add</i>	6.89	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.45	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-4.59	
		<i>For Posts 8' On Centers, Add</i>	3.18	
		<i>For Posts 5' On Centers, Add</i>	11.87	
		<i>For Up To 100, Add</i>	10.78	
		<i>For >100 To 250, Add</i>	3.92	
		<i>For >2,500 To 5,000, Deduct</i>	-1.96	
		<i>For >5,000, Deduct</i>	-3.92	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	76.30	
32 31 13 13-0150	LF	9' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	62.89	8.87
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	4.16	
		<i>For 13 Gauge Fabric, Deduct</i>	-14.81	
		<i>For 11 Gauge Fabric, Deduct</i>	-8.65	
		<i>For 6 Gauge Fabric, Add</i>	13.60	
		<i>For 1" Mesh Fabric, Add</i>	18.54	
		<i>For 1-3/4" Mesh Fabric, Add</i>	7.42	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.71	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-4.94	
		<i>For Posts 8' On Centers, Add</i>	3.39	
		<i>For Posts 5' On Centers, Add</i>	12.64	
		<i>For Up To 100, Add</i>	11.46	
		<i>For >100 To 250, Add</i>	4.16	
		<i>For >2,500 To 5,000, Deduct</i>	-2.08	
		<i>For >5,000, Deduct</i>	-4.16	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	84.20	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0151	LF 10' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post.....	66.85	9.85
	<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	4.40	
	<i>For 13 Gauge Fabric, Deduct</i>	-15.86	
	<i>For 11 Gauge Fabric, Deduct</i>	-9.27	
	<i>For 6 Gauge Fabric, Add</i>	14.56	
	<i>For 1" Mesh Fabric, Add</i>	19.86	
	<i>For 1-3/4" Mesh Fabric, Add</i>	7.94	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.97	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-5.30	
	<i>For Posts 8' On Centers, Add</i>	3.60	
	<i>For Posts 5' On Centers, Add</i>	13.41	
	<i>For Up To 100, Add</i>	12.15	
	<i>For >100 To 250, Add</i>	4.40	
	<i>For >2,500 To 5,000, Deduct</i>	-2.20	
	<i>For >5,000, Deduct</i>	-4.40	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	92.36	
32 31 13 13-0152	LF 12' Galvanized Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post.....	74.26	11.82
	<i>For Each Additional Foot >12, Add</i>	4.05	
	<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	4.86	
	<i>For 13 Gauge Fabric, Deduct</i>	-17.82	
	<i>For 11 Gauge Fabric, Deduct</i>	-10.41	
	<i>For 6 Gauge Fabric, Add</i>	16.36	
	<i>For 1" Mesh Fabric, Add</i>	22.31	
	<i>For 1-3/4" Mesh Fabric, Add</i>	8.92	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-4.46	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-5.95	
	<i>For Posts 8' On Centers, Add</i>	3.99	
	<i>For Posts 5' On Centers, Add</i>	14.86	
	<i>For Up To 100, Add</i>	13.44	
	<i>For >100 To 250, Add</i>	4.86	
	<i>For >2,500 To 5,000, Deduct</i>	-2.43	
	<i>For >5,000, Deduct</i>	-4.86	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	100.16	
32 31 13 13-0153	Vinyl Coated ^(32 31 13 13-0141)		
32 31 13 13-0154	LF 4' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post.....	44.41	3.94
	<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	4.27	
	<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.02	
	<i>For 13 Gauge Fabric, Deduct</i>	-9.90	
	<i>For 11 Gauge Fabric, Deduct</i>	-5.78	
	<i>For 6 Gauge Fabric, Add</i>	9.09	
	<i>For 1" Mesh Fabric, Add</i>	12.39	
	<i>For 1-3/4" Mesh Fabric, Add</i>	4.96	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.48	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.30	
	<i>For Posts 8' On Centers, Add</i>	2.41	
	<i>For Posts 5' On Centers, Add</i>	9.03	
	<i>For Up To 100, Add</i>	8.25	
	<i>For >100 To 250, Add</i>	3.02	
	<i>For >2,500 To 5,000, Deduct</i>	-1.51	
	<i>For >5,000, Deduct</i>	-3.02	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	45.62	
32 31 13 13-0155	LF 5' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post.....	48.10	3.94
	<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	4.75	
	<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.23	
	<i>For 13 Gauge Fabric, Deduct</i>	-11.00	
	<i>For 11 Gauge Fabric, Deduct</i>	-6.43	
	<i>For 6 Gauge Fabric, Add</i>	10.10	
	<i>For 1" Mesh Fabric, Add</i>	13.77	
	<i>For 1-3/4" Mesh Fabric, Add</i>	5.51	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.75	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.67	
	<i>For Posts 8' On Centers, Add</i>	2.60	
	<i>For Posts 5' On Centers, Add</i>	9.73	
	<i>For Up To 100, Add</i>	8.86	
	<i>For >100 To 250, Add</i>	3.23	
	<i>For >2,500 To 5,000, Deduct</i>	-1.61	
	<i>For >5,000, Deduct</i>	-3.23	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	55.66	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 13 13-0156	LF	6' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	53.99	3.94
		<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	5.47	
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.57	
		<i>For 13 Gauge Fabric, Deduct</i>	-12.68	
		<i>For 11 Gauge Fabric, Deduct</i>	-7.41	
		<i>For 6 Gauge Fabric, Add</i>	11.64	
		<i>For 1" Mesh Fabric, Add</i>	15.87	
		<i>For 1-3/4" Mesh Fabric, Add</i>	6.35	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.17	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-4.23	
		<i>For Posts 8' On Centers, Add</i>	2.91	
		<i>For Posts 5' On Centers, Add</i>	10.86	
		<i>For Up To 100, Add</i>	9.85	
		<i>For >100 To 250, Add</i>	3.57	
		<i>For >2,500 To 5,000, Deduct</i>	-1.79	
		<i>For >5,000, Deduct</i>	-3.57	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	65.74	
32 31 13 13-0157	LF	7' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	56.52	5.91
		<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	5.75	
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	3.73	
		<i>For 13 Gauge Fabric, Deduct</i>	-13.33	
		<i>For 11 Gauge Fabric, Deduct</i>	-7.79	
		<i>For 6 Gauge Fabric, Add</i>	12.23	
		<i>For 1" Mesh Fabric, Add</i>	16.68	
		<i>For 1-3/4" Mesh Fabric, Add</i>	6.67	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.34	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-4.45	
		<i>For Posts 8' On Centers, Add</i>	3.04	
		<i>For Posts 5' On Centers, Add</i>	11.35	
		<i>For Up To 100, Add</i>	10.30	
		<i>For >100 To 250, Add</i>	3.73	
		<i>For >2,500 To 5,000, Deduct</i>	-1.87	
		<i>For >5,000, Deduct</i>	-3.73	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	75.96	
32 31 13 13-0158	LF	8' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	64.37	6.90
		<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	6.75	
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	4.19	
		<i>For 13 Gauge Fabric, Deduct</i>	-15.64	
		<i>For 11 Gauge Fabric, Deduct</i>	-9.14	
		<i>For 6 Gauge Fabric, Add</i>	14.36	
		<i>For 1" Mesh Fabric, Add</i>	19.58	
		<i>For 1-3/4" Mesh Fabric, Add</i>	7.83	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.92	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-5.22	
		<i>For Posts 8' On Centers, Add</i>	3.45	
		<i>For Posts 5' On Centers, Add</i>	12.84	
		<i>For Up To 100, Add</i>	11.59	
		<i>For >100 To 250, Add</i>	4.19	
		<i>For >2,500 To 5,000, Deduct</i>	-2.09	
		<i>For >5,000, Deduct</i>	-4.19	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	86.27	
32 31 13 13-0159	LF	9' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post	68.71	8.87
		<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	7.27	
		<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	4.45	
		<i>For 13 Gauge Fabric, Deduct</i>	-16.83	
		<i>For 11 Gauge Fabric, Deduct</i>	-9.83	
		<i>For 6 Gauge Fabric, Add</i>	15.45	
		<i>For 1" Mesh Fabric, Add</i>	21.07	
		<i>For 1-3/4" Mesh Fabric, Add</i>	8.43	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-4.21	
		<i>For 2-3/8" Mesh Fabric, Deduct</i>	-5.62	
		<i>For Posts 8' On Centers, Add</i>	3.68	
		<i>For Posts 5' On Centers, Add</i>	13.69	
		<i>For Up To 100, Add</i>	12.33	
		<i>For >100 To 250, Add</i>	4.45	
		<i>For >2,500 To 5,000, Deduct</i>	-2.22	
		<i>For >5,000, Deduct</i>	-4.45	
		<i>For 3/8" Non-Climbable Mesh, Add</i>	95.30	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0160	LF 10' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post.....	73.07	9.85
	<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	7.78	
	<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	4.71	
	<i>For 13 Gauge Fabric, Deduct</i>	-18.02	
	<i>For 11 Gauge Fabric, Deduct</i>	-10.53	
	<i>For 6 Gauge Fabric, Add</i>	16.55	
	<i>For 1" Mesh Fabric, Add</i>	22.56	
	<i>For 1-3/4" Mesh Fabric, Add</i>	9.03	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-4.51	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-6.02	
	<i>For Posts 8' On Centers, Add</i>	3.91	
	<i>For Posts 5' On Centers, Add</i>	14.53	
	<i>For Up To 100, Add</i>	13.08	
	<i>For >100 To 250, Add</i>	4.71	
	<i>For >2,500 To 5,000, Deduct</i>	-2.36	
	<i>For >5,000, Deduct</i>	-4.71	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	104.58	
32 31 13 13-0161	LF 12' Vinyl Cover Chain Link Fence, 9 Gauge Coiled Spring Mesh, Top And Bottom Rails, 2-1/2" Line Post At 10' On Center, 3" Corner Post.....	79.73	11.82
	<i>For Each Additional Foot >12, Add</i>	4.30	
	<i>For Powder Coated Framework (Posts, Rails, Hardware), Add</i>	8.51	
	<i>For Surface Mount On Concrete (Excludes Drilling And Anchors), Add</i>	5.14	
	<i>For 13 Gauge Fabric, Deduct</i>	-19.72	
	<i>For 11 Gauge Fabric, Deduct</i>	-11.52	
	<i>For 6 Gauge Fabric, Add</i>	18.11	
	<i>For 1" Mesh Fabric, Add</i>	24.69	
	<i>For 1-3/4" Mesh Fabric, Add</i>	9.88	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-4.94	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-6.58	
	<i>For Posts 8' On Centers, Add</i>	4.26	
	<i>For Posts 5' On Centers, Add</i>	15.84	
	<i>For Up To 100, Add</i>	14.26	
	<i>For >100 To 250, Add</i>	5.14	
	<i>For >2,500 To 5,000, Deduct</i>	-2.57	
	<i>For >5,000, Deduct</i>	-5.14	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	113.41	
32 31 13 13-0162	Rails <small>(32 31 13 13)</small> Note: Includes rail end fittings.		
32 31 13 13-0163	SS-20 Chain Link Fence Rails <small>(32 31 13 13-0162)</small> Note: Includes tie wires.		
32 31 13 13-0164	LF 1-3/8" Galvanized Steel Rail, 0.08" Wall Thickness, Tie Wires And Fittings.....	7.23	1.28
	<i>For SS15, Deduct</i>	-0.46	
	<i>For SS40, Add</i>	1.14	
32 31 13 13-0165	LF 1-3/8" Vinyl Coated Rail, 0.08" Wall Thickness, Tie Wires And Fittings.....	8.76	1.28
	<i>For SS40, Add</i>	0.61	
	<i>For Powder Coated, Add</i>	1.22	
	<i>For Aluminum Coated, Add</i>	2.44	
32 31 13 13-0166	LF 1-5/8" Galvanized Steel Rail, 0.085" Wall Thickness, Tie Wires And Fittings.....	8.99	1.45
	<i>For SS15, Deduct</i>	-0.61	
	<i>For SS40, Add</i>	1.52	
32 31 13 13-0167	LF 1-5/8" Vinyl Coated Rail, 0.085" Wall Thickness, Tie Wires And Fittings.....	11.04	1.45
	<i>For SS40, Add</i>	0.81	
	<i>For Powder Coated, Add</i>	1.63	
	<i>For Aluminum Coated, Add</i>	3.26	
32 31 13 13-0168	LF 2" Galvanized Steel Rail, 0.09" Wall Thickness, Tie Wires And Fittings.....	10.55	1.62
	<i>For SS40, Add</i>	1.83	
32 31 13 13-0169	LF 2" Vinyl Coated Rail, 0.09" Wall Thickness, Tie Wires And Fittings.....	13.02	1.62
	<i>For SS40, Add</i>	0.98	
	<i>For Powder Coated, Add</i>	1.95	
	<i>For Aluminum Coated, Add</i>	3.91	
32 31 13 13-0170	Fabric <small>(32 31 13 13)</small>		
32 31 13 13-0171	Fabric, Galvanized Chain Link <small>(32 31 13 13-0170)</small>		
32 31 13 13-0172	LF 3' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh.....	11.38	2.32
	<i>For 1-1/4" Mesh Fabric, Add</i>	1.08	
	<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	0.96	
	<i>For 13 Gauge Fabric, Deduct</i>	-1.73	
	<i>For 11 Gauge Fabric, Deduct</i>	-0.96	
	<i>For 6 Gauge Fabric, Add</i>	3.08	
	<i>For 1" Mesh Fabric, Add</i>	2.89	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1.93	
	<i>For 1-3/4" Mesh Fabric, Add</i>	1.16	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-0.58	
	<i>For 2-3/8" Mesh Fabric, Deduct</i>	-0.77	
	<i>For 3/8" Non-Climbable Mesh, Add</i>	32.44	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 31 13 13-0173	LF		3'-6" Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	12.61	2.61
			<i>For 1-1/4" Mesh Fabric, Add</i>	1.26	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	1.12	
			<i>For 13 Gauge Fabric, Deduct</i>	-2.02	
			<i>For 11 Gauge Fabric, Deduct</i>	-1.12	
			<i>For 6 Gauge Fabric, Add</i>	3.59	
			<i>For 1" Mesh Fabric, Add</i>	3.37	
			<i>For 1-1/4" Mesh Fabric, Add</i>	2.25	
			<i>For 1-3/4" Mesh Fabric, Add</i>	1.35	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-0.67	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-0.90	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	37.18	
32 31 13 13-0174	LF		4' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	13.64	2.90
			<i>For 1-1/4" Mesh Fabric, Add</i>	1.38	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	1.24	
			<i>For 13 Gauge Fabric, Deduct</i>	-2.22	
			<i>For 11 Gauge Fabric, Deduct</i>	-1.24	
			<i>For 6 Gauge Fabric, Add</i>	3.95	
			<i>For 1" Mesh Fabric, Add</i>	3.71	
			<i>For 1-1/4" Mesh Fabric, Add</i>	2.47	
			<i>For 1-3/4" Mesh Fabric, Add</i>	1.48	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-0.74	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-0.99	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	41.95	
32 31 13 13-0175	LF		5' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	15.43	3.48
			<i>For 1-1/4" Mesh Fabric, Add</i>	1.72	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	1.54	
			<i>For 13 Gauge Fabric, Deduct</i>	-2.77	
			<i>For 11 Gauge Fabric, Deduct</i>	-1.54	
			<i>For 6 Gauge Fabric, Add</i>	4.93	
			<i>For 1" Mesh Fabric, Add</i>	4.62	
			<i>For 1-1/4" Mesh Fabric, Add</i>	3.08	
			<i>For 1-3/4" Mesh Fabric, Add</i>	1.85	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-0.92	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-1.23	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	50.81	
32 31 13 13-0176	LF		6' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	17.34	4.06
			<i>For 1-1/4" Mesh Fabric, Add</i>	2.07	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	1.85	
			<i>For 13 Gauge Fabric, Deduct</i>	-3.33	
			<i>For 11 Gauge Fabric, Deduct</i>	-1.85	
			<i>For 6 Gauge Fabric, Add</i>	5.92	
			<i>For 1" Mesh Fabric, Add</i>	5.55	
			<i>For 1-1/4" Mesh Fabric, Add</i>	3.70	
			<i>For 1-3/4" Mesh Fabric, Add</i>	2.22	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-1.11	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-1.48	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	59.77	
32 31 13 13-0177	LF		7' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	19.31	4.64
			<i>For 1-1/4" Mesh Fabric, Add</i>	2.41	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	2.15	
			<i>For 13 Gauge Fabric, Deduct</i>	-3.87	
			<i>For 11 Gauge Fabric, Deduct</i>	-2.15	
			<i>For 6 Gauge Fabric, Add</i>	6.89	
			<i>For 1" Mesh Fabric, Add</i>	6.46	
			<i>For 1-1/4" Mesh Fabric, Add</i>	4.31	
			<i>For 1-3/4" Mesh Fabric, Add</i>	2.58	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-1.29	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-1.72	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	68.84	
32 31 13 13-0178	LF		8' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	21.44	5.80
			<i>For 1-1/4" Mesh Fabric, Add</i>	2.76	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	2.46	
			<i>For 13 Gauge Fabric, Deduct</i>	-4.43	
			<i>For 11 Gauge Fabric, Deduct</i>	-2.46	
			<i>For 6 Gauge Fabric, Add</i>	7.88	
			<i>For 1" Mesh Fabric, Add</i>	7.39	
			<i>For 1-1/4" Mesh Fabric, Add</i>	4.93	
			<i>For 1-3/4" Mesh Fabric, Add</i>	2.96	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-1.48	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-1.97	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	78.04	
32 31 13 13-0179	LF		10' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh	25.60	6.38
			<i>For 1-1/4" Mesh Fabric, Add</i>	3.58	
			<i>For 2 Oz Galvanized Or Zinc Coating, Add</i>	3.20	
			<i>For 13 Gauge Fabric, Deduct</i>	-5.76	
			<i>For 11 Gauge Fabric, Deduct</i>	-3.20	
			<i>For 6 Gauge Fabric, Add</i>	10.24	
			<i>For 1" Mesh Fabric, Add</i>	9.60	
			<i>For 1-1/4" Mesh Fabric, Add</i>	6.40	
			<i>For 1-3/4" Mesh Fabric, Add</i>	3.84	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-1.92	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-2.56	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	94.28	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0180 LF 12' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh.....	29.25	6.96
For 1-1/4" Mesh Fabric, Add	4.30	
For 2 Oz Galvanized Or Zinc Coating, Add	3.84	
For 13 Gauge Fabric, Deduct	-6.90	
For 11 Gauge Fabric, Deduct	-3.84	
For 6 Gauge Fabric, Add	12.27	
For 1" Mesh Fabric, Add	11.51	
For 1-1/4" Mesh Fabric, Add	7.67	
For 1-3/4" Mesh Fabric, Add	4.60	
For 2-1/8" Mesh Fabric, Deduct	-2.30	
For 2-3/8" Mesh Fabric, Deduct	-3.07	
For 3/8" Non-Climbable Mesh, Add	102.24	
32 31 13 13-0181 LF 14' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh.....	32.71	8.12
For 1-1/4" Mesh Fabric, Add	4.61	
For 2 Oz Galvanized Or Zinc Coating, Add	4.12	
For 13 Gauge Fabric, Deduct	-7.42	
For 11 Gauge Fabric, Deduct	-4.12	
For 6 Gauge Fabric, Add	13.18	
For 1" Mesh Fabric, Add	12.36	
For 1-1/4" Mesh Fabric, Add	8.24	
For 1-3/4" Mesh Fabric, Add	4.94	
For 2-1/8" Mesh Fabric, Deduct	-2.47	
For 2-3/8" Mesh Fabric, Deduct	-3.30	
For 3/8" Non-Climbable Mesh, Add	111.43	
32 31 13 13-0182 LF 16' Full Height Fabric Galvanized Chain Link #9 Gauge, 1.2 Oz Coating, 2" Mesh.....	36.16	9.27
For 1-1/4" Mesh Fabric, Add	4.93	
For 2 Oz Galvanized Or Zinc Coating, Add	4.40	
For 13 Gauge Fabric, Deduct	-7.92	
For 11 Gauge Fabric, Deduct	-4.40	
For 6 Gauge Fabric, Add	14.09	
For 1" Mesh Fabric, Add	13.21	
For 1-1/4" Mesh Fabric, Add	8.81	
For 1-3/4" Mesh Fabric, Add	5.28	
For 2-1/8" Mesh Fabric, Deduct	-2.64	
For 2-3/8" Mesh Fabric, Deduct	-3.52	
For 3/8" Non-Climbable Mesh, Add	120.62	
32 31 13 13-0183 Fabric, Vinyl Coated Chain Link <small>(32 31 13 13-0170)</small>		
32 31 13 13-0184 LF 4' Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	15.20	2.32
For 1-1/4" Mesh Fabric, Add	1.82	
For 13 Gauge Fabric, Deduct	-2.93	
For 11 Gauge Fabric, Deduct	-1.63	
For 6 Gauge Fabric, Add	5.20	
For 1" Mesh Fabric, Add	4.88	
For 1-1/4" Mesh Fabric, Add	3.25	
For 1-3/4" Mesh Fabric, Add	1.95	
For 2-1/8" Mesh Fabric, Deduct	-0.98	
For 2-3/8" Mesh Fabric, Deduct	-1.30	
For 3/8" Non-Climbable Mesh, Add	46.93	
For Aluminum Coated, Add	2.60	
32 31 13 13-0185 LF 5' Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	17.40	3.48
For 1-1/4" Mesh Fabric, Add	2.28	
For 13 Gauge Fabric, Deduct	-3.66	
For 11 Gauge Fabric, Deduct	-2.03	
For 6 Gauge Fabric, Add	6.50	
For 1" Mesh Fabric, Add	6.10	
For 1-1/4" Mesh Fabric, Add	4.07	
For 1-3/4" Mesh Fabric, Add	2.44	
For 2-1/8" Mesh Fabric, Deduct	-1.22	
For 2-3/8" Mesh Fabric, Deduct	-1.63	
For 3/8" Non-Climbable Mesh, Add	57.04	
For Aluminum Coated, Add	3.25	
32 31 13 13-0186 LF 6' Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	21.34	4.06
For 1-1/4" Mesh Fabric, Add	3.19	
For 13 Gauge Fabric, Deduct	-5.13	
For 11 Gauge Fabric, Deduct	-2.85	
For 6 Gauge Fabric, Add	9.12	
For 1" Mesh Fabric, Add	8.55	
For 1-1/4" Mesh Fabric, Add	5.70	
For 1-3/4" Mesh Fabric, Add	3.42	
For 2-1/8" Mesh Fabric, Deduct	-1.71	
For 2-3/8" Mesh Fabric, Deduct	-2.28	
For 3/8" Non-Climbable Mesh, Add	67.24	
For Aluminum Coated, Add	4.56	
32 31 13 13-0187 LF 7' Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	23.97	4.64
For 1-1/4" Mesh Fabric, Add	3.72	
For 13 Gauge Fabric, Deduct	-5.97	
For 11 Gauge Fabric, Deduct	-3.32	
For 6 Gauge Fabric, Add	10.62	
For 1" Mesh Fabric, Add	9.95	
For 1-1/4" Mesh Fabric, Add	6.64	
For 1-3/4" Mesh Fabric, Add	3.98	
For 2-1/8" Mesh Fabric, Deduct	-1.99	
For 2-3/8" Mesh Fabric, Deduct	-2.65	
For 3/8" Non-Climbable Mesh, Add	77.56	
For Aluminum Coated, Add	5.31	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 31 13 13-0188	LF	8'	Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	26.87	5.80
			<i>For 1-1/4" Mesh Fabric, Add</i>	4.28	
			<i>For 13 Gauge Fabric, Deduct</i>	-6.88	
			<i>For 11 Gauge Fabric, Deduct</i>	-3.82	
			<i>For 6 Gauge Fabric, Add</i>	12.22	
			<i>For 1" Mesh Fabric, Add</i>	11.46	
			<i>For 1-1/4" Mesh Fabric, Add</i>	7.64	
			<i>For 1-3/4" Mesh Fabric, Add</i>	4.58	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.29	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.06	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	88.01	
			<i>For Aluminum Coated, Add</i>	6.11	
32 31 13 13-0189	LF	10'	Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	31.82	6.38
			<i>For 1-1/4" Mesh Fabric, Add</i>	5.33	
			<i>For 13 Gauge Fabric, Deduct</i>	-8.56	
			<i>For 11 Gauge Fabric, Deduct</i>	-4.76	
			<i>For 6 Gauge Fabric, Add</i>	15.22	
			<i>For 1" Mesh Fabric, Add</i>	14.27	
			<i>For 1-1/4" Mesh Fabric, Add</i>	9.51	
			<i>For 1-3/4" Mesh Fabric, Add</i>	5.71	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-2.85	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-3.80	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	106.50	
			<i>For Aluminum Coated, Add</i>	7.61	
32 31 13 13-0190	LF	12'	Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	34.71	6.96
			<i>For 1-1/4" Mesh Fabric, Add</i>	5.82	
			<i>For 13 Gauge Fabric, Deduct</i>	-9.36	
			<i>For 11 Gauge Fabric, Deduct</i>	-5.20	
			<i>For 6 Gauge Fabric, Add</i>	16.64	
			<i>For 1" Mesh Fabric, Add</i>	15.60	
			<i>For 1-1/4" Mesh Fabric, Add</i>	10.40	
			<i>For 1-3/4" Mesh Fabric, Add</i>	6.24	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.12	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-4.16	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	115.49	
			<i>For Aluminum Coated, Add</i>	8.32	
32 31 13 13-0191	LF	14'	Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	39.13	8.12
			<i>For 1-1/4" Mesh Fabric, Add</i>	6.41	
			<i>For 13 Gauge Fabric, Deduct</i>	-10.31	
			<i>For 11 Gauge Fabric, Deduct</i>	-5.73	
			<i>For 6 Gauge Fabric, Add</i>	18.32	
			<i>For 1" Mesh Fabric, Add</i>	17.18	
			<i>For 1-1/4" Mesh Fabric, Add</i>	11.45	
			<i>For 1-3/4" Mesh Fabric, Add</i>	6.87	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.44	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-4.58	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	125.71	
			<i>For Aluminum Coated, Add</i>	9.16	
32 31 13 13-0192	LF	16'	Full Height Vinyl Coated Fabric Chain Link #9 Gauge Fused, 2" Mesh	43.64	9.27
			<i>For 1-1/4" Mesh Fabric, Add</i>	7.03	
			<i>For 13 Gauge Fabric, Deduct</i>	-11.29	
			<i>For 11 Gauge Fabric, Deduct</i>	-6.27	
			<i>For 6 Gauge Fabric, Add</i>	20.07	
			<i>For 1" Mesh Fabric, Add</i>	18.82	
			<i>For 1-1/4" Mesh Fabric, Add</i>	12.55	
			<i>For 1-3/4" Mesh Fabric, Add</i>	7.53	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-3.76	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-5.02	
			<i>For 3/8" Non-Climbable Mesh, Add</i>	135.93	
			<i>For Aluminum Coated, Add</i>	10.04	
32 31 13 13-0193			Fabric, Aluminized Steel Chain Link <small>(32 31 13 13-0170)</small>		
32 31 13 13-0194	LF	3'	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	10.91	2.32
			<i>For 6 Gauge Fabric, Add</i>	2.70	
			<i>For 1" Mesh Fabric, Add</i>	3.55	
32 31 13 13-0195	LF	3'-6"	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	12.04	2.61
			<i>For 6 Gauge Fabric, Add</i>	3.14	
			<i>For 1" Mesh Fabric, Add</i>	4.12	
32 31 13 13-0196	LF	4'	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	13.19	2.90
			<i>For 6 Gauge Fabric, Add</i>	3.59	
			<i>For 1" Mesh Fabric, Add</i>	4.71	
32 31 13 13-0197	LF	5'	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	14.88	3.48
			<i>For 6 Gauge Fabric, Add</i>	4.49	
			<i>For 1" Mesh Fabric, Add</i>	5.89	
32 31 13 13-0198	LF	6'	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	16.65	4.06
			<i>For 6 Gauge Fabric, Add</i>	5.37	
			<i>For 1" Mesh Fabric, Add</i>	7.05	
32 31 13 13-0199	LF	7'	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	18.55	4.64
			<i>For 6 Gauge Fabric, Add</i>	6.28	
			<i>For 1" Mesh Fabric, Add</i>	8.24	
32 31 13 13-0200	LF	8'	Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh	20.55	5.80
			<i>For 6 Gauge Fabric, Add</i>	7.17	
			<i>For 1" Mesh Fabric, Add</i>	9.41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0201 LF 10' Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	24.00 8.96 11.76	6.38
32 31 13 13-0202 LF 12' Full Height Fabric Chain Link #9 Gauge, Aluminized Steel, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	27.35 10.75 14.11	6.96
32 31 13 13-0203 Fabric, All Aluminum Chain Link <small>(32 31 13 13-0170)</small>		
32 31 13 13-0204 LF 3' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	16.36 7.06 9.27	2.32
32 31 13 13-0205 LF 3'-6" Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	18.42 8.24 10.82	2.61
32 31 13 13-0206 LF 4' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	20.47 9.42 12.36	2.90
32 31 13 13-0207 LF 5' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	23.98 11.77 15.45	3.48
32 31 13 13-0208 LF 6' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	27.60 14.13 18.54	4.06
32 31 13 13-0209 LF 7' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	31.30 16.48 21.63	4.64
32 31 13 13-0210 LF 8' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	35.13 18.83 24.72	5.80
32 31 13 13-0211 LF 10' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	42.23 23.54 30.90	6.38
32 31 13 13-0212 LF 12' Full Height Fabric Chain Link #9 Gauge, All Aluminum, 2" Mesh..... <i>For 6 Gauge Fabric, Add</i> <i>For 1" Mesh Fabric, Add</i>	49.22 28.25 37.08	6.96
32 31 13 13-0213 Fence Inserts <small>(32 31 13 13-0170)</small> Note: For use with new or existing chain link fence, per lf of fence.		
32 31 13 13-0214 Vinyl Plastic Fence Inserts <small>(32 31 13 13-0213)</small> Note: Assorted colors.		
32 31 13 13-0215 LF 3' High Fence, Vinyl Plastic Fence Insert.....	9.94	
32 31 13 13-0216 LF 3-1/2' High Fence, Vinyl Plastic Fence Insert.....	11.36	
32 31 13 13-0217 LF 4' High Fence, Vinyl Plastic Fence Insert.....	12.52	
32 31 13 13-0218 LF 5' High Fence, Vinyl Plastic Fence Insert.....	15.70	
32 31 13 13-0219 LF 6' High Fence, Vinyl Plastic Fence Insert.....	18.78	
32 31 13 13-0220 LF 7' High Fence, Vinyl Plastic Fence Insert.....	21.97	
32 31 13 13-0221 LF 8' High Fence, Vinyl Plastic Fence Insert.....	25.04	
32 31 13 13-0222 LF 10' High Fence, Vinyl Plastic Fence Insert.....	30.36	
32 31 13 13-0223 Aluminum Fence Inserts <small>(32 31 13 13-0213)</small> Note: Assorted colors.		
32 31 13 13-0224 LF 3' High Fence, Aluminum Fence Insert.....	34.22	
32 31 13 13-0225 LF 3-1/2' High Fence, Aluminum Fence Insert.....	37.54	
32 31 13 13-0226 LF 4' High Fence, Aluminum Fence Insert.....	42.68	
32 31 13 13-0227 LF 5' High Fence, Aluminum Fence Insert.....	53.41	
32 31 13 13-0228 LF 6' High Fence, Aluminum Fence Insert.....	64.09	
32 31 13 13-0229 LF 7' High Fence, Aluminum Fence Insert.....	69.68	
32 31 13 13-0230 LF 8' High Fence, Aluminum Fence Insert.....	85.43	
32 31 13 13-0231 LF 10' High Fence, Aluminum Fence Insert.....	106.28	
32 31 13 13-0232 Redwood Fence Inserts <small>(32 31 13 13-0213)</small>		
32 31 13 13-0233 LF 4' High Fence, Redwood Fence Insert.....	14.82	
32 31 13 13-0234 LF 5' High Fence, Redwood Fence Insert.....	18.75	
32 31 13 13-0235 LF 6' High Fence, Redwood Fence Insert.....	22.52	
32 31 13 13-0236 LF 7' High Fence, Redwood Fence Insert.....	26.21	
32 31 13 13-0237 LF 8' High Fence, Redwood Fence Insert.....	29.99	
32 31 13 13-0238 Diagonal Flexible Polyethylene Inserts <small>(32 31 13 13-0213)</small>		
32 31 13 13-0239 SF Diagonal Polyethylene Fence Weave.....	3.97	
32 31 13 13-0240 Hedge Link Fence Inserts <small>(32 31 13 13-0213)</small>		
32 31 13 13-0241 LF 3' High Fence, Hedge Link Fence Insert.....	21.11	
32 31 13 13-0242 LF 3-1/2' High Fence, Hedge Link Fence Insert.....	24.04	
32 31 13 13-0243 LF 4' High Fence, Hedge Link Fence Insert.....	28.20	
32 31 13 13-0244 LF 5' High Fence, Hedge Link Fence Insert.....	34.79	
32 31 13 13-0245 LF 6' High Fence, Hedge Link Fence Insert.....	39.83	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0246	LF	7' High Fence, Hedge Link Fence Insert.....	50.26	
32 31 13 13-0247	LF	8' High Fence, Hedge Link Fence Insert.....	57.07	
32 31 13 13-0248	LF	10' High Fence, Hedge Link Fence Insert.....	68.18	
32 31 13 13-0249	LF	12' High Fence, Hedge Link Fence Insert.....	78.20	
32 31 13 13-0250		Fence Windscreen Fabric (32 31 13 13-0170)		
		Note: Includes plastic wire clips.		
32 31 13 13-0251	SF	Vinyl Coated Polyester Windscreen For Fence, 7 Oz Per SY.....	1.35	0.62
		For Sewn Boxed Vent (Each), Add	28.17	
		For Welded Boxed Vent (Each), Add	14.09	
		For 4' x 4' One Color Logo (Each), Add	586.95	
32 31 13 13-0252		Non-Climbable Fabric, Galvanized Chain Link (32 31 13 13-0170)		
32 31 13 13-0253	LF	3' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	32.44	2.32
		For 11 Gauge, Deduct	-4.98	
		For 10 Gauge, Deduct	-1.99	
		For 7 Gauge, Add	2.99	
		For 6 Gauge, Add	6.97	
		For 1/2" Mesh Fabric, Deduct	-1.25	
		For 5/8" Mesh Fabric, Deduct	-2.74	
		For 3/4" Mesh Fabric, Deduct	-3.99	
32 31 13 13-0254	LF	3'-6" Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	37.18	2.61
		For 11 Gauge, Deduct	-5.81	
		For 10 Gauge, Deduct	-2.32	
		For 7 Gauge, Add	3.49	
		For 6 Gauge, Add	8.14	
		For 1/2" Mesh Fabric, Deduct	-1.45	
		For 5/8" Mesh Fabric, Deduct	-3.20	
		For 3/4" Mesh Fabric, Deduct	-4.65	
32 31 13 13-0255	LF	4' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	41.95	2.90
		For 11 Gauge, Deduct	-6.65	
		For 10 Gauge, Deduct	-2.66	
		For 7 Gauge, Add	3.99	
		For 6 Gauge, Add	9.31	
		For 1/2" Mesh Fabric, Deduct	-1.66	
		For 5/8" Mesh Fabric, Deduct	-3.66	
		For 3/4" Mesh Fabric, Deduct	-5.32	
32 31 13 13-0256	LF	5' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	50.81	3.48
		For 11 Gauge, Deduct	-8.31	
		For 10 Gauge, Deduct	-3.32	
		For 7 Gauge, Add	4.98	
		For 6 Gauge, Add	11.63	
		For 1/2" Mesh Fabric, Deduct	-2.08	
		For 5/8" Mesh Fabric, Deduct	-4.57	
		For 3/4" Mesh Fabric, Deduct	-6.65	
32 31 13 13-0257	LF	6' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	59.77	4.06
		For 11 Gauge, Deduct	-9.97	
		For 10 Gauge, Deduct	-3.99	
		For 7 Gauge, Add	5.98	
		For 6 Gauge, Add	13.95	
		For 1/2" Mesh Fabric, Deduct	-2.49	
		For 5/8" Mesh Fabric, Deduct	-5.48	
		For 3/4" Mesh Fabric, Deduct	-7.97	
32 31 13 13-0258	LF	7' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	68.84	4.64
		For 11 Gauge, Deduct	-11.63	
		For 10 Gauge, Deduct	-4.65	
		For 7 Gauge, Add	6.98	
		For 6 Gauge, Add	16.28	
		For 1/2" Mesh Fabric, Deduct	-2.91	
		For 5/8" Mesh Fabric, Deduct	-6.40	
		For 3/4" Mesh Fabric, Deduct	-9.30	
32 31 13 13-0259	LF	8' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	78.04	5.80
		For 11 Gauge, Deduct	-13.29	
		For 10 Gauge, Deduct	-5.32	
		For 7 Gauge, Add	7.97	
		For 6 Gauge, Add	18.61	
		For 1/2" Mesh Fabric, Deduct	-3.32	
		For 5/8" Mesh Fabric, Deduct	-7.31	
		For 3/4" Mesh Fabric, Deduct	-10.63	
32 31 13 13-0260	LF	9' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh.....	86.13	6.09
		For 11 Gauge, Deduct	-14.79	
		For 10 Gauge, Deduct	-5.92	
		For 7 Gauge, Add	8.88	
		For 6 Gauge, Add	20.71	
		For 1/2" Mesh Fabric, Deduct	-3.70	
		For 5/8" Mesh Fabric, Deduct	-8.14	
		For 3/4" Mesh Fabric, Deduct	-11.83	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0261 LF 10' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh	94.28	6.38
<i>For 11 Gauge, Deduct</i>	-16.30	
<i>For 10 Gauge, Deduct</i>	-6.52	
<i>For 7 Gauge, Add</i>	9.78	
<i>For 6 Gauge, Add</i>	22.81	
<i>For 1/2" Mesh Fabric, Deduct</i>	-4.07	
<i>For 5/8" Mesh Fabric, Deduct</i>	-8.96	
<i>For 3/4" Mesh Fabric, Deduct</i>	-13.04	
32 31 13 13-0262 LF 12' Non-Climbable Fabric Galvanized Chain Link #9 Gauge, 3/8" Mesh	102.24	6.96
<i>For 11 Gauge, Deduct</i>	-17.67	
<i>For 10 Gauge, Deduct</i>	-7.07	
<i>For 7 Gauge, Add</i>	10.60	
<i>For 6 Gauge, Add</i>	24.73	
<i>For 1/2" Mesh Fabric, Deduct</i>	-4.42	
<i>For 5/8" Mesh Fabric, Deduct</i>	-9.72	
<i>For 3/4" Mesh Fabric, Deduct</i>	-14.13	
32 31 13 13-0263 Gates <small>(32 31 13 13)</small>		
Note: Posts exclude drilling or augering in soil or rock. For barbed wire attached directly to posts and gates, select gates and posts sizes for full finished height of gate above grade (top rail to be at lower height, includes barb wire at top area where mesh would be). See CSI section 32 31 13 13-0001 for drilling for augering holes and backfill.		
32 31 13 13-0264 Galvanized Steel Without Barbed Wire <small>(32 31 13 13-0263)</small>		
Note: Industrial swing gate. Includes posts (3" diameter posts for up to 6' wide gate, 4" diameter for > 6' To 12' wide, 6-5/8" diameter for >12' To 18' wide, 8-5/8" diameter for over 18' wide), 2" diameter schedule pipe frame, offset hinges, cap and hardware (drop rod, center locking device, gate keeper, catch bolt and tension bands). Fabric: galvanized chain link 2" mesh # 9 gauge, galvanized 1.2 ounce coating.		
32 31 13 13-0265 4' Fence Height <small>(32 31 13 13-0264)</small>		
32 31 13 13-0266 EA 3' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	368.15	26.04
<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-53.77	
<i>For Aluminized Steel Gate And Post, Add</i>	137.64	
<i>For Powder Coated Gate And Post, Add</i>	74.56	
<i>For 1" Mesh Fabric, Add</i>	124.74	
<i>For 1-1/4" Mesh Fabric, Add</i>	80.29	
<i>For 1-3/4" Mesh Fabric, Add</i>	49.89	
<i>For 2-1/8" Mesh Fabric, Deduct</i>	-24.95	
<i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	68.96	
<i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	96.43	
32 31 13 13-0267 EA 4' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	463.73	27.14
<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-71.69	
<i>For Aluminized Steel Gate And Post, Add</i>	183.52	
<i>For Powder Coated Gate And Post, Add</i>	99.41	
<i>For 1" Mesh Fabric, Add</i>	166.31	
<i>For 1-1/4" Mesh Fabric, Add</i>	107.05	
<i>For 1-3/4" Mesh Fabric, Add</i>	66.53	
<i>For 2-1/8" Mesh Fabric, Deduct</i>	-33.26	
<i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	83.05	
<i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	114.12	
32 31 13 13-0268 EA 5' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	548.42	28.87
<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-86.55	
<i>For Aluminized Steel Gate And Post, Add</i>	221.57	
<i>For Powder Coated Gate And Post, Add</i>	120.02	
<i>For 1" Mesh Fabric, Add</i>	200.80	
<i>For 1-1/4" Mesh Fabric, Add</i>	129.25	
<i>For 1-3/4" Mesh Fabric, Add</i>	80.32	
<i>For 2-1/8" Mesh Fabric, Deduct</i>	-40.16	
<i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	95.37	
<i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	129.47	
32 31 13 13-0269 EA 6' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	645.06	34.72
<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-101.41	
<i>For Aluminized Steel Gate And Post, Add</i>	259.61	
<i>For Powder Coated Gate And Post, Add</i>	140.62	
<i>For 1" Mesh Fabric, Add</i>	235.27	
<i>For 1-1/4" Mesh Fabric, Add</i>	151.44	
<i>For 1-3/4" Mesh Fabric, Add</i>	94.11	
<i>For 2-1/8" Mesh Fabric, Deduct</i>	-47.05	
<i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	107.66	
<i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	145.89	
32 31 13 13-0270 EA 7' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	741.68	40.48
<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-116.27	
<i>For Aluminized Steel Gate And Post, Add</i>	297.66	
<i>For Powder Coated Gate And Post, Add</i>	161.23	
<i>For 1" Mesh Fabric, Add</i>	269.76	
<i>For 1-1/4" Mesh Fabric, Add</i>	173.64	
<i>For 1-3/4" Mesh Fabric, Add</i>	107.90	
<i>For 2-1/8" Mesh Fabric, Deduct</i>	-53.95	
<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	119.97	
<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	161.79	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0271	EA 8' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	841.56	46.23
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-131.75	
	<i>For Aluminized Steel Gate And Post, Add</i>	337.27	
	<i>For Powder Coated Gate And Post, Add</i>	182.69	
	<i>For 1" Mesh Fabric, Add</i>	305.65	
	<i>For 1-1/4" Mesh Fabric, Add</i>	196.74	
	<i>For 1-3/4" Mesh Fabric, Add</i>	122.26	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-61.13	
	<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	132.62	
	<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	178.03	
32 31 13 13-0272	EA 9' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	938.19	52.09
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-146.61	
	<i>For Aluminized Steel Gate And Post, Add</i>	375.32	
	<i>For Powder Coated Gate And Post, Add</i>	203.30	
	<i>For 1" Mesh Fabric, Add</i>	340.14	
	<i>For 1-1/4" Mesh Fabric, Add</i>	218.94	
	<i>For 1-3/4" Mesh Fabric, Add</i>	136.05	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-68.03	
	<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	144.94	
	<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	193.93	
32 31 13 13-0273	EA 10' Wide x 4' High Single Gate Galvanized Steel Without Barbed Wire	1,036.20	57.84
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-161.73	
	<i>For Aluminized Steel Gate And Post, Add</i>	414.04	
	<i>For Powder Coated Gate And Post, Add</i>	224.27	
	<i>For 1" Mesh Fabric, Add</i>	375.22	
	<i>For 1-1/4" Mesh Fabric, Add</i>	241.52	
	<i>For 1-3/4" Mesh Fabric, Add</i>	150.09	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-75.04	
	<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	157.39	
	<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	209.97	
32 31 13 13-0274	EA 10' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire	1,320.63	57.84
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-215.06	
	<i>For Aluminized Steel Gate And Post, Add</i>	550.56	
	<i>For Powder Coated Gate And Post, Add</i>	298.22	
	<i>For 1" Mesh Fabric, Add</i>	498.95	
	<i>For 1-1/4" Mesh Fabric, Add</i>	321.16	
	<i>For 1-3/4" Mesh Fabric, Add</i>	199.58	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-99.79	
	<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	215.34	
	<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	284.64	
32 31 13 13-0275	EA 12' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire	1,562.44	61.96
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-258.08	
	<i>For Aluminized Steel Gate And Post, Add</i>	660.67	
	<i>For Powder Coated Gate And Post, Add</i>	357.86	
	<i>For 1" Mesh Fabric, Add</i>	598.73	
	<i>For 1-1/4" Mesh Fabric, Add</i>	385.39	
	<i>For 1-3/4" Mesh Fabric, Add</i>	239.49	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-119.75	
	<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	247.75	
	<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	324.21	
32 31 13 13-0276	EA 14' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire	1,806.15	66.74
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-301.09	
	<i>For Aluminized Steel Gate And Post, Add</i>	770.78	
	<i>For Powder Coated Gate And Post, Add</i>	417.51	
	<i>For 1" Mesh Fabric, Add</i>	698.52	
	<i>For 1-1/4" Mesh Fabric, Add</i>	449.62	
	<i>For 1-3/4" Mesh Fabric, Add</i>	279.41	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-139.70	
	<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	280.15	
	<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	363.79	
32 31 13 13-0277	EA 16' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire	2,052.24	72.28
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-344.10	
	<i>For Aluminized Steel Gate And Post, Add</i>	880.90	
	<i>For Powder Coated Gate And Post, Add</i>	477.15	
	<i>For 1" Mesh Fabric, Add</i>	798.31	
	<i>For 1-1/4" Mesh Fabric, Add</i>	513.86	
	<i>For 1-3/4" Mesh Fabric, Add</i>	319.32	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-159.66	
	<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	312.56	
	<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	403.37	
32 31 13 13-0278	EA 18' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire	2,334.30	89.77
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-387.11	
	<i>For Aluminized Steel Gate And Post, Add</i>	991.01	
	<i>For Powder Coated Gate And Post, Add</i>	536.80	
	<i>For 1" Mesh Fabric, Add</i>	898.10	
	<i>For 1-1/4" Mesh Fabric, Add</i>	578.09	
	<i>For 1-3/4" Mesh Fabric, Add</i>	359.24	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-179.62	
	<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	344.97	
	<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	442.95	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

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MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0279	EA 20' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	2,582.97 -430.13 1,101.12 596.44 997.89 642.32 399.16 -199.58 377.37 482.52	96.21
32 31 13 13-0280	EA 22' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	2,829.00 -472.09 1,208.54 654.63 1,095.24 704.98 438.10 -219.05 435.81 564.86	103.67
32 31 13 13-0281	EA 24' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	3,078.74 -514.05 1,315.97 712.82 1,192.60 767.65 477.04 -238.52 467.60 603.82	112.27
32 31 13 13-0282	EA 26' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	3,333.19 -556.01 1,423.40 771.01 1,289.95 830.31 515.98 -257.99 499.39 642.77	122.51
32 31 13 13-0283	EA 28' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	3,509.85 -582.24 1,490.54 807.38 1,350.80 869.48 540.32 -270.16 521.95 672.49	134.77
32 31 13 13-0284	EA 30' Wide x 4' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	3,890.51 -645.19 1,651.68 894.66 1,496.84 963.48 598.73 -299.37 566.04 723.77	149.68
32 31 13 13-0285	5' Fence Height (32 31 13 13-0264)		
32 31 13 13-0286	EA 3' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	441.18 -66.44 170.09 92.13 154.15 99.22 61.66 -30.83 76.40 103.87	28.87
32 31 13 13-0287	EA 4' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	557.74 -88.30 226.04 122.44 204.85 131.86 81.94 -40.97 92.79 123.86	28.87

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 31 13 13-0288	EA		5' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire	651.77	30.71
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-104.91	
			<i>For Aluminized Steel Gate And Post, Add</i>	268.56	
			<i>For Powder Coated Gate And Post, Add</i>	145.47	
			<i>For 1" Mesh Fabric, Add</i>	243.39	
			<i>For 1-1/4" Mesh Fabric, Add</i>	156.66	
			<i>For 1-3/4" Mesh Fabric, Add</i>	97.35	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-48.68	
			<i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	106.14	
			<i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	140.24	
32 31 13 13-0289	EA		6' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire	763.46	36.89
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-122.39	
			<i>For Aluminized Steel Gate And Post, Add</i>	313.32	
			<i>For Powder Coated Gate And Post, Add</i>	169.72	
			<i>For 1" Mesh Fabric, Add</i>	283.95	
			<i>For 1-1/4" Mesh Fabric, Add</i>	182.77	
			<i>For 1-3/4" Mesh Fabric, Add</i>	113.58	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-56.79	
			<i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	119.97	
			<i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	158.20	
32 31 13 13-0290	EA		7' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire	865.83	42.97
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-138.13	
			<i>For Aluminized Steel Gate And Post, Add</i>	353.61	
			<i>For Powder Coated Gate And Post, Add</i>	191.54	
			<i>For 1" Mesh Fabric, Add</i>	320.46	
			<i>For 1-1/4" Mesh Fabric, Add</i>	206.27	
			<i>For 1-3/4" Mesh Fabric, Add</i>	128.18	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-64.09	
			<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	132.80	
			<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	174.62	
32 31 13 13-0291	EA		8' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire	978.62	49.49
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-155.61	
			<i>For Aluminized Steel Gate And Post, Add</i>	398.37	
			<i>For Powder Coated Gate And Post, Add</i>	215.78	
			<i>For 1" Mesh Fabric, Add</i>	361.02	
			<i>For 1-1/4" Mesh Fabric, Add</i>	232.38	
			<i>For 1-3/4" Mesh Fabric, Add</i>	144.41	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-72.20	
			<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	146.62	
			<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	192.03	
32 31 13 13-0292	EA		9' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire	1,085.65	55.67
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-172.22	
			<i>For Aluminized Steel Gate And Post, Add</i>	440.89	
			<i>For Powder Coated Gate And Post, Add</i>	238.82	
			<i>For 1" Mesh Fabric, Add</i>	399.56	
			<i>For 1-1/4" Mesh Fabric, Add</i>	257.19	
			<i>For 1-3/4" Mesh Fabric, Add</i>	159.82	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-79.91	
			<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	159.97	
			<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	208.96	
32 31 13 13-0293	EA		10' Wide x 5' High Single Gate Galvanized Steel Without Barbed Wire	1,192.69	61.75
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-188.84	
			<i>For Aluminized Steel Gate And Post, Add</i>	483.42	
			<i>For Powder Coated Gate And Post, Add</i>	261.85	
			<i>For 1" Mesh Fabric, Add</i>	438.10	
			<i>For 1-1/4" Mesh Fabric, Add</i>	281.99	
			<i>For 1-3/4" Mesh Fabric, Add</i>	175.24	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-87.62	
			<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	173.29	
			<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	225.87	
32 31 13 13-0294	EA		10' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	1,607.20	61.96
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-266.47	
			<i>For Aluminized Steel Gate And Post, Add</i>	682.16	
			<i>For Powder Coated Gate And Post, Add</i>	369.50	
			<i>For 1" Mesh Fabric, Add</i>	618.20	
			<i>For 1-1/4" Mesh Fabric, Add</i>	397.92	
			<i>For 1-3/4" Mesh Fabric, Add</i>	247.28	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-123.64	
			<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	245.50	
			<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	314.80	
32 31 13 13-0295	EA		12' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	1,906.86	66.74
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-319.97	
			<i>For Aluminized Steel Gate And Post, Add</i>	819.12	
			<i>For Powder Coated Gate And Post, Add</i>	443.69	
			<i>For 1" Mesh Fabric, Add</i>	742.33	
			<i>For 1-1/4" Mesh Fabric, Add</i>	477.82	
			<i>For 1-3/4" Mesh Fabric, Add</i>	296.93	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-148.47	
			<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	284.07	
			<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	360.53	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

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MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 31 13 13-0296	EA	14' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	2,208.90	72.28
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-373.47	
		<i>For Aluminized Steel Gate And Post, Add</i>		956.09	
		<i>For Powder Coated Gate And Post, Add</i>		517.88	
		<i>For 1" Mesh Fabric, Add</i>		866.46	
		<i>For 1-1/4" Mesh Fabric, Add</i>		557.72	
		<i>For 1-3/4" Mesh Fabric, Add</i>		346.58	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-173.29	
		<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		322.61	
		<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		406.25	
32 31 13 13-0297	EA	16' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	2,546.91	89.77
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-426.98	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,093.06	
		<i>For Powder Coated Gate And Post, Add</i>		592.07	
		<i>For 1" Mesh Fabric, Add</i>		990.59	
		<i>For 1-1/4" Mesh Fabric, Add</i>		637.62	
		<i>For 1-3/4" Mesh Fabric, Add</i>		396.23	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-198.12	
		<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		361.18	
		<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		451.99	
32 31 13 13-0298	EA	18' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	2,845.94	96.21
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-479.43	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,227.35	
		<i>For Powder Coated Gate And Post, Add</i>		664.81	
		<i>For 1" Mesh Fabric, Add</i>		1,112.28	
		<i>For 1-1/4" Mesh Fabric, Add</i>		715.95	
		<i>For 1-3/4" Mesh Fabric, Add</i>		444.91	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-222.46	
		<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		399.13	
		<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		497.11	
32 31 13 13-0299	EA	20' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	3,159.12	103.67
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-533.99	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,367.00	
		<i>For Powder Coated Gate And Post, Add</i>		740.46	
		<i>For 1" Mesh Fabric, Add</i>		1,238.85	
		<i>For 1-1/4" Mesh Fabric, Add</i>		797.42	
		<i>For 1-3/4" Mesh Fabric, Add</i>		495.54	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-247.77	
		<i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		438.30	
		<i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		543.45	
32 31 13 13-0300	EA	22' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	3,470.40	112.27
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-587.49	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,503.97	
		<i>For Powder Coated Gate And Post, Add</i>		814.65	
		<i>For 1" Mesh Fabric, Add</i>		1,362.97	
		<i>For 1-1/4" Mesh Fabric, Add</i>		877.32	
		<i>For 1-3/4" Mesh Fabric, Add</i>		545.19	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-272.59	
		<i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		503.51	
		<i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		632.56	
32 31 13 13-0301	EA	24' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	3,780.80	122.51
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-639.94	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,638.25	
		<i>For Powder Coated Gate And Post, Add</i>		887.39	
		<i>For 1" Mesh Fabric, Add</i>		1,484.66	
		<i>For 1-1/4" Mesh Fabric, Add</i>		955.65	
		<i>For 1-3/4" Mesh Fabric, Add</i>		593.87	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-296.93	
		<i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		541.45	
		<i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		677.67	
32 31 13 13-0302	EA	26' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	4,108.53	134.77
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-694.49	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,777.91	
		<i>For Powder Coated Gate And Post, Add</i>		963.03	
		<i>For 1" Mesh Fabric, Add</i>		1,611.23	
		<i>For 1-1/4" Mesh Fabric, Add</i>		1,037.11	
		<i>For 1-3/4" Mesh Fabric, Add</i>		644.49	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-322.25	
		<i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		580.63	
		<i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		724.01	
32 31 13 13-0303	EA	28' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	.....	4,435.31	149.68
		<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>		-747.34	
		<i>For Aluminized Steel Gate And Post, Add</i>		1,913.18	
		<i>For Powder Coated Gate And Post, Add</i>		1,036.31	
		<i>For 1" Mesh Fabric, Add</i>		1,733.82	
		<i>For 1-1/4" Mesh Fabric, Add</i>		1,116.02	
		<i>For 1-3/4" Mesh Fabric, Add</i>		693.53	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>		-346.76	
		<i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>		618.81	
		<i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>		769.35	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0304	EA 30' Wide x 5' High Double Gate Galvanized Steel Without Barbed Wire	4,769.18	168.39
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-799.40	
	<i>For Aluminized Steel Gate And Post, Add</i>	2,046.47	
	<i>For Powder Coated Gate And Post, Add</i>	1,108.50	
	<i>For 1" Mesh Fabric, Add</i>	1,854.61	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,193.77	
	<i>For 1-3/4" Mesh Fabric, Add</i>	741.85	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-370.92	
	<i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	656.51	
	<i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	814.24	
32 31 13 13-0305	6' Fence Height <small>(32 31 13 13-0264)</small>		
32 31 13 13-0306	EA 3' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	473.02	30.93
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-71.25	
	<i>For Aluminized Steel Gate And Post, Add</i>	182.40	
	<i>For Powder Coated Gate And Post, Add</i>	98.80	
	<i>For 1" Mesh Fabric, Add</i>	165.30	
	<i>For 1-1/4" Mesh Fabric, Add</i>	106.40	
	<i>For 1-3/4" Mesh Fabric, Add</i>	66.12	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-33.06	
	<i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	79.22	
	<i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	106.69	
32 31 13 13-0307	EA 4' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	598.91	30.93
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-94.85	
	<i>For Aluminized Steel Gate And Post, Add</i>	242.83	
	<i>For Powder Coated Gate And Post, Add</i>	131.53	
	<i>For 1" Mesh Fabric, Add</i>	220.06	
	<i>For 1-1/4" Mesh Fabric, Add</i>	141.65	
	<i>For 1-3/4" Mesh Fabric, Add</i>	88.02	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-44.01	
	<i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	96.64	
	<i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	127.71	
32 31 13 13-0308	EA 5' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	700.93	32.88
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-112.91	
	<i>For Aluminized Steel Gate And Post, Add</i>	289.04	
	<i>For Powder Coated Gate And Post, Add</i>	156.56	
	<i>For 1" Mesh Fabric, Add</i>	261.94	
	<i>For 1-1/4" Mesh Fabric, Add</i>	168.61	
	<i>For 1-3/4" Mesh Fabric, Add</i>	104.78	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-52.39	
	<i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	110.83	
	<i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	144.93	
32 31 13 13-0309	EA 6' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	814.10	39.72
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-130.26	
	<i>For Aluminized Steel Gate And Post, Add</i>	333.47	
	<i>For Powder Coated Gate And Post, Add</i>	180.63	
	<i>For 1" Mesh Fabric, Add</i>	302.21	
	<i>For 1-1/4" Mesh Fabric, Add</i>	194.52	
	<i>For 1-3/4" Mesh Fabric, Add</i>	120.88	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-60.44	
	<i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	124.59	
	<i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	162.82	
32 31 13 13-0310	EA 7' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	932.62	46.66
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-148.62	
	<i>For Aluminized Steel Gate And Post, Add</i>	380.47	
	<i>For Powder Coated Gate And Post, Add</i>	206.09	
	<i>For 1" Mesh Fabric, Add</i>	344.80	
	<i>For 1-1/4" Mesh Fabric, Add</i>	221.94	
	<i>For 1-3/4" Mesh Fabric, Add</i>	137.92	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-68.96	
	<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	138.95	
	<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	180.77	
32 31 13 13-0311	EA 8' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	1,045.41	53.18
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-166.10	
	<i>For Aluminized Steel Gate And Post, Add</i>	425.23	
	<i>For Powder Coated Gate And Post, Add</i>	230.33	
	<i>For 1" Mesh Fabric, Add</i>	385.36	
	<i>For 1-1/4" Mesh Fabric, Add</i>	248.05	
	<i>For 1-3/4" Mesh Fabric, Add</i>	154.14	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-77.07	
	<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	152.78	
	<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	198.19	
32 31 13 13-0312	EA 9' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	1,159.30	60.02
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-183.59	
	<i>For Aluminized Steel Gate And Post, Add</i>	469.99	
	<i>For Powder Coated Gate And Post, Add</i>	254.58	
	<i>For 1" Mesh Fabric, Add</i>	425.93	
	<i>For 1-1/4" Mesh Fabric, Add</i>	274.16	
	<i>For 1-3/4" Mesh Fabric, Add</i>	170.37	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-85.19	
	<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	166.64	
	<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	215.63	



Exterior Improvements	32	
Site Improvements	32 30	32
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0313 EA 10' Wide x 6' High Single Gate Galvanized Steel Without Barbed Wire	1,231.19	66.85
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-193.21	
For Aluminized Steel Gate And Post, Add	494.61	
For Powder Coated Gate And Post, Add	267.91	
For 1" Mesh Fabric, Add	448.24	
For 1-1/4" Mesh Fabric, Add	288.52	
For 1-3/4" Mesh Fabric, Add	179.29	
For 2-1/8" Mesh Fabric, Deduct	-89.65	
For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	175.86	
For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	228.44	
32 31 13 13-0314 EA 10' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	1,716.63	66.74
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-284.30	
For Aluminized Steel Gate And Post, Add	727.81	
For Powder Coated Gate And Post, Add	394.23	
For 1" Mesh Fabric, Add	659.58	
For 1-1/4" Mesh Fabric, Add	424.56	
For 1-3/4" Mesh Fabric, Add	263.83	
For 2-1/8" Mesh Fabric, Deduct	-131.92	
For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	255.96	
For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	325.26	
32 31 13 13-0315 EA 12' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	2,035.45	72.28
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-340.95	
For Aluminized Steel Gate And Post, Add	872.84	
For Powder Coated Gate And Post, Add	472.79	
For 1" Mesh Fabric, Add	791.01	
For 1-1/4" Mesh Fabric, Add	509.15	
For 1-3/4" Mesh Fabric, Add	316.40	
For 2-1/8" Mesh Fabric, Deduct	-158.20	
For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	296.38	
For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	372.84	
32 31 13 13-0316 EA 14' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	2,415.12	96.21
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-398.65	
For Aluminized Steel Gate And Post, Add	1,020.55	
For Powder Coated Gate And Post, Add	552.80	
For 1" Mesh Fabric, Add	924.88	
For 1-1/4" Mesh Fabric, Add	595.32	
For 1-3/4" Mesh Fabric, Add	369.95	
For 2-1/8" Mesh Fabric, Deduct	-184.98	
For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	337.39	
For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	421.03	
32 31 13 13-0317 EA 16' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	2,739.48	103.67
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-455.30	
For Aluminized Steel Gate And Post, Add	1,165.57	
For Powder Coated Gate And Post, Add	631.35	
For 1" Mesh Fabric, Add	1,056.30	
For 1-1/4" Mesh Fabric, Add	679.92	
For 1-3/4" Mesh Fabric, Add	422.52	
For 2-1/8" Mesh Fabric, Deduct	-211.26	
For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	377.80	
For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	468.61	
32 31 13 13-0318 EA 18' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	3,073.14	112.27
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-513.00	
For Aluminized Steel Gate And Post, Add	1,313.28	
For Powder Coated Gate And Post, Add	711.36	
For 1" Mesh Fabric, Add	1,190.16	
For 1-1/4" Mesh Fabric, Add	766.08	
For 1-3/4" Mesh Fabric, Add	476.07	
For 2-1/8" Mesh Fabric, Deduct	-238.03	
For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	418.82	
For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	516.80	
32 31 13 13-0319 EA 20' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	3,411.53	122.51
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-570.70	
For Aluminized Steel Gate And Post, Add	1,461.00	
For Powder Coated Gate And Post, Add	791.38	
For 1" Mesh Fabric, Add	1,324.03	
For 1-1/4" Mesh Fabric, Add	852.25	
For 1-3/4" Mesh Fabric, Add	529.61	
For 2-1/8" Mesh Fabric, Deduct	-264.81	
For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	459.84	
For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	564.99	
32 31 13 13-0320 EA 22' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	3,750.44	134.77
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-627.35	
For Aluminized Steel Gate And Post, Add	1,606.02	
For Powder Coated Gate And Post, Add	869.93	
For 1" Mesh Fabric, Add	1,455.46	
For 1-1/4" Mesh Fabric, Add	936.85	
For 1-3/4" Mesh Fabric, Add	582.18	
For 2-1/8" Mesh Fabric, Deduct	-291.09	
For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	526.90	
For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	655.95	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0321	EA 24' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	4,100.33	149.68
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-684.53	
	For Aluminized Steel Gate And Post, Add	1,752.39	
	For Powder Coated Gate And Post, Add	949.21	
	For 1" Mesh Fabric, Add	1,588.11	
	For 1-1/4" Mesh Fabric, Add	1,022.23	
	For 1-3/4" Mesh Fabric, Add	635.24	
	For 2-1/8" Mesh Fabric, Deduct	-317.62	
	For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	567.61	
	For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	703.83	
32 31 13 13-0322	EA 26' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	4,458.09	168.39
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-741.07	
	For Aluminized Steel Gate And Post, Add	1,897.15	
	For Powder Coated Gate And Post, Add	1,027.62	
	For 1" Mesh Fabric, Add	1,719.29	
	For 1-1/4" Mesh Fabric, Add	1,106.67	
	For 1-3/4" Mesh Fabric, Add	687.72	
	For 2-1/8" Mesh Fabric, Deduct	-343.86	
	For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	607.95	
	For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	751.33	
32 31 13 13-0323	EA 28' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	4,835.83	192.42
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-798.35	
	For Aluminized Steel Gate And Post, Add	2,043.79	
	For Powder Coated Gate And Post, Add	1,107.05	
	For 1" Mesh Fabric, Add	1,852.18	
	For 1-1/4" Mesh Fabric, Add	1,192.21	
	For 1-3/4" Mesh Fabric, Add	740.87	
	For 2-1/8" Mesh Fabric, Deduct	-370.44	
	For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	648.74	
	For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	799.28	
32 31 13 13-0324	EA 30' Wide x 6' High Double Gate Galvanized Steel Without Barbed Wire	5,238.20	224.53
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-855.74	
	For Aluminized Steel Gate And Post, Add	2,190.69	
	For Powder Coated Gate And Post, Add	1,186.62	
	For 1" Mesh Fabric, Add	1,985.31	
	For 1-1/4" Mesh Fabric, Add	1,277.90	
	For 1-3/4" Mesh Fabric, Add	794.13	
	For 2-1/8" Mesh Fabric, Deduct	-397.06	
	For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	689.56	
	For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	847.29	
32 31 13 13-0325	7' Fence Height (32 31 13 13-0264)		
32 31 13 13-0326	EA 3' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	496.49	33.32
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-74.31	
	For Aluminized Steel Gate And Post, Add	190.23	
	For Powder Coated Gate And Post, Add	103.04	
	For 1" Mesh Fabric, Add	172.40	
	For 1-1/4" Mesh Fabric, Add	110.97	
	For 1-3/4" Mesh Fabric, Add	68.96	
	For 2-1/8" Mesh Fabric, Deduct	-34.48	
	For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	81.02	
	For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	108.49	
32 31 13 13-0327	EA 4' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	627.04	33.32
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-98.79	
	For Aluminized Steel Gate And Post, Add	252.90	
	For Powder Coated Gate And Post, Add	136.99	
	For 1" Mesh Fabric, Add	229.19	
	For 1-1/4" Mesh Fabric, Add	147.52	
	For 1-3/4" Mesh Fabric, Add	91.68	
	For 2-1/8" Mesh Fabric, Deduct	-45.84	
	For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	98.95	
	For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	130.02	
32 31 13 13-0328	EA 5' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	737.89	35.05
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-118.62	
	For Aluminized Steel Gate And Post, Add	303.66	
	For Powder Coated Gate And Post, Add	164.48	
	For 1" Mesh Fabric, Add	275.19	
	For 1-1/4" Mesh Fabric, Add	177.13	
	For 1-3/4" Mesh Fabric, Add	110.08	
	For 2-1/8" Mesh Fabric, Deduct	-55.04	
	For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	114.18	
	For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	148.28	
32 31 13 13-0329	EA 6' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	904.29	42.65
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-145.54	
	For Aluminized Steel Gate And Post, Add	372.59	
	For Powder Coated Gate And Post, Add	201.82	
	For 1" Mesh Fabric, Add	337.66	
	For 1-1/4" Mesh Fabric, Add	217.34	
	For 1-3/4" Mesh Fabric, Add	135.06	
	For 2-1/8" Mesh Fabric, Deduct	-67.53	
	For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	133.56	
	For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	171.79	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0330 EA 7' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	1,069.63	49.92
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-172.48	
For Aluminized Steel Gate And Post, Add	441.54	
For Powder Coated Gate And Post, Add	239.17	
For 1" Mesh Fabric, Add	400.15	
For 1-1/4" Mesh Fabric, Add	257.57	
For 1-3/4" Mesh Fabric, Add	160.06	
For 2-1/8" Mesh Fabric, Deduct	-80.03	
For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	152.95	
For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	194.77	
32 31 13 13-0331 EA 8' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	1,236.04	57.41
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-199.40	
For Aluminized Steel Gate And Post, Add	510.48	
For Powder Coated Gate And Post, Add	276.51	
For 1" Mesh Fabric, Add	462.62	
For 1-1/4" Mesh Fabric, Add	297.78	
For 1-3/4" Mesh Fabric, Add	185.05	
For 2-1/8" Mesh Fabric, Deduct	-92.52	
For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	172.31	
For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	217.72	
32 31 13 13-0332 EA 9' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	1,401.40	64.68
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-226.34	
For Aluminized Steel Gate And Post, Add	579.43	
For Powder Coated Gate And Post, Add	313.86	
For 1" Mesh Fabric, Add	525.11	
For 1-1/4" Mesh Fabric, Add	338.00	
For 1-3/4" Mesh Fabric, Add	210.04	
For 2-1/8" Mesh Fabric, Deduct	-105.02	
For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	191.72	
For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	240.71	
32 31 13 13-0333 EA 10' Wide x 7' High Single Gate Galvanized Steel Without Barbed Wire	1,541.92	72.28
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-248.42	
For Aluminized Steel Gate And Post, Add	635.94	
For Powder Coated Gate And Post, Add	344.47	
For 1" Mesh Fabric, Add	576.32	
For 1-1/4" Mesh Fabric, Add	370.97	
For 1-3/4" Mesh Fabric, Add	230.53	
For 2-1/8" Mesh Fabric, Deduct	-115.26	
For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	208.25	
For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	260.83	
32 31 13 13-0334 EA 10' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	1,956.11	72.28
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-326.08	
For Aluminized Steel Gate And Post, Add	834.75	
For Powder Coated Gate And Post, Add	452.16	
For 1" Mesh Fabric, Add	756.50	
For 1-1/4" Mesh Fabric, Add	486.94	
For 1-3/4" Mesh Fabric, Add	302.60	
For 2-1/8" Mesh Fabric, Deduct	-151.30	
For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	280.47	
For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	349.77	
32 31 13 13-0335 EA 12' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	2,222.68	96.21
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-362.57	
For Aluminized Steel Gate And Post, Add	928.18	
For Powder Coated Gate And Post, Add	502.76	
For 1" Mesh Fabric, Add	841.16	
For 1-1/4" Mesh Fabric, Add	541.44	
For 1-3/4" Mesh Fabric, Add	336.47	
For 2-1/8" Mesh Fabric, Deduct	-168.23	
For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	309.06	
For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	385.52	
32 31 13 13-0336 EA 14' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	2,567.19	103.67
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-423.00	
For Aluminized Steel Gate And Post, Add	1,082.88	
For Powder Coated Gate And Post, Add	586.56	
For 1" Mesh Fabric, Add	981.36	
For 1-1/4" Mesh Fabric, Add	631.68	
For 1-3/4" Mesh Fabric, Add	392.54	
For 2-1/8" Mesh Fabric, Deduct	-196.27	
For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	351.67	
For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	435.31	
32 31 13 13-0337 EA 16' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	2,888.50	112.27
For 1-5/8" Schedule 40 Pipe Frame, Deduct	-478.38	
For Aluminized Steel Gate And Post, Add	1,224.66	
For Powder Coated Gate And Post, Add	663.36	
For 1" Mesh Fabric, Add	1,109.85	
For 1-1/4" Mesh Fabric, Add	714.38	
For 1-3/4" Mesh Fabric, Add	443.94	
For 2-1/8" Mesh Fabric, Deduct	-221.97	
For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	391.34	
For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	482.15	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0338	EA 18' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	3,243.67	122.51
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-539.23	
	For Aluminized Steel Gate And Post, Add	1,380.43	
	For Powder Coated Gate And Post, Add	747.73	
	For 1" Mesh Fabric, Add	1,251.01	
	For 1-1/4" Mesh Fabric, Add	805.25	
	For 1-3/4" Mesh Fabric, Add	500.40	
	For 2-1/8" Mesh Fabric, Deduct	-250.20	
	For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	434.21	
	For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	532.19	
32 31 13 13-0339	EA 20' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	3,599.37	134.77
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-599.03	
	For Aluminized Steel Gate And Post, Add	1,533.51	
	For Powder Coated Gate And Post, Add	830.65	
	For 1" Mesh Fabric, Add	1,389.74	
	For 1-1/4" Mesh Fabric, Add	894.55	
	For 1-3/4" Mesh Fabric, Add	555.90	
	For 2-1/8" Mesh Fabric, Deduct	-277.95	
	For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	476.46	
	For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	581.61	
32 31 13 13-0340	EA 22' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	3,963.25	149.68
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-658.83	
	For Aluminized Steel Gate And Post, Add	1,686.60	
	For Powder Coated Gate And Post, Add	913.57	
	For 1" Mesh Fabric, Add	1,528.48	
	For 1-1/4" Mesh Fabric, Add	983.85	
	For 1-3/4" Mesh Fabric, Add	611.39	
	For 2-1/8" Mesh Fabric, Deduct	-305.70	
	For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	545.36	
	For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	674.41	
32 31 13 13-0341	EA 24' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	4,338.36	168.39
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-718.62	
	For Aluminized Steel Gate And Post, Add	1,839.68	
	For Powder Coated Gate And Post, Add	996.49	
	For 1" Mesh Fabric, Add	1,667.21	
	For 1-1/4" Mesh Fabric, Add	1,073.14	
	For 1-3/4" Mesh Fabric, Add	666.88	
	For 2-1/8" Mesh Fabric, Deduct	-333.44	
	For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	587.61	
	For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	723.83	
32 31 13 13-0342	EA 26' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	4,729.52	192.42
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-778.42	
	For Aluminized Steel Gate And Post, Add	1,992.76	
	For Powder Coated Gate And Post, Add	1,079.41	
	For 1" Mesh Fabric, Add	1,805.94	
	For 1-1/4" Mesh Fabric, Add	1,162.44	
	For 1-3/4" Mesh Fabric, Add	722.37	
	For 2-1/8" Mesh Fabric, Deduct	-361.19	
	For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	629.86	
	For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	773.24	
32 31 13 13-0343	EA 28' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	5,144.76	224.53
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-838.22	
	For Aluminized Steel Gate And Post, Add	2,145.84	
	For Powder Coated Gate And Post, Add	1,162.33	
	For 1" Mesh Fabric, Add	1,944.67	
	For 1-1/4" Mesh Fabric, Add	1,251.74	
	For 1-3/4" Mesh Fabric, Add	777.87	
	For 2-1/8" Mesh Fabric, Deduct	-388.93	
	For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	672.13	
	For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	822.67	
32 31 13 13-0344	EA 30' Wide x 7' High Double Gate Galvanized Steel Without Barbed Wire	5,598.54	269.41
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-898.02	
	For Aluminized Steel Gate And Post, Add	2,298.92	
	For Powder Coated Gate And Post, Add	1,245.25	
	For 1" Mesh Fabric, Add	2,083.40	
	For 1-1/4" Mesh Fabric, Add	1,341.04	
	For 1-3/4" Mesh Fabric, Add	833.36	
	For 2-1/8" Mesh Fabric, Deduct	-416.68	
	For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	714.37	
	For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	872.10	
32 31 13 13-0345	8' Fence Height (32 31 13 13-0264)		
32 31 13 13-0346	EA 3' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire	581.84	36.13
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-88.75	
	For Aluminized Steel Gate And Post, Add	227.19	
	For Powder Coated Gate And Post, Add	123.06	
	For 1" Mesh Fabric, Add	205.89	
	For 1-1/4" Mesh Fabric, Add	132.53	
	For 1-3/4" Mesh Fabric, Add	82.36	
	For 2-1/8" Mesh Fabric, Deduct	-41.18	
	For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	89.49	
	For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	116.96	



	Exterior Improvements	32	
	Site Improvements	32 30	32
	Fences and Gates	32 31	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0347	EA 4' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	739.62 -118.33 302.93 164.09 274.53 176.71 109.81 -54.91 110.41 141.48	36.13
32 31 13 13-0348	EA 5' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	863.25 -139.17 356.28 192.98 322.87 207.83 129.15 -64.57 126.24 160.34	40.26
32 31 13 13-0349	EA 6' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	990.13 -160.01 409.63 221.88 371.23 238.95 148.49 -74.25 142.04 180.27	45.58
32 31 13 13-0350	EA 7' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	1,129.50 -180.85 462.98 250.78 419.58 270.07 167.83 -83.92 157.86 199.68	54.91
32 31 13 13-0351	EA 8' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	1,267.80 -201.70 516.34 279.68 467.93 301.20 187.17 -93.59 173.66 219.07	63.92
32 31 13 13-0352	EA 9' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	1,407.17 -222.54 569.69 308.58 516.28 332.32 206.51 -103.26 189.48 238.47	73.36
32 31 13 13-0353	EA 10' Wide x 8' High Single Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	1,546.52 -243.38 623.05 337.49 564.64 363.45 225.86 -112.93 205.29 257.87	82.80
32 31 13 13-0354	EA 10' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	2,236.03 -365.07 934.59 506.24 846.97 545.18 338.79 -169.39 303.35 372.65	96.21

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0355	EA 12' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	2,633.17	103.67
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-435.37	
	For Aluminized Steel Gate And Post, Add	1,114.55	
	For Powder Coated Gate And Post, Add	603.71	
	For 1" Mesh Fabric, Add	1,010.06	
	For 1-1/4" Mesh Fabric, Add	650.15	
	For 1-3/4" Mesh Fabric, Add	404.02	
	For 2-1/8" Mesh Fabric, Deduct	-202.01	
	For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	351.77	
	For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	428.23	
32 31 13 13-0356	EA 14' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	3,039.57	112.27
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-506.71	
	For Aluminized Steel Gate And Post, Add	1,297.17	
	For Powder Coated Gate And Post, Add	702.63	
	For 1" Mesh Fabric, Add	1,175.56	
	For 1-1/4" Mesh Fabric, Add	756.68	
	For 1-3/4" Mesh Fabric, Add	470.22	
	For 2-1/8" Mesh Fabric, Deduct	-235.11	
	For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	400.78	
	For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	484.42	
32 31 13 13-0357	EA 16' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	3,461.88	122.51
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-580.14	
	For Aluminized Steel Gate And Post, Add	1,485.17	
	For Powder Coated Gate And Post, Add	804.47	
	For 1" Mesh Fabric, Add	1,345.93	
	For 1-1/4" Mesh Fabric, Add	866.35	
	For 1-3/4" Mesh Fabric, Add	538.37	
	For 2-1/8" Mesh Fabric, Deduct	-269.19	
	For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	451.04	
	For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	541.85	
32 31 13 13-0358	EA 18' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	3,890.32	134.77
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-653.58	
	For Aluminized Steel Gate And Post, Add	1,673.16	
	For Powder Coated Gate And Post, Add	906.30	
	For 1" Mesh Fabric, Add	1,516.31	
	For 1-1/4" Mesh Fabric, Add	976.01	
	For 1-3/4" Mesh Fabric, Add	606.52	
	For 2-1/8" Mesh Fabric, Deduct	-303.26	
32 31 13 13-0359	EA 20' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	4,321.33	149.68
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-725.97	
	For Aluminized Steel Gate And Post, Add	1,858.47	
	For Powder Coated Gate And Post, Add	1,006.67	
	For 1" Mesh Fabric, Add	1,684.24	
	For 1-1/4" Mesh Fabric, Add	1,084.11	
	For 1-3/4" Mesh Fabric, Add	673.70	
	For 2-1/8" Mesh Fabric, Deduct	-336.85	
	For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	550.93	
	For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	656.08	
32 31 13 13-0360	EA 22' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	4,757.99	168.39
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-797.30	
	For Aluminized Steel Gate And Post, Add	2,041.10	
	For Powder Coated Gate And Post, Add	1,105.60	
	For 1" Mesh Fabric, Add	1,849.75	
	For 1-1/4" Mesh Fabric, Add	1,190.64	
	For 1-3/4" Mesh Fabric, Add	739.90	
	For 2-1/8" Mesh Fabric, Deduct	-369.95	
	For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	626.60	
	For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	755.65	
32 31 13 13-0361	EA 24' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	5,221.89	192.42
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-870.74	
	For Aluminized Steel Gate And Post, Add	2,229.10	
	For Powder Coated Gate And Post, Add	1,207.43	
	For 1" Mesh Fabric, Add	2,020.12	
	For 1-1/4" Mesh Fabric, Add	1,300.31	
	For 1-3/4" Mesh Fabric, Add	808.05	
	For 2-1/8" Mesh Fabric, Deduct	-404.02	
	For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	676.85	
	For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	813.07	
32 31 13 13-0362	EA 26' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire	5,709.87	224.53
	For 1-5/8" Schedule 40 Pipe Frame, Deduct	-944.18	
	For Aluminized Steel Gate And Post, Add	2,417.09	
	For Powder Coated Gate And Post, Add	1,309.26	
	For 1" Mesh Fabric, Add	2,190.49	
	For 1-1/4" Mesh Fabric, Add	1,409.97	
	For 1-3/4" Mesh Fabric, Add	876.20	
	For 2-1/8" Mesh Fabric, Deduct	-438.10	
	For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	727.11	
	For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	870.49	



	Exterior Improvements	32
	Site Improvements	32 30
	Fences and Gates	32 31

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31	13	13-0363	EA 28' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	6,230.79 -1,016.56 2,602.40 1,409.63 2,358.43 1,518.07 943.37 -471.69 776.75 927.29	269.41
32 31	13	13-0364	EA 30' Wide x 8' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	6,819.13 -1,088.95 2,787.71 1,510.01 2,526.36 1,626.16 1,010.55 -505.27 826.38 984.11	336.80
32 31	13	13-0365	10' Fence Height ^(32 31 13 13-0264)		
32 31	13	13-0366	EA 3' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	732.65 -114.76 293.79 159.14 266.25 171.38 106.50 -53.25 104.75 132.22	40.16
32 31	13	13-0367	EA 4' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	936.67 -153.02 391.72 212.18 355.00 228.51 142.00 -71.00 130.76 161.83	40.16
32 31	13	13-0368	EA 5' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,085.72 -179.97 460.72 249.56 417.53 268.76 167.01 -83.51 150.17 184.27	41.89
32 31	13	13-0369	EA 6' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,259.86 -206.92 529.72 286.93 480.06 309.01 192.02 -96.01 169.56 207.79	52.09
32 31	13	13-0370	EA 7' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,433.33 -233.87 598.70 324.30 542.57 349.24 217.03 -108.51 188.96 230.78	61.75
32 31	13	13-0371	EA 8' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,606.99 -260.82 667.70 361.67 605.10 389.49 242.04 -121.02 208.34 253.75	71.95

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0372	EA	9' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire	1,780.04	81.72
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-287.77	
			<i>For Aluminized Steel Gate And Post, Add</i>	736.70	
			<i>For Powder Coated Gate And Post, Add</i>	399.05	
			<i>For 1" Mesh Fabric, Add</i>	667.63	
			<i>For 1-1/4" Mesh Fabric, Add</i>	429.74	
			<i>For 1-3/4" Mesh Fabric, Add</i>	267.05	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-133.53	
			<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	227.76	
			<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	276.75	
32 31 13	13-0373	EA	10' Wide x 10' High Single Gate Galvanized Steel Without Barbed Wire.....	1,954.19	91.81
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-314.73	
			<i>For Aluminized Steel Gate And Post, Add</i>	805.70	
			<i>For Powder Coated Gate And Post, Add</i>	436.42	
			<i>For 1" Mesh Fabric, Add</i>	730.16	
			<i>For 1-1/4" Mesh Fabric, Add</i>	469.99	
			<i>For 1-3/4" Mesh Fabric, Add</i>	292.07	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-146.03	
			<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	247.15	
			<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	299.73	
32 31 13	13-0374	EA	10' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire	2,838.86	106.95
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-472.08	
			<i>For Aluminized Steel Gate And Post, Add</i>	1,208.53	
			<i>For Powder Coated Gate And Post, Add</i>	654.62	
			<i>For 1" Mesh Fabric, Add</i>	1,095.23	
			<i>For 1-1/4" Mesh Fabric, Add</i>	704.98	
			<i>For 1-3/4" Mesh Fabric, Add</i>	438.09	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-219.05	
			<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	366.13	
			<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	435.43	
32 31 13	13-0375	EA	12' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire	3,087.31	115.05
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-514.06	
			<i>For Aluminized Steel Gate And Post, Add</i>	1,315.99	
			<i>For Powder Coated Gate And Post, Add</i>	712.83	
			<i>For 1" Mesh Fabric, Add</i>	1,192.62	
			<i>For 1-1/4" Mesh Fabric, Add</i>	767.66	
			<i>For 1-3/4" Mesh Fabric, Add</i>	477.05	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-238.52	
			<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	397.93	
			<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	474.39	
32 31 13	13-0376	EA	14' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire	3,519.06	124.78
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-589.59	
			<i>For Aluminized Steel Gate And Post, Add</i>	1,509.34	
			<i>For Powder Coated Gate And Post, Add</i>	817.56	
			<i>For 1" Mesh Fabric, Add</i>	1,367.84	
			<i>For 1-1/4" Mesh Fabric, Add</i>	880.45	
			<i>For 1-3/4" Mesh Fabric, Add</i>	547.14	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-273.57	
			<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	449.40	
			<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	533.04	
32 31 13	13-0377	EA	16' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire	4,000.55	136.03
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-673.51	
			<i>For Aluminized Steel Gate And Post, Add</i>	1,724.19	
			<i>For Powder Coated Gate And Post, Add</i>	933.94	
			<i>For 1" Mesh Fabric, Add</i>	1,562.55	
			<i>For 1-1/4" Mesh Fabric, Add</i>	1,005.78	
			<i>For 1-3/4" Mesh Fabric, Add</i>	625.02	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-312.51	
			<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	505.82	
			<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	596.63	
32 31 13	13-0378	EA	18' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire	4,489.19	149.68
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-757.44	
			<i>For Aluminized Steel Gate And Post, Add</i>	1,939.05	
			<i>For Powder Coated Gate And Post, Add</i>	1,050.32	
			<i>For 1" Mesh Fabric, Add</i>	1,757.26	
			<i>For 1-1/4" Mesh Fabric, Add</i>	1,131.11	
			<i>For 1-3/4" Mesh Fabric, Add</i>	702.90	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-351.45	
			<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	562.22	
			<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	660.20	
32 31 13	13-0379	EA	20' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire	4,989.29	166.25
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-841.89	
			<i>For Aluminized Steel Gate And Post, Add</i>	2,155.24	
			<i>For Powder Coated Gate And Post, Add</i>	1,167.42	
			<i>For 1" Mesh Fabric, Add</i>	1,953.18	
			<i>For 1-1/4" Mesh Fabric, Add</i>	1,257.22	
			<i>For 1-3/4" Mesh Fabric, Add</i>	781.27	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-390.64	
			<i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	618.94	
			<i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	724.09	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0380	EA	22' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	5,502.37 -926.34 2,371.44 1,284.53 2,149.11 1,383.34 859.65 -429.82 702.30 831.35	187.11
32 31 13	13-0381	EA	24' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	6,029.85 -1,010.27 2,586.29 1,400.91 2,343.82 1,508.67 937.53 -468.76 758.71 894.93	213.66
32 31 13	13-0382	EA	26' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	6,584.89 -1,094.20 2,801.14 1,517.28 2,538.53 1,634.00 1,015.41 -507.71 815.12 958.50	249.44
32 31 13	13-0383	EA	28' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	7,181.55 -1,178.12 3,015.99 1,633.66 2,733.24 1,759.33 1,093.30 -546.65 871.54 1,022.08	299.12
32 31 13	13-0384	EA	30' Wide x 10' High Double Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	7,860.30 -1,263.10 3,233.53 1,751.50 2,930.39 1,886.23 1,172.15 -586.08 928.55 1,086.28	374.22
32 31 13	13-0385		12' Fence Height <small>(32 31 13 13-0264)</small>		
32 31 13	13-0386	EA	3' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	917.43 -146.90 376.06 203.70 340.80 219.37 136.32 -68.16 151.07	44.60
32 31 13	13-0387	EA	4' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,178.57 -195.86 501.40 271.59 454.40 292.49 181.76 -90.88 155.89 186.96	44.60
32 31 13	13-0388	EA	5' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For Aluminized Steel Gate And Post, Add</i> <i>For Powder Coated Gate And Post, Add</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,367.51 -230.36 589.73 319.44 534.44 344.01 213.78 -106.89 179.74 213.84	46.23

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0389	EA	6' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire	1,585.13	57.41
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-264.86	
			<i>For Aluminized Steel Gate And Post, Add</i>	678.04	
			<i>For Powder Coated Gate And Post, Add</i>	367.27	
			<i>For 1" Mesh Fabric, Add</i>	614.47	
			<i>For 1-1/4" Mesh Fabric, Add</i>	395.52	
			<i>For 1-3/4" Mesh Fabric, Add</i>	245.79	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-122.89	
			<i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	203.55	
			<i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	241.78	
32 31 13	13-0390	EA	7' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire	677.56	68.69
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-88.38	
			<i>For Aluminized Steel Gate And Post, Add</i>	226.25	
			<i>For Powder Coated Gate And Post, Add</i>	122.55	
			<i>For 1" Mesh Fabric, Add</i>	205.04	
			<i>For 1-1/4" Mesh Fabric, Add</i>	131.98	
			<i>For 1-3/4" Mesh Fabric, Add</i>	82.02	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-41.01	
			<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	103.61	
			<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	145.43	
32 31 13	13-0391	EA	8' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire	764.44	79.54
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-98.57	
			<i>For Aluminized Steel Gate And Post, Add</i>	252.33	
			<i>For Powder Coated Gate And Post, Add</i>	136.68	
			<i>For 1" Mesh Fabric, Add</i>	228.67	
			<i>For 1-1/4" Mesh Fabric, Add</i>	147.19	
			<i>For 1-3/4" Mesh Fabric, Add</i>	91.47	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-45.73	
			<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	113.15	
			<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	158.56	
32 31 13	13-0392	EA	9' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire	852.40	90.73
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-108.75	
			<i>For Aluminized Steel Gate And Post, Add</i>	278.40	
			<i>For Powder Coated Gate And Post, Add</i>	150.80	
			<i>For 1" Mesh Fabric, Add</i>	252.30	
			<i>For 1-1/4" Mesh Fabric, Add</i>	162.40	
			<i>For 1-3/4" Mesh Fabric, Add</i>	100.92	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-50.46	
			<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	122.73	
			<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	171.72	
32 31 13	13-0393	EA	10' Wide x 12' High Single Gate Galvanized Steel Without Barbed Wire.....	940.36	101.90
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-118.94	
			<i>For Aluminized Steel Gate And Post, Add</i>	304.47	
			<i>For Powder Coated Gate And Post, Add</i>	164.92	
			<i>For 1" Mesh Fabric, Add</i>	275.93	
			<i>For 1-1/4" Mesh Fabric, Add</i>	177.61	
			<i>For 1-3/4" Mesh Fabric, Add</i>	110.37	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-55.19	
			<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	132.29	
			<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	184.87	
32 31 13	13-0394	EA	10' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire	1,240.54	118.84
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-165.71	
			<i>For Aluminized Steel Gate And Post, Add</i>	424.21	
			<i>For Powder Coated Gate And Post, Add</i>	229.78	
			<i>For 1" Mesh Fabric, Add</i>	384.44	
			<i>For 1-1/4" Mesh Fabric, Add</i>	247.46	
			<i>For 1-3/4" Mesh Fabric, Add</i>	153.78	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-76.89	
			<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	186.39	
			<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	255.69	
32 31 13	13-0395	EA	12' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire	1,355.31	127.94
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-182.12	
			<i>For Aluminized Steel Gate And Post, Add</i>	466.24	
			<i>For Powder Coated Gate And Post, Add</i>	252.55	
			<i>For 1" Mesh Fabric, Add</i>	422.53	
			<i>For 1-1/4" Mesh Fabric, Add</i>	271.97	
			<i>For 1-3/4" Mesh Fabric, Add</i>	169.01	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-84.51	
			<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	203.20	
			<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	279.66	
32 31 13	13-0396	EA	14' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire	1,529.60	138.56
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-208.76	
			<i>For Aluminized Steel Gate And Post, Add</i>	534.43	
			<i>For Powder Coated Gate And Post, Add</i>	289.48	
			<i>For 1" Mesh Fabric, Add</i>	484.32	
			<i>For 1-1/4" Mesh Fabric, Add</i>	311.75	
			<i>For 1-3/4" Mesh Fabric, Add</i>	193.73	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-96.86	
			<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	225.98	
			<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	309.62	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0397	EA 16' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	1,725.93 -238.50 610.55 330.71 553.31 356.15 221.32 -110.66 250.61 341.42	151.08
32 31 13 13-0398	EA 18' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	5,344.58 -908.51 2,325.78 1,259.80 2,107.74 1,356.70 843.09 -421.55 650.85 748.83	166.38
32 31 13 13-0399	EA 20' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	5,942.60 -1,010.27 2,586.29 1,400.91 2,343.82 1,508.67 937.53 -468.76 717.72 822.87	184.71
32 31 13 13-0400	EA 22' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	6,549.55 -1,110.98 2,844.11 1,540.56 2,577.48 1,659.06 1,030.99 -515.50 810.63 939.68	207.85
32 31 13 13-0401	EA 24' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	7,181.01 -1,212.74 3,104.62 1,681.67 2,813.56 1,811.03 1,125.43 -562.71 877.50 1,013.72	237.43
32 31 13 13-0402	EA 26' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	7,831.92 -1,312.41 3,359.76 1,819.87 3,044.78 1,959.86 1,217.91 -608.96 943.14 1,086.52	277.25
32 31 13 13-0403	EA 28' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	8,534.66 -1,413.12 3,617.58 1,959.52 3,278.43 2,110.26 1,311.37 -655.69 1,009.40 1,159.94	332.37
32 31 13 13-0404	EA 30' Wide x 12' High Double Gate Galvanized Steel Without Barbed Wire For 1-5/8" Schedule 40 Pipe Frame, Deduct For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	9,327.99 -1,514.88 3,878.09 2,100.63 3,514.52 2,262.22 1,405.81 -702.90 1,076.26 1,233.99	415.81

32 31 13 13-0405 Vinyl Coated Without Barb Wire Arm (32 31 13 13-0263)

Note: Industrial swing gate. Includes posts (3" diameter posts for up to 6' wide gate, 4" diameter to 13' wide, 6-5/8" diameter for 18' wide, 8-5/8" diameter for over 18' wide), 2" diameter schedule pipe frame, offset hinges, cap and hardware (drop rod, center locking device, gate keeper, catch bolt and tension bands). Fabric: galvanized chain link 2" mesh # 9 gauge, galvanized 1.2 ounce coating.

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0406		4' Fence Height (32 31 13 13-0405)		
	32 31 13 13-0407	EA	3' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	191.63	27.14
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-20.67	
			For 1" Mesh Fabric, Add	47.95	
			For 1-1/4" Mesh Fabric, Add	30.86	
			For 1-3/4" Mesh Fabric, Add	19.18	
			For 2-1/8" Mesh Fabric, Deduct	-9.59	
			For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	49.55	
			For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	77.02	
	32 31 13 13-0408	EA	4' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	228.37	27.14
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-27.56	
			For 1" Mesh Fabric, Add	63.93	
			For 1-1/4" Mesh Fabric, Add	41.15	
			For 1-3/4" Mesh Fabric, Add	25.57	
			For 2-1/8" Mesh Fabric, Deduct	-12.79	
			For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	57.16	
			For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	88.23	
	32 31 13 13-0409	EA	5' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	264.42	28.87
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-33.30	
			For 1" Mesh Fabric, Add	77.26	
			For 1-1/4" Mesh Fabric, Add	49.73	
			For 1-3/4" Mesh Fabric, Add	30.90	
			For 2-1/8" Mesh Fabric, Deduct	-15.45	
			For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	64.13	
			For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	98.23	
	32 31 13 13-0410	EA	6' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	312.39	34.72
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-39.04	
			For 1" Mesh Fabric, Add	90.57	
			For 1-1/4" Mesh Fabric, Add	58.30	
			For 1-3/4" Mesh Fabric, Add	36.23	
			For 2-1/8" Mesh Fabric, Deduct	-18.11	
			For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	71.07	
			For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	109.30	
	32 31 13 13-0411	EA	7' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	360.37	40.48
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-44.78	
			For 1" Mesh Fabric, Add	103.89	
			For 1-1/4" Mesh Fabric, Add	66.87	
			For 1-3/4" Mesh Fabric, Add	41.56	
			For 2-1/8" Mesh Fabric, Deduct	-20.78	
			For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	78.03	
			For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	119.85	
	32 31 13 13-0412	EA	8' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	408.37	46.23
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-50.52	
			For 1" Mesh Fabric, Add	117.22	
			For 1-1/4" Mesh Fabric, Add	75.45	
			For 1-3/4" Mesh Fabric, Add	46.89	
			For 2-1/8" Mesh Fabric, Deduct	-23.44	
			For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	84.97	
			For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	130.38	
	32 31 13 13-0413	EA	9' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	456.35	52.09
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-56.26	
			For 1" Mesh Fabric, Add	130.53	
			For 1-1/4" Mesh Fabric, Add	84.02	
			For 1-3/4" Mesh Fabric, Add	52.21	
			For 2-1/8" Mesh Fabric, Deduct	-26.11	
			For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	91.94	
			For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	140.93	
	32 31 13 13-0414	EA	10' Wide x 4' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	504.32	57.84
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-62.00	
			For 1" Mesh Fabric, Add	143.85	
			For 1-1/4" Mesh Fabric, Add	92.59	
			For 1-3/4" Mesh Fabric, Add	57.54	
			For 2-1/8" Mesh Fabric, Deduct	-28.77	
			For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add	98.89	
			For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add	151.47	
	32 31 13 13-0415	EA	10' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	614.55	57.84
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-82.67	
			For 1" Mesh Fabric, Add	191.80	
			For 1-1/4" Mesh Fabric, Add	123.46	
			For 1-3/4" Mesh Fabric, Add	76.72	
			For 2-1/8" Mesh Fabric, Deduct	-38.36	
			For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	137.67	
			For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	206.97	
	32 31 13 13-0416	EA	12' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	715.14	61.96
			For 1-5/8" Schedule 40 Pipe Frame, Deduct	-99.21	
			For 1" Mesh Fabric, Add	230.16	
			For 1-1/4" Mesh Fabric, Add	148.15	
			For 1-3/4" Mesh Fabric, Add	92.06	
			For 2-1/8" Mesh Fabric, Deduct	-46.03	
			For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add	154.55	
			For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add	231.01	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0417	EA 14' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	817.64 -115.74 268.52 172.84 107.41 -53.70 171.41 255.05	66.74
32 31 13 13-0418	EA 16' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	922.51 -132.28 306.88 197.53 122.75 -61.38 188.29 279.10	72.28
32 31 13 13-0419	EA 18' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,063.35 -148.81 345.24 222.22 138.10 -69.05 205.16 303.14	89.77
32 31 13 13-0420	EA 20' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,170.81 -165.35 383.60 246.92 153.44 -76.72 222.03 327.18	96.21
32 31 13 13-0421	EA 22' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,281.22 -181.88 421.96 271.61 168.78 -84.39 265.55 394.60	103.67
32 31 13 13-0422	EA 24' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,395.33 -198.41 460.32 296.30 184.13 -92.06 282.42 418.64	112.27
32 31 13 13-0423	EA 26' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,514.17 -214.95 498.68 320.99 199.47 -99.74 299.29 442.67	122.51
32 31 13 13-0424	EA 28' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,639.13 -231.48 537.04 345.68 214.82 -107.41 316.17 466.71	134.77
32 31 13 13-0425	EA 30' Wide x 4' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,772.27 -248.02 575.40 370.37 230.16 -115.08 333.03 490.76	149.68
32 31 13 13-0426	5' Fence Height <small>(32 31 13 13-0405)</small>		
32 31 13 13-0427	EA 3' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	223.41 -25.61 59.42 38.25 23.77 -11.88 52.44 79.91	28.87

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0428	EA	4' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	268.94	28.87
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-34.15	
			<i>For 1" Mesh Fabric, Add</i>	79.22	
			<i>For 1-1/4" Mesh Fabric, Add</i>	50.99	
			<i>For 1-3/4" Mesh Fabric, Add</i>	31.69	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-15.84	
			<i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	61.02	
			<i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	92.09	
32 31 13	13-0429	EA	5' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	308.53	30.71
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-40.55	
			<i>For 1" Mesh Fabric, Add</i>	94.08	
			<i>For 1-1/4" Mesh Fabric, Add</i>	60.56	
			<i>For 1-3/4" Mesh Fabric, Add</i>	37.63	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-18.82	
			<i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	68.38	
			<i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	102.48	
32 31 13	13-0430	EA	6' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	361.11	36.89
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-46.95	
			<i>For 1" Mesh Fabric, Add</i>	108.93	
			<i>For 1-1/4" Mesh Fabric, Add</i>	70.12	
			<i>For 1-3/4" Mesh Fabric, Add</i>	43.57	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-21.79	
			<i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	75.72	
			<i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	113.95	
32 31 13	13-0431	EA	7' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	413.71	42.97
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-53.36	
			<i>For 1" Mesh Fabric, Add</i>	123.79	
			<i>For 1-1/4" Mesh Fabric, Add</i>	79.68	
			<i>For 1-3/4" Mesh Fabric, Add</i>	49.52	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-24.76	
			<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	83.06	
			<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	124.88	
32 31 13	13-0432	EA	8' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	467.39	49.49
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-59.76	
			<i>For 1" Mesh Fabric, Add</i>	138.64	
			<i>For 1-1/4" Mesh Fabric, Add</i>	89.24	
			<i>For 1-3/4" Mesh Fabric, Add</i>	55.46	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-27.73	
			<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	90.39	
			<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	135.80	
32 31 13	13-0433	EA	9' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	519.98	55.67
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-66.16	
			<i>For 1" Mesh Fabric, Add</i>	153.49	
			<i>For 1-1/4" Mesh Fabric, Add</i>	98.80	
			<i>For 1-3/4" Mesh Fabric, Add</i>	61.40	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-30.70	
32 31 13	13-0434	EA	10' Wide x 5' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	572.57	61.75
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-72.56	
			<i>For 1" Mesh Fabric, Add</i>	168.35	
			<i>For 1-1/4" Mesh Fabric, Add</i>	108.36	
			<i>For 1-3/4" Mesh Fabric, Add</i>	67.34	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-33.67	
			<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	105.08	
			<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	157.66	
32 31 13	13-0435	EA	10' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	732.40	61.96
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-102.44	
			<i>For 1" Mesh Fabric, Add</i>	237.67	
			<i>For 1-1/4" Mesh Fabric, Add</i>	152.98	
			<i>For 1-3/4" Mesh Fabric, Add</i>	95.07	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-47.53	
			<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	149.27	
			<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	218.57	
32 31 13	13-0436	EA	12' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	855.98	66.74
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-122.93	
			<i>For 1" Mesh Fabric, Add</i>	285.20	
			<i>For 1-1/4" Mesh Fabric, Add</i>	183.58	
			<i>For 1-3/4" Mesh Fabric, Add</i>	114.08	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-57.04	
			<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	168.47	
			<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	244.93	
32 31 13	13-0437	EA	14' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	981.94	72.28
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-143.42	
			<i>For 1" Mesh Fabric, Add</i>	332.73	
			<i>For 1-1/4" Mesh Fabric, Add</i>	214.17	
			<i>For 1-3/4" Mesh Fabric, Add</i>	133.09	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-66.55	
			<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	187.65	
			<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	271.29	
32 31 13	13-0438	EA	16' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,143.87	89.77
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-163.91	
			<i>For 1" Mesh Fabric, Add</i>	380.26	
			<i>For 1-1/4" Mesh Fabric, Add</i>	244.77	
			<i>For 1-3/4" Mesh Fabric, Add</i>	152.11	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-76.05	
			<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	206.85	
			<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	297.66	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

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MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0439	EA 18 Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i>	1,272.41 -184.40 427.80 275.36 171.12 -85.56	96.21
32 31 13 13-0440	EA 20' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,403.91 -204.88 475.33 305.96 190.13 -95.07 245.23 350.38	103.67
32 31 13 13-0441	EA 22' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,539.12 -225.37 522.87 336.56 209.15 -104.57 291.07 420.12	112.27
32 31 13 13-0442	EA 24' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,679.04 -245.86 570.40 367.15 228.16 -114.08 310.26 446.48	122.51
32 31 13 13-0443	EA 26' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,825.09 -266.35 617.93 397.75 247.17 -123.59 329.45 472.83	134.77
32 31 13 13-0444	EA 28' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,979.31 -286.84 665.46 428.34 266.19 -133.09 348.65 499.19	149.68
32 31 13 13-0445	EA 30' Wide x 5' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,144.77 -307.33 713.00 458.94 285.20 -142.60 367.83 525.56	168.39
32 31 13 13-0446	6' Fence Height <small>(32 31 13 13-0405)</small>		
32 31 13 13-0447	EA 3' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	238.99 -27.37 63.50 40.87 25.40 -12.70 53.48 80.95	30.93
32 31 13 13-0448	EA 4' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	287.65 -36.49 84.66 54.50 33.87 -16.93 62.40 93.47	30.93
32 31 13 13-0449	EA 5' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	329.88 -43.34 100.54 64.72 40.22 -20.11 70.01 104.11	32.88

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0450	EA	6' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	386.99	39.72
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-50.18	
			<i>For 1" Mesh Fabric, Add</i>	116.41	
			<i>For 1-1/4" Mesh Fabric, Add</i>	74.93	
			<i>For 1-3/4" Mesh Fabric, Add</i>	46.57	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-23.28	
			<i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	77.61	
			<i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	115.84	
32 31 13	13-0451	EA	7' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	444.11	46.66
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-57.02	
			<i>For 1" Mesh Fabric, Add</i>	132.29	
			<i>For 1-1/4" Mesh Fabric, Add</i>	85.15	
			<i>For 1-3/4" Mesh Fabric, Add</i>	52.92	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-26.46	
			<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	85.21	
			<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	127.03	
32 31 13	13-0452	EA	8' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	500.13	53.18
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-63.86	
			<i>For 1" Mesh Fabric, Add</i>	148.17	
			<i>For 1-1/4" Mesh Fabric, Add</i>	95.37	
			<i>For 1-3/4" Mesh Fabric, Add</i>	59.27	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-29.63	
			<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	92.80	
			<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	138.21	
32 31 13	13-0453	EA	9' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	557.26	60.02
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-70.71	
			<i>For 1" Mesh Fabric, Add</i>	164.04	
			<i>For 1-1/4" Mesh Fabric, Add</i>	105.59	
			<i>For 1-3/4" Mesh Fabric, Add</i>	65.62	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-32.81	
			<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	100.41	
			<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	149.40	
32 31 13	13-0454	EA	10' Wide x 6' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	614.37	66.85
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-77.55	
			<i>For 1" Mesh Fabric, Add</i>	179.92	
			<i>For 1-1/4" Mesh Fabric, Add</i>	115.81	
			<i>For 1-3/4" Mesh Fabric, Add</i>	71.97	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-35.98	
			<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	108.01	
			<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	160.59	
32 31 13	13-0455	EA	10' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	784.25	66.74
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-109.48	
			<i>For 1" Mesh Fabric, Add</i>	254.00	
			<i>For 1-1/4" Mesh Fabric, Add</i>	163.49	
			<i>For 1-3/4" Mesh Fabric, Add</i>	101.60	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-50.80	
			<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	153.40	
			<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	222.70	
32 31 13	13-0456	EA	12' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	917.72	72.28
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-131.38	
			<i>For 1" Mesh Fabric, Add</i>	304.80	
			<i>For 1-1/4" Mesh Fabric, Add</i>	196.19	
			<i>For 1-3/4" Mesh Fabric, Add</i>	121.92	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-60.96	
			<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	173.42	
			<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	249.88	
32 31 13	13-0457	EA	14' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,106.43	96.21
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-153.27	
			<i>For 1" Mesh Fabric, Add</i>	355.60	
			<i>For 1-1/4" Mesh Fabric, Add</i>	228.89	
			<i>For 1-3/4" Mesh Fabric, Add</i>	142.24	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-71.12	
			<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	193.43	
			<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	277.07	
32 31 13	13-0458	EA	16' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,245.44	103.67
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-175.17	
			<i>For 1" Mesh Fabric, Add</i>	406.39	
			<i>For 1-1/4" Mesh Fabric, Add</i>	261.59	
			<i>For 1-3/4" Mesh Fabric, Add</i>	162.56	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-81.28	
			<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	213.46	
			<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	304.27	
32 31 13	13-0459	EA	18' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,388.15	112.27
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-197.07	
			<i>For 1" Mesh Fabric, Add</i>	457.19	
			<i>For 1-1/4" Mesh Fabric, Add</i>	294.29	
			<i>For 1-3/4" Mesh Fabric, Add</i>	182.88	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-91.44	
			<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	233.47	
			<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	331.45	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0460	EA 20' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,557.16 -223.01 517.38 333.03 206.95 -103.48 255.86 361.01	122.51
32 31 13 13-0461	EA 22' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,693.06 -241.59 560.50 360.78 224.20 -112.10 300.59 429.64	134.77
32 31 13 13-0462	EA 24' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,850.87 -262.76 609.59 392.38 243.84 -121.92 320.17 456.39	149.68
32 31 13 13-0463	EA 26' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,023.84 -284.65 660.39 425.08 264.16 -132.08 340.19 483.57	168.39
32 31 13 13-0464	EA 28' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,212.86 -306.55 711.19 457.78 284.48 -142.24 360.21 510.75	192.42
32 31 13 13-0465	EA 30' Wide x 6' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,425.96 -328.44 761.99 490.48 304.80 -152.40 380.22 537.95	224.53
32 31 13 13-0466	7' Fence Height <small>(32 31 13 13-0405)</small>		
32 31 13 13-0467	EA 3' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	253.49 -28.75 66.69 42.93 26.68 -13.34 54.29 81.76	33.32
32 31 13 13-0468	EA 4' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	304.60 -38.33 88.93 57.24 35.57 -17.79 63.48 94.55	33.32
32 31 13 13-0469	EA 5' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	348.05 -45.52 105.61 67.98 42.24 -21.12 71.30 105.40	35.05
32 31 13 13-0470	EA 6' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	409.16 -52.71 122.28 78.71 48.91 -24.46 79.09 117.32	42.65

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 31 13	13-0471	EA	7' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	469.19	49.92
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-59.90	
			<i>For 1" Mesh Fabric, Add</i>	138.96	
			<i>For 1-1/4" Mesh Fabric, Add</i>	89.44	
			<i>For 1-3/4" Mesh Fabric, Add</i>	55.58	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-27.79	
			<i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	86.90	
			<i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	128.72	
32 31 13	13-0472	EA	8' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	530.33	57.41
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-67.08	
			<i>For 1" Mesh Fabric, Add</i>	155.63	
			<i>For 1-1/4" Mesh Fabric, Add</i>	100.18	
			<i>For 1-3/4" Mesh Fabric, Add</i>	62.25	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-31.13	
			<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	94.69	
			<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	140.10	
32 31 13	13-0473	EA	9' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	590.35	64.68
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-74.27	
			<i>For 1" Mesh Fabric, Add</i>	172.30	
			<i>For 1-1/4" Mesh Fabric, Add</i>	110.91	
			<i>For 1-3/4" Mesh Fabric, Add</i>	68.92	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-34.46	
			<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	102.50	
			<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	151.49	
32 31 13	13-0474	EA	10' Wide x 7' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	651.48	72.28
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-81.46	
			<i>For 1" Mesh Fabric, Add</i>	188.98	
			<i>For 1-1/4" Mesh Fabric, Add</i>	121.64	
			<i>For 1-3/4" Mesh Fabric, Add</i>	75.59	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-37.80	
			<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	110.30	
			<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	162.88	
32 31 13	13-0475	EA	10' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	830.36	72.28
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-115.00	
			<i>For 1" Mesh Fabric, Add</i>	266.79	
			<i>For 1-1/4" Mesh Fabric, Add</i>	171.73	
			<i>For 1-3/4" Mesh Fabric, Add</i>	106.72	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-53.36	
			<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	156.64	
			<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	225.94	
32 31 13	13-0476	EA	12' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,024.93	96.21
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-137.99	
			<i>For 1" Mesh Fabric, Add</i>	320.14	
			<i>For 1-1/4" Mesh Fabric, Add</i>	206.07	
			<i>For 1-3/4" Mesh Fabric, Add</i>	128.06	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-64.03	
			<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	177.31	
			<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	253.77	
32 31 13	13-0477	EA	14' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,169.84	103.67
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-161.00	
			<i>For 1" Mesh Fabric, Add</i>	373.51	
			<i>For 1-1/4" Mesh Fabric, Add</i>	240.42	
			<i>For 1-3/4" Mesh Fabric, Add</i>	149.40	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-74.70	
			<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	197.96	
			<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	281.60	
32 31 13	13-0478	EA	16' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,318.41	112.27
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-183.99	
			<i>For 1" Mesh Fabric, Add</i>	426.86	
			<i>For 1-1/4" Mesh Fabric, Add</i>	274.76	
			<i>For 1-3/4" Mesh Fabric, Add</i>	170.74	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-85.37	
			<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	218.63	
			<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	309.44	
32 31 13	13-0479	EA	18' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,471.74	122.51
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-206.99	
			<i>For 1" Mesh Fabric, Add</i>	480.22	
			<i>For 1-1/4" Mesh Fabric, Add</i>	309.11	
			<i>For 1-3/4" Mesh Fabric, Add</i>	192.09	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-96.04	
			<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	239.30	
			<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	337.28	
32 31 13	13-0480	EA	20' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,631.16	134.77
			<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-229.99	
			<i>For 1" Mesh Fabric, Add</i>	533.57	
			<i>For 1-1/4" Mesh Fabric, Add</i>	343.45	
			<i>For 1-3/4" Mesh Fabric, Add</i>	213.43	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-106.71	
			<i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	259.96	
			<i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	365.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0481 EA 22' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,798.76 -252.98 586.92 377.79 234.77 -117.38 307.27 436.32	149.68
32 31 13 13-0482 EA 24' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,977.62 -275.99 640.29 412.14 256.11 -128.06 327.93 464.15	168.39
32 31 13 13-0483 EA 26' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,172.54 -298.99 693.65 446.49 277.46 -138.73 348.60 491.98	192.42
32 31 13 13-0484 EA 28' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,391.51 -321.98 747.00 480.63 298.80 -149.40 369.27 519.81	224.53
32 31 13 13-0485 EA 30' Wide x 7' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,649.04 -344.99 800.37 515.18 320.15 -160.07 389.92 547.65	269.41
32 31 13 13-0486 8' Fence Height^(32 31 13 13-0405)		
32 31 13 13-0487 EA 3' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	294.36 -34.85 80.84 52.04 32.34 -16.17 57.86 85.33	36.13
32 31 13 13-0488 EA 4' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	356.31 -46.46 107.79 69.38 43.12 -21.56 68.25 99.32	36.13
32 31 13 13-0489 EA 5' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	397.61 -54.20 125.75 80.95 50.30 -25.15 76.39 110.49	36.13
32 31 13 13-0490 EA 6' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	467.11 -61.95 143.72 92.51 57.49 -28.74 84.51 122.74	45.58
32 31 13 13-0491 EA 7' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	536.63 -69.69 161.68 104.07 64.67 -32.34 92.64 134.46	54.91

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0492	EA 8' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	605.07	63.92
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-77.43	
	<i>For 1" Mesh Fabric, Add</i>	179.65	
	<i>For 1-1/4" Mesh Fabric, Add</i>	115.63	
	<i>For 1-3/4" Mesh Fabric, Add</i>	71.86	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-35.93	
	<i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	100.76	
	<i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	146.17	
32 31 13 13-0493	EA 9' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	674.59	73.36
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-85.18	
	<i>For 1" Mesh Fabric, Add</i>	197.61	
	<i>For 1-1/4" Mesh Fabric, Add</i>	127.20	
	<i>For 1-3/4" Mesh Fabric, Add</i>	79.04	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-39.52	
	<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	108.90	
	<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	157.89	
32 31 13 13-0494	EA 10' Wide x 8' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	744.08	82.80
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-92.92	
	<i>For 1" Mesh Fabric, Add</i>	215.58	
	<i>For 1-1/4" Mesh Fabric, Add</i>	138.76	
	<i>For 1-3/4" Mesh Fabric, Add</i>	86.23	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-43.12	
	<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	117.02	
	<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	169.60	
32 31 13 13-0495	EA 10' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,032.32	96.21
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-139.38	
	<i>For 1" Mesh Fabric, Add</i>	323.36	
	<i>For 1-1/4" Mesh Fabric, Add</i>	208.14	
	<i>For 1-3/4" Mesh Fabric, Add</i>	129.34	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-64.67	
	<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	170.94	
	<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	240.24	
32 31 13 13-0496	EA 12' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,203.23	103.67
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-167.26	
	<i>For 1" Mesh Fabric, Add</i>	388.03	
	<i>For 1-1/4" Mesh Fabric, Add</i>	249.77	
	<i>For 1-3/4" Mesh Fabric, Add</i>	155.21	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-77.61	
	<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	194.47	
	<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	270.93	
32 31 13 13-0497	EA 14' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,377.83	112.27
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-195.13	
	<i>For 1" Mesh Fabric, Add</i>	452.70	
	<i>For 1-1/4" Mesh Fabric, Add</i>	291.40	
	<i>For 1-3/4" Mesh Fabric, Add</i>	181.08	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-90.54	
	<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	217.99	
	<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	301.63	
32 31 13 13-0498	EA 16' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,557.15	122.51
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-223.01	
	<i>For 1" Mesh Fabric, Add</i>	517.38	
	<i>For 1-1/4" Mesh Fabric, Add</i>	333.02	
	<i>For 1-3/4" Mesh Fabric, Add</i>	206.95	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-103.48	
	<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	241.52	
	<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	332.33	
32 31 13 13-0499	EA 18' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,742.60	134.77
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-250.88	
	<i>For 1" Mesh Fabric, Add</i>	582.05	
	<i>For 1-1/4" Mesh Fabric, Add</i>	374.65	
	<i>For 1-3/4" Mesh Fabric, Add</i>	232.82	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-116.41	
	<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	265.04	
	<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	363.02	
32 31 13 13-0500	EA 20' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	1,936.22	149.68
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-278.76	
	<i>For 1" Mesh Fabric, Add</i>	646.72	
	<i>For 1-1/4" Mesh Fabric, Add</i>	416.28	
	<i>For 1-3/4" Mesh Fabric, Add</i>	258.69	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-129.34	
	<i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	288.57	
	<i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	393.72	
32 31 13 13-0501	EA 22' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm.....	2,141.08	168.39
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-306.63	
	<i>For 1" Mesh Fabric, Add</i>	711.39	
	<i>For 1-1/4" Mesh Fabric, Add</i>	457.91	
	<i>For 1-3/4" Mesh Fabric, Add</i>	284.56	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-142.28	
	<i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	338.74	
	<i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	467.79	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0502	EA 24' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,361.99 -334.51 776.06 499.53 310.42 -155.21 362.27 498.49	192.42
32 31 13 13-0503	EA 26' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,606.98 -362.39 840.73 541.16 336.29 -168.15 385.79 529.17	224.53
32 31 13 13-0504	EA 28' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,890.51 -390.26 905.40 582.79 362.16 -181.08 409.32 559.86	269.41
32 31 13 13-0505	EA 30' Wide x 8' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	3,241.46 -418.14 970.08 624.42 388.03 -194.02 432.84 590.57	336.80
32 31 13 13-0506	10' Fence Height <small>(32 31 13 13-0405)</small>		
32 31 13 13-0507	EA 3' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	336.16 -40.42 93.78 60.36 37.51 -18.76 61.13 88.60	40.16
32 31 13 13-0508	EA 4' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	408.02 -53.90 125.04 80.48 50.01 -25.01 72.61 103.68	40.16
32 31 13 13-0509	EA 5' Wide x 10' High Gate Single Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	461.23 -62.88 145.88 93.90 58.35 -29.18 81.48 115.58	41.89
32 31 13 13-0510	EA 6' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	539.53 -71.86 166.72 107.31 66.69 -33.34 90.33 128.56	52.09
32 31 13 13-0511	EA 7' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	616.73 -80.84 187.55 120.72 75.02 -37.51 99.19 141.01	61.75
32 31 13 13-0512	EA 8' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	695.03 -89.83 208.40 134.14 83.36 -41.68 108.03 153.44	71.95

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0513	EA 9' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	772.24	81.72
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-98.81	
	<i>For 1" Mesh Fabric, Add</i>	229.24	
	<i>For 1-1/4" Mesh Fabric, Add</i>	147.56	
	<i>For 1-3/4" Mesh Fabric, Add</i>	91.70	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-45.85	
	<i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	116.90	
	<i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	165.89	
32 31 13 13-0514	EA 10' Wide x 10' High Single Gate Vinyl Coated Without Barbed Wire Arm.....	850.55	91.81
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-107.79	
	<i>For 1" Mesh Fabric, Add</i>	250.08	
	<i>For 1-1/4" Mesh Fabric, Add</i>	160.97	
	<i>For 1-3/4" Mesh Fabric, Add</i>	100.03	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-50.02	
	<i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	125.75	
	<i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	178.33	
32 31 13 13-0515	EA 10' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	1,183.41	106.95
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-161.69	
	<i>For 1" Mesh Fabric, Add</i>	375.11	
	<i>For 1-1/4" Mesh Fabric, Add</i>	241.45	
	<i>For 1-3/4" Mesh Fabric, Add</i>	150.05	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-75.02	
	<i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	184.03	
	<i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	253.33	
32 31 13 13-0516	EA 12' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	1,380.46	115.05
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-194.03	
	<i>For 1" Mesh Fabric, Add</i>	450.14	
	<i>For 1-1/4" Mesh Fabric, Add</i>	289.74	
	<i>For 1-3/4" Mesh Fabric, Add</i>	180.06	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-90.03	
	<i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	210.18	
	<i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	286.64	
32 31 13 13-0517	EA 14' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	1,581.86	124.78
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-226.36	
	<i>For 1" Mesh Fabric, Add</i>	525.16	
	<i>For 1-1/4" Mesh Fabric, Add</i>	338.03	
	<i>For 1-3/4" Mesh Fabric, Add</i>	210.06	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-105.03	
	<i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	236.31	
	<i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	319.95	
32 31 13 13-0518	EA 16' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	1,788.20	136.03
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-258.70	
	<i>For 1" Mesh Fabric, Add</i>	600.18	
	<i>For 1-1/4" Mesh Fabric, Add</i>	386.32	
	<i>For 1-3/4" Mesh Fabric, Add</i>	240.07	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-120.04	
	<i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	262.46	
	<i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	353.27	
32 31 13 13-0519	EA 18' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	2,001.70	149.68
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-291.04	
	<i>For 1" Mesh Fabric, Add</i>	675.20	
	<i>For 1-1/4" Mesh Fabric, Add</i>	434.61	
	<i>For 1-3/4" Mesh Fabric, Add</i>	270.08	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-135.04	
	<i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	288.60	
	<i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	386.58	
32 31 13 13-0520	EA 20' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	2,223.86	166.25
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-323.37	
	<i>For 1" Mesh Fabric, Add</i>	750.22	
	<i>For 1-1/4" Mesh Fabric, Add</i>	482.90	
	<i>For 1-3/4" Mesh Fabric, Add</i>	300.09	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-150.04	
	<i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	314.74	
	<i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	419.89	
32 31 13 13-0521	EA 22' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	2,459.00	187.11
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-355.71	
	<i>For 1" Mesh Fabric, Add</i>	825.25	
	<i>For 1-1/4" Mesh Fabric, Add</i>	531.19	
	<i>For 1-3/4" Mesh Fabric, Add</i>	330.10	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-165.05	
	<i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	367.53	
	<i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	496.58	
32 31 13 13-0522	EA 24 Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	2,711.34	213.66
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-388.05	
	<i>For 1" Mesh Fabric, Add</i>	900.27	
	<i>For 1-1/4" Mesh Fabric, Add</i>	579.49	
	<i>For 1-3/4" Mesh Fabric, Add</i>	360.11	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-180.05	
32 31 13 13-0523	EA 26' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm	2,991.23	249.44
	<i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i>	-420.38	
	<i>For 1" Mesh Fabric, Add</i>	975.29	
	<i>For 1-1/4" Mesh Fabric, Add</i>	627.77	
	<i>For 1-3/4" Mesh Fabric, Add</i>	390.12	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-195.06	
	<i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i>	419.82	
	<i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	563.20	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

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MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0524	EA 28' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	3,312.75 -452.72 1,050.32 676.07 420.13 -210.06 445.97 596.51	299.12
32 31 13 13-0525	EA 30' Wide x 10' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	3,710.76 -485.06 1,125.34 724.35 450.13 -225.07 472.10 629.83	374.22
32 31 13 13-0526	12' Fence Height (32 31 13 13-0405)		
32 31 13 13-0527	EA 3' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 3' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 3' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	434.63 -56.37 130.78 84.18 52.31 -26.16 70.49 97.96	44.60
32 31 13 13-0528	EA 4' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 4' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 4' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	534.57 -75.11 174.26 112.17 69.70 -34.85 85.05 116.12	44.60
32 31 13 13-0529	EA 5' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 5' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 5' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	613.84 -89.05 206.59 132.98 82.64 -41.32 96.83 130.93	46.23
32 31 13 13-0530	EA 6' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 6' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 6' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	709.42 -100.66 233.54 150.32 93.42 -46.71 107.23 145.46	57.41
32 31 13 13-0531	EA 7' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 7' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 7' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	811.90 -113.57 263.48 169.60 105.39 -52.70 118.39 160.21	68.69
32 31 13 13-0532	EA 8' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 8' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 8' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	913.29 -126.47 293.42 188.87 117.37 -58.68 129.53 174.94	79.54
32 31 13 13-0533	EA 9' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 9' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 9' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,015.76 -139.38 323.36 208.14 129.34 -64.67 140.70 189.69	90.73
32 31 13 13-0534	EA 10' Wide x 12' High Single Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 10' Wide Single Gate With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 10' Wide Single Gate With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,111.35 -151.00 350.31 225.49 140.12 -70.06 151.09 203.67	101.90

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0535	EA	10' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 10' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 10' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,564.17 -226.42 525.28 338.11 210.11 -105.06 222.00 291.30	118.84
32 31 13	13-0536	EA	12' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 12' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 12' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	1,872.36 -279.07 647.45 416.75 258.98 -129.49 260.07 336.53	127.94
32 31 13	13-0537	EA	14' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 14' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 14' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,154.03 -325.84 755.95 486.59 302.38 -151.19 294.67 378.31	138.56
32 31 13	13-0538	EA	16' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 16' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 16' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,439.56 -372.30 863.74 555.97 345.50 -172.75 329.11 419.92	151.08
32 31 13	13-0539	EA	18' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 18' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 18' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	2,729.54 -418.14 970.09 624.43 388.04 -194.02 363.17 461.15	166.38
32 31 13	13-0540	EA	20' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 20' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 20' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	3,032.38 -464.60 1,077.88 693.81 431.15 -215.58 397.60 502.75	184.71
32 31 13	13-0541	EA	22' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 22' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 22' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	3,349.99 -511.06 1,185.67 763.19 474.27 -237.13 458.67 587.72	207.85
32 31 13	13-0542	EA	24' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 24' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 24' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	3,686.51 -557.52 1,293.46 832.57 517.38 -258.69 493.10 629.32	237.43
32 31 13	13-0543	EA	26' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 26' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 26' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	4,061.92 -605.53 1,404.83 904.26 561.93 -280.97 528.44 671.82	277.25
32 31 13	13-0544	EA	28' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 28' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 28' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	4,475.32 -651.99 1,512.62 973.64 605.05 -302.52 562.87 713.41	332.37



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0545	EA 30' Wide x 12' High Double Gate Vinyl Coated Without Barbed Wire Arm <i>For 1-5/8" Schedule 40 Pipe Frame, Deduct</i> <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For 30' Wide Double Gates With 3 Strands Barbed Wire And Single Extension Arms, Add</i> <i>For 30' Wide Double Gates With 6 Strands Barbed Wire And Double Extension Arms, Add</i>	4,973.72 -698.45 1,620.41 1,043.02 648.16 -324.08 597.29 755.02	415.81
32 31 13 13-0546	Chain Link Galvanized Steel Sliding Gate <small>(32 31 13 13-0263)</small> Note: Includes posts (3" diameter posts for up to 15' wide gate and 4" diameter over 15' wide), caps, upper and lower rails, track brackets, roller gate wheel carrier, track rollers, 2" diameter Schedule 40 pipe frame top and bottom bar, and 1-1/2" bracing. Includes truss rod, latches, track rollers with brackets, pipe track clamps and two wheel carriers. Fabric: galvanized chain link 2" mesh # 9 gauge, galvanized 1.2 ounce coating. See CSI section 32 31 13 13-0642 for additional gate accessories, 32 31 13 13-0711 for gate replacement parts.		
32 31 13 13-0547	4' High Chain Link Galvanized Steel Sliding Gate <small>(32 31 13 13-0546)</small>		
32 31 13 13-0548	EA 10' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	3,107.24 994.60 640.20 397.84 -198.92 251.51 685.93	410.37
32 31 13 13-0549	EA 12' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	3,734.52 1,193.52 768.24 477.41 -238.70 301.81 823.12	495.46
32 31 13 13-0550	EA 14' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	4,357.17 1,392.44 896.29 556.98 -278.49 352.11 960.31	578.02
32 31 13 13-0551	EA 16' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	4,987.00 1,591.36 1,024.33 636.55 -318.27 402.41 1,097.49	664.36
32 31 13 13-0552	EA 18' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	5,610.43 1,790.29 1,152.37 716.11 -358.06 452.72 1,234.68	747.43
32 31 13 13-0553	EA 20' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	6,218.51 1,989.21 1,280.41 795.68 -397.84 503.02 1,371.87	822.78
32 31 13 13-0554	EA 24' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	7,428.78 2,369.53 1,525.22 947.81 -473.91 599.19 1,634.16	990.79
32 31 13 13-0555	EA 30' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	10,599.70 2,983.81 1,920.61 1,193.52 -596.76 754.53 2,057.80	1,870.20
32 31 13 13-0556	EA 40' Long x 4' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	14,132.94 3,978.41 2,560.82 1,591.36 -795.68 1,006.03 2,743.73	2,493.61
32 31 13 13-0557	5' High Chain Link Galvanized Steel Sliding Gate <small>(32 31 13 13-0546)</small>		

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0558	EA 10' Long x 5' High Chain Link Galvanized Steel Sliding Gate	3,246.95	446.66
	For 1" Mesh Fabric, Add	1,023.83	
	For 1-1/4" Mesh Fabric, Add	659.02	
	For 1-3/4" Mesh Fabric, Add	409.53	
	For 2-1/8" Mesh Fabric, Deduct	-204.77	
	For Gate With Barb Wire Arm, Add	258.90	
	For Vinyl Coated, Add	706.09	
32 31 13 13-0559	EA 12' Long x 5' High Chain Link Galvanized Steel Sliding Gate	3,895.09	535.41
	For 1" Mesh Fabric, Add	1,228.60	
	For 1-1/4" Mesh Fabric, Add	790.82	
	For 1-3/4" Mesh Fabric, Add	491.44	
	For 2-1/8" Mesh Fabric, Deduct	-245.72	
	For Gate With Barb Wire Arm, Add	310.68	
	For Vinyl Coated, Add	847.31	
32 31 13 13-0560	EA 14' Long x 5' High Chain Link Galvanized Steel Sliding Gate	4,544.05	624.54
	For 1" Mesh Fabric, Add	1,433.37	
	For 1-1/4" Mesh Fabric, Add	922.63	
	For 1-3/4" Mesh Fabric, Add	573.35	
	For 2-1/8" Mesh Fabric, Deduct	-286.67	
	For Gate With Barb Wire Arm, Add	362.46	
	For Vinyl Coated, Add	988.53	
32 31 13 13-0561	EA 16' Long x 5' High Chain Link Galvanized Steel Sliding Gate	5,193.55	713.92
	For 1" Mesh Fabric, Add	1,638.14	
	For 1-1/4" Mesh Fabric, Add	1,054.43	
	For 1-3/4" Mesh Fabric, Add	655.25	
	For 2-1/8" Mesh Fabric, Deduct	-327.63	
	For Gate With Barb Wire Arm, Add	414.24	
	For Vinyl Coated, Add	1,129.75	
32 31 13 13-0562	EA 18' Long x 5' High Chain Link Galvanized Steel Sliding Gate	5,842.45	802.93
	For 1" Mesh Fabric, Add	1,842.90	
	For 1-1/4" Mesh Fabric, Add	1,186.23	
	For 1-3/4" Mesh Fabric, Add	737.16	
	For 2-1/8" Mesh Fabric, Deduct	-368.58	
	For Gate With Barb Wire Arm, Add	466.02	
	For Vinyl Coated, Add	1,270.97	
32 31 13 13-0563	EA 20' Long x 5' High Chain Link Galvanized Steel Sliding Gate	6,491.68	892.18
	For 1" Mesh Fabric, Add	2,047.67	
	For 1-1/4" Mesh Fabric, Add	1,318.04	
	For 1-3/4" Mesh Fabric, Add	819.07	
	For 2-1/8" Mesh Fabric, Deduct	-409.53	
	For Gate With Barb Wire Arm, Add	517.80	
	For Vinyl Coated, Add	1,412.18	
32 31 13 13-0564	EA 24' Long x 5' High Chain Link Galvanized Steel Sliding Gate	7,751.00	1,071.83
	For 1" Mesh Fabric, Add	2,439.18	
	For 1-1/4" Mesh Fabric, Add	1,570.04	
	For 1-3/4" Mesh Fabric, Add	975.67	
	For 2-1/8" Mesh Fabric, Deduct	-487.84	
	For Gate With Barb Wire Arm, Add	616.80	
	For Vinyl Coated, Add	1,682.19	
32 31 13 13-0565	EA 30' Long x 5' High Chain Link Galvanized Steel Sliding Gate	9,738.00	1,338.58
	For 1" Mesh Fabric, Add	3,071.50	
	For 1-1/4" Mesh Fabric, Add	1,977.06	
	For 1-3/4" Mesh Fabric, Add	1,228.60	
	For 2-1/8" Mesh Fabric, Deduct	-614.30	
	For Gate With Barb Wire Arm, Add	776.70	
	For Vinyl Coated, Add	2,118.28	
32 31 13 13-0566	EA 40' Long x 5' High Chain Link Galvanized Steel Sliding Gate	12,983.36	1,784.36
	For 1" Mesh Fabric, Add	4,095.33	
	For 1-1/4" Mesh Fabric, Add	2,636.08	
	For 1-3/4" Mesh Fabric, Add	1,638.13	
	For 2-1/8" Mesh Fabric, Deduct	-819.07	
	For Gate With Barb Wire Arm, Add	1,035.60	
	For Vinyl Coated, Add	2,824.37	
32 31 13 13-0567	6' High Chain Link Galvanized Steel Sliding Gate (32 31 13 13-0546)		
32 31 13 13-0568	EA 10' Long x 6' High Chain Link Galvanized Steel Sliding Gate	3,447.89	523.65
	For 1" Mesh Fabric, Add	1,044.30	
	For 1-1/4" Mesh Fabric, Add	672.19	
	For 1-3/4" Mesh Fabric, Add	417.72	
	For 2-1/8" Mesh Fabric, Deduct	-208.86	
	For Gate With Barb Wire Arm, Add	264.07	
	For Vinyl Coated, Add	720.20	
32 31 13 13-0569	EA 12' Long x 6' High Chain Link Galvanized Steel Sliding Gate	4,133.79	626.44
	For 1" Mesh Fabric, Add	1,253.16	
	For 1-1/4" Mesh Fabric, Add	806.63	
	For 1-3/4" Mesh Fabric, Add	501.26	
	For 2-1/8" Mesh Fabric, Deduct	-250.63	
	For Gate With Barb Wire Arm, Add	316.89	
	For Vinyl Coated, Add	864.25	



	Exterior Improvements	32
	Site Improvements	32 30
	Fences and Gates	32 31

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0570	EA	14' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	4,822.51 1,462.01 941.07 584.81 -292.40 369.70 1,008.29	730.73
32 31 13	13-0571	EA	16' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	5,511.72 1,670.87 1,075.51 668.35 -334.17 422.52 1,152.33	835.29
32 31 13	13-0572	EA	18' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	6,200.45 1,879.73 1,209.94 751.89 -375.95 475.33 1,296.37	939.58
32 31 13	13-0573	EA	20' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	6,896.21 2,088.59 1,344.38 835.44 -417.72 528.15 1,440.41	1,047.43
32 31 13	13-0574	EA	24' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	8,225.31 2,487.93 1,601.42 995.17 -497.59 629.13 1,715.81	1,253.00
32 31 13	13-0575	EA	30' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	10,335.25 3,132.89 2,016.57 1,253.15 -626.58 792.22 2,160.61	1,566.66
32 31 13	13-0576	EA	40' Long x 6' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	13,778.60 4,177.18 2,688.76 1,670.87 -835.44 1,056.30 2,880.82	2,087.91
32 31 13	13-0577		7' High Chain Link Galvanized Steel Sliding Gate <small>(32 31 13 13-0546)</small>		
32 31 13	13-0578	EA	10' Long x 7' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	3,662.92 1,085.22 698.53 434.09 -217.04 274.42 748.43	584.09
32 31 13	13-0579	EA	12' Long x 7' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	4,394.63 1,302.30 838.26 520.92 -260.46 329.32 898.14	700.39
32 31 13	13-0580	EA	14' Long x 7' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	5,128.16 1,519.30 977.94 607.72 -303.86 384.19 1,047.80	817.71
32 31 13	13-0581	EA	16' Long x 7' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	5,859.73 1,736.35 1,117.65 694.54 -347.27 439.08 1,197.49	934.03
32 31 13	13-0582	EA	18' Long x 7' High Chain Link Galvanized Steel Sliding Gate <i>For 1" Mesh Fabric, Add</i> <i>For 1-1/4" Mesh Fabric, Add</i> <i>For 1-3/4" Mesh Fabric, Add</i> <i>For 2-1/8" Mesh Fabric, Deduct</i> <i>For Gate With Barb Wire Arm, Add</i> <i>For Vinyl Coated, Add</i>	6,592.38 1,953.39 1,257.36 781.36 -390.68 493.96 1,347.17	1,050.97

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 13 13-0583	EA	20' Long x 7' High Chain Link Galvanized Steel Sliding Gate	7,324.24	1,167.40
		<i>For 1" Mesh Fabric, Add</i>	2,170.45	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,397.07	
		<i>For 1-3/4" Mesh Fabric, Add</i>	868.18	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-434.09	
		<i>For Gate With Barb Wire Arm, Add</i>	548.85	
		<i>For Vinyl Coated, Add</i>	1,496.86	
32 31 13 13-0584	EA	24' Long x 7' High Chain Link Galvanized Steel Sliding Gate	8,745.16	1,400.78
		<i>For 1" Mesh Fabric, Add</i>	2,585.42	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,664.18	
		<i>For 1-3/4" Mesh Fabric, Add</i>	1,034.17	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-517.08	
		<i>For Gate With Barb Wire Arm, Add</i>	653.79	
		<i>For Vinyl Coated, Add</i>	1,783.05	
32 31 13 13-0585	EA	30' Long x 7' High Chain Link Galvanized Steel Sliding Gate	10,986.34	1,750.99
		<i>For 1" Mesh Fabric, Add</i>	3,255.66	
		<i>For 1-1/4" Mesh Fabric, Add</i>	2,095.60	
		<i>For 1-3/4" Mesh Fabric, Add</i>	1,302.26	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-651.13	
		<i>For Gate With Barb Wire Arm, Add</i>	823.27	
		<i>For Vinyl Coated, Add</i>	2,245.28	
32 31 13 13-0586	EA	40' Long x 7' High Chain Link Galvanized Steel Sliding Gate	14,648.46	2,334.68
		<i>For 1" Mesh Fabric, Add</i>	4,340.88	
		<i>For 1-1/4" Mesh Fabric, Add</i>	2,794.13	
		<i>For 1-3/4" Mesh Fabric, Add</i>	1,736.35	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-868.18	
		<i>For Gate With Barb Wire Arm, Add</i>	1,097.69	
		<i>For Vinyl Coated, Add</i>	2,993.71	
32 31 13 13-0587		8' High Chain Link Galvanized Steel Sliding Gate <small>(32 31 13 13-0546)</small>		
32 31 13 13-0588	EA	10' Long x 8' High Chain Link Galvanized Steel Sliding Gate	3,834.20	632.76
		<i>For 1" Mesh Fabric, Add</i>	1,117.38	
		<i>For 1-1/4" Mesh Fabric, Add</i>	719.23	
		<i>For 1-3/4" Mesh Fabric, Add</i>	446.95	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-223.48	
		<i>For Gate With Barb Wire Arm, Add</i>	282.56	
		<i>For Vinyl Coated, Add</i>	770.61	
32 31 13 13-0589	EA	12' Long x 8' High Chain Link Galvanized Steel Sliding Gate	4,597.39	757.54
		<i>For 1" Mesh Fabric, Add</i>	1,340.85	
		<i>For 1-1/4" Mesh Fabric, Add</i>	863.08	
		<i>For 1-3/4" Mesh Fabric, Add</i>	536.34	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-268.17	
		<i>For Gate With Barb Wire Arm, Add</i>	339.07	
		<i>For Vinyl Coated, Add</i>	924.73	
32 31 13 13-0590	EA	14' Long x 8' High Chain Link Galvanized Steel Sliding Gate	5,363.70	883.84
		<i>For 1" Mesh Fabric, Add</i>	1,564.32	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,006.92	
		<i>For 1-3/4" Mesh Fabric, Add</i>	625.73	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-312.86	
		<i>For Gate With Barb Wire Arm, Add</i>	395.58	
		<i>For Vinyl Coated, Add</i>	1,078.84	
32 31 13 13-0591	EA	16' Long x 8' High Chain Link Galvanized Steel Sliding Gate	6,130.25	1,010.14
		<i>For 1" Mesh Fabric, Add</i>	1,787.80	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,150.77	
		<i>For 1-3/4" Mesh Fabric, Add</i>	715.12	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-357.56	
		<i>For Gate With Barb Wire Arm, Add</i>	452.09	
		<i>For Vinyl Coated, Add</i>	1,232.96	
32 31 13 13-0592	EA	18' Long x 8' High Chain Link Galvanized Steel Sliding Gate	6,895.39	1,135.92
		<i>For 1" Mesh Fabric, Add</i>	2,011.27	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,294.61	
		<i>For 1-3/4" Mesh Fabric, Add</i>	804.51	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-402.25	
		<i>For Gate With Barb Wire Arm, Add</i>	508.60	
		<i>For Vinyl Coated, Add</i>	1,387.08	
32 31 13 13-0593	EA	20' Long x 8' High Chain Link Galvanized Steel Sliding Gate	7,662.06	1,262.35
		<i>For 1" Mesh Fabric, Add</i>	2,234.75	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,438.46	
		<i>For 1-3/4" Mesh Fabric, Add</i>	893.90	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-446.95	
		<i>For Gate With Barb Wire Arm, Add</i>	565.11	
		<i>For Vinyl Coated, Add</i>	1,541.21	
32 31 13 13-0594	EA	24' Long x 8' High Chain Link Galvanized Steel Sliding Gate	9,149.55	1,514.95
		<i>For 1" Mesh Fabric, Add</i>	2,662.03	
		<i>For 1-1/4" Mesh Fabric, Add</i>	1,713.49	
		<i>For 1-3/4" Mesh Fabric, Add</i>	1,064.81	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-532.41	
		<i>For Gate With Barb Wire Arm, Add</i>	673.16	
		<i>For Vinyl Coated, Add</i>	1,835.88	
32 31 13 13-0595	EA	30' Long x 8' High Chain Link Galvanized Steel Sliding Gate	11,494.05	1,893.97
		<i>For 1" Mesh Fabric, Add</i>	3,352.13	
		<i>For 1-1/4" Mesh Fabric, Add</i>	2,157.69	
		<i>For 1-3/4" Mesh Fabric, Add</i>	1,340.85	
		<i>For 2-1/8" Mesh Fabric, Deduct</i>	-670.43	
		<i>For Gate With Barb Wire Arm, Add</i>	847.66	
		<i>For Vinyl Coated, Add</i>	2,311.81	



		Exterior Improvements	32
		Site Improvements	32 30
		Fences and Gates	32 31
			32

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0596	EA	40' Long x 8' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	15,321.60 4,469.49 2,876.92 1,787.80 -893.90 1,130.22 3,082.41	2,523.44
32 31 13	13-0597		9' High Chain Link Galvanized Steel Sliding Gate (32 31 13 13-0546)		
32 31 13	13-0598	EA	10' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	4,036.59 1,155.37 743.69 462.15 -231.07 292.16 796.81	690.28
32 31 13	13-0599	EA	12' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	4,838.77 1,386.45 892.43 554.58 -277.29 350.60 956.17	825.81
32 31 13	13-0600	EA	14' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	5,644.93 1,617.53 1,041.17 647.01 -323.51 409.03 1,115.54	963.23
32 31 13	13-0601	EA	16' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	6,452.17 1,848.60 1,189.90 739.44 -369.72 467.46 1,274.90	1,101.29
32 31 13	13-0602	EA	18' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	7,258.57 2,079.67 1,338.64 831.87 -415.93 525.89 1,434.26	1,238.84
32 31 13	13-0603	EA	20' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	8,064.94 2,310.75 1,487.38 924.30 -462.15 584.33 1,593.62	1,376.39
32 31 13	13-0604	EA	24' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	9,630.78 2,752.56 1,771.76 1,101.02 -550.51 696.05 1,898.32	1,651.48
32 31 13	13-0605	EA	30' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	12,096.26 3,466.12 2,231.07 1,386.45 -693.22 876.49 2,390.43	2,064.13
32 31 13	13-0606	EA	40' Long x 9' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	16,132.86 4,621.51 2,974.76 1,848.60 -924.30 1,168.66 3,187.25	2,754.42
32 31 13	13-0607		10' High Chain Link Galvanized Steel Sliding Gate (32 31 13 13-0546)		
32 31 13	13-0608	EA	10' Long x 10' High Chain Link Galvanized Steel Sliding Gate For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Barb Wire Arm, Add For Vinyl Coated, Add	4,288.89 1,205.07 775.68 482.03 -241.01 304.73 831.08	759.30

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 13 13-0609	EA 12' Long x 10' High Chain Link Galvanized Steel Sliding Gate	5,146.67	911.15
	<i>For 1" Mesh Fabric, Add</i>	1,446.08	
	<i>For 1-1/4" Mesh Fabric, Add</i>	930.81	
	<i>For 1-3/4" Mesh Fabric, Add</i>	578.43	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-289.22	
	<i>For Gate With Barb Wire Arm, Add</i>	365.68	
	<i>For Vinyl Coated, Add</i>	997.30	
32 31 13 13-0610	EA 14' Long x 10' High Chain Link Galvanized Steel Sliding Gate	6,004.96	1,063.23
	<i>For 1" Mesh Fabric, Add</i>	1,687.10	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,085.95	
	<i>For 1-3/4" Mesh Fabric, Add</i>	674.84	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-337.42	
	<i>For Gate With Barb Wire Arm, Add</i>	426.62	
	<i>For Vinyl Coated, Add</i>	1,163.52	
32 31 13 13-0611	EA 16' Long x 10' High Chain Link Galvanized Steel Sliding Gate	6,862.53	1,215.07
	<i>For 1" Mesh Fabric, Add</i>	1,928.12	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,241.09	
	<i>For 1-3/4" Mesh Fabric, Add</i>	771.25	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-385.62	
	<i>For Gate With Barb Wire Arm, Add</i>	487.57	
	<i>For Vinyl Coated, Add</i>	1,329.74	
32 31 13 13-0612	EA 18' Long x 10' High Chain Link Galvanized Steel Sliding Gate	7,719.99	1,366.77
	<i>For 1" Mesh Fabric, Add</i>	2,169.12	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,396.21	
	<i>For 1-3/4" Mesh Fabric, Add</i>	867.65	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-433.82	
	<i>For Gate With Barb Wire Arm, Add</i>	548.51	
	<i>For Vinyl Coated, Add</i>	1,495.94	
32 31 13 13-0613	EA 20' Long x 10' High Chain Link Galvanized Steel Sliding Gate	8,577.77	1,518.62
	<i>For 1" Mesh Fabric, Add</i>	2,410.13	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,551.35	
	<i>For 1-3/4" Mesh Fabric, Add</i>	964.05	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-482.03	
	<i>For Gate With Barb Wire Arm, Add</i>	609.46	
	<i>For Vinyl Coated, Add</i>	1,662.16	
32 31 13 13-0614	EA 24' Long x 10' High Chain Link Galvanized Steel Sliding Gate	10,245.87	1,823.04
	<i>For 1" Mesh Fabric, Add</i>	2,870.95	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,847.97	
	<i>For 1-3/4" Mesh Fabric, Add</i>	1,148.38	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-574.19	
	<i>For Gate With Barb Wire Arm, Add</i>	725.99	
	<i>For Vinyl Coated, Add</i>	1,979.96	
32 31 13 13-0615	EA 30' Long x 10' High Chain Link Galvanized Steel Sliding Gate	12,866.66	2,277.92
	<i>For 1" Mesh Fabric, Add</i>	3,615.20	
	<i>For 1-1/4" Mesh Fabric, Add</i>	2,327.03	
	<i>For 1-3/4" Mesh Fabric, Add</i>	1,446.08	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-723.04	
	<i>For Gate With Barb Wire Arm, Add</i>	914.19	
	<i>For Vinyl Coated, Add</i>	2,493.24	
32 31 13 13-0616	EA 40' Long x 10' High Chain Link Galvanized Steel Sliding Gate	17,151.92	3,035.46
	<i>For 1" Mesh Fabric, Add</i>	4,820.28	
	<i>For 1-1/4" Mesh Fabric, Add</i>	3,102.71	
	<i>For 1-3/4" Mesh Fabric, Add</i>	1,928.11	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-964.06	
	<i>For Gate With Barb Wire Arm, Add</i>	1,218.92	
	<i>For Vinyl Coated, Add</i>	3,324.33	

32 31 13 13-0617 Sliding Cantilever Gate, Single Track, Manually Operated Exposed Roller ⁽³²⁾^{31 13 13-0263}

Note: Includes posts (3" diameter posts for up to 15' wide gate and 4" diameter over 15' wide), caps, upper rail, track brackets, roller gate wheel carrier, metal track rollers for rail, 2" diameter Schedule 40 pipe frame top and bottom bar, and 1-1/2" bracing. Includes truss rod, latches, single track, track rollers with brackets, pipe track clamps and two wheel carriers. Fabric: galvanized chain link 2" mesh # 9 gauge, galvanized 1.2 ounce coating. Width listed on tasks is opening width of gate. See CSI section 32 31 11 00-0021 for gate operators.

32 31 13 13-0618	EA 5' High x 10' Wide Galvanized Cantilever Sliding Gate	6,583.17	505.70
	<i>For 1" Mesh Fabric, Add</i>	2,423.72	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,560.10	
	<i>For 1-3/4" Mesh Fabric, Add</i>	969.49	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-484.74	
	<i>For Gate With Single Barb Wire Arm, Add</i>	612.89	
	<i>For Gate With Double Barb Wire Arm, Add</i>	891.48	
	<i>For Aluminized Steel Gate And Post, Add</i>	2,674.45	
	<i>For Powder Coated Gate And Post, Add</i>	1,170.07	
	<i>For Vinyl Coated, Add</i>	1,671.53	
32 31 13 13-0619	EA 5' High x 12' Wide Galvanized Cantilever Sliding Gate	7,215.31	632.12
	<i>For 1" Mesh Fabric, Add</i>	2,588.71	
	<i>For 1-1/4" Mesh Fabric, Add</i>	1,666.30	
	<i>For 1-3/4" Mesh Fabric, Add</i>	1,035.48	
	<i>For 2-1/8" Mesh Fabric, Deduct</i>	-517.74	
	<i>For Gate With Single Barb Wire Arm, Add</i>	654.62	
	<i>For Gate With Double Barb Wire Arm, Add</i>	952.17	
	<i>For Aluminized Steel Gate And Post, Add</i>	2,856.51	
	<i>For Powder Coated Gate And Post, Add</i>	1,249.72	
	<i>For Vinyl Coated, Add</i>	1,785.32	



	Exterior Improvements	32
	Site Improvements	32 30
	Fences and Gates	32 31

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0620 EA 5' High x 15' Wide Galvanized Cantilever Sliding Gate.....	7,852.66	758.55
For 1" Mesh Fabric, Add	2,755.97	
For 1-1/4" Mesh Fabric, Add	1,773.96	
For 1-3/4" Mesh Fabric, Add	1,102.39	
For 2-1/8" Mesh Fabric, Deduct	-551.19	
For Gate With Single Barb Wire Arm, Add	696.91	
For Gate With Double Barb Wire Arm, Add	1,013.69	
For Aluminized Steel Gate And Post, Add	3,041.07	
For Powder Coated Gate And Post, Add	1,330.47	
For Vinyl Coated, Add	1,900.67	
32 31 13 13-0621 EA 5' High x 20' Wide Galvanized Cantilever Sliding Gate.....	9,203.08	1,011.40
For 1" Mesh Fabric, Add	3,123.43	
For 1-1/4" Mesh Fabric, Add	2,010.48	
For 1-3/4" Mesh Fabric, Add	1,249.37	
For 2-1/8" Mesh Fabric, Deduct	-624.69	
For Gate With Single Barb Wire Arm, Add	789.83	
For Gate With Double Barb Wire Arm, Add	1,148.85	
For Aluminized Steel Gate And Post, Add	3,446.54	
For Powder Coated Gate And Post, Add	1,507.86	
For Vinyl Coated, Add	2,154.09	
32 31 13 13-0622 EA 6' High x 15' Wide Galvanized Cantilever Sliding Gate.....	8,547.67	1,011.40
For 1" Mesh Fabric, Add	2,838.32	
For 1-1/4" Mesh Fabric, Add	1,826.97	
For 1-3/4" Mesh Fabric, Add	1,135.33	
For 2-1/8" Mesh Fabric, Deduct	-567.66	
For Gate With Single Barb Wire Arm, Add	717.74	
For Gate With Double Barb Wire Arm, Add	1,043.98	
For Aluminized Steel Gate And Post, Add	3,131.94	
For Powder Coated Gate And Post, Add	1,370.22	
For Vinyl Coated, Add	1,957.46	
32 31 13 13-0623 EA 6' High x 20' Wide Galvanized Cantilever Sliding Gate.....	10,003.23	1,327.46
For 1" Mesh Fabric, Add	3,196.51	
For 1-1/4" Mesh Fabric, Add	2,057.53	
For 1-3/4" Mesh Fabric, Add	1,278.61	
For 2-1/8" Mesh Fabric, Deduct	-639.30	
For Gate With Single Barb Wire Arm, Add	808.31	
For Gate With Double Barb Wire Arm, Add	1,175.73	
For Aluminized Steel Gate And Post, Add	3,527.19	
For Powder Coated Gate And Post, Add	1,543.15	
For Vinyl Coated, Add	2,204.49	
32 31 13 13-0624 EA 6' High x 25' Wide Galvanized Cantilever Sliding Gate.....	13,274.45	1,643.52
For 1" Mesh Fabric, Add	4,344.52	
For 1-1/4" Mesh Fabric, Add	2,796.47	
For 1-3/4" Mesh Fabric, Add	1,737.81	
For 2-1/8" Mesh Fabric, Deduct	-868.90	
For Gate With Single Barb Wire Arm, Add	1,098.61	
For Gate With Double Barb Wire Arm, Add	1,597.98	
For Aluminized Steel Gate And Post, Add	4,793.95	
For Powder Coated Gate And Post, Add	2,097.35	
For Vinyl Coated, Add	2,996.22	
32 31 13 13-0625 EA 6' High x 30' Wide Galvanized Cantilever Sliding Gate.....	14,941.51	1,959.58
For 1" Mesh Fabric, Add	4,794.72	
For 1-1/4" Mesh Fabric, Add	3,086.26	
For 1-3/4" Mesh Fabric, Add	1,917.89	
For 2-1/8" Mesh Fabric, Deduct	-958.94	
For Gate With Single Barb Wire Arm, Add	1,212.46	
For Gate With Double Barb Wire Arm, Add	1,763.57	
For Aluminized Steel Gate And Post, Add	5,290.72	
For Powder Coated Gate And Post, Add	2,314.69	
For Vinyl Coated, Add	3,306.70	
32 31 13 13-0626 EA 6' High x 36' Wide Galvanized Cantilever Sliding Gate.....	17,525.25	2,149.23
For 1" Mesh Fabric, Add	5,753.66	
For 1-1/4" Mesh Fabric, Add	3,703.51	
For 1-3/4" Mesh Fabric, Add	2,301.46	
For 2-1/8" Mesh Fabric, Deduct	-1,150.73	
For Gate With Single Barb Wire Arm, Add	1,454.95	
For Gate With Double Barb Wire Arm, Add	2,116.29	
For Aluminized Steel Gate And Post, Add	6,348.87	
For Powder Coated Gate And Post, Add	2,777.63	
For Vinyl Coated, Add	3,968.04	
32 31 13 13-0627 EA 8' High x 15' Wide Galvanized Cantilever Sliding Gate.....	9,993.66	1,264.25
For 1" Mesh Fabric, Add	3,247.34	
For 1-1/4" Mesh Fabric, Add	2,090.24	
For 1-3/4" Mesh Fabric, Add	1,298.94	
For 2-1/8" Mesh Fabric, Deduct	-649.47	
For Gate With Single Barb Wire Arm, Add	821.17	
For Gate With Double Barb Wire Arm, Add	1,194.43	
For Aluminized Steel Gate And Post, Add	3,583.28	
For Powder Coated Gate And Post, Add	1,567.68	
For Vinyl Coated, Add	2,239.55	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 13 13-0628	EA 8' High x 20' Wide Galvanized Cantilever Sliding Gate.....	11,819.33	1,706.74
	For 1" Mesh Fabric, Add	3,656.55	
	For 1-1/4" Mesh Fabric, Add	2,353.64	
	For 1-3/4" Mesh Fabric, Add	1,462.62	
	For 2-1/8" Mesh Fabric, Deduct	-731.31	
	For Gate With Single Barb Wire Arm, Add	924.64	
	For Gate With Double Barb Wire Arm, Add	1,344.94	
	For Aluminized Steel Gate And Post, Add	4,034.81	
	For Powder Coated Gate And Post, Add	1,765.23	
	For Vinyl Coated, Add	2,521.76	
32 31 13 13-0629	EA 8' High x 25' Wide Galvanized Cantilever Sliding Gate.....	15,723.14	2,149.23
	For 1" Mesh Fabric, Add	4,969.74	
	For 1-1/4" Mesh Fabric, Add	3,198.92	
	For 1-3/4" Mesh Fabric, Add	1,987.90	
	For 2-1/8" Mesh Fabric, Deduct	-993.95	
	For Gate With Single Barb Wire Arm, Add	1,256.72	
	For Gate With Double Barb Wire Arm, Add	1,827.95	
	For Aluminized Steel Gate And Post, Add	5,483.86	
	For Powder Coated Gate And Post, Add	2,399.19	
	For Vinyl Coated, Add	3,427.41	
32 31 13 13-0630	EA 8' High x 30' Wide Galvanized Cantilever Sliding Gate.....	17,664.13	2,528.50
	For 1" Mesh Fabric, Add	5,484.17	
	For 1-1/4" Mesh Fabric, Add	3,530.00	
	For 1-3/4" Mesh Fabric, Add	2,193.64	
	For 2-1/8" Mesh Fabric, Deduct	-1,096.82	
	For Gate With Single Barb Wire Arm, Add	1,386.79	
	For Gate With Double Barb Wire Arm, Add	2,017.14	
	For Aluminized Steel Gate And Post, Add	6,051.43	
	For Powder Coated Gate And Post, Add	2,647.50	
	For Vinyl Coated, Add	3,782.14	
32 31 13 13-0631	EA 8' High x 36' Wide Galvanized Cantilever Sliding Gate.....	20,691.26	2,781.34
	For 1" Mesh Fabric, Add	6,580.93	
	For 1-1/4" Mesh Fabric, Add	4,236.00	
	For 1-3/4" Mesh Fabric, Add	2,632.37	
	For 2-1/8" Mesh Fabric, Deduct	-1,316.19	
	For Gate With Single Barb Wire Arm, Add	1,664.14	
	For Gate With Double Barb Wire Arm, Add	2,420.57	
	For Aluminized Steel Gate And Post, Add	7,261.71	
	For Powder Coated Gate And Post, Add	3,177.00	
	For Vinyl Coated, Add	4,538.57	
32 31 13 13-0632	EA 10' High x 15' Wide Galvanized Cantilever Sliding Gate.....	11,432.49	1,517.10
	For 1" Mesh Fabric, Add	3,653.26	
	For 1-1/4" Mesh Fabric, Add	2,351.52	
	For 1-3/4" Mesh Fabric, Add	1,461.30	
	For 2-1/8" Mesh Fabric, Deduct	-730.65	
	For Gate With Single Barb Wire Arm, Add	923.81	
	For Gate With Double Barb Wire Arm, Add	1,343.73	
	For Aluminized Steel Gate And Post, Add	4,031.18	
	For Powder Coated Gate And Post, Add	1,763.64	
	For Vinyl Coated, Add	2,519.49	
32 31 13 13-0633	EA 10' High x 20' Wide Galvanized Cantilever Sliding Gate.....	13,270.68	1,959.58
	For 1" Mesh Fabric, Add	4,067.91	
	For 1-1/4" Mesh Fabric, Add	2,618.42	
	For 1-3/4" Mesh Fabric, Add	1,627.16	
	For 2-1/8" Mesh Fabric, Deduct	-813.58	
	For Gate With Single Barb Wire Arm, Add	1,028.67	
	For Gate With Double Barb Wire Arm, Add	1,496.24	
	For Aluminized Steel Gate And Post, Add	4,488.72	
	For Powder Coated Gate And Post, Add	1,963.82	
	For Vinyl Coated, Add	2,805.45	
32 31 13 13-0634	EA 10' High x 25' Wide Galvanized Cantilever Sliding Gate.....	17,404.08	2,275.65
	For 1" Mesh Fabric, Add	5,590.96	
	For 1-1/4" Mesh Fabric, Add	3,598.78	
	For 1-3/4" Mesh Fabric, Add	2,236.39	
	For 2-1/8" Mesh Fabric, Deduct	-1,118.19	
	For Gate With Single Barb Wire Arm, Add	1,413.81	
	For Gate With Double Barb Wire Arm, Add	2,056.45	
	For Aluminized Steel Gate And Post, Add	6,169.34	
	For Powder Coated Gate And Post, Add	2,699.09	
	For Vinyl Coated, Add	3,855.84	
32 31 13 13-0635	EA 10' High x 30' Wide Galvanized Cantilever Sliding Gate.....	19,492.87	2,654.92
	For 1" Mesh Fabric, Add	6,169.62	
	For 1-1/4" Mesh Fabric, Add	3,971.25	
	For 1-3/4" Mesh Fabric, Add	2,467.85	
	For 2-1/8" Mesh Fabric, Deduct	-1,233.92	
	For Gate With Single Barb Wire Arm, Add	1,560.13	
	For Gate With Double Barb Wire Arm, Add	2,269.28	
	For Aluminized Steel Gate And Post, Add	6,807.85	
	For Powder Coated Gate And Post, Add	2,978.44	
	For Vinyl Coated, Add	4,254.91	



	Exterior Improvements	32
	Site Improvements	32 30
	Fences and Gates	32 31

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 13 13-0636	EA 10' High x 36' Wide Galvanized Cantilever Sliding Gate..... For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Single Barb Wire Arm, Add For Gate With Double Barb Wire Arm, Add For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For Vinyl Coated, Add	22,835.18 7,403.54 4,765.50 2,961.42 -1,480.71 1,872.16 2,723.14 8,169.43 3,574.12 5,105.89	2,907.77
32 31 13 13-0637	EA 12' High x 15' Wide Galvanized Cantilever Sliding Gate..... For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Single Barb Wire Arm, Add For Gate With Double Barb Wire Arm, Add For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For Vinyl Coated, Add	13,491.42 4,383.91 2,821.83 1,753.57 -876.78 1,108.58 1,612.47 4,837.42 2,116.37 3,023.39	1,706.74
32 31 13 13-0638	EA 12' High x 20' Wide Galvanized Cantilever Sliding Gate..... For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Single Barb Wire Arm, Add For Gate With Double Barb Wire Arm, Add For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For Vinyl Coated, Add	15,646.34 4,936.34 3,177.41 1,974.53 -987.27 1,248.27 1,815.66 5,446.99 2,383.06 3,404.37	2,149.23
32 31 13 13-0639	EA 12' High x 25' Wide Galvanized Cantilever Sliding Gate..... For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Single Barb Wire Arm, Add For Gate With Double Barb Wire Arm, Add For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For Vinyl Coated, Add	20,353.91 6,709.15 4,318.54 2,683.66 -1,341.83 1,696.57 2,467.73 7,403.20 3,238.90 4,627.00	2,465.28
32 31 13 13-0640	EA 12' High x 30' Wide Galvanized Cantilever Sliding Gate..... For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Single Barb Wire Arm, Add For Gate With Double Barb Wire Arm, Add For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For Vinyl Coated, Add	22,582.33 7,403.54 4,765.50 2,961.42 -1,480.71 1,872.16 2,723.14 8,169.43 3,574.12 5,105.89	2,781.34
32 31 13 13-0641	EA 12' High x 36' Wide Galvanized Cantilever Sliding Gate..... For 1" Mesh Fabric, Add For 1-1/4" Mesh Fabric, Add For 1-3/4" Mesh Fabric, Add For 2-1/8" Mesh Fabric, Deduct For Gate With Single Barb Wire Arm, Add For Gate With Double Barb Wire Arm, Add For Aluminized Steel Gate And Post, Add For Powder Coated Gate And Post, Add For Vinyl Coated, Add	25,609.44 8,500.36 5,471.50 3,400.14 -1,700.07 2,149.52 3,126.57 9,379.71 4,103.62 5,862.32	3,034.19
32 31 13 13-0642	Gate Accessories (32 31 13 13-0263)		
32 31 13 13-0643	EA Gate Center Stop, Cast Steel, Ground	44.06	
32 31 13 13-0644	EA Gate Latch, Malleable Galvanized Steel.....	57.93	
32 31 13 13-0645	EA Gate Keeper, Full Length, Galvanized Steel.....	268.32	
32 31 13 13-0646	EA Gate Keeper Hold-Open For Cantilever Gate.....	110.13	20.62
32 31 13 13-0647	EA Heavy Duty Gate Latch, Malleable Galvanized Steel	62.39	
32 31 13 13-0648	EA Gate Keeper, Full Length, Stainless Steel, Internal Locking Device With 3/4" Stainless Steel Rod For 3' To 5' High Gate.....	1,140.99	
32 31 13 13-0649	EA Gate Keeper, Full Length, Stainless Steel, Internal Locking Device With 3/4" Stainless Steel Rod For >5' To 8' High Gate	1,223.01	
32 31 13 13-0650	EA Gate Keeper, Full Length, Stainless Steel, Internal Locking Device With 3/4" Stainless Steel Rod For >8' To 12' High Gate	1,305.03	
32 31 13 13-0651	LF Aluminum V-Groove Gate Track.....	60.34	11.80
32 31 13 13-0652	LF Galvanized Steel V-Groove Gate Track.....	45.84	11.80
32 31 13 13-0653	Accessories (32 31 13 13)		
32 31 13 13-0654	Barbed And Concertina Wire (32 31 13 13-0653)		
32 31 13 13-0655	Single Strand Barbed Wire (32 31 13 13-0654)		

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0656	LF	12-1/2 Gauge, 4 Points, 5" O. C., ASTM A121, Class 1, Galvanized Barbed Wire, Per Strand..... Note: Includes clips. 4 points 12-1/2 Gauge, Class I. For >500 To 2,000, Deduct For >2,000 To 5,000, Deduct	1.17 -0.05 -0.08	0.55
32 31 13	13-0657	LF	12-1/2 Gauge, 4 Points, 5" O. C., ASTM A121, Class 3, Galvanized Barbed Wire, Per Strand..... For >500 To 2,000, Deduct For >2,000 To 5,000, Deduct	1.20 -0.05 -0.08	0.55
32 31 13	13-0658	LF	Vinyl Coated Barbed Wire (Fused), Per Strand Note: Includes clips. For >500 To 2,000, Deduct For >2,000 To 5,000, Deduct	1.27 -0.05 -0.08	0.55
32 31 13	13-0659	EA	Chain Link 2-1/2" (2-3/8" OD) x 1-5/8", 3 Strand, 45 Degree, Galvanized Steel, Barbed Wire Single Arm.....	14.24	8.68
32 31 13	13-0660	EA	Chain Link 2-1/2" (2-3/8" OD) x 1-5/8", 6 Strand, 45 Degree, Galvanized Steel, Barbed Wire V-Barb Arm	22.76	10.42
32 31 13	13-0661	EA	Barbed Wire Eye Tops (For Single Strand).....	13.10	8.68
32 31 13 13-0662 Galvanized Steel Concertina (Razor) Wire, Single Coil (32 31 13 13-0654)					
32 31 13	13-0663	LF	18" Diameter, 18" On Center Galvanized Concertina (Razor) Wire, Attach To Every 6th Barb On Top Of Chain Link Fence, Per LF Of Fence..... For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	5.58 -0.47 -0.95 -1.33 -0.54 4.50	0.76
32 31 13	13-0664	LF	18" Diameter, 12" On Center Galvanized Concertina (Razor) Wire, Attach To Every 4th Barb On Top Of Chain Link Fence, Per LF Of Fence..... For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	8.42 -0.71 -1.43 -2.01 -0.81 6.80	0.76
32 31 13	13-0665	LF	18" Diameter, 9" On Center Galvanized Concertina (Razor) Wire, Attach To Every 3rd Barb On Top Of Chain Link Fence, Per LF Of Fence For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	11.16 -0.95 -1.89 -2.67 -1.09 8.99	0.76
32 31 13	13-0666	LF	24" Diameter, 18" On Center Galvanized Concertina (Razor) Wire, Attach To Every 6th Barb On Top Of Chain Link Fence, Per LF Of Fence..... For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	9.68 -0.79 -1.57 -2.18 -0.60 8.48	0.76
32 31 13	13-0667	LF	24" Diameter, 12" On Center Galvanized Concertina (Razor) Wire, Attach To Every 4th Barb On Top Of Chain Link Fence, Per LF Of Fence..... For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	14.63 -1.19 -2.38 -3.29 -0.91 12.82	0.76
32 31 13	13-0668	LF	24" Diameter, 9" On Center Galvanized Concertina (Razor) Wire, Attach To Every 3rd Barb On Top Of Chain Link Fence, Per LF Of Fence For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	19.31 -1.57 -3.14 -4.34 -1.20 16.92	0.76
32 31 13	13-0669	LF	30" Diameter, 18" On Center Galvanized Concertina (Razor) Wire, Attach To Every 6th Barb On Top Of Chain Link Fence, Per LF Of Fence..... For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	31.23 -2.41 -4.82 -6.52 -0.68 29.87	0.76
32 31 13	13-0670	LF	30" Diameter, 12" On Center Galvanized Concertina (Razor) Wire, Attach To Every 4th Barb On Top Of Chain Link Fence, Per LF Of Fence..... For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	47.26 -3.65 -7.29 -9.86 -1.02 45.23	0.76
32 31 13	13-0671	LF	30" Diameter, 9" On Center Galvanized Concertina (Razor) Wire, Attach To Every 3rd Barb On Top Of Chain Link Fence, Per LF Of Fence For >500 To 1,500, Deduct For >1,500 To 5,000, Deduct For >5,000, Deduct For Ground Installation, Deduct For Double Coil (Helix), Add	62.44 -4.82 -9.64 -13.03 -1.36 59.73	0.76

32 31 13 13-0672 Stainless Steel Concertina (Razor) Wire, Single Coil (32 31 13 13-0654)



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13 13-0673 LF 18" Diameter, 18" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 6th Barb On Top Of Chain Link Fence, Per LF Of Fence	10.47	0.76
For >500 To 1,500, Deduct	-0.84	
For >1,500 To 5,000, Deduct	-1.68	
For >5,000, Deduct	-2.31	
For Ground Installation, Deduct	-0.54	
For Double Coil (Helix), Add	9.39	
32 31 13 13-0674 LF 18" Diameter, 12" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 4th Barb On Top Of Chain Link Fence, Per LF Of Fence	15.83	0.76
For >500 To 1,500, Deduct	-1.27	
For >1,500 To 5,000, Deduct	-2.54	
For >5,000, Deduct	-3.49	
For Ground Installation, Deduct	-0.81	
For Double Coil (Helix), Add	14.21	
32 31 13 13-0675 LF 18" Diameter, 9" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 3rd Barb On Top Of Chain Link Fence, Per LF Of Fence.....	20.95	0.76
For >500 To 1,500, Deduct	-1.68	
For >1,500 To 5,000, Deduct	-3.36	
For >5,000, Deduct	-4.62	
For Ground Installation, Deduct	-1.09	
For Double Coil (Helix), Add	18.78	
32 31 13 13-0676 LF 24" Diameter, 18" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 6th Barb On Top Of Chain Link Fence, Per LF Of Fence	13.83	0.76
For >500 To 1,500, Deduct	-1.10	
For >1,500 To 5,000, Deduct	-2.20	
For >5,000, Deduct	-3.01	
For Ground Installation, Deduct	-0.60	
For Double Coil (Helix), Add	12.63	
32 31 13 13-0677 LF 24" Diameter, 12" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 4th Barb On Top Of Chain Link Fence, Per LF Of Fence	20.92	0.76
For >500 To 1,500, Deduct	-1.66	
For >1,500 To 5,000, Deduct	-3.32	
For >5,000, Deduct	-4.55	
For Ground Installation, Deduct	-0.91	
For Double Coil (Helix), Add	19.11	
32 31 13 13-0678 LF 24" Diameter, 9" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 3rd Barb On Top Of Chain Link Fence, Per LF Of Fence.....	27.61	0.76
For >500 To 1,500, Deduct	-2.19	
For >1,500 To 5,000, Deduct	-4.38	
For >5,000, Deduct	-6.00	
For Ground Installation, Deduct	-1.20	
For Double Coil (Helix), Add	25.22	
32 31 13 13-0679 LF 30" Diameter, 18" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 6th Barb On Top Of Chain Link Fence, Per LF Of Fence	46.94	0.76
For >500 To 1,500, Deduct	-3.59	
For >1,500 To 5,000, Deduct	-7.18	
For >5,000, Deduct	-9.66	
For Ground Installation, Deduct	-0.68	
For Double Coil (Helix), Add	45.58	
32 31 13 13-0680 LF 30" Diameter, 12" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 4th Barb On Top Of Chain Link Fence, Per LF Of Fence	71.07	0.76
For >500 To 1,500, Deduct	-5.43	
For >1,500 To 5,000, Deduct	-10.86	
For >5,000, Deduct	-14.62	
For Ground Installation, Deduct	-1.02	
For Double Coil (Helix), Add	69.04	
32 31 13 13-0681 LF 30" Diameter, 9" On Center, Stainless Steel Concertina (Razor) Wire, Attach To Every 3rd Barb On Top Of Chain Link Fence, Per LF Of Fence.....	93.87	0.76
For >500 To 1,500, Deduct	-7.18	
For >1,500 To 5,000, Deduct	-14.35	
For >5,000, Deduct	-19.32	
For Ground Installation, Deduct	-1.36	
For Double Coil (Helix), Add	91.16	
32 31 13 13-0682 Grounding For Gates (32 31 13 13-0653) Note: Includes two of each of the following per opening: 5/8 ground rods, clamps, braided straps and #6 bare copper wire.		
32 31 13 13-0683 OPNG Grounding For Gates (Per Opening)	490.15	
32 31 13 13-0684 Coiled Spring Reinforcing Wire (32 31 13 13-0653)		
32 31 13 13-0685 Galvanized Steel (32 31 13 13-0684)		
32 31 13 13-0686 LF 7 Gauge, Galvanized Steel, Reinforcing Wire Coiled Spring	1.28	0.55
32 31 13 13-0687 Vinyl Coated Steel (32 31 13 13-0684)		
32 31 13 13-0688 LF 9 Gauge, Vinyl Coated Steel, Reinforcing Wire Coiled Spring.....	1.28	0.55
32 31 13 13-0689 Bending Of Fabric Around Pipe Railings (32 31 13 13-0653) Note: Only where specified.		
32 31 13 13-0690 LF Bend Chain Link Fence Fabric Around Pipe Railing, Top.....	1.74	
32 31 13 13-0691 LF Bend Chain Link Fence Fabric Around Pipe Railing, Bottom.....	1.51	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0692		Mounting Plate With Anchors Or Bolts (32 31 13 13-0653)		
Note: For drilling for anchor or bolts, installing post on or against flat surface.					
32 31 13	13-0693	EA	Mounting Plate For 1-5/8" Diameter Post	48.03	
32 31 13	13-0694	EA	Mounting Plate For 2" Diameter Post	48.81	
32 31 13	13-0695	EA	Mounting Plate For 2-1/2" Diameter Post	50.20	
32 31 13	13-0696	EA	Mounting Plate For 3" Diameter Post	60.43	
32 31 13	13-0697	EA	Mounting Plate For 4" Diameter Post	69.45	
32 31 13	13-0698	EA	Mounting Plate For 6-5/8" Diameter Post	80.41	
32 31 13	13-0699	EA	Mounting Plate For 8-5/8" Diameter Post	94.76	
32 31 13	13-0700		Tension Bar (32 31 13 13-0653)		
32 31 13	13-0701	EA	3' Long x 5/8" Wide x 3/16" Thick Galvanized Steel Tension Bar	17.20	
32 31 13	13-0702	EA	3-1/2' Long x 5/8" Wide x 3/16" Thick Galvanized Steel Tension Bar	18.28	
32 31 13	13-0703	EA	4' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	22.42	
32 31 13	13-0704	EA	5' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	25.94	
32 31 13	13-0705	EA	6' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	30.57	
32 31 13	13-0706	EA	7' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	35.39	
32 31 13	13-0707	EA	8' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	39.99	
32 31 13	13-0708	EA	9' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	47.89	
32 31 13	13-0709	EA	10' Long x 3/4" Wide x 3/16" Thick Galvanized Steel Tension Bar	57.29	
32 31 13	13-0710		Fence And Gate Repair And Replacement (32 31 13 13)		
32 31 13	13-0711		Fence And Gate Parts Replacement (32 31 13 13-0710)		
32 31 13	13-0712	EA	Cantilever Roller Assembly, Ball Bearing With Fittings, Replacement	133.77	
32 31 13	13-0713	EA	Sliding Gate Roller Assembly Replacement	131.64	
32 31 13	13-0714	EA	Rod And Lock Gate Keeper Replacement	132.87	
32 31 13	13-0715	EA	Galvanized Gate Holdback Replacement	29.97	
32 31 13	13-0716	LF	3/8" Cross Bracing Rod Replacement	1.73	
32 31 13	13-0717	LF	1-5/8" Diagonal Pipe Bracing Replacement	2.68	
32 31 13	13-0718	EA	2-3/8" To 2-1/2" Diameter Galvanized Steel Gate Hinge With Bolts, Replacement	29.03	
32 31 13	13-0719	EA	2-7/8" To 3" Diameter Galvanized Steel Gate Hinge With Bolts, Replacement	33.20	
32 31 13	13-0720	EA	3-1/2" To 4" Diameter Galvanized Steel Gate Hinge With Bolts, Replacement	37.47	
32 31 13	13-0721	EA	6-1/2" To 6-5/8" Diameter Galvanized Steel Gate Hinge With Bolts, Replacement	55.58	
32 31 13	13-0722	EA	8-5/8" Diameter Galvanized Steel Gate Hinge With Bolts, Replacement	112.91	
32 31 13	13-0723	EA	2-1/2" x 2" Off Set Gate Hinge Replacement	27.88	
32 31 13	13-0724	EA	3" x 2" Off Set Gate Hinge Replacement	29.11	
32 31 13	13-0725	EA	4" x 2" Off Set Gate Hinge Replacement	31.07	
32 31 13	13-0726	EA	6-5/8" x 2" Off Set Gate Hinge Replacement	50.28	
32 31 13	13-0727	EA	8-5/8" x 2" Off Set Gate Hinge Replacement	78.72	
32 31 13	13-0728	EA	1-5/8" Aluminum Die-Cast Post Cap Replacement	6.34	
32 31 13	13-0729	EA	2" Aluminum Die-Cast Post Cap Replacement	6.96	
32 31 13	13-0730	EA	2-1/2" Aluminum Die-Cast Post Cap Replacement	8.13	
32 31 13	13-0731	EA	3" Aluminum Die-Cast Post Cap Replacement	9.48	
32 31 13	13-0732	EA	2" Galvanized Post Cap Replacement	7.00	
32 31 13	13-0733	EA	2-1/2" Galvanized Post Cap Replacement	7.58	
32 31 13	13-0734	EA	3" Galvanized Post Cap Replacement	8.68	
32 31 13	13-0735	EA	4" Galvanized Post Cap Replacement	12.77	
32 31 13	13-0736	EA	6-5/8" Galvanized Post Cap Replacement	23.70	
32 31 13	13-0737	EA	8-5/8" Galvanized Post Cap Replacement	38.75	
32 31 13	13-0738	EA	1-5/8" Boulevard Clamp Replacement	11.71	
32 31 13	13-0739	EA	2" Boulevard Clamp Replacement	14.27	
32 31 13	13-0740	EA	2-1/2" Boulevard Clamp Replacement	16.74	
32 31 13	13-0741	EA	3" Boulevard Clamp Replacement	20.31	
32 31 13	13-0742	EA	1-5/8" Gate Brace Or End Rail Clamp Replacement	11.49	
32 31 13	13-0743	EA	2" Gate Brace Or End Rail Clamp Replacement	13.96	
32 31 13	13-0744	EA	2-1/2" Gate Brace Or End Rail Clamp Replacement	16.44	
32 31 13	13-0745	EA	3" Gate Brace Or End Rail Clamp Replacement	19.99	
32 31 13	13-0746	EA	1-3/8" Heavy Duty Galvanized Tension Band With Bolt, Replacement	11.81	
32 31 13	13-0747	EA	1-5/8" Heavy Duty Galvanized Tension Band With Bolt, Replacement	11.91	
32 31 13	13-0748	EA	2" Heavy Duty Galvanized Tension Band With Bolt, Replacement	12.17	
32 31 13	13-0749	EA	2-1/2" Heavy Duty Galvanized Tension Band With Bolt, Replacement	12.05	
32 31 13	13-0750	EA	3" Heavy Duty Galvanized Tension Band With Bolt, Replacement	12.25	
32 31 13	13-0751	EA	3-1/2" Heavy Duty Galvanized Tension Band With Bolt, Replacement	12.41	
32 31 13	13-0752	EA	4" Heavy Duty Galvanized Tension Band With Bolt, Replacement	12.88	
32 31 13	13-0753	EA	6-5/8" Heavy Duty Galvanized Tension Band With Bolt, Replacement	16.31	
32 31 13	13-0754		Removal And Reinstallation Of Chain Link Fences (32 31 13 13)		
Note: Includes removal, storage, cleaning and reinstallation of fence fabric, rails and other components. Excludes post work. See CSI section 32 31 13 13-0001 for new post holes where required, 32 31 13 13-0058 for new fence posts where required.					
32 31 13	13-0755	LF	Removal And Reinstallation Of Chain Link Fence Up To 5' Height	21.70	
32 31 13	13-0756	LF	Removal And Reinstallation Of Chain Link Fence 6' To 12' Height	32.56	



Exterior Improvements		32
Site Improvements		32 30
Fences and Gates		32 31

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 13	13-0757		Ballfield Fencing <small>(32 31 13 13)</small> See CSI section 32 31 13 13-0001 for auguring holes and concrete.		
32 31 13	13-0758		Concrete Bases For Ballfield Poles, Cast In Place <small>(32 31 13 13-0757)</small> Note: Includes excavation/drilling, concrete, reinforcement, forms for exposed base, anchors/supports and backfill.		
32 31 13	13-0759	VLF	2-1/2' Diameter Concrete Base For Ballfield Poles.....	138.55	
32 31 13	13-0760	VLF	3' Diameter Concrete Base For Ballfield Poles.....	164.23	
32 31 13	13-0761	VLF	3-1/2' Diameter Concrete Base For Ballfield Poles.....	206.74	
32 31 13	13-0762	VLF	4' Diameter Concrete Base For Ballfield Poles.....	244.95	
32 31 13	13-0763		Ballfield Poles <small>(32 31 13 13-0757)</small>		
32 31 13	13-0764	EA	20' Galvanized Steel Pole, 24" Diameter At Base For Ballfield Netting Note: 10' above grade	8,103.89	687.07
32 31 13	13-0765	EA	25' Galvanized Steel Pole, 24" Diameter At Base For Ballfield Netting Note: 15' above grade	10,052.59	858.84
32 31 13	13-0766	EA	30' Galvanized Steel Pole, 24" Diameter At Base For Ballfield Netting Note: 20' above grade	11,553.08	1,030.61
32 31 13	13-0767	EA	40' Galvanized Steel Pole, 24" Diameter At Base For Ballfield Netting Note: 30' above grade	15,533.05	1,202.38
32 31 13	13-0768	EA	50' Galvanized Steel Pole, 24" Diameter At Base For Ballfield Netting Note: 40' above grade	20,817.92	1,374.15
32 31 13	13-0769	EA	60' Galvanized Steel Pole, 24" Diameter At Base For Ballfield Netting Note: 50' above grade	23,263.39	1,545.92
32 31 13	13-0770		Ballfield Nylon Netting <small>(32 31 13 13-0757)</small> Note: Excludes fastening clips and cabling See CSI section 05 15 00 00-0000 for cabling and accessories.		
32 31 13	13-0771	LF	10' High, #18 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	1.69	
32 31 13	13-0772	LF	10' High, #21 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	1.73	
32 31 13	13-0773	LF	10' High, #36 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	1.95	
32 31 13	13-0774	LF	10' High, #42 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	2.21	
32 31 13	13-0775	LF	10' High, #48 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	2.45	
32 31 13	13-0776	LF	10' High, #60 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	3.28	
32 31 13	13-0777	LF	10' High, #72 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	3.73	
32 31 13	13-0778	LF	10' High, #96 Black Twisted Knotted Nylon Square 1-3/4" Mesh With Sewn Borders For Ballfield Netting.....	4.86	
32 31 13	13-0779		Ballfield Chainlink Netting <small>(32 31 13 13-0757)</small> Note: Excludes fastening clips and cabling See CSI section 05 15 00 00-0000 for cabling and accessories.		
32 31 13	13-0780	SF	#9 Gauge Chain Link Fabric, 2" Mesh For Ballfield Netting.....	3.60	1.16
			<i>For 13 Gauge Fabric, Deduct</i>	-0.58	
			<i>For 11 Gauge Fabric, Deduct</i>	-0.32	
			<i>For 6 Gauge Fabric, Add</i>	1.02	
			<i>For 1" Mesh Fabric, Add</i>	0.96	
			<i>For 1-3/4" Mesh Fabric, Add</i>	0.38	
			<i>For 2-1/8" Mesh Fabric, Deduct</i>	-0.19	
			<i>For 2-3/8" Mesh Fabric, Deduct</i>	-0.26	
32 31 13	13-0781		Ballfield Netting Accessories <small>(32 31 13 13-0757)</small>		
32 31 13	13-0782	EA	Sliding Clip For Ballfield Netting.....	8.31	
32 31 13	13-0783	EA	1/4" Utility Spring Swing Clip For Ballfield Netting.....	3.70	
32 31 13	13-0784	EA	5/16" Utility Spring Swing Clip For Ballfield Netting.....	3.90	
32 31 13	13-0785	EA	3/8" Utility Spring Swing Clip For Ballfield Netting.....	4.20	
32 31 13	33		Chain Link Backstops <small>(32 31 13)</small>		
32 31 13	33-0001		Regulation Baseball Backstop <small>(32 31 13 33)</small> See CSI section 32 31 13 13-0001 for auguring holes and concrete.		
32 31 13	33-0002	EA	20'-6" Wide x 13' High Baseball Backstop Prefabricated With Hood, Galvanized.....	13,370.57	2,196.57
32 31 13	33-0003	EA	34' Wide x 17'-6" High Baseball Backstop Prefabricated With Hood, Galvanized.....	19,284.69	2,928.77
32 31 13	33-0004	EA	48'-3-1/2" Wide x 24' High Baseball Backstop Prefabricated With Hood, Galvanized.....	24,574.27	3,416.89
32 31 13	33-0005	EA	20'-6" Wide x 13' High Baseball Backstop Prefabricated With Hood, Vinyl Coated.....	18,759.13	2,196.57
32 31 13	33-0006	EA	34' Wide x 17'-6" High Baseball Backstop Prefabricated With Hood, Vinyl Coated.....	27,347.68	2,928.77
32 31 13	33-0007	EA	48'-3-1/2" Wide x 24' High Baseball Backstop Prefabricated With Hood, Vinyl Coated.....	35,214.64	3,416.89
32 31 13	33-0008		Regulation Softball Backstop <small>(32 31 13 33)</small> See CSI section 32 31 13 13-0001 for auguring holes and concrete.		
32 31 13	33-0009		14' High Softball Backstop <small>(32 31 13 33-0008)</small> Note: Includes 3" outside diameter posts every 8', top, middle, and bottom brace rails, overhang panel with 9 gauge mesh and 1-1/8" outside diameter frame, 16' of 6 gauge mesh and 32' of 9 gauge mesh.		
32 31 13	33-0010	EA	14' Softball Backstop, Galvanized Regulation.....	11,327.25	2,198.65
32 31 13	33-0011	EA	14' Softball Backstop, Vinyl Coated Regulation.....	15,192.01	2,198.65
32 31 13	33-0012		18' High Softball Backstop <small>(32 31 13 33-0008)</small> Note: Includes 3" outside diameter posts every 8', top, middle, and bottom brace rails, overhang panel with 9 gauge mesh and 1-1/8" outside diameter frame, 16' of 6 gauge mesh and 32' of 9 gauge mesh.		

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
32 31 13 33-0013	EA	18' Softball Backstop, Galvanized Regulation.....	13,223.65		2,444.30
32 31 13 33-0014	EA	18' Softball Backstop Vinyl Coated Regulation	17,898.76		2,444.30
32 31 13 33-0015		20' High Softball Backstop <small>(32 31 13 33-0008)</small>			
		Note: Includes 3" outside diameter posts every 8', top, middle, and bottom brace rails, overhang panel with 9 gauge mesh and 1-1/8" outside diameter frame, 16' of 6 gauge mesh and 32' of 9 gauge mesh.			
32 31 13 33-0016	EA	20' Softball Backstop, Galvanized Regulation.....	14,973.40		2,577.17
32 31 13 33-0017	EA	20' Softball Backstop, Vinyl Coated Regulation	20,521.26		2,577.17
32 31 13 33-0018		22' High Softball Backstop <small>(32 31 13 33-0008)</small>			
		Note: Includes 3" outside diameter posts every 8', top, middle, and bottom brace rails, overhang panel with 9 gauge mesh and 1-1/8" outside diameter frame, 16' of 6 gauge mesh and 32' of 9 gauge mesh.			
32 31 13 33-0019	EA	22' Softball Backstop, Galvanized Regulation.....	17,246.07		2,654.92
32 31 13 33-0020	EA	22' Softball Backstop, Vinyl Coated Regulation	23,915.90		2,654.92
32 31 13 33-0021		24' High Softball Backstop <small>(32 31 13 33-0008)</small>			
		Note: Includes 3" outside diameter posts every 8', top, middle, and bottom brace rails, overhang panel with 9 gauge mesh and 1-1/8" outside diameter frame, 16' of 6 gauge mesh and 32' of 9 gauge mesh.			
32 31 13 33-0022	EA	24' Softball Backstop, Galvanized Regulation.....	20,524.44		3,034.19
32 31 13 33-0023	EA	24' Softball Backstop, Vinyl Coated Regulation	28,814.97		3,034.19
32 31 16		Welded Wire Fences and Gates <small>(32 31)</small>			
32 31 16 00-0001		Welded Wire Fence <small>(32 31 16)</small>			
32 31 16 00-0002		12 Gauge Galvanized Steel Welded Wire Fence, 2" x 4" Mesh <small>(32 31 16 00-0001)</small>			
		Note: Posts 5' on center.			
32 31 16 00-0003	LF	3' High, 12 Gauge Galvanized Steel Welded Wire Fence, 2" x 4" Mesh, Posts At 5'.....	10.72		1.96
32 31 16 00-0004	LF	5' High, 12 Gauge Galvanized Steel Welded Wire Fence, 2" x 4" Mesh, Posts At 5'.....	11.52		1.96
32 31 16 00-0005		14 Gauge Galvanized Steel Welded Wire Fence, 1" x 2" Mesh <small>(32 31 16 00-0001)</small>			
		Note: Posts 5' on center.			
32 31 16 00-0006	LF	3' High, 14 Gauge Galvanized Steel Welded Wire Fence, 1" x 2" Mesh, Posts At 5'.....	10.56		1.96
32 31 16 00-0007	LF	5' High, 14 Gauge Galvanized Steel Welded Wire Fence, 1" x 2" Mesh, Posts At 5'.....	11.27		1.96
32 31 19		Decorative Metal Fences and Gates <small>(32 31)</small>			
		See CSI section 32 31 13 13-0001 for drilling and grouting.			
32 31 19 00-0001		Wrought Iron Fence <small>(32 31 19)</small>			
		Note: Factory primed.			
32 31 19 00-0002		Wrought Iron Fence, 3/4" Verticals At >3" To 4" On Center <small>(32 31 19 00-0001)</small>			
		Note: Factory primed 8 foot long panel sections.			
32 31 19 00-0003	LF	3' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 2" Square Posts, Set 8' On Center.....	47.99		11.94
		For 6' Length Fence Panels With Posts Set 6' O.C., Add	8.87		
		For Verticals Up To 2" On Center, Add	7.72		
		For Verticals >2" To 2-1/2" On Center, Add	4.82		
		For Verticals >2-1/2" To 3" On Center, Add	1.93		
		For Verticals >4" To 6" On Center, Deduct	-2.17		
		For Pickets Extending Above Top Rail, Add	4.21		
		For Curved Pickets Extending Above Top Rail, Add	9.63		
32 31 19 00-0004	LF	4' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 2" Square Posts, Set 8' On Center.....	61.29		15.19
		For 6' Length Fence Panels With Posts Set 6' O.C., Add	11.25		
		For Verticals Up To 2" On Center, Add	10.23		
		For Verticals >2" To 2-1/2" On Center, Add	6.39		
		For Verticals >2-1/2" To 3" On Center, Add	2.56		
		For Verticals >4" To 6" On Center, Deduct	-2.88		
		For Pickets Extending Above Top Rail, Add	5.46		
		For Curved Pickets Extending Above Top Rail, Add	12.59		
32 31 19 00-0005	LF	5' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 2" Square Posts, Set 8' On Center.....	72.23		15.85
		For 6' Length Fence Panels With Posts Set 6' O.C., Add	13.07		
		For Verticals Up To 2" On Center, Add	12.90		
		For Verticals >2" To 2-1/2" On Center, Add	8.06		
		For Verticals >2-1/2" To 3" On Center, Add	3.23		
		For Verticals >4" To 6" On Center, Deduct	-3.63		
		For Pickets Extending Above Top Rail, Add	6.64		
		For Curved Pickets Extending Above Top Rail, Add	15.50		
32 31 19 00-0006	LF	6' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 2" Square Posts, Set 8' On Center.....	87.37		19.10
		For 6' Length Fence Panels With Posts Set 6' O.C., Add	15.79		
		For Verticals Up To 2" On Center, Add	15.71		
		For Verticals >2" To 2-1/2" On Center, Add	9.82		
		For Verticals >2-1/2" To 3" On Center, Add	3.93		
		For Verticals >4" To 6" On Center, Deduct	-4.42		
		For Pickets Extending Above Top Rail, Add	8.05		
		For Curved Pickets Extending Above Top Rail, Add	18.82		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 19 00-0007 LF 7' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 2" Square Posts, Set 8' On Center	101.42	20.21
<i>For 6' Length Fence Panels With Posts Set 6' O.C., Add</i>	18.04	
<i>For Verticals Up To 2" On Center, Add</i>	19.52	
<i>For Verticals >2" To 2-1/2" On Center, Add</i>	12.20	
<i>For Verticals >2-1/2" To 3" On Center, Add</i>	4.88	
<i>For Verticals >4" To 6" On Center, Deduct</i>	-5.49	
<i>For Pickets Extending Above Top Rail, Add</i>	9.65	
<i>For Curved Pickets Extending Above Top Rail, Add</i>	22.86	
32 31 19 00-0008 LF 8' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 3" Square Posts, Set 8' On Center	115.46	21.27
<i>For 6' Length Fence Panels With Posts Set 6' O.C., Add</i>	20.30	
<i>For Verticals Up To 2" On Center, Add</i>	23.33	
<i>For Verticals >2" To 2-1/2" On Center, Add</i>	14.58	
<i>For Verticals >2-1/2" To 3" On Center, Add</i>	5.83	
<i>For Verticals >4" To 6" On Center, Deduct</i>	-6.56	
<i>For Pickets Extending Above Top Rail, Add</i>	11.24	
<i>For Curved Pickets Extending Above Top Rail, Add</i>	26.89	
32 31 19 00-0009 LF 10' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 3" Square Posts, Set 8' On Center.....	139.61	23.87
<i>For 6' Length Fence Panels With Posts Set 6' O.C., Add</i>	24.28	
<i>For Verticals Up To 2" On Center, Add</i>	29.39	
<i>For Verticals >2" To 2-1/2" On Center, Add</i>	18.37	
<i>For Verticals >2-1/2" To 3" On Center, Add</i>	7.35	
<i>For Verticals >4" To 6" On Center, Deduct</i>	-8.27	
<i>For Pickets Extending Above Top Rail, Add</i>	13.87	
<i>For Curved Pickets Extending Above Top Rail, Add</i>	33.43	
32 31 19 00-0010 LF 12' High Wrought Iron Fence, Verticals At >3" To 4" On Center With 3" Square Posts, Set 8' On Center.....	164.56	27.14
<i>For 6' Length Fence Panels With Posts Set 6' O.C., Add</i>	28.48	
<i>For Verticals Up To 2" On Center, Add</i>	35.30	
<i>For Verticals >2" To 2-1/2" On Center, Add</i>	22.06	
<i>For Verticals >2-1/2" To 3" On Center, Add</i>	8.82	
<i>For Verticals >4" To 6" On Center, Deduct</i>	-9.93	
<i>For Pickets Extending Above Top Rail, Add</i>	16.50	
<i>For Curved Pickets Extending Above Top Rail, Add</i>	39.92	
32 31 19 00-0011 Wrought Iron Gates <small>(32 31 19 00-0001)</small>		
Note: Factory primed.		
32 31 19 00-0012 Single Wrought Iron Gates <small>(32 31 19 00-0011)</small>		
Note: Factory primed.		
32 31 19 00-0013 LF 3' Single Wrought Iron Gate, Hardware And Associated Trim	58.86	14.54
32 31 19 00-0014 LF 4' Single Wrought Iron Gate, Hardware And Associated Trim	77.21	18.02
32 31 19 00-0015 LF 5' Single Wrought Iron Gate, Hardware And Associated Trim	93.98	21.70
32 31 19 00-0016 LF 6' Single Wrought Iron Gate, Hardware And Associated Trim	114.07	26.04
32 31 19 00-0017 LF 8' Single Wrought Iron Gate, Hardware And Associated Trim	150.57	28.87
32 31 19 00-0018 LF 10' Single Wrought Iron Gate, Hardware And Associated Trim	181.00	31.91
32 31 19 00-0019 LF 12' Single Wrought Iron Gate, Hardware And Associated Trim	210.90	36.24
32 31 19 00-0020 Double Wrought Iron Gates <small>(32 31 19 00-0011)</small>		
Note: Factory primed.		
32 31 19 00-0021 LF 3' Double Wrought Iron Gate, Hardware And Associated Trim.....	71.73	13.02
32 31 19 00-0022 LF 4' Double Wrought Iron Gate, Hardware And Associated Trim.....	93.96	16.28
32 31 19 00-0023 LF 5' Double Wrought Iron Gate, Hardware And Associated Trim.....	113.89	19.54
32 31 19 00-0024 LF 6' Double Wrought Iron Gate, Hardware And Associated Trim.....	137.79	23.44
32 31 19 00-0025 LF 8' Double Wrought Iron Gate, Hardware And Associated Trim.....	182.73	26.04
32 31 19 00-0026 LF 10' Double Wrought Iron Gate, Hardware And Associated Trim.....	220.05	28.65
32 31 19 00-0027 LF 12' Double Wrought Iron Gate, Hardware And Associated Trim.....	256.89	32.56
32 31 19 00-0028 Repair Or Replace Wrought Iron Fence <small>(32 31 19 00-0001)</small>		
32 31 19 00-0029 LF Removal And Replacement Of Wrought Iron Picket.....	20.53	
32 31 19 00-0030 LF Removal And Replacement Of Wrought Iron Post.....	30.18	
32 31 19 00-0031 EA Straighten Wrought Iron Post.....	86.82	
32 31 19 00-0032 Steel Tube Fence, Powder Coated <small>(32 31 19)</small>		
Note: Pickets are 3/4" square x 16 gauge.		
32 31 19 00-0033 Steel Tube Fence, 2 Rail <small>(32 31 19 00-0032)</small>		
Note: 6 foot long panel sections.		
32 31 19 00-0034 LF 3' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 2-1/2" Square Posts	77.06	11.94
<i>For Verticals Up To 2" On Center, Add</i>	10.73	
<i>For Verticals >2" To 2-1/2" On Center, Add</i>	5.37	
<i>For Verticals >3" To 4" On Center, Deduct</i>	-5.37	
<i>For Verticals >4" To 6" On Center, Deduct</i>	-10.73	
<i>For Pickets Extending Above Top Rail, Add</i>	5.73	
<i>For Curved Pickets Extending Above Top Rail, Add</i>	10.07	
<i>For Solid Pickets, Add</i>	15.58	
<i>For Aluminum With Satin Finish, Add</i>	12.59	
<i>For Third Rail, Add</i>	4.02	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	13.42	
<i>For 3" Square Posts, Add</i>	6.71	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31	19 00-0035	LF	3'-6" Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 2-1/2" Square Posts	82.46	12.76
			<i>For Verticals Up To 2" On Center, Add</i>	11.39	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	5.69	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-5.69	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-11.39	
			<i>For Pickets Extending Above Top Rail, Add</i>	6.12	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	10.74	
			<i>For Solid Pickets, Add</i>	16.64	
			<i>For Aluminum With Satin Finish, Add</i>	13.25	
			<i>For Third Rail, Add</i>	4.27	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	14.23	
			<i>For 3" Square Posts, Add</i>	7.12	
32 31	19 00-0036	LF	4' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 2-1/2" Square Posts	87.25	14.10
			<i>For Verticals Up To 2" On Center, Add</i>	11.92	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	5.96	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-5.96	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-11.92	
			<i>For Pickets Extending Above Top Rail, Add</i>	6.45	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	11.31	
			<i>For Solid Pickets, Add</i>	17.56	
			<i>For Aluminum With Satin Finish, Add</i>	13.73	
			<i>For Third Rail, Add</i>	4.47	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	14.90	
			<i>For 3" Square Posts, Add</i>	7.45	
32 31	19 00-0037	LF	5' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 2-1/2" Square Posts	93.00	15.85
			<i>For Verticals Up To 2" On Center, Add</i>	12.22	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	6.11	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-6.11	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-12.22	
			<i>For Pickets Extending Above Top Rail, Add</i>	6.79	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	11.86	
			<i>For Solid Pickets, Add</i>	18.53	
			<i>For Aluminum With Satin Finish, Add</i>	13.54	
			<i>For Third Rail, Add</i>	4.58	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	15.27	
			<i>For 3" Square Posts, Add</i>	7.64	
32 31	19 00-0038	LF	6' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 2-1/2" Square Posts	107.82	17.90
			<i>For Verticals Up To 2" On Center, Add</i>	14.40	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	7.20	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-7.20	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-14.40	
			<i>For Pickets Extending Above Top Rail, Add</i>	7.91	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	13.85	
			<i>For Solid Pickets, Add</i>	21.57	
			<i>For Aluminum With Satin Finish, Add</i>	16.23	
			<i>For Third Rail, Add</i>	5.40	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	18.00	
			<i>For 3" Square Posts, Add</i>	9.00	
32 31	19 00-0039	LF	7' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 3" Square Posts.....	123.43	19.54
			<i>For Verticals Up To 2" On Center, Add</i>	16.87	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	8.44	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-8.44	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-16.87	
			<i>For Pickets Extending Above Top Rail, Add</i>	9.12	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	16.01	
			<i>For Solid Pickets, Add</i>	24.84	
			<i>For Aluminum With Satin Finish, Add</i>	19.45	
			<i>For Third Rail, Add</i>	6.33	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	21.09	
			<i>For 4" Square Posts, Add</i>	29.53	
32 31	19 00-0040	LF	8' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 3" Square Posts.....	139.26	21.27
			<i>For Verticals Up To 2" On Center, Add</i>	19.34	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	9.67	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-9.67	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-19.34	
			<i>For Pickets Extending Above Top Rail, Add</i>	10.35	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	18.18	
			<i>For Solid Pickets, Add</i>	28.14	
			<i>For Aluminum With Satin Finish, Add</i>	22.64	
			<i>For Third Rail, Add</i>	7.25	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	24.18	
			<i>For 4" Square Posts, Add</i>	33.85	
32 31	19 00-0041	LF	9' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 3" Square Posts.....	161.88	22.79
			<i>For Verticals Up To 2" On Center, Add</i>	23.26	
			<i>For Verticals >2" To 2-1/2" On Center, Add</i>	11.63	
			<i>For Verticals >3" To 4" On Center, Deduct</i>	-11.63	
			<i>For Verticals >4" To 6" On Center, Deduct</i>	-23.26	
			<i>For Pickets Extending Above Top Rail, Add</i>	12.16	
			<i>For Curved Pickets Extending Above Top Rail, Add</i>	21.45	
			<i>For Solid Pickets, Add</i>	33.00	
			<i>For Aluminum With Satin Finish, Add</i>	28.05	
			<i>For Third Rail, Add</i>	8.72	
			<i>For 1" Square x 14 Gauge Pickets, Add</i>	29.08	
			<i>For 4" Square Posts, Add</i>	40.71	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 19 00-0042 LF 10' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 4" Square Posts.....	184.71	24.42
For Verticals Up To 2" On Center, Add	27.17	
For Verticals >2" To 2-1/2" On Center, Add	13.59	
For Verticals >3" To 4" On Center, Deduct	-13.59	
For Verticals >4" To 6" On Center, Deduct	-27.17	
For Pickets Extending Above Top Rail, Add	13.99	
For Curved Pickets Extending Above Top Rail, Add	24.72	
For Solid Pickets, Add	37.90	
For Aluminum With Satin Finish, Add	33.44	
For Third Rail, Add	10.19	
For 1" Square x 14 Gauge Pickets, Add	33.97	
For 6" Square Posts, Add	47.55	
32 31 19 00-0043 LF 12' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 4" Square Posts.....	217.54	27.14
For Verticals Up To 2" On Center, Add	32.66	
For Verticals >2" To 2-1/2" On Center, Add	16.33	
For Verticals >3" To 4" On Center, Deduct	-16.33	
For Verticals >4" To 6" On Center, Deduct	-32.66	
For Pickets Extending Above Top Rail, Add	16.59	
For Curved Pickets Extending Above Top Rail, Add	29.38	
For Solid Pickets, Add	44.88	
For Aluminum With Satin Finish, Add	40.85	
For Third Rail, Add	12.25	
For 1" Square x 14 Gauge Pickets, Add	40.82	
For 6" Square Posts, Add	57.15	
32 31 19 00-0044 LF 14' Steel Tube Fence, Verticals At >2-1/2" To 3" On Center With 4" Square Posts.....	233.04	29.30
For Verticals Up To 2" On Center, Add	34.89	
For Verticals >2" To 2-1/2" On Center, Add	17.44	
For Verticals >3" To 4" On Center, Deduct	-17.44	
For Verticals >4" To 6" On Center, Deduct	-34.89	
For Pickets Extending Above Top Rail, Add	17.76	
For Curved Pickets Extending Above Top Rail, Add	31.43	
For Solid Pickets, Add	48.04	
For Aluminum With Satin Finish, Add	43.54	
For Third Rail, Add	13.08	
For 1" Square x 14 Gauge Pickets, Add	43.61	
For 6" Square Posts, Add	61.05	
32 31 19 00-0045 Steel Tube Swing Gates <small>(32 31 19 00-0032)</small>		
32 31 19 00-0046 3' Fence Height Steel Tube Swing Gates, 2 Rail <small>(32 31 19 00-0045)</small>		
32 31 19 00-0047 EA 3' Wide x 3' High Steel Tube Single Swing Gate	727.45	23.11
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	158.47	
For Aluminum With Satin Finish, Add	186.98	
For Third Rail, Add	49.35	
For 1" Square x 14 Gauge Pickets, Add	65.80	
32 31 19 00-0048 EA 3'-6" Wide x 3' High Steel Tube Single Swing Gate.....	809.17	24.20
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	176.61	
For Aluminum With Satin Finish, Add	210.03	
For Third Rail, Add	55.23	
For 1" Square x 14 Gauge Pickets, Add	73.65	
32 31 19 00-0049 EA 4' Wide x 3' High Steel Tube Single Swing Gate	895.54	25.62
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	195.72	
For Aluminum With Satin Finish, Add	233.99	
For Third Rail, Add	61.39	
For 1" Square x 14 Gauge Pickets, Add	81.85	
32 31 19 00-0050 EA 5' Wide x 3' High Steel Tube Single Swing Gate	941.98	27.46
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	205.76	
For Aluminum With Satin Finish, Add	245.48	
For Third Rail, Add	64.46	
For 1" Square x 14 Gauge Pickets, Add	85.95	
32 31 19 00-0051 EA 6' Wide x 3' High Steel Tube Single Swing Gate	1,052.76	32.88
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	229.46	
For Aluminum With Satin Finish, Add	271.39	
For Third Rail, Add	71.55	
For 1" Square x 14 Gauge Pickets, Add	95.40	
32 31 19 00-0052 EA 7' Wide x 3' High Steel Tube Single Swing Gate	1,120.76	38.31
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	243.54	
For Aluminum With Satin Finish, Add	284.46	
For Third Rail, Add	75.43	
For 1" Square x 14 Gauge Pickets, Add	100.57	
32 31 19 00-0053 EA 8' Wide x 3' High Steel Tube Single Swing Gate	1,223.71	44.06
Note: Includes mounting hardware and associated trim.		
For Solid Pickets, Add	265.41	
For Aluminum With Satin Finish, Add	307.54	
For Third Rail, Add	81.85	
For 1" Square x 14 Gauge Pickets, Add	109.13	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

Los Angeles County Development Authority

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 31 19 00-0054	EA	9' Wide x 3' High Steel Tube Single Swing Gate	1,313.11		49.49
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	284.30		
		For Aluminum With Satin Finish, Add	327.03		
		For Third Rail, Add	87.33		
		For 1" Square x 14 Gauge Pickets, Add	116.44		
32 31 19 00-0055	EA	10' Wide x 3' High Steel Tube Single Swing Gate	1,391.79		54.91
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	300.78		
		For Aluminum With Satin Finish, Add	343.31		
		For Third Rail, Add	92.01		
		For 1" Square x 14 Gauge Pickets, Add	122.68		
32 31 19 00-0056	EA	6' Wide x 3' High Steel Tube Double Swing Gate	1,520.71		46.23
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	331.74		
		For Aluminum With Satin Finish, Add	393.70		
		For Third Rail, Add	103.64		
		For 1" Square x 14 Gauge Pickets, Add	138.18		
32 31 19 00-0057	EA	7' Wide x 3' High Steel Tube Double Swing Gate	1,620.13		48.40
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	353.62		
		For Aluminum With Satin Finish, Add	420.60		
		For Third Rail, Add	110.60		
		For 1" Square x 14 Gauge Pickets, Add	147.47		
32 31 19 00-0058	EA	8' Wide x 3' High Steel Tube Double Swing Gate	1,791.08		51.33
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	391.44		
		For Aluminum With Satin Finish, Add	467.98		
		For Third Rail, Add	122.77		
		For 1" Square x 14 Gauge Pickets, Add	163.70		
32 31 19 00-0059	EA	9' Wide x 3' High Steel Tube Double Swing Gate	1,876.75		53.18
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	410.30		
		For Aluminum With Satin Finish, Add	491.24		
		For Third Rail, Add	128.79		
		For 1" Square x 14 Gauge Pickets, Add	171.72		
32 31 19 00-0060	EA	10' Wide x 3' High Steel Tube Double Swing Gate	1,946.37		54.91
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	425.56		
		For Aluminum With Satin Finish, Add	509.68		
		For Third Rail, Add	133.61		
		For 1" Square x 14 Gauge Pickets, Add	178.14		
32 31 19 00-0061	EA	12' Wide x 3' High Steel Tube Double Swing Gate	2,191.13		65.76
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	478.19		
		For Aluminum With Satin Finish, Add	568.46		
		For Third Rail, Add	149.52		
		For 1" Square x 14 Gauge Pickets, Add	199.36		
32 31 19 00-0062	EA	14' Wide x 3' High Steel Tube Double Swing Gate	2,402.00		76.61
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	523.20		
		For Aluminum With Satin Finish, Add	617.07		
		For Third Rail, Add	162.90		
		For 1" Square x 14 Gauge Pickets, Add	217.19		
32 31 19 00-0063	EA	16' Wide x 3' High Steel Tube Double Swing Gate	2,579.39		88.23
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	560.50		
		For Aluminum With Satin Finish, Add	654.66		
		For Third Rail, Add	173.59		
		For 1" Square x 14 Gauge Pickets, Add	231.46		
32 31 19 00-0064	EA	18' Wide x 3' High Steel Tube Double Swing Gate	2,727.86		98.98
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	591.47		
		For Aluminum With Satin Finish, Add	684.55		
		For Third Rail, Add	182.29		
		For 1" Square x 14 Gauge Pickets, Add	243.05		
32 31 19 00-0065	EA	20' Wide x 3' High Steel Tube Double Swing Gate	2,849.57		109.83
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	616.41		
		For Aluminum With Satin Finish, Add	706.41		
		For Third Rail, Add	188.97		
		For 1" Square x 14 Gauge Pickets, Add	251.97		
32 31 19 00-0066		4' Fence Height Steel Tube Swing Gates, 2 Rail <small>(32 31 19 00-0045)</small>			
32 31 19 00-0067	EA	3' Wide x 4' High Steel Tube Single Swing Gate	840.03		21.70
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add	183.51		
		For Aluminum With Satin Finish, Add	219.05		
		For Third Rail, Add	57.51		
		For 1" Square x 14 Gauge Pickets, Add	76.68		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 19 00-0068 EA 3'-6" Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	908.72 198.76 238.43 62.46 83.28	25.28
32 31 19 00-0069 EA 4' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	980.13 214.42 257.41 67.40 89.87	27.14
32 31 19 00-0070 EA 5' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,039.05 227.27 272.65 71.42 95.22	28.87
32 31 19 00-0071 EA 6' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,120.60 244.32 289.30 76.23 101.64	34.72
32 31 19 00-0072 EA 7' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,230.69 267.79 314.51 83.19 110.92	40.48
32 31 19 00-0073 EA 8' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,381.80 300.49 352.03 93.22 124.29	46.23
32 31 19 00-0074 EA 9' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,529.34 332.38 388.48 102.98 137.31	52.09
32 31 19 00-0075 EA 10' Wide x 4' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,669.73 362.67 422.79 112.21 149.61	57.84
32 31 19 00-0076 EA 6' Wide x 4' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,680.06 367.03 438.09 115.02 153.36	48.84
32 31 19 00-0077 EA 7' Wide x 4' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,817.44 397.53 476.86 124.91 166.55	50.57
32 31 19 00-0078 EA 8' Wide x 4' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,960.25 428.85 514.82 134.81 179.75	54.26
32 31 19 00-0079 EA 9' Wide x 4' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	2,072.67 453.74 546.11 142.83 190.45	55.99
32 31 19 00-0080 EA 10' Wide x 4' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	2,167.25 474.61 572.04 149.52 199.36	57.84
32 31 19 00-0081 EA 12' Wide x 4' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	2,460.54 537.99 644.40 168.91 225.22	69.35

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 31 19 00-0082	EA	14' Wide x 4' High Steel Tube Double Swing Gate		2,718.17	80.96
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		593.36	
		<i>For Aluminum With Satin Finish, Add</i>		706.06	
		<i>For Third Rail, Add</i>		185.63	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		247.51	
32 31 19 00-0083	EA	16' Wide x 4' High Steel Tube Double Swing Gate		2,941.92	92.46
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		641.10	
		<i>For Aluminum With Satin Finish, Add</i>		757.56	
		<i>For Third Rail, Add</i>		199.81	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		266.41	
32 31 19 00-0084	EA	18' Wide x 4' High Steel Tube Double Swing Gate		3,135.35	104.07
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		682.01	
		<i>For Aluminum With Satin Finish, Add</i>		799.96	
		<i>For Third Rail, Add</i>		211.71	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		282.28	
32 31 19 00-0085	EA	20' Wide x 4' High Steel Tube Double Swing Gate		3,300.25	115.69
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		716.51	
		<i>For Aluminum With Satin Finish, Add</i>		833.80	
		<i>For Third Rail, Add</i>		221.47	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		295.30	
32 31 19 00-0086		5' Fence Height Steel Tube Swing Gates, 2 Rail <small>(32 31 19 00-0045)</small>			
32 31 19 00-0087	EA	3' Wide x 5' High Steel Tube Single Swing Gate		914.07	25.28
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		199.97	
		<i>For Aluminum With Satin Finish, Add</i>		240.03	
		<i>For Third Rail, Add</i>		62.86	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		83.81	
32 31 19 00-0088	EA	3'-6" Wide x 5' High Steel Tube Single Swing Gate		964.08	27.14
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		210.81	
		<i>For Aluminum With Satin Finish, Add</i>		252.59	
		<i>For Third Rail, Add</i>		66.20	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		88.27	
32 31 19 00-0089	EA	4' Wide x 5' High Steel Tube Single Swing Gate		1,012.30	28.87
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		221.26	
		<i>For Aluminum With Satin Finish, Add</i>		264.62	
		<i>For Third Rail, Add</i>		69.41	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		92.55	
32 31 19 00-0090	EA	5' Wide x 5' High Steel Tube Single Swing Gate		1,081.93	30.71
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		236.52	
		<i>For Aluminum With Satin Finish, Add</i>		283.07	
		<i>For Third Rail, Add</i>		74.23	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		98.97	
32 31 19 00-0091	EA	6' Wide x 5' High Steel Tube Single Swing Gate		1,177.04	36.89
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		256.53	
		<i>For Aluminum With Satin Finish, Add</i>		303.30	
		<i>For Third Rail, Add</i>		79.98	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		106.64	
32 31 19 00-0092	EA	7' Wide x 5' High Steel Tube Single Swing Gate		1,302.49	42.97
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		283.37	
		<i>For Aluminum With Satin Finish, Add</i>		332.63	
		<i>For Third Rail, Add</i>		88.00	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		117.34	
32 31 19 00-0093	EA	8' Wide x 5' High Steel Tube Single Swing Gate		1,477.16	49.49
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		321.21	
		<i>For Aluminum With Satin Finish, Add</i>		376.24	
		<i>For Third Rail, Add</i>		99.64	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		132.85	
32 31 19 00-0094	EA	9' Wide x 5' High Steel Tube Single Swing Gate		1,647.18	55.67
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		358.08	
		<i>For Aluminum With Satin Finish, Add</i>		418.95	
		<i>For Third Rail, Add</i>		111.00	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		148.01	
32 31 19 00-0095	EA	10' Wide x 5' High Steel Tube Single Swing Gate		1,813.63	61.75
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>		394.15	
		<i>For Aluminum With Satin Finish, Add</i>		460.58	
		<i>For Third Rail, Add</i>		122.10	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>		162.81	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 31 19 00-0096	EA	6' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	1,797.98	42.65
		<i>For Solid Pickets, Add</i>	395.41	
		<i>For Aluminum With Satin Finish, Add</i>	484.60	
		<i>For Third Rail, Add</i>	125.72	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	167.62	
32 31 19 00-0097	EA	7' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	1,905.63	49.70
		<i>For Solid Pickets, Add</i>	418.11	
		<i>For Aluminum With Satin Finish, Add</i>	507.77	
		<i>For Third Rail, Add</i>	132.27	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	176.36	
32 31 19 00-0098	EA	8' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,014.50	57.19
		<i>For Solid Pickets, Add</i>	441.00	
		<i>For Aluminum With Satin Finish, Add</i>	530.76	
		<i>For Third Rail, Add</i>	138.82	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	185.10	
32 31 19 00-0099	EA	9' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,163.19	64.35
		<i>For Solid Pickets, Add</i>	472.93	
		<i>For Aluminum With Satin Finish, Add</i>	566.23	
		<i>For Third Rail, Add</i>	148.45	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	197.94	
32 31 19 00-0100	EA	10' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,294.04	71.41
		<i>For Solid Pickets, Add</i>	500.85	
		<i>For Aluminum With Satin Finish, Add</i>	596.35	
		<i>For Third Rail, Add</i>	156.74	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	208.99	
32 31 19 00-0101	EA	12' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,610.95	79.44
		<i>For Solid Pickets, Add</i>	570.45	
		<i>For Aluminum With Satin Finish, Add</i>	681.22	
		<i>For Third Rail, Add</i>	178.81	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	238.41	
32 31 19 00-0102	EA	14' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,896.37	88.12
		<i>For Solid Pickets, Add</i>	632.79	
		<i>For Aluminum With Satin Finish, Add</i>	755.57	
		<i>For Third Rail, Add</i>	198.34	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	264.45	
32 31 19 00-0103	EA	16' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,152.08	97.78
		<i>For Solid Pickets, Add</i>	688.27	
		<i>For Aluminum With Satin Finish, Add</i>	819.92	
		<i>For Third Rail, Add</i>	215.46	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	287.27	
32 31 19 00-0104	EA	18' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,382.83	108.63
		<i>For Solid Pickets, Add</i>	737.86	
		<i>For Aluminum With Satin Finish, Add</i>	875.18	
		<i>For Third Rail, Add</i>	230.43	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	307.25	
32 31 19 00-0105	EA	20' Wide x 5' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,588.63	120.78
		<i>For Solid Pickets, Add</i>	781.57	
		<i>For Aluminum With Satin Finish, Add</i>	921.34	
		<i>For Third Rail, Add</i>	243.27	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	324.36	
32 31 19 00-0106		6' Fence Height Steel Tube Swing Gates, 2 Rail (32 31 19 00-0045)		
32 31 19 00-0107	EA	3' Wide x 6' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	951.98	27.78
		<i>For Solid Pickets, Add</i>	207.93	
		<i>For Aluminum With Satin Finish, Add</i>	247.99	
		<i>For Third Rail, Add</i>	65.13	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	86.84	
32 31 19 00-0108	EA	3'-6" Wide x 6' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	1,000.90	29.30
		<i>For Solid Pickets, Add</i>	218.61	
		<i>For Aluminum With Satin Finish, Add</i>	260.72	
		<i>For Third Rail, Add</i>	68.48	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	91.30	
32 31 19 00-0109	EA	4' Wide x 6' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	1,050.60	30.93
		<i>For Solid Pickets, Add</i>	229.41	
		<i>For Aluminum With Satin Finish, Add</i>	273.32	
		<i>For Third Rail, Add</i>	71.82	
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	95.76	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 31 19 00-0110	EA	5' Wide x 6' High Steel Tube Single Swing Gate		1,111.62	32.88
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		242.71	
		For Aluminum With Satin Finish, Add		289.04	
		For Third Rail, Add		75.96	
		For 1" Square x 14 Gauge Pickets, Add		101.29	
32 31 19 00-0111	EA	6' Wide x 6' High Steel Tube Single Swing Gate		1,248.14	39.72
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		271.88	
		For Aluminum With Satin Finish, Add		320.73	
		For Third Rail, Add		84.66	
		For 1" Square x 14 Gauge Pickets, Add		112.88	
32 31 19 00-0112	EA	7' Wide x 6' High Steel Tube Single Swing Gate		1,393.57	46.66
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		303.05	
		For Aluminum With Satin Finish, Add		355.08	
		For Third Rail, Add		94.02	
		For 1" Square x 14 Gauge Pickets, Add		125.36	
32 31 19 00-0113	EA	8' Wide x 6' High Steel Tube Single Swing Gate		1,555.77	53.18
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		338.08	
		For Aluminum With Satin Finish, Add		394.95	
		For Third Rail, Add		104.72	
		For 1" Square x 14 Gauge Pickets, Add		139.63	
32 31 19 00-0114	EA	9' Wide x 6' High Steel Tube Single Swing Gate		1,711.92	60.02
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		371.67	
		For Aluminum With Satin Finish, Add		432.51	
		For Third Rail, Add		114.88	
		For 1" Square x 14 Gauge Pickets, Add		153.18	
32 31 19 00-0115	EA	10' Wide x 6' High Steel Tube Single Swing Gate		1,901.93	66.85
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		412.88	
		For Aluminum With Satin Finish, Add		480.24	
		For Third Rail, Add		127.59	
		For 1" Square x 14 Gauge Pickets, Add		170.12	
32 31 19 00-0116	EA	6' Wide x 6' High Steel Tube Double Swing Gate		1,868.15	46.01
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		410.49	
		For Aluminum With Satin Finish, Add		501.36	
		For Third Rail, Add		130.26	
		For 1" Square x 14 Gauge Pickets, Add		173.68	
32 31 19 00-0117	EA	7' Wide x 6' High Steel Tube Double Swing Gate		1,980.00	53.94
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		433.95	
		For Aluminum With Satin Finish, Add		524.70	
		For Third Rail, Add		136.95	
		For 1" Square x 14 Gauge Pickets, Add		182.60	
32 31 19 00-0118	EA	8' Wide x 6' High Steel Tube Double Swing Gate		2,090.64	61.42
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		457.23	
		For Aluminum With Satin Finish, Add		548.23	
		For Third Rail, Add		143.64	
		For 1" Square x 14 Gauge Pickets, Add		191.52	
32 31 19 00-0119	EA	9' Wide x 6' High Steel Tube Double Swing Gate		2,223.89	69.35
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		485.51	
		For Aluminum With Satin Finish, Add		577.99	
		For Third Rail, Add		151.93	
		For 1" Square x 14 Gauge Pickets, Add		202.57	
32 31 19 00-0120	EA	10' Wide x 6' High Steel Tube Double Swing Gate		2,432.01	77.27
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		530.64	
		For Aluminum With Satin Finish, Add		630.23	
		For Third Rail, Add		165.84	
		For 1" Square x 14 Gauge Pickets, Add		221.12	
32 31 19 00-0121	EA	12' Wide x 6' High Steel Tube Double Swing Gate		2,851.17	86.06
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		623.07	
		For Aluminum With Satin Finish, Add		744.69	
		For Third Rail, Add		195.39	
		For 1" Square x 14 Gauge Pickets, Add		260.53	
32 31 19 00-0122	EA	14' Wide x 6' High Steel Tube Double Swing Gate		2,986.81	96.15
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		651.44	
		For Aluminum With Satin Finish, Add		772.49	
		For Third Rail, Add		203.42	
		For 1" Square x 14 Gauge Pickets, Add		271.23	
32 31 19 00-0123	EA	16' Wide x 6' High Steel Tube Double Swing Gate		3,279.98	107.00
		Note: Includes mounting hardware and associated trim.			
		For Solid Pickets, Add		715.08	
		For Aluminum With Satin Finish, Add		846.47	
		For Third Rail, Add		223.08	
		For 1" Square x 14 Gauge Pickets, Add		297.44	



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 19 00-0124	EA		18' Wide x 6' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	3,549.98 773.23 911.90 240.73 320.98	119.05
32 31 19 00-0125	EA		20' Wide x 6' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	3,801.57 826.88 969.65 256.65 342.20	132.83
32 31 19 00-0126			7' Fence Height Steel Tube Swing Gates, 2 Rail (32 31 19 00-0045)		
32 31 19 00-0127	EA		3' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,008.74 220.19 261.95 68.88 91.84	30.06
32 31 19 00-0128	EA		3'-6" Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,059.89 231.34 275.14 72.35 96.47	31.69
32 31 19 00-0129	EA		4' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,111.24 242.52 288.30 75.83 101.11	33.32
32 31 19 00-0130	EA		5' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,162.71 253.71 301.44 79.31 105.74	35.05
32 31 19 00-0131	EA		6' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,345.99 293.24 346.17 91.34 121.79	42.65
32 31 19 00-0132	EA		7' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,513.90 329.40 386.78 102.31 136.42	49.92
32 31 19 00-0133	EA		8' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,636.56 355.28 413.32 109.80 146.40	57.41
32 31 19 00-0134	EA		9' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,775.95 385.02 445.37 118.63 158.17	64.68
32 31 19 00-0135	EA		10' Wide x 7' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,946.74 421.74 486.35 129.73 172.97	72.28
32 31 19 00-0136	EA		6' Wide x 7' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	1,977.57 434.39 529.88 137.75 183.67	49.27
32 31 19 00-0137	EA		7' Wide x 7' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim. <i>For Solid Pickets, Add</i> <i>For Aluminum With Satin Finish, Add</i> <i>For Third Rail, Add</i> <i>For 1" Square x 14 Gauge Pickets, Add</i>	2,094.16 458.83 554.12 144.71 192.94	57.62

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 31 19 00-0138	EA	8' Wide x 7' High Steel Tube Double Swing Gate	2,211.96		66.42
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	483.46		
		<i>For Aluminum With Satin Finish, Add</i>	578.17		
		<i>For Third Rail, Add</i>	151.66		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	202.22		
32 31 19 00-0139	EA	9' Wide x 7' High Steel Tube Double Swing Gate	2,330.34		74.77
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	508.30		
		<i>For Aluminum With Satin Finish, Add</i>	602.95		
		<i>For Third Rail, Add</i>	158.75		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	211.67		
32 31 19 00-0140	EA	10' Wide x 7' High Steel Tube Double Swing Gate	2,624.67		83.56
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	572.64		
		<i>For Aluminum With Satin Finish, Add</i>	679.96		
		<i>For Third Rail, Add</i>	178.94		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	238.59		
32 31 19 00-0141	EA	12' Wide x 7' High Steel Tube Double Swing Gate	3,171.04		93.22
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	693.52		
		<i>For Aluminum With Satin Finish, Add</i>	831.52		
		<i>For Third Rail, Add</i>	217.86		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	290.48		
32 31 19 00-0142	EA	14' Wide x 7' High Steel Tube Double Swing Gate	3,139.08		104.51
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	683.91		
		<i>For Aluminum With Satin Finish, Add</i>	807.43		
		<i>For Third Rail, Add</i>	213.05		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	284.06		
32 31 19 00-0143	EA	16' Wide x 7' High Steel Tube Double Swing Gate	3,401.94		116.56
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	740.46		
		<i>For Aluminum With Satin Finish, Add</i>	870.71		
		<i>For Third Rail, Add</i>	230.17		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	306.89		
32 31 19 00-0144	EA	18' Wide x 7' High Steel Tube Double Swing Gate	3,715.95		130.34
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	808.16		
		<i>For Aluminum With Satin Finish, Add</i>	947.18		
		<i>For Third Rail, Add</i>	250.76		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	334.35		
32 31 19 00-0145	EA	20' Wide x 7' High Steel Tube Double Swing Gate	3,924.76		145.42
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	851.91		
		<i>For Aluminum With Satin Finish, Add</i>	990.49		
		<i>For Third Rail, Add</i>	263.20		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	350.93		
32 31 19 00-0146		8' Fence Height Steel Tube Swing Gates, 2 Rail <small>(32 31 19 00-0045)</small>			
32 31 19 00-0147	EA	3' Wide x 8' High Steel Tube Single Swing Gate	1,096.26		32.56
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	239.33		
		<i>For Aluminum With Satin Finish, Add</i>	284.93		
		<i>For Third Rail, Add</i>	74.89		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	99.86		
32 31 19 00-0148	EA	3'-6" Wide x 8' High Steel Tube Single Swing Gate	1,149.84		34.29
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	250.98		
		<i>For Aluminum With Satin Finish, Add</i>	298.56		
		<i>For Third Rail, Add</i>	78.51		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	104.67		
32 31 19 00-0149	EA	4' Wide x 8' High Steel Tube Single Swing Gate	1,206.97		36.13
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	263.43		
		<i>For Aluminum With Satin Finish, Add</i>	313.26		
		<i>For Third Rail, Add</i>	82.38		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	109.85		
32 31 19 00-0150	EA	5' Wide x 8' High Steel Tube Single Swing Gate	1,258.69		40.26
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	274.13		
		<i>For Aluminum With Satin Finish, Add</i>	323.15		
		<i>For Third Rail, Add</i>	85.33		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	113.77		
32 31 19 00-0151	EA	6' Wide x 8' High Steel Tube Single Swing Gate	1,488.40		45.58
		Note: Includes mounting hardware and associated trim.			
		<i>For Solid Pickets, Add</i>	324.64		
		<i>For Aluminum With Satin Finish, Add</i>	384.99		
		<i>For Third Rail, Add</i>	101.38		
		<i>For 1" Square x 14 Gauge Pickets, Add</i>	135.17		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 31 19 00-0152 EA 7' Wide x 8' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	1,657.49	54.91
<i>For Solid Pickets, Add</i>	360.56	
<i>For Aluminum With Satin Finish, Add</i>	423.02	
<i>For Third Rail, Add</i>	111.94	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	149.25	
32 31 19 00-0153 EA 8' Wide x 8' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	1,732.77	63.92
<i>For Solid Pickets, Add</i>	375.47	
<i>For Aluminum With Satin Finish, Add</i>	433.39	
<i>For Third Rail, Add</i>	115.55	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	154.07	
32 31 19 00-0154 EA 9' Wide x 8' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	1,859.07	73.36
<i>For Solid Pickets, Add</i>	401.77	
<i>For Aluminum With Satin Finish, Add</i>	458.58	
<i>For Third Rail, Add</i>	122.91	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	163.88	
32 31 19 00-0155 EA 10' Wide x 8' High Steel Tube Single Swing Gate Note: Includes mounting hardware and associated trim.	1,969.29	82.80
<i>For Solid Pickets, Add</i>	424.45	
<i>For Aluminum With Satin Finish, Add</i>	478.96	
<i>For Third Rail, Add</i>	129.06	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	172.08	
32 31 19 00-0156 EA 6' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,149.38	52.63
<i>For Solid Pickets, Add</i>	472.33	
<i>For Aluminum With Satin Finish, Add</i>	577.13	
<i>For Third Rail, Add</i>	149.92	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	199.90	
32 31 19 00-0157 EA 7' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,280.28	63.48
<i>For Solid Pickets, Add</i>	499.45	
<i>For Aluminum With Satin Finish, Add</i>	602.43	
<i>For Third Rail, Add</i>	157.41	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	209.88	
32 31 19 00-0158 EA 8' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,408.20	73.91
<i>For Solid Pickets, Add</i>	526.00	
<i>For Aluminum With Satin Finish, Add</i>	627.38	
<i>For Third Rail, Add</i>	164.77	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	219.69	
32 31 19 00-0159 EA 9' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,515.91	84.86
<i>For Solid Pickets, Add</i>	547.91	
<i>For Aluminum With Satin Finish, Add</i>	645.72	
<i>For Third Rail, Add</i>	170.52	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	227.36	
32 31 19 00-0160 EA 10' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	2,923.21	95.71
<i>For Solid Pickets, Add</i>	637.22	
<i>For Aluminum With Satin Finish, Add</i>	753.95	
<i>For Third Rail, Add</i>	198.74	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	264.98	
32 31 19 00-0161 EA 12' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,640.78	107.76
<i>For Solid Pickets, Add</i>	796.08	
<i>For Aluminum With Satin Finish, Add</i>	953.64	
<i>For Third Rail, Add</i>	249.96	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	333.28	
32 31 19 00-0162 EA 14' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,334.24	121.54
<i>For Solid Pickets, Add</i>	724.15	
<i>For Aluminum With Satin Finish, Add</i>	843.95	
<i>For Third Rail, Add</i>	224.01	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	298.69	
32 31 19 00-0163 EA 16' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,572.19	137.50
<i>For Solid Pickets, Add</i>	774.29	
<i>For Aluminum With Satin Finish, Add</i>	894.92	
<i>For Third Rail, Add</i>	238.46	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	317.95	
32 31 19 00-0164 EA 18' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	3,937.95	154.97
<i>For Solid Pickets, Add</i>	852.82	
<i>For Aluminum With Satin Finish, Add</i>	982.09	
<i>For Third Rail, Add</i>	262.13	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	349.51	
32 31 19 00-0165 EA 20' Wide x 8' High Steel Tube Double Swing Gate Note: Includes mounting hardware and associated trim.	4,022.59	174.62
<i>For Solid Pickets, Add</i>	867.66	
<i>For Aluminum With Satin Finish, Add</i>	982.23	
<i>For Third Rail, Add</i>	264.27	
<i>For 1" Square x 14 Gauge Pickets, Add</i>	352.36	

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 19 00-0166	Replace Steel Tube Fence Pickets (32 31 19 00-0032)		
32 31 19 00-0167	LF Removal And Replacement Of 3/4" Square x 16 Gauge Steel Tube Fence Picket For 1" Square x 14 Gauge Pickets, Add	30.86	0.92
32 31 19 00-0168	Removal And Reinstallation Of Ornamental Fences (32 31 19)		
	Note: Including storage and cleaning. Excludes augering and concrete.		
32 31 19 00-0169	LF Removal And Reinstallation Of Ornamental Fence Up To 5' Height	48.84	
32 31 19 00-0170	LF Removal And Reinstallation Of Ornamental Fence, 6' Height	53.71	
32 31 19 00-0171	LF Removal And Reinstallation Of Ornamental Fence, 7' Height	58.60	
32 31 19 00-0172	LF Removal And Reinstallation Of Ornamental Fence, 8' Height	63.48	
32 31 19 00-0173	LF Removal And Reinstallation Of Ornamental Fence, 9' Height	68.37	
32 31 19 00-0174	LF Removal And Reinstallation Of Ornamental Fence, 10' Height	73.25	
32 31 19 00-0175	LF Removal And Reinstallation Of Ornamental Fence 12' Height	81.40	
32 31 19 00-0176	Hot Dipped Galvanized Steel Tube Fence (32 31 19)		
32 31 19 00-0177	Hot Dipped Galvanized Steel Tube Fence, 4 Rail (32 31 19 00-0176)		
32 31 19 00-0178	LF 8' Hot Dip Galvanized Steel Tube Security Fence Assembly Note: Includes four 2" x 2" x 1/8" thick hot dip galvanized horizontal rails, 3/4" square x 11 gauge hot dip galvanized pickets at 4" o.c. max. with curve at top and with anti-climb end, 3" square x 1/8" thick hot dip galvanized steel tube posts at 8' o.c. max with welded cap and closed exposed end, 12" diameter x 48" deep concrete footing at posts.	234.11	50.30
32 31 19 00-0179	Hot Dipped Galvanized Steel Tube Double Gate Assembly (32 31 19 00-0176)		
32 31 19 00-0180	EA 8' Wide x 7' High Double Gate, Hot Dip Galvanized Steel With Hot Dip Galvanized Steel Header Beam Note: Includes two (2) 4'-0" x 7'-0" gates, hot dip galvanized frame and pickets with three (3) minimum heavy duty hinges per leaf; 2" x 4" x 3/16" hot dip galvanized steel header beam, gate frame: 2" x 2" x 3/16" hot dip galvanized steel tube, welded at mitered corners; 3/4" square X 11 gauge hot dip galvanized pickets at 4" on centers; 2" x 2" x 3/16" thick hot dip galvanized horizontal rails; 4" x 4" x 3/16" hot dip galvanized steel post, weld cap (1/8" thick) and close exposed end, 12" diameter x 48" deep concrete footing at posts; 1/8" thick hot dip galvanized steel plate; cane bolt and hasp, typical both gate leaf; flush 16" diameter X 18" deep concrete footing; high security lockset.	1,517.73	275.22
32 31 26	Wire Fences and Gates (32 31)		
32 31 26 13	Wire Fences with Steel Posts (32 31 26)		
32 31 26 13-0001	Chicken Wire (32 31 26 13)		
	Note: Posts at 4'.		
32 31 26 13-0002	LF 4' High, 1" Mesh, Chicken Wire Fence, Metal Posts At 4'	9.12	1.96
32 31 26 13-0003	LF 6' High, 2" Mesh, Chicken Wire Fence, Metal Posts At 4'	9.98	1.96
32 31 26 13-0004	Wire And Screen (32 31 26 13)		
32 31 26 13-0005	Wire And Screen For Partitions And Fences (32 31 26 13-0004)		
	Note: Excludes framing and post.		
32 31 26 13-0006	Screen Wire (32 31 26 13-0005)		
32 31 26 13-0007	LF Screen Wire, 48" Wide Rolls	13.38	1.10
32 31 26 13-0008	Hog Wire (32 31 26 13-0005)		
32 31 26 13-0009	SF 4" x 4" Hog Wire For Fencing	2.30	0.87
32 31 26 13-0010	SF 6" x 6" Hog Wire For Fencing	2.40	0.99
32 31 26 13-0011	Non-Climb Horse Fence (32 31 26 13-0005)		
32 31 26 13-0012	LF 4' Non-Climb Woven, 12.5 Gauge, Horse Fence	10.40	3.50
32 31 26 13-0013	LF 5' Non-Climb Woven, 12.5 Gauge, Horse Fence	13.38	4.37
32 31 26 13-0014	LF 6' Non-Climb Woven, 12.5 Gauge, Horse Fence	16.86	5.25
32 31 26 13-0015	Screen For Partitions And Ceilings (32 31 26 13-0004)		
	Note: Can be used to support insulation on walls and ceilings.		
32 31 26 13-0016	SF 1" Mesh Chicken Wire	2.34	0.62
32 31 26 13-0017	Wicket Fence (32 31 26 13)		
32 31 26 13-0018	LF Steel Wicket Fence, Painted	90.27	5.39
32 31 29	Wood Fences and Gates (32 31)		
	See CSI section 32 31 13 13-0001 for drilling for augering holes and backfill.		
32 31 29 00-0001	Basket Weave (32 31 29)		
	Note: 3/8" x 4" boards, 4" x 4" post		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 31 29 00-0002 LF 6' High #1 Cedar Basket Weave Fence 3/8" x 4" Boards, 4" x 4" Post.....	45.44	3.90
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.68	
32 31 29 00-0003 LF 6' High, Pressure Treated Pine Basket Weave 3/8" x 4" Boards, 4" x 4" Post.....	30.38	3.90
<i>For Fastening With Screws Instead Of Nails, Add</i>	1.95	
32 31 29 00-0004 Board Fence <small>(32 31 29)</small>		
Note: 1x4" board, 2x4" rail, 4x4" post.		
32 31 29 00-0005 LF Two 2" x 4" Rails, 3' High 1" x 4" Boards, Preservative Treated Board Fence	29.78	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.17	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	3.95	
<i>For Fastening With Screws Instead Of Nails, Add</i>	1.94	
32 31 29 00-0006 LF Two 2" x 4" Rails, 4' High 1" x 4" Boards, Preservative Treated Board Fence	33.10	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.45	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.28	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.14	
32 31 29 00-0007 LF Three 2" x 4" Rails, 5' High 1" x 4" Boards, Preservative Treated Board Fence	36.89	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.68	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.52	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.35	
32 31 29 00-0008 LF Three 2" x 4" Rails, 6' High 1" x 4" Boards, Preservative Treated Board Fence	39.36	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.87	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.73	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.49	
32 31 29 00-0009 LF Three 2" x 4" Rails, 8' High 1" x 4" Boards, Preservative Treated Board Fence	42.03	3.90
<i>For 1" x 6" Boards, Deduct</i>	-4.06	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.94	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.64	
32 31 29 00-0010 LF Two 2" x 4" Rails, 3' High 1" x 4" #2 Grade Western Cedar Board Fence	31.77	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.25	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.01	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.04	
32 31 29 00-0011 LF Two 2" x 4" Rails, 4' High 1" x 4" #2 Grade Western Cedar Board Fence	34.63	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.51	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.32	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.21	
32 31 29 00-0012 LF Three 2" x 4" Rails, 5' High 1" x 4" #2 Grade Western Cedar Board Fence	36.89	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.68	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.52	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.35	
32 31 29 00-0013 LF Three 2" x 4" Rails, 6' High 1" x 4" #2 Grade Western Cedar Board Fence	39.36	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.87	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.73	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.49	
32 31 29 00-0014 LF Three 2" x 4" Rails, 8' High 1" x 4" #2 Grade Western Cedar Board Fence	42.03	3.90
<i>For 1" x 6" Boards, Deduct</i>	-4.06	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.94	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.64	
32 31 29 00-0015 LF Two 2" x 4" Rails, 3' High 1" x 4" #1 Grade Cedar Board Fence	31.77	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.25	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.01	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.04	
32 31 29 00-0016 LF Two 2" x 4" Rails, 4' High 1" x 4" #1 Grade Cedar Board Fence	41.42	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.78	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.53	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.55	
32 31 29 00-0017 LF Three 2" x 4" Rails, 5' High 1" x 4" #1 Grade Cedar Board Fence	43.40	3.90
<i>For 1" x 6" Boards, Deduct</i>	-3.94	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.71	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.67	
32 31 29 00-0018 LF Three 2" x 4" Rails, 6' High 1" x 4" #1 Grade Cedar Board Fence	46.64	3.90
<i>For 1" x 6" Boards, Deduct</i>	-4.16	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	4.95	
<i>For Fastening With Screws Instead Of Nails, Add</i>	2.85	
32 31 29 00-0019 LF Three 2" x 4" Rails, 8' High 1" x 4" #1 Grade Cedar Board Fence	50.15	3.90
<i>For 1" x 6" Boards, Deduct</i>	-4.39	
<i>For 1" x 3" Boards (Stockade Top), Add</i>	5.19	
<i>For Fastening With Screws Instead Of Nails, Add</i>	3.05	
32 31 29 00-0020 Shadow Box <small>(32 31 29)</small>		
Note: 1x6" board, 2x4" Rail, 4x4" post.		
32 31 29 00-0021 LF Shadow Box, 3 - 2" x 4" Rails, 6' High 1" x 6" Pressure Treated Pine	62.73	3.90
<i>For Fastening With Screws Instead Of Nails, Add</i>	3.54	
32 31 29 00-0022 LF Shadow Box, 3 - 2" x 4" Rails, 4' High 1" x 4" #1 Cedar	78.75	3.90
<i>For Fastening With Screws Instead Of Nails, Add</i>	4.42	
32 31 29 00-0023 LF Shadow Box, 3 - 2" x 4" Rails, 6' High 1" x 4" #1 Cedar	85.76	3.90
<i>For Fastening With Screws Instead Of Nails, Add</i>	4.79	
32 31 29 00-0024 LF Shadow Box, 3 - 2" x 4" Rails, 8' High 1" x 4" #1 Cedar	92.14	3.90
<i>For Fastening With Screws Instead Of Nails, Add</i>	5.14	
32 31 29 00-0025 Open Rail Fence <small>(32 31 29)</small>		
32 31 29 00-0026 Post And Rail Fence, Ranch Style <small>(32 31 29 00-0025)</small>		

32 Exterior Improvements**32 30 Site Improvements****32 31 Fences and Gates**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 31 29 00-0027	LF	Post And Rail Fence, 2 Rails, 3' High #1 Cedar.....	29.71	3.90
32 31 29 00-0028	LF	Post And Rail Fence, 2 Rails, 3' High #2 Cedar.....	23.40	3.90
32 31 29 00-0029	LF	Post And Rail Fence, 3 Rails, 4' High #1 Cedar.....	35.10	3.90
32 31 29 00-0030	LF	Post And Rail Fence, 3 Rails, 4' High #2 Cedar.....	25.26	3.90
32 31 29 00-0031		Split Rail Fence (32 31 29 00-0025)		
32 31 29 00-0032	LF	Split Rail Fence, 2 Rails, 3' High #1 Cedar.....	28.09	3.90
32 31 29 00-0033	LF	Split Rail Fence, 2 Rails, 3' High #2 Cedar.....	23.33	3.90
32 31 29 00-0034	LF	Split Rail Fence, 3 Rail, 4' High #1 Cedar.....	32.00	3.90
32 31 29 00-0035	LF	Split Rail Fence, 3 Rail, 4' High #2 Cedar.....	26.18	3.90
32 31 29 00-0036		Picket Fence (32 31 29)		
32 31 29 00-0037	LF	Picket Fence, 2 Rail, 3' High, Pressure Treated.....	33.96	3.90
		<i>For Fastening With Screws Instead Of Nails, Add</i>	2.16	
32 31 29 00-0038	LF	Picket Fence, 2 Rail, 3' High #1 Cedar.....	31.79	3.90
		<i>For Fastening With Screws Instead Of Nails, Add</i>	2.06	
32 31 29 00-0039		Wood Fence Post Accessories (32 31 29)		
32 31 29 00-0040	EA	3-1/2" x 3-1/2" Copper, Pyramid Slip Over, Wood Fence Post Cap.....	47.75	
32 31 29 00-0041	EA	4" x 4" Copper, Pyramid Slip Over, Wood Fence Post Cap.....	53.39	
32 31 29 00-0042	EA	6" x 6" Copper, Pyramid Slip Over, Wood Fence Post Cap.....	58.18	
32 31 29 00-0043	EA	8" x 8" Copper, Pyramid Slip Over, Wood Fence Post Cap.....	85.54	
32 31 29 00-0044		Wood Gate (32 31 29)		
32 31 29 00-0045		Board Fence Gates, Pressure Treated Wood (32 31 29 00-0044)		
		Note: Includes galvanized extra duty hinges (1-1/2 butts per leaf), a galvanized latch and extra heavy-duty wheels per leaf, based on 2x4 frame, 1x4 cover, galvanized nails and hinges (treated lumber).		
32 31 29 00-0046	EA	3' To 5' High x 3' Wide, Pressure Treated Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	445.73	136.73
32 31 29 00-0047	EA	3' To 5' High x 3'-6" Wide, Pressure Treated Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	493.15	144.93
32 31 29 00-0048	EA	3' To 5' High x 4' Wide, Pressure Treated Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	551.51	158.61
32 31 29 00-0049	EA	3' To 5' High x 5' Wide, Pressure Treated Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	626.49	166.81
32 31 29 00-0050	EA	3' To 5' High x 6' Wide, Pressure Treated Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	701.46	175.02
32 31 29 00-0051	EA	>5' To 8' High x 3' Wide, Pressure Treated Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	567.69	180.48
32 31 29 00-0052	EA	>5' To 8' High x 3'-6" Wide, Pressure Treated Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	618.56	186.88
32 31 29 00-0053	EA	>5' To 8' High x 4' Wide, Pressure Treated Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	669.42	198.69
32 31 29 00-0054	EA	>5' To 8' High x 5' Wide, Pressure Treated Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	754.74	205.09
32 31 29 00-0055	EA	>5' To 8' High x 6' Wide, Pressure Treated Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	822.82	213.30
32 31 29 00-0056		Board Fence Gates, Grade 2 Cedar (32 31 29 00-0044)		
		Note: Includes galvanized extra duty hinges (1-1/2 butts per leaf), a galvanized latch and extra heavy-duty wheels per leaf, based on 2x4 frame, 1x4 cover, galvanized nails and hinges (cedar lumber)		
32 31 29 00-0057	EA	3' To 5' High x 3' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	709.19	122.03
32 31 29 00-0058	EA	3' To 5' High x 3'-6" Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	734.18	129.36
32 31 29 00-0059	EA	3' To 5' High x 4' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	772.37	141.55
32 31 29 00-0060	EA	3' To 5' High x 5' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	814.57	148.88
32 31 29 00-0061	EA	3' To 5' High x 6' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	867.11	156.21
32 31 29 00-0062	EA	>5' To 8' High x 3' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	838.98	161.08
32 31 29 00-0063	EA	>5' To 8' High x 3'-6" Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	870.85	168.40
32 31 29 00-0064	EA	>5' To 8' High x 4' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	919.94	175.73
32 31 29 00-0065	EA	>5' To 8' High x 5' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	969.04	183.04
32 31 29 00-0066	EA	>5' To 8' High x 6' Wide, #2 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	1,018.14	190.37
32 31 29 00-0067		Board Fence Gates, Grade 1 Cedar (32 31 29 00-0044)		
		Note: Includes galvanized extra duty hinges (1-1/2 butts per leaf), a galvanized latch and extra heavy-duty wheels per leaf, based on 2x4 frame, 1x4 cover, galvanized nails and hinges (cedar lumber)		
32 31 29 00-0068	EA	3' To 5' High x 3' Wide, #1 Cedar Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	760.87	122.03
32 31 29 00-0069	EA	3' To 5' High x 3'-6" Wide, #1 Cedar Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	792.75	129.36
32 31 29 00-0070	EA	3' To 5' High x 4' Wide, #1 Cedar Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	834.38	141.55
32 31 29 00-0071	EA	3' To 5' High x 5' Wide, #1 Cedar Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	883.48	148.88
32 31 29 00-0072	EA	3' To 5' High x 6' Wide, #1 Cedar Board Gate, 2 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	932.57	156.21
32 31 29 00-0073	EA	>5' To 8' High x 3' Wide, #1 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	907.89	161.08
32 31 29 00-0074	EA	>5' To 8' High x 3'-6" Wide, #1 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	939.75	168.40
32 31 29 00-0075	EA	>5' To 8' High x 4' Wide, #1 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	988.85	175.73
32 31 29 00-0076	EA	>5' To 8' High x 5' Wide, #1 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	1,037.95	183.04
32 31 29 00-0077	EA	>5' To 8' High x 6' Wide, #1 Cedar Board Gate, 3 - 2" x 4" Rails With 1" x 4" Board, Post And Hardware.....	1,104.27	190.37
32 31 29 00-0078		Pressure Treated Wood Fence Posts (32 31 29)		
		See CSI section 32 31 13 13-0001 for drilling augering, 32 31 56 00-0017 for barbed wire.		
32 31 29 00-0079	EA	4' High, Pressure Treated Wood Fence Posts, Set In Soil, Earth Fill.....	42.40	13.68
32 31 29 00-0080	EA	6' High, Pressure Treated Wood Fence Posts, Set In Soil, Earth Fill.....	47.84	13.68
32 31 29 00-0081	EA	4' High, Pressure Treated Wood Fence Posts, Set In Concrete.....	74.55	26.26
32 31 29 00-0082	EA	6' High, Pressure Treated Wood Fence Posts, Set In Concrete.....	80.75	26.26



Exterior Improvements	32	32
Site Improvements	32 30	
Fences and Gates	32 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 31 56 Wild Life Deterrent Fence (32 31)

32 31 56 00-0001	Barbed Wire Fences (32 31 56)		
Note: Excludes post holes and fill See CSI section 32 31 13 13-0001 for drilling for augering holes and backfill.			
32 31 56 00-0002	Fence Posts (32 31 56 00-0001)		
32 31 56 00-0003	Fence Post Soil, Set In Concrete (32 31 56 00-0002)		
32 31 56 00-0004	EA Barbed Wire Fence Post, Galvanized Set In Concrete In Soil <i>For Bracing On Corner Post, End Post And Pull Post, Add</i>	105.63 170.25	
32 31 56 00-0005	EA Barbed Wire Fence Post, Vinyl Coated Set In Concrete In Soil <i>For Bracing On Corner Post, End Post And Pull Post, Add</i>	141.77 230.61	8.68
32 31 56 00-0006	Post In Rock (32 31 56 00-0002)		
32 31 56 00-0007	EA Barbed Wire Fence Post, Galvanized Grouted In Rock <i>For Bracing On Corner Post, End Post And Pull Post, Add</i>	103.72 167.39	8.68
32 31 56 00-0008	EA Barbed Wire Fence Post, Vinyl Coated Grouted In Rock <i>For Bracing On Corner Post, End Post And Pull Post, Add</i>	139.86 227.74	8.68
32 31 56 00-0009	Studded Steel T-Posts, Enamel Paint Finish (32 31 56 00-0001)		
Note: Posts for barb wire, chain link or welded wire mesh.			
32 31 56 00-0010	EA 5' Studded Steel T-Post, Driven Into Earth	28.25	
32 31 56 00-0011	EA 5'-6" Studded Steel T-Post, Driven Into Earth	28.93	
32 31 56 00-0012	EA 6' Studded Steel T-Post, Driven Into Earth	30.23	
32 31 56 00-0013	EA 6'-6" Studded Steel T-Post, Driven Into Earth	31.52	
32 31 56 00-0014	EA 7' Studded Steel T-Post, Driven Into Earth	33.23	
32 31 56 00-0015	EA 8' Studded Steel T-Post, Driven Into Earth	37.38	
32 31 56 00-0016	EA 10' Studded Steel T-Post, Driven Into Earth	45.40	
32 31 56 00-0017	Barbed Wire (32 31 56 00-0001)		
Note: Per strand.			
32 31 56 00-0018	LF Galvanized Barbed Wire For Wild Life Deterrent Fencing, Per Strand	0.96	0.44
32 31 56 00-0019	LF Vinyl Coated Barbed Wire, For Wild Life Deterrent Fencing, Per Strand	1.10	0.44
32 31 56 00-0020	Barbed Wire Fence, Farm Style, With Wood Posts (32 31 56 00-0001)		
Note: Based on post at 10' centers, two corner post and two pull post per 300 lf.			
32 31 56 00-0021	LF 4'-6" Height, Three (3) Strand Barbed Wire Fence With Wood Posts	12.89	2.82
Note: Posts at 10' maximum.			

32 32 Retaining Walls (32 30)

32 32 13 Cast-In-Place Concrete Retaining Wall (32 32)

Note: System includes all necessary forms (4 uses), 3000 PSI concrete with an 8" chute, all necessary reinforcing steel, and underdrain. Exposed concrete is patched and rubbed. Excludes initial site grading, subbase preparation or finish grading.

32 32 13 00-0001	Concrete Retaining Walls (32 32 13)		
Note: System elements include all necessary forms (4 uses), 3000 PSI concrete with an 8" chute, all necessary reinforcing steel, and underdrain. Exposed concrete is patched and rubbed. Excludes initial site grading, subbase preparation or finish grading.			
32 32 13 00-0002	LF 4' High With Base, 10" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	391.13 9.07	142.25
32 32 13 00-0003	LF 6' High With Base, 10" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	487.98 11.71	175.05
32 32 13 00-0004	LF 8' High With Base, 10" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	531.60 13.09	188.81
32 32 13 00-0005	LF 10' High With Base, 13" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	677.43 17.90	233.45
32 32 13 00-0006	LF 12' High With Base, 14" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	780.76 20.77	268.15
32 32 13 00-0007	LF 16' High With Base, 16" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	1,129.31 29.12	393.39
32 32 13 00-0008	LF 20' High With Base, 18" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	1,550.20 39.43	543.09
32 32 13 00-0009	LF 4' High With Base, 12" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	429.83 10.13	155.35
32 32 13 00-0010	LF 6' High With Base, 12" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	526.24 12.92	187.18
32 32 13 00-0011	LF 8' High With Base, 12" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	557.32 14.17	195.31
32 32 13 00-0012	LF 10' High With Base, 16" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	766.92 20.68	261.75
32 32 13 00-0013	LF 12' High With Base, 18" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	972.28 25.49	336.23
32 32 13 00-0014	LF 16' High With Base, 21" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	1,457.75 37.28	509.64
32 32 13 00-0015	LF 20' High With Base, 24" Thick, Reinforced, Cast-In-Place Concrete Retaining Wall <i>For >3:1 Sloped Soil At Top, Add</i>	2,057.31 52.58	719.39

32 Exterior Improvements**32 30 Site Improvements****32 32 Retaining Walls**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**32 32 16 Precast Concrete Retaining Walls (32 32)**

32 32 16 00-0001	Precast Retaining Walls (32 32 16)		
	Note: Tied-back earth walls. Includes precast filter fabric, soil reinforcing mesh and cast-in-place coping. Excludes concrete leveling pad, or select earth excavation and backfill.		
32 32 16 00-0002	SF 10-15' High, Tied-back, Precast Concrete Retaining Walls	97.41	14.15
32 32 16 00-0003	SF 16-20' High, Tied-back, Precast Concrete Retaining Walls	100.05	11.37
32 32 16 00-0004	SF 21-25' High, Tied-back, Precast Concrete Retaining Walls	103.76	9.47
32 32 16 00-0005	SF 26-30' High, Tied-back, Precast Concrete Retaining Walls	112.20	9.47
32 32 16 00-0006	SF >30' High, Tied-back, Precast Concrete Retaining Walls.....	118.69	8.08

32 32 23 Segmental Retaining Walls (32 32)**32 32 23 13 Segmental Concrete Unit Masonry Retaining Walls (32 32 23)**

32 32 23 13-0001	Modular Retaining Wall Systems (32 32 23 13)		
	Note: Includes installation, material and manufacturer's wall design. Includes stone wall, cap stones, #57 stone backing, Geo-Grid (2/3 height of wall), miradrain and fill with earth, and compaction. Includes cap at top, pins, and installation. Excludes initial site grading, subbase preparation or finish grading.		
32 32 23 13-0002	"Amastone" Type Modular Retaining Wall Systems (32 32 23 13-0001)		
32 32 23 13-0003	SF Up To 4' Height "Amastone" Type Modular Retaining Wall System.....	65.94	8.61
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.14</i>	
32 32 23 13-0004	SF 4 To 8' Height "Amastone" Type Modular Retaining Wall System	69.57	9.06
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.37</i>	
32 32 23 13-0005	SF 8 To 12' Height "Amastone" Type Modular Retaining Wall System	72.55	9.96
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.47</i>	
32 32 23 13-0006	SF 12 To 16' Height "Amastone" Type Modular Retaining Wall System	75.69	10.87
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.59</i>	

32 32 23 13-0007 "Diamond" Type Modular Retaining Wall Systems (32 32 23 13-0001)

32 32 23 13-0008	SF Up To 4' Height "Diamond" Type Modular Retaining Wall System	68.49	8.61
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.36</i>	
32 32 23 13-0009	SF 4 To 8' Height "Diamond" Type Modular Retaining Wall System	72.12	9.06
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.59</i>	
32 32 23 13-0010	SF 8 To 12' Height "Diamond" Type Modular Retaining Wall System	75.09	9.96
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.69</i>	
32 32 23 13-0011	SF 12 To 16' Height "Diamond" Type Modular Retaining Wall System	78.24	10.87
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.80</i>	

32 32 23 13-0012 "Keystone" Type Modular Retaining Wall Systems (32 32 23 13-0001)

32 32 23 13-0013	SF Up To 4' Height "Keystone" Type Modular Retaining Wall System.....	74.57	8.61
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.88</i>	
32 32 23 13-0014	SF 4 To 8' Height "Keystone" Type Modular Retaining Wall System	78.20	9.06
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>5.11</i>	
32 32 23 13-0015	SF 8 To 12' Height "Keystone" Type Modular Retaining Wall System	81.18	9.96
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>5.21</i>	
32 32 23 13-0016	SF 12 To 16' Height "Keystone" Type Modular Retaining Wall System	84.33	10.87
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>5.32</i>	

32 32 23 13-0017 "Criblock" Type Modular Retaining Wall Systems (32 32 23 13-0001)

32 32 23 13-0018	SF Up To 4' Height "Criblock" Type Modular Retaining Wall System.....	65.94	8.61
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.14</i>	
	<i>For Gravel Backfill Instead Of Earth, Add</i>	<i>0.25</i>	
32 32 23 13-0019	SF 4 To 8' Height "Criblock" Type Modular Retaining Wall System	69.57	9.06
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.37</i>	
	<i>For Gravel Backfill Instead Of Earth, Add</i>	<i>0.25</i>	
32 32 23 13-0020	SF 8 To 12' Height "Criblock" Type Modular Retaining Wall System	72.55	9.96
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.47</i>	
	<i>For Gravel Backfill Instead Of Earth, Add</i>	<i>0.25</i>	
32 32 23 13-0021	SF 12 To 16' Height "Criblock" Type Modular Retaining Wall System	75.69	10.87
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.59</i>	
	<i>For Gravel Backfill Instead Of Earth, Add</i>	<i>0.25</i>	

32 32 23 13-0022 "Versa-Lok" Type Modular Retaining Wall Systems (32 32 23 13-0001)

32 32 23 13-0023	SF Up To 4' Height "Versa-Lok" Type Modular Retaining Wall System	58.21	8.61
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>3.49</i>	
32 32 23 13-0024	SF 4 To 8' Height "Versa-Lok" Type Modular Retaining Wall System	64.39	9.06
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>3.93</i>	
32 32 23 13-0025	SF 8 To 12' Height "Versa-Lok" Type Modular Retaining Wall System	67.41	9.96
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.04</i>	
32 32 23 13-0026	SF 12 To 16' Height "Versa-Lok" Type Modular Retaining Wall System	70.08	10.87
	<i>For >3:1 Sloped Soil At Top, Add</i>	<i>4.11</i>	

32 32 23 13-0027 Retaining Wall Cap Block Restoration (32 32 23 13-0001)

Note: Includes removal of existing cap block and installation of new cap block to match.

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 32 23 13-0028 LF Removal And Reinstall Retaining Wall Cap Block And Pins..... <i>For >3:1 Sloped Soil At Top, Add</i>	34.53 1.84	
32 32 26 Metal Crib Retaining Walls (32 32)		
32 32 26 00-0001 Bin Type Retaining Wall (32 32 26)		
32 32 26 00-0002 Vertical Bin Walls (32 32 26 00-0001) Note: Excludes excavation and backfill.		
32 32 26 00-0003 SF 5.5' Vertical Bin Retaining Wall, Wall Heights To 11'.....	75.15	
32 32 26 00-0004 SF 7.7' Vertical Bin Retaining Wall, Wall Heights, 8.33' To 16.33'.....	89.14	
32 32 26 00-0005 SF 9.9' Vertical Bin Retaining Wall, Wall Heights, 13.67' To 21.67'.....	103.87	
32 32 26 00-0006 SF 12.1' Vertical Bin Retain Wall, Wall Heights 17.67' To 25.67'.....	112.26	
32 32 26 00-0007 SF 14.3' Vertical Bin Retain Wall, Wall Heights 20.33' To 28.33'.....	125.38	
32 32 26 00-0008 SF 16.5' Vertical Bin Retain Wall, Wall Heights 20.33' To 28.33'.....	133.78	
32 32 26 00-0009 Battered Bin Walls (32 32 26 00-0001) Note: Excludes excavation and backfill.		
32 32 26 00-0010 SF 5.5' Battered Bin Retain Wall, Wall Heights To 11'.....	66.71	
32 32 26 00-0011 SF 7.7' Battered Bin Retain Wall, Wall Heights 8.33' To 16.33'.....	72.30	
32 32 26 00-0012 SF 9.9' Battered Bin Retain Wall, Wall Heights 13.67' To 21.67'.....	81.35	
32 32 26 00-0013 SF 12.1' Battered Bin Retain Wall, Wall Heights 17.67' To 25.67'.....	91.14	
32 32 26 00-0014 SF 14.3' Battered Bin Retain Wall, Wall Heights 20.33' To 28.33'.....	106.66	
32 32 26 00-0015 SF 16.5' Battered Bin Retain Wall, Wall Heights 20.33' To 28.33'.....	109.46	
32 32 26 00-0016 Aluminized Steel Bin (32 32 26) Note: Excludes excavation and backfill.		
32 32 26 00-0017 SF 4' High, 5.5' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	50.23 3.41 -4.01	5.08
32 32 26 00-0018 SF 8' High, 5.5' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	56.41 3.92 -4.62	5.08
32 32 26 00-0019 SF 10' High, 7.7' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	60.23 4.18 -4.92	5.55
32 32 26 00-0020 SF 12' High, 7.7' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	68.62 4.77 -5.61	6.26
32 32 26 00-0021 SF 16' High, 7.7' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	65.96 4.51 -5.31	6.50
32 32 26 00-0022 SF 16' High, 9.9' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	73.70 5.15 -6.06	6.62
32 32 26 00-0023 SF 20' High, 9.9' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	81.83 5.76 -6.78	6.98
32 32 26 00-0024 SF 20' High, 12.1' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	83.76 5.88 -6.92	7.33
32 32 26 00-0025 SF 24' High, 12.1' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	88.22 6.25 -7.36	7.33
32 32 26 00-0026 SF 24' High, 14.3' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	92.65 6.62 -7.79	7.45
32 32 26 00-0027 SF 28' High, 14.3' Deep Aluminized Steel Bin..... <i>For >3:1 Sloped Soil At Top, Add</i> <i>For Galvanized Type, Deduct</i>	95.79 6.86 -8.08	7.56
32 32 29 Timber Retaining Walls (32 32)		
32 32 29 00-0001 Wood Post Retaining Walls (32 32 29) Note: System includes wood posts installed side-by-side to various heights, and underdrain. Excludes initial site grading, subbase preparation or finish grading.		
32 32 29 00-0002 LF 4" x 4", 1' High, Redwood, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	85.04 2.30	29.06
32 32 29 00-0003 LF 4" x 4", 2' High, Redwood, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	166.42 4.48	56.88
32 32 29 00-0004 LF 4" x 4", 1' High, Cedar, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	81.59 2.00	29.06
32 32 29 00-0005 LF 4" x 4", 2' High, Cedar, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	159.71 3.91	56.88
32 32 29 00-0006 LF 4" x 4", 1' High, Pressure Treated Lumber, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	82.21 2.67	25.38
32 32 29 00-0007 LF 4" x 4", 2' High, Pressure Treated Lumber, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	160.95 5.24	49.65
32 32 29 00-0008 LF 4" x 4", 1' High, Creosoted Lumber, Wood Post Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	67.91 1.94	22.53

32 Exterior Improvements**32 30 Site Improvements****32 32 Retaining Walls**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 32 29 00-0009	LF	4" x 4", 2' High, Creosoted Lumber, Wood Post Retaining Walls	.....	122.76	40.78
		<i>For >3:1 Sloped Soil At Top, Add</i>		3.50	
32 32 29 00-0010	LF	6" x 6", 2' High, Redwood, Wood Post Retaining Walls	.....	226.00	68.91
		<i>For >3:1 Sloped Soil At Top, Add</i>		7.50	
32 32 29 00-0011	LF	6" x 6", 4' High, Redwood, Wood Post Retaining Walls	.....	446.43	135.07
		<i>For >3:1 Sloped Soil At Top, Add</i>		14.99	
32 32 29 00-0012	LF	6" x 6", 2' High, Cedar, Wood Post Retaining Walls	.....	222.16	68.91
		<i>For >3:1 Sloped Soil At Top, Add</i>		7.17	
32 32 29 00-0013	LF	6" x 6", 4' High, Cedar, Wood Post Retaining Walls	.....	436.84	135.07
		<i>For >3:1 Sloped Soil At Top, Add</i>		14.18	
32 32 29 00-0014	LF	6" x 6", 2' High, Pressure Treated Lumber, Wood Post Retaining Walls	.....	211.93	55.97
		<i>For >3:1 Sloped Soil At Top, Add</i>		8.50	
32 32 29 00-0015	LF	6" x 6", 4' High, Pressure Treated Lumber, Wood Post Retaining Walls	.....	421.00	110.51
		<i>For >3:1 Sloped Soil At Top, Add</i>		16.99	
32 32 29 00-0016	LF	6" x 6", 2' High, Creosoted Lumber, Wood Post Retaining Walls	.....	155.74	44.75
		<i>For >3:1 Sloped Soil At Top, Add</i>		5.62	
32 32 29 00-0017	LF	6" x 6", 4' High, Creosoted Lumber, Wood Post Retaining Walls	.....	306.45	87.57
		<i>For >3:1 Sloped Soil At Top, Add</i>		11.16	
32 32 29 00-0018	LF	8" x 8", 4' High, Redwood, Wood Post Retaining Walls	.....	561.41	149.34
		<i>For >3:1 Sloped Soil At Top, Add</i>		22.33	
32 32 29 00-0019	LF	8" x 8", 6' High, Redwood, Wood Post Retaining Walls	.....	1,050.28	278.80
		<i>For >3:1 Sloped Soil At Top, Add</i>		41.88	
32 32 29 00-0020	LF	8" x 8", 4' High, Cedar, Wood Post Retaining Walls	.....	542.24	149.34
		<i>For >3:1 Sloped Soil At Top, Add</i>		20.70	
32 32 29 00-0021	LF	8" x 8", 6' High, Cedar, Wood Post Retaining Walls	.....	1,013.86	278.80
		<i>For >3:1 Sloped Soil At Top, Add</i>		38.79	
32 32 29 00-0022	LF	8" x 8", 4' High, Pressure Treated Lumber, Wood Post Retaining Walls	.....	581.69	172.28
		<i>For >3:1 Sloped Soil At Top, Add</i>		20.15	
32 32 29 00-0023	LF	8" x 8", 6' High, Pressure Treated Lumber, Wood Post Retaining Walls	.....	1,085.14	321.72
		<i>For >3:1 Sloped Soil At Top, Add</i>		37.54	
32 32 29 00-0024	LF	8" x 8", 4' High, Creosoted Lumber, Wood Post Retaining Walls	.....	436.66	139.25
		<i>For >3:1 Sloped Soil At Top, Add</i>		13.45	
32 32 29 00-0025	LF	8" x 8", 6' High, Creosoted Lumber, Wood Post Retaining Walls	.....	809.90	258.32
		<i>For >3:1 Sloped Soil At Top, Add</i>		24.93	
32 32 29 00-0026	LF	4' High, Cedar, Random Diameter Poles, Wood Post Retaining Walls	.....	162.80	57.39
		<i>For >3:1 Sloped Soil At Top, Add</i>		4.07	
32 32 29 00-0027	LF	6' High, Cedar, Random Diameter Poles, Wood Post Retaining Walls	.....	243.24	86.14
		<i>For >3:1 Sloped Soil At Top, Add</i>		6.03	
32 32 29 00-0028	LF	8' High, Cedar, Random Diameter Poles, Wood Post Retaining Walls	.....	323.59	114.78
		<i>For >3:1 Sloped Soil At Top, Add</i>		7.99	
32 32 29 00-0029	LF	4' High Creosoted Lumber, Random Diameter Poles, Wood Post Retaining Walls	.....	111.87	32.41
		<i>For >3:1 Sloped Soil At Top, Add</i>		3.99	
32 32 29 00-0030	LF	6' High Creosoted Lumber, Random Diameter Poles, Wood Post Retaining Walls	.....	162.63	46.79
		<i>For >3:1 Sloped Soil At Top, Add</i>		5.87	
32 32 29 00-0031	LF	8' High Creosoted Lumber, Random Diameter Poles, Wood Post Retaining Walls	.....	220.29	63.20
		<i>For >3:1 Sloped Soil At Top, Add</i>		7.99	
32 32 29 00-0032		Post And Board Retaining Walls <small>(32 32 29)</small>			
		Note: System includes all the elements that must go into a wall that resists lateral pressure. System elements include posts and boards, cap, underdrain, and deadman where required. Excludes initial site grading, subbase preparation or finish grading.			
32 32 29 00-0033	LF	4" x 4" Post, 4' Spacing, 3' High, 2" Planking, Redwood, Post And Board Retaining Walls	.....	69.26	17.22
		<i>For >3:1 Sloped Soil At Top, Add</i>		2.96	
32 32 29 00-0034	LF	4" x 4" Post, 2' Spacing, 4' High, 2" Planking, Redwood, Post And Board Retaining Walls	.....	105.83	29.46
		<i>For >3:1 Sloped Soil At Top, Add</i>		3.99	
32 32 29 00-0035	LF	6" x 6" Post, 4' Spacing, 5' High 2" Planking, Redwood, Post And Board Retaining Walls	.....	139.38	36.59
		<i>For >3:1 Sloped Soil At Top, Add</i>		5.62	
32 32 29 00-0036	LF	6" x 6" Post, 3' Spacing, 6' High, 2" Planking, Redwood, Post And Board Retaining Walls	.....	194.74	51.89
		<i>For >3:1 Sloped Soil At Top, Add</i>		7.74	
32 32 29 00-0037	LF	6" x 6" With Deadman, 3' Spacing, 8' High, 2" Planking, Redwood, Post And Board Retaining Walls	.....	254.78	67.49
		<i>For >3:1 Sloped Soil At Top, Add</i>		10.19	
32 32 29 00-0038	LF	8" x 8" Post, 2' Spacing, 8' High, 2" Planking, Redwood, Post And Board Retaining Walls	.....	523.98	133.54
		<i>For >3:1 Sloped Soil At Top, Add</i>		21.84	
32 32 29 00-0039	LF	8" x 8" With Deadman, 2' Spacing, 9' High, 2" Planking, Redwood, Post And Board Retaining Walls	.....	592.94	147.92
		<i>For >3:1 Sloped Soil At Top, Add</i>		25.26	
32 32 29 00-0040	LF	4" x 4" Post, 4' Spacing, 3' High, 2" Planking, Cedar, Post And Board Retaining Walls	.....	70.21	17.95
		<i>For >3:1 Sloped Soil At Top, Add</i>		2.92	
32 32 29 00-0041	LF	4" x 4" With Deadman, 2' Spacing, 4' High 2" Planking, Cedar, Post And Board Retaining Walls	.....	123.19	31.91
		<i>For >3:1 Sloped Soil At Top, Add</i>		5.05	
32 32 29 00-0042	LF	6" x 6" Post, 4' Spacing, 4' High 2" Planking, Cedar, Post And Board Retaining Walls	.....	121.08	31.30
		<i>For >3:1 Sloped Soil At Top, Add</i>		4.97	
32 32 29 00-0043	LF	6" x 6" Post, 3' Spacing, 5' High 2" Planking, Cedar, Post And Board Retaining Walls	.....	169.46	44.96
		<i>For >3:1 Sloped Soil At Top, Add</i>		6.76	
32 32 29 00-0044	LF	6" x 6" Post, 2' Spacing, 6' High 2" Planking, Cedar, Post And Board Retaining Walls	.....	263.42	71.76
		<i>For >3:1 Sloped Soil At Top, Add</i>		10.19	
32 32 29 00-0045	LF	6 x 6 Post With Deadman, 3' Spacing, 6' High, 2" Planking, Cedar	.....	209.01	55.15
		<i>For >3:1 Sloped Soil At Top, Add</i>		8.39	
32 32 29 00-0046	LF	8 x 8 Post With Deadman, 2' Spacing, 8' High, 2" Planking, Cedar	.....	542.11	137.82
		<i>For >3:1 Sloped Soil At Top, Add</i>		22.65	
32 32 29 00-0047	LF	4 x 4 Post, 4' Spacing, 3' High 2" Planking, Pressure Treated	.....	85.98	33.13
		<i>For >3:1 Sloped Soil At Top, Add</i>		1.67	
32 32 29 00-0048	LF	4 x 4 Post, 3' Spacing, 4' High 2" Planking, Pressure Treated	.....	124.60	47.10
		<i>For >3:1 Sloped Soil At Top, Add</i>		2.58	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 32 29 00-0049 LF 4 x 4 Post With Deadman, 2' Space, 5' High, 2" Planking, Pressure Treat..... <i>For >3:1 Sloped Soil At Top, Add</i>	181.94 4.48	64.64
32 32 29 00-0050 LF 6 x 6 Post, 3' Spacing, 6' High, 2" Planking, Pressure Treated..... <i>For >3:1 Sloped Soil At Top, Add</i>	320.77 8.72	109.08
32 32 29 00-0051 LF 6 x 6 Post, 2' Spacing, 7' High, 2" Planking, Pressure Treated..... <i>For >3:1 Sloped Soil At Top, Add</i>	325.56 9.13	109.08
32 32 29 00-0052 LF 6 x 6 Post With Deadman, 3' Spacing 8' High, 2" Planking, Pressure Treat..... <i>For >3:1 Sloped Soil At Top, Add</i>	305.49 8.15	104.79
32 32 29 00-0053 LF 8 x 8 Post With Deadman, 2' Spacing 10' High, 2" Planking, Pressure Treated..... <i>For >3:1 Sloped Soil At Top, Add</i>	719.84 20.21	241.09
32 32 29 00-0054 LF 4 x 4 Post, 4' Spacing, 3' High Creosoted 2" Planking..... <i>For >3:1 Sloped Soil At Top, Add</i>	85.98 1.67	33.13
32 32 29 00-0055 LF 4 x 4 Post, 3' Spacing, 4' High Creosoted, 2" Planking..... <i>For >3:1 Sloped Soil At Top, Add</i>	124.60 2.58	47.10
32 32 29 00-0056 LF 4 x 4 Post With Deadman, 2' Spacing, 5' High, Creosoted, 2" Planking..... <i>For >3:1 Sloped Soil At Top, Add</i>	181.94 4.48	64.64
32 32 29 00-0057 LF 6 x 6 Post, 3' Spacing, 6' High Creosoted, 2" Planking..... <i>For >3:1 Sloped Soil At Top, Add</i>	228.85 5.79	80.43
32 32 29 00-0058 LF 6" x 6" Post, 2' Spacing, 7' High, 2" Planking, Creosoted, Post And Board Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	320.77 8.72	109.08
32 32 29 00-0059 LF 6" x 6" Post With Deadman, 3' Spacing, 8' High, 2" Planking, Creosoted, Post And Board Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	305.49 8.15	104.79
32 32 29 00-0060 LF 8" x 8" Post With Deadman, 2' Spacing, 10' High, Creosoted, 2" Planking, Post And Board Retaining Walls..... <i>For >3:1 Sloped Soil At Top, Add</i>	719.84 20.21	241.09
32 32 29 00-0061 Wood Tie Retaining Walls, Rod Connector At 4' <small>(32 32 29)</small> Note: The system includes all the elements that must go into a wall that resists lateral pressure. System elements include: wood ties, threaded rod (1/2" diameter), underdrain, and deadman where required. Excludes initial site grading, subbase preparation or finish grading.		
32 32 29 00-0062 Redwood <small>(32 32 29 00-0061)</small>		
32 32 29 00-0063 LF 2' High, 6" x 6" Wood Tie Wall..... <i>For >3:1 Sloped Soil At Top, Add</i>	116.65 3.91	35.27
32 32 29 00-0064 LF 4' High, 6" x 6" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	266.24 8.96	80.43
32 32 29 00-0065 LF 6' High, 6" x 6" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	398.46 13.36	120.59
32 32 29 00-0066 LF 4' High, 8" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	388.86 15.48	103.37
32 32 29 00-0067 LF 6' High, 8" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	584.36 23.30	155.05
32 32 29 00-0068 LF 8' High, 8" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	772.00 30.96	203.88
32 32 29 00-0069 Cedar <small>(32 32 29 00-0061)</small>		
32 32 29 00-0070 LF 2' High, 6" x 6" Wood Tie Wall..... <i>For >3:1 Sloped Soil At Top, Add</i>	114.73 3.75	35.27
32 32 29 00-0071 LF 4' High, 6" x 6" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	260.49 8.47	80.43
32 32 29 00-0072 LF 6' High, 6" x 6" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	390.79 12.71	120.59
32 32 29 00-0073 LF 4' High, 8" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	375.44 14.34	103.37
32 32 29 00-0074 LF 6' High, 8" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	565.19 21.68	155.05
32 32 29 00-0075 LF 8' High, 8" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	745.15 28.68	203.88
32 32 29 00-0076 Creosoted Wood <small>(32 32 29 00-0061)</small>		
32 32 29 00-0077 LF 2' High, 6" x 8" Wood Tie Wall..... <i>For >3:1 Sloped Soil At Top, Add</i>	126.30 2.78	46.79
32 32 29 00-0078 LF 4' High, 6" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	289.19 6.27	107.65
32 32 29 00-0079 LF 6' High, 6" x 8" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	428.93 9.37	159.33
32 32 29 00-0080 LF 4' High, 7" x 9" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	581.16 12.55	216.73
32 32 29 00-0081 LF 6' High, 7" x 9" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	846.14 18.25	315.71
32 32 29 00-0082 LF 8' High, 7" x 9" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,122.86 24.28	418.57
32 32 29 00-0083 Pressure Treated Wood <small>(32 32 29 00-0061)</small>		
32 32 29 00-0084 LF 2' High, 6" x 6" Wood Tie Wall..... <i>For >3:1 Sloped Soil At Top, Add</i>	101.53 3.67	29.15
32 32 29 00-0085 LF 4' High, 6" x 6" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	230.82 8.39	66.06
32 32 29 00-0086 LF 6' High, 6" x 6" Wood Tie Wall Deadman At 6'..... <i>For >3:1 Sloped Soil At Top, Add</i>	345.75 12.55	99.09

32 Exterior Improvements**32 30 Site Improvements****32 32 Retaining Walls**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 32 29 00-0087	LF	4' High, 8" x 8" Wood Tie Wall Deadman At 6'	373.42	119.17
		<i>For >3:1 Sloped Soil At Top, Add</i>	11.49	
32 32 29 00-0088	LF	6' High, 8" x 8" Wood Tie Wall Deadman At 6'	561.24	178.09
		<i>For >3:1 Sloped Soil At Top, Add</i>	17.44	
32 32 29 00-0089	LF	8' High, 8" x 8" Wood Tie Wall Deadman At 6'	743.89	236.81
		<i>For >3:1 Sloped Soil At Top, Add</i>	22.98	

32 32 53 Stone Retaining Walls (32 32)**32 32 53 00-0001 Stone Retaining Walls (32 32 53)**

Note: Construction is either dry set or mortar set. System includes concrete base, crushed stone, underdrain, and backfill. Standard design to have 12" thick top with vertical backside and sloped face at 2" per foot of height. Excludes initial site grading, subbase preparation or finish grading.

32 32 53 00-0002 Stone Retaining Walls (32 32 53 00-0001)

Note: Stone at \$16.00/ton.

32 32 53 00-0003	LF	\$16.00/ton 3' High Stone Retaining Wall, Dry Set	458.83	203.94
		<i>For >3:1 Sloped Soil At Top, Add</i>	4.32	
32 32 53 00-0004	LF	\$16.00/ton 4' High Stone Retaining Wall, Dry Set	540.90	242.62
		<i>For >3:1 Sloped Soil At Top, Add</i>	4.73	
32 32 53 00-0005	LF	\$16.00/ton 6' High Stone Retaining Wall, Dry Set	709.74	322.35
		<i>For >3:1 Sloped Soil At Top, Add</i>	5.53	
32 32 53 00-0006	LF	\$16.00/ton 8' High Stone Retaining Wall, Dry Set	1,092.06	504.00
		<i>For >3:1 Sloped Soil At Top, Add</i>	7.14	
32 32 53 00-0007	LF	\$16.00/ton 10' High Stone Retaining Wall, Dry Set	1,418.01	659.29
		<i>For >3:1 Sloped Soil At Top, Add</i>	8.45	
32 32 53 00-0008	LF	\$16.00/ton 12' High Stone Retaining Wall, Dry Set	1,759.20	821.01
		<i>For >3:1 Sloped Soil At Top, Add</i>	9.96	
32 32 53 00-0009	LF	\$16.00/ton 3' High Stone Retaining Wall, Mortar Set	411.99	180.56
		<i>For >3:1 Sloped Soil At Top, Add</i>	4.32	
32 32 53 00-0010	LF	\$16.00/ton 4' High Stone Retaining Wall, Mortar Set	482.91	213.64
		<i>For >3:1 Sloped Soil At Top, Add</i>	4.73	
32 32 53 00-0011	LF	\$16.00/ton 6' High Stone Retaining Wall, Mortar Set	624.15	279.49
		<i>For >3:1 Sloped Soil At Top, Add</i>	5.53	
32 32 53 00-0012	LF	\$16.00/ton 8' High Stone Retaining Wall, Mortar Set	954.30	435.15
		<i>For >3:1 Sloped Soil At Top, Add</i>	7.14	
32 32 53 00-0013	LF	\$16.00/ton 10' High Stone Retaining Wall, Mortar Set	1,224.76	562.72
		<i>For >3:1 Sloped Soil At Top, Add</i>	8.45	
32 32 53 00-0014	LF	\$16.00/ton 12' High Stone Retaining Wall, Mortar Set	1,520.83	701.87
		<i>For >3:1 Sloped Soil At Top, Add</i>	9.96	

32 32 53 00-0015 Stone Retaining Walls (32 32 53 00-0001)

Note: Stone at \$32.00/ton.

32 32 53 00-0016	LF	\$32.00/ton 3' High Stone Retaining Wall, Dry Set	474.21	203.94
		<i>For >3:1 Sloped Soil At Top, Add</i>	5.63	
32 32 53 00-0017	LF	\$32.00/ton 4' High Stone Retaining Wall, Dry Set	562.20	242.62
		<i>For >3:1 Sloped Soil At Top, Add</i>	6.54	
32 32 53 00-0018	LF	\$32.00/ton 6' High Stone Retaining Wall, Dry Set	740.49	322.35
		<i>For >3:1 Sloped Soil At Top, Add</i>	8.14	
32 32 53 00-0019	LF	\$32.00/ton 8' High Stone Retaining Wall, Dry Set	1,137.02	504.00
		<i>For >3:1 Sloped Soil At Top, Add</i>	10.96	
32 32 53 00-0020	LF	\$32.00/ton 10' High Stone Retaining Wall, Dry Set	1,479.53	659.29
		<i>For >3:1 Sloped Soil At Top, Add</i>	13.68	
32 32 53 00-0021	LF	\$32.00/ton 12' High Stone Retaining Wall, Dry Set	1,837.28	821.01
		<i>For >3:1 Sloped Soil At Top, Add</i>	16.59	
32 32 53 00-0022	LF	\$32.00/ton 3' High Stone Retaining Wall, Mortar Set	427.37	180.56
		<i>For >3:1 Sloped Soil At Top, Add</i>	5.63	
32 32 53 00-0023	LF	\$32.00/ton 4' High Stone Retaining Wall, Mortar Set	504.21	213.64
		<i>For >3:1 Sloped Soil At Top, Add</i>	6.54	
32 32 53 00-0024	LF	\$32.00/ton 6' High Stone Retaining Wall, Mortar Set	654.90	279.49
		<i>For >3:1 Sloped Soil At Top, Add</i>	8.14	
32 32 53 00-0025	LF	\$32.00/ton 8' High Stone Retaining Wall, Mortar Set	999.26	435.15
		<i>For >3:1 Sloped Soil At Top, Add</i>	10.96	
32 32 53 00-0026	LF	\$32.00/ton 10' High Stone Retaining Wall, Mortar Set	1,286.28	562.72
		<i>For >3:1 Sloped Soil At Top, Add</i>	13.68	
32 32 53 00-0027	LF	\$32.00/ton 12' High Stone Retaining Wall, Mortar Set	1,598.91	701.87
		<i>For >3:1 Sloped Soil At Top, Add</i>	16.59	

32 32 53 00-0028 Stone Retaining Walls (32 32 53 00-0001)

Note: Stone at \$48.00/ton.

32 32 53 00-0029	LF	\$48.00/ton 3' High Stone Retaining Wall, Dry Set	490.77	203.94
		<i>For >3:1 Sloped Soil At Top, Add</i>	7.04	
32 32 53 00-0030	LF	\$48.00/ton 4' High Stone Retaining Wall, Dry Set	583.25	242.62
		<i>For >3:1 Sloped Soil At Top, Add</i>	8.33	
32 32 53 00-0031	LF	\$48.00/ton 6' High Stone Retaining Wall, Dry Set	770.07	322.35
		<i>For >3:1 Sloped Soil At Top, Add</i>	10.66	
32 32 53 00-0032	LF	\$48.00/ton 8' High Stone Retaining Wall, Dry Set	1,181.97	504.00
		<i>For >3:1 Sloped Soil At Top, Add</i>	14.78	
32 32 53 00-0033	LF	\$48.00/ton 10' High Stone Retaining Wall, Dry Set	1,541.05	659.29
		<i>For >3:1 Sloped Soil At Top, Add</i>	18.90	
32 32 53 00-0034	LF	\$48.00/ton 12' High Stone Retaining Wall, Dry Set	1,916.54	821.01
		<i>For >3:1 Sloped Soil At Top, Add</i>	23.33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 32 53 00-0035 LF \$48.00/ton 3' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	443.93 7.04	180.56
32 32 53 00-0036 LF \$48.00/ton 4' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	525.50 8.35	213.64
32 32 53 00-0037 LF \$48.00/ton 6' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	684.48 10.66	279.49
32 32 53 00-0038 LF \$48.00/ton 8' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,044.21 14.78	435.15
32 32 53 00-0039 LF \$48.00/ton 10' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,347.80 18.90	562.72
32 32 53 00-0040 LF \$48.00/ton 12' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,678.17 23.33	701.87
32 32 53 00-0041 Stone Retaining Walls <small>(32 32 53 00-0001)</small> Note: Stone at \$64.00/ton.		
32 32 53 00-0042 LF \$64.00/ton 3' High Stone Retaining Wall, Dry Set <i>For >3:1 Sloped Soil At Top, Add</i>	507.33 8.45	203.94
32 32 53 00-0043 LF \$64.00/ton 4' High Stone Retaining Wall, Dry Set <i>For >3:1 Sloped Soil At Top, Add</i>	581.12 8.14	242.62
32 32 53 00-0044 LF \$64.00/ton 6' High Stone Retaining Wall, Dry Set <i>For >3:1 Sloped Soil At Top, Add</i>	802.01 13.37	322.35
32 32 53 00-0045 LF \$64.00/ton 8' High Stone Retaining Wall, Dry Set <i>For >3:1 Sloped Soil At Top, Add</i>	1,229.29 18.80	504.00
32 32 53 00-0046 LF \$64.00/ton 10' High Stone Retaining Wall, Dry Set <i>For >3:1 Sloped Soil At Top, Add</i>	1,604.93 24.33	659.29
32 32 53 00-0047 LF \$64.00/ton 12' High Stone Retaining Wall, Dry Set <i>For >3:1 Sloped Soil At Top, Add</i>	1,996.98 30.17	821.01
32 32 53 00-0048 LF \$64.00/ton 3' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	460.49 8.45	180.56
32 32 53 00-0049 LF \$64.00/ton 4' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	546.79 10.16	213.64
32 32 53 00-0050 LF \$64.00/ton 6' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	716.42 13.37	279.49
32 32 53 00-0051 LF \$64.00/ton 8' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,091.53 18.80	435.15
32 32 53 00-0052 LF \$64.00/ton 10' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,411.68 24.33	562.72
32 32 53 00-0053 LF \$64.00/ton 12' High Stone Retaining Wall, Mortar Set..... <i>For >3:1 Sloped Soil At Top, Add</i>	1,758.61 30.17	701.87
32 33 Site Furnishings <small>(32 30)</small>		
32 33 23 Site Trash and Litter Receptacles <small>(32 33)</small>		
32 33 23 00-0001 Steel Trash Containment <small>(32 33 23)</small>		
32 33 23 00-0002 Steel Frame Surrounded With Kiln-Dried Wood <small>(32 33 23 00-0001)</small>		
32 33 23 00-0003 EA 13" x 13" x 30" Ash Receptacle Steel Frame, Kiln Dried Wood.....	554.45	58.33
32 33 23 00-0004 EA 24" x 24" x 30" High Open Top Trash Container Steel Frame, Kiln Dried Wood.....	529.46	58.33
32 33 23 00-0005 EA 21" x 21" x 31" High Flat Top Trash Container Steel Frame, Kiln Dried Wood.....	529.46	58.33
32 33 23 00-0006 EA 24" x 24" x 31" High, Flat Top Trash Container Steel Frame, Kiln Dried Wood.....	501.34	58.33
32 33 23 00-0007 EA 18" x 18" x 37" High Dome Top Trash Container Steel Frame, Kiln Dried Wood.....	554.45	58.33
32 33 23 00-0008 EA 23" x 23" x 37" High Dome Top Trash Container Steel Frame, Kiln Dried Wood.....	501.34	58.33
32 33 23 00-0009 EA 24" x 24" x 37" High Dome Top Trash Container Steel Frame, Kiln Dried Wood.....	685.64	58.33
32 33 23 00-0010 Square Steel Frames Surrounded With Flat Steel <small>(32 33 23 00-0001)</small>		
32 33 23 00-0011 EA 26" Diameter x 34" High Open Top Trash Square Container Steel Frame, Flat Steel Surround.....	1,000.00	58.33
32 33 23 00-0012 EA 26" Diameter x 34" High Dome Top Trash Square Container Steel Frame, Flat Steel Surround.....	1,079.39	58.33
32 33 23 00-0013 EA 26" Diameter x 39" High Dome Top Trash Square Container Steel Frame, Flat Steel Surround.....	1,079.39	58.33
32 33 23 00-0014 Round Steel Pipe And Flat Steel Frames <small>(32 33 23 00-0001)</small> Note: Surrounded with kiln-dried wood.		
32 33 23 00-0015 EA 21" Diameter x 32" High Open Top Trash Container Steel Pipe, Flat Steel Frame, Kiln Dried Wood.....	1,476.30	58.33
32 33 23 00-0016 EA 21" Diameter x 32" High Flat Top Trash Steel Container Pipe, Flat Steel Frame, Kiln Dried Wood.....	1,589.71	58.33
32 33 23 00-0017 EA 21" Diameter x 39" High Dome Top Trash Steel Container Pipe, Flat Steel Frame, Kiln Dried Wood.....	1,830.69	58.33
32 33 23 00-0018 EA 21" Diameter x 40" High HPR Top Trash Container Steel Pipe, Flat Steel Frame, Kiln Dried Wood.....	1,660.59	58.33
32 33 23 00-0019 Round Steel Pipe Surrounded With Perforated <small>(32 33 23 00-0001)</small>		
32 33 23 00-0020 EA 21" Diameter x 32" High Open Top Trash Container Perforated Round Steel Pipe.....	1,320.37	58.33
32 33 23 00-0021 EA 21" Diameter x 32" High Flat Top Trash Container Perforated Round Steel Pipe.....	1,433.78	58.33
32 33 23 00-0022 EA 21" Diameter x 39" High Dome Top Trash Container Perforated Round Steel Pipe.....	1,674.76	58.33
32 33 23 00-0023 EA 21" Diameter x 40" High HPR Top Trash Container Perforated Round Steel Pipe.....	1,518.83	58.33
32 33 23 00-0024 Round Steel Pipe Frames Surrounded With Welded Wire <small>(32 33 23 00-0001)</small>		
32 33 23 00-0025 EA 21" Diameter x 32" High Flat Top Trash Container Steel Pipe Frame, Welded Wire Surround.....	1,051.03	58.33
32 33 23 00-0026 EA 21" Diameter x 32" High Open Top Trash Steel Container Pipe Frame, Welded Wire Surround.....	1,164.44	58.33

32 Exterior Improvements**32 30 Site Improvements****32 33 Site Furnishings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 33 23 00-0027	EA		21" Diameter x 39" High Dome Top Trash Steel Container Pipe Frame, Welded Wire Surround.....	1,405.42	58.33
32 33 23 00-0028	EA		21" Diameter x 40" High HPR Top Trash Container Steel Pipe Frame, Welded Wire Surround.....	1,249.49	58.33
32 33 23 00-0029			Litter Baskets (32 33 23)		
32 33 23 00-0030			Round Wire Litter Baskets (32 33 23 00-0029)		
32 33 23 00-0031	EA		1.33' Diameter x 1.83' High Round Wire Litter Basket	184.90	5.93
32 33 23 00-0032	EA		1.5' Diameter x 1.83' High Round Wire Litter Basket	233.41	5.93
32 33 23 00-0033	EA		1.75' Diameter x 2.33' High Round Wire Litter Basket	315.72	5.93
32 33 23 00-0034	EA		1.83' Diameter x 2.83' High Round Wire Litter Basket	362.17	5.93
32 33 23 00-0035			Trash Can/Wire Basket Holder (32 33 23 00-0029)		
32 33 23 00-0036	EA		Steel Post, Single Holder	265.60	47.63
32 33 23 00-0037	EA		Steel Post, Double Holder.....	358.44	47.63
32 33 23 00-0038	EA		Redwood Post, Single Holder.....	137.75	47.63
32 33 23 00-0039	EA		Redwood Post, Double Holder.....	157.48	47.63
32 33 23 00-0040			Litter Receptacles, Freestanding (32 33 23 00-0029)		
			Note: Includes 1-1/2" outside diameter steel leg supports. Wall mounted, includes 3/8" x 3" steel wall plates. Surface mounted, includes 2-1/2" outside diameter steel tube with floor flange, embedded to include 2-1/2" outside diameter steel tube.		
32 33 23 00-0041	EA		16" Diameter x 28" High Litter Receptacle, Freestanding Or Embedded.....	1,485.53	24.31
			For Powder Coated Sand Pan, Add	50.00	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
32 33 23 00-0042	EA		16" Diameter x 32" High Litter Receptacle, Freestanding Or Embedded.....	1,563.62	24.31
			For Powder Coated Sand Pan, Add	50.00	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
32 33 23 00-0043	EA		20" Diameter x 36" High Litter Receptacle, Freestanding Or Embedded.....	1,822.20	36.45
			For Powder Coated Sand Pan, Add	50.00	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
32 33 23 00-0044	EA		20" Diameter x 40" High Litter Receptacle, Freestanding Embedded.....	1,900.30	36.45
			For Powder Coated Sand Pan, Add	50.00	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
32 33 23 00-0045	EA		16" Diameter x 28" High Litter Receptacle, Pole Mount With Pole	1,978.39	36.45
			For Powder Coated Sand Pan, Add	50.00	
			For 1-1/2" x 8-1/2" Diameter Metal Cover Plate, Add	22.50	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
32 33 23 00-0046	EA		16" Diameter x 32" High Litter Receptacle, Pole Mount With Pole	2,056.49	36.45
			For Powder Coated Sand Pan, Add	50.00	
			For 1-1/2" x 8-1/2" Diameter Metal Cover Plate, Add	22.50	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
32 33 23 00-0047	EA		16" Diameter x 28" High Litter Receptacle, Wall Mount.....	1,640.68	31.59
			For Powder Coated Sand Pan, Add	50.00	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
			For 1-1/2" x 6" Diameter Metal Cover Plate, Add	20.00	
32 33 23 00-0048	EA		16" Diameter x 32" High Litter Receptacle, Wall Mount.....	1,718.77	31.59
			For Powder Coated Sand Pan, Add	50.00	
			For Orange Peel Lid, Add	25.00	
			For Polished Granite Lid, Add	50.00	
			For 1-1/2" x 6" Diameter Metal Cover Plate, Add	20.00	
32 33 23 00-0049			Ash Receptacles (32 33 23)		
32 33 23 00-0050	EA		12" Diameter x 21" High Ash Receptacle, Freestanding Or Embedded.....	655.33	24.31
			For 1-1/2" x 8-1/2" Diameter Metal Cover Plate, Add	22.50	
			For Sand Pan, Add	110.00	
			For Bowl And Funnel, Add	120.00	
32 33 23 00-0051	EA		18" Square Concrete Exposed Aggregate x 36" High Ash Receptacles With 3-1/2" ID iron Pipe With Cap Square Concrete With Steel Liner.....	279.20	24.31
32 33 23 00-0052			Trash Receptacles (32 33 23)		
32 33 23 00-0053	EA		Outdoor Covered Steel Receptacle With Liner	1,220.01	24.31
32 33 23 00-0054	EA		Driftwood And Sable Receptacle, 35 Gallon With Liner And Frame	399.08	24.31
32 33 23 00-0055	EA		24" x 24" Square Trash Containment With Exposed Aggregate Finish	706.96	24.31
32 33 23 00-0056	EA		30" x 30" Square Trash Containment With Exposed Aggregate Finish	737.65	26.73
32 33 23 00-0057	EA		36" x 36" Square Trash Containment With Exposed Aggregate Finish	794.14	29.16
32 33 23 00-0058	EA		32 Gallon, Open Round Trash Receptacle, Recycled Plastic Lumber	601.58	19.44
32 33 23 00-0059	EA		32 Gallon, Round Trash Receptacle With Liner And Lid, Recycled Plastic Lumber	718.81	19.44
32 33 23 00-0060	EA		24" x 24" Square 18" High Trash Receptacle, Fiberglass.....	1,219.83	24.31
32 33 23 00-0061			Trash Containers (Dumpsters) (32 33 23)		



		Exterior Improvements	32
		Site Improvements	32 30
		Site Furnishings	32 33

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 33 23 00-0062	EA	1 CY Straight Side Trash Dumpster.....		302.15	
32 33 23 00-0063	EA	1.5 CY Straight Side Trash Dumpster.....		453.23	
32 33 23 00-0064	EA	2 CY Straight Side Trash Dumpster.....		604.30	
32 33 23 00-0065	EA	2 CY Sloped Side Trash Dumpster.....		604.30	
32 33 23 00-0066	EA	3 CY Sloped Side Trash Dumpster.....		906.45	
32 33 23 00-0067	EA	4 CY Sloped Side Trash Dumpster.....		1,208.61	
32 33 23 00-0068	EA	6 CY Sloped Side Trash Dumpster.....		1,812.91	
32 33 23 00-0069	EA	8 CY Sloped Side Trash Dumpster.....		2,417.21	
32 33 33 Site Manufactured Planters (32 33)					
32 33 33 00-0001	Precast Concrete Planters (32 33 33)				
32 33 33 00-0002	Circular Precast Concrete Planters (32 33 33 00-0001)				
32 33 33 00-0003	EA	24" Diameter, 17" Height, Circular Precast Concrete Planter.....		819.85	28.84
32 33 33 00-0004	EA	24" Diameter, 24" Height, Circular Precast Concrete Planter.....		918.06	34.61
32 33 33 00-0005	EA	24" Diameter, 33" Height, Circular Precast Concrete Planter.....		1,004.72	34.61
32 33 33 00-0006	EA	30" Diameter, 17" Height, Circular Precast Concrete Planter.....		1,090.19	40.39
32 33 33 00-0007	EA	30" Diameter, 30" Height, Circular Precast Concrete Planter.....		1,319.74	51.92
32 33 33 00-0008	EA	36" Diameter, 24" Height, Circular Precast Concrete Planter.....		1,436.99	51.92
32 33 33 00-0009	EA	36" Diameter, 30" Height, Circular Precast Concrete Planter.....		1,619.31	57.69
32 33 33 00-0010	EA	48" Diameter, 17" Height, Circular Precast Concrete Planter.....		1,711.07	57.69
32 33 33 00-0011	EA	48" Diameter, 24" Height, Circular Precast Concrete Planter.....		1,905.60	72.11
32 33 33 00-0012	EA	48" Diameter, 30" Height, Circular Precast Concrete Planter.....		2,027.00	76.73
32 33 33 00-0013	EA	48" Diameter, 36" Height, Circular Precast Concrete Planter.....		2,111.55	80.77
32 33 33 00-0014	EA	60" Diameter, 17" Height, Circular Precast Concrete Planter.....		1,917.46	72.11
32 33 33 00-0015	EA	60" Diameter, 24" Height, Circular Precast Concrete Planter.....		2,109.00	80.77
32 33 33 00-0016	EA	60" Diameter, 36" Height, Circular Precast Concrete Planter.....		2,704.27	86.53
32 33 33 00-0017	EA	72" Diameter, 36" Height, Circular Precast Concrete Planter.....		3,510.02	109.61
32 33 33 00-0018	EA	84" Diameter, 36" Height, Circular Precast Concrete Planter.....		4,079.81	115.38
32 33 33 00-0019	Square Precast Concrete Planters (32 33 33 00-0001)				
32 33 33 00-0020	EA	36" Square, 30" Height, Square Precast Concrete Planter.....		1,650.60	75.00
32 33 33 00-0021	EA	42" Square, 30" Height, Square Precast Concrete Planter.....		1,890.45	80.77
32 33 33 00-0022	EA	60" Square, 36" Height, Square Precast Concrete Planter.....		2,991.09	92.30
32 33 33 00-0023	EA	72" Square, 36" Height, Square Precast Concrete Planter.....		3,191.26	98.08
32 33 33 00-0024	Rectangular Precast Concrete Planters (32 33 33 00-0001)				
32 33 33 00-0025	EA	33" x 18", 20" Height, Rectangular Precast Concrete Planter.....		956.29	34.61
32 33 33 00-0026	EA	48" x 18", 20" Height, Rectangular Precast Concrete Planter.....		1,120.91	51.92
32 33 33 00-0027	EA	60" x 18", 20" Height, Rectangular Precast Concrete Planter.....		1,300.68	57.69
32 33 33 00-0028	EA	72" x 18", 20" Height, Rectangular Precast Concrete Planter.....		1,479.91	72.11
32 33 33 00-0029	Fiberglass Planters (32 33 33)				
32 33 33 00-0030	Circular Fiberglass Planters (32 33 33 00-0029)				
32 33 33 00-0031	EA	36" Diameter, 27" High, Circular Fiberglass Planter.....		2,023.94	28.84
32 33 33 00-0032	EA	60" Diameter, 39" High, Circular Fiberglass Planter.....		3,379.04	28.84
32 33 33 00-0033	EA	36" Diameter, 24" High, Circular Fiberglass Planter.....		1,343.96	28.84
32 33 33 00-0034	EA	60" Diameter, 24" High, Circular Fiberglass Planter.....		2,664.68	28.84
32 33 33 00-0035	Tapered Circular Fiberglass Planters (32 33 33 00-0029)				
32 33 33 00-0036	EA	24" Diameter, 20" High, Tapered Circular Fiberglass Planter.....		777.57	28.84
32 33 33 00-0037	EA	30" Diameter, 25" High, Tapered Circular Fiberglass Planter.....		1,147.56	28.84
32 33 33 00-0038	EA	36" Diameter, 30" High, Tapered Circular Fiberglass Planter.....		2,058.33	28.84
32 33 33 00-0039	EA	40" Diameter, 36" High, Tapered Circular Fiberglass Planter.....		2,880.72	28.84
32 33 33 00-0040	Square Fiberglass Planters (32 33 33 00-0029)				
32 33 33 00-0041	EA	24" Square, 21" High, Square Fiberglass Planter.....		1,026.18	28.84
32 33 33 00-0042	EA	24" Square, 24" High, Square Fiberglass Planter.....		1,049.37	28.84
32 33 33 00-0043	EA	30" Square, 12" High, Square Fiberglass Planter.....		1,061.63	28.84
32 33 33 00-0044	EA	30" Square, 21" High, Square Fiberglass Planter.....		1,206.49	28.84
32 33 33 00-0045	EA	30" Square, 24" High, Square Fiberglass Planter.....		1,312.03	28.84
32 33 33 00-0046	Rectangular Fiberglass Planters (32 33 33 00-0029)				
32 33 33 00-0047	EA	48" x 12", 12" High, Rectangular Fiberglass Planter.....		1,183.55	28.84
32 33 33 00-0048	EA	48" x 12", 21" High, Rectangular Fiberglass Planter.....		1,270.10	28.84
32 33 33 00-0049	EA	48" x 24", 12" High, Rectangular Fiberglass Planter.....		1,659.86	28.84
32 33 33 00-0050	EA	48" x 24", 21" High, Rectangular Fiberglass Planter.....		1,832.96	28.84
32 33 33 00-0051	Timber Planters (32 33 33)				
32 33 33 00-0052	Square Timber Planters (32 33 33 00-0051)				

32 Exterior Improvements**32 30 Site Improvements****32 33 Site Furnishings**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 33 33 00-0053	EA	14" Square, 30" High, Square Timber Planter	491.78	58.33
32 33 33 00-0054	EA	21" Square, 30" High, Square Timber Planter	491.78	58.33
32 33 33 00-0055	EA	27" Square, 30" High, Square Timber Planter	906.51	58.33
32 33 33 00-0056	EA	34" Square, 30" High, Square Timber Planter	789.68	58.33
32 33 33 00-0057	EA	41" Square, 36" High, Square Timber Planter	935.72	58.33
32 33 33 00-0058	EA	54" Square, 36" High, Square Timber Planter	2,360.99	58.33
32 33 33 00-0059	EA	81" Square, 36" High, Square Timber Planter	3,535.08	58.33

32 33 33 00-0060 Rectangular Timber Planters (32 33 33 00-0051)

32 33 33 00-0061	EA	21" x 14", 30" High, Rectangular Timber Planter	485.94	58.33
32 33 33 00-0062	EA	27" x 14", 30" High, Rectangular Timber Planter	538.51	58.33
32 33 33 00-0063	EA	27" x 21", 30" High, Rectangular Timber Planter	696.22	58.33
32 33 33 00-0064	EA	34" x 21", 30" High, Rectangular Timber Planter	766.32	58.33
32 33 33 00-0065	EA	41" x 21", 30" High, Rectangular Timber Planter	976.60	58.33
32 33 33 00-0066	EA	34" x 27", 30" High, Rectangular Timber Planter	1,128.48	58.33
32 33 33 00-0067	EA	41" x 27", 30" High, Rectangular Timber Planter	1,256.99	58.33
32 33 33 00-0068	EA	54" x 27", 30" High, Rectangular Timber Planter	1,624.99	58.33
32 33 33 00-0069	EA	54" x 34", 30" High, Rectangular Timber Planter	1,829.43	58.33
32 33 33 00-0070	EA	68" x 34", 36" High, Rectangular Timber Planter	2,080.60	58.33
32 33 33 00-0071	EA	54" x 41", 36" High, Rectangular Timber Planter	1,981.30	58.33
32 33 33 00-0072	EA	68" x 41", 36" High, Rectangular Timber Planter	2,238.32	58.33
32 33 33 00-0073	EA	81" x 41", 36" High, Rectangular Timber Planter	2,501.18	58.33

32 33 43 Site Seating and Tables (32 33)**32 33 43 13 Site Seating (32 33 43)****32 33 43 13-0001 Benches (Landscapeforms) (32 33 43 13)**

Note: Excludes embedding in concrete See CSI section 32 31 13 13-0001 for drilling and concrete.

32 33 43 13-0002	EA	72" Backless Wood Or PolySite Bench (Landscapeforms Balustrade)	1,652.47	97.21
32 33 43 13-0003	EA	72" Backed Wood Or PolySite Bench (Landscapeforms Balustrade)	2,060.72	97.21
32 33 43 13-0004	EA	96" Backed Wood Bench (Landscapeforms Balustrade)	2,323.17	97.21
32 33 43 13-0005	EA	End Loop Arms For Backed Bench (Landscapeforms Balustrade)	194.41	24.31
32 33 43 13-0006	EA	72" Backless Wood Or PolySite Bench (Landscapeforms Gretchen's)	1,804.61	97.21
32 33 43 13-0007	EA	96" Backless Wood Bench (Landscapeforms Gretchen's)	2,039.17	97.21
32 33 43 13-0008	EA	72" Backed Wood Or PolySite Bench (Landscapeforms Gretchen's)	2,223.01	97.21
32 33 43 13-0009	EA	96" Backed Wood Bench (Landscapeforms Gretchen's)	2,508.27	97.21
32 33 43 13-0010	EA	72" Backed Wood Or PolySite Bench With Armrest (Landscapeforms Gretchen's)	2,539.97	97.21
32 33 43 13-0011	EA	96" Backed Wood Bench With Armrest (Landscapeforms Gretchen's)	2,825.24	97.21
32 33 43 13-0012	EA	59" Backed Wood Or Metal Rod Bench (Landscapeforms Hyde Park)	3,291.30	97.21
32 33 43 13-0013	EA	75" Backed Wood Or Metal Rod Bench (Landscapeforms Hyde Park)	3,575.56	97.21
32 33 43 13-0014	EA	42" Backless Metal Grid Bench (Landscapeforms Manistee)	938.74	72.92
32 33 43 13-0015	EA	62" Backless Metal Grid Bench (Landscapeforms Manistee)	1,013.54	72.92
32 33 43 13-0016	EA	72" Backless Metal Grid Bench (Landscapeforms Manistee)	1,097.70	85.07
32 33 43 13-0017	EA	82" Backless Metal Grid Bench (Landscapeforms Manistee)	1,277.23	85.07
32 33 43 13-0018	EA	42" Backed Metal Grid Bench (Landscapeforms Manistee)	1,172.50	85.07
32 33 43 13-0019	EA	62" Backed Metal Grid Bench (Landscapeforms Manistee)	1,247.30	85.07
32 33 43 13-0020	EA	72" Backed Metal Grid Bench (Landscapeforms Manistee)	1,346.41	97.21
32 33 43 13-0021	EA	82" Backed Metal Grid Bench (Landscapeforms Manistee)	1,540.90	97.21
32 33 43 13-0022	EA	42" Backed Metal Grid Bench With Armrest Each End (Landscapeforms Manistee)	1,307.15	85.07
32 33 43 13-0023	EA	62" Backed Metal Grid Bench With Armrest Each End (Landscapeforms Manistee)	1,406.25	97.21
32 33 43 13-0024	EA	72" Backed Metal Grid Bench With Armrest Each End (Landscapeforms Manistee)	1,481.05	97.21
32 33 43 13-0025	EA	82" Backed Metal Grid Bench With Armrest Each End (Landscapeforms Manistee)	1,675.54	97.21
32 33 43 13-0026	EA	72" Backless Solid Wood Bench (Landscapeforms Palisade)	2,654.08	97.21
32 33 43 13-0027	EA	96" Backless Solid Wood Bench (Landscapeforms Palisade)	3,047.11	97.21
32 33 43 13-0028	EA	70" Backless Perforated Metal Bench (Landscapeforms Petoskey)	1,710.79	97.21
32 33 43 13-0029	EA	70" Dual Support Backed Perforated Metal Bench (Landscapeforms Petoskey)	2,060.72	97.21
32 33 43 13-0030	EA	70" Quad Support Backed Perforated Metal Bench (Landscapeforms Petoskey)	2,235.68	97.21
32 33 43 13-0031	EA	72" Backed Wood Bench (Landscapeforms Plainwell)	2,178.63	97.21
32 33 43 13-0032	EA	72" Backed Wood Bench With Center Arm (Landscapeforms Plainwell)	2,413.19	97.21
32 33 43 13-0033	EA	96" Backed Wood Bench (Landscapeforms Plainwell)	2,666.76	97.21
32 33 43 13-0034	EA	96" Backed Wood Bench With Center Arm (Landscapeforms Plainwell)	2,901.31	97.21
32 33 43 13-0035	EA	96" Backed Wood Bench With Two Center Arms (Landscapeforms Plainwell)	3,142.20	97.21
32 33 43 13-0036	EA	72" Backed Aluminum Bench (Landscapeforms Plainwell)	2,768.19	97.21
32 33 43 13-0037	EA	72" Backed Aluminum Bench With Center Arm (Landscapeforms Plainwell)	3,002.74	97.21
32 33 43 13-0038	EA	96" Backed Aluminum Bench (Landscapeforms Plainwell)	3,389.44	97.21
32 33 43 13-0039	EA	96" Backed Aluminum Bench With Center Arm (Landscapeforms Plainwell)	3,636.67	97.21
32 33 43 13-0040	EA	96" Backed Aluminum Bench With Two Center Arms (Landscapeforms Plainwell)	3,864.88	97.21
32 33 43 13-0041	EA	Backless Metal Grid Seats For Straight Runs (Landscapeforms Plexus)	631.83	24.31
32 33 43 13-0042	EA	Backless Metal Grid Seats For 60 Degree Radius (Landscapeforms Plexus)	847.36	24.31
32 33 43 13-0043	EA	Backless Metal Grid Seats For 120 Degree Radius (Landscapeforms Plexus)	847.36	24.31
32 33 43 13-0044	EA	Backed Metal Grid Seats For Straight Runs (Landscapeforms Plexus)	771.29	24.31
32 33 43 13-0045	EA	Narrow-Backed Metal Grid Seats For 60 Degree Radius (Landscapeforms Plexus)	955.13	24.31
32 33 43 13-0046	EA	Narrow-Backed Metal Grid Seats For 120 Degree Radius (Landscapeforms Plexus)	955.13	24.31
32 33 43 13-0047	EA	Wide-Backed Metal Grid Seats For 120 Degree Radius (Landscapeforms Plexus)	955.13	24.31
32 33 43 13-0048	EA	Armrest For Metal Grid Seats (Landscapeforms Presidio)	194.41	24.31
32 33 43 13-0049	EA	Backless Straight Metal Grid Seats (Landscapeforms Presidio)	885.40	24.31
32 33 43 13-0050	EA	Backless Straight Metal Grid Seats With One Arm (Landscapeforms Presidio)	980.49	24.31
32 33 43 13-0051	EA	Backless Straight Metal Grid Seats With Two Arms (Landscapeforms Presidio)	1,075.58	24.31
32 33 43 13-0052	EA	Backless Angled Metal Grid Seats (Landscapeforms Presidio)	1,069.24	24.31

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 33 43 13-0053	EA	Backless Angled Metal Grid Seats With One Arm (Landscapeforms Presidio)		1,164.33	24.31
32 33 43 13-0054	EA	Backless Angled Metal Grid Seats With Two Arms (Landscapeforms Presidio).....		1,259.42	24.31
32 33 43 13-0055	EA	Backed Straight Metal Grid Seats (Landscapeforms Presidio)		1,056.56	24.31
32 33 43 13-0056	EA	Backed Straight Metal Grid Seats With One Arm (Landscapeforms Presidio).....		1,151.65	24.31
32 33 43 13-0057	EA	Backed Straight Metal Grid Seats With Two Arms (Landscapeforms Presidio).....		1,246.74	24.31
32 33 43 13-0058	EA	Narrow-Backed Angled Metal Grid Seats (Landscapeforms Presidio).....		1,291.11	24.31
32 33 43 13-0059	EA	Narrow-Backed Angled Metal Grid Seats With One Arm (Landscapeforms Presidio).....		1,386.20	24.31
32 33 43 13-0060	EA	Narrow-Backed Angled Metal Grid Seats With Two Arms (Landscapeforms Presidio)		1,481.29	24.31
32 33 43 13-0061	EA	Wide-Backed Angled Metal Grid Seats (Landscapeforms Presidio).....		1,291.11	24.31
32 33 43 13-0062	EA	Wide-Backed Angled Metal Grid Seats With One Arm (Landscapeforms Presidio).....		1,386.20	24.31
32 33 43 13-0063	EA	Wide-Backed Angled Metal Grid Seats With Two Arms (Landscapeforms Presidio).....		1,481.29	24.31
32 33 43 13-0064	EA	48" Backless Horizontal Strap Bench (Landscapeforms Scarborough)		1,779.25	97.21
32 33 43 13-0065	EA	72" Backless Horizontal Strap Bench (Landscapeforms Scarborough)		1,804.61	97.21
32 33 43 13-0066	EA	96" Backless Horizontal Strap Bench (Landscapeforms Scarborough)		2,191.31	97.21
32 33 43 13-0067	EA	48" Backless Woven Bench (Landscapeforms Scarborough).....		2,654.08	97.21
32 33 43 13-0068	EA	72" Backless Woven Bench (Landscapeforms Scarborough).....		3,129.53	97.21
32 33 43 13-0069	EA	96" Backless Woven Bench (Landscapeforms Scarborough).....		3,579.62	97.21
32 33 43 13-0070	EA	24" Backed Horizontal Strap Bench (Landscapeforms Scarborough)		1,436.93	97.21
32 33 43 13-0071	EA	48" Backed Horizontal Strap Bench (Landscapeforms Scarborough)		1,906.04	97.21
32 33 43 13-0072	EA	72" Backed Horizontal Strap Bench (Landscapeforms Scarborough)		1,950.42	97.21
32 33 43 13-0073	EA	72" Backed Horizontal Strap Bench With Center Arm (Landscapeforms Scarborough)		2,242.02	97.21
32 33 43 13-0074	EA	96" Backed Horizontal Strap Bench (Landscapeforms Scarborough)		2,527.29	97.21
32 33 43 13-0075	EA	96" Backed Horizontal Strap Bench With Center Arm (Landscapeforms Scarborough)		2,825.24	97.21
32 33 43 13-0076	EA	96" Backed Horizontal Strap Bench With Two Intermediate Arms (Landscapeforms Scarborough)		3,116.85	97.21
32 33 43 13-0077	EA	24" Backed Woven Bench (Landscapeforms Scarborough).....		2,527.29	97.21
32 33 43 13-0078	EA	48" Backed Woven Bench (Landscapeforms Scarborough).....		3,053.45	97.21
32 33 43 13-0079	EA	72" Backed Woven Bench (Landscapeforms Scarborough).....		3,566.94	97.21
32 33 43 13-0080	EA	72" Backed Woven Bench With Center Arm (Landscapeforms Scarborough).....		3,864.88	97.21
32 33 43 13-0081	EA	96" Backed Woven Bench (Landscapeforms Scarborough).....		4,498.81	97.21
32 33 43 13-0082	EA	96" Backed Woven Bench With Center Arm (Landscapeforms Scarborough).....		4,790.42	97.21
32 33 43 13-0083	EA	96" Backed Woven Bench With Two Intermediate Arms (Landscapeforms Scarborough).....		5,075.69	97.21
32 33 43 13-0084	EA	32" Backed Strap Or Perforated Bench (Landscapeforms Town Square)		1,216.11	85.07
32 33 43 13-0085	EA	49" Backed Strap Or Perforated Bench (Landscapeforms Town Square)		1,463.35	85.07
32 33 43 13-0086	EA	49" Backed Strap Or Perforated Bench With Divider (Landscapeforms Town Square).....		1,596.47	85.07
32 33 43 13-0087	EA	70" Backed Strap Or Perforated Bench (Landscapeforms Town Square)		1,868.01	97.21
32 33 43 13-0088	EA	70" Backed Strap Or Perforated Bench With Two Dividers (Landscapeforms Town Square)		2,115.24	97.21
32 33 43 13-0089	Benches (Columbia Cascade, TimberForm) (32 33 43 13)				
32 33 43 13-0090	Wood Benches (Columbia Cascade, TimberForm) (32 33 43 13-0089)				
Note: Includes powder coated steel frames.					
32 33 43 13-0091	EA	70" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2006-6-E).....		873.49	48.61
32 33 43 13-0092	EA	94" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2006-8-E).....		1,001.76	48.61
32 33 43 13-0093	EA	118" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2006-10-E).....		1,283.91	48.61
32 33 43 13-0094	EA	70" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2006-6-P).....		912.00	48.61
32 33 43 13-0095	EA	94" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2006-8-P).....		1,040.24	48.61
32 33 43 13-0096	EA	118" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2006-10-P).....		1,335.22	48.61
32 33 43 13-0097	EA	70" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Bench With Straight Back (TimberForm 2016-6-E).....		1,335.22	48.61
32 33 43 13-0098	EA	94" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Bench With Straight Back (TimberForm 2016-8-E).....		1,553.24	48.61
32 33 43 13-0099	EA	118" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Bench With Straight Back (TimberForm 2016-10-E).....		2,002.11	48.61
32 33 43 13-0100	EA	70" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Bench With Straight Back (TimberForm 2016-6-P).....		1,399.34	48.61
32 33 43 13-0101	EA	94" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Bench With Straight Back (TimberForm 2016-8-P).....		1,617.36	48.61
32 33 43 13-0102	EA	118" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Bench With Straight Back (TimberForm 2016-10-P).....		2,091.88	48.61
32 33 43 13-0103	EA	70" Length, Embedment Mount, Back-To-Back Double Bench, 3 x 4 And 3 x 8 Wood Slats Benches With Straight Backs (TimberForm 2026-6-E).....		2,579.23	48.61
32 33 43 13-0104	EA	94" Length, Embedment Mount, Back-To-Back Double Bench, 3 x 4 And 3 x 8 Wood Slats Benches With Straight Backs (TimberForm 2026-8-E).....		3,028.10	48.61
32 33 43 13-0105	EA	118" Length, Embedment Mount, Back-To-Back Double Bench, 3 x 4 And 3 x 8 Wood Slats Benches With Straight Backs (TimberForm 2026-10-E).....		3,964.31	48.61
32 33 43 13-0106	EA	70" Length, Pedestal Mount, Back-To-Back Double Bench, 3 x 4 And 3 x 8 Wood Slats Benches With Straight Backs (TimberForm 2026-6-P).....		2,643.35	48.61
32 33 43 13-0107	EA	94" Length, Pedestal Mount, Back-To-Back Double Bench, 3 x 4 And 3 x 8 Wood Slats Benches With Straight Backs (TimberForm 2026-8-P).....		3,092.22	48.61
32 33 43 13-0108	EA	118" Length, Pedestal Mount, Back-To-Back Double Bench, 3 x 4 And 3 x 8 Wood Slats Benches With Straight Backs (TimberForm 2026-10-P).....		4,054.09	48.61
32 33 43 13-0109	EA	70" Length, Embedment Mount, 3 x 4 Wood Slats Concave Bench (TimberForm 2028-6-E).....		1,014.59	48.61
32 33 43 13-0110	EA	94" Length, Embedment Mount, 3 x 4 Wood Slats Concave Bench (TimberForm 2028-8-E).....		1,142.84	48.61
32 33 43 13-0111	EA	70" Length, Pedestal Mount, 3 x 4 Wood Slats Concave Bench (TimberForm 2028-6-P).....		1,053.07	48.61
32 33 43 13-0112	EA	94" Length, Pedestal Mount, 3 x 4 Wood Slats Concave Bench (TimberForm 2028-8-P).....		1,181.32	48.61
32 33 43 13-0113	EA	46" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Platform Seat (TimberForm 2044-4-E).....		1,694.31	48.61
32 33 43 13-0114	EA	70" Length, Embedment Mount, 3 x 4 And 3 x 8 Wood Slats Platform Seat (TimberForm 2044-6-E).....		2,002.11	48.61
32 33 43 13-0115	EA	46" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Platform Seat (TimberForm 2044-4-P).....		1,796.91	48.61
32 33 43 13-0116	EA	70" Length, Pedestal Mount, 3 x 4 And 3 x 8 Wood Slats Platform Seat (TimberForm 2044-6-P).....		2,104.71	48.61
32 33 43 13-0117	EA	70" Length, Wall Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2045-6).....		1,066.59	72.92
32 33 43 13-0118	EA	94" Length, Wall Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2045-8).....		1,117.89	72.92
32 33 43 13-0119	EA	118" Length, Wall Mount, 3 x 4 And 3 x 8 Wood Slats Bench (TimberForm 2045-10).....		1,515.46	72.92
32 33 43 13-0120	EA	46" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-4-E).....		822.22	48.61
32 33 43 13-0121	EA	70" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-6-E).....		950.47	48.61
32 33 43 13-0122	EA	94" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-8-E).....		1,078.72	48.61
32 33 43 13-0123	EA	118" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-10-E).....		1,386.52	48.61
32 33 43 13-0124	EA	142" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-12-E).....		1,514.76	48.61

32 Exterior Improvements**32 30 Site Improvements****32 33 Site Furnishings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 33 43 13-0125	EA	46" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-4-P).....	835.05	48.61
32 33 43 13-0126	EA	70" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-6-P).....	963.30	48.61
32 33 43 13-0127	EA	94" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-8-P).....	1,091.54	48.61
32 33 43 13-0128	EA	118" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-10-P).....	1,424.99	48.61
32 33 43 13-0129	EA	142" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench (TimberForm 2139-12-P).....	1,553.24	48.61
32 33 43 13-0130	EA	70" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-6-E).....	1,412.17	48.61
32 33 43 13-0131	EA	94" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-8-E).....	1,630.19	48.61
32 33 43 13-0132	EA	118" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-10-E).....	2,104.71	48.61
32 33 43 13-0133	EA	142" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-12-E).....	2,322.73	48.61
32 33 43 13-0134	EA	70" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-6-P).....	1,437.82	48.61
32 33 43 13-0135	EA	94" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-8-P).....	1,655.84	48.61
32 33 43 13-0136	EA	118" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-10-P).....	2,143.18	48.61
32 33 43 13-0137	EA	142" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2140-12-P).....	2,361.20	48.61
32 33 43 13-0138	EA	70" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-6-E).....	1,412.17	48.61
32 33 43 13-0139	EA	82" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-7-E).....	1,989.28	48.61
32 33 43 13-0140	EA	94" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-8-E).....	1,771.26	48.61
32 33 43 13-0141	EA	118" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-10-E).....	2,335.56	48.61
32 33 43 13-0142	EA	142" Length, Embedment Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-12-E).....	2,553.58	48.61
32 33 43 13-0143	EA	70" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-6-P).....	1,617.36	48.61
32 33 43 13-0144	EA	82" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-7-P).....	2,027.76	48.61
32 33 43 13-0145	EA	94" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-8-P).....	1,796.91	48.61
32 33 43 13-0146	EA	118" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-10-P).....	2,374.03	48.61
32 33 43 13-0147	EA	142" Length, Pedestal Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2141-12-P).....	2,592.05	48.61
32 33 43 13-0148	EA	70" Length, Wall Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2142-6).....	1,489.82	72.92
32 33 43 13-0149	EA	94" Length, Wall Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2142-8).....	1,720.66	72.92
32 33 43 13-0150	EA	118" Length, Wall Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back (TimberForm 2142-10).....	2,208.01	72.92
32 33 43 13-0151	EA	70" Length, Wall Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2143-6).....	1,630.89	72.92
32 33 43 13-0152	EA	94" Length, Wall Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2143-8).....	1,861.74	72.92
32 33 43 13-0153	EA	118" Length, Wall Mount, 3 x 4 Patterned Wood Slats Bench With Contoured Back And Armrests (TimberForm 2143-10).....	2,426.03	72.92

32 33 43 13-0154 Recycled Plastic Benches (Columbia Cascade, TimberForm) (32 33 43 13-0089)

Note: Includes powder coated steel frames.

32 33 43 13-0155	EA	70" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Concave Bench (TimberForm 2029-6-E).....	1,194.14	48.61
32 33 43 13-0156	EA	94" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Concave Bench (TimberForm 2029-8-E).....	1,630.19	48.61
32 33 43 13-0157	EA	70" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Concave Bench (TimberForm 2029-6-P).....	1,232.62	48.61
32 33 43 13-0158	EA	94" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Concave Bench (TimberForm 2029-8-P).....	1,668.66	48.61
32 33 43 13-0159	EA	46" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Platform Seat (TimberForm 2041-4-E).....	1,873.86	48.61
32 33 43 13-0160	EA	70" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Platform Seat (TimberForm 2041-6-E).....	2,194.48	48.61
32 33 43 13-0161	EA	46" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Platform Seat (TimberForm 2041-4-P).....	1,976.46	48.61
32 33 43 13-0162	EA	70" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Platform Seat (TimberForm 2041-6-P).....	2,297.08	48.61
32 33 43 13-0163	EA	70" Length, Wall Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2042-6).....	1,194.84	72.92
32 33 43 13-0164	EA	94" Length, Wall Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2042-8).....	1,438.52	72.92
32 33 43 13-0165	EA	118" Length, Wall Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2042-10).....	1,695.01	72.92
32 33 43 13-0166	EA	70" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2007-6-E).....	976.09	48.61
32 33 43 13-0167	EA	94" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2007-8-E).....	1,309.56	48.61
32 33 43 13-0168	EA	118" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2007-10-E).....	1,566.05	48.61
32 33 43 13-0169	EA	70" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2007-6-P).....	1,014.59	48.61
32 33 43 13-0170	EA	94" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2007-8-P).....	1,348.04	48.61
32 33 43 13-0171	EA	118" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Bench (TimberForm 2007-10-P).....	1,617.36	48.61
32 33 43 13-0172	EA	70" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Bench With Straight Back (TimberForm 2017-6-E).....	1,553.24	48.61
32 33 43 13-0173	EA	94" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Bench With Straight Back (TimberForm 2017-8-E).....	2,091.88	48.61
32 33 43 13-0174	EA	118" Length, Embedment Mount, 3 x 4 Recycled Plastic Slats Bench With Straight Back (TimberForm 2017-10-E).....	2,540.75	48.61
32 33 43 13-0175	EA	70" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Bench With Straight Back (TimberForm 2017-6-P).....	1,617.36	48.61
32 33 43 13-0176	EA	94" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Bench With Straight Back (TimberForm 2017-8-P).....	2,181.66	48.61
32 33 43 13-0177	EA	118" Length, Pedestal Mount, 3 x 4 Recycled Plastic Slats Bench With Straight Back (TimberForm 2017-10-P).....	2,630.53	48.61
32 33 43 13-0178	EA	70" Length, Embedment Mount, Back-To-Back Double Bench, 3 x 4 Recycled Plastic Slats Benches With Straight Backs (TimberForm 2027-6-E).....	3,028.10	48.61
32 33 43 13-0179	EA	94" Length, Embedment Mount, Back-To-Back Double Bench, 3 x 4 Recycled Plastic Slats Benches With Straight Backs (TimberForm 2027-8-E).....	4,169.51	48.61
32 33 43 13-0180	EA	118" Length, Embedment Mount, Back-To-Back Double Bench, 3 x 4 Recycled Plastic Slats Benches With Straight Backs (TimberForm 2027-10-E).....	4,618.38	48.61
32 33 43 13-0181	EA	70" Length, Pedestal Mount, Back-To-Back Double Bench, 3 x 4 Recycled Plastic Slats Benches With Straight Backs (TimberForm 2027-6-P).....	3,092.22	48.61
32 33 43 13-0182	EA	94" Length, Pedestal Mount, Back-To-Back Double Bench, 3 x 4 Recycled Plastic Slats Benches With Straight Backs (TimberForm 2027-8-P).....	4,259.28	48.61
32 33 43 13-0183	EA	118" Length, Pedestal Mount, Back-To-Back Double Bench, 3 x 4 Recycled Plastic Slats Benches With Straight Backs (TimberForm 2027-10-P).....	4,708.15	48.61

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 33 43 13-0184 EA 70" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-6-E).....	1,899.51	48.61
32 33 43 13-0185 EA 82" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-7-E).....	2,643.35	48.61
32 33 43 13-0186 EA 94" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-8-E).....	2,527.93	48.61
32 33 43 13-0187 EA 118" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-10-E).....	2,899.85	48.61
32 33 43 13-0188 EA 142" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-12-E).....	3,900.19	48.61
32 33 43 13-0189 EA 70" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-6-P).....	1,925.16	48.61
32 33 43 13-0190 EA 82" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-7-P).....	2,681.83	48.61
32 33 43 13-0191 EA 94" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-8-P).....	2,566.40	48.61
32 33 43 13-0192 EA 118" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-10-P).....	2,938.32	48.61
32 33 43 13-0193 EA 142" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2155-12-P).....	3,964.31	48.61
32 33 43 13-0194 EA 70" Length, Wall Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2154-6).....	1,810.44	72.92
32 33 43 13-0195 EA 94" Length, Wall Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2154-8).....	2,438.85	72.92
32 33 43 13-0196 EA 118" Length, Wall Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2154-10).....	3,015.97	72.92
32 33 43 13-0197 EA 70" Length, Wall Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2156-6).....	2,028.46	72.92
32 33 43 13-0198 EA 94" Length, Wall Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2156-8).....	2,708.18	72.92
32 33 43 13-0199 EA 118" Length, Wall Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back And Armrests (TimberForm 2156-10).....	2,977.50	72.92
32 33 43 13-0200 EA 46" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-4-E).....	873.52	48.61
32 33 43 13-0201 EA 70" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-6-E).....	1,142.84	48.61
32 33 43 13-0202 EA 94" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-8-E).....	1,540.41	48.61
32 33 43 13-0203 EA 118" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-10-E).....	1,809.74	48.61
32 33 43 13-0204 EA 142" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-12-E).....	2,104.71	48.61
32 33 43 13-0205 EA 46" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-4-P).....	899.17	48.61
32 33 43 13-0206 EA 70" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-6-P).....	1,168.49	48.61
32 33 43 13-0207 EA 94" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-8-P).....	1,578.89	48.61
32 33 43 13-0208 EA 118" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-10-P).....	1,848.21	48.61
32 33 43 13-0209 EA 142" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench (TimberForm 2151-12-P).....	2,156.01	48.61
32 33 43 13-0210 EA 70" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-6-E).....	1,694.31	48.61
32 33 43 13-0211 EA 94" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-8-E).....	2,322.73	48.61
32 33 43 13-0212 EA 118" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-10-E).....	2,861.37	48.61
32 33 43 13-0213 EA 142" Length, Embedment Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-12-E).....	3,220.47	48.61
32 33 43 13-0214 EA 70" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-6-P).....	1,719.96	48.61
32 33 43 13-0215 EA 94" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-8-P).....	2,361.20	48.61
32 33 43 13-0216 EA 118" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-10-P).....	2,899.85	48.61
32 33 43 13-0217 EA 142" Length, Pedestal Mount, 3 x 4 Patterned Recycled Plastic Slats Bench With Contoured Back (TimberForm 2153-12-P).....	3,271.77	48.61
32 33 43 53 Site Tables (32 33 43)		
32 33 43 53-0001 Tables (32 33 43 53)		
32 33 43 53-0002 Tables (Wabash) (32 33 43 53-0001)		
32 33 43 53-0003 EA Spyder ADA Round Table (Wabash SY203P).....	2,570.08	87.49
32 33 43 53-0004 EA Shelter With 6' Table (Wabash SH105P).....	7,783.70	87.49
32 33 43 53-0005 EA 46" Round Table With Attached Chairs, Bench Seats, Solid Top With Square Perforation Seats, Portable/Surface Mount (Wabash CA2Q50C).....	2,363.91	87.49
32 33 43 53-0006 EA 46" Round Table With Attached Chairs, Bench Seats, Solid Top With Square Perforation Seats, Inground (Wabash CA2Q50I).....	2,535.17	97.21
32 33 43 53-0007 Tables (Landscapeforms) (32 33 43 53-0001)		
32 33 43 53-0008 EA Plexus Companion Table For Backed Seat, Straight Runs.....	815.68	90.89
32 33 43 53-0009 EA Companion Table For Narrow-Backed Seat, For 60 Degree Radius (Landscapeforms Plexus).....	1,018.54	90.89
32 33 43 53-0010 EA Companion Table For Narrow-Backed Seat, For 120 Degree Radius (Landscapeforms Plexus).....	1,018.54	90.89
32 33 43 53-0011 EA Companion Table For Wide-Backed Seat, For 120 Degree Radius (Landscapeforms Plexus).....	1,018.54	90.89
32 33 43 53-0012 EA 6-Person Picnic Table (Landscapeforms Manistee).....	3,062.84	90.89
32 33 43 53-0013 EA 4-Person Picnic Table (Landscapeforms Manistee).....	2,722.04	90.89
32 33 43 53-0014 EA 2-Person Picnic Table (Landscapeforms Manistee).....	2,409.63	90.89
32 33 43 53-0015 EA Umbrella Stand For Picnic Table (Landscapeforms).....	253.57	
32 33 43 53-0016 EA 32" x 72" Picnic Table (Landscapeforms Petoskey).....	2,417.97	87.49

32 Exterior Improvements**32 30 Site Improvements****32 33 Site Furnishings**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 33 43 53-0017	EA	62" Backless Metal Rod Bench (Landscapeforms Petoskey)	1,277.23	68.05
32 33 43 53-0018	EA	29" Backless Metal Rod Bench (Landscapeforms Petoskey)	1,067.77	68.05
32 33 43 53-0019	EA	58" x 54" x 30" Wood Or PolySite Picnic Table With Benches (Landscapeforms Gretchen)	2,830.53	87.49
32 33 43 53-0020	EA	3 Seat Table, Backless, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	2,722.04	90.89
32 33 43 53-0021	EA	4 Seat Table, Backless, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	2,722.04	90.89
32 33 43 53-0022	EA	5 Seat Table, Backless, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	3,531.44	90.89
32 33 43 53-0023	EA	6 Seat Table, Backless, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	3,531.44	90.89
32 33 43 53-0024	EA	3 Seat Table, Backless, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	2,906.64	90.89
32 33 43 53-0025	EA	4 Seat Table, Backless, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	2,906.64	90.89
32 33 43 53-0026	EA	5 Seat Table, Backless, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,716.04	90.89
32 33 43 53-0027	EA	6 Seat Table, Backless, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,716.04	90.89
32 33 43 53-0028	EA	3 Seat Table, Backless, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	2,835.64	90.89
32 33 43 53-0029	EA	4 Seat Table, Backless, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	2,835.64	90.89
32 33 43 53-0030	EA	5 Seat Table, Backless, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	3,701.84	90.89
32 33 43 53-0031	EA	6 Seat Table, Backless, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	3,701.84	90.89
32 33 43 53-0032	EA	3 Seat Table, Backless, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,020.24	90.89
32 33 43 53-0033	EA	4 Seat Table, Backless, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,020.24	90.89
32 33 43 53-0034	EA	5 Seat Table, Backless, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,886.44	90.89
32 33 43 53-0035	EA	6 Seat Table, Backless, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,886.44	90.89
32 33 43 53-0036	EA	3 Seat Table, Backed, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	2,892.44	90.89
32 33 43 53-0037	EA	4 Seat Table, Backed, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	2,892.44	90.89
32 33 43 53-0038	EA	5 Seat Table, Backed, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	3,716.04	90.89
32 33 43 53-0039	EA	6 Seat Table, Backed, Grid Seats And Fiberglass Top (Landscapeforms Carousel)	3,716.04	90.89
32 33 43 53-0040	EA	3 Seat Table, Backed, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,077.04	90.89
32 33 43 53-0041	EA	4 Seat Table, Backed, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,077.04	90.89
32 33 43 53-0042	EA	5 Seat Table, Backed, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,900.64	90.89
32 33 43 53-0043	EA	6 Seat Table, Backed, Grid Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,900.64	90.89
32 33 43 53-0044	EA	3 Seat Table, Backed, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	3,034.44	90.89
32 33 43 53-0045	EA	4 Seat Table, Backed, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	3,034.44	90.89
32 33 43 53-0046	EA	5 Seat Table, Backed, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	3,929.04	90.89
32 33 43 53-0047	EA	6 Seat Table, Backed, Perforated Seats And Fiberglass Top (Landscapeforms Carousel)	3,929.04	90.89
32 33 43 53-0048	EA	3 Seat Table, Backed, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,219.04	90.89
32 33 43 53-0049	EA	4 Seat Table, Backed, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	3,219.04	90.89
32 33 43 53-0050	EA	5 Seat Table, Backed, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	4,113.64	90.89
32 33 43 53-0051	EA	6 Seat Table, Backed, Perforated Seats And Fiberglass Polished Granite Top (Landscapeforms Carousel)	4,113.64	90.89
32 33 43 53-0052	EA	3 Seat Table, Backless, Grid Seats And Catena Top (Landscapeforms Carousel)	2,527.29	90.89
32 33 43 53-0053	EA	4 Seat Table, Backless, Grid Seats And Catena Top (Landscapeforms Carousel)	2,527.29	90.89
32 33 43 53-0054	EA	5 Seat Table, Backless, Grid Seats And Catena Top (Landscapeforms Carousel)	3,326.04	90.89
32 33 43 53-0055	EA	6 Seat Table, Backless, Grid Seats And Catena Top (Landscapeforms Carousel)	3,326.04	90.89
32 33 43 53-0056	EA	3 Seat Table, Backless, Grid Seats And Steelhead Top (Landscapeforms Carousel)	2,628.72	90.89
32 33 43 53-0057	EA	4 Seat Table, Backless, Grid Seats And Steelhead Top (Landscapeforms Carousel)	2,628.72	90.89
32 33 43 53-0058	EA	5 Seat Table, Backless, Grid Seats And Steelhead Top (Landscapeforms Carousel)	3,414.79	90.89
32 33 43 53-0059	EA	6 Seat Table, Backless, Grid Seats And Steelhead Top (Landscapeforms Carousel)	3,414.79	90.89
32 33 43 53-0060	EA	3 Seat Table, Backless, Perforated Seats And Catena Top (Landscapeforms Carousel)	2,641.40	90.89
32 33 43 53-0061	EA	4 Seat Table, Backless, Perforated Seats And Catena Top (Landscapeforms Carousel)	2,641.40	90.89
32 33 43 53-0062	EA	5 Seat Table, Backless, Perforated Seats And Catena Top (Landscapeforms Carousel)	3,478.19	90.89
32 33 43 53-0063	EA	6 Seat Table, Backless, Perforated Seats And Catena Top (Landscapeforms Carousel)	3,478.19	90.89
32 33 43 53-0064	EA	3 Seat Table, Backless, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	2,730.15	90.89
32 33 43 53-0065	EA	4 Seat Table, Backless, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	2,730.15	90.89
32 33 43 53-0066	EA	5 Seat Table, Backless, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	3,566.94	90.89
32 33 43 53-0067	EA	6 Seat Table, Backless, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	3,566.94	90.89
32 33 43 53-0068	EA	3 Seat Table, Backed, Grid Seats And Catena Top (Landscapeforms Carousel)	2,692.11	90.89
32 33 43 53-0069	EA	4 Seat Table, Backed, Grid Seats And Catena Top (Landscapeforms Carousel)	2,692.11	90.89
32 33 43 53-0070	EA	5 Seat Table, Backed, Grid Seats And Catena Top (Landscapeforms Carousel)	3,503.54	90.89
32 33 43 53-0071	EA	6 Seat Table, Backed, Grid Seats And Catena Top (Landscapeforms Carousel)	3,503.54	90.89
32 33 43 53-0072	EA	3 Seat Table, Backed, Grid Seats And Steelhead Top (Landscapeforms Carousel)	2,787.20	90.89
32 33 43 53-0073	EA	4 Seat Table, Backed, Grid Seats And Steelhead Top (Landscapeforms Carousel)	2,787.20	90.89
32 33 43 53-0074	EA	5 Seat Table, Backed, Grid Seats And Steelhead Top (Landscapeforms Carousel)	3,592.29	90.89
32 33 43 53-0075	EA	6 Seat Table, Backed, Grid Seats And Steelhead Top (Landscapeforms Carousel)	3,592.29	90.89
32 33 43 53-0076	EA	3 Seat Table, Backed, Perforated Seats And Catena Top (Landscapeforms Carousel)	2,850.60	90.89
32 33 43 53-0077	EA	4 Seat Table, Backed, Perforated Seats And Catena Top (Landscapeforms Carousel)	2,850.60	90.89
32 33 43 53-0078	EA	5 Seat Table, Backed, Perforated Seats And Catena Top (Landscapeforms Carousel)	3,750.78	90.89
32 33 43 53-0079	EA	6 Seat Table, Backed, Perforated Seats And Catena Top (Landscapeforms Carousel)	3,750.78	90.89
32 33 43 53-0080	EA	3 Seat Table, Backed, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	2,939.35	90.89
32 33 43 53-0081	EA	4 Seat Table, Backed, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	2,939.35	90.89
32 33 43 53-0082	EA	5 Seat Table, Backed, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	3,839.53	90.89
32 33 43 53-0083	EA	6 Seat Table, Backed, Perforated Seats And Steelhead Top (Landscapeforms Carousel)	3,839.53	90.89

32 33 43 53-0084 Tables (Columbia Cascade Co. - TimberForm) (32 33 43 53-0001)

32 33 43 53-0085	EA	Table With Four Chairs (Columbia Cascade Co. 2052-E)	4,754.94	113.55
32 33 43 53-0086	EA	Table With Four Chairs (Columbia Cascade Co. 2052-P)	5,802.86	113.55
32 33 43 53-0087	EA	Accessible Table With Three Chairs (Columbia Cascade Co. 2053-E)	4,012.66	113.55
32 33 43 53-0088	EA	Accessible Table With Three Chairs (Columbia Cascade Co. 2053-P)	5,002.36	113.55
32 33 43 53-0089	EA	Table With Four Seats (Columbia Cascade Co. 2054-E)	2,673.64	113.55
32 33 43 53-0090	EA	Table With Four Seats (Columbia Cascade Co. 2054-P)	2,906.51	113.55
32 33 43 53-0091	EA	Accessible Table With Three Seats (Columbia Cascade Co. 2055-E)	2,280.67	113.55
32 33 43 53-0092	EA	Accessible Table With Three Seats (Columbia Cascade Co. 2055-P)	2,484.43	113.55
32 33 43 53-0093	EA	Integral Table With Four Seats (Columbia Cascade Co. 2056-E)	2,979.29	113.55
32 33 43 53-0094	EA	Integral Table With Four Seats (Columbia Cascade Co. 2056-P)	3,183.05	113.55
32 33 43 53-0095	EA	Integral Table With Four Seats (Columbia Cascade Co. 2056-R)	4,813.15	113.55

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 33 43 53-0096 EA Accessible Integral Table With Four Seats (Columbia Cascade Co. 2057-E)	2,644.53	113.55
32 33 43 53-0097 EA Accessible Integral Table With Four Seats (Columbia Cascade Co. 2057-P)	2,848.30	113.55
32 33 43 53-0098 EA Accessible Integral Table With Four Seats (Columbia Cascade Co. 2057-R)	4,478.40	113.55
32 33 43 53-0099 EA Standard Picnic Table And Seats (Columbia Cascade Co. 2062)	3,284.93	113.55
32 33 43 53-0100 EA Standard Picnic Table And Seats (Columbia Cascade Co. 2062-P)	3,517.80	113.55
32 33 43 53-0101 EA Accessible Picnic Table And Seats (Columbia Cascade Co. 2063-E)	3,838.00	113.55
32 33 43 53-0102 EA Accessible Picnic Table And Seats (Columbia Cascade Co. 2063-P)	4,070.87	113.55
32 33 43 53-0103 EA Accessible Picnic Table And Benches (Columbia Cascade Co. 2072-E)	4,813.15	113.55
32 33 43 53-0104 EA Accessible Picnic Table And Benches (Columbia Cascade Co. 2072-P)	5,046.02	113.55
32 33 43 53-0105 EA Standard Picnic Table And Benches (Columbia Cascade Co. 2073-E)	4,813.15	113.55
32 33 43 53-0106 EA Standard Picnic Table And Benches (Columbia Cascade Co. 2073-P)	5,046.02	113.55
32 33 43 53-0107 EA Standard Picnic Table And Seats (Columbia Cascade Co. 2074-6)	1,130.58	45.40
32 33 43 53-0108 EA Accessible Picnic Table And Seats (Columbia Cascade Co. 2075-6)	1,509.00	45.40
32 33 43 53-0109 EA Gameboard (Columbia Cascade Co. 2095)	325.15	22.74
32 33 43 53-0110 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2162-6-E)	3,284.93	113.55
32 33 43 53-0111 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2162-8-E)	3,750.67	113.55
32 33 43 53-0112 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2162-6-P)	3,517.80	113.55
32 33 43 53-0113 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2162-8-P)	3,983.55	113.55
32 33 43 53-0114 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2163-6-E)	3,648.79	113.55
32 33 43 53-0115 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2163-8-E)	4,114.54	113.55
32 33 43 53-0116 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2163-6-P)	3,881.66	113.55
32 33 43 53-0117 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2163-8-P)	4,347.41	113.55
32 33 43 53-0118 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2164-6)	3,080.88	45.40
32 33 43 53-0119 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2164-8)	3,459.30	45.40
32 33 43 53-0120 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2165-6)	3,444.75	45.40
32 33 43 53-0121 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2165-8)	3,823.16	45.40
32 33 43 53-0122 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2638-6-E)	7,753.16	113.55
32 33 43 53-0123 EA Standard Picnic Table With Seats (Columbia Cascade Co. 2638-6-P)	8,568.21	113.55
32 33 43 53-0124 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2639-6-E)	7,753.16	113.55
32 33 43 53-0125 EA Accessible Picnic Table With Seats (Columbia Cascade Co. 2639-6-P)	8,568.21	113.55
32 33 43 53-0126 EA Round Table With Center Support (Columbia Cascade Co. 2902-0030-E)	1,916.81	113.55
32 33 43 53-0127 EA Round Table With Center Support (Columbia Cascade Co. 2902-0036-E)	2,106.02	113.55
32 33 43 53-0128 EA Round Table With Center Support (Columbia Cascade Co. 2902-0042-E)	2,295.22	113.55
32 33 43 53-0129 EA Round Table With Center Support (Columbia Cascade Co. 2902-0030-P)	2,047.80	113.55
32 33 43 53-0130 EA Round Table With Center Support (Columbia Cascade Co. 2902-0036-P)	2,237.01	113.55
32 33 43 53-0131 EA Round Table With Center Support (Columbia Cascade Co. 2902-0042-P)	2,426.22	113.55
32 33 43 53-0132 EA Square Table With Center Support (Columbia Cascade Co. 2902-3030-E)	1,873.14	113.55
32 33 43 53-0133 EA Square Table With Center Support (Columbia Cascade Co. 2902-3636-E)	2,004.13	113.55
32 33 43 53-0134 EA Square Table With Center Support (Columbia Cascade Co. 2902-4242-E)	2,135.12	113.55
32 33 43 53-0135 EA Square Table With Center Support (Columbia Cascade Co. 2902-3030-P)	2,004.13	113.55
32 33 43 53-0136 EA Square Table With Center Support (Columbia Cascade Co. 2902-3636-P)	2,135.12	113.55
32 33 43 53-0137 EA Square Table With Center Support (Columbia Cascade Co. 2902-4242-P)	2,266.12	113.55
32 33 43 53-0138 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0030-E)	1,814.93	113.55
32 33 43 53-0139 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0036-E)	2,004.13	113.55
32 33 43 53-0140 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0042-E)	2,193.34	113.55
32 33 43 53-0141 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0030-P)	1,814.93	113.55
32 33 43 53-0142 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0036-P)	2,004.13	113.55
32 33 43 53-0143 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0042-P)	2,193.34	113.55
32 33 43 53-0144 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0030-L)	1,814.93	113.55
32 33 43 53-0145 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0036-L)	2,004.13	113.55
32 33 43 53-0146 EA Round Table With Four Legs (Columbia Cascade Co. 2905-0042-L)	2,193.34	113.55
32 33 43 53-0147 EA Square Table With Four Legs (Columbia Cascade Co. 2905-3030-E)	1,727.60	113.55
32 33 43 53-0148 EA Square Table With Four Legs (Columbia Cascade Co. 2905-3636-E)	1,858.59	113.55
32 33 43 53-0149 EA Square Table With Four Legs (Columbia Cascade Co. 2905-4242-E)	1,989.58	113.55
32 33 43 53-0150 EA Square Table With Four Legs (Columbia Cascade Co. 2905-3030-P)	1,727.60	113.55
32 33 43 53-0151 EA Square Table With Four Legs (Columbia Cascade Co. 2905-3636-P)	1,858.59	113.55
32 33 43 53-0152 EA Square Table With Four Legs (Columbia Cascade Co. 2905-4242-P)	1,989.58	113.55
32 33 43 53-0153 EA Square Table With Four Legs (Columbia Cascade Co. 2905-3030-L)	1,727.60	113.55
32 33 43 53-0154 EA Square Table With Four Legs (Columbia Cascade Co. 2905-3636-L)	1,858.59	113.55
32 33 43 53-0155 EA Square Table With Four Legs (Columbia Cascade Co. 2905-4242-L)	1,989.58	113.55
32 33 43 53-0156 EA Round Table With Center Support (Columbia Cascade Co. 2912-0030-E)	1,654.83	113.55
32 33 43 53-0157 EA Round Table With Center Support (Columbia Cascade Co. 2912-0036-E)	1,844.04	113.55
32 33 43 53-0158 EA Round Table With Center Support (Columbia Cascade Co. 2912-0042-E)	2,033.24	113.55
32 33 43 53-0159 EA Round Table With Center Support (Columbia Cascade Co. 2912-0030-P)	1,785.82	113.55
32 33 43 53-0160 EA Round Table With Center Support (Columbia Cascade Co. 2912-0036-P)	1,975.03	113.55
32 33 43 53-0161 EA Round Table With Center Support (Columbia Cascade Co. 2912-0042-P)	2,164.23	113.55
32 33 43 53-0162 EA Square Table With Center Support (Columbia Cascade Co. 2912-3030-E)	1,538.39	113.55
32 33 43 53-0163 EA Square Table With Center Support (Columbia Cascade Co. 2912-3636-E)	1,654.83	113.55
32 33 43 53-0164 EA Square Table With Center Support (Columbia Cascade Co. 2912-4242-E)	1,785.82	113.55
32 33 43 53-0165 EA Square Table With Center Support (Columbia Cascade Co. 2912-3030-P)	1,654.83	113.55
32 33 43 53-0166 EA Square Table With Center Support (Columbia Cascade Co. 2912-3636-P)	1,785.82	113.55
32 33 43 53-0167 EA Square Table With Center Support (Columbia Cascade Co. 2912-4242-P)	1,916.81	113.55
32 33 43 53-0168 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0030-E)	1,742.15	113.55
32 33 43 53-0169 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0036-E)	1,931.36	113.55
32 33 43 53-0170 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0042-E)	2,120.57	113.55
32 33 43 53-0171 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0030-P)	1,742.15	113.55
32 33 43 53-0172 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0036-P)	1,931.36	113.55
32 33 43 53-0173 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0042-P)	2,120.57	113.55
32 33 43 53-0174 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0030-L)	1,742.15	113.55
32 33 43 53-0175 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0036-L)	1,931.36	113.55
32 33 43 53-0176 EA Round Table With Four Legs (Columbia Cascade Co. 2915-0042-L)	2,120.57	113.55



Exterior Improvements	32	32
Site Improvements	32 30	
Site Furnishings	32 33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 33 43 53-0258 EA Square Table With Center Support (Columbia Cascade Co. 2962-3030-E).....	1,320.07	113.55
32 33 43 53-0259 EA Square Table With Center Support (Columbia Cascade Co. 2962-3636-E).....	1,363.74	113.55
32 33 43 53-0260 EA Square Table With Center Support (Columbia Cascade Co. 2962-4242-E).....	1,407.40	113.55
32 33 43 53-0261 EA Square Table With Center Support (Columbia Cascade Co. 2962-3030-P).....	1,451.06	113.55
32 33 43 53-0262 EA Square Table With Center Support (Columbia Cascade Co. 2962-3636-P).....	1,494.73	113.55
32 33 43 53-0263 EA Square Table With Center Support (Columbia Cascade Co. 2962-4242-P).....	1,538.39	113.55
32 33 43 53-0264 Picnic Tables (32 33 43 53)		
32 33 43 53-0265 Wooden Picnic Tables (32 33 43 53-0264)		
32 33 43 53-0266 EA 6' Permanent Rectangular Redwood Table.....	853.76	72.92
32 33 43 53-0267 Portable Picnic Tables (32 33 43 53-0264)		
32 33 43 53-0268 EA 6' Wood Table With Aluminum Frame.....	1,465.21	48.61
32 33 43 53-0269 EA 6' Aluminum Table And Frame.....	2,126.32	48.61
32 33 43 53-0270 EA 8' Aluminum Table And Frame.....	2,537.13	60.76
32 33 43 53-0271 EA 6' Steel Table And Frame.....	1,285.92	48.61
32 33 43 53-0272 EA 8' Steel Table And Frame.....	1,472.74	60.76
32 33 43 53-0273 Concrete Picnic Tables (32 33 43 53-0264)		
32 33 43 53-0274 EA 72" Long x 72" Wide, Precast Concrete, One Piece, Rectangular Picnic Table With Two Integral Benches (Quikrete QLBT72PT).....	2,549.09	194.43
32 33 43 53-0275 EA 96" Long x 72" Wide, Precast Concrete, One Piece, Rectangular Picnic Table With Two Integral Benches (Quick Crete QLBT96PT Or QLMR96PT).....	2,943.35	
Note: Standard sealer		
32 33 43 53-0276 EA 102" Long x 72" Wide, Precast Concrete, One Piece, Rectangular Picnic Table With Two Integral Benches And Handicap Access On Two Ends (Quick Crete QLMR102PTADA).....	2,952.76	
Note: Standard sealer		
32 33 43 53-0277 EA 42" Diameter, Precast Concrete, Round Food Court Table Set With Four Benches (Quick Crete QR42FC).....	3,123.64	
Note: Includes table top, four benches and mounting hardware.		
32 33 43 53-0278 Plastic Picnic Tables (32 33 43 53-0264)		
Note: Manufactured from recycled plastic.		
32 33 43 53-0279 Pedestal Tables - 4' Square, 2 Seats (32 33 43 53-0278)		
32 33 43 53-0280 EA 3" x 4" Slats, Pedestal Table, 4' Square, 2 Seats.....	1,749.62	72.92
32 33 43 53-0281 EA 4" x 4" Slats, Pedestal Table, 4' Square, 2 Seats.....	1,919.98	72.92
32 33 43 53-0282 Pedestal Tables - 4' Square, 4 Seats (32 33 43 53-0278)		
32 33 43 53-0283 EA 3" x 4" Slats, Pedestal Table, 4' Square, 4 Seats.....	2,302.07	72.92
32 33 43 53-0284 EA 4" x 4" Slats, Pedestal Table, 4' Square, 4 Seats.....	2,530.84	72.92
32 33 43 53-0285 Recycled Plastic Tables (32 33 43 53-0278)		
32 33 43 53-0286 EA 6' Standard "Step-Over" Table, Recycled Plastic Lumber.....	3,024.05	72.92
32 33 43 53-0287 EA 6' " Walk-Through" Table, Recycled Plastic Lumber.....	2,513.87	72.92
32 33 43 53-0288 EA 7' Reinforced "Step-Over" Table, Recycled Plastic Lumber, ADA Ends.....	2,748.33	72.92
32 33 43 53-0289 EA 8' " Walk-Through" Table, Recycled Plastic Lumber, ADA Ends.....	2,568.26	72.92
32 33 43 53-0290 EA 8' Reinforced "Step-Over" Table, Recycled Plastic Lumber, ADA Ends.....	3,239.29	72.92
32 33 43 53-0291 EA 4' Youth Table, Recycled Plastic Lumber.....	1,277.24	58.33
32 33 53 Site Grills (32 33)		
32 33 53 00-0001 Picnic Grills (32 33 53)		
32 33 53 00-0002 EA 20" Wide x 14" Deep x 8-1/2" High Adjustable Grill.....	431.02	
Note: 11 gauge with galvanized steel post.		
32 33 53 00-0003 EA 20" Wide x 14" Deep x 8-1/2" High Adjustable Grill.....	461.11	
Note: 7 gauge with galvanized steel post.		
32 33 63 Skate Board Deterrent (32 33)		
32 33 63 00-0001 Skate Stoppers (32 33 63)		
32 33 63 00-0002 EA Aluminum Architectural Series Pieces, Skate Stopper.....	65.16	
Note: Various shapes. Includes drilling and anchoring into suitable surface material.		
For >59 To 99, Deduct	-6.93	
For >99 To 249, Deduct	-8.77	
For >249, Deduct	-10.60	
32 33 63 00-0003 EA Aluminum Fixed Angle Series Pieces, Skate Stopper.....	68.96	
Note: Various shapes. Includes drilling and anchoring into suitable surface material.		
For >59 To 99, Deduct	-7.47	
For >99 To 249, Deduct	-9.41	
For >249, Deduct	-11.36	

32 Exterior Improvements**32 30 Site Improvements****32 33 Site Furnishings**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
32 33 63 00-0004	EA	Aluminum Fixed Radius Series Pieces, Skate Stopper.....	48.99	
		Note: Various shapes. Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-4.67	
		For >99 To 249, Deduct	-6.02	
		For >249, Deduct	-7.37	
32 33 63 00-0005	EA	Aluminum Bench Clips, Skate Stopper.....	39.45	
		Note: Various shapes. Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-3.34	
		For >99 To 249, Deduct	-4.40	
		For >249, Deduct	-5.46	
32 33 63 00-0006	EA	Aluminum Curve Clips, Skate Stopper.....	43.02	
		Note: Various shapes. Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-3.83	
		For >99 To 249, Deduct	-5.00	
		For >249, Deduct	-6.17	
32 33 63 00-0007	EA	Aluminum Hand Rail, Skate Stopper.....	41.21	
		Note: Various shapes. Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-3.58	
		For >99 To 249, Deduct	-4.70	
		For >249, Deduct	-5.81	
32 33 63 00-0008	EA	Aluminum 2" x 3" x 0.25" Flat Cap, Skate Stopper.....	38.87	
		Note: Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-3.25	
		For >99 To 249, Deduct	-4.30	
		For >249, Deduct	-5.34	
32 33 63 00-0009	EA	Aluminum 6" Diameter x 0.25" Rumble Disc, Skate Stopper.....	53.42	
		Note: Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-5.29	
		For >99 To 249, Deduct	-6.77	
		For >249, Deduct	-8.25	
32 33 63 00-0010	EA	Aluminum 4" x 17" x 0.25" Flat Strap, Skate Stopper.....	97.09	
		Note: Includes drilling and anchoring into suitable surface material.		
		For >59 To 99, Deduct	-11.40	
		For >99 To 249, Deduct	-14.20	
		For >249, Deduct	-16.99	

32 39 Manufactured Site Specialties (32 30)

Note: Excludes coredrilling, augering, concrete footing and compaction See CSI section 02 41 19 13-0081 for concrete core drilling, 02 41 19 13-0219 for asphalt core drilling, 32 31 13 13-0002 for augering, 32 31 13 13-0019 for concrete footing, 32 31 13 13-0045 for compaction of earth.

32 39 13 Manufactured Metal Bollards (32 39)**32 39 13 00-0001 Metal Pipe Bollards** (32 39 13)

Note: For bollards by the LF, the quantity is the total length, including the buried portion, if any. See CSI section 32 31 13 13-0001 for augering and filling holes for bollards, 32 31 13 13-0018 for concrete fill for post and post holes.

32 39 13 00-0002 Steel Pipe Bollard, Schedule 40 Pipe, Painted Or Powder Coated (32 39 13 00-0001)

32 39 13 00-0003	LF	4" Steel Pipe Bollard, Schedule 40, Painted Or Powder Coated.....	114.83	13.17
		For Galvanized Steel, Add	15.05	
		For 304 Stainless Steel, Add	119.48	
		For Each Surface Mounted Bollard (Includes Base Plate And Anchor Bolts), Add	129.32	
		For Each Sleeve For Removable, Lockable Bollard (Includes Tamper Proof Screw), Add	90.58	
		For Schedule 80, Add	15.91	
		For Concrete Fill, Add Per LF Of Pipe Bollard	10.47	
32 39 13 00-0004	LF	6" Steel Pipe Bollard, Schedule 40, Painted Or Powder Coated.....	165.93	13.17
		For Galvanized Steel, Add	23.73	
		For 304 Stainless Steel, Add	188.46	
		For Each Surface Mounted Bollard (Includes Base Plate And Anchor Bolts), Add	129.32	
		For Each Sleeve For Removable, Lockable Bollard (Includes Tamper Proof Screw), Add	90.58	
		For Schedule 80, Add	23.57	
		For Concrete Fill, Add Per LF Of Pipe Bollard	14.75	
32 39 13 00-0005	LF	8" Steel Pipe Bollard, Schedule 40, Painted Or Powder Coated.....	239.98	16.46
		For Galvanized Steel, Add	35.20	
		For 304 Stainless Steel, Add	279.52	
		For Each Surface Mounted Bollard (Includes Base Plate And Anchor Bolts), Add	169.72	
		For Each Sleeve For Removable, Lockable Bollard, Add	134.02	
		For Schedule 80, Add	34.35	
		For Concrete Fill, Add Per LF Of Pipe Bollard	19.71	
32 39 13 00-0006	LF	10" Steel Pipe Bollard, Schedule 40, Painted Or Powder Coated.....	322.80	19.75
		For Galvanized Steel, Add	48.16	
		For 304 Stainless Steel, Add	382.44	
		For Each Surface Mounted Bollard (Includes Base Plate And Anchor Bolts), Add	196.04	
		For Each Sleeve For Removable, Lockable Bollard, Add	147.18	
		For Schedule 80, Add	46.44	
		For Concrete Fill, Add Per LF Of Pipe Bollard	24.09	
32 39 13 00-0007	LF	12" Steel Pipe Bollard, Schedule 40, Painted Or Powder Coated.....	404.24	26.33
		For Galvanized Steel, Add	59.77	
		For 304 Stainless Steel, Add	474.61	
		For Each Surface Mounted Bollard (Includes Base Plate And Anchor Bolts), Add	269.72	
		For Each Sleeve For Removable, Lockable Bollard, Add	202.23	
		For Schedule 80, Add	58.00	
		For Concrete Fill, Add Per LF Of Pipe Bollard	28.10	



Exterior Improvements	32	32
Site Improvements	32 30	
Manufactured Site Specialties	32 39	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 39 23 Manufactured Concrete Bollards (32 39)

32 39 23 00-0001	Concrete Bollards (32 39 23)		
	Note: For bollards by the LF, the quantity is the total length, including the buried portion, if any.		
32 39 23 00-0002	Concrete Bollard, Exposed Aggregate (32 39 23 00-0001)		
32 39 23 00-0003	EA 12" x 12" x 30" High Concrete Bollard, Light Media Blast.....	657.35	105.35
	Note: Surface mounted with anchor bolts embedded into grout pockets.		
32 39 23 00-0004	EA 12" Diameter x 30" High Concrete Bollard, Light Media Blast.....	657.35	105.35
	Note: Surface mounted with anchor bolts embedded into grout pockets.		

32 39 25 Manufactured Wood Bollards (32 39)

32 39 25 00-0001	Wood Bollards (32 39 25)		
	Note: For bollards by the LF, the quantity is the total length, including the buried portion, if any. See CSI section 32 31 13 13-0001 for augering and filling holes for bollards, 32 31 13 13-0018 for concrete fill.		
32 39 25 00-0002	Wood Bollard, Pressure Treated Timber (32 39 25 00-0001)		
32 39 25 00-0003	LF 4" x 4", Pressure Treated Wood Bollard.....	23.97	10.54
	<i>For Each Sleeve For Removable, Lockable Bollard, Add</i>	89.16	
32 39 25 00-0004	LF 6" x 6", Pressure Treated Wood Bollard.....	27.04	10.54
	<i>For Each Sleeve For Removable, Lockable Bollard, Add</i>	89.16	
32 39 25 00-0005	LF 8" x 8", Pressure Treated Wood Bollard.....	34.33	11.85
	<i>For Each Sleeve For Removable, Lockable Bollard, Add</i>	132.62	
32 39 25 00-0006	LF 10" x 10", Pressure Treated Wood Bollard.....	48.16	15.80
	<i>For Each Sleeve For Removable, Lockable Bollard, Add</i>	148.42	
32 39 25 00-0007	LF 12" x 12", Pressure Treated Wood Bollard.....	65.97	21.07
	<i>For Each Sleeve For Removable, Lockable Bollard, Add</i>	205.37	

32 39 27 Manufactured Plastic Bollards (32 39)

32 39 27 00-0001	Plastic Bollards (32 39 27)		
	See CSI section 32 31 13 13-0001 for augering and filling holes for bollards.		
32 39 27 00-0002	Recycled Plastic Bollards (32 39 27 00-0001)		
32 39 27 00-0003	EA 6" x 6" x 33" Surface Mounted Recycled Plastic Bollard.....	352.12	52.68
	Note: Includes anchor bolts.		
32 39 27 00-0004	EA 6" Diameter x 6' Steel Reinforced Recycled Plastic Bollard.....	571.81	52.68

32 39 27 00-0005 Plastic Bollard Covers (32 39 27 00-0001)

32 39 27 00-0006	EA 4" x 60", 1/8" Thick LDPE Bollard Cover, Fits 4" To 4-1/2" Pipe.....	90.25	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0007	EA 6" x 60", 1/8" Thick LDPE Bollard Cover, Fits 6" To 6-5/8" Pipe.....	97.60	13.75
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0008	EA 3" x 60", 1/4" Thick LDPE Bollard Cover, Fits 3" To 3 1/2" Pipe.....	122.88	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0009	EA 3-1/2" x 52", 1/4" Thick LDPE Bollard Cover, Fits 3-1/2" To 4" Pipe.....	122.88	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0010	EA 3-1/2" x 68", 1/4" Thick LDPE Bollard Cover, Fits 3-1/2" To 4" Pipe.....	138.11	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0011	EA 4" x 52", 1/4" Thick LDPE Bollard Cover, Fits 4" To 4-1/2" Pipe.....	122.88	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0012	EA 4" x 60", 1/4" Thick LDPE Bollard Cover, Fits 4" To 4-1/2" Pipe.....	125.06	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0013	EA 5" x 52", 1/4" Thick LDPE Bollard Cover, Fits 5" To 5-9/16" Pipe.....	122.88	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0014	EA 5" x 60", 1/4" Thick LDPE Bollard Cover, Fits 5" To 5-9/16" Pipe.....	125.06	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0015	EA 5" x 72", 1/4" Thick LDPE Bollard Cover, Fits 5" To 5-9/16" Pipe.....	175.09	12.50
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0016	EA 6" x 52", 1/4" Thick LDPE Bollard Cover, Fits 6" To 6-5/8" Pipe.....	125.37	13.75
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0017	EA 6" x 65", 1/4" Thick LDPE Bollard Cover, Fits 6" To 6-5/8" Pipe.....	160.18	13.75
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0018	EA 6" x 84", 1/4" Thick LDPE Bollard Cover, Fits 6" To 6-5/8" Pipe.....	182.44	13.75
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0019	EA 7" x 56", 1/4" Thick LDPE Bollard Cover, Fits 6" To 6-5/8" Pipe.....	153.98	15.01
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0020	EA 8" x 52", 1/4" Thick LDPE Bollard Cover, Fits 7" To 7-5/16" Pipe.....	167.03	15.01
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0021	EA 8" x 69", 1/4" Thick LDPE Bollard Cover, Fits 8" To 8-5/8" Pipe.....	167.03	15.01
	<i>For Reflective Tape, Add</i>	10.36	
32 39 27 00-0022	EA 10" x 69", 1/4" Thick LDPE Bollard Cover, Fits 10" To 11" Pipe.....	225.79	15.01
	<i>For Reflective Tape, Add</i>	10.36	

32 39 29 Manufactured Stone Bollards (32 39)

32 39 29 00-0001	Stone Bollards (32 39 29)		
32 39 29 00-0002	Granite Bollards (32 39 29 00-0001)		

32 Exterior Improvements**32 30 Site Improvements****32 39 Manufactured Site Specialties**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 39 29 00-0003	EA	16" x 16" x 30" Granite Bollard, Smooth Matt Finish.....	1,450.45	131.69
Note: Surface mounted with anchors embedded into grout pockets.				
32 39 29 00-0004	EA	16" x 16" x 54" Granite Bollard, Smooth Matt Finish.....	1,836.38	184.36
Note: Surface mounted with anchors embedded into grout pockets.				
32 39 29 00-0005	EA	12" x 12" x 24" Granite Bollard, Rough Finish, Pyramid Top	897.92	131.69
Note: Surface mounted with anchors embedded into grout pockets.				
32 39 29 00-0006	EA	12" Diameter x 18" Granite Bollard, Smooth Matt Finish	1,333.02	105.35
Note: Flat Top, surface mounted with anchors embedded into grout pockets.				
32 39 29 00-0007	EA	24" x 24" x 20" Granite Bollard, Octagonal Cross Section	1,991.31	105.35
Note: Smooth matt finish, flat top, surface mounted with anchors embedded into grout pockets.				

32 80 Irrigation ⁽³²⁾**32 82 Irrigation Pumps** ^(32 80)**32 82 00 00-0001 Variable Frequency Booster Pump Stations** ^(32 82)

32 82 00 00-0002	EA	200 GPM, 7.5 HP, 4" Suction/Discharge Connections, Variable Frequency, Horizontal Booster Pump Station (Rain Bird®).....	34,814.00	317.20
Note: Includes marine grade aluminum enclosure, separate NEMA 3R electrical controls enclosure, circuit breaker motor protection, surge protection, fan and louver cooling, glycerin filled pressure gauges, pump thermal switch and auto restart capability.				
For Pump Bypass Manifold With Isolation Valves, Add			641.85	
For Externally Mounted Pump Station Fault Alarm Light, Add			767.97	
For Flow Switch, Add			1,281.44	
For Pressure Relief Valve With Relief Piping, Add			1,740.87	
For Environmental Package With Heater And Insulation, Add			3,715.96	

32 84 Planting Irrigation ^(32 80)**32 84 13 Drip Irrigation** ^(32 84)**32 84 13 00-0001 Drip Emitter Irrigation Devices** ^(32 84 13)**32 84 13 00-0002 Drip Emitter Irrigation Valves** ^(32 84 13 00-0001)

32 84 13 00-0003	EA	1/2" Air/Vacuum Relief Valve For Drip Emitter Irrigation Systems (Rain Bird® ARV050)	50.88	11.48
32 84 13 00-0004	EA	1", Low Flow Remote Control Valve For Drip Emitter Irrigation Systems (Rain Bird® LRV100)	85.73	11.48
32 84 13 00-0005	EA	3/4", Anti-Siphon, Low Flow Remote Control Valve For Drip Emitter Irrigation Systems (Rain Bird® LRV075)	83.30	11.48
32 84 13 00-0006	EA	3/4", Latching Solenoid, Low Flow Remote Control Valve For Drip Emitter Irrigation Systems (Rain Bird® LRV075TBOS)	116.04	11.48

32 84 13 00-0007 Drip Emitter Irrigation Filters ^(32 84 13 00-0001)

32 84 13 00-0008	EA	3/4" Inlet/Outlet, Inline Basket Filter For Drip Emitter Irrigation Systems (Rain Bird® QKCHK-075)	185.24	11.48
32 84 13 00-0009	EA	1" Inlet/Outlet, Inline Basket Filter For Drip Emitter Irrigation Systems (Rain Bird® QKCHK-100)	187.04	11.48
32 84 13 00-0010	EA	3/4" Inlet/Outlet, Inline Wye Filter For Drip Emitter Irrigation Systems (Rain Bird® RBY075MPTX)	66.10	11.48
32 84 13 00-0011	EA	1" Inlet/Outlet, Inline Wye Filter For Drip Emitter Irrigation Systems (Rain Bird® RBY100MPTX)	67.54	11.48
32 84 13 00-0012	EA	1" Inlet/Outlet, Pressure Regulating, Inline Basket Filter For Drip Emitter Irrigation Systems (Rain Bird® PRB-QCHK-100)	202.01	11.48
32 84 13 00-0013	EA	3/4" Inlet/Outlet, Pressure Regulating, Inline RBY Filter For Drip Emitter Irrigation Systems (Rain Bird® PRF075RBY)	87.77	11.48
32 84 13 00-0014	EA	1" Inlet/Outlet, Pressure Regulating, Inline RBY Filter For Drip Emitter Irrigation Systems (Rain Bird® PRF100RBY)	99.06	11.48

32 84 13 00-0015 Drip Emitter Irrigation Pressure Regulators ^(32 84 13 00-0001)

32 84 13 00-0016	EA	3/4", 6 To 300 GPH, 30 PSI, Inline Pressure Regulator For Drip Emitter Irrigation Systems (Rain Bird® PSI-L30X-075)	64.64	11.48
32 84 13 00-0017	EA	3/4", 120 To 600 GPH, 30 PSI, Inline Pressure Regulator For Drip Emitter Irrigation Systems (Rain Bird® PSI-M30X-075)	64.64	11.48
32 84 13 00-0018	EA	3/4", 120 To 600 GPH, 40 PSI, Inline Pressure Regulator For Drip Emitter Irrigation Systems (Rain Bird® PSI-M40X-075)	64.64	11.48
32 84 13 00-0019	EA	1", 120 To 900 GPH, 40 PSI, Inline Pressure Regulator For Drip Emitter Irrigation Systems (Rain Bird® PSI-M40X-100)	76.50	11.48

32 84 13 00-0020 Drip Emitter Irrigation Tubing ^(32 84 13 00-0001)

Note: Includes surface installation and covering of tubing with existing pine straw, pine bark etc.

32 84 13 00-0021	LF	1/4", Landscape Dripline With Extruded Non-Pressure Compensating Drip Emitters (Rain Bird® LDQ0806100)	4.56	1.61
32 84 13 00-0022	LF	1/2", Landscape Dripline With Extruded Pressure Compensating Drip Emitters (Rain Bird® XFD0612100)	4.03	1.83
32 84 13 00-0023	LF	1/4", UV-Resistant, Polyethylene, Distribution Tubing For Drip Emitter Irrigation Systems (Rain Bird® XQ100)	3.42	1.61
For Shallow Trenching And Backfill By Hand, Add			6.60	
32 84 13 00-0024	LF	1/2", UV-Resistant, Polyethylene, Distribution Tubing For Drip Emitter Irrigation Systems (Rain Bird® XT700100)	4.13	1.83
For Shallow Trenching And Backfill By Hand, Add			7.14	

32 84 13 00-0025 Drip Emitter Irrigation Fittings ^(32 84 13 00-0001)

32 84 13 00-0026	EA	1/4", Barbed Coupling For Irrigation Tubing (Rain Bird® XBF1CONN)	3.09	
32 84 13 00-0027	EA	1/4", Barbed Elbow For Irrigation Tubing (Rain Bird® XBF2EL)	3.13	
32 84 13 00-0028	EA	1/4", Barbed Tee For Irrigation Tubing (Rain Bird® XBF3TEE)	3.19	
32 84 13 00-0029	EA	1/4", Self Piercing Barbed Coupling For Irrigation Tubing (Rain Bird® SPB025)	3.41	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 84 13 00-0030 EA 1/4", Plug For Irrigation Tubing (Rain Bird® EMAGPX)	3.05	
32 84 13 00-0031 EA 17mm, Barbed Coupling For Irrigation Tubing (Rain Bird® XFFCOUP)	3.30	
<i>For Compression Fitting, Add</i>	0.43	
32 84 13 00-0032 EA 17mm, Barbed Elbow For Irrigation Tubing (Rain Bird® XFF-ELBOW)	3.42	
<i>For Compression Fitting, Add</i>	0.55	
32 84 13 00-0033 EA 17mm, Barbed Tee For Irrigation Tubing (Rain Bird® XFF-TEE)	3.48	
<i>For Compression Fitting, Add</i>	0.61	
32 84 13 00-0034 EA 17mm, Barbed Male Adapter For Irrigation Tubing (Rain Bird® XFFMA050)	3.52	
<i>For Compression Fitting, Add</i>	0.65	
32 84 13 00-0035 EA 17mm, Barbed Cross For Irrigation Tubing (Rain Bird® XFDCROSS)	3.78	
<i>For Compression Fitting, Add</i>	0.91	
32 84 13 00-0036 EA 1/2", Plug For Irrigation Tubing (Rain Bird® MDCFCAP)	4.07	
32 84 13 00-0037 EA 12 Gauge, Galvanized Stake For Irrigation Tubing (Rain Bird® TDS050BEND)	2.01	
32 84 13 00-0038 Drip Emitters (32 84 13 00-0001)		
32 84 13 00-0039 EA 0.5 To 2 GPH, Single Outlet, Pressure Compensating Emitter For Drip Emitter Irrigation Systems (Rain Bird® XB20PC)	6.40	
32 84 13 00-0040 EA 5 To 24 GPH, Single Outlet, Pressure Compensating Emitter For Drip Emitter Irrigation Systems (Rain Bird® PC24)	7.55	
32 84 13 00-0041 EA 0.5 To 2 GPH, Six Outlet, Pressure Compensating Emitter For Drip Emitter Irrigation Systems (Rain Bird® XB056)	16.76	
32 84 13 00-0042 Drip Emitter Irrigation Micro-Bubblers, Sprays And Misters (32 84 13 00-0001)		
32 84 13 00-0043 EA Adjustable Stream Bubbler With Spike For Drip Emitter Irrigation Systems (Rain Bird® SXB360SPYK)	24.75	10.33
32 84 13 00-0044 EA Adjustable Micro Spray With Spike For Drip Emitter Irrigation Systems (Rain Bird® XS360TSPYK)	24.81	10.33
32 84 13 00-0045 EA 12" Height, Riser Assembly With Pressure Compensating Nozzle For Drip Emitter Irrigation Systems (Rain Bird® SQADP12 With SQFUL)	28.00	10.33
32 84 13 00-0046 EA 24" Height, Riser Assembly With Pressure Compensating Nozzle For Drip Emitter Irrigation Systems (Rain Bird® SQADP24 With SQFUL)	28.34	10.33
32 84 13 00-0047 EA 4" Pop-Up Height, Micro Spray Pop-Ups For Drip Emitter Irrigation Systems (Rain Bird® XP-400X With SQFUL)	41.92	13.55
Note: Includes nozzle.		
32 84 13 00-0048 EA 6" Pop-Up Height, Micro Spray Pop-Ups For Drip Emitter Irrigation Systems (Rain Bird® XP-600X With SQFUL)	46.02	13.55
Note: Includes nozzle.		
32 84 13 00-0049 EA 12" Pop-Up Height, Micro Spray Pop-Ups For Drip Emitter Irrigation Systems (Rain Bird® XP1200X With SQFUL)	48.95	13.55
Note: Includes nozzle.		
32 84 13 00-0050 Subsurface Drip Emitter Irrigation Tubing (Rain Bird® XFS) (32 84 13 00-0001)		
Note: Brown or purple tubing. Includes layout, trenching 4" to 6", installing tubing and backfilling trench.		
32 84 13 00-0051 LF 0.536" ID, 0.634" OD, Subsurface Drip Emitter Irrigation Tubing (Rain Bird® XFS Copper Shield)	4.63	2.01
32 84 23 Underground Sprinklers (32 84)		
32 84 23 00-0001 Sprinkler Heads (32 84 23)		
32 84 23 00-0002 Spray Sprinkler Heads (32 84 23 00-0001)		
Note: Includes plastic riser and case. Includes spray, variable arc or bubbler nozzle with partial or full circle coverage.		
32 84 23 00-0003 EA 2" Pop-Up Height, Spray Sprinkler Head (Rain Bird® 1802P)	36.61	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0004 EA 4" Pop-Up Height, Spray Sprinkler Head (Rain Bird® 1804P)	34.28	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0005 EA 6" Pop-Up Height, Spray Sprinkler Head (Rain Bird® 1806P)	42.91	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0006 EA 12" Pop-Up Height, Spray Sprinkler Head (Rain Bird® 1812P)	50.13	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0007 EA 4" Pop-Up Height, Spray Sprinkler Head With Check Valve (Rain Bird® 1804-SAM)	37.53	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0008 EA 6" Pop-Up Height, Spray Sprinkler Head With Check Valve (Rain Bird® 1806-SAM)	49.67	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0009 EA 12" Pop-Up Height, Spray Sprinkler Head With Check Valve (Rain Bird® 1812-SAM)	55.52	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0010 EA 4" Pop-Up Height, Spray Sprinkler Head With Pressure Regulator (Rain Bird® 1804-PRS)	40.99	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0011 EA 6" Pop-Up Height, Spray Sprinkler Head With Pressure Regulator (Rain Bird® 1806-PRS)	52.06	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0012 EA 12" Pop-Up Height, Spray Sprinkler Head With Pressure Regulator (Rain Bird® 1812-PRS)	57.51	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0013 EA 4" Pop-Up Height, Spray Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 1804-SAM-PRS)	42.37	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0014 EA 6" Pop-Up Height, Spray Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 1806-SAM-PRS)	59.36	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0015 EA 12" Pop-Up Height, Spray Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 1812-SAM-PRS)	64.74	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0016 EA Bubbler Head With Screen, 1/2" NPT (Rain Bird® 1300)	29.75	12.68
<i>For Rotary Nozzle, Add</i>	3.25	
32 84 23 00-0017 EA Pressure Compensating Bubbler With Screen, 1/2" NPT (Rain Bird® 1400)	35.15	12.68

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 84 23 00-0018	Gear-Drive, Rotary Sprinkler Heads (32 84 23 00-0001) Note: Maximum spacing is equivalent to maximum radius.		
32 84 23 00-0019	1/2" Inlet, Up To 35' Spacing, Gear-Drive, Rotary Sprinkler Heads (32 84 23 00-0018) Note: Includes plastic riser and case, standard rubber cover and nozzle with partial or full circle coverage.		
32 84 23 00-0020	EA 4" Pop-Up Height, 1/2" Inlet, Up To 35' Spacing, Gear-Drive, Rotary Sprinkler Head (Rain Bird® 3504PC).....	53.67	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
32 84 23 00-0021	EA 4" Pop-Up Height, 1/2" Inlet, Up To 35' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve (Rain Bird® 3504-PC-SAM).....	55.59	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
32 84 23 00-0022	3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Heads (32 84 23 00-0018) Note: Includes plastic riser and case, standard rubber cover and nozzle with partial or full circle coverage.		
32 84 23 00-0023	EA 4" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head (Rain Bird® 5004-PLPC).....	49.06	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0024	EA 6" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head (Rain Bird® 5006-PLPC).....	69.81	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0025	EA 4" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve (Rain Bird® 5004-PLPCS).....	52.90	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0026	EA 6" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve (Rain Bird® 5006-PLPCS).....	72.89	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0027	EA 4" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Pressure Regulator (Rain Bird® 5004+PCR).....	54.44	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0028	EA 4" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 5004+FCSR).....	57.51	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0029	EA 6" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 5006+PCSR).....	77.50	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0030	EA 12" Pop-Up Height, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 5012+PCSR).....	89.80	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0031	EA Shrub Type, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve (Rain Bird® 5000S-PLPCS).....	57.13	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
32 84 23 00-0032	EA Shrub Type, 3/4" Inlet, Up To 55' Spacing, Gear-Drive, Rotary Sprinkler Head With Check Valve And Pressure Regulator (Rain Bird® 5000S+PCSR).....	69.43	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
32 84 23 00-0033	1" Inlet, Up To 65' Spacing, Gear-Drive, Rotary Sprinkler Heads (32 84 23 00-0018) Note: Includes plastic riser and case, standard rubber cover, check valve and nozzle with partial or full circle coverage.		
32 84 23 00-0034	EA 4" Pop-Up Height, 1" Inlet, Up To 65' Spacing, Gear-Drive, Rotary Sprinkler Head (Rain Bird® F4PC).....	98.64	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
	<i>For Stainless Steel Riser And High Speed Rotor, Add</i>	56.58	
32 84 23 00-0035	1" Inlet, Up To 80' Spacing, Gear-Drive, Rotary Sprinkler Heads (32 84 23 00-0018) Note: Includes plastic riser and case, standard rubber cover, check valve and nozzle with partial or full circle coverage.		
32 84 23 00-0036	EA 5" Pop-Up Height, 1" Inlet, Up To 80' Spacing, Gear-Drive, Rotary Sprinkler Head (Rain Bird® 8005).....	143.22	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
	<i>For Stainless Steel Riser, Add</i>	9.00	
32 84 23 00-0037	Impact-Drive Sprinkler Heads (32 84 23 00-0001) Note: Includes partial or full circle coverage. Maximum spacing is equivalent to maximum radius.		
32 84 23 00-0038	EA 1/2" Inlet, Up To 45' Spacing, Pop-Up, Impact-Drive Rotary Sprinkler Head (Rain Bird® 2045A-08).....	77.12	12.68
	<i>For Non-Potable Cover, Add</i>	2.00	
32 84 23 00-0039	EA 1/2" Inlet, Up To 45' Spacing, Riser Mounted, Plastic Body, Impact-Drive Sprinkler Head (Rain Bird® 2045-PJ08).....	58.67	12.68
32 84 23 00-0040	EA 3/4" Inlet, Up To 51' Spacing, Riser Mounted, Brass/Bronze Body, Impact-Drive Sprinkler Head (Rain Bird® 35A-ADJ-TNTB).....	120.13	12.68
32 84 23 00-0041	Electric Remote Control Irrigation Valves (32 84 23)		
32 84 23 00-0042	0.2 To 22 GPM, Plastic, Electric Remote Control Irrigation Valves (Rain Bird® DV Series) (32 84 23 00-0041) Note: 15 to 150 PSI.		
32 84 23 00-0043	EA 3/4", 0.2 To 22 GPM, Plastic, Electric Remote Control Irrigation Valve (Rain Bird® 75DV).....	154.38	52.87



Exterior Improvements		32
Irrigation		32 80
Planting Irrigation		32 84

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	32 84 23 00-0044	EA	1", 0.2 To 40 GPM, Plastic, Electric Remote Control Irrigation Valve (Rain Bird® 100DV)	154.38	52.87
	32 84 23 00-0045	EA	1", 0.2 To 40 GPM, Slip-On, Plastic, Electric Remote Control Irrigation Valve (Rain Bird® 100DVSS).....	169.49	60.26
	32 84 23 00-0046	EA	1", 0.2 To 22 GPM, Plastic, Electric Remote Control Irrigation Angle Valve (Rain Bird® 100DVA).....	155.91	52.87
	32 84 23 00-0047		0.2 To 22 GPM, Plastic, Electric Remote Control Irrigation Valves With Flow Control (Rain Bird® DVF Series) (32 84 23 00-0041)		
			Note: 15 to 150 PSI.		
	32 84 23 00-0048	EA	1", 0.2 To 40 GPM, Plastic, Electric Remote Control Irrigation Valve With Flow Control (Rain Bird® 100DVF).....	155.91	52.87
	32 84 23 00-0049	EA	1", 0.2 To 40 GPM, Slip-On, Plastic, Electric Remote Control Irrigation Valve With Flow Control (Rain Bird® 100DVFSS)	171.79	60.26
	32 84 23 00-0050	EA	1", 0.2 To 40 GPM, Male x Barb, Plastic, Electric Remote Control Irrigation Valve With Flow Control (Rain Bird® 100DVFMB).....	173.33	60.26
	32 84 23 00-0051		0.25 To 200 GPM, Plastic, Electric Remote Control Irrigation Valves (Rain Bird® PEB Series) (32 84 23 00-0041)		
			Note: 20 to 200 PSI.		
	32 84 23 00-0052	EA	1", 0.25 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve (Rain Bird® 100PEB)	278.90	52.87
	32 84 23 00-0053	EA	1-1/2", 0.25 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve (Rain Bird® 150PEB)	332.71	52.87
	32 84 23 00-0054	EA	2", 0.25 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve (Rain Bird® 200PEB)	401.89	52.87
	32 84 23 00-0055		5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valves With Pressure Regulator (Rain Bird® PEB PRS-D Series) (32 84 23 00-0041)		
			Note: 20 to 200 PSI operating range pressure and 15 to 100 PSI pressure regulation.		
	32 84 23 00-0056	EA	1", 5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 100PEB PRS-D).....	408.89	59.42
	32 84 23 00-0057	EA	1-1/2", 5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 150PEB PRS-D).....	462.70	59.42
	32 84 23 00-0058	EA	2", 5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 200PEB PRS-D).....	531.88	59.42
	32 84 23 00-0059		20 To 200 GPM, Plastic, Electric Remote Control Irrigation Valves With Pressure Regulator And Scrubber Valve (Rain Bird® PESB PRS-D Series) (32 84 23 00-0041)		
			Note: 20 to 200 PSI operating range pressure and 15 to 100 PSI pressure regulation.		
	32 84 23 00-0060	EA	1", 5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve With Pressure Regulator And Scrubber Valve (Rain Bird® 100PESB PRS-D).....	485.76	59.42
	32 84 23 00-0061	EA	1-1/2", 5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve With Pressure Regulator And Scrubber Valve (Rain Bird® 150PESB PRS-D).....	539.57	59.42
	32 84 23 00-0062	EA	2", 5 To 200 GPM, Plastic, Electric Remote Control Irrigation Valve With Pressure Regulator And Scrubber Valve (Rain Bird® 200PESB PRS-D).....	608.75	59.42
	32 84 23 00-0063		0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valves (Hunter IBV Series) (32 84 23 00-0041)		
			Note: 20 to 200 PSI operating range pressure.		
	32 84 23 00-0064	EA	1", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valve (Hunter IBV-101G-B)	431.94	52.87
	32 84 23 00-0065	EA	1-1/2", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valve (Hunter IBV-151G-B).....	679.32	52.87
	32 84 23 00-0066	EA	2", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valve (Hunter IBV-201G-B)	701.68	52.87
	32 84 23 00-0067	EA	3", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valve (Hunter IBV-301G-B).....	1,681.99	71.37
	32 84 23 00-0068		5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valves (Rain Bird® EFB-CP Series) (32 84 23 00-0041)		
			Note: 15 to 200 PSI operating range pressure and 15 to 100 PSI pressure regulation.		
	32 84 23 00-0069	EA	1", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Rain Bird® 100EFB-CP).....	392.21	59.42
	32 84 23 00-0070	EA	1-1/4", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Rain Bird® 125EFB-CP)	465.78	59.42
	32 84 23 00-0071	EA	1-1/2", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Rain Bird® 150EFB-CP)	545.64	59.42
	32 84 23 00-0072	EA	2", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Rain Bird® 200EFB-CP).....	650.80	59.42
	32 84 23 00-0073		0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valves (Hunter IBV FS Series) (32 84 23 00-0041)		
			Note: 20 to 200 PSI operating range pressure and 20 to 100 PSI pressure regulation.		
	32 84 23 00-0074	EA	1", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Hunter IBV-101G-B-FS).....	530.49	59.42
	32 84 23 00-0075	EA	1-1/2", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Hunter IBV-151G-B-FS).....	823.98	59.42
	32 84 23 00-0076	EA	2", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Hunter IBV-201G-B-FS).....	849.14	59.42
	32 84 23 00-0077	EA	3", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve (Hunter IBV-301G-B-FS).....	1,807.89	59.42

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 84 23 00-0078		0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valves With Pressure Regulator (Hunter IBV ACCU-SYNC Series) <small>(32 84 23 00-0041)</small> Note: 20 to 200 PSI operating range pressure and 20 to 100 PSI pressure regulation.		
32 84 23 00-0079	EA	1", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valves With Pressure Regulator (Hunter IBV-101G-B ACCU-SYNC-ADJ).....	543.75	52.87
32 84 23 00-0080	EA	1-1/2", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valves With Pressure Regulator (Hunter IBV-151G-B ACCU-SYNC-ADJ).....	791.12	52.87
32 84 23 00-0081	EA	2", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valves With Pressure Regulator (Hunter IBV-201G-B ACCU-SYNC-ADJ).....	813.48	52.87
32 84 23 00-0082	EA	3", 0.1 To 300 GPM, Brass, Electric Remote Control Irrigation Valves With Pressure Regulator (Hunter IBV-301G-B ACCU-SYNC-ADJ).....	1,793.80	71.37
32 84 23 00-0083		5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valves With Pressure Regulator (Rain Bird® EFB-CP PRS-D Series) <small>(32 84 23 00-0041)</small> Note: 15 to 200 PSI operating range pressure and 15 to 100 PSI pressure regulation.		
32 84 23 00-0084	EA	1", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 100EFB-CP PRS-D).....	507.52	59.42
32 84 23 00-0085	EA	1-1/4", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 125EFB-CP PRS-D).....	581.08	59.42
32 84 23 00-0086	EA	1-1/2", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 150EFB-CP PRS-D).....	660.95	59.42
32 84 23 00-0087	EA	2", 5 To 200 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Rain Bird® 200EFB-CP PRS-D).....	766.10	59.42
32 84 23 00-0088		0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valves With Pressure Regulator (Hunter IBV FS ACCU-SYNC Series) <small>(32 84 23 00-0041)</small> Note: 20 to 200 PSI operating range pressure and 20 to 100 PSI pressure regulation.		
32 84 23 00-0089	EA	1", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Hunter IBV-101G-B-FS ACCU-SYNC-ADJ).....	642.29	59.42
32 84 23 00-0090	EA	1-1/2", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Hunter IBV-151G-B-FS ACCU-SYNC-ADJ).....	935.79	59.42
32 84 23 00-0091	EA	2", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Hunter IBV-201G-B-FS ACCU-SYNC-ADJ).....	960.95	59.42
32 84 23 00-0092	EA	3", 0.1 To 300 GPM, Brass, Contamination Proof, Electric Remote Control Irrigation Valve With Pressure Regulator (Hunter IBV-301G-B-FS ACCU-SYNC-ADJ).....	1,919.70	59.42
32 84 23 00-0093		Other Electric Remote Control Valves/Accessories <small>(32 84 23 00-0041)</small>		
32 84 23 00-0094	EA	Pressure Regulator Module For Electric Remote Control Valves (Rain Bird® PRS-DIAL).....	157.59	
32 84 23 00-0095		Irrigation Valve Boxes <small>(32 84 23)</small> Note: Includes lid.		
32 84 23 00-0096	EA	6" Round Irrigation Valve Box With Lid (Rain Bird® PVB-6RND).....	90.59	38.06
32 84 23 00-0097	EA	7" Round Irrigation Valve Box With Lid (Rain Bird® VB-7RND).....	108.75	38.06
32 84 23 00-0098	EA	10" Round Irrigation Valve Box With Lid (Rain Bird® VB-10RND).....	142.59	50.12
32 84 23 00-0099	EA	21.8" x 16.6" x 12" Depth, Rectangular Irrigation Valve Box With Lid (Rain Bird® VB-STD).....	237.23	73.17
32 84 23 00-0100	EA	21.8" x 16.6" x 12" Depth, Rectangular Irrigation Valve Box With Lock (Rain Bird® VB-STDH).....	242.40	73.17
32 84 23 00-0101	EA	26.3" x 19.8" x 12.1" Depth, Rectangular Irrigation Valve Box With Lid (Rain Bird® VB-JMB).....	279.45	73.17
32 84 23 00-0102	EA	26.3" x 19.8" x 12.1" Depth, Rectangular Irrigation Valve Box With Lock (Rain Bird® VB-JMBH).....	283.86	73.17
32 84 23 00-0103	EA	33.1" x 23.8" x 15" Depth, Rectangular Irrigation Valve Box With Lock (Rain Bird® VB-SPRH).....	495.60	73.17
32 84 23 00-0104	EA	40.3" x 27.1" x 18" Depth, Rectangular Irrigation Valve Box With Lock (Rain Bird® VB-MAXH).....	769.85	73.17
32 84 23 00-0105		Irrigation Controllers <small>(32 84 23)</small>		
32 84 23 00-0106		Irrigation Controllers <small>(32 84 23 00-0105)</small>		
32 84 23 00-0107		Irrigation Controllers (Rain Bird®) <small>(32 84 23 00-0106)</small>		
32 84 23 00-0108		Four Program, Indoor Mount, Modular Irrigation Controllers (Rain Bird® ESP Series) <small>(32 84 23 00-0107)</small>		
32 84 23 00-0109		Four Program, Modular Irrigation Controllers (Rain Bird® ESP-ME Series) <small>(32 84 23 00-0108)</small>		
32 84 23 00-0110		Four Program, Indoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-MEI Series) <small>(32 84 23 00-0109)</small>		
32 84 23 00-0111	EA	4-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	441.93	38.89
32 84 23 00-0112	EA	7-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	616.94	38.89
32 84 23 00-0113	EA	10-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	791.95	38.89
32 84 23 00-0114	EA	13-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	966.97	38.89
32 84 23 00-0115	EA	16-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	1,103.09	38.89
32 84 23 00-0116	EA	19-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	1,282.97	38.89
32 84 23 00-0117	EA	22-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-MEI Series).....	1,462.85	38.89



Exterior Improvements		32
Irrigation		32 80
Planting Irrigation		32 84

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 84 23 00-0118			Four Program, Outdoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-ME Series) (32 84 23 00-0109)		
32 84 23 00-0119	EA		4-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	520.56	38.89
32 84 23 00-0120	EA		7-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	695.57	38.89
32 84 23 00-0121	EA		10-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	870.58	38.89
32 84 23 00-0122	EA		13-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	1,045.60	38.89
32 84 23 00-0123	EA		16-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	1,181.72	38.89
32 84 23 00-0124	EA		19-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	1,361.60	38.89
32 84 23 00-0125	EA		22-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-ME Series).....	1,541.48	38.89
32 84 23 00-0126			Four Program, Modular Irrigation Controllers (Rain Bird® ESP-SMTE Series) (32 84 23 00-0108)		
32 84 23 00-0127			Four Program, Indoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-SMTEI Series) (32 84 23 00-0126)		
32 84 23 00-0128	EA		4-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	715.06	38.89
32 84 23 00-0129	EA		7-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	890.07	38.89
32 84 23 00-0130	EA		10-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	1,065.09	38.89
32 84 23 00-0131	EA		13-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	1,240.10	38.89
32 84 23 00-0132	EA		16-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	1,376.23	38.89
32 84 23 00-0133	EA		19-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	1,556.11	38.89
32 84 23 00-0134	EA		22-Station, Four Program, Indoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTEI Series).....	1,735.98	38.89
32 84 23 00-0135			Four Program, Outdoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-SMTE Series) (32 84 23 00-0126)		
32 84 23 00-0136	EA		4-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	773.98	38.89
32 84 23 00-0137	EA		7-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	948.99	38.89
32 84 23 00-0138	EA		10-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	1,124.01	38.89
32 84 23 00-0139	EA		13-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	1,299.02	38.89
32 84 23 00-0140	EA		16-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	1,435.14	38.89
32 84 23 00-0141	EA		19-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	1,615.03	38.89
32 84 23 00-0142	EA		22-Station, Four Program, Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-SMTE Series).....	1,794.90	38.89
32 84 23 00-0143			Accessories For ESP-ME/MEI Irrigation Controllers (32 84 23 00-0108)		
32 84 23 00-0144	EA		3-Station Expansion Module For ESP Series Irrigation Controllers (Rain Bird® ESP-SM3)..... Note: Use task for increasing capacity of existing ESP series irrigation controllers up to a maximum of 22-stations.	179.87	
32 84 23 00-0145	EA		6-Station Expansion Module For ESP Series Irrigation Controllers (Rain Bird® ESP-SM6)..... Note: Use task for increasing capacity of existing ESP series irrigation controllers up to a maximum of 22-stations.	343.35	
32 84 23 00-0146	EA		Smart Controller Upgrade Kit For ESP Series Irrigation Controllers (Rain Bird® ESPSMTEUPG).....	500.01	
32 84 23 00-0147			Four Program, Indoor/Outdoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-LX Series) (32 84 23 00-0107)		
32 84 23 00-0148			Four Program, Indoor/Outdoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-LX Basic Series) (32 84 23 00-0147)		
32 84 23 00-0149	EA		12-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	1,055.26	38.89
32 84 23 00-0150	EA		16-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	1,276.22	38.89
32 84 23 00-0151	EA		20-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	1,501.00	38.89
32 84 23 00-0152	EA		24-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	1,721.96	38.89
32 84 23 00-0153	EA		28-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	1,946.74	38.89
32 84 23 00-0154	EA		32-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	2,167.71	38.89
32 84 23 00-0155	EA		36-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	2,392.48	38.89
32 84 23 00-0156	EA		40-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	2,613.44	38.89
32 84 23 00-0157	EA		44-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	2,838.22	38.89
32 84 23 00-0158	EA		48-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LX Basic Series).....	3,059.18	38.89
32 84 23 00-0159			Four Program, Indoor/Outdoor Mount, Modular Irrigation Controllers (Rain Bird® ESP-LXME Series) (32 84 23 00-0147)		
32 84 23 00-0160	EA		8-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	1,063.11	38.89
32 84 23 00-0161	EA		12-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	1,284.06	38.89
32 84 23 00-0162	EA		16-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	1,508.84	38.89
32 84 23 00-0163	EA		20-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	1,729.80	38.89
32 84 23 00-0164	EA		24-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	1,954.58	38.89
32 84 23 00-0165	EA		28-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	2,175.55	38.89
32 84 23 00-0166	EA		32-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	2,400.33	38.89
32 84 23 00-0167	EA		36-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	2,621.29	38.89
32 84 23 00-0168	EA		40-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	2,846.06	38.89
32 84 23 00-0169	EA		44-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	3,067.03	38.89
32 84 23 00-0170	EA		48-Station, Four Program, Indoor/Outdoor Mount, Modular Irrigation Controller (Rain Bird® ESP-LXME Series).....	3,291.80	38.89

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 84 23 00-0171			Accessories For ESP-LX/LXME Irrigation Controllers (32 84 23 00-0147)		
32 84 23 00-0172	EA		Powder Coated Steel Wall Cabinet For ESP-LX/LXME Irrigation Controllers (Rain Bird® LXMM).....	793.15	
32 84 23 00-0173	EA		Powder Coated Steel Cabinet And Pedestal For ESP-LX/LXME Irrigation Controllers (Rain Bird® LXMPED + LXMM).....	1,843.72	
			Note: Excludes concrete foundation.		
32 84 23 00-0174	EA		Stainless Steel Wall Cabinet For ESP-LX/LXME Irrigation Controllers (Rain Bird® LXMMSS).....	1,756.03	
32 84 23 00-0175	EA		Stainless Steel Cabinet And Pedestal For ESP-LX/LXME Irrigation Controllers (Rain Bird® LXMMSSPED + LXMMSS).....	3,902.95	
			Note: Excludes concrete foundation.		
32 84 23 00-0176	EA		4-Station Expansion Module For ESP-LX/LXME Irrigation Controllers (Rain Bird® ESPLXMSM4).....	220.96	
			Note: Use task for increasing capacity of existing ESP-LX/LXME irrigation controllers up to a maximum of 48-stations.		
32 84 23 00-0177	EA		8-Station Expansion Module For ESP-LX/LXME Irrigation Controllers (Rain Bird® ESPLXMSM8).....	445.74	
			Note: Use task for increasing capacity of existing ESP-LX/LXME irrigation controllers up to a maximum of 48-stations.		
32 84 23 00-0178	EA		12-Station Expansion Module For ESP-LX/LXME Irrigation Controllers (Rain Bird® ESPLXMSM12).....	692.92	
			Note: Use task for increasing capacity of existing ESP-LX/LXME irrigation controllers up to a maximum of 48-stations.		
32 84 23 00-0179	EA		Flow Smart Water Management Module For ESP-LXME Irrigation Controllers (Rain Bird® FSM-LXME).....	258.91	
32 84 23 00-0180			Three Program, Battery-Operated, Buriable Irrigation Control Modules (Rain Bird® TBOS-II Series) (32 84 23 00-0107)		
32 84 23 00-0181			Three Program, Battery-Operated, Buriable Irrigation Control Modules (Rain Bird® TBOS-II Series) (32 84 23 00-0180)		
32 84 23 00-0182	EA		1-Station, Three Program, Battery-Operated, Buriable Irrigation Control Module (Rain Bird® TBOS-II Series).....	517.07	38.89
32 84 23 00-0183	EA		2-Station, Three Program, Battery-Operated, Buriable Irrigation Control Module (Rain Bird® TBOS-II Series).....	622.68	38.89
32 84 23 00-0184	EA		4-Station, Three Program, Battery-Operated, Buriable Irrigation Control Module (Rain Bird® TBOS-II Series).....	769.09	38.89
32 84 23 00-0185			Accessories For TBOS-II Series Irrigation Controllers (32 84 23 00-0180)		
32 84 23 00-0186	EA		Field Transmitter For TBOS-II Series Irrigation Controllers (Rain Bird® TBOS2FTUS).....	667.34	
32 84 23 00-0187	EA		Potted Latching Solenoid For TBOS-II Series Irrigation Controllers (Rain Bird® TBOSPSOL).....	128.69	29.16
32 84 23 00-0188			Accessories For Irrigation Controllers (Rain Bird®) (32 84 23 00-0107)		
32 84 23 00-0189	EA		Wired Rain Sensor For Irrigation Controllers (Rain Bird® RSDBEX).....	179.58	29.16
32 84 23 00-0190	EA		Wireless Rain Sensor And Controller Interface For Irrigation Controllers (Rain Bird® WR2RC).....	371.75	29.16
32 84 23 00-0191	EA		Wireless Rain/Freeze Sensor And Controller Interface For Irrigation Controllers (Rain Bird® WR2RFC).....	394.63	29.16
32 84 23 00-0192	EA		Soil Moisture Sensor And Controller Interface For Irrigation Controllers (Rain Bird® SMRT-Y).....	592.93	29.16
32 84 23 00-0193			Two-Wire Decoder Systems (32 84 23 00-0105)		
32 84 23 00-0194			Two-Wire Decoder Systems (Rain Bird®) (32 84 23 00-0193)		
32 84 23 00-0195			Controllers For Two-Wire Decoder Systems (Rain Bird® ESP-LXD Series) (32 84 23 00-0194) Note: Includes water resistant cabinet.		
32 84 23 00-0196	EA		50-Station, Modular Controller For Two-Wire Decoder Systems (Rain Bird® ESP-LXD Series).....	3,089.65	38.89
32 84 23 00-0197	EA		125-Station, Modular Controller For Two-Wire Decoder Systems (Rain Bird® ESP-LXD Series).....	4,361.24	38.89
32 84 23 00-0198	EA		200-Station, Modular Controller For Two-Wire Decoder Systems (Rain Bird® ESP-LXD Series).....	5,632.82	38.89
32 84 23 00-0199			Field Decoders For Two-Wire Decoder Systems (Rain Bird®) (32 84 23 00-0194)		
32 84 23 00-0200	EA		One Individual Valve Interface, Field Decoder For Two-Wire Decoder System (Rain Bird® FD101TURF).....	375.90	38.89
32 84 23 00-0201	EA		One Pair Of Valves Interface, Field Decoder For Two-Wire Decoder System (Rain Bird® FD102TURF).....	479.25	38.89
32 84 23 00-0202	EA		Two Pair Of Valves Interface, Field Decoder For Two-Wire Decoder System (Rain Bird® FD202TURF).....	719.07	38.89
32 84 23 00-0203	EA		Up To Four Individual Valves Interface, Field Decoder For Two-Wire Decoder System (Rain Bird® FD401TURF).....	880.72	38.89
32 84 23 00-0204	EA		Up To Six Individual Valves Interface, Field Decoder For Two-Wire Decoder System (Rain Bird® FD601TURF).....	1,464.50	38.89
32 84 23 00-0205			Accessories For Two-Wire Decoder Systems (Rain Bird®) (32 84 23 00-0194)		
32 84 23 00-0206	EA		50-Station Replacement Base Module For ESP-LXD Series Two Wire Decoder Based Controllers (Rain Bird® MOD50-LXD).....	2,287.71	
32 84 23 00-0207	EA		75-Station Expansion Module For ESP-LXD Series Two Wire Decoder Based Controllers (Rain Bird® SPLXD5M75).....	1,271.59	
32 84 23 00-0208	EA		Line Surge Protection For ESP-LXD Series Two-Wire Decoder Systems (Rain Bird® LSP1TURF).....	283.69	34.03
32 84 23 00-0209	EA		Sensor Decoder Interface For ESP-LXD Series Two-Wire Decoder Systems (Rain Bird® SD210TURF).....	1,307.96	38.89
32 84 23 00-0210			Calsense Controllers (32 84 23 00-0105)		
32 84 23 00-0211			Irrigation Controllers (32 84 23 00-0210)		
32 84 23 00-0212	EA		6 Station ET-Driven Irrigation Controller (Calsense ET2000E-6).....	2,815.44	97.21
32 84 23 00-0213	EA		8 Station ET-Driven Irrigation Controller (Calsense ET2000E-8).....	3,632.15	109.36
32 84 23 00-0214	EA		12 Station ET-Driven Irrigation Controller (Calsense ET2000E-12).....	4,985.24	121.52
32 84 23 00-0215	EA		16 Station ET-Driven Irrigation Controller (Calsense ET2000E-16).....	5,485.06	121.52
32 84 23 00-0216	EA		24 Station ET-Driven Irrigation Controller (Calsense ET2000E-24).....	6,484.62	133.67
32 84 23 00-0217	EA		32 Station ET-Driven Irrigation Controller (Calsense ET2000E-32).....	7,825.60	133.67



Exterior Improvements		32
Irrigation		32 80
Planting Irrigation		32 84

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MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 84 23 00-0218	EA 40 Station ET-Driven Irrigation Controller (Calsense ET2000E-40).....	8,861.74	145.82
32 84 23 00-0219	EA 48 Station ET-Driven Irrigation Controller (Calsense ET2000E-48).....	9,922.33	145.82
32 84 23 00-0220	EA Upgrade Existing Calsense Controller To ET2000E (Calsense ET2000E-UPGRADE).....	2,867.83	48.61
32 84 23 00-0221	EA Upgrade Existing Calsense Controller With 8 Additional Stations (Calsense STATION UPGRADE).....	1,205.46	48.61
32 84 23 00-0222	Irrigation Controller Accessories (32 84 23 00-0210)		
32 84 23 00-0223	EA Set Of 10 Keys For Calsense Controllers Or Enclosures (Calsense KEY-1).....	117.03	
32 84 23 00-0224	EA Spare Lock For Enclosures (Calsense PAD).....	126.78	
32 84 23 00-0225	EA Hardware And Software For Up To 4 Additional Light Circuits (Calsense L).....	151.09	12.15
32 84 23 00-0226	EA Transformer For Irrigation Controllers (Calsense TR-1).....	219.12	48.61
32 84 23 00-0227	EA AC Line Protection For Irrigation Controllers (Calsense TP-110).....	597.03	48.61
32 84 23 00-0228	EA Transient Protection Board For Irrigation Controller Stations (Calsense TP-1).....	792.08	48.61
	<i>For Outdoor Gray Powder Coated Stainless Steel Enclosure, Add</i>	366.40	
32 84 23 00-0229	Sensors For Irrigation Controllers (32 84 23 00-0210)		
32 84 23 00-0230	Flow Sensors (32 84 23 00-0229)		
32 84 23 00-0231	EA 1-1/2" Polyvinyl Chloride (PVC) Schedule 80 Tee Mounted Flow Meter (Calsense FM 1.5).....	1,389.28	72.92
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-997.06	
32 84 23 00-0232	EA 2" Polyvinyl Chloride (PVC) Schedule 80 Tee Mounted Flow Meter (Calsense FM 2).....	1,438.04	72.92
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,045.82	
32 84 23 00-0233	EA 3" Polyvinyl Chloride (PVC) Schedule 80 Tee Mounted Flow Meter (Calsense FM 3).....	1,486.80	72.92
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,094.58	
32 84 23 00-0234	EA 1" Brass Tee Mounted Flow Meter (Calsense FM 1B).....	1,645.13	97.21
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,252.60	
32 84 23 00-0235	EA 1-1/4" Brass Tee Mounted Flow Meter (Calsense FM 1.25B).....	1,767.04	97.21
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,374.51	
32 84 23 00-0236	EA 1-1/2" Brass Tee Mounted Flow Meter (Calsense FM 1.5B).....	1,815.80	97.21
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,423.27	
32 84 23 00-0237	EA 2" Brass Tee Mounted Flow Meter (Calsense FM 2B).....	2,132.76	97.21
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,612.05	
32 84 23 00-0238	EA 2" Pipe Saddle Mounted Insertion Flow Meter (Calsense FMBX).....	1,657.63	48.61
	<i>Note: For 4" and larger pipe. Excludes pipe saddle.</i>		
	<i>For Flow Meter Replacement Insert Only, Deduct</i>	-1,136.92	
32 84 23 00-0239	Moisture Sensors (32 84 23 00-0229)		
32 84 23 00-0240	EA Soil Moisture Sensor (Calsense 1000-S).....	584.93	36.46
32 84 23 00-0241	Weather Sensors (32 84 23 00-0229)		
32 84 23 00-0242	EA Wind Gage, Irrigation Weather Sensor (Calsense WG-1).....	1,596.37	97.21
32 84 23 00-0243	EA Tipping Rain Bucket, Irrigation Weather Sensor (Calsense RB-1).....	1,839.56	194.43
32 84 23 00-0244	EA ET Gage, Irrigation Weather Sensor (Calsense ETG).....	3,644.10	145.82
32 84 23 00-0245	Weather Sensor Accessories (32 84 23 00-0229)		
32 84 23 00-0246	EA Ceramic Cup For ET Gage Weather Sensor (Calsense ETG-C).....	1,072.47	
32 84 23 00-0247	EA Removal And Replacement Of Circuit Board For ET Gage Weather Sensor (Calsense ETG-PCB).....	2,023.35	
32 84 23 00-0248	EA Vandal Resistant Mounting Base For ET Gage Enclosure (Calsense ETGE-BASE).....	1,072.47	48.61
32 84 23 00-0249	EA Vandal Resistant Stainless Steel Enclosure For ET Gage (Calsense ETGE).....	2,474.57	48.61
32 84 23 00-0250	Antennas For Irrigation Controllers (32 84 23 00-0210)		
	<i>Note: Excludes antenna cable.</i>		
32 84 23 00-0251	EA Local Radio Dome Antenna (Calsense LR-DOME).....	560.46	48.61
32 84 23 00-0252	EA Local Radio Stick Antenna (Calsense LR-STICK).....	816.46	48.61
32 84 23 00-0253	EA Local Radio Yagi Antenna (Calsense LR-YAGI).....	913.68	97.21
32 84 23 00-0254	EA Local Radio And Calsense Radio, Remote Dome Antenna (Calsense LR-DOME-RR).....	560.46	48.61
32 84 23 00-0255	EA Local Radio And Calsense Radio, Enhanced Remote Dome Antenna (Calsense LR-DOME-RRE).....	560.46	48.61
32 84 23 00-0256	EA GPRS Stubby Antenna (Calsense GR-STUBBY).....	560.46	48.61
32 84 23 00-0257	EA GPRS Stick Antenna (Calsense GR-STICK).....	816.46	48.61
32 84 23 00-0258	EA Spread Spectrum Dome Antenna (Calsense SR-DOME).....	560.46	48.61
32 84 23 00-0259	EA Spread Spectrum Stick Antenna (Calsense SR-STICK).....	816.46	48.61
32 84 23 00-0260	EA Spread Spectrum Yagi Antenna (Calsense SR-YAGI).....	913.68	97.21
32 84 23 00-0261	EA Spread Spectrum And Calsense Radio, Remote Dome Antenna (Calsense SR-DOME-RR).....	560.46	48.61
32 84 23 00-0262	EA Spread Spectrum And Calsense Radio, Enhanced Remote Dome Antenna (Calsense SR-DOME-RRE).....	560.46	48.61
32 84 23 00-0263	EA Spread Spectrum Stubby Antenna (Calsense SR-STUBBY).....	560.46	48.61
32 84 23 00-0264	EA WiFi Stubby Antenna (Calsense WEN-STUBBY).....	560.46	48.61
32 84 23 00-0265	LF Antenna Cable With End Connectors (Calsense LMR-400-DB).....	15.30	0.58
32 84 23 00-0266	EA Surge Protection Device For Antenna (Calsense ANT-PROT).....	560.62	24.31
32 84 23 00-0267	EA 5' High, Non-Penetrating, Antenna Tripod Mount (Calsense ANT-TRIPS).....	913.99	48.61
32 84 23 00-0268	EA 3' Antenna Stand Off Mount For 3" Maximum Tower Leg (Calsense ANT-SOM).....	792.40	
32 84 23 00-0269	EA Local Radio Frequency Filter (Calsense LR-FILTER).....	1,121.55	
32 84 23 00-0270	EA Spread Spectrum Frequency Filter (Calsense SR-FILTER).....	828.97	
32 84 23 00-0271	Pedestals And Enclosures For Irrigation Controllers (32 84 23 00-0210)		
32 84 23 00-0272	EA 15 Amperes, Circuit Breaker With Enclosure For Irrigation Controllers (Calsense SSE-BREAKER).....	511.54	72.92

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 84 23 00-0273	EA	Standard Gray Powder Coated Stainless Steel Controller Enclosure (Calsense C-BOX)	1,240.46		121.52
32 84 23 00-0274	EA	Indoor Wall Mount, Stainless Steel Back Panel (Calsense SSBP)	1,377.24		48.61
		Note: Includes GFI and receptacle.			
32 84 23 00-0275	EA	Standard Gray Powder Coated Stainless Steel Pedestal (Calsense PD-1)	1,645.53		36.46
		Note: Includes factory installed transient protection board and AC line protection.			
32 84 23 00-0276	EA	Heavy-Duty Stainless Steel Enclosure For Irrigation Controllers (Calsense SSE).....	5,158.13		36.46
		Note: Includes factory installed transient protection board and AC line protection.			
32 84 23 00-0277	EA	Heavy-Duty Stainless Steel Enclosure For Irrigation Controllers (Calsense SSE-R).....	5,826.95		36.46
		Note: Includes factory installed transient protection board, AC line protection and dome antenna.			
32 84 23 00-0278	EA	Double-Wide Heavy-Duty Stainless Steel Enclosure For Irrigation Controllers (Calsense SSE-D)	8,454.37		72.92
		Note: Includes factory installed transient protection boards and AC line protection. Pre-wired for two controllers.			
32 84 23 00-0279	EA	Double-Wide Heavy-Duty Stainless Steel Enclosure For Irrigation Controllers (Calsense SSE-D-R)	8,861.65		72.92
		Note: Includes factory installed transient protection boards, AC line protection and dome antenna. Pre-wired for two controllers.			
32 84 23 00-0280	EA	Bolt Mounting Template For Heavy-Duty Stainless Steel Enclosures (Calsense SSE-CAM)	290.29		
32 84 23 00-0281	EA	Stainless Steel Fully Enclosed Riser For Calsense SSE Enclosures (Calsense SSE-PED).....	938.46		
32 84 23 00-0282		Central Computer For Irrigation Control Systems (32 84 23 00-0210)			
32 84 23 00-0283	EA	Central Computer For Irrigation Control Systems (Calsense COMP-2).....	6,502.89		
		Note: Includes a minimum of 133 MHz Pentium, 32 Meg Ram, 1.2 GB hard drive, 14.4 modem and a printer. Excludes Command Center Water Management software.			
32 84 23 00-0284	EA	Command Center Water Management Software For Central Computer (Calsense COMM-1).....	11,512.19		
32 84 23 00-0285	EA	Up To 5 Simultaneous Users Capacity, Calsense Advantage Client/Server Database Add-On (Calsense CS-5).....	2,209.70		
		Note: Package price for up to 5 users. Includes remote communication through internet connection.			
32 84 23 00-0286	EA	>5 To 10 Simultaneous Users Capacity, Calsense Advantage Client/Server Database Add-On (Calsense CS-10)	4,351.34		
		Note: Package price for 6 to 10 users. Includes remote communication through internet connection.			
32 84 23 00-0287	EA	Data Logger With Phone Modem For Irrigation Control Systems (Calsense DL-2)	7,006.29		
32 84 23 00-0288	EA	GPRS Radio For Use At Central Computer (Calsense DTR-G)	4,189.18		
32 84 23 00-0289		Data Access Service (32 84 23 00-0210)			
32 84 23 00-0290	EA	1 Month, Data Access Plan For Up To 2 Controllers (Calsense COMM-1MN)	35.46		
		Note: For communication between GPRS unit and up to 2 controllers.			
32 84 23 00-0291	EA	1 Year, Data Access Plan For Up To 2 Controllers (Calsense COMM-1YR).....	387.89		
		Note: For communication between GPRS unit and up to 2 controllers.			
32 84 23 00-0292	EA	5 Year, Data Access Plan For Up To 2 Controllers (Calsense COMM-5YR)	1,662.38		
		Note: For communication between GPRS unit and up to 2 controllers.			
32 84 23 00-0293	EA	1 Month, Data Access Plan For Up To 2 Controllers (Calsense COMM-1MN-M)	144.07		
		Note: For communication between GPRS unit and multiple controllers.			
32 84 23 00-0294	EA	1 Year, Data Access Plan For Up To 2 Controllers (Calsense COMM-1YR-M)	1,551.55		
		Note: For communication between GPRS unit and multiple controllers.			
32 84 23 00-0295	EA	5 Year, Data Access Plan For Up To 2 Controllers (Calsense COMM-5YR-M)	6,649.50		
		Note: For communication between GPRS unit and multiple controllers.			
32 84 23 00-0296		Communication Options For Irrigation Controllers (32 84 23 00-0210)			
32 84 23 00-0297	EA	FCC License Fee (Calsense).....	237.01		
32 84 23 00-0298	EA	P.C.I.A. And/or A.P.C.O. Fee (Calsense)	458.66		
		Note: Per frequency or frequency pair.			
32 84 23 00-0299	EA	Hardware Communication Option For Irrigation Controllers (Calsense M)	1,285.57		
		Note: Allows multiple controllers to be chained together via a communications cable and share one phone line.			
32 84 23 00-0300	EA	Phone Line Communication Option For Irrigation Controllers (Calsense R)	1,352.06		
32 84 23 00-0301	EA	Ethernet Communication Option For Irrigation Controllers (Calsense EN)	1,352.06		
32 84 23 00-0302	EA	WiFi Communication Option For Irrigation Controllers (Calsense WEN)	2,770.62		
32 84 23 00-0303	EA	Local Radio Communication Option For Irrigation Controllers (Calsense LR)	3,524.24		
32 84 23 00-0304	EA	Spread Spectrum Radio Communication Option For Irrigation Controllers (Calsense SR).....	3,524.24		
32 84 23 00-0305	EA	GPRS Radio Modem Communication Option For Irrigation Controllers (Calsense GR).....	3,524.24		
32 84 23 00-0306	EA	Fiber Optic Modem Communication Option For Irrigation Controllers (Calsense FOM)	11,304.15		
32 84 23 00-0307	EA	Communication Hub For Irrigation Controllers (Calsense HUB).....	4,354.16		
		Note: Accepts up to two communication options. Excludes communication options.			
32 84 23 00-0308		Retrofit Options For Irrigation Controllers (32 84 23 00-0210)			
32 84 23 00-0309		Weather Retrofits For Irrigation Controllers (32 84 23 00-0308)			
32 84 23 00-0310	EA	Add One Flow Sensor Interface To An Existing Calsense Controller (Calsense F-RETRO)	1,726.34		
32 84 23 00-0311	EA	Add One ET Gage Interface To An Existing Calsense Controller (Calsense G-RETRO)	1,726.34		
32 84 23 00-0312	EA	Add One Tipping Rain Bucket Interface To An Existing Calsense Controller (Calsense RB-RETRO)	1,726.34		
32 84 23 00-0313	EA	Add One Wind Gage Interface To An Existing Calsense Controller (Calsense WG-RETRO)	1,726.34		
32 84 23 00-0314		Phone Communication Retrofits For Irrigation Controllers (32 84 23 00-0308)			
32 84 23 00-0315	EA	Add The Ability To Chain To Another Calsense Controller With The Phone Line Communication Option And Share One Phone Line (Calsense M-RETRO)	1,815.00		
32 84 23 00-0316	EA	Add The Phone Line Communication Option To An Existing Calsense Controller (Calsense R-RETRO).....	2,147.47		
32 84 23 00-0317	EA	Add The Phone Line Communication Option And The Ability To Chain To Another Calsense Controller And Share One Phone Line (Calsense MLR-RETRO)	3,444.13		
32 84 23 00-0318		Local Radio Communication Retrofits For Irrigation Controllers (32 84 23 00-0308)			



Exterior Improvements		32
Irrigation		32 80
Planting Irrigation		32 84

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 84 23 00-0319	EA		Add The Ability To Chain To Another Calsense Controller With The Local Radio Communication Option And Share One Local Radio (Calsense ML-RETRO)	2,036.65	
32 84 23 00-0320	EA		Add The Local Radio Communication Option To An Existing Calsense Controller (Calsense LR-RETRO)	4,297.48	
32 84 23 00-0321	EA		Add The Local Radio Communication Option And The Ability To Chain To Another Calsense Controller And Share One Local Radio (Calsense MLR-RETRO)	5,583.05	
32 84 23 00-0322			Spread Spectrum Radio Communication Retrofits For Irrigation Controllers <i>(32 84 23 00-0308)</i>		
32 84 23 00-0323	EA		Add The Ability To Chain To Another Calsense Controller With The Spread Spectrum Radio Communication Option And Share One Spread Spectrum Radio (Calsense MS-Retro)	2,036.65	
32 84 23 00-0324	EA		Add The Spread Spectrum Radio Communication Option To An Existing Calsense Controller (Calsense SR-RETRO)	4,297.48	
32 84 23 00-0325	EA		Add The Spread Spectrum Radio Communication Option And The Ability To Chain To Another Calsense Controller And Share One Spread Spectrum Radio (Calsense MSR-RETRO)	5,583.05	
32 84 23 00-0326			Ethernet Communication Retrofits For Irrigation Controllers <i>(32 84 23 00-0308)</i>		
32 84 23 00-0327	EA		Add The Ability To Chain To Another Calsense Controller With The Ethernet Communication Option And Share One Ethernet Device (Calsense ME-Retro)	2,036.65	
32 84 23 00-0328	EA		Add The Ethernet Communication Option To An Existing Calsense Controller (Calsense EN-RETRO)	2,147.47	
32 84 23 00-0329	EA		Add The Ethernet Communication Option And The Ability To Chain To Another Calsense Controller And Share One Ethernet Device (Calsense MEN-RETRO)	3,444.13	
32 84 23 00-0330			GPRS Radio Modem Communication Retrofits For Irrigation Controllers <i>(32 84 23 00-0308)</i>		
32 84 23 00-0331	EA		Add The Ability To Chain To Another Calsense Controller With The GPRS Communication Option And Share One GPRS Modem (Calsense MG-RETRO)	2,036.65	
32 84 23 00-0332	EA		Add The GPRS Communication Option To An Existing Calsense Controller (Calsense GR-RETRO)	4,297.48	
32 84 23 00-0333	EA		Add The GPRS Communication Option And The Ability To Chain To Another Calsense Controller And Share One GPRS Modem (Calsense MGR-RETRO)	5,583.05	
32 84 23 00-0334			Radio Remote Units For Irrigation Controllers <i>(32 84 23 00-0210)</i>		
32 84 23 00-0335	EA		Enhanced Radio Remote Hand-Held Transmitter With Carry Case (Calsense RRe-TRAN)	2,047.73	
32 84 23 00-0336	EA		Calsense Integrated Radio Remote Receiver Board (Calsense RR/RRe)	438.87	
			Note: Includes polyvinyl chloride (PVC) stick antenna. Excludes antenna cable.		
32 84 23 00-0337	EA		Wall Mount Charger For Hand-Held Transmitter (Calsense RRTRAN-CHG)	188.40	
32 84 23 00-0338	EA		Removal And Replacement Of Battery For Hand-Held Transmitter (Calsense RRTRAN-BAT)	334.62	
32 84 23 00-0339	EA		Polyvinyl Chloride (PVC) Stick Antenna For Radio Remote Receiver Board (Calsense RR-ANT)	212.71	12.15
			Note: Excludes antenna cable.		
32 84 23 00-0340	EA		Whip Antenna For Radio Remote Receiver Board (Calsense RRe-WHIP)	412.20	12.15
			Note: Excludes antenna cable.		
32 84 23 00-0341	EA		Dome Antenna For Radio Remote Receiver Board (Calsense RR-Dome/RRe-Dome)	445.45	12.15
			Note: Excludes antenna cable.		
32 84 23 00-0342			Satellite Irrigation Controllers (Rain Bird® ESP-SAT) <i>(32 84 23 00-0105)</i>		
			Note: Satellite controllers compatible with Maxi-Con Central Control. Includes link communication with SEMET at the controller and stainless steel cabinet. Excludes concrete pad.		
32 84 23 00-0343	EA		12 Station, Satellite Irrigation Controller With Stainless Steel Cabinet (Rain Bird® RBESP12SATLS)	4,803.54	218.74
32 84 23 00-0344	EA		24 Station, Satellite Irrigation Controller With Stainless Steel Cabinet (Rain Bird® RBESP24SATLS)	5,065.77	230.89
32 84 23 00-0345	EA		40 Station, Satellite Irrigation Controller With Stainless Steel Cabinet (Rain Bird® RBESP40SATLS)	7,035.86	243.04
32 84 23 00-0346			Irrigation Valves <i>(32 84 23)</i>		
32 84 23 00-0347			Reduced Pressure Zone Valves With QT Shut-Offs <i>(32 84 23 00-0346)</i>		
			Note: Includes ball type test cocks, two quarter-turn (QT) full port resilient seated bronze body ball valves, and captured spring assemblies (Watts 009 QT series).		
32 84 23 00-0348	EA		3/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M3 QT series)	871.43	43.63
32 84 23 00-0349	EA		1" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series)	1,033.51	53.28
32 84 23 00-0350	EA		1-1/4" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series)	1,567.34	62.00
32 84 23 00-0351	EA		1-1/2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series)	1,655.58	71.19
32 84 23 00-0352	EA		2" Threaded Reduced Pressure Zone Assembly With Quarter Turn Shut-offs (Watts 009M2 QT series)	1,984.41	91.85
32 84 23 00-0353			Brass Quick-Coupling Irrigation Valves <i>(32 84 23 00-0346)</i>		
32 84 23 00-0354	EA		3/4", 1-Piece Brass Body, Quick-Coupling Irrigation Valve (Rain Bird® 3RC)	182.97	38.06
			For Valve Key, Add	56.50	
32 84 23 00-0355	EA		3/4", 2-Piece Brass Body, Quick-Coupling Irrigation Valve (Rain Bird® 33DRC)	189.50	38.06
			For Locking Cover, Add	25.00	
			For Valve Key, Add	56.50	
32 84 23 00-0356	EA		1", 1-Piece Brass Body, Quick-Coupling Irrigation Valve (Rain Bird® 44RC)	261.38	38.06
			For Valve Key, Add	144.51	
32 84 23 00-0357	EA		1", 2-Piece Brass Body, Quick-Coupling Irrigation Valve (Rain Bird® 44LRC)	287.51	38.06
			For Valve Key, Add	144.51	
32 84 23 00-0358	EA		1", 1-Piece Brass Body, Non-Potable (Purple) Quick-Coupling Irrigation Valve (Rain Bird® 5NP)	275.21	38.06
32 84 23 00-0359	EA		1", 2-Piece Brass Body, Non-Potable (Purple) Quick-Coupling Irrigation Valve (Rain Bird® 44NP)	287.51	38.06

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 84 23 00-0360	Anti-Siphon Pressure Type Vacuum Breaker <small>(32 84 23 00-0346)</small>		
	Note: Pressure: 15 to 150 PSI, temperature: 33 to 140 degrees Fahrenheit.		
32 84 23 00-0361	EA 3/4" Anti-Siphon Pressure Type Vacuum Breaker (Watts 800M4QT).....	299.17	32.15
32 84 23 00-0362	EA 1" Anti-Siphon Pressure Type Vacuum Breaker (Watts 800M4QT).....	430.39	36.74
32 84 23 00-0363	EA 1-1/4" Anti-Siphon Pressure Type Vacuum Breaker (Watts 800M4QT).....	785.06	42.48
32 84 23 00-0364	EA 1-1/2" Anti-Siphon Pressure Type Vacuum Breaker (Watts 800M4QT).....	956.58	47.07
32 84 23 00-0365	EA 2" Anti-Siphon Pressure Type Vacuum Breaker.....	963.21	57.41
32 84 23 00-0366	Manual Sprinkler Control Valves <small>(32 84 23 00-0346)</small>		
32 84 23 00-0367	EA 3/4" Manual Sprinkler Control Valves, With Union.....	100.41	31.00
32 84 23 00-0368	EA 1" Manual Sprinkler Control Valves, With Union.....	122.40	33.30
32 84 23 00-0369	EA 1-1/4" Manual Sprinkler Control Valves, With Union.....	188.86	42.14
32 84 23 00-0370	EA 1-1/2" Manual Sprinkler Control Valves, With Union.....	224.05	48.57
32 84 23 00-0371	EA 2" Manual Sprinkler Control Valves, With Union.....	301.55	57.41
32 84 23 00-0372	Irrigation Piping <small>(32 84 23)</small>		
32 84 23 00-0373	Irrigation Piping With Fittings, On Grade With Pipe Stabilizers <small>(32 84 23 00-0372)</small>		
	Note: Install stabilizers every 20', at change of direction and at sprinkler heads less than 12" tall.		
32 84 23 00-0374	Schedule 40 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, On Grade With Pipe Stabilizers <small>(32 84 23 00-0373)</small>		
32 84 23 00-0375	LF 1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	3.62	1.06
	<i>For >1,000, Deduct</i>	-0.18	
32 84 23 00-0376	LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	4.44	1.32
	<i>For >1,000, Deduct</i>	-0.22	
32 84 23 00-0377	LF 1" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	5.51	1.58
	<i>For >1,000, Deduct</i>	-0.28	
32 84 23 00-0378	LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	7.43	2.00
	<i>For >1,000, Deduct</i>	-0.37	
32 84 23 00-0379	LF 2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	9.45	2.52
	<i>For >1,000, Deduct</i>	-0.47	
32 84 23 00-0380	LF 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	12.59	2.94
	<i>For >1,000, Deduct</i>	-0.63	
32 84 23 00-0381	LF 3" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	17.04	4.23
	<i>For >1,000, Deduct</i>	-0.85	
32 84 23 00-0382	LF 4" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	22.73	5.29
	<i>For >1,000, Deduct</i>	-1.14	
32 84 23 00-0383	LF 6" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	34.08	6.61
	<i>For >1,000, Deduct</i>	-1.70	
32 84 23 00-0384	Class 200, SDR-21 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, On Grade With Pipe Stabilizers <small>(32 84 23 00-0373)</small>		
32 84 23 00-0385	LF 3/4" Class 200 Polyvinyl Chloride (PVC) Socketweld Pipe With Fittings, On Grade With Pipe Stabilizers.....	4.05	1.32
	<i>For >1,000, Deduct</i>	-0.20	
32 84 23 00-0386	LF 1" Class 200 Polyvinyl Chloride (PVC) Socketweld Pipe With Fittings, On Grade With Pipe Stabilizers.....	4.85	1.58
	<i>For >1,000, Deduct</i>	-0.24	
32 84 23 00-0387	LF 1-1/2" Class 200 Polyvinyl Chloride (PVC) Socketweld Pipe With Fittings, On Grade With Pipe Stabilizers.....	6.97	2.00
	<i>For >1,000, Deduct</i>	-0.35	
32 84 23 00-0388	LF 2" Class 200 Polyvinyl Chloride (PVC) Socketweld Pipe With Fittings, On Grade With Pipe Stabilizers.....	9.06	2.52
	<i>For >1,000, Deduct</i>	-0.45	
32 84 23 00-0389	LF 2-1/2" Class 200 Polyvinyl Chloride (PVC) Socketweld Pipe With Fittings, On Grade With Pipe Stabilizers.....	12.00	2.94
	<i>For >1,000, Deduct</i>	-0.60	
32 84 23 00-0390	LF 3" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	16.81	4.23
	<i>For >1,000, Deduct</i>	-0.84	
32 84 23 00-0391	LF 4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	23.95	5.29
	<i>For >1,000, Deduct</i>	-1.20	
32 84 23 00-0392	LF 6" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	41.81	6.61
	<i>For >1,000, Deduct</i>	-2.09	
32 84 23 00-0393	Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, On Grade With Pipe Stabilizers <small>(32 84 23 00-0373)</small>		
32 84 23 00-0394	LF 3/4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	4.38	1.32
	<i>For >1,000, Deduct</i>	-0.22	
32 84 23 00-0395	LF 1" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	5.30	1.58
	<i>For >1,000, Deduct</i>	-0.27	
32 84 23 00-0396	LF 1-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	7.83	2.00
	<i>For >1,000, Deduct</i>	-0.39	
32 84 23 00-0397	LF 2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	10.49	2.52
	<i>For >1,000, Deduct</i>	-0.52	
32 84 23 00-0398	LF 2-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	14.27	2.94
	<i>For >1,000, Deduct</i>	-0.71	
32 84 23 00-0399	LF 3" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	17.04	4.23
	<i>For >1,000, Deduct</i>	-0.85	
32 84 23 00-0400	LF 4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	22.73	5.29
	<i>For >1,000, Deduct</i>	-1.14	
32 84 23 00-0401	LF 6" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, On Grade With Pipe Stabilizers.....	34.83	6.61
	<i>For >1,000, Deduct</i>	-1.74	



Exterior Improvements		32
Irrigation		32 80
Planting Irrigation		32 84

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 84 23 00-0402			Irrigation Piping With Fittings, Trenching, Cover, Backfilled And Compacted <small>(32 84 23 00-0372)</small> Note: Install thrust blocks per Caltrans details for 3" piping and larger, upstream of remote control valve.		
32 84 23 00-0403			Schedule 40 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 12" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>		
32 84 23 00-0404	LF		3/4" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	6.57 -0.33	1.32
32 84 23 00-0405	LF		1" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.63 -0.38	1.58
32 84 23 00-0406	LF		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	9.55 -0.48	2.00
32 84 23 00-0407	LF		2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	11.58 -0.58	2.52
32 84 23 00-0408	LF		2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	14.71 -0.74	2.94
32 84 23 00-0409	LF		3" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	19.15 -0.96	4.23
32 84 23 00-0410	LF		4" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	24.85 -1.24	5.29
32 84 23 00-0411	LF		6" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	36.21 -1.81	6.61
32 84 23 00-0412			Schedule 40 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 18" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>		
32 84 23 00-0413	LF		3/4" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	6.83 -0.34	1.32
32 84 23 00-0414	LF		1" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.90 -0.40	1.58
32 84 23 00-0415	LF		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	9.82 -0.49	2.00
32 84 23 00-0416	LF		2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	11.84 -0.59	2.52
32 84 23 00-0417	LF		2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	14.97 -0.75	2.94
32 84 23 00-0418	LF		3" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	19.41 -0.97	4.23
32 84 23 00-0419	LF		4" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	25.11 -1.26	5.29
32 84 23 00-0420	LF		6" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	36.47 -1.82	6.61
32 84 23 00-0421			Schedule 40 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 24" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>		
32 84 23 00-0422	LF		3/4" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.09 -0.35	1.32
32 84 23 00-0423	LF		1" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	8.16 -0.41	1.58
32 84 23 00-0424	LF		1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	10.08 -0.50	2.00
32 84 23 00-0425	LF		2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	12.09 -0.60	2.52
32 84 23 00-0426	LF		2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	15.23 -0.76	2.94
32 84 23 00-0427	LF		3" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	19.68 -0.98	4.23
32 84 23 00-0428	LF		4" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	25.36 -1.27	5.29
32 84 23 00-0429	LF		6" Schedule 40 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	36.72 -1.84	6.61
32 84 23 00-0430			Class 200, SDR-21 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 12" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>		
32 84 23 00-0431	LF		3/4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	6.36 -0.32	1.32
32 84 23 00-0432	LF		1" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.29 -0.36	1.58
32 84 23 00-0433	LF		1-1/2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	9.58 -0.48	2.00
32 84 23 00-0434	LF		2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	12.26 -0.61	2.52
32 84 23 00-0435	LF		2-1/2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	15.83 -0.79	2.94
32 84 23 00-0436	LF		3" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	18.93 -0.95	4.23

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
32 84 23 00-0437	LF	4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		26.07	5.29
		<i>For >1,000, Deduct</i>		-1.30	
32 84 23 00-0438	LF	6" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		43.94	6.61
		<i>For >1,000, Deduct</i>		-2.20	
32 84 23 00-0439		Class 200, SDR-21 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 18" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>			
32 84 23 00-0440	LF	3/4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		6.62	1.32
		<i>For >1,000, Deduct</i>		-0.33	
32 84 23 00-0441	LF	1" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		7.56	1.58
		<i>For >1,000, Deduct</i>		-0.38	
32 84 23 00-0442	LF	1-1/2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		9.85	2.00
		<i>For >1,000, Deduct</i>		-0.49	
32 84 23 00-0443	LF	2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		12.52	2.52
		<i>For >1,000, Deduct</i>		-0.63	
32 84 23 00-0444	LF	2-1/2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		16.09	2.94
		<i>For >1,000, Deduct</i>		-0.80	
32 84 23 00-0445	LF	3" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		19.19	4.23
		<i>For >1,000, Deduct</i>		-0.96	
32 84 23 00-0446	LF	4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		26.33	5.29
		<i>For >1,000, Deduct</i>		-1.32	
32 84 23 00-0447	LF	6" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		44.20	6.61
		<i>For >1,000, Deduct</i>		-2.21	
32 84 23 00-0448		Class 200, SDR-21 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 24" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>			
32 84 23 00-0449	LF	3/4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		6.88	1.32
		<i>For >1,000, Deduct</i>		-0.34	
32 84 23 00-0450	LF	1" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		7.82	1.58
		<i>For >1,000, Deduct</i>		-0.39	
32 84 23 00-0451	LF	1-1/2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		10.11	2.00
		<i>For >1,000, Deduct</i>		-0.51	
32 84 23 00-0452	LF	2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		12.77	2.52
		<i>For >1,000, Deduct</i>		-0.64	
32 84 23 00-0453	LF	2-1/2" Class 200, SDR-21 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		16.35	2.94
		<i>For >1,000, Deduct</i>		-0.82	
32 84 23 00-0454	LF	3" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		19.46	4.23
		<i>For >1,000, Deduct</i>		-0.97	
32 84 23 00-0455	LF	4" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		26.58	5.29
		<i>For >1,000, Deduct</i>		-1.33	
32 84 23 00-0456	LF	6" Class 200, SDR-21 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted		44.45	6.61
		<i>For >1,000, Deduct</i>		-2.22	
32 84 23 00-0457		Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 12" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>			
32 84 23 00-0458	LF	3/4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		6.50	1.32
		<i>For >1,000, Deduct</i>		-0.33	
32 84 23 00-0459	LF	1" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		7.41	1.58
		<i>For >1,000, Deduct</i>		-0.37	
32 84 23 00-0460	LF	1-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		9.95	2.00
		<i>For >1,000, Deduct</i>		-0.50	
32 84 23 00-0461	LF	2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		12.61	2.52
		<i>For >1,000, Deduct</i>		-0.63	
32 84 23 00-0462	LF	2-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		16.40	2.94
		<i>For >1,000, Deduct</i>		-0.82	
32 84 23 00-0463	LF	3" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		19.15	4.23
		<i>For >1,000, Deduct</i>		-0.96	
32 84 23 00-0464	LF	4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		24.85	5.29
		<i>For >1,000, Deduct</i>		-1.24	
32 84 23 00-0465	LF	6" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 12" Of Cover, Backfilled And Compacted		36.96	6.61
		<i>For >1,000, Deduct</i>		-1.85	
32 84 23 00-0466		Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 18" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>			
32 84 23 00-0467	LF	3/4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted		6.76	1.32
		<i>For >1,000, Deduct</i>		-0.34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 84 23 00-0468 LF 1" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.68 -0.38	1.58
32 84 23 00-0469 LF 1-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	10.22 -0.51	2.00
32 84 23 00-0470 LF 2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	12.87 -0.64	2.52
32 84 23 00-0471 LF 2-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	16.66 -0.83	2.94
32 84 23 00-0472 LF 3" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	19.41 -0.97	4.23
32 84 23 00-0473 LF 4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	25.11 -1.26	5.29
32 84 23 00-0474 LF 6" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 18" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	37.22 -1.86	6.61
32 84 23 00-0475 Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Irrigation Piping With Fittings, Trenching, 24" Of Cover, Backfilled And Compacted <small>(32 84 23 00-0402)</small>		
32 84 23 00-0476 LF 3/4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.02 -0.35	1.32
32 84 23 00-0477 LF 1" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	7.94 -0.40	1.58
32 84 23 00-0478 LF 1-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	10.48 -0.52	2.00
32 84 23 00-0479 LF 2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	13.12 -0.66	2.52
32 84 23 00-0480 LF 2-1/2" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	16.92 -0.85	2.94
32 84 23 00-0481 LF 3" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	19.68 -0.98	4.23
32 84 23 00-0482 LF 4" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	25.36 -1.27	5.29
32 84 23 00-0483 LF 6" Class 315, SDR-13.5 Polyvinyl Chloride (PVC) Gasketed Pipe With Fittings, 24" Of Cover, Backfilled And Compacted <i>For >1,000, Deduct</i>	37.47 -1.87	6.61
32 84 23 00-0484 Irrigation Riser Piping With Fittings <small>(32 84 23 00-0372)</small>		
32 84 23 00-0485 EA 1/2" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 6" Exposed, Type IV Note: Includes #4 steel reinforcing bar, stainless steel hose clamp	20.33	3.17
32 84 23 00-0486 EA 3/4" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 6" Exposed, Type IV Note: Includes #4 steel reinforcing bar, stainless steel hose clamp	21.98	3.97
32 84 23 00-0487 EA 1/2" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 12" Exposed, Type IV Note: Includes #4 steel reinforcing bar, stainless steel hose clamp	21.77	3.70
32 84 23 00-0488 EA 3/4" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 12" Exposed, Type IV Note: Includes #4 steel reinforcing bar, stainless steel hose clamp	23.81	4.62
32 84 23 00-0489 EA 1/2" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 24" Exposed, Type I Note: Includes 2" diameter lodge poll support stake, two stainless steel sprinkler ties	43.78	5.55
32 84 23 00-0490 EA 3/4" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 24" Exposed, Type I Note: Includes 2" diameter lodge poll support stake, two stainless steel sprinkler ties	46.66	6.94
32 84 23 00-0491 EA 1/2" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 36" Exposed, Type I Note: Includes 2" diameter lodge poll support stake, two stainless steel sprinkler ties	51.50	7.13
32 84 23 00-0492 EA 3/4" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 36" Exposed, Type I Note: Includes 2" diameter lodge poll support stake, two stainless steel sprinkler ties	55.22	8.93
32 84 23 00-0493 EA 1/2" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 48" Exposed, Type I Note: Includes 2" diameter lodge poll support stake, two stainless steel sprinkler ties	59.23	8.72
32 84 23 00-0494 EA 3/4" Polyvinyl Chloride (PVC) Riser Pipe With Fittings, 48" Exposed, Type I Note: Includes 2" diameter lodge poll support stake, two stainless steel sprinkler ties	63.77	10.91
32 84 23 00-0495 Irrigation Crossover Piping With Fittings <small>(32 84 23 00-0372)</small>		
Note: Install per Caltrans details. Includes thrust blocks, HDPE sleeve pipe and fittings, 3" pvc irrigation piping and 1" electrical pvc conduit. Excludes #5 concrete irrigation pull boxes on ends, electrical control wiring. See CSI section 32 84 23 00-0095 for #5 concrete pull box, 32 84 23 00-0539 for irrigation wiring.		
32 84 23 00-0496 Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 24" Open Trench <small>(32 84 23 00-0495)</small>		
32 84 23 00-0497 LF 6" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 24" Open Trench Installation <i>For >1,000, Deduct</i>	50.93 -2.55	
32 84 23 00-0498 LF 8" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 24" Open Trench Installation <i>For >1,000, Deduct</i>	73.71 -3.69	
32 84 23 00-0499 LF 10" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 24" Open Trench Installation..... <i>For >1,000, Deduct</i>	103.61 -5.18	
32 84 23 00-0500 LF 12" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 24" Open Trench Installation..... <i>For >1,000, Deduct</i>	138.33 -6.92	

32 Exterior Improvements**32 80 Irrigation****32 84 Planting Irrigation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 84 23 00-0501	Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench <small>(32 84 23 00-0495)</small>		
32 84 23 00-0502	LF 6" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	51.71	
	<i>For >1,000, Deduct</i>	-2.59	
32 84 23 00-0503	LF 8" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	74.57	
	<i>For >1,000, Deduct</i>	-3.73	
32 84 23 00-0504	LF 10" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	104.55	
	<i>For >1,000, Deduct</i>	-5.23	
32 84 23 00-0505	LF 12" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	139.36	
	<i>For >1,000, Deduct</i>	-6.97	
32 84 23 00-0506	Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 48" Open Trench <small>(32 84 23 00-0495)</small>		
32 84 23 00-0507	LF 6" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 48" Open Trench Installation.....	52.48	
	<i>For >1,000, Deduct</i>	-2.62	
32 84 23 00-0508	LF 8" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	75.43	
	<i>For >1,000, Deduct</i>	-3.77	
32 84 23 00-0509	LF 10" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	105.51	
	<i>For >1,000, Deduct</i>	-5.28	
32 84 23 00-0510	LF 12" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), 36" Open Trench Installation.....	140.40	
	<i>For >1,000, Deduct</i>	-7.02	
32 84 23 00-0511	Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), Directional Bore <small>(32 84 23 00-0495)</small>		
32 84 23 00-0512	LF 6" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), Directional Bore Installation	111.30	
	<i>For >1,000, Deduct</i>	-5.57	
32 84 23 00-0513	LF 8" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), Directional Bore Installation	146.30	
	<i>For >1,000, Deduct</i>	-7.32	
32 84 23 00-0514	LF 10" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), Directional Bore Installation	182.21	
	<i>For >1,000, Deduct</i>	-9.11	
32 84 23 00-0515	LF 12" Irrigation Crossover, Corrugated High Density Polyethylene Pipe (CHDPE), Directional Bore Installation	222.96	
	<i>For >1,000, Deduct</i>	-11.15	
32 84 23 00-0516	Below Ground Cam Adapter Assembly <small>(32 84 23 00-0372)</small> Note: Includes minimum 6" depth gravel or crushed rock, woven wire cloth, jumbo valve box with 15" x 21.5" cover, 1-1/2" brass ball valve, 1-1/2" aluminum male cam adapter x female NPT, 1-1/2" PVC elbow, 2" PVC reducing tee, 30" PVC pipe		
32 84 23 00-0517	EA Below Ground Cam Adapter Assembly.....	719.64	
	Note: Includes 6" depth gravel or crushed rock, woven wire cloth, jumbo valve box with 15" x 21.5" brass ball valve, 1-1/2" aluminum male cam adapter x female NPT, 1-1/2" PVC elbow, 2" PVC reducing tee, 30" PVC pipe.		
32 84 23 00-0518	Above Ground Cam Adapter Assembly <small>(32 84 23 00-0372)</small> Note: Includes concrete thrust block, 1-1/2" plastic ball valve, 1-1/2" aluminum male cam adapter x female NPT, 1-1/2" PVC elbow, 2" PVC reducing tee, 30" PVC pipe		
32 84 23 00-0519	EA Above Ground Cam Adapter Assembly.....	443.73	
	Note: Includes concrete thrust block, 1-1/2" plastic ball valve, 1-1/2" aluminum male cam adapter x female NPT, 1-1/2" PVC elbow, 2" PVC reducing tee, 30" PVC pipe.		
32 84 23 00-0520	Thrust Block <small>(32 84 23 00-0372)</small>		
32 84 23 00-0521	EA Thrust Block For 1-1/2" Pipe Size And Smaller.....	38.43	
32 84 23 00-0522	EA Thrust Block For 2" Pipe.....	66.21	
32 84 23 00-0523	EA Thrust Block For 3" And 4" Pipe.....	93.99	
32 84 23 00-0524	EA Thrust Block For 6" Pipe.....	150.13	
32 84 23 00-0525	EA Thrust Block For 8" Pipe.....	213.93	
32 84 23 00-0526	Irrigation Swing Joints <small>(32 84 23)</small>		
32 84 23 00-0527	EA 3/4" Male NPT, 12" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint (Rain Bird® TSJ12075).....	69.99	21.05
32 84 23 00-0528	EA 1" Male NPT, 12" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint (Rain Bird® TSJ12).....	79.82	23.49
32 84 23 00-0529	EA 1" Male NPT, 12" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint With 70 PSI Pressure Regulator (Rain Bird® TSJ100PRS).....	110.57	23.49
32 84 23 00-0530	EA 1/2" Diameter, 12" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRANS Type I.....	44.84	27.42
	Note: Consists of three threaded 90 degree elbows and 12" threaded pipe.		
32 84 23 00-0531	EA 3/4" Diameter, 12" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRANS Type I.....	59.92	36.58
	Note: Consists of three threaded 90 degree elbows and 12" threaded pipe.		
32 84 23 00-0532	EA 1" Diameter, 12" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRANS Type I.....	75.65	44.86
	Note: Consists of three threaded 90 degree elbows and 12" threaded pipe.		
32 84 23 00-0533	EA 1/2" Diameter, 24" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRAN Type II.....	63.50	27.85
	Note: Consists of one threaded 90 degree elbow, one threaded x socket 90 degree elbow, one adapter and 24" threaded pipe.		
32 84 23 00-0534	EA 3/4" Diameter, 24" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRAN Type II.....	83.98	36.95
	Note: Consists of one threaded 90 degree elbow, one threaded x socket 90 degree elbow, one adapter and 24" threaded pipe.		



		Exterior Improvements	32
		Irrigation	32 80
		Planting Irrigation	32 84

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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 84 23 00-0535	EA		1" Diameter, 24" Length, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRAN Type II Note: Consists of one threaded 90 degree elbow, one threaded x socket 90 degree elbow, one adapter and 24" threaded pipe.	103.52	45.31
32 84 23 00-0536	EA		1/2" Diameter, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRANS Type III Note: Consists of two street 90 degree elbows.	35.77	17.06
32 84 23 00-0537	EA		3/4" Diameter, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRANS Type III Note: Consists of two street 90 degree elbows.	47.82	22.75
32 84 23 00-0538	EA		1" Diameter, Polyvinyl Chloride (PVC) Irrigation Swing Joint, CALTRANS Type III Note: Consists of two street 90 degree elbows.	56.97	28.20
32 84 23 00-0539			Irrigation Control Wire ^(32 84 23) Note: Excludes excavation and backfill.		
32 84 23 00-0540			18 AWG, Irrigation Control Wire, Buried In Trench ^(32 84 23 00-0539)		
32 84 23 00-0541	CLF		1-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	52.23	15.86
32 84 23 00-0542	CLF		2-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	68.91	18.51
32 84 23 00-0543	CLF		3-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	79.32	21.15
32 84 23 00-0544	CLF		4-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	90.88	23.79
32 84 23 00-0545	CLF		5-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	103.56	26.44
32 84 23 00-0546	CLF		6-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	124.24	29.07
32 84 23 00-0547	CLF		7-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	144.05	31.72
32 84 23 00-0548	CLF		8-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	156.54	34.36
32 84 23 00-0549	CLF		9-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	172.02	37.00
32 84 23 00-0550	CLF		10-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	189.85	39.65
32 84 23 00-0551	CLF		11-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	196.25	42.29
32 84 23 00-0552	CLF		12-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	203.82	44.93
32 84 23 00-0553	CLF		13-Conductor, 18 AWG, Irrigation Control Wire, Buried In Trench	215.01	47.58
32 84 23 00-0554			16 AWG, Irrigation Control Wire, Buried In Trench ^(32 84 23 00-0539)		
32 84 23 00-0555	CLF		1-Conductor, 16 AWG, Irrigation Control Wire, Buried In Trench	55.26	15.86
32 84 23 00-0556			14 AWG, Irrigation Control Wire, Buried In Trench ^(32 84 23 00-0539)		
32 84 23 00-0557	CLF		1-Conductor, 14 AWG, Irrigation Control Wire, Buried In Trench	55.27	15.86
32 84 23 00-0558			12 AWG, Irrigation Control Wire, Buried In Trench ^(32 84 23 00-0539)		
32 84 23 00-0559	CLF		1-Conductor, 12 AWG, Irrigation Control Wire, Buried In Trench	75.30	15.86
32 84 23 00-0560			10 AWG, Irrigation Control Wire, Buried In Trench ^(32 84 23 00-0539)		
32 84 23 00-0561	CLF		1-Conductor, 10 AWG, Irrigation Control Wire, Buried In Trench	100.69	15.86
32 84 23 00-0562			Root Watering Systems ^(32 84 23) Note: Includes swing assembly.		
32 84 23 00-0563	EA		0.25 GPM Bubbler On Riser, 36" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-B-1401)..... <i>For Root Watering Sand Sock, Add</i>	115.64 5.49	21.15
32 84 23 00-0564	EA		0.25 GPM Bubbler And Check Valve On Riser, 36" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-B-C-1401) <i>For Root Watering Sand Sock, Add</i>	125.81 5.49	21.15
32 84 23 00-0565	EA		0.5 GPM Bubbler On Riser, 36" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-B-1402)..... <i>For Root Watering Sand Sock, Add</i>	115.64 5.49	21.15
32 84 23 00-0566	EA		0.5 GPM Bubbler And Check Valve On Riser, 36" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-B-C-1402) <i>For Root Watering Sand Sock, Add</i>	125.81 5.49	21.15
32 84 23 00-0567	EA		1 GPM Bubbler And Check Valve On Riser, 36" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-B-C-1404) <i>For Root Watering Sand Sock, Add</i>	125.81 5.49	21.15
32 84 23 00-0568	EA		0.25 GPM Bubbler On Riser, 18" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-M-B-1401) <i>For Root Watering Sand Sock, Add</i>	100.26 4.96	18.51
32 84 23 00-0569	EA		0.25 GPM Bubbler And Check Valve On Riser, 18" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-M-B-C-1401) <i>For Root Watering Sand Sock, Add</i>	110.02 4.96	18.51
32 84 23 00-0570	EA		0.5 GPM Bubbler On Riser, 18" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-M-B-1402) <i>For Root Watering Sand Sock, Add</i>	100.26 4.96	18.51
32 84 23 00-0571	EA		0.5 GPM Bubbler And Check Valve On Riser, 18" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-M-B-C-1402) <i>For Root Watering Sand Sock, Add</i>	110.02 4.96	18.51
32 84 23 00-0572	EA		0.25 GPM Bubbler On Riser, 10" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-S-B-1401) <i>For Root Watering Sand Sock, Add</i>	65.37 4.44	15.86
32 84 23 00-0573	EA		0.25 GPM Bubbler And Check Valve On Riser, 10" Tube, 4" Diameter Grate, Root Watering System (Rain Bird® RWS-S-B-C-1401) <i>For Root Watering Sand Sock, Add</i>	74.67 4.44	15.86

32 90 Planting ⁽³²⁾

Note: Plant installation includes the initial watering only. The extended watering period for the establishment of lawns, plants and trees is addressed on a per plant per amount per occurrence basis as directed in the specification. cvs = cultivar or cultivated varieties. See CSI section 32 01 90 26-0000 for additional "extended watering period" tasks.

32 Exterior Improvements

32 90 Planting

32 91 Planting Preparation



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 91 Planting Preparation (32 91)

32 91 13 Soil Preparation (32 91)

32 91 13 16 Mulching (32 91 13)

32 91 13 16-0001 Mulch (32 91 13 16)

Note: Includes loading, delivery up to 15 miles and spreading. 1 CY = 108 SF of mulch spread 3" thick. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.

32 91 13 16-0002	CY	Pine Bark Nugget Mulch	105.10
		<i>For >5 To 20, Deduct</i>	-9.10
		<i>For >20 To 50, Deduct</i>	-13.66
		<i>For >50, Deduct</i>	-18.91
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0003	CY	Hardwood Bark Nugget Mulch	103.98
		<i>For >5 To 20, Deduct</i>	-9.05
		<i>For >20 To 50, Deduct</i>	-13.57
		<i>For >50, Deduct</i>	-18.77
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0004	CY	Pine Wood Chip Mulch	101.73
		<i>For >5 To 20, Deduct</i>	-8.94
		<i>For >20 To 50, Deduct</i>	-13.40
		<i>For >50, Deduct</i>	-18.49
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0005	CY	Hardwood Chip Mulch	106.23
		<i>For >5 To 20, Deduct</i>	-9.16
		<i>For >20 To 50, Deduct</i>	-13.74
		<i>For >50, Deduct</i>	-19.05
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0006	CY	Shredded Hardwood Mulch	106.23
		<i>For >5 To 20, Deduct</i>	-9.16
		<i>For >20 To 50, Deduct</i>	-13.74
		<i>For >50, Deduct</i>	-19.05
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0007	CY	Shredded Pine Mulch	96.10
		<i>For >5 To 20, Deduct</i>	-8.65
		<i>For >20 To 50, Deduct</i>	-12.98
		<i>For >50, Deduct</i>	-17.79
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0008	CY	Shredded Cedar Mulch	118.04
		<i>For >5 To 20, Deduct</i>	-9.75
		<i>For >20 To 50, Deduct</i>	-14.63
		<i>For >50, Deduct</i>	-20.53
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0009	CY	Shredded Cypress Mulch	116.36
		<i>For >5 To 20, Deduct</i>	-9.67
		<i>For >20 To 50, Deduct</i>	-14.50
		<i>For >50, Deduct</i>	-20.32
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0010	CY	Shredded Redwood Mulch	120.86
		<i>For >5 To 20, Deduct</i>	-9.89
		<i>For >20 To 50, Deduct</i>	-14.84
		<i>For >50, Deduct</i>	-20.88
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0011	CY	Pea Gravel Mulch	133.55
		<i>For >5 To 20, Deduct</i>	-10.53
		<i>For >20 To 50, Deduct</i>	-15.79
		<i>For >50, Deduct</i>	-22.47
		<i>For Work On Slopes >2.5:1, Add</i>	15.40
32 91 13 16-0012	CY	Chunk Recycled Tire Mulch	177.14
		<i>For >5 To 20, Deduct</i>	-13.78
		<i>For >20 To 50, Deduct</i>	-20.66
		<i>For >50, Deduct</i>	-29.52
		<i>For Work On Slopes >2.5:1, Add</i>	19.68
32 91 13 16-0013	CY	Chunk Colored Recycled Tire Mulch	254.77
		<i>For >5 To 20, Deduct</i>	-17.66
		<i>For >20 To 50, Deduct</i>	-26.49
		<i>For >50, Deduct</i>	-39.23
		<i>For Work On Slopes >2.5:1, Add</i>	19.68
32 91 13 16-0014	CY	Shredded Recycled Tire Mulch	255.89
		<i>For >5 To 20, Deduct</i>	-17.71
		<i>For >20 To 50, Deduct</i>	-26.57
		<i>For >50, Deduct</i>	-39.37
		<i>For Work On Slopes >2.5:1, Add</i>	19.68
32 91 13 16-0015	CY	Shredded Colored Recycled Tire Mulch	411.14
		<i>For >5 To 20, Deduct</i>	-25.48
		<i>For >20 To 50, Deduct</i>	-38.21
		<i>For >50, Deduct</i>	-58.77
		<i>For Work On Slopes >2.5:1, Add</i>	19.68
32 91 13 16-0016	EA	Pine Straw Mulch Bale	8.27
		Note: Covers 50 SF at a thickness of 2" to 4" forming a uniform mat through which none of the original ground surface can be seen.	
		<i>For >100 To 250, Deduct</i>	-0.63
		<i>For >250 To 500, Deduct</i>	-0.85
		<i>For >500, Deduct</i>	-1.04
		<i>For Work On Slopes >2.5:1, Add</i>	0.87

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 91 13 16-0017 EA Wheat Straw Mulch Bale 7.87 Note: Covers 350 SF forming a uniform mat through which 20 to 40% of the original ground surface can be seen. For >100 To 250, Deduct -0.56 For >250 To 500, Deduct -0.72 For >500, Deduct -0.95 For Work On Slopes >2.5:1, Add 0.65		
32 91 13 16-0018 CY Stone/Gravel Mulch, Marble Chips 306.97 For >5 To 20, Deduct -19.20 For >20 To 50, Deduct -28.80 For >50, Deduct -44.14 For Work On Slopes >2.5:1, Add 15.40		
32 91 13 16-0019 CY Stone Mulch, Decomposed Granite Chips 137.70 For >5 To 20, Deduct -10.73 For >20 To 50, Deduct -16.10 For >50, Deduct -22.99 For Work On Slopes >2.5:1, Add 15.40		
32 91 13 16-0020 Compost Soil Amendment (AgriService) (32 91 13 16) Note: Includes loading, delivery up to 15 miles and spreading. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles.		
32 91 13 16-0021 CY Humic Compost (OIM) 97.40 Note: (Agri Service or Equal) For Work On Slopes >2.5:1, Add 15.40 For >100 To 1,000, Deduct -16.42 For >1,000, Deduct -25.14		
32 91 13 26 Planting Beds (32 91 13) Note: Not for use when installing trees and shrubs.		
32 91 13 26-0001 Plant Bed Preparation (32 91 13 26) Note: Not for use when installing trees and shrubs.		
32 91 13 26-0002 SF Up To 8" Deep, Prepare And Mix Plant Bed, By Machine 1.22 Note: Includes loosening subgrade, removing stones, sticks, roots, rubbish, and raking surface. Excludes soil amendments. For Work On Slopes >2.5:1, Add 0.24		
32 91 13 26-0003 SF >8" To 13" Deep, Prepare And Mix Plant Bed, By Machine 1.39 Note: Includes loosening subgrade, removing stones, sticks, roots, rubbish, and raking surface. Excludes soil amendments. For Work On Slopes >2.5:1, Add 0.28		
32 91 13 26-0004 SF >13" To 18" Deep, Prepare And Mix Plant Bed, By Machine 1.64 Note: Includes loosening subgrade, removing stones, sticks, roots, rubbish, and raking surface. Excludes soil amendments. For Work On Slopes >2.5:1, Add 0.33		
32 91 13 26-0005 SF Up To 8" Deep, Prepare And Mix Plant Bed By Hand 5.62 Note: Includes loosening subgrade, removing stones, sticks, roots, rubbish, and raking surface. Excludes soil amendments. For Work On Slopes >2.5:1, Add 1.12		
32 91 13 26-0006 SF >8" To 13" Deep, Prepare And Mix Plant Bed By Hand 6.46 Note: Includes loosening subgrade, removing stones, sticks, roots, rubbish, and raking surface. Excludes soil amendments. For Work On Slopes >2.5:1, Add 1.29		
32 91 13 26-0007 SF >13" To 18" Deep, Prepare And Mix Plant Bed By Hand 7.59 Note: Includes loosening subgrade, removing stones, sticks, roots, rubbish, and raking surface. Excludes soil amendments. For Work On Slopes >2.5:1, Add 1.52		
32 91 13 26-0008 Planting Pit Preparation (32 91 13 26) Note: Not for use when installing trees and shrubs.		
32 91 13 26-0009 CY Excavate Planting Pit By Hand, Sandy Soil 97.21 Note: For use with existing planting pits. For Work On Slopes >2.5:1, Add 19.44		
32 91 13 26-0010 CY Excavate Planting Pit By Hand, Heavy Soil 194.43 Note: For use with existing planting pits. For Work On Slopes >2.5:1, Add 38.89		
32 91 13 26-0011 CY Excavate Planting Pit By Machine, Sandy Soil 14.83 Note: For use with existing planting pits. For Work On Slopes >2.5:1, Add 2.97		
32 91 13 26-0012 CY Excavate Planting Pit By Machine, Heavy Soil 19.30 Note: For use with existing planting pits. For Work On Slopes >2.5:1, Add 3.86		
32 91 13 26-0013 CY Backfill Planting Pit By Hand With Topsoil From Stockpile 86.39 For Work On Slopes >2.5:1, Add 17.28		
32 91 13 26-0014 CY Backfill Planting Pit By Hand With Contractor Furnished Planting Mix 119.00 For Work On Slopes >2.5:1, Add 15.53		
32 91 13 26-0015 CY Backfill Planting Pit By Machine, With Topsoil From Stockpile 8.22 For Work On Slopes >2.5:1, Add 1.64		
32 91 13 26-0016 CY Backfill Planting Pit By Machine, With Contractor Furnished Planting Mix 60.98 For Work On Slopes >2.5:1, Add 3.92		
32 91 13 26-0017 Weed Barrier (32 91 13 26)		

32 Exterior Improvements**32 90 Planting****32 91 Planting Preparation**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 91 13 26-0018	SY	Up To 3 Oz/SY Non-Woven, Polypropylene Weed Barrier	2.44
		<i>For Work On Slopes >2.5:1, Add</i>	0.15
32 91 13 26-0019	SY	4 Oz/SY Woven, Polypropylene Weed Barrier	3.29
		<i>For Work On Slopes >2.5:1, Add</i>	0.15
32 91 13 26-0020	SY	5 Oz/SY Woven, Needle Punched Polypropylene Weed Barrier	3.67
		<i>For Work On Slopes >2.5:1, Add</i>	0.15

32 91 13 33 Soil Conditioners (32 91 13)**32 91 13 33-0001 Spread Soil Conditioners (32 91 13 33)**

32 91 13 33-0002	SY	Aluminum Sulfate 1 LB/SY, Push Spreader	0.44
32 91 13 33-0003	MSF	Aluminum Sulfate 110 LB/MSF Tractor Spreader	40.87
32 91 13 33-0004	MSF	Fertilizer, 20 LB/MSF, Push Spreader	7.87
32 91 13 33-0005	MSF	Fertilizer, 20 LB/MSF, Tractor Spread	3.13
32 91 13 33-0006	MSF	Fertilizer, 20 LB/MSF, Truck Spread	5.57
32 91 13 33-0007	SY	Pelletized Lime, 1 LB/SY, Push Spreader	0.11
32 91 13 33-0008	MSF	Pelletized Lime, 110 LB/MSF, Tractor Spreader	7.83
32 91 13 33-0009	SY	Perlite, 1" Deep, Push Spreader	3.72
32 91 13 33-0010	MSF	Perlite, 1" Deep, Tractor Spreader	385.57
32 91 13 33-0011	SY	Vermiculite, Push Spreader	3.45
32 91 13 33-0012	MSF	Vermiculite, Tractor Spreader	376.64
32 91 13 33-0013	SY	Humate Granular Soil Conditioner, 0.10 LB/SY, Push Spreader	0.23
32 91 13 33-0014	MSF	Humate Granular Soil Conditioner, 10 LB/MSF, Tractor Spreader	20.47

32 91 13 36 Lawn Bed Preparation (32 91 13)**32 91 13 36-0001 Lawn Bed Preparation (32 91 13 36)**

32 91 13 36-0002	MSF	Rake Topsoil With Machine	93.25
32 91 13 36-0003	MSF	Rake Topsoil By Hand	77.76
32 91 13 36-0004	MSF	Screen Loam By Hand	51.84
32 91 13 36-0005	SY	Roll Topsoil With Machine	1.19
32 91 13 36-0006	SY	Roll Topsoil By Hand	3.47
32 91 13 36-0007	MSF	Removal Of Rocks And Debris With Machine	11.03
32 91 13 36-0008	MSF	Removal Of Rocks And Debris By Hand	34.61
32 91 13 36-0009	MSF	Root Raking And Loading, No Boulders	57.71
		<i>For >45 to 225, Deduct</i>	-40.40
		<i>For >225, Deduct</i>	-51.94
32 91 13 36-0010	MSF	Root Raking And Loading, With Boulders	96.19
		<i>For >45 to 225, Deduct</i>	-67.33
		<i>For >225, Deduct</i>	-86.57
32 91 13 36-0011	MSF	Up To 6" Deep Tilling Topsoil With Tractor	5.14
32 91 13 36-0012	MSF	>6" To 12" Deep Tilling Topsoil With Tractor	10.41
		<i>For Work On Slopes >2.5:1, Add</i>	2.08
32 91 13 36-0013	SY	Up To 2" Deep Tilling Topsoil With Rototiller	0.83
32 91 13 36-0014	SY	>2" To 4" Deep Tilling Topsoil With Rototiller	0.99
32 91 13 36-0015	SY	>4" To 6" Deep Tilling Topsoil With Rototiller	1.24
32 91 13 36-0016	LF	"V" Cut Soil For Edge Of Planting Beds	1.38

32 91 13 36-0017 Sod Removal (32 91 13 36)

32 91 13 36-0018	SY	Removal Of Sod By Hand	6.56
		<i>For Work On Slopes >2.5:1, Add</i>	1.31
32 91 13 36-0019	SY	Removal Of Sod With Machine	0.70
		<i>For Work On Slopes >2.5:1, Add</i>	0.14
32 91 13 36-0020	SY	Pile Sod By Hand	3.89
		<i>For Work On Slopes >2.5:1, Add</i>	0.78
32 91 13 36-0021	SY	Pile Sod With Machine	1.30
		<i>For Work On Slopes >2.5:1, Add</i>	0.26

32 91 19 Landscape Grading (32 91)**32 91 19 13 Topsoil Placement and Grading (32 91 19)****32 91 19 13-0001 Remove And Stockpile Topsoil On Site (32 91 19 13)**

32 91 19 13-0002	CY	Removal Of Topsoil, 4" Deep Stockpile On Site	5.30
32 91 19 13-0003	CY	Removal Of Topsoil, 6" Deep Stockpile On Site	5.25

32 91 19 13-0004 Screening Topsoil (32 91 19 13)

32 91 19 13-0005	CY	Screen Topsoil With Vibrating Screen, Wet Material (Organic)	11.64
32 91 19 13-0006	CY	Screen Topsoil With Vibrating Screen, Dry Material	7.75

32 91 19 13-0007 Spreading Topsoil From Stockpile (32 91 19 13)

32 91 19 13-0008	CY	Spread Topsoil By Machine From Stockpile	8.82
32 91 19 13-0009	CY	Spread Topsoil By Hand From Stockpile	74.20



Exterior Improvements		32
	Planting	32 90
	Planting Preparation	32 91

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 91 19 13-0010			Furnish And Place Imported Screened Topsoil <small>(32 91 19 13)</small> Note: Includes delivery up to 15 miles from the closest approved source and spread by machine. Excludes hand spreading. See CSI section 01 74 19 00-0040 for hauling greater than 15 miles, 31 23 16 36-0030 for hand spreading.		
32 91 19 13-0011	SY		Furnish And Place Imported Screened Topsoil, 2" Deep..... <i>For Unscreened, Deduct</i>	3.70	-0.43
32 91 19 13-0012	SY		Furnish And Place Imported Screened Topsoil, 4" Deep..... <i>For Unscreened, Deduct</i>	7.08	-0.87
32 91 19 13-0013	SY		Furnish And Place Imported Screened Topsoil, 6" Deep..... <i>For Unscreened, Deduct</i>	10.18	-1.30
32 91 19 13-0014	SY		Furnish And Place Imported Screened Topsoil, 9" Deep..... <i>For Unscreened, Deduct</i>	14.63	-1.95
32 91 19 13-0015	SY		Furnish And Place Imported Screened Topsoil, 12" Deep..... <i>For Unscreened, Deduct</i>	19.07	-2.60
32 91 19 13-0016	CY		Furnish And Place Imported Screened Topsoil, Over 12" Deep..... <i>For Unscreened, Deduct</i>	51.98	-7.80

32 91 19 13-0017			Scarify Soil For Planting Preparation <small>(32 91 19 13)</small> Note: Ripped in multiple directions with 3" maximum clods.		
32 91 19 13-0018	MSF		Up To 5,000 SF Scarify Up To 8" Soil With Machine.....	69.40	
32 91 19 13-0019	MSF		>5,000 To 20,000 SF Scarify Up To 8" Soil With Machine.....	48.56	
32 91 19 13-0020	MSF		>20,000 SF Scarify Up To 8" Soil With Machine.....	28.48	

32 92 Turf and Grasses (32 90)

32 92 16 Plugging (32 92)

32 92 16 00-0001			Bermuda Or Centipede Plugging, 1" Deep <small>(32 92 16)</small> Note: Includes fine grade and soil preparation.		
32 92 16 00-0002			6" On Center Plugging <small>(32 92 16 00-0001)</small>		
32 92 16 00-0003	MSF		Plugging By Hand, 6" On Center.....	244.04	
32 92 16 00-0004	MSF		Plugging By Walk Behind Planter, 6" On Center.....	27.60	
32 92 16 00-0005	MSF		Plugging By Towed Planter, 6" On Center.....	18.79	
32 92 16 00-0006			9" On Center Plugging <small>(32 92 16 00-0001)</small>		
32 92 16 00-0007	MSF		Plugging By Hand, 9" On Center.....	187.40	
32 92 16 00-0008	MSF		Plugging By Walk Behind Planter, 9" On Center.....	21.91	
32 92 16 00-0009	MSF		Plugging By Towed Planter, 9" On Center.....	14.15	
32 92 16 00-0010			12" On Center Plugging <small>(32 92 16 00-0001)</small>		
32 92 16 00-0011	MSF		Plugging By Hand, 12" On Center.....	158.90	
32 92 16 00-0012	MSF		Plugging By Walk Behind Planter, 12" On Center.....	15.13	
32 92 16 00-0013	MSF		Plugging By Towed Planter, 12" On Center.....	9.16	

32 92 19 Seeding (32 92)

32 92 19 13 Mechanical Seeding (32 92 19)

Note: Includes fertilizing, liming, mixing, seeding and initial watering.

32 92 19 13-0001			Tractor Spreader Mechanical Seeding <small>(32 92 19 13)</small> Note: Excludes straw.		
32 92 19 13-0002	MSF		California Native Grass Mix, Tractor Spreader..... <i>For >5 To 20, Deduct</i> <i>For >20 To 45, Deduct</i> <i>For >45, Deduct</i>	40.47	-2.65 -4.90 -7.78
32 92 19 13-0003	MSF		Common Bluegrass, Tractor Spreader..... Note: 4 LB/MSF spread rate.	42.69	
32 92 19 13-0004	MSF		Tall Fescue, Tractor Spreader..... Note: 5.5 LB/MSF spread rate.	35.21	
32 92 19 13-0005	MSF		Rye, Tractor Spreader..... Note: 10 LB/MSF spread rate.	35.74	
32 92 19 13-0006	MSF		Shade Mix, Tractor Spreader..... Note: 6 LB/MSF spread rate. Mixture of red fescue, creeping red fescue, perennial rye and bluegrass.	38.43	
32 92 19 13-0007	MSF		Turf Mix, Tractor Spreader..... Note: 4 LB/MSF spread rate. Mixture of three varieties of bluegrass and one improved perennial ryegrass.	40.37	
32 92 19 13-0008	MSF		Slope Mix, Tractor Spreader..... Note: 6 LB/MSF spread rate.	37.79	
32 92 19 13-0009	MSF		Utility Mix, Tractor Spreader..... Note: 7 LB/MSF spread rate. Mixture of perennial/annual rye, creeping red fescue and bluegrass.	34.57	
32 92 19 13-0010	MSF		Wild Flower Mix, Tractor Spreader..... Note: 0.10 LB/MSF spread rate.	28.51	
32 92 19 13-0011	MSF		Crown Vetch Mix, Tractor Spreader..... Note: 4 LB/MSF spread rate.	76.46	
32 92 19 13-0012	MSF		Athletic Mix, Tractor Spreader..... Note: 8 LB/MSF spread rate. Mixture of three varieties of drought resistant bluegrass, tall fescue and Kentucky bluegrass.	48.10	
32 92 19 13-0013	MSF		White Clover Mix, Tractor Spreader..... Note: 7 LB/MSF spread rate.	28.44	

32 Exterior Improvements**32 90 Planting****32 92 Turf and Grasses**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 92 19 13-0014	MSF Ladino Clover Mix, Tractor Spreader Note: 7 LB/MSF spread rate.		31.02
32 92 19 13-0015	MSF Bermuda, Tractor Spreader Note: 10 LB/MSF spread rate.		47.39
32 92 19 13-0016	Hydro Or Air Mechanical Seeding ^(32 92 19 13)		
32 92 19 13-0017	MSF California Native Grass Mix, Hydro Or Air Seeding 83.83 <i>For >5 To 20, Deduct</i> -5.64 <i>For >20 To 45, Deduct</i> -10.63 <i>For >45, Deduct</i> -17.06 <i>For Spot Areas Up To 1, Add</i> 97.19 <i>For >1 To 4, Add</i> 63.06 <i>For >4 To 7.5, Add</i> 43.11 <i>For >7.5 To 10, Add</i> 21.55 <i>For >45, Deduct</i> -7.09		
32 92 19 13-0018	MSF Common Bluegrass, Hydro Or Air Seeding 87.52 Note: 4 LB/MSF spread rate. <i>For Spot Areas Up To 1, Add</i> 98.67 <i>For >1 To 4, Add</i> 63.80 <i>For >4 To 7.5, Add</i> 43.47 <i>For >7.5 To 10, Add</i> 21.74 <i>For >45, Deduct</i> -7.27 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0019	MSF Tall Fescue, Hydro Or Air Seeding 92.03 Note: 5.5 LB/MSF spread rate. <i>For Spot Areas Up To 1, Add</i> 100.47 <i>For >1 To 4, Add</i> 64.70 <i>For >4 To 7.5, Add</i> 43.93 <i>For >7.5 To 10, Add</i> 21.96 <i>For >45, Deduct</i> -7.50 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0020	MSF Rye, Hydro Or Air Spread 87.71 Note: 10 LB/MSF spread rate. <i>For Spot Areas Up To 1, Add</i> 98.74 <i>For >1 To 4, Add</i> 63.84 <i>For >4 To 7.5, Add</i> 43.49 <i>For >7.5 To 10, Add</i> 21.75 <i>For >45, Deduct</i> -7.28 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0021	MSF Shade Mix, Hydro Or Air Seeding 87.52 Note: 6 LB/MSF spread rate. Mixture of red fescue, creeping red fescue, perennial rye and bluegrass. <i>For Spot Areas Up To 1, Add</i> 98.67 <i>For >1 To 4, Add</i> 63.80 <i>For >4 To 7.5, Add</i> 43.47 <i>For >7.5 To 10, Add</i> 21.74 <i>For >45, Deduct</i> -7.27 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0022	MSF Turf Mix, Hydro Or Air Seeding 92.03 Note: 4 LB/MSF spread rate. Mixture of three varieties of bluegrass and one improved perennial ryegrass. <i>For Spot Areas Up To 1, Add</i> 100.47 <i>For >1 To 4, Add</i> 64.70 <i>For >4 To 7.5, Add</i> 43.93 <i>For >7.5 To 10, Add</i> 21.96 <i>For >45, Deduct</i> -7.50 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0023	MSF Slope Mix, Hydro Or Air Seeding 90.09 Note: 6 LB/MSF spread rate. <i>For Spot Areas Up To 1, Add</i> 99.69 <i>For >1 To 4, Add</i> 64.31 <i>For >4 To 7.5, Add</i> 43.73 <i>For >7.5 To 10, Add</i> 21.87 <i>For >45, Deduct</i> -7.40 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0024	MSF Utility Mix, Hydro Or Air Seeding 88.53 Note: 7 LB/MSF spread rate. Mixture of perennial/annual rye, creeping red fescue and bluegrass. <i>For Spot Areas Up To 1, Add</i> 99.07 <i>For >1 To 4, Add</i> 64.00 <i>For >4 To 7.5, Add</i> 43.58 <i>For >7.5 To 10, Add</i> 21.79 <i>For >45, Deduct</i> -7.32 <i>For Tackifier, Add</i> 1.44		
32 92 19 13-0025	MSF Wild Flower Mix, Hydro Or Air Seeding 83.51 Note: 0.10 LB/MSF spread rate. <i>For Spot Areas Up To 1, Add</i> 97.06 <i>For >1 To 4, Add</i> 63.00 <i>For >4 To 7.5, Add</i> 43.07 <i>For >7.5 To 10, Add</i> 21.54 <i>For >45, Deduct</i> -7.07 <i>For Tackifier, Add</i> 1.44		



		Exterior Improvements	32
		Planting	32 90
		Turf and Grasses	32 92

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 92 19 13-0026 MSF Crown Vetch Mix, Hydro Or Air Seeding.....	128.76	
Note: 4 LB/MSF spread rate.		
For Spot Areas Up To 1, Add	115.16	
For >1 To 4, Add	72.05	
For >4 To 7.5, Add	47.60	
For >7.5 To 10, Add	23.80	
For >45, Deduct	-9.33	
For Tackifier, Add	1.44	
32 92 19 13-0027 MSF Athletic Mix, Hydro Or Air Seeding	114.60	
Note: 8 LB/MSF spread rate. Mixture of three varieties of drought resistant bluegrass, tall fescue and Kentucky bluegrass.		
For Spot Areas Up To 1, Add	109.50	
For >1 To 4, Add	69.22	
For >4 To 7.5, Add	46.18	
For >7.5 To 10, Add	23.09	
For >45, Deduct	-8.62	
For Tackifier, Add	1.44	
32 92 19 13-0028 MSF White Clover Mix, Hydro Or Air Seeding.....	77.40	
Note: 7 LB/MSF spread rate.		
For Spot Areas Up To 1, Add	94.62	
For >1 To 4, Add	61.78	
For >4 To 7.5, Add	42.46	
For >7.5 To 10, Add	21.23	
For >45, Deduct	-6.76	
For Tackifier, Add	1.44	
32 92 19 13-0029 MSF Ladino Clover Mix, Hydro Or Air Seeding	84.94	
Note: 7 LB/MSF spread rate.		
For Spot Areas Up To 1, Add	97.63	
For >1 To 4, Add	63.28	
For >4 To 7.5, Add	43.22	
For >7.5 To 10, Add	21.61	
For >45, Deduct	-7.14	
For Tackifier, Add	1.44	
32 92 19 13-0030 MSF 60% Kentucky Bluegrass, 20% Creeping Red Fescue, 10% Red Top And 10% Domestic Rye, Hydro Or Air Spread	88.81	
Note: 4 LB/MSF spread rate.		
For Spot Areas Up To 1, Add	99.18	
For >1 To 4, Add	64.06	
For >4 To 7.5, Add	43.60	
For >7.5 To 10, Add	21.80	
For >45, Deduct	-7.33	
For Tackifier, Add	1.44	
32 92 19 13-0031 MSF 2,500 LB/Acre, High Performance - Flexible Growth Medium	100.89	
Note: Applied with seed. Excludes seed.		
For Spot Areas Up To 1, Add	72.19	
For >1 To 4, Add	43.33	
For >4 To 7.5, Add	27.45	
For >7.5 To 10, Add	13.73	
For >45, Deduct	-6.49	
32 92 19 13-0032 MSF 3,000 LB/Acre, High Performance - Flexible Growth Medium	116.73	
Note: Applied with seed. Excludes seed.		
For Spot Areas Up To 1, Add	80.12	
For >1 To 4, Add	47.66	
For >4 To 7.5, Add	29.91	
For >7.5 To 10, Add	14.95	
For >45, Deduct	-7.36	
32 92 19 13-0033 MSF 3,500 LB/Acre, High Performance - Flexible Growth Medium	132.66	
Note: Applied with seed. Excludes seed.		
For Spot Areas Up To 1, Add	88.18	
For >1 To 4, Add	52.07	
For >4 To 7.5, Add	32.42	
For >7.5 To 10, Add	16.21	
For >45, Deduct	-8.23	
32 92 19 13-0034 MSF 4,000 LB/Acre, High Performance - Flexible Growth Medium	148.62	
Note: Applied with seed. Excludes seed.		
For Spot Areas Up To 1, Add	96.30	
For >1 To 4, Add	56.52	
For >4 To 7.5, Add	34.96	
For >7.5 To 10, Add	17.48	
For >45, Deduct	-9.11	
32 92 19 13-0035 MSF 4,500 LB/Acre, High Performance - Flexible Growth Medium	164.69	
Note: Applied with seed. Excludes seed.		
For Spot Areas Up To 1, Add	104.57	
For >1 To 4, Add	61.08	
For >4 To 7.5, Add	37.58	
For >7.5 To 10, Add	18.79	
For >45, Deduct	-9.99	
32 92 19 19 Seeding by Hand <small>(32 92 19)</small>		
Note: Includes fertilizing, liming, mixing, seeding and initial watering. See CSI section 32 91 13 16-0017 for wheat straw mulch.		
32 92 19 19-0001 Push Spreader Or Hand Seeding <small>(32 92 19 19)</small>		
Note: Excludes straw.		

32 Exterior Improvements**32 90 Planting****32 92 Turf and Grasses**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 92 19 19-0002	MSF		California Native Grass Mix, Push Spreader Or Hand	112.77	
			<i>For >5 To 20, Deduct</i>	-8.07	
			<i>For >20 To 45, Deduct</i>	-15.75	
			<i>For >45, Deduct</i>	-25.86	
32 92 19 19-0003	MSF		Common Bluegrass, Push Spreader Or Hand	114.99	
			Note: 4 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-8.18	
			<i>For >20 To 45, Deduct</i>	-15.91	
			<i>For >45, Deduct</i>	-26.08	
32 92 19 19-0004	MSF		Tall Fescue, Push Spreader Or Hand	107.51	
			Note: 5.5 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.81	
			<i>For >20 To 45, Deduct</i>	-15.35	
			<i>For >45, Deduct</i>	-25.33	
32 92 19 19-0005	MSF		Rye, Push Spreader Or Hand	108.04	
			Note: 10 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.83	
			<i>For >20 To 45, Deduct</i>	-15.39	
			<i>For >45, Deduct</i>	-25.38	
32 92 19 19-0006	MSF		Shade Mix, Push Spreader Or Hand	110.73	
			Note: 6 LB/MSF spread rate. Mixture of red fescue, creeping red fescue, perennial rye and bluegrass.		
			<i>For >5 To 20, Deduct</i>	-7.97	
			<i>For >20 To 45, Deduct</i>	-15.59	
			<i>For >45, Deduct</i>	-25.65	
32 92 19 19-0007	MSF		Turf Mix, Push Spreader Or Hand	112.67	
			Note: 4 LB/MSF spread rate. Mixture of three varieties of bluegrass and one improved perennial ryegrass.		
			<i>For >5 To 20, Deduct</i>	-8.06	
			<i>For >20 To 45, Deduct</i>	-15.74	
			<i>For >45, Deduct</i>	-25.85	
32 92 19 19-0008	MSF		Slope Mix, Push Spreader Or Hand	110.09	
			Note: 6 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.93	
			<i>For >20 To 45, Deduct</i>	-15.55	
			<i>For >45, Deduct</i>	-25.59	
32 92 19 19-0009	MSF		Utility Mix, Push Spreader Or Hand	106.87	
			Note: 7 LB/MSF spread rate. Mixture of perennial/annual rye, creeping red fescue and bluegrass.		
			<i>For >5 To 20, Deduct</i>	-7.77	
			<i>For >20 To 45, Deduct</i>	-15.31	
			<i>For >45, Deduct</i>	-25.27	
32 92 19 19-0010	MSF		Wild Flower Mix, Push Spreader Or Hand	100.81	
			Note: 0.10 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.47	
			<i>For >20 To 45, Deduct</i>	-14.85	
			<i>For >45, Deduct</i>	-24.66	
32 92 19 19-0011	MSF		Crown Vetch Mix, Push Spreader Or Hand	148.76	
			Note: 4 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-9.87	
			<i>For >20 To 45, Deduct</i>	-18.45	
			<i>For >45, Deduct</i>	-29.46	
32 92 19 19-0012	MSF		Athletic Mix, Push Spreader Or Hand	120.40	
			Note: 8 LB/MSF spread rate. Mixture of drought resistant bluegrass, tall fescue and Kentucky bluegrass.		
			<i>For >5 To 20, Deduct</i>	-8.45	
			<i>For >20 To 45, Deduct</i>	-16.32	
			<i>For >45, Deduct</i>	-26.62	
32 92 19 19-0013	MSF		White Clover Mix, Push Spreader Or Hand	100.74	
			Note: 7 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.47	
			<i>For >20 To 45, Deduct</i>	-14.85	
			<i>For >45, Deduct</i>	-24.65	
32 92 19 19-0014	MSF		Ladino Clover Mix, Push Spreader Or Hand	103.32	
			Note: 7 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.60	
			<i>For >20 To 45, Deduct</i>	-15.04	
			<i>For >45, Deduct</i>	-24.91	
32 92 19 19-0015	MSF		100% Kentucky Bluegrass, Push Spreader Or Hand	116.21	
			Note: 3.3 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-8.24	
			<i>For >20 To 45, Deduct</i>	-16.01	
			<i>For >45, Deduct</i>	-26.20	
32 92 19 19-0016	MSF		70% Kentucky Bluegrass And 30% Fescue, Push Spreader Or Hand	112.67	
			Note: 3.3 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-8.06	
			<i>For >20 To 45, Deduct</i>	-15.74	
			<i>For >45, Deduct</i>	-25.85	
32 92 19 19-0017	MSF		50% Kentucky Bluegrass And 50% Fescue, Push Spreader Or Hand	110.09	
			Note: 3.3 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-7.93	
			<i>For >20 To 45, Deduct</i>	-15.55	
			<i>For >45, Deduct</i>	-25.59	
32 92 19 19-0018	MSF		50% Kentucky Bluegrass And 50% Perennial Rye, Push Spreader Or Hand	115.25	
			Note: 4.4 LB/MSF spread rate.		
			<i>For >5 To 20, Deduct</i>	-8.19	
			<i>For >20 To 45, Deduct</i>	-15.93	
			<i>For >45, Deduct</i>	-26.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 92 19 19-0019 MSF 60% Kentucky Bluegrass, 20% Creeping Red Fescue, 10% Red Top And 10% Domestic Rye, Push Spreader Or Hand.....	111.38	
Note: 3.3 LB/MSF spread rate.		
For >5 To 20, Deduct	-8.00	
For >20 To 45, Deduct	-15.64	
For >45, Deduct	-25.72	
32 92 19 19-0020 MSF 40% Creeping Red Fescue, 30% Kentucky Bluegrass, 10% Red Top, And 20% Blue Tag Perennial Rye, Push Spreader Or Hand.....	112.67	
Note: 3.3 LB/MSF spread rate.		
For >5 To 20, Deduct	-8.06	
For >20 To 45, Deduct	-15.74	
For >45, Deduct	-25.85	
32 92 19 19-0021 MSF Bermuda, Push Spreader Or Hand.....	119.69	
Note: 10 LB/MSF spread rate.		
For >5 To 20, Deduct	-8.41	
For >20 To 45, Deduct	-16.27	
For >45, Deduct	-26.55	
32 92 23 Sodding (32 92)		
Note: Includes raking preparation, water thoroughly and allow surface to dry before planting, rolling of sod, sanding seams for (up to 16" wide by 24" long) squares or (up to 24" wide by 54" long) rolls and initial watering within 2 hours after planting.		
32 92 23 00-0001 Bermuda Sod (32 92 23)		
32 92 23 00-0002 MSF Up To 1,000 SF, Bermuda Sod, Installed On Level Ground.....	1,438.91	
32 92 23 00-0003 MSF >1,000 To 4,000 SF, Bermuda Sod, Installed On Level Ground.....	1,236.15	
32 92 23 00-0004 MSF >4,000 To 8,000 SF, Bermuda Sod, Installed On Level Ground.....	1,055.22	
32 92 23 00-0005 MSF >8,000 SF, Bermuda Sod, Installed On Level Ground.....	935.32	
32 92 23 00-0006 MSF Up To 1,000 SF, Bermuda Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,820.99	
32 92 23 00-0007 MSF >1,000 To 4,000 SF, Bermuda Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,559.80	
32 92 23 00-0008 MSF >4,000 To 8,000 SF, Bermuda Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,278.50	
32 92 23 00-0009 MSF >8,000 SF, Bermuda Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,125.20	
32 92 23 00-0010 Zoysia Sod (32 92 23)		
32 92 23 00-0011 MSF Up To 1,000 SF, Zoysia Sod, Installed On Level Ground.....	1,984.70	
32 92 23 00-0012 MSF >1,000 To 4,000 SF, Zoysia Sod, Installed On Level Ground.....	1,643.73	
32 92 23 00-0013 MSF >4,000 To 8,000 SF, Zoysia Sod, Installed On Level Ground.....	1,394.88	
32 92 23 00-0014 MSF >8,000 SF, Zoysia Sod, Installed On Level Ground.....	1,207.04	
32 92 23 00-0015 MSF Up To 1,000 SF, Zoysia Sod, Installed On Sloped (>1:6) Ground With Stakes.....	2,364.44	
32 92 23 00-0016 MSF >1,000 To 4,000 SF, Zoysia Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,967.38	
32 92 23 00-0017 MSF >4,000 To 8,000 SF, Zoysia Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,618.16	
32 92 23 00-0018 MSF >8,000 SF, Zoysia Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,396.92	
32 92 23 00-0019 Tall Fescue Sod (32 92 23)		
32 92 23 00-0020 MSF Up To 1,000 SF, Tall Fescue Sod, Installed On Level Ground.....	1,959.54	
For Hybrid Fescue "Marathon", Add	116.09	
32 92 23 00-0021 MSF >1,000 To 4,000 SF, Tall Fescue Sod, Installed On Level Ground.....	1,624.86	
For Hybrid Fescue "Marathon", Add	87.60	
32 92 23 00-0022 MSF >4,000 To 8,000 SF, Tall Fescue Sod, Installed On Level Ground.....	1,379.15	
For Hybrid Fescue "Marathon", Add	73.36	
32 92 23 00-0023 MSF >8,000 SF, Tall Fescue Sod, Installed On Level Ground.....	1,194.46	
For Hybrid Fescue "Marathon", Add	59.12	
32 92 23 00-0024 MSF Up To 1,000 SF, Tall Fescue Sod, Installed On Sloped (>1:6) Ground With Stakes.....	2,339.28	
For Hybrid Fescue "Marathon", Add	116.09	
32 92 23 00-0025 MSF >1,000 To 4,000 SF, Tall Fescue Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,948.51	
For Hybrid Fescue "Marathon", Add	87.60	
32 92 23 00-0026 MSF >4,000 To 8,000 SF, Tall Fescue Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,602.43	
For Hybrid Fescue "Marathon", Add	73.36	
32 92 23 00-0027 MSF >8,000 SF, Tall Fescue Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,384.34	
For Hybrid Fescue "Marathon", Add	59.12	
32 92 23 00-0028 Centipede Sod (32 92 23)		
32 92 23 00-0029 MSF Up To 1,000 SF, Centipede Sod, Installed On Level Ground.....	1,774.62	
32 92 23 00-0030 MSF >1,000 To 4,000 SF, Centipede Sod, Installed On Level Ground.....	1,486.17	
32 92 23 00-0031 MSF >4,000 To 8,000 SF, Centipede Sod, Installed On Level Ground.....	1,263.58	
32 92 23 00-0032 MSF >8,000 SF, Centipede Sod, Installed On Level Ground.....	1,102.00	
32 92 23 00-0033 MSF Up To 1,000 SF, Centipede Sod, Installed On Sloped (>1:6) Ground With Stakes.....	2,154.36	
32 92 23 00-0034 MSF >1,000 To 4,000 SF, Centipede Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,809.82	
32 92 23 00-0035 MSF >4,000 To 8,000 SF, Centipede Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,486.86	
32 92 23 00-0036 MSF >8,000 SF, Centipede Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,291.88	
32 92 23 00-0037 Kentucky Blue Grass Sod (32 92 23)		
32 92 23 00-0038 MSF Up To 1,000 SF, Kentucky Blue Grass Sod, Installed On Level Ground.....	1,700.54	
32 92 23 00-0039 MSF >1,000 To 4,000 SF, Kentucky Blue Grass Sod, Installed On Level Ground.....	1,430.61	
32 92 23 00-0040 MSF >4,000 To 8,000 SF, Kentucky Blue Grass Sod, Installed On Level Ground.....	1,217.28	
32 92 23 00-0041 MSF >8,000 SF, Kentucky Blue Grass Sod, Installed On Level Ground.....	1,064.96	
32 92 23 00-0042 MSF Up To 1,000 SF, Kentucky Blue Grass Sod, Installed On Sloped (>1:6) Ground With Stakes.....	2,080.28	
32 92 23 00-0043 MSF >1,000 To 4,000 SF, Kentucky Blue Grass Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,754.26	

32 Exterior Improvements**32 90 Planting****32 92 Turf and Grasses**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 92 23 00-0044	MSF >4,000 To 8,000 SF, Kentucky Blue Grass Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,440.56
32 92 23 00-0045	MSF >8,000 SF, Kentucky Blue Grass Sod, Installed On Sloped (>1:6) Ground With Stakes.....	1,254.84

32 93 Plants (32 90)**32 93 13 Ground Covers** (32 93)

Note: Materials only. See CSI section 32 93 83 00-0057 for installation and planting of ground cover.

32 93 13 00-0001 Ornamental Grasses (32 93 13)

32 93 13 00-0002	EA 1 Gallon, Cortaderia selloana - Pampas Grass.....	34.95
32 93 13 00-0003	EA 2 Gallon, Cortaderia selloana - Pampas Grass.....	64.60
32 93 13 00-0004	EA 3 Gallon, Cortaderia selloana - Pampas Grass.....	117.41
32 93 13 00-0005	EA 5 Gallon, Cortaderia selloana - Pampas Grass.....	213.69
32 93 13 00-0006	EA 1 Gallon, Distichlis spicata - Saltgrass.....	11.23
32 93 13 00-0007	EA 5 Gallon, Distichlis spicata - Saltgrass.....	29.37
32 93 13 00-0008	EA 1 Quart, Imperata cylindrica - Japanese Blood Grass.....	26.75
32 93 13 00-0009	EA 1 Gallon, Imperata cylindrica - Japanese Blood Grass.....	35.57
32 93 13 00-0010	EA 2 Gallon, Imperata cylindrica - Japanese Blood Grass.....	38.07
32 93 13 00-0011	EA 1 Quart, Koeleria glauca - Blue Hair Grass.....	26.68
32 93 13 00-0012	EA 1 Gallon, Koeleria glauca - Blue Hair Grass.....	35.57
32 93 13 00-0013	EA 3 Gallon, Koeleria glauca - Blue Hair Grass.....	86.06
32 93 13 00-0014	EA 1 Gallon, Miscanthus sinensis 'Gracillimus' - Maiden Grass.....	33.77
32 93 13 00-0015	EA 3 Gallon, Miscanthus sinensis 'Gracillimus' - Maiden Grass.....	43.77
32 93 13 00-0016	EA 5 Gallon, Miscanthus sinensis 'Gracillimus' - Maiden Grass.....	83.68
32 93 13 00-0017	EA 1 Gallon, Miscanthus sinensis 'Zebrinus' - Zebra Grass.....	31.35
32 93 13 00-0018	EA 3 Gallon, Miscanthus sinensis 'Zebrinus' - Zebra Grass.....	49.28
32 93 13 00-0019	EA 5 Gallon, Miscanthus sinensis 'Zebrinus' - Zebra Grass.....	84.34
32 93 13 00-0020	EA 1 Gallon, Monarchochloe littoralis - Shore Grass.....	14.04
32 93 13 00-0021	EA 1 Quart, Pennisetum setaceum - Fountain Grass.....	29.18
32 93 13 00-0022	EA 1 Gallon, Pennisetum setaceum - Fountain Grass.....	74.23
32 93 13 00-0023	EA 3 Gallon, Pennisetum setaceum - Fountain Grass.....	97.86
32 93 13 00-0024	EA 1 Gallon, Saccharum ravennae - Ravenna Grass.....	92.38
32 93 13 00-0025	EA 3 Gallon, Saccharum ravennae - Ravenna Grass.....	103.78
32 93 13 00-0026	EA 7 Gallon, Saccharum ravennae - Ravenna Grass.....	171.21
32 93 13 00-0027	EA 1 Gallon, Spartina pectinata - Variegated Cord Grass.....	50.16
32 93 13 00-0028	EA 2 Gallon, Spartina pectinata - Variegated Cord Grass.....	75.08
32 93 13 00-0029	EA 1 Quart, Stipa gigantea - Giant Feather Grass.....	38.29
32 93 13 00-0030	EA 1 Gallon, Stipa gigantea - Giant Feather Grass.....	53.36
32 93 13 00-0031	EA 1 Gallon, Triglochin maritima - Arrow Grass.....	8.43

32 93 13 00-0032 Ground Covers (32 93 13)

32 93 13 00-0033	EA 1 Gallon Agave Attenuata - Century Plant.....	12.35
32 93 13 00-0034	EA 5 Gallon Agave Attenuata - Century Plant.....	33.30
32 93 13 00-0035	EA 15 Gallon Agave Attenuata - Century Plant.....	110.11
32 93 13 00-0036	EA 1 Gallon Ceanothus 'Carmel Creeper' - Wild Lilac.....	10.54
32 93 13 00-0037	EA 5 Gallon Ceanothus 'Carmel Creeper' - Wild Lilac.....	29.33
32 93 13 00-0038	EA 1 Gallon Ceanothus 'Yankee Point' - Wild Lilac.....	10.54
32 93 13 00-0039	EA 5 Gallon Ceanothus 'Yankee Point' - Wild Lilac.....	27.40
32 93 13 00-0040	EA 1 Gallon Dietes Vegata - Fortnight Lily.....	9.24
32 93 13 00-0041	EA 5 Gallon Dietes Vegata - Fortnight Lily.....	22.77
32 93 13 00-0042	EA 1 Gallon Juncus Patens 'Elk Blue' - California Gray Rush.....	17.17
32 93 13 00-0043	EA 5 Gallon Juncus Patens 'Elk Blue' - California Gray Rush.....	45.10
32 93 13 00-0044	EA 4" Pot Miscanthus 'Morning Light' - NCN.....	12.87
32 93 13 00-0045	EA 20 Count Flat Miscanthus 'Morning Light' - NCN.....	189.84
32 93 13 00-0046	EA 1 Gallon Nassella Tenuissima - Mexican Feather Grass.....	17.17
32 93 13 00-0047	EA 1 Gallon Trachelospermum Jasminoides - Star Jasmine.....	9.33
32 93 13 00-0048	EA 5 Gallon Trachelospermum Jasminoides - Star Jasmine.....	23.38
32 93 13 00-0049	EA 1 Gallon Westringia Fruticosa - Coast Rosemary.....	9.24
32 93 13 00-0050	EA 5 Gallon Westringia Fruticosa - Coast Rosemary.....	22.77
32 93 13 00-0051	EA 15 Gallon Westringia Fruticosa - Coast Rosemary.....	93.46
32 93 13 00-0052	EA 1 Quart Carex 'Bowles Golden' - Variegated Japanese Sedge.....	42.82
32 93 13 00-0053	EA 1 Gallon Carex 'Bowles Golden' - Variegated Japanese Sedge.....	55.74
32 93 13 00-0054	EA 2 Gallon Juniperus horizontalis 'Plumosa Compacta' - Andorra Creeping Juniper.....	70.55
32 93 13 00-0055	EA 1 Quart Waldsteinia ternata - Barren Strawberry.....	12.12
32 93 13 00-0056	EA 1 Gallon Waldsteinia ternata - Barren Strawberry.....	29.08
32 93 13 00-0057	EA 1 Gallon Cotoneaster dammeri - Bearberry Cotoneaster.....	39.58
32 93 13 00-0058	EA 2 Gallon Cotoneaster dammeri - Bearberry Cotoneaster.....	75.13
32 93 13 00-0059	EA 5 Gallon Cotoneaster dammeri - Bearberry Cotoneaster.....	132.48
32 93 13 00-0060	EA 1 Gallon Liriope muscari 'Big Blue' - Big Blue Liriope.....	13.55
32 93 13 00-0061	EA 1 Gallon Distictis buccinatoria - Blood Red Trumpet Vine.....	25.04
32 93 13 00-0062	EA 5 Gallon Distictis buccinatoria - Blood Red Trumpet Vine.....	88.05
32 93 13 00-0063	EA 1 Gallon Juniperus horizontalis 'Wiltoni' - Blue Rug Juniper.....	32.87
32 93 13 00-0064	EA 4" Pot Parthenocissus tricuspidata - Boston Ivy.....	16.16
32 93 13 00-0065	EA 1 Gallon Parthenocissus tricuspidata - Boston Ivy.....	36.84
32 93 13 00-0066	EA 5 Gallon Parthenocissus tricuspidata - Boston Ivy.....	100.81
32 93 13 00-0067	EA 3 Gallon Bougainvillea spectabilis - Bougainvillea.....	42.37
32 93 13 00-0068	EA 1 Quart Iberis sempervirens - Candytuft.....	12.12
32 93 13 00-0069	EA 1 Gallon Iberis sempervirens - Candytuft.....	29.08
32 93 13 00-0070	EA 1 Gallon Gelsemium sempervirens - Carolina Jessamine.....	34.90

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 13 00-0071	EA			5 Gallon Gelsemium sempervirens - Carolina Jessamine	126.02	
32 93 13 00-0072	EA			3" Pot Ajuga reptans - Carpet Bugle	7.27	
32 93 13 00-0073	EA			1 Quart Ajuga reptans - Carpet Bugle	12.12	
32 93 13 00-0074	EA			1 Gallon Ajuga reptans - Carpet Bugle	29.08	
32 93 13 00-0075	EA			24 Plant Flat Ajuga reptans - Carpet Bugle	125.21	
32 93 13 00-0076	EA			1 Gallon Macfadyena unguis-cati - Cat Claw Vine	29.08	
32 93 13 00-0077	EA			5 Gallon Macfadyena unguis-cati - Cat Claw Vine	126.02	
32 93 13 00-0078	EA			1 Gallon Wisteria sinensis - Chinese Wisteria Vine	37.97	
32 93 13 00-0079	EA			3 Gallon Wisteria sinensis - Chinese Wisteria Vine	84.02	
32 93 13 00-0080	EA			5 Gallon Wisteria sinensis - Chinese Wisteria Vine	126.02	
32 93 13 00-0081	EA			1 Gallon Ranunculaceae - Clematis Varieties	41.74	
32 93 13 00-0082	EA			2 Gallon Ranunculaceae - Clematis Varieties	77.20	
32 93 13 00-0083	EA			1 Gallon Hydrangea petiolaris - Climbing Hydrangea	52.51	
32 93 13 00-0084	EA			2 Gallon Hydrangea petiolaris - Climbing Hydrangea	98.55	
32 93 13 00-0085	EA			5 Gallon Hydrangea petiolaris - Climbing Hydrangea	161.56	
32 93 13 00-0086	EA			4" Pot Lantana camera - Common Lantana	7.27	
32 93 13 00-0087	EA			1 Gallon Lantana camera - Common Lantana	21.00	
32 93 13 00-0088	EA			1 Gallon Gardenia jasminoides 'Radicans' - Creeping Gardenia	25.04	
32 93 13 00-0089	EA			5 Gallon Gardenia jasminoides 'Radicans' - Creeping Gardenia	82.40	
32 93 13 00-0090	EA			2 Quart Lysimachia nummularia - Creeping Jenny	12.12	
32 93 13 00-0091	EA			1 Gallon Lysimachia nummularia - Creeping Jenny	23.43	
32 93 13 00-0092	EA			2 Quart Liriope spicata - Creeping Lilytuft	21.00	
32 93 13 00-0093	EA			1 Gallon Liriope spicata - Creeping Lilytuft	37.97	
32 93 13 00-0094	EA			5 Gallon Liriope spicata - Creeping Lilytuft	79.97	
32 93 13 00-0095	EA			Bare Root Liriope spicata - Creeping Liriope	5.30	
32 93 13 00-0096	EA			3" Pot Rosmarinus officinalis 'Prostratus' - Creeping Rosemary	7.27	
32 93 13 00-0097	EA			1 Gallon Rosmarinus officinalis 'Prostratus' - Creeping Rosemary	29.08	
32 93 13 00-0098	EA			2-1/4" Pot Securigera varia - Crown Vetch	4.85	
32 93 13 00-0099	EA			50 Plant Flat Securigera varia - Crown Vetch	163.99	
32 93 13 00-0100	EA			1 Quart Senecio cineraria - Dusty Miller	12.12	
32 93 13 00-0101	EA			1 Gallon Senecio cineraria - Dusty Miller	29.08	
32 93 13 00-0102	EA			2 Gallon Aristolochia macrophylla - Dutchman's Pipe	100.98	
32 93 13 00-0103	EA			5 Gallon Aristolochia macrophylla - Dutchman's Pipe	184.99	
32 93 13 00-0104	EA			1 Gallon Ilex cornuta - Dwarf Holly	21.94	
32 93 13 00-0105	EA			3 Gallon Ilex cornuta - Dwarf Holly	47.02	
32 93 13 00-0106	EA			3 Gallon Rhamphiolepis umbellata 'Minor' - Dwarf Indian Hawthorn	47.02	
32 93 13 00-0107	EA			1 Gallon Tradescantia spathacea - Dwarf Oyster Plant	15.67	
32 93 13 00-0108	EA			2" To 3" Pot Hedera helix - English Ivy	7.27	
32 93 13 00-0109	EA			12" To 15" Runners Hedera helix - English Ivy	12.12	
32 93 13 00-0110	EA			1 Gallon Hedera helix - English Ivy	29.08	
32 93 13 00-0111	EA			50 Plant Flat Hedera helix - English Ivy	168.02	
32 93 13 00-0112	EA			4" Pot Lavandula angustifolia - English Lavender	10.50	
32 93 13 00-0113	EA			1 Quart Lavandula angustifolia - English Lavender	20.20	
32 93 13 00-0114	EA			1 Gallon Lavandula angustifolia - English Lavender	33.12	
32 93 13 00-0115	EA			1 Gallon Euonymus fortunei 'Kewensis' - Wintercreeper	31.50	
32 93 13 00-0116	EA			2 Gallon Euonymus fortunei 'Kewensis' - Wintercreeper	63.01	
32 93 13 00-0117	EA			1 Quart Arundo donax - Giant Reed	38.78	
32 93 13 00-0118	EA			1 Gallon Arundo donax - Giant Reed	55.74	
32 93 13 00-0119	EA			1 Gallon Lonicera x heckrottii - Gold Flame Honeysuckle	33.12	
32 93 13 00-0120	EA			2 Gallon Lonicera x heckrottii - Gold Flame Honeysuckle	63.01	
32 93 13 00-0121	EA			1 Quart Hakonechloa macra 'Aureola' - Golden Variegated Hakone Grass	42.82	
32 93 13 00-0122	EA			1 Gallon Hakonechloa macra 'Aureola' - Golden Variegated Hakone Grass	64.63	
32 93 13 00-0123	EA			3" Pot Lonicera japonica 'Halliana' - Hall's Japanese Honeysuckle	7.27	
32 93 13 00-0124	EA			1 Gallon Lonicera japonica 'Halliana' - Hall's Japanese Honeysuckle	33.12	
32 93 13 00-0125	EA			2 Gallon Lonicera japonica 'Halliana' - Hall's Japanese Honeysuckle	63.01	
32 93 13 00-0126	EA			1 Gallon Hardenbergia violacea - Happy Wanderer	29.08	
32 93 13 00-0127	EA			5 Gallon Hardenbergia violacea - Happy Wanderer	96.94	
32 93 13 00-0128	EA			3 Gallon Hibiscus, Assorted Colors	37.88	
32 93 13 00-0129	EA			1 Gallon Acorus gramineus - Japanese Sweet Flag	30.29	
32 93 13 00-0130	EA			1 Gallon Jasminum volubile - Wax Jasmine	15.26	
32 93 13 00-0131	EA			1 Gallon Jasminum volubile - Wax Jasmine	37.88	
32 93 13 00-0132	EA			1 Gallon Juniperus davurica 'Parsonii' - Parson's Juniper	19.03	
32 93 13 00-0133	EA			3 Gallon Juniperus davurica 'Parsonii' - Parson's Juniper	42.37	
32 93 13 00-0134	EA			1 Gallon Cissus antarctica - Kangaroo Vine	23.43	
32 93 13 00-0135	EA			5 Gallon Cissus antarctica - Kangaroo Vine	73.51	
32 93 13 00-0136	EA			1 Quart Stachys byzantina - Lamb's Ear	12.12	
32 93 13 00-0137	EA			1 Quart Stachys byzantina - Lamb's Ear	29.08	
32 93 13 00-0138	EA			1 Gallon Lantana spp. Various Colors	17.14	
32 93 13 00-0139	EA			1 Gallon Lantana sellowiana - Trailing Lantana	11.28	
32 93 13 00-0140	EA			1 Gallon Cocculus laurifolius - Laurel-leaf Snailseed	23.43	
32 93 13 00-0141	EA			5 Gallon Cocculus laurifolius - Laurel-leaf Snailseed	84.01	
32 93 13 00-0142	EA			1 Gallon Liriope Evergreen Giant, 6 To 8 Bibs Minimum	17.14	
32 93 13 00-0143	EA			1 Gallon Variegated Liriope Evergreen Giant, 6 To 8 Bibs Minimum	21.63	
32 93 13 00-0144	EA			3 Gallon Variegated Liriope Evergreen Giant, 6 To 8 Bibs Minimum	34.59	
32 93 13 00-0145	EA			1 Quart Moss Phlox, Creeping Phlox	12.12	
32 93 13 00-0146	EA			1 Gallon Moss Phlox, Creeping Phlox	29.08	
32 93 13 00-0147	EA			1 Gallon Nephrolepis exaltata - Common Boston Fern	15.26	
32 93 13 00-0148	EA			4" Pot Ophiopogon Japonicus - Mondo grass	7.27	
32 93 13 00-0149	EA			1 Gallon Ophiopogon Japonicus - Mondo grass	29.08	
32 93 13 00-0150	EA			5 Gallon Ophiopogon Japonicus - Mondo grass	67.05	
32 93 13 00-0151	EA			2' To 3' High Oregon Holly-Grape	33.57	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 13 00-0152	EA	1 Gallon Pachysandra terminalis - Pachysandra	43.73	
32 93 13 00-0153	EA	2-1/4" Pot Vinca minor - Periwinkle	4.04	
32 93 13 00-0154	EA	4" Pot Vinca minor - Periwinkle	12.12	
32 93 13 00-0155	EA	Bare Root Vinca minor - Periwinkle	4.04	
32 93 13 00-0156	EA	1 Quart Nepeta mussinii - Persian Catmint	12.12	
32 93 13 00-0157	EA	1 Gallon Nepeta mussinii - Persian Catmint	25.04	
32 93 13 00-0158	EA	1 Gallon Coprosma kirkii - Prostrate Coprosma	20.20	
32 93 13 00-0159	EA	5 Gallon Coprosma kirkii - Prostrate Coprosma	73.51	
32 93 13 00-0160	EA	1 Gallon Juniperus Horizontalis - Prostrate Juniper	33.12	
32 93 13 00-0161	EA	3 Gallon Juniperus Horizontalis - Prostrate Juniper	71.09	
32 93 13 00-0162	EA	5 Gallon Juniperus Horizontalis - Prostrate Juniper	105.02	
32 93 13 00-0163	EA	1 Quart Euonymus fortunei 'Coloratus' - Purple-leaf Wintercreeper	28.84	
32 93 13 00-0164	EA	1 Gallon Euonymus fortunei 'Coloratus' - Purple-leaf Wintercreeper	74.74	
32 93 13 00-0165	EA	24 Plant Flat Euonymus fortunei 'Coloratus' - Purple-leaf Wintercreeper	125.21	
32 93 13 00-0166	EA	1 Gallon Tradescantia spathacea - Rhoeco Discolor "Dwarf"	15.26	
32 93 13 00-0167	EA	1 Quart Festuca glauca 'Sea Urchin' - Sea Urchin Blue Fescue	16.96	
32 93 13 00-0168	EA	1 Gallon Festuca glauca 'Sea Urchin' - Sea Urchin Blue Fescue	30.29	
32 93 13 00-0169	EA	2 Gallon Festuca glauca 'Sea Urchin' - Sea Urchin Blue Fescue	47.26	
32 93 13 00-0170	EA	1 Gallon Hymenocallis latifolia - Spider Lily	18.80	
32 93 13 00-0171	EA	3 Gallon Hymenocallis latifolia - Spider Lily	50.15	
32 93 13 00-0172	EA	1 Quart Hypericum perforatum - St. John's Wort	12.12	
32 93 13 00-0173	EA	1 Gallon Hypericum perforatum - St. John's Wort	29.08	
32 93 13 00-0174	EA	5 Gallon Hypericum perforatum - St. John's Wort	75.13	
32 93 13 00-0175	EA	24" To 30" High Viburnum awabuki - Sweet Viburnum	102.24	
32 93 13 00-0176	EA	1 Gallon Campsis radicans - Trumpet Creeper	44.43	
32 93 13 00-0177	EA	2 Gallon Campsis radicans - Trumpet Creeper	67.05	
32 93 13 00-0178	EA	5 Gallon Campsis radicans - Trumpet Creeper	161.56	
32 93 13 00-0179	EA	2-1/4" Pot Vinca major - Variegated Greater Periwinkle	4.04	
32 93 13 00-0180	EA	4" Pot Vinca major - Variegated Greater Periwinkle	12.12	
32 93 13 00-0181	EA	Bare Root Vinca major - Variegated Greater Periwinkle	4.04	
32 93 13 00-0182	EA	1 Quart Carex hachijoensis - Variegated Japanese Sedge	21.81	
32 93 13 00-0183	EA	1 Gallon Carex hachijoensis - Variegated Japanese Sedge	30.29	
32 93 13 00-0184	EA	2 Gallon Carex hachijoensis - Variegated Japanese Sedge	47.26	
32 93 13 00-0185	EA	1 Gallon Liriope muscari 'Variegata' - Variegated Lilyturf	33.12	
32 93 13 00-0186	EA	2 Quart Verbena peruviana "St. Paul" - St. Paul Verbena	15.35	
32 93 13 00-0187	EA	1 Gallon Verbena peruviana "St. Paul" - St. Paul Verbena	23.43	
32 93 13 00-0188	EA	48 Plant Flat Vinca minor - Lesser Periwinkle	143.98	
32 93 13 00-0189	EA	3" Pot Parthenocissus quinquefolia - Virginia Creeper	7.27	
32 93 13 00-0190	EA	1 Gallon Parthenocissus quinquefolia - Virginia Creeper	37.97	
32 93 13 00-0191	EA	1 Gallon Jasminum polyanthum - Winter Jasmine	29.08	
32 93 13 00-0192	EA	2 Gallon Jasminum polyanthum - Winter Jasmine	58.16	
32 93 13 00-0193	EA	5 Gallon Jasminum polyanthum - Winter Jasmine	100.98	
32 93 13 00-0194	EA	1 Gallon Cistaceae - Wrinkleleaf Rock Rose	23.43	
32 93 13 00-0195	EA	5 Gallon Cistaceae - Wrinkleleaf Rock Rose	79.97	
32 93 13 00-0196	EA	1 Gallon Acmispon galaber - Common Deerweed	10.08	
32 93 13 00-0197	EA	1 Gallon Acacia redolens - Bank Catclaw	4.18	
32 93 13 00-0198	EA	5 Gallon Acacia redolens - Bank Catclaw	12.97	
32 93 13 00-0199	EA	15 Gallon Acacia redolens - Bank Catclaw	50.42	
32 93 13 00-0200	EA	1 Gallon Achillea filipendulina - Fernleaf Yarrow	6.19	
32 93 13 00-0201	EA	1 Gallon Achillea millefolium - Common Yarrow	5.62	
32 93 13 00-0202	EA	5 Gallon Achillea millefolium - Common Yarrow	17.29	
32 93 13 00-0203	EA	1 Gallon Achillea millefolium 'Paprika' - Red Yarrow	6.19	
32 93 13 00-0204	EA	1 Gallon Achillea 'Moonshine' - Yellow yarrow	6.19	
32 93 13 00-0205	EA	1 Gallon Agave americana - Century Plant	8.50	
32 93 13 00-0206	EA	5 Gallon Agave americana - Century Plant	23.05	
32 93 13 00-0207	EA	15 Gallon Agave americana - Century Plant	70.59	
32 93 13 00-0208	EA	24" Box Agave americana - Century Plant	252.10	
32 93 13 00-0209	EA	1 Gallon Agave vilmoriniana - Octopus Agave	8.50	
32 93 13 00-0210	EA	5 Gallon Agave vilmoriniana - Octopus Agave	23.05	
32 93 13 00-0211	EA	15 Gallon Agave vilmoriniana - Octopus Agave	70.59	
32 93 13 00-0212	EA	24" Box Agave vilmoriniana - Octopus Agave	252.10	
32 93 13 00-0213	EA	5 Gallon Nolina parryi - Giant Nolina	23.05	

32 93 23 Plants and Bulbs (32 93)

Note: Materials only. See CSI section 32 93 83 00-0057 for installation and planting of bulbs and annuals.

32 93 23 00-0001 Perennials (32 93 23)

32 93 23 00-0002	EA	2 Quart Assorted Daylilies	23.43	
32 93 23 00-0003	EA	1 Gallon Assorted Daylilies	33.12	
32 93 23 00-0004	EA	2 Gallon Assorted Daylilies	54.93	
32 93 23 00-0005	EA	1 Quart Azure Penstemon	12.12	
32 93 23 00-0006	EA	1 Gallon Azure Penstemon	30.29	
32 93 23 00-0007	EA	1 Quart Balloon Flower	12.12	
32 93 23 00-0008	EA	1 Gallon Balloon Flower	30.29	
32 93 23 00-0009	EA	1 Quart Black-eyed Susan	12.12	
32 93 23 00-0010	EA	1 Gallon Black-eyed Susan	30.29	
32 93 23 00-0011	EA	2 Gallon Black-eyed Susan	39.18	
32 93 23 00-0012	EA	1 Quart Blackberry Lily	12.12	
32 93 23 00-0013	EA	1 Gallon Blackberry Lily	30.29	
32 93 23 00-0014	EA	1 Quart Blank Flower	12.12	
32 93 23 00-0015	EA	1 Gallon Blank Flower	27.87	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 23 00-0016 EA 2 Gallon Blank Flower.....	39.18	
32 93 23 00-0017 EA 1 Quart Blazing Star, Gayfeather	12.12	
32 93 23 00-0018 EA 1 Gallon Blazing Star, Gayfeather	30.29	
32 93 23 00-0019 EA 1 Quart Bloodred Geranium.....	20.60	
32 93 23 00-0020 EA 1 Gallon Bloodred Geranium	34.74	
32 93 23 00-0021 EA 1 Quart Blue Plumbago	12.12	
32 93 23 00-0022 EA 1 Gallon Blue Plumbago	30.29	
32 93 23 00-0023 EA 1 Quart Blue Star	21.81	
32 93 23 00-0024 EA 1 Gallon Blue Star.....	34.74	
32 93 23 00-0025 EA 1 Quart Cardinal Flower.....	12.12	
32 93 23 00-0026 EA 1 Gallon Cardinal Flower	30.29	
32 93 23 00-0027 EA 4" Pot Columbine.....	7.27	
32 93 23 00-0028 EA 1 Quart Columbine.....	12.12	
32 93 23 00-0029 EA 1 Gallon Columbine	30.29	
32 93 23 00-0030 EA 1 Quart Common Globeflower	12.12	
32 93 23 00-0031 EA 1 Gallon Common Globeflower.....	30.29	
32 93 23 00-0032 EA 1 Quart Cottage Pink, Scotch Pink	12.12	
32 93 23 00-0033 EA 1 Quart Cottage Pink, Scotch Pink	30.29	
32 93 23 00-0034 EA 1 Gallon Astilbe 'Deutschland'	43.63	
32 93 23 00-0035 EA 1 Quart Diploid.....	15.35	
32 93 23 00-0036 EA 1 Gallon Diploid	34.74	
32 93 23 00-0037 EA 3 Gallon Diploid	59.78	
32 93 23 00-0038 EA 4" Pot Dune Sunflower.....	17.30	
32 93 23 00-0039 EA 1 Quart Evans Begonia.....	21.81	
32 93 23 00-0040 EA 1 Gallon Evans Begonia	39.18	
32 93 23 00-0041 EA 1 Quart False Dragonhead	12.12	
32 93 23 00-0042 EA 1 Gallon False Dragonhead.....	30.29	
32 93 23 00-0043 EA 1 Quart False Spirea.....	12.12	
32 93 23 00-0044 EA 1 Gallon False Spirea.....	39.18	
32 93 23 00-0045 EA 3 Gallon False Spirea	54.12	
32 93 23 00-0046 EA 2 Quart False Sunflower	19.39	
32 93 23 00-0047 EA 1 Gallon False Sunflower.....	30.29	
32 93 23 00-0048 EA 2 Gallon False Sunflower.....	39.18	
32 93 23 00-0049 EA 1 Gallon Foxglove.....	27.87	
32 93 23 00-0050 EA 2 Gallon Foxglove.....	39.18	
32 93 23 00-0051 EA 3 Gallon Foxglove.....	56.55	
32 93 23 00-0052 EA 1 Gallon Francee Hostas	49.06	
32 93 23 00-0053 EA 1 Quart Garden Phlox.....	12.12	
32 93 23 00-0054 EA 1 Gallon Garden Phlox.....	30.29	
32 93 23 00-0055 EA 2 Quart Golden Groundsel.....	25.85	
32 93 23 00-0056 EA 2 Gallon Golden Groundsel	52.11	
32 93 23 00-0057 EA 1 Quart Golden Star.....	12.12	
32 93 23 00-0058 EA 1 Gallon Golden Star	30.29	
32 93 23 00-0059 EA 1 Quart Goldenrod	12.12	
32 93 23 00-0060 EA 1 Gallon Goldenrod.....	30.29	
32 93 23 00-0061 EA 1 Gallon Happy Returns Daylillies	56.42	
32 93 23 00-0062 EA 4" Pot Hardy Aster, Michaelmas Daisy	7.27	
32 93 23 00-0063 EA 1 Quart Hardy Aster, Michaelmas Daisy	12.12	
32 93 23 00-0064 EA 1 Gallon Hardy Aster, Michaelmas Daisy	30.29	
32 93 23 00-0065 EA 1 Quart Hardy Chrysanthemum.....	10.51	
32 93 23 00-0066 EA 6" To 8" Pot Hardy Chrysanthemum.....	17.37	
32 93 23 00-0067 EA 1 Gallon Hardy Chrysanthemum.....	27.87	
32 93 23 00-0068 EA 1 Gallon Herbaceous Peony.....	43.22	
32 93 23 00-0069 EA 2 Gallon Herbaceous Peony.....	69.07	
32 93 23 00-0070 EA 3 Gallon Herbaceous Peony	90.89	
32 93 23 00-0071 EA 4" Pot Japanese Anemone	7.27	
32 93 23 00-0072 EA 1 Quart Japanese Anemone.....	21.81	
32 93 23 00-0073 EA 2 Gallon Japanese Anemone	39.18	
32 93 23 00-0074 EA 2" Pot Japanese Spurge.....	4.31	
32 93 23 00-0075 EA 6" Pot Japanese Spurge.....	6.46	
32 93 23 00-0076 EA 1 Gallon Japanese Spurge	27.83	
32 93 23 00-0077 EA 1 Quart Oriental Poppy.....	17.37	
32 93 23 00-0078 EA 1 Gallon Oriental Poppy.....	34.74	
32 93 23 00-0079 EA 48 Plant Flat Pachysandra terminalis	143.98	
32 93 23 00-0080 EA 1 Gallon Pacific Coast Iris.....	23.83	
32 93 23 00-0081 EA 3 Gallon Pacific Coast Iris.....	45.24	
32 93 23 00-0082 EA 1 Gallon Palace Purple Coral Bells.....	45.87	
32 93 23 00-0083 EA 4" Pot Perennial Salvia	7.27	
32 93 23 00-0084 EA 1 Quart Perennial Salvia.....	12.12	
32 93 23 00-0085 EA 1 Gallon Perennial Salvia	30.29	
32 93 23 00-0086 EA 1 Quart Pincushion Flower	12.12	
32 93 23 00-0087 EA 1 Gallon Pincushion Flower	30.29	
32 93 23 00-0088 EA 2 Quart Plantain Lily	23.43	
32 93 23 00-0089 EA 1 Gallon Plantain Lily	33.12	
32 93 23 00-0090 EA 2 Gallon Plantain Lily	54.93	
32 93 23 00-0091 EA 3 Gallon Plantain Lily	103.81	
32 93 23 00-0092 EA 2 Quart Purple Coneflower	21.81	
32 93 23 00-0093 EA 1 Gallon Purple Coneflower	30.29	
32 93 23 00-0094 EA 2 Gallon Purple Coneflower.....	39.18	
32 93 23 00-0095 EA 1 Quart Purple Loosestrife.....	12.12	
32 93 23 00-0096 EA 1 Gallon Purple Loosestrife	30.29	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 23 00-0097	EA	1 Quart Rose Mallow	23.83
32 93 23 00-0098	EA	2 Gallon Rose Mallow	43.22
32 93 23 00-0099	EA	3 Gallon Rose Mallow	73.92
32 93 23 00-0100	EA	1 Gallon Autumn Joy Sedum	46.19
32 93 23 00-0101	EA	1 Quart Siberian Iris	20.60
32 93 23 00-0102	EA	2 Gallon Siberian Iris	39.18
32 93 23 00-0103	EA	3 Gallon Siberian Iris	54.12
32 93 23 00-0104	EA	1 Quart Speedwell	12.12
32 93 23 00-0105	EA	1 Gallon Speedwell	30.29
32 93 23 00-0106	EA	1 Quart Tetraploid	30.29
32 93 23 00-0107	EA	1 Gallon Tetraploid	56.55
32 93 23 00-0108	EA	3 Gallon Tetraploid	77.15
32 93 23 00-0109	EA	1 Quart Threadleaf Coreopsis	12.12
32 93 23 00-0110	EA	1 Gallon Threadleaf Coreopsis	30.29
32 93 23 00-0111	EA	1 Quart Torch Lily	12.12
32 93 23 00-0112	EA	1 Quart Bluebeard	21.81
32 93 23 00-0113	EA	1 Gallon Bluebeard	32.32
32 93 23 00-0114	EA	2 Gallon Bluebeard	47.26
32 93 23 00-0115	EA	1 Gallon Anemopsis californica - Yerba Mansa	12.63
32 93 23 00-0116	EA	1 Gallon Artemisia palmeri - San Diego Sagewort	11.23
32 93 23 00-0117	EA	1 Gallon Arthrocnemum subterminale - Parish's Pickleweed	14.04
32 93 23 00-0118	EA	1 Gallon Cressa truxillensis - Alkali Weed	14.04
32 93 23 00-0119	EA	1 Gallon Frankenia salina - Alkali Heath	11.23
32 93 23 00-0120	EA	4" Pot Jaumea carnososa - Salt Marsh Daisy	5.62
32 93 23 00-0121	EA	1 Gallon Jaumea carnososa - Salt Marsh Daisy	11.24
32 93 23 00-0122	EA	1 Gallon Juncus acutus - Spiny Rush	11.23
32 93 23 00-0123	EA	5 Gallon Juncus acutus - Spiny Rush	29.37
32 93 23 00-0124	EA	1 Gallon Limonium californicum - Sea Lavender	11.23
32 93 23 00-0125	EA	1 Gallon Salicornia virginica - Deer Weed	11.23
32 93 23 00-0126	EA	1 Gallon Suaeda esteroa - Sea Blite	14.04
32 93 23 00-0127	EA	1 Gallon Suaeda taxifolia - Woolly Sea Blite	11.23

32 93 23 00-0128 Annuals (32 93 23)

32 93 23 00-0129	EA	2-1/2" Pot Annual Flowers	5.62
32 93 23 00-0130	EA	3" Pot Annual Flowers	7.61
32 93 23 00-0131	EA	4" Pot Annual Flowers	16.26
32 93 23 00-0132	EA	5-1/2" Pot Annual Flowers	21.62
32 93 23 00-0133	EA	6" Pot Annual Flowers	42.81
32 93 23 00-0134	EA	8" Pot Annual Flowers	71.34
32 93 23 00-0135	EA	36 Plant Flat Annual Flowers	93.39
32 93 23 00-0136	EA	48 Plant Flat Annual Flowers	105.93

32 93 23 00-0137 Bulbs (32 93 23)

32 93 23 00-0138	EA	Top Size Allium giganteum - Giant Ornamental Onion	19.55
32 93 23 00-0139	EA	Top Size Allium sphaerocephalum - Drumstick Ornamental Onion	1.13
32 93 23 00-0140	EA	Top Size Crocus Hybrid	1.28
32 93 23 00-0141	EA	Top Size Eranthis hyemalis - Winter Aconite	1.65
32 93 23 00-0142	EA	Top Size Galanthus nivalis - Snowdrops	2.11
32 93 23 00-0143	EA	Top Size Iris reticulata cvs - Dutch Iris	0.83
32 93 23 00-0144	EA	Top Size Muscari armeniacum - Grape Hyacinth	0.98
32 93 23 00-0145	EA	Top Size Muscari latifolium - Grape Hyacinth	1.13
32 93 23 00-0146	EA	Narcissus 'Carlton' - Carlton Daffodil DNI	6.77
32 93 23 00-0147	EA	Narcissus 'Dutch Master' - Dutch Master Daffodil DNI	3.23
32 93 23 00-0148	EA	Narcissus 'February Gold' - February Gold Daffodil DNI	3.38
32 93 23 00-0149	EA	Narcissus 'Ice Follies' - Ice Follies Daffodil DNI	3.38
32 93 23 00-0150	EA	Narcissus 'Mount Hood' - Mount Hood Daffodil DNI	3.53
32 93 23 00-0151	EA	Narcissus 'Papillon Blanc' - Papillon Blanc Daffodil DNI	3.76
32 93 23 00-0152	EA	Narcissus 'Pipit' - Pipit Daffodil DNI	3.53
32 93 23 00-0153	EA	Narcissus 'Salome' - Salome Daffodil DNI	3.31
32 93 23 00-0154	EA	Narcissus 'Tete A Tete' - Tete A Tete Daffodil DNI	3.53
32 93 23 00-0155	EA	Narcissus 'Thalia' - Thalia Daffodil DNI	3.53
32 93 23 00-0156	EA	Top Size Scilla siberica - Siberian Squill	1.05
32 93 23 00-0157	EA	Top Size Tulip 'Angelique' - Angelique Tulip	3.01
32 93 23 00-0158	EA	Top Size Tulip 'Apeldoorn' - Apeldoorn Tulip	2.26
32 93 23 00-0159	EA	Top Size Tulip 'Apricot Beauty' - Apricot Beauty Tulip	3.01
32 93 23 00-0160	EA	Top Size Tulip 'Big Smile' - Big Smile Tulip	2.63
32 93 23 00-0161	EA	Top Size Tulip 'Black Parrot' - Black Parrot Tulip	3.76
32 93 23 00-0162	EA	Top Size Tulip 'Blue Heron' - Blue Heron Tulip	2.86
32 93 23 00-0163	EA	Top Size Tulip 'Cardinal' - Cardinal Tulip	2.48
32 93 23 00-0164	EA	Top Size Tulip 'Christmas Marvel' - Christmas Marvel Tulip	2.78
32 93 23 00-0165	EA	Top Size Tulip clusiana - Species Tulip	2.78
32 93 23 00-0166	EA	Top Size Tulip 'Elizabeth Arden' - Elizabeth Arden Tulip	2.78
32 93 23 00-0167	EA	Top Size Tulip 'Golden Apledoorn' - Golden Apledoorn Tulip	2.26
32 93 23 00-0168	EA	Top Size Tulip 'Golden Emperor' - Golden Emperor Tulip	2.18
32 93 23 00-0169	EA	Top Size Tulip 'Halcro' - Halcro Tulip	2.26
32 93 23 00-0170	EA	Top Size Tulip 'Ivory Floridale' - Ivory Floridale Tulip	3.76
32 93 23 00-0171	EA	Top Size Tulip 'Orange Emperor' - Orange Emperor Tulip	2.26
32 93 23 00-0172	EA	Top Size Tulip 'Passionale' - Passionale Tulip	3.01
32 93 23 00-0173	EA	Top Size Tulip 'Peach Blossom' - Peach Blossom Tulip	3.23



Exterior Improvements		32
Planting		32 90
Plants		32 93

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

32 93 23 00-0174	EA	Top Size Tulip 'Peer Gynt' - Peer Gynt Tulip	3.38
32 93 23 00-0175	EA	Top Size Tulip 'Pink Diamond' - Pink Diamond Tulip	2.71
32 93 23 00-0176	EA	Top Size Tulip 'Pink Emperor' - Pink Emperor Tulip	2.56
32 93 23 00-0177	EA	Top Size Tulip praetens 'Fusilier' - Praetens Fusilier Tulip	2.78
32 93 23 00-0178	EA	Top Size Tulip 'Princeps' - Princeps Tulip	2.78
32 93 23 00-0179	EA	Top Size Tulip 'Red Riding Hood' - Red Riding Hood Tulip	2.18
32 93 23 00-0180	EA	Top Size Tulip saxatilis - Species Tulip	1.50
32 93 23 00-0181	EA	Top Size Tulip 'Shirley' - Shirley Tulip	2.26
32 93 23 00-0182	EA	Top Size Tulip 'Spring Green' - Spring Green Tulip	2.93
32 93 23 00-0183	EA	Top Size Tulip 'White Emperor' - White Emperor Tulip	2.26

32 93 23 00-0184 Localized Landscaping (32 93 23)

32 93 23 00-0185	EA	Tipuana Tipu - Tipu Tree, 15 Gallon	389.04
32 93 23 00-0186	EA	Tipuana Tipu - Tipu Tree, 24" Box	1,151.24
32 93 23 00-0187	EA	Euryops Pectinatus - Euryops, 1 Gallon	18.87
32 93 23 00-0188	EA	Euryops Pectinatus - Euryops, 5 Gallon	68.62
32 93 23 00-0189	EA	Photinia X Fraseri - Photinia, 1 Gallon	32.60
32 93 23 00-0190	EA	Photinia X Fraseri - Photinia, 5 Gallon	88.87
32 93 23 00-0191	EA	Photinia X Fraseri - Photinia, 15 Gallon	329.39
32 93 23 00-0192	EA	Rhapiolepis Indica 'Enchantress' - Indian Hawthorn, 1 Gallon	68.28
32 93 23 00-0193	EA	Rhapiolepis Indica 'Enchantress' - Indian Hawthorn, 5 Gallon	274.14
32 93 23 00-0194	EA	Sienna Artemisiodes - Feathery Cassia, 1 Gallon	29.16
32 93 23 00-0195	EA	Vinca Major - Periwinkle, 1 Gallon	25.73
32 93 23 00-0196	EA	Vinca Major - Periwinkle, 3 Gallon	51.47
32 93 23 00-0197	EA	Agave Attenuata - Foxtail Agave, 1 Gallon	42.81
32 93 23 00-0198	EA	Agave Attenuata - Foxtail Agave, 5 Gallon	216.19
32 93 23 00-0199	EA	Artemesia 'Powis Castle' - Artemesia, 1 Gallon	72.64
32 93 23 00-0200	EA	Dietes Bicolor - Fortnight Lilly, 4" Pot	8.65
32 93 23 00-0201	EA	Dietes Bicolor - Fortnight Lilly, 1 Gallon	15.13
32 93 23 00-0202	EA	Dietes Bicolor - Fortnight Lilly, 3 Gallon	47.56
32 93 23 00-0203	EA	Helianthemum Nummularium - Sunrose, 1 Gallon	69.09
32 93 23 00-0204	EA	1 Gallon Hesperaloe parvifolia - Red Yucca	51.02
32 93 23 00-0205	EA	5 Gallon Hesperaloe parvifolia - Red Yucca	138.36
32 93 23 00-0206	EA	Hypericum Calycium - Aaron's Beard, 4" Pot	8.65
32 93 23 00-0207	EA	Hypericum Calycium - Aaron's Beard, 1 Gallon	30.27
32 93 23 00-0208	EA	Lantana Montevidensis - Lantana Sellowiana, 1 Gallon	23.78
32 93 23 00-0209	EA	Leucadendron Discolor 'Flame Tips' - Leucadendron, 1 Gallon	51.88
32 93 23 00-0210	EA	Leucadendron Discolor 'Flame Tips' - Leucadendron, 5 Gallon	216.19
32 93 23 00-0211	EA	Myoporum Pacificum - Myoporum, 1 Gallon	25.25
32 93 23 00-0212	EA	Rosmarinus Offinalis - Trailing Rosemary, 1 Gallon	21.62
32 93 23 00-0213	EA	Rosmarinus Offinalis - Trailing Rosemary, 5 Gallon	64.86
32 93 23 00-0214	EA	Salvia Greggii - Autumn Sage, 1 Gallon	16.17
32 93 23 00-0215	EA	Salvia Greggii - Autumn Sage, 2 Gallon	64.86
32 93 23 00-0216	EA	Salvia Greggii - Autumn Sage, 5 Gallon	116.74
32 93 23 00-0217	EA	Senecio Mandraliscae - Senecio, 1 Gallon	36.23
32 93 23 00-0218	EA	Senecio Mandraliscae - Senecio, 5 Gallon	138.36
32 93 23 00-0219	EA	Trachelospermum Jasminoides - Star Jasmine, 1 Gallon	27.24
32 93 23 00-0220	EA	Trachelospermum Jasminoides - Star Jasmine, 3 Gallon	57.99
32 93 23 00-0221	EA	Trachelospermum Jasminoides - Star Jasmine, 5 Gallon	109.11
32 93 23 00-0222	EA	Tradessantia Pallida 'Purpurea' - Purple Heart, 1 Gallon	32.43
32 93 23 00-0223	EA	Verbena Tenuisecta - Moss Verbena, 1 Gallon	16.86
32 93 23 00-0224	EA	Verbena Tenuisecta - Moss Verbena, 5 Gallon	60.53
32 93 23 00-0225	EA	Westringia Fruticosa - Coast Rosemary, 1 Gallon	43.24
32 93 23 00-0226	EA	Westringia Fruticosa - Coast Rosemary, 3 Gallon	82.15
32 93 23 00-0227	EA	Westringia Fruticosa - Coast Rosemary, 5 Gallon	116.74

32 93 33 Shrubs (32 93)

Note: (cvs = cultivar or cultivated varieties) materials only. See CSI section 32 93 83 00-0033 for installation and planting of shrubs.

32 93 33 00-0001 Shrubs (32 93 33)

32 93 33 00-0002	EA	1 Gallon Abelia x grandiflora - Abelia	18.87
32 93 33 00-0003	EA	3 Gallon Abelia x grandiflora - Abelia	38.43
32 93 33 00-0004	EA	5 Gallon Abelia x grandiflora - Abelia	73.77
32 93 33 00-0005	EA	3 Gallon Aesculus parviflora 'Rogers' - Rogers Bottlebrush Buckeye	101.16
32 93 33 00-0006	EA	18" Balled and Burlapped, Aesculus parviflora 'Rogers' - Rogers Bottlebrush Buckeye	147.84
32 93 33 00-0007	EA	24" Balled and Burlapped, Aesculus parviflora 'Rogers' - Rogers Bottlebrush Buckeye	164.96
32 93 33 00-0008	EA	30" Balled and Burlapped, Aesculus parviflora 'Rogers' - Rogers Bottlebrush Buckeye	208.54
32 93 33 00-0009	EA	36" Balled and Burlapped, Aesculus parviflora 'Rogers' - Rogers Bottlebrush Buckeye	231.88
32 93 33 00-0010	EA	18" Balled and Burlapped, Aesculus parviflora - Bottlebrush Buckeye	46.69
32 93 33 00-0011	EA	24" Balled and Burlapped, Aesculus parviflora - Bottlebrush Buckeye	62.25
32 93 33 00-0012	EA	30" Balled and Burlapped, Aesculus parviflora - Bottlebrush Buckeye	77.81
32 93 33 00-0013	EA	36" Balled and Burlapped, Aronia arbutifolia & cvs - Red Chokeberry	42.46
32 93 33 00-0014	EA	42" Balled and Burlapped, Aronia arbutifolia & cvs - Red Chokeberry	49.95
32 93 33 00-0015	EA	48" Balled and Burlapped, Aronia arbutifolia & cvs - Red Chokeberry	59.94
32 93 33 00-0016	EA	60" Balled and Burlapped, Aronia arbutifolia & cvs - Red Chokeberry	69.93
32 93 33 00-0017	EA	72" Balled and Burlapped, Aronia arbutifolia & cvs - Red Chokeberry	84.92
32 93 33 00-0018	EA	36" Balled and Burlapped, Aronia melanocarpa & cvs - Black Chokeberry	41.21
32 93 33 00-0019	EA	42" Balled and Burlapped, Aronia melanocarpa & cvs - Black Chokeberry	43.71

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 33 00-0020	EA	48" Balled and Burlapped, Aronia melanocarpa & cvs - Black Chokeberry	46.21	
32 93 33 00-0021	EA	60" Balled and Burlapped, Aronia melanocarpa & cvs - Black Chokeberry	52.45	
32 93 33 00-0022	EA	36" Balled and Burlapped, Aronia prunifolia - Purple-Fruited Chokeberry	41.84	
32 93 33 00-0023	EA	42" Balled and Burlapped, Aronia prunifolia - Purple-Fruited Chokeberry	44.33	
32 93 33 00-0024	EA	48" Balled and Burlapped, Aronia prunifolia - Purple-Fruited Chokeberry	46.83	
32 93 33 00-0025	EA	60" Balled and Burlapped, Aronia prunifolia - Purple-Fruited Chokeberry	49.33	
32 93 33 00-0026	EA	1 Gallon Aspidistra elatior - Cast Iron Plant	8.59	
32 93 33 00-0027	EA	2 Gallon Aspidistra elatior - Cast Iron Plant	19.86	
32 93 33 00-0028	EA	1 Gallon Baccharis pilularis 'Pigeon Point' - Dwarf Coyote Brush	9.33	
32 93 33 00-0029	EA	5 Gallon Baccharis pilularis 'Pigeon Point' - Dwarf Coyote Brush	23.08	
32 93 33 00-0030	EA	1 Gallon Baccharis pilularis 'Twin Peaks' - Dwarf Coyote Brush	9.33	
32 93 33 00-0031	EA	5 Gallon Baccharis pilularis 'Twin Peaks' - Dwarf Coyote Brush	23.08	
32 93 33 00-0032	EA	1 Gallon Aucuba japonica "Variegata" - Gold Dust Plant	10.06	
32 93 33 00-0033	EA	3 Gallon Aucuba japonica "Variegata" - Gold Dust Plant	22.14	
32 93 33 00-0034	EA	5 Gallon Aucuba japonica "Variegata" - Gold Dust Plant	29.92	
32 93 33 00-0035	EA	1 Gallon Bauhinia purpurea - Orange-eye Butterfly Bush	10.73	
32 93 33 00-0036	EA	2 Gallon Bauhinia purpurea - Orange-eye Butterfly Bush	15.70	
32 93 33 00-0037	EA	15" To 18" Berberis - Northern Bayberry	44.81	
32 93 33 00-0038	EA	2' To 2-1/2' Berberis - Northern Bayberry	56.88	
32 93 33 00-0039	EA	2-1/2' To 3' Berberis - Northern Bayberry	79.69	
32 93 33 00-0040	EA	1 Gallon Berberis Buxifolia 'Nana' - Barberry	10.54	
32 93 33 00-0041	EA	5 Gallon Berberis Buxifolia 'Nana' - Barberry	25.39	
32 93 33 00-0042	EA	18" To 24" Berberis julianae - Dwarf Wintergreen Barberry	47.89	
32 93 33 00-0043	EA	2' To 2-1/2' Berberis julianae - Dwarf Wintergreen Barberry	61.31	
32 93 33 00-0044	EA	2-1/2' To 3' Berberis julianae - Dwarf Wintergreen Barberry	78.35	
32 93 33 00-0045	EA	1 Gallon Berberis thunbergii - Crimson Pygmy Barberry	12.88	
32 93 33 00-0046	EA	2 Gallon Berberis thunbergii - Crimson Pygmy Barberry	25.36	
32 93 33 00-0047	EA	3 Gallon Berberis thunbergii - Crimson Pygmy Barberry	30.99	
32 93 33 00-0048	EA	1 Gallon Berberis x mentorensis - Mentor Barberry	12.21	
32 93 33 00-0049	EA	5 Gallon Berberis x mentorensis - Mentor Barberry	34.48	
32 93 33 00-0050	EA	2' To 3' Berberis x mentorensis - Mentor Barberry	47.89	
32 93 33 00-0051	EA	3' To 4' Berberis x mentorensis - Mentor Barberry	73.92	
32 93 33 00-0052	EA	1 Gallon Buxus microphylla japonica - Japanese Boxwood	13.95	
32 93 33 00-0053	EA	5 Gallon Buxus microphylla japonica - Japanese Boxwood	37.43	
32 93 33 00-0054	EA	12" To 15" Buxus microphylla japonica - Japanese Boxwood	39.85	
32 93 33 00-0055	EA	15" To 18" Buxus microphylla japonica - Japanese Boxwood	51.25	
32 93 33 00-0056	EA	18" To 24" Buxus microphylla japonica - Japanese Boxwood	68.29	
32 93 33 00-0057	EA	24" To 30" Buxus microphylla japonica - Japanese Boxwood	102.50	
32 93 33 00-0058	EA	30" To 36" Buxus microphylla japonica - Japanese Boxwood	142.34	
32 93 33 00-0059	EA	12" To 15" Buxus sempervirens - Common Boxwood	39.85	
32 93 33 00-0060	EA	15" To 18" Buxus sempervirens - Common Boxwood	51.25	
32 93 33 00-0061	EA	18" To 24" Buxus sempervirens - Common Boxwood	68.29	
32 93 33 00-0062	EA	24" To 30" Buxus sempervirens - Common Boxwood	102.50	
32 93 33 00-0063	EA	2 Gallon Buxus Hybrid - Boxwood Cultivars	26.23	
32 93 33 00-0064	EA	5 Gallon Buxus Hybrid - Boxwood Cultivars	43.71	
32 93 33 00-0065	EA	5 Gallon Buxus microphylla & cvs - Little leaf Boxwood	114.89	
32 93 33 00-0066	EA	18" Balled and Burlapped, Buxus microphylla & cvs - Little leaf Boxwood	62.44	
32 93 33 00-0067	EA	24" Balled and Burlapped, Buxus microphylla & cvs - Little leaf Boxwood	84.92	
32 93 33 00-0068	EA	30" Balled and Burlapped, Buxus microphylla & cvs - Little leaf Boxwood	114.89	
32 93 33 00-0069	EA	1 Gallon Callistemon citrinus 'Little John' - Dwarf Bottle Bush	5.62	
32 93 33 00-0070	EA	5 Gallon Callistemon citrinus 'Little John' - Dwarf Bottle Bush	17.29	
32 93 33 00-0071	EA	15 Gallon Callistemon citrinus 'Little John' - Dwarf Bottle Bush	56.18	
32 93 33 00-0072	EA	5 Gallon Calycanthus floridus - Common Sweetshrub	41.21	
32 93 33 00-0073	EA	30" Balled and Burlapped, Calycanthus floridus - Common Sweetshrub	37.46	
32 93 33 00-0074	EA	36" Balled and Burlapped, Calycanthus floridus - Common Sweetshrub	49.95	
32 93 33 00-0075	EA	1 Gallon Camellia "Sasanqua" - Camellia	14.96	
32 93 33 00-0076	EA	3 Gallon Camellia "Sasanqua" - Camellia	31.92	
32 93 33 00-0077	EA	5 Gallon Camellia "Sasanqua" - Camellia	53.08	
32 93 33 00-0078	EA	7 Gallon Camellia "Sasanqua" - Camellia	79.03	
32 93 33 00-0079	EA	15 Gallon Camellia "Sasanqua" - Camellia	205.06	
32 93 33 00-0080	EA	1 Gallon Camellia japonica - Camellia	14.96	
32 93 33 00-0081	EA	3 Gallon Camellia japonica - Camellia	31.92	
32 93 33 00-0082	EA	5 Gallon Camellia japonica - Camellia	53.08	
32 93 33 00-0083	EA	5 Gallon Ceanothus americanus - New Jersey Tea	41.21	
32 93 33 00-0084	EA	1 Gallon Ceanothus Griseus Horizontalis 'Yankee Point' - Yankee Point Ceanothus	10.54	
32 93 33 00-0085	EA	5 Gallon Ceanothus Griseus Horizontalis 'Yankee Point' - Yankee Point Ceanothus	27.40	
32 93 33 00-0086	EA	5 Gallon Celastrus scandens - Bittersweet	41.21	
32 93 33 00-0087	EA	36" Balled and Burlapped, Celastrus scandens - Bittersweet	34.97	
32 93 33 00-0088	EA	5 Gallon Cephalanthus occidentalis - Buttonbush	41.21	
32 93 33 00-0089	EA	24" Balled and Burlapped, Cephalanthus occidentalis - Buttonbush	31.22	
32 93 33 00-0090	EA	30" Balled and Burlapped, Cephalanthus occidentalis - Buttonbush	34.97	
32 93 33 00-0091	EA	36" Balled and Burlapped, Cephalanthus occidentalis - Buttonbush	37.46	
32 93 33 00-0092	EA	18" To 24" Chaenomeles speciosa - Flowering Quince	35.95	
32 93 33 00-0093	EA	2' To 3' Chaenomeles speciosa - Flowering Quince	47.89	
32 93 33 00-0094	EA	3' To 4' Chaenomeles speciosa - Flowering Quince	73.92	
32 93 33 00-0095	EA	3 Gallon Clethra alnifolia & cvs - Summersweet Clethra	39.96	
32 93 33 00-0096	EA	18" Balled and Burlapped, Clethra alnifolia & cvs - Summersweet Clethra	43.08	
32 93 33 00-0097	EA	24" Balled and Burlapped, Clethra alnifolia & cvs - Summersweet Clethra	48.08	
32 93 33 00-0098	EA	30" Balled and Burlapped, Clethra alnifolia & cvs - Summersweet Clethra	50.58	
32 93 33 00-0099	EA	36" Balled and Burlapped, Clethra alnifolia & cvs - Summersweet Clethra	59.32	
32 93 33 00-0100	EA	1 Gallon Cistus Hybridus - White Rockrose	9.33	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 33 00-0101 EA 5 Gallon Cistus Hybridus - White Rockrose.....	23.08	
32 93 33 00-0102 EA 1 Gallon Coleonema Pulchellum - Confetti Bush.....	9.33	
32 93 33 00-0103 EA 5 Gallon Coleonema Pulchellum - Confetti Bush.....	23.08	
32 93 33 00-0104 EA 15 Gallon Coleonema Pulchellum - Confetti Bush.....	108.09	
32 93 33 00-0105 EA 2' To 3' Cornus mas - Cornelian Cherry.....	56.88	
32 93 33 00-0106 EA 3' To 4' Cornus mas - Cornelian Cherry.....	71.10	
32 93 33 00-0107 EA 4' To 5' Cornus mas - Cornelian Cherry.....	91.10	
32 93 33 00-0108 EA 5' To 6' Cornus mas - Cornelian Cherry.....	125.17	
32 93 33 00-0109 EA 5 Gallon Cornus alba & cvs - Tartarian Dogwood.....	37.46	
32 93 33 00-0110 EA 36" Balled and Burlapped, Cornus alba & cvs - Tartarian Dogwood.....	26.23	
32 93 33 00-0111 EA 48" Balled and Burlapped, Cornus alba & cvs - Tartarian Dogwood.....	29.97	
32 93 33 00-0112 EA 60" Balled and Burlapped, Cornus alba & cvs - Tartarian Dogwood.....	37.46	
32 93 33 00-0113 EA 72" Balled and Burlapped, Cornus alba & cvs - Tartarian Dogwood.....	44.96	
32 93 33 00-0114 EA 36" Balled and Burlapped, Cornus amomum - Silky Dogwood.....	37.46	
32 93 33 00-0115 EA 5 Gallon Cornus obliqua - Blue Fruited Dogwood.....	41.21	
32 93 33 00-0116 EA 5 Gallon Cornus racemosa - Gray Dogwood.....	41.21	
32 93 33 00-0117 EA 36" Balled and Burlapped, Cornus racemosa - Gray Dogwood.....	37.46	
32 93 33 00-0118 EA 48" Balled and Burlapped, Cornus racemosa - Gray Dogwood.....	43.71	
32 93 33 00-0119 EA 60" Balled and Burlapped, Cornus racemosa - Gray Dogwood.....	47.46	
32 93 33 00-0120 EA 72" Balled and Burlapped, Cornus racemosa - Gray Dogwood.....	57.45	
32 93 33 00-0121 EA 36" Balled and Burlapped, Cornus sanguinea & cvs - Bloodtwig Dogwood.....	40.59	
32 93 33 00-0122 EA 48" Balled and Burlapped, Cornus sanguinea & cvs - Bloodtwig Dogwood.....	45.58	
32 93 33 00-0123 EA 60" Balled and Burlapped, Cornus sanguinea & cvs - Bloodtwig Dogwood.....	51.83	
32 93 33 00-0124 EA 24" Balled and Burlapped, Cornus sericea & cvs - Redosier Dogwood.....	32.47	
32 93 33 00-0125 EA 30" Balled and Burlapped, Cornus sericea & cvs - Redosier Dogwood.....	37.46	
32 93 33 00-0126 EA 36" Balled and Burlapped, Cornus sericea & cvs - Redosier Dogwood.....	39.96	
32 93 33 00-0127 EA 48" Balled and Burlapped, Cornus sericea & cvs - Redosier Dogwood.....	43.71	
32 93 33 00-0128 EA 60" Balled and Burlapped, Cornus sericea & cvs - Redosier Dogwood.....	48.70	
32 93 33 00-0129 EA 5 Gallon Corylus americana - American Filbert.....	38.71	
32 93 33 00-0130 EA 30" Balled and Burlapped, Corylus americana - American Filbert.....	43.71	
32 93 33 00-0131 EA 36" Balled and Burlapped, Corylus americana - American Filbert.....	46.83	
32 93 33 00-0132 EA 48" Balled and Burlapped, Corylus americana - American Filbert.....	50.58	
32 93 33 00-0133 EA 24" Balled and Burlapped, Corylus avellana - Contorted Hazelnut.....	124.88	
32 93 33 00-0134 EA 30" Balled and Burlapped, Corylus avellana - Contorted Hazelnut.....	162.35	
32 93 33 00-0135 EA 36" Balled and Burlapped, Corylus avellana - Contorted Hazelnut.....	174.84	
32 93 33 00-0136 EA 42" Balled and Burlapped, Corylus avellana - Contorted Hazelnut.....	224.79	
32 93 33 00-0137 EA 48" Balled and Burlapped, Corylus avellana - Contorted Hazelnut.....	274.74	
32 93 33 00-0138 EA 60" Balled and Burlapped, Corylus avellana - Contorted Hazelnut.....	312.21	
32 93 33 00-0139 EA 5' To 6' Cotinus coggygria - Smoke Tree.....	119.54	
32 93 33 00-0140 EA 6' To 8' Cotinus coggygria - Smoke Tree.....	179.24	
32 93 33 00-0141 EA 8' To 10' Cotinus coggygria - Smoke Tree.....	270.33	
32 93 33 00-0142 EA 5 Gallon Cotoneaster acutifolia & cvs - Peking Cotoneaster.....	31.22	
32 93 33 00-0143 EA 18" Balled and Burlapped, Cotoneaster acutifolia & cvs - Peking Cotoneaster.....	31.22	
32 93 33 00-0144 EA 24" Balled and Burlapped, Cotoneaster acutifolia & cvs - Peking Cotoneaster.....	32.47	
32 93 33 00-0145 EA 12" To 15" Spread Cotoneaster adpressus - Creeping Cotoneaster.....	29.92	
32 93 33 00-0146 EA 3 Gallon Cotoneaster apiculata & cvs - Cranberry Cotoneaster.....	32.47	
32 93 33 00-0147 EA 18" Balled and Burlapped, Cotoneaster apiculata & cvs - Cranberry Cotoneaster.....	31.22	
32 93 33 00-0148 EA 24" Balled and Burlapped, Cotoneaster apiculata & cvs - Cranberry Cotoneaster.....	32.47	
32 93 33 00-0149 EA 1 Gallon Cotoneaster divaricatus - Spreading Cotoneaster.....	12.88	
32 93 33 00-0150 EA 2' To 3' Cotoneaster divaricatus - Spreading Cotoneaster.....	39.85	
32 93 33 00-0151 EA 3' To 4' Cotoneaster divaricatus - Spreading Cotoneaster.....	53.80	
32 93 33 00-0152 EA 4' To 5' Cotoneaster divaricatus - Spreading Cotoneaster.....	91.09	
32 93 33 00-0153 EA 1 Gallon Cotoneaster glaucophyllus - Gray Leaf Cotoneaster.....	9.33	
32 93 33 00-0154 EA 5 Gallon Cotoneaster glaucophyllus - Gray Leaf Cotoneaster.....	23.08	
32 93 33 00-0155 EA 1 Gallon Cotoneaster horizontalis - Rockspray Cotoneaster.....	12.88	
32 93 33 00-0156 EA 2 Gallon Cotoneaster horizontalis - Rockspray Cotoneaster.....	25.36	
32 93 33 00-0157 EA 1 Gallon Cotoneaster lacteus - Red Clusterberry.....	9.33	
32 93 33 00-0158 EA 5 Gallon Cotoneaster lacteus - Red Clusterberry.....	23.08	
32 93 33 00-0159 EA 15 Gallon Cotoneaster lacteus - Red Clusterberry.....	91.63	
32 93 33 00-0160 EA 1 Gallon Dendromecon harfordii - Island Bush Poppy.....	14.41	
32 93 33 00-0161 EA 5 Gallon Dendromecon harfordii - Island Bush Poppy.....	36.02	
32 93 33 00-0162 EA 18" Balled and Burlapped, Deutzia gracilis - Slender Deutzia.....	31.85	
32 93 33 00-0163 EA 24" Balled and Burlapped, Deutzia gracilis - Slender Deutzia.....	34.97	
32 93 33 00-0164 EA 30" Balled and Burlapped, Deutzia gracilis - Slender Deutzia.....	44.96	
32 93 33 00-0165 EA 36" Balled and Burlapped, Deutzia gracilis - Slender Deutzia.....	52.45	
32 93 33 00-0166 EA 42" Balled and Burlapped, Deutzia gracilis - Slender Deutzia.....	59.94	
32 93 33 00-0167 EA 24" Balled and Burlapped, Diervilla sessilifolia - Southern Bush Honeysuckle.....	49.95	
32 93 33 00-0168 EA 30" Balled and Burlapped, Diervilla sessilifolia - Southern Bush Honeysuckle.....	59.94	
32 93 33 00-0169 EA 36" Balled and Burlapped, Diervilla sessilifolia - Southern Bush Honeysuckle.....	69.93	
32 93 33 00-0170 EA 2 Gallon Diervilla splendens - Splendens Bush Honeysuckle.....	18.73	
32 93 33 00-0171 EA 36" Balled and Burlapped, Diervilla splendens - Splendens Bush Honeysuckle.....	44.96	
32 93 33 00-0172 EA 48" Balled and Burlapped, Diervilla splendens - Splendens Bush Honeysuckle.....	59.94	
32 93 33 00-0173 EA 3' To 4' Elaeagnus umbellata - Autumn Olive.....	37.30	
32 93 33 00-0174 EA 4' To 5' Elaeagnus umbellata - Autumn Olive.....	51.25	
32 93 33 00-0175 EA 5' To 6' Elaeagnus umbellata - Autumn Olive.....	61.31	
32 93 33 00-0176 EA 3' To 4' Elaeagnus angustifolia - Russian Olive.....	59.70	
32 93 33 00-0177 EA 1 Gallon Euonymus - Gold Spot.....	10.73	
32 93 33 00-0178 EA 2 Gallon Euonymus - Gold Spot.....	22.54	
32 93 33 00-0179 EA 5 Gallon Euonymus - Gold Spot.....	30.99	
32 93 33 00-0180 EA 1 Gallon Euonymus alatus - Winged Euonymus.....	9.16	
32 93 33 00-0181 EA 3 Gallon Euonymus alatus - Winged Euonymus.....	26.43	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 33 00-0182	EA	24" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	35.62	
32 93 33 00-0183	EA	30" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	44.52	
32 93 33 00-0184	EA	36" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	61.18	
32 93 33 00-0185	EA	42" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	75.54	
32 93 33 00-0186	EA	48" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	89.04	
32 93 33 00-0187	EA	54" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	114.89	
32 93 33 00-0188	EA	5 Gallon Euonymus alatus - Winged Euonymus.....	33.03	
32 93 33 00-0189	EA	60" Balled and Burlapped, Euonymus alatus - Winged Euonymus.....	143.62	
32 93 33 00-0190	EA	30" Balled and Burlapped, Euonymus alatus compactus - Compact Winged Euonymus.....	56.20	
32 93 33 00-0191	EA	36" Balled and Burlapped, Euonymus alatus compactus - Compact Winged Euonymus.....	66.81	
32 93 33 00-0192	EA	42" Balled and Burlapped, Euonymus alatus compactus - Compact Winged Euonymus.....	87.42	
32 93 33 00-0193	EA	48" Balled and Burlapped, Euonymus alatus compactus - Compact Winged Euonymus.....	104.90	
32 93 33 00-0194	EA	60" Balled and Burlapped, Euonymus alatus compactus - Compact Winged Euonymus.....	129.88	
32 93 33 00-0195	EA	18" To 24" Euonymus alatus - Winged Burning Bush.....	39.85	
32 93 33 00-0196	EA	2' To 2-1/2' Euonymus alatus - Winged Burning Bush.....	46.96	
32 93 33 00-0197	EA	2-1/2' To 3' Euonymus alatus - Winged Burning Bush.....	64.13	
32 93 33 00-0198	EA	3' To 3-1/2' Euonymus alatus - Winged Burning Bush.....	76.87	
32 93 33 00-0199	EA	3-1/2' To 4' Euonymus alatus - Winged Burning Bush.....	96.73	
32 93 33 00-0200	EA	4' To 5' Euonymus alatus - Winged Burning Bush.....	136.57	
32 93 33 00-0201	EA	5' To 6' Euonymus alatus - Winged Burning Bush.....	170.78	
32 93 33 00-0202	EA	6' To 8' Euonymus alatus - Winged Burning Bush.....	199.23	
32 93 33 00-0203	EA	15" To 18" Euonymus alatus - Dwarf Winged Burning Bush.....	39.85	
32 93 33 00-0204	EA	18" To 24" Euonymus alatus - Dwarf Winged Burning Bush.....	45.48	
32 93 33 00-0205	EA	2' To 2-1/2' Euonymus alatus - Dwarf Winged Burning Bush.....	55.54	
32 93 33 00-0206	EA	2-1/2' To 3' Euonymus alatus - Dwarf Winged Burning Bush.....	78.35	
32 93 33 00-0207	EA	3' To 3-1/2' Euonymus alatus - Dwarf Winged Burning Bush.....	92.57	
32 93 33 00-0208	EA	3-1/2' To 4' Euonymus alatus - Dwarf Winged Burning Bush.....	110.95	
32 93 33 00-0209	EA	4' To 5' Euonymus alatus - Dwarf Winged Burning Bush.....	156.56	
32 93 33 00-0210	EA	5' To 6' Euonymus alatus - Dwarf Winged Burning Bush.....	185.00	
32 93 33 00-0211	EA	36" Balled and Burlapped, Euonymus atropurpurea - Eastern Wahoo.....	33.72	
32 93 33 00-0212	EA	1 Gallon Euonymus fortunei - Wintercreeper.....	12.88	
32 93 33 00-0213	EA	2 Gallon Euonymus fortunei - Wintercreeper.....	25.36	
32 93 33 00-0214	EA	3 Gallon Euonymus fortunei - Wintercreeper.....	30.99	
32 93 33 00-0215	EA	5 Gallon Euonymus fortunei - Wintercreeper.....	36.76	
32 93 33 00-0216	EA	2' To 3' Forsythia - Korean Forsythia.....	28.44	
32 93 33 00-0217	EA	3' To 4' Forsythia - Korean Forsythia.....	35.96	
32 93 33 00-0218	EA	4' To 5' Forsythia - Korean Forsythia.....	44.81	
32 93 33 00-0219	EA	30" Balled and Burlapped, Forsythia cvs - Forsythia cultivars.....	28.72	
32 93 33 00-0220	EA	36" Balled and Burlapped, Forsythia cvs - Forsythia cultivars.....	31.85	
32 93 33 00-0221	EA	48" Balled and Burlapped, Forsythia cvs - Forsythia cultivars.....	34.34	
32 93 33 00-0222	EA	18" Balled and Burlapped, Forsythia viridissima & cvs - Green Forsythia.....	29.97	
32 93 33 00-0223	EA	24" Balled and Burlapped, Forsythia viridissima & cvs - Green Forsythia.....	39.96	
32 93 33 00-0224	EA	24" Balled and Burlapped, Forsythia x intermedia & cvs - Border Forsythia.....	29.97	
32 93 33 00-0225	EA	30" Balled and Burlapped, Forsythia x intermedia & cvs - Border Forsythia.....	34.97	
32 93 33 00-0226	EA	36" Balled and Burlapped, Forsythia x intermedia & cvs - Border Forsythia.....	41.21	
32 93 33 00-0227	EA	42" Balled and Burlapped, Forsythia x intermedia & cvs - Border Forsythia.....	47.46	
32 93 33 00-0228	EA	48" Balled and Burlapped, Forsythia x intermedia & cvs - Border Forsythia.....	54.95	
32 93 33 00-0229	EA	2 Gallon Fothergilla gardenii & cvs - Dwarf Fothergilla.....	42.46	
32 93 33 00-0230	EA	3 Gallon Fothergilla gardenii & cvs - Dwarf Fothergilla.....	59.32	
32 93 33 00-0231	EA	5 Gallon Fothergilla gardenii & cvs - Dwarf Fothergilla.....	62.44	
32 93 33 00-0232	EA	15" Balled and Burlapped, Fothergilla gardenii & cvs - Dwarf Fothergilla.....	64.94	
32 93 33 00-0233	EA	18" Balled and Burlapped, Fothergilla gardenii & cvs - Dwarf Fothergilla.....	69.93	
32 93 33 00-0234	EA	24" Balled and Burlapped, Fothergilla gardenii & cvs - Dwarf Fothergilla.....	84.92	
32 93 33 00-0235	EA	24" Balled and Burlapped, Fothergilla major - Large Fothergilla.....	109.90	
32 93 33 00-0236	EA	30" Balled and Burlapped, Fothergilla major - Large Fothergilla.....	124.88	
32 93 33 00-0237	EA	1 Gallon Gardenia jasminoides - Cape Jasmine.....	9.26	
32 93 33 00-0238	EA	3 Gallon Gardenia jasminoides - Cape Jasmine.....	24.28	
32 93 33 00-0239	EA	5 Gallon Gardenia jasminoides - Cape Jasmine.....	30.99	
32 93 33 00-0240	EA	5 Gallon Border Forsythia - Goldenbells.....	34.48	
32 93 33 00-0241	EA	2' To 3' Border Forsythia - Goldenbells.....	28.44	
32 93 33 00-0242	EA	3' To 4' Border Forsythia - Goldenbells.....	35.95	
32 93 33 00-0243	EA	4' To 5' Border Forsythia - Goldenbells.....	44.81	
32 93 33 00-0244	EA	5' To 6' Border Forsythia - Goldenbells.....	53.80	
32 93 33 00-0245	EA	6' To 8' Border Forsythia - Goldenbells.....	73.92	
32 93 33 00-0246	EA	36" Balled and Burlapped, Hamamelis vernalis & cvs - Vernal Witchhazel.....	87.42	
32 93 33 00-0247	EA	48" Balled and Burlapped, Hamamelis vernalis & cvs - Vernal Witchhazel.....	142.37	
32 93 33 00-0248	EA	60" Balled and Burlapped, Hamamelis vernalis & cvs - Vernal Witchhazel.....	179.83	
32 93 33 00-0249	EA	72" Balled and Burlapped, Hamamelis vernalis & cvs - Vernal Witchhazel.....	274.74	
32 93 33 00-0250	EA	84" Balled and Burlapped, Hamamelis vernalis & cvs - Vernal Witchhazel.....	312.21	
32 93 33 00-0251	EA	1 Gallon Hedychium gartdnerum - Variegated Ginger.....	5.31	
32 93 33 00-0252	EA	3 Gallon Hedychium gartdnerum - Variegated Ginger.....	18.67	
32 93 33 00-0253	EA	5 Gallon Hedychium gartdnerum - Variegated Ginger.....	35.90	
32 93 33 00-0254	EA	1 Gallon Hibiscus rosa-sinensis - Hibiscus.....	13.61	
32 93 33 00-0255	EA	3 Gallon Hibiscus rosa-sinensis - Hibiscus.....	22.98	
32 93 33 00-0256	EA	5 Gallon Hibiscus rosa-sinensis - Hibiscus.....	34.75	
32 93 33 00-0257	EA	5 Gallon Hibiscus syriacus - Rose Of Sharon.....	35.96	
32 93 33 00-0258	EA	2' To 3' Hibiscus syriacus - Rose Of Sharon.....	30.59	
32 93 33 00-0259	EA	3' To 4' Hibiscus syriacus - Rose Of Sharon.....	41.32	
32 93 33 00-0260	EA	4' To 5' Hibiscus syriacus - Rose Of Sharon.....	59.70	
32 93 33 00-0261	EA	5' To 6' Hibiscus syriacus - Rose Of Sharon.....	82.51	
32 93 33 00-0262	EA	2 Gallon Hydrangea - Blue Hydrangea.....	25.36	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 33 00-0263 EA 5 Gallon Hydrangea - Blue Hydrangea.....	35.69	
32 93 33 00-0264 EA 2' To 3' Hydrangea paniculata "Grandiflora" - Peegee Hydrangea.....	39.84	
32 93 33 00-0265 EA 3' To 4' Hydrangea paniculata "Grandiflora" - Peegee Hydrangea.....	45.48	
32 93 33 00-0266 EA 2 Gallon Hydrangea quercifolia - Oakleaf Hydrangea.....	25.36	
32 93 33 00-0267 EA 5 Gallon Hydrangea arborescens & cvs - Smooth Hydrangea.....	43.71	
32 93 33 00-0268 EA 30" Balled and Burlapped, Hydrangea arborescens & cvs - Smooth Hydrangea.....	47.46	
32 93 33 00-0269 EA 36" Balled and Burlapped, Hydrangea arborescens & cvs - Smooth Hydrangea.....	54.95	
32 93 33 00-0270 EA 4 Gallon Hydrangea macrophylla & cvs - Bigleaf Hydrangea.....	57.45	
32 93 33 00-0271 EA 18" Balled and Burlapped, Hydrangea macrophylla & cvs - Bigleaf Hydrangea.....	44.96	
32 93 33 00-0272 EA 24" Balled and Burlapped, Hydrangea macrophylla & cvs - Bigleaf Hydrangea.....	59.94	
32 93 33 00-0273 EA 3 Gallon Hydrangea paniculata & cvs - Panicle Hydrangea.....	26.23	
32 93 33 00-0274 EA 5 Gallon Hydrangea paniculata & cvs - Panicle Hydrangea.....	31.22	
32 93 33 00-0275 EA 18" Balled and Burlapped, Hydrangea paniculata & cvs - Panicle Hydrangea.....	26.85	
32 93 33 00-0276 EA 24" Balled and Burlapped, Hydrangea paniculata & cvs - Panicle Hydrangea.....	28.72	
32 93 33 00-0277 EA 30" Balled and Burlapped, Hydrangea paniculata & cvs - Panicle Hydrangea.....	32.47	
32 93 33 00-0278 EA 36" Balled and Burlapped, Hydrangea paniculata & cvs - Panicle Hydrangea.....	37.46	
32 93 33 00-0279 EA 48" Balled and Burlapped, Hydrangea paniculata & cvs - Panicle Hydrangea.....	49.95	
32 93 33 00-0280 EA 18" Balled and Burlapped, Hydrangea quercifolia & cvs - Oakleaf Hydrangea.....	36.22	
32 93 33 00-0281 EA 24" Balled and Burlapped, Hydrangea quercifolia & cvs - Oakleaf Hydrangea.....	41.21	
32 93 33 00-0282 EA 30" Balled and Burlapped, Hydrangea quercifolia & cvs - Oakleaf Hydrangea.....	48.70	
32 93 33 00-0283 EA 2 Gallon Hypericum kalmianum - St. John's Wort.....	25.36	
32 93 33 00-0284 EA 3 Gallon Hypericum kalmianum - Kalm St. John's Wort.....	29.97	
32 93 33 00-0285 EA 24" Balled and Burlapped, Hypericum kalmianum - Kalm St. John's Wort.....	32.47	
32 93 33 00-0286 EA 1 Gallon Ilex "Carissa" - Holly.....	12.88	
32 93 33 00-0287 EA 2 Gallon Ilex "Carissa" - Holly.....	25.36	
32 93 33 00-0288 EA 5 Gallon Ilex "Carissa" - Holly.....	35.69	
32 93 33 00-0289 EA 18" To 24" Ilex - Gulfside Sweet Holly.....	34.21	
32 93 33 00-0290 EA 2' To 2-1/2' Ilex - Gulfside Sweet Holly.....	43.33	
32 93 33 00-0291 EA 2-1/2' To 3' Ilex - Gulfside Sweet Holly.....	56.21	
32 93 33 00-0292 EA 3' To 3-1/2' Ilex - Gulfside Sweet Holly.....	68.29	
32 93 33 00-0293 EA 3 Gallon Ilex cornuta - Dwarf Horned Holly.....	25.55	
32 93 33 00-0294 EA 1 Gallon Ilex cornuta, Osmanthus heterophyllus - Dwarf Chinese Holly.....	12.88	
32 93 33 00-0295 EA 2 Gallon Ilex cornuta, Osmanthus heterophyllus - Dwarf Chinese Holly.....	25.36	
32 93 33 00-0296 EA 5 Gallon Ilex cornuta, Osmanthus heterophyllus - Dwarf Chinese Holly.....	36.76	
32 93 33 00-0297 EA 1 Gallon Ilex crenata - Hellers Japanese Holly.....	12.88	
32 93 33 00-0298 EA 2 Gallon Ilex crenata - Hellers Japanese Holly.....	28.17	
32 93 33 00-0299 EA 3 Gallon Ilex crenata - Hellers Japanese Holly.....	36.76	
32 93 33 00-0300 EA 2 Gallon Ilex crenata - Hetzi Japanese Holly.....	28.17	
32 93 33 00-0301 EA 3 Gallon Ilex crenata - Hetzi Japanese Holly.....	33.94	
32 93 33 00-0302 EA 2' To 3' Ilex crenata - Hetzi Japanese Holly.....	68.29	
32 93 33 00-0303 EA 3' To 4' Ilex crenata - Hetzi Japanese Holly.....	91.09	
32 93 33 00-0304 EA 2' To 3' Ilex opaca - American Holly.....	91.09	
32 93 33 00-0305 EA 3' To 4' Ilex opaca - American Holly.....	150.79	
32 93 33 00-0306 EA 4' To 5' Ilex opaca - American Holly.....	193.46	
32 93 33 00-0307 EA 5' To 6' Ilex opaca - American Holly.....	233.30	
32 93 33 00-0308 EA 6' To 7' Ilex opaca - American Holly.....	327.21	
32 93 33 00-0309 EA 7' To 8' Ilex opaca - American Holly.....	455.33	
32 93 33 00-0310 EA 8' To 10' Ilex opaca - American Holly.....	654.42	
32 93 33 00-0311 EA 10' To 12' Ilex opaca - American Holly.....	995.99	
32 93 33 00-0312 EA 12' To 14' Ilex opaca - American Holly.....	1,209.30	
32 93 33 00-0313 EA 14' To 16' Ilex opaca - American Holly.....	1,493.85	
32 93 33 00-0314 EA 2' To 3' Ilex verticillata - Winterberry (Female).....	91.09	
32 93 33 00-0315 EA 3' To 4' Ilex verticillata - Winterberry (Female).....	119.54	
32 93 33 00-0316 EA 2' To 3' Ilex verticillata - Winterberry (Male).....	73.92	
32 93 33 00-0317 EA 3' To 4' Ilex verticillata - Winterberry (Male).....	102.50	
32 93 33 00-0318 EA 4' To 5' Ilex verticillata - Winterberry (Male).....	119.54	
32 93 33 00-0319 EA 1 Gallon Ilex vomitoria - Yaupon Holly.....	12.08	
32 93 33 00-0320 EA 3 Gallon Ilex vomitoria - Yaupon Holly.....	24.28	
32 93 33 00-0321 EA 10 Gallon Ilex vomitoria - Yaupon Holly.....	85.32	
32 93 33 00-0322 EA 18" Balled and Burlapped, Ilex glabra compacta & cvs - Compact Inkberry Holly.....	38.71	
32 93 33 00-0323 EA 24" Balled and Burlapped, Ilex glabra compacta & cvs - Compact Inkberry Holly.....	43.71	
32 93 33 00-0324 EA 3 Gallon Ilex meserveae & cvs - Blue Holly.....	49.95	
32 93 33 00-0325 EA 18" Balled and Burlapped, Ilex meserveae & cvs - Blue Holly.....	46.21	
32 93 33 00-0326 EA 24" Balled and Burlapped, Ilex meserveae & cvs - Blue Holly.....	56.20	
32 93 33 00-0327 EA 5 Gallon Ilex verticillata & cvs - Common Winterberry.....	41.21	
32 93 33 00-0328 EA 24" Balled and Burlapped, Ilex verticillata & cvs - Common Winterberry.....	41.21	
32 93 33 00-0329 EA 30" Balled and Burlapped, Ilex verticillata & cvs - Common Winterberry.....	43.71	
32 93 33 00-0330 EA 36" Balled and Burlapped, Ilex verticillata & cvs - Common Winterberry.....	52.45	
32 93 33 00-0331 EA 42" Balled and Burlapped, Ilex verticillata & cvs - Common Winterberry.....	58.69	
32 93 33 00-0332 EA 48" Balled and Burlapped, Ilex verticillata & cvs - Common Winterberry.....	62.44	
32 93 33 00-0333 EA 60" Balled and Burlapped, Ilex verticillata & cvs - Common Winterberry.....	79.92	
32 93 33 00-0334 EA 4' To 5' Ilex x attenuata "Foster" - Holly.....	147.98	
32 93 33 00-0335 EA 5' To 6' Ilex x attenuata "Foster" - Holly.....	196.27	
32 93 33 00-0336 EA 6' To 7' Ilex x attenuata "Foster" - Holly.....	175.61	
32 93 33 00-0337 EA 7' To 8' Ilex x attenuata "Foster" - Holly.....	341.43	
32 93 33 00-0338 EA 1 Gallon Jasminum - Jasmine.....	3.30	
32 93 33 00-0339 EA 3 Gallon Jasminum - Jasmine.....	12.93	
32 93 33 00-0340 EA 3 Gallon Jasminum - Orange Jasmine.....	10.05	
32 93 33 00-0341 EA 4' - 5' Jasminum - Orange Jasmine.....	114.89	
32 93 33 00-0342 EA 6' - 7' Jasminum - Orange Jasmine.....	229.78	
32 93 33 00-0343 EA 8' - 10' Jasminum - Orange Jasmine.....	310.21	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 33 00-0344	EA	3 Gallon Juniperus chinensis cvs - Chinese Juniper	43.71	
32 93 33 00-0345	EA	5 Gallon Juniperus chinensis cvs - Chinese Juniper	48.70	
32 93 33 00-0346	EA	18" Balled and Burlapped, Juniperus chinensis cvs - Chinese Juniper	64.94	
32 93 33 00-0347	EA	24" Balled and Burlapped, Juniperus chinensis cvs - Chinese Juniper	84.92	
32 93 33 00-0348	EA	30" Balled and Burlapped, Juniperus chinensis cvs - Chinese Juniper	99.91	
32 93 33 00-0349	EA	36" Balled and Burlapped, Juniperus chinensis cvs - Chinese Juniper	134.87	
32 93 33 00-0350	EA	48" Balled and Burlapped, Juniperus chinensis cvs - Chinese Juniper	184.83	
32 93 33 00-0351	EA	1 Gallon Juniperus horizontalis cvs - Creeping Juniper	20.82	
32 93 33 00-0352	EA	3 Gallon Juniperus horizontalis cvs - Creeping Juniper	43.71	
32 93 33 00-0353	EA	5 Gallon Juniperus horizontalis cvs - Creeping Juniper	48.70	
32 93 33 00-0354	EA	15" Balled and Burlapped, Juniperus horizontalis cvs - Creeping Juniper	52.45	
32 93 33 00-0355	EA	18" Balled and Burlapped, Juniperus horizontalis cvs - Creeping Juniper	57.45	
32 93 33 00-0356	EA	24" Balled and Burlapped, Juniperus horizontalis cvs - Creeping Juniper	69.93	
32 93 33 00-0357	EA	30" Balled and Burlapped, Juniperus horizontalis cvs - Creeping Juniper	84.92	
32 93 33 00-0358	EA	3 Gallon Juniperus procumbens cvs - Japanese Garden Juniper	33.72	
32 93 33 00-0359	EA	18" Balled and Burlapped, Juniperus procumbens cvs - Japanese Garden Juniper	39.96	
32 93 33 00-0360	EA	24" Balled and Burlapped, Juniperus procumbens cvs - Japanese Garden Juniper	54.95	
32 93 33 00-0361	EA	30" Balled and Burlapped, Juniperus procumbens cvs - Japanese Garden Juniper	69.93	
32 93 33 00-0362	EA	36" Balled and Burlapped, Juniperus procumbens cvs - Japanese Garden Juniper	84.92	
32 93 33 00-0363	EA	3 Gallon Juniperus sabina cvs - Savin Juniper	31.22	
32 93 33 00-0364	EA	5 Gallon Juniperus sabina cvs - Savin Juniper	37.46	
32 93 33 00-0365	EA	4 Gallon Juniperus virginiana cvs - Red Cedar Juniper	32.47	
32 93 33 00-0366	EA	36" Balled and Burlapped, Juniperus virginiana cvs - Red Cedar Juniper	62.44	
32 93 33 00-0367	EA	48" Balled and Burlapped, Juniperus virginiana cvs - Red Cedar Juniper	97.41	
32 93 33 00-0368	EA	60" Balled and Burlapped, Juniperus virginiana cvs - Red Cedar Juniper	122.38	
32 93 33 00-0369	EA	15" To 18" Kalmia latifolia - Mountain Laurel	51.25	
32 93 33 00-0370	EA	18" To 24" Kalmia latifolia - Mountain Laurel	68.29	
32 93 33 00-0371	EA	2' To 3' Kalmia latifolia - Mountain Laurel	99.55	
32 93 33 00-0372	EA	4' To 5' Kalmia latifolia - Mountain Laurel	182.05	
32 93 33 00-0373	EA	5' To 6' Kalmia latifolia - Mountain Laurel	278.91	
32 93 33 00-0374	EA	6' To 8' Kalmia latifolia - Mountain Laurel	426.89	
32 93 33 00-0375	EA	1 Gallon Kerria japonica - Kerria	11.40	
32 93 33 00-0376	EA	5 Gallon Kerria japonica - Kerria	35.69	
32 93 33 00-0377	EA	24" Balled and Burlapped, Kolkwitzia amabilis & cvs - Beautybush	36.22	
32 93 33 00-0378	EA	30" Balled and Burlapped, Kolkwitzia amabilis & cvs - Beautybush	41.21	
32 93 33 00-0379	EA	36" Balled and Burlapped, Kolkwitzia amabilis & cvs - Beautybush	44.96	
32 93 33 00-0380	EA	42" Balled and Burlapped, Kolkwitzia amabilis & cvs - Beautybush	52.45	
32 93 33 00-0381	EA	48" Balled and Burlapped, Kolkwitzia amabilis & cvs - Beautybush	59.94	
32 93 33 00-0382	EA	60" Balled and Burlapped, Kolkwitzia amabilis & cvs - Beautybush	74.93	
32 93 33 00-0383	EA	1 Gallon Lagerstroemia indica - Crape Myrtle	8.59	
32 93 33 00-0384	EA	5 Gallon Lagerstroemia indica - Crape Myrtle	30.59	
32 93 33 00-0385	EA	3' To 4' Lagerstroemia indica - Crape Myrtle	42.66	
32 93 33 00-0386	EA	4' To 5' Lagerstroemia indica - Crape Myrtle	62.65	
32 93 33 00-0387	EA	5' To 6' Lagerstroemia indica - Crape Myrtle	99.55	
32 93 33 00-0388	EA	7' To 8' Lagerstroemia indica - Crape Myrtle	129.25	
32 93 33 00-0389	EA	9' To 10' Lagerstroemia indica - Crape Myrtle	172.34	
32 93 33 00-0390	EA	11' To 12' Lagerstroemia indica - Crape Myrtle	359.04	
32 93 33 00-0391	EA	1 Gallon Leucothoe axillaris - Coast Leucothoe	12.88	
32 93 33 00-0392	EA	2 Gallon Leucothoe axillaris - Coast Leucothoe	28.17	
32 93 33 00-0393	EA	3 Gallon Leucothoe axillaris - Coast Leucothoe	33.94	
32 93 33 00-0394	EA	1 Gallon Ligustrum lucidum - Glossy Privet	7.92	
32 93 33 00-0395	EA	5 Gallon Ligustrum lucidum - Glossy Privet	24.28	
32 93 33 00-0396	EA	15 Gallon Ligustrum lucidum - Glossy Privet	113.77	
32 93 33 00-0397	EA	1 Gallon Ligustrum sinense - Variegated Chinese Privet	7.92	
32 93 33 00-0398	EA	2 Gallon Ligustrum sinense - Variegated Chinese Privet	17.04	
32 93 33 00-0399	EA	3 Gallon Ligustrum sinense - Variegated Chinese Privet	22.14	
32 93 33 00-0400	EA	36" Balled and Burlapped, Ligustrum vulgare & cvs - Common Privet	37.46	
32 93 33 00-0401	EA	48" Balled and Burlapped, Ligustrum vulgare & cvs - Common Privet	54.95	
32 93 33 00-0402	EA	60" Balled and Burlapped, Ligustrum vulgare & cvs - Common Privet	69.93	
32 93 33 00-0403	EA	72" Balled and Burlapped, Ligustrum vulgare & cvs - Common Privet	79.92	
32 93 33 00-0404	EA	5 Gallon Linder benzoin - Spicebush	41.21	
32 93 33 00-0405	EA	36" Balled and Burlapped, Linder benzoin - Spicebush	34.97	
32 93 33 00-0406	EA	48" Balled and Burlapped, Linder benzoin - Spicebush	42.46	
32 93 33 00-0407	EA	2' To 3' Lonicera fragrantissima - Winter Honeysuckle	68.29	
32 93 33 00-0408	EA	3' To 4' Lonicera fragrantissima - Winter Honeysuckle	82.51	
32 93 33 00-0409	EA	30" Balled and Burlapped, Lonicera tatarica & cvs - Tatarian Honeysuckle	37.46	
32 93 33 00-0410	EA	36" Balled and Burlapped, Lonicera tatarica & cvs - Tatarian Honeysuckle	44.96	
32 93 33 00-0411	EA	42" Balled and Burlapped, Lonicera tatarica & cvs - Tatarian Honeysuckle	49.95	
32 93 33 00-0412	EA	48" Balled and Burlapped, Lonicera tatarica & cvs - Tatarian Honeysuckle	54.95	
32 93 33 00-0413	EA	1 Gallon Myrica cerifera - Wax Myrtle	7.18	
32 93 33 00-0414	EA	4 Gallon Myrica cerifera - Wax Myrtle	22.98	
32 93 33 00-0415	EA	7 Gallon Myrica cerifera - Wax Myrtle	50.27	
32 93 33 00-0416	EA	10 Gallon Myrica cerifera - Wax Myrtle	74.68	
32 93 33 00-0417	EA	15 Gallon Myrica cerifera - Wax Myrtle	114.89	
32 93 33 00-0418	EA	45 Gallon Myrica cerifera - Wax Myrtle	344.68	
32 93 33 00-0419	EA	1' - 2' Myrica cerifera - Wax Myrtle	10.05	
32 93 33 00-0420	EA	3' - 4' Myrica cerifera - Wax Myrtle	34.47	
32 93 33 00-0421	EA	5' - 6' Myrica cerifera - Wax Myrtle	63.19	
32 93 33 00-0422	EA	7' - 8' Myrica cerifera - Wax Myrtle	86.17	
32 93 33 00-0423	EA	9' - 10' Myrica cerifera - Wax Myrtle	114.89	
32 93 33 00-0424	EA	11' - 12' Myrica cerifera - Wax Myrtle	175.21	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
32 93 33 00-0425 EA 3 Gallon Myrica pensylvanica - Northern Bayberry.....	37.46	
32 93 33 00-0426 EA 24" Balled and Burlapped, Myrica pensylvanica - Northern Bayberry.....	61.19	
32 93 33 00-0427 EA 30" Balled and Burlapped, Myrica pensylvanica - Northern Bayberry.....	89.92	
32 93 33 00-0428 EA 36" Balled and Burlapped, Myrica pensylvanica - Northern Bayberry.....	107.40	
32 93 33 00-0429 EA 48" Balled and Burlapped, Myrica pensylvanica - Northern Bayberry.....	112.39	
32 93 33 00-0430 EA 1 Gallon Nandina domestica - Heavenly Bamboo	12.88	
32 93 33 00-0431 EA 2 Gallon Nandina domestica - Heavenly Bamboo	28.17	
32 93 33 00-0432 EA 5 Gallon Nandina domestica - Heavenly Bamboo	42.66	
32 93 33 00-0433 EA 1 Gallon Osmanthus fragrans - Fragrant Tea Olive	7.92	
32 93 33 00-0434 EA 3 Gallon Osmanthus fragrans - Fragrant Tea Olive	21.46	
32 93 33 00-0435 EA 1 Gallon Philadelphus - Evergreen Mockorange.....	11.00	
32 93 33 00-0436 EA 5 Gallon Philadelphus - Evergreen Mockorange.....	35.69	
32 93 33 00-0437 EA 36" Balled and Burlapped, Philadelphus x virginialis & cvs - Mockorange.....	37.46	
32 93 33 00-0438 EA 42" Balled and Burlapped, Philadelphus x virginialis & cvs - Mockorange.....	43.71	
32 93 33 00-0439 EA 48" Balled and Burlapped, Philadelphus x virginialis & cvs - Mockorange.....	49.95	
32 93 33 00-0440 EA 24" Balled and Burlapped, Physocarpus opulifolius 'Nana' - Dwarf Common Ninebark	37.46	
32 93 33 00-0441 EA 30" Balled and Burlapped, Physocarpus opulifolius 'Nana' - Dwarf Common Ninebark	43.71	
32 93 33 00-0442 EA 36" Balled and Burlapped, Physocarpus opulifolius 'Nana' - Dwarf Common Ninebark	49.95	
32 93 33 00-0443 EA 42" Balled and Burlapped, Physocarpus opulifolius 'Nana' - Dwarf Common Ninebark	62.44	
32 93 33 00-0444 EA 48" Balled and Burlapped, Physocarpus opulifolius 'Nana' - Dwarf Common Ninebark	74.93	
32 93 33 00-0445 EA 12" To 15" Spread Pieris - Mountain Andromeda	34.48	
32 93 33 00-0446 EA 15" To 18" Spread Pieris - Mountain Andromeda	73.92	
32 93 33 00-0447 EA 12" To 15" Pieris japonica - Japanese Andromeda.....	44.81	
32 93 33 00-0448 EA 15" To 18" Pieris japonica - Japanese Andromeda.....	51.25	
32 93 33 00-0449 EA 18" To 24" Pieris japonica - Japanese Andromeda.....	64.13	
32 93 33 00-0450 EA 2' To 2-1/2' Pieris japonica - Japanese Andromeda.....	91.09	
32 93 33 00-0451 EA 2-1/2' To 3' Pieris japonica - Japanese Andromeda.....	108.13	
32 93 33 00-0452 EA 24" Balled and Burlapped, Pinus mugo & cvs - Mugo Pine	38.91	
32 93 33 00-0453 EA 30" Balled and Burlapped, Pinus mugo & cvs - Mugo Pine	49.80	
32 93 33 00-0454 EA 36" Balled and Burlapped, Pinus mugo & cvs - Mugo Pine	59.92	
32 93 33 00-0455 EA 48" Balled and Burlapped, Pinus mugo & cvs - Mugo Pine	77.04	
32 93 33 00-0456 EA 60" Balled and Burlapped, Pinus mugo & cvs - Mugo Pine	92.60	
32 93 33 00-0457 EA 72" Balled and Burlapped, Pinus mugo & cvs - Mugo Pine	135.39	
32 93 33 00-0458 EA 30" Balled and Burlapped, Pinus mugo compacta - Dwarf Mugo Pine	84.04	
32 93 33 00-0459 EA 36" Balled and Burlapped, Pinus mugo compacta - Dwarf Mugo Pine	101.16	
32 93 33 00-0460 EA 48" Balled and Burlapped, Pinus mugo compacta - Dwarf Mugo Pine	134.62	
32 93 33 00-0461 EA 1 Gallon Pittosporum - Pittosporum	4.74	
32 93 33 00-0462 EA 3 Gallon Pittosporum - Pittosporum	12.21	
32 93 33 00-0463 EA 1 Gallon Pittosporum - Varigated Pittosporum.....	4.74	
32 93 33 00-0464 EA 3 Gallon Pittosporum - Varigated Pittosporum.....	12.21	
32 93 33 00-0465 EA 5 Gallon Pittosporum - Varigated Pittosporum.....	21.40	
32 93 33 00-0466 EA 2 Gallon Potentilla fruticosa & cvs - Bush Cinquefoil	21.23	
32 93 33 00-0467 EA 5 Gallon Potentilla fruticosa & cvs - Bush Cinquefoil	29.97	
32 93 33 00-0468 EA 18" Balled and Burlapped, Potentilla fruticosa & cvs - Bush Cinquefoil	22.48	
32 93 33 00-0469 EA 24" Balled and Burlapped, Potentilla fruticosa & cvs - Bush Cinquefoil	24.98	
32 93 33 00-0470 EA 30" Balled and Burlapped, Potentilla fruticosa & cvs - Bush Cinquefoil	36.22	
32 93 33 00-0471 EA 36" Balled and Burlapped, Potentilla fruticosa & cvs - Bush Cinquefoil	41.84	
32 93 33 00-0472 EA 1 Gallon Prunus caroliniana - Carolina Cherry Laurel.....	5.35	
32 93 33 00-0473 EA 5 Gallon Prunus caroliniana - Carolina Cherry Laurel.....	13.37	
32 93 33 00-0474 EA 15 Gallon Prunus caroliniana - Carolina Cherry Laurel.....	79.75	
32 93 33 00-0475 EA 15" To 18" Prunus laurocerasus - Cherry Laurel	20.40	
32 93 33 00-0476 EA 18" To 24" Prunus laurocerasus - Cherry Laurel	25.24	
32 93 33 00-0477 EA 24" To 30" Prunus laurocerasus - Cherry Laurel	32.85	
32 93 33 00-0478 EA 15" To 18" Prunus triloba - Double White Flowering Almond.....	18.22	
32 93 33 00-0479 EA 18" To 24" Prunus triloba - Double White Flowering Almond.....	23.32	
32 93 33 00-0480 EA 3' To 4' Prunus triloba - Double White Flowering Almond.....	37.20	
32 93 33 00-0481 EA 4' To 6' Prunus triloba - Double White Flowering Almond.....	74.48	
32 93 33 00-0482 EA 5 Gallon Prunus triloba - Pink Flowering Almond.....	22.40	
32 93 33 00-0483 EA 18" To 24" Prunus triloba - Pink Flowering Almond	25.16	
32 93 33 00-0484 EA 2' To 3' Prunus triloba - Pink Flowering Almond	29.26	
32 93 33 00-0485 EA 2' To 3' Prunus virginiana - Brilliant Chokeberry	19.90	
32 93 33 00-0486 EA 3' To 4' Prunus virginiana - Brilliant Chokeberry	24.41	
32 93 33 00-0487 EA 4' To 5' Prunus virginiana - Brilliant Chokeberry	29.26	
32 93 33 00-0488 EA 5' To 6' Prunus virginiana - Brilliant Chokeberry	33.52	
32 93 33 00-0489 EA 1 Gallon Punica granatum - Dwarf Pomegranate	8.45	
32 93 33 00-0490 EA 3 Gallon Punica granatum - Dwarf Pomegranate	24.95	
32 93 33 00-0491 EA 7 Gallon Punica granatum - Dwarf Pomegranate	51.25	
32 93 33 00-0492 EA 1 Gallon Pyracantha koidzumi "Santa Cruz" - Pyracantha	10.73	
32 93 33 00-0493 EA 5 Gallon Pyracantha koidzumi "Santa Cruz" - Pyracantha	35.69	
32 93 33 00-0494 EA 5 Gallon Espalier Pyracantha koidzumi "Santa Cruz" - Pyracantha.....	73.92	
32 93 33 00-0495 EA 1 Gallon Ralphiolopsis indica - Indian Hawthorne	8.59	
32 93 33 00-0496 EA 2 Gallon Ralphiolopsis indica - Indian Hawthorne	16.37	
32 93 33 00-0497 EA 5 Gallon Ralphiolopsis indica - Indian Hawthorne	29.11	
32 93 33 00-0498 EA 1 Gallon Rhamnus californica - Coffeeberry	13.05	
32 93 33 00-0499 EA 5 Gallon Rhamnus californica - Coffeeberry	37.32	
32 93 33 00-0500 EA 15 Gallon Rhamnus californica - Coffeeberry	112.00	
32 93 33 00-0501 EA 4' To 5' Rhamnus frangula "Columnaris" - Tallhedge	65.47	
32 93 33 00-0502 EA 5' To 6' Rhamnus frangula "Columnaris" - Tallhedge	89.75	
32 93 33 00-0503 EA 6' To 8' Rhamnus frangula "Columnaris" - Tallhedge	116.72	
32 93 33 00-0504 EA 10' To 12' Rhamnus frangula "Columnaris" - Tallhedge	213.45	
32 93 33 00-0505 EA 1 Gallon Rhododendron - Azalea Evergreen Hybrids.....	13.95	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 33 00-0506	EA	2 Gallon Rhododendron - Azalea Evergreen Hybrids	28.17
32 93 33 00-0507	EA	3 Gallon Rhododendron - Azalea Evergreen Hybrids	36.76
32 93 33 00-0508	EA	5 Gallon Rhododendron - Azalea Evergreen Hybrids	42.66
32 93 33 00-0509	EA	15" To 18" Rhododendron - Azalea Evergreen Hybrids	49.91
32 93 33 00-0510	EA	18" To 24" Rhododendron - Azalea Evergreen Hybrids	62.65
32 93 33 00-0511	EA	2' To 2-1/2' Rhododendron - Azalea Evergreen Hybrids	91.09
32 93 33 00-0512	EA	2-1/2' To 3' Rhododendron - Azalea Evergreen Hybrids	127.99
32 93 33 00-0513	EA	1 Gallon Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	15.70
32 93 33 00-0514	EA	2 Gallon Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	28.17
32 93 33 00-0515	EA	15' To 18' Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	48.43
32 93 33 00-0516	EA	18" To 24" Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	62.65
32 93 33 00-0517	EA	2' To 3' Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	91.09
32 93 33 00-0518	EA	3' To 4' Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	133.76
32 93 33 00-0519	EA	4' To 5' Rhododendron - Azalea Exbury, Knapp Hill And Llam Hybrids	179.24
32 93 33 00-0520	EA	5 Gallon Rhododendron - Boxleaf Azara	35.69
32 93 33 00-0521	EA	15 Gallon Rhododendron - Boxleaf Azara	127.99
32 93 33 00-0522	EA	15" To 18" Rhododendron - Carolina Rhododendron	40.38
32 93 33 00-0523	EA	18" To 24" Rhododendron - Carolina Rhododendron	71.10
32 93 33 00-0524	EA	24" To 30" Rhododendron - Carolina Rhododendron	105.31
32 93 33 00-0525	EA	2' To 3' Rhododendron - Five-leafed Azalea	47.89
32 93 33 00-0526	EA	3' To 4' Rhododendron - Five-leafed Azalea	62.65
32 93 33 00-0527	EA	4' To 5' Rhododendron - Five-leafed Azalea	82.51
32 93 33 00-0528	EA	15" To 18" Rhododendron - Ghent Azalea	47.89
32 93 33 00-0529	EA	18" To 24" Rhododendron - Ghent Azalea	59.70
32 93 33 00-0530	EA	2' To 3' Rhododendron - Ghent Azalea	96.73
32 93 33 00-0531	EA	3' To 4' Rhododendron - Ghent Azalea	133.76
32 93 33 00-0532	EA	4' To 5' Rhododendron - Ghent Azalea	179.24
32 93 33 00-0533	EA	5' To 6' Rhododendron - Ghent Azalea	239.07
32 93 33 00-0534	EA	1 Gallon Rhododendron - Hybrid Rhododendron	15.70
32 93 33 00-0535	EA	2 Gallon Rhododendron - Hybrid Rhododendron	33.94
32 93 33 00-0536	EA	3 Gallon Rhododendron - Hybrid Rhododendron	48.16
32 93 33 00-0537	EA	5 Gallon Rhododendron - Hybrid Rhododendron	53.80
32 93 33 00-0538	EA	15" To 18" Rhododendron - Hybrid Rhododendron	45.48
32 93 33 00-0539	EA	18" To 24" Rhododendron - Hybrid Rhododendron	62.65
32 93 33 00-0540	EA	24" To 30" Rhododendron - Hybrid Rhododendron	85.32
32 93 33 00-0541	EA	30" To 36" Rhododendron - Hybrid Rhododendron	99.55
32 93 33 00-0542	EA	36" To 42" Rhododendron - Hybrid Rhododendron	142.34
32 93 33 00-0543	EA	42" To 48" Rhododendron - Hybrid Rhododendron	176.42
32 93 33 00-0544	EA	15" To 18" Rhododendron - Pjm Rhododendron	51.25
32 93 33 00-0545	EA	18" To 24" Rhododendron - Pjm Rhododendron	62.65
32 93 33 00-0546	EA	2' To 2-1/2' Rhododendron - Pjm Rhododendron	91.09
32 93 33 00-0547	EA	2-1/2' To 3' Rhododendron - Pjm Rhododendron	116.72
32 93 33 00-0548	EA	3' To 3-1/2' Rhododendron - Pjm Rhododendron	142.34
32 93 33 00-0549	EA	12" To 15" Rhododendron - Torch Azalea	39.85
32 93 33 00-0550	EA	15" To 18" Rhododendron - Torch Azalea	47.89
32 93 33 00-0551	EA	18" To 24" Rhododendron - Torch Azalea	59.70
32 93 33 00-0552	EA	2' To 3' Rhododendron - Torch Azalea	99.55
32 93 33 00-0553	EA	3 Gallon Rhododendron cvs - Lepidote Rhododendron	44.96
32 93 33 00-0554	EA	5 Gallon Rhododendron cvs - Lepidote Rhododendron	54.95
32 93 33 00-0555	EA	18" Balled and Burlapped, Rhododendron cvs - Lepidote Rhododendron	67.44
32 93 33 00-0556	EA	24" Balled and Burlapped, Rhododendron cvs - Lepidote Rhododendron	84.92
32 93 33 00-0557	EA	30" Balled and Burlapped, Rhododendron cvs - Lepidote Rhododendron	99.91
32 93 33 00-0558	EA	36" Balled and Burlapped, Rhododendron cvs - Lepidote Rhododendron	119.89
32 93 33 00-0559	EA	1 Gallon Rhus glabra - Dwarf Smooth Sumac	12.88
32 93 33 00-0560	EA	5 Gallon Rhus glabra - Dwarf Smooth Sumac	35.69
32 93 33 00-0561	EA	2 Gallon Rhus aromatica & cvs - Fragrant Sumac	29.97
32 93 33 00-0562	EA	5 Gallon Rhus aromatica & cvs - Fragrant Sumac	41.21
32 93 33 00-0563	EA	18" Balled and Burlapped, Rhus aromatica & cvs - Fragrant Sumac	47.46
32 93 33 00-0564	EA	24" Balled and Burlapped, Rhus aromatica & cvs - Fragrant Sumac	62.44
32 93 33 00-0565	EA	36" Balled and Burlapped, Rhus glabra - Smooth Sumac	37.46
32 93 33 00-0566	EA	48" Balled and Burlapped, Rhus typhina & cvs - Staghorn Sumac	62.44
32 93 33 00-0567	EA	72" Balled and Burlapped, Rhus typhina & cvs - Staghorn Sumac	99.91
32 93 33 00-0568	EA	15" Balled and Burlapped, Ribes alpinum & cvs - Alpine Currant	33.72
32 93 33 00-0569	EA	18" Balled and Burlapped, Ribes alpinum & cvs - Alpine Currant	38.71
32 93 33 00-0570	EA	24" Balled and Burlapped, Ribes alpinum & cvs - Alpine Currant	56.20
32 93 33 00-0571	EA	30" Balled and Burlapped, Ribes alpinum & cvs - Alpine Currant	74.93
32 93 33 00-0572	EA	1 Gallon Rosa hybrids & cvs - Shrub Rose	20.61
32 93 33 00-0573	EA	2 Gallon Rosa hybrids & cvs - Shrub Rose	24.98
32 93 33 00-0574	EA	3 Gallon Rosa hybrids & cvs - Shrub Rose	31.22
32 93 33 00-0575	EA	2 Gallon Rosa rugosa & cvs - Rugosa Rose	22.48
32 93 33 00-0576	EA	3 Gallon Rosa rugosa & cvs - Rugosa Rose	28.72
32 93 33 00-0577	EA	5 Gallon Sambucus canadensis - American Elder	41.21
32 93 33 00-0578	EA	2 Gallon Sarcococca hookeriana humilis - Himalayan Sarcococca	18.51
32 93 33 00-0579	EA	3 Gallon Sarcococca hookeriana humilis - Himalayan Sarcococca	27.10
32 93 33 00-0580	EA	1 Gallon Sarcococca humilis - Fragrant Sarcococca	10.06
32 93 33 00-0581	EA	5 Gallon Sarcococca humilis - Fragrant Sarcococca	26.30
32 93 33 00-0582	EA	5 Gallon Senna artemisioides - Feathery Cassia	17.29
32 93 33 00-0583	EA	15 Gallon Senna artemisioides - Feathery Cassia	68.79
32 93 33 00-0584	EA	24" Box Senna artemisioides - Feathery Cassia	216.09
32 93 33 00-0585	EA	1 Gallon Skimmia japonica - Japanese Skimmia	12.88
32 93 33 00-0586	EA	2 Gallon Skimmia japonica - Japanese Skimmia	25.62

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 93 33 00-0587	EA 5 Gallon Skimmia japonica - Japanese Skimmia	41.32	
32 93 33 00-0588	EA 3' To 4' Spiraea - Garland Spiraea	59.70	
32 93 33 00-0589	EA 4' To 5' Spiraea - Garland Spiraea	91.09	
32 93 33 00-0590	EA 5 Gallon Spiraea - Snowmound Spiraea	35.69	
32 93 33 00-0591	EA 18" To 24" Spiraea - Snowmound Spiraea	29.25	
32 93 33 00-0592	EA 2' To 3' Spiraea - Snowmound Spiraea	41.32	
32 93 33 00-0593	EA 3' To 4' Spiraea - Snowmound Spiraea	47.90	
32 93 33 00-0594	EA 4' To 5' Spiraea - Snowmound Spiraea	82.51	
32 93 33 00-0595	EA 1 Gallon Spiraea japonica & cvs - Japanese Spiraea	12.88	
32 93 33 00-0596	EA 2 Gallon Spiraea japonica & cvs - Japanese Spiraea	25.36	
32 93 33 00-0597	EA 3 Gallon Spiraea japonica & cvs - Japanese Spiraea	29.35	
32 93 33 00-0598	EA 5 Gallon Spiraea japonica & cvs - Japanese Spiraea	31.85	
32 93 33 00-0599	EA 18" Balled and Burlapped, Spiraea japonica & cvs - Japanese Spiraea	32.47	
32 93 33 00-0600	EA 24" Balled and Burlapped, Spiraea japonica & cvs - Japanese Spiraea	37.46	
32 93 33 00-0601	EA 30" Balled and Burlapped, Spiraea japonica & cvs - Japanese Spiraea	42.46	
32 93 33 00-0602	EA 36" Balled and Burlapped, Spiraea japonica & cvs - Japanese Spiraea	49.33	
32 93 33 00-0603	EA 2 Gallon Spiraea nipponica & cvs - Nippon Spiraea	19.98	
32 93 33 00-0604	EA 5 Gallon Spiraea nipponica & cvs - Nippon Spiraea	29.97	
32 93 33 00-0605	EA 18" Balled and Burlapped, Spiraea nipponica & cvs - Nippon Spiraea	27.47	
32 93 33 00-0606	EA 24" Balled and Burlapped, Spiraea nipponica & cvs - Nippon Spiraea	32.47	
32 93 33 00-0607	EA 30" Balled and Burlapped, Spiraea nipponica & cvs - Nippon Spiraea	37.46	
32 93 33 00-0608	EA 36" Balled and Burlapped, Spiraea nipponica & cvs - Nippon Spiraea	42.46	
32 93 33 00-0609	EA 48" Balled and Burlapped, Spiraea nipponica & cvs - Nippon Spiraea	54.95	
32 93 33 00-0610	EA 1 Gallon Spiraea x bumalda & cvs - Bumalda Spiraea	12.88	
32 93 33 00-0611	EA 2 Gallon Spiraea x bumalda & cvs - Bumalda Spiraea	23.10	
32 93 33 00-0612	EA 4 Gallon Spiraea x bumalda & cvs - Bumalda Spiraea	29.97	
32 93 33 00-0613	EA 18" Balled and Burlapped, Spiraea x bumalda & cvs - Bumalda Spiraea	26.23	
32 93 33 00-0614	EA 24" Balled and Burlapped, Spiraea x bumalda & cvs - Bumalda Spiraea	31.85	
32 93 33 00-0615	EA 30" Balled and Burlapped, Spiraea x bumalda & cvs - Bumalda Spiraea	37.46	
32 93 33 00-0616	EA 36" Balled and Burlapped, Spiraea x bumalda & cvs - Bumalda Spiraea	42.46	
32 93 33 00-0617	EA 5 Gallon Spiraea x vanhouttei & cvs - Vanhoutte Spiraea	29.97	
32 93 33 00-0618	EA 18" Balled and Burlapped, Spiraea x vanhouttei & cvs - Vanhoutte Spiraea	29.97	
32 93 33 00-0619	EA 24" Balled and Burlapped, Spiraea x vanhouttei & cvs - Vanhoutte Spiraea	34.97	
32 93 33 00-0620	EA 30" Balled and Burlapped, Spiraea x vanhouttei & cvs - Vanhoutte Spiraea	47.46	
32 93 33 00-0621	EA 36" Balled and Burlapped, Spiraea x vanhouttei & cvs - Vanhoutte Spiraea	54.95	
32 93 33 00-0622	EA 42" Balled and Burlapped, Spiraea x vanhouttei & cvs - Vanhoutte Spiraea	64.94	
32 93 33 00-0623	EA 5 Gallon Staphylea trifolia - Bladdernut	42.16	
32 93 33 00-0624	EA 2 Gallon Stephanandra incisa & cvs - Cutleaf Stephanandra	29.97	
32 93 33 00-0625	EA 5 Gallon Stephanandra incisa & cvs - Cutleaf Stephanandra	32.47	
32 93 33 00-0626	EA 24" Balled and Burlapped, Stephanandra incisa & cvs - Cutleaf Stephanandra	37.46	
32 93 33 00-0627	EA 30" Balled and Burlapped, Stephanandra incisa & cvs - Cutleaf Stephanandra	44.96	
32 93 33 00-0628	EA 2 Gallon Symphoricarpos albus - Common Snowberry	31.22	
32 93 33 00-0629	EA 5 Gallon Symphoricarpos albus - Common Snowberry	33.09	
32 93 33 00-0630	EA 24" Balled and Burlapped, Syringa meyeri & cvs - Meyer Lilac	54.95	
32 93 33 00-0631	EA 30" Balled and Burlapped, Syringa meyeri & cvs - Meyer Lilac	68.69	
32 93 33 00-0632	EA 36" Balled and Burlapped, Syringa meyeri & cvs - Meyer Lilac	79.92	
32 93 33 00-0633	EA 42" Balled and Burlapped, Syringa meyeri & cvs - Meyer Lilac	92.41	
32 93 33 00-0634	EA 18" Balled and Burlapped, Syringa patula 'Miss Kim' - Miss Kim Lilac	54.95	
32 93 33 00-0635	EA 24" Balled and Burlapped, Syringa patula 'Miss Kim' - Miss Kim Lilac	59.94	
32 93 33 00-0636	EA 30" Balled and Burlapped, Syringa patula 'Miss Kim' - Miss Kim Lilac	68.69	
32 93 33 00-0637	EA 36" Balled and Burlapped, Syringa patula 'Miss Kim' - Miss Kim Lilac	79.92	
32 93 33 00-0638	EA 42" Balled and Burlapped, Syringa patula 'Miss Kim' - Miss Kim Lilac	92.41	
32 93 33 00-0639	EA 60" Balled and Burlapped, Syringa villosa & cvs - Late Lilac	43.71	
32 93 33 00-0640	EA 72" Balled and Burlapped, Syringa villosa & cvs - Late Lilac	47.46	
32 93 33 00-0641	EA 36" Balled and Burlapped, Syringa vulgaris & cvs - Common Lilac	37.46	
32 93 33 00-0642	EA 42" Balled and Burlapped, Syringa vulgaris & cvs - Common Lilac	42.46	
32 93 33 00-0643	EA 48" Balled and Burlapped, Syringa vulgaris & cvs - Common Lilac	47.46	
32 93 33 00-0644	EA 60" Balled and Burlapped, Syringa vulgaris & cvs - Common Lilac	54.95	
32 93 33 00-0645	EA 72" Balled and Burlapped, Syringa vulgaris & cvs - Common Lilac	67.44	
32 93 33 00-0646	EA 5 Gallon Syringa x chinensis & cvs - Chinese Lilac	31.22	
32 93 33 00-0647	EA 36" Balled and Burlapped, Syringa x hyacinthiflora & cvs - Hybrid Lilac	36.22	
32 93 33 00-0648	EA 48" Balled and Burlapped, Syringa x hyacinthiflora & cvs - Hybrid Lilac	47.46	
32 93 33 00-0649	EA 48" Balled and Burlapped, Taxus cuspidata capitata - Capitata Japanese Yew	198.56	
32 93 33 00-0650	EA 54" Balled and Burlapped, Taxus cuspidata capitata - Capitata Japanese Yew	222.29	
32 93 33 00-0651	EA 60" Balled and Burlapped, Taxus cuspidata capitata - Capitata Japanese Yew	244.77	
32 93 33 00-0652	EA 72" Balled and Burlapped, Taxus cuspidata capitata - Capitata Japanese Yew	294.72	
32 93 33 00-0653	EA 18" Balled and Burlapped, Taxus cuspidata cvs - Dwarf & Spreading Japanese Yew	52.45	
32 93 33 00-0654	EA 24" Balled and Burlapped, Taxus cuspidata cvs - Dwarf & Spreading Japanese Yew	68.69	
32 93 33 00-0655	EA 30" Balled and Burlapped, Taxus cuspidata cvs - Dwarf & Spreading Japanese Yew	79.92	
32 93 33 00-0656	EA 36" Balled and Burlapped, Taxus cuspidata cvs - Dwarf & Spreading Japanese Yew	87.42	
32 93 33 00-0657	EA 15" Balled and Burlapped, Taxus x media & cvs - Anglojap Yew	52.45	
32 93 33 00-0658	EA 18" Balled and Burlapped, Taxus x media & cvs - Anglojap Yew	68.69	
32 93 33 00-0659	EA 24" Balled and Burlapped, Taxus x media & cvs - Anglojap Yew	81.17	
32 93 33 00-0660	EA 30" Balled and Burlapped, Taxus x media & cvs - Anglojap Yew	96.16	
32 93 33 00-0661	EA 36" Balled and Burlapped, Taxus x media & cvs - Anglojap Yew	144.86	
32 93 33 00-0662	EA 36" Balled and Burlapped, Thuja occidentalis & cvs - Upright Arborvitae	79.92	
32 93 33 00-0663	EA 48" Balled and Burlapped, Thuja occidentalis & cvs - Upright Arborvitae	107.40	
32 93 33 00-0664	EA 60" Balled and Burlapped, Thuja occidentalis & cvs - Upright Arborvitae	162.35	
32 93 33 00-0665	EA 72" Balled and Burlapped, Thuja occidentalis & cvs - Upright Arborvitae	237.28	
32 93 33 00-0666	EA 84" Balled and Burlapped, Thuja occidentalis & cvs - Upright Arborvitae	272.24	
32 93 33 00-0667	EA 96" Balled and Burlapped, Thuja occidentalis & cvs - Upright Arborvitae	315.95	

32 Exterior Improvements**32 90 Planting****32 93 Plants**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 33 00-0668	EA	15" Balled and Burlapped, Thuja occidentalis cvs - Dwarf Arborvitae	34.97
32 93 33 00-0669	EA	18" Balled and Burlapped, Thuja occidentalis cvs - Dwarf Arborvitae	48.70
32 93 33 00-0670	EA	24" Balled and Burlapped, Thuja occidentalis cvs - Dwarf Arborvitae	68.69
32 93 33 00-0671	EA	3' To 4' Viburnum dilatatum - Linden Viburnum	59.70
32 93 33 00-0672	EA	4' To 5' Viburnum dilatatum - Linden Viburnum	91.10
32 93 33 00-0673	EA	5' To 6' Viburnum dilatatum - Linden Viburnum	119.54
32 93 33 00-0674	EA	1 Gallon Viburnum japonicum - Japanese Viburnum	7.24
32 93 33 00-0675	EA	3 Gallon Viburnum japonicum - Japanese Viburnum	19.86
32 93 33 00-0676	EA	5 Gallon Viburnum plicatum - Japanese Snowball	35.69
32 93 33 00-0677	EA	5' To 6' Viburnum plicatum - Japanese Snowball	133.76
32 93 33 00-0678	EA	2' To 3' Viburnum rhytidophyllum - Leatherleaf Viburnum	62.65
32 93 33 00-0679	EA	3' To 4' Viburnum rhytidophyllum - Leatherleaf Viburnum	73.92
32 93 33 00-0680	EA	4' To 5' Viburnum rhytidophyllum - Leatherleaf Viburnum	103.97
32 93 33 00-0681	EA	30" Balled and Burlapped, Viburnum burkwoodii & cvs - Burkwood Viburnum	68.69
32 93 33 00-0682	EA	36" Balled and Burlapped, Viburnum burkwoodii & cvs - Burkwood Viburnum	82.42
32 93 33 00-0683	EA	24" Balled and Burlapped, Viburnum carlesii & cvs - Korean Spice Viburnum	62.44
32 93 33 00-0684	EA	30" Balled and Burlapped, Viburnum carlesii & cvs - Korean Spice Viburnum	74.93
32 93 33 00-0685	EA	36" Balled and Burlapped, Viburnum carlesii & cvs - Korean Spice Viburnum	87.42
32 93 33 00-0686	EA	42" Balled and Burlapped, Viburnum carlesii & cvs - Korean Spice Viburnum	99.91
32 93 33 00-0687	EA	36" Balled and Burlapped, Viburnum dentatum & cvs - Arrowwood Viburnum	34.97
32 93 33 00-0688	EA	42" Balled and Burlapped, Viburnum dentatum & cvs - Arrowwood Viburnum	37.46
32 93 33 00-0689	EA	48" Balled and Burlapped, Viburnum dentatum & cvs - Arrowwood Viburnum	43.71
32 93 33 00-0690	EA	60" Balled and Burlapped, Viburnum dentatum & cvs - Arrowwood Viburnum	49.95
32 93 33 00-0691	EA	72" Balled and Burlapped, Viburnum dentatum & cvs - Arrowwood Viburnum	54.95
32 93 33 00-0692	EA	30" Balled and Burlapped, Viburnum lantana & cvs - Wayfaringtree Viburnum	33.72
32 93 33 00-0693	EA	36" Balled and Burlapped, Viburnum lantana & cvs - Wayfaringtree Viburnum	37.46
32 93 33 00-0694	EA	42" Balled and Burlapped, Viburnum lantana & cvs - Wayfaringtree Viburnum	47.46
32 93 33 00-0695	EA	48" Balled and Burlapped, Viburnum lantana & cvs - Wayfaringtree Viburnum	54.95
32 93 33 00-0696	EA	60" Balled and Burlapped, Viburnum lantana & cvs - Wayfaringtree Viburnum	74.93
32 93 33 00-0697	EA	72" Balled and Burlapped, Viburnum lantana & cvs - Wayfaringtree Viburnum	89.92
32 93 33 00-0698	EA	36" Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	37.46
32 93 33 00-0699	EA	48" Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	49.95
32 93 33 00-0700	EA	5' Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	62.44
32 93 33 00-0701	EA	6' Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	87.42
32 93 33 00-0702	EA	7' Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	124.88
32 93 33 00-0703	EA	8' Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	174.84
32 93 33 00-0704	EA	9' Balled and Burlapped, Viburnum lentago & cvs - Nannyberry Viburnum	224.79
32 93 33 00-0705	EA	30" Balled and Burlapped, Viburnum plicatum tomentosum & cvs - Doublefile Viburnum	44.96
32 93 33 00-0706	EA	36" Balled and Burlapped, Viburnum plicatum tomentosum & cvs - Doublefile Viburnum	49.95
32 93 33 00-0707	EA	36" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	89.92
32 93 33 00-0708	EA	48" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	137.37
32 93 33 00-0709	EA	60" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	174.84
32 93 33 00-0710	EA	72" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	212.30
32 93 33 00-0711	EA	84" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	262.25
32 93 33 00-0712	EA	96" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	312.21
32 93 33 00-0713	EA	108" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	374.65
32 93 33 00-0714	EA	120" Balled and Burlapped, Viburnum prunifolium & cvs - Blackhaw Viburnum	437.09
32 93 33 00-0715	EA	30" Balled and Burlapped, Viburnum sargentii & cvs - Sargent Viburnum	38.09
32 93 33 00-0716	EA	36" Balled and Burlapped, Viburnum sargentii & cvs - Sargent Viburnum	41.84
32 93 33 00-0717	EA	48" Balled and Burlapped, Viburnum sargentii & cvs - Sargent Viburnum	47.46
32 93 33 00-0718	EA	60" Balled and Burlapped, Viburnum sargentii & cvs - Sargent Viburnum	54.95
32 93 33 00-0719	EA	72" Balled and Burlapped, Viburnum sargentii & cvs - Sargent Viburnum	63.07
32 93 33 00-0720	EA	18" Balled and Burlapped, Viburnum trilobum & cvs - American Cranberry Viburnum	36.22
32 93 33 00-0721	EA	24" Balled and Burlapped, Viburnum trilobum & cvs - American Cranberry Viburnum	43.71
32 93 33 00-0722	EA	30" Balled and Burlapped, Viburnum trilobum & cvs - American Cranberry Viburnum	52.45
32 93 33 00-0723	EA	36" Balled and Burlapped, Viburnum trilobum & cvs - American Cranberry Viburnum	59.94
32 93 33 00-0724	EA	42" Balled and Burlapped, Viburnum trilobum & cvs - American Cranberry Viburnum	72.43
32 93 33 00-0725	EA	48" Balled and Burlapped, Viburnum trilobum & cvs - American Cranberry Viburnum	79.92
32 93 33 00-0726	EA	30" Balled and Burlapped, Viburnum x carlcephalum & cvs - Fragrant Viburnum	62.44
32 93 33 00-0727	EA	36" Balled and Burlapped, Viburnum x carlcephalum & cvs - Fragrant Viburnum	74.93
32 93 33 00-0728	EA	42" Balled and Burlapped, Viburnum x carlcephalum & cvs - Fragrant Viburnum	87.42
32 93 33 00-0729	EA	48" Balled and Burlapped, Viburnum x carlcephalum & cvs - Fragrant Viburnum	99.91
32 93 33 00-0730	EA	60" Balled and Burlapped, Viburnum x carlcephalum & cvs - Fragrant Viburnum	112.39
32 93 33 00-0731	EA	30" Balled and Burlapped, Viburnum x juddii & cvs - Judd Viburnum	79.92
32 93 33 00-0732	EA	36" Balled and Burlapped, Viburnum x juddii & cvs - Judd Viburnum	89.92
32 93 33 00-0733	EA	42" Balled and Burlapped, Viburnum x juddii & cvs - Judd Viburnum	102.40
32 93 33 00-0734	EA	48" Balled and Burlapped, Viburnum x juddii & cvs - Judd Viburnum	117.39
32 93 33 00-0735	EA	2' To 3' Viburnum opulus "Roseum" - Fragrant Snowball	73.92
32 93 33 00-0736	EA	3' To 4' Viburnum opulus "Roseum" - Fragrant Snowball	91.09
32 93 33 00-0737	EA	4' To 5' Viburnum opulus "Roseum" - Fragrant Snowball	133.76
32 93 33 00-0738	EA	5 Gallon Weigela florida & cvs - Old Fashioned Weigela	41.21
32 93 33 00-0739	EA	24" Balled and Burlapped, Weigela florida & cvs - Old Fashioned Weigela	37.46
32 93 33 00-0740	EA	30" Balled and Burlapped, Weigela florida & cvs - Old Fashioned Weigela	42.46
32 93 33 00-0741	EA	36" Balled and Burlapped, Weigela florida & cvs - Old Fashioned Weigela	47.46
32 93 33 00-0742	EA	42" Balled and Burlapped, Weigela florida & cvs - Old Fashioned Weigela	54.95
32 93 33 00-0743	EA	48" Balled and Burlapped, Weigela florida & cvs - Old Fashioned Weigela	62.44
32 93 33 00-0744	EA	1 Gallon Xylosma congestum - Shiny Xylosma	8.59
32 93 33 00-0745	EA	5 Gallon Xylosma congestum - Shiny Xylosma	24.28
32 93 33 00-0746	EA	15 Gallon Xylosma congestum - Shiny Xylosma	106.79
32 93 33 00-0747	EA	1 Gallon Yucca aloifolia - Spanish Bayonet	7.24
32 93 33 00-0748	EA	3 Gallon Yucca aloifolia - Spanish Bayonet	19.18

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 33 00-0749 EA 1 Gallon Yucca filamentosa - Adams Needle	10.06	
32 93 33 00-0750 EA 3 Gallon Yucca filamentosa - Adams Needle	19.59	
32 93 33 00-0751 EA 5 Gallon Yucca filamentosa - Adams Needle	30.99	
32 93 33 00-0752 EA 3' Juniperus chinensis - Columnar Chinese Juniper	73.24	
32 93 33 00-0753 EA 4' Juniperus chinensis - Columnar Chinese Juniper	100.53	
32 93 33 00-0754 EA 5' Juniperus chinensis - Columnar Chinese Juniper	157.98	
32 93 33 00-0755 EA 6' Juniperus chinensis - Columnar Chinese Juniper	183.83	
32 93 33 00-0756 EA 7' Juniperus chinensis - Columnar Chinese Juniper	241.27	
32 93 33 00-0757 EA 2 Gallon Chrysobalanus icaco - Cocoplum Red Tip	14.36	
32 93 33 00-0758 EA 3 Gallon Chrysobalanus icaco - Cocoplum Red Tip	20.11	
32 93 33 00-0759 EA 5 Gallon Chrysobalanus icaco - Cocoplum Red Tip	48.69	
32 93 33 00-0760 EA 2 Gallon Chrysobalanus icaco - Cocoplum Green Tip	14.36	
32 93 33 00-0761 EA 3 Gallon Chrysobalanus icaco - Cocoplum Green Tip	20.11	

32 93 43 Trees ^(32 93)

Note: (cvs = cultivar or cultivated varieties) materials only. See CSI section 32 93 83 00-0001 for installation and planting of trees.

32 93 43 00-0001

Deciduous Ornamental Trees ^(32 93 43)

Note: All trees listed by caliper of trunk or height of tree if field grown, dug with spade, balled and burlapped and delivered to site.

32 93 43 00-0002 EA 6' Clump Form Acer ginnala & cvs - Amur Maple	343.78
32 93 43 00-0003 EA 7' Clump Form Acer ginnala & cvs - Amur Maple	420.17
32 93 43 00-0004 EA 8' Clump Form Acer ginnala & cvs - Amur Maple	477.47
32 93 43 00-0005 EA 10' Clump Form Acer ginnala & cvs - Amur Maple	553.86
32 93 43 00-0006 EA 12' Clump Form Acer ginnala & cvs - Amur Maple	630.26
32 93 43 00-0007 EA 14' Clump Form Acer ginnala & cvs - Amur Maple	744.85
32 93 43 00-0008 EA 1-1/2" To 2" Caliper Acer griseum - Paperbark Maple	272.76
32 93 43 00-0009 EA 2" To 2-1/2" Caliper Acer griseum - Paperbark Maple	1,222.32
32 93 43 00-0010 EA 2-1/2" To 3" Caliper Acer griseum - Paperbark Maple	1,527.90
32 93 43 00-0011 EA 5' Clump Form Acer griseum - Paperbark Maple	305.58
32 93 43 00-0012 EA 1-1/2" Caliper Aesculus californica - California Buckeye	763.95
32 93 43 00-0013 EA 2" Caliper Aesculus californica - California Buckeye	993.13
32 93 43 00-0014 EA 2-1/2" Caliper Aesculus californica - California Buckeye	1,145.92
32 93 43 00-0015 EA 3" Caliper Aesculus californica - California Buckeye	1,298.71
32 93 43 00-0016 EA 3-1/2" Caliper Aesculus californica - California Buckeye	1,527.90
32 93 43 00-0017 EA 36" Balled and Burlapped, Amelanchier alnifolia & cvs - Saskatoon Serviceberry	99.91
32 93 43 00-0018 EA 48" Balled and Burlapped, Amelanchier alnifolia & cvs - Saskatoon Serviceberry	124.88
32 93 43 00-0019 EA 60" Balled and Burlapped, Amelanchier alnifolia & cvs - Saskatoon Serviceberry	154.85
32 93 43 00-0020 EA 60" Balled and Burlapped, Amelanchier arborea & cvs - Downy Serviceberry	124.88
32 93 43 00-0021 EA 72" Balled and Burlapped, Amelanchier arborea & cvs - Downy Serviceberry	149.86
32 93 43 00-0022 EA 7' Balled and Burlapped, Amelanchier arborea & cvs - Allegheny Serviceberry	174.84
32 93 43 00-0023 EA 8' Balled and Burlapped, Amelanchier arborea & cvs - Downy Serviceberry	199.81
32 93 43 00-0024 EA 5' Balled and Burlapped, Amelanchier canadensis & cvs - Shadblow Serviceberry	224.79
32 93 43 00-0025 EA 6' Balled and Burlapped, Amelanchier canadensis & cvs - Shadblow Serviceberry	249.77
32 93 43 00-0026 EA 7' Balled and Burlapped, Amelanchier canadensis & cvs - Shadblow Serviceberry	287.23
32 93 43 00-0027 EA 8' Balled and Burlapped, Amelanchier canadensis & cvs - Shadblow Serviceberry	324.69
32 93 43 00-0028 EA 9' Balled and Burlapped, Amelanchier canadensis & cvs - Shadblow Serviceberry	374.65
32 93 43 00-0029 EA 7' Balled and Burlapped, Amelanchier laevis & cvs - Allegheny Serviceberry	287.23
32 93 43 00-0030 EA 8' Balled and Burlapped, Amelanchier laevis & cvs - Allegheny Serviceberry	337.18
32 93 43 00-0031 EA 9' Balled and Burlapped, Amelanchier laevis & cvs - Allegheny Serviceberry	387.14
32 93 43 00-0032 EA 10' Balled and Burlapped, Amelanchier laevis & cvs - Allegheny Serviceberry	424.60
32 93 43 00-0033 EA 30" Balled and Burlapped, Amelanchier stolonifera & cvs - Running Serviceberry	99.91
32 93 43 00-0034 EA 48" Balled and Burlapped, Amelanchier stolonifera & cvs - Running Serviceberry	212.30
32 93 43 00-0035 EA 60" Balled and Burlapped, Amelanchier stolonifera & cvs - Running Serviceberry	274.74
32 93 43 00-0036 EA 2' To 4' Amelemchier - Juneberry	30.41
32 93 43 00-0037 EA 4' To 5' Amelemchier - Juneberry	31.90
32 93 43 00-0038 EA 5' To 6' Amelemchier - Juneberry	37.98
32 93 43 00-0039 EA 6' To 8' Amelemchier - Juneberry	45.32
32 93 43 00-0040 EA 15 Gallon Chilopsis linearis - Desert Willow	66.62
32 93 43 00-0041 EA 24" Box Chilopsis linearis - Desert Willow	214.55
32 93 43 00-0042 EA 36" Box Chilopsis linearis - Desert Willow	564.62
32 93 43 00-0043 EA 15 Gallon Chionanthus retusus - Chinese Fringe Tree	66.62
32 93 43 00-0044 EA 24" Box Chionanthus retusus - Chinese Fringe Tree	180.68
32 93 43 00-0045 EA 36" Box Chionanthus retusus - Chinese Fringe Tree	621.08
32 93 43 00-0046 EA 1 Gallon Handroanthus impetiginosus (Tabebuia avellanedae) - Pink Trumpet Tree	11.18
32 93 43 00-0047 EA 5 Gallon Handroanthus impetiginosus (Tabebuia avellanedae) - Pink Trumpet Tree	27.67
32 93 43 00-0048 EA 15 Gallon Handroanthus impetiginosus (Tabebuia avellanedae) - Pink Trumpet Tree	89.21
32 93 43 00-0049 EA 1 Gallon Jacaranda mimosifolia - Jacaranda	7.34
32 93 43 00-0050 EA 5 Gallon Jacaranda mimosifolia - Jacaranda	20.33
32 93 43 00-0051 EA 15 Gallon Jacaranda mimosifolia - Jacaranda	55.33
32 93 43 00-0052 EA 24" Box Jacaranda mimosifolia - Jacaranda	180.68
32 93 43 00-0053 EA 36" Box Jacaranda mimosifolia - Jacaranda	508.15
32 93 43 00-0054 EA 1 Gallon Koelreuteria bipinnata - Chinese Flame Tree	7.34
32 93 43 00-0055 EA 5 Gallon Koelreuteria bipinnata - Chinese Flame Tree	20.33
32 93 43 00-0056 EA 15 Gallon Koelreuteria bipinnata - Chinese Flame Tree	66.62
32 93 43 00-0057 EA 5 Gallon Liquidambar styraciflua 'Burgundy' - Burgundy Sweetgum	28.10
32 93 43 00-0058 EA 15 Gallon Liquidambar styraciflua 'Burgundy' - Burgundy Sweetgum	118.42
32 93 43 00-0059 EA 24" Box Liquidambar styraciflua 'Burgundy' - Burgundy Sweetgum	321.15
32 93 43 00-0060 EA 36" Box Liquidambar styraciflua 'Burgundy' - Burgundy Sweetgum	903.24
32 93 43 00-0061 EA 48" Box Liquidambar styraciflua 'Burgundy' - Burgundy Sweetgum	2,308.28

32 Exterior Improvements**32 90 Planting****32 93 Plants**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 43 00-0062	EA	5 Gallon Liquidambar styraciflua 'Festival' - Festival Sweetgum.....	28.10	
32 93 43 00-0063	EA	15 Gallon Liquidambar styraciflua 'Festival' - Festival Sweetgum.....	118.42	
32 93 43 00-0064	EA	24" Box Liquidambar styraciflua 'Festival' - Festival Sweetgum.....	321.15	
32 93 43 00-0065	EA	36" Box Liquidambar styraciflua 'Festival' - Festival Sweetgum.....	903.24	
32 93 43 00-0066	EA	48" Box Liquidambar styraciflua 'Festival' - Festival Sweetgum.....	2,308.28	
32 93 43 00-0067	EA	5 Gallon Liquidambar styraciflua 'Palo Alto' - Palo Alto Sweetgum.....	28.10	
32 93 43 00-0068	EA	15 Gallon Liquidambar styraciflua 'Palo Alto' - Palo Alto Sweetgum.....	118.42	
32 93 43 00-0069	EA	24" Box Liquidambar styraciflua 'Palo Alto' - Palo Alto Sweetgum.....	321.15	
32 93 43 00-0070	EA	36" Box Liquidambar styraciflua 'Palo Alto' - Palo Alto Sweetgum.....	903.24	
32 93 43 00-0071	EA	48" Box Liquidambar styraciflua 'Palo Alto' - Palo Alto Sweetgum.....	2,308.28	
32 93 43 00-0072	EA	15 Gallon Macadamia integrifolia - Smoothshell macadamia.....	169.38	
32 93 43 00-0073	EA	2' To 3' Magnolia Virginiana - Sweetbay Magnolia.....	72.39	
32 93 43 00-0074	EA	3' To 4' Magnolia Virginiana - Sweetbay Magnolia.....	108.58	
32 93 43 00-0075	EA	4' To 5' Magnolia Virginiana - Sweetbay Magnolia.....	135.73	
32 93 43 00-0076	EA	5' To 6' Magnolia Virginiana - Sweetbay Magnolia.....	169.05	
32 93 43 00-0077	EA	4' Clump Form Magnolia soulangiana & cvs - Saucer Magnolia.....	286.48	
32 93 43 00-0078	EA	5' Clump Form Magnolia soulangiana & cvs - Saucer Magnolia.....	381.97	
32 93 43 00-0079	EA	6' Clump Form Magnolia soulangiana & cvs - Saucer Magnolia.....	496.57	
32 93 43 00-0080	EA	7' Clump Form Magnolia soulangiana & cvs - Saucer Magnolia.....	553.86	
32 93 43 00-0081	EA	8' Clump Form Magnolia soulangiana & cvs - Saucer Magnolia.....	668.45	
32 93 43 00-0082	EA	9' Clump Form Magnolia soulangiana & cvs - Saucer Magnolia.....	744.85	
32 93 43 00-0083	EA	4' Clump Form Magnolia stellata, cvs & hybrids - Star Magnolia.....	286.48	
32 93 43 00-0084	EA	5' Clump Form Magnolia stellata, cvs & hybrids - Star Magnolia.....	381.97	
32 93 43 00-0085	EA	6' Clump Form Magnolia stellata, cvs & hybrids - Star Magnolia.....	496.57	
32 93 43 00-0086	EA	7' Clump Form Magnolia stellata, cvs & hybrids - Star Magnolia.....	553.86	
32 93 43 00-0087	EA	8' Clump Form Magnolia stellata, cvs & hybrids - Star Magnolia.....	668.45	
32 93 43 00-0088	EA	9' Clump Form Magnolia stellata, cvs & hybrids - Star Magnolia.....	744.85	
32 93 43 00-0089	EA	1 Gallon Melaleuca saligna (Callistemon salignus) - White Bottle Brush.....	6.49	
32 93 43 00-0090	EA	5 Gallon Melaleuca saligna (Callistemon salignus) - White Bottle Brush.....	31.05	
32 93 43 00-0091	EA	15 Gallon Melaleuca saligna (Callistemon salignus) - White Bottle Brush.....	53.64	
32 93 43 00-0092	EA	15 Gallon Melia azedarach - China Berry.....	64.35	
32 93 43 00-0093	EA	24" Box Melia azedarach - China Berry.....	212.28	
32 93 43 00-0094	EA	1 Gallon Pittosporum undulatum - Victorian Box.....	11.15	
32 93 43 00-0095	EA	5 Gallon Pittosporum undulatum - Victorian Box.....	24.01	
32 93 43 00-0096	EA	15 Gallon Pittosporum undulatum - Victorian Box.....	135.48	
32 93 43 00-0097	EA	24" Box Pittosporum undulatum - Victorian Box.....	325.85	
32 93 43 00-0098	EA	36" Box Pittosporum undulatum - Victorian Box.....	943.25	
32 93 43 00-0099	EA	48" Box Pittosporum undulatum - Victorian Box.....	2,143.75	
32 93 43 00-0100	EA	5 Gallon Platanus Racemosa - California Sycamore.....	20.33	
32 93 43 00-0101	EA	15 Gallon Platanus Racemosa - California Sycamore.....	55.33	
32 93 43 00-0102	EA	24" Box Platanus Racemosa - California Sycamore.....	180.68	
32 93 43 00-0103	EA	36" Box Platanus Racemosa - California Sycamore.....	508.15	
32 93 43 00-0104	EA	1 Gallon Platanus racemosa, Multi Trunk - Western Sycamore.....	6.52	
32 93 43 00-0105	EA	5 Gallon Platanus racemosa, Multi Trunk - Western Sycamore.....	27.59	
32 93 43 00-0106	EA	20 Gallon Prunus subhirtella - Flowering Cherry.....	376.75	
32 93 43 00-0107	EA	1-1/2" To 2" Caliper Prunus subhirtella - Flowering Cherry.....	389.45	
32 93 43 00-0108	EA	2" To 2-1/2" Caliper Prunus subhirtella - Flowering Cherry.....	486.76	
32 93 43 00-0109	EA	3-1/2" To 4" Caliper Prunus subhirtella - Flowering Cherry.....	1,015.82	
32 93 43 00-0110	EA	3" To 3-1/2" Caliper Prunus subhirtella - Flowering Cherry.....	782.92	
32 93 43 00-0111	EA	4" To 5" Caliper Prunus subhirtella - Flowering Cherry.....	1,523.74	
32 93 43 00-0112	EA	5 Gallon Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	97.31	
32 93 43 00-0113	EA	15 Gallon Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	266.55	
32 93 43 00-0114	EA	20 Gallon Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	347.14	
32 93 43 00-0115	EA	5' To 6' Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	110.00	
32 93 43 00-0116	EA	6' To 8' Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	211.55	
32 93 43 00-0117	EA	1-1/2" To 2" Caliper Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	389.45	
32 93 43 00-0118	EA	2" To 2-1/2" Caliper Prunus cerasifera x 'Thundercloud' - Thundercloud Purple Leaf Plum.....	465.60	
32 93 43 00-0119	EA	1-1/2" To 1-3/4" Caliper Prunus subhirtella - Weeping Cherry.....	304.83	
32 93 43 00-0120	EA	1-1/4" To 1-1/2" Caliper Prunus subhirtella - Weeping Cherry.....	253.86	
32 93 43 00-0121	EA	1-3/4" To 2" Caliper Prunus subhirtella - Weeping Cherry.....	372.32	
32 93 43 00-0122	EA	2" To 2-1/2" Caliper Prunus subhirtella - Weeping Cherry.....	444.45	
32 93 43 00-0123	EA	2-1/2" To 3" Caliper Prunus subhirtella - Weeping Cherry.....	571.38	
32 93 43 00-0124	EA	15 Gallon Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	294.15	
32 93 43 00-0125	EA	20 Gallon Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	367.69	
32 93 43 00-0126	EA	1-1/2" To 2" Caliper Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	382.39	
32 93 43 00-0127	EA	2" To 2-1/2" Caliper Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	455.93	
32 93 43 00-0128	EA	2-1/2" To 3" Caliper Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	617.71	
32 93 43 00-0129	EA	3" To 3-1/2" Caliper Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	808.91	
32 93 43 00-0130	EA	3-1/2" To 4" Caliper Pyrus Calleryana x 'Aristocrat' - Flowering Pear.....	1,029.52	
32 93 43 00-0131	EA	15 Gallon Pyrus Calleryana x "Bradford" - Flowering Pear.....	294.15	
32 93 43 00-0132	EA	20 Gallon Pyrus Calleryana x "Bradford" - Flowering Pear.....	367.69	
32 93 43 00-0133	EA	1-1/2" To 2" Caliper Pyrus Calleryana x "Bradford" - Flowering Pear.....	250.03	
32 93 43 00-0134	EA	2" To 2-1/2" Caliper Pyrus Calleryana x "Bradford" - Flowering Pear.....	382.39	
32 93 43 00-0135	EA	2-1/2" To 3" Caliper Pyrus Calleryana x "Bradford" - Flowering Pear.....	455.53	
32 93 43 00-0136	EA	3" To 3-1/2" Caliper Pyrus Calleryana x "Bradford" - Flowering Pear.....	617.71	
32 93 43 00-0137	EA	3-1/2" To 4" Caliper Pyrus Calleryana x "Bradford" - Flowering Pear.....	808.91	
32 93 43 00-0138	EA	5 Gallon Pyrus calleryana 'Chanticleer' - Chanticleer Flowering Pear.....	25.09	
32 93 43 00-0139	EA	15 Gallon Pyrus calleryana 'Chanticleer' - Chanticleer Flowering Pear.....	65.24	
32 93 43 00-0140	EA	24" Box Pyrus calleryana 'Chanticleer' - Chanticleer Flowering Pear.....	225.85	
32 93 43 00-0141	EA	36" Box Pyrus calleryana 'Chanticleer' - Chanticleer Flowering Pear.....	602.26	
32 93 43 00-0142	EA	1-1/2" Caliper Pyrus calleryana & cvs - Callery Pear.....	535.81	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 43 00-0143	EA			2" Caliper Pyrus calleryana & cvs - Callery Pear	669.76	
32 93 43 00-0144	EA			2-1/2" Caliper Pyrus calleryana & cvs - Callery Pear	830.50	
32 93 43 00-0145	EA			3" Caliper Pyrus calleryana & cvs - Callery Pear	937.67	
32 93 43 00-0146	EA			3-1/2" Caliper Pyrus calleryana & cvs - Callery Pear	1,044.83	
32 93 43 00-0147	EA			4" Caliper Pyrus calleryana & cvs - Callery Pear	1,339.52	
32 93 43 00-0148	EA			5 Gallon Quercus kelloggii - California Black Oak	50.82	
32 93 43 00-0149	EA			15 Gallon Quercus kelloggii - California Black Oak	90.34	
32 93 43 00-0150	EA			1 Gallon Quercus lobata - Valley Oak	10.15	
32 93 43 00-0151	EA			5 Gallon Quercus lobata - Valley Oak	30.48	
32 93 43 00-0152	EA			15 Gallon Quercus lobata - Valley Oak	91.46	
32 93 43 00-0153	EA			1 Gallon Ribes aureum - Golden Currant	5.70	
32 93 43 00-0154	EA			5 Gallon Ribes aureum - Golden Currant	16.30	
32 93 43 00-0155	EA			1 Gallon Ribes sanguineum - Red Flowering Currant	5.70	
32 93 43 00-0156	EA			5 Gallon Ribes sanguineum - Red Flowering Currant	16.30	
32 93 43 00-0157	EA			1 Gallon Ribes viburnifolium - Evergreen Currant	5.70	
32 93 43 00-0158	EA			5 Gallon Ribes viburnifolium - Evergreen Currant	16.30	
32 93 43 00-0159	EA			8' Cassia leptophlia - Gold Medallion Tree	391.22	
32 93 43 00-0160	EA			10' Cassia leptophlia - Gold Medallion Tree	496.55	
32 93 43 00-0161	EA			12' Cassia leptophlia - Gold Medallion Tree	601.88	
32 93 43 00-0162	EA			5 Gallon Celtis Sinensis - Chinese Hackberry	44.16	
32 93 43 00-0163	EA			15 Gallon Celtis Sinensis - Chinese Hackberry	116.42	
32 93 43 00-0164	EA			24" Box Celtis Sinensis - Chinese Hackberry	381.37	
32 93 43 00-0165	EA			36" Box Celtis Sinensis - Chinese Hackberry	1,114.00	
32 93 43 00-0166	EA			15 Gallon Cercis canadensis - American Redbud, Eastern Redbud	89.21	
32 93 43 00-0167	EA			24" Box Cercis canadensis - American Redbud, Eastern Redbud	214.55	
32 93 43 00-0168	EA			36" Box Cercis canadensis - American Redbud, Eastern Redbud	564.62	
32 93 43 00-0169	EA			1 Gallon Cercis occidentalis - Western Redbud	7.34	
32 93 43 00-0170	EA			5 Gallon Cercis occidentalis - Western Redbud	27.67	
32 93 43 00-0171	EA			15 Gallon Cercis occidentalis - Western Redbud	89.21	
32 93 43 00-0172	EA			24" Box Cercis occidentalis - Western Redbud	214.55	
32 93 43 00-0173	EA			36" Box Cercis occidentalis - Western Redbud	621.08	
32 93 43 00-0174	EA			1 Gallon Chitalpa tashkentensis - Chitalpa	5.08	
32 93 43 00-0175	EA			5 Gallon Chitalpa tashkentensis - Chitalpa	15.81	
32 93 43 00-0176	EA			15 Gallon Chitalpa tashkentensis - Chitalpa	55.33	
32 93 43 00-0177	EA			24" Box Chitalpa tashkentensis - Chitalpa	180.68	
32 93 43 00-0178	EA			36" Box Chitalpa tashkentensis - Chitalpa	508.15	
32 93 43 00-0179	EA			6' Magnolia grandiflora 'St. Mary's'	451.41	
32 93 43 00-0180	EA			8' Magnolia grandiflora 'St. Mary's'	797.49	
32 93 43 00-0181	EA			10' Magnolia grandiflora 'St. Mary's'	1,002.13	
32 93 43 00-0182	EA			12' Magnolia grandiflora 'St. Mary's'	1,203.76	
32 93 43 00-0183	EA			14' Magnolia grandiflora 'St. Mary's'	1,399.37	
32 93 43 00-0184	EA			16' Magnolia grandiflora 'St. Mary's'	1,655.17	
32 93 43 00-0185	EA			24" Box Magnolia grandiflora 'St. Mary's'	496.55	
32 93 43 00-0186	EA			6' Prunus cerasifera - Purple Leaf Plum	234.73	
32 93 43 00-0187	EA			8' Prunus cerasifera - Purple Leaf Plum	270.85	
32 93 43 00-0188	EA			10' Prunus cerasifera - Purple Leaf Plum	349.09	
32 93 43 00-0189	EA			24" Box Prunus cerasifera - Purple Leaf Plum	371.66	
32 93 43 00-0190	EA			30" Box Prunus cerasifera - Purple Leaf Plum	752.35	
32 93 43 00-0191	EA			36" Box Prunus cerasifera - Purple Leaf Plum	1,154.10	
32 93 43 00-0192	EA			6' Pittosporum phylliraeoides - Willow Pittosporum	490.53	
32 93 43 00-0193	EA			8' Pittosporum phylliraeoides - Willow Pittosporum	701.19	
32 93 43 00-0194	EA			10' Pittosporum phylliraeoides - Willow Pittosporum	839.62	
32 93 43 00-0195	EA			12' Pittosporum phylliraeoides - Willow Pittosporum	1,083.38	
32 93 43 00-0196	EA			6' Stenocarpus sinuatus - Firewheel Tree	722.26	
32 93 43 00-0197	EA			8' Stenocarpus sinuatus - Firewheel Tree	963.01	
32 93 43 00-0198	EA			10' Stenocarpus sinuatus - Firewheel Tree	1,203.76	
32 93 43 00-0199	EA			12' Stenocarpus sinuatus - Firewheel Tree	1,444.51	
32 93 43 00-0200	EA			24" Box Handroanthus impetiginosus (Tabebuia avellanedae) - Pink Trumpet Tree	325.85	
32 93 43 00-0201	EA			36" Box Handroanthus impetiginosus (Tabebuia avellanedae) - Pink Trumpet Tree	943.25	
32 93 43 00-0202	EA			1-1/2" Caliper Arbutus menziesii - Madrona	523.37	
32 93 43 00-0203	EA			2" Caliper Arbutus menziesii - Madrona	680.39	
32 93 43 00-0204	EA			2-1/2" Caliper Arbutus menziesii - Madrona	785.06	
32 93 43 00-0205	EA			3" Caliper Arbutus menziesii - Madrona	889.74	
32 93 43 00-0206	EA			3-1/2" Caliper Arbutus menziesii - Madrona	1,046.75	
32 93 43 00-0207	EA			1 Gallon Arbutus 'Marina' - Marina Strawberry Tree	7.34	
32 93 43 00-0208	EA			5 Gallon Arbutus 'Marina' - Marina Strawberry Tree	27.67	
32 93 43 00-0209	EA			15 Gallon Arbutus 'Marina' - Marina Strawberry Tree	89.21	
32 93 43 00-0210	EA			24" Box Arbutus 'Marina' - Marina Strawberry Tree	214.55	
32 93 43 00-0211	EA			36" Box Arbutus 'Marina' - Marina Strawberry Tree	690.08	
32 93 43 00-0212	EA			1 Gallon Arbutus unedo - Strawberry Tree	6.78	
32 93 43 00-0213	EA			5 Gallon Arbutus unedo - Strawberry Tree	20.33	
32 93 43 00-0214	EA			15 Gallon Arbutus unedo - Strawberry Tree	89.21	
32 93 43 00-0215	EA			24" Box Arbutus unedo - Strawberry Tree	214.55	
32 93 43 00-0216	EA			36" Box Arbutus unedo - Strawberry Tree	621.08	
32 93 43 00-0217	EA			1-1/2" Caliper Koelreuteria bipinnata - Chinese Flame Tree	361.13	
32 93 43 00-0218	EA			2" Caliper Koelreuteria bipinnata - Chinese Flame Tree	586.83	
32 93 43 00-0219	EA			2-1/2" Caliper Koelreuteria bipinnata - Chinese Flame Tree	722.26	
32 93 43 00-0220	EA			3" Caliper Koelreuteria bipinnata - Chinese Flame Tree	797.49	
32 93 43 00-0221	EA			24" Box Koelreuteria bipinnata - Chinese Flame Tree	352.10	
32 93 43 00-0222	EA			30" Box Koelreuteria bipinnata - Chinese Flame Tree	812.54	
32 93 43 00-0223	EA			36" Box Koelreuteria bipinnata - Chinese Flame Tree	1,271.47	

32 Exterior Improvements**32 90 Planting****32 93 Plants**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 43 00-0224	EA	1-1/2" Ciber Koelreuteria paniculata - Golden Rain Tree	328.02	
32 93 43 00-0225	EA	2" Ciber Koelreuteria paniculata - Golden Rain Tree	532.66	
32 93 43 00-0226	EA	2-1/2" Ciber Koelreuteria paniculata - Golden Rain Tree	653.04	
32 93 43 00-0227	EA	3" Ciber Koelreuteria paniculata - Golden Rain Tree	737.30	
32 93 43 00-0228	EA	6' Magnolia grandiflora - Southern Magnolia	222.70	
32 93 43 00-0229	EA	7' Magnolia grandiflora - Southern Magnolia	337.05	
32 93 43 00-0230	EA	8' Magnolia grandiflora - Southern Magnolia	472.48	
32 93 43 00-0231	EA	9' Magnolia grandiflora - Southern Magnolia	628.96	
32 93 43 00-0232	EA	10' Magnolia grandiflora - Southern Magnolia	956.99	
32 93 43 00-0233	EA	24" Box Magnolia grandiflora - Southern Magnolia	391.22	
32 93 43 00-0234	EA	1-1/2" Caliper Tipuana tipu - Tipu Tree	466.46	
32 93 43 00-0235	EA	2" Caliper Tipuana tipu - Tipu Tree	607.90	
32 93 43 00-0236	EA	2-1/2" Caliper Tipuana tipu - Tipu Tree	770.41	
32 93 43 00-0237	EA	3" Caliper Tipuana tipu - Tipu Tree	887.77	
32 93 43 00-0238	EA	3-1/2" Caliper Tipuana tipu - Tipu Tree	1,306.08	
32 93 43 00-0239	EA	4" Caliper Tipuana tipu - Tipu Tree	1,745.45	
32 93 43 00-0240	EA	1 Gallon Tipuana tipu - Tipu Tree	7.34	
32 93 43 00-0241	EA	5 Gallon Tipuana tipu - Tipu Tree	20.33	
32 93 43 00-0242	EA	15 Gallon Tipuana tipu - Tipu Tree	66.62	
32 93 43 00-0243	EA	24" Box Tipuana tipu - Tipu Tree	352.10	
32 93 43 00-0244	EA	6' Albizia julibrissin - Silk Tree	722.26	
32 93 43 00-0245	EA	8' Albizia julibrissin - Silk Tree	963.01	
32 93 43 00-0246	EA	10' Albizia julibrissin - Silk Tree	1,203.76	
32 93 43 00-0247	EA	12' Albizia julibrissin - Silk Tree	1,444.51	
32 93 43 00-0248	EA	6' Brachychiton acerifolius - Flame Tree	722.26	
32 93 43 00-0249	EA	8' Brachychiton acerifolius - Flame Tree	963.01	
32 93 43 00-0250	EA	10' Brachychiton acerifolius - Flame Tree	1,203.76	
32 93 43 00-0251	EA	12' Brachychiton acerifolius - Flame Tree	1,444.51	
32 93 43 00-0252	EA	1-1/2" Caliper Chilopsis linearis - Desert Willow	583.82	
32 93 43 00-0253	EA	2" Caliper Chilopsis linearis - Desert Willow	701.19	
32 93 43 00-0254	EA	2-1/2" Caliper Chilopsis linearis - Desert Willow	746.33	
32 93 43 00-0255	EA	3" Caliper Chilopsis linearis - Desert Willow	827.58	
32 93 43 00-0256	EA	5 Gallon Chionanthus retusus - Chinese Fringe Tree	30.09	
32 93 43 00-0257	EA	15 Gallon Chionanthus retusus - Chinese Fringe Tree	120.38	
32 93 43 00-0258	EA	24" Box Chionanthus retusus - Chinese Fringe Tree	601.88	
32 93 43 00-0259	EA	1 Gallon Callistemon salignus - White BottleBrush	3.95	
32 93 43 00-0260	EA	5 Gallon Callistemon salignus - White BottleBrush	11.29	
32 93 43 00-0261	EA	15 Gallon Callistemon salignus - White BottleBrush	44.04	
32 93 43 00-0262	EA	24" Box Callistemon salignus - White BottleBrush	180.68	
32 93 43 00-0263	EA	5 Gallon Calodendrum capense - Cape Chestnut	45.14	
32 93 43 00-0264	EA	15 Gallon Calodendrum capense - Cape Chestnut	180.56	
32 93 43 00-0265	EA	24" Box Calodendrum capense - Cape Chestnut	677.12	
32 93 43 00-0266	EA	6' Chionanthus virginicus - White Fringe Tree	361.13	
32 93 43 00-0267	EA	8' Chionanthus virginicus - White Fringe Tree	614.98	
32 93 43 00-0268	EA	10' Chionanthus virginicus - White Fringe Tree	856.58	
32 93 43 00-0269	EA	15 Gallon Geijera parvifolia - Australian Willow	263.56	
32 93 43 00-0270	EA	24" Box Geijera parvifolia - Australian Willow	542.50	
32 93 43 00-0271	EA	30" Box Geijera parvifolia - Australian Willow	1,010.32	
32 93 43 00-0272	EA	36" Box Geijera parvifolia - Australian Willow	1,449.59	
32 93 43 00-0273	EA	5 Gallon Gleditsia triacanthos 'Shademaster' - Shademaster Honey Locust	28.10	
32 93 43 00-0274	EA	15 Gallon Gleditsia triacanthos 'Shademaster' - Shademaster Honey Locust	98.35	
32 93 43 00-0275	EA	24" Box Gleditsia triacanthos 'Shademaster' - Shademaster Honey Locust	321.15	
32 93 43 00-0276	EA	36" Box Gleditsia triacanthos 'Shademaster' - Shademaster Honey Locust	853.06	
32 93 43 00-0277	EA	48" Box Gleditsia triacanthos 'Shademaster' - Shademaster Honey Locust	1,906.84	
32 93 43 00-0278	EA	5 Gallon Ginkgo biloba - Maidenhair Tree or Ginkgo	27.67	
32 93 43 00-0279	EA	15 Gallon Ginkgo biloba - Maidenhair Tree or Ginkgo	89.21	
32 93 43 00-0280	EA	24" Box Ginkgo biloba - Maidenhair Tree or Ginkgo	180.68	
32 93 43 00-0281	EA	36" Box Ginkgo biloba - Maidenhair Tree or Ginkgo	621.08	
32 93 43 00-0282	EA	1-1/2" Caliper Ginkgo Biloba - Maidenhair Tree	781.90	
32 93 43 00-0283	EA	2" Caliper Ginkgo Biloba - Maidenhair Tree	1,089.39	
32 93 43 00-0284	EA	2-1/2" Caliper Ginkgo Biloba - Maidenhair Tree	1,313.02	
32 93 43 00-0285	EA	3" Caliper Ginkgo Biloba - Maidenhair Tree	1,533.45	
32 93 43 00-0286	EA	3-1/2" Caliper Ginkgo Biloba - Maidenhair Tree	2,007.46	
32 93 43 00-0287	EA	4" Caliper Ginkgo Biloba - Maidenhair Tree	2,143.64	
32 93 43 00-0288	EA	4-1/2" Caliper Ginkgo Biloba - Maidenhair Tree	2,284.20	
32 93 43 00-0289	EA	24" Box Ginkgo Biloba - Maidenhair Tree	713.81	
32 93 43 00-0290	EA	15 Gallon Sapium sebiferum - Chinese Tallow Tree	263.56	
32 93 43 00-0291	EA	24" Box Sapium sebiferum - Chinese Tallow Tree	966.39	
32 93 43 00-0292	EA	4' To 5' Lagerstroemia indica - Crape Myrtle	281.13	
32 93 43 00-0293	EA	6' Lagerstroemia indica - Crape Myrtle	522.73	
32 93 43 00-0294	EA	8' Lagerstroemia indica - Crape Myrtle	540.30	
32 93 43 00-0295	EA	10' Lagerstroemia indica - Crape Myrtle	654.51	
32 93 43 00-0296	EA	24" Box Lagerstroemia indica - Crape Myrtle	513.95	

32 93 43 00-0297 Deciduous Shade Trees (32 93 43)

Note: All trees listed by caliper of trunk or height of tree if field grown, dug with spade, balled and burlapped and delivered to site.

32 93 43 00-0298	EA	3-1/2" To 4" Caliper Acer palmatum - Bloodgood Japanese Maple	233.37	
32 93 43 00-0299	EA	4" To 4-1/2" Caliper Acer palmatum - Bloodgood Japanese Maple	286.07	
32 93 43 00-0300	EA	4-1/2" To 5" Caliper Acer palmatum - Bloodgood Japanese Maple	372.65	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 43 00-0301 EA 5" To 6" Caliper Acer palmatum - Bloodgood Japanese Maple	483.06	
32 93 43 00-0302 EA 2' To 2-1/2' Acer palmatum - Japanese Maple	24.62	
32 93 43 00-0303 EA 4' To 5' Acer palmatum - Japanese Maple	51.69	
32 93 43 00-0304 EA 5' To 6' Acer palmatum - Japanese Maple	67.69	
32 93 43 00-0305 EA 6' To 7' Acer palmatum - Japanese Maple	123.07	
32 93 43 00-0306 EA 7' To 8' Acer palmatum - Japanese Maple	172.30	
32 93 43 00-0307 EA 8' To 10' Acer palmatum - Japanese Maple	221.53	
32 93 43 00-0308 EA 10' To 12' Acer palmatum - Japanese Maple	295.38	
32 93 43 00-0309 EA 2" Caliper Acer platanoides & cvs - Norway Maple	125.47	
32 93 43 00-0310 EA 2" Caliper Acer platanoides & cvs - Norway Maple	152.75	
32 93 43 00-0311 EA 3" Caliper Acer platanoides & cvs - Norway Maple	196.39	
32 93 43 00-0312 EA 3-1/2" Caliper Acer platanoides & cvs - Norway Maple	229.12	
32 93 43 00-0313 EA 4" Caliper Acer platanoides & cvs - Norway Maple	245.48	
32 93 43 00-0314 EA 4-1/2" Caliper Acer platanoides & cvs - Norway Maple	267.31	
32 93 43 00-0315 EA 5" Caliper Acer platanoides & cvs - Norway Maple	300.04	
32 93 43 00-0316 EA 2" Caliper Acer rubrum & cvs - Red Maple	120.01	
32 93 43 00-0317 EA 2-1/2" Caliper Acer rubrum & cvs - Red Maple	152.75	
32 93 43 00-0318 EA 3" Caliper Acer rubrum & cvs - Red Maple	196.39	
32 93 43 00-0319 EA 3-1/2" Caliper Acer rubrum & cvs - Red Maple	240.03	
32 93 43 00-0320 EA 4" Caliper Acer rubrum & cvs - Red Maple	272.76	
32 93 43 00-0321 EA 4-1/2" Caliper Acer rubrum & cvs - Red Maple	316.40	
32 93 43 00-0322 EA 5" Caliper Acer rubrum & cvs - Red Maple	354.59	
32 93 43 00-0323 EA 8' Clump Form Acer rubrum & cvs - Red Maple	147.29	
32 93 43 00-0324 EA 10' Clump Form Acer rubrum & cvs - Red Maple	196.39	
32 93 43 00-0325 EA 12' Clump Form Acer rubrum & cvs - Red Maple	229.12	
32 93 43 00-0326 EA 14' Clump Form Acer rubrum & cvs - Red Maple	261.85	
32 93 43 00-0327 EA 16' Clump Form Acer rubrum & cvs - Red Maple	294.58	
32 93 43 00-0328 EA 18' Clump Form Acer rubrum & cvs - Red Maple	327.31	
32 93 43 00-0329 EA 2" Caliper Aesculus hippocastanum & cvs - Common Horsechestnut	190.93	
32 93 43 00-0330 EA 2-1/2" Caliper Aesculus hippocastanum & cvs - Common Horsechestnut	212.75	
32 93 43 00-0331 EA 3" Caliper Aesculus hippocastanum & cvs - Common Horsechestnut	240.03	
32 93 43 00-0332 EA 3-1/2" Caliper Aesculus hippocastanum & cvs - Common Horsechestnut	272.76	
32 93 43 00-0333 EA 4" Caliper Aesculus hippocastanum & cvs - Common Horsechestnut	327.31	
32 93 43 00-0334 EA 2" Caliper Betula nigra - River Birch	136.38	
32 93 43 00-0335 EA 2-1/2" Caliper Betula nigra - River Birch	154.44	
32 93 43 00-0336 EA 3" Caliper Betula nigra - River Birch	174.57	
32 93 43 00-0337 EA 3-1/2" Caliper Betula nigra - River Birch	218.21	
32 93 43 00-0338 EA 4" Caliper Betula nigra - River Birch	245.48	
32 93 43 00-0339 EA 4-1/2" Caliper Betula nigra - River Birch	272.76	
32 93 43 00-0340 EA 5" Caliper Betula nigra - River Birch	300.04	
32 93 43 00-0341 EA 8' Clump Form Betula nigra - River Birch	125.47	
32 93 43 00-0342 EA 10' Clump Form Betula nigra - River Birch	141.84	
32 93 43 00-0343 EA 12' Clump Form Betula nigra - River Birch	163.66	
32 93 43 00-0344 EA 14' Clump Form Betula nigra - River Birch	190.93	
32 93 43 00-0345 EA 16' Clump Form Betula nigra - River Birch	218.21	
32 93 43 00-0346 EA 12' Clump Form Betula platyphylla japonica & cvs - Asian White Birch	163.66	
32 93 43 00-0347 EA 14' Clump Form Betula platyphylla japonica & cvs - Asian White Birch	196.39	
32 93 43 00-0348 EA 16' Clump Form Betula platyphylla japonica & cvs - Asian White Birch	229.12	
32 93 43 00-0349 EA 18' Clump Form Betula platyphylla japonica & cvs - Asian White Birch	272.76	
32 93 43 00-0350 EA 20' Clump Form Betula platyphylla japonica & cvs - Asian White Birch	283.67	
32 93 43 00-0351 EA 2" Caliper Carpinus betulus & cvs - European Hornbeam	218.21	
32 93 43 00-0352 EA 2-1/2" Caliper Carpinus betulus & cvs - European Hornbeam	245.48	
32 93 43 00-0353 EA 3" Caliper Carpinus betulus & cvs - European Hornbeam	283.67	
32 93 43 00-0354 EA 3-1/2" Caliper Carpinus betulus & cvs - European Hornbeam	343.68	
32 93 43 00-0355 EA 6' Clump Form Carpinus betulus & cvs - European Hornbeam	98.19	
32 93 43 00-0356 EA 7' Clump Form Carpinus betulus & cvs - European Hornbeam	136.38	
32 93 43 00-0357 EA 8' Clump Form Carpinus betulus & cvs - European Hornbeam	169.11	
32 93 43 00-0358 EA 2" Caliper Catalpa speciosa - Western Catalpa	120.01	
32 93 43 00-0359 EA 2-1/2" Caliper Catalpa speciosa - Western Catalpa	163.66	
32 93 43 00-0360 EA 3" Caliper Catalpa speciosa - Western Catalpa	212.75	
32 93 43 00-0361 EA 3-1/2" Caliper Catalpa speciosa - Western Catalpa	256.40	
32 93 43 00-0362 EA 4" Caliper Catalpa speciosa - Western Catalpa	294.58	
32 93 43 00-0363 EA 8' Clump Form Corylus cornuta californica - Western Filbert	152.75	
32 93 43 00-0364 EA 10' Clump Form Corylus cornuta californica - Western Filbert	185.48	
32 93 43 00-0365 EA 12' Clump Form Corylus cornuta californica - Western Filbert	218.21	
32 93 43 00-0366 EA 1-1/2" Caliper Diospyros - Persimmon	98.19	
32 93 43 00-0367 EA 2" Caliper Diospyros - Persimmon	120.01	
32 93 43 00-0368 EA 2-1/2" Caliper Diospyros - Persimmon	152.75	
32 93 43 00-0369 EA 3" Caliper Diospyros - Persimmon	190.93	
32 93 43 00-0370 EA 3-1/2" Caliper Diospyros - Persimmon	229.12	
32 93 43 00-0371 EA 2" Caliper Fagus sylvatica & cvs - European Beech	245.48	
32 93 43 00-0372 EA 2-1/2" Caliper Fagus sylvatica & cvs - European Beech	294.58	
32 93 43 00-0373 EA 3" Caliper Fagus sylvatica & cvs - European Beech	354.59	
32 93 43 00-0374 EA 3-1/2" Caliper Fagus sylvatica & cvs - European Beech	392.78	
32 93 43 00-0375 EA 4" Caliper Fagus sylvatica & cvs - European Beech	463.69	
32 93 43 00-0376 EA 4-1/2" Caliper Fagus sylvatica & cvs - European Beech	600.07	
32 93 43 00-0377 EA 5" Caliper Fagus sylvatica & cvs - European Beech	709.18	
32 93 43 00-0378 EA 2" Caliper Fraxinus americana & cvs - White Ash	136.38	
32 93 43 00-0379 EA 2-1/2" Caliper Fraxinus americana & cvs - White Ash	163.66	
32 93 43 00-0380 EA 3" Caliper Fraxinus americana & cvs - White Ash	207.30	
32 93 43 00-0381 EA 3-1/2" Caliper Fraxinus americana & cvs - White Ash	250.94	

32 Exterior Improvements**32 90 Planting****32 93 Plants**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 43 00-0382	EA	4" Caliper Fraxinus americana & cvs - White Ash.....	294.58	
32 93 43 00-0383	EA	4-1/2" Caliper Fraxinus americana & cvs - White Ash	327.31	
32 93 43 00-0384	EA	5" Caliper Fraxinus americana & cvs - White Ash.....	381.87	
32 93 43 00-0385	EA	1-1/2" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	190.93	
32 93 43 00-0386	EA	2" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	212.75	
32 93 43 00-0387	EA	2-1/2" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	240.03	
32 93 43 00-0388	EA	3" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	267.31	
32 93 43 00-0389	EA	3-1/2" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	300.04	
32 93 43 00-0390	EA	4" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	327.31	
32 93 43 00-0391	EA	4-1/2" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	490.97	
32 93 43 00-0392	EA	5" Caliper Ginkgo biloba & cvs - Ginkgo (Maidenhair Tree).....	545.52	
32 93 43 00-0393	EA	2" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust.....	130.93	
32 93 43 00-0394	EA	2-1/2" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust	163.66	
32 93 43 00-0395	EA	3" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust	196.39	
32 93 43 00-0396	EA	3-1/2" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust	229.12	
32 93 43 00-0397	EA	4" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust	261.85	
32 93 43 00-0398	EA	4-1/2" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust	294.58	
32 93 43 00-0399	EA	5" Caliper Gleditsia triacanthos inermis & cvs - Thornless Common Honeylocust	349.13	
32 93 43 00-0400	EA	10' - 12' Bursera Simaruba - Gumbo Limbo.....	69.01	
32 93 43 00-0401	EA	12' - 14' Bursera Simaruba - Gumbo Limbo.....	81.56	
32 93 43 00-0402	EA	14' - 16' Bursera Simaruba - Gumbo Limbo.....	112.92	
32 93 43 00-0403	EA	17' - 18' Bursera Simaruba - Gumbo Limbo.....	146.80	
32 93 43 00-0404	EA	19' - 20' Bursera Simaruba - Gumbo Limbo.....	163.11	
32 93 43 00-0405	EA	21' - 22' Bursera Simaruba - Gumbo Limbo.....	193.22	
32 93 43 00-0406	EA	1-1/2" Caliper Juglans californica - California Walnut	130.93	
32 93 43 00-0407	EA	2" Caliper Juglans californica - California Walnut	152.75	
32 93 43 00-0408	EA	2-1/2" Caliper Juglans californica - California Walnut	190.93	
32 93 43 00-0409	EA	3" Caliper Juglans californica - California Walnut	240.03	
32 93 43 00-0410	EA	3-1/2" Caliper Juglans californica - California Walnut	294.58	
32 93 43 00-0411	EA	4" Caliper Juglans californica - California Walnut	354.59	
32 93 43 00-0412	EA	4-1/2" Caliper Juglans californica - California Walnut	409.14	
32 93 43 00-0413	EA	5" Caliper Juglans californica - California Walnut	463.69	
32 93 43 00-0414	EA	5 Gallon Koelreuteria Paniculata - Goldenrain Tree	14.77	
32 93 43 00-0415	EA	15 Gallon Koelreuteria Paniculata - Goldenrain Tree	36.92	
32 93 43 00-0416	EA	20 Gallon Koelreuteria Paniculata - Goldenrain Tree	73.84	
32 93 43 00-0417	EA	55 Gallon Koelreuteria Paniculata - Goldenrain Tree	96.00	
32 93 43 00-0418	EA	1-1/2" To 2" Caliper Koelreuteria Paniculata - Goldenrain Tree.....	70.15	
32 93 43 00-0419	EA	2" To 2-1/2" Caliper Koelreuteria Paniculata - Goldenrain Tree.....	84.92	
32 93 43 00-0420	EA	2-1/2" To 3" Caliper Koelreuteria Paniculata - Goldenrain Tree.....	118.15	
32 93 43 00-0421	EA	1-1/2" Caliper Liquidambar styraciflua - American Sweetgum	174.57	
32 93 43 00-0422	EA	2" Caliper Liquidambar styraciflua - American Sweetgum	218.21	
32 93 43 00-0423	EA	2-1/2" Caliper Liquidambar styraciflua - American Sweetgum	272.76	
32 93 43 00-0424	EA	3" Caliper Liquidambar styraciflua - American Sweetgum	327.31	
32 93 43 00-0425	EA	3-1/2" Caliper Liquidambar styraciflua - American Sweetgum	381.87	
32 93 43 00-0426	EA	1-1/2" Caliper Liriodendron tulipifera - Tulip Tree	174.57	
32 93 43 00-0427	EA	2" Caliper Liriodendron tulipifera - Tulip Tree.....	240.03	
32 93 43 00-0428	EA	2-1/2" Caliper Liriodendron tulipifera - Tulip Tree	283.67	
32 93 43 00-0429	EA	3" Caliper Liriodendron tulipifera - Tulip Tree.....	327.31	
32 93 43 00-0430	EA	3-1/2" Caliper Liriodendron tulipifera - Tulip Tree	370.95	
32 93 43 00-0431	EA	8' Clump Form Liriodendron tulipifera - Tulip Tree.....	130.93	
32 93 43 00-0432	EA	10' Clump Form Liriodendron tulipifera - Tulip Tree	234.57	
32 93 43 00-0433	EA	12' Clump Form Liriodendron tulipifera - Tulip Tree	283.67	
32 93 43 00-0434	EA	1-1/2" Caliper Nyssa sylvatica - Black Tupelo Sour Gum	174.57	
32 93 43 00-0435	EA	2" Caliper Nyssa sylvatica - Black Tupelo Sour Gum	218.21	
32 93 43 00-0436	EA	2-1/2" Caliper Nyssa sylvatica - Black Tupelo Sour Gum	272.76	
32 93 43 00-0437	EA	3" Caliper Nyssa sylvatica - Black Tupelo Sour Gum	327.31	
32 93 43 00-0438	EA	3-1/2" Caliper Nyssa sylvatica - Black Tupelo Sour Gum	381.87	
32 93 43 00-0439	EA	4' Clump Form Nyssa sylvatica - Black Tupelo Sour Gum.....	76.37	
32 93 43 00-0440	EA	5' Clump Form Nyssa sylvatica - Black Tupelo Sour Gum	87.28	
32 93 43 00-0441	EA	6' Clump Form Nyssa sylvatica - Black Tupelo Sour Gum	103.65	
32 93 43 00-0442	EA	7' Clump Form Nyssa sylvatica - Black Tupelo Sour Gum.....	130.93	
32 93 43 00-0443	EA	8' Clump Form Nyssa sylvatica - Black Tupelo Sour Gum	163.66	
32 93 43 00-0444	EA	30" Box Platanus Occidentalis - Buttonwood Sycamore.....	237.00	
32 93 43 00-0445	EA	36" Box Platanus Occidentalis - Buttonwood Sycamore.....	344.73	
32 93 43 00-0446	EA	42" Box Platanus occidentalis - Buttonwood Sycamore.....	512.81	
32 93 43 00-0447	EA	1-1/2" To 2" Caliper Platanus occidentalis - Buttonwood Sycamore.....	79.30	
32 93 43 00-0448	EA	2" To 2-1/2" Caliper Platanus occidentalis - Buttonwood Sycamore	94.81	
32 93 43 00-0449	EA	2-1/2" To 3" Caliper Platanus occidentalis - Buttonwood Sycamore	129.27	
32 93 43 00-0450	EA	3" To 3-1/2" Caliper Platanus occidentalis - Buttonwood Sycamore.....	156.88	
32 93 43 00-0451	EA	8' To 10' Platanus occidentalis - Green Or Silver Buttonwood.....	65.24	
32 93 43 00-0452	EA	10' To 12' Platanus occidentalis - Green Or Silver Buttonwood	81.56	
32 93 43 00-0453	EA	12' To 14' Platanus occidentalis - Green Or Silver Buttonwood	144.29	
32 93 43 00-0454	EA	16' To 18' Platanus occidentalis - Green Or Silver Buttonwood	207.03	
32 93 43 00-0455	EA	2" Caliper Platanus x acerifolia & cvs - London Planetree	130.93	
32 93 43 00-0456	EA	2-1/2" Caliper Platanus x acerifolia & cvs - London Planetree	158.20	
32 93 43 00-0457	EA	3" Caliper Platanus x acerifolia & cvs - London Planetree	190.93	
32 93 43 00-0458	EA	3-1/2" Caliper Platanus x acerifolia & cvs - London Planetree	229.12	
32 93 43 00-0459	EA	4" Caliper Platanus x acerifolia & cvs - London Planetree	272.76	
32 93 43 00-0460	EA	2" Caliper Populus alba & cvs - White Poplar	130.93	
32 93 43 00-0461	EA	2-1/2" Caliper Populus alba & cvs - White Poplar.....	152.75	
32 93 43 00-0462	EA	3" Caliper Populus alba & cvs - White Poplar	174.57	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 43 00-0463 EA 3-1/2" Caliper Populus alba & cvs - White Poplar	207.30	
32 93 43 00-0464 EA 4" Caliper Populus alba & cvs - White Poplar	229.12	
32 93 43 00-0465 EA 4-1/2" Caliper Populus alba & cvs - White Poplar	261.85	
32 93 43 00-0466 EA 2" Caliper Populus deltoides & cvs - Eastern Cottonwood	120.01	
32 93 43 00-0467 EA 2-1/2" Caliper Populus deltoides & cvs - Eastern Cottonwood	158.20	
32 93 43 00-0468 EA 3" Caliper Populus deltoides & cvs - Eastern Cottonwood	190.93	
32 93 43 00-0469 EA 3-1/2" Caliper Populus deltoides & cvs - Eastern Cottonwood	229.12	
32 93 43 00-0470 EA 4" Caliper Populus deltoides & cvs - Eastern Cottonwood	272.76	
32 93 43 00-0471 EA 1 Gallon Quercus agrifolia - Coast Live Oak	11.18	
32 93 43 00-0472 EA 5 Gallon Quercus agrifolia - Coast Live Oak	27.67	
32 93 43 00-0473 EA 15 Gallon Quercus agrifolia - Coast Live Oak	89.21	
32 93 43 00-0474 EA 24" Box Quercus agrifolia - Coast Live Oak	271.02	
32 93 43 00-0475 EA 2" Caliper Quercus palustris - Pin Oak	120.01	
32 93 43 00-0476 EA 2-1/2" Caliper Quercus palustris - Pin Oak	163.66	
32 93 43 00-0477 EA 3" Caliper Quercus palustris - Pin Oak	212.75	
32 93 43 00-0478 EA 3-1/2" Caliper Quercus palustris - Pin Oak	245.48	
32 93 43 00-0479 EA 4" Caliper Quercus palustris - Pin Oak	283.67	
32 93 43 00-0480 EA 4-1/2" Caliper Quercus palustris - Pin Oak	321.86	
32 93 43 00-0481 EA 5" Caliper Quercus palustris - Pin Oak	354.59	
32 93 43 00-0482 EA 2" Caliper Quercus shumardii - Shumard Oak	185.48	
32 93 43 00-0483 EA 2-1/2" Caliper Quercus shumardii - Shumard Oak	234.57	
32 93 43 00-0484 EA 3" Caliper Quercus shumardii - Shumard Oak	272.76	
32 93 43 00-0485 EA 3-1/2" Caliper Quercus shumardii - Shumard Oak	327.31	
32 93 43 00-0486 EA 4" Caliper Quercus shumardii - Shumard Oak	381.87	
32 93 43 00-0487 EA 4-1/2" Caliper Quercus shumardii - Shumard Oak	436.42	
32 93 43 00-0488 EA 5" Caliper Quercus shumardii - Shumard Oak	490.97	
32 93 43 00-0489 EA 24" Box Salix babylonica - Weeping Willow	137.89	
32 93 43 00-0490 EA 36" Box Salix babylonica - Weeping Willow	344.73	
32 93 43 00-0491 EA 1-1/2" To 2" Caliper Salix babylonica - Weeping Willow	79.30	
32 93 43 00-0492 EA 2" To 2-1/2" Caliper Salix babylonica - Weeping Willow	94.81	
32 93 43 00-0493 EA 2-1/2" To 3" Caliper Salix babylonica - Weeping Willow	103.42	
32 93 43 00-0494 EA 2' Thuja occidentalis - American Arborvitae	18.70	
32 93 43 00-0495 EA 2-1/2' Thuja occidentalis - American Arborvitae	20.20	
32 93 43 00-0496 EA 3' Thuja occidentalis - American Arborvitae	28.86	
32 93 43 00-0497 EA 4' Thuja occidentalis - American Arborvitae	39.65	
32 93 43 00-0498 EA 5' Thuja occidentalis - American Arborvitae	55.21	
32 93 43 00-0499 EA 6' Thuja occidentalis - American Arborvitae	76.54	
32 93 43 00-0500 EA 7' Thuja occidentalis - American Arborvitae	92.85	
32 93 43 00-0501 EA 8' Thuja occidentalis - American Arborvitae	130.49	
32 93 43 00-0502 EA 2" Caliper Tilia cordata & cvs - Littleleaf Linden	137.20	
32 93 43 00-0503 EA 2-1/2" Caliper Tilia cordata & cvs - Littleleaf Linden	165.73	
32 93 43 00-0504 EA 3" Caliper Tilia cordata & cvs - Littleleaf Linden	190.93	
32 93 43 00-0505 EA 3-1/2" Caliper Tilia cordata & cvs - Littleleaf Linden	234.57	
32 93 43 00-0506 EA 4" Caliper Tilia cordata & cvs - Littleleaf Linden	267.31	
32 93 43 00-0507 EA 4-1/2" Caliper Tilia cordata & cvs - Littleleaf Linden	300.04	
32 93 43 00-0508 EA 5" Caliper Tilia cordata & cvs - Littleleaf Linden	332.77	
32 93 43 00-0509 EA 2" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	152.75	
32 93 43 00-0510 EA 2-1/2" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	174.57	
32 93 43 00-0511 EA 3" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	190.93	
32 93 43 00-0512 EA 3-1/2" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	207.30	
32 93 43 00-0513 EA 4" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	229.12	
32 93 43 00-0514 EA 4-1/2" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	272.76	
32 93 43 00-0515 EA 5" Caliper Ulmus x 'Homestead' - Homestead Hybrid Elm	321.86	
32 93 43 00-0516 EA 2" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	174.57	
32 93 43 00-0517 EA 2-1/2" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	190.93	
32 93 43 00-0518 EA 3" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	207.30	
32 93 43 00-0519 EA 3-1/2" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	229.12	
32 93 43 00-0520 EA 4" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	272.76	
32 93 43 00-0521 EA 4-1/2" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	321.86	
32 93 43 00-0522 EA 5" Caliper Ulmus x 'Pioneer' - Pioneer Hybrid Elm	370.95	
32 93 43 00-0523 EA 2" Caliper Ulmus x 'Regal' - Regal Hybrid Elm	174.57	
32 93 43 00-0524 EA 2-1/2" Mary-Louise Parker Ulmus x 'Regal' - Regal Hybrid Elm	190.93	
32 93 43 00-0525 EA 3" Caliper Ulmus x 'Regal' - Regal Hybrid Elm	207.30	
32 93 43 00-0526 EA 3-1/2" Caliper Ulmus x 'Regal' - Regal Hybrid Elm	229.12	
32 93 43 00-0527 EA 4" Caliper Ulmus x 'Regal' - Regal Hybrid Elm	272.76	
32 93 43 00-0528 EA 4-1/2" Caliper Ulmus x 'Regal' - Regal Hybrid Elm	321.86	
32 93 43 00-0529 EA 5" Caliper Ulmus x 'Regal' - Regal Hybrid Elm	370.95	
32 93 43 00-0530 EA 1-1/2" To 2" Caliper Platanus acerifolia "Bloodgold" - London Plane	408.52	
32 93 43 00-0531 EA 2" To 2-1/2" Caliper Platanus acerifolia "Bloodgold" - London Plane	729.19	
32 93 43 00-0532 EA 2-1/2" To 3" Caliper Platanus acerifolia "Bloodgold" - London Plane	1,067.43	
32 93 43 00-0533 EA 3" To 3-1/2" Caliper Platanus acerifolia "Bloodgold" - London Plane	1,326.60	
32 93 43 00-0534 EA 3-1/2" To 4" Caliper Platanus acerifolia "Bloodgold" - London Plane	1,717.55	
32 93 43 00-0535 EA 4" To 5" Caliper Platanus acerifolia "Bloodgold" - London Plane	1,954.75	
32 93 43 00-0536 EA 24" Box Platanus acerifolia "Bloodgold" - London Plane	513.95	
32 93 43 00-0537 EA 1-1/2" Caliper Quercus suber - Cork Oak	614.98	
32 93 43 00-0538 EA 2" Caliper Quercus suber - Cork Oak	852.18	
32 93 43 00-0539 EA 2-1/2" Caliper Quercus suber - Cork Oak	1,089.39	
32 93 43 00-0540 EA 3" Caliper Quercus suber - Cork Oak	1,361.74	
32 93 43 00-0541 EA 3-1/2" Caliper Quercus suber - Cork Oak	2,042.61	
32 93 43 00-0542 EA 4" Caliper Quercus suber - Cork Oak	2,635.62	
32 93 43 00-0543 EA 4-1/2" Caliper Quercus suber - Cork Oak	3,426.31	

32 Exterior Improvements**32 90 Planting****32 93 Plants**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 43 00-0544	EA	1-1/2" Caliper Quercus ilex - Holly Oak	680.87
32 93 43 00-0545	EA	2" Caliper Quercus ilex - Holly Oak	918.07
32 93 43 00-0546	EA	2-1/2" Caliper Quercus ilex - Holly Oak	1,124.53
32 93 43 00-0547	EA	3" Caliper Quercus ilex - Holly Oak	1,361.74
32 93 43 00-0548	EA	3-1/2" Caliper Quercus ilex - Holly Oak	2,042.61
32 93 43 00-0549	EA	4" Caliper Quercus ilex - Holly Oak	2,635.62

32 93 43 00-0550**Evergreen Trees** (32 93 43)

Note: All trees listed by caliper of trunk or height of tree if field grown, dug with spade, balled and burlapped and delivered to site.

32 93 43 00-0551	EA	5 Gallon Araucaria heterophylla (Araucaria excelsa) - Norfolk Island Pine, Star Pine	30.87
32 93 43 00-0552	EA	15 Gallon Araucaria heterophylla (Araucaria excelsa) - Norfolk Island Pine, Star Pine	214.38
32 93 43 00-0553	EA	24" Box Araucaria heterophylla (Araucaria excelsa) - Norfolk Island Pine, Star Pine	428.75
32 93 43 00-0554	EA	36" Box Araucaria heterophylla (Araucaria excelsa) - Norfolk Island Pine, Star Pine	1,029.00
32 93 43 00-0555	EA	1 Gallon Bauhinia variegata (Bauhinia purpurea) - Purple Orchid Tree	7.34
32 93 43 00-0556	EA	5 Gallon Bauhinia variegata (Bauhinia purpurea) - Purple Orchid Tree	27.67
32 93 43 00-0557	EA	15 Gallon Bauhinia variegata (Bauhinia purpurea) - Purple Orchid Tree	89.21
32 93 43 00-0558	EA	24" Box Bauhinia variegata (Bauhinia purpurea) - Purple Orchid Tree	214.55
32 93 43 00-0559	EA	5 Gallon Bauhinia blakeana - Hong Kong Orchid Tree	20.33
32 93 43 00-0560	EA	15 Gallon Bauhinia blakeana - Hong Kong Orchid Tree	89.21
32 93 43 00-0561	EA	24" Box Bauhinia blakeana - Hong Kong Orchid Tree	214.55
32 93 43 00-0562	EA	1 Gallon Callistemon viminalis - Weeping Bottlebrush	7.72
32 93 43 00-0563	EA	5 Gallon Callistemon viminalis - Weeping Bottlebrush	24.01
32 93 43 00-0564	EA	15 Gallon Callistemon viminalis - Weeping Bottlebrush	84.04
32 93 43 00-0565	EA	24" Box Callistemon viminalis - Weeping Bottlebrush	274.40
32 93 43 00-0566	EA	36" Box Callistemon viminalis - Weeping Bottlebrush	771.75
32 93 43 00-0567	EA	2' To 3' Cedrus atlantica - Blue Atlas Cedar	24.03
32 93 43 00-0568	EA	3' To 4' Cedrus atlantica - Blue Atlas Cedar	38.62
32 93 43 00-0569	EA	4' To 5' Cedrus atlantica - Blue Atlas Cedar	57.38
32 93 43 00-0570	EA	5' To 6' Cedrus atlantica - Blue Atlas Cedar	77.20
32 93 43 00-0571	EA	7' To 8' Cedrus atlantica - Blue Atlas Cedar	109.60
32 93 43 00-0572	EA	6' Cedrus decurrens - Incese Cedar	111.99
32 93 43 00-0573	EA	8' Cedrus decurrens - Incese Cedar	231.65
32 93 43 00-0574	EA	10' Cedrus decurrens - Incese Cedar	306.82
32 93 43 00-0575	EA	12' Cedrus decurrens - Incese Cedar	406.54
32 93 43 00-0576	EA	1 Gallon Cedrus deodara - Deodar Cedar	16.98
32 93 43 00-0577	EA	5 Gallon Cedrus deodara - Deodar Cedar	30.87
32 93 43 00-0578	EA	15 Gallon Cedrus deodara - Deodar Cedar	135.48
32 93 43 00-0579	EA	24" Box Cedrus deodara - Deodar Cedar	428.75
32 93 43 00-0580	EA	36" Box Cedrus deodara - Deodar Cedar	943.25
32 93 43 00-0581	EA	6' To 8' Cedrus deodara - Indian Cedar	99.17
32 93 43 00-0582	EA	8' To 10' Cedrus deodara - Indian Cedar	114.82
32 93 43 00-0583	EA	10' To 12' Cedrus deodara - Indian Cedar	156.55
32 93 43 00-0584	EA	12' To 14' Cedrus deodara - Indian Cedar	203.50
32 93 43 00-0585	EA	14' To 16' Cedrus deodara - Indian Cedar	260.93
32 93 43 00-0586	EA	5 Gallon Cedrus libani - Cedar of Lebanon	30.87
32 93 43 00-0587	EA	15 Gallon Cedrus libani - Cedar of Lebanon	135.48
32 93 43 00-0588	EA	24" Box Cedrus libani - Cedar of Lebanon	325.85
32 93 43 00-0589	EA	36" Box Cedrus libani - Cedar of Lebanon	943.25
32 93 43 00-0590	EA	15 Gallon Celtis australis - European Hackberry	111.48
32 93 43 00-0591	EA	24" Box Celtis australis - European Hackberry	385.88
32 93 43 00-0592	EA	15" To 18" Chamaecyparis obtusa - Compact Hinoki Cypress	31.00
32 93 43 00-0593	EA	18" To 24" Chamaecyparis obtusa - Compact Hinoki Cypress	46.50
32 93 43 00-0594	EA	2' To 3' Chamaecyparis obtusa - Compact Hinoki Cypress	72.33
32 93 43 00-0595	EA	3' To 4' Chamaecyparis obtusa - Compact Hinoki Cypress	124.00
32 93 43 00-0596	EA	1 Gallon Cinnamomum camphora - Camphor Tree	11.15
32 93 43 00-0597	EA	5 Gallon Cinnamomum camphora - Camphor Tree	30.87
32 93 43 00-0598	EA	15 Gallon Cinnamomum camphora - Camphor Tree	84.04
32 93 43 00-0599	EA	24" Box Cinnamomum camphora - Camphor Tree	274.40
32 93 43 00-0600	EA	36" Box Cinnamomum camphora - Camphor Tree	771.75
32 93 43 00-0601	EA	5 Gallon Cupressocyparis leylandii - Leyland Cypress	17.05
32 93 43 00-0602	EA	15 Gallon Cupressocyparis leylandii - Leyland Cypress	68.22
32 93 43 00-0603	EA	4' To 5' Cupressocyparis leylandii - Leyland Cypress	29.85
32 93 43 00-0604	EA	5' To 6' Cupressocyparis leylandii - Leyland Cypress	38.37
32 93 43 00-0605	EA	6' To 7' Cupressocyparis leylandii - Leyland Cypress	59.69
32 93 43 00-0606	EA	24" Box Cupressocyparis leylandii - Leyland Cypress	144.96
32 93 43 00-0607	EA	1 Gallon Cupressus macrocarpa - Monterey Cypress	3.11
32 93 43 00-0608	EA	5 Gallon Cupressus macrocarpa - Monterey Cypress	14.00
32 93 43 00-0609	EA	15 Gallon Cupressus macrocarpa - Monterey Cypress	46.65
32 93 43 00-0610	EA	5 Gallon Cupressus sempervirens - Italian Cypress	16.05
32 93 43 00-0611	EA	15 Gallon Cupressus sempervirens - Italian Cypress	44.14
32 93 43 00-0612	EA	1 Gallon Eriobotrya deflexa - Bronze Loquat	11.15
32 93 43 00-0613	EA	5 Gallon Eriobotrya deflexa - Bronze Loquat	30.87
32 93 43 00-0614	EA	15 Gallon Eriobotrya deflexa - Bronze Loquat	135.48
32 93 43 00-0615	EA	24" Box Eriobotrya deflexa - Bronze Loquat	325.85
32 93 43 00-0616	EA	36" Box Eriobotrya deflexa - Bronze Loquat	943.25
32 93 43 00-0617	EA	1 Gallon Heteromeles arbutifolia - Toyon	11.15
32 93 43 00-0618	EA	5 Gallon Heteromeles arbutifolia - Toyon	30.87
32 93 43 00-0619	EA	15 Gallon Heteromeles arbutifolia - Toyon	102.88
32 93 43 00-0620	EA	24" Box Heteromeles arbutifolia - Toyon	325.85

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 43 00-0621	EA			1 Gallon Juniperus horizontalis "Bar Harbor" - Bar Harbor Juniper	4.72	
32 93 43 00-0622	EA			2 Gallon Juniperus horizontalis "Bar Harbor" - Bar Harbor Juniper	9.23	
32 93 43 00-0623	EA			3 Gallon Juniperus horizontalis "Bar Harbor" - Bar Harbor Juniper	11.44	
32 93 43 00-0624	EA			5 Gallon Juniperus horizontalis "Bar Harbor" - Bar Harbor Juniper	13.44	
32 93 43 00-0625	EA			1 Gallon Juniperus - Blue Sargent Juniper	4.72	
32 93 43 00-0626	EA			2 Gallon Juniperus - Blue Sargent Juniper	9.23	
32 93 43 00-0627	EA			3 Gallon Juniperus - Blue Sargent Juniper	11.44	
32 93 43 00-0628	EA			5 Gallon Juniperus - Blue Sargent Juniper	13.44	
32 93 43 00-0629	EA			5 Gallon Juniperus - Compact Pfitzer Juniper	13.44	
32 93 43 00-0630	EA			15" To 18" Juniperus - Compact Pfitzer Juniper	14.55	
32 93 43 00-0631	EA			18" To 24" Juniperus - Compact Pfitzer Juniper	17.56	
32 93 43 00-0632	EA			2' To 2 1/2' Juniperus - Compact Pfitzer Juniper	26.08	
32 93 43 00-0633	EA			2-1/2' To 3' Juniperus - Compact Pfitzer Juniper	30.20	
32 93 43 00-0634	EA			5' To 6' Juniperus - Fairview Juniper	44.98	
32 93 43 00-0635	EA			1 Gallon Juniperus - Hollywood Juniper	6.02	
32 93 43 00-0636	EA			5 Gallon Juniperus - Hollywood Juniper	16.75	
32 93 43 00-0637	EA			15 Gallon Juniperus - Hollywood Juniper	71.03	
32 93 43 00-0638	EA			4' To 5' Juniperus - Hollywood Juniper	46.95	
32 93 43 00-0639	EA			5' To 6' Juniperus - Hollywood Juniper	60.49	
32 93 43 00-0640	EA			1 Gallon Juniperus - Parson's Juniper	4.72	
32 93 43 00-0641	EA			2 Gallon Juniperus - Parson's Juniper	9.33	
32 93 43 00-0642	EA			3 Gallon Juniperus - Parson's Juniper	11.54	
32 93 43 00-0643	EA			5 Gallon Juniperus - Parson's Juniper	13.64	
32 93 43 00-0644	EA			5 Gallon Juniperus - Skyrocket Juniper	16.85	
32 93 43 00-0645	EA			15 Gallon Juniperus - Skyrocket Juniper	71.73	
32 93 43 00-0646	EA			2' To 3' Juniperus - Skyrocket Juniper	25.28	
32 93 43 00-0647	EA			3' To 4' Juniperus - Skyrocket Juniper	35.81	
32 93 43 00-0648	EA			4' To 5' Juniperus - Skyrocket Juniper	47.45	
32 93 43 00-0649	EA			5' To 6' Juniperus - Skyrocket Juniper	61.20	
32 93 43 00-0650	EA			6' To 8' Juniperus - Skyrocket Juniper	79.05	
32 93 43 00-0651	EA			1 Gallon Juniperus horizontalis "Wiltonii" - Blue Rug Juniper	4.72	
32 93 43 00-0652	EA			2 Gallon Juniperus horizontalis "Wiltonii" - Blue Rug Juniper	9.28	
32 93 43 00-0653	EA			3 Gallon Juniperus horizontalis "Wiltonii" - Blue Rug Juniper	11.39	
32 93 43 00-0654	EA			5 Gallon Juniperus horizontalis "Wiltonii" - Blue Rug Juniper	13.49	
32 93 43 00-0655	EA			1 Gallon Juniperus horizontalis "Plumosa" - Compact Andorra Juniper	4.72	
32 93 43 00-0656	EA			2 Gallon Juniperus horizontalis "Plumosa" - Compact Andorra Juniper	9.28	
32 93 43 00-0657	EA			3 Gallon Juniperus horizontalis "Plumosa" - Compact Andorra Juniper	11.39	
32 93 43 00-0658	EA			5 Gallon Juniperus horizontalis "Plumosa" - Compact Andorra Juniper	13.49	
32 93 43 00-0659	EA			4' Metrosideros excelsus - New Zealand Christmas Tree	95.11	
32 93 43 00-0660	EA			5' Metrosideros excelsus - New Zealand Christmas Tree	128.86	
32 93 43 00-0661	EA			6' Metrosideros excelsus - New Zealand Christmas Tree	219.38	
32 93 43 00-0662	EA			8' Metrosideros excelsus - New Zealand Christmas Tree	271.54	
32 93 43 00-0663	EA			24" Box Metrosideros excelsus - New Zealand Christmas Tree	180.68	
32 93 43 00-0664	EA			1 Gallon Photinia fraseri - Fraser's Photinia	7.72	
32 93 43 00-0665	EA			5 Gallon Photinia fraseri - Fraser's Photinia	66.88	
32 93 43 00-0666	EA			15 Gallon Photinia fraseri - Fraser's Photinia	101.18	
32 93 43 00-0667	EA			24" Box Photinia fraseri - Fraser's Photinia	325.85	
32 93 43 00-0668	EA			1 Gallon Melaleuca citrina (Callistemon citrinus) - Lemon Bottlebrush	6.00	
32 93 43 00-0669	EA			5 Gallon Melaleuca citrina (Callistemon citrinus) - Lemon Bottlebrush	17.15	
32 93 43 00-0670	EA			15 Gallon Melaleuca citrina (Callistemon citrinus) - Lemon Bottlebrush	66.88	
32 93 43 00-0671	EA			24" Box Melaleuca citrina (Callistemon citrinus) - Lemon Bottlebrush	274.40	
32 93 43 00-0672	EA			36" Box Melaleuca citrina (Callistemon citrinus) - Lemon Bottlebrush	771.75	
32 93 43 00-0673	EA			1 Gallon Melaleuca viminalis (Callistemon viminalis) - Weeping Bottle Brush	7.72	
32 93 43 00-0674	EA			5 Gallon Melaleuca viminalis (Callistemon viminalis) - Weeping Bottle Brush	24.01	
32 93 43 00-0675	EA			15 Gallon Melaleuca viminalis (Callistemon viminalis) - Weeping Bottle Brush	84.04	
32 93 43 00-0676	EA			24" Box Melaleuca viminalis (Callistemon viminalis) - Weeping Bottle Brush	274.40	
32 93 43 00-0677	EA			36" Box Melaleuca viminalis (Callistemon viminalis) - Weeping Bottle Brush	771.75	
32 93 43 00-0678	EA			1 Gallon Metrosideros excelsa - New Zealand Christmas Tree	7.34	
32 93 43 00-0679	EA			5 Gallon Metrosideros excelsa - New Zealand Christmas Tree	27.67	
32 93 43 00-0680	EA			15 Gallon Metrosideros excelsa - New Zealand Christmas Tree	89.21	
32 93 43 00-0681	EA			24" Box Olea europaea 'Swan Hill' - Swan Hill Olive	428.75	
32 93 43 00-0682	EA			36" Box Olea europaea 'Swan Hill' - Swan Hill Olive	1,029.00	
32 93 43 00-0683	EA			3' Pinus sylvestris - Scotch Pine	43.82	
32 93 43 00-0684	EA			4' Pinus sylvestris - Scotch Pine	60.83	
32 93 43 00-0685	EA			5' Pinus sylvestris - Scotch Pine	85.38	
32 93 43 00-0686	EA			6' Pinus sylvestris - Scotch Pine	118.46	
32 93 43 00-0687	EA			7' Pinus sylvestris - Scotch Pine	145.14	
32 93 43 00-0688	EA			8' Pinus sylvestris - Scotch Pine	204.90	
32 93 43 00-0689	EA			9' Pinus sylvestris - Scotch Pine	260.13	
32 93 43 00-0690	EA			10' Pinus sylvestris - Scotch Pine	300.15	
32 93 43 00-0691	EA			12' Pinus sylvestris - Scotch Pine	353.51	
32 93 43 00-0692	EA			14' Pinus sylvestris - Scotch Pine	400.20	
32 93 43 00-0693	EA			16' Pinus sylvestris - Scotch Pine	466.90	
32 93 43 00-0694	EA			1 Gallon Pinus thunbergiana - Japanese Black Pine	4.72	
32 93 43 00-0695	EA			5 Gallon Pinus thunbergiana - Japanese Black Pine	16.75	
32 93 43 00-0696	EA			15 Gallon Pinus thunbergiana - Japanese Black Pine	54.27	
32 93 43 00-0697	EA			2' To 3' Pinus thunbergiana - Japanese Black Pine	22.97	
32 93 43 00-0698	EA			3' To 4' Pinus thunbergiana - Japanese Black Pine	29.19	
32 93 43 00-0699	EA			4' To 5' Pinus thunbergiana - Japanese Black Pine	43.84	
32 93 43 00-0700	EA			5' To 6' Pinus thunbergiana - Japanese Black Pine	85.57	
32 93 43 00-0701	EA			6' To 7' Pinus Thunbergiana - Japanese Black Pine	96.01	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 43 00-0702	EA	7' To 8' Pinus thunbergiana - Japanese Black Pine	119.98	
32 93 43 00-0703	EA	6' Pinus flexilis & cvs - Limber Pine	166.75	
32 93 43 00-0704	EA	7' Pinus flexilis & cvs - Limber Pine	193.43	
32 93 43 00-0705	EA	8' Pinus flexilis & cvs - Limber Pine	240.12	
32 93 43 00-0706	EA	9' Pinus flexilis & cvs - Limber Pine	293.48	
32 93 43 00-0707	EA	10' Pinus flexilis & cvs - Limber Pine	333.50	
32 93 43 00-0708	EA	1 Gallon Pinus mugo - Mugho Pine	6.22	
32 93 43 00-0709	EA	2 Gallon Pinus mugo - Mugho Pine	13.14	
32 93 43 00-0710	EA	3 Gallon Pinus mugo - Mugho Pine	16.45	
32 93 43 00-0711	EA	5 Gallon Pinus mugo - Mugho Pine	20.87	
32 93 43 00-0712	EA	12" To 15" Spread Pinus mugo - Mugho Pine	16.15	
32 93 43 00-0713	EA	15" To 18" Spread Pinus mugo - Mugho Pine	19.26	
32 93 43 00-0714	EA	18" To 24" Spread Pinus mugo - Mugho Pine	26.08	
32 93 43 00-0715	EA	2' To 2-1/2' Spread Pinus mugo - Mugho Pine	36.52	
32 93 43 00-0716	EA	2-1/2' To 3' Spread Pinus mugo - Mugho Pine	46.95	
32 93 43 00-0717	EA	3' To 3-1/2' Spread Pinus mugo - Mugho Pine	58.49	
32 93 43 00-0718	EA	3-1/2' To 4' Spread Pinus mugo - Mugho Pine	71.03	
32 93 43 00-0719	EA	6' Pinus nigra - Austrian Pine	166.75	
32 93 43 00-0720	EA	7' Pinus nigra - Austrian Pine	200.10	
32 93 43 00-0721	EA	8' Pinus nigra - Austrian Pine	260.13	
32 93 43 00-0722	EA	9' Pinus nigra - Austrian Pine	300.15	
32 93 43 00-0723	EA	10' Pinus nigra - Austrian Pine	353.51	
32 93 43 00-0724	EA	12' Pinus nigra - Austrian Pine	400.20	
32 93 43 00-0725	EA	14' Pinus nigra - Austrian Pine	446.89	
32 93 43 00-0726	EA	16' Pinus nigra - Austrian Pine	506.92	
32 93 43 00-0727	EA	1 Gallon Podocarpus - Chinese Podocarpus	3.11	
32 93 43 00-0728	EA	3 Gallon Podocarpus - Chinese Podocarpus	7.22	
32 93 43 00-0729	EA	7 Gallon Podocarpus - Chinese Podocarpus	20.87	
32 93 43 00-0730	EA	15 Gallon Podocarpus - Chinese Podocarpus	33.91	
32 93 43 00-0731	EA	4' To 5' Podocarpus - Chinese Podocarpus	52.17	
32 93 43 00-0732	EA	5' To 6' Sequoia sempervirens - Dawn Redwood	65.21	
32 93 43 00-0733	EA	6' To 8' Sequoia sempervirens - Dawn Redwood	88.03	
32 93 43 00-0734	EA	8' To 10' Sequoia sempervirens - Dawn Redwood	107.60	
32 93 43 00-0735	EA	3' To 4' Thuja occidentalis 'Wareana' - Siberian Arborvitae	12.57	
32 93 43 00-0736	EA	3' To 4' Thuja occidentalis 'Woodwardii' - Woodward Arborvitae	23.54	
32 93 43 00-0737	EA	6' Pinus canariensis - Canary Island Pine	368.18	
32 93 43 00-0738	EA	8' Pinus canariensis - Canary Island Pine	490.91	
32 93 43 00-0739	EA	10' Pinus canariensis - Canary Island Pine	613.64	
32 93 43 00-0740	EA	12' Pinus canariensis - Canary Island Pine	736.37	
32 93 43 00-0741	EA	1 Gallon Pinus canariensis - Canary Island Pine	11.15	
32 93 43 00-0742	EA	5 Gallon Pinus canariensis - Canary Island Pine	30.87	
32 93 43 00-0743	EA	15 Gallon Pinus canariensis - Canary Island Pine	101.18	
32 93 43 00-0744	EA	24" Box Pinus canariensis - Canary Island Pine	378.92	
32 93 43 00-0745	EA	1 Gallon Pinus eldarica - Eldarica Pine, Afghan Pine, Mondell Pine	7.72	
32 93 43 00-0746	EA	5 Gallon Pinus eldarica - Eldarica Pine, Afghan Pine, Mondell Pine	24.01	
32 93 43 00-0747	EA	15 Gallon Pinus eldarica - Eldarica Pine, Afghan Pine, Mondell Pine	84.04	
32 93 43 00-0748	EA	24" Box Pinus eldarica - Eldarica Pine, Afghan Pine, Mondell Pine	274.40	
32 93 43 00-0749	EA	36" Box Pinus eldarica - Eldarica Pine, Afghan Pine, Mondell Pine	771.75	
32 93 43 00-0750	EA	1 Gallon Pinus halepensis - Aleppo Pine	7.72	
32 93 43 00-0751	EA	5 Gallon Pinus halepensis - Aleppo Pine	24.01	
32 93 43 00-0752	EA	15 Gallon Pinus halepensis - Aleppo Pine	84.04	
32 93 43 00-0753	EA	24" Box Pinus halepensis - Aleppo Pine	274.40	
32 93 43 00-0754	EA	36" Box Pinus halepensis - Aleppo Pine	771.75	
32 93 43 00-0755	EA	1 Gallon Pinus muricata - Bishop Pine	17.13	
32 93 43 00-0756	EA	5 Gallon Pinus muricata - Bishop Pine	51.43	
32 93 43 00-0757	EA	15 Gallon Pinus patula - Jelecote Pine, Mexican Weeping Pine	111.48	
32 93 43 00-0758	EA	24" Box Pinus patula - Jelecote Pine, Mexican Weeping Pine	385.88	
32 93 43 00-0759	EA	6' Pinus pinea - Italian Stone Pine	368.18	
32 93 43 00-0760	EA	8' Pinus pinea - Italian Stone Pine	490.91	
32 93 43 00-0761	EA	10' Pinus pinea - Italian Stone Pine	613.64	
32 93 43 00-0762	EA	12' Pinus pinea - Italian Stone Pine	736.37	
32 93 43 00-0763	EA	1 Gallon Pinus pinea - Italian Stone Pine	12.96	
32 93 43 00-0764	EA	5 Gallon Pinus pinea - Italian Stone Pine	35.90	
32 93 43 00-0765	EA	15 Gallon Pinus pinea - Italian Stone Pine	117.67	
32 93 43 00-0766	EA	24" Box Pinus pinea - Italian Stone Pine	319.09	
32 93 43 00-0767	EA	36" Box Pinus pinea - Italian Stone Pine	897.45	
32 93 43 00-0768	EA	1 Gallon Rhus lancea - African Sumac	11.15	
32 93 43 00-0769	EA	5 Gallon Rhus lancea - African Sumac	30.87	
32 93 43 00-0770	EA	15 Gallon Rhus lancea - African Sumac	84.04	
32 93 43 00-0771	EA	1 Gallon Pinus torreyana - Torrey Pine	16.98	
32 93 43 00-0772	EA	5 Gallon Pinus torreyana - Torrey Pine	42.02	
32 93 43 00-0773	EA	15 Gallon Pinus torreyana - Torrey Pine	135.48	
32 93 43 00-0774	EA	24" Box Pinus torreyana - Torrey Pine	325.85	
32 93 43 00-0775	EA	36" Box Pinus torreyana - Torrey Pine	943.25	
32 93 43 00-0776	EA	6' Pittosporum undulatum - Victorian Box	202.50	
32 93 43 00-0777	EA	8' Pittosporum undulatum - Victorian Box	320.63	
32 93 43 00-0778	EA	10' Pittosporum undulatum - Victorian Box	421.88	
32 93 43 00-0779	EA	6' Afrocarpus falcatus (Podocarpus gracilior) - African Fern Pine	383.52	
32 93 43 00-0780	EA	8' Afrocarpus falcatus (Podocarpus gracilior) - African Fern Pine	506.25	
32 93 43 00-0781	EA	10' Afrocarpus falcatus (Podocarpus gracilior) - African Fern Pine	644.32	
32 93 43 00-0782	EA	12' Afrocarpus falcatus (Podocarpus gracilior) - African Fern Pine	767.05	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 43 00-0783 EA 24" Box Afrocarpus falcatus (Podocarpus gracilior) - African Fern Pine.....	179.49	
32 93 43 00-0784 EA 1 Gallon Laurus nobilis - Sweet Bay.....	7.72	
32 93 43 00-0785 EA 5 Gallon Laurus nobilis - Sweet Bay.....	24.01	
32 93 43 00-0786 EA 15 Gallon Laurus nobilis - Sweet Bay.....	84.04	
32 93 43 00-0787 EA 24" Box Laurus nobilis - Sweet Bay.....	274.40	
32 93 43 00-0788 EA 36" Box Laurus nobilis - Sweet Bay.....	943.25	
32 93 43 00-0789 EA 5 Gallon Lophostemon confertus (Tristania conferta) - Brisbane Box.....	24.01	
32 93 43 00-0790 EA 15 Gallon Lophostemon confertus (Tristania conferta) - Brisbane Box.....	84.04	
32 93 43 00-0791 EA 24" Box Lophostemon confertus (Tristania conferta) - Brisbane Box.....	274.40	
32 93 43 00-0792 EA 36" Box Lophostemon confertus (Tristania conferta) - Brisbane Box.....	771.75	
32 93 43 00-0793 EA 1 Gallon Lyonothamnus floribundus - Catalina Ironwood.....	16.98	
32 93 43 00-0794 EA 5 Gallon Lyonothamnus floribundus - Catalina Ironwood.....	42.02	
32 93 43 00-0795 EA 15 Gallon Lyonothamnus floribundus - Catalina Ironwood.....	214.38	
32 93 43 00-0796 EA 24" Box Lyonothamnus floribundus - Catalina Ironwood.....	428.75	
32 93 43 00-0797 EA 1 Gallon Lyonothamnus floribundus ssp. asplenifolius - Catalina Ironwood.....	17.13	
32 93 43 00-0798 EA 5 Gallon Lyonothamnus floribundus ssp. asplenifolius - Catalina Ironwood.....	51.43	
32 93 43 00-0799 EA 6' Melaleuca linariifolia - Flaxleaf Paperbark.....	322.16	
32 93 43 00-0800 EA 8' Melaleuca linariifolia - Flaxleaf Paperbark.....	429.55	
32 93 43 00-0801 EA 10' Melaleuca linariifolia - Flaxleaf Paperbark.....	536.94	
32 93 43 00-0802 EA 12' Melaleuca linariifolia - Flaxleaf Paperbark.....	644.32	
32 93 43 00-0803 EA 1 Gallon Melaleuca linariifolia - Flaxleaf Paperbark.....	8.97	
32 93 43 00-0804 EA 5 Gallon Melaleuca linariifolia - Flaxleaf Paperbark.....	27.92	
32 93 43 00-0805 EA 15 Gallon Melaleuca linariifolia - Flaxleaf Paperbark.....	97.72	
32 93 43 00-0806 EA 24" Box Melaleuca linariifolia - Flaxleaf Paperbark.....	319.09	
32 93 43 00-0807 EA 6' Melaleuca quinquenervia - Cajeput Tree.....	322.16	
32 93 43 00-0808 EA 8' Melaleuca quinquenervia - Cajeput Tree.....	429.55	
32 93 43 00-0809 EA 10' Melaleuca quinquenervia - Cajeput Tree.....	536.94	
32 93 43 00-0810 EA 12' Melaleuca quinquenervia - Cajeput Tree.....	644.32	
32 93 43 00-0811 EA 24" Box Melaleuca quinquenervia - Cajeput Tree.....	179.49	
32 93 43 00-0812 EA 30" Box Melaleuca quinquenervia - Cajeput Tree.....	452.56	
32 93 43 00-0813 EA 36" Box Melaleuca quinquenervia - Cajeput Tree.....	713.36	
32 93 43 00-0814 EA 1 Gallon Podocarpus macrophyllus - Yew Pine.....	7.13	
32 93 43 00-0815 EA 3 Gallon Podocarpus macrophyllus - Yew Pine.....	16.72	
32 93 43 00-0816 EA 5 Gallon Podocarpus macrophyllus - Yew Pine.....	21.94	
32 93 43 00-0817 EA 15 Gallon Podocarpus macrophyllus - Yew Pine.....	95.11	
32 93 43 00-0818 EA 24" Box Podocarpus macrophyllus - Yew Pine.....	184.09	
32 93 43 00-0819 EA 15 Gallon Prosopis alba 'Colorado' - Argentine Mesquite.....	97.74	
32 93 43 00-0820 EA 24" Box Prosopis alba 'Colorado' - Argentine Mesquite.....	339.55	
32 93 43 00-0821 EA 15 Gallon Prosopis hybrid 'Phoenix' - Phoenix Mesquite.....	97.74	
32 93 43 00-0822 EA 24" Box Prosopis hybrid 'Phoenix' - Phoenix Mesquite.....	339.55	
32 93 43 00-0823 EA 1 Gallon Prunus ilicifolia ssp lyonii (Prunus lyonii) - Catalina Cherry.....	11.15	
32 93 43 00-0824 EA 5 Gallon Prunus ilicifolia ssp lyonii (Prunus lyonii) - Catalina Cherry.....	42.02	
32 93 43 00-0825 EA 15 Gallon Prunus ilicifolia ssp lyonii (Prunus lyonii) - Catalina Cherry.....	94.32	
32 93 43 00-0826 EA 24" Box Prunus ilicifolia ssp lyonii (Prunus lyonii) - Catalina Cherry.....	325.85	
32 93 43 00-0827 EA 24" Box Quercus engelmannii - Mesa Oak.....	411.60	
32 93 43 00-0828 EA 36" Box Quercus engelmannii - Mesa Oak.....	1,029.00	
32 93 43 00-0829 EA 5 Gallon Quillaja saponaria - Soapbark Tree.....	111.48	
32 93 43 00-0830 EA 15 Gallon Quillaja saponaria - Soapbark Tree.....	385.88	
32 93 43 00-0831 EA 24" Box Rhus lancea - African Sumac.....	189.46	
32 93 43 00-0832 EA 30" Box Rhus lancea - African Sumac.....	306.82	
32 93 43 00-0833 EA 8' Rhus lancea - African Sumac.....	460.23	
32 93 43 00-0834 EA 10' Rhus lancea - African Sumac.....	513.92	
32 93 43 00-0835 EA 12' Rhus lancea - African Sumac.....	613.64	
32 93 43 00-0836 EA 1 Gallon Tristania conferta - Brisbane Box.....	11.15	
32 93 43 00-0837 EA 5 Gallon Tristania conferta - Brisbane Box.....	30.87	
32 93 43 00-0838 EA 15 Gallon Tristania conferta - Brisbane Box.....	84.04	
32 93 43 00-0839 EA 24" Box Tristania conferta - Brisbane Box.....	274.40	
32 93 43 00-0840 EA 36" Box Tristania conferta - Brisbane Box.....	771.75	

32 93 43 00-0841

Palm And Subtropical Trees (32 93 43)

Note: All trees listed by caliper of trunk or height of tree if field grown, dug with spade, balled and burlapped and delivered to site.

32 93 43 00-0842 EA 4' To 5' Acacia baileyana - Bailey Acacia.....	250.94
32 93 43 00-0843 EA 6' Acacia baileyana - Bailey Acacia.....	301.13
32 93 43 00-0844 EA 8' Acacia baileyana - Bailey Acacia.....	351.32
32 93 43 00-0845 EA 10' Acacia baileyana - Bailey Acacia.....	439.14
32 93 43 00-0846 EA 6' Agonis flexuosa - Peppermint Tree.....	150.56
32 93 43 00-0847 EA 8' Agonis flexuosa - Peppermint Tree.....	188.20
32 93 43 00-0848 EA 10' Agonis flexuosa - Peppermint Tree.....	225.85
32 93 43 00-0849 EA 24" Box Agonis flexuosa - Peppermint Tree.....	187.58
32 93 43 00-0850 EA 4' To 5' Bauhinia blakeana - Hong Kong Orchid.....	445.80
32 93 43 00-0851 EA 6' Bauhinia blakeana - Hong Kong Orchid.....	528.74
32 93 43 00-0852 EA 8' Bauhinia blakeana - Hong Kong Orchid.....	704.99
32 93 43 00-0853 EA 10' Bauhinia blakeana - Hong Kong Orchid.....	881.24
32 93 43 00-0854 EA 6' Bauhinia purpurea - Purple Orchid Tree.....	559.84
32 93 43 00-0855 EA 8' Bauhinia purpurea - Purple Orchid Tree.....	746.46
32 93 43 00-0856 EA 10' Bauhinia purpurea - Purple Orchid Tree.....	933.08
32 93 43 00-0857 EA 24" Box Bauhinia purpurea - Purple Orchid Tree.....	242.60
32 93 43 00-0858 EA 6' Bauhinia variegata candida - White Orchid Tree.....	622.05
32 93 43 00-0859 EA 8' Bauhinia variegata candida - White Orchid Tree.....	829.40

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 43 00-0860	EA	10' Bauhinia variegata candida - White Orchid Tree.....	1,036.75	
32 93 43 00-0861	EA	6' Callistemon citrinus - Crimson or Lemon Bottle Brush.....	338.77	
32 93 43 00-0862	EA	8' Callistemon citrinus - Crimson or Lemon Bottle Brush.....	451.69	
32 93 43 00-0863	EA	10' Callistemon citrinus - Crimson or Lemon Bottle Brush.....	564.62	
32 93 43 00-0864	EA	6' Callistemon viminalis - Weeping Bottle Brush.....	338.77	
32 93 43 00-0865	EA	8' Callistemon viminalis - Weeping Bottle Brush.....	451.69	
32 93 43 00-0866	EA	10' Callistemon viminalis - Weeping Bottle Brush.....	564.62	
32 93 43 00-0867	EA	12' Callistemon viminalis - Weeping Bottle Brush.....	677.54	
32 93 43 00-0868	EA	6' Eriobotrya deflexa - Bronze Loquat.....	559.84	
32 93 43 00-0869	EA	8' Eriobotrya deflexa - Bronze Loquat.....	746.46	
32 93 43 00-0870	EA	10' Eriobotrya deflexa - Bronze Loquat.....	933.08	
32 93 43 00-0871	EA	6' Eucalyptus erythrocorys - Red Cap Gum.....	559.84	
32 93 43 00-0872	EA	8' Eucalyptus erythrocorys - Red Cap Gum.....	746.46	
32 93 43 00-0873	EA	10' Eucalyptus erythrocorys - Red Cap Gum.....	933.08	
32 93 43 00-0874	EA	6' Eucalyptus gunnii - Cider Gum.....	559.84	
32 93 43 00-0875	EA	8' Eucalyptus gunnii - Cider Gum.....	746.46	
32 93 43 00-0876	EA	10' Eucalyptus gunnii - Cider Gum.....	933.08	
32 93 43 00-0877	EA	6' Eucalyptus leucoxylon - White Ironbark.....	559.84	
32 93 43 00-0878	EA	8' Eucalyptus leucoxylon - White Ironbark.....	746.46	
32 93 43 00-0879	EA	10' Eucalyptus leucoxylon - White Ironbark.....	933.08	
32 93 43 00-0880	EA	12' Eucalyptus leucoxylon - White Ironbark.....	1,119.69	
32 93 43 00-0881	EA	6' Eucalyptus polyanthemos - Silver Dollar Gum.....	559.84	
32 93 43 00-0882	EA	8' Eucalyptus polyanthemos - Silver Dollar Gum.....	746.46	
32 93 43 00-0883	EA	10' Eucalyptus polyanthemos - Silver Dollar Gum.....	933.08	
32 93 43 00-0884	EA	6' Eucalyptus torquata - Coral Gum.....	559.84	
32 93 43 00-0885	EA	8' Eucalyptus torquata - Coral Gum.....	746.46	
32 93 43 00-0886	EA	10' Eucalyptus torquata - Coral Gum.....	933.08	
32 93 43 00-0887	EA	8' Fraxinus oxycarpa "Raywood" - Raywood Ash.....	351.32	
32 93 43 00-0888	EA	10' Fraxinus oxycarpa "Raywood" - Raywood Ash.....	476.79	
32 93 43 00-0889	EA	12' Fraxinus oxycarpa "Raywood" - Raywood Ash.....	589.71	
32 93 43 00-0890	EA	6' Jacarandra acutifolia - Jacaranda.....	559.84	
32 93 43 00-0891	EA	8' Jacarandra acutifolia - Jacaranda.....	746.46	
32 93 43 00-0892	EA	10' Jacarandra acutifolia - Jacaranda.....	933.08	
32 93 43 00-0893	EA	24" Box Jacarandra acutifolia - Jacaranda.....	242.60	
32 93 43 00-0894	EA	6' Olea europaea - Olive "Fruitless".....	414.21	
32 93 43 00-0895	EA	8' Olea europaea - Olive "Fruitless".....	552.28	
32 93 43 00-0896	EA	10' Olea europaea - Olive "Fruitless".....	690.34	
32 93 43 00-0897	EA	12' Olea europaea - Olive "Fruitless".....	828.41	
32 93 43 00-0898	EA	24" Box Olea europaea - Olive "Fruitless".....	509.32	
32 93 43 00-0899	EA	5 Gallon Pistacia chinensis - Chinese Pistache.....	37.32	
32 93 43 00-0900	EA	15 Gallon Pistacia chinensis - Chinese Pistache.....	124.41	
32 93 43 00-0901	EA	24" Box Pistacia chinensis - Chinese Pistache.....	483.13	
32 93 43 00-0902	EA	36" Box Pistacia chinensis - Chinese Pistache.....	1,285.57	
32 93 43 00-0903	EA	48" Box Pistacia chinensis - Chinese Pistache.....	2,737.02	
32 93 43 00-0904	EA	9' Ptychosperma elegans - Alexander Palm, Solitaire Palm.....	155.51	
32 93 43 00-0905	EA	11' Ptychosperma elegans - Alexander Palm, Solitaire Palm.....	259.19	
32 93 43 00-0906	EA	15' Ptychosperma elegans - Alexander Palm, Solitaire Palm.....	393.96	
32 93 43 00-0907	EA	17' Ptychosperma elegans - Alexander Palm, Solitaire Palm.....	445.80	
32 93 43 00-0908	EA	20' Ptychosperma elegans - Alexander Palm, Solitaire Palm.....	518.38	
32 93 43 00-0909	EA	5 Gallon Pyrus kawakamii - Evergreen Pear, Single.....	23.34	
32 93 43 00-0910	EA	15 Gallon Pyrus kawakamii - Evergreen Pear, Single.....	77.79	
32 93 43 00-0911	EA	24" Box Pyrus kawakamii - Evergreen Pear, Single.....	292.35	
32 93 43 00-0912	EA	30" Box Pyrus kawakamii - Evergreen Pear, Single.....	534.50	
32 93 43 00-0913	EA	36" Box Pyrus kawakamii - Evergreen Pear, Single.....	777.91	
32 93 43 00-0914	EA	5 Gallon Pyrus kawakamii - Evergreen Pear, Multi.....	23.34	
32 93 43 00-0915	EA	15 Gallon Pyrus kawakamii - Evergreen Pear, Multi.....	82.81	
32 93 43 00-0916	EA	24" Box Pyrus kawakamii - Evergreen Pear, Multi.....	301.13	
32 93 43 00-0917	EA	30" Box Pyrus kawakamii - Evergreen Pear, Multi.....	534.50	
32 93 43 00-0918	EA	36" Box Pyrus kawakamii - Evergreen Pear, Multi.....	777.91	
32 93 43 00-0919	EA	1 Gallon Washingtonia robusta - Mexican Fan Palm.....	9.03	
32 93 43 00-0920	EA	5 Gallon Washingtonia robusta - Mexican Fan Palm.....	28.10	
32 93 43 00-0921	EA	15 Gallon Washingtonia robusta - Mexican Fan Palm.....	98.35	
32 93 43 00-0922	EA	24" Box Washingtonia robusta - Mexican Fan Palm.....	321.15	
32 93 43 00-0923	EA	36" Box Washingtonia robusta - Mexican Fan Palm.....	853.06	
32 93 43 00-0924	EA	6' Washingtonia robusta - Mexican Fan Palm.....	559.84	
32 93 43 00-0925	EA	8' Washingtonia robusta - Mexican Fan Palm.....	746.46	
32 93 43 00-0926	EA	10' Washingtonia robusta - Mexican Fan Palm.....	933.08	
32 93 43 00-0927	EA	12' Washingtonia robusta - Mexican Fan Palm.....	1,119.69	
32 93 43 00-0928	EA	5 Gallon Phoenix roebelenii - Pygmy Date Palm.....	23.05	
32 93 43 00-0929	EA	7 Gallon Phoenix roebelenii - Pygmy Date Palm.....	56.18	
32 93 43 00-0930	EA	15 Gallon Phoenix roebelenii - Pygmy Date Palm.....	85.00	
32 93 43 00-0931	EA	24" Box Phoenix roebelenii - Pygmy Date Palm.....	252.10	

32 93 83 Planting of Trees, Shrubs and Ground Cover (32 93)

Note: Includes moving plant(s) from truck or staging site to planting site, excavation of hole, placing plant in hole, backfill and compaction. Use appropriate gallon, height or caliper size to match with description from plant section.

32 93 83 00-0001 Planting Trees (32 93 83)

Note: Excludes mulch. See CSI section 32 91 13 16-0001 for mulch.

32 93 83 00-0002	EA	3" To 5" Bare Root Seedlings Tree Planting.....	1.51	
32 93 83 00-0003	EA	6" To 10" Bare Root Seedlings Tree Planting.....	2.43	



Exterior Improvements		32
Planting		32 90
Plants		32 93

32

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 83 00-0004 EA 11" To 16" Bare Root Seedlings Tree Planting.....	3.04	
32 93 83 00-0005 EA 17" To 24" Bare Root Seedlings Tree Planting.....	4.86	
32 93 83 00-0006 EA 1 Gallon Container Tree Planting.....	24.31	
For >10 To 25, Deduct	-1.22	
For >25 To 50, Deduct	-3.04	
For >50 To 100, Deduct	-4.86	
For >100, Deduct	-7.29	
32 93 83 00-0007 EA 2 Gallon Container Tree Planting.....	34.03	
For >10 To 25, Deduct	-1.70	
For >25 To 50, Deduct	-4.25	
For >50 To 100, Deduct	-6.81	
For >100, Deduct	-10.21	
32 93 83 00-0008 EA 3 Gallon Container Tree Planting.....	43.75	
For >10 To 25, Deduct	-2.19	
For >25 To 50, Deduct	-5.47	
For >50 To 100, Deduct	-8.75	
For >100, Deduct	-13.13	
32 93 83 00-0009 EA 5 Gallon Container Tree Planting.....	72.92	
For >10 To 25, Deduct	-3.65	
For >25 To 50, Deduct	-9.12	
For >50 To 100, Deduct	-14.58	
For >100, Deduct	-21.88	
32 93 83 00-0010 EA 7 Gallon Container Tree Planting.....	97.21	
For >10 To 25, Deduct	-4.86	
For >25 To 50, Deduct	-12.15	
For >50 To 100, Deduct	-19.44	
For >100, Deduct	-29.16	
32 93 83 00-0011 EA 10 Gallon Container Tree Planting.....	126.38	
For >10 To 25, Deduct	-6.32	
For >25 To 50, Deduct	-15.80	
For >50 To 100, Deduct	-25.28	
For >100, Deduct	-37.91	
32 93 83 00-0012 EA 15 Gallon Container Tree Planting.....	179.85	
For >10 To 25, Deduct	-8.99	
For >25 To 50, Deduct	-22.48	
For >50 To 100, Deduct	-35.97	
For >100, Deduct	-53.96	
32 93 83 00-0013 EA 20 Gallon Container Tree Planting.....	296.51	
For >10 To 25, Deduct	-14.83	
For >25 To 50, Deduct	-37.06	
For >50 To 100, Deduct	-59.30	
For >100, Deduct	-88.95	
32 93 83 00-0014 EA 25 Gallon Container Tree Planting.....	384.00	
For >10 To 25, Deduct	-19.20	
For >25 To 50, Deduct	-48.00	
For >50 To 100, Deduct	-76.80	
For >100, Deduct	-115.20	
32 93 83 00-0015 EA 30 Gallon Container Tree Planting.....	461.77	
For >10 To 25, Deduct	-23.09	
For >25 To 50, Deduct	-57.72	
For >50 To 100, Deduct	-92.35	
For >100, Deduct	-138.53	
32 93 83 00-0016 EA 45 Gallon Container Tree Planting.....	573.57	
For >10 To 25, Deduct	-28.68	
For >25 To 50, Deduct	-71.70	
For >50 To 100, Deduct	-114.71	
For >100, Deduct	-172.07	
32 93 83 00-0017 EA 65 Gallon Container Tree Planting.....	680.51	
For >10 To 25, Deduct	-34.03	
For >25 To 50, Deduct	-85.06	
For >50 To 100, Deduct	-136.10	
For >100, Deduct	-204.15	
32 93 83 00-0018 EA 6' Balled And Burlapped Tree Planting.....	243.04	
For >10 To 25, Deduct	-12.15	
For >25 To 50, Deduct	-30.38	
For >50 To 100, Deduct	-48.61	
For >100, Deduct	-72.91	
32 93 83 00-0019 EA 7' Balled And Burlapped Tree Planting.....	323.73	
For >10 To 25, Deduct	-16.19	
For >25 To 50, Deduct	-40.47	
For >50 To 100, Deduct	-64.75	
For >100, Deduct	-97.12	
32 93 83 00-0020 EA 8' Balled And Burlapped Tree Planting.....	364.56	
For >10 To 25, Deduct	-18.23	
For >25 To 50, Deduct	-45.57	
For >50 To 100, Deduct	-72.91	
For >100, Deduct	-109.37	
32 93 83 00-0021 EA 10' Balled And Burlapped Tree Planting.....	425.32	
For >10 To 25, Deduct	-21.27	
For >25 To 50, Deduct	-53.17	
For >50 To 100, Deduct	-85.06	
For >100, Deduct	-127.60	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 93 83 00-0022	EA 12' Balled And Burlapped Tree Planting	568.71	
	For>10 To 25, Deduct	-28.44	
	For>25 To 50, Deduct	-71.09	
	For>50 To 100, Deduct	-113.74	
	For>100, Deduct	-170.61	
32 93 83 00-0023	EA 14' Balled And Burlapped Tree Planting	651.35	
	For>10 To 25, Deduct	-32.57	
	For>25 To 50, Deduct	-81.42	
	For>50 To 100, Deduct	-130.27	
	For>100, Deduct	-195.41	
32 93 83 00-0024	EA 16' Balled And Burlapped Tree Planting	789.88	
	For>10 To 25, Deduct	-39.49	
	For>25 To 50, Deduct	-98.74	
	For>50 To 100, Deduct	-157.98	
	For>100, Deduct	-236.96	
32 93 83 00-0025	EA 18' Balled And Burlapped Tree Planting	947.85	
	For>10 To 25, Deduct	-47.39	
	For>25 To 50, Deduct	-118.48	
	For>50 To 100, Deduct	-189.57	
	For>100, Deduct	-284.36	
32 93 83 00-0026	EA 20' Balled And Burlapped Tree Planting	1,093.68	
	For>10 To 25, Deduct	-54.68	
	For>25 To 50, Deduct	-136.71	
	For>50 To 100, Deduct	-218.74	
	For>100, Deduct	-328.10	
32 93 83 00-0027	EA 1-1/2" Caliper Balled And Burlapped Tree Planting	364.56	
	For>10 To 25, Deduct	-18.23	
	For>25 To 50, Deduct	-45.57	
	For>50 To 100, Deduct	-72.91	
	For>100, Deduct	-109.37	
32 93 83 00-0028	EA 2" Caliper Balled And Burlapped Tree Planting	425.32	
	For>10 To 25, Deduct	-21.27	
	For>25 To 50, Deduct	-53.17	
	For>50 To 100, Deduct	-85.06	
	For>100, Deduct	-127.60	
32 93 83 00-0029	EA 2-1/2" Caliper Balled And Burlapped Tree Planting	571.14	
	For>10 To 25, Deduct	-28.56	
	For>25 To 50, Deduct	-71.39	
	For>50 To 100, Deduct	-114.23	
	For>100, Deduct	-171.34	
32 93 83 00-0030	EA 3" Caliper Balled And Burlapped Tree Planting	656.20	
	For>10 To 25, Deduct	-32.81	
	For>25 To 50, Deduct	-82.03	
	For>50 To 100, Deduct	-131.24	
	For>100, Deduct	-196.86	
32 93 83 00-0031	EA 3-1/2" Caliper Balled And Burlapped Tree Planting	729.12	
	For>10 To 25, Deduct	-36.46	
	For>25 To 50, Deduct	-91.14	
	For>50 To 100, Deduct	-145.82	
	For>100, Deduct	-218.74	
32 93 83 00-0032	EA 4" Caliper Balled And Burlapped Tree Planting	836.05	
	For>10 To 25, Deduct	-41.80	
	For>25 To 50, Deduct	-104.51	
	For>50 To 100, Deduct	-167.21	
	For>100, Deduct	-250.82	
32 93 83 00-0033	Planting Shrubs (32 93 83)		
	Note: Excludes mulch. See CSI section 32 91 13 16-0001 for mulch.		
32 93 83 00-0034	EA 1 Gallon Container Shrub Planting	20.67	
	For>10 To 25, Deduct	-1.03	
	For>25 To 50, Deduct	-2.58	
	For>50 To 100, Deduct	-4.13	
	For>100, Deduct	-6.20	
32 93 83 00-0035	EA 2 Gallon Container Shrub Planting	29.16	
	For>10 To 25, Deduct	-1.46	
	For>25 To 50, Deduct	-3.65	
	For>50 To 100, Deduct	-5.83	
	For>100, Deduct	-8.75	
32 93 83 00-0036	EA 3 Gallon Container Shrub Planting	36.46	
	For>10 To 25, Deduct	-1.82	
	For>25 To 50, Deduct	-4.56	
	For>50 To 100, Deduct	-7.29	
	For>100, Deduct	-10.94	
32 93 83 00-0037	EA 4 Gallon Container Shrub Planting	48.61	
	For>10 To 25, Deduct	-2.43	
	For>25 To 50, Deduct	-6.08	
	For>50 To 100, Deduct	-9.72	
	For>100, Deduct	-14.58	
32 93 83 00-0038	EA 5 Gallon Container Shrub Planting	60.76	
	For>10 To 25, Deduct	-3.04	
	For>25 To 50, Deduct	-7.60	
	For>50 To 100, Deduct	-12.15	
	For>100, Deduct	-18.23	



Exterior Improvements		32
Planting		32 90
Plants		32 93

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 93 83 00-0039 EA 7 Gallon Container Shrub Planting	82.64	
For >10 To 25, Deduct	-4.13	
For >25 To 50, Deduct	-10.33	
For >50 To 100, Deduct	-16.53	
For >100, Deduct	-24.79	
32 93 83 00-0040 EA 10 Gallon Container Shrub Planting	109.36	
For >10 To 25, Deduct	-5.47	
For >25 To 50, Deduct	-13.67	
For >50 To 100, Deduct	-21.87	
For >100, Deduct	-32.81	
32 93 83 00-0041 EA 15 Gallon Container Shrub Planting	150.69	
For >10 To 25, Deduct	-7.53	
For >25 To 50, Deduct	-18.84	
For >50 To 100, Deduct	-30.14	
For >100, Deduct	-45.21	
32 93 83 00-0042 EA 20 Gallon Container Shrub Planting	252.76	
For >10 To 25, Deduct	-12.64	
For >25 To 50, Deduct	-31.60	
For >50 To 100, Deduct	-50.55	
For >100, Deduct	-75.83	
32 93 83 00-0043 EA 25 Gallon Container Shrub Planting	323.73	
For >10 To 25, Deduct	-16.19	
For >25 To 50, Deduct	-40.47	
For >50 To 100, Deduct	-64.75	
For >100, Deduct	-97.12	
32 93 83 00-0044 EA 15" Balled And Burlapped Shrub Planting	68.05	
For >10 To 25, Deduct	-3.40	
For >25 To 50, Deduct	-8.51	
For >50 To 100, Deduct	-13.61	
For >100, Deduct	-20.42	
32 93 83 00-0045 EA 18" Balled And Burlapped Shrub Planting	70.48	
For >10 To 25, Deduct	-3.52	
For >25 To 50, Deduct	-8.81	
For >50 To 100, Deduct	-14.10	
For >100, Deduct	-21.14	
32 93 83 00-0046 EA 24" Balled And Burlapped Shrub Planting	77.77	
For >10 To 25, Deduct	-3.89	
For >25 To 50, Deduct	-9.72	
For >50 To 100, Deduct	-15.55	
For >100, Deduct	-23.33	
32 93 83 00-0047 EA 30" Balled And Burlapped Shrub Planting	77.77	
For >10 To 25, Deduct	-3.89	
For >25 To 50, Deduct	-9.72	
For >50 To 100, Deduct	-15.55	
For >100, Deduct	-23.33	
32 93 83 00-0048 EA 36" Balled And Burlapped Shrub Planting	85.07	
For >10 To 25, Deduct	-4.25	
For >25 To 50, Deduct	-10.63	
For >50 To 100, Deduct	-17.01	
For >100, Deduct	-25.52	
32 93 83 00-0049 EA 42" Balled And Burlapped Shrub Planting	89.92	
For >10 To 25, Deduct	-4.50	
For >25 To 50, Deduct	-11.24	
For >50 To 100, Deduct	-17.98	
For >100, Deduct	-26.98	
32 93 83 00-0050 EA 48" Balled And Burlapped Shrub Planting	97.21	
For >10 To 25, Deduct	-4.86	
For >25 To 50, Deduct	-12.15	
For >50 To 100, Deduct	-19.44	
For >100, Deduct	-29.16	
32 93 83 00-0051 EA 5' Balled And Burlapped Shrub Planting	145.82	
For >10 To 25, Deduct	-7.29	
For >25 To 50, Deduct	-18.23	
For >50 To 100, Deduct	-29.16	
For >100, Deduct	-43.75	
32 93 83 00-0052 EA 6' Balled And Burlapped Shrub Planting	206.58	
For >10 To 25, Deduct	-10.33	
For >25 To 50, Deduct	-25.82	
For >50 To 100, Deduct	-41.32	
For >100, Deduct	-61.97	
32 93 83 00-0053 EA 7' Balled And Burlapped Shrub Planting	274.63	
For >10 To 25, Deduct	-13.73	
For >25 To 50, Deduct	-34.33	
For >50 To 100, Deduct	-54.93	
For >100, Deduct	-82.39	
32 93 83 00-0054 EA 8' Balled And Burlapped Shrub Planting	311.09	
For >10 To 25, Deduct	-15.55	
For >25 To 50, Deduct	-38.89	
For >50 To 100, Deduct	-62.22	
For >100, Deduct	-93.33	
32 93 83 00-0055 EA 9' Balled And Burlapped Shrub Planting	335.40	
For >10 To 25, Deduct	-16.77	
For >25 To 50, Deduct	-41.93	
For >50 To 100, Deduct	-67.08	
For >100, Deduct	-100.62	

32 Exterior Improvements**32 90 Planting****32 93 Plants**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 93 83 00-0056	EA 10' Balled And Burlapped Shrub Planting	364.56
	<i>For >10 To 25, Deduct</i>	-18.23
	<i>For >25 To 50, Deduct</i>	-45.57
	<i>For >50 To 100, Deduct</i>	-72.91
	<i>For >100, Deduct</i>	-109.37

32 93 83 00-0057 Planting Groundcover, Vines, Perennials, Annuals And Bulbs (32 93 83)

See CSI section 32 91 13 16-0001 for mulch.

32 93 83 00-0058	EA 2-1/4" Diameter Potted Groundcover And Flower Planting	2.03
	<i>For >10 To 25, Deduct</i>	-0.10
	<i>For >25 To 50, Deduct</i>	-0.25
	<i>For >50 To 100, Deduct</i>	-0.41
	<i>For >100, Deduct</i>	-0.61
32 93 83 00-0059	EA 3" Diameter Potted Groundcover And Flower Planting	2.32
	<i>For >10 To 25, Deduct</i>	-0.12
	<i>For >25 To 50, Deduct</i>	-0.29
	<i>For >50 To 100, Deduct</i>	-0.46
	<i>For >100, Deduct</i>	-0.70
32 93 83 00-0060	EA 4" Diameter Potted Groundcover And Flower Planting	2.70
	<i>For >10 To 25, Deduct</i>	-0.14
	<i>For >25 To 50, Deduct</i>	-0.34
	<i>For >50 To 100, Deduct</i>	-0.54
	<i>For >100, Deduct</i>	-0.81
32 93 83 00-0061	EA 5-1/2" Diameter Potted Groundcover And Flower Planting	3.24
	<i>For >10 To 25, Deduct</i>	-0.16
	<i>For >25 To 50, Deduct</i>	-0.41
	<i>For >50 To 100, Deduct</i>	-0.65
	<i>For >100, Deduct</i>	-0.97
32 93 83 00-0062	EA 6" Diameter Potted Groundcover And Flower Planting	4.05
	<i>For >10 To 25, Deduct</i>	-0.20
	<i>For >25 To 50, Deduct</i>	-0.51
	<i>For >50 To 100, Deduct</i>	-0.81
	<i>For >100, Deduct</i>	-1.22
32 93 83 00-0063	EA 8" Diameter Potted Groundcover And Flower Planting	6.08
	<i>For >10 To 25, Deduct</i>	-0.30
	<i>For >25 To 50, Deduct</i>	-0.76
	<i>For >50 To 100, Deduct</i>	-1.22
	<i>For >100, Deduct</i>	-1.82
32 93 83 00-0064	EA 1 Gallon Container Groundcover And Flower Planting	19.44
	<i>For >10 To 25, Deduct</i>	-0.97
	<i>For >25 To 50, Deduct</i>	-2.43
	<i>For >50 To 100, Deduct</i>	-3.89
	<i>For >100, Deduct</i>	-5.83
32 93 83 00-0065	EA 2 Gallon Container Groundcover And Flower Planting	26.74
	<i>For >10 To 25, Deduct</i>	-1.34
	<i>For >25 To 50, Deduct</i>	-3.34
	<i>For >50 To 100, Deduct</i>	-5.35
	<i>For >100, Deduct</i>	-8.02
32 93 83 00-0066	EA 3 Gallon Container Groundcover And Flower Planting	34.03
	<i>For >10 To 25, Deduct</i>	-1.70
	<i>For >25 To 50, Deduct</i>	-4.25
	<i>For >50 To 100, Deduct</i>	-6.81
	<i>For >100, Deduct</i>	-10.21
32 93 83 00-0067	EA 4 Gallon Container Groundcover And Flower Planting	43.75
	<i>For >10 To 25, Deduct</i>	-2.19
	<i>For >25 To 50, Deduct</i>	-5.47
	<i>For >50 To 100, Deduct</i>	-8.75
	<i>For >100, Deduct</i>	-13.13
32 93 83 00-0068	EA 5 Gallon Container Groundcover And Flower Planting	53.47
	<i>For >10 To 25, Deduct</i>	-2.67
	<i>For >25 To 50, Deduct</i>	-6.68
	<i>For >50 To 100, Deduct</i>	-10.69
	<i>For >100, Deduct</i>	-16.04
32 93 83 00-0069	EA 7 Gallon Container Groundcover And Flower Planting	72.92
	<i>For >10 To 25, Deduct</i>	-3.65
	<i>For >25 To 50, Deduct</i>	-9.12
	<i>For >50 To 100, Deduct</i>	-14.58
	<i>For >100, Deduct</i>	-21.88
32 93 83 00-0070	EA Bulb Planting	1.21
	<i>For >10 To 25, Deduct</i>	-0.06
	<i>For >25 To 50, Deduct</i>	-0.15
	<i>For >50 To 100, Deduct</i>	-0.24
	<i>For >100, Deduct</i>	-0.36
32 93 83 00-0071	EA Flats Of 24 Groundcover And Flower Planting	34.03
	<i>For >10 To 25, Deduct</i>	-1.70
	<i>For >25, Deduct</i>	-4.25
32 93 83 00-0072	EA Flats Of 36 Groundcover And Flower Planting	48.26
	<i>For >10 To 25, Deduct</i>	-2.41
	<i>For >25, Deduct</i>	-6.03
32 93 83 00-0073	EA Flats Of 48 Groundcover And Flower Planting	64.25
	<i>For >10 To 25, Deduct</i>	-3.21
	<i>For >25, Deduct</i>	-8.03

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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32 93 83 00-0074

Tree Pits (32 93 83)

Note: Costs given show the tree pit size accommodates the soil ball and the type of soil excavated includes excavation, bank run sand and gravel fill for drainage, imported mix planting soil, hand backfill, perforated drainage pipe for watering, and drainage fabric. Includes one layer of woven fabric to be applied before mulch is spread. Excludes additional soil conditioners or mulch.

32 93 83 00-0075	EA	2' x 1-1/4' Deep Tree Pit	124.72
32 93 83 00-0076	EA	2' x 2-1/2' Deep Tree Pit	187.04
32 93 83 00-0077	EA	2-1/2' x 1-1/2' Deep Tree Pit	242.03
32 93 83 00-0078	EA	2-1/2' x 3' Deep Tree Pit	362.98
32 93 83 00-0079	EA	3' x 1-3/4' Deep Tree Pit	372.79
32 93 83 00-0080	EA	3' x 3-1/2' Deep Tree Pit	556.17
32 93 83 00-0081	EA	3-1/2' x 1-3/4' Deep Tree Pit	456.32
32 93 83 00-0082	EA	3-1/2' x 3-1/2' Deep Tree Pit	683.49
32 93 83 00-0083	EA	4' x 2' Deep Tree Pit	545.25
32 93 83 00-0084	EA	4' x 4' Deep Tree Pit	817.42
32 93 83 00-0085	EA	4-1/2' x 2' Deep Tree Pit	784.10
32 93 83 00-0086	EA	4-1/2' x 4' Deep Tree Pit	1,178.56
32 93 83 00-0087	EA	5' x 2-1/4' Deep Tree Pit	1,042.96
32 93 83 00-0088	EA	5' x 4-1/2' Deep Tree Pit	1,553.04
32 93 83 00-0089	EA	6' x 2-1/2' Deep Tree Pit	1,479.16
32 93 83 00-0090	EA	6' x 5' Deep Tree Pit	2,215.30
32 93 83 00-0091	EA	7' x 3' Deep Tree Pit	2,491.31
32 93 83 00-0092	EA	7' x 6' Deep Tree Pit	3,757.75
32 93 83 00-0093	EA	8' x 3-1/4' Deep Tree Pit	3,423.42
32 93 83 00-0094	EA	8' x 6-1/2' Deep Tree Pit	5,132.84

32 94 Planting Accessories (32 94)

32 94 13 Landscape Edging (32 94)

Note: Including stakes.

32 94 13 00-0001 Landscape Edging (32 94 13)

Note: Includes stakes.

32 94 13 00-0002	LF	6" Poly/Vinyl Landscape Edging With Non-Round Top.....	6.10	1.24
		<i>For >2,000 To 5,000 LF, Deduct</i>	-0.36	
		<i>For >5,000 LF, Deduct</i>	-0.72	
32 94 13 00-0003	LF	5" Polyethylene Landscape Edging With Round Top	3.61	1.24
		<i>For >2,000 To 5,000 LF, Deduct</i>	-0.11	
		<i>For >5,000 LF, Deduct</i>	-0.23	
32 94 13 00-0004	LF	5-1/2" Polyethylene Landscape Edging With Round Top	3.68	1.24
		<i>For >2,000 To 5,000 LF, Deduct</i>	-0.12	
		<i>For >5,000 LF, Deduct</i>	-0.24	
32 94 13 00-0005	LF	5" Polyethylene Landscape Edging With Corrugated Sides And Round Top	3.71	1.24
		<i>For >2,000 To 5,000 LF, Deduct</i>	-0.12	
		<i>For >5,000 LF, Deduct</i>	-0.25	
32 94 13 00-0006	LF	1/8" x 4", Mill Finish, Aluminum Alloy Landscape Edging	10.49	2.94
		<i>For >1,000 LF, Deduct</i>	-1.15	
32 94 13 00-0007	LF	1/8" x 4", Black Paint, Aluminum Alloy Landscape Edging	11.44	2.94
		<i>For >1,000 LF, Deduct</i>	-1.39	
32 94 13 00-0008	LF	1/8" x 4", Black Anodized, Aluminum Alloy Landscape Edging.....	11.51	2.94
		<i>For >1,000 LF, Deduct</i>	-1.41	
32 94 13 00-0009	LF	3/16" x 4", Mill Finish, Aluminum Alloy Landscape Edging	13.18	3.04
		<i>For >1,000 LF, Deduct</i>	-1.79	
32 94 13 00-0010	LF	3/16" x 4", Black Paint, Aluminum Alloy Landscape Edging	14.35	3.04
		<i>For >1,000 LF, Deduct</i>	-2.08	
32 94 13 00-0011	LF	3/16" x 4", Black Anodized, Aluminum Alloy Landscape Edging.....	14.33	3.04
		<i>For >1,000 LF, Deduct</i>	-2.07	
32 94 13 00-0012	LF	1/8" x 5-1/2", Mill Finish, Aluminum Alloy Landscape Edging	11.76	3.14
		<i>For >1,000 LF, Deduct</i>	-1.39	
32 94 13 00-0013	LF	1/8" x 5-1/2", Black Paint, Aluminum Alloy Landscape Edging	13.07	3.14
		<i>For >1,000 LF, Deduct</i>	-1.72	
32 94 13 00-0014	LF	1/8" x 5-1/2", Black Anodized, Aluminum Alloy Landscape Edging	13.20	3.14
		<i>For >1,000 LF, Deduct</i>	-1.75	
32 94 13 00-0015	LF	3/16" x 5-1/2", Mill Finish, Aluminum Alloy Landscape Edging	14.84	3.24
		<i>For >1,000 LF, Deduct</i>	-2.12	
32 94 13 00-0016	LF	3/16" x 5-1/2", Black Paint, Aluminum Alloy Landscape Edging	16.14	3.24
		<i>For >1,000 LF, Deduct</i>	-2.44	
32 94 13 00-0017	LF	3/16" x 5-1/2", Black Anodized, Aluminum Alloy Landscape Edging	16.26	3.24
		<i>For >1,000 LF, Deduct</i>	-2.47	
32 94 13 00-0018	LF	1/8" x 4" Powder Coated Steel Landscape Edging	11.16	3.04
		<i>For >1,000 LF, Deduct</i>	-1.27	
32 94 13 00-0019	LF	3/16" x 4" Powder Coated Steel Landscape Edging	13.09	3.04
		<i>For >1,000 LF, Deduct</i>	-1.75	
32 94 13 00-0020	LF	1/4" x 5" Powder Coated Steel Landscape Edging	18.25	3.04
		<i>For >1,000 LF, Deduct</i>	-3.04	
32 94 13 00-0021	LF	1/2" x 4", Recycled Plastic Landscape Edging (Bend-A-Board).....	8.41	2.94
		<i>For >1,000 LF, Deduct</i>	-0.63	
32 94 13 00-0022	LF	1" x 4", Recycled Plastic Landscape Edging (Bend-A-Board)	9.56	2.94
		<i>For >1,000 LF, Deduct</i>	-0.92	
32 94 13 00-0023	LF	1" x 6", Recycled Plastic Landscape Edging (Bend-A-Board)	10.56	2.94
		<i>For >1,000 LF, Deduct</i>	-1.17	
32 94 13 00-0024	LF	2" x 4", Recycled Plastic Landscape Edging (Bend-A-Board)	10.78	2.94
		<i>For >1,000 LF, Deduct</i>	-1.23	

32 Exterior Improvements**32 90 Planting****32 94 Planting Accessories**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 94 13 00-0025 Concrete Band, Cast In Place <small>(32 94 13)</small>			
Note: Includes delivered concrete, forms, rebar, chairs (where necessary), expansion joints, finish and curing.			
32 94 13 00-0026	LF 6" x 4" Concrete Band.....	17.20	8.93
	Note: Excludes base course.		
	For Up To 20, Add	10.45	
	For >20 To 50, Add	5.92	
	For >50 To 100, Add	2.26	
	For >500 To 1,000, Deduct	-2.26	
	For >1,000, Deduct	-3.82	
32 94 13 00-0027	LF 6" x 6" Concrete Band.....	20.55	10.51
	Note: Excludes base course.		
	For Up To 20, Add	12.52	
	For >20 To 50, Add	7.10	
	For >50 To 100, Add	2.71	
	For >500 To 1,000, Deduct	-2.71	
	For >1,000, Deduct	-4.58	
32 94 13 00-0028	LF 8" x 6" Concrete Band.....	23.75	120.88
	Note: Excludes base course.		
	For Up To 20, Add	14.48	
	For >20 To 50, Add	8.21	
	For >50 To 100, Add	3.13	
	For >500 To 1,000, Deduct	-3.13	
	For >1,000, Deduct	-5.29	
32 94 13 00-0029	LF 10" x 6" Concrete Band.....	26.39	131.39
	Note: Excludes base course.		
	For Up To 20, Add	16.05	
	For >20 To 50, Add	9.10	
	For >50 To 100, Add	3.47	
	For >500 To 1,000, Deduct	-3.47	
	For >1,000, Deduct	-5.87	
32 94 13 00-0030	LF 12" x 6" Concrete Band.....	27.47	13.67
	Note: Excludes base course.		
	For Up To 20, Add	16.53	
	For >20 To 50, Add	9.37	
	For >50 To 100, Add	3.58	
	For >500 To 1,000, Deduct	-3.58	
	For >1,000, Deduct	-6.06	

32 94 16 Landscape Timbers (32 94)

32 94 16 00-0001	LF 1" x 4" Redwood Edging.....	5.32	1.75
32 94 16 00-0002	LF 2" x 4" Redwood Edging.....	7.30	2.62
32 94 16 00-0003	LF 4" x 6" Pressure Treated Hardwood.....	10.07	3.50
32 94 16 00-0004	LF 6" x 6" Pressure Treated Hardwood.....	13.10	4.37
32 94 16 00-0005	LF 6" x 8" Pressure Treated Hardwood.....	15.28	5.14
32 94 16 00-0006	LF 1" x 4" Pressure Treated Pine.....	4.02	1.75
32 94 16 00-0007	LF 2" x 4" Pressure Treated Pine.....	6.09	2.62
32 94 16 00-0008	LF 4" x 6" Pressure Treated Pine.....	9.56	3.39
32 94 16 00-0009	LF 6" x 6" Pressure Treated Pine.....	13.00	4.37
32 94 16 00-0010	LF 6" x 8" Pressure Treated Pine.....	15.89	5.14
32 94 16 00-0011	LF 6" x 8" Railroad Ties.....	15.03	4.79
32 94 16 00-0012	LF 7" x 9" Railroad Ties.....	18.07	6.02

32 94 43 Tree Grates (32 94)

32 94 43 00-0001 Tree Grates With Frames <small>(32 94 43)</small>			
32 94 43 00-0002 Round Cast Iron Tree Grates With Frames <small>(32 94 43 00-0001)</small>			
32 94 43 00-0003	EA 32" Diameter, 100 To 150 LB Cast Iron Tree Grate With Frame.....	1,054.48	62.72
	For >3 To 9, Deduct	-69.68	
	For >9, Deduct	-144.00	
32 94 43 00-0004	EA 36" Diameter, 125 To 175 LB Cast Iron Tree Grate With Frame.....	1,223.38	62.72
	For >3 To 9, Deduct	-82.34	
	For >9, Deduct	-170.18	
32 94 43 00-0005	EA 42" Diameter, 150 To 200 LB Cast Iron Tree Grate With Frame.....	1,476.33	83.63
	For >3 To 9, Deduct	-98.18	
	For >9, Deduct	-202.91	
32 94 43 00-0006	EA 48" Diameter, 200 To 250 LB Cast Iron Tree Grate With Frame.....	1,843.96	83.63
	For >3 To 9, Deduct	-125.75	
	For >9, Deduct	-259.89	
32 94 43 00-0007	EA 54" Diameter, 300 To 350 LB Cast Iron Tree Grate With Frame.....	2,365.19	104.54
	For >3 To 9, Deduct	-161.71	
	For >9, Deduct	-334.20	
32 94 43 00-0008	EA 60" Diameter, Up To 350 LB Cast Iron Tree Grate With Frame.....	2,476.54	125.45
	For >3 To 9, Deduct	-166.92	
	For >9, Deduct	-344.98	
32 94 43 00-0009	EA 60" Diameter, >350 LB Cast Iron Tree Grate With Frame.....	2,732.40	125.45
	For >3 To 9, Deduct	-186.11	
	For >9, Deduct	-384.64	
32 94 43 00-0010	EA 72" Diameter, Up To 550 LB Cast Iron Tree Grate With Frame.....	3,634.31	177.72
	For >3 To 9, Deduct	-245.92	
	For >9, Deduct	-508.23	



Exterior Improvements		32
Planting		32 90
Planting Accessories		32 94

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
32 94 43 00-0011	EA 72" Diameter, >500 To 550 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,783.35 -257.09 -531.33	177.72
32 94 43 00-0012	EA 72" Diameter, >600 To 650 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,907.55 -266.41 -550.58	177.72
32 94 43 00-0013	EA 72" Diameter, >650 To 700 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,006.91 -273.86 -565.98	177.72
32 94 43 00-0014	EA 72" Diameter, >700 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,081.43 -279.45 -577.53	177.72
32 94 43 00-0015	EA 93" Diameter, 950 To 1,000 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,472.05 -304.04 -628.35	209.08
32 94 43 00-0016 Square Cast Iron Tree Grates With Frames (32 94 43 00-0001)			
32 94 43 00-0017	EA 30" x 30", 75 To 125 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	970.01 -63.34 -130.91	62.72
32 94 43 00-0018	EA 36" x 36", 100 To 150 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	1,181.15 -79.18 -163.63	62.72
32 94 43 00-0019	EA 48" x 48", Up To 200 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	1,749.16 -115.51 -238.71	104.54
32 94 43 00-0020	EA 48" x 48", >200 To 250 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	2,072.08 -139.73 -288.77	104.54
32 94 43 00-0021	EA 48" x 48", >250 To 300 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	2,370.16 -162.08 -334.97	104.54
32 94 43 00-0022	EA 48" x 48", >300 To 350 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	2,643.40 -182.57 -377.32	104.54
32 94 43 00-0023	EA 48" x 48", >350 To 400 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	2,891.80 -201.20 -415.82	104.54
32 94 43 00-0024	EA 48" x 48", >400 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,115.36 -217.97 -450.47	104.54
32 94 43 00-0025	EA 60" x 60", Up To 400 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	2,975.44 -201.20 -415.82	146.36
32 94 43 00-0026	EA 60" x 60", >400 To 450 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,199.00 -217.97 -450.47	146.36
32 94 43 00-0027	EA 60" x 60", >450 To 500 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,397.72 -232.88 -481.28	146.36
32 94 43 00-0028	EA 60" x 60", >500 To 550 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,571.60 -245.92 -508.23	146.36
32 94 43 00-0029	EA 60" x 60", >550 To 600 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,720.64 -257.09 -531.33	146.36
32 94 43 00-0030	EA 60" x 60", >600 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,844.84 -266.41 -550.58	146.36
32 94 43 00-0031	EA 72" x 72", Up To 550 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,634.31 -245.92 -508.23	177.72
32 94 43 00-0032	EA 72" x 72", >550 To 600 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,783.35 -257.09 -531.33	177.72
32 94 43 00-0033	EA 72" x 72", >600 To 650 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	3,907.55 -266.41 -550.58	177.72
32 94 43 00-0034	EA 72" x 72", >650 To 700 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,006.91 -273.86 -565.98	177.72
32 94 43 00-0035	EA 72" x 72", >700 To 750 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,081.43 -279.45 -577.53	177.72
32 94 43 00-0036	EA 72" x 72", >750 To 800 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,131.11 -283.18 -585.23	177.72
32 94 43 00-0037	EA 72" x 72", >800 To 850 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,155.95 -285.04 -589.08	177.72
32 94 43 00-0038	EA 72" x 72", >850 LB Cast Iron Tree Grate With Frame <i>For >3 To 9, Deduct</i> <i>For >9, Deduct</i>	4,180.79 -286.90 -592.93	177.72

32 Exterior Improvements**32 90 Planting****32 94 Planting Accessories**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

32 94 43 00-0039	Rectangular Cast Iron Tree Grates With Frames (32 94 43 00-0001)		
32 94 43 00-0040	EA 36" x 48", 200 To 250 LB Cast Iron Tree Grate With Frame.....	1,843.96	83.63
	For >3 To 9, Deduct	-125.75	
	For >9, Deduct	-259.89	
32 94 43 00-0041	EA 36" x 60", 200 To 250 LB Cast Iron Tree Grate With Frame.....	1,881.22	83.63
	For >3 To 9, Deduct	-128.55	
	For >9, Deduct	-265.66	
32 94 43 00-0042	EA 36" x 72", 275 To 325 LB Cast Iron Tree Grate With Frame.....	2,298.12	104.54
	For >3 To 9, Deduct	-156.68	
	For >9, Deduct	-323.80	
32 94 43 00-0043	EA 48" x 72", Up To 350 LB Cast Iron Tree Grate With Frame.....	2,712.95	104.54
	For >3 To 9, Deduct	-187.79	
	For >9, Deduct	-388.10	
32 94 43 00-0044	EA 48" x 72", >350 LB Cast Iron Tree Grate With Frame.....	2,891.80	104.54
	For >3 To 9, Deduct	-201.20	
	For >9, Deduct	-415.82	
32 94 43 00-0045	EA 60" x 84", 700 To 750 LB Cast Iron Tree Grate With Frame.....	3,857.87	177.72
	For >3 To 9, Deduct	-262.68	
	For >9, Deduct	-542.88	

32 94 49 Plant and Tree Accessories (32 94)

32 94 49 00-0001	Tree Guying (32 94 49)		
32 94 49 00-0002	Tree Guying, Stakes (32 94 49 00-0001)		
	Note: Includes stakes, cross brace, double #12 gauge twisted wire and reinforced rubber hose tree wrap.		
32 94 49 00-0003	EA Tree Guying Up To 2" Caliper, 2 Stakes, Guy Wire And Wrap.....	25.32	
32 94 49 00-0004	EA Tree Guying 2" To 3" Caliper, 2 Stakes, Guy Wire And Wrap.....	45.97	
32 94 49 00-0005	EA Tree Guying 3" To 4" Caliper, 3 Stakes, Guy Wire And Wrap.....	78.98	
32 94 49 00-0006	Tree Guying, Anchors (32 94 49 00-0001)		
	Note: Includes arrowhead anchor, cable, turnbuckles and wrap or reinforced rubber hose.		
32 94 49 00-0007	EA Tree Guying Up To 3" Caliper, 3" Anchors And Polypropylene Flat Rope.....	104.94	
32 94 49 00-0008	EA Tree Guying 3" To 6" Caliper, 4" Anchors And Polypropylene Flat Rope.....	141.38	
32 94 49 00-0009	EA Tree Guying 6" To 8" Caliper, 6" Anchors And Polypropylene Flat Rope.....	180.23	
32 94 49 00-0010	EA Tree Guying 8" And Up Caliper, 8" Anchors And Polypropylene Flat Rope.....	234.10	
32 94 49 00-0011	Tree Wrap (32 94 49)		
32 94 49 00-0012	EA Tree Wrap, Up To 1" Caliper Applied Ground Level To First Branches Of Tree.....	7.36	
32 94 49 00-0013	EA Tree Wrap, 1" To 2" Caliper Applied Ground Level To First Branches Of Tree.....	12.24	
32 94 49 00-0014	EA Tree Wrap, >2" To 4" Caliper Applied Ground Level To First Branches Of Tree.....	24.27	
32 94 49 00-0015	EA Tree Wrap, >4" To 6" Caliper Applied Ground Level To First Branches Of Tree.....	37.59	
32 94 49 00-0016	Tree Guards (32 94 49)		
32 94 49 00-0017	EA 3' Preformed Plastic Tree Guard.....	14.53	
32 94 49 00-0018	EA 2' Preformed Plastic Tree Guard.....	12.76	
32 94 49 00-0019	Stake Out Tree And Shrub Locations (32 94 49)		
	Note: When no design available.		
32 94 49 00-0020	EA Stake Out Trees Or Shrubs.....	7.66	
32 94 49 00-0021	Root Barriers (32 94 49)		
32 94 49 00-0022	EA 12" High x 24" Long, 0.080" Polypropylene, Root Barrier Panel With Self Locking Joiner.....	12.92	
32 94 49 00-0023	EA 18" High x 24" Long, 0.080" Polypropylene, Root Barrier Panel With Self Locking Joiner.....	18.31	
32 94 49 00-0024	EA 24" High x 24" Long, 0.080" Polypropylene, Root Barrier Panel With Self Locking Joiner.....	21.63	
32 94 49 00-0025	EA 36" High x 24" Long, 0.080" Polypropylene, Root Barrier Panel With Self Locking Joiner.....	40.54	
32 94 49 00-0026	EA 48" High x 24" Long, 0.080" Polypropylene, Root Barrier Panel With Self Locking Joiner.....	56.00	

32 96 Transplanting (32 96)

See CSI section 32 94 49 00-0001 for guying.

32 96 33 Shrub Transplanting (32 96)

Note: Includes digging up, moving on site, digging new hole and replanting.

32 96 33 00-0001	Moving Shrubs On Site, Relocate (32 96 33)		
	Note: Includes digging up, moving on site, digging new hole and replanting. See CSI section 32 94 49 00-0001 for guying.		
32 96 33 00-0002	EA Up To 18" Root Ball, Move Shrubs On Site.....	83.00	
	For >25 To 50, Deduct	-8.30	
	For >50, Deduct	-12.45	
32 96 33 00-0003	EA >18" To 24" Root Ball, Move Shrubs On Site.....	112.30	
	For >25 To 50, Deduct	-11.23	
	For >50, Deduct	-16.85	
32 96 33 00-0004	EA >24" To 30" Root Ball, Move Shrubs On Site.....	190.41	
	For >25 To 50, Deduct	-19.04	
	For >50, Deduct	-28.56	



Exterior Improvements		32
Planting		32 90
Transplanting		32 96

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
32 96 33 00-0005 EA >30" To 36" Root Ball, Move Shrubs On Site	292.95	
<i>For >25 To 50, Deduct</i>	-29.30	
<i>For >50, Deduct</i>	-43.94	
32 96 43 Tree Transplanting (32 96)		
Note: Includes digging up, moving on site, digging new hole and replanting.		
32 96 43 00-0001 Moving Trees On Site, Relocate (32 96 43)		
Note: Includes digging up, moving on site, digging new hole and replanting. Excludes crane where necessary for trees over 20' tall. See CSI section 01 22 23 00-0776 for crane lifting equipment, 32 94 49 00-0001 for guying.		
32 96 43 00-0002 EA Up To 24" Root Ball, Move Trees On Site	312.50	
<i>For >5 To 10, Deduct</i>	-15.63	
<i>For >10 To 20, Deduct</i>	-31.25	
<i>For >20, Deduct</i>	-46.88	
32 96 43 00-0003 EA >24" To 30" Root Ball, Move Trees On Site.....	428.57	
<i>For >5 To 10, Deduct</i>	-21.43	
<i>For >10 To 20, Deduct</i>	-42.86	
<i>For >20, Deduct</i>	-64.29	
32 96 43 00-0004 EA >30" To 36" Root Ball, Move Trees On Site.....	694.43	
<i>For >5 To 10, Deduct</i>	-34.72	
<i>For >10 To 20, Deduct</i>	-69.44	
<i>For >20, Deduct</i>	-104.16	
32 96 43 00-0005 EA >36" To 48" Root Ball, Move Trees On Site.....	1,153.82	
<i>For >5 To 10, Deduct</i>	-57.69	
<i>For >10 To 20, Deduct</i>	-115.38	
<i>For >20, Deduct</i>	-173.07	
32 96 43 00-0006 EA >48" To 60" Root Ball, Move Trees On Site.....	1,874.97	
<i>For >5 To 10, Deduct</i>	-93.75	
<i>For >10 To 20, Deduct</i>	-187.50	
<i>For >20, Deduct</i>	-281.25	
32 96 43 00-0007 EA >60" To 72" Root Ball, Move Trees On Site.....	2,419.31	
<i>For >5 To 10, Deduct</i>	-120.97	
<i>For >10 To 20, Deduct</i>	-241.93	
<i>For >20, Deduct</i>	-362.90	
32 96 43 00-0008 EA >72" To 84" Root Ball, Move Trees On Site.....	3,124.95	
<i>For >5 To 10, Deduct</i>	-156.25	
<i>For >10 To 20, Deduct</i>	-312.50	
<i>For >20, Deduct</i>	-468.74	
32 96 43 00-0009 EA >84" To 96" Root Ball, Move Trees On Site.....	3,749.94	
<i>For >5 To 10, Deduct</i>	-187.50	
<i>For >10 To 20, Deduct</i>	-374.99	
<i>For >20, Deduct</i>	-562.49	
32 96 43 00-0010 EA >96" To 120" Root Ball, Move Trees On Site.....	4,261.29	
<i>For >5 To 10, Deduct</i>	-213.06	
<i>For >10 To 20, Deduct</i>	-426.13	
<i>For >20, Deduct</i>	-639.19	

END OF SECTION 32

32	32	Exterior Improvements
	32 90	Planting
	32 96	Transplanting



MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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Utilities	33	CS	
Operation and Maintenance of Utilities			33 01
Operation and Maintenance of Water Utilities			33 01 10

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 Utilities

Note: Buried plastic pipe and conduit includes detectable tracer wire

33 01 Operation and Maintenance of Utilities ⁽³³⁾

33 01 10 Operation and Maintenance of Water Utilities ^(33 01)

33 01 10 54 Cleaning of Water Utility Piping ^(33 01 10)

See CSI section 33 01 30 41-0012 for cleaning of water lines.

33 01 10 58 Disinfection of Water Utility Piping Systems ^(33 01 10)

33 01 10 58-0001 Water Main Disinfection/Sterilization ^(33 01 10 58)

Note: Gas chlorination. Continuous or plug method.

33 01 10 58-0002	EA	Setting Up And Removing Equipment For Water Main Disinfection/Sterilization, Gas Chlorination Method	1,105.15
33 01 10 58-0003	EA	Re-Set Up/Move Equipment For Water Main Disinfection/Sterilization, Gas Chlorination Method	552.58
33 01 10 58-0004	LF	Up To 4" Diameter Pipe Water Main Disinfection/Sterilization	0.42
		<i>For >250 To 500, Deduct</i>	-0.02
		<i>For >500 To 1,000, Deduct</i>	-0.04
		<i>For >1,000 To 2,000, Deduct</i>	-0.06
		<i>For >2,000 To 5,000, Deduct</i>	-0.08
		<i>For >5,000, Deduct</i>	-0.11
33 01 10 58-0005	LF	6" Diameter Pipe Water Main Disinfection/Sterilization	0.64
		<i>For >250 To 500, Deduct</i>	-0.03
		<i>For >500 To 1,000, Deduct</i>	-0.06
		<i>For >1,000 To 2,000, Deduct</i>	-0.10
		<i>For >2,000 To 5,000, Deduct</i>	-0.13
		<i>For >5,000, Deduct</i>	-0.16
33 01 10 58-0006	LF	8" Diameter Pipe Water Main Disinfection/Sterilization	0.83
		<i>For >250 To 500, Deduct</i>	-0.04
		<i>For >500 To 1,000, Deduct</i>	-0.08
		<i>For >1,000 To 2,000, Deduct</i>	-0.12
		<i>For >2,000 To 5,000, Deduct</i>	-0.17
		<i>For >5,000, Deduct</i>	-0.21
33 01 10 58-0007	LF	10" Diameter Pipe Water Main Disinfection/Sterilization	0.97
		<i>For >250 To 500, Deduct</i>	-0.05
		<i>For >500 To 1,000, Deduct</i>	-0.10
		<i>For >1,000 To 2,000, Deduct</i>	-0.15
		<i>For >2,000 To 5,000, Deduct</i>	-0.19
		<i>For >5,000, Deduct</i>	-0.24
33 01 10 58-0008	LF	12" Diameter Pipe Water Main Disinfection/Sterilization	1.28
		<i>For >250 To 500, Deduct</i>	-0.06
		<i>For >500 To 1,000, Deduct</i>	-0.13
		<i>For >1,000 To 2,000, Deduct</i>	-0.19
		<i>For >2,000 To 5,000, Deduct</i>	-0.26
		<i>For >5,000, Deduct</i>	-0.32

33 01 10 71 Relining Water Utilities Pipelines ^(33 01 10)

33 01 10 71-0001 Small Diameter Epoxy Coating Of Potable Water Piping ^(33 01 10 71)

Note: Includes buildings up to 2 stories and up to 80 total units. Excludes: Pre-existing holes, drywall patching, asbestos, lead paint, toxic mold, or other hazardous material abatement. See CSI section 02 80 00 00-0000 for hazardous material abatement, 09 01 20 91-0001 for cutting and patching drywall.

33 01 10 71-0002	EA	Epoxy Coating Of Potable Copper Water Piping, Complete Per Unit	20,015.91
		Note: Cold water main 1-1/4" or smaller, Hot water main 3/4" or smaller, Cold water shut off valve per 2 units or less, Hot water shut off each unit. One (1) bath unit (toilet bathroom sink, tub/shower), kitchen sink, and water heater. Includes: Epoxy coating of the pressurized hot and cold potable water. New ball valve type shut off valves for the hot and cold water supply piping. New chrome anglestops for sinks, toilets, and wash machines. New water flex connectors for water heaters, sinks, and toilets. New shower valve cartridge for major manufacturers. (Moen, Delta, Price Pfister, American Standard, Kohler, etc.). New hosebibbs with vacuum breakers. Excludes: Recirculating piping and pumps. Wash machine hoses and dishwasher hoses. Integral stops and balancing side spools. (Can't identify if it's there unless trim plates are removed and qualified individual looks at the rough shower valve.) Use modifier for additional fixtures (Laundry Rooms, community rooms, pool buildings, etc.) attached to the building being restored or within 75 ft of the building being restored.	
		<i>For Additional Fixtures (Water Heater, Sink, Automatic Washer, Toilet, Hose Bibb, etc), Add Per Each</i>	3,689.61
		<i>For Additional Patching (Excludes: Pre-existing holes, asbestos, lead paint, toxic mold, or other hazardous material abatement), Add Per Each</i>	600.48

33 Utilities**33 01 Operation and Maintenance of Utilities****33 01 10 Operation and Maintenance of Water Utilities**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 01 10 71-0003	EA	Epoxy Coating Of Potable Copper Water Piping, Complete Per Unit .....21,536.39 Note: Cold water main up to 3", Hot water main up to 3", Hot water recirculation piping up to 1- 1/4". (1)Cold water shut off valve common for all units. Piping is located in ceiling of one of the floors or in subterranean garage, not under slab of ground floor (on slab building). The main piping is to be accessible, if needed drywall holes to be cut to access pipe and install valves for isolation in order to break system up into daily restoration tasks. (1)Hot water shut off valve common for all units. (1) Hot water recirculating system. Piping is located in ceiling of one of the floors or in subterranean garage, not under slab of ground floor (on slab building). The main piping is to be accessible, if needed drywall holes to be cut to access pipe and install valves for isolation in order to break system up into daily restoration tasks. 1 bath units (toilet bathroom sink, tub/shower), and kitchen sink. Includes: Epoxy coating of the pressurized hot and cold potable water. Excludes: Piping between tank and water heater/boiler and pumps. Includes: New ball valve type shut off valves for the hot and cold water supply piping. New chrome anglestops for sinks, toilets, and wash machines. New water flex connectors for water heaters, sinks, and toilets. Excludes: Wash machine hoses and dishwasher hoses Includes: New shower valve cartridge for major mfrs. (Moen, Delta, Price Pfister, American Standard, Kohler, etc.) Excludes: Integral stops and balancing side spools. (Can't identify if it's there unless trim plates are removed and qualified individual looks at the rough shower valve.) Includes: New hose bibbs with vacuum breakers Use modifier for additional fixtures (Laundry Rooms, community rooms, pool buildings, etc.) attached to the building being restored or within 75 ft of the building being restored.	
		<i>For Additional Fixtures (Water Heater, Sink, Automatic Washer, Toilet, Hose Bibb, etc), Add Per Each</i>	3,689.61
		<i>For Additional Patching (Excludes: Pre-existing holes, asbestos, lead paint, toxic mold, or other hazardous material abatement), Add Per Each</i>	646.09

33 01 30 Operation and Maintenance of Sewer Utilities (33 01)**33 01 30 11 Television Inspection Of Pipelines (33 01 30)**

Note: Rotating head color camera. Includes all log records and color video tape, DVD or CD.

33 01 30 11-0001 Remote Visual Inspection (RVI) Of Pipe Interior And Culverts (33 01 30 11)**33 01 30 11-0002 Video Camera Set-up (33 01 30 11-0001)**

Note: A "push camera" is a straight view camera at the end of a rigid push rod for 1" to 12" diameter pipes for distances up to 300 feet. Crawlers are generally remotely operated vehicles (ROVs) for longer distances (over 300') and for larger diameters (4" and larger).

33 01 30 11-0003	EA	Initial Set Up For "Push Camera" Video Camera Inspection, 1" To 12" Diameter Pipe Or Culvert	949.00
33 01 30 11-0004	EA	Initial Set Up For "Crawler" Video Camera Inspection, 4" To 30" Diameter Pipe Or Culvert.....	1,898.01
33 01 30 11-0005	EA	Initial Set Up For "Crawler" Video Camera Inspection, >30" Diameter Pipe Or Culvert.....	2,847.01
33 01 30 11-0006	EA	Re-Set Up/Move For "Push Camera" Video Camera Inspection, 1" To 12" Diameter Pipe Or Culvert.....	474.50
33 01 30 11-0007	EA	Re-Set Up/Move For "Crawler" Video Camera Inspection, 4" And Larger Diameter Pipe Or Culvert	949.00

33 01 30 11-0008 Video Camera Planning And Analysis Inspection (33 01 30 11-0001)

Note: For pipe interior and culverts.

33 01 30 11-0009	LF	4" To 6" Diameter Pipe Inspection, Planning/Analysis Phase.....2.40 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-0.24
		<i>For >1,000 To 5,000, Deduct</i>	-0.60
		<i>For >5,000, Deduct</i>	-0.84
33 01 30 11-0010	LF	>6" To 12" Diameter Pipe Inspection, Planning/Analysis Phase.....3.21 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-0.32
		<i>For >1,000 To 5,000, Deduct</i>	-0.80
		<i>For >5,000, Deduct</i>	-1.12
33 01 30 11-0011	LF	>12" To 21" Diameter Pipe Inspection, Planning/Analysis Phase.....4.01 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-0.40
		<i>For >1,000 To 5,000, Deduct</i>	-1.00
		<i>For >5,000, Deduct</i>	-1.40
33 01 30 11-0012	LF	>21" To 30" Diameter Pipe Inspection, Planning/Analysis Phase.....5.34 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-0.53
		<i>For >1,000 To 5,000, Deduct</i>	-1.34
		<i>For >5,000, Deduct</i>	-1.87
33 01 30 11-0013	LF	>30" To 42" Diameter Pipe Inspection, Planning/Analysis Phase.....7.51 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-0.75
		<i>For >1,000 To 5,000, Deduct</i>	-1.88
		<i>For >5,000, Deduct</i>	-2.63
33 01 30 11-0014	LF	>42" To 60" Diameter Pipe Inspection, Planning/Analysis Phase.....10.03 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-1.00
		<i>For >1,000 To 5,000, Deduct</i>	-2.51
		<i>For >5,000, Deduct</i>	-3.51
33 01 30 11-0015	LF	>60" To 72" Diameter Pipe Inspection, Planning/Analysis Phase.....14.15 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-1.42
		<i>For >1,000 To 5,000, Deduct</i>	-3.54
		<i>For >5,000, Deduct</i>	-4.95
33 01 30 11-0016	LF	>72" To 84" Diameter Pipe Inspection, Planning/Analysis Phase.....20.05 Note: CCTV inspection of pipe interior.	
		<i>For >500 To 1,000, Deduct</i>	-2.01
		<i>For >1,000 To 5,000, Deduct</i>	-5.01
		<i>For >5,000, Deduct</i>	-7.02

33 01 30 11-0017 Video Camera Pre-Rehab For Pipe Interior And Culverts (33 01 30 11-0001)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 11-0018 LF 4" To 6" Diameter Pipe Inspection, Pre-Rehabilitation Phase 3.56 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.36 <i>For >1,000 To 5,000, Deduct</i> -0.89 <i>For >5,000, Deduct</i> -1.25		
33 01 30 11-0019 LF >6" To 12" Diameter Pipe Inspection, Pre-Rehabilitation Phase 4.75 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.48 <i>For >1,000 To 5,000, Deduct</i> -1.19 <i>For >5,000, Deduct</i> -1.66		
33 01 30 11-0020 LF >12" To 21" Diameter Pipe Inspection, Pre-Rehabilitation Phase 5.94 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.59 <i>For >1,000 To 5,000, Deduct</i> -1.49 <i>For >5,000, Deduct</i> -2.08		
33 01 30 11-0021 LF >21" To 30" Diameter Pipe Inspection, Pre-Rehabilitation Phase 7.91 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.79 <i>For >1,000 To 5,000, Deduct</i> -1.98 <i>For >5,000, Deduct</i> -2.77		
33 01 30 11-0022 LF >30" To 42" Diameter Pipe Inspection, Pre-Rehabilitation Phase 11.12 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -1.11 <i>For >1,000 To 5,000, Deduct</i> -2.78 <i>For >5,000, Deduct</i> -3.89		
33 01 30 11-0023 LF >42" To 60" Diameter Pipe Inspection, Pre-Rehabilitation Phase 14.83 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -1.48 <i>For >1,000 To 5,000, Deduct</i> -3.71 <i>For >5,000, Deduct</i> -5.19		
33 01 30 11-0024 LF >60" To 72" Diameter Pipe Inspection, Pre-Rehabilitation Phase 20.94 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -2.09 <i>For >1,000 To 5,000, Deduct</i> -5.24 <i>For >5,000, Deduct</i> -7.33		
33 01 30 11-0025 LF >72" To 84" Diameter Pipe Inspection, Pre-Rehabilitation Phase 29.66 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -2.97 <i>For >1,000 To 5,000, Deduct</i> -7.42 <i>For >5,000, Deduct</i> -10.38		
33 01 30 11-0026 Video Camera Post-Rehab For Pipe Interior And Culverts (33 01 30 11-0001) 2.54		
33 01 30 11-0027 LF 4" To 6" Diameter Pipe Inspection, Post-Rehabilitation Phase 2.54 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.25 <i>For >1,000 To 5,000, Deduct</i> -0.64 <i>For >5,000, Deduct</i> -0.89		
33 01 30 11-0028 LF >6" To 12" Diameter Pipe Inspection, Post-Rehabilitation Phase 3.39 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.34 <i>For >1,000 To 5,000, Deduct</i> -0.85 <i>For >5,000, Deduct</i> -1.19		
33 01 30 11-0029 LF >12" To 21" Diameter Pipe Inspection, Post-Rehabilitation Phase 4.23 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.42 <i>For >1,000 To 5,000, Deduct</i> -1.06 <i>For >5,000, Deduct</i> -1.48		
33 01 30 11-0030 LF >21" To 30" Diameter Pipe Inspection, Post-Rehabilitation Phase 5.65 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.57 <i>For >1,000 To 5,000, Deduct</i> -1.41 <i>For >5,000, Deduct</i> -1.98		
33 01 30 11-0031 LF >30" To 42" Diameter Pipe Inspection, Post-Rehabilitation Phase 7.94 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -0.79 <i>For >1,000 To 5,000, Deduct</i> -1.99 <i>For >5,000, Deduct</i> -2.78		
33 01 30 11-0032 LF >42" To 60" Diameter Pipe Inspection, Post-Rehabilitation Phase 10.60 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -1.06 <i>For >1,000 To 5,000, Deduct</i> -2.65 <i>For >5,000, Deduct</i> -3.71		
33 01 30 11-0033 LF >60" To 72" Diameter Pipe Inspection, Post-Rehabilitation Phase 14.95 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -1.50 <i>For >1,000 To 5,000, Deduct</i> -3.74 <i>For >5,000, Deduct</i> -5.23		
33 01 30 11-0034 LF >72" To 84" Diameter Pipe Inspection, Post-Rehabilitation Phase 21.18 Note: CCTV inspection of pipe interior. <i>For >500 To 1,000, Deduct</i> -2.12 <i>For >1,000 To 5,000, Deduct</i> -5.30 <i>For >5,000, Deduct</i> -7.41		

33 01 30 41 Cleaning of Sewers (33 01 30)

33 Utilities
33 01 Operation and Maintenance of Utilities
33 01 30 Operation and Maintenance of Sewer Utilities



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 01 30 41-0001			Pipe Line Cleaning And Flushing <small>(33 01 30 41)</small> Note: Includes flushing. Owner provided water.		
33 01 30 41-0002			Pipe Line Cleaning <small>(33 01 30 41-0001)</small> Note: Includes removal of all debris/waste. Excludes disposal.		
33 01 30 41-0003			Hydro Jet Set-up And Reinsertion <small>(33 01 30 41-0002)</small> Note: Includes mobilization delivery, set-up, clean-up after use and return.		
33 01 30 41-0004	EA		Initial Set Up And Final Equipment Removal For Up To 8" Jet Cleaning	1,467.28	
33 01 30 41-0005	EA		Initial Set Up And Final Equipment Removal For >8" To 12" Jet Cleaning	2,200.91	
33 01 30 41-0006	EA		Initial Set Up And Final Equipment Removal For >12" To 30" Jet Cleaning	2,934.56	
33 01 30 41-0007	EA		Initial Set Up And Final Equipment Removal For >30" Jet Cleaning	3,912.73	
33 01 30 41-0008	EA		Move And Reset Up At Different Access/Location For Up To 8" Jet Cleaning	366.82	
33 01 30 41-0009	EA		Move And Reset Up At Different Access/Location For >8" To 12" Jet Cleaning	550.23	
33 01 30 41-0010	EA		Move And Reset Up At Different Access/Location For >12" To 30" Jet Cleaning	733.63	
33 01 30 41-0011	EA		Move And Reset Up At Different Access/Location For >30" Jet Cleaning	917.05	

33 01 30 41-0012			Hydro Jet Cleaning Of Sewer And Water Pipelines <small>(33 01 30 41-0002)</small>		
33 01 30 41-0013	LF		Up To 4" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	3.94	
			<i>For >250 To 500, Deduct</i>	-0.20	
			<i>For >500 To 1,000, Deduct</i>	-0.39	
			<i>For >1,000 To 2,000, Deduct</i>	-0.59	
			<i>For >2,000 To 5,000, Deduct</i>	-0.79	
			<i>For >5,000, Deduct</i>	-0.99	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	2.96	
33 01 30 41-0014	LF		6" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	4.53	
			<i>For >250 To 500, Deduct</i>	-0.23	
			<i>For >500 To 1,000, Deduct</i>	-0.45	
			<i>For >1,000 To 2,000, Deduct</i>	-0.68	
			<i>For >2,000 To 5,000, Deduct</i>	-0.91	
			<i>For >5,000, Deduct</i>	-1.13	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	3.40	
33 01 30 41-0015	LF		8" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	5.32	
			<i>For >250 To 500, Deduct</i>	-0.27	
			<i>For >500 To 1,000, Deduct</i>	-0.53	
			<i>For >1,000 To 2,000, Deduct</i>	-0.80	
			<i>For >2,000 To 5,000, Deduct</i>	-1.06	
			<i>For >5,000, Deduct</i>	-1.33	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	3.99	
33 01 30 41-0016	LF		10" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	6.57	
			<i>For >250 To 500, Deduct</i>	-0.33	
			<i>For >500 To 1,000, Deduct</i>	-0.66	
			<i>For >1,000 To 2,000, Deduct</i>	-0.99	
			<i>For >2,000 To 5,000, Deduct</i>	-1.31	
			<i>For >5,000, Deduct</i>	-1.64	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	4.93	
33 01 30 41-0017	LF		12" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	7.45	
			<i>For >250 To 500, Deduct</i>	-0.37	
			<i>For >500 To 1,000, Deduct</i>	-0.75	
			<i>For >1,000 To 2,000, Deduct</i>	-1.12	
			<i>For >2,000 To 5,000, Deduct</i>	-1.49	
			<i>For >5,000, Deduct</i>	-1.86	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	5.59	
33 01 30 41-0018	LF		>12" To 16" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	8.61	
			<i>For >250 To 500, Deduct</i>	-0.43	
			<i>For >500 To 1,000, Deduct</i>	-0.86	
			<i>For >1,000 To 2,000, Deduct</i>	-1.29	
			<i>For >2,000 To 5,000, Deduct</i>	-1.72	
			<i>For >5,000, Deduct</i>	-2.15	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	6.46	
33 01 30 41-0019	LF		>16" To 24" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	10.37	
			<i>For >250 To 500, Deduct</i>	-0.52	
			<i>For >500 To 1,000, Deduct</i>	-1.04	
			<i>For >1,000 To 2,000, Deduct</i>	-1.56	
			<i>For >2,000 To 5,000, Deduct</i>	-2.07	
			<i>For >5,000, Deduct</i>	-2.59	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	7.78	
33 01 30 41-0020	LF		>24" To 30" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	11.75	
			<i>For >250 To 500, Deduct</i>	-0.59	
			<i>For >500 To 1,000, Deduct</i>	-1.18	
			<i>For >1,000 To 2,000, Deduct</i>	-1.76	
			<i>For >2,000 To 5,000, Deduct</i>	-2.35	
			<i>For >5,000, Deduct</i>	-2.94	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	8.81	
33 01 30 41-0021	LF		>30" To 42" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	13.90	
			<i>For >250 To 500, Deduct</i>	-0.70	
			<i>For >500 To 1,000, Deduct</i>	-1.39	
			<i>For >1,000 To 2,000, Deduct</i>	-2.09	
			<i>For >2,000 To 5,000, Deduct</i>	-2.78	
			<i>For >5,000, Deduct</i>	-3.48	
			<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	10.43	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 41-0022 LF >42" To 60" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes.....	17.46	
<i>For >250 To 500, Deduct</i>	-0.87	
<i>For >500 To 1,000, Deduct</i>	-1.75	
<i>For >1,000 To 2,000, Deduct</i>	-2.62	
<i>For >2,000 To 5,000, Deduct</i>	-3.49	
<i>For >5,000, Deduct</i>	-4.37	
<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	13.10	
33 01 30 41-0023 LF >60" Diameter Pipe Line Cleaning, Hydro Jetting Method, Light Cleaning - 3 Passes	20.38	
<i>For >250 To 500, Deduct</i>	-1.02	
<i>For >500 To 1,000, Deduct</i>	-2.04	
<i>For >1,000 To 2,000, Deduct</i>	-3.06	
<i>For >2,000 To 5,000, Deduct</i>	-4.08	
<i>For >5,000, Deduct</i>	-5.10	
<i>For Heavy Cleaning, >4 Passes (Includes Attached Mechanical Device), Add</i>	15.29	
33 01 30 41-0024 Flushing Of Storm Water Pipelines (33 01 30 41-0002)		
Note: To remove silt and small debris from storm drainage pipes. Excludes disposal.		
33 01 30 41-0025 LF 12" To 16" Diameter Pipe Line Flushing	1.57	
<i>For >250 To 500, Deduct</i>	-0.08	
<i>For >500 To 1,000, Deduct</i>	-0.16	
<i>For >1,000 To 2,000, Deduct</i>	-0.24	
<i>For >2,000 To 5,000, Deduct</i>	-0.31	
<i>For >5,000, Deduct</i>	-0.39	
33 01 30 41-0026 LF >16" To 24" Diameter Pipe Line Flushing	1.80	
<i>For >250 To 500, Deduct</i>	-0.09	
<i>For >500 To 1,000, Deduct</i>	-0.18	
<i>For >1,000 To 2,000, Deduct</i>	-0.27	
<i>For >2,000 To 5,000, Deduct</i>	-0.36	
<i>For >5,000, Deduct</i>	-0.45	
33 01 30 41-0027 LF >24" To 30" Diameter Pipe Line Flushing	2.12	
<i>For >250 To 500, Deduct</i>	-0.11	
<i>For >500 To 1,000, Deduct</i>	-0.21	
<i>For >1,000 To 2,000, Deduct</i>	-0.32	
<i>For >2,000 To 5,000, Deduct</i>	-0.42	
<i>For >5,000, Deduct</i>	-0.53	
33 01 30 41-0028 LF >30" To 42" Diameter Pipe Line Flushing	2.43	
<i>For >250 To 500, Deduct</i>	-0.12	
<i>For >500 To 1,000, Deduct</i>	-0.24	
<i>For >1,000 To 2,000, Deduct</i>	-0.36	
<i>For >2,000 To 5,000, Deduct</i>	-0.49	
<i>For >5,000, Deduct</i>	-0.61	
33 01 30 41-0029 LF >42" To 60" Diameter Pipe Line Flushing	3.24	
<i>For >250 To 500, Deduct</i>	-0.16	
<i>For >500 To 1,000, Deduct</i>	-0.32	
<i>For >1,000 To 2,000, Deduct</i>	-0.49	
<i>For >2,000 To 5,000, Deduct</i>	-0.65	
<i>For >5,000, Deduct</i>	-0.81	
33 01 30 41-0030 Hydro Jet Cleaning Of Culverts (33 01 30 41-0002)		
33 01 30 41-0031 LF Jet Cleaning Of Culvert, 0-250 LF	18.24	
<i>For >250 To 500, Deduct</i>	-0.91	
<i>For >500 To 1,000, Deduct</i>	-1.82	
<i>For >1,000 To 2,000, Deduct</i>	-2.74	
<i>For >2,000 To 5,000, Deduct</i>	-3.65	
<i>For >5,000, Deduct</i>	-4.56	
33 01 30 41-0032 Pipe Line Cleaning, Mechanical Method (33 01 30 41-0001)		
Note: Power winching buckets, scrapers, scooters, porcupines, brushes and other debris removing equipment. Includes removal of all debris/waste. Excludes disposal.		
33 01 30 41-0033 EA Initial Set Up And Final Equipment Removal For Mechanical Cleaning.....	1,326.18	
33 01 30 41-0034 EA Move And Reset Up At Different Access/Location.....	442.06	
33 01 30 41-0035 LF Up To 4" Diameter Pipe Line Cleaning, Mechanical Method	7.67	
<i>For >250 To 500, Deduct</i>	-0.37	
<i>For >500 To 1,000, Deduct</i>	-0.74	
<i>For >1,000 To 2,000, Deduct</i>	-1.11	
<i>For >2,000 To 5,000, Deduct</i>	-1.47	
<i>For >5,000, Deduct</i>	-1.84	
33 01 30 41-0036 LF 6" Diameter Pipe Line Cleaning, Mechanical Method.....	10.08	
<i>For >250 To 500, Deduct</i>	-0.47	
<i>For >500 To 1,000, Deduct</i>	-0.95	
<i>For >1,000 To 2,000, Deduct</i>	-1.42	
<i>For >2,000 To 5,000, Deduct</i>	-1.90	
<i>For >5,000, Deduct</i>	-2.37	
33 01 30 41-0037 LF 8" Diameter Pipe Line Cleaning, Mechanical Method.....	11.80	
<i>For >250 To 500, Deduct</i>	-0.55	
<i>For >500 To 1,000, Deduct</i>	-1.11	
<i>For >1,000 To 2,000, Deduct</i>	-1.66	
<i>For >2,000 To 5,000, Deduct</i>	-2.21	
<i>For >5,000, Deduct</i>	-2.76	

33 Utilities**33 01 Operation and Maintenance of Utilities****33 01 30 Operation and Maintenance of Sewer Utilities**

Los Angeles County Development Authority

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 41-0038 LF 10" Diameter Pipe Line Cleaning, Mechanical Method	13.65	
For >250 To 500, Deduct	-0.64	
For >500 To 1,000, Deduct	-1.28	
For >1,000 To 2,000, Deduct	-1.91	
For >2,000 To 5,000, Deduct	-2.55	
For >5,000, Deduct	-3.19	
33 01 30 41-0039 LF 12" Diameter Pipe Line Cleaning, Mechanical Method	14.86	
For >250 To 500, Deduct	-0.69	
For >500 To 1,000, Deduct	-1.38	
For >1,000 To 2,000, Deduct	-2.07	
For >2,000 To 5,000, Deduct	-2.76	
For >5,000, Deduct	-3.45	
33 01 30 41-0040 Pipe Line Auguring/Rod Out Pipe (33 01 30 41-0001)		
33 01 30 41-0041 EA Initial Set Up And Final Equipment Removal For Auguring.....	1,326.18	
33 01 30 41-0042 EA Move And Reset Up At Different Location	442.06	
33 01 30 41-0043 LF Up To 4" Diameter Pipe Line Auguring/Rod Out.....	4.42	
For >250 To 500, Deduct	-0.22	
For >500 To 1,000, Deduct	-0.44	
For >1,000 To 2,000, Deduct	-0.66	
For >2,000 To 5,000, Deduct	-0.88	
For >5,000, Deduct	-1.11	
33 01 30 41-0044 LF 6" Diameter Pipe Line Auguring/Rod Out	5.71	
For >250 To 500, Deduct	-0.29	
For >500 To 1,000, Deduct	-0.57	
For >1,000 To 2,000, Deduct	-0.86	
For >2,000 To 5,000, Deduct	-1.14	
For >5,000, Deduct	-1.43	
33 01 30 41-0045 LF 8" Diameter Pipe Line Auguring/Rod Out	6.63	
For >250 To 500, Deduct	-0.33	
For >500 To 1,000, Deduct	-0.66	
For >1,000 To 2,000, Deduct	-0.99	
For >2,000 To 5,000, Deduct	-1.33	
For >5,000, Deduct	-1.66	
33 01 30 41-0046 LF 10" Diameter Pipe Line Auguring/Rod Out	7.72	
For >250 To 500, Deduct	-0.39	
For >500 To 1,000, Deduct	-0.77	
For >1,000 To 2,000, Deduct	-1.16	
For >2,000 To 5,000, Deduct	-1.54	
For >5,000, Deduct	-1.93	
33 01 30 41-0047 LF 12" Diameter Pipe Line Auguring/Rod Out	8.29	
For >250 To 500, Deduct	-0.41	
For >500 To 1,000, Deduct	-0.83	
For >1,000 To 2,000, Deduct	-1.24	
For >2,000 To 5,000, Deduct	-1.66	
For >5,000, Deduct	-2.07	
33 01 30 41-0048 LF >12" To 16" Diameter Pipe Line Auguring/Rod Out	9.48	
For >250 To 500, Deduct	-0.47	
For >500 To 1,000, Deduct	-0.95	
For >1,000 To 2,000, Deduct	-1.42	
For >2,000 To 5,000, Deduct	-1.90	
For >5,000, Deduct	-2.37	
33 01 30 41-0049 LF >16" To 24" Diameter Pipe Line Auguring/Rod Out	11.63	
For >250 To 500, Deduct	-0.58	
For >500 To 1,000, Deduct	-1.16	
For >1,000 To 2,000, Deduct	-1.74	
For >2,000 To 5,000, Deduct	-2.33	
For >5,000, Deduct	-2.91	
33 01 30 41-0050 LF >24" To 30" Diameter Pipe Line Auguring/Rod Out	13.00	
For >250 To 500, Deduct	-0.65	
For >500 To 1,000, Deduct	-1.30	
For >1,000 To 2,000, Deduct	-1.95	
For >2,000 To 5,000, Deduct	-2.60	
For >5,000, Deduct	-3.25	
33 01 30 41-0051 LF >30" To 42" Diameter Pipe Line Auguring/Rod Out	15.07	
For >250 To 500, Deduct	-0.75	
For >500 To 1,000, Deduct	-1.51	
For >1,000 To 2,000, Deduct	-2.26	
For >2,000 To 5,000, Deduct	-3.01	
For >5,000, Deduct	-3.77	
33 01 30 41-0052 LF >42 To 60" Diameter Pipe Line Auguring/Rod Out	20.72	
For >250 To 500, Deduct	-1.04	
For >500 To 1,000, Deduct	-2.07	
For >1,000 To 2,000, Deduct	-3.11	
For >2,000 To 5,000, Deduct	-4.14	
For >5,000, Deduct	-5.18	
33 01 30 41-0053 LF >60" Diameter Pipe Line Auguring/Rod Out	22.11	
For >250 To 500, Deduct	-1.11	
For >500 To 1,000, Deduct	-2.21	
For >1,000 To 2,000, Deduct	-3.32	
For >2,000 To 5,000, Deduct	-4.42	
For >5,000, Deduct	-5.53	

33 01 30 42 Cleaning of Manholes (33 01 30)

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 42-0001		Structure Cleaning And Flushing (33 01 30 42) Note: Includes flushing. Owner provided water.		
33 01 30 42-0002		Rod Out Structures And Other Hand Operations (33 01 30 42-0001)		
33 01 30 42-0003	EA	Rod Out Waste Water Drain	52.91	
33 01 30 42-0004	EA	Rod Out Sewer Catch Basin	105.81	
33 01 30 42-0005	EA	Up To 6" Diameter Pipe, Rod Out Blockage	21.16	
33 01 30 42-0006	EA	8" Diameter Pipe, Rod Out Blockage	23.28	
33 01 30 42-0007	EA	10" Diameter Pipe, Rod Out Blockage	26.45	
33 01 30 42-0008	EA	12" Diameter Pipe, Rod Out Blockage	30.69	
33 01 30 42-0009	EA	>12" To 16" Diameter Pipe, Rod Out Blockage	35.98	
33 01 30 42-0010	EA	>16" To 24" Diameter Pipe, Rod Out Blockage	42.33	
33 01 30 42-0011	EA	>24" To 30" Diameter Pipe, Rod Out Blockage	49.74	
33 01 30 42-0012	EA	>30" To 42" Diameter Pipe, Rod Out Blockage	57.14	
33 01 30 42-0013	EA	>42" To 60" Diameter Pipe, Rod Out Blockage	66.67	
33 01 30 42-0014	EA	>60" Diameter Pipe, Rod Out Blockage	79.36	
33 01 30 42-0015	EA	Clean Out Debris From Entrance To Inlet Structure	264.54	
33 01 30 42-0016	EA	3' To 4' Diameter, Clean Out Blocked Manhole By Hand	972.16	
		<i>For >10 To 100, Deduct</i>	-145.82	
		<i>For >100 To 250, Deduct</i>	-218.74	
		<i>For >250, Deduct</i>	-291.65	
33 01 30 42-0017	EA	5' To 6' Diameter, Clean Out Blocked Manhole By Hand	1,166.58	
		<i>For >10 To 100, Deduct</i>	-174.99	
		<i>For >100 To 250, Deduct</i>	-262.48	
		<i>For >250, Deduct</i>	-349.97	
33 01 30 42-0018	EA	Clean Out Blocked Catch Basin By Hand	583.29	
		<i>For >10 To 100, Deduct</i>	-87.49	
		<i>For >100 To 250, Deduct</i>	-131.24	
		<i>For >250, Deduct</i>	-174.99	
33 01 30 42-0019		Cleaning Manholes And Drainage Structures With Jet/Vacuum (33 01 30 42-0001) Note: Includes the removal of debris with high pressure water jetting and vacuum equipment and cleaning of grate. Excludes hardened concrete debris and disposal of material.		
33 01 30 42-0020	EA	Jet/Vacuum Clean 1 To 2 Catch Basins Or Manholes	298.49	
33 01 30 42-0021	EA	Jet/Vacuum Clean 3 To 10 Catch Basins Or Manholes	277.49	
33 01 30 42-0022	EA	Jet/Vacuum Clean 11 To 25 Catch Basins Or Manholes	256.48	
33 01 30 42-0023	EA	Jet/Vacuum Clean 26 To 100 Catch Basins Or Manholes	235.48	
33 01 30 42-0024	EA	Jet/Vacuum Clean 101 To 250 Catch Basins Or Manholes	214.48	
33 01 30 42-0025	EA	Jet/Vacuum Clean >250 Catch Basins Or Manholes	193.48	
33 01 30 51		Maintenance of Utilities (33 01 30)		
33 01 30 51-0001		Pipe Repair (33 01 30 51) Note: Excludes excavation and backfill where required See CSI section 31 23 00 00-0000 for excavation and backfill.		
33 01 30 51-0002		Pipe Repair Clamp, Full Circle, Single Band (33 01 30 51-0001) Note: Repair clamps for asbestos cement pipe, cast iron soil pipe, non-reinforced concrete pipe, PVC pipe, vitrified clay pipe, gray iron pipe and ductile iron pipe.		
33 01 30 51-0003	EA	2" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	127.62	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	20.64	
33 01 30 51-0004	EA	2" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	181.15	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	31.10	
33 01 30 51-0005	EA	2" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	209.21	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	36.63	
33 01 30 51-0006	EA	2" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	238.31	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	42.14	
33 01 30 51-0007	EA	2-1/2" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	137.64	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	22.41	
33 01 30 51-0008	EA	2-1/2" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	192.53	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	33.19	
33 01 30 51-0009	EA	2-1/2" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	220.59	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	38.59	
33 01 30 51-0010	EA	2-1/2" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	254.86	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	45.15	
33 01 30 51-0011	EA	3" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	147.95	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	24.52	
33 01 30 51-0012	EA	3" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	200.24	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	34.70	
33 01 30 51-0013	EA	3" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	231.43	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	40.68	
33 01 30 51-0014	EA	3" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	269.71	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	48.30	
33 01 30 51-0015	EA	4" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	166.67	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	27.88	
33 01 30 51-0016	EA	4" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	220.04	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	37.53	
33 01 30 51-0017	EA	4" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	266.82	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	45.68	
33 01 30 51-0018	EA	4" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226)	321.44	
		<i>For Stainless Steel Nuts And Bolts, Add</i>	55.11	

33 Utilities**33 01 Operation and Maintenance of Utilities****33 01 30 Operation and Maintenance of Sewer Utilities**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 01 30 51-0019	EA		4" Diameter, 20" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	420.04 74.02	
33 01 30 51-0020	EA		4" Diameter, 25" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	522.46 92.93	
33 01 30 51-0021	EA		4" Diameter, 30" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	637.31 113.99	
33 01 30 51-0022	EA		6" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	195.91 32.90	
33 01 30 51-0023	EA		6" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	260.12 44.63	
33 01 30 51-0024	EA		6" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	308.11 52.62	
33 01 30 51-0025	EA		6" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	361.04 61.15	
33 01 30 51-0026	EA		6" Diameter, 20" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	499.46 88.61	
33 01 30 51-0027	EA		6" Diameter, 25" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	607.26 108.06	
33 01 30 51-0028	EA		6" Diameter, 30" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	725.30 129.12	
33 01 30 51-0029	EA		8" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	255.71 39.36	
33 01 30 51-0030	EA		8" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	332.17 52.08	
33 01 30 51-0031	EA		8" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	400.91 63.02	
33 01 30 51-0032	EA		8" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	478.78 75.10	
33 01 30 51-0033	EA		8" Diameter, 20" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	635.28 104.04	
33 01 30 51-0034	EA		8" Diameter, 25" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	759.81 124.41	
33 01 30 51-0035	EA		8" Diameter, 30" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	899.95 146.43	
33 01 30 51-0036	EA		10" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	299.21 47.90	
33 01 30 51-0037	EA		10" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	401.75 66.26	
33 01 30 51-0038	EA		10" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	473.24 77.47	
33 01 30 51-0039	EA		10" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	580.52 95.82	
33 01 30 51-0040	EA		10" Diameter, 20" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	761.76 129.97	
33 01 30 51-0041	EA		10" Diameter, 25" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	867.38 145.27	
33 01 30 51-0042	EA		10" Diameter, 30" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	1,115.58 191.65	
33 01 30 51-0043	EA		12" Diameter, 7-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	340.65 54.03	
33 01 30 51-0044	EA		12" Diameter, 10" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	444.61 71.86	
33 01 30 51-0045	EA		12" Diameter, 12-1/2" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	536.68 86.96	
33 01 30 51-0046	EA		12" Diameter, 15" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	660.12 108.06	
33 01 30 51-0047	EA		12" Diameter, 20" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	848.93 142.72	
33 01 30 51-0048	EA		12" Diameter, 25" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	998.50 166.67	
33 01 30 51-0049	EA		12" Diameter, 30" Long, Pipe Repair Clamp, Single Band With Alloy Bolts And Nuts (Smith-Blair 226) <i>For Stainless Steel Nuts And Bolts, Add</i>	1,268.43 216.11	

33 01 30 51-0050 Pipe Repair Clamp, Full Circle, Double Bands (33 01 30 51-0001)

Note: Repair clamps for reinforced concrete pipe, gray iron pipe and ductile iron pipe.

33 01 30 51-0051	EA		14.38" To 15.13" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228) <i>For Stainless Steel Nuts And Bolts, Add</i>	755.25 207.89	
33 01 30 51-0052	EA		14.38" To 15.13" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228) <i>For Stainless Steel Nuts And Bolts, Add</i>	1,070.17 300.12	
33 01 30 51-0053	EA		14.38" To 15.13" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228) <i>For Stainless Steel Nuts And Bolts, Add</i>	1,440.77 407.00	
33 01 30 51-0054	EA		14.38" To 15.13" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228) <i>For Stainless Steel Nuts And Bolts, Add</i>	2,120.88 613.43	
33 01 30 51-0055	EA		15.07" To 15.82" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228) <i>For Stainless Steel Nuts And Bolts, Add</i>	792.74 218.12	
33 01 30 51-0056	EA		15.07" To 15.82" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228) <i>For Stainless Steel Nuts And Bolts, Add</i>	1,120.28 314.03	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 51-0057 EA 15.07" To 15.82" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,504.58	
<i>For Stainless Steel Nuts And Bolts, Add</i>	424.56	
33 01 30 51-0058 EA 15.07" To 15.82" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	2,223.34	
<i>For Stainless Steel Nuts And Bolts, Add</i>	642.70	
33 01 30 51-0059 EA 15.92" To 16.67" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	813.09	
<i>For Stainless Steel Nuts And Bolts, Add</i>	222.53	
33 01 30 51-0060 EA 15.92" To 16.67" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,147.04	
<i>For Stainless Steel Nuts And Bolts, Add</i>	319.90	
33 01 30 51-0061 EA 15.92" To 16.67" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,544.22	
<i>For Stainless Steel Nuts And Bolts, Add</i>	434.08	
33 01 30 51-0062 EA 15.92" To 16.67" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	2,280.08	
<i>For Stainless Steel Nuts And Bolts, Add</i>	656.60	
33 01 30 51-0063 EA 16.56" To 17.31" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	834.46	
<i>For Stainless Steel Nuts And Bolts, Add</i>	226.92	
33 01 30 51-0064 EA 16.56" To 17.31" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,177.53	
<i>For Stainless Steel Nuts And Bolts, Add</i>	326.48	
33 01 30 51-0065 EA 16.56" To 17.31" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,582.69	
<i>For Stainless Steel Nuts And Bolts, Add</i>	442.13	
33 01 30 51-0066 EA 16.56" To 17.31" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	2,336.84	
<i>For Stainless Steel Nuts And Bolts, Add</i>	669.79	
33 01 30 51-0067 EA 17.15" To 17.90" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	853.71	
<i>For Stainless Steel Nuts And Bolts, Add</i>	230.58	
33 01 30 51-0068 EA 17.15" To 17.90" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,203.67	
<i>For Stainless Steel Nuts And Bolts, Add</i>	331.60	
33 01 30 51-0069 EA 17.15" To 17.90" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,621.16	
<i>For Stainless Steel Nuts And Bolts, Add</i>	450.18	
33 01 30 51-0070 EA 17.15" To 17.90" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	2,388.18	
<i>For Stainless Steel Nuts And Bolts, Add</i>	680.76	
33 01 30 51-0071 EA 17.82" To 18.57" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	871.89	
<i>For Stainless Steel Nuts And Bolts, Add</i>	234.25	
33 01 30 51-0072 EA 17.82" To 18.57" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,230.42	
<i>For Stainless Steel Nuts And Bolts, Add</i>	337.45	
33 01 30 51-0073 EA 17.82" To 18.57" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,655.41	
<i>For Stainless Steel Nuts And Bolts, Add</i>	457.50	
33 01 30 51-0074 EA 17.82" To 18.57" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	2,421.20	
<i>For Stainless Steel Nuts And Bolts, Add</i>	686.25	
33 01 30 51-0075 EA 18.46" To 19.21" OD Diameter Pipe, 10" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	892.69	
<i>For Stainless Steel Nuts And Bolts, Add</i>	238.81	
33 01 30 51-0076 EA 18.46" To 19.21" OD Diameter Pipe, 15" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,261.98	
<i>For Stainless Steel Nuts And Bolts, Add</i>	344.77	
33 01 30 51-0077 EA 18.46" To 19.21" OD Diameter Pipe, 20" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	1,691.74	
<i>For Stainless Steel Nuts And Bolts, Add</i>	465.55	
33 01 30 51-0078 EA 18.46" To 19.21" OD Diameter Pipe, 30" Long, Pipe Repair Clamp, Double Bands With Alloy Bolts And Nuts (Smith-Blair 228).....	2,494.15	
<i>For Stainless Steel Nuts And Bolts, Add</i>	705.65	
33 01 30 51-0079 Polyseal Pipe Coupler <small>(33 01 30 51-0001)</small>		
33 01 30 51-0080 EA 18" Diameter Pipe, PolySeal Repair Couplers (MarMac).....	334.79	
33 01 30 51-0081 EA 24" Diameter Pipe, PolySeal Repair Couplers (MarMac).....	377.87	
33 01 30 81 Manhole Rehabilitation <small>(33 01 30)</small>		
33 01 30 81-0001 Restoration And Rehabilitation Of Manholes <small>(33 01 30 81)</small>		
Note: Work is in confined spaces.		
33 01 30 81-0002 Manhole Seals <small>(33 01 30 81-0001)</small>		
33 01 30 81-0003 Internal Manhole Chimney Seals <small>(33 01 30 81-0002)</small>		
Note: Cretex.		
33 01 30 81-0004 EA 20" Internal Manhole Chimney Seal.....	577.11	
33 01 30 81-0005 EA 22" Internal Manhole Chimney Seal.....	608.31	
33 01 30 81-0006 EA 24" Internal Manhole Chimney Seal.....	623.91	
33 01 30 81-0007 EA 26" Internal Manhole Chimney Seal.....	717.49	

33 Utilities**33 01 Operation and Maintenance of Utilities****33 01 30 Operation and Maintenance of Sewer Utilities**

Los Angeles County Development Authority

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 01 30 81-0008	EA	28" Internal Manhole Chimney Seal.....	811.08	
33 01 30 81-0009	EA	30" Internal Manhole Chimney Seal.....	904.66	
33 01 30 81-0010	EA	36" Internal Manhole Chimney Seal.....	1,091.84	
33 01 30 81-0011		External Manhole Encapsulation (33 01 30 81-0002)		
		Note: Wrapidseal.		
33 01 30 81-0012	EA	24" External Manhole Encapsulation	842.28	
33 01 30 81-0013	EA	30" External Manhole Encapsulation	889.07	
33 01 30 81-0014	EA	36" External Manhole Encapsulation	951.46	
33 01 30 81-0015	EA	42" External Manhole Encapsulation	1,029.45	
33 01 30 81-0016	EA	48" External Manhole Encapsulation	1,138.63	
33 01 30 81-0017	EA	54" External Manhole Encapsulation	1,263.42	
33 01 30 81-0018	EA	60" External Manhole Encapsulation	1,419.39	
33 01 30 81-0019		Manhole Crack Repair (33 01 30 81-0001)		
		Note: Includes removing loose materials and cleaning.		
33 01 30 81-0020	LF	Up To 1/4" Wide, Epoxy Grout Injection, Manhole Crack Repair.....	59.66	
33 01 30 81-0021	LF	>1/4" To 1/2" Wide, Epoxy Grout Injection, Manhole Crack Repair	80.31	
33 01 30 81-0022	LF	Up To 1/4" Wide, Urethane Grout Injection, Manhole Crack Repair	56.81	
33 01 30 81-0023	LF	>1/4" To 1/2" Wide, Urethane Grout Injection, Manhole Crack Repair	77.02	
33 01 30 81-0024		Manhole Patching (33 01 30 81-0001)		
		Note: Includes removing loose materials and cleaning.		
33 01 30 81-0025	SF	Up To 1/4" Thick, Cementitious Grout, Manhole Patching.....	17.75	
33 01 30 81-0026	SF	Up To 1/4" Thick, Epoxy Grout, Manhole Patching.....	40.55	
33 01 30 81-0027		Manhole Joint Restoration (33 01 30 81-0001)		
		Note: Includes drilling holes at joints, fill joints with grout.		
33 01 30 81-0028	EA	3' Diameter Joint Restoration, Grout Fill Per Each Manhole	2,420.61	
		Note: Includes two (2) joints sections to be grouted and two (2) pipe connections.		
		<i>For Grouting Each Additional Manhole Joint Section, Add</i>	<i>237.04</i>	
33 01 30 81-0029	EA	3-1/2' Diameter Joint Restoration, Grout Fill Per Each Manhole.....	2,825.74	
		Note: Includes two (2) joints sections to be grouted and two (2) pipe connections.		
		<i>For Grouting Each Additional Manhole Joint Section, Add</i>	<i>264.05</i>	
33 01 30 81-0030	EA	4' Diameter Joint Restoration, Grout Fill Per Each Manhole	3,227.46	
		Note: Includes two (2) joints sections to be grouted and two (2) pipe connections.		
		<i>For Grouting Each Additional Manhole Joint Section, Add</i>	<i>291.05</i>	
33 01 30 81-0031	EA	5' Diameter Joint Restoration, Grout Fill Per Each Manhole	3,833.49	
		Note: Includes two (2) joints sections to be grouted and two (2) pipe connections.		
		<i>For Grouting Each Additional Manhole Joint Section, Add</i>	<i>304.56</i>	
33 01 30 81-0032	EA	6' Diameter Joint Restoration, Grout Fill Per Each Manhole	4,437.81	
		Note: Includes two (2) joints sections to be grouted and two (2) pipe connections.		
		<i>For Grouting Each Additional Manhole Joint Section, Add</i>	<i>318.06</i>	
33 01 30 81-0033		Step Installation In Existing Manholes (33 01 30 81-0001)		
		Note: Including drilling in existing concrete manhole, step and grout. Demolition cost includes removal of old step and patching holes.		
33 01 30 81-0034	EA	Drill And Grout 8" x 9" Cast Iron Manhole Steps.....	160.97	24.81
33 01 30 81-0035	EA	Drill And Grout Galvanized Steel Manhole Step	126.43	24.81
33 01 30 81-0036	EA	Bolt On Galvanized Steel Manhole Step	133.32	24.81
33 01 30 81-0037	EA	Drill And Grout Aluminum Manhole Step	157.27	24.81
33 01 30 81-0038	EA	Drill And Insert Polypropylene Manhole Step.....	74.85	19.84
33 01 30 81-0039		Invert Restoration (33 01 30 81-0001)		
		Note: Includes removal of existing defective material and installation of new material.		
33 01 30 81-0040		Concrete Invert Restoration (33 01 30 81-0039)		
33 01 30 81-0041	EA	2' Diameter, Concrete Invert Restoration.....	370.33	
33 01 30 81-0042	EA	3' Diameter, Concrete Invert Restoration	416.72	
33 01 30 81-0043	EA	4' Diameter, Concrete Invert Restoration	463.11	
33 01 30 81-0044	EA	5' Diameter, Concrete Invert Restoration	509.50	
33 01 30 81-0045	EA	6' Diameter, Concrete Invert Restoration.....	648.68	
33 01 30 81-0046	SF	Square Or Rectangular, Concrete Invert Restoration	36.83	
33 01 30 81-0047		Brick Invert Restoration (33 01 30 81-0039)		
33 01 30 81-0048	EA	2' Diameter, Brick Invert Restoration	597.93	
33 01 30 81-0049	EA	3' Diameter, Brick Invert Restoration	644.32	
33 01 30 81-0050	EA	4' Diameter, Brick Invert Restoration	690.71	
33 01 30 81-0051	EA	5' Diameter, Brick Invert Restoration	737.10	
33 01 30 81-0052	EA	6' Diameter, Brick Invert Restoration	783.49	
33 01 30 81-0053	SF	Square Or Rectangular, Brick Invert Restoration	51.61	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 01 30 81-0054	Repair In-Kind Of Drainage Structures <small>(33 01 30 81)</small>	
	Note: For brick, concrete or concrete block catch basins, inlets, manholes, and other drainage structures. Includes replacing bricks or concrete blocks, concrete repair, sealing and repairing joints, excavation, backfilling, pavement removal, restoration of pavement and all tasks to perform interior and/or exterior repair in-kind. Sizes are inside dimensions. For other sizes, use closest size.	
33 01 30 81-0055	VLF 2' Diameter, Repair In-Kind Drainage Structure.....	828.66
33 01 30 81-0056	VLF 3' Diameter, Repair In-Kind Drainage Structure.....	1,243.00
33 01 30 81-0057	VLF 4' Diameter, Repair In-Kind Drainage Structure.....	1,657.44
33 01 30 81-0058	VLF 5' Diameter, Repair In-Kind Drainage Structure.....	2,071.66
33 01 30 81-0059	VLF 6' Diameter, Repair In-Kind Drainage Structure.....	2,485.99
33 01 30 81-0060	VLF 2' x 2', Repair In-Kind Drainage Structure.....	1,055.62
33 01 30 81-0061	VLF 2' x 3', Repair In-Kind Drainage Structure.....	1,319.53
33 01 30 81-0062	VLF 2' x 4', Repair In-Kind Drainage Structure.....	1,583.44
33 01 30 81-0063	VLF 3' x 4', Repair In-Kind Drainage Structure.....	1,847.34
33 01 30 81-0064	VLF 4' x 4', Repair In-Kind Drainage Structure.....	2,111.25
33 01 30 81-0065	VLF 4' x 5', Repair In-Kind Drainage Structure.....	2,375.15
33 01 30 81-0066	VLF 4' x 6', Repair In-Kind Drainage Structure.....	2,639.06
33 01 30 81-0067	VLF 4' x 8', Repair In-Kind Drainage Structure.....	3,166.87
33 01 30 81-0068	VLF >32 GSF, Repair In-Kind Drainage Structure	3,694.68

33 01 30 82 Epoxy Lining for Concrete Manholes (33 01 30)

33 01 30 82-0001	Epoxy Manhole Restoration, Interior <small>(33 01 30 82)</small>	
33 01 30 82-0002	VLF 60 Mil Epoxy Restoration Of 3' Diameter Manhole Interior	365.25
	<i>For 80 Mil Material, Add</i>	43.26
	<i>For 100 Mil Material, Add</i>	86.52
	<i>For 125 Mil Material, Add</i>	134.90
	<i>For 150 Mil Material, Add</i>	183.28
	<i>For 200 Mil Material, Add</i>	264.85
	<i>For 2 To 5 Manholes, Deduct</i>	-25.86
	<i>For 6 To 10 Manholes, Deduct</i>	-42.59
	<i>For >10 Manholes, Deduct</i>	-85.17
33 01 30 82-0003	VLF 60 Mil Epoxy Restoration Of 3-1/2' Diameter Manhole Interior	443.06
	<i>For 80 Mil Material, Add</i>	51.76
	<i>For 100 Mil Material, Add</i>	103.51
	<i>For 125 Mil Material, Add</i>	161.25
	<i>For 150 Mil Material, Add</i>	218.98
	<i>For 200 Mil Material, Add</i>	315.88
	<i>For 2 To 5 Manholes, Deduct</i>	-31.44
	<i>For 6 To 10 Manholes, Deduct</i>	-51.80
	<i>For >10 Manholes, Deduct</i>	-103.59
33 01 30 82-0004	VLF 60 Mil Epoxy Restoration Of 4' Diameter Manhole Interior	486.99
	<i>For 80 Mil Material, Add</i>	57.68
	<i>For 100 Mil Material, Add</i>	115.36
	<i>For 125 Mil Material, Add</i>	179.86
	<i>For 150 Mil Material, Add</i>	244.37
	<i>For 200 Mil Material, Add</i>	353.12
	<i>For 2 To 5 Manholes, Deduct</i>	-34.48
	<i>For 6 To 10 Manholes, Deduct</i>	-56.78
	<i>For >10 Manholes, Deduct</i>	-113.56
33 01 30 82-0005	VLF 60 Mil Epoxy Restoration Of 5' Diameter Manhole Interior	608.81
	<i>For 80 Mil Material, Add</i>	72.12
	<i>For 100 Mil Material, Add</i>	144.24
	<i>For 125 Mil Material, Add</i>	224.90
	<i>For 150 Mil Material, Add</i>	305.56
	<i>For 200 Mil Material, Add</i>	441.55
	<i>For 2 To 5 Manholes, Deduct</i>	-43.10
	<i>For 6 To 10 Manholes, Deduct</i>	-70.98
	<i>For >10 Manholes, Deduct</i>	-141.96
33 01 30 82-0006	VLF 60 Mil Epoxy Restoration Of 6' Diameter Manhole Interior	730.55
	<i>For 80 Mil Material, Add</i>	86.54
	<i>For 100 Mil Material, Add</i>	173.08
	<i>For 125 Mil Material, Add</i>	269.86
	<i>For 150 Mil Material, Add</i>	366.65
	<i>For 200 Mil Material, Add</i>	529.83
	<i>For 2 To 5 Manholes, Deduct</i>	-51.72
	<i>For 6 To 10 Manholes, Deduct</i>	-85.17
	<i>For >10 Manholes, Deduct</i>	-170.35

33 01 30 83 Lining for Concrete Manholes (33 01 30)

33 01 30 83-0001	Manhole Lining <small>(33 01 30 83)</small>	
	Note: Includes power washing and cleaning of manhole interiors.	
33 01 30 83-0002	Cementitious Manhole Restoration, Interior <small>(33 01 30 83-0001)</small>	
33 01 30 83-0003	VLF 1/2" Cementitious Restoration On 3' Diameter Manhole Interior.....	156.26
	<i>For Each Additional 1/2" Thick Material, Add</i>	38.01
	<i>For 2 To 5 Manholes, Deduct</i>	-11.02
	<i>For 6 To 10 Manholes, Deduct</i>	-18.13
	<i>For >10 Manholes, Deduct</i>	-36.27

33 Utilities**33 01 Operation and Maintenance of Utilities****33 01 30 Operation and Maintenance of Sewer Utilities**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 83-0004 VLF 1/2" Cementitious Restoration On 3-1/2' Diameter Manhole Interior	181.19	
For Each Additional 1/2" Thick Material, Add	44.24	
For 2 To 5 Manholes, Deduct	-12.77	
For 6 To 10 Manholes, Deduct	-21.02	
For >10 Manholes, Deduct	-42.03	
33 01 30 83-0005 VLF 1/2" Cementitious Restoration On 4' Diameter Manhole Interior.....	206.11	
For Each Additional 1/2" Thick Material, Add	50.46	
For 2 To 5 Manholes, Deduct	-14.53	
For 6 To 10 Manholes, Deduct	-23.90	
For >10 Manholes, Deduct	-47.80	
33 01 30 83-0006 VLF 1/2" Cementitious Restoration On 5' Diameter Manhole Interior.....	242.66	
For Each Additional 1/2" Thick Material, Add	61.75	
For 2 To 5 Manholes, Deduct	-17.03	
For 6 To 10 Manholes, Deduct	-27.99	
For >10 Manholes, Deduct	-55.98	
33 01 30 83-0007 VLF 1/2" Cementitious Restoration On 6' Diameter Manhole Interior.....	265.26	
For Each Additional 1/2" Thick Material, Add	71.29	
For 2 To 5 Manholes, Deduct	-18.50	
For 6 To 10 Manholes, Deduct	-30.36	
For >10 Manholes, Deduct	-60.72	
33 01 30 83-0008 Polyurethane Manhole Restoration, Interior (33 01 30 83-0001)		
33 01 30 83-0009 VLF 60 Mil Polyurethane Restoration Of 3' Diameter Manhole Interior	325.27	
For 80 Mil Material, Add	29.93	
For 100 Mil Material, Add	59.87	
For 125 Mil Material, Add	91.59	
For 150 Mil Material, Add	123.31	
For 200 Mil Material, Add	171.56	
For 2 To 5 Manholes, Deduct	-23.86	
For 6 To 10 Manholes, Deduct	-39.59	
For >10 Manholes, Deduct	-79.17	
33 01 30 83-0010 VLF 60 Mil Polyurethane Restoration Of 3-1/2' Diameter Manhole Interior	396.36	
For 80 Mil Material, Add	36.19	
For 100 Mil Material, Add	72.38	
For 125 Mil Material, Add	110.66	
For 150 Mil Material, Add	148.93	
For 200 Mil Material, Add	206.92	
For 2 To 5 Manholes, Deduct	-29.10	
For 6 To 10 Manholes, Deduct	-48.29	
For >10 Manholes, Deduct	-96.59	
33 01 30 83-0011 VLF 60 Mil Polyurethane Restoration Of 4' Diameter Manhole Interior	433.69	
For 80 Mil Material, Add	39.91	
For 100 Mil Material, Add	79.82	
For 125 Mil Material, Add	122.12	
For 150 Mil Material, Add	164.42	
For 200 Mil Material, Add	228.75	
For 2 To 5 Manholes, Deduct	-31.81	
For 6 To 10 Manholes, Deduct	-52.78	
For >10 Manholes, Deduct	-105.56	
33 01 30 83-0012 VLF 60 Mil Polyurethane Restoration Of 5' Diameter Manhole Interior	542.12	
For 80 Mil Material, Add	49.89	
For 100 Mil Material, Add	99.78	
For 125 Mil Material, Add	152.65	
For 150 Mil Material, Add	205.52	
For 200 Mil Material, Add	285.95	
For 2 To 5 Manholes, Deduct	-39.77	
For 6 To 10 Manholes, Deduct	-65.98	
For >10 Manholes, Deduct	-131.96	
33 01 30 83-0013 VLF 60 Mil Polyurethane Restoration Of 6' Diameter Manhole Interior	650.54	
For 80 Mil Material, Add	59.87	
For 100 Mil Material, Add	119.74	
For 125 Mil Material, Add	183.19	
For 150 Mil Material, Add	246.63	
For 200 Mil Material, Add	343.14	
For 2 To 5 Manholes, Deduct	-47.72	
For 6 To 10 Manholes, Deduct	-79.17	
For >10 Manholes, Deduct	-158.35	
33 01 30 83-0014 Multiplexx™ PVC Cured-In-Place (CIP) Lining Manhole Restoration, Interior (33 01 30 83-0001)		
33 01 30 83-0015 VLF 3' Diameter, Multiplexx™ PVC Cured-In-Place (CIP) Manhole Liner For Existing Manhole	568.30	
For 2 To 5 Manholes, Deduct	-33.00	
For 6 To 10 Manholes, Deduct	-51.79	
For >10 Manholes, Deduct	-103.57	
33 01 30 83-0016 VLF 3-1/2' Diameter, Multiplexx™ PVC Cured-In-Place (CIP) Manhole Liner For Existing Manhole.....	695.97	
For 2 To 5 Manholes, Deduct	-40.40	
For 6 To 10 Manholes, Deduct	-63.40	
For >10 Manholes, Deduct	-126.80	
33 01 30 83-0017 VLF 4' Diameter, Multiplexx™ PVC Cured-In-Place (CIP) Manhole Liner For Existing Manhole	820.34	
For 2 To 5 Manholes, Deduct	-47.13	
For 6 To 10 Manholes, Deduct	-73.74	
For >10 Manholes, Deduct	-147.49	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 30 83-0018 VLF 5' Diameter, Multiplexx™ PVCP Cured-In-Place (CIP) Manhole Liner For Existing Manhole.....	1,028.78	
<i>For 2 To 5 Manholes, Deduct</i>	-59.08	
<i>For 6 To 10 Manholes, Deduct</i>	-92.43	
<i>For >10 Manholes, Deduct</i>	-184.87	
33 01 30 83-0019 VLF 6' Diameter, Multiplexx™ PVCP Cured-In-Place (CIP) Manhole Liner For Existing Manhole.....	1,237.20	
<i>For 2 To 5 Manholes, Deduct</i>	-71.02	
<i>For 6 To 10 Manholes, Deduct</i>	-111.12	
<i>For >10 Manholes, Deduct</i>	-222.24	

33 01 70 Operation and Maintenance of Electrical Utilities (33 01)

33 01 70 51 Electrical Utility Visual Inspection (33 01 70)

- 33 01 70 51-0001 Video Camera Inspection Of Gas Piping and Electrical Duct (33 01 70 51)
- 33 01 70 51-0002 Video Camera Set-up (33 01 70 51-0001)

33 01 70 51-0003 EA Up To 12" Diameter, Initial Set Up For Video Inspection, Gas Pipe Or Electrical Duct.....	284.70
33 01 70 51-0004 EA >12" To 48" Diameter, Initial Set Up For Video Inspection, Gas Pipe.....	320.29
33 01 70 51-0005 EA Up To 12" Diameter, Re-Set Up/Move For Video Inspection, Gas Pipe Or Electrical Duct.....	71.17
33 01 70 51-0006 EA >12" To 48" Diameter, Re-Set Up/Move For Video Inspection, Gas Pipe.....	106.76

33 01 70 51-0007 Video Camera Inspection Of Gas Pipe Or Electrical Duct (33 01 70 51-0001)

33 01 70 51-0008 LF Up To 12" Diameter, Video Inspection, Gas Pipe Or Electrical Duct	1.10
<i>For >1,000 To 5,000, Deduct</i>	-0.06
<i>For >5,000, Deduct</i>	-0.11
33 01 70 51-0009 LF >12" To 48" Diameter, Video Inspection, Gas Pipe	1.69
<i>For >1,000 To 5,000, Deduct</i>	-0.08
<i>For >5,000, Deduct</i>	-0.17

33 01 70 72 Cured-in-Place Conduit Lining (33 01 70)

33 01 70 72-0001 Lining Conduit With Cured In-Place (CIP) Liner (33 01 70 72)

Note: Cured in-place thermosetting resin pipe and resin impregnated tube. Excludes video camera inspection and cleaning.

33 01 70 72-0002 2mm Thick Cured In-Place Conduit Lining (33 01 70 72-0001)

33 01 70 72-0003 LF 1-1/2" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining.....	7.64
<i>For Up To >10, Add</i>	14.67
<i>For >10 To 25, Add</i>	11.68
<i>For >25 To 50, Add</i>	7.17
<i>For >50 To 100, Add</i>	3.59
<i>For >500 To 1,000, Deduct</i>	-0.49
<i>For >1,000 To 2,000, Deduct</i>	-0.79
<i>For >2,000 To 5,000, Deduct</i>	-1.48
<i>For >5,000, Deduct</i>	-2.40
33 01 70 72-0004 LF 2" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining.....	9.34
<i>For Up To >10, Add</i>	16.90
<i>For >10 To 25, Add</i>	13.34
<i>For >25 To 50, Add</i>	8.23
<i>For >50 To 100, Add</i>	4.11
<i>For >500 To 1,000, Deduct</i>	-0.59
<i>For >1,000 To 2,000, Deduct</i>	-0.95
<i>For >2,000 To 5,000, Deduct</i>	-1.76
<i>For >5,000, Deduct</i>	-2.85
33 01 70 72-0005 LF 2-1/2" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining.....	11.72
<i>For Up To >10, Add</i>	21.14
<i>For >10 To 25, Add</i>	16.68
<i>For >25 To 50, Add</i>	10.29
<i>For >50 To 100, Add</i>	5.14
<i>For >500 To 1,000, Deduct</i>	-0.74
<i>For >1,000 To 2,000, Deduct</i>	-1.18
<i>For >2,000 To 5,000, Deduct</i>	-2.20
<i>For >5,000, Deduct</i>	-3.57
33 01 70 72-0006 LF 3" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining.....	13.83
<i>For Up To >10, Add</i>	24.57
<i>For >10 To 25, Add</i>	19.34
<i>For >25 To 50, Add</i>	11.94
<i>For >50 To 100, Add</i>	5.97
<i>For >500 To 1,000, Deduct</i>	-0.87
<i>For >1,000 To 2,000, Deduct</i>	-1.39
<i>For >2,000 To 5,000, Deduct</i>	-2.58
<i>For >5,000, Deduct</i>	-4.18
33 01 70 72-0007 LF 3-1/2" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining.....	15.53
<i>For Up To >10, Add</i>	26.77
<i>For >10 To 25, Add</i>	20.98
<i>For >25 To 50, Add</i>	12.99
<i>For >50 To 100, Add</i>	6.49
<i>For >500 To 1,000, Deduct</i>	-0.97
<i>For >1,000 To 2,000, Deduct</i>	-1.54
<i>For >2,000 To 5,000, Deduct</i>	-2.85
<i>For >5,000, Deduct</i>	-4.63

33 Utilities**33 01 Operation and Maintenance of Utilities****33 01 70 Operation and Maintenance of Electrical Utilities**

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

33 01 70 72-0008	LF 4" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining	17.51	
	For Up To >10, Add	29.81	
	For >10 To 25, Add	23.32	
	For >25 To 50, Add	14.45	
	For >50 To 100, Add	7.22	
	For >500 To 1,000, Deduct	-1.09	
	For >1,000 To 2,000, Deduct	-1.73	
	For >2,000 To 5,000, Deduct	-3.20	
	For >5,000, Deduct	-5.19	
33 01 70 72-0009	LF 5" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining	20.64	
	For Up To >10, Add	33.40	
	For >10 To 25, Add	25.93	
	For >25 To 50, Add	16.13	
	For >50 To 100, Add	8.06	
	For >500 To 1,000, Deduct	-1.26	
	For >1,000 To 2,000, Deduct	-2.01	
	For >2,000 To 5,000, Deduct	-3.68	
	For >5,000, Deduct	-5.97	
33 01 70 72-0010	LF 6" Conduit Lined With 2mm Thick Cured In-Place (CIP) Lining	23.77	
	For Up To >10, Add	36.99	
	For >10 To 25, Add	28.53	
	For >25 To 50, Add	17.81	
	For >50 To 100, Add	8.90	
	For >500 To 1,000, Deduct	-1.44	
	For >1,000 To 2,000, Deduct	-2.28	
	For >2,000 To 5,000, Deduct	-4.16	
	For >5,000, Deduct	-6.76	
33 01 70 72-0011	3mm Thick Cured In-Place Conduit Lining <small>(33 01 70 72-0001)</small>		
33 01 70 72-0012	LF 1-1/2" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining	9.42	
	For Up To >10, Add	16.24	
	For >10 To 25, Add	12.73	
	For >25 To 50, Add	7.88	
	For >50 To 100, Add	3.94	
	For >500 To 1,000, Deduct	-0.59	
	For >1,000 To 2,000, Deduct	-0.94	
	For >2,000 To 5,000, Deduct	-1.73	
	For >5,000, Deduct	-2.81	
33 01 70 72-0013	LF 2" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining	12.24	
	For Up To >10, Add	20.37	
	For >10 To 25, Add	15.89	
	For >25 To 50, Add	9.86	
	For >50 To 100, Add	4.93	
	For >500 To 1,000, Deduct	-0.75	
	For >1,000 To 2,000, Deduct	-1.20	
	For >2,000 To 5,000, Deduct	-2.21	
	For >5,000, Deduct	-3.59	
33 01 70 72-0014	LF 2-1/2" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining	15.07	
	For Up To >10, Add	24.51	
	For >10 To 25, Add	19.05	
	For >25 To 50, Add	11.84	
	For >50 To 100, Add	5.92	
	For >500 To 1,000, Deduct	-0.92	
	For >1,000 To 2,000, Deduct	-1.47	
	For >2,000 To 5,000, Deduct	-2.69	
	For >5,000, Deduct	-4.37	
33 01 70 72-0015	LF 3" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining	17.62	
	For Up To >10, Add	27.81	
	For >10 To 25, Add	21.51	
	For >25 To 50, Add	13.40	
	For >50 To 100, Add	6.70	
	For >500 To 1,000, Deduct	-1.07	
	For >1,000 To 2,000, Deduct	-1.70	
	For >2,000 To 5,000, Deduct	-3.10	
	For >5,000, Deduct	-5.04	
33 01 70 72-0016	LF 3-1/2" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining	20.04	
	For Up To >10, Add	30.72	
	For >10 To 25, Add	23.64	
	For >25 To 50, Add	14.77	
	For >50 To 100, Add	7.39	
	For >500 To 1,000, Deduct	-1.21	
	For >1,000 To 2,000, Deduct	-1.92	
	For >2,000 To 5,000, Deduct	-3.48	
	For >5,000, Deduct	-5.66	
33 01 70 72-0017	LF 4" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining	22.59	
	For Up To >10, Add	34.02	
	For >10 To 25, Add	26.10	
	For >25 To 50, Add	16.34	
	For >50 To 100, Add	8.17	
	For >500 To 1,000, Deduct	-1.36	
	For >1,000 To 2,000, Deduct	-2.15	
	For >2,000 To 5,000, Deduct	-3.89	
	For >5,000, Deduct	-6.34	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 01 70 72-0018 LF 5" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining.....	27.57	
<i>For Up To >10, Add</i>	40.26	
<i>For >10 To 25, Add</i>	30.72	
<i>For >25 To 50, Add</i>	19.28	
<i>For >50 To 100, Add</i>	9.64	
<i>For >500 To 1,000, Deduct</i>	-1.64	
<i>For >1,000 To 2,000, Deduct</i>	-2.60	
<i>For >2,000 To 5,000, Deduct</i>	-4.69	
<i>For >5,000, Deduct</i>	-7.63	
33 01 70 72-0019 LF 6" Conduit Lined With 3mm Thick Cured In-Place (CIP) Lining.....	32.12	
<i>For Up To >10, Add</i>	45.24	
<i>For >10 To 25, Add</i>	34.29	
<i>For >25 To 50, Add</i>	21.60	
<i>For >50 To 100, Add</i>	10.80	
<i>For >500 To 1,000, Deduct</i>	-1.90	
<i>For >1,000 To 2,000, Deduct</i>	-2.99	
<i>For >2,000 To 5,000, Deduct</i>	-5.37	
<i>For >5,000, Deduct</i>	-8.76	

33 05 Common Work Results for Utilities ⁽³³⁾

33 05 09 Piping Specials for Utilities ^(33 05)

33 05 09 23 Adapters for Utility Piping ^(33 05 09)
See CSI section 33 14 13 53-0191 for ductile iron body adapters, 33 14 13 53-0198 for steel body adapters.

33 05 09 33 Thrust Restraint for Utility Piping ^(33 05 09)
See CSI section 33 14 13 13-0241 for mechanical restraints, 33 14 13 13-0267 for flanged restraints, 33 14 13 13-0643 for slip-on restraints, 33 14 13 13-0649 for slip-on restraint harnesses.

33 05 16 Cast-Iron Utility Pipe ^(33 05)

See CSI section 22 13 16 00-0019 for cast iron utility piping.

33 05 17 Copper Utility Pipe and Tubing ^(33 05)

See CSI section 33 14 13 39-0000 for copper utility piping.

33 05 19 Ductile-Iron Utility Pipe ^(33 05)

See CSI section 33 14 13 13-0000 for ductile iron utility piping.

33 05 24 Steel Utility Pipe ^(33 05)

33 05 24 23 Steel Pipe for Water Service ^(33 05 24)
See CSI section 33 14 13 26-0000 for galvanized steel utility piping, 33 14 13 36-0000 for steel utility piping.

33 05 31 Thermoplastic Utility Pipe ^(33 05)

33 05 31 11 Polyvinyl Chloride Gravity Sewer Pipe ^(33 05 31)
See CSI section 33 31 11 00-0000 for polyvinyl chloride gravity sewer pipe.

33 05 31 13 Polyvinyl Chloride Pressure Pipe ^(33 05 31)
See CSI section 33 14 13 23-0001 for polyvinyl chloride pressure pipe.

33 05 31 16 Polyvinyl Chloride Pressure Pipe for Water Transmission and Distribution (AWWA C900 and AWWA C905) ^(33 05 31)
See CSI section 33 14 13 23-0171 for AWWA C900 and 905 polyvinyl chloride pressure pipe.

33 05 33 Polyethylene Utility Pipe ^(33 05)

33 05 33 53 HDPE Gas Utility Pipe ^(33 05 33)
See CSI section 33 52 16 26-0001 for high-density polyethylene gas utility pipe.

33 05 33 56 Medium-Density Polyethylene Gas Utility Pipe ^(33 05 33)
See CSI section 33 52 16 23-0000 for Medium-Density Polyethylene Gas Utility Pipe.

33 05 33 63 HDPE Communication Duct ^(33 05 33)

33 05 33 63-0001	ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine ^(33 05 33 63)	
	Note: Excludes boring.	
33 05 33 63-0002 LF	1" Schedule 40, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	3.80
	<i>For Up To 250, Add</i>	0.12
	<i>For >250 To 500, Add</i>	0.08
33 05 33 63-0003 LF	1-1/4" Schedule 40, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	4.27
	<i>For Up To 250, Add</i>	0.15
	<i>For >250 To 500, Add</i>	0.10
33 05 33 63-0004 LF	1-1/2" Schedule 40, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	4.62
	<i>For Up To 250, Add</i>	0.17
	<i>For >250 To 500, Add</i>	0.11
33 05 33 63-0005 LF	2" Schedule 40, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	5.09
	<i>For Up To 250, Add</i>	0.20
	<i>For >250 To 500, Add</i>	0.14

33 Utilities**33 05 Common Work Results for Utilities****33 05 33 Polyethylene Utility Pipe**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 05 33 63-0006	LF	3" Schedule 40, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	6.87	
		For Up To 250, Add	0.43	
		For >250 To 500, Add	0.28	
33 05 33 63-0007	LF	4" Schedule 40, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	8.69	
		For Up To 250, Add	0.65	
		For >250 To 500, Add	0.43	
33 05 33 63-0008	LF	1" Schedule 80, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	3.89	
		For Up To 250, Add	0.14	
		For >250 To 500, Add	0.09	
33 05 33 63-0009	LF	1-1/4" Schedule 80, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	4.43	
		For Up To 250, Add	0.17	
		For >250 To 500, Add	0.12	
33 05 33 63-0010	LF	1-1/2" Schedule 80, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	4.75	
		For Up To 250, Add	0.19	
		For >250 To 500, Add	0.13	
33 05 33 63-0011	LF	2" Schedule 80, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	5.42	
		For Up To 250, Add	0.25	
		For >250 To 500, Add	0.17	
33 05 33 63-0012	LF	3" Schedule 80, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	7.59	
		For Up To 250, Add	0.53	
		For >250 To 500, Add	0.36	
33 05 33 63-0013	LF	4" Schedule 80, ASTM F2160, UL 651-A, NEMA TC-7, Smoothwall HDPE Conduit, Pulled In Place By Boring Machine.....	9.60	
		For Up To 250, Add	0.79	
		For >250 To 500, Add	0.52	

33 05 39 Concrete Pipe (33 05)**33 05 39 13 Prestressed Concrete Pressure Pipe, Steel-Cylinder Type (AWWA C301)** (33 05)

³⁹⁾
See CSI section 33 42 11 00-0040 for prestressed concrete pressure pipe.

33 05 39 41 Reinforced Concrete Pipe for Sewers and Culverts (33 05 39)

See CSI section 33 42 11 00-0001 for reinforced concrete pipe.

33 05 41 Vitrified Clay Utility Pipe (33 05)

See CSI section 33 42 11 00-0066 for vitrified clay piping.

33 05 61 Concrete Manholes (33 05)**33 05 61 00-0001 Manholes** (33 05 61)**33 05 61 00-0002 Precast Concrete Manholes** (33 05 61 00-0001)

Note: Includes base, riser(s), reducer and openings. Excludes excavation, aggregate, backfill and frame/cover.
See CSI section 33 05 84 00-0002 for top slabs.

33 05 61 00-0003 3' Diameter, Precast Concrete Manholes (33 05 61 00-0002)

33 05 61 00-0004	EA	4' Deep, 3' Diameter, Precast Concrete Manhole.....	1,741.94	317.30
		For Bitumastic Coating, Add	79.63	
		For Epoxy Coating, Add	152.16	
33 05 61 00-0005	EA	6' Deep, 3' Diameter, Precast Concrete Manhole.....	2,375.07	455.76
		For Bitumastic Coating, Add	119.44	
		For Epoxy Coating, Add	228.24	
33 05 61 00-0006	EA	8' Deep, 3' Diameter, Precast Concrete Manhole.....	3,204.37	692.30
		For Bitumastic Coating, Add	159.25	
		For Epoxy Coating, Add	304.32	
33 05 61 00-0007	VLF	Riser For 3' Diameter, Precast Concrete Manhole.....	339.65	80.77
		Note: For depths greater than 8'.		
		For Bitumastic Coating, Add	19.91	
		For Epoxy Coating, Add	38.04	
33 05 61 00-0008	VLF	Drop Collar For 3' Diameter, Precast Concrete Manhole.....	365.78	80.77
33 05 61 00-0009	EA	Drop Base For 3' Diameter, Precast Concrete Manhole.....	583.22	80.77
33 05 61 00-0010	EA	Extended Base Slab For 3' Diameter, Precast Concrete Manhole.....	466.45	80.77
33 05 61 00-0011	EA	Precast Channel For 3' Diameter, Precast Concrete Manhole.....	665.33	80.77

33 05 61 00-0012 4' Diameter, Precast Concrete Manholes (33 05 61 00-0002)

33 05 61 00-0013	EA	4' Deep, 4' Diameter, Precast Concrete Manhole.....	2,648.60	363.46
		For Bitumastic Coating, Add	79.63	
		For Epoxy Coating, Add	152.16	
33 05 61 00-0014	EA	6' Deep, 4' Diameter, Precast Concrete Manhole.....	3,533.55	496.15
		For Bitumastic Coating, Add	119.44	
		For Epoxy Coating, Add	228.24	
33 05 61 00-0015	EA	8' Deep, 4' Diameter, Precast Concrete Manhole.....	4,650.21	749.99
		For Bitumastic Coating, Add	159.25	
		For Epoxy Coating, Add	304.32	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 61 00-0016 VLF Riser For 4' Diameter, Precast Concrete Manhole Note: For depths greater than 8'. For Bitumastic Coating, Add For Epoxy Coating, Add	495.83 19.91 38.04	95.19
33 05 61 00-0017 VLF Drop Collar For 4' Diameter, Precast Concrete Manhole.....	541.07	95.19
33 05 61 00-0018 EA Drop Base For 4' Diameter, Precast Concrete Manhole.....	917.46	95.19
33 05 61 00-0019 EA Extended Base Slab For 4' Diameter, Precast Concrete Manhole	715.33	95.19
33 05 61 00-0020 EA Precast Channel For 4' Diameter, Precast Concrete Manhole	1,059.63	95.19
33 05 61 00-0021 5' Diameter, Precast Concrete Manholes (33 05 61 00-0002)		
33 05 61 00-0022 EA 4' Deep, 5' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	5,019.24 102.59 245.30	403.84
33 05 61 00-0023 EA 6' Deep, 5' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	6,682.42 153.89 367.95	553.84
33 05 61 00-0024 EA 8' Deep, 5' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	8,602.43 205.19 490.60	830.75
33 05 61 00-0025 VLF Riser For 5' Diameter, Precast Concrete Manhole Note: For depths greater than 8'. For Bitumastic Coating, Add For Epoxy Coating, Add	891.09 25.65 61.32	103.85
33 05 61 00-0026 6' Diameter, Precast Concrete Manholes (33 05 61 00-0002)		
33 05 61 00-0027 EA 4' Deep, 6' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	6,749.51 117.46 287.18	449.99
33 05 61 00-0028 EA 6' Deep, 6' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	8,786.41 176.18 430.77	611.53
33 05 61 00-0029 EA 8' Deep, 6' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	11,110.87 234.91 574.36	923.06
33 05 61 00-0030 VLF Riser For 6' Diameter, Precast Concrete Manhole Note: For depths greater than 8'. For Bitumastic Coating, Add For Epoxy Coating, Add	1,084.11 29.36 71.80	115.38
33 05 61 00-0031 7' Diameter, Precast Concrete Manholes (33 05 61 00-0002)		
33 05 61 00-0032 EA 4' Deep, 7' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	10,674.70 249.77 501.83	496.15
33 05 61 00-0033 EA 6' Deep, 7' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	13,798.36 374.66 752.74	676.72
33 05 61 00-0034 EA 8' Deep, 7' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	17,238.15 499.55 1,003.65	1,015.37
33 05 61 00-0035 VLF Riser For 7' Diameter, Precast Concrete Manhole Note: For depths greater than 8'. For Bitumastic Coating, Add For Epoxy Coating, Add	1,635.10 62.44 125.46	126.92
33 05 61 00-0036 8' Diameter, Precast Concrete Manholes (33 05 61 00-0002)		
33 05 61 00-0037 EA 4' Deep, 8' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	15,471.89 295.29 611.68	571.14
33 05 61 00-0038 EA 6' Deep, 8' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	20,055.41 442.93 917.52	778.83
33 05 61 00-0039 EA 8' Deep, 8' Diameter, Precast Concrete Manhole..... For Bitumastic Coating, Add For Epoxy Coating, Add	25,002.37 590.57 1,223.37	1,168.25
33 05 61 00-0040 VLF Riser For 8' Diameter, Precast Concrete Manhole Note: For depths greater than 8'. For Bitumastic Coating, Add For Epoxy Coating, Add	2,372.53 73.82 152.92	144.22

33 05 63 Concrete Vaults and Chambers (33 05)

- 33 05 63 00-0001 Underground Utility Vaults And Structures (33 05 63)
See CSI section 33 05 61 00-0001 for manholes, 33 05 81 00-0006 for frames and covers.
- 33 05 63 00-0002 Precast Concrete Underground Utility Vault (33 05 63 00-0001)
Note: Sizes given are for inside dimensions.
- 33 05 63 00-0003 6' High Precast Concrete Underground Utility Vault (33 05 63 00-0002)

33 Utilities**33 05 Common Work Results for Utilities****33 05 63 Concrete Vaults and Chambers**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 05 63 00-0004	EA	4' x 4' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	3,643.29	
33 05 63 00-0005	EA	4' x 6' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	4,749.08	
33 05 63 00-0006	EA	5' x 10' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	7,834.89	
33 05 63 00-0007	EA	5' x 12' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,046.65	
33 05 63 00-0008	EA	6' x 6' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	6,069.10	
33 05 63 00-0009	EA	6' x 8' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	7,387.94	
33 05 63 00-0010	EA	6' x 10' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	8,707.96	
33 05 63 00-0011	EA	6' x 12' x 6' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	12,581.34	
33 05 63 00-0012	EA	6' x 14' x 6' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	12,581.34	
33 05 63 00-0013	EA	6' x 16' x 6' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	15,841.88	
33 05 63 00-0014	EA	8' x 8' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	8,922.23	
33 05 63 00-0015	EA	8' x 10' x 6' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	10,455.35	
33 05 63 00-0016	EA	8' x 12' x 6' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	14,945.03	
33 05 63 00-0017	EA	8' x 14' x 6' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	16,820.57	
33 05 63 00-0018		7' High Precast Concrete Underground Utility Vault (33 05 63 00-0002)		
33 05 63 00-0019	EA	4' x 4' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	4,115.58	
33 05 63 00-0020	EA	4' x 6' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	5,343.93	
33 05 63 00-0021	EA	4' x 8' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	6,405.09	
33 05 63 00-0022	EA	5' x 10' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	8,522.71	
33 05 63 00-0023	EA	5' x 12' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,826.93	
33 05 63 00-0024	EA	6' x 6' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	6,792.09	
33 05 63 00-0025	EA	6' x 8' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	8,030.71	
33 05 63 00-0026	EA	6' x 10' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,688.46	
33 05 63 00-0027	EA	6' x 12' x 7' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	13,681.83	
33 05 63 00-0028	EA	6' x 16' x 7' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	17,187.05	
33 05 63 00-0029	EA	8' x 8' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,656.25	
33 05 63 00-0030	EA	8' x 10' x 7' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	11,280.72	
33 05 63 00-0031	EA	8' x 12' x 7' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	16,168.53	
33 05 63 00-0032	EA	8' x 14' x 7' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	18,164.58	
33 05 63 00-0033	EA	10' x 10' x 7' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	16,412.34	
33 05 63 00-0034		8' High Precast Concrete Underground Utility Vault (33 05 63 00-0002)		
33 05 63 00-0035	EA	4' x 4' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	4,377.35	
33 05 63 00-0036	EA	4' x 6' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	5,666.93	
33 05 63 00-0037	EA	5' x 10' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,210.52	
33 05 63 00-0038	EA	5' x 12' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	10,606.05	
33 05 63 00-0039	EA	6' x 6' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	7,169.60	
33 05 63 00-0040	EA	6' x 8' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	8,672.28	
33 05 63 00-0041	EA	6' x 10' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	10,174.97	
33 05 63 00-0042	EA	6' x 12' x 8' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	14,782.29	
33 05 63 00-0043	EA	6' x 16' x 8' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	18,532.29	
33 05 63 00-0044	EA	8' x 8' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	10,389.17	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 63 00-0045 EA 8' x 10' x 8' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	12,106.08	
33 05 63 00-0046 EA 8' x 12' x 8' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	17,390.78	
33 05 63 00-0047 EA 8' x 14' x 8' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	19,509.80	
33 05 63 00-0048 EA 10' x 10' x 8' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	17,635.46	
33 05 63 00-0049 10' High Precast Concrete Underground Utility Vault (33 05 63 00-0002)		
33 05 63 00-0050 EA 6' x 6' x 10' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	7,719.87	
33 05 63 00-0051 EA 6' x 8' x 10' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,313.84	
33 05 63 00-0052 EA 10' x 10' x 10' Precast Concrete Underground Utility Vault..... Note: 8" thick walls and top.	18,857.66	
33 05 63 00-0053 12' High Precast Concrete Underground Utility Vault (33 05 63 00-0002)		
33 05 63 00-0054 EA 6' x 6' x 12' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	8,270.11	
33 05 63 00-0055 EA 6' x 8' x 12' Precast Concrete Underground Utility Vault..... Note: 6" thick walls and 8" thick top.	9,956.58	
33 05 63 00-0056 Meter Pit (33 05 63 00-0001)		
33 05 63 00-0057 Precast Concrete Meter Pit (33 05 63 00-0056)		
33 05 63 00-0058 EA 4' x 4' x 4' Deep Precast Concrete Meter Pit.....	3,592.05	
33 05 63 00-0059 EA 4' x 4' x 6' Deep Precast Concrete Meter Pit.....	4,870.06	
33 05 63 00-0060 EA 4' x 4' x 8' Deep Precast Concrete Meter Pit.....	6,113.59	
33 05 63 00-0061 EA 4' x 4' x 10' Deep Precast Concrete Meter Pit.....	7,574.13	
33 05 63 00-0062 EA 4' x 4' x 15' Deep Precast Concrete Meter Pit.....	10,466.66	
33 05 63 00-0063 EA 6' x 6' x 4' Deep Precast Concrete Meter Pit.....	5,446.36	
33 05 63 00-0064 EA 6' x 6' x 6' Deep Precast Concrete Meter Pit.....	7,574.13	
33 05 63 00-0065 EA 6' x 6' x 8' Deep Precast Concrete Meter Pit.....	9,757.90	
33 05 63 00-0066 EA 6' x 6' x 10' Deep Precast Concrete Meter Pit.....	12,173.35	
33 05 63 00-0067 EA 6' x 6' x 15' Deep Precast Concrete Meter Pit.....	17,309.14	
33 05 63 00-0068 Handhole Or Pull Box Enclosures (33 05 63 00-0001)		
33 05 63 00-0069 Polymer Concrete Handhole Enclosures (33 05 63 00-0068)		
33 05 63 00-0070 Polymer Concrete Handhole Enclosures (33 05 63 00-0069) Note: Excludes cover See CSI section 33 05 63 00-0290 for covers.		
33 05 63 00-0071 Flared Sides, Polymer Concrete Handhole Enclosures (33 05 63 00-0070)		
33 05 63 00-0072 Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosures (33 05 63 00-0071)		
33 05 63 00-0073 EA 12" x 12", 24" Depth, 15,000 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	424.38	26.24
33 05 63 00-0074 EA 10" x 15", 18" Depth, 15,000 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	353.77	58.29
33 05 63 00-0075 EA 13" x 24", 18" Depth, 15,000 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	540.67	87.43
33 05 63 00-0076 EA 17" x 30", 18" Depth, 15,000 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	633.51	87.43
33 05 63 00-0077 EA 13" x 24", 18" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	602.84	87.43
33 05 63 00-0078 EA 13" x 24", 26" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	736.73	87.43
33 05 63 00-0079 EA 17" x 30", 18" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	716.52	87.43
33 05 63 00-0080 EA 17" x 30", 26" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	987.64	87.43
33 05 63 00-0081 EA 27" Round, 36" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	1,405.49	116.58
33 05 63 00-0082 EA 27" Round, 48" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	1,988.96	116.58
33 05 63 00-0083 EA 24" x 36", 18" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	1,256.66	160.29
33 05 63 00-0084 EA 24" x 36", 26" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	1,439.38	160.29
33 05 63 00-0085 EA 24" x 36", 48" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	2,389.91	160.29
33 05 63 00-0086 EA 39" Round, 18" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	1,340.65	174.87
33 05 63 00-0087 EA 39" Round, 24" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	1,939.17	174.87
33 05 63 00-0088 EA 39" Round, 36" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....	2,428.61	174.87

33 Utilities**33 05 Common Work Results for Utilities****33 05 63 Concrete Vaults and Chambers**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
33 05 63 00-0089	EA	39" Round, 48" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		3,586.25	174.87
33 05 63 00-0090	EA	30" x 48", 24" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		1,925.12	265.49
33 05 63 00-0091	EA	30" x 48", 48" Depth, 22,500 LB Design Load, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		2,825.93	265.49
33 05 63 00-0092		Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosures <small>(33 05 63 00-0071)</small>			
33 05 63 00-0093	EA	12" x 12", 24" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		545.66	26.24
33 05 63 00-0094	EA	13" x 24", 18" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		685.12	87.43
33 05 63 00-0095	EA	17" x 30", 18" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		834.55	87.43
33 05 63 00-0096	EA	13" x 24", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		767.67	87.43
33 05 63 00-0097	EA	13" x 24", 26" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		882.10	87.43
33 05 63 00-0098	EA	17" x 30", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		912.11	87.43
33 05 63 00-0099	EA	17" x 30", 26" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		1,184.92	87.43
33 05 63 00-0100	EA	24" x 36", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		1,563.82	160.29
33 05 63 00-0101	EA	24" x 36", 26" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		1,746.54	160.29
33 05 63 00-0102	EA	24" x 36", 48" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		2,697.10	160.29
33 05 63 00-0103	EA	30" x 48", 24" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		2,284.06	265.49
33 05 63 00-0104	EA	30" x 48", 48" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure.....		3,191.71	265.49
33 05 63 00-0105		Straight Sides, Polymer Concrete Handhole Enclosures <small>(33 05 63 00-0070)</small>			
33 05 63 00-0106		Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosures <small>(33 05 63 00-0105)</small>			
33 05 63 00-0107	EA	5" x 16", 12" Depth, 5,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		701.74	26.24
33 05 63 00-0108	EA	10" x 12", 15" Depth, 5,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		591.96	26.24
33 05 63 00-0109	EA	13" x 24", 12" Depth, 5,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		459.66	87.43
33 05 63 00-0110	EA	17" x 30", 12" Depth, 5,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		524.44	87.43
33 05 63 00-0111	EA	6" x 8", 6" Depth, 15,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		158.36	26.24
33 05 63 00-0112	EA	12" x 12", 12" Depth, 15,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		250.16	26.24
33 05 63 00-0113	EA	8" x 18", 7" Depth, 15,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		409.48	26.24
33 05 63 00-0114	EA	8" x 18", 8" Depth, 15,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		428.76	26.24
33 05 63 00-0115	EA	11" x 18", 12" Depth, 15,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		347.05	58.29
33 05 63 00-0116	EA	11" x 18", 18" Depth, 15,000 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		376.62	58.29
33 05 63 00-0117	EA	8" x 8", 12" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		246.21	26.24
33 05 63 00-0118	EA	8" x 8", 18" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		282.34	26.24
33 05 63 00-0119	EA	11" x 18", 12" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		373.55	58.29
33 05 63 00-0120	EA	11" x 18", 18" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		423.27	58.29
33 05 63 00-0121	EA	11" x 20", 12" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		391.09	58.29
33 05 63 00-0122	EA	13" x 24", 12" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		462.68	87.43
33 05 63 00-0123	EA	13" x 24", 18" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		511.45	87.43
33 05 63 00-0124	EA	17" x 30", 12" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		547.72	87.43
33 05 63 00-0125	EA	17" x 30", 18" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		602.34	87.43
33 05 63 00-0126	EA	17" x 30", 22" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		711.27	87.43
33 05 63 00-0127	EA	17" x 30", 24" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		777.35	87.43
33 05 63 00-0128	EA	17" x 30", 28" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		849.66	87.43
33 05 63 00-0129	EA	17" x 30", 30" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		895.12	87.43
33 05 63 00-0130	EA	24" x 24", 24" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		1,062.75	116.58
33 05 63 00-0131	EA	24" x 36", 18" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure.....		1,058.72	160.29



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 63 00-0132 EA 24" x 36", 24" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,375.39	160.29
33 05 63 00-0133 EA 24" x 36", 30" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,667.79	160.29
33 05 63 00-0134 EA 24" x 36", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,852.45	160.29
33 05 63 00-0135 EA 24" x 36", 42" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,036.13	160.29
33 05 63 00-0136 EA 36" x 36", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,276.55	265.49
33 05 63 00-0137 EA 30" x 48", 18" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,629.21	265.49
33 05 63 00-0138 EA 30" x 48", 24" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,863.74	265.49
33 05 63 00-0139 EA 30" x 48", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,312.21	265.49
33 05 63 00-0140 EA 30" x 60", 21" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,307.60	265.49
33 05 63 00-0141 EA 30" x 60", 30" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,475.01	265.49
33 05 63 00-0142 EA 30" x 60", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,796.96	265.49
33 05 63 00-0143 EA 36" x 60", 19" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,556.89	284.45
33 05 63 00-0144 EA 36" x 60", 24" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,784.20	284.45
33 05 63 00-0145 EA 36" x 60", 31" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,074.40	284.45
33 05 63 00-0146 EA 36" x 60", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,190.52	284.45
33 05 63 00-0147 EA 48" x 48", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,230.88	284.45
33 05 63 00-0148 EA 48" x 48", 48" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,673.06	284.45
33 05 63 00-0149 EA 36" x 72", 21" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,814.32	284.45
33 05 63 00-0150 EA 36" x 72", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,746.04	284.45
33 05 63 00-0151 EA 48" x 72", 36" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	4,223.02	303.42
33 05 63 00-0152 EA 48" x 72", 48" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	5,236.76	303.42
33 05 63 00-0153 EA 48" x 96", 48" Depth, 22,500 LB Design Load, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	6,747.54	303.42
33 05 63 00-0154 Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosures <small>(33 05 63 00-0105)</small>		
33 05 63 00-0155 EA 13" x 24", 12" Depth, 5,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	627.83	87.43
33 05 63 00-0156 EA 17" x 30", 12" Depth, 5,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	723.91	87.43
33 05 63 00-0157 EA 6" x 8", 6" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	273.53	26.24
33 05 63 00-0158 EA 12" x 12", 12" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	398.98	26.24
33 05 63 00-0159 EA 8" x 18", 7" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	537.66	26.24
33 05 63 00-0160 EA 8" x 18", 8" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	556.97	26.24
33 05 63 00-0161 EA 10" x 15", 18" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Flared Sides, Polymer Concrete Handhole Enclosure	473.32	58.29
33 05 63 00-0162 EA 11" x 18", 12" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	493.90	58.29
33 05 63 00-0163 EA 11" x 18", 18" Depth, 15,000 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	521.42	58.29
33 05 63 00-0164 EA 8" x 8", 12" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	371.79	26.24
33 05 63 00-0165 EA 8" x 8", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	440.85	26.24
33 05 63 00-0166 EA 11" x 18", 12" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	520.75	58.29
33 05 63 00-0167 EA 11" x 18", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	570.47	58.29
33 05 63 00-0168 EA 11" x 20", 12" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	539.86	58.29
33 05 63 00-0169 EA 13" x 24", 12" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	626.90	87.43
33 05 63 00-0170 EA 13" x 24", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	676.28	87.43
33 05 63 00-0171 EA 17" x 30", 12" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	743.69	87.43
33 05 63 00-0172 EA 17" x 30", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	797.96	87.43

33 Utilities**33 05 Common Work Results for Utilities****33 05 63 Concrete Vaults and Chambers**

MINOR CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 63 00-0173	EA	17" x 30", 22" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	906.58	87.43
33 05 63 00-0174	EA	17" x 30", 24" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	972.94	87.43
33 05 63 00-0175	EA	17" x 30", 28" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,044.93	87.43
33 05 63 00-0176	EA	17" x 30", 30" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,090.71	87.43
33 05 63 00-0177	EA	24" x 30", 24" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,332.94	116.58
33 05 63 00-0178	EA	24" x 36", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,365.91	160.29
33 05 63 00-0179	EA	24" x 36", 24" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,682.20	160.29
33 05 63 00-0180	EA	24" x 36", 30" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,974.29	160.29
33 05 63 00-0181	EA	24" x 36", 36" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,158.66	160.29
33 05 63 00-0182	EA	24" x 36", 42" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,342.94	160.29
33 05 63 00-0183	EA	30" x 48", 18" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,984.76	265.49
33 05 63 00-0184	EA	30" x 48", 24" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,219.64	265.49
33 05 63 00-0185	EA	30" x 48", 36" Depth, 22,500 LB Design Load, Gasketed, Open Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,667.76	265.49
33 05 63 00-0186 Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosures <small>(33 05 63 00-0105)</small>				
33 05 63 00-0187	EA	13" x 24", 12" Depth, 5,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	574.13	87.43
33 05 63 00-0188	EA	17" x 30", 12" Depth, 5,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	672.89	87.43
33 05 63 00-0189	EA	6" x 8", 6" Depth, 15,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	200.11	26.24
33 05 63 00-0190	EA	12" x 12", 12" Depth, 15,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	334.53	26.24
33 05 63 00-0191	EA	8" x 18", 7" Depth, 15,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	484.02	26.24
33 05 63 00-0192	EA	8" x 18", 8" Depth, 15,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	503.68	26.24
33 05 63 00-0193	EA	11" x 18", 12" Depth, 15,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	438.00	58.29
33 05 63 00-0194	EA	11" x 18", 18" Depth, 15,000 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	495.23	58.29
33 05 63 00-0195	EA	8" x 8", 18" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	291.73	26.24
33 05 63 00-0196	EA	11" x 18", 12" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	466.13	58.29
33 05 63 00-0197	EA	11" x 18", 18" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	537.42	58.29
33 05 63 00-0198	EA	11" x 20", 12" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	484.65	58.29
33 05 63 00-0199	EA	13" x 24", 12" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	619.33	87.43
33 05 63 00-0200	EA	13" x 24", 18" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	716.81	87.43
33 05 63 00-0201	EA	17" x 30", 12" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	749.23	87.43
33 05 63 00-0202	EA	17" x 30", 18" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	826.41	87.43
33 05 63 00-0203	EA	17" x 30", 22" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	897.41	87.43
33 05 63 00-0204	EA	17" x 30", 24" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	964.45	87.43
33 05 63 00-0205	EA	17" x 30", 28" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,084.48	87.43
33 05 63 00-0206	EA	17" x 30", 30" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,101.21	87.43
33 05 63 00-0207	EA	24" x 24", 24" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,353.88	116.58
33 05 63 00-0208	EA	24" x 36", 18" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,393.05	160.29
33 05 63 00-0209	EA	24" x 36", 24" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,742.36	160.29
33 05 63 00-0210	EA	24" x 36", 30" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,087.83	160.29
33 05 63 00-0211	EA	24" x 36", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,317.28	160.29
33 05 63 00-0212	EA	24" x 36", 42" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,546.74	160.29
33 05 63 00-0213	EA	36" x 36", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,704.06	265.49
33 05 63 00-0214	EA	30" x 48", 18" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,056.75	265.49
33 05 63 00-0215	EA	30" x 48", 24" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,309.57	265.49
33 05 63 00-0216	EA	30" x 48", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,757.73	265.49

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 63 00-0217 EA 30" x 60", 21" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,955.41	265.49
33 05 63 00-0218 EA 30" x 60", 30" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,017.31	265.49
33 05 63 00-0219 EA 30" x 60", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,617.83	265.49
33 05 63 00-0220 EA 36" x 60", 19" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,342.74	284.45
33 05 63 00-0221 EA 36" x 60", 24" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,460.19	284.45
33 05 63 00-0222 EA 36" x 60", 31" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,793.36	284.45
33 05 63 00-0223 EA 36" x 60", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	4,045.52	284.45
33 05 63 00-0224 EA 36" x 72", 21" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,708.46	284.45
33 05 63 00-0225 EA 36" x 72", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	4,610.29	284.45
33 05 63 00-0226 EA 48" x 48", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,989.24	284.45
33 05 63 00-0227 EA 48" x 48", 48" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	4,393.88	284.45
33 05 63 00-0228 EA 48" x 72", 36" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	5,336.04	303.42
33 05 63 00-0229 EA 48" x 72", 48" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	6,350.18	303.42
33 05 63 00-0230 EA 48" x 96", 48" Depth, 22,500 LB Design Load, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	8,600.74	303.42
33 05 63 00-0231 Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosures <small>(33 05 63 00-0105)</small>		
33 05 63 00-0232 EA 13" x 24", 12" Depth, 5,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	742.27	87.43
33 05 63 00-0233 EA 17" x 30", 12" Depth, 5,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	872.74	87.43
33 05 63 00-0234 EA 6" x 8", 6" Depth, 15,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	314.35	26.24
33 05 63 00-0235 EA 12" x 12", 12" Depth, 15,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	483.06	26.24
33 05 63 00-0236 EA 8" x 18", 7" Depth, 15,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	611.94	26.24
33 05 63 00-0237 EA 8" x 18", 8" Depth, 15,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	631.86	26.24
33 05 63 00-0238 EA 11" x 18", 12" Depth, 15,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	585.20	58.29
33 05 63 00-0239 EA 11" x 18", 18" Depth, 15,000 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	642.09	58.29
33 05 63 00-0240 EA 8" x 8", 18" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	454.97	26.24
33 05 63 00-0241 EA 11" x 18", 12" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	612.66	58.29
33 05 63 00-0242 EA 11" x 18", 18" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	683.96	58.29
33 05 63 00-0243 EA 11" x 20", 12" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	591.41	58.29
33 05 63 00-0244 EA 13" x 24", 12" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	784.22	87.43
33 05 63 00-0245 EA 13" x 24", 18" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	881.70	87.43
33 05 63 00-0246 EA 17" x 30", 12" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	944.82	87.43
33 05 63 00-0247 EA 17" x 30", 18" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,022.03	87.43
33 05 63 00-0248 EA 17" x 30", 22" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,093.01	87.43
33 05 63 00-0249 EA 17" x 30", 24" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,160.07	87.43
33 05 63 00-0250 EA 17" x 30", 28" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,280.13	87.43
33 05 63 00-0251 EA 17" x 30", 30" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,296.80	87.43
33 05 63 00-0252 EA 24" x 24", 24" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,623.72	116.58
33 05 63 00-0253 EA 24" x 36", 18" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	1,700.21	160.29
33 05 63 00-0254 EA 24" x 36", 24" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,049.21	160.29
33 05 63 00-0255 EA 24" x 36", 30" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,394.29	160.29
33 05 63 00-0256 EA 24" x 36", 36" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,623.92	160.29
33 05 63 00-0257 EA 24" x 36", 42" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,853.55	160.29

33 Utilities**33 05 Common Work Results for Utilities****33 05 63 Concrete Vaults and Chambers**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 05 63 00-0258	EA	30" x 48", 18" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,412.62	265.49
33 05 63 00-0259	EA	30" x 48", 24" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	2,665.79	265.49
33 05 63 00-0260	EA	30" x 48", 36" Depth, 22,500 LB Design Load, Gasketed, Solid Bottom, Straight Sides, Polymer Concrete Handhole Enclosure	3,113.63	265.49

33 05 63 00-0261 Footed, Straight Sides, Polymer Concrete Handhole Enclosures (33 05 63 00-0105)

33 05 63 00-0262	EA	17" x 30", 12" Depth, 5,000 LB Design Load, Footed, Straight Sides, Polymer Concrete Handhole Enclosure	615.13	87.43
33 05 63 00-0263	EA	11" x 18", 12" Depth, 15,000 LB Design Load, Footed, Straight Sides, Polymer Concrete Handhole Enclosure	415.73	58.29
33 05 63 00-0264	EA	11" x 18", 18" Depth, 15,000 LB Design Load, Footed, Straight Sides, Polymer Concrete Handhole Enclosure	470.71	58.29
33 05 63 00-0265	EA	13" x 24", 12" Depth, 15,000 LB Design Load, Footed, Straight Sides, Polymer Concrete Handhole Enclosure	543.78	87.43
33 05 63 00-0266	EA	11" x 18", 12" Depth, 22,500 LB Design Load, Footed, Straight Sides, Polymer Concrete Handhole Enclosure	433.74	58.29
33 05 63 00-0267	EA	11" x 18", 18" Depth, 22,500 LB Design Load, Footed, Straight Sides, Polymer Concrete Handhole Enclosure	486.39	58.29

33 05 63 00-0268 Polymer Concrete Handhole Enclosure Extensions (33 05 63 00-0069)

Note: Excludes bases See CSI section 33 05 63 00-0070 for bases.

33 05 63 00-0269	EA	13" x 24", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	441.43	87.43
33 05 63 00-0270	EA	17" x 30", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	498.72	87.43
33 05 63 00-0271	EA	24" x 24", 6" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	566.90	116.58
33 05 63 00-0272	EA	24" x 24", 12" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	623.15	116.58
33 05 63 00-0273	EA	24" x 36", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	730.71	160.29
33 05 63 00-0274	EA	36" x 36", 12" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	1,295.55	265.49
33 05 63 00-0275	EA	30" x 48", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	1,234.05	265.49
33 05 63 00-0276	EA	30" x 48", 11" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	1,247.47	265.49
33 05 63 00-0277	EA	36" x 60", 12" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	1,707.25	284.45
33 05 63 00-0278	EA	48" x 72", 12" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	2,759.04	303.42
33 05 63 00-0279	EA	48" x 96", 12" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Extension	3,652.34	303.42
33 05 63 00-0280	EA	13" x 24", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Solid Base Extension	742.04	87.43
33 05 63 00-0281	EA	17" x 30", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Solid Base Extension	777.03	87.43
33 05 63 00-0282	EA	24" x 24", 6" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Solid Base Extension	823.32	116.58
33 05 63 00-0283	EA	24" x 24", 12" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Solid Base Extension	880.18	116.58
33 05 63 00-0284	EA	24" x 36", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Solid Base Extension	1,011.95	160.29
33 05 63 00-0285	EA	30" x 48", 8" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Solid Base Extension	1,631.50	265.49
33 05 63 00-0286	EA	13" x 24", 3" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Grade Adjustable Extension	570.94	87.43
33 05 63 00-0287	EA	17" x 30", 3" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Grade Adjustable Extension	639.98	87.43
33 05 63 00-0288	EA	24" x 36", 4" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Grade Adjustable Extension	829.76	160.29
33 05 63 00-0289	EA	36" x 60", 3" Extension, 22,500 LB Design Load, Straight Sides, Polymer Concrete Handhole Enclosure Grade Adjustable Extension	1,641.41	284.45

33 05 63 00-0290 Polymer Concrete Handhole Enclosure Covers (33 05 63 00-0069)**33 05 63 00-0291 Polymer Concrete Handhole Enclosure Covers (33 05 63 00-0290)**

33 05 63 00-0292	EA	5" x 16", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	163.95	11.67
33 05 63 00-0293	EA	10" x 12", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	166.15	11.67
33 05 63 00-0294	EA	12" x 12", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	153.54	11.67
33 05 63 00-0295	EA	8" x 18", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	166.58	11.67
33 05 63 00-0296	EA	11" x 18", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	168.26	11.66
33 05 63 00-0297	EA	13" x 24", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	193.94	11.66
33 05 63 00-0298	EA	17" x 30", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	225.72	11.66
33 05 63 00-0299	EA	30" x 59", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	1,503.13	34.13
33 05 63 00-0300	EA	30" x 60", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	1,313.66	34.13
33 05 63 00-0301	EA	36" x 60", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	1,973.61	34.13
33 05 63 00-0302	EA	48" x 48", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	1,996.11	34.13
33 05 63 00-0303	EA	36" x 72", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	2,263.14	34.13
33 05 63 00-0304	EA	48" x 72", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	2,467.12	34.13
33 05 63 00-0305	EA	48" x 96", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	3,973.05	34.13
33 05 63 00-0306	EA	10" x 15", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	139.52	11.66
33 05 63 00-0307	EA	11" x 18", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	202.58	11.66
33 05 63 00-0308	EA	11" x 20", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	205.51	11.66

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 63 00-0309 EA 13" x 24", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	260.17	11.66
33 05 63 00-0310 EA 13" x 24", 8,000 LB Design Load, Standard Duty, Service Box, Polymer Concrete Handhole Enclosure Cover	194.76	11.66
33 05 63 00-0311 EA 17" x 30", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	308.90	11.66
33 05 63 00-0312 EA 17" x 30", 8,000 LB Design Load, Standard Duty, Service Box, Polymer Concrete Handhole Enclosure Cover	241.20	11.66
33 05 63 00-0313 EA 27" Round, 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	501.51	11.66
33 05 63 00-0314 EA 24" x 24", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	435.58	17.49
33 05 63 00-0315 EA 24" x 36", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	548.24	17.49
33 05 63 00-0316 EA 39" Round, 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	707.77	20.40
33 05 63 00-0317 EA 36" x 36", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	995.13	26.55
33 05 63 00-0318 EA 30" x 48", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover	1,032.85	50.57
33 05 63 00-0319 EA 11" x 18", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	263.44	11.66
33 05 63 00-0320 EA 13" x 24", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	378.26	11.66
33 05 63 00-0321 EA 17" x 30", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	431.26	11.66
33 05 63 00-0322 EA 27" Round, 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	721.20	11.66
33 05 63 00-0323 EA 24" x 24", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	590.46	17.49
33 05 63 00-0324 EA 39" Round, 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,002.78	20.40
33 05 63 00-0325 EA 36" x 36", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,314.70	26.55
33 05 63 00-0326 EA 30" x 59", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,774.77	34.13
33 05 63 00-0327 EA 30" x 60", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,576.25	34.13
33 05 63 00-0328 EA 36" x 60", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	2,207.53	34.13
33 05 63 00-0329 EA 48" x 48", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	2,878.91	34.13
33 05 63 00-0330 EA 36" x 72", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	2,756.44	34.13
33 05 63 00-0331 EA 48" x 72", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	4,191.70	34.13
33 05 63 00-0332 EA 48" x 96", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover	6,482.50	34.13
33 05 63 00-0333 EA 11" x 18", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	348.51	11.66
33 05 63 00-0334 EA 11" x 20", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	381.68	11.66
33 05 63 00-0335 EA 13" x 24", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	504.53	11.66
33 05 63 00-0336 EA 17" x 30", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	575.82	11.66
33 05 63 00-0337 EA 27" Round, 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	999.80	11.66
33 05 63 00-0338 EA 24" x 24", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	721.74	17.49
33 05 63 00-0339 EA 24" x 36", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	990.17	17.49
33 05 63 00-0340 EA 39" Round, 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,538.79	20.40
33 05 63 00-0341 EA 36" x 36", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,759.55	26.55
33 05 63 00-0342 EA 30" x 48", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	1,829.34	50.57
33 05 63 00-0343 EA 30" x 60", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	2,116.55	34.13
33 05 63 00-0344 EA 36" x 60", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	2,960.59	34.13
33 05 63 00-0345 EA 48" x 48", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	4,147.77	34.13
33 05 63 00-0346 EA 36" x 72", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	3,699.73	34.13
33 05 63 00-0347 EA 48" x 72", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	6,140.75	34.13
33 05 63 00-0348 EA 48" x 96", 22,500 LB Design Load, Extra Heavy Duty, Polymer Concrete Handhole Enclosure Cover	9,486.20	34.13
33 05 63 00-0349 Polymer Concrete Handhole Enclosure Covers With Gaskets (33 05 63 00-0290)		
33 05 63 00-0350 EA 12" x 12", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	189.20	11.67
33 05 63 00-0351 EA 8" x 18", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	200.30	11.67
33 05 63 00-0352 EA 11" x 18", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	203.92	11.66
33 05 63 00-0353 EA 13" x 24", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	205.28	11.66
33 05 63 00-0354 EA 17" x 30", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	237.84	11.66
33 05 63 00-0355 EA 10" x 15", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	149.76	11.66
33 05 63 00-0356 EA 11" x 18", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	213.08	11.66
33 05 63 00-0357 EA 11" x 20", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	215.11	11.66
33 05 63 00-0358 EA 13" x 24", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	270.98	11.66
33 05 63 00-0359 EA 13" x 24", 8,000 LB Design Load, Standard Duty, Service Box, Polymer Concrete Handhole Enclosure Cover With Gasket	206.53	11.66
33 05 63 00-0360 EA 17" x 30", 8,000 LB Design Load, Standard Duty, Service Box, Polymer Concrete Handhole Enclosure Cover With Gasket	253.64	11.66
33 05 63 00-0361 EA 17" x 30", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	320.36	11.66
33 05 63 00-0362 EA 24" x 24", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	443.26	17.49
33 05 63 00-0363 EA 24" x 36", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	560.05	17.49
33 05 63 00-0364 EA 30" x 48", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	1,044.97	50.57
33 05 63 00-0365 EA 6" x 8", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	123.73	11.67
33 05 63 00-0366 EA 8" x 8", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	196.82	11.67
33 05 63 00-0367 EA 8" x 18", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	219.61	11.67
33 05 63 00-0368 EA 12" x 12", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	209.49	11.67
33 05 63 00-0369 EA 10" x 15", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	171.53	11.66
33 05 63 00-0370 EA 11" x 18", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	273.91	11.66
33 05 63 00-0371 EA 11" x 20", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	297.57	11.66
33 05 63 00-0372 EA 13" x 24", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	389.39	11.66
33 05 63 00-0373 EA 17" x 30", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	443.35	11.66
33 05 63 00-0374 EA 24" x 24", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	601.27	17.49
33 05 63 00-0375 EA 24" x 36", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	753.00	17.49
33 05 63 00-0376 EA 30" x 48", 15,000 LB Design Load, Heavy Duty, Polymer Concrete Handhole Enclosure Cover With Gasket	1,380.23	50.57
33 05 63 00-0377 Polymer Concrete Handhole Enclosure Covers Without Bolts (33 05 63 00-0290)		
33 05 63 00-0378 EA 6" x 9", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	98.59	11.67
33 05 63 00-0379 EA 7" x 13", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	118.25	11.67
33 05 63 00-0380 EA 12" x 12", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	144.72	11.67
33 05 63 00-0381 EA 8" x 18", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	156.49	11.67
33 05 63 00-0382 EA 11" x 18", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	156.16	11.66
33 05 63 00-0383 EA 13" x 24", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	186.32	11.66

33 Utilities**33 05 Common Work Results for Utilities****33 05 63 Concrete Vaults and Chambers**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 05 63 00-0384	EA	17" x 30", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	215.95	11.66
33 05 63 00-0385	EA	24" x 36", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	528.94	17.49
33 05 63 00-0386	EA	30" x 48", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	988.72	50.57
33 05 63 00-0387	EA	30" x 59", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	1,486.57	34.13
33 05 63 00-0388	EA	30" x 60", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	1,294.95	34.13
33 05 63 00-0389	EA	48" x 48", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	1,942.85	34.13
33 05 63 00-0390	EA	36" x 60", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	1,874.34	34.13
33 05 63 00-0391	EA	36" x 72", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	2,245.28	34.13
33 05 63 00-0392	EA	48" x 72", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	2,401.13	34.13
33 05 63 00-0393	EA	48" x 96", 5,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	3,846.23	34.13
33 05 63 00-0394	EA	10" x 15", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	133.93	11.66
33 05 63 00-0395	EA	10" x 16", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	130.65	11.66
33 05 63 00-0396	EA	11" x 20", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	195.51	11.66
33 05 63 00-0397	EA	11" x 21", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	215.37	11.66
33 05 63 00-0398	EA	13" x 24", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	244.48	11.66
33 05 63 00-0399	EA	13" x 24", 8,000 LB Design Load, Standard Duty, Service Box, Polymer Concrete Handhole Enclosure Cover Without Bolts	184.61	11.66
33 05 63 00-0400	EA	18" x 19", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	206.53	11.66
33 05 63 00-0401	EA	17" x 30", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	295.16	11.66
33 05 63 00-0402	EA	24" x 24", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	426.67	17.49
33 05 63 00-0403	EA	20" x 42", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	535.05	17.49
33 05 63 00-0404	EA	24" x 36", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	528.62	17.49
33 05 63 00-0405	EA	36" x 36", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	954.89	26.55
33 05 63 00-0406	EA	30" x 48", 8,000 LB Design Load, Standard Duty, Polymer Concrete Handhole Enclosure Cover Without Bolts	988.72	30.34

33 05 63 00-0407 Overlapping, Polymer Concrete Handhole Enclosure Covers (33 05 63 00-0290)

33 05 63 00-0408	EA	30" x 60", 5,000 LB Design Load, Standard Duty, Overlapping, Polymer Concrete Handhole Enclosure Cover	1,548.30	34.13
33 05 63 00-0409	EA	36" x 60", 5,000 LB Design Load, Standard Duty, Overlapping, Polymer Concrete Handhole Enclosure Cover	2,247.57	34.13
33 05 63 00-0410	EA	30" x 48", 8,000 LB Design Load, Standard Duty, Overlapping, Polymer Concrete Handhole Enclosure Cover	1,298.43	50.57
33 05 63 00-0411	EA	30" x 48", 15,000 LB Design Load, Heavy Duty, Overlapping, Polymer Concrete Handhole Enclosure Cover	1,725.31	50.57
33 05 63 00-0412	EA	30" x 60", 15,000 LB Design Load, Heavy Duty, Overlapping, Polymer Concrete Handhole Enclosure Cover	1,841.92	34.13
33 05 63 00-0413	EA	36" x 60", 15,000 LB Design Load, Heavy Duty, Overlapping, Polymer Concrete Handhole Enclosure Cover	2,514.93	34.13

33 05 63 00-0414 Split, Polymer Concrete Handhole Enclosure Covers (33 05 63 00-0290)

33 05 63 00-0415	EA	24" x 36", 8,000 LB Design Load, Standard Duty, Split, Polymer Concrete Handhole Enclosure Cover	601.48	17.49
33 05 63 00-0416	EA	36" x 36", 8,000 LB Design Load, Standard Duty, Split, Polymer Concrete Handhole Enclosure Cover	1,121.08	26.55
33 05 63 00-0417	EA	30" x 48", 8,000 LB Design Load, Standard Duty, Split, Polymer Concrete Handhole Enclosure Cover	1,171.24	50.57
33 05 63 00-0418	EA	6" x 8", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	93.11	11.67
33 05 63 00-0419	EA	8" x 8", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	157.54	11.67
33 05 63 00-0420	EA	12" x 12", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	173.83	11.67
33 05 63 00-0421	EA	8" x 18", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	184.62	11.67
33 05 63 00-0422	EA	10" x 15", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	161.38	11.66
33 05 63 00-0423	EA	11" x 20", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	287.97	11.66
33 05 63 00-0424	EA	24" x 36", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	808.44	17.49
33 05 63 00-0425	EA	36" x 36", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	1,494.32	26.55
33 05 63 00-0426	EA	30" x 48", 15,000 LB Design Load, Heavy Duty, Split, Polymer Concrete Handhole Enclosure Cover	1,565.06	50.57

33 05 63 00-0427 Precast Concrete Handholes With Steel Cover (33 05 63 00-0068)

Note: 8000 To 12000 pound traffic rated top. Includes cover stamped with utility (Electrical, Sewer, Water, Etc.).

33 05 63 00-0428	EA	12" x 12" x 12" Precast Concrete Handholes With Steel Cover	1,007.24	248.60
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	18.00
33 05 63 00-0429	EA	12" x 24" x 21" Precast Concrete Handholes With Steel Cover	1,718.53	372.90
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	108.92
33 05 63 00-0430	EA	18" x 30" x 18" Precast Concrete Handholes With Steel Cover	2,057.87	497.20
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	191.19
33 05 63 00-0431	EA	24" x 24" x 24" Precast Concrete Handholes With Steel Cover	2,148.63	497.20
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	241.79
33 05 63 00-0432	EA	24" x 24" x 30" Precast Concrete Handholes With Steel Cover	2,505.30	621.50
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	291.31
33 05 63 00-0433	EA	30" x 36" x 30" Precast Concrete Handholes With Steel Cover	2,655.78	621.50
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	319.76
33 05 63 00-0434	EA	36" x 36" x 48" Precast Concrete Handholes With Steel Cover	3,052.37	745.80
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	373.74
33 05 63 00-0435	EA	48" x 48" x 48" Precast Concrete Handholes With Steel Cover	3,497.14	870.10
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	521.06
33 05 63 00-0436	EA	48" x 72" x 36" Precast Concrete Handholes With Steel Cover	3,499.87	745.80
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	563.06
33 05 63 00-0437	EA	54" x 38" x 24" Precast Concrete Handholes With Steel Cover	3,538.35	745.80
			Note: 8000 To 12000 pound traffic rated top.	
			For 15,000 to 22,500 Pound Traffic Rated Top, Add	392.86

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 63 00-0438 EA 6" Diameter Precast Concrete Handholes With Steel Cover Note: 8000 To 12000 pound traffic rated top.	760.79	248.60
<i>For 15,000 to 22,500 Pound Traffic Rated Top, Add</i>	15.00	
33 05 63 00-0439 EA 9" Diameter Precast Concrete Handholes With Steel Cover Note: 8000 To 12000 pound traffic rated top.	904.00	279.67
<i>For 15,000 to 22,500 Pound Traffic Rated Top, Add</i>	15.00	
33 05 63 00-0440 EA 12" Diameter Precast Concrete Handholes With Steel Cover Note: 8000 To 12000 pound traffic rated top.	1,128.25	310.75
<i>For 15,000 to 22,500 Pound Traffic Rated Top, Add</i>	15.00	

33 05 81 Metallic Castings for Utility Structures (33 05)

33 05 81 00-0001 Manhole Accessories (33 05 81)

33 05 81 00-0002 Steps For Cast-In-Place Manholes (33 05 81 00-0001)

See CSI section 33 01 30 81-0033 for installation of steps in existing manholes.

33 05 81 00-0003	EA	Cast Iron Manhole Step For New Manholes	101.73	
33 05 81 00-0004	EA	Galvanized Steel Manhole Step For New Manholes.....	67.19	
33 05 81 00-0005	EA	Aluminum Manhole Step For New Manholes.....	98.02	

33 05 81 00-0006 Manhole Covers And Frames (33 05 81)

Note: Includes moisture-tight masonry joints and waterproof grouting.

33 05 81 00-0007 Regular Manhole Covers And Frames (33 05 81 00-0006)

33 05 81 00-0008	EA	18" Square, Gray Iron, Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,623.26	99.23
			1,626.29	
33 05 81 00-0009	EA	18" Diameter, Gray Iron, Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	1,427.70	99.23
			789.40	
33 05 81 00-0010	EA	24" Diameter, Gray Iron, Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	1,650.03	115.38
			912.71	
33 05 81 00-0011	EA	24" Square, Gray Iron, Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,650.09	128.08
			1,585.84	
33 05 81 00-0012	EA	26" Diameter, Gray Iron, Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,214.27	138.46
			1,258.07	
33 05 81 00-0013	EA	30" Diameter, Gray Iron, Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,310.94	144.22
			1,314.79	

33 05 81 00-0014 Watertight Type Manhole Covers And Frames (33 05 81 00-0006)

33 05 81 00-0015	EA	20" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,891.57	81.92
			1,795.84	
33 05 81 00-0016	EA	22" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,926.83	81.92
			1,801.72	
33 05 81 00-0017	EA	24" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	2,975.47	95.77
			1,813.60	
33 05 81 00-0018	EA	26" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	3,558.86	107.31
			2,199.28	
33 05 81 00-0019	EA	30" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	4,141.66	109.61
			2,596.29	
33 05 81 00-0020	EA	32" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	4,365.62	111.92
			2,749.10	
33 05 81 00-0021	EA	36" Diameter, Gray Iron, Watertight Manhole Cover With Frame <i>For Ductile Iron Castings, Add</i>	4,566.01	115.38
			2,885.25	

33 05 81 00-0022 Aluminum Manhole Covers And Frames (33 05 81 00-0006)

33 05 81 00-0023	EA	12" Square Aluminum Manhole Cover With Frame	1,236.90	31.24
33 05 81 00-0024	EA	18" Square Aluminum Manhole Cover With Frame	2,277.46	34.59
33 05 81 00-0025	EA	24" Square Aluminum Manhole Cover With Frame	3,273.62	40.17

33 05 81 00-0026 Removal And Reinstallation Of Manhole Cover And Frame (33 05 81 00-0006)

Note: Includes surrounding asphalt removal and repair. Excludes saw cutting.

33 05 81 00-0027	EA	Removal And Reinstallation Of Manhole Cover And Frame	462.62	
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33 05 83 Non-Metallic Accessories for Utility Structures (33 05)

33 05 83 00-0001 Manhole Accessories (33 05 83)

33 05 83 00-0002 Steps For Cast-In-Place Manholes (33 05 83 00-0001)

See CSI section 33 01 30 81-0033 for installation of steps in existing manholes.

33 05 83 00-0003	EA	Polypropylene Manhole Step For New Manholes	51.04	
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33 05 83 00-0004 Rainguard Inflow Protectors (33 05 83)

33 05 83 00-0005	EA	18" Diameter Acrylonitrile Butadiene Styrene (ABS) Rainguard Inflow Protectors	147.17	24.81
33 05 83 00-0006	EA	22" Diameter Acrylonitrile Butadiene Styrene (ABS) Rainguard Inflow Protectors	170.68	24.81
33 05 83 00-0007	EA	24" Diameter Acrylonitrile Butadiene Styrene (ABS) Rainguard Inflow Protectors	204.06	29.76
33 05 83 00-0008	EA	26" Diameter Acrylonitrile Butadiene Styrene (ABS) Rainguard Inflow Protectors	218.91	29.76
33 05 83 00-0009	EA	30" Diameter Acrylonitrile Butadiene Styrene (ABS) Rainguard Inflow Protectors	271.85	34.73

33 Utilities**33 05 Common Work Results for Utilities****33 05 83 Non-Metallic Accessories for Utility Structures**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 05 83 00-0010 EA 32" Diameter Acrylonitrile Butadiene Styrene (ABS) Rainguard Inflow Protectors.....290.09 34.73

33 05 84 Accessories for Utility Structures (33 05)

See CSI section 22 13 19 26-0044 for oil interceptors, 22 13 23 00-0000 for sediment interceptors, 31 23 16 00-0000 for excavation, 31 23 16 36-0016 for backfill.

33 05 84 00-0001 Manhole Accessories (33 05 84)**33 05 84 00-0002 Precast Concrete Manhole Tops** (33 05 84 00-0001)**33 05 84 00-0003 Precast Concrete Manhole Slab Tops** (33 05 84 00-0002)

33 05 84 00-0004	EA	3' Diameter x 8" Thick Precast Manhole Top Slab	639.28	86.53
33 05 84 00-0005	EA	4' Diameter x 8" Thick Precast Manhole Top Slab	895.89	93.46
33 05 84 00-0006	EA	5' Diameter x 8" Thick Precast Manhole Top Slab	1,214.02	100.39
33 05 84 00-0007	EA	6' Diameter x 8" Thick Precast Manhole Top Slab	1,454.52	107.31
33 05 84 00-0008	EA	7' Diameter x 8" Thick Precast Manhole Top Slab	2,217.89	115.38
33 05 84 00-0009	EA	8' Diameter x 10" Thick Precast Manhole Top Slab	2,963.04	124.03
33 05 84 00-0010	EA	10' Diameter x 12" Thick Precast Manhole Top Slab	5,016.02	132.69
33 05 84 00-0011	EA	12' Diameter x 12" Thick Precast Manhole Top Slab	7,119.85	142.79

33 05 84 00-0012 Precast Concrete Manhole Cone Tops (33 05 84 00-0002)

33 05 84 00-0013	EA	3' Diameter x 8" Thick Precast Manhole Top Cone	1,018.94	108.17
33 05 84 00-0014	EA	3'-6" Diameter x 8" Thick Precast Manhole Top Cone	1,133.95	112.50
33 05 84 00-0015	EA	4' Diameter x 8" Thick Precast Manhole Top Cone	1,248.99	116.82
33 05 84 00-0016	EA	5' Diameter x 8" Thick Precast Manhole Top Cone	1,473.24	124.03
33 05 84 00-0017	EA	6' Diameter x 8" Thick Precast Manhole Top Cone	1,703.28	132.69
33 05 84 00-0018	EA	7' Diameter x 8" Thick Precast Manhole Top Cone	2,703.75	141.35
33 05 84 00-0019	EA	8' Diameter x 10" Thick Precast Manhole Top Cone	3,397.16	155.77

33 05 84 00-0020 Precast Concrete Manhole Reducer Slabs (33 05 84 00-0002)

33 05 84 00-0021	EA	5' Diameter To 4' Diameter, Precast Concrete Manhole Reducer Slab	1,327.15	100.39
33 05 84 00-0022	EA	6' Diameter To 4' Diameter, Precast Concrete Manhole Reducer Slab	1,709.33	107.31
33 05 84 00-0023	EA	7' Diameter To 4' Diameter, Precast Concrete Manhole Reducer Slab	2,257.17	107.31
33 05 84 00-0024	EA	8' Diameter To 4' Diameter, Precast Concrete Manhole Reducer Slab	3,573.49	107.31
33 05 84 00-0025	EA	10' Diameter To 4' Diameter, Precast Concrete Manhole Reducer Slab	4,597.55	107.31
33 05 84 00-0026	EA	12' Diameter To 4' Diameter, Precast Concrete Manhole Reducer Slab	6,659.71	107.31

33 05 84 00-0027 Pipe To Manhole Connector (33 05 84 00-0001)**33 05 84 00-0028 Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connectors** (33 05 84 00-0027)

33 05 84 00-0029	EA	4" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	119.42	
33 05 84 00-0030	EA	6" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	189.99	
33 05 84 00-0031	EA	8" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	213.48	
33 05 84 00-0032	EA	10" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	344.99	
33 05 84 00-0033	EA	12" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	491.21	
33 05 84 00-0034	EA	15" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	641.72	
33 05 84 00-0035	EA	18" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	1,207.71	
33 05 84 00-0036	EA	21" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	1,689.68	
33 05 84 00-0037	EA	24" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	2,726.87	
33 05 84 00-0038	EA	27" Ethylene Propylene Diene Monomer (EPDM) Pipe To Manhole Boot Connector	3,192.03	

33 05 84 00-0039 Elastomeric Polyvinyl Chloride (PVC) Flexible Manhole Adapter And Grout (33 05 84 00-0027)

Note: Fernco CMA.

33 05 84 00-0040	EA	4" Elastomeric Polyvinyl Chloride (PVC) Flexible Manhole Adapter And Grout	118.39	
33 05 84 00-0041	EA	6" Elastomeric Polyvinyl Chloride (PVC) Flexible Manhole Adapter And Grout	164.36	
33 05 84 00-0042	EA	8" Elastomeric Polyvinyl Chloride (PVC) Flexible Manhole Adapter And Grout	207.65	
33 05 84 00-0043	EA	10" Elastomeric Polyvinyl Chloride (PVC) Flexible Manhole Adapter And Grout	250.75	
33 05 84 00-0044	EA	12" Elastomeric Polyvinyl Chloride (PVC) Flexible Manhole Adapter And Grout	290.90	

33 05 84 00-0045 Brick And Grout Pipe To Manhole Connector (33 05 84 00-0027)

33 05 84 00-0046	EA	Seal Gap Between Pipe And Structure With Brick And Grout	260.28	
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33 05 84 00-0047 Inverts For Manholes (33 05 84 00-0001)

33 05 84 00-0048	EA	Single Channel Concrete Invert For Manholes	422.26	
33 05 84 00-0049	EA	Double Channel Concrete Invert For Manholes	608.54	
33 05 84 00-0050	EA	Triple Channel Concrete Invert For Manholes	819.76	
33 05 84 00-0051	EA	Quad Channel Concrete Invert For Manholes	1,030.90	
33 05 84 00-0052	EA	Single Channel Brick Invert For Manholes	620.25	
33 05 84 00-0053	EA	Double Channel Brick Invert For Manholes	928.50	
33 05 84 00-0054	EA	Triple Channel Brick Invert For Manholes	1,242.04	
33 05 84 00-0055	EA	Quad Channel Brick Invert For Manholes	1,552.09	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 05 84 00-0056 Protective Coating For New Manholes <small>(33 05 84 00-0001)</small>		
33 05 84 00-0057 Polyurethane Protective Coating For New Manholes <small>(33 05 84 00-0056)</small>		
33 05 84 00-0058 VLF 60 Mil Polyurethane Coating Of 3' Diameter Manhole Interior .....213.33		
For 80 Mil Material, Add	31.87	
For 100 Mil Material, Add	63.73	
For 125 Mil Material, Add	100.72	
For 150 Mil Material, Add	137.70	
For 200 Mil Material, Add	204.08	
For 2 To 5 Manholes, Deduct	-14.46	
For 6 To 10 Manholes, Deduct	-23.60	
For >10 Manholes, Deduct	-47.19	
33 05 84 00-0059 VLF 60 Mil Polyurethane Coating Of 3-1/2' Diameter Manhole Interior .....257.39		
For 80 Mil Material, Add	37.83	
For 100 Mil Material, Add	75.66	
For 125 Mil Material, Add	119.47	
For 150 Mil Material, Add	163.28	
For 200 Mil Material, Add	241.61	
For 2 To 5 Manholes, Deduct	-17.51	
For 6 To 10 Manholes, Deduct	-28.59	
For >10 Manholes, Deduct	-57.18	
33 05 84 00-0060 VLF 60 Mil Polyurethane Coating Of 4' Diameter Manhole Interior .....284.44		
For 80 Mil Material, Add	42.49	
For 100 Mil Material, Add	84.98	
For 125 Mil Material, Add	134.29	
For 150 Mil Material, Add	183.60	
For 200 Mil Material, Add	272.10	
For 2 To 5 Manholes, Deduct	-19.29	
For 6 To 10 Manholes, Deduct	-31.46	
For >10 Manholes, Deduct	-62.92	
33 05 84 00-0061 VLF 60 Mil Polyurethane Coating Of 5' Diameter Manhole Interior .....355.62		
For 80 Mil Material, Add	53.13	
For 100 Mil Material, Add	106.26	
For 125 Mil Material, Add	167.93	
For 150 Mil Material, Add	229.60	
For 200 Mil Material, Add	340.28	
For 2 To 5 Manholes, Deduct	-24.11	
For 6 To 10 Manholes, Deduct	-39.33	
For >10 Manholes, Deduct	-78.66	
33 05 84 00-0062 VLF 60 Mil Polyurethane Coating Of 6' Diameter Manhole Interior .....413.23		
For 80 Mil Material, Add	62.74	
For 100 Mil Material, Add	125.48	
For 125 Mil Material, Add	198.47	
For 150 Mil Material, Add	271.45	
For 200 Mil Material, Add	402.90	
For 2 To 5 Manholes, Deduct	-27.92	
For 6 To 10 Manholes, Deduct	-45.51	
For >10 Manholes, Deduct	-91.02	
33 05 84 00-0063 Polyvinyl Chloride (PVC) Liner <small>(33 05 84 00-0056)</small>		
Note: For new manholes and shop applied.		
33 05 84 00-0064 VLF 3' Diameter Polyvinyl Chloride (PVC) Liner For New Manhole .....288.76		
33 05 84 00-0065 VLF 3-1/2' Diameter Polyvinyl Chloride (PVC) Liner For New Manhole .....353.97		
33 05 84 00-0066 VLF 4' Diameter Polyvinyl Chloride (PVC) Liner For New Manhole .....431.97		
33 05 84 00-0067 VLF 5' Diameter Polyvinyl Chloride (PVC) Liner For New Manhole .....542.48		
33 05 84 00-0068 VLF 6' Diameter Polyvinyl Chloride (PVC) Liner For New Manhole .....652.98		
33 05 84 00-0069 SF Polyvinyl Chloride (PVC) Liner At Structures .....79.82		
33 05 84 00-0070 Concrete Grade Extensions/Grade Rings <small>(33 05 84 00-0001)</small>		
33 05 84 00-0071 18" Diameter, Concrete Grade Extensions/Grade Rings <small>(33 05 84 00-0070)</small>		
33 05 84 00-0072 EA 4" Rise, 18" Diameter, Concrete Grade Extensions/Grade Rings .....97.65		
33 05 84 00-0073 EA 6" Rise, 18" Diameter, Concrete Grade Extensions/Grade Ring .....106.79		
33 05 84 00-0074 EA 8" Rise, 18" Diameter, Concrete Grade Extensions/Grade Ring .....115.94		
33 05 84 00-0075 EA 10" Rise, 18" Diameter, Concrete Grade Extensions/Grade Ring .....125.08		
33 05 84 00-0076 24" Diameter, Concrete Grade Extensions/Grade Rings <small>(33 05 84 00-0070)</small>		
33 05 84 00-0077 EA 4" Rise, 24" Diameter, Concrete Grade Extensions/Grade Ring .....109.65		
33 05 84 00-0078 EA 6" Rise, 24" Diameter, Concrete Grade Extensions/Grade Ring .....120.05		
33 05 84 00-0079 EA 8" Rise, 24" Diameter, Concrete Grade Extensions/Grade Ring .....130.44		
33 05 84 00-0080 EA 10" Rise, 24" Diameter, Concrete Grade Extensions/Grade Ring .....140.83		
33 05 84 00-0081 30" Diameter, Concrete Grade Extensions/Grade Rings <small>(33 05 84 00-0070)</small>		
33 05 84 00-0082 EA 4" Rise, 30" Diameter, Concrete Grade Extensions/Grade Ring .....121.40		
33 05 84 00-0083 EA 6" Rise, 30" Diameter, Concrete Grade Extensions/Grade Ring .....132.99		
33 05 84 00-0084 EA 8" Rise, 30" Diameter, Concrete Grade Extensions/Grade Ring .....144.58		
33 05 84 00-0085 EA 10" Rise, 30" Diameter, Concrete Grade Extensions/Grade Ring .....156.17		

33 Utilities**33 05 Common Work Results for Utilities****33 05 84 Accessories for Utility Structures**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 05 84 00-0086	Bentonite Collar (33 05 84 00-0001)			
33 05 84 00-0087	Bentonite Collar At Manhole Connections (33 05 84 00-0086)			
33 05 84 00-0088	EA	Up To 12" Pipe, Bentonite Collar At Manhole Connection	147.96	
33 05 84 00-0089	EA	>12" To 21", Bentonite Collar At Manhole Connection	234.30	
33 05 84 00-0090	EA	>21" To 30" Pipe, Bentonite Collar At Manhole Connection	370.33	
33 05 84 00-0091	EA	>30" To 36" Pipe, Bentonite Collar At Manhole Connection	864.54	
33 05 84 00-0092	EA	>36" To 48" Pipe, Bentonite Collar At Manhole Connection	1,355.90	
33 05 84 00-0093	EA	>48" To 60" Pipe, Bentonite Collar At Manhole Connection	2,464.46	

33 05 84 00-0094 **Waste Water Collection System Taps** (33 05 84)
Note: For tapping existing structures only. Includes grout.

33 05 84 00-0095	Brick Manhole Taps (33 05 84 00-0094)			
33 05 84 00-0096	EA	4" Tap In 6" Brick Manhole	583.79	
33 05 84 00-0097	EA	6" Tap In 6" Brick Manhole	652.69	
33 05 84 00-0098	EA	8" Tap In 6" Brick Manhole	720.34	
33 05 84 00-0099	EA	10" Tap In 6" Brick Manhole	787.86	
33 05 84 00-0100	EA	12" Tap In 6" Brick Manhole	868.46	
33 05 84 00-0101	EA	15" Tap In 6" Brick Manhole	935.84	

33 05 84 00-0102	Precast Concrete Manhole Tap (33 05 84 00-0094)			
33 05 84 00-0103	EA	4" Tap In Existing Precast Concrete Manhole.....	859.86	
33 05 84 00-0104	EA	6" Tap In Existing Precast Concrete Manhole.....	963.19	
33 05 84 00-0105	EA	8" Tap In Existing Precast Concrete Manhole.....	1,077.17	
33 05 84 00-0106	EA	10" Tap In Existing Precast Concrete Manhole.....	1,178.44	
33 05 84 00-0107	EA	12" Tap In Existing Precast Concrete Manhole.....	1,279.52	
33 05 84 00-0108	EA	15" Tap In Existing Precast Concrete Manhole.....	1,383.05	
33 05 84 00-0109	EA	18" Tap In Existing Precast Concrete Manhole.....	1,592.24	
33 05 84 00-0110	EA	24" Tap In Existing Precast Concrete Manhole.....	2,047.01	

33 05 97 Identification and Signage for Utilities (33 05)**33 05 97 23 Utility Identification Warning Tape** (33 05 97)

33 05 97 23-0001	Non-Detectable Utility Warning Tape (33 05 97 23) Note: Labor installation is included with pipe and excavation..			
33 05 97 23-0002	CLF	3" Non-Detectable Utility Warning Tape	8.50	
33 05 97 23-0003	CLF	6" Non-Detectable Utility Warning Tape	11.86	

33 05 97 23-0004	Detectable Utility Warning Tape (33 05 97 23) Note: Labor installation is included with pipe and excavation..			
33 05 97 23-0005	CLF	2" Detectable Utility Warning Tape	8.59	
33 05 97 23-0006	CLF	3" Detectable Utility Warning Tape	11.66	
33 05 97 23-0007	CLF	6" Detectable Utility Warning Tape	18.52	

33 10 Water Utilities (33)**33 11 Groundwater Sources** (33 10)**33 11 13 Potable Water Supply Wells** (33 11)

33 11 13 00-0001	Submersible Well Pumps (33 11 13) Note: Includes pump end, motor and control box.			
33 11 13 00-0002	4" Submersible Well Pumps (33 11 13 00-0001)			
33 11 13 00-0003	Powder Coated Case And Cast Iron Ends (33 11 13 00-0002)			
33 11 13 00-0004	EA	1/2 HP Submersible Well Pump, 4" Diameter Powder Coated Case And Cast Iron Ends	1,415.65	493.69
33 11 13 00-0005	EA	3/4 HP Submersible Well Pump, 4" Diameter Powder Coated Case And Cast Iron Ends	1,613.00	547.19
33 11 13 00-0006	EA	1 HP Submersible Well Pump, 4" Diameter Powder Coated Case And Cast Iron Ends	1,790.28	608.00
33 11 13 00-0007	Stainless Steel Case And Ends (33 11 13 00-0002)			
33 11 13 00-0008	EA	1/2 HP Submersible Well Pump, 4" Diameter Stainless Steel	1,588.53	486.40
33 11 13 00-0009	EA	3/4 HP Submersible Well Pump, 4" Diameter Stainless Steel	1,810.77	547.19
33 11 13 00-0010	EA	1 HP Submersible Well Pump, 4" Diameter Stainless Steel	2,029.47	608.00
33 11 13 00-0011	EA	1-1/2 HP Submersible Well Pump, 4" Diameter Stainless Steel	2,321.58	668.80
33 11 13 00-0012	EA	2 HP Submersible Well Pump, 4" Diameter Stainless Steel	2,624.34	729.59
33 11 13 00-0013	EA	3 HP Submersible Well Pump, 4" Diameter Stainless Steel	3,222.77	851.19
33 11 13 00-0014	EA	5 HP Submersible Well Pump, 4" Diameter Stainless Steel	4,042.62	972.80
33 11 13 00-0015	6" Submersible Well Pumps (33 11 13 00-0001)			
33 11 13 00-0016	EA	5 HP Submersible Well Pump, 6" Diameter Stainless Steel	3,961.84	1,215.99
33 11 13 00-0017	EA	7.5 HP Submersible Well Pump, 6" Diameter Stainless Steel	4,561.46	1,337.59



	Utilities	33	
	Water Utilities	33 10	CS
	Groundwater Sources	33 11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 11 13 00-0018 EA 10 HP Submersible Well Pump, 6" Diameter Stainless Steel	5,183.57	1,459.19
33 11 13 00-0019 EA 15 HP Submersible Well Pump, 6" Diameter Stainless Steel	6,275.75	1,702.39

33 14 Water Utility Transmission and Distribution (33 10)

33 14 11 Water Utility Transmission Piping (33 14)

See CSI section 33 14 13 00-0000 for water utility transmission piping.

33 14 13 Public Water Utility Distribution Piping (33 14)

Note: Piping includes hydrostatic testing, disinfecting and warning tape. Excludes excavation and backfill. See CSI section 31 23 16 00-0000 for excavation, 31 23 16 36-0016 for backfill.

33 14 13 13 Ductile Iron Public Water Utility Distribution Piping (33 14 13)

33 14 13 13-0001 Ductile Iron Piping (33 14 13 13)

33 14 13 13-0002 Mechanical Joint Ductile Iron Piping (33 14 13 13-0001)

Note: Cement lining and bituminous coating shall conform to ANSI A21.4. Fittings are C153. See CSI section 33 14 13 13-0204 for bolts and gaskets.

33 14 13 13-0003 Mechanical Joint Ductile Iron Pipe (33 14 13 13-0002)

Note: Conforming to ANSI/AWWA C151/A21.51, federal specification WW-P-421D.

33 14 13 13-0004 LF 3", Class 51, Mechanical Joint Ductile Iron Pipe.....	48.82	13.63
For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	19.74	
For Cement Mortar Lining (CML), Add	2.82	
Note: ANSI/AWWA C104/A21.4		
For 40 Mil Ceramic Epoxy Lining (P401), Add	15.23	
For Fusion Bonded Epoxy Lining (206N), Add	5.08	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	2.12	
Note: ANSI/AWWA C151/A21.51		
For >1,000, Deduct	-2.44	
For Class 52, Add	8.84	
For Class 53, Add	15.89	
For Class 54, Add	22.64	
For Class 55, Add	26.06	
For Class 56, Add	29.42	
33 14 13 13-0005 LF 4", Class 50, Mechanical Joint Ductile Iron Pipe.....	52.96	14.50
For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	21.69	
For Cement Mortar Lining (CML), Add	3.10	
Note: ANSI/AWWA C104/A21.4		
For 40 Mil Ceramic Epoxy Lining (P401), Add	16.73	
For Fusion Bonded Epoxy Lining (206N), Add	5.58	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	2.32	
Note: ANSI/AWWA C151/A21.51		
For >1,000, Deduct	-2.65	
For Class 51, Add	4.50	
For Class 52, Add	9.69	
For Class 53, Add	17.43	
For Class 54, Add	24.84	
For Class 55, Add	28.59	
For Class 56, Add	32.27	
33 14 13 13-0006 LF 6", Class 50, Mechanical Joint Ductile Iron Pipe.....	56.65	15.23
For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	23.54	
For Cement Mortar Lining (CML), Add	3.36	
Note: ANSI/AWWA C104/A21.4		
For 40 Mil Ceramic Epoxy Lining (P401), Add	18.16	
For Fusion Bonded Epoxy Lining (206N), Add	6.05	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	2.52	
Note: ANSI/AWWA C151/A21.51		
For >1,000, Deduct	-2.83	
For Class 51, Add	4.87	
For Class 52, Add	10.50	
For Class 53, Add	18.89	
For Class 54, Add	26.93	
For Class 55, Add	30.98	
For Class 56, Add	34.97	
33 14 13 13-0007 LF 8", Class 50, Mechanical Joint Ductile Iron Pipe.....	66.99	15.83
For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	30.11	
For Cement Mortar Lining (CML), Add	4.30	
Note: ANSI/AWWA C104/A21.4		
For 40 Mil Ceramic Epoxy Lining (P401), Add	23.23	
For Fusion Bonded Epoxy Lining (206N), Add	7.74	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	3.23	
Note: ANSI/AWWA C151/A21.51		
For >1,000, Deduct	-3.35	
For Class 51, Add	6.16	
For Class 52, Add	13.29	
For Class 53, Add	23.95	
For Class 54, Add	34.17	
For Class 55, Add	39.29	
For Class 56, Add	44.32	

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0008	LF	10"	Class 50, Mechanical Joint Ductile Iron Pipe.....	89.95	22.43
			For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	33.58	
			For Cement Mortar Lining (CML), Add	5.60	
			Note: ANSI/AWWA C104/A21.4		
			For 40 Mil Ceramic Epoxy Lining (P401), Add	27.98	
			For Fusion Bonded Epoxy Lining (206N), Add	10.07	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	4.20	
			Note: ANSI/AWWA C151/A21.51		
			For >1,000, Deduct	-4.50	
			For Class 51, Add	8.05	
			For Class 52, Add	17.36	
			For Class 53, Add	31.26	
			For Class 54, Add	44.59	
			For Class 55, Add	51.29	
			For Class 56, Add	57.87	
33 14 13 13-0009	LF	12"	Class 50, Mechanical Joint Ductile Iron Pipe.....	109.24	24.92
			For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	35.74	
			For Cement Mortar Lining (CML), Add	7.15	
			Note: ANSI/AWWA C104/A21.4		
			For 40 Mil Ceramic Epoxy Lining (P401), Add	28.59	
			For Fusion Bonded Epoxy Lining (206N), Add	12.87	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	5.36	
			Note: ANSI/AWWA C151/A21.51		
			For >1,000, Deduct	-5.46	
			For Class 51, Add	10.21	
			For Class 52, Add	22.04	
			For Class 53, Add	39.72	
			For Class 54, Add	56.67	
			For Class 55, Add	65.16	
			For Class 56, Add	73.49	
33 14 13 13-0010			Mechanical Joint Ductile Iron 90 Degree Elbow (33 14 13 13-0002)		
33 14 13 13-0011	EA	3"	Mechanical Joint Ductile Iron 90 Degree Elbow	186.61	43.04
			For Cement Mortar Lining (CML), Add	12.14	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	21.85	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	9.10	
			Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0012	EA	4"	Mechanical Joint Ductile Iron 90 Degree Elbow	210.02	51.43
			For Cement Mortar Lining (CML), Add	13.21	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	23.78	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	9.91	
			Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0013	EA	6"	Mechanical Joint Ductile Iron 90 Degree Elbow	331.09	76.01
			For Cement Mortar Lining (CML), Add	21.60	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	38.88	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	16.20	
			Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0014	EA	8"	Mechanical Joint Ductile Iron 90 Degree Elbow	450.84	90.16
			For Cement Mortar Lining (CML), Add	31.42	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	56.55	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	23.56	
			Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0015	EA	10"	Mechanical Joint Ductile Iron 90 Degree Elbow	650.50	99.46
			For Cement Mortar Lining (CML), Add	49.98	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	89.97	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	37.49	
			Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0016	EA	12"	Mechanical Joint Ductile Iron 90 Degree Elbow	849.70	116.68
			For Cement Mortar Lining (CML), Add	67.30	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	121.14	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	50.47	
			Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0017			Mechanical Joint Ductile Iron 45 Degree Elbow (33 14 13 13-0002)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0018 EA 3" Mechanical Joint Ductile Iron 45 Degree Elbow	174.11	43.04
<i>For Cement Mortar Lining (CML), Add</i>	10.89	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	19.60	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	8.17	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0019 EA 4" Mechanical Joint Ductile Iron 45 Degree Elbow	186.81	51.43
<i>For Cement Mortar Lining (CML), Add</i>	10.89	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	19.60	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	8.17	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0020 EA 6" Mechanical Joint Ductile Iron 45 Degree Elbow	290.03	76.01
<i>For Cement Mortar Lining (CML), Add</i>	17.49	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	31.49	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	13.12	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0021 EA 8" Mechanical Joint Ductile Iron 45 Degree Elbow	391.93	90.16
<i>For Cement Mortar Lining (CML), Add</i>	25.53	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	45.95	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	19.15	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0022 EA 10" Mechanical Joint Ductile Iron 45 Degree Elbow	523.76	99.46
<i>For Cement Mortar Lining (CML), Add</i>	37.31	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	67.16	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	27.98	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0023 EA 12" Mechanical Joint Ductile Iron 45 Degree Elbow	733.67	116.68
<i>For Cement Mortar Lining (CML), Add</i>	55.70	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	100.25	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	41.77	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0024 Mechanical Joint Ductile Iron 22-1/2 Degree Elbow <small>(33 14 13 13-0002)</small>		
33 14 13 13-0025 EA 3" Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	150.91	43.04
<i>For Cement Mortar Lining (CML), Add</i>	8.57	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	15.42	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	6.43	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0026 EA 4" Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	181.46	51.43
<i>For Cement Mortar Lining (CML), Add</i>	10.35	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	18.64	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	7.77	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0027 EA 6" Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	275.75	76.01
<i>For Cement Mortar Lining (CML), Add</i>	16.07	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	28.92	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	12.05	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0028 EA 8" Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	386.58	90.16
<i>For Cement Mortar Lining (CML), Add</i>	24.99	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	44.99	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	18.74	
<i>Note: ANSI/AWWA C151/A21.51</i>		
33 14 13 13-0029 EA 10" Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	521.97	99.46
<i>For Cement Mortar Lining (CML), Add</i>	37.13	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Fusion Bonded Epoxy Lining (206N), Add</i>	66.83	
<i>Note: ANSI/AWWA C104/A21.4</i>		
<i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i>	27.85	
<i>Note: ANSI/AWWA C151/A21.51</i>		

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13	13-0030	EA	12" Mechanical Joint Ductile Iron 22-1/2 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	664.05 48.73 87.72 36.55	116.68
33 14 13	13-0031		Mechanical Joint Ductile Iron 11-1/4 Degree Elbow (33 14 13 13-0002)		
33 14 13	13-0032	EA	3" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	150.91 8.57 15.42 6.43	43.04
33 14 13	13-0033	EA	4" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	176.10 9.82 17.67 7.36	51.43
33 14 13	13-0034	EA	6" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	281.11 16.60 29.88 12.45	76.01
33 14 13	13-0035	EA	8" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	363.37 22.67 40.81 17.00	90.16
33 14 13	13-0036	EA	10" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	518.40 36.77 66.19 27.58	99.46
33 14 13	13-0037	EA	12" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	633.70 45.70 82.26 34.27	116.68
33 14 13	13-0038	EA	14" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,210.39 101.22 182.19 75.91	130.84
33 14 13	13-0039	EA	16" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,335.13 110.86 199.54 83.14	149.54
33 14 13	13-0040	EA	18" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,943.38 162.62 292.72 121.97	209.35
33 14 13	13-0041	EA	20" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,044.13 164.77 296.58 123.58	261.69
33 14 13	13-0042	EA	24" Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,725.53 219.75 395.55 164.81	348.46

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0043 Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow <small>(33 14 13 13-0002)</small>		
EA 3" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	191.96	43.04
For Cement Mortar Lining (CML), Add	12.67	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	22.81	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	9.51	
Note: ANSI/AWWA C151/A21.51		
EA 4" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	235.01	51.43
For Cement Mortar Lining (CML), Add	15.71	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	28.28	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	11.78	
Note: ANSI/AWWA C151/A21.51		
EA 6" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	375.72	76.01
For Cement Mortar Lining (CML), Add	26.06	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	46.91	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	19.55	
Note: ANSI/AWWA C151/A21.51		
EA 8" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	509.75	90.16
For Cement Mortar Lining (CML), Add	37.31	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	67.16	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	27.98	
Note: ANSI/AWWA C151/A21.51		
EA 10" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	736.19	99.46
For Cement Mortar Lining (CML), Add	58.55	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	105.39	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	43.91	
Note: ANSI/AWWA C151/A21.51		
EA 12" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	942.53	116.68
For Cement Mortar Lining (CML), Add	76.58	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	137.85	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	57.44	
Note: ANSI/AWWA C151/A21.51		
EA 14" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	1,622.76	130.84
For Cement Mortar Lining (CML), Add	142.45	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	256.42	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	106.84	
Note: ANSI/AWWA C151/A21.51		
EA 16" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	2,482.96	149.54
For Cement Mortar Lining (CML), Add	225.64	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	406.15	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	169.23	
Note: ANSI/AWWA C151/A21.51		
EA 18" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	2,880.57	209.35
For Cement Mortar Lining (CML), Add	256.34	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	461.42	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	192.26	
Note: ANSI/AWWA C151/A21.51		
EA 20" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	3,914.93	261.69
For Cement Mortar Lining (CML), Add	351.85	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	633.32	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	263.89	
Note: ANSI/AWWA C151/A21.51		
EA 24" Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow.....	4,755.21	348.46
For Cement Mortar Lining (CML), Add	422.72	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	760.89	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	317.04	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0055 Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow <small>(33 14 13 13-0002)</small>		

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0056 EA 3" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	175.90 11.07 19.92 8.30	43.04
33 14 13 13-0057 EA 4" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	192.17 11.43 20.57 8.57	51.43
33 14 13 13-0058 EA 6" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	309.67 19.46 35.02 14.59	76.01
33 14 13 13-0059 EA 8" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	449.06 31.24 56.23 23.43	90.16
33 14 13 13-0060 EA 10" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	614.80 46.41 83.54 34.81	99.46
33 14 13 13-0061 EA 12" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	837.20 66.05 118.89 49.54	116.68
33 14 13 13-0062 EA 14" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,435.32 123.71 222.68 92.78	130.84
33 14 13 13-0063 EA 16" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,188.42 196.19 353.13 147.14	149.54
33 14 13 13-0064 EA 18" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,582.46 226.53 407.76 169.90	209.35
33 14 13 13-0065 EA 20" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,354.40 295.79 532.43 221.85	261.69
33 14 13 13-0066 EA 24" Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,214.32 368.63 663.53 276.47	348.46

33 14 13 13-0067 Mechanical Joint Ductile Iron Tee (33 14 13 13-0002)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0068 EA 3" x 3" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	304.90 20.71 37.27 15.53	64.57
33 14 13 13-0069 EA 4" x 3" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	316.41 20.71 37.27 15.53	72.16
33 14 13 13-0070 EA 4" x 4" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	288.25 17.32 31.17 12.99	76.01
33 14 13 13-0071 EA 6" x 3" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	384.27 23.92 43.06 17.94	95.75
33 14 13 13-0072 EA 6" x 4" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	442.02 29.10 52.37 21.82	99.70
33 14 13 13-0073 EA 6" x 6" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	481.43 31.24 56.23 23.43	111.62
33 14 13 13-0074 EA 8" x 4" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	512.43 33.74 60.73 25.30	115.53
33 14 13 13-0075 EA 8" x 6" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	582.19 38.92 70.05 29.19	127.40
33 14 13 13-0076 EA 8" x 8" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	674.52 46.95 84.51 35.21	135.36
33 14 13 13-0077 EA 10" x 4" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	704.97 51.77 93.18 38.83	123.61
33 14 13 13-0078 EA 10" x 6" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	705.91 50.16 90.29 37.62	134.83
33 14 13 13-0079 EA 10" x 8" Mechanical Joint Ductile Iron Tee <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	802.93 58.73 105.71 44.05	142.31

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 14 13 13-0080	EA 10" x 10" Mechanical Joint Ductile Iron Tee..... <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	897.78 67.12 120.82 50.34	149.54
33 14 13 13-0081	EA 12" x 4" Mechanical Joint Ductile Iron Tee..... <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	843.67 63.37 114.07 47.53	138.57
33 14 13 13-0082	EA 12" x 6" Mechanical Joint Ductile Iron Tee..... <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	958.83 73.19 131.74 54.89	149.77
33 14 13 13-0083	EA 12" x 8" Mechanical Joint Ductile Iron Tee..... <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	1,179.03 94.08 169.34 70.56	157.26
33 14 13 13-0084	EA 12" x 10" Mechanical Joint Ductile Iron Tee..... <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	1,263.16 101.40 182.51 76.05	164.49
33 14 13 13-0085	EA 12" x 12" Mechanical Joint Ductile Iron Tee..... <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	1,197.73 93.72 168.69 70.29	171.97
33 14 13 13-0086	Mechanical Joint Ductile Iron Wye (Laterals) <small>(33 14 13 13-0002)</small>		
33 14 13 13-0087	EA 4" x 3" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	261.08 15.17 27.31 11.38	72.16
33 14 13 13-0088	EA 4" x 4" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	398.92 28.38 51.09 21.29	75.96
33 14 13 13-0089	EA 6" x 3" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	384.27 23.92 43.06 17.94	95.75
33 14 13 13-0090	EA 6" x 4" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	443.81 29.28 52.70 21.96	99.70
33 14 13 13-0091	EA 6" x 6" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	597.46 42.84 77.12 32.13	111.55
33 14 13 13-0092	EA 8" x 4" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Fusion Bonded Epoxy Lining (206N), Add</i> Note: ANSI/AWWA C104/A21.4 <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> Note: ANSI/AWWA C151/A21.51	765.91 59.09 106.36 44.32	115.53

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0093 EA 8" x 6" Mechanical Joint Ductile Iron Wye (Lateral)	687.51	127.40
For Cement Mortar Lining (CML), Add	49.45	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	89.01	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	37.09	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0094 EA 8" x 8" Mechanical Joint Ductile Iron Wye (Lateral)	829.82	135.31
For Cement Mortar Lining (CML), Add	62.48	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	112.46	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	46.86	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0095 EA 10" x 4" Mechanical Joint Ductile Iron Wye (Lateral)	1,181.60	123.61
For Cement Mortar Lining (CML), Add	99.43	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	178.98	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	74.57	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0096 EA 10" x 6" Mechanical Joint Ductile Iron Wye (Lateral)	1,250.37	134.83
For Cement Mortar Lining (CML), Add	104.61	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	188.29	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	78.46	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0097 EA 10" x 8" Mechanical Joint Ductile Iron Wye (Lateral)	1,436.65	142.31
For Cement Mortar Lining (CML), Add	122.10	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	219.78	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	91.58	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0098 EA 10" x 10" Mechanical Joint Ductile Iron Wye (Lateral)	1,617.18	149.54
For Cement Mortar Lining (CML), Add	139.06	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	250.31	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	104.30	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0099 EA 12" x 4" Mechanical Joint Ductile Iron Wye (Lateral)	1,507.73	138.57
For Cement Mortar Lining (CML), Add	129.78	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	233.60	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	97.33	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0100 EA 12" x 6" Mechanical Joint Ductile Iron Wye (Lateral)	1,705.01	149.77
For Cement Mortar Lining (CML), Add	147.81	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	266.05	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	110.86	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0101 EA 12" x 8" Mechanical Joint Ductile Iron Wye (Lateral)	2,053.74	157.26
For Cement Mortar Lining (CML), Add	181.55	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	326.78	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	136.16	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0102 EA 12" x 10" Mechanical Joint Ductile Iron Wye (Lateral)	2,112.88	164.49
For Cement Mortar Lining (CML), Add	186.37	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	335.46	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	139.78	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0103 EA 12" x 12" Mechanical Joint Ductile Iron Wye (Lateral)	1,915.35	171.95
For Cement Mortar Lining (CML), Add	165.48	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	297.87	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	124.11	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0104 EA 14" x 6" Mechanical Joint Ductile Iron Wye (Lateral)	2,256.61	174.52
For Cement Mortar Lining (CML), Add	199.22	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	358.59	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	149.41	
Note: ANSI/AWWA C151/A21.51		

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13	13-0105	EA	14" x 8" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,582.14 230.64 415.15 172.98	182.02
33 14 13	13-0106	EA	14" x 10" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,369.61 308.29 554.92 231.22	189.23
33 14 13	13-0107	EA	14" x 12" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,609.44 331.14 596.05 248.36	196.71
33 14 13	13-0108	EA	14" x 14" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,528.22 321.14 578.06 240.86	209.08
33 14 13	13-0109	EA	16" x 6" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,320.09 200.29 360.52 150.22	209.34
33 14 13	13-0110	EA	16" x 8" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,552.79 222.43 400.37 166.82	216.82
33 14 13	13-0111	EA	16" x 10" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,008.22 266.88 480.38 200.16	224.05
33 14 13	13-0112	EA	16" x 12" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,364.07 301.33 542.39 226.00	231.52
33 14 13	13-0113	EA	16" x 14" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,207.56 383.80 690.84 287.85	243.90
33 14 13	13-0114	EA	16" x 16" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,058.98 366.31 659.35 274.73	261.30
33 14 13	13-0115	EA	18" x 6" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,649.49 324.36 583.84 243.27	267.92
33 14 13	13-0116	EA	18" x 8" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	3,928.60 351.13 632.04 263.35	275.39

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0117 EA 18" x 10" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,198.38 377.02 678.63 282.76	282.63
33 14 13 13-0118 EA 18" x 12" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,491.76 405.22 729.40 303.92	290.10
33 14 13 13-0119 EA 18" x 14" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,542.64 408.44 735.18 306.33	302.47
33 14 13 13-0120 EA 18" x 16" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,590.44 410.58 739.04 307.93	319.88
33 14 13 13-0121 EA 18" x 18" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,202.81 367.38 661.28 275.53	349.17
33 14 13 13-0122 EA 20" x 6" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,334.43 375.23 675.42 281.42	384.20
33 14 13 13-0123 EA 20" x 8" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,429.67 383.62 690.52 287.72	391.68
33 14 13 13-0124 EA 20" x 10" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	4,861.90 425.75 766.35 319.31	398.90
33 14 13 13-0125 EA 20" x 12" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	5,290.95 467.52 841.54 350.64	406.37
33 14 13 13-0126 EA 20" x 14" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	5,345.41 471.09 847.97 353.32	418.75
33 14 13 13-0127 EA 20" x 16" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	5,409.26 474.84 854.72 356.13	436.16
33 14 13 13-0128 EA 20" x 18" Mechanical Joint Ductile Iron Wye (Lateral) <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	6,264.07 555.89 1,000.59 416.91	465.44

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13	13-0129	EA	20" x 20" Mechanical Joint Ductile Iron Wye (Lateral)	5,941.59	523.57
			For Cement Mortar Lining (CML), Add	514.83	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	926.69	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	386.12	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0130	EA	24" x 6" Mechanical Joint Ductile Iron Wye (Lateral)	5,272.32	500.12
			For Cement Mortar Lining (CML), Add	451.46	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	812.62	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	338.59	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0131	EA	24" x 8" Mechanical Joint Ductile Iron Wye (Lateral)	5,340.78	507.59
			For Cement Mortar Lining (CML), Add	457.17	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	822.90	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	342.88	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0132	EA	24" x 10" Mechanical Joint Ductile Iron Wye (Lateral)	5,942.60	514.83
			For Cement Mortar Lining (CML), Add	516.26	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	929.26	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	387.19	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0133	EA	24" x 12" Mechanical Joint Ductile Iron Wye (Lateral)	6,218.11	522.29
			For Cement Mortar Lining (CML), Add	542.68	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	976.82	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	407.01	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0134	EA	24" x 14" Mechanical Joint Ductile Iron Wye (Lateral)	7,172.26	534.67
			For Cement Mortar Lining (CML), Add	636.22	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	1,145.19	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	477.16	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0135	EA	24" x 16" Mechanical Joint Ductile Iron Wye (Lateral)	7,964.46	552.07
			For Cement Mortar Lining (CML), Add	712.80	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	1,283.04	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	534.60	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0136	EA	24" x 18" Mechanical Joint Ductile Iron Wye (Lateral)	8,908.53	581.36
			For Cement Mortar Lining (CML), Add	802.77	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	1,444.98	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	602.08	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0137	EA	24" x 20" Mechanical Joint Ductile Iron Wye (Lateral)	9,787.43	639.50
			For Cement Mortar Lining (CML), Add	881.85	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	1,587.33	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	661.39	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0138	EA	24" x 24" Mechanical Joint Ductile Iron Wye (Lateral)	8,697.08	697.46
			For Cement Mortar Lining (CML), Add	764.03	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	1,375.26	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	573.02	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0139		Mechanical Joint Ductile Iron Cross (33 14 13 13-0002)		
33 14 13	13-0140	EA	3" x 3" Mechanical Joint Ductile Iron Cross	360.71	86.09
			For Cement Mortar Lining (CML), Add	23.03	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	41.45	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	17.27	
			Note: ANSI/AWWA C151/A21.51		
33 14 13	13-0141	EA	4" x 3" Mechanical Joint Ductile Iron Cross	436.48	93.68
			For Cement Mortar Lining (CML), Add	29.45	
			Note: ANSI/AWWA C104/A21.4		
			For Fusion Bonded Epoxy Lining (206N), Add	53.02	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	22.09	
			Note: ANSI/AWWA C151/A21.51		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0142 EA 4" x 4" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	516.97 37.31 67.16 27.98	94.95
33 14 13 13-0143 EA 6" x 3" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	617.06 43.91 79.05 32.94	117.37
33 14 13 13-0144 EA 6" x 4" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	598.83 40.70 73.26 30.53	126.60
33 14 13 13-0145 EA 6" x 6" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	696.76 45.70 82.26 34.27	158.25
33 14 13 13-0146 EA 8" x 4" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	615.04 40.52 72.94 30.39	138.48
33 14 13 13-0147 EA 8" x 6" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	730.83 47.31 85.15 35.48	170.13
33 14 13 13-0148 EA 8" x 8" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	773.83 49.81 89.65 37.35	181.99
33 14 13 13-0149 EA 10" x 4" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	747.45 52.84 95.11 39.63	144.57
33 14 13 13-0150 EA 10" x 6" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	857.02 59.27 106.68 44.45	174.48
33 14 13 13-0151 EA 10" x 8" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,016.84 73.55 132.38 55.16	185.71
33 14 13 13-0152 EA 10" x 10" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,100.09 79.80 143.63 59.85	199.38
33 14 13 13-0153 EA 12 x 4" Mechanical Joint Ductile Iron Cross..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	905.52 66.76 120.17 50.07	157.02

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13	13-0154	EA	12" x 6" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,052.60 76.94 138.49 57.70	186.92
33 14 13	13-0155	EA	12" x 8" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,514.09 121.39 218.50 91.04	198.14
33 14 13	13-0156	EA	12" x 10" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,534.89 121.39 218.50 91.04	211.87
33 14 13	13-0157	EA	12" x 12" Mechanical Joint Ductile Iron Cross <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,741.17 140.13 252.24 105.10	224.30
33 14 13	13-0158		Mechanical Joint x Mechanical Joint Ductile Iron Reducers <small>(33 14 13 13-0002)</small>		
33 14 13	13-0159	EA	4" x 3" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	174.51 10.35 18.64 7.77	46.84
33 14 13	13-0160	EA	6" x 3" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	203.21 11.43 20.57 8.57	58.71
33 14 13	13-0161	EA	6" x 4" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	219.67 12.50 22.49 9.37	62.51
33 14 13	13-0162	EA	8" x 4" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	278.19 17.14 30.85 12.85	70.44
33 14 13	13-0163	EA	8" x 6" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	306.77 18.21 32.77 13.66	82.29
33 14 13	13-0164	EA	10" x 4" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	334.92 22.31 40.17 16.74	73.77
33 14 13	13-0165	EA	10" x 6" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	364.40 23.56 42.42 17.67	84.99
33 14 13	13-0166	EA	10" x 8" Mechanical Joint x Mechanical Joint Ductile Iron Reducer <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	398.93 25.88 46.59 19.41	92.46

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0167 EA 12" x 4" Mechanical Joint x Mechanical Joint Ductile Iron Reducer..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	405.14 28.21 50.77 21.15	81.25
33 14 13 13-0168 EA 12" x 6" Mechanical Joint x Mechanical Joint Ductile Iron Reducer..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	450.69 31.06 55.91 23.30	92.46
33 14 13 13-0169 EA 12" x 8" Mechanical Joint x Mechanical Joint Ductile Iron Reducer..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	470.96 31.95 57.52 23.97	99.94
33 14 13 13-0170 EA 12" x 10" Mechanical Joint x Mechanical Joint Ductile Iron Reducer..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	515.82 35.35 63.62 26.51	107.16
33 14 13 13-0171 Mechanical Joint Ductile Iron Caps <small>(33 14 13 13-0002)</small>		
33 14 13 13-0172 EA 3" Mechanical Joint Ductile Iron Caps <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	196.27 4.64 8.35 3.48	98.90
33 14 13 13-0173 EA 4" Mechanical Joint Ductile Iron Caps <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	224.04 4.82 8.68 3.62	116.05
33 14 13 13-0174 EA 6" Mechanical Joint Ductile Iron Caps <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	305.48 8.57 15.42 6.43	145.06
33 14 13 13-0175 EA 8" Mechanical Joint Ductile Iron Caps <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	394.01 14.28 25.71 10.71	165.80
33 14 13 13-0176 EA 10" Mechanical Joint Ductile Iron Caps <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	557.91 18.03 32.45 13.52	249.22
33 14 13 13-0177 EA 12" Mechanical Joint Ductile Iron Caps <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	681.49 26.96 48.52 20.22	271.88
33 14 13 13-0178 Mechanical Joint Ductile Iron Plug <small>(33 14 13 13-0002)</small>		
33 14 13 13-0179 EA 3" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	203.41 5.36 9.64 4.02	98.90

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 14 13 13-0180	EA 4" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	234.75 5.89 10.60 4.42	116.05
33 14 13 13-0181	EA 6" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	334.04 11.43 20.57 8.57	145.06
33 14 13 13-0182	EA 8" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	422.57 17.14 30.85 12.85	165.80
33 14 13 13-0183	EA 10" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	673.94 29.63 53.34 22.22	249.22
33 14 13 13-0184	EA 12" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	713.63 30.17 54.30 22.63	271.88
33 14 13 13-0185	EA 14" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,067.22 61.41 110.53 46.06	299.07
33 14 13 13-0186	EA 16" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	582.03 7.86 14.14 5.89	332.26
33 14 13 13-0187	EA 18" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,541.10 97.47 175.44 73.10	373.84
33 14 13 13-0188	EA 20" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	1,929.06 128.17 230.71 96.13	427.20
33 14 13 13-0189	EA 24" Mechanical Joint Ductile Iron Plug..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	2,533.21 177.80 320.04 133.35	498.45
33 14 13 13-0190	Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters (33 14 13 13-0002)		
33 14 13 13-0191	EA 3" Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	343.82 11.60 20.89 8.70	150.34
33 14 13 13-0192	EA 4" Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters..... <i>For Cement Mortar Lining (CML), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Fusion Bonded Epoxy Lining (206N), Add</i> <i>Note: ANSI/AWWA C104/A21.4</i> <i>For Bituminous Or Coal Tar Coating, 1 Mil, Add</i> <i>Note: ANSI/AWWA C151/A21.51</i>	388.71 12.50 22.49 9.37	174.07

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0193 EA 6" Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	502.85	217.59
For Cement Mortar Lining (CML), Add	17.32	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	31.17	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	12.99	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0194 EA 8" Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	639.20	248.65
For Cement Mortar Lining (CML), Add	26.24	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	47.23	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	19.68	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0195 EA 10" Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	1,023.41	373.84
For Cement Mortar Lining (CML), Add	45.70	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	82.26	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	34.27	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0196 EA 12" Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	1,203.44	407.83
For Cement Mortar Lining (CML), Add	58.55	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	105.39	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	43.91	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0197 Mechanical Joint Ductile Iron Long Sleeves (33 14 13 13-0002)		
33 14 13 13-0198 EA 3" Mechanical Joint Ductile Iron Long Sleeves.....	325.97	150.34
For Cement Mortar Lining (CML), Add	9.82	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	17.67	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	7.36	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0199 EA 4" Mechanical Joint Ductile Iron Long Sleeves.....	379.78	174.07
For Cement Mortar Lining (CML), Add	11.60	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	20.89	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	8.70	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0200 EA 6" Mechanical Joint Ductile Iron Long Sleeves.....	524.27	217.59
For Cement Mortar Lining (CML), Add	19.46	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	35.02	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	14.59	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0201 EA 8" Mechanical Joint Ductile Iron Long Sleeves.....	696.33	248.65
For Cement Mortar Lining (CML), Add	31.95	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	57.52	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	23.97	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0202 EA 10" Mechanical Joint Ductile Iron Long Sleeves.....	946.65	373.84
For Cement Mortar Lining (CML), Add	38.02	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	68.44	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	28.52	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0203 EA 12" Mechanical Joint Ductile Iron Long Sleeves.....	1,132.03	407.83
For Cement Mortar Lining (CML), Add	51.41	
Note: ANSI/AWWA C104/A21.4		
For Fusion Bonded Epoxy Lining (206N), Add	92.54	
Note: ANSI/AWWA C104/A21.4		
For Bituminous Or Coal Tar Coating, 1 Mil, Add	38.56	
Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0204 Mechanical Joint Ductile Iron Gland Packs (33 14 13 13-0002)		
Note: Includes ductile iron retainer gland, gasket, break off torque bolts and all nuts.		
33 14 13 13-0205 Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts (33 14 13 13-0204)		
Note: Labor installation is included with pipe fittings or valves.		
33 14 13 13-0206 EA 3" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts.....	35.70	
33 14 13 13-0207 EA 4" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts.....	40.26	
Note: Includes four (4) 3/4" diameter plain finish Boltss with nut.		
33 14 13 13-0208 EA 6" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts.....	48.65	
Note: Includes six (6) 3/4" diameter plain finish Boltss with nut.		

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
33 14 13 13-0209	EA	8" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes six (6) 3/4" diameter plain finish Boltss with nut.	57.04		
33 14 13 13-0210	EA	10" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes eight (8) 3/4" diameter plain finish Boltss with nut.	78.85		
33 14 13 13-0211	EA	12" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes eight (8) 3/4" diameter plain finish Boltss with nut.	83.88		
33 14 13 13-0212	EA	14" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes ten (10) 3/4" diameter plain finish Boltss with nut.	137.56		
33 14 13 13-0213	EA	16" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes twelve (12) 3/4" diameter plain finish Boltss with nut.	145.95		
33 14 13 13-0214	EA	18" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes twelve (12) 3/4" diameter plain finish Boltss with nut.	194.60		
33 14 13 13-0215	EA	20" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes fourteen (14) 3/4" diameter plain finish Boltss with nut.	251.64		
33 14 13 13-0216	EA	24" Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes sixteen (16) 3/4" diameter plain finish Boltss with nut.	350.62		
33 14 13 13-0217 Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts <small>(33 14 13 13-0204)</small>					
Note: Labor installation is included with pipe fittings or valves.					
33 14 13 13-0218	EA	3" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts.....	60.69		
33 14 13 13-0219	EA	4" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts..... Note: Includes four (4) 3/4" diameter plain finish Boltss with nut.	57.04		
33 14 13 13-0220	EA	6" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts..... Note: Includes six (6) 3/4" diameter plain finish Boltss with nut.	72.14		
33 14 13 13-0221	EA	8" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts..... Note: Includes six (6) 3/4" diameter plain finish Boltss with nut.	78.85		
33 14 13 13-0222	EA	10" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes eight (8) 3/4" diameter plain finish Boltss with nut.	109.04		
33 14 13 13-0223	EA	12" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes eight (8) 3/4" diameter plain finish Boltss with nut.	114.08		
33 14 13 13-0224	EA	14" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes ten (10) 3/4" diameter plain finish Boltss with nut.	172.79		
33 14 13 13-0225	EA	16" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes twelve (12) 3/4" diameter plain finish Boltss with nut.	189.57		
33 14 13 13-0226	EA	18" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes twelve (12) 3/4" diameter plain finish Boltss with nut.	251.64		
33 14 13 13-0227	EA	20" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes fourteen (14) 3/4" diameter plain finish Boltss with nut.	325.45		
33 14 13 13-0228	EA	24" Mechanical Joint Gland, Gasket, Star Blue Fluoropolymer Coated T-Head Bolts And Nuts Note: Includes sixteen (16) 3/4" diameter plain finish Boltss with nut.	454.63		
33 14 13 13-0229 Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts <small>(33 14 13 13-0204)</small>					
Note: Labor installation is included with pipe fittings or valves.					
33 14 13 13-0230	EA	3" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts.....	39.27		
33 14 13 13-0231	EA	4" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts..... Note: Includes four (4) 3/4" diameter plain finish Boltss with nut.	43.62		
33 14 13 13-0232	EA	6" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts..... Note: Includes six (6) 3/4" diameter plain finish Boltss with nut.	52.01		
33 14 13 13-0233	EA	8" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts..... Note: Includes six (6) 3/4" diameter plain finish Boltss with nut.	62.07		
33 14 13 13-0234	EA	10" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes eight (8) 3/4" diameter plain finish Boltss with nut.	85.56		
33 14 13 13-0235	EA	12" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes eight (8) 3/4" diameter plain finish Boltss with nut.	90.59		
33 14 13 13-0236	EA	14" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes ten (10) 3/4" diameter plain finish Boltss with nut.	149.31		
33 14 13 13-0237	EA	16" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes twelve (12) 3/4" diameter plain finish Boltss with nut.	157.69		
33 14 13 13-0238	EA	18" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes twelve (12) 3/4" diameter plain finish Boltss with nut.	213.06		
33 14 13 13-0239	EA	20" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes fourteen (14) 3/4" diameter plain finish Boltss with nut.	273.45		
33 14 13 13-0240	EA	24" Epoxy Coated Mechanical Joint Gland, Gasket, T-Head Bolts And Nuts Note: Includes sixteen (16) 3/4" diameter plain finish Boltss with nut.	382.49		
33 14 13 13-0241 Mechanical Joint Restraints With Accessories For Ductile Iron Pipe (MEGALUG® 1100DEC Series) <small>(33 14 13 13-0002)</small>					
Note: Includes ductile iron retainer gland, gasket, break off torque bolts and all nuts and bolts. Excludes pipe and fitting.					
33 14 13 13-0242	EA	3" Mechanical Joint Restraints For Ductile Iron Pipe (MEGALUG® 1103DSC).....	206.26	75.41	
33 14 13 13-0243	EA	4" Mechanical Joint Restraints For Ductile Iron Pipe (MEGALUG® 1104DEC).....	235.27	89.32	
33 14 13 13-0244	EA	6" Mechanical Joint Restraints For Ductile Iron Pipe (MEGALUG® 1106DEC).....	291.87	110.53	
33 14 13 13-0245	EA	8" Mechanical Joint Restraints For Ductile Iron Pipe (MEGALUG® 1108DEC).....	364.23	129.00	
33 14 13 13-0246	EA	10" Mechanical Joint Restraints For Ductile Iron Pipe (MEGALUG® 1110DEC).....	524.48	186.92	
33 14 13 13-0247	EA	12" Mechanical Joint Restraints For Ductile Iron Pipe (MEGALUG® 1112DEC).....	647.10	213.65	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0308			Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow <small>(33 14 13 13-0283)</small>		
33 14 13 13-0309	EA		3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	331.20	43.04
33 14 13 13-0310	EA		4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	493.86	51.56
33 14 13 13-0311	EA		6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	747.02	75.53
33 14 13 13-0312	EA		8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	1,032.79	89.92
33 14 13 13-0313	EA		10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	1,355.63	99.69
33 14 13 13-0314	EA		12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	1,688.71	116.68
33 14 13 13-0315	EA		14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	2,436.77	131.41
33 14 13 13-0316	EA		16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	2,836.42	149.54
33 14 13 13-0317	EA		18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	3,414.34	209.57
33 14 13 13-0318	EA		20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	4,313.03	261.69
33 14 13 13-0319	EA		24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	5,371.08	348.92
33 14 13 13-0320	EA		30" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	8,986.83	373.84
33 14 13 13-0321	EA		36" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	12,268.02	388.57
33 14 13 13-0322	EA		42" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	17,556.23	448.60
33 14 13 13-0323	EA		48" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 22-1/2 Degree Elbow	22,480.14	476.93
33 14 13 13-0324			Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow <small>(33 14 13 13-0283)</small>		
33 14 13 13-0325	EA		3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	331.20	43.04
33 14 13 13-0326	EA		4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	592.04	51.56
33 14 13 13-0327	EA		6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	754.16	75.53
33 14 13 13-0328	EA		8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	1,000.66	89.92
33 14 13 13-0329	EA		10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	1,352.06	99.69
33 14 13 13-0330	EA		12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	1,640.51	116.68
33 14 13 13-0331	EA		14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	2,624.21	131.41
33 14 13 13-0332	EA		16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	2,923.89	149.54
33 14 13 13-0333	EA		18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	3,921.32	209.57
33 14 13 13-0334	EA		20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	4,159.51	261.69
33 14 13 13-0335	EA		24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron 11-1/4 Degree Elbow	5,372.87	348.92
33 14 13 13-0336			Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow <small>(33 14 13 13-0283)</small>		
33 14 13 13-0337	EA		3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	390.11	43.04
33 14 13 13-0338	EA		4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	574.19	51.56
33 14 13 13-0339	EA		6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	895.19	75.53
33 14 13 13-0340	EA		8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	1,216.66	89.92
33 14 13 13-0341	EA		10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	1,675.16	99.69
33 14 13 13-0342	EA		12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	2,102.85	116.68
33 14 13 13-0343	EA		14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	3,780.97	131.41
33 14 13 13-0344	EA		16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	5,901.47	149.54
33 14 13 13-0345	EA		18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	6,743.59	209.57
33 14 13 13-0346	EA		20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	7,772.60	261.69
33 14 13 13-0347	EA		24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 90 Degree Elbow	8,404.00	348.92
33 14 13 13-0348			Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow <small>(33 14 13 13-0283)</small>		
33 14 13 13-0349	EA		3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	390.11	43.04
33 14 13 13-0350	EA		4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	506.35	51.56
33 14 13 13-0351	EA		6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	797.01	75.53
33 14 13 13-0352	EA		8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	1,127.40	89.92
33 14 13 13-0353	EA		10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	1,494.87	99.69
33 14 13 13-0354	EA		12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	1,945.76	116.68
33 14 13 13-0355	EA		14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	2,593.86	131.41
33 14 13 13-0356	EA		16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	3,116.68	149.54

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0357 EA 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	5,833.16	209.57
33 14 13 13-0358 EA 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	6,119.55	261.69
33 14 13 13-0359 EA 24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Plain End (MJxPE) Ductile Iron 45 Degree Elbow	6,372.53	348.92
33 14 13 13-0360 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee <small>(33 14 13 13-0283)</small>		
33 14 13 13-0361 EA 3" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	549.47	64.57
33 14 13 13-0362 EA 4" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	599.42	72.79
33 14 13 13-0363 EA 4" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	632.77	75.53
33 14 13 13-0364 EA 6" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	901.95	95.75
33 14 13 13-0365 EA 6" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	977.56	99.50
33 14 13 13-0366 EA 6" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,031.24	111.50
33 14 13 13-0367 EA 8" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,199.70	115.09
33 14 13 13-0368 EA 8" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,298.02	127.08
33 14 13 13-0369 EA 8" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,427.84	135.47
33 14 13 13-0370 EA 10" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,610.03	123.48
33 14 13 13-0371 EA 10" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,607.39	134.81
33 14 13 13-0372 EA 10" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,741.91	142.74
33 14 13 13-0373 EA 10" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,879.59	149.54
33 14 13 13-0374 EA 12" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,937.95	138.21
33 14 13 13-0375 EA 12" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	1,954.93	149.54
33 14 13 13-0376 EA 12" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	2,114.43	157.47
33 14 13 13-0377 EA 12" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	2,437.77	164.26
33 14 13 13-0378 EA 12" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	2,443.74	172.20
33 14 13 13-0379 EA 14" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	2,768.94	174.46
33 14 13 13-0380 EA 14" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	2,996.28	182.39
33 14 13 13-0381 EA 14" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	3,637.38	189.19
33 14 13 13-0382 EA 14" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	3,839.72	197.12
33 14 13 13-0383 EA 14" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	3,556.78	209.57
33 14 13 13-0384 EA 16" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	3,312.51	209.57
33 14 13 13-0385 EA 16" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	3,491.76	216.37
33 14 13 13-0386 EA 16" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	4,189.97	224.30
33 14 13 13-0387 EA 16" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	3,929.96	231.10
33 14 13 13-0388 EA 16" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,128.68	243.56
33 14 13 13-0389 EA 16" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	4,639.14	261.69
33 14 13 13-0390 EA 18" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	4,349.26	268.48
33 14 13 13-0391 EA 18" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	4,587.31	275.28
33 14 13 13-0392 EA 18" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	4,889.22	282.07
33 14 13 13-0393 EA 18" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,168.32	290.01
33 14 13 13-0394 EA 18" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,310.25	302.47
33 14 13 13-0395 EA 18" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,674.00	319.46
33 14 13 13-0396 EA 18" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	6,334.24	348.92
33 14 13 13-0397 EA 20" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	4,998.50	384.03
33 14 13 13-0398 EA 20" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,083.03	391.96
33 14 13 13-0399 EA 20" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,586.66	398.76
33 14 13 13-0400 EA 20" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,862.19	406.69
33 14 13 13-0401 EA 20" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,920.22	419.16
33 14 13 13-0402 EA 20" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	5,844.83	436.15
33 14 13 13-0403 EA 20" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	7,474.39	465.60
33 14 13 13-0404 EA 20" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	6,370.01	523.38
33 14 13 13-0405 EA 24" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	6,066.70	499.58
33 14 13 13-0406 EA 24" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	6,124.45	508.65
33 14 13 13-0407 EA 24" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	6,235.36	514.31
33 14 13 13-0408 EA 24" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	6,400.20	522.24
33 14 13 13-0409 EA 24" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	7,281.15	534.70
33 14 13 13-0410 EA 24" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	7,594.94	551.69
33 14 13 13-0411 EA 24" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	9,349.46	581.15
33 14 13 13-0412 EA 24" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	9,651.76	640.06
33 14 13 13-0413 EA 24" x 24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Tee.....	9,052.31	697.83
33 14 13 13-0414 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Laterals) <small>(33 14 13 13-0283)</small>		
33 14 13 13-0415 EA 3" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	616.31	72.16
33 14 13 13-0416 EA 4" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	678.79	72.16
33 14 13 13-0417 EA 4" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	797.01	75.53
33 14 13 13-0418 EA 6" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	878.74	95.75
33 14 13 13-0419 EA 6" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	981.13	99.50
33 14 13 13-0420 EA 6" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	1,200.83	111.50
33 14 13 13-0421 EA 8" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	1,579.93	115.09
33 14 13 13-0422 EA 8" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	1,455.11	127.08
33 14 13 13-0423 EA 8" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	1,636.70	135.47
33 14 13 13-0424 EA 10" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	2,322.29	123.48
33 14 13 13-0425 EA 10" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	2,417.84	134.81
33 14 13 13-0426 EA 10" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	2,705.87	142.74
33 14 13 13-0427 EA 10" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	2,954.23	149.54
33 14 13 13-0428 EA 12" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	2,835.86	138.21

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 13 13-0429	EA	12" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	3,217.01	149.54
33 14 13 13-0430	EA	12" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	3,810.30	157.47
33 14 13 13-0431	EA	12" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	3,812.31	164.26
33 14 13 13-0432	EA	12" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	3,514.81	172.20
33 14 13 13-0433	EA	14" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	4,182.76	174.46
33 14 13 13-0434	EA	14" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	4,811.75	182.39
33 14 13 13-0435	EA	14" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	6,348.98	189.19
33 14 13 13-0436	EA	14" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	6,810.16	197.12
33 14 13 13-0437	EA	14" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	6,632.54	209.57
33 14 13 13-0438	EA	16" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	4,349.78	209.57
33 14 13 13-0439	EA	16" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	4,807.40	216.37
33 14 13 13-0440	EA	16" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	5,712.68	224.30
33 14 13 13-0441	EA	16" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	5,893.59	231.10
33 14 13 13-0442	EA	16" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,308.31	243.56
33 14 13 13-0443	EA	16" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	6,906.24	261.69
33 14 13 13-0444	EA	18" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	6,170.08	268.48
33 14 13 13-0445	EA	18" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	6,658.05	275.28
33 14 13 13-0446	EA	18" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,129.55	282.07
33 14 13 13-0447	EA	18" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,640.71	290.01
33 14 13 13-0448	EA	18" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,716.59	302.47
33 14 13 13-0449	EA	18" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,801.87	319.46
33 14 13 13-0450	EA	18" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,059.00	348.92
33 14 13 13-0451	EA	20" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,251.32	384.03
33 14 13 13-0452	EA	20" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	7,410.82	391.96
33 14 13 13-0453	EA	20" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	8,171.51	398.76
33 14 13 13-0454	EA	20" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	8,925.45	406.69
33 14 13 13-0455	EA	20" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	9,006.69	419.16
33 14 13 13-0456	EA	20" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	9,100.89	436.15
33 14 13 13-0457	EA	20" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	10,584.06	465.60
33 14 13 13-0458	EA	20" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	9,943.83	523.38
33 14 13 13-0459	EA	24" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	8,781.86	499.58
33 14 13 13-0460	EA	24" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	8,894.96	507.51
33 14 13 13-0461	EA	24" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	9,955.55	514.31
33 14 13 13-0462	EA	24" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	10,436.35	522.24
33 14 13 13-0463	EA	24" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	12,117.04	534.70
33 14 13 13-0464	EA	24" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	13,505.48	551.69
33 14 13 13-0465	EA	24" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	15,147.53	581.15
33 14 13 13-0466	EA	24" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	16,642.29	640.06
33 14 13 13-0467	EA	24" x 24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Wye (Lateral)	14,636.18	697.83

33 14 13 13-0468 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee (33 14 13 13-0283)

33 14 13 13-0469	EA	6" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	1,097.29	111.50
33 14 13 13-0470	EA	8" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	1,365.85	127.08
33 14 13 13-0471	EA	10" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	1,964.42	134.81
33 14 13 13-0472	EA	12" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	2,261.97	149.54
33 14 13 13-0473	EA	14" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	2,995.65	174.46
33 14 13 13-0474	EA	16" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	3,650.01	209.57
33 14 13 13-0475	EA	18" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	4,304.63	268.48
33 14 13 13-0476	EA	20" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	5,782.16	384.03
33 14 13 13-0477	EA	24" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Hydrant Tee	6,742.71	499.58

33 14 13 13-0478 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross (33 14 13 13-0283)

33 14 13 13-0479	EA	3" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	610.63	86.09
33 14 13 13-0480	EA	4" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	764.95	93.68
33 14 13 13-0481	EA	4" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	959.68	94.71
33 14 13 13-0482	EA	6" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,015.14	117.41
33 14 13 13-0483	EA	6" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,189.70	127.08
33 14 13 13-0484	EA	6" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,310.84	158.25
33 14 13 13-0485	EA	8" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,263.04	139.07
33 14 13 13-0486	EA	8" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,487.72	170.24
33 14 13 13-0487	EA	8" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,470.02	182.23
33 14 13 13-0488	EA	10" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,486.49	145.00
33 14 13 13-0489	EA	10" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,663.89	174.46
33 14 13 13-0490	EA	10" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,980.80	185.79
33 14 13 13-0491	EA	10" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	2,146.17	199.38
33 14 13 13-0492	EA	12" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	1,915.90	157.47
33 14 13 13-0493	EA	12" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	2,216.49	186.92
33 14 13 13-0494	EA	12" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	2,406.65	198.24

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0495 EA 12" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	2,811.25	211.85
33 14 13 13-0496 EA 12" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	3,213.89	224.30
33 14 13 13-0497 EA 14" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	3,328.37	205.05
33 14 13 13-0498 EA 14" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	3,952.32	216.37
33 14 13 13-0499 EA 14" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	4,046.29	231.10
33 14 13 13-0500 EA 14" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	4,270.44	242.43
33 14 13 13-0501 EA 14" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	4,734.30	261.69
33 14 13 13-0502 EA 16" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	3,725.03	232.23
33 14 13 13-0503 EA 16" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	4,266.86	242.43
33 14 13 13-0504 EA 16" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	5,153.42	257.15
33 14 13 13-0505 EA 16" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	5,766.72	269.62
33 14 13 13-0506 EA 16" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	7,014.27	287.74
33 14 13 13-0507 EA 16" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	7,318.08	313.80
33 14 13 13-0508 EA 18" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	6,459.63	274.15
33 14 13 13-0509 EA 18" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	6,835.46	285.47
33 14 13 13-0510 EA 18" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	7,156.13	299.07
33 14 13 13-0511 EA 18" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	7,776.57	311.53
33 14 13 13-0512 EA 18" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	9,118.72	329.66
33 14 13 13-0513 EA 18" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	9,699.24	355.71
33 14 13 13-0514 EA 18" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	10,122.12	398.76
33 14 13 13-0515 EA 20" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	8,122.02	344.38
33 14 13 13-0516 EA 20" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	8,501.41	354.58
33 14 13 13-0517 EA 20" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	8,759.61	369.30
33 14 13 13-0518 EA 20" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	9,374.70	381.77
33 14 13 13-0519 EA 20" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	9,524.39	399.90
33 14 13 13-0520 EA 20" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	11,599.05	425.95
33 14 13 13-0521 EA 20" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	12,021.94	467.86
33 14 13 13-0522 EA 20" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	12,966.70	538.10
33 14 13 13-0523 EA 24" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	11,126.79	430.48
33 14 13 13-0524 EA 24" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	11,385.14	441.81
33 14 13 13-0525 EA 24" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	11,823.28	455.41
33 14 13 13-0526 EA 24" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	12,200.96	467.86
33 14 13 13-0527 EA 24" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	12,407.76	485.99
33 14 13 13-0528 EA 24" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	12,868.68	512.05
33 14 13 13-0529 EA 24" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	17,183.12	555.09
33 14 13 13-0530 EA 24" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	18,065.42	624.20
33 14 13 13-0531 EA 24" x 24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Cross	19,874.16	710.29
33 14 13 13-0532 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducers <small>(33 14 13 13-0283)</small>		
33 14 13 13-0533 EA 4" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	436.92	46.84
33 14 13 13-0534 EA 6" x 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	612.00	58.71
33 14 13 13-0535 EA 6" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	673.09	62.34
33 14 13 13-0536 EA 8" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	885.13	70.73
33 14 13 13-0537 EA 8" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	919.07	82.72
33 14 13 13-0538 EA 10" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,084.67	73.64
33 14 13 13-0539 EA 10" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,133.78	84.97
33 14 13 13-0540 EA 10" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,179.03	92.89
33 14 13 13-0541 EA 12" x 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,254.86	81.57
33 14 13 13-0542 EA 12" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,387.88	92.89
33 14 13 13-0543 EA 12" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,409.93	99.69
33 14 13 13-0544 EA 12" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,472.65	107.62
33 14 13 13-0545 EA 14" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	2,177.81	105.35
33 14 13 13-0546 EA 14" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	2,189.15	112.15
33 14 13 13-0547 EA 14" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,901.98	120.08
33 14 13 13-0548 EA 14" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	1,940.08	126.88
33 14 13 13-0549 EA 16" x 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	2,611.18	122.34
33 14 13 13-0550 EA 16" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	2,531.48	130.28
33 14 13 13-0551 EA 16" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	2,374.63	137.07
33 14 13 13-0552 EA 16" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer	2,344.90	143.87

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0553 EA 16" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	2,652.84	156.33
33 14 13 13-0554 EA 18" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	2,834.71	158.59
33 14 13 13-0555 EA 18" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,199.10	166.53
33 14 13 13-0556 EA 18" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,053.34	173.32
33 14 13 13-0557 EA 18" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,654.03	185.79
33 14 13 13-0558 EA 18" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,193.07	203.91
33 14 13 13-0559 EA 20" x 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,774.30	217.50
33 14 13 13-0560 EA 20" x 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,803.09	224.30
33 14 13 13-0561 EA 20" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,450.26	232.23
33 14 13 13-0562 EA 20" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,445.79	244.70
33 14 13 13-0563 EA 20" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,357.92	261.69
33 14 13 13-0564 EA 20" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	3,975.32	291.14
33 14 13 13-0565 EA 24" x 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	4,751.95	290.01
33 14 13 13-0566 EA 24" x 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	4,820.68	302.47
33 14 13 13-0567 EA 24" x 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	4,904.18	319.46
33 14 13 13-0568 EA 24" x 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	4,823.59	348.92
33 14 13 13-0569 EA 24" x 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Mechanical Joint Ductile Iron Reducer.....	5,563.25	406.69
33 14 13 13-0570 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps <small>(33 14 13 13-0283)</small>		
33 14 13 13-0571 EA 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	394.42	98.90
33 14 13 13-0572 EA 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	475.74	116.29
33 14 13 13-0573 EA 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	698.20	145.06
33 14 13 13-0574 EA 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	938.47	165.44
33 14 13 13-0575 EA 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	1,243.39	249.22
33 14 13 13-0576 EA 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	1,572.27	271.88
33 14 13 13-0577 EA 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	1,788.41	299.07
33 14 13 13-0578 EA 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	2,179.71	331.93
33 14 13 13-0579 EA 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	2,555.04	373.84
33 14 13 13-0580 EA 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	3,084.03	427.08
33 14 13 13-0581 EA 24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Caps.....	3,959.52	498.45
33 14 13 13-0582 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug <small>(33 14 13 13-0283)</small>		
33 14 13 13-0583 EA 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	396.21	98.90
33 14 13 13-0584 EA 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	493.59	116.29
33 14 13 13-0585 EA 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	744.62	145.06
33 14 13 13-0586 EA 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	984.88	165.44
33 14 13 13-0587 EA 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	1,509.38	249.22
33 14 13 13-0588 EA 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	1,632.96	271.88
33 14 13 13-0589 EA 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	2,175.78	299.07
33 14 13 13-0590 EA 16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	2,627.77	331.93
33 14 13 13-0591 EA 18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	3,128.07	373.84
33 14 13 13-0592 EA 20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	3,858.77	427.08
33 14 13 13-0593 EA 24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Plug.....	5,062.72	498.45
33 14 13 13-0594 Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters <small>(33 14 13 13-0283)</small>		
33 14 13 13-0595 EA 3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	536.62	150.34
33 14 13 13-0596 EA 4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	711.82	173.83
33 14 13 13-0597 EA 6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	981.26	218.19
33 14 13 13-0598 EA 8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	1,292.56	248.16
33 14 13 13-0599 EA 10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	1,901.69	373.84
33 14 13 13-0600 EA 12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	2,274.51	407.83
33 14 13 13-0601 EA 14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	2,982.51	448.60



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Water Utilities	33 10	
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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0602	EA		16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	3,386.50	498.45
33 14 13 13-0603	EA		18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	4,452.00	560.76
33 14 13 13-0604	EA		20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	5,164.26	641.19
33 14 13 13-0605	EA		24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint x Flanged End (MJxFE) Ductile Iron Adapters.....	6,254.35	747.68
33 14 13 13-0606			Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves <small>(33 14 13 13-0283)</small>		
33 14 13 13-0607	EA		3" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	558.04	150.34
33 14 13 13-0608	EA		4" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	685.04	173.83
33 14 13 13-0609	EA		6" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	1,011.61	218.19
33 14 13 13-0610	EA		8" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	1,374.67	248.16
33 14 13 13-0611	EA		10" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	1,787.44	373.84
33 14 13 13-0612	EA		12" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	2,167.40	407.83
33 14 13 13-0613	EA		14" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	2,754.02	448.60
33 14 13 13-0614	EA		16" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	3,265.11	498.45
33 14 13 13-0615	EA		18" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	3,902.19	560.76
33 14 13 13-0616	EA		20" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	4,544.82	641.19
33 14 13 13-0617	EA		24" Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Mechanical Joint Ductile Iron Long Sleeves.....	5,686.68	747.68
33 14 13 13-0618			Push-On Joint Ductile Iron Piping And Gaskets <small>(33 14 13 13-0001)</small>		
33 14 13 13-0619			Push-On Joint Ductile Iron Pipe <small>(33 14 13 13-0618)</small> Note: Conforming to ANSI/AWWA C151/A21.51, federal specification WW-P-421D.		
33 14 13 13-0620	LF		4", Class 50, Push-On Joint Ductile Iron Pipe.....	36.12	9.89
			For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	14.79	
			For Cement Mortar Lining (CML), Add	2.11	
			Note: ANSI/AWWA C104/A21.4		
			For 40 Mil Ceramic Epoxy Lining (P401), Add	11.41	
			For Fusion Bonded Epoxy Lining (206N), Add	3.80	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	1.58	
			Note: ANSI/AWWA C151/A21.51		
			For >1,000, Deduct	-1.81	
			For Class 51, Add	3.07	
			For Class 52, Add	6.61	
			For Class 53, Add	11.89	
			For Class 54, Add	16.94	
			For Class 55, Add	19.50	
			For Class 56, Add	22.01	
33 14 13 13-0621	LF		6", Class 50, Push-On Joint Ductile Iron Pipe.....	39.62	10.91
			For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	16.23	
			For Cement Mortar Lining (CML), Add	2.32	
			Note: ANSI/AWWA C104/A21.4		
			For 40 Mil Ceramic Epoxy Lining (P401), Add	12.52	
			For Fusion Bonded Epoxy Lining (206N), Add	4.17	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	1.74	
			Note: ANSI/AWWA C151/A21.51		
			For >1,000, Deduct	-1.98	
			For Class 51, Add	3.37	
			For Class 52, Add	7.25	
			For Class 53, Add	13.04	
			For Class 54, Add	18.59	
			For Class 55, Add	21.40	
			For Class 56, Add	24.16	
33 14 13 13-0622	LF		8", Class 50, Push-On Joint Ductile Iron Pipe.....	49.69	11.99
			For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	22.19	
			For Cement Mortar Lining (CML), Add	3.17	
			Note: ANSI/AWWA C104/A21.4		
			For 40 Mil Ceramic Epoxy Lining (P401), Add	17.12	
			For Fusion Bonded Epoxy Lining (206N), Add	5.71	
			Note: ANSI/AWWA C104/A21.4		
			For Bituminous Or Coal Tar Coating, 1 Mil, Add	2.38	
			Note: ANSI/AWWA C151/A21.51		
			For >1,000, Deduct	-2.48	
			For Class 51, Add	4.55	
			For Class 52, Add	9.80	
			For Class 53, Add	17.66	
			For Class 54, Add	25.19	
			For Class 55, Add	28.97	
			For Class 56, Add	32.68	

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 14 13 13-0623	LF 10", Class 50, Push-On Joint Ductile Iron Pipe.....	70.20	16.88
	For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	26.83	
	For Cement Mortar Lining (CML), Add	4.47	
	Note: ANSI/AWWA C104/A21.4		
	For 40 Mil Ceramic Epoxy Lining (P401), Add	22.36	
	For Fusion Bonded Epoxy Lining (206N), Add	8.05	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	3.35	
	Note: ANSI/AWWA C151/A21.51		
	For >1,000, Deduct	-3.51	
	For Class 51, Add	6.41	
	For Class 52, Add	13.83	
	For Class 53, Add	24.92	
	For Class 54, Add	35.55	
	For Class 55, Add	40.88	
	For Class 56, Add	46.12	
33 14 13 13-0624	LF 12", Class 50, Push-On Joint Ductile Iron Pipe.....	81.63	18.69
	For 40 Mil Glass Fiber Epoxy Or Polyurethane Lining, Add	26.66	
	For Cement Mortar Lining (CML), Add	5.33	
	Note: ANSI/AWWA C104/A21.4		
	For 40 Mil Ceramic Epoxy Lining (P401), Add	21.32	
	For Fusion Bonded Epoxy Lining (206N), Add	9.60	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	4.00	
	Note: ANSI/AWWA C151/A21.51		
	For >1,000, Deduct	-4.08	
	For Class 51, Add	7.62	
	For Class 52, Add	16.44	
	For Class 53, Add	29.63	
	For Class 54, Add	42.27	
	For Class 55, Add	48.60	
	For Class 56, Add	54.82	
33 14 13 13-0625	Push-On Joint Ductile Iron 90 Degree Elbow (33 14 13 13-0618)		
33 14 13 13-0626	EA 4" 90 Degree Elbow, Push-On Joint Ductile Iron	255.81	38.60
	For Cement Mortar Lining (CML), Add	19.73	
	Note: ANSI/AWWA C104/A21.4		
	For Fusion Bonded Epoxy Lining (206N), Add	35.52	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	14.80	
	Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0627	EA 6" 90 Degree Elbow, Push-On Joint Ductile Iron	370.76	56.94
	For Cement Mortar Lining (CML), Add	28.44	
	Note: ANSI/AWWA C104/A21.4		
	For Fusion Bonded Epoxy Lining (206N), Add	51.20	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	21.33	
	Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0628	EA 8" 90 Degree Elbow, Push-On Joint Ductile Iron	497.05	67.62
	For Cement Mortar Lining (CML), Add	39.46	
	Note: ANSI/AWWA C104/A21.4		
	For Fusion Bonded Epoxy Lining (206N), Add	71.02	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	29.59	
	Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0629	EA 10" 90 Degree Elbow, Push-On Joint Ductile Iron	750.63	74.54
	For Cement Mortar Lining (CML), Add	59.65	
	Note: ANSI/AWWA C104/A21.4		
	For Fusion Bonded Epoxy Lining (206N), Add	107.36	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	44.73	
	Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0630	EA 12" 90 Degree Elbow, Push-On Joint Ductile Iron	969.88	87.46
	For Cement Mortar Lining (CML), Add	78.91	
	Note: ANSI/AWWA C104/A21.4		
	For Fusion Bonded Epoxy Lining (206N), Add	142.05	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	59.19	
	Note: ANSI/AWWA C151/A21.51		
33 14 13 13-0631	Push-On Joint Ductile Iron Tee (33 14 13 13-0618)		
33 14 13 13-0632	EA 4" Tee, Push-On Joint Ductile Iron.....	391.42	56.94
	For Cement Mortar Lining (CML), Add	30.51	
	Note: ANSI/AWWA C104/A21.4		
	For Fusion Bonded Epoxy Lining (206N), Add	54.92	
	Note: ANSI/AWWA C104/A21.4		
	For Bituminous Or Coal Tar Coating, 1 Mil, Add	22.88	
	Note: ANSI/AWWA C151/A21.51		



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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 13-0633 EA 6" Tee, Push-On Joint Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	544.33 41.75 75.15 31.31	83.68
33 14 13 13-0634 EA 8" Tee, Push-On Joint Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	745.68 59.19 106.53 44.39	101.43
33 14 13 13-0635 EA 10" Tee, Push-On Joint Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	1,101.25 93.13 167.64 69.85	113.29
33 14 13 13-0636 EA 12" Tee, Push-On Joint Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	1,372.73 117.45 211.41 88.09	130.62
33 14 13 13-0637 Flanged End x Push-On Joint Ductile Iron Adapters (33 14 13 13-0618)		
33 14 13 13-0638 EA 4" Flanged End x Push-On Joint Adapter, Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	431.47 22.86 41.14 17.14	133.92
33 14 13 13-0639 EA 6" Flanged End x Push-On Joint Adapter, Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	528.26 27.71 49.87 20.78	165.80
33 14 13 13-0640 EA 8" Flanged End x Push-On Joint Adapter, Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	691.34 39.83 71.69 29.87	193.37
33 14 13 13-0641 EA 10" Flanged End x Push-On Joint Adapter, Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	944.31 51.95 93.51 38.96	280.38
33 14 13 13-0642 EA 12" Flanged End x Push-On Joint Adapter, Ductile Iron For Cement Mortar Lining (CML), Add Note: ANSI/AWWA C104/A21.4 For Fusion Bonded Epoxy Lining (206N), Add Note: ANSI/AWWA C104/A21.4 For Bituminous Or Coal Tar Coating, 1 Mil, Add Note: ANSI/AWWA C151/A21.51	1,143.52 65.80 118.44 49.35	320.48
33 14 13 13-0643 Push-On Joint Ductile Iron Pipe And Fitting Restraints (33 14 13 13-0618) Note: Includes ductile iron follower gland, restraint ring and all nuts and bolts. Excludes pipe and fitting.		
33 14 13 13-0644 EA 4" Pipe And Fitting Restraint, Push-On Joint Ductile Iron	51.84	20.85
33 14 13 13-0645 EA 6" Pipe And Fitting Restraint, Push-On Joint Ductile Iron	67.94	27.20
33 14 13 13-0646 EA 8" Pipe And Fitting Restraint, Push-On Joint Ductile Iron	88.39	27.72
33 14 13 13-0647 EA 10" Pipe And Fitting Restraint, Push-On Joint Ductile Iron	104.49	29.44
33 14 13 13-0648 EA 12" Pipe And Fitting Restraint, Push-On Joint Ductile Iron	124.25	32.71
33 14 13 13-0649 Push-On Joint Ductile Iron Bell Restraint Harness (MEGALUG® 1700 Series) (33 14 13 13-0618)		
33 14 13 13-0650 EA 4" Bell Restraint Harness, Ductile Iron (MEGALUG® 170400).....	242.23	76.46
33 14 13 13-0651 EA 6" Bell Restraint Harness, Ductile Iron (MEGALUG® 170600).....	319.37	93.35
33 14 13 13-0652 EA 8" Bell Restraint Harness, Ductile Iron (MEGALUG® 170800).....	411.03	113.85
33 14 13 13-0653 EA 10" Bell Restraint Harness, Ductile Iron (MEGALUG® 17100).....	618.49	138.89
33 14 13 13-0654 EA 12" Bell Restraint Harness, Ductile Iron (MEGALUG® 171200).....	767.06	169.36
33 14 13 13-0655 EA 14" Bell Restraint Harness, Ductile Iron (MEGALUG® 171400).....	1,319.97	206.63

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR		TOTAL DIRECT DEMOLITION	
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 14 13 13-0656	EA 16" Bell Restraint Harness, Ductile Iron (MEGALUG® 171600).....	1,507.40	252.17
33 14 13 13-0657	EA 18" Bell Restraint Harness, Ductile Iron (MEGALUG® 171800).....	1,711.84	307.57
33 14 13 13-0658	EA 20" Bell Restraint Harness, Ductile Iron (MEGALUG® 172000).....	2,325.77	375.32
33 14 13 13-0659	EA 24" Bell Restraint Harness, Ductile Iron (MEGALUG® 172400).....	2,965.82	457.78
33 14 13 23	Plastic Public Water Utility Distribution Piping (33 14 13)		
33 14 13 23-0001	Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Piping (33 14 13 23)		
33 14 13 23-0002	Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe (33 14 13 23-0001)		
33 14 13 23-0003	LF 3/4" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	2.70	0.86
	<i>For >1,000, Deduct</i>	-0.14	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.08	
33 14 13 23-0004	LF 1" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	3.04	0.92
	<i>For >1,000, Deduct</i>	-0.15	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.11	
33 14 13 23-0005	LF 1-1/4" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	3.67	1.01
	<i>For >1,000, Deduct</i>	-0.18	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.17	
33 14 13 23-0006	LF 1-1/2" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	4.36	1.11
	<i>For >1,000, Deduct</i>	-0.22	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.24	
33 14 13 23-0007	LF 2" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	6.03	1.25
	<i>For >1,000, Deduct</i>	-0.30	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.44	
33 14 13 23-0008	LF 2-1/2" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	8.17	1.42
	<i>For >1,000, Deduct</i>	-0.41	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.69	
33 14 13 23-0009	LF 3" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	10.37	1.62
	<i>For >1,000, Deduct</i>	-0.52	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.95	
33 14 13 23-0010	LF 4" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	15.31	2.00
	<i>For >1,000, Deduct</i>	-0.77	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	1.55	
33 14 13 23-0011	LF 6" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	28.84	2.53
	<i>For >1,000, Deduct</i>	-1.44	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	3.38	
33 14 13 23-0012	LF 8" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	46.61	3.39
	<i>For >1,000, Deduct</i>	-2.33	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	5.72	
33 14 13 23-0013	LF 10" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	70.62	4.53
	<i>For >1,000, Deduct</i>	-3.53	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	8.90	
33 14 13 23-0014	LF 12" Class 200, SDR 21 Polyvinyl Chloride (PVC) Pressure Pipe.....	98.79	6.09
	<i>For >1,000, Deduct</i>	-4.94	
	<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	12.53	
33 14 13 23-0015	90 Degree Elbows, Class 200, SDR 21 Polyvinyl Chloride (PVC) (33 14 13 23-0001)		
33 14 13 23-0016	EA 3/4", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	26.37	10.30
33 14 13 23-0017	EA 1", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	33.54	12.87
33 14 13 23-0018	EA 1-1/4", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	42.52	16.09
33 14 13 23-0019	EA 1-1/2", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	77.24	17.80
33 14 13 23-0020	EA 2", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	82.38	19.95
33 14 13 23-0021	EA 2-1/2", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	99.39	22.63
33 14 13 23-0022	EA 3", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	113.00	25.97
33 14 13 23-0023	EA 4", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	164.87	31.89
33 14 13 23-0024	EA 6", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	248.08	40.52
33 14 13 23-0025	EA 8", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	426.34	53.19
33 14 13 23-0026	EA 10", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	512.97	71.17
33 14 13 23-0027	EA 12", Class 200, SDR 21 Polyvinyl Chloride (PVC) 90 Degree Elbow.....	674.75	95.79
33 14 13 23-0028	45 Degree Elbows, Class 200, SDR 21 Polyvinyl Chloride (PVC) (33 14 13 23-0001)		
33 14 13 23-0029	EA 3/4" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	27.25	10.30
33 14 13 23-0030	EA 1" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	34.17	12.87
33 14 13 23-0031	EA 1-1/4" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	42.90	16.09
33 14 13 23-0032	EA 1-1/2" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	65.72	17.80
33 14 13 23-0033	EA 2" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	83.45	19.95
33 14 13 23-0034	EA 2-1/2" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	103.74	22.63
33 14 13 23-0035	EA 3" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	111.16	25.97
33 14 13 23-0036	EA 4" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	160.91	31.89
33 14 13 23-0037	EA 6" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	240.08	40.52
33 14 13 23-0038	EA 8" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	411.10	53.19
33 14 13 23-0039	EA 10" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	449.81	71.17
33 14 13 23-0040	EA 12" 45 Degree Elbow, Class 200, SDR 21 Polyvinyl Chloride (PVC).....	587.33	95.79
33 14 13 23-0041	Tees Or Wyes, Class 200, SDR 21 Polyvinyl Chloride (PVC) (33 14 13 23-0001)		
33 14 13 23-0042	EA 3/4" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	39.49	15.44
33 14 13 23-0043	EA 1" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	50.05	19.41
33 14 13 23-0044	EA 1-1/4" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	63.01	24.24



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 23-0045 EA 1-1/2" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	101.69	26.82
33 14 13 23-0046 EA 2" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	117.03	29.81
33 14 13 23-0047 EA 2-1/2" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	137.84	34.00
33 14 13 23-0048 EA 3" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	174.39	38.85
33 14 13 23-0049 EA 4" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	235.56	47.89
33 14 13 23-0050 EA 6" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	427.31	60.88
33 14 13 23-0051 EA 8" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	663.00	79.79
33 14 13 23-0052 EA 10" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	739.24	108.67
33 14 13 23-0053 EA 12" Tees Or Wyes, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	902.35	146.23
33 14 13 23-0054 Couplings, Class 200, SDR 21 Polyvinyl Chloride (PVC) (33 14 13 23-0001)		
33 14 13 23-0055 EA 3/4" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	17.73	6.87
33 14 13 23-0056 EA 1" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	24.01	9.23
33 14 13 23-0057 EA 1-1/4" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	32.52	12.12
33 14 13 23-0058 EA 1-1/2" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	52.67	13.41
33 14 13 23-0059 EA 2" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	57.73	14.91
33 14 13 23-0060 EA 2-1/2" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	65.65	16.94
33 14 13 23-0061 EA 3" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	77.59	19.43
33 14 13 23-0062 EA 4" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	111.99	23.89
33 14 13 23-0063 EA 6" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	167.69	30.44
33 14 13 23-0064 EA 8" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	308.51	39.89
33 14 13 23-0065 EA 10" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	344.83	54.39
33 14 13 23-0066 EA 12" Coupling, Class 200 SDR 21 Polyvinyl Chloride (PVC).....	431.18	73.12
33 14 13 23-0067 Schedule 40 Polyvinyl Chloride (PVC) Pipe And Fittings (33 14 13 23)		
33 14 13 23-0068 Schedule 40 Polyvinyl Chloride (PVC) Pipe (33 14 13 23-0067)		
33 14 13 23-0069 LF 3/4" Schedule 40 Polyvinyl Chloride (PVC) Pipe	3.14	0.86
For >1,000, Deduct	-0.16	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	0.15	
33 14 13 23-0070 LF 1" Schedule 40 Polyvinyl Chloride (PVC) Pipe	3.89	0.92
For >1,000, Deduct	-0.19	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	0.24	
33 14 13 23-0071 LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe	5.15	1.11
For >1,000, Deduct	-0.26	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	0.36	
33 14 13 23-0072 LF 2" Schedule 40 Polyvinyl Chloride (PVC) Pipe	6.32	1.25
For >1,000, Deduct	-0.32	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	0.48	
33 14 13 23-0073 LF 2-1/2" Schedule 40 Polyvinyl Chloride (PVC) Pipe	8.64	1.42
For >1,000, Deduct	-0.43	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	0.77	
33 14 13 23-0074 LF 3" Schedule 40 Polyvinyl Chloride (PVC) Pipe	10.67	1.62
For >1,000, Deduct	-0.53	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	0.99	
33 14 13 23-0075 LF 4" Schedule 40 Polyvinyl Chloride (PVC) Pipe	14.50	2.00
For >1,000, Deduct	-0.73	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	1.43	
33 14 13 23-0076 LF 6" Schedule 40 Polyvinyl Chloride (PVC) Pipe	22.96	2.53
For >1,000, Deduct	-1.15	
For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add	2.49	
33 14 13 23-0077 Schedule 40 Polyvinyl Chloride (PVC) 90 Degree Elbows (33 14 13 23-0067)		
33 14 13 23-0078 EA 3/4" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	26.69	10.30
33 14 13 23-0079 EA 1" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	33.73	12.87
33 14 13 23-0080 EA 1-1/2" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	47.14	17.80
33 14 13 23-0081 EA 2" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	53.79	19.95
33 14 13 23-0082 EA 2-1/2" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	67.27	22.63
33 14 13 23-0083 EA 3" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	77.86	25.97
33 14 13 23-0084 EA 4" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	106.05	31.89
33 14 13 23-0085 EA 6" 90 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	185.09	40.52
33 14 13 23-0086 Schedule 40 Polyvinyl Chloride (PVC) 45 Degree Elbows (33 14 13 23-0067)		
33 14 13 23-0087 EA 3/4" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	26.61	10.30
33 14 13 23-0088 EA 1" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	33.65	12.87
33 14 13 23-0089 EA 1-1/2" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	47.17	17.80
33 14 13 23-0090 EA 2" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	53.49	19.95
33 14 13 23-0091 EA 2-1/2" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	66.45	22.63
33 14 13 23-0092 EA 3" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	76.89	25.97
33 14 13 23-0093 EA 4" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	104.11	31.89
33 14 13 23-0094 EA 6" 45 Degree Elbow, Schedule 40 Polyvinyl Chloride (PVC).....	178.90	40.52
33 14 13 23-0095 Schedule 40 Polyvinyl Chloride (PVC) Tees Or Wyes (33 14 13 23-0067)		
33 14 13 23-0096 EA 3/4" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	39.82	15.44
33 14 13 23-0097 EA 1" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	50.31	19.41
33 14 13 23-0098 EA 1-1/2" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	70.33	26.82
33 14 13 23-0099 EA 2" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	79.61	29.81

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 23-0100	EA		2-1/2" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	101.38	34.00
33 14 13 23-0101	EA		3" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	120.73	38.85
33 14 13 23-0102	EA		4" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	151.17	47.89
33 14 13 23-0103	EA		6" Tees Or Wyes, Schedule 40 Polyvinyl Chloride (PVC).....	283.58	60.88
33 14 13 23-0104			Schedule 40 Polyvinyl Chloride (PVC) Couplings (33 14 13 23-0067)		
33 14 13 23-0105	EA		3/4" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	17.88	6.87
33 14 13 23-0106	EA		1" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	24.13	9.23
33 14 13 23-0107	EA		1-1/2" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	34.97	13.41
33 14 13 23-0108	EA		2" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	39.79	14.91
33 14 13 23-0109	EA		2-1/2" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	47.82	16.94
33 14 13 23-0110	EA		3" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	56.93	19.43
33 14 13 23-0111	EA		4" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	70.86	23.89
33 14 13 23-0112	EA		6" Coupling, Schedule 40 Polyvinyl Chloride (PVC)	114.21	30.44
33 14 13 23-0113			Crosses, Schedule 40 Polyvinyl Chloride (PVC) (33 14 13 23-0067)		
33 14 13 23-0114	EA		3/4" Cross, Schedule 40 Polyvinyl Chloride (PVC)	53.39	20.59
33 14 13 23-0115	EA		1" Cross, Schedule 40 Polyvinyl Chloride (PVC)	66.99	25.84
33 14 13 23-0116	EA		1-1/2" Cross, Schedule 40 Polyvinyl Chloride (PVC)	93.75	35.72
33 14 13 23-0117	EA		2" Cross, Schedule 40 Polyvinyl Chloride (PVC)	106.13	39.79
33 14 13 23-0118	EA		2-1/2" Cross, Schedule 40 Polyvinyl Chloride (PVC)	135.08	45.26
33 14 13 23-0119	EA		3" Cross, Schedule 40 Polyvinyl Chloride (PVC)	160.84	51.84
33 14 13 23-0120	EA		4" Cross, Schedule 40 Polyvinyl Chloride (PVC)	201.37	63.78
33 14 13 23-0121	EA		6" Cross, Schedule 40 Polyvinyl Chloride (PVC)	377.33	81.14
33 14 13 23-0122			Schedule 80 Polyvinyl Chloride (PVC) Pipe And Fittings (33 14 13 23-0122)		
33 14 13 23-0123			Schedule 80 Polyvinyl Chloride (PVC) Pipe (33 14 13 23-0122)		
33 14 13 23-0124	LF		1" Schedule 80 Polyvinyl Chloride (PVC) Pipe	4.37	0.92
			<i>For >1,000, Deduct</i>	-0.22	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.31	
33 14 13 23-0125	LF		1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Pipe	6.12	1.11
			<i>For >1,000, Deduct</i>	-0.31	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.50	
33 14 13 23-0126	LF		2" Schedule 80 Polyvinyl Chloride (PVC) Pipe	7.96	1.25
			<i>For >1,000, Deduct</i>	-0.40	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	0.73	
33 14 13 23-0127	LF		2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Pipe	10.76	1.42
			<i>For >1,000, Deduct</i>	-0.54	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	1.08	
33 14 13 23-0128	LF		3" Schedule 80 Polyvinyl Chloride (PVC) Pipe	13.64	1.62
			<i>For >1,000, Deduct</i>	-0.68	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	1.44	
33 14 13 23-0129	LF		4" Schedule 80 Polyvinyl Chloride (PVC) Pipe	19.05	2.00
			<i>For >1,000, Deduct</i>	-0.95	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	2.11	
33 14 13 23-0130	LF		6" Schedule 80 Polyvinyl Chloride (PVC) Pipe	33.09	2.53
			<i>For >1,000, Deduct</i>	-1.65	
			<i>For Coloring Of Polyvinyl Chloride (PVC) Pipe For Reclaimed Water Identification, Add</i>	4.01	
33 14 13 23-0131			Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbows (33 14 13 23-0122)		
33 14 13 23-0132	EA		1" 90 Degree Elbow, Schedule 80 Polyvinyl Chloride (PVC)	36.25	12.87
33 14 13 23-0133	EA		1-1/2" 90 Degree Elbow, Schedule 80 Polyvinyl Chloride (PVC)	47.14	17.80
33 14 13 23-0134	EA		2" 90 Degree Elbow, Schedule 80 Polyvinyl Chloride (PVC)	56.31	19.95
33 14 13 23-0135	EA		2-1/2" 90 Degree Elbow, Schedule 80 Polyvinyl Chloride (PVC)	72.63	22.63
33 14 13 23-0136	EA		3" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbow	82.83	25.97
33 14 13 23-0137	EA		4" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbow	107.25	31.89
33 14 13 23-0138	EA		6" Schedule 80 Polyvinyl Chloride (PVC) 90 Degree Elbow	179.42	40.52
33 14 13 23-0139			Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbows (33 14 13 23-0122)		
33 14 13 23-0140	EA		1" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	46.58	12.87
33 14 13 23-0141	EA		1-1/2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	57.09	17.80
33 14 13 23-0142	EA		2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	65.88	19.95
33 14 13 23-0143	EA		2-1/2" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	90.57	22.63
33 14 13 23-0144	EA		3" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	106.19	25.97
33 14 13 23-0145	EA		4" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	154.22	31.89
33 14 13 23-0146	EA		6" Schedule 80 Polyvinyl Chloride (PVC) 45 Degree Elbow	176.28	40.52
33 14 13 23-0147			Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes (33 14 13 23-0122)		
33 14 13 23-0148	EA		1" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	55.60	19.41
33 14 13 23-0149	EA		1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	86.39	26.82
33 14 13 23-0150	EA		2" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	98.76	29.81
33 14 13 23-0151	EA		2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	111.52	34.00
33 14 13 23-0152	EA		3" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	130.43	38.85
33 14 13 23-0153	EA		4" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	158.16	47.89



Utilities	33	CS
Water Utilities	33 10	
Water Utility Transmission and Distribution	33 14	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 23-0154 EA 6" Schedule 80 Polyvinyl Chloride (PVC) Tees Or Wyes.....	283.32	60.88
33 14 13 23-0155 Schedule 80 Polyvinyl Chloride (PVC) Couplings (33 14 13 23-0122)		
33 14 13 23-0156 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Coupling	27.91	9.23
33 14 13 23-0157 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Coupling	41.46	13.41
33 14 13 23-0158 EA 2" Schedule 80 Polyvinyl Chloride (PVC) Coupling	45.89	14.91
33 14 13 23-0159 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Coupling	63.50	16.94
33 14 13 23-0160 EA 3" Schedule 80 Polyvinyl Chloride (PVC) Coupling	72.74	19.43
33 14 13 23-0161 EA 4" Schedule 80 Polyvinyl Chloride (PVC) Coupling	90.07	23.89
33 14 13 23-0162 EA 6" Schedule 80 Polyvinyl Chloride (PVC) Coupling	141.04	30.44
33 14 13 23-0163 Crosses, Schedule 80 Polyvinyl Chloride (PVC) (33 14 13 23-0122)		
33 14 13 23-0164 EA 1" Schedule 80 Polyvinyl Chloride (PVC) Cross	74.02	25.84
33 14 13 23-0165 EA 1-1/2" Schedule 80 Polyvinyl Chloride (PVC) Cross	115.07	35.72
33 14 13 23-0166 EA 2" Schedule 80 Polyvinyl Chloride (PVC) Cross	131.55	39.79
33 14 13 23-0167 EA 2-1/2" Schedule 80 Polyvinyl Chloride (PVC) Cross	148.54	45.26
33 14 13 23-0168 EA 3" Schedule 80 Polyvinyl Chloride (PVC) Cross	173.71	51.84
33 14 13 23-0169 EA 4" Schedule 80 Polyvinyl Chloride (PVC) Cross	210.64	63.78
33 14 13 23-0170 EA 6" Schedule 80 Polyvinyl Chloride (PVC) Cross	377.00	81.14
33 14 13 23-0171 AWWA C900/C905 Polyvinyl Chloride (PVC) Pipe (33 14 13 23)		
Note: Includes hub on one end of pipe. C900 is available in blue, white, purple or green.		
33 14 13 23-0172 AWWA C900, DR 25, PC 165 Polyvinyl Chloride (PVC) Pipe (33 14 13 23-0171)		
33 14 13 23-0173 LF 4" AWWA C900, DR 25, PC 165 Polyvinyl Chloride (PVC) Pipe	11.22	4.04
33 14 13 23-0174 LF 6" AWWA C900, DR 25, PC 165 Polyvinyl Chloride (PVC) Pipe	16.18	4.90
33 14 13 23-0175 LF 8" AWWA C900, DR 25, PC 165 Polyvinyl Chloride (PVC) Pipe	22.01	5.51
33 14 13 23-0176 LF 10" AWWA C900, DR 25, PC 165 Polyvinyl Chloride (PVC) Pipe	28.83	6.12
33 14 13 23-0177 LF 12" AWWA C900, DR 25, PC 165 Polyvinyl Chloride (PVC) Pipe	37.18	6.86
33 14 13 23-0178 AWWA C900, DR 18, PC 235 Polyvinyl Chloride (PVC) Pipe (33 14 13 23-0171)		
33 14 13 23-0179 LF 4" AWWA C900, DR 18, PC 235 Polyvinyl Chloride (PVC) Pipe	12.34	4.04
33 14 13 23-0180 LF 6" AWWA C900, DR 18, PC 235 Polyvinyl Chloride (PVC) Pipe	18.50	4.90
33 14 13 23-0181 LF 8" AWWA C900, DR 18, PC 235 Polyvinyl Chloride (PVC) Pipe	25.92	5.51
33 14 13 23-0182 LF 10" AWWA C900, DR 18, PC 235 Polyvinyl Chloride (PVC) Pipe	34.91	6.12
33 14 13 23-0183 LF 12" AWWA C900, DR 18, PC 235 Polyvinyl Chloride (PVC) Pipe	45.67	6.86
33 14 13 23-0184 AWWA C900, DR 14, PC 305 Polyvinyl Chloride (PVC) Pipe (33 14 13 23-0171)		
33 14 13 23-0185 LF 4" AWWA C900, DR 14, PC 305 Polyvinyl Chloride (PVC) Pipe	13.44	4.04
33 14 13 23-0186 LF 6" AWWA C900, DR 14, PC 305 Polyvinyl Chloride (PVC) Pipe	20.81	4.90
33 14 13 23-0187 LF 8" AWWA C900, DR 14, PC 305 Polyvinyl Chloride (PVC) Pipe	29.84	5.51
33 14 13 23-0188 LF 10" AWWA C900, DR 14, PC 305 Polyvinyl Chloride (PVC) Pipe	40.86	6.12
33 14 13 23-0189 LF 12" AWWA C900, DR 14, PC 305 Polyvinyl Chloride (PVC) Pipe	54.16	6.86
33 14 13 23-0190 AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) Fittings (33 14 13 23)		
Note: Includes rubber gaskets.		
33 14 13 23-0191 90 Degree Elbows, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) (33 14 13 23-0190)		
33 14 13 23-0192 EA 4" 90 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	205.56	12.87
For DR 25, Deduct	-10.79	
33 14 13 23-0193 EA 6" 90 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	421.49	14.48
For DR 25, Deduct	-23.55	
33 14 13 23-0194 EA 8" 90 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	633.42	16.09
For DR 25, Deduct	-36.07	
33 14 13 23-0195 EA 10" 90 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	966.93	25.40
For DR 25, Deduct	-54.97	
33 14 13 23-0196 EA 12" 90 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,257.72	42.33
For DR 25, Deduct	-70.39	
33 14 13 23-0197 45 Degree Elbows, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) (33 14 13 23-0190)		
33 14 13 23-0198 EA 4" 45 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	182.09	12.87
For DR 25, Deduct	-9.38	
33 14 13 23-0199 EA 6" 45 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	315.00	14.48
For DR 25, Deduct	-17.16	
33 14 13 23-0200 EA 8" 45 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	399.30	16.09
For DR 25, Deduct	-22.03	
33 14 13 23-0201 EA 10" 45 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	564.31	25.40
For DR 25, Deduct	-30.81	
33 14 13 23-0202 EA 12" 45 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	753.90	42.33
For DR 25, Deduct	-40.16	

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 23-0203			22-1/2 Degree Elbows, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0204	EA		4" 22-1/2 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	179.23	12.87
			<i>For DR 25, Deduct</i>	-9.21	
33 14 13 23-0205	EA		6" 22-1/2 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	315.01	14.48
			<i>For DR 25, Deduct</i>	-17.16	
33 14 13 23-0206	EA		8" 22-1/2 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	399.30	16.09
			<i>For DR 25, Deduct</i>	-22.03	
33 14 13 23-0207	EA		10" 22-1/2 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	564.32	25.40
			<i>For DR 25, Deduct</i>	-30.81	
33 14 13 23-0208	EA		12" 22-1/2 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	753.91	42.33
			<i>For DR 25, Deduct</i>	-40.16	
33 14 13 23-0209			11-1/4 Degree Elbows, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0210	EA		4" 11-1/4 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	158.21	12.87
			<i>For DR 25, Deduct</i>	-7.95	
33 14 13 23-0211	EA		6" 11-1/4 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	315.01	14.48
			<i>For DR 25, Deduct</i>	-17.16	
33 14 13 23-0212	EA		8" 11-1/4 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	399.30	16.09
			<i>For DR 25, Deduct</i>	-22.03	
33 14 13 23-0213	EA		10" 11-1/4 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	564.32	25.40
			<i>For DR 25, Deduct</i>	-30.81	
33 14 13 23-0214	EA		12" 11-1/4 Degree Elbow, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	753.91	42.33
			<i>For DR 25, Deduct</i>	-40.16	
33 14 13 23-0215			Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0216	EA		4" Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	244.35	14.48
			<i>For DR 25, Deduct</i>	-12.92	
33 14 13 23-0217	EA		6" Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	472.51	16.09
			<i>For DR 25, Deduct</i>	-26.42	
33 14 13 23-0218	EA		8" Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	659.59	18.23
			<i>For DR 25, Deduct</i>	-37.39	
33 14 13 23-0219	EA		10" Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,359.87	31.75
			<i>For DR 25, Deduct</i>	-77.78	
33 14 13 23-0220	EA		12" Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,658.23	63.49
			<i>For DR 25, Deduct</i>	-91.88	
33 14 13 23-0221			Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0222	EA		6" x 4" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	470.25	20.91
			<i>For DR 25, Deduct</i>	-25.71	
33 14 13 23-0223	EA		8" x 4" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	639.94	22.52
			<i>For DR 25, Deduct</i>	-35.69	
33 14 13 23-0224	EA		8" x 6" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	655.96	23.33
			<i>For DR 25, Deduct</i>	-36.56	
33 14 13 23-0225	EA		10" x 4" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	850.73	31.75
			<i>For DR 25, Deduct</i>	-47.23	
33 14 13 23-0226	EA		10" x 6" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,152.83	32.54
			<i>For DR 25, Deduct</i>	-65.27	
33 14 13 23-0227	EA		10" x 8" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,233.37	33.33
			<i>For DR 25, Deduct</i>	-70.00	
33 14 13 23-0228	EA		12" x 4" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,306.74	48.68
			<i>For DR 25, Deduct</i>	-72.56	
33 14 13 23-0229	EA		12" x 6" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,500.42	49.47
			<i>For DR 25, Deduct</i>	-84.09	
33 14 13 23-0230	EA		12" x 8" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,591.92	50.26
			<i>For DR 25, Deduct</i>	-89.48	
33 14 13 23-0231	EA		12" x 10" Reducing Tees Or Wyes, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,621.67	55.02
			<i>For DR 25, Deduct</i>	-90.70	
33 14 13 23-0232			Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0233	EA		4" Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	338.68	25.74
			<i>For DR 25, Deduct</i>	-17.23	
33 14 13 23-0234	EA		6" Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	609.10	28.96
			<i>For DR 25, Deduct</i>	-33.07	
33 14 13 23-0235	EA		8" Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	843.64	32.17
			<i>For DR 25, Deduct</i>	-46.76	
33 14 13 23-0236	EA		10" Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,721.36	50.79
			<i>For DR 25, Deduct</i>	-97.19	
33 14 13 23-0237	EA		12" Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	2,041.42	63.49
			<i>For DR 25, Deduct</i>	-114.87	
33 14 13 23-0238			Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 23-0239 EA 6" x 4" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	590.66	27.35
For DR 25, Deduct	-32.16	
33 14 13 23-0240 EA 8" x 4" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	802.46	28.96
For DR 25, Deduct	-44.67	
33 14 13 23-0241 EA 8" x 6" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	822.93	30.56
For DR 25, Deduct	-45.71	
33 14 13 23-0242 EA 10" x 4" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,234.04	38.09
For DR 25, Deduct	-69.47	
33 14 13 23-0243 EA 10" x 6" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,439.23	39.68
For DR 25, Deduct	-81.59	
33 14 13 23-0244 EA 10" x 8" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,581.20	41.27
For DR 25, Deduct	-89.92	
33 14 13 23-0245 EA 12" x 4" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,622.28	55.02
For DR 25, Deduct	-90.73	
33 14 13 23-0246 EA 12" x 6" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,865.00	56.61
For DR 25, Deduct	-105.11	
33 14 13 23-0247 EA 12" x 8" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	1,980.59	58.20
For DR 25, Deduct	-111.85	
33 14 13 23-0248 EA 12" x 10" Reducing Cross, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	2,024.82	67.72
For DR 25, Deduct	-113.36	
33 14 13 23-0249 Couplings, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0250 EA 4" Coupling, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	122.59	12.87
For DR 25, Deduct	-5.81	
33 14 13 23-0251 EA 6" Coupling, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	228.86	14.48
For DR 25, Deduct	-11.99	
33 14 13 23-0252 EA 8" Coupling, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	275.52	16.09
For DR 25, Deduct	-14.60	
33 14 13 23-0253 EA 10" Coupling, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	391.19	25.40
For DR 25, Deduct	-20.42	
33 14 13 23-0254 EA 12" Coupling, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	622.81	31.75
For DR 25, Deduct	-33.56	
33 14 13 23-0255 Flanged End x Gasket Joint Adapter, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC) <small>(33 14 13 23-0190)</small>		
33 14 13 23-0256 EA 4" Flanged End x Gasket Joint Adapter, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	152.08	12.87
For DR 25, Deduct	-7.58	
33 14 13 23-0257 EA 6" Flanged End x Gasket Joint Adapter, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	206.73	14.48
For DR 25, Deduct	-10.67	
33 14 13 23-0258 EA 8" Flanged End x Gasket Joint Adapter, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	300.72	16.09
For DR 25, Deduct	-16.11	
33 14 13 23-0259 EA 10" Flanged End x Gasket Joint Adapter, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	410.85	25.40
For DR 25, Deduct	-21.60	
33 14 13 23-0260 EA 12" Flanged End x Gasket Joint Adapter, AWWA C900/905, DR 18, PC 235 Polyvinyl Chloride (PVC).....	658.29	42.33
For DR 25, Deduct	-34.42	
33 14 13 26 Galvanized Steel Public Water Utility Distribution Piping <small>(33 14 13)</small>		
See CSI section 22 11 16 00-0013 for galvanized steel pipe.		
33 14 13 36 Steel Public Water Utility Distribution Piping <small>(33 14 13)</small>		
33 14 13 36-0001 Steel Piping <small>(33 14 13 36)</small>		
33 14 13 36-0002 Welded, Plain End, Uncoated Steel Piping <small>(33 14 13 36-0001)</small>		
Note: ASTM A252 steel pipe. See CSI section 33 14 13 43-0001 for pipe coatings, 33 14 13 43-0073 for pipe linings.		
33 14 13 36-0003 Up To 1/4" Wall Thickness Welded, Plain End, Uncoated Steel Piping <small>(33 14 13 36-0002)</small>		
33 14 13 36-0004 LF 8" Diameter, 3/16" Wall Thickness Welded, Plain End, Uncoated Steel Pipe.....	107.25	28.81
For <100, Add	11.91	
For >1,000, Deduct	-5.36	
33 14 13 36-0005 LF 8" Diameter, 1/4" Wall Thickness Welded, Plain End, Uncoated Steel Pipe.....	127.50	28.81
For <100, Add	12.92	
For >1,000, Deduct	-6.38	
33 14 13 36-0006 LF 10" Diameter, 3/16" Wall Thickness Welded, Plain End, Uncoated Steel Pipe.....	127.26	31.43
For <100, Add	13.51	
For >1,000, Deduct	-6.36	
33 14 13 36-0007 LF 10" Diameter, 1/4" Wall Thickness Welded, Plain End, Uncoated Steel Pipe.....	152.86	31.43
For <100, Add	14.79	
For >1,000, Deduct	-7.64	
33 14 13 36-0008 LF 12" Diameter, 3/16" Wall Thickness Welded, Plain End, Uncoated Steel Pipe.....	153.41	32.94
For <100, Add	15.15	
For >1,000, Deduct	-7.67	
33 14 13 36-0009 LF 12" Diameter, 1/4" Wall Thickness Welded, Plain End, Uncoated Steel Pipe.....	173.32	32.94
For <100, Add	16.15	
For >1,000, Deduct	-8.67	
33 14 13 36-0010 Flexible Couplings (Dresser Style 38) <small>(33 14 13 36-0001)</small>		
33 14 13 36-0011 EA 2" Dresser Coupling For Plain End Welded Steel Pipe.....	114.03	27.49

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 13 36-0012	EA	3" Dresser Coupling For Plain End Welded Steel Pipe.....	169.59	52.87
33 14 13 36-0013	EA	4" Dresser Coupling For Plain End Welded Steel Pipe.....	225.71	69.79
33 14 13 36-0014	EA	6" Dresser Coupling For Plain End Welded Steel Pipe.....	359.16	105.73
33 14 13 36-0015	EA	8" Dresser Coupling For Plain End Welded Steel Pipe.....	469.40	133.22
33 14 13 36-0016	EA	10" Dresser Coupling For Plain End Welded Steel Pipe.....	659.33	169.92
33 14 13 36-0017	EA	12" Dresser Coupling For Plain End Welded Steel Pipe.....	785.49	212.97

33 14 13 39 Copper Public Water Utility Distribution Piping (33 14 13)**33 14 13 39-0001 Type L Copper Water Distribution Piping (33 14 13 39)**

33 14 13 39-0002	LF	1/2" Type L Copper Water Distribution Pipe.....	7.81	2.04
33 14 13 39-0003	LF	3/4" Type L Copper Water Distribution Pipe.....	9.92	2.29
33 14 13 39-0004	LF	1" Type L Copper Water Distribution Pipe.....	13.17	2.55
33 14 13 39-0005	LF	1-1/4" Type L Copper Water Distribution Pipe.....	16.53	3.05
33 14 13 39-0006	LF	1-1/2" Type L Copper Water Distribution Pipe.....	20.42	4.08
33 14 13 39-0007	LF	2" Type L Copper Water Distribution Pipe.....	29.96	5.10
33 14 13 39-0008	LF	2-1/2" Type L Copper Water Distribution Pipe.....	37.74	6.12
33 14 13 39-0009	LF	3" Type L Copper Water Distribution Pipe.....	47.53	6.73
33 14 13 39-0010	LF	3-1/2" Type L Copper Water Distribution Pipe.....	63.81	8.46
33 14 13 39-0011	LF	4" Type L Copper Water Distribution Pipe.....	84.36	10.70
33 14 13 39-0012	LF	5" Type L Copper Water Distribution Pipe.....	136.72	13.36
33 14 13 39-0013	LF	6" Type L Copper Water Distribution Pipe.....	176.85	16.11
33 14 13 39-0014	LF	8" Type L Copper Water Distribution Pipe.....	306.69	18.04

33 14 13 39-0015 Type K Copper Water Distribution Piping (33 14 13 39)

33 14 13 39-0016	LF	1/2" Type K Copper Water Distribution Pipe.....	8.34	2.04
33 14 13 39-0017	LF	3/4" Type K Copper Water Distribution Pipe.....	11.81	2.29
33 14 13 39-0018	LF	1" Type K Copper Water Distribution Pipe.....	15.04	2.55
33 14 13 39-0019	LF	1-1/4" Type K Copper Water Distribution Pipe.....	17.69	3.05
33 14 13 39-0020	LF	1-1/2" Type K Copper Water Distribution Pipe.....	22.13	4.08
33 14 13 39-0021	LF	2" Type K Copper Water Distribution Pipe.....	32.26	5.10
33 14 13 39-0022	LF	2-1/2" Type K Copper Water Distribution Pipe.....	44.14	6.12
33 14 13 39-0023	LF	3" Type K Copper Water Distribution Pipe.....	57.11	6.73
33 14 13 39-0024	LF	3-1/2" Type K Copper Water Distribution Pipe.....	75.08	8.46
33 14 13 39-0025	LF	4" Type K Copper Water Distribution Pipe.....	101.45	10.70
33 14 13 39-0026	LF	5" Type K Copper Water Distribution Pipe.....	172.10	13.36
33 14 13 39-0027	LF	6" Type K Copper Water Distribution Pipe.....	240.47	16.11
33 14 13 39-0028	LF	8" Type K Copper Water Distribution Pipe.....	424.11	18.04

33 14 13 43 Public Water Utility Distribution Piping Coatings and Wraps (33 14 13)**33 14 13 43-0001 Pipe Coatings (33 14 13 43)****33 14 13 43-0002 Epoxy Wrap And Pipe Coating (33 14 13 43-0001)**

Note: Applied at fabrication shop.

33 14 13 43-0003	LF	8" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	3.18	
33 14 13 43-0004	LF	10" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	3.78	
33 14 13 43-0005	LF	12" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	4.46	
33 14 13 43-0006	LF	14" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	5.93	
33 14 13 43-0007	LF	16" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	6.76	
33 14 13 43-0008	LF	18" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	7.11	
33 14 13 43-0009	LF	20" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	7.66	
33 14 13 43-0010	LF	24" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	8.92	
33 14 13 43-0011	LF	30" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	11.72	
33 14 13 43-0012	LF	36" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	18.51	
33 14 13 43-0013	LF	42" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	39.90	
33 14 13 43-0014	LF	48" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	45.59	
33 14 13 43-0015	LF	54" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	51.29	
33 14 13 43-0016	LF	60" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	56.99	
33 14 13 43-0017	LF	66" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	62.69	
33 14 13 43-0018	LF	72" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	68.36	
33 14 13 43-0019	LF	78" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	74.09	
33 14 13 43-0020	LF	84" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	79.79	
33 14 13 43-0021	LF	90" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	85.49	
33 14 13 43-0022	LF	96" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	91.19	
33 14 13 43-0023	LF	102" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	96.86	
33 14 13 43-0024	LF	108" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	102.62	
33 14 13 43-0025	LF	114" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	108.23	
33 14 13 43-0026	LF	120" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	113.99	
33 14 13 43-0027	LF	126" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	119.74	
33 14 13 43-0028	LF	132" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	125.21	
33 14 13 43-0029	LF	138" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	130.97	
33 14 13 43-0030	LF	144" Outside Diameter Of Pipe, Epoxy Wrap And Pipe Coating.....	136.73	

33 14 13 43-0031 Cement Coating With Fiberglass Or Wire Mesh Reinforcing (33 14 13 43-0001)

Note: Applied at fabrication shop. Thickness ranging between 1" and 2".

33 14 13 43-0032	LF	4" Diameter Cement Coated Pipe 1" To 2" Mesh.....	9.22	
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Note: Reinforcing applied at fabrication shop.

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 43-0033 LF 6" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	11.34	
33 14 13 43-0034 LF 8" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	14.18	
33 14 13 43-0035 LF 10" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	15.79	
33 14 13 43-0036 LF 12" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	17.84	
33 14 13 43-0037 LF 14" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	20.87	
33 14 13 43-0038 LF 16" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	23.71	
33 14 13 43-0039 LF 18" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	26.75	
33 14 13 43-0040 LF 20" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	29.74	
33 14 13 43-0041 LF 24" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	35.67	
33 14 13 43-0042 LF 30" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	44.59	
33 14 13 43-0043 LF 36" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	53.51	
33 14 13 43-0044 LF 42" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	62.43	
33 14 13 43-0045 LF 48" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	71.34	
33 14 13 43-0046 LF 54" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	80.26	
33 14 13 43-0047 LF 60" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	89.18	
33 14 13 43-0048 LF 66" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	98.10	
33 14 13 43-0049 LF 72" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	107.02	
33 14 13 43-0050 LF 78" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	115.93	
33 14 13 43-0051 LF 84" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	124.85	
33 14 13 43-0052 LF 90" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	133.77	
33 14 13 43-0053 LF 96" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	142.69	
33 14 13 43-0054 LF 102" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	151.61	
33 14 13 43-0055 LF 108" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	160.52	
33 14 13 43-0056 LF 114" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	169.44	
33 14 13 43-0057 LF 120" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	178.36	
33 14 13 43-0058 LF 126" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	187.28	
33 14 13 43-0059 LF 132" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	196.20	
33 14 13 43-0060 LF 138" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	205.11	
33 14 13 43-0061 LF 144" Diameter Cement Coated Pipe 1" To 2" Mesh Note: Reinforcing applied at fabrication shop.	214.03	
33 14 13 43-0062 Epoxy Wrap And Fitting Coating (33 14 13 43-0001) Note: Applied at fabrication shop.		
33 14 13 43-0063 EA 4" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	9.98 0.48	
33 14 13 43-0064 EA 6" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	12.69 0.64	
33 14 13 43-0065 EA 8" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	18.38 0.83	
33 14 13 43-0066 EA 10" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	30.76 1.21	
33 14 13 43-0067 EA 12" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	46.93 1.78	
33 14 13 43-0068 EA 14" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	73.52 2.73	
33 14 13 43-0069 EA 16" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	112.63 3.52	
33 14 13 43-0070 EA 18" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	152.49 3.63	
33 14 13 43-0071 EA 20" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	207.61 4.34	
33 14 13 43-0072 EA 24" Outside Diameter, Epoxy Wrap And Fitting Coating..... <i>For 1/2" Thick, Add</i>	301.82 6.07	

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 13 43-0073	Cement Pipe Lining (33 14 13 43)		
33 14 13 43-0074	Cement Pipe Lining (33 14 13 43-0073)		
	Note: Shop applied.		
33 14 13 43-0075	LF 4" Outside Diameter, 1/4" Thick Cement Pipe Lining	13.74	
	For 1/2" Thick, Add	1.23	
33 14 13 43-0076	LF 6" Outside Diameter, 1/4" Thick Cement Pipe Lining	17.07	
	For 1/2" Thick, Add	1.51	
33 14 13 43-0077	LF 8" Outside Diameter, 1/4" Thick Cement Pipe Lining	20.85	
	For 1/2" Thick, Add	1.89	
33 14 13 43-0078	LF 10" Outside Diameter, 1/4" Thick Cement Pipe Lining	27.02	
	For 1/2" Thick, Add	2.36	
33 14 13 43-0079	LF 12" Outside Diameter, 1/4" Thick Cement Pipe Lining	33.22	
	For 1/2" Thick, Add	2.84	
33 14 13 43-0080	LF 14" Outside Diameter, 1/4" Thick Cement Pipe Lining	42.30	
	For 1/2" Thick, Add	3.33	
33 14 13 43-0081	LF 16" Outside Diameter, 1/4" Thick Cement Pipe Lining	54.54	
	For 1/2" Thick, Add	3.78	
33 14 13 43-0082	LF 18" Outside Diameter, 5/16" Thick Cement Pipe Lining	65.04	
	For 1/2" Thick, Add	3.62	
33 14 13 43-0083	LF 20" Outside Diameter, 5/16" Thick Cement Pipe Lining	78.34	
	For 1/2" Thick, Add	4.03	
33 14 13 43-0084	LF 24" Outside Diameter, 5/16" Thick Cement Pipe Lining	94.95	
	For 1/2" Thick, Add	4.83	
33 14 13 43-0085	LF 30" Outside Diameter, 5/16" Thick Cement Pipe Lining	114.42	
	For 1/2" Thick, Add	6.04	
33 14 13 43-0086	LF 36" Outside Diameter, 5/16" Thick Cement Pipe Lining	137.67	
	For 1/2" Thick, Add	7.25	
33 14 13 43-0087	LF 42" Outside Diameter, 3/8" Thick Cement Pipe Lining	160.66	
	For 1/2" Thick, Add	6.22	
33 14 13 43-0088	LF 48" Outside Diameter, 3/8" Thick Cement Pipe Lining	183.54	
	For 1/2" Thick, Add	7.11	
33 14 13 43-0089	LF 54" Outside Diameter, 3/8" Thick Cement Pipe Lining	206.52	
	For 1/2" Thick, Add	7.99	
33 14 13 43-0090	LF 60" Outside Diameter, 3/8" Thick Cement Pipe Lining	229.49	
	For 1/2" Thick, Add	8.88	
33 14 13 43-0091	LF 66" Outside Diameter, 7/16" Thick Cement Pipe Lining	252.38	
	For 1/2" Thick, Add	5.21	
33 14 13 43-0092	LF 72" Outside Diameter, 7/16" Thick Cement Pipe Lining	275.35	
	For 1/2" Thick, Add	5.68	
33 14 13 43-0093	LF 78" Outside Diameter, 7/16" Thick Cement Pipe Lining	298.33	
	For 1/2" Thick, Add	6.16	
33 14 13 43-0094	LF 84" Outside Diameter, 7/16" Thick Cement Pipe Lining	321.21	
	For 1/2" Thick, Add	6.63	
33 14 13 43-0095	LF 90" Outside Diameter, 7/16" Thick Cement Pipe Lining	344.19	
	For 1/2" Thick, Add	7.11	
33 14 13 43-0096	LF 96" Outside Diameter, 1/2" Thick Cement Pipe Lining	367.16	
33 14 13 43-0097	LF 102" Outside Diameter, 1/2" Thick Cement Pipe Lining	390.05	
33 14 13 43-0098	LF 108" Outside Diameter, 1/2" Thick Cement Pipe Lining	413.02	
33 14 13 43-0099	LF 114" Outside Diameter, 1/2" Thick Cement Pipe Lining	436.01	
33 14 13 43-0100	LF 120" Outside Diameter, 1/2" Thick Cement Pipe Lining	458.89	
33 14 13 43-0101	LF 126" Outside Diameter, 1/2" Thick Cement Pipe Lining	481.87	
33 14 13 43-0102	LF 132" Outside Diameter, 1/2" Thick Cement Pipe Lining	504.84	
33 14 13 43-0103	LF 138" Outside Diameter, 1/2" Thick Cement Pipe Lining	527.73	
33 14 13 43-0104	LF 144" Outside Diameter, 1/2" Thick Cement Pipe Lining	550.70	
33 14 13 43-0105	Cement Fitting Lining (33 14 13 43-0073)		
	Note: Shop applied.		
33 14 13 43-0106	EA 4" Outside Diameter, 1/4" Thick Cement Fitting Lining	14.69	
	For 1/2" Thick, Add	1.42	
33 14 13 43-0107	EA 6" Outside Diameter, 1/4" Thick Cement Fitting Lining	18.96	
	For 1/2" Thick, Add	1.89	
33 14 13 43-0108	EA 8" Outside Diameter, 1/4" Thick Cement Fitting Lining	26.54	
	For 1/2" Thick, Add	2.46	
33 14 13 43-0109	EA 10" Outside Diameter, 1/4" Thick Cement Fitting Lining	43.61	
	For 1/2" Thick, Add	3.78	
33 14 13 43-0110	EA 12" Outside Diameter, 1/4" Thick Cement Fitting Lining	66.43	
	For 1/2" Thick, Add	5.68	
33 14 13 43-0111	EA 14" Outside Diameter, 1/4" Thick Cement Fitting Lining	98.13	
	For 1/2" Thick, Add	7.65	
33 14 13 43-0112	EA 16" Outside Diameter, 1/4" Thick Cement Fitting Lining	144.16	
	For 1/2" Thick, Add	9.82	
33 14 13 43-0113	EA 18" Outside Diameter, 5/16" Thick Cement Fittings Lining	195.11	
	For 1/2" Thick, Add	10.87	
33 14 13 43-0114	EA 20" Outside Diameter, 5/16" Thick Cement Fitting Lining	261.00	
	For 1/2" Thick, Add	13.41	
33 14 13 43-0115	EA 24" Outside Diameter, 5/16" Thick Cement Fitting Lining	379.81	
	For 1/2" Thick, Add	19.33	
33 14 13 43-0116	8 Mil Polyethylene Encasement Tubing (33 14 13 43)		
	Note: ANSI/AWWA C105/A21.5-99 section 4.2.		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 43-0117 LF 3" To 8" Diameter, 8 Mil Polyethylene Encasement Tubing.....	1.69	
33 14 13 43-0118 LF 10" To 12" Diameter, 8 Mil Polyethylene Encasement Tubing.....	2.74	
33 14 13 43-0119 LF 14" To 16" Diameter, 8 Mil Polyethylene Encasement Tubing.....	3.30	
33 14 13 43-0120 LF 18" To 20" Diameter, 8 Mil Polyethylene Encasement Tubing.....	4.13	
33 14 13 43-0121 LF 24" Diameter, 8 Mil Polyethylene Encasement Tubing.....	5.62	

33 14 13 53 Public Water Utility Distribution Piping Saddles And Adapters (33 14 13)

33 14 13 53-0001

Double Stud Stainless Steel Service Saddles (33 14 13 53)

Note: 1/2" listed taps are compression, 3/4" to 2" are either compression or NPT.

33 14 13 53-0002 EA 4" Diameter x 1/2", 3/4" Or 1" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	264.37
33 14 13 53-0003 EA 4" Diameter x 1-1/4" Or 1-1/2" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	369.63
33 14 13 53-0004 EA 4" Diameter x 2" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	382.01
33 14 13 53-0005 EA 6" Diameter x 1/2", 3/4" Or 1" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	315.91
33 14 13 53-0006 EA 6" Diameter x 1-1/4", 1-1/2" Or 2" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	396.43
33 14 13 53-0007 EA 8" Diameter x 1/2", 3/4" Or 1" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	330.22
33 14 13 53-0008 EA 8" Diameter x 1-1/4", 1-1/2" Or 2" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	415.21
33 14 13 53-0009 EA 10" Diameter x 1/2", 3/4" Or 1" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	371.47
33 14 13 53-0010 EA 10" Diameter x 1-1/4", 1-1/2" Or 2" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	437.41
33 14 13 53-0011 EA 12" Diameter x 1/2", 3/4" Or 1" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	387.49
33 14 13 53-0012 EA 12" Diameter x 1-1/4", 1-1/2" Or 2" Tap Double Stud Stainless Steel Service Saddle (Smith-Blair 372).....	448.76

33 14 13 53-0013

Double Bale Epoxy Coated Ductile Iron Body Service Saddles (33 14 13 53)

Note: Electro-galvanized steel bales. 5/8" listed taps are compression, 3/4" to 2" are either compression or NPT. 2-1/2", 3" or 4" are NPT.

33 14 13 53-0014 EA 1-1/4" To 1-1/2" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	222.53
33 14 13 53-0015 EA 2" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	222.68
33 14 13 53-0016 EA 2" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	236.92
33 14 13 53-0017 EA 2-1/2" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	226.29
33 14 13 53-0018 EA 3" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	242.08
33 14 13 53-0019 EA 3" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	267.46
33 14 13 53-0020 EA 3" Diameter x 2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	284.42
33 14 13 53-0021 EA 4" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	260.36
33 14 13 53-0022 EA 4" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	285.95
33 14 13 53-0023 EA 4" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	300.50
33 14 13 53-0024 EA 5" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	274.74
33 14 13 53-0025 EA 5" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	301.12
33 14 13 53-0026 EA 5" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	315.61
33 14 13 53-0027 EA 6" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	289.59
33 14 13 53-0028 EA 6" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	315.23
33 14 13 53-0029 EA 6" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	329.54
33 14 13 53-0030 EA 6" Diameter x 3" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	478.07
33 14 13 53-0031 EA 6" Diameter x 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	490.45
33 14 13 53-0032 EA 8" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	313.31
33 14 13 53-0033 EA 8" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	344.19
33 14 13 53-0034 EA 8" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	357.50
33 14 13 53-0035 EA 8" Diameter x 3" To 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	564.95
33 14 13 53-0036 EA 10" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	350.07
33 14 13 53-0037 EA 10" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	387.01
33 14 13 53-0038 EA 10" Diameter x 3" To 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	629.93
33 14 13 53-0039 EA 12" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	380.40
33 14 13 53-0040 EA 12" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	419.43
33 14 13 53-0041 EA 12" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	434.54
33 14 13 53-0042 EA 12" Diameter x 3" To 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	702.05
33 14 13 53-0043 EA 14" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	442.56
33 14 13 53-0044 EA 14" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	473.26
33 14 13 53-0045 EA 14" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	509.15
33 14 13 53-0046 EA 14" Diameter x 3" To 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	860.22
33 14 13 53-0047 EA 15" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	454.95
33 14 13 53-0048 EA 15" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	516.77
33 14 13 53-0049 EA 15" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	538.25
33 14 13 53-0050 EA 15" Diameter x 3" To 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	924.00
33 14 13 53-0051 EA 16" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	475.34
33 14 13 53-0052 EA 16" Diameter x 1-1/4" To 1-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	539.39
33 14 13 53-0053 EA 16" Diameter x 2" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	561.43
33 14 13 53-0054 EA 16" Diameter x 3" To 4" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	961.46
33 14 13 53-0055 EA 18" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	525.24
33 14 13 53-0056 EA 18" Diameter x 1-1/4" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	606.20
33 14 13 53-0057 EA 20" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	597.18
33 14 13 53-0058 EA 20" Diameter x 1-1/4" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	660.58
33 14 13 53-0059 EA 24" Diameter x 5/8" To 1" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313).....	623.58

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 13 53-0060 EA 24" Diameter x 1-1/4" To 2-1/2" Tap Double Bale Epoxy Coated Ductile Iron Body Service Saddle (Smith-Blair 313)..... 703.10

33 14 13 53-0061 Double Bale Bronze Service Saddles (33 14 13 53)

33 14 13 53-0062 EA 4" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 305.91
 33 14 13 53-0063 EA 4" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 334.15
 33 14 13 53-0064 EA 6" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 347.61
 33 14 13 53-0065 EA 6" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 376.11
 33 14 13 53-0066 EA 8" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 386.72
 33 14 13 53-0067 EA 8" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 406.43
 33 14 13 53-0068 EA 10" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 375.70
 33 14 13 53-0069 EA 10" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 399.42
 33 14 13 53-0070 EA 12" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 474.08
 33 14 13 53-0071 EA 12" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 512.23
 33 14 13 53-0072 EA 14" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 707.56
 33 14 13 53-0073 EA 14" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 798.21
 33 14 13 53-0074 EA 16" Diameter x 3/4" To 1" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 821.92
 33 14 13 53-0075 EA 16" Diameter x 1-1/4" To 2" Tap Double Bale Bronze Service Saddle (Mueller BR2B)..... 916.36

33 14 13 53-0076 Stainless Steel Double Straps, Bronze Body Service Saddle (33 14 13 53)

Note: Taps are compression or NPT.

33 14 13 53-0077 EA 4" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 320.98
 33 14 13 53-0078 EA 4" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 353.17
 33 14 13 53-0079 EA 6" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 365.41
 33 14 13 53-0080 EA 6" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 396.44
 33 14 13 53-0081 EA 8" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 408.72
 33 14 13 53-0082 EA 8" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 429.61
 33 14 13 53-0083 EA 10" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 459.57
 33 14 13 53-0084 EA 10" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 491.57
 33 14 13 53-0085 EA 12" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 494.24
 33 14 13 53-0086 EA 12" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 534.99
 33 14 13 53-0087 EA 14" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 757.52
 33 14 13 53-0088 EA 14" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 868.86
 33 14 13 53-0089 EA 16" Diameter x 3/4" To 1" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 881.20
 33 14 13 53-0090 EA 16" Diameter x 1-1/4" To 2" Tap Stainless Steel Double Straps, Bronze Body Service Saddle (Mueller BR2S)..... 959.38

33 14 13 53-0091 Ductile Iron Mechanical Joint Tapping Sleeve (33 14 13 53)

33 14 13 53-0092 EA 4" Diameter x 4" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 1,420.95
 33 14 13 53-0093 EA 6" Diameter x 4" Or 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 1,716.31
 33 14 13 53-0094 EA 8" Diameter x 4" Or 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 2,050.97
 33 14 13 53-0095 EA 8" Diameter x 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 2,169.30
 33 14 13 53-0096 EA 10" Diameter x 4" Or 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 3,283.96
 33 14 13 53-0097 EA 10" Diameter x 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 3,449.11
 33 14 13 53-0098 EA 10" Diameter x 10" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 3,520.56
 33 14 13 53-0099 EA 12" Diameter x 4" Or 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 3,469.79
 33 14 13 53-0100 EA 12" Diameter x 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 3,634.26
 33 14 13 53-0101 EA 12" Diameter x 10" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 4,033.47
 33 14 13 53-0102 EA 12" Diameter x 12" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 4,136.62
 33 14 13 53-0103 EA 14" Diameter x 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 6,893.84
 33 14 13 53-0104 EA 14" Diameter x 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,079.56
 33 14 13 53-0105 EA 14" Diameter x 10" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,163.66
 33 14 13 53-0106 EA 14" Diameter x 12" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,200.45
 33 14 13 53-0107 EA 14" Diameter x 14" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,464.44
 33 14 13 53-0108 EA 16" Diameter x 4" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,454.39
 33 14 13 53-0109 EA 16" Diameter x 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,479.18
 33 14 13 53-0110 EA 16" Diameter x 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,686.57
 33 14 13 53-0111 EA 16" Diameter x 10" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,736.32
 33 14 13 53-0112 EA 16" Diameter x 12" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 7,790.96
 33 14 13 53-0113 EA 16" Diameter x 14" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 11,919.55
 33 14 13 53-0114 EA 16" Diameter x 16" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 8,172.39
 33 14 13 53-0115 EA 18" Diameter x 4" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 10,361.42
 33 14 13 53-0116 EA 18" Diameter x 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 10,828.34
 33 14 13 53-0117 EA 18" Diameter x 8", 10", 12" Or 16" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 10,962.89
 33 14 13 53-0118 EA 18" Diameter x 18" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 11,366.56
 33 14 13 53-0119 EA 20" Diameter x 4" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 9,709.16
 33 14 13 53-0120 EA 20" Diameter x 6" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 9,356.37
 33 14 13 53-0121 EA 20" Diameter x 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 9,535.15
 33 14 13 53-0122 EA 20" Diameter x 10" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 9,605.62
 33 14 13 53-0123 EA 20" Diameter x 12" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 9,952.36
 33 14 13 53-0124 EA 20" Diameter x 14" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 13,435.50
 33 14 13 53-0125 EA 20" Diameter x 16", 18" Or 20" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 13,699.42
 33 14 13 53-0126 EA 24" Diameter x 4", 6" Or 8" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 11,726.82
 33 14 13 53-0127 EA 24" Diameter x 10" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 11,889.69
 33 14 13 53-0128 EA 24" Diameter x 12" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 11,936.85
 33 14 13 53-0129 EA 24" Diameter x 14" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 16,504.47
 33 14 13 53-0130 EA 24" Diameter x 16" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 16,717.98
 33 14 13 53-0131 EA 24" Diameter x 18" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 16,767.54
 33 14 13 53-0132 EA 24" Diameter x 20" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)..... 17,226.95

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 13 53-0133 EA 24" Diameter x 24" Tap Ductile Iron Mechanical Joint Tapping Sleeve (Mueller H-615)	17,446.36	
33 14 13 53-0134 Carbon Steel Epoxy Coated Flange, Stainless Steel Tapping Sleeve <small>(33 14 13 53)</small>		
33 14 13 53-0135 EA 4" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,170.92	
33 14 13 53-0136 EA 6" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,245.17	
33 14 13 53-0137 EA 6" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,360.77	
33 14 13 53-0138 EA 8" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,401.49	
33 14 13 53-0139 EA 8" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,459.55	
33 14 13 53-0140 EA 8" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,674.68	
33 14 13 53-0141 EA 10" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,530.47	
33 14 13 53-0142 EA 10" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,587.01	
33 14 13 53-0143 EA 10" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,776.23	
33 14 13 53-0144 EA 10" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,446.72	
33 14 13 53-0145 EA 12" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,721.87	
33 14 13 53-0146 EA 12" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,804.40	
33 14 13 53-0147 EA 12" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	1,990.62	
33 14 13 53-0148 EA 12" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,591.36	
33 14 13 53-0149 EA 12" Diameter x 12" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,824.62	
33 14 13 53-0150 EA 14" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,260.13	
33 14 13 53-0151 EA 14" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,328.56	
33 14 13 53-0152 EA 14" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,727.18	
33 14 13 53-0153 EA 14" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,221.20	
33 14 13 53-0154 EA 14" Diameter x 12" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,542.74	
33 14 13 53-0155 EA 16" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,682.80	
33 14 13 53-0156 EA 16" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,753.42	
33 14 13 53-0157 EA 16" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,017.58	
33 14 13 53-0158 EA 16" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,723.79	
33 14 13 53-0159 EA 16" Diameter x 12" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,891.35	
33 14 13 53-0160 EA 18" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,847.18	
33 14 13 53-0161 EA 18" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	2,974.43	
33 14 13 53-0162 EA 18" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,150.89	
33 14 13 53-0163 EA 18" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,981.75	
33 14 13 53-0164 EA 18" Diameter x 12" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	4,149.10	
33 14 13 53-0165 EA 20" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,434.26	
33 14 13 53-0166 EA 20" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,504.73	
33 14 13 53-0167 EA 20" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,899.66	
33 14 13 53-0168 EA 20" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	4,566.91	
33 14 13 53-0169 EA 20" Diameter x 12" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	4,850.52	
33 14 13 53-0170 EA 24" Diameter x 4" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,707.72	
33 14 13 53-0171 EA 24" Diameter x 6" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	3,861.15	
33 14 13 53-0172 EA 24" Diameter x 8" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	4,068.03	
33 14 13 53-0173 EA 24" Diameter x 10" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	5,014.72	
33 14 13 53-0174 EA 24" Diameter x 12" Epoxy Coated Carbon Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 662)	5,189.18	
33 14 13 53-0175 Stainless Steel Flange, Stainless Steel Tapping Sleeve <small>(33 14 13 53)</small>		
33 14 13 53-0176 EA 4" Diameter x 4" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,351.97	
33 14 13 53-0177 EA 6" Diameter x 4" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,473.84	
33 14 13 53-0178 EA 6" Diameter x 6" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,560.03	
33 14 13 53-0179 EA 8" Diameter x 4" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,592.77	
33 14 13 53-0180 EA 8" Diameter x 6" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,691.91	
33 14 13 53-0181 EA 8" Diameter x 8" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,986.40	
33 14 13 53-0182 EA 10" Diameter x 4" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,826.60	
33 14 13 53-0183 EA 10" Diameter x 6" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	1,936.43	
33 14 13 53-0184 EA 10" Diameter x 8" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	2,200.48	
33 14 13 53-0185 EA 10" Diameter x 10" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	2,963.55	
33 14 13 53-0186 EA 12" Diameter x 4" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	2,085.41	
33 14 13 53-0187 EA 12" Diameter x 6" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	2,234.82	
33 14 13 53-0188 EA 12" Diameter x 8" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	2,583.38	
33 14 13 53-0189 EA 12" Diameter x 10" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	3,037.25	
33 14 13 53-0190 EA 12" Diameter x 12" Stainless Steel Flange, Stainless Steel Tapping Sleeve (Smith-Blair 663)	3,384.43	
33 14 13 53-0191 Ductile Iron Body, Flanged Coupling Adapter <small>(33 14 13 53)</small>		
33 14 13 53-0192 EA 3" Ductile Iron Body, Flanged Coupling Adapter (Smith-Blair 912)	332.67	61.70
33 14 13 53-0193 EA 4" Ductile Iron Body, Flanged Coupling Adapter (Smith-Blair 912)	416.83	77.79
33 14 13 53-0194 EA 6" Ductile Iron Body, Flanged Coupling Adapter (Smith-Blair 912)	548.26	107.29
33 14 13 53-0195 EA 8" Ductile Iron Body, Flanged Coupling Adapter (Smith-Blair 912)	710.12	126.07
33 14 13 53-0196 EA 10" Ductile Iron Body, Flanged Coupling Adapter (Smith-Blair 912)	1,113.40	142.16
33 14 13 53-0197 EA 12" Ductile Iron Body, Flanged Coupling Adapter (Smith-Blair 912)	1,243.91	160.94
33 14 13 53-0198 Steel Body, Flanged Coupling Adapter <small>(33 14 13 53)</small>		
33 14 13 53-0199 EA 3" Steel Body, Flanged Coupling Adapter (Smith-Blair 913)	484.53	61.70
33 14 13 53-0200 EA 4" Steel Body, Flanged Coupling Adapter (Smith-Blair 913)	573.09	77.79
33 14 13 53-0201 EA 6" Steel Body, Flanged Coupling Adapter (Smith-Blair 913)	765.32	107.29
33 14 13 53-0202 EA 8" Steel Body, Flanged Coupling Adapter (Smith-Blair 913)	936.03	126.07
33 14 13 53-0203 EA 10" Steel Body, Flanged Coupling Adapter (Smith-Blair 913)	1,142.38	142.16
33 14 13 53-0204 EA 12" Steel Body, Flanged Coupling Adapter (Smith-Blair 913)	1,331.06	160.94

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 13 53-0205	Ductile Iron Body, Omni Coupling System (33 14 13 53)			
33 14 13 53-0206	EA 2" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	150.92		42.92
33 14 13 53-0207	EA 2-1/2" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	186.10		50.96
33 14 13 53-0208	EA 3" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	230.34		61.70
33 14 13 53-0209	EA 4" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	289.27		77.79
33 14 13 53-0210	EA 6" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	386.07		107.29
33 14 13 53-0211	EA 8" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	468.90		126.07
33 14 13 53-0212	EA 10" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	585.26		142.16
33 14 13 53-0213	EA 12" Ductile Iron Body, Omni Coupling System (Smith-Blair 441)	684.25		160.94

33 14 19 Valves and Hydrants for Water Utility Service (33 14)

Note: Flanged valves excludes bolt and gasket set. Excludes excavation and backfill. See CSI section 23 21 13 23-0619 for bolt and gasket sets.

33 14 19 00-0001	Accessories For Valves (33 14 19)			
33 14 19 00-0002	EA 1' Valve Extension Stem	116.26		
	For Each Additional LF, Add	8.57		
33 14 19 00-0003	EA Up to 80" Long Indicator Post Telescoping Barrel Assembly Note: Excludes valve.	1,644.45		105.73
33 14 19 00-0004	EA >80" To 114" Long Indicator Post Telescoping Barrel Assembly Note: Excludes valve.	1,865.70		116.31
33 14 19 00-0005	EA Adjust Water Valve Box To Grade	105.73		

33 14 19 00-0006 Water Utility Distribution Valves (33 14 19)**33 14 19 00-0007 Angle Valves (33 14 19 00-0006)**

Note: For connecting meters to water service.

33 14 19 00-0008 Threaded, Class 150, Bronze Angle Valve (33 14 19 00-0007)

Note: Nibco T-335Y

33 14 19 00-0009	EA 1/2" Threaded, Class 150, Bronze Angle Valve	100.74		18.37
33 14 19 00-0010	EA 3/4" Threaded, Class 150, Bronze Angle Valve	135.86		24.69
33 14 19 00-0011	EA 1" Threaded, Class 150, Bronze Angle Valve	182.77		30.43
33 14 19 00-0012	EA 1-1/4" Threaded, Class 150, Bronze Angle Valve	235.29		38.23
33 14 19 00-0013	EA 1-1/2" Threaded, Class 150, Bronze Angle Valve	293.57		44.20
33 14 19 00-0014	EA 2" Threaded, Class 150, Bronze Angle Valve	437.03		51.67
33 14 19 00-0015	EA 2-1/2" Threaded, Class 150, Bronze Angle Valve	699.10		70.52
33 14 19 00-0016	EA 3" Threaded, Class 150, Bronze Angle Valve	1,059.50		81.41

33 14 19 00-0017 Butterfly Valves (33 14 19 00-0006)**33 14 19 00-0018 Lug Type Flanged, Cast Iron Disc, Butterfly Valves (33 14 19 00-0017)**

Note: ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, 304 Stainless Steel Pin

33 14 19 00-0019	EA 3" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 3,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-HD8 Modified)	1,978.72		195.20
33 14 19 00-0020	EA 3" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 3,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-CW8 Modified)	2,213.66		195.20
33 14 19 00-0021	EA 4" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 4,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-HD8 Modified)	2,227.72		302.09
33 14 19 00-0022	EA 4" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 4,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-CW8 Modified)	2,460.66		302.09
33 14 19 00-0023	EA 6" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 6,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-HD8 Modified)	2,575.48		372.27
33 14 19 00-0024	EA 6" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 6,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-CW8 Modified)	2,808.42		372.27
33 14 19 00-0025	EA 8" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 8,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-HD8 Modified)	2,922.67		475.68
33 14 19 00-0026	EA 8" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 8,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-CW8 Modified)	3,143.82		475.68
33 14 19 00-0027	EA 10" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 10,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-HD8 Modified)	3,651.62		579.08
33 14 19 00-0028	EA 10" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 10,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-CW8)	4,876.61		579.08
33 14 19 00-0029	EA 12" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 12,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-HD8 Modified)	4,181.34		701.90
33 14 19 00-0030	EA 12" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW, 12,F1,CI,NBRN-NBR, 150B, CI-S2*GS-6B-CW8 Modified)	4,414.28		701.90

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 19 00-0031 EA 14" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,14,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-HD12 Modified)	5,624.34	1,002.73
33 14 19 00-0032 EA 14" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,14,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-CW12 Modified)	6,233.45	1,002.73
33 14 19 00-0033 EA 16" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,16,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-HD16 Modified)	6,548.88	1,103.01
33 14 19 00-0034 EA 16" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,16,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-CW20 Modified)	7,295.89	1,103.01
33 14 19 00-0035 EA 18" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,18,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-HD24 Modified)	8,204.02	1,223.34
33 14 19 00-0036 EA 18" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,18,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-CW24 Modified)	8,995.20	1,223.34
33 14 19 00-0037 EA 20" Handwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,20,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-HD24 Modified)	9,400.99	1,378.75
33 14 19 00-0038 EA 20" Chainwheel Operated, Flanged, ANSI Class 125, Cast Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Cast Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,20,F1,CI,NBRN-NBR,150B,CI-S2*GS-6B-CW24 Modified)	10,190.84	1,378.75
33 14 19 00-0039 Lug Type Flanged, Ductile Iron Disc, Butterfly Valves <small>(33 14 19 00-0017)</small> Note: ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, 304 Stainless Steel Pin		
33 14 19 00-0040 EA 24" Chainwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,24,F1,DI,NBRN-NBR,150B,DI-S2*GS-12A-CW20 Modified)	15,685.56	1,692.12
33 14 19 00-0041 EA 24" Cylinder Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,24,F1,DI,NBRN-NBR,150B,DI-S2*GS-12-PC10 Modified)	24,453.71	1,692.12
33 14 19 00-0042 EA 24" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,24,F1,DI,NBRN-NBR,150B,DI-S2*GS-12A-HD20 Modified)	15,638.57	1,692.12
33 14 19 00-0043 EA 30" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,30,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR3L-HD24 Modified)	32,044.86	2,675.19
33 14 19 00-0044 EA 36" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,36,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR3L-HD24 Modified)	37,961.80	3,566.91
33 14 19 00-0045 EA 42" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,42,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR3L-HD32 Modified)	48,273.21	5,350.36
33 14 19 00-0046 EA 48" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,48,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR4L-HD24 Modified)	63,055.14	6,687.95
33 14 19 00-0047 EA 54" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,54,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR6L-HD24 Modified)	106,274.81	8,025.55
33 14 19 00-0048 EA 60" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,60,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR6L-HD36 Modified)	133,147.76	9,630.65
33 14 19 00-0049 EA 72" Handwheel Operated, Flanged, ANSI Class 125, Ductile Iron Body, Acrylonitrile-Butadiene Packing, Acrylonitrile-Butadiene Seat, Class AWWA C-504, Ductile Iron Disc, 304 Stainless Steel Pin, Butterfly Valve (DeZurik BAW,72,F1,DI,NBRN-NBR,150B,DI-S2*MG-WR8L-HD36 Modified)	190,936.66	11,556.79
33 14 19 00-0050 LF 3/16" Link, 316 Stainless Steel Chain For Use With Dezurik Chainwheel	17.75	
33 14 19 00-0051 EA 316 Stainless Steel Closing Link For Use With Dezurik Chainwheel	9.40	
Note: One required per valve.		
33 14 19 00-0052 Check Valves <small>(33 14 19 00-0006)</small>		
33 14 19 00-0053 Flanged, Swing Type Gravity Operated Check Valves <small>(33 14 19 00-0052)</small> Note: AWWA C508. Bronze disc facing. Mueller A-2600-6.		
33 14 19 00-0054 EA 2-1/2" Flanged, Swing Type Gravity Operated Check Valve	1,394.80	153.31
33 14 19 00-0055 EA 3" Flanged, Swing Type Gravity Operated Check Valve	1,427.52	179.75
33 14 19 00-0056 EA 4" Flanged, Swing Type Gravity Operated Check Valve	1,935.95	227.33
33 14 19 00-0057 EA 4" x 6" Flanged, Swing Type Gravity Operated Check Valve	2,750.14	342.04
33 14 19 00-0058 EA 4" x 8" Flanged, Swing Type Gravity Operated Check Valve	2,847.39	382.00
33 14 19 00-0059 EA 6" Flanged, Swing Type Gravity Operated Check Valve	2,708.62	380.64
33 14 19 00-0060 EA 6" x 8" Flanged, Swing Type Gravity Operated Check Valve	3,562.41	432.67
33 14 19 00-0061 EA 6" x 10" Flanged, Swing Type Gravity Operated Check Valve	3,707.00	486.37
33 14 19 00-0062 EA 8" Flanged, Swing Type Gravity Operated Check Valve	3,869.86	486.37
33 14 19 00-0063 EA 10" Flanged, Swing Type Gravity Operated Check Valve	6,599.69	592.10
33 14 19 00-0064 EA 12" Flanged, Swing Type Gravity Operated Check Valve	10,060.44	444.08
33 14 19 00-0065 EA 14" Flanged, Swing Type Gravity Operated Check Valve	14,226.66	1,002.73
33 14 19 00-0066 EA 16" Flanged, Swing Type Gravity Operated Check Valve	18,961.68	1,103.01
33 14 19 00-0067 EA 18" Flanged, Swing Type Gravity Operated Check Valve	27,571.44	1,223.34
33 14 19 00-0068 EA 20" Flanged, Swing Type Gravity Operated Check Valve	32,108.05	1,378.75

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 19 00-0069	Combination Air Release Valves (33 14 19 00-0066)			
33 14 19 00-0070	EA	1" Combination Air Release Valve	626.96	22.20
33 14 19 00-0071	EA	2" Combination Air Release Valve	1,011.56	38.06
33 14 19 00-0072	Corporation Stop And Curb Valve (33 14 19 00-0066)			
	Note: AWWA C800			
33 14 19 00-0073	Ball Corporation Valves (33 14 19 00-0072)			
	Note: Mueller B-25000.			
33 14 19 00-0074	EA	3/4" Ball Corporation Valve (Mueller B-25000)	81.03	22.20
33 14 19 00-0075	EA	1" Ball Corporation Valve (Mueller B-25000)	101.68	27.49
33 14 19 00-0076	EA	1-1/2" Ball Corporation Valve (Mueller B-25000)	180.20	40.18
33 14 19 00-0077	EA	2" Ball Corporation Valve (Mueller B-25000)	268.78	47.58
33 14 19 00-0078	Gate Valve, AWWA C500 And C509 (33 14 19 00-0066)			
33 14 19 00-0079	Gate Valve, Flanged (33 14 19 00-0078)			
	Note: Mueller A-2380-6.			
33 14 19 00-0080	EA	2" Gate Valve, Flanged	854.69	140.94
33 14 19 00-0081	EA	2-1/2" Gate Valve, Flanged	1,002.37	153.31
33 14 19 00-0082	EA	3" Gate Valve, Flanged	1,186.37	179.75
33 14 19 00-0083	EA	4" Gate Valve, Flanged	1,524.77	225.21
33 14 19 00-0084	EA	6" Gate Valve, Flanged	1,913.68	380.64
33 14 19 00-0085	EA	8" Gate Valve, Flanged	2,848.48	486.37
33 14 19 00-0086	EA	10" Gate Valve, Flanged	4,306.55	592.10
33 14 19 00-0087	EA	12" Gate Valve, Flanged	5,194.10	444.08
33 14 19 00-0088	EA	14" Gate Valve, Flanged	11,537.11	1,002.73
33 14 19 00-0089	EA	16" Gate Valve, Flanged	15,120.80	1,103.01
33 14 19 00-0090	EA	18" Gate Valve, Flanged	24,022.52	1,223.34
33 14 19 00-0091	EA	20" Gate Valve, Flanged	28,738.41	1,378.75
33 14 19 00-0092	Resilient Wedge Gate Valve, Flanged (33 14 19 00-0078)			
	Note: Mueller A-2360-6.			
33 14 19 00-0093	EA	2" Resilient Wedge Gate Valve, Flanged	816.32	140.94
33 14 19 00-0094	EA	2-1/2" Resilient Wedge Gate Valve, Flanged	956.52	153.31
33 14 19 00-0095	EA	3" Resilient Wedge Gate Valve, Flanged	1,131.95	179.75
33 14 19 00-0096	EA	4" Resilient Wedge Gate Valve, Flanged	1,463.94	225.21
33 14 19 00-0097	EA	6" Resilient Wedge Gate Valve, Flanged	1,832.37	380.64
33 14 19 00-0098	EA	8" Resilient Wedge Gate Valve, Flanged	2,721.45	486.37
33 14 19 00-0099	EA	10" Resilient Wedge Gate Valve, Flanged	4,104.70	592.10
33 14 19 00-0100	EA	12" Resilient Wedge Gate Valve, Flanged	4,950.38	444.08
33 14 19 00-0101	Gate Valve, Mechanical Joint (33 14 19 00-0078)			
	Note: Mueller A-2380-20.			
33 14 19 00-0102	EA	2" Gate Valve, Mechanical Joint	999.27	112.60
33 14 19 00-0103	EA	2-1/2" Gate Valve, Mechanical Joint	1,076.82	141.15
33 14 19 00-0104	EA	3" Gate Valve, Mechanical Joint	1,355.00	170.76
33 14 19 00-0105	EA	4" Gate Valve, Mechanical Joint	1,609.69	225.21
33 14 19 00-0106	EA	6" Gate Valve, Mechanical Joint	2,029.28	264.33
33 14 19 00-0107	EA	8" Gate Valve, Mechanical Joint	2,968.94	317.20
33 14 19 00-0108	EA	10" Gate Valve, Mechanical Joint	4,368.14	370.06
33 14 19 00-0109	EA	12" Gate Valve, Mechanical Joint	5,473.82	444.08
33 14 19 00-0110	EA	14" Gate Valve, Mechanical Joint	12,274.94	614.17
33 14 19 00-0111	EA	16" Gate Valve, Mechanical Joint	15,902.34	689.38
33 14 19 00-0112	EA	18" Gate Valve, Mechanical Joint	25,420.77	764.58
33 14 19 00-0113	EA	20" Gate Valve, Mechanical Joint	30,248.85	861.73
33 14 19 00-0114	Resilient Wedge Gate Valve, Mechanical Joint (33 14 19 00-0078)			
	Note: Mueller A-2360-20.			
33 14 19 00-0115	EA	2" Resilient Wedge Gate Valve, Mechanical Joint	955.45	112.60
33 14 19 00-0116	EA	3" Resilient Wedge Gate Valve, Mechanical Joint	1,297.63	170.76
33 14 19 00-0117	EA	4" Resilient Wedge Gate Valve, Mechanical Joint	1,544.07	225.21
33 14 19 00-0118	EA	6" Resilient Wedge Gate Valve, Mechanical Joint	1,944.35	264.33
33 14 19 00-0119	EA	8" Resilient Wedge Gate Valve, Mechanical Joint	2,836.82	317.20
33 14 19 00-0120	EA	10" Resilient Wedge Gate Valve, Mechanical Joint	4,162.80	370.06
33 14 19 00-0121	EA	12" Resilient Wedge Gate Valve, Mechanical Joint	5,214.21	444.08
33 14 19 00-0122	Resilient Wedge Gate Valve, Mechanical Joint X Flange Joint (33 14 19 00-0078)			
	Note: Mueller A-2361.			
33 14 19 00-0123	EA	14" Resilient Wedge Gate Valve, Mechanical Joint X Flanged Joint	8,223.92	1,002.73
33 14 19 00-0124	EA	16" Resilient Wedge Gate Valve, Mechanical Joint X Flanged Joint	8,941.28	1,103.01
33 14 19 00-0125	EA	18" Resilient Wedge Gate Valve, Mechanical Joint X Flanged Joint	13,905.69	1,223.34
33 14 19 00-0126	EA	20" Resilient Wedge Gate Valve, Mechanical Joint X Flanged Joint	16,591.35	1,378.75
33 14 19 00-0127	EA	24" Resilient Wedge Gate Valve, Mechanical Joint X Flanged Joint	23,546.34	1,692.12

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 14 19 00-0128	Gate Valve, Threaded, WW-V-51 Class A, Type 1 <small>(33 14 19 00-0078)</small> Note: NIBCO T-113.		
33 14 19 00-0129	EA 1/4" Gate Valve, Bronze, Threaded	59.11	18.49
33 14 19 00-0130	EA 3/8" Gate Valve, Bronze, Threaded	60.87	18.49
33 14 19 00-0131	EA 1/2" Gate Valve, Bronze, Threaded	60.29	18.49
33 14 19 00-0132	EA 3/4" Gate Valve, Bronze, Threaded	77.63	24.97
33 14 19 00-0133	EA 1" Gate Valve, Bronze, Threaded	95.72	30.20
33 14 19 00-0134	EA 1-1/4" Gate Valve, Bronze, Threaded	130.14	38.23
33 14 19 00-0135	EA 1-1/2" Gate Valve, Bronze, Threaded	151.01	44.20
33 14 19 00-0136	EA 2" Gate Valve, Bronze, Threaded	183.24	51.67
33 14 19 00-0137	EA 2-1/2" Gate Valve, Bronze, Threaded	353.31	70.52
33 14 19 00-0138	EA 3" Gate Valve, Bronze, Threaded	423.53	80.89

33 14 19 00-0139	Globe Valve, AWWA <small>(33 14 19 00-0006)</small>		
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33 14 19 00-0140	Globe Valve, Threaded, WW-V-51 Class B, Type 1 <small>(33 14 19 00-0139)</small> Note: NIBCO T-235.		
33 14 19 00-0141	EA 1/8" Globe Valve, Threaded	83.69	18.49
33 14 19 00-0142	EA 1/4" Globe Valve, Threaded	80.14	18.49
33 14 19 00-0143	EA 3/8" Globe Valve, Threaded	81.90	18.49
33 14 19 00-0144	EA 1/2" Globe Valve, Threaded	83.69	18.49
33 14 19 00-0145	EA 3/4" Globe Valve, Threaded	113.64	24.97
33 14 19 00-0146	EA 1" Globe Valve, Threaded	159.49	30.20
33 14 19 00-0147	EA 1-1/4" Globe Valve, Threaded	233.19	38.23
33 14 19 00-0148	EA 1-1/2" Globe Valve, Threaded	278.38	44.20
33 14 19 00-0149	EA 2" Globe Valve, Threaded	388.45	51.67
33 14 19 00-0150	EA 2-1/2" Globe Valve, Threaded	713.21	70.52
33 14 19 00-0151	EA 3" Globe Valve, Threaded	976.54	81.31

33 14 19 00-0152	Tapping Valve, AWWA C500 And C509 <small>(33 14 19 00-0006)</small>		
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33 14 19 00-0153	Tapping Valve, AWWA C500 And C509 <small>(33 14 19 00-0152)</small> Note: Flanged inlet X mechanical joint, Mueller H-667.		
33 14 19 00-0154	EA 2" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	1,220.48	140.94
33 14 19 00-0155	EA 3" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	1,572.88	179.75
33 14 19 00-0156	EA 4" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	1,898.12	225.21
33 14 19 00-0157	EA 6" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	2,484.21	380.64
33 14 19 00-0158	EA 8" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	3,580.17	486.37
33 14 19 00-0159	EA 10" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	5,195.74	592.10
33 14 19 00-0160	EA 12" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	7,697.88	444.08
33 14 19 00-0161	EA 14" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	14,112.50	1,002.73
33 14 19 00-0162	EA 16" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	17,847.92	1,103.01
33 14 19 00-0163	EA 18" Resilient Wedge Tapping Gate Valve, Mechanical Joint X Flanged Joint	28,858.16	1,223.34

33 14 19 00-0164	Fire Hydrants <small>(33 14 19)</small> Note: Breakaway type.		
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33 14 19 00-0165	Three Way, Standard (Traditional) Model Fire Hydrant <small>(33 14 19 00-0164)</small> Note: Mechanical joint shoe. Includes shoe, lower barrel and upper barrel (hydrant).		
33 14 19 00-0166	EA 1-1/2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,570.45	289.54
33 14 19 00-0167	EA 2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,636.96	289.54
33 14 19 00-0168	EA 2-1/2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,703.64	289.54
33 14 19 00-0169	EA 3' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,790.68	310.22
33 14 19 00-0170	EA 3-1/2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,857.26	310.22
33 14 19 00-0171	EA 4' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,949.75	336.07
33 14 19 00-0172	EA 4-1/2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,016.22	336.07
33 14 19 00-0173	EA 5' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,108.73	361.92
33 14 19 00-0174	EA 5-1/2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,175.30	361.92
33 14 19 00-0175	EA 6' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,267.62	387.77
33 14 19 00-0176	EA 6-1/2' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,360.03	413.63
33 14 19 00-0177	EA 7' Burial Section, 4-1/2" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,478.18	465.33
33 14 19 00-0178	EA 1-1/2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,631.15	289.54
33 14 19 00-0179	EA 2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,717.46	289.54
33 14 19 00-0180	EA 2-1/2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,803.56	289.54
33 14 19 00-0181	EA 3' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,910.34	310.22
33 14 19 00-0182	EA 3-1/2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	3,996.44	310.22
33 14 19 00-0183	EA 4' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,108.71	336.07
33 14 19 00-0184	EA 4-1/2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,194.70	336.07
33 14 19 00-0185	EA 5' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,306.74	361.92
33 14 19 00-0186	EA 5-1/2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,392.82	361.92
33 14 19 00-0187	EA 6' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,504.62	387.77
33 14 19 00-0188	EA 6-1/2' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,616.79	413.63
33 14 19 00-0189	EA 7' Burial Section, 5-1/4" Valve, Three Way, Standard Type (Traditional) Fire Hydrant	4,754.44	465.33

33 14 19 00-0190	Two Way, Standard (Traditional) Model Fire Hydrant <small>(33 14 19 00-0164)</small> Note: Mechanical joint shoe. Includes shoe, lower barrel and upper barrel (hydrant).		
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33 14 19 00-0191	EA 1-1/2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant	3,205.37	289.54
33 14 19 00-0192	EA 2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant	3,271.65	289.54

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 19 00-0193	EA	2-1/2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,338.31	289.54
33 14 19 00-0194	EA	3' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,425.63	310.22
33 14 19 00-0195	EA	3-1/2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,491.99	310.22
33 14 19 00-0196	EA	4' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,584.33	336.07
33 14 19 00-0197	EA	4-1/2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,650.90	336.07
33 14 19 00-0198	EA	5' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,743.47	361.92
33 14 19 00-0199	EA	5-1/2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,809.90	361.92
33 14 19 00-0200	EA	6' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,902.58	387.77
33 14 19 00-0201	EA	6-1/2' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,994.57	413.63
33 14 19 00-0202	EA	7' Burial Section, 4-1/2" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	4,112.86	465.33
33 14 19 00-0203	EA	1-1/2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,299.13	289.54
33 14 19 00-0204	EA	2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,385.25	289.54
33 14 19 00-0205	EA	2-1/2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,471.24	289.54
33 14 19 00-0206	EA	3' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,578.24	310.22
33 14 19 00-0207	EA	3-1/2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,664.12	310.22
33 14 19 00-0208	EA	4' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,776.24	336.07
33 14 19 00-0209	EA	4-1/2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,862.17	336.07
33 14 19 00-0210	EA	5' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	3,974.49	361.92
33 14 19 00-0211	EA	5-1/2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	4,060.37	361.92
33 14 19 00-0212	EA	6' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	4,172.47	387.77
33 14 19 00-0213	EA	6-1/2' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	4,284.22	413.63
33 14 19 00-0214	EA	7' Burial Section, 5-1/4" Valve, Two Way, Standard Type (Traditional) Fire Hydrant.....	4,422.34	465.33

33 14 19 00-0215 Three Way, Modern Model Fire Hydrant (33 14 19 00-0164)

Note: Mechanical joint shoe. Includes shoe, lower barrel and upper barrel (hydrant).

33 14 19 00-0216	EA	1-1/2' Burial Section, Three Way, Modern Type Fire Hydrant.....	3,725.67	289.54
33 14 19 00-0217	EA	2' Burial Section, Three Way, Modern Type Fire Hydrant.....	3,811.66	289.54
33 14 19 00-0218	EA	2-1/2' Burial Section, Three Way, Modern Type Fire Hydrant.....	3,897.91	289.54
33 14 19 00-0219	EA	3' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,004.74	310.22
33 14 19 00-0220	EA	3-1/2' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,090.79	310.22
33 14 19 00-0221	EA	4' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,202.74	336.07
33 14 19 00-0222	EA	4-1/2' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,288.91	336.07
33 14 19 00-0223	EA	5' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,400.88	361.92
33 14 19 00-0224	EA	5-1/2' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,486.96	361.92
33 14 19 00-0225	EA	6' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,598.91	361.92
33 14 19 00-0226	EA	6-1/2' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,711.13	413.63
33 14 19 00-0227	EA	7' Burial Section, Three Way, Modern Type Fire Hydrant.....	4,847.88	413.63

33 14 19 00-0228 Two Way, Modern Model Fire Hydrant (33 14 19 00-0164)

Note: Mechanical joint shoe. Includes shoe, lower barrel and upper barrel (hydrant).

33 14 19 00-0229	EA	1-1/2' Burial Section, Two Way, Modern Type Fire Hydrant.....	2,647.41	289.54
33 14 19 00-0230	EA	2' Burial Section, Two Way, Modern Type Fire Hydrant.....	2,712.85	289.54
33 14 19 00-0231	EA	2-1/2' Burial Section, Two Way, Modern Type Fire Hydrant.....	2,779.02	289.54
33 14 19 00-0232	EA	3' Burial Section, Two Way, Modern Type Fire Hydrant.....	2,864.37	310.22
33 14 19 00-0233	EA	3-1/2' Burial Section, Two Way, Modern Type Fire Hydrant.....	2,929.79	310.22
33 14 19 00-0234	EA	4' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,021.06	336.07
33 14 19 00-0235	EA	4-1/2' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,086.46	336.07
33 14 19 00-0236	EA	5' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,177.81	361.92
33 14 19 00-0237	EA	5-1/2' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,243.04	361.92
33 14 19 00-0238	EA	6' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,334.33	387.77
33 14 19 00-0239	EA	6-1/2' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,425.70	413.63
33 14 19 00-0240	EA	7' Burial Section, Two Way, Modern Type Fire Hydrant.....	3,542.01	465.33

33 14 19 00-0241 Fire Hydrant Extension Kits (33 14 19 00-0164)

33 14 19 00-0242	EA	6" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	550.61	25.85
33 14 19 00-0243	EA	12" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	654.01	32.31
33 14 19 00-0244	EA	18" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	712.88	38.78
33 14 19 00-0245	EA	24" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	809.80	47.83
33 14 19 00-0246	EA	30" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	1,225.78	49.77
33 14 19 00-0247	EA	36" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	1,309.39	51.70
33 14 19 00-0248	EA	42" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	1,329.07	54.29
33 14 19 00-0249	EA	48" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	1,403.67	58.16
33 14 19 00-0250	EA	54" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	1,546.77	69.80
33 14 19 00-0251	EA	60" Long, 4-1/2" Diameter, Fire Hydrant Extension Kit.....	1,630.93	84.02
33 14 19 00-0252	EA	6" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	612.55	28.96
33 14 19 00-0253	EA	12" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	725.10	35.16
33 14 19 00-0254	EA	18" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	831.83	42.39
33 14 19 00-0255	EA	24" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	929.26	52.74
33 14 19 00-0256	EA	30" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	1,274.66	54.81
33 14 19 00-0257	EA	36" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	1,359.33	56.87
33 14 19 00-0258	EA	42" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	1,417.43	59.98
33 14 19 00-0259	EA	48" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	1,658.66	64.11
33 14 19 00-0260	EA	54" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	1,816.95	76.52
33 14 19 00-0261	EA	60" Long, 5-1/4" Diameter, Fire Hydrant Extension Kit.....	1,907.62	92.03



Utilities	33	CS
Water Utilities	33 10	
Water Utility Transmission and Distribution	33 14	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 14 19 00-0262 Removal And Reinstallation Of Standard Fire Hydrant <small>(33 14 19 00-0164)</small>		
Note: Includes all necessary fittings for resetting, storage and cleaning. Excludes excavation, backfill and thrust blocking around fire hydrant.		
33 14 19 00-0263 EA Up To 5' Bury Section, Removal And Reinstallation Of Fire Hydrant.....	827.25	
33 14 19 00-0264 EA >5' Bury Section, Removal And Reinstallation Of Fire Hydrant.....	1,206.41	
33 14 19 00-0265 EA Reset Fire Hydrant Upper Barrel	1,225.93	
Note: Includes Safety Repair Kit		
33 14 19 00-0266 Yard Hydrants <small>(33 14 19)</small>		
Note: With 3/4" hose thread outlet.		
33 14 19 00-0267 EA 2' Bury Depth Yard Hydrant, 3/4" Galvanized Column And 3/4" Threaded Hose Outlet.....	365.48	34.45
33 14 19 00-0268 EA 4' Bury Depth Yard Hydrant, 3/4" Galvanized Column And 3/4" Threaded Hose Outlet.....	393.01	34.45
33 14 19 00-0269 EA 6' Bury Depth Yard Hydrant, 3/4" Galvanized Column And 3/4" Threaded Hose Outlet.....	420.53	34.45
33 14 19 00-0270 EA 2' Bury Depth Yard Hydrant, 1" Galvanized Column And 3/4" Threaded Hose Outlet.....	336.03	43.63
33 14 19 00-0271 EA 4' Bury Depth Yard Hydrant, 1" Galvanized Column And 3/4" Threaded Hose Outlet.....	352.45	43.63
33 14 19 00-0272 EA 6' Bury Depth Yard Hydrant, 1" Galvanized Column And 3/4" Threaded Hose Outlet.....	368.86	43.63
33 14 19 00-0273 Sanitary Yard Hydrants <small>(33 14 19)</small>		
Note: With 3/4" hose thread outlet.		
33 14 19 00-0274 EA 2' Bury Depth Sanitary Yard Hydrant, 1" Galvanized Column And 3/4" Threaded Hose Outlet.....	1,665.59	71.77
33 14 19 00-0275 EA 4' Bury Depth Sanitary Yard Hydrant, 1" Galvanized Column And 3/4" Threaded Hose Outlet.....	1,751.61	71.77
33 14 19 00-0276 EA 6' Bury Depth Sanitary Yard Hydrant, 1" Galvanized Column And 3/4" Threaded Hose Outlet.....	1,837.62	71.77
33 14 19 00-0277 Flushing Hydrants <small>(33 14 19)</small>		
33 14 19 00-0278 EA 2" Inlet x 2-1/2" Outlet Steel Flushing Hydrant, 3' Bury Depth	860.93	44.21
33 14 23 Enclosures for Water Utility Piping and Valves <small>(33 14)</small>		
Note: Excludes excavation and backfill. See CSI section 22 11 19 00-0464 for Enclosures.		
33 14 23 00-0001 Roadway Utility Box <small>(33 14 23)</small>		
33 14 23 00-0002 Utility Box <small>(33 14 23 00-0001)</small>		
Note: Christy Concrete Products.		
33 14 23 00-0003 B3 Utility Box, 9-3/8" x 15-1/2" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0004 EA 9-3/8" x 15-1/2" Precast Concrete Utility Box.....	120.39	52.35
33 14 23 00-0005 EA Cast Iron Lid For 9-3/8" x 15-1/2" Utility Box.....	124.41	5.82
33 14 23 00-0006 EA Reinforced Concrete Lid For 9-3/8" x 15-1/2" Utility Box	51.30	5.82
33 14 23 00-0007 EA Steel Checkered Plate Cover For 9-3/8" x 15-1/2" Utility Box.....	273.04	5.82
33 14 23 00-0008 EA 12-1/8" x 18-5/8" Reinforced Concrete Slab For 9-3/8" x 15-1/2" Utility Box	72.26	11.63
33 14 23 00-0009 EA 3" High Reinforced Concrete Base For 9-3/8" x 15-1/2" Utility Box	104.56	11.63
33 14 23 00-0010 B9 Utility Box, 10-1/4" x 17-1/4" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0011 EA 10-1/4" x 17-1/4" Precast Concrete Utility Box.....	145.61	69.81
33 14 23 00-0012 EA Cast Iron Lid For 10-1/4" x 17-1/4" Utility Box.....	145.72	6.98
33 14 23 00-0013 EA Reinforced Concrete Lid For 10-1/4" x 17-1/4" Utility Box	56.87	6.98
33 14 23 00-0014 EA Steel Checkered Plate Cover For 10-1/4" x 17-1/4" Utility Box	286.49	5.82
33 14 23 00-0015 EA 13" x 19-3/4" Reinforced Concrete Slab For 10-1/4" x 17-1/4" Utility Box	81.14	11.63
33 14 23 00-0016 EA 5-3/4" High Reinforced Concrete Base For 10-1/4" x 17-1/4" Utility Box	108.40	17.45
33 14 23 00-0017 EA 12" High Reinforced Concrete Extension For 10-1/4" x 17-1/4" Utility Box.....	126.84	31.99
33 14 23 00-0018 B12 Utility Box, 12" x 20" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0019 EA 12" x 20" Precast Concrete Utility Box.....	160.15	75.62
33 14 23 00-0020 EA Cast Iron Lid For 12" x 20" Utility Box.....	262.92	8.73
33 14 23 00-0021 EA Reinforced Concrete Lid For 12" x 20" Utility Box.....	75.96	11.63
33 14 23 00-0022 EA Steel Checkered Plate Cover For 12" x 20" Utility Box	384.79	11.63
33 14 23 00-0023 EA 12" High Reinforced Concrete Extension For 12" x 20" Utility Box	165.54	40.72
33 14 23 00-0024 B16 Utility Box, 12" x 22-1/4" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0025 EA 12" x 22-1/4" Precast Concrete Utility Box.....	184.24	88.41
33 14 23 00-0026 EA Cast Iron Lid For 12" x 22-1/4" Utility Box.....	296.84	11.63
33 14 23 00-0027 EA Reinforced Concrete Lid For 12" x 22-1/4" Utility Box	94.27	11.63
33 14 23 00-0028 EA Steel Checkered Plate Cover For 12" x 22-1/4" Utility Box.....	386.98	11.63
33 14 23 00-0029 EA 16" x 27" Reinforced Concrete Slab For 12" x 22-1/4" Utility Box	131.88	19.78
33 14 23 00-0030 EA 12" High Reinforced Concrete Extension For 12" x 22-1/4" Utility Box	168.58	40.72
33 14 23 00-0031 B30 Utility Box, 13-1/4" x 24" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0032 EA 13-1/4" x 24" Precast Concrete Utility Box (Christy B30BOX)	222.08	104.70
33 14 23 00-0033 EA Reinforced Concrete Lid For 13-1/4" x 24" Utility Box (Christy B30D)	126.55	18.62
33 14 23 00-0034 EA Steel Checkered Plate Cover For 13-1/4" x 24" Utility Box (Christy B30-61G)	478.29	15.13
33 14 23 00-0035 EA 16" x 27" Reinforced Concrete Slab For 13-1/4" x 24" Utility Box (Christy B30SL).....	131.88	19.78
33 14 23 00-0036 EA 5-1/2" High Reinforced Concrete Base For 13-1/4" x 24" Utility Box (Christy B30BA).....	201.70	32.58
33 14 23 00-0037 EA 6" High Reinforced Concrete Extension For 13-1/4" x 24" Utility Box (Christy B30X6).....	158.00	22.10

33 Utilities**33 10 Water Utilities****33 14 Water Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 14 23 00-0038	EA	12" High Reinforced Concrete Extension For 13-1/4" x 24" Utility Box (Christy B30X12).....	218.49	52.35
33 14 23 00-0039		B36 Utility Box, 17-1/4" x 30" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0040	EA	17-1/4" x 30" Precast Concrete Utility Box (Christy B36BOX)	290.54	132.63
33 14 23 00-0041	EA	Reinforced Concrete Lid For 17-1/4" x 30" Utility Box (Christy B36D)	205.95	31.99
33 14 23 00-0042	EA	Steel Checkered Plate Cover For 17-1/4" x 30" Utility Box (Christy B36-61D)	599.10	22.10
33 14 23 00-0043	EA	20" x 34" Reinforced Concrete Slab For 17-1/4" x 30" Utility Box (Christy B36SL).....	183.69	41.88
33 14 23 00-0044	EA	6" High Reinforced Concrete Base For 17-1/4" x 30" Utility Box (Christy B36BA).....	314.38	46.53
33 14 23 00-0045	EA	12" High Reinforced Concrete Extension For 17-1/4" x 30" Utility Box (Christy B36X12).....	292.09	67.48
33 14 23 00-0046		B40 Utility Box, 24-1/2" x 36" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0047	EA	24-1/2" x 36" Precast Concrete Utility Box.....	606.19	204.76
33 14 23 00-0048	EA	Reinforced Concrete Lid For 24-1/2" x 36" Utility Box.....	565.16	76.78
33 14 23 00-0049	EA	Steel Checkered Plate Cover For 24-1/2" x 36" Utility Box	850.62	33.73
33 14 23 00-0050	EA	30" x 40" Reinforced Concrete Slab For 24-1/2" x 36" Utility Box	460.74	72.13
33 14 23 00-0051	EA	10" High Reinforced Concrete Extension For 24-1/2" x 36" Utility Box.....	488.95	75.62
33 14 23 00-0052		B48 Utility Box, 30-1/4" x 48-1/4" <small>(33 14 23 00-0002)</small>		
33 14 23 00-0053	EA	30-1/4" x 48-1/4" Precast Concrete Utility Box.....	763.17	232.67
33 14 23 00-0054	EA	1 Piece Reinforced Concrete Lid For 30-1/4" x 48-1/4" Utility Box	775.97	126.81
33 14 23 00-0055	EA	2 Piece Reinforced Concrete Lid For 30-1/4" x 48-1/4" Utility Box	983.22	126.81
33 14 23 00-0056	EA	2 Piece Steel Checkered Plate Cover For 30-1/4" x 48-1/4" Utility Box.....	1,345.96	58.17
33 14 23 00-0057	EA	36" x 53" Reinforced Concrete Slab For 30-1/4" x 48-1/4" Utility Box.....	661.96	157.06
33 14 23 00-0058	EA	10" High Reinforced Concrete Extension For 30-1/4" x 48-1/4" Utility Box.....	602.53	105.87
33 14 23 00-0059		Roadway Or Curb Valve Boxes <small>(33 14 23)</small>		
33 14 23 00-0060		Round Head, Cast Iron Service, Roadway Or Valve Boxes <small>(33 14 23 00-0059)</small>		
33 14 23 00-0061	EA	36" To 48" High, Two Piece, Screw Type, 2-1/2" Shaft, Round Head, Cast Iron Service Box	270.57	13.95
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0062	EA	36" To 54" High, Two Piece, Screw Type, 2-1/2" Shaft, Round Head, Cast Iron Service Box	316.12	13.95
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0063	EA	42" To 60" High, Two Piece, Screw Type, 2-1/2" Shaft, Round Head, Cast Iron Service Box	318.21	13.95
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0064	EA	9" Extension For Screw Type, 2-1/2" Shaft, Round Head, Cast Iron Service Box	79.13	6.98
33 14 23 00-0065	EA	16" Extension For Screw Type, 2-1/2" Shaft, Round Head, Cast Iron Service Box	91.19	6.98
33 14 23 00-0066	EA	24" Extension For Screw Type, 2-1/2" Shaft, Round Head, Cast Iron Service Box	109.34	6.98
33 14 23 00-0067	EA	36" To 48" High, Screw Type, 4-1/4" Shaft, Round Head, Cast Iron Roadway Box.....	410.85	17.45
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0068	EA	45" To 54" High, Three Piece, Screw Type, 5-1/4" Shaft, Round Head, Cast Iron Valve Box	716.16	24.42
		Note: Includes cover, top section, bottom section and #6 round base.		
33 14 23 00-0069	EA	45" To 66" High, Three Piece, Screw Type, 5-1/4" Shaft, Round Head, Cast Iron Valve Box	801.12	24.42
		Note: Includes cover, top section, bottom section and #6 round base.		
33 14 23 00-0070	EA	24" To 36" High, Two Piece, Screw Type, 5-1/4" Shaft, Round Head, Cast Iron Valve Box.....	427.70	17.45
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0071	EA	36" To 48" High, Two Piece, Screw Type, 5-1/4" Shaft, Round Head, Cast Iron Valve Box.....	447.99	17.45
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0072	EA	24" To 36" High, Two Piece, Slip Type, 5-1/4" Shaft, Round Head, Cast Iron Valve Box.....	432.49	17.45
		Note: Includes cover, top section and bottom section.		
33 14 23 00-0073	EA	12" Extension For Screw Type, 5-1/4" Shaft, Round Head, Cast Iron Valve Box	156.23	6.98
33 14 23 00-0074	EA	18" To 24" High Round Head Cast Iron Roadway Or Curb Valve Boxes.....	257.21	28.71
33 14 23 00-0075	EA	22" To 28" High Round Head Cast Iron Roadway Or Curb Valve Boxes.....	266.43	29.86
33 14 23 00-0076	EA	30" To 36" High Round Head Cast Iron Roadway Or Curb Valve Boxes.....	296.76	31.00
33 14 23 00-0077	EA	36" To 48" High Round Head Cast Iron Roadway Or Curb Valve Box.....	413.57	32.73
33 14 23 00-0078	EA	48" To 60" High Round Head Cast Iron Roadway Or Curb Valve Boxes.....	500.48	34.45
33 14 23 00-0079	EA	18" Cast Iron Service Box Extension Section	118.45	
33 14 23 00-0080		Plastic Roadway Grade Water Meter Box And Cover <small>(33 14 23 00-0059)</small>		
33 14 23 00-0081	EA	12" Wide x 16" Long x 16" Deep Plastic Meter Box And Cover	501.74	40.19
33 14 23 00-0082	EA	9-3/4" Wide x 19-1/4" Long x 16" Deep Oval Plastic Meter Box And Cover.....	380.12	28.71
33 14 23 00-0083	EA	Cast Iron Lid For Plastic Meter Box	118.52	

33 16 Water Utility Storage Tanks (33 10)**33 16 23 Ground-Level Steel Water Storage Tanks** (33 16)

See CSI section 23 13 23 16-0000 for aboveground steel storage tanks.

33 19 Water Utility Metering Equipment (33 10)**33 19 13 Positive Displacement Water Meters** (33 19)**33 19 13 23 Nutating Disc Water Meters** (33 19 13)**33 19 13 23-0001 Bronze Disk Type Water Service Meters** (33 19 13 23)

33 19 13 23-0002	EA	5/8" Diameter, 0 To 20 GPM, Screwed, Disk Type, Bronze Water Supply Meter.....	316.36	59.70
33 19 13 23-0003	EA	3/4" Diameter, 0 To 30 GPM, Screwed, Disk Type, Bronze Water Supply Meter.....	397.91	71.19

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 19 13 23-0004 EA 1" Diameter, 0 To 50 GPM, Screwed, Disk Type, Bronze Water Supply Meter	535.25	81.52
33 19 13 23-0005 EA 1-1/2" Diameter, 0 To 100 GPM, Screwed, Disk Type, Bronze Water Supply Meter	1,043.70	121.71
33 19 13 23-0006 EA 2" Diameter, 0 To 160 GPM, Screwed, Disk Type, Bronze Water Supply Meter	1,414.55	158.45
33 19 13 23-0007 Magnetic Driven, Positive Displacement Type Water Service Meters (33 19 13 23)		
33 19 13 23-0008 EA 5/8" Diameter Transmitting Water Supply Meter, Screwed, 150 PSI Max. (Neptune T10 E-Coder/R900i).....	579.09	59.70
<i>For Owner Furnished Material, Deduct</i>	<i>-518.66</i>	
33 19 13 23-0009 EA 3/4" Diameter Transmitting Water Supply Meter, Screwed, 150 PSI Max.(Neptune T10 E-Coder/R900i).....	660.12	71.19
<i>For Owner Furnished Material, Deduct</i>	<i>-588.35</i>	
33 19 13 23-0010 EA 1" Diameter Transmitting Water Supply Meter, Screwed, 150 PSI Max.(Neptune T10 E-Coder/R900i).....	984.78	81.52
<i>For Owner Furnished Material, Deduct</i>	<i>-902.76</i>	
33 19 13 23-0011 EA 1-1/2" Diameter Transmitting Water Supply Meter, Screwed, 150 PSI Max.(Neptune T10 E-Coder/R900i).....	1,667.84	121.71
<i>For Owner Furnished Material, Deduct</i>	<i>-1,545.70</i>	
33 19 13 23-0012 EA 2" Diameter Transmitting Water Supply Meter, Screwed, 150 PSI Max.(Neptune T10 E-Coder/R900i).....	2,064.22	158.45
<i>For Owner Furnished Material, Deduct</i>	<i>-1,904.75</i>	
33 19 13 23-0013 EA Electronic Transmitter.....	470.73	28.71
Note: For use with transmitting meter valve.		
<i>For Owner Furnished Material, Deduct</i>	<i>-442.02</i>	
33 19 16 Velocity-Type Water Meters (33 19)		
33 19 16 23 Turbine Water Meters (33 19 16)		
33 19 16 23-0001 Flanged Turbine Water Service Meter (33 19 16 23)		
33 19 16 23-0002 Vertical Turbine Meters (33 19 16 23-0001)		
33 19 16 23-0003 EA 1-1/2" Diameter, 0 - 100 GPM Vertical Turbine Meter, Flanged	1,014.08	111.02
33 19 16 23-0004 EA 2" Diameter, 0 - 160 GPM Vertical Turbine Meter, Flanged.....	1,423.41	140.94
33 19 16 23-0005 EA 3" Diameter, 0 - 350 GPM Vertical Turbine Meter, Flanged.....	2,656.45	179.75
33 19 16 23-0006 EA 4" Diameter, 0 - 650 GPM Vertical Turbine Meter, Flanged.....	3,964.38	281.25
33 19 16 23-0007 EA 6" Diameter, 0 - 1,300 GPM Vertical Turbine Meter, Flanged.....	7,478.73	380.64
33 19 16 23-0008 Horizontal Turbine Meters (33 19 16 23-0001)		
33 19 16 23-0009 EA 1-1/2" Diameter, 0 - 120 GPM Horizontal Turbine Meter, Flanged	1,597.38	111.02
33 19 16 23-0010 EA 2" Diameter, 0 - 160 GPM Horizontal Turbine Meter, Flanged	2,256.14	140.94
33 19 16 23-0011 EA 3" Diameter, 0 - 600 GPM Horizontal Turbine Meter, Flanged	2,990.31	179.75
33 19 16 23-0012 EA 4" Diameter, 0 - 1,000 GPM Horizontal Turbine Meter, Flanged	4,405.69	281.25
33 19 16 23-0013 EA 6" Diameter, 0 - 2,000 GPM Horizontal Turbine Meter, Flanged	9,086.64	380.64
33 19 16 23-0014 EA 8" Diameter, 0 - 3,500 GPM Horizontal Turbine Meter, Flanged	12,149.13	486.37
33 19 16 23-0015 EA 10" Diameter, 0 - 5,500 GPM Horizontal Turbine Meter, Flanged	16,960.75	592.10
33 19 16 23-0016 EA 12" Diameter, 0 - 6,600 GPM Horizontal Turbine Meter, Flanged	20,473.39	933.62
33 19 19 Compound Water Meters (33 19)		
33 19 19 00-0001 Flanged Compound Type Water Service Meter (33 19 19)		
33 19 19 00-0002 EA 2" Diameter, 0 To 160 GPM, Flanged And Bronze, Compound Type Water Service Meter	4,255.48	140.94
33 19 19 00-0003 EA 3" Diameter, 0 To 320 GPM, Flanged And Bronze, Compound Type Water Service Meter	5,181.53	179.75
33 19 19 00-0004 EA 4" Diameter, 0 To 500 GPM, Flanged And Bronze, Compound Type Water Service Meter	8,565.54	281.25
33 19 19 00-0005 EA 6" Diameter, 0 To 1,000 GPM, Flanged And Bronze, Compound Type Water Service Meter	11,980.12	380.64
33 19 19 00-0006 EA 8" Diameter, 0 To 1,600 GPM, Flanged And Bronze, Compound Type Water Service Meter	24,617.17	486.37
33 19 19 00-0007 EA 10" Diameter, 0 To 2,500 GPM, Flanged And Bronze, Compound Type Water Service Meter	42,157.77	592.10
33 19 23 Magnetic Water Meters (33 19)		
33 19 23 00-0001 Flanged Electromagnetic Flow (EMF) Water Meter (33 19 23)		
33 19 23 00-0002 EA 2" Diameter, Flanged, Stainless Steel, Electromagnetic Flow (EMF) Water Meter (Sensus Accu-MAG).....	8,728.85	140.94
33 19 23 00-0003 EA 3" Diameter, Flanged, Stainless Steel, Electromagnetic Flow (EMF) Water Meter (Sensus Accu-MAG).....	12,295.87	179.75
33 19 23 00-0004 EA 4" Diameter, Flanged, Stainless Steel, Electromagnetic Flow (EMF) Water Meter (Sensus Accu-MAG).....	14,105.85	281.25
33 19 26 Ultrasonic Water Meters (33 19)		
33 19 26 00-0001 Ultrasonic Water Service Meters (Mastermeter Active) (33 19 26)		
33 19 26 00-0002 EA 3" Diameter, Ductile Iron Body, Flanged, Ultrasonic Water Meter (Mastermeter Active).....	4,392.39	179.75
33 19 26 00-0003 EA 4" Diameter, Ductile Iron Body, Flanged, Ultrasonic Water Meter (Mastermeter Active).....	5,052.85	281.25
33 19 26 00-0004 EA 6" Diameter, Ductile Iron Body, Flanged, Ultrasonic Water Meter (Mastermeter Active).....	7,439.72	380.64
33 19 26 00-0005 EA 8" Diameter, Ductile Iron Body, Flanged, Ultrasonic Water Meter (Mastermeter Active).....	10,724.81	486.37
33 30 Sanitary Sewerage Utilities (33)		
33 31 Sanitary Sewerage Piping (33 30)		
33 31 11 Public Sanitary Sewerage Gravity Piping (33 31)		
Note: Piping includes hydrostatic testing, disinfecting and warning tape. Excludes excavation and backfill. See CSI section 31 23 16 00-0000 for excavation, 31 23 16 36-0016 for backfill.		

33 Utilities**33 30 Sanitary Sewerage Utilities****33 31 Sanitary Sewerage Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 31 11 00-0001	Cast Iron Service Saddles With U Bolt <small>(33 31 11)</small>		
33 31 11 00-0002	EA 2" Diameter x 2" Tapped Tee Cast Iron Service Saddles With U Bolt.....	122.79	
33 31 11 00-0003	EA 3" Diameter x 1-1/2" Tapped Tee Cast Iron Service Saddles With U Bolt.....	123.46	
33 31 11 00-0004	EA 3" Diameter x 2" Tapped Tee Cast Iron Service Saddles With U Bolt.....	135.85	
33 31 11 00-0005	EA 4" Diameter x 1-1/2" Tapped Tee Cast Iron Service Saddles With U Bolt.....	131.52	
33 31 11 00-0006	EA 4" Diameter x 2" Hub Tee Cast Iron Service Saddles With U Bolt.....	148.52	
33 31 11 00-0007	EA 4" Diameter x 3" Hub Tee Cast Iron Service Saddles With U Bolt.....	167.19	
33 31 11 00-0008	EA 4" Diameter x 4" Hub Tee Cast Iron Service Saddles With U Bolt.....	198.09	
33 31 11 00-0009	EA 6" Diameter x 2" Hub Tee Cast Iron Service Saddles With U Bolt.....	167.82	
33 31 11 00-0010	EA 6" Diameter x 3" Hub Tee Cast Iron Service Saddles With U Bolt.....	183.45	
33 31 11 00-0011	EA 6" Diameter x 4" Hub Tee Cast Iron Service Saddles With U Bolt.....	211.55	
33 31 11 00-0012	EA 4" Diameter x 1-1/2" Tapped Wye Cast Iron Service Saddle With U Bolt.....	135.31	
33 31 11 00-0013	EA 4" Diameter x 2" Tapped Wye Cast Iron Service Saddle With U Bolt.....	147.71	
33 31 11 00-0014	EA 4" Diameter x 3" Hub Wye Cast Iron Service Saddle With U Bolt.....	176.05	
33 31 11 00-0015	EA 4" Diameter x 4" Hub Wye Cast Iron Service Saddle With U Bolt.....	208.97	
33 31 11 00-0016	EA 6" Diameter x 4" Hub Wye Cast Iron Service Saddle With U Bolt.....	225.11	
33 31 11 00-0017	Plastic Sewer And Drain Piping <small>(33 31 11)</small>		
33 31 11 00-0018	Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe <small>(33 31 11 00-0017)</small>		
33 31 11 00-0019	LF 1-1/2" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	11.53	4.43
33 31 11 00-0020	LF 2" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	14.08	5.22
33 31 11 00-0021	LF 3" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	20.15	6.33
33 31 11 00-0022	LF 4" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	25.55	7.38
33 31 11 00-0023	LF 6" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	36.01	8.58
33 31 11 00-0024	LF 8" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	49.32	9.97
33 31 11 00-0025	LF 10" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	69.65	10.33
33 31 11 00-0026	LF 12" Schedule 40 Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	93.44	10.70
33 31 11 00-0027	Belled End Polyvinyl Chloride (PVC) Sewer And Drain Pipe <small>(33 31 11 00-0017)</small>		
	Note: D-2729 PVC pipe.		
33 31 11 00-0028	LF 3" Belled End Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	15.00	6.33
33 31 11 00-0029	LF 4" Belled End Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	17.68	7.38
33 31 11 00-0030	LF 6" Belled End Polyvinyl Chloride (PVC) Sewer And Drain Pipe.....	22.91	8.58
33 31 11 00-0031	Polyvinyl Chloride (PVC) Sewer And Drain Fittings <small>(33 31 11 00-0017)</small>		
33 31 11 00-0032	1/4 Bends, Polyvinyl Chloride (PVC) Sewer And Drain <small>(33 31 11 00-0031)</small>		
33 31 11 00-0033	EA 1-1/2" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	29.01	14.27
33 31 11 00-0034	EA 2" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	37.28	18.45
33 31 11 00-0035	EA 3" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	67.23	24.77
33 31 11 00-0036	EA 4" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	106.59	28.64
33 31 11 00-0037	EA 6" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	443.41	37.22
33 31 11 00-0038	EA 8" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	738.91	50.09
33 31 11 00-0039	EA 10" 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	975.31	66.70
33 31 11 00-0040	1/8 Bends, Polyvinyl Chloride (PVC) Sewer And Drain <small>(33 31 11 00-0031)</small>		
33 31 11 00-0041	EA 1-1/2" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	30.77	14.27
33 31 11 00-0042	EA 2" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	37.14	18.45
33 31 11 00-0043	EA 3" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	64.60	24.77
33 31 11 00-0044	EA 4" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	93.70	28.64
33 31 11 00-0045	EA 6" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	410.61	37.22
33 31 11 00-0046	EA 8" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	662.68	50.09
33 31 11 00-0047	EA 10" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	751.08	66.70
33 31 11 00-0048	EA 12" 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	1,118.83	88.84
33 31 11 00-0049	Long Sweep 1/4 Bends, Polyvinyl Chloride (PVC) Sewer And Drain <small>(33 31 11 00-0031)</small>		
33 31 11 00-0050	EA 1-1/2" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	50.39	14.05
33 31 11 00-0051	EA 2" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	49.58	18.45
33 31 11 00-0052	EA 3" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	98.86	24.77
33 31 11 00-0053	EA 4" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	164.57	28.64
33 31 11 00-0054	EA 6" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	331.42	37.22
33 31 11 00-0055	EA 8" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	591.73	50.09
33 31 11 00-0056	EA 10" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	972.67	66.70
33 31 11 00-0057	EA 12" Long Sweep 1/4 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	1,477.43	88.84
33 31 11 00-0058	1/16 Bends, Polyvinyl Chloride (PVC) Sewer And Drain <small>(33 31 11 00-0031)</small>		
33 31 11 00-0059	EA 1-1/2" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	34.52	14.27
33 31 11 00-0060	EA 2" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	40.94	18.45
33 31 11 00-0061	EA 3" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	75.55	24.77
33 31 11 00-0062	EA 4" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	114.02	28.64
33 31 11 00-0063	EA 6" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	552.51	37.22
33 31 11 00-0064	EA 8" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	897.73	50.09
33 31 11 00-0065	EA 10" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	1,011.46	66.70



Utilities	33	CS
Sanitary Sewerage Utilities	33 30	
Sanitary Sewerage Piping	33 31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 31 11 00-0066 EA 12" 1/16 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	1,032.04	88.84
33 31 11 00-0067 Reducers, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0068 EA 2" x 1-1/2" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	39.69	16.28
33 31 11 00-0069 EA 3" x 1-1/2" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	77.78	19.43
33 31 11 00-0070 EA 3" x 2" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	72.87	21.43
33 31 11 00-0071 EA 4" x 2" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	115.70	23.42
33 31 11 00-0072 EA 4" x 3" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	124.08	26.57
33 31 11 00-0073 EA 6" x 4" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	390.96	32.89
33 31 11 00-0074 EA 8" x 6" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	836.62	43.61
33 31 11 00-0075 EA 10" x 4" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	233.77	47.62
33 31 11 00-0076 EA 10" x 6" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	331.13	51.94
33 31 11 00-0077 EA 10" x 8" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	304.76	58.33
33 31 11 00-0078 EA 12" x 6" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	865.96	63.05
33 31 11 00-0079 EA 12" x 8" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	914.06	69.45
33 31 11 00-0080 EA 12" x 10" Reducer, Polyvinyl Chloride (PVC) Sewer And Drain.....	967.07	77.77
33 31 11 00-0081 Sanitary Tees, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0082 EA 1-1/2" Sanitary Tee, Polyvinyl Chloride (PVC) Sewer And Drain.....	45.92	21.56
33 31 11 00-0083 EA 2" Sanitary Tee, Polyvinyl Chloride (PVC) Sewer And Drain.....	61.22	27.89
33 31 11 00-0084 EA 3" Sanitary Tee, Polyvinyl Chloride (PVC) Sewer And Drain.....	107.05	36.79
33 31 11 00-0085 EA 4" Sanitary Tee, Polyvinyl Chloride (PVC) Sewer And Drain.....	167.31	45.69
33 31 11 00-0086 EA 6" Sanitary Tee, Polyvinyl Chloride (PVC) Sewer And Drain.....	649.91	50.09
33 31 11 00-0087 EA 8" Sanitary Tee, Polyvinyl Chloride (PVC) Sewer And Drain.....	843.20	66.70
33 31 11 00-0088 Wyes, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0089 EA 1-1/2" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	59.53	21.56
33 31 11 00-0090 EA 2" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	69.13	27.89
33 31 11 00-0091 EA 3" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	117.16	36.79
33 31 11 00-0092 EA 4" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	183.85	45.69
33 31 11 00-0093 EA 6" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	587.83	50.09
33 31 11 00-0094 EA 8" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	725.29	66.70
33 31 11 00-0095 EA 10" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	953.83	89.01
33 31 11 00-0096 EA 12" Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	1,510.64	118.79
33 31 11 00-0097 Reducing Wyes, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0098 EA 2" x 1-1/2" x 1-1/2" Reducing Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	80.91	21.56
33 31 11 00-0099 EA 2" x 2" x 1" Reducing Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	89.92	27.89
33 31 11 00-0100 EA 3" x 3" x 2" Reducing Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	103.11	36.79
33 31 11 00-0101 EA 4" x 4" x 2" Reducing Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	161.16	45.69
33 31 11 00-0102 EA 4" x 4" x 3" Reducing Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	176.67	45.69
33 31 11 00-0103 Double Wyes, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0104 EA 1-1/2" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	99.73	27.89
33 31 11 00-0105 EA 2" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	129.75	36.79
33 31 11 00-0106 EA 3" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	266.96	49.66
33 31 11 00-0107 EA 4" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	480.43	60.06
33 31 11 00-0108 EA 2" x 2" x 1-1/2" x 1-1/2" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	123.31	36.79
33 31 11 00-0109 EA 3" x 3" x 2" x 2" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	217.76	49.66
33 31 11 00-0110 EA 4" x 4" x 3" x 3" Double Wye, Polyvinyl Chloride (PVC) Sewer And Drain.....	399.18	60.06
33 31 11 00-0111 Combination Wye And 1/8 Bends, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0112 EA 1-1/2" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	76.52	21.56
33 31 11 00-0113 EA 2" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	95.63	27.89
33 31 11 00-0114 EA 3" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	196.80	36.79
33 31 11 00-0115 EA 4" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	362.46	45.69
33 31 11 00-0116 EA 2" x 2" x 1-1/2" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	153.31	27.89
33 31 11 00-0117 EA 3" x 3" x 1-1/2" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	249.05	36.79
33 31 11 00-0118 EA 3" x 3" x 2" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	176.37	36.79
33 31 11 00-0119 EA 4" x 4" x 2" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	337.97	45.69
33 31 11 00-0120 EA 4" x 4" x 3" Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	360.37	45.69
33 31 11 00-0121 Double Combination Wye And 1/8 Bends, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0122 EA 1-1/2" Double Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	112.90	27.89
33 31 11 00-0123 EA 2" Double Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	131.22	36.79
33 31 11 00-0124 EA 3" Double Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	206.49	49.66
33 31 11 00-0125 EA 4" Double Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	785.84	60.06
33 31 11 00-0126 EA 6" Double Combination Wye And 1/8 Bend, Polyvinyl Chloride (PVC) Sewer And Drain.....	2,625.59	66.49

33 Utilities**33 30 Sanitary Sewerage Utilities****33 31 Sanitary Sewerage Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 31 11 00-0127			Cleanout Tees With Plug, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0128	EA		4" Polyvinyl Chloride (PVC) Cleanout Tees With Plug, Sewer And Drain.....	606.30	117.09
33 31 11 00-0129	EA		6" Polyvinyl Chloride (PVC) Cleanout Tees With Plug, Sewer And Drain.....	1,477.91	151.06
33 31 11 00-0130	EA		8" Polyvinyl Chloride (PVC) Cleanout Tees With Plug, Sewer And Drain.....	1,877.37	212.87
33 31 11 00-0131	EA		10" Polyvinyl Chloride (PVC) Cleanout Tees With Plug, Sewer And Drain.....	2,580.14	342.43
33 31 11 00-0132			Couplings, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0133	EA		1-1/2" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	28.09	14.27
33 31 11 00-0134	EA		2" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	34.92	18.34
33 31 11 00-0135	EA		3" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	55.97	24.56
33 31 11 00-0136	EA		4" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	74.26	28.64
33 31 11 00-0137	EA		6" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	228.95	37.22
33 31 11 00-0138	EA		8" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	575.07	50.09
33 31 11 00-0139	EA		10" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	874.89	66.70
33 31 11 00-0140	EA		12" Coupling, Polyvinyl Chloride (PVC) Sewer And Drain.....	1,453.20	88.84
33 31 11 00-0141			Adapters, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0142	EA		4" Male, Plastic Pipe x Malleable Iron Pipe Adapter, Drain And Sewer Fitting.....	138.72	74.23
33 31 11 00-0143	EA		2" x 3" x 3" Downspout Adapter, Drain And Sewer Fitting.....	93.92	56.46
33 31 11 00-0144	EA		2" x 3" x 4" Downspout Adapter, Drain And Sewer Fitting.....	97.93	56.46
33 31 11 00-0145	EA		3" x 4" x 4" Downspout Adapter, Drain And Sewer Fitting.....	108.54	56.46
33 31 11 00-0146	EA		4" Hub, Cast Iron Pipe x Plastic Pipe Adapter, Drain And Sewer Fitting.....	141.63	74.23
33 31 11 00-0147	EA		4" Spigot, Clay Pipe x Plastic Pipe Adapter, Drain And Sewer Fitting.....	133.14	74.23
33 31 11 00-0148	EA		4" Spigot, Fiberglass Pipe x Plastic Pipe Adapter, Drain And Sewer Fitting.....	119.18	74.23
33 31 11 00-0149	EA		4" Drain Grate, Drain And Sewer Fitting.....	67.64	38.17
33 31 11 00-0150			Caps, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0151	EA		3" Cap, Polyvinyl Chloride (PVC) Drain And Sewer Fitting.....	47.33	15.33
33 31 11 00-0152	EA		4" Cap, Polyvinyl Chloride (PVC) Drain And Sewer Fitting.....	83.81	19.09
33 31 11 00-0153	EA		6" Cap, Polyvinyl Chloride (PVC) Drain And Sewer Fitting.....	168.98	24.67
33 31 11 00-0154			Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain (33 31 11 00-0031)		
33 31 11 00-0155	EA		1-1/2" Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain.....	26.25	14.27
33 31 11 00-0156	EA		2" Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain.....	34.29	18.45
33 31 11 00-0157	EA		3" Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain.....	52.99	24.77
33 31 11 00-0158	EA		4" Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain.....	73.23	28.64
33 31 11 00-0159	EA		6" Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain.....	135.94	37.22
33 31 11 00-0160	EA		8" Plug Cleanout, Polyvinyl Chloride (PVC) Sewer And Drain.....	590.70	50.09
33 31 11 00-0161			Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe (33 31 11 00-0017) Note: ASTM 3034.		
33 31 11 00-0162	LF		4" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	18.50	7.38
			For SDR 26, Add.....	0.73	
33 31 11 00-0163	LF		6" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	24.32	8.58
			For SDR 26, Add.....	1.40	
33 31 11 00-0164	LF		8" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	32.10	9.97
			For SDR 26, Add.....	2.38	
33 31 11 00-0165	LF		10" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	38.88	10.33
			For SDR 26, Add.....	3.57	
33 31 11 00-0166	LF		12" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	47.04	10.70
			For SDR 26, Add.....	5.03	
33 31 11 00-0167	LF		15" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	60.63	11.07
			For SDR 26, Add.....	7.54	
33 31 11 00-0168	LF		18" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	76.16	11.48
33 31 11 00-0169	LF		21" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	98.27	12.46
33 31 11 00-0170	LF		24" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	118.76	13.45
33 31 11 00-0171	LF		27" Gasketed SDR 35 Polyvinyl Chloride (PVC) Pipe.....	147.44	15.77
33 31 11 00-0172			Solvent Weld SDR 35 Polyvinyl Chloride (PVC) Pipe (33 31 11 00-0017) Note: ASTM 3034.		
33 31 11 00-0173	LF		4" Solvent Weld SDR 35 Polyvinyl Chloride (PVC) Pipe.....	20.22	7.38
			For SDR 26, Add.....	1.07	
33 31 11 00-0174	LF		6" Solvent Weld SDR 35 Polyvinyl Chloride (PVC) Pipe.....	28.12	8.58
			For SDR 26, Add.....	2.15	
33 31 11 00-0175	LF		8" Solvent Weld SDR 35 Polyvinyl Chloride (PVC) Pipe.....	39.10	9.97
			For SDR 26, Add.....	3.75	
33 31 11 00-0176			Gasketed SDR 35 Polyvinyl Chloride (PVC) Fittings (33 31 11 00-0017) Note: ASTM 3034.		
33 31 11 00-0177			1/4 Bends, Gasketed SDR 35 Polyvinyl Chloride (PVC) (33 31 11 00-0176)		
33 31 11 00-0178	EA		4" 1/4 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	86.38	26.81
			For SDR 26, Add.....	4.00	



Utilities	33	CS
Sanitary Sewerage Utilities	33 30	
Sanitary Sewerage Piping	33 31	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	33 31 11 00-0179	EA	6" 1/4 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	128.65 7.36	31.17
	33 31 11 00-0180	EA	8" 1/4 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	271.35 20.37	35.32
	33 31 11 00-0181	EA	10" 1/4 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	782.80 68.50	41.56
	33 31 11 00-0182	EA	12" 1/4 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	1,011.61 88.64	52.99
33 31 11 00-0183			1/8 Bends, Gasketed SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
	33 31 11 00-0184	EA	4" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	77.81 3.18	26.81
	33 31 11 00-0185	EA	6" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	119.20 6.46	31.17
	33 31 11 00-0186	EA	8" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	247.46 18.07	35.32
	33 31 11 00-0187	EA	10" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	557.81 46.90	41.56
	33 31 11 00-0188	EA	12" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	797.68 68.10	52.99
	33 31 11 00-0189	EA	15" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	1,713.11 152.49	74.80
	33 31 11 00-0190	EA	18" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	2,719.00	105.97
	33 31 11 00-0191	EA	21" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	4,539.52	140.25
	33 31 11 00-0192	EA	24" 1/8 Bend, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	6,190.03	187.00
33 31 11 00-0193			Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
	33 31 11 00-0194	EA	4" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	130.78 6.12	40.21
	33 31 11 00-0195	EA	6" x 4" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	212.30 13.25	44.56
	33 31 11 00-0196	EA	6" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	238.87 15.45	46.75
	33 31 11 00-0197	EA	8" x 4" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	263.92 17.51	48.93
	33 31 11 00-0198	EA	8" x 6" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	302.68 20.88	51.11
	33 31 11 00-0199	EA	8" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	583.69 47.51	53.29
	33 31 11 00-0200	EA	10" x 4" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	748.81 63.16	54.54
	33 31 11 00-0201	EA	10" x 6" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	849.12 72.38	57.14
	33 31 11 00-0202	EA	10" x 8" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	1,256.06 111.10	59.32
	33 31 11 00-0203	EA	10" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	1,638.46 147.32	62.33
	33 31 11 00-0204	EA	12" x 4" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	921.43 77.84	66.39
	33 31 11 00-0205	EA	12" x 6" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	978.36 82.95	68.57
	33 31 11 00-0206	EA	12" x 8" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	1,398.46 122.93	70.75
	33 31 11 00-0207	EA	12" x 10" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	2,019.70 182.09	73.76
	33 31 11 00-0208	EA	12" Sanitary Tees, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	2,276.39 205.82	79.47
33 31 11 00-0209			Wyes, Gasketed SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
	33 31 11 00-0210	EA	4" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	124.13 5.48	40.21
	33 31 11 00-0211	EA	6" x 4" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	190.14 11.12	44.56
	33 31 11 00-0212	EA	6" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	209.10 12.59	46.75
	33 31 11 00-0213	EA	8" x 4" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	254.42	48.93
	33 31 11 00-0214	EA	8" x 6" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	291.34	51.11
	33 31 11 00-0215	EA	8" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	448.25	53.29
	33 31 11 00-0216	EA	10" x 4" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	684.48	54.96
	33 31 11 00-0217	EA	10" x 6" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	698.12	57.14
	33 31 11 00-0218	EA	10" x 8" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,052.76	59.32
	33 31 11 00-0219	EA	10" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,165.22	62.33
	33 31 11 00-0220	EA	12" x 4" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	867.76	66.39
	33 31 11 00-0221	EA	12" x 6" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	895.01	68.57
	33 31 11 00-0222	EA	12" x 8" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,284.21	70.75
	33 31 11 00-0223	EA	12" x 10" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,548.48	73.76
	33 31 11 00-0224	EA	12" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,616.57	79.47
	33 31 11 00-0225	EA	15" x 10" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,992.48	95.58
	33 31 11 00-0226	EA	15" x 12" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	2,210.96	101.30
	33 31 11 00-0227	EA	15" Wye, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	2,765.59	112.20

33 Utilities**33 30 Sanitary Sewerage Utilities****33 31 Sanitary Sewerage Piping**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 31 11 00-0228			Couplings, Gasketed SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
33 31 11 00-0229	EA		4" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	85.63	26.81
			<i>For SDR 26, Add</i>	3.93	
33 31 11 00-0230	EA		6" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	133.71	31.17
			<i>For SDR 26, Add</i>	7.85	
33 31 11 00-0231	EA		8" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	198.07	35.53
			<i>For SDR 26, Add</i>	13.33	
33 31 11 00-0232	EA		10" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	377.46	41.56
			<i>For SDR 26, Add</i>	29.58	
33 31 11 00-0233	EA		12" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	536.10	52.99
			<i>For SDR 26, Add</i>	42.99	
33 31 11 00-0234	EA		15" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,051.12	74.80
			<i>For SDR 26, Add</i>	88.94	
33 31 11 00-0235	EA		18" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,980.07	105.97
33 31 11 00-0236	EA		21" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	3,307.29	140.25
33 31 11 00-0237	EA		24" Coupling, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	4,789.14	187.00
33 31 11 00-0238			Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
33 31 11 00-0239	EA		6" x 4" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	165.82	28.99
			<i>For SDR 26, Add</i>	11.28	
33 31 11 00-0240	EA		8" x 4" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	238.52	31.17
			<i>For SDR 26, Add</i>	17.91	
33 31 11 00-0241	EA		8" x 6" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	251.49	33.34
			<i>For SDR 26, Add</i>	18.81	
33 31 11 00-0242	EA		10" x 6" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	569.91	36.36
			<i>For SDR 26, Add</i>	48.90	
33 31 11 00-0243	EA		10" x 8" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	655.29	38.54
			<i>For SDR 26, Add</i>	56.74	
33 31 11 00-0244	EA		12" x 6" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	732.28	42.07
			<i>For SDR 26, Add</i>	63.57	
33 31 11 00-0245	EA		12" x 8" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	840.80	44.26
			<i>For SDR 26, Add</i>	73.64	
33 31 11 00-0246	EA		12" x 10" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	964.37	47.27
			<i>For SDR 26, Add</i>	85.02	
33 31 11 00-0247	EA		15" x 12" Increaser, Gasketed SDR 35 Polyvinyl Chloride (PVC).....	1,452.58	63.89
			<i>For SDR 26, Add</i>	129.22	
33 31 11 00-0248			Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
33 31 11 00-0249	EA		6" x 4" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	136.58	
			<i>For SDR 26, Add</i>	8.12	
33 31 11 00-0250	EA		8" x 4" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	180.74	
			<i>For SDR 26, Add</i>	11.37	
33 31 11 00-0251	EA		8" x 6" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	184.84	
			<i>For SDR 26, Add</i>	11.76	
33 31 11 00-0252	EA		10" x 4" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	307.53	
			<i>For SDR 26, Add</i>	22.54	
33 31 11 00-0253	EA		10" x 6" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	324.72	
			<i>For SDR 26, Add</i>	24.19	
33 31 11 00-0254	EA		10" x 8" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	620.37	
			<i>For SDR 26, Add</i>	52.57	
33 31 11 00-0255	EA		12" x 4" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	350.01	
			<i>For SDR 26, Add</i>	25.12	
33 31 11 00-0256	EA		12" x 6" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	382.23	
			<i>For SDR 26, Add</i>	28.22	
33 31 11 00-0257	EA		12" x 8" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	859.55	
			<i>For SDR 26, Add</i>	74.04	
33 31 11 00-0258	EA		12" x 10" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	1,014.67	
			<i>For SDR 26, Add</i>	88.93	
33 31 11 00-0259	EA		15" x 4" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	400.45	
			<i>For SDR 26, Add</i>	26.47	
33 31 11 00-0260	EA		15" x 6" Saddle Wye With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	428.56	
			<i>For SDR 26, Add</i>	29.17	
33 31 11 00-0261			Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC) <small>(33 31 11 00-0176)</small>		
33 31 11 00-0262	EA		6" x 4" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	146.21	
			<i>For SDR 26, Add</i>	9.05	
33 31 11 00-0263	EA		8" x 4" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	180.74	
			<i>For SDR 26, Add</i>	11.37	
33 31 11 00-0264	EA		8" x 6" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	197.94	
			<i>For SDR 26, Add</i>	13.02	
33 31 11 00-0265	EA		10" x 4" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	282.04	
			<i>For SDR 26, Add</i>	20.09	
33 31 11 00-0266	EA		10" x 6" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	322.66	
			<i>For SDR 26, Add</i>	23.99	
33 31 11 00-0267	EA		10" x 8" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC).....	492.04	
			<i>For SDR 26, Add</i>	40.25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 31 11 00-0268 EA 12" x 4" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	347.97 24.93	
33 31 11 00-0269 EA 12" x 6" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	380.28 28.03	
33 31 11 00-0270 EA 12" x 8" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	572.22 46.46	
33 31 11 00-0271 EA 12" x 10" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	697.49 58.48	
33 31 11 00-0272 EA 15" x 4" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	399.18 26.35	
33 31 11 00-0273 EA 15" x 6" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	419.03 28.26	
33 31 11 00-0274 EA 15" x 8" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	702.84 55.50	
33 31 11 00-0275 EA 15" x 10" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	778.44 62.76	
33 31 11 00-0276 EA 15" x 12" Saddle Tee With Stainless Steel Clamps, SDR 35 Polyvinyl Chloride (PVC)..... <i>For SDR 26, Add</i>	1,103.35 93.95	
33 31 11 00-0277 Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe and Fittings <small>(33 31 11 00-0017)</small> Note: ASTM F949.		
33 31 11 00-0278 Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe <small>(33 31 11 00-0277)</small>		
33 31 11 00-0279 LF 4" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	18.56	7.38
33 31 11 00-0280 LF 6" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	26.88	8.58
33 31 11 00-0281 LF 8" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	34.52	9.97
33 31 11 00-0282 LF 10" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	41.61	10.33
33 31 11 00-0283 LF 12" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	44.16	10.70
33 31 11 00-0284 LF 15" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	52.70	11.07
33 31 11 00-0285 LF 18" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	68.51	11.48
33 31 11 00-0286 LF 21" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	80.39	12.46
33 31 11 00-0287 LF 24" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	99.46	13.45
33 31 11 00-0288 LF 30" Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) Pipe.....	143.40	18.10
33 31 11 00-0289 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) <small>(33 31 11 00-0277)</small>		
33 31 11 00-0290 EA 4" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	79.25	
33 31 11 00-0291 EA 6" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	109.05	
33 31 11 00-0292 EA 8" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	152.78	
33 31 11 00-0293 EA 10" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	264.11	
33 31 11 00-0294 EA 12" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	282.88	
33 31 11 00-0295 EA 15" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	475.93	
33 31 11 00-0296 EA 18" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	757.56	
33 31 11 00-0297 EA 21" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,084.88	
33 31 11 00-0298 EA 24" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,412.12	
33 31 11 00-0299 EA 30" 1/4 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,865.93	
33 31 11 00-0300 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) <small>(33 31 11 00-0277)</small>		
33 31 11 00-0301 EA 4" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	73.51	
33 31 11 00-0302 EA 6" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	100.56	
33 31 11 00-0303 EA 8" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	140.42	
33 31 11 00-0304 EA 10" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	240.89	
33 31 11 00-0305 EA 12" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	258.56	
33 31 11 00-0306 EA 15" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	432.97	
33 31 11 00-0307 EA 18" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	687.53	
33 31 11 00-0308 EA 21" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	980.94	
33 31 11 00-0309 EA 24" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,274.42	
33 31 11 00-0310 EA 30" 1/8 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,682.19	
33 31 11 00-0311 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) <small>(33 31 11 00-0277)</small>		
33 31 11 00-0312 EA 4" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	64.91	
33 31 11 00-0313 EA 6" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	82.63	
33 31 11 00-0314 EA 8" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	131.27	
33 31 11 00-0315 EA 10" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	166.45	
33 31 11 00-0316 EA 12" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	232.77	
33 31 11 00-0317 EA 15" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	387.31	
33 31 11 00-0318 EA 18" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	567.48	
33 31 11 00-0319 EA 21" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	874.57	
33 31 11 00-0320 EA 24" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,181.68	
33 31 11 00-0321 EA 30" 1/16 Bend, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC)	1,677.79	

33	33 Utilities
	33 30 Sanitary Sewerage Utilities
	33 31 Sanitary Sewerage Piping



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 31 11 00-0322	Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) ⁽³³⁾		
	<small>31 11 00-0277)</small>		
33 31 11 00-0323	EA 4" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	123.92	
33 31 11 00-0324	EA 6" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	162.14	
33 31 11 00-0325	EA 8" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	295.24	
33 31 11 00-0326	EA 10" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	479.70	
33 31 11 00-0327	EA 12" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	805.43	
33 31 11 00-0328	EA 15" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,152.37	
33 31 11 00-0329	EA 18" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,675.04	
33 31 11 00-0330	EA 21" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,930.02	
33 31 11 00-0331	EA 24" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	2,184.93	
33 31 11 00-0332	EA 30" Wye, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	3,992.82	

33 31 11 00-0333	Tees, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC) ⁽³³⁾		
	<small>31 11 00-0277)</small>		
33 31 11 00-0334	EA 4" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	112.18	
33 31 11 00-0335	EA 6" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	146.04	
33 31 11 00-0336	EA 8" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	262.32	
33 31 11 00-0337	EA 10" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	423.45	
33 31 11 00-0338	EA 12" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	706.61	
33 31 11 00-0339	EA 15" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,009.71	
33 31 11 00-0340	EA 18" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,466.17	
33 31 11 00-0341	EA 21" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,687.76	
33 31 11 00-0342	EA 24" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	1,909.32	
33 31 11 00-0343	EA 30" Tee, Smooth Interior, Double Wall, Corrugated Polyvinyl Chloride (PVC).....	3,475.01	

33 31 11 00-0344	Couplings And Plug Fittings ^(33 31 11)		
33 31 11 00-0345	Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Polyvinyl Chloride (PVC) Flexible Pipe Couplings ^(33 31 11 00-0344)		
	<small>Note: For cast iron or plastic to cast iron to plastic pipe. Includes stainless steel clamps.</small>		
33 31 11 00-0346	EA 1-1/2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-150).....	19.61	6.98
33 31 11 00-0347	EA 2" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-22).....	21.45	8.14
33 31 11 00-0348	EA 3" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-33).....	24.81	9.30
33 31 11 00-0349	EA 4" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-44).....	28.11	9.89
33 31 11 00-0350	EA 5" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-55).....	34.42	10.47
33 31 11 00-0351	EA 6" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-66).....	40.75	11.63
33 31 11 00-0352	EA 8" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-88).....	51.82	12.80
33 31 11 00-0353	EA 10" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-1010).....	63.98	13.37
33 31 11 00-0354	EA 12" Cast Iron/Plastic To Cast Iron/Plastic, Elastomeric Flexible Pipe Coupling (Fernco 1056-1212).....	105.66	13.96

33 31 11 00-0355	Manhole Inside Bowl Drop ^(33 31 11)		
33 31 11 00-0356	EA Inside Pipe Drop, 4" Outlet for 4' to 5' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A4DB).....	337.28	
33 31 11 00-0357	EA Inside Pipe Drop, 4" Outlet for 6' to 8' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A4R96).....	353.64	
33 31 11 00-0358	EA Inside Pipe Drop, 6" Outlet for 4' to 5' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A6DB).....	362.56	
33 31 11 00-0359	EA Inside Pipe Drop, 6" Outlet for 6' to 8' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A6R96).....	375.02	
33 31 11 00-0360	EA Inside Pipe Drop, 8" Outlet for 4' to 5' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A8DB).....	389.72	
33 31 11 00-0361	EA Inside Pipe Drop, 8" Outlet for 6' to 8' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A8DBR84).....	418.01	
33 31 11 00-0362	EA Inside Pipe Drop, 10" Outlet for 4' to 5' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A10DB).....	435.28	
33 31 11 00-0363	EA Inside Pipe Drop, 10" Outlet for 6' to 8' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner A10R96).....	449.43	
33 31 11 00-0364	EA Inside Pipe Drop, 12" Outlet for 4' to 6' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner 24/12R60).....	774.12	
33 31 11 00-0365	EA Inside Pipe Drop, 12" Outlet for 7' to 8' Diameter Manhole With Stainless Steel Expansion Bolts (Reliner 24/12R96).....	795.34	

33 32 Sanitary Sewerage Equipment ^(33 30)

33 32 16 Packaged Wastewater Grinder Pump Assemblies ^(33 32)

33 32 16 00-0001	Submersible Grinder Pumps, Cast Iron With Bronze Impeller ^(33 32 16)		
33 32 16 00-0002	EA 2 HP Submersible Grinder Pump, 200/208, 230 Volt, 1 Phase, 3450 RPM, 1-1/2" Threaded Discharge..... <small>Note: Zoeller 840 series.</small>	2,174.45	344.71
33 32 16 00-0003	EA 2 HP Submersible Grinder Pump, 200/208, 230, 460 Volt, 3 Phase, 3450 RPM, 1-1/2" Threaded Discharge..... <small>Note: Zoeller 840 series.</small>	2,143.75	344.71
33 32 16 00-0004	EA Simplex Control Panel With Auto Reversing Switch..... <small>Note: For Zoeller 840 series grinder pump.</small>	1,026.85	114.87
33 32 16 00-0005	EA Duplex Control Panel With Auto Reversing Switch..... <small>Note: For Zoeller 840 series grinder pump.</small>	1,597.34	114.87
33 32 16 00-0006	EA Grinder Pump, 120 Gallon Sewage Basin, 1 HP, 120 V (Environment One 2012-74).....	13,355.05	

33 32 16 00-0007	Submersible Grinder Pumps ^(33 32 16)		
	<small>Note: Includes 50' of cord with pumps unless otherwise noted.</small>		
33 32 16 00-0008	EA 2 HP Submersible Grinder Pump At 3,450 RPM, Explosion Proof.....	3,869.36	729.59
33 32 16 00-0009	EA 3 HP Submersible Grinder Pump At 3,450 RPM, Explosion Proof.....	5,764.36	851.19
33 32 16 00-0010	EA 5 HP Submersible Grinder Pump At 3,450 RPM, Explosion Proof.....	7,063.10	1,094.39



	Utilities	33	CS
	Stormwater Utilities	33 40	
	Sanitary Sewerage Equipment	33 32	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

33 40 Stormwater Utilities ⁽³³⁾

33 41 Subdrainage ^(33 40)

33 41 16 Subdrainage Piping ^(33 41)

33 41 16 13 Subdrainage Piping ^(33 41 16)

33 41 16 13-0001 Perforated Polyvinyl Chloride (PVC) Drainage Piping, D2729 ^(33 41 16 13)

Note: Includes fittings, couplings, elbows, etc.

33 41 16 13-0002	LF	3" Perforated Polyvinyl Chloride (PVC) Drainage Piping	8.85	4.06
33 41 16 13-0003	LF	4" Perforated Polyvinyl Chloride (PVC) Drainage Piping	9.71	4.39
33 41 16 13-0004	LF	6" Perforated Polyvinyl Chloride (PVC) Drainage Piping	14.41	5.25
33 41 16 13-0005	LF	8" Perforated Polyvinyl Chloride (PVC) Drainage Piping	23.68	6.57
33 41 16 13-0006	LF	10" Perforated Polyvinyl Chloride (PVC) Drainage Piping	41.06	6.84
33 41 16 13-0007	LF	12" Perforated Polyvinyl Chloride (PVC) Drainage Piping	53.29	7.47
33 41 16 13-0008	LF	15" Perforated Polyvinyl Chloride (PVC) Drainage Piping	74.85	8.41

33 41 16 13-0009 Perforated Non-Reinforced Concrete Drainage Piping, C444 ^(33 41 16 13)

33 41 16 13-0010	LF	6" Perforated Non-Reinforced Concrete Drainage Pipe.....	36.46	13.50
		<i>For Extra Strength, Add</i>	2.02	
		<i>For >1,000, Deduct</i>	-1.82	
33 41 16 13-0011	LF	8" Perforated Non-Reinforced Concrete Drainage Pipe.....	42.60	15.00
		<i>For Extra Strength, Add</i>	2.49	
		<i>For >1,000, Deduct</i>	-2.13	
33 41 16 13-0012	LF	10" Perforated Non-Reinforced Concrete Drainage Pipe.....	48.20	16.50
		<i>For Extra Strength, Add</i>	2.89	
		<i>For >1,000, Deduct</i>	-2.41	
33 41 16 13-0013	LF	12" Perforated Non-Reinforced Concrete Drainage Pipe.....	56.59	17.99
		<i>For Extra Strength, Add</i>	3.63	
		<i>For >1,000, Deduct</i>	-2.83	

33 41 16 13-0014 Extra Strength Porous Non-Reinforced Concrete Drainage Piping, C654 ^(33 41 16 13)

Note: Bell and spigot or tongue and groove. With seals and gaskets.

33 41 16 13-0015	LF	6" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	30.21	13.50
		<i>For >1,000, Deduct</i>	-1.51	
33 41 16 13-0016	LF	8" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	33.43	15.00
		<i>For >1,000, Deduct</i>	-1.67	
33 41 16 13-0017	LF	10" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	36.87	16.50
		<i>For >1,000, Deduct</i>	-1.84	
33 41 16 13-0018	LF	12" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	42.10	17.14
		<i>For >1,000, Deduct</i>	-2.11	
33 41 16 13-0019	LF	15" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	48.90	19.29
		<i>For >1,000, Deduct</i>	-2.45	
33 41 16 13-0020	LF	18" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	60.52	24.64
		<i>For >1,000, Deduct</i>	-3.03	
33 41 16 13-0021	LF	21" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	75.58	31.60
		<i>For >1,000, Deduct</i>	-3.78	
33 41 16 13-0022	LF	24" Extra Strength Porous Non-Reinforced Concrete Drainage Pipe	92.16	38.56
		<i>For >1,000, Deduct</i>	-4.61	

33 41 16 13-0023 Standard Strength Porous Non-Reinforced Concrete Drainage Piping, C654 ^(33 41 16 13)

33 41 16 13-0024	LF	6" Standard Strength Porous Non-Reinforced Concrete Drainage Pipe	28.15	13.50
		<i>For >1,000, Deduct</i>	-1.41	
33 41 16 13-0025	LF	8" Standard Strength Porous Non-Reinforced Concrete Drainage Pipe	35.71	15.00
		<i>For >1,000, Deduct</i>	-1.79	
33 41 16 13-0026	LF	10" Standard Strength Porous Non-Reinforced Concrete Drainage Pipe	45.14	16.50
		<i>For >1,000, Deduct</i>	-2.26	
33 41 16 13-0027	LF	12" Standard Strength Porous Non-Reinforced Concrete Drainage Pipe	54.76	17.99
		<i>For >1,000, Deduct</i>	-2.74	
33 41 16 13-0028	LF	15" Standard Strength Porous Non-Reinforced Concrete Drainage Pipe	62.70	20.02
		<i>For >1,000, Deduct</i>	-3.14	
33 41 16 13-0029	LF	18" Standard Strength Porous Non-Reinforced Concrete Drainage Pipe	81.25	24.97
		<i>For >1,000, Deduct</i>	-4.06	

33 41 16 13-0030 Perforated Vitrified Clay Drainage Piping, C700 ^(33 41 16 13)

33 41 16 13-0031	LF	4" Perforated Vitrified Clay Drainage Pipe	27.80	15.00
33 41 16 13-0032	LF	6" Perforated Vitrified Clay Drainage Pipe	33.14	16.87
33 41 16 13-0033	LF	8" Perforated Vitrified Clay Drainage Pipe	37.65	16.87
33 41 16 13-0034	LF	10" Perforated Vitrified Clay Drainage Pipe	50.35	20.62
33 41 16 13-0035	LF	12" Perforated Vitrified Clay Drainage Pipe	59.73	22.50

33 41 16 13-0036 Geotextile Filter Fabric Sock ^(33 41 16 13)

33 41 16 13-0037	LF	3" Geotextile Filter Fabric Sock	0.87	
33 41 16 13-0038	LF	4" Geotextile Filter Fabric Sock	1.15	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 41 16 13-0039	LF	6" Geotextile Filter Fabric Sock.....	1.75	
33 41 16 13-0040	LF	8" Geotextile Filter Fabric Sock.....	2.35	
33 41 16 13-0041	LF	10" Geotextile Filter Fabric Sock.....	3.50	
33 41 16 13-0042	LF	12" Geotextile Filter Fabric Sock.....	4.81	
33 41 16 13-0043	LF	15" Geotextile Filter Fabric Sock.....	5.76	

33 41 16 13-0044 Prefabricated Composite Drains (33 41 16 13)

33 41 16 13-0045 Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE) (33 41 16 13-0044)

Note: Excludes excavation and backfill. See CSI section 31 23 16 13-0000 for excavation and backfill.

33 41 16 13-0046	LF	12" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	11.61	2.45
		<i>For External Typar Geotextile Wrap, Add</i>	2.11	
33 41 16 13-0047	EA	Coupler For 12" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	52.89	
33 41 16 13-0048	EA	End Cap For 12" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	52.89	
33 41 16 13-0049	EA	Side Outlet For 12" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	101.74	
33 41 16 13-0050	EA	End Outlet For 12" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	101.74	
33 41 16 13-0051	LF	18" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	18.53	3.07
		<i>For External Typar Geotextile Wrap, Add</i>	3.16	
33 41 16 13-0052	EA	Coupler For 18" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	77.97	
33 41 16 13-0053	EA	End Cap For 18" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	77.97	
33 41 16 13-0054	EA	Side Outlet For 18" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	133.44	
33 41 16 13-0055	EA	End Outlet For 18" Height, Panel-Shaped, Oblong Corrugated HDPE Drainage Pipe (ADS AdvanEDGE).....	133.44	

33 41 19 Underslab Drainage (33 41)

33 41 19 13 Underslab Drainage Piping (33 41 19)

33 41 19 13-0001 Capillary Water Barrier Underslab Drainage (33 41 19 13)

Note: Consists of a layer of fine granular material overlying a coarse layer.

33 41 19 13-0002	CY	2" Stone Capillary Water Barrier (Compacted Thickness) Underslab Drainage	68.58	
33 41 19 13-0003	CY	4" Stone Capillary Water Barrier (Compacted Thickness) Underslab Drainage	65.73	
33 41 19 13-0004	CY	6" Stone Capillary Water Barrier (Compacted Thickness) Underslab Drainage	64.58	
33 41 19 13-0005	CY	8" Stone Capillary Water Barrier (Compacted Thickness) Underslab Drainage	62.87	

33 42 Stormwater Conveyance (33 40)

Note: Piping includes hydrostatic testing, disinfecting and warning tape. See CSI section 31 23 16 00-0000 for excavation, 31 23 16 36-0016 for backfill.

33 42 11 Stormwater Gravity Piping (33 42)

33 42 11 00-0001 Reinforced Concrete Piping (33 42 11)

33 42 11 00-0002 Class 3 Reinforced Concrete Pipe Without Gaskets (33 42 11 00-0001)

33 42 11 00-0003	LF	12" Diameter Class 3 Reinforced Concrete Pipe Without Gaskets.....	54.55	17.99
		<i>For >1,000, Deduct</i>	-2.73	
		<i>For Class 4, Add</i>	2.74	
		<i>For Class 5, Add</i>	5.77	
33 42 11 00-0004	LF	15" Diameter Class 3 Reinforced Concrete Pipe Without Gaskets.....	65.52	20.02
		<i>For >1,000, Deduct</i>	-3.28	
		<i>For Class 4, Add</i>	3.51	
		<i>For Class 5, Add</i>	7.38	
33 42 11 00-0005	LF	18" Diameter Class 3 Reinforced Concrete Pipe Without Gaskets.....	74.51	24.97
		<i>For >1,000, Deduct</i>	-3.73	
		<i>For Class 4, Add</i>	3.69	
		<i>For Class 5, Add</i>	7.77	
33 42 11 00-0006	LF	21" Diameter Class 3 Reinforced Concrete Pipe Without Gaskets.....	95.46	31.50
		<i>For >1,000, Deduct</i>	-4.77	
		<i>For Class 4, Add</i>	4.79	
		<i>For Class 5, Add</i>	10.09	
33 42 11 00-0007	LF	24" Diameter Class 3 Reinforced Concrete Pipe Without Gaskets.....	111.74	38.25
		<i>For >1,000, Deduct</i>	-5.59	
		<i>For Class 4, Add</i>	5.42	
		<i>For Class 5, Add</i>	11.42	

33 42 11 00-0008 Concrete Reducing Wye Without Gaskets (33 42 11 00-0001)

33 42 11 00-0009	EA	12" Concrete Reducing Wye Without Gaskets.....	667.71	68.57
33 42 11 00-0010	EA	15" Concrete Reducing Wye Without Gaskets.....	800.68	83.56
33 42 11 00-0011	EA	18" Concrete Reducing Wye Without Gaskets.....	989.67	92.13
33 42 11 00-0012	EA	21" Concrete Reducing Wye Without Gaskets.....	1,135.62	113.56
33 42 11 00-0013	EA	24" Concrete Reducing Wye Without Gaskets.....	1,283.23	137.12

33 42 11 00-0014 Concrete Pipe Joint Gaskets (33 42 11 00-0001)

33 42 11 00-0015	EA	12" Diameter Concrete Pipe Joint Gasket	6.39	
33 42 11 00-0016	EA	15" Diameter Concrete Pipe Joint Gasket	7.56	
33 42 11 00-0017	EA	18" Diameter Concrete Pipe Joint Gasket	8.76	
33 42 11 00-0018	EA	21" Diameter Concrete Pipe Joint Gasket	10.59	
33 42 11 00-0019	EA	24" Diameter Concrete Pipe Joint Gasket	12.41	



	Utilities	33	
	Stormwater Utilities	33 40	CS
	Stormwater Conveyance	33 42	

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 42 11 00-0020			Precast Concrete Cut Off Wall <small>(33 42 11 00-0001)</small>		
33 42 11 00-0021	EA		12" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	290.31	200.77
33 42 11 00-0022	EA		15" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	358.09	248.67
33 42 11 00-0023	EA		18" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	444.14	314.84
33 42 11 00-0024	EA		21" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	525.61	376.43
33 42 11 00-0025	EA		24" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	604.68	435.63
33 42 11 00-0026	EA		27" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	745.59	556.66
33 42 11 00-0027	EA		30" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	975.55	766.56
33 42 11 00-0028	EA		36" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	1,216.25	967.32
33 42 11 00-0029	EA		42" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	1,501.98	1,213.48
33 42 11 00-0030	EA		48" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	1,681.11	1,367.71
33 42 11 00-0031	EA		54" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	1,876.95	1,533.11
33 42 11 00-0032	EA		60" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	2,075.57	1,703.08
33 42 11 00-0033	EA		66" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	2,156.71	1,768.10
33 42 11 00-0034	EA		72" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	2,228.07	1,825.13
33 42 11 00-0035	EA		78" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	2,299.43	1,882.17
33 42 11 00-0036	EA		84" ID Pipe, 18" Thick, 36" High, Precast Concrete Cut Off Wall	2,372.58	1,939.20

33 42 11 00-0037			Strap Assembly <small>(33 42 11 00-0001)</small>		
Note: Includes drilling holes in concrete pipe, setting threaded rod, bolts, and mounting the 12' strap.					
33 42 11 00-0038	EA		Up To 24" Diameter Pipe, 12' Strap Assembly	253.50	
33 42 11 00-0039	EA		>24" Diameter Pipe, 12' Strap Assembly	358.06	

33 42 11 00-0040			Prestressed Concrete Cylinder Piping <small>(33 42 11)</small>		
33 42 11 00-0041			150 PSI Prestressed Concrete Cylinder Pipe And Fittings <small>(33 42 11 00-0040)</small>		
33 42 11 00-0042			150 PSI Prestressed Concrete Cylinder Pipe With Gaskets <small>(33 42 11 00-0041)</small>		
Note: Lined-cylinder pipe (AWWA C301) up to 48". Embedded-cylinder pipe (AWWA C301) >48".					
33 42 11 00-0043	LF		12" 150 PSI Prestressed Concrete Cylinder Pipe With Gaskets.....	149.92	17.99
			For >1,000, Deduct	-7.50	
			For 100 PSI, Deduct	-31.05	
33 42 11 00-0044	LF		15" 150 PSI Prestressed Concrete Cylinder Pipe With Gaskets.....	159.99	20.02
			For >1,000, Deduct	-8.00	
			For 100 PSI, Deduct	-32.85	
33 42 11 00-0045	LF		18" 150 PSI Prestressed Concrete Cylinder Pipe With Gaskets.....	174.26	24.97
			For >1,000, Deduct	-8.71	
			For 100 PSI, Deduct	-34.65	
33 42 11 00-0046	LF		21" 150 PSI Prestressed Concrete Cylinder Pipe With Gaskets.....	190.77	31.50
			For >1,000, Deduct	-9.54	
			For 100 PSI, Deduct	-36.45	
33 42 11 00-0047	LF		24" 150 PSI Prestressed Concrete Cylinder Pipe With Gaskets.....	207.61	38.25
			For >1,000, Deduct	-10.38	
			For 100 PSI, Deduct	-38.24	

33 42 11 00-0048			150 PSI Prestressed Concrete Cylinder 90 Degree Elbows With Gaskets <small>(33 42 11 00-0041)</small>		
33 42 11 00-0049	EA		12" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	504.16	168.73
33 42 11 00-0050	EA		15" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	697.81	241.04
33 42 11 00-0051	EA		18" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	897.73	321.40
33 42 11 00-0052	EA		21" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	1,097.65	401.74
33 42 11 00-0053	EA		24" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	1,332.90	499.24
33 42 11 00-0054	EA		30" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	1,706.75	669.57
33 42 11 00-0055	EA		42" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	2,468.58	931.96
33 42 11 00-0056	EA		54" 90 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	3,420.23	1,328.92

33 42 11 00-0057			150 PSI Prestressed Concrete Cylinder 45 Degree Elbows With Gaskets <small>(33 42 11 00-0041)</small>		
33 42 11 00-0058	EA		12" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	470.82	168.73
33 42 11 00-0059	EA		15" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	654.67	241.04
33 42 11 00-0060	EA		18" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	846.74	321.40
33 42 11 00-0061	EA		21" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	1,038.82	401.74
33 42 11 00-0062	EA		24" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	1,266.22	499.24
33 42 11 00-0063	EA		30" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	1,615.23	624.57
33 42 11 00-0064	EA		42" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	2,347.65	931.96
33 42 11 00-0065	EA		54" 45 Degree Elbows With Gaskets, 150 PSI Prestressed Concrete Cylinder Piping.....	3,233.53	1,328.92

33 42 11 00-0066			Vitrified Clay Piping <small>(33 42 11)</small>		
33 42 11 00-0067			Extra Strength Vitrified Clay Piping <small>(33 42 11 00-0066)</small>		
33 42 11 00-0068			Plain Joint, Extra Strength, Vitrified Clay Piping <small>(33 42 11 00-0067)</small>		
Note: ASTM C700.					

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 42 11 00-0069	LF	4" Plain Joint, Extra Strength, Vitrified Clay Pipe	22.26
		<i>For 3' Lengths, Add</i>	1.93
		<i>For 2' Lengths, Add</i>	2.57
		<i>For Standard Strength, Deduct</i>	-0.64
		<i>For >1,000, Deduct</i>	-1.11
33 42 11 00-0070	LF	6" Plain Joint, Extra Strength, Vitrified Clay Pipe	36.95
		<i>For 3' Lengths, Add</i>	2.99
		<i>For 2' Lengths, Add</i>	3.99
		<i>For Standard Strength, Deduct</i>	-1.00
		<i>For >1,000, Deduct</i>	-1.85
33 42 11 00-0071	LF	8" Plain Joint, Extra Strength, Vitrified Clay Pipe	44.24
		<i>For 3' Lengths, Add</i>	4.28
		<i>For 2' Lengths, Add</i>	5.71
		<i>For Standard Strength, Deduct</i>	-1.43
		<i>For >1,000, Deduct</i>	-2.21
33 42 11 00-0072	LF	10" Plain Joint, Extra Strength, Vitrified Clay Pipe	53.00
		<i>For 3' Lengths, Add</i>	6.56
		<i>For 2' Lengths, Add</i>	8.74
		<i>For Standard Strength, Deduct</i>	-2.19
		<i>For >1,000, Deduct</i>	-2.65
33 42 11 00-0073	LF	12" Plain Joint, Extra Strength, Vitrified Clay Pipe	64.84
		<i>For 3' Lengths, Add</i>	9.26
		<i>For 2' Lengths, Add</i>	12.34
		<i>For Standard Strength, Deduct</i>	-3.09
		<i>For >1,000, Deduct</i>	-3.24
33 42 11 00-0074		Compression Joint, Extra Strength, Vitrified Clay Piping (33 42 11 00-0067)	
		Note: ASTM C425.	
33 42 11 00-0075	LF	4" Compression Joint, Extra Strength, Vitrified Clay Pipe	31.55
		<i>For 3' Lengths, Add</i>	2.27
		<i>For 2' Lengths, Add</i>	3.03
		<i>For Standard Strength, Deduct</i>	-0.76
		<i>For >1,000, Deduct</i>	-1.58
33 42 11 00-0076	LF	6" Compression Joint, Extra Strength, Vitrified Clay Pipe	39.35
		<i>For 3' Lengths, Add</i>	3.71
		<i>For 2' Lengths, Add</i>	4.95
		<i>For Standard Strength, Deduct</i>	-1.24
		<i>For >1,000, Deduct</i>	-1.97
33 42 11 00-0077	LF	8" Compression Joint, Extra Strength, Vitrified Clay Pipe	47.45
		<i>For 3' Lengths, Add</i>	5.24
		<i>For 2' Lengths, Add</i>	6.99
		<i>For Standard Strength, Deduct</i>	-1.75
		<i>For >1,000, Deduct</i>	-2.37
33 42 11 00-0078	LF	10" Compression Joint, Extra Strength, Vitrified Clay Pipe	59.85
		<i>For 3' Lengths, Add</i>	8.61
		<i>For 2' Lengths, Add</i>	11.48
		<i>For Standard Strength, Deduct</i>	-2.87
		<i>For >1,000, Deduct</i>	-2.99
33 42 11 00-0079	LF	12" Compression Joint, Extra Strength, Vitrified Clay Pipe	71.69
		<i>For 3' Lengths, Add</i>	11.31
		<i>For 2' Lengths, Add</i>	15.08
		<i>For Standard Strength, Deduct</i>	-3.77
		<i>For >1,000, Deduct</i>	-3.58
33 42 11 00-0080		Extra Strength, Vitrified Clay Pipe Fittings (33 42 11 00-0066)	
33 42 11 00-0081		1/8 Bends, Extra Strength, Vitrified Clay (33 42 11 00-0080)	
33 42 11 00-0082		Plain End 1/8 Bend, Extra Strength, Vitrified Clay (33 42 11 00-0081)	
33 42 11 00-0083	EA	4" Plain End 1/8 Bend, Extra Strength, Vitrified Clay	93.34
33 42 11 00-0084	EA	6" Plain End 1/8 Bend, Extra Strength, Vitrified Clay	126.14
33 42 11 00-0085	EA	8" Plain End 1/8 Bend, Extra Strength, Vitrified Clay	180.46
33 42 11 00-0086	EA	10" Plain End 1/8 Bend, Extra Strength, Vitrified Clay	248.04
33 42 11 00-0087	EA	12" Plain End 1/8 Bend, Extra Strength, Vitrified Clay	327.94
33 42 11 00-0088		Compression Joint 1/8 Bends, Extra Strength, Vitrified Clay (33 42 11 00-0081)	
33 42 11 00-0089	EA	4" Compression Joint 1/8 Bend, Extra Strength, Vitrified Clay	105.48
33 42 11 00-0090	EA	6" Compression Joint 1/8 Bend, Extra Strength, Vitrified Clay	150.14
33 42 11 00-0091	EA	8" Compression Joint 1/8 Bend, Extra Strength, Vitrified Clay	203.54
33 42 11 00-0092	EA	10" Compression Joint 1/8 Bend, Extra Strength, Vitrified Clay	272.75
33 42 11 00-0093	EA	12" Compression Joint 1/8 Bend, Extra Strength, Vitrified Clay	346.39
33 42 11 00-0094		1/4 Bends, Extra Strength, Vitrified Clay (33 42 11 00-0080)	
33 42 11 00-0095		Plain End 1/4 Bends, Extra Strength, Vitrified Clay (33 42 11 00-0094)	
33 42 11 00-0096	EA	4" Plain End 1/4 Bend, Extra Strength, Vitrified Clay	109.17
33 42 11 00-0097	EA	6" Plain End 1/4 Bend, Extra Strength, Vitrified Clay	145.20
33 42 11 00-0098	EA	8" Plain End 1/4 Bend, Extra Strength, Vitrified Clay	202.76
33 42 11 00-0099	EA	10" Plain End 1/4 Bend, Extra Strength, Vitrified Clay	272.17
33 42 11 00-0100	EA	12" Plain End 1/4 Bend, Extra Strength, Vitrified Clay	355.12

MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 42 11 00-0101	Compression Joint 1/4 Bends, Extra Strength, Vitrified Clay <small>(33 42 11 00-0094)</small>		
33 42 11 00-0102	EA 4" Compression Joint 1/4 Bend, Extra Strength, Vitrified Clay.....	124.47	
33 42 11 00-0103	EA 6" Compression Joint 1/4 Bend, Extra Strength, Vitrified Clay.....	173.00	
33 42 11 00-0104	EA 8" Compression Joint 1/4 Bend, Extra Strength, Vitrified Clay.....	230.30	
33 42 11 00-0105	EA 10" Compression Joint 1/4 Bend, Extra Strength, Vitrified Clay.....	301.70	
33 42 11 00-0106	EA 12" Compression Joint 1/4 Bend, Extra Strength, Vitrified Clay.....	379.02	

33 42 11 00-0107	Wyes Or Tees, Extra Strength, Vitrified Clay <small>(33 42 11 00-0080)</small>		
33 42 11 00-0108	Plain End Wyes Or Tees, Extra Strength, Vitrified Clay <small>(33 42 11 00-0107)</small>		
33 42 11 00-0109	EA 4" Plain End Wyes Or Tees, Extra Strength, Vitrified Clay	119.90	
33 42 11 00-0110	EA 6" Plain End Wyes Or Tees, Extra Strength, Vitrified Clay	156.57	
33 42 11 00-0111	EA 8" Plain End Wyes Or Tees, Extra Strength, Vitrified Clay	212.89	
33 42 11 00-0112	EA 10" Plain End Wyes Or Tees, Extra Strength, Vitrified Clay	281.19	
33 42 11 00-0113	EA 12" Plain End Wyes Or Tees, Extra Strength, Vitrified Clay	355.63	

33 42 11 00-0114	Compression Joint Wyes Or Tees, Extra Strength, Vitrified Clay <small>(33 42 11 00-0107)</small>		
33 42 11 00-0115	EA 4" Compression Joint Wyes Or Tees, Extra Strength, Vitrified Clay	146.49	
33 42 11 00-0116	EA 6" Compression Joint Wyes Or Tees, Extra Strength, Vitrified Clay	200.98	
33 42 11 00-0117	EA 8" Compression Joint Wyes Or Tees, Extra Strength, Vitrified Clay	264.75	
33 42 11 00-0118	EA 10" Compression Joint Wyes Or Tees, Extra Strength, Vitrified Clay	342.28	
33 42 11 00-0119	EA 12" Compression Joint Wyes Or Tees, Extra Strength, Vitrified Clay	427.17	

33 42 11 00-0120	Vitrified Clay Couplings <small>(33 42 11 00-0066)</small>		
33 42 11 00-0121	Vitrified Clay To Cast Iron Or Plastic Pipe Couplings <small>(33 42 11 00-0120)</small>		
	Note: Stainless steel tightening band at each end (Fernco #1002)		
33 42 11 00-0122	EA 4" x 3" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	33.17	
33 42 11 00-0123	EA 4" x 4" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	32.88	
33 42 11 00-0124	EA 5" x 4" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	44.35	
33 42 11 00-0125	EA 5" x 5" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	42.03	
33 42 11 00-0126	EA 6" x 4" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	53.72	
33 42 11 00-0127	EA 6" x 5" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	55.73	
33 42 11 00-0128	EA 6" x 6" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	51.28	
33 42 11 00-0129	EA 8" x 6" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	72.59	
33 42 11 00-0130	EA 8" x 8" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	67.50	
33 42 11 00-0131	EA 10" x 8" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	93.93	
33 42 11 00-0132	EA 10" x 10" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	86.06	
33 42 11 00-0133	EA 12" x 10" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	115.86	
33 42 11 00-0134	EA 12" x 12" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	97.80	
33 42 11 00-0135	EA 15" x 12" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	192.54	
33 42 11 00-0136	EA 15" x 15" Vitrified Clay To Cast Iron Or Plastic Pipe Coupling	149.50	

33 42 11 00-0137	Vitrified Clay To Vitrified Clay Pipe Non-Shear Couplings <small>(33 42 11 00-0120)</small>		
	Note: Stainless steel tightening band at each end. (NDS Non-shear)		
33 42 11 00-0138	EA 4" x 4" Vitrified Clay To Vitrified Clay Pipe Non-Shear Coupling.....	72.85	
33 42 11 00-0139	EA 6" x 4" Vitrified Clay To Vitrified Clay Pipe Non-Shear Coupling.....	97.23	
33 42 11 00-0140	EA 6" x 6" Vitrified Clay To Vitrified Clay Pipe Non-Shear Coupling.....	102.91	
33 42 11 00-0141	EA 8" x 8" Vitrified Clay To Vitrified Clay Pipe Non-Shear Coupling.....	107.88	
33 42 11 00-0142	EA 10" x 10" Vitrified Clay To Vitrified Clay Pipe Non-Shear Coupling.....	133.47	
33 42 11 00-0143	EA 12" x 12" Vitrified Clay To Vitrified Clay Pipe Non-Shear Coupling.....	155.03	

33 42 11 00-0144	Vitrified Clay To Plastic Pipe Non-Shear Couplings <small>(33 42 11 00-0120)</small>		
	Note: Stainless steel tightening band at each end. (NDS Non-shear)		
33 42 11 00-0145	EA 4" x 4" Vitrified Clay To Plastic Pipe Non-Shear Coupling	74.75	
33 42 11 00-0146	EA 6" x 4" Vitrified Clay To Plastic Pipe Non-Shear Coupling	99.14	
33 42 11 00-0147	EA 6" x 6" Vitrified Clay To Plastic Pipe Non-Shear Coupling	90.67	
33 42 11 00-0148	EA 8" x 8" Vitrified Clay To Plastic Pipe Non-Shear Coupling	119.26	
33 42 11 00-0149	EA 10" x 10" Vitrified Clay To Plastic Pipe Non-Shear Coupling	173.33	
33 42 11 00-0150	EA 12" x 12" Vitrified Clay To Plastic Pipe Non-Shear Coupling	195.97	

33 42 13 Stormwater Culverts (33 42)

33 42 13 13 Precast Concrete Stormwater Culverts (33 42 13)

33 42 13 13-0001 Precast Reinforced Concrete Box Culvert (33 42 13 13)

Note: The quantity required shall be the entire length of the culvert including the length of the cut-off sections. Includes delivery, handling, hoisting into place, alignment, bracing, permanent connections, grouting of joints and caulking of joints. Excludes crane, excavation and backfill. Minimum length 6'-0". See CSI section 01 22 23 00-0775 for crane lifting equipment.			
33 42 13 13-0002	LF 3' x 3' Precast Reinforced Concrete Box Culvert	441.21	57.04
	For Each LF Of Cut-Off Section, Add	17.65	
33 42 13 13-0003	LF 4' x 2' Precast Reinforced Concrete Box Culvert	495.98	57.04
	For Each LF Of Cut-Off Section, Add	19.84	

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 42 13 13-0004	LF 4' x 3' Precast Reinforced Concrete Box Culvert	584.45	57.04
	<i>For Each LF Of Cut-Off Section, Add</i>	23.38	
33 42 13 13-0005	LF 5' x 3' Precast Reinforced Concrete Box Culvert	702.13	71.29
	<i>For Each LF Of Cut-Off Section, Add</i>	28.09	
33 42 13 13-0006	LF 5' x 4' Precast Reinforced Concrete Box Culvert	718.98	71.29
	<i>For Each LF Of Cut-Off Section, Add</i>	28.76	
33 42 13 13-0007	LF 5' x 5' Precast Reinforced Concrete Box Culvert	727.40	71.29
	<i>For Each LF Of Cut-Off Section, Add</i>	29.10	
33 42 13 13-0008	LF 6' x 3' Precast Reinforced Concrete Box Culvert	750.11	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	30.00	
33 42 13 13-0009	LF 6' x 4' Precast Reinforced Concrete Box Culvert	754.32	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	30.17	
33 42 13 13-0010	LF 6' x 6' Precast Reinforced Concrete Box Culvert	830.15	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	33.21	
33 42 13 13-0011	LF 7' x 4' Precast Reinforced Concrete Box Culvert	853.51	85.56
	<i>For Each LF Of Cut-Off Section, Add</i>	34.14	
33 42 13 13-0012	LF 7' x 6' Precast Reinforced Concrete Box Culvert	916.58	116.36
	<i>For Each LF Of Cut-Off Section, Add</i>	36.66	
33 42 13 13-0013	LF 8' x 2' Precast Reinforced Concrete Box Culvert	834.37	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	33.37	
33 42 13 13-0014	LF 8' x 3' Precast Reinforced Concrete Box Culvert	857.73	85.56
	<i>For Each LF Of Cut-Off Section, Add</i>	34.31	
33 42 13 13-0015	LF 8' x 4' Precast Reinforced Concrete Box Culvert	870.36	85.56
	<i>For Each LF Of Cut-Off Section, Add</i>	34.81	
33 42 13 13-0016	LF 8' x 5' Precast Reinforced Concrete Box Culvert	1,051.78	114.07
	<i>For Each LF Of Cut-Off Section, Add</i>	42.07	
33 42 13 13-0017	LF 8' x 6' Precast Reinforced Concrete Box Culvert	1,055.16	114.07
	<i>For Each LF Of Cut-Off Section, Add</i>	42.21	
33 42 13 13-0018	LF 8' x 8' Precast Reinforced Concrete Box Culvert	1,170.02	142.58
	<i>For Each LF Of Cut-Off Section, Add</i>	46.80	
33 42 13 13-0019	LF 9' x 4' Precast Reinforced Concrete Box Culvert	1,160.48	114.07
	<i>For Each LF Of Cut-Off Section, Add</i>	46.42	
33 42 13 13-0020	LF 9' x 6' Precast Reinforced Concrete Box Culvert	1,231.53	142.58
	<i>For Each LF Of Cut-Off Section, Add</i>	49.26	
33 42 13 13-0021	LF 10' x 3' Precast Reinforced Concrete Box Culvert	1,235.74	142.58
	<i>For Each LF Of Cut-Off Section, Add</i>	49.43	
33 42 13 13-0022	LF 10' x 4' Precast Reinforced Concrete Box Culvert	1,496.95	142.58
	<i>For Each LF Of Cut-Off Section, Add</i>	59.88	
33 42 13 13-0023	LF 10' x 5' Precast Reinforced Concrete Box Culvert	1,572.20	171.11
	<i>For Each LF Of Cut-Off Section, Add</i>	62.89	
33 42 13 13-0024	LF 10' x 6' Precast Reinforced Concrete Box Culvert	1,589.05	171.11
	<i>For Each LF Of Cut-Off Section, Add</i>	63.56	
33 42 13 13-0025	LF 10' x 7' Precast Reinforced Concrete Box Culvert	1,593.27	171.11
	<i>For Each LF Of Cut-Off Section, Add</i>	63.73	
33 42 13 13-0026	LF 10' x 8' Precast Reinforced Concrete Box Culvert	1,599.16	171.11
	<i>For Each LF Of Cut-Off Section, Add</i>	63.97	
33 42 13 13-0027	LF 12' x 3' Precast Reinforced Concrete Box Culvert	1,664.31	199.62
	<i>For Each LF Of Cut-Off Section, Add</i>	66.57	
33 42 13 13-0028	LF 12' x 4' Precast Reinforced Concrete Box Culvert	1,664.31	199.62
	<i>For Each LF Of Cut-Off Section, Add</i>	66.57	
33 42 13 13-0029	LF 12' x 6' Precast Reinforced Concrete Box Culvert	1,664.31	199.62
	<i>For Each LF Of Cut-Off Section, Add</i>	66.57	
33 42 13 13-0030	LF 12' x 8' Precast Reinforced Concrete Box Culvert	1,664.31	199.62
	<i>For Each LF Of Cut-Off Section, Add</i>	66.57	
33 42 13 13-0031	LF 16' x 10' Precast Reinforced Concrete Box Culvert	2,413.65	228.14
	<i>For Each LF Of Cut-Off Section, Add</i>	96.55	
33 42 13 13-0032	LF 24' x 10' Precast Reinforced Concrete Box Culvert	3,340.51	228.14
	<i>For Each LF Of Cut-Off Section, Add</i>	133.62	
33 42 13 13-0033	Precast Reinforced Concrete Box Culvert For Roadways <small>(33 42 13 13)</small>		
	Note: AASHTO HL-93 Rated. The quantity required shall be the entire length of the culvert including the length of the cut-off sections. Includes delivery, handling, hoisting into place, alignment, bracing, permanent connections, grouting of joints and caulking of joints. Excludes crane, excavation and backfill. Minimum length 6'-0". See CSI section 01 22 23 00-0775 for crane lifting equipment.		
33 42 13 13-0034	LF 3' x 3' Precast Reinforced Concrete Box Culvert For Roadways	1,086.22	57.04
	<i>For Each LF Of Cut-Off Section, Add</i>	43.45	
33 42 13 13-0035	LF 4' x 2' Precast Reinforced Concrete Box Culvert For Roadways	1,167.15	57.04
	<i>For Each LF Of Cut-Off Section, Add</i>	46.69	
33 42 13 13-0036	LF 4' x 3' Precast Reinforced Concrete Box Culvert For Roadways	1,310.39	57.04
	<i>For Each LF Of Cut-Off Section, Add</i>	52.42	
33 42 13 13-0037	LF 5' x 3' Precast Reinforced Concrete Box Culvert For Roadways	1,482.79	71.29
	<i>For Each LF Of Cut-Off Section, Add</i>	59.31	
33 42 13 13-0038	LF 5' x 4' Precast Reinforced Concrete Box Culvert For Roadways	1,626.02	71.29
	<i>For Each LF Of Cut-Off Section, Add</i>	65.04	
33 42 13 13-0039	LF 5' x 5' Precast Reinforced Concrete Box Culvert For Roadways	1,769.25	71.29
	<i>For Each LF Of Cut-Off Section, Add</i>	70.77	
33 42 13 13-0040	LF 6' x 3' Precast Reinforced Concrete Box Culvert For Roadways	1,631.87	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	65.27	
33 42 13 13-0041	LF 6' x 4' Precast Reinforced Concrete Box Culvert For Roadways	1,775.10	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	71.00	
33 42 13 13-0042	LF 6' x 6' Precast Reinforced Concrete Box Culvert For Roadways	2,061.57	74.14
	<i>For Each LF Of Cut-Off Section, Add</i>	82.46	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 13 13-0043 LF 7' x 4' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	1,941.70 77.67	85.56
33 42 13 13-0044 LF 7' x 6' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,291.20 91.65	116.36
33 42 13 13-0045 LF 8' x 2' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	1,775.10 71.00	74.14
33 42 13 13-0046 LF 8' x 3' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	1,941.70 77.67	85.56
33 42 13 13-0047 LF 8' x 4' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,084.93 83.40	85.56
33 42 13 13-0048 LF 8' x 5' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,286.53 91.46	114.07
33 42 13 13-0049 LF 8' x 6' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,429.76 97.19	114.07
33 42 13 13-0050 LF 8' x 8' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,774.64 110.99	142.58
33 42 13 13-0051 LF 9' x 4' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,453.21 98.13	114.07
33 42 13 13-0052 LF 9' x 6' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,817.75 112.71	142.58
33 42 13 13-0053 LF 10' x 3' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,786.58 111.46	142.58
33 42 13 13-0054 LF 10' x 4' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	2,956.66 118.27	142.58
33 42 13 13-0055 LF 10' x 5' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	3,185.13 127.41	171.11
33 42 13 13-0056 LF 10' x 6' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	3,355.21 134.21	171.11
33 42 13 13-0057 LF 10' x 7' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	3,525.31 141.01	171.11
33 42 13 13-0058 LF 10' x 8' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	3,695.39 147.82	171.11
33 42 13 13-0059 LF 12' x 3' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	3,695.92 147.84	199.62
33 42 13 13-0060 LF 12' x 4' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	3,889.25 155.57	199.62
33 42 13 13-0061 LF 12' x 6' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	4,275.97 171.04	199.62
33 42 13 13-0062 LF 12' x 8' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	4,662.69 186.51	199.62
33 42 13 13-0063 LF 16' x 10' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	5,580.46 223.22	228.14
33 42 13 13-0064 LF 24' x 10' Precast Reinforced Concrete Box Culvert For Roadways <i>For Each LF Of Cut-Off Section, Add</i>	7,041.37 281.65	228.14
 33 42 23 Headwalls and Endwalls for Stormwater Piping (33 42)		
33 42 23 00-0001 Headwalls (33 42 23) <i>Note: Excludes excavation and backfill. Select pipe with closest opening area for square or round culverts.</i>		
33 42 23 00-0002 Cast In Place Concrete Headwalls (33 42 23 00-0001) <i>Note: Includes concrete, forms, rebar (where required), finish and curing.</i>		
33 42 23 00-0003 Skewed Wingwall, Cast In Place Concrete Headwall (33 42 23 00-0002) <i>Note: Sized by pipe diameter.</i>		
33 42 23 00-0004 EA 12" Pipe, Skewed Wingwall, Cast In Place Concrete Headwall.....	1,642.57	689.99
33 42 23 00-0005 Precast Concrete Headwalls (33 42 23 00-0001)		
33 42 23 00-0006 EA 12" Pipe, Precast Concrete Headwall.....	994.41	192.83
33 42 23 00-0007 Precast Concrete Wingwalls (33 42 23 00-0001)		
33 42 23 00-0008 EA 18" ID Pipe (26" Hole) Precast Concrete Wingwall..... <i>Note: 12" Thick wall and base. Wingwalls are configured at 0-30 degrees off centerline of pipe.</i>	6,135.41	2,032.75
33 42 23 00-0009 EA 24" ID Pipe (32" Hole) Precast Concrete Wingwall..... <i>Note: 12" Thick wall and base. Wingwalls are configured at 0-30 degrees off centerline of pipe.</i>	6,477.62	2,258.60
 33 42 26 End Sections for Stormwater Piping (33 42)		
33 42 26 23 Concrete End Sections for Stormwater Piping (33 42 26)		
33 42 26 23-0001 Precast Concrete End Sections (33 42 26 23)		
33 42 26 23-0002 Precast Concrete End Sections (33 42 26 23-0001)		
33 42 26 23-0003 EA 12" Diameter Pipe, Precast Concrete End Section.....	721.55	125.67
33 42 26 23-0004 EA 15" Diameter Pipe, Precast Concrete End Section.....	967.64	155.55
33 42 26 23-0005 EA 18" Diameter Pipe, Precast Concrete End Section.....	1,198.42	196.91
33 42 26 23-0006 EA 21" Diameter Pipe, Precast Concrete End Section.....	1,375.99	235.47
33 42 26 23-0007 EA 24" Diameter Pipe, Precast Concrete End Section.....	1,464.09	272.54
33 42 26 23-0008 Flared Precast Concrete End Sections (33 42 26 23-0001)		

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 42 26 23-0009	EA	12" Diameter Pipe, Flared Precast Concrete End Section	905.16	132.89
33 42 26 23-0010	EA	15" Diameter Pipe, Flared Precast Concrete End Section	1,090.35	165.63
33 42 26 23-0011	EA	18" Diameter Pipe, Flared Precast Concrete End Section	1,324.38	209.67
33 42 26 23-0012	EA	21" Diameter Pipe, Flared Precast Concrete End Section	1,514.15	250.72
33 42 26 23-0013	EA	24" Diameter Pipe, Flared Precast Concrete End Section	1,846.44	290.20

33 42 31 Stormwater Area Drains and Inlets (33 42)

33 42 31 00-0001 Storm Drains (33 42 31)

33 42 31 00-0002 Catch Basins And Inlet Basins (33 42 31 00-0001)

Note: Includes base slab, opening and grout. Excludes frame, grate, excavation and backfill.

33 42 31 00-0003 Cast In Place, Grate Drop Inlet Basins (33 42 31 00-0002)

Note: Inside dimensions.

33 42 31 00-0004 3' x 3' x 4" Thick Wall, Cast In Place, Grate Drop Inlet Basins (33 42 31 00-0003)

33 42 31 00-0005	EA	2' Deep, 3' x 3' x 4" Thick Wall, Cast In Place, Grate Drop Inlet Basin	1,825.72	339.38
33 42 31 00-0006	EA	3' Deep, 3' x 3' x 4" Thick Wall, Cast In Place, Grate Drop Inlet Basin	2,180.27	397.64
33 42 31 00-0007	EA	4' Deep, 3' x 3' x 4" Thick Wall, Cast In Place, Grate Drop Inlet Basin	2,534.80	455.80
33 42 31 00-0008	EA	5' Deep, 3' x 3' x 4" Thick Wall, Cast In Place, Grate Drop Inlet Basin	2,889.34	514.07
33 42 31 00-0009	EA	6' Deep, 3' x 3' x 4" Thick Wall, Cast In Place, Grate Drop Inlet Basin	3,243.88	572.23

33 42 31 00-0010 3'-8" x 3'-8" x 6" Thick Wall, Cast In Place, Grate Drop Inlet Basins (33 42 31 00-0003)

33 42 31 00-0011	EA	2' Deep, 3'-8" x 3'-8" x 6" Thick Wall, Cast In Place, Grate Drop Inlet Basin	2,344.29	337.33
33 42 31 00-0012	EA	3' Deep, 3'-8" x 3'-8" x 6" Thick Wall, Cast In Place, Grate Drop Inlet Basin	2,901.68	449.77
33 42 31 00-0013	EA	4' Deep, 3'-8" x 3'-8" x 6" Thick Wall, Cast In Place, Grate Drop Inlet Basin	3,705.55	613.33
33 42 31 00-0014	EA	5' Deep, 3'-8" x 3'-8" x 6" Thick Wall, Cast In Place, Grate Drop Inlet Basin	4,512.87	715.55
33 42 31 00-0015	EA	6' Deep, 3'-8" x 3'-8" x 6" Thick Wall, Cast In Place, Grate Drop Inlet Basin	5,151.57	817.77

33 42 31 00-0016 4' x 4' x 8" Thick Wall, Cast In Place, Grate Drop Inlet Basins (33 42 31 00-0003)

33 42 31 00-0017	EA	2' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Grate Drop Inlet Basin	2,519.63	367.99
33 42 31 00-0018	EA	3' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Grate Drop Inlet Basin	3,490.30	511.11
33 42 31 00-0019	EA	4' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Grate Drop Inlet Basin	4,265.36	664.44
33 42 31 00-0020	EA	5' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Grate Drop Inlet Basin	4,925.64	766.66
33 42 31 00-0021	EA	6' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Grate Drop Inlet Basin	6,247.79	981.32

33 42 31 00-0022 Cast In Place, Catch Basin (33 42 31 00-0002)

Note: Inside span, overall depth. Includes concrete, forms, rebar (where required), finish and curing.

33 42 31 00-0023 3' x 3', Cast In Place, Catch Basins (33 42 31 00-0022)

33 42 31 00-0024	EA	3' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	2,288.28	410.31
33 42 31 00-0025	EA	3'-6" Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	2,424.57	436.28
33 42 31 00-0026	EA	4' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	2,664.08	468.58
33 42 31 00-0027	EA	4'-6" Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	2,990.42	518.67
33 42 31 00-0028	EA	5' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	3,239.46	552.09
33 42 31 00-0029	EA	5'-6" Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	3,388.94	578.98
33 42 31 00-0030	EA	6' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	3,638.18	612.41
33 42 31 00-0031	EA	6'-6" Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	3,784.04	639.39
33 42 31 00-0032	EA	7' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	4,035.01	672.71
33 42 31 00-0033	EA	7'-6" Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	4,182.75	699.70
33 42 31 00-0034	EA	8' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	4,431.90	733.13
33 42 31 00-0035	VLF	>8' Deep, 3' x 3' x 6" Thick Wall, Cast In Place, Catch Basin	554.01	91.59

33 42 31 00-0036 3'-6" x 3'-6", Cast In Place, Catch Basins (33 42 31 00-0022)

33 42 31 00-0037	EA	3' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	2,627.32	474.31
33 42 31 00-0038	EA	3'-6" Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	2,800.06	507.63
33 42 31 00-0039	EA	4' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,048.73	541.06
33 42 31 00-0040	EA	4'-6" Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,430.13	599.22
33 42 31 00-0041	EA	5' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,702.03	637.04
33 42 31 00-0042	EA	5'-6" Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,874.18	668.42
33 42 31 00-0043	EA	6' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	4,149.49	706.24
33 42 31 00-0044	EA	6'-6" Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	4,321.64	737.63
33 42 31 00-0045	EA	7' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	4,595.15	775.45
33 42 31 00-0046	EA	7'-6" Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	4,767.37	806.83
33 42 31 00-0047	EA	8' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	5,041.00	844.65
33 42 31 00-0048	VLF	>8' Deep, 3'-6" x 3'-6" x 6" Thick Wall, Cast In Place, Catch Basin	630.15	105.59

33 42 31 00-0049 4' x 4', Cast In Place, Catch Basins (33 42 31 00-0022)

33 42 31 00-0050	EA	3' Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	2,990.33	542.58
33 42 31 00-0051	EA	3'-6" Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	3,172.26	577.03
33 42 31 00-0052	EA	4' Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	3,455.66	617.82
33 42 31 00-0053	EA	4'-6" Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	3,892.71	684.16
33 42 31 00-0054	EA	5' Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	4,190.80	726.38
33 42 31 00-0055	EA	5'-6" Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	4,387.29	762.26
33 42 31 00-0056	EA	6' Deep, 4' x 4' x 6" Thick Wall, Cast In Place, Catch Basin	4,685.38	804.48

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 31 00-0057 EA 6'-6" Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Catch Basin	4,881.80	840.36
33 42 31 00-0058 EA 7' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Catch Basin	5,179.88	882.58
33 42 31 00-0059 EA 7'-6" Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Catch Basin	5,376.37	918.45
33 42 31 00-0060 EA 8' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Catch Basin	5,674.46	960.77
33 42 31 00-0061 VLF >8' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Catch Basin	709.27	120.11
33 42 31 00-0062 4'-6" x 4'-6", Cast In Place, Catch Basins (33 42 31 00-0022)		
33 42 31 00-0063 EA 3' Deep, 4'-6" x 4'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,452.96	629.17
33 42 31 00-0064 EA 3'-6" Deep, 4'-6" x 4'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,665.67	664.74
33 42 31 00-0065 EA 4' Deep, 4'-6" x 4'-6" x 6" Thick Wall, Cast In Place, Catch Basin	3,978.18	710.74
33 42 31 00-0066 EA 4'-6" Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	4,476.78	786.18
33 42 31 00-0067 EA 5' Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	4,806.37	833.81
33 42 31 00-0068 EA 5'-6" Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	5,034.48	875.01
33 42 31 00-0069 EA 6' Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	5,364.15	922.64
33 42 31 00-0070 EA 6'-6" Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	5,592.26	963.94
33 42 31 00-0071 EA 7' Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	5,921.85	1,011.58
33 42 31 00-0072 EA 7'-6" Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	6,148.24	1,052.77
33 42 31 00-0073 EA 8' Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	6,479.63	1,100.41
33 42 31 00-0074 VLF >8' Deep, 4'-6" x 4'-6" x 8" Thick Wall, Cast In Place, Catch Basin	810.00	137.59
33 42 31 00-0075 5' x 5', Cast In Place, Catch Basins (33 42 31 00-0022)		
33 42 31 00-0076 EA 4' Deep, 5' x 5' x 6" Thick Wall, Cast In Place, Catch Basin	4,447.38	798.04
33 42 31 00-0077 EA 4'-6" Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	5,002.75	881.86
33 42 31 00-0078 EA 5' Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	5,358.93	934.09
33 42 31 00-0079 EA 5'-6" Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	5,611.90	979.89
33 42 31 00-0080 EA 6' Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	5,964.57	1,032.02
33 42 31 00-0081 EA 6'-6" Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	6,219.27	1,077.81
33 42 31 00-0082 EA 7' Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	6,573.74	1,130.05
33 42 31 00-0083 EA 7'-6" Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	6,824.92	1,175.85
33 42 31 00-0084 EA 8' Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	7,181.10	1,227.98
33 42 31 00-0085 VLF >8' Deep, 5' x 5' x 8" Thick Wall, Cast In Place, Catch Basin	1,362.77	153.53
33 42 31 00-0086 5'-6" x 5'-6", Cast In Place, Catch Basins (33 42 31 00-0022)		
33 42 31 00-0087 EA 4' Deep, 5'-6" x 5'-6" x 6" Thick Wall, Cast In Place, Catch Basin	4,939.28	889.94
33 42 31 00-0088 EA 4'-6" Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	5,745.91	1,007.39
33 42 31 00-0089 EA 5' Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	6,138.90	1,065.44
33 42 31 00-0090 EA 5'-6" Deep, 5'-6" x 5' x 8" Thick Wall, Cast In Place, Catch Basin	6,428.70	1,117.47
33 42 31 00-0091 EA 6' Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	6,823.48	1,175.95
33 42 31 00-0092 EA 6'-6" Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	7,115.00	1,227.98
33 42 31 00-0093 EA 7' Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	7,507.99	1,286.45
33 42 31 00-0094 EA 7'-6" Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	7,797.78	1,338.48
33 42 31 00-0095 EA 8' Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	8,190.77	1,396.95
33 42 31 00-0096 VLF >8' Deep, 5'-6" x 5'-6" x 8" Thick Wall, Cast In Place, Catch Basin	1,023.84	174.59
33 42 31 00-0097 6' x 6', Cast In Place, Catch Basins (33 42 31 00-0022)		
33 42 31 00-0098 EA 4' Deep, 6' x 6' x 6" Thick Wall, Cast In Place, Catch Basin	5,457.36	986.12
33 42 31 00-0099 EA 4'-6" Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	6,346.40	1,115.03
33 42 31 00-0100 EA 5' Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	6,766.59	1,178.19
33 42 31 00-0101 EA 5'-6" Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	7,083.51	1,234.93
33 42 31 00-0102 EA 6' Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	7,501.99	1,298.11
33 42 31 00-0103 EA 6'-6" Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	7,820.70	1,354.83
33 42 31 00-0104 EA 7' Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	8,239.11	1,418.01
33 42 31 00-0105 EA 7'-6" Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	8,556.10	1,474.74
33 42 31 00-0106 EA 8' Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	8,976.30	1,537.91
33 42 31 00-0107 VLF >8' Deep, 6' x 6' x 8" Thick Wall, Cast In Place, Catch Basin	1,122.09	192.27
33 42 31 00-0108 6'-6" x 6'-6", Cast In Place, Catch Basins (33 42 31 00-0022)		
33 42 31 00-0109 EA 4' Deep, 6'-6" x 6'-6" x 6" Thick Wall, Cast In Place, Catch Basin	5,998.10	1,086.92
33 42 31 00-0110 EA 4'-6" Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	7,217.08	1,259.25
33 42 31 00-0111 EA 5' Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	7,677.75	1,329.18
33 42 31 00-0112 EA 5'-6" Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	8,036.85	1,392.66
33 42 31 00-0113 EA 6' Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	8,497.52	1,462.47
33 42 31 00-0114 EA 6'-6" Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	8,856.62	1,526.06
33 42 31 00-0115 EA 7' Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	9,317.28	1,595.87
33 42 31 00-0116 EA 7'-6" Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	9,676.39	1,659.35
33 42 31 00-0117 EA 8' Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	10,138.85	1,729.27
33 42 31 00-0118 VLF >8' Deep, 6'-6" x 6'-6" x 8" Thick Wall, Cast In Place, Catch Basin	1,267.30	216.20
33 42 31 00-0119 7' x 7', Cast In Place, Catch Basins (33 42 31 00-0022)		
33 42 31 00-0120 EA 4' Deep, 7' x 7' x 6" Thick Wall, Cast In Place, Catch Basin	6,563.43	1,192.10
33 42 31 00-0121 EA 4'-6" Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	7,897.95	1,380.19
33 42 31 00-0122 EA 5' Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	8,386.45	1,455.01
33 42 31 00-0123 EA 5'-6" Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	8,771.67	1,523.29
33 42 31 00-0124 EA 6' Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	9,261.78	1,598.02

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	33 42 31 00-0125	EA	6'-6" Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	9,647.00	1,666.40
	33 42 31 00-0126	EA	7' Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	10,135.49	1,741.13
	33 42 31 00-0127	EA	7'-6" Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	10,522.43	1,809.52
	33 42 31 00-0128	EA	8' Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	11,010.82	1,884.23
	33 42 31 00-0129	VLF	>8' Deep, 7' x 7' x 8" Thick Wall, Cast In Place, Catch Basin	1,376.40	235.52
33 42 31 00-0130			7'-6" x 7'-6", Cast In Place, Catch Basins (33 42 31 00-0022)		
	33 42 31 00-0131	EA	4' Deep, 7'-6" x 7'-6" x 6" Thick Wall, Cast In Place, Catch Basin	7,432.37	1,337.97
	33 42 31 00-0132	EA	4'-6" Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	8,606.76	1,506.02
	33 42 31 00-0133	EA	5' Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	9,121.28	1,585.65
	33 42 31 00-0134	EA	5'-6" Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	9,536.03	1,658.84
	33 42 31 00-0135	EA	6' Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	10,052.17	1,738.47
	33 42 31 00-0136	EA	6'-6" Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	10,466.92	1,811.66
	33 42 31 00-0137	EA	7' Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	10,981.44	1,891.29
	33 42 31 00-0138	EA	7'-6" Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	11,396.19	1,964.48
	33 42 31 00-0139	EA	8' Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	11,912.43	2,044.11
	33 42 31 00-0140	VLF	>8' Deep, 7'-6" x 7'-6" x 8" Thick Wall, Cast In Place, Catch Basin	1,489.01	255.55
33 42 31 00-0141			8' x 8', Cast In Place, Catch Basins (33 42 31 00-0022)		
	33 42 31 00-0142	EA	4' Deep, 8' x 8' x 6" Thick Wall, Cast In Place, Catch Basin	8,073.15	1,455.73
	33 42 31 00-0143	EA	4'-6" Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	9,341.47	1,636.76
	33 42 31 00-0144	EA	5' Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	9,883.84	1,721.19
	33 42 31 00-0145	EA	5'-6" Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	10,326.41	1,799.29
	33 42 31 00-0146	EA	6' Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	10,868.66	1,883.73
	33 42 31 00-0147	EA	6'-6" Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	11,307.79	1,961.83
	33 42 31 00-0148	EA	7' Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	11,853.49	2,046.25
	33 42 31 00-0149	EA	7'-6" Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	12,296.07	2,124.35
	33 42 31 00-0150	EA	8' Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	12,829.24	2,208.79
	33 42 31 00-0151	VLF	>8' Deep, 8' x 8' x 8" Thick Wall, Cast In Place, Catch Basin	1,604.80	276.10
33 42 31 00-0152			Precast Concrete Catch Basins (33 42 31 00-0002)		
			Note: Inside dimensions.		
33 42 31 00-0153			1'-6" Diameter Precast Catch Basins (33 42 31 00-0152)		
	33 42 31 00-0154	EA	4' Deep, 1'-6" Diameter Precast Catch Basins	734.85	230.77
	33 42 31 00-0155	EA	6' Deep, 1'-6" Diameter Precast Catch Basins	1,023.81	346.15
	33 42 31 00-0156	EA	8' Deep, 1'-6" Diameter Precast Catch Basins	1,298.77	449.99
	33 42 31 00-0157	EA	10' Deep, 1'-6" Diameter Precast Catch Basins	1,554.74	531.91
	33 42 31 00-0158	EA	12' Deep, 1'-6" Diameter Precast Catch Basins	1,915.99	674.98
	33 42 31 00-0159	EA	14' Deep, 1'-6" Diameter Precast Catch Basins	2,192.38	778.83
	33 42 31 00-0160	VLF	Vertical Linear Foot Over 14' Deep, 1'-6" Diameter Precast Catch Basins	152.82	51.92
33 42 31 00-0161			2' Diameter Precast Catch Basins (33 42 31 00-0152)		
	33 42 31 00-0162	EA	4' Deep, 2' Diameter Precast Catch Basin	836.93	256.72
	33 42 31 00-0163	EA	6' Deep, 2' Diameter Precast Catch Basin	1,159.66	380.76
	33 42 31 00-0164	EA	8' Deep, 2' Diameter Precast Catch Basin	1,465.30	501.92
	33 42 31 00-0165	EA	10' Deep, 2' Diameter Precast Catch Basin	1,748.38	585.57
	33 42 31 00-0166	EA	12' Deep, 2' Diameter Precast Catch Basin	2,167.86	749.99
	33 42 31 00-0167	EA	14' Deep, 2' Diameter Precast Catch Basin	2,477.43	865.37
	33 42 31 00-0168	VLF	Vertical Linear Foot Over 14' Deep, 2' Diameter Precast Catch Basin	172.74	62.30
33 42 31 00-0169			3' Diameter Precast Catch Basins (33 42 31 00-0152)		
	33 42 31 00-0170	EA	4' Deep, 3' Diameter Precast Catch Basin	1,102.02	302.88
	33 42 31 00-0171	EA	6' Deep, 3' Diameter Precast Catch Basin	1,506.48	447.69
	33 42 31 00-0172	EA	8' Deep, 3' Diameter Precast Catch Basin	1,894.70	591.34
	33 42 31 00-0173	EA	10' Deep, 3' Diameter Precast Catch Basin	2,359.66	738.45
	33 42 31 00-0174	EA	12' Deep, 3' Diameter Precast Catch Basin	2,788.05	880.37
	33 42 31 00-0175	EA	14' Deep, 3' Diameter Precast Catch Basin	3,201.98	1,024.60
	33 42 31 00-0176	VLF	Vertical Linear Foot Over 14' Deep, 3' Diameter Precast Catch Basin	220.47	73.18
33 42 31 00-0177			4' Diameter Precast Catch Basins (33 42 31 00-0152)		
	33 42 31 00-0178	EA	4' Deep, 4' Diameter Precast Catch Basin	1,331.09	336.92
	33 42 31 00-0179	EA	6' Deep, 4' Diameter Precast Catch Basin	1,732.82	461.53
	33 42 31 00-0180	EA	8' Deep, 4' Diameter Precast Catch Basin	2,325.58	692.30
	33 42 31 00-0181	EA	10' Deep, 4' Diameter Precast Catch Basin	2,902.08	865.37
	33 42 31 00-0182	EA	12' Deep, 4' Diameter Precast Catch Basin	3,431.49	1,038.44
	33 42 31 00-0183	EA	14' Deep, 4' Diameter Precast Catch Basin	3,944.83	1,211.52
	33 42 31 00-0184	VLF	Vertical Linear Foot Over 14' Deep, 4' Diameter Precast Catch Basin	270.96	86.53
33 42 31 00-0185			5' Diameter Precast Catch Basins (33 42 31 00-0152)		
	33 42 31 00-0186	EA	4' Deep, 5' Diameter Precast Catch Basin	1,792.51	461.53
	33 42 31 00-0187	EA	6' Deep, 5' Diameter Precast Catch Basin	2,458.24	692.30
	33 42 31 00-0188	EA	8' Deep, 5' Diameter Precast Catch Basin	3,127.37	923.06

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 31 00-0189 EA 10' Deep, 5' Diameter Precast Catch Basin.....	3,826.09	1,153.82
33 42 31 00-0190 EA 12' Deep, 5' Diameter Precast Catch Basin.....	4,514.96	1,384.59
33 42 31 00-0191 EA 14' Deep, 5' Diameter Precast Catch Basin.....	5,255.68	1,615.36
33 42 31 00-0192 VLF Vertical Linear Foot Over 14' Deep, 5' Diameter Precast Catch Basin.....	360.53	115.38
33 42 31 00-0193 6' Diameter Precast Catch Basins (33 42 31 00-0152)		
33 42 31 00-0194 EA 4' Deep, 6' Diameter Precast Catch Basin.....	2,624.05	692.30
33 42 31 00-0195 EA 6' Deep, 6' Diameter Precast Catch Basin.....	3,564.15	1,038.44
33 42 31 00-0196 EA 8' Deep, 6' Diameter Precast Catch Basin.....	4,568.56	1,384.59
33 42 31 00-0197 EA 10' Deep, 6' Diameter Precast Catch Basin.....	5,694.11	1,730.74
33 42 31 00-0198 EA 12' Deep, 6' Diameter Precast Catch Basin.....	6,786.51	2,076.89
33 42 31 00-0199 EA 14' Deep, 6' Diameter Precast Catch Basin.....	7,854.76	2,423.04
33 42 31 00-0200 VLF Vertical Linear Foot Over 14' Deep, 6' Diameter Precast Catch Basin.....	537.49	173.08
33 42 31 00-0201 Precast Catch Basins Accessories (33 42 31 00-0152)		
33 42 31 00-0202 EA Single Or Double Wing Slab Top With Throat.....	1,606.57	749.99
33 42 31 00-0203 EA 4' x 4' Weir Box, Precast Catch Basin.....	720.48	92.30
33 42 31 00-0204 EA 4' Diameter Inlet Round To Square Adapter, Precast Catch Basin.....	408.45	98.08
33 42 31 00-0205 EA 3' Diameter, Up To 6" High, Precast Extension Ring.....	510.73	144.22
For Each Additional Inch In Height, Add	61.06	
33 42 31 00-0206 EA 4' Diameter, Up To 6" High, Precast Extension Ring.....	602.67	173.08
For Each Additional Inch In Height, Add	71.57	
33 42 31 00-0207 EA 5' Diameter, Up To 6" High, Precast Extension Ring.....	702.92	201.92
For Each Additional Inch In Height, Add	83.54	
33 42 31 00-0208 EA 6' Diameter, Up To 6" High, Precast Extension Ring.....	882.50	288.46
For Each Additional Inch In Height, Add	99.06	
33 42 31 00-0209 EA Adjust Existing Catch Basin Inlet Grate To Match Grade.....	692.26	
33 42 31 00-0210 Catch Basin Risers (33 42 31 00-0152)		
33 42 31 00-0211 EA Up To 860 Square Inch, Up To 2" Rise, Catch Basin Riser.....	420.10	
33 42 31 00-0212 EA >860 To 1140 Square Inch, Up To 2" Rise, Catch Basin Riser.....	468.68	
33 42 31 00-0213 EA >1140 Square Inch, Up To 2" Rise, Catch Basin Riser.....	526.42	
33 42 31 00-0214 EA Up To 860 Square Inch, >2" To 3" Rise, Catch Basin Riser.....	452.22	
33 42 31 00-0215 EA >860 To 1140 Square Inch, >2" To 3" Rise, Catch Basin Riser.....	504.06	
33 42 31 00-0216 EA >1140 Square Inch, >2" To 3" Rise, Catch Basin Riser.....	568.07	
33 42 31 00-0217 EA Up To 860 Square Inch, >3" To 4" Rise, Catch Basin Riser.....	500.09	
33 42 31 00-0218 EA >860 To 1140 Square Inch, >3" To 4" Rise, Catch Basin Riser.....	546.15	
33 42 31 00-0219 EA >1140 Square Inch, >3" To 4" Rise, Catch Basin Riser.....	610.39	
33 42 31 00-0220 Cast In Place, Storm Drain Cleanout (33 42 31 00-0002)		
Note: Inside span.		
33 42 31 00-0221 EA 6' Deep, 4' x 4' x 8" Thick Wall, Cast In Place, Storm Drain Cleanout.....	4,824.34	809.38
33 42 31 00-0222 EA 6' Deep, 4' x 5' x 8" Thick Wall, Cast In Place, Storm Drain Cleanout.....	5,492.28	923.67
33 42 31 00-0223 EA 6' Deep, 4' x 6' x 8" Thick Wall, Cast In Place, Storm Drain Cleanout.....	6,241.89	1,048.28
33 42 31 00-0224 EA 7' Deep, 4' x 7' x 8" Thick Wall, Cast In Place, Storm Drain Cleanout.....	7,490.01	1,257.52
33 42 31 00-0225 EA 8' Deep, 4' x 8' x 8" Thick Wall, Cast In Place, Storm Drain Cleanout.....	9,096.30	1,518.19
33 42 31 00-0226 Precast Concrete Inlet Boxes (33 42 31 00-0002)		
Note: Inside dimensions.		
33 42 31 00-0227 Precast Concrete Inlet Boxes (33 42 31 00-0226)		
33 42 31 00-0228 24" x 24" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)		
Note: Yard inlet.		
33 42 31 00-0229 24" x 24" ID, Precast Concrete Inlet Boxes (33 42 31 00-0228)		
33 42 31 00-0230 EA 24" Height, 24" x 24" ID, Precast Concrete Inlet Box.....	831.23	80.77
33 42 31 00-0231 EA 30" Height, 24" x 24" ID, Precast Concrete Inlet Box.....	977.45	98.08
33 42 31 00-0232 EA 36" Height, 24" x 24" ID, Precast Concrete Inlet Box.....	1,123.69	115.38
33 42 31 00-0233 EA 42" Height, 24" x 24" ID, Precast Concrete Inlet Box.....	1,271.35	133.41
33 42 31 00-0234 24" x 24" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0228)		
33 42 31 00-0235 EA 6" Height, 24" x 24" ID, Precast Concrete Inlet Box Riser.....	209.69	
33 42 31 00-0236 EA 12" Height, 24" x 24" ID, Precast Concrete Inlet Box Riser.....	338.61	
33 42 31 00-0237 EA 18" Height, 24" x 24" ID, Precast Concrete Inlet Box Riser.....	479.06	
33 42 31 00-0238 EA 24" Height, 24" x 24" ID, Precast Concrete Inlet Box Riser.....	619.54	
33 42 31 00-0239 EA 30" Height, 24" x 24" ID, Precast Concrete Inlet Box Riser.....	759.99	
33 42 31 00-0240 EA 36" Height, 24" x 24" ID, Precast Concrete Inlet Box Riser.....	900.46	
33 42 31 00-0241 22" x 48" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)		
33 42 31 00-0242 22" x 48" ID, Precast Concrete Inlet Boxes (33 42 31 00-0241)		
33 42 31 00-0243 EA 36" Height, 22" x 48" ID, Precast Concrete Inlet Box.....	1,711.30	228.14
33 42 31 00-0244 EA 42" Height, 22" x 48" ID, Precast Concrete Inlet Box.....	1,925.62	263.79
33 42 31 00-0245 EA 48" Height, 22" x 48" ID, Precast Concrete Inlet Box.....	2,139.96	299.43

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
33 42 31 00-0246	EA	54" Height, 22" x 48" ID, Precast Concrete Inlet Box.....		2,354.45	335.17
33 42 31 00-0247	EA	60" Height, 22" x 48" ID, Precast Concrete Inlet Box.....		2,568.96	370.90
33 42 31 00-0248	EA	66" Height, 22" x 48" ID, Precast Concrete Inlet Box.....		2,783.46	406.64
33 42 31 00-0249	EA	72" Height, 22" x 48" ID, Precast Concrete Inlet Box.....		2,997.96	442.37
33 42 31 00-0250		22" x 48" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0241)			
33 42 31 00-0251	EA	6" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		410.68	
33 42 31 00-0252	EA	12" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		659.83	
33 42 31 00-0253	EA	18" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		717.56	
33 42 31 00-0254	EA	24" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		918.29	
33 42 31 00-0255	EA	30" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		1,119.01	
33 42 31 00-0256	EA	36" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		1,314.49	
33 42 31 00-0257	EA	42" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		1,528.81	
33 42 31 00-0258	EA	48" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		1,743.15	
33 42 31 00-0259	EA	54" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		1,957.64	
33 42 31 00-0260	EA	60" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		2,172.15	
33 42 31 00-0261	EA	66" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		2,386.65	
33 42 31 00-0262	EA	72" Height, 22" x 48" ID, Precast Concrete Inlet Box Riser.....		2,601.14	
33 42 31 00-0263		30" x 48" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)			
33 42 31 00-0264		30" x 48" ID, Precast Concrete Inlet Boxes (33 42 31 00-0263)			
33 42 31 00-0265	EA	36" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		1,652.43	250.96
33 42 31 00-0266	EA	42" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		1,867.39	290.17
33 42 31 00-0267	EA	48" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		2,082.33	329.38
33 42 31 00-0268	EA	54" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		2,297.47	368.68
33 42 31 00-0269	EA	60" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		2,512.61	407.99
33 42 31 00-0270	EA	66" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		2,727.74	447.29
33 42 31 00-0271	EA	72" Height, 30" x 48" ID, Precast Concrete Inlet Box.....		2,942.88	486.61
33 42 31 00-0272		30" x 48" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0263)			
33 42 31 00-0273	EA	6" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		408.97	
33 42 31 00-0274	EA	12" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		649.11	
33 42 31 00-0275	EA	18" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		708.45	
33 42 31 00-0276	EA	24" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		905.42	
33 42 31 00-0277	EA	30" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		1,102.41	
33 42 31 00-0278	EA	36" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		1,298.26	
33 42 31 00-0279	EA	42" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		1,510.07	
33 42 31 00-0280	EA	48" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		1,720.74	
33 42 31 00-0281	EA	54" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		1,932.56	
33 42 31 00-0282	EA	60" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		2,143.23	
33 42 31 00-0283	EA	66" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		2,355.04	
33 42 31 00-0284	EA	72" Height, 30" x 48" ID, Precast Concrete Inlet Box Riser.....		2,566.85	
33 42 31 00-0285		42" x 48" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)			
33 42 31 00-0286		42" x 48" ID, Precast Concrete Inlet Boxes (33 42 31 00-0285)			
33 42 31 00-0287	EA	36" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		1,963.63	273.77
33 42 31 00-0288	EA	42" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		2,216.02	318.26
33 42 31 00-0289	EA	48" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		2,468.40	363.89
33 42 31 00-0290	EA	54" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		2,719.65	408.37
33 42 31 00-0291	EA	60" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		2,972.04	454.00
33 42 31 00-0292	EA	66" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		3,224.43	498.49
33 42 31 00-0293	EA	72" Height, 42" x 48" ID, Precast Concrete Inlet Box.....		3,475.68	542.98
33 42 31 00-0294		42" x 48" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0285)			
33 42 31 00-0295	EA	6" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		451.01	
33 42 31 00-0296	EA	12" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		730.92	
33 42 31 00-0297	EA	18" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		791.95	
33 42 31 00-0298	EA	24" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		1,015.25	
33 42 31 00-0299	EA	30" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		1,238.56	
33 42 31 00-0300	EA	36" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		1,461.85	
33 42 31 00-0301	EA	42" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		1,700.55	
33 42 31 00-0302	EA	48" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		1,939.25	
33 42 31 00-0303	EA	54" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		2,177.95	
33 42 31 00-0304	EA	60" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		2,416.65	
33 42 31 00-0305	EA	66" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		2,655.35	
33 42 31 00-0306	EA	72" Height, 42" x 48" ID, Precast Concrete Inlet Box Riser.....		2,894.05	
33 42 31 00-0307		42" x 48" ID, Precast Concrete Inlet Box Tops (33 42 31 00-0285)			
33 42 31 00-0308	EA	42" x 48" ID, Precast Concrete Inlet Box Top Slab.....		1,115.03	171.11
33 42 31 00-0309		48" x 54" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)			



Utilities	33	33
Stormwater Utilities	33 40	
Stormwater Conveyance	33 42	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 42 31 00-0310	48" x 54" ID, Precast Concrete Inlet Boxes (33 42 31 00-0309)		
33 42 31 00-0311	EA 36" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	2,780.23	304.19
33 42 31 00-0312	EA 42" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	3,116.86	354.18
33 42 31 00-0313	EA 48" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	3,453.49	404.18
33 42 31 00-0314	EA 54" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	3,789.74	454.01
33 42 31 00-0315	EA 60" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	4,125.99	503.82
33 42 31 00-0316	EA 66" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	4,462.25	553.64
33 42 31 00-0317	EA 72" Height, 48" x 54" ID, Precast Concrete Inlet Box.....	4,798.51	603.46
33 42 31 00-0318	48" x 54" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0309)		
33 42 31 00-0319	EA 6" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	453.35	
33 42 31 00-0320	EA 12" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	720.40	
33 42 31 00-0321	EA 18" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	1,052.08	
33 42 31 00-0322	EA 24" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	1,383.76	
33 42 31 00-0323	EA 30" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	1,696.43	
33 42 31 00-0324	EA 36" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	2,028.10	
33 42 31 00-0325	EA 42" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	2,364.74	
33 42 31 00-0326	EA 48" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	2,701.36	
33 42 31 00-0327	EA 54" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	3,037.61	
33 42 31 00-0328	EA 60" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	3,373.86	
33 42 31 00-0329	EA 66" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	3,710.13	
33 42 31 00-0330	EA 72" Height, 48" x 54" ID, Precast Concrete Inlet Box Riser.....	4,046.38	
33 42 31 00-0331	48" x 54" ID, Precast Concrete Inlet Box Tops (33 42 31 00-0309)		
33 42 31 00-0332	EA 48" x 54" ID, Precast Concrete Inlet Box Top Slab.....	1,211.81	185.36
33 42 31 00-0333	48" x 66" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)		
33 42 31 00-0334	48" x 66" ID, Precast Concrete Inlet Boxes (33 42 31 00-0333)		
33 42 31 00-0335	EA 36" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	3,207.31	383.28
33 42 31 00-0336	EA 42" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	3,578.05	447.32
33 42 31 00-0337	EA 48" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	3,948.78	511.35
33 42 31 00-0338	EA 54" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	4,318.81	575.04
33 42 31 00-0339	EA 60" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	4,688.85	638.72
33 42 31 00-0340	EA 66" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	5,058.88	702.40
33 42 31 00-0341	EA 72" Height, 48" x 66" ID, Precast Concrete Inlet Box.....	5,428.92	766.08
33 42 31 00-0342	48" x 66" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0333)		
33 42 31 00-0343	EA 6" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	498.19	
33 42 31 00-0344	EA 12" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	772.79	
33 42 31 00-0345	EA 18" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	1,143.22	
33 42 31 00-0346	EA 24" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	1,513.64	
33 42 31 00-0347	EA 30" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	1,852.13	
33 42 31 00-0348	EA 36" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	2,222.55	
33 42 31 00-0349	EA 42" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	2,593.29	
33 42 31 00-0350	EA 48" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	2,964.03	
33 42 31 00-0351	EA 54" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	3,334.05	
33 42 31 00-0352	EA 60" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	3,704.09	
33 42 31 00-0353	EA 66" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	4,074.12	
33 42 31 00-0354	EA 72" Height, 48" x 66" ID, Precast Concrete Inlet Box Riser.....	4,444.16	
33 42 31 00-0355	48" x 66" ID, Precast Concrete Inlet Box Tops (33 42 31 00-0333)		
33 42 31 00-0356	EA 48" x 66" ID, Precast Concrete Inlet Box Top Slab.....	1,347.36	207.61
33 42 31 00-0357	42" x 102" ID, Precast Concrete Inlet Boxes (33 42 31 00-0227)		
33 42 31 00-0358	42" x 102" ID, Precast Concrete Inlet Boxes (33 42 31 00-0357)		
33 42 31 00-0359	EA 36" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	4,019.44	516.74
33 42 31 00-0360	EA 42" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	4,488.82	602.29
33 42 31 00-0361	EA 48" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	4,958.19	686.71
33 42 31 00-0362	EA 54" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	5,426.43	772.26
33 42 31 00-0363	EA 60" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	5,895.81	856.67
33 42 31 00-0364	EA 66" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	6,364.04	941.08
33 42 31 00-0365	EA 72" Height, 42" x 102" ID, Precast Concrete Inlet Box.....	6,834.55	1,026.64
33 42 31 00-0366	42" x 102" ID, Precast Concrete Inlet Box Risers (33 42 31 00-0357)		
33 42 31 00-0367	EA 6" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	667.86	
33 42 31 00-0368	EA 12" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	1,018.60	
33 42 31 00-0369	EA 18" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	1,479.99	
33 42 31 00-0370	EA 24" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	1,941.39	
33 42 31 00-0371	EA 30" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	2,369.69	
33 42 31 00-0372	EA 36" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	2,831.08	

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 42 31 00-0373	EA	42" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	3,300.46	
33 42 31 00-0374	EA	48" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	3,769.83	
33 42 31 00-0375	EA	54" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	4,238.07	
33 42 31 00-0376	EA	60" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	4,707.45	
33 42 31 00-0377	EA	66" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	5,175.68	
33 42 31 00-0378	EA	72" Height, 42" x 102" ID, Precast Concrete Inlet Box Riser.....	5,645.06	

33 42 31 00-0379 42" x 102" ID, Precast Concrete Inlet Box Tops (33 42 31 00-0357)

33 42 31 00-0380	EA	42" x 102" ID, Precast Concrete Inlet Box Top Slab.....	1,833.84	228.14
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33 42 31 00-0381 Frames And Grates For Inlets (33 42 31 00-0226)**33 42 31 00-0382 Inlet Frames And Grates (33 42 31 00-0381)**

33 42 31 00-0383	EA	24" x 24", Heavy Duty Inlet Grate Note: For type A, B, D, or E inlets.	417.90	53.57
33 42 31 00-0384	EA	47-3/4" x 21-3/4", Bicycle Safe Inlet Grate (US Foundry 6352 GRT)..... Note: For type A, B, D, or E inlets.	541.43	53.57
33 42 31 00-0385	EA	47-3/4" x 21-3/4", Phase II Stormwater Compliant Inlet Grate (US Foundry 6352 GRT)..... Note: Includes legend: Dump No Waste "Drains To Waterways".	541.43	53.57
33 42 31 00-0386	EA	Phase II Storm Water Compliant Grate, Echo Grate, Type "B" And "D" Inlet Covers (US Foundry 6352 GRT)..... Note: Legend: Dump No Waste "Drains to Waterways"	541.43	53.57
33 42 31 00-0387	EA	Parallel Bar Grates For Type A, B, D And E Inlets (Campbell Foundry 2617-0362).....	593.14	53.57
33 42 31 00-0388	EA	Type B Inlet Dirt Plate (US Foundry 5217 BK).....	441.75	107.13
33 42 31 00-0389	EA	Back Plate For Type B Inlets (Campbell Foundry 2548-1942).....	514.14	107.13
33 42 31 00-0390	EA	Phase II Echo-Safe Bar For Series 2500/2600 Curb Inlets (Campbell Foundry 25419EC4)..... Note: Includes cam action clamping system, stainless steel badge labeled to center of plate, steel plate welded to bar with legend: Dump No Waste "Drains to Waterways".	640.09	133.91
33 42 31 00-0391	EA	1-1/2" Catch Basin Riser For Type B And D Inlets (General Foundries 6352 EXT).....	547.02	133.91
33 42 31 00-0392	EA	2" Catch Basin Riser For Type B And D Inlets (General Foundries 6352 EXT).....	557.37	133.91
33 42 31 00-0393	EA	2-1/2" Catch Basin Riser For Type B And D Inlets (General Foundries 6352 EXT).....	578.05	133.91
33 42 31 00-0394	EA	3" Catch Basin Riser For Type B And D Inlets (General Foundries 6352 EXT).....	598.73	133.91
33 42 31 00-0395	EA	2" Extension Frame For Type A Inlet (General Foundries 6352 EXT).....	578.05	133.91
33 42 31 00-0396	EA	2-1/2" Extension Frame For Type A Inlet (General Foundries 6352 EXT).....	598.73	133.91
33 42 31 00-0397	EA	3" Extension Frame For Type A Inlet (General Foundries 6352 EXT).....	619.41	133.91
33 42 31 00-0398	EA	2" Extension Frame For Type E Inlet (General Foundries 6352 EXT).....	888.26	133.91
33 42 31 00-0399	EA	2-1/2" Extension Frame For Type E Inlet (General Foundries 6352 EXT).....	929.63	133.91
33 42 31 00-0400	EA	3" Extension Frame For Type E Inlet (General Foundries 6352 EXT).....	970.99	133.91
33 42 31 00-0401	EA	2", 3 Sided Extension Frame For Type A, B, D, And E Inlet (Campbell Foundry 2701).....	660.77	133.91
33 42 31 00-0402	EA	6" Type N Curb Back Piece For Type B And D Inlets (US Foundry 5218N6).....	598.73	133.91
33 42 31 00-0403	EA	8" Type N Curb Back Piece For Type B And D Inlets (US Foundry 5218N8).....	598.73	133.91
33 42 31 00-0404	EA	6" Radius Curb Back Piece For Type B And D Inlets (Campbell Foundry BSCB-6).....	1,220.95	133.91
33 42 31 00-0405	EA	8" Radius Curb Back Piece For Type B And D Inlets (Campbell Foundry BSCB-8).....	1,220.95	133.91
33 42 31 00-0406	EA	Safety Bars For Type B And D Inlets (General Foundries 5218 SB).....	501.43	147.31
33 42 31 00-0407	EA	6", Phase II Echo-Safe Catch Basin Curb Inlet Cover (Campbell Foundry ERSS 648)..... Note: Includes cam action clamping system and stainless steel badge labeled to center of plate.	697.90	147.31
33 42 31 00-0408	EA	8", Phase II Echo-Safe Catch Basin Curb Inlet Cover (Campbell Foundry ERSS 848)..... Note: Includes cam action clamping system and stainless steel badge labeled to center of plate.	697.90	147.31
33 42 31 00-0409	EA	10", Phase II Echo-Safe Catch Basin Curb Inlet Cover (Campbell Foundry ERSS 1048)..... Note: Includes cam action clamping system and stainless steel badge labeled to center of plate.	770.29	147.31
33 42 31 00-0410	EA	Type B Inlet Frame (US Foundry 5216 FRM).....	884.03	147.31
33 42 31 00-0411	EA	Type D Inlet Frame (US Foundry 2999 FRM).....	759.94	147.31
33 42 31 00-0412	EA	Type B Inlet Frame (Campbell Foundry 2618-0202).....	1,080.50	147.31
33 42 31 00-0413	EA	Type D Inlet Frame (Campbell Foundry 2617-0002).....	956.42	147.31
33 42 31 00-0414	EA	Type A Inlet, Single Frame And Grate (US Foundry 52340).....	1,235.09	214.26
33 42 31 00-0415	EA	Type E Inlet, Single Frame And Grate (US Foundry 52342).....	1,979.61	214.26
33 42 31 00-0416	EA	Type A Inlet, Single Frame And Grate (General Foundries 52340).....	1,204.07	214.26
33 42 31 00-0417	EA	Type E Inlet, Double Frame And Grate (General Foundries 52342).....	1,882.41	214.26
33 42 31 00-0418	EA	Oversized Type A Inlet, Single Frame And Reticuline Grate (US Foundry 82340).....	2,018.08	321.40
33 42 31 00-0419	EA	Heavy Duty Rectangular Frame And Grate (Campbell Foundry 3084).....	2,076.15	428.53
33 42 31 00-0420	EA	6" Curb Piece, Type B Inlet Frame And Grate (US Foundry 52186).....	2,273.71	428.53
33 42 31 00-0421	EA	8" Curb Piece, Type B Inlet Frame And Grate (US Foundry 52198).....	2,273.71	428.53
33 42 31 00-0422	EA	6" Curb Piece, Type D Inlet Frame And Grate (US Foundry 72266).....	2,015.19	428.53
33 42 31 00-0423	EA	8" Curb Piece, Type D Inlet Frame And Grate (US Foundry 72268).....	2,015.19	428.53
33 42 31 00-0424	EA	Type B And C Inlet Frame And Grate With Type N Curb And Back Plate (Campbell Foundry GFI 52198).....	2,356.43	428.53

33 42 31 00-0425 Concrete Drainage Inlet Structures (CALTRANS) (33 42 31 00-0001)**33 42 31 00-0426 Type OS Concrete Drainage Inlet Structure (33 42 31 00-0425)**

33 42 31 00-0427	EA	3' Deep Type OS Concrete Drainage Inlet Structure, 6" Wall Thickness.....	2,817.50	
33 42 31 00-0428	EA	4' Deep Type OS Concrete Drainage Inlet Structure, 6" Wall Thickness.....	3,273.80	
33 42 31 00-0429	EA	5' Deep Type OS Concrete Drainage Inlet Structure, 6" Wall Thickness.....	3,697.65	
33 42 31 00-0430	EA	6' Deep Type OS Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,089.05	
33 42 31 00-0431	EA	7' Deep Type OS Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,448.00	
33 42 31 00-0432	EA	8' Deep Type OS Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,774.51	
33 42 31 00-0433	EA	8' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	6,496.74	
33 42 31 00-0434	EA	10' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	7,574.52	
33 42 31 00-0435	EA	12' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	8,569.59	
33 42 31 00-0436	EA	14' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,484.28	
33 42 31 00-0437	EA	16' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,365.36	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 31 00-0438	EA			18' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,175.88	
33 42 31 00-0439	EA			20' Deep Type OS Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,915.87	
33 42 31 00-0440				Type OL-7 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0441	EA			3' Deep Type OL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	3,836.60	
33 42 31 00-0442	EA			4' Deep Type OL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,263.24	
33 42 31 00-0443	EA			5' Deep Type OL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,657.42	
33 42 31 00-0444	EA			6' Deep Type OL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,019.17	
33 42 31 00-0445	EA			7' Deep Type OL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,347.30	
33 42 31 00-0446	EA			8' Deep Type OL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,644.14	
33 42 31 00-0447	EA			8' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	7,315.22	
33 42 31 00-0448	EA			10' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	8,367.88	
33 42 31 00-0449	EA			12' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,337.82	
33 42 31 00-0450	EA			14' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,226.21	
33 42 31 00-0451	EA			16' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,085.57	
33 42 31 00-0452	EA			18' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,874.37	
33 42 31 00-0453	EA			20' Deep Type OL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,592.64	
33 42 31 00-0454				Type OL-10 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0455	EA			3' Deep Type OL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,775.76	
33 42 31 00-0456	EA			4' Deep Type OL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,175.32	
33 42 31 00-0457	EA			5' Deep Type OL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,541.27	
33 42 31 00-0458	EA			6' Deep Type OL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,875.92	
33 42 31 00-0459	EA			7' Deep Type OL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,176.98	
33 42 31 00-0460	EA			8' Deep Type OL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,445.59	
33 42 31 00-0461	EA			8' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	8,133.71	
33 42 31 00-0462	EA			10' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,160.07	
33 42 31 00-0463	EA			12' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,106.03	
33 42 31 00-0464	EA			14' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,969.30	
33 42 31 00-0465	EA			16' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,805.78	
33 42 31 00-0466	EA			18' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,572.87	
33 42 31 00-0467	EA			20' Deep Type OL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	13,268.26	
33 42 31 00-0468				Type OL-14 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0469	EA			3' Deep Type OL-14 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,114.57	
33 42 31 00-0470	EA			4' Deep Type OL-14 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,474.18	
33 42 31 00-0471	EA			5' Deep Type OL-14 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,801.31	
33 42 31 00-0472	EA			6' Deep Type OL-14 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	7,096.00	
33 42 31 00-0473	EA			7' Deep Type OL-14 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	7,358.25	
33 42 31 00-0474	EA			8' Deep Type OL-14 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	7,588.05	
33 42 31 00-0475	EA			8' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,293.24	
33 42 31 00-0476	EA			10' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,283.89	
33 42 31 00-0477	EA			12' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,193.00	
33 42 31 00-0478	EA			14' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,020.57	
33 42 31 00-0479	EA			16' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,827.33	
33 42 31 00-0480	EA			18' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	13,562.39	
33 42 31 00-0481	EA			20' Deep Type OL-14 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	14,226.92	
33 42 31 00-0482				Type OL-21 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0483	EA			3' Deep Type OL-21 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	8,832.17	
33 42 31 00-0484	EA			4' Deep Type OL-21 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	9,112.28	
33 42 31 00-0485	EA			5' Deep Type OL-21 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	9,359.95	
33 42 31 00-0486	EA			6' Deep Type OL-21 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	9,575.16	
33 42 31 00-0487	EA			7' Deep Type OL-21 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	9,756.78	
33 42 31 00-0488	EA			8' Deep Type OL-21 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	9,907.11	
33 42 31 00-0489	EA			8' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,561.13	
33 42 31 00-0490	EA			10' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,481.45	
33 42 31 00-0491	EA			12' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	13,320.22	
33 42 31 00-0492	EA			14' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	14,077.45	
33 42 31 00-0493	EA			16' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	14,823.33	
33 42 31 00-0494	EA			18' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	15,497.51	
33 42 31 00-0495	EA			20' Deep Type OL-21 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	16,101.15	
33 42 31 00-0496				Type GOL-7 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0497	EA			3' Deep Type GOL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,655.87	
33 42 31 00-0498	EA			4' Deep Type GOL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,126.83	
33 42 31 00-0499	EA			5' Deep Type GOL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,560.54	
33 42 31 00-0500	EA			6' Deep Type GOL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,957.01	
33 42 31 00-0501	EA			7' Deep Type GOL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,317.38	
33 42 31 00-0502	EA			8' Deep Type GOL-7 Concrete Drainage Inlet Structure, 6" Wall Thickness.....	6,641.69	
33 42 31 00-0503	EA			8' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	8,457.69	
33 42 31 00-0504	EA			10' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,630.09	
33 42 31 00-0505	EA			12' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,710.81	
33 42 31 00-0506	EA			14' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,698.68	
33 42 31 00-0507	EA			16' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,655.95	

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 42 31 00-0508	EA	18' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness	13,533.87
33 42 31 00-0509	EA	20' Deep Type GOL-7 Concrete Drainage Inlet Structure, 8" Wall Thickness	14,331.28

33 42 31 00-0510 Type GOL-10 Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0511	EA	3' Deep Type GOL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,674.97
33 42 31 00-0512	EA	4' Deep Type GOL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,115.11
33 42 31 00-0513	EA	5' Deep Type GOL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,519.16
33 42 31 00-0514	EA	6' Deep Type GOL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,887.12
33 42 31 00-0515	EA	7' Deep Type GOL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness	7,217.85
33 42 31 00-0516	EA	8' Deep Type GOL-10 Concrete Drainage Inlet Structure, 6" Wall Thickness	7,511.32
33 42 31 00-0517	EA	8' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	9,327.34
33 42 31 00-0518	EA	10' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,472.39
33 42 31 00-0519	EA	12' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	11,525.75
33 42 31 00-0520	EA	14' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	12,487.41
33 42 31 00-0521	EA	16' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	13,420.96
33 42 31 00-0522	EA	18' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	14,275.15
33 42 31 00-0523	EA	20' Deep Type GOL-10 Concrete Drainage Inlet Structure, 8" Wall Thickness	15,050.00

33 42 31 00-0524 Type G-1 Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0525	EA	3' Deep Type G-1 Concrete Drainage Inlet Structure, 6" Wall Thickness	1,898.32
33 42 31 00-0526	EA	4' Deep Type G-1 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,269.81
33 42 31 00-0527	EA	5' Deep Type G-1 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,614.15
33 42 31 00-0528	EA	6' Deep Type G-1 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,933.60
33 42 31 00-0529	EA	7' Deep Type G-1 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,228.19
33 42 31 00-0530	EA	8' Deep Type G-1 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,495.62

33 42 31 00-0531 Type G-2 Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0532	EA	3' Deep Type G-2 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,617.67
33 42 31 00-0533	EA	4' Deep Type G-2 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,035.28
33 42 31 00-0534	EA	5' Deep Type G-2 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,423.20
33 42 31 00-0535	EA	6' Deep Type G-2 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,781.49
33 42 31 00-0536	EA	7' Deep Type G-2 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,110.09
33 42 31 00-0537	EA	8' Deep Type G-2 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,407.90
33 42 31 00-0538	EA	8' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	5,968.14
33 42 31 00-0539	EA	10' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	6,962.51
33 42 31 00-0540	EA	12' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	7,881.93
33 42 31 00-0541	EA	14' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	8,726.36
33 42 31 00-0542	EA	16' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	9,539.84
33 42 31 00-0543	EA	18' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,288.51
33 42 31 00-0544	EA	20' Deep Type G-2 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,971.19

33 42 31 00-0545 Type G-3 Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0546	EA	3' Deep Type G-3 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,058.17
33 42 31 00-0547	EA	4' Deep Type G-3 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,424.53
33 42 31 00-0548	EA	5' Deep Type G-3 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,764.85
33 42 31 00-0549	EA	6' Deep Type G-3 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,080.31
33 42 31 00-0550	EA	7' Deep Type G-3 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,368.61
33 42 31 00-0551	EA	8' Deep Type G-3 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,632.03

33 42 31 00-0552 Type G-4_24 Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0553	EA	3' Deep Type G-4_24 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,537.75
33 42 31 00-0554	EA	4' Deep Type G-4_24 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,957.92
33 42 31 00-0555	EA	5' Deep Type G-4_24 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,348.43
33 42 31 00-0556	EA	6' Deep Type G-4_24 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,708.13
33 42 31 00-0557	EA	7' Deep Type G-4_24 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,039.31
33 42 31 00-0558	EA	8' Deep Type G-4_24 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,339.68
33 42 31 00-0559	EA	8' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	5,934.02
33 42 31 00-0560	EA	10' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	6,930.27
33 42 31 00-0561	EA	12' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	7,820.39
33 42 31 00-0562	EA	14' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	8,695.54
33 42 31 00-0563	EA	16' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	9,509.59
33 42 31 00-0564	EA	18' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,258.81
33 42 31 00-0565	EA	20' Deep Type G-4_24 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,943.22

33 42 31 00-0566 Type G-4_18 Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0567	EA	3' Deep Type G-4_18 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,617.67
33 42 31 00-0568	EA	4' Deep Type G-4_18 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,035.28
33 42 31 00-0569	EA	5' Deep Type G-4_18 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,423.20
33 42 31 00-0570	EA	6' Deep Type G-4_18 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,781.49
33 42 31 00-0571	EA	7' Deep Type G-4_18 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,110.09
33 42 31 00-0572	EA	8' Deep Type G-4_18 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,407.90
33 42 31 00-0573	EA	8' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	5,968.14
33 42 31 00-0574	EA	10' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	6,962.51
33 42 31 00-0575	EA	12' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	7,881.93

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 31 00-0576 EA 14' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	8,726.36	
33 42 31 00-0577 EA 16' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	9,539.84	
33 42 31 00-0578 EA 18' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,288.51	
33 42 31 00-0579 EA 20' Deep Type G-4_18 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,971.19	
33 42 31 00-0580 Type G-5 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0581 EA 3' Deep Type G-5 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,038.19	
33 42 31 00-0582 EA 4' Deep Type G-5 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,404.90	
33 42 31 00-0583 EA 5' Deep Type G-5 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,746.73	
33 42 31 00-0584 EA 6' Deep Type G-5 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,061.40	
33 42 31 00-0585 EA 7' Deep Type G-5 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,351.21	
33 42 31 00-0586 EA 8' Deep Type G-5 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,614.99	
33 42 31 00-0587 Type G-6 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0588 EA 3' Deep Type G-6 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,078.16	
33 42 31 00-0589 EA 4' Deep Type G-6 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,444.14	
33 42 31 00-0590 EA 5' Deep Type G-6 Concrete Drainage Inlet Structure, 6" Wall Thickness	2,784.13	
33 42 31 00-0591 EA 6' Deep Type G-6 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,098.08	
33 42 31 00-0592 EA 7' Deep Type G-6 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,386.01	
33 42 31 00-0593 EA 8' Deep Type G-6 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,649.08	
33 42 31 00-0594 Type GT1 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0595 EA 3' Deep Type GT1 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,476.92	
33 42 31 00-0596 EA 4' Deep Type GT1 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,049.64	
33 42 31 00-0597 EA 5' Deep Type GT1 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,621.02	
33 42 31 00-0598 EA 6' Deep Type GT1 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,073.61	
33 42 31 00-0599 EA 7' Deep Type GT1 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,523.68	
33 42 31 00-0600 EA 8' Deep Type GT1 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,934.02	
33 42 31 00-0601 Type GT2 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0602 EA 3' Deep Type GT2 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,216.26	
33 42 31 00-0603 EA 4' Deep Type GT2 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,839.80	
33 42 31 00-0604 EA 5' Deep Type GT2 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,417.54	
33 42 31 00-0605 EA 6' Deep Type GT2 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,950.60	
33 42 31 00-0606 EA 7' Deep Type GT2 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,437.84	
33 42 31 00-0607 EA 8' Deep Type GT2 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,880.41	
33 42 31 00-0608 EA 8' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	9,207.98	
33 42 31 00-0609 EA 10' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,674.01	
33 42 31 00-0610 EA 12' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	12,027.78	
33 42 31 00-0611 EA 14' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	13,270.45	
33 42 31 00-0612 EA 16' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	14,469.39	
33 42 31 00-0613 EA 18' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	15,571.14	
33 42 31 00-0614 EA 20' Deep Type GT2 Concrete Drainage Inlet Structure, 8" Wall Thickness	16,575.70	
33 42 31 00-0615 Type GT3 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0616 EA 3' Deep Type GT3 Concrete Drainage Inlet Structure, 6" Wall Thickness	3,456.93	
33 42 31 00-0617 EA 4' Deep Type GT3 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,030.01	
33 42 31 00-0618 EA 5' Deep Type GT3 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,563.37	
33 42 31 00-0619 EA 6' Deep Type GT3 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,055.84	
33 42 31 00-0620 EA 7' Deep Type GT3 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,506.28	
33 42 31 00-0621 EA 8' Deep Type GT3 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,916.98	
33 42 31 00-0622 Type GT4 Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0623 EA 3' Deep Type GT4 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,356.14	
33 42 31 00-0624 EA 4' Deep Type GT4 Concrete Drainage Inlet Structure, 6" Wall Thickness	4,974.89	
33 42 31 00-0625 EA 5' Deep Type GT4 Concrete Drainage Inlet Structure, 6" Wall Thickness	5,548.97	
33 42 31 00-0626 EA 6' Deep Type GT4 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,077.25	
33 42 31 00-0627 EA 7' Deep Type GT4 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,560.84	
33 42 31 00-0628 EA 8' Deep Type GT4 Concrete Drainage Inlet Structure, 6" Wall Thickness	6,999.76	
33 42 31 00-0629 EA 8' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	9,225.03	
33 42 31 00-0630 EA 10' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	10,690.70	
33 42 31 00-0631 EA 12' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	12,044.12	
33 42 31 00-0632 EA 14' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	13,285.28	
33 42 31 00-0633 EA 16' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	14,483.93	
33 42 31 00-0634 EA 18' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	15,585.40	
33 42 31 00-0635 EA 20' Deep Type GT4 Concrete Drainage Inlet Structure, 8" Wall Thickness	16,589.67	
33 42 31 00-0636 Type GO Concrete Drainage Inlet Structure (33 42 31 00-0425)		
33 42 31 00-0637 EA 3' Deep Type GO Concrete Drainage Inlet Structure, 6" Wall Thickness	2,477.80	
33 42 31 00-0638 EA 4' Deep Type GO Concrete Drainage Inlet Structure, 6" Wall Thickness	2,880.57	
33 42 31 00-0639 EA 5' Deep Type GO Concrete Drainage Inlet Structure, 6" Wall Thickness	3,254.38	
33 42 31 00-0640 EA 6' Deep Type GO Concrete Drainage Inlet Structure, 6" Wall Thickness	3,599.24	
33 42 31 00-0641 EA 7' Deep Type GO Concrete Drainage Inlet Structure, 6" Wall Thickness	3,915.15	

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 42 31 00-0642	EA	8' Deep Type GO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,203.28	
33 42 31 00-0643	EA	8' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	5,780.56	
33 42 31 00-0644	EA	10' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	6,745.34	
33 42 31 00-0645	EA	12' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	7,635.58	
33 42 31 00-0646	EA	14' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	8,453.54	
33 42 31 00-0647	EA	16' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,243.02	
33 42 31 00-0648	EA	18' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,967.78	
33 42 31 00-0649	EA	20' Deep Type GO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,630.11	

33 42 31 00-0650 Type GDO Concrete Drainage Inlet Structure (33 42 31 00-0425)

33 42 31 00-0651	EA	3' Deep Type GDO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	3,237.13	
33 42 31 00-0652	EA	4' Deep Type GDO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	3,766.55	
33 42 31 00-0653	EA	5' Deep Type GDO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,258.09	
33 42 31 00-0654	EA	6' Deep Type GDO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	4,712.91	
33 42 31 00-0655	EA	7' Deep Type GDO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,128.68	
33 42 31 00-0656	EA	8' Deep Type GDO Concrete Drainage Inlet Structure, 6" Wall Thickness.....	5,507.73	
33 42 31 00-0657	EA	8' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	7,434.59	
33 42 31 00-0658	EA	10' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	8,678.07	
33 42 31 00-0659	EA	12' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	9,827.01	
33 42 31 00-0660	EA	14' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	10,882.55	
33 42 31 00-0661	EA	16' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	11,899.90	
33 42 31 00-0662	EA	18' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	12,835.37	
33 42 31 00-0663	EA	20' Deep Type GDO Concrete Drainage Inlet Structure, 8" Wall Thickness.....	13,689.00	

33 42 31 00-0664 Catch Basin Frames And Covers (33 42 31 00-0001)**33 42 31 00-0665 Cast Iron Frames And Covers (33 42 31 00-0664)**

33 42 31 00-0666	EA	18" Diameter Cast Iron Catch Basin Frame And Cover.....	864.94	115.38
33 42 31 00-0667	EA	22" Diameter Cast Iron Catch Basin Frame And Cover.....	1,093.43	130.38
33 42 31 00-0668	EA	24" Diameter Cast Iron Catch Basin Frame And Cover.....	1,237.47	135.00
33 42 31 00-0669	EA	26" Diameter Cast Iron Catch Basin Frame And Cover.....	1,394.43	156.92
33 42 31 00-0670	EA	28" Diameter Cast Iron Catch Basin Frame And Cover.....	1,634.51	178.85
33 42 31 00-0671	EA	32" Diameter Cast Iron Catch Basin Frame And Cover.....	2,605.33	186.92
33 42 31 00-0672	EA	16" x 16" Cast Iron Catch Basin Frame And Cover.....	1,412.90	141.92
33 42 31 00-0673	EA	18" x 24" Cast Iron Catch Basin Frame And Cover.....	1,841.55	163.84
33 42 31 00-0674	EA	20" x 27" Cast Iron Catch Basin Frame And Cover.....	2,082.03	170.76
33 42 31 00-0675	EA	23" x 23" Cast Iron Catch Basin Frame And Cover.....	1,967.51	170.76
33 42 31 00-0676	EA	24" x 24" Cast Iron Catch Basin Frame And Cover.....	2,033.59	177.69
33 42 31 00-0677	EA	26" x 26" Cast Iron Catch Basin Frame And Cover.....	2,183.64	184.61
33 42 31 00-0678	EA	24" x 36" Cast Iron Catch Basin Frame And Cover.....	2,624.46	198.45

33 42 31 00-0679 Area Yard Drain (33 42 31 00-0001)**33 42 31 00-0680 Ductile Iron Grates (33 42 31 00-0679)**

Note: Not for traffic loading.

33 42 31 00-0681	EA	8" Diameter Ductile Iron Grate Adapter Necks Down To 4" and 6" Diameter Pipe.....	166.56	38.95
33 42 31 00-0682	EA	10" Diameter Ductile Iron Grate Adapters To 4", 6", or 8" Diameter Pipe.....	204.39	41.56
33 42 31 00-0683	EA	12" Diameter Ductile Iron Grate Adapters To 4" Through 12" Diameter Pipe.....	476.94	51.95
33 42 31 00-0684	EA	15" Diameter Ductile Iron Grate Adapters To 4" Through 12" Diameter Pipe.....	569.89	62.33

33 42 33 Stormwater Curbside Drains and Inlets (33 42)**33 42 33 00-0001 Curb Inlet Frames And Covers (33 42 33)****33 42 33 00-0002 Cast Iron Curb Inlet Frames And Covers (33 42 33 00-0001)**

33 42 33 00-0003	EA	20" x 22" Cast Iron Curb Inlet Frame And Cover.....	1,763.16	135.00
33 42 33 00-0004	EA	22" x 24" Cast Iron Curb Inlet Frame And Cover.....	1,885.36	156.92
33 42 33 00-0005	EA	24" x 24" Cast Iron Curb Inlet Frame And Cover.....	1,960.39	156.92
33 42 33 00-0006	EA	27" x 27" Cast Iron Curb Inlet Frame And Cover.....	2,146.79	184.61
33 42 33 00-0007	EA	36" x 24" Cast Iron Curb Inlet Frame And Cover.....	2,123.96	197.30

33 42 36 Stormwater Trench Drains (33 42)**33 42 36 00-0001 Modular Trench Drains (33 42 36)**

See CSI section 03 31 13 00-0011 for concrete.

33 42 36 00-0002 Modular Trench Drains (33 42 36 00-0001)

Note: Excludes grates. See CSI section 33 42 36 00-0118 for grates.

33 42 36 00-0003 4" Wide, Modular Trench Drains (33 42 36 00-0002)**33 42 36 00-0004 4 Wide, High Density Polyethylene, Shallow Modular Trench Drains (33 42 36 00-0003)****33 42 36 00-0005 4 Wide, High Density Polyethylene, Shallow Modular Trench Drains (33 42 36 00-0004)**



Utilities	33	33
Stormwater Utilities	33 40	
Stormwater Conveyance	33 42	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 36 00-0006 LF 4" Wide, High Density Polyethylene, Shallow Modular Trench Drain (Zurn Z844-C)..... <i>For Extra Heavy Duty Frame Assembly With Anchor Studs And Grate Lockdown, Add</i> <i>For Galvanized Extra Heavy Duty Frame Assembly With Anchor Studs And Grate Lockdown, Add</i> <i>For Stainless Steel Extra Heavy Duty Frame Assembly With Anchor Studs And Grate Lockdown, Add</i> <i>For Type 304 Stainless Steel Top Veneer Frame, Add</i> <i>For Aluminum Veneer Bronze Anodized Frame, Add</i>	70.22 104.23 208.46 333.53 83.38 41.69	18.46
33 42 36 00-0007 Outlet Adapters For 4 Wide, High Density Polyethylene, Shallow Modular Trench Drains (33 42 36 00-0004)		
33 42 36 00-0008 EA Closed End Cap For 4" Wide, High Density Polyethylene, Shallow Modular Trench Drain	53.16	
33 42 36 00-0009 EA No-Hub End Outlet For 4" Wide, High Density Polyethylene, Shallow Modular Trench Drain	64.69	
33 42 36 00-0010 EA No-Hub Bottom Outlet For 4" Wide, High Density Polyethylene, Shallow Modular Trench Drain	64.69	
33 42 36 00-0011 6" Wide, Modular Trench Drains (33 42 36 00-0002)		
33 42 36 00-0012 6" Wide, High Density Polyethylene, Modular Trench Drains (33 42 36 00-0011)		
33 42 36 00-0013 6" Wide, High Density Polyethylene, Modular Trench Drains (33 42 36 00-0012)		
33 42 36 00-0014 LF 6" Wide, High Density Polyethylene, Modular Trench Drain	215.26 104.23 208.46 333.53 83.38 41.69	18.46
33 42 36 00-0015 Outlet Adapters For 6" Wide, High Density Polyethylene, Modular Trench Drains (33 42 36 00-0012)		
33 42 36 00-0016 EA Closed End Cap For 6" Wide, High Density Polyethylene, Modular Trench Drains	98.12	
33 42 36 00-0017 EA No-Hub End Outlet For 6" Wide, High Density Polyethylene, Modular Trench Drains	109.65	
33 42 36 00-0018 EA No-Hub Bottom Outlet For 6" Wide, High Density Polyethylene, Modular Trench Drains	109.65	
33 42 36 00-0019 Other Fittings For 6" Wide, High Density Polyethylene, Modular Trench Drains (33 42 36 00-0012)		
33 42 36 00-0020 EA Bottom Dome Strainer For 6" Wide, High Density Polyethylene, Modular Trench Drains	188.24	
33 42 36 00-0021 EA Joint Connector For 6" Wide, High Density Polyethylene, Modular Trench Drains	188.24	
33 42 36 00-0022 EA 90 Degree, 45 Degree, Tee Or Side Outlet Charge For 6" Wide, High Density Polyethylene, Modular Trench Drains	891.51	
33 42 36 00-0023 EA Cross For 6" Wide, High Density Polyethylene, Modular Trench Drains	1,725.33	
33 42 36 00-0024 EA Cutting Charge For 6" Wide, High Density Polyethylene, Modular Trench Drains	208.46	
33 42 36 00-0025 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains (33 42 36 00-0011)		
33 42 36 00-0026 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains (33 42 36 00-0025)		
33 42 36 00-0027 LF 6" Wide, Fiber Reinforced Polyester, Modular Trench Drain	313.23 79.21 79.21 291.84	18.46
33 42 36 00-0028 Outlet Adapters For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains (33 42 36 00-0025)		
33 42 36 00-0029 EA Closed End Cap For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	106.46	
33 42 36 00-0030 EA No-Hub End Outlet For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	117.99	
33 42 36 00-0031 EA No-Hub Bottom Outlet For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	117.99	
33 42 36 00-0032 Other Fittings For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains (33 42 36 00-0025)		
33 42 36 00-0033 EA Bottom Dome Strainer For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	188.24	
33 42 36 00-0034 EA Joint Connector For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	188.24	
33 42 36 00-0035 EA 90 Degree, 45 Degree, Tee Or Side Outlet For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	891.51	
33 42 36 00-0036 EA Cross For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	1,725.33	
33 42 36 00-0037 EA Cutting Charge For 6" Wide, Fiber Reinforced Polyester, Modular Trench Drains	208.46	
33 42 36 00-0038 6" Wide, Vinylester Fiberglass, Modular Trench Drains (33 42 36 00-0011)		
33 42 36 00-0039 6" Wide, Vinylester Fiberglass, Modular Trench Drains (33 42 36 00-0038)		
33 42 36 00-0040 LF 6" Wide, Vinylester Fiberglass, Modular Trench Drain	404.95 79.21 79.21 291.84	18.46
33 42 36 00-0041 Outlet Adapters For 6" Wide, Vinylester Fiberglass, Modular Trench Drains (33 42 36 00-0038)		

33	33 Utilities
	33 40 Stormwater Utilities
	33 42 Stormwater Conveyance



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
33 42 36 00-0042	EA	Closed End Cap For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	173.17	
33 42 36 00-0043	EA	No-Hub End Outlet For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	184.70	
33 42 36 00-0044	EA	No-Hub Bottom Outlet For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	184.70	
33 42 36 00-0045		Other Fittings For 6" Wide, Vinylester Fiberglass, Modular Trench Drains ^(33 42 36 00-0045)		
33 42 36 00-0046	EA	Bottom Dome Strainer For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	188.24	
33 42 36 00-0047	EA	Joint Connector For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	188.24	
33 42 36 00-0048	EA	90 Degree, 45 Degree, Tee Or Side Outlet For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	891.51	
33 42 36 00-0049	EA	Cross For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	1,725.33	
33 42 36 00-0050	EA	Cutting Charge For 6" Wide, Vinylester Fiberglass, Modular Trench Drains	208.46	
33 42 36 00-0051		6" Wide, Polymer Concrete, Modular Trench Drains ^(33 42 36 00-0051)		
33 42 36 00-0052		6" Wide, Polymer Concrete, Modular Trench Drains ^(33 42 36 00-0052)		
33 42 36 00-0053	LF	6" Wide, Polymer Concrete, Modular Trench Drain	480.40	
33 42 36 00-0054		Outlet Adapters For 6" Wide, Polymer Concrete, Modular Trench Drains ^(33 42 36 00-0054)		
33 42 36 00-0055	EA	Closed End Cap For 6" Wide, Polymer Concrete, Modular Trench Drain	190.69	
33 42 36 00-0056	EA	No-Hub End Outlet For 6" Wide, Polymer Concrete, Modular Trench Drain	232.47	
33 42 36 00-0057	EA	No-Hub Bottom Outlet For 6" Wide, Polymer Concrete, Modular Trench Drain	74.18	
33 42 36 00-0058		12" Wide, Modular Trench Drains ^(33 42 36 00-0058)		
33 42 36 00-0059		12" Wide, High Density Polyethylene, Modular Trench Drains ^(33 42 36 00-0059)		
33 42 36 00-0060		12" Wide, High Density Polyethylene, Modular Trench Drains ^(33 42 36 00-0060)		
33 42 36 00-0061	LF	12" Wide, High Density Polyethylene, Modular Trench Drain	405.14	25.38
		<i>For Acid Resistant Coated Top Frame, Add</i>	108.40	
		<i>For Galvanized Welded Frame Assembly, Add</i>	113.61	
		<i>For Type 304 Stainless Steel Top Frame, Add</i>	650.38	
33 42 36 00-0062		Outlet Adapters For 12" Wide, High Density Polyethylene, Modular Trench Drains ^(33 42 36 00-0062)		
33 42 36 00-0063	EA	End Cap For 12" Wide, High Density Polyethylene, Modular Trench Drains	201.69	
33 42 36 00-0064	EA	No-Hub End Outlet For 12" Wide, High Density Polyethylene, Modular Trench Drains	217.09	
33 42 36 00-0065	EA	No-Hub Bottom Outlet For 12" Wide, High Density Polyethylene, Modular Trench Drains	217.09	
33 42 36 00-0066		Other Fittings For 12" Wide, High Density Polyethylene, Modular Trench Drains ^(33 42 36 00-0066)		
33 42 36 00-0067	EA	Bottom Dome Strainer For 12" Wide, High Density Polyethylene, Modular Trench Drains	336.35	
33 42 36 00-0068	EA	Joint Connector For 12" Wide, High Density Polyethylene, Modular Trench Drains	440.58	
33 42 36 00-0069	EA	90 Degree, 45 Degree, Tee Or Side Outlet For 12" Wide, High Density Polyethylene, Modular Trench Drains	1,756.39	
33 42 36 00-0070	EA	Cross For 12" Wide, High Density Polyethylene, Modular Trench Drains	3,424.03	
33 42 36 00-0071	EA	Cutting Charges For 12" Wide, High Density Polyethylene, Modular Trench Drains	416.91	
33 42 36 00-0072		12" Wide, Fiber Reinforced Polyester, Modular Trench Drains ^(33 42 36 00-0072)		
33 42 36 00-0073		12" Wide, Fiber Reinforced Polyester, Modular Trench Drains ^(33 42 36 00-0073)		
33 42 36 00-0074	LF	12" Wide, Fiber Reinforced Polyester, Modular Trench Drain	509.37	25.38
		<i>For Acid Resistant Coated Top Frame, Add</i>	108.40	
		<i>For Galvanized Welded Frame Assembly, Add</i>	113.61	
		<i>For Type 304 Stainless Steel Top Frame, Add</i>	650.38	
33 42 36 00-0075		Outlet Adapters For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains ^(33 42 36 00-0075)		
33 42 36 00-0076	EA	End Cap For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	210.03	
33 42 36 00-0077	EA	No-Hub End Outlet For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	225.43	
33 42 36 00-0078	EA	No-Hub Bottom Outlet For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	225.43	
33 42 36 00-0079		Other Fittings For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains ^(33 42 36 00-0079)		
33 42 36 00-0080	EA	Bottom Dome Strainer For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	336.35	
33 42 36 00-0081	EA	Joint Connector For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	440.58	
33 42 36 00-0082	EA	90 Degree, 45 Degree, Tee Or Side Outlet For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	1,756.39	
33 42 36 00-0083	EA	Cross For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	3,424.03	
33 42 36 00-0084	EA	Cutting Charges For 12" Wide, Fiber Reinforced Polyester, Modular Trench Drains	416.91	
33 42 36 00-0085		12" Wide, Vinylester Fiberglass, Modular Trench Drains ^(33 42 36 00-0085)		



Utilities	33	33
Stormwater Utilities	33 40	
Stormwater Conveyance	33 42	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 42 36 00-0086 12" Wide, Vinylester Fiberglass, Modular Trench Drains <small>(33 42 36 00-0085)</small>		
33 42 36 00-0087 LF 12" Wide, Vinylester Fiberglass, Modular Trench Drain.....	717.83	25.38
<i>For Acid Resistant Coated Top Frame, Add</i>	<i>108.40</i>	
<i>For Galvanized Welded Frame Assembly, Add</i>	<i>113.61</i>	
<i>For Type 304 Stainless Steel Top Frame, Add</i>	<i>650.38</i>	
33 42 36 00-0088 Outlet Adapters For 12" Wide, Vinylester Fiberglass, Modular Trench Drains <small>(33 42 36 00-0085)</small>		
33 42 36 00-0089 EA End Cap For 12" Wide, Vinylester Fiberglass, Modular Trench Drains.....	522.71	
33 42 36 00-0090 EA No-Hub End Outlet For 12" Wide, Vinylester Fiberglass, Modular Trench Drains	538.11	
33 42 36 00-0091 EA No-Hub Bottom Outlet For 12" Wide, Vinylester Fiberglass, Modular Trench Drains	538.11	
33 42 36 00-0092 Other Fittings For 12" Wide, Vinylester Fiberglass, Modular Trench Drains <small>(33 42 36 00-0085)</small>		
33 42 36 00-0093 EA Bottom Dome Strainer For 12" Wide, Vinylester Fiberglass, Modular Trench Drains	336.35	
33 42 36 00-0094 EA Joint Connector For 12" Wide, Vinylester Fiberglass, Modular Trench Drains	440.58	
33 42 36 00-0095 EA 90 Degree, 45 Degree, Tee Or Side Outlet For 12" Wide, Vinylester Fiberglass, Modular Trench Drains	1,756.39	
33 42 36 00-0096 EA Cross For 12" Wide, Vinylester Fiberglass, Modular Trench Drains	3,424.03	
33 42 36 00-0097 EA Cutting Charges For 12" Wide, Vinylester Fiberglass, Modular Trench Drains.....	416.91	
33 42 36 00-0098 12" Wide, Polymer Concrete, Modular Trench Drains <small>(33 42 36 00-0098)</small>		
33 42 36 00-0099 12" Wide, Polymer Concrete, Modular Trench Drains <small>(33 42 36 00-0098)</small>		
33 42 36 00-0100 LF 12" Wide, Polymer Concrete, Modular Trench Drain	644.34	
33 42 36 00-0101 Outlet Adapters For 12" Wide, Polymer Concrete, Modular Trench Drains <small>(33 42 36 00-0098)</small>		
33 42 36 00-0102 EA Closed End Cap For 12" Wide, Polymer Concrete, Modular Trench Drain.....	324.13	
33 42 36 00-0103 EA No-Hub End Outlet For 12" Wide, Polymer Concrete, Modular Trench Drain.....	558.31	
33 42 36 00-0104 EA No-Hub Bottom Outlet For 12" Wide, Polymer Concrete, Modular Trench Drain.....	129.86	
33 42 36 00-0105 23" Wide, Modular Trench Drains <small>(33 42 36 00-0002)</small>		
33 42 36 00-0106 23" Wide, High Density Polyethylene, Modular Trench Drains <small>(33 42 36 00-0105)</small>		
33 42 36 00-0107 23" Wide, High Density Polyethylene, Modular Trench Drains <small>(33 42 36 00-0106)</small>		
33 42 36 00-0108 LF 23" Wide, High Density Polyethylene, Modular Trench Drain	567.98	34.61
<i>For Acid Resistant Coated Frame, Add</i>	<i>162.59</i>	
<i>For Galvanized Frame Assembly, Add</i>	<i>162.59</i>	
<i>For Type 304 Stainless Steel Top Frame, Add</i>	<i>1,000.58</i>	
33 42 36 00-0109 Outlet Adapters For 23" Wide, High Density Polyethylene, Modular Trench Drains <small>(33 42 36 00-0106)</small>		
33 42 36 00-0110 EA End Cap For 23" Wide, High Density Polyethylene, Modular Trench Drains	641.38	
33 42 36 00-0111 EA No-Hub End Outlet For 23" Wide, High Density Polyethylene, Modular Trench Drains.....	936.38	
33 42 36 00-0112 EA No-Hub Bottom Outlet For 23" Wide, High Density Polyethylene, Modular Trench Drains.....	936.38	
33 42 36 00-0113 Other Fittings For 23" Wide, High Density Polyethylene, Modular Trench Drains <small>(33 42 36 00-0106)</small>		
33 42 36 00-0114 EA Bottom Dome Strainer For 23" Wide, High Density Polyethylene, Modular Trench Drains.....	764.20	
33 42 36 00-0115 EA 90 Degree, 45 Degree, Tee Or Side Outlet For 23" Wide, High Density Polyethylene, Modular Trench Drains.....	3,479.49	
33 42 36 00-0116 EA Cross For 23" Wide, High Density Polyethylene, Modular Trench Drains.....	6,814.77	
33 42 36 00-0117 EA Cutting Charges For 23" Wide, High Density Polyethylene, Modular Trench Drains	833.82	
33 42 36 00-0118 Modular Trench Drain Grates <small>(33 42 36 00-0001)</small>		
33 42 36 00-0119 4" Wide, Modular Trench Drain Grates <small>(33 42 36 00-0118)</small>		
33 42 36 00-0120 LF 4" Wide, Polypropylene, Silver Heel Proof, Modular Trench Drain Grate (Zurn Z884-P4-HPP)	44.12	3.46
33 42 36 00-0121 LF 4" Wide, Class C Cast Iron, Modular Trench Drain Grate (Zurn Z884-P4-CG).....	46.38	3.46
33 42 36 00-0122 LF 4" Wide, Galvanized Steel Slotted, Modular Trench Drain Grate (Zurn Z884-P4-FG).....	37.36	3.46
33 42 36 00-0123 LF 4" Wide, Stainless Steel Slotted, Modular Trench Drain Grate (Zurn Z884-P4-FS).....	99.40	3.46
33 42 36 00-0124 LF 4" Wide, Galvanized Steel Perforated, Modular Trench Drain Grate (Zurn Z884-P4-FG).....	37.36	3.46
33 42 36 00-0125 LF 4" Wide, Stainless Steel Perforated, Modular Trench Drain Grate (Zurn Z884-P4-FS)	99.40	3.46
33 42 36 00-0126 6" Wide, Modular Trench Drain Grates <small>(33 42 36 00-0118)</small>		
33 42 36 00-0127 LF 6" Wide, Galvanized Ductile Iron Cast Bar, Modular Trench Drain Grate	205.89	3.46
33 42 36 00-0128 LF 6" Wide, Ductile Iron Cast Bar, Modular Trench Drain Grate.....	174.41	3.46
33 42 36 00-0129 LF 6" Wide, Ductile Iron Solid Cover, Modular Trench Drain Grate	183.17	3.46
33 42 36 00-0130 LF 6" Wide, Ductile Iron Slotted, Modular Trench Drain Grate.....	160.03	3.46
33 42 36 00-0131 LF 6" Wide, Galvanized Ductile Iron Slotted, Modular Trench Drain Grate.....	172.53	3.46
33 42 36 00-0132 LF 6" Wide, Heel Proof Ductile Iron, Modular Trench Drain Grate.....	174.62	3.46

33 Utilities**33 40 Stormwater Utilities****33 42 Stormwater Conveyance**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 42 36 00-0133	LF	6" Wide, Ductile Iron Longitudinal Slotted, Modular Trench Drain Grate	174.62	3.46
33 42 36 00-0134	LF	6" Wide, Galvanized Cast Iron Slotted, Modular Trench Drain Grate	172.53	3.46
33 42 36 00-0135	LF	6" Wide, Galvanized Steel Slotted, Modular Trench Drain Grate	151.69	3.46
33 42 36 00-0136	LF	6" Wide, Perforated Galvanized Steel, Modular Trench Drain Grate	151.69	3.46
33 42 36 00-0137	LF	6" Wide, Reinforced Galvanized Steel Slotted, Modular Trench Drain Grate	161.28	3.46
33 42 36 00-0138	LF	6" Wide, Reinforced Perforated Galvanized Steel, Modular Trench Drain Grate	161.28	3.46
33 42 36 00-0139	LF	6" Wide, Fabricated Stainless Steel Slotted, Modular Trench Drain Grate	210.06	3.46
33 42 36 00-0140	LF	6" Wide, Perforated Stainless Steel, Modular Trench Drain Grate	210.06	3.46
33 42 36 00-0141	LF	6" Wide, Reinforced Stainless Steel Slotted, Modular Trench Drain Grate	385.16	3.46
33 42 36 00-0142	LF	6" Wide, Reinforced Perforated Stainless Steel, Modular Trench Drain Grate	385.16	3.46
33 42 36 00-0143	LF	6" Wide, Stainless Steel Bar, Modular Trench Drain Grate	1,073.06	3.46
33 42 36 00-0144	LF	6" Wide, Heel Proof Polyethylene, Modular Trench Drain Grate	143.35	3.46
33 42 36 00-0145	LF	6" Wide, Fiberglass, Modular Trench Drain Grate	310.11	3.46

33 42 36 00-0146 12" Wide, Modular Trench Drain Grates (33 42 36 00-0118)

33 42 36 00-0147	LF	12" Wide, Black Acid Resistant Coated Ductile Iron, Modular Trench Drain Grate	569.18	3.75
33 42 36 00-0148	LF	12" Wide, Ductile Iron Solid Cover, Modular Trench Drain Grate	544.16	3.75
33 42 36 00-0149	LF	12" Wide, Galvanized Ductile Iron Slotted, Modular Trench Drain Grate	473.29	3.75
33 42 36 00-0150	LF	12" Wide, Heel Proof Ductile Iron, Modular Trench Drain Grate	497.26	3.75
33 42 36 00-0151	LF	12" Wide, Perforated Galvanized Steel, Modular Trench Drain Grate	429.51	3.75
33 42 36 00-0152	LF	12" Wide, Reinforced Galvanized Steel Slotted, Modular Trench Drain Grate	841.21	3.75
33 42 36 00-0153	LF	12" Wide, Reinforced Perforated Galvanized Steel, Modular Trench Drain Grate	841.21	3.75
33 42 36 00-0154	LF	12" Wide, Fabricated Stainless Steel Slotted, Modular Trench Drain Grate	1,073.64	3.75
33 42 36 00-0155	LF	12" Wide, Perforated Stainless Steel, Modular Trench Drain Grate	1,073.64	3.75
33 42 36 00-0156	LF	12" Wide, Reinforced Stainless Steel Slotted, Modular Trench Drain Grate	1,370.69	3.75
33 42 36 00-0157	LF	12" Wide, Reinforced Perforated Stainless Steel Slotted, Modular Trench Drain Grate	1,370.69	3.75
33 42 36 00-0158	LF	12" Wide, Stainless Steel Cast Bar, Modular Trench Drain Grate	1,300.86	3.75
33 42 36 00-0159	LF	12" Wide, Fiberglass, Modular Trench Drain Grate	614.00	3.75

33 42 36 00-0160 23" Wide, Modular Trench Drain Grates (33 42 36 00-0118)

33 42 36 00-0161	LF	23" Wide, Ductile Iron Solid Cover, Modular Trench Drain Grate	899.11	4.04
33 42 36 00-0162	LF	23" Wide, Ductile Iron Slotted, Modular Trench Drain Grate	757.36	4.04
33 42 36 00-0163	LF	23" Wide, Galvanized Ductile Iron Slotted, Modular Trench Drain Grate	1,174.27	4.04
33 42 36 00-0164	LF	23" Wide, Heel Proof Longitudinal Ductile Iron, Modular Trench Drain Grate	869.92	4.04

33 44 Storm Utility Water Drains (33 40)**33 44 36 Oil and Stormwater Separators (33 44)****33 44 36 00-0001 Oil/Water Separator (33 44 36)**

Note: Complete with internal sensors and detectors.

33 44 36 00-0002 Coalescing Oil Water Separator (33 44 36 00-0001)

Note: Underground tank with interior polyurethane coating. Includes manways, coalescer, inlet and outlet spools, pump mount, 2" level sensor pipe and 4" pump out pipe. HighGuard as manufactured by Highland Tank, Stoystown, PA.

33 44 36 00-0003 Single Wall Steel Coalescing Oil Water Separator (33 44 36 00-0002)

33 44 36 00-0004	EA	550 Gallon, 55 GPM Single Wall Steel Coalescing Oil Water Separator With Manways	19,045.32	
Note: HTC-G 550. 3'-6" diameter x 10'-9" long tank.				
For Interior Polyurethane Coating, Add			711.00	

33 44 36 00-0005	EA	1,000 Gallon, 100 GPM Single Wall Steel Coalescing Oil Water Separator With Manways	23,294.47	
Note: HTC-G 1000. 4' diameter x 14' long tank.				
For Interior Polyurethane Coating, Add			893.70	

33 44 36 00-0006	EA	2,000 Gallon, 200 GPM Single Wall Steel Coalescing Oil Water Separator With Manways	27,888.79	
Note: HTC-G 2000. 5'-4" diameter x 15' long tank.				
For Interior Polyurethane Coating, Add			1,340.10	

33 44 36 00-0007 Double Wall Steel Coalescing Oil Water Separator (33 44 36 00-0002)

33 44 36 00-0008	EA	550 Gallon, 55 GPM Double Wall Steel Coalescing Oil Water Separator With Manways	29,562.69	
Note: HTC-G 550. 3'-6" diameter x 10'-9" long tank.				
For Interior Polyurethane Coating, Add			711.00	

33 44 36 00-0009	EA	1,000 Gallon, 100 GPM Double Wall Steel Coalescing Oil Water Separator With Manways	33,997.22	
Note: HTC-G 1000. 4' diameter x 14' long tank.				
For Interior Polyurethane Coating, Add			893.70	

33 44 36 00-0010	EA	2,000 Gallon, 200 GPM Double Wall Steel Coalescing Oil Water Separator With Manways	41,508.99	
Note: HTC-G 2000. 5'-4" diameter x 15' long tank.				
For Interior Polyurethane Coating, Add			1,340.10	

33 44 36 00-0011	EA	3,000 Gallon, 300 GPM Double Wall Steel Coalescing Oil Water Separator With Manways	48,306.92	
Note: HTC-G 3000. 5'-4" diameter x 21'-4" long tank.				
For Interior Polyurethane Coating, Add			1,550.70	

33 44 36 00-0012	EA	5,000 Gallon, 500 GPM Double Wall Steel Coalescing Oil Water Separator With Manways	64,127.40	
Note: HTC-G 5000. 6' diameter x 28'-8" long tank.				
For Interior Polyurethane Coating, Add			2,057.80	

33 44 36 00-0013 Accessories For Coalescing Oil Water Separators (33 44 36 00-0002)

33 44 36 00-0014	EA	Single Channel Alarm Panel For Coalescing Oil Water Separator	1,180.47	
Note: HTAP1.				

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 44 36 00-0015 EA Two Channel Alarm Panel For Coalescing Oil Water Separator 1,605.58	1,605.58	
33 44 36 00-0016 EA Float Interface Sensor For Coalescing Oil Water Separator 954.20	954.20	
33 44 36 00-0017 EA 1-1/2" Liquid Only Sensor For Coalescing Oil Water Separator 704.63	704.63	
33 44 36 00-0018 EA Polyvinyl Chloride (PVC) Cap For 2" Sensor For Coalescing Oil Water Separator 236.67	236.67	
33 44 36 00-0019 EA 550, 1,000 Or 2,000 Gallon Tank Concrete Deadmen Set (2 Each) For Coalescing Oil Water Separator 4,040.86	4,040.86	
33 44 36 00-0020 EA 3,000 Gallon Tank Concrete Deadmen Set (4 Each) For Coalescing Oil Water Separator 8,081.71	8,081.71	
33 44 36 00-0021 EA 5,000 Gallon Tank Concrete Deadmen Set (6 Each) For Coalescing Oil Water Separator 12,122.65	12,122.65	
33 44 36 00-0022 EA 550 Or 1,000 Gallon Tank Polyester Hold Down Straps (2 Each) With Galvanized Turnbuckle And Clamps For Coalescing Oil Water Separator 725.36	725.36	
33 44 36 00-0023 EA 2,000 Gallon Tank Polyester Hold Down Straps (2 Each) With Galvanized Turnbuckle And Clamps For Coalescing Oil Water Separator 858.47	858.47	
33 44 36 00-0024 EA 3,000 Gallon Tank Polyester Hold Down Straps (4 Each) With Galvanized Turnbuckle And Clamps For Coalescing Oil Water Separator 1,716.94	1,716.94	
33 44 36 00-0025 EA 5,000 Gallon Tank Polyester Hold Down Straps (6 Each) With Galvanized Turnbuckle And Clamps For Coalescing Oil Water Separator 3,823.33	3,823.33	
33 44 36 00-0026 EA 30" Diameter Grade Level Manway For Coalescing Oil Water Separator 1,037.33	1,037.33	
33 44 36 00-0027 EA 36" Diameter Grade Level Manway For Coalescing Oil Water Separator 1,353.67	1,353.67	
33 44 36 00-0028 EA 48" Diameter Grade Level Manway For Coalescing Oil Water Separator 1,877.98	1,877.98	
33 44 36 00-0029 EA 54" x 54" Grade Level Manway For Coalescing Oil Water Separator 3,433.68	3,433.68	
33 44 36 00-0030 EA 66" x 54" Grade Level Manway For Coalescing Oil Water Separator 4,419.51	4,419.51	
33 44 36 00-0031 EA 66" x 66" Grade Level Manway For Coalescing Oil Water Separator 5,550.93	5,550.93	
33 44 36 00-0032 EA 78" x 66" Grade Level Manway For Coalescing Oil Water Separator 7,002.63	7,002.63	
33 44 36 00-0033 EA 550 Gallon Petroscreen (Material Only) For Coalescing Oil Water Separator 1,387.23	1,387.23	
33 44 36 00-0034 EA 1,000 Gallon Petroscreen (Material Only) For Coalescing Oil Water Separator 1,690.89	1,690.89	
33 44 36 00-0035 EA 2,000 Gallon Petroscreen (Material Only) For Coalescing Oil Water Separator 2,655.92	2,655.92	
33 44 36 00-0036 EA 550 Gallon Corrugated Coalescer Plate (Material Only) For Coalescing Oil Water Separator 1,322.76	1,322.76	
33 44 36 00-0037 EA 1,000 Gallon Corrugated Coalescer Plate (Material Only) For Coalescing Oil Water Separator 1,605.61	1,605.61	
33 44 36 00-0038 EA 2,000 Gallon Corrugated Coalescer Plate (Material Only) For Coalescing Oil Water Separator 1,905.11	1,905.11	
33 44 36 00-0039 EA 18" Manhole Gasket (Material Only) For Coalescing Oil Water Separator 112.31	112.31	
33 44 36 00-0040 EA 24" Manhole Gasket (Material Only) For Coalescing Oil Water Separator 126.87	126.87	
33 44 36 00-0041 Oil Skimmers (33 44 36)		
33 44 36 00-0042 Oil Skimmers, 12" And 24" Models (33 44 36 00-0041)		
33 44 36 00-0043 EA Oil Skimmers, TENV, 12" Open, 1/2 HP, 230/460 Volt, 3 Phase 5,118.12	5,118.12	634.50
33 44 36 00-0044 EA Oil Skimmers, Explosion-Proof, 12" Open, 1/2 HP, 230/460 Volt, 3 Phase 5,353.92	5,353.92	634.50
33 44 36 00-0045 EA Oil Skimmers, TENV, 12" Open, 1/2 HP, 115/220 Volt, 1 Phase 5,139.96	5,139.96	634.50
33 44 36 00-0046 EA Oil Skimmers, Explosion-Proof, 12" Open, 1/2 HP, 115/220 Volt, 1 Phase 5,442.34	5,442.34	634.50
33 44 36 00-0047 EA Oil Skimmers, TENV, 12" Enclosed, 1/2 HP, 230/460 Volt, 3 Phase 5,387.76	5,387.76	634.50
33 44 36 00-0048 EA Oil Skimmers, Explosion-Proof, 12" Enclosed, 1/2 HP, 230/460 Volt, 3 Phase 5,587.53	5,587.53	634.50
33 44 36 00-0049 EA Oil Skimmers, TENV, 12" Enclosed, 1/2 HP, 115/220 Volt, 1 Phase 5,439.06	5,439.06	634.50
33 44 36 00-0050 EA Oil Skimmers, Explosion-Proof, 12" Enclosed, 1/2 HP, 115/220 Volt, 1 Phase 5,740.36	5,740.36	634.50
33 44 36 00-0051 EA Oil Skimmers, TENV, 24" Open, 1/2 HP, 230/460 Volt, 3 Phase 5,794.65	5,794.65	846.19
33 44 36 00-0052 EA Oil Skimmers, Explosion-Proof, 24" Open, 1/2 HP, 230/460 Volt, 3 Phase 6,046.82	6,046.82	846.19
33 44 36 00-0053 EA Oil Skimmers, TENV, 24" Open, 1/2 HP, 115/220 Volt, 1 Phase 5,861.24	5,861.24	846.19
33 44 36 00-0054 EA Oil Skimmers, Explosion-Proof, 24" Open, 1/2 HP, 115/220 Volt, 1 Phase 6,223.67	6,223.67	846.19
33 44 36 00-0055 EA Oil Skimmers, TENV, 24" Enclosed, 1/2 HP, 230/460 Volt, 3 Phase 6,432.17	6,432.17	846.19
33 44 36 00-0056 EA Oil Skimmers, Explosion-Proof, 24" Enclosed, 1/2 HP, 230/460 Volt, 3 Phase 6,684.34	6,684.34	846.19
33 44 36 00-0057 EA Oil Skimmers, TENV, 24" Enclosed, 1/2 HP, 115/220 Volt, 1 Phase 6,485.66	6,485.66	846.19
33 44 36 00-0058 EA Oil Skimmers, Explosion-Proof, 24" Enclosed, 1/2 HP, 115/220 Volt, 1 Phase 6,849.18	6,849.18	846.19
33 44 36 00-0059 Oil Skimmers, Add-Ons (33 44 36 00-0041)		
33 44 36 00-0060 LF Add For Belt Projection, 12" Width 16.37	16.37	
33 44 36 00-0061 LF Add For Belt Projection, 24" Width 30.57	30.57	
33 44 36 00-0062 LF Add For Spacer Stands, 12" Models 267.29	267.29	
33 44 36 00-0063 LF Add For Spacer Stands, 24" Models 315.32	315.32	

33 46 Stormwater Management (33 40)

33 46 23 Modular Buried Stormwater Storage Units (33 46)

33 46 23 00-0001 Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™) (33 46 23)

Note: Includes chambers and end caps delivery to site. Excludes excavation and earthwork, foundation stone, embedment and perimeter stone, geotextile fabrics and cutting holes in chambers. See CSI section 31 05 16 00-0000 for aggregate (foundation, embedment and perimeter stone), 31 23 16 36-0000 for excavation and earth backfill, 31 32 19 16-0000 for woven and non-woven geotextile fabric.

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 46 23 00-0002	85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-740) (33 46 23 00-0001)		
33 46 23 00-0003	EA Up To 10, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-740).....	580.26	
33 46 23 00-0004	EA >10 To 20, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-740).....	536.51	
33 46 23 00-0005	EA >20 To 30, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-740).....	504.44	
33 46 23 00-0006	EA >30, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-740).....	473.43	
33 46 23 00-0007	EA Up To 10, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-740).....	236.13	
33 46 23 00-0008	EA >10 To 20, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-740).....	209.59	
33 46 23 00-0009	EA >20 To 30, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-740).....	193.87	
33 46 23 00-0010	EA >30, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-740).....	178.39	
33 46 23 00-0011	85.4" Long x 34" Wide x 16" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-310) (33 46 23 00-0001)		
33 46 23 00-0012	EA Up To 10, 85.4" Long x 34" Wide x 16" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-310).....	327.63	
33 46 23 00-0013	EA >10 To 20, 85.4" Long x 34" Wide x 16" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-310).....	300.76	
33 46 23 00-0014	EA >20 To 30, 85.4" Long x 34" Wide x 16" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-310).....	281.78	
33 46 23 00-0015	EA >30, 85.4" Long x 34" Wide x 16" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ SC-310).....	264.38	
33 46 23 00-0016	EA Up To 10, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-310).....	184.02	
33 46 23 00-0017	EA >10 To 20, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-310).....	164.31	
33 46 23 00-0018	EA >20 To 30, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-310).....	152.13	
33 46 23 00-0019	EA >30, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ SC-310).....	141.21	
33 46 23 00-0020	90" Long x 77" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC3500) (33 46 23 00-0001)		
33 46 23 00-0021	EA Up To 10, 90" Long x 77" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC3500).....	993.33	
33 46 23 00-0022	EA >10 To 20, 90" Long x 77" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC3500).....	927.11	
33 46 23 00-0023	EA >20 To 30, 90" Long x 77" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC3500).....	873.52	
33 46 23 00-0024	EA >30, 90" Long x 77" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC3500).....	824.58	
33 46 23 00-0025	EA Up To 10, 25.7" Long x 75" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC3500).....	835.01	
33 46 23 00-0026	EA >10 To 20, 25.7" Long x 75" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC3500).....	776.69	
33 46 23 00-0027	EA >20 To 30, 25.7" Long x 75" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC3500).....	730.63	
33 46 23 00-0028	EA >30, 25.7" Long x 75" Wide x 45" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC3500).....	688.84	
33 46 23 00-0029	85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ DC-780) (33 46 23 00-0001)		
33 46 23 00-0030	EA Up To 10, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ DC-780).....	602.96	
33 46 23 00-0031	EA >10 To 20, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ DC-780).....	558.10	
33 46 23 00-0032	EA >20 To 30, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ DC-780).....	524.93	
33 46 23 00-0033	EA >30, 85.4" Long x 51" Wide x 30" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ DC-780).....	492.89	
33 46 23 00-0034	EA Up To 10, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ DC-780).....	236.13	
33 46 23 00-0035	EA >10 To 20, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ DC-780).....	205.30	
33 46 23 00-0036	EA >20 To 30, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ DC-780).....	193.87	
33 46 23 00-0037	EA >30, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ DC-780).....	178.39	
33 46 23 00-0038	52" Long x 100" Wide x 60" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC4500) (33 46 23 00-0001)		
33 46 23 00-0039	EA Up To 10, 52" Long x 100" Wide x 60" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC4500).....	1,031.78	
33 46 23 00-0040	EA >10 To 20, 52" Long x 100" Wide x 60" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC4500).....	961.80	
33 46 23 00-0041	EA >20 To 30, 52" Long x 100" Wide x 60" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC4500).....	904.51	
33 46 23 00-0042	EA >30, 52" Long x 100" Wide x 60" High, Polypropylene Corrugated Wall Stormwater Collection Chambers (StormTech™ MC4500).....	854.55	
33 46 23 00-0043	EA Up To 10, 35.1" Long x 90.2" Wide x 59.4" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC4500).....	1,288.10	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 46 23 00-0044 EA >10 To 20, 35.1" Long x 90.2" Wide x 59.4" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC4500).....	1,205.29	
33 46 23 00-0045 EA >20 To 30, 35.1" Long x 90.2" Wide x 59.4" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC4500).....	1,135.83	
33 46 23 00-0046 EA >30, 35.1" Long x 90.2" Wide x 59.4" High, Polypropylene Corrugated Wall Stormwater Collection Chamber End Cap (StormTech™ MC4500).....	1,074.31	
33 46 23 00-0047 Cut Opening In Polypropylene Corrugated Wall Stormwater Collection Chambers <small>(33 46 23 00-0001)</small>		
33 46 23 00-0048 EA Cut Up To 6" Diameter Opening, Polypropylene Corrugated Wall Stormwater Colelction Chamber Or End Cap	59.52	
33 46 23 00-0049 EA Cut >6" To 12" Diameter Opening, Polypropylene Corrugated Wall Stormwater Colelction Chamber Or End Cap	75.50	
33 46 23 00-0050 EA Cut >12" To 24" Diameter Opening, Polypropylene Corrugated Wall Stormwater Colelction Chamber Or End Cap	98.72	
33 46 23 00-0051 EA Cut >24" To 36" Diameter Opening, Polypropylene Corrugated Wall Stormwater Colelction Chamber Or End Cap	124.72	
33 46 23 00-0052 EA 12" x 6" Inspection Port Kit	732.93	
Note: (2712AG6IPKIT)		
33 46 53 Stormwater Leaching Pits <small>(33 46)</small>		
33 46 53 00-0001 Drainage Wells <small>(33 46 53)</small>		
Note: Includes augering hole.		
33 46 53 00-0002 LF 12" Diameter Drainage Well With Corrugated Metal Liner.....	36.04	
33 46 53 00-0003 LF 18" Diameter Drainage Well With Corrugated Metal Liner.....	44.72	
33 46 53 00-0004 LF 24" Diameter Drainage Well With Corrugated Metal Liner.....	61.03	
33 50 Hydrocarbon Utilities <small>(33)</small>		
33 52 Hydrocarbon Transmission and Distribution <small>(33 50)</small>		
33 52 16 Gas Hydrocarbon Piping <small>(33 52)</small>		
33 52 16 13 Steel Natural Gas Piping <small>(33 52 16)</small>		
See CSI section 23 05 23 00-0000 for gas valves.		
33 52 16 13-0001 Gas Distribution Lines <small>(33 52 16 13)</small>		
Note: Excludes excavation and backfill.		
33 52 16 13-0002 Gas Line Taps <small>(33 52 16 13-0001)</small>		
Note: Includes material to tap into main and gas valve.		
33 52 16 13-0003 Polyethylene, 60 PSI <small>(33 52 16 13-0002)</small>		
33 52 16 13-0004 EA 2" Polyethylene Hot Tap, With Valve	5,136.01	
33 52 16 13-0005 EA 2-1/2" Polyethylene Hot Tap, With Valve	2,850.37	
33 52 16 13-0006 EA 3" Polyethylene Hot Tap, With Valve	2,990.91	
33 52 16 13-0007 EA 4" Polyethylene Hot Tap, With Valve	8,888.46	
33 52 16 13-0008 EA 6" Polyethylene Hot Tap, With Valve	13,966.37	
33 52 16 13-0009 Steel, Schedule 40 <small>(33 52 16 13-0002)</small>		
Note: For punch steel service tee.		
33 52 16 13-0010 EA 1/2" Iron Pipe Size Weld Base, 1/2" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,311.35	
33 52 16 13-0011 EA 3/4" Iron Pipe Size Weld Base, 1/2" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,367.56	
33 52 16 13-0012 EA 3/4" Iron Pipe Size Weld Base, 3/4" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,440.88	
33 52 16 13-0013 EA 3/4" Iron Pipe Size Weld Base, 1" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,512.21	
33 52 16 13-0014 EA 1" Iron Pipe Size Weld Base, 1" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,568.27	
33 52 16 13-0015 EA 1-1/4" Iron Pipe Size Weld Base, 1" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,889.29	
33 52 16 13-0016 EA 1-1/4" Iron Pipe Size Weld Base, 1-1/4" Iron Pipe Size Compression/Plain End Pipe Outlet Punch Valve Steel Service Tee	3,983.15	
33 52 16 13-0017 Protective Pipe And Fitting Wrap <small>(33 52 16 13-0001)</small>		
Note: Includes cleaning and priming pipe.		
33 52 16 13-0018 Corrosion Protection Pipe Wrap For Pipe <small>(33 52 16 13-0017)</small>		
Note: Field applied.		
33 52 16 13-0019 LF 1/2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	3.14	
33 52 16 13-0020 LF 3/4" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	3.33	
33 52 16 13-0021 LF 1" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	3.54	
33 52 16 13-0022 LF 1-1/4" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	3.95	
33 52 16 13-0023 LF 1-1/2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	4.27	
33 52 16 13-0024 LF 2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	4.88	
33 52 16 13-0025 LF 2-1/2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	5.86	
33 52 16 13-0026 LF 3" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	7.17	
33 52 16 13-0027 LF 4" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	8.95	
33 52 16 13-0028 LF 6" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe.....	11.75	

33 Utilities**33 50 Hydrocarbon Utilities****33 52 Hydrocarbon Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST**33 52 16 13-0029****Corrosion Resistance Wrap And Coat - Fittings** (33 52 16 13-0017)

Note: Field applied.

33 52 16 13-0030	EA	1/2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	19.25	
33 52 16 13-0031	EA	3/4" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	19.25	
33 52 16 13-0032	EA	1" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	23.85	
33 52 16 13-0033	EA	1-1/4" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	26.70	
33 52 16 13-0034	EA	1-1/2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	26.70	
33 52 16 13-0035	EA	2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	31.58	
33 52 16 13-0036	EA	2-1/2" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	42.26	
33 52 16 13-0037	EA	3" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	56.55	
33 52 16 13-0038	EA	4" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	57.05	
33 52 16 13-0039	EA	6" Outside Pipe Diameter, Corrosion Protection Wrap For Pipe Fittings	65.45	

33 52 16 13-0040**Service Fittings** (33 52 16 13-0001)**33 52 16 13-0041****Brass Fittings** (33 52 16 13-0040)

33 52 16 13-0042	EA	1/2" X 2" Long Nipples, Threaded Both Ends, Brass	39.49	
33 52 16 13-0043	EA	3/4" X 2" Long Nipples, Threaded Both Ends, Brass	46.12	
33 52 16 13-0044	EA	1" X 2" Long Nipples, Threaded Both Ends, Brass	58.91	
33 52 16 13-0045	EA	1-1/4" X 2" Long Nipples, Threaded Both Ends, Brass	73.69	
33 52 16 13-0046	EA	1-1/2" X 2" Long Nipples, Threaded Both Ends, Brass	82.97	
33 52 16 13-0047	EA	2" X 2" Long Nipples, Threaded Both Ends, Brass	109.17	
33 52 16 13-0048	EA	1/2" 90 Degree Elbow, Brass	33.35	
33 52 16 13-0049	EA	3/4" 90 Degree Elbow, Brass	38.47	
33 52 16 13-0050	EA	1" 90 Degree Elbow, Brass	50.24	
33 52 16 13-0051	EA	1-1/4" 90 Degree Elbow, Brass	65.45	
33 52 16 13-0052	EA	1-1/2" 90 Degree Elbow, Brass	75.07	
33 52 16 13-0053	EA	2" 90 Degree Elbow, Brass	101.19	
33 52 16 13-0054	EA	1/2" Diameter Chrome Plated Nipple	26.68	
33 52 16 13-0055	EA	3/4" Diameter Chrome Plated Nipple	34.44	
33 52 16 13-0056	EA	1" Diameter Chrome Plated Nipple	44.87	
33 52 16 13-0057	EA	1-1/4" Diameter Chrome Plated Nipple	64.06	
33 52 16 13-0058	EA	1-1/2" Diameter Chrome Plated Nipple	77.87	
33 52 16 13-0059	EA	2" Diameter Chrome Plated Nipple	105.48	

33 52 16 13-0060**Anodless Gas Riser** (33 52 16 13-0040)

33 52 16 13-0061	EA	3/4" Anodless Gas Riser	99.70	
33 52 16 13-0062	EA	1" Anodless Gas Riser	123.61	
33 52 16 13-0063	EA	1-1/4" Anodless Gas Riser	145.55	
33 52 16 13-0064	EA	1-1/2" Anodless Gas Riser	183.22	
33 52 16 13-0065	EA	2" Anodless Gas Riser	210.96	

33 52 16 13-0066**Brass Service Adapter** (33 52 16 13-0040)

33 52 16 13-0067	EA	1/2" Brass Service Adapter	75.28	
33 52 16 13-0068	EA	3/4" Brass Service Adapter	82.85	
33 52 16 13-0069	EA	1" Brass Service Adapter	99.83	
33 52 16 13-0070	EA	1-1/4" Brass Service Adapter	125.03	
33 52 16 13-0071	EA	1-1/2" Brass Service Adapter	154.09	
33 52 16 13-0072	EA	2" Brass Service Adapter	189.77	
33 52 16 13-0073	EA	2-1/2" Brass Service Adapter	386.28	
33 52 16 13-0074	EA	3" Brass Service Adapter	473.46	
33 52 16 13-0075	EA	4" Brass Service Adapter	691.71	

33 52 16 23**Medium Density Polyethylene Piping for Natural Gas** (33 52 16)**33 52 16 23-0001****Medium Density Polyethylene (MDPE) Gas Distribution Piping** (33 52 16 23)

Note: PE2406/PE2708. Includes couplings, #12 tracer wire, helically wrapped around piping.

33 52 16 23-0002	LF	1/2" Diameter, SDR 9, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	4.10	1.83
		<i>For Colors, Add</i>	0.05	
33 52 16 23-0003	LF	3/4" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	4.55	1.96
		<i>For Colors, Add</i>	0.07	
33 52 16 23-0004	LF	1" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	5.01	2.09
		<i>For Colors, Add</i>	0.08	
33 52 16 23-0005	LF	1-1/4" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	5.48	2.22
		<i>For Colors, Add</i>	0.10	
33 52 16 23-0006	LF	1-1/2" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	6.29	2.68
		<i>For Colors, Add</i>	0.14	
33 52 16 23-0007	LF	2" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	7.09	2.91
		<i>For Colors, Add</i>	0.19	
33 52 16 23-0008	LF	2-1/2" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	8.90	3.41
		<i>For Colors, Add</i>	0.31	
33 52 16 23-0009	LF	3" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	10.86	4.05
		<i>For Colors, Add</i>	0.42	
33 52 16 23-0010	LF	4" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	17.71	4.80
		<i>For Colors, Add</i>	0.78	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 52 16 23-0011 LF 5" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	22.28	4.80
<i>For SDR 13.5, Deduct</i>	-1.69	
<i>For SDR 15.5, Deduct</i>	-3.10	
<i>For Colors, Add</i>	1.09	
33 52 16 23-0012 LF 6" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	26.97	4.80
<i>For Colors, Add</i>	1.39	
33 52 16 23-0013 LF 8" Diameter, SDR 11, Medium Density Polyethylene (MDPE) Gas Distribution Pipe	39.73	6.00
<i>For Colors, Add</i>	2.32	

33 52 16 26 High Density Polyethylene Piping for Natural Gas (33 52 16)

33 52 16 26-0001 High Density Polyethylene (HDPE) Gas Distribution Piping (33 52 16 26)

Note: ASTM F2619, ASTM D2513, API 15 LE. Includes couplings, #12 tracer wire, helically wrapped around piping.

33 52 16 26-0002 LF 1/2" Diameter, SDR 9 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	4.17	1.83
33 52 16 26-0003 LF 3/4" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	4.65	1.96
<i>For SDR 13.5, Deduct</i>	-0.12	
33 52 16 26-0004 LF 1" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	5.11	2.09
<i>For SDR 13.5, Deduct</i>	-0.14	
33 52 16 26-0005 LF 1-1/4" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	5.61	2.22
<i>For SDR 13.5, Deduct</i>	-0.17	
33 52 16 26-0006 LF 1-1/2" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	6.47	2.68
<i>For SDR 13.5, Deduct</i>	-0.24	
33 52 16 26-0007 LF 2" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	7.32	2.91
<i>For SDR 13.5, Deduct</i>	-0.32	
<i>For SDR 15.5, Deduct</i>	-0.58	
<i>For SDR 17, Deduct</i>	-0.85	
33 52 16 26-0008 LF 2-1/2" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	9.29	3.41
<i>For SDR 13.5, Deduct</i>	-0.53	
<i>For SDR 15.5, Deduct</i>	-0.97	
<i>For SDR 17, Deduct</i>	-1.41	
33 52 16 26-0009 LF 3" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	11.39	4.05
<i>For SDR 13.5, Deduct</i>	-0.72	
<i>For SDR 15.5, Deduct</i>	-1.33	
<i>For SDR 17, Deduct</i>	-1.93	
<i>For SDR 21, Deduct</i>	-2.64	
33 52 16 26-0010 LF 4" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	18.69	4.80
<i>For SDR 13.5, Deduct</i>	-1.34	
<i>For SDR 15.5, Deduct</i>	-2.46	
<i>For SDR 17, Deduct</i>	-3.57	
<i>For SDR 21, Deduct</i>	-4.88	
33 52 16 26-0011 LF 6" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	28.71	4.80
<i>For SDR 13.5, Deduct</i>	-2.37	
<i>For SDR 15.5, Deduct</i>	-4.36	
<i>For SDR 17, Deduct</i>	-6.33	
<i>For SDR 21, Deduct</i>	-8.66	
33 52 16 26-0012 LF 8" Diameter, SDR 11 High Density Polyethylene (HDPE) Gas Distribution Pipe.....	42.62	6.00
<i>For SDR 13.5, Deduct</i>	-3.95	
<i>For SDR 15.5, Deduct</i>	-7.26	
<i>For SDR 17, Deduct</i>	-10.54	
<i>For SDR 21, Deduct</i>	-14.42	

33 56 Hydrocarbon Storage (33 50)

33 56 13 Aboveground Hydrocarbon Storage Tanks (33 56)

See CSI section 23 13 23 00-0000 for aboveground storage tanks.

33 56 33 Underground Hydrocarbon Storage (33 56)

See CSI section 23 13 13 00-0000 for underground storage tanks.

33 60 Hydronic and Steam Energy Utilities (33)

33 61 Hydronic Energy Distribution (33 60)

33 61 13 Buried Hydronic Energy Distribution (33 61)

33 61 13 00-0001 Prefabricated/Preinsulated Pipe (33 61 13)

Note: Includes coupling per full length of pipe. Insulation and jacketing sealed for seamless system including all fittings. Excludes excavation and backfill. See CSI section 23 01 20 91-0041 for purging of existing system.

33 61 13 00-0002 Preinsulated Schedule 40 Black Steel Pipe (33 61 13 00-0001)

Note: With polyurethane insulation and non-metallic casing. Excludes excavation or backfill.

33 61 13 00-0003 Standard Black Steel Carrier Pipe (33 61 13 00-0002)

Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.

33 61 13 00-0004 LF 3/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	169.72	20.00
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.86	
<i>For Schedule 80 Pipe, Add</i>	28.61	
33 61 13 00-0005 LF 1" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	186.11	21.58
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.15	
<i>For Schedule 80 Pipe, Add</i>	31.47	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
33 61 13 00-0006	LF	1-1/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	207.77		22.91
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.54		
		<i>For Schedule 80 Pipe, Add</i>	35.44		
33 61 13 00-0007	LF	1-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	222.46		24.19
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.80		
		<i>For Schedule 80 Pipe, Add</i>	38.04		
33 61 13 00-0008	LF	2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	233.08		25.69
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.98		
		<i>For Schedule 80 Pipe, Add</i>	39.77		
33 61 13 00-0009	LF	2-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	258.46		31.76
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.32		
		<i>For Schedule 80 Pipe, Add</i>	43.22		
33 61 13 00-0010	LF	3" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	285.09		38.76
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.67		
		<i>For Schedule 80 Pipe, Add</i>	46.68		
33 61 13 00-0011	LF	4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	359.74		49.35
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.88		
		<i>For Schedule 80 Pipe, Add</i>	58.79		
33 61 13 00-0012	LF	5" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	456.65		60.45
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.52		
		<i>For Schedule 80 Pipe, Add</i>	75.21		
33 61 13 00-0013	LF	6" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	530.99		70.82
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.73		
		<i>For Schedule 80 Pipe, Add</i>	87.31		
33 61 13 00-0014	LF	8" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	749.49		85.57
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	12.71		
		<i>For Schedule 80 Pipe, Add</i>	127.08		
33 61 13 00-0015	LF	10" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	974.33		101.82
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	16.77		
		<i>For Schedule 80 Pipe, Add</i>	167.71		
33 61 13 00-0016	LF	12" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,213.13		125.31
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	20.92		
		<i>For Schedule 80 Pipe, Add</i>	209.21		
33 61 13 00-0017		Standard Black Steel Carrier Pipe <small>(33 61 13 00-0002)</small>			
		Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.			
33 61 13 00-0018	LF	3/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	184.03		20.00
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.15		
		<i>For Schedule 80 Pipe, Add</i>	31.48		
33 61 13 00-0019	LF	1" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	201.84		21.58
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.46		
		<i>For Schedule 80 Pipe, Add</i>	34.61		
33 61 13 00-0020	LF	1-1/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	225.49		22.91
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.90		
		<i>For Schedule 80 Pipe, Add</i>	38.99		
33 61 13 00-0021	LF	1-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	241.48		24.19
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.18		
		<i>For Schedule 80 Pipe, Add</i>	41.84		
33 61 13 00-0022	LF	2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	252.97		25.69
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.37		
		<i>For Schedule 80 Pipe, Add</i>	43.74		
33 61 13 00-0023	LF	2-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	280.08		31.76
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.75		
		<i>For Schedule 80 Pipe, Add</i>	47.55		
33 61 13 00-0024	LF	3" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	308.44		38.76
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.14		
		<i>For Schedule 80 Pipe, Add</i>	51.35		
33 61 13 00-0025	LF	4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	389.13		49.35
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.47		
		<i>For Schedule 80 Pipe, Add</i>	64.66		
33 61 13 00-0026	LF	5" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	494.25		60.45
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.27		
		<i>For Schedule 80 Pipe, Add</i>	82.73		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0027 LF 6" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	574.65	70.82
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.60	
<i>For Schedule 80 Pipe, Add</i>	96.05	
33 61 13 00-0028 LF 8" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	813.04	85.57
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	13.98	
<i>For Schedule 80 Pipe, Add</i>	139.79	
33 61 13 00-0029 LF 10" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,058.19	101.82
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	18.45	
<i>For Schedule 80 Pipe, Add</i>	184.48	
33 61 13 00-0030 LF 12" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,317.73	125.31
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	23.01	
<i>For Schedule 80 Pipe, Add</i>	230.13	
33 61 13 00-0031 Standard Black Steel Carrier Pipe <small>(33 61 13 00-0002)</small>		
Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0032 LF 3/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	191.19	20.00
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.29	
<i>For Schedule 80 Pipe, Add</i>	32.91	
33 61 13 00-0033 LF 1" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	209.71	21.58
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.62	
<i>For Schedule 80 Pipe, Add</i>	36.19	
33 61 13 00-0034 LF 1-1/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	234.36	22.91
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.08	
<i>For Schedule 80 Pipe, Add</i>	40.76	
33 61 13 00-0035 LF 1-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	250.99	24.19
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.37	
<i>For Schedule 80 Pipe, Add</i>	43.74	
33 61 13 00-0036 LF 2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	262.91	25.69
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.57	
<i>For Schedule 80 Pipe, Add</i>	45.73	
33 61 13 00-0037 LF 2-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	290.88	31.76
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.97	
<i>For Schedule 80 Pipe, Add</i>	49.71	
33 61 13 00-0038 LF 3" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	320.11	38.76
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.37	
<i>For Schedule 80 Pipe, Add</i>	53.69	
33 61 13 00-0039 LF 4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	403.83	49.35
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.76	
<i>For Schedule 80 Pipe, Add</i>	67.60	
33 61 13 00-0040 LF 5" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	513.05	60.45
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.65	
<i>For Schedule 80 Pipe, Add</i>	86.49	
33 61 13 00-0041 LF 6" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	596.48	70.82
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.04	
<i>For Schedule 80 Pipe, Add</i>	100.41	
33 61 13 00-0042 LF 8" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	844.81	85.57
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	14.61	
<i>For Schedule 80 Pipe, Add</i>	146.14	
33 61 13 00-0043 LF 10" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,100.11	101.82
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.29	
<i>For Schedule 80 Pipe, Add</i>	192.87	
33 61 13 00-0044 LF 12" Diameter Preinsulated Schedule 40 Black Steel Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,370.04	125.31
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	24.06	
<i>For Schedule 80 Pipe, Add</i>	240.59	
33 61 13 00-0045 Standard Black Steel Carrier Pipe <small>(33 61 13 00-0002)</small>		
Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0046 LF 3/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	201.92	20.00
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.51	
<i>For Schedule 80 Pipe, Add</i>	35.05	
33 61 13 00-0047 LF 1" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	221.51	21.58
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.85	
<i>For Schedule 80 Pipe, Add</i>	38.55	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
33 61 13 00-0048	LF	1-1/4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	247.65		22.91
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.34		
		<i>For Schedule 80 Pipe, Add</i>	43.42		
33 61 13 00-0049	LF	1-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	265.25		24.19
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.66		
		<i>For Schedule 80 Pipe, Add</i>	46.60		
33 61 13 00-0050	LF	2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	277.82		25.69
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.87		
		<i>For Schedule 80 Pipe, Add</i>	48.71		
33 61 13 00-0051	LF	2-1/2" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	307.09		31.76
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.30		
		<i>For Schedule 80 Pipe, Add</i>	52.95		
33 61 13 00-0052	LF	3" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	337.61		38.76
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.72		
		<i>For Schedule 80 Pipe, Add</i>	57.19		
33 61 13 00-0053	LF	4" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	425.87		49.35
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.20		
		<i>For Schedule 80 Pipe, Add</i>	72.01		
33 61 13 00-0054	LF	5" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	541.26		60.45
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.21		
		<i>For Schedule 80 Pipe, Add</i>	92.13		
33 61 13 00-0055	LF	6" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	629.22		70.82
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.70		
		<i>For Schedule 80 Pipe, Add</i>	106.96		
33 61 13 00-0056	LF	8" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	892.46		85.57
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	15.57		
		<i>For Schedule 80 Pipe, Add</i>	155.67		
33 61 13 00-0057	LF	10" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,163.01		101.82
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	20.54		
		<i>For Schedule 80 Pipe, Add</i>	205.45		
33 61 13 00-0058	LF	12" Diameter Preinsulated Schedule 40 Black Steel Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,448.49		125.31
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	25.63		
		<i>For Schedule 80 Pipe, Add</i>	256.28		
33 61 13 00-0059		Preinsulated Black Steel Fittings <small>(33 61 13 00-0001)</small>			
		Note: No excavation or backfill.			
33 61 13 00-0060		Elbows <small>(33 61 13 00-0059)</small>			
33 61 13 00-0061		Elbows <small>(33 61 13 00-0060)</small>			
		Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.			
33 61 13 00-0062	EA	3/4" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,210.40		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	21.80		
33 61 13 00-0063	EA	1" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,245.36		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	22.31		
33 61 13 00-0064	EA	1-1/4" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,422.84		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	25.39		
33 61 13 00-0065	EA	1-1/2" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,572.34		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	27.69		
33 61 13 00-0066	EA	2" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,723.85		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.85		
33 61 13 00-0067	EA	2-1/2" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,911.63		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	30.00		
33 61 13 00-0068	EA	3" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,213.03		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	34.62		
33 61 13 00-0069	EA	4" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,582.27		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	40.39		
33 61 13 00-0070	EA	5" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,198.80		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	51.93		
33 61 13 00-0071	EA	6" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,581.40		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	58.98		
33 61 13 00-0072	EA	8" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,107.46		
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	85.26		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
33 61 13 00-0073 EA 10" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	6,716.01	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	108.98	
33 61 13 00-0074 EA 12" Diameter Preinsulated Black Steel Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	8,733.06	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	144.24	
33 61 13 00-0075 Elbows <small>(33 61 13 00-0060)</small>		
<small>Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.</small>		
33 61 13 00-0076 EA 3/4" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,292.14	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	23.43	
33 61 13 00-0077 EA 1" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,329.02	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	23.98	
33 61 13 00-0078 EA 1-1/4" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,518.04	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	27.29	
33 61 13 00-0079 EA 1-1/2" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,676.20	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	29.77	
33 61 13 00-0080 EA 2" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,832.03	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	31.01	
33 61 13 00-0081 EA 2-1/2" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,024.14	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	32.25	
33 61 13 00-0082 EA 3" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,342.85	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	37.21	
33 61 13 00-0083 EA 4" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,733.72	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	43.42	
33 61 13 00-0084 EA 5" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,393.53	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	55.82	
33 61 13 00-0085 EA 6" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,802.57	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	63.40	
33 61 13 00-0086 EA 8" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,427.19	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	91.66	
33 61 13 00-0087 EA 10" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	7,124.70	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	117.16	
33 61 13 00-0088 EA 12" Diameter Preinsulated Black Steel Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	9,273.96	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	155.06	
33 61 13 00-0089 Elbows <small>(33 61 13 00-0060)</small>		
<small>Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.</small>		
33 61 13 00-0090 EA 3/4" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,373.88	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	25.07	
33 61 13 00-0091 EA 1" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,412.68	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	25.66	
33 61 13 00-0092 EA 1-1/4" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,613.24	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	29.19	
33 61 13 00-0093 EA 1-1/2" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,780.05	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	31.85	
33 61 13 00-0094 EA 2" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,940.21	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	33.18	
33 61 13 00-0095 EA 2-1/2" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,136.64	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	34.50	
33 61 13 00-0096 EA 3" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,472.67	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	39.81	
33 61 13 00-0097 EA 4" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,885.17	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	46.45	
33 61 13 00-0098 EA 5" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,588.25	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	59.72	
33 61 13 00-0099 EA 6" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,023.74	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	67.83	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61	13 00-0100	EA	8" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,746.93	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	98.05	
33 61	13 00-0101	EA	10" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	7,533.37	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	125.33	
33 61	13 00-0102	EA	12" Diameter Preinsulated Black Steel Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	9,814.87	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	165.88	
33 61	13 00-0103		Elbows <small>(33 61 13 00-0060)</small>		
			Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61	13 00-0104	EA	3/4" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,455.61	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	26.70	
33 61	13 00-0105	EA	1" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,496.34	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	27.33	
33 61	13 00-0106	EA	1-1/4" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,708.44	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	31.10	
33 61	13 00-0107	EA	1-1/2" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,883.91	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	33.93	
33 61	13 00-0108	EA	2" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,048.39	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	35.34	
33 61	13 00-0109	EA	2-1/2" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,249.15	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	36.75	
33 61	13 00-0110	EA	3" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,602.48	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	42.41	
33 61	13 00-0111	EA	4" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,036.63	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	49.47	
33 61	13 00-0112	EA	5" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,782.98	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	63.61	
33 61	13 00-0113	EA	6" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,244.91	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	72.25	
33 61	13 00-0114	EA	8" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	6,066.67	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	104.45	
33 61	13 00-0115	EA	10" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	7,942.06	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	133.50	
33 61	13 00-0116	EA	12" Diameter Preinsulated Black Steel Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	10,355.77	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	176.70	
33 61	13 00-0117		Tees <small>(33 61 13 00-0059)</small>		
33 61	13 00-0118		Tees <small>(33 61 13 00-0117)</small>		
			Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61	13 00-0119	EA	3/4" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,799.19	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	32.37	
33 61	13 00-0120	EA	1" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,851.13	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	33.13	
33 61	13 00-0121	EA	1-1/4" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,115.00	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	37.70	
33 61	13 00-0122	EA	1-1/2" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,337.51	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	41.13	
33 61	13 00-0123	EA	2" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,563.62	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	42.84	
33 61	13 00-0124	EA	2-1/2" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,844.20	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	44.55	
33 61	13 00-0125	EA	3" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,293.58	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	51.41	
33 61	13 00-0126	EA	4" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,843.10	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	59.98	
33 61	13 00-0127	EA	5" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,762.45	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	77.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0128 EA 6" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,328.74	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	87.58	
33 61 13 00-0129 EA 8" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	7,595.67	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	126.61	
33 61 13 00-0130 EA 10" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	9,994.52	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	161.84	
33 61 13 00-0131 EA 12" Diameter Preinsulated Black Steel Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	12,991.40	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	214.20	
33 61 13 00-0132 Tees <small>(33 61 13 00-0117)</small>		
<i>Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.</i>		
33 61 13 00-0133 EA 3/4" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,920.56	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	34.80	
33 61 13 00-0134 EA 1" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,975.36	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	35.61	
33 61 13 00-0135 EA 1-1/4" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,256.37	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	40.53	
33 61 13 00-0136 EA 1-1/2" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,491.73	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	44.21	
33 61 13 00-0137 EA 2" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,724.27	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	46.05	
33 61 13 00-0138 EA 2-1/2" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,011.28	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	47.89	
33 61 13 00-0139 EA 3" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,486.36	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	55.26	
33 61 13 00-0140 EA 4" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,068.01	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	64.47	
33 61 13 00-0141 EA 5" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,051.61	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	82.89	
33 61 13 00-0142 EA 6" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,657.18	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	94.15	
33 61 13 00-0143 EA 8" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	8,070.48	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	136.11	
33 61 13 00-0144 EA 10" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	10,601.41	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	173.98	
33 61 13 00-0145 EA 12" Diameter Preinsulated Black Steel Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	13,794.65	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	230.26	
33 61 13 00-0146 Tees <small>(33 61 13 00-0117)</small>		
<i>Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.</i>		
33 61 13 00-0147 EA 3/4" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,041.94	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	37.22	
33 61 13 00-0148 EA 1" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,099.60	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	38.10	
33 61 13 00-0149 EA 1-1/4" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,397.75	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	43.35	
33 61 13 00-0150 EA 1-1/2" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,645.96	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	47.30	
33 61 13 00-0151 EA 2" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,884.92	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	49.27	
33 61 13 00-0152 EA 2-1/2" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,178.35	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	51.24	
33 61 13 00-0153 EA 3" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,679.13	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	59.12	
33 61 13 00-0154 EA 4" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,292.92	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	68.97	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 61 13 00-0155	EA	5" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,340.78	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	88.68	
33 61 13 00-0156	EA	6" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,985.62	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	100.72	
33 61 13 00-0157	EA	8" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	8,545.29	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	145.61	
33 61 13 00-0158	EA	10" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	11,208.30	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	186.11	
33 61 13 00-0159	EA	12" Diameter Preinsulated Black Steel Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	14,597.90	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	246.33	
33 61 13 00-0160		Tees <small>(33 61 13 00-0117)</small>		
		Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0161	EA	3/4" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,163.32	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	39.65	
33 61 13 00-0162	EA	1" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,223.83	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	40.58	
33 61 13 00-0163	EA	1-1/4" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,539.12	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	46.18	
33 61 13 00-0164	EA	1-1/2" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,800.18	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	50.38	
33 61 13 00-0165	EA	2" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,045.57	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	52.48	
33 61 13 00-0166	EA	2-1/2" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,345.42	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	54.58	
33 61 13 00-0167	EA	3" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,871.91	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	62.97	
33 61 13 00-0168	EA	4" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,517.83	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	73.47	
33 61 13 00-0169	EA	5" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,629.95	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	94.46	
33 61 13 00-0170	EA	6" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	6,314.05	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	107.29	
33 61 13 00-0171	EA	8" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	9,020.10	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	155.10	
33 61 13 00-0172	EA	10" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	11,815.20	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	198.25	
33 61 13 00-0173	EA	12" Diameter Preinsulated Black Steel Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	15,401.14	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	262.39	
33 61 13 00-0174		Reducers <small>(33 61 13 00-0059)</small>		
33 61 13 00-0175		Reducers <small>(33 61 13 00-0174)</small>		
		Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0176	EA	3/4" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,013.10	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	18.09	
33 61 13 00-0177	EA	1" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,042.72	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	18.52	
33 61 13 00-0178	EA	1-1/4" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,191.71	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	21.07	
33 61 13 00-0179	EA	1-1/2" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,318.09	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	22.99	
33 61 13 00-0180	EA	2" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,450.37	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	23.94	
33 61 13 00-0181	EA	2-1/2" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,624.71	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	24.90	
33 61 13 00-0182	EA	3" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,874.44	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.73	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0183 EA 4" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,182.43	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	33.52	
33 61 13 00-0184 EA 5" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,697.37	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	43.10	
33 61 13 00-0185 EA 6" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,017.05	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	48.95	
33 61 13 00-0186 EA 8" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,298.48	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	70.77	
33 61 13 00-0187 EA 10" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,663.51	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	90.46	
33 61 13 00-0188 EA 12" Diameter Preinsulated Black Steel Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	7,352.59	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	119.72	
33 61 13 00-0189 Reducers <small>(33 61 13 00-0174)</small>		
Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0190 EA 3/4" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,080.94	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.45	
33 61 13 00-0191 EA 1" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,112.15	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.91	
33 61 13 00-0192 EA 1-1/4" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,270.72	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	22.65	
33 61 13 00-0193 EA 1-1/2" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,404.29	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	24.71	
33 61 13 00-0194 EA 2" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,540.16	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	25.74	
33 61 13 00-0195 EA 2-1/2" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,718.09	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	26.77	
33 61 13 00-0196 EA 3" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,982.19	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	30.89	
33 61 13 00-0197 EA 4" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,308.14	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	36.04	
33 61 13 00-0198 EA 5" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,859.00	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	46.33	
33 61 13 00-0199 EA 6" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,200.62	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	52.62	
33 61 13 00-0200 EA 8" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,563.86	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	76.08	
33 61 13 00-0201 EA 10" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	6,002.72	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	97.24	
33 61 13 00-0202 EA 12" Diameter Preinsulated Black Steel Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	7,801.54	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	128.70	
33 61 13 00-0203 Reducers <small>(33 61 13 00-0174)</small>		
Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0204 EA 3/4" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,148.79	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	20.80	
33 61 13 00-0205 EA 1" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,181.59	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	21.29	
33 61 13 00-0206 EA 1-1/4" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,349.74	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	24.23	
33 61 13 00-0207 EA 1-1/2" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,490.49	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	26.43	
33 61 13 00-0208 EA 2" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,629.95	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	27.54	
33 61 13 00-0209 EA 2-1/2" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,811.47	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.64	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 61 13 00-0210	EA	3" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,089.94	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	33.04	
33 61 13 00-0211	EA	4" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,433.84	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	38.55	
33 61 13 00-0212	EA	5" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,020.62	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	49.56	
33 61 13 00-0213	EA	6" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,384.19	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	56.30	
33 61 13 00-0214	EA	8" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,829.23	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	81.38	
33 61 13 00-0215	EA	10" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	6,341.93	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	104.02	
33 61 13 00-0216	EA	12" Diameter Preinsulated Black Steel Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	8,250.49	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	137.68	
33 61 13 00-0217		Reducers <small>(33 61 13 00-0174)</small>		
		Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0218	EA	3/4" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,216.63	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	22.16	
33 61 13 00-0219	EA	1" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,251.03	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	22.68	
33 61 13 00-0220	EA	1-1/4" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,428.75	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	25.81	
33 61 13 00-0221	EA	1-1/2" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,576.69	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.16	
33 61 13 00-0222	EA	2" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,719.74	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	29.33	
33 61 13 00-0223	EA	2-1/2" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,904.85	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	30.50	
33 61 13 00-0224	EA	3" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,197.69	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	35.20	
33 61 13 00-0225	EA	4" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,559.55	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	41.06	
33 61 13 00-0226	EA	5" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,182.24	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	52.80	
33 61 13 00-0227	EA	6" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,567.76	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	59.97	
33 61 13 00-0228	EA	8" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	5,094.61	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	86.69	
33 61 13 00-0229	EA	10" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	6,681.13	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	110.81	
33 61 13 00-0230	EA	12" Diameter Preinsulated Black Steel Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	8,699.44	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	146.66	
33 61 13 00-0231		Preinsulated Type K Copper Pipe <small>(33 61 13 00-0001)</small>		
		Note: With polyurethane insulation and non-metallic casing. Excludes excavation or backfill.		
33 61 13 00-0232		Type K Copper Carrier Pipe <small>(33 61 13 00-0231)</small>		
		Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0233	LF	3/4" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	48.15	17.84
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.43	
33 61 13 00-0234	LF	1" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	52.42	19.25
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.47	
33 61 13 00-0235	LF	1-1/4" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	57.17	20.44
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.53	
33 61 13 00-0236	LF	1-1/2" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	60.83	21.59
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.57	
33 61 13 00-0237	LF	2" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	64.11	22.92
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.60	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0238 LF 2-1/2" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	74.82	28.34
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.65	
33 61 13 00-0239 LF 3" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	86.78	34.58
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.70	
33 61 13 00-0240 LF 4" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	110.01	44.05
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.88	
33 61 13 00-0241 LF 5" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	137.14	53.94
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.13	
33 61 13 00-0242 LF 6" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	160.08	63.19
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.31	
33 61 13 00-0243 LF 8" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	209.56	76.65
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.90	
33 61 13 00-0244 LF 10" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	261.72	90.87
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.51	
33 61 13 00-0245 LF 12" Diameter Preinsulated Type K Copper Pipe With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	324.19	111.81
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.13	
33 61 13 00-0246 Type K Copper Carrier Pipe <small>(33 61 13 00-0231)</small>		
Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0247 LF 3/4" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	50.29	17.84
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.47	
33 61 13 00-0248 LF 1" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	54.77	19.25
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.52	
33 61 13 00-0249 LF 1-1/4" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	59.82	20.44
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.58	
33 61 13 00-0250 LF 1-1/2" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	63.68	21.59
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.63	
33 61 13 00-0251 LF 2" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	67.08	22.92
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.65	
33 61 13 00-0252 LF 2-1/2" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	78.06	28.34
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.71	
33 61 13 00-0253 LF 3" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	90.27	34.58
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.77	
33 61 13 00-0254 LF 4" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	114.41	44.05
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.97	
33 61 13 00-0255 LF 5" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	142.77	53.94
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.24	
33 61 13 00-0256 LF 6" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	166.61	63.19
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.44	
33 61 13 00-0257 LF 8" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	219.07	76.65
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.09	
33 61 13 00-0258 LF 10" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	274.27	90.87
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.76	
33 61 13 00-0259 LF 12" Diameter Preinsulated Type K Copper Pipe With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	339.84	111.81
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.44	
33 61 13 00-0260 Type K Copper Carrier Pipe <small>(33 61 13 00-0231)</small>		
Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0261 LF 3/4" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	51.36	17.84
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.49	
33 61 13 00-0262 LF 1" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	55.95	19.25
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.54	
33 61 13 00-0263 LF 1-1/4" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	61.15	20.44
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.61	
33 61 13 00-0264 LF 1-1/2" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	65.10	21.59
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.65	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0265	LF		2" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	68.57	22.92
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.68	
33 61 13 00-0266	LF		2-1/2" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	79.68	28.34
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.74	
33 61 13 00-0267	LF		3" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	92.02	34.58
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.80	
33 61 13 00-0268	LF		4" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	116.61	44.05
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.01	
33 61 13 00-0269	LF		5" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	145.58	53.94
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.29	
33 61 13 00-0270	LF		6" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	169.88	63.19
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.50	
33 61 13 00-0271	LF		8" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	223.83	76.35
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.19	
33 61 13 00-0272	LF		10" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	280.54	90.87
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.89	
33 61 13 00-0273	LF		12" Diameter Preinsulated Type K Copper Pipe With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	347.67	111.81
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.60	
33 61 13 00-0274			Type K Copper Carrier Pipe <small>(33 61 13 00-0231)</small>		
			Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0275	LF		3/4" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	52.97	17.84
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.52	
33 61 13 00-0276	LF		1" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	57.71	19.25
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.58	
33 61 13 00-0277	LF		1-1/4" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	63.14	20.44
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.65	
33 61 13 00-0278	LF		1-1/2" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	67.24	21.59
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.70	
33 61 13 00-0279	LF		2" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	70.80	22.92
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.73	
33 61 13 00-0280	LF		2-1/2" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	82.10	28.34
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.79	
33 61 13 00-0281	LF		3" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	94.64	34.58
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	0.86	
33 61 13 00-0282	LF		4" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	119.91	44.05
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.08	
33 61 13 00-0283	LF		5" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	149.80	53.94
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.38	
33 61 13 00-0284	LF		6" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	174.78	63.19
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1.60	
33 61 13 00-0285	LF		8" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	230.96	76.35
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2.33	
33 61 13 00-0286	LF		10" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	289.95	90.87
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.07	
33 61 13 00-0287	LF		12" Diameter Preinsulated Type K Copper Pipe With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	359.41	111.81
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	3.84	
33 61 13 00-0288			Preinsulated Copper Fittings <small>(33 61 13 00-0001)</small>		
33 61 13 00-0289			Elbows <small>(33 61 13 00-0288)</small>		
33 61 13 00-0290			Elbows <small>(33 61 13 00-0289)</small>		
			Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0291	EA		3/4" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	348.89	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.88	
33 61 13 00-0292	EA		1" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	362.75	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.00	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0293 EA 1-1/4" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	417.74	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.69	
33 61 13 00-0294 EA 1-1/2" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	473.24	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.20	
33 61 13 00-0295 EA 2" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	567.75	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.46	
33 61 13 00-0296 EA 2-1/2" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	693.76	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.72	
33 61 13 00-0297 EA 3" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	806.83	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.75	
33 61 13 00-0298 EA 4" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	941.65	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.04	
33 61 13 00-0299 EA 5" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,105.26	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.63	
33 61 13 00-0300 EA 6" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,210.35	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	13.21	
33 61 13 00-0301 EA 8" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,688.88	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.09	
33 61 13 00-0302 EA 10" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	2,321.81	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	24.41	
33 61 13 00-0303 EA 12" Diameter Preinsulated Type K Copper Elbow With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	2,937.66	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	32.30	
33 61 13 00-0304 Elbows <small>(33 61 13 00-0289)</small>		
Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0305 EA 3/4" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	367.20	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.25	
33 61 13 00-0306 EA 1" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	381.48	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.37	
33 61 13 00-0307 EA 1-1/4" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	439.06	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.11	
33 61 13 00-0308 EA 1-1/2" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	496.50	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.67	
33 61 13 00-0309 EA 2" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	591.98	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.94	
33 61 13 00-0310 EA 2-1/2" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	718.96	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.22	
33 61 13 00-0311 EA 3" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	835.90	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.33	
33 61 13 00-0312 EA 4" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	975.56	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.72	
33 61 13 00-0313 EA 5" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,148.87	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	12.50	
33 61 13 00-0314 EA 6" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,259.88	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	14.20	
33 61 13 00-0315 EA 8" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	1,760.48	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	20.53	
33 61 13 00-0316 EA 10" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	2,413.33	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	26.24	
33 61 13 00-0317 EA 12" Diameter Preinsulated Type K Copper Elbow With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	3,058.79	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	34.72	
33 61 13 00-0318 Elbows <small>(33 61 13 00-0289)</small>		
Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0319 EA 3/4" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket	385.50	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.61	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 61 13 00-0320	EA	1" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	400.21	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.75	
33 61 13 00-0321	EA	1-1/4" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	460.38	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.54	
33 61 13 00-0322	EA	1-1/2" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	519.75	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.13	
33 61 13 00-0323	EA	2" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	616.20	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.43	
33 61 13 00-0324	EA	2-1/2" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	744.15	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.73	
33 61 13 00-0325	EA	3" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	864.98	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.92	
33 61 13 00-0326	EA	4" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,009.48	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.40	
33 61 13 00-0327	EA	5" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,192.47	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	13.37	
33 61 13 00-0328	EA	6" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,309.68	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	15.19	
33 61 13 00-0329	EA	8" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,831.92	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	21.96	
33 61 13 00-0330	EA	10" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,504.39	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.07	
33 61 13 00-0331	EA	12" Diameter Preinsulated Type K Copper Elbow With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,180.26	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	37.15	

33 61 13 00-0332 Elbows (33 61 13 00-0289)

Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.

33 61 13 00-0333	EA	3/4" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	403.80	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.98	
33 61 13 00-0334	EA	1" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	418.95	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.12	
33 61 13 00-0335	EA	1-1/4" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	481.70	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.96	
33 61 13 00-0336	EA	1-1/2" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	543.01	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.60	
33 61 13 00-0337	EA	2" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	640.43	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.91	
33 61 13 00-0338	EA	2-1/2" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	769.35	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.23	
33 61 13 00-0339	EA	3" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	894.05	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.50	
33 61 13 00-0340	EA	4" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,043.39	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.08	
33 61 13 00-0341	EA	5" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,236.08	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	14.24	
33 61 13 00-0342	EA	6" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,359.20	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	16.18	
33 61 13 00-0343	EA	8" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,903.52	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	23.39	
33 61 13 00-0344	EA	10" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,595.92	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	29.90	
33 61 13 00-0345	EA	12" Diameter Preinsulated Type K Copper Elbow With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,301.39	
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	39.57	

33 61 13 00-0346 Tees (33 61 13 00-0288)**33 61 13 00-0347 Tees** (33 61 13 00-0346)

Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
33 61 13 00-0348 EA 3/4" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	519.64	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.25	
33 61 13 00-0349 EA 1" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	540.22	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.42	
33 61 13 00-0350 EA 1-1/4" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	622.17	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.44	
33 61 13 00-0351 EA 1-1/2" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	705.02	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.21	
33 61 13 00-0352 EA 2" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	846.30	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.59	
33 61 13 00-0353 EA 2-1/2" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,034.98	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.98	
33 61 13 00-0354 EA 3" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,204.49	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.51	
33 61 13 00-0355 EA 4" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,405.74	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	13.43	
33 61 13 00-0356 EA 5" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,652.00	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	17.27	
33 61 13 00-0357 EA 6" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,806.28	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.61	
33 61 13 00-0358 EA 8" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,517.47	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.35	
33 61 13 00-0359 EA 10" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,466.26	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	36.24	
33 61 13 00-0360 EA 12" Diameter Preinsulated Type K Copper Tee With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,382.27	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	47.97	
33 61 13 00-0361 Tees <small>(33 61 13 00-0346)</small>		
Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0362 EA 3/4" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	546.82	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.79	
33 61 13 00-0363 EA 1" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	568.04	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.98	
33 61 13 00-0364 EA 1-1/4" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	653.83	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.08	
33 61 13 00-0365 EA 1-1/2" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	739.55	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.90	
33 61 13 00-0366 EA 2" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	882.28	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.31	
33 61 13 00-0367 EA 2-1/2" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,072.39	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.73	
33 61 13 00-0368 EA 3" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,247.66	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	12.38	
33 61 13 00-0369 EA 4" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,456.11	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	14.44	
33 61 13 00-0370 EA 5" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,716.76	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	18.56	
33 61 13 00-0371 EA 6" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,879.83	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	21.08	
33 61 13 00-0372 EA 8" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,623.79	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	30.48	
33 61 13 00-0373 EA 10" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,602.17	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	38.96	
33 61 13 00-0374 EA 12" Diameter Preinsulated Type K Copper Tee With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,562.15	
<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	51.56	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0375			Tees <small>(33 61 13 00-0346)</small>		
			Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0376	EA		3/4" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	574.00	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.34	
33 61 13 00-0377	EA		1" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	595.86	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.53	
33 61 13 00-0378	EA		1-1/4" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	685.49	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.71	
33 61 13 00-0379	EA		1-1/2" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	774.09	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.59	
33 61 13 00-0380	EA		2" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	918.25	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.03	
33 61 13 00-0381	EA		2-1/2" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,109.81	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.47	
33 61 13 00-0382	EA		3" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,290.83	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	13.24	
33 61 13 00-0383	EA		4" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,506.47	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	15.45	
33 61 13 00-0384	EA		5" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,781.51	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.86	
33 61 13 00-0385	EA		6" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,953.78	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	22.56	
33 61 13 00-0386	EA		8" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,729.06	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	32.61	
33 61 13 00-0387	EA		10" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,735.55	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	41.68	
33 61 13 00-0388	EA		12" Diameter Preinsulated Type K Copper Tee With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,744.96	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	55.16	
33 61 13 00-0389			Tees <small>(33 61 13 00-0346)</small>		
			Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0390	EA		3/4" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	601.18	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.88	
33 61 13 00-0391	EA		1" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	623.68	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.09	
33 61 13 00-0392	EA		1-1/4" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	717.15	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	10.34	
33 61 13 00-0393	EA		1-1/2" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	808.62	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.28	
33 61 13 00-0394	EA		2" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	954.23	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.75	
33 61 13 00-0395	EA		2-1/2" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,147.22	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	12.22	
33 61 13 00-0396	EA		3" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,334.00	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	14.10	
33 61 13 00-0397	EA		4" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,556.84	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	16.45	
33 61 13 00-0398	EA		5" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,846.27	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	21.15	
33 61 13 00-0399	EA		6" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,027.33	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	24.03	
33 61 13 00-0400	EA		8" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,835.39	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	34.73	
33 61 13 00-0401	EA		10" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	3,871.46	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	44.40	
33 61 13 00-0402	EA		12" Diameter Preinsulated Type K Copper Tee With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	4,924.83	
			<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	58.76	

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
33 61 13 00-0403		Reducers <small>(33 61 13 00-0288)</small>		
33 61 13 00-0404		Reducers <small>(33 61 13 00-0403)</small> Note: With 1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0405	EA	3/4" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	296.95 4.05	
33 61 13 00-0406	EA	1" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	308.96 4.15	
33 61 13 00-0407	EA	1-1/4" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	356.08 4.72	
33 61 13 00-0408	EA	1-1/2" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	404.14 5.15	
33 61 13 00-0409	EA	2" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	488.25 5.36	
33 61 13 00-0410	EA	2-1/2" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	608.91 5.58	
33 61 13 00-0411	EA	3" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	702.39 6.43	
33 61 13 00-0412	EA	4" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	815.62 7.51	
33 61 13 00-0413	EA	5" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	954.23 9.65	
33 61 13 00-0414	EA	6" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1,043.27 10.96	
33 61 13 00-0415	EA	8" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1,453.26 15.85	
33 61 13 00-0416	EA	10" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2,004.78 20.26	
33 61 13 00-0417	EA	12" Diameter Preinsulated Type K Copper Reducer With 1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2,528.83 26.81	
33 61 13 00-0418		Reducers <small>(33 61 13 00-0403)</small> Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.		
33 61 13 00-0419	EA	3/4" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	312.15 4.36	
33 61 13 00-0420	EA	1" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	324.51 4.46	
33 61 13 00-0421	EA	1-1/4" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	373.77 5.07	
33 61 13 00-0422	EA	1-1/2" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	423.44 5.53	
33 61 13 00-0423	EA	2" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	508.36 5.76	
33 61 13 00-0424	EA	2-1/2" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	629.83 5.99	
33 61 13 00-0425	EA	3" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	726.52 6.92	
33 61 13 00-0426	EA	4" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	843.77 8.07	
33 61 13 00-0427	EA	5" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	990.42 10.38	
33 61 13 00-0428	EA	6" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1,084.38 11.78	
33 61 13 00-0429	EA	8" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	1,512.69 17.04	
33 61 13 00-0430	EA	10" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket <i>For High Density Polyethylene (HDPE) Jacket, Add</i>	2,080.74 21.78	

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 61 13 00-0431	EA	12" Diameter Preinsulated Type K Copper Reducer With 1" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,629.37
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	28.82

33 61 13 00-0432 Reducers (33 61 13 00-0403)

Note: With 1-1/2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.

33 61 13 00-0433	EA	3/4" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	327.34
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.66
33 61 13 00-0434	EA	1" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	340.06
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.77
33 61 13 00-0435	EA	1-1/4" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	391.47
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.43
33 61 13 00-0436	EA	1-1/2" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	442.74
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.92
33 61 13 00-0437	EA	2" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	528.46
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.17
33 61 13 00-0438	EA	2-1/2" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	650.74
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.41
33 61 13 00-0439	EA	3" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	750.65
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.40
33 61 13 00-0440	EA	4" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	871.92
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	8.63
33 61 13 00-0441	EA	5" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,026.62
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.10
33 61 13 00-0442	EA	6" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,125.70
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	12.61
33 61 13 00-0443	EA	8" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,571.74
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	18.22
33 61 13 00-0444	EA	10" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,156.33
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	23.29
33 61 13 00-0445	EA	12" Diameter Preinsulated Type K Copper Reducer With 1-1/2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	2,730.17
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	30.83

33 61 13 00-0446 Reducers (33 61 13 00-0403)

Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.

33 61 13 00-0447	EA	3/4" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	342.53
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	4.96
33 61 13 00-0448	EA	1" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	355.61
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.08
33 61 13 00-0449	EA	1-1/4" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	409.16
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	5.78
33 61 13 00-0450	EA	1-1/2" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	462.04
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.31
33 61 13 00-0451	EA	2" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	548.57
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.57
33 61 13 00-0452	EA	2-1/2" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	671.65
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	6.83
33 61 13 00-0453	EA	3" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	774.78
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	7.88
33 61 13 00-0454	EA	4" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	900.07
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	9.20
33 61 13 00-0455	EA	5" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,062.81
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	11.82
33 61 13 00-0456	EA	6" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,166.81
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	13.43
33 61 13 00-0457	EA	8" Diameter Preinsulated Type K Copper Reducer With 2" Polyurethane Foam Insulation And Fiberglass Reinforced Polyester (FRP) Jacket.....	1,631.17
		<i>For High Density Polyethylene (HDPE) Jacket, Add</i>	19.41

33 Utilities**33 60 Hydronic and Steam Energy Utilities****33 61 Hydronic Energy Distribution**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
33 61 13 00-0495	EA	20" Diameter Preinsulated Ductile Iron Elbow With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		15,732.51	
33 61 13 00-0496	EA	24" Diameter Preinsulated Ductile Iron Elbow With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		20,208.78	
33 61 13 00-0497		Tees <small>(33 61 13 00-0478)</small>			
33 61 13 00-0498		Tees <small>(33 61 13 00-0497)</small>			
		Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.			
33 61 13 00-0499	EA	4" Diameter Preinsulated Ductile Iron Tee With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		2,796.39	
33 61 13 00-0500	EA	6" Diameter Preinsulated Ductile Iron Tee With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		3,800.20	
33 61 13 00-0501	EA	8" Diameter Preinsulated Ductile Iron Tee With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		5,385.94	
33 61 13 00-0502	EA	10" Diameter Preinsulated Ductile Iron Tee With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		7,170.05	
33 61 13 00-0503	EA	12" Diameter Preinsulated Ductile Iron Tee With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		9,253.13	
33 61 13 00-0504		Tees <small>(33 61 13 00-0497)</small>			
		Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.			
33 61 13 00-0505	EA	4" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		3,068.77	
33 61 13 00-0506	EA	6" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		4,197.97	
33 61 13 00-0507	EA	8" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		5,960.97	
33 61 13 00-0508	EA	10" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		7,905.04	
33 61 13 00-0509	EA	12" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		10,225.93	
33 61 13 00-0510	EA	14" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		12,290.87	
33 61 13 00-0511	EA	16" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		14,594.99	
33 61 13 00-0512	EA	18" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		18,237.28	
33 61 13 00-0513	EA	20" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		23,100.03	
33 61 13 00-0514	EA	24" Diameter Preinsulated Ductile Iron Tee With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket.....		29,662.20	
33 61 13 00-0515		Reducers <small>(33 61 13 00-0478)</small>			
33 61 13 00-0516		Reducers <small>(33 61 13 00-0515)</small>			
		Note: With 1" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.			
33 61 13 00-0517	EA	4" Diameter Preinsulated Ductile Iron Reducer With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		1,597.40	
33 61 13 00-0518	EA	6" Diameter Preinsulated Ductile Iron Reducer With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		2,162.72	
33 61 13 00-0519	EA	8" Diameter Preinsulated Ductile Iron Reducer With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		3,063.41	
33 61 13 00-0520	EA	10" Diameter Preinsulated Ductile Iron Reducer With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		4,084.85	
33 61 13 00-0521	EA	12" Diameter Preinsulated Ductile Iron Reducer With 1" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		5,263.19	
33 61 13 00-0522		Reducers <small>(33 61 13 00-0515)</small>			
		Note: With 2" polyurethane insulation and non-metallic fiberglass reinforced polyester (FRP) casing.			
33 61 13 00-0523	EA	4" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		1,749.64	
33 61 13 00-0524	EA	6" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		2,385.03	
33 61 13 00-0525	EA	8" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		3,384.80	
33 61 13 00-0526	EA	10" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		4,495.65	
33 61 13 00-0527	EA	12" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		5,806.90	
33 61 13 00-0528	EA	14" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		6,971.52	
33 61 13 00-0529	EA	16" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		8,269.33	
33 61 13 00-0530	EA	18" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		10,279.96	
33 61 13 00-0531	EA	20" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		13,088.76	
33 61 13 00-0532	EA	24" Diameter Preinsulated Ductile Iron Reducer With 2" Polyurethane Foam Insulation And High Density Polyethylene (HDPE) Jacket		16,844.23	



	Utilities	33
	Hydronic and Steam Energy Utilities	33 60
	Hydronic Energy Distribution	33 61

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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33 61 13 00-0533	Tempered Water Piping Pre-Insulated <small>(33 61 13 00-0001)</small>	
33 61 13 00-0534	Fiberglass Reinforced Polyester (FRP) Carrier And Casing, 1" Polyurethane Insulation <small>(33 61 13 00-0533)</small>	
33 61 13 00-0535	LF	4" Fiberglass Reinforced Polyester (FRP) Carrier And Casing With 1" Polyurethane Insulation 179.94 23.28
33 61 13 00-0536	LF	6" Fiberglass Reinforced Polyester (FRP) Carrier And Casing With 1" Polyurethane Insulation 233.17 25.27
33 61 13 00-0537	LF	8" Fiberglass Reinforced Polyester (FRP) Carrier And Casing With 1" Polyurethane Insulation 331.16 28.03
33 61 13 00-0538	LF	10" Fiberglass Reinforced Polyester (FRP) Carrier And Casing With 1" Polyurethane Insulation 459.91 35.05
33 61 13 00-0539	LF	12" Fiberglass Reinforced Polyester (FRP) Carrier And Casing With 1" Polyurethane Insulation 590.37 43.23
33 61 13 00-0540	Fiberglass Reinforced Polyester (FRP) Carrier And Polyvinyl Chloride (PVC) Casing, 1" Polyurethane Insulation <small>(33 61 13 00-0533)</small>	
33 61 13 00-0541	LF	4" Fiberglass Reinforced Polyester (FRP) Carrier And Polyvinyl Chloride (PVC) Casing With 1" Polyurethane Insulation 77.95 25.27
33 61 13 00-0542	LF	6" Fiberglass Reinforced Polyester (FRP) Carrier And Polyvinyl Chloride (PVC) Casing With 1" Polyurethane Insulation 95.34 25.27
33 61 13 00-0543	LF	8" Fiberglass Reinforced Polyester (FRP) Carrier And Polyvinyl Chloride (PVC) Casing With 1" Polyurethane Insulation 111.78 25.27
33 61 13 00-0544	LF	10" Fiberglass Reinforced Polyester (FRP) Carrier And Polyvinyl Chloride (PVC) Casing With 1" Polyurethane Insulation 133.84 29.87
33 61 13 00-0545	LF	12" Fiberglass Reinforced Polyester (FRP) Carrier And Polyvinyl Chloride (PVC) Casing With 1" Polyurethane Insulation 160.70 37.91
33 61 13 00-0546	Polyvinyl Chloride (PVC) Carrier And Casing, 1" Polyurethane Insulation <small>(33 61 13 00-0533)</small>	
33 61 13 00-0547	LF	4" Polyvinyl Chloride (PVC) Carrier And Casing With 1" Polyurethane Insulation 77.95 25.27
33 61 13 00-0548	LF	6" Polyvinyl Chloride (PVC) Carrier And Casing With 1" Polyurethane Insulation 95.33 25.27
33 61 13 00-0549	LF	8" Polyvinyl Chloride (PVC) Carrier And Casing With 1" Polyurethane Insulation 110.62 25.27
33 61 13 00-0550	LF	10" Polyvinyl Chloride (PVC) Carrier And Casing With 1" Polyurethane Insulation 133.83 29.87
33 61 13 00-0551	LF	12" Polyvinyl Chloride (PVC) Carrier And Casing With 1" Polyurethane Insulation 160.69 37.91

33 70 Electrical Utilities (33)

33 71 Electrical Utility Transmission and Distribution (33 70)

33 71 19 Electrical Underground Ducts, Ductbanks and Manholes (33 71)

Note: Excludes excavation and backfill. See CSI section 31 23 16 00-0000 for excavation, 31 23 16 36-0016 for backfill.

33 71 19 13 Electrical Manholes and Handholes (33 71 19)

33 71 19 13-0001 Electrical Handholes And Pull Boxes (33 71 19 13)

33 71 19 13-0002 Electrical Pull Boxes (33 71 19 13-0001)

See CSI section 33 05 63 00-0427 for handholes.

33 71 19 13-0003	EA	24" x 36" x 24", Electric Pull Boxes, Precast Concrete 2,406.82 515.85
33 71 19 13-0004	EA	24" x 36" x 36", Electric Pull Boxes, Precast Concrete 2,911.72 571.78
33 71 19 13-0005	EA	30" x 48" x 36", Electric Pull Boxes, Precast Concrete 3,396.52 621.50
33 71 19 13-0006	EA	36" x 72" x 24", Electric Pull Boxes, Precast Concrete 5,420.89 745.80
33 71 19 13-0007	EA	36" x 60" x 36", Electric Pull Boxes, Precast Concrete 5,813.82 745.80
33 71 19 13-0008	EA	48" x 48" x 36", Electric Pull Boxes, Precast Concrete 6,268.82 776.87
33 71 19 13-0009	EA	48" x 60" x 48", Electric Pull Boxes, Precast Concrete 7,223.43 870.10

33 71 19 13-0010 Electrical Pull Boxes (CALTRANS) (33 71 19 13-0001)

33 71 19 13-0011	EA	Body, CALTRANS 3-1/2 Precast Concrete Pull Box 146.19
33 71 19 13-0012	EA	Concrete Cover, CALTRANS 3-1/2 Precast Concrete Pull Box 57.24
33 71 19 13-0013	EA	Bolt Down Concrete Cover, CALTRANS 3-1/2 Precast Concrete Pull Box 88.49
33 71 19 13-0014	EA	Bolt Down Cast Iron Cover, CALTRANS 3-1/2 Precast Concrete Pull Box 184.80
33 71 19 13-0015	EA	Bolt Down Steel Cover, CALTRANS 3-1/2 Precast Concrete Pull Box 284.65
		<i>For Galvanized Steel Cover, Add</i> 48.34
33 71 19 13-0016	EA	12" Extension, CALTRANS 3-1/2 Precast Concrete Pull Box 73.13
33 71 19 13-0017	EA	Flat Plate Base, CALTRANS 3-1/2 Precast Concrete Pull Box 73.13
33 71 19 13-0018	EA	Body, CALTRANS 5 Precast Concrete Pull Box 209.53
33 71 19 13-0019	EA	Concrete Cover, CALTRANS 5 Precast Concrete Pull Box 76.15
33 71 19 13-0020	EA	Bolt Down Concrete Cover, CALTRANS 5 Precast Concrete Pull Box 107.40
33 71 19 13-0021	EA	Bolt Down Steel Cover, CALTRANS 5 Precast Concrete Pull Box 376.82
		<i>For Galvanized Steel Cover, Add</i> 88.63
33 71 19 13-0022	EA	12" Extension, CALTRANS 5 Precast Concrete Pull Box 102.67
33 71 19 13-0023	EA	Flat Plate Base, CALTRANS 5 Precast Concrete Pull Box 96.17
33 71 19 13-0024	EA	Body, CALTRANS 6 Precast Concrete Pull Box 228.44
33 71 19 13-0025	EA	Concrete Cover, CALTRANS 6 Precast Concrete Pull Box 101.56
33 71 19 13-0026	EA	Bolt Down Concrete Cover, CALTRANS 6 Precast Concrete Pull Box 132.80
33 71 19 13-0027	EA	Bolt Down Steel Cover, CALTRANS 6 Precast Concrete Pull Box 516.26
		<i>For Galvanized Steel Cover, Add</i> 124.08
33 71 19 13-0028	EA	12" Extension, CALTRANS 6 Precast Concrete Pull Box 121.58
33 71 19 13-0029	EA	Flat Plate Base, CALTRANS 6 Precast Concrete Pull Box 114.49
33 71 19 13-0030	EA	6" Return Flat Plate Base, CALTRANS 6 Precast Concrete Pull Box 157.03

33 Utilities**33 70 Electrical Utilities****33 71 Electrical Utility Transmission and Distribution**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

33 71 19 13-0031	EA	Body, CALTRANS 3-1/2-T Precast Concrete Pull Box	319.30	
33 71 19 13-0032	EA	Bolt Down Concrete Cover, CALTRANS 3-1/2-T Precast Concrete Pull Box	452.45	
33 71 19 13-0033	EA	12" Extension, CALTRANS 3-1/2-T Precast Concrete Pull Box	145.21	
33 71 19 13-0034	EA	Flat Plate Base, CALTRANS 3-1/2-T Precast Concrete Pull Box	133.39	
33 71 19 13-0035	EA	Body, CALTRANS 5-T Precast Concrete Pull Box	417.51	
33 71 19 13-0036	EA	Bolt Down Concrete Cover, CALTRANS 5-T Precast Concrete Pull Box	653.33	
33 71 19 13-0037	EA	12" Extension, CALTRANS 5-T Precast Concrete Pull Box	173.57	
33 71 19 13-0038	EA	Flat Plate Base, CALTRANS 5-T Precast Concrete Pull Box	168.84	
33 71 19 13-0039	EA	Body, CALTRANS 6-T Precast Concrete Pull Box	590.03	
33 71 19 13-0040	EA	Bolt Down Concrete Cover, CALTRANS 6-T Precast Concrete Pull Box	913.30	
33 71 19 13-0041	EA	12" Extension, CALTRANS 6-T Precast Concrete Pull Box	291.74	
33 71 19 13-0042	EA	Flat Plate Base, CALTRANS 6-T Precast Concrete Pull Box	227.93	

33 71 19 13-0043 Electrical Property Line Boxes (33 71 19 13)

33 71 19 13-0044	EA	3'-6" x 2'-9" x 2' Deep Property Line Box	5,154.79	419.51
33 71 19 13-0045	EA	4'-6" x 3'-6" x 4' Deep Property Line Box	6,067.28	435.05
33 71 19 13-0046	EA	6' x 4' x 5' Deep Property Line Box	6,648.85	528.28
33 71 19 13-0047	EA	11'-6" x 4'-6" x 6' Deep Property Line Box	10,185.34	776.87

33 71 19 13-0048 Manhole Accessories (33 71 19 13)

33 71 19 13-0049	EA	6" Precast Grade Ring Riser Casting.....	512.91	146.73
33 71 19 13-0050	EA	12" Precast Grade Ring Riser Casting.....	555.47	158.96
33 71 19 13-0051	EA	36" Opening Cast Iron Frame And Cover (NEENAH #R-1640-D).....	2,478.62	244.56
33 71 19 13-0052	EA	42" Opening Cast Iron Frame And Cover (NEENAH #R-1740-E1).....	3,237.99	305.70
33 71 19 13-0053	EA	Cast Iron Adjusting Ring (NEENAH #R-1979)	1,030.65	163.25
33 71 19 13-0054	EA	Cast Iron Frame And Cover (NEENAH #R-1640-B)	1,316.89	183.42

33 71 19 23 Trenched Electrical Underground Duct and Ductbanks (33 71 19)**33 71 19 23-0001 Underground Ductbank** (33 71 19 23)

Note: Installation of single or multiple configuration underground utility raceways assembly to have minimum 3" concrete leveling base and encased in concrete envelope. Based on minimum 100' run, minimum 30" bury depth. Includes installation in trench using the appropriate supports, cleaning to remove any obstructions and installation of nylon pull string. Excludes trenching, concrete, backfilling, grading and seeding. Duct Banks are to be installed according to the appropriate sections of the accompanying specifications. Individual rows to be stacked for larger duct bank configurations. See CSI section 03 30 53 00-0001 for concrete.

33 71 19 23-0002 Rigid Galvanized Steel Conduit, Galvanized Rigid Conduit (GRC) Or Rigid Galvanized Steel (RGS), Duct Bank (33 71 19 23-0001)

Note: Includes appropriate spacers and fittings.

33 71 19 23-0003	LF	2 At 2", Rigid Galvanized Conduit Duct Bank	36.98	
33 71 19 23-0004	LF	4 At 2", Rigid Galvanized Conduit Duct Bank	73.99	
33 71 19 23-0005	LF	2 At 3", Rigid Galvanized Conduit Duct Bank	76.48	
33 71 19 23-0006	LF	4 At 3", Rigid Galvanized Conduit Duct Bank	153.41	
33 71 19 23-0007	LF	2 At 4", Rigid Galvanized Conduit Duct Bank	112.64	
33 71 19 23-0008	LF	4 At 4", Rigid Galvanized Conduit Duct Bank	226.42	
33 71 19 23-0009	LF	6 At 4", Rigid Galvanized Conduit Duct Bank	340.15	

33 71 19 23-0010 Polyvinyl Chloride (PVC), Type EB-20 Duct Bank System (33 71 19 23-0001)

Note: Includes appropriate spacers and fittings.

33 71 19 23-0011	LF	1 At 2", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	9.00	
33 71 19 23-0012	LF	2 At 2", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	19.55	
33 71 19 23-0013	LF	4 At 2", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	37.74	
33 71 19 23-0014	LF	1 At 3", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	12.01	
33 71 19 23-0015	LF	2 At 3", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	23.95	
33 71 19 23-0016	LF	4 At 3", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	48.55	
33 71 19 23-0017	LF	1 At 4", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	16.44	
33 71 19 23-0018	LF	2 At 4", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	32.92	
33 71 19 23-0019	LF	4 At 4", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	65.93	
33 71 19 23-0020	LF	6 At 4", Duplex Polyvinyl Chloride (PVC), Type EB Duct Bank.....	98.85	

33 71 19 23-0021 Polyvinyl Chloride (PVC), Type DB-60 Duct Bank System (33 71 19 23-0001)

Note: Includes appropriate spacers and fittings.

33 71 19 23-0022	LF	1 At 2", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	10.03	
33 71 19 23-0023	LF	2 At 2", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	21.67	
33 71 19 23-0024	LF	4 At 2", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	41.73	
33 71 19 23-0025	LF	1 At 3", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	12.60	
33 71 19 23-0026	LF	2 At 3", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	25.18	
33 71 19 23-0027	LF	4 At 3", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	50.12	
33 71 19 23-0028	LF	1 At 4", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	17.07	
33 71 19 23-0029	LF	2 At 4", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	34.18	
33 71 19 23-0030	LF	4 At 4", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	68.45	
33 71 19 23-0031	LF	6 At 4", Duplex Polyvinyl Chloride (PVC), Type DB Duct Bank.....	102.64	

33 71 19 23-0032 Male Or Female Adapters (33 71 19 23-0001)



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Electrical Utilities	33 70	
Electrical Utility Transmission and Distribution	33 71	

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
33 71 19 23-0033	EA 2" Adapter.....	46.01	
33 71 19 23-0034	EA 3" Adapter.....	71.58	
33 71 19 23-0035	EA 4" Adapter.....	94.39	
33 71 19 23-0036	Underground Electrical Concrete Markers <small>(33 71 19 23)</small>		
33 71 19 23-0037	EA 36" x 6" x 6", Underground Electric Concrete Marker	367.09	

END OF SECTION 33

33	33	Utilities
	33 70	Electrical Utilities
	33 71	Electrical Utility Transmission and Distribution



MINOR
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TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

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MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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34 Transportation

34 70 Transportation Construction and Equipment ⁽³⁴⁾

34 71 Roadway Construction ^(34 70)

34 71 13 Vehicle Barriers ^(34 71)

34 71 13 13 Vehicle Median Barriers ^(34 71 13)

34 71 13 13-0001 Concrete Median Barrier ^(34 71 13 13)

34 71 13 13-0002	LF	Median Barrier, Precast, 42" High Single Face.....	73.24	4.56
34 71 13 13-0003	LF	Median Barrier, Precast, 32" High, 2' Wide Base, Double Face	114.33	4.56
34 71 13 13-0004	LF	Median Barrier, Precast, 42" High, 2' Wide Base, Double Face	157.39	4.56
34 71 13 13-0005	LF	Median Barrier, Cast In Place With Steel Forms.....	48.89	6.15
34 71 13 13-0006	LF	Median Barrier, Slipformed Concrete.....	42.21	3.63

34 71 13 16 Vehicle Crash Barriers ^(34 71 13)

34 71 13 16-0001 Impact Barrier, Non-Redirective ^(34 71 13 16)

34 71 13 16-0002 Sand Barrel Impact Attenuator ^(34 71 13 16-0001)

Note: Includes containers, inserts, and lid. Excludes sand.				
34 71 13 16-0003	EA	200, 400 Or 700 LB Sand Barrel.....	615.74	55.97
Note: Includes containers, inserts, and lid.				

34 71 13 26 Vehicle Guide Rails ^(34 71 13)

34 71 13 26-0001 Mobilize Guide Rail Crew ^(34 71 13 26)

34 71 13 26-0002	EA	Mobilize Guide Rail Crew	1,416.90	
Note: Excludes equipment mobilization.				

34 71 13 26-0003 Corrugated Beam Guide Rail ^(34 71 13 26)

34 71 13 26-0004 Corrugated Beam Guide Railing ^(34 71 13 26-0003)

34 71 13 26-0005 Corrugated Beam Guide Railing, Straight Sections ^(34 71 13 26-0004)

Note: Add additional length for back-up sections.				
34 71 13 26-0006	LF	Corrugated Beam Guide Railing	19.31	2.53
34 71 13 26-0007	LF	Corrugated Beam Guide Railing (Rustic).....	20.80	2.53

34 71 13 26-0008 Corrugated Beam Guide Railing, Shop Curved ^(34 71 13 26-0004)

Note: Add additional length for back-up sections.				
34 71 13 26-0009	LF	Shop Curved Corrugated Beam Guide Railing	25.18	2.53
34 71 13 26-0010	LF	Shop Curved Corrugated Beam Guide Railing (Rustic).....	27.25	2.53
34 71 13 26-0011	LF	Shop Curved Corrugated Beam Guide Railing End.....	64.36	2.53
Note: Treatment for mall barriers driveways, walkways, special end, etc.				
34 71 13 26-0012	LF	Shop Curved Corrugated Beam Guide Railing (Rustic) End	70.21	2.53
Note: Treatment for mall barriers shop curved corrugated beam guide railing end etc.				

34 71 13 26-0013 Corrugated Beam Guide Railing, Manufactured End Sections ^(34 71 13 26-0003)

34 71 13 26-0014	EA	Corrugated Beam Guide Railing End Section At Anchor Unit.....	146.58	33.40
34 71 13 26-0015	EA	Corrugated Beam Guide Railing End Section (Rustic) At Anchor Unit	154.58	33.40
34 71 13 26-0016	EA	Corrugated Beam Guide Railing Flared Or 180 Degree End Section	194.57	33.40
34 71 13 26-0017	EA	Corrugated Beam Guide Railing Flared Or 180 Degree End Section (Rustic).....	202.57	33.40
34 71 13 26-0018	EA	Corrugated Beam Guide Railing 225 Degree End Section	194.57	33.40
34 71 13 26-0019	EA	Corrugated Beam Guide Railing 225 Degree End Section (Rustic).....	202.57	33.40

34 71 13 26-0020 Corrugated Beam Guide Rail Posts ^(34 71 13 26-0003)

Note: Includes mounting hardware.				
34 71 13 26-0021	EA	Standard Post For Corrugated Beam Guide Rail.....	150.60	16.97
For Installation Without Soil Plate, Deduct			-5.00	
For Installation In Rock, Add			4.53	
34 71 13 26-0022	EA	Standard Post For (Rustic) Corrugated Beam Guide Rail	158.59	16.97
For Installation Without Soil Plate, Deduct			-5.00	
For Installation In Rock, Add			4.53	
34 71 13 26-0023	EA	Extra Long Post For Corrugated Beam Guide Rail.....	166.59	16.97
For Installation Without Soil Plate, Deduct			-5.00	
For Installation In Rock, Add			4.53	
34 71 13 26-0024	EA	Extra Long Post (Rustic) for Corrugated Beam Guide Rail.....	174.59	16.97
For Installation Without Soil Plate, Deduct			-5.00	
For Installation In Rock, Add			4.53	
34 71 13 26-0025	EA	6BB-1/2" or Mall Barrier Post for Corrugated Beam Guide Rail	150.60	16.97
For Installation Without Soil Plate, Deduct			-5.00	
For Installation In Rock, Add			4.53	

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

34 71 13 26-0026	EA	Post Struts for Corrugated Beam Guide Rail Mall Barrier Post <i>For Installation In Rock, Add</i>	214.58 4.53	16.97
34 71 13 26-0027		Heavy Post Blocked Out Corrugated Beam Guide Rail Posts <small>(34 71 13 26-0003)</small> Note: Includes mounting hardware. Excludes triangular mounting brackets.		
34 71 13 26-0028	EA	Standard Post For Heavy Post Blocked Out Corrugated Beam Guide	150.60	16.97
34 71 13 26-0029	EA	Standard Rustic Post For Heavy Post Blocked Out Corrugated Beam Guide	158.59	16.97
34 71 13 26-0030	EA	Extra Long Post for Heavy Post Blocked Out Corrugated Beam Guide	166.59	16.97
34 71 13 26-0031	EA	Extra Long Post (Rustic) For heavy post blocked out corrugated beam guide rail Note: For heavy post blocked out corrugated beam guide (rustic)	174.59	16.97
34 71 13 26-0032	EA	Type A Post 1630mm Post Note: For heavy post blocked out corrugated beam guide rail	146.60	16.97
34 71 13 26-0033	EA	Type A Post 1630mm Post (Rustic) Note: For heavy post blocked out corrugated beam guide rail	154.60	16.97
34 71 13 26-0034	EA	Type B Post 1460mm Note: For heavy post blocked out corrugated beam guide rail	138.60	16.97
34 71 13 26-0035	EA	Type B Post 1460mm (Rustic) Note: For heavy post blocked out corrugated beam guide rail	146.60	16.97
34 71 13 26-0036	EA	Type C Post 1290mm Note: For heavy post blocked out corrugated beam guide rail	130.60	16.97
34 71 13 26-0037	EA	Type C Post 1290mm (Rustic) Note: For heavy post blocked out corrugated beam guide rail	138.60	16.97
34 71 13 26-0038	EA	Breakaway Wood Or Steel Post In Steel Foundation Tube	551.77	16.97
34 71 13 26-0039	EA	Wood, Metal, Plastic Or Composite Offset Block Or Beam Note: For heavy post blocked out corrugated beam guide rail.	62.62	16.97
34 71 13 26-0040		Corrugated Beam Guide Rail Accessories <small>(34 71 13 26-0003)</small>		
34 71 13 26-0041	EA	Triangular Mounting Brackets (Galvanized Or Rustic) For All Post Types A, B And C	130.59	37.95
34 71 13 26-0042		Corrugated Beam Guide Rail Repair for Existing Guide Rail <small>(34 71 13 26-0003)</small> Note: Includes associated hardware.		
34 71 13 26-0043	LF	Removal And Storage Of Corrugated Beam Guide Railing And Post	14.83	
34 71 13 26-0044	EA	Install Stored Post For Corrugated Beam Guide Rail	50.61	
34 71 13 26-0045	LF	Install Stored Corrugated Beam Guide Railing And Post	8.60	
34 71 13 26-0046		Corrugated Thrie Beam Guide Railing <small>(34 71 13 26-0003)</small>		
34 71 13 26-0047		Corrugated Thrie Beam Guide Railing. Straight Sections <small>(34 71 13 26-0046)</small> Note: Add additional length for back-up sections.		
34 71 13 26-0048	LF	Corrugated Thrie Beam Guide Railing	45.08	3.19
34 71 13 26-0049	LF	Corrugated Thrie Beam Guide Railing (Rustic)	47.52	3.19
34 71 13 26-0050		Corrugated Thrie Beam Guide Railing. Shop Curved <small>(34 71 13 26-0046)</small> Note: Add additional length for back-up sections.		
34 71 13 26-0051	LF	Shop Curved Corrugated Thrie Beam Guide Railing	54.83	3.19
34 71 13 26-0052	LF	Shop Curved Corrugated Thrie Beam Guide Railing (Rustic)	57.27	3.19
34 71 13 26-0053		Corrugated Thrie Beam Guide Rail Posts <small>(34 71 13 26-0046)</small> Note: Includes hardware for mounting.		
34 71 13 26-0054	EA	Standard Post For Corrugated Thrie Beam Guide Rail <i>For Installation Without Soil Plate, Deduct</i> <i>For 32" Soil Plate, Add</i>	180.20 -5.00 7.00	3.19
34 71 13 26-0055	EA	Standard Post (Rustic) For Corrugated Thrie Beam Guide Rail <i>For Installation Without Soil Plate, Deduct</i> <i>For 32" Soil Plate, Add</i>	188.20 -5.00 7.00	3.19
34 71 13 26-0056		Timber Guide Rails <small>(34 71 13 26)</small> Note: Includes drilling and fasteners. Excludes excavation, auguring and concrete.		
34 71 13 26-0057		Timber Guide Rail Posts <small>(34 71 13 26-0056)</small>		
34 71 13 26-0058	EA	6" x 8" Timber Guide Rail Post	116.40	12.65
34 71 13 26-0059	EA	6" x 9" Timber Guide Rail Post	132.88	12.65
34 71 13 26-0060	EA	10" x 10" Timber Guide Rail Post	262.06	12.65
34 71 13 26-0061	EA	10" x 12" Timber Guide Rail Post	277.47	12.65
34 71 13 26-0062	EA	12" x 12" Timber Guide Rail Post	321.38	12.65
34 71 13 26-0063		Timber Guide Rails <small>(34 71 13 26-0056)</small> Note: Excludes posts, spacer blocks and steel backup plates.		
34 71 13 26-0064	LF	4" x 9" Timber Guide Rail	14.45	1.52
34 71 13 26-0065	LF	6" x 10" Timber Guide Rail	20.38	1.52
34 71 13 26-0066	LF	6" x 12" Timber Guide Rail	23.86	1.52
34 71 13 26-0067		Spacer Blocks For Timber Guide Rails <small>(34 71 13 26-0056)</small>		



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MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
	34 71	13 26-0068	EA 4" x 9" Spacer Block For Timber Guide Rails	18.81	2.03
	34 71	13 26-0069	EA 6" x 8" Spacer Block For Timber Guide Rails	21.66	2.03
	34 71	13 26-0070	EA 8" x 8" Spacer Block For Timber Guide Rails	25.29	2.03
34 71	13 26-0071		Weathering Steel Backup Plates For Timber Guide Rails (34 71 13 26-0056)		
	34 71	13 26-0072	LF 6" High, Weathering Steel Backup Plate For Timber Guide Rails.....	26.30	1.27
34 71	13 26-0073		Weathering Steel Splice And Bearing Plates For Timber Guide Rails (34 71 13 26-0056)		
	34 71	13 26-0074	EA Weathering Steel Splice Plate For Timber Guide Rails	182.27	17.71
	34 71	13 26-0075	EA Weathering Steel Bearing Termination Plate For Timber Guide Rails	114.21	12.65
34 71	13 26-0076		Cable Guide Rail (34 71 13 26)		
34 71	13 26-0077		Cable Guide Rail (34 71 13 26-0076)		
	34 71	13 26-0078	LF Cable (Each Cable)	10.46	2.73
			Note: Includes tensioning. Excludes splices.		
	34 71	13 26-0079	EA Cable Splice With Wedges	265.24	18.98
34 71	13 26-0080		Cable Guide Rail Posts (34 71 13 26-0076)		
			Note: Includes hardware for cable mounting.		
	34 71	13 26-0081	EA Standard Post for Cable Guide Rail.....	195.38	56.56
			For Installation Without Soil Plate, Deduct	-5.00	
			For Installation In Rock, Add	15.08	
	34 71	13 26-0082	EA Standard Post (Rustic) for Cable Guide Rail	203.38	56.56
			For Installation Without Soil Plate, Deduct	-5.00	
			For Installation In Rock, Add	15.08	
	34 71	13 26-0083	EA Extra Long Post for Cable Guide Rail	203.38	56.56
			For Installation Without Soil Plate, Deduct	-5.00	
			For Installation In Rock, Add	15.08	
	34 71	13 26-0084	EA Extra Long Post (Rustic) for Cable Guide Rail.....	211.37	56.56
			For Installation Without Soil Plate, Deduct	-5.00	
			For Installation In Rock, Add	15.08	
	34 71	13 26-0085	EA Slip Impact Post Top for Anchor Unit.....	126.14	22.63
	34 71	13 26-0086	EA Slip Impact Post Base and Keeper Plate	326.09	22.63
			Note: For anchor unit.		
34 71	13 26-0087		Cable Guide Rail Accessories For Breakaway Anchor Angle Systems (34 71 13 26-0076)		
	34 71	13 26-0088	EA Turnbuckle Cable End Assembly For Use With Breakaway Anchors	609.96	253.53
	34 71	13 26-0089	EA Turnbuckle Cable End Assembly.....	176.86	12.68
	34 71	13 26-0090	EA Spring Cable End Assembly (Compensating Device) For Use With Breakaway Anchors	568.25	6.30
	34 71	13 26-0091	EA Spring Cable End Assembly (Compensating Device) Without Turnbuckle	584.25	6.30
	34 71	13 26-0092	EA Breakaway Anchor Angle	224.85	12.68
	34 71	13 26-0093	EA Standard End Post Cap Assembly.....	104.37	6.30
	34 71	13 26-0094	EA Driveway End Post Cap Assembly	88.38	6.30
	34 71	13 26-0095	EA End Post Ground Support Plates.....	48.39	6.30
	34 71	13 26-0096	EA 11" Stud Bolt, Cable Guide Rail.....	42.39	6.30
	34 71	13 26-0097	EA 18" Stud Bolt, Cable Guide Rail.....	50.39	6.30
	34 71	13 26-0098	EA 25" Stud Bolt, Cable Guide Rail.....	58.39	6.30
	34 71	13 26-0099	EA 1-1/4" Diameter Turnbuckle, Cable Guide Rail	496.77	12.68
	34 71	13 26-0100	EA 1-1/2" Diameter Turnbuckle, Cable Guide Rail	528.77	12.68
	34 71	13 26-0101	EA 5/8" Diameter Turnbuckle With 12" Take-up And Shackle Ends, Cable Guide Rail.....	352.81	12.68
	34 71	13 26-0102	EA 5/8" Eye Bolt 18" Long, Cable Guide Rail.....	216.35	6.30
	34 71	13 26-0103	EA 3/4" Eye Bolt 8'-6" Long, Cable Guide Rail	224.85	12.68
	34 71	13 26-0104	EA 1-5/8" Anchor Rod 10' Long With Plate, Cable Guide Rail	241.24	18.98
34 71	13 26-0105		Cable Guide Rail Accessories For Slip Impact Post Systems (34 71 13 26-0076)		
	34 71	13 26-0106	EA Turnbuckle Cable End Assembly.....	401.08	18.89
			Note: For use with slip impact post.		
	34 71	13 26-0107	EA Spring Cable End Assembly (Compensating Device).....	784.98	18.89
			Note: For use with slip impact post.		
	34 71	13 26-0108	EA Anchor Angle For Slip Impact Post System	233.13	18.89
	34 71	13 26-0109	EA Cable End Assembly Rod	193.14	18.89
			Note: Includes cable end, threaded rod and keeper to anchor angle.		
34 71	13 26-0110		Cable Guide Rail Repair For Existing Guide Rail (34 71 13 26-0076)		
			Note: Includes associated hardware.		
	34 71	13 26-0111	LF Retention Existing Cable (Each Cable).....	1.69	
	34 71	13 26-0112	LF Removal And Storage Of Cable Guide Railing	10.19	
	34 71	13 26-0113	EA Install Stored Post For Cable Guide Railing	75.41	
	34 71	13 26-0114	LF Install Stored Cable, (Each Cable).....	4.51	
			Note: Includes retensioning. Excludes splices.		

34 Transportation**34 70 Transportation Construction and Equipment****34 71 Roadway Construction**

Los Angeles County Development Authority

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
34 71 13 26-0115 6" x 6" Box Beam Guide Rail <small>(34 71 13 26)</small>		
34 71 13 26-0116 Box Beam Guide Rail, 6" x 6" <small>(34 71 13 26-0115)</small>		
34 71 13 26-0117 Straight Sections, Box Beam Guide Rail <small>(34 71 13 26-0116)</small>		
34 71 13 26-0118 LF Box Beam Guide Railing 6" x 6" x 3/16" Galvanized.....	54.22	3.19
Note: Excludes splices.		
<i>For Flush Mounting Directly To Structure, Add</i>	1.83	
34 71 13 26-0119 LF Box Beam Guide Railing 6" x 6" x 3/16" (Rustic)	61.54	3.19
Note: Excludes splices.		
<i>For Flush Mounting Directly To Structure, Add</i>	1.83	
34 71 13 26-0120 Shop Curved, Box Beam Guide Rail <small>(34 71 13 26-0116)</small>		
34 71 13 26-0121 LF Shop Curved Box Beam Guide Railing 6" x 6" x 3/16" Galvanized.....	82.26	3.19
Note: Excludes splices.		
<i>For Shop Curved At <20' Radius, Add</i>	2.44	
<i>For Flush Mounting Directly To Structure, Add</i>	1.83	
34 71 13 26-0122 LF Shop Curved Box Beam Guide Railing 6" x 6" x 3/16" (Rustic)	89.57	3.19
Note: Excludes splices.		
<i>For Shop Curved At <20' Radius, Add</i>	2.44	
<i>For Flush Mounting Directly To Structure, Add</i>	1.83	
34 71 13 26-0123 Box Beam Guide Rail End Treatment Sections <small>(34 71 13 26-0115)</small>		
Note: Includes rail, end cover plate and hardware only. Excludes posts and splice.		
34 71 13 26-0124 EA Box Beam End Piece Guide Railing Section.....	850.40	37.95
Note: Galvanized excludes splices.		
34 71 13 26-0125 EA Box Beam End Piece Guide Railing Section (Rustic)	938.38	37.95
Note: Excludes splices.		
34 71 13 26-0126 EA Box Beam Guide Railing End Treatment Section At Driveway, Galvanized	802.41	37.95
Note: Excludes splices.		
34 71 13 26-0127 EA Box Beam Guide Railing End Treatment Section At Driveway, (Rustic).....	834.40	37.95
Note: Excludes splices.		
34 71 13 26-0128 Splices For Box Beam Guide Rail <small>(34 71 13 26-0115)</small>		
34 71 13 26-0129 EA Splice For Box Beam Guide Rail	232.65	56.34
34 71 13 26-0130 EA Splice For Box Beam Guide Rail (Rustic)	288.63	56.34
34 71 13 26-0131 Box Beam Guide Rail Posts <small>(34 71 13 26-0115)</small>		
Note: Includes hardware for box beam mounting.		
34 71 13 26-0132 EA Standard Post For Box Beam Guide Rail.....	203.38	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0133 EA Standard Post (Rustic) for Box Beam Guide Railing.....	211.37	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0134 EA Extra Long Post For Box Beam Guide Rail.....	219.37	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0135 EA Extra Long Post (Rustic) For Box Beam Guide Rail	227.37	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0136 EA Type I End Assembly Post.....	195.38	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0137 EA Type I End Assembly Post (Rustic)	203.38	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0138 EA Type II End Assembly Post.....	187.38	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0139 EA Type II End Assembly Post (Rustic).....	195.38	56.56
<i>For Installation Without Soil Plate, Deduct</i>	-5.00	
<i>For Installation In Rock, Add</i>	15.08	
34 71 13 26-0140 Box Beam Guide Rail Accessories <small>(34 71 13 26-0115)</small>		
34 71 13 26-0141 EA Box Beam Guide Rail End Cover Plate.....	111.15	11.38
34 71 13 26-0142 EA Box Beam Guide Rail End Cover Plate (Rustic)	119.15	11.38
34 71 13 26-0143 Box Beam Guide Railing Repair, And Resetting <small>(34 71 13 26-0115)</small>		
Note: For existing guide rail.		
34 71 13 26-0144 LF Removal And Storage Of Box Beam Guide Rail And Post	5.00	
34 71 13 26-0145 LF Reset Box Beam Guide Rail	14.59	
34 71 13 26-0146 6" x 8" Box Beam Median Barrier <small>(34 71 13 26)</small>		
34 71 13 26-0147 Box Beam Median Barrier, 6" x 8" <small>(34 71 13 26-0146)</small>		

34 Transportation**34 70 Transportation Construction and Equipment****34 71 Roadway Construction**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

34 71 13 26-0178	Guide Rail Concrete Anchor Units For All Types Of Guide Rail (34 71 13 26-0177)			
	Note: For cast in place or precast. Includes excavation, formwork, concrete, reinforcement, anchor rods and/or imbedded plate. Excludes anchor angle. For anchor angles and other terminal connections, use accessories section for respective guide rail type.			
34 71 13 26-0179	CY	Guide Rail Concrete Anchor Unit.....	862.24	
		<i>For Each Additional Set Of Anchor Rods, Add</i>	38.00	
34 71 13 26-0180	EA	Reset Existing Anchorage Unit for All Types of Guide Rail.....	580.36	
		Note: Includes excavation and backfill.		
34 71 13 26-0181	EA	Removal Of Guide Rail Concrete Anchor Unit.....	609.47	
34 71 13 26-0182	Guide Rail Repair For All Types Of Existing Guide Rail (34 71 13 26-0177)			
	Note: Includes associated hardware.			
34 71 13 26-0183	EA	Straighten And Reset Driven Post For Guide Rail	75.41	
34 71 13 26-0184	EA	Straighten And Reset Post Mounted On Concrete For Guide Rail	86.93	
		Note: With base plate for guide rail. Includes new anchor bolts.		
34 71 13 26-0185	Additional Wood and Steel Posts (34 71 13 26-0177)			
34 71 13 26-0186	LF	4" x 6" Wood Post.....	63.17	18.90
		<i>For Installation In Rock, Add</i>	5.04	
34 71 13 26-0187	LF	6" x 8" Wood Post.....	75.16	18.90
		<i>For Installation In Rock, Add</i>	5.04	
34 71 13 26-0188	LF	6" x 7/8" Galvanized Steel Post	47.84	18.90
		<i>For Installation In Rock, Add</i>	5.04	
34 71 13 26-0189	EA	Base Plate With Anchor Bolts For Mounting Post On Concrete.....	435.29	18.89
34 71 13 26-0190	Accessories For All Types of Guide Rail (34 71 13 26-0177)			
34 71 13 26-0191	EA	Reflector For Guard Rail.....	52.24	
34 71 13 26-0192	Guide Rail Transitions (34 71 13 26)			
34 71 13 26-0193	Transition Box Beam Guide Rail To Corrugated Beam (34 71 13 26-0192)			
34 71 13 26-0194	EA	Box Beam To Corrugated Beam Rail Bolted Section.....	817.90	
34 71 13 26-0195	EA	Box Beam To Corrugated Beam Rail Bolted Plate	497.99	
		Note: For making cable connections.		
34 71 13 26-0196	Transition Box Beam Median Barrier To Corrugated Beam Median (34 71 13 26-0192)			
34 71 13 26-0197	EA	Box Beam Median Barrier To Corrugated Beam Bolted Section	833.90	
34 71 13 26-0198	EA	Box Beam Median Barrier To Corrugated Beam Harness Plate	497.99	
		Note: For making cable connections.		
34 71 13 26-0199	Transition Box Beam Guide Rail To Cable Guide Rail (34 71 13 26-0192)			
34 71 13 26-0200	EA	Box Beam to Cable Guide Rail U-bolt And Plate	113.79	20.24
34 71 13 26-0201	Transition Box Beam Median Barrier To Concrete Median Barrier (34 71 13 26-0192)			
34 71 13 26-0202	EA	Box Beam Median Barrier To Concrete Barrier End Connection	1,137.82	
34 71 13 26-0203	Transition Thrie Beam To Concrete Median Barrier (34 71 13 26-0192)			
34 71 13 26-0204	EA	Thrie Beam Terminal Connector At Concrete Median Barrier.....	737.93	
34 71 13 26-0205	EA	Thrie Beam Transition Section To Corrugated Beam Guide Rail.....	937.87	
34 71 13 26-0206	Resilient Guard Fence And Light Shield (34 71 13 26)			
34 71 13 26-0207	LF	Resilient Guard Fence And Light Shield, Up To 6' High	100.03	7.79
34 71 13 26-0208	Individual Concrete Guard Rail Posts (34 71 13 26)			
34 71 13 26-0209	EA	6'-5" Concrete Guard Rail Posts, Round.....	96.87	7.79
34 71 13 26-0210	EA	6'-5" Concrete Posts, Square.....	108.35	8.76
34 71 13 26-0211	EA	6'-5" Concrete Posts, Triangular	105.51	8.76
34 71 16	Impact Attenuating Devices (34 71)			
34 71 16 00-0001	Guard Rail Energy Absorbing Terminals (34 71 16)			
	Note: Crushable foam cartridges surrounded by steel guardrail for narrow hazards. QuadGuard System as manufactured by Energy Absorption Systems, Inc.			
34 71 16 00-0002	24" Wide Guard Rail Energy Absorbing Terminals (34 71 16 00-0001)			
34 71 16 00-0003	EA	24" Wide, 3 Cartridge Bays, Energy Absorbing Crash Attenuator	37,220.80	3,792.74
34 71 16 00-0004	EA	24" Wide, 5 Cartridge, Bays Energy Absorbing Crash Attenuator	51,681.18	5,056.99
34 71 16 00-0005	EA	24" Wide, 7 Cartridge, Bays Energy Absorbing Crash Attenuator	70,518.33	6,637.30
34 71 16 00-0006	EA	24" Wide, 9 Cartridge, Bays Energy Absorbing Crash Attenuator	78,428.14	8,217.61



Transportation	34	34
Transportation Construction and Equipment	34 70	
Roadway Construction	34 71	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
34 71 16 00-0007 30" Wide Guard Rail Energy Absorbing Terminals <small>(34 71 16 00-0001)</small>		
34 71 16 00-0008 EA 30" Wide, 3 Cartridge Bays, Energy Absorbing Crash Attenuator	40,089.59	4,266.84
34 71 16 00-0009 EA 30" Wide, 5 Cartridge Bays, Energy Absorbing Crash Attenuator	55,831.20	5,689.11
34 71 16 00-0010 EA 30" Wide, 7 Cartridge Bays, Energy Absorbing Crash Attenuator	76,613.24	7,585.49
34 71 16 00-0011 EA 30" Wide, 9 Cartridge Bays, Energy Absorbing Crash Attenuator	87,766.83	9,165.79
34 71 16 00-0012 36" Wide Guard Rail Energy Absorbing Terminals <small>(34 71 16 00-0001)</small>		
34 71 16 00-0013 EA 36" Wide, 3 Cartridge Bays, Energy Absorbing Crash Attenuator	42,991.15	4,740.93
34 71 16 00-0014 EA 36" Wide, 5 Cartridge Bays, Energy Absorbing Crash Attenuator	60,013.19	6,321.24
34 71 16 00-0015 EA 36" Wide, 7 Cartridge Bays, Energy Absorbing Crash Attenuator	82,045.03	8,375.64
34 71 16 00-0016 EA 36" Wide, 9 Cartridge Bays, Energy Absorbing Crash Attenuator	97,071.72	10,113.98
34 71 16 00-0017 69" Wide Guard Rail Energy Absorbing Terminals <small>(34 71 16 00-0001)</small>		
34 71 16 00-0018 EA 69" Wide, 3 Cartridge Bays, Energy Absorbing Crash Attenuator	46,558.05	5,215.02
34 71 16 00-0019 EA 69" Wide, 5 Cartridge Bays, Energy Absorbing Crash Attenuator	64,454.55	6,953.36
34 71 16 00-0020 EA 69" Wide, 7 Cartridge Bays, Energy Absorbing Crash Attenuator	88,512.62	9,165.79
34 71 16 00-0021 EA 69" Wide, 9 Cartridge Bays, Energy Absorbing Crash Attenuator	104,235.10	11,062.17
34 71 16 00-0022 90" Wide Guard Rail Energy Absorbing Terminals <small>(34 71 16 00-0001)</small>		
34 71 16 00-0023 EA 90" Wide, 3 Cartridge Bays, Energy Absorbing Crash Attenuator	50,221.50	5,689.11
34 71 16 00-0024 EA 90" Wide, 5 Cartridge Bays, Energy Absorbing Crash Attenuator	69,009.34	7,585.49
34 71 16 00-0025 EA 90" Wide, 7 Cartridge Bays, Energy Absorbing Crash Attenuator	95,839.53	10,113.98
34 71 16 00-0026 EA 90" Wide, 9 Cartridge Bays, Energy Absorbing Crash Attenuator	111,597.81	12,010.35
34 71 19 Vehicle Delineators <small>(34 71)</small>		
34 71 19 16 Flexible Vehicle Delineators <small>(34 71 19)</small>		
34 71 19 16-0001 EA 2' High, 3" Diameter Flexible Fixed Stanchion Delineator	97.97	9.73
34 71 19 16-0002 EA 3' High, 3" Diameter Flexible Fixed Stanchion Delineator	99.32	9.73
34 71 19 16-0003 EA 3-1/2' High, 3" Diameter Flexible Fixed Stanchion Delineator	100.68	9.73
34 71 19 16-0004 EA 4' High, 3" Diameter Flexible Fixed Stanchion Delineator	102.03	9.73

END OF SECTION 34

34	34	Transportation
	34 70	Transportation Construction and Equipment
	34 71	Roadway Construction



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST

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	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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35 Waterway and Marine Construction

35 05 Common Work Results for Waterway and Marine Construction ⁽³⁵⁾

35 05 70 Common Work Results for Dams ^(35 05)

35 05 70 00-0001	Rubber Dam Repair ^(35 05 70)			
35 05 70 00-0002	EA	Class A Rubber Dam Repair (Bullet And Similar Holes).....	40.86	
35 05 70 00-0003	SF	Class B Rubber Dam Repair (Minor Surface Rubber Damage).....	81.36	
35 05 70 00-0004	SF	Class C Rubber Dam Repair (Major Surface Rubber Damage).....	119.21	
35 05 70 00-0005	SF	Class D Rubber Dam Repair (Serious Surface Rubber Damage), Per Layer Of Material	133.10	

35 20 Waterway and Marine Construction and Equipment ⁽³⁵⁾

35 22 Hydraulic Gates ^(35 20)

35 22 26 Sluice Gates ^(35 22)

35 22 26 00-0001 Heavy Duty Cast Iron Sluice Gates Self Contained ^(35 22 26)

Note: Includes crank operated geared gate lift, anchor bolts, and grouting.

35 22 26 00-0002	EA	18" x 18" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	10,499.67	1,266.21
		<i>For Electric Motor Operated Valve, Add</i>	1,103.25	
35 22 26 00-0003	EA	24" x 24" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	15,045.18	1,899.39
		<i>For Electric Motor Operated Valve, Add</i>	1,229.88	
35 22 26 00-0004	EA	30" x 30" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	18,211.89	2,170.74
		<i>For Electric Motor Operated Valve, Add</i>	1,284.15	
35 22 26 00-0005	EA	36" x 36" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	20,761.38	2,374.24
		<i>For Electric Motor Operated Valve, Add</i>	1,324.85	
35 22 26 00-0006	EA	42" x 42" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	23,303.76	2,713.42
		<i>For Electric Motor Operated Valve, Add</i>	1,392.68	
35 22 26 00-0007	EA	48" x 48" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	32,682.65	4,341.47
		<i>For Electric Motor Operated Valve, Add</i>	1,718.30	
35 22 26 00-0008	EA	54" x 54" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	43,521.57	5,426.84
		<i>For Electric Motor Operated Valve, Add</i>	1,935.37	
35 22 26 00-0009	EA	60" x 60" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	50,829.48	7,190.56
		<i>For Electric Motor Operated Valve, Add</i>	2,288.11	
35 22 26 00-0010	EA	66" x 66" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	63,317.71	9,496.98
		<i>For Electric Motor Operated Valve, Add</i>	2,749.40	
35 22 26 00-0011	EA	72" x 72" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	66,545.46	10,853.68
		<i>For Electric Motor Operated Valve, Add</i>	3,020.74	
35 22 26 00-0012	EA	78" x 78" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	74,548.63	10,853.68
		<i>For Electric Motor Operated Valve, Add</i>	3,420.74	
35 22 26 00-0013	EA	84" x 84" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	86,438.03	12,210.39
		<i>For Electric Motor Operated Valve, Add</i>	3,692.08	
35 22 26 00-0014	EA	90" x 90" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	103,795.56	13,985.07
		<i>For Electric Motor Operated Valve, Add</i>	4,047.02	
35 22 26 00-0015	EA	96" x 96" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	116,947.14	14,651.03
		<i>For Electric Motor Operated Valve, Add</i>	4,180.21	
35 22 26 00-0016	EA	108" x 108" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	144,885.46	17,314.86
		<i>For Electric Motor Operated Valve, Add</i>	4,712.97	
35 22 26 00-0017	EA	120" x 120" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	178,992.92	21,310.59
		<i>For Electric Motor Operated Valve, Add</i>	5,512.12	
35 22 26 00-0018	EA	132" x 132" Heavy Duty Sluice Gates Self Contained With Crank Operated Gate.....	218,298.84	23,974.41
		<i>For Electric Motor Operated Valve, Add</i>	6,044.88	

35 22 59 Hydraulic Closure Gates ^(35 22)

35 22 59 00-0001 Steel Slide Gates Self Contained ^(35 22 59)

Note: Includes anchors and bolts.

35 22 59 00-0002	EA	12" x 12" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	3,612.74	474.85
		<i>For Electric Motor Operated Valve, Add</i>	944.97	
35 22 59 00-0003	EA	18" x 18" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	4,811.71	542.69
		<i>For Electric Motor Operated Valve, Add</i>	958.54	
35 22 59 00-0004	EA	24" x 24" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	5,490.72	633.18
		<i>For Electric Motor Operated Valve, Add</i>	976.63	
35 22 59 00-0005	EA	30" x 30" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	6,634.85	759.76
		<i>For Electric Motor Operated Valve, Add</i>	1,001.95	
35 22 59 00-0006	EA	36" x 36" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	8,489.94	949.70
		<i>For Electric Motor Operated Valve, Add</i>	1,039.94	
35 22 59 00-0007	EA	42" x 42" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	9,956.46	1,266.21
		<i>For Electric Motor Operated Valve, Add</i>	1,103.25	
35 22 59 00-0008	EA	48" x 48" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	13,655.87	1,899.39
		<i>For Electric Motor Operated Valve, Add</i>	1,229.88	
35 22 59 00-0009	EA	54" x 54" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	20,712.35	2,374.24
		<i>For Electric Motor Operated Valve, Add</i>	1,324.85	
35 22 59 00-0010	EA	60" x 60" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	27,043.51	3,798.79
		<i>For Electric Motor Operated Valve, Add</i>	1,609.76	

35	Waterway and Marine Construction
35 20	Waterway and Marine Construction and Equipment
35 22	Hydraulic Gates



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
35 22 59 00-0011	EA		72" x 72" Steel Slide Gates Self Contained Including Anchor Bolts And Grouting.....	34,517.76	6,331.36
			<i>For Electric Motor Operated Valve, Add</i>	2,116.26	
35 22 59 00-0012	SF		Over 36 SF Steel Slide Gates Self Contained Including Anchor.....	957.32	175.02
			<i>For Electric Motor Operated Valve, Add</i>	1,585.00	
35 22 59 00-0013			Stainless Steel, Slide Gates, Frame Assembly Only (35 22 59)		
35 22 59 00-0014	EA		24" x 24" Stainless Steel Slide Gate, Frame Assembly Only	19,063.79	620.02
35 22 59 00-0015	EA		30" x 30" Stainless Steel Slide Gate, Frame Assembly Only	23,571.25	774.68
35 22 59 00-0016	EA		36" x 36" Stainless Steel Slide Gate, Frame Assembly Only	30,060.89	944.27
35 22 59 00-0017	EA		48" x 48" Stainless Steel Slide Gate, Frame Assembly Only	45,882.59	1,808.50
35 22 59 00-0018	EA		60" x 60" Stainless Steel Slide Gate, Frame Assembly Only	67,596.19	3,946.68
35 22 59 00-0019	EA		72" x 72" Stainless Steel Slide Gate, Frame Assembly Only	88,805.34	6,029.22
35 22 59 00-0020	EA		84" x 84" Stainless Steel Slide Gate, Frame Assembly Only	134,165.05	7,537.88
35 22 59 00-0021	Day		Start Up And Training, Stainless Steel Slide Gate, Frame Assembly	3,572.19	
35 22 59 00-0022			Aluminum Flap Gates (35 22 59)		
35 22 59 00-0023	EA		18" Diameter Aluminum Flap Gates.....	3,503.29	474.85
			<i>For Electric Motor Operated Valve, Add</i>	944.97	
35 22 59 00-0024	EA		20" Diameter Aluminum Flap Gates.....	3,897.65	508.77
			<i>For Electric Motor Operated Valve, Add</i>	951.75	
35 22 59 00-0025	EA		24" Diameter Aluminum Flap Gates.....	4,288.57	542.69
			<i>For Electric Motor Operated Valve, Add</i>	958.54	
35 22 59 00-0026	EA		30" Diameter Aluminum Flap Gates.....	5,806.52	633.18
			<i>For Electric Motor Operated Valve, Add</i>	976.63	
35 22 59 00-0027	EA		36" Diameter Aluminum Flap Gates.....	7,196.50	759.76
			<i>For Electric Motor Operated Valve, Add</i>	1,001.95	
35 22 59 00-0028	EA		42" Diameter Aluminum Flap Gates.....	10,177.01	949.70
			<i>For Electric Motor Operated Valve, Add</i>	1,039.94	
35 22 59 00-0029	EA		48" Diameter Aluminum Flap Gates.....	12,881.63	1,266.21
			<i>For Electric Motor Operated Valve, Add</i>	1,103.25	
35 22 59 00-0030	EA		54" Diameter Aluminum Flap Gates.....	16,685.11	1,899.39
			<i>For Electric Motor Operated Valve, Add</i>	1,229.88	
35 22 59 00-0031	EA		60" Diameter Aluminum Flap Gates.....	22,071.33	2,713.42
			<i>For Electric Motor Operated Valve, Add</i>	1,392.68	
35 22 59 00-0032	EA		66" Diameter Aluminum Flap Gates.....	28,563.61	3,798.79
			<i>For Electric Motor Operated Valve, Add</i>	1,609.76	
35 22 59 00-0033	EA		72" Diameter Aluminum Flap Gates.....	35,672.64	5,426.84
			<i>For Electric Motor Operated Valve, Add</i>	1,935.37	
35 22 59 00-0034			Stainless Steel Flap Gates (35 22 59)		
35 22 59 00-0035	EA		12" x 12" Stainless Steel Flap Gate	7,700.84	407.01
			<i>For Electric Motor Operated Valve, Add</i>	931.40	
35 22 59 00-0036	EA		18" x 18" Stainless Steel Flap Gate	9,867.01	474.85
			<i>For Electric Motor Operated Valve, Add</i>	944.97	
35 22 59 00-0037	EA		24" x 24" Stainless Steel Flap Gate	12,719.43	542.69
			<i>For Electric Motor Operated Valve, Add</i>	958.54	
35 22 59 00-0038	EA		30" x 30" Stainless Steel Flap Gate	16,560.87	633.58
			<i>For Electric Motor Operated Valve, Add</i>	976.63	
35 22 59 00-0039	EA		36" x 36" Stainless Steel Flap Gate	24,584.58	759.76
			<i>For Electric Motor Operated Valve, Add</i>	1,001.95	
35 22 59 00-0040	EA		48" x 48" Stainless Steel Flap Gate	36,007.71	1,265.81
			<i>For Electric Motor Operated Valve, Add</i>	1,103.25	
35 22 59 00-0041	EA		60" x 60" Stainless Steel Flap Gate	55,146.08	2,713.42
			<i>For Electric Motor Operated Valve, Add</i>	1,392.68	
35 22 59 00-0042	EA		72" x 72" Stainless Steel Flap Gate	79,909.75	5,426.84
			<i>For Electric Motor Operated Valve, Add</i>	1,935.37	
35 22 59 00-0043	EA		84" x 84" Stainless Steel Flap Gate	114,806.16	10,853.68
			<i>For Electric Motor Operated Valve, Add</i>	3,020.74	
35 22 59 00-0044			Cast Iron Flap Gates (35 22 59)		
35 22 59 00-0045	EA		12" x 12" Cast Iron Flap Gate	13,665.91	508.77
			<i>For Electric Motor Operated Valve, Add</i>	951.75	
35 22 59 00-0046	EA		18" x 18" Cast Iron Flap Gate	19,207.88	594.24
			<i>For Electric Motor Operated Valve, Add</i>	968.71	
35 22 59 00-0047	EA		24" x 24" Cast Iron Flap Gate	24,528.94	678.35
			<i>For Electric Motor Operated Valve, Add</i>	985.67	
35 22 59 00-0048	EA		30" x 30" Cast Iron Flap Gate	34,409.37	790.96
			<i>For Electric Motor Operated Valve, Add</i>	1,008.28	
35 22 59 00-0049	EA		36" x 36" Cast Iron Flap Gate	38,852.76	949.70
			<i>For Electric Motor Operated Valve, Add</i>	1,039.94	
35 22 59 00-0050	EA		48" x 48" Cast Iron Flap Gate	48,264.56	1,583.28
			<i>For Electric Motor Operated Valve, Add</i>	1,166.57	
35 22 59 00-0051	EA		60" x 60" Cast Iron Flap Gate	82,616.50	2,984.77
			<i>For Electric Motor Operated Valve, Add</i>	1,446.95	
35 22 59 00-0052	EA		72" x 72" Cast Iron Flap Gate	131,524.10	5,833.86
			<i>For Electric Motor Operated Valve, Add</i>	2,016.77	
35 22 59 00-0053	EA		84" x 84" Cast Iron Flap Gate	152,519.63	11,396.37
			<i>For Electric Motor Operated Valve, Add</i>	3,129.27	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
35 22 59 00-0054 Steel Knife Gates Including Handwheel Operator <small>(35 22 59)</small>		
Note: ANSI 150 PSI. for hub, flange, or spigot ends.		
35 22 59 00-0055 EA 6" Diameter Knife Gates Including Handwheel Operator For Hub	1,831.39	168.54
For Electric Motor Operated Valve, Add	883.71	
35 22 59 00-0056 EA 8" Diameter Knife Gates Including Handwheel Operator For Hub	2,457.77	196.59
For Electric Motor Operated Valve, Add	889.33	
35 22 59 00-0057 EA 10" Diameter Knife Gates Including Handwheel Operator For Hub	3,456.61	294.94
For Electric Motor Operated Valve, Add	908.99	
35 22 59 00-0058 EA 12" Diameter Knife Gates Including Handwheel Operator For Hub	4,321.75	393.30
For Electric Motor Operated Valve, Add	928.65	
35 22 59 00-0059 EA 14" Diameter Knife Gates Including Handwheel Operator For Hub	5,286.31	421.34
For Electric Motor Operated Valve, Add	934.27	
35 22 59 00-0060 EA 16" Diameter Knife Gates Including Handwheel Operator For Hub	6,829.72	453.73
For Electric Motor Operated Valve, Add	940.75	
35 22 59 00-0061 EA 18" Diameter Knife Gates Including Handwheel Operator For Hub	9,060.31	471.90
For Electric Motor Operated Valve, Add	944.38	
35 22 59 00-0062 EA 20" Diameter Knife Gates Including Handwheel Operator For Hub	11,320.38	536.31
For Electric Motor Operated Valve, Add	957.25	
35 22 59 00-0063 EA 24" Diameter Knife Gates Including Handwheel Operator For Hub	14,498.84	589.88
For Electric Motor Operated Valve, Add	967.98	
35 22 59 00-0064 EA 30" Diameter Knife Gates Including Handwheel Operator For Hub	26,347.21	786.47
For Electric Motor Operated Valve, Add	1,007.30	
35 22 59 00-0065 EA 36" Diameter Knife Gates Including Handwheel Operator For Hub	35,073.25	1,179.77
For Electric Motor Operated Valve, Add	1,085.95	
35 22 59 00-0066 Steel Hollow Jet Flow Gate Valve <small>(35 22 59)</small>		
35 22 59 00-0067 EA 6" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	1,719.90	189.94
For Electric Motor Operated Valve, Add	887.99	
35 22 59 00-0068 EA 8" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	2,648.98	221.82
For Electric Motor Operated Valve, Add	894.37	
35 22 59 00-0069 EA 10" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	3,193.71	332.39
For Electric Motor Operated Valve, Add	916.48	
35 22 59 00-0070 EA 12" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	4,075.38	442.97
For Electric Motor Operated Valve, Add	938.61	
35 22 59 00-0071 EA 14" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	6,097.09	474.85
For Electric Motor Operated Valve, Add	944.97	
35 22 59 00-0072 EA 16" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	7,342.22	511.48
For Electric Motor Operated Valve, Add	952.29	
35 22 59 00-0073 EA 18" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	12,278.23	531.83
For Electric Motor Operated Valve, Add	956.37	
35 22 59 00-0074 EA 20" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	15,429.73	604.41
For Electric Motor Operated Valve, Add	970.89	
35 22 59 00-0075 EA 24" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	22,151.70	664.78
For Electric Motor Operated Valve, Add	982.97	
35 22 59 00-0076 EA 30" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	27,149.16	886.61
For Electric Motor Operated Valve, Add	1,027.32	
35 22 59 00-0077 EA 36" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	38,754.77	1,329.58
For Electric Motor Operated Valve, Add	1,115.87	
35 22 59 00-0078 EA 42" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	46,196.29	1,628.05
For Electric Motor Operated Valve, Add	1,575.68	
35 22 59 00-0079 EA 48" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	54,774.03	1,899.39
For Electric Motor Operated Valve, Add	1,629.88	
35 22 59 00-0080 EA 54" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	72,110.34	2,374.24
For Electric Motor Operated Valve, Add	1,724.85	
35 22 59 00-0081 EA 60" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	80,350.28	2,849.09
For Electric Motor Operated Valve, Add	1,820.05	
35 22 59 00-0082 EA 66" Diameter Jet Flow Gate Valve Including Handwheel Operator For Hub	102,595.21	3,934.46
For Electric Motor Operated Valve, Add	2,037.48	
35 22 59 00-0083 Steel Dish Head Valve <small>(35 22 59)</small>		
35 22 59 00-0084 EA 12" Diameter Dish Head Valve	2,226.83	474.85
35 22 59 00-0085 EA 18" Diameter Dish Head Valve	3,187.21	542.69
35 22 59 00-0086 EA 20" Diameter Dish Head Valve	3,664.82	593.56
35 22 59 00-0087 EA 24" Diameter Dish Head Valve	4,305.92	633.18
35 22 59 00-0088 EA 30" Diameter Dish Head Valve	6,425.38	759.76
35 22 59 00-0089 EA 36" Diameter Dish Head Valve	7,922.16	949.70
35 22 59 00-0090 EA 42" Diameter Dish Head Valve	13,220.82	1,266.21
35 22 59 00-0091 EA 48" Diameter Dish Head Valve	17,352.39	1,899.39
35 22 59 00-0092 EA 54" Diameter Dish Head Valve	24,593.47	2,374.24
35 22 59 00-0093 EA 60" Diameter Dish Head Valve	31,782.92	3,798.79
35 22 59 00-0094 EA 66" Diameter Dish Head Valve	43,899.36	4,748.48
35 22 59 00-0095 EA 72" Diameter Dish Head Valve	53,587.33	6,331.36
35 22 63 Through-Levee Access Gates <small>(35 22)</small>		
35 22 63 00-0001 Cast Iron Canal Gates <small>(35 22 63)</small>		
35 22 63 00-0002 EA 12" Diameter Cast Iron Canal Gates With Fabricated Frame	2,688.85	474.85
For Electric Motor Operated Valve, Add	944.97	

35	Waterway and Marine Construction
35 20	Waterway and Marine Construction and Equipment
35 22	Hydraulic Gates



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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35 22 63 00-0003	EA		18" Diameter Cast Iron Canal Gates With Fabricated Frame	3,947.58	542.69
			<i>For Electric Motor Operated Valve, Add</i>	<i>958.54</i>	
35 22 63 00-0004	EA		20" Diameter Cast Iron Canal Gates With Fabricated Frame	4,519.08	593.56
			<i>For Electric Motor Operated Valve, Add</i>	<i>968.71</i>	
35 22 63 00-0005	EA		24" Diameter Cast Iron Canal Gates With Fabricated Frame	5,405.56	633.18
			<i>For Electric Motor Operated Valve, Add</i>	<i>976.63</i>	
35 22 63 00-0006	EA		30" Diameter Cast Iron Canal Gates With Fabricated Frame	8,200.15	759.76
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,001.95</i>	
35 22 63 00-0007	EA		36" Diameter Cast Iron Canal Gates With Fabricated Frame	10,100.98	949.70
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,039.94</i>	
35 22 63 00-0008	EA		42" Diameter Cast Iron Canal Gates With Fabricated Frame	17,087.46	1,266.21
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,103.25</i>	
35 22 63 00-0009	EA		48" Diameter Cast Iron Canal Gates With Fabricated Frame	22,255.58	1,899.39
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,229.88</i>	
35 22 63 00-0010	EA		54" Diameter Cast Iron Canal Gates With Fabricated Frame	31,772.66	2,374.24
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,324.85</i>	
35 22 63 00-0011	EA		60" Diameter Cast Iron Canal Gates With Fabricated Frame	40,532.28	3,798.79
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,609.76</i>	
35 22 63 00-0012	EA		66" Diameter Cast Iron Canal Gates With Fabricated Frame	56,344.88	4,748.48
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,799.70</i>	
35 22 63 00-0013	EA		72" Diameter Cast Iron Canal Gates With Fabricated Frame	66,583.42	5,426.84
			<i>For Electric Motor Operated Valve, Add</i>	<i>1,935.37</i>	

END OF SECTION 35



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 Process Interconnections

40 05 Common Work Results For Process Interconnections ⁽⁴⁰⁾

40 05 19 Ductile Iron Process Pipe ^(40 05)

40 05 19 00-0001	Flanged End, Cement Lined, Bituminous Seal Coat, Ductile Iron Piping ^(40 05 19) <small>Note: 350 PSI rating for 2" - 24" sizes, 250 PSI rating for 30" - 48" sizes. Pipe barrels conform to ANSI/AWWA C151/A21.51. The bolt holes are aligned per ANSI/AWWA C115/A21.15. Flanged fittings conform to ANSI/AWWA C110/A21.10. Interiors shall be cement lined in accordance with ANSI/AWWA C104/A21.04. Exterior shall be bituminous coating, in accordance with ANSI/AWWA C104/A21.04. See CSI section 40 05 19 00-4062 for bolts, 40 05 19 00-4077 for gaskets.</small>		
40 05 19 00-0002	Flanged End (FxF), Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0001)</small>		
40 05 19 00-0003	4" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0004	EA 4" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	890.27	227.24
	For Class 52 Rating, Deduct	-60.06	
	For Class 54 Rating, Add	86.03	
	For Class 55 Rating, Add	130.01	
	For Class 56 Rating, Add	173.46	
40 05 19 00-0005	EA 4" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	954.70	231.21
	For Class 52 Rating, Deduct	-66.48	
	For Class 54 Rating, Add	94.86	
	For Class 55 Rating, Add	143.19	
	For Class 56 Rating, Add	190.91	
40 05 19 00-0006	EA 4" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,019.14	235.18
	For Class 52 Rating, Deduct	-72.91	
	For Class 54 Rating, Add	103.70	
	For Class 55 Rating, Add	156.36	
	For Class 56 Rating, Add	208.36	
40 05 19 00-0007	EA 4" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,083.58	239.15
	For Class 52 Rating, Deduct	-79.33	
	For Class 54 Rating, Add	112.53	
	For Class 55 Rating, Add	169.53	
	For Class 56 Rating, Add	225.80	
40 05 19 00-0008	EA 4" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,148.02	243.13
	For Class 52 Rating, Deduct	-85.76	
	For Class 54 Rating, Add	121.37	
	For Class 55 Rating, Add	182.70	
	For Class 56 Rating, Add	243.26	
40 05 19 00-0009	EA 4" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,212.46	247.10
	For Class 52 Rating, Deduct	-92.19	
	For Class 54 Rating, Add	130.20	
	For Class 55 Rating, Add	195.87	
	For Class 56 Rating, Add	260.71	
40 05 19 00-0010	EA 4" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,276.89	251.07
	For Class 52 Rating, Deduct	-98.61	
	For Class 54 Rating, Add	139.04	
	For Class 55 Rating, Add	209.04	
	For Class 56 Rating, Add	278.15	
40 05 19 00-0011	EA 4" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,341.32	255.05
	For Class 52 Rating, Deduct	-105.04	
	For Class 54 Rating, Add	147.87	
	For Class 55 Rating, Add	222.21	
	For Class 56 Rating, Add	295.60	
40 05 19 00-0012	EA 4" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,405.76	259.02
	For Class 52 Rating, Deduct	-111.46	
	For Class 54 Rating, Add	156.71	
	For Class 55 Rating, Add	235.39	
	For Class 56 Rating, Add	313.05	
40 05 19 00-0013	EA 4" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,470.19	262.99
	For Class 52 Rating, Deduct	-117.89	
	For Class 54 Rating, Add	165.54	
	For Class 55 Rating, Add	248.56	
	For Class 56 Rating, Add	330.50	
40 05 19 00-0014	EA 4" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,534.63	266.97
	For Class 52 Rating, Deduct	-124.32	
	For Class 54 Rating, Add	174.37	
	For Class 55 Rating, Add	261.73	
	For Class 56 Rating, Add	347.95	
40 05 19 00-0015	EA 4" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,599.08	270.94
	For Class 52 Rating, Deduct	-130.74	
	For Class 54 Rating, Add	183.21	
	For Class 55 Rating, Add	274.90	
	For Class 56 Rating, Add	365.40	
40 05 19 00-0016	EA 4" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,663.50	274.91
	For Class 52 Rating, Deduct	-137.17	
	For Class 54 Rating, Add	192.04	
	For Class 55 Rating, Add	288.07	
	For Class 56 Rating, Add	382.85	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0017	EA		4" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,727.94	278.88
			<i>For Class 52 Rating, Deduct</i>	-143.59	
			<i>For Class 54 Rating, Add</i>	200.88	
			<i>For Class 55 Rating, Add</i>	301.24	
			<i>For Class 56 Rating, Add</i>	400.30	
40 05 19 00-0018	EA		4" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,792.38	282.85
			<i>For Class 52 Rating, Deduct</i>	-150.02	
			<i>For Class 54 Rating, Add</i>	209.71	
			<i>For Class 55 Rating, Add</i>	314.42	
			<i>For Class 56 Rating, Add</i>	417.75	
40 05 19 00-0019	EA		4" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,856.81	286.82
			<i>For Class 52 Rating, Deduct</i>	-156.44	
			<i>For Class 54 Rating, Add</i>	218.55	
			<i>For Class 55 Rating, Add</i>	327.59	
			<i>For Class 56 Rating, Add</i>	435.20	
40 05 19 00-0020	EA		4" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,921.25	290.80
			<i>For Class 52 Rating, Deduct</i>	-162.87	
			<i>For Class 54 Rating, Add</i>	227.38	
			<i>For Class 55 Rating, Add</i>	340.76	
			<i>For Class 56 Rating, Add</i>	452.65	
40 05 19 00-0021	EA		4" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,985.68	294.78
			<i>For Class 52 Rating, Deduct</i>	-169.30	
			<i>For Class 54 Rating, Add</i>	236.22	
			<i>For Class 55 Rating, Add</i>	353.93	
			<i>For Class 56 Rating, Add</i>	470.10	
40 05 19 00-0022	EA		4" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,050.11	298.75
			<i>For Class 52 Rating, Deduct</i>	-175.72	
			<i>For Class 54 Rating, Add</i>	245.05	
			<i>For Class 55 Rating, Add</i>	367.10	
			<i>For Class 56 Rating, Add</i>	487.55	
40 05 19 00-0023	EA		4" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,114.55	302.72
			<i>For Class 52 Rating, Deduct</i>	-182.15	
			<i>For Class 54 Rating, Add</i>	253.89	
			<i>For Class 55 Rating, Add</i>	380.27	
			<i>For Class 56 Rating, Add</i>	505.00	
40 05 19 00-0024	EA		4" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,179.00	306.69
			<i>For Class 52 Rating, Deduct</i>	-188.57	
			<i>For Class 54 Rating, Add</i>	262.72	
			<i>For Class 55 Rating, Add</i>	393.44	
			<i>For Class 56 Rating, Add</i>	522.45	
40 05 19 00-0025	EA		4" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,243.44	310.66
			<i>For Class 52 Rating, Deduct</i>	-195.00	
			<i>For Class 54 Rating, Add</i>	271.56	
			<i>For Class 55 Rating, Add</i>	406.62	
			<i>For Class 56 Rating, Add</i>	539.90	
40 05 19 00-0026	EA		4" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,307.86	314.63
			<i>For Class 52 Rating, Deduct</i>	-201.43	
			<i>For Class 54 Rating, Add</i>	280.39	
			<i>For Class 55 Rating, Add</i>	419.79	
			<i>For Class 56 Rating, Add</i>	557.35	
40 05 19 00-0027	EA		4" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,372.30	318.61
			<i>For Class 52 Rating, Deduct</i>	-207.85	
			<i>For Class 54 Rating, Add</i>	289.23	
			<i>For Class 55 Rating, Add</i>	432.96	
			<i>For Class 56 Rating, Add</i>	574.80	
40 05 19 00-0028	EA		4" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,436.74	322.58
			<i>For Class 52 Rating, Deduct</i>	-214.28	
			<i>For Class 54 Rating, Add</i>	298.06	
			<i>For Class 55 Rating, Add</i>	446.13	
			<i>For Class 56 Rating, Add</i>	592.25	
40 05 19 00-0029	EA		4" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,501.17	326.56
			<i>For Class 52 Rating, Deduct</i>	-220.70	
			<i>For Class 54 Rating, Add</i>	306.90	
			<i>For Class 55 Rating, Add</i>	459.30	
			<i>For Class 56 Rating, Add</i>	609.70	
40 05 19 00-0030	EA		4" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,565.61	330.53
			<i>For Class 52 Rating, Deduct</i>	-227.13	
			<i>For Class 54 Rating, Add</i>	315.73	
			<i>For Class 55 Rating, Add</i>	472.47	
			<i>For Class 56 Rating, Add</i>	627.15	
40 05 19 00-0031	EA		4" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,630.04	334.50
			<i>For Class 52 Rating, Deduct</i>	-233.56	
			<i>For Class 54 Rating, Add</i>	324.57	
			<i>For Class 55 Rating, Add</i>	485.64	
			<i>For Class 56 Rating, Add</i>	644.60	
40 05 19 00-0032	EA		4" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,694.47	338.47
			<i>For Class 52 Rating, Deduct</i>	-239.98	
			<i>For Class 54 Rating, Add</i>	333.40	
			<i>For Class 55 Rating, Add</i>	498.81	
			<i>For Class 56 Rating, Add</i>	662.05	
40 05 19 00-0033	EA		4" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,758.92	342.44
			<i>For Class 52 Rating, Deduct</i>	-246.41	
			<i>For Class 54 Rating, Add</i>	342.24	
			<i>For Class 55 Rating, Add</i>	511.99	
			<i>For Class 56 Rating, Add</i>	679.50	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0034 EA 4" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,823.36	346.42
<i>For Class 52 Rating, Deduct</i>	-252.83	
<i>For Class 54 Rating, Add</i>	351.07	
<i>For Class 55 Rating, Add</i>	525.16	
<i>For Class 56 Rating, Add</i>	696.95	
40 05 19 00-0035 EA 4" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,887.79	350.39
<i>For Class 52 Rating, Deduct</i>	-259.26	
<i>For Class 54 Rating, Add</i>	359.90	
<i>For Class 55 Rating, Add</i>	538.33	
<i>For Class 56 Rating, Add</i>	714.39	
40 05 19 00-0036 EA 4" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,952.22	354.36
<i>For Class 52 Rating, Deduct</i>	-265.68	
<i>For Class 54 Rating, Add</i>	368.74	
<i>For Class 55 Rating, Add</i>	551.50	
<i>For Class 56 Rating, Add</i>	731.85	
40 05 19 00-0037 EA 4" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,016.66	358.33
<i>For Class 52 Rating, Deduct</i>	-272.11	
<i>For Class 54 Rating, Add</i>	377.57	
<i>For Class 55 Rating, Add</i>	564.67	
<i>For Class 56 Rating, Add</i>	749.30	
40 05 19 00-0038 EA 4" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,081.09	362.31
<i>For Class 52 Rating, Deduct</i>	-278.54	
<i>For Class 54 Rating, Add</i>	386.41	
<i>For Class 55 Rating, Add</i>	577.84	
<i>For Class 56 Rating, Add</i>	766.74	
40 05 19 00-0039 EA 4" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,145.53	366.28
<i>For Class 52 Rating, Deduct</i>	-284.96	
<i>For Class 54 Rating, Add</i>	395.24	
<i>For Class 55 Rating, Add</i>	591.01	
<i>For Class 56 Rating, Add</i>	784.19	
40 05 19 00-0040 EA 4" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,209.97	370.26
<i>For Class 52 Rating, Deduct</i>	-291.39	
<i>For Class 54 Rating, Add</i>	404.08	
<i>For Class 55 Rating, Add</i>	604.19	
<i>For Class 56 Rating, Add</i>	801.64	
40 05 19 00-0041 EA 4" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,274.40	374.23
<i>For Class 52 Rating, Deduct</i>	-297.81	
<i>For Class 54 Rating, Add</i>	412.91	
<i>For Class 55 Rating, Add</i>	617.36	
<i>For Class 56 Rating, Add</i>	819.09	
40 05 19 00-0042 EA 4" Flanged (FxF), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,338.84	378.20
<i>For Class 52 Rating, Deduct</i>	-304.24	
<i>For Class 54 Rating, Add</i>	421.75	
<i>For Class 55 Rating, Add</i>	630.53	
<i>For Class 56 Rating, Add</i>	836.54	
40 05 19 00-0043 6" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0044 EA 6" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,127.64	286.03
<i>For Class 52 Rating, Deduct</i>	-76.37	
<i>For Class 54 Rating, Add</i>	109.34	
<i>For Class 55 Rating, Add</i>	165.22	
<i>For Class 56 Rating, Add</i>	220.41	
40 05 19 00-0045 EA 6" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,205.56	290.00
<i>For Class 52 Rating, Deduct</i>	-84.28	
<i>For Class 54 Rating, Add</i>	120.20	
<i>For Class 55 Rating, Add</i>	181.40	
<i>For Class 56 Rating, Add</i>	241.84	
40 05 19 00-0046 EA 6" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,283.49	293.98
<i>For Class 52 Rating, Deduct</i>	-92.19	
<i>For Class 54 Rating, Add</i>	131.05	
<i>For Class 55 Rating, Add</i>	197.58	
<i>For Class 56 Rating, Add</i>	263.26	
40 05 19 00-0047 EA 6" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,361.39	297.95
<i>For Class 52 Rating, Deduct</i>	-100.09	
<i>For Class 54 Rating, Add</i>	141.91	
<i>For Class 55 Rating, Add</i>	213.75	
<i>For Class 56 Rating, Add</i>	284.69	
40 05 19 00-0048 EA 6" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,439.31	301.92
<i>For Class 52 Rating, Deduct</i>	-108.00	
<i>For Class 54 Rating, Add</i>	152.77	
<i>For Class 55 Rating, Add</i>	229.93	
<i>For Class 56 Rating, Add</i>	306.11	
40 05 19 00-0049 EA 6" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,517.23	305.90
<i>For Class 52 Rating, Deduct</i>	-115.91	
<i>For Class 54 Rating, Add</i>	163.62	
<i>For Class 55 Rating, Add</i>	246.11	
<i>For Class 56 Rating, Add</i>	327.54	
40 05 19 00-0050 EA 6" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,595.15	309.87
<i>For Class 52 Rating, Deduct</i>	-123.82	
<i>For Class 54 Rating, Add</i>	174.48	
<i>For Class 55 Rating, Add</i>	262.29	
<i>For Class 56 Rating, Add</i>	348.97	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0051	EA		6" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,673.06	313.84
			<i>For Class 52 Rating, Deduct</i>	-131.73	
			<i>For Class 54 Rating, Add</i>	185.34	
			<i>For Class 55 Rating, Add</i>	278.46	
			<i>For Class 56 Rating, Add</i>	370.39	
40 05 19 00-0052	EA		6" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,750.97	317.82
			<i>For Class 52 Rating, Deduct</i>	-139.64	
			<i>For Class 54 Rating, Add</i>	196.19	
			<i>For Class 55 Rating, Add</i>	294.64	
			<i>For Class 56 Rating, Add</i>	391.82	
40 05 19 00-0053	EA		6" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,828.89	321.79
			<i>For Class 52 Rating, Deduct</i>	-147.55	
			<i>For Class 54 Rating, Add</i>	207.05	
			<i>For Class 55 Rating, Add</i>	310.82	
			<i>For Class 56 Rating, Add</i>	413.25	
40 05 19 00-0054	EA		6" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,906.82	325.76
			<i>For Class 52 Rating, Deduct</i>	-155.46	
			<i>For Class 54 Rating, Add</i>	217.91	
			<i>For Class 55 Rating, Add</i>	327.00	
			<i>For Class 56 Rating, Add</i>	434.67	
40 05 19 00-0055	EA		6" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,984.73	329.73
			<i>For Class 52 Rating, Deduct</i>	-163.36	
			<i>For Class 54 Rating, Add</i>	228.76	
			<i>For Class 55 Rating, Add</i>	343.17	
			<i>For Class 56 Rating, Add</i>	456.10	
40 05 19 00-0056	EA		6" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,062.65	333.70
			<i>For Class 52 Rating, Deduct</i>	-171.27	
			<i>For Class 54 Rating, Add</i>	239.62	
			<i>For Class 55 Rating, Add</i>	359.35	
			<i>For Class 56 Rating, Add</i>	477.53	
40 05 19 00-0057	EA		6" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,140.56	337.68
			<i>For Class 52 Rating, Deduct</i>	-179.18	
			<i>For Class 54 Rating, Add</i>	250.48	
			<i>For Class 55 Rating, Add</i>	375.53	
			<i>For Class 56 Rating, Add</i>	498.95	
40 05 19 00-0058	EA		6" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,218.48	341.65
			<i>For Class 52 Rating, Deduct</i>	-187.09	
			<i>For Class 54 Rating, Add</i>	261.34	
			<i>For Class 55 Rating, Add</i>	391.71	
			<i>For Class 56 Rating, Add</i>	520.38	
40 05 19 00-0059	EA		6" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,296.40	345.63
			<i>For Class 52 Rating, Deduct</i>	-195.00	
			<i>For Class 54 Rating, Add</i>	272.19	
			<i>For Class 55 Rating, Add</i>	407.89	
			<i>For Class 56 Rating, Add</i>	541.81	
40 05 19 00-0060	EA		6" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,374.31	349.60
			<i>For Class 52 Rating, Deduct</i>	-202.91	
			<i>For Class 54 Rating, Add</i>	283.05	
			<i>For Class 55 Rating, Add</i>	424.06	
			<i>For Class 56 Rating, Add</i>	563.23	
40 05 19 00-0061	EA		6" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,452.23	353.57
			<i>For Class 52 Rating, Deduct</i>	-210.82	
			<i>For Class 54 Rating, Add</i>	293.91	
			<i>For Class 55 Rating, Add</i>	440.24	
			<i>For Class 56 Rating, Add</i>	584.66	
40 05 19 00-0062	EA		6" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,530.15	357.54
			<i>For Class 52 Rating, Deduct</i>	-218.73	
			<i>For Class 54 Rating, Add</i>	304.76	
			<i>For Class 55 Rating, Add</i>	456.42	
			<i>For Class 56 Rating, Add</i>	606.09	
40 05 19 00-0063	EA		6" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,608.07	361.51
			<i>For Class 52 Rating, Deduct</i>	-226.64	
			<i>For Class 54 Rating, Add</i>	315.62	
			<i>For Class 55 Rating, Add</i>	472.60	
			<i>For Class 56 Rating, Add</i>	627.51	
40 05 19 00-0064	EA		6" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,685.98	365.48
			<i>For Class 52 Rating, Deduct</i>	-234.54	
			<i>For Class 54 Rating, Add</i>	326.48	
			<i>For Class 55 Rating, Add</i>	488.77	
			<i>For Class 56 Rating, Add</i>	648.94	
40 05 19 00-0065	EA		6" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,763.90	369.46
			<i>For Class 52 Rating, Deduct</i>	-242.45	
			<i>For Class 54 Rating, Add</i>	337.33	
			<i>For Class 55 Rating, Add</i>	504.95	
			<i>For Class 56 Rating, Add</i>	670.36	
40 05 19 00-0066	EA		6" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,841.82	373.44
			<i>For Class 52 Rating, Deduct</i>	-250.36	
			<i>For Class 54 Rating, Add</i>	348.19	
			<i>For Class 55 Rating, Add</i>	521.13	
			<i>For Class 56 Rating, Add</i>	691.79	
40 05 19 00-0067	EA		6" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,919.74	377.41
			<i>For Class 52 Rating, Deduct</i>	-258.27	
			<i>For Class 54 Rating, Add</i>	359.05	
			<i>For Class 55 Rating, Add</i>	537.31	
			<i>For Class 56 Rating, Add</i>	713.22	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0068 EA 6" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,997.64	381.38
<i>For Class 52 Rating, Deduct</i>	-266.18	
<i>For Class 54 Rating, Add</i>	369.90	
<i>For Class 55 Rating, Add</i>	553.48	
<i>For Class 56 Rating, Add</i>	734.64	
40 05 19 00-0069 EA 6" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,075.56	385.35
<i>For Class 52 Rating, Deduct</i>	-274.09	
<i>For Class 54 Rating, Add</i>	380.76	
<i>For Class 55 Rating, Add</i>	569.66	
<i>For Class 56 Rating, Add</i>	756.07	
40 05 19 00-0070 EA 6" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,153.48	389.32
<i>For Class 52 Rating, Deduct</i>	-282.00	
<i>For Class 54 Rating, Add</i>	391.62	
<i>For Class 55 Rating, Add</i>	585.84	
<i>For Class 56 Rating, Add</i>	777.50	
40 05 19 00-0071 EA 6" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,231.41	393.30
<i>For Class 52 Rating, Deduct</i>	-289.91	
<i>For Class 54 Rating, Add</i>	402.48	
<i>For Class 55 Rating, Add</i>	602.02	
<i>For Class 56 Rating, Add</i>	798.93	
40 05 19 00-0072 EA 6" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,309.32	397.27
<i>For Class 52 Rating, Deduct</i>	-297.81	
<i>For Class 54 Rating, Add</i>	413.33	
<i>For Class 55 Rating, Add</i>	618.19	
<i>For Class 56 Rating, Add</i>	820.35	
40 05 19 00-0073 EA 6" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,387.23	401.24
<i>For Class 52 Rating, Deduct</i>	-305.72	
<i>For Class 54 Rating, Add</i>	424.19	
<i>For Class 55 Rating, Add</i>	634.37	
<i>For Class 56 Rating, Add</i>	841.78	
40 05 19 00-0074 EA 6" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,465.15	405.21
<i>For Class 52 Rating, Deduct</i>	-313.63	
<i>For Class 54 Rating, Add</i>	435.05	
<i>For Class 55 Rating, Add</i>	650.55	
<i>For Class 56 Rating, Add</i>	863.20	
40 05 19 00-0075 EA 6" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,543.07	409.19
<i>For Class 52 Rating, Deduct</i>	-321.54	
<i>For Class 54 Rating, Add</i>	445.90	
<i>For Class 55 Rating, Add</i>	666.73	
<i>For Class 56 Rating, Add</i>	884.63	
40 05 19 00-0076 EA 6" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,620.98	413.16
<i>For Class 52 Rating, Deduct</i>	-329.45	
<i>For Class 54 Rating, Add</i>	456.76	
<i>For Class 55 Rating, Add</i>	682.90	
<i>For Class 56 Rating, Add</i>	906.06	
40 05 19 00-0077 EA 6" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,698.90	417.13
<i>For Class 52 Rating, Deduct</i>	-337.36	
<i>For Class 54 Rating, Add</i>	467.62	
<i>For Class 55 Rating, Add</i>	699.08	
<i>For Class 56 Rating, Add</i>	927.48	
40 05 19 00-0078 EA 6" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,776.81	421.11
<i>For Class 52 Rating, Deduct</i>	-345.27	
<i>For Class 54 Rating, Add</i>	478.47	
<i>For Class 55 Rating, Add</i>	715.26	
<i>For Class 56 Rating, Add</i>	948.91	
40 05 19 00-0079 EA 6" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,854.73	425.08
<i>For Class 52 Rating, Deduct</i>	-353.17	
<i>For Class 54 Rating, Add</i>	489.33	
<i>For Class 55 Rating, Add</i>	731.44	
<i>For Class 56 Rating, Add</i>	970.34	
40 05 19 00-0080 EA 6" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,932.65	429.05
<i>For Class 52 Rating, Deduct</i>	-361.08	
<i>For Class 54 Rating, Add</i>	500.19	
<i>For Class 55 Rating, Add</i>	747.62	
<i>For Class 56 Rating, Add</i>	991.76	
40 05 19 00-0081 EA 6" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,010.57	433.02
<i>For Class 52 Rating, Deduct</i>	-368.99	
<i>For Class 54 Rating, Add</i>	511.04	
<i>For Class 55 Rating, Add</i>	763.79	
<i>For Class 56 Rating, Add</i>	1,013.19	
40 05 19 00-0082 EA 6" Flanged (FxF), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,088.49	436.99
<i>For Class 52 Rating, Deduct</i>	-376.90	
<i>For Class 54 Rating, Add</i>	521.90	
<i>For Class 55 Rating, Add</i>	779.97	
<i>For Class 56 Rating, Add</i>	1,034.62	
40 05 19 00-0083 8" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		
<small>(40 05 19 00-0002)</small>		
40 05 19 00-0084 EA 8" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,576.06	365.48
<i>For Class 52 Rating, Deduct</i>	-112.45	
<i>For Class 54 Rating, Add</i>	159.99	
<i>For Class 55 Rating, Add</i>	241.26	
<i>For Class 56 Rating, Add</i>	321.51	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0085	EA 8" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,680.94	369.46
	<i>For Class 52 Rating, Deduct</i>	-123.33	
	<i>For Class 54 Rating, Add</i>	174.89	
	<i>For Class 55 Rating, Add</i>	263.45	
	<i>For Class 56 Rating, Add</i>	350.89	
40 05 19 00-0086	EA 8" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,785.82	373.44
	<i>For Class 52 Rating, Deduct</i>	-134.20	
	<i>For Class 54 Rating, Add</i>	189.79	
	<i>For Class 55 Rating, Add</i>	285.64	
	<i>For Class 56 Rating, Add</i>	380.27	
40 05 19 00-0087	EA 8" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,890.70	377.41
	<i>For Class 52 Rating, Deduct</i>	-145.08	
	<i>For Class 54 Rating, Add</i>	204.69	
	<i>For Class 55 Rating, Add</i>	307.83	
	<i>For Class 56 Rating, Add</i>	409.65	
40 05 19 00-0088	EA 8" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,995.57	381.38
	<i>For Class 52 Rating, Deduct</i>	-155.95	
	<i>For Class 54 Rating, Add</i>	219.59	
	<i>For Class 55 Rating, Add</i>	330.02	
	<i>For Class 56 Rating, Add</i>	439.03	
40 05 19 00-0089	EA 8" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,100.45	385.35
	<i>For Class 52 Rating, Deduct</i>	-166.82	
	<i>For Class 54 Rating, Add</i>	234.49	
	<i>For Class 55 Rating, Add</i>	352.21	
	<i>For Class 56 Rating, Add</i>	468.41	
40 05 19 00-0090	EA 8" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,205.33	389.32
	<i>For Class 52 Rating, Deduct</i>	-177.70	
	<i>For Class 54 Rating, Add</i>	249.40	
	<i>For Class 55 Rating, Add</i>	374.40	
	<i>For Class 56 Rating, Add</i>	497.79	
40 05 19 00-0091	EA 8" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,310.22	393.30
	<i>For Class 52 Rating, Deduct</i>	-188.57	
	<i>For Class 54 Rating, Add</i>	264.30	
	<i>For Class 55 Rating, Add</i>	396.59	
	<i>For Class 56 Rating, Add</i>	527.17	
40 05 19 00-0092	EA 8" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,415.10	397.27
	<i>For Class 52 Rating, Deduct</i>	-199.45	
	<i>For Class 54 Rating, Add</i>	279.20	
	<i>For Class 55 Rating, Add</i>	418.78	
	<i>For Class 56 Rating, Add</i>	556.55	
40 05 19 00-0093	EA 8" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,519.97	401.24
	<i>For Class 52 Rating, Deduct</i>	-210.32	
	<i>For Class 54 Rating, Add</i>	294.10	
	<i>For Class 55 Rating, Add</i>	440.97	
	<i>For Class 56 Rating, Add</i>	585.93	
40 05 19 00-0094	EA 8" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,624.85	405.21
	<i>For Class 52 Rating, Deduct</i>	-221.20	
	<i>For Class 54 Rating, Add</i>	309.00	
	<i>For Class 55 Rating, Add</i>	463.16	
	<i>For Class 56 Rating, Add</i>	615.32	
40 05 19 00-0095	EA 8" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,729.73	409.19
	<i>For Class 52 Rating, Deduct</i>	-232.07	
	<i>For Class 54 Rating, Add</i>	323.90	
	<i>For Class 55 Rating, Add</i>	485.35	
	<i>For Class 56 Rating, Add</i>	644.70	
40 05 19 00-0096	EA 8" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,834.60	413.16
	<i>For Class 52 Rating, Deduct</i>	-242.95	
	<i>For Class 54 Rating, Add</i>	338.80	
	<i>For Class 55 Rating, Add</i>	507.54	
	<i>For Class 56 Rating, Add</i>	674.07	
40 05 19 00-0097	EA 8" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,939.48	417.13
	<i>For Class 52 Rating, Deduct</i>	-253.82	
	<i>For Class 54 Rating, Add</i>	353.70	
	<i>For Class 55 Rating, Add</i>	529.73	
	<i>For Class 56 Rating, Add</i>	703.45	
40 05 19 00-0098	EA 8" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,044.35	421.11
	<i>For Class 52 Rating, Deduct</i>	-264.70	
	<i>For Class 54 Rating, Add</i>	368.60	
	<i>For Class 55 Rating, Add</i>	551.92	
	<i>For Class 56 Rating, Add</i>	732.83	
40 05 19 00-0099	EA 8" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,149.23	425.08
	<i>For Class 52 Rating, Deduct</i>	-275.57	
	<i>For Class 54 Rating, Add</i>	383.51	
	<i>For Class 55 Rating, Add</i>	574.11	
	<i>For Class 56 Rating, Add</i>	762.21	
40 05 19 00-0100	EA 8" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,254.12	429.05
	<i>For Class 52 Rating, Deduct</i>	-286.44	
	<i>For Class 54 Rating, Add</i>	398.41	
	<i>For Class 55 Rating, Add</i>	596.30	
	<i>For Class 56 Rating, Add</i>	791.59	
40 05 19 00-0101	EA 8" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,359.00	433.02
	<i>For Class 52 Rating, Deduct</i>	-297.32	
	<i>For Class 54 Rating, Add</i>	413.31	
	<i>For Class 55 Rating, Add</i>	618.49	
	<i>For Class 56 Rating, Add</i>	820.98	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0102 EA 8" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,463.88	436.99
For Class 52 Rating, Deduct	-308.19	
For Class 54 Rating, Add	428.21	
For Class 55 Rating, Add	640.68	
For Class 56 Rating, Add	850.36	
40 05 19 00-0103 EA 8" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,568.75	440.96
For Class 52 Rating, Deduct	-319.07	
For Class 54 Rating, Add	443.11	
For Class 55 Rating, Add	662.87	
For Class 56 Rating, Add	879.74	
40 05 19 00-0104 EA 8" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,673.63	444.95
For Class 52 Rating, Deduct	-329.94	
For Class 54 Rating, Add	458.01	
For Class 55 Rating, Add	685.06	
For Class 56 Rating, Add	909.12	
40 05 19 00-0105 EA 8" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,778.51	448.92
For Class 52 Rating, Deduct	-340.82	
For Class 54 Rating, Add	472.91	
For Class 55 Rating, Add	707.25	
For Class 56 Rating, Add	938.50	
40 05 19 00-0106 EA 8" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,883.39	452.89
For Class 52 Rating, Deduct	-351.69	
For Class 54 Rating, Add	487.81	
For Class 55 Rating, Add	729.44	
For Class 56 Rating, Add	967.88	
40 05 19 00-0107 EA 8" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,988.27	456.86
For Class 52 Rating, Deduct	-362.57	
For Class 54 Rating, Add	502.72	
For Class 55 Rating, Add	751.63	
For Class 56 Rating, Add	997.26	
40 05 19 00-0108 EA 8" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,093.13	460.83
For Class 52 Rating, Deduct	-373.44	
For Class 54 Rating, Add	517.62	
For Class 55 Rating, Add	773.82	
For Class 56 Rating, Add	1,026.63	
40 05 19 00-0109 EA 8" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,198.02	464.80
For Class 52 Rating, Deduct	-384.31	
For Class 54 Rating, Add	532.52	
For Class 55 Rating, Add	796.01	
For Class 56 Rating, Add	1,056.02	
40 05 19 00-0110 EA 8" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,302.90	468.77
For Class 52 Rating, Deduct	-395.19	
For Class 54 Rating, Add	547.42	
For Class 55 Rating, Add	818.20	
For Class 56 Rating, Add	1,085.40	
40 05 19 00-0111 EA 8" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,407.78	472.75
For Class 52 Rating, Deduct	-406.06	
For Class 54 Rating, Add	562.32	
For Class 55 Rating, Add	840.39	
For Class 56 Rating, Add	1,114.78	
40 05 19 00-0112 EA 8" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,512.66	476.72
For Class 52 Rating, Deduct	-416.94	
For Class 54 Rating, Add	577.22	
For Class 55 Rating, Add	862.58	
For Class 56 Rating, Add	1,144.16	
40 05 19 00-0113 EA 8" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,617.53	480.70
For Class 52 Rating, Deduct	-427.81	
For Class 54 Rating, Add	592.12	
For Class 55 Rating, Add	884.77	
For Class 56 Rating, Add	1,173.54	
40 05 19 00-0114 EA 8" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,722.41	484.67
For Class 52 Rating, Deduct	-438.69	
For Class 54 Rating, Add	607.02	
For Class 55 Rating, Add	906.96	
For Class 56 Rating, Add	1,202.92	
40 05 19 00-0115 EA 8" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,827.29	488.64
For Class 52 Rating, Deduct	-449.56	
For Class 54 Rating, Add	621.92	
For Class 55 Rating, Add	929.15	
For Class 56 Rating, Add	1,232.30	
40 05 19 00-0116 EA 8" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,932.17	492.61
For Class 52 Rating, Deduct	-460.44	
For Class 54 Rating, Add	636.83	
For Class 55 Rating, Add	951.34	
For Class 56 Rating, Add	1,261.68	
40 05 19 00-0117 EA 8" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,037.06	496.59
For Class 52 Rating, Deduct	-471.31	
For Class 54 Rating, Add	651.73	
For Class 55 Rating, Add	973.53	
For Class 56 Rating, Add	1,291.06	
40 05 19 00-0118 EA 8" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,141.94	500.56
For Class 52 Rating, Deduct	-482.19	
For Class 54 Rating, Add	666.63	
For Class 55 Rating, Add	995.73	
For Class 56 Rating, Add	1,320.44	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0119	EA 8" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,246.81	504.53
	<i>For Class 52 Rating, Deduct</i>	-493.06	
	<i>For Class 54 Rating, Add</i>	681.53	
	<i>For Class 55 Rating, Add</i>	1,017.92	
	<i>For Class 56 Rating, Add</i>	1,349.82	
40 05 19 00-0120	EA 8" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,351.69	508.50
	<i>For Class 52 Rating, Deduct</i>	-503.94	
	<i>For Class 54 Rating, Add</i>	696.43	
	<i>For Class 55 Rating, Add</i>	1,040.11	
	<i>For Class 56 Rating, Add</i>	1,379.20	
40 05 19 00-0121	EA 8" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,456.56	512.47
	<i>For Class 52 Rating, Deduct</i>	-514.81	
	<i>For Class 54 Rating, Add</i>	711.33	
	<i>For Class 55 Rating, Add</i>	1,062.29	
	<i>For Class 56 Rating, Add</i>	1,408.58	
40 05 19 00-0122	EA 8" Flanged (FxF), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,561.44	516.45
	<i>For Class 52 Rating, Deduct</i>	-525.68	
	<i>For Class 54 Rating, Add</i>	726.23	
	<i>For Class 55 Rating, Add</i>	1,084.48	
	<i>For Class 56 Rating, Add</i>	1,437.96	
40 05 19 00-0123 10" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>			
40 05 19 00-0124	EA 10" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,986.28	444.95
	<i>For Class 52 Rating, Deduct</i>	-144.33	
	<i>For Class 54 Rating, Add</i>	204.91	
	<i>For Class 55 Rating, Add</i>	308.78	
	<i>For Class 56 Rating, Add</i>	411.35	
40 05 19 00-0125	EA 10" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,122.62	448.92
	<i>For Class 52 Rating, Deduct</i>	-158.67	
	<i>For Class 54 Rating, Add</i>	224.53	
	<i>For Class 55 Rating, Add</i>	337.99	
	<i>For Class 56 Rating, Add</i>	450.01	
40 05 19 00-0126	EA 10" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,258.95	452.89
	<i>For Class 52 Rating, Deduct</i>	-173.00	
	<i>For Class 54 Rating, Add</i>	244.15	
	<i>For Class 55 Rating, Add</i>	367.19	
	<i>For Class 56 Rating, Add</i>	488.67	
40 05 19 00-0127	EA 10" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,395.28	456.86
	<i>For Class 52 Rating, Deduct</i>	-187.34	
	<i>For Class 54 Rating, Add</i>	263.77	
	<i>For Class 55 Rating, Add</i>	396.40	
	<i>For Class 56 Rating, Add</i>	527.33	
40 05 19 00-0128	EA 10" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,531.61	460.83
	<i>For Class 52 Rating, Deduct</i>	-201.67	
	<i>For Class 54 Rating, Add</i>	283.39	
	<i>For Class 55 Rating, Add</i>	425.60	
	<i>For Class 56 Rating, Add</i>	565.99	
40 05 19 00-0129	EA 10" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,667.95	464.80
	<i>For Class 52 Rating, Deduct</i>	-216.01	
	<i>For Class 54 Rating, Add</i>	303.01	
	<i>For Class 55 Rating, Add</i>	454.81	
	<i>For Class 56 Rating, Add</i>	604.64	
40 05 19 00-0130	EA 10" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,804.29	468.77
	<i>For Class 52 Rating, Deduct</i>	-230.34	
	<i>For Class 54 Rating, Add</i>	322.63	
	<i>For Class 55 Rating, Add</i>	484.01	
	<i>For Class 56 Rating, Add</i>	643.31	
40 05 19 00-0131	EA 10" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,940.62	472.75
	<i>For Class 52 Rating, Deduct</i>	-244.68	
	<i>For Class 54 Rating, Add</i>	342.24	
	<i>For Class 55 Rating, Add</i>	513.22	
	<i>For Class 56 Rating, Add</i>	681.96	
40 05 19 00-0132	EA 10" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,076.96	476.72
	<i>For Class 52 Rating, Deduct</i>	-259.01	
	<i>For Class 54 Rating, Add</i>	361.87	
	<i>For Class 55 Rating, Add</i>	542.42	
	<i>For Class 56 Rating, Add</i>	720.62	
40 05 19 00-0133	EA 10" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,213.28	480.70
	<i>For Class 52 Rating, Deduct</i>	-273.35	
	<i>For Class 54 Rating, Add</i>	381.48	
	<i>For Class 55 Rating, Add</i>	571.63	
	<i>For Class 56 Rating, Add</i>	759.28	
40 05 19 00-0134	EA 10" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,349.62	484.67
	<i>For Class 52 Rating, Deduct</i>	-287.68	
	<i>For Class 54 Rating, Add</i>	401.10	
	<i>For Class 55 Rating, Add</i>	600.83	
	<i>For Class 56 Rating, Add</i>	797.94	
40 05 19 00-0135	EA 10" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,485.95	488.64
	<i>For Class 52 Rating, Deduct</i>	-302.01	
	<i>For Class 54 Rating, Add</i>	420.72	
	<i>For Class 55 Rating, Add</i>	630.04	
	<i>For Class 56 Rating, Add</i>	836.60	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0136 EA 10" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,622.28	492.61
<i>For Class 52 Rating, Deduct</i>	-316.35	
<i>For Class 54 Rating, Add</i>	440.34	
<i>For Class 55 Rating, Add</i>	659.24	
<i>For Class 56 Rating, Add</i>	875.26	
40 05 19 00-0137 EA 10" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,758.63	496.59
<i>For Class 52 Rating, Deduct</i>	-330.68	
<i>For Class 54 Rating, Add</i>	459.96	
<i>For Class 55 Rating, Add</i>	688.44	
<i>For Class 56 Rating, Add</i>	913.92	
40 05 19 00-0138 EA 10" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,894.96	500.56
<i>For Class 52 Rating, Deduct</i>	-345.02	
<i>For Class 54 Rating, Add</i>	479.58	
<i>For Class 55 Rating, Add</i>	717.65	
<i>For Class 56 Rating, Add</i>	952.58	
40 05 19 00-0139 EA 10" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,031.29	504.53
<i>For Class 52 Rating, Deduct</i>	-359.35	
<i>For Class 54 Rating, Add</i>	499.20	
<i>For Class 55 Rating, Add</i>	746.85	
<i>For Class 56 Rating, Add</i>	991.24	
40 05 19 00-0140 EA 10" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,167.62	508.50
<i>For Class 52 Rating, Deduct</i>	-373.69	
<i>For Class 54 Rating, Add</i>	518.82	
<i>For Class 55 Rating, Add</i>	776.06	
<i>For Class 56 Rating, Add</i>	1,029.90	
40 05 19 00-0141 EA 10" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,303.96	512.47
<i>For Class 52 Rating, Deduct</i>	-388.02	
<i>For Class 54 Rating, Add</i>	538.44	
<i>For Class 55 Rating, Add</i>	805.26	
<i>For Class 56 Rating, Add</i>	1,068.56	
40 05 19 00-0142 EA 10" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,440.29	516.45
<i>For Class 52 Rating, Deduct</i>	-402.36	
<i>For Class 54 Rating, Add</i>	558.06	
<i>For Class 55 Rating, Add</i>	834.47	
<i>For Class 56 Rating, Add</i>	1,107.22	
40 05 19 00-0143 EA 10" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,576.62	520.43
<i>For Class 52 Rating, Deduct</i>	-416.69	
<i>For Class 54 Rating, Add</i>	577.68	
<i>For Class 55 Rating, Add</i>	863.67	
<i>For Class 56 Rating, Add</i>	1,145.88	
40 05 19 00-0144 EA 10" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,712.95	524.40
<i>For Class 52 Rating, Deduct</i>	-431.03	
<i>For Class 54 Rating, Add</i>	597.30	
<i>For Class 55 Rating, Add</i>	892.88	
<i>For Class 56 Rating, Add</i>	1,184.54	
40 05 19 00-0145 EA 10" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,849.28	528.37
<i>For Class 52 Rating, Deduct</i>	-445.36	
<i>For Class 54 Rating, Add</i>	616.92	
<i>For Class 55 Rating, Add</i>	922.08	
<i>For Class 56 Rating, Add</i>	1,223.20	
40 05 19 00-0146 EA 10" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,985.63	532.34
<i>For Class 52 Rating, Deduct</i>	-459.70	
<i>For Class 54 Rating, Add</i>	636.54	
<i>For Class 55 Rating, Add</i>	951.29	
<i>For Class 56 Rating, Add</i>	1,261.86	
40 05 19 00-0147 EA 10" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,121.96	536.31
<i>For Class 52 Rating, Deduct</i>	-474.03	
<i>For Class 54 Rating, Add</i>	656.16	
<i>For Class 55 Rating, Add</i>	980.49	
<i>For Class 56 Rating, Add</i>	1,300.51	
40 05 19 00-0148 EA 10" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,258.30	540.28
<i>For Class 52 Rating, Deduct</i>	-488.36	
<i>For Class 54 Rating, Add</i>	675.78	
<i>For Class 55 Rating, Add</i>	1,009.70	
<i>For Class 56 Rating, Add</i>	1,339.18	
40 05 19 00-0149 EA 10" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,394.62	544.25
<i>For Class 52 Rating, Deduct</i>	-502.70	
<i>For Class 54 Rating, Add</i>	695.39	
<i>For Class 55 Rating, Add</i>	1,038.90	
<i>For Class 56 Rating, Add</i>	1,377.83	
40 05 19 00-0150 EA 10" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,530.96	548.23
<i>For Class 52 Rating, Deduct</i>	-517.03	
<i>For Class 54 Rating, Add</i>	715.01	
<i>For Class 55 Rating, Add</i>	1,068.10	
<i>For Class 56 Rating, Add</i>	1,416.49	
40 05 19 00-0151 EA 10" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,667.29	552.21
<i>For Class 52 Rating, Deduct</i>	-531.37	
<i>For Class 54 Rating, Add</i>	734.63	
<i>For Class 55 Rating, Add</i>	1,097.31	
<i>For Class 56 Rating, Add</i>	1,455.15	
40 05 19 00-0152 EA 10" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,803.62	556.18
<i>For Class 52 Rating, Deduct</i>	-545.70	
<i>For Class 54 Rating, Add</i>	754.25	
<i>For Class 55 Rating, Add</i>	1,126.51	
<i>For Class 56 Rating, Add</i>	1,493.81	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0153	EA	10"	Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,939.96	560.15
			<i>For Class 52 Rating, Deduct</i>	-560.04	
			<i>For Class 54 Rating, Add</i>	773.87	
			<i>For Class 55 Rating, Add</i>	1,155.72	
			<i>For Class 56 Rating, Add</i>	1,532.47	
40 05 19 00-0154	EA	10"	Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,076.28	564.12
			<i>For Class 52 Rating, Deduct</i>	-574.37	
			<i>For Class 54 Rating, Add</i>	793.49	
			<i>For Class 55 Rating, Add</i>	1,184.92	
			<i>For Class 56 Rating, Add</i>	1,571.13	
40 05 19 00-0155	EA	10"	Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,210.38	568.09
			<i>For Class 52 Rating, Deduct</i>	-588.46	
			<i>For Class 54 Rating, Add</i>	812.77	
			<i>For Class 55 Rating, Add</i>	1,213.63	
			<i>For Class 56 Rating, Add</i>	1,609.13	
40 05 19 00-0156	EA	10"	Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,348.96	572.07
			<i>For Class 52 Rating, Deduct</i>	-603.04	
			<i>For Class 54 Rating, Add</i>	832.73	
			<i>For Class 55 Rating, Add</i>	1,243.33	
			<i>For Class 56 Rating, Add</i>	1,648.45	
40 05 19 00-0157	EA	10"	Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,485.30	576.04
			<i>For Class 52 Rating, Deduct</i>	-617.38	
			<i>For Class 54 Rating, Add</i>	852.35	
			<i>For Class 55 Rating, Add</i>	1,272.54	
			<i>For Class 56 Rating, Add</i>	1,687.11	
40 05 19 00-0158	EA	10"	Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,621.63	580.01
			<i>For Class 52 Rating, Deduct</i>	-631.71	
			<i>For Class 54 Rating, Add</i>	871.97	
			<i>For Class 55 Rating, Add</i>	1,301.74	
			<i>For Class 56 Rating, Add</i>	1,725.77	
40 05 19 00-0159	EA	10"	Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,757.96	583.98
			<i>For Class 52 Rating, Deduct</i>	-646.05	
			<i>For Class 54 Rating, Add</i>	891.59	
			<i>For Class 55 Rating, Add</i>	1,330.95	
			<i>For Class 56 Rating, Add</i>	1,764.43	
40 05 19 00-0160	EA	10"	Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,894.29	587.96
			<i>For Class 52 Rating, Deduct</i>	-660.38	
			<i>For Class 54 Rating, Add</i>	911.21	
			<i>For Class 55 Rating, Add</i>	1,360.15	
			<i>For Class 56 Rating, Add</i>	1,803.09	
40 05 19 00-0161	EA	10"	Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,030.62	591.93
			<i>For Class 52 Rating, Deduct</i>	-674.71	
			<i>For Class 54 Rating, Add</i>	930.83	
			<i>For Class 55 Rating, Add</i>	1,389.35	
			<i>For Class 56 Rating, Add</i>	1,841.75	
40 05 19 00-0162	EA	10"	Flanged (FxF), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,166.96	595.91
			<i>For Class 52 Rating, Deduct</i>	-689.05	
			<i>For Class 54 Rating, Add</i>	950.45	
			<i>For Class 55 Rating, Add</i>	1,418.56	
			<i>For Class 56 Rating, Add</i>	1,880.41	
40 05 19 00-0163			12" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0164	EA	12"	Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,599.69	556.18
			<i>For Class 52 Rating, Deduct</i>	-193.27	
			<i>For Class 54 Rating, Add</i>	273.66	
			<i>For Class 55 Rating, Add</i>	412.04	
			<i>For Class 56 Rating, Add</i>	548.65	
40 05 19 00-0165	EA	12"	Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,769.72	560.15
			<i>For Class 52 Rating, Deduct</i>	-211.31	
			<i>For Class 54 Rating, Add</i>	298.34	
			<i>For Class 55 Rating, Add</i>	448.75	
			<i>For Class 56 Rating, Add</i>	597.25	
40 05 19 00-0166	EA	12"	Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,939.75	564.12
			<i>For Class 52 Rating, Deduct</i>	-229.35	
			<i>For Class 54 Rating, Add</i>	323.01	
			<i>For Class 55 Rating, Add</i>	485.47	
			<i>For Class 56 Rating, Add</i>	645.85	
40 05 19 00-0167	EA	12"	Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,109.80	568.09
			<i>For Class 52 Rating, Deduct</i>	-247.40	
			<i>For Class 54 Rating, Add</i>	347.69	
			<i>For Class 55 Rating, Add</i>	522.20	
			<i>For Class 56 Rating, Add</i>	694.46	
40 05 19 00-0168	EA	12"	Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,279.83	572.07
			<i>For Class 52 Rating, Deduct</i>	-265.44	
			<i>For Class 54 Rating, Add</i>	372.36	
			<i>For Class 55 Rating, Add</i>	558.91	
			<i>For Class 56 Rating, Add</i>	743.06	
40 05 19 00-0169	EA	12"	Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,449.87	576.04
			<i>For Class 52 Rating, Deduct</i>	-283.48	
			<i>For Class 54 Rating, Add</i>	397.04	
			<i>For Class 55 Rating, Add</i>	595.64	
			<i>For Class 56 Rating, Add</i>	791.66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0170 EA 12" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,619.91	580.01
<i>For Class 52 Rating, Deduct</i>	-301.52	
<i>For Class 54 Rating, Add</i>	421.71	
<i>For Class 55 Rating, Add</i>	632.36	
<i>For Class 56 Rating, Add</i>	840.26	
40 05 19 00-0171 EA 12" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,789.93	583.98
<i>For Class 52 Rating, Deduct</i>	-319.56	
<i>For Class 54 Rating, Add</i>	446.38	
<i>For Class 55 Rating, Add</i>	669.08	
<i>For Class 56 Rating, Add</i>	888.86	
40 05 19 00-0172 EA 12" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,959.97	587.96
<i>For Class 52 Rating, Deduct</i>	-337.60	
<i>For Class 54 Rating, Add</i>	471.06	
<i>For Class 55 Rating, Add</i>	705.80	
<i>For Class 56 Rating, Add</i>	937.46	
40 05 19 00-0173 EA 12" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,130.01	591.93
<i>For Class 52 Rating, Deduct</i>	-355.65	
<i>For Class 54 Rating, Add</i>	495.73	
<i>For Class 55 Rating, Add</i>	742.52	
<i>For Class 56 Rating, Add</i>	986.07	
40 05 19 00-0174 EA 12" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,300.04	595.91
<i>For Class 52 Rating, Deduct</i>	-373.69	
<i>For Class 54 Rating, Add</i>	520.41	
<i>For Class 55 Rating, Add</i>	779.24	
<i>For Class 56 Rating, Add</i>	1,034.67	
40 05 19 00-0175 EA 12" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,470.09	599.88
<i>For Class 52 Rating, Deduct</i>	-391.73	
<i>For Class 54 Rating, Add</i>	545.08	
<i>For Class 55 Rating, Add</i>	815.96	
<i>For Class 56 Rating, Add</i>	1,083.27	
40 05 19 00-0176 EA 12" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,640.11	603.85
<i>For Class 52 Rating, Deduct</i>	-409.77	
<i>For Class 54 Rating, Add</i>	569.76	
<i>For Class 55 Rating, Add</i>	852.68	
<i>For Class 56 Rating, Add</i>	1,131.87	
40 05 19 00-0177 EA 12" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,810.15	607.82
<i>For Class 52 Rating, Deduct</i>	-427.81	
<i>For Class 54 Rating, Add</i>	594.43	
<i>For Class 55 Rating, Add</i>	889.40	
<i>For Class 56 Rating, Add</i>	1,180.47	
40 05 19 00-0178 EA 12" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,980.19	611.79
<i>For Class 52 Rating, Deduct</i>	-445.86	
<i>For Class 54 Rating, Add</i>	619.11	
<i>For Class 55 Rating, Add</i>	926.12	
<i>For Class 56 Rating, Add</i>	1,229.07	
40 05 19 00-0179 EA 12" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,150.22	615.76
<i>For Class 52 Rating, Deduct</i>	-463.90	
<i>For Class 54 Rating, Add</i>	643.78	
<i>For Class 55 Rating, Add</i>	962.84	
<i>For Class 56 Rating, Add</i>	1,277.67	
40 05 19 00-0180 EA 12" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,320.26	619.73
<i>For Class 52 Rating, Deduct</i>	-481.94	
<i>For Class 54 Rating, Add</i>	668.46	
<i>For Class 55 Rating, Add</i>	999.56	
<i>For Class 56 Rating, Add</i>	1,326.28	
40 05 19 00-0181 EA 12" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,490.30	623.72
<i>For Class 52 Rating, Deduct</i>	-499.98	
<i>For Class 54 Rating, Add</i>	693.13	
<i>For Class 55 Rating, Add</i>	1,036.28	
<i>For Class 56 Rating, Add</i>	1,374.88	
40 05 19 00-0182 EA 12" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,660.32	627.69
<i>For Class 52 Rating, Deduct</i>	-518.02	
<i>For Class 54 Rating, Add</i>	717.81	
<i>For Class 55 Rating, Add</i>	1,073.00	
<i>For Class 56 Rating, Add</i>	1,423.48	
40 05 19 00-0183 EA 12" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,830.36	631.66
<i>For Class 52 Rating, Deduct</i>	-536.06	
<i>For Class 54 Rating, Add</i>	742.48	
<i>For Class 55 Rating, Add</i>	1,109.72	
<i>For Class 56 Rating, Add</i>	1,472.08	
40 05 19 00-0184 EA 12" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,000.41	635.63
<i>For Class 52 Rating, Deduct</i>	-554.11	
<i>For Class 54 Rating, Add</i>	767.16	
<i>For Class 55 Rating, Add</i>	1,146.44	
<i>For Class 56 Rating, Add</i>	1,520.68	
40 05 19 00-0185 EA 12" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,170.44	639.60
<i>For Class 52 Rating, Deduct</i>	-572.15	
<i>For Class 54 Rating, Add</i>	791.83	
<i>For Class 55 Rating, Add</i>	1,183.16	
<i>For Class 56 Rating, Add</i>	1,569.28	
40 05 19 00-0186 EA 12" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,340.48	643.57
<i>For Class 52 Rating, Deduct</i>	-590.19	
<i>For Class 54 Rating, Add</i>	816.51	
<i>For Class 55 Rating, Add</i>	1,219.88	
<i>For Class 56 Rating, Add</i>	1,617.89	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0187	EA	12" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,510.50	647.55	
		<i>For Class 52 Rating, Deduct</i>	-608.23		
		<i>For Class 54 Rating, Add</i>	841.18		
		<i>For Class 55 Rating, Add</i>	1,256.60		
		<i>For Class 56 Rating, Add</i>	1,666.48		
40 05 19 00-0188	EA	12" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,850.54	651.52	
		<i>For Class 52 Rating, Deduct</i>	-626.27		
		<i>For Class 54 Rating, Add</i>	865.85		
		<i>For Class 55 Rating, Add</i>	1,293.32		
		<i>For Class 56 Rating, Add</i>	1,715.09		
40 05 19 00-0189	EA	12" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,850.58	655.49	
		<i>For Class 52 Rating, Deduct</i>	-644.32		
		<i>For Class 54 Rating, Add</i>	890.53		
		<i>For Class 55 Rating, Add</i>	1,330.04		
		<i>For Class 56 Rating, Add</i>	1,763.69		
40 05 19 00-0190	EA	12" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,020.61	659.47	
		<i>For Class 52 Rating, Deduct</i>	-662.36		
		<i>For Class 54 Rating, Add</i>	915.20		
		<i>For Class 55 Rating, Add</i>	1,366.76		
		<i>For Class 56 Rating, Add</i>	1,812.29		
40 05 19 00-0191	EA	12" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,190.65	663.44	
		<i>For Class 52 Rating, Deduct</i>	-680.40		
		<i>For Class 54 Rating, Add</i>	939.88		
		<i>For Class 55 Rating, Add</i>	1,403.48		
		<i>For Class 56 Rating, Add</i>	1,860.89		
40 05 19 00-0192	EA	12" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,360.69	667.41	
		<i>For Class 52 Rating, Deduct</i>	-698.44		
		<i>For Class 54 Rating, Add</i>	964.55		
		<i>For Class 55 Rating, Add</i>	1,440.20		
		<i>For Class 56 Rating, Add</i>	1,909.49		
40 05 19 00-0193	EA	12" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,530.72	671.38	
		<i>For Class 52 Rating, Deduct</i>	-716.48		
		<i>For Class 54 Rating, Add</i>	989.23		
		<i>For Class 55 Rating, Add</i>	1,476.92		
		<i>For Class 56 Rating, Add</i>	1,958.09		
40 05 19 00-0194	EA	12" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,700.76	675.36	
		<i>For Class 52 Rating, Deduct</i>	-734.52		
		<i>For Class 54 Rating, Add</i>	1,013.90		
		<i>For Class 55 Rating, Add</i>	1,513.64		
		<i>For Class 56 Rating, Add</i>	2,006.70		
40 05 19 00-0195	EA	12" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,870.80	679.33	
		<i>For Class 52 Rating, Deduct</i>	-752.57		
		<i>For Class 54 Rating, Add</i>	1,038.58		
		<i>For Class 55 Rating, Add</i>	1,550.36		
		<i>For Class 56 Rating, Add</i>	2,055.30		
40 05 19 00-0196	EA	12" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,040.83	683.30	
		<i>For Class 52 Rating, Deduct</i>	-770.61		
		<i>For Class 54 Rating, Add</i>	1,063.25		
		<i>For Class 55 Rating, Add</i>	1,587.08		
		<i>For Class 56 Rating, Add</i>	2,103.90		
40 05 19 00-0197	EA	12" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,210.86	687.27	
		<i>For Class 52 Rating, Deduct</i>	-788.65		
		<i>For Class 54 Rating, Add</i>	1,087.93		
		<i>For Class 55 Rating, Add</i>	1,623.80		
		<i>For Class 56 Rating, Add</i>	2,152.50		
40 05 19 00-0198	EA	12" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,380.90	691.24	
		<i>For Class 52 Rating, Deduct</i>	-806.69		
		<i>For Class 54 Rating, Add</i>	1,112.60		
		<i>For Class 55 Rating, Add</i>	1,660.52		
		<i>For Class 56 Rating, Add</i>	2,201.10		
40 05 19 00-0199	EA	12" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,550.93	695.22	
		<i>For Class 52 Rating, Deduct</i>	-824.73		
		<i>For Class 54 Rating, Add</i>	1,137.28		
		<i>For Class 55 Rating, Add</i>	1,697.24		
		<i>For Class 56 Rating, Add</i>	2,249.70		
40 05 19 00-0200	EA	12" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,720.97	699.20	
		<i>For Class 52 Rating, Deduct</i>	-842.77		
		<i>For Class 54 Rating, Add</i>	1,161.95		
		<i>For Class 55 Rating, Add</i>	1,733.96		
		<i>For Class 56 Rating, Add</i>	2,298.31		
40 05 19 00-0201	EA	12" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,891.01	703.17	
		<i>For Class 52 Rating, Deduct</i>	-860.82		
		<i>For Class 54 Rating, Add</i>	1,186.62		
		<i>For Class 55 Rating, Add</i>	1,770.68		
		<i>For Class 56 Rating, Add</i>	2,346.91		
40 05 19 00-0202	EA	12" Flanged (FxF), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,061.04	707.14	
		<i>For Class 52 Rating, Deduct</i>	-878.86		
		<i>For Class 54 Rating, Add</i>	1,211.30		
		<i>For Class 55 Rating, Add</i>	1,807.40		
		<i>For Class 56 Rating, Add</i>	2,395.51		

40 05 19 00-0203 14" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat,
Ductile Iron Pipe (40 05 19 00-0002)

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0204 EA 14" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,471.48	667.41
<i>For Class 52 Rating, Deduct</i>	-270.63	
<i>For Class 54 Rating, Add</i>	381.17	
<i>For Class 55 Rating, Add</i>	572.91	
<i>For Class 56 Rating, Add</i>	762.18	
40 05 19 00-0205 EA 14" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,677.46	671.38
<i>For Class 52 Rating, Deduct</i>	-292.62	
<i>For Class 54 Rating, Add</i>	411.24	
<i>For Class 55 Rating, Add</i>	617.64	
<i>For Class 56 Rating, Add</i>	821.38	
40 05 19 00-0206 EA 14" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,883.45	675.36
<i>For Class 52 Rating, Deduct</i>	-314.62	
<i>For Class 54 Rating, Add</i>	441.31	
<i>For Class 55 Rating, Add</i>	662.38	
<i>For Class 56 Rating, Add</i>	880.59	
40 05 19 00-0207 EA 14" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,089.43	679.33
<i>For Class 52 Rating, Deduct</i>	-336.62	
<i>For Class 54 Rating, Add</i>	471.37	
<i>For Class 55 Rating, Add</i>	707.11	
<i>For Class 56 Rating, Add</i>	939.80	
40 05 19 00-0208 EA 14" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,295.42	683.30
<i>For Class 52 Rating, Deduct</i>	-358.61	
<i>For Class 54 Rating, Add</i>	501.44	
<i>For Class 55 Rating, Add</i>	751.85	
<i>For Class 56 Rating, Add</i>	999.00	
40 05 19 00-0209 EA 14" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,501.39	687.27
<i>For Class 52 Rating, Deduct</i>	-380.61	
<i>For Class 54 Rating, Add</i>	531.51	
<i>For Class 55 Rating, Add</i>	796.59	
<i>For Class 56 Rating, Add</i>	1,058.21	
40 05 19 00-0210 EA 14" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,707.38	691.24
<i>For Class 52 Rating, Deduct</i>	-402.60	
<i>For Class 54 Rating, Add</i>	561.57	
<i>For Class 55 Rating, Add</i>	841.33	
<i>For Class 56 Rating, Add</i>	1,117.42	
40 05 19 00-0211 EA 14" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,913.36	695.22
<i>For Class 52 Rating, Deduct</i>	-424.60	
<i>For Class 54 Rating, Add</i>	591.64	
<i>For Class 55 Rating, Add</i>	886.06	
<i>For Class 56 Rating, Add</i>	1,176.62	
40 05 19 00-0212 EA 14" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,119.35	699.20
<i>For Class 52 Rating, Deduct</i>	-446.60	
<i>For Class 54 Rating, Add</i>	621.71	
<i>For Class 55 Rating, Add</i>	930.80	
<i>For Class 56 Rating, Add</i>	1,235.83	
40 05 19 00-0213 EA 14" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,325.34	703.17
<i>For Class 52 Rating, Deduct</i>	-468.59	
<i>For Class 54 Rating, Add</i>	651.77	
<i>For Class 55 Rating, Add</i>	975.53	
<i>For Class 56 Rating, Add</i>	1,295.03	
40 05 19 00-0214 EA 14" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,531.32	707.14
<i>For Class 52 Rating, Deduct</i>	-490.59	
<i>For Class 54 Rating, Add</i>	681.84	
<i>For Class 55 Rating, Add</i>	1,020.27	
<i>For Class 56 Rating, Add</i>	1,354.24	
40 05 19 00-0215 EA 14" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,737.30	711.11
<i>For Class 52 Rating, Deduct</i>	-512.58	
<i>For Class 54 Rating, Add</i>	711.91	
<i>For Class 55 Rating, Add</i>	1,065.01	
<i>For Class 56 Rating, Add</i>	1,413.45	
40 05 19 00-0216 EA 14" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,943.29	715.08
<i>For Class 52 Rating, Deduct</i>	-534.58	
<i>For Class 54 Rating, Add</i>	741.98	
<i>For Class 55 Rating, Add</i>	1,109.75	
<i>For Class 56 Rating, Add</i>	1,472.65	
40 05 19 00-0217 EA 14" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,149.27	719.05
<i>For Class 52 Rating, Deduct</i>	-556.58	
<i>For Class 54 Rating, Add</i>	772.04	
<i>For Class 55 Rating, Add</i>	1,154.48	
<i>For Class 56 Rating, Add</i>	1,531.86	
40 05 19 00-0218 EA 14" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,355.26	723.03
<i>For Class 52 Rating, Deduct</i>	-578.57	
<i>For Class 54 Rating, Add</i>	802.11	
<i>For Class 55 Rating, Add</i>	1,199.22	
<i>For Class 56 Rating, Add</i>	1,591.07	
40 05 19 00-0219 EA 14" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,561.23	727.00
<i>For Class 52 Rating, Deduct</i>	-600.57	
<i>For Class 54 Rating, Add</i>	832.18	
<i>For Class 55 Rating, Add</i>	1,243.95	
<i>For Class 56 Rating, Add</i>	1,650.27	
40 05 19 00-0220 EA 14" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,767.22	730.98
<i>For Class 52 Rating, Deduct</i>	-622.57	
<i>For Class 54 Rating, Add</i>	862.24	
<i>For Class 55 Rating, Add</i>	1,288.69	
<i>For Class 56 Rating, Add</i>	1,709.48	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0221	EA 14" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,973.20	734.95
	For Class 52 Rating, Deduct	-644.56	
	For Class 54 Rating, Add	892.31	
	For Class 55 Rating, Add	1,333.43	
	For Class 56 Rating, Add	1,768.68	
40 05 19 00-0222	EA 14" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,179.20	738.92
	For Class 52 Rating, Deduct	-666.56	
	For Class 54 Rating, Add	922.38	
	For Class 55 Rating, Add	1,378.17	
	For Class 56 Rating, Add	1,827.89	
40 05 19 00-0223	EA 14" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,385.18	742.89
	For Class 52 Rating, Deduct	-688.55	
	For Class 54 Rating, Add	952.44	
	For Class 55 Rating, Add	1,422.90	
	For Class 56 Rating, Add	1,887.10	
40 05 19 00-0224	EA 14" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,591.16	746.86
	For Class 52 Rating, Deduct	-710.55	
	For Class 54 Rating, Add	982.51	
	For Class 55 Rating, Add	1,467.64	
	For Class 56 Rating, Add	1,946.31	
40 05 19 00-0225	EA 14" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,797.15	750.84
	For Class 52 Rating, Deduct	-732.55	
	For Class 54 Rating, Add	1,012.58	
	For Class 55 Rating, Add	1,512.38	
	For Class 56 Rating, Add	2,005.51	
40 05 19 00-0226	EA 14" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,003.13	754.81
	For Class 52 Rating, Deduct	-754.54	
	For Class 54 Rating, Add	1,042.65	
	For Class 55 Rating, Add	1,557.11	
	For Class 56 Rating, Add	2,064.72	
40 05 19 00-0227	EA 14" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,209.12	758.78
	For Class 52 Rating, Deduct	-776.54	
	For Class 54 Rating, Add	1,072.71	
	For Class 55 Rating, Add	1,601.85	
	For Class 56 Rating, Add	2,123.93	
40 05 19 00-0228	EA 14" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,415.10	762.75
	For Class 52 Rating, Deduct	-798.54	
	For Class 54 Rating, Add	1,102.78	
	For Class 55 Rating, Add	1,646.58	
	For Class 56 Rating, Add	2,183.13	
40 05 19 00-0229	EA 14" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,621.08	766.73
	For Class 52 Rating, Deduct	-820.53	
	For Class 54 Rating, Add	1,132.85	
	For Class 55 Rating, Add	1,691.32	
	For Class 56 Rating, Add	2,242.34	
40 05 19 00-0230	EA 14" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,827.07	770.70
	For Class 52 Rating, Deduct	-842.53	
	For Class 54 Rating, Add	1,162.91	
	For Class 55 Rating, Add	1,736.06	
	For Class 56 Rating, Add	2,301.54	
40 05 19 00-0231	EA 14" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,033.06	774.68
	For Class 52 Rating, Deduct	-864.52	
	For Class 54 Rating, Add	1,192.98	
	For Class 55 Rating, Add	1,780.80	
	For Class 56 Rating, Add	2,360.75	
40 05 19 00-0232	EA 14" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,239.04	778.65
	For Class 52 Rating, Deduct	-886.52	
	For Class 54 Rating, Add	1,223.05	
	For Class 55 Rating, Add	1,825.53	
	For Class 56 Rating, Add	2,419.96	
40 05 19 00-0233	EA 14" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,445.03	782.62
	For Class 52 Rating, Deduct	-908.52	
	For Class 54 Rating, Add	1,253.12	
	For Class 55 Rating, Add	1,870.27	
	For Class 56 Rating, Add	2,479.16	
40 05 19 00-0234	EA 14" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,651.01	786.59
	For Class 52 Rating, Deduct	-930.51	
	For Class 54 Rating, Add	1,283.18	
	For Class 55 Rating, Add	1,915.01	
	For Class 56 Rating, Add	2,538.37	
40 05 19 00-0235	EA 14" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,856.99	790.56
	For Class 52 Rating, Deduct	-952.51	
	For Class 54 Rating, Add	1,313.25	
	For Class 55 Rating, Add	1,959.74	
	For Class 56 Rating, Add	2,597.58	
40 05 19 00-0236	EA 14" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,062.97	794.53
	For Class 52 Rating, Deduct	-974.50	
	For Class 54 Rating, Add	1,343.32	
	For Class 55 Rating, Add	2,004.48	
	For Class 56 Rating, Add	2,656.78	
40 05 19 00-0237	EA 14" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,268.96	798.50
	For Class 52 Rating, Deduct	-996.50	
	For Class 54 Rating, Add	1,373.38	
	For Class 55 Rating, Add	2,049.22	
	For Class 56 Rating, Add	2,715.99	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0238 EA 14" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,474.94	802.49
<i>For Class 52 Rating, Deduct</i>	-1,018.50	
<i>For Class 54 Rating, Add</i>	1,403.45	
<i>For Class 55 Rating, Add</i>	2,093.95	
<i>For Class 56 Rating, Add</i>	2,775.19	
40 05 19 00-0239 EA 14" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,680.94	806.46
<i>For Class 52 Rating, Deduct</i>	-1,040.49	
<i>For Class 54 Rating, Add</i>	1,433.52	
<i>For Class 55 Rating, Add</i>	2,138.69	
<i>For Class 56 Rating, Add</i>	2,834.40	
40 05 19 00-0240 EA 14" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,886.91	810.43
<i>For Class 52 Rating, Deduct</i>	-1,062.49	
<i>For Class 54 Rating, Add</i>	1,463.58	
<i>For Class 55 Rating, Add</i>	2,183.42	
<i>For Class 56 Rating, Add</i>	2,893.61	
40 05 19 00-0241 EA 14" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,092.90	814.40
<i>For Class 52 Rating, Deduct</i>	-1,084.49	
<i>For Class 54 Rating, Add</i>	1,493.65	
<i>For Class 55 Rating, Add</i>	2,228.16	
<i>For Class 56 Rating, Add</i>	2,952.82	
40 05 19 00-0242 16" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0243 EA 16" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,072.04	762.75
<i>For Class 52 Rating, Deduct</i>	-320.80	
<i>For Class 54 Rating, Add</i>	451.32	
<i>For Class 55 Rating, Add</i>	678.08	
<i>For Class 56 Rating, Add</i>	901.93	
40 05 19 00-0244 EA 16" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,311.71	766.73
<i>For Class 52 Rating, Deduct</i>	-346.50	
<i>For Class 54 Rating, Add</i>	486.44	
<i>For Class 55 Rating, Add</i>	730.33	
<i>For Class 56 Rating, Add</i>	971.07	
40 05 19 00-0245 EA 16" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,551.41	770.70
<i>For Class 52 Rating, Deduct</i>	-372.20	
<i>For Class 54 Rating, Add</i>	521.56	
<i>For Class 55 Rating, Add</i>	782.59	
<i>For Class 56 Rating, Add</i>	1,040.22	
40 05 19 00-0246 EA 16" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,791.10	774.68
<i>For Class 52 Rating, Deduct</i>	-397.91	
<i>For Class 54 Rating, Add</i>	556.69	
<i>For Class 55 Rating, Add</i>	834.84	
<i>For Class 56 Rating, Add</i>	1,109.37	
40 05 19 00-0247 EA 16" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,030.79	778.65
<i>For Class 52 Rating, Deduct</i>	-423.61	
<i>For Class 54 Rating, Add</i>	591.81	
<i>For Class 55 Rating, Add</i>	887.09	
<i>For Class 56 Rating, Add</i>	1,178.52	
40 05 19 00-0248 EA 16" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,270.47	782.62
<i>For Class 52 Rating, Deduct</i>	-449.31	
<i>For Class 54 Rating, Add</i>	626.93	
<i>For Class 55 Rating, Add</i>	939.34	
<i>For Class 56 Rating, Add</i>	1,247.67	
40 05 19 00-0249 EA 16" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,510.16	786.59
<i>For Class 52 Rating, Deduct</i>	-475.02	
<i>For Class 54 Rating, Add</i>	662.05	
<i>For Class 55 Rating, Add</i>	991.60	
<i>For Class 56 Rating, Add</i>	1,316.82	
40 05 19 00-0250 EA 16" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,749.84	790.56
<i>For Class 52 Rating, Deduct</i>	-500.72	
<i>For Class 54 Rating, Add</i>	697.18	
<i>For Class 55 Rating, Add</i>	1,043.85	
<i>For Class 56 Rating, Add</i>	1,385.97	
40 05 19 00-0251 EA 16" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,989.52	794.53
<i>For Class 52 Rating, Deduct</i>	-526.42	
<i>For Class 54 Rating, Add</i>	732.30	
<i>For Class 55 Rating, Add</i>	1,096.10	
<i>For Class 56 Rating, Add</i>	1,455.11	
40 05 19 00-0252 EA 16" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,229.21	798.50
<i>For Class 52 Rating, Deduct</i>	-552.13	
<i>For Class 54 Rating, Add</i>	767.42	
<i>For Class 55 Rating, Add</i>	1,148.35	
<i>For Class 56 Rating, Add</i>	1,524.26	
40 05 19 00-0253 EA 16" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,468.90	802.49
<i>For Class 52 Rating, Deduct</i>	-577.83	
<i>For Class 54 Rating, Add</i>	802.54	
<i>For Class 55 Rating, Add</i>	1,200.60	
<i>For Class 56 Rating, Add</i>	1,593.41	
40 05 19 00-0254 EA 16" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,708.60	806.46
<i>For Class 52 Rating, Deduct</i>	-603.54	
<i>For Class 54 Rating, Add</i>	837.67	
<i>For Class 55 Rating, Add</i>	1,252.86	
<i>For Class 56 Rating, Add</i>	1,662.56	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0255	EA 16" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,948.27	810.43
	For Class 52 Rating, Deduct	-629.24	
	For Class 54 Rating, Add	872.79	
	For Class 55 Rating, Add	1,305.11	
	For Class 56 Rating, Add	1,731.71	
40 05 19 00-0256	EA 16" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,427.96	814.40
	For Class 52 Rating, Deduct	-654.94	
	For Class 54 Rating, Add	907.91	
	For Class 55 Rating, Add	1,357.36	
	For Class 56 Rating, Add	1,800.86	
40 05 19 00-0257	EA 16" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,427.65	818.37
	For Class 52 Rating, Deduct	-680.65	
	For Class 54 Rating, Add	943.03	
	For Class 55 Rating, Add	1,409.61	
	For Class 56 Rating, Add	1,870.01	
40 05 19 00-0258	EA 16" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,667.33	822.34
	For Class 52 Rating, Deduct	-706.35	
	For Class 54 Rating, Add	978.15	
	For Class 55 Rating, Add	1,461.86	
	For Class 56 Rating, Add	1,939.15	
40 05 19 00-0259	EA 16" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,907.02	826.32
	For Class 52 Rating, Deduct	-732.05	
	For Class 54 Rating, Add	1,013.28	
	For Class 55 Rating, Add	1,514.12	
	For Class 56 Rating, Add	2,008.30	
40 05 19 00-0260	EA 16" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,146.70	830.29
	For Class 52 Rating, Deduct	-757.76	
	For Class 54 Rating, Add	1,048.40	
	For Class 55 Rating, Add	1,566.37	
	For Class 56 Rating, Add	2,077.45	
40 05 19 00-0261	EA 16" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,386.39	834.26
	For Class 52 Rating, Deduct	-783.46	
	For Class 54 Rating, Add	1,083.52	
	For Class 55 Rating, Add	1,618.62	
	For Class 56 Rating, Add	2,146.60	
40 05 19 00-0262	EA 16" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,626.07	838.24
	For Class 52 Rating, Deduct	-809.16	
	For Class 54 Rating, Add	1,118.64	
	For Class 55 Rating, Add	1,670.87	
	For Class 56 Rating, Add	2,215.75	
40 05 19 00-0263	EA 16" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,865.77	842.21
	For Class 52 Rating, Deduct	-834.87	
	For Class 54 Rating, Add	1,153.77	
	For Class 55 Rating, Add	1,723.13	
	For Class 56 Rating, Add	2,284.90	
40 05 19 00-0264	EA 16" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,105.46	846.18
	For Class 52 Rating, Deduct	-860.57	
	For Class 54 Rating, Add	1,188.89	
	For Class 55 Rating, Add	1,775.38	
	For Class 56 Rating, Add	2,354.05	
40 05 19 00-0265	EA 16" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,345.13	850.16
	For Class 52 Rating, Deduct	-886.27	
	For Class 54 Rating, Add	1,224.01	
	For Class 55 Rating, Add	1,827.63	
	For Class 56 Rating, Add	2,423.19	
40 05 19 00-0266	EA 16" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,584.82	854.13
	For Class 52 Rating, Deduct	-911.98	
	For Class 54 Rating, Add	1,259.13	
	For Class 55 Rating, Add	1,879.88	
	For Class 56 Rating, Add	2,492.34	
40 05 19 00-0267	EA 16" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,824.51	858.10
	For Class 52 Rating, Deduct	-937.68	
	For Class 54 Rating, Add	1,294.26	
	For Class 55 Rating, Add	1,932.14	
	For Class 56 Rating, Add	2,561.49	
40 05 19 00-0268	EA 16" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,064.20	862.07
	For Class 52 Rating, Deduct	-963.38	
	For Class 54 Rating, Add	1,329.38	
	For Class 55 Rating, Add	1,984.39	
	For Class 56 Rating, Add	2,630.64	
40 05 19 00-0269	EA 16" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,303.88	866.04
	For Class 52 Rating, Deduct	-989.09	
	For Class 54 Rating, Add	1,364.50	
	For Class 55 Rating, Add	2,036.64	
	For Class 56 Rating, Add	2,699.79	
40 05 19 00-0270	EA 16" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,543.56	870.01
	For Class 52 Rating, Deduct	-1,014.79	
	For Class 54 Rating, Add	1,399.62	
	For Class 55 Rating, Add	2,088.89	
	For Class 56 Rating, Add	2,768.94	
40 05 19 00-0271	EA 16" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,783.26	873.99
	For Class 52 Rating, Deduct	-1,040.49	
	For Class 54 Rating, Add	1,434.75	
	For Class 55 Rating, Add	2,141.15	
	For Class 56 Rating, Add	2,838.09	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0272 EA 16" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,022.95	877.97
<i>For Class 52 Rating, Deduct</i>	-1,066.20	
<i>For Class 54 Rating, Add</i>	1,469.87	
<i>For Class 55 Rating, Add</i>	2,193.40	
<i>For Class 56 Rating, Add</i>	2,907.24	
40 05 19 00-0273 EA 16" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,262.63	881.94
<i>For Class 52 Rating, Deduct</i>	-1,091.90	
<i>For Class 54 Rating, Add</i>	1,504.99	
<i>For Class 55 Rating, Add</i>	2,245.65	
<i>For Class 56 Rating, Add</i>	2,976.38	
40 05 19 00-0274 EA 16" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,502.32	885.91
<i>For Class 52 Rating, Deduct</i>	-1,117.60	
<i>For Class 54 Rating, Add</i>	1,540.11	
<i>For Class 55 Rating, Add</i>	2,297.90	
<i>For Class 56 Rating, Add</i>	3,045.53	
40 05 19 00-0275 EA 16" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,742.00	889.88
<i>For Class 52 Rating, Deduct</i>	-1,143.31	
<i>For Class 54 Rating, Add</i>	1,575.23	
<i>For Class 55 Rating, Add</i>	2,350.15	
<i>For Class 56 Rating, Add</i>	3,114.68	
40 05 19 00-0276 EA 16" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,981.68	893.85
<i>For Class 52 Rating, Deduct</i>	-1,169.01	
<i>For Class 54 Rating, Add</i>	1,610.36	
<i>For Class 55 Rating, Add</i>	2,402.40	
<i>For Class 56 Rating, Add</i>	3,183.83	
40 05 19 00-0277 EA 16" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,221.37	897.82
<i>For Class 52 Rating, Deduct</i>	-1,194.71	
<i>For Class 54 Rating, Add</i>	1,645.48	
<i>For Class 55 Rating, Add</i>	2,454.66	
<i>For Class 56 Rating, Add</i>	3,252.98	
40 05 19 00-0278 EA 16" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,461.06	901.80
<i>For Class 52 Rating, Deduct</i>	-1,220.42	
<i>For Class 54 Rating, Add</i>	1,680.60	
<i>For Class 55 Rating, Add</i>	2,506.91	
<i>For Class 56 Rating, Add</i>	3,322.13	
40 05 19 00-0279 EA 16" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,700.75	905.77
<i>For Class 52 Rating, Deduct</i>	-1,246.12	
<i>For Class 54 Rating, Add</i>	1,715.72	
<i>For Class 55 Rating, Add</i>	2,559.16	
<i>For Class 56 Rating, Add</i>	3,391.27	
40 05 19 00-0280 EA 16" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,940.44	909.75
<i>For Class 52 Rating, Deduct</i>	-1,271.82	
<i>For Class 54 Rating, Add</i>	1,750.85	
<i>For Class 55 Rating, Add</i>	2,611.41	
<i>For Class 56 Rating, Add</i>	3,460.42	
40 05 19 00-0281 18" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0282 EA 18" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,740.16	859.69
<i>For Class 52 Rating, Deduct</i>	-378.14	
<i>For Class 54 Rating, Add</i>	531.27	
<i>For Class 55 Rating, Add</i>	797.85	
<i>For Class 56 Rating, Add</i>	1,060.98	
40 05 19 00-0283 EA 18" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,015.79	863.66
<i>For Class 52 Rating, Deduct</i>	-407.79	
<i>For Class 54 Rating, Add</i>	571.79	
<i>For Class 55 Rating, Add</i>	858.12	
<i>For Class 56 Rating, Add</i>	1,140.74	
40 05 19 00-0284 EA 18" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,291.44	867.63
<i>For Class 52 Rating, Deduct</i>	-437.45	
<i>For Class 54 Rating, Add</i>	612.30	
<i>For Class 55 Rating, Add</i>	918.39	
<i>For Class 56 Rating, Add</i>	1,220.49	
40 05 19 00-0285 EA 18" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,567.07	871.60
<i>For Class 52 Rating, Deduct</i>	-467.11	
<i>For Class 54 Rating, Add</i>	652.81	
<i>For Class 55 Rating, Add</i>	978.65	
<i>For Class 56 Rating, Add</i>	1,300.25	
40 05 19 00-0286 EA 18" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,842.71	875.58
<i>For Class 52 Rating, Deduct</i>	-496.77	
<i>For Class 54 Rating, Add</i>	693.33	
<i>For Class 55 Rating, Add</i>	1,038.92	
<i>For Class 56 Rating, Add</i>	1,380.00	
40 05 19 00-0287 EA 18" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,118.34	879.56
<i>For Class 52 Rating, Deduct</i>	-526.42	
<i>For Class 54 Rating, Add</i>	733.84	
<i>For Class 55 Rating, Add</i>	1,099.19	
<i>For Class 56 Rating, Add</i>	1,459.75	
40 05 19 00-0288 EA 18" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,393.97	883.53
<i>For Class 52 Rating, Deduct</i>	-556.08	
<i>For Class 54 Rating, Add</i>	774.36	
<i>For Class 55 Rating, Add</i>	1,159.46	
<i>For Class 56 Rating, Add</i>	1,539.51	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0289	EA		18" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,669.61	887.50
			<i>For Class 52 Rating, Deduct</i>	-585.74	
			<i>For Class 54 Rating, Add</i>	814.87	
			<i>For Class 55 Rating, Add</i>	1,219.73	
			<i>For Class 56 Rating, Add</i>	1,619.26	
40 05 19 00-0290	EA		18" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,945.24	891.47
			<i>For Class 52 Rating, Deduct</i>	-615.40	
			<i>For Class 54 Rating, Add</i>	855.39	
			<i>For Class 55 Rating, Add</i>	1,280.00	
			<i>For Class 56 Rating, Add</i>	1,699.01	
40 05 19 00-0291	EA		18" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,220.88	895.44
			<i>For Class 52 Rating, Deduct</i>	-645.06	
			<i>For Class 54 Rating, Add</i>	895.90	
			<i>For Class 55 Rating, Add</i>	1,340.27	
			<i>For Class 56 Rating, Add</i>	1,778.77	
40 05 19 00-0292	EA		18" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,496.51	899.41
			<i>For Class 52 Rating, Deduct</i>	-674.71	
			<i>For Class 54 Rating, Add</i>	936.42	
			<i>For Class 55 Rating, Add</i>	1,400.53	
			<i>For Class 56 Rating, Add</i>	1,858.52	
40 05 19 00-0293	EA		18" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,772.15	903.39
			<i>For Class 52 Rating, Deduct</i>	-704.37	
			<i>For Class 54 Rating, Add</i>	976.93	
			<i>For Class 55 Rating, Add</i>	1,460.80	
			<i>For Class 56 Rating, Add</i>	1,938.27	
40 05 19 00-0294	EA		18" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,047.79	907.36
			<i>For Class 52 Rating, Deduct</i>	-734.03	
			<i>For Class 54 Rating, Add</i>	1,017.45	
			<i>For Class 55 Rating, Add</i>	1,521.07	
			<i>For Class 56 Rating, Add</i>	2,018.03	
40 05 19 00-0295	EA		18" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,323.42	911.33
			<i>For Class 52 Rating, Deduct</i>	-763.69	
			<i>For Class 54 Rating, Add</i>	1,057.96	
			<i>For Class 55 Rating, Add</i>	1,581.34	
			<i>For Class 56 Rating, Add</i>	2,097.78	
40 05 19 00-0296	EA		18" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,599.06	915.31
			<i>For Class 52 Rating, Deduct</i>	-793.35	
			<i>For Class 54 Rating, Add</i>	1,098.48	
			<i>For Class 55 Rating, Add</i>	1,641.61	
			<i>For Class 56 Rating, Add</i>	2,177.53	
40 05 19 00-0297	EA		18" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,874.69	919.28
			<i>For Class 52 Rating, Deduct</i>	-823.00	
			<i>For Class 54 Rating, Add</i>	1,138.99	
			<i>For Class 55 Rating, Add</i>	1,701.88	
			<i>For Class 56 Rating, Add</i>	2,257.29	
40 05 19 00-0298	EA		18" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,150.32	923.25
			<i>For Class 52 Rating, Deduct</i>	-852.66	
			<i>For Class 54 Rating, Add</i>	1,179.51	
			<i>For Class 55 Rating, Add</i>	1,762.15	
			<i>For Class 56 Rating, Add</i>	2,337.04	
40 05 19 00-0299	EA		18" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,425.96	927.23
			<i>For Class 52 Rating, Deduct</i>	-882.32	
			<i>For Class 54 Rating, Add</i>	1,220.02	
			<i>For Class 55 Rating, Add</i>	1,822.42	
			<i>For Class 56 Rating, Add</i>	2,416.79	
40 05 19 00-0300	EA		18" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,701.59	931.20
			<i>For Class 52 Rating, Deduct</i>	-911.98	
			<i>For Class 54 Rating, Add</i>	1,260.53	
			<i>For Class 55 Rating, Add</i>	1,882.69	
			<i>For Class 56 Rating, Add</i>	2,496.55	
40 05 19 00-0301	EA		18" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,977.24	935.17
			<i>For Class 52 Rating, Deduct</i>	-941.63	
			<i>For Class 54 Rating, Add</i>	1,301.05	
			<i>For Class 55 Rating, Add</i>	1,942.96	
			<i>For Class 56 Rating, Add</i>	2,576.30	
40 05 19 00-0302	EA		18" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,252.87	939.14
			<i>For Class 52 Rating, Deduct</i>	-971.29	
			<i>For Class 54 Rating, Add</i>	1,341.56	
			<i>For Class 55 Rating, Add</i>	2,003.22	
			<i>For Class 56 Rating, Add</i>	2,656.05	
40 05 19 00-0303	EA		18" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,528.50	943.11
			<i>For Class 52 Rating, Deduct</i>	-1,000.95	
			<i>For Class 54 Rating, Add</i>	1,382.08	
			<i>For Class 55 Rating, Add</i>	2,063.49	
			<i>For Class 56 Rating, Add</i>	2,735.81	
40 05 19 00-0304	EA		18" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,804.14	947.08
			<i>For Class 52 Rating, Deduct</i>	-1,030.61	
			<i>For Class 54 Rating, Add</i>	1,422.59	
			<i>For Class 55 Rating, Add</i>	2,123.76	
			<i>For Class 56 Rating, Add</i>	2,815.56	
40 05 19 00-0305	EA		18" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,079.77	951.06
			<i>For Class 52 Rating, Deduct</i>	-1,060.26	
			<i>For Class 54 Rating, Add</i>	1,463.11	
			<i>For Class 55 Rating, Add</i>	2,184.03	
			<i>For Class 56 Rating, Add</i>	2,895.31	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0306 EA 18" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,355.41	955.04
<i>For Class 52 Rating, Deduct</i>	-1,089.92	
<i>For Class 54 Rating, Add</i>	1,503.62	
<i>For Class 55 Rating, Add</i>	2,244.30	
<i>For Class 56 Rating, Add</i>	2,975.07	
40 05 19 00-0307 EA 18" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,631.04	959.01
<i>For Class 52 Rating, Deduct</i>	-1,119.58	
<i>For Class 54 Rating, Add</i>	1,544.14	
<i>For Class 55 Rating, Add</i>	2,304.57	
<i>For Class 56 Rating, Add</i>	3,054.82	
40 05 19 00-0308 EA 18" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,906.68	962.98
<i>For Class 52 Rating, Deduct</i>	-1,149.24	
<i>For Class 54 Rating, Add</i>	1,584.65	
<i>For Class 55 Rating, Add</i>	2,364.84	
<i>For Class 56 Rating, Add</i>	3,134.57	
40 05 19 00-0309 EA 18" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,182.31	966.95
<i>For Class 52 Rating, Deduct</i>	-1,178.90	
<i>For Class 54 Rating, Add</i>	1,625.17	
<i>For Class 55 Rating, Add</i>	2,425.11	
<i>For Class 56 Rating, Add</i>	3,214.33	
40 05 19 00-0310 EA 18" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,457.95	970.92
<i>For Class 52 Rating, Deduct</i>	-1,208.55	
<i>For Class 54 Rating, Add</i>	1,665.68	
<i>For Class 55 Rating, Add</i>	2,485.37	
<i>For Class 56 Rating, Add</i>	3,294.08	
40 05 19 00-0311 EA 18" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,733.59	974.89
<i>For Class 52 Rating, Deduct</i>	-1,238.21	
<i>For Class 54 Rating, Add</i>	1,706.20	
<i>For Class 55 Rating, Add</i>	2,545.64	
<i>For Class 56 Rating, Add</i>	3,373.83	
40 05 19 00-0312 EA 18" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,009.22	978.87
<i>For Class 52 Rating, Deduct</i>	-1,267.87	
<i>For Class 54 Rating, Add</i>	1,746.71	
<i>For Class 55 Rating, Add</i>	2,605.91	
<i>For Class 56 Rating, Add</i>	3,453.59	
40 05 19 00-0313 EA 18" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,284.86	982.84
<i>For Class 52 Rating, Deduct</i>	-1,297.53	
<i>For Class 54 Rating, Add</i>	1,787.22	
<i>For Class 55 Rating, Add</i>	2,666.18	
<i>For Class 56 Rating, Add</i>	3,533.34	
40 05 19 00-0314 EA 18" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,560.49	986.82
<i>For Class 52 Rating, Deduct</i>	-1,327.19	
<i>For Class 54 Rating, Add</i>	1,827.74	
<i>For Class 55 Rating, Add</i>	2,726.45	
<i>For Class 56 Rating, Add</i>	3,613.10	
40 05 19 00-0315 EA 18" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,836.12	990.79
<i>For Class 52 Rating, Deduct</i>	-1,356.84	
<i>For Class 54 Rating, Add</i>	1,868.25	
<i>For Class 55 Rating, Add</i>	2,786.72	
<i>For Class 56 Rating, Add</i>	3,692.85	
40 05 19 00-0316 EA 18" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,111.76	994.76
<i>For Class 52 Rating, Deduct</i>	-1,386.50	
<i>For Class 54 Rating, Add</i>	1,908.77	
<i>For Class 55 Rating, Add</i>	2,846.99	
<i>For Class 56 Rating, Add</i>	3,772.60	
40 05 19 00-0317 EA 18" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,387.39	998.73
<i>For Class 52 Rating, Deduct</i>	-1,416.16	
<i>For Class 54 Rating, Add</i>	1,949.28	
<i>For Class 55 Rating, Add</i>	2,907.26	
<i>For Class 56 Rating, Add</i>	3,852.35	
40 05 19 00-0318 EA 18" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,663.04	1,002.71
<i>For Class 52 Rating, Deduct</i>	-1,445.82	
<i>For Class 54 Rating, Add</i>	1,989.80	
<i>For Class 55 Rating, Add</i>	2,967.53	
<i>For Class 56 Rating, Add</i>	3,932.11	
40 05 19 00-0319 EA 18" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,938.67	1,006.68
<i>For Class 52 Rating, Deduct</i>	-1,475.47	
<i>For Class 54 Rating, Add</i>	2,030.31	
<i>For Class 55 Rating, Add</i>	3,027.79	
<i>For Class 56 Rating, Add</i>	4,011.86	
40 05 19 00-0320 20" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0321 EA 20" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,551.21	981.26
<i>For Class 52 Rating, Deduct</i>	-447.09	
<i>For Class 54 Rating, Add</i>	627.51	
<i>For Class 55 Rating, Add</i>	942.06	
<i>For Class 56 Rating, Add</i>	1,252.54	
40 05 19 00-0322 EA 20" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,867.29	985.23
<i>For Class 52 Rating, Deduct</i>	-481.20	
<i>For Class 54 Rating, Add</i>	674.09	
<i>For Class 55 Rating, Add</i>	1,011.34	
<i>For Class 56 Rating, Add</i>	1,344.22	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0323	EA 20" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,183.37	989.20
	For Class 52 Rating, Deduct	-515.30	
	For Class 54 Rating, Add	720.67	
	For Class 55 Rating, Add	1,080.63	
	For Class 56 Rating, Add	1,435.91	
40 05 19 00-0324	EA 20" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,499.44	993.17
	For Class 52 Rating, Deduct	-549.41	
	For Class 54 Rating, Add	767.25	
	For Class 55 Rating, Add	1,149.92	
	For Class 56 Rating, Add	1,527.59	
40 05 19 00-0325	EA 20" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,815.51	997.14
	For Class 52 Rating, Deduct	-583.52	
	For Class 54 Rating, Add	813.83	
	For Class 55 Rating, Add	1,219.21	
	For Class 56 Rating, Add	1,619.27	
40 05 19 00-0326	EA 20" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,131.59	1,001.11
	For Class 52 Rating, Deduct	-617.62	
	For Class 54 Rating, Add	860.41	
	For Class 55 Rating, Add	1,288.49	
	For Class 56 Rating, Add	1,710.96	
40 05 19 00-0327	EA 20" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,447.67	1,005.09
	For Class 52 Rating, Deduct	-651.73	
	For Class 54 Rating, Add	907.00	
	For Class 55 Rating, Add	1,357.78	
	For Class 56 Rating, Add	1,802.64	
40 05 19 00-0328	EA 20" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,763.76	1,009.06
	For Class 52 Rating, Deduct	-685.84	
	For Class 54 Rating, Add	953.58	
	For Class 55 Rating, Add	1,427.07	
	For Class 56 Rating, Add	1,894.33	
40 05 19 00-0329	EA 20" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,079.83	1,013.03
	For Class 52 Rating, Deduct	-719.94	
	For Class 54 Rating, Add	1,000.16	
	For Class 55 Rating, Add	1,496.36	
	For Class 56 Rating, Add	1,986.01	
40 05 19 00-0330	EA 20" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,395.91	1,017.01
	For Class 52 Rating, Deduct	-754.05	
	For Class 54 Rating, Add	1,046.74	
	For Class 55 Rating, Add	1,565.64	
	For Class 56 Rating, Add	2,077.70	
40 05 19 00-0331	EA 20" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,711.99	1,020.98
	For Class 52 Rating, Deduct	-788.16	
	For Class 54 Rating, Add	1,093.32	
	For Class 55 Rating, Add	1,634.93	
	For Class 56 Rating, Add	2,169.38	
40 05 19 00-0332	EA 20" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,028.06	1,024.95
	For Class 52 Rating, Deduct	-822.26	
	For Class 54 Rating, Add	1,139.90	
	For Class 55 Rating, Add	1,704.22	
	For Class 56 Rating, Add	2,261.06	
40 05 19 00-0333	EA 20" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,344.14	1,028.93
	For Class 52 Rating, Deduct	-856.37	
	For Class 54 Rating, Add	1,186.48	
	For Class 55 Rating, Add	1,773.51	
	For Class 56 Rating, Add	2,352.75	
40 05 19 00-0334	EA 20" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,660.21	1,032.90
	For Class 52 Rating, Deduct	-890.47	
	For Class 54 Rating, Add	1,233.06	
	For Class 55 Rating, Add	1,842.79	
	For Class 56 Rating, Add	2,444.43	
40 05 19 00-0335	EA 20" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,976.29	1,036.87
	For Class 52 Rating, Deduct	-924.58	
	For Class 54 Rating, Add	1,279.64	
	For Class 55 Rating, Add	1,912.08	
	For Class 56 Rating, Add	2,536.11	
40 05 19 00-0336	EA 20" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,292.37	1,040.84
	For Class 52 Rating, Deduct	-958.69	
	For Class 54 Rating, Add	1,326.23	
	For Class 55 Rating, Add	1,981.37	
	For Class 56 Rating, Add	2,627.80	
40 05 19 00-0337	EA 20" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,608.46	1,044.81
	For Class 52 Rating, Deduct	-992.79	
	For Class 54 Rating, Add	1,372.81	
	For Class 55 Rating, Add	2,050.66	
	For Class 56 Rating, Add	2,719.48	
40 05 19 00-0338	EA 20" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,924.53	1,048.79
	For Class 52 Rating, Deduct	-1,026.90	
	For Class 54 Rating, Add	1,419.39	
	For Class 55 Rating, Add	2,119.94	
	For Class 56 Rating, Add	2,811.16	
40 05 19 00-0339	EA 20" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,240.61	1,052.77
	For Class 52 Rating, Deduct	-1,061.01	
	For Class 54 Rating, Add	1,465.97	
	For Class 55 Rating, Add	2,189.23	
	For Class 56 Rating, Add	2,902.85	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0340 EA 20" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,556.68	1,056.74
<i>For Class 52 Rating, Deduct</i>	-1,095.11	
<i>For Class 54 Rating, Add</i>	1,512.55	
<i>For Class 55 Rating, Add</i>	2,258.52	
<i>For Class 56 Rating, Add</i>	2,994.53	
40 05 19 00-0341 EA 20" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,872.76	1,060.71
<i>For Class 52 Rating, Deduct</i>	-1,129.22	
<i>For Class 54 Rating, Add</i>	1,559.13	
<i>For Class 55 Rating, Add</i>	2,327.81	
<i>For Class 56 Rating, Add</i>	3,086.22	
40 05 19 00-0342 EA 20" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,188.84	1,064.68
<i>For Class 52 Rating, Deduct</i>	-1,163.33	
<i>For Class 54 Rating, Add</i>	1,605.71	
<i>For Class 55 Rating, Add</i>	2,397.09	
<i>For Class 56 Rating, Add</i>	3,177.90	
40 05 19 00-0343 EA 20" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,504.92	1,068.65
<i>For Class 52 Rating, Deduct</i>	-1,197.43	
<i>For Class 54 Rating, Add</i>	1,652.29	
<i>For Class 55 Rating, Add</i>	2,466.38	
<i>For Class 56 Rating, Add</i>	3,269.59	
40 05 19 00-0344 EA 20" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,820.99	1,072.62
<i>For Class 52 Rating, Deduct</i>	-1,231.54	
<i>For Class 54 Rating, Add</i>	1,698.87	
<i>For Class 55 Rating, Add</i>	2,535.67	
<i>For Class 56 Rating, Add</i>	3,361.27	
40 05 19 00-0345 EA 20" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,137.06	1,076.59
<i>For Class 52 Rating, Deduct</i>	-1,265.64	
<i>For Class 54 Rating, Add</i>	1,745.45	
<i>For Class 55 Rating, Add</i>	2,604.96	
<i>For Class 56 Rating, Add</i>	3,452.95	
40 05 19 00-0346 EA 20" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,453.15	1,080.57
<i>For Class 52 Rating, Deduct</i>	-1,299.75	
<i>For Class 54 Rating, Add</i>	1,792.03	
<i>For Class 55 Rating, Add</i>	2,674.24	
<i>For Class 56 Rating, Add</i>	3,544.64	
40 05 19 00-0347 EA 20" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,769.23	1,084.55
<i>For Class 52 Rating, Deduct</i>	-1,333.86	
<i>For Class 54 Rating, Add</i>	1,838.62	
<i>For Class 55 Rating, Add</i>	2,743.53	
<i>For Class 56 Rating, Add</i>	3,636.32	
40 05 19 00-0348 EA 20" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,085.31	1,088.52
<i>For Class 52 Rating, Deduct</i>	-1,367.96	
<i>For Class 54 Rating, Add</i>	1,885.20	
<i>For Class 55 Rating, Add</i>	2,812.82	
<i>For Class 56 Rating, Add</i>	3,728.01	
40 05 19 00-0349 EA 20" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,401.39	1,092.49
<i>For Class 52 Rating, Deduct</i>	-1,402.07	
<i>For Class 54 Rating, Add</i>	1,931.78	
<i>For Class 55 Rating, Add</i>	2,882.11	
<i>For Class 56 Rating, Add</i>	3,819.69	
40 05 19 00-0350 EA 20" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,717.45	1,096.46
<i>For Class 52 Rating, Deduct</i>	-1,436.18	
<i>For Class 54 Rating, Add</i>	1,978.36	
<i>For Class 55 Rating, Add</i>	2,951.39	
<i>For Class 56 Rating, Add</i>	3,911.37	
40 05 19 00-0351 EA 20" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,033.53	1,100.43
<i>For Class 52 Rating, Deduct</i>	-1,470.28	
<i>For Class 54 Rating, Add</i>	2,024.94	
<i>For Class 55 Rating, Add</i>	3,020.68	
<i>For Class 56 Rating, Add</i>	4,003.06	
40 05 19 00-0352 EA 20" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,349.61	1,104.41
<i>For Class 52 Rating, Deduct</i>	-1,504.39	
<i>For Class 54 Rating, Add</i>	2,071.52	
<i>For Class 55 Rating, Add</i>	3,089.97	
<i>For Class 56 Rating, Add</i>	4,094.74	
40 05 19 00-0353 EA 20" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,665.69	1,108.38
<i>For Class 52 Rating, Deduct</i>	-1,538.50	
<i>For Class 54 Rating, Add</i>	2,118.10	
<i>For Class 55 Rating, Add</i>	3,159.26	
<i>For Class 56 Rating, Add</i>	4,186.42	
40 05 19 00-0354 EA 20" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,981.78	1,112.35
<i>For Class 52 Rating, Deduct</i>	-1,572.60	
<i>For Class 54 Rating, Add</i>	2,164.68	
<i>For Class 55 Rating, Add</i>	3,228.54	
<i>For Class 56 Rating, Add</i>	4,278.11	
40 05 19 00-0355 EA 20" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,297.85	1,116.32
<i>For Class 52 Rating, Deduct</i>	-1,606.71	
<i>For Class 54 Rating, Add</i>	2,211.26	
<i>For Class 55 Rating, Add</i>	3,297.83	
<i>For Class 56 Rating, Add</i>	4,369.79	
40 05 19 00-0356 EA 20" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,613.93	1,120.30
<i>For Class 52 Rating, Deduct</i>	-1,640.82	
<i>For Class 54 Rating, Add</i>	2,257.85	
<i>For Class 55 Rating, Add</i>	3,367.12	
<i>For Class 56 Rating, Add</i>	4,461.48	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0357	EA		20" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,930.00	1,124.27
			<i>For Class 52 Rating, Deduct</i>	-1,674.92	
			<i>For Class 54 Rating, Add</i>	2,304.43	
			<i>For Class 55 Rating, Add</i>	3,436.41	
			<i>For Class 56 Rating, Add</i>	4,553.16	
40 05 19 00-0358	EA		20" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,246.08	1,128.24
			<i>For Class 52 Rating, Deduct</i>	-1,709.03	
			<i>For Class 54 Rating, Add</i>	2,351.01	
			<i>For Class 55 Rating, Add</i>	3,505.69	
			<i>For Class 56 Rating, Add</i>	4,644.84	
40 05 19 00-0359			24" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0360	EA		24" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,830.88	1,160.03
			<i>For Class 52 Rating, Deduct</i>	-558.06	
			<i>For Class 54 Rating, Add</i>	782.08	
			<i>For Class 55 Rating, Add</i>	1,173.52	
			<i>For Class 56 Rating, Add</i>	1,559.89	
40 05 19 00-0361	EA		24" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,221.11	1,164.00
			<i>For Class 52 Rating, Deduct</i>	-600.32	
			<i>For Class 54 Rating, Add</i>	839.79	
			<i>For Class 55 Rating, Add</i>	1,259.35	
			<i>For Class 56 Rating, Add</i>	1,673.45	
40 05 19 00-0362	EA		24" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,611.33	1,167.97
			<i>For Class 52 Rating, Deduct</i>	-642.58	
			<i>For Class 54 Rating, Add</i>	897.49	
			<i>For Class 55 Rating, Add</i>	1,345.17	
			<i>For Class 56 Rating, Add</i>	1,787.00	
40 05 19 00-0363	EA		24" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,001.55	1,171.94
			<i>For Class 52 Rating, Deduct</i>	-684.85	
			<i>For Class 54 Rating, Add</i>	955.19	
			<i>For Class 55 Rating, Add</i>	1,430.99	
			<i>For Class 56 Rating, Add</i>	1,900.56	
40 05 19 00-0364	EA		24" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,391.77	1,175.91
			<i>For Class 52 Rating, Deduct</i>	-727.11	
			<i>For Class 54 Rating, Add</i>	1,012.89	
			<i>For Class 55 Rating, Add</i>	1,516.81	
			<i>For Class 56 Rating, Add</i>	2,014.12	
40 05 19 00-0365	EA		24" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,781.99	1,179.89
			<i>For Class 52 Rating, Deduct</i>	-769.37	
			<i>For Class 54 Rating, Add</i>	1,070.60	
			<i>For Class 55 Rating, Add</i>	1,602.63	
			<i>For Class 56 Rating, Add</i>	2,127.67	
40 05 19 00-0366	EA		24" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,172.22	1,183.86
			<i>For Class 52 Rating, Deduct</i>	-811.63	
			<i>For Class 54 Rating, Add</i>	1,128.30	
			<i>For Class 55 Rating, Add</i>	1,688.45	
			<i>For Class 56 Rating, Add</i>	2,241.23	
40 05 19 00-0367	EA		24" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,562.44	1,187.83
			<i>For Class 52 Rating, Deduct</i>	-853.90	
			<i>For Class 54 Rating, Add</i>	1,186.00	
			<i>For Class 55 Rating, Add</i>	1,774.27	
			<i>For Class 56 Rating, Add</i>	2,354.78	
40 05 19 00-0368	EA		24" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,952.67	1,191.81
			<i>For Class 52 Rating, Deduct</i>	-896.16	
			<i>For Class 54 Rating, Add</i>	1,243.70	
			<i>For Class 55 Rating, Add</i>	1,860.10	
			<i>For Class 56 Rating, Add</i>	2,468.34	
40 05 19 00-0369	EA		24" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,342.89	1,195.78
			<i>For Class 52 Rating, Deduct</i>	-938.42	
			<i>For Class 54 Rating, Add</i>	1,301.41	
			<i>For Class 55 Rating, Add</i>	1,945.92	
			<i>For Class 56 Rating, Add</i>	2,581.90	
40 05 19 00-0370	EA		24" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,733.10	1,199.75
			<i>For Class 52 Rating, Deduct</i>	-980.68	
			<i>For Class 54 Rating, Add</i>	1,359.11	
			<i>For Class 55 Rating, Add</i>	2,031.74	
			<i>For Class 56 Rating, Add</i>	2,695.45	
40 05 19 00-0371	EA		24" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,123.33	1,203.72
			<i>For Class 52 Rating, Deduct</i>	-1,022.95	
			<i>For Class 54 Rating, Add</i>	1,416.81	
			<i>For Class 55 Rating, Add</i>	2,117.56	
			<i>For Class 56 Rating, Add</i>	2,809.01	
40 05 19 00-0372	EA		24" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,513.55	1,207.70
			<i>For Class 52 Rating, Deduct</i>	-1,065.21	
			<i>For Class 54 Rating, Add</i>	1,474.51	
			<i>For Class 55 Rating, Add</i>	2,203.38	
			<i>For Class 56 Rating, Add</i>	2,922.57	
40 05 19 00-0373	EA		24" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,903.77	1,211.67
			<i>For Class 52 Rating, Deduct</i>	-1,107.47	
			<i>For Class 54 Rating, Add</i>	1,532.22	
			<i>For Class 55 Rating, Add</i>	2,289.20	
			<i>For Class 56 Rating, Add</i>	3,036.12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0374 EA 24" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,294.00	1,215.64
<i>For Class 52 Rating, Deduct</i>	-1,149.73	
<i>For Class 54 Rating, Add</i>	1,589.92	
<i>For Class 55 Rating, Add</i>	2,375.03	
<i>For Class 56 Rating, Add</i>	3,149.68	
40 05 19 00-0375 EA 24" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,684.22	1,219.61
<i>For Class 52 Rating, Deduct</i>	-1,192.00	
<i>For Class 54 Rating, Add</i>	1,647.62	
<i>For Class 55 Rating, Add</i>	2,460.85	
<i>For Class 56 Rating, Add</i>	3,263.24	
40 05 19 00-0376 EA 24" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,074.44	1,223.58
<i>For Class 52 Rating, Deduct</i>	-1,234.26	
<i>For Class 54 Rating, Add</i>	1,705.33	
<i>For Class 55 Rating, Add</i>	2,546.67	
<i>For Class 56 Rating, Add</i>	3,376.79	
40 05 19 00-0377 EA 24" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,464.66	1,227.56
<i>For Class 52 Rating, Deduct</i>	-1,276.52	
<i>For Class 54 Rating, Add</i>	1,763.03	
<i>For Class 55 Rating, Add</i>	2,632.49	
<i>For Class 56 Rating, Add</i>	3,490.35	
40 05 19 00-0378 EA 24" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,854.88	1,231.54
<i>For Class 52 Rating, Deduct</i>	-1,318.78	
<i>For Class 54 Rating, Add</i>	1,820.73	
<i>For Class 55 Rating, Add</i>	2,718.31	
<i>For Class 56 Rating, Add</i>	3,603.91	
40 05 19 00-0379 EA 24" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,245.11	1,235.51
<i>For Class 52 Rating, Deduct</i>	-1,361.04	
<i>For Class 54 Rating, Add</i>	1,878.43	
<i>For Class 55 Rating, Add</i>	2,804.14	
<i>For Class 56 Rating, Add</i>	3,717.46	
40 05 19 00-0380 EA 24" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,635.32	1,239.48
<i>For Class 52 Rating, Deduct</i>	-1,403.31	
<i>For Class 54 Rating, Add</i>	1,936.14	
<i>For Class 55 Rating, Add</i>	2,889.96	
<i>For Class 56 Rating, Add</i>	3,831.02	
40 05 19 00-0381 EA 24" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,025.54	1,243.45
<i>For Class 52 Rating, Deduct</i>	-1,445.57	
<i>For Class 54 Rating, Add</i>	1,993.84	
<i>For Class 55 Rating, Add</i>	2,975.78	
<i>For Class 56 Rating, Add</i>	3,944.58	
40 05 19 00-0382 EA 24" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,415.77	1,247.42
<i>For Class 52 Rating, Deduct</i>	-1,487.83	
<i>For Class 54 Rating, Add</i>	2,051.54	
<i>For Class 55 Rating, Add</i>	3,061.60	
<i>For Class 56 Rating, Add</i>	4,058.13	
40 05 19 00-0383 EA 24" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,806.00	1,251.39
<i>For Class 52 Rating, Deduct</i>	-1,530.09	
<i>For Class 54 Rating, Add</i>	2,109.24	
<i>For Class 55 Rating, Add</i>	3,147.42	
<i>For Class 56 Rating, Add</i>	4,171.69	
40 05 19 00-0384 EA 24" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,196.22	1,255.37
<i>For Class 52 Rating, Deduct</i>	-1,572.36	
<i>For Class 54 Rating, Add</i>	2,166.95	
<i>For Class 55 Rating, Add</i>	3,233.24	
<i>For Class 56 Rating, Add</i>	4,285.25	
40 05 19 00-0385 EA 24" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,586.43	1,259.34
<i>For Class 52 Rating, Deduct</i>	-1,614.62	
<i>For Class 54 Rating, Add</i>	2,224.65	
<i>For Class 55 Rating, Add</i>	3,319.06	
<i>For Class 56 Rating, Add</i>	4,398.80	
40 05 19 00-0386 EA 24" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,976.66	1,263.32
<i>For Class 52 Rating, Deduct</i>	-1,656.88	
<i>For Class 54 Rating, Add</i>	2,282.35	
<i>For Class 55 Rating, Add</i>	3,404.89	
<i>For Class 56 Rating, Add</i>	4,512.36	
40 05 19 00-0387 EA 24" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,366.88	1,267.29
<i>For Class 52 Rating, Deduct</i>	-1,699.14	
<i>For Class 54 Rating, Add</i>	2,340.05	
<i>For Class 55 Rating, Add</i>	3,490.71	
<i>For Class 56 Rating, Add</i>	4,625.92	
40 05 19 00-0388 EA 24" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,757.10	1,271.26
<i>For Class 52 Rating, Deduct</i>	-1,741.40	
<i>For Class 54 Rating, Add</i>	2,397.76	
<i>For Class 55 Rating, Add</i>	3,576.53	
<i>For Class 56 Rating, Add</i>	4,739.47	
40 05 19 00-0389 EA 24" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,249.65	1,342.77
<i>For Class 52 Rating, Deduct</i>	-1,783.67	
<i>For Class 54 Rating, Add</i>	2,456.69	
<i>For Class 55 Rating, Add</i>	3,664.81	
<i>For Class 56 Rating, Add</i>	4,856.71	
40 05 19 00-0390 EA 24" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,639.87	1,346.74
<i>For Class 52 Rating, Deduct</i>	-1,825.93	
<i>For Class 54 Rating, Add</i>	2,514.39	
<i>For Class 55 Rating, Add</i>	3,750.63	
<i>For Class 56 Rating, Add</i>	4,970.27	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0391	EA	24"	Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,030.09	1,350.71
			<i>For Class 52 Rating, Deduct</i>	-1,868.19	
			<i>For Class 54 Rating, Add</i>	2,572.09	
			<i>For Class 55 Rating, Add</i>	3,836.45	
			<i>For Class 56 Rating, Add</i>	5,083.83	
40 05 19 00-0392	EA	24"	Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,420.32	1,354.68
			<i>For Class 52 Rating, Deduct</i>	-1,910.45	
			<i>For Class 54 Rating, Add</i>	2,629.79	
			<i>For Class 55 Rating, Add</i>	3,922.27	
			<i>For Class 56 Rating, Add</i>	5,197.38	
40 05 19 00-0393	EA	24"	Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,810.55	1,358.66
			<i>For Class 52 Rating, Deduct</i>	-1,952.72	
			<i>For Class 54 Rating, Add</i>	2,687.50	
			<i>For Class 55 Rating, Add</i>	4,008.10	
			<i>For Class 56 Rating, Add</i>	5,310.94	
40 05 19 00-0394	EA	24"	Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,200.76	1,362.63
			<i>For Class 52 Rating, Deduct</i>	-1,994.98	
			<i>For Class 54 Rating, Add</i>	2,745.20	
			<i>For Class 55 Rating, Add</i>	4,093.92	
			<i>For Class 56 Rating, Add</i>	5,424.50	
40 05 19 00-0395	EA	24"	Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,590.98	1,366.60
			<i>For Class 52 Rating, Deduct</i>	-2,037.24	
			<i>For Class 54 Rating, Add</i>	2,802.90	
			<i>For Class 55 Rating, Add</i>	4,179.74	
			<i>For Class 56 Rating, Add</i>	5,538.05	
40 05 19 00-0396	EA	24"	Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,981.21	1,370.58
			<i>For Class 52 Rating, Deduct</i>	-2,079.50	
			<i>For Class 54 Rating, Add</i>	2,860.61	
			<i>For Class 55 Rating, Add</i>	4,265.56	
			<i>For Class 56 Rating, Add</i>	5,651.61	
40 05 19 00-0397	EA	24"	Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,371.43	1,374.55
			<i>For Class 52 Rating, Deduct</i>	-2,121.77	
			<i>For Class 54 Rating, Add</i>	2,918.31	
			<i>For Class 55 Rating, Add</i>	4,351.38	
			<i>For Class 56 Rating, Add</i>	5,765.17	
40 05 19 00-0398			30" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0399	EA	30"	Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,545.93	1,636.75
			<i>For Class 52 Rating, Deduct</i>	-887.26	
			<i>For Class 54 Rating, Add</i>	1,239.66	
			<i>For Class 55 Rating, Add</i>	1,858.24	
			<i>For Class 56 Rating, Add</i>	2,468.75	
40 05 19 00-0400	EA	30"	Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,106.91	1,640.72
			<i>For Class 52 Rating, Deduct</i>	-948.31	
			<i>For Class 54 Rating, Add</i>	1,322.98	
			<i>For Class 55 Rating, Add</i>	1,982.14	
			<i>For Class 56 Rating, Add</i>	2,632.68	
40 05 19 00-0401	EA	30"	Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,667.89	1,644.69
			<i>For Class 52 Rating, Deduct</i>	-1,009.35	
			<i>For Class 54 Rating, Add</i>	1,406.29	
			<i>For Class 55 Rating, Add</i>	2,106.04	
			<i>For Class 56 Rating, Add</i>	2,796.61	
40 05 19 00-0402	EA	30"	Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,228.86	1,648.66
			<i>For Class 52 Rating, Deduct</i>	-1,070.40	
			<i>For Class 54 Rating, Add</i>	1,489.61	
			<i>For Class 55 Rating, Add</i>	2,229.94	
			<i>For Class 56 Rating, Add</i>	2,960.54	
40 05 19 00-0403	EA	30"	Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,789.84	1,652.63
			<i>For Class 52 Rating, Deduct</i>	-1,131.44	
			<i>For Class 54 Rating, Add</i>	1,572.93	
			<i>For Class 55 Rating, Add</i>	2,353.84	
			<i>For Class 56 Rating, Add</i>	3,124.47	
40 05 19 00-0404	EA	30"	Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,350.82	1,656.61
			<i>For Class 52 Rating, Deduct</i>	-1,192.49	
			<i>For Class 54 Rating, Add</i>	1,656.24	
			<i>For Class 55 Rating, Add</i>	2,477.74	
			<i>For Class 56 Rating, Add</i>	3,288.40	
40 05 19 00-0405	EA	30"	Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,911.81	1,660.58
			<i>For Class 52 Rating, Deduct</i>	-1,253.53	
			<i>For Class 54 Rating, Add</i>	1,739.56	
			<i>For Class 55 Rating, Add</i>	2,601.64	
			<i>For Class 56 Rating, Add</i>	3,452.33	
40 05 19 00-0406	EA	30"	Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,472.79	1,664.56
			<i>For Class 52 Rating, Deduct</i>	-1,314.58	
			<i>For Class 54 Rating, Add</i>	1,822.87	
			<i>For Class 55 Rating, Add</i>	2,725.54	
			<i>For Class 56 Rating, Add</i>	3,616.26	
40 05 19 00-0407	EA	30"	Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,033.76	1,668.53
			<i>For Class 52 Rating, Deduct</i>	-1,375.63	
			<i>For Class 54 Rating, Add</i>	1,906.19	
			<i>For Class 55 Rating, Add</i>	2,849.44	
			<i>For Class 56 Rating, Add</i>	3,780.19	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0408 EA 30" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,594.74	1,672.50
<i>For Class 52 Rating, Deduct</i>	-1,436.67	
<i>For Class 54 Rating, Add</i>	1,989.51	
<i>For Class 55 Rating, Add</i>	2,973.34	
<i>For Class 56 Rating, Add</i>	3,944.12	
40 05 19 00-0409 EA 30" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,155.72	1,676.47
<i>For Class 52 Rating, Deduct</i>	-1,497.72	
<i>For Class 54 Rating, Add</i>	2,072.82	
<i>For Class 55 Rating, Add</i>	3,097.24	
<i>For Class 56 Rating, Add</i>	4,108.05	
40 05 19 00-0410 EA 30" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,716.70	1,680.44
<i>For Class 52 Rating, Deduct</i>	-1,558.76	
<i>For Class 54 Rating, Add</i>	2,156.14	
<i>For Class 55 Rating, Add</i>	3,221.14	
<i>For Class 56 Rating, Add</i>	4,271.98	
40 05 19 00-0411 EA 30" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,277.68	1,684.41
<i>For Class 52 Rating, Deduct</i>	-1,619.81	
<i>For Class 54 Rating, Add</i>	2,239.46	
<i>For Class 55 Rating, Add</i>	3,345.04	
<i>For Class 56 Rating, Add</i>	4,435.91	
40 05 19 00-0412 EA 30" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,838.65	1,688.40
<i>For Class 52 Rating, Deduct</i>	-1,680.85	
<i>For Class 54 Rating, Add</i>	2,322.77	
<i>For Class 55 Rating, Add</i>	3,468.95	
<i>For Class 56 Rating, Add</i>	4,599.84	
40 05 19 00-0413 EA 30" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,399.63	1,692.37
<i>For Class 52 Rating, Deduct</i>	-1,741.90	
<i>For Class 54 Rating, Add</i>	2,406.09	
<i>For Class 55 Rating, Add</i>	3,592.85	
<i>For Class 56 Rating, Add</i>	4,763.77	
40 05 19 00-0414 EA 30" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,960.62	1,696.34
<i>For Class 52 Rating, Deduct</i>	-1,802.95	
<i>For Class 54 Rating, Add</i>	2,489.40	
<i>For Class 55 Rating, Add</i>	3,716.75	
<i>For Class 56 Rating, Add</i>	4,927.70	
40 05 19 00-0415 EA 30" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,521.60	1,700.31
<i>For Class 52 Rating, Deduct</i>	-1,863.99	
<i>For Class 54 Rating, Add</i>	2,572.72	
<i>For Class 55 Rating, Add</i>	3,840.65	
<i>For Class 56 Rating, Add</i>	5,091.63	
40 05 19 00-0416 EA 30" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,082.58	1,704.28
<i>For Class 52 Rating, Deduct</i>	-1,925.04	
<i>For Class 54 Rating, Add</i>	2,656.04	
<i>For Class 55 Rating, Add</i>	3,964.55	
<i>For Class 56 Rating, Add</i>	5,255.56	
40 05 19 00-0417 EA 30" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,643.54	1,708.25
<i>For Class 52 Rating, Deduct</i>	-1,986.08	
<i>For Class 54 Rating, Add</i>	2,739.35	
<i>For Class 55 Rating, Add</i>	4,088.45	
<i>For Class 56 Rating, Add</i>	5,419.48	
40 05 19 00-0418 EA 30" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,204.52	1,712.23
<i>For Class 52 Rating, Deduct</i>	-2,047.13	
<i>For Class 54 Rating, Add</i>	2,822.67	
<i>For Class 55 Rating, Add</i>	4,212.35	
<i>For Class 56 Rating, Add</i>	5,583.41	
40 05 19 00-0419 EA 30" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,765.50	1,716.20
<i>For Class 52 Rating, Deduct</i>	-2,108.17	
<i>For Class 54 Rating, Add</i>	2,905.98	
<i>For Class 55 Rating, Add</i>	4,336.25	
<i>For Class 56 Rating, Add</i>	5,747.34	
40 05 19 00-0420 EA 30" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,326.48	1,720.17
<i>For Class 52 Rating, Deduct</i>	-2,169.22	
<i>For Class 54 Rating, Add</i>	2,989.30	
<i>For Class 55 Rating, Add</i>	4,460.15	
<i>For Class 56 Rating, Add</i>	5,911.27	
40 05 19 00-0421 EA 30" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,887.46	1,724.15
<i>For Class 52 Rating, Deduct</i>	-2,230.26	
<i>For Class 54 Rating, Add</i>	3,072.62	
<i>For Class 55 Rating, Add</i>	4,584.05	
<i>For Class 56 Rating, Add</i>	6,075.20	
40 05 19 00-0422 EA 30" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,448.44	1,728.12
<i>For Class 52 Rating, Deduct</i>	-2,291.31	
<i>For Class 54 Rating, Add</i>	3,155.93	
<i>For Class 55 Rating, Add</i>	4,707.95	
<i>For Class 56 Rating, Add</i>	6,239.13	
40 05 19 00-0423 EA 30" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,007.18	1,732.09
<i>For Class 52 Rating, Deduct</i>	-2,352.11	
<i>For Class 54 Rating, Add</i>	3,238.91	
<i>For Class 55 Rating, Add</i>	4,831.35	
<i>For Class 56 Rating, Add</i>	6,402.40	
40 05 19 00-0424 EA 30" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,570.40	1,736.06
<i>For Class 52 Rating, Deduct</i>	-2,413.40	
<i>For Class 54 Rating, Add</i>	3,322.56	
<i>For Class 55 Rating, Add</i>	4,955.75	
<i>For Class 56 Rating, Add</i>	6,566.99	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0425	EA	30"	Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,131.38	1,740.04
			<i>For Class 52 Rating, Deduct</i>	-2,474.45	
			<i>For Class 54 Rating, Add</i>	3,405.88	
			<i>For Class 55 Rating, Add</i>	5,079.65	
			<i>For Class 56 Rating, Add</i>	6,730.92	
40 05 19 00-0426	EA	30"	Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,692.36	1,744.01
			<i>For Class 52 Rating, Deduct</i>	-2,535.49	
			<i>For Class 54 Rating, Add</i>	3,489.20	
			<i>For Class 55 Rating, Add</i>	5,203.55	
			<i>For Class 56 Rating, Add</i>	6,894.85	
40 05 19 00-0427	EA	30"	Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,253.34	1,747.98
			<i>For Class 52 Rating, Deduct</i>	-2,596.54	
			<i>For Class 54 Rating, Add</i>	3,572.51	
			<i>For Class 55 Rating, Add</i>	5,327.45	
			<i>For Class 56 Rating, Add</i>	7,058.78	
40 05 19 00-0428	EA	30"	Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,814.31	1,751.95
			<i>For Class 52 Rating, Deduct</i>	-2,657.58	
			<i>For Class 54 Rating, Add</i>	3,655.83	
			<i>For Class 55 Rating, Add</i>	5,451.35	
			<i>For Class 56 Rating, Add</i>	7,222.71	
40 05 19 00-0429	EA	30"	Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,375.29	1,755.92
			<i>For Class 52 Rating, Deduct</i>	-2,718.63	
			<i>For Class 54 Rating, Add</i>	3,739.15	
			<i>For Class 55 Rating, Add</i>	5,575.25	
			<i>For Class 56 Rating, Add</i>	7,386.64	
40 05 19 00-0430	EA	30"	Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,936.27	1,759.90
			<i>For Class 52 Rating, Deduct</i>	-2,779.67	
			<i>For Class 54 Rating, Add</i>	3,822.46	
			<i>For Class 55 Rating, Add</i>	5,699.15	
			<i>For Class 56 Rating, Add</i>	7,550.57	
40 05 19 00-0431	EA	30"	Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	28,497.26	1,763.88
			<i>For Class 52 Rating, Deduct</i>	-2,840.72	
			<i>For Class 54 Rating, Add</i>	3,905.78	
			<i>For Class 55 Rating, Add</i>	5,823.05	
			<i>For Class 56 Rating, Add</i>	7,714.50	
40 05 19 00-0432	EA	30"	Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,058.24	1,767.85
			<i>For Class 52 Rating, Deduct</i>	-2,901.76	
			<i>For Class 54 Rating, Add</i>	3,989.09	
			<i>For Class 55 Rating, Add</i>	5,946.95	
			<i>For Class 56 Rating, Add</i>	7,878.43	
40 05 19 00-0433	EA	30"	Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,619.21	1,771.82
			<i>For Class 52 Rating, Deduct</i>	-2,962.81	
			<i>For Class 54 Rating, Add</i>	4,072.41	
			<i>For Class 55 Rating, Add</i>	6,070.85	
			<i>For Class 56 Rating, Add</i>	8,042.36	
40 05 19 00-0434	EA	30"	Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,180.19	1,775.79
			<i>For Class 52 Rating, Deduct</i>	-3,023.86	
			<i>For Class 54 Rating, Add</i>	4,155.73	
			<i>For Class 55 Rating, Add</i>	6,194.75	
			<i>For Class 56 Rating, Add</i>	8,206.29	
40 05 19 00-0435	EA	30"	Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,741.17	1,779.76
			<i>For Class 52 Rating, Deduct</i>	-3,084.90	
			<i>For Class 54 Rating, Add</i>	4,239.04	
			<i>For Class 55 Rating, Add</i>	6,318.66	
			<i>For Class 56 Rating, Add</i>	8,370.22	
40 05 19 00-0436	EA	30"	Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	31,302.15	1,783.73
			<i>For Class 52 Rating, Deduct</i>	-3,145.95	
			<i>For Class 54 Rating, Add</i>	4,322.36	
			<i>For Class 55 Rating, Add</i>	6,442.56	
			<i>For Class 56 Rating, Add</i>	8,534.15	
40 05 19 00-0437			36" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0438	EA	36"	Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,683.85	2,073.74
			<i>For Class 52 Rating, Deduct</i>	-1,269.60	
			<i>For Class 54 Rating, Add</i>	1,768.98	
			<i>For Class 55 Rating, Add</i>	2,649.23	
			<i>For Class 56 Rating, Add</i>	3,577.95	
40 05 19 00-0439	EA	36"	Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,444.79	2,077.71
			<i>For Class 52 Rating, Deduct</i>	-1,352.64	
			<i>For Class 54 Rating, Add</i>	1,882.29	
			<i>For Class 55 Rating, Add</i>	2,817.73	
			<i>For Class 56 Rating, Add</i>	3,740.87	
40 05 19 00-0440	EA	36"	Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,205.73	2,081.69
			<i>For Class 52 Rating, Deduct</i>	-1,435.68	
			<i>For Class 54 Rating, Add</i>	1,995.60	
			<i>For Class 55 Rating, Add</i>	2,986.22	
			<i>For Class 56 Rating, Add</i>	3,963.79	
40 05 19 00-0441	EA	36"	Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,966.68	2,085.66
			<i>For Class 52 Rating, Deduct</i>	-1,518.72	
			<i>For Class 54 Rating, Add</i>	2,108.91	
			<i>For Class 55 Rating, Add</i>	3,154.71	
			<i>For Class 56 Rating, Add</i>	4,186.71	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0442 EA 36" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,727.62	2,089.63
<i>For Class 52 Rating, Deduct</i>	-1,601.77	
<i>For Class 54 Rating, Add</i>	2,222.22	
<i>For Class 55 Rating, Add</i>	3,323.20	
<i>For Class 56 Rating, Add</i>	4,409.63	
40 05 19 00-0443 EA 36" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,488.57	2,093.61
<i>For Class 52 Rating, Deduct</i>	-1,684.81	
<i>For Class 54 Rating, Add</i>	2,335.53	
<i>For Class 55 Rating, Add</i>	3,491.70	
<i>For Class 56 Rating, Add</i>	4,632.55	
40 05 19 00-0444 EA 36" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,249.50	2,097.58
<i>For Class 52 Rating, Deduct</i>	-1,767.85	
<i>For Class 54 Rating, Add</i>	2,448.84	
<i>For Class 55 Rating, Add</i>	3,660.19	
<i>For Class 56 Rating, Add</i>	4,855.46	
40 05 19 00-0445 EA 36" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,010.45	2,101.55
<i>For Class 52 Rating, Deduct</i>	-1,850.89	
<i>For Class 54 Rating, Add</i>	2,562.15	
<i>For Class 55 Rating, Add</i>	3,828.68	
<i>For Class 56 Rating, Add</i>	5,078.39	
40 05 19 00-0446 EA 36" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,771.40	2,105.52
<i>For Class 52 Rating, Deduct</i>	-1,933.93	
<i>For Class 54 Rating, Add</i>	2,675.46	
<i>For Class 55 Rating, Add</i>	3,997.17	
<i>For Class 56 Rating, Add</i>	5,301.30	
40 05 19 00-0447 EA 36" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,532.34	2,109.49
<i>For Class 52 Rating, Deduct</i>	-2,016.97	
<i>For Class 54 Rating, Add</i>	2,788.77	
<i>For Class 55 Rating, Add</i>	4,165.67	
<i>For Class 56 Rating, Add</i>	5,524.22	
40 05 19 00-0448 EA 36" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,293.29	2,113.46
<i>For Class 52 Rating, Deduct</i>	-2,100.02	
<i>For Class 54 Rating, Add</i>	2,902.09	
<i>For Class 55 Rating, Add</i>	4,334.16	
<i>For Class 56 Rating, Add</i>	5,747.14	
40 05 19 00-0449 EA 36" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,054.22	2,117.44
<i>For Class 52 Rating, Deduct</i>	-2,183.06	
<i>For Class 54 Rating, Add</i>	3,015.40	
<i>For Class 55 Rating, Add</i>	4,502.65	
<i>For Class 56 Rating, Add</i>	5,970.06	
40 05 19 00-0450 EA 36" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,815.17	2,121.42
<i>For Class 52 Rating, Deduct</i>	-2,266.10	
<i>For Class 54 Rating, Add</i>	3,128.71	
<i>For Class 55 Rating, Add</i>	4,671.15	
<i>For Class 56 Rating, Add</i>	6,192.98	
40 05 19 00-0451 EA 36" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,576.11	2,125.39
<i>For Class 52 Rating, Deduct</i>	-2,349.14	
<i>For Class 54 Rating, Add</i>	3,242.02	
<i>For Class 55 Rating, Add</i>	4,839.64	
<i>For Class 56 Rating, Add</i>	6,415.90	
40 05 19 00-0452 EA 36" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,337.06	2,129.36
<i>For Class 52 Rating, Deduct</i>	-2,432.18	
<i>For Class 54 Rating, Add</i>	3,355.33	
<i>For Class 55 Rating, Add</i>	5,008.13	
<i>For Class 56 Rating, Add</i>	6,638.82	
40 05 19 00-0453 EA 36" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,098.00	2,133.33
<i>For Class 52 Rating, Deduct</i>	-2,515.22	
<i>For Class 54 Rating, Add</i>	3,468.64	
<i>For Class 55 Rating, Add</i>	5,176.62	
<i>For Class 56 Rating, Add</i>	6,861.74	
40 05 19 00-0454 EA 36" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,858.94	2,137.30
<i>For Class 52 Rating, Deduct</i>	-2,598.27	
<i>For Class 54 Rating, Add</i>	3,581.95	
<i>For Class 55 Rating, Add</i>	5,345.12	
<i>For Class 56 Rating, Add</i>	7,084.66	
40 05 19 00-0455 EA 36" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,619.89	2,141.27
<i>For Class 52 Rating, Deduct</i>	-2,681.31	
<i>For Class 54 Rating, Add</i>	3,695.26	
<i>For Class 55 Rating, Add</i>	5,513.61	
<i>For Class 56 Rating, Add</i>	7,307.58	
40 05 19 00-0456 EA 36" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	28,380.84	2,145.25
<i>For Class 52 Rating, Deduct</i>	-2,764.35	
<i>For Class 54 Rating, Add</i>	3,808.57	
<i>For Class 55 Rating, Add</i>	5,682.10	
<i>For Class 56 Rating, Add</i>	7,530.50	
40 05 19 00-0457 EA 36" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,141.78	2,149.22
<i>For Class 52 Rating, Deduct</i>	-2,847.39	
<i>For Class 54 Rating, Add</i>	3,921.88	
<i>For Class 55 Rating, Add</i>	5,850.59	
<i>For Class 56 Rating, Add</i>	7,753.42	
40 05 19 00-0458 EA 36" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,902.73	2,153.20
<i>For Class 52 Rating, Deduct</i>	-2,930.43	
<i>For Class 54 Rating, Add</i>	4,035.20	
<i>For Class 55 Rating, Add</i>	6,019.09	
<i>For Class 56 Rating, Add</i>	7,976.34	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0459	EA		36" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,663.66	2,157.17
			<i>For Class 52 Rating, Deduct</i>	-3,013.48	
			<i>For Class 54 Rating, Add</i>	4,148.51	
			<i>For Class 55 Rating, Add</i>	6,187.58	
			<i>For Class 56 Rating, Add</i>	8,199.26	
40 05 19 00-0460	EA		36" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	31,424.61	2,161.14
			<i>For Class 52 Rating, Deduct</i>	-3,096.52	
			<i>For Class 54 Rating, Add</i>	4,261.82	
			<i>For Class 55 Rating, Add</i>	6,356.07	
			<i>For Class 56 Rating, Add</i>	8,422.18	
40 05 19 00-0461	EA		36" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	32,185.55	2,165.11
			<i>For Class 52 Rating, Deduct</i>	-3,179.56	
			<i>For Class 54 Rating, Add</i>	4,375.13	
			<i>For Class 55 Rating, Add</i>	6,524.56	
			<i>For Class 56 Rating, Add</i>	8,645.10	
40 05 19 00-0462	EA		36" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	32,946.50	2,169.09
			<i>For Class 52 Rating, Deduct</i>	-3,262.60	
			<i>For Class 54 Rating, Add</i>	4,488.44	
			<i>For Class 55 Rating, Add</i>	6,693.06	
			<i>For Class 56 Rating, Add</i>	8,868.02	
40 05 19 00-0463	EA		36" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	33,707.45	2,173.06
			<i>For Class 52 Rating, Deduct</i>	-3,345.64	
			<i>For Class 54 Rating, Add</i>	4,601.75	
			<i>For Class 55 Rating, Add</i>	6,861.55	
			<i>For Class 56 Rating, Add</i>	9,090.94	
40 05 19 00-0464	EA		36" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	34,468.40	2,177.03
			<i>For Class 52 Rating, Deduct</i>	-3,428.68	
			<i>For Class 54 Rating, Add</i>	4,715.06	
			<i>For Class 55 Rating, Add</i>	7,030.04	
			<i>For Class 56 Rating, Add</i>	9,313.86	
40 05 19 00-0465	EA		36" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	35,229.33	2,181.00
			<i>For Class 52 Rating, Deduct</i>	-3,511.73	
			<i>For Class 54 Rating, Add</i>	4,828.37	
			<i>For Class 55 Rating, Add</i>	7,198.54	
			<i>For Class 56 Rating, Add</i>	9,536.77	
40 05 19 00-0466	EA		36" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	35,990.28	2,184.97
			<i>For Class 52 Rating, Deduct</i>	-3,594.77	
			<i>For Class 54 Rating, Add</i>	4,941.68	
			<i>For Class 55 Rating, Add</i>	7,367.03	
			<i>For Class 56 Rating, Add</i>	9,759.69	
40 05 19 00-0467	EA		36" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	36,751.22	2,188.95
			<i>For Class 52 Rating, Deduct</i>	-3,677.81	
			<i>For Class 54 Rating, Add</i>	5,054.99	
			<i>For Class 55 Rating, Add</i>	7,535.52	
			<i>For Class 56 Rating, Add</i>	9,982.61	
40 05 19 00-0468	EA		36" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	37,512.17	2,192.92
			<i>For Class 52 Rating, Deduct</i>	-3,760.85	
			<i>For Class 54 Rating, Add</i>	5,168.31	
			<i>For Class 55 Rating, Add</i>	7,704.01	
			<i>For Class 56 Rating, Add</i>	10,205.53	
40 05 19 00-0469	EA		36" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	38,273.11	2,196.90
			<i>For Class 52 Rating, Deduct</i>	-3,843.89	
			<i>For Class 54 Rating, Add</i>	5,281.62	
			<i>For Class 55 Rating, Add</i>	7,872.51	
			<i>For Class 56 Rating, Add</i>	10,428.45	
40 05 19 00-0470	EA		36" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	39,034.05	2,200.87
			<i>For Class 52 Rating, Deduct</i>	-3,926.94	
			<i>For Class 54 Rating, Add</i>	5,394.93	
			<i>For Class 55 Rating, Add</i>	8,041.00	
			<i>For Class 56 Rating, Add</i>	10,651.37	
40 05 19 00-0471	EA		36" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	39,794.99	2,204.84
			<i>For Class 52 Rating, Deduct</i>	-4,009.98	
			<i>For Class 54 Rating, Add</i>	5,508.24	
			<i>For Class 55 Rating, Add</i>	8,209.49	
			<i>For Class 56 Rating, Add</i>	10,874.29	
40 05 19 00-0472	EA		36" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	40,555.94	2,208.81
			<i>For Class 52 Rating, Deduct</i>	-4,093.02	
			<i>For Class 54 Rating, Add</i>	5,621.55	
			<i>For Class 55 Rating, Add</i>	8,377.98	
			<i>For Class 56 Rating, Add</i>	11,097.21	
40 05 19 00-0473	EA		36" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	41,316.89	2,212.78
			<i>For Class 52 Rating, Deduct</i>	-4,176.06	
			<i>For Class 54 Rating, Add</i>	5,734.86	
			<i>For Class 55 Rating, Add</i>	8,546.48	
			<i>For Class 56 Rating, Add</i>	11,320.13	
40 05 19 00-0474	EA		36" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	42,077.83	2,216.75
			<i>For Class 52 Rating, Deduct</i>	-4,259.10	
			<i>For Class 54 Rating, Add</i>	5,848.17	
			<i>For Class 55 Rating, Add</i>	8,714.97	
			<i>For Class 56 Rating, Add</i>	11,543.05	
40 05 19 00-0475	EA		36" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	42,838.77	2,220.73
			<i>For Class 52 Rating, Deduct</i>	-4,342.14	
			<i>For Class 54 Rating, Add</i>	5,961.48	
			<i>For Class 55 Rating, Add</i>	8,883.46	
			<i>For Class 56 Rating, Add</i>	11,765.97	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0476 42" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0477 EA 42" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	19,357.96	2,614.03
<i>For Class 52 Rating, Deduct</i>	-1,693.71	
<i>For Class 54 Rating, Add</i>	2,357.13	
<i>For Class 55 Rating, Add</i>	3,528.66	
<i>For Class 56 Rating, Add</i>	4,684.79	
40 05 19 00-0478 EA 42" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	20,491.88	2,618.00
<i>For Class 52 Rating, Deduct</i>	-1,817.77	
<i>For Class 54 Rating, Add</i>	2,526.38	
<i>For Class 55 Rating, Add</i>	3,780.32	
<i>For Class 56 Rating, Add</i>	5,017.74	
40 05 19 00-0479 EA 42" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	21,612.32	2,621.97
<i>For Class 52 Rating, Deduct</i>	-1,940.36	
<i>For Class 54 Rating, Add</i>	2,693.62	
<i>For Class 55 Rating, Add</i>	4,028.98	
<i>For Class 56 Rating, Add</i>	5,346.71	
40 05 19 00-0480 EA 42" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	22,743.98	2,625.95
<i>For Class 52 Rating, Deduct</i>	-2,064.18	
<i>For Class 54 Rating, Add</i>	2,862.54	
<i>For Class 55 Rating, Add</i>	4,280.14	
<i>For Class 56 Rating, Add</i>	5,678.99	
40 05 19 00-0481 EA 42" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	23,864.41	2,629.92
<i>For Class 52 Rating, Deduct</i>	-2,186.77	
<i>For Class 54 Rating, Add</i>	3,029.77	
<i>For Class 55 Rating, Add</i>	4,528.80	
<i>For Class 56 Rating, Add</i>	6,007.96	
40 05 19 00-0482 EA 42" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	24,998.32	2,633.89
<i>For Class 52 Rating, Deduct</i>	-2,310.83	
<i>For Class 54 Rating, Add</i>	3,199.03	
<i>For Class 55 Rating, Add</i>	4,780.47	
<i>For Class 56 Rating, Add</i>	6,340.90	
40 05 19 00-0483 EA 42" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	26,116.51	2,637.86
<i>For Class 52 Rating, Deduct</i>	-2,433.17	
<i>For Class 54 Rating, Add</i>	3,365.92	
<i>For Class 55 Rating, Add</i>	5,028.63	
<i>For Class 56 Rating, Add</i>	6,669.21	
40 05 19 00-0484 EA 42" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	27,250.42	2,641.83
<i>For Class 52 Rating, Deduct</i>	-2,557.24	
<i>For Class 54 Rating, Add</i>	3,535.18	
<i>For Class 55 Rating, Add</i>	5,280.29	
<i>For Class 56 Rating, Add</i>	7,002.15	
40 05 19 00-0485 EA 42" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	28,370.85	2,645.80
<i>For Class 52 Rating, Deduct</i>	-2,679.83	
<i>For Class 54 Rating, Add</i>	3,702.41	
<i>For Class 55 Rating, Add</i>	5,528.95	
<i>For Class 56 Rating, Add</i>	7,331.12	
40 05 19 00-0486 EA 42" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	29,502.51	2,649.78
<i>For Class 52 Rating, Deduct</i>	-2,803.65	
<i>For Class 54 Rating, Add</i>	3,871.33	
<i>For Class 55 Rating, Add</i>	5,780.11	
<i>For Class 56 Rating, Add</i>	7,663.40	
40 05 19 00-0487 EA 42" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	30,622.95	2,653.76
<i>For Class 52 Rating, Deduct</i>	-2,926.23	
<i>For Class 54 Rating, Add</i>	4,038.57	
<i>For Class 55 Rating, Add</i>	6,028.77	
<i>For Class 56 Rating, Add</i>	7,992.37	
40 05 19 00-0488 EA 42" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	31,754.62	2,657.73
<i>For Class 52 Rating, Deduct</i>	-3,050.05	
<i>For Class 54 Rating, Add</i>	4,207.49	
<i>For Class 55 Rating, Add</i>	6,279.94	
<i>For Class 56 Rating, Add</i>	8,324.66	
40 05 19 00-0489 EA 42" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	32,875.05	2,661.70
<i>For Class 52 Rating, Deduct</i>	-3,172.64	
<i>For Class 54 Rating, Add</i>	4,374.72	
<i>For Class 55 Rating, Add</i>	6,528.59	
<i>For Class 56 Rating, Add</i>	8,653.62	
40 05 19 00-0490 EA 42" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	33,997.73	2,665.67
<i>For Class 52 Rating, Deduct</i>	-3,295.47	
<i>For Class 54 Rating, Add</i>	4,542.29	
<i>For Class 55 Rating, Add</i>	6,777.75	
<i>For Class 56 Rating, Add</i>	8,983.26	
40 05 19 00-0491 EA 42" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	35,127.14	2,669.64
<i>For Class 52 Rating, Deduct</i>	-3,419.05	
<i>For Class 54 Rating, Add</i>	4,710.87	
<i>For Class 55 Rating, Add</i>	7,028.42	
<i>For Class 56 Rating, Add</i>	9,314.87	
40 05 19 00-0492 EA 42" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	36,247.57	2,673.61
<i>For Class 52 Rating, Deduct</i>	-3,541.63	
<i>For Class 54 Rating, Add</i>	4,878.11	
<i>For Class 55 Rating, Add</i>	7,277.07	
<i>For Class 56 Rating, Add</i>	9,643.84	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0493	EA		42" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	37,381.49	2,677.59
			<i>For Class 52 Rating, Deduct</i>	-3,665.70	
			<i>For Class 54 Rating, Add</i>	5,047.36	
			<i>For Class 55 Rating, Add</i>	7,528.74	
			<i>For Class 56 Rating, Add</i>	9,976.79	
40 05 19 00-0494	EA		42" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	38,501.92	2,681.56
			<i>For Class 52 Rating, Deduct</i>	-3,788.28	
			<i>For Class 54 Rating, Add</i>	5,214.60	
			<i>For Class 55 Rating, Add</i>	7,777.40	
			<i>For Class 56 Rating, Add</i>	10,305.76	
40 05 19 00-0495	EA		42" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	39,633.59	2,685.54
			<i>For Class 52 Rating, Deduct</i>	-3,912.11	
			<i>For Class 54 Rating, Add</i>	5,383.52	
			<i>For Class 55 Rating, Add</i>	8,028.56	
			<i>For Class 56 Rating, Add</i>	10,638.04	
40 05 19 00-0496	EA		42" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	40,754.02	2,689.51
			<i>For Class 52 Rating, Deduct</i>	-4,034.69	
			<i>For Class 54 Rating, Add</i>	5,550.75	
			<i>For Class 55 Rating, Add</i>	8,277.22	
			<i>For Class 56 Rating, Add</i>	10,967.01	
40 05 19 00-0497	EA		42" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	41,887.93	2,693.48
			<i>For Class 52 Rating, Deduct</i>	-4,158.76	
			<i>For Class 54 Rating, Add</i>	5,720.01	
			<i>For Class 55 Rating, Add</i>	8,528.88	
			<i>For Class 56 Rating, Add</i>	11,299.95	
40 05 19 00-0498	EA		42" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	43,008.37	2,697.45
			<i>For Class 52 Rating, Deduct</i>	-4,281.35	
			<i>For Class 54 Rating, Add</i>	5,887.24	
			<i>For Class 55 Rating, Add</i>	8,777.54	
			<i>For Class 56 Rating, Add</i>	11,628.92	
40 05 19 00-0499	EA		42" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	44,140.03	2,701.43
			<i>For Class 52 Rating, Deduct</i>	-4,405.17	
			<i>For Class 54 Rating, Add</i>	6,056.16	
			<i>For Class 55 Rating, Add</i>	9,028.71	
			<i>For Class 56 Rating, Add</i>	11,961.20	
40 05 19 00-0500	EA		42" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	45,260.47	2,705.40
			<i>For Class 52 Rating, Deduct</i>	-4,527.75	
			<i>For Class 54 Rating, Add</i>	6,223.40	
			<i>For Class 55 Rating, Add</i>	9,277.37	
			<i>For Class 56 Rating, Add</i>	12,290.17	
40 05 19 00-0501	EA		42" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	46,394.38	2,709.37
			<i>For Class 52 Rating, Deduct</i>	-4,651.82	
			<i>For Class 54 Rating, Add</i>	6,392.65	
			<i>For Class 55 Rating, Add</i>	9,529.03	
			<i>For Class 56 Rating, Add</i>	12,623.12	
40 05 19 00-0502	EA		42" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	47,514.80	2,713.34
			<i>For Class 52 Rating, Deduct</i>	-4,774.40	
			<i>For Class 54 Rating, Add</i>	6,559.89	
			<i>For Class 55 Rating, Add</i>	9,777.69	
			<i>For Class 56 Rating, Add</i>	12,952.09	
40 05 19 00-0503	EA		42" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	48,644.22	2,717.31
			<i>For Class 52 Rating, Deduct</i>	-4,897.98	
			<i>For Class 54 Rating, Add</i>	6,728.47	
			<i>For Class 55 Rating, Add</i>	10,028.35	
			<i>For Class 56 Rating, Add</i>	13,283.71	
40 05 19 00-0504	EA		42" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	49,766.91	2,721.29
			<i>For Class 52 Rating, Deduct</i>	-5,020.81	
			<i>For Class 54 Rating, Add</i>	6,896.04	
			<i>For Class 55 Rating, Add</i>	10,277.51	
			<i>For Class 56 Rating, Add</i>	13,613.34	
40 05 19 00-0505	EA		42" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	50,862.66	2,725.26
			<i>For Class 52 Rating, Deduct</i>	-5,118.68	
			<i>For Class 54 Rating, Add</i>	7,029.57	
			<i>For Class 55 Rating, Add</i>	10,476.06	
			<i>For Class 56 Rating, Add</i>	13,876.02	
40 05 19 00-0506	EA		42" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	52,019.01	2,729.24
			<i>For Class 52 Rating, Deduct</i>	-5,267.22	
			<i>For Class 54 Rating, Add</i>	7,232.19	
			<i>For Class 55 Rating, Add</i>	10,777.33	
			<i>For Class 56 Rating, Add</i>	14,274.59	
40 05 19 00-0507	EA		42" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	53,139.43	2,733.21
			<i>For Class 52 Rating, Deduct</i>	-5,389.80	
			<i>For Class 54 Rating, Add</i>	7,399.43	
			<i>For Class 55 Rating, Add</i>	11,025.99	
			<i>For Class 56 Rating, Add</i>	14,603.56	
40 05 19 00-0508	EA		42" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	54,271.10	2,737.18
			<i>For Class 52 Rating, Deduct</i>	-5,513.62	
			<i>For Class 54 Rating, Add</i>	7,568.35	
			<i>For Class 55 Rating, Add</i>	11,277.15	
			<i>For Class 56 Rating, Add</i>	14,935.84	
40 05 19 00-0509	EA		42" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	55,391.53	2,741.15
			<i>For Class 52 Rating, Deduct</i>	-5,636.21	
			<i>For Class 54 Rating, Add</i>	7,735.58	
			<i>For Class 55 Rating, Add</i>	11,525.81	
			<i>For Class 56 Rating, Add</i>	15,264.81	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0510 EA 42" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	56,525.45	2,745.12
<i>For Class 52 Rating, Deduct</i>	-5,760.28	
<i>For Class 54 Rating, Add</i>	7,904.84	
<i>For Class 55 Rating, Add</i>	11,777.48	
<i>For Class 56 Rating, Add</i>	15,597.75	
40 05 19 00-0511 EA 42" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	57,643.63	2,749.09
<i>For Class 52 Rating, Deduct</i>	-5,882.62	
<i>For Class 54 Rating, Add</i>	8,071.73	
<i>For Class 55 Rating, Add</i>	12,025.63	
<i>For Class 56 Rating, Add</i>	15,926.06	
40 05 19 00-0512 EA 42" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	58,777.54	2,753.07
<i>For Class 52 Rating, Deduct</i>	-6,006.69	
<i>For Class 54 Rating, Add</i>	8,240.99	
<i>For Class 55 Rating, Add</i>	12,277.30	
<i>For Class 56 Rating, Add</i>	16,259.01	
40 05 19 00-0513 EA 42" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	59,897.98	2,757.05
<i>For Class 52 Rating, Deduct</i>	-6,129.27	
<i>For Class 54 Rating, Add</i>	8,408.22	
<i>For Class 55 Rating, Add</i>	12,525.96	
<i>For Class 56 Rating, Add</i>	16,587.97	
40 05 19 00-0514 EA 42" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	61,029.65	2,761.02
<i>For Class 52 Rating, Deduct</i>	-6,253.09	
<i>For Class 54 Rating, Add</i>	8,577.14	
<i>For Class 55 Rating, Add</i>	12,777.12	
<i>For Class 56 Rating, Add</i>	16,920.26	
40 05 19 00-0515 48" Flanged End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0002)</small>		
40 05 19 00-0516 EA 48" Flanged (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,282.40	3,285.41
<i>For Class 52 Rating, Deduct</i>	-2,123.50	
<i>For Class 54 Rating, Add</i>	2,955.41	
<i>For Class 55 Rating, Add</i>	4,424.38	
<i>For Class 56 Rating, Add</i>	5,874.03	
40 05 19 00-0517 EA 48" Flanged (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,930.83	3,289.39
<i>For Class 52 Rating, Deduct</i>	-2,304.16	
<i>For Class 54 Rating, Add</i>	3,201.84	
<i>For Class 55 Rating, Add</i>	4,790.78	
<i>For Class 56 Rating, Add</i>	6,358.76	
40 05 19 00-0518 EA 48" Flanged (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,577.01	3,293.36
<i>For Class 52 Rating, Deduct</i>	-2,484.58	
<i>For Class 54 Rating, Add</i>	3,447.94	
<i>For Class 55 Rating, Add</i>	5,156.68	
<i>For Class 56 Rating, Add</i>	6,842.83	
40 05 19 00-0519 EA 48" Flanged (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,236.68	3,297.33
<i>For Class 52 Rating, Deduct</i>	-2,666.48	
<i>For Class 54 Rating, Add</i>	3,696.06	
<i>For Class 55 Rating, Add</i>	5,525.59	
<i>For Class 56 Rating, Add</i>	7,330.87	
40 05 19 00-0520 EA 48" Flanged (FxF), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,885.11	3,301.30
<i>For Class 52 Rating, Deduct</i>	-2,847.15	
<i>For Class 54 Rating, Add</i>	3,942.49	
<i>For Class 55 Rating, Add</i>	5,891.99	
<i>For Class 56 Rating, Add</i>	7,815.60	
40 05 19 00-0521 EA 48" Flanged (FxF), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	32,533.54	3,305.27
<i>For Class 52 Rating, Deduct</i>	-3,027.81	
<i>For Class 54 Rating, Add</i>	4,188.93	
<i>For Class 55 Rating, Add</i>	6,258.39	
<i>For Class 56 Rating, Add</i>	8,300.32	
40 05 19 00-0522 EA 48" Flanged (FxF), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	34,190.95	3,309.24
<i>For Class 52 Rating, Deduct</i>	-3,209.46	
<i>For Class 54 Rating, Add</i>	4,436.71	
<i>For Class 55 Rating, Add</i>	6,626.79	
<i>For Class 56 Rating, Add</i>	8,787.70	
40 05 19 00-0523 EA 48" Flanged (FxF), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	35,841.63	3,313.22
<i>For Class 52 Rating, Deduct</i>	-3,390.38	
<i>For Class 54 Rating, Add</i>	4,683.48	
<i>For Class 55 Rating, Add</i>	6,993.70	
<i>For Class 56 Rating, Add</i>	9,273.09	
40 05 19 00-0524 EA 48" Flanged (FxF), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	37,487.82	3,317.19
<i>For Class 52 Rating, Deduct</i>	-3,570.79	
<i>For Class 54 Rating, Add</i>	4,929.58	
<i>For Class 55 Rating, Add</i>	7,359.60	
<i>For Class 56 Rating, Add</i>	9,757.16	
40 05 19 00-0525 EA 48" Flanged (FxF), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	39,147.48	3,321.16
<i>For Class 52 Rating, Deduct</i>	-3,752.70	
<i>For Class 54 Rating, Add</i>	5,177.70	
<i>For Class 55 Rating, Add</i>	7,728.51	
<i>For Class 56 Rating, Add</i>	10,245.20	
40 05 19 00-0526 EA 48" Flanged (FxF), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	40,795.90	3,325.14
<i>For Class 52 Rating, Deduct</i>	-3,933.36	
<i>For Class 54 Rating, Add</i>	5,424.13	
<i>For Class 55 Rating, Add</i>	8,094.91	
<i>For Class 56 Rating, Add</i>	10,729.93	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0527	EA		48" Flanged (FxF), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	42,455.57	3,329.11
			<i>For Class 52 Rating, Deduct</i>	-4,115.26	
			<i>For Class 54 Rating, Add</i>	5,672.25	
			<i>For Class 55 Rating, Add</i>	8,463.82	
			<i>For Class 56 Rating, Add</i>	11,217.97	
40 05 19 00-0528	EA		48" Flanged (FxF), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	44,101.75	3,333.08
			<i>For Class 52 Rating, Deduct</i>	-4,295.68	
			<i>For Class 54 Rating, Add</i>	5,918.35	
			<i>For Class 55 Rating, Add</i>	8,829.72	
			<i>For Class 56 Rating, Add</i>	11,702.04	
40 05 19 00-0529	EA		48" Flanged (FxF), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	45,750.19	3,337.06
			<i>For Class 52 Rating, Deduct</i>	-4,476.34	
			<i>For Class 54 Rating, Add</i>	6,164.78	
			<i>For Class 55 Rating, Add</i>	9,196.12	
			<i>For Class 56 Rating, Add</i>	12,186.76	
40 05 19 00-0530	EA		48" Flanged (FxF), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	47,409.86	3,341.03
			<i>For Class 52 Rating, Deduct</i>	-4,658.25	
			<i>For Class 54 Rating, Add</i>	6,412.90	
			<i>For Class 55 Rating, Add</i>	9,565.03	
			<i>For Class 56 Rating, Add</i>	12,674.81	
40 05 19 00-0531	EA		48" Flanged (FxF), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	49,058.28	3,345.00
			<i>For Class 52 Rating, Deduct</i>	-4,838.91	
			<i>For Class 54 Rating, Add</i>	6,659.33	
			<i>For Class 55 Rating, Add</i>	9,931.43	
			<i>For Class 56 Rating, Add</i>	13,159.53	
40 05 19 00-0532	EA		48" Flanged (FxF), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	50,704.46	3,348.97
			<i>For Class 52 Rating, Deduct</i>	-5,019.33	
			<i>For Class 54 Rating, Add</i>	6,905.43	
			<i>For Class 55 Rating, Add</i>	10,297.33	
			<i>For Class 56 Rating, Add</i>	13,643.60	
40 05 19 00-0533	EA		48" Flanged (FxF), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	52,364.13	3,352.94
			<i>For Class 52 Rating, Deduct</i>	-5,201.23	
			<i>For Class 54 Rating, Add</i>	7,153.55	
			<i>For Class 55 Rating, Add</i>	10,666.24	
			<i>For Class 56 Rating, Add</i>	14,131.64	
40 05 19 00-0534	EA		48" Flanged (FxF), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	54,012.56	3,356.91
			<i>For Class 52 Rating, Deduct</i>	-5,381.90	
			<i>For Class 54 Rating, Add</i>	7,399.98	
			<i>For Class 55 Rating, Add</i>	11,032.64	
			<i>For Class 56 Rating, Add</i>	14,616.37	
40 05 19 00-0535	EA		48" Flanged (FxF), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	55,658.74	3,360.90
			<i>For Class 52 Rating, Deduct</i>	-5,562.31	
			<i>For Class 54 Rating, Add</i>	7,646.08	
			<i>For Class 55 Rating, Add</i>	11,398.54	
			<i>For Class 56 Rating, Add</i>	15,100.43	
40 05 19 00-0536	EA		48" Flanged (FxF), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	57,318.40	3,364.87
			<i>For Class 52 Rating, Deduct</i>	-5,744.21	
			<i>For Class 54 Rating, Add</i>	7,894.20	
			<i>For Class 55 Rating, Add</i>	11,767.45	
			<i>For Class 56 Rating, Add</i>	15,588.48	
40 05 19 00-0537	EA		48" Flanged (FxF), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	58,969.07	3,368.84
			<i>For Class 52 Rating, Deduct</i>	-5,925.13	
			<i>For Class 54 Rating, Add</i>	8,140.97	
			<i>For Class 55 Rating, Add</i>	12,134.35	
			<i>For Class 56 Rating, Add</i>	16,073.86	
40 05 19 00-0538	EA		48" Flanged (FxF), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	60,615.27	3,372.81
			<i>For Class 52 Rating, Deduct</i>	-6,105.54	
			<i>For Class 54 Rating, Add</i>	8,387.07	
			<i>For Class 55 Rating, Add</i>	12,500.25	
			<i>For Class 56 Rating, Add</i>	16,557.93	
40 05 19 00-0539	EA		48" Flanged (FxF), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	62,274.93	3,376.78
			<i>For Class 52 Rating, Deduct</i>	-6,287.44	
			<i>For Class 54 Rating, Add</i>	8,635.18	
			<i>For Class 55 Rating, Add</i>	12,869.16	
			<i>For Class 56 Rating, Add</i>	17,045.97	
40 05 19 00-0540	EA		48" Flanged (FxF), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	63,923.36	3,380.75
			<i>For Class 52 Rating, Deduct</i>	-6,468.11	
			<i>For Class 54 Rating, Add</i>	8,881.62	
			<i>For Class 55 Rating, Add</i>	13,235.56	
			<i>For Class 56 Rating, Add</i>	17,530.70	
40 05 19 00-0541	EA		48" Flanged (FxF), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	65,569.54	3,384.72
			<i>For Class 52 Rating, Deduct</i>	-6,648.53	
			<i>For Class 54 Rating, Add</i>	9,127.72	
			<i>For Class 55 Rating, Add</i>	13,601.46	
			<i>For Class 56 Rating, Add</i>	18,014.77	
40 05 19 00-0542	EA		48" Flanged (FxF), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	67,229.20	3,388.70
			<i>For Class 52 Rating, Deduct</i>	-6,830.43	
			<i>For Class 54 Rating, Add</i>	9,375.83	
			<i>For Class 55 Rating, Add</i>	13,970.37	
			<i>For Class 56 Rating, Add</i>	18,502.81	
40 05 19 00-0543	EA		48" Flanged (FxF), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	68,877.63	3,392.67
			<i>For Class 52 Rating, Deduct</i>	-7,011.09	
			<i>For Class 54 Rating, Add</i>	9,622.27	
			<i>For Class 55 Rating, Add</i>	14,336.77	
			<i>For Class 56 Rating, Add</i>	18,987.53	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0544 EA 48" Flanged (FxF), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	70,323.85	3,396.65
<i>For Class 52 Rating, Deduct</i>	-7,169.52	
<i>For Class 54 Rating, Add</i>	9,838.37	
<i>For Class 55 Rating, Add</i>	14,658.08	
<i>For Class 56 Rating, Add</i>	19,412.61	
40 05 19 00-0545 EA 48" Flanged (FxF), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	72,185.73	3,400.62
<i>For Class 52 Rating, Deduct</i>	-7,373.66	
<i>For Class 54 Rating, Add</i>	10,116.82	
<i>For Class 55 Rating, Add</i>	15,072.08	
<i>For Class 56 Rating, Add</i>	19,960.31	
40 05 19 00-0546 EA 48" Flanged (FxF), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	75,831.92	3,404.59
<i>For Class 52 Rating, Deduct</i>	-7,554.08	
<i>For Class 54 Rating, Add</i>	10,362.92	
<i>For Class 55 Rating, Add</i>	15,437.98	
<i>For Class 56 Rating, Add</i>	20,444.37	
40 05 19 00-0547 EA 48" Flanged (FxF), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	75,493.82	3,408.56
<i>For Class 52 Rating, Deduct</i>	-7,736.23	
<i>For Class 54 Rating, Add</i>	10,611.37	
<i>For Class 55 Rating, Add</i>	15,807.39	
<i>For Class 56 Rating, Add</i>	20,933.07	
40 05 19 00-0548 EA 48" Flanged (FxF), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	77,140.01	3,412.54
<i>For Class 52 Rating, Deduct</i>	-7,916.65	
<i>For Class 54 Rating, Add</i>	10,857.47	
<i>For Class 55 Rating, Add</i>	16,173.29	
<i>For Class 56 Rating, Add</i>	21,417.14	
40 05 19 00-0549 EA 48" Flanged (FxF), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	78,786.19	3,416.51
<i>For Class 52 Rating, Deduct</i>	-8,097.06	
<i>For Class 54 Rating, Add</i>	11,103.57	
<i>For Class 55 Rating, Add</i>	16,539.19	
<i>For Class 56 Rating, Add</i>	21,901.20	
40 05 19 00-0550 EA 48" Flanged (FxF), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	80,448.10	3,420.48
<i>For Class 52 Rating, Deduct</i>	-8,279.21	
<i>For Class 54 Rating, Add</i>	11,352.02	
<i>For Class 55 Rating, Add</i>	16,908.60	
<i>For Class 56 Rating, Add</i>	22,389.91	
40 05 19 00-0551 EA 48" Flanged (FxF), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	82,094.29	3,424.45
<i>For Class 52 Rating, Deduct</i>	-8,459.63	
<i>For Class 54 Rating, Add</i>	11,598.12	
<i>For Class 55 Rating, Add</i>	17,274.50	
<i>For Class 56 Rating, Add</i>	22,873.98	
40 05 19 00-0552 EA 48" Flanged (FxF), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	83,742.71	3,428.42
<i>For Class 52 Rating, Deduct</i>	-8,640.29	
<i>For Class 54 Rating, Add</i>	11,844.55	
<i>For Class 55 Rating, Add</i>	17,640.90	
<i>For Class 56 Rating, Add</i>	23,358.70	
40 05 19 00-0553 EA 48" Flanged (FxF), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	85,402.37	3,432.40
<i>For Class 52 Rating, Deduct</i>	-8,822.19	
<i>For Class 54 Rating, Add</i>	12,092.67	
<i>For Class 55 Rating, Add</i>	18,009.81	
<i>For Class 56 Rating, Add</i>	23,846.74	
 40 05 19 00-0554 Flanged End x Grooved End (FxF), Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0001)</small>		
40 05 19 00-0555 4" Flanged End x Grooved End (FxF), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0556 EA 4" Flanged x Grooved (FxF), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	657.40	181.79
<i>For Class 52 Rating, Deduct</i>	-42.02	
<i>For Class 54 Rating, Add</i>	60.60	
<i>For Class 55 Rating, Add</i>	91.79	
<i>For Class 56 Rating, Add</i>	122.59	
40 05 19 00-0557 EA 4" Flanged x Grooved (FxF), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	720.63	184.97
<i>For Class 52 Rating, Deduct</i>	-48.44	
<i>For Class 54 Rating, Add</i>	69.42	
<i>For Class 55 Rating, Add</i>	104.93	
<i>For Class 56 Rating, Add</i>	140.00	
40 05 19 00-0558 EA 4" Flanged x Grooved (FxF), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	783.86	188.14
<i>For Class 52 Rating, Deduct</i>	-54.87	
<i>For Class 54 Rating, Add</i>	78.24	
<i>For Class 55 Rating, Add</i>	118.07	
<i>For Class 56 Rating, Add</i>	157.41	
40 05 19 00-0559 EA 4" Flanged x Grooved (FxF), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	847.10	191.33
<i>For Class 52 Rating, Deduct</i>	-61.29	
<i>For Class 54 Rating, Add</i>	87.06	
<i>For Class 55 Rating, Add</i>	131.22	
<i>For Class 56 Rating, Add</i>	174.81	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0560	EA	4" Flanged x Grooved (F&G), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	910.32	194.51
		<i>For Class 52 Rating, Deduct</i>		-67.72	
		<i>For Class 54 Rating, Add</i>		95.88	
		<i>For Class 55 Rating, Add</i>		144.36	
		<i>For Class 56 Rating, Add</i>		192.22	
40 05 19 00-0561	EA	4" Flanged x Grooved (F&G), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	973.56	197.69
		<i>For Class 52 Rating, Deduct</i>		-74.14	
		<i>For Class 54 Rating, Add</i>		104.70	
		<i>For Class 55 Rating, Add</i>		157.50	
		<i>For Class 56 Rating, Add</i>		209.62	
40 05 19 00-0562	EA	4" Flanged x Grooved (F&G), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,036.79	200.86
		<i>For Class 52 Rating, Deduct</i>		-80.57	
		<i>For Class 54 Rating, Add</i>		113.52	
		<i>For Class 55 Rating, Add</i>		170.64	
		<i>For Class 56 Rating, Add</i>		227.03	
40 05 19 00-0563	EA	4" Flanged x Grooved (F&G), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,100.02	204.04
		<i>For Class 52 Rating, Deduct</i>		-87.00	
		<i>For Class 54 Rating, Add</i>		122.34	
		<i>For Class 55 Rating, Add</i>		183.78	
		<i>For Class 56 Rating, Add</i>		244.44	
40 05 19 00-0564	EA	4" Flanged x Grooved (F&G), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,163.25	207.22
		<i>For Class 52 Rating, Deduct</i>		-93.42	
		<i>For Class 54 Rating, Add</i>		131.16	
		<i>For Class 55 Rating, Add</i>		196.93	
		<i>For Class 56 Rating, Add</i>		261.84	
40 05 19 00-0565	EA	4" Flanged x Grooved (F&G), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,226.49	210.39
		<i>For Class 52 Rating, Deduct</i>		-99.85	
		<i>For Class 54 Rating, Add</i>		139.98	
		<i>For Class 55 Rating, Add</i>		210.07	
		<i>For Class 56 Rating, Add</i>		279.25	
40 05 19 00-0566	EA	4" Flanged x Grooved (F&G), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,289.71	213.57
		<i>For Class 52 Rating, Deduct</i>		-106.27	
		<i>For Class 54 Rating, Add</i>		148.80	
		<i>For Class 55 Rating, Add</i>		223.21	
		<i>For Class 56 Rating, Add</i>		296.65	
40 05 19 00-0567	EA	4" Flanged x Grooved (F&G), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,352.95	216.76
		<i>For Class 52 Rating, Deduct</i>		-112.70	
		<i>For Class 54 Rating, Add</i>		157.62	
		<i>For Class 55 Rating, Add</i>		236.35	
		<i>For Class 56 Rating, Add</i>		314.06	
40 05 19 00-0568	EA	4" Flanged x Grooved (F&G), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,416.18	219.93
		<i>For Class 52 Rating, Deduct</i>		-119.13	
		<i>For Class 54 Rating, Add</i>		166.44	
		<i>For Class 55 Rating, Add</i>		249.50	
		<i>For Class 56 Rating, Add</i>		331.47	
40 05 19 00-0569	EA	4" Flanged x Grooved (F&G), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,479.41	223.11
		<i>For Class 52 Rating, Deduct</i>		-125.55	
		<i>For Class 54 Rating, Add</i>		175.26	
		<i>For Class 55 Rating, Add</i>		262.64	
		<i>For Class 56 Rating, Add</i>		348.87	
40 05 19 00-0570	EA	4" Flanged x Grooved (F&G), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,542.64	226.29
		<i>For Class 52 Rating, Deduct</i>		-131.98	
		<i>For Class 54 Rating, Add</i>		184.08	
		<i>For Class 55 Rating, Add</i>		275.78	
		<i>For Class 56 Rating, Add</i>		366.28	
40 05 19 00-0571	EA	4" Flanged x Grooved (F&G), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,605.88	229.46
		<i>For Class 52 Rating, Deduct</i>		-138.40	
		<i>For Class 54 Rating, Add</i>		192.90	
		<i>For Class 55 Rating, Add</i>		288.92	
		<i>For Class 56 Rating, Add</i>		383.69	
40 05 19 00-0572	EA	4" Flanged x Grooved (F&G), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,669.10	232.64
		<i>For Class 52 Rating, Deduct</i>		-144.83	
		<i>For Class 54 Rating, Add</i>		201.72	
		<i>For Class 55 Rating, Add</i>		302.07	
		<i>For Class 56 Rating, Add</i>		401.09	
40 05 19 00-0573	EA	4" Flanged x Grooved (F&G), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	1,732.35	235.82
		<i>For Class 52 Rating, Deduct</i>		-151.25	
		<i>For Class 54 Rating, Add</i>		210.54	
		<i>For Class 55 Rating, Add</i>		315.21	
		<i>For Class 56 Rating, Add</i>		418.50	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0574 EA 4" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,795.58	238.99
<i>For Class 52 Rating, Deduct</i>	-157.68	
<i>For Class 54 Rating, Add</i>	219.36	
<i>For Class 55 Rating, Add</i>	328.35	
<i>For Class 56 Rating, Add</i>	435.91	
40 05 19 00-0575 EA 4" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,858.82	242.18
<i>For Class 52 Rating, Deduct</i>	-164.11	
<i>For Class 54 Rating, Add</i>	228.19	
<i>For Class 55 Rating, Add</i>	341.50	
<i>For Class 56 Rating, Add</i>	453.31	
40 05 19 00-0576 EA 4" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,922.04	245.36
<i>For Class 52 Rating, Deduct</i>	-170.53	
<i>For Class 54 Rating, Add</i>	237.00	
<i>For Class 55 Rating, Add</i>	354.64	
<i>For Class 56 Rating, Add</i>	470.72	
40 05 19 00-0577 EA 4" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,985.28	248.54
<i>For Class 52 Rating, Deduct</i>	-176.96	
<i>For Class 54 Rating, Add</i>	245.83	
<i>For Class 55 Rating, Add</i>	367.78	
<i>For Class 56 Rating, Add</i>	488.13	
40 05 19 00-0578 EA 4" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,048.51	251.71
<i>For Class 52 Rating, Deduct</i>	-183.38	
<i>For Class 54 Rating, Add</i>	254.65	
<i>For Class 55 Rating, Add</i>	380.92	
<i>For Class 56 Rating, Add</i>	505.53	
40 05 19 00-0579 EA 4" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,111.74	254.89
<i>For Class 52 Rating, Deduct</i>	-189.81	
<i>For Class 54 Rating, Add</i>	263.47	
<i>For Class 55 Rating, Add</i>	394.06	
<i>For Class 56 Rating, Add</i>	522.94	
40 05 19 00-0580 EA 4" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,174.97	258.07
<i>For Class 52 Rating, Deduct</i>	-196.24	
<i>For Class 54 Rating, Add</i>	272.29	
<i>For Class 55 Rating, Add</i>	407.21	
<i>For Class 56 Rating, Add</i>	540.34	
40 05 19 00-0581 EA 4" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,238.21	261.24
<i>For Class 52 Rating, Deduct</i>	-202.66	
<i>For Class 54 Rating, Add</i>	281.11	
<i>For Class 55 Rating, Add</i>	420.35	
<i>For Class 56 Rating, Add</i>	557.75	
40 05 19 00-0582 EA 4" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,301.43	264.42
<i>For Class 52 Rating, Deduct</i>	-209.09	
<i>For Class 54 Rating, Add</i>	289.93	
<i>For Class 55 Rating, Add</i>	433.49	
<i>For Class 56 Rating, Add</i>	575.16	
40 05 19 00-0583 EA 4" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,364.67	267.61
<i>For Class 52 Rating, Deduct</i>	-215.51	
<i>For Class 54 Rating, Add</i>	298.75	
<i>For Class 55 Rating, Add</i>	446.63	
<i>For Class 56 Rating, Add</i>	592.56	
40 05 19 00-0584 EA 4" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,427.90	270.78
<i>For Class 52 Rating, Deduct</i>	-221.94	
<i>For Class 54 Rating, Add</i>	307.57	
<i>For Class 55 Rating, Add</i>	459.78	
<i>For Class 56 Rating, Add</i>	609.97	
40 05 19 00-0585 EA 4" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,491.12	273.96
<i>For Class 52 Rating, Deduct</i>	-228.36	
<i>For Class 54 Rating, Add</i>	316.39	
<i>For Class 55 Rating, Add</i>	472.92	
<i>For Class 56 Rating, Add</i>	627.37	
40 05 19 00-0586 EA 4" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,554.36	277.14
<i>For Class 52 Rating, Deduct</i>	-234.79	
<i>For Class 54 Rating, Add</i>	325.21	
<i>For Class 55 Rating, Add</i>	486.06	
<i>For Class 56 Rating, Add</i>	644.78	
40 05 19 00-0587 EA 4" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,617.59	280.31
<i>For Class 52 Rating, Deduct</i>	-241.22	
<i>For Class 54 Rating, Add</i>	334.03	
<i>For Class 55 Rating, Add</i>	499.21	
<i>For Class 56 Rating, Add</i>	662.19	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0588	EA	4" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,680.82	283.49
		<i>For Class 52 Rating, Deduct</i>	-247.64	
		<i>For Class 54 Rating, Add</i>	342.85	
		<i>For Class 55 Rating, Add</i>	512.35	
		<i>For Class 56 Rating, Add</i>	679.59	
40 05 19 00-0589	EA	4" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,744.05	286.67
		<i>For Class 52 Rating, Deduct</i>	-254.07	
		<i>For Class 54 Rating, Add</i>	351.67	
		<i>For Class 55 Rating, Add</i>	525.49	
		<i>For Class 56 Rating, Add</i>	697.00	
40 05 19 00-0590	EA	4" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,807.29	289.84
		<i>For Class 52 Rating, Deduct</i>	-260.49	
		<i>For Class 54 Rating, Add</i>	360.49	
		<i>For Class 55 Rating, Add</i>	538.63	
		<i>For Class 56 Rating, Add</i>	714.41	
40 05 19 00-0591	EA	4" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,870.51	293.03
		<i>For Class 52 Rating, Deduct</i>	-266.92	
		<i>For Class 54 Rating, Add</i>	369.31	
		<i>For Class 55 Rating, Add</i>	551.77	
		<i>For Class 56 Rating, Add</i>	731.81	
40 05 19 00-0592	EA	4" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,933.75	296.21
		<i>For Class 52 Rating, Deduct</i>	-273.35	
		<i>For Class 54 Rating, Add</i>	378.13	
		<i>For Class 55 Rating, Add</i>	564.92	
		<i>For Class 56 Rating, Add</i>	749.22	
40 05 19 00-0593	EA	4" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,996.98	299.39
		<i>For Class 52 Rating, Deduct</i>	-279.77	
		<i>For Class 54 Rating, Add</i>	386.95	
		<i>For Class 55 Rating, Add</i>	578.06	
		<i>For Class 56 Rating, Add</i>	766.63	
40 05 19 00-0594	EA	4" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,060.21	302.56
		<i>For Class 52 Rating, Deduct</i>	-286.20	
		<i>For Class 54 Rating, Add</i>	395.77	
		<i>For Class 55 Rating, Add</i>	591.20	
		<i>For Class 56 Rating, Add</i>	784.03	
40 05 19 00-0595		6" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0596	EA	6" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	820.77	228.83
		<i>For Class 52 Rating, Deduct</i>	-52.15	
		<i>For Class 54 Rating, Add</i>	75.27	
		<i>For Class 55 Rating, Add</i>	114.04	
		<i>For Class 56 Rating, Add</i>	152.33	
40 05 19 00-0597	EA	6" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	897.49	232.00
		<i>For Class 52 Rating, Deduct</i>	-60.06	
		<i>For Class 54 Rating, Add</i>	86.11	
		<i>For Class 55 Rating, Add</i>	130.19	
		<i>For Class 56 Rating, Add</i>	173.72	
40 05 19 00-0598	EA	6" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	974.20	235.18
		<i>For Class 52 Rating, Deduct</i>	-67.97	
		<i>For Class 54 Rating, Add</i>	96.96	
		<i>For Class 55 Rating, Add</i>	146.34	
		<i>For Class 56 Rating, Add</i>	195.10	
40 05 19 00-0599	EA	6" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,050.92	238.36
		<i>For Class 52 Rating, Deduct</i>	-75.87	
		<i>For Class 54 Rating, Add</i>	107.80	
		<i>For Class 55 Rating, Add</i>	162.49	
		<i>For Class 56 Rating, Add</i>	216.48	
40 05 19 00-0600	EA	6" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,127.63	241.54
		<i>For Class 52 Rating, Deduct</i>	-83.78	
		<i>For Class 54 Rating, Add</i>	118.64	
		<i>For Class 55 Rating, Add</i>	178.64	
		<i>For Class 56 Rating, Add</i>	237.87	
40 05 19 00-0601	EA	6" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,204.34	244.72
		<i>For Class 52 Rating, Deduct</i>	-91.69	
		<i>For Class 54 Rating, Add</i>	129.48	
		<i>For Class 55 Rating, Add</i>	194.78	
		<i>For Class 56 Rating, Add</i>	259.25	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0602 EA 6" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,281.05	247.90
<i>For Class 52 Rating, Deduct</i>	-99.60	
<i>For Class 54 Rating, Add</i>	140.33	
<i>For Class 55 Rating, Add</i>	210.93	
<i>For Class 56 Rating, Add</i>	280.63	
40 05 19 00-0603 EA 6" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,357.78	251.07
<i>For Class 52 Rating, Deduct</i>	-107.51	
<i>For Class 54 Rating, Add</i>	151.17	
<i>For Class 55 Rating, Add</i>	227.08	
<i>For Class 56 Rating, Add</i>	302.02	
40 05 19 00-0604 EA 6" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,434.49	254.25
<i>For Class 52 Rating, Deduct</i>	-115.42	
<i>For Class 54 Rating, Add</i>	162.01	
<i>For Class 55 Rating, Add</i>	243.23	
<i>For Class 56 Rating, Add</i>	323.40	
40 05 19 00-0605 EA 6" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,511.20	257.43
<i>For Class 52 Rating, Deduct</i>	-123.33	
<i>For Class 54 Rating, Add</i>	172.85	
<i>For Class 55 Rating, Add</i>	259.38	
<i>For Class 56 Rating, Add</i>	344.78	
40 05 19 00-0606 EA 6" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,587.91	260.61
<i>For Class 52 Rating, Deduct</i>	-131.24	
<i>For Class 54 Rating, Add</i>	183.70	
<i>For Class 55 Rating, Add</i>	275.53	
<i>For Class 56 Rating, Add</i>	366.16	
40 05 19 00-0607 EA 6" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,664.63	263.78
<i>For Class 52 Rating, Deduct</i>	-139.14	
<i>For Class 54 Rating, Add</i>	194.54	
<i>For Class 55 Rating, Add</i>	291.68	
<i>For Class 56 Rating, Add</i>	387.55	
40 05 19 00-0608 EA 6" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,741.34	266.97
<i>For Class 52 Rating, Deduct</i>	-147.05	
<i>For Class 54 Rating, Add</i>	205.38	
<i>For Class 55 Rating, Add</i>	307.83	
<i>For Class 56 Rating, Add</i>	408.93	
40 05 19 00-0609 EA 6" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,818.05	270.15
<i>For Class 52 Rating, Deduct</i>	-154.96	
<i>For Class 54 Rating, Add</i>	216.22	
<i>For Class 55 Rating, Add</i>	323.97	
<i>For Class 56 Rating, Add</i>	430.31	
40 05 19 00-0610 EA 6" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,894.76	273.32
<i>For Class 52 Rating, Deduct</i>	-162.87	
<i>For Class 54 Rating, Add</i>	227.07	
<i>For Class 55 Rating, Add</i>	340.12	
<i>For Class 56 Rating, Add</i>	451.70	
40 05 19 00-0611 EA 6" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,971.48	276.50
<i>For Class 52 Rating, Deduct</i>	-170.78	
<i>For Class 54 Rating, Add</i>	237.91	
<i>For Class 55 Rating, Add</i>	356.27	
<i>For Class 56 Rating, Add</i>	473.08	
40 05 19 00-0612 EA 6" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,048.19	279.68
<i>For Class 52 Rating, Deduct</i>	-178.69	
<i>For Class 54 Rating, Add</i>	248.75	
<i>For Class 55 Rating, Add</i>	372.42	
<i>For Class 56 Rating, Add</i>	494.46	
40 05 19 00-0613 EA 6" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,124.90	282.85
<i>For Class 52 Rating, Deduct</i>	-186.60	
<i>For Class 54 Rating, Add</i>	259.59	
<i>For Class 55 Rating, Add</i>	388.57	
<i>For Class 56 Rating, Add</i>	515.85	
40 05 19 00-0614 EA 6" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,201.61	286.03
<i>For Class 52 Rating, Deduct</i>	-194.51	
<i>For Class 54 Rating, Add</i>	270.44	
<i>For Class 55 Rating, Add</i>	404.72	
<i>For Class 56 Rating, Add</i>	537.23	
40 05 19 00-0615 EA 6" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,278.33	289.21
<i>For Class 52 Rating, Deduct</i>	-202.41	
<i>For Class 54 Rating, Add</i>	281.28	
<i>For Class 55 Rating, Add</i>	420.87	
<i>For Class 56 Rating, Add</i>	558.61	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0616	EA	6" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,355.04	292.39
		<i>For Class 52 Rating, Deduct</i>		-210.32	
		<i>For Class 54 Rating, Add</i>		292.12	
		<i>For Class 55 Rating, Add</i>		437.01	
		<i>For Class 56 Rating, Add</i>		580.00	
40 05 19 00-0617	EA	6" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,431.75	295.57
		<i>For Class 52 Rating, Deduct</i>		-218.23	
		<i>For Class 54 Rating, Add</i>		302.96	
		<i>For Class 55 Rating, Add</i>		453.16	
		<i>For Class 56 Rating, Add</i>		601.38	
40 05 19 00-0618	EA	6" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,508.46	298.75
		<i>For Class 52 Rating, Deduct</i>		-226.14	
		<i>For Class 54 Rating, Add</i>		313.80	
		<i>For Class 55 Rating, Add</i>		469.31	
		<i>For Class 56 Rating, Add</i>		622.76	
40 05 19 00-0619	EA	6" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,585.18	301.92
		<i>For Class 52 Rating, Deduct</i>		-234.05	
		<i>For Class 54 Rating, Add</i>		324.65	
		<i>For Class 55 Rating, Add</i>		485.46	
		<i>For Class 56 Rating, Add</i>		644.15	
40 05 19 00-0620	EA	6" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,661.89	305.10
		<i>For Class 52 Rating, Deduct</i>		-241.96	
		<i>For Class 54 Rating, Add</i>		335.49	
		<i>For Class 55 Rating, Add</i>		501.61	
		<i>For Class 56 Rating, Add</i>		665.53	
40 05 19 00-0621	EA	6" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,738.60	308.28
		<i>For Class 52 Rating, Deduct</i>		-249.87	
		<i>For Class 54 Rating, Add</i>		346.33	
		<i>For Class 55 Rating, Add</i>		517.76	
		<i>For Class 56 Rating, Add</i>		686.91	
40 05 19 00-0622	EA	6" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,815.31	311.46
		<i>For Class 52 Rating, Deduct</i>		-257.78	
		<i>For Class 54 Rating, Add</i>		357.17	
		<i>For Class 55 Rating, Add</i>		533.91	
		<i>For Class 56 Rating, Add</i>		708.29	
40 05 19 00-0623	EA	6" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,892.03	314.63
		<i>For Class 52 Rating, Deduct</i>		-265.68	
		<i>For Class 54 Rating, Add</i>		368.02	
		<i>For Class 55 Rating, Add</i>		550.06	
		<i>For Class 56 Rating, Add</i>		729.68	
40 05 19 00-0624	EA	6" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,968.74	317.82
		<i>For Class 52 Rating, Deduct</i>		-273.59	
		<i>For Class 54 Rating, Add</i>		378.86	
		<i>For Class 55 Rating, Add</i>		566.20	
		<i>For Class 56 Rating, Add</i>		751.06	
40 05 19 00-0625	EA	6" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,045.47	321.00
		<i>For Class 52 Rating, Deduct</i>		-281.50	
		<i>For Class 54 Rating, Add</i>		389.70	
		<i>For Class 55 Rating, Add</i>		582.35	
		<i>For Class 56 Rating, Add</i>		772.45	
40 05 19 00-0626	EA	6" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,122.17	324.17
		<i>For Class 52 Rating, Deduct</i>		-289.41	
		<i>For Class 54 Rating, Add</i>		400.54	
		<i>For Class 55 Rating, Add</i>		598.50	
		<i>For Class 56 Rating, Add</i>		793.83	
40 05 19 00-0627	EA	6" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,198.89	327.35
		<i>For Class 52 Rating, Deduct</i>		-297.32	
		<i>For Class 54 Rating, Add</i>		411.39	
		<i>For Class 55 Rating, Add</i>		614.65	
		<i>For Class 56 Rating, Add</i>		815.21	
40 05 19 00-0628	EA	6" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,275.60	330.53
		<i>For Class 52 Rating, Deduct</i>		-305.23	
		<i>For Class 54 Rating, Add</i>		422.23	
		<i>For Class 55 Rating, Add</i>		630.80	
		<i>For Class 56 Rating, Add</i>		836.59	
40 05 19 00-0629	EA	6" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,352.32	333.70
		<i>For Class 52 Rating, Deduct</i>		-313.14	
		<i>For Class 54 Rating, Add</i>		433.07	
		<i>For Class 55 Rating, Add</i>		646.95	
		<i>For Class 56 Rating, Add</i>		857.98	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0630 EA 6" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,429.02	336.88
For Class 52 Rating, Deduct	-321.04	
For Class 54 Rating, Add	443.91	
For Class 55 Rating, Add	663.10	
For Class 56 Rating, Add	879.36	
40 05 19 00-0631 EA 6" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,505.74	340.06
For Class 52 Rating, Deduct	-328.95	
For Class 54 Rating, Add	454.76	
For Class 55 Rating, Add	679.25	
For Class 56 Rating, Add	900.74	
40 05 19 00-0632 EA 6" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,582.45	343.24
For Class 52 Rating, Deduct	-336.86	
For Class 54 Rating, Add	465.60	
For Class 55 Rating, Add	695.39	
For Class 56 Rating, Add	922.13	
40 05 19 00-0633 EA 6" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,659.17	346.42
For Class 52 Rating, Deduct	-344.77	
For Class 54 Rating, Add	476.44	
For Class 55 Rating, Add	711.54	
For Class 56 Rating, Add	943.51	
40 05 19 00-0634 EA 6" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,735.87	349.60
For Class 52 Rating, Deduct	-352.68	
For Class 54 Rating, Add	487.28	
For Class 55 Rating, Add	727.69	
For Class 56 Rating, Add	964.89	
40 05 19 00-0635 8" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-0554)		
40 05 19 00-0636 EA 8" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,135.02	292.39
For Class 52 Rating, Deduct	-76.12	
For Class 54 Rating, Add	109.12	
For Class 55 Rating, Add	164.95	
For Class 56 Rating, Add	220.09	
40 05 19 00-0637 EA 8" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,238.70	295.57
For Class 52 Rating, Deduct	-87.00	
For Class 54 Rating, Add	124.00	
For Class 55 Rating, Add	187.11	
For Class 56 Rating, Add	249.43	
40 05 19 00-0638 EA 8" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,342.37	298.75
For Class 52 Rating, Deduct	-97.87	
For Class 54 Rating, Add	138.89	
For Class 55 Rating, Add	209.27	
For Class 56 Rating, Add	278.77	
40 05 19 00-0639 EA 8" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,446.05	301.92
For Class 52 Rating, Deduct	-108.74	
For Class 54 Rating, Add	153.78	
For Class 55 Rating, Add	231.43	
For Class 56 Rating, Add	308.10	
40 05 19 00-0640 EA 8" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,549.72	305.10
For Class 52 Rating, Deduct	-119.62	
For Class 54 Rating, Add	168.66	
For Class 55 Rating, Add	253.60	
For Class 56 Rating, Add	337.44	
40 05 19 00-0641 EA 8" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,653.40	308.28
For Class 52 Rating, Deduct	-130.49	
For Class 54 Rating, Add	183.55	
For Class 55 Rating, Add	275.76	
For Class 56 Rating, Add	366.78	
40 05 19 00-0642 EA 8" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,757.07	311.46
For Class 52 Rating, Deduct	-141.37	
For Class 54 Rating, Add	198.44	
For Class 55 Rating, Add	297.92	
For Class 56 Rating, Add	396.11	
40 05 19 00-0643 EA 8" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,860.75	314.63
For Class 52 Rating, Deduct	-152.24	
For Class 54 Rating, Add	213.33	
For Class 55 Rating, Add	320.08	
For Class 56 Rating, Add	425.45	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0644	EA	8" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,964.42	317.82
		<i>For Class 52 Rating, Deduct</i>		-163.12	
		<i>For Class 54 Rating, Add</i>		228.21	
		<i>For Class 55 Rating, Add</i>		342.24	
		<i>For Class 56 Rating, Add</i>		454.79	
40 05 19 00-0645	EA	8" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,068.11	321.00
		<i>For Class 52 Rating, Deduct</i>		-173.99	
		<i>For Class 54 Rating, Add</i>		243.10	
		<i>For Class 55 Rating, Add</i>		364.40	
		<i>For Class 56 Rating, Add</i>		484.13	
40 05 19 00-0646	EA	8" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,171.78	324.17
		<i>For Class 52 Rating, Deduct</i>		-184.87	
		<i>For Class 54 Rating, Add</i>		257.99	
		<i>For Class 55 Rating, Add</i>		386.56	
		<i>For Class 56 Rating, Add</i>		513.46	
40 05 19 00-0647	EA	8" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,275.46	327.35
		<i>For Class 52 Rating, Deduct</i>		-195.74	
		<i>For Class 54 Rating, Add</i>		272.87	
		<i>For Class 55 Rating, Add</i>		408.73	
		<i>For Class 56 Rating, Add</i>		542.80	
40 05 19 00-0648	EA	8" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,379.12	330.53
		<i>For Class 52 Rating, Deduct</i>		-206.62	
		<i>For Class 54 Rating, Add</i>		287.76	
		<i>For Class 55 Rating, Add</i>		430.88	
		<i>For Class 56 Rating, Add</i>		572.13	
40 05 19 00-0649	EA	8" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,482.80	333.70
		<i>For Class 52 Rating, Deduct</i>		-217.49	
		<i>For Class 54 Rating, Add</i>		302.64	
		<i>For Class 55 Rating, Add</i>		453.05	
		<i>For Class 56 Rating, Add</i>		601.47	
40 05 19 00-0650	EA	8" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,586.47	336.88
		<i>For Class 52 Rating, Deduct</i>		-228.36	
		<i>For Class 54 Rating, Add</i>		317.53	
		<i>For Class 55 Rating, Add</i>		475.21	
		<i>For Class 56 Rating, Add</i>		630.81	
40 05 19 00-0651	EA	8" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,690.15	340.06
		<i>For Class 52 Rating, Deduct</i>		-239.24	
		<i>For Class 54 Rating, Add</i>		332.42	
		<i>For Class 55 Rating, Add</i>		497.37	
		<i>For Class 56 Rating, Add</i>		660.14	
40 05 19 00-0652	EA	8" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,793.82	343.24
		<i>For Class 52 Rating, Deduct</i>		-250.11	
		<i>For Class 54 Rating, Add</i>		347.30	
		<i>For Class 55 Rating, Add</i>		519.53	
		<i>For Class 56 Rating, Add</i>		689.48	
40 05 19 00-0653	EA	8" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,897.50	346.42
		<i>For Class 52 Rating, Deduct</i>		-260.99	
		<i>For Class 54 Rating, Add</i>		362.19	
		<i>For Class 55 Rating, Add</i>		541.69	
		<i>For Class 56 Rating, Add</i>		718.82	
40 05 19 00-0654	EA	8" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,001.17	349.60
		<i>For Class 52 Rating, Deduct</i>		-271.86	
		<i>For Class 54 Rating, Add</i>		377.08	
		<i>For Class 55 Rating, Add</i>		563.85	
		<i>For Class 56 Rating, Add</i>		748.16	
40 05 19 00-0655	EA	8" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,104.85	352.78
		<i>For Class 52 Rating, Deduct</i>		-282.74	
		<i>For Class 54 Rating, Add</i>		391.97	
		<i>For Class 55 Rating, Add</i>		586.01	
		<i>For Class 56 Rating, Add</i>		777.49	
40 05 19 00-0656	EA	8" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,208.52	355.95
		<i>For Class 52 Rating, Deduct</i>		-293.61	
		<i>For Class 54 Rating, Add</i>		406.85	
		<i>For Class 55 Rating, Add</i>		608.18	
		<i>For Class 56 Rating, Add</i>		806.83	
40 05 19 00-0657	EA	8" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,312.20	359.13
		<i>For Class 52 Rating, Deduct</i>		-304.49	
		<i>For Class 54 Rating, Add</i>		421.74	
		<i>For Class 55 Rating, Add</i>		630.34	
		<i>For Class 56 Rating, Add</i>		836.17	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0658 EA 8" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,415.87	362.31
<i>For Class 52 Rating, Deduct</i>	-315.36	
<i>For Class 54 Rating, Add</i>	436.63	
<i>For Class 55 Rating, Add</i>	652.50	
<i>For Class 56 Rating, Add</i>	865.50	
40 05 19 00-0659 EA 8" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,519.55	365.48
<i>For Class 52 Rating, Deduct</i>	-326.24	
<i>For Class 54 Rating, Add</i>	451.51	
<i>For Class 55 Rating, Add</i>	674.66	
<i>For Class 56 Rating, Add</i>	894.84	
40 05 19 00-0660 EA 8" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,623.22	368.67
<i>For Class 52 Rating, Deduct</i>	-337.11	
<i>For Class 54 Rating, Add</i>	466.40	
<i>For Class 55 Rating, Add</i>	696.82	
<i>For Class 56 Rating, Add</i>	924.18	
40 05 19 00-0661 EA 8" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,726.89	371.85
<i>For Class 52 Rating, Deduct</i>	-347.98	
<i>For Class 54 Rating, Add</i>	481.28	
<i>For Class 55 Rating, Add</i>	718.98	
<i>For Class 56 Rating, Add</i>	953.51	
40 05 19 00-0662 EA 8" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,830.56	375.02
<i>For Class 52 Rating, Deduct</i>	-358.86	
<i>For Class 54 Rating, Add</i>	496.17	
<i>For Class 55 Rating, Add</i>	741.14	
<i>For Class 56 Rating, Add</i>	982.85	
40 05 19 00-0663 EA 8" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,934.24	378.20
<i>For Class 52 Rating, Deduct</i>	-369.73	
<i>For Class 54 Rating, Add</i>	511.06	
<i>For Class 55 Rating, Add</i>	763.30	
<i>For Class 56 Rating, Add</i>	1,012.19	
40 05 19 00-0664 EA 8" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,037.91	381.38
<i>For Class 52 Rating, Deduct</i>	-380.61	
<i>For Class 54 Rating, Add</i>	525.94	
<i>For Class 55 Rating, Add</i>	785.46	
<i>For Class 56 Rating, Add</i>	1,041.52	
40 05 19 00-0665 EA 8" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,141.59	384.55
<i>For Class 52 Rating, Deduct</i>	-391.48	
<i>For Class 54 Rating, Add</i>	540.83	
<i>For Class 55 Rating, Add</i>	807.63	
<i>For Class 56 Rating, Add</i>	1,070.86	
40 05 19 00-0666 EA 8" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,245.26	387.73
<i>For Class 52 Rating, Deduct</i>	-402.36	
<i>For Class 54 Rating, Add</i>	555.72	
<i>For Class 55 Rating, Add</i>	829.79	
<i>For Class 56 Rating, Add</i>	1,100.20	
40 05 19 00-0667 EA 8" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,348.94	390.91
<i>For Class 52 Rating, Deduct</i>	-413.23	
<i>For Class 54 Rating, Add</i>	570.60	
<i>For Class 55 Rating, Add</i>	851.95	
<i>For Class 56 Rating, Add</i>	1,129.53	
40 05 19 00-0668 EA 8" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,452.62	394.09
<i>For Class 52 Rating, Deduct</i>	-424.11	
<i>For Class 54 Rating, Add</i>	585.49	
<i>For Class 55 Rating, Add</i>	874.11	
<i>For Class 56 Rating, Add</i>	1,158.87	
40 05 19 00-0669 EA 8" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,556.30	397.27
<i>For Class 52 Rating, Deduct</i>	-434.98	
<i>For Class 54 Rating, Add</i>	600.38	
<i>For Class 55 Rating, Add</i>	896.27	
<i>For Class 56 Rating, Add</i>	1,188.21	
40 05 19 00-0670 EA 8" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,659.97	400.45
<i>For Class 52 Rating, Deduct</i>	-445.86	
<i>For Class 54 Rating, Add</i>	615.27	
<i>For Class 55 Rating, Add</i>	918.43	
<i>For Class 56 Rating, Add</i>	1,217.55	
40 05 19 00-0671 EA 8" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,763.65	403.63
<i>For Class 52 Rating, Deduct</i>	-456.73	
<i>For Class 54 Rating, Add</i>	630.15	
<i>For Class 55 Rating, Add</i>	940.59	
<i>For Class 56 Rating, Add</i>	1,246.88	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0672	EA	8" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,867.32	406.80
		<i>For Class 52 Rating, Deduct</i>		-467.60	
		<i>For Class 54 Rating, Add</i>		645.04	
		<i>For Class 55 Rating, Add</i>		962.75	
		<i>For Class 56 Rating, Add</i>		1,276.22	
40 05 19 00-0673	EA	8" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,970.99	409.98
		<i>For Class 52 Rating, Deduct</i>		-478.48	
		<i>For Class 54 Rating, Add</i>		659.92	
		<i>For Class 55 Rating, Add</i>		984.91	
		<i>For Class 56 Rating, Add</i>		1,305.55	
40 05 19 00-0674	EA	8" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,074.66	413.16
		<i>For Class 52 Rating, Deduct</i>		-489.35	
		<i>For Class 54 Rating, Add</i>		674.81	
		<i>For Class 55 Rating, Add</i>		1,007.08	
		<i>For Class 56 Rating, Add</i>		1,334.89	
40 05 19 00-0675 10" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-0554)					
40 05 19 00-0676	EA	10" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,424.56	355.95
		<i>For Class 52 Rating, Deduct</i>		-97.38	
		<i>For Class 54 Rating, Add</i>		139.26	
		<i>For Class 55 Rating, Add</i>		210.35	
		<i>For Class 56 Rating, Add</i>		280.56	
40 05 19 00-0677	EA	10" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,559.69	359.13
		<i>For Class 52 Rating, Deduct</i>		-111.71	
		<i>For Class 54 Rating, Add</i>		158.86	
		<i>For Class 55 Rating, Add</i>		239.53	
		<i>For Class 56 Rating, Add</i>		319.18	
40 05 19 00-0678	EA	10" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,694.82	362.31
		<i>For Class 52 Rating, Deduct</i>		-126.05	
		<i>For Class 54 Rating, Add</i>		178.47	
		<i>For Class 55 Rating, Add</i>		268.70	
		<i>For Class 56 Rating, Add</i>		357.79	
40 05 19 00-0679	EA	10" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,829.95	365.48
		<i>For Class 52 Rating, Deduct</i>		-140.38	
		<i>For Class 54 Rating, Add</i>		198.07	
		<i>For Class 55 Rating, Add</i>		297.88	
		<i>For Class 56 Rating, Add</i>		396.41	
40 05 19 00-0680	EA	10" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,965.08	368.67
		<i>For Class 52 Rating, Deduct</i>		-154.72	
		<i>For Class 54 Rating, Add</i>		217.68	
		<i>For Class 55 Rating, Add</i>		327.06	
		<i>For Class 56 Rating, Add</i>		435.03	
40 05 19 00-0681	EA	10" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,100.21	371.85
		<i>For Class 52 Rating, Deduct</i>		-169.05	
		<i>For Class 54 Rating, Add</i>		237.28	
		<i>For Class 55 Rating, Add</i>		356.23	
		<i>For Class 56 Rating, Add</i>		473.64	
40 05 19 00-0682	EA	10" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,235.34	375.02
		<i>For Class 52 Rating, Deduct</i>		-183.38	
		<i>For Class 54 Rating, Add</i>		256.89	
		<i>For Class 55 Rating, Add</i>		385.41	
		<i>For Class 56 Rating, Add</i>		512.26	
40 05 19 00-0683	EA	10" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,370.47	378.20
		<i>For Class 52 Rating, Deduct</i>		-197.72	
		<i>For Class 54 Rating, Add</i>		276.49	
		<i>For Class 55 Rating, Add</i>		414.58	
		<i>For Class 56 Rating, Add</i>		550.87	
40 05 19 00-0684	EA	10" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,505.59	381.38
		<i>For Class 52 Rating, Deduct</i>		-212.05	
		<i>For Class 54 Rating, Add</i>		296.10	
		<i>For Class 55 Rating, Add</i>		443.76	
		<i>For Class 56 Rating, Add</i>		589.49	
40 05 19 00-0685	EA	10" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,640.73	384.55
		<i>For Class 52 Rating, Deduct</i>		-226.39	
		<i>For Class 54 Rating, Add</i>		315.70	
		<i>For Class 55 Rating, Add</i>		472.93	
		<i>For Class 56 Rating, Add</i>		628.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0686 EA 10" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,775.85	387.73
For Class 52 Rating, Deduct	-240.72	
For Class 54 Rating, Add	335.31	
For Class 55 Rating, Add	502.11	
For Class 56 Rating, Add	666.72	
40 05 19 00-0687 EA 10" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,910.99	390.91
For Class 52 Rating, Deduct	-255.06	
For Class 54 Rating, Add	354.91	
For Class 55 Rating, Add	531.29	
For Class 56 Rating, Add	705.34	
40 05 19 00-0688 EA 10" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,046.12	394.09
For Class 52 Rating, Deduct	-269.39	
For Class 54 Rating, Add	374.52	
For Class 55 Rating, Add	560.46	
For Class 56 Rating, Add	743.95	
40 05 19 00-0689 EA 10" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,181.26	397.27
For Class 52 Rating, Deduct	-283.73	
For Class 54 Rating, Add	394.12	
For Class 55 Rating, Add	589.64	
For Class 56 Rating, Add	782.57	
40 05 19 00-0690 EA 10" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,316.38	400.45
For Class 52 Rating, Deduct	-298.06	
For Class 54 Rating, Add	413.73	
For Class 55 Rating, Add	618.81	
For Class 56 Rating, Add	821.19	
40 05 19 00-0691 EA 10" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,451.52	403.63
For Class 52 Rating, Deduct	-312.40	
For Class 54 Rating, Add	433.33	
For Class 55 Rating, Add	647.99	
For Class 56 Rating, Add	859.80	
40 05 19 00-0692 EA 10" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,586.64	406.80
For Class 52 Rating, Deduct	-326.73	
For Class 54 Rating, Add	452.94	
For Class 55 Rating, Add	677.16	
For Class 56 Rating, Add	898.42	
40 05 19 00-0693 EA 10" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,721.77	409.98
For Class 52 Rating, Deduct	-341.06	
For Class 54 Rating, Add	472.54	
For Class 55 Rating, Add	706.34	
For Class 56 Rating, Add	937.03	
40 05 19 00-0694 EA 10" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,856.90	413.16
For Class 52 Rating, Deduct	-355.40	
For Class 54 Rating, Add	492.15	
For Class 55 Rating, Add	735.51	
For Class 56 Rating, Add	975.65	
40 05 19 00-0695 EA 10" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,992.03	416.33
For Class 52 Rating, Deduct	-369.73	
For Class 54 Rating, Add	511.75	
For Class 55 Rating, Add	764.69	
For Class 56 Rating, Add	1,014.27	
40 05 19 00-0696 EA 10" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,127.16	419.52
For Class 52 Rating, Deduct	-384.07	
For Class 54 Rating, Add	531.36	
For Class 55 Rating, Add	793.87	
For Class 56 Rating, Add	1,052.88	
40 05 19 00-0697 EA 10" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,262.29	422.70
For Class 52 Rating, Deduct	-398.40	
For Class 54 Rating, Add	550.96	
For Class 55 Rating, Add	823.04	
For Class 56 Rating, Add	1,091.50	
40 05 19 00-0698 EA 10" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,397.42	425.87
For Class 52 Rating, Deduct	-412.74	
For Class 54 Rating, Add	570.57	
For Class 55 Rating, Add	852.22	
For Class 56 Rating, Add	1,130.12	
40 05 19 00-0699 EA 10" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,532.55	429.05
For Class 52 Rating, Deduct	-427.07	
For Class 54 Rating, Add	590.17	
For Class 55 Rating, Add	881.39	
For Class 56 Rating, Add	1,168.73	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0700	EA	10" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,667.67	432.23
		<i>For Class 52 Rating, Deduct</i>		-441.41	
		<i>For Class 54 Rating, Add</i>		609.78	
		<i>For Class 55 Rating, Add</i>		910.57	
		<i>For Class 56 Rating, Add</i>		1,207.35	
40 05 19 00-0701	EA	10" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,802.81	435.40
		<i>For Class 52 Rating, Deduct</i>		-455.74	
		<i>For Class 54 Rating, Add</i>		629.38	
		<i>For Class 55 Rating, Add</i>		939.74	
		<i>For Class 56 Rating, Add</i>		1,245.96	
40 05 19 00-0702	EA	10" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,937.93	438.58
		<i>For Class 52 Rating, Deduct</i>		-470.08	
		<i>For Class 54 Rating, Add</i>		648.99	
		<i>For Class 55 Rating, Add</i>		968.92	
		<i>For Class 56 Rating, Add</i>		1,284.58	
40 05 19 00-0703	EA	10" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,073.07	441.76
		<i>For Class 52 Rating, Deduct</i>		-484.41	
		<i>For Class 54 Rating, Add</i>		668.59	
		<i>For Class 55 Rating, Add</i>		998.10	
		<i>For Class 56 Rating, Add</i>		1,323.20	
40 05 19 00-0704	EA	10" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,208.19	444.95
		<i>For Class 52 Rating, Deduct</i>		-498.74	
		<i>For Class 54 Rating, Add</i>		688.20	
		<i>For Class 55 Rating, Add</i>		1,027.27	
		<i>For Class 56 Rating, Add</i>		1,361.81	
40 05 19 00-0705	EA	10" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,343.33	448.12
		<i>For Class 52 Rating, Deduct</i>		-513.08	
		<i>For Class 54 Rating, Add</i>		707.80	
		<i>For Class 55 Rating, Add</i>		1,056.45	
		<i>For Class 56 Rating, Add</i>		1,400.43	
40 05 19 00-0706	EA	10" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,478.45	451.30
		<i>For Class 52 Rating, Deduct</i>		-527.41	
		<i>For Class 54 Rating, Add</i>		727.41	
		<i>For Class 55 Rating, Add</i>		1,085.62	
		<i>For Class 56 Rating, Add</i>		1,439.04	
40 05 19 00-0707	EA	10" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,613.58	454.48
		<i>For Class 52 Rating, Deduct</i>		-541.75	
		<i>For Class 54 Rating, Add</i>		747.01	
		<i>For Class 55 Rating, Add</i>		1,114.80	
		<i>For Class 56 Rating, Add</i>		1,477.66	
40 05 19 00-0708	EA	10" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,748.71	457.65
		<i>For Class 52 Rating, Deduct</i>		-556.08	
		<i>For Class 54 Rating, Add</i>		766.62	
		<i>For Class 55 Rating, Add</i>		1,143.97	
		<i>For Class 56 Rating, Add</i>		1,516.28	
40 05 19 00-0709	EA	10" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,883.83	460.83
		<i>For Class 52 Rating, Deduct</i>		-570.42	
		<i>For Class 54 Rating, Add</i>		786.22	
		<i>For Class 55 Rating, Add</i>		1,173.15	
		<i>For Class 56 Rating, Add</i>		1,554.89	
40 05 19 00-0710	EA	10" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,018.98	464.01
		<i>For Class 52 Rating, Deduct</i>		-584.75	
		<i>For Class 54 Rating, Add</i>		805.83	
		<i>For Class 55 Rating, Add</i>		1,202.33	
		<i>For Class 56 Rating, Add</i>		1,593.51	
40 05 19 00-0711	EA	10" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,154.10	467.18
		<i>For Class 52 Rating, Deduct</i>		-599.09	
		<i>For Class 54 Rating, Add</i>		825.43	
		<i>For Class 55 Rating, Add</i>		1,231.50	
		<i>For Class 56 Rating, Add</i>		1,632.12	
40 05 19 00-0712	EA	10" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,289.24	470.37
		<i>For Class 52 Rating, Deduct</i>		-613.42	
		<i>For Class 54 Rating, Add</i>		845.04	
		<i>For Class 55 Rating, Add</i>		1,260.68	
		<i>For Class 56 Rating, Add</i>		1,670.74	
40 05 19 00-0713	EA	10" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,424.36	473.55
		<i>For Class 52 Rating, Deduct</i>		-627.76	
		<i>For Class 54 Rating, Add</i>		864.64	
		<i>For Class 55 Rating, Add</i>		1,289.85	
		<i>For Class 56 Rating, Add</i>		1,709.36	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0714 EA 10" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,559.50	476.72
For Class 52 Rating, Deduct	-642.09	
For Class 54 Rating, Add	884.25	
For Class 55 Rating, Add	1,319.03	
For Class 56 Rating, Add	1,747.97	
40 05 19 00-0715 12" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0716 EA 12" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,846.98	444.95
For Class 52 Rating, Deduct	-129.01	
For Class 54 Rating, Add	184.01	
For Class 55 Rating, Add	277.72	
For Class 56 Rating, Add	370.25	
40 05 19 00-0717 EA 12" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,015.82	448.12
For Class 52 Rating, Deduct	-147.05	
For Class 54 Rating, Add	208.68	
For Class 55 Rating, Add	314.41	
For Class 56 Rating, Add	418.81	
40 05 19 00-0718 EA 12" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,184.64	451.30
For Class 52 Rating, Deduct	-165.09	
For Class 54 Rating, Add	233.33	
For Class 55 Rating, Add	351.10	
For Class 56 Rating, Add	467.37	
40 05 19 00-0719 EA 12" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,353.47	454.48
For Class 52 Rating, Deduct	-183.14	
For Class 54 Rating, Add	258.00	
For Class 55 Rating, Add	387.79	
For Class 56 Rating, Add	515.93	
40 05 19 00-0720 EA 12" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,522.31	457.65
For Class 52 Rating, Deduct	-201.18	
For Class 54 Rating, Add	282.66	
For Class 55 Rating, Add	424.49	
For Class 56 Rating, Add	564.49	
40 05 19 00-0721 EA 12" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,691.13	460.83
For Class 52 Rating, Deduct	-219.22	
For Class 54 Rating, Add	307.32	
For Class 55 Rating, Add	461.18	
For Class 56 Rating, Add	613.04	
40 05 19 00-0722 EA 12" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,859.98	464.01
For Class 52 Rating, Deduct	-237.26	
For Class 54 Rating, Add	331.98	
For Class 55 Rating, Add	497.87	
For Class 56 Rating, Add	661.60	
40 05 19 00-0723 EA 12" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,028.80	467.18
For Class 52 Rating, Deduct	-255.30	
For Class 54 Rating, Add	356.64	
For Class 55 Rating, Add	534.56	
For Class 56 Rating, Add	710.16	
40 05 19 00-0724 EA 12" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,197.64	470.37
For Class 52 Rating, Deduct	-273.35	
For Class 54 Rating, Add	381.30	
For Class 55 Rating, Add	571.25	
For Class 56 Rating, Add	758.72	
40 05 19 00-0725 EA 12" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,366.47	473.55
For Class 52 Rating, Deduct	-291.39	
For Class 54 Rating, Add	405.96	
For Class 55 Rating, Add	607.94	
For Class 56 Rating, Add	807.28	
40 05 19 00-0726 EA 12" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,535.30	476.72
For Class 52 Rating, Deduct	-309.43	
For Class 54 Rating, Add	430.62	
For Class 55 Rating, Add	644.63	
For Class 56 Rating, Add	855.84	
40 05 19 00-0727 EA 12" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,704.13	479.90
For Class 52 Rating, Deduct	-327.47	
For Class 54 Rating, Add	455.28	
For Class 55 Rating, Add	681.32	
For Class 56 Rating, Add	904.39	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0728	EA	12" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,872.97	483.08
		<i>For Class 52 Rating, Deduct</i>		-345.51	
		<i>For Class 54 Rating, Add</i>		479.94	
		<i>For Class 55 Rating, Add</i>		718.02	
		<i>For Class 56 Rating, Add</i>		952.95	
40 05 19 00-0729	EA	12" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,041.79	486.25
		<i>For Class 52 Rating, Deduct</i>		-363.55	
		<i>For Class 54 Rating, Add</i>		504.60	
		<i>For Class 55 Rating, Add</i>		754.71	
		<i>For Class 56 Rating, Add</i>		1,001.51	
40 05 19 00-0730	EA	12" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,210.63	489.43
		<i>For Class 52 Rating, Deduct</i>		-381.60	
		<i>For Class 54 Rating, Add</i>		529.26	
		<i>For Class 55 Rating, Add</i>		791.40	
		<i>For Class 56 Rating, Add</i>		1,050.07	
40 05 19 00-0731	EA	12" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,379.46	492.61
		<i>For Class 52 Rating, Deduct</i>		-399.64	
		<i>For Class 54 Rating, Add</i>		553.92	
		<i>For Class 55 Rating, Add</i>		828.09	
		<i>For Class 56 Rating, Add</i>		1,098.63	
40 05 19 00-0732	EA	12" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,548.29	495.80
		<i>For Class 52 Rating, Deduct</i>		-417.68	
		<i>For Class 54 Rating, Add</i>		578.58	
		<i>For Class 55 Rating, Add</i>		864.78	
		<i>For Class 56 Rating, Add</i>		1,147.18	
40 05 19 00-0733	EA	12" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,717.12	498.97
		<i>For Class 52 Rating, Deduct</i>		-435.72	
		<i>For Class 54 Rating, Add</i>		603.24	
		<i>For Class 55 Rating, Add</i>		901.47	
		<i>For Class 56 Rating, Add</i>		1,195.74	
40 05 19 00-0734	EA	12" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,885.95	502.15
		<i>For Class 52 Rating, Deduct</i>		-453.76	
		<i>For Class 54 Rating, Add</i>		627.90	
		<i>For Class 55 Rating, Add</i>		938.16	
		<i>For Class 56 Rating, Add</i>		1,244.30	
40 05 19 00-0735	EA	12" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,054.78	505.33
		<i>For Class 52 Rating, Deduct</i>		-471.81	
		<i>For Class 54 Rating, Add</i>		652.56	
		<i>For Class 55 Rating, Add</i>		974.85	
		<i>For Class 56 Rating, Add</i>		1,292.86	
40 05 19 00-0736	EA	12" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,223.62	508.50
		<i>For Class 52 Rating, Deduct</i>		-489.85	
		<i>For Class 54 Rating, Add</i>		677.22	
		<i>For Class 55 Rating, Add</i>		1,011.55	
		<i>For Class 56 Rating, Add</i>		1,341.42	
40 05 19 00-0737	EA	12" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,392.44	511.68
		<i>For Class 52 Rating, Deduct</i>		-507.89	
		<i>For Class 54 Rating, Add</i>		701.88	
		<i>For Class 55 Rating, Add</i>		1,048.24	
		<i>For Class 56 Rating, Add</i>		1,389.97	
40 05 19 00-0738	EA	12" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,561.28	514.86
		<i>For Class 52 Rating, Deduct</i>		-525.93	
		<i>For Class 54 Rating, Add</i>		726.54	
		<i>For Class 55 Rating, Add</i>		1,084.93	
		<i>For Class 56 Rating, Add</i>		1,438.53	
40 05 19 00-0739	EA	12" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,730.11	518.03
		<i>For Class 52 Rating, Deduct</i>		-543.97	
		<i>For Class 54 Rating, Add</i>		751.20	
		<i>For Class 55 Rating, Add</i>		1,121.62	
		<i>For Class 56 Rating, Add</i>		1,487.09	
40 05 19 00-0740	EA	12" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,898.94	521.22
		<i>For Class 52 Rating, Deduct</i>		-562.01	
		<i>For Class 54 Rating, Add</i>		775.86	
		<i>For Class 55 Rating, Add</i>		1,158.31	
		<i>For Class 56 Rating, Add</i>		1,535.65	
40 05 19 00-0741	EA	12" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,067.77	524.40
		<i>For Class 52 Rating, Deduct</i>		-580.06	
		<i>For Class 54 Rating, Add</i>		800.52	
		<i>For Class 55 Rating, Add</i>		1,195.00	
		<i>For Class 56 Rating, Add</i>		1,584.21	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0742	EA			12" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....6,236.61		527.57
				<i>For Class 52 Rating, Deduct</i>	-598.10	
				<i>For Class 54 Rating, Add</i>	825.18	
				<i>For Class 55 Rating, Add</i>	1,231.69	
				<i>For Class 56 Rating, Add</i>	1,632.77	
40 05 19 00-0743	EA			12" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....6,405.43		530.75
				<i>For Class 52 Rating, Deduct</i>	-616.14	
				<i>For Class 54 Rating, Add</i>	849.84	
				<i>For Class 55 Rating, Add</i>	1,268.38	
				<i>For Class 56 Rating, Add</i>	1,681.32	
40 05 19 00-0744	EA			12" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....6,574.27		533.93
				<i>For Class 52 Rating, Deduct</i>	-634.18	
				<i>For Class 54 Rating, Add</i>	874.50	
				<i>For Class 55 Rating, Add</i>	1,305.08	
				<i>For Class 56 Rating, Add</i>	1,729.88	
40 05 19 00-0745	EA			12" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....6,743.11		537.11
				<i>For Class 52 Rating, Deduct</i>	-652.22	
				<i>For Class 54 Rating, Add</i>	899.16	
				<i>For Class 55 Rating, Add</i>	1,341.77	
				<i>For Class 56 Rating, Add</i>	1,778.44	
40 05 19 00-0746	EA			12" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....6,911.94		540.28
				<i>For Class 52 Rating, Deduct</i>	-670.27	
				<i>For Class 54 Rating, Add</i>	923.82	
				<i>For Class 55 Rating, Add</i>	1,378.46	
				<i>For Class 56 Rating, Add</i>	1,827.00	
40 05 19 00-0747	EA			12" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....7,080.77		543.46
				<i>For Class 52 Rating, Deduct</i>	-688.31	
				<i>For Class 54 Rating, Add</i>	948.48	
				<i>For Class 55 Rating, Add</i>	1,415.15	
				<i>For Class 56 Rating, Add</i>	1,875.56	
40 05 19 00-0748	EA			12" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....7,249.60		546.65
				<i>For Class 52 Rating, Deduct</i>	-706.35	
				<i>For Class 54 Rating, Add</i>	973.14	
				<i>For Class 55 Rating, Add</i>	1,451.84	
				<i>For Class 56 Rating, Add</i>	1,924.12	
40 05 19 00-0749	EA			12" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....7,418.43		549.82
				<i>For Class 52 Rating, Deduct</i>	-724.39	
				<i>For Class 54 Rating, Add</i>	997.80	
				<i>For Class 55 Rating, Add</i>	1,488.53	
				<i>For Class 56 Rating, Add</i>	1,972.67	
40 05 19 00-0750	EA			12" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....7,587.27		553.00
				<i>For Class 52 Rating, Deduct</i>	-742.43	
				<i>For Class 54 Rating, Add</i>	1,022.46	
				<i>For Class 55 Rating, Add</i>	1,525.22	
				<i>For Class 56 Rating, Add</i>	2,021.23	
40 05 19 00-0751	EA			12" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....7,756.09		556.18
				<i>For Class 52 Rating, Deduct</i>	-760.47	
				<i>For Class 54 Rating, Add</i>	1,047.12	
				<i>For Class 55 Rating, Add</i>	1,561.91	
				<i>For Class 56 Rating, Add</i>	2,069.79	
40 05 19 00-0752	EA			12" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....7,924.93		559.35
				<i>For Class 52 Rating, Deduct</i>	-778.52	
				<i>For Class 54 Rating, Add</i>	1,071.78	
				<i>For Class 55 Rating, Add</i>	1,598.60	
				<i>For Class 56 Rating, Add</i>	2,118.35	
40 05 19 00-0753	EA			12" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....8,093.76		562.53
				<i>For Class 52 Rating, Deduct</i>	-796.56	
				<i>For Class 54 Rating, Add</i>	1,096.44	
				<i>For Class 55 Rating, Add</i>	1,635.30	
				<i>For Class 56 Rating, Add</i>	2,166.91	
40 05 19 00-0754	EA			12" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....8,262.59		565.71
				<i>For Class 52 Rating, Deduct</i>	-814.60	
				<i>For Class 54 Rating, Add</i>	1,121.10	
				<i>For Class 55 Rating, Add</i>	1,671.99	
				<i>For Class 56 Rating, Add</i>	2,215.46	

40 05 19 00-0755 14" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-0554)

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0756	EA	14" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,561.48	533.93
		<i>For Class 52 Rating, Deduct</i>		-192.78	
		<i>For Class 54 Rating, Add</i>		272.58	
		<i>For Class 55 Rating, Add</i>		410.22	
		<i>For Class 56 Rating, Add</i>		546.11	
40 05 19 00-0757	EA	14" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,766.27	537.11
		<i>For Class 52 Rating, Deduct</i>		-214.77	
		<i>For Class 54 Rating, Add</i>		302.64	
		<i>For Class 55 Rating, Add</i>		454.93	
		<i>For Class 56 Rating, Add</i>		605.28	
40 05 19 00-0758	EA	14" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,971.05	540.28
		<i>For Class 52 Rating, Deduct</i>		-236.77	
		<i>For Class 54 Rating, Add</i>		332.69	
		<i>For Class 55 Rating, Add</i>		499.64	
		<i>For Class 56 Rating, Add</i>		664.44	
40 05 19 00-0759	EA	14" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,175.83	543.46
		<i>For Class 52 Rating, Deduct</i>		-258.76	
		<i>For Class 54 Rating, Add</i>		362.74	
		<i>For Class 55 Rating, Add</i>		544.35	
		<i>For Class 56 Rating, Add</i>		723.60	
40 05 19 00-0760	EA	14" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,380.61	546.65
		<i>For Class 52 Rating, Deduct</i>		-280.76	
		<i>For Class 54 Rating, Add</i>		392.79	
		<i>For Class 55 Rating, Add</i>		589.05	
		<i>For Class 56 Rating, Add</i>		782.76	
40 05 19 00-0761	EA	14" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,585.39	549.82
		<i>For Class 52 Rating, Deduct</i>		-302.76	
		<i>For Class 54 Rating, Add</i>		422.85	
		<i>For Class 55 Rating, Add</i>		633.76	
		<i>For Class 56 Rating, Add</i>		841.93	
40 05 19 00-0762	EA	14" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,790.18	553.00
		<i>For Class 52 Rating, Deduct</i>		-324.75	
		<i>For Class 54 Rating, Add</i>		452.90	
		<i>For Class 55 Rating, Add</i>		678.47	
		<i>For Class 56 Rating, Add</i>		901.09	
40 05 19 00-0763	EA	14" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,994.95	556.18
		<i>For Class 52 Rating, Deduct</i>		-346.75	
		<i>For Class 54 Rating, Add</i>		482.95	
		<i>For Class 55 Rating, Add</i>		723.18	
		<i>For Class 56 Rating, Add</i>		960.25	
40 05 19 00-0764	EA	14" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,199.74	559.35
		<i>For Class 52 Rating, Deduct</i>		-368.75	
		<i>For Class 54 Rating, Add</i>		513.00	
		<i>For Class 55 Rating, Add</i>		767.89	
		<i>For Class 56 Rating, Add</i>		1,019.42	
40 05 19 00-0765	EA	14" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,404.51	562.53
		<i>For Class 52 Rating, Deduct</i>		-390.74	
		<i>For Class 54 Rating, Add</i>		543.06	
		<i>For Class 55 Rating, Add</i>		812.59	
		<i>For Class 56 Rating, Add</i>		1,078.58	
40 05 19 00-0766	EA	14" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,609.30	565.71
		<i>For Class 52 Rating, Deduct</i>		-412.74	
		<i>For Class 54 Rating, Add</i>		573.11	
		<i>For Class 55 Rating, Add</i>		857.30	
		<i>For Class 56 Rating, Add</i>		1,137.74	
40 05 19 00-0767	EA	14" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,814.07	568.88
		<i>For Class 52 Rating, Deduct</i>		-434.73	
		<i>For Class 54 Rating, Add</i>		603.16	
		<i>For Class 55 Rating, Add</i>		902.01	
		<i>For Class 56 Rating, Add</i>		1,196.91	
40 05 19 00-0768	EA	14" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,018.86	572.07
		<i>For Class 52 Rating, Deduct</i>		-456.73	
		<i>For Class 54 Rating, Add</i>		633.21	
		<i>For Class 55 Rating, Add</i>		946.72	
		<i>For Class 56 Rating, Add</i>		1,256.07	
40 05 19 00-0769	EA	14" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,223.63	575.25
		<i>For Class 52 Rating, Deduct</i>		-478.73	
		<i>For Class 54 Rating, Add</i>		663.27	
		<i>For Class 55 Rating, Add</i>		991.43	
		<i>For Class 56 Rating, Add</i>		1,315.23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0770 EA 14" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	5,428.42	578.42
For Class 52 Rating, Deduct	-500.72	
For Class 54 Rating, Add	693.32	
For Class 55 Rating, Add	1,036.13	
For Class 56 Rating, Add	1,374.40	
40 05 19 00-0771 EA 14" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	5,633.19	581.60
For Class 52 Rating, Deduct	-522.72	
For Class 54 Rating, Add	723.37	
For Class 55 Rating, Add	1,080.84	
For Class 56 Rating, Add	1,433.56	
40 05 19 00-0772 EA 14" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	5,837.98	584.78
For Class 52 Rating, Deduct	-544.71	
For Class 54 Rating, Add	753.42	
For Class 55 Rating, Add	1,125.55	
For Class 56 Rating, Add	1,492.72	
40 05 19 00-0773 EA 14" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	6,042.75	587.96
For Class 52 Rating, Deduct	-566.71	
For Class 54 Rating, Add	783.48	
For Class 55 Rating, Add	1,170.26	
For Class 56 Rating, Add	1,551.88	
40 05 19 00-0774 EA 14" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	6,247.54	591.13
For Class 52 Rating, Deduct	-588.71	
For Class 54 Rating, Add	813.53	
For Class 55 Rating, Add	1,214.97	
For Class 56 Rating, Add	1,611.05	
40 05 19 00-0775 EA 14" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	6,452.31	594.31
For Class 52 Rating, Deduct	-610.70	
For Class 54 Rating, Add	843.58	
For Class 55 Rating, Add	1,259.67	
For Class 56 Rating, Add	1,670.21	
40 05 19 00-0776 EA 14" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	6,657.10	597.50
For Class 52 Rating, Deduct	-632.70	
For Class 54 Rating, Add	873.63	
For Class 55 Rating, Add	1,304.38	
For Class 56 Rating, Add	1,729.37	
40 05 19 00-0777 EA 14" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	6,861.87	600.67
For Class 52 Rating, Deduct	-654.69	
For Class 54 Rating, Add	903.69	
For Class 55 Rating, Add	1,349.09	
For Class 56 Rating, Add	1,788.54	
40 05 19 00-0778 EA 14" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	7,066.66	603.85
For Class 52 Rating, Deduct	-676.69	
For Class 54 Rating, Add	933.74	
For Class 55 Rating, Add	1,393.80	
For Class 56 Rating, Add	1,847.70	
40 05 19 00-0779 EA 14" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	7,271.44	607.03
For Class 52 Rating, Deduct	-698.69	
For Class 54 Rating, Add	963.79	
For Class 55 Rating, Add	1,438.50	
For Class 56 Rating, Add	1,906.86	
40 05 19 00-0780 EA 14" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	7,476.23	610.20
For Class 52 Rating, Deduct	-720.68	
For Class 54 Rating, Add	993.85	
For Class 55 Rating, Add	1,483.21	
For Class 56 Rating, Add	1,966.03	
40 05 19 00-0781 EA 14" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	7,681.00	613.38
For Class 52 Rating, Deduct	-742.68	
For Class 54 Rating, Add	1,023.90	
For Class 55 Rating, Add	1,527.92	
For Class 56 Rating, Add	2,025.19	
40 05 19 00-0782 EA 14" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	7,885.79	616.56
For Class 52 Rating, Deduct	-764.68	
For Class 54 Rating, Add	1,053.95	
For Class 55 Rating, Add	1,572.63	
For Class 56 Rating, Add	2,084.35	
40 05 19 00-0783 EA 14" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron		
Pipe	8,090.56	619.73
For Class 52 Rating, Deduct	-786.67	
For Class 54 Rating, Add	1,084.00	
For Class 55 Rating, Add	1,617.33	
For Class 56 Rating, Add	2,143.51	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0784	EA	14" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,295.35	622.92
		<i>For Class 52 Rating, Deduct</i>	-808.67	
		<i>For Class 54 Rating, Add</i>	1,114.06	
		<i>For Class 55 Rating, Add</i>	1,662.04	
		<i>For Class 56 Rating, Add</i>	2,202.68	
40 05 19 00-0785	EA	14" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,500.12	626.10
		<i>For Class 52 Rating, Deduct</i>	-830.66	
		<i>For Class 54 Rating, Add</i>	1,144.11	
		<i>For Class 55 Rating, Add</i>	1,706.75	
		<i>For Class 56 Rating, Add</i>	2,261.84	
40 05 19 00-0786	EA	14" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,704.91	629.27
		<i>For Class 52 Rating, Deduct</i>	-852.66	
		<i>For Class 54 Rating, Add</i>	1,174.16	
		<i>For Class 55 Rating, Add</i>	1,751.46	
		<i>For Class 56 Rating, Add</i>	2,321.00	
40 05 19 00-0787	EA	14" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,909.69	632.45
		<i>For Class 52 Rating, Deduct</i>	-874.66	
		<i>For Class 54 Rating, Add</i>	1,204.21	
		<i>For Class 55 Rating, Add</i>	1,796.17	
		<i>For Class 56 Rating, Add</i>	2,380.17	
40 05 19 00-0788	EA	14" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,114.47	635.63
		<i>For Class 52 Rating, Deduct</i>	-896.65	
		<i>For Class 54 Rating, Add</i>	1,234.27	
		<i>For Class 55 Rating, Add</i>	1,840.87	
		<i>For Class 56 Rating, Add</i>	2,439.33	
40 05 19 00-0789	EA	14" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,319.25	638.81
		<i>For Class 52 Rating, Deduct</i>	-918.65	
		<i>For Class 54 Rating, Add</i>	1,264.32	
		<i>For Class 55 Rating, Add</i>	1,885.58	
		<i>For Class 56 Rating, Add</i>	2,498.50	
40 05 19 00-0790	EA	14" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,524.03	641.98
		<i>For Class 52 Rating, Deduct</i>	-940.65	
		<i>For Class 54 Rating, Add</i>	1,294.37	
		<i>For Class 55 Rating, Add</i>	1,930.29	
		<i>For Class 56 Rating, Add</i>	2,557.66	
40 05 19 00-0791	EA	14" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,728.81	645.16
		<i>For Class 52 Rating, Deduct</i>	-962.64	
		<i>For Class 54 Rating, Add</i>	1,324.42	
		<i>For Class 55 Rating, Add</i>	1,975.00	
		<i>For Class 56 Rating, Add</i>	2,616.82	
40 05 19 00-0792	EA	14" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,933.59	648.35
		<i>For Class 52 Rating, Deduct</i>	-984.64	
		<i>For Class 54 Rating, Add</i>	1,354.48	
		<i>For Class 55 Rating, Add</i>	2,019.70	
		<i>For Class 56 Rating, Add</i>	2,675.98	
40 05 19 00-0793	EA	14" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,138.37	651.52
		<i>For Class 52 Rating, Deduct</i>	-1,006.63	
		<i>For Class 54 Rating, Add</i>	1,384.53	
		<i>For Class 55 Rating, Add</i>	2,064.41	
		<i>For Class 56 Rating, Add</i>	2,735.15	
40 05 19 00-0794		16" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0795	EA	16" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,998.36	610.20
		<i>For Class 52 Rating, Deduct</i>	-228.12	
		<i>For Class 54 Rating, Add</i>	322.16	
		<i>For Class 55 Rating, Add</i>	484.65	
		<i>For Class 56 Rating, Add</i>	645.06	
40 05 19 00-0796	EA	16" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,236.83	613.38
		<i>For Class 52 Rating, Deduct</i>	-253.82	
		<i>For Class 54 Rating, Add</i>	357.27	
		<i>For Class 55 Rating, Add</i>	536.87	
		<i>For Class 56 Rating, Add</i>	714.16	
40 05 19 00-0797	EA	16" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,475.32	616.56
		<i>For Class 52 Rating, Deduct</i>	-279.52	
		<i>For Class 54 Rating, Add</i>	392.38	
		<i>For Class 55 Rating, Add</i>	589.09	
		<i>For Class 56 Rating, Add</i>	783.26	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0798	EA			16" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,713.80	619.73
				<i>For Class 52 Rating, Deduct</i>	-305.23	
				<i>For Class 54 Rating, Add</i>	427.49	
				<i>For Class 55 Rating, Add</i>	641.32	
				<i>For Class 56 Rating, Add</i>	852.37	
40 05 19 00-0799	EA			16" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,952.29	622.92
				<i>For Class 52 Rating, Deduct</i>	-330.93	
				<i>For Class 54 Rating, Add</i>	462.60	
				<i>For Class 55 Rating, Add</i>	693.54	
				<i>For Class 56 Rating, Add</i>	921.48	
40 05 19 00-0800	EA			16" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,190.76	626.10
				<i>For Class 52 Rating, Deduct</i>	-356.63	
				<i>For Class 54 Rating, Add</i>	497.70	
				<i>For Class 55 Rating, Add</i>	745.76	
				<i>For Class 56 Rating, Add</i>	990.58	
40 05 19 00-0801	EA			16" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,429.25	629.27
				<i>For Class 52 Rating, Deduct</i>	-382.34	
				<i>For Class 54 Rating, Add</i>	532.81	
				<i>For Class 55 Rating, Add</i>	797.99	
				<i>For Class 56 Rating, Add</i>	1,059.69	
40 05 19 00-0802	EA			16" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,667.73	632.45
				<i>For Class 52 Rating, Deduct</i>	-408.04	
				<i>For Class 54 Rating, Add</i>	567.92	
				<i>For Class 55 Rating, Add</i>	850.21	
				<i>For Class 56 Rating, Add</i>	1,128.79	
40 05 19 00-0803	EA			16" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,906.21	635.63
				<i>For Class 52 Rating, Deduct</i>	-433.74	
				<i>For Class 54 Rating, Add</i>	603.03	
				<i>For Class 55 Rating, Add</i>	902.43	
				<i>For Class 56 Rating, Add</i>	1,197.89	
40 05 19 00-0804	EA			16" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,122.22	638.81
				<i>For Class 52 Rating, Deduct</i>	-456.98	
				<i>For Class 54 Rating, Add</i>	634.76	
				<i>For Class 55 Rating, Add</i>	949.64	
				<i>For Class 56 Rating, Add</i>	1,260.37	
40 05 19 00-0805	EA			16" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,383.18	641.98
				<i>For Class 52 Rating, Deduct</i>	-485.15	
				<i>For Class 54 Rating, Add</i>	673.24	
				<i>For Class 55 Rating, Add</i>	1,006.88	
				<i>For Class 56 Rating, Add</i>	1,336.11	
40 05 19 00-0806	EA			16" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,621.66	645.16
				<i>For Class 52 Rating, Deduct</i>	-510.86	
				<i>For Class 54 Rating, Add</i>	708.35	
				<i>For Class 55 Rating, Add</i>	1,059.10	
				<i>For Class 56 Rating, Add</i>	1,405.21	
40 05 19 00-0807	EA			16" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,860.14	648.35
				<i>For Class 52 Rating, Deduct</i>	-536.56	
				<i>For Class 54 Rating, Add</i>	743.46	
				<i>For Class 55 Rating, Add</i>	1,111.33	
				<i>For Class 56 Rating, Add</i>	1,474.32	
40 05 19 00-0808	EA			16" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,098.62	651.52
				<i>For Class 52 Rating, Deduct</i>	-562.26	
				<i>For Class 54 Rating, Add</i>	778.57	
				<i>For Class 55 Rating, Add</i>	1,163.55	
				<i>For Class 56 Rating, Add</i>	1,543.42	
40 05 19 00-0809	EA			16" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,337.11	654.70
				<i>For Class 52 Rating, Deduct</i>	-587.97	
				<i>For Class 54 Rating, Add</i>	813.67	
				<i>For Class 55 Rating, Add</i>	1,215.77	
				<i>For Class 56 Rating, Add</i>	1,612.53	
40 05 19 00-0810	EA			16" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,575.58	657.88
				<i>For Class 52 Rating, Deduct</i>	-613.67	
				<i>For Class 54 Rating, Add</i>	848.78	
				<i>For Class 55 Rating, Add</i>	1,268.00	
				<i>For Class 56 Rating, Add</i>	1,681.63	
40 05 19 00-0811	EA			16" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,814.07	661.05
				<i>For Class 52 Rating, Deduct</i>	-639.37	
				<i>For Class 54 Rating, Add</i>	883.89	
				<i>For Class 55 Rating, Add</i>	1,320.22	
				<i>For Class 56 Rating, Add</i>	1,750.74	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0812	EA	16" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,052.55	664.23
		<i>For Class 52 Rating, Deduct</i>	-665.08	
		<i>For Class 54 Rating, Add</i>	919.00	
		<i>For Class 55 Rating, Add</i>	1,372.44	
		<i>For Class 56 Rating, Add</i>	1,819.84	
40 05 19 00-0813	EA	16" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,291.04	667.41
		<i>For Class 52 Rating, Deduct</i>	-690.78	
		<i>For Class 54 Rating, Add</i>	954.11	
		<i>For Class 55 Rating, Add</i>	1,424.67	
		<i>For Class 56 Rating, Add</i>	1,888.95	
40 05 19 00-0814	EA	16" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,529.51	670.58
		<i>For Class 52 Rating, Deduct</i>	-716.48	
		<i>For Class 54 Rating, Add</i>	989.21	
		<i>For Class 55 Rating, Add</i>	1,476.89	
		<i>For Class 56 Rating, Add</i>	1,958.05	
40 05 19 00-0815	EA	16" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,767.99	673.77
		<i>For Class 52 Rating, Deduct</i>	-742.19	
		<i>For Class 54 Rating, Add</i>	1,024.32	
		<i>For Class 55 Rating, Add</i>	1,529.11	
		<i>For Class 56 Rating, Add</i>	2,027.16	
40 05 19 00-0816	EA	16" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,006.48	676.95
		<i>For Class 52 Rating, Deduct</i>	-767.89	
		<i>For Class 54 Rating, Add</i>	1,059.43	
		<i>For Class 55 Rating, Add</i>	1,581.34	
		<i>For Class 56 Rating, Add</i>	2,096.26	
40 05 19 00-0817	EA	16" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,244.96	680.13
		<i>For Class 52 Rating, Deduct</i>	-793.59	
		<i>For Class 54 Rating, Add</i>	1,094.54	
		<i>For Class 55 Rating, Add</i>	1,633.56	
		<i>For Class 56 Rating, Add</i>	2,165.37	
40 05 19 00-0818	EA	16" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,483.45	683.30
		<i>For Class 52 Rating, Deduct</i>	-819.30	
		<i>For Class 54 Rating, Add</i>	1,129.64	
		<i>For Class 55 Rating, Add</i>	1,685.78	
		<i>For Class 56 Rating, Add</i>	2,234.47	
40 05 19 00-0819	EA	16" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,721.93	686.48
		<i>For Class 52 Rating, Deduct</i>	-845.00	
		<i>For Class 54 Rating, Add</i>	1,164.75	
		<i>For Class 55 Rating, Add</i>	1,738.01	
		<i>For Class 56 Rating, Add</i>	2,303.58	
40 05 19 00-0820	EA	16" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,960.42	689.66
		<i>For Class 52 Rating, Deduct</i>	-870.70	
		<i>For Class 54 Rating, Add</i>	1,199.86	
		<i>For Class 55 Rating, Add</i>	1,790.23	
		<i>For Class 56 Rating, Add</i>	2,372.68	
40 05 19 00-0821	EA	16" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,198.89	692.83
		<i>For Class 52 Rating, Deduct</i>	-896.41	
		<i>For Class 54 Rating, Add</i>	1,234.97	
		<i>For Class 55 Rating, Add</i>	1,842.45	
		<i>For Class 56 Rating, Add</i>	2,441.79	
40 05 19 00-0822	EA	16" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,437.38	696.01
		<i>For Class 52 Rating, Deduct</i>	-922.11	
		<i>For Class 54 Rating, Add</i>	1,270.08	
		<i>For Class 55 Rating, Add</i>	1,894.68	
		<i>For Class 56 Rating, Add</i>	2,510.89	
40 05 19 00-0823	EA	16" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,675.86	699.20
		<i>For Class 52 Rating, Deduct</i>	-947.81	
		<i>For Class 54 Rating, Add</i>	1,305.18	
		<i>For Class 55 Rating, Add</i>	1,946.90	
		<i>For Class 56 Rating, Add</i>	2,580.00	
40 05 19 00-0824	EA	16" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,914.35	702.37
		<i>For Class 52 Rating, Deduct</i>	-973.52	
		<i>For Class 54 Rating, Add</i>	1,340.29	
		<i>For Class 55 Rating, Add</i>	1,999.12	
		<i>For Class 56 Rating, Add</i>	2,649.11	
40 05 19 00-0825	EA	16" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,152.82	705.55
		<i>For Class 52 Rating, Deduct</i>	-999.22	
		<i>For Class 54 Rating, Add</i>	1,375.40	
		<i>For Class 55 Rating, Add</i>	2,051.35	
		<i>For Class 56 Rating, Add</i>	2,718.21	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0826 EA 16" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,391.31	708.73
<i>For Class 52 Rating, Deduct</i>	-1,024.92	
<i>For Class 54 Rating, Add</i>	1,410.51	
<i>For Class 55 Rating, Add</i>	2,103.57	
<i>For Class 56 Rating, Add</i>	2,787.31	
40 05 19 00-0827 EA 16" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,629.79	711.90
<i>For Class 52 Rating, Deduct</i>	-1,050.63	
<i>For Class 54 Rating, Add</i>	1,445.62	
<i>For Class 55 Rating, Add</i>	2,155.79	
<i>For Class 56 Rating, Add</i>	2,856.42	
40 05 19 00-0828 EA 16" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,868.27	715.08
<i>For Class 52 Rating, Deduct</i>	-1,076.33	
<i>For Class 54 Rating, Add</i>	1,480.72	
<i>For Class 55 Rating, Add</i>	2,208.02	
<i>For Class 56 Rating, Add</i>	2,925.52	
40 05 19 00-0829 EA 16" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,106.75	718.26
<i>For Class 52 Rating, Deduct</i>	-1,102.03	
<i>For Class 54 Rating, Add</i>	1,515.83	
<i>For Class 55 Rating, Add</i>	2,260.24	
<i>For Class 56 Rating, Add</i>	2,994.63	
40 05 19 00-0830 EA 16" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,345.24	721.44
<i>For Class 52 Rating, Deduct</i>	-1,127.74	
<i>For Class 54 Rating, Add</i>	1,550.94	
<i>For Class 55 Rating, Add</i>	2,312.46	
<i>For Class 56 Rating, Add</i>	3,063.74	
40 05 19 00-0831 EA 16" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,583.72	724.62
<i>For Class 52 Rating, Deduct</i>	-1,153.44	
<i>For Class 54 Rating, Add</i>	1,586.05	
<i>For Class 55 Rating, Add</i>	2,364.69	
<i>For Class 56 Rating, Add</i>	3,132.84	
40 05 19 00-0832 EA 16" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,822.20	727.80
<i>For Class 52 Rating, Deduct</i>	-1,179.14	
<i>For Class 54 Rating, Add</i>	1,621.15	
<i>For Class 55 Rating, Add</i>	2,416.91	
<i>For Class 56 Rating, Add</i>	3,201.94	
40 05 19 00-0833 18" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0834 EA 18" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,502.30	687.75
<i>For Class 52 Rating, Deduct</i>	-270.63	
<i>For Class 54 Rating, Add</i>	381.54	
<i>For Class 55 Rating, Add</i>	573.64	
<i>For Class 56 Rating, Add</i>	763.29	
40 05 19 00-0835 EA 18" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,776.72	690.93
<i>For Class 52 Rating, Deduct</i>	-300.28	
<i>For Class 54 Rating, Add</i>	422.04	
<i>For Class 55 Rating, Add</i>	633.88	
<i>For Class 56 Rating, Add</i>	843.00	
40 05 19 00-0836 EA 18" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,051.16	694.11
<i>For Class 52 Rating, Deduct</i>	-329.94	
<i>For Class 54 Rating, Add</i>	462.54	
<i>For Class 55 Rating, Add</i>	694.12	
<i>For Class 56 Rating, Add</i>	922.71	
40 05 19 00-0837 EA 18" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,325.58	697.30
<i>For Class 52 Rating, Deduct</i>	-359.60	
<i>For Class 54 Rating, Add</i>	503.04	
<i>For Class 55 Rating, Add</i>	754.36	
<i>For Class 56 Rating, Add</i>	1,002.42	
40 05 19 00-0838 EA 18" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,600.02	700.47
<i>For Class 52 Rating, Deduct</i>	-389.26	
<i>For Class 54 Rating, Add</i>	543.54	
<i>For Class 55 Rating, Add</i>	814.60	
<i>For Class 56 Rating, Add</i>	1,082.13	
40 05 19 00-0839 EA 18" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,874.45	703.65
<i>For Class 52 Rating, Deduct</i>	-418.92	
<i>For Class 54 Rating, Add</i>	584.04	
<i>For Class 55 Rating, Add</i>	874.84	
<i>For Class 56 Rating, Add</i>	1,161.84	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0840	EA	18" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,148.88	706.83
		<i>For Class 52 Rating, Deduct</i>		-448.57	
		<i>For Class 54 Rating, Add</i>		624.54	
		<i>For Class 55 Rating, Add</i>		935.08	
		<i>For Class 56 Rating, Add</i>		1,241.55	
40 05 19 00-0841	EA	18" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,423.31	710.00
		<i>For Class 52 Rating, Deduct</i>		-478.23	
		<i>For Class 54 Rating, Add</i>		665.04	
		<i>For Class 55 Rating, Add</i>		995.32	
		<i>For Class 56 Rating, Add</i>		1,321.26	
40 05 19 00-0842	EA	18" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,697.74	713.18
		<i>For Class 52 Rating, Deduct</i>		-507.89	
		<i>For Class 54 Rating, Add</i>		705.54	
		<i>For Class 55 Rating, Add</i>		1,055.56	
		<i>For Class 56 Rating, Add</i>		1,400.97	
40 05 19 00-0843	EA	18" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,972.17	716.36
		<i>For Class 52 Rating, Deduct</i>		-537.55	
		<i>For Class 54 Rating, Add</i>		746.04	
		<i>For Class 55 Rating, Add</i>		1,115.80	
		<i>For Class 56 Rating, Add</i>		1,480.68	
40 05 19 00-0844	EA	18" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,246.61	719.53
		<i>For Class 52 Rating, Deduct</i>		-567.21	
		<i>For Class 54 Rating, Add</i>		786.54	
		<i>For Class 55 Rating, Add</i>		1,176.04	
		<i>For Class 56 Rating, Add</i>		1,560.39	
40 05 19 00-0845	EA	18" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,521.04	722.72
		<i>For Class 52 Rating, Deduct</i>		-596.86	
		<i>For Class 54 Rating, Add</i>		827.04	
		<i>For Class 55 Rating, Add</i>		1,236.28	
		<i>For Class 56 Rating, Add</i>		1,640.10	
40 05 19 00-0846	EA	18" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,795.48	725.90
		<i>For Class 52 Rating, Deduct</i>		-626.52	
		<i>For Class 54 Rating, Add</i>		867.54	
		<i>For Class 55 Rating, Add</i>		1,296.52	
		<i>For Class 56 Rating, Add</i>		1,719.81	
40 05 19 00-0847	EA	18" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		7,069.90	729.07
		<i>For Class 52 Rating, Deduct</i>		-656.18	
		<i>For Class 54 Rating, Add</i>		908.04	
		<i>For Class 55 Rating, Add</i>		1,356.76	
		<i>For Class 56 Rating, Add</i>		1,799.52	
40 05 19 00-0848	EA	18" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		7,344.34	732.25
		<i>For Class 52 Rating, Deduct</i>		-685.84	
		<i>For Class 54 Rating, Add</i>		948.54	
		<i>For Class 55 Rating, Add</i>		1,417.00	
		<i>For Class 56 Rating, Add</i>		1,879.23	
40 05 19 00-0849	EA	18" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		7,618.77	735.43
		<i>For Class 52 Rating, Deduct</i>		-715.49	
		<i>For Class 54 Rating, Add</i>		989.04	
		<i>For Class 55 Rating, Add</i>		1,477.24	
		<i>For Class 56 Rating, Add</i>		1,958.94	
40 05 19 00-0850	EA	18" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		7,893.20	738.60
		<i>For Class 52 Rating, Deduct</i>		-745.15	
		<i>For Class 54 Rating, Add</i>		1,029.54	
		<i>For Class 55 Rating, Add</i>		1,537.48	
		<i>For Class 56 Rating, Add</i>		2,038.65	
40 05 19 00-0851	EA	18" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		8,167.63	741.78
		<i>For Class 52 Rating, Deduct</i>		-774.81	
		<i>For Class 54 Rating, Add</i>		1,070.04	
		<i>For Class 55 Rating, Add</i>		1,597.72	
		<i>For Class 56 Rating, Add</i>		2,118.36	
40 05 19 00-0852	EA	18" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		8,442.06	744.96
		<i>For Class 52 Rating, Deduct</i>		-804.47	
		<i>For Class 54 Rating, Add</i>		1,110.54	
		<i>For Class 55 Rating, Add</i>		1,657.96	
		<i>For Class 56 Rating, Add</i>		2,198.07	
40 05 19 00-0853	EA	18" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		8,716.49	748.15
		<i>For Class 52 Rating, Deduct</i>		-834.12	
		<i>For Class 54 Rating, Add</i>		1,151.04	
		<i>For Class 55 Rating, Add</i>		1,718.20	
		<i>For Class 56 Rating, Add</i>		2,277.78	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0854	EA			18" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,990.93	751.32
				<i>For Class 52 Rating, Deduct</i>	-863.78	
				<i>For Class 54 Rating, Add</i>	1,191.55	
				<i>For Class 55 Rating, Add</i>	1,778.44	
				<i>For Class 56 Rating, Add</i>	2,357.49	
40 05 19 00-0855	EA			18" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,265.35	754.50
				<i>For Class 52 Rating, Deduct</i>	-893.44	
				<i>For Class 54 Rating, Add</i>	1,232.05	
				<i>For Class 55 Rating, Add</i>	1,838.68	
				<i>For Class 56 Rating, Add</i>	2,437.20	
40 05 19 00-0856	EA			18" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,539.79	757.68
				<i>For Class 52 Rating, Deduct</i>	-923.10	
				<i>For Class 54 Rating, Add</i>	1,272.55	
				<i>For Class 55 Rating, Add</i>	1,898.92	
				<i>For Class 56 Rating, Add</i>	2,516.91	
40 05 19 00-0857	EA			18" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,814.21	760.85
				<i>For Class 52 Rating, Deduct</i>	-952.76	
				<i>For Class 54 Rating, Add</i>	1,313.05	
				<i>For Class 55 Rating, Add</i>	1,959.16	
				<i>For Class 56 Rating, Add</i>	2,596.62	
40 05 19 00-0858	EA			18" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,088.64	764.03
				<i>For Class 52 Rating, Deduct</i>	-982.41	
				<i>For Class 54 Rating, Add</i>	1,353.55	
				<i>For Class 55 Rating, Add</i>	2,019.40	
				<i>For Class 56 Rating, Add</i>	2,676.33	
40 05 19 00-0859	EA			18" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,363.08	767.21
				<i>For Class 52 Rating, Deduct</i>	-1,012.07	
				<i>For Class 54 Rating, Add</i>	1,394.05	
				<i>For Class 55 Rating, Add</i>	2,079.64	
				<i>For Class 56 Rating, Add</i>	2,756.04	
40 05 19 00-0860	EA			18" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,637.50	770.38
				<i>For Class 52 Rating, Deduct</i>	-1,041.73	
				<i>For Class 54 Rating, Add</i>	1,434.55	
				<i>For Class 55 Rating, Add</i>	2,139.88	
				<i>For Class 56 Rating, Add</i>	2,835.75	
40 05 19 00-0861	EA			18" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,911.94	773.57
				<i>For Class 52 Rating, Deduct</i>	-1,071.39	
				<i>For Class 54 Rating, Add</i>	1,475.05	
				<i>For Class 55 Rating, Add</i>	2,200.12	
				<i>For Class 56 Rating, Add</i>	2,915.46	
40 05 19 00-0862	EA			18" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,186.36	776.75
				<i>For Class 52 Rating, Deduct</i>	-1,101.04	
				<i>For Class 54 Rating, Add</i>	1,515.55	
				<i>For Class 55 Rating, Add</i>	2,260.36	
				<i>For Class 56 Rating, Add</i>	2,995.17	
40 05 19 00-0863	EA			18" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,460.80	779.92
				<i>For Class 52 Rating, Deduct</i>	-1,130.70	
				<i>For Class 54 Rating, Add</i>	1,556.05	
				<i>For Class 55 Rating, Add</i>	2,320.60	
				<i>For Class 56 Rating, Add</i>	3,074.88	
40 05 19 00-0864	EA			18" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,735.23	783.10
				<i>For Class 52 Rating, Deduct</i>	-1,160.36	
				<i>For Class 54 Rating, Add</i>	1,596.55	
				<i>For Class 55 Rating, Add</i>	2,380.84	
				<i>For Class 56 Rating, Add</i>	3,154.59	
40 05 19 00-0865	EA			18" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,009.66	786.28
				<i>For Class 52 Rating, Deduct</i>	-1,190.02	
				<i>For Class 54 Rating, Add</i>	1,637.05	
				<i>For Class 55 Rating, Add</i>	2,441.08	
				<i>For Class 56 Rating, Add</i>	3,234.30	
40 05 19 00-0866	EA			18" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,284.09	789.45
				<i>For Class 52 Rating, Deduct</i>	-1,219.68	
				<i>For Class 54 Rating, Add</i>	1,677.55	
				<i>For Class 55 Rating, Add</i>	2,501.32	
				<i>For Class 56 Rating, Add</i>	3,314.01	
40 05 19 00-0867	EA			18" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,558.53	792.63
				<i>For Class 52 Rating, Deduct</i>	-1,249.33	
				<i>For Class 54 Rating, Add</i>	1,718.05	
				<i>For Class 55 Rating, Add</i>	2,561.56	
				<i>For Class 56 Rating, Add</i>	3,393.72	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-0868	EA		18" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,832.96	795.81
			<i>For Class 52 Rating, Deduct</i>	-1,278.99	
			<i>For Class 54 Rating, Add</i>	1,758.55	
			<i>For Class 55 Rating, Add</i>	2,621.80	
			<i>For Class 56 Rating, Add</i>	3,473.43	
40 05 19 00-0869	EA		18" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,107.40	799.00
			<i>For Class 52 Rating, Deduct</i>	-1,308.65	
			<i>For Class 54 Rating, Add</i>	1,799.05	
			<i>For Class 55 Rating, Add</i>	2,682.04	
			<i>For Class 56 Rating, Add</i>	3,553.14	
40 05 19 00-0870	EA		18" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,381.82	802.17
			<i>For Class 52 Rating, Deduct</i>	-1,338.31	
			<i>For Class 54 Rating, Add</i>	1,839.55	
			<i>For Class 55 Rating, Add</i>	2,742.28	
			<i>For Class 56 Rating, Add</i>	3,632.85	
40 05 19 00-0871	EA		18" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,656.26	805.35
			<i>For Class 52 Rating, Deduct</i>	-1,367.96	
			<i>For Class 54 Rating, Add</i>	1,880.05	
			<i>For Class 55 Rating, Add</i>	2,802.52	
			<i>For Class 56 Rating, Add</i>	3,712.56	

40 05 19 00-0872 20" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-0554)

40 05 19 00-0873	EA		20" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,063.06	785.00
			<i>For Class 52 Rating, Deduct</i>	-316.10	
			<i>For Class 54 Rating, Add</i>	445.32	
			<i>For Class 55 Rating, Add</i>	669.37	
			<i>For Class 56 Rating, Add</i>	890.55	
40 05 19 00-0874	EA		20" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,377.93	788.18
			<i>For Class 52 Rating, Deduct</i>	-350.21	
			<i>For Class 54 Rating, Add</i>	491.89	
			<i>For Class 55 Rating, Add</i>	738.63	
			<i>For Class 56 Rating, Add</i>	982.19	
40 05 19 00-0875	EA		20" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,692.80	791.36
			<i>For Class 52 Rating, Deduct</i>	-384.31	
			<i>For Class 54 Rating, Add</i>	538.45	
			<i>For Class 55 Rating, Add</i>	807.89	
			<i>For Class 56 Rating, Add</i>	1,073.83	
40 05 19 00-0876	EA		20" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,007.67	794.53
			<i>For Class 52 Rating, Deduct</i>	-418.42	
			<i>For Class 54 Rating, Add</i>	585.02	
			<i>For Class 55 Rating, Add</i>	877.15	
			<i>For Class 56 Rating, Add</i>	1,165.47	
40 05 19 00-0877	EA		20" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,322.55	797.71
			<i>For Class 52 Rating, Deduct</i>	-452.53	
			<i>For Class 54 Rating, Add</i>	631.59	
			<i>For Class 55 Rating, Add</i>	946.41	
			<i>For Class 56 Rating, Add</i>	1,257.11	
40 05 19 00-0878	EA		20" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,637.42	800.90
			<i>For Class 52 Rating, Deduct</i>	-486.63	
			<i>For Class 54 Rating, Add</i>	678.15	
			<i>For Class 55 Rating, Add</i>	1,015.66	
			<i>For Class 56 Rating, Add</i>	1,348.75	
40 05 19 00-0879	EA		20" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,952.30	804.07
			<i>For Class 52 Rating, Deduct</i>	-520.74	
			<i>For Class 54 Rating, Add</i>	724.72	
			<i>For Class 55 Rating, Add</i>	1,084.92	
			<i>For Class 56 Rating, Add</i>	1,440.39	
40 05 19 00-0880	EA		20" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,267.17	807.25
			<i>For Class 52 Rating, Deduct</i>	-554.85	
			<i>For Class 54 Rating, Add</i>	771.29	
			<i>For Class 55 Rating, Add</i>	1,154.18	
			<i>For Class 56 Rating, Add</i>	1,532.03	
40 05 19 00-0881	EA		20" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,582.04	810.43
			<i>For Class 52 Rating, Deduct</i>	-588.95	
			<i>For Class 54 Rating, Add</i>	817.85	
			<i>For Class 55 Rating, Add</i>	1,223.44	
			<i>For Class 56 Rating, Add</i>	1,623.67	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0882	EA			20" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,896.91	813.60
				<i>For Class 52 Rating, Deduct</i>	-623.06	
				<i>For Class 54 Rating, Add</i>	864.42	
				<i>For Class 55 Rating, Add</i>	1,292.70	
				<i>For Class 56 Rating, Add</i>	1,715.31	
40 05 19 00-0883	EA			20" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,211.79	816.78
				<i>For Class 52 Rating, Deduct</i>	-657.17	
				<i>For Class 54 Rating, Add</i>	910.99	
				<i>For Class 55 Rating, Add</i>	1,361.96	
				<i>For Class 56 Rating, Add</i>	1,806.95	
40 05 19 00-0884	EA			20" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,526.67	819.96
				<i>For Class 52 Rating, Deduct</i>	-691.27	
				<i>For Class 54 Rating, Add</i>	957.55	
				<i>For Class 55 Rating, Add</i>	1,431.22	
				<i>For Class 56 Rating, Add</i>	1,898.59	
40 05 19 00-0885	EA			20" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,841.55	823.14
				<i>For Class 52 Rating, Deduct</i>	-725.38	
				<i>For Class 54 Rating, Add</i>	1,004.12	
				<i>For Class 55 Rating, Add</i>	1,500.47	
				<i>For Class 56 Rating, Add</i>	1,990.24	
40 05 19 00-0886	EA			20" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,156.42	826.32
				<i>For Class 52 Rating, Deduct</i>	-759.49	
				<i>For Class 54 Rating, Add</i>	1,050.69	
				<i>For Class 55 Rating, Add</i>	1,569.73	
				<i>For Class 56 Rating, Add</i>	2,081.88	
40 05 19 00-0887	EA			20" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,471.29	829.50
				<i>For Class 52 Rating, Deduct</i>	-793.59	
				<i>For Class 54 Rating, Add</i>	1,097.25	
				<i>For Class 55 Rating, Add</i>	1,638.99	
				<i>For Class 56 Rating, Add</i>	2,173.51	
40 05 19 00-0888	EA			20" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,786.16	832.68
				<i>For Class 52 Rating, Deduct</i>	-827.70	
				<i>For Class 54 Rating, Add</i>	1,143.82	
				<i>For Class 55 Rating, Add</i>	1,708.25	
				<i>For Class 56 Rating, Add</i>	2,265.16	
40 05 19 00-0889	EA			20" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,101.04	835.85
				<i>For Class 52 Rating, Deduct</i>	-861.80	
				<i>For Class 54 Rating, Add</i>	1,190.39	
				<i>For Class 55 Rating, Add</i>	1,777.51	
				<i>For Class 56 Rating, Add</i>	2,356.80	
40 05 19 00-0890	EA			20" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,415.91	839.03
				<i>For Class 52 Rating, Deduct</i>	-895.91	
				<i>For Class 54 Rating, Add</i>	1,236.95	
				<i>For Class 55 Rating, Add</i>	1,846.77	
				<i>For Class 56 Rating, Add</i>	2,448.44	
40 05 19 00-0891	EA			20" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,730.79	842.21
				<i>For Class 52 Rating, Deduct</i>	-930.02	
				<i>For Class 54 Rating, Add</i>	1,283.52	
				<i>For Class 55 Rating, Add</i>	1,916.03	
				<i>For Class 56 Rating, Add</i>	2,540.08	
40 05 19 00-0892	EA			20" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,045.66	845.38
				<i>For Class 52 Rating, Deduct</i>	-964.12	
				<i>For Class 54 Rating, Add</i>	1,330.09	
				<i>For Class 55 Rating, Add</i>	1,985.29	
				<i>For Class 56 Rating, Add</i>	2,631.72	
40 05 19 00-0893	EA			20" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,360.54	848.56
				<i>For Class 52 Rating, Deduct</i>	-998.23	
				<i>For Class 54 Rating, Add</i>	1,376.65	
				<i>For Class 55 Rating, Add</i>	2,054.54	
				<i>For Class 56 Rating, Add</i>	2,723.36	
40 05 19 00-0894	EA			20" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,675.40	851.75
				<i>For Class 52 Rating, Deduct</i>	-1,032.34	
				<i>For Class 54 Rating, Add</i>	1,423.22	
				<i>For Class 55 Rating, Add</i>	2,123.80	
				<i>For Class 56 Rating, Add</i>	2,815.00	
40 05 19 00-0895	EA			20" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,990.28	854.92
				<i>For Class 52 Rating, Deduct</i>	-1,066.44	
				<i>For Class 54 Rating, Add</i>	1,469.79	
				<i>For Class 55 Rating, Add</i>	2,193.06	
				<i>For Class 56 Rating, Add</i>	2,906.64	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0896	EA	20" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		11,305.15	858.10
		<i>For Class 52 Rating, Deduct</i>		-1,100.55	
		<i>For Class 54 Rating, Add</i>		1,516.35	
		<i>For Class 55 Rating, Add</i>		2,262.32	
		<i>For Class 56 Rating, Add</i>		2,998.28	
40 05 19 00-0897	EA	20" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		11,620.03	861.28
		<i>For Class 52 Rating, Deduct</i>		-1,134.66	
		<i>For Class 54 Rating, Add</i>		1,562.92	
		<i>For Class 55 Rating, Add</i>		2,331.58	
		<i>For Class 56 Rating, Add</i>		3,089.92	
40 05 19 00-0898	EA	20" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		11,934.90	864.46
		<i>For Class 52 Rating, Deduct</i>		-1,168.76	
		<i>For Class 54 Rating, Add</i>		1,609.49	
		<i>For Class 55 Rating, Add</i>		2,400.84	
		<i>For Class 56 Rating, Add</i>		3,181.56	
40 05 19 00-0899	EA	20" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		12,249.78	867.63
		<i>For Class 52 Rating, Deduct</i>		-1,202.87	
		<i>For Class 54 Rating, Add</i>		1,656.05	
		<i>For Class 55 Rating, Add</i>		2,470.10	
		<i>For Class 56 Rating, Add</i>		3,273.20	
40 05 19 00-0900	EA	20" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		12,564.64	870.81
		<i>For Class 52 Rating, Deduct</i>		-1,236.98	
		<i>For Class 54 Rating, Add</i>		1,702.62	
		<i>For Class 55 Rating, Add</i>		2,539.35	
		<i>For Class 56 Rating, Add</i>		3,364.84	
40 05 19 00-0901	EA	20" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		12,879.52	873.99
		<i>For Class 52 Rating, Deduct</i>		-1,271.08	
		<i>For Class 54 Rating, Add</i>		1,749.18	
		<i>For Class 55 Rating, Add</i>		2,608.61	
		<i>For Class 56 Rating, Add</i>		3,456.48	
40 05 19 00-0902	EA	20" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		13,194.39	877.17
		<i>For Class 52 Rating, Deduct</i>		-1,305.19	
		<i>For Class 54 Rating, Add</i>		1,795.75	
		<i>For Class 55 Rating, Add</i>		2,677.87	
		<i>For Class 56 Rating, Add</i>		3,548.12	
40 05 19 00-0903	EA	20" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		13,509.27	880.35
		<i>For Class 52 Rating, Deduct</i>		-1,339.30	
		<i>For Class 54 Rating, Add</i>		1,842.32	
		<i>For Class 55 Rating, Add</i>		2,747.13	
		<i>For Class 56 Rating, Add</i>		3,639.76	
40 05 19 00-0904	EA	20" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		13,824.14	883.53
		<i>For Class 52 Rating, Deduct</i>		-1,373.40	
		<i>For Class 54 Rating, Add</i>		1,888.88	
		<i>For Class 55 Rating, Add</i>		2,816.39	
		<i>For Class 56 Rating, Add</i>		3,731.41	
40 05 19 00-0905	EA	20" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		14,139.02	886.70
		<i>For Class 52 Rating, Deduct</i>		-1,407.51	
		<i>For Class 54 Rating, Add</i>		1,935.45	
		<i>For Class 55 Rating, Add</i>		2,885.65	
		<i>For Class 56 Rating, Add</i>		3,823.05	
40 05 19 00-0906	EA	20" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		14,453.88	889.88
		<i>For Class 52 Rating, Deduct</i>		-1,441.61	
		<i>For Class 54 Rating, Add</i>		1,982.02	
		<i>For Class 55 Rating, Add</i>		2,954.90	
		<i>For Class 56 Rating, Add</i>		3,914.68	
40 05 19 00-0907	EA	20" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		14,768.76	893.06
		<i>For Class 52 Rating, Deduct</i>		-1,475.72	
		<i>For Class 54 Rating, Add</i>		2,028.58	
		<i>For Class 55 Rating, Add</i>		3,024.16	
		<i>For Class 56 Rating, Add</i>		4,006.33	
40 05 19 00-0908	EA	20" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		15,083.64	896.23
		<i>For Class 52 Rating, Deduct</i>		-1,509.83	
		<i>For Class 54 Rating, Add</i>		2,075.15	
		<i>For Class 55 Rating, Add</i>		3,093.42	
		<i>For Class 56 Rating, Add</i>		4,097.97	
40 05 19 00-0909	EA	20" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		15,398.51	899.41
		<i>For Class 52 Rating, Deduct</i>		-1,543.93	
		<i>For Class 54 Rating, Add</i>		2,121.72	
		<i>For Class 55 Rating, Add</i>		3,162.68	
		<i>For Class 56 Rating, Add</i>		4,189.61	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0910 EA 20" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,713.39	902.60
For Class 52 Rating, Deduct	-1,578.04	
For Class 54 Rating, Add	2,168.28	
For Class 55 Rating, Add	3,231.94	
For Class 56 Rating, Add	4,281.25	
40 05 19 00-0911 24" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0912 EA 24" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,036.92	928.02
For Class 52 Rating, Deduct	-399.39	
For Class 54 Rating, Add	561.50	
For Class 55 Rating, Add	843.42	
For Class 56 Rating, Add	1,121.71	
40 05 19 00-0913 EA 24" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,425.93	931.20
For Class 52 Rating, Deduct	-441.65	
For Class 54 Rating, Add	619.19	
For Class 55 Rating, Add	929.21	
For Class 56 Rating, Add	1,235.23	
40 05 19 00-0914 EA 24" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,814.95	934.38
For Class 52 Rating, Deduct	-483.92	
For Class 54 Rating, Add	676.87	
For Class 55 Rating, Add	1,015.01	
For Class 56 Rating, Add	1,348.74	
40 05 19 00-0915 EA 24" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,203.97	937.55
For Class 52 Rating, Deduct	-526.18	
For Class 54 Rating, Add	734.56	
For Class 55 Rating, Add	1,100.80	
For Class 56 Rating, Add	1,462.25	
40 05 19 00-0916 EA 24" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,592.99	940.73
For Class 52 Rating, Deduct	-568.44	
For Class 54 Rating, Add	792.25	
For Class 55 Rating, Add	1,186.59	
For Class 56 Rating, Add	1,575.77	
40 05 19 00-0917 EA 24" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,982.00	943.91
For Class 52 Rating, Deduct	-610.70	
For Class 54 Rating, Add	849.94	
For Class 55 Rating, Add	1,272.38	
For Class 56 Rating, Add	1,689.28	
40 05 19 00-0918 EA 24" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,371.03	947.08
For Class 52 Rating, Deduct	-652.97	
For Class 54 Rating, Add	907.63	
For Class 55 Rating, Add	1,358.18	
For Class 56 Rating, Add	1,802.79	
40 05 19 00-0919 EA 24" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,760.04	950.26
For Class 52 Rating, Deduct	-695.23	
For Class 54 Rating, Add	965.31	
For Class 55 Rating, Add	1,443.97	
For Class 56 Rating, Add	1,916.31	
40 05 19 00-0920 EA 24" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,149.06	953.45
For Class 52 Rating, Deduct	-737.49	
For Class 54 Rating, Add	1,023.00	
For Class 55 Rating, Add	1,529.76	
For Class 56 Rating, Add	2,029.82	
40 05 19 00-0921 EA 24" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,538.07	956.63
For Class 52 Rating, Deduct	-779.75	
For Class 54 Rating, Add	1,080.69	
For Class 55 Rating, Add	1,615.56	
For Class 56 Rating, Add	2,143.33	
40 05 19 00-0922 EA 24" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,927.10	959.80
For Class 52 Rating, Deduct	-822.01	
For Class 54 Rating, Add	1,138.38	
For Class 55 Rating, Add	1,701.35	
For Class 56 Rating, Add	2,256.85	
40 05 19 00-0923 EA 24" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,316.12	962.98
For Class 52 Rating, Deduct	-864.28	
For Class 54 Rating, Add	1,196.07	
For Class 55 Rating, Add	1,787.14	
For Class 56 Rating, Add	2,370.36	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0924	EA	24" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,705.14		966.16
		<i>For Class 52 Rating, Deduct</i>	-906.54		
		<i>For Class 54 Rating, Add</i>	1,253.76		
		<i>For Class 55 Rating, Add</i>	1,872.93		
		<i>For Class 56 Rating, Add</i>	2,483.87		
40 05 19 00-0925	EA	24" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,094.16		969.33
		<i>For Class 52 Rating, Deduct</i>	-948.80		
		<i>For Class 54 Rating, Add</i>	1,311.44		
		<i>For Class 55 Rating, Add</i>	1,958.73		
		<i>For Class 56 Rating, Add</i>	2,597.39		
40 05 19 00-0926	EA	24" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,483.18		972.51
		<i>For Class 52 Rating, Deduct</i>	-991.06		
		<i>For Class 54 Rating, Add</i>	1,369.13		
		<i>For Class 55 Rating, Add</i>	2,044.52		
		<i>For Class 56 Rating, Add</i>	2,710.90		
40 05 19 00-0927	EA	24" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,872.19		975.69
		<i>For Class 52 Rating, Deduct</i>	-1,033.33		
		<i>For Class 54 Rating, Add</i>	1,426.82		
		<i>For Class 55 Rating, Add</i>	2,130.31		
		<i>For Class 56 Rating, Add</i>	2,824.41		
40 05 19 00-0928	EA	24" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,261.21		978.87
		<i>For Class 52 Rating, Deduct</i>	-1,075.59		
		<i>For Class 54 Rating, Add</i>	1,484.51		
		<i>For Class 55 Rating, Add</i>	2,216.10		
		<i>For Class 56 Rating, Add</i>	2,937.92		
40 05 19 00-0929	EA	24" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,650.23		982.05
		<i>For Class 52 Rating, Deduct</i>	-1,117.85		
		<i>For Class 54 Rating, Add</i>	1,542.20		
		<i>For Class 55 Rating, Add</i>	2,301.90		
		<i>For Class 56 Rating, Add</i>	3,051.44		
40 05 19 00-0930	EA	24" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,039.25		985.23
		<i>For Class 52 Rating, Deduct</i>	-1,160.11		
		<i>For Class 54 Rating, Add</i>	1,599.89		
		<i>For Class 55 Rating, Add</i>	2,387.69		
		<i>For Class 56 Rating, Add</i>	3,164.95		
40 05 19 00-0931	EA	24" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,428.26		988.40
		<i>For Class 52 Rating, Deduct</i>	-1,202.37		
		<i>For Class 54 Rating, Add</i>	1,657.57		
		<i>For Class 55 Rating, Add</i>	2,473.48		
		<i>For Class 56 Rating, Add</i>	3,278.46		
40 05 19 00-0932	EA	24" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,817.28		991.58
		<i>For Class 52 Rating, Deduct</i>	-1,244.64		
		<i>For Class 54 Rating, Add</i>	1,715.26		
		<i>For Class 55 Rating, Add</i>	2,559.28		
		<i>For Class 56 Rating, Add</i>	3,391.98		
40 05 19 00-0933	EA	24" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,206.30		994.76
		<i>For Class 52 Rating, Deduct</i>	-1,286.90		
		<i>For Class 54 Rating, Add</i>	1,772.95		
		<i>For Class 55 Rating, Add</i>	2,645.07		
		<i>For Class 56 Rating, Add</i>	3,505.49		
40 05 19 00-0934	EA	24" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,595.32		997.93
		<i>For Class 52 Rating, Deduct</i>	-1,329.16		
		<i>For Class 54 Rating, Add</i>	1,830.64		
		<i>For Class 55 Rating, Add</i>	2,730.86		
		<i>For Class 56 Rating, Add</i>	3,619.00		
40 05 19 00-0935	EA	24" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,984.33		1,001.11
		<i>For Class 52 Rating, Deduct</i>	-1,371.42		
		<i>For Class 54 Rating, Add</i>	1,888.33		
		<i>For Class 55 Rating, Add</i>	2,816.65		
		<i>For Class 56 Rating, Add</i>	3,732.52		
40 05 19 00-0936	EA	24" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,373.36		1,004.30
		<i>For Class 52 Rating, Deduct</i>	-1,413.69		
		<i>For Class 54 Rating, Add</i>	1,946.01		
		<i>For Class 55 Rating, Add</i>	2,902.45		
		<i>For Class 56 Rating, Add</i>	3,846.03		
40 05 19 00-0937	EA	24" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,762.37		1,007.48
		<i>For Class 52 Rating, Deduct</i>	-1,455.95		
		<i>For Class 54 Rating, Add</i>	2,003.70		
		<i>For Class 55 Rating, Add</i>	2,988.24		
		<i>For Class 56 Rating, Add</i>	3,959.54		



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0938 EA 24" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,151.39	1,010.65
For Class 52 Rating, Deduct	-1,498.21	
For Class 54 Rating, Add	2,061.39	
For Class 55 Rating, Add	3,074.03	
For Class 56 Rating, Add	4,073.06	
40 05 19 00-0939 EA 24" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,540.40	1,013.83
For Class 52 Rating, Deduct	-1,540.47	
For Class 54 Rating, Add	2,119.08	
For Class 55 Rating, Add	3,159.83	
For Class 56 Rating, Add	4,186.57	
40 05 19 00-0940 EA 24" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,929.43	1,017.01
For Class 52 Rating, Deduct	-1,582.74	
For Class 54 Rating, Add	2,176.77	
For Class 55 Rating, Add	3,245.62	
For Class 56 Rating, Add	4,300.08	
40 05 19 00-0941 EA 24" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,400.31	1,074.21
For Class 52 Rating, Deduct	-1,625.00	
For Class 54 Rating, Add	2,235.44	
For Class 55 Rating, Add	3,333.38	
For Class 56 Rating, Add	4,416.54	
40 05 19 00-0942 EA 24" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,789.32	1,077.39
For Class 52 Rating, Deduct	-1,667.26	
For Class 54 Rating, Add	2,293.13	
For Class 55 Rating, Add	3,419.17	
For Class 56 Rating, Add	4,530.06	
40 05 19 00-0943 EA 24" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,178.35	1,080.57
For Class 52 Rating, Deduct	-1,709.52	
For Class 54 Rating, Add	2,350.81	
For Class 55 Rating, Add	3,504.96	
For Class 56 Rating, Add	4,643.57	
40 05 19 00-0944 EA 24" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,567.36	1,083.75
For Class 52 Rating, Deduct	-1,751.79	
For Class 54 Rating, Add	2,408.50	
For Class 55 Rating, Add	3,590.76	
For Class 56 Rating, Add	4,757.08	
40 05 19 00-0945 EA 24" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,956.38	1,086.93
For Class 52 Rating, Deduct	-1,794.05	
For Class 54 Rating, Add	2,466.19	
For Class 55 Rating, Add	3,676.55	
For Class 56 Rating, Add	4,870.60	
40 05 19 00-0946 EA 24" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,345.39	1,090.10
For Class 52 Rating, Deduct	-1,836.31	
For Class 54 Rating, Add	2,523.88	
For Class 55 Rating, Add	3,762.34	
For Class 56 Rating, Add	4,984.11	
40 05 19 00-0947 EA 24" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,734.42	1,093.28
For Class 52 Rating, Deduct	-1,878.57	
For Class 54 Rating, Add	2,581.57	
For Class 55 Rating, Add	3,848.13	
For Class 56 Rating, Add	5,097.62	
40 05 19 00-0948 EA 24" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,123.43	1,096.46
For Class 52 Rating, Deduct	-1,920.83	
For Class 54 Rating, Add	2,639.26	
For Class 55 Rating, Add	3,933.93	
For Class 56 Rating, Add	5,211.14	
40 05 19 00-0949 EA 24" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,512.45	1,099.64
For Class 52 Rating, Deduct	-1,963.10	
For Class 54 Rating, Add	2,696.94	
For Class 55 Rating, Add	4,019.72	
For Class 56 Rating, Add	5,324.65	
40 05 19 00-0950 30" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0951 EA 30" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,780.67	1,309.40
For Class 52 Rating, Deduct	-637.64	
For Class 54 Rating, Add	893.32	
For Class 55 Rating, Add	1,340.29	
For Class 56 Rating, Add	1,781.46	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-0952	EA	30" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,340.45		1,312.58
		<i>For Class 52 Rating, Deduct</i>	-698.69		
		<i>For Class 54 Rating, Add</i>	976.62		
		<i>For Class 55 Rating, Add</i>	1,464.16		
		<i>For Class 56 Rating, Add</i>	1,945.35		
40 05 19 00-0953	EA	30" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,900.22		1,315.75
		<i>For Class 52 Rating, Deduct</i>	-759.73		
		<i>For Class 54 Rating, Add</i>	1,059.92		
		<i>For Class 55 Rating, Add</i>	1,588.03		
		<i>For Class 56 Rating, Add</i>	2,109.23		
40 05 19 00-0954	EA	30" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,460.01		1,318.93
		<i>For Class 52 Rating, Deduct</i>	-820.78		
		<i>For Class 54 Rating, Add</i>	1,143.22		
		<i>For Class 55 Rating, Add</i>	1,711.90		
		<i>For Class 56 Rating, Add</i>	2,273.12		
40 05 19 00-0955	EA	30" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,019.78		1,322.11
		<i>For Class 52 Rating, Deduct</i>	-881.82		
		<i>For Class 54 Rating, Add</i>	1,226.53		
		<i>For Class 55 Rating, Add</i>	1,835.77		
		<i>For Class 56 Rating, Add</i>	2,437.01		
40 05 19 00-0956	EA	30" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,579.56		1,325.28
		<i>For Class 52 Rating, Deduct</i>	-942.87		
		<i>For Class 54 Rating, Add</i>	1,309.83		
		<i>For Class 55 Rating, Add</i>	1,959.65		
		<i>For Class 56 Rating, Add</i>	2,600.89		
40 05 19 00-0957	EA	30" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,139.33		1,328.46
		<i>For Class 52 Rating, Deduct</i>	-1,003.92		
		<i>For Class 54 Rating, Add</i>	1,393.13		
		<i>For Class 55 Rating, Add</i>	2,083.52		
		<i>For Class 56 Rating, Add</i>	2,764.78		
40 05 19 00-0958	EA	30" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,699.11		1,331.65
		<i>For Class 52 Rating, Deduct</i>	-1,064.96		
		<i>For Class 54 Rating, Add</i>	1,476.43		
		<i>For Class 55 Rating, Add</i>	2,207.39		
		<i>For Class 56 Rating, Add</i>	2,928.67		
40 05 19 00-0959	EA	30" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,258.88		1,334.83
		<i>For Class 52 Rating, Deduct</i>	-1,126.01		
		<i>For Class 54 Rating, Add</i>	1,559.73		
		<i>For Class 55 Rating, Add</i>	2,331.26		
		<i>For Class 56 Rating, Add</i>	3,092.55		
40 05 19 00-0960	EA	30" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,818.66		1,338.00
		<i>For Class 52 Rating, Deduct</i>	-1,187.05		
		<i>For Class 54 Rating, Add</i>	1,643.03		
		<i>For Class 55 Rating, Add</i>	2,455.13		
		<i>For Class 56 Rating, Add</i>	3,256.44		
40 05 19 00-0961	EA	30" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,378.43		1,341.18
		<i>For Class 52 Rating, Deduct</i>	-1,248.10		
		<i>For Class 54 Rating, Add</i>	1,726.34		
		<i>For Class 55 Rating, Add</i>	2,579.00		
		<i>For Class 56 Rating, Add</i>	3,420.33		
40 05 19 00-0962	EA	30" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,938.20		1,344.36
		<i>For Class 52 Rating, Deduct</i>	-1,309.14		
		<i>For Class 54 Rating, Add</i>	1,809.64		
		<i>For Class 55 Rating, Add</i>	2,702.88		
		<i>For Class 56 Rating, Add</i>	3,584.21		
40 05 19 00-0963	EA	30" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,497.98		1,347.53
		<i>For Class 52 Rating, Deduct</i>	-1,370.19		
		<i>For Class 54 Rating, Add</i>	1,892.94		
		<i>For Class 55 Rating, Add</i>	2,826.75		
		<i>For Class 56 Rating, Add</i>	3,748.10		
40 05 19 00-0964	EA	30" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,057.75		1,350.71
		<i>For Class 52 Rating, Deduct</i>	-1,431.23		
		<i>For Class 54 Rating, Add</i>	1,976.24		
		<i>For Class 55 Rating, Add</i>	2,950.62		
		<i>For Class 56 Rating, Add</i>	3,911.98		
40 05 19 00-0965	EA	30" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,617.53		1,353.89
		<i>For Class 52 Rating, Deduct</i>	-1,492.28		
		<i>For Class 54 Rating, Add</i>	2,059.54		
		<i>For Class 55 Rating, Add</i>	3,074.49		
		<i>For Class 56 Rating, Add</i>	4,075.87		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0966 EA 30" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	16,177.30	1,357.07
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,553.33	
<i>For Class 54 Rating, Add</i>	2,142.84	
<i>For Class 55 Rating, Add</i>	3,198.36	
<i>For Class 56 Rating, Add</i>	4,239.76	
40 05 19 00-0967 EA 30" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	16,737.08	1,360.25
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,614.37	
<i>For Class 54 Rating, Add</i>	2,226.15	
<i>For Class 55 Rating, Add</i>	3,322.23	
<i>For Class 56 Rating, Add</i>	4,403.64	
40 05 19 00-0968 EA 30" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	17,296.85	1,363.43
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,675.42	
<i>For Class 54 Rating, Add</i>	2,309.45	
<i>For Class 55 Rating, Add</i>	3,446.11	
<i>For Class 56 Rating, Add</i>	4,567.53	
40 05 19 00-0969 EA 30" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	17,856.63	1,366.60
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,736.46	
<i>For Class 54 Rating, Add</i>	2,392.75	
<i>For Class 55 Rating, Add</i>	3,569.98	
<i>For Class 56 Rating, Add</i>	4,731.42	
40 05 19 00-0970 EA 30" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	18,416.40	1,369.78
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,797.51	
<i>For Class 54 Rating, Add</i>	2,476.05	
<i>For Class 55 Rating, Add</i>	3,693.85	
<i>For Class 56 Rating, Add</i>	4,895.30	
40 05 19 00-0971 EA 30" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	18,976.18	1,372.96
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,858.55	
<i>For Class 54 Rating, Add</i>	2,559.35	
<i>For Class 55 Rating, Add</i>	3,817.72	
<i>For Class 56 Rating, Add</i>	5,059.19	
40 05 19 00-0972 EA 30" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	19,535.95	1,376.14
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,919.60	
<i>For Class 54 Rating, Add</i>	2,642.66	
<i>For Class 55 Rating, Add</i>	3,941.59	
<i>For Class 56 Rating, Add</i>	5,223.08	
40 05 19 00-0973 EA 30" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	20,095.73	1,379.31
Pipe		
<i>For Class 52 Rating, Deduct</i>	-1,980.64	
<i>For Class 54 Rating, Add</i>	2,725.96	
<i>For Class 55 Rating, Add</i>	4,065.46	
<i>For Class 56 Rating, Add</i>	5,386.96	
40 05 19 00-0974 EA 30" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	20,655.49	1,382.50
Pipe		
<i>For Class 52 Rating, Deduct</i>	-2,041.69	
<i>For Class 54 Rating, Add</i>	2,809.26	
<i>For Class 55 Rating, Add</i>	4,189.33	
<i>For Class 56 Rating, Add</i>	5,550.85	
40 05 19 00-0975 EA 30" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	21,215.27	1,385.68
Pipe		
<i>For Class 52 Rating, Deduct</i>	-2,102.73	
<i>For Class 54 Rating, Add</i>	2,892.56	
<i>For Class 55 Rating, Add</i>	4,313.20	
<i>For Class 56 Rating, Add</i>	5,714.73	
40 05 19 00-0976 EA 30" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	21,775.04	1,388.85
Pipe		
<i>For Class 52 Rating, Deduct</i>	-2,163.78	
<i>For Class 54 Rating, Add</i>	2,975.86	
<i>For Class 55 Rating, Add</i>	4,437.08	
<i>For Class 56 Rating, Add</i>	5,878.62	
40 05 19 00-0977 EA 30" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	22,334.83	1,392.03
Pipe		
<i>For Class 52 Rating, Deduct</i>	-2,224.83	
<i>For Class 54 Rating, Add</i>	3,059.16	
<i>For Class 55 Rating, Add</i>	4,560.95	
<i>For Class 56 Rating, Add</i>	6,042.51	
40 05 19 00-0978 EA 30" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	22,894.60	1,395.21
Pipe		
<i>For Class 52 Rating, Deduct</i>	-2,285.87	
<i>For Class 54 Rating, Add</i>	3,142.46	
<i>For Class 55 Rating, Add</i>	4,684.82	
<i>For Class 56 Rating, Add</i>	6,206.39	
40 05 19 00-0979 EA 30" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	23,454.38	1,398.38
Pipe		
<i>For Class 52 Rating, Deduct</i>	-2,346.92	
<i>For Class 54 Rating, Add</i>	3,225.77	
<i>For Class 55 Rating, Add</i>	4,808.69	
<i>For Class 56 Rating, Add</i>	6,370.28	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-0980	EA	30" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,014.15	1,401.56
		<i>For Class 52 Rating, Deduct</i>	-2,407.96	
		<i>For Class 54 Rating, Add</i>	3,309.07	
		<i>For Class 55 Rating, Add</i>	4,932.56	
		<i>For Class 56 Rating, Add</i>	6,534.17	
40 05 19 00-0981	EA	30" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,573.93	1,404.74
		<i>For Class 52 Rating, Deduct</i>	-2,469.01	
		<i>For Class 54 Rating, Add</i>	3,392.37	
		<i>For Class 55 Rating, Add</i>	5,056.43	
		<i>For Class 56 Rating, Add</i>	6,698.05	
40 05 19 00-0982	EA	30" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,133.70	1,407.92
		<i>For Class 52 Rating, Deduct</i>	-2,530.05	
		<i>For Class 54 Rating, Add</i>	3,475.67	
		<i>For Class 55 Rating, Add</i>	5,180.31	
		<i>For Class 56 Rating, Add</i>	6,861.94	
40 05 19 00-0983	EA	30" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,693.48	1,411.10
		<i>For Class 52 Rating, Deduct</i>	-2,591.10	
		<i>For Class 54 Rating, Add</i>	3,558.97	
		<i>For Class 55 Rating, Add</i>	5,304.18	
		<i>For Class 56 Rating, Add</i>	7,025.83	
40 05 19 00-0984	EA	30" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,253.25	1,414.28
		<i>For Class 52 Rating, Deduct</i>	-2,652.15	
		<i>For Class 54 Rating, Add</i>	3,642.28	
		<i>For Class 55 Rating, Add</i>	5,428.05	
		<i>For Class 56 Rating, Add</i>	7,189.71	
40 05 19 00-0985	EA	30" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,813.03	1,417.45
		<i>For Class 52 Rating, Deduct</i>	-2,713.19	
		<i>For Class 54 Rating, Add</i>	3,725.58	
		<i>For Class 55 Rating, Add</i>	5,551.92	
		<i>For Class 56 Rating, Add</i>	7,353.60	
40 05 19 00-0986	EA	30" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,372.80	1,420.63
		<i>For Class 52 Rating, Deduct</i>	-2,774.24	
		<i>For Class 54 Rating, Add</i>	3,808.88	
		<i>For Class 55 Rating, Add</i>	5,675.79	
		<i>For Class 56 Rating, Add</i>	7,517.49	
40 05 19 00-0987	EA	30" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,932.58	1,423.81
		<i>For Class 52 Rating, Deduct</i>	-2,835.28	
		<i>For Class 54 Rating, Add</i>	3,892.18	
		<i>For Class 55 Rating, Add</i>	5,799.66	
		<i>For Class 56 Rating, Add</i>	7,681.37	
40 05 19 00-0988	EA	30" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	28,492.35	1,426.99
		<i>For Class 52 Rating, Deduct</i>	-2,896.33	
		<i>For Class 54 Rating, Add</i>	3,975.48	
		<i>For Class 55 Rating, Add</i>	5,923.54	
		<i>For Class 56 Rating, Add</i>	7,845.26	
40 05 19 00-0989		36" Flanged End x Grooved End (FxG), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0554)</small>		
40 05 19 00-0990	EA	36" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,685.23	1,658.99
		<i>For Class 52 Rating, Deduct</i>	-898.88	
		<i>For Class 54 Rating, Add</i>	1,255.90	
		<i>For Class 55 Rating, Add</i>	1,882.60	
		<i>For Class 56 Rating, Add</i>	2,501.12	
40 05 19 00-0991	EA	36" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,444.98	1,662.18
		<i>For Class 52 Rating, Deduct</i>	-981.92	
		<i>For Class 54 Rating, Add</i>	1,369.20	
		<i>For Class 55 Rating, Add</i>	2,051.06	
		<i>For Class 56 Rating, Add</i>	2,723.99	
40 05 19 00-0992	EA	36" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,204.71	1,665.35
		<i>For Class 52 Rating, Deduct</i>	-1,064.96	
		<i>For Class 54 Rating, Add</i>	1,482.50	
		<i>For Class 55 Rating, Add</i>	2,219.52	
		<i>For Class 56 Rating, Add</i>	2,946.87	
40 05 19 00-0993	EA	36" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,964.46	1,668.53
		<i>For Class 52 Rating, Deduct</i>	-1,148.00	
		<i>For Class 54 Rating, Add</i>	1,595.80	
		<i>For Class 55 Rating, Add</i>	2,387.99	
		<i>For Class 56 Rating, Add</i>	3,169.75	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-0994	EA			36" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,724.19	1,671.71
				<i>For Class 52 Rating, Deduct</i>	-1,231.04	
				<i>For Class 54 Rating, Add</i>	1,709.09	
				<i>For Class 55 Rating, Add</i>	2,556.45	
				<i>For Class 56 Rating, Add</i>	3,392.62	
40 05 19 00-0995	EA			36" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,483.94	1,674.88
				<i>For Class 52 Rating, Deduct</i>	-1,314.09	
				<i>For Class 54 Rating, Add</i>	1,822.39	
				<i>For Class 55 Rating, Add</i>	2,724.92	
				<i>For Class 56 Rating, Add</i>	3,615.50	
40 05 19 00-0996	EA			36" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,243.68	1,678.06
				<i>For Class 52 Rating, Deduct</i>	-1,397.13	
				<i>For Class 54 Rating, Add</i>	1,935.68	
				<i>For Class 55 Rating, Add</i>	2,893.38	
				<i>For Class 56 Rating, Add</i>	3,838.37	
40 05 19 00-0997	EA			36" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,003.43	1,681.24
				<i>For Class 52 Rating, Deduct</i>	-1,480.17	
				<i>For Class 54 Rating, Add</i>	2,048.98	
				<i>For Class 55 Rating, Add</i>	3,061.84	
				<i>For Class 56 Rating, Add</i>	4,061.25	
40 05 19 00-0998	EA			36" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,763.16	1,684.41
				<i>For Class 52 Rating, Deduct</i>	-1,563.21	
				<i>For Class 54 Rating, Add</i>	2,162.28	
				<i>For Class 55 Rating, Add</i>	3,230.31	
				<i>For Class 56 Rating, Add</i>	4,284.13	
40 05 19 00-0999	EA			36" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,522.90	1,687.60
				<i>For Class 52 Rating, Deduct</i>	-1,646.25	
				<i>For Class 54 Rating, Add</i>	2,275.57	
				<i>For Class 55 Rating, Add</i>	3,398.77	
				<i>For Class 56 Rating, Add</i>	4,507.00	
40 05 19 00-1000	EA			36" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,282.64	1,690.78
				<i>For Class 52 Rating, Deduct</i>	-1,729.29	
				<i>For Class 54 Rating, Add</i>	2,388.87	
				<i>For Class 55 Rating, Add</i>	3,567.23	
				<i>For Class 56 Rating, Add</i>	4,729.88	
40 05 19 00-1001	EA			36" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,042.38	1,693.95
				<i>For Class 52 Rating, Deduct</i>	-1,812.34	
				<i>For Class 54 Rating, Add</i>	2,502.17	
				<i>For Class 55 Rating, Add</i>	3,735.70	
				<i>For Class 56 Rating, Add</i>	4,952.75	
40 05 19 00-1002	EA			36" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,802.12	1,697.13
				<i>For Class 52 Rating, Deduct</i>	-1,895.38	
				<i>For Class 54 Rating, Add</i>	2,615.46	
				<i>For Class 55 Rating, Add</i>	3,904.16	
				<i>For Class 56 Rating, Add</i>	5,175.63	
40 05 19 00-1003	EA			36" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,561.86	1,700.31
				<i>For Class 52 Rating, Deduct</i>	-1,978.42	
				<i>For Class 54 Rating, Add</i>	2,728.76	
				<i>For Class 55 Rating, Add</i>	4,072.63	
				<i>For Class 56 Rating, Add</i>	5,398.51	
40 05 19 00-1004	EA			36" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,321.60	1,703.49
				<i>For Class 52 Rating, Deduct</i>	-2,061.46	
				<i>For Class 54 Rating, Add</i>	2,842.06	
				<i>For Class 55 Rating, Add</i>	4,241.09	
				<i>For Class 56 Rating, Add</i>	5,621.38	
40 05 19 00-1005	EA			36" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,081.34	1,706.66
				<i>For Class 52 Rating, Deduct</i>	-2,144.50	
				<i>For Class 54 Rating, Add</i>	2,955.35	
				<i>For Class 55 Rating, Add</i>	4,409.55	
				<i>For Class 56 Rating, Add</i>	5,844.26	
40 05 19 00-1006	EA			36" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,841.08	1,709.84
				<i>For Class 52 Rating, Deduct</i>	-2,227.55	
				<i>For Class 54 Rating, Add</i>	3,068.65	
				<i>For Class 55 Rating, Add</i>	4,578.02	
				<i>For Class 56 Rating, Add</i>	6,067.14	
40 05 19 00-1007	EA			36" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,600.82	1,713.03
				<i>For Class 52 Rating, Deduct</i>	-2,310.59	
				<i>For Class 54 Rating, Add</i>	3,181.95	
				<i>For Class 55 Rating, Add</i>	4,746.48	
				<i>For Class 56 Rating, Add</i>	6,290.01	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1008	EA	36" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,360.56	1,716.20
		<i>For Class 52 Rating, Deduct</i>	-2,393.63	
		<i>For Class 54 Rating, Add</i>	3,295.24	
		<i>For Class 55 Rating, Add</i>	4,914.95	
		<i>For Class 56 Rating, Add</i>	6,512.89	
40 05 19 00-1009	EA	36" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,120.30	1,719.38
		<i>For Class 52 Rating, Deduct</i>	-2,476.67	
		<i>For Class 54 Rating, Add</i>	3,408.54	
		<i>For Class 55 Rating, Add</i>	5,083.41	
		<i>For Class 56 Rating, Add</i>	6,735.76	
40 05 19 00-1010	EA	36" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,880.04	1,722.56
		<i>For Class 52 Rating, Deduct</i>	-2,559.71	
		<i>For Class 54 Rating, Add</i>	3,521.84	
		<i>For Class 55 Rating, Add</i>	5,251.87	
		<i>For Class 56 Rating, Add</i>	6,958.64	
40 05 19 00-1011	EA	36" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,639.78	1,725.73
		<i>For Class 52 Rating, Deduct</i>	-2,642.75	
		<i>For Class 54 Rating, Add</i>	3,635.13	
		<i>For Class 55 Rating, Add</i>	5,420.34	
		<i>For Class 56 Rating, Add</i>	7,181.51	
40 05 19 00-1012	EA	36" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,399.52	1,728.91
		<i>For Class 52 Rating, Deduct</i>	-2,725.80	
		<i>For Class 54 Rating, Add</i>	3,748.43	
		<i>For Class 55 Rating, Add</i>	5,588.80	
		<i>For Class 56 Rating, Add</i>	7,404.39	
40 05 19 00-1013	EA	36" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	28,159.26	1,732.09
		<i>For Class 52 Rating, Deduct</i>	-2,808.84	
		<i>For Class 54 Rating, Add</i>	3,861.72	
		<i>For Class 55 Rating, Add</i>	5,757.26	
		<i>For Class 56 Rating, Add</i>	7,627.27	
40 05 19 00-1014	EA	36" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	28,919.00	1,735.26
		<i>For Class 52 Rating, Deduct</i>	-2,891.88	
		<i>For Class 54 Rating, Add</i>	3,975.02	
		<i>For Class 55 Rating, Add</i>	5,925.73	
		<i>For Class 56 Rating, Add</i>	7,850.14	
40 05 19 00-1015	EA	36" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,678.74	1,738.45
		<i>For Class 52 Rating, Deduct</i>	-2,974.92	
		<i>For Class 54 Rating, Add</i>	4,088.32	
		<i>For Class 55 Rating, Add</i>	6,094.19	
		<i>For Class 56 Rating, Add</i>	8,073.02	
40 05 19 00-1016	EA	36" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,438.48	1,741.63
		<i>For Class 52 Rating, Deduct</i>	-3,057.96	
		<i>For Class 54 Rating, Add</i>	4,201.61	
		<i>For Class 55 Rating, Add</i>	6,262.66	
		<i>For Class 56 Rating, Add</i>	8,295.90	
40 05 19 00-1017	EA	36" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	31,198.22	1,744.80
		<i>For Class 52 Rating, Deduct</i>	-3,141.00	
		<i>For Class 54 Rating, Add</i>	4,314.91	
		<i>For Class 55 Rating, Add</i>	6,431.12	
		<i>For Class 56 Rating, Add</i>	8,518.77	
40 05 19 00-1018	EA	36" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	31,957.97	1,747.98
		<i>For Class 52 Rating, Deduct</i>	-3,224.05	
		<i>For Class 54 Rating, Add</i>	4,428.21	
		<i>For Class 55 Rating, Add</i>	6,599.58	
		<i>For Class 56 Rating, Add</i>	8,741.65	
40 05 19 00-1019	EA	36" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	32,717.71	1,751.16
		<i>For Class 52 Rating, Deduct</i>	-3,307.09	
		<i>For Class 54 Rating, Add</i>	4,541.50	
		<i>For Class 55 Rating, Add</i>	6,768.05	
		<i>For Class 56 Rating, Add</i>	8,964.52	
40 05 19 00-1020	EA	36" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	33,477.45	1,754.34
		<i>For Class 52 Rating, Deduct</i>	-3,390.13	
		<i>For Class 54 Rating, Add</i>	4,654.80	
		<i>For Class 55 Rating, Add</i>	6,936.51	
		<i>For Class 56 Rating, Add</i>	9,187.40	
40 05 19 00-1021	EA	36" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	34,237.19	1,757.51
		<i>For Class 52 Rating, Deduct</i>	-3,473.17	
		<i>For Class 54 Rating, Add</i>	4,768.10	
		<i>For Class 55 Rating, Add</i>	7,104.97	
		<i>For Class 56 Rating, Add</i>	9,410.28	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1022 EA 36" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	34,996.93	1,760.69
For Class 52 Rating, Deduct	-3,556.21	
For Class 54 Rating, Add	4,881.39	
For Class 55 Rating, Add	7,273.44	
For Class 56 Rating, Add	9,633.15	
40 05 19 00-1023 EA 36" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	35,756.67	1,763.88
For Class 52 Rating, Deduct	-3,639.25	
For Class 54 Rating, Add	4,994.69	
For Class 55 Rating, Add	7,441.90	
For Class 56 Rating, Add	9,856.03	
40 05 19 00-1024 EA 36" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	36,516.40	1,767.05
For Class 52 Rating, Deduct	-3,722.30	
For Class 54 Rating, Add	5,107.99	
For Class 55 Rating, Add	7,610.36	
For Class 56 Rating, Add	10,078.90	
40 05 19 00-1025 EA 36" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	37,276.15	1,770.23
For Class 52 Rating, Deduct	-3,805.34	
For Class 54 Rating, Add	5,221.28	
For Class 55 Rating, Add	7,778.83	
For Class 56 Rating, Add	10,301.78	
40 05 19 00-1026 EA 36" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	38,035.88	1,773.41
For Class 52 Rating, Deduct	-3,888.38	
For Class 54 Rating, Add	5,334.58	
For Class 55 Rating, Add	7,947.29	
For Class 56 Rating, Add	10,524.66	
40 05 19 00-1027 EA 36" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	38,795.63	1,776.58
For Class 52 Rating, Deduct	-3,971.42	
For Class 54 Rating, Add	5,447.88	
For Class 55 Rating, Add	8,115.76	
For Class 56 Rating, Add	10,747.53	
40 05 19 00-1028 Flanged End x Plain End (FxPE), Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-0001)</small>		
40 05 19 00-1029 4" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1030 EA 4" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	561.28	155.43
For Class 52 Rating, Deduct	-35.84	
For Class 54 Rating, Add	51.69	
For Class 55 Rating, Add	78.30	
For Class 56 Rating, Add	104.59	
40 05 19 00-1031 EA 4" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	623.81	158.14
For Class 52 Rating, Deduct	-42.26	
For Class 54 Rating, Add	60.51	
For Class 55 Rating, Add	91.43	
For Class 56 Rating, Add	121.96	
40 05 19 00-1032 EA 4" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	686.35	160.87
For Class 52 Rating, Deduct	-48.69	
For Class 54 Rating, Add	69.32	
For Class 55 Rating, Add	104.55	
For Class 56 Rating, Add	139.35	
40 05 19 00-1033 EA 4" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	748.88	163.58
For Class 52 Rating, Deduct	-55.11	
For Class 54 Rating, Add	78.13	
For Class 55 Rating, Add	117.68	
For Class 56 Rating, Add	156.73	
40 05 19 00-1034 EA 4" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	811.42	166.30
For Class 52 Rating, Deduct	-61.54	
For Class 54 Rating, Add	86.94	
For Class 55 Rating, Add	130.80	
For Class 56 Rating, Add	174.11	
40 05 19 00-1035 EA 4" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	873.96	169.02
For Class 52 Rating, Deduct	-67.97	
For Class 54 Rating, Add	95.75	
For Class 55 Rating, Add	143.93	
For Class 56 Rating, Add	191.49	
40 05 19 00-1036 EA 4" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	936.49	171.74
For Class 52 Rating, Deduct	-74.39	
For Class 54 Rating, Add	104.57	
For Class 55 Rating, Add	157.06	
For Class 56 Rating, Add	208.87	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1037	EA	4" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		999.02	174.45
		<i>For Class 52 Rating, Deduct</i>		-80.82	
		<i>For Class 54 Rating, Add</i>		113.38	
		<i>For Class 55 Rating, Add</i>		170.18	
		<i>For Class 56 Rating, Add</i>		226.25	
40 05 19 00-1038	EA	4" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,061.55	177.17
		<i>For Class 52 Rating, Deduct</i>		-87.24	
		<i>For Class 54 Rating, Add</i>		122.19	
		<i>For Class 55 Rating, Add</i>		183.31	
		<i>For Class 56 Rating, Add</i>		243.63	
40 05 19 00-1039	EA	4" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,124.09	179.89
		<i>For Class 52 Rating, Deduct</i>		-93.67	
		<i>For Class 54 Rating, Add</i>		131.00	
		<i>For Class 55 Rating, Add</i>		196.43	
		<i>For Class 56 Rating, Add</i>		261.02	
40 05 19 00-1040	EA	4" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,186.62	182.60
		<i>For Class 52 Rating, Deduct</i>		-100.09	
		<i>For Class 54 Rating, Add</i>		139.81	
		<i>For Class 55 Rating, Add</i>		209.56	
		<i>For Class 56 Rating, Add</i>		278.40	
40 05 19 00-1041	EA	4" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,249.15	185.32
		<i>For Class 52 Rating, Deduct</i>		-106.52	
		<i>For Class 54 Rating, Add</i>		148.62	
		<i>For Class 55 Rating, Add</i>		222.69	
		<i>For Class 56 Rating, Add</i>		295.78	
40 05 19 00-1042	EA	4" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,311.69	188.04
		<i>For Class 52 Rating, Deduct</i>		-112.95	
		<i>For Class 54 Rating, Add</i>		157.44	
		<i>For Class 55 Rating, Add</i>		235.81	
		<i>For Class 56 Rating, Add</i>		313.16	
40 05 19 00-1043	EA	4" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,374.22	190.76
		<i>For Class 52 Rating, Deduct</i>		-119.37	
		<i>For Class 54 Rating, Add</i>		166.25	
		<i>For Class 55 Rating, Add</i>		248.94	
		<i>For Class 56 Rating, Add</i>		330.54	
40 05 19 00-1044	EA	4" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,436.75	193.47
		<i>For Class 52 Rating, Deduct</i>		-125.80	
		<i>For Class 54 Rating, Add</i>		175.06	
		<i>For Class 55 Rating, Add</i>		262.06	
		<i>For Class 56 Rating, Add</i>		347.92	
40 05 19 00-1045	EA	4" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,499.29	196.19
		<i>For Class 52 Rating, Deduct</i>		-132.22	
		<i>For Class 54 Rating, Add</i>		183.87	
		<i>For Class 55 Rating, Add</i>		275.19	
		<i>For Class 56 Rating, Add</i>		365.30	
40 05 19 00-1046	EA	4" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,561.82	198.92
		<i>For Class 52 Rating, Deduct</i>		-138.65	
		<i>For Class 54 Rating, Add</i>		192.68	
		<i>For Class 55 Rating, Add</i>		288.31	
		<i>For Class 56 Rating, Add</i>		382.68	
40 05 19 00-1047	EA	4" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,624.35	201.62
		<i>For Class 52 Rating, Deduct</i>		-145.08	
		<i>For Class 54 Rating, Add</i>		201.50	
		<i>For Class 55 Rating, Add</i>		301.44	
		<i>For Class 56 Rating, Add</i>		400.06	
40 05 19 00-1048	EA	4" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,686.90	204.34
		<i>For Class 52 Rating, Deduct</i>		-151.50	
		<i>For Class 54 Rating, Add</i>		210.31	
		<i>For Class 55 Rating, Add</i>		314.57	
		<i>For Class 56 Rating, Add</i>		417.45	
40 05 19 00-1049	EA	4" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,749.44	207.06
		<i>For Class 52 Rating, Deduct</i>		-157.93	
		<i>For Class 54 Rating, Add</i>		219.12	
		<i>For Class 55 Rating, Add</i>		327.69	
		<i>For Class 56 Rating, Add</i>		434.83	
40 05 19 00-1050	EA	4" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,811.96	209.78
		<i>For Class 52 Rating, Deduct</i>		-164.35	
		<i>For Class 54 Rating, Add</i>		227.93	
		<i>For Class 55 Rating, Add</i>		340.82	
		<i>For Class 56 Rating, Add</i>		452.21	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1051 EA 4" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,874.50	212.49
<i>For Class 52 Rating, Deduct</i>	-170.78	
<i>For Class 54 Rating, Add</i>	236.74	
<i>For Class 55 Rating, Add</i>	353.94	
<i>For Class 56 Rating, Add</i>	469.59	
40 05 19 00-1052 EA 4" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,937.03	215.21
<i>For Class 52 Rating, Deduct</i>	-177.21	
<i>For Class 54 Rating, Add</i>	245.56	
<i>For Class 55 Rating, Add</i>	367.07	
<i>For Class 56 Rating, Add</i>	486.97	
40 05 19 00-1053 EA 4" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,999.56	217.93
<i>For Class 52 Rating, Deduct</i>	-183.63	
<i>For Class 54 Rating, Add</i>	254.37	
<i>For Class 55 Rating, Add</i>	380.19	
<i>For Class 56 Rating, Add</i>	504.35	
40 05 19 00-1054 EA 4" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,062.10	220.64
<i>For Class 52 Rating, Deduct</i>	-190.06	
<i>For Class 54 Rating, Add</i>	263.18	
<i>For Class 55 Rating, Add</i>	393.32	
<i>For Class 56 Rating, Add</i>	521.73	
40 05 19 00-1055 EA 4" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,124.63	223.36
<i>For Class 52 Rating, Deduct</i>	-196.48	
<i>For Class 54 Rating, Add</i>	271.99	
<i>For Class 55 Rating, Add</i>	406.45	
<i>For Class 56 Rating, Add</i>	539.12	
40 05 19 00-1056 EA 4" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,187.16	226.09
<i>For Class 52 Rating, Deduct</i>	-202.91	
<i>For Class 54 Rating, Add</i>	280.80	
<i>For Class 55 Rating, Add</i>	419.57	
<i>For Class 56 Rating, Add</i>	556.49	
40 05 19 00-1057 EA 4" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,249.70	228.80
<i>For Class 52 Rating, Deduct</i>	-209.33	
<i>For Class 54 Rating, Add</i>	289.62	
<i>For Class 55 Rating, Add</i>	432.70	
<i>For Class 56 Rating, Add</i>	573.88	
40 05 19 00-1058 EA 4" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,312.23	231.51
<i>For Class 52 Rating, Deduct</i>	-215.76	
<i>For Class 54 Rating, Add</i>	298.43	
<i>For Class 55 Rating, Add</i>	445.82	
<i>For Class 56 Rating, Add</i>	591.26	
40 05 19 00-1059 EA 4" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,374.76	234.23
<i>For Class 52 Rating, Deduct</i>	-222.19	
<i>For Class 54 Rating, Add</i>	307.24	
<i>For Class 55 Rating, Add</i>	458.95	
<i>For Class 56 Rating, Add</i>	608.64	
40 05 19 00-1060 EA 4" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,437.30	236.95
<i>For Class 52 Rating, Deduct</i>	-228.61	
<i>For Class 54 Rating, Add</i>	316.05	
<i>For Class 55 Rating, Add</i>	472.07	
<i>For Class 56 Rating, Add</i>	626.02	
40 05 19 00-1061 EA 4" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,499.83	239.68
<i>For Class 52 Rating, Deduct</i>	-235.04	
<i>For Class 54 Rating, Add</i>	324.86	
<i>For Class 55 Rating, Add</i>	485.20	
<i>For Class 56 Rating, Add</i>	643.40	
40 05 19 00-1062 EA 4" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,562.37	242.38
<i>For Class 52 Rating, Deduct</i>	-241.46	
<i>For Class 54 Rating, Add</i>	333.68	
<i>For Class 55 Rating, Add</i>	498.33	
<i>For Class 56 Rating, Add</i>	660.78	
40 05 19 00-1063 EA 4" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,624.91	245.10
<i>For Class 52 Rating, Deduct</i>	-247.89	
<i>For Class 54 Rating, Add</i>	342.49	
<i>For Class 55 Rating, Add</i>	511.45	
<i>For Class 56 Rating, Add</i>	678.16	
40 05 19 00-1064 EA 4" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,687.44	247.82
<i>For Class 52 Rating, Deduct</i>	-254.32	
<i>For Class 54 Rating, Add</i>	351.30	
<i>For Class 55 Rating, Add</i>	524.58	
<i>For Class 56 Rating, Add</i>	695.55	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-1065	EA		4" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,749.97	250.53
			<i>For Class 52 Rating, Deduct</i>	-260.74	
			<i>For Class 54 Rating, Add</i>	360.11	
			<i>For Class 55 Rating, Add</i>	537.70	
			<i>For Class 56 Rating, Add</i>	712.92	
40 05 19 00-1066	EA		4" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,812.50	253.26
			<i>For Class 52 Rating, Deduct</i>	-267.17	
			<i>For Class 54 Rating, Add</i>	368.92	
			<i>For Class 55 Rating, Add</i>	550.83	
			<i>For Class 56 Rating, Add</i>	730.31	
40 05 19 00-1067	EA		4" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,875.04	255.97
			<i>For Class 52 Rating, Deduct</i>	-273.59	
			<i>For Class 54 Rating, Add</i>	377.74	
			<i>For Class 55 Rating, Add</i>	563.96	
			<i>For Class 56 Rating, Add</i>	747.69	
40 05 19 00-1068	EA		4" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,937.57	258.69
			<i>For Class 52 Rating, Deduct</i>	-280.02	
			<i>For Class 54 Rating, Add</i>	386.55	
			<i>For Class 55 Rating, Add</i>	577.08	
			<i>For Class 56 Rating, Add</i>	765.07	

40 05 19 00-1069 6" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-1028)

40 05 19 00-1070	EA		6" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	703.10	195.65
			<i>For Class 52 Rating, Deduct</i>	-44.73	
			<i>For Class 54 Rating, Add</i>	64.56	
			<i>For Class 55 Rating, Add</i>	97.80	
			<i>For Class 56 Rating, Add</i>	130.64	
40 05 19 00-1071	EA		6" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	779.12	198.37
			<i>For Class 52 Rating, Deduct</i>	-52.64	
			<i>For Class 54 Rating, Add</i>	75.39	
			<i>For Class 55 Rating, Add</i>	113.93	
			<i>For Class 56 Rating, Add</i>	152.00	
40 05 19 00-1072	EA		6" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	855.14	201.07
			<i>For Class 52 Rating, Deduct</i>	-60.55	
			<i>For Class 54 Rating, Add</i>	86.23	
			<i>For Class 55 Rating, Add</i>	130.07	
			<i>For Class 56 Rating, Add</i>	173.36	
40 05 19 00-1073	EA		6" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	931.14	203.80
			<i>For Class 52 Rating, Deduct</i>	-68.46	
			<i>For Class 54 Rating, Add</i>	97.06	
			<i>For Class 55 Rating, Add</i>	146.20	
			<i>For Class 56 Rating, Add</i>	194.71	
40 05 19 00-1074	EA		6" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,007.16	206.52
			<i>For Class 52 Rating, Deduct</i>	-76.37	
			<i>For Class 54 Rating, Add</i>	107.89	
			<i>For Class 55 Rating, Add</i>	162.33	
			<i>For Class 56 Rating, Add</i>	216.07	
40 05 19 00-1075	EA		6" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,083.19	209.23
			<i>For Class 52 Rating, Deduct</i>	-84.28	
			<i>For Class 54 Rating, Add</i>	118.73	
			<i>For Class 55 Rating, Add</i>	178.46	
			<i>For Class 56 Rating, Add</i>	237.43	
40 05 19 00-1076	EA		6" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,159.20	211.95
			<i>For Class 52 Rating, Deduct</i>	-92.19	
			<i>For Class 54 Rating, Add</i>	129.56	
			<i>For Class 55 Rating, Add</i>	194.59	
			<i>For Class 56 Rating, Add</i>	258.79	
40 05 19 00-1077	EA		6" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,235.21	214.67
			<i>For Class 52 Rating, Deduct</i>	-100.09	
			<i>For Class 54 Rating, Add</i>	140.40	
			<i>For Class 55 Rating, Add</i>	210.73	
			<i>For Class 56 Rating, Add</i>	280.14	
40 05 19 00-1078	EA		6" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,311.22	217.39
			<i>For Class 52 Rating, Deduct</i>	-108.00	
			<i>For Class 54 Rating, Add</i>	151.23	
			<i>For Class 55 Rating, Add</i>	226.86	
			<i>For Class 56 Rating, Add</i>	301.50	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-1093	EA		6" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,451.45	258.14
			<i>For Class 52 Rating, Deduct</i>	-226.64	
			<i>For Class 54 Rating, Add</i>	313.74	
			<i>For Class 55 Rating, Add</i>	468.84	
			<i>For Class 56 Rating, Add</i>	621.88	
40 05 19 00-1094	EA		6" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,527.46	260.86
			<i>For Class 52 Rating, Deduct</i>	-234.54	
			<i>For Class 54 Rating, Add</i>	324.57	
			<i>For Class 55 Rating, Add</i>	484.97	
			<i>For Class 56 Rating, Add</i>	643.23	
40 05 19 00-1095	EA		6" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,603.47	263.58
			<i>For Class 52 Rating, Deduct</i>	-242.45	
			<i>For Class 54 Rating, Add</i>	335.41	
			<i>For Class 55 Rating, Add</i>	501.10	
			<i>For Class 56 Rating, Add</i>	664.59	
40 05 19 00-1096	EA		6" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,679.49	266.30
			<i>For Class 52 Rating, Deduct</i>	-250.36	
			<i>For Class 54 Rating, Add</i>	346.24	
			<i>For Class 55 Rating, Add</i>	517.23	
			<i>For Class 56 Rating, Add</i>	685.95	
40 05 19 00-1097	EA		6" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,755.51	269.01
			<i>For Class 52 Rating, Deduct</i>	-258.27	
			<i>For Class 54 Rating, Add</i>	357.08	
			<i>For Class 55 Rating, Add</i>	533.37	
			<i>For Class 56 Rating, Add</i>	707.31	
40 05 19 00-1098	EA		6" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,831.51	271.73
			<i>For Class 52 Rating, Deduct</i>	-266.18	
			<i>For Class 54 Rating, Add</i>	367.91	
			<i>For Class 55 Rating, Add</i>	549.50	
			<i>For Class 56 Rating, Add</i>	728.66	
40 05 19 00-1099	EA		6" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,907.53	274.45
			<i>For Class 52 Rating, Deduct</i>	-274.09	
			<i>For Class 54 Rating, Add</i>	378.74	
			<i>For Class 55 Rating, Add</i>	565.63	
			<i>For Class 56 Rating, Add</i>	750.02	
40 05 19 00-1100	EA		6" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,983.55	277.16
			<i>For Class 52 Rating, Deduct</i>	-282.00	
			<i>For Class 54 Rating, Add</i>	389.58	
			<i>For Class 55 Rating, Add</i>	581.76	
			<i>For Class 56 Rating, Add</i>	771.38	
40 05 19 00-1101	EA		6" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,059.56	279.88
			<i>For Class 52 Rating, Deduct</i>	-289.91	
			<i>For Class 54 Rating, Add</i>	400.41	
			<i>For Class 55 Rating, Add</i>	597.89	
			<i>For Class 56 Rating, Add</i>	792.74	
40 05 19 00-1102	EA		6" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,135.57	282.61
			<i>For Class 52 Rating, Deduct</i>	-297.81	
			<i>For Class 54 Rating, Add</i>	411.25	
			<i>For Class 55 Rating, Add</i>	614.02	
			<i>For Class 56 Rating, Add</i>	814.09	
40 05 19 00-1103	EA		6" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,211.60	285.33
			<i>For Class 52 Rating, Deduct</i>	-305.72	
			<i>For Class 54 Rating, Add</i>	422.08	
			<i>For Class 55 Rating, Add</i>	630.16	
			<i>For Class 56 Rating, Add</i>	835.45	
40 05 19 00-1104	EA		6" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,287.61	288.03
			<i>For Class 52 Rating, Deduct</i>	-313.63	
			<i>For Class 54 Rating, Add</i>	432.92	
			<i>For Class 55 Rating, Add</i>	646.29	
			<i>For Class 56 Rating, Add</i>	856.81	
40 05 19 00-1105	EA		6" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,363.63	290.75
			<i>For Class 52 Rating, Deduct</i>	-321.54	
			<i>For Class 54 Rating, Add</i>	443.75	
			<i>For Class 55 Rating, Add</i>	662.42	
			<i>For Class 56 Rating, Add</i>	878.17	
40 05 19 00-1106	EA		6" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,439.63	293.47
			<i>For Class 52 Rating, Deduct</i>	-329.45	
			<i>For Class 54 Rating, Add</i>	454.58	
			<i>For Class 55 Rating, Add</i>	678.55	
			<i>For Class 56 Rating, Add</i>	899.53	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1107 EA 6" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,515.65	296.19
For Class 52 Rating, Deduct	-337.36	
For Class 54 Rating, Add	465.42	
For Class 55 Rating, Add	694.68	
For Class 56 Rating, Add	920.89	
40 05 19 00-1108 EA 6" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,591.67	298.90
For Class 52 Rating, Deduct	-345.27	
For Class 54 Rating, Add	476.25	
For Class 55 Rating, Add	710.82	
For Class 56 Rating, Add	942.24	
40 05 19 00-1109 8" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-1028)		
40 05 19 00-1110 EA 8" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	969.69	249.99
For Class 52 Rating, Deduct	-65.00	
For Class 54 Rating, Add	93.18	
For Class 55 Rating, Add	140.86	
For Class 56 Rating, Add	187.95	
40 05 19 00-1111 EA 8" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,072.67	252.71
For Class 52 Rating, Deduct	-75.87	
For Class 54 Rating, Add	108.06	
For Class 55 Rating, Add	163.01	
For Class 56 Rating, Add	217.27	
40 05 19 00-1112 EA 8" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,175.64	255.44
For Class 52 Rating, Deduct	-86.75	
For Class 54 Rating, Add	122.94	
For Class 55 Rating, Add	185.15	
For Class 56 Rating, Add	246.58	
40 05 19 00-1113 EA 8" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,278.62	258.14
For Class 52 Rating, Deduct	-97.62	
For Class 54 Rating, Add	137.82	
For Class 55 Rating, Add	207.30	
For Class 56 Rating, Add	275.89	
40 05 19 00-1114 EA 8" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,381.60	260.86
For Class 52 Rating, Deduct	-108.50	
For Class 54 Rating, Add	152.70	
For Class 55 Rating, Add	229.44	
For Class 56 Rating, Add	305.20	
40 05 19 00-1115 EA 8" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,484.56	263.58
For Class 52 Rating, Deduct	-119.37	
For Class 54 Rating, Add	167.57	
For Class 55 Rating, Add	251.58	
For Class 56 Rating, Add	334.51	
40 05 19 00-1116 EA 8" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,587.54	266.30
For Class 52 Rating, Deduct	-130.25	
For Class 54 Rating, Add	182.45	
For Class 55 Rating, Add	273.73	
For Class 56 Rating, Add	363.82	
40 05 19 00-1117 EA 8" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,690.52	269.01
For Class 52 Rating, Deduct	-141.12	
For Class 54 Rating, Add	197.33	
For Class 55 Rating, Add	295.87	
For Class 56 Rating, Add	393.14	
40 05 19 00-1118 EA 8" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,793.49	271.73
For Class 52 Rating, Deduct	-152.00	
For Class 54 Rating, Add	212.21	
For Class 55 Rating, Add	318.02	
For Class 56 Rating, Add	422.45	
40 05 19 00-1119 EA 8" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,896.47	274.45
For Class 52 Rating, Deduct	-162.87	
For Class 54 Rating, Add	227.09	
For Class 55 Rating, Add	340.16	
For Class 56 Rating, Add	451.76	
40 05 19 00-1120 EA 8" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,999.45	277.16
For Class 52 Rating, Deduct	-173.75	
For Class 54 Rating, Add	241.96	
For Class 55 Rating, Add	362.31	
For Class 56 Rating, Add	481.07	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-1121	EA		8" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,102.42	279.88
			<i>For Class 52 Rating, Deduct</i>	-184.62	
			<i>For Class 54 Rating, Add</i>	256.84	
			<i>For Class 55 Rating, Add</i>	384.45	
			<i>For Class 56 Rating, Add</i>	510.38	
40 05 19 00-1122	EA		8" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,205.40	282.61
			<i>For Class 52 Rating, Deduct</i>	-195.49	
			<i>For Class 54 Rating, Add</i>	271.72	
			<i>For Class 55 Rating, Add</i>	406.60	
			<i>For Class 56 Rating, Add</i>	539.69	
40 05 19 00-1123	EA		8" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,308.39	285.33
			<i>For Class 52 Rating, Deduct</i>	-206.37	
			<i>For Class 54 Rating, Add</i>	286.60	
			<i>For Class 55 Rating, Add</i>	428.74	
			<i>For Class 56 Rating, Add</i>	569.01	
40 05 19 00-1124	EA		8" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,411.36	288.03
			<i>For Class 52 Rating, Deduct</i>	-217.24	
			<i>For Class 54 Rating, Add</i>	301.48	
			<i>For Class 55 Rating, Add</i>	450.89	
			<i>For Class 56 Rating, Add</i>	598.32	
40 05 19 00-1125	EA		8" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,514.34	290.75
			<i>For Class 52 Rating, Deduct</i>	-228.12	
			<i>For Class 54 Rating, Add</i>	316.36	
			<i>For Class 55 Rating, Add</i>	473.03	
			<i>For Class 56 Rating, Add</i>	627.63	
40 05 19 00-1126	EA		8" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,617.31	293.47
			<i>For Class 52 Rating, Deduct</i>	-238.99	
			<i>For Class 54 Rating, Add</i>	331.23	
			<i>For Class 55 Rating, Add</i>	495.17	
			<i>For Class 56 Rating, Add</i>	656.94	
40 05 19 00-1127	EA		8" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,720.28	296.19
			<i>For Class 52 Rating, Deduct</i>	-249.87	
			<i>For Class 54 Rating, Add</i>	346.11	
			<i>For Class 55 Rating, Add</i>	517.32	
			<i>For Class 56 Rating, Add</i>	686.25	
40 05 19 00-1128	EA		8" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,823.26	298.90
			<i>For Class 52 Rating, Deduct</i>	-260.74	
			<i>For Class 54 Rating, Add</i>	360.99	
			<i>For Class 55 Rating, Add</i>	539.46	
			<i>For Class 56 Rating, Add</i>	715.56	
40 05 19 00-1129	EA		8" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,926.23	301.62
			<i>For Class 52 Rating, Deduct</i>	-271.62	
			<i>For Class 54 Rating, Add</i>	375.87	
			<i>For Class 55 Rating, Add</i>	561.61	
			<i>For Class 56 Rating, Add</i>	744.87	
40 05 19 00-1130	EA		8" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,029.21	304.34
			<i>For Class 52 Rating, Deduct</i>	-282.49	
			<i>For Class 54 Rating, Add</i>	390.75	
			<i>For Class 55 Rating, Add</i>	583.75	
			<i>For Class 56 Rating, Add</i>	774.19	
40 05 19 00-1131	EA		8" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,132.19	307.05
			<i>For Class 52 Rating, Deduct</i>	-293.36	
			<i>For Class 54 Rating, Add</i>	405.63	
			<i>For Class 55 Rating, Add</i>	605.90	
			<i>For Class 56 Rating, Add</i>	803.50	
40 05 19 00-1132	EA		8" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,235.16	309.78
			<i>For Class 52 Rating, Deduct</i>	-304.24	
			<i>For Class 54 Rating, Add</i>	420.50	
			<i>For Class 55 Rating, Add</i>	628.04	
			<i>For Class 56 Rating, Add</i>	832.81	
40 05 19 00-1133	EA		8" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,338.14	312.50
			<i>For Class 52 Rating, Deduct</i>	-315.11	
			<i>For Class 54 Rating, Add</i>	435.38	
			<i>For Class 55 Rating, Add</i>	650.18	
			<i>For Class 56 Rating, Add</i>	862.12	
40 05 19 00-1134	EA		8" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,441.12	315.21
			<i>For Class 52 Rating, Deduct</i>	-325.99	
			<i>For Class 54 Rating, Add</i>	450.26	
			<i>For Class 55 Rating, Add</i>	672.33	
			<i>For Class 56 Rating, Add</i>	891.43	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1135 EA 8" Flanged x Plain End (FxpPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	3,544.09	317.92
Pipe	3,544.09	317.92
For Class 52 Rating, Deduct	-336.86	
For Class 54 Rating, Add	465.14	
For Class 55 Rating, Add	694.47	
For Class 56 Rating, Add	920.75	
40 05 19 00-1136 EA 8" Flanged x Plain End (FxpPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	3,647.07	320.64
Pipe	3,647.07	320.64
For Class 52 Rating, Deduct	-347.74	
For Class 54 Rating, Add	480.02	
For Class 55 Rating, Add	716.62	
For Class 56 Rating, Add	950.06	
40 05 19 00-1137 EA 8" Flanged x Plain End (FxpPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	3,750.05	323.37
Pipe	3,750.05	323.37
For Class 52 Rating, Deduct	-358.61	
For Class 54 Rating, Add	494.90	
For Class 55 Rating, Add	738.76	
For Class 56 Rating, Add	979.37	
40 05 19 00-1138 EA 8" Flanged x Plain End (FxpPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	3,853.03	326.07
Pipe	3,853.03	326.07
For Class 52 Rating, Deduct	-369.49	
For Class 54 Rating, Add	509.77	
For Class 55 Rating, Add	760.91	
For Class 56 Rating, Add	1,008.68	
40 05 19 00-1139 EA 8" Flanged x Plain End (FxpPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	3,956.01	328.79
Pipe	3,956.01	328.79
For Class 52 Rating, Deduct	-380.36	
For Class 54 Rating, Add	524.65	
For Class 55 Rating, Add	783.05	
For Class 56 Rating, Add	1,037.99	
40 05 19 00-1140 EA 8" Flanged x Plain End (FxpPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,058.97	331.51
Pipe	4,058.97	331.51
For Class 52 Rating, Deduct	-391.23	
For Class 54 Rating, Add	539.53	
For Class 55 Rating, Add	805.19	
For Class 56 Rating, Add	1,067.30	
40 05 19 00-1141 EA 8" Flanged x Plain End (FxpPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,161.95	334.24
Pipe	4,161.95	334.24
For Class 52 Rating, Deduct	-402.11	
For Class 54 Rating, Add	554.41	
For Class 55 Rating, Add	827.34	
For Class 56 Rating, Add	1,096.62	
40 05 19 00-1142 EA 8" Flanged x Plain End (FxpPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,264.93	336.95
Pipe	4,264.93	336.95
For Class 52 Rating, Deduct	-412.98	
For Class 54 Rating, Add	569.29	
For Class 55 Rating, Add	849.48	
For Class 56 Rating, Add	1,125.93	
40 05 19 00-1143 EA 8" Flanged x Plain End (FxpPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,367.90	339.67
Pipe	4,367.90	339.67
For Class 52 Rating, Deduct	-423.86	
For Class 54 Rating, Add	584.16	
For Class 55 Rating, Add	871.63	
For Class 56 Rating, Add	1,155.24	
40 05 19 00-1144 EA 8" Flanged x Plain End (FxpPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,470.88	342.38
Pipe	4,470.88	342.38
For Class 52 Rating, Deduct	-434.73	
For Class 54 Rating, Add	599.04	
For Class 55 Rating, Add	893.77	
For Class 56 Rating, Add	1,184.55	
40 05 19 00-1145 EA 8" Flanged x Plain End (FxpPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,573.86	345.09
Pipe	4,573.86	345.09
For Class 52 Rating, Deduct	-445.61	
For Class 54 Rating, Add	613.92	
For Class 55 Rating, Add	915.92	
For Class 56 Rating, Add	1,213.86	
40 05 19 00-1146 EA 8" Flanged x Plain End (FxpPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,676.83	347.81
Pipe	4,676.83	347.81
For Class 52 Rating, Deduct	-456.48	
For Class 54 Rating, Add	628.80	
For Class 55 Rating, Add	938.06	
For Class 56 Rating, Add	1,243.17	
40 05 19 00-1147 EA 8" Flanged x Plain End (FxpPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,779.81	350.54
Pipe	4,779.81	350.54
For Class 52 Rating, Deduct	-467.36	
For Class 54 Rating, Add	643.68	
For Class 55 Rating, Add	960.21	
For Class 56 Rating, Add	1,272.49	
40 05 19 00-1148 EA 8" Flanged x Plain End (FxpPE), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron	4,882.79	353.26
Pipe	4,882.79	353.26
For Class 52 Rating, Deduct	-478.23	
For Class 54 Rating, Add	658.56	
For Class 55 Rating, Add	982.35	
For Class 56 Rating, Add	1,301.80	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR
 CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1149			10" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1150	EA		10" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,222.79	304.34
			<i>For Class 52 Rating, Deduct</i>	-83.78	
			<i>For Class 54 Rating, Add</i>	119.78	
			<i>For Class 55 Rating, Add</i>	180.92	
			<i>For Class 56 Rating, Add</i>	241.29	
40 05 19 00-1151	EA		10" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,357.22	307.05
			<i>For Class 52 Rating, Deduct</i>	-98.12	
			<i>For Class 54 Rating, Add</i>	139.38	
			<i>For Class 55 Rating, Add</i>	210.08	
			<i>For Class 56 Rating, Add</i>	279.88	
40 05 19 00-1152	EA		10" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,491.64	309.78
			<i>For Class 52 Rating, Deduct</i>	-112.45	
			<i>For Class 54 Rating, Add</i>	158.98	
			<i>For Class 55 Rating, Add</i>	239.24	
			<i>For Class 56 Rating, Add</i>	318.47	
40 05 19 00-1153	EA		10" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,626.08	312.50
			<i>For Class 52 Rating, Deduct</i>	-126.79	
			<i>For Class 54 Rating, Add</i>	178.57	
			<i>For Class 55 Rating, Add</i>	268.40	
			<i>For Class 56 Rating, Add</i>	357.06	
40 05 19 00-1154	EA		10" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,760.51	315.21
			<i>For Class 52 Rating, Deduct</i>	-141.12	
			<i>For Class 54 Rating, Add</i>	198.17	
			<i>For Class 55 Rating, Add</i>	297.55	
			<i>For Class 56 Rating, Add</i>	395.65	
40 05 19 00-1155	EA		10" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,894.94	317.92
			<i>For Class 52 Rating, Deduct</i>	-155.46	
			<i>For Class 54 Rating, Add</i>	217.77	
			<i>For Class 55 Rating, Add</i>	326.71	
			<i>For Class 56 Rating, Add</i>	434.25	
40 05 19 00-1156	EA		10" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,029.37	320.64
			<i>For Class 52 Rating, Deduct</i>	-169.79	
			<i>For Class 54 Rating, Add</i>	237.36	
			<i>For Class 55 Rating, Add</i>	355.87	
			<i>For Class 56 Rating, Add</i>	472.84	
40 05 19 00-1157	EA		10" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,163.81	323.37
			<i>For Class 52 Rating, Deduct</i>	-184.13	
			<i>For Class 54 Rating, Add</i>	256.96	
			<i>For Class 55 Rating, Add</i>	385.03	
			<i>For Class 56 Rating, Add</i>	511.43	
40 05 19 00-1158	EA		10" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,298.24	326.07
			<i>For Class 52 Rating, Deduct</i>	-198.46	
			<i>For Class 54 Rating, Add</i>	276.56	
			<i>For Class 55 Rating, Add</i>	414.19	
			<i>For Class 56 Rating, Add</i>	550.02	
40 05 19 00-1159	EA		10" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,432.67	328.79
			<i>For Class 52 Rating, Deduct</i>	-212.79	
			<i>For Class 54 Rating, Add</i>	296.15	
			<i>For Class 55 Rating, Add</i>	443.35	
			<i>For Class 56 Rating, Add</i>	588.61	
40 05 19 00-1160	EA		10" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,567.10	331.51
			<i>For Class 52 Rating, Deduct</i>	-227.13	
			<i>For Class 54 Rating, Add</i>	315.75	
			<i>For Class 55 Rating, Add</i>	472.51	
			<i>For Class 56 Rating, Add</i>	627.20	
40 05 19 00-1161	EA		10" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,701.53	334.24
			<i>For Class 52 Rating, Deduct</i>	-241.46	
			<i>For Class 54 Rating, Add</i>	335.34	
			<i>For Class 55 Rating, Add</i>	501.67	
			<i>For Class 56 Rating, Add</i>	665.79	
40 05 19 00-1162	EA		10" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,835.97	336.95
			<i>For Class 52 Rating, Deduct</i>	-255.80	
			<i>For Class 54 Rating, Add</i>	354.94	
			<i>For Class 55 Rating, Add</i>	530.83	
			<i>For Class 56 Rating, Add</i>	704.38	
40 05 19 00-1163	EA		10" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,970.39	339.67
			<i>For Class 52 Rating, Deduct</i>	-270.13	
			<i>For Class 54 Rating, Add</i>	374.54	
			<i>For Class 55 Rating, Add</i>	559.98	
			<i>For Class 56 Rating, Add</i>	742.97	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1164 EA 10" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,104.83	342.38
<i>For Class 52 Rating, Deduct</i>	-284.47	
<i>For Class 54 Rating, Add</i>	394.14	
<i>For Class 55 Rating, Add</i>	589.14	
<i>For Class 56 Rating, Add</i>	781.57	
40 05 19 00-1165 EA 10" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,239.26	345.09
<i>For Class 52 Rating, Deduct</i>	-298.80	
<i>For Class 54 Rating, Add</i>	413.73	
<i>For Class 55 Rating, Add</i>	618.30	
<i>For Class 56 Rating, Add</i>	820.16	
40 05 19 00-1166 EA 10" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,373.69	347.81
<i>For Class 52 Rating, Deduct</i>	-313.14	
<i>For Class 54 Rating, Add</i>	433.33	
<i>For Class 55 Rating, Add</i>	647.46	
<i>For Class 56 Rating, Add</i>	858.75	
40 05 19 00-1167 EA 10" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,508.12	350.54
<i>For Class 52 Rating, Deduct</i>	-327.47	
<i>For Class 54 Rating, Add</i>	452.92	
<i>For Class 55 Rating, Add</i>	676.62	
<i>For Class 56 Rating, Add</i>	897.34	
40 05 19 00-1168 EA 10" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,642.55	353.26
<i>For Class 52 Rating, Deduct</i>	-341.81	
<i>For Class 54 Rating, Add</i>	472.52	
<i>For Class 55 Rating, Add</i>	705.78	
<i>For Class 56 Rating, Add</i>	935.93	
40 05 19 00-1169 EA 10" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,776.98	355.96
<i>For Class 52 Rating, Deduct</i>	-356.14	
<i>For Class 54 Rating, Add</i>	492.12	
<i>For Class 55 Rating, Add</i>	734.94	
<i>For Class 56 Rating, Add</i>	974.52	
40 05 19 00-1170 EA 10" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,911.41	358.68
<i>For Class 52 Rating, Deduct</i>	-370.47	
<i>For Class 54 Rating, Add</i>	511.71	
<i>For Class 55 Rating, Add</i>	764.10	
<i>For Class 56 Rating, Add</i>	1,013.11	
40 05 19 00-1171 EA 10" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,045.86	361.41
<i>For Class 52 Rating, Deduct</i>	-384.81	
<i>For Class 54 Rating, Add</i>	531.31	
<i>For Class 55 Rating, Add</i>	793.26	
<i>For Class 56 Rating, Add</i>	1,051.70	
40 05 19 00-1172 EA 10" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,180.28	364.12
<i>For Class 52 Rating, Deduct</i>	-399.14	
<i>For Class 54 Rating, Add</i>	550.91	
<i>For Class 55 Rating, Add</i>	822.41	
<i>For Class 56 Rating, Add</i>	1,090.29	
40 05 19 00-1173 EA 10" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,314.72	366.84
<i>For Class 52 Rating, Deduct</i>	-413.48	
<i>For Class 54 Rating, Add</i>	570.50	
<i>For Class 55 Rating, Add</i>	851.57	
<i>For Class 56 Rating, Add</i>	1,128.89	
40 05 19 00-1174 EA 10" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,449.14	369.55
<i>For Class 52 Rating, Deduct</i>	-427.81	
<i>For Class 54 Rating, Add</i>	590.10	
<i>For Class 55 Rating, Add</i>	880.73	
<i>For Class 56 Rating, Add</i>	1,167.47	
40 05 19 00-1175 EA 10" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,583.58	372.27
<i>For Class 52 Rating, Deduct</i>	-442.15	
<i>For Class 54 Rating, Add</i>	609.70	
<i>For Class 55 Rating, Add</i>	909.89	
<i>For Class 56 Rating, Add</i>	1,206.07	
40 05 19 00-1176 EA 10" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,718.01	374.99
<i>For Class 52 Rating, Deduct</i>	-456.48	
<i>For Class 54 Rating, Add</i>	629.29	
<i>For Class 55 Rating, Add</i>	939.05	
<i>For Class 56 Rating, Add</i>	1,244.66	
40 05 19 00-1177 EA 10" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,852.43	377.71
<i>For Class 52 Rating, Deduct</i>	-470.82	
<i>For Class 54 Rating, Add</i>	648.89	
<i>For Class 55 Rating, Add</i>	968.21	
<i>For Class 56 Rating, Add</i>	1,283.25	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1178	EA	10" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,986.87	380.43
		<i>For Class 52 Rating, Deduct</i>		-485.15	
		<i>For Class 54 Rating, Add</i>		668.49	
		<i>For Class 55 Rating, Add</i>		997.37	
		<i>For Class 56 Rating, Add</i>		1,321.84	
40 05 19 00-1179	EA	10" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,121.30	383.14
		<i>For Class 52 Rating, Deduct</i>		-499.49	
		<i>For Class 54 Rating, Add</i>		688.08	
		<i>For Class 55 Rating, Add</i>		1,026.53	
		<i>For Class 56 Rating, Add</i>		1,360.43	
40 05 19 00-1180	EA	10" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,255.73	385.85
		<i>For Class 52 Rating, Deduct</i>		-513.82	
		<i>For Class 54 Rating, Add</i>		707.68	
		<i>For Class 55 Rating, Add</i>		1,055.69	
		<i>For Class 56 Rating, Add</i>		1,399.02	
40 05 19 00-1181	EA	10" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,390.16	388.58
		<i>For Class 52 Rating, Deduct</i>		-528.16	
		<i>For Class 54 Rating, Add</i>		727.28	
		<i>For Class 55 Rating, Add</i>		1,084.84	
		<i>For Class 56 Rating, Add</i>		1,437.61	
40 05 19 00-1182	EA	10" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,524.60	391.30
		<i>For Class 52 Rating, Deduct</i>		-542.49	
		<i>For Class 54 Rating, Add</i>		746.87	
		<i>For Class 55 Rating, Add</i>		1,114.00	
		<i>For Class 56 Rating, Add</i>		1,476.20	
40 05 19 00-1183	EA	10" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,659.02	394.01
		<i>For Class 52 Rating, Deduct</i>		-556.82	
		<i>For Class 54 Rating, Add</i>		766.47	
		<i>For Class 55 Rating, Add</i>		1,143.16	
		<i>For Class 56 Rating, Add</i>		1,514.79	
40 05 19 00-1184	EA	10" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,793.45	396.72
		<i>For Class 52 Rating, Deduct</i>		-571.16	
		<i>For Class 54 Rating, Add</i>		786.07	
		<i>For Class 55 Rating, Add</i>		1,172.32	
		<i>For Class 56 Rating, Add</i>		1,553.38	
40 05 19 00-1185	EA	10" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,927.89	399.44
		<i>For Class 52 Rating, Deduct</i>		-585.49	
		<i>For Class 54 Rating, Add</i>		805.66	
		<i>For Class 55 Rating, Add</i>		1,201.48	
		<i>For Class 56 Rating, Add</i>		1,591.98	
40 05 19 00-1186	EA	10" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,062.32	402.17
		<i>For Class 52 Rating, Deduct</i>		-599.83	
		<i>For Class 54 Rating, Add</i>		825.26	
		<i>For Class 55 Rating, Add</i>		1,230.64	
		<i>For Class 56 Rating, Add</i>		1,630.57	
40 05 19 00-1187	EA	10" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,196.76	404.88
		<i>For Class 52 Rating, Deduct</i>		-614.16	
		<i>For Class 54 Rating, Add</i>		844.86	
		<i>For Class 55 Rating, Add</i>		1,259.80	
		<i>For Class 56 Rating, Add</i>		1,669.16	
40 05 19 00-1188	EA	10" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		6,331.18	407.60
		<i>For Class 52 Rating, Deduct</i>		-628.50	
		<i>For Class 54 Rating, Add</i>		864.45	
		<i>For Class 55 Rating, Add</i>		1,288.96	
		<i>For Class 56 Rating, Add</i>		1,707.75	
40 05 19 00-1189		12" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>			
40 05 19 00-1190	EA	12" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,591.95	380.43
		<i>For Class 52 Rating, Deduct</i>		-111.71	
		<i>For Class 54 Rating, Add</i>		159.25	
		<i>For Class 55 Rating, Add</i>		240.30	
		<i>For Class 56 Rating, Add</i>		320.34	
40 05 19 00-1191	EA	12" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		1,760.09	383.14
		<i>For Class 52 Rating, Deduct</i>		-129.75	
		<i>For Class 54 Rating, Add</i>		183.90	
		<i>For Class 55 Rating, Add</i>		276.98	
		<i>For Class 56 Rating, Add</i>		368.87	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1192 EA 12" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	1,928.22	385.85
<i>For Class 52 Rating, Deduct</i>	-147.79	
<i>For Class 54 Rating, Add</i>	208.55	
<i>For Class 55 Rating, Add</i>	313.65	
<i>For Class 56 Rating, Add</i>	417.41	
40 05 19 00-1193 EA 12" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,096.35	388.58
<i>For Class 52 Rating, Deduct</i>	-165.84	
<i>For Class 54 Rating, Add</i>	233.21	
<i>For Class 55 Rating, Add</i>	350.32	
<i>For Class 56 Rating, Add</i>	465.94	
40 05 19 00-1194 EA 12" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,264.49	391.30
<i>For Class 52 Rating, Deduct</i>	-183.88	
<i>For Class 54 Rating, Add</i>	257.86	
<i>For Class 55 Rating, Add</i>	387.00	
<i>For Class 56 Rating, Add</i>	514.47	
40 05 19 00-1195 EA 12" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,432.62	394.01
<i>For Class 52 Rating, Deduct</i>	-201.92	
<i>For Class 54 Rating, Add</i>	282.51	
<i>For Class 55 Rating, Add</i>	423.68	
<i>For Class 56 Rating, Add</i>	563.01	
40 05 19 00-1196 EA 12" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,600.75	396.72
<i>For Class 52 Rating, Deduct</i>	-219.96	
<i>For Class 54 Rating, Add</i>	307.16	
<i>For Class 55 Rating, Add</i>	460.35	
<i>For Class 56 Rating, Add</i>	611.54	
40 05 19 00-1197 EA 12" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,768.89	399.44
<i>For Class 52 Rating, Deduct</i>	-238.00	
<i>For Class 54 Rating, Add</i>	331.81	
<i>For Class 55 Rating, Add</i>	497.02	
<i>For Class 56 Rating, Add</i>	660.07	
40 05 19 00-1198 EA 12" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,937.02	402.17
<i>For Class 52 Rating, Deduct</i>	-256.04	
<i>For Class 54 Rating, Add</i>	356.46	
<i>For Class 55 Rating, Add</i>	533.70	
<i>For Class 56 Rating, Add</i>	708.60	
40 05 19 00-1199 EA 12" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,105.16	404.88
<i>For Class 52 Rating, Deduct</i>	-274.09	
<i>For Class 54 Rating, Add</i>	381.12	
<i>For Class 55 Rating, Add</i>	570.37	
<i>For Class 56 Rating, Add</i>	757.14	
40 05 19 00-1200 EA 12" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,273.29	407.60
<i>For Class 52 Rating, Deduct</i>	-292.13	
<i>For Class 54 Rating, Add</i>	405.77	
<i>For Class 55 Rating, Add</i>	607.05	
<i>For Class 56 Rating, Add</i>	805.67	
40 05 19 00-1201 EA 12" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,441.42	410.32
<i>For Class 52 Rating, Deduct</i>	-310.17	
<i>For Class 54 Rating, Add</i>	430.42	
<i>For Class 55 Rating, Add</i>	643.72	
<i>For Class 56 Rating, Add</i>	854.20	
40 05 19 00-1202 EA 12" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,609.56	413.02
<i>For Class 52 Rating, Deduct</i>	-328.21	
<i>For Class 54 Rating, Add</i>	455.07	
<i>For Class 55 Rating, Add</i>	680.40	
<i>For Class 56 Rating, Add</i>	902.74	
40 05 19 00-1203 EA 12" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,777.69	415.75
<i>For Class 52 Rating, Deduct</i>	-346.25	
<i>For Class 54 Rating, Add</i>	479.72	
<i>For Class 55 Rating, Add</i>	717.07	
<i>For Class 56 Rating, Add</i>	951.27	
40 05 19 00-1204 EA 12" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,945.82	418.47
<i>For Class 52 Rating, Deduct</i>	-364.30	
<i>For Class 54 Rating, Add</i>	504.38	
<i>For Class 55 Rating, Add</i>	753.74	
<i>For Class 56 Rating, Add</i>	999.80	
40 05 19 00-1205 EA 12" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,113.96	421.19
<i>For Class 52 Rating, Deduct</i>	-382.34	
<i>For Class 54 Rating, Add</i>	529.03	
<i>For Class 55 Rating, Add</i>	790.42	
<i>For Class 56 Rating, Add</i>	1,048.33	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1206	EA	12" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	4,282.09	423.89
		<i>For Class 52 Rating, Deduct</i>		-400.38	
		<i>For Class 54 Rating, Add</i>		553.68	
		<i>For Class 55 Rating, Add</i>		827.09	
		<i>For Class 56 Rating, Add</i>		1,096.87	
40 05 19 00-1207	EA	12" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	4,450.22	426.62
		<i>For Class 52 Rating, Deduct</i>		-418.42	
		<i>For Class 54 Rating, Add</i>		578.33	
		<i>For Class 55 Rating, Add</i>		863.77	
		<i>For Class 56 Rating, Add</i>		1,145.40	
40 05 19 00-1208	EA	12" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	4,618.36	429.34
		<i>For Class 52 Rating, Deduct</i>		-436.46	
		<i>For Class 54 Rating, Add</i>		602.98	
		<i>For Class 55 Rating, Add</i>		900.44	
		<i>For Class 56 Rating, Add</i>		1,193.93	
40 05 19 00-1209	EA	12" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	4,786.49	432.05
		<i>For Class 52 Rating, Deduct</i>		-454.51	
		<i>For Class 54 Rating, Add</i>		627.64	
		<i>For Class 55 Rating, Add</i>		937.12	
		<i>For Class 56 Rating, Add</i>		1,242.47	
40 05 19 00-1210	EA	12" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	4,954.62	434.77
		<i>For Class 52 Rating, Deduct</i>		-472.55	
		<i>For Class 54 Rating, Add</i>		652.29	
		<i>For Class 55 Rating, Add</i>		973.79	
		<i>For Class 56 Rating, Add</i>		1,291.00	
40 05 19 00-1211	EA	12" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	5,122.77	437.49
		<i>For Class 52 Rating, Deduct</i>		-490.59	
		<i>For Class 54 Rating, Add</i>		676.94	
		<i>For Class 55 Rating, Add</i>		1,010.47	
		<i>For Class 56 Rating, Add</i>		1,339.53	
40 05 19 00-1212	EA	12" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	5,290.89	440.21
		<i>For Class 52 Rating, Deduct</i>		-508.63	
		<i>For Class 54 Rating, Add</i>		701.59	
		<i>For Class 55 Rating, Add</i>		1,047.14	
		<i>For Class 56 Rating, Add</i>		1,388.06	
40 05 19 00-1213	EA	12" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	5,459.03	442.92
		<i>For Class 52 Rating, Deduct</i>		-526.67	
		<i>For Class 54 Rating, Add</i>		726.24	
		<i>For Class 55 Rating, Add</i>		1,083.81	
		<i>For Class 56 Rating, Add</i>		1,436.60	
40 05 19 00-1214	EA	12" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	5,627.16	445.64
		<i>For Class 52 Rating, Deduct</i>		-544.71	
		<i>For Class 54 Rating, Add</i>		750.90	
		<i>For Class 55 Rating, Add</i>		1,120.49	
		<i>For Class 56 Rating, Add</i>		1,485.13	
40 05 19 00-1215	EA	12" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	5,795.29	448.36
		<i>For Class 52 Rating, Deduct</i>		-562.76	
		<i>For Class 54 Rating, Add</i>		775.55	
		<i>For Class 55 Rating, Add</i>		1,157.16	
		<i>For Class 56 Rating, Add</i>		1,533.66	
40 05 19 00-1216	EA	12" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	5,963.43	451.08
		<i>For Class 52 Rating, Deduct</i>		-580.80	
		<i>For Class 54 Rating, Add</i>		800.20	
		<i>For Class 55 Rating, Add</i>		1,193.84	
		<i>For Class 56 Rating, Add</i>		1,582.20	
40 05 19 00-1217	EA	12" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	6,131.56	453.79
		<i>For Class 52 Rating, Deduct</i>		-598.84	
		<i>For Class 54 Rating, Add</i>		824.85	
		<i>For Class 55 Rating, Add</i>		1,230.51	
		<i>For Class 56 Rating, Add</i>		1,630.73	
40 05 19 00-1218	EA	12" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	6,299.69	456.51
		<i>For Class 52 Rating, Deduct</i>		-616.88	
		<i>For Class 54 Rating, Add</i>		849.50	
		<i>For Class 55 Rating, Add</i>		1,267.19	
		<i>For Class 56 Rating, Add</i>		1,679.26	
40 05 19 00-1219	EA	12" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	6,467.83	459.23
		<i>For Class 52 Rating, Deduct</i>		-634.92	
		<i>For Class 54 Rating, Add</i>		874.15	
		<i>For Class 55 Rating, Add</i>		1,303.86	
		<i>For Class 56 Rating, Add</i>		1,727.80	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1220 EA 12" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,635.96	461.94
<i>For Class 52 Rating, Deduct</i>	-652.97	
<i>For Class 54 Rating, Add</i>	898.81	
<i>For Class 55 Rating, Add</i>	1,340.54	
<i>For Class 56 Rating, Add</i>	1,776.33	
40 05 19 00-1221 EA 12" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,804.09	464.66
<i>For Class 52 Rating, Deduct</i>	-671.01	
<i>For Class 54 Rating, Add</i>	923.46	
<i>For Class 55 Rating, Add</i>	1,377.21	
<i>For Class 56 Rating, Add</i>	1,824.86	
40 05 19 00-1222 EA 12" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,972.23	467.38
<i>For Class 52 Rating, Deduct</i>	-689.05	
<i>For Class 54 Rating, Add</i>	948.11	
<i>For Class 55 Rating, Add</i>	1,413.89	
<i>For Class 56 Rating, Add</i>	1,873.40	
40 05 19 00-1223 EA 12" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,140.35	470.10
<i>For Class 52 Rating, Deduct</i>	-707.09	
<i>For Class 54 Rating, Add</i>	972.76	
<i>For Class 55 Rating, Add</i>	1,450.56	
<i>For Class 56 Rating, Add</i>	1,921.93	
40 05 19 00-1224 EA 12" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,308.49	472.81
<i>For Class 52 Rating, Deduct</i>	-725.13	
<i>For Class 54 Rating, Add</i>	997.41	
<i>For Class 55 Rating, Add</i>	1,487.23	
<i>For Class 56 Rating, Add</i>	1,970.46	
40 05 19 00-1225 EA 12" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,476.63	475.53
<i>For Class 52 Rating, Deduct</i>	-743.17	
<i>For Class 54 Rating, Add</i>	1,022.07	
<i>For Class 55 Rating, Add</i>	1,523.91	
<i>For Class 56 Rating, Add</i>	2,019.00	
40 05 19 00-1226 EA 12" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,644.76	478.25
<i>For Class 52 Rating, Deduct</i>	-761.22	
<i>For Class 54 Rating, Add</i>	1,046.72	
<i>For Class 55 Rating, Add</i>	1,560.58	
<i>For Class 56 Rating, Add</i>	2,067.53	
40 05 19 00-1227 EA 12" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,812.90	480.96
<i>For Class 52 Rating, Deduct</i>	-779.26	
<i>For Class 54 Rating, Add</i>	1,071.37	
<i>For Class 55 Rating, Add</i>	1,597.26	
<i>For Class 56 Rating, Add</i>	2,116.06	
40 05 19 00-1228 EA 12" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,981.03	483.68
<i>For Class 52 Rating, Deduct</i>	-797.30	
<i>For Class 54 Rating, Add</i>	1,096.02	
<i>For Class 55 Rating, Add</i>	1,633.93	
<i>For Class 56 Rating, Add</i>	2,164.60	
40 05 19 00-1229 14" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1230 EA 14" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,140.87	456.51
<i>For Class 52 Rating, Deduct</i>	-159.41	
<i>For Class 54 Rating, Add</i>	225.68	
<i>For Class 55 Rating, Add</i>	339.77	
<i>For Class 56 Rating, Add</i>	452.41	
40 05 19 00-1231 EA 14" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,344.95	459.23
<i>For Class 52 Rating, Deduct</i>	-181.41	
<i>For Class 54 Rating, Add</i>	255.72	
<i>For Class 55 Rating, Add</i>	384.46	
<i>For Class 56 Rating, Add</i>	511.55	
40 05 19 00-1232 EA 14" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,549.03	461.94
<i>For Class 52 Rating, Deduct</i>	-203.40	
<i>For Class 54 Rating, Add</i>	285.77	
<i>For Class 55 Rating, Add</i>	429.15	
<i>For Class 56 Rating, Add</i>	570.69	
40 05 19 00-1233 EA 14" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,753.11	464.66
<i>For Class 52 Rating, Deduct</i>	-225.40	
<i>For Class 54 Rating, Add</i>	315.81	
<i>For Class 55 Rating, Add</i>	473.84	
<i>For Class 56 Rating, Add</i>	629.82	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1234	EA	14" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		2,957.20	467.38
		<i>For Class 52 Rating, Deduct</i>		-247.40	
		<i>For Class 54 Rating, Add</i>		345.86	
		<i>For Class 55 Rating, Add</i>		518.53	
		<i>For Class 56 Rating, Add</i>		688.96	
40 05 19 00-1235	EA	14" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,161.27	470.10
		<i>For Class 52 Rating, Deduct</i>		-269.39	
		<i>For Class 54 Rating, Add</i>		375.90	
		<i>For Class 55 Rating, Add</i>		563.22	
		<i>For Class 56 Rating, Add</i>		748.10	
40 05 19 00-1236	EA	14" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,365.36	472.81
		<i>For Class 52 Rating, Deduct</i>		-291.39	
		<i>For Class 54 Rating, Add</i>		405.94	
		<i>For Class 55 Rating, Add</i>		607.92	
		<i>For Class 56 Rating, Add</i>		807.24	
40 05 19 00-1237	EA	14" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,569.44	475.53
		<i>For Class 52 Rating, Deduct</i>		-313.38	
		<i>For Class 54 Rating, Add</i>		435.99	
		<i>For Class 55 Rating, Add</i>		652.61	
		<i>For Class 56 Rating, Add</i>		866.38	
40 05 19 00-1238	EA	14" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,773.53	478.25
		<i>For Class 52 Rating, Deduct</i>		-335.38	
		<i>For Class 54 Rating, Add</i>		466.03	
		<i>For Class 55 Rating, Add</i>		697.30	
		<i>For Class 56 Rating, Add</i>		925.51	
40 05 19 00-1239	EA	14" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		3,977.61	480.96
		<i>For Class 52 Rating, Deduct</i>		-357.38	
		<i>For Class 54 Rating, Add</i>		496.08	
		<i>For Class 55 Rating, Add</i>		741.99	
		<i>For Class 56 Rating, Add</i>		984.65	
40 05 19 00-1240	EA	14" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,181.69	483.68
		<i>For Class 52 Rating, Deduct</i>		-379.37	
		<i>For Class 54 Rating, Add</i>		526.12	
		<i>For Class 55 Rating, Add</i>		786.68	
		<i>For Class 56 Rating, Add</i>		1,043.79	
40 05 19 00-1241	EA	14" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,385.77	486.40
		<i>For Class 52 Rating, Deduct</i>		-401.37	
		<i>For Class 54 Rating, Add</i>		556.16	
		<i>For Class 55 Rating, Add</i>		831.37	
		<i>For Class 56 Rating, Add</i>		1,102.93	
40 05 19 00-1242	EA	14" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,589.86	489.12
		<i>For Class 52 Rating, Deduct</i>		-423.36	
		<i>For Class 54 Rating, Add</i>		586.21	
		<i>For Class 55 Rating, Add</i>		876.06	
		<i>For Class 56 Rating, Add</i>		1,162.07	
40 05 19 00-1243	EA	14" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,793.93	491.83
		<i>For Class 52 Rating, Deduct</i>		-445.36	
		<i>For Class 54 Rating, Add</i>		616.25	
		<i>For Class 55 Rating, Add</i>		920.75	
		<i>For Class 56 Rating, Add</i>		1,221.20	
40 05 19 00-1244	EA	14" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		4,998.02	494.55
		<i>For Class 52 Rating, Deduct</i>		-467.36	
		<i>For Class 54 Rating, Add</i>		646.30	
		<i>For Class 55 Rating, Add</i>		965.44	
		<i>For Class 56 Rating, Add</i>		1,280.34	
40 05 19 00-1245	EA	14" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,202.10	497.27
		<i>For Class 52 Rating, Deduct</i>		-489.35	
		<i>For Class 54 Rating, Add</i>		676.34	
		<i>For Class 55 Rating, Add</i>		1,010.13	
		<i>For Class 56 Rating, Add</i>		1,339.48	
40 05 19 00-1246	EA	14" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,406.18	499.98
		<i>For Class 52 Rating, Deduct</i>		-511.35	
		<i>For Class 54 Rating, Add</i>		706.39	
		<i>For Class 55 Rating, Add</i>		1,054.83	
		<i>For Class 56 Rating, Add</i>		1,398.62	
40 05 19 00-1247	EA	14" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		5,610.26	502.70
		<i>For Class 52 Rating, Deduct</i>		-533.34	
		<i>For Class 54 Rating, Add</i>		736.43	
		<i>For Class 55 Rating, Add</i>		1,099.52	
		<i>For Class 56 Rating, Add</i>		1,457.75	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1248 EA 14" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,814.35	505.43
<i>For Class 52 Rating, Deduct</i>	-555.34	
<i>For Class 54 Rating, Add</i>	766.47	
<i>For Class 55 Rating, Add</i>	1,144.21	
<i>For Class 56 Rating, Add</i>	1,516.89	
40 05 19 00-1249 EA 14" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,018.42	508.14
<i>For Class 52 Rating, Deduct</i>	-577.34	
<i>For Class 54 Rating, Add</i>	796.52	
<i>For Class 55 Rating, Add</i>	1,188.90	
<i>For Class 56 Rating, Add</i>	1,576.03	
40 05 19 00-1250 EA 14" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,222.51	510.85
<i>For Class 52 Rating, Deduct</i>	-599.33	
<i>For Class 54 Rating, Add</i>	826.56	
<i>For Class 55 Rating, Add</i>	1,233.59	
<i>For Class 56 Rating, Add</i>	1,635.17	
40 05 19 00-1251 EA 14" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,426.61	513.57
<i>For Class 52 Rating, Deduct</i>	-621.33	
<i>For Class 54 Rating, Add</i>	856.61	
<i>For Class 55 Rating, Add</i>	1,278.28	
<i>For Class 56 Rating, Add</i>	1,694.31	
40 05 19 00-1252 EA 14" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,630.68	516.29
<i>For Class 52 Rating, Deduct</i>	-643.33	
<i>For Class 54 Rating, Add</i>	886.65	
<i>For Class 55 Rating, Add</i>	1,322.97	
<i>For Class 56 Rating, Add</i>	1,753.45	
40 05 19 00-1253 EA 14" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,834.77	519.02
<i>For Class 52 Rating, Deduct</i>	-665.32	
<i>For Class 54 Rating, Add</i>	916.70	
<i>For Class 55 Rating, Add</i>	1,367.66	
<i>For Class 56 Rating, Add</i>	1,812.58	
40 05 19 00-1254 EA 14" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,038.84	521.72
<i>For Class 52 Rating, Deduct</i>	-687.32	
<i>For Class 54 Rating, Add</i>	946.74	
<i>For Class 55 Rating, Add</i>	1,412.35	
<i>For Class 56 Rating, Add</i>	1,871.72	
40 05 19 00-1255 EA 14" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,242.93	524.44
<i>For Class 52 Rating, Deduct</i>	-709.32	
<i>For Class 54 Rating, Add</i>	976.78	
<i>For Class 55 Rating, Add</i>	1,457.05	
<i>For Class 56 Rating, Add</i>	1,930.86	
40 05 19 00-1256 EA 14" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,447.01	527.16
<i>For Class 52 Rating, Deduct</i>	-731.31	
<i>For Class 54 Rating, Add</i>	1,006.83	
<i>For Class 55 Rating, Add</i>	1,501.74	
<i>For Class 56 Rating, Add</i>	1,990.00	
40 05 19 00-1257 EA 14" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,651.09	529.87
<i>For Class 52 Rating, Deduct</i>	-753.31	
<i>For Class 54 Rating, Add</i>	1,036.87	
<i>For Class 55 Rating, Add</i>	1,546.43	
<i>For Class 56 Rating, Add</i>	2,049.14	
40 05 19 00-1258 EA 14" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,855.17	532.60
<i>For Class 52 Rating, Deduct</i>	-775.30	
<i>For Class 54 Rating, Add</i>	1,066.92	
<i>For Class 55 Rating, Add</i>	1,591.12	
<i>For Class 56 Rating, Add</i>	2,108.27	
40 05 19 00-1259 EA 14" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,059.26	535.31
<i>For Class 52 Rating, Deduct</i>	-797.30	
<i>For Class 54 Rating, Add</i>	1,096.96	
<i>For Class 55 Rating, Add</i>	1,635.81	
<i>For Class 56 Rating, Add</i>	2,167.41	
40 05 19 00-1260 EA 14" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,263.33	538.03
<i>For Class 52 Rating, Deduct</i>	-819.30	
<i>For Class 54 Rating, Add</i>	1,127.00	
<i>For Class 55 Rating, Add</i>	1,680.50	
<i>For Class 56 Rating, Add</i>	2,226.55	
40 05 19 00-1261 EA 14" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,467.42	540.74
<i>For Class 52 Rating, Deduct</i>	-841.29	
<i>For Class 54 Rating, Add</i>	1,157.05	
<i>For Class 55 Rating, Add</i>	1,725.19	
<i>For Class 56 Rating, Add</i>	2,285.69	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1262	EA	14" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,671.50	543.46
		<i>For Class 52 Rating, Deduct</i>	-863.29	
		<i>For Class 54 Rating, Add</i>	1,187.09	
		<i>For Class 55 Rating, Add</i>	1,769.88	
		<i>For Class 56 Rating, Add</i>	2,344.82	
40 05 19 00-1263	EA	14" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,875.58	546.19
		<i>For Class 52 Rating, Deduct</i>	-885.28	
		<i>For Class 54 Rating, Add</i>	1,217.14	
		<i>For Class 55 Rating, Add</i>	1,814.57	
		<i>For Class 56 Rating, Add</i>	2,403.96	
40 05 19 00-1264	EA	14" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,079.66	548.89
		<i>For Class 52 Rating, Deduct</i>	-907.28	
		<i>For Class 54 Rating, Add</i>	1,247.18	
		<i>For Class 55 Rating, Add</i>	1,859.26	
		<i>For Class 56 Rating, Add</i>	2,463.10	
40 05 19 00-1265	EA	14" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,283.75	551.61
		<i>For Class 52 Rating, Deduct</i>	-929.28	
		<i>For Class 54 Rating, Add</i>	1,277.22	
		<i>For Class 55 Rating, Add</i>	1,903.96	
		<i>For Class 56 Rating, Add</i>	2,522.24	
40 05 19 00-1266	EA	14" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,487.83	554.33
		<i>For Class 52 Rating, Deduct</i>	-951.27	
		<i>For Class 54 Rating, Add</i>	1,307.27	
		<i>For Class 55 Rating, Add</i>	1,948.65	
		<i>For Class 56 Rating, Add</i>	2,581.38	
40 05 19 00-1267	EA	14" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,691.92	557.05
		<i>For Class 52 Rating, Deduct</i>	-973.27	
		<i>For Class 54 Rating, Add</i>	1,337.31	
		<i>For Class 55 Rating, Add</i>	1,993.34	
		<i>For Class 56 Rating, Add</i>	2,640.52	
40 05 19 00-1268		16" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1269	EA	16" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,504.80	521.72
		<i>For Class 52 Rating, Deduct</i>	-188.57	
		<i>For Class 54 Rating, Add</i>	266.63	
		<i>For Class 55 Rating, Add</i>	401.26	
		<i>For Class 56 Rating, Add</i>	534.18	
40 05 19 00-1270	EA	16" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,742.59	524.44
		<i>For Class 52 Rating, Deduct</i>	-214.28	
		<i>For Class 54 Rating, Add</i>	301.73	
		<i>For Class 55 Rating, Add</i>	453.47	
		<i>For Class 56 Rating, Add</i>	603.26	
40 05 19 00-1271	EA	16" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,980.37	527.16
		<i>For Class 52 Rating, Deduct</i>	-239.98	
		<i>For Class 54 Rating, Add</i>	336.83	
		<i>For Class 55 Rating, Add</i>	505.68	
		<i>For Class 56 Rating, Add</i>	672.34	
40 05 19 00-1272	EA	16" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,218.15	529.87
		<i>For Class 52 Rating, Deduct</i>	-265.68	
		<i>For Class 54 Rating, Add</i>	371.93	
		<i>For Class 55 Rating, Add</i>	557.88	
		<i>For Class 56 Rating, Add</i>	741.42	
40 05 19 00-1273	EA	16" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,455.94	532.60
		<i>For Class 52 Rating, Deduct</i>	-291.39	
		<i>For Class 54 Rating, Add</i>	407.03	
		<i>For Class 55 Rating, Add</i>	610.09	
		<i>For Class 56 Rating, Add</i>	810.50	
40 05 19 00-1274	EA	16" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,693.72	535.31
		<i>For Class 52 Rating, Deduct</i>	-317.09	
		<i>For Class 54 Rating, Add</i>	442.13	
		<i>For Class 55 Rating, Add</i>	662.29	
		<i>For Class 56 Rating, Add</i>	879.58	
40 05 19 00-1275	EA	16" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,931.50	538.03
		<i>For Class 52 Rating, Deduct</i>	-342.79	
		<i>For Class 54 Rating, Add</i>	477.23	
		<i>For Class 55 Rating, Add</i>	714.50	
		<i>For Class 56 Rating, Add</i>	948.66	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1276 EA 16" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,169.29	540.74
<i>For Class 52 Rating, Deduct</i>	-368.50	
<i>For Class 54 Rating, Add</i>	512.33	
<i>For Class 55 Rating, Add</i>	766.71	
<i>For Class 56 Rating, Add</i>	1,017.74	
40 05 19 00-1277 EA 16" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,407.08	543.46
<i>For Class 52 Rating, Deduct</i>	-394.20	
<i>For Class 54 Rating, Add</i>	547.43	
<i>For Class 55 Rating, Add</i>	818.92	
<i>For Class 56 Rating, Add</i>	1,086.82	
40 05 19 00-1278 EA 16" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,644.85	546.19
<i>For Class 52 Rating, Deduct</i>	-419.90	
<i>For Class 54 Rating, Add</i>	582.53	
<i>For Class 55 Rating, Add</i>	871.12	
<i>For Class 56 Rating, Add</i>	1,155.90	
40 05 19 00-1279 EA 16" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,882.64	548.89
<i>For Class 52 Rating, Deduct</i>	-445.61	
<i>For Class 54 Rating, Add</i>	617.63	
<i>For Class 55 Rating, Add</i>	923.33	
<i>For Class 56 Rating, Add</i>	1,224.98	
40 05 19 00-1280 EA 16" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,120.43	551.61
<i>For Class 52 Rating, Deduct</i>	-471.31	
<i>For Class 54 Rating, Add</i>	652.73	
<i>For Class 55 Rating, Add</i>	975.54	
<i>For Class 56 Rating, Add</i>	1,294.06	
40 05 19 00-1281 EA 16" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,358.21	554.33
<i>For Class 52 Rating, Deduct</i>	-497.01	
<i>For Class 54 Rating, Add</i>	687.83	
<i>For Class 55 Rating, Add</i>	1,027.74	
<i>For Class 56 Rating, Add</i>	1,363.14	
40 05 19 00-1282 EA 16" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,596.00	557.05
<i>For Class 52 Rating, Deduct</i>	-522.72	
<i>For Class 54 Rating, Add</i>	722.93	
<i>For Class 55 Rating, Add</i>	1,079.95	
<i>For Class 56 Rating, Add</i>	1,432.22	
40 05 19 00-1283 EA 16" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,833.78	559.77
<i>For Class 52 Rating, Deduct</i>	-548.42	
<i>For Class 54 Rating, Add</i>	758.03	
<i>For Class 55 Rating, Add</i>	1,132.16	
<i>For Class 56 Rating, Add</i>	1,501.30	
40 05 19 00-1284 EA 16" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,071.57	562.49
<i>For Class 52 Rating, Deduct</i>	-574.13	
<i>For Class 54 Rating, Add</i>	793.13	
<i>For Class 55 Rating, Add</i>	1,184.36	
<i>For Class 56 Rating, Add</i>	1,570.38	
40 05 19 00-1285 EA 16" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,309.35	565.20
<i>For Class 52 Rating, Deduct</i>	-599.83	
<i>For Class 54 Rating, Add</i>	828.22	
<i>For Class 55 Rating, Add</i>	1,236.57	
<i>For Class 56 Rating, Add</i>	1,639.46	
40 05 19 00-1286 EA 16" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,547.13	567.91
<i>For Class 52 Rating, Deduct</i>	-625.53	
<i>For Class 54 Rating, Add</i>	863.32	
<i>For Class 55 Rating, Add</i>	1,288.77	
<i>For Class 56 Rating, Add</i>	1,708.54	
40 05 19 00-1287 EA 16" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,784.92	570.63
<i>For Class 52 Rating, Deduct</i>	-651.24	
<i>For Class 54 Rating, Add</i>	898.42	
<i>For Class 55 Rating, Add</i>	1,340.98	
<i>For Class 56 Rating, Add</i>	1,777.62	
40 05 19 00-1288 EA 16" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,022.71	573.36
<i>For Class 52 Rating, Deduct</i>	-676.94	
<i>For Class 54 Rating, Add</i>	933.52	
<i>For Class 55 Rating, Add</i>	1,393.19	
<i>For Class 56 Rating, Add</i>	1,846.70	
40 05 19 00-1289 EA 16" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,260.48	576.08
<i>For Class 52 Rating, Deduct</i>	-702.64	
<i>For Class 54 Rating, Add</i>	968.62	
<i>For Class 55 Rating, Add</i>	1,445.39	
<i>For Class 56 Rating, Add</i>	1,915.78	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1290	EA	16" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,498.27		578.78
		<i>For Class 52 Rating, Deduct</i>	-728.35		
		<i>For Class 54 Rating, Add</i>	1,003.72		
		<i>For Class 55 Rating, Add</i>	1,497.60		
		<i>For Class 56 Rating, Add</i>	1,984.86		
40 05 19 00-1291	EA	16" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,736.06		581.50
		<i>For Class 52 Rating, Deduct</i>	-754.05		
		<i>For Class 54 Rating, Add</i>	1,038.82		
		<i>For Class 55 Rating, Add</i>	1,549.81		
		<i>For Class 56 Rating, Add</i>	2,053.94		
40 05 19 00-1292	EA	16" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,973.83		584.23
		<i>For Class 52 Rating, Deduct</i>	-779.75		
		<i>For Class 54 Rating, Add</i>	1,073.92		
		<i>For Class 55 Rating, Add</i>	1,602.01		
		<i>For Class 56 Rating, Add</i>	2,123.02		
40 05 19 00-1293	EA	16" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,211.62		586.95
		<i>For Class 52 Rating, Deduct</i>	-805.46		
		<i>For Class 54 Rating, Add</i>	1,109.02		
		<i>For Class 55 Rating, Add</i>	1,654.22		
		<i>For Class 56 Rating, Add</i>	2,192.10		
40 05 19 00-1294	EA	16" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,449.42		589.66
		<i>For Class 52 Rating, Deduct</i>	-831.16		
		<i>For Class 54 Rating, Add</i>	1,144.12		
		<i>For Class 55 Rating, Add</i>	1,706.43		
		<i>For Class 56 Rating, Add</i>	2,261.18		
40 05 19 00-1295	EA	16" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,687.20		592.37
		<i>For Class 52 Rating, Deduct</i>	-856.86		
		<i>For Class 54 Rating, Add</i>	1,179.22		
		<i>For Class 55 Rating, Add</i>	1,758.64		
		<i>For Class 56 Rating, Add</i>	2,330.26		
40 05 19 00-1296	EA	16" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,924.98		595.09
		<i>For Class 52 Rating, Deduct</i>	-882.57		
		<i>For Class 54 Rating, Add</i>	1,214.32		
		<i>For Class 55 Rating, Add</i>	1,810.84		
		<i>For Class 56 Rating, Add</i>	2,399.34		
40 05 19 00-1297	EA	16" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,162.76		597.81
		<i>For Class 52 Rating, Deduct</i>	-908.27		
		<i>For Class 54 Rating, Add</i>	1,249.42		
		<i>For Class 55 Rating, Add</i>	1,863.05		
		<i>For Class 56 Rating, Add</i>	2,468.42		
40 05 19 00-1298	EA	16" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,400.55		600.53
		<i>For Class 52 Rating, Deduct</i>	-933.97		
		<i>For Class 54 Rating, Add</i>	1,284.52		
		<i>For Class 55 Rating, Add</i>	1,915.25		
		<i>For Class 56 Rating, Add</i>	2,537.50		
40 05 19 00-1299	EA	16" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,638.33		603.25
		<i>For Class 52 Rating, Deduct</i>	-959.68		
		<i>For Class 54 Rating, Add</i>	1,319.62		
		<i>For Class 55 Rating, Add</i>	1,967.46		
		<i>For Class 56 Rating, Add</i>	2,606.58		
40 05 19 00-1300	EA	16" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,876.11		605.96
		<i>For Class 52 Rating, Deduct</i>	-985.38		
		<i>For Class 54 Rating, Add</i>	1,354.72		
		<i>For Class 55 Rating, Add</i>	2,019.67		
		<i>For Class 56 Rating, Add</i>	2,675.66		
40 05 19 00-1301	EA	16" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,113.90		608.67
		<i>For Class 52 Rating, Deduct</i>	-1,011.08		
		<i>For Class 54 Rating, Add</i>	1,389.82		
		<i>For Class 55 Rating, Add</i>	2,071.87		
		<i>For Class 56 Rating, Add</i>	2,744.74		
40 05 19 00-1302	EA	16" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,351.69		611.40
		<i>For Class 52 Rating, Deduct</i>	-1,036.79		
		<i>For Class 54 Rating, Add</i>	1,424.92		
		<i>For Class 55 Rating, Add</i>	2,124.08		
		<i>For Class 56 Rating, Add</i>	2,813.82		
40 05 19 00-1303	EA	16" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,589.46		614.12
		<i>For Class 52 Rating, Deduct</i>	-1,062.49		
		<i>For Class 54 Rating, Add</i>	1,460.01		
		<i>For Class 55 Rating, Add</i>	2,176.29		
		<i>For Class 56 Rating, Add</i>	2,882.90		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1304 EA 16" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,827.25	616.83
<i>For Class 52 Rating, Deduct</i>	-1,088.19	
<i>For Class 54 Rating, Add</i>	1,495.11	
<i>For Class 55 Rating, Add</i>	2,228.49	
<i>For Class 56 Rating, Add</i>	2,951.98	
40 05 19 00-1305 EA 16" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,065.04	619.54
<i>For Class 52 Rating, Deduct</i>	-1,113.90	
<i>For Class 54 Rating, Add</i>	1,530.21	
<i>For Class 55 Rating, Add</i>	2,280.70	
<i>For Class 56 Rating, Add</i>	3,021.06	
40 05 19 00-1306 EA 16" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,302.81	622.26
<i>For Class 52 Rating, Deduct</i>	-1,139.60	
<i>For Class 54 Rating, Add</i>	1,565.31	
<i>For Class 55 Rating, Add</i>	2,332.91	
<i>For Class 56 Rating, Add</i>	3,090.14	
40 05 19 00-1307 18" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		
<small>(40 05 19 00-1028)</small>		
40 05 19 00-1308 EA 18" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	2,901.84	588.03
<i>For Class 52 Rating, Deduct</i>	-221.20	
<i>For Class 54 Rating, Add</i>	312.32	
<i>For Class 55 Rating, Add</i>	469.81	
<i>For Class 56 Rating, Add</i>	625.29	
40 05 19 00-1309 EA 18" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,175.57	590.75
<i>For Class 52 Rating, Deduct</i>	-250.86	
<i>For Class 54 Rating, Add</i>	352.82	
<i>For Class 55 Rating, Add</i>	530.03	
<i>For Class 56 Rating, Add</i>	704.97	
40 05 19 00-1310 EA 18" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,449.31	593.46
<i>For Class 52 Rating, Deduct</i>	-280.51	
<i>For Class 54 Rating, Add</i>	393.31	
<i>For Class 55 Rating, Add</i>	590.26	
<i>For Class 56 Rating, Add</i>	784.66	
40 05 19 00-1311 EA 18" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,723.03	596.18
<i>For Class 52 Rating, Deduct</i>	-310.17	
<i>For Class 54 Rating, Add</i>	433.80	
<i>For Class 55 Rating, Add</i>	650.48	
<i>For Class 56 Rating, Add</i>	864.34	
40 05 19 00-1312 EA 18" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,996.77	598.90
<i>For Class 52 Rating, Deduct</i>	-339.83	
<i>For Class 54 Rating, Add</i>	474.29	
<i>For Class 55 Rating, Add</i>	710.70	
<i>For Class 56 Rating, Add</i>	944.03	
40 05 19 00-1313 EA 18" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,270.51	601.61
<i>For Class 52 Rating, Deduct</i>	-369.49	
<i>For Class 54 Rating, Add</i>	514.78	
<i>For Class 55 Rating, Add</i>	770.93	
<i>For Class 56 Rating, Add</i>	1,023.71	
40 05 19 00-1314 EA 18" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,544.23	604.33
<i>For Class 52 Rating, Deduct</i>	-399.14	
<i>For Class 54 Rating, Add</i>	555.27	
<i>For Class 55 Rating, Add</i>	831.15	
<i>For Class 56 Rating, Add</i>	1,103.39	
40 05 19 00-1315 EA 18" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,817.97	607.05
<i>For Class 52 Rating, Deduct</i>	-428.80	
<i>For Class 54 Rating, Add</i>	595.77	
<i>For Class 55 Rating, Add</i>	891.37	
<i>For Class 56 Rating, Add</i>	1,183.08	
40 05 19 00-1316 EA 18" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,091.70	609.77
<i>For Class 52 Rating, Deduct</i>	-458.46	
<i>For Class 54 Rating, Add</i>	636.26	
<i>For Class 55 Rating, Add</i>	951.59	
<i>For Class 56 Rating, Add</i>	1,262.76	
40 05 19 00-1317 EA 18" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,365.44	612.47
<i>For Class 52 Rating, Deduct</i>	-488.12	
<i>For Class 54 Rating, Add</i>	676.75	
<i>For Class 55 Rating, Add</i>	1,011.82	
<i>For Class 56 Rating, Add</i>	1,342.45	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-1318	EA		18" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,639.18	615.20
			<i>For Class 52 Rating, Deduct</i>	-517.78	
			<i>For Class 54 Rating, Add</i>	717.24	
			<i>For Class 55 Rating, Add</i>	1,072.04	
			<i>For Class 56 Rating, Add</i>	1,422.14	
40 05 19 00-1319	EA		18" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,912.90	617.92
			<i>For Class 52 Rating, Deduct</i>	-547.43	
			<i>For Class 54 Rating, Add</i>	757.73	
			<i>For Class 55 Rating, Add</i>	1,132.26	
			<i>For Class 56 Rating, Add</i>	1,501.82	
40 05 19 00-1320	EA		18" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,186.64	620.63
			<i>For Class 52 Rating, Deduct</i>	-577.09	
			<i>For Class 54 Rating, Add</i>	798.23	
			<i>For Class 55 Rating, Add</i>	1,192.49	
			<i>For Class 56 Rating, Add</i>	1,581.51	
40 05 19 00-1321	EA		18" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,460.37	623.35
			<i>For Class 52 Rating, Deduct</i>	-606.75	
			<i>For Class 54 Rating, Add</i>	838.72	
			<i>For Class 55 Rating, Add</i>	1,252.71	
			<i>For Class 56 Rating, Add</i>	1,661.19	
40 05 19 00-1322	EA		18" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,734.10	626.08
			<i>For Class 52 Rating, Deduct</i>	-636.41	
			<i>For Class 54 Rating, Add</i>	879.21	
			<i>For Class 55 Rating, Add</i>	1,312.93	
			<i>For Class 56 Rating, Add</i>	1,740.87	
40 05 19 00-1323	EA		18" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,007.84	628.79
			<i>For Class 52 Rating, Deduct</i>	-666.06	
			<i>For Class 54 Rating, Add</i>	919.70	
			<i>For Class 55 Rating, Add</i>	1,373.16	
			<i>For Class 56 Rating, Add</i>	1,820.56	
40 05 19 00-1324	EA		18" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,281.57	631.50
			<i>For Class 52 Rating, Deduct</i>	-695.72	
			<i>For Class 54 Rating, Add</i>	960.19	
			<i>For Class 55 Rating, Add</i>	1,433.38	
			<i>For Class 56 Rating, Add</i>	1,900.24	
40 05 19 00-1325	EA		18" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,555.30	634.22
			<i>For Class 52 Rating, Deduct</i>	-725.38	
			<i>For Class 54 Rating, Add</i>	1,000.69	
			<i>For Class 55 Rating, Add</i>	1,493.60	
			<i>For Class 56 Rating, Add</i>	1,979.93	
40 05 19 00-1326	EA		18" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,829.03	636.94
			<i>For Class 52 Rating, Deduct</i>	-755.04	
			<i>For Class 54 Rating, Add</i>	1,041.18	
			<i>For Class 55 Rating, Add</i>	1,553.83	
			<i>For Class 56 Rating, Add</i>	2,059.61	
40 05 19 00-1327	EA		18" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,102.77	639.66
			<i>For Class 52 Rating, Deduct</i>	-784.69	
			<i>For Class 54 Rating, Add</i>	1,081.67	
			<i>For Class 55 Rating, Add</i>	1,614.05	
			<i>For Class 56 Rating, Add</i>	2,139.30	
40 05 19 00-1328	EA		18" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,376.50	642.37
			<i>For Class 52 Rating, Deduct</i>	-814.35	
			<i>For Class 54 Rating, Add</i>	1,122.16	
			<i>For Class 55 Rating, Add</i>	1,674.27	
			<i>For Class 56 Rating, Add</i>	2,218.99	
40 05 19 00-1329	EA		18" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,650.23	645.09
			<i>For Class 52 Rating, Deduct</i>	-844.01	
			<i>For Class 54 Rating, Add</i>	1,162.65	
			<i>For Class 55 Rating, Add</i>	1,734.50	
			<i>For Class 56 Rating, Add</i>	2,298.67	
40 05 19 00-1330	EA		18" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,923.97	647.81
			<i>For Class 52 Rating, Deduct</i>	-873.67	
			<i>For Class 54 Rating, Add</i>	1,203.14	
			<i>For Class 55 Rating, Add</i>	1,794.72	
			<i>For Class 56 Rating, Add</i>	2,378.35	
40 05 19 00-1331	EA		18" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,197.70	650.52
			<i>For Class 52 Rating, Deduct</i>	-903.33	
			<i>For Class 54 Rating, Add</i>	1,243.64	
			<i>For Class 55 Rating, Add</i>	1,854.94	
			<i>For Class 56 Rating, Add</i>	2,458.04	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1332	EA			18" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	9,471.44	653.25
				<i>For Class 52 Rating, Deduct</i>	-932.98	
				<i>For Class 54 Rating, Add</i>	1,284.13	
				<i>For Class 55 Rating, Add</i>	1,915.17	
				<i>For Class 56 Rating, Add</i>	2,537.72	
40 05 19 00-1333	EA			18" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	9,745.17	655.96
				<i>For Class 52 Rating, Deduct</i>	-962.64	
				<i>For Class 54 Rating, Add</i>	1,324.62	
				<i>For Class 55 Rating, Add</i>	1,975.39	
				<i>For Class 56 Rating, Add</i>	2,617.41	
40 05 19 00-1334	EA			18" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	10,018.90	658.68
				<i>For Class 52 Rating, Deduct</i>	-992.30	
				<i>For Class 54 Rating, Add</i>	1,365.11	
				<i>For Class 55 Rating, Add</i>	2,035.61	
				<i>For Class 56 Rating, Add</i>	2,697.09	
40 05 19 00-1335	EA			18" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	10,292.64	661.39
				<i>For Class 52 Rating, Deduct</i>	-1,021.96	
				<i>For Class 54 Rating, Add</i>	1,405.60	
				<i>For Class 55 Rating, Add</i>	2,095.84	
				<i>For Class 56 Rating, Add</i>	2,776.78	
40 05 19 00-1336	EA			18" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	10,566.36	664.11
				<i>For Class 52 Rating, Deduct</i>	-1,051.61	
				<i>For Class 54 Rating, Add</i>	1,446.09	
				<i>For Class 55 Rating, Add</i>	2,156.06	
				<i>For Class 56 Rating, Add</i>	2,856.46	
40 05 19 00-1337	EA			18" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	10,840.10	666.84
				<i>For Class 52 Rating, Deduct</i>	-1,081.27	
				<i>For Class 54 Rating, Add</i>	1,486.59	
				<i>For Class 55 Rating, Add</i>	2,216.28	
				<i>For Class 56 Rating, Add</i>	2,936.15	
40 05 19 00-1338	EA			18" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	11,113.84	669.54
				<i>For Class 52 Rating, Deduct</i>	-1,110.93	
				<i>For Class 54 Rating, Add</i>	1,527.08	
				<i>For Class 55 Rating, Add</i>	2,276.51	
				<i>For Class 56 Rating, Add</i>	3,015.84	
40 05 19 00-1339	EA			18" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	11,387.56	672.26
				<i>For Class 52 Rating, Deduct</i>	-1,140.59	
				<i>For Class 54 Rating, Add</i>	1,567.57	
				<i>For Class 55 Rating, Add</i>	2,336.73	
				<i>For Class 56 Rating, Add</i>	3,095.52	
40 05 19 00-1340	EA			18" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	11,661.30	674.98
				<i>For Class 52 Rating, Deduct</i>	-1,170.25	
				<i>For Class 54 Rating, Add</i>	1,608.06	
				<i>For Class 55 Rating, Add</i>	2,396.95	
				<i>For Class 56 Rating, Add</i>	3,175.20	
40 05 19 00-1341	EA			18" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	11,935.03	677.70
				<i>For Class 52 Rating, Deduct</i>	-1,199.90	
				<i>For Class 54 Rating, Add</i>	1,648.55	
				<i>For Class 55 Rating, Add</i>	2,457.17	
				<i>For Class 56 Rating, Add</i>	3,254.89	
40 05 19 00-1342	EA			18" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	12,208.76	680.42
				<i>For Class 52 Rating, Deduct</i>	-1,229.56	
				<i>For Class 54 Rating, Add</i>	1,689.05	
				<i>For Class 55 Rating, Add</i>	2,517.40	
				<i>For Class 56 Rating, Add</i>	3,334.57	
40 05 19 00-1343	EA			18" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	12,482.50	683.13
				<i>For Class 52 Rating, Deduct</i>	-1,259.22	
				<i>For Class 54 Rating, Add</i>	1,729.54	
				<i>For Class 55 Rating, Add</i>	2,577.62	
				<i>For Class 56 Rating, Add</i>	3,414.26	
40 05 19 00-1344	EA			18" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	12,756.23	685.85
				<i>For Class 52 Rating, Deduct</i>	-1,288.88	
				<i>For Class 54 Rating, Add</i>	1,770.03	
				<i>For Class 55 Rating, Add</i>	2,637.84	
				<i>For Class 56 Rating, Add</i>	3,493.94	
40 05 19 00-1345	EA			18" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe.....	13,029.97	688.56
				<i>For Class 52 Rating, Deduct</i>	-1,318.53	
				<i>For Class 54 Rating, Add</i>	1,810.52	
				<i>For Class 55 Rating, Add</i>	2,698.07	
				<i>For Class 56 Rating, Add</i>	3,573.63	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR
 CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
 UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1346			20" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1347	EA		20" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,385.07	671.18
			<i>For Class 52 Rating, Deduct</i>	-260.49	
			<i>For Class 54 Rating, Add</i>	367.42	
			<i>For Class 55 Rating, Add</i>	552.50	
			<i>For Class 56 Rating, Add</i>	735.21	
40 05 19 00-1348	EA		20" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	3,699.24	673.90
			<i>For Class 52 Rating, Deduct</i>	-294.60	
			<i>For Class 54 Rating, Add</i>	413.98	
			<i>For Class 55 Rating, Add</i>	621.74	
			<i>For Class 56 Rating, Add</i>	826.82	
40 05 19 00-1349	EA		20" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,013.41	676.61
			<i>For Class 52 Rating, Deduct</i>	-328.71	
			<i>For Class 54 Rating, Add</i>	460.54	
			<i>For Class 55 Rating, Add</i>	690.98	
			<i>For Class 56 Rating, Add</i>	918.44	
40 05 19 00-1350	EA		20" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,327.59	679.33
			<i>For Class 52 Rating, Deduct</i>	-362.81	
			<i>For Class 54 Rating, Add</i>	507.10	
			<i>For Class 55 Rating, Add</i>	760.22	
			<i>For Class 56 Rating, Add</i>	1,010.05	
40 05 19 00-1351	EA		20" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,641.76	682.05
			<i>For Class 52 Rating, Deduct</i>	-396.92	
			<i>For Class 54 Rating, Add</i>	553.65	
			<i>For Class 55 Rating, Add</i>	829.47	
			<i>For Class 56 Rating, Add</i>	1,101.67	
40 05 19 00-1352	EA		20" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,955.94	684.76
			<i>For Class 52 Rating, Deduct</i>	-431.03	
			<i>For Class 54 Rating, Add</i>	600.21	
			<i>For Class 55 Rating, Add</i>	898.71	
			<i>For Class 56 Rating, Add</i>	1,193.28	
40 05 19 00-1353	EA		20" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,270.12	687.48
			<i>For Class 52 Rating, Deduct</i>	-465.13	
			<i>For Class 54 Rating, Add</i>	646.77	
			<i>For Class 55 Rating, Add</i>	967.95	
			<i>For Class 56 Rating, Add</i>	1,284.90	
40 05 19 00-1354	EA		20" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,584.29	690.20
			<i>For Class 52 Rating, Deduct</i>	-499.24	
			<i>For Class 54 Rating, Add</i>	693.33	
			<i>For Class 55 Rating, Add</i>	1,037.19	
			<i>For Class 56 Rating, Add</i>	1,376.52	
40 05 19 00-1355	EA		20" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,898.46	692.92
			<i>For Class 52 Rating, Deduct</i>	-533.34	
			<i>For Class 54 Rating, Add</i>	739.89	
			<i>For Class 55 Rating, Add</i>	1,106.43	
			<i>For Class 56 Rating, Add</i>	1,468.13	
40 05 19 00-1356	EA		20" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,212.64	695.63
			<i>For Class 52 Rating, Deduct</i>	-567.45	
			<i>For Class 54 Rating, Add</i>	786.45	
			<i>For Class 55 Rating, Add</i>	1,175.67	
			<i>For Class 56 Rating, Add</i>	1,559.75	
40 05 19 00-1357	EA		20" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,526.81	698.35
			<i>For Class 52 Rating, Deduct</i>	-601.56	
			<i>For Class 54 Rating, Add</i>	833.00	
			<i>For Class 55 Rating, Add</i>	1,244.92	
			<i>For Class 56 Rating, Add</i>	1,651.36	
40 05 19 00-1358	EA		20" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,840.99	701.07
			<i>For Class 52 Rating, Deduct</i>	-635.66	
			<i>For Class 54 Rating, Add</i>	879.56	
			<i>For Class 55 Rating, Add</i>	1,314.16	
			<i>For Class 56 Rating, Add</i>	1,742.98	
40 05 19 00-1359	EA		20" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,155.17	703.78
			<i>For Class 52 Rating, Deduct</i>	-669.77	
			<i>For Class 54 Rating, Add</i>	926.12	
			<i>For Class 55 Rating, Add</i>	1,383.40	
			<i>For Class 56 Rating, Add</i>	1,834.59	
40 05 19 00-1360	EA		20" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,469.35	706.50
			<i>For Class 52 Rating, Deduct</i>	-703.88	
			<i>For Class 54 Rating, Add</i>	972.68	
			<i>For Class 55 Rating, Add</i>	1,452.64	
			<i>For Class 56 Rating, Add</i>	1,926.21	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1361 EA 20" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,783.52	709.22
<i>For Class 52 Rating, Deduct</i>	-737.98	
<i>For Class 54 Rating, Add</i>	1,019.24	
<i>For Class 55 Rating, Add</i>	1,521.88	
<i>For Class 56 Rating, Add</i>	2,017.82	
40 05 19 00-1362 EA 20" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,097.69	711.94
<i>For Class 52 Rating, Deduct</i>	-772.09	
<i>For Class 54 Rating, Add</i>	1,065.79	
<i>For Class 55 Rating, Add</i>	1,591.13	
<i>For Class 56 Rating, Add</i>	2,109.44	
40 05 19 00-1363 EA 20" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,411.87	714.65
<i>For Class 52 Rating, Deduct</i>	-806.20	
<i>For Class 54 Rating, Add</i>	1,112.35	
<i>For Class 55 Rating, Add</i>	1,660.37	
<i>For Class 56 Rating, Add</i>	2,201.05	
40 05 19 00-1364 EA 20" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,726.05	717.37
<i>For Class 52 Rating, Deduct</i>	-840.30	
<i>For Class 54 Rating, Add</i>	1,158.91	
<i>For Class 55 Rating, Add</i>	1,729.61	
<i>For Class 56 Rating, Add</i>	2,292.67	
40 05 19 00-1365 EA 20" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,040.22	720.09
<i>For Class 52 Rating, Deduct</i>	-874.41	
<i>For Class 54 Rating, Add</i>	1,205.47	
<i>For Class 55 Rating, Add</i>	1,798.85	
<i>For Class 56 Rating, Add</i>	2,384.29	
40 05 19 00-1366 EA 20" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,354.40	722.81
<i>For Class 52 Rating, Deduct</i>	-908.52	
<i>For Class 54 Rating, Add</i>	1,252.03	
<i>For Class 55 Rating, Add</i>	1,868.09	
<i>For Class 56 Rating, Add</i>	2,475.90	
40 05 19 00-1367 EA 20" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,668.58	725.52
<i>For Class 52 Rating, Deduct</i>	-942.62	
<i>For Class 54 Rating, Add</i>	1,298.59	
<i>For Class 55 Rating, Add</i>	1,937.34	
<i>For Class 56 Rating, Add</i>	2,567.52	
40 05 19 00-1368 EA 20" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,982.74	728.25
<i>For Class 52 Rating, Deduct</i>	-976.73	
<i>For Class 54 Rating, Add</i>	1,345.14	
<i>For Class 55 Rating, Add</i>	2,006.58	
<i>For Class 56 Rating, Add</i>	2,659.13	
40 05 19 00-1369 EA 20" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,296.92	730.96
<i>For Class 52 Rating, Deduct</i>	-1,010.84	
<i>For Class 54 Rating, Add</i>	1,391.70	
<i>For Class 55 Rating, Add</i>	2,075.82	
<i>For Class 56 Rating, Add</i>	2,750.75	
40 05 19 00-1370 EA 20" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,611.10	733.67
<i>For Class 52 Rating, Deduct</i>	-1,044.94	
<i>For Class 54 Rating, Add</i>	1,438.26	
<i>For Class 55 Rating, Add</i>	2,145.06	
<i>For Class 56 Rating, Add</i>	2,842.36	
40 05 19 00-1371 EA 20" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,925.27	736.39
<i>For Class 52 Rating, Deduct</i>	-1,079.05	
<i>For Class 54 Rating, Add</i>	1,484.82	
<i>For Class 55 Rating, Add</i>	2,214.30	
<i>For Class 56 Rating, Add</i>	2,933.98	
40 05 19 00-1372 EA 20" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,239.45	739.11
<i>For Class 52 Rating, Deduct</i>	-1,113.15	
<i>For Class 54 Rating, Add</i>	1,531.38	
<i>For Class 55 Rating, Add</i>	2,283.55	
<i>For Class 56 Rating, Add</i>	3,025.59	
40 05 19 00-1373 EA 20" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,553.64	741.84
<i>For Class 52 Rating, Deduct</i>	-1,147.26	
<i>For Class 54 Rating, Add</i>	1,577.94	
<i>For Class 55 Rating, Add</i>	2,352.79	
<i>For Class 56 Rating, Add</i>	3,117.21	
40 05 19 00-1374 EA 20" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,867.80	744.54
<i>For Class 52 Rating, Deduct</i>	-1,181.37	
<i>For Class 54 Rating, Add</i>	1,624.49	
<i>For Class 55 Rating, Add</i>	2,422.03	
<i>For Class 56 Rating, Add</i>	3,208.82	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-1375	EA	20" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,181.98	747.26
		<i>For Class 52 Rating, Deduct</i>	-1,215.47	
		<i>For Class 54 Rating, Add</i>	1,671.05	
		<i>For Class 55 Rating, Add</i>	2,491.27	
		<i>For Class 56 Rating, Add</i>	3,300.44	
40 05 19 00-1376	EA	20" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,496.16	749.98
		<i>For Class 52 Rating, Deduct</i>	-1,249.58	
		<i>For Class 54 Rating, Add</i>	1,717.61	
		<i>For Class 55 Rating, Add</i>	2,560.51	
		<i>For Class 56 Rating, Add</i>	3,392.06	
40 05 19 00-1377	EA	20" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,810.33	752.69
		<i>For Class 52 Rating, Deduct</i>	-1,283.69	
		<i>For Class 54 Rating, Add</i>	1,764.17	
		<i>For Class 55 Rating, Add</i>	2,629.75	
		<i>For Class 56 Rating, Add</i>	3,483.67	
40 05 19 00-1378	EA	20" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,124.51	755.42
		<i>For Class 52 Rating, Deduct</i>	-1,317.79	
		<i>For Class 54 Rating, Add</i>	1,810.73	
		<i>For Class 55 Rating, Add</i>	2,699.00	
		<i>For Class 56 Rating, Add</i>	3,575.29	
40 05 19 00-1379	EA	20" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,438.68	758.13
		<i>For Class 52 Rating, Deduct</i>	-1,351.90	
		<i>For Class 54 Rating, Add</i>	1,857.28	
		<i>For Class 55 Rating, Add</i>	2,768.24	
		<i>For Class 56 Rating, Add</i>	3,666.90	
40 05 19 00-1380	EA	20" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,752.85	760.85
		<i>For Class 52 Rating, Deduct</i>	-1,386.01	
		<i>For Class 54 Rating, Add</i>	1,903.84	
		<i>For Class 55 Rating, Add</i>	2,837.48	
		<i>For Class 56 Rating, Add</i>	3,758.52	
40 05 19 00-1381	EA	20" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,067.03	763.56
		<i>For Class 52 Rating, Deduct</i>	-1,420.11	
		<i>For Class 54 Rating, Add</i>	1,950.40	
		<i>For Class 55 Rating, Add</i>	2,906.72	
		<i>For Class 56 Rating, Add</i>	3,850.13	
40 05 19 00-1382	EA	20" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,381.20	766.28
		<i>For Class 52 Rating, Deduct</i>	-1,454.22	
		<i>For Class 54 Rating, Add</i>	1,996.96	
		<i>For Class 55 Rating, Add</i>	2,975.96	
		<i>For Class 56 Rating, Add</i>	3,941.75	
40 05 19 00-1383	EA	20" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,695.38	769.01
		<i>For Class 52 Rating, Deduct</i>	-1,488.33	
		<i>For Class 54 Rating, Add</i>	2,043.52	
		<i>For Class 55 Rating, Add</i>	3,045.20	
		<i>For Class 56 Rating, Add</i>	4,033.36	
40 05 19 00-1384	EA	20" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,009.56	771.71
		<i>For Class 52 Rating, Deduct</i>	-1,522.43	
		<i>For Class 54 Rating, Add</i>	2,090.07	
		<i>For Class 55 Rating, Add</i>	3,114.45	
		<i>For Class 56 Rating, Add</i>	4,124.98	
40 05 19 00-1385		24" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1386	EA	24" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,159.00	793.45
		<i>For Class 52 Rating, Deduct</i>	-325.25	
		<i>For Class 54 Rating, Add</i>	457.95	
		<i>For Class 55 Rating, Add</i>	688.22	
		<i>For Class 56 Rating, Add</i>	915.53	
40 05 19 00-1387	EA	24" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,547.31	796.18
		<i>For Class 52 Rating, Deduct</i>	-367.51	
		<i>For Class 54 Rating, Add</i>	515.62	
		<i>For Class 55 Rating, Add</i>	773.99	
		<i>For Class 56 Rating, Add</i>	1,029.02	
40 05 19 00-1388	EA	24" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	4,935.63	798.90
		<i>For Class 52 Rating, Deduct</i>	-409.77	
		<i>For Class 54 Rating, Add</i>	573.30	
		<i>For Class 55 Rating, Add</i>	859.77	
		<i>For Class 56 Rating, Add</i>	1,142.51	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1389	EA			24" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,323.96	801.60
				For Class 52 Rating, Deduct	-452.03	
				For Class 54 Rating, Add	630.98	
				For Class 55 Rating, Add	945.55	
				For Class 56 Rating, Add	1,256.00	
40 05 19 00-1390	EA			24" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	5,712.27	804.32
				For Class 52 Rating, Deduct	-494.30	
				For Class 54 Rating, Add	688.66	
				For Class 55 Rating, Add	1,031.32	
				For Class 56 Rating, Add	1,369.48	
40 05 19 00-1391	EA			24" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,100.59	807.05
				For Class 52 Rating, Deduct	-536.56	
				For Class 54 Rating, Add	746.34	
				For Class 55 Rating, Add	1,117.10	
				For Class 56 Rating, Add	1,482.97	
40 05 19 00-1392	EA			24" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,488.92	809.77
				For Class 52 Rating, Deduct	-578.82	
				For Class 54 Rating, Add	804.02	
				For Class 55 Rating, Add	1,202.87	
				For Class 56 Rating, Add	1,596.46	
40 05 19 00-1393	EA			24" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,877.23	812.47
				For Class 52 Rating, Deduct	-621.08	
				For Class 54 Rating, Add	861.70	
				For Class 55 Rating, Add	1,288.65	
				For Class 56 Rating, Add	1,709.95	
40 05 19 00-1394	EA			24" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,265.55	815.19
				For Class 52 Rating, Deduct	-663.35	
				For Class 54 Rating, Add	919.38	
				For Class 55 Rating, Add	1,374.42	
				For Class 56 Rating, Add	1,823.44	
40 05 19 00-1395	EA			24" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,653.88	817.91
				For Class 52 Rating, Deduct	-705.61	
				For Class 54 Rating, Add	977.06	
				For Class 55 Rating, Add	1,460.20	
				For Class 56 Rating, Add	1,936.92	
40 05 19 00-1396	EA			24" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,042.20	820.63
				For Class 52 Rating, Deduct	-747.87	
				For Class 54 Rating, Add	1,034.74	
				For Class 55 Rating, Add	1,545.98	
				For Class 56 Rating, Add	2,050.41	
40 05 19 00-1397	EA			24" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,430.52	823.35
				For Class 52 Rating, Deduct	-790.13	
				For Class 54 Rating, Add	1,092.42	
				For Class 55 Rating, Add	1,631.75	
				For Class 56 Rating, Add	2,163.90	
40 05 19 00-1398	EA			24" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,818.84	826.07
				For Class 52 Rating, Deduct	-832.39	
				For Class 54 Rating, Add	1,150.10	
				For Class 55 Rating, Add	1,717.53	
				For Class 56 Rating, Add	2,277.39	
40 05 19 00-1399	EA			24" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,207.16	828.78
				For Class 52 Rating, Deduct	-874.66	
				For Class 54 Rating, Add	1,207.78	
				For Class 55 Rating, Add	1,803.31	
				For Class 56 Rating, Add	2,390.88	
40 05 19 00-1400	EA			24" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,595.48	831.49
				For Class 52 Rating, Deduct	-916.92	
				For Class 54 Rating, Add	1,265.46	
				For Class 55 Rating, Add	1,889.08	
				For Class 56 Rating, Add	2,504.37	
40 05 19 00-1401	EA			24" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,983.79	834.22
				For Class 52 Rating, Deduct	-959.18	
				For Class 54 Rating, Add	1,323.14	
				For Class 55 Rating, Add	1,974.86	
				For Class 56 Rating, Add	2,617.85	
40 05 19 00-1402	EA			24" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,372.11	836.94
				For Class 52 Rating, Deduct	-1,001.44	
				For Class 54 Rating, Add	1,380.82	
				For Class 55 Rating, Add	2,060.63	
				For Class 56 Rating, Add	2,731.34	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1403	EA	24" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	10,760.44	839.65
		<i>For Class 52 Rating, Deduct</i>		-1,043.71	
		<i>For Class 54 Rating, Add</i>		1,438.50	
		<i>For Class 55 Rating, Add</i>		2,146.41	
		<i>For Class 56 Rating, Add</i>		2,844.83	
40 05 19 00-1404	EA	24" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	11,148.75	842.36
		<i>For Class 52 Rating, Deduct</i>		-1,085.97	
		<i>For Class 54 Rating, Add</i>		1,496.18	
		<i>For Class 55 Rating, Add</i>		2,232.19	
		<i>For Class 56 Rating, Add</i>		2,958.32	
40 05 19 00-1405	EA	24" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	11,537.07	845.08
		<i>For Class 52 Rating, Deduct</i>		-1,128.23	
		<i>For Class 54 Rating, Add</i>		1,553.86	
		<i>For Class 55 Rating, Add</i>		2,317.96	
		<i>For Class 56 Rating, Add</i>		3,071.80	
40 05 19 00-1406	EA	24" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	11,925.39	847.81
		<i>For Class 52 Rating, Deduct</i>		-1,170.49	
		<i>For Class 54 Rating, Add</i>		1,611.54	
		<i>For Class 55 Rating, Add</i>		2,403.74	
		<i>For Class 56 Rating, Add</i>		3,185.29	
40 05 19 00-1407	EA	24" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	12,313.71	850.52
		<i>For Class 52 Rating, Deduct</i>		-1,212.76	
		<i>For Class 54 Rating, Add</i>		1,669.22	
		<i>For Class 55 Rating, Add</i>		2,489.51	
		<i>For Class 56 Rating, Add</i>		3,298.78	
40 05 19 00-1408	EA	24" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	12,702.03	853.24
		<i>For Class 52 Rating, Deduct</i>		-1,255.02	
		<i>For Class 54 Rating, Add</i>		1,726.90	
		<i>For Class 55 Rating, Add</i>		2,575.29	
		<i>For Class 56 Rating, Add</i>		3,412.27	
40 05 19 00-1409	EA	24" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	13,090.35	855.95
		<i>For Class 52 Rating, Deduct</i>		-1,297.28	
		<i>For Class 54 Rating, Add</i>		1,784.58	
		<i>For Class 55 Rating, Add</i>		2,661.06	
		<i>For Class 56 Rating, Add</i>		3,525.76	
40 05 19 00-1410	EA	24" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	13,478.68	858.67
		<i>For Class 52 Rating, Deduct</i>		-1,339.54	
		<i>For Class 54 Rating, Add</i>		1,842.26	
		<i>For Class 55 Rating, Add</i>		2,746.84	
		<i>For Class 56 Rating, Add</i>		3,639.25	
40 05 19 00-1411	EA	24" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	13,867.00	861.39
		<i>For Class 52 Rating, Deduct</i>		-1,381.80	
		<i>For Class 54 Rating, Add</i>		1,899.94	
		<i>For Class 55 Rating, Add</i>		2,832.62	
		<i>For Class 56 Rating, Add</i>		3,752.73	
40 05 19 00-1412	EA	24" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	14,255.32	864.11
		<i>For Class 52 Rating, Deduct</i>		-1,424.07	
		<i>For Class 54 Rating, Add</i>		1,957.62	
		<i>For Class 55 Rating, Add</i>		2,918.39	
		<i>For Class 56 Rating, Add</i>		3,866.22	
40 05 19 00-1413	EA	24" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	14,643.63	866.83
		<i>For Class 52 Rating, Deduct</i>		-1,466.33	
		<i>For Class 54 Rating, Add</i>		2,015.30	
		<i>For Class 55 Rating, Add</i>		3,004.17	
		<i>For Class 56 Rating, Add</i>		3,979.71	
40 05 19 00-1414	EA	24" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	15,031.96	869.53
		<i>For Class 52 Rating, Deduct</i>		-1,508.59	
		<i>For Class 54 Rating, Add</i>		2,072.98	
		<i>For Class 55 Rating, Add</i>		3,089.95	
		<i>For Class 56 Rating, Add</i>		4,093.20	
40 05 19 00-1415	EA	24" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	15,490.26	918.45
		<i>For Class 52 Rating, Deduct</i>		-1,550.85	
		<i>For Class 54 Rating, Add</i>		2,131.50	
		<i>For Class 55 Rating, Add</i>		3,177.40	
		<i>For Class 56 Rating, Add</i>		4,209.20	
40 05 19 00-1416	EA	24" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	.....	15,878.58	921.17
		<i>For Class 52 Rating, Deduct</i>		-1,593.12	
		<i>For Class 54 Rating, Add</i>		2,189.18	
		<i>For Class 55 Rating, Add</i>		3,263.18	
		<i>For Class 56 Rating, Add</i>		4,322.69	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1417 EA 24" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,266.91	923.89
<i>For Class 52 Rating, Deduct</i>	-1,635.38	
<i>For Class 54 Rating, Add</i>	2,246.86	
<i>For Class 55 Rating, Add</i>	3,348.95	
<i>For Class 56 Rating, Add</i>	4,436.18	
40 05 19 00-1418 EA 24" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,655.22	926.61
<i>For Class 52 Rating, Deduct</i>	-1,677.64	
<i>For Class 54 Rating, Add</i>	2,304.54	
<i>For Class 55 Rating, Add</i>	3,434.73	
<i>For Class 56 Rating, Add</i>	4,549.67	
40 05 19 00-1419 EA 24" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,043.54	929.32
<i>For Class 52 Rating, Deduct</i>	-1,719.90	
<i>For Class 54 Rating, Add</i>	2,362.22	
<i>For Class 55 Rating, Add</i>	3,520.51	
<i>For Class 56 Rating, Add</i>	4,663.16	
40 05 19 00-1420 EA 24" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,431.86	932.04
<i>For Class 52 Rating, Deduct</i>	-1,762.16	
<i>For Class 54 Rating, Add</i>	2,419.90	
<i>For Class 55 Rating, Add</i>	3,606.28	
<i>For Class 56 Rating, Add</i>	4,776.64	
40 05 19 00-1421 EA 24" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,820.19	934.76
<i>For Class 52 Rating, Deduct</i>	-1,804.43	
<i>For Class 54 Rating, Add</i>	2,477.58	
<i>For Class 55 Rating, Add</i>	3,692.06	
<i>For Class 56 Rating, Add</i>	4,890.13	
40 05 19 00-1422 EA 24" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,208.51	937.46
<i>For Class 52 Rating, Deduct</i>	-1,846.69	
<i>For Class 54 Rating, Add</i>	2,535.26	
<i>For Class 55 Rating, Add</i>	3,777.83	
<i>For Class 56 Rating, Add</i>	5,003.62	
40 05 19 00-1423 EA 24" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,596.83	940.19
<i>For Class 52 Rating, Deduct</i>	-1,888.95	
<i>For Class 54 Rating, Add</i>	2,592.94	
<i>For Class 55 Rating, Add</i>	3,863.61	
<i>For Class 56 Rating, Add</i>	5,117.11	
40 05 19 00-1424 30" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1425 EA 30" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,369.60	1,119.53
<i>For Class 52 Rating, Deduct</i>	-514.07	
<i>For Class 54 Rating, Add</i>	721.36	
<i>For Class 55 Rating, Add</i>	1,082.87	
<i>For Class 56 Rating, Add</i>	1,439.70	
40 05 19 00-1426 EA 30" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	6,928.69	1,122.25
<i>For Class 52 Rating, Deduct</i>	-575.11	
<i>For Class 54 Rating, Add</i>	804.65	
<i>For Class 55 Rating, Add</i>	1,206.72	
<i>For Class 56 Rating, Add</i>	1,603.56	
40 05 19 00-1427 EA 30" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	7,487.76	1,124.97
<i>For Class 52 Rating, Deduct</i>	-636.16	
<i>For Class 54 Rating, Add</i>	887.94	
<i>For Class 55 Rating, Add</i>	1,330.57	
<i>For Class 56 Rating, Add</i>	1,767.42	
40 05 19 00-1428 EA 30" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,046.84	1,127.69
<i>For Class 52 Rating, Deduct</i>	-697.20	
<i>For Class 54 Rating, Add</i>	971.24	
<i>For Class 55 Rating, Add</i>	1,454.43	
<i>For Class 56 Rating, Add</i>	1,931.29	
40 05 19 00-1429 EA 30" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	8,605.92	1,130.41
<i>For Class 52 Rating, Deduct</i>	-758.25	
<i>For Class 54 Rating, Add</i>	1,054.53	
<i>For Class 55 Rating, Add</i>	1,578.28	
<i>For Class 56 Rating, Add</i>	2,095.15	
40 05 19 00-1430 EA 30" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,164.99	1,133.11
<i>For Class 52 Rating, Deduct</i>	-819.30	
<i>For Class 54 Rating, Add</i>	1,137.82	
<i>For Class 55 Rating, Add</i>	1,702.14	
<i>For Class 56 Rating, Add</i>	2,259.01	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-1431	EA		30" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	9,724.07	1,135.84
			<i>For Class 52 Rating, Deduct</i>	-880.34	
			<i>For Class 54 Rating, Add</i>	1,221.12	
			<i>For Class 55 Rating, Add</i>	1,825.99	
			<i>For Class 56 Rating, Add</i>	2,422.87	
40 05 19 00-1432	EA		30" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,283.14	1,138.56
			<i>For Class 52 Rating, Deduct</i>	-941.39	
			<i>For Class 54 Rating, Add</i>	1,304.41	
			<i>For Class 55 Rating, Add</i>	1,949.85	
			<i>For Class 56 Rating, Add</i>	2,586.73	
40 05 19 00-1433	EA		30" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	10,842.22	1,141.27
			<i>For Class 52 Rating, Deduct</i>	-1,002.43	
			<i>For Class 54 Rating, Add</i>	1,387.70	
			<i>For Class 55 Rating, Add</i>	2,073.70	
			<i>For Class 56 Rating, Add</i>	2,750.59	
40 05 19 00-1434	EA		30" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,401.30	1,143.99
			<i>For Class 52 Rating, Deduct</i>	-1,063.48	
			<i>For Class 54 Rating, Add</i>	1,471.00	
			<i>For Class 55 Rating, Add</i>	2,197.56	
			<i>For Class 56 Rating, Add</i>	2,914.45	
40 05 19 00-1435	EA		30" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,960.37	1,146.71
			<i>For Class 52 Rating, Deduct</i>	-1,124.52	
			<i>For Class 54 Rating, Add</i>	1,554.29	
			<i>For Class 55 Rating, Add</i>	2,321.41	
			<i>For Class 56 Rating, Add</i>	3,078.31	
40 05 19 00-1436	EA		30" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,519.45	1,149.43
			<i>For Class 52 Rating, Deduct</i>	-1,185.57	
			<i>For Class 54 Rating, Add</i>	1,637.58	
			<i>For Class 55 Rating, Add</i>	2,445.27	
			<i>For Class 56 Rating, Add</i>	3,242.18	
40 05 19 00-1437	EA		30" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,078.53	1,152.14
			<i>For Class 52 Rating, Deduct</i>	-1,246.61	
			<i>For Class 54 Rating, Add</i>	1,720.88	
			<i>For Class 55 Rating, Add</i>	2,569.12	
			<i>For Class 56 Rating, Add</i>	3,406.04	
40 05 19 00-1438	EA		30" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,637.60	1,154.86
			<i>For Class 52 Rating, Deduct</i>	-1,307.66	
			<i>For Class 54 Rating, Add</i>	1,804.17	
			<i>For Class 55 Rating, Add</i>	2,692.98	
			<i>For Class 56 Rating, Add</i>	3,569.90	
40 05 19 00-1439	EA		30" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,196.68	1,157.58
			<i>For Class 52 Rating, Deduct</i>	-1,368.71	
			<i>For Class 54 Rating, Add</i>	1,887.46	
			<i>For Class 55 Rating, Add</i>	2,816.83	
			<i>For Class 56 Rating, Add</i>	3,733.76	
40 05 19 00-1440	EA		30" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	14,755.76	1,160.28
			<i>For Class 52 Rating, Deduct</i>	-1,429.75	
			<i>For Class 54 Rating, Add</i>	1,970.76	
			<i>For Class 55 Rating, Add</i>	2,940.69	
			<i>For Class 56 Rating, Add</i>	3,897.62	
40 05 19 00-1441	EA		30" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,314.84	1,163.01
			<i>For Class 52 Rating, Deduct</i>	-1,490.80	
			<i>For Class 54 Rating, Add</i>	2,054.05	
			<i>For Class 55 Rating, Add</i>	3,064.54	
			<i>For Class 56 Rating, Add</i>	4,061.48	
40 05 19 00-1442	EA		30" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,873.92	1,165.73
			<i>For Class 52 Rating, Deduct</i>	-1,551.84	
			<i>For Class 54 Rating, Add</i>	2,137.34	
			<i>For Class 55 Rating, Add</i>	3,188.40	
			<i>For Class 56 Rating, Add</i>	4,225.35	
40 05 19 00-1443	EA		30" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,433.00	1,168.45
			<i>For Class 52 Rating, Deduct</i>	-1,612.89	
			<i>For Class 54 Rating, Add</i>	2,220.64	
			<i>For Class 55 Rating, Add</i>	3,312.25	
			<i>For Class 56 Rating, Add</i>	4,389.21	
40 05 19 00-1444	EA		30" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,992.07	1,171.16
			<i>For Class 52 Rating, Deduct</i>	-1,673.93	
			<i>For Class 54 Rating, Add</i>	2,303.93	
			<i>For Class 55 Rating, Add</i>	3,436.11	
			<i>For Class 56 Rating, Add</i>	4,553.07	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1445 EA 30" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,551.15	1,173.88
<i>For Class 52 Rating, Deduct</i>	-1,734.98	
<i>For Class 54 Rating, Add</i>	2,387.22	
<i>For Class 55 Rating, Add</i>	3,559.96	
<i>For Class 56 Rating, Add</i>	4,716.93	
40 05 19 00-1446 EA 30" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,110.22	1,176.60
<i>For Class 52 Rating, Deduct</i>	-1,796.03	
<i>For Class 54 Rating, Add</i>	2,470.52	
<i>For Class 55 Rating, Add</i>	3,683.82	
<i>For Class 56 Rating, Add</i>	4,880.79	
40 05 19 00-1447 EA 30" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,669.30	1,179.31
<i>For Class 52 Rating, Deduct</i>	-1,857.07	
<i>For Class 54 Rating, Add</i>	2,553.81	
<i>For Class 55 Rating, Add</i>	3,807.67	
<i>For Class 56 Rating, Add</i>	5,044.65	
40 05 19 00-1448 EA 30" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,228.37	1,182.03
<i>For Class 52 Rating, Deduct</i>	-1,918.12	
<i>For Class 54 Rating, Add</i>	2,637.10	
<i>For Class 55 Rating, Add</i>	3,931.53	
<i>For Class 56 Rating, Add</i>	5,208.51	
40 05 19 00-1449 EA 30" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,787.44	1,184.75
<i>For Class 52 Rating, Deduct</i>	-1,979.16	
<i>For Class 54 Rating, Add</i>	2,720.40	
<i>For Class 55 Rating, Add</i>	4,055.38	
<i>For Class 56 Rating, Add</i>	5,372.37	
40 05 19 00-1450 EA 30" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,346.52	1,187.48
<i>For Class 52 Rating, Deduct</i>	-2,040.21	
<i>For Class 54 Rating, Add</i>	2,803.69	
<i>For Class 55 Rating, Add</i>	4,179.24	
<i>For Class 56 Rating, Add</i>	5,536.23	
40 05 19 00-1451 EA 30" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,905.60	1,190.18
<i>For Class 52 Rating, Deduct</i>	-2,101.25	
<i>For Class 54 Rating, Add</i>	2,886.98	
<i>For Class 55 Rating, Add</i>	4,303.09	
<i>For Class 56 Rating, Add</i>	5,700.09	
40 05 19 00-1452 EA 30" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,464.67	1,192.90
<i>For Class 52 Rating, Deduct</i>	-2,162.30	
<i>For Class 54 Rating, Add</i>	2,970.28	
<i>For Class 55 Rating, Add</i>	4,426.94	
<i>For Class 56 Rating, Add</i>	5,863.96	
40 05 19 00-1453 EA 30" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,023.75	1,195.62
<i>For Class 52 Rating, Deduct</i>	-2,223.34	
<i>For Class 54 Rating, Add</i>	3,053.57	
<i>For Class 55 Rating, Add</i>	4,550.80	
<i>For Class 56 Rating, Add</i>	6,027.82	
40 05 19 00-1454 EA 30" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,582.84	1,198.34
<i>For Class 52 Rating, Deduct</i>	-2,284.39	
<i>For Class 54 Rating, Add</i>	3,136.86	
<i>For Class 55 Rating, Add</i>	4,674.65	
<i>For Class 56 Rating, Add</i>	6,191.68	
40 05 19 00-1455 EA 30" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,141.91	1,201.06
<i>For Class 52 Rating, Deduct</i>	-2,345.43	
<i>For Class 54 Rating, Add</i>	3,220.16	
<i>For Class 55 Rating, Add</i>	4,798.51	
<i>For Class 56 Rating, Add</i>	6,355.54	
40 05 19 00-1456 EA 30" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,700.99	1,203.77
<i>For Class 52 Rating, Deduct</i>	-2,406.48	
<i>For Class 54 Rating, Add</i>	3,303.45	
<i>For Class 55 Rating, Add</i>	4,922.36	
<i>For Class 56 Rating, Add</i>	6,519.40	
40 05 19 00-1457 EA 30" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,260.07	1,206.49
<i>For Class 52 Rating, Deduct</i>	-2,467.53	
<i>For Class 54 Rating, Add</i>	3,386.74	
<i>For Class 55 Rating, Add</i>	5,046.22	
<i>For Class 56 Rating, Add</i>	6,683.26	
40 05 19 00-1458 EA 30" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,819.14	1,209.20
<i>For Class 52 Rating, Deduct</i>	-2,528.57	
<i>For Class 54 Rating, Add</i>	3,470.04	
<i>For Class 55 Rating, Add</i>	5,170.07	
<i>For Class 56 Rating, Add</i>	6,847.12	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1459	EA	30" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		25,378.22	1,211.92
		<i>For Class 52 Rating, Deduct</i>		-2,589.62	
		<i>For Class 54 Rating, Add</i>		3,553.33	
		<i>For Class 55 Rating, Add</i>		5,293.93	
		<i>For Class 56 Rating, Add</i>		7,010.99	
40 05 19 00-1460	EA	30" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		25,937.29	1,214.65
		<i>For Class 52 Rating, Deduct</i>		-2,650.66	
		<i>For Class 54 Rating, Add</i>		3,636.62	
		<i>For Class 55 Rating, Add</i>		5,417.78	
		<i>For Class 56 Rating, Add</i>		7,174.85	
40 05 19 00-1461	EA	30" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		26,496.37	1,217.36
		<i>For Class 52 Rating, Deduct</i>		-2,711.71	
		<i>For Class 54 Rating, Add</i>		3,719.92	
		<i>For Class 55 Rating, Add</i>		5,541.64	
		<i>For Class 56 Rating, Add</i>		7,338.71	
40 05 19 00-1462	EA	30" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		27,055.45	1,220.07
		<i>For Class 52 Rating, Deduct</i>		-2,772.75	
		<i>For Class 54 Rating, Add</i>		3,803.21	
		<i>For Class 55 Rating, Add</i>		5,665.49	
		<i>For Class 56 Rating, Add</i>		7,502.57	
40 05 19 00-1463		36" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>			
40 05 19 00-1464	EA	36" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		8,804.17	1,418.44
		<i>For Class 52 Rating, Deduct</i>		-732.05	
		<i>For Class 54 Rating, Add</i>		1,024.04	
		<i>For Class 55 Rating, Add</i>		1,535.65	
		<i>For Class 56 Rating, Add</i>		2,040.60	
40 05 19 00-1465	EA	36" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		9,563.21	1,421.16
		<i>For Class 52 Rating, Deduct</i>		-815.09	
		<i>For Class 54 Rating, Add</i>		1,137.33	
		<i>For Class 55 Rating, Add</i>		1,704.10	
		<i>For Class 56 Rating, Add</i>		2,263.45	
40 05 19 00-1466	EA	36" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		10,322.25	1,423.88
		<i>For Class 52 Rating, Deduct</i>		-898.14	
		<i>For Class 54 Rating, Add</i>		1,250.62	
		<i>For Class 55 Rating, Add</i>		1,872.54	
		<i>For Class 56 Rating, Add</i>		2,486.30	
40 05 19 00-1467	EA	36" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		11,081.31	1,426.59
		<i>For Class 52 Rating, Deduct</i>		-981.18	
		<i>For Class 54 Rating, Add</i>		1,363.91	
		<i>For Class 55 Rating, Add</i>		2,040.99	
		<i>For Class 56 Rating, Add</i>		2,709.16	
40 05 19 00-1468	EA	36" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		11,840.34	1,429.31
		<i>For Class 52 Rating, Deduct</i>		-1,064.22	
		<i>For Class 54 Rating, Add</i>		1,477.20	
		<i>For Class 55 Rating, Add</i>		2,209.44	
		<i>For Class 56 Rating, Add</i>		2,932.00	
40 05 19 00-1469	EA	36" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		12,599.39	1,432.02
		<i>For Class 52 Rating, Deduct</i>		-1,147.26	
		<i>For Class 54 Rating, Add</i>		1,590.48	
		<i>For Class 55 Rating, Add</i>		2,377.89	
		<i>For Class 56 Rating, Add</i>		3,154.86	
40 05 19 00-1470	EA	36" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		13,358.43	1,434.74
		<i>For Class 52 Rating, Deduct</i>		-1,230.30	
		<i>For Class 54 Rating, Add</i>		1,703.77	
		<i>For Class 55 Rating, Add</i>		2,546.33	
		<i>For Class 56 Rating, Add</i>		3,377.71	
40 05 19 00-1471	EA	36" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		14,117.47	1,437.47
		<i>For Class 52 Rating, Deduct</i>		-1,313.35	
		<i>For Class 54 Rating, Add</i>		1,817.06	
		<i>For Class 55 Rating, Add</i>		2,714.78	
		<i>For Class 56 Rating, Add</i>		3,600.56	
40 05 19 00-1472	EA	36" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		14,876.51	1,440.18
		<i>For Class 52 Rating, Deduct</i>		-1,396.39	
		<i>For Class 54 Rating, Add</i>		1,930.35	
		<i>For Class 55 Rating, Add</i>		2,883.23	
		<i>For Class 56 Rating, Add</i>		3,823.41	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1473	EA			36" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,635.54	1,442.89
				<i>For Class 52 Rating, Deduct</i>	-1,479.43	
				<i>For Class 54 Rating, Add</i>	2,043.64	
				<i>For Class 55 Rating, Add</i>	3,051.67	
				<i>For Class 56 Rating, Add</i>	4,046.26	
40 05 19 00-1474	EA			36" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,394.59	1,445.61
				<i>For Class 52 Rating, Deduct</i>	-1,562.47	
				<i>For Class 54 Rating, Add</i>	2,156.92	
				<i>For Class 55 Rating, Add</i>	3,220.12	
				<i>For Class 56 Rating, Add</i>	4,269.11	
40 05 19 00-1475	EA			36" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,153.63	1,448.33
				<i>For Class 52 Rating, Deduct</i>	-1,645.51	
				<i>For Class 54 Rating, Add</i>	2,270.21	
				<i>For Class 55 Rating, Add</i>	3,388.57	
				<i>For Class 56 Rating, Add</i>	4,491.96	
40 05 19 00-1476	EA			36" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,912.67	1,451.05
				<i>For Class 52 Rating, Deduct</i>	-1,728.55	
				<i>For Class 54 Rating, Add</i>	2,383.50	
				<i>For Class 55 Rating, Add</i>	3,557.01	
				<i>For Class 56 Rating, Add</i>	4,714.81	
40 05 19 00-1477	EA			36" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,671.71	1,453.76
				<i>For Class 52 Rating, Deduct</i>	-1,811.59	
				<i>For Class 54 Rating, Add</i>	2,496.79	
				<i>For Class 55 Rating, Add</i>	3,725.46	
				<i>For Class 56 Rating, Add</i>	4,937.66	
40 05 19 00-1478	EA			36" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,430.76	1,456.48
				<i>For Class 52 Rating, Deduct</i>	-1,894.64	
				<i>For Class 54 Rating, Add</i>	2,610.08	
				<i>For Class 55 Rating, Add</i>	3,893.91	
				<i>For Class 56 Rating, Add</i>	5,160.52	
40 05 19 00-1479	EA			36" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,189.79	1,459.20
				<i>For Class 52 Rating, Deduct</i>	-1,977.68	
				<i>For Class 54 Rating, Add</i>	2,723.36	
				<i>For Class 55 Rating, Add</i>	4,062.35	
				<i>For Class 56 Rating, Add</i>	5,383.36	
40 05 19 00-1480	EA			36" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,948.84	1,461.91
				<i>For Class 52 Rating, Deduct</i>	-2,060.72	
				<i>For Class 54 Rating, Add</i>	2,836.65	
				<i>For Class 55 Rating, Add</i>	4,230.80	
				<i>For Class 56 Rating, Add</i>	5,606.22	
40 05 19 00-1481	EA			36" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,707.88	1,464.64
				<i>For Class 52 Rating, Deduct</i>	-2,143.76	
				<i>For Class 54 Rating, Add</i>	2,949.94	
				<i>For Class 55 Rating, Add</i>	4,399.25	
				<i>For Class 56 Rating, Add</i>	5,829.07	
40 05 19 00-1482	EA			36" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,466.93	1,467.35
				<i>For Class 52 Rating, Deduct</i>	-2,226.80	
				<i>For Class 54 Rating, Add</i>	3,063.23	
				<i>For Class 55 Rating, Add</i>	4,567.70	
				<i>For Class 56 Rating, Add</i>	6,051.92	
40 05 19 00-1483	EA			36" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,225.97	1,470.07
				<i>For Class 52 Rating, Deduct</i>	-2,309.84	
				<i>For Class 54 Rating, Add</i>	3,176.52	
				<i>For Class 55 Rating, Add</i>	4,736.14	
				<i>For Class 56 Rating, Add</i>	6,274.77	
40 05 19 00-1484	EA			36" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	23,985.02	1,472.78
				<i>For Class 52 Rating, Deduct</i>	-2,392.89	
				<i>For Class 54 Rating, Add</i>	3,289.81	
				<i>For Class 55 Rating, Add</i>	4,904.59	
				<i>For Class 56 Rating, Add</i>	6,497.62	
40 05 19 00-1485	EA			36" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,744.05	1,475.50
				<i>For Class 52 Rating, Deduct</i>	-2,475.93	
				<i>For Class 54 Rating, Add</i>	3,403.09	
				<i>For Class 55 Rating, Add</i>	5,073.04	
				<i>For Class 56 Rating, Add</i>	6,720.47	
40 05 19 00-1486	EA			36" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	25,503.10	1,478.23
				<i>For Class 52 Rating, Deduct</i>	-2,558.97	
				<i>For Class 54 Rating, Add</i>	3,516.38	
				<i>For Class 55 Rating, Add</i>	5,241.49	
				<i>For Class 56 Rating, Add</i>	6,943.32	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1487	EA	36" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	26,262.13		1,480.93
		<i>For Class 52 Rating, Deduct</i>	-2,642.01		
		<i>For Class 54 Rating, Add</i>	3,629.67		
		<i>For Class 55 Rating, Add</i>	5,409.93		
		<i>For Class 56 Rating, Add</i>	7,166.17		
40 05 19 00-1488	EA	36" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,021.18		1,483.65
		<i>For Class 52 Rating, Deduct</i>	-2,725.05		
		<i>For Class 54 Rating, Add</i>	3,742.96		
		<i>For Class 55 Rating, Add</i>	5,578.38		
		<i>For Class 56 Rating, Add</i>	7,389.03		
40 05 19 00-1489	EA	36" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	27,780.22		1,486.37
		<i>For Class 52 Rating, Deduct</i>	-2,808.10		
		<i>For Class 54 Rating, Add</i>	3,856.25		
		<i>For Class 55 Rating, Add</i>	5,746.83		
		<i>For Class 56 Rating, Add</i>	7,611.88		
40 05 19 00-1490	EA	36" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	28,539.26		1,489.10
		<i>For Class 52 Rating, Deduct</i>	-2,891.14		
		<i>For Class 54 Rating, Add</i>	3,969.53		
		<i>For Class 55 Rating, Add</i>	5,915.27		
		<i>For Class 56 Rating, Add</i>	7,834.73		
40 05 19 00-1491	EA	36" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	29,298.30		1,491.81
		<i>For Class 52 Rating, Deduct</i>	-2,974.18		
		<i>For Class 54 Rating, Add</i>	4,082.82		
		<i>For Class 55 Rating, Add</i>	6,083.72		
		<i>For Class 56 Rating, Add</i>	8,057.58		
40 05 19 00-1492	EA	36" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,057.35		1,494.52
		<i>For Class 52 Rating, Deduct</i>	-3,057.22		
		<i>For Class 54 Rating, Add</i>	4,196.11		
		<i>For Class 55 Rating, Add</i>	6,252.17		
		<i>For Class 56 Rating, Add</i>	8,280.43		
40 05 19 00-1493	EA	36" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	30,816.38		1,497.24
		<i>For Class 52 Rating, Deduct</i>	-3,140.26		
		<i>For Class 54 Rating, Add</i>	4,309.40		
		<i>For Class 55 Rating, Add</i>	6,420.61		
		<i>For Class 56 Rating, Add</i>	8,503.28		
40 05 19 00-1494	EA	36" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	31,575.43		1,499.95
		<i>For Class 52 Rating, Deduct</i>	-3,223.30		
		<i>For Class 54 Rating, Add</i>	4,422.69		
		<i>For Class 55 Rating, Add</i>	6,589.06		
		<i>For Class 56 Rating, Add</i>	8,726.13		
40 05 19 00-1495	EA	36" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	32,334.48		1,502.68
		<i>For Class 52 Rating, Deduct</i>	-3,306.35		
		<i>For Class 54 Rating, Add</i>	4,535.97		
		<i>For Class 55 Rating, Add</i>	6,757.51		
		<i>For Class 56 Rating, Add</i>	8,948.98		
40 05 19 00-1496	EA	36" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	33,093.52		1,505.40
		<i>For Class 52 Rating, Deduct</i>	-3,389.39		
		<i>For Class 54 Rating, Add</i>	4,649.26		
		<i>For Class 55 Rating, Add</i>	6,925.96		
		<i>For Class 56 Rating, Add</i>	9,171.84		
40 05 19 00-1497	EA	36" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	33,852.56		1,508.12
		<i>For Class 52 Rating, Deduct</i>	-3,472.43		
		<i>For Class 54 Rating, Add</i>	4,762.55		
		<i>For Class 55 Rating, Add</i>	7,094.40		
		<i>For Class 56 Rating, Add</i>	9,394.69		
40 05 19 00-1498	EA	36" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	34,611.60		1,510.82
		<i>For Class 52 Rating, Deduct</i>	-3,555.47		
		<i>For Class 54 Rating, Add</i>	4,875.84		
		<i>For Class 55 Rating, Add</i>	7,262.85		
		<i>For Class 56 Rating, Add</i>	9,617.53		
40 05 19 00-1499	EA	36" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	35,370.64		1,513.54
		<i>For Class 52 Rating, Deduct</i>	-3,638.51		
		<i>For Class 54 Rating, Add</i>	4,989.13		
		<i>For Class 55 Rating, Add</i>	7,431.30		
		<i>For Class 56 Rating, Add</i>	9,840.39		
40 05 19 00-1500	EA	36" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	36,129.68		1,516.27
		<i>For Class 52 Rating, Deduct</i>	-3,721.55		
		<i>For Class 54 Rating, Add</i>	5,102.41		
		<i>For Class 55 Rating, Add</i>	7,599.74		
		<i>For Class 56 Rating, Add</i>	10,063.24		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1501 EA 36" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	36,888.72	1,518.98
For Class 52 Rating, Deduct	-3,804.60	
For Class 54 Rating, Add	5,215.70	
For Class 55 Rating, Add	7,768.19	
For Class 56 Rating, Add	10,286.09	
40 05 19 00-1502 42" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1503 EA 42" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	11,631.12	1,787.99
For Class 52 Rating, Deduct	-981.42	
For Class 54 Rating, Add	1,370.81	
For Class 55 Rating, Add	2,054.63	
For Class 56 Rating, Add	2,729.53	
40 05 19 00-1504 EA 42" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	12,763.14	1,790.70
For Class 52 Rating, Deduct	-1,105.49	
For Class 54 Rating, Add	1,540.05	
For Class 55 Rating, Add	2,306.25	
For Class 56 Rating, Add	3,062.41	
40 05 19 00-1505 EA 42" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	13,881.66	1,793.43
For Class 52 Rating, Deduct	-1,228.08	
For Class 54 Rating, Add	1,707.26	
For Class 55 Rating, Add	2,554.87	
For Class 56 Rating, Add	3,391.31	
40 05 19 00-1506 EA 42" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,011.43	1,796.15
For Class 52 Rating, Deduct	-1,351.90	
For Class 54 Rating, Add	1,876.16	
For Class 55 Rating, Add	2,805.98	
For Class 56 Rating, Add	3,723.52	
40 05 19 00-1507 EA 42" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	16,129.96	1,798.87
For Class 52 Rating, Deduct	-1,474.49	
For Class 54 Rating, Add	2,043.37	
For Class 55 Rating, Add	3,054.60	
For Class 56 Rating, Add	4,052.42	
40 05 19 00-1508 EA 42" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	17,261.96	1,801.57
For Class 52 Rating, Deduct	-1,598.55	
For Class 54 Rating, Add	2,212.60	
For Class 55 Rating, Add	3,306.21	
For Class 56 Rating, Add	4,385.30	
40 05 19 00-1509 EA 42" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	18,378.25	1,804.30
For Class 52 Rating, Deduct	-1,720.89	
For Class 54 Rating, Add	2,379.48	
For Class 55 Rating, Add	3,554.33	
For Class 56 Rating, Add	4,713.53	
40 05 19 00-1510 EA 42" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	19,510.27	1,807.02
For Class 52 Rating, Deduct	-1,844.96	
For Class 54 Rating, Add	2,548.71	
For Class 55 Rating, Add	3,805.95	
For Class 56 Rating, Add	5,046.41	
40 05 19 00-1511 EA 42" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	20,628.79	1,809.74
For Class 52 Rating, Deduct	-1,967.54	
For Class 54 Rating, Add	2,715.92	
For Class 55 Rating, Add	4,054.56	
For Class 56 Rating, Add	5,375.31	
40 05 19 00-1512 EA 42" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	21,758.56	1,812.45
For Class 52 Rating, Deduct	-2,091.37	
For Class 54 Rating, Add	2,884.82	
For Class 55 Rating, Add	4,305.68	
For Class 56 Rating, Add	5,707.52	
40 05 19 00-1513 EA 42" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	22,877.09	1,815.16
For Class 52 Rating, Deduct	-2,213.95	
For Class 54 Rating, Add	3,052.03	
For Class 55 Rating, Add	4,554.29	
For Class 56 Rating, Add	6,036.42	
40 05 19 00-1514 EA 42" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	24,006.85	1,817.89
For Class 52 Rating, Deduct	-2,337.77	
For Class 54 Rating, Add	3,220.92	
For Class 55 Rating, Add	4,805.41	
For Class 56 Rating, Add	6,368.64	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1515	EA	42" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		25,125.38	1,820.60
		<i>For Class 52 Rating, Deduct</i>		-2,460.36	
		<i>For Class 54 Rating, Add</i>		3,388.14	
		<i>For Class 55 Rating, Add</i>		5,054.02	
		<i>For Class 56 Rating, Add</i>		6,697.54	
40 05 19 00-1516	EA	42" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		26,246.16	1,823.32
		<i>For Class 52 Rating, Deduct</i>		-2,583.19	
		<i>For Class 54 Rating, Add</i>		3,555.68	
		<i>For Class 55 Rating, Add</i>		5,303.13	
		<i>For Class 56 Rating, Add</i>		7,027.10	
40 05 19 00-1517	EA	42" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		27,373.67	1,826.04
		<i>For Class 52 Rating, Deduct</i>		-2,706.76	
		<i>For Class 54 Rating, Add</i>		3,724.24	
		<i>For Class 55 Rating, Add</i>		5,553.75	
		<i>For Class 56 Rating, Add</i>		7,358.65	
40 05 19 00-1518	EA	42" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		28,492.21	1,828.75
		<i>For Class 52 Rating, Deduct</i>		-2,829.35	
		<i>For Class 54 Rating, Add</i>		3,891.46	
		<i>For Class 55 Rating, Add</i>		5,802.37	
		<i>For Class 56 Rating, Add</i>		7,687.55	
40 05 19 00-1519	EA	42" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		29,624.21	1,831.47
		<i>For Class 52 Rating, Deduct</i>		-2,953.42	
		<i>For Class 54 Rating, Add</i>		4,060.69	
		<i>For Class 55 Rating, Add</i>		6,053.98	
		<i>For Class 56 Rating, Add</i>		8,020.43	
40 05 19 00-1520	EA	42" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		30,742.74	1,834.19
		<i>For Class 52 Rating, Deduct</i>		-3,076.00	
		<i>For Class 54 Rating, Add</i>		4,227.90	
		<i>For Class 55 Rating, Add</i>		6,302.60	
		<i>For Class 56 Rating, Add</i>		8,349.33	
40 05 19 00-1521	EA	42" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		31,872.51	1,836.91
		<i>For Class 52 Rating, Deduct</i>		-3,199.83	
		<i>For Class 54 Rating, Add</i>		4,396.80	
		<i>For Class 55 Rating, Add</i>		6,553.71	
		<i>For Class 56 Rating, Add</i>		8,681.54	
40 05 19 00-1522	EA	42" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		32,991.03	1,839.62
		<i>For Class 52 Rating, Deduct</i>		-3,322.41	
		<i>For Class 54 Rating, Add</i>		4,564.01	
		<i>For Class 55 Rating, Add</i>		6,802.33	
		<i>For Class 56 Rating, Add</i>		9,010.44	
40 05 19 00-1523	EA	42" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		34,123.05	1,842.33
		<i>For Class 52 Rating, Deduct</i>		-3,446.48	
		<i>For Class 54 Rating, Add</i>		4,733.24	
		<i>For Class 55 Rating, Add</i>		7,053.95	
		<i>For Class 56 Rating, Add</i>		9,343.32	
40 05 19 00-1524	EA	42" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		35,241.58	1,845.06
		<i>For Class 52 Rating, Deduct</i>		-3,569.06	
		<i>For Class 54 Rating, Add</i>		4,900.45	
		<i>For Class 55 Rating, Add</i>		7,302.56	
		<i>For Class 56 Rating, Add</i>		9,672.22	
40 05 19 00-1525	EA	42" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		36,371.35	1,847.78
		<i>For Class 52 Rating, Deduct</i>		-3,692.89	
		<i>For Class 54 Rating, Add</i>		5,069.35	
		<i>For Class 55 Rating, Add</i>		7,553.68	
		<i>For Class 56 Rating, Add</i>		10,004.44	
40 05 19 00-1526	EA	42" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		37,489.88	1,850.49
		<i>For Class 52 Rating, Deduct</i>		-3,815.47	
		<i>For Class 54 Rating, Add</i>		5,236.56	
		<i>For Class 55 Rating, Add</i>		7,802.29	
		<i>For Class 56 Rating, Add</i>		10,333.34	
40 05 19 00-1527	EA	42" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		38,621.89	1,853.21
		<i>For Class 52 Rating, Deduct</i>		-3,939.54	
		<i>For Class 54 Rating, Add</i>		5,405.79	
		<i>For Class 55 Rating, Add</i>		8,053.91	
		<i>For Class 56 Rating, Add</i>		10,666.21	
40 05 19 00-1528	EA	42" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		39,740.41	1,855.93
		<i>For Class 52 Rating, Deduct</i>		-4,062.12	
		<i>For Class 54 Rating, Add</i>		5,573.00	
		<i>For Class 55 Rating, Add</i>		8,302.52	
		<i>For Class 56 Rating, Add</i>		10,995.11	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1529 EA 42" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	40,867.93	1,858.64
For Class 52 Rating, Deduct	-4,185.70	
For Class 54 Rating, Add	5,741.56	
For Class 55 Rating, Add	8,553.14	
For Class 56 Rating, Add	11,326.66	
40 05 19 00-1530 EA 42" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	41,988.71	1,861.36
For Class 52 Rating, Deduct	-4,308.53	
For Class 54 Rating, Add	5,909.11	
For Class 55 Rating, Add	8,802.25	
For Class 56 Rating, Add	11,656.22	
40 05 19 00-1531 EA 42" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	42,882.56	1,864.08
For Class 52 Rating, Deduct	-4,406.40	
For Class 54 Rating, Add	6,042.62	
For Class 55 Rating, Add	9,000.76	
For Class 56 Rating, Add	11,918.85	
40 05 19 00-1532 EA 42" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	44,237.00	1,866.80
For Class 52 Rating, Deduct	-4,554.94	
For Class 54 Rating, Add	6,245.22	
For Class 55 Rating, Add	9,301.98	
For Class 56 Rating, Add	12,317.34	
40 05 19 00-1533 EA 42" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	45,355.53	1,869.50
For Class 52 Rating, Deduct	-4,677.52	
For Class 54 Rating, Add	6,412.43	
For Class 55 Rating, Add	9,550.60	
For Class 56 Rating, Add	12,646.24	
40 05 19 00-1534 EA 42" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	46,485.29	1,872.23
For Class 52 Rating, Deduct	-4,801.34	
For Class 54 Rating, Add	6,581.33	
For Class 55 Rating, Add	9,801.71	
For Class 56 Rating, Add	12,978.45	
40 05 19 00-1535 EA 42" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	47,603.83	1,874.95
For Class 52 Rating, Deduct	-4,923.93	
For Class 54 Rating, Add	6,748.54	
For Class 55 Rating, Add	10,050.33	
For Class 56 Rating, Add	13,307.35	
40 05 19 00-1536 EA 42" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	48,735.83	1,877.67
For Class 52 Rating, Deduct	-5,048.00	
For Class 54 Rating, Add	6,917.77	
For Class 55 Rating, Add	10,301.95	
For Class 56 Rating, Add	13,640.23	
40 05 19 00-1537 EA 42" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	49,852.12	1,880.38
For Class 52 Rating, Deduct	-5,170.34	
For Class 54 Rating, Add	7,084.65	
For Class 55 Rating, Add	10,550.06	
For Class 56 Rating, Add	13,968.47	
40 05 19 00-1538 EA 42" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	50,984.14	1,883.10
For Class 52 Rating, Deduct	-5,294.40	
For Class 54 Rating, Add	7,253.88	
For Class 55 Rating, Add	10,801.68	
For Class 56 Rating, Add	14,301.35	
40 05 19 00-1539 EA 42" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	52,102.66	1,885.82
For Class 52 Rating, Deduct	-5,416.99	
For Class 54 Rating, Add	7,421.09	
For Class 55 Rating, Add	11,050.29	
For Class 56 Rating, Add	14,630.24	
40 05 19 00-1540 EA 42" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	53,232.43	1,888.53
For Class 52 Rating, Deduct	-5,540.81	
For Class 54 Rating, Add	7,589.99	
For Class 55 Rating, Add	11,301.41	
For Class 56 Rating, Add	14,962.46	
40 05 19 00-1541 48" Flanged End x Plain End (FxPE), Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-1028)</small>		
40 05 19 00-1542 EA 48" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	15,007.36	2,247.21
For Class 52 Rating, Deduct	-1,276.27	
For Class 54 Rating, Add	1,781.23	
For Class 55 Rating, Add	2,669.07	
For Class 56 Rating, Add	3,545.31	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-1543	EA	48" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		16,653.88	2,249.94
		<i>For Class 52 Rating, Deduct</i>		-1,456.94	
		<i>For Class 54 Rating, Add</i>		2,027.64	
		<i>For Class 55 Rating, Add</i>		3,035.43	
		<i>For Class 56 Rating, Add</i>		4,029.97	
40 05 19 00-1544	EA	48" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		18,298.16	2,252.66
		<i>For Class 52 Rating, Deduct</i>		-1,637.36	
		<i>For Class 54 Rating, Add</i>		2,273.71	
		<i>For Class 55 Rating, Add</i>		3,401.28	
		<i>For Class 56 Rating, Add</i>		4,513.96	
40 05 19 00-1545	EA	48" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		19,955.92	2,255.38
		<i>For Class 52 Rating, Deduct</i>		-1,819.26	
		<i>For Class 54 Rating, Add</i>		2,521.81	
		<i>For Class 55 Rating, Add</i>		3,770.14	
		<i>For Class 56 Rating, Add</i>		5,001.93	
40 05 19 00-1546	EA	48" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		21,602.45	2,258.08
		<i>For Class 52 Rating, Deduct</i>		-1,999.92	
		<i>For Class 54 Rating, Add</i>		2,768.22	
		<i>For Class 55 Rating, Add</i>		4,136.50	
		<i>For Class 56 Rating, Add</i>		5,486.60	
40 05 19 00-1547	EA	48" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		23,248.98	2,260.80
		<i>For Class 52 Rating, Deduct</i>		-2,180.59	
		<i>For Class 54 Rating, Add</i>		3,014.63	
		<i>For Class 55 Rating, Add</i>		4,502.86	
		<i>For Class 56 Rating, Add</i>		5,971.25	
40 05 19 00-1548	EA	48" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		24,904.50	2,263.53
		<i>For Class 52 Rating, Deduct</i>		-2,362.24	
		<i>For Class 54 Rating, Add</i>		3,262.39	
		<i>For Class 55 Rating, Add</i>		4,871.22	
		<i>For Class 56 Rating, Add</i>		6,458.56	
40 05 19 00-1549	EA	48" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		26,553.27	2,266.24
		<i>For Class 52 Rating, Deduct</i>		-2,543.15	
		<i>For Class 54 Rating, Add</i>		3,509.14	
		<i>For Class 55 Rating, Add</i>		5,238.07	
		<i>For Class 56 Rating, Add</i>		6,943.89	
40 05 19 00-1550	EA	48" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		28,197.56	2,268.96
		<i>For Class 52 Rating, Deduct</i>		-2,723.57	
		<i>For Class 54 Rating, Add</i>		3,755.21	
		<i>For Class 55 Rating, Add</i>		5,603.93	
		<i>For Class 56 Rating, Add</i>		7,427.88	
40 05 19 00-1551	EA	48" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		29,855.32	2,271.68
		<i>For Class 52 Rating, Deduct</i>		-2,905.47	
		<i>For Class 54 Rating, Add</i>		4,003.31	
		<i>For Class 55 Rating, Add</i>		5,972.79	
		<i>For Class 56 Rating, Add</i>		7,915.86	
40 05 19 00-1552	EA	48" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		31,501.84	2,274.39
		<i>For Class 52 Rating, Deduct</i>		-3,086.14	
		<i>For Class 54 Rating, Add</i>		4,249.72	
		<i>For Class 55 Rating, Add</i>		6,339.15	
		<i>For Class 56 Rating, Add</i>		8,400.52	
40 05 19 00-1553	EA	48" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		33,159.61	2,277.11
		<i>For Class 52 Rating, Deduct</i>		-3,268.04	
		<i>For Class 54 Rating, Add</i>		4,497.82	
		<i>For Class 55 Rating, Add</i>		6,708.01	
		<i>For Class 56 Rating, Add</i>		8,888.49	
40 05 19 00-1554	EA	48" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		34,803.89	2,279.83
		<i>For Class 52 Rating, Deduct</i>		-3,448.46	
		<i>For Class 54 Rating, Add</i>		4,743.89	
		<i>For Class 55 Rating, Add</i>		7,073.86	
		<i>For Class 56 Rating, Add</i>		9,372.49	
40 05 19 00-1555	EA	48" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		36,450.41	2,282.55
		<i>For Class 52 Rating, Deduct</i>		-3,629.12	
		<i>For Class 54 Rating, Add</i>		4,990.30	
		<i>For Class 55 Rating, Add</i>		7,440.22	
		<i>For Class 56 Rating, Add</i>		9,857.15	
40 05 19 00-1556	EA	48" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe		38,108.18	2,285.27
		<i>For Class 52 Rating, Deduct</i>		-3,811.02	
		<i>For Class 54 Rating, Add</i>		5,238.40	
		<i>For Class 55 Rating, Add</i>		7,809.08	
		<i>For Class 56 Rating, Add</i>		10,345.12	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1557 EA 48" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	39,754.71	2,287.97
For Class 52 Rating, Deduct	-3,991.69	
For Class 54 Rating, Add	5,484.81	
For Class 55 Rating, Add	8,175.44	
For Class 56 Rating, Add	10,829.78	
40 05 19 00-1558 EA 48" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	41,398.98	2,290.70
For Class 52 Rating, Deduct	-4,172.11	
For Class 54 Rating, Add	5,730.88	
For Class 55 Rating, Add	8,541.29	
For Class 56 Rating, Add	11,313.77	
40 05 19 00-1559 EA 48" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	43,056.75	2,293.42
For Class 52 Rating, Deduct	-4,354.01	
For Class 54 Rating, Add	5,978.98	
For Class 55 Rating, Add	8,910.16	
For Class 56 Rating, Add	11,801.75	
40 05 19 00-1560 EA 48" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	44,703.27	2,296.13
For Class 52 Rating, Deduct	-4,534.67	
For Class 54 Rating, Add	6,225.39	
For Class 55 Rating, Add	9,276.51	
For Class 56 Rating, Add	12,286.41	
40 05 19 00-1561 EA 48" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	46,347.55	2,298.85
For Class 52 Rating, Deduct	-4,715.09	
For Class 54 Rating, Add	6,471.46	
For Class 55 Rating, Add	9,642.37	
For Class 56 Rating, Add	12,770.40	
40 05 19 00-1562 EA 48" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	48,005.32	2,301.56
For Class 52 Rating, Deduct	-4,896.99	
For Class 54 Rating, Add	6,719.56	
For Class 55 Rating, Add	10,011.23	
For Class 56 Rating, Add	13,258.38	
40 05 19 00-1563 EA 48" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	49,654.09	2,304.29
For Class 52 Rating, Deduct	-5,077.90	
For Class 54 Rating, Add	6,966.31	
For Class 55 Rating, Add	10,378.09	
For Class 56 Rating, Add	13,743.70	
40 05 19 00-1564 EA 48" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	51,298.38	2,307.00
For Class 52 Rating, Deduct	-5,258.32	
For Class 54 Rating, Add	7,212.38	
For Class 55 Rating, Add	10,743.94	
For Class 56 Rating, Add	14,227.70	
40 05 19 00-1565 EA 48" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	52,956.14	2,309.72
For Class 52 Rating, Deduct	-5,440.22	
For Class 54 Rating, Add	7,460.48	
For Class 55 Rating, Add	11,112.80	
For Class 56 Rating, Add	14,715.67	
40 05 19 00-1566 EA 48" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	54,602.66	2,312.44
For Class 52 Rating, Deduct	-5,620.89	
For Class 54 Rating, Add	7,706.89	
For Class 55 Rating, Add	11,479.16	
For Class 56 Rating, Add	15,200.33	
40 05 19 00-1567 EA 48" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	56,246.95	2,315.14
For Class 52 Rating, Deduct	-5,801.31	
For Class 54 Rating, Add	7,952.96	
For Class 55 Rating, Add	11,845.02	
For Class 56 Rating, Add	15,684.33	
40 05 19 00-1568 EA 48" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	57,904.71	2,317.87
For Class 52 Rating, Deduct	-5,983.21	
For Class 54 Rating, Add	8,201.06	
For Class 55 Rating, Add	12,213.88	
For Class 56 Rating, Add	16,172.30	
40 05 19 00-1569 EA 48" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	59,551.23	2,320.59
For Class 52 Rating, Deduct	-6,163.87	
For Class 54 Rating, Add	8,447.47	
For Class 55 Rating, Add	12,580.23	
For Class 56 Rating, Add	16,656.96	
40 05 19 00-1570 EA 48" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	60,995.55	2,323.31
For Class 52 Rating, Deduct	-6,322.29	
For Class 54 Rating, Add	8,663.55	
For Class 55 Rating, Add	12,901.50	
For Class 56 Rating, Add	17,081.97	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1571	EA		48" Flanged x Plain End (FxpE), 15'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	62,855.52	2,326.02
			<i>For Class 52 Rating, Deduct</i>	-6,526.44	
			<i>For Class 54 Rating, Add</i>	8,941.98	
			<i>For Class 55 Rating, Add</i>	13,315.45	
			<i>For Class 56 Rating, Add</i>	17,629.59	
40 05 19 00-1572	EA		48" Flanged x Plain End (FxpE), 16'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	64,499.80	2,328.74
			<i>For Class 52 Rating, Deduct</i>	-6,706.86	
			<i>For Class 54 Rating, Add</i>	9,188.05	
			<i>For Class 55 Rating, Add</i>	13,681.31	
			<i>For Class 56 Rating, Add</i>	18,113.59	
40 05 19 00-1573	EA		48" Flanged x Plain End (FxpE), 16'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	66,159.81	2,331.46
			<i>For Class 52 Rating, Deduct</i>	-6,889.00	
			<i>For Class 54 Rating, Add</i>	9,436.49	
			<i>For Class 55 Rating, Add</i>	14,050.67	
			<i>For Class 56 Rating, Add</i>	18,602.22	
40 05 19 00-1574	EA		48" Flanged x Plain End (FxpE), 17'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	67,804.09	2,334.17
			<i>For Class 52 Rating, Deduct</i>	-7,069.42	
			<i>For Class 54 Rating, Add</i>	9,682.56	
			<i>For Class 55 Rating, Add</i>	14,416.52	
			<i>For Class 56 Rating, Add</i>	19,086.22	
40 05 19 00-1575	EA		48" Flanged x Plain End (FxpE), 17'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	69,448.37	2,336.89
			<i>For Class 52 Rating, Deduct</i>	-7,249.84	
			<i>For Class 54 Rating, Add</i>	9,928.63	
			<i>For Class 55 Rating, Add</i>	14,782.38	
			<i>For Class 56 Rating, Add</i>	19,570.22	
40 05 19 00-1576	EA		48" Flanged x Plain End (FxpE), 18'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	71,108.39	2,339.61
			<i>For Class 52 Rating, Deduct</i>	-7,431.99	
			<i>For Class 54 Rating, Add</i>	10,177.07	
			<i>For Class 55 Rating, Add</i>	15,151.74	
			<i>For Class 56 Rating, Add</i>	20,058.85	
40 05 19 00-1577	EA		48" Flanged x Plain End (FxpE), 18'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	72,752.67	2,342.33
			<i>For Class 52 Rating, Deduct</i>	-7,612.41	
			<i>For Class 54 Rating, Add</i>	10,423.14	
			<i>For Class 55 Rating, Add</i>	15,517.60	
			<i>For Class 56 Rating, Add</i>	20,542.85	
40 05 19 00-1578	EA		48" Flanged x Plain End (FxpE), 19'-0" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	74,399.20	2,345.04
			<i>For Class 52 Rating, Deduct</i>	-7,793.07	
			<i>For Class 54 Rating, Add</i>	10,669.55	
			<i>For Class 55 Rating, Add</i>	15,883.95	
			<i>For Class 56 Rating, Add</i>	21,027.51	
40 05 19 00-1579	EA		48" Flanged x Plain End (FxpE), 19'-6" Spool Length, Class 53, Cement Lined, Bituminous Seal Coat, Ductile Iron Pipe	76,056.96	2,347.76
			<i>For Class 52 Rating, Deduct</i>	-7,974.97	
			<i>For Class 54 Rating, Add</i>	10,917.65	
			<i>For Class 55 Rating, Add</i>	16,252.82	
			<i>For Class 56 Rating, Add</i>	21,515.48	

40 05 19 00-1580 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree

Elbows (40 05 19 00-0001)

40 05 19 00-1581	EA		4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	410.74	131.10
40 05 19 00-1582	EA		6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	582.22	167.65
40 05 19 00-1583	EA		8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	828.03	189.89
40 05 19 00-1584	EA		10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	1,222.45	240.74
40 05 19 00-1585	EA		12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	1,522.26	266.97
40 05 19 00-1586	EA		14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	1,910.15	290.00
40 05 19 00-1587	EA		16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	2,353.08	357.54
40 05 19 00-1588	EA		18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	3,099.27	429.05
40 05 19 00-1589	EA		20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	3,814.31	540.28
40 05 19 00-1590	EA		24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	5,865.59	611.79
40 05 19 00-1591	EA		30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	9,930.13	810.43
40 05 19 00-1592	EA		36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	14,145.73	917.69
40 05 19 00-1593	EA		42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	23,837.69	1,048.79
40 05 19 00-1594	EA		48" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow	31,772.44	1,287.15

40 05 19 00-1595 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree

Elbows (40 05 19 00-0001)

40 05 19 00-1596	EA		4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	387.52	131.10
40 05 19 00-1597	EA		6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	545.06	167.65
40 05 19 00-1598	EA		8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	733.59	189.89
40 05 19 00-1599	EA		10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	1,086.21	240.74
40 05 19 00-1600	EA		12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	1,348.87	266.97
40 05 19 00-1601	EA		14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	1,557.17	290.00
40 05 19 00-1602	EA		16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	1,962.94	357.54
40 05 19 00-1603	EA		18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	2,574.44	429.05

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1604 EA 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	3,335.93	540.28
40 05 19 00-1605 EA 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	4,422.71	611.79
40 05 19 00-1606 EA 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	8,874.28	810.43
40 05 19 00-1607 EA 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	13,374.75	917.69
40 05 19 00-1608 EA 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	20,523.08	1,048.79
40 05 19 00-1609 EA 48" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 45 Degree Elbow	28,022.79	1,287.15
40 05 19 00-1610 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbows <small>(40 05 19 00-0001)</small>		
40 05 19 00-1611 EA 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	385.97	131.10
40 05 19 00-1612 EA 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	532.68	167.65
40 05 19 00-1613 EA 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	722.75	189.89
40 05 19 00-1614 EA 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	1,055.25	240.74
40 05 19 00-1615 EA 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	1,416.99	266.97
40 05 19 00-1616 EA 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	1,772.37	290.00
40 05 19 00-1617 EA 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	2,010.93	357.54
40 05 19 00-1618 EA 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	2,633.27	429.05
40 05 19 00-1619 EA 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	3,591.37	540.28
40 05 19 00-1620 EA 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	5,004.81	611.79
40 05 19 00-1621 EA 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	8,878.01	810.43
40 05 19 00-1622 EA 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	13,613.16	917.69
40 05 19 00-1623 EA 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	20,998.36	1,048.79
40 05 19 00-1624 EA 48" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	28,642.06	1,287.15
40 05 19 00-1625 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbows <small>(40 05 19 00-0001)</small>		
40 05 19 00-1626 EA 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	424.67	131.10
40 05 19 00-1627 EA 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	605.44	167.65
40 05 19 00-1628 EA 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	753.72	189.89
40 05 19 00-1629 EA 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	1,165.17	240.74
40 05 19 00-1630 EA 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	1,619.80	266.97
40 05 19 00-1631 EA 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	1,825.00	290.00
40 05 19 00-1632 EA 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	2,230.77	357.54
40 05 19 00-1633 EA 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	2,633.27	429.05
40 05 19 00-1634 EA 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	3,591.37	540.28
40 05 19 00-1635 EA 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	5,213.82	611.79
40 05 19 00-1636 EA 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	9,081.74	810.43
40 05 19 00-1637 EA 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	13,715.34	917.69
40 05 19 00-1638 EA 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	21,106.73	1,048.79
40 05 19 00-1639 EA 48" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	28,860.35	1,287.15
40 05 19 00-1640 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbows <small>(40 05 19 00-0001)</small>		
40 05 19 00-1641 EA 6" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	552.98	149.37
40 05 19 00-1642 EA 8" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	689.05	160.49
40 05 19 00-1643 EA 8" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	777.11	178.77
40 05 19 00-1644 EA 10" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,052.68	185.92
40 05 19 00-1645 EA 10" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,109.79	204.20
40 05 19 00-1646 EA 10" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,214.88	215.31
40 05 19 00-1647 EA 12" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,131.97	199.43
40 05 19 00-1648 EA 12" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,277.33	217.71
40 05 19 00-1649 EA 12" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,473.76	228.83
40 05 19 00-1650 EA 12" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,568.02	254.25
40 05 19 00-1651 EA 14" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,473.76	228.83
40 05 19 00-1652 EA 14" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,636.15	239.95
40 05 19 00-1653 EA 14" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,823.29	265.37
40 05 19 00-1654 EA 14" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,021.80	278.88
40 05 19 00-1655 EA 16" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,699.87	262.60
40 05 19 00-1656 EA 16" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,835.93	273.72
40 05 19 00-1657 EA 16" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,111.33	299.14
40 05 19 00-1658 EA 16" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,307.68	312.25
40 05 19 00-1659 EA 16" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,473.75	323.77
40 05 19 00-1660 EA 18" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,990.92	298.35
40 05 19 00-1661 EA 18" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,393.25	309.48
40 05 19 00-1662 EA 18" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,461.20	334.90
40 05 19 00-1663 EA 18" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,600.27	348.01
40 05 19 00-1664 EA 18" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,825.18	359.53
40 05 19 00-1665 EA 18" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,080.71	393.30
40 05 19 00-1666 EA 20" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,576.78	353.96
40 05 19 00-1667 EA 20" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,753.11	365.09
40 05 19 00-1668 EA 20" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,427.92	390.52
40 05 19 00-1669 EA 20" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,557.71	403.63
40 05 19 00-1670 EA 20" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,931.24	415.15
40 05 19 00-1671 EA 20" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,835.32	448.92
40 05 19 00-1672 EA 20" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,081.46	484.67
40 05 19 00-1673 EA 24" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,649.64	389.72
40 05 19 00-1674 EA 24" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,827.51	400.84

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-1675	EA	24"	x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,119.93	426.27
40 05 19 00-1676	EA	24"	x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,331.77	439.38
40 05 19 00-1677	EA	24"	x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,731.62	450.90
40 05 19 00-1678	EA	24"	x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,100.15	484.67
40 05 19 00-1679	EA	24"	x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,217.81	520.43
40 05 19 00-1680	EA	24"	x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,495.49	514.67
40 05 19 00-1681	EA	30"	x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	6,550.59	538.69
40 05 19 00-1682	EA	30"	x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	6,978.31	550.21
40 05 19 00-1683	EA	30"	x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,874.76	583.98
40 05 19 00-1684	EA	30"	x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	9,167.47	619.73
40 05 19 00-1685	EA	30"	x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	10,609.48	675.36
40 05 19 00-1686	EA	36"	x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	11,205.50	711.11
40 05 19 00-1687	EA	36"	x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	9,057.81	592.33
40 05 19 00-1688	EA	36"	x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	11,769.07	603.85
40 05 19 00-1689	EA	36"	x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	9,536.70	637.62
40 05 19 00-1690	EA	36"	x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	12,489.03	673.37
40 05 19 00-1691	EA	36"	x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	11,927.71	728.99
40 05 19 00-1692	EA	36"	x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	13,011.41	764.75
40 05 19 00-1693	EA	36"	x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	13,870.95	864.06
40 05 19 00-1694	EA	42"	x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	16,110.35	669.40
40 05 19 00-1695	EA	42"	x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	13,555.96	703.17
40 05 19 00-1696	EA	42"	x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	18,305.70	738.92
40 05 19 00-1697	EA	42"	x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	17,998.28	794.53
40 05 19 00-1698	EA	42"	x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	15,679.12	830.29
40 05 19 00-1699	EA	42"	x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	18,486.25	929.61
40 05 19 00-1700	EA	42"	x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	26,178.27	983.24
40 05 19 00-1701	EA	48"	x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	25,050.69	959.40
40 05 19 00-1702	EA	48"	x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	27,240.10	1,058.72
40 05 19 00-1703	EA	48"	x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	28,033.53	1,112.35
40 05 19 00-1704	EA	48"	x 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	35,903.04	1,177.90

40 05 19 00-1705 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbows (40 05 19 00-0001)

40 05 19 00-1706	EA	4"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	495.89	131.10
40 05 19 00-1707	EA	6"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	772.64	167.65
40 05 19 00-1708	EA	8"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	1,146.95	189.89
40 05 19 00-1709	EA	10"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	1,637.36	240.74
40 05 19 00-1710	EA	12"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	2,328.85	266.97
40 05 19 00-1711	EA	14"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	2,719.84	290.00
40 05 19 00-1712	EA	16"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	3,532.78	357.54
40 05 19 00-1713	EA	18"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	4,379.60	429.05
40 05 19 00-1714	EA	20"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	5,981.73	540.28
40 05 19 00-1715	EA	24"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	8,828.77	611.79
40 05 19 00-1716	EA	30"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	15,601.04	810.43
40 05 19 00-1717	EA	36"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	23,820.18	917.69
40 05 19 00-1718	EA	42"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow	37,020.27	1,048.79

40 05 19 00-1719 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbows With Base (40 05 19 00-0001)

40 05 19 00-1720	EA	4"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	525.30	131.10
40 05 19 00-1721	EA	6"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	715.36	167.65
40 05 19 00-1722	EA	8"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	1,187.20	189.89
40 05 19 00-1723	EA	10"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	1,607.94	240.74
40 05 19 00-1724	EA	12"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	2,172.49	266.97
40 05 19 00-1725	EA	14"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	2,571.22	290.00
40 05 19 00-1726	EA	16"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	3,176.70	357.54
40 05 19 00-1727	EA	18"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	3,995.65	429.05
40 05 19 00-1728	EA	20"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	5,278.87	540.28
40 05 19 00-1729	EA	24"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	7,491.16	611.79
40 05 19 00-1730	EA	30"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	12,323.58	810.43
40 05 19 00-1731	EA	36"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	17,675.54	917.69
40 05 19 00-1732	EA	42"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	32,976.48	1,048.79
40 05 19 00-1733	EA	48"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base	35,523.63	1,287.15

40 05 19 00-1734 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tees (40 05 19 00-0001)

40 05 19 00-1735	EA	4"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	706.06	210.55
40 05 19 00-1736	EA	6"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	875.48	259.02
40 05 19 00-1737	EA	8"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	1,244.79	289.21
40 05 19 00-1738	EA	10"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	1,795.56	375.82
40 05 19 00-1739	EA	12"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	2,404.67	409.98
40 05 19 00-1740	EA	14"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	3,242.72	440.96
40 05 19 00-1741	EA	16"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	3,661.89	556.18
40 05 19 00-1742	EA	18"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	4,474.31	635.63
40 05 19 00-1743	EA	20"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	5,643.62	802.49
40 05 19 00-1744	EA	24"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	8,374.03	885.91
40 05 19 00-1745	EA	30"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	14,311.96	1,223.58
40 05 19 00-1746	EA	36"	Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee	20,705.80	1,402.35

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1747	EA			42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee.....	43,093.49	1,620.86
40 05 19 00-1748				Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tees		
				<small>(40 05 19 00-0001)</small>		
40 05 19 00-1749	EA			6" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	890.45	235.18
40 05 19 00-1750	EA			8" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,112.87	239.95
40 05 19 00-1751	EA			8" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,105.98	270.15
40 05 19 00-1752	EA			10" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,478.05	265.37
40 05 19 00-1753	EA			10" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,452.59	295.57
40 05 19 00-1754	EA			10" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,531.02	314.63
40 05 19 00-1755	EA			12" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,885.56	278.88
40 05 19 00-1756	EA			12" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,874.02	309.07
40 05 19 00-1757	EA			12" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	1,978.77	328.14
40 05 19 00-1758	EA			12" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	2,357.88	389.32
40 05 19 00-1759	EA			14" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	2,772.48	290.00
40 05 19 00-1760	EA			14" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	2,705.21	320.20
40 05 19 00-1761	EA			14" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	2,823.89	339.26
40 05 19 00-1762	EA			14" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	2,973.88	400.45
40 05 19 00-1763	EA			14" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,154.40	421.50
40 05 19 00-1764	EA			16" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,368.59	323.77
40 05 19 00-1765	EA			16" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,092.32	353.96
40 05 19 00-1766	EA			16" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,037.61	373.03
40 05 19 00-1767	EA			16" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,565.34	434.22
40 05 19 00-1768	EA			16" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,453.27	455.27
40 05 19 00-1769	EA			16" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,857.42	474.73
40 05 19 00-1770	EA			18" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,127.18	359.53
40 05 19 00-1771	EA			18" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,086.11	389.72
40 05 19 00-1772	EA			18" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,729.63	408.79
40 05 19 00-1773	EA			18" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	3,730.98	469.97
40 05 19 00-1774	EA			18" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,064.77	491.02
40 05 19 00-1775	EA			18" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,442.61	510.49
40 05 19 00-1776	EA			18" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,744.04	591.93
40 05 19 00-1777	EA			20" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	9,199.62	415.15
40 05 19 00-1778	EA			20" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,563.74	445.34
40 05 19 00-1779	EA			20" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,656.10	464.41
40 05 19 00-1780	EA			20" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	4,844.79	525.58
40 05 19 00-1781	EA			20" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	5,034.60	546.65
40 05 19 00-1782	EA			20" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	5,096.60	566.11
40 05 19 00-1783	EA			20" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	6,144.24	647.55
40 05 19 00-1784	EA			20" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	6,273.93	691.24
40 05 19 00-1785	EA			24" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	6,069.23	450.90
40 05 19 00-1786	EA			24" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	5,223.24	481.09
40 05 19 00-1787	EA			24" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	5,461.13	500.16
40 05 19 00-1788	EA			24" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	5,669.94	561.34
40 05 19 00-1789	EA			24" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	6,364.45	582.40
40 05 19 00-1790	EA			24" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	6,520.90	601.86
40 05 19 00-1791	EA			24" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	6,727.89	683.30
40 05 19 00-1792	EA			24" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	8,876.37	727.00
40 05 19 00-1793	EA			24" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	9,176.40	776.86
40 05 19 00-1794	EA			30" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	10,815.50	580.41
40 05 19 00-1795	EA			30" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	10,876.90	599.48
40 05 19 00-1796	EA			30" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	11,175.51	660.66
40 05 19 00-1797	EA			30" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	11,207.41	681.71
40 05 19 00-1798	EA			30" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	11,236.91	701.18
40 05 19 00-1799	EA			30" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	11,462.48	782.62
40 05 19 00-1800	EA			30" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	11,596.81	826.32
40 05 19 00-1801	EA			30" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	11,934.08	937.55
40 05 19 00-1802	EA			30" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	15,319.39	985.23
40 05 19 00-1803	EA			36" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	14,913.39	830.69
40 05 19 00-1804	EA			36" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	15,962.69	845.79
40 05 19 00-1805	EA			36" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	16,062.36	889.09
40 05 19 00-1806	EA			36" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	16,190.42	906.17
40 05 19 00-1807	EA			36" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	16,247.96	921.66
40 05 19 00-1808	EA			36" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	16,403.36	979.27
40 05 19 00-1809	EA			36" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	16,497.61	1,019.00
40 05 19 00-1810	EA			36" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	16,760.25	1,102.42
40 05 19 00-1811	EA			36" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	17,131.53	1,144.13
40 05 19 00-1812	EA			36" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	22,471.51	1,312.97
40 05 19 00-1813	EA			42" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	26,827.03	718.66
40 05 19 00-1814	EA			42" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	24,232.12	779.84
40 05 19 00-1815	EA			42" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	24,264.02	800.90
40 05 19 00-1816	EA			42" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	24,329.13	820.36
40 05 19 00-1817	EA			42" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	24,525.29	901.80
40 05 19 00-1818	EA			42" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	24,774.19	945.50
40 05 19 00-1819	EA			42" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	24,942.72	1,056.74
40 05 19 00-1820	EA			42" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	25,306.00	1,104.41
40 05 19 00-1821	EA			42" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	32,074.99	1,342.77
40 05 19 00-1822	EA			42" x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	41,259.41	1,467.90
40 05 19 00-1823	EA			48" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	32,835.20	930.00
40 05 19 00-1824	EA			48" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	32,864.70	949.47
40 05 19 00-1825	EA			48" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	33,096.46	1,030.91

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
40 05 19 00-1826	EA	48" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	33,162.66		1,074.61
40 05 19 00-1827	EA	48" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	33,475.19		1,185.84
40 05 19 00-1828	EA	48" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	33,802.87		1,233.52
40 05 19 00-1829	EA	48" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Reducing Tee.....	34,674.91		1,471.88
40 05 19 00-1830 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tees With Base (40 05 19 00-0001)					
40 05 19 00-1831	EA	4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base	764.89		210.55
40 05 19 00-1832	EA	6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base	1,044.23		259.02
40 05 19 00-1833	EA	8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base	1,535.85		289.21
40 05 19 00-1834	EA	10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	2,345.16		375.82
40 05 19 00-1835	EA	12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	3,166.37		409.98
40 05 19 00-1836	EA	14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	3,539.97		440.96
40 05 19 00-1837	EA	16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	4,392.62		556.18
40 05 19 00-1838	EA	18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	5,342.82		635.63
40 05 19 00-1839	EA	20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	7,142.24		802.49
40 05 19 00-1840	EA	24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	10,327.81		885.91
40 05 19 00-1841	EA	30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	17,354.10		1,223.58
40 05 19 00-1842	EA	36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Tee With Base.....	24,791.39		1,402.35
40 05 19 00-1843 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wyes (40 05 19 00-0001)					
40 05 19 00-1844	EA	4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wye.....	616.27		210.55
40 05 19 00-1845	EA	6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wye.....	867.74		259.02
40 05 19 00-1846	EA	8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wye.....	1,268.01		289.21
40 05 19 00-1847	EA	10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wye.....	1,667.07		375.82
40 05 19 00-1848	EA	12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wye.....	2,396.93		409.98
40 05 19 00-1849	EA	14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Wye.....	3,125.06		440.96
40 05 19 00-1850 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Crosses (40 05 19 00-0001)					
40 05 19 00-1851	EA	4" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	846.57		290.00
40 05 19 00-1852	EA	6" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	1,127.90		314.24
40 05 19 00-1853	EA	6" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	1,191.96		350.39
40 05 19 00-1854	EA	8" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	1,402.01		319.41
40 05 19 00-1855	EA	8" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	1,526.19		361.51
40 05 19 00-1856	EA	8" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	1,577.95		388.53
40 05 19 00-1857	EA	10" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	1,824.46		344.83
40 05 19 00-1858	EA	10" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,007.49		386.94
40 05 19 00-1859	EA	10" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,197.04		413.95
40 05 19 00-1860	EA	10" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,727.85		510.89
40 05 19 00-1861	EA	12" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,376.90		357.94
40 05 19 00-1862	EA	12" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,499.53		400.05
40 05 19 00-1863	EA	12" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,690.63		427.06
40 05 19 00-1864	EA	12" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,250.87		524.00
40 05 19 00-1865	EA	12" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,051.75		553.00
40 05 19 00-1866	EA	14" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	2,990.73		411.57
40 05 19 00-1867	EA	14" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,180.28		438.58
40 05 19 00-1868	EA	14" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,534.60		535.52
40 05 19 00-1869	EA	14" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,846.38		564.52
40 05 19 00-1870	EA	14" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	4,034.98		591.93
40 05 19 00-1871	EA	16" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,576.01		445.34
40 05 19 00-1872	EA	16" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,793.42		472.35
40 05 19 00-1873	EA	16" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	4,147.75		569.29
40 05 19 00-1874	EA	16" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	4,488.93		598.29
40 05 19 00-1875	EA	16" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	6,293.82		625.70
40 05 19 00-1876	EA	16" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,080.62		754.81
40 05 19 00-1877	EA	18" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,719.98		481.09
40 05 19 00-1878	EA	18" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	3,935.85		508.11
40 05 19 00-1879	EA	18" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	4,231.34		605.04
40 05 19 00-1880	EA	18" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	4,570.97		634.04
40 05 19 00-1881	EA	18" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,262.74		661.46
40 05 19 00-1882	EA	18" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,726.19		790.56
40 05 19 00-1883	EA	18" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,982.49		842.21
40 05 19 00-1884	EA	20" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	4,861.63		536.71
40 05 19 00-1885	EA	20" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,092.99		563.73
40 05 19 00-1886	EA	20" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,366.81		660.66
40 05 19 00-1887	EA	20" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,729.67		689.66
40 05 19 00-1888	EA	20" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	5,834.68		717.07
40 05 19 00-1889	EA	20" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	7,114.02		846.18
40 05 19 00-1890	EA	20" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	7,382.68		897.82
40 05 19 00-1891	EA	20" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	8,082.91		1,064.68
40 05 19 00-1892	EA	24" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	6,445.39		572.46
40 05 19 00-1893	EA	24" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	6,611.72		599.48
40 05 19 00-1894	EA	24" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	6,981.53		696.41
40 05 19 00-1895	EA	24" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	7,217.44		725.42
40 05 19 00-1896	EA	24" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	7,354.95		752.82
40 05 19 00-1897	EA	24" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	7,773.52		881.94
40 05 19 00-1898	EA	24" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross.....	10,115.17		933.58

MINOR	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-1899	EA	24" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	10,686.79	1,039.06
40 05 19 00-1900	EA	24" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	11,763.37	1,160.03
40 05 19 00-1901	EA	30" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	11,936.54	824.73
40 05 19 00-1902	EA	30" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	12,012.13	852.14
40 05 19 00-1903	EA	30" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	12,446.17	981.26
40 05 19 00-1904	EA	30" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	12,592.53	1,032.90
40 05 19 00-1905	EA	30" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	13,221.55	1,199.75
40 05 19 00-1906	EA	30" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	17,237.97	1,259.34
40 05 19 00-1907	EA	30" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	19,548.38	1,636.75
40 05 19 00-1908	EA	36" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	16,882.39	1,049.19
40 05 19 00-1909	EA	36" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	16,917.91	1,072.62
40 05 19 00-1910	EA	36" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	17,284.87	1,177.90
40 05 19 00-1911	EA	36" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	17,423.68	1,225.57
40 05 19 00-1912	EA	36" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	17,942.43	1,364.61
40 05 19 00-1913	EA	36" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	18,570.19	1,418.25
40 05 19 00-1914	EA	36" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	25,145.72	1,726.14
40 05 19 00-1915	EA	36" x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	27,573.96	1,887.02
40 05 19 00-1916	EA	42" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	25,027.21	943.91
40 05 19 00-1917	EA	42" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	25,068.74	971.32
40 05 19 00-1918	EA	42" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	25,482.67	1,100.43
40 05 19 00-1919	EA	42" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	25,596.53	1,152.07
40 05 19 00-1920	EA	42" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	26,177.55	1,318.93
40 05 19 00-1921	EA	42" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	26,814.33	1,378.52
40 05 19 00-1922	EA	42" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	34,521.62	1,755.92
40 05 19 00-1923	EA	42" x 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	47,783.87	1,952.57
40 05 19 00-1924	EA	48" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	35,293.66	2,192.92
40 05 19 00-1925	EA	48" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	33,601.22	1,100.43
40 05 19 00-1926	EA	48" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	34,016.69	1,229.55
40 05 19 00-1927	EA	48" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	34,130.53	1,281.19
40 05 19 00-1928	EA	48" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	34,674.40	1,448.05
40 05 19 00-1929	EA	48" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	35,311.19	1,507.63
40 05 19 00-1930	EA	48" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Cross	36,866.10	1,885.04

40 05 19 00-1931 Flanged End x Flanged End, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducers (40 05 19 00-0001)

40 05 19 00-1932	EA	6" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	452.35	149.37
40 05 19 00-1933	EA	8" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	582.23	160.49
40 05 19 00-1934	EA	8" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	640.87	178.77
40 05 19 00-1935	EA	10" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	787.95	185.92
40 05 19 00-1936	EA	10" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	792.42	204.20
40 05 19 00-1937	EA	10" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	930.02	215.31
40 05 19 00-1938	EA	12" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,012.77	199.43
40 05 19 00-1939	EA	12" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,045.11	217.71
40 05 19 00-1940	EA	12" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,147.10	228.83
40 05 19 00-1941	EA	12" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,290.90	254.25
40 05 19 00-1942	EA	14" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,599.35	217.71
40 05 19 00-1943	EA	14" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,264.76	228.83
40 05 19 00-1944	EA	14" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,400.83	239.95
40 05 19 00-1945	EA	14" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,539.98	265.37
40 05 19 00-1946	EA	14" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,493.88	278.88
40 05 19 00-1947	EA	16" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,895.12	244.32
40 05 19 00-1948	EA	16" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,524.93	262.60
40 05 19 00-1949	EA	16" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,436.51	273.72
40 05 19 00-1950	EA	16" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,601.98	299.14
40 05 19 00-1951	EA	16" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,994.95	312.25
40 05 19 00-1952	EA	16" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,148.64	323.77
40 05 19 00-1953	EA	18" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,399.64	298.35
40 05 19 00-1954	EA	18" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,890.10	309.48
40 05 19 00-1955	EA	18" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,077.25	334.90
40 05 19 00-1956	EA	18" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,061.51	348.01
40 05 19 00-1957	EA	18" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,379.31	359.53
40 05 19 00-1958	EA	18" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,370.10	393.30
40 05 19 00-1959	EA	20" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,448.29	353.96
40 05 19 00-1960	EA	20" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,370.71	365.09
40 05 19 00-1961	EA	20" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,568.69	390.52
40 05 19 00-1962	EA	20" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,500.32	403.63
40 05 19 00-1963	EA	20" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,893.97	415.15
40 05 19 00-1964	EA	20" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,706.71	448.92
40 05 19 00-1965	EA	20" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,349.18	484.67
40 05 19 00-1966	EA	24" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,220.63	400.84
40 05 19 00-1967	EA	24" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,641.55	426.27
40 05 19 00-1968	EA	24" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,919.96	439.38
40 05 19 00-1969	EA	24" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,024.11	450.90
40 05 19 00-1970	EA	24" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,547.35	484.67
40 05 19 00-1971	EA	24" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,293.55	520.43
40 05 19 00-1972	EA	24" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,540.27	514.67
40 05 19 00-1973	EA	30" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	6,210.49	583.98
40 05 19 00-1974	EA	30" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	6,470.58	619.73
40 05 19 00-1975	EA	30" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	6,965.11	675.36
40 05 19 00-1976	EA	30" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	7,702.02	711.11

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-1977	EA	36" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	8,511.82	637.62
40 05 19 00-1978	EA	36" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	8,940.65	673.37
40 05 19 00-1979	EA	36" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	9,503.29	728.99
40 05 19 00-1980	EA	36" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	10,343.93	764.75
40 05 19 00-1981	EA	36" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	11,928.01	864.06
40 05 19 00-1982	EA	42" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	14,513.36	830.29
40 05 19 00-1983	EA	42" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	16,410.17	929.61
40 05 19 00-1984	EA	42" x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	18,567.51	983.24
40 05 19 00-1985	EA	48" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	18,458.63	959.40
40 05 19 00-1986	EA	48" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	20,720.80	1,058.72
40 05 19 00-1987	EA	48" x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	23,169.21	1,112.35
40 05 19 00-1988	EA	48" x 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Concentric Reducer	25,963.85	1,177.90

40 05 19 00-1989 Flanged End x Flanged End, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducers (40 05 19 00-0001)

40 05 19 00-1990	EA	6" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	494.15	149.37
40 05 19 00-1991	EA	8" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	630.22	160.49
40 05 19 00-1992	EA	8" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	716.73	178.77
40 05 19 00-1993	EA	10" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	787.95	185.92
40 05 19 00-1994	EA	10" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	843.51	204.20
40 05 19 00-1995	EA	10" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	978.02	215.31
40 05 19 00-1996	EA	12" x 4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,012.77	199.43
40 05 19 00-1997	EA	12" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,100.84	217.71
40 05 19 00-1998	EA	12" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,205.93	228.83
40 05 19 00-1999	EA	12" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,393.08	254.25
40 05 19 00-2000	EA	14" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,264.76	228.83
40 05 19 00-2001	EA	14" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,371.41	239.95
40 05 19 00-2002	EA	14" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,529.14	265.37
40 05 19 00-2003	EA	14" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,755.52	278.88
40 05 19 00-2004	EA	16" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,524.93	262.60
40 05 19 00-2005	EA	16" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,657.89	273.72
40 05 19 00-2006	EA	16" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,845.05	299.14
40 05 19 00-2007	EA	16" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,042.94	312.25
40 05 19 00-2008	EA	16" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,148.64	323.77
40 05 19 00-2009	EA	18" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	1,890.10	309.48
40 05 19 00-2010	EA	18" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,077.25	334.90
40 05 19 00-2011	EA	18" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,275.15	348.01
40 05 19 00-2012	EA	18" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,379.31	359.53
40 05 19 00-2013	EA	18" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,608.52	393.30
40 05 19 00-2014	EA	20" x 6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,779.59	353.96
40 05 19 00-2015	EA	20" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,530.17	365.09
40 05 19 00-2016	EA	20" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,568.69	390.52
40 05 19 00-2017	EA	20" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,811.50	403.63
40 05 19 00-2018	EA	20" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	2,893.97	415.15
40 05 19 00-2019	EA	20" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	3,164.97	448.92
40 05 19 00-2020	EA	20" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	3,347.63	484.67
40 05 19 00-2021	EA	24" x 8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	3,539.56	400.84
40 05 19 00-2022	EA	24" x 10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	3,641.55	426.27
40 05 19 00-2023	EA	24" x 12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	3,724.89	439.38
40 05 19 00-2024	EA	24" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	3,805.82	450.90
40 05 19 00-2025	EA	24" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	4,081.46	484.67
40 05 19 00-2026	EA	24" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	4,293.55	520.43
40 05 19 00-2027	EA	24" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	4,540.27	514.67
40 05 19 00-2028	EA	30" x 14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	7,458.24	550.21
40 05 19 00-2029	EA	30" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	7,269.43	583.98
40 05 19 00-2030	EA	30" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	6,504.64	619.73
40 05 19 00-2031	EA	30" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	6,965.11	675.36
40 05 19 00-2032	EA	30" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	7,702.02	711.11
40 05 19 00-2033	EA	36" x 16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	8,579.94	637.62
40 05 19 00-2034	EA	36" x 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	8,940.65	673.37
40 05 19 00-2035	EA	36" x 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	9,469.23	728.99
40 05 19 00-2036	EA	36" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	10,306.78	764.75
40 05 19 00-2037	EA	36" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	11,893.95	864.06
40 05 19 00-2038	EA	42" x 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	14,513.36	830.29
40 05 19 00-2039	EA	42" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	12,230.14	929.61
40 05 19 00-2040	EA	42" x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	18,567.51	983.24
40 05 19 00-2041	EA	48" x 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	20,720.80	1,058.72
40 05 19 00-2042	EA	48" x 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	23,169.21	1,112.35
40 05 19 00-2043	EA	48" x 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Eccentric Reducer.....	25,963.85	1,177.90

40 05 19 00-2044 Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flanges (40 05 19 00-0001)

40 05 19 00-2045	EA	4" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	175.78	51.64
40 05 19 00-2046	EA	6" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	264.19	76.28
40 05 19 00-2047	EA	8" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	386.49	90.58
40 05 19 00-2048	EA	10" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	534.76	105.67
40 05 19 00-2049	EA	12" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	692.50	123.95
40 05 19 00-2050	EA	14" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	919.73	139.04
40 05 19 00-2051	EA	16" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	1,100.00	158.90



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2052 EA 18" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	1,488.90	222.47
40 05 19 00-2053 EA 20" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	1,980.34	278.09
40 05 19 00-2054 EA 24" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	2,830.77	337.68
40 05 19 00-2055 EA 30" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	4,004.96	393.30
40 05 19 00-2056 EA 36" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	7,198.62	433.02
40 05 19 00-2057 EA 42" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	10,172.28	476.72
40 05 19 00-2058 EA 48" Flanged, Cement Lined, Bituminous Seal Coat, Ductile Iron Blind Flange	13,459.52	536.31
40 05 19 00-2059 Flanged End, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Piping <small>(40 05 19)</small>		
Note: 350 PSI rating for 2" - 24" sizes, 250 PSI rating for 30" - 48" sizes. Pipe barrels conform to ANSI/AWWA C151/A21.51. The bolt holes are aligned per ANSI/AWWA C115/A21.15. Flanged fittings conform to ANSI/AWWA C110/A21.10. Interiors shall be ceramic epoxy. Exterior shall be bituminous coating, in accordance with ANSI/AWWA C104/A21.04. See CSI section 40 05 19 00-4062 for bolts, 40 05 19 00-4077 for gaskets.		
40 05 19 00-2060 Flanged End (FxF), Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2059)</small>		
40 05 19 00-2061 4" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>		
40 05 19 00-2062 EA 4" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,094.98	227.24
For Class 52 Rating, Deduct	-82.57	
For Class 54 Rating, Add	116.73	
For Class 55 Rating, Add	175.66	
For Class 56 Rating, Add	233.85	
40 05 19 00-2063 EA 4" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,207.82	231.21
For Class 52 Rating, Deduct	-94.33	
For Class 54 Rating, Add	132.83	
For Class 55 Rating, Add	199.63	
For Class 56 Rating, Add	265.58	
40 05 19 00-2064 EA 4" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,320.68	235.18
For Class 52 Rating, Deduct	-106.08	
For Class 54 Rating, Add	148.93	
For Class 55 Rating, Add	223.60	
For Class 56 Rating, Add	297.31	
40 05 19 00-2065 EA 4" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,433.55	239.15
For Class 52 Rating, Deduct	-117.83	
For Class 54 Rating, Add	165.03	
For Class 55 Rating, Add	247.57	
For Class 56 Rating, Add	329.05	
40 05 19 00-2066 EA 4" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,546.41	243.13
For Class 52 Rating, Deduct	-129.58	
For Class 54 Rating, Add	181.13	
For Class 55 Rating, Add	271.54	
For Class 56 Rating, Add	360.78	
40 05 19 00-2067 EA 4" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,659.26	247.10
For Class 52 Rating, Deduct	-141.33	
For Class 54 Rating, Add	197.22	
For Class 55 Rating, Add	295.51	
For Class 56 Rating, Add	392.51	
40 05 19 00-2068 EA 4" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,772.12	251.07
For Class 52 Rating, Deduct	-153.09	
For Class 54 Rating, Add	213.32	
For Class 55 Rating, Add	319.48	
For Class 56 Rating, Add	424.25	
40 05 19 00-2069 EA 4" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,884.97	255.05
For Class 52 Rating, Deduct	-164.84	
For Class 54 Rating, Add	229.42	
For Class 55 Rating, Add	343.45	
For Class 56 Rating, Add	455.98	
40 05 19 00-2070 EA 4" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,997.83	259.02
For Class 52 Rating, Deduct	-176.59	
For Class 54 Rating, Add	245.52	
For Class 55 Rating, Add	367.42	
For Class 56 Rating, Add	487.72	
40 05 19 00-2071 EA 4" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,110.69	262.99
For Class 52 Rating, Deduct	-188.34	
For Class 54 Rating, Add	261.61	
For Class 55 Rating, Add	391.39	
For Class 56 Rating, Add	519.45	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-2072	EA		4" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,223.54	266.97
			<i>For Class 52 Rating, Deduct</i>	-200.10	
			<i>For Class 54 Rating, Add</i>	277.71	
			<i>For Class 55 Rating, Add</i>	415.36	
			<i>For Class 56 Rating, Add</i>	551.18	
40 05 19 00-2073	EA		4" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,336.41	270.94
			<i>For Class 52 Rating, Deduct</i>	-211.85	
			<i>For Class 54 Rating, Add</i>	293.81	
			<i>For Class 55 Rating, Add</i>	439.33	
			<i>For Class 56 Rating, Add</i>	582.92	
40 05 19 00-2074	EA		4" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,449.26	274.91
			<i>For Class 52 Rating, Deduct</i>	-223.60	
			<i>For Class 54 Rating, Add</i>	309.91	
			<i>For Class 55 Rating, Add</i>	463.30	
			<i>For Class 56 Rating, Add</i>	614.65	
40 05 19 00-2075	EA		4" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,562.12	278.88
			<i>For Class 52 Rating, Deduct</i>	-235.35	
			<i>For Class 54 Rating, Add</i>	326.01	
			<i>For Class 55 Rating, Add</i>	487.27	
			<i>For Class 56 Rating, Add</i>	646.38	
40 05 19 00-2076	EA		4" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,674.97	282.85
			<i>For Class 52 Rating, Deduct</i>	-247.10	
			<i>For Class 54 Rating, Add</i>	342.10	
			<i>For Class 55 Rating, Add</i>	511.23	
			<i>For Class 56 Rating, Add</i>	678.12	
40 05 19 00-2077	EA		4" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,787.83	286.82
			<i>For Class 52 Rating, Deduct</i>	-258.86	
			<i>For Class 54 Rating, Add</i>	358.20	
			<i>For Class 55 Rating, Add</i>	535.20	
			<i>For Class 56 Rating, Add</i>	709.85	
40 05 19 00-2078	EA		4" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,900.69	290.80
			<i>For Class 52 Rating, Deduct</i>	-270.61	
			<i>For Class 54 Rating, Add</i>	374.30	
			<i>For Class 55 Rating, Add</i>	559.17	
			<i>For Class 56 Rating, Add</i>	741.59	
40 05 19 00-2079	EA		4" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,013.54	294.78
			<i>For Class 52 Rating, Deduct</i>	-282.36	
			<i>For Class 54 Rating, Add</i>	390.40	
			<i>For Class 55 Rating, Add</i>	583.14	
			<i>For Class 56 Rating, Add</i>	773.32	
40 05 19 00-2080	EA		4" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,126.40	298.75
			<i>For Class 52 Rating, Deduct</i>	-294.11	
			<i>For Class 54 Rating, Add</i>	406.50	
			<i>For Class 55 Rating, Add</i>	607.11	
			<i>For Class 56 Rating, Add</i>	805.05	
40 05 19 00-2081	EA		4" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,239.25	302.72
			<i>For Class 52 Rating, Deduct</i>	-305.86	
			<i>For Class 54 Rating, Add</i>	422.59	
			<i>For Class 55 Rating, Add</i>	631.08	
			<i>For Class 56 Rating, Add</i>	836.79	
40 05 19 00-2082	EA		4" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,352.12	306.69
			<i>For Class 52 Rating, Deduct</i>	-317.62	
			<i>For Class 54 Rating, Add</i>	438.69	
			<i>For Class 55 Rating, Add</i>	655.05	
			<i>For Class 56 Rating, Add</i>	868.52	
40 05 19 00-2083	EA		4" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,464.98	310.66
			<i>For Class 52 Rating, Deduct</i>	-329.37	
			<i>For Class 54 Rating, Add</i>	454.79	
			<i>For Class 55 Rating, Add</i>	679.02	
			<i>For Class 56 Rating, Add</i>	900.26	
40 05 19 00-2084	EA		4" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,577.83	314.63
			<i>For Class 52 Rating, Deduct</i>	-341.12	
			<i>For Class 54 Rating, Add</i>	470.89	
			<i>For Class 55 Rating, Add</i>	702.99	
			<i>For Class 56 Rating, Add</i>	931.99	
40 05 19 00-2085	EA		4" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,690.68	318.61
			<i>For Class 52 Rating, Deduct</i>	-352.87	
			<i>For Class 54 Rating, Add</i>	486.98	
			<i>For Class 55 Rating, Add</i>	726.96	
			<i>For Class 56 Rating, Add</i>	963.72	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2086	EA			4" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,803.54	322.58
				<i>For Class 52 Rating, Deduct</i>	-364.63	
				<i>For Class 54 Rating, Add</i>	503.08	
				<i>For Class 55 Rating, Add</i>	750.93	
				<i>For Class 56 Rating, Add</i>	995.46	
40 05 19 00-2087	EA			4" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,916.40	326.56
				<i>For Class 52 Rating, Deduct</i>	-376.38	
				<i>For Class 54 Rating, Add</i>	519.18	
				<i>For Class 55 Rating, Add</i>	774.90	
				<i>For Class 56 Rating, Add</i>	1,027.19	
40 05 19 00-2088	EA			4" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,029.26	330.53
				<i>For Class 52 Rating, Deduct</i>	-388.13	
				<i>For Class 54 Rating, Add</i>	535.28	
				<i>For Class 55 Rating, Add</i>	798.87	
				<i>For Class 56 Rating, Add</i>	1,058.92	
40 05 19 00-2089	EA			4" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,142.11	334.50
				<i>For Class 52 Rating, Deduct</i>	-399.88	
				<i>For Class 54 Rating, Add</i>	551.38	
				<i>For Class 55 Rating, Add</i>	822.84	
				<i>For Class 56 Rating, Add</i>	1,090.66	
40 05 19 00-2090	EA			4" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,254.96	338.47
				<i>For Class 52 Rating, Deduct</i>	-411.63	
				<i>For Class 54 Rating, Add</i>	567.47	
				<i>For Class 55 Rating, Add</i>	846.80	
				<i>For Class 56 Rating, Add</i>	1,122.39	
40 05 19 00-2091	EA			4" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,367.83	342.44
				<i>For Class 52 Rating, Deduct</i>	-423.39	
				<i>For Class 54 Rating, Add</i>	583.57	
				<i>For Class 55 Rating, Add</i>	870.77	
				<i>For Class 56 Rating, Add</i>	1,154.13	
40 05 19 00-2092	EA			4" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,480.69	346.42
				<i>For Class 52 Rating, Deduct</i>	-435.14	
				<i>For Class 54 Rating, Add</i>	599.67	
				<i>For Class 55 Rating, Add</i>	894.74	
				<i>For Class 56 Rating, Add</i>	1,185.86	
40 05 19 00-2093	EA			4" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,593.55	350.39
				<i>For Class 52 Rating, Deduct</i>	-446.89	
				<i>For Class 54 Rating, Add</i>	615.77	
				<i>For Class 55 Rating, Add</i>	918.71	
				<i>For Class 56 Rating, Add</i>	1,217.59	
40 05 19 00-2094	EA			4" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,706.39	354.36
				<i>For Class 52 Rating, Deduct</i>	-458.64	
				<i>For Class 54 Rating, Add</i>	631.86	
				<i>For Class 55 Rating, Add</i>	942.68	
				<i>For Class 56 Rating, Add</i>	1,249.33	
40 05 19 00-2095	EA			4" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,819.25	358.33
				<i>For Class 52 Rating, Deduct</i>	-470.40	
				<i>For Class 54 Rating, Add</i>	647.96	
				<i>For Class 55 Rating, Add</i>	966.65	
				<i>For Class 56 Rating, Add</i>	1,281.06	
40 05 19 00-2096	EA			4" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,932.11	362.31
				<i>For Class 52 Rating, Deduct</i>	-482.15	
				<i>For Class 54 Rating, Add</i>	664.06	
				<i>For Class 55 Rating, Add</i>	990.62	
				<i>For Class 56 Rating, Add</i>	1,312.79	
40 05 19 00-2097	EA			4" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,044.97	366.28
				<i>For Class 52 Rating, Deduct</i>	-493.90	
				<i>For Class 54 Rating, Add</i>	680.16	
				<i>For Class 55 Rating, Add</i>	1,014.59	
				<i>For Class 56 Rating, Add</i>	1,344.53	
40 05 19 00-2098	EA			4" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,157.83	370.26
				<i>For Class 52 Rating, Deduct</i>	-505.65	
				<i>For Class 54 Rating, Add</i>	696.26	
				<i>For Class 55 Rating, Add</i>	1,038.56	
				<i>For Class 56 Rating, Add</i>	1,376.26	
40 05 19 00-2099	EA			4" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,270.68	374.23
				<i>For Class 52 Rating, Deduct</i>	-517.40	
				<i>For Class 54 Rating, Add</i>	712.35	
				<i>For Class 55 Rating, Add</i>	1,062.53	
				<i>For Class 56 Rating, Add</i>	1,408.00	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2100	EA	4" Flanged (FxF), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		5,383.54	378.20
		<i>For Class 52 Rating, Deduct</i>		-529.16	
		<i>For Class 54 Rating, Add</i>		728.45	
		<i>For Class 55 Rating, Add</i>		1,086.50	
		<i>For Class 56 Rating, Add</i>		1,439.73	
40 05 19 00-2101		6" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>			
40 05 19 00-2102	EA	6" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		1,369.62	286.03
		<i>For Class 52 Rating, Deduct</i>		-102.99	
		<i>For Class 54 Rating, Add</i>		145.64	
		<i>For Class 55 Rating, Add</i>		219.18	
		<i>For Class 56 Rating, Add</i>		291.79	
40 05 19 00-2103	EA	6" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		1,499.34	290.00
		<i>For Class 52 Rating, Deduct</i>		-116.59	
		<i>For Class 54 Rating, Add</i>		164.26	
		<i>For Class 55 Rating, Add</i>		246.91	
		<i>For Class 56 Rating, Add</i>		328.50	
40 05 19 00-2104	EA	6" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		1,629.08	293.98
		<i>For Class 52 Rating, Deduct</i>		-130.20	
		<i>For Class 54 Rating, Add</i>		182.89	
		<i>For Class 55 Rating, Add</i>		274.64	
		<i>For Class 56 Rating, Add</i>		365.21	
40 05 19 00-2105	EA	6" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		1,758.80	297.95
		<i>For Class 52 Rating, Deduct</i>		-143.81	
		<i>For Class 54 Rating, Add</i>		201.52	
		<i>For Class 55 Rating, Add</i>		302.38	
		<i>For Class 56 Rating, Add</i>		401.92	
40 05 19 00-2106	EA	6" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		1,888.52	301.92
		<i>For Class 52 Rating, Deduct</i>		-157.42	
		<i>For Class 54 Rating, Add</i>		220.15	
		<i>For Class 55 Rating, Add</i>		330.11	
		<i>For Class 56 Rating, Add</i>		438.63	
40 05 19 00-2107	EA	6" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,018.25	305.90
		<i>For Class 52 Rating, Deduct</i>		-171.02	
		<i>For Class 54 Rating, Add</i>		238.78	
		<i>For Class 55 Rating, Add</i>		357.84	
		<i>For Class 56 Rating, Add</i>		475.34	
40 05 19 00-2108	EA	6" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,147.98	309.87
		<i>For Class 52 Rating, Deduct</i>		-184.63	
		<i>For Class 54 Rating, Add</i>		257.41	
		<i>For Class 55 Rating, Add</i>		385.57	
		<i>For Class 56 Rating, Add</i>		512.05	
40 05 19 00-2109	EA	6" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,277.70	313.84
		<i>For Class 52 Rating, Deduct</i>		-198.24	
		<i>For Class 54 Rating, Add</i>		276.03	
		<i>For Class 55 Rating, Add</i>		413.30	
		<i>For Class 56 Rating, Add</i>		548.76	
40 05 19 00-2110	EA	6" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,407.42	317.82
		<i>For Class 52 Rating, Deduct</i>		-211.85	
		<i>For Class 54 Rating, Add</i>		294.66	
		<i>For Class 55 Rating, Add</i>		441.03	
		<i>For Class 56 Rating, Add</i>		585.47	
40 05 19 00-2111	EA	6" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,537.15	321.79
		<i>For Class 52 Rating, Deduct</i>		-225.46	
		<i>For Class 54 Rating, Add</i>		313.29	
		<i>For Class 55 Rating, Add</i>		468.76	
		<i>For Class 56 Rating, Add</i>		622.18	
40 05 19 00-2112	EA	6" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,666.88	325.76
		<i>For Class 52 Rating, Deduct</i>		-239.06	
		<i>For Class 54 Rating, Add</i>		331.92	
		<i>For Class 55 Rating, Add</i>		496.49	
		<i>For Class 56 Rating, Add</i>		658.89	
40 05 19 00-2113	EA	6" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		2,796.61	329.73
		<i>For Class 52 Rating, Deduct</i>		-252.67	
		<i>For Class 54 Rating, Add</i>		350.55	
		<i>For Class 55 Rating, Add</i>		524.22	
		<i>For Class 56 Rating, Add</i>		695.60	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2114 EA 6" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,926.34	333.70
<i>For Class 52 Rating, Deduct</i>	-266.28	
<i>For Class 54 Rating, Add</i>	369.18	
<i>For Class 55 Rating, Add</i>	551.96	
<i>For Class 56 Rating, Add</i>	732.31	
40 05 19 00-2115 EA 6" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,056.06	337.68
<i>For Class 52 Rating, Deduct</i>	-279.89	
<i>For Class 54 Rating, Add</i>	387.80	
<i>For Class 55 Rating, Add</i>	579.69	
<i>For Class 56 Rating, Add</i>	769.03	
40 05 19 00-2116 EA 6" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,185.78	341.65
<i>For Class 52 Rating, Deduct</i>	-293.49	
<i>For Class 54 Rating, Add</i>	406.43	
<i>For Class 55 Rating, Add</i>	607.42	
<i>For Class 56 Rating, Add</i>	805.73	
40 05 19 00-2117 EA 6" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,315.51	345.63
<i>For Class 52 Rating, Deduct</i>	-307.10	
<i>For Class 54 Rating, Add</i>	425.06	
<i>For Class 55 Rating, Add</i>	635.15	
<i>For Class 56 Rating, Add</i>	842.44	
40 05 19 00-2118 EA 6" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,445.24	349.60
<i>For Class 52 Rating, Deduct</i>	-320.71	
<i>For Class 54 Rating, Add</i>	443.69	
<i>For Class 55 Rating, Add</i>	662.88	
<i>For Class 56 Rating, Add</i>	879.16	
40 05 19 00-2119 EA 6" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,574.96	353.57
<i>For Class 52 Rating, Deduct</i>	-334.32	
<i>For Class 54 Rating, Add</i>	462.32	
<i>For Class 55 Rating, Add</i>	690.61	
<i>For Class 56 Rating, Add</i>	915.86	
40 05 19 00-2120 EA 6" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,704.69	357.54
<i>For Class 52 Rating, Deduct</i>	-347.93	
<i>For Class 54 Rating, Add</i>	480.94	
<i>For Class 55 Rating, Add</i>	718.34	
<i>For Class 56 Rating, Add</i>	952.58	
40 05 19 00-2121 EA 6" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,834.42	361.51
<i>For Class 52 Rating, Deduct</i>	-361.53	
<i>For Class 54 Rating, Add</i>	499.57	
<i>For Class 55 Rating, Add</i>	746.07	
<i>For Class 56 Rating, Add</i>	989.29	
40 05 19 00-2122 EA 6" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,964.14	365.48
<i>For Class 52 Rating, Deduct</i>	-375.14	
<i>For Class 54 Rating, Add</i>	518.20	
<i>For Class 55 Rating, Add</i>	773.80	
<i>For Class 56 Rating, Add</i>	1,025.99	
40 05 19 00-2123 EA 6" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,093.87	369.46
<i>For Class 52 Rating, Deduct</i>	-388.75	
<i>For Class 54 Rating, Add</i>	536.83	
<i>For Class 55 Rating, Add</i>	801.53	
<i>For Class 56 Rating, Add</i>	1,062.71	
40 05 19 00-2124 EA 6" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,223.60	373.44
<i>For Class 52 Rating, Deduct</i>	-402.36	
<i>For Class 54 Rating, Add</i>	555.46	
<i>For Class 55 Rating, Add</i>	829.27	
<i>For Class 56 Rating, Add</i>	1,099.42	
40 05 19 00-2125 EA 6" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,353.32	377.41
<i>For Class 52 Rating, Deduct</i>	-415.96	
<i>For Class 54 Rating, Add</i>	574.09	
<i>For Class 55 Rating, Add</i>	857.00	
<i>For Class 56 Rating, Add</i>	1,136.13	
40 05 19 00-2126 EA 6" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,483.04	381.38
<i>For Class 52 Rating, Deduct</i>	-429.57	
<i>For Class 54 Rating, Add</i>	592.71	
<i>For Class 55 Rating, Add</i>	884.73	
<i>For Class 56 Rating, Add</i>	1,172.84	
40 05 19 00-2127 EA 6" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,612.77	385.35
<i>For Class 52 Rating, Deduct</i>	-443.18	
<i>For Class 54 Rating, Add</i>	611.34	
<i>For Class 55 Rating, Add</i>	912.46	
<i>For Class 56 Rating, Add</i>	1,209.55	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-2128	EA	6" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,742.50	389.32
		<i>For Class 52 Rating, Deduct</i>	-456.79	
		<i>For Class 54 Rating, Add</i>	629.97	
		<i>For Class 55 Rating, Add</i>	940.19	
		<i>For Class 56 Rating, Add</i>	1,246.26	
40 05 19 00-2129	EA	6" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,872.23	393.30
		<i>For Class 52 Rating, Deduct</i>	-470.40	
		<i>For Class 54 Rating, Add</i>	648.60	
		<i>For Class 55 Rating, Add</i>	967.92	
		<i>For Class 56 Rating, Add</i>	1,282.97	
40 05 19 00-2130	EA	6" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,001.96	397.27
		<i>For Class 52 Rating, Deduct</i>	-484.00	
		<i>For Class 54 Rating, Add</i>	667.23	
		<i>For Class 55 Rating, Add</i>	995.65	
		<i>For Class 56 Rating, Add</i>	1,319.68	
40 05 19 00-2131	EA	6" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,131.68	401.24
		<i>For Class 52 Rating, Deduct</i>	-497.61	
		<i>For Class 54 Rating, Add</i>	685.86	
		<i>For Class 55 Rating, Add</i>	1,023.38	
		<i>For Class 56 Rating, Add</i>	1,356.39	
40 05 19 00-2132	EA	6" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,261.40	405.21
		<i>For Class 52 Rating, Deduct</i>	-511.22	
		<i>For Class 54 Rating, Add</i>	704.48	
		<i>For Class 55 Rating, Add</i>	1,051.11	
		<i>For Class 56 Rating, Add</i>	1,393.10	
40 05 19 00-2133	EA	6" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,391.13	409.19
		<i>For Class 52 Rating, Deduct</i>	-524.83	
		<i>For Class 54 Rating, Add</i>	723.11	
		<i>For Class 55 Rating, Add</i>	1,078.85	
		<i>For Class 56 Rating, Add</i>	1,429.81	
40 05 19 00-2134	EA	6" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,520.86	413.16
		<i>For Class 52 Rating, Deduct</i>	-538.43	
		<i>For Class 54 Rating, Add</i>	741.74	
		<i>For Class 55 Rating, Add</i>	1,106.58	
		<i>For Class 56 Rating, Add</i>	1,466.52	
40 05 19 00-2135	EA	6" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,650.58	417.13
		<i>For Class 52 Rating, Deduct</i>	-552.04	
		<i>For Class 54 Rating, Add</i>	760.37	
		<i>For Class 55 Rating, Add</i>	1,134.31	
		<i>For Class 56 Rating, Add</i>	1,503.23	
40 05 19 00-2136	EA	6" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,780.30	421.11
		<i>For Class 52 Rating, Deduct</i>	-565.65	
		<i>For Class 54 Rating, Add</i>	779.00	
		<i>For Class 55 Rating, Add</i>	1,162.04	
		<i>For Class 56 Rating, Add</i>	1,539.94	
40 05 19 00-2137	EA	6" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,910.03	425.08
		<i>For Class 52 Rating, Deduct</i>	-579.26	
		<i>For Class 54 Rating, Add</i>	797.63	
		<i>For Class 55 Rating, Add</i>	1,189.77	
		<i>For Class 56 Rating, Add</i>	1,576.65	
40 05 19 00-2138	EA	6" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,039.76	429.05
		<i>For Class 52 Rating, Deduct</i>	-592.86	
		<i>For Class 54 Rating, Add</i>	816.25	
		<i>For Class 55 Rating, Add</i>	1,217.50	
		<i>For Class 56 Rating, Add</i>	1,613.36	
40 05 19 00-2139	EA	6" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,169.49	433.02
		<i>For Class 52 Rating, Deduct</i>	-606.47	
		<i>For Class 54 Rating, Add</i>	834.88	
		<i>For Class 55 Rating, Add</i>	1,245.23	
		<i>For Class 56 Rating, Add</i>	1,650.07	
40 05 19 00-2140	EA	6" Flanged (FxF), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,299.22	436.99
		<i>For Class 52 Rating, Deduct</i>	-620.08	
		<i>For Class 54 Rating, Add</i>	853.51	
		<i>For Class 55 Rating, Add</i>	1,272.96	
		<i>For Class 56 Rating, Add</i>	1,686.78	

40 05 19 00-2141 8" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-2060)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2142 EA 8" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,906.11	365.48
<i>For Class 52 Rating, Deduct</i>	-148.76	
<i>For Class 54 Rating, Add</i>	209.50	
<i>For Class 55 Rating, Add</i>	314.86	
<i>For Class 56 Rating, Add</i>	418.88	
40 05 19 00-2143 EA 8" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,072.39	369.46
<i>For Class 52 Rating, Deduct</i>	-166.39	
<i>For Class 54 Rating, Add</i>	233.61	
<i>For Class 55 Rating, Add</i>	350.74	
<i>For Class 56 Rating, Add</i>	466.37	
40 05 19 00-2144 EA 8" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,238.66	373.44
<i>For Class 52 Rating, Deduct</i>	-184.01	
<i>For Class 54 Rating, Add</i>	257.72	
<i>For Class 55 Rating, Add</i>	386.62	
<i>For Class 56 Rating, Add</i>	513.86	
40 05 19 00-2145 EA 8" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,404.94	377.41
<i>For Class 52 Rating, Deduct</i>	-201.64	
<i>For Class 54 Rating, Add</i>	281.83	
<i>For Class 55 Rating, Add</i>	422.51	
<i>For Class 56 Rating, Add</i>	561.35	
40 05 19 00-2146 EA 8" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,571.21	381.38
<i>For Class 52 Rating, Deduct</i>	-219.27	
<i>For Class 54 Rating, Add</i>	305.94	
<i>For Class 55 Rating, Add</i>	458.39	
<i>For Class 56 Rating, Add</i>	608.85	
40 05 19 00-2147 EA 8" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,737.48	385.35
<i>For Class 52 Rating, Deduct</i>	-236.90	
<i>For Class 54 Rating, Add</i>	330.05	
<i>For Class 55 Rating, Add</i>	494.27	
<i>For Class 56 Rating, Add</i>	656.34	
40 05 19 00-2148 EA 8" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,903.76	389.32
<i>For Class 52 Rating, Deduct</i>	-254.53	
<i>For Class 54 Rating, Add</i>	354.16	
<i>For Class 55 Rating, Add</i>	530.15	
<i>For Class 56 Rating, Add</i>	703.83	
40 05 19 00-2149 EA 8" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,070.05	393.30
<i>For Class 52 Rating, Deduct</i>	-272.16	
<i>For Class 54 Rating, Add</i>	378.27	
<i>For Class 55 Rating, Add</i>	566.04	
<i>For Class 56 Rating, Add</i>	751.32	
40 05 19 00-2150 EA 8" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,236.32	397.27
<i>For Class 52 Rating, Deduct</i>	-289.78	
<i>For Class 54 Rating, Add</i>	402.38	
<i>For Class 55 Rating, Add</i>	601.92	
<i>For Class 56 Rating, Add</i>	798.81	
40 05 19 00-2151 EA 8" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,402.59	401.24
<i>For Class 52 Rating, Deduct</i>	-307.41	
<i>For Class 54 Rating, Add</i>	426.49	
<i>For Class 55 Rating, Add</i>	637.80	
<i>For Class 56 Rating, Add</i>	846.31	
40 05 19 00-2152 EA 8" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,568.87	405.21
<i>For Class 52 Rating, Deduct</i>	-325.04	
<i>For Class 54 Rating, Add</i>	450.60	
<i>For Class 55 Rating, Add</i>	673.68	
<i>For Class 56 Rating, Add</i>	893.80	
40 05 19 00-2153 EA 8" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,735.14	409.19
<i>For Class 52 Rating, Deduct</i>	-342.67	
<i>For Class 54 Rating, Add</i>	474.71	
<i>For Class 55 Rating, Add</i>	709.56	
<i>For Class 56 Rating, Add</i>	941.29	
40 05 19 00-2154 EA 8" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,901.42	413.16
<i>For Class 52 Rating, Deduct</i>	-360.30	
<i>For Class 54 Rating, Add</i>	498.83	
<i>For Class 55 Rating, Add</i>	745.44	
<i>For Class 56 Rating, Add</i>	988.78	
40 05 19 00-2155 EA 8" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,067.70	417.13
<i>For Class 52 Rating, Deduct</i>	-377.92	
<i>For Class 54 Rating, Add</i>	522.94	
<i>For Class 55 Rating, Add</i>	781.33	
<i>For Class 56 Rating, Add</i>	1,036.28	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2156	EA	8" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,233.96	421.11
		<i>For Class 52 Rating, Deduct</i>	-395.55	
		<i>For Class 54 Rating, Add</i>	547.05	
		<i>For Class 55 Rating, Add</i>	817.21	
		<i>For Class 56 Rating, Add</i>	1,083.77	
40 05 19 00-2157	EA	8" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,400.24	425.08
		<i>For Class 52 Rating, Deduct</i>	-413.18	
		<i>For Class 54 Rating, Add</i>	571.16	
		<i>For Class 55 Rating, Add</i>	853.09	
		<i>For Class 56 Rating, Add</i>	1,131.26	
40 05 19 00-2158	EA	8" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,566.53	429.05
		<i>For Class 52 Rating, Deduct</i>	-430.81	
		<i>For Class 54 Rating, Add</i>	595.27	
		<i>For Class 55 Rating, Add</i>	888.97	
		<i>For Class 56 Rating, Add</i>	1,178.76	
40 05 19 00-2159	EA	8" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,732.80	433.02
		<i>For Class 52 Rating, Deduct</i>	-448.44	
		<i>For Class 54 Rating, Add</i>	619.38	
		<i>For Class 55 Rating, Add</i>	924.85	
		<i>For Class 56 Rating, Add</i>	1,226.25	
40 05 19 00-2160	EA	8" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,899.08	436.99
		<i>For Class 52 Rating, Deduct</i>	-466.07	
		<i>For Class 54 Rating, Add</i>	643.49	
		<i>For Class 55 Rating, Add</i>	960.73	
		<i>For Class 56 Rating, Add</i>	1,273.74	
40 05 19 00-2161	EA	8" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,065.35	440.96
		<i>For Class 52 Rating, Deduct</i>	-483.69	
		<i>For Class 54 Rating, Add</i>	667.60	
		<i>For Class 55 Rating, Add</i>	996.62	
		<i>For Class 56 Rating, Add</i>	1,321.23	
40 05 19 00-2162	EA	8" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,231.62	444.95
		<i>For Class 52 Rating, Deduct</i>	-501.32	
		<i>For Class 54 Rating, Add</i>	691.71	
		<i>For Class 55 Rating, Add</i>	1,032.50	
		<i>For Class 56 Rating, Add</i>	1,368.72	
40 05 19 00-2163	EA	8" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,397.90	448.92
		<i>For Class 52 Rating, Deduct</i>	-518.95	
		<i>For Class 54 Rating, Add</i>	715.82	
		<i>For Class 55 Rating, Add</i>	1,068.38	
		<i>For Class 56 Rating, Add</i>	1,416.22	
40 05 19 00-2164	EA	8" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,564.18	452.89
		<i>For Class 52 Rating, Deduct</i>	-536.58	
		<i>For Class 54 Rating, Add</i>	739.93	
		<i>For Class 55 Rating, Add</i>	1,104.26	
		<i>For Class 56 Rating, Add</i>	1,463.71	
40 05 19 00-2165	EA	8" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,730.45	456.86
		<i>For Class 52 Rating, Deduct</i>	-554.21	
		<i>For Class 54 Rating, Add</i>	764.04	
		<i>For Class 55 Rating, Add</i>	1,140.14	
		<i>For Class 56 Rating, Add</i>	1,511.20	
40 05 19 00-2166	EA	8" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,896.72	460.83
		<i>For Class 52 Rating, Deduct</i>	-571.84	
		<i>For Class 54 Rating, Add</i>	788.15	
		<i>For Class 55 Rating, Add</i>	1,176.02	
		<i>For Class 56 Rating, Add</i>	1,558.69	
40 05 19 00-2167	EA	8" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,063.01	464.80
		<i>For Class 52 Rating, Deduct</i>	-589.46	
		<i>For Class 54 Rating, Add</i>	812.27	
		<i>For Class 55 Rating, Add</i>	1,211.91	
		<i>For Class 56 Rating, Add</i>	1,606.19	
40 05 19 00-2168	EA	8" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,229.28	468.77
		<i>For Class 52 Rating, Deduct</i>	-607.09	
		<i>For Class 54 Rating, Add</i>	836.37	
		<i>For Class 55 Rating, Add</i>	1,247.79	
		<i>For Class 56 Rating, Add</i>	1,653.68	
40 05 19 00-2169	EA	8" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,395.56	472.75
		<i>For Class 52 Rating, Deduct</i>	-624.72	
		<i>For Class 54 Rating, Add</i>	860.49	
		<i>For Class 55 Rating, Add</i>	1,283.67	
		<i>For Class 56 Rating, Add</i>	1,701.17	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2170 EA 8" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,561.84	476.72
For Class 52 Rating, Deduct	-642.35	
For Class 54 Rating, Add	884.60	
For Class 55 Rating, Add	1,319.55	
For Class 56 Rating, Add	1,748.66	
40 05 19 00-2171 EA 8" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,728.10	480.70
For Class 52 Rating, Deduct	-659.98	
For Class 54 Rating, Add	908.71	
For Class 55 Rating, Add	1,355.43	
For Class 56 Rating, Add	1,796.15	
40 05 19 00-2172 EA 8" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,894.38	484.67
For Class 52 Rating, Deduct	-677.60	
For Class 54 Rating, Add	932.82	
For Class 55 Rating, Add	1,391.31	
For Class 56 Rating, Add	1,843.65	
40 05 19 00-2173 EA 8" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,060.66	488.64
For Class 52 Rating, Deduct	-695.23	
For Class 54 Rating, Add	956.93	
For Class 55 Rating, Add	1,427.20	
For Class 56 Rating, Add	1,891.14	
40 05 19 00-2174 EA 8" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,226.93	492.61
For Class 52 Rating, Deduct	-712.86	
For Class 54 Rating, Add	981.04	
For Class 55 Rating, Add	1,463.08	
For Class 56 Rating, Add	1,938.63	
40 05 19 00-2175 EA 8" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,393.22	496.59
For Class 52 Rating, Deduct	-730.49	
For Class 54 Rating, Add	1,005.15	
For Class 55 Rating, Add	1,498.96	
For Class 56 Rating, Add	1,986.13	
40 05 19 00-2176 EA 8" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,559.50	500.56
For Class 52 Rating, Deduct	-748.12	
For Class 54 Rating, Add	1,029.26	
For Class 55 Rating, Add	1,534.84	
For Class 56 Rating, Add	2,033.62	
40 05 19 00-2177 EA 8" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,725.76	504.53
For Class 52 Rating, Deduct	-765.75	
For Class 54 Rating, Add	1,053.37	
For Class 55 Rating, Add	1,570.72	
For Class 56 Rating, Add	2,081.11	
40 05 19 00-2178 EA 8" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,892.04	508.50
For Class 52 Rating, Deduct	-783.37	
For Class 54 Rating, Add	1,077.48	
For Class 55 Rating, Add	1,606.60	
For Class 56 Rating, Add	2,128.60	
40 05 19 00-2179 EA 8" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,058.32	512.47
For Class 52 Rating, Deduct	-801.00	
For Class 54 Rating, Add	1,101.59	
For Class 55 Rating, Add	1,642.49	
For Class 56 Rating, Add	2,176.10	
40 05 19 00-2180 EA 8" Flanged (FxF), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,224.59	516.45
For Class 52 Rating, Deduct	-818.63	
For Class 54 Rating, Add	1,125.70	
For Class 55 Rating, Add	1,678.37	
For Class 56 Rating, Add	2,223.59	
40 05 19 00-2181 10" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>		
40 05 19 00-2182 EA 10" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,406.05	444.95
For Class 52 Rating, Deduct	-190.51	
For Class 54 Rating, Add	267.87	
For Class 55 Rating, Add	402.39	
For Class 56 Rating, Add	535.18	
40 05 19 00-2183 EA 10" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,620.12	448.92
For Class 52 Rating, Deduct	-213.39	
For Class 54 Rating, Add	299.15	
For Class 55 Rating, Add	448.93	
For Class 56 Rating, Add	596.77	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-2184	EA		10" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,834.19	452.89
			<i>For Class 52 Rating, Deduct</i>	-236.28	
			<i>For Class 54 Rating, Add</i>	330.43	
			<i>For Class 55 Rating, Add</i>	495.47	
			<i>For Class 56 Rating, Add</i>	658.36	
40 05 19 00-2185	EA		10" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,048.26	456.86
			<i>For Class 52 Rating, Deduct</i>	-259.17	
			<i>For Class 54 Rating, Add</i>	361.71	
			<i>For Class 55 Rating, Add</i>	542.01	
			<i>For Class 56 Rating, Add</i>	719.95	
40 05 19 00-2186	EA		10" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,262.33	460.83
			<i>For Class 52 Rating, Deduct</i>	-282.05	
			<i>For Class 54 Rating, Add</i>	393.00	
			<i>For Class 55 Rating, Add</i>	588.55	
			<i>For Class 56 Rating, Add</i>	781.55	
40 05 19 00-2187	EA		10" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,476.41	464.80
			<i>For Class 52 Rating, Deduct</i>	-304.94	
			<i>For Class 54 Rating, Add</i>	424.28	
			<i>For Class 55 Rating, Add</i>	635.09	
			<i>For Class 56 Rating, Add</i>	843.14	
40 05 19 00-2188	EA		10" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,690.48	468.77
			<i>For Class 52 Rating, Deduct</i>	-327.82	
			<i>For Class 54 Rating, Add</i>	455.55	
			<i>For Class 55 Rating, Add</i>	681.63	
			<i>For Class 56 Rating, Add</i>	904.73	
40 05 19 00-2189	EA		10" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,904.55	472.75
			<i>For Class 52 Rating, Deduct</i>	-350.71	
			<i>For Class 54 Rating, Add</i>	486.83	
			<i>For Class 55 Rating, Add</i>	728.17	
			<i>For Class 56 Rating, Add</i>	966.32	
40 05 19 00-2190	EA		10" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,118.63	476.72
			<i>For Class 52 Rating, Deduct</i>	-373.60	
			<i>For Class 54 Rating, Add</i>	518.12	
			<i>For Class 55 Rating, Add</i>	774.71	
			<i>For Class 56 Rating, Add</i>	1,027.92	
40 05 19 00-2191	EA		10" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,332.69	480.70
			<i>For Class 52 Rating, Deduct</i>	-396.48	
			<i>For Class 54 Rating, Add</i>	549.40	
			<i>For Class 55 Rating, Add</i>	821.25	
			<i>For Class 56 Rating, Add</i>	1,089.51	
40 05 19 00-2192	EA		10" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,546.76	484.67
			<i>For Class 52 Rating, Deduct</i>	-419.37	
			<i>For Class 54 Rating, Add</i>	580.68	
			<i>For Class 55 Rating, Add</i>	867.79	
			<i>For Class 56 Rating, Add</i>	1,151.10	
40 05 19 00-2193	EA		10" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,760.83	488.64
			<i>For Class 52 Rating, Deduct</i>	-442.25	
			<i>For Class 54 Rating, Add</i>	611.95	
			<i>For Class 55 Rating, Add</i>	914.33	
			<i>For Class 56 Rating, Add</i>	1,212.69	
40 05 19 00-2194	EA		10" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,974.91	492.61
			<i>For Class 52 Rating, Deduct</i>	-465.14	
			<i>For Class 54 Rating, Add</i>	643.24	
			<i>For Class 55 Rating, Add</i>	960.88	
			<i>For Class 56 Rating, Add</i>	1,274.29	
40 05 19 00-2195	EA		10" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,188.99	496.59
			<i>For Class 52 Rating, Deduct</i>	-488.02	
			<i>For Class 54 Rating, Add</i>	674.52	
			<i>For Class 55 Rating, Add</i>	1,007.42	
			<i>For Class 56 Rating, Add</i>	1,335.88	
40 05 19 00-2196	EA		10" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,403.06	500.56
			<i>For Class 52 Rating, Deduct</i>	-510.91	
			<i>For Class 54 Rating, Add</i>	705.80	
			<i>For Class 55 Rating, Add</i>	1,053.95	
			<i>For Class 56 Rating, Add</i>	1,397.47	
40 05 19 00-2197	EA		10" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,617.12	504.53
			<i>For Class 52 Rating, Deduct</i>	-533.79	
			<i>For Class 54 Rating, Add</i>	737.08	
			<i>For Class 55 Rating, Add</i>	1,100.49	
			<i>For Class 56 Rating, Add</i>	1,459.06	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2198 EA 10" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,831.20	508.50
<i>For Class 52 Rating, Deduct</i>	-556.68	
<i>For Class 54 Rating, Add</i>	768.36	
<i>For Class 55 Rating, Add</i>	1,147.04	
<i>For Class 56 Rating, Add</i>	1,520.65	
40 05 19 00-2199 EA 10" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,045.27	512.47
<i>For Class 52 Rating, Deduct</i>	-579.57	
<i>For Class 54 Rating, Add</i>	799.64	
<i>For Class 55 Rating, Add</i>	1,193.58	
<i>For Class 56 Rating, Add</i>	1,582.25	
40 05 19 00-2200 EA 10" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,259.34	516.45
<i>For Class 52 Rating, Deduct</i>	-602.45	
<i>For Class 54 Rating, Add</i>	830.92	
<i>For Class 55 Rating, Add</i>	1,240.12	
<i>For Class 56 Rating, Add</i>	1,643.84	
40 05 19 00-2201 EA 10" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,473.41	520.43
<i>For Class 52 Rating, Deduct</i>	-625.34	
<i>For Class 54 Rating, Add</i>	862.20	
<i>For Class 55 Rating, Add</i>	1,286.65	
<i>For Class 56 Rating, Add</i>	1,705.43	
40 05 19 00-2202 EA 10" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,687.48	524.40
<i>For Class 52 Rating, Deduct</i>	-648.22	
<i>For Class 54 Rating, Add</i>	893.48	
<i>For Class 55 Rating, Add</i>	1,333.20	
<i>For Class 56 Rating, Add</i>	1,767.02	
40 05 19 00-2203 EA 10" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,901.55	528.37
<i>For Class 52 Rating, Deduct</i>	-671.11	
<i>For Class 54 Rating, Add</i>	924.76	
<i>For Class 55 Rating, Add</i>	1,379.74	
<i>For Class 56 Rating, Add</i>	1,828.61	
40 05 19 00-2204 EA 10" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,115.63	532.34
<i>For Class 52 Rating, Deduct</i>	-694.00	
<i>For Class 54 Rating, Add</i>	956.04	
<i>For Class 55 Rating, Add</i>	1,426.28	
<i>For Class 56 Rating, Add</i>	1,890.21	
40 05 19 00-2205 EA 10" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,329.70	536.31
<i>For Class 52 Rating, Deduct</i>	-716.88	
<i>For Class 54 Rating, Add</i>	987.32	
<i>For Class 55 Rating, Add</i>	1,472.82	
<i>For Class 56 Rating, Add</i>	1,951.80	
40 05 19 00-2206 EA 10" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,543.78	540.28
<i>For Class 52 Rating, Deduct</i>	-739.77	
<i>For Class 54 Rating, Add</i>	1,018.60	
<i>For Class 55 Rating, Add</i>	1,519.36	
<i>For Class 56 Rating, Add</i>	2,013.39	
40 05 19 00-2207 EA 10" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,757.84	544.25
<i>For Class 52 Rating, Deduct</i>	-762.65	
<i>For Class 54 Rating, Add</i>	1,049.88	
<i>For Class 55 Rating, Add</i>	1,565.90	
<i>For Class 56 Rating, Add</i>	2,074.98	
40 05 19 00-2208 EA 10" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,971.91	548.23
<i>For Class 52 Rating, Deduct</i>	-785.54	
<i>For Class 54 Rating, Add</i>	1,081.16	
<i>For Class 55 Rating, Add</i>	1,612.44	
<i>For Class 56 Rating, Add</i>	2,136.58	
40 05 19 00-2209 EA 10" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,185.98	552.21
<i>For Class 52 Rating, Deduct</i>	-808.42	
<i>For Class 54 Rating, Add</i>	1,112.44	
<i>For Class 55 Rating, Add</i>	1,658.98	
<i>For Class 56 Rating, Add</i>	2,198.17	
40 05 19 00-2210 EA 10" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,400.06	556.18
<i>For Class 52 Rating, Deduct</i>	-831.31	
<i>For Class 54 Rating, Add</i>	1,143.72	
<i>For Class 55 Rating, Add</i>	1,705.52	
<i>For Class 56 Rating, Add</i>	2,259.76	
40 05 19 00-2211 EA 10" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,614.13	560.15
<i>For Class 52 Rating, Deduct</i>	-854.20	
<i>For Class 54 Rating, Add</i>	1,175.00	
<i>For Class 55 Rating, Add</i>	1,752.06	
<i>For Class 56 Rating, Add</i>	2,321.35	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
40 05 19 00-2212	EA	10" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,828.19		564.12
		<i>For Class 52 Rating, Deduct</i>	-877.08		
		<i>For Class 54 Rating, Add</i>	1,206.28		
		<i>For Class 55 Rating, Add</i>	1,798.60		
		<i>For Class 56 Rating, Add</i>	2,382.94		
40 05 19 00-2213	EA	10" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,042.27		568.09
		<i>For Class 52 Rating, Deduct</i>	-899.97		
		<i>For Class 54 Rating, Add</i>	1,237.56		
		<i>For Class 55 Rating, Add</i>	1,845.14		
		<i>For Class 56 Rating, Add</i>	2,444.54		
40 05 19 00-2214	EA	10" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,256.35		572.07
		<i>For Class 52 Rating, Deduct</i>	-922.85		
		<i>For Class 54 Rating, Add</i>	1,268.84		
		<i>For Class 55 Rating, Add</i>	1,891.68		
		<i>For Class 56 Rating, Add</i>	2,506.13		
40 05 19 00-2215	EA	10" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,470.42		576.04
		<i>For Class 52 Rating, Deduct</i>	-945.74		
		<i>For Class 54 Rating, Add</i>	1,300.12		
		<i>For Class 55 Rating, Add</i>	1,938.22		
		<i>For Class 56 Rating, Add</i>	2,567.72		
40 05 19 00-2216	EA	10" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,684.49		580.01
		<i>For Class 52 Rating, Deduct</i>	-968.62		
		<i>For Class 54 Rating, Add</i>	1,331.40		
		<i>For Class 55 Rating, Add</i>	1,984.76		
		<i>For Class 56 Rating, Add</i>	2,629.31		
40 05 19 00-2217	EA	10" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,898.55		583.98
		<i>For Class 52 Rating, Deduct</i>	-991.51		
		<i>For Class 54 Rating, Add</i>	1,362.68		
		<i>For Class 55 Rating, Add</i>	2,031.30		
		<i>For Class 56 Rating, Add</i>	2,690.90		
40 05 19 00-2218	EA	10" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,112.63		587.96
		<i>For Class 52 Rating, Deduct</i>	-1,014.40		
		<i>For Class 54 Rating, Add</i>	1,393.96		
		<i>For Class 55 Rating, Add</i>	2,077.84		
		<i>For Class 56 Rating, Add</i>	2,752.50		
40 05 19 00-2219	EA	10" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,326.70		591.93
		<i>For Class 52 Rating, Deduct</i>	-1,037.28		
		<i>For Class 54 Rating, Add</i>	1,425.24		
		<i>For Class 55 Rating, Add</i>	2,124.38		
		<i>For Class 56 Rating, Add</i>	2,814.09		
40 05 19 00-2220	EA	10" Flanged (FxF), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,540.77		595.91
		<i>For Class 52 Rating, Deduct</i>	-1,060.17		
		<i>For Class 54 Rating, Add</i>	1,456.52		
		<i>For Class 55 Rating, Add</i>	2,170.92		
		<i>For Class 56 Rating, Add</i>	2,875.68		
40 05 19 00-2221		12" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>			
40 05 19 00-2222	EA	12" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,148.14		556.18
		<i>For Class 52 Rating, Deduct</i>	-253.60		
		<i>For Class 54 Rating, Add</i>	355.93		
		<i>For Class 55 Rating, Add</i>	534.34		
		<i>For Class 56 Rating, Add</i>	710.44		
40 05 19 00-2223	EA	12" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,412.82		560.15
		<i>For Class 52 Rating, Deduct</i>	-282.05		
		<i>For Class 54 Rating, Add</i>	394.80		
		<i>For Class 55 Rating, Add</i>	592.17		
		<i>For Class 56 Rating, Add</i>	786.97		
40 05 19 00-2224	EA	12" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,677.49		564.12
		<i>For Class 52 Rating, Deduct</i>	-310.50		
		<i>For Class 54 Rating, Add</i>	433.67		
		<i>For Class 55 Rating, Add</i>	649.99		
		<i>For Class 56 Rating, Add</i>	863.49		
40 05 19 00-2225	EA	12" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,942.18		568.09
		<i>For Class 52 Rating, Deduct</i>	-338.96		
		<i>For Class 54 Rating, Add</i>	472.54		
		<i>For Class 55 Rating, Add</i>	707.82		
		<i>For Class 56 Rating, Add</i>	940.01		



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2226	EA			12" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,206.86	572.07
				<i>For Class 52 Rating, Deduct</i>	-367.41	
				<i>For Class 54 Rating, Add</i>	511.41	
				<i>For Class 55 Rating, Add</i>	765.64	
				<i>For Class 56 Rating, Add</i>	1,016.53	
40 05 19 00-2227	EA			12" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,471.54	576.04
				<i>For Class 52 Rating, Deduct</i>	-395.86	
				<i>For Class 54 Rating, Add</i>	550.29	
				<i>For Class 55 Rating, Add</i>	823.47	
				<i>For Class 56 Rating, Add</i>	1,093.05	
40 05 19 00-2228	EA			12" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,736.22	580.01
				<i>For Class 52 Rating, Deduct</i>	-424.32	
				<i>For Class 54 Rating, Add</i>	589.16	
				<i>For Class 55 Rating, Add</i>	881.29	
				<i>For Class 56 Rating, Add</i>	1,169.57	
40 05 19 00-2229	EA			12" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,000.89	583.98
				<i>For Class 52 Rating, Deduct</i>	-452.77	
				<i>For Class 54 Rating, Add</i>	628.03	
				<i>For Class 55 Rating, Add</i>	939.12	
				<i>For Class 56 Rating, Add</i>	1,246.09	
40 05 19 00-2230	EA			12" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,265.57	587.96
				<i>For Class 52 Rating, Deduct</i>	-481.22	
				<i>For Class 54 Rating, Add</i>	666.90	
				<i>For Class 55 Rating, Add</i>	996.94	
				<i>For Class 56 Rating, Add</i>	1,322.62	
40 05 19 00-2231	EA			12" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,530.24	591.93
				<i>For Class 52 Rating, Deduct</i>	-509.67	
				<i>For Class 54 Rating, Add</i>	705.77	
				<i>For Class 55 Rating, Add</i>	1,054.77	
				<i>For Class 56 Rating, Add</i>	1,399.13	
40 05 19 00-2232	EA			12" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,794.92	595.91
				<i>For Class 52 Rating, Deduct</i>	-538.12	
				<i>For Class 54 Rating, Add</i>	744.64	
				<i>For Class 55 Rating, Add</i>	1,112.59	
				<i>For Class 56 Rating, Add</i>	1,475.66	
40 05 19 00-2233	EA			12" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,059.61	599.88
				<i>For Class 52 Rating, Deduct</i>	-566.58	
				<i>For Class 54 Rating, Add</i>	783.51	
				<i>For Class 55 Rating, Add</i>	1,170.42	
				<i>For Class 56 Rating, Add</i>	1,552.18	
40 05 19 00-2234	EA			12" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,324.28	603.85
				<i>For Class 52 Rating, Deduct</i>	-595.03	
				<i>For Class 54 Rating, Add</i>	822.38	
				<i>For Class 55 Rating, Add</i>	1,228.25	
				<i>For Class 56 Rating, Add</i>	1,628.70	
40 05 19 00-2235	EA			12" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,588.96	607.82
				<i>For Class 52 Rating, Deduct</i>	-623.48	
				<i>For Class 54 Rating, Add</i>	861.25	
				<i>For Class 55 Rating, Add</i>	1,286.07	
				<i>For Class 56 Rating, Add</i>	1,705.22	
40 05 19 00-2236	EA			12" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,853.64	611.79
				<i>For Class 52 Rating, Deduct</i>	-651.93	
				<i>For Class 54 Rating, Add</i>	900.13	
				<i>For Class 55 Rating, Add</i>	1,343.90	
				<i>For Class 56 Rating, Add</i>	1,781.74	
40 05 19 00-2237	EA			12" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,118.32	615.76
				<i>For Class 52 Rating, Deduct</i>	-680.39	
				<i>For Class 54 Rating, Add</i>	939.00	
				<i>For Class 55 Rating, Add</i>	1,401.72	
				<i>For Class 56 Rating, Add</i>	1,858.26	
40 05 19 00-2238	EA			12" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,383.00	619.73
				<i>For Class 52 Rating, Deduct</i>	-708.84	
				<i>For Class 54 Rating, Add</i>	977.87	
				<i>For Class 55 Rating, Add</i>	1,459.55	
				<i>For Class 56 Rating, Add</i>	1,934.78	
40 05 19 00-2239	EA			12" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,647.68	623.72
				<i>For Class 52 Rating, Deduct</i>	-737.29	
				<i>For Class 54 Rating, Add</i>	1,016.74	
				<i>For Class 55 Rating, Add</i>	1,517.37	
				<i>For Class 56 Rating, Add</i>	2,011.31	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2240	EA	12" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,912.35		627.69
		<i>For Class 52 Rating, Deduct</i>	-765.75		
		<i>For Class 54 Rating, Add</i>	1,055.61		
		<i>For Class 55 Rating, Add</i>	1,575.20		
		<i>For Class 56 Rating, Add</i>	2,087.83		
40 05 19 00-2241	EA	12" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,177.03		631.66
		<i>For Class 52 Rating, Deduct</i>	-794.20		
		<i>For Class 54 Rating, Add</i>	1,094.48		
		<i>For Class 55 Rating, Add</i>	1,633.02		
		<i>For Class 56 Rating, Add</i>	2,164.35		
40 05 19 00-2242	EA	12" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,441.72		635.63
		<i>For Class 52 Rating, Deduct</i>	-822.65		
		<i>For Class 54 Rating, Add</i>	1,133.35		
		<i>For Class 55 Rating, Add</i>	1,690.85		
		<i>For Class 56 Rating, Add</i>	2,240.87		
40 05 19 00-2243	EA	12" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,706.40		639.60
		<i>For Class 52 Rating, Deduct</i>	-851.10		
		<i>For Class 54 Rating, Add</i>	1,172.22		
		<i>For Class 55 Rating, Add</i>	1,748.68		
		<i>For Class 56 Rating, Add</i>	2,317.39		
40 05 19 00-2244	EA	12" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,971.08		643.57
		<i>For Class 52 Rating, Deduct</i>	-879.56		
		<i>For Class 54 Rating, Add</i>	1,211.10		
		<i>For Class 55 Rating, Add</i>	1,806.50		
		<i>For Class 56 Rating, Add</i>	2,393.91		
40 05 19 00-2245	EA	12" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,235.75		647.55
		<i>For Class 52 Rating, Deduct</i>	-908.01		
		<i>For Class 54 Rating, Add</i>	1,249.97		
		<i>For Class 55 Rating, Add</i>	1,864.33		
		<i>For Class 56 Rating, Add</i>	2,470.43		
40 05 19 00-2246	EA	12" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,497.62		651.52
		<i>For Class 52 Rating, Deduct</i>	-936.15		
		<i>For Class 54 Rating, Add</i>	1,288.42		
		<i>For Class 55 Rating, Add</i>	1,921.53		
		<i>For Class 56 Rating, Add</i>	2,546.13		
40 05 19 00-2247	EA	12" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,765.11		655.49
		<i>For Class 52 Rating, Deduct</i>	-964.91		
		<i>For Class 54 Rating, Add</i>	1,327.71		
		<i>For Class 55 Rating, Add</i>	1,979.98		
		<i>For Class 56 Rating, Add</i>	2,623.48		
40 05 19 00-2248	EA	12" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,029.79		659.47
		<i>For Class 52 Rating, Deduct</i>	-993.37		
		<i>For Class 54 Rating, Add</i>	1,366.58		
		<i>For Class 55 Rating, Add</i>	2,037.80		
		<i>For Class 56 Rating, Add</i>	2,700.00		
40 05 19 00-2249	EA	12" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,294.47		663.44
		<i>For Class 52 Rating, Deduct</i>	-1,021.82		
		<i>For Class 54 Rating, Add</i>	1,405.45		
		<i>For Class 55 Rating, Add</i>	2,095.63		
		<i>For Class 56 Rating, Add</i>	2,776.52		
40 05 19 00-2250	EA	12" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,559.15		667.41
		<i>For Class 52 Rating, Deduct</i>	-1,050.27		
		<i>For Class 54 Rating, Add</i>	1,444.32		
		<i>For Class 55 Rating, Add</i>	2,153.46		
		<i>For Class 56 Rating, Add</i>	2,853.04		
40 05 19 00-2251	EA	12" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,823.83		671.38
		<i>For Class 52 Rating, Deduct</i>	-1,078.72		
		<i>For Class 54 Rating, Add</i>	1,483.19		
		<i>For Class 55 Rating, Add</i>	2,211.28		
		<i>For Class 56 Rating, Add</i>	2,929.56		
40 05 19 00-2252	EA	12" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,088.51		675.36
		<i>For Class 52 Rating, Deduct</i>	-1,107.18		
		<i>For Class 54 Rating, Add</i>	1,522.07		
		<i>For Class 55 Rating, Add</i>	2,269.11		
		<i>For Class 56 Rating, Add</i>	3,006.08		
40 05 19 00-2253	EA	12" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,353.19		679.33
		<i>For Class 52 Rating, Deduct</i>	-1,135.63		
		<i>For Class 54 Rating, Add</i>	1,560.94		
		<i>For Class 55 Rating, Add</i>	2,326.93		
		<i>For Class 56 Rating, Add</i>	3,082.60		



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2254 EA 12" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,617.87	683.30
For Class 52 Rating, Deduct	-1,164.08	
For Class 54 Rating, Add	1,599.81	
For Class 55 Rating, Add	2,384.76	
For Class 56 Rating, Add	3,159.13	
40 05 19 00-2255 EA 12" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,882.54	687.27
For Class 52 Rating, Deduct	-1,192.53	
For Class 54 Rating, Add	1,638.68	
For Class 55 Rating, Add	2,442.58	
For Class 56 Rating, Add	3,235.65	
40 05 19 00-2256 EA 12" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,147.22	691.24
For Class 52 Rating, Deduct	-1,220.99	
For Class 54 Rating, Add	1,677.55	
For Class 55 Rating, Add	2,500.41	
For Class 56 Rating, Add	3,312.17	
40 05 19 00-2257 EA 12" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,411.90	695.22
For Class 52 Rating, Deduct	-1,249.44	
For Class 54 Rating, Add	1,716.42	
For Class 55 Rating, Add	2,558.24	
For Class 56 Rating, Add	3,388.69	
40 05 19 00-2258 EA 12" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,676.58	699.20
For Class 52 Rating, Deduct	-1,277.89	
For Class 54 Rating, Add	1,755.29	
For Class 55 Rating, Add	2,616.06	
For Class 56 Rating, Add	3,465.21	
40 05 19 00-2259 EA 12" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,941.27	703.17
For Class 52 Rating, Deduct	-1,306.34	
For Class 54 Rating, Add	1,794.16	
For Class 55 Rating, Add	2,673.89	
For Class 56 Rating, Add	3,541.73	
40 05 19 00-2260 EA 12" Flanged (FxF), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,205.94	707.14
For Class 52 Rating, Deduct	-1,334.80	
For Class 54 Rating, Add	1,833.04	
For Class 55 Rating, Add	2,731.71	
For Class 56 Rating, Add	3,618.25	
40 05 19 00-2261 14" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		
<small>(40 05 19 00-2060)</small>		
40 05 19 00-2262 EA 14" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,219.17	667.41
For Class 52 Rating, Deduct	-352.87	
For Class 54 Rating, Add	493.33	
For Class 55 Rating, Add	739.64	
For Class 56 Rating, Add	982.75	
40 05 19 00-2263 EA 14" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,540.08	671.38
For Class 52 Rating, Deduct	-387.51	
For Class 54 Rating, Add	540.63	
For Class 55 Rating, Add	810.01	
For Class 56 Rating, Add	1,075.86	
40 05 19 00-2264 EA 14" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,860.99	675.36
For Class 52 Rating, Deduct	-422.15	
For Class 54 Rating, Add	587.94	
For Class 55 Rating, Add	880.37	
For Class 56 Rating, Add	1,168.97	
40 05 19 00-2265 EA 14" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,181.91	679.33
For Class 52 Rating, Deduct	-456.79	
For Class 54 Rating, Add	635.24	
For Class 55 Rating, Add	950.74	
For Class 56 Rating, Add	1,262.08	
40 05 19 00-2266 EA 14" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,502.82	683.30
For Class 52 Rating, Deduct	-491.43	
For Class 54 Rating, Add	682.55	
For Class 55 Rating, Add	1,021.10	
For Class 56 Rating, Add	1,355.19	
40 05 19 00-2267 EA 14" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,823.72	687.27
For Class 52 Rating, Deduct	-526.06	
For Class 54 Rating, Add	729.86	
For Class 55 Rating, Add	1,091.47	
For Class 56 Rating, Add	1,448.30	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2268	EA	14" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,144.63	691.24
		<i>For Class 52 Rating, Deduct</i>	-560.70	
		<i>For Class 54 Rating, Add</i>	777.16	
		<i>For Class 55 Rating, Add</i>	1,161.83	
		<i>For Class 56 Rating, Add</i>	1,541.40	
40 05 19 00-2269	EA	14" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,465.54	695.22
		<i>For Class 52 Rating, Deduct</i>	-595.34	
		<i>For Class 54 Rating, Add</i>	824.47	
		<i>For Class 55 Rating, Add</i>	1,232.20	
		<i>For Class 56 Rating, Add</i>	1,634.51	
40 05 19 00-2270	EA	14" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,786.45	699.20
		<i>For Class 52 Rating, Deduct</i>	-629.98	
		<i>For Class 54 Rating, Add</i>	871.77	
		<i>For Class 55 Rating, Add</i>	1,302.56	
		<i>For Class 56 Rating, Add</i>	1,727.62	
40 05 19 00-2271	EA	14" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,107.37	703.17
		<i>For Class 52 Rating, Deduct</i>	-664.62	
		<i>For Class 54 Rating, Add</i>	919.08	
		<i>For Class 55 Rating, Add</i>	1,372.93	
		<i>For Class 56 Rating, Add</i>	1,820.73	
40 05 19 00-2272	EA	14" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,428.27	707.14
		<i>For Class 52 Rating, Deduct</i>	-699.25	
		<i>For Class 54 Rating, Add</i>	966.38	
		<i>For Class 55 Rating, Add</i>	1,443.29	
		<i>For Class 56 Rating, Add</i>	1,913.84	
40 05 19 00-2273	EA	14" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,749.18	711.11
		<i>For Class 52 Rating, Deduct</i>	-733.89	
		<i>For Class 54 Rating, Add</i>	1,013.69	
		<i>For Class 55 Rating, Add</i>	1,513.66	
		<i>For Class 56 Rating, Add</i>	2,006.95	
40 05 19 00-2274	EA	14" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,070.09	715.08
		<i>For Class 52 Rating, Deduct</i>	-768.53	
		<i>For Class 54 Rating, Add</i>	1,061.00	
		<i>For Class 55 Rating, Add</i>	1,584.02	
		<i>For Class 56 Rating, Add</i>	2,100.06	
40 05 19 00-2275	EA	14" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,391.00	719.05
		<i>For Class 52 Rating, Deduct</i>	-803.17	
		<i>For Class 54 Rating, Add</i>	1,108.30	
		<i>For Class 55 Rating, Add</i>	1,654.39	
		<i>For Class 56 Rating, Add</i>	2,193.17	
40 05 19 00-2276	EA	14" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,711.91	723.03
		<i>For Class 52 Rating, Deduct</i>	-837.81	
		<i>For Class 54 Rating, Add</i>	1,155.61	
		<i>For Class 55 Rating, Add</i>	1,724.75	
		<i>For Class 56 Rating, Add</i>	2,286.28	
40 05 19 00-2277	EA	14" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,032.81	727.00
		<i>For Class 52 Rating, Deduct</i>	-872.44	
		<i>For Class 54 Rating, Add</i>	1,202.91	
		<i>For Class 55 Rating, Add</i>	1,795.12	
		<i>For Class 56 Rating, Add</i>	2,379.39	
40 05 19 00-2278	EA	14" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,353.72	730.98
		<i>For Class 52 Rating, Deduct</i>	-907.08	
		<i>For Class 54 Rating, Add</i>	1,250.22	
		<i>For Class 55 Rating, Add</i>	1,865.48	
		<i>For Class 56 Rating, Add</i>	2,472.50	
40 05 19 00-2279	EA	14" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,674.63	734.95
		<i>For Class 52 Rating, Deduct</i>	-941.72	
		<i>For Class 54 Rating, Add</i>	1,297.52	
		<i>For Class 55 Rating, Add</i>	1,935.85	
		<i>For Class 56 Rating, Add</i>	2,565.61	
40 05 19 00-2280	EA	14" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,995.55	738.92
		<i>For Class 52 Rating, Deduct</i>	-976.36	
		<i>For Class 54 Rating, Add</i>	1,344.83	
		<i>For Class 55 Rating, Add</i>	2,006.21	
		<i>For Class 56 Rating, Add</i>	2,658.72	
40 05 19 00-2281	EA	14" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,316.46	742.89
		<i>For Class 52 Rating, Deduct</i>	-1,010.99	
		<i>For Class 54 Rating, Add</i>	1,392.14	
		<i>For Class 55 Rating, Add</i>	2,076.58	
		<i>For Class 56 Rating, Add</i>	2,751.83	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2282 EA 14" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,637.36	746.86
<i>For Class 52 Rating, Deduct</i>	-1,045.63	
<i>For Class 54 Rating, Add</i>	1,439.44	
<i>For Class 55 Rating, Add</i>	2,146.94	
<i>For Class 56 Rating, Add</i>	2,844.93	
40 05 19 00-2283 EA 14" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,958.27	750.84
<i>For Class 52 Rating, Deduct</i>	-1,080.27	
<i>For Class 54 Rating, Add</i>	1,486.75	
<i>For Class 55 Rating, Add</i>	2,217.31	
<i>For Class 56 Rating, Add</i>	2,938.04	
40 05 19 00-2284 EA 14" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,279.18	754.81
<i>For Class 52 Rating, Deduct</i>	-1,114.91	
<i>For Class 54 Rating, Add</i>	1,534.05	
<i>For Class 55 Rating, Add</i>	2,287.67	
<i>For Class 56 Rating, Add</i>	3,031.15	
40 05 19 00-2285 EA 14" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,600.09	758.78
<i>For Class 52 Rating, Deduct</i>	-1,149.55	
<i>For Class 54 Rating, Add</i>	1,581.36	
<i>For Class 55 Rating, Add</i>	2,358.04	
<i>For Class 56 Rating, Add</i>	3,124.26	
40 05 19 00-2286 EA 14" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,921.00	762.75
<i>For Class 52 Rating, Deduct</i>	-1,184.18	
<i>For Class 54 Rating, Add</i>	1,628.66	
<i>For Class 55 Rating, Add</i>	2,428.40	
<i>For Class 56 Rating, Add</i>	3,217.37	
40 05 19 00-2287 EA 14" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,241.90	766.73
<i>For Class 52 Rating, Deduct</i>	-1,218.82	
<i>For Class 54 Rating, Add</i>	1,675.97	
<i>For Class 55 Rating, Add</i>	2,498.77	
<i>For Class 56 Rating, Add</i>	3,310.48	
40 05 19 00-2288 EA 14" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,562.82	770.70
<i>For Class 52 Rating, Deduct</i>	-1,253.46	
<i>For Class 54 Rating, Add</i>	1,723.28	
<i>For Class 55 Rating, Add</i>	2,569.13	
<i>For Class 56 Rating, Add</i>	3,403.59	
40 05 19 00-2289 EA 14" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,883.73	774.68
<i>For Class 52 Rating, Deduct</i>	-1,288.10	
<i>For Class 54 Rating, Add</i>	1,770.58	
<i>For Class 55 Rating, Add</i>	2,639.50	
<i>For Class 56 Rating, Add</i>	3,496.70	
40 05 19 00-2290 EA 14" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,204.64	778.65
<i>For Class 52 Rating, Deduct</i>	-1,322.74	
<i>For Class 54 Rating, Add</i>	1,817.89	
<i>For Class 55 Rating, Add</i>	2,709.86	
<i>For Class 56 Rating, Add</i>	3,589.81	
40 05 19 00-2291 EA 14" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,525.55	782.62
<i>For Class 52 Rating, Deduct</i>	-1,357.37	
<i>For Class 54 Rating, Add</i>	1,865.19	
<i>For Class 55 Rating, Add</i>	2,780.23	
<i>For Class 56 Rating, Add</i>	3,682.92	
40 05 19 00-2292 EA 14" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,846.46	786.59
<i>For Class 52 Rating, Deduct</i>	-1,392.01	
<i>For Class 54 Rating, Add</i>	1,912.50	
<i>For Class 55 Rating, Add</i>	2,850.59	
<i>For Class 56 Rating, Add</i>	3,776.03	
40 05 19 00-2293 EA 14" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,167.36	790.56
<i>For Class 52 Rating, Deduct</i>	-1,426.65	
<i>For Class 54 Rating, Add</i>	1,959.80	
<i>For Class 55 Rating, Add</i>	2,920.96	
<i>For Class 56 Rating, Add</i>	3,869.14	
40 05 19 00-2294 EA 14" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,488.27	794.53
<i>For Class 52 Rating, Deduct</i>	-1,461.29	
<i>For Class 54 Rating, Add</i>	2,007.11	
<i>For Class 55 Rating, Add</i>	2,991.32	
<i>For Class 56 Rating, Add</i>	3,962.25	
40 05 19 00-2295 EA 14" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,809.18	798.50
<i>For Class 52 Rating, Deduct</i>	-1,495.93	
<i>For Class 54 Rating, Add</i>	2,054.42	
<i>For Class 55 Rating, Add</i>	3,061.69	
<i>For Class 56 Rating, Add</i>	4,055.35	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2296	EA	14" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,130.09	802.49
		<i>For Class 52 Rating, Deduct</i>	-1,530.56	
		<i>For Class 54 Rating, Add</i>	2,101.72	
		<i>For Class 55 Rating, Add</i>	3,132.05	
		<i>For Class 56 Rating, Add</i>	4,148.46	
40 05 19 00-2297	EA	14" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,451.01	806.46
		<i>For Class 52 Rating, Deduct</i>	-1,565.20	
		<i>For Class 54 Rating, Add</i>	2,149.03	
		<i>For Class 55 Rating, Add</i>	3,202.42	
		<i>For Class 56 Rating, Add</i>	4,241.57	
40 05 19 00-2298	EA	14" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,771.91	810.43
		<i>For Class 52 Rating, Deduct</i>	-1,599.84	
		<i>For Class 54 Rating, Add</i>	2,196.33	
		<i>For Class 55 Rating, Add</i>	3,272.78	
		<i>For Class 56 Rating, Add</i>	4,334.68	
40 05 19 00-2299	EA	14" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,092.82	814.40
		<i>For Class 52 Rating, Deduct</i>	-1,634.48	
		<i>For Class 54 Rating, Add</i>	2,243.64	
		<i>For Class 55 Rating, Add</i>	3,343.14	
		<i>For Class 56 Rating, Add</i>	4,427.79	
40 05 19 00-2300 16" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-2060)				
40 05 19 00-2301	EA	16" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,951.24	762.75
		<i>For Class 52 Rating, Deduct</i>	-417.51	
		<i>For Class 54 Rating, Add</i>	583.20	
		<i>For Class 55 Rating, Add</i>	874.14	
		<i>For Class 56 Rating, Add</i>	1,161.29	
40 05 19 00-2302	EA	16" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,322.75	766.73
		<i>For Class 52 Rating, Deduct</i>	-457.72	
		<i>For Class 54 Rating, Add</i>	638.10	
		<i>For Class 55 Rating, Add</i>	955.79	
		<i>For Class 56 Rating, Add</i>	1,269.33	
40 05 19 00-2303	EA	16" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,694.28	770.70
		<i>For Class 52 Rating, Deduct</i>	-497.92	
		<i>For Class 54 Rating, Add</i>	693.00	
		<i>For Class 55 Rating, Add</i>	1,037.45	
		<i>For Class 56 Rating, Add</i>	1,377.37	
40 05 19 00-2304	EA	16" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,065.79	774.68
		<i>For Class 52 Rating, Deduct</i>	-538.12	
		<i>For Class 54 Rating, Add</i>	747.89	
		<i>For Class 55 Rating, Add</i>	1,119.09	
		<i>For Class 56 Rating, Add</i>	1,485.41	
40 05 19 00-2305	EA	16" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,437.31	778.65
		<i>For Class 52 Rating, Deduct</i>	-578.33	
		<i>For Class 54 Rating, Add</i>	802.79	
		<i>For Class 55 Rating, Add</i>	1,200.75	
		<i>For Class 56 Rating, Add</i>	1,593.45	
40 05 19 00-2306	EA	16" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,808.83	782.62
		<i>For Class 52 Rating, Deduct</i>	-618.53	
		<i>For Class 54 Rating, Add</i>	857.69	
		<i>For Class 55 Rating, Add</i>	1,282.40	
		<i>For Class 56 Rating, Add</i>	1,701.49	
40 05 19 00-2307	EA	16" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,180.35	786.59
		<i>For Class 52 Rating, Deduct</i>	-658.74	
		<i>For Class 54 Rating, Add</i>	912.58	
		<i>For Class 55 Rating, Add</i>	1,364.05	
		<i>For Class 56 Rating, Add</i>	1,809.52	
40 05 19 00-2308	EA	16" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,551.86	790.56
		<i>For Class 52 Rating, Deduct</i>	-698.94	
		<i>For Class 54 Rating, Add</i>	967.48	
		<i>For Class 55 Rating, Add</i>	1,445.70	
		<i>For Class 56 Rating, Add</i>	1,917.56	
40 05 19 00-2309	EA	16" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,923.37	794.53
		<i>For Class 52 Rating, Deduct</i>	-739.15	
		<i>For Class 54 Rating, Add</i>	1,022.38	
		<i>For Class 55 Rating, Add</i>	1,527.35	
		<i>For Class 56 Rating, Add</i>	2,025.60	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2310 EA 16" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,294.89	798.50
<i>For Class 52 Rating, Deduct</i>	-779.35	
<i>For Class 54 Rating, Add</i>	1,077.27	
<i>For Class 55 Rating, Add</i>	1,609.00	
<i>For Class 56 Rating, Add</i>	2,133.64	
40 05 19 00-2311 EA 16" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,666.41	802.49
<i>For Class 52 Rating, Deduct</i>	-819.56	
<i>For Class 54 Rating, Add</i>	1,132.17	
<i>For Class 55 Rating, Add</i>	1,690.65	
<i>For Class 56 Rating, Add</i>	2,241.68	
40 05 19 00-2312 EA 16" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,037.94	806.46
<i>For Class 52 Rating, Deduct</i>	-859.76	
<i>For Class 54 Rating, Add</i>	1,187.07	
<i>For Class 55 Rating, Add</i>	1,772.30	
<i>For Class 56 Rating, Add</i>	2,349.72	
40 05 19 00-2313 EA 16" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,409.44	810.43
<i>For Class 52 Rating, Deduct</i>	-899.97	
<i>For Class 54 Rating, Add</i>	1,241.96	
<i>For Class 55 Rating, Add</i>	1,853.95	
<i>For Class 56 Rating, Add</i>	2,457.75	
40 05 19 00-2314 EA 16" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,780.96	814.40
<i>For Class 52 Rating, Deduct</i>	-940.17	
<i>For Class 54 Rating, Add</i>	1,296.86	
<i>For Class 55 Rating, Add</i>	1,935.60	
<i>For Class 56 Rating, Add</i>	2,565.79	
40 05 19 00-2315 EA 16" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,152.48	818.37
<i>For Class 52 Rating, Deduct</i>	-980.38	
<i>For Class 54 Rating, Add</i>	1,351.76	
<i>For Class 55 Rating, Add</i>	2,017.25	
<i>For Class 56 Rating, Add</i>	2,673.83	
40 05 19 00-2316 EA 16" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,524.00	822.34
<i>For Class 52 Rating, Deduct</i>	-1,020.58	
<i>For Class 54 Rating, Add</i>	1,406.65	
<i>For Class 55 Rating, Add</i>	2,098.90	
<i>For Class 56 Rating, Add</i>	2,781.87	
40 05 19 00-2317 EA 16" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,895.51	826.32
<i>For Class 52 Rating, Deduct</i>	-1,060.79	
<i>For Class 54 Rating, Add</i>	1,461.55	
<i>For Class 55 Rating, Add</i>	2,180.55	
<i>For Class 56 Rating, Add</i>	2,889.91	
40 05 19 00-2318 EA 16" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,267.02	830.29
<i>For Class 52 Rating, Deduct</i>	-1,100.99	
<i>For Class 54 Rating, Add</i>	1,516.45	
<i>For Class 55 Rating, Add</i>	2,262.20	
<i>For Class 56 Rating, Add</i>	2,997.95	
40 05 19 00-2319 EA 16" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,638.54	834.26
<i>For Class 52 Rating, Deduct</i>	-1,141.20	
<i>For Class 54 Rating, Add</i>	1,571.34	
<i>For Class 55 Rating, Add</i>	2,343.85	
<i>For Class 56 Rating, Add</i>	3,105.99	
40 05 19 00-2320 EA 16" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,010.06	838.24
<i>For Class 52 Rating, Deduct</i>	-1,181.40	
<i>For Class 54 Rating, Add</i>	1,626.24	
<i>For Class 55 Rating, Add</i>	2,425.50	
<i>For Class 56 Rating, Add</i>	3,214.02	
40 05 19 00-2321 EA 16" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,381.58	842.21
<i>For Class 52 Rating, Deduct</i>	-1,221.61	
<i>For Class 54 Rating, Add</i>	1,681.14	
<i>For Class 55 Rating, Add</i>	2,507.15	
<i>For Class 56 Rating, Add</i>	3,322.06	
40 05 19 00-2322 EA 16" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,753.10	846.18
<i>For Class 52 Rating, Deduct</i>	-1,261.81	
<i>For Class 54 Rating, Add</i>	1,736.04	
<i>For Class 55 Rating, Add</i>	2,588.80	
<i>For Class 56 Rating, Add</i>	3,430.10	
40 05 19 00-2323 EA 16" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,124.61	850.16
<i>For Class 52 Rating, Deduct</i>	-1,302.02	
<i>For Class 54 Rating, Add</i>	1,790.93	
<i>For Class 55 Rating, Add</i>	2,670.45	
<i>For Class 56 Rating, Add</i>	3,538.14	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2324	EA	16" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,496.13		854.13
		<i>For Class 52 Rating, Deduct</i>	-1,342.22		
		<i>For Class 54 Rating, Add</i>	1,845.83		
		<i>For Class 55 Rating, Add</i>	2,752.11		
		<i>For Class 56 Rating, Add</i>	3,646.18		
40 05 19 00-2325	EA	16" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,867.64		858.10
		<i>For Class 52 Rating, Deduct</i>	-1,362.42		
		<i>For Class 54 Rating, Add</i>	1,900.73		
		<i>For Class 55 Rating, Add</i>	2,833.75		
		<i>For Class 56 Rating, Add</i>	3,754.21		
40 05 19 00-2326	EA	16" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,239.16		862.07
		<i>For Class 52 Rating, Deduct</i>	-1,422.63		
		<i>For Class 54 Rating, Add</i>	1,955.62		
		<i>For Class 55 Rating, Add</i>	2,915.40		
		<i>For Class 56 Rating, Add</i>	3,862.25		
40 05 19 00-2327	EA	16" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,610.68		866.04
		<i>For Class 52 Rating, Deduct</i>	-1,462.83		
		<i>For Class 54 Rating, Add</i>	2,010.52		
		<i>For Class 55 Rating, Add</i>	2,997.06		
		<i>For Class 56 Rating, Add</i>	3,970.29		
40 05 19 00-2328	EA	16" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,982.19		870.01
		<i>For Class 52 Rating, Deduct</i>	-1,503.04		
		<i>For Class 54 Rating, Add</i>	2,065.42		
		<i>For Class 55 Rating, Add</i>	3,078.71		
		<i>For Class 56 Rating, Add</i>	4,078.33		
40 05 19 00-2329	EA	16" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,353.71		873.99
		<i>For Class 52 Rating, Deduct</i>	-1,543.24		
		<i>For Class 54 Rating, Add</i>	2,120.31		
		<i>For Class 55 Rating, Add</i>	3,160.36		
		<i>For Class 56 Rating, Add</i>	4,186.37		
40 05 19 00-2330	EA	16" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,725.23		877.97
		<i>For Class 52 Rating, Deduct</i>	-1,583.45		
		<i>For Class 54 Rating, Add</i>	2,175.21		
		<i>For Class 55 Rating, Add</i>	3,242.01		
		<i>For Class 56 Rating, Add</i>	4,294.41		
40 05 19 00-2331	EA	16" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,096.75		881.94
		<i>For Class 52 Rating, Deduct</i>	-1,623.65		
		<i>For Class 54 Rating, Add</i>	2,230.11		
		<i>For Class 55 Rating, Add</i>	3,323.66		
		<i>For Class 56 Rating, Add</i>	4,402.45		
40 05 19 00-2332	EA	16" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,468.27		885.91
		<i>For Class 52 Rating, Deduct</i>	-1,663.86		
		<i>For Class 54 Rating, Add</i>	2,285.00		
		<i>For Class 55 Rating, Add</i>	3,405.31		
		<i>For Class 56 Rating, Add</i>	4,510.49		
40 05 19 00-2333	EA	16" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,839.78		889.88
		<i>For Class 52 Rating, Deduct</i>	-1,704.06		
		<i>For Class 54 Rating, Add</i>	2,339.90		
		<i>For Class 55 Rating, Add</i>	3,486.96		
		<i>For Class 56 Rating, Add</i>	4,618.53		
40 05 19 00-2334	EA	16" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,211.29		893.85
		<i>For Class 52 Rating, Deduct</i>	-1,744.27		
		<i>For Class 54 Rating, Add</i>	2,394.80		
		<i>For Class 55 Rating, Add</i>	3,568.61		
		<i>For Class 56 Rating, Add</i>	4,726.56		
40 05 19 00-2335	EA	16" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,582.81		897.82
		<i>For Class 52 Rating, Deduct</i>	-1,784.47		
		<i>For Class 54 Rating, Add</i>	2,449.69		
		<i>For Class 55 Rating, Add</i>	3,650.26		
		<i>For Class 56 Rating, Add</i>	4,834.60		
40 05 19 00-2336	EA	16" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,954.33		901.80
		<i>For Class 52 Rating, Deduct</i>	-1,824.68		
		<i>For Class 54 Rating, Add</i>	2,504.59		
		<i>For Class 55 Rating, Add</i>	3,731.91		
		<i>For Class 56 Rating, Add</i>	4,942.64		
40 05 19 00-2337	EA	16" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,325.85		905.77
		<i>For Class 52 Rating, Deduct</i>	-1,864.88		
		<i>For Class 54 Rating, Add</i>	2,559.49		
		<i>For Class 55 Rating, Add</i>	3,813.56		
		<i>For Class 56 Rating, Add</i>	5,050.68		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2338 EA 16" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,697.37	909.75
For Class 52 Rating, Deduct	-1,905.09	
For Class 54 Rating, Add	2,614.38	
For Class 55 Rating, Add	3,895.21	
For Class 56 Rating, Add	5,158.72	
40 05 19 00-2339 18" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		
(40 05 19 00-2060)		
40 05 19 00-2340 EA 18" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,772.88	859.69
For Class 52 Rating, Deduct	-491.74	
For Class 54 Rating, Add	686.18	
For Class 55 Rating, Add	1,028.14	
For Class 56 Rating, Add	1,365.64	
40 05 19 00-2341 EA 18" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,200.61	863.66
For Class 52 Rating, Deduct	-538.12	
For Class 54 Rating, Add	749.51	
For Class 55 Rating, Add	1,122.33	
For Class 56 Rating, Add	1,490.26	
40 05 19 00-2342 EA 18" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,628.37	867.63
For Class 52 Rating, Deduct	-584.51	
For Class 54 Rating, Add	812.84	
For Class 55 Rating, Add	1,216.52	
For Class 56 Rating, Add	1,614.89	
40 05 19 00-2343 EA 18" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,056.12	871.60
For Class 52 Rating, Deduct	-630.91	
For Class 54 Rating, Add	876.17	
For Class 55 Rating, Add	1,310.71	
For Class 56 Rating, Add	1,739.51	
40 05 19 00-2344 EA 18" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,483.87	875.58
For Class 52 Rating, Deduct	-677.30	
For Class 54 Rating, Add	939.50	
For Class 55 Rating, Add	1,404.90	
For Class 56 Rating, Add	1,864.14	
40 05 19 00-2345 EA 18" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,911.62	879.56
For Class 52 Rating, Deduct	-723.69	
For Class 54 Rating, Add	1,002.84	
For Class 55 Rating, Add	1,499.09	
For Class 56 Rating, Add	1,988.77	
40 05 19 00-2346 EA 18" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,339.35	883.53
For Class 52 Rating, Deduct	-770.07	
For Class 54 Rating, Add	1,066.17	
For Class 55 Rating, Add	1,593.28	
For Class 56 Rating, Add	2,113.39	
40 05 19 00-2347 EA 18" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,767.10	887.50
For Class 52 Rating, Deduct	-816.47	
For Class 54 Rating, Add	1,129.50	
For Class 55 Rating, Add	1,687.47	
For Class 56 Rating, Add	2,238.02	
40 05 19 00-2348 EA 18" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,194.85	891.47
For Class 52 Rating, Deduct	-862.86	
For Class 54 Rating, Add	1,192.83	
For Class 55 Rating, Add	1,781.66	
For Class 56 Rating, Add	2,362.65	
40 05 19 00-2349 EA 18" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,622.60	895.44
For Class 52 Rating, Deduct	-909.25	
For Class 54 Rating, Add	1,256.16	
For Class 55 Rating, Add	1,875.85	
For Class 56 Rating, Add	2,487.27	
40 05 19 00-2350 EA 18" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,050.35	899.41
For Class 52 Rating, Deduct	-955.64	
For Class 54 Rating, Add	1,319.49	
For Class 55 Rating, Add	1,970.04	
For Class 56 Rating, Add	2,611.90	
40 05 19 00-2351 EA 18" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,478.09	903.39
For Class 52 Rating, Deduct	-1,002.03	
For Class 54 Rating, Add	1,382.82	
For Class 55 Rating, Add	2,064.23	
For Class 56 Rating, Add	2,736.53	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
40 05 19 00-2352	EA	18" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,905.84		907.36
		<i>For Class 52 Rating, Deduct</i>	-1,048.42		
		<i>For Class 54 Rating, Add</i>	1,446.15		
		<i>For Class 55 Rating, Add</i>	2,158.42		
		<i>For Class 56 Rating, Add</i>	2,861.15		
40 05 19 00-2353	EA	18" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,333.59		911.33
		<i>For Class 52 Rating, Deduct</i>	-1,094.81		
		<i>For Class 54 Rating, Add</i>	1,509.49		
		<i>For Class 55 Rating, Add</i>	2,252.61		
		<i>For Class 56 Rating, Add</i>	2,985.78		
40 05 19 00-2354	EA	18" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,761.34		915.31
		<i>For Class 52 Rating, Deduct</i>	-1,141.20		
		<i>For Class 54 Rating, Add</i>	1,572.82		
		<i>For Class 55 Rating, Add</i>	2,346.80		
		<i>For Class 56 Rating, Add</i>	3,110.41		
40 05 19 00-2355	EA	18" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,189.09		919.28
		<i>For Class 52 Rating, Deduct</i>	-1,187.59		
		<i>For Class 54 Rating, Add</i>	1,636.15		
		<i>For Class 55 Rating, Add</i>	2,440.99		
		<i>For Class 56 Rating, Add</i>	3,235.03		
40 05 19 00-2356	EA	18" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,616.82		923.25
		<i>For Class 52 Rating, Deduct</i>	-1,233.98		
		<i>For Class 54 Rating, Add</i>	1,699.48		
		<i>For Class 55 Rating, Add</i>	2,535.18		
		<i>For Class 56 Rating, Add</i>	3,359.66		
40 05 19 00-2357	EA	18" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,044.57		927.23
		<i>For Class 52 Rating, Deduct</i>	-1,280.37		
		<i>For Class 54 Rating, Add</i>	1,762.81		
		<i>For Class 55 Rating, Add</i>	2,629.37		
		<i>For Class 56 Rating, Add</i>	3,484.28		
40 05 19 00-2358	EA	18" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,472.32		931.20
		<i>For Class 52 Rating, Deduct</i>	-1,326.76		
		<i>For Class 54 Rating, Add</i>	1,826.14		
		<i>For Class 55 Rating, Add</i>	2,723.56		
		<i>For Class 56 Rating, Add</i>	3,608.91		
40 05 19 00-2359	EA	18" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,900.08		935.17
		<i>For Class 52 Rating, Deduct</i>	-1,373.15		
		<i>For Class 54 Rating, Add</i>	1,889.48		
		<i>For Class 55 Rating, Add</i>	2,817.75		
		<i>For Class 56 Rating, Add</i>	3,733.54		
40 05 19 00-2360	EA	18" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,327.83		939.14
		<i>For Class 52 Rating, Deduct</i>	-1,419.54		
		<i>For Class 54 Rating, Add</i>	1,952.81		
		<i>For Class 55 Rating, Add</i>	2,911.94		
		<i>For Class 56 Rating, Add</i>	3,858.17		
40 05 19 00-2361	EA	18" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,755.56		943.11
		<i>For Class 52 Rating, Deduct</i>	-1,465.93		
		<i>For Class 54 Rating, Add</i>	2,016.14		
		<i>For Class 55 Rating, Add</i>	3,006.13		
		<i>For Class 56 Rating, Add</i>	3,982.79		
40 05 19 00-2362	EA	18" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,183.31		947.08
		<i>For Class 52 Rating, Deduct</i>	-1,512.32		
		<i>For Class 54 Rating, Add</i>	2,079.47		
		<i>For Class 55 Rating, Add</i>	3,100.32		
		<i>For Class 56 Rating, Add</i>	4,107.42		
40 05 19 00-2363	EA	18" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,611.06		951.06
		<i>For Class 52 Rating, Deduct</i>	-1,558.71		
		<i>For Class 54 Rating, Add</i>	2,142.80		
		<i>For Class 55 Rating, Add</i>	3,194.51		
		<i>For Class 56 Rating, Add</i>	4,232.04		
40 05 19 00-2364	EA	18" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,038.81		955.04
		<i>For Class 52 Rating, Deduct</i>	-1,605.10		
		<i>For Class 54 Rating, Add</i>	2,206.13		
		<i>For Class 55 Rating, Add</i>	3,288.70		
		<i>For Class 56 Rating, Add</i>	4,356.67		
40 05 19 00-2365	EA	18" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,466.56		959.01
		<i>For Class 52 Rating, Deduct</i>	-1,651.49		
		<i>For Class 54 Rating, Add</i>	2,269.46		
		<i>For Class 55 Rating, Add</i>	3,382.89		
		<i>For Class 56 Rating, Add</i>	4,481.30		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2366 EA 18" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,894.30	962.98
<i>For Class 52 Rating, Deduct</i>	-1,697.88	
<i>For Class 54 Rating, Add</i>	2,332.79	
<i>For Class 55 Rating, Add</i>	3,477.08	
<i>For Class 56 Rating, Add</i>	4,605.92	
40 05 19 00-2367 EA 18" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,322.04	966.95
<i>For Class 52 Rating, Deduct</i>	-1,744.27	
<i>For Class 54 Rating, Add</i>	2,396.13	
<i>For Class 55 Rating, Add</i>	3,571.27	
<i>For Class 56 Rating, Add</i>	4,730.55	
40 05 19 00-2368 EA 18" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,749.80	970.92
<i>For Class 52 Rating, Deduct</i>	-1,790.66	
<i>For Class 54 Rating, Add</i>	2,459.46	
<i>For Class 55 Rating, Add</i>	3,665.46	
<i>For Class 56 Rating, Add</i>	4,855.18	
40 05 19 00-2369 EA 18" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,177.55	974.89
<i>For Class 52 Rating, Deduct</i>	-1,837.05	
<i>For Class 54 Rating, Add</i>	2,522.79	
<i>For Class 55 Rating, Add</i>	3,759.65	
<i>For Class 56 Rating, Add</i>	4,979.80	
40 05 19 00-2370 EA 18" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,605.30	978.87
<i>For Class 52 Rating, Deduct</i>	-1,883.44	
<i>For Class 54 Rating, Add</i>	2,586.12	
<i>For Class 55 Rating, Add</i>	3,853.84	
<i>For Class 56 Rating, Add</i>	5,104.43	
40 05 19 00-2371 EA 18" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,033.04	982.84
<i>For Class 52 Rating, Deduct</i>	-1,929.83	
<i>For Class 54 Rating, Add</i>	2,649.45	
<i>For Class 55 Rating, Add</i>	3,948.03	
<i>For Class 56 Rating, Add</i>	5,229.05	
40 05 19 00-2372 EA 18" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,460.78	986.82
<i>For Class 52 Rating, Deduct</i>	-1,976.22	
<i>For Class 54 Rating, Add</i>	2,712.78	
<i>For Class 55 Rating, Add</i>	4,042.22	
<i>For Class 56 Rating, Add</i>	5,353.68	
40 05 19 00-2373 EA 18" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,888.53	990.79
<i>For Class 52 Rating, Deduct</i>	-2,022.61	
<i>For Class 54 Rating, Add</i>	2,776.12	
<i>For Class 55 Rating, Add</i>	4,136.41	
<i>For Class 56 Rating, Add</i>	5,478.31	
40 05 19 00-2374 EA 18" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,316.28	994.76
<i>For Class 52 Rating, Deduct</i>	-2,069.00	
<i>For Class 54 Rating, Add</i>	2,839.45	
<i>For Class 55 Rating, Add</i>	4,230.60	
<i>For Class 56 Rating, Add</i>	5,602.94	
40 05 19 00-2375 EA 18" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,744.03	998.73
<i>For Class 52 Rating, Deduct</i>	-2,115.39	
<i>For Class 54 Rating, Add</i>	2,902.78	
<i>For Class 55 Rating, Add</i>	4,324.79	
<i>For Class 56 Rating, Add</i>	5,727.56	
40 05 19 00-2376 EA 18" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,171.78	1,002.71
<i>For Class 52 Rating, Deduct</i>	-2,161.78	
<i>For Class 54 Rating, Add</i>	2,966.11	
<i>For Class 55 Rating, Add</i>	4,418.97	
<i>For Class 56 Rating, Add</i>	5,852.19	
40 05 19 00-2377 EA 18" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,599.52	1,006.68
<i>For Class 52 Rating, Deduct</i>	-2,208.17	
<i>For Class 54 Rating, Add</i>	3,029.44	
<i>For Class 55 Rating, Add</i>	4,513.16	
<i>For Class 56 Rating, Add</i>	5,976.81	
40 05 19 00-2378 20" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		
<small>(40 05 19 00-2060)</small>		
40 05 19 00-2379 EA 20" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,758.35	981.26
<i>For Class 52 Rating, Deduct</i>	-579.88	
<i>For Class 54 Rating, Add</i>	808.58	
<i>For Class 55 Rating, Add</i>	1,211.25	
<i>For Class 56 Rating, Add</i>	1,608.65	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-2380	EA	20" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,245.14	985.23
		<i>For Class 52 Rating, Deduct</i>	-632.76	
		<i>For Class 54 Rating, Add</i>	880.77	
		<i>For Class 55 Rating, Add</i>	1,318.60	
		<i>For Class 56 Rating, Add</i>	1,750.69	
40 05 19 00-2381	EA	20" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,731.93	989.20
		<i>For Class 52 Rating, Deduct</i>	-685.65	
		<i>For Class 54 Rating, Add</i>	952.96	
		<i>For Class 55 Rating, Add</i>	1,425.96	
		<i>For Class 56 Rating, Add</i>	1,892.73	
40 05 19 00-2382	EA	20" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,218.71	993.17
		<i>For Class 52 Rating, Deduct</i>	-738.53	
		<i>For Class 54 Rating, Add</i>	1,025.14	
		<i>For Class 55 Rating, Add</i>	1,533.32	
		<i>For Class 56 Rating, Add</i>	2,034.78	
40 05 19 00-2383	EA	20" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,705.50	997.14
		<i>For Class 52 Rating, Deduct</i>	-791.41	
		<i>For Class 54 Rating, Add</i>	1,097.33	
		<i>For Class 55 Rating, Add</i>	1,640.67	
		<i>For Class 56 Rating, Add</i>	2,176.82	
40 05 19 00-2384	EA	20" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,192.29	1,001.11
		<i>For Class 52 Rating, Deduct</i>	-844.30	
		<i>For Class 54 Rating, Add</i>	1,169.52	
		<i>For Class 55 Rating, Add</i>	1,748.03	
		<i>For Class 56 Rating, Add</i>	2,318.86	
40 05 19 00-2385	EA	20" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,679.08	1,005.09
		<i>For Class 52 Rating, Deduct</i>	-897.18	
		<i>For Class 54 Rating, Add</i>	1,241.71	
		<i>For Class 55 Rating, Add</i>	1,855.39	
		<i>For Class 56 Rating, Add</i>	2,460.91	
40 05 19 00-2386	EA	20" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,165.88	1,009.06
		<i>For Class 52 Rating, Deduct</i>	-950.07	
		<i>For Class 54 Rating, Add</i>	1,313.90	
		<i>For Class 55 Rating, Add</i>	1,962.74	
		<i>For Class 56 Rating, Add</i>	2,602.95	
40 05 19 00-2387	EA	20" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,652.66	1,013.03
		<i>For Class 52 Rating, Deduct</i>	-1,002.95	
		<i>For Class 54 Rating, Add</i>	1,386.08	
		<i>For Class 55 Rating, Add</i>	2,070.10	
		<i>For Class 56 Rating, Add</i>	2,745.00	
40 05 19 00-2388	EA	20" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,139.45	1,017.01
		<i>For Class 52 Rating, Deduct</i>	-1,055.84	
		<i>For Class 54 Rating, Add</i>	1,458.27	
		<i>For Class 55 Rating, Add</i>	2,177.45	
		<i>For Class 56 Rating, Add</i>	2,887.04	
40 05 19 00-2389	EA	20" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,626.24	1,020.98
		<i>For Class 52 Rating, Deduct</i>	-1,108.72	
		<i>For Class 54 Rating, Add</i>	1,530.46	
		<i>For Class 55 Rating, Add</i>	2,284.81	
		<i>For Class 56 Rating, Add</i>	3,029.08	
40 05 19 00-2390	EA	20" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,113.03	1,024.95
		<i>For Class 52 Rating, Deduct</i>	-1,161.61	
		<i>For Class 54 Rating, Add</i>	1,602.65	
		<i>For Class 55 Rating, Add</i>	2,392.17	
		<i>For Class 56 Rating, Add</i>	3,171.13	
40 05 19 00-2391	EA	20" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,599.82	1,028.93
		<i>For Class 52 Rating, Deduct</i>	-1,214.49	
		<i>For Class 54 Rating, Add</i>	1,674.83	
		<i>For Class 55 Rating, Add</i>	2,499.52	
		<i>For Class 56 Rating, Add</i>	3,313.17	
40 05 19 00-2392	EA	20" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,086.60	1,032.90
		<i>For Class 52 Rating, Deduct</i>	-1,267.38	
		<i>For Class 54 Rating, Add</i>	1,747.02	
		<i>For Class 55 Rating, Add</i>	2,606.88	
		<i>For Class 56 Rating, Add</i>	3,455.21	
40 05 19 00-2393	EA	20" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,573.39	1,036.87
		<i>For Class 52 Rating, Deduct</i>	-1,320.26	
		<i>For Class 54 Rating, Add</i>	1,819.21	
		<i>For Class 55 Rating, Add</i>	2,714.23	
		<i>For Class 56 Rating, Add</i>	3,597.26	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2394 EA 20" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,060.18	1,040.84
<i>For Class 52 Rating, Deduct</i>	-1,373.15	
<i>For Class 54 Rating, Add</i>	1,891.40	
<i>For Class 55 Rating, Add</i>	2,821.59	
<i>For Class 56 Rating, Add</i>	3,739.30	
40 05 19 00-2395 EA 20" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,546.98	1,044.81
<i>For Class 52 Rating, Deduct</i>	-1,426.03	
<i>For Class 54 Rating, Add</i>	1,963.58	
<i>For Class 55 Rating, Add</i>	2,928.95	
<i>For Class 56 Rating, Add</i>	3,881.35	
40 05 19 00-2396 EA 20" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,033.77	1,048.79
<i>For Class 52 Rating, Deduct</i>	-1,478.92	
<i>For Class 54 Rating, Add</i>	2,035.77	
<i>For Class 55 Rating, Add</i>	3,036.30	
<i>For Class 56 Rating, Add</i>	4,023.39	
40 05 19 00-2397 EA 20" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,520.56	1,052.77
<i>For Class 52 Rating, Deduct</i>	-1,531.80	
<i>For Class 54 Rating, Add</i>	2,107.96	
<i>For Class 55 Rating, Add</i>	3,143.66	
<i>For Class 56 Rating, Add</i>	4,165.43	
40 05 19 00-2398 EA 20" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,007.34	1,056.74
<i>For Class 52 Rating, Deduct</i>	-1,584.69	
<i>For Class 54 Rating, Add</i>	2,180.15	
<i>For Class 55 Rating, Add</i>	3,251.02	
<i>For Class 56 Rating, Add</i>	4,307.48	
40 05 19 00-2399 EA 20" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,494.13	1,060.71
<i>For Class 52 Rating, Deduct</i>	-1,637.57	
<i>For Class 54 Rating, Add</i>	2,252.34	
<i>For Class 55 Rating, Add</i>	3,358.37	
<i>For Class 56 Rating, Add</i>	4,449.52	
40 05 19 00-2400 EA 20" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,980.92	1,064.68
<i>For Class 52 Rating, Deduct</i>	-1,690.45	
<i>For Class 54 Rating, Add</i>	2,324.52	
<i>For Class 55 Rating, Add</i>	3,465.73	
<i>For Class 56 Rating, Add</i>	4,591.57	
40 05 19 00-2401 EA 20" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,467.71	1,068.65
<i>For Class 52 Rating, Deduct</i>	-1,743.34	
<i>For Class 54 Rating, Add</i>	2,396.71	
<i>For Class 55 Rating, Add</i>	3,573.08	
<i>For Class 56 Rating, Add</i>	4,733.61	
40 05 19 00-2402 EA 20" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,954.50	1,072.62
<i>For Class 52 Rating, Deduct</i>	-1,796.22	
<i>For Class 54 Rating, Add</i>	2,468.90	
<i>For Class 55 Rating, Add</i>	3,680.44	
<i>For Class 56 Rating, Add</i>	4,875.65	
40 05 19 00-2403 EA 20" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,441.28	1,076.59
<i>For Class 52 Rating, Deduct</i>	-1,849.11	
<i>For Class 54 Rating, Add</i>	2,541.09	
<i>For Class 55 Rating, Add</i>	3,787.80	
<i>For Class 56 Rating, Add</i>	5,017.70	
40 05 19 00-2404 EA 20" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,928.08	1,080.57
<i>For Class 52 Rating, Deduct</i>	-1,901.99	
<i>For Class 54 Rating, Add</i>	2,613.27	
<i>For Class 55 Rating, Add</i>	3,895.15	
<i>For Class 56 Rating, Add</i>	5,159.74	
40 05 19 00-2405 EA 20" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,414.87	1,084.55
<i>For Class 52 Rating, Deduct</i>	-1,954.88	
<i>For Class 54 Rating, Add</i>	2,685.46	
<i>For Class 55 Rating, Add</i>	4,002.51	
<i>For Class 56 Rating, Add</i>	5,301.78	
40 05 19 00-2406 EA 20" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,901.66	1,088.52
<i>For Class 52 Rating, Deduct</i>	-2,007.76	
<i>For Class 54 Rating, Add</i>	2,757.65	
<i>For Class 55 Rating, Add</i>	4,109.87	
<i>For Class 56 Rating, Add</i>	5,443.83	
40 05 19 00-2407 EA 20" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,388.45	1,092.49
<i>For Class 52 Rating, Deduct</i>	-2,060.65	
<i>For Class 54 Rating, Add</i>	2,829.84	
<i>For Class 55 Rating, Add</i>	4,217.22	
<i>For Class 56 Rating, Add</i>	5,585.87	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2408	EA	20" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		20,875.23	1,096.46
		<i>For Class 52 Rating, Deduct</i>		-2,113.53	
		<i>For Class 54 Rating, Add</i>		2,902.03	
		<i>For Class 55 Rating, Add</i>		4,324.58	
		<i>For Class 56 Rating, Add</i>		5,727.92	
40 05 19 00-2409	EA	20" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		21,362.02	1,100.43
		<i>For Class 52 Rating, Deduct</i>		-2,166.42	
		<i>For Class 54 Rating, Add</i>		2,974.21	
		<i>For Class 55 Rating, Add</i>		4,431.93	
		<i>For Class 56 Rating, Add</i>		5,869.96	
40 05 19 00-2410	EA	20" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		21,848.81	1,104.41
		<i>For Class 52 Rating, Deduct</i>		-2,219.30	
		<i>For Class 54 Rating, Add</i>		3,046.40	
		<i>For Class 55 Rating, Add</i>		4,539.29	
		<i>For Class 56 Rating, Add</i>		6,012.00	
40 05 19 00-2411	EA	20" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		22,335.60	1,108.38
		<i>For Class 52 Rating, Deduct</i>		-2,272.19	
		<i>For Class 54 Rating, Add</i>		3,118.59	
		<i>For Class 55 Rating, Add</i>		4,646.65	
		<i>For Class 56 Rating, Add</i>		6,154.05	
40 05 19 00-2412	EA	20" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		22,822.40	1,112.35
		<i>For Class 52 Rating, Deduct</i>		-2,325.07	
		<i>For Class 54 Rating, Add</i>		3,190.78	
		<i>For Class 55 Rating, Add</i>		4,754.00	
		<i>For Class 56 Rating, Add</i>		6,296.09	
40 05 19 00-2413	EA	20" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		23,309.18	1,116.32
		<i>For Class 52 Rating, Deduct</i>		-2,377.96	
		<i>For Class 54 Rating, Add</i>		3,262.96	
		<i>For Class 55 Rating, Add</i>		4,861.36	
		<i>For Class 56 Rating, Add</i>		6,438.14	
40 05 19 00-2414	EA	20" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		23,795.97	1,120.30
		<i>For Class 52 Rating, Deduct</i>		-2,430.84	
		<i>For Class 54 Rating, Add</i>		3,335.15	
		<i>For Class 55 Rating, Add</i>		4,968.71	
		<i>For Class 56 Rating, Add</i>		6,580.18	
40 05 19 00-2415	EA	20" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		24,282.76	1,124.27
		<i>For Class 52 Rating, Deduct</i>		-2,483.73	
		<i>For Class 54 Rating, Add</i>		3,407.34	
		<i>For Class 55 Rating, Add</i>		5,076.07	
		<i>For Class 56 Rating, Add</i>		6,722.22	
40 05 19 00-2416	EA	20" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		24,769.55	1,128.24
		<i>For Class 52 Rating, Deduct</i>		-2,536.61	
		<i>For Class 54 Rating, Add</i>		3,479.53	
		<i>For Class 55 Rating, Add</i>		5,183.43	
		<i>For Class 56 Rating, Add</i>		6,864.27	
40 05 19 00-2417		24" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>			
40 05 19 00-2418	EA	24" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		8,336.57	1,160.03
		<i>For Class 52 Rating, Deduct</i>		-723.69	
		<i>For Class 54 Rating, Add</i>		1,007.94	
		<i>For Class 55 Rating, Add</i>		1,509.29	
		<i>For Class 56 Rating, Add</i>		2,004.07	
40 05 19 00-2419	EA	24" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		8,938.63	1,164.00
		<i>For Class 52 Rating, Deduct</i>		-789.25	
		<i>For Class 54 Rating, Add</i>		1,097.41	
		<i>For Class 55 Rating, Add</i>		1,642.35	
		<i>For Class 56 Rating, Add</i>		2,180.12	
40 05 19 00-2420	EA	24" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		9,540.69	1,167.97
		<i>For Class 52 Rating, Deduct</i>		-854.81	
		<i>For Class 54 Rating, Add</i>		1,186.89	
		<i>For Class 55 Rating, Add</i>		1,775.41	
		<i>For Class 56 Rating, Add</i>		2,356.16	
40 05 19 00-2421	EA	24" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		10,142.75	1,171.94
		<i>For Class 52 Rating, Deduct</i>		-920.38	
		<i>For Class 54 Rating, Add</i>		1,276.37	
		<i>For Class 55 Rating, Add</i>		1,908.47	
		<i>For Class 56 Rating, Add</i>		2,532.21	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2422	EA			24" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,744.81	1,175.91
				<i>For Class 52 Rating, Deduct</i>	-985.94	
				<i>For Class 54 Rating, Add</i>	1,365.85	
				<i>For Class 55 Rating, Add</i>	2,041.54	
				<i>For Class 56 Rating, Add</i>	2,708.26	
40 05 19 00-2423	EA			24" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,346.87	1,179.89
				<i>For Class 52 Rating, Deduct</i>	-1,051.51	
				<i>For Class 54 Rating, Add</i>	1,455.33	
				<i>For Class 55 Rating, Add</i>	2,174.60	
				<i>For Class 56 Rating, Add</i>	2,884.31	
40 05 19 00-2424	EA			24" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,948.94	1,183.86
				<i>For Class 52 Rating, Deduct</i>	-1,117.07	
				<i>For Class 54 Rating, Add</i>	1,544.81	
				<i>For Class 55 Rating, Add</i>	2,307.66	
				<i>For Class 56 Rating, Add</i>	3,060.36	
40 05 19 00-2425	EA			24" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,551.00	1,187.83
				<i>For Class 52 Rating, Deduct</i>	-1,182.64	
				<i>For Class 54 Rating, Add</i>	1,634.28	
				<i>For Class 55 Rating, Add</i>	2,440.72	
				<i>For Class 56 Rating, Add</i>	3,236.41	
40 05 19 00-2426	EA			24" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,153.06	1,191.81
				<i>For Class 52 Rating, Deduct</i>	-1,248.20	
				<i>For Class 54 Rating, Add</i>	1,723.76	
				<i>For Class 55 Rating, Add</i>	2,573.78	
				<i>For Class 56 Rating, Add</i>	3,412.46	
40 05 19 00-2427	EA			24" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,755.13	1,195.78
				<i>For Class 52 Rating, Deduct</i>	-1,313.77	
				<i>For Class 54 Rating, Add</i>	1,813.24	
				<i>For Class 55 Rating, Add</i>	2,706.85	
				<i>For Class 56 Rating, Add</i>	3,588.51	
40 05 19 00-2428	EA			24" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,357.18	1,199.75
				<i>For Class 52 Rating, Deduct</i>	-1,379.33	
				<i>For Class 54 Rating, Add</i>	1,902.72	
				<i>For Class 55 Rating, Add</i>	2,839.91	
				<i>For Class 56 Rating, Add</i>	3,764.56	
40 05 19 00-2429	EA			24" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,959.24	1,203.72
				<i>For Class 52 Rating, Deduct</i>	-1,444.90	
				<i>For Class 54 Rating, Add</i>	1,992.20	
				<i>For Class 55 Rating, Add</i>	2,972.97	
				<i>For Class 56 Rating, Add</i>	3,940.61	
40 05 19 00-2430	EA			24" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,561.30	1,207.70
				<i>For Class 52 Rating, Deduct</i>	-1,510.46	
				<i>For Class 54 Rating, Add</i>	2,081.68	
				<i>For Class 55 Rating, Add</i>	3,106.03	
				<i>For Class 56 Rating, Add</i>	4,116.65	
40 05 19 00-2431	EA			24" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,163.37	1,211.67
				<i>For Class 52 Rating, Deduct</i>	-1,576.03	
				<i>For Class 54 Rating, Add</i>	2,171.16	
				<i>For Class 55 Rating, Add</i>	3,239.10	
				<i>For Class 56 Rating, Add</i>	4,292.71	
40 05 19 00-2432	EA			24" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,765.44	1,215.64
				<i>For Class 52 Rating, Deduct</i>	-1,641.59	
				<i>For Class 54 Rating, Add</i>	2,260.64	
				<i>For Class 55 Rating, Add</i>	3,372.16	
				<i>For Class 56 Rating, Add</i>	4,468.76	
40 05 19 00-2433	EA			24" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,367.49	1,219.61
				<i>For Class 52 Rating, Deduct</i>	-1,707.15	
				<i>For Class 54 Rating, Add</i>	2,350.11	
				<i>For Class 55 Rating, Add</i>	3,505.22	
				<i>For Class 56 Rating, Add</i>	4,644.80	
40 05 19 00-2434	EA			24" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,969.55	1,223.58
				<i>For Class 52 Rating, Deduct</i>	-1,772.72	
				<i>For Class 54 Rating, Add</i>	2,439.59	
				<i>For Class 55 Rating, Add</i>	3,638.28	
				<i>For Class 56 Rating, Add</i>	4,820.85	
40 05 19 00-2435	EA			24" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,571.61	1,227.56
				<i>For Class 52 Rating, Deduct</i>	-1,838.28	
				<i>For Class 54 Rating, Add</i>	2,529.07	
				<i>For Class 55 Rating, Add</i>	3,771.34	
				<i>For Class 56 Rating, Add</i>	4,996.90	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2436	EA	24" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	19,173.68	1,231.54
		<i>For Class 52 Rating, Deduct</i>		-1,903.85	
		<i>For Class 54 Rating, Add</i>		2,618.55	
		<i>For Class 55 Rating, Add</i>		3,904.40	
		<i>For Class 56 Rating, Add</i>		5,172.95	
40 05 19 00-2437	EA	24" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	19,775.74	1,235.51
		<i>For Class 52 Rating, Deduct</i>		-1,969.41	
		<i>For Class 54 Rating, Add</i>		2,708.03	
		<i>For Class 55 Rating, Add</i>		4,037.47	
		<i>For Class 56 Rating, Add</i>		5,349.00	
40 05 19 00-2438	EA	24" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	20,377.79	1,239.48
		<i>For Class 52 Rating, Deduct</i>		-2,034.98	
		<i>For Class 54 Rating, Add</i>		2,797.51	
		<i>For Class 55 Rating, Add</i>		4,170.53	
		<i>For Class 56 Rating, Add</i>		5,525.05	
40 05 19 00-2439	EA	24" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	20,979.85	1,243.45
		<i>For Class 52 Rating, Deduct</i>		-2,100.54	
		<i>For Class 54 Rating, Add</i>		2,886.98	
		<i>For Class 55 Rating, Add</i>		4,303.59	
		<i>For Class 56 Rating, Add</i>		5,701.10	
40 05 19 00-2440	EA	24" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	21,581.92	1,247.42
		<i>For Class 52 Rating, Deduct</i>		-2,166.11	
		<i>For Class 54 Rating, Add</i>		2,976.46	
		<i>For Class 55 Rating, Add</i>		4,436.65	
		<i>For Class 56 Rating, Add</i>		5,877.15	
40 05 19 00-2441	EA	24" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	22,183.99	1,251.39
		<i>For Class 52 Rating, Deduct</i>		-2,231.67	
		<i>For Class 54 Rating, Add</i>		3,065.94	
		<i>For Class 55 Rating, Add</i>		4,569.71	
		<i>For Class 56 Rating, Add</i>		6,053.20	
40 05 19 00-2442	EA	24" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	22,786.05	1,255.37
		<i>For Class 52 Rating, Deduct</i>		-2,297.24	
		<i>For Class 54 Rating, Add</i>		3,155.42	
		<i>For Class 55 Rating, Add</i>		4,702.78	
		<i>For Class 56 Rating, Add</i>		6,229.25	
40 05 19 00-2443	EA	24" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	23,388.10	1,259.34
		<i>For Class 52 Rating, Deduct</i>		-2,362.80	
		<i>For Class 54 Rating, Add</i>		3,244.90	
		<i>For Class 55 Rating, Add</i>		4,835.84	
		<i>For Class 56 Rating, Add</i>		6,405.29	
40 05 19 00-2444	EA	24" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	23,990.17	1,263.32
		<i>For Class 52 Rating, Deduct</i>		-2,428.37	
		<i>For Class 54 Rating, Add</i>		3,334.38	
		<i>For Class 55 Rating, Add</i>		4,968.90	
		<i>For Class 56 Rating, Add</i>		6,581.35	
40 05 19 00-2445	EA	24" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	24,592.23	1,267.29
		<i>For Class 52 Rating, Deduct</i>		-2,493.93	
		<i>For Class 54 Rating, Add</i>		3,423.86	
		<i>For Class 55 Rating, Add</i>		5,101.96	
		<i>For Class 56 Rating, Add</i>		6,757.39	
40 05 19 00-2446	EA	24" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	25,194.29	1,271.26
		<i>For Class 52 Rating, Deduct</i>		-2,559.50	
		<i>For Class 54 Rating, Add</i>		3,513.33	
		<i>For Class 55 Rating, Add</i>		5,235.02	
		<i>For Class 56 Rating, Add</i>		6,933.44	
40 05 19 00-2447	EA	24" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	25,898.67	1,342.77
		<i>For Class 52 Rating, Deduct</i>		-2,625.06	
		<i>For Class 54 Rating, Add</i>		3,604.04	
		<i>For Class 55 Rating, Add</i>		5,370.54	
		<i>For Class 56 Rating, Add</i>		7,113.17	
40 05 19 00-2448	EA	24" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	26,500.73	1,346.74
		<i>For Class 52 Rating, Deduct</i>		-2,690.62	
		<i>For Class 54 Rating, Add</i>		3,693.52	
		<i>For Class 55 Rating, Add</i>		5,503.60	
		<i>For Class 56 Rating, Add</i>		7,289.22	
40 05 19 00-2449	EA	24" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	.....	27,102.80	1,350.71
		<i>For Class 52 Rating, Deduct</i>		-2,756.19	
		<i>For Class 54 Rating, Add</i>		3,783.00	
		<i>For Class 55 Rating, Add</i>		5,636.66	
		<i>For Class 56 Rating, Add</i>		7,465.27	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2450 EA 24" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	27,704.87	1,354.68
<i>For Class 52 Rating, Deduct</i>	-2,821.75	
<i>For Class 54 Rating, Add</i>	3,872.48	
<i>For Class 55 Rating, Add</i>	5,769.73	
<i>For Class 56 Rating, Add</i>	7,641.32	
40 05 19 00-2451 EA 24" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,306.93	1,358.66
<i>For Class 52 Rating, Deduct</i>	-2,887.32	
<i>For Class 54 Rating, Add</i>	3,961.96	
<i>For Class 55 Rating, Add</i>	5,902.79	
<i>For Class 56 Rating, Add</i>	7,817.37	
40 05 19 00-2452 EA 24" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,908.98	1,362.63
<i>For Class 52 Rating, Deduct</i>	-2,952.88	
<i>For Class 54 Rating, Add</i>	4,051.43	
<i>For Class 55 Rating, Add</i>	6,035.85	
<i>For Class 56 Rating, Add</i>	7,993.42	
40 05 19 00-2453 EA 24" Flanged (FxF), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	29,511.05	1,366.60
<i>For Class 52 Rating, Deduct</i>	-3,018.45	
<i>For Class 54 Rating, Add</i>	4,140.91	
<i>For Class 55 Rating, Add</i>	6,168.91	
<i>For Class 56 Rating, Add</i>	8,169.47	
40 05 19 00-2454 EA 24" Flanged (FxF), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,113.11	1,370.58
<i>For Class 52 Rating, Deduct</i>	-3,084.01	
<i>For Class 54 Rating, Add</i>	4,230.39	
<i>For Class 55 Rating, Add</i>	6,301.97	
<i>For Class 56 Rating, Add</i>	8,345.52	
40 05 19 00-2455 EA 24" Flanged (FxF), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,715.17	1,374.55
<i>For Class 52 Rating, Deduct</i>	-3,149.58	
<i>For Class 54 Rating, Add</i>	4,319.87	
<i>For Class 55 Rating, Add</i>	6,435.04	
<i>For Class 56 Rating, Add</i>	8,521.57	
40 05 19 00-2456 30" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe		
<small>(40 05 19 00-2060)</small>		
40 05 19 00-2457 EA 30" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,893.79	1,636.75
<i>For Class 52 Rating, Deduct</i>	-1,145.53	
<i>For Class 54 Rating, Add</i>	1,591.84	
<i>For Class 55 Rating, Add</i>	2,381.81	
<i>For Class 56 Rating, Add</i>	3,161.37	
40 05 19 00-2458 EA 30" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,754.51	1,640.72
<i>For Class 52 Rating, Deduct</i>	-1,239.54	
<i>For Class 54 Rating, Add</i>	1,720.12	
<i>For Class 55 Rating, Add</i>	2,572.55	
<i>For Class 56 Rating, Add</i>	3,413.72	
40 05 19 00-2459 EA 30" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,615.23	1,644.69
<i>For Class 52 Rating, Deduct</i>	-1,333.56	
<i>For Class 54 Rating, Add</i>	1,848.39	
<i>For Class 55 Rating, Add</i>	2,763.30	
<i>For Class 56 Rating, Add</i>	3,666.08	
40 05 19 00-2460 EA 30" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,475.95	1,648.66
<i>For Class 52 Rating, Deduct</i>	-1,427.58	
<i>For Class 54 Rating, Add</i>	1,976.67	
<i>For Class 55 Rating, Add</i>	2,954.04	
<i>For Class 56 Rating, Add</i>	3,918.43	
40 05 19 00-2461 EA 30" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,336.67	1,652.63
<i>For Class 52 Rating, Deduct</i>	-1,521.59	
<i>For Class 54 Rating, Add</i>	2,104.95	
<i>For Class 55 Rating, Add</i>	3,144.78	
<i>For Class 56 Rating, Add</i>	4,170.78	
40 05 19 00-2462 EA 30" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,197.39	1,656.61
<i>For Class 52 Rating, Deduct</i>	-1,615.61	
<i>For Class 54 Rating, Add</i>	2,233.23	
<i>For Class 55 Rating, Add</i>	3,335.53	
<i>For Class 56 Rating, Add</i>	4,423.14	
40 05 19 00-2463 EA 30" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,058.12	1,660.58
<i>For Class 52 Rating, Deduct</i>	-1,709.63	
<i>For Class 54 Rating, Add</i>	2,361.50	
<i>For Class 55 Rating, Add</i>	3,526.27	
<i>For Class 56 Rating, Add</i>	4,675.49	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-2464	EA	30" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,918.84	1,664.56
		<i>For Class 52 Rating, Deduct</i>	-1,803.65	
		<i>For Class 54 Rating, Add</i>	2,489.78	
		<i>For Class 55 Rating, Add</i>	3,717.01	
		<i>For Class 56 Rating, Add</i>	4,927.84	
40 05 19 00-2465	EA	30" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,779.56	1,668.53
		<i>For Class 52 Rating, Deduct</i>	-1,897.66	
		<i>For Class 54 Rating, Add</i>	2,618.06	
		<i>For Class 55 Rating, Add</i>	3,907.76	
		<i>For Class 56 Rating, Add</i>	5,180.20	
40 05 19 00-2466	EA	30" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,640.28	1,672.50
		<i>For Class 52 Rating, Deduct</i>	-1,991.68	
		<i>For Class 54 Rating, Add</i>	2,746.34	
		<i>For Class 55 Rating, Add</i>	4,098.50	
		<i>For Class 56 Rating, Add</i>	5,432.55	
40 05 19 00-2467	EA	30" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,501.00	1,676.47
		<i>For Class 52 Rating, Deduct</i>	-2,085.70	
		<i>For Class 54 Rating, Add</i>	2,874.61	
		<i>For Class 55 Rating, Add</i>	4,289.24	
		<i>For Class 56 Rating, Add</i>	5,684.91	
40 05 19 00-2468	EA	30" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	22,361.72	1,680.44
		<i>For Class 52 Rating, Deduct</i>	-2,179.71	
		<i>For Class 54 Rating, Add</i>	3,002.89	
		<i>For Class 55 Rating, Add</i>	4,479.98	
		<i>For Class 56 Rating, Add</i>	5,937.26	
40 05 19 00-2469	EA	30" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	23,222.45	1,684.41
		<i>For Class 52 Rating, Deduct</i>	-2,273.73	
		<i>For Class 54 Rating, Add</i>	3,131.17	
		<i>For Class 55 Rating, Add</i>	4,670.73	
		<i>For Class 56 Rating, Add</i>	6,189.62	
40 05 19 00-2470	EA	30" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	24,083.16	1,688.40
		<i>For Class 52 Rating, Deduct</i>	-2,367.75	
		<i>For Class 54 Rating, Add</i>	3,259.45	
		<i>For Class 55 Rating, Add</i>	4,861.47	
		<i>For Class 56 Rating, Add</i>	6,441.97	
40 05 19 00-2471	EA	30" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	24,943.88	1,692.37
		<i>For Class 52 Rating, Deduct</i>	-2,461.77	
		<i>For Class 54 Rating, Add</i>	3,387.73	
		<i>For Class 55 Rating, Add</i>	5,052.21	
		<i>For Class 56 Rating, Add</i>	6,694.32	
40 05 19 00-2472	EA	30" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	25,804.61	1,696.34
		<i>For Class 52 Rating, Deduct</i>	-2,555.78	
		<i>For Class 54 Rating, Add</i>	3,516.00	
		<i>For Class 55 Rating, Add</i>	5,242.96	
		<i>For Class 56 Rating, Add</i>	6,946.68	
40 05 19 00-2473	EA	30" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	26,665.33	1,700.31
		<i>For Class 52 Rating, Deduct</i>	-2,649.80	
		<i>For Class 54 Rating, Add</i>	3,644.28	
		<i>For Class 55 Rating, Add</i>	5,433.70	
		<i>For Class 56 Rating, Add</i>	7,199.03	
40 05 19 00-2474	EA	30" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	27,526.06	1,704.28
		<i>For Class 52 Rating, Deduct</i>	-2,743.82	
		<i>For Class 54 Rating, Add</i>	3,772.56	
		<i>For Class 55 Rating, Add</i>	5,624.44	
		<i>For Class 56 Rating, Add</i>	7,451.38	
40 05 19 00-2475	EA	30" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,386.77	1,708.25
		<i>For Class 52 Rating, Deduct</i>	-2,837.84	
		<i>For Class 54 Rating, Add</i>	3,900.84	
		<i>For Class 55 Rating, Add</i>	5,815.19	
		<i>For Class 56 Rating, Add</i>	7,703.74	
40 05 19 00-2476	EA	30" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	29,247.49	1,712.23
		<i>For Class 52 Rating, Deduct</i>	-2,931.85	
		<i>For Class 54 Rating, Add</i>	4,029.11	
		<i>For Class 55 Rating, Add</i>	6,005.93	
		<i>For Class 56 Rating, Add</i>	7,956.09	
40 05 19 00-2477	EA	30" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,108.21	1,716.20
		<i>For Class 52 Rating, Deduct</i>	-3,025.87	
		<i>For Class 54 Rating, Add</i>	4,157.39	
		<i>For Class 55 Rating, Add</i>	6,196.67	
		<i>For Class 56 Rating, Add</i>	8,208.44	

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2478	EA			30" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	30,968.93	1,720.17
				<i>For Class 52 Rating, Deduct</i>	-3,119.89	
				<i>For Class 54 Rating, Add</i>	4,285.67	
				<i>For Class 55 Rating, Add</i>	6,387.41	
				<i>For Class 56 Rating, Add</i>	8,460.80	
40 05 19 00-2479	EA			30" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	31,829.66	1,724.15
				<i>For Class 52 Rating, Deduct</i>	-3,213.91	
				<i>For Class 54 Rating, Add</i>	4,413.95	
				<i>For Class 55 Rating, Add</i>	6,578.16	
				<i>For Class 56 Rating, Add</i>	8,713.15	
40 05 19 00-2480	EA			30" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	32,690.38	1,728.12
				<i>For Class 52 Rating, Deduct</i>	-3,307.92	
				<i>For Class 54 Rating, Add</i>	4,542.22	
				<i>For Class 55 Rating, Add</i>	6,768.90	
				<i>For Class 56 Rating, Add</i>	8,965.51	
40 05 19 00-2481	EA			30" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	33,551.10	1,732.09
				<i>For Class 52 Rating, Deduct</i>	-3,401.94	
				<i>For Class 54 Rating, Add</i>	4,670.50	
				<i>For Class 55 Rating, Add</i>	6,959.64	
				<i>For Class 56 Rating, Add</i>	9,217.86	
40 05 19 00-2482	EA			30" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	34,411.82	1,736.06
				<i>For Class 52 Rating, Deduct</i>	-3,495.96	
				<i>For Class 54 Rating, Add</i>	4,798.78	
				<i>For Class 55 Rating, Add</i>	7,150.39	
				<i>For Class 56 Rating, Add</i>	9,470.21	
40 05 19 00-2483	EA			30" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	35,272.54	1,740.04
				<i>For Class 52 Rating, Deduct</i>	-3,589.97	
				<i>For Class 54 Rating, Add</i>	4,927.06	
				<i>For Class 55 Rating, Add</i>	7,341.13	
				<i>For Class 56 Rating, Add</i>	9,722.57	
40 05 19 00-2484	EA			30" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	36,133.27	1,744.01
				<i>For Class 52 Rating, Deduct</i>	-3,683.99	
				<i>For Class 54 Rating, Add</i>	5,055.33	
				<i>For Class 55 Rating, Add</i>	7,531.87	
				<i>For Class 56 Rating, Add</i>	9,974.92	
40 05 19 00-2485	EA			30" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	36,993.99	1,747.98
				<i>For Class 52 Rating, Deduct</i>	-3,778.01	
				<i>For Class 54 Rating, Add</i>	5,183.61	
				<i>For Class 55 Rating, Add</i>	7,722.62	
				<i>For Class 56 Rating, Add</i>	10,227.28	
40 05 19 00-2486	EA			30" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	37,854.70	1,751.95
				<i>For Class 52 Rating, Deduct</i>	-3,872.03	
				<i>For Class 54 Rating, Add</i>	5,311.89	
				<i>For Class 55 Rating, Add</i>	7,913.36	
				<i>For Class 56 Rating, Add</i>	10,479.63	
40 05 19 00-2487	EA			30" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	38,715.42	1,755.92
				<i>For Class 52 Rating, Deduct</i>	-3,966.04	
				<i>For Class 54 Rating, Add</i>	5,440.17	
				<i>For Class 55 Rating, Add</i>	8,104.10	
				<i>For Class 56 Rating, Add</i>	10,731.98	
40 05 19 00-2488	EA			30" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	39,576.14	1,759.90
				<i>For Class 52 Rating, Deduct</i>	-4,060.06	
				<i>For Class 54 Rating, Add</i>	5,568.44	
				<i>For Class 55 Rating, Add</i>	8,294.84	
				<i>For Class 56 Rating, Add</i>	10,984.34	
40 05 19 00-2489	EA			30" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	40,436.88	1,763.88
				<i>For Class 52 Rating, Deduct</i>	-4,154.08	
				<i>For Class 54 Rating, Add</i>	5,696.72	
				<i>For Class 55 Rating, Add</i>	8,485.59	
				<i>For Class 56 Rating, Add</i>	11,236.69	
40 05 19 00-2490	EA			30" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	41,297.60	1,767.85
				<i>For Class 52 Rating, Deduct</i>	-4,248.09	
				<i>For Class 54 Rating, Add</i>	5,825.00	
				<i>For Class 55 Rating, Add</i>	8,676.33	
				<i>For Class 56 Rating, Add</i>	11,489.04	
40 05 19 00-2491	EA			30" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	42,158.31	1,771.82
				<i>For Class 52 Rating, Deduct</i>	-4,342.11	
				<i>For Class 54 Rating, Add</i>	5,953.28	
				<i>For Class 55 Rating, Add</i>	8,867.07	
				<i>For Class 56 Rating, Add</i>	11,741.40	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2492			36" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>		
40 05 19 00-2493	EA		36" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,989.68	2,073.74
			For Class 52 Rating, Deduct	-1,633.24	
			For Class 54 Rating, Add	2,264.85	
			For Class 55 Rating, Add	3,366.43	
			For Class 56 Rating, Add	4,493.17	
40 05 19 00-2494	EA		36" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,142.79	2,077.71
			For Class 52 Rating, Deduct	-1,759.42	
			For Class 54 Rating, Add	2,436.99	
			For Class 55 Rating, Add	3,642.38	
			For Class 56 Rating, Add	4,831.78	
40 05 19 00-2495	EA		36" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,295.91	2,081.69
			For Class 52 Rating, Deduct	-1,885.60	
			For Class 54 Rating, Add	2,609.12	
			For Class 55 Rating, Add	3,898.33	
			For Class 56 Rating, Add	5,170.39	
40 05 19 00-2496	EA		36" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,449.03	2,085.66
			For Class 52 Rating, Deduct	-2,011.78	
			For Class 54 Rating, Add	2,781.26	
			For Class 55 Rating, Add	4,154.28	
			For Class 56 Rating, Add	5,509.00	
40 05 19 00-2497	EA		36" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	22,602.15	2,089.63
			For Class 52 Rating, Deduct	-2,137.96	
			For Class 54 Rating, Add	2,953.40	
			For Class 55 Rating, Add	4,410.22	
			For Class 56 Rating, Add	5,847.61	
40 05 19 00-2498	EA		36" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	23,755.27	2,093.61
			For Class 52 Rating, Deduct	-2,264.15	
			For Class 54 Rating, Add	3,125.54	
			For Class 55 Rating, Add	4,666.17	
			For Class 56 Rating, Add	6,186.22	
40 05 19 00-2499	EA		36" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	24,908.38	2,097.58
			For Class 52 Rating, Deduct	-2,390.33	
			For Class 54 Rating, Add	3,297.67	
			For Class 55 Rating, Add	4,922.12	
			For Class 56 Rating, Add	6,524.83	
40 05 19 00-2500	EA		36" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	26,061.50	2,101.55
			For Class 52 Rating, Deduct	-2,516.51	
			For Class 54 Rating, Add	3,469.81	
			For Class 55 Rating, Add	5,178.07	
			For Class 56 Rating, Add	6,863.45	
40 05 19 00-2501	EA		36" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	27,214.63	2,105.52
			For Class 52 Rating, Deduct	-2,642.69	
			For Class 54 Rating, Add	3,641.95	
			For Class 55 Rating, Add	5,434.01	
			For Class 56 Rating, Add	7,202.06	
40 05 19 00-2502	EA		36" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,367.75	2,109.49
			For Class 52 Rating, Deduct	-2,768.87	
			For Class 54 Rating, Add	3,814.09	
			For Class 55 Rating, Add	5,689.96	
			For Class 56 Rating, Add	7,540.67	
40 05 19 00-2503	EA		36" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	29,520.87	2,113.46
			For Class 52 Rating, Deduct	-2,895.05	
			For Class 54 Rating, Add	3,986.22	
			For Class 55 Rating, Add	5,945.91	
			For Class 56 Rating, Add	7,879.28	
40 05 19 00-2504	EA		36" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,673.98	2,117.44
			For Class 52 Rating, Deduct	-3,021.23	
			For Class 54 Rating, Add	4,158.36	
			For Class 55 Rating, Add	6,201.86	
			For Class 56 Rating, Add	8,217.89	
40 05 19 00-2505	EA		36" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	31,827.10	2,121.42
			For Class 52 Rating, Deduct	-3,147.41	
			For Class 54 Rating, Add	4,330.50	
			For Class 55 Rating, Add	6,457.81	
			For Class 56 Rating, Add	8,556.50	
40 05 19 00-2506	EA		36" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	32,980.22	2,125.39
			For Class 52 Rating, Deduct	-3,273.59	
			For Class 54 Rating, Add	4,502.63	
			For Class 55 Rating, Add	6,713.75	
			For Class 56 Rating, Add	8,895.11	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2507 EA 36" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	34,133.34	2,129.36
<i>For Class 52 Rating, Deduct</i>	-3,399.77	
<i>For Class 54 Rating, Add</i>	4,674.77	
<i>For Class 55 Rating, Add</i>	6,969.70	
<i>For Class 56 Rating, Add</i>	9,233.72	
40 05 19 00-2508 EA 36" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	35,286.46	2,133.33
<i>For Class 52 Rating, Deduct</i>	-3,525.96	
<i>For Class 54 Rating, Add</i>	4,846.91	
<i>For Class 55 Rating, Add</i>	7,225.65	
<i>For Class 56 Rating, Add</i>	9,572.33	
40 05 19 00-2509 EA 36" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	36,439.57	2,137.30
<i>For Class 52 Rating, Deduct</i>	-3,652.14	
<i>For Class 54 Rating, Add</i>	5,019.05	
<i>For Class 55 Rating, Add</i>	7,481.60	
<i>For Class 56 Rating, Add</i>	9,910.95	
40 05 19 00-2510 EA 36" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	37,592.70	2,141.27
<i>For Class 52 Rating, Deduct</i>	-3,778.32	
<i>For Class 54 Rating, Add</i>	5,191.18	
<i>For Class 55 Rating, Add</i>	7,737.54	
<i>For Class 56 Rating, Add</i>	10,249.56	
40 05 19 00-2511 EA 36" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	38,745.82	2,145.25
<i>For Class 52 Rating, Deduct</i>	-3,904.50	
<i>For Class 54 Rating, Add</i>	5,363.32	
<i>For Class 55 Rating, Add</i>	7,993.49	
<i>For Class 56 Rating, Add</i>	10,588.17	
40 05 19 00-2512 EA 36" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	39,898.94	2,149.22
<i>For Class 52 Rating, Deduct</i>	-4,030.68	
<i>For Class 54 Rating, Add</i>	5,535.46	
<i>For Class 55 Rating, Add</i>	8,249.44	
<i>For Class 56 Rating, Add</i>	10,926.78	
40 05 19 00-2513 EA 36" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	41,052.06	2,153.20
<i>For Class 52 Rating, Deduct</i>	-4,156.86	
<i>For Class 54 Rating, Add</i>	5,707.60	
<i>For Class 55 Rating, Add</i>	8,505.39	
<i>For Class 56 Rating, Add</i>	11,265.39	
40 05 19 00-2514 EA 36" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	42,205.17	2,157.17
<i>For Class 52 Rating, Deduct</i>	-4,283.04	
<i>For Class 54 Rating, Add</i>	5,879.73	
<i>For Class 55 Rating, Add</i>	8,761.34	
<i>For Class 56 Rating, Add</i>	11,604.00	
40 05 19 00-2515 EA 36" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	43,358.29	2,161.14
<i>For Class 52 Rating, Deduct</i>	-4,409.22	
<i>For Class 54 Rating, Add</i>	6,051.87	
<i>For Class 55 Rating, Add</i>	9,017.28	
<i>For Class 56 Rating, Add</i>	11,942.61	
40 05 19 00-2516 EA 36" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	44,511.41	2,165.11
<i>For Class 52 Rating, Deduct</i>	-4,535.40	
<i>For Class 54 Rating, Add</i>	6,224.01	
<i>For Class 55 Rating, Add</i>	9,273.23	
<i>For Class 56 Rating, Add</i>	12,281.22	
40 05 19 00-2517 EA 36" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	45,664.53	2,169.09
<i>For Class 52 Rating, Deduct</i>	-4,661.58	
<i>For Class 54 Rating, Add</i>	6,396.14	
<i>For Class 55 Rating, Add</i>	9,529.18	
<i>For Class 56 Rating, Add</i>	12,619.84	
40 05 19 00-2518 EA 36" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	46,817.66	2,173.06
<i>For Class 52 Rating, Deduct</i>	-4,787.77	
<i>For Class 54 Rating, Add</i>	6,568.28	
<i>For Class 55 Rating, Add</i>	9,785.13	
<i>For Class 56 Rating, Add</i>	12,958.45	
40 05 19 00-2519 EA 36" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	47,970.78	2,177.03
<i>For Class 52 Rating, Deduct</i>	-4,913.95	
<i>For Class 54 Rating, Add</i>	6,740.42	
<i>For Class 55 Rating, Add</i>	10,041.07	
<i>For Class 56 Rating, Add</i>	13,297.06	
40 05 19 00-2520 EA 36" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	49,123.89	2,181.00
<i>For Class 52 Rating, Deduct</i>	-5,040.13	
<i>For Class 54 Rating, Add</i>	6,912.56	
<i>For Class 55 Rating, Add</i>	10,297.02	
<i>For Class 56 Rating, Add</i>	13,635.67	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2521	EA	36" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	50,277.01	2,184.97
		<i>For Class 52 Rating, Deduct</i>	-5,166.31	
		<i>For Class 54 Rating, Add</i>	7,084.69	
		<i>For Class 55 Rating, Add</i>	10,552.97	
		<i>For Class 56 Rating, Add</i>	13,974.28	
40 05 19 00-2522	EA	36" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	51,430.13	2,188.95
		<i>For Class 52 Rating, Deduct</i>	-5,292.49	
		<i>For Class 54 Rating, Add</i>	7,256.83	
		<i>For Class 55 Rating, Add</i>	10,808.92	
		<i>For Class 56 Rating, Add</i>	14,312.89	
40 05 19 00-2523	EA	36" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	52,583.25	2,192.92
		<i>For Class 52 Rating, Deduct</i>	-5,418.67	
		<i>For Class 54 Rating, Add</i>	7,428.97	
		<i>For Class 55 Rating, Add</i>	11,064.87	
		<i>For Class 56 Rating, Add</i>	14,651.50	
40 05 19 00-2524	EA	36" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	53,736.37	2,196.90
		<i>For Class 52 Rating, Deduct</i>	-5,544.85	
		<i>For Class 54 Rating, Add</i>	7,601.10	
		<i>For Class 55 Rating, Add</i>	11,320.81	
		<i>For Class 56 Rating, Add</i>	14,990.11	
40 05 19 00-2525	EA	36" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	54,889.48	2,200.87
		<i>For Class 52 Rating, Deduct</i>	-5,671.03	
		<i>For Class 54 Rating, Add</i>	7,773.24	
		<i>For Class 55 Rating, Add</i>	11,576.76	
		<i>For Class 56 Rating, Add</i>	15,328.72	
40 05 19 00-2526	EA	36" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	56,042.60	2,204.84
		<i>For Class 52 Rating, Deduct</i>	-5,797.21	
		<i>For Class 54 Rating, Add</i>	7,945.38	
		<i>For Class 55 Rating, Add</i>	11,832.71	
		<i>For Class 56 Rating, Add</i>	15,667.34	
40 05 19 00-2527	EA	36" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	57,195.73	2,208.81
		<i>For Class 52 Rating, Deduct</i>	-5,923.39	
		<i>For Class 54 Rating, Add</i>	8,117.52	
		<i>For Class 55 Rating, Add</i>	12,088.66	
		<i>For Class 56 Rating, Add</i>	16,005.95	

40 05 19 00-2528 42" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-2060)

40 05 19 00-2529	EA	42" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	23,767.80	2,614.03
		<i>For Class 52 Rating, Deduct</i>	-2,178.79	
		<i>For Class 54 Rating, Add</i>	3,018.60	
		<i>For Class 55 Rating, Add</i>	4,512.05	
		<i>For Class 56 Rating, Add</i>	5,985.70	
40 05 19 00-2530	EA	42" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	25,460.74	2,618.00
		<i>For Class 52 Rating, Deduct</i>	-2,364.35	
		<i>For Class 54 Rating, Add</i>	3,271.71	
		<i>For Class 55 Rating, Add</i>	4,888.38	
		<i>For Class 56 Rating, Add</i>	6,483.55	
40 05 19 00-2531	EA	42" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	27,139.61	2,621.97
		<i>For Class 52 Rating, Deduct</i>	-2,548.36	
		<i>For Class 54 Rating, Add</i>	3,522.71	
		<i>For Class 55 Rating, Add</i>	5,261.57	
		<i>For Class 56 Rating, Add</i>	6,977.26	
40 05 19 00-2532	EA	42" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,835.36	2,625.95
		<i>For Class 52 Rating, Deduct</i>	-2,734.23	
		<i>For Class 54 Rating, Add</i>	3,776.24	
		<i>For Class 55 Rating, Add</i>	5,638.52	
		<i>For Class 56 Rating, Add</i>	7,475.95	
40 05 19 00-2533	EA	42" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,519.85	2,629.92
		<i>For Class 52 Rating, Deduct</i>	-2,918.86	
		<i>For Class 54 Rating, Add</i>	4,028.09	
		<i>For Class 55 Rating, Add</i>	6,012.97	
		<i>For Class 56 Rating, Add</i>	7,971.31	
40 05 19 00-2534	EA	42" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	32,221.21	2,633.89
		<i>For Class 52 Rating, Deduct</i>	-3,105.35	
		<i>For Class 54 Rating, Add</i>	4,282.46	
		<i>For Class 55 Rating, Add</i>	6,391.17	
		<i>For Class 56 Rating, Add</i>	8,471.66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2535 EA 42" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	33,905.71	2,637.86
For Class 52 Rating, Deduct	-3,289.98	
For Class 54 Rating, Add	4,534.30	
For Class 55 Rating, Add	6,765.62	
For Class 56 Rating, Add	8,967.02	
40 05 19 00-2536 EA 42" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	35,609.89	2,641.83
For Class 52 Rating, Deduct	-3,476.78	
For Class 54 Rating, Add	4,789.10	
For Class 55 Rating, Add	7,144.45	
For Class 56 Rating, Add	9,468.20	
40 05 19 00-2537 EA 42" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	37,300.01	2,645.80
For Class 52 Rating, Deduct	-3,662.03	
For Class 54 Rating, Add	5,041.79	
For Class 55 Rating, Add	7,520.15	
For Class 56 Rating, Add	9,965.22	
40 05 19 00-2538 EA 42" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	39,004.18	2,649.78
For Class 52 Rating, Deduct	-3,848.83	
For Class 54 Rating, Add	5,296.58	
For Class 55 Rating, Add	7,898.98	
For Class 56 Rating, Add	10,466.40	
40 05 19 00-2539 EA 42" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	40,694.31	2,653.76
For Class 52 Rating, Deduct	-4,034.08	
For Class 54 Rating, Add	5,549.27	
For Class 55 Rating, Add	8,274.68	
For Class 56 Rating, Add	10,963.42	
40 05 19 00-2540 EA 42" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	42,401.30	2,657.73
For Class 52 Rating, Deduct	-4,221.19	
For Class 54 Rating, Add	5,804.49	
For Class 55 Rating, Add	8,654.14	
For Class 56 Rating, Add	11,465.43	
40 05 19 00-2541 EA 42" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	44,091.42	2,661.70
For Class 52 Rating, Deduct	-4,406.44	
For Class 54 Rating, Add	6,057.18	
For Class 55 Rating, Add	9,029.84	
For Class 56 Rating, Add	11,962.45	
40 05 19 00-2542 EA 42" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	45,787.16	2,665.67
For Class 52 Rating, Deduct	-4,592.31	
For Class 54 Rating, Add	6,310.71	
For Class 55 Rating, Add	9,406.80	
For Class 56 Rating, Add	12,461.14	
40 05 19 00-2543 EA 42" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	47,491.33	2,669.64
For Class 52 Rating, Deduct	-4,779.11	
For Class 54 Rating, Add	6,565.50	
For Class 55 Rating, Add	9,785.63	
For Class 56 Rating, Add	12,962.31	
40 05 19 00-2544 EA 42" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	49,184.26	2,673.61
For Class 52 Rating, Deduct	-4,964.67	
For Class 54 Rating, Add	6,818.61	
For Class 55 Rating, Add	10,161.95	
For Class 56 Rating, Add	13,460.17	
40 05 19 00-2545 EA 42" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	50,896.87	2,677.59
For Class 52 Rating, Deduct	-5,152.39	
For Class 54 Rating, Add	7,074.67	
For Class 55 Rating, Add	10,542.67	
For Class 56 Rating, Add	13,963.83	
40 05 19 00-2546 EA 42" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	52,592.62	2,681.56
For Class 52 Rating, Deduct	-5,338.26	
For Class 54 Rating, Add	7,328.20	
For Class 55 Rating, Add	10,919.62	
For Class 56 Rating, Add	14,462.51	
40 05 19 00-2547 EA 42" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	54,302.42	2,685.54
For Class 52 Rating, Deduct	-5,525.68	
For Class 54 Rating, Add	7,583.84	
For Class 55 Rating, Add	11,299.71	
For Class 56 Rating, Add	14,965.35	
40 05 19 00-2548 EA 42" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	55,995.35	2,689.51
For Class 52 Rating, Deduct	-5,711.24	
For Class 54 Rating, Add	7,836.95	
For Class 55 Rating, Add	11,676.04	
For Class 56 Rating, Add	15,463.20	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT DEMOLITION		
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2549	EA	42" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	57,710.77	2,693.48
		<i>For Class 52 Rating, Deduct</i>	-5,899.27	
		<i>For Class 54 Rating, Add</i>	8,093.43	
		<i>For Class 55 Rating, Add</i>	12,057.38	
		<i>For Class 56 Rating, Add</i>	15,967.69	
40 05 19 00-2550	EA	42" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	59,406.52	2,697.45
		<i>For Class 52 Rating, Deduct</i>	-6,085.14	
		<i>For Class 54 Rating, Add</i>	8,346.97	
		<i>For Class 55 Rating, Add</i>	12,434.33	
		<i>For Class 56 Rating, Add</i>	16,466.38	
40 05 19 00-2551	EA	42" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	61,116.32	2,701.43
		<i>For Class 52 Rating, Deduct</i>	-6,272.56	
		<i>For Class 54 Rating, Add</i>	8,602.60	
		<i>For Class 55 Rating, Add</i>	12,814.42	
		<i>For Class 56 Rating, Add</i>	16,969.21	
40 05 19 00-2552	EA	42" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	62,812.06	2,705.40
		<i>For Class 52 Rating, Deduct</i>	-6,458.43	
		<i>For Class 54 Rating, Add</i>	8,856.13	
		<i>For Class 55 Rating, Add</i>	13,191.37	
		<i>For Class 56 Rating, Add</i>	17,467.89	
40 05 19 00-2553	EA	42" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	64,527.49	2,709.37
		<i>For Class 52 Rating, Deduct</i>	-6,646.46	
		<i>For Class 54 Rating, Add</i>	9,112.62	
		<i>For Class 55 Rating, Add</i>	13,572.71	
		<i>For Class 56 Rating, Add</i>	17,972.39	
40 05 19 00-2554	EA	42" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	66,223.22	2,713.34
		<i>For Class 52 Rating, Deduct</i>	-6,832.33	
		<i>For Class 54 Rating, Add</i>	9,366.15	
		<i>For Class 55 Rating, Add</i>	13,949.67	
		<i>For Class 56 Rating, Add</i>	18,471.07	
40 05 19 00-2555	EA	42" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	67,933.02	2,717.31
		<i>For Class 52 Rating, Deduct</i>	-7,019.75	
		<i>For Class 54 Rating, Add</i>	9,621.79	
		<i>For Class 55 Rating, Add</i>	14,329.75	
		<i>For Class 56 Rating, Add</i>	18,973.90	
40 05 19 00-2556	EA	42" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	69,631.59	2,721.29
		<i>For Class 52 Rating, Deduct</i>	-7,205.93	
		<i>For Class 54 Rating, Add</i>	9,875.74	
		<i>For Class 55 Rating, Add</i>	14,707.33	
		<i>For Class 56 Rating, Add</i>	19,473.42	
40 05 19 00-2557	EA	42" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	71,006.82	2,725.26
		<i>For Class 52 Rating, Deduct</i>	-7,356.54	
		<i>For Class 54 Rating, Add</i>	10,081.19	
		<i>For Class 55 Rating, Add</i>	15,012.81	
		<i>For Class 56 Rating, Add</i>	19,877.55	
40 05 19 00-2558	EA	42" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	73,042.75	2,729.24
		<i>For Class 52 Rating, Deduct</i>	-7,579.83	
		<i>For Class 54 Rating, Add</i>	10,385.75	
		<i>For Class 55 Rating, Add</i>	15,465.63	
		<i>For Class 56 Rating, Add</i>	20,476.59	
40 05 19 00-2559	EA	42" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	74,738.49	2,733.21
		<i>For Class 52 Rating, Deduct</i>	-7,765.70	
		<i>For Class 54 Rating, Add</i>	10,639.29	
		<i>For Class 55 Rating, Add</i>	15,842.58	
		<i>For Class 56 Rating, Add</i>	20,975.28	
40 05 19 00-2560	EA	42" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	76,451.10	2,737.18
		<i>For Class 52 Rating, Deduct</i>	-7,953.42	
		<i>For Class 54 Rating, Add</i>	10,895.35	
		<i>For Class 55 Rating, Add</i>	16,223.29	
		<i>For Class 56 Rating, Add</i>	21,478.94	
40 05 19 00-2561	EA	42" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	78,149.65	2,741.15
		<i>For Class 52 Rating, Deduct</i>	-8,139.60	
		<i>For Class 54 Rating, Add</i>	11,149.30	
		<i>For Class 55 Rating, Add</i>	16,600.87	
		<i>For Class 56 Rating, Add</i>	21,978.45	
40 05 19 00-2562	EA	42" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	79,865.08	2,745.12
		<i>For Class 52 Rating, Deduct</i>	-8,327.64	
		<i>For Class 54 Rating, Add</i>	11,405.78	
		<i>For Class 55 Rating, Add</i>	16,982.22	
		<i>For Class 56 Rating, Add</i>	22,482.95	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2563 EA 42" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	81,558.01	2,749.09
For Class 52 Rating, Deduct	-8,513.20	
For Class 54 Rating, Add	11,658.89	
For Class 55 Rating, Add	17,358.54	
For Class 56 Rating, Add	22,980.80	
40 05 19 00-2564 48" Flanged End (FxF), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2060)</small>		
40 05 19 00-2565 EA 48" Flanged (FxF), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	29,812.05	3,285.41
For Class 52 Rating, Deduct	-2,731.76	
For Class 54 Rating, Add	3,784.86	
For Class 55 Rating, Add	5,657.49	
For Class 56 Rating, Add	7,505.28	
40 05 19 00-2566 EA 48" Flanged (FxF), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	32,230.35	3,289.39
For Class 52 Rating, Deduct	-2,997.11	
For Class 54 Rating, Add	4,146.77	
For Class 55 Rating, Add	6,195.57	
For Class 56 Rating, Add	8,217.12	
40 05 19 00-2567 EA 48" Flanged (FxF), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	34,654.28	3,293.36
For Class 52 Rating, Deduct	-3,263.08	
For Class 54 Rating, Add	4,509.53	
For Class 55 Rating, Add	6,734.91	
For Class 56 Rating, Add	8,930.62	
40 05 19 00-2568 EA 48" Flanged (FxF), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	37,106.32	3,297.33
For Class 52 Rating, Deduct	-3,532.14	
For Class 54 Rating, Add	4,876.51	
For Class 55 Rating, Add	7,280.52	
For Class 56 Rating, Add	9,652.41	
40 05 19 00-2569 EA 48" Flanged (FxF), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	39,549.93	3,301.30
For Class 52 Rating, Deduct	-3,800.28	
For Class 54 Rating, Add	5,242.22	
For Class 55 Rating, Add	7,824.24	
For Class 56 Rating, Add	10,371.72	
40 05 19 00-2570 EA 48" Flanged (FxF), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	41,999.16	3,305.27
For Class 52 Rating, Deduct	-4,069.03	
For Class 54 Rating, Add	5,608.77	
For Class 55 Rating, Add	8,369.22	
For Class 56 Rating, Add	11,092.68	
40 05 19 00-2571 EA 48" Flanged (FxF), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	44,465.26	3,309.24
For Class 52 Rating, Deduct	-4,339.64	
For Class 54 Rating, Add	5,977.86	
For Class 55 Rating, Add	8,917.96	
For Class 56 Rating, Add	11,818.62	
40 05 19 00-2572 EA 48" Flanged (FxF), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	46,925.74	3,313.22
For Class 52 Rating, Deduct	-4,609.63	
For Class 54 Rating, Add	6,346.10	
For Class 55 Rating, Add	9,465.45	
For Class 56 Rating, Add	12,542.91	
40 05 19 00-2573 EA 48" Flanged (FxF), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	49,383.40	3,317.19
For Class 52 Rating, Deduct	-4,879.31	
For Class 54 Rating, Add	6,713.92	
For Class 55 Rating, Add	10,012.31	
For Class 56 Rating, Add	13,266.36	
40 05 19 00-2574 EA 48" Flanged (FxF), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	51,866.37	3,321.16
For Class 52 Rating, Deduct	-5,151.77	
For Class 54 Rating, Add	7,085.53	
For Class 55 Rating, Add	10,564.82	
For Class 56 Rating, Add	13,997.27	
40 05 19 00-2575 EA 48" Flanged (FxF), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	54,332.46	3,325.14
For Class 52 Rating, Deduct	-5,422.38	
For Class 54 Rating, Add	7,454.61	
For Class 55 Rating, Add	11,113.56	
For Class 56 Rating, Add	14,723.21	
40 05 19 00-2576 EA 48" Flanged (FxF), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	56,818.24	3,329.11
For Class 52 Rating, Deduct	-5,695.16	
For Class 54 Rating, Add	7,826.65	
For Class 55 Rating, Add	11,666.69	
For Class 56 Rating, Add	15,454.96	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2577	EA	48" Flanged (FxF), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	59,289.96		3,333.08
		<i>For Class 52 Rating, Deduct</i>	-5,966.38		
		<i>For Class 54 Rating, Add</i>	8,196.58		
		<i>For Class 55 Rating, Add</i>	12,216.69		
		<i>For Class 56 Rating, Add</i>	16,182.56		
40 05 19 00-2578	EA	48" Flanged (FxF), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	61,764.51		3,337.06
		<i>For Class 52 Rating, Deduct</i>	-6,237.92		
		<i>For Class 54 Rating, Add</i>	8,566.93		
		<i>For Class 55 Rating, Add</i>	12,767.31		
		<i>For Class 56 Rating, Add</i>	16,910.99		
40 05 19 00-2579	EA	48" Flanged (FxF), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	64,255.91		3,341.03
		<i>For Class 52 Rating, Deduct</i>	-6,511.31		
		<i>For Class 54 Rating, Add</i>	8,939.81		
		<i>For Class 55 Rating, Add</i>	13,321.70		
		<i>For Class 56 Rating, Add</i>	17,644.39		
40 05 19 00-2580	EA	48" Flanged (FxF), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	66,736.06		3,345.00
		<i>For Class 52 Rating, Deduct</i>	-6,783.47		
		<i>For Class 54 Rating, Add</i>	9,311.00		
		<i>For Class 55 Rating, Add</i>	13,873.57		
		<i>For Class 56 Rating, Add</i>	18,374.48		
40 05 19 00-2581	EA	48" Flanged (FxF), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	69,213.41		3,348.97
		<i>For Class 52 Rating, Deduct</i>	-7,055.31		
		<i>For Class 54 Rating, Add</i>	9,681.77		
		<i>For Class 55 Rating, Add</i>	14,424.82		
		<i>For Class 56 Rating, Add</i>	19,103.74		
40 05 19 00-2582	EA	48" Flanged (FxF), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	71,710.43		3,352.94
		<i>For Class 52 Rating, Deduct</i>	-7,329.32		
		<i>For Class 54 Rating, Add</i>	10,055.49		
		<i>For Class 55 Rating, Add</i>	14,980.46		
		<i>For Class 56 Rating, Add</i>	19,838.80		
40 05 19 00-2583	EA	48" Flanged (FxF), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	74,193.40		3,356.91
		<i>For Class 52 Rating, Deduct</i>	-7,601.79		
		<i>For Class 54 Rating, Add</i>	10,427.11		
		<i>For Class 55 Rating, Add</i>	15,532.97		
		<i>For Class 56 Rating, Add</i>	20,569.72		
40 05 19 00-2584	EA	48" Flanged (FxF), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	76,673.56		3,360.90
		<i>For Class 52 Rating, Deduct</i>	-7,873.94		
		<i>For Class 54 Rating, Add</i>	10,798.30		
		<i>For Class 55 Rating, Add</i>	16,084.84		
		<i>For Class 56 Rating, Add</i>	21,299.80		
40 05 19 00-2585	EA	48" Flanged (FxF), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	79,173.39		3,364.87
		<i>For Class 52 Rating, Deduct</i>	-8,148.26		
		<i>For Class 54 Rating, Add</i>	11,172.45		
		<i>For Class 55 Rating, Add</i>	16,641.11		
		<i>For Class 56 Rating, Add</i>	22,035.70		
40 05 19 00-2586	EA	48" Flanged (FxF), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	81,661.98		3,368.84
		<i>For Class 52 Rating, Deduct</i>	-8,421.35		
		<i>For Class 54 Rating, Add</i>	11,544.90		
		<i>For Class 55 Rating, Add</i>	17,194.87		
		<i>For Class 56 Rating, Add</i>	22,768.27		
40 05 19 00-2587	EA	48" Flanged (FxF), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	84,144.96		3,372.81
		<i>For Class 52 Rating, Deduct</i>	-8,693.81		
		<i>For Class 54 Rating, Add</i>	11,916.52		
		<i>For Class 55 Rating, Add</i>	17,747.37		
		<i>For Class 56 Rating, Add</i>	23,499.19		
40 05 19 00-2588	EA	48" Flanged (FxF), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	86,647.61		3,376.78
		<i>For Class 52 Rating, Deduct</i>	-8,968.44		
		<i>For Class 54 Rating, Add</i>	12,291.09		
		<i>For Class 55 Rating, Add</i>	18,304.27		
		<i>For Class 56 Rating, Add</i>	24,235.91		
40 05 19 00-2589	EA	48" Flanged (FxF), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	89,136.20		3,380.75
		<i>For Class 52 Rating, Deduct</i>	-9,241.52		
		<i>For Class 54 Rating, Add</i>	12,663.54		
		<i>For Class 55 Rating, Add</i>	18,858.02		
		<i>For Class 56 Rating, Add</i>	24,968.49		
40 05 19 00-2590	EA	48" Flanged (FxF), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	91,621.97		3,384.72
		<i>For Class 52 Rating, Deduct</i>	-9,514.30		
		<i>For Class 54 Rating, Add</i>	13,035.58		
		<i>For Class 55 Rating, Add</i>	19,411.15		
		<i>For Class 56 Rating, Add</i>	25,700.23		



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2591 EA 48" Flanged (FxF), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	94,127.43	3,388.70
<i>For Class 52 Rating, Deduct</i>	-9,789.23	
<i>For Class 54 Rating, Add</i>	13,410.57	
<i>For Class 55 Rating, Add</i>	19,968.67	
<i>For Class 56 Rating, Add</i>	26,437.78	
40 05 19 00-2592 EA 48" Flanged (FxF), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	96,618.84	3,392.67
<i>For Class 52 Rating, Deduct</i>	-10,062.63	
<i>For Class 54 Rating, Add</i>	13,783.45	
<i>For Class 55 Rating, Add</i>	20,523.06	
<i>For Class 56 Rating, Add</i>	27,171.19	
40 05 19 00-2593 EA 48" Flanged (FxF), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	98,817.84	3,396.65
<i>For Class 52 Rating, Deduct</i>	-10,303.86	
<i>For Class 54 Rating, Add</i>	14,112.47	
<i>For Class 55 Rating, Add</i>	21,012.24	
<i>For Class 56 Rating, Add</i>	27,818.34	
40 05 19 00-2594 EA 48" Flanged (FxF), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	101,615.70	3,400.62
<i>For Class 52 Rating, Deduct</i>	-10,610.96	
<i>For Class 54 Rating, Add</i>	14,531.32	
<i>For Class 55 Rating, Add</i>	21,634.96	
<i>For Class 56 Rating, Add</i>	28,642.15	
40 05 19 00-2595 EA 48" Flanged (FxF), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	104,104.30	3,404.59
<i>For Class 52 Rating, Deduct</i>	-10,884.04	
<i>For Class 54 Rating, Add</i>	14,903.77	
<i>For Class 55 Rating, Add</i>	22,188.72	
<i>For Class 56 Rating, Add</i>	29,374.72	
40 05 19 00-2596 EA 48" Flanged (FxF), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	106,615.38	3,408.56
<i>For Class 52 Rating, Deduct</i>	-11,159.60	
<i>For Class 54 Rating, Add</i>	15,279.61	
<i>For Class 55 Rating, Add</i>	22,747.50	
<i>For Class 56 Rating, Add</i>	30,113.93	
40 05 19 00-2597 EA 48" Flanged (FxF), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	109,103.97	3,412.54
<i>For Class 52 Rating, Deduct</i>	-11,432.68	
<i>For Class 54 Rating, Add</i>	15,652.07	
<i>For Class 55 Rating, Add</i>	23,301.25	
<i>For Class 56 Rating, Add</i>	30,846.51	
40 05 19 00-2598 EA 48" Flanged (FxF), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	111,592.56	3,416.51
<i>For Class 52 Rating, Deduct</i>	-11,705.76	
<i>For Class 54 Rating, Add</i>	16,024.52	
<i>For Class 55 Rating, Add</i>	23,855.01	
<i>For Class 56 Rating, Add</i>	31,579.08	
40 05 19 00-2599 EA 48" Flanged (FxF), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	114,106.46	3,420.48
<i>For Class 52 Rating, Deduct</i>	-11,981.63	
<i>For Class 54 Rating, Add</i>	16,400.78	
<i>For Class 55 Rating, Add</i>	24,414.41	
<i>For Class 56 Rating, Add</i>	32,319.13	
40 05 19 00-2600 Flanged End x Grooved End (FxG), Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2059)</small>		
40 05 19 00-2601 4" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>		
40 05 19 00-2602 EA 4" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	778.70	181.79
<i>For Class 52 Rating, Deduct</i>	-55.36	
<i>For Class 54 Rating, Add</i>	78.79	
<i>For Class 55 Rating, Add</i>	118.84	
<i>For Class 56 Rating, Add</i>	158.38	
40 05 19 00-2603 EA 4" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	890.36	184.97
<i>For Class 52 Rating, Deduct</i>	-67.11	
<i>For Class 54 Rating, Add</i>	94.88	
<i>For Class 55 Rating, Add</i>	142.78	
<i>For Class 56 Rating, Add</i>	190.07	
40 05 19 00-2604 EA 4" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,002.01	188.14
<i>For Class 52 Rating, Deduct</i>	-78.86	
<i>For Class 54 Rating, Add</i>	110.96	
<i>For Class 55 Rating, Add</i>	166.72	
<i>For Class 56 Rating, Add</i>	221.76	
40 05 19 00-2605 EA 4" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,113.67	191.33
<i>For Class 52 Rating, Deduct</i>	-90.62	
<i>For Class 54 Rating, Add</i>	127.05	
<i>For Class 55 Rating, Add</i>	190.66	
<i>For Class 56 Rating, Add</i>	253.45	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2606	EA	4" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,225.31		194.51
		<i>For Class 52 Rating, Deduct</i>	-102.37		
		<i>For Class 54 Rating, Add</i>	143.13		
		<i>For Class 55 Rating, Add</i>	214.60		
		<i>For Class 56 Rating, Add</i>	285.14		
40 05 19 00-2607	EA	4" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,336.97		197.69
		<i>For Class 52 Rating, Deduct</i>	-114.12		
		<i>For Class 54 Rating, Add</i>	159.21		
		<i>For Class 55 Rating, Add</i>	238.54		
		<i>For Class 56 Rating, Add</i>	316.83		
40 05 19 00-2608	EA	4" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,448.62		200.86
		<i>For Class 52 Rating, Deduct</i>	-125.87		
		<i>For Class 54 Rating, Add</i>	175.30		
		<i>For Class 55 Rating, Add</i>	262.48		
		<i>For Class 56 Rating, Add</i>	348.52		
40 05 19 00-2609	EA	4" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,560.28		204.04
		<i>For Class 52 Rating, Deduct</i>	-137.62		
		<i>For Class 54 Rating, Add</i>	191.38		
		<i>For Class 55 Rating, Add</i>	286.42		
		<i>For Class 56 Rating, Add</i>	380.21		
40 05 19 00-2610	EA	4" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,671.92		207.22
		<i>For Class 52 Rating, Deduct</i>	-149.38		
		<i>For Class 54 Rating, Add</i>	207.46		
		<i>For Class 55 Rating, Add</i>	310.36		
		<i>For Class 56 Rating, Add</i>	411.90		
40 05 19 00-2611	EA	4" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,783.58		210.39
		<i>For Class 52 Rating, Deduct</i>	-161.13		
		<i>For Class 54 Rating, Add</i>	223.55		
		<i>For Class 55 Rating, Add</i>	334.30		
		<i>For Class 56 Rating, Add</i>	443.59		
40 05 19 00-2612	EA	4" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,895.23		213.57
		<i>For Class 52 Rating, Deduct</i>	-172.88		
		<i>For Class 54 Rating, Add</i>	239.63		
		<i>For Class 55 Rating, Add</i>	358.24		
		<i>For Class 56 Rating, Add</i>	475.28		
40 05 19 00-2613	EA	4" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,006.89		216.76
		<i>For Class 52 Rating, Deduct</i>	-184.63		
		<i>For Class 54 Rating, Add</i>	255.71		
		<i>For Class 55 Rating, Add</i>	382.18		
		<i>For Class 56 Rating, Add</i>	506.97		
40 05 19 00-2614	EA	4" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,118.54		219.93
		<i>For Class 52 Rating, Deduct</i>	-196.39		
		<i>For Class 54 Rating, Add</i>	271.80		
		<i>For Class 55 Rating, Add</i>	406.12		
		<i>For Class 56 Rating, Add</i>	538.67		
40 05 19 00-2615	EA	4" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,230.19		223.11
		<i>For Class 52 Rating, Deduct</i>	-208.14		
		<i>For Class 54 Rating, Add</i>	287.88		
		<i>For Class 55 Rating, Add</i>	430.06		
		<i>For Class 56 Rating, Add</i>	570.35		
40 05 19 00-2616	EA	4" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,341.84		226.29
		<i>For Class 52 Rating, Deduct</i>	-219.89		
		<i>For Class 54 Rating, Add</i>	303.96		
		<i>For Class 55 Rating, Add</i>	454.00		
		<i>For Class 56 Rating, Add</i>	602.04		
40 05 19 00-2617	EA	4" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,453.50		229.46
		<i>For Class 52 Rating, Deduct</i>	-231.64		
		<i>For Class 54 Rating, Add</i>	320.05		
		<i>For Class 55 Rating, Add</i>	477.94		
		<i>For Class 56 Rating, Add</i>	633.74		
40 05 19 00-2618	EA	4" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,565.15		232.64
		<i>For Class 52 Rating, Deduct</i>	-243.39		
		<i>For Class 54 Rating, Add</i>	336.13		
		<i>For Class 55 Rating, Add</i>	501.88		
		<i>For Class 56 Rating, Add</i>	665.43		
40 05 19 00-2619	EA	4" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,676.81		235.82
		<i>For Class 52 Rating, Deduct</i>	-255.15		
		<i>For Class 54 Rating, Add</i>	352.21		
		<i>For Class 55 Rating, Add</i>	525.82		
		<i>For Class 56 Rating, Add</i>	697.12		



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2620	EA			4" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,788.46	238.99
				<i>For Class 52 Rating, Deduct</i>	-266.90	
				<i>For Class 54 Rating, Add</i>	368.30	
				<i>For Class 55 Rating, Add</i>	549.76	
				<i>For Class 56 Rating, Add</i>	728.81	
40 05 19 00-2621	EA			4" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,900.12	242.18
				<i>For Class 52 Rating, Deduct</i>	-278.65	
				<i>For Class 54 Rating, Add</i>	384.38	
				<i>For Class 55 Rating, Add</i>	573.71	
				<i>For Class 56 Rating, Add</i>	760.50	
40 05 19 00-2622	EA			4" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,011.77	245.36
				<i>For Class 52 Rating, Deduct</i>	-290.40	
				<i>For Class 54 Rating, Add</i>	400.46	
				<i>For Class 55 Rating, Add</i>	597.65	
				<i>For Class 56 Rating, Add</i>	792.19	
40 05 19 00-2623	EA			4" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,123.43	248.54
				<i>For Class 52 Rating, Deduct</i>	-302.15	
				<i>For Class 54 Rating, Add</i>	416.55	
				<i>For Class 55 Rating, Add</i>	621.59	
				<i>For Class 56 Rating, Add</i>	823.88	
40 05 19 00-2624	EA			4" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,235.07	251.71
				<i>For Class 52 Rating, Deduct</i>	-313.91	
				<i>For Class 54 Rating, Add</i>	432.63	
				<i>For Class 55 Rating, Add</i>	645.53	
				<i>For Class 56 Rating, Add</i>	855.57	
40 05 19 00-2625	EA			4" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,346.73	254.89
				<i>For Class 52 Rating, Deduct</i>	-325.66	
				<i>For Class 54 Rating, Add</i>	448.71	
				<i>For Class 55 Rating, Add</i>	669.47	
				<i>For Class 56 Rating, Add</i>	887.26	
40 05 19 00-2626	EA			4" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,458.38	258.07
				<i>For Class 52 Rating, Deduct</i>	-337.41	
				<i>For Class 54 Rating, Add</i>	464.80	
				<i>For Class 55 Rating, Add</i>	693.41	
				<i>For Class 56 Rating, Add</i>	918.95	
40 05 19 00-2627	EA			4" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,570.04	261.24
				<i>For Class 52 Rating, Deduct</i>	-349.16	
				<i>For Class 54 Rating, Add</i>	480.88	
				<i>For Class 55 Rating, Add</i>	717.35	
				<i>For Class 56 Rating, Add</i>	950.64	
40 05 19 00-2628	EA			4" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,681.68	264.42
				<i>For Class 52 Rating, Deduct</i>	-360.91	
				<i>For Class 54 Rating, Add</i>	496.96	
				<i>For Class 55 Rating, Add</i>	741.29	
				<i>For Class 56 Rating, Add</i>	982.33	
40 05 19 00-2629	EA			4" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,793.34	267.61
				<i>For Class 52 Rating, Deduct</i>	-372.67	
				<i>For Class 54 Rating, Add</i>	513.05	
				<i>For Class 55 Rating, Add</i>	765.23	
				<i>For Class 56 Rating, Add</i>	1,014.02	
40 05 19 00-2630	EA			4" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,904.99	270.78
				<i>For Class 52 Rating, Deduct</i>	-384.42	
				<i>For Class 54 Rating, Add</i>	529.13	
				<i>For Class 55 Rating, Add</i>	789.17	
				<i>For Class 56 Rating, Add</i>	1,045.71	
40 05 19 00-2631	EA			4" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,016.64	273.96
				<i>For Class 52 Rating, Deduct</i>	-396.17	
				<i>For Class 54 Rating, Add</i>	545.21	
				<i>For Class 55 Rating, Add</i>	813.11	
				<i>For Class 56 Rating, Add</i>	1,077.40	
40 05 19 00-2632	EA			4" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,128.29	277.14
				<i>For Class 52 Rating, Deduct</i>	-407.92	
				<i>For Class 54 Rating, Add</i>	561.30	
				<i>For Class 55 Rating, Add</i>	837.05	
				<i>For Class 56 Rating, Add</i>	1,109.09	
40 05 19 00-2633	EA			4" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,239.94	280.31
				<i>For Class 52 Rating, Deduct</i>	-419.68	
				<i>For Class 54 Rating, Add</i>	577.38	
				<i>For Class 55 Rating, Add</i>	860.99	
				<i>For Class 56 Rating, Add</i>	1,140.78	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-2634	EA	4" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,351.60	283.49
		<i>For Class 52 Rating, Deduct</i>	-431.43	
		<i>For Class 54 Rating, Add</i>	593.46	
		<i>For Class 55 Rating, Add</i>	884.93	
		<i>For Class 56 Rating, Add</i>	1,172.47	
40 05 19 00-2635	EA	4" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,463.25	286.67
		<i>For Class 52 Rating, Deduct</i>	-443.18	
		<i>For Class 54 Rating, Add</i>	609.55	
		<i>For Class 55 Rating, Add</i>	908.87	
		<i>For Class 56 Rating, Add</i>	1,204.16	
40 05 19 00-2636	EA	4" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,574.91	289.84
		<i>For Class 52 Rating, Deduct</i>	-454.93	
		<i>For Class 54 Rating, Add</i>	625.63	
		<i>For Class 55 Rating, Add</i>	932.81	
		<i>For Class 56 Rating, Add</i>	1,235.86	
40 05 19 00-2637	EA	4" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,686.55	293.03
		<i>For Class 52 Rating, Deduct</i>	-466.68	
		<i>For Class 54 Rating, Add</i>	641.71	
		<i>For Class 55 Rating, Add</i>	956.75	
		<i>For Class 56 Rating, Add</i>	1,267.54	
40 05 19 00-2638	EA	4" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,798.21	296.21
		<i>For Class 52 Rating, Deduct</i>	-478.44	
		<i>For Class 54 Rating, Add</i>	657.80	
		<i>For Class 55 Rating, Add</i>	980.69	
		<i>For Class 56 Rating, Add</i>	1,299.24	
40 05 19 00-2639	EA	4" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,881.74	299.39
		<i>For Class 52 Rating, Deduct</i>	-487.10	
		<i>For Class 54 Rating, Add</i>	669.66	
		<i>For Class 55 Rating, Add</i>	998.36	
		<i>For Class 56 Rating, Add</i>	1,322.63	
40 05 19 00-2640	EA	4" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,021.52	302.56
		<i>For Class 52 Rating, Deduct</i>	-501.94	
		<i>For Class 54 Rating, Add</i>	689.97	
		<i>For Class 55 Rating, Add</i>	1,028.57	
		<i>For Class 56 Rating, Add</i>	1,362.62	

40 05 19 00-2641 6" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-2600)

40 05 19 00-2642	EA	6" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,007.41	228.83
		<i>For Class 52 Rating, Deduct</i>	-72.68	
		<i>For Class 54 Rating, Add</i>	103.27	
		<i>For Class 55 Rating, Add</i>	155.66	
		<i>For Class 56 Rating, Add</i>	207.39	
40 05 19 00-2643	EA	6" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,135.93	232.00
		<i>For Class 52 Rating, Deduct</i>	-86.29	
		<i>For Class 54 Rating, Add</i>	121.88	
		<i>For Class 55 Rating, Add</i>	183.36	
		<i>For Class 56 Rating, Add</i>	244.06	
40 05 19 00-2644	EA	6" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,264.45	235.18
		<i>For Class 52 Rating, Deduct</i>	-99.89	
		<i>For Class 54 Rating, Add</i>	140.49	
		<i>For Class 55 Rating, Add</i>	211.06	
		<i>For Class 56 Rating, Add</i>	280.72	
40 05 19 00-2645	EA	6" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,392.98	238.36
		<i>For Class 52 Rating, Deduct</i>	-113.50	
		<i>For Class 54 Rating, Add</i>	159.11	
		<i>For Class 55 Rating, Add</i>	238.77	
		<i>For Class 56 Rating, Add</i>	317.39	
40 05 19 00-2646	EA	6" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,521.49	241.54
		<i>For Class 52 Rating, Deduct</i>	-127.11	
		<i>For Class 54 Rating, Add</i>	177.72	
		<i>For Class 55 Rating, Add</i>	266.47	
		<i>For Class 56 Rating, Add</i>	354.06	
40 05 19 00-2647	EA	6" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,650.02	244.72
		<i>For Class 52 Rating, Deduct</i>	-140.72	
		<i>For Class 54 Rating, Add</i>	196.34	
		<i>For Class 55 Rating, Add</i>	294.17	
		<i>For Class 56 Rating, Add</i>	390.72	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2648 EA 6" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,778.54	247.90
<i>For Class 52 Rating, Deduct</i>	-154.32	
<i>For Class 54 Rating, Add</i>	214.95	
<i>For Class 55 Rating, Add</i>	321.87	
<i>For Class 56 Rating, Add</i>	427.39	
40 05 19 00-2649 EA 6" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,907.08	251.07
<i>For Class 52 Rating, Deduct</i>	-167.93	
<i>For Class 54 Rating, Add</i>	233.56	
<i>For Class 55 Rating, Add</i>	349.58	
<i>For Class 56 Rating, Add</i>	464.06	
40 05 19 00-2650 EA 6" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,035.59	254.25
<i>For Class 52 Rating, Deduct</i>	-181.54	
<i>For Class 54 Rating, Add</i>	252.18	
<i>For Class 55 Rating, Add</i>	377.28	
<i>For Class 56 Rating, Add</i>	500.72	
40 05 19 00-2651 EA 6" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,164.12	257.43
<i>For Class 52 Rating, Deduct</i>	-195.15	
<i>For Class 54 Rating, Add</i>	270.79	
<i>For Class 55 Rating, Add</i>	404.98	
<i>For Class 56 Rating, Add</i>	537.39	
40 05 19 00-2652 EA 6" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,292.64	260.61
<i>For Class 52 Rating, Deduct</i>	-208.76	
<i>For Class 54 Rating, Add</i>	289.41	
<i>For Class 55 Rating, Add</i>	432.68	
<i>For Class 56 Rating, Add</i>	574.06	
40 05 19 00-2653 EA 6" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,421.16	263.78
<i>For Class 52 Rating, Deduct</i>	-222.36	
<i>For Class 54 Rating, Add</i>	308.02	
<i>For Class 55 Rating, Add</i>	460.38	
<i>For Class 56 Rating, Add</i>	610.73	
40 05 19 00-2654 EA 6" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,549.68	266.97
<i>For Class 52 Rating, Deduct</i>	-235.97	
<i>For Class 54 Rating, Add</i>	326.63	
<i>For Class 55 Rating, Add</i>	488.09	
<i>For Class 56 Rating, Add</i>	647.39	
40 05 19 00-2655 EA 6" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,678.21	270.15
<i>For Class 52 Rating, Deduct</i>	-249.58	
<i>For Class 54 Rating, Add</i>	345.25	
<i>For Class 55 Rating, Add</i>	515.79	
<i>For Class 56 Rating, Add</i>	684.06	
40 05 19 00-2656 EA 6" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,806.72	273.32
<i>For Class 52 Rating, Deduct</i>	-263.19	
<i>For Class 54 Rating, Add</i>	363.86	
<i>For Class 55 Rating, Add</i>	543.49	
<i>For Class 56 Rating, Add</i>	720.73	
40 05 19 00-2657 EA 6" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,935.25	276.50
<i>For Class 52 Rating, Deduct</i>	-276.79	
<i>For Class 54 Rating, Add</i>	382.47	
<i>For Class 55 Rating, Add</i>	571.19	
<i>For Class 56 Rating, Add</i>	757.39	
40 05 19 00-2658 EA 6" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,063.77	279.68
<i>For Class 52 Rating, Deduct</i>	-290.40	
<i>For Class 54 Rating, Add</i>	401.09	
<i>For Class 55 Rating, Add</i>	598.89	
<i>For Class 56 Rating, Add</i>	794.06	
40 05 19 00-2659 EA 6" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,192.29	282.85
<i>For Class 52 Rating, Deduct</i>	-304.01	
<i>For Class 54 Rating, Add</i>	419.70	
<i>For Class 55 Rating, Add</i>	626.60	
<i>For Class 56 Rating, Add</i>	830.73	
40 05 19 00-2660 EA 6" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,320.81	286.03
<i>For Class 52 Rating, Deduct</i>	-317.62	
<i>For Class 54 Rating, Add</i>	438.32	
<i>For Class 55 Rating, Add</i>	654.30	
<i>For Class 56 Rating, Add</i>	867.39	
40 05 19 00-2661 EA 6" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,449.34	289.21
<i>For Class 52 Rating, Deduct</i>	-331.23	
<i>For Class 54 Rating, Add</i>	456.93	
<i>For Class 55 Rating, Add</i>	682.00	
<i>For Class 56 Rating, Add</i>	904.06	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2662	EA	6" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,577.85	292.39
		<i>For Class 52 Rating, Deduct</i>	-344.83	
		<i>For Class 54 Rating, Add</i>	475.54	
		<i>For Class 55 Rating, Add</i>	709.70	
		<i>For Class 56 Rating, Add</i>	940.73	
40 05 19 00-2663	EA	6" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,706.38	295.57
		<i>For Class 52 Rating, Deduct</i>	-358.44	
		<i>For Class 54 Rating, Add</i>	494.16	
		<i>For Class 55 Rating, Add</i>	737.40	
		<i>For Class 56 Rating, Add</i>	977.39	
40 05 19 00-2664	EA	6" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,834.90	298.75
		<i>For Class 52 Rating, Deduct</i>	-372.05	
		<i>For Class 54 Rating, Add</i>	512.77	
		<i>For Class 55 Rating, Add</i>	765.11	
		<i>For Class 56 Rating, Add</i>	1,014.06	
40 05 19 00-2665	EA	6" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,963.43	301.92
		<i>For Class 52 Rating, Deduct</i>	-385.66	
		<i>For Class 54 Rating, Add</i>	531.39	
		<i>For Class 55 Rating, Add</i>	792.81	
		<i>For Class 56 Rating, Add</i>	1,050.73	
40 05 19 00-2666	EA	6" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,091.94	305.10
		<i>For Class 52 Rating, Deduct</i>	-399.26	
		<i>For Class 54 Rating, Add</i>	550.00	
		<i>For Class 55 Rating, Add</i>	820.51	
		<i>For Class 56 Rating, Add</i>	1,087.39	
40 05 19 00-2667	EA	6" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,220.47	308.28
		<i>For Class 52 Rating, Deduct</i>	-412.87	
		<i>For Class 54 Rating, Add</i>	568.61	
		<i>For Class 55 Rating, Add</i>	848.21	
		<i>For Class 56 Rating, Add</i>	1,124.06	
40 05 19 00-2668	EA	6" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,348.99	311.46
		<i>For Class 52 Rating, Deduct</i>	-426.48	
		<i>For Class 54 Rating, Add</i>	587.23	
		<i>For Class 55 Rating, Add</i>	875.92	
		<i>For Class 56 Rating, Add</i>	1,160.73	
40 05 19 00-2669	EA	6" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,477.51	314.63
		<i>For Class 52 Rating, Deduct</i>	-440.09	
		<i>For Class 54 Rating, Add</i>	605.84	
		<i>For Class 55 Rating, Add</i>	903.62	
		<i>For Class 56 Rating, Add</i>	1,197.39	
40 05 19 00-2670	EA	6" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,606.03	317.82
		<i>For Class 52 Rating, Deduct</i>	-453.70	
		<i>For Class 54 Rating, Add</i>	624.45	
		<i>For Class 55 Rating, Add</i>	931.32	
		<i>For Class 56 Rating, Add</i>	1,234.06	
40 05 19 00-2671	EA	6" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,734.57	321.00
		<i>For Class 52 Rating, Deduct</i>	-467.30	
		<i>For Class 54 Rating, Add</i>	643.07	
		<i>For Class 55 Rating, Add</i>	959.02	
		<i>For Class 56 Rating, Add</i>	1,270.73	
40 05 19 00-2672	EA	6" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,863.08	324.17
		<i>For Class 52 Rating, Deduct</i>	-480.91	
		<i>For Class 54 Rating, Add</i>	661.68	
		<i>For Class 55 Rating, Add</i>	986.72	
		<i>For Class 56 Rating, Add</i>	1,307.40	
40 05 19 00-2673	EA	6" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,991.61	327.35
		<i>For Class 52 Rating, Deduct</i>	-494.52	
		<i>For Class 54 Rating, Add</i>	680.29	
		<i>For Class 55 Rating, Add</i>	1,014.43	
		<i>For Class 56 Rating, Add</i>	1,344.06	
40 05 19 00-2674	EA	6" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,120.13	330.53
		<i>For Class 52 Rating, Deduct</i>	-508.13	
		<i>For Class 54 Rating, Add</i>	698.91	
		<i>For Class 55 Rating, Add</i>	1,042.13	
		<i>For Class 56 Rating, Add</i>	1,380.73	
40 05 19 00-2675	EA	6" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,248.65	333.70
		<i>For Class 52 Rating, Deduct</i>	-521.73	
		<i>For Class 54 Rating, Add</i>	717.52	
		<i>For Class 55 Rating, Add</i>	1,069.83	
		<i>For Class 56 Rating, Add</i>	1,417.40	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2676 EA 6" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,377.17	336.88
<i>For Class 52 Rating, Deduct</i>	-535.34	
<i>For Class 54 Rating, Add</i>	736.14	
<i>For Class 55 Rating, Add</i>	1,097.53	
<i>For Class 56 Rating, Add</i>	1,454.06	
40 05 19 00-2677 EA 6" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,505.70	340.06
<i>For Class 52 Rating, Deduct</i>	-548.95	
<i>For Class 54 Rating, Add</i>	754.75	
<i>For Class 55 Rating, Add</i>	1,125.24	
<i>For Class 56 Rating, Add</i>	1,490.73	
40 05 19 00-2678 EA 6" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,634.21	343.24
<i>For Class 52 Rating, Deduct</i>	-562.56	
<i>For Class 54 Rating, Add</i>	773.36	
<i>For Class 55 Rating, Add</i>	1,152.94	
<i>For Class 56 Rating, Add</i>	1,527.40	
40 05 19 00-2679 EA 6" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,762.74	346.42
<i>For Class 52 Rating, Deduct</i>	-576.16	
<i>For Class 54 Rating, Add</i>	791.98	
<i>For Class 55 Rating, Add</i>	1,180.64	
<i>For Class 56 Rating, Add</i>	1,564.06	
40 05 19 00-2680 EA 6" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,891.26	349.60
<i>For Class 52 Rating, Deduct</i>	-589.77	
<i>For Class 54 Rating, Add</i>	810.59	
<i>For Class 55 Rating, Add</i>	1,208.34	
<i>For Class 56 Rating, Add</i>	1,600.73	
 40 05 19 00-2681 8" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>		
40 05 19 00-2682 EA 8" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,382.06	292.39
<i>For Class 52 Rating, Deduct</i>	-103.30	
<i>For Class 54 Rating, Add</i>	146.17	
<i>For Class 55 Rating, Add</i>	220.04	
<i>For Class 56 Rating, Add</i>	292.97	
40 05 19 00-2683 EA 8" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,547.13	295.57
<i>For Class 52 Rating, Deduct</i>	-120.92	
<i>For Class 54 Rating, Add</i>	170.27	
<i>For Class 55 Rating, Add</i>	255.89	
<i>For Class 56 Rating, Add</i>	340.42	
40 05 19 00-2684 EA 8" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,712.20	298.75
<i>For Class 52 Rating, Deduct</i>	-138.55	
<i>For Class 54 Rating, Add</i>	194.37	
<i>For Class 55 Rating, Add</i>	291.75	
<i>For Class 56 Rating, Add</i>	387.87	
40 05 19 00-2685 EA 8" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,877.28	301.92
<i>For Class 52 Rating, Deduct</i>	-156.18	
<i>For Class 54 Rating, Add</i>	218.46	
<i>For Class 55 Rating, Add</i>	327.60	
<i>For Class 56 Rating, Add</i>	435.32	
40 05 19 00-2686 EA 8" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,042.34	305.10
<i>For Class 52 Rating, Deduct</i>	-173.81	
<i>For Class 54 Rating, Add</i>	242.56	
<i>For Class 55 Rating, Add</i>	363.45	
<i>For Class 56 Rating, Add</i>	482.76	
40 05 19 00-2687 EA 8" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,207.42	308.28
<i>For Class 52 Rating, Deduct</i>	-191.44	
<i>For Class 54 Rating, Add</i>	266.65	
<i>For Class 55 Rating, Add</i>	399.30	
<i>For Class 56 Rating, Add</i>	530.21	
40 05 19 00-2688 EA 8" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,372.49	311.46
<i>For Class 52 Rating, Deduct</i>	-209.06	
<i>For Class 54 Rating, Add</i>	290.75	
<i>For Class 55 Rating, Add</i>	435.16	
<i>For Class 56 Rating, Add</i>	577.66	
40 05 19 00-2689 EA 8" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,537.56	314.63
<i>For Class 52 Rating, Deduct</i>	-226.69	
<i>For Class 54 Rating, Add</i>	314.85	
<i>For Class 55 Rating, Add</i>	471.01	
<i>For Class 56 Rating, Add</i>	625.11	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-2690	EA	8" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,702.63	317.82
		<i>For Class 52 Rating, Deduct</i>	-244.32	
		<i>For Class 54 Rating, Add</i>	338.94	
		<i>For Class 55 Rating, Add</i>	506.86	
		<i>For Class 56 Rating, Add</i>	672.56	
40 05 19 00-2691	EA	8" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,867.72	321.00
		<i>For Class 52 Rating, Deduct</i>	-261.95	
		<i>For Class 54 Rating, Add</i>	363.04	
		<i>For Class 55 Rating, Add</i>	542.72	
		<i>For Class 56 Rating, Add</i>	720.01	
40 05 19 00-2692	EA	8" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,032.78	324.17
		<i>For Class 52 Rating, Deduct</i>	-279.58	
		<i>For Class 54 Rating, Add</i>	387.14	
		<i>For Class 55 Rating, Add</i>	578.57	
		<i>For Class 56 Rating, Add</i>	767.46	
40 05 19 00-2693	EA	8" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,197.86	327.35
		<i>For Class 52 Rating, Deduct</i>	-297.21	
		<i>For Class 54 Rating, Add</i>	411.23	
		<i>For Class 55 Rating, Add</i>	614.42	
		<i>For Class 56 Rating, Add</i>	814.91	
40 05 19 00-2694	EA	8" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,362.93	330.53
		<i>For Class 52 Rating, Deduct</i>	-314.83	
		<i>For Class 54 Rating, Add</i>	435.33	
		<i>For Class 55 Rating, Add</i>	650.27	
		<i>For Class 56 Rating, Add</i>	862.36	
40 05 19 00-2695	EA	8" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,528.00	333.70
		<i>For Class 52 Rating, Deduct</i>	-332.46	
		<i>For Class 54 Rating, Add</i>	459.42	
		<i>For Class 55 Rating, Add</i>	686.13	
		<i>For Class 56 Rating, Add</i>	909.80	
40 05 19 00-2696	EA	8" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,693.07	336.88
		<i>For Class 52 Rating, Deduct</i>	-350.09	
		<i>For Class 54 Rating, Add</i>	483.52	
		<i>For Class 55 Rating, Add</i>	721.98	
		<i>For Class 56 Rating, Add</i>	957.25	
40 05 19 00-2697	EA	8" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,858.15	340.06
		<i>For Class 52 Rating, Deduct</i>	-367.72	
		<i>For Class 54 Rating, Add</i>	507.62	
		<i>For Class 55 Rating, Add</i>	757.83	
		<i>For Class 56 Rating, Add</i>	1,004.70	
40 05 19 00-2698	EA	8" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,023.21	343.24
		<i>For Class 52 Rating, Deduct</i>	-385.35	
		<i>For Class 54 Rating, Add</i>	531.71	
		<i>For Class 55 Rating, Add</i>	793.68	
		<i>For Class 56 Rating, Add</i>	1,052.15	
40 05 19 00-2699	EA	8" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,188.29	346.42
		<i>For Class 52 Rating, Deduct</i>	-402.98	
		<i>For Class 54 Rating, Add</i>	555.81	
		<i>For Class 55 Rating, Add</i>	829.54	
		<i>For Class 56 Rating, Add</i>	1,099.60	
40 05 19 00-2700	EA	8" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,353.36	349.60
		<i>For Class 52 Rating, Deduct</i>	-420.60	
		<i>For Class 54 Rating, Add</i>	579.91	
		<i>For Class 55 Rating, Add</i>	865.39	
		<i>For Class 56 Rating, Add</i>	1,147.05	
40 05 19 00-2701	EA	8" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,518.43	352.78
		<i>For Class 52 Rating, Deduct</i>	-438.23	
		<i>For Class 54 Rating, Add</i>	604.00	
		<i>For Class 55 Rating, Add</i>	901.24	
		<i>For Class 56 Rating, Add</i>	1,194.50	
40 05 19 00-2702	EA	8" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,683.50	355.95
		<i>For Class 52 Rating, Deduct</i>	-455.86	
		<i>For Class 54 Rating, Add</i>	628.10	
		<i>For Class 55 Rating, Add</i>	937.10	
		<i>For Class 56 Rating, Add</i>	1,241.95	
40 05 19 00-2703	EA	8" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,848.58	359.13
		<i>For Class 52 Rating, Deduct</i>	-473.49	
		<i>For Class 54 Rating, Add</i>	652.20	
		<i>For Class 55 Rating, Add</i>	972.95	
		<i>For Class 56 Rating, Add</i>	1,289.40	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2704 EA 8" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,013.64	362.31
<i>For Class 52 Rating, Deduct</i>	-491.12	
<i>For Class 54 Rating, Add</i>	676.29	
<i>For Class 55 Rating, Add</i>	1,008.80	
<i>For Class 56 Rating, Add</i>	1,336.85	
40 05 19 00-2705 EA 8" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,178.72	365.48
<i>For Class 52 Rating, Deduct</i>	-508.74	
<i>For Class 54 Rating, Add</i>	700.39	
<i>For Class 55 Rating, Add</i>	1,044.65	
<i>For Class 56 Rating, Add</i>	1,384.30	
40 05 19 00-2706 EA 8" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,343.79	368.67
<i>For Class 52 Rating, Deduct</i>	-526.37	
<i>For Class 54 Rating, Add</i>	724.48	
<i>For Class 55 Rating, Add</i>	1,080.51	
<i>For Class 56 Rating, Add</i>	1,431.75	
40 05 19 00-2707 EA 8" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,508.86	371.85
<i>For Class 52 Rating, Deduct</i>	-544.00	
<i>For Class 54 Rating, Add</i>	748.58	
<i>For Class 55 Rating, Add</i>	1,116.36	
<i>For Class 56 Rating, Add</i>	1,479.19	
40 05 19 00-2708 EA 8" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,673.93	375.02
<i>For Class 52 Rating, Deduct</i>	-561.63	
<i>For Class 54 Rating, Add</i>	772.68	
<i>For Class 55 Rating, Add</i>	1,152.21	
<i>For Class 56 Rating, Add</i>	1,526.64	
40 05 19 00-2709 EA 8" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,839.01	378.20
<i>For Class 52 Rating, Deduct</i>	-579.26	
<i>For Class 54 Rating, Add</i>	796.77	
<i>For Class 55 Rating, Add</i>	1,188.07	
<i>For Class 56 Rating, Add</i>	1,574.09	
40 05 19 00-2710 EA 8" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,004.07	381.38
<i>For Class 52 Rating, Deduct</i>	-596.89	
<i>For Class 54 Rating, Add</i>	820.87	
<i>For Class 55 Rating, Add</i>	1,223.92	
<i>For Class 56 Rating, Add</i>	1,621.54	
40 05 19 00-2711 EA 8" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,169.15	384.55
<i>For Class 52 Rating, Deduct</i>	-614.51	
<i>For Class 54 Rating, Add</i>	844.97	
<i>For Class 55 Rating, Add</i>	1,259.77	
<i>For Class 56 Rating, Add</i>	1,668.99	
40 05 19 00-2712 EA 8" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,334.22	387.73
<i>For Class 52 Rating, Deduct</i>	-632.14	
<i>For Class 54 Rating, Add</i>	869.06	
<i>For Class 55 Rating, Add</i>	1,295.62	
<i>For Class 56 Rating, Add</i>	1,716.44	
40 05 19 00-2713 EA 8" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,499.29	390.91
<i>For Class 52 Rating, Deduct</i>	-649.77	
<i>For Class 54 Rating, Add</i>	893.16	
<i>For Class 55 Rating, Add</i>	1,331.48	
<i>For Class 56 Rating, Add</i>	1,763.89	
40 05 19 00-2714 EA 8" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,664.37	394.09
<i>For Class 52 Rating, Deduct</i>	-667.40	
<i>For Class 54 Rating, Add</i>	917.25	
<i>For Class 55 Rating, Add</i>	1,367.33	
<i>For Class 56 Rating, Add</i>	1,811.34	
40 05 19 00-2715 EA 8" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,829.45	397.27
<i>For Class 52 Rating, Deduct</i>	-685.03	
<i>For Class 54 Rating, Add</i>	941.35	
<i>For Class 55 Rating, Add</i>	1,403.18	
<i>For Class 56 Rating, Add</i>	1,858.79	
40 05 19 00-2716 EA 8" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,994.51	400.45
<i>For Class 52 Rating, Deduct</i>	-702.65	
<i>For Class 54 Rating, Add</i>	965.45	
<i>For Class 55 Rating, Add</i>	1,439.03	
<i>For Class 56 Rating, Add</i>	1,906.23	
40 05 19 00-2717 EA 8" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,159.59	403.63
<i>For Class 52 Rating, Deduct</i>	-720.28	
<i>For Class 54 Rating, Add</i>	989.54	
<i>For Class 55 Rating, Add</i>	1,474.89	
<i>For Class 56 Rating, Add</i>	1,953.69	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2718	EA	8" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,324.66		406.80
		<i>For Class 52 Rating, Deduct</i>	-737.91		
		<i>For Class 54 Rating, Add</i>	1,013.64		
		<i>For Class 55 Rating, Add</i>	1,510.74		
		<i>For Class 56 Rating, Add</i>	2,001.13		
40 05 19 00-2719	EA	8" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,489.73		409.98
		<i>For Class 52 Rating, Deduct</i>	-755.54		
		<i>For Class 54 Rating, Add</i>	1,037.74		
		<i>For Class 55 Rating, Add</i>	1,546.59		
		<i>For Class 56 Rating, Add</i>	2,048.58		
40 05 19 00-2720	EA	8" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,654.80		413.16
		<i>For Class 52 Rating, Deduct</i>	-773.17		
		<i>For Class 54 Rating, Add</i>	1,061.83		
		<i>For Class 55 Rating, Add</i>	1,582.45		
		<i>For Class 56 Rating, Add</i>	2,096.03		
40 05 19 00-2721		10" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>			
40 05 19 00-2722	EA	10" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,737.03		355.95
		<i>For Class 52 Rating, Deduct</i>	-131.75		
		<i>For Class 54 Rating, Add</i>	186.13		
		<i>For Class 55 Rating, Add</i>	280.03		
		<i>For Class 56 Rating, Add</i>	372.74		
40 05 19 00-2723	EA	10" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	1,949.90		359.13
		<i>For Class 52 Rating, Deduct</i>	-154.63		
		<i>For Class 54 Rating, Add</i>	217.39		
		<i>For Class 55 Rating, Add</i>	326.54		
		<i>For Class 56 Rating, Add</i>	434.29		
40 05 19 00-2724	EA	10" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,162.76		362.31
		<i>For Class 52 Rating, Deduct</i>	-177.52		
		<i>For Class 54 Rating, Add</i>	248.66		
		<i>For Class 55 Rating, Add</i>	373.05		
		<i>For Class 56 Rating, Add</i>	495.84		
40 05 19 00-2725	EA	10" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,375.63		365.48
		<i>For Class 52 Rating, Deduct</i>	-200.40		
		<i>For Class 54 Rating, Add</i>	279.92		
		<i>For Class 55 Rating, Add</i>	419.57		
		<i>For Class 56 Rating, Add</i>	557.38		
40 05 19 00-2726	EA	10" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,588.50		368.67
		<i>For Class 52 Rating, Deduct</i>	-223.29		
		<i>For Class 54 Rating, Add</i>	311.19		
		<i>For Class 55 Rating, Add</i>	466.08		
		<i>For Class 56 Rating, Add</i>	618.94		
40 05 19 00-2727	EA	10" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	2,801.37		371.85
		<i>For Class 52 Rating, Deduct</i>	-246.18		
		<i>For Class 54 Rating, Add</i>	342.46		
		<i>For Class 55 Rating, Add</i>	512.59		
		<i>For Class 56 Rating, Add</i>	680.48		
40 05 19 00-2728	EA	10" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,014.23		375.02
		<i>For Class 52 Rating, Deduct</i>	-269.06		
		<i>For Class 54 Rating, Add</i>	373.72		
		<i>For Class 55 Rating, Add</i>	559.10		
		<i>For Class 56 Rating, Add</i>	742.03		
40 05 19 00-2729	EA	10" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,227.10		378.20
		<i>For Class 52 Rating, Deduct</i>	-291.95		
		<i>For Class 54 Rating, Add</i>	404.99		
		<i>For Class 55 Rating, Add</i>	605.61		
		<i>For Class 56 Rating, Add</i>	803.58		
40 05 19 00-2730	EA	10" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,439.97		381.38
		<i>For Class 52 Rating, Deduct</i>	-314.83		
		<i>For Class 54 Rating, Add</i>	436.25		
		<i>For Class 55 Rating, Add</i>	652.12		
		<i>For Class 56 Rating, Add</i>	865.13		
40 05 19 00-2731	EA	10" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,652.84		384.55
		<i>For Class 52 Rating, Deduct</i>	-337.72		
		<i>For Class 54 Rating, Add</i>	467.52		
		<i>For Class 55 Rating, Add</i>	698.63		
		<i>For Class 56 Rating, Add</i>	926.68		

	MINOR	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2732	EA		10" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,865.70	387.73
			<i>For Class 52 Rating, Deduct</i>	-360.61	
			<i>For Class 54 Rating, Add</i>	498.78	
			<i>For Class 55 Rating, Add</i>	745.14	
			<i>For Class 56 Rating, Add</i>	988.23	
40 05 19 00-2733	EA		10" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,078.57	390.91
			<i>For Class 52 Rating, Deduct</i>	-383.49	
			<i>For Class 54 Rating, Add</i>	530.05	
			<i>For Class 55 Rating, Add</i>	791.66	
			<i>For Class 56 Rating, Add</i>	1,049.78	
40 05 19 00-2734	EA		10" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,291.45	394.09
			<i>For Class 52 Rating, Deduct</i>	-406.38	
			<i>For Class 54 Rating, Add</i>	561.32	
			<i>For Class 55 Rating, Add</i>	838.17	
			<i>For Class 56 Rating, Add</i>	1,111.33	
40 05 19 00-2735	EA		10" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,504.32	397.27
			<i>For Class 52 Rating, Deduct</i>	-429.26	
			<i>For Class 54 Rating, Add</i>	592.58	
			<i>For Class 55 Rating, Add</i>	884.68	
			<i>For Class 56 Rating, Add</i>	1,172.87	
40 05 19 00-2736	EA		10" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,717.18	400.45
			<i>For Class 52 Rating, Deduct</i>	-452.15	
			<i>For Class 54 Rating, Add</i>	623.85	
			<i>For Class 55 Rating, Add</i>	931.19	
			<i>For Class 56 Rating, Add</i>	1,234.42	
40 05 19 00-2737	EA		10" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,930.05	403.63
			<i>For Class 52 Rating, Deduct</i>	-475.03	
			<i>For Class 54 Rating, Add</i>	655.11	
			<i>For Class 55 Rating, Add</i>	977.70	
			<i>For Class 56 Rating, Add</i>	1,295.97	
40 05 19 00-2738	EA		10" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,142.92	406.80
			<i>For Class 52 Rating, Deduct</i>	-497.92	
			<i>For Class 54 Rating, Add</i>	686.38	
			<i>For Class 55 Rating, Add</i>	1,024.21	
			<i>For Class 56 Rating, Add</i>	1,357.52	
40 05 19 00-2739	EA		10" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,355.79	409.98
			<i>For Class 52 Rating, Deduct</i>	-520.81	
			<i>For Class 54 Rating, Add</i>	717.64	
			<i>For Class 55 Rating, Add</i>	1,070.72	
			<i>For Class 56 Rating, Add</i>	1,419.07	
40 05 19 00-2740	EA		10" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,568.65	413.16
			<i>For Class 52 Rating, Deduct</i>	-543.69	
			<i>For Class 54 Rating, Add</i>	748.91	
			<i>For Class 55 Rating, Add</i>	1,117.23	
			<i>For Class 56 Rating, Add</i>	1,480.62	
40 05 19 00-2741	EA		10" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,781.52	416.33
			<i>For Class 52 Rating, Deduct</i>	-566.58	
			<i>For Class 54 Rating, Add</i>	780.17	
			<i>For Class 55 Rating, Add</i>	1,163.75	
			<i>For Class 56 Rating, Add</i>	1,542.17	
40 05 19 00-2742	EA		10" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,994.39	419.52
			<i>For Class 52 Rating, Deduct</i>	-589.46	
			<i>For Class 54 Rating, Add</i>	811.44	
			<i>For Class 55 Rating, Add</i>	1,210.26	
			<i>For Class 56 Rating, Add</i>	1,603.72	
40 05 19 00-2743	EA		10" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,207.26	422.70
			<i>For Class 52 Rating, Deduct</i>	-612.35	
			<i>For Class 54 Rating, Add</i>	842.71	
			<i>For Class 55 Rating, Add</i>	1,256.77	
			<i>For Class 56 Rating, Add</i>	1,665.27	
40 05 19 00-2744	EA		10" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,420.12	425.87
			<i>For Class 52 Rating, Deduct</i>	-635.23	
			<i>For Class 54 Rating, Add</i>	873.97	
			<i>For Class 55 Rating, Add</i>	1,303.28	
			<i>For Class 56 Rating, Add</i>	1,726.81	
40 05 19 00-2745	EA		10" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,632.99	429.05
			<i>For Class 52 Rating, Deduct</i>	-658.12	
			<i>For Class 54 Rating, Add</i>	905.24	
			<i>For Class 55 Rating, Add</i>	1,349.79	
			<i>For Class 56 Rating, Add</i>	1,788.36	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2746	EA	10" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,845.86		432.23
		<i>For Class 52 Rating, Deduct</i>	-681.01		
		<i>For Class 54 Rating, Add</i>	936.50		
		<i>For Class 55 Rating, Add</i>	1,396.30		
		<i>For Class 56 Rating, Add</i>	1,849.91		
40 05 19 00-2747	EA	10" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,058.73		435.40
		<i>For Class 52 Rating, Deduct</i>	-703.89		
		<i>For Class 54 Rating, Add</i>	967.77		
		<i>For Class 55 Rating, Add</i>	1,442.81		
		<i>For Class 56 Rating, Add</i>	1,911.46		
40 05 19 00-2748	EA	10" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,271.59		438.58
		<i>For Class 52 Rating, Deduct</i>	-726.78		
		<i>For Class 54 Rating, Add</i>	999.03		
		<i>For Class 55 Rating, Add</i>	1,489.33		
		<i>For Class 56 Rating, Add</i>	1,973.01		
40 05 19 00-2749	EA	10" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,484.46		441.76
		<i>For Class 52 Rating, Deduct</i>	-749.66		
		<i>For Class 54 Rating, Add</i>	1,030.30		
		<i>For Class 55 Rating, Add</i>	1,535.84		
		<i>For Class 56 Rating, Add</i>	2,034.56		
40 05 19 00-2750	EA	10" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,697.33		444.95
		<i>For Class 52 Rating, Deduct</i>	-772.55		
		<i>For Class 54 Rating, Add</i>	1,061.57		
		<i>For Class 55 Rating, Add</i>	1,582.35		
		<i>For Class 56 Rating, Add</i>	2,096.11		
40 05 19 00-2751	EA	10" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,910.20		448.12
		<i>For Class 52 Rating, Deduct</i>	-795.44		
		<i>For Class 54 Rating, Add</i>	1,092.83		
		<i>For Class 55 Rating, Add</i>	1,628.86		
		<i>For Class 56 Rating, Add</i>	2,157.66		
40 05 19 00-2752	EA	10" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,123.06		451.30
		<i>For Class 52 Rating, Deduct</i>	-818.32		
		<i>For Class 54 Rating, Add</i>	1,124.10		
		<i>For Class 55 Rating, Add</i>	1,675.37		
		<i>For Class 56 Rating, Add</i>	2,219.20		
40 05 19 00-2753	EA	10" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,335.92		454.48
		<i>For Class 52 Rating, Deduct</i>	-841.21		
		<i>For Class 54 Rating, Add</i>	1,155.36		
		<i>For Class 55 Rating, Add</i>	1,721.88		
		<i>For Class 56 Rating, Add</i>	2,280.75		
40 05 19 00-2754	EA	10" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,548.80		457.65
		<i>For Class 52 Rating, Deduct</i>	-864.09		
		<i>For Class 54 Rating, Add</i>	1,186.63		
		<i>For Class 55 Rating, Add</i>	1,768.39		
		<i>For Class 56 Rating, Add</i>	2,342.30		
40 05 19 00-2755	EA	10" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,761.66		460.83
		<i>For Class 52 Rating, Deduct</i>	-886.98		
		<i>For Class 54 Rating, Add</i>	1,217.89		
		<i>For Class 55 Rating, Add</i>	1,814.90		
		<i>For Class 56 Rating, Add</i>	2,403.85		
40 05 19 00-2756	EA	10" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,974.54		464.01
		<i>For Class 52 Rating, Deduct</i>	-909.86		
		<i>For Class 54 Rating, Add</i>	1,249.16		
		<i>For Class 55 Rating, Add</i>	1,861.42		
		<i>For Class 56 Rating, Add</i>	2,465.40		
40 05 19 00-2757	EA	10" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,187.40		467.18
		<i>For Class 52 Rating, Deduct</i>	-932.75		
		<i>For Class 54 Rating, Add</i>	1,280.43		
		<i>For Class 55 Rating, Add</i>	1,907.93		
		<i>For Class 56 Rating, Add</i>	2,526.95		
40 05 19 00-2758	EA	10" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,400.28		470.37
		<i>For Class 52 Rating, Deduct</i>	-955.64		
		<i>For Class 54 Rating, Add</i>	1,311.69		
		<i>For Class 55 Rating, Add</i>	1,954.44		
		<i>For Class 56 Rating, Add</i>	2,588.50		
40 05 19 00-2759	EA	10" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,613.14		473.55
		<i>For Class 52 Rating, Deduct</i>	-978.52		
		<i>For Class 54 Rating, Add</i>	1,342.96		
		<i>For Class 55 Rating, Add</i>	2,000.95		
		<i>For Class 56 Rating, Add</i>	2,650.05		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2760 EA 10" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,826.01	476.72
<i>For Class 52 Rating, Deduct</i>	-1,001.41	
<i>For Class 54 Rating, Add</i>	1,374.22	
<i>For Class 55 Rating, Add</i>	2,047.46	
<i>For Class 56 Rating, Add</i>	2,711.59	
40 05 19 00-2761 12" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>		
40 05 19 00-2762 EA 12" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,248.60	444.95
<i>For Class 52 Rating, Deduct</i>	-173.19	
<i>For Class 54 Rating, Add</i>	244.26	
<i>For Class 55 Rating, Add</i>	367.28	
<i>For Class 56 Rating, Add</i>	488.73	
40 05 19 00-2763 EA 12" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,512.08	448.12
<i>For Class 52 Rating, Deduct</i>	-201.64	
<i>For Class 54 Rating, Add</i>	283.11	
<i>For Class 55 Rating, Add</i>	425.08	
<i>For Class 56 Rating, Add</i>	565.21	
40 05 19 00-2764 EA 12" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,775.55	451.30
<i>For Class 52 Rating, Deduct</i>	-230.09	
<i>For Class 54 Rating, Add</i>	321.97	
<i>For Class 55 Rating, Add</i>	482.88	
<i>For Class 56 Rating, Add</i>	641.69	
40 05 19 00-2765 EA 12" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,039.02	454.48
<i>For Class 52 Rating, Deduct</i>	-258.55	
<i>For Class 54 Rating, Add</i>	360.83	
<i>For Class 55 Rating, Add</i>	540.67	
<i>For Class 56 Rating, Add</i>	718.17	
40 05 19 00-2766 EA 12" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,302.50	457.65
<i>For Class 52 Rating, Deduct</i>	-287.00	
<i>For Class 54 Rating, Add</i>	399.68	
<i>For Class 55 Rating, Add</i>	598.47	
<i>For Class 56 Rating, Add</i>	794.64	
40 05 19 00-2767 EA 12" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,565.97	460.83
<i>For Class 52 Rating, Deduct</i>	-315.45	
<i>For Class 54 Rating, Add</i>	438.54	
<i>For Class 55 Rating, Add</i>	656.27	
<i>For Class 56 Rating, Add</i>	871.12	
40 05 19 00-2768 EA 12" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,829.46	464.01
<i>For Class 52 Rating, Deduct</i>	-343.91	
<i>For Class 54 Rating, Add</i>	477.40	
<i>For Class 55 Rating, Add</i>	714.06	
<i>For Class 56 Rating, Add</i>	947.60	
40 05 19 00-2769 EA 12" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,092.93	467.18
<i>For Class 52 Rating, Deduct</i>	-372.36	
<i>For Class 54 Rating, Add</i>	516.25	
<i>For Class 55 Rating, Add</i>	771.86	
<i>For Class 56 Rating, Add</i>	1,024.08	
40 05 19 00-2770 EA 12" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,356.41	470.37
<i>For Class 52 Rating, Deduct</i>	-400.81	
<i>For Class 54 Rating, Add</i>	555.11	
<i>For Class 55 Rating, Add</i>	829.66	
<i>For Class 56 Rating, Add</i>	1,100.56	
40 05 19 00-2771 EA 12" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,619.88	473.55
<i>For Class 52 Rating, Deduct</i>	-429.26	
<i>For Class 54 Rating, Add</i>	593.97	
<i>For Class 55 Rating, Add</i>	887.45	
<i>For Class 56 Rating, Add</i>	1,177.03	
40 05 19 00-2772 EA 12" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,883.36	476.72
<i>For Class 52 Rating, Deduct</i>	-457.72	
<i>For Class 54 Rating, Add</i>	632.83	
<i>For Class 55 Rating, Add</i>	945.25	
<i>For Class 56 Rating, Add</i>	1,253.51	
40 05 19 00-2773 EA 12" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,146.83	479.90
<i>For Class 52 Rating, Deduct</i>	-486.17	
<i>For Class 54 Rating, Add</i>	671.68	
<i>For Class 55 Rating, Add</i>	1,003.05	
<i>For Class 56 Rating, Add</i>	1,329.99	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-2774	EA		12" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,410.31	483.08
			<i>For Class 52 Rating, Deduct</i>	-514.62	
			<i>For Class 54 Rating, Add</i>	710.54	
			<i>For Class 55 Rating, Add</i>	1,060.84	
			<i>For Class 56 Rating, Add</i>	1,406.47	
40 05 19 00-2775	EA		12" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,673.78	486.25
			<i>For Class 52 Rating, Deduct</i>	-543.07	
			<i>For Class 54 Rating, Add</i>	749.40	
			<i>For Class 55 Rating, Add</i>	1,118.64	
			<i>For Class 56 Rating, Add</i>	1,482.95	
40 05 19 00-2776	EA		12" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,937.26	489.43
			<i>For Class 52 Rating, Deduct</i>	-571.53	
			<i>For Class 54 Rating, Add</i>	788.25	
			<i>For Class 55 Rating, Add</i>	1,176.44	
			<i>For Class 56 Rating, Add</i>	1,559.43	
40 05 19 00-2777	EA		12" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,200.73	492.61
			<i>For Class 52 Rating, Deduct</i>	-599.98	
			<i>For Class 54 Rating, Add</i>	827.11	
			<i>For Class 55 Rating, Add</i>	1,234.23	
			<i>For Class 56 Rating, Add</i>	1,635.90	
40 05 19 00-2778	EA		12" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,464.21	495.80
			<i>For Class 52 Rating, Deduct</i>	-628.43	
			<i>For Class 54 Rating, Add</i>	865.97	
			<i>For Class 55 Rating, Add</i>	1,292.03	
			<i>For Class 56 Rating, Add</i>	1,712.38	
40 05 19 00-2779	EA		12" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,727.68	498.97
			<i>For Class 52 Rating, Deduct</i>	-656.88	
			<i>For Class 54 Rating, Add</i>	904.82	
			<i>For Class 55 Rating, Add</i>	1,349.83	
			<i>For Class 56 Rating, Add</i>	1,788.86	
40 05 19 00-2780	EA		12" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,991.16	502.15
			<i>For Class 52 Rating, Deduct</i>	-685.34	
			<i>For Class 54 Rating, Add</i>	943.68	
			<i>For Class 55 Rating, Add</i>	1,407.62	
			<i>For Class 56 Rating, Add</i>	1,865.34	
40 05 19 00-2781	EA		12" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,254.63	505.33
			<i>For Class 52 Rating, Deduct</i>	-713.79	
			<i>For Class 54 Rating, Add</i>	982.54	
			<i>For Class 55 Rating, Add</i>	1,465.42	
			<i>For Class 56 Rating, Add</i>	1,941.82	
40 05 19 00-2782	EA		12" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,518.11	508.50
			<i>For Class 52 Rating, Deduct</i>	-742.24	
			<i>For Class 54 Rating, Add</i>	1,021.39	
			<i>For Class 55 Rating, Add</i>	1,523.22	
			<i>For Class 56 Rating, Add</i>	2,018.29	
40 05 19 00-2783	EA		12" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,781.58	511.68
			<i>For Class 52 Rating, Deduct</i>	-770.69	
			<i>For Class 54 Rating, Add</i>	1,060.25	
			<i>For Class 55 Rating, Add</i>	1,581.01	
			<i>For Class 56 Rating, Add</i>	2,094.77	
40 05 19 00-2784	EA		12" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,045.06	514.86
			<i>For Class 52 Rating, Deduct</i>	-799.15	
			<i>For Class 54 Rating, Add</i>	1,099.11	
			<i>For Class 55 Rating, Add</i>	1,638.81	
			<i>For Class 56 Rating, Add</i>	2,171.25	
40 05 19 00-2785	EA		12" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,308.53	518.03
			<i>For Class 52 Rating, Deduct</i>	-827.60	
			<i>For Class 54 Rating, Add</i>	1,137.96	
			<i>For Class 55 Rating, Add</i>	1,696.61	
			<i>For Class 56 Rating, Add</i>	2,247.73	
40 05 19 00-2786	EA		12" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,572.01	521.22
			<i>For Class 52 Rating, Deduct</i>	-856.05	
			<i>For Class 54 Rating, Add</i>	1,176.82	
			<i>For Class 55 Rating, Add</i>	1,754.40	
			<i>For Class 56 Rating, Add</i>	2,324.21	
40 05 19 00-2787	EA		12" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,835.48	524.40
			<i>For Class 52 Rating, Deduct</i>	-884.50	
			<i>For Class 54 Rating, Add</i>	1,215.68	
			<i>For Class 55 Rating, Add</i>	1,812.20	
			<i>For Class 56 Rating, Add</i>	2,400.68	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2788	EA			12" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,098.96	527.57
				<i>For Class 52 Rating, Deduct</i>	-912.96	
				<i>For Class 54 Rating, Add</i>	1,254.53	
				<i>For Class 55 Rating, Add</i>	1,870.00	
				<i>For Class 56 Rating, Add</i>	2,477.16	
40 05 19 00-2789	EA			12" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,362.43	530.75
				<i>For Class 52 Rating, Deduct</i>	-941.41	
				<i>For Class 54 Rating, Add</i>	1,293.39	
				<i>For Class 55 Rating, Add</i>	1,927.79	
				<i>For Class 56 Rating, Add</i>	2,553.64	
40 05 19 00-2790	EA			12" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,625.91	533.93
				<i>For Class 52 Rating, Deduct</i>	-969.86	
				<i>For Class 54 Rating, Add</i>	1,332.25	
				<i>For Class 55 Rating, Add</i>	1,985.59	
				<i>For Class 56 Rating, Add</i>	2,630.12	
40 05 19 00-2791	EA			12" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,889.39	537.11
				<i>For Class 52 Rating, Deduct</i>	-998.31	
				<i>For Class 54 Rating, Add</i>	1,371.10	
				<i>For Class 55 Rating, Add</i>	2,043.39	
				<i>For Class 56 Rating, Add</i>	2,706.60	
40 05 19 00-2792	EA			12" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,152.87	540.28
				<i>For Class 52 Rating, Deduct</i>	-1,026.77	
				<i>For Class 54 Rating, Add</i>	1,409.96	
				<i>For Class 55 Rating, Add</i>	2,101.18	
				<i>For Class 56 Rating, Add</i>	2,783.07	
40 05 19 00-2793	EA			12" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,416.34	543.46
				<i>For Class 52 Rating, Deduct</i>	-1,055.22	
				<i>For Class 54 Rating, Add</i>	1,448.82	
				<i>For Class 55 Rating, Add</i>	2,158.98	
				<i>For Class 56 Rating, Add</i>	2,859.55	
40 05 19 00-2794	EA			12" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,679.82	546.65
				<i>For Class 52 Rating, Deduct</i>	-1,083.67	
				<i>For Class 54 Rating, Add</i>	1,487.67	
				<i>For Class 55 Rating, Add</i>	2,216.78	
				<i>For Class 56 Rating, Add</i>	2,936.03	
40 05 19 00-2795	EA			12" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,943.29	549.82
				<i>For Class 52 Rating, Deduct</i>	-1,112.13	
				<i>For Class 54 Rating, Add</i>	1,526.53	
				<i>For Class 55 Rating, Add</i>	2,274.57	
				<i>For Class 56 Rating, Add</i>	3,012.51	
40 05 19 00-2796	EA			12" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,206.77	553.00
				<i>For Class 52 Rating, Deduct</i>	-1,140.58	
				<i>For Class 54 Rating, Add</i>	1,565.39	
				<i>For Class 55 Rating, Add</i>	2,332.37	
				<i>For Class 56 Rating, Add</i>	3,088.99	
40 05 19 00-2797	EA			12" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,470.24	556.18
				<i>For Class 52 Rating, Deduct</i>	-1,169.03	
				<i>For Class 54 Rating, Add</i>	1,604.24	
				<i>For Class 55 Rating, Add</i>	2,390.17	
				<i>For Class 56 Rating, Add</i>	3,165.46	
40 05 19 00-2798	EA			12" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,733.72	559.35
				<i>For Class 52 Rating, Deduct</i>	-1,197.48	
				<i>For Class 54 Rating, Add</i>	1,643.10	
				<i>For Class 55 Rating, Add</i>	2,447.97	
				<i>For Class 56 Rating, Add</i>	3,241.94	
40 05 19 00-2799	EA			12" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,997.19	562.53
				<i>For Class 52 Rating, Deduct</i>	-1,225.94	
				<i>For Class 54 Rating, Add</i>	1,681.96	
				<i>For Class 55 Rating, Add</i>	2,505.76	
				<i>For Class 56 Rating, Add</i>	3,318.42	
40 05 19 00-2800	EA			12" Flanged x Grooved (FxG), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,260.67	565.71
				<i>For Class 52 Rating, Deduct</i>	-1,254.39	
				<i>For Class 54 Rating, Add</i>	1,720.82	
				<i>For Class 55 Rating, Add</i>	2,563.56	
				<i>For Class 56 Rating, Add</i>	3,394.90	

40 05 19 00-2801 14" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-2800)

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-2802	EA		14" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,131.30	533.93
			<i>For Class 52 Rating, Deduct</i>	-255.46	
			<i>For Class 54 Rating, Add</i>	358.06	
			<i>For Class 55 Rating, Add</i>	537.29	
			<i>For Class 56 Rating, Add</i>	714.21	
40 05 19 00-2803	EA		14" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,451.01	537.11
			<i>For Class 52 Rating, Deduct</i>	-290.09	
			<i>For Class 54 Rating, Add</i>	405.35	
			<i>For Class 55 Rating, Add</i>	607.63	
			<i>For Class 56 Rating, Add</i>	807.27	
40 05 19 00-2804	EA		14" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	3,770.72	540.28
			<i>For Class 52 Rating, Deduct</i>	-324.73	
			<i>For Class 54 Rating, Add</i>	452.64	
			<i>For Class 55 Rating, Add</i>	677.97	
			<i>For Class 56 Rating, Add</i>	900.34	
40 05 19 00-2805	EA		14" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,090.42	543.46
			<i>For Class 52 Rating, Deduct</i>	-359.37	
			<i>For Class 54 Rating, Add</i>	499.93	
			<i>For Class 55 Rating, Add</i>	748.30	
			<i>For Class 56 Rating, Add</i>	993.41	
40 05 19 00-2806	EA		14" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,410.13	546.65
			<i>For Class 52 Rating, Deduct</i>	-394.01	
			<i>For Class 54 Rating, Add</i>	547.22	
			<i>For Class 55 Rating, Add</i>	818.64	
			<i>For Class 56 Rating, Add</i>	1,086.47	
40 05 19 00-2807	EA		14" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,729.83	549.82
			<i>For Class 52 Rating, Deduct</i>	-428.64	
			<i>For Class 54 Rating, Add</i>	594.51	
			<i>For Class 55 Rating, Add</i>	888.97	
			<i>For Class 56 Rating, Add</i>	1,179.54	
40 05 19 00-2808	EA		14" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,049.54	553.00
			<i>For Class 52 Rating, Deduct</i>	-463.28	
			<i>For Class 54 Rating, Add</i>	641.80	
			<i>For Class 55 Rating, Add</i>	959.31	
			<i>For Class 56 Rating, Add</i>	1,272.60	
40 05 19 00-2809	EA		14" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,369.24	556.18
			<i>For Class 52 Rating, Deduct</i>	-497.92	
			<i>For Class 54 Rating, Add</i>	689.09	
			<i>For Class 55 Rating, Add</i>	1,029.65	
			<i>For Class 56 Rating, Add</i>	1,365.67	
40 05 19 00-2810	EA		14" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,688.95	559.35
			<i>For Class 52 Rating, Deduct</i>	-532.56	
			<i>For Class 54 Rating, Add</i>	736.39	
			<i>For Class 55 Rating, Add</i>	1,099.98	
			<i>For Class 56 Rating, Add</i>	1,458.74	
40 05 19 00-2811	EA		14" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,008.65	562.53
			<i>For Class 52 Rating, Deduct</i>	-567.20	
			<i>For Class 54 Rating, Add</i>	783.68	
			<i>For Class 55 Rating, Add</i>	1,170.32	
			<i>For Class 56 Rating, Add</i>	1,551.80	
40 05 19 00-2812	EA		14" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,328.36	565.71
			<i>For Class 52 Rating, Deduct</i>	-601.83	
			<i>For Class 54 Rating, Add</i>	830.97	
			<i>For Class 55 Rating, Add</i>	1,240.65	
			<i>For Class 56 Rating, Add</i>	1,644.87	
40 05 19 00-2813	EA		14" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,648.06	568.88
			<i>For Class 52 Rating, Deduct</i>	-636.47	
			<i>For Class 54 Rating, Add</i>	878.26	
			<i>For Class 55 Rating, Add</i>	1,310.99	
			<i>For Class 56 Rating, Add</i>	1,737.93	
40 05 19 00-2814	EA		14" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,967.77	572.07
			<i>For Class 52 Rating, Deduct</i>	-671.11	
			<i>For Class 54 Rating, Add</i>	925.55	
			<i>For Class 55 Rating, Add</i>	1,381.33	
			<i>For Class 56 Rating, Add</i>	1,831.00	
40 05 19 00-2815	EA		14" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,287.47	575.25
			<i>For Class 52 Rating, Deduct</i>	-705.75	
			<i>For Class 54 Rating, Add</i>	972.84	
			<i>For Class 55 Rating, Add</i>	1,451.66	
			<i>For Class 56 Rating, Add</i>	1,924.06	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2816 EA 14" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,607.18	578.42
<i>For Class 52 Rating, Deduct</i>	-740.39	
<i>For Class 54 Rating, Add</i>	1,020.13	
<i>For Class 55 Rating, Add</i>	1,522.00	
<i>For Class 56 Rating, Add</i>	2,017.13	
40 05 19 00-2817 EA 14" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,926.88	581.60
<i>For Class 52 Rating, Deduct</i>	-775.02	
<i>For Class 54 Rating, Add</i>	1,067.43	
<i>For Class 55 Rating, Add</i>	1,592.33	
<i>For Class 56 Rating, Add</i>	2,110.20	
40 05 19 00-2818 EA 14" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,246.59	584.78
<i>For Class 52 Rating, Deduct</i>	-809.66	
<i>For Class 54 Rating, Add</i>	1,114.72	
<i>For Class 55 Rating, Add</i>	1,662.67	
<i>For Class 56 Rating, Add</i>	2,203.26	
40 05 19 00-2819 EA 14" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,566.29	587.96
<i>For Class 52 Rating, Deduct</i>	-844.30	
<i>For Class 54 Rating, Add</i>	1,162.01	
<i>For Class 55 Rating, Add</i>	1,733.01	
<i>For Class 56 Rating, Add</i>	2,296.33	
40 05 19 00-2820 EA 14" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,886.00	591.13
<i>For Class 52 Rating, Deduct</i>	-878.94	
<i>For Class 54 Rating, Add</i>	1,209.30	
<i>For Class 55 Rating, Add</i>	1,803.34	
<i>For Class 56 Rating, Add</i>	2,389.39	
40 05 19 00-2821 EA 14" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,205.70	594.31
<i>For Class 52 Rating, Deduct</i>	-913.58	
<i>For Class 54 Rating, Add</i>	1,256.59	
<i>For Class 55 Rating, Add</i>	1,873.68	
<i>For Class 56 Rating, Add</i>	2,482.46	
40 05 19 00-2822 EA 14" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,525.41	597.50
<i>For Class 52 Rating, Deduct</i>	-948.21	
<i>For Class 54 Rating, Add</i>	1,303.88	
<i>For Class 55 Rating, Add</i>	1,944.01	
<i>For Class 56 Rating, Add</i>	2,575.53	
40 05 19 00-2823 EA 14" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,845.11	600.67
<i>For Class 52 Rating, Deduct</i>	-982.85	
<i>For Class 54 Rating, Add</i>	1,351.17	
<i>For Class 55 Rating, Add</i>	2,014.35	
<i>For Class 56 Rating, Add</i>	2,668.59	
40 05 19 00-2824 EA 14" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,164.82	603.85
<i>For Class 52 Rating, Deduct</i>	-1,017.49	
<i>For Class 54 Rating, Add</i>	1,398.46	
<i>For Class 55 Rating, Add</i>	2,084.69	
<i>For Class 56 Rating, Add</i>	2,761.66	
40 05 19 00-2825 EA 14" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,484.53	607.03
<i>For Class 52 Rating, Deduct</i>	-1,052.13	
<i>For Class 54 Rating, Add</i>	1,445.76	
<i>For Class 55 Rating, Add</i>	2,155.02	
<i>For Class 56 Rating, Add</i>	2,854.72	
40 05 19 00-2826 EA 14" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,804.24	610.20
<i>For Class 52 Rating, Deduct</i>	-1,086.76	
<i>For Class 54 Rating, Add</i>	1,493.05	
<i>For Class 55 Rating, Add</i>	2,225.36	
<i>For Class 56 Rating, Add</i>	2,947.79	
40 05 19 00-2827 EA 14" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,123.94	613.38
<i>For Class 52 Rating, Deduct</i>	-1,121.40	
<i>For Class 54 Rating, Add</i>	1,540.34	
<i>For Class 55 Rating, Add</i>	2,295.69	
<i>For Class 56 Rating, Add</i>	3,040.86	
40 05 19 00-2828 EA 14" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,443.65	616.56
<i>For Class 52 Rating, Deduct</i>	-1,156.04	
<i>For Class 54 Rating, Add</i>	1,587.63	
<i>For Class 55 Rating, Add</i>	2,366.03	
<i>For Class 56 Rating, Add</i>	3,133.92	
40 05 19 00-2829 EA 14" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,763.35	619.73
<i>For Class 52 Rating, Deduct</i>	-1,190.68	
<i>For Class 54 Rating, Add</i>	1,634.92	
<i>For Class 55 Rating, Add</i>	2,436.37	
<i>For Class 56 Rating, Add</i>	3,226.99	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2830	EA	14" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,083.06		622.92
		<i>For Class 52 Rating, Deduct</i>	-1,225.32		
		<i>For Class 54 Rating, Add</i>	1,682.21		
		<i>For Class 55 Rating, Add</i>	2,506.70		
		<i>For Class 56 Rating, Add</i>	3,320.05		
40 05 19 00-2831	EA	14" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,402.76		626.10
		<i>For Class 52 Rating, Deduct</i>	-1,259.95		
		<i>For Class 54 Rating, Add</i>	1,729.50		
		<i>For Class 55 Rating, Add</i>	2,577.04		
		<i>For Class 56 Rating, Add</i>	3,413.12		
40 05 19 00-2832	EA	14" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,722.47		629.27
		<i>For Class 52 Rating, Deduct</i>	-1,294.59		
		<i>For Class 54 Rating, Add</i>	1,776.79		
		<i>For Class 55 Rating, Add</i>	2,647.37		
		<i>For Class 56 Rating, Add</i>	3,506.19		
40 05 19 00-2833	EA	14" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,042.17		632.45
		<i>For Class 52 Rating, Deduct</i>	-1,329.23		
		<i>For Class 54 Rating, Add</i>	1,824.09		
		<i>For Class 55 Rating, Add</i>	2,717.71		
		<i>For Class 56 Rating, Add</i>	3,599.25		
40 05 19 00-2834	EA	14" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,361.88		635.63
		<i>For Class 52 Rating, Deduct</i>	-1,363.87		
		<i>For Class 54 Rating, Add</i>	1,871.38		
		<i>For Class 55 Rating, Add</i>	2,788.05		
		<i>For Class 56 Rating, Add</i>	3,692.32		
40 05 19 00-2835	EA	14" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,681.58		638.81
		<i>For Class 52 Rating, Deduct</i>	-1,398.51		
		<i>For Class 54 Rating, Add</i>	1,918.67		
		<i>For Class 55 Rating, Add</i>	2,858.38		
		<i>For Class 56 Rating, Add</i>	3,785.38		
40 05 19 00-2836	EA	14" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,001.29		641.98
		<i>For Class 52 Rating, Deduct</i>	-1,433.14		
		<i>For Class 54 Rating, Add</i>	1,965.96		
		<i>For Class 55 Rating, Add</i>	2,928.72		
		<i>For Class 56 Rating, Add</i>	3,878.45		
40 05 19 00-2837	EA	14" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,320.99		645.16
		<i>For Class 52 Rating, Deduct</i>	-1,467.78		
		<i>For Class 54 Rating, Add</i>	2,013.25		
		<i>For Class 55 Rating, Add</i>	2,999.05		
		<i>For Class 56 Rating, Add</i>	3,971.51		
40 05 19 00-2838	EA	14" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,640.70		648.35
		<i>For Class 52 Rating, Deduct</i>	-1,502.42		
		<i>For Class 54 Rating, Add</i>	2,060.54		
		<i>For Class 55 Rating, Add</i>	3,069.39		
		<i>For Class 56 Rating, Add</i>	4,064.58		
40 05 19 00-2839	EA	14" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,960.40		651.52
		<i>For Class 52 Rating, Deduct</i>	-1,537.06		
		<i>For Class 54 Rating, Add</i>	2,107.83		
		<i>For Class 55 Rating, Add</i>	3,139.73		
		<i>For Class 56 Rating, Add</i>	4,157.65		
40 05 19 00-2840		16" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2800)</small>			
40 05 19 00-2841	EA	16" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,665.79		610.20
		<i>For Class 52 Rating, Deduct</i>	-301.54		
		<i>For Class 54 Rating, Add</i>	422.28		
		<i>For Class 55 Rating, Add</i>	633.48		
		<i>For Class 56 Rating, Add</i>	841.95		
40 05 19 00-2842	EA	16" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,036.10		613.38
		<i>For Class 52 Rating, Deduct</i>	-341.74		
		<i>For Class 54 Rating, Add</i>	477.16		
		<i>For Class 55 Rating, Add</i>	715.11		
		<i>For Class 56 Rating, Add</i>	949.94		
40 05 19 00-2843	EA	16" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,406.42		616.56
		<i>For Class 52 Rating, Deduct</i>	-381.95		
		<i>For Class 54 Rating, Add</i>	532.04		
		<i>For Class 55 Rating, Add</i>	796.73		
		<i>For Class 56 Rating, Add</i>	1,057.94		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2844 EA 16" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	4,776.72	619.73
<i>For Class 52 Rating, Deduct</i>	-422.15	
<i>For Class 54 Rating, Add</i>	586.93	
<i>For Class 55 Rating, Add</i>	878.35	
<i>For Class 56 Rating, Add</i>	1,165.93	
40 05 19 00-2845 EA 16" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,147.04	622.92
<i>For Class 52 Rating, Deduct</i>	-462.35	
<i>For Class 54 Rating, Add</i>	641.81	
<i>For Class 55 Rating, Add</i>	959.97	
<i>For Class 56 Rating, Add</i>	1,273.93	
40 05 19 00-2846 EA 16" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,517.35	626.10
<i>For Class 52 Rating, Deduct</i>	-502.56	
<i>For Class 54 Rating, Add</i>	696.69	
<i>For Class 55 Rating, Add</i>	1,041.59	
<i>For Class 56 Rating, Add</i>	1,381.92	
40 05 19 00-2847 EA 16" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	5,887.67	629.27
<i>For Class 52 Rating, Deduct</i>	-542.76	
<i>For Class 54 Rating, Add</i>	751.57	
<i>For Class 55 Rating, Add</i>	1,123.21	
<i>For Class 56 Rating, Add</i>	1,489.92	
40 05 19 00-2848 EA 16" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,257.98	632.45
<i>For Class 52 Rating, Deduct</i>	-582.97	
<i>For Class 54 Rating, Add</i>	806.46	
<i>For Class 55 Rating, Add</i>	1,204.84	
<i>For Class 56 Rating, Add</i>	1,597.91	
40 05 19 00-2849 EA 16" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,628.29	635.63
<i>For Class 52 Rating, Deduct</i>	-623.17	
<i>For Class 54 Rating, Add</i>	861.34	
<i>For Class 55 Rating, Add</i>	1,286.46	
<i>For Class 56 Rating, Add</i>	1,705.91	
40 05 19 00-2850 EA 16" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,998.60	638.81
<i>For Class 52 Rating, Deduct</i>	-663.38	
<i>For Class 54 Rating, Add</i>	916.22	
<i>For Class 55 Rating, Add</i>	1,368.08	
<i>For Class 56 Rating, Add</i>	1,813.90	
40 05 19 00-2851 EA 16" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,368.92	641.98
<i>For Class 52 Rating, Deduct</i>	-703.58	
<i>For Class 54 Rating, Add</i>	971.10	
<i>For Class 55 Rating, Add</i>	1,449.70	
<i>For Class 56 Rating, Add</i>	1,921.90	
40 05 19 00-2852 EA 16" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,739.23	645.16
<i>For Class 52 Rating, Deduct</i>	-743.79	
<i>For Class 54 Rating, Add</i>	1,025.99	
<i>For Class 55 Rating, Add</i>	1,531.32	
<i>For Class 56 Rating, Add</i>	2,029.90	
40 05 19 00-2853 EA 16" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,109.54	648.35
<i>For Class 52 Rating, Deduct</i>	-783.99	
<i>For Class 54 Rating, Add</i>	1,080.87	
<i>For Class 55 Rating, Add</i>	1,612.94	
<i>For Class 56 Rating, Add</i>	2,137.89	
40 05 19 00-2854 EA 16" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,479.85	651.52
<i>For Class 52 Rating, Deduct</i>	-824.20	
<i>For Class 54 Rating, Add</i>	1,135.75	
<i>For Class 55 Rating, Add</i>	1,694.56	
<i>For Class 56 Rating, Add</i>	2,245.88	
40 05 19 00-2855 EA 16" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,850.17	654.70
<i>For Class 52 Rating, Deduct</i>	-864.40	
<i>For Class 54 Rating, Add</i>	1,190.63	
<i>For Class 55 Rating, Add</i>	1,776.19	
<i>For Class 56 Rating, Add</i>	2,353.88	
40 05 19 00-2856 EA 16" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,220.48	657.88
<i>For Class 52 Rating, Deduct</i>	-904.61	
<i>For Class 54 Rating, Add</i>	1,245.52	
<i>For Class 55 Rating, Add</i>	1,857.81	
<i>For Class 56 Rating, Add</i>	2,461.88	
40 05 19 00-2857 EA 16" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,590.79	661.05
<i>For Class 52 Rating, Deduct</i>	-944.81	
<i>For Class 54 Rating, Add</i>	1,300.40	
<i>For Class 55 Rating, Add</i>	1,939.43	
<i>For Class 56 Rating, Add</i>	2,569.87	

40 Process Interconnections
40 05 Common Work Results For Process Interconnections
40 05 19 Ductile Iron Process Pipe



MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2858	EA	16" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,961.10	664.23
		<i>For Class 52 Rating, Deduct</i>	-985.02	
		<i>For Class 54 Rating, Add</i>	1,355.28	
		<i>For Class 55 Rating, Add</i>	2,021.05	
		<i>For Class 56 Rating, Add</i>	2,677.86	
40 05 19 00-2859	EA	16" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,331.42	667.41
		<i>For Class 52 Rating, Deduct</i>	-1,025.22	
		<i>For Class 54 Rating, Add</i>	1,410.16	
		<i>For Class 55 Rating, Add</i>	2,102.67	
		<i>For Class 56 Rating, Add</i>	2,785.86	
40 05 19 00-2860	EA	16" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,701.73	670.58
		<i>For Class 52 Rating, Deduct</i>	-1,065.43	
		<i>For Class 54 Rating, Add</i>	1,465.05	
		<i>For Class 55 Rating, Add</i>	2,184.29	
		<i>For Class 56 Rating, Add</i>	2,893.86	
40 05 19 00-2861	EA	16" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,072.03	673.77
		<i>For Class 52 Rating, Deduct</i>	-1,105.63	
		<i>For Class 54 Rating, Add</i>	1,519.93	
		<i>For Class 55 Rating, Add</i>	2,265.91	
		<i>For Class 56 Rating, Add</i>	3,001.85	
40 05 19 00-2862	EA	16" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,442.35	676.95
		<i>For Class 52 Rating, Deduct</i>	-1,145.83	
		<i>For Class 54 Rating, Add</i>	1,574.81	
		<i>For Class 55 Rating, Add</i>	2,347.54	
		<i>For Class 56 Rating, Add</i>	3,109.84	
40 05 19 00-2863	EA	16" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,812.67	680.13
		<i>For Class 52 Rating, Deduct</i>	-1,186.04	
		<i>For Class 54 Rating, Add</i>	1,629.69	
		<i>For Class 55 Rating, Add</i>	2,429.16	
		<i>For Class 56 Rating, Add</i>	3,217.84	
40 05 19 00-2864	EA	16" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,182.99	683.30
		<i>For Class 52 Rating, Deduct</i>	-1,226.24	
		<i>For Class 54 Rating, Add</i>	1,684.58	
		<i>For Class 55 Rating, Add</i>	2,510.78	
		<i>For Class 56 Rating, Add</i>	3,325.84	
40 05 19 00-2865	EA	16" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,553.29	686.48
		<i>For Class 52 Rating, Deduct</i>	-1,266.45	
		<i>For Class 54 Rating, Add</i>	1,739.46	
		<i>For Class 55 Rating, Add</i>	2,592.40	
		<i>For Class 56 Rating, Add</i>	3,433.83	
40 05 19 00-2866	EA	16" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,923.61	689.66
		<i>For Class 52 Rating, Deduct</i>	-1,306.65	
		<i>For Class 54 Rating, Add</i>	1,794.34	
		<i>For Class 55 Rating, Add</i>	2,674.02	
		<i>For Class 56 Rating, Add</i>	3,541.83	
40 05 19 00-2867	EA	16" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,293.92	692.83
		<i>For Class 52 Rating, Deduct</i>	-1,346.86	
		<i>For Class 54 Rating, Add</i>	1,849.22	
		<i>For Class 55 Rating, Add</i>	2,755.64	
		<i>For Class 56 Rating, Add</i>	3,649.82	
40 05 19 00-2868	EA	16" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,664.24	696.01
		<i>For Class 52 Rating, Deduct</i>	-1,387.06	
		<i>For Class 54 Rating, Add</i>	1,904.11	
		<i>For Class 55 Rating, Add</i>	2,837.27	
		<i>For Class 56 Rating, Add</i>	3,757.82	
40 05 19 00-2869	EA	16" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,034.54	699.20
		<i>For Class 52 Rating, Deduct</i>	-1,427.27	
		<i>For Class 54 Rating, Add</i>	1,958.99	
		<i>For Class 55 Rating, Add</i>	2,918.89	
		<i>For Class 56 Rating, Add</i>	3,865.81	
40 05 19 00-2870	EA	16" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,404.86	702.37
		<i>For Class 52 Rating, Deduct</i>	-1,467.47	
		<i>For Class 54 Rating, Add</i>	2,013.87	
		<i>For Class 55 Rating, Add</i>	3,000.51	
		<i>For Class 56 Rating, Add</i>	3,973.81	
40 05 19 00-2871	EA	16" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,775.17	705.55
		<i>For Class 52 Rating, Deduct</i>	-1,507.68	
		<i>For Class 54 Rating, Add</i>	2,068.75	
		<i>For Class 55 Rating, Add</i>	3,082.13	
		<i>For Class 56 Rating, Add</i>	4,081.80	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2872 EA 16" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,145.49	708.73
<i>For Class 52 Rating, Deduct</i>	-1,547.88	
<i>For Class 54 Rating, Add</i>	2,123.63	
<i>For Class 55 Rating, Add</i>	3,163.75	
<i>For Class 56 Rating, Add</i>	4,189.80	
40 05 19 00-2873 EA 16" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,515.80	711.90
<i>For Class 52 Rating, Deduct</i>	-1,588.09	
<i>For Class 54 Rating, Add</i>	2,178.52	
<i>For Class 55 Rating, Add</i>	3,245.37	
<i>For Class 56 Rating, Add</i>	4,297.79	
40 05 19 00-2874 EA 16" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,886.11	715.08
<i>For Class 52 Rating, Deduct</i>	-1,628.29	
<i>For Class 54 Rating, Add</i>	2,233.40	
<i>For Class 55 Rating, Add</i>	3,326.99	
<i>For Class 56 Rating, Add</i>	4,405.79	
40 05 19 00-2875 EA 16" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,256.42	718.26
<i>For Class 52 Rating, Deduct</i>	-1,668.50	
<i>For Class 54 Rating, Add</i>	2,288.28	
<i>For Class 55 Rating, Add</i>	3,408.62	
<i>For Class 56 Rating, Add</i>	4,513.78	
40 05 19 00-2876 EA 16" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,626.74	721.44
<i>For Class 52 Rating, Deduct</i>	-1,708.70	
<i>For Class 54 Rating, Add</i>	2,343.16	
<i>For Class 55 Rating, Add</i>	3,490.24	
<i>For Class 56 Rating, Add</i>	4,621.78	
40 05 19 00-2877 EA 16" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,997.05	724.62
<i>For Class 52 Rating, Deduct</i>	-1,748.91	
<i>For Class 54 Rating, Add</i>	2,398.05	
<i>For Class 55 Rating, Add</i>	3,571.86	
<i>For Class 56 Rating, Add</i>	4,729.77	
40 05 19 00-2878 EA 16" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,367.36	727.80
<i>For Class 52 Rating, Deduct</i>	-1,789.11	
<i>For Class 54 Rating, Add</i>	2,452.93	
<i>For Class 55 Rating, Add</i>	3,653.48	
<i>For Class 56 Rating, Add</i>	4,837.77	
40 05 19 00-2879 18" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2800)</small>		
40 05 19 00-2880 EA 18" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,289.36	687.75
<i>For Class 52 Rating, Deduct</i>	-357.20	
<i>For Class 54 Rating, Add</i>	499.60	
<i>For Class 55 Rating, Add</i>	749.16	
<i>For Class 56 Rating, Add</i>	995.47	
40 05 19 00-2881 EA 18" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,715.89	690.93
<i>For Class 52 Rating, Deduct</i>	-403.59	
<i>For Class 54 Rating, Add</i>	562.92	
<i>For Class 55 Rating, Add</i>	843.32	
<i>For Class 56 Rating, Add</i>	1,120.05	
40 05 19 00-2882 EA 18" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,142.44	694.11
<i>For Class 52 Rating, Deduct</i>	-449.98	
<i>For Class 54 Rating, Add</i>	626.23	
<i>For Class 55 Rating, Add</i>	937.48	
<i>For Class 56 Rating, Add</i>	1,244.63	
40 05 19 00-2883 EA 18" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,568.98	697.30
<i>For Class 52 Rating, Deduct</i>	-496.37	
<i>For Class 54 Rating, Add</i>	689.55	
<i>For Class 55 Rating, Add</i>	1,031.64	
<i>For Class 56 Rating, Add</i>	1,369.22	
40 05 19 00-2884 EA 18" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,995.53	700.47
<i>For Class 52 Rating, Deduct</i>	-542.76	
<i>For Class 54 Rating, Add</i>	752.87	
<i>For Class 55 Rating, Add</i>	1,125.80	
<i>For Class 56 Rating, Add</i>	1,493.80	
40 05 19 00-2885 EA 18" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,422.07	703.65
<i>For Class 52 Rating, Deduct</i>	-589.15	
<i>For Class 54 Rating, Add</i>	816.19	
<i>For Class 55 Rating, Add</i>	1,219.96	
<i>For Class 56 Rating, Add</i>	1,618.39	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR

CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-2886	EA	18" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	6,848.61	706.83
		<i>For Class 52 Rating, Deduct</i>	-635.54	
		<i>For Class 54 Rating, Add</i>	879.50	
		<i>For Class 55 Rating, Add</i>	1,314.12	
		<i>For Class 56 Rating, Add</i>	1,742.97	
40 05 19 00-2887	EA	18" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,275.15	710.00
		<i>For Class 52 Rating, Deduct</i>	-681.93	
		<i>For Class 54 Rating, Add</i>	942.82	
		<i>For Class 55 Rating, Add</i>	1,408.28	
		<i>For Class 56 Rating, Add</i>	1,867.55	
40 05 19 00-2888	EA	18" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	7,701.70	713.18
		<i>For Class 52 Rating, Deduct</i>	-728.32	
		<i>For Class 54 Rating, Add</i>	1,006.14	
		<i>For Class 55 Rating, Add</i>	1,502.45	
		<i>For Class 56 Rating, Add</i>	1,992.13	
40 05 19 00-2889	EA	18" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,128.24	716.36
		<i>For Class 52 Rating, Deduct</i>	-774.71	
		<i>For Class 54 Rating, Add</i>	1,069.45	
		<i>For Class 55 Rating, Add</i>	1,596.61	
		<i>For Class 56 Rating, Add</i>	2,116.72	
40 05 19 00-2890	EA	18" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,554.79	719.53
		<i>For Class 52 Rating, Deduct</i>	-821.10	
		<i>For Class 54 Rating, Add</i>	1,132.77	
		<i>For Class 55 Rating, Add</i>	1,690.77	
		<i>For Class 56 Rating, Add</i>	2,241.30	
40 05 19 00-2891	EA	18" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	8,981.33	722.72
		<i>For Class 52 Rating, Deduct</i>	-867.49	
		<i>For Class 54 Rating, Add</i>	1,196.09	
		<i>For Class 55 Rating, Add</i>	1,784.93	
		<i>For Class 56 Rating, Add</i>	2,365.88	
40 05 19 00-2892	EA	18" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,407.88	725.90
		<i>For Class 52 Rating, Deduct</i>	-913.88	
		<i>For Class 54 Rating, Add</i>	1,259.40	
		<i>For Class 55 Rating, Add</i>	1,879.09	
		<i>For Class 56 Rating, Add</i>	2,490.47	
40 05 19 00-2893	EA	18" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,834.42	729.07
		<i>For Class 52 Rating, Deduct</i>	-960.27	
		<i>For Class 54 Rating, Add</i>	1,322.72	
		<i>For Class 55 Rating, Add</i>	1,973.25	
		<i>For Class 56 Rating, Add</i>	2,615.05	
40 05 19 00-2894	EA	18" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,260.97	732.25
		<i>For Class 52 Rating, Deduct</i>	-1,006.67	
		<i>For Class 54 Rating, Add</i>	1,386.04	
		<i>For Class 55 Rating, Add</i>	2,067.41	
		<i>For Class 56 Rating, Add</i>	2,739.63	
40 05 19 00-2895	EA	18" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,687.51	735.43
		<i>For Class 52 Rating, Deduct</i>	-1,053.06	
		<i>For Class 54 Rating, Add</i>	1,449.36	
		<i>For Class 55 Rating, Add</i>	2,161.57	
		<i>For Class 56 Rating, Add</i>	2,864.22	
40 05 19 00-2896	EA	18" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,114.05	738.60
		<i>For Class 52 Rating, Deduct</i>	-1,099.44	
		<i>For Class 54 Rating, Add</i>	1,512.67	
		<i>For Class 55 Rating, Add</i>	2,255.73	
		<i>For Class 56 Rating, Add</i>	2,988.80	
40 05 19 00-2897	EA	18" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,540.59	741.78
		<i>For Class 52 Rating, Deduct</i>	-1,145.83	
		<i>For Class 54 Rating, Add</i>	1,575.99	
		<i>For Class 55 Rating, Add</i>	2,349.89	
		<i>For Class 56 Rating, Add</i>	3,113.38	
40 05 19 00-2898	EA	18" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,967.14	744.96
		<i>For Class 52 Rating, Deduct</i>	-1,192.23	
		<i>For Class 54 Rating, Add</i>	1,639.31	
		<i>For Class 55 Rating, Add</i>	2,444.05	
		<i>For Class 56 Rating, Add</i>	3,237.97	
40 05 19 00-2899	EA	18" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,393.68	748.15
		<i>For Class 52 Rating, Deduct</i>	-1,238.62	
		<i>For Class 54 Rating, Add</i>	1,702.62	
		<i>For Class 55 Rating, Add</i>	2,538.22	
		<i>For Class 56 Rating, Add</i>	3,362.55	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2900 EA 18" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,820.23	751.32
For Class 52 Rating, Deduct	-1,285.01	
For Class 54 Rating, Add	1,765.94	
For Class 55 Rating, Add	2,632.38	
For Class 56 Rating, Add	3,487.13	
40 05 19 00-2901 EA 18" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,246.76	754.50
For Class 52 Rating, Deduct	-1,331.39	
For Class 54 Rating, Add	1,829.26	
For Class 55 Rating, Add	2,726.54	
For Class 56 Rating, Add	3,611.71	
40 05 19 00-2902 EA 18" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,673.31	757.68
For Class 52 Rating, Deduct	-1,377.79	
For Class 54 Rating, Add	1,892.57	
For Class 55 Rating, Add	2,820.70	
For Class 56 Rating, Add	3,736.30	
40 05 19 00-2903 EA 18" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,099.85	760.85
For Class 52 Rating, Deduct	-1,424.18	
For Class 54 Rating, Add	1,955.89	
For Class 55 Rating, Add	2,914.86	
For Class 56 Rating, Add	3,860.88	
40 05 19 00-2904 EA 18" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,526.39	764.03
For Class 52 Rating, Deduct	-1,470.57	
For Class 54 Rating, Add	2,019.21	
For Class 55 Rating, Add	3,009.02	
For Class 56 Rating, Add	3,985.46	
40 05 19 00-2905 EA 18" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,952.94	767.21
For Class 52 Rating, Deduct	-1,516.96	
For Class 54 Rating, Add	2,082.53	
For Class 55 Rating, Add	3,103.18	
For Class 56 Rating, Add	4,110.05	
40 05 19 00-2906 EA 18" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,379.47	770.38
For Class 52 Rating, Deduct	-1,563.35	
For Class 54 Rating, Add	2,145.84	
For Class 55 Rating, Add	3,197.34	
For Class 56 Rating, Add	4,234.63	
40 05 19 00-2907 EA 18" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,806.02	773.57
For Class 52 Rating, Deduct	-1,609.74	
For Class 54 Rating, Add	2,209.16	
For Class 55 Rating, Add	3,291.50	
For Class 56 Rating, Add	4,359.21	
40 05 19 00-2908 EA 18" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,232.56	776.75
For Class 52 Rating, Deduct	-1,656.13	
For Class 54 Rating, Add	2,272.48	
For Class 55 Rating, Add	3,385.66	
For Class 56 Rating, Add	4,483.80	
40 05 19 00-2909 EA 18" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,659.11	779.92
For Class 52 Rating, Deduct	-1,702.52	
For Class 54 Rating, Add	2,335.79	
For Class 55 Rating, Add	3,479.83	
For Class 56 Rating, Add	4,608.38	
40 05 19 00-2910 EA 18" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,085.65	783.10
For Class 52 Rating, Deduct	-1,748.91	
For Class 54 Rating, Add	2,399.11	
For Class 55 Rating, Add	3,573.99	
For Class 56 Rating, Add	4,732.96	
40 05 19 00-2911 EA 18" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,512.19	786.28
For Class 52 Rating, Deduct	-1,795.30	
For Class 54 Rating, Add	2,462.43	
For Class 55 Rating, Add	3,668.15	
For Class 56 Rating, Add	4,857.54	
40 05 19 00-2912 EA 18" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,938.73	789.45
For Class 52 Rating, Deduct	-1,841.69	
For Class 54 Rating, Add	2,525.74	
For Class 55 Rating, Add	3,762.31	
For Class 56 Rating, Add	4,982.13	
40 05 19 00-2913 EA 18" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,365.29	792.63
For Class 52 Rating, Deduct	-1,888.08	
For Class 54 Rating, Add	2,589.06	
For Class 55 Rating, Add	3,856.47	
For Class 56 Rating, Add	5,106.71	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2914	EA	18" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,791.83		795.81
		<i>For Class 52 Rating, Deduct</i>	-1,934.47		
		<i>For Class 54 Rating, Add</i>	2,652.38		
		<i>For Class 55 Rating, Add</i>	3,950.63		
		<i>For Class 56 Rating, Add</i>	5,231.30		
40 05 19 00-2915	EA	18" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,218.38		799.00
		<i>For Class 52 Rating, Deduct</i>	-1,980.86		
		<i>For Class 54 Rating, Add</i>	2,715.70		
		<i>For Class 55 Rating, Add</i>	4,044.79		
		<i>For Class 56 Rating, Add</i>	5,355.88		
40 05 19 00-2916	EA	18" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,644.91		802.17
		<i>For Class 52 Rating, Deduct</i>	-2,027.25		
		<i>For Class 54 Rating, Add</i>	2,779.01		
		<i>For Class 55 Rating, Add</i>	4,138.95		
		<i>For Class 56 Rating, Add</i>	5,480.46		
40 05 19 00-2917	EA	18" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,071.46		805.35
		<i>For Class 52 Rating, Deduct</i>	-2,073.64		
		<i>For Class 54 Rating, Add</i>	2,842.33		
		<i>For Class 55 Rating, Add</i>	4,233.11		
		<i>For Class 56 Rating, Add</i>	5,605.04		
40 05 19 00-2918		20" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>			
40 05 19 00-2919	EA	20" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,970.89		785.00
		<i>For Class 52 Rating, Deduct</i>	-415.96		
		<i>For Class 54 Rating, Add</i>	581.50		
		<i>For Class 55 Rating, Add</i>	871.82		
		<i>For Class 56 Rating, Add</i>	1,158.36		
40 05 19 00-2920	EA	20" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,456.47		788.18
		<i>For Class 52 Rating, Deduct</i>	-468.85		
		<i>For Class 54 Rating, Add</i>	653.67		
		<i>For Class 55 Rating, Add</i>	979.15		
		<i>For Class 56 Rating, Add</i>	1,300.36		
40 05 19 00-2921	EA	20" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,942.06		791.36
		<i>For Class 52 Rating, Deduct</i>	-521.73		
		<i>For Class 54 Rating, Add</i>	725.84		
		<i>For Class 55 Rating, Add</i>	1,086.47		
		<i>For Class 56 Rating, Add</i>	1,442.36		
40 05 19 00-2922	EA	20" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,427.64		794.53
		<i>For Class 52 Rating, Deduct</i>	-574.62		
		<i>For Class 54 Rating, Add</i>	798.02		
		<i>For Class 55 Rating, Add</i>	1,193.80		
		<i>For Class 56 Rating, Add</i>	1,584.36		
40 05 19 00-2923	EA	20" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,913.23		797.71
		<i>For Class 52 Rating, Deduct</i>	-627.50		
		<i>For Class 54 Rating, Add</i>	870.19		
		<i>For Class 55 Rating, Add</i>	1,301.13		
		<i>For Class 56 Rating, Add</i>	1,726.36		
40 05 19 00-2924	EA	20" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,398.81		800.90
		<i>For Class 52 Rating, Deduct</i>	-680.39		
		<i>For Class 54 Rating, Add</i>	942.36		
		<i>For Class 55 Rating, Add</i>	1,408.45		
		<i>For Class 56 Rating, Add</i>	1,868.36		
40 05 19 00-2925	EA	20" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,884.40		804.07
		<i>For Class 52 Rating, Deduct</i>	-733.27		
		<i>For Class 54 Rating, Add</i>	1,014.54		
		<i>For Class 55 Rating, Add</i>	1,515.78		
		<i>For Class 56 Rating, Add</i>	2,010.36		
40 05 19 00-2926	EA	20" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,369.98		807.25
		<i>For Class 52 Rating, Deduct</i>	-786.16		
		<i>For Class 54 Rating, Add</i>	1,086.71		
		<i>For Class 55 Rating, Add</i>	1,623.11		
		<i>For Class 56 Rating, Add</i>	2,152.36		
40 05 19 00-2927	EA	20" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,855.57		810.43
		<i>For Class 52 Rating, Deduct</i>	-839.04		
		<i>For Class 54 Rating, Add</i>	1,158.88		
		<i>For Class 55 Rating, Add</i>	1,730.44		
		<i>For Class 56 Rating, Add</i>	2,294.36		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2928 EA 20" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,341.15	813.60
<i>For Class 52 Rating, Deduct</i>	-891.93	
<i>For Class 54 Rating, Add</i>	1,231.06	
<i>For Class 55 Rating, Add</i>	1,837.76	
<i>For Class 56 Rating, Add</i>	2,436.36	
40 05 19 00-2929 EA 20" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	9,826.74	816.78
<i>For Class 52 Rating, Deduct</i>	-944.81	
<i>For Class 54 Rating, Add</i>	1,303.23	
<i>For Class 55 Rating, Add</i>	1,945.09	
<i>For Class 56 Rating, Add</i>	2,578.36	
40 05 19 00-2930 EA 20" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,312.33	819.96
<i>For Class 52 Rating, Deduct</i>	-997.70	
<i>For Class 54 Rating, Add</i>	1,375.40	
<i>For Class 55 Rating, Add</i>	2,052.42	
<i>For Class 56 Rating, Add</i>	2,720.36	
40 05 19 00-2931 EA 20" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,797.92	823.14
<i>For Class 52 Rating, Deduct</i>	-1,050.58	
<i>For Class 54 Rating, Add</i>	1,447.58	
<i>For Class 55 Rating, Add</i>	2,159.75	
<i>For Class 56 Rating, Add</i>	2,862.36	
40 05 19 00-2932 EA 20" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,283.50	826.32
<i>For Class 52 Rating, Deduct</i>	-1,103.47	
<i>For Class 54 Rating, Add</i>	1,519.75	
<i>For Class 55 Rating, Add</i>	2,267.07	
<i>For Class 56 Rating, Add</i>	3,004.36	
40 05 19 00-2933 EA 20" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,769.09	829.50
<i>For Class 52 Rating, Deduct</i>	-1,156.35	
<i>For Class 54 Rating, Add</i>	1,591.92	
<i>For Class 55 Rating, Add</i>	2,374.40	
<i>For Class 56 Rating, Add</i>	3,146.37	
40 05 19 00-2934 EA 20" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,254.67	832.68
<i>For Class 52 Rating, Deduct</i>	-1,209.23	
<i>For Class 54 Rating, Add</i>	1,664.10	
<i>For Class 55 Rating, Add</i>	2,481.73	
<i>For Class 56 Rating, Add</i>	3,288.37	
40 05 19 00-2935 EA 20" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,740.26	835.85
<i>For Class 52 Rating, Deduct</i>	-1,262.12	
<i>For Class 54 Rating, Add</i>	1,736.27	
<i>For Class 55 Rating, Add</i>	2,589.05	
<i>For Class 56 Rating, Add</i>	3,430.37	
40 05 19 00-2936 EA 20" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,225.84	839.03
<i>For Class 52 Rating, Deduct</i>	-1,315.00	
<i>For Class 54 Rating, Add</i>	1,808.44	
<i>For Class 55 Rating, Add</i>	2,696.38	
<i>For Class 56 Rating, Add</i>	3,572.37	
40 05 19 00-2937 EA 20" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,711.43	842.21
<i>For Class 52 Rating, Deduct</i>	-1,367.89	
<i>For Class 54 Rating, Add</i>	1,880.62	
<i>For Class 55 Rating, Add</i>	2,803.71	
<i>For Class 56 Rating, Add</i>	3,714.37	
40 05 19 00-2938 EA 20" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,197.01	845.38
<i>For Class 52 Rating, Deduct</i>	-1,420.77	
<i>For Class 54 Rating, Add</i>	1,952.79	
<i>For Class 55 Rating, Add</i>	2,911.04	
<i>For Class 56 Rating, Add</i>	3,856.37	
40 05 19 00-2939 EA 20" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,682.60	848.56
<i>For Class 52 Rating, Deduct</i>	-1,473.66	
<i>For Class 54 Rating, Add</i>	2,024.96	
<i>For Class 55 Rating, Add</i>	3,018.36	
<i>For Class 56 Rating, Add</i>	3,998.37	
40 05 19 00-2940 EA 20" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,168.18	851.75
<i>For Class 52 Rating, Deduct</i>	-1,526.54	
<i>For Class 54 Rating, Add</i>	2,097.14	
<i>For Class 55 Rating, Add</i>	3,125.69	
<i>For Class 56 Rating, Add</i>	4,140.37	
40 05 19 00-2941 EA 20" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,653.77	854.92
<i>For Class 52 Rating, Deduct</i>	-1,579.43	
<i>For Class 54 Rating, Add</i>	2,169.31	
<i>For Class 55 Rating, Add</i>	3,233.02	
<i>For Class 56 Rating, Add</i>	4,282.37	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-2942	EA	20" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,139.35		858.10
		<i>For Class 52 Rating, Deduct</i>	-1,632.31		
		<i>For Class 54 Rating, Add</i>	2,241.48		
		<i>For Class 55 Rating, Add</i>	3,340.35		
		<i>For Class 56 Rating, Add</i>	4,424.37		
40 05 19 00-2943	EA	20" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,624.94		861.28
		<i>For Class 52 Rating, Deduct</i>	-1,685.20		
		<i>For Class 54 Rating, Add</i>	2,313.66		
		<i>For Class 55 Rating, Add</i>	3,447.67		
		<i>For Class 56 Rating, Add</i>	4,566.37		
40 05 19 00-2944	EA	20" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,110.52		864.46
		<i>For Class 52 Rating, Deduct</i>	-1,738.08		
		<i>For Class 54 Rating, Add</i>	2,385.83		
		<i>For Class 55 Rating, Add</i>	3,555.00		
		<i>For Class 56 Rating, Add</i>	4,708.37		
40 05 19 00-2945	EA	20" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,596.11		867.63
		<i>For Class 52 Rating, Deduct</i>	-1,790.97		
		<i>For Class 54 Rating, Add</i>	2,458.00		
		<i>For Class 55 Rating, Add</i>	3,662.33		
		<i>For Class 56 Rating, Add</i>	4,850.37		
40 05 19 00-2946	EA	20" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,081.69		870.81
		<i>For Class 52 Rating, Deduct</i>	-1,843.85		
		<i>For Class 54 Rating, Add</i>	2,530.17		
		<i>For Class 55 Rating, Add</i>	3,769.65		
		<i>For Class 56 Rating, Add</i>	4,992.37		
40 05 19 00-2947	EA	20" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,567.28		873.99
		<i>For Class 52 Rating, Deduct</i>	-1,896.74		
		<i>For Class 54 Rating, Add</i>	2,602.35		
		<i>For Class 55 Rating, Add</i>	3,876.98		
		<i>For Class 56 Rating, Add</i>	5,134.37		
40 05 19 00-2948	EA	20" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,052.86		877.17
		<i>For Class 52 Rating, Deduct</i>	-1,949.62		
		<i>For Class 54 Rating, Add</i>	2,674.52		
		<i>For Class 55 Rating, Add</i>	3,984.31		
		<i>For Class 56 Rating, Add</i>	5,276.37		
40 05 19 00-2949	EA	20" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,538.45		880.35
		<i>For Class 52 Rating, Deduct</i>	-2,002.50		
		<i>For Class 54 Rating, Add</i>	2,746.69		
		<i>For Class 55 Rating, Add</i>	4,091.64		
		<i>For Class 56 Rating, Add</i>	5,418.37		
40 05 19 00-2950	EA	20" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,024.03		883.53
		<i>For Class 52 Rating, Deduct</i>	-2,055.39		
		<i>For Class 54 Rating, Add</i>	2,818.87		
		<i>For Class 55 Rating, Add</i>	4,198.96		
		<i>For Class 56 Rating, Add</i>	5,560.37		
40 05 19 00-2951	EA	20" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,509.62		886.70
		<i>For Class 52 Rating, Deduct</i>	-2,108.27		
		<i>For Class 54 Rating, Add</i>	2,891.04		
		<i>For Class 55 Rating, Add</i>	4,306.29		
		<i>For Class 56 Rating, Add</i>	5,702.37		
40 05 19 00-2952	EA	20" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,995.20		889.88
		<i>For Class 52 Rating, Deduct</i>	-2,161.16		
		<i>For Class 54 Rating, Add</i>	2,963.21		
		<i>For Class 55 Rating, Add</i>	4,413.62		
		<i>For Class 56 Rating, Add</i>	5,844.37		
40 05 19 00-2953	EA	20" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,480.79		893.06
		<i>For Class 52 Rating, Deduct</i>	-2,214.04		
		<i>For Class 54 Rating, Add</i>	3,035.39		
		<i>For Class 55 Rating, Add</i>	4,520.95		
		<i>For Class 56 Rating, Add</i>	5,986.37		
40 05 19 00-2954	EA	20" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,966.38		896.23
		<i>For Class 52 Rating, Deduct</i>	-2,266.93		
		<i>For Class 54 Rating, Add</i>	3,107.56		
		<i>For Class 55 Rating, Add</i>	4,628.27		
		<i>For Class 56 Rating, Add</i>	6,128.38		
40 05 19 00-2955	EA	20" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,451.96		899.41
		<i>For Class 52 Rating, Deduct</i>	-2,319.81		
		<i>For Class 54 Rating, Add</i>	3,179.73		
		<i>For Class 55 Rating, Add</i>	4,735.60		
		<i>For Class 56 Rating, Add</i>	6,270.38		



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2956 EA 20" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,937.55	902.60
For Class 52 Rating, Deduct	-2,372.70	
For Class 54 Rating, Add	3,251.91	
For Class 55 Rating, Add	4,842.93	
For Class 56 Rating, Add	6,412.38	
40 05 19 00-2957 24" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-2600)		
40 05 19 00-2958 EA 24" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,180.05	928.02
For Class 52 Rating, Deduct	-525.14	
For Class 54 Rating, Add	732.97	
For Class 55 Rating, Add	1,098.34	
For Class 56 Rating, Add	1,458.94	
40 05 19 00-2959 EA 24" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,780.90	931.20
For Class 52 Rating, Deduct	-590.70	
For Class 54 Rating, Add	822.43	
For Class 55 Rating, Add	1,231.37	
For Class 56 Rating, Add	1,634.94	
40 05 19 00-2960 EA 24" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,381.77	934.38
For Class 52 Rating, Deduct	-656.27	
For Class 54 Rating, Add	911.90	
For Class 55 Rating, Add	1,364.41	
For Class 56 Rating, Add	1,810.95	
40 05 19 00-2961 EA 24" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,982.62	937.55
For Class 52 Rating, Deduct	-721.83	
For Class 54 Rating, Add	1,001.36	
For Class 55 Rating, Add	1,497.44	
For Class 56 Rating, Add	1,986.96	
40 05 19 00-2962 EA 24" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,583.48	940.73
For Class 52 Rating, Deduct	-787.39	
For Class 54 Rating, Add	1,090.82	
For Class 55 Rating, Add	1,630.47	
For Class 56 Rating, Add	2,162.96	
40 05 19 00-2963 EA 24" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,184.33	943.91
For Class 52 Rating, Deduct	-852.96	
For Class 54 Rating, Add	1,180.29	
For Class 55 Rating, Add	1,763.50	
For Class 56 Rating, Add	2,338.97	
40 05 19 00-2964 EA 24" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,785.19	947.08
For Class 52 Rating, Deduct	-918.52	
For Class 54 Rating, Add	1,269.75	
For Class 55 Rating, Add	1,896.54	
For Class 56 Rating, Add	2,514.97	
40 05 19 00-2965 EA 24" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,386.05	950.26
For Class 52 Rating, Deduct	-984.09	
For Class 54 Rating, Add	1,359.22	
For Class 55 Rating, Add	2,029.57	
For Class 56 Rating, Add	2,690.98	
40 05 19 00-2966 EA 24" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,986.91	953.45
For Class 52 Rating, Deduct	-1,049.65	
For Class 54 Rating, Add	1,448.68	
For Class 55 Rating, Add	2,162.60	
For Class 56 Rating, Add	2,866.98	
40 05 19 00-2967 EA 24" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,587.76	956.63
For Class 52 Rating, Deduct	-1,115.22	
For Class 54 Rating, Add	1,538.14	
For Class 55 Rating, Add	2,295.64	
For Class 56 Rating, Add	3,042.99	
40 05 19 00-2968 EA 24" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,188.62	959.80
For Class 52 Rating, Deduct	-1,180.78	
For Class 54 Rating, Add	1,627.61	
For Class 55 Rating, Add	2,428.67	
For Class 56 Rating, Add	3,218.99	
40 05 19 00-2969 EA 24" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,789.49	962.98
For Class 52 Rating, Deduct	-1,246.35	
For Class 54 Rating, Add	1,717.07	
For Class 55 Rating, Add	2,561.70	
For Class 56 Rating, Add	3,395.00	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-2970	EA		24" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,390.35	966.16
			<i>For Class 52 Rating, Deduct</i>	-1,311.91	
			<i>For Class 54 Rating, Add</i>	1,806.54	
			<i>For Class 55 Rating, Add</i>	2,694.74	
			<i>For Class 56 Rating, Add</i>	3,571.01	
40 05 19 00-2971	EA		24" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,991.20	969.33
			<i>For Class 52 Rating, Deduct</i>	-1,377.48	
			<i>For Class 54 Rating, Add</i>	1,896.00	
			<i>For Class 55 Rating, Add</i>	2,827.77	
			<i>For Class 56 Rating, Add</i>	3,747.01	
40 05 19 00-2972	EA		24" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,592.06	972.51
			<i>For Class 52 Rating, Deduct</i>	-1,443.04	
			<i>For Class 54 Rating, Add</i>	1,985.46	
			<i>For Class 55 Rating, Add</i>	2,960.80	
			<i>For Class 56 Rating, Add</i>	3,923.02	
40 05 19 00-2973	EA		24" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,192.91	975.69
			<i>For Class 52 Rating, Deduct</i>	-1,508.60	
			<i>For Class 54 Rating, Add</i>	2,074.93	
			<i>For Class 55 Rating, Add</i>	3,093.83	
			<i>For Class 56 Rating, Add</i>	4,099.02	
40 05 19 00-2974	EA		24" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,793.78	978.87
			<i>For Class 52 Rating, Deduct</i>	-1,574.17	
			<i>For Class 54 Rating, Add</i>	2,164.39	
			<i>For Class 55 Rating, Add</i>	3,226.87	
			<i>For Class 56 Rating, Add</i>	4,275.03	
40 05 19 00-2975	EA		24" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,394.63	982.05
			<i>For Class 52 Rating, Deduct</i>	-1,639.73	
			<i>For Class 54 Rating, Add</i>	2,253.86	
			<i>For Class 55 Rating, Add</i>	3,359.90	
			<i>For Class 56 Rating, Add</i>	4,451.04	
40 05 19 00-2976	EA		24" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,995.49	985.23
			<i>For Class 52 Rating, Deduct</i>	-1,705.30	
			<i>For Class 54 Rating, Add</i>	2,343.32	
			<i>For Class 55 Rating, Add</i>	3,492.93	
			<i>For Class 56 Rating, Add</i>	4,627.04	
40 05 19 00-2977	EA		24" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,596.34	988.40
			<i>For Class 52 Rating, Deduct</i>	-1,770.86	
			<i>For Class 54 Rating, Add</i>	2,432.78	
			<i>For Class 55 Rating, Add</i>	3,625.97	
			<i>For Class 56 Rating, Add</i>	4,803.05	
40 05 19 00-2978	EA		24" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,197.21	991.58
			<i>For Class 52 Rating, Deduct</i>	-1,836.43	
			<i>For Class 54 Rating, Add</i>	2,522.25	
			<i>For Class 55 Rating, Add</i>	3,759.00	
			<i>For Class 56 Rating, Add</i>	4,979.06	
40 05 19 00-2979	EA		24" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,798.06	994.76
			<i>For Class 52 Rating, Deduct</i>	-1,901.99	
			<i>For Class 54 Rating, Add</i>	2,611.71	
			<i>For Class 55 Rating, Add</i>	3,892.03	
			<i>For Class 56 Rating, Add</i>	5,155.06	
40 05 19 00-2980	EA		24" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,398.92	997.93
			<i>For Class 52 Rating, Deduct</i>	-1,967.56	
			<i>For Class 54 Rating, Add</i>	2,701.18	
			<i>For Class 55 Rating, Add</i>	4,025.07	
			<i>For Class 56 Rating, Add</i>	5,331.07	
40 05 19 00-2981	EA		24" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,999.77	1,001.11
			<i>For Class 52 Rating, Deduct</i>	-2,033.12	
			<i>For Class 54 Rating, Add</i>	2,790.64	
			<i>For Class 55 Rating, Add</i>	4,158.10	
			<i>For Class 56 Rating, Add</i>	5,507.07	
40 05 19 00-2982	EA		24" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,600.63	1,004.30
			<i>For Class 52 Rating, Deduct</i>	-2,098.69	
			<i>For Class 54 Rating, Add</i>	2,880.11	
			<i>For Class 55 Rating, Add</i>	4,291.13	
			<i>For Class 56 Rating, Add</i>	5,683.08	
40 05 19 00-2983	EA		24" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,201.49	1,007.48
			<i>For Class 52 Rating, Deduct</i>	-2,164.25	
			<i>For Class 54 Rating, Add</i>	2,969.57	
			<i>For Class 55 Rating, Add</i>	4,424.16	
			<i>For Class 56 Rating, Add</i>	5,859.08	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-2984 EA 24" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,802.35	1,010.65
<i>For Class 52 Rating, Deduct</i>	-2,229.82	
<i>For Class 54 Rating, Add</i>	3,059.03	
<i>For Class 55 Rating, Add</i>	4,557.20	
<i>For Class 56 Rating, Add</i>	6,035.09	
40 05 19 00-2985 EA 24" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,403.20	1,013.83
<i>For Class 52 Rating, Deduct</i>	-2,295.38	
<i>For Class 54 Rating, Add</i>	3,148.50	
<i>For Class 55 Rating, Add</i>	4,690.23	
<i>For Class 56 Rating, Add</i>	6,211.09	
40 05 19 00-2986 EA 24" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,004.06	1,017.01
<i>For Class 52 Rating, Deduct</i>	-2,360.95	
<i>For Class 54 Rating, Add</i>	3,237.96	
<i>For Class 55 Rating, Add</i>	4,823.26	
<i>For Class 56 Rating, Add</i>	6,387.10	
40 05 19 00-2987 EA 24" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,686.79	1,074.21
<i>For Class 52 Rating, Deduct</i>	-2,426.51	
<i>For Class 54 Rating, Add</i>	3,328.41	
<i>For Class 55 Rating, Add</i>	4,958.26	
<i>For Class 56 Rating, Add</i>	6,566.05	
40 05 19 00-2988 EA 24" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	24,287.64	1,077.39
<i>For Class 52 Rating, Deduct</i>	-2,492.08	
<i>For Class 54 Rating, Add</i>	3,417.87	
<i>For Class 55 Rating, Add</i>	5,091.29	
<i>For Class 56 Rating, Add</i>	6,742.06	
40 05 19 00-2989 EA 24" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	24,888.50	1,080.57
<i>For Class 52 Rating, Deduct</i>	-2,557.64	
<i>For Class 54 Rating, Add</i>	3,507.34	
<i>For Class 55 Rating, Add</i>	5,224.33	
<i>For Class 56 Rating, Add</i>	6,918.06	
40 05 19 00-2990 EA 24" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	25,489.35	1,083.75
<i>For Class 52 Rating, Deduct</i>	-2,623.20	
<i>For Class 54 Rating, Add</i>	3,596.80	
<i>For Class 55 Rating, Add</i>	5,357.36	
<i>For Class 56 Rating, Add</i>	7,094.07	
40 05 19 00-2991 EA 24" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,090.21	1,086.93
<i>For Class 52 Rating, Deduct</i>	-2,688.77	
<i>For Class 54 Rating, Add</i>	3,686.26	
<i>For Class 55 Rating, Add</i>	5,490.39	
<i>For Class 56 Rating, Add</i>	7,270.08	
40 05 19 00-2992 EA 24" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,688.26	1,090.10
<i>For Class 52 Rating, Deduct</i>	-2,754.02	
<i>For Class 54 Rating, Add</i>	3,775.31	
<i>For Class 55 Rating, Add</i>	5,622.80	
<i>For Class 56 Rating, Add</i>	7,445.25	
40 05 19 00-2993 EA 24" Flanged x Grooved (FxG), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	27,291.93	1,093.28
<i>For Class 52 Rating, Deduct</i>	-2,819.90	
<i>For Class 54 Rating, Add</i>	3,865.19	
<i>For Class 55 Rating, Add</i>	5,756.46	
<i>For Class 56 Rating, Add</i>	7,622.09	
40 05 19 00-2994 EA 24" Flanged x Grooved (FxG), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	27,892.78	1,096.46
<i>For Class 52 Rating, Deduct</i>	-2,885.46	
<i>For Class 54 Rating, Add</i>	3,954.66	
<i>For Class 55 Rating, Add</i>	5,889.49	
<i>For Class 56 Rating, Add</i>	7,798.09	
40 05 19 00-2995 EA 24" Flanged x Grooved (FxG), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	28,493.64	1,099.64
<i>For Class 52 Rating, Deduct</i>	-2,951.03	
<i>For Class 54 Rating, Add</i>	4,044.12	
<i>For Class 55 Rating, Add</i>	6,022.52	
<i>For Class 56 Rating, Add</i>	7,974.10	
40 05 19 00-2996 30" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>		
40 05 19 00-2997 EA 30" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,501.93	1,309.40
<i>For Class 52 Rating, Deduct</i>	-826.98	
<i>For Class 54 Rating, Add</i>	1,151.51	
<i>For Class 55 Rating, Add</i>	1,724.13	
<i>For Class 56 Rating, Add</i>	2,289.23	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-2998	EA	30" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	10,361.46	1,312.58
		<i>For Class 52 Rating, Deduct</i>	-921.00	
		<i>For Class 54 Rating, Add</i>	1,279.77	
		<i>For Class 55 Rating, Add</i>	1,914.84	
		<i>For Class 56 Rating, Add</i>	2,541.54	
40 05 19 00-2999	EA	30" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	11,220.97	1,315.75
		<i>For Class 52 Rating, Deduct</i>	-1,015.02	
		<i>For Class 54 Rating, Add</i>	1,408.03	
		<i>For Class 55 Rating, Add</i>	2,105.56	
		<i>For Class 56 Rating, Add</i>	2,793.85	
40 05 19 00-3000	EA	30" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,080.50	1,318.93
		<i>For Class 52 Rating, Deduct</i>	-1,109.03	
		<i>For Class 54 Rating, Add</i>	1,536.30	
		<i>For Class 55 Rating, Add</i>	2,296.27	
		<i>For Class 56 Rating, Add</i>	3,046.16	
40 05 19 00-3001	EA	30" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	12,940.01	1,322.11
		<i>For Class 52 Rating, Deduct</i>	-1,203.05	
		<i>For Class 54 Rating, Add</i>	1,664.56	
		<i>For Class 55 Rating, Add</i>	2,486.99	
		<i>For Class 56 Rating, Add</i>	3,298.47	
40 05 19 00-3002	EA	30" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,799.53	1,325.28
		<i>For Class 52 Rating, Deduct</i>	-1,297.07	
		<i>For Class 54 Rating, Add</i>	1,792.82	
		<i>For Class 55 Rating, Add</i>	2,677.70	
		<i>For Class 56 Rating, Add</i>	3,550.78	
40 05 19 00-3003	EA	30" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,659.05	1,328.46
		<i>For Class 52 Rating, Deduct</i>	-1,391.08	
		<i>For Class 54 Rating, Add</i>	1,921.09	
		<i>For Class 55 Rating, Add</i>	2,868.41	
		<i>For Class 56 Rating, Add</i>	3,803.10	
40 05 19 00-3004	EA	30" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,518.57	1,331.65
		<i>For Class 52 Rating, Deduct</i>	-1,485.10	
		<i>For Class 54 Rating, Add</i>	2,049.35	
		<i>For Class 55 Rating, Add</i>	3,059.13	
		<i>For Class 56 Rating, Add</i>	4,055.41	
40 05 19 00-3005	EA	30" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,378.08	1,334.83
		<i>For Class 52 Rating, Deduct</i>	-1,579.12	
		<i>For Class 54 Rating, Add</i>	2,177.61	
		<i>For Class 55 Rating, Add</i>	3,249.84	
		<i>For Class 56 Rating, Add</i>	4,307.72	
40 05 19 00-3006	EA	30" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,237.60	1,338.00
		<i>For Class 52 Rating, Deduct</i>	-1,673.14	
		<i>For Class 54 Rating, Add</i>	2,305.88	
		<i>For Class 55 Rating, Add</i>	3,440.56	
		<i>For Class 56 Rating, Add</i>	4,560.03	
40 05 19 00-3007	EA	30" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,097.12	1,341.18
		<i>For Class 52 Rating, Deduct</i>	-1,767.15	
		<i>For Class 54 Rating, Add</i>	2,434.14	
		<i>For Class 55 Rating, Add</i>	3,631.27	
		<i>For Class 56 Rating, Add</i>	4,812.34	
40 05 19 00-3008	EA	30" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,956.63	1,344.36
		<i>For Class 52 Rating, Deduct</i>	-1,861.17	
		<i>For Class 54 Rating, Add</i>	2,562.40	
		<i>For Class 55 Rating, Add</i>	3,821.99	
		<i>For Class 56 Rating, Add</i>	5,064.65	
40 05 19 00-3009	EA	30" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	19,816.15	1,347.53
		<i>For Class 52 Rating, Deduct</i>	-1,955.19	
		<i>For Class 54 Rating, Add</i>	2,690.67	
		<i>For Class 55 Rating, Add</i>	4,012.70	
		<i>For Class 56 Rating, Add</i>	5,316.96	
40 05 19 00-3010	EA	30" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,675.66	1,350.71
		<i>For Class 52 Rating, Deduct</i>	-2,049.20	
		<i>For Class 54 Rating, Add</i>	2,818.93	
		<i>For Class 55 Rating, Add</i>	4,203.41	
		<i>For Class 56 Rating, Add</i>	5,569.27	
40 05 19 00-3011	EA	30" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,535.18	1,353.89
		<i>For Class 52 Rating, Deduct</i>	-2,143.22	
		<i>For Class 54 Rating, Add</i>	2,947.19	
		<i>For Class 55 Rating, Add</i>	4,394.13	
		<i>For Class 56 Rating, Add</i>	5,821.58	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3012 EA 30" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	22,394.70	1,357.07
<i>For Class 52 Rating, Deduct</i>	-2,237.24	
<i>For Class 54 Rating, Add</i>	3,075.45	
<i>For Class 55 Rating, Add</i>	4,584.84	
<i>For Class 56 Rating, Add</i>	6,073.89	
40 05 19 00-3013 EA 30" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	23,254.22	1,360.25
<i>For Class 52 Rating, Deduct</i>	-2,331.26	
<i>For Class 54 Rating, Add</i>	3,203.72	
<i>For Class 55 Rating, Add</i>	4,775.56	
<i>For Class 56 Rating, Add</i>	6,326.20	
40 05 19 00-3014 EA 30" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	24,113.73	1,363.43
<i>For Class 52 Rating, Deduct</i>	-2,425.27	
<i>For Class 54 Rating, Add</i>	3,331.98	
<i>For Class 55 Rating, Add</i>	4,966.27	
<i>For Class 56 Rating, Add</i>	6,578.51	
40 05 19 00-3015 EA 30" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	24,973.25	1,366.60
<i>For Class 52 Rating, Deduct</i>	-2,519.29	
<i>For Class 54 Rating, Add</i>	3,460.24	
<i>For Class 55 Rating, Add</i>	5,156.98	
<i>For Class 56 Rating, Add</i>	6,830.82	
40 05 19 00-3016 EA 30" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	25,832.76	1,369.78
<i>For Class 52 Rating, Deduct</i>	-2,613.31	
<i>For Class 54 Rating, Add</i>	3,588.51	
<i>For Class 55 Rating, Add</i>	5,347.70	
<i>For Class 56 Rating, Add</i>	7,083.13	
40 05 19 00-3017 EA 30" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	26,692.29	1,372.96
<i>For Class 52 Rating, Deduct</i>	-2,707.33	
<i>For Class 54 Rating, Add</i>	3,716.77	
<i>For Class 55 Rating, Add</i>	5,538.41	
<i>For Class 56 Rating, Add</i>	7,335.44	
40 05 19 00-3018 EA 30" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	27,551.80	1,376.14
<i>For Class 52 Rating, Deduct</i>	-2,801.34	
<i>For Class 54 Rating, Add</i>	3,845.03	
<i>For Class 55 Rating, Add</i>	5,729.13	
<i>For Class 56 Rating, Add</i>	7,587.75	
40 05 19 00-3019 EA 30" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,411.32	1,379.31
<i>For Class 52 Rating, Deduct</i>	-2,895.36	
<i>For Class 54 Rating, Add</i>	3,973.30	
<i>For Class 55 Rating, Add</i>	5,919.84	
<i>For Class 56 Rating, Add</i>	7,840.06	
40 05 19 00-3020 EA 30" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	29,270.83	1,382.50
<i>For Class 52 Rating, Deduct</i>	-2,989.38	
<i>For Class 54 Rating, Add</i>	4,101.56	
<i>For Class 55 Rating, Add</i>	6,110.55	
<i>For Class 56 Rating, Add</i>	8,092.37	
40 05 19 00-3021 EA 30" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,130.35	1,385.68
<i>For Class 52 Rating, Deduct</i>	-3,083.39	
<i>For Class 54 Rating, Add</i>	4,229.82	
<i>For Class 55 Rating, Add</i>	6,301.27	
<i>For Class 56 Rating, Add</i>	8,344.68	
40 05 19 00-3022 EA 30" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,989.87	1,388.85
<i>For Class 52 Rating, Deduct</i>	-3,177.41	
<i>For Class 54 Rating, Add</i>	4,358.09	
<i>For Class 55 Rating, Add</i>	6,491.98	
<i>For Class 56 Rating, Add</i>	8,597.00	
40 05 19 00-3023 EA 30" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	31,849.40	1,392.03
<i>For Class 52 Rating, Deduct</i>	-3,271.43	
<i>For Class 54 Rating, Add</i>	4,486.35	
<i>For Class 55 Rating, Add</i>	6,682.70	
<i>For Class 56 Rating, Add</i>	8,849.31	
40 05 19 00-3024 EA 30" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	32,708.91	1,395.21
<i>For Class 52 Rating, Deduct</i>	-3,365.45	
<i>For Class 54 Rating, Add</i>	4,614.61	
<i>For Class 55 Rating, Add</i>	6,873.41	
<i>For Class 56 Rating, Add</i>	9,101.62	
40 05 19 00-3025 EA 30" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	33,568.43	1,398.38
<i>For Class 52 Rating, Deduct</i>	-3,459.46	
<i>For Class 54 Rating, Add</i>	4,742.87	
<i>For Class 55 Rating, Add</i>	7,064.12	
<i>For Class 56 Rating, Add</i>	9,353.93	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION	
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
40 05 19 00-3026	EA	30" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	34,427.94		1,401.56
		<i>For Class 52 Rating, Deduct</i>	-3,553.48		
		<i>For Class 54 Rating, Add</i>	4,871.14		
		<i>For Class 55 Rating, Add</i>	7,254.84		
		<i>For Class 56 Rating, Add</i>	9,606.24		
40 05 19 00-3027	EA	30" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	35,287.47		1,404.74
		<i>For Class 52 Rating, Deduct</i>	-3,647.50		
		<i>For Class 54 Rating, Add</i>	4,999.40		
		<i>For Class 55 Rating, Add</i>	7,445.55		
		<i>For Class 56 Rating, Add</i>	9,858.55		
40 05 19 00-3028	EA	30" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	36,146.98		1,407.92
		<i>For Class 52 Rating, Deduct</i>	-3,741.51		
		<i>For Class 54 Rating, Add</i>	5,127.66		
		<i>For Class 55 Rating, Add</i>	7,636.27		
		<i>For Class 56 Rating, Add</i>	10,110.86		
40 05 19 00-3029	EA	30" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	37,006.50		1,411.10
		<i>For Class 52 Rating, Deduct</i>	-3,835.53		
		<i>For Class 54 Rating, Add</i>	5,255.93		
		<i>For Class 55 Rating, Add</i>	7,826.98		
		<i>For Class 56 Rating, Add</i>	10,363.17		
40 05 19 00-3030	EA	30" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	37,866.01		1,414.28
		<i>For Class 52 Rating, Deduct</i>	-3,929.55		
		<i>For Class 54 Rating, Add</i>	5,384.19		
		<i>For Class 55 Rating, Add</i>	8,017.70		
		<i>For Class 56 Rating, Add</i>	10,615.48		
40 05 19 00-3031	EA	30" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	38,725.54		1,417.45
		<i>For Class 52 Rating, Deduct</i>	-4,023.57		
		<i>For Class 54 Rating, Add</i>	5,512.45		
		<i>For Class 55 Rating, Add</i>	8,208.41		
		<i>For Class 56 Rating, Add</i>	10,867.79		
40 05 19 00-3032		36" Flanged End x Grooved End (FxG), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2600)</small>			
40 05 19 00-3033	EA	36" Flanged x Grooved (FxG), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	13,143.98		1,658.99
		<i>For Class 52 Rating, Deduct</i>	-1,169.34		
		<i>For Class 54 Rating, Add</i>	1,624.72		
		<i>For Class 55 Rating, Add</i>	2,430.90		
		<i>For Class 56 Rating, Add</i>	3,226.45		
40 05 19 00-3034	EA	36" Flanged x Grooved (FxG), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	14,295.90		1,662.18
		<i>For Class 52 Rating, Deduct</i>	-1,295.52		
		<i>For Class 54 Rating, Add</i>	1,796.84		
		<i>For Class 55 Rating, Add</i>	2,686.82		
		<i>For Class 56 Rating, Add</i>	3,565.01		
40 05 19 00-3035	EA	36" Flanged x Grooved (FxG), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	15,447.81		1,665.35
		<i>For Class 52 Rating, Deduct</i>	-1,421.70		
		<i>For Class 54 Rating, Add</i>	1,968.96		
		<i>For Class 55 Rating, Add</i>	2,942.73		
		<i>For Class 56 Rating, Add</i>	3,903.58		
40 05 19 00-3036	EA	36" Flanged x Grooved (FxG), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	16,599.73		1,668.53
		<i>For Class 52 Rating, Deduct</i>	-1,547.88		
		<i>For Class 54 Rating, Add</i>	2,141.09		
		<i>For Class 55 Rating, Add</i>	3,198.65		
		<i>For Class 56 Rating, Add</i>	4,242.15		
40 05 19 00-3037	EA	36" Flanged x Grooved (FxG), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	17,751.64		1,671.71
		<i>For Class 52 Rating, Deduct</i>	-1,674.06		
		<i>For Class 54 Rating, Add</i>	2,313.21		
		<i>For Class 55 Rating, Add</i>	3,454.57		
		<i>For Class 56 Rating, Add</i>	4,580.72		
40 05 19 00-3038	EA	36" Flanged x Grooved (FxG), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	18,903.56		1,674.88
		<i>For Class 52 Rating, Deduct</i>	-1,800.24		
		<i>For Class 54 Rating, Add</i>	2,485.33		
		<i>For Class 55 Rating, Add</i>	3,710.49		
		<i>For Class 56 Rating, Add</i>	4,919.29		
40 05 19 00-3039	EA	36" Flanged x Grooved (FxG), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	20,055.48		1,678.06
		<i>For Class 52 Rating, Deduct</i>	-1,926.43		
		<i>For Class 54 Rating, Add</i>	2,657.45		
		<i>For Class 55 Rating, Add</i>	3,966.41		
		<i>For Class 56 Rating, Add</i>	5,257.85		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3040 EA 36" Flanged x Grooved (FxG), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	21,207.40	1,681.24
<i>For Class 52 Rating, Deduct</i>	-2,052.61	
<i>For Class 54 Rating, Add</i>	2,829.58	
<i>For Class 55 Rating, Add</i>	4,222.33	
<i>For Class 56 Rating, Add</i>	5,596.42	
40 05 19 00-3041 EA 36" Flanged x Grooved (FxG), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	22,359.31	1,684.41
<i>For Class 52 Rating, Deduct</i>	-2,178.79	
<i>For Class 54 Rating, Add</i>	3,001.70	
<i>For Class 55 Rating, Add</i>	4,478.25	
<i>For Class 56 Rating, Add</i>	5,934.99	
40 05 19 00-3042 EA 36" Flanged x Grooved (FxG), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	23,511.23	1,687.60
<i>For Class 52 Rating, Deduct</i>	-2,304.97	
<i>For Class 54 Rating, Add</i>	3,173.82	
<i>For Class 55 Rating, Add</i>	4,734.17	
<i>For Class 56 Rating, Add</i>	6,273.56	
40 05 19 00-3043 EA 36" Flanged x Grooved (FxG), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	24,663.14	1,690.78
<i>For Class 52 Rating, Deduct</i>	-2,431.15	
<i>For Class 54 Rating, Add</i>	3,345.95	
<i>For Class 55 Rating, Add</i>	4,990.09	
<i>For Class 56 Rating, Add</i>	6,612.13	
40 05 19 00-3044 EA 36" Flanged x Grooved (FxG), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	25,815.06	1,693.95
<i>For Class 52 Rating, Deduct</i>	-2,557.33	
<i>For Class 54 Rating, Add</i>	3,518.07	
<i>For Class 55 Rating, Add</i>	5,246.00	
<i>For Class 56 Rating, Add</i>	6,950.69	
40 05 19 00-3045 EA 36" Flanged x Grooved (FxG), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	26,966.97	1,697.13
<i>For Class 52 Rating, Deduct</i>	-2,683.51	
<i>For Class 54 Rating, Add</i>	3,690.19	
<i>For Class 55 Rating, Add</i>	5,501.92	
<i>For Class 56 Rating, Add</i>	7,289.26	
40 05 19 00-3046 EA 36" Flanged x Grooved (FxG), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	28,118.89	1,700.31
<i>For Class 52 Rating, Deduct</i>	-2,809.69	
<i>For Class 54 Rating, Add</i>	3,862.31	
<i>For Class 55 Rating, Add</i>	5,757.84	
<i>For Class 56 Rating, Add</i>	7,627.83	
40 05 19 00-3047 EA 36" Flanged x Grooved (FxG), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	29,270.80	1,703.49
<i>For Class 52 Rating, Deduct</i>	-2,935.87	
<i>For Class 54 Rating, Add</i>	4,034.44	
<i>For Class 55 Rating, Add</i>	6,013.76	
<i>For Class 56 Rating, Add</i>	7,966.40	
40 05 19 00-3048 EA 36" Flanged x Grooved (FxG), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	30,422.72	1,706.66
<i>For Class 52 Rating, Deduct</i>	-3,062.05	
<i>For Class 54 Rating, Add</i>	4,206.56	
<i>For Class 55 Rating, Add</i>	6,269.68	
<i>For Class 56 Rating, Add</i>	8,304.96	
40 05 19 00-3049 EA 36" Flanged x Grooved (FxG), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	31,574.63	1,709.84
<i>For Class 52 Rating, Deduct</i>	-3,188.24	
<i>For Class 54 Rating, Add</i>	4,378.68	
<i>For Class 55 Rating, Add</i>	6,525.60	
<i>For Class 56 Rating, Add</i>	8,643.53	
40 05 19 00-3050 EA 36" Flanged x Grooved (FxG), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	32,726.55	1,713.03
<i>For Class 52 Rating, Deduct</i>	-3,314.42	
<i>For Class 54 Rating, Add</i>	4,550.80	
<i>For Class 55 Rating, Add</i>	6,781.52	
<i>For Class 56 Rating, Add</i>	8,982.10	
40 05 19 00-3051 EA 36" Flanged x Grooved (FxG), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	33,878.46	1,716.20
<i>For Class 52 Rating, Deduct</i>	-3,440.60	
<i>For Class 54 Rating, Add</i>	4,722.93	
<i>For Class 55 Rating, Add</i>	7,037.44	
<i>For Class 56 Rating, Add</i>	9,320.67	
40 05 19 00-3052 EA 36" Flanged x Grooved (FxG), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	35,030.38	1,719.38
<i>For Class 52 Rating, Deduct</i>	-3,566.78	
<i>For Class 54 Rating, Add</i>	4,895.05	
<i>For Class 55 Rating, Add</i>	7,293.36	
<i>For Class 56 Rating, Add</i>	9,659.24	
40 05 19 00-3053 EA 36" Flanged x Grooved (FxG), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe	36,182.29	1,722.56
<i>For Class 52 Rating, Deduct</i>	-3,692.96	
<i>For Class 54 Rating, Add</i>	5,067.17	
<i>For Class 55 Rating, Add</i>	7,549.27	
<i>For Class 56 Rating, Add</i>	9,997.80	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3054	EA	36" Flanged x Grooved (FxG), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	37,334.21	1,725.73
		<i>For Class 52 Rating, Deduct</i>	-3,819.14	
		<i>For Class 54 Rating, Add</i>	5,239.30	
		<i>For Class 55 Rating, Add</i>	7,805.19	
		<i>For Class 56 Rating, Add</i>	10,336.37	
40 05 19 00-3055	EA	36" Flanged x Grooved (FxG), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	38,486.12	1,728.91
		<i>For Class 52 Rating, Deduct</i>	-3,945.32	
		<i>For Class 54 Rating, Add</i>	5,411.42	
		<i>For Class 55 Rating, Add</i>	8,061.11	
		<i>For Class 56 Rating, Add</i>	10,674.94	
40 05 19 00-3056	EA	36" Flanged x Grooved (FxG), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	39,638.04	1,732.09
		<i>For Class 52 Rating, Deduct</i>	-4,071.50	
		<i>For Class 54 Rating, Add</i>	5,583.54	
		<i>For Class 55 Rating, Add</i>	8,317.03	
		<i>For Class 56 Rating, Add</i>	11,013.51	
40 05 19 00-3057	EA	36" Flanged x Grooved (FxG), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	40,789.95	1,735.26
		<i>For Class 52 Rating, Deduct</i>	-4,197.68	
		<i>For Class 54 Rating, Add</i>	5,755.66	
		<i>For Class 55 Rating, Add</i>	8,572.95	
		<i>For Class 56 Rating, Add</i>	11,352.08	
40 05 19 00-3058	EA	36" Flanged x Grooved (FxG), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	41,941.87	1,738.45
		<i>For Class 52 Rating, Deduct</i>	-4,323.86	
		<i>For Class 54 Rating, Add</i>	5,927.79	
		<i>For Class 55 Rating, Add</i>	8,828.87	
		<i>For Class 56 Rating, Add</i>	11,690.64	
40 05 19 00-3059	EA	36" Flanged x Grooved (FxG), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	43,093.78	1,741.63
		<i>For Class 52 Rating, Deduct</i>	-4,450.05	
		<i>For Class 54 Rating, Add</i>	6,099.91	
		<i>For Class 55 Rating, Add</i>	9,084.79	
		<i>For Class 56 Rating, Add</i>	12,029.21	
40 05 19 00-3060	EA	36" Flanged x Grooved (FxG), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	44,245.70	1,744.80
		<i>For Class 52 Rating, Deduct</i>	-4,576.23	
		<i>For Class 54 Rating, Add</i>	6,272.03	
		<i>For Class 55 Rating, Add</i>	9,340.71	
		<i>For Class 56 Rating, Add</i>	12,367.78	
40 05 19 00-3061	EA	36" Flanged x Grooved (FxG), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	45,397.62	1,747.98
		<i>For Class 52 Rating, Deduct</i>	-4,702.41	
		<i>For Class 54 Rating, Add</i>	6,444.16	
		<i>For Class 55 Rating, Add</i>	9,596.63	
		<i>For Class 56 Rating, Add</i>	12,706.35	
40 05 19 00-3062	EA	36" Flanged x Grooved (FxG), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	46,549.54	1,751.16
		<i>For Class 52 Rating, Deduct</i>	-4,828.59	
		<i>For Class 54 Rating, Add</i>	6,616.28	
		<i>For Class 55 Rating, Add</i>	9,852.54	
		<i>For Class 56 Rating, Add</i>	13,044.91	
40 05 19 00-3063	EA	36" Flanged x Grooved (FxG), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	47,701.45	1,754.34
		<i>For Class 52 Rating, Deduct</i>	-4,954.77	
		<i>For Class 54 Rating, Add</i>	6,788.40	
		<i>For Class 55 Rating, Add</i>	10,108.46	
		<i>For Class 56 Rating, Add</i>	13,383.48	
40 05 19 00-3064	EA	36" Flanged x Grooved (FxG), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	48,853.37	1,757.51
		<i>For Class 52 Rating, Deduct</i>	-5,080.95	
		<i>For Class 54 Rating, Add</i>	6,960.52	
		<i>For Class 55 Rating, Add</i>	10,364.38	
		<i>For Class 56 Rating, Add</i>	13,722.05	
40 05 19 00-3065	EA	36" Flanged x Grooved (FxG), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	50,005.28	1,760.69
		<i>For Class 52 Rating, Deduct</i>	-5,207.13	
		<i>For Class 54 Rating, Add</i>	7,132.65	
		<i>For Class 55 Rating, Add</i>	10,620.30	
		<i>For Class 56 Rating, Add</i>	14,060.62	
40 05 19 00-3066	EA	36" Flanged x Grooved (FxG), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	51,157.20	1,763.88
		<i>For Class 52 Rating, Deduct</i>	-5,333.31	
		<i>For Class 54 Rating, Add</i>	7,304.77	
		<i>For Class 55 Rating, Add</i>	10,876.22	
		<i>For Class 56 Rating, Add</i>	14,399.19	
40 05 19 00-3067	EA	36" Flanged x Grooved (FxG), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	52,309.11	1,767.05
		<i>For Class 52 Rating, Deduct</i>	-5,459.49	
		<i>For Class 54 Rating, Add</i>	7,476.89	
		<i>For Class 55 Rating, Add</i>	11,132.14	
		<i>For Class 56 Rating, Add</i>	14,737.75	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3068	Flanged End x Plain End (FxPE), Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-2059)</small>	
40 05 19 00-3069	4" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>	
40 05 19 00-3070	EA 4" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	710.64 155.43
	For Class 52 Rating, Deduct	-52.27
	For Class 54 Rating, Add	74.10
	For Class 55 Rating, Add	111.61
	For Class 56 Rating, Add	148.65
40 05 19 00-3071	EA 4" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	821.59 158.14
	For Class 52 Rating, Deduct	-64.02
	For Class 54 Rating, Add	90.17
	For Class 55 Rating, Add	135.53
	For Class 56 Rating, Add	180.31
40 05 19 00-3072	EA 4" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	932.55 160.87
	For Class 52 Rating, Deduct	-75.77
	For Class 54 Rating, Add	106.25
	For Class 55 Rating, Add	159.46
	For Class 56 Rating, Add	211.98
40 05 19 00-3073	EA 4" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,043.50 163.58
	For Class 52 Rating, Deduct	-87.52
	For Class 54 Rating, Add	122.32
	For Class 55 Rating, Add	183.38
	For Class 56 Rating, Add	243.64
40 05 19 00-3074	EA 4" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,154.47 166.30
	For Class 52 Rating, Deduct	-99.28
	For Class 54 Rating, Add	138.40
	For Class 55 Rating, Add	207.30
	For Class 56 Rating, Add	275.31
40 05 19 00-3075	EA 4" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,265.43 169.02
	For Class 52 Rating, Deduct	-111.03
	For Class 54 Rating, Add	154.47
	For Class 55 Rating, Add	231.23
	For Class 56 Rating, Add	306.97
40 05 19 00-3076	EA 4" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,376.37 171.74
	For Class 52 Rating, Deduct	-122.78
	For Class 54 Rating, Add	170.55
	For Class 55 Rating, Add	255.15
	For Class 56 Rating, Add	338.64
40 05 19 00-3077	EA 4" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,487.33 174.45
	For Class 52 Rating, Deduct	-134.53
	For Class 54 Rating, Add	186.62
	For Class 55 Rating, Add	279.07
	For Class 56 Rating, Add	370.30
40 05 19 00-3078	EA 4" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,598.28 177.17
	For Class 52 Rating, Deduct	-146.28
	For Class 54 Rating, Add	202.70
	For Class 55 Rating, Add	303.00
	For Class 56 Rating, Add	401.97
40 05 19 00-3079	EA 4" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,709.24 179.89
	For Class 52 Rating, Deduct	-158.04
	For Class 54 Rating, Add	218.77
	For Class 55 Rating, Add	326.92
	For Class 56 Rating, Add	433.64
40 05 19 00-3080	EA 4" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,820.19 182.60
	For Class 52 Rating, Deduct	-169.79
	For Class 54 Rating, Add	234.85
	For Class 55 Rating, Add	350.85
	For Class 56 Rating, Add	465.30
40 05 19 00-3081	EA 4" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,931.14 185.32
	For Class 52 Rating, Deduct	-181.54
	For Class 54 Rating, Add	250.92
	For Class 55 Rating, Add	374.77
	For Class 56 Rating, Add	496.96
40 05 19 00-3082	EA 4" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,042.10 188.04
	For Class 52 Rating, Deduct	-193.29
	For Class 54 Rating, Add	267.00
	For Class 55 Rating, Add	398.69
	For Class 56 Rating, Add	528.63

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3083	EA	4" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,153.06		190.76
		<i>For Class 52 Rating, Deduct</i>	-205.04		
		<i>For Class 54 Rating, Add</i>	283.07		
		<i>For Class 55 Rating, Add</i>	422.62		
		<i>For Class 56 Rating, Add</i>	560.30		
40 05 19 00-3084	EA	4" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,264.01		193.47
		<i>For Class 52 Rating, Deduct</i>	-216.80		
		<i>For Class 54 Rating, Add</i>	299.15		
		<i>For Class 55 Rating, Add</i>	446.54		
		<i>For Class 56 Rating, Add</i>	591.96		
40 05 19 00-3085	EA	4" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,374.96		196.19
		<i>For Class 52 Rating, Deduct</i>	-228.55		
		<i>For Class 54 Rating, Add</i>	315.22		
		<i>For Class 55 Rating, Add</i>	470.46		
		<i>For Class 56 Rating, Add</i>	623.63		
40 05 19 00-3086	EA	4" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,485.92		198.92
		<i>For Class 52 Rating, Deduct</i>	-240.30		
		<i>For Class 54 Rating, Add</i>	331.30		
		<i>For Class 55 Rating, Add</i>	494.39		
		<i>For Class 56 Rating, Add</i>	655.29		
40 05 19 00-3087	EA	4" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,596.87		201.62
		<i>For Class 52 Rating, Deduct</i>	-252.05		
		<i>For Class 54 Rating, Add</i>	347.37		
		<i>For Class 55 Rating, Add</i>	518.31		
		<i>For Class 56 Rating, Add</i>	686.96		
40 05 19 00-3088	EA	4" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,707.84		204.34
		<i>For Class 52 Rating, Deduct</i>	-263.81		
		<i>For Class 54 Rating, Add</i>	363.45		
		<i>For Class 55 Rating, Add</i>	542.24		
		<i>For Class 56 Rating, Add</i>	718.62		
40 05 19 00-3089	EA	4" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,818.79		207.06
		<i>For Class 52 Rating, Deduct</i>	-275.56		
		<i>For Class 54 Rating, Add</i>	379.52		
		<i>For Class 55 Rating, Add</i>	566.16		
		<i>For Class 56 Rating, Add</i>	750.29		
40 05 19 00-3090	EA	4" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,929.74		209.78
		<i>For Class 52 Rating, Deduct</i>	-287.31		
		<i>For Class 54 Rating, Add</i>	395.60		
		<i>For Class 55 Rating, Add</i>	590.08		
		<i>For Class 56 Rating, Add</i>	781.95		
40 05 19 00-3091	EA	4" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,040.70		212.49
		<i>For Class 52 Rating, Deduct</i>	-299.06		
		<i>For Class 54 Rating, Add</i>	411.67		
		<i>For Class 55 Rating, Add</i>	614.01		
		<i>For Class 56 Rating, Add</i>	813.62		
40 05 19 00-3092	EA	4" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,151.65		215.21
		<i>For Class 52 Rating, Deduct</i>	-310.81		
		<i>For Class 54 Rating, Add</i>	427.75		
		<i>For Class 55 Rating, Add</i>	637.93		
		<i>For Class 56 Rating, Add</i>	845.28		
40 05 19 00-3093	EA	4" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,262.61		217.93
		<i>For Class 52 Rating, Deduct</i>	-322.57		
		<i>For Class 54 Rating, Add</i>	443.83		
		<i>For Class 55 Rating, Add</i>	661.85		
		<i>For Class 56 Rating, Add</i>	876.95		
40 05 19 00-3094	EA	4" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,649.09		220.64
		<i>For Class 52 Rating, Deduct</i>	-364.63		
		<i>For Class 54 Rating, Add</i>	501.23		
		<i>For Class 55 Rating, Add</i>	747.22		
		<i>For Class 56 Rating, Add</i>	989.90		
40 05 19 00-3095	EA	4" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,760.04		223.36
		<i>For Class 52 Rating, Deduct</i>	-376.38		
		<i>For Class 54 Rating, Add</i>	517.30		
		<i>For Class 55 Rating, Add</i>	771.14		
		<i>For Class 56 Rating, Add</i>	1,021.56		
40 05 19 00-3096	EA	4" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,871.00		226.09
		<i>For Class 52 Rating, Deduct</i>	-388.13		
		<i>For Class 54 Rating, Add</i>	533.38		
		<i>For Class 55 Rating, Add</i>	795.07		
		<i>For Class 56 Rating, Add</i>	1,053.23		



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3097 EA 4" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,981.96	228.80
<i>For Class 52 Rating, Deduct</i>	-399.88	
<i>For Class 54 Rating, Add</i>	549.45	
<i>For Class 55 Rating, Add</i>	818.99	
<i>For Class 56 Rating, Add</i>	1,084.89	
40 05 19 00-3098 EA 4" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,092.90	231.51
<i>For Class 52 Rating, Deduct</i>	-411.63	
<i>For Class 54 Rating, Add</i>	565.53	
<i>For Class 55 Rating, Add</i>	842.91	
<i>For Class 56 Rating, Add</i>	1,116.56	
40 05 19 00-3099 EA 4" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,203.86	234.23
<i>For Class 52 Rating, Deduct</i>	-423.39	
<i>For Class 54 Rating, Add</i>	581.60	
<i>For Class 55 Rating, Add</i>	866.84	
<i>For Class 56 Rating, Add</i>	1,148.22	
40 05 19 00-3100 EA 4" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,314.82	236.95
<i>For Class 52 Rating, Deduct</i>	-435.14	
<i>For Class 54 Rating, Add</i>	597.68	
<i>For Class 55 Rating, Add</i>	890.76	
<i>For Class 56 Rating, Add</i>	1,179.89	
40 05 19 00-3101 EA 4" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,425.77	239.68
<i>For Class 52 Rating, Deduct</i>	-446.89	
<i>For Class 54 Rating, Add</i>	613.75	
<i>For Class 55 Rating, Add</i>	914.69	
<i>For Class 56 Rating, Add</i>	1,211.55	
40 05 19 00-3102 EA 4" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,536.73	242.38
<i>For Class 52 Rating, Deduct</i>	-458.64	
<i>For Class 54 Rating, Add</i>	629.83	
<i>For Class 55 Rating, Add</i>	938.61	
<i>For Class 56 Rating, Add</i>	1,243.22	
40 05 19 00-3103 EA 4" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,647.69	245.10
<i>For Class 52 Rating, Deduct</i>	-470.40	
<i>For Class 54 Rating, Add</i>	645.90	
<i>For Class 55 Rating, Add</i>	962.53	
<i>For Class 56 Rating, Add</i>	1,274.88	
40 05 19 00-3104 EA 4" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,758.64	247.82
<i>For Class 52 Rating, Deduct</i>	-482.15	
<i>For Class 54 Rating, Add</i>	661.98	
<i>For Class 55 Rating, Add</i>	986.46	
<i>For Class 56 Rating, Add</i>	1,306.55	
40 05 19 00-3105 EA 4" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,869.60	250.53
<i>For Class 52 Rating, Deduct</i>	-493.90	
<i>For Class 54 Rating, Add</i>	678.06	
<i>For Class 55 Rating, Add</i>	1,010.38	
<i>For Class 56 Rating, Add</i>	1,338.22	
40 05 19 00-3106 EA 4" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,980.55	253.26
<i>For Class 52 Rating, Deduct</i>	-505.65	
<i>For Class 54 Rating, Add</i>	694.13	
<i>For Class 55 Rating, Add</i>	1,034.30	
<i>For Class 56 Rating, Add</i>	1,369.88	
40 05 19 00-3107 EA 4" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,091.50	255.97
<i>For Class 52 Rating, Deduct</i>	-517.40	
<i>For Class 54 Rating, Add</i>	710.20	
<i>For Class 55 Rating, Add</i>	1,058.23	
<i>For Class 56 Rating, Add</i>	1,401.54	
40 05 19 00-3108 EA 4" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,202.46	258.69
<i>For Class 52 Rating, Deduct</i>	-529.16	
<i>For Class 54 Rating, Add</i>	726.28	
<i>For Class 55 Rating, Add</i>	1,082.15	
<i>For Class 56 Rating, Add</i>	1,433.21	
40 05 19 00-3109 6" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3110 EA 6" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	872.79	195.65
<i>For Class 52 Rating, Deduct</i>	-63.40	
<i>For Class 54 Rating, Add</i>	90.01	
<i>For Class 55 Rating, Add</i>	135.64	
<i>For Class 56 Rating, Add</i>	180.70	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3111	EA	6" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,000.62	198.37
		<i>For Class 52 Rating, Deduct</i>		-77.01	
		<i>For Class 54 Rating, Add</i>		108.62	
		<i>For Class 55 Rating, Add</i>		163.33	
		<i>For Class 56 Rating, Add</i>		217.34	
40 05 19 00-3112	EA	6" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,128.45	201.07
		<i>For Class 52 Rating, Deduct</i>		-90.62	
		<i>For Class 54 Rating, Add</i>		127.22	
		<i>For Class 55 Rating, Add</i>		191.02	
		<i>For Class 56 Rating, Add</i>		253.98	
40 05 19 00-3113	EA	6" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,256.26	203.80
		<i>For Class 52 Rating, Deduct</i>		-104.22	
		<i>For Class 54 Rating, Add</i>		145.83	
		<i>For Class 55 Rating, Add</i>		218.70	
		<i>For Class 56 Rating, Add</i>		290.62	
40 05 19 00-3114	EA	6" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,384.09	206.52
		<i>For Class 52 Rating, Deduct</i>		-117.83	
		<i>For Class 54 Rating, Add</i>		164.43	
		<i>For Class 55 Rating, Add</i>		246.38	
		<i>For Class 56 Rating, Add</i>		327.27	
40 05 19 00-3115	EA	6" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,511.93	209.23
		<i>For Class 52 Rating, Deduct</i>		-131.44	
		<i>For Class 54 Rating, Add</i>		183.04	
		<i>For Class 55 Rating, Add</i>		274.07	
		<i>For Class 56 Rating, Add</i>		363.91	
40 05 19 00-3116	EA	6" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,639.74	211.95
		<i>For Class 52 Rating, Deduct</i>		-145.05	
		<i>For Class 54 Rating, Add</i>		201.64	
		<i>For Class 55 Rating, Add</i>		301.76	
		<i>For Class 56 Rating, Add</i>		400.55	
40 05 19 00-3117	EA	6" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,767.57	214.67
		<i>For Class 52 Rating, Deduct</i>		-158.65	
		<i>For Class 54 Rating, Add</i>		220.25	
		<i>For Class 55 Rating, Add</i>		329.44	
		<i>For Class 56 Rating, Add</i>		437.19	
40 05 19 00-3118	EA	6" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,895.39	217.39
		<i>For Class 52 Rating, Deduct</i>		-172.26	
		<i>For Class 54 Rating, Add</i>		238.86	
		<i>For Class 55 Rating, Add</i>		357.13	
		<i>For Class 56 Rating, Add</i>		473.83	
40 05 19 00-3119	EA	6" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,023.21	220.10
		<i>For Class 52 Rating, Deduct</i>		-185.87	
		<i>For Class 54 Rating, Add</i>		257.46	
		<i>For Class 55 Rating, Add</i>		384.81	
		<i>For Class 56 Rating, Add</i>		510.47	
40 05 19 00-3120	EA	6" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,151.04	222.82
		<i>For Class 52 Rating, Deduct</i>		-199.48	
		<i>For Class 54 Rating, Add</i>		276.07	
		<i>For Class 55 Rating, Add</i>		412.50	
		<i>For Class 56 Rating, Add</i>		547.12	
40 05 19 00-3121	EA	6" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,278.86	225.54
		<i>For Class 52 Rating, Deduct</i>		-213.09	
		<i>For Class 54 Rating, Add</i>		294.67	
		<i>For Class 55 Rating, Add</i>		440.18	
		<i>For Class 56 Rating, Add</i>		583.76	
40 05 19 00-3122	EA	6" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,406.68	228.25
		<i>For Class 52 Rating, Deduct</i>		-226.69	
		<i>For Class 54 Rating, Add</i>		313.28	
		<i>For Class 55 Rating, Add</i>		467.87	
		<i>For Class 56 Rating, Add</i>		620.40	
40 05 19 00-3123	EA	6" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,534.51	230.97
		<i>For Class 52 Rating, Deduct</i>		-240.30	
		<i>For Class 54 Rating, Add</i>		331.88	
		<i>For Class 55 Rating, Add</i>		495.55	
		<i>For Class 56 Rating, Add</i>		657.04	
40 05 19 00-3124	EA	6" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,662.33	233.69
		<i>For Class 52 Rating, Deduct</i>		-253.91	
		<i>For Class 54 Rating, Add</i>		350.49	
		<i>For Class 55 Rating, Add</i>		523.24	
		<i>For Class 56 Rating, Add</i>		693.68	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3125 EA 6" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,790.15	236.41
<i>For Class 52 Rating, Deduct</i>	-267.52	
<i>For Class 54 Rating, Add</i>	369.09	
<i>For Class 55 Rating, Add</i>	550.92	
<i>For Class 56 Rating, Add</i>	730.32	
40 05 19 00-3126 EA 6" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,917.98	239.12
<i>For Class 52 Rating, Deduct</i>	-281.12	
<i>For Class 54 Rating, Add</i>	387.70	
<i>For Class 55 Rating, Add</i>	578.61	
<i>For Class 56 Rating, Add</i>	766.97	
40 05 19 00-3127 EA 6" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,045.80	241.84
<i>For Class 52 Rating, Deduct</i>	-294.73	
<i>For Class 54 Rating, Add</i>	406.30	
<i>For Class 55 Rating, Add</i>	606.30	
<i>For Class 56 Rating, Add</i>	803.61	
40 05 19 00-3128 EA 6" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,173.63	244.56
<i>For Class 52 Rating, Deduct</i>	-308.34	
<i>For Class 54 Rating, Add</i>	424.91	
<i>For Class 55 Rating, Add</i>	633.98	
<i>For Class 56 Rating, Add</i>	840.25	
40 05 19 00-3129 EA 6" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,301.45	247.28
<i>For Class 52 Rating, Deduct</i>	-321.95	
<i>For Class 54 Rating, Add</i>	443.51	
<i>For Class 55 Rating, Add</i>	661.67	
<i>For Class 56 Rating, Add</i>	876.89	
40 05 19 00-3130 EA 6" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,429.28	249.99
<i>For Class 52 Rating, Deduct</i>	-335.56	
<i>For Class 54 Rating, Add</i>	462.12	
<i>For Class 55 Rating, Add</i>	689.35	
<i>For Class 56 Rating, Add</i>	913.53	
40 05 19 00-3131 EA 6" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,557.11	252.71
<i>For Class 52 Rating, Deduct</i>	-349.16	
<i>For Class 54 Rating, Add</i>	480.73	
<i>For Class 55 Rating, Add</i>	717.04	
<i>For Class 56 Rating, Add</i>	950.18	
40 05 19 00-3132 EA 6" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,684.92	255.44
<i>For Class 52 Rating, Deduct</i>	-362.77	
<i>For Class 54 Rating, Add</i>	499.33	
<i>For Class 55 Rating, Add</i>	744.72	
<i>For Class 56 Rating, Add</i>	986.82	
40 05 19 00-3133 EA 6" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,812.75	258.14
<i>For Class 52 Rating, Deduct</i>	-376.38	
<i>For Class 54 Rating, Add</i>	517.94	
<i>For Class 55 Rating, Add</i>	772.41	
<i>For Class 56 Rating, Add</i>	1,023.46	
40 05 19 00-3134 EA 6" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,940.58	260.86
<i>For Class 52 Rating, Deduct</i>	-389.99	
<i>For Class 54 Rating, Add</i>	536.54	
<i>For Class 55 Rating, Add</i>	800.09	
<i>For Class 56 Rating, Add</i>	1,060.10	
40 05 19 00-3135 EA 6" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,068.39	263.58
<i>For Class 52 Rating, Deduct</i>	-403.59	
<i>For Class 54 Rating, Add</i>	555.15	
<i>For Class 55 Rating, Add</i>	827.78	
<i>For Class 56 Rating, Add</i>	1,096.74	
40 05 19 00-3136 EA 6" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,196.22	266.30
<i>For Class 52 Rating, Deduct</i>	-417.20	
<i>For Class 54 Rating, Add</i>	573.75	
<i>For Class 55 Rating, Add</i>	855.46	
<i>For Class 56 Rating, Add</i>	1,133.38	
40 05 19 00-3137 EA 6" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,324.05	269.01
<i>For Class 52 Rating, Deduct</i>	-430.81	
<i>For Class 54 Rating, Add</i>	592.36	
<i>For Class 55 Rating, Add</i>	883.15	
<i>For Class 56 Rating, Add</i>	1,170.03	
40 05 19 00-3138 EA 6" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,451.86	271.73
<i>For Class 52 Rating, Deduct</i>	-444.42	
<i>For Class 54 Rating, Add</i>	610.96	
<i>For Class 55 Rating, Add</i>	910.83	
<i>For Class 56 Rating, Add</i>	1,206.67	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3139	EA	6" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,579.69	274.45
		<i>For Class 52 Rating, Deduct</i>		-458.02	
		<i>For Class 54 Rating, Add</i>		629.57	
		<i>For Class 55 Rating, Add</i>		938.52	
		<i>For Class 56 Rating, Add</i>		1,243.31	
40 05 19 00-3140	EA	6" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,707.52	277.16
		<i>For Class 52 Rating, Deduct</i>		-471.63	
		<i>For Class 54 Rating, Add</i>		648.17	
		<i>For Class 55 Rating, Add</i>		966.21	
		<i>For Class 56 Rating, Add</i>		1,279.95	
40 05 19 00-3141	EA	6" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,835.33	279.88
		<i>For Class 52 Rating, Deduct</i>		-485.24	
		<i>For Class 54 Rating, Add</i>		666.78	
		<i>For Class 55 Rating, Add</i>		993.89	
		<i>For Class 56 Rating, Add</i>		1,316.59	
40 05 19 00-3142	EA	6" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,963.16	282.61
		<i>For Class 52 Rating, Deduct</i>		-498.85	
		<i>For Class 54 Rating, Add</i>		685.39	
		<i>For Class 55 Rating, Add</i>		1,021.58	
		<i>For Class 56 Rating, Add</i>		1,353.23	
40 05 19 00-3143	EA	6" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,091.00	285.33
		<i>For Class 52 Rating, Deduct</i>		-512.46	
		<i>For Class 54 Rating, Add</i>		703.99	
		<i>For Class 55 Rating, Add</i>		1,049.26	
		<i>For Class 56 Rating, Add</i>		1,389.88	
40 05 19 00-3144	EA	6" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,218.82	288.03
		<i>For Class 52 Rating, Deduct</i>		-526.06	
		<i>For Class 54 Rating, Add</i>		722.60	
		<i>For Class 55 Rating, Add</i>		1,076.95	
		<i>For Class 56 Rating, Add</i>		1,426.52	
40 05 19 00-3145	EA	6" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,346.64	290.75
		<i>For Class 52 Rating, Deduct</i>		-539.67	
		<i>For Class 54 Rating, Add</i>		741.20	
		<i>For Class 55 Rating, Add</i>		1,104.63	
		<i>For Class 56 Rating, Add</i>		1,463.16	
40 05 19 00-3146	EA	6" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,474.46	293.47
		<i>For Class 52 Rating, Deduct</i>		-553.28	
		<i>For Class 54 Rating, Add</i>		759.81	
		<i>For Class 55 Rating, Add</i>		1,132.32	
		<i>For Class 56 Rating, Add</i>		1,499.80	
40 05 19 00-3147	EA	6" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,602.29	296.19
		<i>For Class 52 Rating, Deduct</i>		-566.89	
		<i>For Class 54 Rating, Add</i>		778.41	
		<i>For Class 55 Rating, Add</i>		1,160.01	
		<i>For Class 56 Rating, Add</i>		1,536.44	
40 05 19 00-3148	EA	6" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,730.11	298.90
		<i>For Class 52 Rating, Deduct</i>		-580.49	
		<i>For Class 54 Rating, Add</i>		797.02	
		<i>For Class 55 Rating, Add</i>		1,187.69	
		<i>For Class 56 Rating, Add</i>		1,573.08	
40 05 19 00-3149		8" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>			
40 05 19 00-3150	EA	8" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,191.31	249.99
		<i>For Class 52 Rating, Deduct</i>		-89.38	
		<i>For Class 54 Rating, Add</i>		126.42	
		<i>For Class 55 Rating, Add</i>		190.28	
		<i>For Class 56 Rating, Add</i>		253.33	
40 05 19 00-3151	EA	8" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,355.69	252.71
		<i>For Class 52 Rating, Deduct</i>		-107.01	
		<i>For Class 54 Rating, Add</i>		150.51	
		<i>For Class 55 Rating, Add</i>		226.12	
		<i>For Class 56 Rating, Add</i>		300.76	
40 05 19 00-3152	EA	8" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		1,520.05	255.44
		<i>For Class 52 Rating, Deduct</i>		-124.63	
		<i>For Class 54 Rating, Add</i>		174.60	
		<i>For Class 55 Rating, Add</i>		261.96	
		<i>For Class 56 Rating, Add</i>		348.18	

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3153 EA 8" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,684.43	258.14
<i>For Class 52 Rating, Deduct</i>	-142.26	
<i>For Class 54 Rating, Add</i>	198.69	
<i>For Class 55 Rating, Add</i>	297.79	
<i>For Class 56 Rating, Add</i>	395.60	
40 05 19 00-3154 EA 8" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,848.81	260.86
<i>For Class 52 Rating, Deduct</i>	-159.89	
<i>For Class 54 Rating, Add</i>	222.78	
<i>For Class 55 Rating, Add</i>	333.63	
<i>For Class 56 Rating, Add</i>	443.03	
40 05 19 00-3155 EA 8" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,013.17	263.58
<i>For Class 52 Rating, Deduct</i>	-177.52	
<i>For Class 54 Rating, Add</i>	246.86	
<i>For Class 55 Rating, Add</i>	369.46	
<i>For Class 56 Rating, Add</i>	490.45	
40 05 19 00-3156 EA 8" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,177.55	266.30
<i>For Class 52 Rating, Deduct</i>	-195.15	
<i>For Class 54 Rating, Add</i>	270.95	
<i>For Class 55 Rating, Add</i>	405.30	
<i>For Class 56 Rating, Add</i>	537.88	
40 05 19 00-3157 EA 8" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,341.93	269.01
<i>For Class 52 Rating, Deduct</i>	-212.78	
<i>For Class 54 Rating, Add</i>	295.04	
<i>For Class 55 Rating, Add</i>	441.14	
<i>For Class 56 Rating, Add</i>	585.30	
40 05 19 00-3158 EA 8" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,506.29	271.73
<i>For Class 52 Rating, Deduct</i>	-230.40	
<i>For Class 54 Rating, Add</i>	319.13	
<i>For Class 55 Rating, Add</i>	476.97	
<i>For Class 56 Rating, Add</i>	632.72	
40 05 19 00-3159 EA 8" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,670.67	274.45
<i>For Class 52 Rating, Deduct</i>	-248.03	
<i>For Class 54 Rating, Add</i>	343.22	
<i>For Class 55 Rating, Add</i>	512.81	
<i>For Class 56 Rating, Add</i>	680.15	
40 05 19 00-3160 EA 8" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,835.05	277.16
<i>For Class 52 Rating, Deduct</i>	-265.66	
<i>For Class 54 Rating, Add</i>	367.30	
<i>For Class 55 Rating, Add</i>	548.65	
<i>For Class 56 Rating, Add</i>	727.57	
40 05 19 00-3161 EA 8" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,999.41	279.88
<i>For Class 52 Rating, Deduct</i>	-283.29	
<i>For Class 54 Rating, Add</i>	391.39	
<i>For Class 55 Rating, Add</i>	584.48	
<i>For Class 56 Rating, Add</i>	774.99	
40 05 19 00-3162 EA 8" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,163.79	282.61
<i>For Class 52 Rating, Deduct</i>	-300.92	
<i>For Class 54 Rating, Add</i>	415.48	
<i>For Class 55 Rating, Add</i>	620.32	
<i>For Class 56 Rating, Add</i>	822.42	
40 05 19 00-3163 EA 8" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,328.18	285.33
<i>For Class 52 Rating, Deduct</i>	-318.55	
<i>For Class 54 Rating, Add</i>	439.57	
<i>For Class 55 Rating, Add</i>	656.15	
<i>For Class 56 Rating, Add</i>	869.84	
40 05 19 00-3164 EA 8" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,492.54	288.03
<i>For Class 52 Rating, Deduct</i>	-336.17	
<i>For Class 54 Rating, Add</i>	463.66	
<i>For Class 55 Rating, Add</i>	691.99	
<i>For Class 56 Rating, Add</i>	917.27	
40 05 19 00-3165 EA 8" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,656.92	290.75
<i>For Class 52 Rating, Deduct</i>	-353.80	
<i>For Class 54 Rating, Add</i>	487.74	
<i>For Class 55 Rating, Add</i>	727.83	
<i>For Class 56 Rating, Add</i>	964.69	
40 05 19 00-3166 EA 8" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,821.29	293.47
<i>For Class 52 Rating, Deduct</i>	-371.43	
<i>For Class 54 Rating, Add</i>	511.83	
<i>For Class 55 Rating, Add</i>	763.66	
<i>For Class 56 Rating, Add</i>	1,012.12	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-3167	EA		8" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,985.66	296.19
			<i>For Class 52 Rating, Deduct</i>	-389.06	
			<i>For Class 54 Rating, Add</i>	535.92	
			<i>For Class 55 Rating, Add</i>	799.50	
			<i>For Class 56 Rating, Add</i>	1,059.54	
40 05 19 00-3168	EA		8" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,150.04	298.90
			<i>For Class 52 Rating, Deduct</i>	-406.69	
			<i>For Class 54 Rating, Add</i>	560.01	
			<i>For Class 55 Rating, Add</i>	835.33	
			<i>For Class 56 Rating, Add</i>	1,106.96	
40 05 19 00-3169	EA		8" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,314.41	301.62
			<i>For Class 52 Rating, Deduct</i>	-424.32	
			<i>For Class 54 Rating, Add</i>	584.10	
			<i>For Class 55 Rating, Add</i>	871.17	
			<i>For Class 56 Rating, Add</i>	1,154.39	
40 05 19 00-3170	EA		8" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,478.78	304.34
			<i>For Class 52 Rating, Deduct</i>	-441.94	
			<i>For Class 54 Rating, Add</i>	608.18	
			<i>For Class 55 Rating, Add</i>	907.01	
			<i>For Class 56 Rating, Add</i>	1,201.81	
40 05 19 00-3171	EA		8" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,643.16	307.05
			<i>For Class 52 Rating, Deduct</i>	-459.57	
			<i>For Class 54 Rating, Add</i>	632.27	
			<i>For Class 55 Rating, Add</i>	942.84	
			<i>For Class 56 Rating, Add</i>	1,249.24	
40 05 19 00-3172	EA		8" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,807.53	309.78
			<i>For Class 52 Rating, Deduct</i>	-477.20	
			<i>For Class 54 Rating, Add</i>	656.36	
			<i>For Class 55 Rating, Add</i>	978.68	
			<i>For Class 56 Rating, Add</i>	1,296.66	
40 05 19 00-3173	EA		8" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,971.90	312.50
			<i>For Class 52 Rating, Deduct</i>	-494.83	
			<i>For Class 54 Rating, Add</i>	680.45	
			<i>For Class 55 Rating, Add</i>	1,014.51	
			<i>For Class 56 Rating, Add</i>	1,344.08	
40 05 19 00-3174	EA		8" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,136.28	315.21
			<i>For Class 52 Rating, Deduct</i>	-512.46	
			<i>For Class 54 Rating, Add</i>	704.53	
			<i>For Class 55 Rating, Add</i>	1,050.35	
			<i>For Class 56 Rating, Add</i>	1,391.51	
40 05 19 00-3175	EA		8" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,300.65	317.92
			<i>For Class 52 Rating, Deduct</i>	-530.08	
			<i>For Class 54 Rating, Add</i>	728.62	
			<i>For Class 55 Rating, Add</i>	1,086.19	
			<i>For Class 56 Rating, Add</i>	1,438.93	
40 05 19 00-3176	EA		8" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,465.02	320.64
			<i>For Class 52 Rating, Deduct</i>	-547.71	
			<i>For Class 54 Rating, Add</i>	752.71	
			<i>For Class 55 Rating, Add</i>	1,122.02	
			<i>For Class 56 Rating, Add</i>	1,486.35	
40 05 19 00-3177	EA		8" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,629.40	323.37
			<i>For Class 52 Rating, Deduct</i>	-565.34	
			<i>For Class 54 Rating, Add</i>	776.80	
			<i>For Class 55 Rating, Add</i>	1,157.86	
			<i>For Class 56 Rating, Add</i>	1,533.78	
40 05 19 00-3178	EA		8" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,793.78	326.07
			<i>For Class 52 Rating, Deduct</i>	-582.97	
			<i>For Class 54 Rating, Add</i>	800.89	
			<i>For Class 55 Rating, Add</i>	1,193.70	
			<i>For Class 56 Rating, Add</i>	1,581.20	
40 05 19 00-3179	EA		8" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,958.15	328.79
			<i>For Class 52 Rating, Deduct</i>	-600.60	
			<i>For Class 54 Rating, Add</i>	824.97	
			<i>For Class 55 Rating, Add</i>	1,229.53	
			<i>For Class 56 Rating, Add</i>	1,628.63	
40 05 19 00-3180	EA		8" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,122.52	331.51
			<i>For Class 52 Rating, Deduct</i>	-618.23	
			<i>For Class 54 Rating, Add</i>	849.06	
			<i>For Class 55 Rating, Add</i>	1,265.37	
			<i>For Class 56 Rating, Add</i>	1,676.05	



MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3181 EA 8" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,286.90	334.24
<i>For Class 52 Rating, Deduct</i>	-635.85	
<i>For Class 54 Rating, Add</i>	873.15	
<i>For Class 55 Rating, Add</i>	1,301.20	
<i>For Class 56 Rating, Add</i>	1,723.48	
40 05 19 00-3182 EA 8" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,451.27	336.95
<i>For Class 52 Rating, Deduct</i>	-653.48	
<i>For Class 54 Rating, Add</i>	897.24	
<i>For Class 55 Rating, Add</i>	1,337.04	
<i>For Class 56 Rating, Add</i>	1,770.90	
40 05 19 00-3183 EA 8" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,615.64	339.67
<i>For Class 52 Rating, Deduct</i>	-671.11	
<i>For Class 54 Rating, Add</i>	921.33	
<i>For Class 55 Rating, Add</i>	1,372.87	
<i>For Class 56 Rating, Add</i>	1,818.32	
40 05 19 00-3184 EA 8" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,780.02	342.38
<i>For Class 52 Rating, Deduct</i>	-688.74	
<i>For Class 54 Rating, Add</i>	945.41	
<i>For Class 55 Rating, Add</i>	1,408.71	
<i>For Class 56 Rating, Add</i>	1,865.75	
40 05 19 00-3185 EA 8" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,944.39	345.09
<i>For Class 52 Rating, Deduct</i>	-706.37	
<i>For Class 54 Rating, Add</i>	969.50	
<i>For Class 55 Rating, Add</i>	1,444.55	
<i>For Class 56 Rating, Add</i>	1,913.17	
40 05 19 00-3186 EA 8" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,108.76	347.81
<i>For Class 52 Rating, Deduct</i>	-723.99	
<i>For Class 54 Rating, Add</i>	993.59	
<i>For Class 55 Rating, Add</i>	1,480.38	
<i>For Class 56 Rating, Add</i>	1,960.59	
40 05 19 00-3187 EA 8" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,273.13	350.54
<i>For Class 52 Rating, Deduct</i>	-741.62	
<i>For Class 54 Rating, Add</i>	1,017.68	
<i>For Class 55 Rating, Add</i>	1,516.22	
<i>For Class 56 Rating, Add</i>	2,008.02	
40 05 19 00-3188 EA 8" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,437.51	353.26
<i>For Class 52 Rating, Deduct</i>	-759.25	
<i>For Class 54 Rating, Add</i>	1,041.76	
<i>For Class 55 Rating, Add</i>	1,552.05	
<i>For Class 56 Rating, Add</i>	2,055.44	
40 05 19 00-3189 10" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3190 EA 10" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,504.19	304.34
<i>For Class 52 Rating, Deduct</i>	-114.74	
<i>For Class 54 Rating, Add</i>	161.99	
<i>For Class 55 Rating, Add</i>	243.67	
<i>For Class 56 Rating, Add</i>	324.31	
40 05 19 00-3191 EA 10" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,716.37	307.05
<i>For Class 52 Rating, Deduct</i>	-137.62	
<i>For Class 54 Rating, Add</i>	193.25	
<i>For Class 55 Rating, Add</i>	290.17	
<i>For Class 56 Rating, Add</i>	385.83	
40 05 19 00-3192 EA 10" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,928.53	309.78
<i>For Class 52 Rating, Deduct</i>	-160.51	
<i>For Class 54 Rating, Add</i>	224.51	
<i>For Class 55 Rating, Add</i>	336.66	
<i>For Class 56 Rating, Add</i>	447.35	
40 05 19 00-3193 EA 10" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,140.70	312.50
<i>For Class 52 Rating, Deduct</i>	-183.40	
<i>For Class 54 Rating, Add</i>	255.77	
<i>For Class 55 Rating, Add</i>	383.16	
<i>For Class 56 Rating, Add</i>	508.88	
40 05 19 00-3194 EA 10" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,352.87	315.21
<i>For Class 52 Rating, Deduct</i>	-206.28	
<i>For Class 54 Rating, Add</i>	287.02	
<i>For Class 55 Rating, Add</i>	429.65	
<i>For Class 56 Rating, Add</i>	570.40	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3195	EA	10" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,565.04	317.92
		<i>For Class 52 Rating, Deduct</i>		-229.17	
		<i>For Class 54 Rating, Add</i>		318.28	
		<i>For Class 55 Rating, Add</i>		476.15	
		<i>For Class 56 Rating, Add</i>		631.93	
40 05 19 00-3196	EA	10" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,777.21	320.64
		<i>For Class 52 Rating, Deduct</i>		-252.05	
		<i>For Class 54 Rating, Add</i>		349.54	
		<i>For Class 55 Rating, Add</i>		522.64	
		<i>For Class 56 Rating, Add</i>		693.45	
40 05 19 00-3197	EA	10" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		2,989.38	323.37
		<i>For Class 52 Rating, Deduct</i>		-274.94	
		<i>For Class 54 Rating, Add</i>		380.80	
		<i>For Class 55 Rating, Add</i>		569.13	
		<i>For Class 56 Rating, Add</i>		754.97	
40 05 19 00-3198	EA	10" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		3,201.55	326.07
		<i>For Class 52 Rating, Deduct</i>		-297.82	
		<i>For Class 54 Rating, Add</i>		412.05	
		<i>For Class 55 Rating, Add</i>		615.63	
		<i>For Class 56 Rating, Add</i>		816.50	
40 05 19 00-3199	EA	10" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		3,413.73	328.79
		<i>For Class 52 Rating, Deduct</i>		-320.71	
		<i>For Class 54 Rating, Add</i>		443.31	
		<i>For Class 55 Rating, Add</i>		662.12	
		<i>For Class 56 Rating, Add</i>		878.02	
40 05 19 00-3200	EA	10" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		3,625.89	331.51
		<i>For Class 52 Rating, Deduct</i>		-343.60	
		<i>For Class 54 Rating, Add</i>		474.57	
		<i>For Class 55 Rating, Add</i>		708.62	
		<i>For Class 56 Rating, Add</i>		939.54	
40 05 19 00-3201	EA	10" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		3,838.06	334.24
		<i>For Class 52 Rating, Deduct</i>		-366.48	
		<i>For Class 54 Rating, Add</i>		505.82	
		<i>For Class 55 Rating, Add</i>		755.11	
		<i>For Class 56 Rating, Add</i>		1,001.07	
40 05 19 00-3202	EA	10" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,050.23	336.95
		<i>For Class 52 Rating, Deduct</i>		-389.37	
		<i>For Class 54 Rating, Add</i>		537.08	
		<i>For Class 55 Rating, Add</i>		801.61	
		<i>For Class 56 Rating, Add</i>		1,062.59	
40 05 19 00-3203	EA	10" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,262.40	339.67
		<i>For Class 52 Rating, Deduct</i>		-412.25	
		<i>For Class 54 Rating, Add</i>		568.34	
		<i>For Class 55 Rating, Add</i>		848.10	
		<i>For Class 56 Rating, Add</i>		1,124.12	
40 05 19 00-3204	EA	10" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,474.57	342.38
		<i>For Class 52 Rating, Deduct</i>		-435.14	
		<i>For Class 54 Rating, Add</i>		599.60	
		<i>For Class 55 Rating, Add</i>		894.60	
		<i>For Class 56 Rating, Add</i>		1,185.64	
40 05 19 00-3205	EA	10" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,686.74	345.09
		<i>For Class 52 Rating, Deduct</i>		-458.02	
		<i>For Class 54 Rating, Add</i>		630.85	
		<i>For Class 55 Rating, Add</i>		941.09	
		<i>For Class 56 Rating, Add</i>		1,247.16	
40 05 19 00-3206	EA	10" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		4,898.90	347.81
		<i>For Class 52 Rating, Deduct</i>		-480.91	
		<i>For Class 54 Rating, Add</i>		662.11	
		<i>For Class 55 Rating, Add</i>		987.58	
		<i>For Class 56 Rating, Add</i>		1,308.69	
40 05 19 00-3207	EA	10" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,111.08	350.54
		<i>For Class 52 Rating, Deduct</i>		-503.80	
		<i>For Class 54 Rating, Add</i>		693.37	
		<i>For Class 55 Rating, Add</i>		1,034.08	
		<i>For Class 56 Rating, Add</i>		1,370.21	
40 05 19 00-3208	EA	10" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....		5,323.25	353.26
		<i>For Class 52 Rating, Deduct</i>		-526.68	
		<i>For Class 54 Rating, Add</i>		724.63	
		<i>For Class 55 Rating, Add</i>		1,080.57	
		<i>For Class 56 Rating, Add</i>		1,431.73	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3209 EA 10" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	5,535.41	355.96
<i>For Class 52 Rating, Deduct</i>	-549.57	
<i>For Class 54 Rating, Add</i>	755.88	
<i>For Class 55 Rating, Add</i>	1,127.07	
<i>For Class 56 Rating, Add</i>	1,493.26	
40 05 19 00-3210 EA 10" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	5,747.58	358.68
<i>For Class 52 Rating, Deduct</i>	-572.45	
<i>For Class 54 Rating, Add</i>	787.14	
<i>For Class 55 Rating, Add</i>	1,173.56	
<i>For Class 56 Rating, Add</i>	1,554.78	
40 05 19 00-3211 EA 10" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	5,959.77	361.41
<i>For Class 52 Rating, Deduct</i>	-595.34	
<i>For Class 54 Rating, Add</i>	818.40	
<i>For Class 55 Rating, Add</i>	1,220.06	
<i>For Class 56 Rating, Add</i>	1,616.31	
40 05 19 00-3212 EA 10" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	6,171.93	364.12
<i>For Class 52 Rating, Deduct</i>	-618.23	
<i>For Class 54 Rating, Add</i>	849.65	
<i>For Class 55 Rating, Add</i>	1,266.55	
<i>For Class 56 Rating, Add</i>	1,677.83	
40 05 19 00-3213 EA 10" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	6,384.10	366.84
<i>For Class 52 Rating, Deduct</i>	-641.11	
<i>For Class 54 Rating, Add</i>	880.91	
<i>For Class 55 Rating, Add</i>	1,313.05	
<i>For Class 56 Rating, Add</i>	1,739.35	
40 05 19 00-3214 EA 10" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	6,596.26	369.55
<i>For Class 52 Rating, Deduct</i>	-664.00	
<i>For Class 54 Rating, Add</i>	912.17	
<i>For Class 55 Rating, Add</i>	1,359.54	
<i>For Class 56 Rating, Add</i>	1,800.87	
40 05 19 00-3215 EA 10" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	6,808.44	372.27
<i>For Class 52 Rating, Deduct</i>	-686.88	
<i>For Class 54 Rating, Add</i>	943.43	
<i>For Class 55 Rating, Add</i>	1,406.04	
<i>For Class 56 Rating, Add</i>	1,862.40	
40 05 19 00-3216 EA 10" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	7,020.61	374.99
<i>For Class 52 Rating, Deduct</i>	-709.77	
<i>For Class 54 Rating, Add</i>	974.68	
<i>For Class 55 Rating, Add</i>	1,452.53	
<i>For Class 56 Rating, Add</i>	1,923.92	
40 05 19 00-3217 EA 10" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	7,232.77	377.71
<i>For Class 52 Rating, Deduct</i>	-732.65	
<i>For Class 54 Rating, Add</i>	1,005.94	
<i>For Class 55 Rating, Add</i>	1,499.02	
<i>For Class 56 Rating, Add</i>	1,985.45	
40 05 19 00-3218 EA 10" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	7,444.94	380.43
<i>For Class 52 Rating, Deduct</i>	-755.54	
<i>For Class 54 Rating, Add</i>	1,037.20	
<i>For Class 55 Rating, Add</i>	1,545.52	
<i>For Class 56 Rating, Add</i>	2,046.97	
40 05 19 00-3219 EA 10" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	7,657.12	383.14
<i>For Class 52 Rating, Deduct</i>	-778.43	
<i>For Class 54 Rating, Add</i>	1,068.46	
<i>For Class 55 Rating, Add</i>	1,592.01	
<i>For Class 56 Rating, Add</i>	2,108.50	
40 05 19 00-3220 EA 10" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	7,869.28	385.85
<i>For Class 52 Rating, Deduct</i>	-801.31	
<i>For Class 54 Rating, Add</i>	1,099.71	
<i>For Class 55 Rating, Add</i>	1,638.51	
<i>For Class 56 Rating, Add</i>	2,170.02	
40 05 19 00-3221 EA 10" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	8,081.45	388.58
<i>For Class 52 Rating, Deduct</i>	-824.20	
<i>For Class 54 Rating, Add</i>	1,130.97	
<i>For Class 55 Rating, Add</i>	1,685.00	
<i>For Class 56 Rating, Add</i>	2,231.54	
40 05 19 00-3222 EA 10" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	8,293.62	391.30
<i>For Class 52 Rating, Deduct</i>	-847.08	
<i>For Class 54 Rating, Add</i>	1,162.23	
<i>For Class 55 Rating, Add</i>	1,731.50	
<i>For Class 56 Rating, Add</i>	2,293.06	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3223	EA	10" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,505.79		394.01
		<i>For Class 52 Rating, Deduct</i>	-869.97		
		<i>For Class 54 Rating, Add</i>	1,193.49		
		<i>For Class 55 Rating, Add</i>	1,777.99		
		<i>For Class 56 Rating, Add</i>	2,354.59		
40 05 19 00-3224	EA	10" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,717.96		396.72
		<i>For Class 52 Rating, Deduct</i>	-892.85		
		<i>For Class 54 Rating, Add</i>	1,224.74		
		<i>For Class 55 Rating, Add</i>	1,824.49		
		<i>For Class 56 Rating, Add</i>	2,416.11		
40 05 19 00-3225	EA	10" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,930.13		399.44
		<i>For Class 52 Rating, Deduct</i>	-915.74		
		<i>For Class 54 Rating, Add</i>	1,256.00		
		<i>For Class 55 Rating, Add</i>	1,870.98		
		<i>For Class 56 Rating, Add</i>	2,477.64		
40 05 19 00-3226	EA	10" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,142.30		402.17
		<i>For Class 52 Rating, Deduct</i>	-938.63		
		<i>For Class 54 Rating, Add</i>	1,287.26		
		<i>For Class 55 Rating, Add</i>	1,917.47		
		<i>For Class 56 Rating, Add</i>	2,539.16		
40 05 19 00-3227	EA	10" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,354.48		404.88
		<i>For Class 52 Rating, Deduct</i>	-961.51		
		<i>For Class 54 Rating, Add</i>	1,318.51		
		<i>For Class 55 Rating, Add</i>	1,963.97		
		<i>For Class 56 Rating, Add</i>	2,600.69		
40 05 19 00-3228	EA	10" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,566.64		407.60
		<i>For Class 52 Rating, Deduct</i>	-984.40		
		<i>For Class 54 Rating, Add</i>	1,349.77		
		<i>For Class 55 Rating, Add</i>	2,010.46		
		<i>For Class 56 Rating, Add</i>	2,662.21		
40 05 19 00-3229		12" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>			
40 05 19 00-3230	EA	12" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	1,954.04		380.43
		<i>For Class 52 Rating, Deduct</i>	-151.54		
		<i>For Class 54 Rating, Add</i>	213.56		
		<i>For Class 55 Rating, Add</i>	321.05		
		<i>For Class 56 Rating, Add</i>	427.15		
40 05 19 00-3231	EA	12" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,216.82		383.14
		<i>For Class 52 Rating, Deduct</i>	-179.99		
		<i>For Class 54 Rating, Add</i>	252.41		
		<i>For Class 55 Rating, Add</i>	378.83		
		<i>For Class 56 Rating, Add</i>	503.61		
40 05 19 00-3232	EA	12" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,479.59		385.85
		<i>For Class 52 Rating, Deduct</i>	-208.45		
		<i>For Class 54 Rating, Add</i>	291.26		
		<i>For Class 55 Rating, Add</i>	436.61		
		<i>For Class 56 Rating, Add</i>	580.06		
40 05 19 00-3233	EA	12" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,742.37		388.58
		<i>For Class 52 Rating, Deduct</i>	-236.90		
		<i>For Class 54 Rating, Add</i>	330.11		
		<i>For Class 55 Rating, Add</i>	494.39		
		<i>For Class 56 Rating, Add</i>	656.51		
40 05 19 00-3234	EA	12" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,005.15		391.30
		<i>For Class 52 Rating, Deduct</i>	-265.35		
		<i>For Class 54 Rating, Add</i>	368.96		
		<i>For Class 55 Rating, Add</i>	552.17		
		<i>For Class 56 Rating, Add</i>	732.97		
40 05 19 00-3235	EA	12" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,267.92		394.01
		<i>For Class 52 Rating, Deduct</i>	-293.80		
		<i>For Class 54 Rating, Add</i>	407.80		
		<i>For Class 55 Rating, Add</i>	609.95		
		<i>For Class 56 Rating, Add</i>	809.42		
40 05 19 00-3236	EA	12" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,530.70		396.72
		<i>For Class 52 Rating, Deduct</i>	-322.26		
		<i>For Class 54 Rating, Add</i>	446.65		
		<i>For Class 55 Rating, Add</i>	667.73		
		<i>For Class 56 Rating, Add</i>	885.87		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3237 EA 12" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,793.48	399.44
For Class 52 Rating, Deduct	-350.71	
For Class 54 Rating, Add	485.50	
For Class 55 Rating, Add	725.51	
For Class 56 Rating, Add	962.32	
40 05 19 00-3238 EA 12" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,056.26	402.17
For Class 52 Rating, Deduct	-379.16	
For Class 54 Rating, Add	524.35	
For Class 55 Rating, Add	783.29	
For Class 56 Rating, Add	1,038.78	
40 05 19 00-3239 EA 12" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,319.04	404.88
For Class 52 Rating, Deduct	-407.61	
For Class 54 Rating, Add	563.20	
For Class 55 Rating, Add	841.07	
For Class 56 Rating, Add	1,115.23	
40 05 19 00-3240 EA 12" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,581.81	407.60
For Class 52 Rating, Deduct	-436.07	
For Class 54 Rating, Add	602.05	
For Class 55 Rating, Add	898.85	
For Class 56 Rating, Add	1,191.68	
40 05 19 00-3241 EA 12" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,844.59	410.32
For Class 52 Rating, Deduct	-464.52	
For Class 54 Rating, Add	640.90	
For Class 55 Rating, Add	956.63	
For Class 56 Rating, Add	1,268.14	
40 05 19 00-3242 EA 12" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,107.37	413.02
For Class 52 Rating, Deduct	-492.97	
For Class 54 Rating, Add	679.74	
For Class 55 Rating, Add	1,014.41	
For Class 56 Rating, Add	1,344.59	
40 05 19 00-3243 EA 12" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,370.14	415.75
For Class 52 Rating, Deduct	-521.42	
For Class 54 Rating, Add	718.59	
For Class 55 Rating, Add	1,072.19	
For Class 56 Rating, Add	1,421.04	
40 05 19 00-3244 EA 12" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,632.92	418.47
For Class 52 Rating, Deduct	-549.88	
For Class 54 Rating, Add	757.44	
For Class 55 Rating, Add	1,129.97	
For Class 56 Rating, Add	1,497.50	
40 05 19 00-3245 EA 12" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,895.70	421.19
For Class 52 Rating, Deduct	-578.33	
For Class 54 Rating, Add	796.29	
For Class 55 Rating, Add	1,187.75	
For Class 56 Rating, Add	1,573.95	
40 05 19 00-3246 EA 12" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,158.47	423.89
For Class 52 Rating, Deduct	-606.78	
For Class 54 Rating, Add	835.14	
For Class 55 Rating, Add	1,245.53	
For Class 56 Rating, Add	1,650.40	
40 05 19 00-3247 EA 12" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,421.25	426.62
For Class 52 Rating, Deduct	-635.23	
For Class 54 Rating, Add	873.99	
For Class 55 Rating, Add	1,303.31	
For Class 56 Rating, Add	1,726.85	
40 05 19 00-3248 EA 12" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,684.03	429.34
For Class 52 Rating, Deduct	-663.69	
For Class 54 Rating, Add	912.83	
For Class 55 Rating, Add	1,361.09	
For Class 56 Rating, Add	1,803.31	
40 05 19 00-3249 EA 12" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,946.80	432.05
For Class 52 Rating, Deduct	-692.14	
For Class 54 Rating, Add	951.68	
For Class 55 Rating, Add	1,418.87	
For Class 56 Rating, Add	1,879.76	
40 05 19 00-3250 EA 12" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,209.58	434.77
For Class 52 Rating, Deduct	-720.59	
For Class 54 Rating, Add	990.53	
For Class 55 Rating, Add	1,476.65	
For Class 56 Rating, Add	1,956.21	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3251	EA	12" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,472.37		437.49
		<i>For Class 52 Rating, Deduct</i>	-749.05		
		<i>For Class 54 Rating, Add</i>	1,029.38		
		<i>For Class 55 Rating, Add</i>	1,534.43		
		<i>For Class 56 Rating, Add</i>	2,032.67		
40 05 19 00-3252	EA	12" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,735.14		440.21
		<i>For Class 52 Rating, Deduct</i>	-777.50		
		<i>For Class 54 Rating, Add</i>	1,068.23		
		<i>For Class 55 Rating, Add</i>	1,592.21		
		<i>For Class 56 Rating, Add</i>	2,109.12		
40 05 19 00-3253	EA	12" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,997.92		442.92
		<i>For Class 52 Rating, Deduct</i>	-805.95		
		<i>For Class 54 Rating, Add</i>	1,107.08		
		<i>For Class 55 Rating, Add</i>	1,649.99		
		<i>For Class 56 Rating, Add</i>	2,185.57		
40 05 19 00-3254	EA	12" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,260.69		445.64
		<i>For Class 52 Rating, Deduct</i>	-834.40		
		<i>For Class 54 Rating, Add</i>	1,145.92		
		<i>For Class 55 Rating, Add</i>	1,707.77		
		<i>For Class 56 Rating, Add</i>	2,262.02		
40 05 19 00-3255	EA	12" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,523.47		448.36
		<i>For Class 52 Rating, Deduct</i>	-862.86		
		<i>For Class 54 Rating, Add</i>	1,184.77		
		<i>For Class 55 Rating, Add</i>	1,765.55		
		<i>For Class 56 Rating, Add</i>	2,338.48		
40 05 19 00-3256	EA	12" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,786.25		451.08
		<i>For Class 52 Rating, Deduct</i>	-891.31		
		<i>For Class 54 Rating, Add</i>	1,223.62		
		<i>For Class 55 Rating, Add</i>	1,823.33		
		<i>For Class 56 Rating, Add</i>	2,414.93		
40 05 19 00-3257	EA	12" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,049.02		453.79
		<i>For Class 52 Rating, Deduct</i>	-919.76		
		<i>For Class 54 Rating, Add</i>	1,262.47		
		<i>For Class 55 Rating, Add</i>	1,881.11		
		<i>For Class 56 Rating, Add</i>	2,491.38		
40 05 19 00-3258	EA	12" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,311.80		456.51
		<i>For Class 52 Rating, Deduct</i>	-948.21		
		<i>For Class 54 Rating, Add</i>	1,301.32		
		<i>For Class 55 Rating, Add</i>	1,938.89		
		<i>For Class 56 Rating, Add</i>	2,567.84		
40 05 19 00-3259	EA	12" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,574.58		459.23
		<i>For Class 52 Rating, Deduct</i>	-976.67		
		<i>For Class 54 Rating, Add</i>	1,340.17		
		<i>For Class 55 Rating, Add</i>	1,996.67		
		<i>For Class 56 Rating, Add</i>	2,644.29		
40 05 19 00-3260	EA	12" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,837.35		461.94
		<i>For Class 52 Rating, Deduct</i>	-1,005.12		
		<i>For Class 54 Rating, Add</i>	1,379.01		
		<i>For Class 55 Rating, Add</i>	2,054.45		
		<i>For Class 56 Rating, Add</i>	2,720.74		
40 05 19 00-3261	EA	12" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,100.13		464.66
		<i>For Class 52 Rating, Deduct</i>	-1,033.57		
		<i>For Class 54 Rating, Add</i>	1,417.86		
		<i>For Class 55 Rating, Add</i>	2,112.23		
		<i>For Class 56 Rating, Add</i>	2,797.19		
40 05 19 00-3262	EA	12" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,362.91		467.38
		<i>For Class 52 Rating, Deduct</i>	-1,062.02		
		<i>For Class 54 Rating, Add</i>	1,456.71		
		<i>For Class 55 Rating, Add</i>	2,170.01		
		<i>For Class 56 Rating, Add</i>	2,873.65		
40 05 19 00-3263	EA	12" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,625.68		470.10
		<i>For Class 52 Rating, Deduct</i>	-1,090.48		
		<i>For Class 54 Rating, Add</i>	1,495.56		
		<i>For Class 55 Rating, Add</i>	2,227.79		
		<i>For Class 56 Rating, Add</i>	2,950.10		
40 05 19 00-3264	EA	12" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,888.46		472.81
		<i>For Class 52 Rating, Deduct</i>	-1,118.93		
		<i>For Class 54 Rating, Add</i>	1,534.41		
		<i>For Class 55 Rating, Add</i>	2,285.57		
		<i>For Class 56 Rating, Add</i>	3,026.55		

MINOR	TOTAL DIRECT	DEMOLITION
CSI UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3265 EA 12" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,151.24	475.53
<i>For Class 52 Rating, Deduct</i>	-1,147.38	
<i>For Class 54 Rating, Add</i>	1,573.26	
<i>For Class 55 Rating, Add</i>	2,343.35	
<i>For Class 56 Rating, Add</i>	3,103.01	
40 05 19 00-3266 EA 12" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,414.02	478.25
<i>For Class 52 Rating, Deduct</i>	-1,175.83	
<i>For Class 54 Rating, Add</i>	1,612.11	
<i>For Class 55 Rating, Add</i>	2,401.13	
<i>For Class 56 Rating, Add</i>	3,179.46	
40 05 19 00-3267 EA 12" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,676.80	480.96
<i>For Class 52 Rating, Deduct</i>	-1,204.29	
<i>For Class 54 Rating, Add</i>	1,650.95	
<i>For Class 55 Rating, Add</i>	2,458.91	
<i>For Class 56 Rating, Add</i>	3,255.91	
40 05 19 00-3268 EA 12" Flanged x Plain End (FxPE), 20'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,939.57	483.68
<i>For Class 52 Rating, Deduct</i>	-1,232.74	
<i>For Class 54 Rating, Add</i>	1,689.80	
<i>For Class 55 Rating, Add</i>	2,516.69	
<i>For Class 56 Rating, Add</i>	3,332.37	
40 05 19 00-3269 14" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3270 EA 14" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,634.44	456.51
<i>For Class 52 Rating, Deduct</i>	-213.70	
<i>For Class 54 Rating, Add</i>	299.71	
<i>For Class 55 Rating, Add</i>	449.84	
<i>For Class 56 Rating, Add</i>	598.01	
40 05 19 00-3271 EA 14" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	2,953.45	459.23
<i>For Class 52 Rating, Deduct</i>	-248.34	
<i>For Class 54 Rating, Add</i>	347.00	
<i>For Class 55 Rating, Add</i>	520.16	
<i>For Class 56 Rating, Add</i>	691.06	
40 05 19 00-3272 EA 14" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,272.45	461.94
<i>For Class 52 Rating, Deduct</i>	-282.98	
<i>For Class 54 Rating, Add</i>	394.28	
<i>For Class 55 Rating, Add</i>	590.47	
<i>For Class 56 Rating, Add</i>	784.10	
40 05 19 00-3273 EA 14" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,591.46	464.66
<i>For Class 52 Rating, Deduct</i>	-317.62	
<i>For Class 54 Rating, Add</i>	441.56	
<i>For Class 55 Rating, Add</i>	660.79	
<i>For Class 56 Rating, Add</i>	877.14	
40 05 19 00-3274 EA 14" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,910.47	467.38
<i>For Class 52 Rating, Deduct</i>	-352.26	
<i>For Class 54 Rating, Add</i>	488.85	
<i>For Class 55 Rating, Add</i>	731.11	
<i>For Class 56 Rating, Add</i>	970.18	
40 05 19 00-3275 EA 14" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,229.47	470.10
<i>For Class 52 Rating, Deduct</i>	-386.89	
<i>For Class 54 Rating, Add</i>	536.13	
<i>For Class 55 Rating, Add</i>	801.43	
<i>For Class 56 Rating, Add</i>	1,063.22	
40 05 19 00-3276 EA 14" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,548.48	472.81
<i>For Class 52 Rating, Deduct</i>	-421.53	
<i>For Class 54 Rating, Add</i>	583.41	
<i>For Class 55 Rating, Add</i>	871.75	
<i>For Class 56 Rating, Add</i>	1,156.26	
40 05 19 00-3277 EA 14" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,867.49	475.53
<i>For Class 52 Rating, Deduct</i>	-456.17	
<i>For Class 54 Rating, Add</i>	630.69	
<i>For Class 55 Rating, Add</i>	942.07	
<i>For Class 56 Rating, Add</i>	1,249.30	
40 05 19 00-3278 EA 14" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,186.50	478.25
<i>For Class 52 Rating, Deduct</i>	-490.81	
<i>For Class 54 Rating, Add</i>	677.98	
<i>For Class 55 Rating, Add</i>	1,012.39	
<i>For Class 56 Rating, Add</i>	1,342.34	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3279	EA	14" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,505.51		480.96
		<i>For Class 52 Rating, Deduct</i>	-525.44		
		<i>For Class 54 Rating, Add</i>	725.26		
		<i>For Class 55 Rating, Add</i>	1,082.71		
		<i>For Class 56 Rating, Add</i>	1,435.38		
40 05 19 00-3280	EA	14" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,824.51		483.68
		<i>For Class 52 Rating, Deduct</i>	-560.08		
		<i>For Class 54 Rating, Add</i>	772.54		
		<i>For Class 55 Rating, Add</i>	1,153.03		
		<i>For Class 56 Rating, Add</i>	1,528.42		
40 05 19 00-3281	EA	14" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,143.52		486.40
		<i>For Class 52 Rating, Deduct</i>	-594.72		
		<i>For Class 54 Rating, Add</i>	819.83		
		<i>For Class 55 Rating, Add</i>	1,223.35		
		<i>For Class 56 Rating, Add</i>	1,621.46		
40 05 19 00-3282	EA	14" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,462.53		489.12
		<i>For Class 52 Rating, Deduct</i>	-629.36		
		<i>For Class 54 Rating, Add</i>	867.11		
		<i>For Class 55 Rating, Add</i>	1,293.67		
		<i>For Class 56 Rating, Add</i>	1,714.50		
40 05 19 00-3283	EA	14" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,781.53		491.83
		<i>For Class 52 Rating, Deduct</i>	-664.00		
		<i>For Class 54 Rating, Add</i>	914.39		
		<i>For Class 55 Rating, Add</i>	1,363.99		
		<i>For Class 56 Rating, Add</i>	1,807.54		
40 05 19 00-3284	EA	14" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,100.54		494.55
		<i>For Class 52 Rating, Deduct</i>	-698.63		
		<i>For Class 54 Rating, Add</i>	961.67		
		<i>For Class 55 Rating, Add</i>	1,434.31		
		<i>For Class 56 Rating, Add</i>	1,900.59		
40 05 19 00-3285	EA	14" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,419.55		497.27
		<i>For Class 52 Rating, Deduct</i>	-733.27		
		<i>For Class 54 Rating, Add</i>	1,008.96		
		<i>For Class 55 Rating, Add</i>	1,504.63		
		<i>For Class 56 Rating, Add</i>	1,993.63		
40 05 19 00-3286	EA	14" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,738.55		499.98
		<i>For Class 52 Rating, Deduct</i>	-767.91		
		<i>For Class 54 Rating, Add</i>	1,056.24		
		<i>For Class 55 Rating, Add</i>	1,574.94		
		<i>For Class 56 Rating, Add</i>	2,086.67		
40 05 19 00-3287	EA	14" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,057.56		502.70
		<i>For Class 52 Rating, Deduct</i>	-802.55		
		<i>For Class 54 Rating, Add</i>	1,103.52		
		<i>For Class 55 Rating, Add</i>	1,645.26		
		<i>For Class 56 Rating, Add</i>	2,179.71		
40 05 19 00-3288	EA	14" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,376.57		505.43
		<i>For Class 52 Rating, Deduct</i>	-837.19		
		<i>For Class 54 Rating, Add</i>	1,150.81		
		<i>For Class 55 Rating, Add</i>	1,715.58		
		<i>For Class 56 Rating, Add</i>	2,272.75		
40 05 19 00-3289	EA	14" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,695.57		508.14
		<i>For Class 52 Rating, Deduct</i>	-871.82		
		<i>For Class 54 Rating, Add</i>	1,198.09		
		<i>For Class 55 Rating, Add</i>	1,785.90		
		<i>For Class 56 Rating, Add</i>	2,365.79		
40 05 19 00-3290	EA	14" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,014.59		510.85
		<i>For Class 52 Rating, Deduct</i>	-906.46		
		<i>For Class 54 Rating, Add</i>	1,245.37		
		<i>For Class 55 Rating, Add</i>	1,856.22		
		<i>For Class 56 Rating, Add</i>	2,458.83		
40 05 19 00-3291	EA	14" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,333.61		513.57
		<i>For Class 52 Rating, Deduct</i>	-941.10		
		<i>For Class 54 Rating, Add</i>	1,292.66		
		<i>For Class 55 Rating, Add</i>	1,926.54		
		<i>For Class 56 Rating, Add</i>	2,551.87		
40 05 19 00-3292	EA	14" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,652.61		516.29
		<i>For Class 52 Rating, Deduct</i>	-975.74		
		<i>For Class 54 Rating, Add</i>	1,339.94		
		<i>For Class 55 Rating, Add</i>	1,996.86		
		<i>For Class 56 Rating, Add</i>	2,644.91		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3293 EA 14" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	9,971.62	519.02
<i>For Class 52 Rating, Deduct</i>	-1,010.38	
<i>For Class 54 Rating, Add</i>	1,387.22	
<i>For Class 55 Rating, Add</i>	2,067.18	
<i>For Class 56 Rating, Add</i>	2,737.96	
40 05 19 00-3294 EA 14" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	10,290.62	521.72
<i>For Class 52 Rating, Deduct</i>	-1,045.01	
<i>For Class 54 Rating, Add</i>	1,434.51	
<i>For Class 55 Rating, Add</i>	2,137.50	
<i>For Class 56 Rating, Add</i>	2,831.00	
40 05 19 00-3295 EA 14" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	10,609.63	524.44
<i>For Class 52 Rating, Deduct</i>	-1,079.65	
<i>For Class 54 Rating, Add</i>	1,481.79	
<i>For Class 55 Rating, Add</i>	2,207.82	
<i>For Class 56 Rating, Add</i>	2,924.04	
40 05 19 00-3296 EA 14" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	10,928.64	527.16
<i>For Class 52 Rating, Deduct</i>	-1,114.29	
<i>For Class 54 Rating, Add</i>	1,529.07	
<i>For Class 55 Rating, Add</i>	2,278.14	
<i>For Class 56 Rating, Add</i>	3,017.08	
40 05 19 00-3297 EA 14" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	11,247.64	529.87
<i>For Class 52 Rating, Deduct</i>	-1,148.93	
<i>For Class 54 Rating, Add</i>	1,576.35	
<i>For Class 55 Rating, Add</i>	2,348.46	
<i>For Class 56 Rating, Add</i>	3,110.12	
40 05 19 00-3298 EA 14" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	11,566.65	532.60
<i>For Class 52 Rating, Deduct</i>	-1,183.57	
<i>For Class 54 Rating, Add</i>	1,623.64	
<i>For Class 55 Rating, Add</i>	2,418.78	
<i>For Class 56 Rating, Add</i>	3,203.16	
40 05 19 00-3299 EA 14" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	11,885.66	535.31
<i>For Class 52 Rating, Deduct</i>	-1,218.20	
<i>For Class 54 Rating, Add</i>	1,670.92	
<i>For Class 55 Rating, Add</i>	2,489.10	
<i>For Class 56 Rating, Add</i>	3,296.20	
40 05 19 00-3300 EA 14" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	12,204.66	538.03
<i>For Class 52 Rating, Deduct</i>	-1,252.84	
<i>For Class 54 Rating, Add</i>	1,718.20	
<i>For Class 55 Rating, Add</i>	2,559.42	
<i>For Class 56 Rating, Add</i>	3,389.24	
40 05 19 00-3301 EA 14" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	12,523.67	540.74
<i>For Class 52 Rating, Deduct</i>	-1,287.48	
<i>For Class 54 Rating, Add</i>	1,765.49	
<i>For Class 55 Rating, Add</i>	2,629.74	
<i>For Class 56 Rating, Add</i>	3,482.28	
40 05 19 00-3302 EA 14" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	12,842.68	543.46
<i>For Class 52 Rating, Deduct</i>	-1,322.12	
<i>For Class 54 Rating, Add</i>	1,812.77	
<i>For Class 55 Rating, Add</i>	2,700.06	
<i>For Class 56 Rating, Add</i>	3,575.32	
40 05 19 00-3303 EA 14" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	13,161.68	546.19
<i>For Class 52 Rating, Deduct</i>	-1,356.76	
<i>For Class 54 Rating, Add</i>	1,860.05	
<i>For Class 55 Rating, Add</i>	2,770.37	
<i>For Class 56 Rating, Add</i>	3,668.36	
40 05 19 00-3304 EA 14" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	13,480.69	548.89
<i>For Class 52 Rating, Deduct</i>	-1,391.39	
<i>For Class 54 Rating, Add</i>	1,907.33	
<i>For Class 55 Rating, Add</i>	2,840.69	
<i>For Class 56 Rating, Add</i>	3,761.40	
40 05 19 00-3305 EA 14" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	13,799.70	551.61
<i>For Class 52 Rating, Deduct</i>	-1,426.03	
<i>For Class 54 Rating, Add</i>	1,954.62	
<i>For Class 55 Rating, Add</i>	2,911.01	
<i>For Class 56 Rating, Add</i>	3,854.44	
40 05 19 00-3306 EA 14" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	14,118.71	554.33
<i>For Class 52 Rating, Deduct</i>	-1,460.67	
<i>For Class 54 Rating, Add</i>	2,001.90	
<i>For Class 55 Rating, Add</i>	2,981.33	
<i>For Class 56 Rating, Add</i>	3,947.49	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3307	EA	14" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,437.72	557.05
		<i>For Class 52 Rating, Deduct</i>	-1,495.31	
		<i>For Class 54 Rating, Add</i>	2,049.18	
		<i>For Class 55 Rating, Add</i>	3,051.65	
		<i>For Class 56 Rating, Add</i>	4,040.53	
40 05 19 00-3308 16" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>				
40 05 19 00-3309	EA	16" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,081.88	521.72
		<i>For Class 52 Rating, Deduct</i>	-252.05	
		<i>For Class 54 Rating, Add</i>	353.19	
		<i>For Class 55 Rating, Add</i>	529.95	
		<i>For Class 56 Rating, Add</i>	704.42	
40 05 19 00-3310	EA	16" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,451.50	524.44
		<i>For Class 52 Rating, Deduct</i>	-292.26	
		<i>For Class 54 Rating, Add</i>	408.07	
		<i>For Class 55 Rating, Add</i>	611.56	
		<i>For Class 56 Rating, Add</i>	812.39	
40 05 19 00-3311	EA	16" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,821.11	527.16
		<i>For Class 52 Rating, Deduct</i>	-332.46	
		<i>For Class 54 Rating, Add</i>	462.94	
		<i>For Class 55 Rating, Add</i>	693.16	
		<i>For Class 56 Rating, Add</i>	920.36	
40 05 19 00-3312	EA	16" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,190.72	529.87
		<i>For Class 52 Rating, Deduct</i>	-372.67	
		<i>For Class 54 Rating, Add</i>	517.82	
		<i>For Class 55 Rating, Add</i>	774.77	
		<i>For Class 56 Rating, Add</i>	1,028.33	
40 05 19 00-3313	EA	16" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,560.34	532.60
		<i>For Class 52 Rating, Deduct</i>	-412.87	
		<i>For Class 54 Rating, Add</i>	572.69	
		<i>For Class 55 Rating, Add</i>	856.37	
		<i>For Class 56 Rating, Add</i>	1,136.30	
40 05 19 00-3314	EA	16" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,929.96	535.31
		<i>For Class 52 Rating, Deduct</i>	-453.08	
		<i>For Class 54 Rating, Add</i>	627.56	
		<i>For Class 55 Rating, Add</i>	937.98	
		<i>For Class 56 Rating, Add</i>	1,244.27	
40 05 19 00-3315	EA	16" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,299.56	538.03
		<i>For Class 52 Rating, Deduct</i>	-493.28	
		<i>For Class 54 Rating, Add</i>	682.44	
		<i>For Class 55 Rating, Add</i>	1,019.58	
		<i>For Class 56 Rating, Add</i>	1,352.24	
40 05 19 00-3316	EA	16" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,669.18	540.74
		<i>For Class 52 Rating, Deduct</i>	-533.49	
		<i>For Class 54 Rating, Add</i>	737.31	
		<i>For Class 55 Rating, Add</i>	1,101.18	
		<i>For Class 56 Rating, Add</i>	1,460.21	
40 05 19 00-3317	EA	16" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,038.80	543.46
		<i>For Class 52 Rating, Deduct</i>	-573.69	
		<i>For Class 54 Rating, Add</i>	792.19	
		<i>For Class 55 Rating, Add</i>	1,182.79	
		<i>For Class 56 Rating, Add</i>	1,568.18	
40 05 19 00-3318	EA	16" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,408.41	546.19
		<i>For Class 52 Rating, Deduct</i>	-613.90	
		<i>For Class 54 Rating, Add</i>	847.06	
		<i>For Class 55 Rating, Add</i>	1,264.39	
		<i>For Class 56 Rating, Add</i>	1,676.15	
40 05 19 00-3319	EA	16" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,778.02	548.89
		<i>For Class 52 Rating, Deduct</i>	-654.10	
		<i>For Class 54 Rating, Add</i>	901.93	
		<i>For Class 55 Rating, Add</i>	1,346.00	
		<i>For Class 56 Rating, Add</i>	1,784.12	
40 05 19 00-3320	EA	16" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,147.64	551.61
		<i>For Class 52 Rating, Deduct</i>	-694.30	
		<i>For Class 54 Rating, Add</i>	956.81	
		<i>For Class 55 Rating, Add</i>	1,427.60	
		<i>For Class 56 Rating, Add</i>	1,892.09	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3321 EA 16" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,517.26	554.33
<i>For Class 52 Rating, Deduct</i>	-734.51	
<i>For Class 54 Rating, Add</i>	1,011.68	
<i>For Class 55 Rating, Add</i>	1,509.21	
<i>For Class 56 Rating, Add</i>	2,000.06	
40 05 19 00-3322 EA 16" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,886.88	557.05
<i>For Class 52 Rating, Deduct</i>	-774.71	
<i>For Class 54 Rating, Add</i>	1,066.56	
<i>For Class 55 Rating, Add</i>	1,590.81	
<i>For Class 56 Rating, Add</i>	2,108.03	
40 05 19 00-3323 EA 16" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,256.49	559.77
<i>For Class 52 Rating, Deduct</i>	-814.92	
<i>For Class 54 Rating, Add</i>	1,121.43	
<i>For Class 55 Rating, Add</i>	1,672.42	
<i>For Class 56 Rating, Add</i>	2,216.00	
40 05 19 00-3324 EA 16" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,626.10	562.49
<i>For Class 52 Rating, Deduct</i>	-855.12	
<i>For Class 54 Rating, Add</i>	1,176.30	
<i>For Class 55 Rating, Add</i>	1,754.02	
<i>For Class 56 Rating, Add</i>	2,323.97	
40 05 19 00-3325 EA 16" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,995.72	565.20
<i>For Class 52 Rating, Deduct</i>	-895.33	
<i>For Class 54 Rating, Add</i>	1,231.18	
<i>For Class 55 Rating, Add</i>	1,835.63	
<i>For Class 56 Rating, Add</i>	2,431.94	
40 05 19 00-3326 EA 16" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,365.33	567.91
<i>For Class 52 Rating, Deduct</i>	-935.53	
<i>For Class 54 Rating, Add</i>	1,286.05	
<i>For Class 55 Rating, Add</i>	1,917.23	
<i>For Class 56 Rating, Add</i>	2,539.91	
40 05 19 00-3327 EA 16" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,734.95	570.63
<i>For Class 52 Rating, Deduct</i>	-975.74	
<i>For Class 54 Rating, Add</i>	1,340.93	
<i>For Class 55 Rating, Add</i>	1,998.84	
<i>For Class 56 Rating, Add</i>	2,647.88	
40 05 19 00-3328 EA 16" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,104.56	573.36
<i>For Class 52 Rating, Deduct</i>	-1,015.94	
<i>For Class 54 Rating, Add</i>	1,395.80	
<i>For Class 55 Rating, Add</i>	2,080.44	
<i>For Class 56 Rating, Add</i>	2,755.85	
40 05 19 00-3329 EA 16" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,474.17	576.08
<i>For Class 52 Rating, Deduct</i>	-1,056.15	
<i>For Class 54 Rating, Add</i>	1,450.67	
<i>For Class 55 Rating, Add</i>	2,162.05	
<i>For Class 56 Rating, Add</i>	2,863.82	
40 05 19 00-3330 EA 16" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,843.79	578.78
<i>For Class 52 Rating, Deduct</i>	-1,096.35	
<i>For Class 54 Rating, Add</i>	1,505.55	
<i>For Class 55 Rating, Add</i>	2,243.65	
<i>For Class 56 Rating, Add</i>	2,971.79	
40 05 19 00-3331 EA 16" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,213.41	581.50
<i>For Class 52 Rating, Deduct</i>	-1,136.56	
<i>For Class 54 Rating, Add</i>	1,560.42	
<i>For Class 55 Rating, Add</i>	2,325.26	
<i>For Class 56 Rating, Add</i>	3,079.76	
40 05 19 00-3332 EA 16" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,583.01	584.23
<i>For Class 52 Rating, Deduct</i>	-1,176.76	
<i>For Class 54 Rating, Add</i>	1,615.30	
<i>For Class 55 Rating, Add</i>	2,406.86	
<i>For Class 56 Rating, Add</i>	3,187.73	
40 05 19 00-3333 EA 16" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,952.63	586.95
<i>For Class 52 Rating, Deduct</i>	-1,216.97	
<i>For Class 54 Rating, Add</i>	1,670.17	
<i>For Class 55 Rating, Add</i>	2,488.47	
<i>For Class 56 Rating, Add</i>	3,295.70	
40 05 19 00-3334 EA 16" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,322.26	589.66
<i>For Class 52 Rating, Deduct</i>	-1,257.17	
<i>For Class 54 Rating, Add</i>	1,725.05	
<i>For Class 55 Rating, Add</i>	2,570.07	
<i>For Class 56 Rating, Add</i>	3,403.67	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3335	EA	16" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,691.87	592.37
		<i>For Class 52 Rating, Deduct</i>	-1,297.38	
		<i>For Class 54 Rating, Add</i>	1,779.92	
		<i>For Class 55 Rating, Add</i>	2,651.68	
		<i>For Class 56 Rating, Add</i>	3,511.64	
40 05 19 00-3336	EA	16" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,061.48	595.09
		<i>For Class 52 Rating, Deduct</i>	-1,337.58	
		<i>For Class 54 Rating, Add</i>	1,834.79	
		<i>For Class 55 Rating, Add</i>	2,733.28	
		<i>For Class 56 Rating, Add</i>	3,619.61	
40 05 19 00-3337	EA	16" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,431.09	597.81
		<i>For Class 52 Rating, Deduct</i>	-1,377.79	
		<i>For Class 54 Rating, Add</i>	1,889.67	
		<i>For Class 55 Rating, Add</i>	2,814.88	
		<i>For Class 56 Rating, Add</i>	3,727.58	
40 05 19 00-3338	EA	16" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,800.71	600.53
		<i>For Class 52 Rating, Deduct</i>	-1,417.99	
		<i>For Class 54 Rating, Add</i>	1,944.54	
		<i>For Class 55 Rating, Add</i>	2,896.49	
		<i>For Class 56 Rating, Add</i>	3,835.55	
40 05 19 00-3339	EA	16" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,170.33	603.25
		<i>For Class 52 Rating, Deduct</i>	-1,458.20	
		<i>For Class 54 Rating, Add</i>	1,999.42	
		<i>For Class 55 Rating, Add</i>	2,978.10	
		<i>For Class 56 Rating, Add</i>	3,943.52	
40 05 19 00-3340	EA	16" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,539.93	605.96
		<i>For Class 52 Rating, Deduct</i>	-1,498.40	
		<i>For Class 54 Rating, Add</i>	2,054.29	
		<i>For Class 55 Rating, Add</i>	3,059.70	
		<i>For Class 56 Rating, Add</i>	4,051.49	
40 05 19 00-3341	EA	16" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,909.55	608.67
		<i>For Class 52 Rating, Deduct</i>	-1,538.60	
		<i>For Class 54 Rating, Add</i>	2,109.16	
		<i>For Class 55 Rating, Add</i>	3,141.30	
		<i>For Class 56 Rating, Add</i>	4,159.46	
40 05 19 00-3342	EA	16" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,279.17	611.40
		<i>For Class 52 Rating, Deduct</i>	-1,578.81	
		<i>For Class 54 Rating, Add</i>	2,164.04	
		<i>For Class 55 Rating, Add</i>	3,222.91	
		<i>For Class 56 Rating, Add</i>	4,267.43	
40 05 19 00-3343	EA	16" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,648.78	614.12
		<i>For Class 52 Rating, Deduct</i>	-1,619.01	
		<i>For Class 54 Rating, Add</i>	2,218.91	
		<i>For Class 55 Rating, Add</i>	3,304.51	
		<i>For Class 56 Rating, Add</i>	4,375.40	
40 05 19 00-3344	EA	16" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,018.39	616.83
		<i>For Class 52 Rating, Deduct</i>	-1,659.22	
		<i>For Class 54 Rating, Add</i>	2,273.79	
		<i>For Class 55 Rating, Add</i>	3,386.12	
		<i>For Class 56 Rating, Add</i>	4,483.37	
40 05 19 00-3345	EA	16" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,388.01	619.54
		<i>For Class 52 Rating, Deduct</i>	-1,699.42	
		<i>For Class 54 Rating, Add</i>	2,328.66	
		<i>For Class 55 Rating, Add</i>	3,467.72	
		<i>For Class 56 Rating, Add</i>	4,591.34	
40 05 19 00-3346	EA	16" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,757.62	622.26
		<i>For Class 52 Rating, Deduct</i>	-1,739.63	
		<i>For Class 54 Rating, Add</i>	2,383.53	
		<i>For Class 55 Rating, Add</i>	3,549.33	
		<i>For Class 56 Rating, Add</i>	4,699.31	
40 05 19 00-3347		18" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3348	EA	18" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	3,575.95	588.03
		<i>For Class 52 Rating, Deduct</i>	-295.35	
		<i>For Class 54 Rating, Add</i>	413.44	
		<i>For Class 55 Rating, Add</i>	620.14	
		<i>For Class 56 Rating, Add</i>	824.15	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3349 EA 18" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,001.80	590.75
<i>For Class 52 Rating, Deduct</i>	-341.74	
<i>For Class 54 Rating, Add</i>	476.75	
<i>For Class 55 Rating, Add</i>	714.28	
<i>For Class 56 Rating, Add</i>	948.71	
40 05 19 00-3350 EA 18" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,427.65	593.46
<i>For Class 52 Rating, Deduct</i>	-388.13	
<i>For Class 54 Rating, Add</i>	540.06	
<i>For Class 55 Rating, Add</i>	808.43	
<i>For Class 56 Rating, Add</i>	1,073.27	
40 05 19 00-3351 EA 18" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,853.49	596.18
<i>For Class 52 Rating, Deduct</i>	-434.52	
<i>For Class 54 Rating, Add</i>	603.37	
<i>For Class 55 Rating, Add</i>	902.57	
<i>For Class 56 Rating, Add</i>	1,197.82	
40 05 19 00-3352 EA 18" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,279.33	598.90
<i>For Class 52 Rating, Deduct</i>	-480.91	
<i>For Class 54 Rating, Add</i>	666.68	
<i>For Class 55 Rating, Add</i>	996.71	
<i>For Class 56 Rating, Add</i>	1,322.38	
40 05 19 00-3353 EA 18" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,705.18	601.61
<i>For Class 52 Rating, Deduct</i>	-527.30	
<i>For Class 54 Rating, Add</i>	729.98	
<i>For Class 55 Rating, Add</i>	1,090.86	
<i>For Class 56 Rating, Add</i>	1,446.94	
40 05 19 00-3354 EA 18" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,131.02	604.33
<i>For Class 52 Rating, Deduct</i>	-573.69	
<i>For Class 54 Rating, Add</i>	793.29	
<i>For Class 55 Rating, Add</i>	1,185.00	
<i>For Class 56 Rating, Add</i>	1,571.50	
40 05 19 00-3355 EA 18" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,556.87	607.05
<i>For Class 52 Rating, Deduct</i>	-620.08	
<i>For Class 54 Rating, Add</i>	856.60	
<i>For Class 55 Rating, Add</i>	1,279.15	
<i>For Class 56 Rating, Add</i>	1,696.06	
40 05 19 00-3356 EA 18" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,982.72	609.77
<i>For Class 52 Rating, Deduct</i>	-666.47	
<i>For Class 54 Rating, Add</i>	919.91	
<i>For Class 55 Rating, Add</i>	1,373.29	
<i>For Class 56 Rating, Add</i>	1,820.61	
40 05 19 00-3357 EA 18" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,408.56	612.47
<i>For Class 52 Rating, Deduct</i>	-712.86	
<i>For Class 54 Rating, Add</i>	983.22	
<i>For Class 55 Rating, Add</i>	1,467.43	
<i>For Class 56 Rating, Add</i>	1,945.17	
40 05 19 00-3358 EA 18" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,834.41	615.20
<i>For Class 52 Rating, Deduct</i>	-759.25	
<i>For Class 54 Rating, Add</i>	1,046.53	
<i>For Class 55 Rating, Add</i>	1,561.58	
<i>For Class 56 Rating, Add</i>	2,069.73	
40 05 19 00-3359 EA 18" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,260.25	617.92
<i>For Class 52 Rating, Deduct</i>	-805.64	
<i>For Class 54 Rating, Add</i>	1,109.84	
<i>For Class 55 Rating, Add</i>	1,655.72	
<i>For Class 56 Rating, Add</i>	2,194.29	
40 05 19 00-3360 EA 18" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,686.10	620.63
<i>For Class 52 Rating, Deduct</i>	-852.03	
<i>For Class 54 Rating, Add</i>	1,173.15	
<i>For Class 55 Rating, Add</i>	1,749.87	
<i>For Class 56 Rating, Add</i>	2,318.85	
40 05 19 00-3361 EA 18" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,111.95	623.35
<i>For Class 52 Rating, Deduct</i>	-898.42	
<i>For Class 54 Rating, Add</i>	1,236.45	
<i>For Class 55 Rating, Add</i>	1,844.01	
<i>For Class 56 Rating, Add</i>	2,443.40	
40 05 19 00-3362 EA 18" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,537.78	626.08
<i>For Class 52 Rating, Deduct</i>	-944.81	
<i>For Class 54 Rating, Add</i>	1,299.76	
<i>For Class 55 Rating, Add</i>	1,938.16	
<i>For Class 56 Rating, Add</i>	2,567.96	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3363	EA	18" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,963.63		628.79
		<i>For Class 52 Rating, Deduct</i>	-991.20		
		<i>For Class 54 Rating, Add</i>	1,363.07		
		<i>For Class 55 Rating, Add</i>	2,032.30		
		<i>For Class 56 Rating, Add</i>	2,692.52		
40 05 19 00-3364	EA	18" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,389.48		631.50
		<i>For Class 52 Rating, Deduct</i>	-1,037.59		
		<i>For Class 54 Rating, Add</i>	1,426.38		
		<i>For Class 55 Rating, Add</i>	2,126.44		
		<i>For Class 56 Rating, Add</i>	2,817.08		
40 05 19 00-3365	EA	18" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,815.32		634.22
		<i>For Class 52 Rating, Deduct</i>	-1,083.98		
		<i>For Class 54 Rating, Add</i>	1,489.69		
		<i>For Class 55 Rating, Add</i>	2,220.59		
		<i>For Class 56 Rating, Add</i>	2,941.64		
40 05 19 00-3366	EA	18" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,241.17		636.94
		<i>For Class 52 Rating, Deduct</i>	-1,130.37		
		<i>For Class 54 Rating, Add</i>	1,553.00		
		<i>For Class 55 Rating, Add</i>	2,314.73		
		<i>For Class 56 Rating, Add</i>	3,066.19		
40 05 19 00-3367	EA	18" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,667.01		639.66
		<i>For Class 52 Rating, Deduct</i>	-1,176.76		
		<i>For Class 54 Rating, Add</i>	1,616.30		
		<i>For Class 55 Rating, Add</i>	2,408.88		
		<i>For Class 56 Rating, Add</i>	3,190.75		
40 05 19 00-3368	EA	18" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,092.85		642.37
		<i>For Class 52 Rating, Deduct</i>	-1,223.15		
		<i>For Class 54 Rating, Add</i>	1,679.61		
		<i>For Class 55 Rating, Add</i>	2,503.02		
		<i>For Class 56 Rating, Add</i>	3,315.31		
40 05 19 00-3369	EA	18" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,518.70		645.09
		<i>For Class 52 Rating, Deduct</i>	-1,269.54		
		<i>For Class 54 Rating, Add</i>	1,742.92		
		<i>For Class 55 Rating, Add</i>	2,597.17		
		<i>For Class 56 Rating, Add</i>	3,439.87		
40 05 19 00-3370	EA	18" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,944.55		647.81
		<i>For Class 52 Rating, Deduct</i>	-1,315.93		
		<i>For Class 54 Rating, Add</i>	1,806.23		
		<i>For Class 55 Rating, Add</i>	2,691.31		
		<i>For Class 56 Rating, Add</i>	3,564.43		
40 05 19 00-3371	EA	18" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,370.40		650.52
		<i>For Class 52 Rating, Deduct</i>	-1,362.32		
		<i>For Class 54 Rating, Add</i>	1,869.54		
		<i>For Class 55 Rating, Add</i>	2,785.45		
		<i>For Class 56 Rating, Add</i>	3,688.98		
40 05 19 00-3372	EA	18" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,796.24		653.25
		<i>For Class 52 Rating, Deduct</i>	-1,408.71		
		<i>For Class 54 Rating, Add</i>	1,932.85		
		<i>For Class 55 Rating, Add</i>	2,879.60		
		<i>For Class 56 Rating, Add</i>	3,813.54		
40 05 19 00-3373	EA	18" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,222.08		655.96
		<i>For Class 52 Rating, Deduct</i>	-1,455.10		
		<i>For Class 54 Rating, Add</i>	1,996.16		
		<i>For Class 55 Rating, Add</i>	2,973.74		
		<i>For Class 56 Rating, Add</i>	3,938.10		
40 05 19 00-3374	EA	18" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,647.93		658.68
		<i>For Class 52 Rating, Deduct</i>	-1,501.49		
		<i>For Class 54 Rating, Add</i>	2,059.47		
		<i>For Class 55 Rating, Add</i>	3,067.89		
		<i>For Class 56 Rating, Add</i>	4,062.66		
40 05 19 00-3375	EA	18" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,073.78		661.39
		<i>For Class 52 Rating, Deduct</i>	-1,547.88		
		<i>For Class 54 Rating, Add</i>	2,122.77		
		<i>For Class 55 Rating, Add</i>	3,162.03		
		<i>For Class 56 Rating, Add</i>	4,187.22		
40 05 19 00-3376	EA	18" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,499.62		664.11
		<i>For Class 52 Rating, Deduct</i>	-1,594.27		
		<i>For Class 54 Rating, Add</i>	2,186.08		
		<i>For Class 55 Rating, Add</i>	3,256.18		
		<i>For Class 56 Rating, Add</i>	4,311.77		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3377 EA 18" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,925.46	666.84
<i>For Class 52 Rating, Deduct</i>	-1,640.66	
<i>For Class 54 Rating, Add</i>	2,249.39	
<i>For Class 55 Rating, Add</i>	3,350.32	
<i>For Class 56 Rating, Add</i>	4,436.33	
40 05 19 00-3378 EA 18" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,351.31	669.54
<i>For Class 52 Rating, Deduct</i>	-1,687.05	
<i>For Class 54 Rating, Add</i>	2,312.70	
<i>For Class 55 Rating, Add</i>	3,444.46	
<i>For Class 56 Rating, Add</i>	4,560.89	
40 05 19 00-3379 EA 18" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,777.15	672.26
<i>For Class 52 Rating, Deduct</i>	-1,733.44	
<i>For Class 54 Rating, Add</i>	2,376.01	
<i>For Class 55 Rating, Add</i>	3,538.61	
<i>For Class 56 Rating, Add</i>	4,685.45	
40 05 19 00-3380 EA 18" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,203.00	674.98
<i>For Class 52 Rating, Deduct</i>	-1,779.83	
<i>For Class 54 Rating, Add</i>	2,439.32	
<i>For Class 55 Rating, Add</i>	3,632.75	
<i>For Class 56 Rating, Add</i>	4,810.01	
40 05 19 00-3381 EA 18" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,628.85	677.70
<i>For Class 52 Rating, Deduct</i>	-1,826.22	
<i>For Class 54 Rating, Add</i>	2,502.63	
<i>For Class 55 Rating, Add</i>	3,726.90	
<i>For Class 56 Rating, Add</i>	4,934.56	
40 05 19 00-3382 EA 18" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,054.68	680.42
<i>For Class 52 Rating, Deduct</i>	-1,872.61	
<i>For Class 54 Rating, Add</i>	2,565.93	
<i>For Class 55 Rating, Add</i>	3,821.04	
<i>For Class 56 Rating, Add</i>	5,059.12	
40 05 19 00-3383 EA 18" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,480.53	683.13
<i>For Class 52 Rating, Deduct</i>	-1,919.00	
<i>For Class 54 Rating, Add</i>	2,629.24	
<i>For Class 55 Rating, Add</i>	3,915.18	
<i>For Class 56 Rating, Add</i>	5,183.68	
40 05 19 00-3384 EA 18" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,906.38	685.85
<i>For Class 52 Rating, Deduct</i>	-1,965.39	
<i>For Class 54 Rating, Add</i>	2,692.55	
<i>For Class 55 Rating, Add</i>	4,009.33	
<i>For Class 56 Rating, Add</i>	5,308.24	
40 05 19 00-3385 EA 18" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,332.23	688.56
<i>For Class 52 Rating, Deduct</i>	-2,011.78	
<i>For Class 54 Rating, Add</i>	2,755.86	
<i>For Class 55 Rating, Add</i>	4,103.47	
<i>For Class 56 Rating, Add</i>	5,432.80	
40 05 19 00-3386 20" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3387 EA 20" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,165.84	671.18
<i>For Class 52 Rating, Deduct</i>	-346.38	
<i>For Class 54 Rating, Add</i>	484.54	
<i>For Class 55 Rating, Add</i>	726.61	
<i>For Class 56 Rating, Add</i>	965.54	
40 05 19 00-3388 EA 20" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	4,650.72	673.90
<i>For Class 52 Rating, Deduct</i>	-399.26	
<i>For Class 54 Rating, Add</i>	556.70	
<i>For Class 55 Rating, Add</i>	833.92	
<i>For Class 56 Rating, Add</i>	1,107.51	
40 05 19 00-3389 EA 20" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,135.61	676.61
<i>For Class 52 Rating, Deduct</i>	-452.15	
<i>For Class 54 Rating, Add</i>	628.87	
<i>For Class 55 Rating, Add</i>	941.23	
<i>For Class 56 Rating, Add</i>	1,249.49	
40 05 19 00-3390 EA 20" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,620.50	679.33
<i>For Class 52 Rating, Deduct</i>	-505.03	
<i>For Class 54 Rating, Add</i>	701.03	
<i>For Class 55 Rating, Add</i>	1,048.54	
<i>For Class 56 Rating, Add</i>	1,391.46	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3391	EA	20" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,105.38		682.05
		<i>For Class 52 Rating, Deduct</i>	-557.92		
		<i>For Class 54 Rating, Add</i>	773.20		
		<i>For Class 55 Rating, Add</i>	1,155.85		
		<i>For Class 56 Rating, Add</i>	1,533.44		
40 05 19 00-3392	EA	20" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,590.27		684.76
		<i>For Class 52 Rating, Deduct</i>	-610.80		
		<i>For Class 54 Rating, Add</i>	845.36		
		<i>For Class 55 Rating, Add</i>	1,263.16		
		<i>For Class 56 Rating, Add</i>	1,675.41		
40 05 19 00-3393	EA	20" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,075.16		687.48
		<i>For Class 52 Rating, Deduct</i>	-663.69		
		<i>For Class 54 Rating, Add</i>	917.53		
		<i>For Class 55 Rating, Add</i>	1,370.47		
		<i>For Class 56 Rating, Add</i>	1,817.39		
40 05 19 00-3394	EA	20" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,560.04		690.20
		<i>For Class 52 Rating, Deduct</i>	-716.57		
		<i>For Class 54 Rating, Add</i>	989.69		
		<i>For Class 55 Rating, Add</i>	1,477.78		
		<i>For Class 56 Rating, Add</i>	1,959.36		
40 05 19 00-3395	EA	20" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,044.93		692.92
		<i>For Class 52 Rating, Deduct</i>	-769.46		
		<i>For Class 54 Rating, Add</i>	1,061.86		
		<i>For Class 55 Rating, Add</i>	1,585.10		
		<i>For Class 56 Rating, Add</i>	2,101.34		
40 05 19 00-3396	EA	20" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,529.82		695.63
		<i>For Class 52 Rating, Deduct</i>	-822.34		
		<i>For Class 54 Rating, Add</i>	1,134.02		
		<i>For Class 55 Rating, Add</i>	1,692.41		
		<i>For Class 56 Rating, Add</i>	2,243.31		
40 05 19 00-3397	EA	20" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,014.70		698.35
		<i>For Class 52 Rating, Deduct</i>	-875.23		
		<i>For Class 54 Rating, Add</i>	1,206.19		
		<i>For Class 55 Rating, Add</i>	1,799.72		
		<i>For Class 56 Rating, Add</i>	2,385.29		
40 05 19 00-3398	EA	20" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,499.59		701.07
		<i>For Class 52 Rating, Deduct</i>	-928.11		
		<i>For Class 54 Rating, Add</i>	1,278.35		
		<i>For Class 55 Rating, Add</i>	1,907.03		
		<i>For Class 56 Rating, Add</i>	2,527.26		
40 05 19 00-3399	EA	20" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,984.48		703.78
		<i>For Class 52 Rating, Deduct</i>	-981.00		
		<i>For Class 54 Rating, Add</i>	1,350.52		
		<i>For Class 55 Rating, Add</i>	2,014.34		
		<i>For Class 56 Rating, Add</i>	2,669.24		
40 05 19 00-3400	EA	20" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,469.37		706.50
		<i>For Class 52 Rating, Deduct</i>	-1,033.88		
		<i>For Class 54 Rating, Add</i>	1,422.68		
		<i>For Class 55 Rating, Add</i>	2,121.65		
		<i>For Class 56 Rating, Add</i>	2,811.22		
40 05 19 00-3401	EA	20" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,954.26		709.22
		<i>For Class 52 Rating, Deduct</i>	-1,086.76		
		<i>For Class 54 Rating, Add</i>	1,494.85		
		<i>For Class 55 Rating, Add</i>	2,228.96		
		<i>For Class 56 Rating, Add</i>	2,953.19		
40 05 19 00-3402	EA	20" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,439.14		711.94
		<i>For Class 52 Rating, Deduct</i>	-1,139.65		
		<i>For Class 54 Rating, Add</i>	1,567.01		
		<i>For Class 55 Rating, Add</i>	2,336.27		
		<i>For Class 56 Rating, Add</i>	3,095.17		
40 05 19 00-3403	EA	20" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,924.03		714.65
		<i>For Class 52 Rating, Deduct</i>	-1,192.53		
		<i>For Class 54 Rating, Add</i>	1,639.18		
		<i>For Class 55 Rating, Add</i>	2,443.58		
		<i>For Class 56 Rating, Add</i>	3,237.14		
40 05 19 00-3404	EA	20" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,408.92		717.37
		<i>For Class 52 Rating, Deduct</i>	-1,245.42		
		<i>For Class 54 Rating, Add</i>	1,711.34		
		<i>For Class 55 Rating, Add</i>	2,550.89		
		<i>For Class 56 Rating, Add</i>	3,379.12		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3405 EA 20" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	12,893.80	720.09
<i>For Class 52 Rating, Deduct</i>	-1,298.30	
<i>For Class 54 Rating, Add</i>	1,783.51	
<i>For Class 55 Rating, Add</i>	2,658.20	
<i>For Class 56 Rating, Add</i>	3,521.09	
40 05 19 00-3406 EA 20" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	13,378.69	722.81
<i>For Class 52 Rating, Deduct</i>	-1,351.19	
<i>For Class 54 Rating, Add</i>	1,855.67	
<i>For Class 55 Rating, Add</i>	2,765.51	
<i>For Class 56 Rating, Add</i>	3,663.07	
40 05 19 00-3407 EA 20" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	13,863.58	725.52
<i>For Class 52 Rating, Deduct</i>	-1,404.07	
<i>For Class 54 Rating, Add</i>	1,927.84	
<i>For Class 55 Rating, Add</i>	2,872.82	
<i>For Class 56 Rating, Add</i>	3,805.04	
40 05 19 00-3408 EA 20" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	14,348.46	728.25
<i>For Class 52 Rating, Deduct</i>	-1,456.96	
<i>For Class 54 Rating, Add</i>	2,000.00	
<i>For Class 55 Rating, Add</i>	2,980.13	
<i>For Class 56 Rating, Add</i>	3,947.02	
40 05 19 00-3409 EA 20" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	14,833.35	730.96
<i>For Class 52 Rating, Deduct</i>	-1,509.84	
<i>For Class 54 Rating, Add</i>	2,072.17	
<i>For Class 55 Rating, Add</i>	3,087.44	
<i>For Class 56 Rating, Add</i>	4,088.99	
40 05 19 00-3410 EA 20" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	15,318.24	733.67
<i>For Class 52 Rating, Deduct</i>	-1,562.73	
<i>For Class 54 Rating, Add</i>	2,144.33	
<i>For Class 55 Rating, Add</i>	3,194.75	
<i>For Class 56 Rating, Add</i>	4,230.97	
40 05 19 00-3411 EA 20" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	15,803.12	736.39
<i>For Class 52 Rating, Deduct</i>	-1,615.61	
<i>For Class 54 Rating, Add</i>	2,216.50	
<i>For Class 55 Rating, Add</i>	3,302.06	
<i>For Class 56 Rating, Add</i>	4,372.94	
40 05 19 00-3412 EA 20" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	16,288.01	739.11
<i>For Class 52 Rating, Deduct</i>	-1,668.50	
<i>For Class 54 Rating, Add</i>	2,288.66	
<i>For Class 55 Rating, Add</i>	3,409.37	
<i>For Class 56 Rating, Add</i>	4,514.92	
40 05 19 00-3413 EA 20" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	16,772.91	741.84
<i>For Class 52 Rating, Deduct</i>	-1,721.38	
<i>For Class 54 Rating, Add</i>	2,360.83	
<i>For Class 55 Rating, Add</i>	3,516.68	
<i>For Class 56 Rating, Add</i>	4,656.90	
40 05 19 00-3414 EA 20" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	17,257.79	744.54
<i>For Class 52 Rating, Deduct</i>	-1,774.27	
<i>For Class 54 Rating, Add</i>	2,432.99	
<i>For Class 55 Rating, Add</i>	3,624.00	
<i>For Class 56 Rating, Add</i>	4,798.87	
40 05 19 00-3415 EA 20" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	17,742.68	747.26
<i>For Class 52 Rating, Deduct</i>	-1,827.15	
<i>For Class 54 Rating, Add</i>	2,505.16	
<i>For Class 55 Rating, Add</i>	3,731.31	
<i>For Class 56 Rating, Add</i>	4,940.85	
40 05 19 00-3416 EA 20" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	18,227.57	749.98
<i>For Class 52 Rating, Deduct</i>	-1,880.04	
<i>For Class 54 Rating, Add</i>	2,577.32	
<i>For Class 55 Rating, Add</i>	3,838.62	
<i>For Class 56 Rating, Add</i>	5,082.82	
40 05 19 00-3417 EA 20" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	18,712.45	752.69
<i>For Class 52 Rating, Deduct</i>	-1,932.92	
<i>For Class 54 Rating, Add</i>	2,649.49	
<i>For Class 55 Rating, Add</i>	3,945.93	
<i>For Class 56 Rating, Add</i>	5,224.80	
40 05 19 00-3418 EA 20" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal		
Coat, Ductile Iron Pipe.....	19,197.34	755.42
<i>For Class 52 Rating, Deduct</i>	-1,985.80	
<i>For Class 54 Rating, Add</i>	2,721.65	
<i>For Class 55 Rating, Add</i>	4,053.24	
<i>For Class 56 Rating, Add</i>	5,366.77	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3419	EA	20" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,682.22	758.13
		<i>For Class 52 Rating, Deduct</i>	-2,038.69	
		<i>For Class 54 Rating, Add</i>	2,793.82	
		<i>For Class 55 Rating, Add</i>	4,160.55	
		<i>For Class 56 Rating, Add</i>	5,508.75	
40 05 19 00-3420	EA	20" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,167.11	760.85
		<i>For Class 52 Rating, Deduct</i>	-2,091.57	
		<i>For Class 54 Rating, Add</i>	2,865.98	
		<i>For Class 55 Rating, Add</i>	4,267.86	
		<i>For Class 56 Rating, Add</i>	5,650.72	
40 05 19 00-3421	EA	20" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,652.00	763.56
		<i>For Class 52 Rating, Deduct</i>	-2,144.46	
		<i>For Class 54 Rating, Add</i>	2,938.15	
		<i>For Class 55 Rating, Add</i>	4,375.17	
		<i>For Class 56 Rating, Add</i>	5,792.70	
40 05 19 00-3422	EA	20" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,136.88	766.28
		<i>For Class 52 Rating, Deduct</i>	-2,197.34	
		<i>For Class 54 Rating, Add</i>	3,010.31	
		<i>For Class 55 Rating, Add</i>	4,482.48	
		<i>For Class 56 Rating, Add</i>	5,934.67	
40 05 19 00-3423	EA	20" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,621.77	769.01
		<i>For Class 52 Rating, Deduct</i>	-2,250.23	
		<i>For Class 54 Rating, Add</i>	3,082.47	
		<i>For Class 55 Rating, Add</i>	4,589.79	
		<i>For Class 56 Rating, Add</i>	6,076.65	
40 05 19 00-3424	EA	20" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,106.66	771.71
		<i>For Class 52 Rating, Deduct</i>	-2,303.11	
		<i>For Class 54 Rating, Add</i>	3,154.64	
		<i>For Class 55 Rating, Add</i>	4,697.10	
		<i>For Class 56 Rating, Add</i>	6,218.62	
40 05 19 00-3425		24" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3426	EA	24" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,132.71	793.45
		<i>For Class 52 Rating, Deduct</i>	-432.36	
		<i>For Class 54 Rating, Add</i>	604.00	
		<i>For Class 55 Rating, Add</i>	905.35	
		<i>For Class 56 Rating, Add</i>	1,202.78	
40 05 19 00-3427	EA	24" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	5,732.87	796.18
		<i>For Class 52 Rating, Deduct</i>	-497.92	
		<i>For Class 54 Rating, Add</i>	693.46	
		<i>For Class 55 Rating, Add</i>	1,038.37	
		<i>For Class 56 Rating, Add</i>	1,378.76	
40 05 19 00-3428	EA	24" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,333.03	798.90
		<i>For Class 52 Rating, Deduct</i>	-563.48	
		<i>For Class 54 Rating, Add</i>	782.91	
		<i>For Class 55 Rating, Add</i>	1,171.39	
		<i>For Class 56 Rating, Add</i>	1,554.74	
40 05 19 00-3429	EA	24" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	6,933.19	801.60
		<i>For Class 52 Rating, Deduct</i>	-629.05	
		<i>For Class 54 Rating, Add</i>	872.37	
		<i>For Class 55 Rating, Add</i>	1,304.40	
		<i>For Class 56 Rating, Add</i>	1,730.72	
40 05 19 00-3430	EA	24" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	7,533.34	804.32
		<i>For Class 52 Rating, Deduct</i>	-694.61	
		<i>For Class 54 Rating, Add</i>	961.82	
		<i>For Class 55 Rating, Add</i>	1,437.42	
		<i>For Class 56 Rating, Add</i>	1,906.70	
40 05 19 00-3431	EA	24" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,133.51	807.05
		<i>For Class 52 Rating, Deduct</i>	-760.18	
		<i>For Class 54 Rating, Add</i>	1,051.28	
		<i>For Class 55 Rating, Add</i>	1,570.44	
		<i>For Class 56 Rating, Add</i>	2,082.68	
40 05 19 00-3432	EA	24" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,733.67	809.77
		<i>For Class 52 Rating, Deduct</i>	-825.74	
		<i>For Class 54 Rating, Add</i>	1,140.74	
		<i>For Class 55 Rating, Add</i>	1,703.45	
		<i>For Class 56 Rating, Add</i>	2,258.66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3433 EA 24" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,333.82	812.47
<i>For Class 52 Rating, Deduct</i>	-891.31	
<i>For Class 54 Rating, Add</i>	1,230.19	
<i>For Class 55 Rating, Add</i>	1,836.47	
<i>For Class 56 Rating, Add</i>	2,434.64	
40 05 19 00-3434 EA 24" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,933.98	815.19
<i>For Class 52 Rating, Deduct</i>	-956.87	
<i>For Class 54 Rating, Add</i>	1,319.65	
<i>For Class 55 Rating, Add</i>	1,969.48	
<i>For Class 56 Rating, Add</i>	2,610.62	
40 05 19 00-3435 EA 24" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,534.16	817.91
<i>For Class 52 Rating, Deduct</i>	-1,022.44	
<i>For Class 54 Rating, Add</i>	1,409.10	
<i>For Class 55 Rating, Add</i>	2,102.50	
<i>For Class 56 Rating, Add</i>	2,786.61	
40 05 19 00-3436 EA 24" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,134.31	820.63
<i>For Class 52 Rating, Deduct</i>	-1,088.00	
<i>For Class 54 Rating, Add</i>	1,498.56	
<i>For Class 55 Rating, Add</i>	2,235.52	
<i>For Class 56 Rating, Add</i>	2,962.59	
40 05 19 00-3437 EA 24" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,734.47	823.35
<i>For Class 52 Rating, Deduct</i>	-1,153.57	
<i>For Class 54 Rating, Add</i>	1,588.02	
<i>For Class 55 Rating, Add</i>	2,368.53	
<i>For Class 56 Rating, Add</i>	3,138.57	
40 05 19 00-3438 EA 24" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,334.63	826.07
<i>For Class 52 Rating, Deduct</i>	-1,219.13	
<i>For Class 54 Rating, Add</i>	1,677.47	
<i>For Class 55 Rating, Add</i>	2,501.55	
<i>For Class 56 Rating, Add</i>	3,314.55	
40 05 19 00-3439 EA 24" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,934.78	828.78
<i>For Class 52 Rating, Deduct</i>	-1,284.70	
<i>For Class 54 Rating, Add</i>	1,766.93	
<i>For Class 55 Rating, Add</i>	2,634.57	
<i>For Class 56 Rating, Add</i>	3,490.53	
40 05 19 00-3440 EA 24" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,534.95	831.49
<i>For Class 52 Rating, Deduct</i>	-1,350.26	
<i>For Class 54 Rating, Add</i>	1,856.38	
<i>For Class 55 Rating, Add</i>	2,767.58	
<i>For Class 56 Rating, Add</i>	3,666.51	
40 05 19 00-3441 EA 24" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,135.10	834.22
<i>For Class 52 Rating, Deduct</i>	-1,415.83	
<i>For Class 54 Rating, Add</i>	1,945.84	
<i>For Class 55 Rating, Add</i>	2,900.60	
<i>For Class 56 Rating, Add</i>	3,842.49	
40 05 19 00-3442 EA 24" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,735.26	836.94
<i>For Class 52 Rating, Deduct</i>	-1,481.39	
<i>For Class 54 Rating, Add</i>	2,035.29	
<i>For Class 55 Rating, Add</i>	3,033.62	
<i>For Class 56 Rating, Add</i>	4,018.47	
40 05 19 00-3443 EA 24" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,335.42	839.65
<i>For Class 52 Rating, Deduct</i>	-1,546.95	
<i>For Class 54 Rating, Add</i>	2,124.75	
<i>For Class 55 Rating, Add</i>	3,166.63	
<i>For Class 56 Rating, Add</i>	4,194.45	
40 05 19 00-3444 EA 24" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,935.58	842.36
<i>For Class 52 Rating, Deduct</i>	-1,612.52	
<i>For Class 54 Rating, Add</i>	2,214.21	
<i>For Class 55 Rating, Add</i>	3,299.65	
<i>For Class 56 Rating, Add</i>	4,370.43	
40 05 19 00-3445 EA 24" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,535.74	845.08
<i>For Class 52 Rating, Deduct</i>	-1,678.08	
<i>For Class 54 Rating, Add</i>	2,303.66	
<i>For Class 55 Rating, Add</i>	3,432.66	
<i>For Class 56 Rating, Add</i>	4,546.41	
40 05 19 00-3446 EA 24" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,135.90	847.81
<i>For Class 52 Rating, Deduct</i>	-1,743.65	
<i>For Class 54 Rating, Add</i>	2,393.12	
<i>For Class 55 Rating, Add</i>	3,565.68	
<i>For Class 56 Rating, Add</i>	4,722.39	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3447	EA	24" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,736.05		850.52
		<i>For Class 52 Rating, Deduct</i>	-1,809.21		
		<i>For Class 54 Rating, Add</i>	2,482.57		
		<i>For Class 55 Rating, Add</i>	3,698.70		
		<i>For Class 56 Rating, Add</i>	4,898.37		
40 05 19 00-3448	EA	24" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,336.21		853.24
		<i>For Class 52 Rating, Deduct</i>	-1,874.78		
		<i>For Class 54 Rating, Add</i>	2,572.03		
		<i>For Class 55 Rating, Add</i>	3,831.71		
		<i>For Class 56 Rating, Add</i>	5,074.35		
40 05 19 00-3449	EA	24" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,936.38		855.95
		<i>For Class 52 Rating, Deduct</i>	-1,940.34		
		<i>For Class 54 Rating, Add</i>	2,661.48		
		<i>For Class 55 Rating, Add</i>	3,964.73		
		<i>For Class 56 Rating, Add</i>	5,250.34		
40 05 19 00-3450	EA	24" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,536.54		858.67
		<i>For Class 52 Rating, Deduct</i>	-2,005.91		
		<i>For Class 54 Rating, Add</i>	2,750.94		
		<i>For Class 55 Rating, Add</i>	4,097.75		
		<i>For Class 56 Rating, Add</i>	5,426.32		
40 05 19 00-3451	EA	24" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,136.70		861.39
		<i>For Class 52 Rating, Deduct</i>	-2,071.47		
		<i>For Class 54 Rating, Add</i>	2,840.40		
		<i>For Class 55 Rating, Add</i>	4,230.76		
		<i>For Class 56 Rating, Add</i>	5,602.30		
40 05 19 00-3452	EA	24" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,736.86		864.11
		<i>For Class 52 Rating, Deduct</i>	-2,137.04		
		<i>For Class 54 Rating, Add</i>	2,929.85		
		<i>For Class 55 Rating, Add</i>	4,363.78		
		<i>For Class 56 Rating, Add</i>	5,778.28		
40 05 19 00-3453	EA	24" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,337.02		866.83
		<i>For Class 52 Rating, Deduct</i>	-2,202.60		
		<i>For Class 54 Rating, Add</i>	3,019.31		
		<i>For Class 55 Rating, Add</i>	4,496.79		
		<i>For Class 56 Rating, Add</i>	5,954.26		
40 05 19 00-3454	EA	24" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,937.18		869.53
		<i>For Class 52 Rating, Deduct</i>	-2,268.17		
		<i>For Class 54 Rating, Add</i>	3,108.76		
		<i>For Class 55 Rating, Add</i>	4,629.81		
		<i>For Class 56 Rating, Add</i>	6,130.24		
40 05 19 00-3455	EA	24" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,607.32		918.45
		<i>For Class 52 Rating, Deduct</i>	-2,333.73		
		<i>For Class 54 Rating, Add</i>	3,199.06		
		<i>For Class 55 Rating, Add</i>	4,764.51		
		<i>For Class 56 Rating, Add</i>	6,308.74		
40 05 19 00-3456	EA	24" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,207.48		921.17
		<i>For Class 52 Rating, Deduct</i>	-2,399.29		
		<i>For Class 54 Rating, Add</i>	3,288.51		
		<i>For Class 55 Rating, Add</i>	4,897.52		
		<i>For Class 56 Rating, Add</i>	6,484.72		
40 05 19 00-3457	EA	24" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,807.64		923.89
		<i>For Class 52 Rating, Deduct</i>	-2,464.86		
		<i>For Class 54 Rating, Add</i>	3,377.97		
		<i>For Class 55 Rating, Add</i>	5,030.54		
		<i>For Class 56 Rating, Add</i>	6,660.70		
40 05 19 00-3458	EA	24" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	24,407.80		926.61
		<i>For Class 52 Rating, Deduct</i>	-2,530.42		
		<i>For Class 54 Rating, Add</i>	3,467.43		
		<i>For Class 55 Rating, Add</i>	5,163.56		
		<i>For Class 56 Rating, Add</i>	6,836.68		
40 05 19 00-3459	EA	24" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	25,007.96		929.32
		<i>For Class 52 Rating, Deduct</i>	-2,595.99		
		<i>For Class 54 Rating, Add</i>	3,556.88		
		<i>For Class 55 Rating, Add</i>	5,296.57		
		<i>For Class 56 Rating, Add</i>	7,012.66		
40 05 19 00-3460	EA	24" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	28,419.64		932.04
		<i>For Class 52 Rating, Deduct</i>	-2,970.82		
		<i>For Class 54 Rating, Add</i>	4,068.07		
		<i>For Class 55 Rating, Add</i>	6,056.56		
		<i>For Class 56 Rating, Add</i>	8,018.04		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3461 EA 24" Flanged x Plain End (FxPE), 18'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,208.28	934.76
<i>For Class 52 Rating, Deduct</i>	-2,727.12	
<i>For Class 54 Rating, Add</i>	3,735.79	
<i>For Class 55 Rating, Add</i>	5,562.60	
<i>For Class 56 Rating, Add</i>	7,364.62	
40 05 19 00-3462 EA 24" Flanged x Plain End (FxPE), 19'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,808.45	937.46
<i>For Class 52 Rating, Deduct</i>	-2,792.68	
<i>For Class 54 Rating, Add</i>	3,825.25	
<i>For Class 55 Rating, Add</i>	5,695.62	
<i>For Class 56 Rating, Add</i>	7,540.60	
40 05 19 00-3463 EA 24" Flanged x Plain End (FxPE), 19'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	27,408.61	940.19
<i>For Class 52 Rating, Deduct</i>	-2,858.25	
<i>For Class 54 Rating, Add</i>	3,914.70	
<i>For Class 55 Rating, Add</i>	5,828.64	
<i>For Class 56 Rating, Add</i>	7,716.58	
40 05 19 00-3464 30" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3465 EA 30" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	8,708.19	1,119.53
<i>For Class 52 Rating, Deduct</i>	-771.31	
<i>For Class 54 Rating, Add</i>	1,072.14	
<i>For Class 55 Rating, Add</i>	1,604.37	
<i>For Class 56 Rating, Add</i>	2,129.58	
40 05 19 00-3466 EA 30" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	9,567.02	1,122.25
<i>For Class 52 Rating, Deduct</i>	-865.33	
<i>For Class 54 Rating, Add</i>	1,200.40	
<i>For Class 55 Rating, Add</i>	1,795.07	
<i>For Class 56 Rating, Add</i>	2,381.87	
40 05 19 00-3467 EA 30" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,425.84	1,124.97
<i>For Class 52 Rating, Deduct</i>	-959.35	
<i>For Class 54 Rating, Add</i>	1,328.66	
<i>For Class 55 Rating, Add</i>	1,985.77	
<i>For Class 56 Rating, Add</i>	2,634.16	
40 05 19 00-3468 EA 30" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	11,284.66	1,127.69
<i>For Class 52 Rating, Deduct</i>	-1,053.36	
<i>For Class 54 Rating, Add</i>	1,456.91	
<i>For Class 55 Rating, Add</i>	2,176.46	
<i>For Class 56 Rating, Add</i>	2,886.44	
40 05 19 00-3469 EA 30" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,143.48	1,130.41
<i>For Class 52 Rating, Deduct</i>	-1,147.38	
<i>For Class 54 Rating, Add</i>	1,585.16	
<i>For Class 55 Rating, Add</i>	2,367.16	
<i>For Class 56 Rating, Add</i>	3,138.73	
40 05 19 00-3470 EA 30" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,002.29	1,133.11
<i>For Class 52 Rating, Deduct</i>	-1,241.40	
<i>For Class 54 Rating, Add</i>	1,713.42	
<i>For Class 55 Rating, Add</i>	2,557.86	
<i>For Class 56 Rating, Add</i>	3,391.01	
40 05 19 00-3471 EA 30" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,861.11	1,135.84
<i>For Class 52 Rating, Deduct</i>	-1,335.42	
<i>For Class 54 Rating, Add</i>	1,841.67	
<i>For Class 55 Rating, Add</i>	2,748.55	
<i>For Class 56 Rating, Add</i>	3,643.30	
40 05 19 00-3472 EA 30" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,719.93	1,138.56
<i>For Class 52 Rating, Deduct</i>	-1,429.43	
<i>For Class 54 Rating, Add</i>	1,969.93	
<i>For Class 55 Rating, Add</i>	2,939.25	
<i>For Class 56 Rating, Add</i>	3,895.58	
40 05 19 00-3473 EA 30" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,578.75	1,141.27
<i>For Class 52 Rating, Deduct</i>	-1,523.45	
<i>For Class 54 Rating, Add</i>	2,098.18	
<i>For Class 55 Rating, Add</i>	3,129.95	
<i>For Class 56 Rating, Add</i>	4,147.87	
40 05 19 00-3474 EA 30" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,437.57	1,143.99
<i>For Class 52 Rating, Deduct</i>	-1,617.47	
<i>For Class 54 Rating, Add</i>	2,226.44	
<i>For Class 55 Rating, Add</i>	3,320.65	
<i>For Class 56 Rating, Add</i>	4,400.15	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3475	EA	30" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,296.38		1,146.71
		<i>For Class 52 Rating, Deduct</i>	-1,711.48		
		<i>For Class 54 Rating, Add</i>	2,354.69		
		<i>For Class 55 Rating, Add</i>	3,511.34		
		<i>For Class 56 Rating, Add</i>	4,652.44		
40 05 19 00-3476	EA	30" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,155.20		1,149.43
		<i>For Class 52 Rating, Deduct</i>	-1,805.50		
		<i>For Class 54 Rating, Add</i>	2,482.95		
		<i>For Class 55 Rating, Add</i>	3,702.04		
		<i>For Class 56 Rating, Add</i>	4,904.72		
40 05 19 00-3477	EA	30" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,014.03		1,152.14
		<i>For Class 52 Rating, Deduct</i>	-1,899.52		
		<i>For Class 54 Rating, Add</i>	2,611.20		
		<i>For Class 55 Rating, Add</i>	3,892.74		
		<i>For Class 56 Rating, Add</i>	5,157.01		
40 05 19 00-3478	EA	30" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,872.84		1,154.86
		<i>For Class 52 Rating, Deduct</i>	-1,993.54		
		<i>For Class 54 Rating, Add</i>	2,739.46		
		<i>For Class 55 Rating, Add</i>	4,083.44		
		<i>For Class 56 Rating, Add</i>	5,409.29		
40 05 19 00-3479	EA	30" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,731.66		1,157.58
		<i>For Class 52 Rating, Deduct</i>	-2,087.55		
		<i>For Class 54 Rating, Add</i>	2,867.71		
		<i>For Class 55 Rating, Add</i>	4,274.13		
		<i>For Class 56 Rating, Add</i>	5,661.58		
40 05 19 00-3480	EA	30" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,590.48		1,160.28
		<i>For Class 52 Rating, Deduct</i>	-2,181.57		
		<i>For Class 54 Rating, Add</i>	2,995.97		
		<i>For Class 55 Rating, Add</i>	4,464.83		
		<i>For Class 56 Rating, Add</i>	5,913.86		
40 05 19 00-3481	EA	30" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,449.30		1,163.01
		<i>For Class 52 Rating, Deduct</i>	-2,275.59		
		<i>For Class 54 Rating, Add</i>	3,124.22		
		<i>For Class 55 Rating, Add</i>	4,655.53		
		<i>For Class 56 Rating, Add</i>	6,166.15		
40 05 19 00-3482	EA	30" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,308.13		1,165.73
		<i>For Class 52 Rating, Deduct</i>	-2,369.61		
		<i>For Class 54 Rating, Add</i>	3,252.48		
		<i>For Class 55 Rating, Add</i>	4,846.23		
		<i>For Class 56 Rating, Add</i>	6,418.44		
40 05 19 00-3483	EA	30" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	24,166.95		1,168.45
		<i>For Class 52 Rating, Deduct</i>	-2,463.62		
		<i>For Class 54 Rating, Add</i>	3,380.73		
		<i>For Class 55 Rating, Add</i>	5,036.92		
		<i>For Class 56 Rating, Add</i>	6,670.72		
40 05 19 00-3484	EA	30" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	25,025.76		1,171.16
		<i>For Class 52 Rating, Deduct</i>	-2,557.64		
		<i>For Class 54 Rating, Add</i>	3,508.98		
		<i>For Class 55 Rating, Add</i>	5,227.62		
		<i>For Class 56 Rating, Add</i>	6,923.01		
40 05 19 00-3485	EA	30" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	25,884.58		1,173.88
		<i>For Class 52 Rating, Deduct</i>	-2,651.66		
		<i>For Class 54 Rating, Add</i>	3,637.24		
		<i>For Class 55 Rating, Add</i>	5,418.32		
		<i>For Class 56 Rating, Add</i>	7,175.29		
40 05 19 00-3486	EA	30" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,743.39		1,176.60
		<i>For Class 52 Rating, Deduct</i>	-2,745.67		
		<i>For Class 54 Rating, Add</i>	3,765.49		
		<i>For Class 55 Rating, Add</i>	5,609.01		
		<i>For Class 56 Rating, Add</i>	7,427.58		
40 05 19 00-3487	EA	30" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	27,602.22		1,179.31
		<i>For Class 52 Rating, Deduct</i>	-2,839.69		
		<i>For Class 54 Rating, Add</i>	3,893.75		
		<i>For Class 55 Rating, Add</i>	5,799.71		
		<i>For Class 56 Rating, Add</i>	7,679.86		
40 05 19 00-3488	EA	30" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	28,461.04		1,182.03
		<i>For Class 52 Rating, Deduct</i>	-2,933.71		
		<i>For Class 54 Rating, Add</i>	4,022.00		
		<i>For Class 55 Rating, Add</i>	5,990.41		
		<i>For Class 56 Rating, Add</i>	7,932.15		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3489 EA 30" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	29,319.85	1,184.75
<i>For Class 52 Rating, Deduct</i>	-3,027.73	
<i>For Class 54 Rating, Add</i>	4,150.26	
<i>For Class 55 Rating, Add</i>	6,181.11	
<i>For Class 56 Rating, Add</i>	8,184.43	
40 05 19 00-3490 EA 30" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	30,178.67	1,187.48
<i>For Class 52 Rating, Deduct</i>	-3,121.74	
<i>For Class 54 Rating, Add</i>	4,278.51	
<i>For Class 55 Rating, Add</i>	6,371.80	
<i>For Class 56 Rating, Add</i>	8,436.72	
40 05 19 00-3491 EA 30" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	31,037.49	1,190.18
<i>For Class 52 Rating, Deduct</i>	-3,215.76	
<i>For Class 54 Rating, Add</i>	4,406.77	
<i>For Class 55 Rating, Add</i>	6,562.50	
<i>For Class 56 Rating, Add</i>	8,689.00	
40 05 19 00-3492 EA 30" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	31,896.31	1,192.90
<i>For Class 52 Rating, Deduct</i>	-3,309.78	
<i>For Class 54 Rating, Add</i>	4,535.02	
<i>For Class 55 Rating, Add</i>	6,753.20	
<i>For Class 56 Rating, Add</i>	8,941.29	
40 05 19 00-3493 EA 30" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	32,755.13	1,195.62
<i>For Class 52 Rating, Deduct</i>	-3,403.79	
<i>For Class 54 Rating, Add</i>	4,663.28	
<i>For Class 55 Rating, Add</i>	6,943.90	
<i>For Class 56 Rating, Add</i>	9,193.57	
40 05 19 00-3494 EA 30" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	33,613.96	1,198.34
<i>For Class 52 Rating, Deduct</i>	-3,497.81	
<i>For Class 54 Rating, Add</i>	4,791.53	
<i>For Class 55 Rating, Add</i>	7,134.59	
<i>For Class 56 Rating, Add</i>	9,445.86	
40 05 19 00-3495 EA 30" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	34,472.77	1,201.06
<i>For Class 52 Rating, Deduct</i>	-3,591.83	
<i>For Class 54 Rating, Add</i>	4,919.79	
<i>For Class 55 Rating, Add</i>	7,325.29	
<i>For Class 56 Rating, Add</i>	9,698.14	
40 05 19 00-3496 EA 30" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	35,331.60	1,203.77
<i>For Class 52 Rating, Deduct</i>	-3,685.85	
<i>For Class 54 Rating, Add</i>	5,048.04	
<i>For Class 55 Rating, Add</i>	7,515.99	
<i>For Class 56 Rating, Add</i>	9,950.43	
40 05 19 00-3497 EA 30" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	36,190.42	1,206.49
<i>For Class 52 Rating, Deduct</i>	-3,779.86	
<i>For Class 54 Rating, Add</i>	5,176.30	
<i>For Class 55 Rating, Add</i>	7,706.69	
<i>For Class 56 Rating, Add</i>	10,202.72	
40 05 19 00-3498 EA 30" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	37,049.23	1,209.20
<i>For Class 52 Rating, Deduct</i>	-3,873.88	
<i>For Class 54 Rating, Add</i>	5,304.55	
<i>For Class 55 Rating, Add</i>	7,897.38	
<i>For Class 56 Rating, Add</i>	10,455.00	
40 05 19 00-3499 EA 30" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	37,908.05	1,211.92
<i>For Class 52 Rating, Deduct</i>	-3,967.90	
<i>For Class 54 Rating, Add</i>	5,432.81	
<i>For Class 55 Rating, Add</i>	8,088.08	
<i>For Class 56 Rating, Add</i>	10,707.29	
40 05 19 00-3500 36" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe <small>(40 05 19 00-3068)</small>		
40 05 19 00-3501 EA 36" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	10,881.73	1,418.44
<i>For Class 52 Rating, Deduct</i>	-960.58	
<i>For Class 54 Rating, Add</i>	1,335.68	
<i>For Class 55 Rating, Add</i>	1,998.94	
<i>For Class 56 Rating, Add</i>	2,653.48	
40 05 19 00-3502 EA 36" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	12,032.94	1,421.16
<i>For Class 52 Rating, Deduct</i>	-1,086.76	
<i>For Class 54 Rating, Add</i>	1,507.79	
<i>For Class 55 Rating, Add</i>	2,254.85	
<i>For Class 56 Rating, Add</i>	2,992.02	

40 Process Interconnections

40 05 Common Work Results For Process Interconnections

40 05 19 Ductile Iron Process Pipe



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION		UNIT COST	UNIT COST
40 05 19 00-3503	EA	36" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	13,184.16		1,423.88
		<i>For Class 52 Rating, Deduct</i>	-1,212.95		
		<i>For Class 54 Rating, Add</i>	1,679.91		
		<i>For Class 55 Rating, Add</i>	2,510.75		
		<i>For Class 56 Rating, Add</i>	3,330.57		
40 05 19 00-3504	EA	36" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,335.39		1,426.59
		<i>For Class 52 Rating, Deduct</i>	-1,339.13		
		<i>For Class 54 Rating, Add</i>	1,852.02		
		<i>For Class 55 Rating, Add</i>	2,766.65		
		<i>For Class 56 Rating, Add</i>	3,669.11		
40 05 19 00-3505	EA	36" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	15,486.60		1,429.31
		<i>For Class 52 Rating, Deduct</i>	-1,465.31		
		<i>For Class 54 Rating, Add</i>	2,024.13		
		<i>For Class 55 Rating, Add</i>	3,022.55		
		<i>For Class 56 Rating, Add</i>	4,007.65		
40 05 19 00-3506	EA	36" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,637.82		1,432.02
		<i>For Class 52 Rating, Deduct</i>	-1,591.49		
		<i>For Class 54 Rating, Add</i>	2,196.25		
		<i>For Class 55 Rating, Add</i>	3,278.46		
		<i>For Class 56 Rating, Add</i>	4,346.19		
40 05 19 00-3507	EA	36" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,789.04		1,434.74
		<i>For Class 52 Rating, Deduct</i>	-1,717.67		
		<i>For Class 54 Rating, Add</i>	2,368.36		
		<i>For Class 55 Rating, Add</i>	3,534.36		
		<i>For Class 56 Rating, Add</i>	4,684.74		
40 05 19 00-3508	EA	36" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,940.25		1,437.47
		<i>For Class 52 Rating, Deduct</i>	-1,843.85		
		<i>For Class 54 Rating, Add</i>	2,540.48		
		<i>For Class 55 Rating, Add</i>	3,790.26		
		<i>For Class 56 Rating, Add</i>	5,023.28		
40 05 19 00-3509	EA	36" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	20,091.47		1,440.18
		<i>For Class 52 Rating, Deduct</i>	-1,970.03		
		<i>For Class 54 Rating, Add</i>	2,712.59		
		<i>For Class 55 Rating, Add</i>	4,046.16		
		<i>For Class 56 Rating, Add</i>	5,361.82		
40 05 19 00-3510	EA	36" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,242.68		1,442.89
		<i>For Class 52 Rating, Deduct</i>	-2,096.21		
		<i>For Class 54 Rating, Add</i>	2,884.71		
		<i>For Class 55 Rating, Add</i>	4,302.06		
		<i>For Class 56 Rating, Add</i>	5,700.36		
40 05 19 00-3511	EA	36" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,393.90		1,445.61
		<i>For Class 52 Rating, Deduct</i>	-2,222.39		
		<i>For Class 54 Rating, Add</i>	3,056.82		
		<i>For Class 55 Rating, Add</i>	4,557.97		
		<i>For Class 56 Rating, Add</i>	6,038.91		
40 05 19 00-3512	EA	36" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,545.12		1,448.33
		<i>For Class 52 Rating, Deduct</i>	-2,348.57		
		<i>For Class 54 Rating, Add</i>	3,228.94		
		<i>For Class 55 Rating, Add</i>	4,813.87		
		<i>For Class 56 Rating, Add</i>	6,377.45		
40 05 19 00-3513	EA	36" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	24,696.33		1,451.05
		<i>For Class 52 Rating, Deduct</i>	-2,474.76		
		<i>For Class 54 Rating, Add</i>	3,401.05		
		<i>For Class 55 Rating, Add</i>	5,069.77		
		<i>For Class 56 Rating, Add</i>	6,715.99		
40 05 19 00-3514	EA	36" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	25,847.55		1,453.76
		<i>For Class 52 Rating, Deduct</i>	-2,600.94		
		<i>For Class 54 Rating, Add</i>	3,573.16		
		<i>For Class 55 Rating, Add</i>	5,325.67		
		<i>For Class 56 Rating, Add</i>	7,054.54		
40 05 19 00-3515	EA	36" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,998.77		1,456.48
		<i>For Class 52 Rating, Deduct</i>	-2,727.12		
		<i>For Class 54 Rating, Add</i>	3,745.28		
		<i>For Class 55 Rating, Add</i>	5,581.57		
		<i>For Class 56 Rating, Add</i>	7,393.08		
40 05 19 00-3516	EA	36" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	28,149.98		1,459.20
		<i>For Class 52 Rating, Deduct</i>	-2,853.30		
		<i>For Class 54 Rating, Add</i>	3,917.39		
		<i>For Class 55 Rating, Add</i>	5,837.48		
		<i>For Class 56 Rating, Add</i>	7,731.62		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3517 EA 36" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	29,301.20	1,461.91
<i>For Class 52 Rating, Deduct</i>	-2,979.48	
<i>For Class 54 Rating, Add</i>	4,089.51	
<i>For Class 55 Rating, Add</i>	6,093.38	
<i>For Class 56 Rating, Add</i>	8,070.16	
40 05 19 00-3518 EA 36" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	30,452.42	1,464.64
<i>For Class 52 Rating, Deduct</i>	-3,105.66	
<i>For Class 54 Rating, Add</i>	4,261.62	
<i>For Class 55 Rating, Add</i>	6,349.28	
<i>For Class 56 Rating, Add</i>	8,408.71	
40 05 19 00-3519 EA 36" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	31,603.64	1,467.35
<i>For Class 52 Rating, Deduct</i>	-3,231.84	
<i>For Class 54 Rating, Add</i>	4,433.74	
<i>For Class 55 Rating, Add</i>	6,605.18	
<i>For Class 56 Rating, Add</i>	8,747.25	
40 05 19 00-3520 EA 36" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	32,754.86	1,470.07
<i>For Class 52 Rating, Deduct</i>	-3,358.02	
<i>For Class 54 Rating, Add</i>	4,605.85	
<i>For Class 55 Rating, Add</i>	6,861.09	
<i>For Class 56 Rating, Add</i>	9,085.79	
40 05 19 00-3521 EA 36" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	33,906.08	1,472.78
<i>For Class 52 Rating, Deduct</i>	-3,484.20	
<i>For Class 54 Rating, Add</i>	4,777.97	
<i>For Class 55 Rating, Add</i>	7,116.99	
<i>For Class 56 Rating, Add</i>	9,424.34	
40 05 19 00-3522 EA 36" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	35,057.29	1,475.50
<i>For Class 52 Rating, Deduct</i>	-3,610.38	
<i>For Class 54 Rating, Add</i>	4,950.08	
<i>For Class 55 Rating, Add</i>	7,372.89	
<i>For Class 56 Rating, Add</i>	9,762.88	
40 05 19 00-3523 EA 36" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	36,208.51	1,478.23
<i>For Class 52 Rating, Deduct</i>	-3,736.57	
<i>For Class 54 Rating, Add</i>	5,122.19	
<i>For Class 55 Rating, Add</i>	7,628.79	
<i>For Class 56 Rating, Add</i>	10,101.42	
40 05 19 00-3524 EA 36" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	37,359.72	1,480.93
<i>For Class 52 Rating, Deduct</i>	-3,862.75	
<i>For Class 54 Rating, Add</i>	5,294.31	
<i>For Class 55 Rating, Add</i>	7,884.69	
<i>For Class 56 Rating, Add</i>	10,439.96	
40 05 19 00-3525 EA 36" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	38,510.94	1,483.65
<i>For Class 52 Rating, Deduct</i>	-3,988.93	
<i>For Class 54 Rating, Add</i>	5,466.42	
<i>For Class 55 Rating, Add</i>	8,140.60	
<i>For Class 56 Rating, Add</i>	10,778.51	
40 05 19 00-3526 EA 36" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	39,662.17	1,486.37
<i>For Class 52 Rating, Deduct</i>	-4,115.11	
<i>For Class 54 Rating, Add</i>	5,638.54	
<i>For Class 55 Rating, Add</i>	8,396.50	
<i>For Class 56 Rating, Add</i>	11,117.05	
40 05 19 00-3527 EA 36" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	40,813.38	1,489.10
<i>For Class 52 Rating, Deduct</i>	-4,241.29	
<i>For Class 54 Rating, Add</i>	5,810.65	
<i>For Class 55 Rating, Add</i>	8,652.40	
<i>For Class 56 Rating, Add</i>	11,455.59	
40 05 19 00-3528 EA 36" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	41,964.60	1,491.81
<i>For Class 52 Rating, Deduct</i>	-4,367.47	
<i>For Class 54 Rating, Add</i>	5,982.77	
<i>For Class 55 Rating, Add</i>	8,908.30	
<i>For Class 56 Rating, Add</i>	11,794.14	
40 05 19 00-3529 EA 36" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	43,115.82	1,494.52
<i>For Class 52 Rating, Deduct</i>	-4,493.65	
<i>For Class 54 Rating, Add</i>	6,154.88	
<i>For Class 55 Rating, Add</i>	9,164.21	
<i>For Class 56 Rating, Add</i>	12,132.68	
40 05 19 00-3530 EA 36" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	44,267.03	1,497.24
<i>For Class 52 Rating, Deduct</i>	-4,619.83	
<i>For Class 54 Rating, Add</i>	6,327.00	
<i>For Class 55 Rating, Add</i>	9,420.11	
<i>For Class 56 Rating, Add</i>	12,471.22	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3531	EA	36" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	45,418.25	1,499.95
		<i>For Class 52 Rating, Deduct</i>	-4,746.01	
		<i>For Class 54 Rating, Add</i>	6,499.11	
		<i>For Class 55 Rating, Add</i>	9,676.01	
		<i>For Class 56 Rating, Add</i>	12,809.76	
40 05 19 00-3532	EA	36" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	46,569.48	1,502.68
		<i>For Class 52 Rating, Deduct</i>	-4,872.20	
		<i>For Class 54 Rating, Add</i>	6,671.22	
		<i>For Class 55 Rating, Add</i>	9,931.91	
		<i>For Class 56 Rating, Add</i>	13,148.31	
40 05 19 00-3533	EA	36" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	47,720.69	1,505.40
		<i>For Class 52 Rating, Deduct</i>	-4,998.38	
		<i>For Class 54 Rating, Add</i>	6,843.34	
		<i>For Class 55 Rating, Add</i>	10,187.81	
		<i>For Class 56 Rating, Add</i>	13,486.85	
40 05 19 00-3534	EA	36" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	48,871.91	1,508.12
		<i>For Class 52 Rating, Deduct</i>	-5,124.56	
		<i>For Class 54 Rating, Add</i>	7,015.45	
		<i>For Class 55 Rating, Add</i>	10,443.72	
		<i>For Class 56 Rating, Add</i>	13,825.39	
40 05 19 00-3535	EA	36" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	50,023.13	1,510.82
		<i>For Class 52 Rating, Deduct</i>	-5,250.74	
		<i>For Class 54 Rating, Add</i>	7,187.57	
		<i>For Class 55 Rating, Add</i>	10,699.62	
		<i>For Class 56 Rating, Add</i>	14,163.94	
40 05 19 00-3536 42" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-3068)				
40 05 19 00-3537	EA	42" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	14,416.25	1,787.99
		<i>For Class 52 Rating, Deduct</i>	-1,287.79	
		<i>For Class 54 Rating, Add</i>	1,788.58	
		<i>For Class 55 Rating, Add</i>	2,675.72	
		<i>For Class 56 Rating, Add</i>	3,551.14	
40 05 19 00-3538	EA	42" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	16,112.90	1,790.70
		<i>For Class 52 Rating, Deduct</i>	-1,473.97	
		<i>For Class 54 Rating, Add</i>	2,042.51	
		<i>For Class 55 Rating, Add</i>	3,053.25	
		<i>For Class 56 Rating, Add</i>	4,050.59	
40 05 19 00-3539	EA	42" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	17,795.49	1,793.43
		<i>For Class 52 Rating, Deduct</i>	-1,658.60	
		<i>For Class 54 Rating, Add</i>	2,294.33	
		<i>For Class 55 Rating, Add</i>	3,427.65	
		<i>For Class 56 Rating, Add</i>	4,545.89	
40 05 19 00-3540	EA	42" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	19,494.96	1,796.15
		<i>For Class 52 Rating, Deduct</i>	-1,845.09	
		<i>For Class 54 Rating, Add</i>	2,548.69	
		<i>For Class 55 Rating, Add</i>	3,805.81	
		<i>For Class 56 Rating, Add</i>	5,046.16	
40 05 19 00-3541	EA	42" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,183.18	1,798.87
		<i>For Class 52 Rating, Deduct</i>	-2,030.34	
		<i>For Class 54 Rating, Add</i>	2,801.35	
		<i>For Class 55 Rating, Add</i>	4,181.46	
		<i>For Class 56 Rating, Add</i>	5,543.12	
40 05 19 00-3542	EA	42" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	22,888.26	1,801.57
		<i>For Class 52 Rating, Deduct</i>	-2,217.45	
		<i>For Class 54 Rating, Add</i>	3,056.55	
		<i>For Class 55 Rating, Add</i>	4,560.88	
		<i>For Class 56 Rating, Add</i>	6,045.05	
40 05 19 00-3543	EA	42" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	24,576.48	1,804.30
		<i>For Class 52 Rating, Deduct</i>	-2,402.70	
		<i>For Class 54 Rating, Add</i>	3,309.21	
		<i>For Class 55 Rating, Add</i>	4,936.53	
		<i>For Class 56 Rating, Add</i>	6,542.01	
40 05 19 00-3544	EA	42" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	26,284.39	1,807.02
		<i>For Class 52 Rating, Deduct</i>	-2,590.11	
		<i>For Class 54 Rating, Add</i>	3,564.83	
		<i>For Class 55 Rating, Add</i>	5,316.57	
		<i>For Class 56 Rating, Add</i>	7,044.78	



	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3545	EA			42" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	27,975.41	1,809.74
				<i>For Class 52 Rating, Deduct</i>	-2,775.67	
				<i>For Class 54 Rating, Add</i>	3,817.91	
				<i>For Class 55 Rating, Add</i>	5,692.85	
				<i>For Class 56 Rating, Add</i>	7,542.56	
40 05 19 00-3546	EA			42" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	29,686.12	1,812.45
				<i>For Class 52 Rating, Deduct</i>	-2,963.40	
				<i>For Class 54 Rating, Add</i>	4,073.95	
				<i>For Class 55 Rating, Add</i>	6,073.52	
				<i>For Class 56 Rating, Add</i>	8,046.16	
40 05 19 00-3547	EA			42" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	31,377.16	1,815.16
				<i>For Class 52 Rating, Deduct</i>	-3,148.96	
				<i>For Class 54 Rating, Add</i>	4,327.04	
				<i>For Class 55 Rating, Add</i>	6,449.80	
				<i>For Class 56 Rating, Add</i>	8,543.94	
40 05 19 00-3548	EA			42" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	33,087.86	1,817.89
				<i>For Class 52 Rating, Deduct</i>	-3,336.68	
				<i>For Class 54 Rating, Add</i>	4,583.08	
				<i>For Class 55 Rating, Add</i>	6,830.47	
				<i>For Class 56 Rating, Add</i>	9,047.54	
40 05 19 00-3549	EA			42" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	34,781.70	1,820.60
				<i>For Class 52 Rating, Deduct</i>	-3,522.55	
				<i>For Class 54 Rating, Add</i>	4,836.58	
				<i>For Class 55 Rating, Add</i>	7,207.38	
				<i>For Class 56 Rating, Add</i>	9,546.15	
40 05 19 00-3550	EA			42" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	36,478.36	1,823.32
				<i>For Class 52 Rating, Deduct</i>	-3,708.73	
				<i>For Class 54 Rating, Add</i>	5,090.51	
				<i>For Class 55 Rating, Add</i>	7,584.91	
				<i>For Class 56 Rating, Add</i>	10,045.60	
40 05 19 00-3551	EA			42" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	38,186.25	1,826.04
				<i>For Class 52 Rating, Deduct</i>	-3,896.15	
				<i>For Class 54 Rating, Add</i>	5,346.13	
				<i>For Class 55 Rating, Add</i>	7,964.96	
				<i>For Class 56 Rating, Add</i>	10,548.36	
40 05 19 00-3552	EA			42" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	39,880.09	1,828.75
				<i>For Class 52 Rating, Deduct</i>	-4,082.02	
				<i>For Class 54 Rating, Add</i>	5,599.64	
				<i>For Class 55 Rating, Add</i>	8,341.86	
				<i>For Class 56 Rating, Add</i>	11,046.98	
40 05 19 00-3553	EA			42" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	41,593.61	1,831.47
				<i>For Class 52 Rating, Deduct</i>	-4,270.05	
				<i>For Class 54 Rating, Add</i>	5,856.10	
				<i>For Class 55 Rating, Add</i>	8,723.16	
				<i>For Class 56 Rating, Add</i>	11,551.40	
40 05 19 00-3554	EA			42" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	43,290.26	1,834.19
				<i>For Class 52 Rating, Deduct</i>	-4,456.23	
				<i>For Class 54 Rating, Add</i>	6,110.03	
				<i>For Class 55 Rating, Add</i>	9,100.69	
				<i>For Class 56 Rating, Add</i>	12,050.85	
40 05 19 00-3555	EA			42" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	45,000.97	1,836.91
				<i>For Class 52 Rating, Deduct</i>	-4,643.96	
				<i>For Class 54 Rating, Add</i>	6,366.07	
				<i>For Class 55 Rating, Add</i>	9,481.36	
				<i>For Class 56 Rating, Add</i>	12,554.44	
40 05 19 00-3556	EA			42" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	46,697.62	1,839.62
				<i>For Class 52 Rating, Deduct</i>	-4,830.14	
				<i>For Class 54 Rating, Add</i>	6,620.00	
				<i>For Class 55 Rating, Add</i>	9,858.90	
				<i>For Class 56 Rating, Add</i>	13,053.89	
40 05 19 00-3557	EA			42" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	48,411.14	1,842.33
				<i>For Class 52 Rating, Deduct</i>	-5,018.17	
				<i>For Class 54 Rating, Add</i>	6,876.46	
				<i>For Class 55 Rating, Add</i>	10,240.19	
				<i>For Class 56 Rating, Add</i>	13,558.31	
40 05 19 00-3558	EA			42" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	50,107.80	1,845.06
				<i>For Class 52 Rating, Deduct</i>	-5,204.35	
				<i>For Class 54 Rating, Add</i>	7,130.39	
				<i>For Class 55 Rating, Add</i>	10,617.73	
				<i>For Class 56 Rating, Add</i>	14,057.76	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3559	EA	42" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	51,821.32	1,847.78
		<i>For Class 52 Rating, Deduct</i>	-5,392.38	
		<i>For Class 54 Rating, Add</i>	7,386.84	
		<i>For Class 55 Rating, Add</i>	10,999.02	
		<i>For Class 56 Rating, Add</i>	14,562.18	
40 05 19 00-3560	EA	42" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	53,515.17	1,850.49
		<i>For Class 52 Rating, Deduct</i>	-5,578.25	
		<i>For Class 54 Rating, Add</i>	7,640.35	
		<i>For Class 55 Rating, Add</i>	11,375.93	
		<i>For Class 56 Rating, Add</i>	15,060.80	
40 05 19 00-3561	EA	42" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	55,231.50	1,853.21
		<i>For Class 52 Rating, Deduct</i>	-5,766.60	
		<i>For Class 54 Rating, Add</i>	7,897.23	
		<i>For Class 55 Rating, Add</i>	11,757.85	
		<i>For Class 56 Rating, Add</i>	15,566.05	
40 05 19 00-3562	EA	42" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	56,928.15	1,855.93
		<i>For Class 52 Rating, Deduct</i>	-5,952.78	
		<i>For Class 54 Rating, Add</i>	8,151.17	
		<i>For Class 55 Rating, Add</i>	12,135.39	
		<i>For Class 56 Rating, Add</i>	16,065.49	
40 05 19 00-3563	EA	42" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	58,638.86	1,858.64
		<i>For Class 52 Rating, Deduct</i>	-6,140.50	
		<i>For Class 54 Rating, Add</i>	8,407.20	
		<i>For Class 55 Rating, Add</i>	12,516.06	
		<i>For Class 56 Rating, Add</i>	16,569.09	
40 05 19 00-3564	EA	42" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	60,338.33	1,861.36
		<i>For Class 52 Rating, Deduct</i>	-6,326.99	
		<i>For Class 54 Rating, Add</i>	8,661.56	
		<i>For Class 55 Rating, Add</i>	12,894.22	
		<i>For Class 56 Rating, Add</i>	17,069.36	
40 05 19 00-3565	EA	42" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	61,703.21	1,864.08
		<i>For Class 52 Rating, Deduct</i>	-6,476.67	
		<i>For Class 54 Rating, Add</i>	8,865.72	
		<i>For Class 55 Rating, Add</i>	13,197.77	
		<i>For Class 56 Rating, Add</i>	17,470.94	
40 05 19 00-3566	EA	42" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	63,748.50	1,866.80
		<i>For Class 52 Rating, Deduct</i>	-6,701.20	
		<i>For Class 54 Rating, Add</i>	9,171.94	
		<i>For Class 55 Rating, Add</i>	13,653.05	
		<i>For Class 56 Rating, Add</i>	18,073.23	
40 05 19 00-3567	EA	42" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	65,442.33	1,869.50
		<i>For Class 52 Rating, Deduct</i>	-6,887.07	
		<i>For Class 54 Rating, Add</i>	9,425.45	
		<i>For Class 55 Rating, Add</i>	14,029.95	
		<i>For Class 56 Rating, Add</i>	18,571.85	
40 05 19 00-3568	EA	42" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	67,155.85	1,872.23
		<i>For Class 52 Rating, Deduct</i>	-7,075.11	
		<i>For Class 54 Rating, Add</i>	9,681.91	
		<i>For Class 55 Rating, Add</i>	14,411.25	
		<i>For Class 56 Rating, Add</i>	19,076.27	
40 05 19 00-3569	EA	42" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	68,852.51	1,874.95
		<i>For Class 52 Rating, Deduct</i>	-7,261.28	
		<i>For Class 54 Rating, Add</i>	9,935.84	
		<i>For Class 55 Rating, Add</i>	14,788.78	
		<i>For Class 56 Rating, Add</i>	19,575.72	
40 05 19 00-3570	EA	42" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	70,568.83	1,877.67
		<i>For Class 52 Rating, Deduct</i>	-7,449.63	
		<i>For Class 54 Rating, Add</i>	10,192.72	
		<i>For Class 55 Rating, Add</i>	15,170.71	
		<i>For Class 56 Rating, Add</i>	20,080.97	
40 05 19 00-3571	EA	42" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	72,262.68	1,880.38
		<i>For Class 52 Rating, Deduct</i>	-7,635.50	
		<i>For Class 54 Rating, Add</i>	10,446.23	
		<i>For Class 55 Rating, Add</i>	15,547.61	
		<i>For Class 56 Rating, Add</i>	20,579.58	

40 05 19 00-3572 48" Flanged End x Plain End (FxPE), Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe (40 05 19 00-3068)



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3573 EA 48" Flanged x Plain End (FxPE), 1'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	18,629.26	2,247.21
<i>For Class 52 Rating, Deduct</i>	-1,674.68	
<i>For Class 54 Rating, Add</i>	2,324.52	
<i>For Class 55 Rating, Add</i>	3,476.75	
<i>For Class 56 Rating, Add</i>	4,613.77	
40 05 19 00-3574 EA 48" Flanged x Plain End (FxPE), 1'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	21,068.15	2,249.94
<i>For Class 52 Rating, Deduct</i>	-1,942.51	
<i>For Class 54 Rating, Add</i>	2,689.78	
<i>For Class 55 Rating, Add</i>	4,019.81	
<i>For Class 56 Rating, Add</i>	5,332.18	
40 05 19 00-3575 EA 48" Flanged x Plain End (FxPE), 2'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	23,515.48	2,252.66
<i>For Class 52 Rating, Deduct</i>	-2,211.26	
<i>For Class 54 Rating, Add</i>	3,056.31	
<i>For Class 55 Rating, Add</i>	4,564.74	
<i>For Class 56 Rating, Add</i>	6,053.07	
40 05 19 00-3576 EA 48" Flanged x Plain End (FxPE), 2'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	25,988.11	2,255.38
<i>For Class 52 Rating, Deduct</i>	-2,482.80	
<i>For Class 54 Rating, Add</i>	3,426.64	
<i>For Class 55 Rating, Add</i>	5,115.32	
<i>For Class 56 Rating, Add</i>	6,781.43	
40 05 19 00-3577 EA 48" Flanged x Plain End (FxPE), 3'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	28,455.11	2,258.08
<i>For Class 52 Rating, Deduct</i>	-2,753.71	
<i>For Class 54 Rating, Add</i>	3,796.12	
<i>For Class 55 Rating, Add</i>	5,664.64	
<i>For Class 56 Rating, Add</i>	7,508.13	
40 05 19 00-3578 EA 48" Flanged x Plain End (FxPE), 3'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	30,924.94	2,260.80
<i>For Class 52 Rating, Deduct</i>	-3,024.94	
<i>For Class 54 Rating, Add</i>	4,166.03	
<i>For Class 55 Rating, Add</i>	6,214.60	
<i>For Class 56 Rating, Add</i>	8,235.66	
40 05 19 00-3579 EA 48" Flanged x Plain End (FxPE), 4'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	33,411.64	2,263.53
<i>For Class 52 Rating, Deduct</i>	-3,298.03	
<i>For Class 54 Rating, Add</i>	4,538.46	
<i>For Class 55 Rating, Add</i>	6,768.31	
<i>For Class 56 Rating, Add</i>	8,968.17	
40 05 19 00-3580 EA 48" Flanged x Plain End (FxPE), 4'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	35,892.70	2,266.24
<i>For Class 52 Rating, Deduct</i>	-3,570.49	
<i>For Class 54 Rating, Add</i>	4,910.05	
<i>For Class 55 Rating, Add</i>	7,320.77	
<i>For Class 56 Rating, Add</i>	9,699.02	
40 05 19 00-3581 EA 48" Flanged x Plain End (FxPE), 5'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	38,368.14	2,268.96
<i>For Class 52 Rating, Deduct</i>	-3,842.34	
<i>For Class 54 Rating, Add</i>	5,280.80	
<i>For Class 55 Rating, Add</i>	7,871.97	
<i>For Class 56 Rating, Add</i>	10,428.21	
40 05 19 00-3582 EA 48" Flanged x Plain End (FxPE), 5'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	40,866.08	2,271.68
<i>For Class 52 Rating, Deduct</i>	-4,116.66	
<i>For Class 54 Rating, Add</i>	5,654.92	
<i>For Class 55 Rating, Add</i>	8,428.19	
<i>For Class 56 Rating, Add</i>	11,164.03	
40 05 19 00-3583 EA 48" Flanged x Plain End (FxPE), 6'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	43,352.76	2,274.39
<i>For Class 52 Rating, Deduct</i>	-4,389.74	
<i>For Class 54 Rating, Add</i>	6,027.36	
<i>For Class 55 Rating, Add</i>	8,981.90	
<i>For Class 56 Rating, Add</i>	11,896.54	
40 05 19 00-3584 EA 48" Flanged x Plain End (FxPE), 6'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	45,853.51	2,277.11
<i>For Class 52 Rating, Deduct</i>	-4,664.37	
<i>For Class 54 Rating, Add</i>	6,401.90	
<i>For Class 55 Rating, Add</i>	9,538.75	
<i>For Class 56 Rating, Add</i>	12,633.19	
40 05 19 00-3585 EA 48" Flanged x Plain End (FxPE), 7'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	48,337.40	2,279.83
<i>For Class 52 Rating, Deduct</i>	-4,937.14	
<i>For Class 54 Rating, Add</i>	6,773.92	
<i>For Class 55 Rating, Add</i>	10,091.84	
<i>For Class 56 Rating, Add</i>	13,364.87	
40 05 19 00-3586 EA 48" Flanged x Plain End (FxPE), 7'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	50,826.89	2,282.55
<i>For Class 52 Rating, Deduct</i>	-5,210.53	
<i>For Class 54 Rating, Add</i>	7,146.77	
<i>For Class 55 Rating, Add</i>	10,646.17	
<i>For Class 56 Rating, Add</i>	14,098.21	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-3587	EA	48" Flanged x Plain End (FxPE), 8'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	53,330.45	2,285.27
		<i>For Class 52 Rating, Deduct</i>	-5,485.47	
		<i>For Class 54 Rating, Add</i>	7,521.74	
		<i>For Class 55 Rating, Add</i>	11,203.65	
		<i>For Class 56 Rating, Add</i>	14,835.69	
40 05 19 00-3588	EA	48" Flanged x Plain End (FxPE), 8'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	55,819.95	2,287.97
		<i>For Class 52 Rating, Deduct</i>	-5,758.86	
		<i>For Class 54 Rating, Add</i>	7,894.60	
		<i>For Class 55 Rating, Add</i>	11,757.99	
		<i>For Class 56 Rating, Add</i>	15,569.03	
40 05 19 00-3589	EA	48" Flanged x Plain End (FxPE), 9'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	58,309.45	2,290.70
		<i>For Class 52 Rating, Deduct</i>	-6,032.26	
		<i>For Class 54 Rating, Add</i>	8,267.45	
		<i>For Class 55 Rating, Add</i>	12,312.33	
		<i>For Class 56 Rating, Add</i>	16,302.36	
40 05 19 00-3590	EA	48" Flanged x Plain End (FxPE), 9'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	60,815.82	2,293.42
		<i>For Class 52 Rating, Deduct</i>	-6,307.50	
		<i>For Class 54 Rating, Add</i>	8,642.84	
		<i>For Class 55 Rating, Add</i>	12,870.43	
		<i>For Class 56 Rating, Add</i>	17,040.68	
40 05 19 00-3591	EA	48" Flanged x Plain End (FxPE), 10'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	63,308.13	2,296.13
		<i>For Class 52 Rating, Deduct</i>	-6,581.21	
		<i>For Class 54 Rating, Add</i>	9,016.12	
		<i>For Class 55 Rating, Add</i>	13,425.40	
		<i>For Class 56 Rating, Add</i>	17,774.84	
40 05 19 00-3592	EA	48" Flanged x Plain End (FxPE), 10'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	65,797.63	2,298.85
		<i>For Class 52 Rating, Deduct</i>	-6,854.60	
		<i>For Class 54 Rating, Add</i>	9,388.98	
		<i>For Class 55 Rating, Add</i>	13,979.73	
		<i>For Class 56 Rating, Add</i>	18,508.18	
40 05 19 00-3593	EA	48" Flanged x Plain End (FxPE), 11'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	68,309.63	2,301.56
		<i>For Class 52 Rating, Deduct</i>	-7,130.47	
		<i>For Class 54 Rating, Add</i>	9,765.21	
		<i>For Class 55 Rating, Add</i>	14,539.09	
		<i>For Class 56 Rating, Add</i>	19,248.15	
40 05 19 00-3594	EA	48" Flanged x Plain End (FxPE), 11'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	70,804.75	2,304.29
		<i>For Class 52 Rating, Deduct</i>	-7,404.48	
		<i>For Class 54 Rating, Add</i>	10,138.91	
		<i>For Class 55 Rating, Add</i>	15,094.68	
		<i>For Class 56 Rating, Add</i>	19,983.14	
40 05 19 00-3595	EA	48" Flanged x Plain End (FxPE), 12'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	73,297.07	2,307.00
		<i>For Class 52 Rating, Deduct</i>	-7,678.18	
		<i>For Class 54 Rating, Add</i>	10,512.19	
		<i>For Class 55 Rating, Add</i>	15,649.65	
		<i>For Class 56 Rating, Add</i>	20,717.31	
40 05 19 00-3596	EA	48" Flanged x Plain End (FxPE), 12'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	75,806.25	2,309.72
		<i>For Class 52 Rating, Deduct</i>	-7,953.73	
		<i>For Class 54 Rating, Add</i>	10,888.00	
		<i>For Class 55 Rating, Add</i>	16,208.38	
		<i>For Class 56 Rating, Add</i>	21,456.45	
40 05 19 00-3597	EA	48" Flanged x Plain End (FxPE), 13'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	78,301.37	2,312.44
		<i>For Class 52 Rating, Deduct</i>	-8,227.74	
		<i>For Class 54 Rating, Add</i>	11,261.70	
		<i>For Class 55 Rating, Add</i>	16,763.97	
		<i>For Class 56 Rating, Add</i>	22,191.45	
40 05 19 00-3598	EA	48" Flanged x Plain End (FxPE), 13'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	80,793.68	2,315.14
		<i>For Class 52 Rating, Deduct</i>	-8,501.45	
		<i>For Class 54 Rating, Add</i>	11,634.97	
		<i>For Class 55 Rating, Add</i>	17,318.94	
		<i>For Class 56 Rating, Add</i>	22,925.61	
40 05 19 00-3599	EA	48" Flanged x Plain End (FxPE), 14'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	83,305.68	2,317.87
		<i>For Class 52 Rating, Deduct</i>	-8,777.31	
		<i>For Class 54 Rating, Add</i>	12,011.21	
		<i>For Class 55 Rating, Add</i>	17,878.29	
		<i>For Class 56 Rating, Add</i>	23,665.59	
40 05 19 00-3600	EA	48" Flanged x Plain End (FxPE), 14'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	85,800.80	2,320.59
		<i>For Class 52 Rating, Deduct</i>	-9,051.32	
		<i>For Class 54 Rating, Add</i>	12,384.91	
		<i>For Class 55 Rating, Add</i>	18,433.89	
		<i>For Class 56 Rating, Add</i>	24,400.58	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3601 EA 48" Flanged x Plain End (FxPE), 15'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	88,000.71	2,323.31
For Class 52 Rating, Deduct	-9,292.86	
For Class 54 Rating, Add	12,714.32	
For Class 55 Rating, Add	18,923.65	
For Class 56 Rating, Add	25,048.49	
40 05 19 00-3602 EA 48" Flanged x Plain End (FxPE), 15'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	90,810.72	2,326.02
For Class 52 Rating, Deduct	-9,601.51	
For Class 54 Rating, Add	13,135.26	
For Class 55 Rating, Add	19,549.46	
For Class 56 Rating, Add	25,876.38	
40 05 19 00-3603 EA 48" Flanged x Plain End (FxPE), 16'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	93,303.04	2,328.74
For Class 52 Rating, Deduct	-9,875.21	
For Class 54 Rating, Add	13,508.54	
For Class 55 Rating, Add	20,104.43	
For Class 56 Rating, Add	26,610.54	
40 05 19 00-3604 EA 48" Flanged x Plain End (FxPE), 16'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	95,820.65	2,331.46
For Class 52 Rating, Deduct	-10,151.70	
For Class 54 Rating, Add	13,885.61	
For Class 55 Rating, Add	20,665.04	
For Class 56 Rating, Add	27,352.17	
40 05 19 00-3605 EA 48" Flanged x Plain End (FxPE), 17'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	98,312.96	2,334.17
For Class 52 Rating, Deduct	-10,425.40	
For Class 54 Rating, Add	14,258.89	
For Class 55 Rating, Add	21,220.00	
For Class 56 Rating, Add	28,086.34	
40 05 19 00-3606 EA 48" Flanged x Plain End (FxPE), 17'-6" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	100,805.27	2,336.89
For Class 52 Rating, Deduct	-10,699.10	
For Class 54 Rating, Add	14,632.17	
For Class 55 Rating, Add	21,774.97	
For Class 56 Rating, Add	28,820.50	
40 05 19 00-3607 EA 48" Flanged x Plain End (FxPE), 18'-0" Spool Length, Class 53, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Pipe.....	103,322.90	2,339.61
For Class 52 Rating, Deduct	-10,975.58	
For Class 54 Rating, Add	15,009.24	
For Class 55 Rating, Add	22,335.58	
For Class 56 Rating, Add	29,562.13	
40 05 19 00-3608 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbows <small>(40 05 19 00-2059)</small>		
40 05 19 00-3609 EA 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	784.92	131.10
40 05 19 00-3610 EA 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	1,152.32	167.65
40 05 19 00-3611 EA 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	1,650.78	189.89
40 05 19 00-3612 EA 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	2,361.73	240.74
40 05 19 00-3613 EA 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	2,946.68	266.97
40 05 19 00-3614 EA 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	3,618.78	290.00
40 05 19 00-3615 EA 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	4,443.69	357.54
40 05 19 00-3616 EA 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	5,576.80	429.05
40 05 19 00-3617 EA 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	6,814.44	540.28
40 05 19 00-3618 EA 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	10,162.92	611.79
40 05 19 00-3619 EA 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	15,789.66	810.43
40 05 19 00-3620 EA 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	23,450.65	917.69
40 05 19 00-3621 EA 42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	40,088.11	1,048.79
40 05 19 00-3622 EA 48" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow.....	53,045.24	1,287.15
40 05 19 00-3623 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbows <small>(40 05 19 00-2059)</small>		
40 05 19 00-3624 EA 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	747.15	131.10
40 05 19 00-3625 EA 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	1,089.91	167.65
40 05 19 00-3626 EA 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	1,496.41	189.89
40 05 19 00-3627 EA 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	2,141.67	240.74
40 05 19 00-3628 EA 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	2,662.57	266.97
40 05 19 00-3629 EA 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	3,104.76	290.00
40 05 19 00-3630 EA 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	3,816.36	357.54
40 05 19 00-3631 EA 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	4,860.78	429.05
40 05 19 00-3632 EA 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	6,113.20	540.28
40 05 19 00-3633 EA 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	8,039.50	611.79
40 05 19 00-3634 EA 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	15,413.59	810.43
40 05 19 00-3635 EA 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	22,948.12	917.69
40 05 19 00-3636 EA 42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	34,737.69	1,048.79
40 05 19 00-3637 EA 48" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 45 Degree Elbow.....	46,990.30	1,287.15
40 05 19 00-3638 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbows <small>(40 05 19 00-2059)</small>		
40 05 19 00-3639 EA 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow.....	745.51	131.10

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-3640	EA	6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	1,068.56	167.65
40 05 19 00-3641	EA	8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	1,483.27	189.89
40 05 19 00-3642	EA	10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	2,090.76	240.74
40 05 19 00-3643	EA	12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	2,775.88	266.97
40 05 19 00-3644	EA	14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	3,451.27	290.00
40 05 19 00-3645	EA	16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	3,895.18	357.54
40 05 19 00-3646	EA	18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	4,966.03	429.05
40 05 19 00-3647	EA	20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	6,522.12	540.28
40 05 19 00-3648	EA	24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	8,983.79	611.79
40 05 19 00-3649	EA	30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	15,581.10	810.43
40 05 19 00-3650	EA	36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	23,330.77	917.69
40 05 19 00-3651	EA	42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	35,501.34	1,048.79
40 05 19 00-3652	EA	48" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 22-1/2 Degree Elbow	47,988.79	1,287.15

40 05 19 00-3653 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron
11-1/4 Degree Elbows (40 05 19 00-2059)

40 05 19 00-3654	EA	4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	809.55	131.10
40 05 19 00-3655	EA	6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	1,188.44	167.65
40 05 19 00-3656	EA	8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	1,532.54	189.89
40 05 19 00-3657	EA	10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	2,266.48	240.74
40 05 19 00-3658	EA	12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	3,102.69	266.97
40 05 19 00-3659	EA	14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	3,535.02	290.00
40 05 19 00-3660	EA	16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	4,248.27	357.54
40 05 19 00-3661	EA	18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	4,966.03	429.05
40 05 19 00-3662	EA	20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	6,522.12	540.28
40 05 19 00-3663	EA	24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	9,318.81	611.79
40 05 19 00-3664	EA	30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	15,745.32	810.43
40 05 19 00-3665	EA	36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	23,498.27	917.69
40 05 19 00-3666	EA	42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	35,677.06	1,048.79
40 05 19 00-3667	EA	48" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 11-1/4 Degree Elbow	48,343.51	1,287.15

40 05 19 00-3668 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron
Reducing 90 Degree Elbows (40 05 19 00-2059)

40 05 19 00-3669	EA	6" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,122.98	149.37
40 05 19 00-3670	EA	8" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,451.87	160.49
40 05 19 00-3671	EA	8" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	1,576.44	178.77
40 05 19 00-3672	EA	10" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,171.92	185.92
40 05 19 00-3673	EA	10" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,211.10	204.20
40 05 19 00-3674	EA	10" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,374.11	215.31
40 05 19 00-3675	EA	12" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,594.51	217.71
40 05 19 00-3676	EA	12" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	2,898.74	228.83
40 05 19 00-3677	EA	12" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,034.16	254.25
40 05 19 00-3678	EA	14" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,023.55	228.83
40 05 19 00-3679	EA	14" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,280.18	239.95
40 05 19 00-3680	EA	14" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,555.18	265.37
40 05 19 00-3681	EA	14" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,864.69	278.88
40 05 19 00-3682	EA	16" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,480.35	262.60
40 05 19 00-3683	EA	16" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	3,689.35	273.72
40 05 19 00-3684	EA	16" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,108.88	299.14
40 05 19 00-3685	EA	16" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,419.41	312.25
40 05 19 00-3686	EA	16" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,673.35	323.77
40 05 19 00-3687	EA	18" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,041.99	298.35
40 05 19 00-3688	EA	18" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,682.88	309.48
40 05 19 00-3689	EA	18" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,765.75	334.90
40 05 19 00-3690	EA	18" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	4,977.75	348.01
40 05 19 00-3691	EA	18" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,330.23	359.53
40 05 19 00-3692	EA	18" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,713.13	393.30
40 05 19 00-3693	EA	20" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,055.75	353.96
40 05 19 00-3694	EA	20" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	5,332.09	365.09
40 05 19 00-3695	EA	20" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	6,400.29	390.52
40 05 19 00-3696	EA	20" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	6,594.24	403.63
40 05 19 00-3697	EA	20" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,188.12	415.15
40 05 19 00-3698	EA	20" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,002.79	448.92
40 05 19 00-3699	EA	20" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,364.06	484.67
40 05 19 00-3700	EA	24" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,003.43	389.72
40 05 19 00-3701	EA	24" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,274.83	400.84
40 05 19 00-3702	EA	24" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	7,727.20	426.27
40 05 19 00-3703	EA	24" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	8,055.81	439.38
40 05 19 00-3704	EA	24" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	8,690.74	450.90
40 05 19 00-3705	EA	24" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	9,257.57	484.67
40 05 19 00-3706	EA	24" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	9,413.56	520.43
40 05 19 00-3707	EA	24" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	9,866.30	514.67
40 05 19 00-3708	EA	30" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	11,914.47	538.69
40 05 19 00-3709	EA	30" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	12,595.38	550.21
40 05 19 00-3710	EA	30" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	14,264.15	583.98
40 05 19 00-3711	EA	30" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	16,064.03	619.73
40 05 19 00-3712	EA	30" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	21,518.43	675.36
40 05 19 00-3713	EA	30" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow	22,998.06	711.11

	MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3714	EA			36" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....20,785.12	20,785.12	728.99
40 05 19 00-3715	EA			36" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....22,711.46	22,711.46	764.75
40 05 19 00-3716	EA			36" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....23,801.30	23,801.30	864.06
40 05 19 00-3717	EA			42" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....30,851.20	30,851.20	794.53
40 05 19 00-3718	EA			42" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....31,596.75	31,596.75	830.29
40 05 19 00-3719	EA			42" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....31,556.74	31,556.74	929.61
40 05 19 00-3720	EA			42" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....45,073.17	45,073.17	983.24
40 05 19 00-3721	EA			48" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....43,110.70	43,110.70	959.40
40 05 19 00-3722	EA			48" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....46,860.97	46,860.97	1,058.72
40 05 19 00-3723	EA			48" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....48,198.55	48,198.55	1,112.35
40 05 19 00-3724	EA			48" x 42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing 90 Degree Elbow .....59,816.52	59,816.52	1,177.90
40 05 19 00-3725				Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbows (40 05 19 00-2059)		
40 05 19 00-3726	EA			4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....924.51	924.51	131.10
40 05 19 00-3727	EA			6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....1,457.77	1,457.77	167.65
40 05 19 00-3728	EA			8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....2,169.73	2,169.73	189.89
40 05 19 00-3729	EA			10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....3,031.77	3,031.77	240.74
40 05 19 00-3730	EA			12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....4,247.33	4,247.33	266.97
40 05 19 00-3731	EA			14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....4,981.84	4,981.84	290.00
40 05 19 00-3732	EA			16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....6,350.33	6,350.33	357.54
40 05 19 00-3733	EA			18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....7,774.12	7,774.12	429.05
40 05 19 00-3734	EA			20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....10,383.03	10,383.03	540.28
40 05 19 00-3735	EA			24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....15,158.61	15,158.61	611.79
40 05 19 00-3736	EA			30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....26,275.36	26,275.36	810.43
40 05 19 00-3737	EA			36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....39,812.29	39,812.29	917.69
40 05 19 00-3738	EA			42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Long Radius 90 Degree Elbow .....61,371.54	61,371.54	1,048.79
40 05 19 00-3739				Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbows With Base (40 05 19 00-2059)		
40 05 19 00-3740	EA			4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....970.49	970.49	131.10
40 05 19 00-3741	EA			6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....1,367.45	1,367.45	167.65
40 05 19 00-3742	EA			8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....2,230.49	2,230.49	189.89
40 05 19 00-3743	EA			10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....2,985.79	2,985.79	240.74
40 05 19 00-3744	EA			12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....3,996.07	3,996.07	266.97
40 05 19 00-3745	EA			14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....4,740.43	4,740.43	290.00
40 05 19 00-3746	EA			16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....5,777.19	5,777.19	357.54
40 05 19 00-3747	EA			18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....7,156.63	7,156.63	429.05
40 05 19 00-3748	EA			20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....9,248.24	9,248.24	540.28
40 05 19 00-3749	EA			24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....12,997.42	12,997.42	611.79
40 05 19 00-3750	EA			30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....20,982.42	20,982.42	810.43
40 05 19 00-3751	EA			36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....29,891.52	29,891.52	917.69
40 05 19 00-3752	EA			42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....52,679.17	52,679.17	1,048.79
40 05 19 00-3753	EA			48" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron 90 Degree Elbow With Base .....59,100.18	59,100.18	1,287.15
40 05 19 00-3754				Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tees (40 05 19 00-2059)		
40 05 19 00-3755	EA			4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....1,187.76	1,187.76	210.55
40 05 19 00-3756	EA			6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....1,538.73	1,538.73	259.02
40 05 19 00-3757	EA			8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....2,231.53	2,231.53	289.21
40 05 19 00-3758	EA			10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....3,159.23	3,159.23	375.82
40 05 19 00-3759	EA			12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....4,234.12	4,234.12	409.98
40 05 19 00-3760	EA			14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....5,685.17	5,685.17	440.96
40 05 19 00-3761	EA			16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....6,137.27	6,137.27	556.18
40 05 19 00-3762	EA			18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....7,627.29	7,627.29	635.63
40 05 19 00-3763	EA			20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....9,594.59	9,594.59	802.49
40 05 19 00-3764	EA			24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....14,166.54	14,166.54	885.91
40 05 19 00-3765	EA			30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....23,306.50	23,306.50	1,223.58
40 05 19 00-3766	EA			36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....32,982.47	32,982.47	1,402.35
40 05 19 00-3767	EA			42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee .....70,646.57	70,646.57	1,620.86
40 05 19 00-3768				Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tees (40 05 19 00-2059)		
40 05 19 00-3769	EA			6" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....1,586.37	1,586.37	235.18
40 05 19 00-3770	EA			8" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....2,063.28	2,063.28	239.95
40 05 19 00-3771	EA			8" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....2,026.92	2,026.92	270.15
40 05 19 00-3772	EA			10" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....2,753.77	2,753.77	265.37
40 05 19 00-3773	EA			10" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....2,679.63	2,679.63	295.57
40 05 19 00-3774	EA			10" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....2,792.28	2,792.28	314.63
40 05 19 00-3775	EA			12" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....3,521.46	3,521.46	278.88
40 05 19 00-3776	EA			12" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....3,475.23	3,475.23	309.07
40 05 19 00-3777	EA			12" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....3,625.65	3,625.65	328.14
40 05 19 00-3778	EA			12" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....4,179.82	4,179.82	389.32
40 05 19 00-3779	EA			14" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....5,054.09	5,054.09	290.00
40 05 19 00-3780	EA			14" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee .....4,929.05	4,929.05	320.20

MINOR
CSI UOM DESCRIPTION

TOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

40 05 19 00-3781	EA	14" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,102.46	339.26
40 05 19 00-3782	EA	14" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,290.41	400.45
40 05 19 00-3783	EA	14" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,562.08	421.50
40 05 19 00-3784	EA	16" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	6,102.09	323.77
40 05 19 00-3785	EA	16" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,124.73	353.96
40 05 19 00-3786	EA	16" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,240.66	373.03
40 05 19 00-3787	EA	16" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	6,328.55	434.22
40 05 19 00-3788	EA	16" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,657.58	455.27
40 05 19 00-3789	EA	16" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	6,766.03	474.73
40 05 19 00-3790	EA	18" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	5,724.12	389.72
40 05 19 00-3791	EA	18" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	6,746.58	408.79
40 05 19 00-3792	EA	18" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	6,693.11	469.97
40 05 19 00-3793	EA	18" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	6,319.37	491.02
40 05 19 00-3794	EA	18" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	7,802.26	510.49
40 05 19 00-3795	EA	18" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	8,213.04	591.93
40 05 19 00-3796	EA	20" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	8,179.80	445.34
40 05 19 00-3797	EA	20" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	8,310.51	464.41
40 05 19 00-3798	EA	20" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	8,559.22	525.58
40 05 19 00-3799	EA	20" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	8,848.95	546.65
40 05 19 00-3800	EA	20" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	8,929.35	566.11
40 05 19 00-3801	EA	20" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	10,545.54	647.55
40 05 19 00-3802	EA	20" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	10,713.56	691.24
40 05 19 00-3803	EA	24" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	9,455.79	481.09
40 05 19 00-3804	EA	24" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	9,822.98	500.16
40 05 19 00-3805	EA	24" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	10,104.54	561.34
40 05 19 00-3806	EA	24" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	11,203.90	582.40
40 05 19 00-3807	EA	24" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	11,438.68	601.86
40 05 19 00-3808	EA	24" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	11,698.37	683.30
40 05 19 00-3809	EA	24" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	15,126.24	727.00
40 05 19 00-3810	EA	24" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	15,566.37	776.86
40 05 19 00-3811	EA	30" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	18,761.76	580.41
40 05 19 00-3812	EA	30" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	18,844.85	599.48
40 05 19 00-3813	EA	30" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	19,269.28	660.66
40 05 19 00-3814	EA	30" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	19,301.18	681.71
40 05 19 00-3815	EA	30" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	19,330.68	701.18
40 05 19 00-3816	EA	30" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	19,454.07	782.62
40 05 19 00-3817	EA	30" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	20,067.14	826.32
40 05 19 00-3818	EA	30" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	21,035.44	937.55
40 05 19 00-3819	EA	30" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	25,656.69	985.23
40 05 19 00-3820	EA	36" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	26,949.82	830.69
40 05 19 00-3821	EA	36" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	27,192.75	845.79
40 05 19 00-3822	EA	36" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	27,312.56	889.09
40 05 19 00-3823	EA	36" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	27,504.30	906.17
40 05 19 00-3824	EA	36" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	27,583.62	921.66
40 05 19 00-3825	EA	36" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	27,779.29	979.27
40 05 19 00-3826	EA	36" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	27,896.96	1,019.00
40 05 19 00-3827	EA	36" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	28,241.77	1,102.42
40 05 19 00-3828	EA	36" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	28,804.21	1,144.13
40 05 19 00-3829	EA	36" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	37,267.95	1,312.97
40 05 19 00-3830	EA	42" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	41,004.95	800.90
40 05 19 00-3831	EA	42" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	41,095.21	820.36
40 05 19 00-3832	EA	42" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	41,333.55	901.80
40 05 19 00-3833	EA	42" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	41,458.90	945.50
40 05 19 00-3834	EA	42" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	41,862.27	1,056.74
40 05 19 00-3835	EA	42" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	42,405.82	1,104.41
40 05 19 00-3836	EA	42" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	53,114.72	1,342.77
40 05 19 00-3837	EA	42" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	67,826.66	1,467.90
40 05 19 00-3838	EA	48" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	55,092.28	930.00
40 05 19 00-3839	EA	48" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	55,121.78	949.47
40 05 19 00-3840	EA	48" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	55,419.25	1,030.91
40 05 19 00-3841	EA	48" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	55,485.45	1,074.61
40 05 19 00-3842	EA	48" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	55,888.84	1,185.84
40 05 19 00-3843	EA	48" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	56,374.92	1,233.52
40 05 19 00-3844	EA	48" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Reducing Tee	57,558.83	1,471.88

40 05 19 00-3845 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tees With Base

		<small>(40 05 19 00-2059)</small>		
40 05 19 00-3846	EA	4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	1,283.01	210.55
40 05 19 00-3847	EA	6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	1,816.27	259.02
40 05 19 00-3848	EA	8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	2,701.21	289.21
40 05 19 00-3849	EA	10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	4,049.33	375.82
40 05 19 00-3850	EA	12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	5,469.08	409.98
40 05 19 00-3851	EA	14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	6,166.35	440.96
40 05 19 00-3852	EA	16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	7,556.17	556.18
40 05 19 00-3853	EA	18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	9,136.51	635.63
40 05 19 00-3854	EA	20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	12,013.61	802.49
40 05 19 00-3855	EA	24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	17,322.93	885.91
40 05 19 00-3856	EA	30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	28,719.32	1,223.58
40 05 19 00-3857	EA	36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Tee With Base	40,930.91	1,402.35

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-3858		Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wyes <small>(40 05 19 00-2059)</small>		
40 05 19 00-3859	EA	4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wye	1,044.89	210.55
40 05 19 00-3860	EA	6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wye	1,527.24	259.02
40 05 19 00-3861	EA	8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wye	2,269.30	289.21
40 05 19 00-3862	EA	10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wye	2,991.72	375.82
40 05 19 00-3863	EA	12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wye	4,539.57	409.98
40 05 19 00-3864	EA	14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Wye	6,089.16	440.96
40 05 19 00-3865		Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Crosses <small>(40 05 19 00-2059)</small>		
40 05 19 00-3866	EA	4" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	1,340.99	290.00
40 05 19 00-3867	EA	6" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	1,896.66	314.24
40 05 19 00-3868	EA	6" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	1,967.86	350.39
40 05 19 00-3869	EA	8" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	2,457.92	319.41
40 05 19 00-3870	EA	8" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	2,630.26	361.51
40 05 19 00-3871	EA	8" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	2,675.97	388.53
40 05 19 00-3872	EA	10" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	3,237.08	344.83
40 05 19 00-3873	EA	10" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	3,493.04	386.94
40 05 19 00-3874	EA	10" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	3,773.74	413.95
40 05 19 00-3875	EA	10" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	4,539.73	510.89
40 05 19 00-3876	EA	12" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	4,242.30	357.94
40 05 19 00-3877	EA	12" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	4,401.35	400.05
40 05 19 00-3878	EA	12" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	4,682.04	427.06
40 05 19 00-3879	EA	12" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	5,497.32	524.00
40 05 19 00-3880	EA	12" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	5,150.40	553.00
40 05 19 00-3881	EA	14" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	5,307.26	411.57
40 05 19 00-3882	EA	14" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	5,587.96	438.58
40 05 19 00-3883	EA	14" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,066.56	535.52
40 05 19 00-3884	EA	14" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,544.05	564.52
40 05 19 00-3885	EA	14" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,822.06	591.93
40 05 19 00-3886	EA	16" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,338.85	445.34
40 05 19 00-3887	EA	16" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,665.52	472.35
40 05 19 00-3888	EA	16" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	7,145.76	569.29
40 05 19 00-3889	EA	16" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	7,669.23	598.29
40 05 19 00-3890	EA	16" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	10,533.77	625.70
40 05 19 00-3891	EA	16" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	8,481.18	754.81
40 05 19 00-3892	EA	18" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,660.70	481.09
40 05 19 00-3893	EA	18" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	6,987.38	508.11
40 05 19 00-3894	EA	18" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	7,372.38	605.04
40 05 19 00-3895	EA	18" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	7,895.84	634.04
40 05 19 00-3896	EA	18" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	8,986.77	661.46
40 05 19 00-3897	EA	18" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	9,614.30	790.56
40 05 19 00-3898	EA	18" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	9,976.67	842.21
40 05 19 00-3899	EA	20" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	8,576.06	536.71
40 05 19 00-3900	EA	20" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	8,925.74	563.73
40 05 19 00-3901	EA	20" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	9,277.89	660.66
40 05 19 00-3902	EA	20" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	9,835.85	689.66
40 05 19 00-3903	EA	20" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	9,982.48	717.07
40 05 19 00-3904	EA	20" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	11,927.10	846.18
40 05 19 00-3905	EA	20" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	12,312.44	897.82
40 05 19 00-3906	EA	20" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	13,286.19	1,064.68
40 05 19 00-3907	EA	24" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	11,343.22	572.46
40 05 19 00-3908	EA	24" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	11,592.71	599.48
40 05 19 00-3909	EA	24" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	12,097.59	696.41
40 05 19 00-3910	EA	24" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	12,450.27	725.42
40 05 19 00-3911	EA	24" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	12,646.17	752.82
40 05 19 00-3912	EA	24" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	13,201.45	881.94
40 05 19 00-3913	EA	24" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	16,933.68	933.58
40 05 19 00-3914	EA	24" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	17,760.24	1,039.06
40 05 19 00-3915	EA	24" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	19,383.77	1,160.03
40 05 19 00-3916	EA	30" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	20,343.91	824.73
40 05 19 00-3917	EA	30" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	20,439.64	852.14
40 05 19 00-3918	EA	30" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	21,019.55	981.26
40 05 19 00-3919	EA	30" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	21,211.11	1,032.90
40 05 19 00-3920	EA	30" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	22,068.26	1,199.75
40 05 19 00-3921	EA	30" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	28,497.60	1,259.34
40 05 19 00-3922	EA	30" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	31,879.30	1,636.75
40 05 19 00-3923	EA	36" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	28,489.56	1,049.19
40 05 19 00-3924	EA	36" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	28,525.08	1,072.62
40 05 19 00-3925	EA	36" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	29,019.60	1,177.90
40 05 19 00-3926	EA	36" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	29,200.23	1,225.57
40 05 19 00-3927	EA	36" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	29,906.85	1,364.61
40 05 19 00-3928	EA	36" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	30,870.00	1,418.25
40 05 19 00-3929	EA	36" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	41,201.42	1,726.14
40 05 19 00-3930	EA	36" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	44,974.37	1,887.02
40 05 19 00-3931	EA	42" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	42,453.99	1,100.43

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-3932	EA		42" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	42,593.02	1,152.07
40 05 19 00-3933	EA		42" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	43,407.47	1,318.93
40 05 19 00-3934	EA		42" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	44,433.83	1,378.52
40 05 19 00-3935	EA		42" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	57,227.20	1,755.92
40 05 19 00-3936	EA		42" x 42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	77,908.64	1,952.57
40 05 19 00-3937	EA		48" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	57,819.95	1,448.05
40 05 19 00-3938	EA		48" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	58,846.32	1,507.63
40 05 19 00-3939	EA		48" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Cross	61,103.09	1,885.04

40 05 19 00-3940 Flanged End x Flanged End, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducers (40 05 19 00-2059)

40 05 19 00-3941	EA		6" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	960.40	149.37
40 05 19 00-3942	EA		8" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,281.08	160.49
40 05 19 00-3943	EA		8" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,361.31	178.77
40 05 19 00-3944	EA		10" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,710.45	185.92
40 05 19 00-3945	EA		10" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,702.01	204.20
40 05 19 00-3946	EA		10" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	1,912.64	215.31
40 05 19 00-3947	EA		12" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,185.81	199.43
40 05 19 00-3948	EA		12" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,218.44	217.71
40 05 19 00-3949	EA		12" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,374.87	228.83
40 05 19 00-3950	EA		12" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,580.90	254.25
40 05 19 00-3951	EA		14" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,690.18	228.83
40 05 19 00-3952	EA		14" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	2,899.18	239.95
40 05 19 00-3953	EA		14" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,101.92	265.37
40 05 19 00-3954	EA		14" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,010.72	278.88
40 05 19 00-3955	EA		16" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,196.25	262.60
40 05 19 00-3956	EA		16" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,045.59	273.72
40 05 19 00-3957	EA		16" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,289.40	299.14
40 05 19 00-3958	EA		16" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,683.69	312.25
40 05 19 00-3959	EA		16" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,146.19	323.77
40 05 19 00-3960	EA		18" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	3,868.33	309.48
40 05 19 00-3961	EA		18" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,146.62	334.90
40 05 19 00-3962	EA		18" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,105.72	348.01
40 05 19 00-3963	EA		18" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,612.57	359.53
40 05 19 00-3964	EA		18" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,563.56	393.30
40 05 19 00-3965	EA		20" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,714.61	365.09
40 05 19 00-3966	EA		20" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	5,009.32	390.52
40 05 19 00-3967	EA		20" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	4,887.95	403.63
40 05 19 00-3968	EA		20" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	5,511.39	415.15
40 05 19 00-3969	EA		20" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	5,179.91	448.92
40 05 19 00-3970	EA		20" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	6,184.93	484.67
40 05 19 00-3971	EA		24" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	6,837.10	426.27
40 05 19 00-3972	EA		24" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	7,390.70	439.38
40 05 19 00-3973	EA		24" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	7,546.10	450.90
40 05 19 00-3974	EA		24" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	6,743.30	484.67
40 05 19 00-3975	EA		24" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	7,920.77	520.43
40 05 19 00-3976	EA		24" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	8,322.60	514.67
40 05 19 00-3977	EA		30" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	11,322.90	583.98
40 05 19 00-3978	EA		30" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	11,710.45	619.73
40 05 19 00-3979	EA		30" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	12,456.54	675.36
40 05 19 00-3980	EA		30" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	13,611.02	711.11
40 05 19 00-3981	EA		36" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	16,054.99	637.62
40 05 19 00-3982	EA		36" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	16,283.24	673.37
40 05 19 00-3983	EA		36" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	17,290.44	728.99
40 05 19 00-3984	EA		36" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	18,193.66	764.75
40 05 19 00-3985	EA		36" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	20,662.98	864.06
40 05 19 00-3986	EA		42" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	25,233.07	830.29
40 05 19 00-3987	EA		42" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	28,206.57	929.61
40 05 19 00-3988	EA		42" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	31,638.00	983.24
40 05 19 00-3989	EA		48" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	33,432.98	959.40
40 05 19 00-3990	EA		48" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	35,412.91	1,058.72
40 05 19 00-3991	EA		48" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	39,315.68	1,112.35
40 05 19 00-3992	EA		48" x 42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Concentric Reducer	43,766.91	1,177.90

40 05 19 00-3993 Flanged End x Flanged End, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducers (40 05 19 00-2059)

40 05 19 00-3994	EA		6" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	1,027.73	149.37
40 05 19 00-3995	EA		8" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	1,358.26	160.49
40 05 19 00-3996	EA		8" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	1,479.55	178.77
40 05 19 00-3997	EA		10" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	1,710.45	185.92
40 05 19 00-3998	EA		10" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	1,784.12	204.20
40 05 19 00-3999	EA		10" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	1,991.47	215.31
40 05 19 00-4000	EA		12" x 4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	2,185.81	199.43
40 05 19 00-4001	EA		12" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	2,310.40	217.71
40 05 19 00-4002	EA		12" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	2,470.12	228.83
40 05 19 00-4003	EA		12" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	2,746.77	254.25
40 05 19 00-4004	EA		14" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	2,690.18	228.83
40 05 19 00-4005	EA		14" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	2,849.91	239.95

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 19 00-4006	EA		14" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,078.93	265.37
40 05 19 00-4007	EA		14" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,434.42	278.88
40 05 19 00-4008	EA		16" x 6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,196.25	262.60
40 05 19 00-4009	EA		16" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,401.95	273.72
40 05 19 00-4010	EA		16" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,681.89	299.14
40 05 19 00-4011	EA		16" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,987.50	312.25
40 05 19 00-4012	EA		16" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	4,146.19	323.77
40 05 19 00-4013	EA		18" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	3,868.33	309.48
40 05 19 00-4014	EA		18" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	4,146.62	334.90
40 05 19 00-4015	EA		18" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	4,450.59	348.01
40 05 19 00-4016	EA		18" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	4,612.57	359.53
40 05 19 00-4017	EA		18" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	4,949.49	393.30
40 05 19 00-4018	EA		20" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	4,970.80	365.09
40 05 19 00-4019	EA		20" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	5,189.96	390.52
40 05 19 00-4020	EA		20" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	5,390.48	403.63
40 05 19 00-4021	EA		20" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	5,511.39	415.15
40 05 19 00-4022	EA		20" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	5,920.56	448.92
40 05 19 00-4023	EA		20" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	6,180.01	484.67
40 05 19 00-4024	EA		24" x 8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	7,025.21	400.84
40 05 19 00-4025	EA		24" x 10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	6,955.35	426.27
40 05 19 00-4026	EA		24" x 12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	7,078.68	439.38
40 05 19 00-4027	EA		24" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	7,197.95	450.90
40 05 19 00-4028	EA		24" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	7,608.76	484.67
40 05 19 00-4029	EA		24" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	7,920.77	520.43
40 05 19 00-4030	EA		24" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	8,322.60	514.67
40 05 19 00-4031	EA		30" x 14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	13,992.93	550.21
40 05 19 00-4032	EA		30" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	13,034.11	583.98
40 05 19 00-4033	EA		30" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	11,764.65	619.73
40 05 19 00-4034	EA		30" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	12,456.54	675.36
40 05 19 00-4035	EA		30" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	13,611.02	711.11
40 05 19 00-4036	EA		36" x 16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	15,095.92	637.62
40 05 19 00-4037	EA		36" x 18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	15,718.31	673.37
40 05 19 00-4038	EA		36" x 20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	16,628.61	728.99
40 05 19 00-4039	EA		36" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	18,136.18	764.75
40 05 19 00-4040	EA		36" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	20,953.65	864.06
40 05 19 00-4041	EA		42" x 24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	25,233.07	830.29
40 05 19 00-4042	EA		42" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	28,206.57	929.61
40 05 19 00-4043	EA		42" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	31,638.00	983.24
40 05 19 00-4044	EA		48" x 30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	35,412.91	1,058.72
40 05 19 00-4045	EA		48" x 36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	39,315.68	1,112.35
40 05 19 00-4046	EA		48" x 42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Eccentric Reducer	43,766.91	1,177.90
40 05 19 00-4047 Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flanges <small>(40 05 19 00-2059)</small>					
40 05 19 00-4048	EA		4" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	477.31	51.64
40 05 19 00-4049	EA		6" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	726.48	76.28
40 05 19 00-4050	EA		8" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	971.50	90.58
40 05 19 00-4051	EA		10" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	1,416.42	105.67
40 05 19 00-4052	EA		12" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	1,879.31	123.95
40 05 19 00-4053	EA		14" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	2,593.56	139.04
40 05 19 00-4054	EA		16" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	3,134.40	158.90
40 05 19 00-4055	EA		18" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	4,217.68	222.47
40 05 19 00-4056	EA		20" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	5,665.01	278.09
40 05 19 00-4057	EA		24" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	8,313.91	337.68
40 05 19 00-4058	EA		30" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	12,063.67	393.30
40 05 19 00-4059	EA		36" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	22,662.12	433.02
40 05 19 00-4060	EA		42" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	32,512.79	476.72
40 05 19 00-4061	EA		48" Flanged, Ceramic Epoxy Lined (P401), Bituminous Seal Coat, Ductile Iron Blind Flange.....	43,356.47	536.31
40 05 19 00-4062 Ductile Iron Bolt Packs <small>(40 05 19)</small>					
Note: Labor installation is included with pipe fittings or valves.					
40 05 19 00-4063	EA		4" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	44.25	
Note: Includes eight (8) 5/8" diameter plain finish bolts with washers and nut.					
For Zinc Plated, Add				12.39	
For Hot Dip Galvanized, Add				17.70	
40 05 19 00-4064	EA		6" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	68.28	
Note: Includes eight (8) 3/4" diameter plain finish bolts with washers and nut.					
For Zinc Plated, Add				19.12	
For Hot Dip Galvanized, Add				27.31	
40 05 19 00-4065	EA		8" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	74.14	
Note: Includes eight (8) 3/4" diameter plain finish bolts with washers and nut.					
For Zinc Plated, Add				20.76	
For Hot Dip Galvanized, Add				29.66	
40 05 19 00-4066	EA		10" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	166.53	
Note: Includes twelve (12) 7/8" diameter plain finish bolts with washers and nut.					
For Zinc Plated, Add				46.63	
For Hot Dip Galvanized, Add				66.61	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 19 Ductile Iron Process Pipe**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 19 00-4067	EA 12" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	168.00	
	Note: Includes twelve (12) 7/8" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	47.04	
	For Hot Dip Galvanized, Add	67.20	
40 05 19 00-4068	EA 14" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	188.22	
	Note: Includes twelve (12) 1" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	52.70	
	For Hot Dip Galvanized, Add	75.29	
40 05 19 00-4069	EA 16" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	316.42	
	Note: Includes sixteen (16) 1" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	88.60	
	For Hot Dip Galvanized, Add	126.57	
40 05 19 00-4070	EA 18" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	459.67	
	Note: Includes sixteen (16) 1-1/8" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	128.71	
	For Hot Dip Galvanized, Add	183.87	
40 05 19 00-4071	EA 20" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	580.39	
	Note: Includes twenty (20) 1-1/8" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	162.51	
	For Hot Dip Galvanized, Add	232.16	
40 05 19 00-4072	EA 24" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	830.44	
	Note: Includes twenty (20) 1-1/4" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	232.52	
	For Hot Dip Galvanized, Add	332.18	
40 05 19 00-4073	EA 30" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	1,312.22	
	Note: Includes twenty-eight (28) 1-1/4" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	367.42	
	For Hot Dip Galvanized, Add	524.89	
40 05 19 00-4074	EA 36" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	1,871.92	
	Note: Includes thirty-two (32) 1-1/2" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	524.14	
	For Hot Dip Galvanized, Add	748.77	
40 05 19 00-4075	EA 42" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	2,408.16	
	Note: Includes thirty-six (36) 1-1/2" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	674.28	
	For Hot Dip Galvanized, Add	963.26	
40 05 19 00-4076	EA 48" Pipe Diameter, Ductile Iron Flange Bolt Pack.....	2,943.31	
	Note: Includes forty-four (44) 1-1/2" diameter plain finish bolts with washers and nut.		
	For Zinc Plated, Add	824.13	
	For Hot Dip Galvanized, Add	1,177.32	
40 05 19 00-4077	Full Face Flange Gaskets, ANSI/AWWA C115/A21.15 (40 05 19)		
	Note: Labor installation is included with pipe fittings or valves.		
40 05 19 00-4078	Full Face Flange Styrene Butadiene (SBR) Gaskets (40 05 19 00-4077)		
40 05 19 00-4079	EA 4" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	8.44	
40 05 19 00-4080	EA 6" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	10.74	
40 05 19 00-4081	EA 8" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	14.57	
40 05 19 00-4082	EA 10" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	16.87	
40 05 19 00-4083	EA 12" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	18.40	
40 05 19 00-4084	EA 14" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	30.67	
40 05 19 00-4085	EA 16" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	37.58	
40 05 19 00-4086	EA 18" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	39.88	
40 05 19 00-4087	EA 20" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	61.35	
40 05 19 00-4088	EA 24" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	65.95	
40 05 19 00-4089	EA 30" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	85.12	
40 05 19 00-4090	EA 36" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	97.39	
40 05 19 00-4091	EA 42" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	104.29	
40 05 19 00-4092	EA 48" Full Face Flange Styrene Butadiene (SBR) Gasket, 1/8" Thick.....	114.26	
40 05 19 00-4093	Full Face Flange Nitrile Buna-N (NBR) Gaskets (40 05 19 00-4077)		
	Note: (Acrylonitrile Butadiene)		
40 05 19 00-4094	EA 4" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	26.07	
40 05 19 00-4095	EA 6" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	36.81	
40 05 19 00-4096	EA 8" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	56.75	
40 05 19 00-4097	EA 10" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	62.11	
40 05 19 00-4098	EA 12" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	66.72	
40 05 19 00-4099	EA 14" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	125.76	
40 05 19 00-4100	EA 16" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	154.90	
40 05 19 00-4101	EA 18" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	155.67	
40 05 19 00-4102	EA 20" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	161.81	
40 05 19 00-4103	EA 24" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	171.01	
40 05 19 00-4104	EA 30" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	189.41	
40 05 19 00-4105	EA 36" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	208.58	
40 05 19 00-4106	EA 42" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	296.77	
40 05 19 00-4107	EA 48" Full Face Flange Nitrile (NBR) Gasket, 1/8" Thick.....	324.38	
40 05 19 00-4108	Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gaskets (40 05 19 00-4077)		
40 05 19 00-4109	EA 4" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	23.01	
40 05 19 00-4110	EA 6" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	29.91	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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40 05 19 00-4111	EA	8" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	40.64	
40 05 19 00-4112	EA	10" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	47.54	
40 05 19 00-4113	EA	12" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	52.91	
40 05 19 00-4114	EA	14" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	87.42	
40 05 19 00-4115	EA	16" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	105.06	
40 05 19 00-4116	EA	18" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	105.83	
40 05 19 00-4117	EA	20" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	108.13	
40 05 19 00-4118	EA	24" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	125.76	
40 05 19 00-4119	EA	30" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	154.14	
40 05 19 00-4120	EA	36" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	175.61	
40 05 19 00-4121	EA	42" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	251.53	
40 05 19 00-4122	EA	48" Full Face Flange Ethylene Propylene Diene Monomer (EPDM) Gasket, 1/8" Thick.....	277.60	

40 05 19 00-4123 Full Face Flange Neoprene Gaskets (40 05 19 00-4077)
 Note: (Polychloroprene)

40 05 19 00-4124	EA	4" Full Face Flange Neoprene Gasket, 1/8" Thick.....	26.84	
40 05 19 00-4125	EA	6" Full Face Flange Neoprene Gasket, 1/8" Thick.....	37.58	
40 05 19 00-4126	EA	8" Full Face Flange Neoprene Gasket, 1/8" Thick.....	57.51	
40 05 19 00-4127	EA	10" Full Face Flange Neoprene Gasket, 1/8" Thick.....	62.11	
40 05 19 00-4128	EA	12" Full Face Flange Neoprene Gasket, 1/8" Thick.....	66.72	
40 05 19 00-4129	EA	14" Full Face Flange Neoprene Gasket, 1/8" Thick.....	88.95	
40 05 19 00-4130	EA	16" Full Face Flange Neoprene Gasket, 1/8" Thick.....	156.44	
40 05 19 00-4131	EA	18" Full Face Flange Neoprene Gasket, 1/8" Thick.....	157.20	
40 05 19 00-4132	EA	20" Full Face Flange Neoprene Gasket, 1/8" Thick.....	166.41	
40 05 19 00-4133	EA	24" Full Face Flange Neoprene Gasket, 1/8" Thick.....	168.71	
40 05 19 00-4134	EA	30" Full Face Flange Neoprene Gasket, 1/8" Thick.....	183.28	
40 05 19 00-4135	EA	36" Full Face Flange Neoprene Gasket, 1/8" Thick.....	206.28	
40 05 19 00-4136	EA	42" Full Face Flange Neoprene Gasket, 1/8" Thick.....	299.07	
40 05 19 00-4137	EA	48" Full Face Flange Neoprene Gasket, 1/8" Thick.....	327.44	

40 05 19 00-4138 Full Face Flange FKM Gaskets (40 05 19 00-4077)
 Note: (Fluoroelastomer Fluorel Viton®)

40 05 19 00-4139	EA	4" Full Face Flange FKM Gasket, 1/8" Thick.....	126.38	
40 05 19 00-4140	EA	6" Full Face Flange FKM Gasket, 1/8" Thick.....	188.17	
40 05 19 00-4141	EA	8" Full Face Flange FKM Gasket, 1/8" Thick.....	251.36	
40 05 19 00-4142	EA	10" Full Face Flange FKM Gasket, 1/8" Thick.....	303.32	
40 05 19 00-4143	EA	12" Full Face Flange FKM Gasket, 1/8" Thick.....	394.59	
40 05 19 00-4144	EA	14" Full Face Flange FKM Gasket, 1/8" Thick.....	721.78	
40 05 19 00-4145	EA	16" Full Face Flange FKM Gasket, 1/8" Thick.....	827.10	
40 05 19 00-4146	EA	18" Full Face Flange FKM Gasket, 1/8" Thick.....	866.42	
40 05 19 00-4147	EA	20" Full Face Flange FKM Gasket, 1/8" Thick.....	924.00	
40 05 19 00-4148	EA	24" Full Face Flange FKM Gasket, 1/8" Thick.....	1,277.87	
40 05 19 00-4149	EA	30" Full Face Flange FKM Gasket, 1/8" Thick.....	1,532.04	
40 05 19 00-4150	EA	36" Full Face Flange FKM Gasket, 1/8" Thick.....	1,616.29	
40 05 19 00-4151	EA	42" Full Face Flange FKM Gasket, 1/8" Thick.....	2,015.10	
40 05 19 00-4152	EA	48" Full Face Flange FKM Gasket, 1/8" Thick.....	2,111.99	

40 05 19 00-4153 Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100) (40 05 19)

40 05 19 00-4154	EA	4" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	400.93	76.46
40 05 19 00-4155	EA	6" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	555.91	93.35
40 05 19 00-4156	EA	8" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	822.50	113.85
40 05 19 00-4157	EA	10" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	1,129.34	138.89
40 05 19 00-4158	EA	12" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	1,433.63	169.36
40 05 19 00-4159	EA	14" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	2,302.19	206.63
40 05 19 00-4160	EA	16" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	3,619.31	252.17
40 05 19 00-4161	EA	18" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	3,737.87	307.57
40 05 19 00-4162	EA	20" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	4,579.44	375.32
40 05 19 00-4163	EA	24" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	5,103.11	457.78
40 05 19 00-4164	EA	30" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	6,576.30	558.60
40 05 19 00-4165	EA	36" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	9,774.03	681.41
40 05 19 00-4166	EA	42" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	25,464.44	831.40
40 05 19 00-4167	EA	48" Restrained Flange Adapter For Ductile Iron Pipe (Megaflange 2100).....	32,525.43	1,014.24

40 05 23 Stainless Steel Process Pipe and Tubing (40 05)

40 05 23 23 300- and 400-Series Stainless Steel Process Pipe (40 05 23)

40 05 23 23-0001		Schedule 40 Pipe, Type 304, With 150 LB Screwed Fittings Assembly (40 05 23)		
		Note: Includes hangers and fittings. Fittings are assumed every 10'. Not for use where detail is available.		
40 05 23 23-0002	LF	1/2" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly.....	39.16	9.41
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		For Type 316, Add	5.27	
		For Work In Restricted Working Space, Add	5.67	
40 05 23 23-0003	LF	3/4" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly.....	43.70	10.79
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		For Type 316, Add	5.52	
		For Work In Restricted Working Space, Add	6.74	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0004	LF	1" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	50.94	12.17
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Type 316, Add</i>	6.47	
		<i>For Work In Restricted Working Space, Add</i>	7.82	
40 05 23 23-0005	LF	1-1/4" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	59.47	14.70
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Type 316, Add</i>	8.16	
		<i>For Work In Restricted Working Space, Add</i>	8.42	
40 05 23 23-0006	LF	1-1/2" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	66.06	15.12
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Type 316, Add</i>	9.35	
		<i>For Work In Restricted Working Space, Add</i>	9.03	
40 05 23 23-0007	LF	2" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	80.12	19.99
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Type 316, Add</i>	11.40	
		<i>For Work In Restricted Working Space, Add</i>	10.88	
40 05 23 23-0008	LF	2-1/2" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	120.33	24.63
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Type 316, Add</i>	19.61	
		<i>For Work In Restricted Working Space, Add</i>	13.48	
40 05 23 23-0009	LF	3" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	153.16	28.55
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Type 316, Add</i>	25.53	
		<i>For Work In Restricted Working Space, Add</i>	16.49	
40 05 23 23-0010	LF	4" Stainless Steel Pipe, Schedule 40 Type 304 With 150 LB Screwed Fitting Assembly	211.14	28.55
		Note: Includes all fittings and hangers. Fittings are assumed every 10'. Not for use where detail is available.		
		<i>For Work In Restricted Working Space, Add</i>	20.92	
40 05 23 23-0011		Stainless Steel Tubing And Fittings <small>(40 05 23 23)</small>		
40 05 23 23-0012		Type 304 Tubing <small>(40 05 23 23-0011)</small>		
40 05 23 23-0013		0.035" Wall <small>(40 05 23 23-0012)</small>		
40 05 23 23-0014	LF	1/4", 0.035" Wall, Type 304, Stainless Steel Tubing	8.66	3.10
		<i>For Work In Restricted Working Space, Add</i>	1.85	
40 05 23 23-0015	LF	3/8", 0.035" Wall, Type 304, Stainless Steel Tubing	10.00	3.68
		<i>For Work In Restricted Working Space, Add</i>	2.21	
40 05 23 23-0016	LF	1/2", 0.035" Wall, Type 304, Stainless Steel Tubing	11.97	4.36
		<i>For Work In Restricted Working Space, Add</i>	2.59	
40 05 23 23-0017	LF	5/8", 0.035" Wall, Type 304, Stainless Steel Tubing	20.05	4.94
		<i>For Work In Restricted Working Space, Add</i>	2.96	
40 05 23 23-0018	LF	3/4", 0.035" Wall, Type 304, Stainless Steel Tubing	23.85	5.51
		<i>For Work In Restricted Working Space, Add</i>	3.33	
40 05 23 23-0019	LF	7/8", 0.035" Wall, Type 304, Stainless Steel Tubing	26.39	6.21
		<i>For Work In Restricted Working Space, Add</i>	3.71	
40 05 23 23-0020	LF	1", 0.035" Wall, Type 304, Stainless Steel Tubing	29.36	7.46
		<i>For Work In Restricted Working Space, Add</i>	4.45	
40 05 23 23-0021		0.049" Wall <small>(40 05 23 23-0012)</small>		
40 05 23 23-0022	LF	1/4", 0.049" Wall, Type 304, Stainless Steel Tubing	14.79	3.68
		<i>For Work In Restricted Working Space, Add</i>	2.21	
40 05 23 23-0023	LF	3/8", 0.049" Wall, Type 304, Stainless Steel Tubing	16.43	4.36
		<i>For Work In Restricted Working Space, Add</i>	2.59	
40 05 23 23-0024	LF	1/2", 0.049" Wall, Type 304, Stainless Steel Tubing	19.83	4.94
		<i>For Work In Restricted Working Space, Add</i>	2.96	
40 05 23 23-0025	LF	5/8", 0.049" Wall, Type 304, Stainless Steel Tubing	25.10	6.21
		<i>For Work In Restricted Working Space, Add</i>	3.71	
40 05 23 23-0026	LF	3/4", 0.049" Wall, Type 304, Stainless Steel Tubing	28.63	7.46
		<i>For Work In Restricted Working Space, Add</i>	4.45	
40 05 23 23-0027	LF	7/8", 0.049" Wall, Type 304, Stainless Steel Tubing	32.10	8.61
		<i>For Work In Restricted Working Space, Add</i>	5.18	
40 05 23 23-0028	LF	1", 0.049" Wall, Type 304, Stainless Steel Tubing	37.06	9.76
		<i>For Work In Restricted Working Space, Add</i>	5.89	
40 05 23 23-0029		0.065" Wall <small>(40 05 23 23-0012)</small>		
40 05 23 23-0030	LF	1/4", 0.065" Wall, Type 304, Stainless Steel Tubing	17.26	4.36
		<i>For Work In Restricted Working Space, Add</i>	2.59	
40 05 23 23-0031	LF	3/8", 0.065" Wall, Type 304, Stainless Steel Tubing	19.89	4.94
		<i>For Work In Restricted Working Space, Add</i>	2.96	
40 05 23 23-0032	LF	1/2", 0.065" Wall, Type 304, Stainless Steel Tubing	24.49	6.21
		<i>For Work In Restricted Working Space, Add</i>	3.71	
40 05 23 23-0033	LF	5/8", 0.065" Wall, Type 304, Stainless Steel Tubing	28.74	7.46
		<i>For Work In Restricted Working Space, Add</i>	4.45	
40 05 23 23-0034	LF	3/4", 0.065" Wall, Type 304, Stainless Steel Tubing	33.93	8.61
		<i>For Work In Restricted Working Space, Add</i>	5.18	
40 05 23 23-0035	LF	7/8", 0.065" Wall, Type 304, Stainless Steel Tubing	39.01	9.76
		<i>For Work In Restricted Working Space, Add</i>	5.89	
40 05 23 23-0036	LF	1", 0.065" Wall, Type 304, Stainless Steel Tubing	43.98	11.03
		<i>For Work In Restricted Working Space, Add</i>	6.63	

	MINOR	CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0037		Type 304 Tube Fittings (40 05 23 23-0011)		
40 05 23 23-0038		90 Degree Elbows (40 05 23 23-0037)		
40 05 23 23-0039	EA	1/4", Type 304, Stainless Steel, 90 Degree Elbow	56.20	12.40
		<i>For Work In Restricted Working Space, Add</i>	7.41	
40 05 23 23-0040	EA	3/8", Type 304, Stainless Steel, 90 Degree Elbow	66.74	13.56
		<i>For Work In Restricted Working Space, Add</i>	8.11	
40 05 23 23-0041	EA	1/2", Type 304, Stainless Steel, 90 Degree Elbow	101.84	15.28
		<i>For Work In Restricted Working Space, Add</i>	9.19	
40 05 23 23-0042	EA	5/8", Type 304, Stainless Steel, 90 Degree Elbow	108.58	17.11
		<i>For Work In Restricted Working Space, Add</i>	10.29	
40 05 23 23-0043	EA	3/4", Type 304, Stainless Steel, 90 Degree Elbow	121.61	18.50
		<i>For Work In Restricted Working Space, Add</i>	11.12	
40 05 23 23-0044	EA	7/8", Type 304, Stainless Steel, 90 Degree Elbow	167.34	20.56
		<i>For Work In Restricted Working Space, Add</i>	12.31	
40 05 23 23-0045	EA	1", Type 304, Stainless Steel, 90 Degree Elbow	213.54	24.47
		<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0046		Union Tees (40 05 23 23-0037)		
40 05 23 23-0047	EA	1/4", Type 304, Stainless Steel, Union Tee	89.43	18.50
		<i>For Work In Restricted Working Space, Add</i>	11.12	
40 05 23 23-0048	EA	3/8", Type 304, Stainless Steel, Union Tee	108.97	20.56
		<i>For Work In Restricted Working Space, Add</i>	12.31	
40 05 23 23-0049	EA	1/2", Type 304, Stainless Steel, Union Tee	150.19	22.98
		<i>For Work In Restricted Working Space, Add</i>	13.79	
40 05 23 23-0050	EA	5/8", Type 304, Stainless Steel, Union Tee	161.24	26.07
		<i>For Work In Restricted Working Space, Add</i>	15.66	
40 05 23 23-0051	EA	3/4", Type 304, Stainless Steel, Union Tee	207.34	28.02
		<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0052	EA	7/8", Type 304, Stainless Steel, Union Tee	332.88	31.02
		<i>For Work In Restricted Working Space, Add</i>	18.63	
40 05 23 23-0053	EA	1", Type 304, Stainless Steel, Union Tee	398.99	37.10
		<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0054		Unions (40 05 23 23-0037)		
40 05 23 23-0055	EA	1/4", Type 304, Stainless Steel, Union	85.26	18.50
		<i>For Work In Restricted Working Space, Add</i>	11.12	
40 05 23 23-0056	EA	3/8", Type 304, Stainless Steel, Union	111.32	20.56
		<i>For Work In Restricted Working Space, Add</i>	12.31	
40 05 23 23-0057	EA	1/2", Type 304, Stainless Steel, Union	151.73	22.98
		<i>For Work In Restricted Working Space, Add</i>	13.79	
40 05 23 23-0058	EA	5/8", Type 304, Stainless Steel, Union	185.45	26.07
		<i>For Work In Restricted Working Space, Add</i>	15.66	
40 05 23 23-0059	EA	3/4", Type 304, Stainless Steel, Union	222.07	28.02
		<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0060	EA	7/8", Type 304, Stainless Steel, Union	344.63	31.02
		<i>For Work In Restricted Working Space, Add</i>	18.63	
40 05 23 23-0061	EA	1", Type 304, Stainless Steel, Union	365.69	37.10
		<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0062		Male Connectors (40 05 23 23-0037)		
40 05 23 23-0063	EA	1/4" x 1/4", Type 304, Stainless Steel, Male Connection	41.28	12.40
		<i>For Work In Restricted Working Space, Add</i>	7.41	
40 05 23 23-0064	EA	3/8" x 3/8", Type 304, Stainless Steel, Male Connection	52.07	13.56
		<i>For Work In Restricted Working Space, Add</i>	8.11	
40 05 23 23-0065	EA	1/2" x 1/2", Type 304, Stainless Steel, Male Connection	68.10	15.28
		<i>For Work In Restricted Working Space, Add</i>	9.19	
40 05 23 23-0066	EA	5/8" x 5/8" Male Connection, Stainless Steel Type 304	76.77	17.11
		<i>For Work In Restricted Working Space, Add</i>	10.29	
40 05 23 23-0067	EA	3/4" x 3/4", Type 304, Stainless Steel, Male Connection	93.34	18.50
		<i>For Work In Restricted Working Space, Add</i>	11.12	
40 05 23 23-0068	EA	7/8" x 7/8", Type 304, Stainless Steel, Male Connection	142.55	20.56
		<i>For Work In Restricted Working Space, Add</i>	12.31	
40 05 23 23-0069	EA	1" x 1", Type 304, Stainless Steel, Male Connection	148.51	24.47
		<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0070		Type 304 Valves (40 05 23 23-0011)		
40 05 23 23-0071		Gate Valves (40 05 23 23-0070)		
40 05 23 23-0072	EA	1/4" Gate Valve, Stainless Steel Type 304	230.80	18.50
		<i>For Work In Restricted Working Space, Add</i>	10.03	
40 05 23 23-0073	EA	3/8" Gate Valve, Stainless Steel Type 304	391.08	21.71
		<i>For Work In Restricted Working Space, Add</i>	10.56	
40 05 23 23-0074	EA	1/2" Gate Valve, Stainless Steel Type 304	404.75	24.47
		<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0075	EA	3/4" Gate Valve, Stainless Steel Type 304	448.49	28.02
		<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0076	EA	1" Gate Valve, Stainless Steel Type 304	409.39	37.10
		<i>For Work In Restricted Working Space, Add</i>	22.23	

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**MINOR
CSI UOM DESCRIPTIONTOTAL DIRECT DEMOLITION
UNIT COST UNIT COST

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23	23-0077		Globe Valves (40 05 23 23-0070)		
40 05 23	23-0078	EA	1/4" Globe Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	234.03 10.03	18.50
40 05 23	23-0079	EA	3/8" Globe Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	153.27 10.56	21.71
40 05 23	23-0080	EA	1/2" Globe Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	276.84 14.66	24.47
40 05 23	23-0081	EA	3/4" Globe Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	308.01 16.81	28.02
40 05 23	23-0082	EA	1" Globe Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	450.10 22.23	37.10
40 05 23	23-0083		Check Valves (40 05 23 23-0070)		
40 05 23	23-0084	EA	1/4" Check Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	329.06 10.03	18.50
40 05 23	23-0085	EA	3/8" Check Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	330.83 10.56	21.71
40 05 23	23-0086	EA	1/2" Check Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	214.12 14.66	24.47
40 05 23	23-0087	EA	3/4" Check Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	223.67 16.81	28.02
40 05 23	23-0088	EA	1" Check Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	246.54 22.23	37.10
40 05 23	23-0089		Plug Valves (40 05 23 23-0070)		
40 05 23	23-0090	EA	1/2" Plug Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	509.27 14.66	24.47
40 05 23	23-0091	EA	3/4" Plug Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	557.34 16.81	28.02
40 05 23	23-0092	EA	1" Plug Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	629.98 22.23	37.10
40 05 23	23-0093	EA	1-1/2" Plug Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	876.91 25.15	41.93
40 05 23	23-0094	EA	2" Plug Valve, Stainless Steel Type 304 <i>For Work In Restricted Working Space, Add</i>	1,141.34 34.46	57.43
40 05 23	23-0095		Type 316 Tubing (40 05 23 23-0011)		
40 05 23	23-0096		0.035" Wall (40 05 23 23-0095)		
40 05 23	23-0097	LF	1/4" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	9.04 1.85	3.10
40 05 23	23-0098	LF	3/8" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	11.86 2.21	3.68
40 05 23	23-0099	LF	1/2" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	13.11 2.59	4.36
40 05 23	23-0100	LF	5/8" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	23.06 2.96	4.94
40 05 23	23-0101	LF	3/4" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	26.19 3.33	5.51
40 05 23	23-0102	LF	7/8" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	33.57 3.71	6.21
40 05 23	23-0103	LF	1" Stainless Steel Tubing, Type 316, 0.035" Wall <i>For Work In Restricted Working Space, Add</i>	34.92 4.45	7.46
40 05 23	23-0104		0.049" Wall (40 05 23 23-0095)		
40 05 23	23-0105	LF	1/4" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	16.40 2.21	3.68
40 05 23	23-0106	LF	3/8" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	18.12 2.59	4.36
40 05 23	23-0107	LF	1/2" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	21.41 2.96	4.94
40 05 23	23-0108	LF	5/8" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	28.03 3.71	6.21
40 05 23	23-0109	LF	3/4" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	32.27 4.45	7.46
40 05 23	23-0110	LF	7/8" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	41.45 5.18	8.61
40 05 23	23-0111	LF	1" Stainless Steel Tubing, Type 316, 0.049" Wall <i>For Work In Restricted Working Space, Add</i>	41.97 5.89	9.76
40 05 23	23-0112		0.065" Wall (40 05 23 23-0095)		
40 05 23	23-0113	LF	1/4" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	19.18 2.59	4.36
40 05 23	23-0114	LF	3/8" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	21.35 2.96	4.94

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0115 LF 1/2" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	26.79 3.71	6.21
40 05 23 23-0116 LF 5/8" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	31.91 4.45	7.46
40 05 23 23-0117 LF 3/4" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	38.79 5.18	8.61
40 05 23 23-0118 LF 7/8" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	42.62 5.89	9.76
40 05 23 23-0119 LF 1" Stainless Steel Tubing, Type 316, 0.065" Wall <i>For Work In Restricted Working Space, Add</i>	49.79 6.63	11.03
40 05 23 23-0120 Type 316 Tube Fittings <small>(40 05 23 23-0011)</small>		
40 05 23 23-0121 90 Degree Elbows <small>(40 05 23 23-0120)</small>		
40 05 23 23-0122 EA 1/4" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	78.93 7.41	12.40
40 05 23 23-0123 EA 3/8" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	95.41 8.11	13.56
40 05 23 23-0124 EA 1/2" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	153.24 9.19	15.28
40 05 23 23-0125 EA 5/8" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	162.21 10.29	17.11
40 05 23 23-0126 EA 3/4" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	182.65 11.12	18.50
40 05 23 23-0127 EA 7/8" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	258.54 12.31	20.56
40 05 23 23-0128 EA 1" 90 Degree Elbow, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	332.43 14.66	24.47
40 05 23 23-0129 Union Tees <small>(40 05 23 23-0120)</small>		
40 05 23 23-0130 EA 1/4" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	127.24 11.12	18.50
40 05 23 23-0131 EA 3/8" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	158.03 12.31	20.56
40 05 23 23-0132 EA 1/2" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	225.45 13.79	22.98
40 05 23 23-0133 EA 5/8" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	239.96 15.66	26.07
40 05 23 23-0134 EA 3/4" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	316.59 16.81	28.02
40 05 23 23-0135 EA 7/8" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	528.38 18.63	31.02
40 05 23 23-0136 EA 1" Union Tee, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	633.54 22.23	37.10
40 05 23 23-0137 Unions <small>(40 05 23 23-0120)</small>		
40 05 23 23-0138 EA 1/4" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	79.49 11.12	18.50
40 05 23 23-0139 EA 3/8" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	102.92 12.31	20.56
40 05 23 23-0140 EA 1/2" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	139.09 13.79	22.98
40 05 23 23-0141 EA 5/8" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	169.52 15.66	26.07
40 05 23 23-0142 EA 3/4" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	202.22 16.81	28.02
40 05 23 23-0143 EA 7/8" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	310.86 18.63	31.02
40 05 23 23-0144 EA 1" Union, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	330.83 22.23	37.10
40 05 23 23-0145 Male Connectors <small>(40 05 23 23-0120)</small>		
40 05 23 23-0146 EA 1/4" x 1/4" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	53.00 7.41	12.40
40 05 23 23-0147 EA 3/8" x 3/8" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	69.77 8.11	13.56
40 05 23 23-0148 EA 1/2" x 1/2" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	94.59 9.19	15.28
40 05 23 23-0149 EA 5/8" x 5/8" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	106.80 10.29	17.11
40 05 23 23-0150 EA 3/4" x 3/4" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	133.14 11.12	18.50
40 05 23 23-0151 EA 7/8" x 7/8" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	214.33 12.31	20.56
40 05 23 23-0152 EA 1" x 1" Male Connector, Stainless Steel Type 316 <i>For Work In Restricted Working Space, Add</i>	218.95 14.66	24.47
40 05 23 23-0153 Type 316 Valves <small>(40 05 23 23-0011)</small>		

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0154 Gate Valves <small>(40 05 23 23-0153)</small>					
40 05 23 23-0155	EA		1/4" Gate Valve, Stainless Steel Type 316	294.52	18.50
			<i>For Work In Restricted Working Space, Add</i>	10.03	
40 05 23 23-0156	EA		3/8" Gate Valve, Stainless Steel Type 316	505.98	21.71
			<i>For Work In Restricted Working Space, Add</i>	10.56	
40 05 23 23-0157	EA		1/2" Gate Valve, Stainless Steel Type 316	519.65	24.47
			<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0158	EA		3/4" Gate Valve, Stainless Steel Type 316	575.21	28.02
			<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0159	EA		1" Gate Valve, Stainless Steel Type 316	517.64	37.10
			<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0160	EA		1-1/4" Gate Valve, Stainless Steel Type 316	714.40	38.48
			<i>For Work In Restricted Working Space, Add</i>	23.09	
40 05 23 23-0161	EA		1-1/2" Gate Valve, Stainless Steel Type 316	1,153.06	41.93
			<i>For Work In Restricted Working Space, Add</i>	25.15	
40 05 23 23-0162	EA		2" Gate Valve, Stainless Steel Type 316	1,369.42	57.43
			<i>For Work In Restricted Working Space, Add</i>	34.46	
40 05 23 23-0163	EA		2-1/2" Gate Valve, Stainless Steel Type 316	2,007.15	183.90
			<i>For Work In Restricted Working Space, Add</i>	110.30	
40 05 23 23-0164 Globe Valves <small>(40 05 23 23-0153)</small>					
40 05 23 23-0165	EA		1/4" Globe Valve, Stainless Steel Type 316	298.80	18.50
			<i>For Work In Restricted Working Space, Add</i>	10.03	
40 05 23 23-0166	EA		3/8" Globe Valve, Stainless Steel Type 316	191.40	21.71
			<i>For Work In Restricted Working Space, Add</i>	10.56	
40 05 23 23-0167	EA		1/2" Globe Valve, Stainless Steel Type 316	350.45	24.47
			<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0168	EA		3/4" Globe Valve, Stainless Steel Type 316	389.37	28.02
			<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0169	EA		1" Globe Valve, Stainless Steel Type 316	571.49	37.10
			<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0170	EA		1-1/4" Globe Valve, Stainless Steel Type 316	715.89	38.25
			<i>For Work In Restricted Working Space, Add</i>	22.92	
40 05 23 23-0171	EA		1-1/2" Globe Valve, Stainless Steel Type 316	1,195.83	41.93
			<i>For Work In Restricted Working Space, Add</i>	25.15	
40 05 23 23-0172	EA		2" Globe Valve, Stainless Steel Type 316	1,412.19	57.43
			<i>For Work In Restricted Working Space, Add</i>	34.46	
40 05 23 23-0173	EA		2-1/2" Globe Valve, Stainless Steel Type 316	1,736.28	183.90
			<i>For Work In Restricted Working Space, Add</i>	110.30	
40 05 23 23-0174 Check Valves <small>(40 05 23 23-0153)</small>					
40 05 23 23-0175	EA		1/4" Check Valve, Stainless Steel Type 316	424.50	18.50
			<i>For Work In Restricted Working Space, Add</i>	10.03	
40 05 23 23-0176	EA		3/8" Check Valve, Stainless Steel Type 316	426.27	21.71
			<i>For Work In Restricted Working Space, Add</i>	10.56	
40 05 23 23-0177	EA		1/2" Check Valve, Stainless Steel Type 316	267.48	24.47
			<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0178	EA		3/4" Check Valve, Stainless Steel Type 316	277.79	28.02
			<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0179	EA		1" Check Valve, Stainless Steel Type 316	302.21	37.10
			<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0180	EA		1-1/4" Check Valve, Stainless Steel Type 316	421.68	38.48
			<i>For Work In Restricted Working Space, Add</i>	23.09	
40 05 23 23-0181	EA		1-1/2" Check Valve, Stainless Steel Type 316	953.47	41.93
			<i>For Work In Restricted Working Space, Add</i>	25.15	
40 05 23 23-0182	EA		2" Check Valve, Stainless Steel Type 316	1,155.58	57.43
			<i>For Work In Restricted Working Space, Add</i>	34.46	
40 05 23 23-0183	EA		2-1/2" Check Valve, Stainless Steel Type 316	2,268.51	183.90
			<i>For Work In Restricted Working Space, Add</i>	110.30	
40 05 23 23-0184 Diaphragm Valves, Ethylene Propylene Diene Monomer (EPDM) Lined <small>(40 05 23 23-0153)</small>					
40 05 23 23-0185	EA		1/2" Diaphragm Valve, Stainless Steel Type 316, Ethylene Propylene Diene Monomer (EPDM) Lined	454.16	24.47
			<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0186	EA		3/4" Diaphragm Valve, Stainless Steel Type 316, Ethylene Propylene Diene Monomer (EPDM) Lined	530.70	28.02
			<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0187	EA		1" Diaphragm Valve, Stainless Steel Type 316, Ethylene Propylene Diene Monomer (EPDM) Lined	676.47	37.10
			<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0188	EA		1-1/2" Diaphragm Valve, Stainless Steel Type 316, Ethylene Propylene Diene Monomer (EPDM) Lined	1,083.15	41.93
			<i>For Work In Restricted Working Space, Add</i>	25.15	
40 05 23 23-0189	EA		2" Diaphragm Valve, Stainless Steel Type 316, Ethylene Propylene Diene Monomer (EPDM) Lined	1,513.91	57.43
			<i>For Work In Restricted Working Space, Add</i>	34.46	
40 05 23 23-0190 Diaphragm Valves, Teflon Lined <small>(40 05 23 23-0153)</small>					
40 05 23 23-0191	EA		1/2" Diaphragm Valve, Stainless Steel Type 316, Teflon Lined	604.05	24.47
			<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0192	EA		3/4" Diaphragm Valve, Stainless Steel Type 316, Teflon Lined	694.48	28.02
			<i>For Work In Restricted Working Space, Add</i>	16.81	



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0193 EA 1" Diaphragm Valve, Stainless Steel Type 316, Teflon Lined..... <i>For Work In Restricted Working Space, Add</i>	840.25 22.23	37.10
40 05 23 23-0194 EA 1-1/2" Diaphragm Valve, Stainless Steel Type 316, Teflon Lined..... <i>For Work In Restricted Working Space, Add</i>	1,313.54 25.15	41.93
40 05 23 23-0195 EA 2" Diaphragm Valve, Stainless Steel Type 316, Teflon Lined..... <i>For Work In Restricted Working Space, Add</i>	1,788.71 34.46	57.43
40 05 23 23-0196 Strainers <small>(40 05 23 23-0153)</small>		
40 05 23 23-0197 EA 1/2" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	605.50 14.66	24.47
40 05 23 23-0198 EA 3/4" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	724.98 16.89	28.15
40 05 23 23-0199 EA 1" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	948.41 22.40	37.33
40 05 23 23-0200 EA 1-1/4" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	1,180.12 23.09	38.48
40 05 23 23-0201 EA 1-1/2" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	1,483.25 25.16	41.93
40 05 23 23-0202 EA 2" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	2,139.99 34.46	57.43
40 05 23 23-0203 EA 2-1/2" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	2,941.73 45.83	76.39
40 05 23 23-0204 EA 3" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	4,282.83 68.92	114.87
40 05 23 23-0205 EA 4" Strainer, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	5,470.54 110.26	183.78
40 05 23 23-0206 Plug Valves <small>(40 05 23 23-0153)</small>		
40 05 23 23-0207 EA 1/2" Plug Valve, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	645.73 14.66	24.47
40 05 23 23-0208 EA 3/4" Plug Valve, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	705.93 16.81	28.02
40 05 23 23-0209 EA 1" Plug Valve, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	794.75 22.23	37.10
40 05 23 23-0210 EA 1-1/2" Plug Valve, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	1,111.99 25.15	41.93
40 05 23 23-0211 EA 2" Plug Valve, Stainless Steel Type 316..... <i>For Work In Restricted Working Space, Add</i>	1,445.60 34.46	57.43
40 05 23 23-0212 Stainless Steel Pipe And Fittings <small>(40 05 23 23)</small>		
40 05 23 23-0213 Type 304, Schedule 40 Stainless Steel Pipe And 150 LB Threaded Fittings <small>(40 05 23 23-0212)</small>		
40 05 23 23-0214 Type 304, Schedule 40 Stainless Steel Threaded Pipe <small>(40 05 23 23-0213)</small>		
40 05 23 23-0215 LF 1/2" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	19.83 2.96	4.94
40 05 23 23-0216 LF 3/4" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	24.33 3.71	6.21
40 05 23 23-0217 LF 1" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	30.04 4.45	7.46
40 05 23 23-0218 LF 1-1/4" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	36.30 5.18	8.61
40 05 23 23-0219 LF 1-1/2" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	42.12 5.89	9.76
40 05 23 23-0220 LF 2" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	53.96 7.41	12.40
40 05 23 23-0221 LF 2-1/2" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	74.63 8.84	14.71
40 05 23 23-0222 LF 3" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	93.79 11.12	18.50
40 05 23 23-0223 LF 4" Pipe, Stainless Steel, Schedule 40 Type 304 For 150 LB Threaded Fitting..... <i>For Work In Restricted Working Space, Add</i>	127.42 14.66	24.47
40 05 23 23-0224 150#, Type 304 Stainless Steel Threaded 90 Degree Elbows <small>(40 05 23 23-0213)</small>		
40 05 23 23-0225 EA 1/2", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	40.38 11.12	18.50
40 05 23 23-0226 EA 3/4", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	53.64 14.66	24.47
40 05 23 23-0227 EA 1", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	69.03 18.63	31.02
40 05 23 23-0228 EA 1-1/4", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	96.93 25.52	42.50
40 05 23 23-0229 EA 1-1/2", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	115.66 29.96	49.96
40 05 23 23-0230 EA 2", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	140.94 36.27	60.42
40 05 23 23-0231 EA 2-1/2", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	237.06 57.43	95.68

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0232	EA	3", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	305.13 74.11	123.48
40 05 23 23-0233	EA	4", 150#, Type 304 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	419.72 91.89	153.12
40 05 23 23-0234		150#, Type 304 Stainless Steel Threaded 45 Degree Elbows <small>(40 05 23 23-0213)</small>		
40 05 23 23-0235	EA	1/2", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	41.15 11.12	18.50
40 05 23 23-0236	EA	3/4", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	54.88 14.66	24.47
40 05 23 23-0237	EA	1", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	69.42 18.63	31.02
40 05 23 23-0238	EA	1-1/4", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	96.78 25.52	42.50
40 05 23 23-0239	EA	1-1/2", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	113.83 29.96	49.96
40 05 23 23-0240	EA	2", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	140.52 36.27	60.42
40 05 23 23-0241	EA	2-1/2", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	245.37 57.43	95.68
40 05 23 23-0242	EA	3", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	321.34 74.11	123.48
40 05 23 23-0243	EA	4", 150#, Type 304 Stainless Steel Threaded 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	438.60 91.89	153.12
40 05 23 23-0244		150#, Type 304 Stainless Steel Threaded Tees <small>(40 05 23 23-0213)</small>		
40 05 23 23-0245	EA	1/2", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	60.56 16.81	28.02
40 05 23 23-0246	EA	3/4", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	81.29 22.23	37.10
40 05 23 23-0247	EA	1", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	101.03 27.57	45.95
40 05 23 23-0248	EA	1-1/4", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	145.81 38.29	63.87
40 05 23 23-0249	EA	1-1/2", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	166.18 43.07	71.79
40 05 23 23-0250	EA	2", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	220.46 57.43	95.68
40 05 23 23-0251	EA	2-1/2", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	339.02 83.03	138.41
40 05 23 23-0252	EA	3", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	460.22 111.16	185.28
40 05 23 23-0253	EA	4", 150#, Type 304 Stainless Steel Threaded Tee <i>For Work In Restricted Working Space, Add</i>	621.45 137.84	229.73
40 05 23 23-0254		150#, Type 304 Stainless Steel Threaded Reducers <small>(40 05 23 23-0213)</small>		
40 05 23 23-0255	EA	3/4", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	53.07 14.66	24.47
40 05 23 23-0256	EA	1", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	67.81 18.63	31.02
40 05 23 23-0257	EA	1-1/4", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	93.45 25.52	42.50
40 05 23 23-0258	EA	1-1/2", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	111.93 29.96	49.96
40 05 23 23-0259	EA	2", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	141.03 36.27	60.42
40 05 23 23-0260	EA	2-1/2", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	234.60 57.43	95.68
40 05 23 23-0261	EA	3", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	308.49 74.11	123.48
40 05 23 23-0262	EA	4", 150#, Type 304 Stainless Steel Threaded Reducer <i>For Work In Restricted Working Space, Add</i>	408.12 91.89	153.12
40 05 23 23-0263		150#, Type 304 Stainless Steel Threaded Caps <small>(40 05 23 23-0213)</small>		
40 05 23 23-0264	EA	1/2", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	20.75 5.56	9.31
40 05 23 23-0265	EA	3/4", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	27.48 7.41	12.40
40 05 23 23-0266	EA	1", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	34.79 9.19	15.28
40 05 23 23-0267	EA	1-1/4", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	50.89 13.01	21.71
40 05 23 23-0268	EA	1-1/2", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	58.77 14.66	24.47
40 05 23 23-0269	EA	2", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	74.69 18.63	31.02
40 05 23 23-0270	EA	2-1/2", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	114.64 27.57	45.95

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0271 EA 3", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	152.35 36.27	60.42
40 05 23 23-0272 EA 4", 150#, Type 304 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	206.36 45.95	76.62
40 05 23 23-0273 150#, Type 304 Stainless Steel Threaded Unions (40 05 23 23-0213)		
40 05 23 23-0274 EA 1/2", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	65.38 16.81	28.02
40 05 23 23-0275 EA 3/4", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	85.96 22.23	37.10
40 05 23 23-0276 EA 1", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	109.79 27.57	45.95
40 05 23 23-0277 EA 1-1/4", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	158.68 38.29	63.87
40 05 23 23-0278 EA 1-1/2", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	178.67 43.07	71.79
40 05 23 23-0279 EA 2", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	233.47 57.43	95.68
40 05 23 23-0280 EA 2-1/2", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	401.01 86.15	143.58
40 05 23 23-0281 EA 3", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	513.91 111.17	185.28
40 05 23 23-0282 EA 4", 150#, Type 304 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	539.04 91.91	153.17
40 05 23 23-0283 150#, Type 304 Stainless Steel Threaded Couplings (40 05 23 23-0213)		
40 05 23 23-0284 EA 1/2", 150#, Type 304 Stainless Steel Threaded Coupling..... <i>For Work In Restricted Working Space, Add</i>	40.06 11.12	18.50
40 05 23 23-0285 EA 3/4", 150#, Type 304 Stainless Steel Threaded Coupling..... <i>For Work In Restricted Working Space, Add</i>	53.22 14.66	24.47
40 05 23 23-0286 EA 1", 150#, Type 304 Stainless Steel Threaded Coupling..... <i>For Work In Restricted Working Space, Add</i>	68.69 18.63	31.02
40 05 23 23-0287 EA 1-1/4", 150#, Type 304 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	95.57 25.52	42.50
40 05 23 23-0288 EA 1-1/2", 150#, Type 304 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	112.33 29.96	49.96
40 05 23 23-0289 EA 2", 150#, Type 304 Stainless Steel Threaded Coupling..... <i>For Work In Restricted Working Space, Add</i>	138.47 36.27	60.42
40 05 23 23-0290 EA 2-1/2", 150#, Type 304 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	229.97 57.43	95.68
40 05 23 23-0291 EA 3", 150#, Type 304 Stainless Steel Threaded Coupling..... <i>For Work In Restricted Working Space, Add</i>	296.83 74.11	123.48
40 05 23 23-0292 EA 4", 150#, Type 304 Stainless Steel Threaded Coupling..... <i>For Work In Restricted Working Space, Add</i>	383.71 91.89	153.12
40 05 23 23-0293 Type 316, Schedule 40 Stainless Steel Pipe And 150 LB Threaded Fittings (40 05 23 23-0212)		
40 05 23 23-0294 Type 316, Schedule 40 Stainless Steel Threaded Pipe (40 05 23 23-0293)		
40 05 23 23-0295 LF 1/2" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	25.10 2.96	4.94
40 05 23 23-0296 LF 3/4" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	29.53 3.71	6.21
40 05 23 23-0297 LF 1" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	37.51 4.45	7.46
40 05 23 23-0298 LF 1-1/4" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	46.07 5.18	8.61
40 05 23 23-0299 LF 1-1/2" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	53.69 5.89	9.76
40 05 23 23-0300 LF 2" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	69.45 7.41	12.40
40 05 23 23-0301 LF 2-1/2" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	96.27 8.84	14.71
40 05 23 23-0302 LF 3" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	126.07 11.12	18.50
40 05 23 23-0303 LF 4" Pipe, Stainless Steel Schedule 40 Type 316 For 150 LB Threaded Fitting <i>For Work In Restricted Working Space, Add</i>	169.44 14.66	24.47
40 05 23 23-0304 150#, Type 316 Stainless Steel Threaded 90 Degree Elbows (40 05 23 23-0293)		
40 05 23 23-0305 EA 1/2", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	41.39 11.12	18.50
40 05 23 23-0306 EA 3/4", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	55.14 14.66	24.47
40 05 23 23-0307 EA 1", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	69.95 18.63	31.02
40 05 23 23-0308 EA 1-1/4", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	98.58 25.52	42.50
40 05 23 23-0309 EA 1-1/2", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	117.86 29.96	49.96

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0310	EA	2", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow	143.66	60.42
		<i>For Work In Restricted Working Space, Add</i>	36.27	
40 05 23 23-0311	EA	2-1/2", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow	241.40	95.68
		<i>For Work In Restricted Working Space, Add</i>	57.43	
40 05 23 23-0312	EA	3", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow	315.75	123.48
		<i>For Work In Restricted Working Space, Add</i>	74.11	
40 05 23 23-0313	EA	4", 150#, Type 316 Stainless Steel Threaded 90 Degree Elbow	432.62	153.12
		<i>For Work In Restricted Working Space, Add</i>	91.89	
40 05 23 23-0314		150#, Type 316 Stainless Steel Threaded 45 Degree Elbows <small>(40 05 23 23-0293)</small>		
40 05 23 23-0315	EA	1/2", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	42.20	18.50
		<i>For Work In Restricted Working Space, Add</i>	11.12	
40 05 23 23-0316	EA	3/4", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	55.65	24.47
		<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0317	EA	1", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	70.55	31.02
		<i>For Work In Restricted Working Space, Add</i>	18.63	
40 05 23 23-0318	EA	1-1/4", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	98.41	42.50
		<i>For Work In Restricted Working Space, Add</i>	25.52	
40 05 23 23-0319	EA	1-1/2", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	115.73	49.96
		<i>For Work In Restricted Working Space, Add</i>	29.96	
40 05 23 23-0320	EA	2", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	143.06	60.42
		<i>For Work In Restricted Working Space, Add</i>	36.27	
40 05 23 23-0321	EA	2-1/2", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	249.45	95.68
		<i>For Work In Restricted Working Space, Add</i>	57.43	
40 05 23 23-0322	EA	3", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	330.74	123.48
		<i>For Work In Restricted Working Space, Add</i>	74.11	
40 05 23 23-0323	EA	4", 150#, Type 316 Stainless Steel Threaded 45 Degree Elbow	463.95	153.12
		<i>For Work In Restricted Working Space, Add</i>	91.89	
40 05 23 23-0324		150#, Type 316 Stainless Steel Threaded Tees <small>(40 05 23 23-0293)</small>		
40 05 23 23-0325	EA	1/2", 150#, Type 316 Stainless Steel Threaded Tee	61.63	28.02
		<i>For Work In Restricted Working Space, Add</i>	16.81	
40 05 23 23-0326	EA	3/4", 150#, Type 316 Stainless Steel Threaded Tee	82.38	37.10
		<i>For Work In Restricted Working Space, Add</i>	22.23	
40 05 23 23-0327	EA	1", 150#, Type 316 Stainless Steel Threaded Tee	102.25	45.95
		<i>For Work In Restricted Working Space, Add</i>	27.57	
40 05 23 23-0328	EA	1-1/4", 150#, Type 316 Stainless Steel Threaded Tee	148.28	63.87
		<i>For Work In Restricted Working Space, Add</i>	38.29	
40 05 23 23-0329	EA	1-1/2", 150#, Type 316 Stainless Steel Threaded Tee	168.63	71.79
		<i>For Work In Restricted Working Space, Add</i>	43.07	
40 05 23 23-0330	EA	2", 150#, Type 316 Stainless Steel Threaded Tee	223.69	95.68
		<i>For Work In Restricted Working Space, Add</i>	57.43	
40 05 23 23-0331	EA	2-1/2", 150#, Type 316 Stainless Steel Threaded Tee	352.19	138.41
		<i>For Work In Restricted Working Space, Add</i>	83.03	
40 05 23 23-0332	EA	3", 150#, Type 316 Stainless Steel Threaded Tee	478.18	185.28
		<i>For Work In Restricted Working Space, Add</i>	111.16	
40 05 23 23-0333	EA	4", 150#, Type 316 Stainless Steel Threaded Tee	634.84	229.73
		<i>For Work In Restricted Working Space, Add</i>	137.84	
40 05 23 23-0334		150#, Type 316 Stainless Steel Threaded Reducers <small>(40 05 23 23-0293)</small>		
40 05 23 23-0335	EA	3/4", 150#, Type 316 Stainless Steel Threaded Reducer	53.98	24.47
		<i>For Work In Restricted Working Space, Add</i>	14.66	
40 05 23 23-0336	EA	1", 150#, Type 316 Stainless Steel Threaded Reducer	70.53	31.02
		<i>For Work In Restricted Working Space, Add</i>	18.63	
40 05 23 23-0337	EA	1-1/4", 150#, Type 316 Stainless Steel Threaded Reducer	93.96	42.50
		<i>For Work In Restricted Working Space, Add</i>	25.52	
40 05 23 23-0338	EA	1-1/2", 150#, Type 316 Stainless Steel Threaded Reducer	114.60	49.96
		<i>For Work In Restricted Working Space, Add</i>	29.96	
40 05 23 23-0339	EA	2", 150#, Type 316 Stainless Steel Threaded Reducer	145.71	60.42
		<i>For Work In Restricted Working Space, Add</i>	36.27	
40 05 23 23-0340	EA	2-1/2", 150#, Type 316 Stainless Steel Threaded Reducer	245.24	95.68
		<i>For Work In Restricted Working Space, Add</i>	57.43	
40 05 23 23-0341	EA	3", 150#, Type 316 Stainless Steel Threaded Reducer	320.23	123.48
		<i>For Work In Restricted Working Space, Add</i>	74.11	
40 05 23 23-0342	EA	4", 150#, Type 316 Stainless Steel Threaded Reducer	427.71	153.12
		<i>For Work In Restricted Working Space, Add</i>	91.89	
40 05 23 23-0343		150#, Type 316 Stainless Steel Threaded Caps <small>(40 05 23 23-0293)</small>		
40 05 23 23-0344	EA	1/2", 150#, Type 316 Stainless Steel Threaded Cap	21.35	9.31
		<i>For Work In Restricted Working Space, Add</i>	5.56	
40 05 23 23-0345	EA	3/4", 150#, Type 316 Stainless Steel Threaded Cap	27.92	12.40
		<i>For Work In Restricted Working Space, Add</i>	7.41	
40 05 23 23-0346	EA	1", 150#, Type 316 Stainless Steel Threaded Cap	35.59	15.28
		<i>For Work In Restricted Working Space, Add</i>	9.19	
40 05 23 23-0347	EA	1-1/4", 150#, Type 316 Stainless Steel Threaded Cap	53.09	21.71
		<i>For Work In Restricted Working Space, Add</i>	13.01	
40 05 23 23-0348	EA	1-1/2", 150#, Type 316 Stainless Steel Threaded Cap	61.37	24.47
		<i>For Work In Restricted Working Space, Add</i>	14.66	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0349 EA 2", 150#, Type 316 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	78.09 18.63	31.02
40 05 23 23-0350 EA 2-1/2", 150#, Type 316 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	120.25 27.57	45.95
40 05 23 23-0351 EA 3", 150#, Type 316 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	158.05 36.27	60.42
40 05 23 23-0352 EA 4", 150#, Type 316 Stainless Steel Threaded Cap <i>For Work In Restricted Working Space, Add</i>	217.68 45.95	76.62
40 05 23 23-0353 150#, Type 316 Stainless Steel Threaded Unions (40 05 23 23-0293)		
40 05 23 23-0354 EA 1/2", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	66.67 16.81	28.02
40 05 23 23-0355 EA 3/4", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	90.81 22.23	37.10
40 05 23 23-0356 EA 1", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	112.24 27.57	45.95
40 05 23 23-0357 EA 1-1/4", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	162.85 38.29	63.87
40 05 23 23-0358 EA 1-1/2", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	183.54 43.07	71.79
40 05 23 23-0359 EA 2", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	239.11 57.43	95.68
40 05 23 23-0360 EA 2-1/2", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	409.66 86.15	143.58
40 05 23 23-0361 EA 3", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	540.87 111.17	185.28
40 05 23 23-0362 EA 4", 150#, Type 316 Stainless Steel Threaded Union <i>For Work In Restricted Working Space, Add</i>	596.49 91.91	153.17
40 05 23 23-0363 150#, Type 316 Stainless Steel Threaded Couplings (40 05 23 23-0293)		
40 05 23 23-0364 EA 1/2", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	42.09 11.12	18.50
40 05 23 23-0365 EA 3/4", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	54.16 14.66	24.47
40 05 23 23-0366 EA 1", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	69.59 18.63	31.02
40 05 23 23-0367 EA 1-1/4", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	97.00 25.52	42.50
40 05 23 23-0368 EA 1-1/2", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	114.04 29.96	49.96
40 05 23 23-0369 EA 2", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	140.84 36.27	60.42
40 05 23 23-0370 EA 2-1/2", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	238.26 57.43	95.68
40 05 23 23-0371 EA 3", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	307.50 74.11	123.48
40 05 23 23-0372 EA 4", 150#, Type 316 Stainless Steel Threaded Coupling <i>For Work In Restricted Working Space, Add</i>	399.73 91.89	153.12
40 05 23 23-0373 Type 304, Schedule 10 Stainless Steel Pipe And Butt Weld Fittings (40 05 23 23-0212)		
40 05 23 23-0374 Type 304, Schedule 10 Stainless Steel Pipe (40 05 23 23-0373)		
40 05 23 23-0375 LF 1/2" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	22.56 2.90	4.83
40 05 23 23-0376 LF 3/4" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	26.74 3.54	5.90
40 05 23 23-0377 LF 1" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	36.08 4.15	6.97
40 05 23 23-0378 LF 1-1/4" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	43.91 5.19	8.69
40 05 23 23-0379 LF 1-1/2" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	48.75 5.85	9.76
40 05 23 23-0380 LF 2" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	60.28 7.25	12.12
40 05 23 23-0381 LF 2-1/2" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	72.53 8.28	13.84
40 05 23 23-0382 LF 3" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	86.15 9.33	15.56
40 05 23 23-0383 LF 4" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	109.03 11.04	18.45
40 05 23 23-0384 LF 6" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	161.09 14.50	24.25
40 05 23 23-0385 LF 8" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	266.91 28.28	44.01
40 05 23 23-0386 LF 10" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	346.81 31.11	48.39
40 05 23 23-0387 LF 12" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	418.23 34.57	53.80
40 05 23 23-0388 LF 14" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	518.82 38.89	60.48

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0389	LF 16" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	569.35 44.44	69.13
40 05 23 23-0390	LF 18" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	635.48 51.85	80.65
40 05 23 23-0391	LF 20" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	893.77 62.21	96.78
40 05 23 23-0392	LF 24" Pipe, Stainless Steel Schedule 10 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	1,169.58 77.77	120.98
40 05 23 23-0393	Type 304, Schedule 10 Stainless Steel Butt Weld 90 Degree Elbow <small>(40 05 23 23-0373)</small>		
40 05 23 23-0394	EA 1/2", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	127.50 36.69	55.04
40 05 23 23-0395	EA 3/4", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	135.02 38.95	58.43
40 05 23 23-0396	EA 1", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	148.80 42.81	64.20
40 05 23 23-0397	EA 1-1/4", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	162.40 46.65	69.98
40 05 23 23-0398	EA 1-1/2", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	179.37 51.52	77.28
40 05 23 23-0399	EA 2", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	200.52 57.32	85.98
40 05 23 23-0400	EA 2-1/2", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	260.71 73.36	110.03
40 05 23 23-0401	EA 3", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	305.82 85.97	128.96
40 05 23 23-0402	EA 4", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	374.47 102.90	154.35
40 05 23 23-0403	EA 6", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	512.80 128.55	192.82
40 05 23 23-0404	EA 8", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	895.36 222.20	333.31
40 05 23 23-0405	EA 10", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,319.40 296.27	444.39
40 05 23 23-0406	EA 12", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,992.61 444.40	666.60
40 05 23 23-0407	EA 14", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,355.76 518.47	777.70
40 05 23 23-0408	EA 16", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,766.05 591.41	887.10
40 05 23 23-0409	EA 18", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,495.49 740.66	1,111.00
40 05 23 23-0410	EA 20", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	4,873.59 1,036.93	1,555.39
40 05 23 23-0411	EA 24", Type 304, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	6,995.84 1,481.33	2,221.99
40 05 23 23-0412	Type 304, Schedule 10 Stainless Steel Butt Weld 45 Degree Elbow <small>(40 05 23 23-0373)</small>		
40 05 23 23-0413	EA 1/2", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	129.03 36.69	55.04
40 05 23 23-0414	EA 3/4", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	136.55 38.95	58.43
40 05 23 23-0415	EA 1", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	150.63 42.81	64.20
40 05 23 23-0416	EA 1-1/4", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	164.84 46.65	69.98
40 05 23 23-0417	EA 1-1/2", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	179.67 51.52	77.28
40 05 23 23-0418	EA 2", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	200.52 57.32	85.98
40 05 23 23-0419	EA 2-1/2", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	259.18 73.36	110.03
40 05 23 23-0420	EA 3", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	303.07 85.97	128.96
40 05 23 23-0421	EA 4", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	369.28 102.90	154.35
40 05 23 23-0422	EA 6", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	485.62 128.55	192.82
40 05 23 23-0423	EA 8", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	842.92 222.20	333.31
40 05 23 23-0424	EA 10", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,226.05 296.27	444.39
40 05 23 23-0425	EA 12", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,844.82 444.40	666.60
40 05 23 23-0426	EA 14", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,174.36 518.47	777.70
40 05 23 23-0427	EA 16", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,542.17 591.41	887.10
40 05 23 23-0428	EA 18", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,201.49 740.66	1,111.00



Process Interconnections	40
Common Work Results For Process Interconnections	
Stainless Steel Process Pipe and Tubing	40 05 23

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0429 EA 20", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	4,476.88 1,036.93	1,555.39
40 05 23 23-0430 EA 24", Type 304, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	6,433.09 1,481.33	2,221.99
40 05 23 23-0431 Type 304, Schedule 10 Stainless Steel Butt Weld Tee (40 05 23 23-0373)		
40 05 23 23-0432 EA 1/2", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	172.27 46.64	69.96
40 05 23 23-0433 EA 3/4", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	207.64 57.25	85.88
40 05 23 23-0434 EA 1", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	231.22 64.33	96.49
40 05 23 23-0435 EA 1-1/4", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	263.18 73.36	110.03
40 05 23 23-0436 EA 1-1/2", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	279.27 78.74	118.11
40 05 23 23-0437 EA 2", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	304.29 85.88	128.82
40 05 23 23-0438 EA 2-1/2", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	393.86 102.90	154.35
40 05 23 23-0439 EA 3", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	462.86 128.96	193.44
40 05 23 23-0440 EA 4", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	531.93 144.74	217.10
40 05 23 23-0441 EA 6", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	774.90 192.98	289.46
40 05 23 23-0442 EA 8", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	1,297.96 296.27	444.39
40 05 23 23-0443 EA 10", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	1,992.61 444.40	666.60
40 05 23 23-0444 EA 12", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	2,561.85 555.50	833.24
40 05 23 23-0445 EA 14", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	3,151.18 667.55	1,001.33
40 05 23 23-0446 EA 16", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	3,817.24 814.34	1,221.51
40 05 23 23-0447 EA 18", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	4,857.29 1,036.93	1,555.39
40 05 23 23-0448 EA 20", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	6,495.19 1,364.38	2,046.58
40 05 23 23-0449 EA 24", Type 304, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	9,737.73 2,073.86	3,110.79
40 05 23 23-0450 Type 304, Schedule 10 Stainless Steel Butt Weld Reducing Tees (40 05 23 23-0373)		
40 05 23 23-0451 EA 3/4", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	159.82 38.97	58.45
40 05 23 23-0452 EA 1", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	189.09 47.75	71.62
40 05 23 23-0453 EA 1-1/4", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	233.47 53.65	80.47
40 05 23 23-0454 EA 1-1/2", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	241.43 61.16	91.73
40 05 23 23-0455 EA 2", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	252.96 65.72	98.57
40 05 23 23-0456 EA 2-1/2", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	330.66 71.62	107.43
40 05 23 23-0457 EA 3", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	389.40 85.85	128.76
40 05 23 23-0458 EA 4", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	479.82 107.30	160.94
40 05 23 23-0459 EA 6", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	634.06 122.60	183.90
40 05 23 23-0460 EA 8", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	1,213.60 185.16	277.75
40 05 23 23-0461 EA 10", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	1,999.59 246.89	370.34
40 05 23 23-0462 EA 12", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	2,857.38 370.33	555.50
40 05 23 23-0463 EA 14", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	3,466.68 444.91	667.37
40 05 23 23-0464 EA 16", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	4,293.31 542.70	814.06
40 05 23 23-0465 EA 18", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	5,543.94 691.29	1,036.93
40 05 23 23-0466 EA 20", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	7,883.41 909.59	1,364.38
40 05 23 23-0467 EA 24", Type 304, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	12,331.30 1,381.34	2,072.02
40 05 23 23-0468 Type 304, Schedule 10 Stainless Steel Butt Weld Reducers (40 05 23 23-0373)		

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0469	EA 3/4", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	128.49 35.43	53.15
40 05 23 23-0470	EA 1", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	141.54 38.61	57.91
40 05 23 23-0471	EA 1-1/4", Type 304, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	156.91 42.81	64.20
40 05 23 23-0472	EA 1-1/2", Type 304, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	166.81 46.65	69.98
40 05 23 23-0473	EA 2", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	181.81 51.52	77.28
40 05 23 23-0474	EA 2-1/2", Type 304, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	244.53 64.38	96.57
40 05 23 23-0475	EA 3", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	276.38 73.29	109.93
40 05 23 23-0476	EA 4", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	322.98 85.88	128.82
40 05 23 23-0477	EA 6", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	416.98 109.34	164.00
40 05 23 23-0478	EA 8", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	676.92 177.76	266.64
40 05 23 23-0479	EA 10", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	861.06 222.20	333.31
40 05 23 23-0480	EA 12", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,158.09 296.27	444.39
40 05 23 23-0481	EA 14", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,650.86 388.85	583.27
40 05 23 23-0482	EA 16", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,930.38 443.13	664.70
40 05 23 23-0483	EA 18", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,376.47 555.50	833.24
40 05 23 23-0484	EA 20", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	3,335.89 740.66	1,111.00
40 05 23 23-0485	EA 24", Type 304, Schedule 10 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	4,810.51 1,111.00	1,666.50
40 05 23 23-0486	EA 3/4", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	157.21 35.43	53.15
40 05 23 23-0487	EA 1", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	162.61 38.61	57.91
40 05 23 23-0488	EA 1-1/4", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	171.34 42.81	64.20
40 05 23 23-0489	EA 1-1/2", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	193.08 46.65	69.98
40 05 23 23-0490	EA 2", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	200.75 51.52	77.28
40 05 23 23-0491	EA 2-1/2", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	265.30 64.38	96.57
40 05 23 23-0492	EA 3", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	296.84 73.29	109.93
40 05 23 23-0493	EA 4", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	338.80 85.88	128.82
40 05 23 23-0494	EA 6", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	474.10 109.34	164.00
40 05 23 23-0495	EA 8", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	799.35 177.76	266.64
40 05 23 23-0496	EA 10", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,099.88 222.20	333.31
40 05 23 23-0497	EA 12", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,378.77 296.27	444.39
40 05 23 23-0498	EA 14", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,159.94 388.85	583.27
40 05 23 23-0499	EA 16", Type 304, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,513.70 443.13	664.70
40 05 23 23-0500	EA 18", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	3,088.39 555.50	833.24
40 05 23 23-0501	EA 20", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	4,476.71 740.66	1,111.00
40 05 23 23-0502	EA 24", Type 304, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	6,322.44 1,111.00	1,666.50
40 05 23 23-0503	Type 304, Schedule 10 Stainless Steel Butt Weld Caps (40 05 23 23-0373)		
40 05 23 23-0504	EA 1/2", Type 304, Schedule 10 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	70.63 18.35	27.52
40 05 23 23-0505	EA 3/4", Type 304, Schedule 10 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	77.75 19.48	29.21
40 05 23 23-0506	EA 1", Type 304, Schedule 10 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	85.39 21.40	32.10
40 05 23 23-0507	EA 1-1/4", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	94.10 23.33	34.98
40 05 23 23-0508	EA 1-1/2", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	100.84 25.76	38.63
40 05 23 23-0509	EA 2", Type 304, Schedule 10 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	108.66 28.66	42.98

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0510 EA 2-1/2", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	141.20 36.68	55.02
40 05 23 23-0511 EA 3", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	159.48 42.99	64.49
40 05 23 23-0512 EA 4", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	192.29 51.46	77.18
40 05 23 23-0513 EA 6", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	248.50 64.38	96.57
40 05 23 23-0514 EA 8", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	431.37 111.10	166.64
40 05 23 23-0515 EA 10", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	574.41 148.13	222.20
40 05 23 23-0516 EA 12", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	845.73 222.20	333.29
40 05 23 23-0517 EA 14", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	992.87 259.23	388.85
40 05 23 23-0518 EA 16", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,151.76 295.70	443.55
40 05 23 23-0519 EA 18", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,455.04 370.33	555.50
40 05 23 23-0520 EA 20", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	2,008.71 518.47	777.70
40 05 23 23-0521 EA 24", Type 304, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	2,963.11 740.66	1,110.99
40 05 23 23-0522 Type 304, Schedule 40 Stainless Steel Pipe And Butt Weld Fittings <small>(40 05 23 23-0522)</small>		
40 05 23 23-0523 Type 304, Schedule 40 Stainless Steel Pipe <small>(40 05 23 23-0523)</small>		
40 05 23 23-0524 LF 1/2" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	25.74 2.90	4.83
40 05 23 23-0525 LF 3/4" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	31.23 3.54	5.90
40 05 23 23-0526 LF 1" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	38.50 4.15	6.97
40 05 23 23-0527 LF 1-1/4" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	48.14 5.19	8.59
40 05 23 23-0528 LF 1-1/2" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	55.62 5.85	9.66
40 05 23 23-0529 LF 2" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	71.60 7.25	12.34
40 05 23 23-0530 LF 2-1/2" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	89.80 8.28	13.94
40 05 23 23-0531 LF 3" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	85.84 9.33	15.56
40 05 23 23-0532 LF 4" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	147.52 11.04	18.24
40 05 23 23-0533 LF 6" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	233.32 14.50	24.14
40 05 23 23-0534 LF 8" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	411.37 28.28	43.78
40 05 23 23-0535 LF 10" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	526.50 31.11	48.39
40 05 23 23-0536 LF 12" Pipe, Stainless Steel Schedule 40 Type 304 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	661.34 34.57	53.57
40 05 23 23-0537 Type 304, Schedule 40 Stainless Steel Butt Weld 90 Degree Elbows <small>(40 05 23 23-0537)</small>		
40 05 23 23-0538 EA 1/2", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	128.72 36.69	55.04
40 05 23 23-0539 EA 3/4", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	136.24 38.95	58.43
40 05 23 23-0540 EA 1", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	149.71 42.81	64.20
40 05 23 23-0541 EA 1-1/4", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	163.06 46.65	69.98
40 05 23 23-0542 EA 1-1/2", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	179.98 51.52	77.28
40 05 23 23-0543 EA 2", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	202.66 57.32	85.98
40 05 23 23-0544 EA 2-1/2", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	268.65 73.36	110.03
40 05 23 23-0545 EA 3", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	317.43 85.97	128.96
40 05 23 23-0546 EA 4", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	394.02 102.90	154.35
40 05 23 23-0547 EA 6", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	637.72 128.55	192.82
40 05 23 23-0548 EA 8", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,065.58 222.20	333.31
40 05 23 23-0549 EA 10", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,664.77 296.27	444.39

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0550	EA 12", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,440.56 444.40	666.60
40 05 23 23-0551	EA 14", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,899.19 518.47	777.70
40 05 23 23-0552	EA 16", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,464.16 591.41	887.10
40 05 23 23-0553	EA 18", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	4,465.50 740.66	1,111.00
40 05 23 23-0554	EA 20", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	6,070.85 1,036.93	1,555.39
40 05 23 23-0555	EA 24", Type 304, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	8,703.93 1,481.33	2,221.99
40 05 23 23-0556 Type 304, Schedule 40 Stainless Steel Butt Weld 45 Degree Elbows (40 05 23 23-0522)			
40 05 23 23-0557	EA 1/2", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	130.86 36.69	55.04
40 05 23 23-0558	EA 3/4", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	138.38 38.95	58.43
40 05 23 23-0559	EA 1", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	151.24 42.81	64.20
40 05 23 23-0560	EA 1-1/4", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	164.62 46.65	69.98
40 05 23 23-0561	EA 1-1/2", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	181.50 51.52	77.28
40 05 23 23-0562	EA 2", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	202.98 57.32	85.98
40 05 23 23-0563	EA 2-1/2", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	268.65 73.36	110.03
40 05 23 23-0564	EA 3", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	308.88 85.97	128.96
40 05 23 23-0565	EA 4", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	398.60 102.90	154.35
40 05 23 23-0566	EA 6", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	533.57 128.55	192.82
40 05 23 23-0567	EA 8", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	956.39 222.20	333.31
40 05 23 23-0568	EA 10", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,391.98 296.27	444.39
40 05 23 23-0569	EA 12", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,038.14 444.40	666.60
40 05 23 23-0570	EA 14", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,310.69 518.47	777.70
40 05 23 23-0571	EA 16", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,763.48 591.41	887.10
40 05 23 23-0572	EA 18", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,487.98 740.66	1,111.00
40 05 23 23-0573	EA 20", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	4,751.83 1,036.93	1,555.39
40 05 23 23-0574	EA 24", Type 304, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	6,899.94 1,481.33	2,221.99
40 05 23 23-0575 Type 304, Schedule 40 Stainless Steel Butt Weld Tees (40 05 23 23-0522)			
40 05 23 23-0576	EA 1/2", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	173.49 46.64	69.96
40 05 23 23-0577	EA 3/4", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	208.86 57.25	85.88
40 05 23 23-0578	EA 1", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	232.44 64.33	96.49
40 05 23 23-0579	EA 1-1/4", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	266.29 73.36	110.03
40 05 23 23-0580	EA 1-1/2", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	280.49 78.74	118.11
40 05 23 23-0581	EA 2", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	305.82 85.88	128.82
40 05 23 23-0582	EA 2-1/2", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	397.99 102.90	154.35
40 05 23 23-0583	EA 3", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	469.27 128.96	193.44
40 05 23 23-0584	EA 4", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	538.95 144.74	217.10
40 05 23 23-0585	EA 6", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	823.46 192.98	289.46
40 05 23 23-0586	EA 8", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	1,442.11 296.27	444.39
40 05 23 23-0587	EA 10", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	2,434.97 444.40	666.60
40 05 23 23-0588	EA 12", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	3,028.28 555.50	833.24
40 05 23 23-0589	EA 14", Type 304, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	4,091.05 667.55	1,001.33

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0590 EA 16", Type 304, Schedule 40 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	5,189.40 814.34	1,221.51
40 05 23 23-0591 EA 18", Type 304, Schedule 40 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	6,720.34 1,036.93	1,555.39
40 05 23 23-0592 EA 20", Type 304, Schedule 40 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	8,680.50 1,364.38	2,046.58
40 05 23 23-0593 EA 24", Type 304, Schedule 40 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	13,286.94 2,073.86	3,110.79
40 05 23 23-0594 Type 304, Schedule 40 Stainless Steel Butt Weld Reducing Tees <small>(40 05 23 23-0522)</small>		
40 05 23 23-0595 EA 3/4", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	163.79 38.97	58.45
40 05 23 23-0596 EA 1", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	193.06 47.75	71.62
40 05 23 23-0597 EA 1-1/4", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	252.58 53.65	80.47
40 05 23 23-0598 EA 1-1/2", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	247.23 61.16	91.73
40 05 23 23-0599 EA 2", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	252.96 65.72	98.57
40 05 23 23-0600 EA 2-1/2", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	311.14 71.62	107.43
40 05 23 23-0601 EA 3", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	346.33 85.85	128.76
40 05 23 23-0602 EA 4", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	457.22 107.30	160.94
40 05 23 23-0603 EA 6", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	637.72 122.60	183.90
40 05 23 23-0604 EA 8", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	1,083.96 185.16	277.75
40 05 23 23-0605 EA 10", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	2,040.16 246.89	370.34
40 05 23 23-0606 EA 12", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	2,938.53 370.33	555.50
40 05 23 23-0607 EA 14", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	3,352.82 444.91	667.37
40 05 23 23-0608 EA 16", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	4,150.71 542.70	814.06
40 05 23 23-0609 EA 18", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	5,357.99 691.29	1,036.93
40 05 23 23-0610 EA 20", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	7,604.94 909.59	1,364.38
40 05 23 23-0611 EA 24", Type 304, Schedule 40 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	11,887.79 1,381.34	2,072.02
40 05 23 23-0612 Type 304, Schedule 40 Stainless Steel Butt Weld Reducers <small>(40 05 23 23-0522)</small>		
40 05 23 23-0613 EA 3/4", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	131.55 35.43	53.15
40 05 23 23-0614 EA 1", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	144.59 38.61	57.91
40 05 23 23-0615 EA 1-1/4", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	157.13 42.81	64.20
40 05 23 23-0616 EA 1-1/2", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	169.87 46.65	69.98
40 05 23 23-0617 EA 2", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	183.64 51.52	77.28
40 05 23 23-0618 EA 2-1/2", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	244.53 64.38	96.57
40 05 23 23-0619 EA 3", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	265.38 73.29	109.93
40 05 23 23-0620 EA 4", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	307.34 85.88	128.82
40 05 23 23-0621 EA 6", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	419.43 109.34	164.00
40 05 23 23-0622 EA 8", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	728.78 177.76	266.64
40 05 23 23-0623 EA 10", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	950.13 222.20	333.31
40 05 23 23-0624 EA 12", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,237.58 296.27	444.39
40 05 23 23-0625 EA 14", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,829.26 388.85	583.27
40 05 23 23-0626 EA 16", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,154.64 443.13	664.70
40 05 23 23-0627 EA 18", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,830.61 555.50	833.24
40 05 23 23-0628 EA 20", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	3,871.57 740.66	1,111.00
40 05 23 23-0629 EA 24", Type 304, Schedule 40 Stainless Steel Concentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	5,365.26 1,111.00	1,666.50
40 05 23 23-0630 EA 3/4", Type 304, Schedule 40 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	158.45 35.43	53.15

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23	23-0631	EA	1", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	169.03 38.61	57.91
40 05 23	23-0632	EA	1-1/4", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	193.34 42.81	64.20
40 05 23	23-0633	EA	1-1/2", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	204.38 46.65	69.98
40 05 23	23-0634	EA	2", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	218.16 51.52	77.28
40 05 23	23-0635	EA	2-1/2", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	265.30 64.38	96.57
40 05 23	23-0636	EA	3", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	334.72 73.29	109.93
40 05 23	23-0637	EA	4", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	364.46 85.88	128.82
40 05 23	23-0638	EA	6", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	499.45 109.34	164.00
40 05 23	23-0639	EA	8", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	802.01 177.76	266.64
40 05 23	23-0640	EA	10", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,097.57 222.20	333.31
40 05 23	23-0641	EA	12", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,498.84 296.27	444.39
40 05 23	23-0642	EA	14", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,469.63 388.85	583.27
40 05 23	23-0643	EA	16", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,800.94 443.13	664.70
40 05 23	23-0644	EA	18", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	3,666.73 555.50	833.24
40 05 23	23-0645	EA	20", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	4,762.13 740.66	1,111.00
40 05 23	23-0646	EA	24", Type 304, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	7,587.53 1,111.00	1,666.50
40 05 23	23-0647		Type 304, Schedule 40 Stainless Steel Butt Weld Caps (40 05 23 23-0522)		
40 05 23	23-0648	EA	1/2", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	71.54 18.35	27.52
40 05 23	23-0649	EA	3/4", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	76.83 19.48	29.21
40 05 23	23-0650	EA	1", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	86.31 21.40	32.10
40 05 23	23-0651	EA	1-1/4", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	98.19 23.33	34.98
40 05 23	23-0652	EA	1-1/2", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	104.81 25.76	38.63
40 05 23	23-0653	EA	2", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	108.36 28.66	42.98
40 05 23	23-0654	EA	2-1/2", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	139.14 36.68	55.02
40 05 23	23-0655	EA	3", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	160.70 42.99	64.49
40 05 23	23-0656	EA	4", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	195.95 51.46	77.18
40 05 23	23-0657	EA	6", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	271.10 64.38	96.57
40 05 23	23-0658	EA	8", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	467.66 111.10	166.64
40 05 23	23-0659	EA	10", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	625.73 148.13	222.20
40 05 23	23-0660	EA	12", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	943.52 222.20	333.29
40 05 23	23-0661	EA	14", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,082.45 259.23	388.85
40 05 23	23-0662	EA	16", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,274.99 295.70	443.55
40 05 23	23-0663	EA	18", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,601.10 370.33	555.50
40 05 23	23-0664	EA	20", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	2,203.49 518.47	777.70
40 05 23	23-0665	EA	24", Type 304, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	3,288.77 740.66	1,110.99
40 05 23	23-0666		Type 316, Schedule 10 Stainless Steel Pipe And Butt Weld Fittings (40 05 23 23-0212)		
40 05 23	23-0667		Type 316, Schedule 10 Stainless Steel Pipe (40 05 23 23-0666)		
40 05 23	23-0668	LF	1/2" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	26.59 2.90	4.83
40 05 23	23-0669	LF	3/4" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	31.40 3.54	5.90
40 05 23	23-0670	LF	1" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	43.03 4.15	6.97
40 05 23	23-0671	LF	1-1/4" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	52.22 5.19	8.69

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0672 LF 1-1/2" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	57.89 5.85	9.76
40 05 23 23-0673 LF 2" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	71.56 7.25	12.12
40 05 23 23-0674 LF 2-1/2" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	86.56 8.28	13.84
40 05 23 23-0675 LF 3" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	103.35 9.33	15.56
40 05 23 23-0676 LF 4" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	131.59 11.04	18.45
40 05 23 23-0677 LF 6" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	196.30 14.50	24.25
40 05 23 23-0678 LF 8" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	320.83 28.28	44.01
40 05 23 23-0679 LF 10" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	422.73 31.11	48.39
40 05 23 23-0680 LF 12" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	512.86 34.57	53.80
40 05 23 23-0681 LF 14" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	640.36 38.89	60.48
40 05 23 23-0682 LF 16" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	700.89 44.44	69.13
40 05 23 23-0683 LF 18" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	779.97 51.85	80.65
40 05 23 23-0684 LF 20" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	1,108.13 62.21	96.78
40 05 23 23-0685 LF 24" Pipe, Stainless Steel Schedule 10 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	1,453.87 77.77	120.98
40 05 23 23-0686 Type 316, Schedule 10 Stainless Steel Butt Weld 90 Degree Elbows <small>(40 05 23 23-0686)</small>		
40 05 23 23-0687 EA 1/2", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	129.03 36.69	55.04
40 05 23 23-0688 EA 3/4", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	136.55 38.95	58.43
40 05 23 23-0689 EA 1", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	150.63 42.81	64.20
40 05 23 23-0690 EA 1-1/4", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	165.06 46.65	69.98
40 05 23 23-0691 EA 1-1/2", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	181.20 51.52	77.28
40 05 23 23-0692 EA 2", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	202.66 57.32	85.98
40 05 23 23-0693 EA 2-1/2", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	264.68 73.36	110.03
40 05 23 23-0694 EA 3", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	311.63 85.97	128.96
40 05 23 23-0695 EA 4", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	383.33 102.90	154.35
40 05 23 23-0696 EA 6", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	536.01 128.55	192.82
40 05 23 23-0697 EA 8", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	938.58 222.20	333.31
40 05 23 23-0698 EA 10", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,419.33 296.27	444.39
40 05 23 23-0699 EA 12", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,128.85 444.40	666.60
40 05 23 23-0700 EA 14", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,483.96 518.47	777.70
40 05 23 23-0701 EA 16", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,968.83 591.41	887.10
40 05 23 23-0702 EA 18", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,738.65 740.66	1,111.00
40 05 23 23-0703 EA 20", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	5,220.95 1,036.93	1,555.39
40 05 23 23-0704 EA 24", Type 316, Schedule 10 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	7,512.00 1,481.33	2,221.99
40 05 23 23-0705 Type 316, Schedule 10 Stainless Steel Butt Weld 45 Degree Elbows <small>(40 05 23 23-0686)</small>		
40 05 23 23-0706 EA 1/2", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	130.86 36.69	55.04
40 05 23 23-0707 EA 3/4", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	138.38 38.95	58.43
40 05 23 23-0708 EA 1", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	152.46 42.81	64.20
40 05 23 23-0709 EA 1-1/4", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	167.51 46.65	69.98
40 05 23 23-0710 EA 1-1/2", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	181.20 51.52	77.28
40 05 23 23-0711 EA 2", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	202.66 57.32	85.98

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23	23-0712	EA	2-1/2", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	262.85 73.36	110.03
40 05 23	23-0713	EA	3", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	308.88 85.97	128.96
40 05 23	23-0714	EA	4", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	376.91 102.90	154.35
40 05 23	23-0715	EA	6", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	498.14 128.55	192.82
40 05 23	23-0716	EA	8", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	870.62 222.20	333.31
40 05 23	23-0717	EA	10", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	1,391.98 296.27	444.39
40 05 23	23-0718	EA	12", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	2,038.14 444.40	666.60
40 05 23	23-0719	EA	14", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	2,398.96 518.47	777.70
40 05 23	23-0720	EA	16", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	2,812.98 591.41	887.10
40 05 23	23-0721	EA	18", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	3,555.12 740.66	1,111.00
40 05 23	23-0722	EA	20", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	5,056.04 1,036.93	1,555.39
40 05 23	23-0723	EA	24", Type 316, Schedule 10 Stainless Steel 45 Degree Elbow..... <i>For Work In Restricted Working Space, Add</i>	7,292.36 1,481.33	2,221.99
40 05 23	23-0724		Type 316, Schedule 10 Stainless Steel Butt Weld Tees (40 05 23 23-0666)		
40 05 23	23-0725	EA	1/2", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	176.24 46.64	69.96
40 05 23	23-0726	EA	3/4", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	211.61 57.25	85.88
40 05 23	23-0727	EA	1", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	235.19 64.33	96.49
40 05 23	23-0728	EA	1-1/4", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	270.51 73.36	110.03
40 05 23	23-0729	EA	1-1/2", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	285.07 78.74	118.11
40 05 23	23-0730	EA	2", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	309.48 85.88	128.82
40 05 23	23-0731	EA	2-1/2", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	377.22 102.90	154.35
40 05 23	23-0732	EA	3", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	472.94 128.96	193.44
40 05 23	23-0733	EA	4", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	545.67 144.74	217.10
40 05 23	23-0734	EA	6", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	814.30 192.98	289.46
40 05 23	23-0735	EA	8", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	1,401.52 296.27	444.39
40 05 23	23-0736	EA	10", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	2,191.52 444.40	666.60
40 05 23	23-0737	EA	12", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	2,825.40 555.50	833.24
40 05 23	23-0738	EA	14", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	3,639.86 667.55	1,001.33
40 05 23	23-0739	EA	16", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	4,290.50 814.34	1,221.51
40 05 23	23-0740	EA	18", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	5,452.75 1,036.93	1,555.39
40 05 23	23-0741	EA	20", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	7,363.53 1,364.38	2,046.58
40 05 23	23-0742	EA	24", Type 316, Schedule 10 Stainless Steel Tee..... <i>For Work In Restricted Working Space, Add</i>	10,499.32 2,073.86	3,110.79
40 05 23	23-0743		Type 316, Schedule 10 Stainless Steel Butt Weld Reducing Tees (40 05 23 23-0666)		
40 05 23	23-0744	EA	3/4", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	169.29 38.97	58.45
40 05 23	23-0745	EA	1", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	200.39 47.75	71.62
40 05 23	23-0746	EA	1-1/4", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	247.25 53.65	80.47
40 05 23	23-0747	EA	1-1/2", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	250.90 61.16	91.73
40 05 23	23-0748	EA	2", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	266.10 65.72	98.57
40 05 23	23-0749	EA	2-1/2", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	370.37 71.62	107.43
40 05 23	23-0750	EA	3", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	353.66 85.85	128.76
40 05 23	23-0751	EA	4", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	479.82 107.30	160.94
40 05 23	23-0752	EA	6", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	690.56 122.60	183.90

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0753 EA 8", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	1,377.88 185.16	277.75
40 05 23 23-0754 EA 10", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	2,547.50 246.89	370.34
40 05 23 23-0755 EA 12", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	3,324.14 370.33	555.50
40 05 23 23-0756 EA 14", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	3,775.92 444.91	667.37
40 05 23 23-0757 EA 16", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	4,680.60 542.70	814.06
40 05 23 23-0758 EA 18", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	6,048.98 691.29	1,036.93
40 05 23 23-0759 EA 20", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	8,639.72 909.59	1,364.38
40 05 23 23-0760 EA 24", Type 316, Schedule 10 Stainless Steel Reducing Tee..... <i>For Work In Restricted Working Space, Add</i>	13,535.88 1,381.34	2,072.02
40 05 23 23-0761 Type 316, Schedule 10 Stainless Steel Butt Weld Reducers (40 05 23 23-0666)		
40 05 23 23-0762 EA 3/4", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	131.24 35.43	53.15
40 05 23 23-0763 EA 1", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	144.90 38.61	57.91
40 05 23 23-0764 EA 1-1/4", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	161.79 42.81	64.20
40 05 23 23-0765 EA 1-1/2", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	168.95 46.65	69.98
40 05 23 23-0766 EA 2", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	183.64 51.52	77.28
40 05 23 23-0767 EA 2-1/2", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	243.25 64.38	96.57
40 05 23 23-0768 EA 3", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	283.71 73.29	109.93
40 05 23 23-0769 EA 4", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	309.52 85.88	128.82
40 05 23 23-0770 EA 6", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	431.95 109.34	164.00
40 05 23 23-0771 EA 8", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	692.57 177.76	266.64
40 05 23 23-0772 EA 10", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	897.69 222.20	333.31
40 05 23 23-0773 EA 12", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,201.31 296.27	444.39
40 05 23 23-0774 EA 14", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,710.38 388.85	583.27
40 05 23 23-0775 EA 16", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,986.74 443.13	664.70
40 05 23 23-0776 EA 18", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,459.32 555.50	833.24
40 05 23 23-0777 EA 20", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	3,463.90 740.66	1,111.00
40 05 23 23-0778 EA 24", Type 316, Schedule 10 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	5,037.47 1,111.00	1,666.50
40 05 23 23-0779 EA 3/4", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	154.98 35.43	53.15
40 05 23 23-0780 EA 1", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	173.09 38.61	57.91
40 05 23 23-0781 EA 1-1/4", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	195.22 42.81	64.20
40 05 23 23-0782 EA 1-1/2", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	208.04 46.65	69.98
40 05 23 23-0783 EA 2", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	207.77 51.52	77.28
40 05 23 23-0784 EA 2-1/2", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	276.60 64.38	96.57
40 05 23 23-0785 EA 3", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	317.92 73.29	109.93
40 05 23 23-0786 EA 4", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	355.91 85.88	128.82
40 05 23 23-0787 EA 6", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	511.67 109.34	164.00
40 05 23 23-0788 EA 8", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	865.33 177.76	266.64
40 05 23 23-0789 EA 10", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,195.22 222.20	333.31
40 05 23 23-0790 EA 12", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	1,510.05 296.27	444.39
40 05 23 23-0791 EA 14", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,295.86 388.85	583.27
40 05 23 23-0792 EA 16", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	2,694.38 443.13	664.70
40 05 23 23-0793 EA 18", Type 316, Schedule 10 Stainless Steel Eccentric Reducer..... <i>For Work In Restricted Working Space, Add</i>	3,338.50 555.50	833.24

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT	DEMOLITION
CSI	UOM DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-0794	EA 20", Type 316, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	4,869.99 740.66	1,111.00
40 05 23 23-0795	EA 24", Type 316, Schedule 10 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	6,707.31 1,111.00	1,666.50
40 05 23 23-0796	Type 316, Schedule 10 Stainless Steel Butt Weld Caps (40 05 23 23-0666)		
40 05 23 23-0797	EA 1/2", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	74.60 18.35	27.52
40 05 23 23-0798	EA 3/4", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	82.94 19.48	29.21
40 05 23 23-0799	EA 1", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	90.89 21.40	32.10
40 05 23 23-0800	EA 1-1/4", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	99.41 23.33	34.98
40 05 23 23-0801	EA 1-1/2", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	107.25 25.76	38.63
40 05 23 23-0802	EA 2", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	112.33 28.66	42.98
40 05 23 23-0803	EA 2-1/2", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	140.03 36.68	55.02
40 05 23 23-0804	EA 3", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	165.89 42.99	64.49
40 05 23 23-0805	EA 4", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	198.70 51.46	77.18
40 05 23 23-0806	EA 6", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	259.80 64.38	96.57
40 05 23 23-0807	EA 8", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	451.49 111.10	166.64
40 05 23 23-0808	EA 10", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	598.85 148.13	222.20
40 05 23 23-0809	EA 12", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	881.46 222.20	333.29
40 05 23 23-0810	EA 14", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,025.09 259.23	388.85
40 05 23 23-0811	EA 16", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,178.99 295.70	443.55
40 05 23 23-0812	EA 18", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,486.25 370.33	555.50
40 05 23 23-0813	EA 20", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	2,058.49 518.47	777.70
40 05 23 23-0814	EA 24", Type 316, Schedule 10 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	3,116.36 740.66	1,110.99
40 05 23 23-0815	Type 316, Schedule 40 Stainless Steel Pipe And Butt Weld Fittings (40 05 23 23-0212)		
40 05 23 23-0816	Type 316, Schedule 40 Stainless Steel Pipe (40 05 23 23-0815)		
40 05 23 23-0817	LF 1/2" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	31.11 2.90	4.83
40 05 23 23-0818	LF 3/4" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	37.73 3.54	5.90
40 05 23 23-0819	LF 1" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	46.75 4.15	6.97
40 05 23 23-0820	LF 1-1/4" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	58.45 5.19	8.59
40 05 23 23-0821	LF 1-1/2" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	67.71 5.85	9.66
40 05 23 23-0822	LF 2" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	87.47 7.25	12.34
40 05 23 23-0823	LF 2-1/2" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	110.60 8.28	13.94
40 05 23 23-0824	LF 3" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	104.16 9.33	15.56
40 05 23 23-0825	LF 4" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	184.56 11.04	18.24
40 05 23 23-0826	LF 6" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	295.19 14.50	24.14
40 05 23 23-0827	LF 8" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	517.45 28.28	43.78
40 05 23 23-0828	LF 10" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	667.94 31.11	48.39
40 05 23 23-0829	LF 12" Pipe, Stainless Steel Schedule 40 Type 316 For Welded Butt Fitting <i>For Work In Restricted Working Space, Add</i>	844.03 34.57	53.57
40 05 23 23-0830	Type 316, Schedule 40 Stainless Steel Butt Weld 90 Degree Elbows (40 05 23 23-0815)		
40 05 23 23-0831	EA 1/2", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	130.56 36.69	55.04
40 05 23 23-0832	EA 3/4", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	138.08 38.95	58.43
40 05 23 23-0833	EA 1", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	152.16 42.81	64.20

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0834 EA 1-1/4", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	165.73 46.65	69.98
40 05 23 23-0835 EA 1-1/2", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	182.73 51.52	77.28
40 05 23 23-0836 EA 2", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	206.32 57.32	85.98
40 05 23 23-0837 EA 2-1/2", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	275.98 73.36	110.03
40 05 23 23-0838 EA 3", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	327.51 85.97	128.96
40 05 23 23-0839 EA 4", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	418.15 102.90	154.35
40 05 23 23-0840 EA 6", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	658.18 128.55	192.82
40 05 23 23-0841 EA 8", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,172.44 222.20	333.31
40 05 23 23-0842 EA 10", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,930.62 296.27	444.39
40 05 23 23-0843 EA 12", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,747.35 444.40	666.60
40 05 23 23-0844 EA 14", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,067.74 518.47	777.70
40 05 23 23-0845 EA 16", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,730.97 591.41	887.10
40 05 23 23-0846 EA 18", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	4,766.53 740.66	1,111.00
40 05 23 23-0847 EA 20", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	6,429.91 1,036.93	1,555.39
40 05 23 23-0848 EA 24", Type 316, Schedule 40 Stainless Steel 90 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	9,336.87 1,481.33	2,221.99
40 05 23 23-0849 Type 316, Schedule 40 Stainless Steel Butt Weld 45 Degree Elbows (40 05 23 23-0815)		
40 05 23 23-0850 EA 1/2", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	133.61 36.69	55.04
40 05 23 23-0851 EA 3/4", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	141.13 38.95	58.43
40 05 23 23-0852 EA 1", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	153.99 42.81	64.20
40 05 23 23-0853 EA 1-1/4", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	166.62 46.65	69.98
40 05 23 23-0854 EA 1-1/2", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	184.56 51.52	77.28
40 05 23 23-0855 EA 2", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	206.32 57.32	85.98
40 05 23 23-0856 EA 2-1/2", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	275.98 73.36	110.03
40 05 23 23-0857 EA 3", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	315.60 85.97	128.96
40 05 23 23-0858 EA 4", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	395.54 102.90	154.35
40 05 23 23-0859 EA 6", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	565.33 128.55	192.82
40 05 23 23-0860 EA 8", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,008.85 222.20	333.31
40 05 23 23-0861 EA 10", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	1,553.61 296.27	444.39
40 05 23 23-0862 EA 12", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,242.64 444.40	666.60
40 05 23 23-0863 EA 14", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,545.38 518.47	777.70
40 05 23 23-0864 EA 16", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	2,873.99 591.41	887.10
40 05 23 23-0865 EA 18", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	3,699.65 740.66	1,111.00
40 05 23 23-0866 EA 20", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	5,022.58 1,036.93	1,555.39
40 05 23 23-0867 EA 24", Type 316, Schedule 40 Stainless Steel 45 Degree Elbow <i>For Work In Restricted Working Space, Add</i>	7,457.43 1,481.33	2,221.99
40 05 23 23-0868 Type 316, Schedule 40 Stainless Steel Butt Weld Tees (40 05 23 23-0815)		
40 05 23 23-0869 EA 1/2", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	178.07 46.64	69.96
40 05 23 23-0870 EA 3/4", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	213.44 57.25	85.88
40 05 23 23-0871 EA 1", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	237.02 64.33	96.49
40 05 23 23-0872 EA 1-1/4", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	273.17 73.36	110.03
40 05 23 23-0873 EA 1-1/2", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	285.07 78.74	118.11

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23	23-0874	EA	2", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	310.70 85.88	128.82
40 05 23	23-0875	EA	2-1/2", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	388.10 102.90	154.35
40 05 23	23-0876	EA	3", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	478.74 128.96	193.44
40 05 23	23-0877	EA	4", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	555.75 144.74	217.10
40 05 23	23-0878	EA	6", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	886.08 192.98	289.46
40 05 23	23-0879	EA	8", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	1,585.93 296.27	444.39
40 05 23	23-0880	EA	10", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	2,678.40 444.40	666.60
40 05 23	23-0881	EA	12", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	3,292.17 555.50	833.24
40 05 23	23-0882	EA	14", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	4,737.88 667.55	1,001.33
40 05 23	23-0883	EA	16", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	5,872.78 814.34	1,221.51
40 05 23	23-0884	EA	18", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	7,609.67 1,036.93	1,555.39
40 05 23	23-0885	EA	20", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	9,883.50 1,364.38	2,046.58
40 05 23	23-0886	EA	24", Type 316, Schedule 40 Stainless Steel Tee <i>For Work In Restricted Working Space, Add</i>	14,138.87 2,073.86	3,110.79
40 05 23 23-0887 Type 316, Schedule 40 Stainless Steel Butt Weld Reducing Tees (40 05 23 23-0815)					
40 05 23	23-0888	EA	3/4", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	175.09 38.97	58.45
40 05 23	23-0889	EA	1", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	204.36 47.75	71.62
40 05 23	23-0890	EA	1-1/4", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	271.68 53.65	80.47
40 05 23	23-0891	EA	1-1/2", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	260.36 61.16	91.73
40 05 23	23-0892	EA	2", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	266.10 65.72	98.57
40 05 23	23-0893	EA	2-1/2", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	372.20 71.62	107.43
40 05 23	23-0894	EA	3", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	366.79 85.85	128.76
40 05 23	23-0895	EA	4", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	492.96 107.30	160.94
40 05 23	23-0896	EA	6", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	698.81 122.60	183.90
40 05 23	23-0897	EA	8", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	1,215.59 185.16	277.75
40 05 23	23-0898	EA	10", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	2,588.08 246.89	370.34
40 05 23	23-0899	EA	12", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	3,405.29 370.33	555.50
40 05 23	23-0900	EA	14", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	3,864.96 444.91	667.37
40 05 23	23-0901	EA	16", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	4,792.11 542.70	814.06
40 05 23	23-0902	EA	18", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	6,194.40 691.29	1,036.93
40 05 23	23-0903	EA	20", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	8,857.49 909.59	1,364.38
40 05 23	23-0904	EA	24", Type 316, Schedule 40 Stainless Steel Reducing Tee <i>For Work In Restricted Working Space, Add</i>	13,882.71 1,381.34	2,072.02
40 05 23 23-0905 Type 316, Schedule 40 Stainless Steel Butt Weld Reducers (40 05 23 23-0815)					
40 05 23	23-0906	EA	3/4", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	136.13 35.43	53.15
40 05 23	23-0907	EA	1", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	149.78 38.67	57.91
40 05 23	23-0908	EA	1-1/4", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	164.01 42.81	64.20
40 05 23	23-0909	EA	1-1/2", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	174.45 46.65	69.98
40 05 23	23-0910	EA	2", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	187.00 51.52	77.28
40 05 23	23-0911	EA	2-1/2", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	254.00 64.38	96.57
40 05 23	23-0912	EA	3", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	271.80 73.29	109.93
40 05 23	23-0913	EA	4", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	313.76 85.88	128.82
40 05 23	23-0914	EA	6", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	434.09 109.34	164.00

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0915 EA 8", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	756.48 177.76	266.64
40 05 23 23-0916 EA 10", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,018.09 222.20	333.31
40 05 23 23-0917 EA 12", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,287.73 296.27	444.39
40 05 23 23-0918 EA 14", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,874.99 388.85	583.27
40 05 23 23-0919 EA 16", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,161.94 443.13	664.70
40 05 23 23-0920 EA 18", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,896.93 555.50	833.24
40 05 23 23-0921 EA 20", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	3,932.00 740.66	1,111.00
40 05 23 23-0922 EA 24", Type 316, Schedule 40 Stainless Steel Concentric Reducer <i>For Work In Restricted Working Space, Add</i>	5,628.55 1,111.00	1,666.50
40 05 23 23-0923 EA 3/4", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	170.64 35.43	53.15
40 05 23 23-0924 EA 1", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	181.24 38.61	57.91
40 05 23 23-0925 EA 1-1/4", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	211.11 42.81	64.20
40 05 23 23-0926 EA 1-1/2", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	217.51 46.65	69.98
40 05 23 23-0927 EA 2", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	232.82 51.52	77.28
40 05 23 23-0928 EA 2-1/2", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	276.60 64.38	96.57
40 05 23 23-0929 EA 3", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	360.07 73.29	109.93
40 05 23 23-0930 EA 4", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	389.51 85.88	128.82
40 05 23 23-0931 EA 6", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	558.40 109.34	164.00
40 05 23 23-0932 EA 8", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	849.50 177.76	266.64
40 05 23 23-0933 EA 10", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,222.59 222.20	333.31
40 05 23 23-0934 EA 12", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	1,696.76 296.27	444.39
40 05 23 23-0935 EA 14", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,562.21 388.85	583.27
40 05 23 23-0936 EA 16", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	2,953.07 443.13	664.70
40 05 23 23-0937 EA 18", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	3,978.41 555.50	833.24
40 05 23 23-0938 EA 20", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	5,108.64 740.66	1,111.00
40 05 23 23-0939 EA 24", Type 316, Schedule 40 Stainless Steel Eccentric Reducer <i>For Work In Restricted Working Space, Add</i>	7,658.56 1,111.00	1,666.50
40 05 23 23-0940 Type 316, Schedule 40 Stainless Steel Butt Weld Caps (40 05 23 23-0815)		
40 05 23 23-0941 EA 1/2", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	75.21 18.35	27.52
40 05 23 23-0942 EA 3/4", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	82.64 19.48	29.21
40 05 23 23-0943 EA 1", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	91.50 21.40	32.10
40 05 23 23-0944 EA 1-1/4", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	105.07 23.33	34.98
40 05 23 23-0945 EA 1-1/2", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	102.67 25.76	38.63
40 05 23 23-0946 EA 2", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	116.60 28.66	42.98
40 05 23 23-0947 EA 2-1/2", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	145.58 36.68	55.02
40 05 23 23-0948 EA 3", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	166.81 42.99	64.49
40 05 23 23-0949 EA 4", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	205.42 51.46	77.18
40 05 23 23-0950 EA 6", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	287.90 64.38	96.57
40 05 23 23-0951 EA 8", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	504.27 111.10	166.64
40 05 23 23-0952 EA 10", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	676.52 148.13	222.20
40 05 23 23-0953 EA 12", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,008.50 222.20	333.29
40 05 23 23-0954 EA 14", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,148.21 259.23	388.85
40 05 23 23-0955 EA 16", Type 316, Schedule 40 Stainless Steel Cap <i>For Work In Restricted Working Space, Add</i>	1,289.26 295.70	443.55

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23	23-0956	EA	18", Type 316, Schedule 40 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	1,647.72 370.33	555.50
40 05 23	23-0957	EA	20", Type 316, Schedule 40 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	2,261.76 518.47	777.70
40 05 23	23-0958	EA	24", Type 316, Schedule 40 Stainless Steel Cap..... <i>For Work In Restricted Working Space, Add</i>	3,512.22 740.66	1,110.99
40 05 23	23-0959		Stainless Steel Thread-O-Let Fittings (40 05 23 23-0212)		
40 05 23	23-0960	EA	1/2", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	89.64 22.23	33.34
40 05 23	23-0961	EA	3/4", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	118.22 29.64	44.46
40 05 23	23-0962	EA	1", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	145.63 36.76	55.13
40 05 23	23-0963	EA	1-1/4", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	209.24 52.01	78.02
40 05 23	23-0964	EA	1-1/2", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	231.37 58.65	87.98
40 05 23	23-0965	EA	2", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	289.20 74.51	111.77
40 05 23	23-0966	EA	2-1/2", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	519.86 114.87	172.30
40 05 23	23-0967	EA	3", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	697.60 146.64	219.96
40 05 23	23-0968	EA	4", Stainless Steel Thread-o-let Fitting..... <i>For Work In Restricted Working Space, Add</i>	921.48 183.78	275.67
40 05 23	23-0969		Stainless Steel Flanges (40 05 23 23-0212)		
40 05 23	23-0970		150#, Type 304 Stainless Steel Raised Face Threaded Flange (40 05 23 23-0969)		
40 05 23	23-0971	EA	1/2", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	79.45 11.12	18.53
40 05 23	23-0972	EA	3/4", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	96.51 14.82	24.71
40 05 23	23-0973	EA	1", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	114.03 18.38	30.63
40 05 23	23-0974	EA	1-1/4", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	153.59 26.01	43.35
40 05 23	23-0975	EA	1-1/2", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	164.66 29.33	48.88
40 05 23	23-0976	EA	2", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	211.83 37.25	62.08
40 05 23	23-0977	EA	2-1/2", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	313.92 57.43	95.68
40 05 23	23-0978	EA	3", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	372.53 73.32	195.28
40 05 23	23-0979	EA	4", 150#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	481.55 91.89	153.12
40 05 23	23-0980		300#, Type 304 Stainless Steel Raised Face Threaded Flange (40 05 23 23-0969)		
40 05 23	23-0981	EA	1/2", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	103.95 11.12	18.53
40 05 23	23-0982	EA	3/4", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	116.30 14.82	24.71
40 05 23	23-0983	EA	1", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	128.16 18.38	30.63
40 05 23	23-0984	EA	1-1/4", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	189.42 26.01	43.35
40 05 23	23-0985	EA	1-1/2", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	200.49 29.33	48.88
40 05 23	23-0986	EA	2", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	248.56 37.25	62.08
40 05 23	23-0987	EA	2-1/2", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	395.90 57.43	95.68
40 05 23	23-0988	EA	3", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	456.37 73.32	195.28
40 05 23	23-0989	EA	4", 300#, Type 304 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	610.64 91.89	153.12
40 05 23	23-0990		150#, Type 304 Stainless Steel Raised Face Weld Neck Flange (40 05 23 23-0969)		
40 05 23	23-0991	EA	1/2", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	103.56 18.35	27.51
40 05 23	23-0992	EA	3/4", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	112.03 19.48	29.21
40 05 23	23-0993	EA	1", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	125.97 21.41	32.10
40 05 23	23-0994	EA	1-1/4", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	156.04 23.35	35.01

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-0995 EA 1-1/2", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	163.99 25.73	38.59
40 05 23 23-0996 EA 2", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	182.24 28.67	42.99
40 05 23 23-0997 EA 2-1/2", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	253.17 36.65	54.98
40 05 23 23-0998 EA 3", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	286.26 42.91	64.37
40 05 23 23-0999 EA 4", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	371.14 51.42	77.12
40 05 23 23-1000 EA 6", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	558.97 64.25	96.36
40 05 23 23-1001 EA 8", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	954.45 111.10	166.64
40 05 23 23-1002 EA 10", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	1,355.82 148.13	222.19
40 05 23 23-1003 EA 12", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	2,085.98 222.20	333.29
40 05 23 23-1004 EA 14", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	2,612.36 259.23	388.85
40 05 23 23-1005 EA 16", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	3,267.03 295.70	443.55
40 05 23 23-1006 EA 18", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	4,005.80 370.33	555.50
40 05 23 23-1007 EA 20", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	5,180.92 518.47	777.70
40 05 23 23-1008 EA 24", 150#, Type 304 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	7,361.66 740.66	1,110.99
40 05 23 23-1009 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange (40 05 23 23-0969)		
40 05 23 23-1010 EA 1/2" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	132.77 18.35	27.51
40 05 23 23-1011 EA 3/4" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	136.53 19.48	29.21
40 05 23 23-1012 EA 1" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	142.96 21.41	32.10
40 05 23 23-1013 EA 1-1/4" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	188.97 23.35	35.01
40 05 23 23-1014 EA 1-1/2" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	196.92 25.73	38.59
40 05 23 23-1015 EA 2" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	210.51 28.67	42.99
40 05 23 23-1016 EA 2-1/2" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	302.13 36.65	54.98
40 05 23 23-1017 EA 3" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	340.88 42.91	64.37
40 05 23 23-1018 EA 4" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	499.23 51.42	77.12
40 05 23 23-1019 EA 6" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	704.05 64.25	96.36
40 05 23 23-1020 EA 8" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	1,316.21 111.10	166.64
40 05 23 23-1021 EA 10" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	1,833.49 148.13	222.19
40 05 23 23-1022 EA 12" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	2,692.74 222.20	333.29
40 05 23 23-1023 EA 14" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	3,571.52 259.23	388.85
40 05 23 23-1024 EA 16" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	4,414.07 295.70	443.55
40 05 23 23-1025 EA 18" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	5,639.15 370.33	555.50
40 05 23 23-1026 EA 20" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	7,270.72 518.47	777.70
40 05 23 23-1027 EA 24" 300#, Type 304 Stainless Steel Raised Face Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	10,589.25 740.66	1,110.99
40 05 23 23-1028 150#, Type 304 Stainless Steel Raised Face Slip-On Flanges (40 05 23 23-0969)		
40 05 23 23-1029 EA 1/2", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	159.99 36.69	55.03
40 05 23 23-1030 EA 3/4", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	168.47 38.95	58.42
40 05 23 23-1031 EA 1", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	185.10 42.81	64.20
40 05 23 23-1032 EA 1-1/4", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	213.11 46.69	70.03
40 05 23 23-1033 EA 1-1/2", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	229.03 51.47	77.19
40 05 23 23-1034 EA 2", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	265.56 57.33	85.99
40 05 23 23-1035 EA 2-1/2", 150#, Type 304 Stainless Steel Slip-On Flange..... <i>For Work In Restricted Working Space, Add</i>	348.95 73.31	109.96

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-1036	EA	3", 150#, Type 304 Stainless Steel Slip-On Flange	398.25	128.73
		<i>For Work In Restricted Working Space, Add</i>	85.83	
40 05 23 23-1037	EA	4", 150#, Type 304 Stainless Steel Slip-On Flange	495.44	154.26
		<i>For Work In Restricted Working Space, Add</i>	102.84	
40 05 23 23-1038	EA	6", 150#, Type 304 Stainless Steel Slip-On Flange	661.01	192.73
		<i>For Work In Restricted Working Space, Add</i>	128.49	
40 05 23 23-1039	EA	8", 150#, Type 304 Stainless Steel Slip-On Flange	1,180.65	333.29
		<i>For Work In Restricted Working Space, Add</i>	222.20	
40 05 23 23-1040	EA	10" 150#, Type 304 Stainless Steel Raised Face Slip-On Flange	1,670.58	444.39
		<i>For Work In Restricted Working Space, Add</i>	296.27	
40 05 23 23-1041	EA	12" 150#, Type 304 Stainless Steel Raised Face Slip-On Flange	2,490.34	666.58
		<i>For Work In Restricted Working Space, Add</i>	444.40	
40 05 23 23-1042		300#, Type 304 Stainless Steel Raised Face Slip-On Flanges (40 05 23 23-0969)		
40 05 23 23-1043	EA	1/2" 300#, Type 304 Stainless Steel Raised Neck Slip-On Flange	178.84	55.03
		<i>For Work In Restricted Working Space, Add</i>	36.69	
40 05 23 23-1044	EA	3/4" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	186.36	58.42
		<i>For Work In Restricted Working Space, Add</i>	38.95	
40 05 23 23-1045	EA	1" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	199.23	64.20
		<i>For Work In Restricted Working Space, Add</i>	42.81	
40 05 23 23-1046	EA	1-1/4" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	242.32	70.03
		<i>For Work In Restricted Working Space, Add</i>	46.69	
40 05 23 23-1047	EA	1-1/2" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	258.24	77.19
		<i>For Work In Restricted Working Space, Add</i>	51.47	
40 05 23 23-1048	EA	2" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	285.30	85.99
		<i>For Work In Restricted Working Space, Add</i>	57.33	
40 05 23 23-1049	EA	2-1/2" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	422.47	109.96
		<i>For Work In Restricted Working Space, Add</i>	73.31	
40 05 23 23-1050	EA	3" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	471.72	128.73
		<i>For Work In Restricted Working Space, Add</i>	85.83	
40 05 23 23-1051	EA	4" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	597.17	154.26
		<i>For Work In Restricted Working Space, Add</i>	102.84	
40 05 23 23-1052	EA	6" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	948.36	192.73
		<i>For Work In Restricted Working Space, Add</i>	128.49	
40 05 23 23-1053	EA	8" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	1,470.80	333.29
		<i>For Work In Restricted Working Space, Add</i>	222.20	
40 05 23 23-1054	EA	10" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	2,137.88	444.39
		<i>For Work In Restricted Working Space, Add</i>	296.27	
40 05 23 23-1055	EA	12" 300#, Type 304 Stainless Steel Raised Face Slip-On Flange	3,091.43	666.58
		<i>For Work In Restricted Working Space, Add</i>	444.40	
40 05 23 23-1056		150#, Type 304 Stainless Steel Blind Flanges (40 05 23 23-0969)		
40 05 23 23-1057	EA	1/2", 150#, Type 304 Stainless Steel Raised Face Blind Flange	64.67	11.00
		<i>For Work In Restricted Working Space, Add</i>	7.34	
40 05 23 23-1058	EA	3/4", 150#, Type 304 Stainless Steel Raised Face Blind Flange	67.41	11.67
		<i>For Work In Restricted Working Space, Add</i>	7.79	
40 05 23 23-1059	EA	1", 150#, Type 304 Stainless Steel Raised Face Blind Flange	72.84	12.83
		<i>For Work In Restricted Working Space, Add</i>	8.56	
40 05 23 23-1060	EA	1-1/4", 150#, Type 304 Stainless Steel Raised Face Blind Flange	94.90	14.29
		<i>For Work In Restricted Working Space, Add</i>	9.53	
40 05 23 23-1061	EA	1-1/2", 150#, Type 304 Stainless Steel Raised Face Blind Flange	106.06	19.31
		<i>For Work In Restricted Working Space, Add</i>	12.88	
40 05 23 23-1062	EA	2", 150#, Type 304 Stainless Steel Raised Face Blind Flange	125.86	21.44
		<i>For Work In Restricted Working Space, Add</i>	14.29	
40 05 23 23-1063	EA	2-1/2", 150#, Type 304 Stainless Steel Raised Face Blind Flange	172.42	27.56
		<i>For Work In Restricted Working Space, Add</i>	18.38	
40 05 23 23-1064	EA	3", 150#, Type 304 Stainless Steel Raised Face Blind Flange	208.31	38.62
		<i>For Work In Restricted Working Space, Add</i>	25.75	
40 05 23 23-1065	EA	4", 150#, Type 304 Stainless Steel Raised Face Blind Flange	314.50	64.36
		<i>For Work In Restricted Working Space, Add</i>	42.91	
40 05 23 23-1066	EA	6", 150#, Type 304 Stainless Steel Raised Face Blind Flange	434.52	82.76
		<i>For Work In Restricted Working Space, Add</i>	55.17	
40 05 23 23-1067	EA	8", 150#, Type 304 Stainless Steel Raised Face Blind Flange	689.26	103.70
		<i>For Work In Restricted Working Space, Add</i>	69.13	
40 05 23 23-1068	EA	10", 150#, Type 304 Stainless Steel Raised Face Blind Flange	1,073.55	124.43
		<i>For Work In Restricted Working Space, Add</i>	82.95	
40 05 23 23-1069	EA	12", 150#, Type 304 Stainless Steel Raised Face Blind Flange	1,424.36	155.54
		<i>For Work In Restricted Working Space, Add</i>	103.69	
40 05 23 23-1070	EA	14", 150#, Type 304 Stainless Steel Raised Face Blind Flange	1,812.00	194.43
		<i>For Work In Restricted Working Space, Add</i>	129.62	
40 05 23 23-1071	EA	16", 150#, Type 304 Stainless Steel Raised Face Blind Flange	2,349.31	221.78
		<i>For Work In Restricted Working Space, Add</i>	147.86	
40 05 23 23-1072	EA	18", 150#, Type 304 Stainless Steel Raised Face Blind Flange	2,771.52	277.75
		<i>For Work In Restricted Working Space, Add</i>	185.17	
40 05 23 23-1073	EA	20", 150#, Type 304 Stainless Steel Raised Face Blind Flange	3,673.62	388.85
		<i>For Work In Restricted Working Space, Add</i>	259.23	
40 05 23 23-1074	EA	24", 150#, Type 304 Stainless Steel Raised Face Blind Flange	5,354.40	555.50
		<i>For Work In Restricted Working Space, Add</i>	370.33	
40 05 23 23-1075		300#, Type 304 Stainless Steel Blind Flanges (40 05 23 23-0969)		

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-1076 EA 1/2", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	83.84 7.34	11.00
40 05 23 23-1077 EA 3/4", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	85.35 7.79	11.67
40 05 23 23-1078 EA 1", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	87.92 8.56	12.83
40 05 23 23-1079 EA 1-1/4", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	112.79 9.53	14.29
40 05 23 23-1080 EA 1-1/2", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	123.95 12.88	19.31
40 05 23 23-1081 EA 2", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	135.29 14.29	21.44
40 05 23 23-1082 EA 2-1/2", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	238.37 18.38	27.56
40 05 23 23-1083 EA 3", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	270.02 25.75	38.62
40 05 23 23-1084 EA 4", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	391.73 42.91	64.36
40 05 23 23-1085 EA 6", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	752.94 55.17	82.76
40 05 23 23-1086 EA 8", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	1,069.86 69.13	103.70
40 05 23 23-1087 EA 10", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	1,537.04 82.95	124.43
40 05 23 23-1088 EA 12", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	2,135.66 103.69	155.54
40 05 23 23-1089 EA 14", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	2,998.36 129.62	194.43
40 05 23 23-1090 EA 16", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	3,847.15 147.86	221.78
40 05 23 23-1091 EA 18", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	5,025.74 185.17	277.75
40 05 23 23-1092 EA 20", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	6,348.11 259.23	388.85
40 05 23 23-1093 EA 24", 300#, Type 304 Stainless Steel Raised Face Blind Flange..... <i>For Work In Restricted Working Space, Add</i>	9,753.29 370.33	555.50
40 05 23 23-1094 150#, Type 316 Stainless Steel Raised Face Threaded Flange (40 05 23 23-0969)		
40 05 23 23-1095 EA 1/2", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	96.43 11.12	18.53
40 05 23 23-1096 EA 3/4", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	118.20 14.82	24.71
40 05 23 23-1097 EA 1", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	134.73 18.38	30.63
40 05 23 23-1098 EA 1-1/4", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	184.66 26.01	43.35
40 05 23 23-1099 EA 1-1/2", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	195.73 29.33	48.88
40 05 23 23-1100 EA 2", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	245.75 37.25	62.08
40 05 23 23-1101 EA 2-1/2", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	362.92 57.43	95.68
40 05 23 23-1102 EA 3", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	435.67 73.32	195.28
40 05 23 23-1103 EA 4", 150#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	570.10 91.89	153.12
40 05 23 23-1104 300#, Type 316 Stainless Steel Raised Face Threaded Flange (40 05 23 23-0969)		
40 05 23 23-1105 EA 1/2", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	128.45 11.12	18.53
40 05 23 23-1106 EA 3/4", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	140.80 14.82	24.71
40 05 23 23-1107 EA 1", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	152.66 18.38	30.63
40 05 23 23-1108 EA 1-1/4", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	236.52 26.01	43.35
40 05 23 23-1109 EA 1-1/2", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	247.59 29.33	48.88
40 05 23 23-1110 EA 2", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	290.00 37.25	62.08
40 05 23 23-1111 EA 2-1/2", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	489.16 57.43	95.68
40 05 23 23-1112 EA 3", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	551.53 73.32	195.28
40 05 23 23-1113 EA 4", 300#, Type 316 Stainless Steel Raised Face Threaded Flange..... <i>For Work In Restricted Working Space, Add</i>	762.28 91.89	153.12
40 05 23 23-1114 150#, Type 316 Stainless Steel Raised Face Weld Neck Flange (40 05 23 23-0969)		
40 05 23 23-1115 EA 1/2", 150#, Type 316 Stainless Steel Weld Neck Flange..... <i>For Work In Restricted Working Space, Add</i>	125.20 18.35	27.51

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-1116	EA	3/4"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	133.72 19.48	29.21
40 05 23 23-1117	EA	1"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	150.48 21.41	32.10
40 05 23 23-1118	EA	1-1/4"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	188.07 23.35	35.01
40 05 23 23-1119	EA	1-1/2"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	196.02 25.73	38.59
40 05 23 23-1120	EA	2"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	215.22 28.67	42.99
40 05 23 23-1121	EA	2-1/2"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	308.70 36.65	54.98
40 05 23 23-1122	EA	3"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	336.17 42.91	64.37
40 05 23 23-1123	EA	4"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	455.93 51.42	77.12
40 05 23 23-1124	EA	6"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	705.95 64.25	96.36
40 05 23 23-1125	EA	8"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	1,181.51 111.10	166.64
40 05 23 23-1126	EA	10"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	1,734.57 148.13	222.19
40 05 23 23-1127	EA	12"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	2,586.30 222.20	333.29
40 05 23 23-1128	EA	14"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	3,026.72 259.23	388.85
40 05 23 23-1129	EA	16"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	3,807.75 295.70	443.55
40 05 23 23-1130	EA	18"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	4,662.66 370.33	555.50
40 05 23 23-1131	EA	20"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	5,999.26 518.47	777.70
40 05 23 23-1132	EA	24"	150#, Type 316 Stainless Steel Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	8,521.33 740.66	1,110.99
40 05 23 23-1133			300#, Type 316 Stainless Steel Raised Face Weld Neck Flange (40 05 23 23-0969)		
40 05 23 23-1134	EA	1/2"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	161.03 18.35	27.51
40 05 23 23-1135	EA	3/4"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	164.79 19.48	29.21
40 05 23 23-1136	EA	1"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	171.22 21.41	32.10
40 05 23 23-1137	EA	1-1/4"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	227.65 23.35	35.01
40 05 23 23-1138	EA	1-1/2"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	235.60 25.73	38.59
40 05 23 23-1139	EA	2"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	257.61 28.67	42.99
40 05 23 23-1140	EA	2-1/2"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	383.17 36.65	54.98
40 05 23 23-1141	EA	3"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	417.21 42.91	64.37
40 05 23 23-1142	EA	4"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	640.54 51.42	77.12
40 05 23 23-1143	EA	6"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	1,053.58 64.25	96.36
40 05 23 23-1144	EA	8"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	1,673.31 111.10	166.64
40 05 23 23-1145	EA	10"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	2,411.94 148.13	222.19
40 05 23 23-1146	EA	12"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	3,542.50 222.20	333.29
40 05 23 23-1147	EA	14"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	4,807.46 259.23	388.85
40 05 23 23-1148	EA	16"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	5,979.15 295.70	443.55
40 05 23 23-1149	EA	18"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	7,649.93 370.33	555.50
40 05 23 23-1150	EA	20"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	9,800.91 518.47	777.70
40 05 23 23-1151	EA	24"	300#, Type 316 Stainless Steel Raised Face Weld Neck Flange <i>For Work In Restricted Working Space, Add</i>	14,296.24 740.66	1,110.99
40 05 23 23-1152			150#, Type 316 Stainless Steel Raised Face Slip-On Flanges (40 05 23 23-0969)		
40 05 23 23-1153	EA	1/2"	150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	171.32 36.69	55.03
40 05 23 23-1154	EA	3/4"	150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	185.45 38.95	58.42
40 05 23 23-1155	EA	1"	150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	204.56 42.81	64.20
40 05 23 23-1156	EA	1-1/4"	150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	284.10 46.69	70.03

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
40 05 23 23-1157 EA 1-1/2", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	251.63 51.47	77.19
40 05 23 23-1158 EA 2", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	271.17 57.33	85.99
40 05 23 23-1159 EA 2-1/2", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	345.20 73.31	109.96
40 05 23 23-1160 EA 3", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	430.27 85.83	128.73
40 05 23 23-1161 EA 4", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	563.25 102.84	154.26
40 05 23 23-1162 EA 6", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	761.79 128.49	192.73
40 05 23 23-1163 EA 8", 150#, Type 316 Stainless Steel Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	1,388.82 222.20	333.29
40 05 23 23-1164 EA 10" 150#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	1,955.12 296.27	444.39
40 05 23 23-1165 EA 12" 150#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	2,870.94 444.40	666.58
40 05 23 23-1166 300#, Type 316 Stainless Steel Raised Face Slip-On Flanges (40 05 23 23-0969)		
40 05 23 23-1167 EA 1/2" 300#, Type 316 Stainless Steel Raised Neck Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	197.68 36.69	55.03
40 05 23 23-1168 EA 3/4" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	205.20 38.95	58.42
40 05 23 23-1169 EA 1" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	218.07 42.81	64.20
40 05 23 23-1170 EA 1-1/4" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	279.06 46.69	70.03
40 05 23 23-1171 EA 1-1/2" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	294.98 51.47	77.19
40 05 23 23-1172 EA 2" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	320.04 57.33	85.99
40 05 23 23-1173 EA 2-1/2" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	504.40 73.31	109.96
40 05 23 23-1174 EA 3" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	555.55 85.83	128.73
40 05 23 23-1175 EA 4" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	727.16 102.84	154.26
40 05 23 23-1176 EA 6" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	1,137.73 128.49	192.73
40 05 23 23-1177 EA 8" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	1,665.84 222.20	333.29
40 05 23 23-1178 EA 10" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	2,772.86 296.27	444.39
40 05 23 23-1179 EA 12" 300#, Type 316 Stainless Steel Raised Face Slip-On Flange <i>For Work In Restricted Working Space, Add</i>	3,651.04 444.40	666.58
40 05 23 23-1180 150#, Type 316 Stainless Steel Blind Flanges (40 05 23 23-0969)		
40 05 23 23-1181 EA 1/2", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	73.47 7.34	11.00
40 05 23 23-1182 EA 3/4", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	83.45 7.79	11.67
40 05 23 23-1183 EA 1", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	94.49 8.56	12.83
40 05 23 23-1184 EA 1-1/4", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	111.84 9.53	14.29
40 05 23 23-1185 EA 1-1/2", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	123.00 12.88	19.31
40 05 23 23-1186 EA 2", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	154.13 14.29	21.44
40 05 23 23-1187 EA 2-1/2", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	216.72 18.38	27.56
40 05 23 23-1188 EA 3", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	257.31 25.75	38.62
40 05 23 23-1189 EA 4", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	397.39 42.91	64.36
40 05 23 23-1190 EA 6", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	567.37 55.17	82.76
40 05 23 23-1191 EA 8", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	1,006.72 69.13	103.70
40 05 23 23-1192 EA 10", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	1,324.16 82.95	124.43
40 05 23 23-1193 EA 12", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	2,146.98 103.69	155.54
40 05 23 23-1194 EA 14", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	2,551.84 129.62	194.43
40 05 23 23-1195 EA 16", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	3,344.64 147.86	221.78
40 05 23 23-1196 EA 18", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	3,926.52 185.17	277.75
40 05 23 23-1197 EA 20", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	5,179.91 259.23	388.85

40 Process Interconnections**40 05 Common Work Results For Process Interconnections****40 05 23 Stainless Steel Process Pipe and Tubing**

MINOR		TOTAL DIRECT		DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST
40 05 23 23-1198	EA	24", 150#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	7,563.27 370.33	555.50
40 05 23 23-1199		300#, Type 316 Stainless Steel Blind Flanges <small>(40 05 23 23-0969)</small>		
40 05 23 23-1200	EA	1-1/4", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	115.86 7.34	11.00
40 05 23 23-1201	EA	3/4", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	117.37 7.79	11.67
40 05 23 23-1202	EA	1", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	119.94 8.56	12.83
40 05 23 23-1203	EA	1-1/4", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	181.59 9.53	14.29
40 05 23 23-1204	EA	1-1/2", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	192.75 12.88	19.31
40 05 23 23-1205	EA	2", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	213.46 14.29	21.44
40 05 23 23-1206	EA	2-1/2", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	358.99 18.38	27.56
40 05 23 23-1207	EA	3", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	392.97 25.75	38.62
40 05 23 23-1208	EA	4", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	598.99 42.91	64.36
40 05 23 23-1209	EA	6", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	1,106.28 55.17	82.76
40 05 23 23-1210	EA	8", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	1,435.43 69.13	103.70
40 05 23 23-1211	EA	10", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	2,599.78 82.95	124.43
40 05 23 23-1212	EA	12", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	3,169.18 103.69	155.54
40 05 23 23-1213	EA	14", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	4,585.79 129.62	194.43
40 05 23 23-1214	EA	16", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	5,922.00 147.86	221.78
40 05 23 23-1215	EA	18", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	7,752.68 185.17	277.75
40 05 23 23-1216	EA	20", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	9,740.33 259.23	388.85
40 05 23 23-1217	EA	24", 300#, Type 316 Stainless Steel Raised Face Blind Flange <i>For Work In Restricted Working Space, Add</i>	15,022.76 370.33	555.50

END OF SECTION 40



MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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41 Material Processing and Handling Equipment

41 01 Operation and Maintenance of Material Processing and Handling Equipment ⁽⁴¹⁾

41 01 20 Operation and Maintenance of Piece Material Handling Equipment ^(41 01)

41 01 20 13 Operation And Maintenance Of Hoists Or Cranes ^(41 01 20)

41 01 20 13-0001 Maintenance ^(41 01 20 13)

41 01 20 13-0002	EA	Regular Inspection.....	408.93
41 01 20 13-0003	HR	Hoist Or Crane Servicing, Labor Only.....	122.01
41 01 20 13-0004	MO	Hoist Or Crane Maintenance Contract.....	987.80

41 20 Piece Material Handling Equipment ⁽⁴¹⁾

41 22 Cranes and Hoists ^(41 20)

41 22 23 Hoists ^(41 22)

41 22 23 13 Fixed Hoists ^(41 22 23)

41 22 23 13-0001 Electric Hoists ^(41 22 23 13)

41 22 23 13-0002 Electric Industrial Chain Hoists ^(41 22 23 13-0001)

Note: Includes 20' of chain. Excludes beams.

41 22 23 13-0003	EA	500 LB Capacity, Electric Industrial Chain Hoist.....	2,851.25	
		<i>For DC Electrical Operated, Add</i>	531.78	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0004	EA	1,000 LB Capacity, Electric Industrial Chain Hoist.....	2,968.15	360.97
		<i>For DC Electrical Operated, Add</i>	560.52	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0005	EA	2,000 LB Capacity, Electric Industrial Chain Hoist.....	3,264.25	360.97
		<i>For DC Electrical Operated, Add</i>	631.57	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0006	EA	3,000 LB Capacity, Electric Industrial Chain Hoist.....	4,831.76	373.42
		<i>For DC Electrical Operated, Add</i>	1,015.56	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0007	EA	4,000 LB Capacity, Electric Industrial Chain Hoist.....	4,193.89	373.42
		<i>For DC Electrical Operated, Add</i>	853.88	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0008	EA	5,000 LB Capacity, Electric Industrial Chain Hoist.....	5,920.28	385.86
		<i>For DC Electrical Operated, Add</i>	1,275.45	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0009	EA	6,000 LB Capacity, Electric Industrial Chain Hoist.....	5,410.35	423.20
		<i>For DC Electrical Operated, Add</i>	1,113.13	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0010	EA	7,500 LB Capacity, Electric Industrial Chain Hoist.....	6,638.50	522.78
		<i>For DC Electrical Operated, Add</i>	1,414.08	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0011	EA	10,000 LB Capacity, Electric Industrial Chain Hoist.....	7,819.15	553.66
		<i>For DC Electrical Operated, Add</i>	1,715.33	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0012	EA	15,000 LB Capacity, Electric Industrial Chain Hoist.....	12,482.95	577.73
		<i>For DC Electrical Operated, Add</i>	2,831.62	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0013	EA	20,000 LB Capacity, Electric Industrial Chain Hoist.....	14,910.20	601.80
		<i>For DC Electrical Operated, Add</i>	3,425.93	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0014	EA	25,000 LB Capacity, Electric Industrial Chain Hoist.....	20,525.68	625.87
		<i>For DC Electrical Operated, Add</i>	4,816.95	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	
41 22 23 13-0015	EA	30,000 LB Capacity, Electric Industrial Chain Hoist.....	26,211.99	686.05
		<i>For DC Electrical Operated, Add</i>	6,208.29	
		<i>For Each LF Copper Conductor Bar, Add</i>	10.50	

41 22 23 13-0016 Hand Chain Hoists ^(41 22 23 13)

41 22 23 13-0017	EA	1,000 LB Capacity, Hand Chain Hoist.....	1,799.61	152.63
41 22 23 13-0018	EA	2,000 LB Capacity, Hand Chain Hoist.....	2,123.78	154.72
41 22 23 13-0019	EA	3,000 LB Capacity, Hand Chain Hoist.....	2,857.60	162.04
41 22 23 13-0020	EA	4,000 LB Capacity, Hand Chain Hoist.....	3,218.91	164.12
41 22 23 13-0021	EA	5,000 LB Capacity, Hand Chain Hoist.....	3,888.16	172.49
41 22 23 13-0022	EA	6,000 LB Capacity, Hand Chain Hoist.....	4,353.16	201.76
41 22 23 13-0023	EA	10,000 LB Capacity, Hand Chain Hoist.....	6,045.73	208.04
41 22 23 13-0024	EA	16,000 LB Capacity, Hand Chain Hoist.....	7,897.85	250.89
41 22 23 13-0025	EA	20,000 LB Capacity, Hand Chain Hoist.....	9,653.10	262.40

41	41	Material Processing and Handling Equipment
	41 20	Piece Material Handling Equipment
	41 22	Cranes and Hoists



MINOR				TOTAL DIRECT	DEMOLITION
CSI	UOM	DESCRIPTION	UNIT COST	UNIT COST	
41 22 23 13-0026	EA	30,000 LB Capacity, Hand Chain Hoist.....	17,035.42		300.03

END OF SECTION 41



Process Gas and Liquid Handling, Purification, and Storage Equipment	43	43
Liquid Handling Equipment	43 20	
Dry Location Liquid Pumps	43 23	

MINOR CSI UOM DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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43 Process Gas and Liquid Handling, Purification, and Storage Equipment

43 20 Liquid Handling Equipment ⁽⁴³⁾

43 23 Dry Location Liquid Pumps ^(43 20)

43 23 78 Controlled Volume Horizontal Reciprocating Pumps ^(43 23)

43 23 78 31 Controlled Volume Horizontal Mechanically-Coupled Diaphragm Simplex Reciprocating Pumps ^(43 23 78)

43 23 78 31-0001 Diaphragm Pump ^(43 23 78 31)

43 23 78 31-0002 EA 28 GPH Diaphragm Pump, Adjustable Flow 0-100% 250 PSI..... 4,814.74

43 24 Suspended Liquid Pumps ^(43 20)

43 24 41 Archimedes Screw Pumps ^(43 24)

43 24 41 23 Positive-Displacement Inclined Closed-casing Archimedes Screw-type Pumps ^(43 24 41)

43 24 41 23-0001 Positive Displacement Pump ^(43 24 41 23)

43 24 41 23-0002 EA 25 GPH Positive Displacement Pump, Adjustable Flow 0-100% 200 PSI Neoprene Packing..... 3,956.63

43 40 Gas and Liquid Storage ⁽⁴³⁾

43 42 Pressurized Tanks And Vessels ^(43 40)

43 42 41 Metallic Specialty Pressure Tanks ^(43 42)

43 42 41 00-0001 L.P.G. Tanks With Regulator And Safety Controls ^(43 42 41)

43 42 41 00-0002	EA	250 Gallon Aboveground LP Gas Storage Tank.....	2,149.56	135.67
43 42 41 00-0003	EA	500 Gallon Aboveground LP Gas Storage Tank.....	3,977.32	203.51
43 42 41 00-0004	EA	1,000 Gallon Aboveground LP Gas Storage Tank.....	5,696.55	217.07

END OF SECTION 43

43 Process Gas and Liquid Handling, Purification, and Storage Equipment

43 40 Gas and Liquid Storage

43 42 Pressurized Tanks And Vessels



MINOR	CSI	UOM	DESCRIPTION	TOTAL DIRECT UNIT COST	DEMOLITION UNIT COST
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Greenville, South Carolina 29615

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Job Order Contract Technical Specifications

CSI Division 01-43 May 2024

Los Angeles Community Development Authority



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01 General Requirements

01 00 00 00	General Requirements
01 22 16 00	No Specification Required
01 42 13 00	Abbreviations, Acronyms, Definitions, and Symbols
01 42 19 00	References
01 52 13 00	Temporary Facilities and Controls
01 54 23 00	Scaffolding Tubular Steel
01 56 26 00	Erosion and Sedimentation Controls
01 71 23 16	Cutting and Patching
01 74 19 00	Construction Waste Management
01 95 06 00	Exterior Finish Carpentry
01 95 06 00a	Interior Finish Carpentry
01 95 06 00b	Interior Architectural Woodwork
01 95 06 00c	Casework
01 95 07 00	TEMPORARY ROOF COVER
01 95 07 00a	Sheet Metal Flashing And Trim
01 95 09 00	Cork Flooring
01 95 99 92	Disposal Of Hazardous Materials
01 95 99 92a	Removal Of Nonfriable Asbestos-Containing Materials
01 95 99 92b	Lead Paint Related Abatement Procedures
01 95 99 92c	XRF Testing For Lead-Based Paint
01 95 99 92d	Lead Dust Wipe, Air And Tcpl Sampling And Analysis
01 95 99 92e	Sheathing
01 95 99 92f	Exterior Architectural Woodwork
01 95 99 92g	Preparation for Re-Roofing
01 95 99 92h	Gypsum Board
01 95 99 99	Relief Wells
01 95 99 99a	Common Work Results for Fire Suppression
01 95 99 99b	Common Work Results for Plumbing
01 95 99 99c	Storm Drainage Piping
01 95 99 99d	Compressed-Air Piping For Laboratory And Healthcare Facilities
01 95 99 99e	Vacuum Piping For Laboratory And Healthcare Facilities
01 95 99 99f	Gas Piping For Laboratory And Healthcare Facilities
01 95 99 99g	Common Work Results for HVAC
01 95 99 99h	Water Supply Wells

02 Existing Conditions

02 41 13 13	Portland Cement Concrete Removal
02 41 16 13	Building Demolition
02 41 19 13	Selective Demolition
02 58 13 00	Snow And Other Temporary Fencing
02 61 13 00	Excavation And Handling Of Contaminated Material
02 61 13 00a	Precision Testing Of Underground Fuel Oil Tanks
02 61 13 00b	Hydrostatic Pressure Testing Of Air Receiving Tanks
02 65 00 00	Underground Storage Tank Removal
02 82 16 00	Encapsulation (Lock-Down) Of Asbestos-Containing Materials
02 82 33 00	Removal Of Friable Asbestos-Containing Materials
02 83 19 13	Removal And Disposal Of Lead-Containing Paint
02 84 16 00	Removal of Fluorescent Light Ballasts/Capacitors and Fluorescent Light Tubes
02 87 13 33	Mold Remediation
02 87 16 13	Bird And Bird Waste Abatement

03 Concrete

03 01 30 71	Concrete Rehabilitation
03 01 30 71a	Self-Adhering Sheet Waterproofing
03 05 13 00	Cast-In-Place Concrete
03 11 16 13	Cast-In-Place Architectural Concrete
03 11 16 13a	Rusticated Concrete Finishes
03 30 53 00	Miscellaneous Cast-In-Place Concrete
03 31 13 00	Portland Cement Concrete Overlays

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03 31 13 00a	Steel Reinforced Portland Cement Concrete Overlays
03 31 13 00b	Fiber Reinforced Portland Cement Concrete Overlays
03 31 13 00c	Roller Compacted Concrete Pavement
03 35 23 00	Exposed Aggregate Surface Concrete Walls
03 37 13 00	Shotcrete
03 37 13 00a	Glass Fiber Reinforced Concrete
03 48 29 00	Plant-Precast Structural Concrete
03 51 13 00	Cementitious Wood-Fiber Deck
03 51 16 00	Precast Lightweight Roof Slabs
03 51 16 00a	Gypsum Concrete Decks
03 51 16 00b	Gypsum Plank Decking
03 53 14 00	Concrete Floor Topping
03 54 16 00	Cement-Based Underlayment

04 Masonry

04 01 20 91	Clay Masonry Restoration And Cleaning
04 20 00 00	Unit Masonry Assemblies
04 23 13 00	Glass Unit Masonry Assemblies
04 41 00 00	Dimension Stone Cladding
04 41 00 00a	Interior Stone Facing
04 42 43 00	Stone Masonry
04 72 00 00	Architectural Precast Concrete

05 Metals

05 05 21 00	Structural Steel
05 12 23 00	Cold-Formed Metal Framing
05 14 13 00	Structural Aluminum
05 15 16 00	Ornamental Metal
05 50 00 00	Metal Fabrications
05 51 13 00	Metal Stairs
05 51 13 00a	Fabricated Spiral Stairs
05 52 13 00	Pipe And Tube Railings
05 53 13 00	Gratings
05 73 23 00	Miscellaneous Ornamental Metals
05 73 23 00a	Ornamental Railings
05 75 00 00	Ornamental Formed Metal

06 Wood, Plastics, and Composites

06 01 40 91	Door Hardware
06 05 23 00	Timber Bridge Components
06 05 23 00a	Heavy Timber Construction
06 10 00 00	Rough Carpentry
06 10 00 00a	Miscellaneous Carpentry
06 11 16 00	Rough Carpentry Renovation
06 15 13 00	Exterior Rough Carpentry
06 15 13 00a	Wood Decking
06 17 13 00	Structural Glued-Laminated Timber
06 17 33 00	Metal-Plate-Connected Wood Trusses
06 25 16 00	Paneling
06 41 13 00	Wood-Veneer-Faced Architectural Cabinets
06 42 19 00	Plastic Paneling
06 51 13 00	Structural Plastic Lumber
06 51 13 00a	Plastic Lumber
06 51 13 00b	Composite Plastic Lumber
06 74 13 00	Pultruded Fiberglass Industrial Grating
06 82 00 00	Pultruded Fiberglass Structural Shapes

07 Thermal And Moisture Protection

07 05 13 00	Built-Up Coal-Tar Roofing
07 11 13 00	Bituminous Dampproofing
07 11 13 00a	Cold Fluid-Applied Waterproofing
07 13 13 00	Bituminous Waterproofing
07 13 53 00	Elastomeric Sheet Waterproofing
07 14 13 00	Hot Fluid-Applied Rubberized Asphalt Waterproofing
07 16 13 00	Modified Cement Waterproofing
07 16 16 00	Crystalline Waterproofing
07 16 19 00	Metal-Oxide Waterproofing
07 17 13 00	Bentonite Waterproofing
07 19 13 00	Water Repellents
07 21 13 13	Modified Bitumous Protected Membrane Roofing
07 21 16 00	Building Insulation
07 22 16 00	Roof And Deck Insulation
07 24 13 00	Polymer-Based Exterior Insulation And Finish System (EIFS)
07 24 13 00a	Water-Drainage Exterior Insulation and Finish System (EIFS)
07 31 13 13	Asphalt Shingles
07 31 16 00	Metal Shingles
07 31 26 00	Slate Shingles
07 31 29 13	Wood Shingles And Shakes
07 31 33 00	Composite Rubber Shingles
07 32 13 00	Clay Roof Tiles
07 32 16 00	Concrete Roof Tiles
07 41 13 00	Metal Roof Panels
07 41 13 00a	Sheet Metal Roofing
07 42 13 19	Glazing
07 42 93 00	Siding
07 46 16 00	Metal Plate Wall Panels
07 46 16 00a	Metal Wall Panels
07 46 63 00	Insulated-Core Metal Wall Panels
07 51 13 00	Built-Up Asphalt Roofing
07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 53 16 00	CSPE Membrane Roofing
07 53 23 00	EPDM Membrane Roofing
07 54 19 00	Polyvinyl-Chloride (PVC) Roofing
07 54 23 00	Thermoplastic Polyolefin (TPO) Roofing
07 57 00 00	Coated Foamed Roofing
07 71 23 00	Manufactured Roof Specialties
07 72 23 00	Roof Accessories
07 81 16 00	Sprayed Fire-Resistive Materials
07 84 13 16	Firestopping
07 84 13 16a	Through-Penetration Firestop Systems
07 84 43 00	Fire-Resistive Joint Systems
07 84 56 13	Board Fire Protection
07 91 23 00	Joint Sealants
07 95 13 13	Architectural Joint Systems
07 95 13 16	Roof Expansion Assemblies

08 Openings

08 01 11 61	Steel Doors And Frames
08 01 11 61a	Steel Entry Doors
08 01 52 61	Wood Windows
08 11 63 13	Steel Storm Doors
08 11 63 13a	Security Window Screens and Doors
08 11 63 23	Aluminum Storm Doors
08 11 73 00	Sliding Metal Fire Doors
08 12 13 13	Stainless Steel Doors And Frames
08 14 00 00	Wood Doors
08 14 16 00	Flush Wood Doors
08 14 16 00a	Stile And Rail Wood Doors

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08 16 13 00	Fiberglass Reinforced Plastic (FRP) Doors and Frames
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08 18 16 00a	Sliding Wood-Framed Glass Doors
08 31 13 00	Access Doors And Frames
08 33 23 11	Overhead Coiling Doors
08 33 26 00	Overhead Coiling Grilles
08 33 36 00	Side Coiling Grilles
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08 35 13 13	Folding Doors
08 36 13 00	Sectional Overhead Doors
08 38 13 00	Flexible Doors
08 42 13 00	Aluminum-Framed Entrances And Storefronts
08 44 13 00	Glazed Aluminum Curtain Walls
08 44 13 00a	Structural-Sealant-Glazed Curtain Walls
08 44 13 00b	Sloped Glazing Assemblies
08 45 23 00	Structured-Polycarbonate-Panel Assemblies
08 45 23 00a	Fiberglass-Sandwich-Panel Assemblies
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08 53 13 00	Vinyl Windows
08 56 19 00	Security Windows
08 62 00 00	Roof Windows
08 71 11 00	Detention Door Hardware
08 71 13 00	Automatic Door Operators
08 83 13 00	Mirrors
08 84 00 00	Plastic Glazing
08 87 23 16	Fragment Retention Film For Glass
08 88 53 00	Security Glazing
08 90 00 00	Louvers And Vents

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09 22 13 13	Gypsum Plaster
09 22 13 13a	Portland Cement Plaster
09 22 13 13b	Gypsum Veneer Plaster
09 22 16 13	Non-Load-Bearing Steel Framing
09 22 36 23	Lath and Plaster Renovation
09 23 13 00	Gypsum Board Renovation
09 29 82 00	Gypsum Board Shaft-Wall Assemblies
09 30 13 00	Ceramic Tile
09 51 13 00	Acoustical Panel Ceilings
09 51 23 00	Acoustical Tile Ceilings
09 54 23 00	Acoustical Metal Pan Ceilings
09 54 23 00a	Linear Metal Ceilings
09 64 00 00	Wood Flooring
09 64 66 00	Wood Sports-Floor Assemblies
09 65 13 13	Resilient Wall Base And Accessories
09 65 13 33	Linoleum Floor Coverings
09 65 16 23	Resilient Sheet Flooring
09 65 19 19	Resilient Floor Tile
09 65 66 00	Interlocking Resilient Flooring
09 66 13 00	Portland Cement Terrazzo Flooring
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09 68 16 00	Carpet
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09 84 13 00	Acoustical Wall Panels
09 91 13 00	Exterior Painting
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09 91 13 00b	High-Temperature-Resistant Coatings
09 91 23 00	Interior Painting
09 91 23 00a	Multicolored Interior Coatings
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09 96 00 00 High-Performance Coatings

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 10 14 00 00 Signage
 10 14 19 00 Vitrified Brick Pavement Replacement
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 10 21 13 13 Toilet Compartments
 10 21 13 19 Solid Surface Material Toilet Compartments
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 10 44 16 13 Fire Extinguishers
 10 51 13 00 Metal Lockers
 10 51 13 00a Wire Basket Lockers
 10 51 26 00 Solid Plastic Lockers
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 10 73 26 13 Extruded Aluminum Walkway Cover
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 10 81 13 00 Oriented Flexible Netting Bird Barrier
 10 86 00 00 Detention Furniture

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 11 68 23 13 Playing Fields

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 12 21 13 13 Horizontal Louver Blinds
 12 21 16 13 Vertical Louver Blinds
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 12 24 13 00 Roller Shades
 12 24 13 00a Pleated Shades
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12 48 13 13	Floor Mats And Frames
12 48 13 13a	Foot Grilles
12 62 23 00	Portable Bleachers

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13 34 16 13a	Fixed Wood Bleachers (Exterior)
13 34 16 13b	Demountable Bleachers (Exterior)
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14 31 00 00	Escalators
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14 41 19 00	Wheelchair Lifts

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21 05 13 00	Common Motor Requirements for Fire Suppression Equipment
21 05 48 13	Vibration And Seismic Controls For Fire-Suppression Piping And Equipment
21 07 00 00	Fire-Suppression Systems Insulation
21 11 19 00	Fire-Suppression Standpipes
21 13 13 00	Wet-Pipe Fire-Suppression Sprinklers
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22 05 13 00	Common Motor Requirements for Plumbing Equipment
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22 05 23 00	Architecturally Exposed Structural Steel Framing
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22 11 16 00b	Steam And Condensate Piping
22 11 16 00c	Refrigerant Piping
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22 11 23 13a	Packaged Booster Pumps
22 13 16 00	Sanitary Waste And Vent Piping
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22 13 29 13	Packaged Sewage Pumping Stations
22 13 29 13a	Sewage Pumps
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22 15 19 13	General-Service Packaged Air Compressors and Receivers
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22 35 23 13	Domestic Water Heat Exchangers
22 40 00 00	Plumbing Fixtures
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22 42 13 13	Security Plumbing Fixtures
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23 Heating, Ventilating, and Air-Conditioning (HVAC)

23 01 10 91	Sequence Of Operation
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23 01 50 61	Cast-Iron Boilers
23 01 60 71	Condensing Units
23 05 13 00	Common Motor Requirements for HVAC Equipment
23 05 16 00	Expansion Fittings and Loops for Plumbing Piping
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SECTION 01 00 00 00 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 BRACKETED OPTIONS

- A. Within these Technical Specifications there are bracketed options. For example **[6ft] [12ft] [24ft]**. The final selection will be made by the Owner and set forth in the Detailed Scope of Work.

1.2 WARRANTY

- A. Within these Technical Specifications there are warranty periods listed. The warranty periods listed cover both material and labor for that period. If a manufacture will warranty a material for a longer period than what is listed, the material is covered as a replacement by the manufacture for the extra period. The labor to replace will be at the installation price for the contractor.

END OF SECTION 01 00 00 00

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Task	Specification	Specification Description
01 20 00 00	01 00 00 00	General Requirements
01 22 00 00	01 00 00 00	General Requirements

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SECTION 01 22 16 00 - NO SPECIFICATION REQUIRED

1.1 GENERAL

- A. A separate specification is not required for this item. The description given in the line item of the Construction Task Catalog completely defines the item.

1.2 PRODUCTS - (Not Used)

1.3 EXECUTION - (Not Used)

END OF SECTION 01 22 16 00

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Task	Specification	Specification Description
01 22 16 00	01 00 00 00	General Requirements
01 22 20 00	01 00 00 00	General Requirements
01 22 20 00	01 22 16 00	No Specification Required
01 22 23 00	01 00 00 00	General Requirements
01 22 23 00	01 22 16 00	No Specification Required
01 30 00 00	01 00 00 00	General Requirements
01 35 00 00	01 00 00 00	General Requirements
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01 35 33 00	01 00 00 00	General Requirements
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01 42 00 00	01 00 00 00	General Requirements

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SECTION 01 42 13 00 - ABBREVIATIONS, ACRONYMS, DEFINITIONS, AND SYMBOLS

1.1 GENERAL

A. Description Of Work

1. This specification covers abbreviations, acronyms, definitions, and symbols used in the Contract Documents.

B. Unit of Measure Definitions

1. Following is a list of Industry Standard abbreviations.

A	Area Square Feet; Ampere	B&W	Black and White
AB	Anchor Bolt	BC	Between Centers
ABC	Aggregate Base Course	BCY	Bank Cubic Yard
ABS	Acrylonitrile Butadiene Styrene	BDL	Bundle
AC	Alternating Current; Air-Conditioning; Asphaltic Concrete; Plywood Grade A & C	BD FT	Board Feet
ACFM	Actual Cubic Feet Per Minute	BEV	Bevel/Beveled
ACM	Asbestos Containing Material	BF	Board Feet
ACP	Asphaltic Concrete Paving	BFP	Boiler Feed Pump
ACR	Acre	BHN	Brinell Hardness Number
ACZA	Ammoniacal Copper Zinc Arsenate	BHP	Boiler Horsepower; Brake Horsepower
AD	Plywood, Grade A & D	BI	Black Iron
ADDL	Additional	Bit.	Bituminous
ADJ	Adjustable	Bitum.	Bituminous
ADMIN	Administer; Administration	Bk.	Backed
AGG	Aggregate	Brkrs.	Breakers
AH	Ampere Hours	Bldg.	Building
AHM	Ampere-Hour Meter	BLK	Black; Block
AHU	Air Handling Unit	BM	Bank Measure; Beam
AIC	Amperes Interrupting Capacity	BOD	Biochemical Oxygen Demand
AL	Aluminum	BOX	Box (each)
ALT	Alternate	BR	Bedroom
AMP	Ampere	Brg.	Bearing
AMT	Amount	BRK	Brick
AOT	Adjusted Oxygen Transfer	BTFLY VLV	Butterfly Valve
APP	Attactic Polypropylene	BTR	Better (Lumber)
APPROX	Approximate	BTU	British Thermal Units
Apt.	Apartment	BTU/HR	British Thermal Units per Hour
ART	Articulated	BUR	Built Up Roof
ASB	Asbestos	BW	Butt Weld
ASJ	All Surface Jacketing	BWG	Birmingham Wire Gauge
Avg.	Average	BX	Interlocked Armored Cable
AWG	American Wire Gauge	C	Centigrade; Conductance; Conductivity, Hundred
BAG	Bag	CA	Corrosion Allowance
BBL	Barrel	Cab.	Cabinet
B&B	Grade B and Better; Balled & Burlapped	CAP	Capacity
B&S	Bell and Spigot	CB	Circuit Breaker
		CC	Center to Center
		CCA	Chromate Copper Arsenate
		CCF	Hundred Cubic Feet

01 - General Requirements



CCY	Compacted Cubic Yard	Dis.	Discharge
cd	Candela	Disch.	Discharge
cd/sf	Candela per Square Foot	DB	Dry Bulb; Decibel
CF	Cubic Foot (Feet)	DBL	Double
CFM	Cubic Feet per Minute	DC	Direct Current
CHG	Charge	DCS	Distributed Control System
CHW	Chilled Water; Commercial Hot Water	DDC	Direct Digital Control
CI	Cast Iron	Demob	Demobilization
CIP	Cast in Place; Cast Iron Pipe	DF	Douglas Fir
CIRC	Circulating; Circuit	DFT	Dry Film Thickness
CLF	Hundred Linear Feet; Current Limiting Fuse	DH	Double Hung
CLP	Cross Linked Polyethylene	DHW	Domestic Hot Water
cm	Centimeter	DI	Ductile Iron
CMP	Corrugated Metal Pipe	D/P	Differential Pressure
CMPA	Corrugated Metal Pipe - Arched	DIA	Diameter
CMU	Concrete Masonry Unit	Diam	Diameter
CO	Carbon Monoxide	Diag.	Diagonal
CO2	Carbon Dioxide	Distrib.	Distribution
COL	Column	DL	Dead Load; Diesel
Comb	Combination	DLH	Deep Long Span Bar Joist
Compr	Compressor	DPST	Double Pole, Single Throw
CONC	Concrete	DS	Double Strength
CONSTR	Construction	DSA	Double Strength A Quality Glass
Cont	Continuous; Continued	DSB	Double Strength B Quality Glass
Corr	Corrugated	DWV	Drain, Waste, Vent Piping
CP	Chrome Plated	DX	Deluxe White, Direct Expansion
CPE	Chlorinated Polyethylene	dyn	Dyne
Cplg.	Coupling	e	Eccentricity
CPM	Cycles per Minute	E	Electrical Grade (Fiberglass Construction)
CPM	Critical Path Method	EA	Each
CPS	Centipoise	Econ.	Economy
CPRSR	Compressor	ECR	Electrical Grade, Corrosion Resistant (Fiberglass Construction)
CPVC	Chlorinated Polyvinyl Chloride	EDP	Electronic Data Processing
CS	Carbon Steel	EDR	Equiv. Direct Radiation
CSF	Hundred Square Feet	EG	Electro Galvanized
CSPE	ChloroSulphinated Polyethylene	EIFS	Exterior Insulation Finish System
CSS	Cast Semi Steel	ELEC	Electric; Electrical
CT	Current Transformer	Elev.	Elevator; Elevating
CTB	Cement Treated Base	EM	Electron Microscopy
CTR	Center	EMT	Electric Metallic Tubing; Thin Wall Conduit
CU FT	Cubic Foot	Eng.	Engine, Engineered
CU IN	Cubic Inch	EPDM	Ethylene Propylene Diene Monomer
CU YD	Cubic Yard	EPS	Expanded Polystyrene
CW	Chilled Water; Cold Water	EQL	Equally
CWR	Chilled Water Return	Equip.	Equipment
CWS	Chilled Water Supply	ERW	Electrical Resistance Welded
CWT	Hundred Weight	EROPS	Enclosed Roll Over Protection System
CY	Cubic Yard (27 cu. ft.); Cycle	ES	Energy Saver
CYH	Cubic Yards Per Hour	Est.	Estimated
Cyl	Cylinder	EW	Each Way
d	Penny (nail size)	EWT	Entering Water Temperature
D	Deep; Depth; Discharge		

Excav.	Excavation	Gen.	General
EXH	Exhaust	GFCI	Ground Fault Circuit Interrupter
Exp.	Expansion; Exposure	GFR	Ground Fault Relay
EXP JT	Expansion Joint	GPD	Gallons per Day
Ext.	Exterior	GPH	Gallon per Hour
		GPM	Gallon per Minute
F	Fahrenheit; Female; Fill	GR	Grade
f	Fiber stress	Grnd.	Ground
f _c	Compressive Stress in Concrete	GSF	Ground Square Foot
f _y	Minimum Yield Stress of Steel	GVW	Gross Vehicle Weight
f _m	Compressive Strength of Masonry		
F&D	Flanged-and-Dished	H	High, Height; High Strength Bar Joist
F&I	Furnished and Installed	HC	Handicapped; High Capacity
Fab.	Fabricated	HD	High Density; Heavy Duty
FAD	Free Air Delivery	HDO	High Density Overlay
FBGS	Fiberglass	HDPE	High Density Polyethylene
FC	Footcandles	Hdr.	Header
FCXP	Fan Cooled Explosion Proof	Hdw.	Hardware
FDA	Food and Drug Administration	HEPA	High Efficiency Particulate Air
FEP	Fluorinated Ethylene Propylene (Teflon)	Hg	Mercury
FF	Flat Face	HIC	High Interrupting Capacity
Fig.	Figure	HM	Hollow Metal
Fin.	Finished	HNDL	Handle
FL	Full Load	HO	High Output; Heel Outlet
FLDG	Folding	Horiz.	Horizontal
Fl. Oz.	Fluid Ounces	HP	High Pressure; Horse Power
Flr.	Floor	HPF	High Pressure Factor
FM	Frequency Modulation; Factory Mutual	HPL	High Pressure Laminate
Frmg.	Framing	HR	Hour
Fndtn.	Foundation	HRS	Hot-Rolled Steel
FT	Foot, Feet	HS	High Speed; High Strength
FTNG(S)	Fitting(s)	HSC	High Short Circuit
FLG	Flange	HSLA	High Strength Low Alloy
FOB	Freight on Board	HT	Hospital Tips; Height
Fount.	Fountain	Htg.	Heating
FPM	Feet Per Minute	Htrs.	Heaters
FPS	Feet Per Second	HVAC	Heating, Ventilating & Air Conditioning
FPT	Female Pipe Thread	Hvy.	Heavy
FRP	Fiberglass Reinforced Plastic	HW	Hot Water
FS	Forged Steel	HWR	Hot Water Return
FSC	Cast Body, Cast Switch Box	HWS	Hot Water Supply
Ftg.	Footing	HWT	Hundred Carton Weight
Ft. Lb.	Foot Pound	Hyd.	Hydraulic
Furn.	Furniture	Hydr.	Hydraulic
FVNR	Full Voltage Non-Reversing	HZ	Hertz (cycles)
FXM	Female by Male		
		I	Moment of Inertia
G	Gravity	IC	Interrupt Capacity
g	Gram	ICFM	Inlet Cubic Feet per Minute
GA	Gauge or Gage	ID	Inside Diameter
G & A	General and Administrative	I.D.	Identification; Inside Dimension
GAL	Gallon	IF	Inside Frosted
Gal./Min.	Gallon per Minute	IMC	Intermediate Metal Conduit
GALV	Galvanized	IN	Inch
GBSD	Gear Box Sheave Diameter	IN LB	Inch Pound
		IN WC	Inches Water Column

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Incan.	Incandescent	LE	Leading Edge; Lead Equivalent
Incl.	Include, Including	LED	Light Emitting Diode
Inst.	Install, Installation	LEL	Lower Explosive Limit
Insul.	Insulation, Insulated	LF	Linear Foot
Int.	Interior	LFD	Linear Feet Per Day
INTSCT	Intersect	LFTL	Lineal Feet Tube Length
IP	Iron Pipe	Lge.	Large; Long
IPS	International Pipe Standard Iron Pipe Size Inches per Second	LH	Labor Hours; Long Span Bar Joist
IPT	Iron Pipe Threaded	LIN	Linear
ISP	Inlet Steam Pressure	LL	Live Load
IW	Indirect Waste	LLD	Lamp Lumen Depreciation
		LNG	Liquid Natural Gas
J	Joule	LOA	Length Over All
JOB	Job	L-O-L	Lateralolelet
JOC	Job Order Contracting	LP(G)	Liquid Propane (Gas)
JT	Joint	LS	Low Speed; Lump Sum
		Lt	Light
K	Thousand; Thousand Pounds; Heavy Wall Copper Tubing; Kelvin	Lt Ga	Light Gauge
KAH	Thousand Amp Hours	LTL	Less than Truck Load
KD	Kiln Dried; Knocked Down	Lt Wt	Light Weight
KDAT	Kiln Dried After Treatment	LV	Low Voltage
Kip	1000 Pounds	lm	Lumen
KO	Knockout	lm/sf	Lumen per square foot
Km	Kilometer	lm/W	Lumen per Watt
KLF	Kips per Linear Foot	m	Meter
KSF	Kips per Square Foot	m ³ /H	Cubic Meters per Hour
KSI	Kips per Square Inch	mA	Milliampere
kA	KiloAmp	m/S	Meters per Second
kg	Kilogram	M	Thousand; Male; Light Wall Copper Tubing
kHz	Kilohertz	MATL	Material
kJ	Kilojoule	MAX	Maximum
kV	Kilovolt	Mach	Machine
kVA	Kilovolt Ampere (1,000 volt amps)	Mag. Str.	Magnetic Starter
KVAR	Kilovar (Reactance)	Maint.	Maintenance
kW	Kilowatt	Mat	Material
kWh	Kilowatt Hour	Mat'l;	Material
		Max.	Maximum
L	Length; Long; Medium Wall Copper Tubing	Mb	Million Bytes (characters)
L&E	Labor and Equipment	MBF	Thousand Board Feet
LAB	Labor	MBH	Thousand BTU per Hour
LAN	Lane	MBtu	Thousand British Thermal Units
LAT	Latitude	MC	Metal Clad Cable
LAV	Lavatory	MCF	Thousand Cubic Feet
L.B.	Load Bearing; L Conduit Body	MCM	Thousand Circular Mills
LB	Pound (Force or Mass)	MCP	Motor Circuit Protector
LB/HR	Pounds per Hour	MD	Medium Duty
LBS	Pounds	MDO	Medium Density Overlaid
LBSF	Pounds per Square Foot	Med.	Medium
LCD	Liquid Crystal Display	MF	Thousand Feet
LCL	Less Than Carload Lot	MF3	Thousand Cubic Feet
LCY	Loose Cubic Yard	Mfg.	Manufacturing
		Mfrs.	Manufacturers
		Mg	Milligram

MG	Market Grade	nW	Nanowatt
MGD	Million Gallons per Day	OAL	Overall Length
MGPH	Thousand Gallons per Hour	OB	Opposing Blade
MH	Manhole; Manhour; Metal Halide	OC	On Center
MHz	MegaHertz	OD	Outside Diameter
Mi	Mile	O.D.	Outside Dimension
MI	Malleable Iron; Mineral Insulated	ODP	Open Drip Roof
MIN	Minimum; Minute	ODS	Overhead Distribution System
MISC	Miscellaneous	OEM	Original Equipment Manufacturer
ml	Milliliter; Mainline	OG	Ogee
MLF	Thousand Linear Feet	OH	Overhead
mm	Millimeter	OH&P	Overhead and Profit
MO	Month	OHL	Over Hung Load
Mobil.	Mobilization	Oper.	Operator
Mog.	Mogul Base	Opng.	Opening
MPH	Miles Per Hour	OPR	Operating
MPT	Male Pipe Thread	Orna.	Ornamental
MRT	Mile Round Trip	OSA	Outside Air
ms	Millisecond	OSB	Oriented Strand Board
MSD	Motor Sheave Diameter	OS & Y	Outside Screw and Yoke
MSF	Thousand Square Feet	OUT	Outlet or Output (each)
MSY	Thousand Square Yards	Ovhd.	Overhead
MT	Mount	OWG	Oil, Water or Gas
MTD	Mounted	OWSJ	Open Web Steel Joist
MTG	Mounting	OZ	Ounce
MTR	Mill Test Report	P	Pole; Applied Load; Projection
MVA	Million Volt Ampere	p	Page
MVAR	Million Volt Amperes Reactance	pp	Pages
MV	Megavolt	PAPR	Powered Air Purifying Respirator
MW	Megawatt	PAR	Weatherproof Reflector
MXM	Male by Male	PB	Push Button
MYD	Thousand Yards	PC	Personal Computer; Piece;
N	Natural; North	PCs	Pieces
nA	Nanoampere	P.C.	Portland Cement; Power Connector
NA	Not Applicable	PCF	Pounds per Cubic Foot
NC	Normally Closed	PCM	Phase Contrast Microscopy
NEHB	Bolted Circuit Breaker to 600V	PE	Professional Engineer; Plain End Porcelain Enamel; Polyethylene;
NDT	Non Destructive Testing	PERF	Perforated
NIOSH	National Alloy	PH	Phase
NLB	Non-Load Bearing	PI	Pressure Injected
NM	Non-Metallic Cable	PID	Programmable Integral Derivative Con- troller
nm	Nanometer	PKG	Package
NO	Normally Open	PL	Plate
No.	Number	PLC	Programmable Loop Controller
NOM	Nominal	PLM	Polarized Light Microscopy
NQOD	Combination Plug-on/Bolt-on Circuit Breaker to 240V	PLTC	Power Limited Tray Cable
NRC	Noise Reduction Coefficient	PLY	Plywood
NPT	National Pipe Thread	PNEU	Pneumatic
NPS	Nominal Pipe Size	PNTD	Painted
NRP	Non-Removable Pins	POA	Priced On Application/Priced On Approv- al
NRS	Non-Rising Stem	PESB	Pre-engineered Steel Building
ns	Nanosecond		
NTE	Note		
NTP	National Taper Pipe (Thread)		

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PPD	Pounds Per Day	ROM	Room
PP; PPL	Polypropylene	ROPS	Roll Over Protection System
PPM	Parts Per Million	ROW	Row
PPS	Polyphenylene Sulfide	R.O.W.	Right of Way
PR	Pair	RPM	Revolutions Per Minute
Prefab.	Prefabricated	RR	Direct Burial Feeder Conduit
Prefin.	Prefinished	RS	Rapid Start
PROGEN®	Proposal Generator Software for Job Order Contracting	RSC	Rigid Steel Conduit
PROP	Propelled; Propeller	RSR	Riser (Per Rise)
PSF	Pounds Per Square Foot	RT	Round Trip
PSI	Pounds Per Square Inch	RTD	Resistance Temperature Detector
PSIA	Pounds Per Square Inch Atmosphere	RTJ	Ring Type Joint
PSIG	Pounds Per Square Inch Gauge	RTRP	Reinforced Thermoset Resin Piping
PSP	Plastic Sewer Pipe	RVT	Reinforced Vinyl Tile
PT	Power or Potential Transformer	S	Suction; Single Entrance; South
Pt.	Pint	S1S2E	Surfaced 1 side, 2 Edges
Ptns.	Partitions	S2S	Surfaced 2 Sides
P&T	Pressure & Temperature	S4S	Surfaced 4 Sides
PTFE	Polytetrafluoroethylene	Sa	Sack
Pu	Ultimate Load	SA	Supply Air
PV	Photovoltaic	SBS	Styrene Butyl Styrene
PVA	Polyvinyl Acrylate	Scaf.	Scaffolding
PVC	Polyvinyl Chloride	SCFH	Standard Cubic Foot Per Hour
PVDC	Polyvinylidene Chloride	SCFM	Standard Cubic Foot per Minute
PVDF	Polyvinylidene Fluoride	SCH	Schedule
PVF	Polyvinyl Fluoride	SCR	Modular Brick
Pvmt.	Pavement	SCRD	Screwed
PVQ	Pressure Vessel Quality	SD	Sound Deadening
Pwr.	Power	SDR	Standard Dimension Brick; Size To Diameter Ratio
Q	Quantity Heat Flow	SE	Surfaced Edge; Semi-Elliptical
QA	Quality Assurance	SEA	Seat
QC	Quality Control; Quick Coupling	SER	Service Entrance Cable
QT	Quart	SEU	Service Entrance Cable
Quan.	Quantity	SET	Set
Qty.	Quantity	SF	Square Foot/Feet
R	Thermal Resistance	SFCA	Square Feet of Form in Contact with Concrete
R/L	Random Lengths	SHTS	Sheets
R/W/L	Random Widths and Lengths	SI	Square Inch
RA	Return Air; Registered Architect	SIS	Synthetic Heat-Resistant
RCP	Reinforced Concrete Pipe	SLDR	Solder
Rect.	Rectangle	SLH	Super Long Span Bar Joist
REINF	Reinforced/Reinforcing	SN	Solid Neutral
Req'd	Required	S-O-L	Socketolet
RF	Raised Face	SP	Self-Propelled; Single Pole; Space; Standpipe
RGH	Rough		Static Pressure (measured in inches of water);
RGS	Rigid Galvanized Steel	SPDT	Single Pole, Double Throw
RH	Relative Humidity	SPGR	Specific Gravity
RHW	Rubber, Heat & Water Resistant; Residential Hot Water	SPWG	Static Pressure Water Gauge
rms	Root Mean Square	SQ	Square; Hundred Square Feet (10' x 10' area)
RND	Round		
ROL	Roll (each)		

SQ FT	Square Foot/Square Feet	UA	Unequal Angle
SQ IN	Square Inch	UCI	Uniform Construction Index
SQ YD	Square Yard	UF	Underground Feeder
SS	Stainless Steel; Single Strength	UHF	Ultra High Frequency
SSB	Single Strength B Quality Glass	UI	United Inch
SSL	Self Sealing Lap	UNC	Unified Coarse (Threads)
STC	Sound Transmission Class	USP	United States Primed
STD	Standard	UTP	Unshielded Twisted Pair
STK	Select Tight Knot	UV	Under Voltage
STP	Stop (each); Standard Temperature & Pressure	V	Volt
SURF	Surface	VA	Volt Amperes
STL	Steel	VAV	Variable Air Volume
SURF	Surface	VCT	Vinyl Composition Tile
SW	Seam Weld	Vert.	Vertical
SW	Switch	VF	Vinyl Faced
SWBD	Switchboard	VHF	Very High Frequency
SWS	Segmentally Welded Steel	VLF	Vertical Linear Foot
SWSI	Single Width, Single Inlet	VLV	Valve
SY	Square Yard	Vol.	Volume
SYN	Synthetic	VRP	Vinyl Reinforced Polyester
SYP	Southern Yellow Pine		
SYS	System	w/	With
		W	Watt; Width; Wire; West
T	Thick; Temperature; Ton	WB	Wet Bulb
T&C	Threaded and Coupled	WC	Water Column; Water Closet
T&G	Tongue and Groove	WF	Wide Flange
TBC	Tensile Bolt Cloth	WG	Water Gauge
TBE	Threaded Both Ends	WHM	Watthour Meter
TC	Terra Cotta	WK	Week
TCLP	Toxicity Characteristic Leaching Procedure	Wldg.	Welding
TDS	Total Dissolved Solids	WOG	Water, Oil, Gas
TEAO	Totally Enclosed Air Over	W-O-L	Weldolet
TEFC	Totally Enclosed Fan Cooled	WP	Weather Protected
TETC	Totally Enclosed Tube Cooled	WR	Water Resistant
TFE	Tetrafluoroethylene (Teflon)	WSP	Water, Steam, Petroleum
THHN	Nylon Jacketed Wire	WT	Weight
THK	Thick	WWF	Welded Wire Fabric
THKNS	Thickness		
THW	Insulated Strand Wire	X or x	By or Times
THWN	Nylon Jacketed Wire	XFER	Transfer
TI	Titanium	XFMR	Transformer
TL	Truckload	XHD	Extra Heavy Duty
TM	Track Mounted	XHHW; XLPE	Cross-Linked Polyethylene Wire Insulation
T-O-L	Threadolet	XLP	Cross-Linked Polyethylene
TON	Ton	XP	Explosion Proof
Tot.	Total	XRF	X-Ray Fluorescence
TPH	Tons Per Hour	Y	Wye
Transf.	Transformer	YD	Yard
TSHP	Total Shaft Horse Power	YR	Year
T'STAT	Thermostat		
TV	Television		
TW	Thermoplastic Water Resistant Wire		

2. Symbols

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Δ	Delta	∅	Diameter or Phase
/	per	'	feet
-	through or to	"	inches
@	at	#	pound or number
%	per 100 or percent	°	degree
\$	U.S. dollars	<	Less Than
~	Approximate	>	Greater Than

3. Explanation Of Terms

BTU: Stands for British Thermal Unit. The BTU number indicates the amount of heat required to raise one pound of water by one degree Fahrenheit. What this means is the higher the BTU rating, the higher the heating capacity of a product.

MBH: Equal to 1000 BTUs.

Tons (In Reference To Cooling): Unit of measurement for determining cooling capacity. One ton equals 12,000 BTUH.

SEER: Stands for Seasonal Energy Efficiency Ratio. This measures the cooling efficiency in air conditioners or heat pumps. The higher the SEER rating, the more energy-efficient the unit. The government's minimum SEER rating is 10.

4. Calculation Of Board Feet

a. All Lumber Grades Are Presumed To Be 75 Percent Construction And 25 Percent Standard Or Equivalent Grade Unless Otherwise Listed. Dimensions Are Nominal. Board Foot Is Defined As 1" x 12" x 1' Long; To Calculate BF/LF, Multiply The Size Of The Board Height x Width/12.

- 1) 1"x2" = 0.167 BF/LF
- 2) 1"x3" = 0.25 BF/LF
- 3) 2"x3" = 0.5 BF/LF
- 4) 2"x4" = 0.667 BF/LF
- 5) 2"x6" = 1.0 BF/LF
- 6) 2"x8" = 1.333 BF/LF
- 7) 2"x10" = 1.667 BF/LF
- 8) 2"x12" = 2.0 BF/LF
- 9) 4"x4" = 1.333 BF/LF
- 10) 6"x4" = 2.0 BF/LF
- 11) 6"x6" = 3.0 BF/LF
- 12) 8"x8" = 5.333 BF/LF
- 13) etc.

b. To Calculate Board Feet;

- 1) For most lumber: Thickness (inches) x width (inches) x length (feet) divided by 12 = board feet.
- 2) For small pieces: Thickness (inches) x width (inches) x length (inches) divided by 144 = board feet.

5. Conversion Tables

ENGLISH TO METRIC CONVERSION TABLE					
MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
acres	0.404 687 3	Hectares	ounce(force)	0.278 013 9	newtons=N
board feet	0.002 359 74	cubic meter	pint(liq.)	0.473 176	liters=l

ENGLISH TO METRIC CONVERSION TABLE					
cubic ft.	0.028 316 85	cubic meter	pint(dry)	0.550 61	liters=l
cubic yd.	0.764 554 9	cubic meter	pound(wt.)	0.453 592 37	kilogram
feet	0.304 8	Meters	pound(force)	4.448 222	newtons=N
footcandles	10.763 91	lux=lumens/m ²	pound/sq.ft	47.880 26	pascal=N/m ²
ft.-lbr	1.355 818	N□m=joule	pound/sq.in	6.894 757	kilopascals
gallon (US)	3.785 412	Liters	quart(liq.)	0.946 352 9	liters
horsepower*	745.699 9	watt=J/sec	sq. feet	0.092 903 04	sq. meter
* horsepower=550 ft-lbr/sec			sq. in.	645.16	sq. mm
inch	25.4	Millimeters	sq. mile	258.998 8	hectares
inch-poundr	0.112 984 8	N□m=joule	sq. mile	2.589 988	sq. km
kips	4.448 222	Kilonewton	sq. yard	0.836 127 4	sq. meter
kips/in ²	6.894 757	megapascal	ton(short)	0.907 184 7	metric ton
miles (US)	1.609 347	Kilometer	ton(short)	907.184 7	kilogram=kg
ounce (wt.)	28.349 52	Grams	ton(short)	8896.444	newtons=N
ounce(liq.)	29.573 53	MI	yards	0.914 4	meters=m

FOR TEMPERATURE CONVERSION USE °C= 5/9(°F - 32)

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METRIC TO ENGLISH CONVERSION TABLE					
MULTIPLY	BY	TO GET	MULTIPLY	BY	TO GET
cubic meter	1.308 0	cubic yard	liter	0.264 17	gallon
	35.314 7	cubic foot		1.056 7	quart
	61,024	cubic inch		2.113 4	pint
	264.172	Gallon		33.814	fl.ounce
gram	0.035 274	ounce(wt)	milliliter	0.033 814	fl.ounce
	0.002 204 6	pound(wt)	liter/m	0.080 52	gal/ft
kilogram	35.274	ounce(wt)	liter/m ²	0.220 88	gal/sq.yd
	2.204 623	pound(wt)	lux	0.092 902	ft-candle
	0.002 204 6	Kip	meter	1.093 6	yard
	0.001 102 3	Ton		3.280 84	foot
megagram (metric ton)	1.102 3	ton	millimeter	0.039 370	inch
			kilometer	0.621 37	mile
hectare	2.471 04	Acre	micrometer	0.039 370 1	mil
	107,639	square feet	Newton	0.224 81	pound(f)
	11,959.9	square yard	kilonewton	0.224 81	kip(f)
	0.003 861 02	square mile	Pascal	0.020 885	lb/sq. feet
microare	0.155 00	square inch	kilopascal	0.145 04	lb/sq. inch
joule	0.737 56	foot pound	megapascal	0.145 04	kips/sq. inch
	8.849 5	inch pound	square meter	1.195 99	square yard
kg/m³	1.685 55	lbs./cubic yards		10.763 9	square feet
	0.062 428	lbs./cubic feet	square millimeter	0.001 55	square inch
km/hr	0.621 37	miles per hour	square kilometer	0.386 102	square mile
			watt (J/second)	0.001 341	horsepower
				0.737 56	ft-lb/second

FOR TEMPERATURE CONVERSION USE °F = 9/5 °C + 32

C. Material Weights/Engineering Values

1. The following engineering values are guidelines for establishing shrink/swell factors and shall be used unless otherwise directed by the Owner. The Owner has final authority in establishing unit weights that are appropriate for all material and may change the stated values.

a. Material weights (Lbs Per CY) for In-place (Bank) [BCY], Loose (Excavated Materials) [LCY], and Compacted [CCY]

<u>MATERIALS</u>	<u>BCY</u>	<u>LCY</u>	<u>CCY</u>
Earth, Common (Average)	3170	2536	3520
Sand (Dry)	2880	2590	3240
Sand (Wet)	3090	2940	3460
Earth, Dry	3030	2070	3520
Earth, Damp	3370	2360	3520
Earth, Wet	2940	2940	3520
Earth, Rock Mixture (75% E/ 25% R)	3380	2370	3720
Earth, Rock Mixture (50% E/ 50% R)	3750	2710	4000
Earth, Rock Mixture (25% E/ 75% R)	4120	3140	3680
Gravel (Average)	3280	2730	3570
Limestone	4380	2690	3220
Riprap Rock (Average)	4500	2610	3150
Granite	4540	2640	3170
Basalt	4950	3020	3640
Clay	3220	2150	3570
Gneiss	4550	2720	3180

D. Reclaimed Asphalt Pavement (RAP)

1. Origin

a. Reclaimed asphalt pavement (RAP) is the term given to removed and/or reprocessed pavement materials containing asphalt and aggregates. These materials are generated when asphalt pavements are removed for reconstruction, resurfacing, or to obtain access to buried utilities. When properly crushed and screened, RAP consists of high-quality, well-graded aggregates coated by asphalt cement.

b. Asphalt pavement is generally removed either by milling or full-depth removal. Milling entails removal of the pavement surface using a milling machine, which can remove up to 50 mm (2 in) thickness in a single pass. Full-depth removal involves ripping and breaking the pavement using a rhino horn on a bulldozer and/or pneumatic pavement breakers. In most instances, the broken material is picked up and loaded into haul trucks by a front-end loader and transported to a central facility for processing. At this facility, the RAP is processed using a series of operations, including crushing, screening, conveying, and stacking.

c. Although the majority of old asphalt pavements are recycled at central processing plants, asphalt pavements may be pulverized in place and incorporated into granular or stabilized base courses using a self-propelled pulverizing machine. Hot in-place and cold in-place recycling processes have evolved into continuous train operations that include partial depth removal of the pavement surface, mixing the reclaimed material with beneficiating additives (such as virgin aggregate, binder, and/or softening or rejuvenating agents to improve binder properties), and placing and compacting the resultant mix in a single pass.

2. Physical Properties

a. The properties of RAP are largely dependent on the properties of the constituent materials and the type of asphalt concrete mix (wearing surface, binder course, etc.). There can be substantial differences between asphalt concrete mixes in aggregate quality, size, and consistency. Since the aggregates in surface course (wearing course) asphalt concrete must have high resistance to wear/abrasion (polishing) to contribute to acceptable friction

- resistance properties, these aggregates may be of higher quality than the aggregates in binder course applications, where polishing resistance is not of concern.
- b. Both milling and crushing can cause some aggregate degradation. The gradation of milled RAP is generally finer and more dense than that of the virgin aggregates. Crushing does not cause as much degradation as milling; consequently, the gradation of crushed RAP is generally not as fine as milled RAP, but finer than virgin aggregates crushed with the same type of equipment.
 - c. The particle size distribution of milled or crushed RAP may vary to some extent, depending on the type of equipment used to produce the RAP, the type of aggregate in the pavement, and whether any underlying base or subbase aggregate has been mixed in with the reclaimed asphalt pavement material during the pavement removal.
 - d. During processing, virtually all RAP produced is milled or crushed down to 38 mm (1.5 in) or less, with a maximum allowable top size of either 51 mm (2 in) or 63 mm (2.5 in). Table 13-1 lists the typical range of particle size distribution that normally results from the milling or crushing of RAP. Milled RAP is generally finer than crushed RAP. The pavement fraction passing a 2.36 mm (No. 8) sieve can be expected to increase from a premilled range of 41 to 69 percent to a postmilled range of 52 to 72 percent. The fraction passing a 0.075 mm (No. 200) sieve can be expected to increase from approximately 6 to 10 percent to a range of 8 to 12 percent. Most sources of RAP will be a well-graded coarse aggregate, comparable to, or perhaps slightly finer and more variable than, crushed natural aggregates.
 - e. The unit weight of milled or processed RAP depends on the type of aggregate in the reclaimed pavement and the moisture content of the stockpiled material. The unit weight of milled or processed RAP has been found to range from 1940 to 2300 kg/m³ (120 to 140 lb/ft³), which is slightly lower than that of natural aggregates.
 - f. Moisture content of the RAP will increase while in storage. Crushed or milled RAP can pick up a considerable amount of water if exposed to rain. Moisture contents up to 5 percent or higher have been measured for stored crushed RAP. As noted earlier, during periods of extensive precipitation, the moisture content of some RAP stockpiles may be as high as 7 to 8 percent. Lengthy stockpiling of crushed or milled RAP should, therefore, be kept to a minimum.
 - g. The asphalt cement content of RAP typically ranges between 3 and 7 percent by weight. The asphalt cement adhering to the aggregate is somewhat harder than new asphalt cement. This is due primarily to exposure of the pavement to atmospheric oxygen (oxidation) during use and weathering. The degree of hardening depends on several factors, including the intrinsic properties of the asphalt cement, the mixing temperature/time (increases with increasing high temperature exposure), the degree of asphalt concrete compaction (increases if not well compacted), asphalt cement/air voids content (increases with lower asphalt/higher air voids content), and age in service (increases with age).

Table 1. Typical range of particle size distribution for reclaimed asphalt pavement (RAP) (percent by weight passing).

Screen Size (mesh)	Percent Finer After Processing or Milling
37.5 mm (1.5 in)	100
25 mm (1.0 in)	95 - 100
19 mm (3/4 in)	84 - 100
12.5 mm (1/2 in)	70 - 100
9.5 mm (3/8 in)	58 - 95
75 mm (No. 4)	38 - 75
2.36 mm (No. 8)	25 - 60
1.18 mm (No. 16)	17 - 40
0.60 mm (No. 30)	10 - 35 ^a
0.30 mm (No. 50)	5 - 25 ^b
0.15 mm (No. 100)	3 - 20 ^c
0.075 mm (No. 200)	2 - 15 ^d
a. Usually less than 30 percent b. Usually less than 20 percent c. Usually less than 15 percent d. Usually less than 10 percent	

- h. The RAP obtained from most wearing surface mixes will usually have an asphalt content in the 4.5 to 6 percent range. The recovered asphalt from RAP usually exhibits low penetration and relatively high viscosity values, depending on the amount of time the original pavement has been in service. Penetration values at 25°C (77°F) are likely to range from 10 to 80 while the absolute viscosity values at 60°C (140°F) may range from as low as 2,000 poises (equivalent to AC-20) up to as high as 50,000 poises or greater, depending on the extent of aging. Viscosity ranges from 4,000 to 25,000 poises can normally be expected from the asphalt cement that is recovered from RAP material. Table 2 provides a summary of the typical ranges of physical properties of RAP, other than gradation.

Table 2. Physical and mechanical properties of reclaimed asphalt pavement (RAP).

Type of Property	RAP Property	Typical Range of Values
Physical Properties	Unit Weight	1940 - 2300 kg/m ³ (120-140 lb/ft ³)
	Moisture Content	Normal: up to 5% Maximum: 7-8%
	Asphalt Content	Normal: 4.5-6% Maximum Range: 3-7%
	Asphalt Penetration	Normal: 10-80 at 25°C (77°F)
	Absolute Viscosity or Recovered Asphalt Cement	Normal: 4,000 - 25,000 poises at 60°C (140°F)
Mechanical Properties	Compacted Unit Weight	1600 - 2000 kg/m ³ (100-125 lb/ft ³)
	California Bearing Ratio (CBR)	100% RAP: 20-25% 40% RAP and 60% Natural Aggregate: 150% or higher

3. Chemical Properties

- a. Mineral aggregates constitute the overwhelming majority (93 to 97 percent by weight) of RAP. Only a minor percentage (3 to 7 percent) of RAP consists of hardened asphalt cement. Consequently, the overall chemical composition of RAP is essentially similar to that of the naturally occurring aggregate that is its principal constituent.
- b. Asphalt cement is made up of mainly high molecular weight aliphatic hydrocarbon compounds, but also small concentrations of other materials such as sulfur, nitrogen, and polycyclic hydrocarbons (aromatic and/or naphthenic) of very low chemical reactivity. Asphalt cement is a combination of asphaltenes and maltenes (resins and oils). Asphaltenes are more viscous than either resins or oils and play a major role in determining asphalt viscosity. Oxidation of aged asphalt causes the oils to convert to resins and the resins to convert to asphaltenes, resulting in age hardening and a higher viscosity binder.

4. Mechanical Properties

- a. The mechanical properties of RAP depend on the original asphalt pavement type, the method(s) utilized to recover the material, and the degree of processing necessary to prepare the RAP for a particular application. Since most RAP is recycled back into pavements, there is a general lack of data pertaining to the mechanical properties for RAP in other possible applications.
- b. The compacted unit weight of RAP will decrease with increasing unit weight, with maximum dry density values reported to range from 1600 kg/m³ (100 lb/ft³) to 2000 kg/m³ (125 lb/ft³). California Bearing Ratio (CBR) values for RAP material containing trap rock aggregate have been reported in the 20 to 25 percent range. However, when RAP is blended with natural aggregates for use in granular base, the asphalt cement in the RAP has a significant strengthening effect over time, such that specimens containing 40 percent RAP have produced CBR values exceeding 150 after 1 week.
- c. Table 2 provides a summary of the mechanical properties of RAP discussed in the preceding paragraphs.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION (Not Used)

END OF SECTION 01 42 13 00

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Task	Specification	Specification Description
01 42 13 00	01 00 00 00	General Requirements
01 42 16 00	01 00 00 00	General Requirements
01 42 16 00	01 42 13 00	Abbreviations, Acronyms, Definitions, and Symbols

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SECTION 01 42 19 00 - REFERENCES

1.1 GENERAL

A. Definitions

1. General: Basic Contract definitions are included in the Conditions of the Contract.
2. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
3. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
4. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
5. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
6. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
7. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
8. "Provide": Furnish and install, complete and ready for the intended use.
9. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

B. Industry Standards

1. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
2. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
3. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - a. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

C. Abbreviations And Acronyms

1. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association, Inc. (The) www.aluminum.org	(703) 358-2960
AAADM	American Association of Automatic Door Manufacturers www.aaadm.com	(216) 241-7333
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202

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AAMA	American Architectural Manufacturers Association www.aamanet.org	(847) 303-5664
AASHTO	American Association of State Highway and Transportation Officials www.transportation.org	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists (The) www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	American Bearing Manufacturers Association www.abma-dc.org	(202) 367-1155
ACI	ACI International (American Concrete Institute) www.aci-int.org	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	American Forest & Paper Association www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	American Gas Association www.aga.org	(202) 824-7000
AGC	Associated General Contractors of America (The) www.agc.org	(703) 548-3118
AHA	American Hardboard Association (Now part of CPA)	
AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AI	Asphalt Institute www.asphaltinstitute.org	(859) 288-4960
AIA	American Institute of Architects (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	American Institute of Timber Construction	(303) 792-9559

	www.aitc-glulam.org	
ALCA	Associated Landscape Contractors of America (Now PLANET - Professional Landcare Network)	
ALSC	American Lumber Standard Committee, Incorporated www.alsc.org	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	Association of Official Seed Analysts, Inc. www.aosaseed.com	(405) 780-7372
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
APA	APA - The Engineered Wood Association www.apawood.org	(253) 565-6600
APA EWS	APA - The Engineered Wood Association; Engineered Wood Systems (See APA - The Engineered Wood Association)	
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	Air-Conditioning & Refrigeration Institute www.ari.org	(703) 524-8800
ARMA	Asphalt Roofing Manufacturers Association www.asphaltroofing.org	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	ASME International (The American Society of Mechanical Engineers International) www.asme.org	(800) 843-2763 (973) 882-1170
ASSE	American Society of Sanitary Engineering www.asse-plumbing.org	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International)	(610) 832-9585

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	www.astm.org	
AWCI	AWCI International (Association of the Wall and Ceiling Industry International) www.awci.org	(703) 534-8300
AWCMA	American Window Covering Manufacturers Association (Now WCSC)	
AWI	Architectural Woodwork Institute www.awinet.org	(571) 323-3636
AWPA	American Wood-Preservers' Association www.awpa.com	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	Builders Hardware Manufacturers Association www.buildershardware.com	(212) 297-2122
BIA	Brick Industry Association (The) www.bia.org	(703) 620-0010
BICSI	Building Industry Consulting Service International www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	Carpet Cushion Council www.carpetcushion.org	(610) 527-3880
CDA	Copper Development Association www.copper.org	(800) 232-3282 (212) 251-7200
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CFFA	Chemical Fabrics & Film Association, Inc. www.chemicalfabricsandfilm.com	(216) 241-7333
CGA	Compressed Gas Association www.cganet.com	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462

CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	Cast Iron Soil Pipe Institute www.cispi.org	(423) 892-0137
CLFMI	Chain Link Fence Manufacturers Institute www.chainlinkinfo.org	(301) 596-2583
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CPA	Composite Panel Association www.pbmdf.com	(301) 670-0604
CPPA	Corrugated Polyethylene Pipe Association www.cppa-info.org	(800) 510-2772 (202) 462-9607
CRI	Carpet & Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	Concrete Reinforcing Steel Institute www.crsi.org	(847) 517-1200
CSA	Canadian Standards Association	(800) 463-6727 (416) 747-4000
CSA	CSA International (Formerly: IAS - International Approval Services) www.csa-international.org	(866) 797-4272 (416) 747-4000
CSI	Cast Stone Institute www.caststone.org	(717) 272-3744
CSI	Construction Specifications Institute (The) www.csinet.org	(800) 689-2900 (703) 684-0300
CSSB	Cedar Shake & Shingle Bureau www.cedarbureau.org	(604) 820-7700
CTI	Cooling Technology Institute (Formerly: Cooling Tower Institute) www.cti.org	(281) 583-4087
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
EIA	Electronic Industries Alliance www.eia.org	(703) 907-7500
EIMA	EIFS Industry Members Association www.eima.com	(800) 294-3462 (770) 968-7945
EJCDC	Engineers Joint Contract Documents Committee www.ejdc.org	(703) 295-5000

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EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	ESD Association www.esda.org	(315) 339-6937
FIBA	Federation Internationale de Basketball (The International Basketball Federation) www.fiba.com	41 22 545 00 00
FIVB	Federation Internationale de Volleyball (The International Volleyball Federation) www.fivb.ch	41 21 345 35 35
FM Approvals	FM Approvals www.fmglobal.com	(781) 762-4300
FM Global	FM Global (Formerly: FMG - FM Global) www.fmglobal.com	(401) 275-3000
FMRC	Factory Mutual Research (Now FM Global)	
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc. www.floridarroof.com	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	Gypsum Association www.gypsum.org	(202) 289-5440
GANA	Glass Association of North America www.glasswebsite.com	(785) 271-0208
GRI	(Now GSI)	
GS	Green Seal www.greenseal.org	(202) 872-6400
GSI	Geosynthetic Institute www.geosynthetic-institute.org	(610) 522-8440
HI	Hydraulic Institute www.pumps.org	(888) 786-7744 (973) 267-9700
HI	Hydronics Institute www.gamanet.org	(908) 464-8200

HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	Hardwood Plywood & Veneer Association www.hpva.org	(703) 435-2900
HPW	H. P. White Laboratory, Inc. www.hpwhite.com	(410) 838-6550
IAS	International Approval Services (Now CSA International)	
IBF	International Badminton Federation www.internationalbadminton.org	(6-03) 9283-7155
ICEA	Insulated Cable Engineers Association, Inc. www.icea.net	(770) 830-0369
ICRI	International Concrete Repair Institute, Inc. www.icri.org	(847) 827-0830
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	Institute of Electrical and Electronics Engineers, Inc. (The) www.ieee.org	(212) 419-7900
IESNA	Illuminating Engineering Society of North America www.iesna.org	(212) 248-5000
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561
IGCC	Insulating Glass Certification Council www.igcc.org	(315) 646-2234
IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	Indiana Limestone Institute of America, Inc. www.iliai.com	(812) 275-4426
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
	Available from ANSI www.ansi.org	(202) 293-8020
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (702) 567-8150
ITS	Intertek Testing Service NA www.intertek.com	(972) 238-5591
ITU	International Telecommunication Union www.itu.int/home	41 22 730 51 11

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KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LMA	Laminating Materials Association (Now part of CPA)	
LPI	Lightning Protection Institute www.lightning.org	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MFMA	Maple Flooring Manufacturers Association, Inc. www.maplefloor.org	(847) 480-9138
MFMA	Metal Framing Manufacturers Association, Inc. www.metalframingmfg.org	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	Marble Institute of America www.marble-institute.com	(440) 250-9222
MPI	Master Painters Institute www.paintinfo.com	(888) 674-8937
MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(312) 332-0405
NACE	NACE International (National Association of Corrosion Engineers International) www.nace.org	(800) 797-6623 (281) 228-6200
NADCA	National Air Duct Cleaners Association www.nadca.com	(202) 737-2926
NAGWS	National Association for Girls and Women in Sport www.aahperd.org/nagws/	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848

NCAA	National Collegiate Athletic Association (The) www.ncaa.org	(317) 917-6222
NCMA	National Concrete Masonry Association www.ncma.org	(703) 713-1900
NCPI	National Clay Pipe Institute www.ncpi.org	(262) 248-9094
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 775-3550
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	National Electrical Contractors Association www.necanet.org	(301) 657-3110
NeLMA	Northeastern Lumber Manufacturers' Association www.nelma.org	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (303) 697-8441
NFHS	National Federation of State High School Associations www.nfhs.org	(317) 972-6900
NFPA	NFPA (National Fire Protection Association) www.nfpa.org	(800) 344-3555 (617) 770-3000
NFRC	National Fenestration Rating Council www.nfrc.org	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	National Lumber Grades Authority www.nlga.org	(604) 524-2393
NOFMA	NOFMA: The Wood Flooring Manufacturers Association (Formerly: National Oak Flooring Manufacturers Association) www.nofma.com	(901) 526-5016
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400

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NSF	NSF International (National Sanitation Foundation International) www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	National Stone, Sand & Gravel Association www.nssga.org	(800) 342-1415 (703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The) www.ntma.com	(800) 323-9736 (540) 751-0930
NTRMA	National Tile Roofing Manufacturers Association (Now TRI)	
NWWDA	National Wood Window and Door Association (Now WDMA)	
OPL	Omega Point Laboratories, Inc. (Now ITS)	
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDCA	Painting & Decorating Contractors of America www.pdca.com	(800) 332-7322 (314) 514-7322
PDI	Plumbing & Drainage Institute www.pdionline.org	(800) 589-8956 (978) 557-0720
PGI	PVC Geomembrane Institute http://pgi-tp.ce.uiuc.edu	(217) 333-3929
PLANET	Professional Landcare Network (Formerly: ACLA - Associated Landscape Contractors of America) www.landcarenetwork.org	(800) 395-2522 (703) 736-9666
PTI	Post-Tensioning Institute www.post-tensioning.org	(602) 870-7540
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	Resilient Floor Covering Institute www.rfci.com	(301) 340-8580
RIS	Redwood Inspection Service www.calredwood.org	(888) 225-7339 (415) 382-0662
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SDI	Steel Deck Institute www.sdi.org	(847) 458-4647
SDI	Steel Door Institute	(440) 899-0010

	www.steeldoor.org	
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(516) 294-5424
SEI/ASCE	Structural Engineering Institute/American Society of Civil Engineers (See ASCE)	
SGCC	Safety Glazing Certification Council www.sgcc.org	(315) 646-2234
SIA	Security Industry Association www.siaonline.org	(703) 683-2075
SIGMA	Sealed Insulating Glass Manufacturers Association (Now IGMA)	
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association www.smacna.org	(703) 803-2980
SMPTE	Society of Motion Picture and Television Engineers www.smpte.org	(914) 761-1100
SPFA	Spray Polyurethane Foam Alliance (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The) www.spib.org	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	SSPC: The Society for Protective Coatings www.sspc.org	(877) 281-7772 (412) 281-2331
STI	Steel Tank Institute www.steeltank.com	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWRI	Sealant, Waterproofing, & Restoration Institute www.swrionline.org	(816) 472-7974

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TCA	Tile Council of America, Inc. www.tileusa.com	(864) 646-8453
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	The Masonry Society www.masonrysociety.org	(303) 939-9700
TPI	Truss Plate Institute, Inc. www.tpinst.org	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.org	(312) 670-4177
UL	Underwriters Laboratories Inc. www.ul.com	(877) 854-3577 (847) 272-8800
UNI	Uni-Bell PVC Pipe Association www.uni-bell.org	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(202) 828-7422
USITT	United States Institute for Theatre Technology, Inc. www.usitt.org	(800) 938-7488 (315) 463-6463
WASTEC	Waste Equipment Technology Association www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association (Now WCSC)	
WCSC	Window Covering Safety Council (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 297-2109
WDMA	Window & Door Manufacturers Association (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WI	Woodwork Institute (Formerly: WIC - Woodwork Institute of	(916) 372-9943

References

	California) www.wicnet.org	
WIC	Woodwork Institute of California (Now WI)	
WMMPA	Wood Moulding & Millwork Producers Association www.wmmpa.com	(800) 550-7889 (530) 661-9591
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

2. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

IAPMO	International Association of Plumbing and Mechanical Officials www.iapmo.org	(909) 472-4100
IBC	International Building Code (See ICC)	
ICBO	International Conference of Building Officials (See ICC)	
ICBO ES	ICBO Evaluation Service, Inc. (See ICC-ES)	
ICC	International Code Council www.iccsafe.org	(888) 422-7233 (703) 931-4533
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
SBCCI	Southern Building Code Congress International, Inc. (See ICC)	

3. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000

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DOD	Department of Defense http://.dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220
EPA	Environmental Protection Agency www.epa.gov	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	Food and Drug Administration www.fda.gov	(888) 463-6332
GSA	General Services Administration www.gsa.gov	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	National Cooperative Highway Research Program (See TRB)	
NIST	National Institute of Standards and Technology www.nist.gov	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Building Service (See GSA)	
PHS	Office of Public Health and Science www.osophs.dhhs.gov/ophs	(202) 690-7694
RUS	Rural Utilities Service (See USDA)	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	Department of Agriculture www.usda.gov	(202) 720-2791

USPS	Postal Service www.usps.com	(202) 268-2000
4.	Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.	
ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Federal Specification Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
	Available from Defense Standardization Program www.dps.dla.mil	
	Available from General Services Administration www.gsa.gov	(202) 619-8925
	Available from National Institute of Building Sciences www.wbdg.org/ccb	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL	(See MILSPEC)	
MIL-STD	(See MILSPEC)	
MILSPEC	Military Specification and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
UFAS	Uniform Federal Accessibility Standards Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-0080
5.	State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following	

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list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	State of California, Department of Consumer Affairs Bureau of Home Furnishings and Thermal Insulation www.dca.ca.gov/bhfti	(800) 952-5210 (916) 574-2041
CCR	California Code of Regulations www.calregs.com	(916) 323-6815
CPUC	California Public Utilities Commission www.cpuc.ca.gov	(415) 703-2782
TFS	Texas Forest Service Forest Resource Development http://txforests-service.tamu.edu	(979) 458-6650

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 19 00

Task	Specification	Specification Description
01 42 19 00	01 00 00 00	General Requirements
01 42 21 00	01 00 00 00	General Requirements
01 45 00 00	01 00 00 00	General Requirements
01 45 23 00	01 00 00 00	General Requirements
01 45 29 00	01 00 00 00	General Requirements
01 50 00 00	01 00 00 00	General Requirements
01 51 00 00	01 00 00 00	General Requirements
01 51 26 00	01 00 00 00	General Requirements
01 52 00 00	01 00 00 00	General Requirements

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SECTION 01 52 13 00 - TEMPORARY FACILITIES AND CONTROLS

1.1 GENERAL

A. Summary

1. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Definitions

1. Permanent Enclosure: As determined by the Owner, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

C. Use Charges

1. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, the Owner's construction forces, the Owner, occupants of Project, testing agencies, and authorities having jurisdiction.
2. Water Service: Water from the Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
3. Electric Power Service: Electric power from the Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

D. Submittals

1. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

E. Quality Assurance

1. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
2. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

F. Project Conditions

1. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before the Owner's acceptance, regardless of previously assigned responsibilities.

1.2 PRODUCTS

A. Materials

1. Pavement: Comply with Division 32 Section(s) "Asphalt Paving" OR "Concrete Paving", **as directed**.
2. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.76-mm-) thick, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails **OR** with galvanized barbed-wire top strand, **as directed**.
3. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-

mm-) OD top and bottom rails. Provide concrete **OR** galvanized steel, **as directed**, bases for supporting posts.

4. Wood Enclosure Fence: Plywood, **6 feet (1.8 m) OR 8 feet (2.4 m)**, **as directed**, high, framed with four **2-by-4-inch (50-by-100-mm)** rails, with preservative-treated wood posts spaced not more than **8 feet (2.4 m)** apart.
5. Lumber and Plywood: Comply with requirements in Division 06 Section(s) "Rough Carpentry" OR "Miscellaneous Rough Carpentry", **as directed**.
6. Gypsum Board: Minimum **1/2 inch (12.7 mm)** thick by **48 inches (1219 mm)** wide by maximum available lengths; regular-type panels with tapered edges. Comply with ASTM C 36/C 36M.
7. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
8. Paint: Comply with requirements in Division 09.

B. Temporary Facilities

1. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
2. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
 - a. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - b. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and **4-foot- (1.2-m-)** square tack board.
 - c. Drinking water and private toilet.
 - d. Coffee machine and supplies.
 - e. Heating and cooling equipment necessary to maintain a uniform indoor temperature of **68 to 72 deg F (20 to 22 deg C)**.
 - f. Lighting fixtures capable of maintaining average illumination of **20 fc (215 lx)** at desk height.
3. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - a. Store combustible materials apart from building.

C. Equipment

1. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
2. HVAC Equipment: Unless the Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - b. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - c. Permanent HVAC System: If the Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

1.3 EXECUTION

A. Installation, General

1. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

- a. For greenfield sites if reduced site disturbance is required for LEED-NC Credit SS 5.1: Locate facilities to limit site disturbance as specified in General Requirements.
 2. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- B. Temporary Utility Installation**
1. General: Install temporary service or connect to existing service.
 - a. Arrange with utility company, the Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
 2. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - a. Connect temporary sewers to municipal system **OR** private system indicated, **as directed**, as directed by authorities having jurisdiction.
 3. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
OR
Water Service: Use of the Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to the Owner. At Final Completion, restore these facilities to condition existing before initial use.
 - a. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
 4. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
 - a. Toilets: Use of the Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to the Owner. At Final Completion, restore these facilities to condition existing before initial use.
 5. Heating **OR** Heating and Cooling, **as directed**: Provide temporary heating **OR** heating and cooling, **as directed**, required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
 6. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 7. Electric Power Service: Use of the Owner's existing electric power service will be permitted, as long as equipment is maintained in a condition acceptable to the Owner.
OR
Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 - a. Install electric power service overhead **OR** underground, **as directed**, unless otherwise indicated.
 - b. Connect temporary service to the Owner's existing power source, as directed by the Owner.
 8. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - a. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 - b. Install lighting for Project identification sign.
 9. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line for each field office.
 - a. Provide additional telephone lines for the following:
 - 1) Provide a dedicated telephone line for each facsimile machine and computer in each field office.

- b. At each telephone, post a list of important telephone numbers.
 - 1) Police and fire departments.
 - 2) Ambulance service.
 - 3) Contractor's home office.
 - 4) the Owner's office.
 - 5) the Owner's office.
 - 6) Principal subcontractors' field and home offices.
 - c. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
10. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
- a. Provide DSL **OR** T-1 line, **as directed**, in primary field office.
- C. Support Facilities Installation
- 1. General: Comply with the following:
 - a. Provide incombustible construction for offices, shops, and sheds located within construction area or within **30 feet (9 m)** of building lines. Comply with NFPA 241.
 - b. Maintain support facilities until near Final Completion. Remove before Final Completion. Personnel remaining after Final Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
 - 2. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated **OR** within construction limits indicated, **as directed**, on Drawings.
 - a. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- OR**
- 3. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas in same location as permanent roads and paved areas. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 - a. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 - b. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Division 31 Section "Earth Moving".
 - c. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 - d. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Final Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Division 32 Section "Asphalt Paving".
 - 4. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - a. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - b. Maintain access for fire-fighting equipment and access to fire hydrants.
 - 5. Parking: Provide temporary **OR** Use designated areas of the Owner's existing, **as directed**, parking areas for construction personnel.
 - 6. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - a. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - b. Remove snow and ice as required to minimize accumulations.
 - 7. Project Identification and Temporary Signs: Provide Project identification and other signs as indicated on Drawings, **OR as directed**. Install signs where indicated to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 - b. Maintain and touchup signs so they are legible at all times.

8. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with General Requirements for progress cleaning requirements.
9. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
 - a. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
10. Temporary Elevator Use: Refer to Division 14 for temporary use of new elevators.
11. Existing Elevator Use: Use of the Owner's existing elevators will be permitted, as long as elevators are cleaned and maintained in a condition acceptable to the Owner. At Final Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
 - a. Do not load elevators beyond their rated weight capacity.
 - b. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
12. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
13. Existing Stair Usage: Use of the Owner's existing stairs will be permitted, as long as stairs are cleaned and maintained in a condition acceptable to the Owner. At Final Completion, restore stairs to condition existing before initial use.
 - a. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If, despite such protection, stairs become damaged, restore damaged areas so no evidence remains of correction work.
14. Temporary Use of Permanent Stairs: Cover finished, permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of acceptance.

D. Security And Protection Facilities Installation

1. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
2. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
 - a. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
3. Stormwater Control: Comply with authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
4. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
5. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Final Completion. Obtain extended warranty for the Owner. Perform control operations lawfully, using environmentally safe materials.
6. Site Enclosure Fence: Before construction operations begin **OR** When excavation begins, **as directed**, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - a. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations **OR** As indicated on Drawings, **as directed**.
 - b. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide the Owner with one set of keys, **as directed**.

7. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 8. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
 9. Covered Walkway: Erect structurally adequate, protective, covered walkway for passage of individuals along adjacent public street(s). Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings, **OR as directed**.
 - a. Construct covered walkways using scaffold or shoring framing.
 - b. Provide wood-plank overhead decking, protective plywood enclosure walls, handrails, barricades, warning signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 - c. Extend back wall beyond the structure to complete enclosure fence.
 - d. Paint and maintain in a manner approved by the Owner.
 10. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
 - a. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
 11. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by the Owner and tenants from fumes and noise.
 - a. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 - b. If containment of airborne particles and dust generated by construction activities is critical to occupants of other spaces in building, e.g., occupied healthcare facilities: Construct dustproof partitions with 2 layers of **3-mil (0.07-mm)** polyethylene sheet on each side. Cover floor with 2 layers of **3-mil (0.07-mm)** polyethylene sheet, extending sheets **18 inches (460 mm)** up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant plywood.
 - 1) Construct vestibule and airlock at each entrance through temporary partition with not less than **48 inches (1219 mm)** between doors. Maintain water-dampened foot mats in vestibule.
 - c. Insulate partitions to provide noise protection to occupied areas.
 - d. Seal joints and perimeter. Equip partitions with dustproof doors and security locks.
 - e. Protect air-handling equipment.
 - f. Weather strip openings.
 - g. Provide walk-off mats at each entrance through temporary partition.
 12. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
 - a. Prohibit smoking in hazardous fire-exposure **OR** construction, **as directed**, areas.
 - b. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - c. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - d. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.
- E. Operation, Termination, And Removal
1. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
 2. Maintenance: Maintain facilities in good operating condition until removal.

- a. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
3. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
4. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Final Completion.
5. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Final Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - a. Materials and facilities that constitute temporary facilities are property of Contractor. the Owner reserves right to take possession of Project identification signs.
 - b. Remove temporary paving not intended for or acceptable for integration into permanent paving. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - c. At Final Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in General Requirements

END OF SECTION 01 52 13 00

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Task	Specification	Specification Description
01 52 13 00	01 00 00 00	General Requirements
01 52 13 00	01 22 16 00	No Specification Required
01 52 19 00	01 00 00 00	General Requirements
01 52 19 00	01 22 16 00	No Specification Required
01 52 19 00	01 52 13 00	Temporary Facilities and Controls
01 53 00 00	01 00 00 00	General Requirements
01 53 16 00	01 00 00 00	General Requirements
01 53 16 00	01 22 16 00	No Specification Required
01 53 23 00	01 00 00 00	General Requirements
01 54 00 00	01 00 00 00	General Requirements
01 54 09 00	01 00 00 00	General Requirements

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SECTION 01 54 23 00 - SCAFFOLDING TUBULAR STEEL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of scaffolding-tubular steel. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Tubular steel or aluminum scaffolding system shall comply with OSHA Safety and Health Standards, Section 29 CFR, 1926/1910.

1.3 EXECUTION - (Section not used.)

END OF SECTION 01 54 23 00

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Task	Specification	Specification Description
01 54 23 00	01 00 00 00	General Requirements
01 54 23 00	01 22 16 00	No Specification Required
01 54 23 00	04 20 00 00	Unit Masonry Assemblies
01 54 26 00	01 00 00 00	General Requirements
01 54 26 00	01 22 16 00	No Specification Required
01 55 00 00	01 00 00 00	General Requirements
01 55 23 00	01 00 00 00	General Requirements
01 55 23 00	01 22 16 00	No Specification Required
01 55 26 00	01 00 00 00	General Requirements
01 55 26 00	01 22 16 00	No Specification Required
01 55 26 00	10 14 53 11	Traffic Signs
01 56 00 00	01 00 00 00	General Requirements
01 56 16 00	01 00 00 00	General Requirements
01 56 16 00	01 22 16 00	No Specification Required

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SECTION 01 56 26 00 - EROSION AND SEDIMENTATION CONTROLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of mesh or netting for erosion control. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

A. Materials

1. Jute Mesh: Fed. Spec. CCC-C-467.
2. Plastic Mesh: Manufacturer's recommendation.
3. Plastic Netting: Manufacturer's recommendation.
4. Polypropylene Mesh: Manufacturer's recommendation.
5. Woven Fabric Fence: EPA specifications.
6. Hay-Bales: EPA specifications.

1.3 EXECUTION:

- A. Preparation: Grade, compact, fertilize, and seed the area to be protected.
- B. Installation: Apply blankets either horizontally or vertically to the slope. In ditches, apply blanket in direction of water flow. Lap and anchor blankets according to the manufacturer's instructions. Install woven fabric fence and hay bales adjacent to all excavated areas.

END OF SECTION 01 56 26 00

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Task	Specification	Specification Description
01 56 26 00	01 00 00 00	General Requirements
01 56 26 00	01 22 16 00	No Specification Required
01 56 26 00	31 25 14 00	Stabilization Measures for Erosion and Sedimentation Control
01 56 29 00	01 00 00 00	General Requirements
01 56 29 00	01 22 16 00	No Specification Required
01 56 33 00	01 00 00 00	General Requirements
01 56 33 00	01 22 16 00	No Specification Required
01 56 39 00	01 00 00 00	General Requirements
01 56 39 00	01 22 16 00	No Specification Required
01 57 00 00	01 00 00 00	General Requirements
01 57 13 00	01 00 00 00	General Requirements
01 57 13 00	31 25 14 00	Stabilization Measures for Erosion and Sedimentation Control
01 57 23 00	01 00 00 00	General Requirements
01 58 00 00	01 00 00 00	General Requirements
01 58 13 00	01 00 00 00	General Requirements
01 58 13 00	01 22 16 00	No Specification Required
01 58 13 00	10 14 00 00	Signage
01 60 00 00	01 00 00 00	General Requirements
01 65 00 00	01 00 00 00	General Requirements
01 66 00 00	01 00 00 00	General Requirements
01 66 19 00	01 00 00 00	General Requirements
01 66 19 00	01 22 16 00	No Specification Required
01 70 00 00	01 00 00 00	General Requirements
01 71 00 00	01 00 00 00	General Requirements
01 71 13 00	01 00 00 00	General Requirements
01 71 13 00	01 22 16 00	No Specification Required
01 71 23 00	01 00 00 00	General Requirements

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SECTION 01 71 23 16 - CUTTING AND PATCHING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cutting and patching. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes procedural requirements for cutting and patching.

C. Definitions

1. Cutting: Removal of in-place construction necessary to permit installation or performance of other Work.
2. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

D. Submittals

1. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
 - a. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
 - b. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
 - c. Products: List products to be used and firms or entities that will perform the Work.
 - d. Dates: Indicate when cutting and patching will be performed.
 - e. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
 - f. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
 - g. the Owner's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

E. Quality Assurance

1. LEED Requirements for Building Reuse:
 - a. Credit MR 1.1 and 1.2, **as directed**: Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be removed; do not cut such existing construction beyond indicated limits.
 - b. Credit MR 1.3: Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be removed; do not cut such existing construction beyond indicated limits.
 - c. Credit MR 1.2 and 1.3, **as directed**: Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be removed; do not cut such existing construction beyond indicated limits.

2. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
 - a. **Refer to the Owner for list of elements that might otherwise be overlooked as structural elements and that require Architect's or Construction Manager's approval of a cutting and patching proposal.**
3. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
 - a. Primary operational systems and equipment.
 - b. Air or smoke barriers.
 - c. Fire-suppression systems.
 - d. Mechanical systems piping and ducts.
 - e. Control systems.
 - f. Communication systems.
 - g. Conveying systems.
 - h. Electrical wiring systems.
 - i. Operating systems of special construction in Division 13.
4. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.
5. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
6. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

F. Warranty

1. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials so as not to void existing warranties.

1.2 PRODUCTS

A. Materials

1. General: Comply with requirements specified in other Sections.
2. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - a. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

1.3 EXECUTION

A. Preparation

1. Temporary Support: Provide temporary support of Work to be cut.
2. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
3. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
4. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize **OR** prevent, **as directed**, interruption to occupied areas.

B. Performance

1. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - a. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
2. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - a. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - b. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - c. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - d. Excavating and Backfilling: Comply with requirements in applicable Division 31 where required by cutting and patching operations.
 - e. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - f. Proceed with patching after construction operations requiring cutting are complete.
3. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
 - a. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - b. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
 - 1) Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - 2) Restore damaged pipe covering to its original condition.
 - c. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - 1) Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

01 - General Requirements



- d. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - e. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
4. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 01 71 23 16

Task	Specification	Specification Description
01 71 23 16	01 00 00 00	General Requirements
01 71 36 00	01 00 00 00	General Requirements
01 74 00 00	01 00 00 00	General Requirements
01 74 13 00	01 00 00 00	General Requirements
01 74 16 00	01 00 00 00	General Requirements
01 74 16 00	01 22 16 00	No Specification Required

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SECTION 01 74 19 00 - CONSTRUCTION WASTE MANAGEMENT

1.1 GENERAL

A. Summary

1. This Section includes administrative and procedural requirements for the following:
 - a. Salvaging nonhazardous demolition and construction waste.
Note: All salvageable materials remain the property of the Owner and shall be turned over as directed when specified in the Job Order.
 - b. Recycling nonhazardous demolition and construction waste.
 - c. Disposing of nonhazardous demolition and construction waste.

B. Definitions

1. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
2. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
3. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
4. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
5. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
6. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

C. Performance Goals **OR** Requirements, **as directed**

1. General: Develop waste management plan that results in end-of-Project rates for salvage/recycling of 50 **OR** 75, **as directed**, percent by weight of total waste generated by the Work.
2. Salvage/Recycle Goals **OR** Requirements, **as directed**: Owner's goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible including the following materials:
OR
Salvage/Recycle Goals **OR** Requirements, **as directed**: Owner's goal is to salvage and recycle as much nonhazardous demolition and construction waste as possible. Owner has established minimum goals for the following materials:
 - a. Demolition Waste:
 - 1) Asphaltic concrete paving.
 - 2) Concrete.
 - 3) Concrete reinforcing steel.
 - 4) Brick.
 - 5) Concrete masonry units.
 - 6) Wood studs.
 - 7) Wood joists.
 - 8) Plywood and oriented strand board.
 - 9) Wood paneling.
 - 10) Wood trim.
 - 11) Structural and miscellaneous steel.
 - 12) Rough hardware.
 - 13) Roofing.
 - 14) Insulation.
 - 15) Doors and frames.

- 16) Door hardware.
 - 17) Windows.
 - 18) Glazing.
 - 19) Metal studs.
 - 20) Gypsum board.
 - 21) Acoustical tile and panels.
 - 22) Carpet.
 - 23) Carpet pad.
 - 24) Demountable partitions.
 - 25) Equipment.
 - 26) Cabinets.
 - 27) Plumbing fixtures.
 - 28) Piping.
 - 29) Supports and hangers.
 - 30) Valves.
 - 31) Sprinklers.
 - 32) Mechanical equipment.
 - 33) Refrigerants.
 - 34) Electrical conduit.
 - 35) Copper wiring.
 - 36) Lighting fixtures.
 - 37) Lamps.
 - 38) Ballasts.
 - 39) Electrical devices.
 - 40) Switchgear and panelboards.
 - 41) Transformers.
 - b. Construction Waste:
 - 1) Site-clearing waste.
 - 2) Masonry and CMU.
 - 3) Lumber.
 - 4) Wood sheet materials.
 - 5) Wood trim.
 - 6) Metals.
 - 7) Roofing.
 - 8) Insulation.
 - 9) Carpet and pad.
 - 10) Gypsum board.
 - 11) Piping.
 - 12) Electrical conduit.
 - 13) Packaging: Regardless of salvage/recycle goal indicated above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - a) Paper.
 - b) Cardboard.
 - c) Boxes.
 - d) Plastic sheet and film.
 - e) Polystyrene packaging.
 - f) Wood crates.
 - g) Plastic pails.
- D. Submittals
1. Waste Management Plan: Submit 3 copies of plan within 7 **OR** 30, **as directed**, days of date established for commencement of the Work **OR** the Notice to Proceed **OR** the Notice of Award, **as directed**.

2. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit three copies of report. Include separate reports for demolition and construction waste, **as directed**. Include the following information:
 - a. Material category.
 - b. Generation point of waste.
 - c. Total quantity of waste in **tons (tonnes)**.
 - d. Quantity of waste salvaged, both estimated and actual in **tons (tonnes)**.
 - e. Quantity of waste recycled, both estimated and actual in **tons (tonnes)**.
 - f. Total quantity of waste recovered (salvaged plus recycled) in **tons (tonnes)**.
 - g. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
 3. Waste Reduction Calculations: Before request for Final Completion, submit three copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
 4. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 5. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
 6. LEED Submittal: LEED letter template for Credit MR 2.1 and 2.2, **as directed**, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
 7. Qualification Data: For Waste Management Coordinator and refrigerant recovery technician.
 8. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- E. Quality Assurance
1. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council. Waste management coordinator may also serve as LEED coordinator.
 2. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
 3. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
 4. Waste Management Conference: Conduct conference at Project site. Review methods and procedures related to waste management including, but not limited to, the following:
 - a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.
- F. Waste Management Plan
1. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Include separate sections in plan for demolition and construction waste if Project requires selective demolition or building demolition. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
 2. Waste Identification: Indicate anticipated types and quantities of demolition, site-clearing, and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.
 3. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

- a. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 - b. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 - c. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - d. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.
4. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Include the following:
- a. Total quantity of waste.
 - b. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 - c. Total cost of disposal (with no waste management).
 - d. Revenue from salvaged materials.
 - e. Revenue from recycled materials.
 - f. Savings in hauling and tipping fees by donating materials.
 - g. Savings in hauling and tipping fees that are avoided.
 - h. Handling and transportation costs. Include cost of collection containers for each type of waste.
 - i. Net additional cost or net savings from waste management plan.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION

A. Plan Implementation

1. General: Implement waste management plan as approved by the Owner. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - a. Comply with Division 01 Section "Temporary Facilities And Controls" for operation, termination, and removal requirements.
2. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.
3. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 - a. Distribute waste management plan to everyone concerned within three days of submittal return.
 - b. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
4. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - b. Comply with Division 01 Section "Temporary Facilities And Controls" for controlling dust and dirt, environmental protection, and noise control.

B. Salvaging Demolition Waste

1. Salvaged Items for Reuse in the Work:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until installation.
 - d. Protect items from damage during transport and storage.
 - e. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
 2. Salvaged Items for Sale and Donation: Not permitted.
 3. Salvaged Items for Owner's Use:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport items to Owner's storage area on-site **OR** off-site **OR** designated by Owner, **as directed**.
 - e. Protect items from damage during transport and storage.
 4. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.
- C. Recycling Demolition And Construction Waste, General
1. General: Recycle paper and beverage containers used by on-site workers.
 2. Recycling Receivers and Processors: Refer to the Owner for available recycling receivers and processors.
 3. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner **OR** accrue to Contractor **OR** be shared equally by Owner and Contractor, **as directed**.
 4. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.
 - a. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - 1) Inspect containers and bins for contamination and remove contaminated materials if found.
 - b. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - c. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - d. Store components off the ground and protect from the weather.
 - e. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.
- D. Recycling Demolition Waste
1. Asphaltic Concrete Paving: Grind asphalt to maximum **1-1/2-inch (38-mm) OR 4-inch (100-mm), as directed**, size.
 - a. Crush asphaltic concrete paving and screen to comply with requirements in Division 31 Section "Earth Moving" for use as general fill.
 2. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
 3. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - a. Pulverize concrete to maximum **1-1/2-inch (38-mm) OR 4-inch (100-mm), as directed**, size.
 - b. Crush concrete and screen to comply with requirements in Division 31 Section "Earth Moving" for use as satisfactory soil for fill or subbase.
 4. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - a. Pulverize masonry to maximum **3/4-inch (19-mm) OR 1-inch (25-mm) OR 1-1/2-inch (38-mm) OR 4-inch (100-mm), as directed**, size.

- 1) Crush masonry and screen to comply with requirements in Division 31 Section "Earth Moving" for use as general fill **OR** satisfactory soil for fill or subbase, **as directed**.
 - 2) Crush masonry and screen to comply with requirements in Division 32 Section "Plants" for use as mineral mulch.
 - b. Clean and stack undamaged, whole masonry units on wood pallets.
 5. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
 6. Metals: Separate metals by type.
 - a. Structural Steel: Stack members according to size, type of member, and length.
 - b. Remove and dispose of bolts, nuts, washers, and other rough hardware.
 7. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
 8. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
 9. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
 - a. Separate suspension system, trim, and other metals from panels and tile and sort with other metals.
 10. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - a. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
 11. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
 12. Plumbing Fixtures: Separate by type and size.
 13. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
 14. Lighting Fixtures: Separate lamps by type and protect from breakage.
 15. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
 16. Conduit: Reduce conduit to straight lengths and store by type and size.
- E. Recycling Construction Waste
1. Packaging:
 - a. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 - b. Polystyrene Packaging: Separate and bag materials.
 - c. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 - d. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
 2. Site-Clearing Wastes: Chip brush, branches, and trees on-site **OR** at landfill facility, **as directed**.
 - a. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.
 3. Wood Materials:
 - a. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 - b. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - 1) Comply with requirements in Division 32 Section "Plants" for use of clean sawdust as organic mulch.
 4. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.
 - a. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - 1) Comply with requirements in Division 32 Section "Plants" for use of clean ground gypsum board as inorganic soil amendment.

F. Disposal Of Waste

1. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
 - a. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
2. Burning: Do not burn waste materials.
OR
Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
3. Disposal: Transport waste materials and dispose of at designated spoil areas on Owner's property.
OR
Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01 74 19 00

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Task	Specification	Specification Description
01 74 19 00	01 00 00 00	General Requirements
01 74 19 00	01 22 16 00	No Specification Required
01 74 23 00	01 00 00 00	General Requirements
01 95 00 00	01 00 00 00	General Requirements
01 95 01 00	01 00 00 00	General Requirements

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SECTION 01 95 06 00 - EXTERIOR FINISH CARPENTRY

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for exterior finish carpentry. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Exterior standing and running trim.
 - b. Lumber, Plywood, and Hardboard siding.
 - c. Plywood and Hardboard soffits.
 - d. Exterior stairs and railings.
 - e. Exterior ornamental wood columns.

C. Definitions

1. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association.
 - b. NLGA: National Lumber Grades Authority.
 - c. RIS: Redwood Inspection Service.
 - d. SPIB: The Southern Pine Inspection Bureau.
 - e. WCLIB: West Coast Lumber Inspection Bureau.
 - f. WWPA: Western Wood Products Association.

D. Submittals

1. Product Data: For each type of process and factory-fabricated product.
2. Samples: For each type of siding indicated.
3. LEED Submittal:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
4. Research/Evaluation Reports: For fire-retardant-treated wood.
5. Compliance Certificates:
 - a. For lumber that is not marked with grade stamp.
 - b. For preservative-treated wood that is not marked with treatment quality mark.
 - c. For fire-retardant-treated wood that is not marked with classification marking of testing and inspecting agency.
6. Warranties: Special warranties specified in this Section.

E. Quality Assurance

1. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - a. Exterior standing and running trim.
 - b. Exterior lumber, plywood, and hardboard siding.
 - c. Exterior plywood and hardboard soffits.
 - d. Exterior stairs and railings.
 - e. Exterior ornamental wood columns.

F. Delivery, Storage, And Handling

1. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.

G. Warranty

1. Special Warranty for Cellular PVC Trim: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace trim that fails due to defects in manufacturing within 25 years from date of Final Completion. Failures include, but are not limited to rotting, corrosion, delamination, and excessive swelling from moisture.
2. Special Warranty for Hardboard Siding and Trim: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace siding that fails in materials or workmanship within specified warranty period. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
 - a. Warranty Period for Factory-Applied Finish: Five years from date of Final Completion.
 - b. Warranty Period for Siding and Trim (Excluding Finish): 25 years from date of Final Completion.
3. Special Warranty for Columns: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace columns that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

A. Materials, General

1. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
2. Softwood Plywood: DOC PS 1.
3. Hardboard: AHA A135.4.

B. Wood-Preservative-Treated Materials

1. Water-Repellent Preservative Treatment by Nonpressure Process: AWPA N1 (dip, spray, flood, or vacuum-pressure treatment).
 - a. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC), combined with an insecticide containing chlorpyrifos (CPF).
 - b. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
 - c. Application: Items not required to be pressure-preservative treated.
 - d. Application: Exterior trim and wood siding.
2. Preservative Treatment by Pressure Process:
 - a. Lumber: AWPA C2 except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX). Kiln dry after treatment to a maximum moisture content of 19 percent.
 - b. Plywood: AWPA C9. Kiln dry after treatment to a maximum moisture content of 18 percent.
 - c. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - d. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
 - e. Do not use material that is warped or does not comply with requirements for untreated material.
 - f. Mark lumber with treatment quality mark of an inspection agency approved by ALSC's Board of Review.

- 1) For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - g. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
 - 1) For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
 - h. Application: Where indicated **OR** All exterior lumber and plywood, **as directed**.
- C. Fire-Retardant-Treated Materials
1. Lumber: Comply with performance requirements in AWPA C20, Exterior type. Kiln dry after treatment to a maximum moisture content of 19 percent.
 2. Plywood: Comply with performance requirements in AWPA C27, Exterior type. Kiln dry after treatment to a maximum moisture content of 15 percent.
 3. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants and provide materials that do not have marks from spacer sticks on the exposed face.
 4. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
 5. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 - b. For exposed plywood indicated to receive a stained or natural finish, mark back of each piece.
 6. Application: Where indicated **OR** All exterior lumber and plywood, **as directed**.
- D. Standing And Running Trim
1. Lumber Trim for Semitransparent-Stained Finish **OR** Clear Finish **OR** Unfinished Applications, **as directed**:
 - a. Species and Grade: Redwood, Clear All Heart **OR** Hart B **OR** Clear **OR** Grade B, **as directed**; RIS.
 - b. Species and Grade: Western red cedar, Clear Heart VG (Vertical Grain) **OR** Clear Heart **OR** Grade A **OR** Grade B, **as directed**; NLGA, WCLIB, or WWPA.
 - c. Species and Grade: Hem-fir, pressure-preservative treated; 1 **OR** 2, **as directed**, Common; NLGA, WCLIB, or WWPA.
 - d. Species and Grade: Southern pine, pressure-preservative treated; B & B **OR** C & Btr **OR** D, **as directed**; SPIB.
 - e. Maximum Moisture Content: 19 **OR** 15, **as directed**, percent with at least 85 percent of shipment at 12 percent or less, **as directed**.
 - f. Finger Jointing: Not allowed **OR** Allowed if made with wet-use adhesive complying with ASTM D 5572, **as directed**.
 - g. Face Surface: Surfaced (smooth) **OR** Saw textured, **as directed**.
 2. Lumber Trim for Opaque-Stained **OR** Painted, **as directed**, Finish:
 - a. Species and Grade: Redwood, Clear **OR** Grade B, **as directed**; RIS.
 - b. Species and Grade: Western red cedar, Grade A **OR** B, **as directed**; NLGA, WCLIB, or WWPA.
 - c. Species and Grade: Hem-fir, Prime or D finish **OR** 1 Common **OR** 2 Common, **as directed**; NLGA, WCLIB, or WWPA.
 - d. Species and Grade: Eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; D Select (Quality) **OR** Finish or 1 Common (Colonial) **OR** Premium or 2 Common (Sterling), **as directed**; NeLMA, NLGA, WCLIB, or WWPA.
 - e. Species and Grade: Northern white cedar, D Select **OR** 1 Common **OR** 2 Common, **as directed**; NeLMA or NLGA.

- f. Maximum Moisture Content: 19 **OR** 15, **as directed**, percent with at least 85 percent of shipment at 12 percent or less, **as directed**.
 - g. Finger Jointing: Not allowed **OR** Allowed if made with wet-use adhesive complying with ASTM D 5572, **as directed**.
 - h. Face Surface: Surfaced (smooth) **OR** Saw textured, **as directed**.
 - 3. Moldings for Semitransparent-Stained Finish **OR** Clear Finish **OR** Unfinished Applications, **as directed**: WMMPA WM 4, N-grade wood moldings, without finger jointing. Made from kiln-dried stock to patterns included in WMMPA WM 12.
 - a. Species: Redwood **OR** Western red cedar **OR** Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine, **as directed**.
 - b. Brick-Mold Pattern: WM 180, 1-1/4 by 2 inches (32 by 51 mm).
 - c. Drip-Cap Pattern: WM 197, 11/16 by 1-5/8 inches (17 by 41 mm).
 - d. Bed-Mold Pattern: WM 75, 9/16 by 1-5/8 inches (14 by 41 mm).
 - e. Screen-Bead Pattern: WM 144, 1/4 by 3/4 inch (6 by 19 mm).
 - 4. Moldings for Opaque-Stained **OR** Painted, **as directed**, Finish: WMMPA WM 4, P-grade wood moldings. Made from kiln-dried stock to patterns included in WMMPA WM 12.
 - a. Species: Redwood **OR** Western red cedar **OR** Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine, **as directed**.
 - b. Finger Jointing: Not allowed **OR** Allowed if made with wet-use adhesive complying with ASTM D 5572, **as directed**.
 - c. Brick-Mold Pattern: WM 180, 1-1/4 by 2 inches (32 by 51 mm).
 - d. Drip-Cap Pattern: WM 197, 11/16 by 1-5/8 inches (17 by 41 mm).
 - e. Bed-Mold Pattern: WM 75, 9/16 by 1-5/8 inches (14 by 41 mm).
 - f. Screen-Bead Pattern: WM 144, 1/4 by 3/4 inch (6 by 19 mm).
 - 5. MDO Trim: Exterior Grade B-B, MDO plywood.
 - 6. Cellular PVC Trim: Extruded, expanded PVC with a small-cell microstructure, made from UV- and heat-stabilized, rigid material.
 - a. Density: Not less than 31 lb/cu. ft. (500 kg/cu. m).
 - b. Heat Deflection Temperature: Not less than 130 deg F (54 deg C), per ASTM D 648.
 - c. Coefficient of Thermal Expansion: Not more than 4.5×10^{-5} inches/inch x deg F (8.1×10^{-5} mm/mm x deg C).
 - d. Water Absorption: Not more than 1 percent, per ASTM D 570.
 - e. Flame-Spread Index: 75 or less, per ASTM E 84.
 - 7. Foam Plastic Moldings: Molded product of shapes indicated, with a tough outer skin on exposed surfaces; factory primed. Exposed surfaces shall not be shaped after molding. Product is recommended by manufacturer for exterior use.
 - a. Density: Not less than 20 lb/cu. ft. (320 kg/cu. m).
 - b. Flame-Spread Index: Not more than 75 when tested according to ASTM E 84.
 - c. Thickness: Not more than 1/2 inch (12.7 mm).
 - d. Width: Not more than 8 inches (204 mm).
 - e. Patterns: As indicated by manufacturer's designations.
- E. Lumber Siding
- 1. Provide kiln-dried lumber siding complying with DOC PS 20, factory coated with exterior alkyd primer, **as directed**.
 - 2. Species and Grade:
 - a. Clear All Heart VG **OR** Clear All Heart **OR** Clear VG (Vertical Grain) **OR** Clear **OR** Grade B, **as directed**, redwood; RIS.
 - b. Clear VG (Vertical Grain) Heart **OR** Grade A **OR** Grade B, **as directed** western red cedar; NLGA, WCLIB, or WWPA.
 - c. Grade 1 **OR** 2, **as directed**, Common spruce-pine-fir; NeLMA, NLGA, WCLIB, or WWPA.
 - d. Grade Prime or D finish **OR** 1 Common **OR** 2 Common, **as directed**, pressure-preservative-treated hem-fir; NLGA, WCLIB, or WWPA.

- e. Grade D Select (Quality) **OR** Finish or 1 Common (Colonial) **OR** Premium or 2 Common (Sterling), **as directed**, eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; NeLMA, NLGA, WCLIB, or WWPA.
 - f. Grade D Select **OR** 1 Common **OR** 2 Common, **as directed**, northern white cedar; NeLMA or NLGA.
 - g. Grade B & B **OR** C & Btr **OR** D **OR** 1 Common **OR** 2 Common, **as directed**, pressure-preservative-treated southern pine; SPIB.
3. Pattern:
- a. Bevel siding, S1S2E, actual overall dimensions of **5-1/2 by 11/16 inch (140 by 17 mm) OR 5-1/2 by 3/4 inch (140 by 19 mm) OR 7-1/4 by 3/4 inch (184 by 19 mm) OR 9-1/4 by 3/4 inch (235 by 19 mm) OR 9-1/4 by 1-3/32 inches (235 by 28 mm)**, **as directed**, measured on the face and thick edge at 19 percent moisture content.
 - b. Drop siding, SPIB or WWPA pattern No. 105, actual face width (coverage) and thickness of **4-7/8 by 9/16 inch (124 by 14 mm) OR 4-7/8 by 23/32 inch (124 by 18 mm) OR 6-5/8 by 23/32 inch (168 by 18 mm) OR 8-5/8 by 23/32 inch (219 by 18 mm)**, **as directed**, measured at 19 percent moisture content.
 - c. V-edge, smooth-faced tongue-and-groove pattern with eased edges, actual face width (coverage) and thickness of **3-1/8 by 9/16 inch (79 by 14 mm) OR 3-1/8 by 23/32 inch (79 by 18 mm) OR 5-1/8 by 23/32 inch (130 by 18 mm) OR 6-7/8 by 23/32 inch (175 by 18 mm)**, **as directed**, measured at 19 percent moisture content.
- F. Plywood Siding
- 1. Plywood Type: APA-rated siding, pressure-preservative treated, **OR** factory coated with exterior acrylic latex stain, **as directed**, in panel sizes indicated.
 - a. Face Grade: 303-OC **OR** OL **OR** NR **OR** SR, **as directed**.
 - b. Face Grade: 303-6 **OR** 18 **OR** 30, **as directed-S OR W OR S/W**, **as directed**.
 - 2. Thickness: **11/32 inch (8.7 mm) OR 3/8 inch (9.5 mm) OR 15/32 inch (11.9 mm) OR 1/2 inch (12.7 mm) OR 19/32 inch (15.1 mm) OR 5/8 inch (15.9 mm) OR As indicated**, **as directed**.
 - 3. Face Species: Southern pine **OR** Douglas fir **OR** Western red cedar **OR** Redwood, **as directed**.
 - 4. Pattern: Plain **OR** Channel groove; grooves **4 inches (101.6 mm)** o.c. **OR** Texture 1-11; grooves **4 inches (101.6 mm)** o.c. **OR** Reverse board-and-batten; grooves **12 inches (304.8 mm)** o.c., **as directed**.
 - 5. Surface: Smooth **OR** Rough sawn, **as directed**.
- G. Hardboard Siding
- 1. Hardboard Siding: AHA A135.6, primed with manufacturer's standard exterior primer.
 - a. Type:
 - 1) **7/16-inch- (11-mm-) thick-by-6-inch- (152-mm-) OR 8-inch- (203-mm-)**, **as directed**, wide lap siding.
 - 2) **1/2-inch- (12.7-mm-) thick-by-8-inch- (203-mm-)** wide, beaded-edge lap siding.
 - 3) **7/16-inch- (11-mm-) thick**, shiplap-edge panels; with grooves **3-5/8 inches (92 mm)** o.c., simulating wood drop siding.
 - 4) **1/2-inch- (12.7-mm-) thick**, shiplap-edge panels; with grooves **5-1/2 inches (140 mm)** o.c., simulating wood drop siding.
 - 5) **7/16-inch- (11-mm-) thick**, square-edge flat panels; without grooves.
 - 6) **7/16-inch- (11-mm-) thick**, shiplap-edge panels; channel grooved with grooves **8 inches (203.2 mm)** o.c.
 - b. Texture: Smooth **OR** Wood grain **OR** Shingle **OR** Stucco, **as directed**.
 - 2. Primed Hardboard Trim: High-temperature-cured, high-resin, wood-fiber composite; factory primed on faces and edges. Recommended by manufacturer for exterior use.
 - 3. Colors, Textures, and Patterns: As selected by the Owner from manufacturer's full range.
- H. Plywood Soffits
- 1. Plywood Type: Exterior, Grade A-C **OR** Grade B-C **OR** Grade C-C, plugged and touch sanded **OR** APA-rated siding, **as directed**.
 - a. Face Grade: 303-OC **OR** OL **OR** NR **OR** SR, **as directed**.

01 - General Requirements



- b. Face Grade: 303-6 **OR** 18 **OR** 30, **as directed**, -S **OR** W **OR** S/W, **as directed**.
 2. Thickness: **11/32 inch (8.7 mm) OR 3/8 inch (9.5 mm) OR 15/32 inch (11.9 mm) OR 1/2 inch (12.7 mm) OR 19/32 inch (15.1 mm) OR** As indicated, **as directed**.
 3. Face Species: Southern pine **OR** Douglas fir **OR** Western red cedar **OR** Redwood, **as directed**.
 4. Pattern: Plain **OR** Channel groove; grooves **4 inches (101.6 mm)** o.c. **OR** Texture 1-11; grooves **4 inches (101.6 mm)** o.c., **as directed**.
 5. Surface: Smooth **OR** Rough sawn, **as directed**.
- I. Hardboard Soffits
1. Hardboard Soffits: Primed hardboard, complying with AHA A135.6, with manufacturer's standard exterior primer.
 - a. Type: **7/16-inch- (11-mm-) OR 1/2-inch- (12.7-mm-), as directed**, thick flat panels, smooth **OR** wood-grain textured **OR** stucco textured, **as directed**.
 2. Colors, Textures, and Patterns: As selected by the Owner from manufacturer's full range.
- J. Stairs And Railings
1. Stairs:
 - a. Treads: **1-1/4-inch (32-mm)** thick, kiln-dried, pressure-preservative-treated stepping with half-round or rounded edge nosing.
 - 1) Species and Grade: Douglas fir, C & Btr VG (Vertical Grain) stepping; NLGA, WCLIB, or WWPA **OR** Hem-fir, C & Btr VG (Vertical Grain) stepping; NLGA, WCLIB, or WWPA **OR** Southern pine, B & B stepping; SPIB, **as directed**.
 - b. Risers: **3/4-inch (19-mm)** thick, kiln-dried, pressure-preservative-treated finish boards.
 - 1) Species and Grade: Douglas fir, C & Btr or Superior finish; NLGA, WCLIB, or WWPA **OR** Hem-fir, C & Btr or Superior finish; NLGA, WCLIB, or WWPA **OR** Southern pine, B & B; SPIB, **as directed**
 2. Railings: Clear, kiln-dried, solid, yellow poplar **OR** pressure-preservative-treated Douglas fir **OR** pressure-preservative-treated southern pine, **as directed**; railing stock of pattern indicated.
 3. Balusters: **1-1/16-inch- (27-mm-)** square, clear, kiln-dried, solid, yellow poplar **OR** pressure-preservative-treated Douglas fir **OR** pressure-preservative-treated southern pine, **as directed**.
 4. Newel Posts: Clear, kiln-dried, yellow poplar **OR** pressure-preservative-treated, Douglas fir **OR** pressure-preservative-treated, southern pine, **as directed**, turned newel posts of pattern and size indicated.
 5. Newel Posts: **2-3/4-inch- (70-mm-)** square, clear, kiln-dried yellow poplar **OR** pressure-preservative-treated Douglas fir **OR** pressure-preservative-treated southern pine, **as directed**; either solid or laminated.
- K. Ornamental Wood Columns
1. Factory fabricate columns from clear stock, either solid or finger jointed, with a moisture content of not more than 15 **OR** 19, **as directed**, percent.
 - a. Wood Species: Redwood **OR** Western red cedar **OR** Eastern white, Idaho white, lodgepole, ponderosa, or sugar pine, **as directed**.
 2. Shafts: Built up from tongue-and-groove staves joined with waterproof glue. Lathe turn shafts to provide base diameter indicated and true architectural entasis taper. Precisely mill flutes as indicated.
 3. Capital and Base: Molded glass-fiber-reinforced plastic **OR** Built up from wood components with waterproof glue. Turn circular elements on lathes.
 4. Plinths: Cast-aluminum or molded glass-fiber-reinforced plastic, constructed to ventilate the interior of column shaft.
 5. Treatment and Finishing:
 - a. Treat wood columns with water-repellant preservative by nonpressure process.
 - b. Coat inside of column shafts with bituminous mastic.
 - c. Prime columns with two coats of exterior alkyd wood primer compatible with specified topcoats.

- L. Miscellaneous Materials
1. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than **1-1/2 inches (38 mm)** into wood substrate.
 - a. For face-fastening siding, provide ringed-shank siding nails unless hot-dip galvanized nails are used.
 - b. For redwood, provide brass/bronze **OR** stainless-steel **OR** hot-dip galvanized steel, **as directed**, fasteners.
 - c. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
 - d. For pressure-preservative-treated wood, provide stainless-steel **OR** hot-dip galvanized steel, **as directed**, fasteners.
 - e. For applications not otherwise indicated, provide stainless-steel **OR** hot-dip galvanized steel **OR** aluminum, **as directed**, fasteners.
 2. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.
 3. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.
 4. Flashing: Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim" for flashing materials installed in exterior finish carpentry.
 - a. Horizontal Joint Flashing for Panel Siding: Preformed, galvanized steel **OR** aluminum **OR** prefinished aluminum **OR** stainless-steel, **as directed**, Z-shaped flashing.
 5. Insect Screening for Soffit Vents: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh **OR** PVC-coated glass-fiber fabric, **18-by-14 (1.4-by-1.8-mm)** or **18-by-16 (1.4-by-1.6-mm)** mesh **OR** Stainless steel, **18-by-18 (1.4-by-1.4-mm)** mesh, **as directed**.
 6. Continuous Soffit Vents: Aluminum hat channel shape with stamped louvers **OR** perforations, **as directed**, **2 inches (51 mm)** wide, and in lengths not less than **96 inches (2438 mm)**.
 - a. Net Free Area: **4 sq. in./linear ft. (280 sq. cm/m)** **OR** **6 sq. in./linear ft. (420 sq. cm/m)** **OR** **8 sq. in./linear ft. (560 sq. cm/m)**, **as directed**.
 - b. Finish: Mill finish **OR** White paint **OR** Brown paint, **as directed**.
 7. Round Soffit Vents: Stamped aluminum louvered vents, **2 inches (51 mm)** **OR** **2-1/2 inches (64 mm)** **OR** **3 inches (76 mm)** **OR** **4 inches (102 mm)**, **as directed**, in diameter, made to be inserted into round holes cut into soffit.
 - a. Finish: Mill finish **OR** White paint **OR** Brown paint, **as directed**.
 8. Sealants: Latex, complying with ASTM C 834, Type P, Grade NF and with applicable requirements in Division 07 Section "Joint Sealants", recommended by sealant manufacturer and manufacturer of substrates for intended application.
- M. Fabrication
1. Back out or kerf backs of standing and running trim wider than **5 inches (125 mm)**, except members with ends exposed in finished work.
 2. Ease edges of lumber less than **1 inch (25 mm)** in nominal thickness to **1/16-inch (1.5-mm)** radius and edges of lumber **1 inch (25 mm)** or more in nominal thickness to **1/8-inch (3-mm)** radius.

1.3 EXECUTION

- A. Preparation
1. Clean substrates of projections and substances detrimental to application.
 2. Prime lumber to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 09 Section "Exterior Painting".
- B. Installation, General
1. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - a. Do not use manufactured units with defective surfaces, sizes, or patterns.
 2. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.

- a. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - b. Install to tolerance of **1/8 inch in 96 inches (3 mm in 2438 mm)** for level and plumb. Install adjoining exterior finish carpentry with **1/32-inch (0.8-mm)** maximum offset for flush installation and **1/16-inch (1.5-mm)** maximum offset for reveal installation.
 - c. Install stairs with no more than **3/16-inch (4.7-mm)** variation between adjacent treads and risers and with no more than **3/8-inch (9.5-mm)** variation between largest and smallest treads and risers within each flight.
 - d. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.
- C. Standing And Running Trim Installation
1. Install flat grain lumber with bark side exposed to weather.
 2. Install cellular PVC trim to comply with manufacturer's written instructions.
 3. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than **24 inches (610 mm)** long except where necessary.
 - a. Use scarf joints for end-to-end joints.
 - b. Stagger end joints in adjacent and related members.
 4. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
 5. Unless otherwise indicated, countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.
- D. Siding Installation
1. Install siding to comply with manufacturer's written instructions and warranty requirements.
 2. Horizontal Lumber Siding: Apply starter strip along bottom edge of sheathing or sill. Install first course of siding with lower edge at least **1/8 inch (3 mm)** below starter strip and subsequent courses lapped **1 inch (25 mm)** over course below. Nail at each stud. Do not allow nails to penetrate more than one thickness of siding.
 3. Diagonal Lumber Siding: Begin application at corner with tongue edge up. Install subsequent courses with tongue-and-groove edges tightly fitted together. Nail at each stud.
 - a. Leave **1/8-inch (3-mm)** gap at trim and corners unless otherwise recommended by manufacturer, and apply sealant.
 - b. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.
 - c. Install prefabricated outside corners as recommended by manufacturer of siding materials.
 4. Plywood Siding: Install panels with edges over framing or blocking. Nail at **6 inches (150 mm)** o.c. at panel perimeter and **12 inches (300 mm)** o.c. at intermediate supports unless manufacturer recommends closer spacing. Leave **1/16-inch (1.5-mm)** gap between adjacent panels and **1/8-inch (3-mm)** gap at perimeter, openings, and horizontal joints unless otherwise recommended by panel manufacturer.
 - a. Seal butt joints at inside and outside corners and at trim locations.
 - b. Install continuous metal flashing at horizontal panel joints.
 - c. Apply battens and corner trim as indicated. Countersink nail heads, fill flush, and sand filler.
 - d. Conceal fasteners to greatest practical extent by countersinking and filling, by placing in grooves of siding pattern or by concealing with applied trim or battens as detailed. Do not nail through overlapping pieces.
 5. Hardboard Siding: Install hardboard siding complying with AHA's "Recommended Basic Application and Painting Instructions for Hardboard Siding." Install panels with edges over framing or blocking. Leave **3/16-inch (5-mm)** gap at perimeter, openings, and horizontal panel joints unless otherwise recommended by panel manufacturer.
 - a. Seal butt joints at inside and outside corners and at trim locations.

- b. Install continuous metal flashing at horizontal panel joints.
 - c. Apply battens and corner trim as indicated.
 - d. Conceal fasteners to greatest practical extent by placing in grooves of siding pattern or by concealing with applied trim or battens as detailed.
6. Flashing: Install metal flashing as indicated on Drawings and as recommended by siding manufacturer.
 7. Finish: Apply finish within two weeks of installation.
- E. Stair And Railing Installation
1. Treads and Risers at Exterior Stairs: Secure treads and risers by gluing and nailing to carriages. Countersink nail heads, fill flush, and sand filler. Extend treads over carriages and finish with bullnose edge.
 2. Balusters: Fit balusters to treads, glue, and nail in place. Countersink nail heads, fill flush, and sand filler. Let into railings and glue in place.
 3. Newel Posts: Secure newel posts to stringers and risers with through bolts **OR** lag screws **OR** countersunk-head wood screws and glue, **as directed**.
 4. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts, and glue.
- F. Ornamental Column Installation
1. Install columns to comply with manufacturer's written instructions. Comply with requirements below unless manufacturer's written instructions state otherwise.
 2. Lay out column locations on soffits and beams and plumb down to locate column locations at supports.
 3. Set plinths in location, shim as required to temporarily level, and scribe and trim as required so that top of plinths will sit level without use of shims. Fasten plinths in place to support using pins or fasteners as recommended by manufacturer.
 4. Scribe and trim tops of columns to fit to soffits and beams. Maintain ventilation passages to interior of columns.
 5. Seal ends of columns with two coats of wood sealer or primer.
 6. Install column caps and flashing on columns and fasten to column. Install caps and flashing so that loads are not imposed on caps and so that ventilation of column interior is not blocked.
 7. Secure columns in place at top and bottom with fasteners recommended by manufacturer.
- G. Adjusting
1. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.
- H. Cleaning
1. Clean exterior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.
- I. Protection
1. Protect installed products from damage from weather and other causes during construction.
 2. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - a. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 01 95 06 00

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SECTION 01 95 06 00a - INTERIOR FINISH CARPENTRY

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for interior finish carpentry. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Interior standing and running trim.
 - b. Fire-rated interior door and sidelight frames.
 - c. Plywood, Hardboard, and Board paneling.
 - d. Shelving and clothes rods.
 - e. Interior stairs and railings.
 - f. Interior ornamental wood columns.

C. Definitions

1. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association.
 - b. NHLA: National Hardwood Lumber Association.
 - c. NLGA: National Lumber Grades Authority.
 - d. SPIB: The Southern Pine Inspection Bureau.
 - e. WCLIB: West Coast Lumber Inspection Bureau.
 - f. WWPA: Western Wood Products Association.
2. MDF: Medium-density fiberboard.
3. MDO Plywood: Plywood with a medium-density overlay on the face.

D. Submittals

1. Product Data: For each type of process and factory-fabricated product.
2. Samples: For each type of paneling indicated.
3. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives and glues used at Project site, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.
 - c. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
4. Research/Evaluation Reports: Showing that fire-retardant-treated wood complies with building code in effect for Project.
5. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - a. Interior standing and running trim.
 - b. Interior plywood, hardboard, and board paneling.
 - c. Shelving and clothes rods.
 - d. Interior stairs and railings.

e. Interior ornamental wood columns.

F. Delivery, Storage, And Handling

1. Protect materials against weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation within and around stacks and under temporary coverings.
2. Deliver interior finish carpentry materials only when environmental conditions meet requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions meet requirements specified for installation areas.

G. Warranty

1. Special Warranty for Columns: Manufacturer's standard form, signed by manufacturer, Installer, and Contractor, in which manufacturer agrees to repair or replace columns that fail in materials or workmanship five years from date of Final Completion.

1.2 PRODUCTS

A. Materials, General

1. Lumber: DOC PS 20 and applicable grading rules of inspection agencies certified by ALSC's Board of Review.
2. Softwood Plywood: DOC PS 1.
3. Hardboard: AHA A135.4.
4. MDF: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
5. Particleboard: ANSI A208.1, Grade M-2 **OR** M-2-Exterior Glue **OR** M-2, made with binder containing no urea-formaldehyde resin, **as directed**.
6. Melamine-Faced Particleboard: Particleboard complying with ANSI A208.1, Grade M-2, finished on both faces with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

B. Wood-Preservative-Treated Materials

1. Lumber: AWWA C2 **OR** AWWA C31 (treated with inorganic boron), **as directed**. Kiln dry after treatment to a maximum moisture content of 19 percent.
2. Plywood: AWWA C9. Kiln dry after treatment to a maximum moisture content of 18 percent.
3. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
4. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
5. Do not use material that is warped or does not comply with requirements for untreated material.
6. Mark lumber with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
7. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
8. Application: Where indicated.

C. Fire-Retardant-Treated Materials

1. Lumber: Comply with performance requirements in AWWA C20, Exterior type **OR** Interior Type A, **as directed**. Kiln dry after treatment to a maximum moisture content of 19 percent.
2. Plywood: Comply with performance requirements in AWWA C27, Exterior type **OR** Interior Type A, **as directed**. Kiln dry after treatment to a maximum moisture content of 15 percent.
3. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not contain colorants and provide materials that do not have marks from spacer sticks on the exposed face.

4. Do not use material that does not comply with requirements for untreated material or is warped or discolored.
5. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
6. Application: Where indicated **OR** All interior lumber and plywood, **as directed**.

D. Standing And Running Trim

1. Softwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - a. Species and Grade:
 - 1) Eastern white pine, C Select **OR** D Select **OR** Finish or 1 Common **OR** Premium or 2 Common, **as directed**; NeLMA or NLGA.
 - 2) Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice) **OR** D Select (Quality) **OR** 1 Common (Colonial) **OR** 2 Common (Sterling), **as directed**; NLGA or WWPA.
 - 3) Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice) **OR** D Select (Quality) **OR** Finish or 1 Common (Colonial) **OR** Premium or 2 Common (Sterling), **as directed**; NeLMA, NLGA, or WWPA.
 - 4) White woods, C Select **OR** D Select **OR** 1 Common **OR** 2 Common, **as directed**; WWPA.
 - 5) Douglas fir-larch or Douglas fir south, Superior or C & Btr **OR** Prime or D, **as directed**, finish; NLGA, WCLIB, or WWPA.
 - 6) Southern pine, B & B **OR** C & Btr, **as directed**, finish; SPIB.
 - 7) Western red cedar, Clear Heart **OR** Grade A **OR** Grade B, **as directed**; NLGA, WCLIB, or WWPA.
 - b. Maximum Moisture Content: 19 **OR** 15, **as directed**, percent with at least 85 percent of shipment at 12 percent or less, **as directed**.
 - c. Finger Jointing: Allowed **OR** Not allowed, **as directed**.
 - d. Face Surface: Surfaced (smooth) **OR** Saw textured, **as directed**.
2. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):
 - a. Species and Grade: Red oak **OR** White maple **OR** Alder **OR** Aspen, basswood, cottonwood, sap gum, sycamore, white maple, or yellow poplar, **as directed**; Clear **OR** A finish **OR** B finish, **as directed**; NHLA.
 - b. Maximum Moisture Content: 13 **OR** 10 **OR** 9, **as directed**, percent.
 - c. Finger Jointing: Not allowed.
 - d. Gluing for Width: Allowed **OR** Not allowed **OR** Use for lumber trim wider than 6 inches (150 mm), **as directed**.
 - e. Veneered Material: Allowed **OR** Not allowed **OR** Use for lumber trim wider than 6 inches (150 mm), **as directed**.
 - f. Face Surface: Surfaced (smooth) **OR** Saw textured, **as directed**.
 - g. Matching: Selected for compatible grain and color.
3. Lumber Trim for Opaque Finish (Painted):
 - a. Species and Grade:
 - 1) Eastern white pine, D Select **OR** Finish or 1 Common **OR** Premium or 2 Common, **as directed**; NeLMA or NLGA.
 - 2) Idaho white, lodgepole, ponderosa, radiata, or sugar pine; D Select (Quality) **OR** 1 Common (Colonial) **OR** 2 Common (Sterling), **as directed**; NLGA or WWPA.
 - 3) Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; D Select (Quality) **OR** Finish or 1 Common (Colonial) **OR** Premium or 2 Common (Sterling), **as directed**; NeLMA, NLGA, or WWPA.
 - 4) White woods, D Select **OR** 1 Common **OR** 2 Common, **as directed**; WWPA.
 - 5) Douglas fir-larch or Douglas fir south, Superior or C & Btr **OR** Prime or D, **as directed**, finish; NLGA, WCLIB, or WWPA.
 - 6) Spruce-pine-fir, 1 **OR** 2, **as directed**, Common; NeLMA, NLGA, WCLIB, or WWPA.
 - 7) Alder, aspen, basswood, cottonwood, gum, magnolia, soft maple, sycamore, tupelo, or yellow poplar; A **OR** B, **as directed**, finish; NHLA.

- b. Maximum Moisture Content: 19 **OR** 15, **as directed**, percent with at least 85 percent of shipment at 12 percent or less, **as directed**.
 - c. Finger Jointing: Allowed **OR** Not allowed, **as directed**.
 - d. Face Surface: Surfaced (smooth) **OR** Saw textured, **as directed**.
 - e. Optional Material: Primed MDF of same actual dimensions as lumber indicated may be used in lieu of lumber.
4. Softwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA WM 4, N-grade wood moldings. Made to patterns included in WMMPA WM 12.
- a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine **OR** Southern pine **OR** Western red cedar **OR** Douglas fir, **as directed**.
 - b. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 - c. Finger Jointing: Not allowed.
 - d. Matching: Selected for compatible grain and color.
 - e. Base Pattern: WM 623, 9/16-by-3-1/4-inch (14-by-83-mm) ogee **OR** WM 713, 9/16-by-3-1/4-inch (14-by-83-mm) ranch **OR** WM 753, 9/16-by-3-1/4-inch (14-by-83-mm) beaded-edge **OR** WM 620, 9/16-by-4-1/4-inch (14-by-108-mm) ogee **OR** WM 750, 9/16-by-4-1/4-inch (14-by-108-mm) beaded-edge, **as directed**, base.
 - f. Shoe-Mold Pattern: WM 129, 7/16-by-11/16-inch (11-by-17-mm) quarter-round **OR** WM 126, 1/2-by-3/4-inch (13-by-19-mm) quarter-round **OR** WM 131, 1/2-by-3/4-inch (13-by-19-mm) ogee, **as directed**, shoe mold.
 - g. Casing Pattern: WM 327, 11/16-by-2-1/4-inch (17-by-57-mm) clamshell **OR** WM 366, 11/16-by-2-1/4-inch (17-by-57-mm) featheredge **OR** WM 376, 11/16-by-2-1/4-inch (17-by-57-mm) beaded-edge, **as directed**, casing.
 - h. Mull-Casing Pattern: WM 957, 3/8-by-1-3/4-inch (9.5-by-44-mm) beaded-edge **OR** WM 973, 3/8-by-1-3/4-inch (9.5-by-44-mm) bullnose **OR** WM 983, 3/8-by-1-3/4-inch (9.5-by-44-mm) featheredge, **as directed**, casing.
 - i. Stop Pattern: WM 856, 3/8-by-1-3/8-inch (9.5-by-35-mm) ranch **OR** WM 946, 3/8-by-1-3/8-inch (9.5-by-35-mm) ogee **OR** WM 886, 3/8-by-1-3/8-inch (9.5-by-35-mm) bullnose, **as directed**, stop.
 - j. Chair-Rail Pattern: WM 297, 11/16-by-3-inch (17-by-76-mm) chair rail.
5. Hardwood Moldings for Transparent Finish (Stain or Clear Finish): WMMPA HWM 2, N-grade wood moldings made to patterns included in WMMPA HWM 1.
- a. Species: Red oak **OR** White maple **OR** Aspen, basswood, cottonwood, sap gum, sycamore, white maple, or yellow poplar, **as directed**.
 - b. Kiln-dried softwood or MDF, with exposed surfaces veneered with species indicated, may be used in lieu of solid wood.
 - c. Maximum Moisture Content: 9 percent.
 - d. Finger Jointing: Not allowed.
 - e. Matching: Selected for compatible grain and color.
 - f. Base Pattern: HWM 633, 7/16-by-3-1/4-inch (11-by-83-mm) ogee **OR** HWM 713, 7/16-by-3-1/4-inch (11-by-83-mm) ranch **OR** HWM 753, 7/16-by-3-1/4-inch (11-by-83-mm) beaded-edge **OR** WM 620, 7/16-by-4-1/4-inch (11-by-108-mm) ogee, **as directed**, base.
 - g. Shoe-Mold Pattern: HWM 129, 7/16-by-11/16-inch (11-by-17-mm) quarter-round **OR** HWM 126, 1/2-by-3/4-inch (13-by-19-mm) quarter-round **OR** HWM 131, 1/2-by-3/4-inch (13-by-19-mm) ogee, **as directed**, shoe mold.
 - h. Casing Pattern: HWM 328, 1/2-by-2-1/4-inch (13-by-57-mm) clamshell **OR** HWM 366, 1/2-by-2-1/4-inch (13-by-57-mm) featheredge **OR** HWM 376, 1/2-by-2-1/4-inch (13-by-57-mm) beaded-edge, **as directed**, casing.
 - i. Mull-Casing Pattern: HWM 989, 3/16-by-2-inch (5-by-51-mm) square-edge **OR** HWM 988, 3/8-by-1-1/2-inch (9.5-by-38-mm) featheredge **OR** HWM 987, 3/8-by-2-inch (9.5-by-51-mm) featheredge, **as directed**, casing.
 - j. Stop Pattern: HWM 856, 3/8-by-1-3/8-inch (9.5-by-35-mm) ranch **OR** HWM 946, 3/8-by-1-3/8-inch (9.5-by-35-mm) ogee **OR** HWM 886, 3/8-by-1-3/8-inch (9.5-by-35-mm) bullnose, **as directed**, stop.

- k. Chair-Rail Pattern: HWM 297, **11/16-by-3-inch (17-by-76-mm)** chair rail.
- 6. Moldings for Opaque Finish (Painted): Made to patterns included in WMMPA WM 12.
 - a. Softwood Moldings: WMMPA WM 4, P-grade.
 - 1) Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
 - 2) Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less.
 - b. Hardwood Moldings: WMMPA HWM 2, P-grade.
 - 1) Species: Aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar.
 - 2) Maximum Moisture Content: 9 percent.
 - c. Optional Material: Primed MDF.
 - d. Finger Jointing: Allowed **OR** Not allowed, **as directed**.
 - e. Base Pattern: WM 623, **9/16-by-3-1/4-inch (14-by-83-mm)** ogee **OR** WM 713, **9/16-by-3-1/4-inch (14-by-83-mm)** ranch **OR** WM 753, **9/16-by-3-1/4-inch (14-by-83-mm)** beaded-edge **OR** WM 620, **9/16-by-4-1/4-inch (14-by-108-mm)** ogee **OR** WM 750, **9/16-by-4-1/4-inch (14-by-108-mm)** beaded-edge, **as directed**, base.
 - f. Shoe-Mold Pattern: WM 129, **7/16-by-11/16-inch (11-by-17-mm)** quarter-round **OR** WM 126, **1/2-by-3/4-inch (13-by-19-mm)** quarter-round **OR** WM 131, **1/2-by-3/4-inch (13-by-19-mm)** ogee, **as directed**, shoe mold.
 - g. Casing Pattern: WM 327, **11/16-by-2-1/4-inch (17-by-57-mm)** clamshell **OR** WM 366, **11/16-by-2-1/4-inch (17-by-57-mm)** featheredge **OR** WM 376, **11/16-by-2-1/4-inch (17-by-57-mm)** beaded-edge, **as directed**, casing.
 - h. Mull-Casing Pattern: WM 957, **3/8-by-1-3/4-inch (9.5-by-44-mm)** beaded-edge **OR** WM 973, **3/8-by-1-3/4-inch (9.5-by-44-mm)** bullnose **OR** WM 983, **3/8-by-1-3/4-inch (9.5-by-44-mm)** featheredge, **as directed**, casing.
 - i. Stop Pattern: WM 856, **3/8-by-1-3/8-inch (9.5-by-35-mm)** ranch **OR** WM 946, **3/8-by-1-3/8-inch (9.5-by-35-mm)** ogee **OR** WM 886, **3/8-by-1-3/8-inch (9.5-by-35-mm)** bullnose, **as directed**, stop.
 - j. Chair-Rail Pattern: WM 297, **11/16-by-3-inch (17-by-76-mm)** chair rail.
- 7. PVC-Wrapped Moldings: WMMPA WM 2 and made to patterns included in WMMPA WM 12.
 - a. Base Pattern: WM 623, **9/16-by-3-1/4-inch (14-by-83-mm)** ogee **OR** WM 713, **9/16-by-3-1/4-inch (14-by-83-mm)** ranch, **as directed**, base.
 - b. Shoe-Mold Pattern: WM 129, **7/16-by-11/16-inch (11-by-17-mm)** quarter-round **OR** WM 126, **1/2-by-3/4-inch (13-by-19-mm)** quarter-round, **as directed**, shoe mold.
 - c. Casing Pattern: WM 327, **11/16-by-2-1/4-inch (17-by-57-mm)** featheredge, **as directed**, casing.
 - d. Mull-Casing Pattern: WM 973, **3/8-by-1-3/4-inch (9.5-by-44-mm)** bullnose **OR** WM 983, **3/8-by-1-3/4-inch (9.5-by-44-mm)** featheredge, **as directed**, casing.
 - e. Stop Pattern: WM 856, **3/8-by-1-3/8-inch (9.5-by-35-mm)** ranch **OR** WM 886, **3/8-by-1-3/8-inch (9.5-by-35-mm)** bullnose, **as directed**, stop.
 - f. Chair-Rail Pattern: WM 297, **11/16-by-3-inch (17-by-76-mm)** chair rail.
 - g. Colors, Textures, and Grain Patterns: As selected by the Owner from manufacturer's full range.
- 8. Foam Plastic Moldings: Molded product of shapes indicated, with a tough outer skin on exposed surfaces; factory primed. Exposed surfaces shall not be shaped after molding.
 - a. Density: Not less than **20 lb/cu. ft. (320 kg/cu. m)**.
 - b. Flame-Spread Index: Not more than 75 when tested according to ASTM E 84.
 - c. Thickness: Not more than **1/2 inch (12.7 mm)**.
 - d. Width: Not more than **8 inches (204 mm)**.
 - e. Patterns: As indicated by manufacturer's designations.
- E. Fire-Rated Interior Door And Sidelight Frames
 - 1. Frames, complete with casings, fabricated from fire-retardant particleboard or fire-retardant MDF with veneered exposed surfaces, or from solid fire-retardant-treated wood. Frames shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to

authorities having jurisdiction, based on testing according to NFPA 252 **OR** IBC Standard 703, **as directed**.

- a. Species: Red oak **OR** White oak **OR** White maple **OR** Cherry, **as directed**.
- b. Fire Rating: 20 minutes **OR** 30 minutes **OR** 45 minutes **OR** 60 minutes **OR** 90 minutes **OR** As indicated, **as directed**.

F. Paneling

1. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1, made without urea-formaldehyde adhesive.
 - a. Face Veneer Species and Cut: Rotary-cut white birch **OR** Plain-sliced red oak **OR** Plain-sliced hickory, **as directed**.
 - b. Veneer Matching: Random match **OR** Selected for similar color and grain, **as directed**.
 - c. Backing Veneer Species: Same species as face veneer **OR** Any hardwood compatible with face species, **as directed**.
 - d. Construction: Veneer core.
 - e. Thickness: **1/8 inch (3.2 mm) OR 5/32 inch (4 mm) OR 5 mm OR 1/4 inch (6.4 mm) OR 5/16 inch (7.9 mm) OR 7/16 inch (11 mm), as directed.**
 - f. Glue Bond: Type II (interior) **OR** I (exterior), **as directed**.
2. Hardboard Paneling: Interior factory-finished hardboard paneling complying with AHA 135.5.
 - a. Thickness: **1/8 inch (3.2 mm) OR 5/32 inch (4 mm) OR 1/4 inch (6.4 mm), as directed.**
 - b. Finish: Class I **OR** II, **as directed**.
 - c. Surface-Burning Characteristics: As follows, tested per ASTM E 84:
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 450 or less.
3. Board Paneling: Interior wood board paneling complying with WMMPA WM 9.
 - a. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine **OR** Southern pine **OR** Western red cedar **OR** Figured red gum, **as directed**.
 - b. Grade: Clear No. 1 **OR** Clear No. 2 **OR** Knotty No. 1 **OR** Knotty No. 2 **OR** Finger jointed, **as directed**.
 - c. Maximum Moisture Content: 15 percent with at least 85 percent of shipment at 12 percent or less **OR** 9 percent, **as directed**.
4. Board Paneling:
 - a. Species and Grade:
 - 1) Eastern white pine, C Select **OR** D Select **OR** Finish or 1 Common **OR** Premium or 2 Common, **as directed**; NeLMA or NLGA.
 - 2) Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice) **OR** D Select (Quality) **OR** 1 Common (Colonial) **OR** 2 Common (Sterling), **as directed**; NLGA or WWPA.
 - 3) Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice) **OR** D Select (Quality) **OR** Finish or 1 Common (Colonial) **OR** Premium or 2 Common (Sterling), **as directed**; NeLMA, NLGA, or WWPA.
 - 4) Southern pine, B & B **OR** C & Btr **OR** No. 2, **as directed**, Paneling; SPIB.
 - 5) Western red cedar, Clear Heart **OR** Grade A **OR** Grade B, **as directed**; NLGA, WCLIB, or WWPA.
 - b. Maximum Moisture Content: 19 **OR** 15, **as directed**, percent with at least 85 percent of shipment at 12 percent or less, **as directed**.

G. Shelving And Clothes Rods

1. Exposed **OR** Closet **OR** Utility, **as directed**, Shelving: Made from one of the following materials, **as directed**, **3/4 inch (19 mm)** thick. Do not use particleboard or MDF that contains urea formaldehyde.
 - a. Particleboard with radiused and filled **OR** solid-wood, **as directed**, front edge.
 - b. MDF with radiused **OR** solid-wood, **as directed**, front edge.
 - c. MDO softwood plywood with solid-wood edge.

- d. Melamine-faced particleboard with radiused and filled **OR** applied PVC, **as directed**, front edge.
 - e. Wood boards as specified above for lumber trim for opaque **OR** softwood lumber trim for transparent **OR** hardwood lumber trim for transparent, **as directed**, finish.
 - f. Softwood Boards: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine; C Select (Choice) **OR** D Select (Quality) **OR** Finish or 1 Common (Colonial) **OR** Premium or 2 Common (Sterling), **as directed**; NeLMA, NLGA, or WWPA; kiln dried.
 - g. Softwood Boards: Douglas fir-larch, Douglas fir south, or hem-fir; Superior or C & Btr **OR** Prime or D, **as directed**, finish; NLGA, WCLIB, or WWPA; or southern pine, B & B **OR** C, **as directed**, finish; SPIB; kiln dried.
2. Shelf Cleats: **3/4-by-3-1/2-inch (19-by-89-mm)** boards **OR** **3/4-by-5-1/2-inch (19-by-140-mm)** boards **OR** **3/4-by-5-1/2-inch (19-by-140-mm)** boards with hole and notch to receive clothes rods, **as directed**, as specified above for shelving **OR** lumber trim for opaque finish **OR** softwood lumber trim for transparent finish **OR** hardwood lumber trim for transparent finish, **as directed**.
 3. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.
 4. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.
 5. Standards for Adjustable Shelf Brackets: BHMA A156.9, B04102; powder-coat finished **OR** brass-finished **OR** zinc-plated, **as directed**, steel.
 6. Adjustable Shelf Brackets: BHMA A156.9, B04112; powder-coat finished steel **OR** brass-finished steel **OR** zinc-plated steel **OR** bronze-anodized aluminum **OR** black-anodized aluminum **OR** natural aluminum, **as directed**.
 7. Standards for Adjustable Shelf Supports: BHMA A156.9, B04071; powder-coat finished **OR** brass-finished **OR** zinc-plated, **as directed**, steel.
 8. Adjustable Shelf Supports: BHMA A156.9, B04081 or B04091; powder-coat finished **OR** brass-finished **OR** zinc-plated, **as directed**, steel.
 9. Clothes Rods: **1-1/2-inch- (38-mm-)** diameter, clear, kiln-dried hardwood **OR** clear, kiln-dried softwood; either Douglas fir or southern pine, **as directed**.
 10. Clothes Rods: **1-5/16-inch- (33-mm-)** diameter, aluminum tubes **OR** chrome-plated steel tubes **OR** chrome-plated steel telescoping tubes with end brackets for mounting on shelf cleats, **as directed**.
 11. Rod Flanges: Clear, kiln-dried, Douglas fir or southern pine **OR** eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine **OR** red oak **OR** white maple **OR** aspen, basswood, cottonwood, sap gum, white maple, or yellow poplar, **as directed**, turnings.
 12. Rod Flanges: Aluminum **OR** Chrome-plated steel **OR** Stainless steel, **as directed**.
- H. Stairs And Railings
1. Treads: **1-1/16-inch (27-mm)**, clear, kiln-dried, edge-glued, rift-sawn red oak **OR** red oak **OR** hard maple **OR** poplar, **as directed**, stepping with half-round nosing.
 2. Risers: **13/16-inch (21-mm)**, clear, kiln-dried, edge-glued red oak **OR** hard maple **OR** poplar, **as directed**, stock.
 3. Risers: **3/4-inch (19-mm)** finish boards as specified above for interior lumber trim for opaque finish.
 4. Finished Stringers: **3/4-inch (19-mm)** finish boards as specified above for interior lumber trim for opaque finish.
 5. Interior Railings: Clear, kiln-dried red oak **OR** hard maple **OR** yellow poplar, **as directed**.
 6. Balusters: Clear, kiln-dried, red oak **OR** hard maple **OR** yellow poplar, **as directed**.
 7. Newel Posts: Clear, kiln-dried, red oak **OR** hard maple **OR** yellow poplar, **as directed**.
 8. Factory fabricate columns for transparent finish from clear, kiln-dried eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine **OR** aspen, basswood, cottonwood, sap gum, white maple, or yellow poplar **OR** red oak **OR** white maple **OR** mahogany, **as directed**.
 9. Factory fabricate columns for opaque finish from clear, kiln-dried eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine **OR** aspen, basswood, cottonwood, sap gum, white maple, or yellow poplar, **as directed**. Column staves may be finger jointed.
 10. Shafts: Built up from tongue-and-groove staves joined with waterproof glue. Lathe turn shafts to provide indicated base diameter and true architectural entasis taper. Precisely mill flutes as indicated.

11. Capital and Base: Molded glass-fiber-reinforced plastic **OR** Built up from wood components with waterproof glue. Turn circular elements on lathes, **as directed**.
12. Prime columns for opaque finish with one coat of interior wood primer compatible with specified topcoats.

I. Miscellaneous Materials

1. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.
 - a. Where galvanized finish is indicated, provide fasteners and anchorages with hot-dip galvanized coating complying with ASTM A 153/A 153M.
2. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 - a. Use wood glue that has a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Installation Adhesive for Foam Plastic Moldings: Product recommended for indicated use by foam plastic molding manufacturer.
 - a. Use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
 - a. Use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
 - a. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

J. Fabrication

1. Back out or kerf backs of the following members except those with ends exposed in finished work:
 - a. Interior standing and running trim except shoe and crown molds.
 - b. Wood board paneling.
2. Ease edges of lumber less than **1 inch (25 mm)** in nominal thickness to **1/16-inch (1.5-mm)** radius and edges of lumber **1 inch (25 mm)** or more in nominal thickness to **1/8-inch (3-mm)** radius.

1.3 EXECUTION

A. Preparation

1. Clean substrates of projections and substances detrimental to application.
2. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

B. Installation, General

1. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - a. Do not use manufactured units with defective surfaces, sizes, or patterns.
2. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - a. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - b. Countersink fasteners, fill surface flush, and sand where face fastening is unavoidable.

- c. Install to tolerance of **1/8 inch in 96 inches (3 mm in 2438 mm)** for level and plumb. Install adjoining interior finish carpentry with **1/32-inch (0.8-mm)** maximum offset for flush installation and **1/16-inch (1.5-mm)** maximum offset for reveal installation.
 - d. Install stairs with no more than **3/16-inch (4.7-mm)** variation between adjacent treads and risers and with no more than **3/8-inch (9.5-mm)** variation between largest and smallest treads and risers within each flight.
 - e. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.
- C. Standing And Running Trim Installation
- 1. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than **24 inches (610 mm)** long, except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 - a. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 - b. Install trim after gypsum board joint finishing operations are completed.
 - c. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads on exposed carpentry work and fill holes.
- D. Paneling Installation
- 1. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels. Leave **1/4-inch (6-mm)** gap to be covered with trim at top, bottom, and openings. Install with uniform tight joints between panels.
 - a. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners. Space fasteners as recommended by panel manufacturer.
 - b. Conceal fasteners to greatest practical extent.
 - c. Arrange panels with grooves and joints over supports. Fasten to supports with nails of type and at spacing recommended by panel manufacturer. Use fasteners with prefinished heads matching groove color.
 - 2. Hardboard Paneling: Install according to manufacturer's written recommendations. Leave **1/4-inch (6-mm)** gap to be covered with trim at top, bottom, and openings. Butt adjacent panels with moderate contact. Use fasteners with prefinished heads matching paneling color.
 - a. Wood Stud or Furring Substrate: Install with **1-inch (25-mm)** annular-ring shank hardboard nails.
 - b. Plaster or Gypsum Board Substrate: Install with **1-5/8-inch (41-mm)** annular-ring shank hardboard nails.
 - c. Nailing: Space nails **4 inches (100 mm)** o.c. at panel perimeter and **8 inches (200 mm)** o.c. at intermediate supports unless otherwise required by manufacturer.
 - 3. Board Paneling: Install according to manufacturer's written instructions. Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.
 - a. Install in full lengths without end joints.
OR
Stagger end joints in random pattern to uniformly distribute joints on each wall.
 - b. Install with uniform end joints with only end-matched (tongue-and-groove) joints within each field of paneling.
OR
Install with uniform end joints. Locate end joints only over furring or blocking.
 - c. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards. Install with uniform tight joints between boards.
 - d. Fasten paneling by face nailing, setting nails, and filling over nail heads.
OR

Fasten paneling with trim screws, set below face and filled.

OR

Fasten paneling by blind nailing through tongues.

OR

Fasten paneling with paneling system manufacturer's concealed clips.

OR

Fasten paneling to gypsum wallboard with panel adhesive.

E. Shelving And Clothes Rod Installation

1. Cut shelf cleats at ends of shelves about **1/2 inch (13 mm)** less than width of shelves and sand exposed ends smooth.
2. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled. Space fasteners not more than **16 inches (400 mm)** o.c. Use 2 fasteners at each framing member or fastener location for cleats **4 inches nominal (89 mm actual)** in width and wider.
 - a. Apply a bead of multipurpose construction adhesive to back of shelf cleats right before installing. Remove adhesive that is squeezed out immediately after fastening shelf cleats in place.
3. Install shelf brackets according to manufacturer's written instructions, spaced not more than **36 inches (900 mm)** o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
4. Install standards for adjustable shelf supports according to manufacturer's written instructions. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Space fasteners not more than **12 inches (300 mm)** o.c.
5. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than **36 inches (900 mm)** o.c. and within **6 inches (150 mm)** of end of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
6. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.
 - a. Fasten shelves to cleats with finish nails or trim screws, set flush.
 - b. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.
7. Install rod flanges for rods as indicated. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Install rods in rod flanges.

F. Stair And Railing Installation

1. Treads and Risers at Interior Stairs: Secure treads and risers by gluing and nailing to rough carriages.
 - a. Closed Stringers: House treads and risers into wall stringers, glue, and wedge into place **OR** Cope wall stringers to fit tightly over treads and risers, **as directed**.
 - b. Open Stringers: Miter risers and stringer at open stringers. Extend tread over open stringers and finish with bullnose edge cut from tread stock and fitted to tread with mitered return at nosing.
2. Balusters: Dovetail or mortise balusters into treads, glue, and nail in place. Let into railings and glue in place.
3. Newel Posts: Secure newel posts to stringers, rough carriages, and risers with countersunk-head wood screws and glue.
4. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts, and glue. Assemble railings at goosenecks, easements, and splices with rail bolts and glue.

G. Ornamental Column Installation

1. Install columns to comply with manufacturer's written instructions. Comply with requirements below unless manufacturer's written instructions state otherwise.
2. Lay out column locations on ceiling and plumb down to locate column locations at floor.

3. Set plinths in location, shim to temporarily level, and scribe and trim as required so that tops of plinths will sit level without use of shims. Seal cut surfaces with wood sealer or primer and fasten plinths to floor using pins or fasteners as recommended by manufacturer.
 4. Set columns in location, shim as required to temporarily plumb, scribe and trim as required so that columns will sit plumb without shims.
 5. Scribe and trim tops of columns to fit to ceiling.
 6. Seal ends of columns with wood sealer or primer.
 7. Install column caps on columns and fasten to columns.
 8. Secure columns in place at top and bottom with fasteners recommended by manufacturer.
- H. Adjusting
1. Replace interior finish carpentry that is damaged or does not comply with requirements. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.
- I. Cleaning
1. Clean interior finish carpentry on exposed and semiexposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.
- J. Protection
1. Protect installed products from damage from weather and other causes during remainder of the construction period.
 2. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
 - a. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 01 95 06 00a

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SECTION 01 95 06 00b - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior standing and running trim.
2. Closet and utility shelving.
3. Interior frames and jambs.
4. Interior stairs and railings.
5. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
6. Shop priming of interior architectural woodwork.
7. Shop finishing of interior architectural woodwork.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.
2. Section 062023 "Interior Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.

1.2 COORDINATION

- ##### **A.**
- Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.3 PREINSTALLATION MEETINGS

- ##### **A.**
- Preinstallation Conference: Conduct conference at site location as directed by the Owner .

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Anchors.
2. Adhesives.
3. Shop finishing materials.
4. Wood-Preservative Treatment:
 - a. Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 - b. Indicate type of preservative used and net amount of preservative retained.
 - c. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's written warranty.

5. Fire-Retardant Treatment: Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
 6. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Sustainable Design Submittals:
1. as directed by the Owner.
- C. Shop Drawings:
1. Include the following:
 - a. Dimensioned plans, elevations, and sections.
 - b. Attachment details.
 2. Show **[large-scale]** **[full-size]** details.
 3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
 4. Apply **[AWI Quality Certification]** **[WI Certified Compliance]** Program label to Shop Drawings.
- D. Samples: For each exposed product and for each shop-applied color and finish specified.
1. Size:
 - a. Panel Products: **12 inches by 12 inches (300 mm by 300 mm)**.
 - b. Lumber Products: Not less than **[5 inches (125 mm) wide by 12 inches (300 mm) long]** **[5 inches (125 mm) wide by 24 inches (600 mm) long]**, for each species and cut, finished on one side and one edge.
- E. Samples for Initial Selection: For each type of shop-applied exposed finish.
1. Size:
 - a. Panel Products: **12 inches by 12 inches (300 mm by 300 mm)**.
 - b. Lumber Products: Not less than **[5 inches (125 mm) wide by 12 inches (300 mm) long]** **[5 inches (125 mm) wide by 24 inches (600 mm) long]**, for each species and cut, finished on one side and one edge.
- F. Samples for Verification: For the following:
1. Lumber for Transparent Finish: Not less than **[5 inches (125 mm) wide by 12 inches (300 mm) long]** **[5 inches (125 mm) wide by 24 inches (600 mm) long]**, for each species and cut, finished on one side and one edge.
 2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished interior architectural woodwork.
 3. Lumber and Panel Products with Shop-Applied Opaque Finish: **5 inches (125 mm) wide by 12 inches (300 mm) long** for lumber and **[8 by 10 inches (200 by 250 mm)]** **[12 by 12 inches (300 by 300 mm)]** for panels, for each finish system and color.
 - a. Finish **[entire]** **[one-half of]** exposed surface.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **[architectural woodwork manufacturer]** **[and]** **[Installer]**.
- B. Product Certificates: For the following:
 - 1. Composite wood products.
 - 2. Adhesives.
- C. Evaluation Reports: For **[preservative-treated]** **[and]** **[fire-retardant-treated]** wood materials, from ICC-ES.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: **[AWI Quality Certification Program]** **[WI Certified Compliance Program]** certificates.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in **[AWI's Quality Certification Program]** **[WI's Certified Compliance Program]**.
 - 2. Installer Qualifications: **[Manufacturer of products]** **[and]** **[Licensed participant in AWI's Quality Certification Program]** **[Licensed participant in WI's Certified Compliance Program]**.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups of **[typical interior architectural woodwork as shown on Drawings]** or as directed by the Owner .
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Architectural Woodwork Standards, Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
 - 1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.9 FIELD CONDITIONS

- A. Environmental Limitations without Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels designed for building occupants for the remainder of the construction period.
- B. Environmental Limitations with Humidity Control: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between **60 and 90 deg F (16 and 32 deg C)** and relative humidity between **[25 and 55] [43 and 70] [20 and 50]** percent or as directed by the Owner during the remainder of the construction period.
- C. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Frames: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
 - 1. Smoke- and Draft-Control Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.
- B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing in accordance with NFPA 257 or UL 9.

2.2 ARCHITECTURAL WOODWORK MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, as directed by the Owner .

2.3 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide **[labels]** **[and]** **[certificates]** from **[AWI]** **[WI]** certification program indicating that woodwork**[and installation]** complies with requirements of grades specified.
 - a. This project has been registered with AWI as AWI Quality Certification Program Number as directed by the Owner .
2. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: **[Premium]** **[Custom]** **[Economy]**.

B. Hardwood Lumber:

1. Wood Species and Cut:**[Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.]**
2. Species: **[Red oak]** **[White oak]** **[White ash]** **[Hickory]** or as directed by the Owner .
3. Cut: **[Plain sliced/plain sawn]** **[Rift cut/rift sawn]** **[Quarter cut/quarter sawn]**.
4. Wood Moisture Content: **[5 to 10]** **[8 to 13]** **[4 to 9]** percent.
5. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
6. For trim items**[other than base]** wider than available lumber, use veneered construction. Do not glue for width.
 - a. For veneered base, use hardwood lumber core, glued for width.
7. For base wider than available lumber, glue for width. Do not use veneered construction.
8. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.

C. Softwood Lumber:

1. Wood Species and Cut:**[Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.]**
2. Species: **[Eastern white pine]** **[Sugar pine]** **[Western white pine]** **[Douglas fir]** or as directed by the Owner .
3. Cut: **[Plain sawn]** or as directed by the Owner .
4. Wood Moisture Content: **[5 to 10]** **[8 to 13]** **[4 to 9]** percent.
5. Provide split species on trim that faces areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.
6. For trim items**[other than base]** wider than available lumber, use veneered construction. Do not glue for width.
 - a. For veneered base, use softwood lumber core, glued for width.
7. For base wider than available lumber, glue for width. Do not use veneered construction.
8. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.
9. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: **[Premium]** **[Custom]** **[Economy]**.
1. Wood Species: **[Any closed-grain hardwood]** **[Eastern white pine, sugar pine, or western white pine]** or as directed by the Owner .
 2. Wood Moisture Content: **[5 to 10]** **[8 to 13]** **[4 to 9]** percent.

2.6 CLOSET AND UTILITY SHELVING

- A. Architectural Woodwork Standards Grade: **[Premium]** **[Custom]** **[Economy]**.
- B. Shelf Material: **3/4-inch (19-mm)** **[solid lumber]** **[veneer-faced panel product with solid-lumber edge]** **[veneer-faced panel product with veneer edge banding]** **[thermoset decorative panel with solid-lumber edge]** **[thermoset decorative panel with PVC T-mold edge]** **[MDF with solid-lumber edge]** **[particleboard with solid-lumber edge]** **[MDF with radiused edge]** **[particleboard with radiused and filled edge]**.
- C. Cleats: **3/4-inch (19-mm)** **[solid lumber]** **[thermoset decorative panel]** **[panel product]**.
- D. Wood Species: **[Red oak]** **[Match species indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated]** **[Match species indicated for door to closet where shelving is located]** **[Any closed-grain hardwood]** **[Eastern white pine, sugar pine, or western white pine]** or as directed by the Owner .
- E. Wood Closet Rods: **1-1/2-inch- (38-mm-)** diameter, **[red oak]** **[hardwood]** **[Douglas fir or southern pine]** or as directed by the Owner .
- F. Metal Closet Rods: **1-5/16-inch- (33-mm-)** diameter, **[aluminum]** **[chrome-plated-steel]** **[color-coated-steel]** **[stainless steel]** tubes complying with BHMA A156.16, L03131.
- G. Wood Rod Flanges: Clear, kiln-dried, **[red oak]** **[hardwood]** **[Douglas fir or southern pine]** **[eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine]** or turnings as directed by the Owner .
- H. Metal Rod Flanges: **[Aluminum]** **[Chrome-plated steel]** **[Stainless steel]**.
- I. Wood Finish: **[Transparent]** **[Opaque]** **[As indicated on Drawings or in schedules]** or as directed by the Owner .

2.7 INTERIOR FRAMES AND JAMBS FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: **[Premium]** **[Custom]** **[Economy]**.
- B. Wood Species and Cut: **[Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.]**
1. Species: **[Red oak]** **[White oak]** **[White ash]** **[Hickory]** or as directed by the Owner .
 2. Cut: **[Plain sliced/plain sawn]** **[Rift cut/rift sawn]** **[Quarter cut/quarter sawn]**.
 3. Wood Moisture Content: **[5 to 10]** **[8 to 13]** **[4 to 9]** percent.
 4. Provide split species on frames and jambs that face areas with different wood species, matching each face of woodwork to species and cut of finish wood surfaces in areas finished.

- C. For frames or jambs wider than available lumber, use veneered construction. Do not glue for width.
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
- D. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard or fire-retardant MDF with veneered exposed surfaces and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing in accordance with NFPA 252.
 - 1. Fire Rating: 20 minutes.

2.8 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: **[Premium] [Custom] [Economy]**.
- B. Wood Species: **[Any closed-grain hardwood] [Eastern white pine, sugar pine, or western white pine]** or as directed by the Owner .
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
 - 2. Wood Moisture Content: **[5 to 10] [8 to 13] [4 to 9]** percent.
- C. Fire-Rated Interior Frames and Jambs: Products fabricated from fire-retardant particleboard with veneered exposed surfaces or fire-retardant MDF and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing in accordance with NFPA 252.
 - 1. Fire Rating: 20 minutes.

2.9 INTERIOR WOOD STAIRS AND RAILINGS

- A. Architectural Woodwork Standards Grade: **[Premium] [Custom] [Economy]**.
- B. Wood for Transparent Finish:
 - 1. Species and cut:
 - a. Stringers: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .
 - b. Risers: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .
 - c. Treads: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .
 - d. Railings: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .
 - e. Balusters: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .
 - f. Newels: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .
 - g. Moldings: **[Red oak, plain sawn] [Red oak, quarter sawn] [Hard maple, plain sawn]** or as directed by the Owner .

2. Wood Moisture Content: [5 to 10] [8 to 13] [4 to 9] percent.
- C. Wood for Opaque Finish:
1. Species: [Any closed-grain hardwood] [Eastern white pine, sugar pine, or western white pine] [Any closed-grain hardwood, except that eastern white pine, sugar pine, or western white pine may be used for risers, stringers, and moldings] or as directed by the Owner .
 2. Wood Moisture Content: [5 to 10] [8 to 13] [4 to 9] percent.
- D. Rough Carriage Stairs:
1. Laminated veneer lumber, made with an exterior-type adhesive complying with ASTM D2559, and with the following allowable design values as determined in accordance with ASTM D5456:
 - a. Extreme Fiber Stress in Bending, Edgewise: [3100 psi (21.3 MPa)] [2900 psi (20.0 MPa)] [2600 psi (17.9 MPa)] [2250 psi (15.5 MPa)] or as directed by the Owner for 12-inch nominal- (286-mm actual-) depth members.
 - b. Modulus of Elasticity, Edgewise: [2,000,000 psi (13 800 MPa)] [1,800,000 psi (12 400 MPa)] [1,500,000 psi (10 300 MPa)] or as directed by the Owner .
 2. [Select Structural] [No. 1] [No. 2] grade, kiln-dried to 15 percent maximum moisture content:
 - a. Acceptable Species:
 - 1) Hem-fir (north).
 - 2) Southern pine.
 - 3) Douglas fir-larch.
 - 4) Douglas fir-larch (north).
 - 5) Spruce-pine-fir.
 - 6) Hem-fir.
 - 7) Douglas fir-south.
 - 8) Spruce-pine-fir (south).
- E. Finishes for Stair Parts:
1. Treads: [Transparent] [Opaque].
 2. Risers: [Transparent] [Opaque].
 3. Stringers: [Transparent] [Opaque].
 4. Balusters: [Transparent] [Opaque].
 5. Handrails: [Transparent] [Opaque].
 6. Scotia, Cove, and Other Moldings: [Transparent] [Opaque].
- F. Handrail Brackets: [Cast nickel-silver] [Cast aluminum] [Cast bronze] [Cast stainless steel] with wall flange drilled [for exposed anchor] [and tapped for concealed hanger bolt] and with support arm for screwing to underside of rail. Size to provide 1-1/2-inch (38-mm) clearance between handrail and face of wall.
- G. Handrail/Bumper Rail Brackets: Pairs of extruded-aluminum channels: one for fastening to back of rail and one for fastening to face of wall, assembled in overlapping fashion and fastened together at top and bottom with self-tapping screws. Size to provide 1-1/2-inch (38-mm) clearance between handrail and wall.

2.10 HARDWOOD SHEET MATERIALS

- A. Composite Wood Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.
1. Medium-Density Fiberboard (MDF): ANSI A208.2, [**Grade 130**] or as directed by the Owner .
 2. Particleboard: ANSI A208.1, [**Grade M-2**] [**Grade M-2-Exterior Glue**].
 3. Softwood Plywood: DOC PS 1[, **medium-density overlay**].
 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.11 PRESERVATIVE-TREATED-WOOD MATERIALS

- A. Preservative-Treated-Wood Materials: Provide with water-repellent preservative treatment complying with AWWPA N1 (dip, spray, flood, or vacuum-pressure treatment).
1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC) [, **combined with a compatible EPA-registered insecticide**].
 2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- B. Extent of Preservative-Treated Wood Materials: Treat [**interior architectural woodwork in contact with concrete or masonry**] or as directed by the Owner .
1. Items fabricated from the following wood species need not be treated:
 - a. [**Redwood**] [**All-heart redwood**].
 - b. [**Western red cedar**] [**All-heart western red cedar**].
 - c. White oak.
 - d. African mahogany.
 - e. Honduras mahogany.
 - f. Ipe.
 - g. Dark red meranti.
 - h. Teak.

2.12 FIRE-RETARDANT-TREATED WOOD MATERIALS

- A. Fire-Retardant-Treated Wood Materials: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products in accordance with test method indicated by a qualified testing agency.
1. Use treated materials that comply with requirements of the Architectural Woodwork Standards. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84, with no evidence of significant progressive combustion when the

test is extended an additional 20 minutes, and with the flame front not extending more than **10.5 feet (3.2 m)** beyond the centerline of the burners at any time during the test.

1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. For items indicated to receive a stained, transparent, or natural finish, use organic resin chemical formulation.
3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
4. Mill lumber before treatment, and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

C. Fire-Retardant Particleboard: Made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less in accordance with ASTM E84.

1. For panels **3/4 inch (19 mm)** thick and less, comply with ANSI A208.1 for Grade M-2, except for the following minimum properties: modulus of rupture, **1600 psi (11 MPa)**; modulus of elasticity, **300,000 psi (2070 MPa)**; internal bond, **80 psi (550 kPa)**; and screw-holding capacity on face and edge, **250 and 225 lbf (1100 and 1000 N)**, respectively.
2. For panels **13/16 to 1-1/4 inches (20 to 32 mm)** thick, comply with ANSI A208.1 for Grade M-1, except for the following minimum properties: modulus of rupture, **1300 psi (9 MPa)**; modulus of elasticity, **250,000 psi (1720 MPa)**; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, **250 and 175 lbf (1100 and 780 N)**, respectively.

D. Fire-Retardant Fiberboard: Medium-density fiberboard (MDF) panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture, to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less in accordance with ASTM E84.

2.13 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Nailers: **[Softwood or hardwood lumber] [Fire-retardant-treated softwood lumber]**, kiln-dried to less than 15 percent moisture content.

1. Preservative Treatment: Provide softwood lumber treated by pressure process, AWPA U1; Use Category UC3b.
 - a. Provide **[where indicated] [where in contact with concrete or masonry]** or as directed by the Owner .
 - b. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - c. Preservative Chemicals: Acceptable to authorities having jurisdiction **[and containing no arsenic or chromium]**.
 - d. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.
2. Fire-Retardant Treatment: Complying with requirements; provide **[where indicated]** or as directed by the Owner .

B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.

- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 - 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
 - 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

- D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.14 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

- B. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.

- 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: **1/16 inch (1.5 mm)** unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than **3/4 Inch (19 mm)** Thick: **1/8 inch (3 mm)**.

- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.

- 1. Disassemble components only as necessary for shipment and installation.
- 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
- 3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
- 4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

- D. Stairs: Cut rough carriages to accurately fit treads and risers.

- 1. Glue treads to risers, and glue and nail treads and risers to carriages.
- 2. House **[wall] [and] [face]** stringers, and glue and wedge treads and risers.
- 3. Fabricate stairs with treads and risers no more than **1/8 inch (3 mm)** from indicated position and no more than **1/16 inch (1.5 mm)** out of relative position for adjacent treads and risers.

2.15 SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.

- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer as specified in Section 099123 "Interior Painting."

- 1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. **[Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.]**

- C. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing."
1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork. **[Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.]**

2.16 SHOP FINISHING

- A. Finish interior architectural woodwork **[with transparent finish] [indicated on Drawings]** at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with Architectural Woodwork Standards, Section 5 for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of interior architectural woodwork. Apply two coats to end-grain surfaces.
- C. Transparent Finish:
1. Architectural Woodwork Standards Grade: **[Premium] [Custom] [Economy] [Same as item to be finished]**.
 2. Finish System - 1: Lacquer, Nitrocellulose.
 3. Finish System - 2: Lacquer, Pre Catalyzed.
 4. Finish System - 3: Lacquer, Post Catalyzed.
 5. Finish System - 4: Latex Acrylic, Water Based.
 6. Finish System - 5: Varnish, Conversion.
 7. Finish System - 6: Oil, Synthetic Penetrating.
 8. Finish System - 7: Vinyl, Catalyzed.
 9. Finish System - 8: Acrylic Cross Linking, Water Based.
 10. Finish System - 9: UV Curable, Acrylated Epoxy, Polyester, or Urethane.
 11. Finish System - 10: UV Curable, Water Based.
 12. Finish System - 11: Polyurethane, Catalyzed.
 13. Finish System - 12: Polyurethane, Water Based.
 14. Finish System - 13: Polyester, Catalyzed.
 15. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
 16. Staining: **[None required] [Match approved sample for color] [Match Architect's sample]**.
 17. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 18. Filled Finish for Open-Grain Woods: **[After staining, apply wash-coat sealer and allow to dry.]** Apply paste wood filler and wipe off excess. Tint filler to match stained wood.
 19. Sheen: **[Flat, 8-14] [Satin, 15-25] [Satin Gloss, 26-49] [Semigloss, 50-70] [Gloss, 71-90]** gloss units measured on 60-degree gloss meter in accordance with ASTM D523.
- D. Opaque Finish:
1. Architectural Woodworking Standards Grade: **[Premium] [Custom] [Economy] [Same as item to be finished]**.
 2. Finish System - 1: Lacquer, Nitrocellulose.
 3. Finish System - 2: Lacquer, Pre Catalyzed.
 4. Finish System - 3: Lacquer, Post Catalyzed.
 5. Finish System - 4: Latex Acrylic, Water Based.

6. Finish System - 5: Varnish, Conversion.
7. Finish System - 7: Vinyl, Catalyzed.
8. Finish System - 8: Acrylic Cross Linking, Water Based.
9. Finish System - 9: UV Curable, Acrylated Epoxy, Polyester, or Urethane.
10. Finish System - 10: UV Curable, Water Based.
11. Finish System - 11: Polyurethane, Catalyzed.
12. Finish System - 12: Polyurethane, Water Based.
13. Finish System - 13: Polyester, Catalyzed.
14. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range].**
15. Sheen: **[Flat, 8-14] [Satin, 15-25] [Satin Gloss, 26-49] [Semigloss, 50-70] [Gloss, 71-90]** gloss units measured on 60-degree gloss meter in accordance with ASTM D523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 1. Shim as required with concealed shims.
 2. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes in accordance with AWP A M4.
- F. Fire-Retardant-Treated Wood: Install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- G. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 1. Secure with countersunk, concealed fasteners and blind nailing.
 2. Use fine finishing nails **[or finishing screws]** for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 3. For shop-finished items, use filler matching finish of items being installed.
- H. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than **[36 inches (900 mm)] [60 inches (1500 mm)] [96 inches (2400 mm)]** long, except where shorter single-length pieces are necessary.
3. Scarf running joints and stagger in adjacent and related members.
4. Fill gaps, if any, between top of base and wall with **[plastic wood filler; sand smooth; and finish same as wood base if finished] [latex sealant, painted to match wall]**.
5. Install standing and running trim with no more variation from a straight line than **1/8 inch in 96 inches (3 mm in 2400 mm)**.

I. Stairs: Securely anchor carriages to supporting substrates.

1. Install stairs with treads and risers no more than **1/8 inch (3 mm)** from indicated position.
2. Secure with countersunk, concealed fasteners and blind nailing.
3. Use fine finishing nails **[or finishing screws]** for exposed fastening, countersunk and filled flush with wood surface.

J. Railings:

1. Install rails with no more than **1/8 inch in 96-inch (3 mm in 2400-mm)** variation from a straight line.
2. Stair Rails: Glue and dowel or pin balusters to treads and railings, and railings to newel posts.
 - a. Secure with countersunk, concealed fasteners and blind nailing.
 - b. Use fine finishing nails **[or finishing screws]** for exposed fastening, countersunk and filled flush with wood surface.
3. Wall Rails: Support rails on wall brackets securely fastened to wall framing.
 - a. Space rail brackets not more than **Dimension** o.c. as directed by the Owner .

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through **[AWI's Quality Certification Program] [WI's Certified Compliance Program]** certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

1. Inspection entity is to prepare and submit report of inspection.

3.4 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects **[and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade]**.
- B. Where not possible to repair, replace defective woodwork.
- C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.
1. Fill nail holes with matching filler where exposed.
 2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

- D. Field Finish: See [**Section 099123 "Interior Painting"**] [and] [**Section 099300 "Staining and Transparent Finishing"**] for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.5 CLEANING

- A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 01 95 06 00b

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SECTION 01 95 06 00c - CASEWORK

PART 1 - GENERAL

1.01 SUMMARY:

A. Related Section:

1. Documents affecting Work of this Section include, but are not necessarily limited to the GENERAL CONDITIONS, and Sections in DIVISION 1 of these Specifications.

B. Section includes:

1. Special fabricated casework units.
2. Countertops.
3. Cabinet hardware.

C. Work Includes:

1. Furnish and install new kitchen and bathroom cabinetry with hinges and pulls.
2. Provide and install new plastic laminate countertops and backsplashes in kitchens and bathrooms.

1.02 REFERENCES:

A. Builders Hardware Manufacturing Association.

1. BHMA A156.9 – Cabinet Hardware.

B. Woodwork Institute of California (W.I.C.).

1. WIC – Manual of Millwork, Latest Edition.

C. National Electrical Manufacturers Association.

1. NEMA LD3 – High Pressure Decorative Laminates.

D. U.S. Department of Commerce – Product Standard.

1. PS 1 – Construction and Industrial Plywood.
2. PS 20 – American Softwood Lumber Standard.
3. PS 51 – American Hardwood and Decorative Plywood Standard.
4. PS 58 – American Basic Hardwood.

E. National Conference of Building Officials.

1. UBC – Chapter 16 Structural Forces.

F. American National Standards Institute.

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1. ANSI A135.4 – Hardboard.
2. ANSI A208.1 – Wood Particle Board.

G. South Coast Air Quality Management District.

1. SCAQMD – Rule 1113.

H. American Society for Testing and Materials.

1. ASTM D1037 – Evaluating the Properties of Wood-Base Fiber and Particle Panel

Materials.

1.03 SUBMITTALS:

A. Submit under provisions of Section 01300 and WIC Technical Bulletin 434.

B. Show Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location, and schedule of finishes based on contractor's field verified measurements.

1. Indicate grounds, backing, blocking and other items required for casework installation.

2. The first page of the Shop Drawings shall bear the WIC Certified Compliance Label.

Shop Drawings not complying with this requirement will be returned without approval. Costs of WIC approval(s) to be paid by Contractor.

3. A statement shall appear prominently on the Shop Drawings certifying that all casework construction complies to the structural requirements of UBC Table 16-0 for the required horizontal force factor for anchorage of non- structural components.

C. Submit three samples of each species of finish wood and specified countertop material for approval by the Owner prior to installation.

D. Submit three samples of drawer pulls, hinges and cabinet locks and latches illustrating hardware finish for approval by the Owner prior to installation.

1.04 QUALITY ASSURANCE:

A. Perform work in accordance with WIC Custom Grade.

B. Cabinets and countertops shall be manufactured in accordance with Section 14 and Section 16 of WIC for Type II Style A Frameless Construction or to higher standards as specified herein.

C. If the manufacturer is not a WIC Licensee, the Contractor shall furnish a Certificate of Reinspection by the WIC indicating that the work meets the requirements of the WIC grade specified.

D. If the manufacturer is a WIC licensee, each unit of work shall bear the WIC Certified Compliance grade stamp indicating the grade specified.

E. WIC Certified Compliance Certificates shall indicate that the products furnished fully meet the requirements for the grade specified.

F. One copy of the referenced "WIC Manual of Millwork" shall be made available for reference at the job site throughout the installation period.

G. Inspections by authorized WIC inspectors shall be made in accordance with the following schedule:

1. Site inspection immediately following completed installation of all casework components.
2. Additional site inspections may be required at the option of the Owner and at no cost or time to the Contract when certified WIC inspection reports indicate unsatisfactory conformance with WIC standards of quality and specified requirements.

1.05 QUALIFICATIONS:

A. Manufacturer and Installer: Company specializing in manufacturing the products specified in this section with minimum five years experience.

B. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.06 MOCKUP:

A. Provide complete mock-up units for each type of apartment unit including kitchen and bathroom cabinetry with specified countertop, hardware, plumbing fixtures and all associated work for approval by the Owner prior to installation.

B. Units will be examined to ascertain quality and conformity to WIC Quality level standards and specification requirements.

D. Approved mock-up units may remain and be installed as part of the Work.

1.07 DELIVERY, HANDLING

A. Deliver, store and handle casework products under the provisions STORAGE AND of WIC Manual Section 1.

B. Provide additional protection as needed to assure that the work of this Section remains undamaged during fabrication, installation, and the time between completion of installation and actual acceptance of the total Work.

C. Protect units from moisture damage prior to installation.

D. Use all means necessary to protect delivered units from possible damage from other trades, before, during, and after installation.

E. All casework units delivered to the job-site shall be properly identified as to the location in the structure.

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F. In the event of damage to the work of this Section, immediately make all necessary repairs and replacement.

1.08 FIELD AND JOB SITE CONDITIONS:

A. Verify that field measurements and conditions are as indicated on MEASUREMENTS Shop Drawings.

B. Report discrepancies to Owner.

1.09 COORDINATION:

A. Coordinate the work with plumbing and electrical rough-in.

B. Coordinate rough-in for items installed through or in millwork and trim. Locate rough-ins for proper alignment with edges, faces and reveals.

1.10 ENVIRONMENTAL

A. Condition interior casework and trim products to building REQUIREMENTS: environment. Maintain temperature and humidity at complete Work and accordance with requirements for storage.

B. Do not install casework and trim until required temperature and relative humidity conditions have been stabilized and will be maintained in installation areas.

PART 2 - PRODUCTS

2.01 WOOD

A. Softwood Lumber: PS 20; graded in accordance with WIC MATERIALS: Custom Grade.

1. Moisture content shall be a minimum of 6 percent and shall not exceed 12 percent up to 2 inch nominal thickness and shall not exceed 19 percent for pieces thicker than 2 inches up to 4 inch nominal thickness.

2. Provide solid stock lumber at all locations except where other material is specified or is called for on the Drawings.

B. Hardwood Lumber: PS 58; graded in accordance with WIC Custom Grade.

1. Moisture content shall be a minimum of 6 percent and shall not exceed 12 percent up to 2 inch nominal thickness and shall not exceed 19 percent for members thicker than 2 inches up to 4 inch nominal thickness.

2. Provide solid stock capable of receiving transparent finish, with grain and uniform color matching the adjacent work.

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2.02 SHEET MATERIALS:

A. Face Material of Softwood Plywood: PS 1; graded in accordance with WIC Custom Grade, Grade A for opaque and transparent finish, core materials as specified herein.

B. Face Material of Hardwood Plywood: PS 51; graded in accordance with WIC Custom Grade, Grade B for opaque finish, Grade AA for transparent finish, core materials as specified herein, type of glue recommended for application, face veneer and types of veneer cuts as selected by Owner.

C. Core, one of the following:

1. Veneer Core: Constructed of an odd number of plies, with inner plies in pairs, except innermost ply. Grain of each ply shall be at right angles to the grain of the adjacent ply.

2.03 LAMINATE MATERIALS:

A. Plastic Laminate: NEMA LD3; decorative high pressure laminate, general purpose type. Comply with Section 16 of WIC, color, (BATHROOM AND pattern, gloss and surface texture to be selected by Owner.

KITCHEN Minimum required thicknesses:

1. Countertops: 0.050 inch
2. Vertical post forming: 0.030 inch
3. Horizontal surfaces other than countertops: 0.040 inch
4. Self-edge bands: 0.028 inch
5. Cabinet liners: 0.020 inch
6. Backing sheets: 0.020 inch

B. Laminate Backing Sheet: NEMA LD-3; backing grade, undecorated plastic laminate, for backing at countertops and other concealed locations.

C. Acceptable manufacturers: Formica, Wilsonart, and Nevamar. .

2.04 ACCESSORIES:

A. Adhesive: Urea-formaldehyde resin, cold setting, or phenol type with catalytic agent set under a pressure of not less than 30 lbs psi.

1. Adhesives shall comply with SCAQMD Rule 1113.
2. Alternate glues must be approved by the WIC standards.
3. No contact cement is allowed.

B. Anchors: Select materials, type, and size and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.

1. Anchors: Select material, type, and size and finish required by each substrate for secure anchorage. Provide non-ferrous metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.

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C. Fasteners: Size and type to suit application. Material, color and finish shall be same as metal to which applied, except use only stainless steel at aluminum materials and use cadmium plated at interior pre-painted steel products.

D. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; white metal finish in all locations.

E. Nails: Select material, type, size and finish required for each use.

F. Concealed Joint Fasteners: Threaded steel.

2.05 HARDWARE:

A. Hardware: BHMA A156.9. Comply with Supplement No. 1 to Section 14 and 15, WIC. Any hardware listed therein may be installed, except where these standards are exceeded as described below:

B. Hinges:

1. On doors between 40 inches and 60 inches in height, provide three hinges. On doors 60 inches and taller, provide 4 hinges.

a. Blum min 110 degree opening concealed, self closing B95m365.

b. Blum Compact 33 face frame hinge 110 degree opening B33.360 with 133.2 wrap around plate.

c. Door and drawer pulls:

1. Stanley #4484 Aluminum.

D. Drawer guides, full extension:

1. Typical Drawers, 100 lb capacity rated:

a. KV#1429.

b. Blum B430E.

E. Adjustable shelf standards:

1. AM #231.100.068 and #207.100.068.

2. Grant #120 aluminum.

3. KDV #255, zinc/steel or aluminum.

4. KDV #255, zinc/steel or aluminum.

The above listed hardware is available from Louis and Company — Brea, California. Telephone # (714) 529-1771.

Note: Contractor will be responsible for coordinating correct model numbers with existing conditions on partial work. If the described

hardware listed above does not meet the job conditions notify Owner before proceeding.

2.06 HARDWARE FINISH

- A. All concealed hardware: Polished or satin chrome or stainless steel.

2.07 FABRICATION — WOOD CASEWORK

A. Casework Components:

1. Construction: Custom grade, style A, frameless, construction Type II, in accordance with WIC Section 14 .
 - a. Upper wall cabinet depth: 13 inches (inside clearance min 11~"), typically excluding door and drawer front thicknesses. Height: 30 inches (typical). Match existing configurations .
 - b. Base cabinet height: Including countertop 36 inches (34"max. for handicap), typically. Depth: 24 inches, including door and drawer front thicknesses. Match existing configurations.
 - c. Countertop overhang: Provide 3/4 inch overhang on sides and front.
 - d. Shelves: Unless otherwise indicated, wall and base cabinets shall have two adjustable shelves.
 - e. Toe-kicks: Separate base unit for casework, 4 inches high by 3 inches deep at front and 4 inches high by 3/4 inch deep at exposed ends.
 - f. The amount of face frame that is exposed will be a consistent dimension, both horizontally and vertically.
 2. Use solid stock for frames, jambs, heads, stops, mounting strips and edges.
 - a. Provide minimum two mounting strips, 1/2 inch by 2 1/2 inch by 2 1/2 inches, at top and bottom of each case. Provide intermediate mounting strip at middle of casework 60 inches high or higher.
 3. Use plywood core material for body construction of cabinets where members are more than 11 inches wide.
- B. Backs: 1/4 inch thick hardboard, dadoed into top rail, sides and bottom of cabinet.
1. Accurately fit and align the separate parts.
 2. Provide ample screw, glue-and-bolt blocks, draw-bolts, tongues, grooves, splines, dowels, tenons, mortises, and other means of fastening to render the work substantial, rigid, and permanently secured in the proper position.
 3. Provide sufficient additional material to permit scribing to walls, floors, and related work.
 4. Provide adequate allowance for shrinkage occurring after installation.
- C. Drawers: 3/4 inch thick maple plywood, seven ply plywood Grade B with banding on all 4 edges, 1/2 inch thick sides, backs and sub- fronts, and 1/4 inch thick bottoms.

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1. Provide slip dovetail construction, well glued, or other joinery type of lock joint consistent with specified grade of casework.
 2. Provide full extension slides at all drawers.
- D. Doors: $\frac{1}{2}$ inch thick maple plywood, with all four edges edge-banded. Face pattern shall be continuous with drawer fronts and trim.
1. Provide rubber stops at ends and backs of doors.
 2. Fit and adjust as necessary to achieve smooth and noiseless operation.
 3. The reveal dimension will be consistent across the cabinet elevation. The doors and drawer faces shall align.
- E. When necessary to cut and fit on site, provide materials with ample allowance for cutting.
1. Assemble with bolted and screwed connections, securing to structural backings with cinch anchors, expansion screws, or toggle bolts.
 2. Mortise-and-tenon all rails and stiles, neatly miter and member throughout, make butt joints flush and smooth, and make up permanent joints with water resistant glue.
 3. Assemble fixtures without exposed face nails or face screws.
- F. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, fixtures and fittings. Verify locations of cutouts from on-site dimensions. Prime paint contact surfaces of cut edges.
- G. Rout, drill, and otherwise prepare the surfaces as needed, and firmly install all finish hardware and accessories in accordance with the approved design and the manufacturers' recommendations.
- H. Adjustable Shelves: Plywood or solid stock, support shelves on vertical metal shelf standards, recessed-mounted on sides of cabinet, spaced not more than 2 inches from front and back, provided with shelf clips which lock into standards with thumb-press.
1. Provide adjustable shelves supported by metal shelf rests inserted into vertical rows of cleanly-bored holes in cabinet sides, not exceeding 2 inches oc. Locate rows between 1 1/2 and 2 inches from front and back faces of cabinet body. Row size, spacing and location shall be identical throughout all casework units.
- I. Closures: Minimum 1 inch and maximum 2 inches wide, scribed to wall. Close all gaps at face, bottom and top of cabinets. Provide closure at all cabinet sides abutting walls, to ensure clearance for door to swing open fully.
- J. Finishes: (Refer to WIC Section 5, for both shop and field applied millwork finishes).
1. Before finishing, all exposed portions of millwork shall have handling marks or effects of exposure to moisture removed with a thorough, final sanding over all surfaces to exposed portions, using at least 150 grit or fine sandpaper, and shall be cleaned before applying finish. Finishes shall be applied in factory or shop for all new casework.

2. Exposed portions of new and existing plywood cabinets, including inside faces of all doors, door edges and exposed edges shall receive 3 coats of clear lacquer semigloss finish.
3. Interior and exterior of all cases, drawers, shelves and doors to be provided with 3 coats of lacquer.
4. Provide samples to Owner for approval prior to finishing.

2.08 FABRICATION — COUNTERTOPS:

- A. Provide WIC Custom Grade at all locations.
- B. Provide plastic laminate over medium density fiberboard core (MDF), 3/4 inch thick at all countertops.
- C. Locate counter butt joints minimum 24 inches from sink cut-outs.
- D. Countertops shall extend 3/4 inch beyond faces of doors and drawer fronts along the front face of base cabinets and 3/4 inch beyond the exposed ends of base cabinets, where not abutting walls.
- E. Unless indicated otherwise on the Drawings, back and side splashes shall be 4 inches high.
- F. Provide support from below countertop, either by base cabinets or corbels spaced so that unsupported length does not exceed 36 inches.
- G. Countertop Edges:
 1. Front Edge, Countertops: No-drip bullnose.
 2. Backsplash, Countertops: Integral coved, postformed.
 3. Backsplash, Top Edge: 1/2" radius.
 4. Sidesplash, Top Edge: 1/2" radius.
- I. Finish edges and ends adjacent to ranges.

3.01 EXAMINATION:

- A. Verify adequacy of backing and support framing.

3.02 INSTALLATION:

- A. Set and secure casework in place; rigid, plumb, and level. Secure casework to walls or floors or both. Install toe kick bases first and level before setting casework bodies. Secure to floor structure with appropriate angles and anchors, concealed.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. All joint fasteners to align and secure adjoining cabinet units and counter tops. Use threaded steel fasteners where possible.

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- D. Carefully scribe casework abutting other components, with maximum gaps of 1/16 inch. Do not use additional overlay trim for this purpose.
- E. Attach plastic laminate-covered countertops with concealed screws or other approved mechanical fasteners. Do not use adhesive. Finish cut-edges at sink cut-outs with one coat of oil- based wood primer.
- F. Countersink anchorage devices at any exposed locations. In locations here plastic laminate is not applied, conceal anchorage devices with solid wood plugs of species to match surrounding wood. Finish flush with surrounding surfaces.

3.03 ADJUSTING:

- A. Countersink anchorage devices at any exposed locations. In locations here plastic laminate is not applied, conceal anchorage devices with solid wood plugs of species to match surrounding wood. Finish flush with surrounding surfaces.
- B. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly and correctly, without binding or squeaking.

3.04 CLEANING:

- A. Perform cleaning operations under provisions of Section 01710.
- B. Visually inspect each installed casework unit and countertop and thoroughly clean all surfaces using the cleaning material recommended by the manufacturer of the finish being cleaned and carefully adjust all operating components for optimum operation after the cleaning operation.
- C. Remove all rubbish, debris, tools and equipment and leave the immediate work areas and casework units and countertops in a clean and acceptable.

3.05 FIELD INSPECTIONS:

- A. Contractor shall schedule and request field inspection of completed installation, as required herein, by WIC, and in accordance with WIC Reinspection Service Program.
- B. All fees, if any, for WIC field inspection shall be included in the work of this Section.

END OF SECTION 01 95 06 00c

Task	Specification	Specification Description
01 95 06 00	01 00 00 00	General Requirements
01 95 06 00	01 22 16 00	No Specification Required
01 95 06 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 01 95 07 00 - TEMPORARY ROOF COVER

***Prior to the start of any roof work, Contractor shall provide Owner with a written plan describing how the roof will be protected against weather (e.g. rain, winds, etc.) at all times during the course of the work or project. This plan shall identify all materials and details and description of how the roof will be protected. The Owner or its Representative must review and approve the plan before work commences. However, the Owner shall not be responsible for the effectiveness of the plan as that remains the sole responsibility of the Contractor.*

A. GENERAL PROVISIONS

1. Contractor acknowledges that the project sites are located at the County of Los Angeles.
2. Contractor and owner's representative will communicate or meet weekly to anticipate upcoming weather conditions. If a high chance of precipitation (50% or more) is forecast work should be delayed. At all other times these procedures shall be followed.
3. No greater area of roof shall be removed than can be covered by new roof in a single day by the Contractor's employees and equipment. Contractor and owner's representative will agree to a maximum removal area based on crew size beforehand.
4. Contractor shall monitor weather conditions at project site. No roof demolition may be performed if the forecast calls for a 50% or more chance of rain, or other unsafe weather conditions, in the following 24 hours.
5. An adequate amount of materials (tarps, screws, etc.) shall be kept on site at all times to cover the exposed roof area.
6. Contractor shall have a written procedure in place for covering an exposed roof area in the event of unexpected rain or other unsafe conditions.
7. Owner and Contractor will inspect the site at the end of each business day to ensure all exposed roof areas are protected from water intrusion (watertight). All removed roof sheathing shall be replaced on the day it is removed. Roof penetrations such as roof ventilators, plumbing pipes, exhaust fans and combustion vent pipes will be watertight at the end of each day.
8. No alterations or substitutions are allowed without approval through a written submittal.
9. Contractor shall not be entitled to recover from Owner any additional compensation or damages resulting from any delay or disruption to the workflow, whether caused in whole or in part by acts of God, weather conditions, or material supply shortage. Contractor's sole remedy for such delay shall be an extension of time to perform, which must be requested in writing by Contractor and approved, in writing, by Owner.
10. Contractor shall store all material and debris in a location approved by Owner, and where it will not impede the activities of tenants. The storage of materials, equipment, or debris in locations usually occupied by tenants must be properly barricaded with warning tape and/or other appropriate protections to prevent injury to others.
11. Contractor will not disrupt, alter, remove, block, or make less effective any/all conveyances of drainage water on the building or the site.
12. Should any problems arise during operations, please contact Owner's Project Manager at the main office. The office phone number is (626) 262-4511

B. APPLICATION OF TARPS

1. Materials to be used to cover the exposed roof, including, but not limited to:
 - a. Roof tarps of woven polyethylene, 5 mil minimum thickness or Visqueen of 10 mil minimum thickness, that must be 100% waterproof, all weather resistant, meet ASTM E84 Class A rated fire and smoke requirements, meet ASTM D7238-06 for ultraviolet resistance of 80% at 200 hours and be mildew resistant, tear resistant and acid resistant.
 - b. 1x2 wood slats.
 - c. 2" deck screws with 1½" diameter washers.
 - d. Sandbags, ropes, etc.
 - e. 3" double-sided tarp tape (adheres to specific roof material without damage when removed).
 - f. 3" Duct tape or other adhesive compatible with the roof and cover materials.
2. All exposed roof areas shall be covered at the end of each working day. Employees shall include adequate time to cover exposed roof areas during allowed working hours.
3. Exposed roof areas shall be cleaned of all construction debris prior to installation of temporary roof cover.
4. No screws or penetrating fasteners shall be installed into new roofing. These areas shall be secured by sandbags, ropes, or other non-intrusive methods.
5. Roof openings shall be identified (for equipment, etc.) and marked with paint on the tarps to warn of hazards, and temporary barricades installed to prevent injury.
6. Existing roof penetrations such as pipes, vents, etc., shall not be covered. Tarps shall be cut around the penetration and sealed by approved double-sided tape. Additional duct type tape shall be added to adhere the cover material to the penetrating item.
7. All roof cover scraps such as tarps, battens, etc., shall be collected and placed with other construction waste.
8. Contractor is to provide all safety measures for employees and tenants.
9. Products of demolition shall be removed at the end of each day or stored on or near the site in an appropriate roll-off trash bin. Location to be approved by Owner.

C. LOW SLOPE (FLAT, TPO, BUR) PERFORMANCE PROCEDURES AND INSTALLATION

1. All exposed roof areas shall be covered at the end of each working day. Employees shall include adequate time to cover exposed roof area during allowed working hours.
2. Exposed roof areas shall be cleaned of all construction debris prior to installation of temporary roof cover.
3. Tarps shall be installed a minimum of 2' over a ridge or parapet, where applicable. No fasteners shall be used in parapets, flashings, sheet metal, etc. Tarps shall overlap adjacent new or old roof areas by a minimum of 3'.

4. No screws or penetrating fasteners shall be installed on new roofing. These areas shall be secured by sandbags, ropes, or other non-intrusive methods.
5. Roof openings shall be identified (for equipment, etc.) and marked with paint on the tarps to warn of hazards, and temporary barricades installed to prevent injury.
6. Existing roof penetrations such as pipes, vents, etc., shall not be covered. Tarps shall be cut around the penetration and sealed by approved double-sided tape. Additional duct type tape shall be added to adhere the cover material to the penetrating item.
7. All roof cover scraps such as tarps, battens, etc., shall be collected and placed with other construction waste.
8. Battens and/or sandbags shall be positioned to direct water to roof drains.
9. Cover material shall be terminated at roof drains or scuppers to maintain water flow. Material shall be taped to drain or scupper to allow water flow. Sandbags may be used to allow water flow.
10. Products of demolition shall be removed at the end of each day or stored on or near the site in an appropriate roll-off trash bin. Location to be approved by Owner.

D. SHINGLED ROOFS

1. Tarps shall be stretched taut over the exposed area and secured by 1x2 wood battens arranged vertically at less than or equal to 6' on center.
2. Battens shall be secured by 2" deck screws at 24" centers.
3. Tarps shall be secured at roof perimeters by rolling over a batten two full rotations before securing to roof.
4. No battens shall be installed in roof valleys. Maintain waterways such as valleys, crickets, etc.
5. Existing roof penetrations such as pipes, vents, etc., shall not be covered. The tarp shall be cut around the penetration and sealed by approved double-sided tape. Additional duct type tape shall be added to adhere the cover material to the penetrating item.
6. Products of demolition shall be removed at the end of each day or stored on or near the site in an appropriate roll-off trash bin. Location to be approved by Owner.

E. CEMENT CLAY ROOF TILE

1. 2-3-inch-wide double sided tape shall be used to secure the tarp to the tile.
2. It is best to also weigh the tarp down with sandbags or heavy objects, to keep wind from blowing under it.
3. Existing roof penetrations such as pipes, vents, etc., shall not be covered. Tarps shall be cut around the penetration and sealed by approved double-sided tape. Additional duct type tape shall be added to adhere the cover material to the penetrating item.
4. Products of demolition shall be removed at the end of each day or stored on or near the site in an appropriate roll-off trash bin. Location to be approved by the Owner.

END OF SECTION01 95 07 00

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SECTION 01 95 07 00a - SHEET METAL FLASHING AND TRIM

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for sheet metal flashing and trim. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Manufactured Products:
 - 1) Manufactured through-wall flashing and counterflashing.
 - 2) Manufactured reglets and counterflashing.
 - b. Formed Products:
 - 1) Formed roof drainage sheet metal fabrications.
 - 2) Formed low-slope roof sheet metal fabrications.
 - 3) Formed steep-slope roof sheet metal fabrications.
 - 4) Formed wall sheet metal fabrications.
 - 5) Formed equipment support flashing.
 - 6) Formed overhead-piping safety pans.

C. Performance Requirements

1. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
2. Fabricate and install roof edge flashing and copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - a. Wind Zone 1: For velocity pressures of 10 to 20 lbf/sq. ft. (0.48 to 0.96 kPa): 40-lbf/sq. ft. (1.92-kPa) perimeter uplift force, 60-lbf/sq. ft. (2.87-kPa) corner uplift force, and 20-lbf/sq. ft. (0.96-kPa) outward force.
 - b. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.
 - c. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.
 - d. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.
3. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

- a. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.
3. Samples: For each exposed product and for each finish specified.
4. Maintenance data.
5. Warranty: Sample of special warranty.

E. Quality Assurance

1. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
2. Copper Sheet Metal Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
3. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - a. Build mockup of typical roof eave, including built-in gutter, fascia, fascia trim, and apron flashing, approximately **10 feet (3.0 m)** long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
4. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
2. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

G. Warranty

1. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within **20 OR 10, as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Sheet Metals

1. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
2. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
 - a. Non-Patinated Exposed Finish: Mill.
 - b. Non-Patinated, Exposed, Lacquered Finish: Finish designations for copper alloys comply with the system defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
 - 1) Brushed Satin (Lacquered): M32-06x (Mechanical Finish: directionally textured, medium satin; with clear organic coating); coating of "Incralac," waterborne **OR** solvent-borne, **as directed**, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to a total thickness of **1 mil (0.025 mm)**.
 - 2) Mirror Polished (Lacquered): M22-06x (Mechanical Finish: buffed, specular; with clear organic coating); coating of "Incralac," waterborne **OR** solvent-borne, **as directed**, air-drying, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to a total thickness of **1 mil (0.025 mm)**.
 - c. Pre-Patinated Copper-Sheet Finish: Dark brown **OR** Verdigris, **as directed**, pre-patinated according to ASTM B 882.

3. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - a. As-Milled Finish: Mill **OR** One-side bright mill **OR** Standard one-side bright **OR** Standard two-side bright, **as directed**, finish.
 - b. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
 - c. Surface: Smooth, flat **OR** Embossed, **as directed**.
 - d. Factory Prime Coating: Where painting after installation is indicated, pretreat with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of **0.2 mil (0.005 mm)**.
 - e. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - f. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 - 1) Color: Champagne **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black, **as directed**.
 - 2) Color Range: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
 - g. Exposed Coil-Coated Finishes:
 - 1) Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 - 2) Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 3) Four-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats.
 - 4) Mica Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat.
 - 5) Metallic Fluoropolymer: AAMA 620. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 6) FEVE Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat.
 - 7) Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mils (0.97 mm)** for topcoat.
 - h. Color: As selected from manufacturer's full range.
 - i. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
 - a. Finish: 2D (dull, cold rolled) **OR** 2B (bright, cold rolled) **OR** 3 (coarse, polished directional satin) **OR** 4 (polished directional satin), **as directed**.
 - b. Surface: Smooth, flat **OR** Embossed, **as directed**.
5. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet of minimum uncoated thickness indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin), with factory-applied gray preweathering.
6. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, of minimum uncoated weight (thickness) indicated; coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
7. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.

- a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation; structural quality.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275)**; structural quality.
 - c. Surface: Smooth, flat **OR** Embossed, **as directed**, and mill phosphatized for field painting **OR** and with manufacturer's standard clear acrylic coating on both sides, **as directed**.
 - d. Exposed Coil-Coated Finish:
 - 1) Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.
 - 2) Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 3) Four-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats.
 - 4) Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat.
 - 5) Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat.
 - 6) FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat.
 - 7) Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mils (0.97 mm)** for topcoat.
 - e. Color: As selected from manufacturer's full range.
 - f. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
8. Zinc Sheet: Zinc, 99 percent pure, alloyed with a maximum of 1 percent copper and titanium; with manufacturer's standard factory-applied, flexible, protective back coating.
- a. Finish: Bright rolled **OR** Preweathered gray **OR** Preweathered black, **as directed**.
- B. Underlayment Materials
1. Polyethylene Sheet: **6-mil- (0.15-mm-)** thick polyethylene sheet complying with ASTM D 4397.
 2. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 3. Self-Adhering, High-Temperature Sheet: Minimum **30 to 40 mils (0.76 to 1.0 mm)** thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - a. Thermal Stability: ASTM D 1970; stable after testing at **240 deg F (116 deg C)**.
 - b. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus **20 deg F (29 deg C)**.
 4. Slip Sheet: Building paper, **3-lb/100 sq. ft. (0.16-kg/sq. m)** minimum, rosin sized.
- C. Miscellaneous Materials
1. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
 2. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 - a. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

- 1) Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
- 2) Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
- 3) Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
- b. Fasteners for Copper **OR** Zinc-Tin Alloy-Coated Copper, **as directed**, Sheet: Copper, hardware bronze or Series 300 stainless steel.
- c. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- d. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- e. Fasteners for Zinc-Tin Alloy-Coated Stainless-Steel Sheet: Series 300 stainless steel.
- f. Fasteners for Zinc-Coated (Galvanized) **OR** Aluminum-Zinc Alloy-Coated, **as directed**, Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
- g. Fasteners for Zinc Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.
3. Solder:
 - a. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 - b. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
 - c. For Zinc-Tin Alloy-Coated Stainless Steel **OR** Copper, **as directed**: ASTM B 32, 100 percent tin.
 - d. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
 - e. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.
4. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
5. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** polysulfide **OR** silicone, **as directed**, polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
6. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
7. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
8. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
9. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- D. Manufactured Sheet Metal Flashing And Trim
 1. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at **3-inch (75-mm)** intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing **OR** interlocking counterflashing on exterior face, of same metal as reglet, **as directed**.
 - a. Copper: **10 oz. (0.34 mm thick)** minimum for fully concealed flashing; **16 oz. (0.55 mm thick)** elsewhere.
 - b. Stainless Steel: **0.016 inch (0.40 mm)** thick.
 2. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions **OR** with interlocking counterflashing on exterior face, of same metal as reglet, **as directed**.
 - a. Material: Stainless steel, **0.019 inch (0.48 mm)** thick **OR** Copper, **16 oz./sq. ft. (0.55 mm thick)** **OR** Aluminum, **0.024 inch (0.61 mm)** thick **OR** Galvanized steel, **0.022 inch (0.56 mm)** thick, **as directed**.

- b. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - c. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 - d. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - e. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 - f. Accessories:
 - 1) Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - 2) Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 - g. Finish: Mill **OR** With manufacturer's standard color coating, **as directed**.
- E. Fabrication, General
- 1. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - a. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - b. Obtain field measurements for accurate fit before shop fabrication.
 - c. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
 - 2. Fabrication Tolerances:
 - a. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
OR
Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
 - 3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
 - 4. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with butyl sealant concealed within joints.
 - 5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
 - 6. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49, **as directed**, for application, but not less than thickness of metal being secured.
 - 7. Seams:
 - a. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
OR
Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
 - 8. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

9. Do not use graphite pencils to mark metal surfaces.

F. Roof Drainage Sheet Metal Fabrications

1. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum **96-inch- (2400-mm-)** long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
 - a. Gutter Style: SMACNA designation A **OR B OR C OR D OR E OR F OR G OR H OR I OR J OR K OR L, as directed.**
 - b. Expansion Joints: Lap type **OR** Butt type **OR** Butt type with cover plate **OR** Built in, **as directed.**
 - c. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen **OR** Wire ball downspout strainer **OR** Valley baffles, **as directed.**
 - d. Gutters with Girth up to **15 Inches (380 mm)**: Fabricate from the following materials:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick).**
 - 2) Aluminum: **0.032 inch (0.81 mm) thick.**
 - 3) Stainless Steel: **0.016 inch (0.40 mm) thick.**
 - 4) Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm) thick.**
 - 5) Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick).**
 - 6) Galvanized Steel: **0.022 inch (0.56 mm) thick.**
 - 7) Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm) thick.**
 - 8) Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.**
 - e. Gutters with Girth **16 to 20 Inches (410 to 510 mm)**: Fabricate from the following materials:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick).**
 - 2) Aluminum: **0.040 inch (1.02 mm) thick.**
 - 3) Stainless Steel: **0.019 inch (0.48 mm) thick.**
 - 4) Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm) thick.**
 - 5) Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick).**
 - 6) Galvanized Steel: **0.028 inch (0.71 mm) thick.**
 - 7) Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm) thick.**
 - 8) Zinc: **0.039 inch (1.00 mm) OR 0.048 inch (1.25 mm), as directed, thick.**
 - f. Gutters with Girth **21 to 25 Inches (530 to 640 mm)**: Fabricate from the following materials:
 - 1) Copper: **20 oz./sq. ft. (0.68 mm thick).**
 - 2) Aluminum: **0.050 inch (1.27 mm) thick.**
 - 3) Stainless Steel: **0.025 inch (0.64 mm) thick.**
 - 4) Zinc-Tin Alloy-Coated Stainless Steel: **0.024 inch (0.61 mm) thick.**
 - 5) Zinc-Tin Alloy-Coated Copper: **20 oz./sq. ft. (0.68 mm thick).**
 - 6) Galvanized Steel: **0.034 inch (0.86 mm) thick.**
 - 7) Aluminum-Zinc Alloy-Coated Steel: **0.034 inch (0.86 mm) thick.**
 - 8) Zinc: **0.048 inch (1.25 mm) OR 0.059 inch (1.50 mm), as directed, thick.**
 - g. Gutters with Girth **26 to 30 Inches (660 to 760 mm)**: Fabricate from the following materials:
 - 1) Copper: **24 oz./sq. ft. (0.82 mm thick).**
 - 2) Aluminum: **0.063 inch (1.60 mm) thick.**
 - 3) Stainless Steel: **0.031 inch (0.79 mm) thick.**
 - 4) Zinc-Tin Alloy-Coated Copper: **24 oz./sq. ft. (0.82 mm thick).**
 - 5) Galvanized Steel: **0.040 inch (1.02 mm) thick.**
 - 6) Aluminum-Zinc Alloy-Coated Steel: **0.040 inch (1.02 mm) thick.**
 - h. Gutters with Girth **31 to 35 Inches (790 to 890 mm)**: Fabricate from the following materials:
 - 1) Copper: **24 oz./sq. ft. (0.82 mm thick).**
 - 2) Stainless Steel: **0.038 inch (0.95 mm) thick.**
 - 3) Zinc-Tin Alloy-Coated Copper: **25 oz./sq. ft. (0.87 mm thick).**
 - 4) Galvanized Steel: **0.052 inch (1.32 mm) thick.**
 - 5) Aluminum-Zinc Alloy-Coated Steel: **0.052 inch (1.32 mm) thick.**

2. Built-in Gutters: Fabricate to cross section indicated, with riveted and soldered joints, complete with end pieces, outlet tubes, and other special accessories as required. Fabricate in minimum **96-inch- (2400-mm-)** long sections. Fabricate expansion joints and accessories from same metal as gutters unless otherwise indicated.
 - a. Fabricate gutters with built-in expansion joints and gutter-end expansion joints at walls.
 - b. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen **OR** Bronze wire ball downspout strainer **OR** Wire ball downspout strainer, **as directed**.
 - c. Fabricate from the following materials:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - 2) Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - 3) Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - 4) Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - 5) Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
3. Downspouts: Fabricate round **OR** rectangular **OR** open-face, **as directed**, downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - a. Fabricated Hanger Style: SMACNA figure designation 1-35A **OR** 1-35B **OR** 1-35C **OR** 1-35D **OR** 1-35E **OR** 1-35F **OR** 1-35G **OR** 1-35H **OR** 1-35I **OR** 1-35J, **as directed**.
 - b. Manufactured Hanger Style: SMACNA figure designation 1-34A **OR** 1-34B **OR** 1-34C **OR** 1-34D **OR** 1-34E, **as directed**.
 - c. Hanger Style: **<Insert description>**.
 - d. Fabricate from the following materials:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - 2) Aluminum: **0.024 inch (0.61 mm)** thick.
 - 3) Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - 4) Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - 5) Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - 6) Galvanized Steel: **0.022 inch (0.56 mm)** thick.
 - 7) Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
 - 8) Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
4. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, **4-inch- (100-mm-)** wide wall flanges to interior, and base extending **4 inches (100 mm)** beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper. Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
5. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
6. Splash Pans: Fabricate from the following materials:

- a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Aluminum: 0.040 inch (1.02 mm) thick.
 - c. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - e. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
 - f. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.
- G. Low-Slope Roof Sheet Metal Fabrications
1. Roof-Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates.
 - a. Joint Style: Lap, 4 inches (100 mm) wide OR Butt, with 12-inch- (300-mm-) wide, concealed backup plate OR Butt, with 6-inch- (150-mm-) wide, exposed cover plates OR Butt, with 12-inch- (300-mm-) wide, concealed backup plate and 6-inch- (150-mm-) wide, exposed cover plates, as directed.
 - b. Fabricate with scuppers spaced 10 feet (3 m) apart, of dimensions required with 4-inch- (100-mm-) wide flanges and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
 - c. Fabricate from the following materials:
 - 1) Copper: 20 oz./sq. ft. (0.68 mm thick).
 - 2) Aluminum: 0.050 inch (1.27 mm) thick.
 - 3) Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 4) Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - 5) Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft. (0.68 mm thick).
 - 6) Galvanized Steel: 0.028 inch (0.71 mm) thick.
 - 7) Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
 - 8) Zinc: 0.048 inch (1.25 mm) OR 0.059 inch (1.50 mm), as directed, thick.
 2. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.
 - a. Coping Profile: SMACNA figure designation 3-4A OR 3-4B OR 3-4C OR 3-4D OR 3-4E OR 3-4F OR 3-4G, as directed.
 - b. Joint Style: Butt, with 12-inch- (300-mm-) wide, concealed backup plate OR Butt, with 6-inch- (150-mm-) wide, exposed cover plates OR Butt, with 12-inch- (300-mm-) wide, concealed backup plate and 6-inch- (150-mm-) wide, exposed cover plates, as directed.
 - c. Fabricate from the following materials:
 - 1) Copper: 24 oz./sq. ft. (0.82 mm thick).
 - 2) Aluminum: 0.050 inch (1.27 mm) thick.
 - 3) Stainless Steel: 0.025 inch (0.64 mm) thick.
 - 4) Zinc-Tin Alloy-Coated Stainless Steel: 0.024 inch (0.61 mm) thick.
 - 5) Zinc-Tin Alloy-Coated Copper: 24 oz./sq. ft. (0.82 mm thick).
 - 6) Galvanized Steel: 0.040 inch (1.02 mm) thick.
 - 7) Aluminum-Zinc Alloy-Coated Steel: 0.040 inch (1.02 mm) thick.
 - 8) Zinc: 0.048 inch (1.25 mm) OR 0.059 inch (1.50 mm), as directed, thick.
 3. Roof and Roof to Wall Transition OR Roof to Roof Edge Flashing (Gravel Stop) Transition OR Roof to Roof Edge Flashing (Gravel Stop) and Fascia Cap Transition, as directed, Expansion-Joint Cover: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Aluminum: 0.050 inch (1.27 mm) thick.
 - c. Stainless Steel: 0.025 inch (0.64 mm) thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: 0.024 inch (0.61 mm) thick.
 - e. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick)>.
 - f. Galvanized Steel: 0.034 inch (0.86 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: 0.034 inch (0.86 mm) thick.
 - h. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.

4. Base Flashing: Fabricate from the following materials:
 - a. Copper: 20 oz./sq. ft. (0.68 mm thick)>.
 - b. Aluminum: 0.040 inch (1.02 mm) thick.
 - c. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - e. Zinc-Tin Alloy-Coated Copper: 20 oz./sq. ft. (0.68 mm thick)>.
 - f. Galvanized Steel: 0.028 inch (0.71 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
 - h. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.
 5. Counterflashing: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Aluminum: 0.032 inch (0.81 mm) thick.
 - c. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - e. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick)>.
 - f. Galvanized Steel: 0.022 inch (0.56 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
 - h. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.
 6. Flashing Receivers: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Aluminum: 0.032 inch (0.81 mm) thick.
 - c. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.38 mm) thick.
 - e. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
 - f. Galvanized Steel: 0.022 inch (0.56 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
 - h. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.
 7. Roof-Penetration Flashing: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - c. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - d. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
 - e. Galvanized Steel: 0.028 inch (0.71 mm) thick.
 - f. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch (0.71 mm) thick.
 - g. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.
 8. Roof-Drain Flashing: Fabricate from the following materials:
 - a. Copper: 12 oz./sq. ft. (0.41 mm thick).
 - b. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - c. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.38 mm) thick.
- H. Steep-Slope Roof Sheet Metal Fabrications
1. Apron, Step, Cricket, and Backer Flashing: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Aluminum: 0.032 inch (0.81 mm) thick.
 - c. Stainless Steel: 0.016 inch (0.40 mm) thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.38 mm) thick.
 - e. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
 - f. Galvanized Steel: 0.022 inch (0.56 mm) thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch (0.56 mm) thick.
 - h. Zinc: 0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm), as directed, thick.
 2. Valley Flashing: Fabricate from the following materials:
 - a. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - b. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - c. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - d. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).

- e. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
- f. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
- g. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
3. Drip Edges: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.022 inch (0.56 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
4. Eave, Rake, Ridge, and Hip Flashing: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.022 inch (0.56 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
5. Counterflashing: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.022 inch (0.56 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
6. Flashing Receivers: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.022 inch (0.56 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
7. Roof-Penetration Flashing: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - c. Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - e. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
 - f. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
 - g. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
- I. Wall Sheet Metal Fabrications
 1. Through-Wall Flashing: Fabricate continuous flashings in minimum **96-inch- (2400-mm-)** long, but not exceeding **12-foot- (3.6-m-)** long, sections, under copings, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend **6 inches (150 mm)** beyond each side of wall openings. Form with **2-inch- (50-mm-)** high, end dams where flashing is discontinuous. Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Stainless Steel: **0.016 inch (0.40 mm)** thick.

- c. Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
- d. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
- e. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
2. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend **4 inches (100 mm)** beyond wall openings. Form head and sill flashing with **2-inch- (50-mm-)** high, end dams. Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.032 inch (0.81 mm)** thick.
 - c. Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.015 inch (0.38 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.022 inch (0.56 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.022 inch (0.56 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.
3. Wall Expansion-Joint Cover: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Aluminum: **0.040 inch (1.02 mm)** thick.
 - c. Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm)** thick.
 - e. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - f. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
 - g. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
 - h. Zinc: **0.032 inch (0.80 mm) OR 0.039 inch (1.00 mm)**, **as directed**, thick.

J. Miscellaneous Sheet Metal Fabrications

1. Equipment Support Flashing: Fabricate from the following materials:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - c. Zinc-Tin Alloy-Coated Stainless Steel: **0.018 inch (0.46 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - e. Galvanized Steel: **0.028 inch (0.71 mm)** thick.
 - f. Aluminum-Zinc Alloy-Coated Steel: **0.028 inch (0.71 mm)** thick.
2. Overhead-Piping Safety Pans: Fabricate from the following materials:
 - a. Copper: **24 oz./sq. ft. (0.82 mm thick)**.
 - b. Stainless Steel: **0.025 inch (0.64 mm)** thick.
 - c. Zinc-Tin Alloy-Coated Stainless Steel: **0.024 inch (0.61 mm)** thick.
 - d. Zinc-Tin Alloy-Coated Copper: **24 oz./sq. ft. (0.82 mm thick)**.
 - e. Galvanized Steel: **0.040 inch (1.02 mm)** thick.
 - f. Aluminum-Zinc Alloy-Coated Steel: **0.040 inch (1.02 mm)** thick.

1.3 EXECUTION

A. Underlayment Installation

1. General: Install underlayment as indicated on Drawings.
2. Polyethylene Sheet: Install polyethylene sheet with adhesive for anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped and taped joints of not less than **2 inches (50 mm)**.
3. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.
4. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not

less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Overlap side edges not less than **3-1/2 inches (90 mm)**. Roll laps with roller. Cover underlayment within 14 days.

B. Installation, General

1. **General:** Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - a. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - b. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - c. Space cleats not more than **12 inches (300 mm)** apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - d. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - e. Install sealant tape where indicated.
 - f. Torch cutting of sheet metal flashing and trim is not permitted.
 - g. Do not use graphite pencils to mark metal surfaces.
2. **Metal Protection:** Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - a. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - b. **Underlayment:** Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
3. **Expansion Provisions:** Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with sealant concealed within joints.
4. **Fastener Sizes:** Use fasteners of sizes that will penetrate wood sheathing not less than **1-1/4 inches (32 mm)** for nails and not less than **3/4 inch (19 mm)** for wood screws **OR** metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance, **as directed**.
5. **Seal joints as shown and as required for watertight construction.**
 - a. Where sealant-filled joints are used, embed hooked flanges of joint members not less than **1 inch (25 mm)** into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below **40 deg F (4 deg C)**.
 - b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
6. **Soldered Joints:** Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches (38 mm)**, except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - a. Do not solder metallic-coated steel and aluminum sheet.
 - b. Pre-tinning is not required for zinc-tin alloy-coated stainless steel and zinc-tin alloy-coated copper.
 - c. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

- d. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - e. Copper Soldering: Tin edges of uncoated copper sheets using solder for copper.
7. Rivets: Rivet joints in uncoated aluminum **OR** zinc, **as directed**, where indicated and where necessary for strength.

C. Roof Drainage System Installation

1. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
2. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets **OR** straps **OR** twisted straps, **as directed**, spaced not more than **36 inches (900 mm)** apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - a. Fasten gutter spacers to front and back of gutter.
 - b. Loosely lock straps to front gutter bead and anchor to roof deck.
 - c. Anchor and loosely lock back edge of gutter to continuous cleat **OR** eave or apron flashing, **as directed**.
 - d. Anchor back of gutter that extends onto roof deck with cleats spaced not more than **24 inches (600 mm)** apart.
 - e. Anchor gutter with spikes and ferrules spaced not more than **24 inches (600 mm) OR 30 inches (750 mm)**, **as directed**, apart.
 - f. Install gutter with expansion joints at locations indicated, but not exceeding, **50 feet (15.24 m)** apart. Install expansion-joint caps.
 - g. Install continuous gutter screens on gutters with noncorrosive fasteners, removable **OR** hinged to swing open, **as directed**, for cleaning gutters.
3. Built-in Gutters: Join sections with riveted and soldered or lapped joints sealed with sealant. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.
 - a. Install felt underlayment layer in built-in gutter trough and extend to drip edge at eaves and under felt underlayment on roof sheathing. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with roofing nails. Install slip sheet over felt underlayment.
 - b. Anchor and loosely lock back edge of gutter to continuous cleat **OR** eave or apron flashing, **as directed**.
 - c. Anchor back of gutter that extends onto roof deck with cleats spaced not more than **24 inches (600 mm)** apart.
 - d. Install gutter with expansion joints at locations indicated, but not exceeding, **50 feet (15.24 m)** apart. Install expansion-joint caps.
4. Downspouts: Join sections with **1-1/2-inch (38-mm)** telescoping joints.
 - a. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately **60 inches (1500 mm)** o.c. in between.
 - b. Provide elbows at base of downspout to direct water away from building.
 - c. Connect downspouts to underground drainage system indicated.
5. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement **OR** elastomeric sealant, **as directed**, compatible with roofing membrane.
6. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 - a. Anchor scupper closure trim flange to exterior wall and solder or seal with elastomeric sealant to scupper.
 - b. Loosely lock front edge of scupper with conductor head.

- c. Solder or seal with elastomeric sealant exterior wall scupper flanges into back of conductor head.
 7. Conductor Heads: Anchor securely to wall with elevation of conductor head rim **1 inch (25 mm)** below scupper **OR** gutter, **as directed**, discharge.
 8. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of **4 inches (100 mm)** in direction of water flow.
- D. Roof Flashing Installation
1. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 2. Roof Edge Flashing:
 - a. Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered **3-inch (75-mm)** centers.
OR
Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at **24-inch (600-mm) OR 16-inch (400-mm)**, **as directed**, centers.
 3. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
 - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at **24-inch (600-mm) OR 16-inch (400-mm)**, **as directed**, centers.
 - b. Anchor interior leg of coping with washers and screw fasteners through slotted holes at **24-inch (600-mm)** centers.
 4. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
 - a. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at **24-inch (600-mm) OR 16-inch (400-mm)**, **as directed**, centers.
 - b. Anchor interior leg of coping with screw fasteners and washers at **24-inch (600-mm) OR 20-inch (500-mm)**, **as directed**, centers.
 5. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of **4 inches (100 mm)** over base flashing. Install stainless-steel draw band and tighten.
 6. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing **4 inches (100 mm)** over base flashing. Lap counterflashing joints a minimum of **4 inches (100 mm)** and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant **OR** interlocking folded seam or blind rivets and sealant **OR** anchor and washer at **36-inch (900-mm)** centers, **as directed**.
 7. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric **OR** butyl, **as directed**, sealant and clamp flashing to pipes that penetrate roof.
- E. Wall Flashing Installation
1. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
 2. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section(s) "Unit Masonry" **OR** "Stone Masonry", **as directed**.
 3. Reglets: Installation of reglets is specified in Division 03 Section(s) "Cast-in-place Concrete" **OR** Division 04 Section(s) "Unit Masonry", **as directed**.

01 - General Requirements



4. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend **4 inches (100 mm)** beyond wall openings.

F. Miscellaneous Flashing Installation

1. Overhead-Piping Safety Pans: Suspend pans independent from structure above as indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.
2. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

G. Erection Tolerances

1. Installation Tolerances:
 - a. Shim and align sheet metal flashing and trim within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
OR
Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

H. Cleaning And Protection

1. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
2. Clean and neutralize flux materials. Clean off excess solder.
3. Clean off excess sealants.
4. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
5. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 01 95 07 00a

Task	Specification	Specification Description
01 95 07 00	01 00 00 00	General Requirements
01 95 07 00	01 22 16 00	No Specification Required
01 95 08 00	01 00 00 00	General Requirements
01 95 08 00	01 22 16 00	No Specification Required

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SECTION 01 95 09 00 - CORK FLOORING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cork flooring. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Cork floor tile.
 - b. Engineered cork floor tile.
 - c. Cork rubber floor tile.
 - d. Cork floating floor system.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 6.0: For cork flooring, including printed statement of costs for each rapidly renewable material.
 - b. Product Data for Credit EQ 4.1: For adhesive, including printed statement of VOC content.
 - c. Product Data for Credit EQ 4.2: For field-applied sealer and finish coatings, including printed statement of VOC content.
 - d. Product Data for Credit EQ 4.4: For cork flooring and MDF, including printed statement indicating that the bonding agent and adhesive contain no urea-formaldehyde resins.
3. Shop Drawings: For each type of cork flooring. Include cork flooring layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
4. Samples: Full-size units of each shade and finish **OR** shade, pattern, and finish **OR** color and pattern, **as directed**, of cork flooring required.
5. Maintenance Data: For each type of cork flooring to include in maintenance manuals.

D. Quality Assurance

1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm **OR** Class II, not less than 0.22 W/sq. cm, **as directed**.
2. Product Certificates: For cork floating floor system, from manufacturer, certifying that MDF core contains no urea-formaldehyde resins.

E. Delivery, Storage, And Handling

1. Store cork flooring and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**. Store cork flooring on flat surfaces.

F. Project Conditions

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than **65 deg F (18 deg C)** or more than **75 deg F (24 deg C)** where relative humidity is between 45 and 65 percent, in spaces to receive cork flooring during the following time periods:
 - a. 72 hours before installation.
 - b. During installation.
 - c. 72 hours after installation.

2. Until Final Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **65 deg F (18 deg C)** or more than **75 deg F (24 deg C)**.
3. Close spaces to traffic during cork flooring installation.
4. Close spaces to traffic for 72 hours after cork flooring installation.
5. Install cork flooring after other finishing operations, including painting, have been completed.

1.2 PRODUCTS

A. Cork Floor Tile

1. Cork Floor Tile: Composed of 100 percent natural cork bark and recycled cork granules and set in a natural or synthetic, flexible resin matrix; homogeneous and uniform in composition throughout the tile thickness.
2. Provide cork floor tile made with adhesives and binders that do not contain urea-formaldehyde resins.
3. Minimum Density: **30 lb/cu. ft. (480 kg/cu. m) OR 34 lb/cu. ft. (544 kg/cu. m) OR 37 lb/cu. ft. (592 kg/cu. m), as directed.**
4. Thickness: Nominal **0.180 inch (4.8 mm) OR Nominal 0.312 inch (8.0 mm), as directed.**
5. Size: **12 by 12 inches (305 by 305 mm) OR 12 by 24 inches (305 by 610 mm) OR 24 by 24 inches (610 by 610 mm), as directed.**
6. Shade: Light **OR** Medium **OR** Dark **OR** As indicated by manufacturer's designations **OR** Match sample, **as directed.**
7. Finish: Sanded or unfinished **OR** Waxed **OR** Polyurethane **OR** Polyurethane containing UV inhibitors **OR** Acrylic **OR** As indicated by manufacturer's designations **OR** Match sample, **as directed.**

B. Engineered Cork Floor Tile

1. Engineered Cork Floor Tile: Composed of 100 percent natural cork bark and recycled cork granules with laminated, patterned cork veneers and set in a natural or synthetic, flexible resin matrix; homogeneous and uniform in composition throughout the tile thickness.
2. Provide cork floor tile made with adhesives and binders that do not contain urea-formaldehyde resins.
3. Minimum Density: **30 lb/cu. ft. (480 kg/cu. m) OR 34 lb/cu. ft. (544 kg/cu. m) OR 37 lb/cu. ft. (592 kg/cu. m), as directed.**
4. Thickness: Nominal **0.180 inch (4.8 mm) OR Nominal 0.312 inch (8.0 mm), as directed.**
5. Size: **12 by 12 inches (305 by 305 mm) OR 12 by 24 inches (305 by 610 mm) OR 24 by 24 inches (610 by 610 mm), as directed.**
6. Shade: Light **OR** Medium **OR** Dark **OR** As indicated by manufacturer's designations **OR** Match sample, **as directed.**
7. Pattern: As indicated by manufacturer's designations **OR** Match sample, **as directed.**
8. Finish: Sanded or unfinished **OR** Waxed **OR** Polyurethane **OR** Polyurethane containing UV inhibitors **OR** Acrylic **OR** As indicated by manufacturer's designations **OR** Match sample, **as directed.**

C. Cork Rubber Floor Tile

1. Cork Rubber Floor Tile: Composed of 70 percent natural cork granules and 30 percent rubber granules combined with fade-resistant pigments; homogeneous and uniform in composition throughout the tile thickness.
2. Provide cork rubber floor tile made with adhesives and binders that do not contain urea-formaldehyde resins.
3. Physical Characteristics:
 - a. Minimum Density: **78 lb/cu. ft. (1249 kg/cu. m).**
 - b. Minimum Tensile Strength: **700 psi (4.8 MPa).**
4. Thickness: Nominal **0.125 inch (3.2 mm).**
5. Size: **18 by 18 inches (450 by 450 mm).**

6. Texture: Lightly textured wear surface.
 7. Colors and Patterns: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from full range of industry colors, **as directed**.
- D. Cork Floating Floor System
1. Cork Floating Floor System: Laminated planks made of two cork layers, top and bottom, sandwiched around an MDF core and containing no urea-formaldehyde resins.
 2. Plank Density:
 - a. Cork Top Layer: **28 lb/cu. ft. (448 kg/cu. m)** **OR** Manufacturer's standard density, **as directed**.
 - b. Interlocking MDF Core: **45 lb/cu. ft. (720 kg/cu. m)** **OR** Manufacturer's standard density, **as directed**.
 - c. Cork Underlayment Layer: **13 lb/cu. ft. (208 kg/cu. m)** **OR** Manufacturer's standard density, **as directed**.
 3. Plank Thickness: Nominal **0.450-inch (11.4-mm)** overall thickness made up as follows:
 - a. Cork Top Layer: Nominal **0.125 inch (3.2 mm)** **OR** Manufacturer's standard dimension, **as directed**.
 - b. Interlocking MDF Core: Nominal **0.250 inch (6.3 mm)** **OR** Manufacturer's standard dimension, **as directed**.
 - c. Cork Underlayment Layer: Nominal **0.078 inch (2.0 mm)** **OR** Manufacturer's standard dimension, **as directed**.
 4. Plank Size: **18 by 18 inches (450 by 450 mm)** **OR** **36 by 12 inches (900 by 305 mm)**, **as directed**.
 5. Plank Edge: Tongue-and-groove type **OR** Manufacturer's standard interlock, **as directed**.
 6. Shade: Light **OR** Medium **OR** Dark **OR** As indicated by manufacturer's designations **OR** Match sample, **as directed**.
 7. Pattern: As indicated by manufacturer's designations **OR** Match sample, **as directed**.
 8. Finish: Sanded or unfinished **OR** Waxed **OR** Polyurethane **OR** Polyurethane containing UV inhibitors **OR** Acrylic **OR** As indicated by manufacturer's designations **OR** Match sample, **as directed**.
- E. Installation Materials
1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement-based or blended hydraulic-cement-based formulation provided or approved by cork flooring manufacturer for applications indicated.
 2. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than **6.0 mils (0.15 mm)** **OR** **8.0 mils (0.2 mm)**, **as directed**, thick.
 3. Adhesive: Water-resistant products as recommended by manufacturer to suit cork flooring and substrate conditions indicated.
 - a. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- F. Field-Applied Finishes
1. Cork Sealer: Product as recommended by cork flooring manufacturer.
 - a. Use sealers that have a VOC content of not more than 350 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Paste Wax: Products as recommended by cork flooring manufacturer.
 3. Finish Coatings: Products containing UV inhibitors as recommended by cork flooring manufacturer.
 - a. Use finish coatings that have a VOC content of not more than 350 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Cork Rubber Tile Sealer: Product as recommended by cork rubber floor tile manufacturer.
 - a. Use sealers that have a VOC content of not more than 350 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.3 EXECUTION

A. Preparation

1. Prepare substrates according to cork flooring manufacturer's written instructions to ensure adhesion of cork flooring.
2. Concrete Substrates: Prepare according to ASTM F 710.
 - a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - c. Alkalinity and Adhesion Testing: Perform tests recommended by cork flooring manufacturer. Proceed with installation only after substrates pass testing.
 - d. Moisture Testing: Perform tests recommended by cork flooring manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - 1) Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
 - 2) Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
3. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
4. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
5. Do not install cork flooring until materials are same temperature as space where they are to be installed.
 - a. Move cork flooring products and installation materials into spaces where they will be installed at least 72 hours in advance of installation.
6. Immediately before installation, sweep and vacuum clean substrates to be covered by cork flooring products.

B. Floor Tile Installation

1. Comply with cork flooring manufacturer's written instructions for installing cork flooring.
2. Mix floor tiles from each carton together to ensure uniform distribution of shade.
3. Discard broken, cracked, chipped, or deformed floor tiles.
4. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
5. Lay floor tiles square with room axis **OR** at a 45-degree angle with room axis **OR** in ashlar or staggered joint pattern **OR** in pattern indicated, **as directed**.
6. Apply adhesive to substrate and set floor tiles in adhesive.
7. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
8. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
9. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
10. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of shade and finish **OR** shade, pattern, and finish **OR** color and pattern, **as directed**, between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.

C. Cork Floating Floor System Installation

1. Comply with manufacturer's written instructions for installing cork floating floor system.
 2. Install continuous vapor retarder over substrate, taping side and end laps.
 3. Mix floor planks from several cartons to ensure uniform distribution of shade.
 4. Discard broken, cracked, chipped, or deformed floor planks.
 5. Do not attach floor planks to substrate.
 6. Tightly interlock and adhere plank edges with adhesive. Remove excess adhesive from top surface of planks.
 7. Lay floor planks in pattern indicated.
 8. Use spacers to keep planks from shifting as subsequent rows are added. Remove spacers after installing cork floating floor system.
 9. Maintain expansion space at walls and other obstructions and terminations of flooring as indicated on Drawings **OR** of not less than **3/8 inch (9.5 mm)**, **as directed**.
 10. Extend floor planks into toe spaces, door reveals, closets, and similar openings. Extend floor planks to center of door openings.
 11. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor planks as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- D. Field-Applied Finishes
1. Apply finishes according to cork flooring manufacturer's written instructions.
 2. Cork Sealer: Apply one **OR** two, **as directed**, coat(s).
 3. Paste Wax: Apply one **OR** two **OR** three, **as directed**, coat(s).
 4. Finish Coatings: Apply two **OR** three, **as directed**, coat(s).
 5. Cork Rubber Tile Sealer: Apply one **OR** two, **as directed**, coat(s).
- E. Cleaning And Protection
1. Comply with manufacturer's written instructions for cleaning and protecting cork flooring.
 2. Remove adhesive and other blemishes from exposed surfaces.
 3. Sweep and vacuum surfaces thoroughly.
 4. Damp-mop surfaces to remove marks and soil.
 5. Protect cork flooring products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
 6. Cover cork flooring until Final Completion.

END OF SECTION 01 95 09 00

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Task	Specification	Specification Description
01 95 09 00	01 00 00 00	General Requirements
01 95 09 00	01 22 16 00	No Specification Required
01 95 09 00	09 65 16 23	Resilient Sheet Flooring
01 95 09 00	09 65 19 19	Resilient Floor Tile
01 95 09 00	09 68 13 00	Carpet Tile
01 95 09 00	09 68 16 00	Carpet
01 95 09 00	09 91 23 00	Interior Painting
01 95 10 00	01 00 00 00	General Requirements
01 95 11 00	01 00 00 00	General Requirements
01 95 22 00	01 00 00 00	General Requirements
01 95 22 00	01 22 16 00	No Specification Required
01 95 22 00	01 95 06 00b	Interior Architectural Woodwork
01 95 23 00	01 00 00 00	General Requirements
01 95 23 00	01 22 16 00	No Specification Required
01 95 23 00	23 81 13 11	Packaged Terminal Air Conditioners
01 95 26 00	01 00 00 00	General Requirements
01 95 26 00	01 22 16 00	No Specification Required
01 95 26 00	23 34 23 00	Power Ventilators
01 95 26 00	26 51 00 00	Interior Lighting

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SECTION 01 95 99 92 - DISPOSAL OF HAZARDOUS MATERIALS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for disposal of hazardous materials. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Definition

1. Hazardous materials shall be defined as asbestos containing materials, lead-based paint, PCBs, bird waste, and other materials categorized as hazardous by the EPA.

C. Submittals

1. Before start of work: At the pre-construction meeting, the Contractor shall submit the following to the Owner's Representative for review. Do not start work until these submittal are returned with Owner's Representative stamp indicating that the submittal is returned for unrestricted use.
 - a. Copy of State or local license for hazardous waste hauler.
 - b. Certificate of at least one on-site supervisor which has satisfactorily completed the OSHA 40 hour Health and Safety course for handling hazardous materials.
 - c. Certificates of workers which have successfully completed the OSHA 40-Hour Health and Safety Course for Hazardous Materials.
 - d. List of the employees scheduled to perform this work.
 - e. Schedule of start and finish times and dates for this work.
 - f. Name and address of landfill where these waste materials are to be deposited. Include contact person and telephone number.
 - g. Material Safety Data Sheet (MSDS) for all materials to be removed.
 - h. If contractor introduces any chemical into the work environment, a MSDS for that chemical must be presented to the Owner's Representative prior to use.
 - i. Transporter must have notified the EPA and/or other appropriate local government agency in advance of its intentions to transport hazardous materials and, if applicable, receive an identification number.
 - j. Contingency Plan for handling emergencies with spills or leaks.
 - k. Certificates of workers which have successfully completed the OSHA 24-Hour Health and Safety Course for Hazardous Materials.

1.2 PRODUCTS

A. Materials

1. Drums: Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA, EPA (40 CFR Parts 264-264 and 300), and DOT Regulations (49 CFR Parts 171-178). Use of damaged containers shall not be allowed.
2. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.
3. Absorbent Material: Clay, soil or any commercially available absorbent used for the purpose of absorbing hazardous or potentially hazardous materials.

1.3 EXECUTION

01 - General Requirements



-
- A. All waste shall be transported and disposed of in accordance with all federal, state and local guidelines and regulations. The contractor is to obtain all permits, licenses, etc., which are necessary for the transporting and disposal of hazardous waste.
 - B. Waste haulers shall maintain waste manifest and shipment record forms.

END OF SECTION 01 95 99 92

SECTION 01 95 99 92a - REMOVAL OF NONFRIABLE ASBESTOS-CONTAINING MATERIALS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for removal of nonfriable asbestos-containing materials. Products shall be as follows or as directed by the the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Definitions

1. ACM: Asbestos Containing material which is any material containing more than one percent asbestos.
2. Amended Water: Water containing a wetting agent or surfactant with a maximum surface tension of 2.9 Pa 29 dynes per centimeter when tested in accordance with ASTM D 1331.
3. Area Sampling: Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.
4. Asbestos: The term asbestos collectively refers to a naturally occurring mineral known by the following specific names: chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.
5. Asbestos control Area: That area where asbestos removal operations are performed. The area shall be isolated by physical boundaries to assist in the prevention of the uncontrolled access by non-qualified persons.
6. Asbestos Fibers: Those fibers having an aspect ratio of at least 3:1 and longer than-5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.
7. Asbestos Permissible Exposure Limit: 0.1 fibers per cubic centimeter of air as an e-hour time weighted average measured in the breathing zone as by defined 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.
8. Background: The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for contaminated areas are measured in similar but asbestos free locations.
9. Contractor: The Contractor is that individual, or entity under contract to the Owner to perform the herein listed work.
10. Contractor/Supervisor (Asbestos abatement): A person who has successfully completed training and is therefore accredited as a Contractor/Supervisor under a State Model Accreditation Plan or EPA Model Accreditation Plan as described in 40 CFR 763.
11. Critical Barrier: The layer of polyethylene sheeting that covers an opening or penetration in a room or area that is to become a negative pressure enclosure.
12. Encapsulation: The abatement of an asbestos hazard through the appropriate use of chemical encapsulants.
13. Encapsulants: Specific materials in various forms used to chemically or physically entrap asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.
 - a. Removal Encapsulant (can be used as a wetting agent)
 - b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)
 - c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)
 - d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

14. Friable Asbestos Material: Any material containing more than one percent asbestos that can be crumbled, pulverized, or reduced to powder by hand pressure when dry.
15. Glovebag Technique: Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.
16. HEPA Filter Equipment: High efficiency particulate air (HEPA) filtered vacuum and/or exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.
17. the Owner: That qualified person employed directly by the Owner to monitor, sample, inspect the work, and advise the Owner.
18. Negative Pressure Enclosure (NPE): That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101.
19. Non-friable Asbestos Material: Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos is well bound and will not normally release asbestos fibers during any appropriate use, handling, storage or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, renovation, removal, or mishap.
20. Personal Sampling: Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.
21. Competent Person (CP): A person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan or EPA Model Accreditation Plan as described in 40 CFR 763 as a Contractor/Supervisor and shall be appropriately licensed according to the Statutes of the State in which the work is to be performed.
22. TEM: Refers to Transmission Electron Microscopy.
23. Time Weighted Average (TWA): The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.
24. Wetting Agent: A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 2.9 Pa 29 dynes per centimeter when tested in accordance with ASTM D 1331.

C. Requirements

1. Description of Work: The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures shall be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. The asbestos work includes the use of non-friable removal technique(s) which is governed by 40 CFR 763 as indicated. Provide non-friable removal technique(s) as outlined in this specification for the locations indicated.
2. Medical Requirements: Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.
 - a. Medical Examinations: Before exposure to airborne asbestos fibers, provide workers with a comprehensive medical examination as required by 29 CFR 1926.1101 or other pertinent State or local directives. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination shall be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."
 - b. Medical Records: Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of 30 years after termination of employment and make records of the required medical examinations and

- exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.
- c. Medical Certification: Submit written certification for each worker and contractor/supervisor, signed by a licensed physician indicating that the worker and contractor/supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1910.134 as prescribed by law.
3. Training: Train all personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. The Contractor shall document the training by providing a copy of a current training certification to the the Owner for each person assigned to work on this project. Furnish each employee with respirator training and fit testing documentation as required by 29 CFR 1910.134. Provide instruction on the engineering and other hazard control techniques and procedures to be used on this project.
 - a. Employee Training: Submit copies of training certificates for each employee indicating that the employee has received training at the appropriate level in accordance with 40 CFR 763.
 4. Permits, Licenses, and Notifications: Notify the local air pollution control district/agency and the the Owner in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M or applicable state and local regulations. Obtain necessary permits or licenses in conjunction with asbestos removal, encapsulation, hauling, and disposal. Post the permit and/or license at the work site, visible from a non-controlled area. Notify the local fire department 3 days prior to removing fire-proofing material from the building including notice that the material contains asbestos.
 5. Environment, Safety and Health Compliance: Comply with the applicable requirements of the current issue of 29 CFR 1926.1101, 40 CFR 61-SUBPART A, and 40 CFR 61-SUBPART M or applicable State or local regulations regarding handling, storing, transporting, and disposing of asbestos waste materials. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable regulations, or referenced documents vary, the most stringent requirement shall apply.
 - a. Site Inspection: While performing asbestos engineering control work, the Contractor shall be subject to on-site inspection by the Federal, State, or local regulatory agencies and the Contracting Officer or its designated representative. If the work is found to be in violation of Federal, State, or local regulations or this specification, the Contracting Officer or its representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the. violation shall be at the Contractor's expense.
 6. Respiratory Protection Program: Establish and implement a respirator program as required by ANSI 288.2 and 29 CFR 1910.134. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.
 - a. Respirator Program Records: Submit records of the respirator program as required by ANSI 288.2 and 29 CFR 1910.134.
 7. Contractor/Supervisor (Asbestos Abatement): The Contractor shall be represented on-site by a trained contractor/Supervisor. This person shall be on-site at all times when asbestos work is in progress. The Qualified Person, as defined herein, can be the Contractor/Supervisor.
 8. Hazard Communication: Adhere to all parts of 29 CFR 1910.1200 and 29 CFR 1926.59. Provide the Contracting Officer with a copy of the Material Safety Data Sheets (MSDS) for all materials brought to the site. Review the Asbestos Survey Report(s) provided by the the Owner, if any.
 9. Asbestos Hazard Abatement Plan: Submit a detailed plan of the safety precautions such as lockout, tag-out, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal of materials containing asbestos. The plan shall be prepared by the Contractor (and reviewed and signed by an asbestos consultant (LAC) licensed according to the Statutes of the State in which the work is to be performed) for review and

recommendation for approval by the the Owner. The plan shall be forwarded to the the Owner for final approval at least 10 days prior to beginning abatement activities. The plan shall include but not be limited to the detailed description of personal protective equipment and work practices to be used including, but not limited to, respiratory protection, type of whole-body protection , the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos encapsulant to be used, locations of local exhaust equipment, planned air sampling strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan shall also include both fire and medical emergency response plans. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work.

10. Testing Laboratory: Submit the name, address, and telephone number of each testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and/or permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis.
11. Landfill Approval: Submit written evidence that the landfill for disposal is approved for asbestos disposal by the USEPA and State and local regulatory agency(s).
12. Waste Shipment Records/Asbestos Waste Manifest: Submit waste shipment records and/or asbestos manifest records, prepared in accordance with applicable Federal, State, or local regulations, signed and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill, within 3 days after delivery.
13. Negative Exposure Assessment: Submit objective data demonstrating that the method(s) used for the specified non-friable ACM removal does not release airborne concentrations of asbestos fibers exceeding the TWA PEL or excursion limit. This data may be from previous work within the last 12 months or from initial exposure assessments on this project. Data from previous work must have been gathered by the firm employed on this contract, using workers trained to the same level, with the ACM and workplace conditions "closely resembling" the conditions for this contract.
14. Contractor Daily Reports: Prepare a written report for each day that asbestos work is being accomplished. The report should be submitted to the the Owner monthly. The report as a minimum shall include the following, where applicable:
 - a. Daily Visual Inspection Reports: Prepare a written report documenting compliance with the Asbestos Hazard Abatement Plan and Federal, State, or local regulations.
 - b. Air Sampling Reports: Complete fiber counting within 24 hours of the "time off" of the sample pump. Notify the the Owner immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Sampling results shall be submitted to the the Owner the day following receipt. The affected employees will be provided copies of the results where required by law within 3 working days. These results shall be signed by the air sampler and the testing laboratory employee that analyzed the sample.
 - c. Pressure Differential Recordings for Local Exhaust System-Not Used
 - d. Asbestos Disposal Quantity Report: The Contractor shall record and report daily the amount of asbestos containing material removed and the amount transported for disposal. Deliver the report for the previous day and cumulative totals with amounts of material removed reported in linear meters or square meters linear feet or square feet as described initially in this specification and the amounts of material transported for disposal reported in cubic meters yards.

D. Submittals

1. Submit the following in accordance with Section "Submittal Procedures."
 - a. Vacuums and tools
 - b. Respirators
 - c. Wetting Agent
 - d. Material Safety Data Sheets (MSDS) for all materials proposed for transport to the project site
 - e. Local exhaust system
 - f. Pressure differential automatic recording instrument
 - g. Daily Reports
 - h. Asbestos hazard abatement plan
 - i. Testing laboratory
 - j. Training Certificates
 - k. Landfill approval
 - l. Employee training
 - m. Medical certification requirements
 - n. Waste shipment records/Asbestos waste manifest
 - o. Respiratory Protection Program
 - p. Negative Exposure Assessment
 - q. Local Exhaust system
 - r. Show compliance with ANSI Z9.2 by providing manufacturers' certifications.
 - s. Permits, licenses, and Notifications
 - t. Rental equipment
 - u. Respirator program records
 - v. Protective clothing decontamination quality control records
 - w. Protective clothing decontamination facility notification.

E. Quality Assurance

1. Glovebags-Not Used
2. Rental Equipment: Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.
3. Protective Clothing Decontamination Quality Control Records: Provide all records that document quality control for the decontamination of reusable outer protective clothing.
4. Protective Clothing Decontamination Facility Notification: Submit written evidence that persons who decontaminate, store, or transport asbestos contaminated clothing used in the performance of this contract were duly notified in accordance with 29 CFR 1926.1101.

1.2 PRODUCTS

A. Encapsulants

1. See Division 21 Section "Facility Fire-suppression Water-service Piping".

1.3 EXECUTION

A. Equipment

1. Respirators: Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH). Provide personnel engaged in pre-cleaning, cleanup, handling, and removal of asbestos containing materials with the appropriate respiratory protection as specified in 29 CFR 1910.134.
2. Exterior Whole Body Protection

- a. Outer Protective Clothing: Provide personnel exposed to asbestos with disposable "non-breathable," or reusable "non-breathable" whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but shall not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape. Reusable whole body outer protective clothing shall be either disposed of as asbestos contaminated waste upon exiting from the asbestos regulated work area or be properly decontaminated.
 - b. Work Clothing-Not Used
 - c. Decontamination of Reusable Outer Protective Clothing: When reusable outer protective clothing is used, transport the double bagged clothing to a previously notified commercial/industrial decontamination facility for decontamination. Perform non-destructive testing to determine the effectiveness of asbestos decontamination. If representative sampling is used, ensure the statistical validity of the sampling results. If representative sampling is used, reject any entire batch in which any of the pieces exceed 40 fibers per square millimeter. Inspect reusable protective clothing prior to use to ensure that it will provide adequate protection and is not or is not about to become ripped, torn, deteriorated, or damaged, and that it is not visibly contaminated. Notify, in writing, all personnel involved in the decontamination of reusable outer protective clothing as indicated in 29 CFR 1926.1101.
 - d. Eye Protection: Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.
3. Warning Signs and Labels: Provide bilingual warning signs printed in English and Spanish at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos.
- a. Warning Sign: Provide vertical format conforming to 29 CFR 1926.1101 minimum 20 by 14 inches (500 by 355 mm) displaying the following legend in the lower panel:

DANGER
ASBESTOS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
AUTHORIZED PERSONNEL ONLY
WEAR RESPIRATORY PROTECTION AND
PROTECTIVE CLOTHING IN THIS AREA

- b. Warning Labels: Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST
AVOID CREATING DUST

- c. Provide the following asbestos labels, of sufficient size to be clearly legible, for display on waste containers (bags or drums) which will be used to transport asbestos contaminated

material in accordance with United States Department of Transportation 49 CFR Parts 171 and 172.

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4. Vacuums and Tools: Vacuums shall be leak proof to the filter and equipped with HEPA filters. Filters on vacuums shall conform to ANSI Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse.
- B. General
1. Pre-Asbestos Work Conference: The Contractor and the Contractor/Supervisor shall meet with the Contracting officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Owners Engineer, the plan will be enforced as if a part of this specification. Any changes required in the specification as a result of the plan shall be identified specifically in the plan to allow for free discussion and approval by the Owners Engineer prior to starting work.
 2. Asbestos Control Area Requirements: The Contractor shall demarcate the asbestos control area(s) using physical barriers and signs to prevent access by unauthorized personnel. This area is defined by 29 CFR 1926.1101 as the regulated area.
 3. Work Procedure: Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, applicable State or local regulation, and as specified herein. Use wet removal procedures. Personnel shall wear and utilize protective clothing and equipment as specified herein. Eating, smoking, drinking, chewing gum or tobacco, or applying cosmetics shall not be permitted in the asbestos control area(s). Personnel of other trades not engaged in the removal of asbestos containing material shall not be exposed at any time to airborne concentrations of asbestos. If an asbestos fiber release or spill, stop work immediately, correct the condition to the satisfaction of the Owners Engineer, including clean-up and clearance sampling, if appropriate, prior to resumption of work.
 4. Furnishings: Furniture will be removed from the area of work by the Owner before asbestos work begins.
 5. Pre-cleaning: Wet wipe and HEPA vacuum all surfaces potentially contaminated with asbestos prior to establishment of an enclosure.
- C. Removal Procedures: Wet asbestos containing material with a fine spray of amended water during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 0.15 mm 6 mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 0.15 mm 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Owner's Engineer for approval. Asbestos containing material shall be containerized while wet. At no time shall asbestos containing material be allowed to accumulate or become dry. Handle asbestos containing material as indicated in 40 CFR 61-SUBPART M, applicable State or local regulation, and 29 CFR 1926.1101.
1. Exposed Pipe Insulation Edges-Not Used
 2. Negative Pressure Enclosure: Block and seal openings in areas where the release of airborne asbestos fibers can be expected. Establish an asbestos negative pressure enclosure with the use of curtains, portable partitions, or other enclosures in order to prevent the escape of asbestos fibers from the contaminated asbestos work area.
 - a. Personnel/Equipment Decontamination Unit: Provide a temporary facility with a separate equipment/dirty change room and clean change room. Provide a shower that complies with 29 CFR 1926.51 in between the dirty room and clean room for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA

vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. All employees shall shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste or properly decontaminate as specified in the Asbestos Hazard Abatement Plan.

- b. Waste Load-Out Unit: Provide a separate temporary area expressly for short-term storage of bagged asbestos containing material that is ready for disposal. The unit shall be the only port used to transfer waste to a truck, dumpster, or other approved on-site storage facility. It shall not be used for personnel egress. A waste load-out unit shall be integral to each negative pressure enclosure.
3. Non-friable Removal Procedures:
 - a. Under normal conditions EPA Category II, non-friable asbestos containing materials may not be considered hazardous; however, this material may release airborne asbestos fibers during demolition and removal; therefore it must be handled in a manner to prevent the release of asbestos fibers. At no time will this material be mechanically chipped, sawed, sanded, or ground.
 - b. Prior to beginning removal, establish an Asbestos Control Area and install Critical Barriers as specified elsewhere in this section. Submit a Negative Exposure Assessment which is less than 12 months old to the the Owner for approval or conduct air sampling as specified elsewhere in this section to establish the exposure levels for the exact removal method being used. The Contractor will establish the correct level of Personal Protective Equipment required.
 - c. Acceptable methods of removal include, but are not limited to, the use of dry ice, a heat gun or lamp, citrus-based solvents, and hand tools with amended water. Removal shall be accomplished to keep the ACM substantially intact. Breakage into small pieces is an unacceptable work practice. The method shall-be detailed in the Asbestos Abatement Plan and shall not be changed during the removal without Contracting Officer approval.
 - d. Upon completion of the removal and clean-up, but prior to removal of critical barriers, the Contractor Testing company shall conduct a visual inspection of all areas affected by the removal. Re-clean as required.

D. Field Quality Control Requirements

1. Visual Inspections: The the Owner will conduct periodic inspections of all areas where asbestos removal and activities are in progress to ensure compliance with the approved Asbestos Hazard Abatement Plan and Federal/State regulatory requirements. This inspection shall include confirmation of proper control/containment/enclosure, worker protection, housekeeping, exhaust equipment operation, decontamination procedures, proper wetting and disposal, and inspection of work progress and work practices. Each activity will be documented as acceptable or noted as unacceptable with justification for the non-compliance.
2. Air Sampling: Sampling of airborne concentrations of asbestos fibers shall be performed in accordance with 29 CFR 1926.1101 and as specified herein. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Air Sampling may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate.
 - a. Sampling Prior to Asbestos Work (Not Used)
 - b. Sampling During Asbestos Work
 - 1) The Contractor's testing company shall perform area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. Perform area sampling at least once every week close to the work inside the enclosure, outside the personnel/equipment decontamination unit entrance to the enclosure.

- 2) If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the fiber release, and notify the the Owner immediately. Determine by testing if adjacent areas are contaminated. If so the Contractor shall clean the contaminated areas, visually inspect, and sample the areas as specified herein.
- 3) The Contractor shall conduct personal sampling of at least 25% of the workers engaged in asbestos handling (removal, disposal, transport and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds 0.1 fibers per cubic centimeter, notify the PQP immediately, evaluate work practices, and take corrective action to reduce airborne asbestos fibers.

E. Clean-Up And Disposal

1. Housekeeping

- a. Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. **DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR.** All asbestos waste shall be placed in an approved on-site storage facility or transported for disposal daily. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the PQP shall visually inspect the asbestos control area for cleanliness. After final clean-up and acceptable pre-clearance airborne concentrations are attained but before the local exhaust system is turned off and the negative pressure enclosure removed), remove all pre-filters on the building HVAC system and provide new pre-filters.
- b. Dispose of filters as asbestos contaminated materials. Reestablish HVAC,. mechanical, and electrical systems in proper working order.

2. Title to Materials: All waste materials, except as specified otherwise, shall become the property of the Contractor and shall be disposed of as specified in applicable Federal, State, and local regulations and herein.

3. Disposal of Asbestos

- a. Collect all removed asbestos containing material, contaminated materials, contaminated water, scrap, debris, bags, containers, expendable equipment, and asbestos contaminated clothing which may produce airborne asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 0.15 mm 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 0.15 mm 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag.
- b. Each container or bag shall clearly indicate that the waste generator is the Owner and the development at which the waste is generated, and the Job Order number of the project.
- c. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off the Owner's property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids will be coordinated with the the Owner. Procedure for hauling and disposal shall comply with 40 CFR 61-SUBPART M, State, regional, and local standards. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags shall remain

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in the drum and the entire contaminated drum shall be buried. Uncontaminated drums may be recycled. Workers unloading the sealed drums shall wear appropriate respirators and personal protective equipment when handling asbestos materials at the disposal site.

END OF SECTION 01 95 99 92a

SECTION 01 95 99 92b - LEAD PAINT RELATED ABATEMENT PROCEDURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for lead paint related abatement procedures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. General Provisions

1. The site of this work will be occupied while work is being done. Perform the abatement work with the least inconvenience to the residents.
2. Take all necessary precautions to protect the property of the the Owner and its residents. Damaged property shall be repaired and restored to its original condition. If the damage is beyond repair, the Contractor shall replace it with new materials to match existing, at the Contractor's expense.
3. Hazardous waste generated during the abatement process (including lead-base paint) when carted away from the developments shall not be transferred from one vehicle to another except at a licensed transfer station.
4. Develop a work plan to be performed as requested by the the Owner. The detailed plan shall include sequencing of abatement work in a manner that will be least disruptive to the normal use of the non-work areas in the building. The plan should also include emergency procedures in case of fire.
5. The Contractor shall include all supplementary miscellaneous items not specified but implied or required in order to complete the work.
6. Workmanship required in the execution of the work herein specified shall be of good quality and subject to the approval of the the Owner.
7. Make in a timely fashion all applicable and necessary notifications to relevant Federal, State and Local authorities. The Contractor shall indemnify the the Owner and the the Owner's representative from, and pay all claims resulting from failure to adhere to these provisions.
8. the Owner may retain an independent Monitoring Contractor to monitor the abatement contract and conduct all wipe sampling and clearance tests.
9. Contractor performing lead-based paint abatement or renovation activities involving lead-based paint shall be a Certified Lead Abatement Contractor and shall ensure that supervisors and workers are trained and certified by U.S. EPA approved state program or equivalent, to perform lead paint removal operations.
10. Establish and implement a Chemical Hazard Communication Program as required by OSHA regulations 29 CFR 1926.59.
11. Provide workers with a comprehensive medical examination as required by OSHA regulations 29 CFR 1926.62 before exposure to lead contaminated dust. The medical examination shall be conducted to approve use of appropriate respirators and shall include biological monitoring. NIOSH/MSHA approved respirators shall be utilized.
12. For employees required to wear a negative pressure respirators: conduct a respirator fit test at the time of initial fitting and at least once every six (6) months thereafter as required by OSHA regulations 29 CFR 1926.62.
13. Determine if any worker will be exposed to lead at or above the action level in accordance with OSHA regulation 29 CFR 1926.62 and 29 CFR 1910.1025. Conduct an exposure assessment to identify the level of exposure a worker would be subjected to without respiratory protection. Assess the exposure level by obtaining personal monitoring samples representative of a full shift of at least an 8-hour TWA.
14. Furnish appropriate respirators approved by NIOSH/MSHA for use in atmospheres containing lead aerosols. Instruct workers in all aspects of respiratory protection. Maintain an adequate supply of HEPA filter elements and spare parts on site for all types of respirators in use.

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15. For manual demolition, scraping, sanding, use of heat gun or power tool paint removal with HEPA collection systems, workers shall minimally use the half-mask negative pressure respirator with high efficiency filters (for airborne concentrations not in excess of 500µg/m³).
16. Ensure that work area preparation, work practices, and clean-up procedures comply with these specifications and applicable Federal, State and Local regulations.
17. Notify all applicable agencies five days prior to the date the abatement will begin and provide evidence of notifications to the the Owner at the pre-start meeting.

C. Submissions

1. Within ten (10) consecutive calendar days calculated from the date of the the Owner's Job Order, the Contractor shall tender all required submissions. Six (6) sets of each submission are required. Where physical samples are required two (2) physical samples shall be submitted for each item. In general, items shall include but not be restricted to the following:
 - a. Paint remover - corner cutter/Vac-Pac System by Pentek Inc; Decontamination Products Division 1026 Fourth Avenue, Corapolis, PA. 15108. Telephone No. (412) 262-0725 or approved equal.
 - b. Description of removal method to be used on each substrate condition including manufacturer's operating instructions and recommendation for equipment usage.
 - c. Copies of current training certificates of Staff to be assigned to the contract.
 - d. List of three previous lead abatement jobs performed successfully by Contractor and name, address, and telephone number of contact person for verification.
2. In the event that all or any portion of the submitted material is rejected by the the Owner, the Contractor shall tender new submissions. All submissions returned for corrections shall be resubmitted with the required corrections within ten(10) consecutive calendar days calculated from the date of rejection, until final submissions are obtained that require no further correction. In no event shall the Contractor be permitted to tender submissions hereunder beyond twenty (20) days from the the Owner's Job Order, unless duly extended in writing by the the Owner.
3. No work shall begin, nor shall the materials be ordered or delivered to the site until final approval of all submissions.

D. Applicable Regulations

1. 24 CFR Part 35
2. HUD "Guidelines For the Evaluation and Control of Lead-Based Paint Hazards in Housing"
3. Abatement work shall also be in accordance with applicable regulations of the Environmental Protection Agency (EPA), Occupational Safety & Health Agency (OSHA) and any State or Local LBP standards. Where there is a conflict between Federal, State or Local regulations, the more stringent requirement shall prevail.
4. OSHA Standards
 - a. 29 CFR 1926.20 General safety and health provisions;
 - b. 29 CFR 1926.21 Safety training and education;
 - c. 29 CFR 1925.25 Housekeeping;
 - d. 29 CFR 1926-28 Personal protective equipment;
 - e. 29 CFR 1926.51(f) Washing facilities;
 - f. 29 CFR 1926.55 Gases, vapors, fumes, dusts, and mists;
 - g. 29 CFR 1926.57 Ventilation
 - h. 29 CFR 1926.59 Hazardous Communication Standards;
 - i. 29 CFR 1926.103 Respiratory protection, and
 - j. 29 CFR 1926.62 Lead in Construction
5. The Contractor must comply with all applicable requirements of the Resource Conservation & Recovery Act (RCRA) of 1976 as amended in 1980 and 1984 by the Hazardous & Solid Waste Amendments (HSWA).
6. These Specifications refer to many requirements found in the preceding references but in no way is it intended to cite or reiterate all provisions therein or elsewhere. It is the Contractor's responsibility to obtain a copy, and know, understand and abide by all such regulations, guidelines and common practices.

1.2 PRODUCTS – (not used)

1.3 EXECUTION

A. Abatement

1. Have risk assessment or paint inspection performed by certified risk assessor or a certified inspector technician who is independent of the abatement contractor.
2. Develop a site specific lead hazard control plan, reviewed and signed by an asbestos consultant (LAC) who is licensed in the State in which the work is to be performed, and submit for review and approval to the the Owner.
3. Obtain any necessary building or waste permits, notify local authorities as required by applicable codes and laws.
4. Select specific building component replacement items, enclosure materials, paint removal equipment and/or chemicals, tools, and cleaning supplies. Consider waste management and historical preservation implications of selected treatment.
5. Develop project specific specifications.
6. Schedule other work so that leaded surfaces are not inadvertently disturbed and unprotected workers are not place at risk. Include time for clearance examinations and laboratory dust sample analysis in the scheduling process.
7. Select a certified abatement subcontractor.
8. Conduct a pre-construction conference to ensure that the subcontractor fully understands the work involved.
9. Notify residents of the dwelling and adjacent dwellings of the work and date it will begin. Coordinate this with the the Owner.
10. Correct any existing conditions that could impede the abatement work (i.e. trash removal, structural deficiencies).
11. Post warning signs and restrict entry to work area to authorized personnel. Implement worksite preparation procedures.
 - a. Place proper warning signs required by OSHA regulations at all entrances to the work area. Signage shall be minimum of 12" x 20" and shall state the following:

**WARNING
LEAD WORK AREA
POISON
NO SMOKING OR EATING**

12. Coordinate test, pilot or sample portion approach to the project with the Owner.
13. Shut-down forced air heating, ventilation and air conditioning systems and cover all vents, diffusers, windows etc., with a single layer six-mil polyethylene sheet secured with duct tape. Exceptions shall be for minor disturbances of area less than 2 square feet and where if vents, diffusers, and windows are more than 5 feet away from surface being disturbed, they need not be covered.
14. Collect preabatement soil samples, which may not have to be analyzed until post abatement soil samples have been collected, analyzed, and compared to clearance standards. If postabatement soil levels are below applicable limits, the preabatement samples need not be analyzed.
15. Cover entrances to the work area with a single layer of 6 mil polyethylene sheets taped to the top and weighted at bottom.
16. Rig a containment non-flammable polyethylene sheet underneath the work area. This containment method should catch all stripped paint for proper disposal.
17. Execute abatement work.
18. Avoid spreading dust and debris outside the work area.
19. Store all waste in a secure area and make sure it is properly labeled with an accumulation start date.
20. Conduct daily and final cleanup.
21. Execute waste disposal procedures.

22. Maintain appropriate records.

B. Paint Removal

1. Do not use the following prohibited paint removal methods:
 - a. Dry scraping or sanding (except for limited areas)
 - b. Use of heat gun over 1,100°F
 - c. Open flame burning or torching
 - d. Machine sanding or grinding without HEPA vacuum exhaust tool
 - e. Abrasive blasting or sandblasting without HEPA vacuum exhaust tool
 - f. Uncontained hydro blasting or high-pressure wash
 - g. Use of chemical strippers containing Methylene chloride.
2. Select the appropriate worksite preparation level.
3. For heat gun work, provide fire extinguishers in the work area and ensure that adequate electrical power is available. Use for limited areas only. Train workers to avoid gouging or abrading the substrate.
4. For mechanical removal methods, use tools equipped with HEPA exhaust capability. Be sure workers keep the shroud against the surface being treated. Vacuum blasting and needle guns should not be used on wood, plaster, drywall, or other soft substrates. Observe all manufacturers directions for the amount of vacuum airflow required.
5. For wet scraping, use a spray bottle or wet sponge attached to the scraper to keep the surface wet while scraping. Apply enough water to moisten the surface completely, but not so much that large amounts of water run onto the ground or floor. Do not moisten areas near electrical circuits.
6. For chemical paint removers, determine if the building component can be removed and stripped offsite. Offsite stripping is generally preferred to onsite paint removal. Observe all manufacturers' directions for use of paint removers.
7. For offsite stripping, determine how to remove the component. Score the edges with a knife or razor blade to minimize the damage to adjacent surfaces. Punch or tag the building component, if similar building components are also being stripped offsite (i.e. doors). This will ensure that the individual component is reinstalled in the same location. Inform the offsite paint remover that the lead-based paint component is present for shipping. Wrap the component in plastic and send to the offsite stripping location. Clean all surfaces before reinstallation and remove any lead residue by HEPA vacuuming all surfaces, cleaning with other lead-specific cleaners, or phosphate detergents, and HEPA vacuuming again.
8. For onsite paint removal, first test the product on a small area to determine its effectiveness. Chemical paint removers may not be effective or desirable on exterior, deteriorated wood surfaces, aluminum, and glass. Provide neoprene, nitrile, rubber, or polyvinyl chloride (PVC) gloves (or other type of glove recommended by the manufacture); face shields; respirators with combination filter cartridges for lead dust and organic vapors(if appropriate); and chemically resistant clothing. Be sure to select the right type of organic vapor filter cartridge, gloves, and clothing for the specific chemical being used. Portable eyewash stations capable of providing a 15-minute flow must be on-site. Apply the chemical and wait the required period of time. Securely store chemical s overnight. For caustic chemical paint removers, neutralize the surface before repainting using glacial acetic acid (not vinegar). Repaint.
9. Make sure all debris is caught in the containment sheet for proper disposal.
10. Mark and legally dispose of waste in accordance with all applicable Federal, State and Local regulations. Most wastes from paint removal projects, such as paint chips and paint remover sludge, will need to be managed as hazardous waste.
11. Conduct clean-up
12. Have a certified risk assessor or inspector technician conduct a clearance examination and provide documentation and a Statement of Lead-Based Paint Compliance.

C. Building Component Replacement

1. Prepare work area by selecting proper worksite preparation level.
2. Prepare the hazardous material building component for removal. Turn off and disconnect any electrical circuits inside or near the building component to be removed.

3. Lightly mist the component to be removed (unless electrical circuits are located nearby).
4. Score all painted seams with a sharp knife.
5. Remove any screw, nails, or other fasteners.
6. Use flat pry instrument and hammer to pry component from the substrate.
7. Remove or bend back all nails.
8. Wrap and seal all bulk components in plastic and take them to a covered truck or secured waste storage area along a pathway covered in plastic. Shovel any debris. Dispose of properly.
9. HEPA vacuum any dust or chips in the area where the component was located.
10. Conduct cleaning and clearance activities.

D. Soil and Exterior Dust Abatement

1. Determine if soil lead hazard exists. For hazard to exist, a total of at least 9 square feet of soil in a single yard or area must be bare and soil concentrations must exceed 2,000µg/gram lead for the yard or building perimeter or 400µg/gram of lead for small, high-contact play areas (pending the development of an EPA soil standard). Bare soil above these levels shall be treated by either interim controls or abatement. Soil abatement is most appropriate when levels of lead are extraordinarily high (greater than 5,000µg/gram lead) and when use patterns indicate contact frequency and exposure will be high.
2. Collect Preabatement soil samples to determine baseline levels. These samples need not be analyzed if post abatement samples are below applicable clearance levels.
3. Determine the method of soil abatement (soil removal and replacement, soil cleaning, or paving). Soil cultivation (rototilling or turning over the soil) is not permitted.
4. If paving, use a high quality concrete or asphalt. Observe normal precautions associate with traffic load weight and thermal expansion and contraction. Obtain necessary permits. Keep soil cultivation to a minimum.
5. If removing and replacing soil.
 - a. Determine if waste soil will be placed in an offsite burial pit. Prepare vehicle operation and soil movement plan. Test new replacement soil (should not contain more than 200 µg/gram lead).
 - b. Contact local utilities to determine location of underground utilities including water, gas, cable TV, electric, telephone, and sewer. Mark all locations to be avoided
 - c. Remove fencing, if necessary to allow equipment access and define set limits with temporary fencing, signs, or yellow caution tape.
 - d. Tie and protect existing trees, shrubs, and bushes.
 - e. Have enough tools to avoid handling clean soil with contaminated tools.
 - f. Remove soil.
 - g. Clean all walkways, driveways, and street areas near abatement area.
 - h. Replace soil at proper grade to allow drainage. Replacement soil should be at least 2 inches above existing grade to allow for settling.
 - i. Install new soil covering (grass or sod) and maintain it through the growing season.
 - j. Determine if soil waste is hazardous and manage it accordingly
 - k. Conduct clean-up and clearance.
 - l. Provide walk-off doormats.
 - m. Maintain proper documentation.

E. Encapsulation

1. Determine if the applicable regulations allow encapsulation to be used. Do not encapsulate the following surfaces:
 - a. Friction surfaces, such as window jambs and door jambs.
 - b. Surfaces that fail patch tests.
 - c. Surfaces with substrates or existing coatings that have a high level of deterioration.
 - d. Surfaces in which there is a known incompatibility between two existing paint layers.
 - e. Surfaces that cannot support the additional weight stress of encapsulation due to existing paint thickness.
 - f. Metal surfaces that are prone to rust or corrosion.
2. Conduct field tests of surfaces to be encapsulated for paint film integrity.

3. Consider special use and environmental requirements (i.e. abrasion resistance and ability to span base substrate cracks).
4. Provide to the the Owner encapsulant test data provided by the manufacturer.
5. Conduct at least one test patch on each type of building component where the encapsulant will be used. Report the results to the the Owner.
6. For both nonreinforced and reinforced coatings, use a 6" x 6" test patch area. Prepare the surface in the manner selected to complete the job. Prepared surfaces for patch testing should be at least 2" larger in each direction than the patch area.
7. For fiber-reinforced wall coverings, use 3" x 3" patch. For rigid coatings that cannot be cut with a knife, use soundness test. For all encapsulants, carry out the appropriate adhesion tests.
8. For liquid coating encapsulants, allow coating to cure, then visually examine it for wrinkling, blistering, cracking, bubbling, or other chemical reaction with the underlying paint.
9. Record results of all patch tests and provide to the the Owner.
10. Implement proper work site preparation level.
11. Repair all building components and substrates as needed (i.e. caulk cracks and repair sources of water leaks).
12. Prepare surfaces. Remove all dirt, grease, chalking paint, mildew and other surface contaminants, remnants of cleaning solutions, and loose paint. All surfaces should be deglossed, as needed.
13. Ventilate the contaminated area whenever solvents or chemicals are used.
14. During encapsulant application or installation, monitor temperature and humidity. For liquid coatings monitor coating thickness to ensure that the encapsulant manufacturer's installation/application specifications are followed.
15. Conduct clean up and clearance.
16. Provide the the Owner information on how to care for the encapsulation system properly.
17. Maintain records on the exact detailed locations of encapsulant applications, patch test specifications and results, product name, subcontractor, date of application, a copy of the product label and material Data Safety sheet (MSDS) for the product and provide to the the Owner.

F. Enclosure

1. Stamp, label or stencil all lead-based painted surfaces that will be enclosed with a warning approximately every 2 feet both horizontally and vertically on all components. The Warning shall read "**Danger Lead-Based Paint**". Deteriorated paint should not be removed from the surface to be enclosed.
2. Select the proper worksite preparation level.
3. Attach a durable drawing to the utility room closet showing where lead-based paint has been enclosed in the dwelling.
4. An independent inspector or technician or risk assessor should evaluate the integrity of the enclosure.
5. Repair any unsound substrates and structural members that will support the enclosure, if necessary.
6. Utilize appropriate enclosure material (drywall or fiberboard, wood paneling, laminated products, ridged tile and brick veneers, vinyl, aluminum m, or plywood).
7. Install extension rings for all electrical switches and outlets that will penetrate the enclosure.
8. If enclosing floors, remove all dirt with a HEPA vacuum to avoid small lumps in the new flooring.
9. Seal and back-caulk all seams and joints. Back-caulk means applying caulk to the underside of the enclosure.
10. When installing enclosure directly to painted surfaces, use adhesive and then anchor with mechanical fasteners (screws or nails).
11. Conduct clean up and clearance activities.
12. Maintain proper records and submit a Statement of Lead-Based Paint Compliance.

G. Final Cleaning Procedures

1. Use the following step-by-step procedures

- a. Assign responsibilities to specific workers for cleaning and for maintaining the cleaning equipment.
 - b. Have sufficient cleaning equipment and supplies before beginning work.
 - c. If contamination is extensive, conduct precleaning of the dwelling unit.
 - d. Conduct ongoing cleaning during the job, including regular removal of large and small debris and dust. Decontamination of all tools, equipment and worker protection gear is required before it leaves contaminated areas. Electrical equipment should be wiped and high-efficiency particulate air (HEPA) vacuumed, not wetted down, to minimize electrocution hazards.
 - e. Schedule sufficient time (usually 30 minutes to an hour) for complete daily cleaning, starting at the same time near the end of every workday after lead hazard control activity has stopped.
 - f. For final cleaning, wait at least 1 hour after active lead hazard control activity has ceased to let dust particles settle.
 - g. Use a vacuum cleaner equipped with a HEPA exhaust filter. HEPA vacuum all surfaces in the room (ceilings, walls, trim, and floors). Start with the ceiling and work down, moving toward the entry door. Completely clean each room before moving on.
 - h. Wash all surfaces with lead-specific detergent, high-phosphate detergent, or other suitable cleaning agent to dislodge any ground-in contamination, then rinse. Change the cleaning solution after every room is cleaned.
 - i. Repeat step g above. To meet clearance standards consistently, a HEPA vacuum, wet wash, and HEPA vacuum cycle is recommended. For interim control projects involving dust removal only, the final HEPA vacuuming step is usually not needed. Other cleaning methods are acceptable, as long as clearance criteria are met and workers are not over exposed.
 - j. After final cleaning perform visual examination to ensure that all surfaces requiring lead hazard control have been addressed and all visible dust and debris have been removed. Record findings and correct any incomplete work.
 - k. If other construction work will disturb the lead-based paint surfaces, it should be completed at this point. If those surfaces are disturbed, repeat the final cleaning step after construction work has been completed.
 - l. Paint and otherwise seal treated surfaces and interior floors.
 - m. Conduct clearance examination.
 - n. If clearance is not achieved, repeat final cleaning.
 - o. Continue clearance testing and repeated cleanings until dwelling unit achieves compliance with all clearance standards. The cost of repeated cleaning, after failure to achieve clearance is to be borne by the contractor.
 - p. Do not allow residents to enter work area until final cleaning is completed and clearance is established.
 - q. Cleaning equipment list is as follows:
 - 1) HEPA Vacuums
 - 2) Detergent
 - 3) Waterproof gloves
 - 4) Rags
 - 5) Sponges
 - 6) Mops
 - 7) Buckets
 - 8) HEPA vacuum attachments (crevice tools, beater bar for cleaning rugs)
 - 9) 6-mil plastic bags
 - 10) Debris containers
 - 11) Waste water containers
 - 12) Shovels
 - 13) Rakes
 - 14) Water-misting sprayers
 - 15) 6-mil polyethylene sheeting (or equivalent)
2. Order of execution for final cleaning steps should be as follows:

- a. As the first stage in final cleaning, floor plastic shall be misted and swept.
- b. Upper level plastic, such as on cabinets and counters should be removed first, after it has been misted and cleaned. All plastic should be carefully folded from the corners/ends to the middle to trap any remaining dust. Next remove both layers of plastic from the floor.
- c. Plastic sheets used to isolate contaminated rooms from noncontaminated rooms should remain in place until after cleaning and removal of other plastic sheeting, these sheets may then be misted, cleaned and removed last.
- d. Removed plastic should be placed into double 4-mil or single 6-mil plastic bags, or plastic bags with equivalent (or better) performance characteristics, which are sealed and removed from the premises. As with daily cleanings, this plastic removal process usually requires workers to use protective clothing and respirators.
- e. After plastic has been removed from the contaminated area, the entire area should be cleaned using the HEPA/wet wash/HEPA cycle.

H. Waste Testing And Disposal

1. General: All materials, whether hazardous or non-hazardous shall be properly disposed of. the Owner may hire an independent Monitoring Consultant to perform TCLP test to determine which of the wastes are hazardous. Contractor shall cooperate in this test. If less than 100kg (200 lbs) or 1/2 of a 55 gallon drum of hazardous waste per month will be generated, it is considered "conditionally exempt" abatement waste, and may be managed as solid non-hazardous waste. The RCRA hazardous waste manifest is not required when shipping this waste to an offsite disposal facility.
2. Separate Abatement Waste into The Following Four Categories:
 - a. Category I. Low lead waste (typically non-hazardous) e.g. Filtered personal and commercial wash water.
 - b. Category II. Architectural components - (painted finish carpentry items) e.g. Doors, windows, window trim and sills, baseboards, railings, moldings. (May do a TCLP to determine if they are hazardous).
 - c. Category III. Concentrated lead waste e.g. sludge from stripping, lead-base paint chip and dust, HEPA vacuum debris and filter, unfiltered wash waste, any waste included in EPA's list of hazardous waste.
 - d. Category IV. Material that cannot be determined to be either hazardous or non-hazardous must be tested by TCLP.

If the hazardous waste generated is greater than 100kg per month, dispose according to the referenced guidelines and RCRA hazardous waste management requirements including those listed below.

3. Disposal Requirements: Contact the regional EPA, state, local and all other pertinent authorities to determine lead-based paint debris disposal requirements. Comply with requirements of the Resource Conservation and Recovery Act (RCRA) and with applicable federal, state, county, or local waste requirements.
4. EPA ID Numbers: Obtain a Generator RCRA Hazardous Material ID number and coordinate this action through the State and secure any additional number as required.
5. Storage Requirements: Keep all hazardous items in a secure area or lockable container that is inaccessible to all persons other than the Contractor's personnel. Label all hazardous waste "Hazardous Waste" with the date that the Contractor began to collect the waste in that container. Keep hazardous and non-hazardous waste in separate containers. Until TCLP testing is completed, considered all items hazardous and store in a secured area or lockable container.
6. Waste Transportation: Transport hazardous waste using a RCRA/DOT/EPA certified Hazardous Waste Transporter. Submit names and qualifications of certified transporter/hauler for the Owner approval. The Contractor shall be responsible for all actions of the waste hauler as pertaining to waste removal and disposal under these procedures and all EPA, DOT and other applicable regulations.
7. Disposal Facility: Supply documents that detail the site(s) to be used for ultimate disposal. Submit documents from these sites proving that they are licensed/permitted to accept such waste and shall accept the waste proposed by the Contractor for treatment or ultimate disposal.

8. Waste Containers: Comply with EPA and DOT regulations for waste containers. Contact the state and local authorities to determine their criteria for containers. In the case of any conflict in regulations, the more stringent shall apply.
 9. Emergencies: Contact local fire, police, hospitals or local emergency response teams and inform them of the type of hazardous waste activity and ask for assistance in the event of any accident. Additionally, the container shall provide the following:
 - a. Keep and properly maintain a suitable fire extinguisher(s) on site.
 - b. Have a immediate means of communication with the regulatory agency in the event of an emergency.
 - c. Keep a list of phone numbers of regulatory agencies on site.
 - d. Appoint an emergency coordinator and ensure the coordinator is on site to supervise emergency procedures to be carried out in the event of an emergency.
 - e. Keep and maintain a "right to know" manual that is in an easily accessible location and in an area that is known to all employees.
 10. Transporting Waste: Provide certifications that the transporter is registered with the U.S. Department of Transportation is required by 49 CFR Part 107(a) transport hazardous waste.
 - a. Provide certifications that each vehicle dedicated to haul hazardous waste has been assigned a "U.S. DOT Hazardous Material Registration Number" as required by 49 CFR Part 107.
 - b. Be responsible for all other applicable permits pertaining to hauling, transport, reduction, and disposal of hazardous waste as they may apply to this project.
 - c. Vehicle: Ensure that all non-hazardous waste is transported in covered vehicles to a landfill, or lined landfill, if required.
 - d. Container Handling: Carefully place the containers into the truck or dumpster used for disposal. At no time shall debris or containers be thrown or dropped.
 - e. Liquid Wastes: Contain and properly dispose of all liquid wastes, including lead-contaminated wash water.
 - f. Containers: HEPA vacuum the exterior of all waste containers prior to removing the waste containers from the work area. Wet wipe the containers to ensure that there is no residual contamination. Then move containers out of the work area into the designated storage area.
- I. Clearance
1. Clearance on all abatement projects must be done by an independent certified risk assessor or inspector technician. Follow all jurisdictional law with regard to licensure requirements for personnel conducting clearance activities.
 2. Clearance step-by-step procedures are as follows:
 - a. Finish the lead hazard control clean-up effort. Seal floors before clearance (if necessary).
 - b. Wait 1 hour to allow any airborne dust to settle. Do not enter work area during that hour.
 - c. Conduct visual examination
 - 1) Determine if all required work has been completed and all lead-based paint hazards have been controlled.
 - 2) Determine if there is visible settled dust, paint chips, or debris in the interior or around the exterior.
 - d. Complete the Visual Clearance Form required by the the Owner; if all work is not completed inform the the Owner and order completion of the work and repeat cleanup, if necessary.
 - e. Conduct clearance dust sampling of the floors, interior window sills, and window troughs using approved protocol.
 - f. Conduct soil sampling if bare soil is present that was not sampled previously, or if exterior paint work was completed as part of the lead hazard control effort. Whenever exterior work has been don, it may be necessary to take samples from the soil that is not bare to determine if contamination has occurred. If results are above 1,000 µg/g (or 400 µg/g in high contact play area), compare the results to baseline soil sampling results to determine what additional measures are needed.
 - g. Complete the Dust and Soil Sampling Clearance Form required by the the Owner.

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- h. Submit samples to a U.S. Environmental Protection Agency (EPA) recognized laboratory participating in the National Lead Laboratory Accreditation program (NLLAP) for analysis.
- i. Interpret results by comparing them to Interim Clearance Standards as listed below:
 - 1) Floors 400 µg/ft²
 - 2) Window sills 250 µg/ft²
 - 3) Window Troughs 800 µg/ft²
 - 4) Soils (Play area with children under 6 years of age) 400 µg/gram
- j. If clearance is achieved go to step N.
- k. Order repeated cleanings or soil treatments if results are above applicable standards. Clean all surfaces the sample represents.
- l. Continue sampling and repeated cleanings until the dwelling achieves compliance with all applicable clearance standards.
- m. Complete any related construction work that does not disturb a surface with lead-based paint (all work that does disturb painted surfaces or that could generate lead dust should be completed as part of the lead hazard control effort).
- n. Issue any necessary statements of lead-based paint compliance or releases and maintain appropriate records.

J. Labels

- 1. Use the following labels on drums used for disposal.

HAZARDOUS WASTE	
FEDERAL LAW PROHIBITS IMPROPER DISPOSAL. IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.	
GENERATOR INFORMATION:	
NAME _____	
ADDRESS _____	PHONE _____
CITY _____	STATE _____ ZIP _____
EPA- / MANIFEST ID NO. / DOCUMENT NO. _____ / _____	
ACCUMULATION START DATE _____	EPA WASTE NO. _____
[HAZARDOUS WASTE, SOLID, N.O.S. (_____)	
NA3077	
<small>D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX</small>	
HANDLE WITH CARE!	
<small>STYLE HMM12</small>	

WORKPLACE ACCUMULATION CONTAINER		
Proper D.O.T. Shipping Name: _____ UN or NA# _____ Generator Information: Name: _____ Facility: _____ Address: _____ Phone: _____ City: _____ State: _____ Zip: _____ EPA ID No. / Manifest Document No. _____ State Manifest Document No. _____ EPA Waste No. _____	HAZARDOUS WASTE FEDERAL LAW PROHIBITS IMPROPER DISPOSAL. IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY. HANDLE WITH CARE!	Workplace Accumulation Start Date: <input type="text"/> Waste Accumulation Area: <input type="text"/> MANEJESE CON CUIDADO CONTIENE DESPERDICIOS TOXICOS

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K. Disposal of lead-based paint waste.

1. Follow the RCRA and HUD recommended practices as defined in the table below:

Waste Management Practices	Category I: Low Lead Waste	Category II: Architectural Components	Category III: Concentrated Lead Waste	Category IV: Other waste
RCRA Requirements	Manage as nonhazardous Waste	Depending upon knowledge or TCLP testing results, manage as solid hazardous or nonhazardous waste	If more than 100 kg/ month, manage as hazardous waste. If less than 100 kg/month manage as solid waste.	Use TCP to determine if waste is hazardous.
HUD Recommended Practices	Applicable	Applicable, if knowledge or TCLP testing indicates that it is nonhazardous.	Applicable if less than 100 kg/month otherwise subject to full RCRA regulations	Only applicable if TCLP testing shows waste is nonhazardous
Wrapped in plastic; seal all seams with tape (if acceptable to the disposal facility).	X	X	X	X
Stored in designated, secure area.	X	X	X	X
Covered During Transport	X	X	X	X
Prohibit cutting/breaking outside work area.	X	X	X	X
Cover ground with 6-mil plastic if handling outside.	X	X	X	X
Prohibit disposal in solid waste incinerators and reuse recycling for mulch	X	X	X	X
Recommended disposal in State licensed/permitted	X	X	If appropriate.	X

solid waste landfill.				
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L. Safety Requirements

1. To protect the health and safety of all persons involved, it is of the utmost importance that deleading is safely and correctly done in a timely manner. The following specific safety requirements are the responsibility of the Deleading Contractor.

K. General Safety:

1. General
 - a. NO ONE is to be allowed in the work area without an approved respirator except for methods that have been documented not requiring a respirator.
 - b. Each work area must be sealed from the remainder of the dwelling by taping plastic sheets (6 mil thick). Work areas must remain sealed off until both work and clean-up are completed.
 - c. Cover all floors, carpets, furniture and appliances with 6 mil plastic within the work area. Use automotive masking tape (2 inches wide) to seal all edges and seams.
 - d. Make certain all electrical connections are properly grounded.
 - e. At least three days prior to the start of any deleading work, post appropriate warning signs at all entrances and exits of work areas and leave in place until all clearance testing indicates that these areas are safe for re-occupancy. The signs must include the following phrase: "CAUTION LEAD HAZARD-KEEP OUT". Post bilingual signs when necessary.
2. Worker Safety: The Deleading Contractor shall take the following minimum precautions to protect the health of all individuals involved in the deleading process.
 - a. Pre-Abatement Medical Exam: Each employee shall undergo a medical examination to determine both respiratory fitness capability and also pre-existing/current blood lead level. Said results shall be provided to the employee and also to the Owner within 3 days of receipt of same, and in all cases, prior to employee's commencement to active abatement. Records of same are required to be kept by the Contractor for 40 years.
 - b. Medical Surveillance is the monitoring of worker blood levels. It is required that the Contractor have blood level monitoring of all active abatement and clean-up workmen and on-site supervisors performed and said results provided to the Owner.
 - 1) Before assignment to active abatement activity for each worker.
 - 2) 30 days after active abatement has begun.
 - 3) At least every two months during the first six months and every six months throughout the deleading job.
 - 4) At least every two months for each employee whose blood lead analysis indicated a blood lead level at or above 25 micrograms per deciliter. (20 micrograms per deciliter for women of child bearing age).
 - 5) At termination of employment.
 - 6) Contractor shall reassign any employee whose blood lead has reached 25 µg/dl (20 µg/dl for women of child bearing age) to a job function deemed safe from lead exposure. Said employee shall remain away from active abatement until such time as 2 consecutive months' blood tests indicate µg/dl below 20 µg/dl.
 - c. Respiratory Protection Programs must be established by the Contractor in accordance with OSHA regulations and qualitative respirator fit testing must be conducted daily by the on-site supervisor. Medical examinations must be performed by a physician prior to fit testing and at anytime when a worker demonstrates any difficulty breathing during the use of or the fit testing of respirators. The following are minimal acceptable respiratory protection program requirements as set up and administered by the Contractor:
 - 1) Written standard operating procedures which oversees the selection and use of respirators.
 - 2) Selection of respirators on the basis of hazards to which the worker is exposed.
 - 3) Worker training on the limitations and use of respirators (includes fit testing).
 - 4) Individual workers assigned respirators for their exclusive use only.

- 5) Daily cleaning and disinfecting of respirators.
 - 6) Proper storage of all respirators.
 - 7) Proper inspection of all respirators for wear and tear.
 - 8) Continual surveillance of work area conditions and level of worker exposure or stress.
 - 9) Use of approved respirators only, modified as needed by the weekly exposure monitoring results.
 - 10) Supply weekly report covering items 1-9 to the Owner or its Lead Consultant.
- d. Exposure Monitoring is the measured concentration of lead in the workers breathing zones. The Contractor shall perform personnel monitoring during active abatement using the NIOSH 7072 method and shall be responsible for:
- 1) Monitoring the level of worker protection needed during the abatement process;
 - 2) Evaluating, modifying and improving any engineering and work practice control(s) as needed;
 - 3) Evaluating each employee's personal quality of work and any need for additional worker training or safety instruction;
 - 4) Providing the Owner results of all personnel monitoring tests within 10 days of testing; and
 - 5) Providing half-face APR respirators with HEPA filters unless said monitoring test results dictate differently. OSHA guidelines shall be used to determine respirator PEL protection factors.
- e. Protective Clothing Equipment must be provided to all workers to help assure that lead dust is contained to the work areas. The following must be supplied/enforced by the Deleading Contractor:
- 1) Full body protective clothing and shoe covers of appropriate sizes on a daily basis or as needed.
 - 2) Clean changing areas separated from the dirty/contaminated clothes storage area.
 - 3) Water and wash facilities for washing of hands and face and shower facilities if deemed necessary by the Owner's Lead Advisor.
 - 4) Instructing worker on proper maintenance of clothing and equipment.
 - 5) Proper disposal of disposable clothing and proper permanent work clothes.
 - 6) Enforcing the removal of protective clothing at the end of each work day and before eating, drinking and smoking.
 - 7) Enforcement of the removal of protective shoe covers before leaving work area.
3. Contractor/Worker Daily Safe-Work Procedures
- a. Daily Start-Up:
- 1) Workers to put on protective gear prior to entering work areas.
 - 2) All garment seams to be sealed with duct tape.
 - 3) All non-working garments must be stored in designated changing area.
 - 4) Respirators, as required, must be properly fitted before entering work area. Perform qualitative fit test.
- b. Temporary depart:
- 1) All protective clothing to be HEPA vacuumed while still being worn.
 - 2) All shoe covers to be removed and left in the work area (immediate departure upon removing).
 - 3) Remove all protective gear in designated "contaminated" changing area before eating, drinking, and smoking or before leaving work site.
 - 4) Wash hands and face.
 - 5) Clean respirators.
- c. Daily Shut-Down:
- 1) Dispose of protective clothing with abatement waste by sealing in a 6 mil poly bag.
 - 2) Laundered clothes must be placed in closed container.
 - 3) Wash hands and face.
 - 4) Shower if facilities allow and circumstances dictate.
 - 5) Clean all protective gear (respirators included).

4. Tenant's Safety: Temporary relocation of the tenants is necessary if the lead paint surface is broken. Temporary relocation of the tenants and their belongings is the responsibility of the Owner. However, the Contractor has the joint responsibility to administer and enforce the following safety practices on behalf of the occupants:
 - a. Adults
 - 1) NO OCCUPANT is allowed to enter the work area during paint removal and initial clean-up. A three day clean-up and settlement period may be imposed depending upon the abatement procedures used, at the discretion of the Owner or their Lead Consultant.
 - 2) the Owner shall notify all occupants in writing when they are allowed to return to their post-abated residence. Contractor shall abide by these notices.
 - 3) Every resident who has received prior notice of abatement is responsible for placing all personal items (clothing, dishes, linens, etc.) in closed, easy to handle containers; and move such items to the center of each room as requested.
 - 4) As long as visible dust remains, occupants may not occupy dwelling, and all surfaces within the dwelling must be re-washed with trisodium phosphate and HEPA vacuumed by deleading contractor.
 - 5) Persons reoccupying dwellings following abatement are required to report any visible dust or debris to the Owner immediately for additional Contractor clean-up.
 - b. Pregnant Women and Children
 - 1) Absolutely no pregnant women nor children under the age of twelve years of age may be allowed in the building while any part of the abatement process is going on.

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SECTION 01 95 99 92c - XRF TESTING FOR LEAD-BASED PAINT

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for XRF testing for lead-based paint. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 SUMMARY

- A. The Contractor shall perform work in accordance with the latest HUD Guidelines, in accordance with all applicable regulations of the Environmental Protection Agency (EPA), Occupational Safety & Health Agency (OSHA) and any applicable State or Local standards that may be more stringent than the Federal Standards except, as such guidelines are modified by the Owner in writing in this contract or any contract pursuant to this contract.
- B. Workmanship required in the execution of the work herein specified shall be of good quality and subject to the approval of the the Owner.

1.3 SUBMITTALS

- A. Notification Before Start of Work
 1. The Contractor shall send notices to the Project Superintendent, Residents, and the Department of Planning and Development 48 hours before the scheduled start of work. The Contractor shall make three (3) attempts to gain entry to each apartment, with proper 48 hour notification to the resident each time.
 2. The Contractor shall begin work no later than 48 hours after receiving a work proceed order.
- B. Copies of the submissions listed below must be tendered with the bid:
 1. Ability to perform XRF testing and paint chip sampling by submitting evidence of the successful completion of lead inspector training by all staff to be assigned to the job including inspector technicians. Training must be provided through a State approved EPA-Model program. All staff assigned to the Contract must also demonstrate training in the use of the XRF testing machines to be dedicated to this contract. The serial number of such XRF machine shall be provided to the the Owner.
 - a. Contractor or Subcontractor performing the work must have at least 3 years of satisfactory experience (documented) in performing XRF testing for a City, State or Federal Agency.
 2. Laboratory certification by the State Department of Health (or other responsible agency) and by the USEPA through the EPA's National Lead Laboratory Accreditation Program ("NLLAP"), or as an alternative having accreditation application pending before NLLAP, and having acceptable performance on five consecutive rounds of the EPA, Environmental Laboratory Proficiency Analytical Testing (ELPAT) program, including the most recent round; evidence of such accreditation must be provided. Indicate if the laboratory is an independent entity from the Contractor.
 3. If a subcontractor will be used for any of the laboratory work of this contract, evidence of certification stated above must also be provided for the subcontractor.

- C. XRF Testing Report Format

- a. All XRF report must be made after a formal submittal and approval by the Owner.
- b. A faxed summary report must be provided to the the Owner within 48 hours after completion of testing for a work Authorization. For XRF testing requiring confirmation by laboratory analysis of paint chip samples, the faxed summary report must be provided within 48 hours after the the Owner gives approval for testing of the collected paint chip samples.
- c. A detailed report must be provided to the the Owner within 5 business days after completion of the testing.

1.4 QUALITY ASSURANCE

- A. The work shall consist of furnishing all labor, material, insurance and all other incidental items required to do the following:
 1. XRF Testing
 - a. Random or comprehensive testing of various components in single family housing units, multi-family housing units, common areas and exterior sites, using any of the approved X-ray Fluorescence ("XRF") machines, to determine if the lead-based paint concentration is within permissible limits.
Note: Testing may be for entire apartments or selected rooms or components within the apartment.
 - b. The permissible limit shall be defined as a final reading showing a lead concentration of less than 1.0 mg/cm².
 - c. Refer to the Manufacturer's manual, as well as the "XRF Performance Characteristic Sheet" when determining calibration check tolerance, and other instrument specific information. Use the adjusted "XRF Performance Characteristic Sheets" in this contract when determining the inconclusive range.
 - d. In addition to the manufacturer's recommended warm up and quality control procedures, a set of three nominal XRF calibration check readings must be taken before the inspection begins and after the inspection has been completed in a particular unit, or every 4 hours, whichever occurs first. All reference material values and calibration check readings must be included in the report provided to the Owner.
 - e. Do not use the XRF to test highly curved or ornate surfaces, or surfaces inaccessible to the XRF, due to poor reliability of results. For such surfaces, laboratory analysis of paint chips must be done.
 - f. Only one XRF reading is required per testing combination. A unique testing combination is characterized by the room equivalent, the component, the substrate and the visible color of the paint. However, testing combinations with different colors on the same component and substrate may be combined into a single component type.
 - g. All inconclusive results must be treated according to the inspection rules using multi-family inspection or single family inspection rules as appropriate.
 - h. XRF field data sheets shall be filled out as they appear on completed Form 7.1("Single-Family Housing LBP Testing Data Sheet") and 7.5 ("Multifamily Housing LBP Testing Data Sheet") in HUD Guidelines.
 - i. Room equivalents or sections thereof that are not accessible for testing (i.e. locked bedrooms) shall be noted in the final report to the Owner.
 2. Laboratory testing of paint chips.
 - a. Collection of paint chips from various painted components for laboratory analysis due to XRF substrate corrected inconclusive and/or positive readings as directed by the the Owner.

- b. Laboratory preparation and testing by Flame Atomic Absorption Spectrometry (FAAS) or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) to determine if the lead paint concentration is within permissible limits.
 - c. The permissible limit shall be defined as a lead concentration less than 0.5% by weight.
 - d. Collect paint chips in accordance with ASTM ES28-94.
 - e. Prepare paint chips in the laboratory for testing in accordance with ASTM ES37-94.
 - f. Repair and repaint areas from which paint chips have been collected, to match adjacent areas, unless notified by the the Owner in writing to utilize a temporary covering for the tested surfaces. The Contractor shall provide water based latex paint for this purpose. Colors shall be limited to white and off-white; and other colors if provided by the tenant.
 - g. Only one paint chip is required per testing combination. A unique testing combination is characterized by the room equivalent, the component, the substrate, and the visible color of the paint. However, testing combinations with different colors on the same component and substrate may be combined into a single component type.
 - h. Field data sheets and signed chain of custodies must be attached to the final report to the Owner.
- B. Occupied Residences
- 1. Some of the work of this contract will be in occupied apartments. The Contractor shall perform all of the work of this contract with the least inconvenience to the tenants.
 - 2. The Contractor shall take all necessary precautions to protect the property of the the Owner, its residents and the public. The contractor must repair any damaged property, whether of the the Owner, its residents, or the public, and restore such property to its original condition. If the damage is beyond repair, the Contractor shall replace it with new, that in the judgement of the the Owner, match the existing materials and are of equal quality and workmanship. All such repairs shall be at the Contractor's expense.
- C. Applicable Regulations
- 1. ASTM Standards
 - a. ASTM E 1583 on evaluating laboratories used to determine lead levels;
 - b. ASTM E 1605 on terminology;
 - c. ASTM E 1613 on determining lead by atomic emission or atomic absorption spectroscopy;
 - d. ASTM E 1645 on laboratory preparation of paint-chip samples;
 - e. ASTM E 1775 on-site extraction and field portable stripping voltammetry analysis for lead;
 - f. ASTM PS 53 on identifying and managing lead in facilities;
 - g. ASTM PS 87 on ultrasonic extraction for later analysis for lead;
 - h. ASTM PS 88 on determining lead by portable electro analysis
 - 2. OSHA Standards (without limitation), include:
 - a. 29 CFR 1926.20 - General safety and health provisions;
 - b. 29 CFR 1926.21 - Safety training and education;
 - c. 29 CFR 1925.25 - Housekeeping;
 - d. 29 CFR 1926.28 - Personal protective equipment;
 - e. 29 CFR 1926.51(f) - Washing facilities;
 - f. 29 CFR 1926.55 - Gases, vapors, fumes, dusts, and mists;
 - g. 29 CFR 1926.57 - Ventilations;
 - h. 29 CFR 1926.59 - Hazardous Communication Standards;
 - i. 29 CFR 1926.10 - Respiratory protection; and
 - j. 29 CFR 1926.62 - Lead in Construction
 - 3. The Contractor must comply with all applicable requirements of the Resource Conservation & Recovery Act (RCRA) of 1976 as amended in 1980 and 1984 by the Hazardous & Solid Waste Amendments (HSWA).

4. The Contractor must follow the XRF Performance Characteristic Sheet (PCS) for all inspection activities. XRF PCSs are available from the National Lead Information Center Clearinghouse or through the HUD website at <http://www.hud.gov/offices/lead/lbp/hudguidelines/allpcs.pdf>.

1.5 PRODUCTS

- A. XRF Instruments and Testing Protocols
 1. The Contractor shall use XRF instruments that are approved by the Owner.
 2. XRFs must be used in accordance with the manufacturer's instructions and the XRF Performance Characteristic Sheet. If discrepancies exist between the XRF Performance Characteristic Sheet, the HUD Guidelines and the manufacturer's instructions, the most stringent guidelines should be followed.

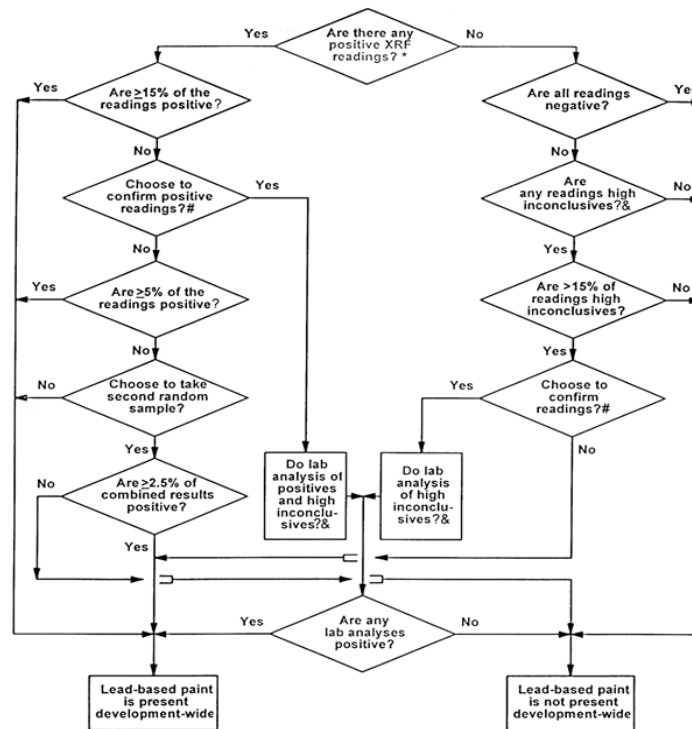
1.6 EXECUTION

- A. Inspection and Testing
 1. **Single Family Testing Rules**
 - a. If the housing development has less
 - 1) than 10 units built between 1960-1970 or
 - 2) 20 units built before 1960 or
 - 3) the random testing rules in a multi-family development are not being used then single family testing rules must be followed.
 - b. List all testing combinations (see HUD Guidelines Table for an example) in all interior rooms, on all exterior building surfaces, and on surfaces in other exterior areas, such as fences, playground equipment, and garages. The "SingleFamily Housing LBP Testing Data Sheet" (see HUD Guidelines) or a comparable data collection instrument may be used for this purpose.
 - 1) Test all room equivalents inside and outside the dwelling unit. The final report must include a final determination of the presence or absence of lead-based paint on each testing combination in each room equivalent.
 - 2) Inspect each testing combination in each room equivalent, unless similar building component types with identical substrates (such as windows) are all found to contain lead-based paint in the first five interior room equivalents. In that case, testing of that component type in the remaining room equivalents may be discontinued, if and only if the Owner agrees beforehand to such a discontinuation. The inspector should then conclude that similar building component types in the rest of the dwelling unit also contain lead-based paint.
 - 3) Painted furniture that is physically attached to the unit (for example, a desk or dresser that is built-in) should be included in the inspection as a testing combination.
 - 4) Results of an inspection may be summarized by classifying component types across room equivalents if patterns or trends are supported by the data.
 - 5) All substrates across all room equivalents should be grouped into one of the six substrate categories (brick, concrete, drywall, metal, plaster, or wood).
 - c. Number and Location of XRF Readings
 - 1) XRF testing is required for at least one location per layers of paint should be included and the XRF probe testing combination, except for interior and exterior faceplate should be able to lie flat against the surface walls, where four readings should be taken, one on of the test location each wall.
 - 2) For interior and exterior walls: take at least four readings (one of ea. wall). If there are more than four walls test the four largest walls, calculate the average of the

- readings, round the result to same number of decimal places as the XRF instrument displays, and classify the remaining walls with the same painting history as the tested walls, based on this rounded average. When the remaining walls in a room equivalent clearly do not have the same painting history as that of the tested walls, test and classify the remaining walls individually.
- 3) Select areas of paint which are most likely to have old paint or coatings, where areas of paint appear thickest. Avoid testing where paint has worn away, chipped; or over pipes, electrical surfaces, nails, and any other possible interferences.
 - 4) A numbering system, floor plan, sketch or other system may be used to document which testing combinations were tested and sufficiently detailed enough for another individual to find them.
 - a) Side identification Identify perimeter wall sides with letters A, B, C, and D (or numbers or Roman numerals). Side A for single-family housing is the street side for the address. Side A in multi-family housing is the apartment entry door side. Side B, C, and D are identified clockwise from Side A as one faces the dwelling; thus Wall B is to the left, Wall C is across from Side A, and Side D is to the right of Side A. Each room equivalent's side identification follows the scheme for the whole housing unit. Because a room can have two or more entries, sides should not be allocated based on the entry point. For example, giving a closet a side allocation based on how the room is entered would make it difficult for another person to make an easy identification, especially if the room had two closets and two entryways.
 - b) Room Equivalent Identification Room equivalents should be identified by both a number and a use pattern (for example, Room 5-Kitchen). Room 1 can always be the first room, at the A-D junction at the entryway, or it can be the exterior. Rooms are consecutively numbered clockwise. If multiple closets exist, they are given the side allocation: for example, Room 3, Side C Closet. The exterior is always assigned a separate room equivalent identifier.
 - c) Sides in a Room Sides in an interior room equivalent follow the overall housing unit side allocation. Therefore, when standing in any four-sided room facing Side C, the room's Side A will always be to the rear, Side B will be to the left, and Side D will be to the right.
 - d) Building Component Identification Individual building components are first identified by their room number and side allocation (for example, the radiator in Room 1, Side B is easily identified). If multiple similar component types are in a room (for example, three windows), they are differentiated from each other by side allocation. If multiple components are on the same wall side, they are differentiated by being numbered left to right when facing the components. For example, three windows on Wall D are identified as windows D1, D2, and D3, left to right. If window D3 has the only old original sash, it is considered a separate testing combination from the other two windows. Codes or abbreviations for building components and/or locations may be used in order to shorten the time needed for data entry. If codes or abbreviations are used, the inspection records and the inspection report must include a table showing their meaning.
 - d. XRF Instrument Reading Time
 - 1) The recommended time to open an XRF instrument's shutter to obtain a single XRF result for a testing location depends on the specific XRF instrument model and the mode in which the instrument is operating. Follow manufacturer's instructions per HUD Guidelines.
 - e. XRF Calibration Check Readings
 - 1) Follow manufacturer's instructions per HUD Guidelines.

- f. Substrate Correction
- 1) The XRF measurements, corrected for substrate contribution, if required by the Performance Characteristic Sheet ("PCS") for the particular type of instrument being used, should be sorted by the inspector by component type into the following categories:
 - a) Positive- A positive XRF reading in accordance with the XRF's Performance Characteristic Sheet.
 - b) Negative- A negative XRF reading in accordance with the XRF's Performance Characteristic Sheet.
 - c) High Inconclusive- An inconclusive XRF reading equal to or greater than the midpoint of the XRF's inconclusive range, in accordance with the XRF's Performance Characteristic Sheet.

- g. The following Decision analyses will be used to determine which components are positive, negative or inconclusive:



* "Positive," "negative," and "inconclusive" XRF readings are determined in accordance with the XRF instrument's Performance Characteristics Sheet as described in the HUD Guidelines for the Evaluation and Control of Lead Hazards in Housing, chapter 7.
 & A high inconclusive reading is an XRF reading at or above the midpoint of the inconclusive range. For example, if the inconclusive range is 0.41 to 1.39, its midpoint (average) is 0.90; a reading in the range from 0.90 to 1.39 would be a high inconclusive reading.
 # Any paint or coating may be assumed to be lead-based paint, even without XRF or laboratory analysis. Similarly, any XRF reading may be confirmed by laboratory analysis.

- 1) All inconclusive results must be confirmed with laboratory analysis, or as an alternative must be classified as positive. the Owner may also wish to confirm positive XRF results with laboratory analysis. Therefore the Contractor must make a field determination of which XRF readings falls in the inconclusive or positive ranges and take paint chip samples during the XRF testing for possible laboratory analysis. If the majority of XRF readings are positive in the first few units, the inspector must consult with the Owner on whether to continue taking paint chip samples. Only the Owner may determine whether to submit collected paint chip samples for laboratory analysis or to classify the element as positive.

2. Multi-family Housing Testing Rules (Random Sampling)

- a. In order to use the Multi-family housing testing rules, there must multi-family housing is defined as any group of more than four units that are similar in construction from unit to unit
- b. Determine the number of randomly selected units to be tested in accordance with Table 7.3, below. Chapter 7 of the HUD Guidelines also describes how to select the units randomly. If a unit or units which were selected as part of the original random sample cannot be entered for a particular reason, a replacement unit(s) must be randomly selected in accordance with the HUD Guidelines.

Table 7.3 Number of Units to be Tested in Multi-family Building or Developments*

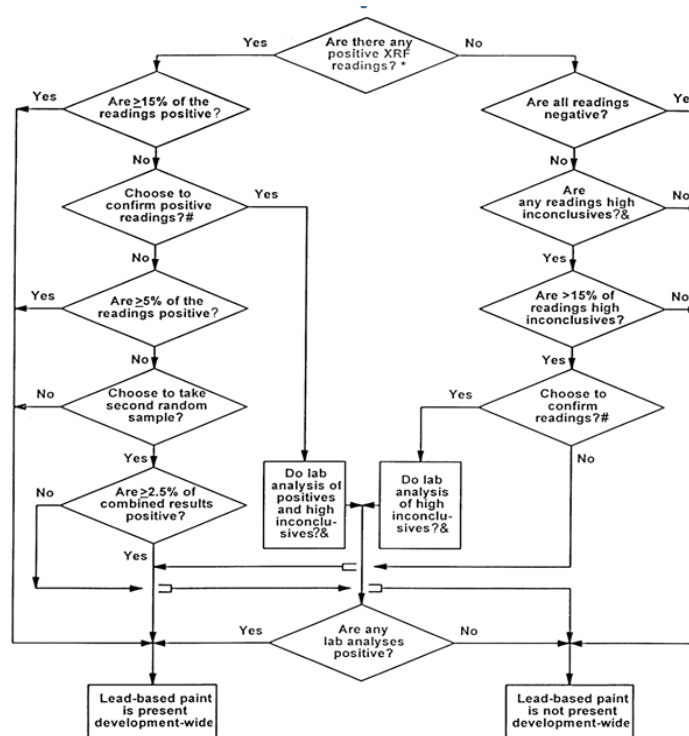
Number of Similar Units, Similar Common Areas, or Similar Exterior Sites	Pre-1960 or Unknown-Age Building or Development: Number of Units to Test *	1960-1977 Building or Development: Number of Units to Test *
1-10	All	All
11-13	All	10
14	All	11
15	All	12
16-17	All	13
18	All	14
19	All	15
20	All	16
21-26	20	16
27	21	17
28	22	18
29	23	18
30	23	19
31	24	19
32	25	19
33-34	26	19
35	27	19
36	28	19
37	29	19
38-39	30	20
40-48	31	21
49-50	31	22
51	32	22
52-53	33	22
54	34	22
55-56	35	22
57-58	36	22
59	37	23
60-69	38	23
70-73	38	24
74-75	39	24
76-77	40	24

Number of Similar Units, Similar Common Areas, or Similar Exterior Sites	Pre-1960 or Unknown-Age Building or Development: Number of Units to Test *	1960-1977 Building or Development: Number of Units to Test *
78-79	41	24
80-88	42	24
89-95	42	25
96-97	43	25
98-99	44	25
100-109	45	25
110-117	45	26
118-119	46	26
120-138	47	26
139-157	48	26
158-159	49	26
160-177	49	27
178-197	50	27
198-218	51	27
219-258	52	27
259-279	53	27
280-299	53	28
300-379	54	28
380-499	55	28
500-776	56	28
777-939	57	28
940-1004	57	29
1005-1022	58	29
1023-1032	59	29
1033-1039	59	30
1500	87	44
2000	116	58
2500	145	73
3000	174	87
3500	203	102
4000	232	116

* For brevity, "Number of Units" and "Number of Units to Test" are used, but the number to test is the same for similar units, similar common areas, and similar exterior sites.

- c. An assessment on each tested component must note four attributes, also called a testing combination.
 - 1) The room equivalent (where the testing took place i.e. bedroom, bathroom, etc.)
 - 2) The component type (door, wall #1 - upper left, etc.)
 - 3) The substrate (brick, wood, concrete, drywall, plaster or metal).
 - 4) The color of the paint.
- d. These attributes must be included as part of the report.
- e. For each testing combination, the condition of the painted surfaces should be noted as either intact, fair or poor.
- f. One reading with the X-ray fluorescence (XRF) instrument on each testing combination is all that is required.
- g. At least 40 components of a given type must be tested to obtain the desired level of confidence in the results throughout the multi-family development. If less than 40 components of a given type exist in the buildings to be tested i.e. they are unique components, then the measurement should be taken using single family testing rules (described below). If less than 40 components of a given type exist in the units to be tested, additional components of this type can be identified in other units in the complex and tested to bring the total up to 40 so that multi-family testing rules can be used. The decision of which option the Contractor should use will be made by the the Owner.
- h. To increase the number of tested components of a given type, testing combinations with different colors on the same component and substrate may be combined into a single component type. For example, if "wood doors" is the component type, all wood doors tested for lead-based paint could belong to the same component type, regardless of color.
- i. A component type may be differentiated by color as long as there are 40 tested and there is a good reason for differentiation.
- j. The XRF measurements, corrected for substrate contribution, if required by the Performance Characteristic Sheet ("PCS") for the particular type of instrument being used, should be sorted by the inspector by component type into the following categories:
 - 1) Positive- A positive XRF reading in accordance with the XRF's Performance Characteristic Sheet.
 - 2) Negative- A negative XRF reading in accordance with the XRF's Performance Characteristic Sheet.
 - 3) High Inconclusive- An inconclusive XRF reading equal to or greater than the midpoint of the XRF's inconclusive range, in accordance with the XRF's Performance Characteristic Sheet.

k. The following Decision analyses will be used to determine which components are positive, negative or inconclusive:



* "Positive," "negative," and "inconclusive" XRF readings are determined in accordance with the XRF instrument's Performance Characteristics Sheet as described in the HUD Guidelines for the Evaluation and Control of Lead Hazards in Housing, chapter 7.
 & A high inconclusive reading is an XRF reading at or above the midpoint of the inconclusive range. For example, if the inconclusive range is 0.41 to 1.39, its midpoint (average) is 0.90; a reading in the range from 0.90 to 1.39 would be a high inconclusive reading.
 # Any paint or coating may be assumed to be lead-based paint, even without XRF or laboratory analysis. Similarly, any XRF reading may be confirmed by laboratory analysis.

- i. If there are readings on a component type(s) equal to or greater than 1.0 mg/cm² and paint chip samples are submitted to the laboratory, there are two possible results:
 - 1) If all lab samples on a component type are below 0.5% lead by weight, the component type can be classified as negative throughout the development.
 - 2) If one or more lab results are positive, (equal to or greater than 0.5% lead by weight for a component) the the Owner will take one of three options:
 - a) Treat the component type as positive throughout the development, or
 - b) Test the component type throughout the development, or
 - c) If 5% or less of the component type are positive, take a second random sample, just testing that component type.
 - 3) If option 2)c) above is selected by the Owner and the combined results of the first and second random sample are less than 2½% positive, the following additional options are available depending on the results.
 - a) If no positives are found in the second sample, no further testing is necessary. Those positives in the first random sample will be monitored/abated (not by this Agreement), but the rest of the component type can be classified as negative.

- b) If positives are found on a component type in the second sample, the the Owner has the option to classify the component type as positive throughout the development or comprehensively test it.
 - c) If the combined results of the two random samples are equal to or greater than 2½%, the the Owner also has the option to comprehensively test the remaining components of that type or classify them as positive.
 - m. **Paint Chip Sample Size:** The Paint chip samples should be taken from a 4 square inch (25 square centimeter) area that is representative of the paint on the testing combination, as close as possible to any XRF reading locations and, if possible, unobtrusive. This area may be a 2" x 2" (5 x 5 centimeters) square, or a 1" x 4" (2.5 x 10 centimeters) rectangle, or have any other dimensions that equal at least 4 square inches (25 square centimeters). Regardless of shape, the dimensions of the surface area must be accurately measured (to the nearest millimeter or 1/16th of an inch) so that the laboratory results can be reported in mg/cm². Results should be reported as percent by weight if the surface area cannot be measured accurately or if all paint within the sampled area cannot be removed. In these cases, lead should be reported in ppm or percent weight, not in mg/cm². Smaller surface area can be used if acceptable to the laboratory. (See ASTM E 1729). In all cases those who take the samples should consult with the NLAAP recognized laboratory selected regarding the requirements for the submission samples for lead-based paint analysis.
 - n. If the the Owner decides to test in search of these hard-to-find components coated with lead based paint, the inspector must use the single family testing rules described in the previous section.
- 3. Common Areas and Exterior Sites Testing Rules**
- a. Similar common areas and similar exterior sites must always be tested, but in some cases they can be sampled in much the same way that dwelling units are. Common areas and building exteriors typically have a similar painting history from one building to the next. In multifamily housing, each common area (such as building lobby, laundry room, or hallway) can be treated as a dwelling unit. If there are multiple similar common areas, they may be grouped for sampling purposes I exactly the same way as regular dwelling units. However, dwelling units, common areas and exterior sites cannot be all mixed together in a single group. All testing combinations within each common area or building exteriors selected for testing must be inspected. This includes playground equipment, benches and miscellaneous testing combinations located throughout the development. The specific common areas and building exteriors to test should be randomly selected, in much the same way as specific units are selected using random numbers. The number of common areas to be tested should be taken from table 7.3 (HUD Guidelines). In this instance, common areas and building exteriors can be treated in the same way as housing units (although they are not to be confused with true housing units).
- 4. Unit and Common Area Drawings**
- a. Mark-ups of as built drawings depicting room equivalents that are tested must be provided as part of the report.
 - b. The Contractor should test in a clockwise path starting from the door through the space and room equivalents so that the approximate location of each component tested can be easily established by referencing the room equivalent and sides.
 - c. Each space must have a reference point (side A, B, C, D or wall 1, 2, 3 or 4). The wall with the door should always be referenced as wall 1 or side A. If there is more than one door, wall 1 or side A should be used to refer to the wall with the door through which the room is first entered when moving in a clockwise fashion through the unit.

B. Evaluation of the Inspection by the the Owner

1. The Contractor will be required to carry out retesting at no additional cost to the the Owner, after completion of the Inspection at each the Owner's development as described in the HUD Guidelines, for single family housing, multi-family housing and common areas. The the Owner shall randomly select the testing combinations to be retested and the Contractor shall perform the retesting using the same XRF instrument(s) which was/were used to take the original readings. An the Owner's inspector shall be present to observe all retesting. The retesting shall be limited to ten (10) testing combinations, and if necessary to repeat the retest, the testing combinations randomly selected for repeating the retest shall also be limited to ten.
 2. If the retest tolerance limit computed from the information provided in the "XRF Performance Characteristics Sheet" (see HUD Guidelines) is exceeded, the retest will be repeated as described in the HUD Guidelines for single family, multi-family housing and common areas. If the retest tolerance limit is exceeded again, the the Owner may require the Contractor to retest the entire development at no additional cost to the the Owner, or the the Owner may withhold all payments and terminate its agreement with the Contractor.
- C. Option to do Laboratory Testing only
1. The the Owner may, for a specific testing assignment, request in writing that the Contractor, when utilizing the multi-family housing testing rules for random sampling, or the single family housing testing rules, do all testing through laboratory analysis of paint chips rather than through XRF Spectrum Analyzer testing with laboratory confirmation as needed. Please note that under the single family housing testing rules, only one paint chip must be taken and analyzed for each component type.
- D. Waste Disposal
1. All waste generated must be legally disposed in accordance with Federal, State and Local regulations.

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SECTION 01 95 99 92d - LEAD DUST WIPE, AIR AND TCLP SAMPLING AND ANALYSIS

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for lead dust wipe, air and TCLP sampling and analysis. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

- A. Definitions: Unless otherwise specified the following definitions shall apply:
1. **"Approved"**: shall mean approved by all public agencies having jurisdiction, and the Owner.
 2. **"The Owner"**: shall mean the Owner and its designated authorized representatives.
 3. **"Contractor"**: shall mean the firm that is awarded this contract and is responsible to ensure compliance with Federal, State and City regulations as well as these Contract documents.
 4. **"Development or Project"**: a group of buildings in one or more designated geographical locations, owned or operated by the Owner and referred to by a common name by the Owner.
 5. **"Dust Cleaning Firm"**: shall mean the contractor under a separate contract or the Owner responsible for cleaning of lead dust, as directed by the Owner, until the clearance levels are achieved, as defined in the "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing, June 1995" or latest edition published by the United States Department of Housing and Urban Development (HUD).
 6. **"Equal or Approved Equal"**: shall mean equal in the opinion of the Owner.
 7. **"HUD"**: the United States Department of Housing and Urban Development.
 8. **"HUD Guidelines"**: shall mean Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing issued by HUD'S Office of Lead-Based Paint Abatement and Poisoning Prevention in June 1995 except as such guidelines are later modified by HUD and/or modified by the Owner in writing pursuant to this contract.
 9. **"Inspector"**: an individual who has completed training from an accredited program and been licensed or certified by the appropriate State or local agency to (1) perform inspections to determine and report the presence of lead-based paint on a surface-by-surface basis through on-site testing, (2) report the findings of such an inspection, (3) collect environmental samples for laboratory analysis, (4) perform clearance testing, and (5) document successful compliance with lead-based paint hazard control requirements or standards.
 10. **"Lead-Based Paint"**: any paint, varnish, shellac, or other coating that contains lead equal to or greater than 1.0 mg/cm² as measured by XRF or laboratory analysis, or 0.5 percent by weight (5,000 µg/g, 5,000 PPM, or 5,000 mg/kg) as measured by laboratory analysis.
 11. **"Lead-Based Paint Hazard"**: a condition in which exposure to lead from lead-contaminated dust, lead-contaminated soil or deteriorated lead-based paint would have an adverse effect on human health (as established by the EPA Administrator under Title IV of the Toxic Substance Control Act). Lead-based paint hazards include for example, deteriorated lead-based paint, leaded dust levels above applicable standards and bare leaded soil above applicable standards.
 12. **"Lead-Based Paint Hazard Control"**: activities to control or eliminate lead-based paint hazards, including interim controls and complete abatement.
 13. **"Lead-Contaminated Dust"**: surface dust in residences that contain an area or mass concentration of lead in excess of the standard established by the EPA Administrator, pursuant to Title IV of the Toxic Substance Control Act. Until the EPA standards are set, the HUD recommended clearance and risk assessment standards for leaded dust are 40 µg/ft² on floors, 250 µg/ft² on interior window sills, and 800 µg/ft² on window troughs.

14. **"Monitoring"**: shall refer to inspection to ensure compliance with all Federal, State and City Standards or guidelines, and contractual specifications.
15. **"Provide"**: shall mean furnish and install.
16. **"Risk Assessor"**: a certified individual who has completed training with an accredited training program and who has been certified to (1) perform risk assessments, (2) identify acceptable abatement and interim control strategies for reducing identified lead-based paint hazards, (3) perform clearance testing and reevaluations, and (4) document the successful completion of lead-based paint hazard control activities.

B. Applicable Regulations/References

1. The work conducted shall comply with all applicable Federal, State and City regulations. Applicable guidelines and standards listed in the scope of work include, but are not limited to:

24 CFR Parts 35,36,37 Guidelines for the Evaluation and Control of Lead-Based Paint in Housing (HUD Guidelines June 1995) & 1997 Revisions 29 CFR 1910 29 CFR 1910.1025 29 CFR 1910.134 29 CFR 1910.1200 29 CFR 1910.245 29 CFR 1926 29 CFR 1926.20 29 CFR 1926.21 29 CFR 1926.25 29 CFR 1926.28 29 CFR 1926.51 29 CFR 1926.55 29 CFR 1926.59 29 CFR 1926.62 29 CFR 1926.103 40 CFR 61 Subpart A 40 CFR 241 40 CFR 257 40 CFR 261/262 American National Standards Institute (ANSI) Z87.1 ANSI Z88.2-80 American Society For Testing Materials (ASTM)	HUD Lead-Based Paint Regulations General Industry Standard Lead Standard for General Industry Respiratory Protection Hazard Communication Specification for Accident Prevention Construction Industry Standards General Safety & Health Provisions Safety Training & Education Housekeeping Personal Protective Equipment Washing Facilities Gases, Vapors, Fumes, Dusts & Mists Hazard Communication Standard Construction Industry Lead Standard Respiratory Protection General Provisions Guidelines for the Land Disposal of Solid Waste Criteria for the Land Disposal of Solid Waste Waste Disposal Facilities & Practices Eye Protection Practices for Respiratory Protection All Applicable Standards
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2. The contractor shall ensure that any programs, certifications, licenses or other documentation in accordance with the above and/or any other applicable Federal, State, and Local Regulations/Guidelines are provided.

C. Scope Of Work

1. The work shall consist of furnishing labor, materials, insurance and all other incidental items required to perform the following:
 - a. Dust wipe sampling and analysis
 - 1) Collect dust wipe samples from various horizontal surfaces, such as floors, window sills, window troughs, etc., as directed by the Owner.
 - 2) Dust wipe samples shall be collected in accordance with ASTM ES30-94.

- 3) Analyze dust wipe sample in the laboratory using Flame Atomic Absorption Spectrometry ("FAAS") or Graphite Furnace Atomic Absorption Spectrometry("GFAAS").
 - 4) Provide result of analysis in micrograms per square foot.
 - 5) A faxed summary of results must be provided to the Owner within 24 hours after the Owner authorizes the Contractor to perform the laboratory analysis of the collected dust wipe sample. Contractor shall also have the ability to provide results in 4 hours for clearance, following lead-based paint abatement work, if requested by the Owner. The sampling result must be provided in a form approved by the Owner and must include for each dust wipe sample, the Project, the building address, the sample number, the room or room equivalent, the surface type, dimensions of sample areas, total micrograms, micrograms per square feet, and an indication of pass or fail.
 - 6) Turn-around time for results shall be counted from the time the Contractor performs collection of dust wipe samples to the time the results are actually presented to the Owner. This includes travel time from the site to the laboratory of the Contractor and back to the site.
 - 7) A detailed final report covering the results of all dust wipe samples taken and analyzed must be submitted within 5 days from the time the Owner authorizes the performance of the laboratory analysis. The sampling report must include for each dust wipe sample, the Project, the building address, the sample number, the room or room equivalent, the surface type, dimensions of sample areas, total micrograms, micrograms per square feet, and indicate pass or fail in a form approved by the Owner. Also include in the report the method of analysis, i.e. "FAAS" or "GFAAS", and the detection limits. The laboratory test results in the final report must be signed by the Laboratory Director.
 - 8) The sampling data report must contain all required data fields as specified by the Owner. The sampling data report shall be provided to the Owner on 3.5 inch high density diskettes in ASCII file form. The required data fields will be provided by the Owner to the Contractor.
 - 9) The laboratory used for the analysis of the dust wipe samples must be certified by the State Department of Health (or other responsible agency) and by the USEPA through the EPA's National Lead Laboratory Accreditation Program ("NLLAP"), or as an alternative having accreditation application pending before NLLAP, and having acceptable performance on five consecutive rounds of the EPA, Environmental Laboratory Proficiency Analytical Testing (ELPAT) program, including the most recent round; evidence of such accreditation must be provided. Indicate if the laboratory is an independent entity from the Contractor.
- b. Dust Spiked Samples
- 1) Provide dust spiked samples to the Owner. Dust spiked samples shall be prepared in accordance with the HUD Guidelines.
NOTE: These samples are separate from the ones required by the Contractor for its own QA/QC
 - 2) Prepare dust spiked samples in a manner such that they are indistinguishable from the field samples.
 - 3) Prepare dust spiked samples using the same lot as that to be used in the field.
 - 4) Dust spiked samples shall be inserted into the sample stream, randomly, by the Owner Inspector.
 - 5) Blind analysis of dust spiked samples must fall within 80%-120% of the true value. If the laboratory fails to obtain readings within these limits, two more spiked samples shall be sent immediately to the lab for analysis.
 - 6) If the two additional spiked samples fail, the sample batch shall be considered invalid, and the Owner may, at its sole discretion, terminate this contract as well as withhold payment for services already rendered.
- c. Air Sampling and Analysis

- 1) Collect area air samples at various locations and various projects for personal exposure assessment as directed by the Owner.
 - 2) Air samples shall be collected in accordance with ASTM E1553-93.
 - 3) Prepare air samples for analysis in accordance with ASTM E33-94
 - 4) Analyze air samples using FAAS or GFAAS.
 - 5) All equipment required for personal air sampling, including pumps shall be provided by the Contractor at no extra cost to the Owner.
 - 6) Provide results of air samples in micrograms per cubic meter.
 - 7) A faxed summary of result must be provided to the Owner within 24 hours after the Owner authorizes the Contractor to perform the laboratory analysis of the collected air sample. The sampling result must include for each air sample taken the Project, the building address, the sample number, the room or room equivalent, and the reading.
 - 8) Turn-around time shall start after collection of the air samples, and includes travel time to and from the laboratory.
 - 9) A detailed final report covering the results of all air samples taken and analyzed must be submitted within 5 days from the time the Owner authorizes the performance of the laboratory analysis. The sampling report must include for each air sample, the Project, the building address, the sample number, the room or room equivalent, and the reading. The laboratory report contained in the final report must be signed by the Laboratory Director.
 - 10) The sampling data report must contain all required data fields as specified by the Owner. The sampling data report shall be provided to the Owner on 3.5 inch high density diskettes in ASCII file form. The required data fields will be provided by the Owner to the Contractor.
 - 11) The laboratory used for the analysis of the dust wipe samples must be certified by the State Department of Health (or other responsible agency) and by the USEPA through the EPA's National Lead Laboratory Accreditation Program ("NLLAP"), or as an alternative having accreditation application pending before NLLAP, and having acceptable performance on five consecutive rounds of the EPA, Environmental Laboratory Proficiency Analytical Testing (ELPAT) program, including the most recent round; evidence of such accreditation must be provided. Indicate if the laboratory is an independent entity from the Contractor.
 - 12) Air sampling technician shall be present during the entire shift of the air sampling.
- d. TCLP Sampling and Analysis
- 1) Take core samples of construction waste as directed by the Owner and analyze by TCLP testing to determine if waste is hazardous.
 - 2) Waste shall be classified as hazardous if the concentration of lead is greater than 5 parts per million by TCLP testing.
 - 3) The laboratory used for the analysis of the TCLP samples must be certified by the State Department of Health (or other responsible agency) and by the USEPA through the EPA's National Lead Laboratory Accreditation Program ("NLLAP"), or as an alternative having accreditation application pending before NLLAP, and having acceptable performance on five consecutive rounds of the EPA, Environmental Laboratory Proficiency Analytical Testing (ELPAT) program, including the most recent round; evidence of such accreditation must be provided. Indicate if the laboratory is an independent entity from the Contractor.
 - 4) A faxed summary of result must be provided to the Owner within 48 hours after the Owner authorizes the Contractor to perform the TCLP analysis of the waste. Provide results in parts per million (ppm).
 - 5) Final results provided to the Owner by the Contractor must include written sample preparation procedure and laboratory specific written procedures for performing TCLP, including quality control procedures used for performing the TCLP, and a table listing the sample numbers, description of the construction waste, and the

result of the TCLP. The laboratory report contained in the final report must be signed by the Laboratory Director.

- 6) Final report must also specify detection limits.
- 7) Final report must be provided within 5 days from the time the authorization to perform the TCLP is given by the Owner.

D. General Provisions

1. Some of the work of this contract may be in occupied apartments. The Contractor shall perform all of the work of this contract with the least inconvenience to the tenants.
2. The Contractor shall take all necessary precautions to protect the property of the Owner, its residents, and the public. The Contractor must repair any damaged property, whether of the Owner, its residents, or the public, and restore such property to its original condition. If the damage is beyond repair, the Contractor shall replace it with new, that in the judgment of the Owner, match the existing materials and/or of equal quality and workmanship. All such repairs shall be at the Contractor's expense.
3. The Contractor shall develop a work plan to be performed as requested by the Department of Planning and Development. The detailed plan shall include coordination of the monitoring and sampling work with the Contractor in a manner that will be least disruptive to the normal use of the non-work areas in the building. The plan should also include emergency procedures in case of fire.
4. The Contractor shall perform work in accordance with the latest HUD Guidelines, except as such Guidelines are modified by the Owner in writing in this Contract, or any Contract pursuant to this Contract, and in accordance with all applicable Federal, State and Local regulations.
5. The Contractor shall include in the bid price all supplementary miscellaneous items not specified but implied or required in order to complete the work.

E. Submissions

1. Six (6) copies of the submissions listed below must be submitted to the Owner by the Contractor or Subcontractor performing the Work:
 - a. Ability to perform lead dust wipe sampling by submitting evidence of the successful completion of lead inspector and/or risk assessor training by all staff to be assigned to the job including inspector technicians. As stated previously, training must be provided through an approved program.
 - b. Laboratory certification by the State Department of Health (or other responsible agency) through its ELAP program and by the USEPA through the EPA's National Lead Laboratory Accreditation Program ("NLLAP"), or as an alternative having accreditation application pending before NLLAP and having acceptable performance on five consecutive rounds of the EPA, Environmental Laboratory Proficiency Analytical Testing (ELPAT) program, including the most recent round; evidence of such accreditation must be provided.
 - c. If a subcontractor will be used for any of the laboratory work of this contract, evidence of certification stated in (2) above must also be provided for the subcontractor.

F. Waste Disposal

1. All waste generated must be legally disposed in accordance with the Federal, State and Local Regulations.

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SECTION 01 95 99 92e - SHEATHING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for sheathing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Wall sheathing.
 - b. Roof sheathing.
 - c. Composite nail base insulated roof sheathing.
 - d. Subflooring.
 - e. Underlayment.
 - f. Building paper.
 - g. Building wrap.
 - h. Sheathing joint-and-penetration treatment.
 - i. Flexible flashing at openings in sheathing.

C. Submittals

1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
 - b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
 - c. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
 - d. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 - f. For building wrap, include data on air-/moisture-infiltration protection based on testing according to referenced standards.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.
 - c. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
3. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - a. Preservative-treated plywood.
 - b. Fire-retardant-treated plywood.

- c. Foam-plastic sheathing.
- d. Building wrap.

D. Quality Assurance

1. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
2. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - a. Plywood.
 - b. Oriented strand board.
 - c. Fiberboard wall sheathing.
 - d. Particleboard underlayment.
 - e. Hardboard underlayment.

E. Delivery, Storage, And Handling

1. Stack plywood and other panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.2 PRODUCTS

A. Wood Panel Products, General

1. Plywood: DOC PS 1 **OR** Either DOC PS 1 or DOC PS 2, unless otherwise indicated, **as directed**.
2. Oriented Strand Board: DOC PS 2.
3. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
4. Factory mark panels to indicate compliance with applicable standard.

B. Preservative-Treated Plywood

1. Preservative Treatment by Pressure Process: AWWA C9.
 - a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
3. Application: Treat all plywood, unless otherwise indicated **OR** Treat items indicated on Drawings, **as directed**, and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

C. Fire-Retardant-Treated Plywood

1. General: Comply with performance requirements in AWWA C27.
 - a. Use treatment that does not promote corrosion of metal fasteners.
 - b. Use Exterior type for exterior locations and where indicated.
 - c. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
 - d. Use Interior Type A, unless otherwise indicated.
2. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
3. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
4. Application: Treat all plywood, unless otherwise indicated **OR** Treat plywood indicated on Drawings, and the following, **as directed**:
 - a. Roof and wall sheathing within **48 inches (1220 mm)** of fire **OR** party, **as directed**, walls.

- b. Roof sheathing.
 - c. Subflooring and underlayment for raised platforms.
- D. Wall Sheathing
1. Plywood Wall Sheathing: Exterior, Structural I **OR** Exterior **OR** Exposure 1, Structural I **OR** Exposure 1, **as directed**, sheathing.
 2. Oriented-Strand-Board Wall Sheathing: Exposure 1, Structural I **OR** Exposure 1, **as directed**, sheathing.
 3. Paper-Surfaced Gypsum Wall Sheathing: ASTM C 79/C 79M or ASTM C 1396/C 1396M, gypsum sheathing; with water-resistant-treated core and with water-repellent paper bonded to core's face, back, and long edges.
 - a. Type and Thickness: Regular, **1/2 inch (13 mm)** **OR** Type X, **5/8 inch (15.9 mm)**, **as directed**, thick.
 4. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
 - a. Type and Thickness: Regular, **1/2 inch (13 mm)** **OR** Type X, **5/8 inch (15.9 mm)**, **as directed**, thick.
 5. Cellulose Fiber-Reinforced Gypsum Sheathing: ASTM C 1278/C 1278M, gypsum sheathing.
 - a. Type and Thickness: Regular, **1/2 inch (13 mm)** **OR** Type X, **5/8 inch (15.9 mm)**, **as directed**, thick.
 6. Fiberboard Wall Sheathing: ASTM C 208, Type IV, Grade 1 (Regular) **OR** 2 (Structural), **as directed**, cellulosic fiberboard sheathing with square edges, **1/2 inch (13 mm)** **OR** **25/32 inch (20 mm)**, **as directed**, thick.
 7. Extruded-Polystyrene-Foam Wall Sheathing: ASTM C 578, Type IV, in manufacturer's standard lengths and widths with tongue-and-groove or shiplap long edges as standard with manufacturer.
 - a. Thickness: **3/4 inch (19 mm)** **OR** **1 inch (25 mm)** **OR** As indicated, **as directed**.
 8. Foil-Faced, Polyisocyanurate-Foam Wall Sheathing: ASTM C 1289, Type I, Class 2, aluminum-foil-faced, glass-fiber-reinforced, rigid, cellular, polyisocyanurate thermal insulation. Foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually.
 - a. Thickness: **7/16 inch (11.1 mm)** **OR** **1/2 inch (13 mm)** **OR** **5/8 inch (15.9 mm)** **OR** **3/4 inch (19 mm)** **OR** **1 inch (25 mm)** **OR** As indicated, **as directed**.
- E. Roof Sheathing
1. Plywood Roof Sheathing: Exterior, Structural I **OR** Exterior **OR** Exposure 1, Structural I **OR** Exposure 1, **as directed**, sheathing.
 2. Oriented-Strand-Board Roof Sheathing: Exposure 1, Structural I **OR** Exposure 1, **as directed**, sheathing.
- F. Composite Nail Base Insulated Roof Sheathing
1. Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing: Rigid, cellular, polyisocyanurate thermal insulation with oriented strand board laminated to one face complying with ASTM C 1289, Type V.
 2. Vented, Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing:
 - a. Rigid, cellular, polyisocyanurate thermal insulation complying with ASTM C 1289, Type II, Class 1, with oriented strand board adhered to spacers on one face.
OR
Rigid, cellular, polyisocyanurate thermal insulation with oriented strand board laminated to one face complying with ASTM C 1289, Type V. Oriented-strand-board face has a second layer of oriented strand board adhered to it with spacers between.
 - 1) Polyisocyanurate-Foam Thickness: **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)** **OR** **2 inches (50 mm)** **OR** **2-1/2 inches (64 mm)** **OR** **3 inches (76 mm)** **OR** **3-1/2 inches (89 mm)** **OR** **4 inches (102 mm)**, **as directed**.
 - 2) Oriented-Strand-Board Nominal Thickness: **7/16 inch (11.1 mm)** **OR** **5/8 inch (15.9 mm)**, **as directed**.
 - 3) Spacers: Wood furring strips or blocks not less than **3/4 inch (19 mm)** thick and spaced not more than **12 inches (300 mm)** **OR** **16 inches (400 mm)** **OR** **24 inches (600 mm)**, **as directed**, o.c.

G. Subflooring And Underlayment

1. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exterior, Structural I, C-C Plugged **OR** Exterior, C-C Plugged **OR** Exposure 1, Structural I, Underlayment **OR** Exposure 1, Underlayment, **as directed**, single-floor panels.
2. Oriented-Strand-Board Combination Subfloor-Underlayment: Exposure 1 single-floor panels.
3. Plywood Subflooring: Exterior, Structural I **OR** Exterior **OR** Exposure 1, Structural I **OR** Exposure 1, **as directed**, single-floor panels or sheathing.
4. Oriented-Strand-Board Subflooring: Exposure 1, Structural I sheathing **OR** single-floor panels or sheathing, **as directed**.
5. Underlayment, General: Provide underlayment in nominal thicknesses indicated or, if not indicated, not less than **1/4 inch (6.4 mm)** over smooth subfloors and not less than **3/8 inch (9.5 mm)** over board or uneven subfloors.
6. Plywood Underlayment for Resilient Flooring: DOC PS 1, Exterior A-C **OR** Exterior B-C **OR** Exterior, C-C Plugged **OR** Exposure 1 Underlayment, **as directed**, with fully sanded face.
7. Plywood Underlayment for Ceramic Tile: DOC PS 1, Exterior, C-C Plugged, not less than **5/8-inch (15.9-mm)** nominal thickness, for ceramic tile set in organic **OR** epoxy, **as directed**, adhesive.
8. Plywood Underlayment for Carpet: DOC PS 1, Exterior, C-C Plugged **OR** Exposure 1, Underlayment **OR** Interior, Underlayment, **as directed**.
9. Particleboard Underlayment: ANSI A208.1, Grade PBU **OR** M-2, Exterior Glue, complying with dimensional tolerances and thickness swell requirements of Grade PBU, **as directed**.
10. Hardboard Underlayment: AHA A135.4, Class 4 (Service), Surface S1S; with back side sanded.

H. Fasteners

1. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - a. For roof and wall, **as directed**, sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M **OR** of Type 304 stainless steel, **as directed**.
2. Nails, Brads, and Staples: ASTM F 1667.
3. Power-Driven Fasteners: NES NER-272.
4. Wood Screws: ASME B18.6.1.
5. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - a. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
6. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.
 - a. For steel framing less than **0.0329 inch (0.835 mm)** thick, attach sheathing to comply with ASTM C 1002.
 - b. For steel framing from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick, attach sheathing to comply with ASTM C 954.
7. Screws for Fastening Oriented-Strand-Board-Surfaced, Polyisocyanurate-Foam Sheathing to Metal Roof Deck: Steel drill screws, in type and length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117. Provide washers or plates if recommended by sheathing manufacturer.

I. Weather-Resistant Sheathing Paper

1. Building Paper:
 - a. ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.**OR**

- IBC Standard 1404.2, Grade D (water-vapor-permeable, kraft building paper), except that water resistance shall be not less than 1 hour and water-vapor transmission shall be not less than 75 g/sq. m x 24 h.
2. Building Wrap: ASTM E 1677, Type I air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - a. Water-Vapor Permeance: Not less than 535 **OR** 152 **OR** 125 **OR** 63, **as directed**, g through 1 sq. m of surface in 24 hours per ASTM E 96, Desiccant Method (Procedure A).
 - b. Allowable UV Exposure Time: Not less than three months.
 3. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.
- J. Sheathing Joint-And-Penetration Treatment Materials
1. Sealant for Paper-Surfaced **OR** Glass-Mat, **as directed**, Gypsum Sheathing Board:
 - a. Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Division 07 Section "Joint Sealants".
OR
Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing, and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
 2. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum **2 inches (50 mm)** wide, **10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m)**, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.
 3. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.
- K. Miscellaneous Materials
1. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 **OR** ASTM D 3498, **as directed**, that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.
 - a. Use adhesives that have a VOC content of 50 **OR** 70, **as directed**, g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.025 inch (0.6 mm) OR 0.030 inch (0.8 mm) OR 0.040 inch (1.0 mm)**, **as directed**.
 3. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

1.3 EXECUTION

- A. Installation, General
1. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 2. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
 3. Securely attach to substrate by fastening as indicated, complying with the following:
 - a. NES NER-272 for power-driven fasteners.
 - b. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - c. "Nailing Schedule," and Tables in Section 2304 of the ICC's International Building Code.
 - d. Table 2306.1, "Fastening Schedule," in SBCCI's "Standard Building Code."

- e. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
 - f. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's "International One- and Two-Family Dwelling Code."
 4. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
 5. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
 6. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
 7. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.
- B. Wood Structural Panel Installation
1. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
 2. Fastening Methods: Fasten panels as indicated below:
 - a. Combination Subfloor-Underlayment:
 - 1) Glue and nail **OR** Nail, **as directed**, to wood framing.
 - 2) Screw to cold-formed metal framing.
 - 3) Space panels **1/8 inch (3 mm)** apart at edges and ends.
 - b. Subflooring:
 - 1) Glue and nail **OR** Nail **OR** Nail or staple, **as directed**, to wood framing.
 - 2) Screw to cold-formed metal framing.
 - 3) Space panels **1/8 inch (3 mm)** apart at edges and ends.
 - c. Wall and Roof Sheathing:
 - 1) Nail **OR** Nail or staple, **as directed**, to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
 - 2) Screw to cold-formed metal framing.
 - 3) Space panels **1/8 inch (3 mm)** apart at edges and ends.
 - d. Underlayment:
 - 1) Nail **OR** Nail or staple, **as directed**, to subflooring.
 - 2) Space panels **1/32 inch (0.8 mm)** apart at edges and ends.
 - 3) Fill and sand edge joints of underlayment receiving resilient flooring right before installing flooring.
- C. Gypsum Sheathing Installation
1. Comply with GA-253 and with manufacturer's written instructions.
 - a. Fasten gypsum sheathing to wood framing with nails **OR** screws, **as directed**.
 - b. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - c. Install boards with a **3/8-inch (9.5-mm)** gap where non-load-bearing construction abuts structural elements.
 - d. Install boards with a **1/4-inch (6.4-mm)** gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
 2. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
 3. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent boards without forcing. Abut ends of boards over centers of studs, and stagger end joints of adjacent boards not less than one stud spacing. Attach boards at perimeter and within field of board to each steel stud.

- a. Space fasteners approximately **8 inches (200 mm)** o.c. and set back a minimum of **3/8 inch (9.5 mm)** from edges and ends of boards.
- b. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
4. Vertical Installation: Install board vertical edges centered over studs. Abut ends and edges of each board with those of adjacent boards. Attach boards at perimeter and within field of board to each stud.
 - a. Space fasteners approximately **8 inches (200 mm)** o.c. and set back a minimum of **3/8 inch (9.5 mm)** from edges and ends of boards.
 - b. For sheathing under stucco cladding, boards may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Fiberboard Sheathing Installation
 1. Comply with ASTM C 846 and with manufacturer's written instructions.
 2. Fasten fiberboard sheathing panels to intermediate supports and then at edges and ends. Use galvanized roofing nails or galvanized staples, **as directed**; comply with manufacturer's recommended spacing and referenced fastening schedule. Drive fasteners flush with surface of sheathing and locate perimeter fasteners at least **3/8 inch (9.5 mm)** from edges and ends.
 3. Install sheathing vertically with long edges parallel to, and centered over, studs. Install solid wood blocking where end joints do not occur over framing. Allow **1/8-inch (3-mm)** open space between edges and ends of adjacent units. Stagger horizontal joints if any.
 4. Cover sheathing as soon as practical after installation to prevent deterioration from wetting.
- E. Foam-Plastic Sheathing Installation
 1. Comply with manufacturer's written instructions.
 2. Foam-Plastic Wall Sheathing: Install vapor-relief strips or equivalent for permitting escape of moisture vapor that otherwise would be trapped in stud cavity behind sheathing.
- F. Particleboard Underlayment Installation
 1. Comply with the National Particleboard Association's recommendations for type of subfloor indicated. Fill and sand gouges, gaps, and chipped edges. Sand uneven joints flush.
 - a. Fastening Method: Glue and nail **OR** Nail **OR** Nail or staple, **as directed**, underlayment to subflooring.
- G. Hardboard Underlayment Installation
 1. Comply with AHA's "Application Instructions for Basic Hardboard Products" and with hardboard manufacturer's written instructions for preparing and applying hardboard underlayment.
 - a. Fastening Method: Nail **OR** Nail or staple, **as directed**, underlayment to subflooring.
- H. Weather-Resistant Sheathing-Paper Installation
 1. General: Cover sheathing with weather-resistant sheathing paper as follows:
 - a. Cut back barrier **1/2 inch (13 mm)** on each side of the break in supporting members at expansion- or control-joint locations.
 - b. Apply barrier to cover vertical flashing with a minimum **4-inch (100-mm)** overlap, unless otherwise indicated.
 2. Building Paper: Apply horizontally with a **2-inch (50-mm)** overlap and a **6-inch (150-mm)** end lap; fasten to sheathing with galvanized staples or roofing nails.
 3. Building Wrap: Comply with manufacturer's written instructions.
 - a. Seal seams, edges, fasteners, and penetrations with tape.
 - b. Extend into jambs of openings and seal corners with tape.
- I. Sheathing Joint-And-Penetration Treatment
 1. Seal sheathing joints according to sheathing manufacturer's written instructions.

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- a. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - b. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.
 - c. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.
- J. Flexible Flashing Installation
1. Apply flexible flashing where indicated to comply with manufacturers written instructions.
 - a. Prime substrates as recommended by flashing manufacturer.
 - b. Lap seams and junctures with other materials at least **4 inches (100 mm)**, except that at flashing flanges of other construction, laps need not exceed flange width.
 - c. Lap flashing over weather-resistant building paper at bottom and sides of openings.
 - d. Lap weather-resistant building paper over flashing at heads of openings.
 - e. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.
- K. Protection
1. Paper-Surfaced Gypsum Sheathing: Protect sheathing by covering exposed exterior surface of sheathing with weather-resistant sheathing paper securely fastened to framing. Apply covering immediately after sheathing is installed.

END OF SECTION 01 95 99 92e

SECTION 01 95 99 92f - EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior standing and running trim.
2. Exterior frames and jambs.
3. Exterior shutters.
4. Exterior **[stairs] [and] [railings]**.
5. Wood furring, blocking, shims, and hanging strips for installing exterior architectural woodwork items that are not concealed within other construction.
6. Shop priming of exterior architectural woodwork.
7. Shop finishing of exterior architectural woodwork.

B. Related Requirements:

1. **[Section 061000 "Rough Carpentry"]** for wood furring, blocking, shims, and hanging strips required for installing exterior architectural woodwork that are concealed within other construction before exterior architectural woodwork installation.
2. Section 062013 "Exterior Finish Carpentry" for exterior carpentry exposed to view that is not specified in this Section.

1.2 COORDINATION

- ##### **A.**
- Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that exterior architectural woodwork can be supported and installed as indicated.

1.3 PREINSTALLATION MEETINGS

- ##### **A.**
- Preinstallation Conference: Conduct conference at site location as directed by the Owner .

1.4 ACTION SUBMITTALS

- ##### **A.**
- Product Data: For each type of product.

1. Wood-Preservative Treatment:

- a. Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- b. Indicate type of preservative used and net amount of preservative retained.
- c. Include chemical-treatment manufacturer's written instructions for finishing treated material and manufacturer's written warranty.

- ##### **2. Fire-Retardant Treatment:**
- Include data and warranty information from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

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3. Waterborne Treatments: For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

B. Sustainable Design Submittals:

1. as directed by the Owner .

C. Shop Drawings:

1. Include dimensioned plans, elevations, sections, and attachment details.
2. Show [**large-scale**] [**full-size**] details.
3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
4. Apply [**AWI Quality Certification**] [**WI Certified Compliance**] Program label to Shop Drawings.

D. Samples: For each exposed product and for each color and finish specified.

1. Size:

- a. Panel Products: **12 inches by 12 inches (300 mm by 300 mm)**.
- b. Lumber Products: Not less than [**5 inches (125 mm) wide by 12 inches (300 mm) long**] [**5 inches (125 mm) wide by 24 inches (600 mm) long**], for each species and cut, finished on one side and one edge.

E. Samples for Initial Selection: For each type of exposed finish.

1. Size:

- a. Panel Products: **12 inches by 12 inches (300 mm by 300 mm)**.
- b. Lumber Products: Not less than [**5 inches (125 mm) wide by 12 inches (300 mm) long**] [**5 inches (125 mm) wide by 24 inches (600 mm) long**], for each species and cut, finished on one side and one edge.

F. Samples for Verification: For the following:

1. Lumber for Exterior Wood-Stain Finish: Not less than **5 inches (125 mm) wide by 12 inches (300 mm) long**, for each species, with one-half of exposed surface finished.
2. Lumber for Transparent Finish: Not less than [**5 inches (125 mm) wide by 12 inches (300 mm) long**] [**5 inches (125 mm) wide by 24 inches (600 mm) long**], for each species and cut, finished on one side and one edge.
3. Lumber and Panel Products with Shop-Applied Opaque Finish: **5 inches (125 mm) wide by 12 inches (300 mm) long** for lumber and [**8 by 10 inches (200 by 250 mm)**] [**12 by 12 inches (300 by 300 mm)**] for panels, for each finish system and color.
 - a. Finish [**entire**] [**one-half of**] exposed surface.
4. Shutter Hardware: Full-size samples for each type and size of hardware in each finish, and color required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [**architectural woodwork manufacturer**] [**and**] [**Installer**].

- B. Evaluation Reports: For **[preservative-treated]** **[and]** **[fire-retardant-treated]** wood materials, from ICC-ES.
- C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Quality Standard Compliance Certificates: **[AWI Quality Certification Program]** **[WI Certified Compliance Program]** certificates.

1.7 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
 - 1. Manufacturer's Certification: Licensed participant in **[AWI's Quality Certification Program]** **[WI's Certified Compliance Program]**.
- B. Installer Qualifications: **[Fabricator of products]** **[Licensed participant in AWI's Quality Certification Program]** **[Licensed participant in WI's Certified Compliance Program]**.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockups of **[typical exterior architectural woodwork as shown on Drawings]** or as directed by the Owner .
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with Architectural Woodwork Standards, Section 2.
- B. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
 - 1. Handle and store fire-retardant-treated wood to comply with chemical-treatment manufacturer's written instructions.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation of exterior architectural woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.
- B. Field Measurements: Where exterior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.

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1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.

C. Established Dimensions: Where exterior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, as directed by the Owner .

2.2 ARCHITECTURAL WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1. Provide [labels] [and] [certificates] from [AWI] [WI] certification program indicating that woodwork[and installation] complies with requirements of grades specified.

a. This project has been registered with AWI as AWI Quality Certification Program Number or as directed by the Owner .

b. Contractor is to register the Work under this Section with the AWI Quality Certification Program at www.awiqcp.org or by calling 800-345-0991.

2. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and the Architectural Woodwork Standards.

2.3 EXTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

A. Architectural Woodwork Standards Grade: [Premium] [Custom] [Economy].

B. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

C. Wood Species: [All-heart redwood] [Western red cedar] [Ponderosa pine or sugar pine] [Eastern white pine] or as directed by the Owner .

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (76 mm) wide.

2. Wood Moisture Content: [9 to 15] [10 to 15] [7 to 12] percent.

2.4 EXTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

A. Architectural Woodwork Standards Grade: [Premium] [Custom] [Economy].

- B. Backout or groove backs of flat trim members, and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- C. Wood Species: [**All-heart redwood**] [**Western red cedar**] [**Ponderosa pine or sugar pine**] [**Eastern white pine, sugar pine, or western white pine**] [**Any closed-grain hardwood**] or as directed by the Owner .
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
 - 2. Wood Moisture Content: [**9 to 15**] [**10 to 15**] [**7 to 12**] percent.

2.5 EXTERIOR FRAMES AND JAMBS FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: [**Premium**] [**Custom**] [**Economy**].
- B. Wood Species: [**Teak**] [**All-heart redwood**] [**Western red cedar**] [**White oak**] [**Ponderosa pine or sugar pine**] or as directed by the Owner .
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
 - 2. Wood Moisture Content: [**9 to 15**] [**10 to 15**] [**7 to 12**] percent.

2.6 EXTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: [**Premium**] [**Custom**] [**Economy**].
- B. Wood Species: [**All-heart redwood**] [**Western red cedar**] [**Ponderosa pine**] [**Ponderosa pine or sugar pine**] [**Eastern white pine, sugar pine, or western white pine**] [**Any closed-grain hardwood**] or as directed by the Owner .
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
 - 2. Wood Moisture Content: [**9 to 15**] [**10 to 15**] [**7 to 12**] percent.

2.7 EXTERIOR SHUTTERS FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: [**Premium**] [**Custom**] [**Economy**].
- B. Wood Species: [**Teak**] [**African mahogany**] [**All-heart redwood**] [**Ponderosa pine or sugar pine**] or as directed by the Owner .
 - 1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
 - 2. Wood Moisture Content: [**9 to 15**] [**10 to 15**] [**7 to 12**] percent.

2.8 EXTERIOR SHUTTERS FOR OPAQUE FINISH

- A. Architectural Woodwork Standards Grade: [**Premium**] [**Custom**] [**Economy**].
- B. Wood Species: [**All-heart redwood**] [**Ponderosa pine**] [**Ponderosa pine or sugar pine**] or as directed by the Owner .

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than **3 inches (76 mm)** wide.
2. Wood Moisture Content: **[9 to 15] [10 to 15] [7 to 12]** percent.

2.9 EXTERIOR STAIRS AND RAILINGS

- A. Architectural Woodwork Standards Grade: **[Premium] [Custom] [Economy]**.
- B. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.
- C. Stair Treads:
 1. **[1-1/4-inch- (32-mm-)] [1-inch- (25-mm-)]** thick, kiln-dried[, **pressure-preservative-treated**] stepping with half-round or rounded edge nosing, of any of the following:
 - a. Douglas fir, NLGA, WCLIB, or WWPA C & Btr VG (Vertical Grain) stepping.
 - b. Hem-fir, NLGA, WCLIB, or WWPA C & Btr VG (Vertical Grain) stepping.
 - c. Southern pine, SPIB B & B stepping.
 2. **[1-1/4-inch- (32-mm-)] [1 inch- (25 mm-)]** actual thickness, kiln-dried with half-round or rounded edge nosing.
 - a. Redwood, RIS **[Deck Heart or Construction Heart] [Deck Common or Construction Common]**.
 - b. Redwood, RIS **[Heart Clear] [Heart B or Select Heart]**.
 - c. Western red cedar, WWPA **[Patio 1] [Patio 2]**.
 - d. Western red cedar, WCLIB **[Select Dex] [Commercial Dex]**.
 - e. Western red cedar (North), NLGAS **[Select Patio] [Commercial Patio]**.
 3. **[1-1/4-inch- (32-mm-)] [1-inch- (25-mm-)] [3/4-inch- (19-mm-)]** actual thickness radius-edged S4S boards, with one face free of planer skip, machine burn, and torn or chipped grain.
 - a. Species: **[Ipe] [Teak] [Cumaru] [Garapa] [Goncalo alves]** or as directed by the Owner .
 - b. Grade Characteristics:
 - 1) Clear[**one face; small pin knots and worm holes allowed on back face**].
 - 2) Sound; small pin knots, worm holes, and fixed knots allowed.
 - 3) All heart[**one face**].
 - 4) Straight grained and parallel cut.
 - 5) Free of heart centers.
 - 6) No decay, incipient decay, honeycomb, knot holes, shakes, splits, or wane.
 - 7) No discoloration.
- D. Stair Risers:
 1. **3/4-inch- (19-mm-)** thick, kiln-dried[, **pressure-preservative-treated**] finish boards, of any of the following:
 - a. Douglas fir, NLGA, WCLIB, or WWPA C & Btr or Superior finish.
 - b. Hem-fir, NLGA, WCLIB, or WWPA C & Btr or Superior finish.
 - c. Southern pine, SPIB B & B.

2. **3/4-inch- (19-mm-)** actual thickness, kiln-dried with half-round or rounded edge nosing.
 - a. Redwood, RIS [**Deck Heart or Construction Heart**] [**Deck Common or Construction Common**].
 - b. Redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
 - c. Western red cedar, WWPA [**Patio 1**] [**Patio 2**].
 - d. Western red cedar, WCLIB [**Select Dex**] [**Commercial Dex**].
 - e. Western red cedar (North), NLGAS [**Select Patio**] [**Commercial Patio**].

3. **3/4-inch- (19-mm-)** actual thickness radius-edged S4S boards, with one face free of planer skip, machine burn, and torn or chipped grain.
 - a. Species: [**Ipe**] [**Teak**] [**Cumaru**] [**Garapa**] [**Goncalo alves**] or as directed by the Owner .
 - b. Grade Characteristics:
 - 1) Clear[**one face; small pin knots and worm holes allowed on back face**].
 - 2) Sound; small pin knots, worm holes, and fixed knots allowed.
 - 3) All heart[**one face**].
 - 4) Straight grained and parallel cut.
 - 5) Free of heart centers.
 - 6) No decay, incipient decay, honeycomb, knot holes, shakes, splits, or wane.
 - 7) No discoloration.

E. Railing Members:

1. Clear, kiln-dried, solid, [**yellow poplar**] [**pressure-preservative-treated Douglas fir**] [**pressure-preservative-treated southern pine**]; railing stock of pattern indicated on Drawings.
2. [**Select Structural**] [**No. 1**] [**No. 2**] [**Construction or No. 2**] grade and[**any of**] the following species:
 - a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Redwood; RIS.
 - e. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.

3. Redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
4. [**Any of the following species and grades:**]
 - a. Douglas fir, NLGA, WCLIB, or WWPA C & Btr finish or C Select.
 - b. Hem-fir, NLGA, WCLIB, or WWPA C & Btr finish or C Select.
 - c. Redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
 - d. Southern pine, SPIM B & B finish.

5. Radius-edged [**Ipe**] [**Teak**] S4S boards, [**same grade as stair treads**] [**clear**] [**clear all heart**] [, **straight grained and parallel cut**].

F. Balusters:

1. **1-1/16-inch- (27-mm-)** square, clear, kiln-dried, solid, [**yellow poplar**] [**pressure-preservative-treated Douglas fir**] [**pressure-preservative-treated southern pine**].
2. **1-1/16-inch- (27-mm-)** square, [**Select Structural**] [**No. 1**] [**No. 2**] [**Construction or No. 2**] grade, and[**any of**] the following species:
 - a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.

- c. Mixed southern pine; SPIB.
 - d. Redwood; RIS.
 - e. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.
3. **1-1/16-inch- (27-mm-)** square, redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
4. **1-1/16-inch- (27-mm-)** square, [**and any of the following species and grades:**]
- a. Douglas fir, NLGA, WCLIB, or WWPA C & Btr finish or C Select.
 - b. Hem-fir, NLGA, WCLIB, or WWPA C & Btr finish or C Select.
 - c. Redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
 - d. Southern pine, SPIM B & B finish.
5. **1-1/16-inch- (27-mm-)** square, radius-edged [**Ipe**] [**Teak**] S4S boards, [**same grade as stair treads**] [**clear**] [**clear all heart**] [, **straight grained and parallel cut**].

G. Newel Posts:

1. **2-3/4-inch- (70-mm-)** square, clear, kiln-dried, [**yellow poplar**] [**pressure-preservative-treated Douglas fir**] [**pressure-preservative-treated southern pine**], turned newel posts of pattern and size indicated on Drawings.
2. **2-3/4-inch- (70-mm-)** square, [**Select Structural**] [**No. 1**] [**No. 2**] [**Construction or No. 2**] grade, and [**any of**] the following species:
- a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Redwood; RIS.
 - e. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.
3. **2-3/4-inch- (70-mm-)** square, redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
4. **2-3/4-inch- (70-mm-)** square, [**and any of the following species and grades:**]
- a. Douglas fir, NLGA, WCLIB, or WWPA C & Btr finish or C Select.
 - b. Hem-fir, NLGA, WCLIB, or WWPA C & Btr finish or C Select.
 - c. Redwood, RIS [**Heart Clear**] [**Heart B or Select Heart**].
 - d. Southern pine, SPIM B & B finish.
5. **2-3/4-inch- (70-mm-)** square, radius-edged [**Ipe**] [**Teak**] S4S boards, [**same grade as stair treads**] [**clear**] [**clear all heart**] [, **straight grained and parallel cut**].

2.10 WOOD MATERIALS

- A. Hardboard: ANSI A135.4.
- B. Softwood Plywood: DOC PS 1, exterior[, **medium-density overlay**].

2.11 PRESERVATIVE-TREATED-WOOD MATERIALS

- A. Preservative-Treated-Wood Materials: Provide with water-repellent preservative treatment complying with AWWA N1 (dip, spray, flood, or vacuum-pressure treatment).

1. Preservative Chemicals: 3-iodo-2-propynyl butyl carbamate (IPBC)[, **combined with a compatible EPA-registered insecticide**].
 2. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- B. Extent of Preservative-Treated Wood Materials: Treat wood materials [**unless otherwise indicated on Drawings**] [**except items indicated to be fire-retardant treated**] or as directed by the Owner .
1. Items fabricated from the following wood species need not be treated:
 - a. **[Redwood]** [**All-heart redwood**].
 - b. **[Western red cedar]** [**All-heart western red cedar**].
 - c. White oak.
 - d. African mahogany.
 - e. Honduras mahogany.
 - f. Ipe.
 - g. Dark red meranti.
 - h. Teak.

2.12 FIRE-RETARDANT-TREATED WOOD MATERIALS

- A. Fire-Retardant-Treated Wood Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products in accordance with test method indicated by a qualified testing agency.
1. Use treated materials that comply with requirements of the Architectural Woodwork Standards for the grade specified. Do not use materials that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Exterior Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested in accordance with ASTM E84 after being subjected to accelerated weathering in accordance with ASTM D2898, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than **10.5 feet (3.2 m)** beyond the centerline of the burners at any time during the test.
1. Kiln-dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
 2. For items indicated to receive a stained, transparent, or natural finish, use organic resin chemical formulation.
 3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking shop certified by testing and inspecting agency.
 4. Mill lumber before treatment and implement procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
- C. Extent of Fire-Retardant-Treated Wood Materials:
1. Exterior architectural woodwork located more than **40 feet (12.192 m)** above grade.
 2. Exterior architectural woodwork in locations with a fire-separation distance of **5 feet (1.524 m)** or less.

3. [Where indicated on Drawings] or as directed by the Owner .

2.13 SHUTTER HARDWARE

- A. Offset Strap Hinges: For inset shutters and with tapered strap. Shutters can lift off pintles after installation. Provide top and bottom hinges for each shutter and matching wood screws for installation.
 1. Offset: [1/2 inch (13 mm)] [1-1/2 inches (38 mm)] [2-1/4 inches (57 mm)] [3-1/4 inches (83 mm)] or as directed by the Owner .
 2. Strap Length: [10 inches (254 mm)] [12 inches (300 mm)] [14 inches (356 mm)] [16 inches (406 mm)] or as directed by the Owner .
 3. Strap Width: [1-3/4 inches (45 mm)] at widest point or as directed by the Owner .
 4. Pintle Plate: [3-1/2 by 1-1/2 by 1/8 inches (89 by 38 by 3 mm)] or as directed by the Owner .
 5. Pintle Diameter: [3/8 inch (10 mm)] or as directed by the Owner .
 6. Material and Finish: [Zinc-chromate-plated steel with black finish] or as directed by the Owner .
- B. New York-Style Hinges: Offset type for full-inset shutters. Provide top and bottom hinges for each shutter and matching wood screws for installation.
 1. Overall Hinge Dimensions: [4-1/4 by 5 inches (108 by 127 mm)] [6 by 6-3/4 inches (152 by 172 mm)] or as directed by the Owner .
 2. Offset: [1-1/16 inches (27 mm)] [1-1/4 inches (32 mm)] [2-1/8 inches (54 mm)] [2-1/4 inches (57 mm)] or as directed by the Owner .
 3. Pintle Plate: [2 by 1-1/8 inches (51 by 29 mm)] [3-1/8 by 1-1/8 inches (79 by 29 mm)] [3-5/8 by 1-3/16 inches (92 by 30 mm)] or as directed by the Owner .
 4. Material and Finish: [Cast iron with rust-inhibiting primer and black matte powder-coated polyurethane finish] [Galvanized steel] [Solid bronze with wax finish] or as directed by the Owner .
- C. L-Type Hinges: Offset type for inset shutters; with tapered long-leg of L-shape oriented horizontally. Shutters can lift off pintles after installation. Provide top and bottom hinges[**and matching middle, straight-plate hinge**] for each shutter and matching wood screws for installation.
 1. L-Shape Plate: [5-inch- (127-mm-) long vertical leg and 6-inch- (152-mm-) long horizontal leg] or as directed by the Owner .
 2. Maximum Leg Width: [1-3/8 inches (35 mm)] or as directed by the Owner .
 3. Offset: [1/2 inch (13 mm)] [1-1/2 inches (38 mm)] [2-1/4 inches (57 mm)] or as directed by the Owner .
 4. Pintle Plate: [3-1/2 by 1-1/2 by 1/8 inch (89 by 38 by 3 mm)] or as directed by the Owner .
 5. Pintle Diameter: [3/8 inch (10 mm)] or as directed by the Owner .
 6. Material and Finish: [Zinc-chromate-plated steel with wrought-iron black finish] or as directed by the Owner .
- D. Connecticut-Style Hinges: Strap-type, loose-joint hinges with threaded pintle. Provide top and bottom hinges[**and matching middle hinge**] for each shutter and matching wood screws for installation.
 1. Type: [No offset] [1-1/4-inch (32-mm) offset] [2-3/16-inch (56-mm) offset] or as directed by the Owner .
 2. Strap Dimensions: [1 by 4-1/4 inches (25 by 108 mm)] [1 by 6-1/2 inches (25 by 165 mm)] or as directed by the Owner .
 3. Pintle: [2-3/8 inches (60 mm) long with 5/16-inch- (8-mm-) diameter thread] [2-3/4 inches (70 mm) long with 1/4-inch- (6-mm-) diameter thread] [4-1/2 inches (114 mm) long with 3/8-inch-

- (10-mm-) diameter thread] [4-1/2 inches (114 mm) long with 7/16-inch- (11-mm-) diameter thread] or as directed by the Owner .
4. Material and Finish: [Galvanized steel] [Stainless steel with black finish] or as directed by the Owner .
- E. Bermuda-Style Hinges: For top-hung shutters. Provide [two] hinges or as directed by the Owner and one matching, shutter stay per shutter. Provide matching wood screws for installation.
1. Overall Hinge Dimensions: [6-3/16 by 3-1/2 inches (157 by 89 mm)] or as directed by the Owner .
 2. Hinge Leg Width: Approximately [1-1/16 inches (27 mm)] or as directed by the Owner .
 3. Hinge Material Thickness: Approximately [1/4 inch (6 mm)] or as directed by the Owner .
 4. Shutter Stay: [24-inch- (610-mm-)] long or as directed by the Owner .
 5. Material and Finish: [Cast iron and coated with a black textured powder coat] or as directed by the Owner .
- F. Shutter Dogs: For holding shutters in open position.
1. Type: [Traditional scroll design] or as directed by the Owner .
 2. Overall Dimensions: [6-3/4 by 2-3/8 inches (172 by 60 mm)] [8-1/8 by 3-1/4 inches (206 by 83 mm)] or as directed by the Owner .
 3. Material and Finish: [Steel with rough black, rust-inhibiting finish] or as directed by the Owner .

2.14 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
1. Use [stainless steel] [fasteners with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329/F2329M] unless otherwise indicated.
 2. For pressure-preservative-treated wood, use stainless steel fasteners.
 3. For redwood, use [brass/bronze] [stainless steel] [hot-dip galvanized-steel] fasteners.
- B. Nails: ASTM F1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Carbon-Steel Bolts: ASTM A307 with ASTM A563 (ASTM A563M) hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- F. Stainless Steel Bolts: ASTM F593, Alloy Group 1 or 2; with ASTM F594, Alloy Group 1 or 2 (ASTM F836M, Grade A1 or Grade A4) hex nuts and, where indicated, flat washers.
- G. Postinstalled Anchors: Stainless steel, [chemical] [or] [torque-controlled expansion] anchors with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing in accordance with ASTM E488/E488M conducted by a qualified independent testing and inspecting agency.
1. Stainless steel bolts and nuts complying with ASTM F593 and ASTM F594, Alloy Group 1 or 2 (ASTM F836M, Grade A1 or Grade A4).

2.15 MISCELLANEOUS MATERIALS

- A. Blocking, Shims, and Nailers: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.
 - 1. Wood-Preservative Treatment: By pressure process, AWPA U1; Use Category UC3b.
 - a. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
 - b. Preservative Chemicals: Acceptable to authorities having jurisdiction[**and containing no arsenic or chromium**].
 - c. Mark lumber with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee's (ALSC) Board of Review.
 - 2. Fire-Retardant Treatment: Complying with requirements; provide [**where indicated on Drawings**] or as directed by the Owner .

2.16 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate exterior architectural woodwork to dimensions, profiles, and details indicated.
 - 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: **1/16 inch (1.5 mm)** unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than **3/4 Inch (19 mm)** Thick: **1/8 inch (3 mm)**.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
 - 1. Disassemble components only as necessary for shipment and installation.
 - 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - 3. Notify Architect seven days in advance of the dates and times exterior architectural woodwork fabrication will be complete.
 - 4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

2.17 SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing exterior architectural woodwork, as applicable to each unit of work.
- B. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork.[**Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.**]
- C. Exterior Architectural Woodwork for Opaque Finish: Shop prime all surfaces with one coat of wood primer as specified in Section 099113 "Exterior Painting."

- D. Exterior Architectural Woodwork for Transparent Finish:
 - 1. Shop seal surfaces to be concealed
 - 2. Shop seal exposed surfaces with stain (if specified), other required pretreatments, and first coat of finish as specified in Section 099300 "Staining and Transparent Finishing."

2.18 SHOP FINISHING

- A. Finish exterior architectural woodwork [**with transparent finish**] [**indicated on Drawings**] at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing exterior architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of exterior architectural woodwork. Apply two coats to end-grain surfaces.
- C. Transparent Finish: Comply with Section 099300 "Staining and Transparent Finishing."
- D. Opaque Finish: Comply with Section 099113 "Exterior Painting."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition exterior architectural woodwork to average prevailing humidity conditions at Project site.
- B. Before installing exterior architectural woodwork, examine shop-fabricated work for completion, and complete work as required, including removing packing and backpriming concealed surfaces.

3.2 INSTALLATION

- A. Grade: Install exterior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble exterior architectural woodwork, and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install exterior architectural woodwork level, plumb, true in line, and without distortion.
 - 1. Shim as required with concealed shims.
 - 2. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- D. Standing and Running Trim:
 - 1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
 - 2. Do not use pieces less than [**36 inches (900 mm)**] [**60 inches (1500 mm)**] [**96 inches (2400 mm)**] long, except where shorter single-length pieces are necessary.
 - 3. Scarf running joints and stagger in adjacent and related members.

- E. Scribe and cut exterior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Preservative-Treated Wood Materials: Where field cut or drilled, treat cut ends and drilled holes in accordance with AWPA M4.
- G. Fire-Retardant-Treated Wood Materials: Install fire-retardant-treated materials to comply with chemical treatment manufacturer's written instructions.
- H. Anchor exterior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 - 1. Secure with countersunk, concealed fasteners and blind nailing.
 - 2. Use fine finishing nails[**or finishing screws**] for exposed fastening, countersunk and filled flush with exterior architectural woodwork.
 - 3. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.
 - 4. For shop-finished items, use filler matching finish of items being installed.
- I. Stair and Railing Installation:
 - 1. Treads and Risers:
 - a. Install stair tread with crown side up (bark side down).
 - b. Secure treads and risers by gluing and nailing to carriages.
 - 1) Extend treads over carriages[**and finish with bullnose edge**].
 - c. Countersink nail heads, fill flush, and sand filler.
 - 2. Balusters:
 - a. Fit balusters to treads, glue, and nail in place.
 - b. Countersink nail heads, fill flush, and sand filler.
 - c. Let into railings and glue in place.
 - 3. Newel Posts: Secure newel posts to stringers and risers with [**through bolts**] [**lag screws**] [**countersunk-head wood screws and glue**].
 - 4. Railings:
 - a. Secure wall rails with metal brackets.
 - b. Fasten freestanding railings to newel posts and to trim at walls with glue and countersunk-head wood screws or rail bolts.
 - 5. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.
 - 6. Install stairs with no more than **3/16-inch (4.7-mm)** variation between adjacent treads and risers and with no more than **3/8-inch (10-mm)** variation between largest and smallest treads and risers within each flight.
- J. Touch up finishing work specified in this Section after installation of exterior architectural woodwork.
 - 1. Fill nail holes with matching filler where exposed.
 - 2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

- K. Field Finishing: See [**Section 099113 "Exterior Painting"**] [and] [**Section 099300 "Staining and Transparent Finishing"**] for final finishing of installed exterior architectural woodwork.

3.3 FIELD QUALITY CONTROL

- A. Inspections: Provide inspection of installed Work through [**AWI's Quality Certification Program**] [**WI's Certified Compliance Program**] certifying that woodwork, including installation, complies with requirements of the Architectural Woodwork Standards for the specified grade.

- 1. Inspection entity is to prepare and submit report of inspection.

3.4 REPAIR

- A. Repair damaged and defective exterior architectural woodwork, where possible, to eliminate functional and visual defects[**and to result in exterior architectural woodwork being in compliance with requirements of the Architectural Woodwork Standards for the specified grade**].

- B. Where not possible to repair, replace defective woodwork.

3.5 CLEANING

- A. Clean exterior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION 01 95 99 92f

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SECTION 01 95 99 92g - PREPARATION FOR RE-ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for preparation for re-roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Roof tear-off.
 - b. Partial roof tear-off.
 - c. Temporary roofing membrane.
 - d. Roof re-cover preparation.
 - e. Removal of base flashings.

C. Materials Ownership

1. Except for items or materials indicated to be reused, reinstalled, or otherwise indicated to remain the Owner's property, demolished materials shall become Contractor's property and shall be removed from Project site.

D. Definitions

1. Roofing Terminology: Refer to ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
2. Existing Membrane Roofing System: Built-up asphalt, Built-up coal-tar, EPDM, CSPE, PVC, TPO, APP-modified bituminous, or SBS-modified bituminous roofing membrane, roof insulation, surfacing, and components and accessories between deck and roofing membrane.
3. Roof Re-Cover Preparation: Existing roofing membrane that is to remain and be prepared for reuse.
4. Roof Tear-Off: Removal of existing membrane roofing system from deck.
5. Partial Roof Tear-Off: Removal of a portion of existing membrane roofing system from deck or removal of selected components and accessories from existing membrane roofing system.
6. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and reinstalled.
7. Existing to Remain: Existing items of construction that are not indicated to be removed.

E. Submittals

1. Product Data: For each type of product indicated.
2. Temporary Roofing: Include Product Data and description of temporary roofing system. If temporary roof will remain in place, submit surface preparation requirements needed to receive permanent roof, and submit a letter from roofing membrane manufacturer stating acceptance of the temporary membrane and that its inclusion will not adversely affect the roofing system's resistance to fire and wind or its FM Global rating, **as directed**.
3. Coal tar roofs can't be mixed with asphalt roofs. Test materials in accordance with the American Society for Testing and Materials (ASTM).
4. Fastener pull-out test report.
5. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including exterior and interior finish surfaces that might be misconstrued as having been damaged by reroofing operations. Submit before Work begins.
6. Landfill Records: Indicate receipt and acceptance of hazardous wastes, such as asbestos-containing material, by a landfill facility licensed to accept hazardous wastes.

7. Qualification Data: For Installer including certificate that Installer is licensed to perform asbestos abatement and is approved by warrantor of existing roofing system.

F. Quality Assurance

1. Installer Qualifications: Installer of new membrane roofing system, licensed to perform asbestos abatement in the State or jurisdiction where Project is located, **as directed**, and approved by warrantor of existing roofing system to work on existing roofing, **as directed**.
2. Regulatory Requirements: Comply with governing EPA notification regulations before beginning membrane roofing removal. Comply with hauling and disposal regulations of authorities having jurisdiction.
3. Reroofing Conference: Conduct conference at Project site.

G. Project Conditions

1. the Owner will occupy portions of building immediately below reroofing area. Conduct reroofing so the Owner's operations will not be disrupted. Provide the Owner with not less than 72 hours' notice of activities that may affect the Owner's operations.
 - a. Coordinate work activities daily with the Owner so the Owner can place protective dust or water leakage covers over sensitive equipment or furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below the work area.
 - b. Before working over structurally impaired areas of deck, notify the Owner to evacuate occupants from below the affected area. Verify that occupants below the work area have been evacuated before proceeding with work over the impaired deck area.
2. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
3. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
4. Conditions existing at time of inspection for bidding will be maintained by the Owner as far as practical.
 - a. A roof moisture survey of existing membrane roofing system is available for Contractor's reference.
 - b. The results of an analysis of test cores from existing membrane roofing system are available for Contractor's reference.
 - c. Construction Drawings and Project Manual for existing roofing system are provided for Contractor's reference. Contractor is responsible for conclusions derived from existing documents.
5. Limit construction loads on roof, as directed by the Owner. Rooftop equipment wheel loads and for uniformly distributed loads.
6. Weather Limitations: Proceed with reroofing preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing roofing system or building.
7. Hazardous Materials: It is not expected that hazardous materials such as asbestos-containing materials will be encountered in the Work.
 - a. Hazardous materials will be removed by the Owner before start of the Work. Existing roof will be left no less watertight than before removal.
 - b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. Hazardous materials will be removed by the Owner under a separate contract.

OR

Hazardous Materials: Present in building to be reroofed. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

- a. Hazardous material remediation is specified elsewhere in the Contract Documents.
- b. Do not disturb hazardous materials or items suspected of containing hazardous materials except according to procedures specified elsewhere in the Contract Documents.

- c. Coordinate with hazardous material remediation subcontractor to prevent water from entering existing roofing system or building.

H. Warranty

1. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during reroofing, by methods and with materials so as not to void existing roofing system warranty. Notify warrantor before proceeding.
 - a. Notify warrantor of existing roofing system on completion of reroofing, and obtain documentation verifying that existing roofing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.2 PRODUCTS

A. Infill Materials

1. Use infill materials matching existing membrane roofing system materials unless otherwise indicated.
 - a. Infill materials are specified in a Division 07.

B. Temporary Roofing Materials

1. Design and selection of materials for temporary roofing are responsibilities of Contractor.
2. Sheathing Paper: Red-rosin type, minimum **3 lb/100 sq. ft. (0.16 kg/sq. m)**.
3. Base Sheet: ASTM D 4601, Type II, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet.
4. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt.
5. Asphalt Primer: ASTM D 41.
6. Roofing Asphalt: ASTM D 312, Type III or IV.

C. Recover Boards

1. Recover Board: ASTM C 208, Type II, Grade 1 **OR** 2, **as directed**, cellulosic-fiber insulation board; **1/2 inch (13 mm)** thick.
OR
 Recover Board: Fan-folded, unfaced, extruded-polystyrene board insulation; **3/16-inch (5-mm)** **OR** **1/4-inch (6-mm)** **OR** **3/8-inch (10-mm)**, **as directed**, nominal thickness.
OR
 Recover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate; **1/4 inch (6 mm)** **OR** **1/2 inch (13 mm)** **OR** Type X, **5/8 inch (16 mm)**, **as directed**, thick.
OR
 Recover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate; **1/4 inch (6 mm)** **OR** **3/8 inch (10 mm)** **OR** **1/2 inch (13 mm)** **OR** **5/8 inch (16 mm)**, **as directed**, thick.
OR
 Recover Board: ASTM C 728, perlite board; **1/2 inch (13 mm)** **OR** **3/4 inch (19 mm)** **OR** **1 inch (25 mm)**, **as directed**, thick.
2. Fasteners: Factory-coated steel fasteners, No. 12 or 14, and metal or plastic plates listed in FM Approval's "Approval Guide," designed for fastening recover boards to deck.

D. Auxiliary Reroofing Materials

1. General: Auxiliary reroofing preparation materials recommended by roofing system manufacturer for intended use and compatible with components of existing and new membrane roofing system.
2. Base Sheet Fasteners: Capped head, factory-coated steel fasteners, listed in FM Approval's "Approval Guide."
3. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing And Trim".

1.3 EXECUTION

A. Preparation

1. Protect existing membrane roofing system that is indicated not to be reroofed.
 - a. Loosely lay **1-inch- (25-mm-)** minimum thick, molded expanded polystyrene (MEPS) insulation over the roofing membrane in areas indicated. Loosely lay **15/32-inch (12-mm)** plywood or OSB panels over MEPS. Extend MEPS past edges of plywood or OSB panels a minimum of **1 inch (25 mm)**.
 - b. Limit traffic and material storage to areas of existing roofing membrane that have been protected.
 - c. Maintain temporary protection and leave in place until replacement roofing has been completed. Remove temporary protection on completion of reroofing.
2. Coordinate with the Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
3. During removal operations, have sufficient and suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain.
4. Maintain roof drains in functioning condition to ensure roof drainage at end of each workday. Prevent debris from entering or blocking roof drains and conductors. Use roof-drain plugs specifically designed for this purpose. Remove roof-drain plugs at end of each workday, when no work is taking place, or when rain is forecast.
 - a. If roof drains are temporarily blocked or unserviceable due to roofing system removal or partial installation of new membrane roofing system, provide alternative drainage method to remove water and eliminate ponding. Do not permit water to enter into or under existing membrane roofing system components that are to remain.
5. Verify that rooftop utilities and service piping have been shut off before beginning the Work.

B. Roof Tear-Off

1. General: Notify the Owner each day of extent of roof tear-off proposed for that day and obtain authorization to proceed.
2. Remove aggregate ballast from roofing membrane. Store aggregate ballast for reuse, **as directed**.
3. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing using a power broom.
4. Remove pavers and accessories from roofing membrane. Store and protect pavers and accessories for reuse, **as directed**. Discard cracked pavers, **as directed**.
5. Remove protection mat and extruded-polystyrene insulation from protected roofing membrane.
 - a. Discard extruded-polystyrene insulation that is wet and exceeds **8 lb/cu. ft. (128 kg/cu. m)**.
 - b. Store extruded-polystyrene insulation for reuse and protect from physical damage.
6. Roof Tear-Off: Remove existing roofing membrane and other membrane roofing system components down to the deck.
 - a. Remove cover boards **OR** roof insulation **OR** substrate boards, **as directed**.
 - b. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen and felts and wet felts.
 - c. Remove excess asphalt from steel deck. A maximum of **15 lb/100 sq. ft. (0.72 kg/sq. m)** of asphalt is permitted to remain on steel decks.
 - d. Remove fasteners from deck or cut fasteners off slightly above deck surface, **as directed**.
7. Partial Roof Tear-Off: Where indicated, remove existing roofing membrane and other membrane roofing system components down to the deck.
 - a. Remove cover boards **OR** roof insulation **OR** substrate boards, **as directed**.
 - b. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen and felts and wet felts.
 - c. Remove excess asphalt from steel deck. A maximum of **15 lb/100 sq. ft. (0.72 kg/sq. m)** of asphalt is permitted to remain on steel decks.
 - d. Remove fasteners from deck or cut fasteners off slightly above deck surface, **as directed**.

OR

Partial Roof Tear-Off: Remove existing roofing membrane and immediately check for presence of moisture by visually observing cover boards **OR** roof insulation **OR** substrate boards, **as directed**, that will remain.

- a. Coordinate with the Owner's inspector to schedule times for tests and inspections immediately after membrane removal.
- b. With an electrical capacitance moisture-detection meter, spot check cover boards **OR** roof insulation **OR** substrate boards, **as directed**, that will remain.
- c. Remove wet or damp boards and roof insulation. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents, **as directed**.
- d. Bitumen and felts that are firmly bonded to concrete decks are permitted to remain if felts are dry. Remove unadhered bitumen and felts and wet felts.
- e. Remove excess asphalt from steel deck. A maximum of **15 lb/100 sq. ft. (0.72 kg/sq. m)** of asphalt is permitted to remain on steel decks.
- f. Remove fasteners from deck or cut fasteners off slightly above deck surface, **as directed**.

C. Deck Preparation

1. Inspect deck after tear-off **OR** partial tear-off, **as directed**, of membrane roofing system.
2. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263 or by pouring **1 pint (0.5 L)** of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if moisture condenses under the plastic sheet or if asphalt test sample foams or can be easily and cleanly stripped after cooling.
3. If broken or loose fasteners that secure deck panels to one another or to structure are observed or if deck appears or feels inadequately attached, immediately notify the Owner. Do not proceed with installation until directed by the Owner.
4. If deck surface is not suitable for receiving new roofing or if structural integrity of deck is suspect, immediately notify the Owner. Do not proceed with installation until directed by the Owner.
5. Provide additional deck securement as indicated on Drawings.
6. Replace deck as indicated on Drawings. Replacement deck is specified in Division 31 OR Division 03 OR Division 21 Section(s) "Fire-suppression Standpipes".

D. Infill Materials Installation

1. Immediately after removal of selected portions of existing membrane roofing system, and inspection and repair, if needed, of deck, fill in the tear-off areas to match existing membrane roofing system construction.
 - a. Installation of infill materials is specified in Division 07.
 - b. Install new roofing membrane patch over roof infill area. If new roofing membrane is installed the same day tear-off is made, roofing membrane patch is not required.

E. Temporary Roofing Membrane

1. Install approved temporary roofing membrane over area to be reroofed.

OR

Install temporary roofing membrane over area to be reroofed. Install two glass-fiber felts **OR** Mechanically fasten base sheet and install a glass-fiber felt, **as directed**, lapping each sheet **19 inches (483 mm)** over preceding sheet. Embed glass-fiber felt in a solid mopping of hot roofing asphalt applied within equiviscous temperature range. Glaze-coat completed surface with hot roofing asphalt.
2. Remove temporary roofing membrane before installing new roofing membrane.

OR

Prepare the temporary roof to receive new roofing membrane according to approved temporary roofing membrane proposal **OR** by patching and repairing temporary roofing membrane, **as directed**. Restore temporary roofing membrane to watertight condition. Obtain approval for temporary roof substrate from roofing membrane manufacturer and the Owner before installing new roof.

F. Roof Re-Cover Preparation

1. Remove blisters, ridges, buckles, mechanically attached roofing membrane fastener buttons projecting above the membrane, **as directed**, and other substrate irregularities from existing roofing membrane that inhibit new recover boards from conforming to substrate.
 - a. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing with a power broom.
 - b. Scarify the surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new recover boards.
 - c. Broom clean existing substrate.
 - d. Coordinate with the Owner's inspector to schedule times for tests and inspections before proceeding with installation of recover boards.
 - e. Verify that existing substrate is dry before proceeding with installation of recover boards. Spot check substrates with an electrical capacitance moisture-detection meter.
 - f. Remove materials that are wet or damp. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.
2. Remove blisters, ridges, buckles, mechanically attached roofing membrane fastener buttons projecting above the membrane, **as directed**, and other substrate irregularities from existing roofing membrane that inhibit new recover boards **OR** roofing membrane, **as directed**, from conforming to substrate.
 - a. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing with a power broom.
 - b. Scarify the surface of sprayed polyurethane foam as necessary to achieve a sufficiently uniform plane to receive new recover boards **OR** roofing membrane, **as directed**.
 - c. Broom clean existing substrate.
 - d. Coordinate with the Owner's inspector to schedule times for tests and inspections.
 - e. Verify that existing substrate is dry before proceeding with installation. Spot check substrates with an electrical capacitance moisture-detection meter.
 - f. Remove materials that are wet and damp. Removal will be paid for by adjusting the Contract Sum according to unit prices included in the Contract Documents.
3. Remove blisters and areas of membrane not fully adhered.
OR
Remove mechanically attached roofing membrane fastener buttons projecting above the membrane and other, **as directed**, substrate irregularities that inhibit new recover boards from conforming to substrate.
 - a. Remove loose aggregate from aggregate-surfaced built-up bituminous roofing with a power broom.
 - b. Clean substrate of contaminants such as dirt, debris, oil, and grease that can affect adhesion of coated foamed roofing.
 - c. Power vacuum the existing roof surface. If recommended by foam manufacturer, prime dried surface at recommended rate with recommended primer.
 - d. Scarify the surface of coated polyurethane roofing as necessary to achieve a suitable substrate for new roofing.
 - e. Provide additional uplift securement for existing roofing system with new screws and plates applied to each roof zone at the following densities:
 - 1) Field of roof, one fastener for each.
 - 2) Corners of roof, one fastener for each.
 - 3) Perimeters of roof, one fastener for each. Width of perimeter zone of roof as directed by the Owner.
 - f. Verify that surface is dry by pressing litmus paper to surface areas most likely to retain moisture, such as shaded areas and low spots. If paper changes color, surface is too wet to apply foam.
 - g. Build up isolated low spots on existing roofing membrane with sprayed foam specified in Division 07 Section "Coated Foamed Roofing" to prevent ponding.

G. Existing Base Flashings

1. Remove existing base flashings around parapets, curbs, walls, and penetrations.
 - a. Clean substrates of contaminants such as asphalt, sheet materials, dirt, and debris.
 2. Do not damage metal counterflashings that are to remain. Replace metal counterflashings damaged during removal with counterflashings of same metal, weight or thickness, and finish **OR** specified in Division 07 Section "Sheet Metal Flashing And Trim" **OR** specified in Division 07 Section "Roof Specialties", **as directed**.
 3. Inspect parapet sheathing for deterioration and damage. If parapet sheathing has deteriorated, immediately notify the Owner.
 4. Remove existing parapet sheathing and replace with new pressure-preservative **OR** exterior fire-retardant, **as directed**, -treated plywood sheathing, 19/32 inch (15 mm) thick. If parapet framing has deteriorated, immediately notify the Owner.
 - a. Plywood parapet sheathing is specified in Division 06 Section(s) "Rough Carpentry" **OR** "Miscellaneous Rough Carpentry", **as directed**.
- H. Fastener Pull-Out Testing
1. Perform **OR** Retain independent testing and inspecting agency to conduct, **as directed**, fastener pull-out tests according to SPRI FX-1, and submit test report to the Owner **OR** roofing membrane manufacturer, **as directed**, before installing new membrane roofing system.
 - a. Obtain the Owner's **OR** roofing membrane manufacturer's, **as directed**, approval to proceed with specified fastening pattern. the Owner **OR** Roofing membrane manufacturer, **as directed**, may furnish revised fastening pattern commensurate with pull-out test results.
- I. Recover Board Installation
1. Install recover boards over roof insulation **OR** roofing membrane, **as directed**, with long joints in continuous straight lines and end joints staggered between rows. Loosely butt recover boards together and fasten to deck, **as directed**.
 - a. Tape joints of recover boards if required by roofing membrane manufacturer.
 - b. Fasten recover boards to resist wind-uplift pressure at corners, perimeter, and field of roof specified in Division 07 Section "Built-up Asphalt Roofing".
 - c. Install additional fasteners near board corners and edges as necessary to conform boards to substrate and to adjacent boards.
- J. Disposal
1. Collect demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site.
 - a. Storage or sale of demolished items or materials on-site is not permitted.
 2. Transport and legally dispose of demolished materials off the Owner's property.

END OF SECTION 01 95 99 92g

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SECTION 01 95 99 92h - GYPSUM BOARD

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gypsum board. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Interior gypsum board.
 - b. Exterior gypsum board for ceilings and soffits.
 - c. Tile backing panels.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For the following products:
 - a. Trim Accessories: Full-size Sample in **12-inch- (300-mm-)** long length for each trim accessory indicated.
 - b. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.
3. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For adhesives used to laminate gypsum board panels to substrates, including printed statement of VOC content.

D. Quality Assurance

1. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
2. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

E. Storage And Handling

1. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

F. Project Conditions

1. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
2. Do not install interior products until installation areas are enclosed and conditioned.
3. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.2 PRODUCTS

A. Panels, General

1. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
2. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

B. Interior Gypsum Board

1. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.
2. Regular Type:
 - a. Thickness: **1/2 inch (12.7 mm)**.
 - b. Long Edges: Tapered **OR** Tapered and featured (rounded or beveled) for prefilling, **as directed**.
3. Type X:
 - a. Thickness: **5/8 inch (15.9 mm)**.
 - b. Long Edges: Tapered **OR** Tapered and featured (rounded or beveled) for prefilling, **as directed**.
4. Type C:
 - a. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
 - b. Long Edges: Tapered.
5. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 - a. Thickness: **1/4 inch (6.4 mm)**.
 - b. Long Edges: Tapered.
6. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
 - a. Thickness: **1/2 inch (12.7 mm)**.
 - b. Long Edges: Tapered.
7. Foil-Backed Type:
 - a. Core: As indicated on Drawings **OR 3/8 inch (9.5 mm)**, regular type **OR 1/2 inch (12.7 mm)**, regular type **OR 5/8 inch (15.9 mm)**, Type X **OR** Type C as required by fire-resistance-rated assembly indicated on Drawings, **as directed**.
 - b. Long Edges: Tapered **OR** Tapered and featured (rounded or beveled) for prefilling, **as directed**.
8. Abuse-Resistant Type: Manufactured to produce greater resistance to surface indentation, through-penetration (impact resistance), and abrasion than standard, regular-type and Type X gypsum board.
 - a. Core: As indicated on Drawings **OR 1/2 inch (12.7 mm)**, regular type **OR 5/8 inch (15.9 mm)**, Type X, **as directed**.
 - b. Long Edges: Tapered.
9. High-Impact Type: Manufactured with Type X core, plastic film laminated to back side for greater resistance to through-penetration (impact resistance).
 - a. Core: As indicated on Drawings **OR 5/8 inch (15.9 mm)** thick, **as directed**.
 - b. Plastic-Film Thickness: **0.010 inch (0.254 mm)** **OR 0.020 inch (0.508 mm)** **OR 0.030 inch (0.762 mm)** **OR 0.081 inch (2.057 mm)**, **as directed**.
10. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
 - a. Core: **5/8 inch (15.9 mm)**, Type X.
 - b. Long Edges: Tapered.

C. Exterior Gypsum Board For Ceilings And Soffits

1. Exterior Gypsum Soffit Board: ASTM C 931/C 931M or ASTM C 1396/C 1396M, with manufacturer's standard edges.

- 1) Core: As indicated **OR 1/2 inch (12.7 mm)**, regular type **OR 5/8 inch (15.9 mm)**, Type X, **as directed**.
2. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.
 - a. Core: As indicated **OR 1/2 inch (12.7 mm)**, regular type **OR 5/8 inch (15.9 mm)**, Type X, **as directed**.
- D. Tile Backing Panels
 1. Water-Resistant Gypsum Backing Board: ASTM C 630/C 630M or ASTM C 1396/C 1396M.
 - a. Core: As indicated on Drawings **OR 1/2 inch (12.7 mm)**, regular type **OR 5/8 inch (15.9 mm)**, Type X **OR** Type C as required by fire-resistance-rated assembly indicated on Drawings, **as directed**.
 2. Glass-Mat, Water-Resistant Backing Board:
 - a. Complying with ASTM C 1178/C 1178M.
 - b. Complying with ASTM C1177/C 1177M.
 - c. Core: As indicated on Drawings **OR 1/2 inch (12.7 mm)**, regular type **OR 5/8 inch (15.9 mm)**, Type X, **as directed**.
 3. Cementitious Backer Units: ANSI A118.9.
 - a. Thickness: As indicated on Drawings **OR 1/2 inch (12.7 mm)**, **as directed**.
- E. Trim Accessories
 1. Interior Trim: ASTM C 1047.
 - a. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet **OR** Galvanized or aluminum-coated steel sheet or rolled zinc **OR** Plastic **OR** Paper-faced galvanized steel sheet, **as directed**.
 - b. Shapes:
 - 1) Cornerbead.
 - 2) Bullnose bead.
 - 3) LC-Bead: J-shaped; exposed long flange receives joint compound.
 - 4) L-Bead: L-shaped; exposed long flange receives joint compound.
 - 5) U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - 6) Expansion (control) joint.
 - 7) Curved-Edge Cornerbead: With notched or flexible flanges.
 2. Exterior Trim: ASTM C 1047.
 - a. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.
 - b. Shapes:
 - 1) Cornerbead.
 - 2) LC-Bead: J-shaped; exposed long flange receives joint compound.
 - 3) Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.
 3. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - a. Aluminum: Alloy and temper with not less than the strength and durability properties of **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5.
 - b. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.
- F. Joint Treatment Materials
 1. General: Comply with ASTM C 475/C 475M.
 2. Joint Tape:
 - a. Interior Gypsum Wallboard: Paper.
 - b. Exterior Gypsum Soffit Board: Paper.
 - c. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 - d. Tile Backing Panels: As recommended by panel manufacturer.
 3. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - a. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

- b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping **OR** drying-type, all-purpose, **as directed**, compound.
 - 1) Use setting-type compound for installing paper-faced metal trim accessories.
 - c. Fill Coat: For second coat, use setting-type, sandable topping **OR** drying-type, all-purpose, **as directed**, compound.
 - d. Finish Coat: For third coat, use setting-type, sandable topping **OR** drying-type, all-purpose, **as directed**, compound.
 - e. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound **OR** drying-type, all-purpose compound **OR** high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish, **as directed**.
4. Joint Compound for Exterior Applications:
 - a. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - b. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.
 5. Joint Compound for Tile Backing Panels:
 - a. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - b. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
 - c. Cementitious Backer Units: As recommended by backer unit manufacturer.
- G. Auxiliary Materials
1. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
 2. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
 - a. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - a. Use screws complying with ASTM C 954 for fastening panels to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
 - b. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
 4. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - a. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - b. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
 5. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants".
 - a. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 6. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation".
 7. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation".
- H. Texture Finishes
1. Primer: As recommended by textured finish manufacturer.
 2. Polystyrene Aggregate Ceiling Finish: Water-based, job-mixed, polystyrene aggregate finish with flame-spread and smoke-developed indexes of not more than 25 when tested according to ASTM E 84.
 - a. Texture: Fine **OR** Medium **OR** Coarse, **as directed**.
 3. Aggregate Finish: Water-based, job-mixed, aggregated, drying-type texture finish for spray application.

- a. Texture: Light spatter **OR** Spatter knock-down, **as directed**.
4. Acoustical Finish: Water-based, chemical-setting or drying-type, job-mixed texture finish for spray application.
 - a. Application Thickness: **1/2 inch (12.7 mm)**.
 - b. Fire-Test-Response Characteristics: Indices when tested according to ASTM E 84 as follows:
 - 1) Flame Spread: Less than 25.
 - 2) Smoke Developed: Less than 450.
 - c. NRC: 0.55 according to ASTM C 423.

1.3 EXECUTION

A. Examination

1. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
2. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Applying And Finishing Panels, General

1. Comply with ASTM C 840.
2. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
3. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch (1.5 mm)** of open space between panels. Do not force into place.
4. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
5. Form control and expansion joints with space between edges of adjoining gypsum panels.
6. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - a. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than **8 sq. ft. (0.7 sq. m)** in area.
 - b. Fit gypsum panels around ducts, pipes, and conduits.
 - c. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow **1/4- to 3/8-inch- (6.4- to 9.5-mm-)** wide joints to install sealant.
7. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide **1/4- to 1/2-inch- (6.4- to 12.7-mm-)** wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
8. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
9. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members, or provide control joints to counteract wood shrinkage.
10. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

11. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

C. Applying Interior Gypsum Board

1. Install interior gypsum board in the following locations:
 - a. Regular Type: As indicated on Drawings **OR** Vertical surfaces, unless otherwise indicated, **as directed**.
 - b. Type X: As indicated on Drawings **OR** Where required for fire-resistance-rated assembly **OR** Vertical surfaces, unless otherwise indicated, **as directed**.
 - c. Type C: As indicated on Drawings **OR** Where required for specific fire-resistance-rated assembly indicated, **as directed**.
 - d. Flexible Type: As indicated on Drawings **OR** Apply in double layer at curved assemblies, **as directed**.
 - e. Ceiling Type: As indicated on Drawings **OR** Ceiling surfaces, **as directed**.
 - f. Foil-Backed Type: As indicated on Drawings **OR as directed**.
 - g. Abuse-Resistant Type: As indicated on Drawings **OR as directed**.
 - h. High-Impact Type: As indicated on Drawings **OR as directed**.
 - i. Moisture- and Mold-Resistant Type: As indicated on Drawings **OR as directed**.
2. Single-Layer Application:
 - a. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - b. On partitions/walls, apply gypsum panels vertically (parallel to framing) **OR** horizontally (perpendicular to framing), **as directed**, unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - 1) Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 2) At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 - c. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 - d. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
3. Multilayer Application:
 - a. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, **16 inches (400 mm)** minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 - b. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 - c. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 - d. Fastening Methods: Fasten base layers and face layers separately to supports with screws **OR** Fasten base layers with screws; fasten face layers with adhesive and supplementary fasteners, **as directed**.
4. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
5. Curved Surfaces:

- a. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus **12-inch- (300-mm-)** long straight sections at ends of curves and tangent to them.
 - b. For double-layer construction, fasten base layer to studs with screws **16 inches (400 mm)** o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced **12 inches (300 mm)** o.c.
- D. Applying Exterior Gypsum Panels For Ceilings And Soffits
1. Apply panels perpendicular to supports, with end joints staggered and located over supports.
 - a. Install with **1/4-inch (6.4-mm)** open space where panels abut other construction or structural penetrations.
 - b. Fasten with corrosion-resistant screws.
- E. Applying Tile Backing Panels
1. Water-Resistant Gypsum Backing Board: Install at showers, tubs, and where indicated. Install with **1/4-inch (6.4-mm)** gap where panels abut other construction or penetrations.
 2. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install at showers, tubs, and where indicated **OR** locations indicated to receive tile, **as directed**. Install with **1/4-inch (6.4-mm)** gap where panels abut other construction or penetrations.
 3. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated **OR** locations indicated to receive tile, **as directed**.
 4. Areas Not Subject to Wetting: Install regular-type gypsum wallboard panels to produce a flat surface except at showers, tubs, and other locations indicated to receive water-resistant panels.
 5. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- F. Installing Trim Accessories
1. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
 2. Control Joints: Install control joints at locations indicated on Drawings **OR** according to ASTM C 840 and in specific locations approved by the Owner for visual effect, **as directed**.
 3. Interior Trim: Install in the following locations:
 - a. Cornerbead: Use at outside corners, unless otherwise indicated.
 - b. Bullnose Bead: Use at outside corners **OR** where indicated, **as directed**.
 - c. LC-Bead: Use at exposed panel edges.
 - d. L-Bead: Use where indicated.
 - e. U-Bead: Use at exposed panel edges **OR** where indicated, **as directed**.
 - f. Curved-Edge Cornerbead: Use at curved openings.
 4. Exterior Trim: Install in the following locations:
 - a. Cornerbead: Use at outside corners.
 - b. LC-Bead: Use at exposed panel edges.
 5. Aluminum Trim: Install in locations indicated on Drawings.
- G. Finishing Gypsum Board
1. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
 2. Prefill open joints, rounded or beveled edges, and damaged surface areas.
 3. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
 4. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - a. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - b. Level 2: Panels that are substrate for tile **OR** Panels that are substrate for acoustical tile **OR** Where indicated on Drawings, **as directed**.

- c. Level 3: For surfaces receiving medium- or heavy-textured finishes before painting or heavy wallcoverings where lighting conditions are not critical **OR** Where indicated on Drawings, **as directed**.
- d. Level 4: For surfaces receiving light-textured finishes, wallcoverings, and flat paints **OR** At panel surfaces that will be exposed to view, unless otherwise indicated, **as directed**. This is generally the standard exposed finish. Gloss and semi-gloss enamel paints are not usually recommended over this level of finish. ASTM C 840 requires application of "drywall primer" on surfaces before final decoration
 - 1) Primer and its application to surfaces are specified in other Division 07.
- e. Level 5: For surfaces receiving gloss and semigloss enamels and other surfaces subject to severe lighting **OR** Where indicated on Drawings, **as directed**.
 - 1) Primer and its application to surfaces are specified in other Division 07.
- f. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- g. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.
- h. Cementitious Backer Units: Finish according to manufacturer's written instructions.

H. Applying Texture Finishes

- 1. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.
- 2. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.
- 3. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture-finish manufacturer's written recommendations.

I. Protection

- 1. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- 2. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 01 95 99 92h

Task	Specification	Specification Description
01 95 99 92	01 00 00 00	General Requirements
01 95 99 92	01 22 16 00	No Specification Required
01 95 99 92	01 74 19 00	Construction Waste Management
01 95 99 92	02 82 16 00	Encapsulation (Lock-Down) Of Asbestos-Containing Materials
01 95 99 92	02 82 33 00	Removal Of Friable Asbestos-Containing Materials
01 95 99 92	02 83 19 13	Removal And Disposal Of Lead-Containing Paint
01 95 99 92	06 10 00 00	Rough Carpentry
01 95 99 92	06 10 00 00a	Miscellaneous Carpentry
01 95 99 92	01 95 06 00b	Interior Architectural Woodwork
01 95 99 92	07 31 13 13	Asphalt Shingles
01 95 99 92	07 31 16 00	Metal Shingles
01 95 99 92	07 31 26 00	Slate Shingles
01 95 99 92	07 31 29 13	Wood Shingles And Shakes
01 95 99 92	07 32 13 00	Clay Roof Tiles
01 95 99 92	07 32 16 00	Concrete Roof Tiles
01 95 99 92	07 51 13 00	Built-Up Asphalt Roofing
01 95 99 92	01 95 07 00a	Sheet Metal Flashing And Trim
01 95 99 92	08 53 13 00	Vinyl Windows
01 95 99 92	09 91 13 00	Exterior Painting
01 95 99 92	09 91 23 00	Interior Painting

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SECTION 01 95 99 99 - RELIEF WELLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for relief wells. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Submit shop drawings.
2. Statements
 - a. Before installation, all well screen shall be approved.
 - b. The filter pack material and its gradation shall be approved before it is placed.
 - c. Submit the cement grout mixture proportion to be used in plugging abandoned wells.
3. Reports: Submit sampling and testing reports for each relief well, logs of the borings, well screen and riser pipe, backfill material, and pump tests. Register each well with the state as required by the state in which the well is installed.

- C. Regulatory Requirements: The state statutory and regulatory requirements form a part of this specification.

1.2 PRODUCTS

- A. Well Screen: The Contractor may, at its option, furnish and install well screen of any of the alternate types specified. The clear inside diameter of the screen shall be as directed by the Owner. Screen openings shall be uniform in size and pattern, and shall be spaced approximately equally around the circumference of the pipe.

1. PVC Pipe Screen: Pipe, fittings, and screen shall be of the size and types specified. Pipe, fittings, and screen shall conform to ASTM D 1784, ASTM D 1785, ASTM D 2466, or ASTM D 2467. All joints in the PVC pipe shall include couplings and shall be glued with a solvent cement conforming to ASTM D 2564. The PVC pipe strength properties shall be equivalent to PVC 1120 Schedule 40 **OR 80, as directed**, unthreaded plastic pipe.
 - a. Couplings: Couplings shall be bonded socket **OR** threaded, **OR** certilock, **as directed**, type. Fittings shall be produced of the same material and equal quality as specified for plastic pipe screen. Socket type fitting connections of pipe sections shall be bonded with solvent cement. The determination of the proportions and preparation of adhesives, the method of application, and the procedure used for making and curing the connections shall be the responsibility of the Contractor. The system for making joints at the relief well site shall provide a curing period adequate to develop the ultimate strength of the solvent cement. Self-tapping screws or other devices for holding pipe in the couplings during the setting period may be utilized as long as the screws do not penetrate the inside of the pipe. In no case shall a newly-made joint in the casing be stressed, lowered into the relief well, or be submerged in water prior to complete curing of the solvent cement adhesive.
 - b. Perforations: The PVC well screen shall be mill slot **OR** continuous wire wrapped rod base **OR** continuous wire wrapped rod base on perforated pipe **OR** continuous wire wrapped on perforated pipe screen **OR** similar to that manufactured by Johnson Well Equipment, Inc., Pensacola, FL, telephone (904) 453-3131, **as directed**. All well screen shall have smooth, sharp-edged openings free of burns, chipped edges, or broken areas on the interior and exterior surfaces of the pipe. The slots or groups of slots shall be distributed in a uniform pattern around the periphery of the pipe and shall be oriented with the length of the slot parallel to, normal to, or diagonal with the axis of the pipe.

2. **Fiberglass Pipe Screen:** Fiberglass pipe screen and fittings shall be manufactured from thermosetting epoxy resins and glass fiber by either a centrifugal casting process or by a filament winding process. Glass fiber used shall be continuous filament, electrical glass with a finish compatible with epoxy resins. Each glass fiber or filament shall be thoroughly impregnated with epoxy resin. Fiberglass pipe wall thickness, strength and durability requirements shall be equivalent to the Fiberglass/Epoxy pipe produced by Fiberglass Resources Corporation of Farmingdale, New York or Burgess Well Company, Inc., Minden, Nebraska, telephone (308) 832-1642. All fiberglass pipe and fittings shall be round and straight, of uniform quality and workmanship, and free from all defects including indentation, delamination, bends, cracks, blisters, porosity, dry spots, resin segregation and resin-starved areas. The inside of the pipe and fittings shall be smooth and uniform. The impregnation of the glass fiber with resin shall be such that when the pipe is cut or slotted, no fraying or looseness of glass fiber occurs.
 - a. **Couplings:** Couplings for fiberglass pipe sections shall be socket threaded or mechanical key-type couplings. The couplings shall be manufactured of the same materials used for the fiberglass pipe specified herein and may be either cast integrally with the pipe sections or as separate components for attachment to the pipe in the manufacturers plant. Key-type couplings shall consist of male and female halves designed for joining and locking together by means of a key strip inserted in grooves in the coupling halves. The minimum wall thickness remaining at any grooved section shall not be less than the minimum thickness specified for pipe. Key strips and locking strips shall be of fiberglass, plastic or other non-corrosive material capable of withstanding shearing and bearing stresses equivalent to the design load for the coupling. Socket type fitting connections of the pipe sections shall be bonded with epoxy adhesive. The epoxy materials and bonding agents shall be as recommended by the pipe manufacturer. Self-tapping screws or other devices for holding adhesive-joined pipe in the couplings during the curing period may be utilized. In no case shall a newly-made joint in the casing pipe be lowered into the relief well, or be submerged in water prior to complete curing of the adhesive.
 - b. **Perforations:** All fiberglass well screen shall be mill slot **OR** continuous wire wrapped rod base, **as directed**. All relief well screen shall have smooth, sharp-edged openings free of burrs, chipped edges, or broken areas on the interior and exterior surfaces of the pipe. The slots or groups of slots shall be distributed in a uniform pattern around the periphery of the pipe and shall be oriented with the length of the slot parallel to, normal to, or diagonal with the axis of the pipe.
3. **Steel Pipe Screen:** Steel well screen shall consist of perforated or slotted sections of steel pipe conforming to the requirements of ASTM A 53.
 - a. **Couplings:** Couplings for steel pipe screen shall be welded joints or threaded couplings. Welding shall be performed in accordance with requirements in ASME B31.9. Couplings shall meet the material requirements specified for steel pipe screen, except perforations shall be omitted. All threaded pipe and fittings shall be threaded in accordance with ASME B1.20.1. All threaded pipe sections may be field connected. Couplings shall be given the same protection against corrosion as specified for the well screen pipe. Protective coatings damaged while making couplings shall have the areas recoated.
 - b. **Perforations:** All steel pipe to be used as relief well screen shall be provided with perforations which shall consist of either machine-cut slots; drilled or punched openings. The slots or groups of slots shall be distributed in a uniform pattern around the periphery of the pipe and shall be oriented with the length of the slot parallel to, normal to, or diagonal with the axis of the pipe. The pattern of the openings shall be uniformly spaced around the periphery of the pipe.
4. **Stainless Steel Well Screen:** The perforated well screen and fittings shall be fabricated entirely from stainless steel conforming to ASTM A 312/A 312M, Type 304, 304-L, 316 or 316-L. The well screen shall be of stainless steel with a keystone wire-wrapped continuous slot strainer equivalent to that manufactured by Howard Smith Screen Company, Houston, TX, telephone (713) 869-5771 or Johnson Screens, St. Paul, MN 55164, telephone (612) 636-3900.
 - a. **Couplings:** Couplings for the stainless steel well screen shall consist of the same material as the well screen and shall be threaded, flanged, and/or fitted with a welding ring. The

couplings shall conform in design to the couplings recommended by the manufacturer of the well screen.

- b. Tailpipe for Well Screen: The tailpipe for each well screen shall be made of the same material and at least the same minimum thickness as the riser pipe and shall include a bottom plug.
- B. Riser Pipe: The relief well riser pipe material and method of manufacture shall conform to the requirements specified in paragraph WELL SCREEN, except that the screen perforations or opening shall be omitted. The relief well riser pipe diameter and discharge details shall be as directed. Couplings to the well screen and between riser pipe sections shall be as specified in paragraph COUPLING.
- C. Filter Pack: Material for the filter pack around the riser pipes and screens shall be a washed grave, **OR** washed sand **OR** dry processed sand, **as directed**, composed of hard, tough, and durable particles free from adherent coating. The filter pack shall not be crushed stone. The filter pack material shall contain no detrimental quantities of organic matter nor soft, friable, thin, or elongated particles in accordance with the quality requirements in ASTM C 33, Table 1 and Table 3, Class 5S, and in ASTM E 11, Table 1.
- D. Outlet For Relief Well: Check Valve.
 1. The check valve shall be a one piece reinforced all rubber (neoprene) check valve with an integral elastomer flange similar and equal to the Red Valve Series 35, manufactured by Red Valve Company, Inc., 700 North Bell Ave., Pittsburgh, PA 15106, telephone (412) 279-0044. The backup ring for the check valve shall be stainless steel. Stainless steel bolts, washers, and nuts shall be used to fasten the valves onto the flanged end of the pipes. The check valve shall be installed with the flared end duck bill in a vertical position.
OR
Fabricate check valves of brass **OR** stainless steel **OR** aluminum, **as directed**, plate, threaded fasteners and rods. Fabricate sealing disc of silicone sponge rubber free of porous areas, foreign materials, and visible defects.
 2. Workmanship and metalwork fabrication of check valves shall be as directed. Install check valves accurately vertically and adjust to the required elevation.
- E. Concrete: Concrete shall conform to the requirements specified in Division 03 Section "Cast-in-place Concrete".

1.3 EXECUTION

- A. Drilling: Wells may be drilled by the reverse rotary circulation method or other method approved, which will ensure proper placement of the well screen, riser pipe, and filter pack. Methods which involve radical displacement of the formation, or which may reduce the yield of the well, will not be permitted. Excavated material shall be disposed of as directed.
 1. Reverse Circulation Method: If the reverse circulation method is used for drilling wells, all of the drilling fluid shall be removed from the filter pack and the natural pervious formation. If in the opinion of the Owner the walls of the hole above the top of the filter pack require support during development operations, a temporary casing similar to that specified in paragraph TEMPORARY CASING shall be placed so as to extend from the ground surface to at least **3 ft (1 m)** below the top of the filter pack. The diameter of the hole shall be such as will permit the placement of the minimum thickness of filter pack as specified in paragraph FILTER PACK PLACEMENT. The drilling fluid shall be a suspension of fine grained soil or shall be a commercial product of a recognized manufacturer, shall be approved by the Owner, and shall have the characteristic of being readily removable from the filter pack and the walls of the formation by development as specified in paragraph DEVELOPMENT. The use of bentonite will not be permitted.
 2. Temporary Casing: Temporary well casing of either iron or steel of sufficient length to case to the bottom of all borings shall be available at the construction site. the Owner will direct the use of a temporary casing to the bottom of the boring during drilling and placement of screen, riser, and

filter pack when it believes it is necessary to provide adequate support to the sides of the hole. When the walls of the boring will require support only during development operations a temporary casing will be required to extend only to a depth **3 ft (3 m)** below the top of the filter pack. The temporary casing, shall have sufficient thickness to retain its shape and maintain a true section throughout its depth, and may be in sections of any convenient length. The temporary casing shall be such as to permit its removal without disturbing the filter pack, riser, or well screen. The setting of temporary casing shall be such that no cavity will be created outside of it at any point along its length. In the event the temporary casing should become unduly distorted or bent it shall be discarded and a new casing shall be used during installation of any additional relief wells.

B. Installation Of Riser Pipe And Screen

1. **Assembly:** All riser pipe and screen shall be in good condition before installation and all couplings and other accessory parts shall be securely fastened in place. The successive lengths of pipe shall be arranged to provide accurate placement of the screen sections in the bore hole. The riser-pipe shall be provided with an approved cap and a flanged top section, the top of which shall be set at the elevation directed. Centralizers shall be attached to the assembled riser pipe and screen in such numbers and of a type that they will satisfactorily center the riser pipe and screen in the well and will hold it securely in position while the filter pack material is being placed.
2. **Joints:** Sections of relief well pipe shall be joined together as specified in paragraph COUPLINGS. Joints shall be designed and constructed to have the strength of the pipe and where possible a strength capable to support the weight of the relief well stem as it is lowered into the hole. When not practicable to construct joints that will support the weight of the relief well stem, the stem shall be supported at the lower end by any approved means that will assure that the joints do not open while being lowered into place in the well.
3. **Installation:** The assembled riser pipe and screen shall be placed in the bore hole in such manner as to avoid jarring impacts and to ensure that the assembly is centered and not damaged or disconnected. The screen shall be suspended in the hole and not resting on the bottom of the hole. After the screen and riser pipe have been placed, a filter pack shall be constructed around the screen section as specified in paragraph FILTER PACK PLACEMENT and the well developed as specified in paragraph DEVELOPMENT. The top of the riser pipe shall be held at the designated elevation during placement of the filter pack.
4. **Check for Plumbness and Alignment:** The well shall be constructed and all casing set round, plumb, and true. The Contractor shall perform the following tests after the installation of the well but prior to backfilling, and before its acceptance. Additional tests may be made during the performance of the work at the option of the Contractor. Should the Contractor fail to correct, at no additional cost to the Owner, any faulty alignment or plumbness disclosed as a result of these tests, the Owner may refuse to accept the well. the Owner may waive the requirements for plumbness if in its judgement the Contractor has exercised all possible care in constructing the well and the defect is due to circumstances beyond its control or if the utility of the completed well is not materially affected or if the cost of necessary remedial measures will be excessive. In no event will the provisions with respect to alignment be waived.
 - a. **Plumbness:** Plumbness shall be tested by use of a plumb line. The plummet shall be suspended from a small diameter wire rope and its point of suspension shall be in the exact center of the plummet. The plummet shall be sufficiently heavy to stretch the wire rope taut. The wire rope shall pass over a guide sheave which shall be positioned above the top of the well and adjusted horizontally so that the plummet hangs in the center of the well. Displacement of the wire rope during the plumbness check shall be measured by means of a transparent plastic sheet on which a number of concentric circles shall be scribed or drawn, and which is centered on the top of the well. The exact center of these circles shall be marked, and then a slot, slightly larger than the plumb line and extending from this center to the edge, shall be cut in the plastic sheet. As the plummet is lowered, any out-of-plumb condition of the well will be indicated by the wire rope tending to drift away from the center, and the plastic sheet shall be rotated until the slot is oriented in the direction of this drift, while at all times maintaining the center of the concentric circles coincident with the center of the well. Measurement of the amount of drift shall be made

- along the edge of the slot for each increment by which the plummet is lowered into the well. Drift at any depth shall be determined by multiplying the measured plumb line displacement by the total length of the plumb line and dividing the result by the fixed distance between the guide sheave and the top of the well. If desired, alignment may be calculated from the plumbness data in lieu of the alignment check described in paragraph ALIGNMENT. Should the well vary from the vertical in excess of allowable, the plumbness of the well shall be corrected by the Contractor at no additional cost to the Owner.
- b. Alignment: Alignment shall be tested by lowering into the well a section of cylinder or a dummy of the same length. The outside diameter of cylinder shall be smaller than the inside diameter of the well. Should the cylinder fail to move freely throughout the length of the well, the alignment of the well shall be corrected by the Contractor at no additional expense to the Owner.
- C. Filter Pack Placement: After the well screen and riser pipe have been installed, the filter pack material shall be placed by tremie, when using a well graded material, in an approved manner such that segregation will not occur. When using a uniform graded filter material, the material may be poured around the well screen at a rate that will prevent bridging of the material. The material shall be placed around all sides of the screen to assure that the screen is not pushed against the side of the bore hole causing the screen to come in contact with foundation material or prevent the proper thickness of filter from being placed uniformly around the screen. The filter pack shall be placed at a constant rate from the start of placement until it has reached the elevation directed. If a tremie is required, a double string of tremie pipe shall be used. The pipes shall be placed on opposite sides of the screen and/or casing, that is, 180 degrees apart, and shall be guided in such a manner that they will remain in this position throughout the placing process. The tremie pipes shall be set in place, filled completely with filter pack prior to being lifted off the bottom of the hole. The filter pack in the tremie pipe shall be kept above the water surface in the well throughout the placing process. In no case shall the gradation of the filter pack fall outside of the range specified in paragraph FILTER PACK.
- D. Development
1. General: Following placement of filter pack materials, the Contractor shall develop the relief well by jetting, surging, intermittent pumping, or other approved methods as may be necessary to give the maximum yield of water. At the time of development of any relief well, the well shall be free of drawdown or surcharge effects due to pump testing, developing or drilling at another location. The Contractor shall be responsible for maintaining at the relief well the needed access and work area and clearance in the relief well necessary to accomplish development. The Contractor shall furnish, install, or construct the necessary discharge line and troughs to conduct and dispose of the discharge a sufficient distance from the work areas to prevent damage. Development shall be conducted to achieve a stable well of maximum efficiency and shall be continued until a satisfactory sand test, as specified in paragraph SAND TEST, is obtained. As development proceeds, filter pack material shall be added to the annular space around the screen to maintain the top elevation of the filter pack to the specified elevation. The Contractor shall provide an open tube or other approved means for accurately determining the water level in the well under all conditions. If at any time during the development process it becomes apparent in the opinion of the Owner that the well may be damaged, development operations shall be immediately terminated. the Owner may require a change in method if the method selected does not accomplish the desired results. the Owner may order that wells which continue to produce excessive amounts of fines after development for 6 hours be abandoned, plugged, and backfilled, and may require the Contractor to construct new wells nearby. All materials pulled into the well by the development process shall be removed prior to performing the pumping test.
 - a. Jetting: Jetting should be performed using either a single or double ring jet. The jetting tool shall be constructed of high-strength material and conservatively designed and proportioned so that it will withstand high pressures. The jetting tool shall have two hydraulically balanced nozzles spaced 180 degrees **OR** four diameter holes spaced 90 degrees, **as directed**, apart and which shall exert the jetting force horizontally through the screen slots. The rings shall be constructed such that the tips of the jets shall be within **1/2 in. (13 mm)** from the inner surface of the well screen. The pump used in conjunction with

the jetting tool shall be capable of providing a minimum jetting fluid exit velocity of **150 feet per second (45 meters per second)**. Prior to commencing jetting, and following each jetting cycle, all sand and/or other materials shall be removed from inside the screen. All wells shall be pumped during the jetting cycle to remove incoming sand and other material. Such pumping shall be at a rate not less than 115 percent of the rate at which fluid is introduced through the jetting tool. This will allow a flow of material into the well as it is being developed. Water used for development shall be free of sand. the Owner may require other means of developing the well such as intermittent pumping method, variation of the intermittent pumping method, or surge block if it appears that the development of the well is not producing the desired results.

- b. Intermittent Pumping: Intermittent pumping shall be performed by pumping the well at a capacity sufficient to produce a rapid drawdown, stopping the pump (backflow through pump will not be permitted) to permit the water surface to rise to its former elevation, and repeating this procedure. Cycle time for this procedure will vary as directed but will not be more than 3 cycles per minute. A deep well turbine pump, or electric submersible pump with check valve, shall be used with any attachment necessary to accomplish rapid starting and stopping for intermittent pumping. The intake shall be set below the maximum expected drawdown in the well. Prior to commencing intermittent pumping, and periodically during development by this method, all sand and/or other materials shall be removed from inside the screen. The amount of drawdown may be decreased if, in the opinion of the Owner, the efficiency of the well might otherwise be impaired.
 - c. Surging: Surging of the well shall require use of a circular block which is smaller in diameter than the inside diameter of the relief well and is constructed of a material which will not damage the screen if the block comes in contact with the screen, and a bailer or pump to remove materials drawn into the well. The surging shall be continued for a period of approximately one hour or until little or no additional material from the foundation or filter pack can be pulled through the screen. The surge block shall be moved by a steady motion up and down the full length of the well screen. Prior to commencing surging, and periodically during development by this method, all sand and/or other materials shall be removed from inside the screen. All materials pulled into the well by the surging process shall be removed by the Contractor.
- E. Backfilling: After the well has been developed, additional filter pack shall be added if necessary to meet the requirements of paragraph FILTER PACK PLACEMENT. Then the annular space above the filter pack, shall be backfilled by first placing a layer of concrete sand on the filter pack and then filling the remainder of the space up to the finished ground surface **OR** well pit, **as directed**, with grout or concrete. The concrete backfill shall be placed to a depth at least equal to the existing impervious blanket. For PVC riser pipe, after the well has been developed, additional filter pack shall be added if necessary for it to meet the requirements of paragraph FILTER PACK PLACEMENT. Then the remaining annular space above the filter pack shall be backfilled by first placing a layer of concrete sand on the filter pack and then filling the remainder of the space up to the finished ground surface **OR** well pit, **as directed**, with bentonite. The temporary casing, if used, shall be withdrawn in increments as the backfill is placed. The Contractor shall fill with impervious material to original grade all pits such as those incidental to the reverse rotary circulation method of drilling.
- F. Plugging Of Abandoned Wells: The Contractor has the option of attempting to remove the well screen. If the well screen can be removed, the Contractor will grout the bore hole starting from the bottom of the hole. The grouting shall start at the elevation of the bottom of the tailpipe of the well. If the well screen can not be removed or breaks off during the removal attempt, the Contractor shall still be responsible for grouting the well from the bottom of the tailpipe to within **3 ft (1 m)** of ground surface. Either of the above abandonment procedures may require the Contractor to redrill the hole so that the bore hole can be grouted. The well shall be grouted from the bottom of the tailpipe. After the grout has setup the riser pipe shall be cutoff. Then the hole shall be backfilled. The cement grout mixture proportion to be used shall be submitted for approval.

G. Tests

1. Pump Test: Upon completion but before acceptance, each well shall be subjected to a pump test of which a sand test will form a part. The Contractor shall provide a deep well turbine pump, capable of producing the specified drawdowns over periods of time sufficient to satisfactorily perform the pump test specified herein. The intake shall be set below the maximum expected drawdown in the well. The amount of sand shall be measured after each test. The pump shall be complete with either gasoline, diesel, or electric motor of adequate size. In case an electric motor is used, the Contractor shall provide, without additional cost to the Owner, the electric power and the necessary wiring. The Contractor shall provide an open tube or other approved means for accurately determining the water level in the well. The Contractor shall furnish and install an orifice meter of approved design or other approved equipment for the purpose of measuring the discharge from the well during the pumping test. The Contractor shall furnish, install, or construct the necessary pipe discharge line, troughs, or ditches necessary to dispose of the pumping test discharge a sufficient distance from the work area to prevent damage. The tests will be conducted under the direction of the Owner and may be made as soon as each well is completed. Test data will be recorded by the Owner. The Contractor shall test each well by pumping continuously for a minimum of 6 hours. Prior to starting the pump test all material shall be removed from the bottom of the well. If the test is interrupted, other than by order of the Owner, prior to the completion of the specified period of continuous operation, the test shall be re-run. In addition to the required pumping test, the Owner may direct the Contractor to perform additional pump tests. Such additional testing shall conform in general to the requirements specified herein except that the duration of the tests and the approximate draw-down will be determined by the Owner. In the event that sand or other material collects in the well as a result of the pump test, accurate measurements shall be taken as to the quantity of material in the well and all such material shall be removed by the Contractor. Upon completion of the pump test, the Contractor shall remove all equipment, discharge lines, electrical lines, lumber, and debris, and shall backfill any excavated areas with impervious material.
2. Sand Test: As part of each Pump Test or at the end of each intermittent pumping a determination of the amount of sand (filter pack and/or foundation material) a well is producing shall be performed. Prior to starting the sand test all material shall be removed from the bottom of the tailpipe. After the pump is at the desired pumping rate the flow from the discharge shall be diverted into a container that will collect all the sand being carried by the water **OR** through a Rossum Sand Tester, **as directed**. Upon completion of the test the amount of sand in the tailpipe shall be determined to verify that no material is being deposited in the bottom of the well.
3. Filter Pack Sampling and Testing: The Contractor shall verify that all materials conform to the specifications before delivery to the project. The particle size distribution of the filter pack shall be sampled and tested by the Contractor in accordance with ASTM C 136 and ASTM D 75. Within 48 hours before being placed in the relief well to be back-filled, the filter pack shall be sampled from the material stockpiled at the project site. There shall be at least one particle size distribution test on the filter pack for each well. A pump test shall be performed in accordance with technical provisions herein specified.
4. Reports: Reports shall include, for each relief well, logs of the boring, elevations of the well screen, top of riser pipe, bottom of the tailpipe, filter pack gradation, quantity of filter pack added during development, pump test, sand test, and report of backfilling. The log of backfill material shall include the filter pack particle size distribution test data, and notes concerning installation and development of the relief well. The pump test log shall include the duration of the test and the draw-down response data with time in the pumped well, in adjacent wells, and in nearby piezometers. The relief well log and the pump test log shall be submitted to the Owner. The Contractor shall also submit a report of the well installation to the appropriate public agency and in the form required by state statutory and/or regulatory requirements specified in paragraph REGULATORY REQUIREMENTS.

END OF SECTION 01 95 99 99

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SECTION 01 95 99 99a - COMMON WORK RESULTS FOR FIRE SUPPRESSION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common work results for fire suppression. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Piping materials and installation instructions common to most piping systems.
 - b. Mechanical sleeve seals.
 - c. Sleeves.
 - d. Escutcheons.
 - e. Grout.
 - f. Fire-suppression equipment and piping demolition.
 - g. Equipment installation requirements common to equipment sections.
 - h. Painting and finishing.
 - i. Concrete bases.
 - j. Supports and anchorages.

C. Definitions

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
6. The following are industry abbreviations for plastic materials:
 - a. CPVC: Chlorinated polyvinyl chloride plastic.
7. The following are industry abbreviations for rubber materials:
 - a. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - b. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Welding certificates.

E. Quality Assurance

1. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
2. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - a. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

3. Electrical Characteristics for Fire-Suppression Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

F. Delivery, Storage, And Handling

1. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
2. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.2 PRODUCTS

A. Pipe, Tube, And Fittings

1. Refer to individual Division 28 for pipe, tube, and fitting materials and joining methods.
2. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

B. Joining Materials

1. Refer to individual Division 28 for special joining materials not listed below.
2. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - b. AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
3. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
4. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
5. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
6. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
7. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
8. Solvent Cements for Joining CPVC Plastic Piping: ASTM F 493.

C. Mechanical Sleeve Seals

1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

D. Sleeves

1. Galvanized-Steel Sheet: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
5. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
6. PVC Pipe: ASTM D 1785, Schedule 40.
7. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

E. Escutcheons

1. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
2. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
3. One-Piece, Cast-Brass Type: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
4. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
5. One-Piece, Stamped-Steel Type: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
6. Split-Plate, Stamped-Steel Type: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
7. One-Piece, Floor-Plate Type: Cast-iron floor plate.
8. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

F. Grout

1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Fire-Suppression Demolition

1. Refer to Division 01 Section(s) "Cutting And Patching" AND Division 02 Section(s) "Selective Structure Demolition" for general demolition requirements and procedures.
2. Disconnect, demolish, and remove fire-suppression systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.
3. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

B. Piping Systems - Common Requirements

1. Install piping according to the following requirements and Division 28 specifying piping systems.
2. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
3. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
6. Install piping to permit valve servicing.
7. Install piping at indicated slopes.
8. Install piping free of sags and bends.
9. Install fittings for changes in direction and branch connections.
10. Install piping to allow application of insulation.
11. Select system components with pressure rating equal to or greater than system operating pressure.
12. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - 2) Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - 3) Insulated Piping: One-piece, stamped-steel type with spring clips.
 - 4) Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - a) One-piece, cast-brass type with polished chrome-plated finish.
OR
One-piece, stamped-steel type.
 - 5) Bare Piping at Ceiling Penetrations in Finished Spaces:
 - a) One-piece **OR** Split-casting, **as directed**, cast-brass type with polished chrome-plated finish.
OR
One-piece, stamped-steel type **OR** Split-plate, stamped-steel type with concealed hinge, **as directed**, and set screw.
 - 6) Bare Piping in Unfinished Service Spaces:
 - a) One-piece, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
One-piece, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw **OR** spring clips, **as directed**.
 - 7) Bare Piping in Equipment Rooms:
 - a) One-piece, cast-brass type.

One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - 8) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
 - b. Existing Piping: Use the following:
 - c. Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
 - d. Insulated Piping: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - e. Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - 1) Split-casting, cast-brass type with chrome-plated finish.
OR
Split-plate, stamped-steel type with concealed hinge and spring clips.

- f. Bare Piping at Ceiling Penetrations in Finished Spaces:
 - 1) Split-casting, cast-brass type with chrome-plated finish.
OR
Split-plate, stamped-steel type with concealed hinge and set screw.
- g. Bare Piping in Unfinished Service Spaces:
 - 1) Split-casting, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw or spring clips.
- h. Bare Piping in Equipment Rooms:
 - 1) Split-casting, cast-brass type.
OR
Split-plate, stamped-steel type with set screw or spring clips.
- i. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
- 13. Sleeves are not required for core-drilled holes.
- 14. Permanent sleeves are not required for holes formed by removable PE sleeves.
- 15. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- 16. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - a. Cut sleeves to length for mounting flush with both surfaces.
 - 1) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - b. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - c. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 1) PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - 2) Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum-board partitions.
 - 3) Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - a) Seal space outside of sleeve fittings with grout.
 - d. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- 17. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Install steel pipe for sleeves smaller than **6 inches (150 mm)** in diameter.
 - b. Install cast-iron "wall pipes" for sleeves **6 inches (150 mm)** and larger in diameter.
 - c. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- 18. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

01 - General Requirements



19. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
20. Verify final equipment locations for roughing-in.
21. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

C. Piping Joint Construction

1. Join pipe and fittings according to the following requirements and Division 28 specifying piping systems.
2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
4. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
6. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
7. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Para. 1.1 "Quality Assurance" Article.
8. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
9. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
10. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.

D. Painting

1. Painting of fire-suppression systems, equipment, and components is specified in Division 09 Section(s) "Exterior Painting" AND "Interior Painting".
2. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

E. Concrete Bases

1. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of the base.
 - c. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - f. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

- g. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".

- F. Erection Of Metal Supports And Anchorages
 - 1. Refer to Division 05 Section "Metal Fabrications" for structural steel.
 - 2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor fire-suppression materials and equipment.
 - 3. Field Welding: Comply with AWS D1.1.

- G. Erection Of Wood Supports And Anchorages
 - 1. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor fire-suppression materials and equipment.
 - 2. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
 - 3. Attach to substrates as required to support applied loads.

- H. Grouting
 - 1. Mix and install grout for fire-suppression equipment base bearing surfaces, pump and other equipment base plates, and anchors.
 - 2. Clean surfaces that will come into contact with grout.
 - 3. Provide forms as required for placement of grout.
 - 4. Avoid air entrapment during placement of grout.
 - 5. Place grout, completely filling equipment bases.
 - 6. Place grout on concrete bases and provide smooth bearing surface for equipment.
 - 7. Place grout around anchors.
 - 8. Cure placed grout.

END OF SECTION 01 95 99 99a

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SECTION 01 95 99 99b - COMMON WORK RESULTS FOR PLUMBING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common work results for plumbing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Piping materials and installation instructions common to most piping systems.
 - b. Transition fittings.
 - c. Dielectric fittings.
 - d. Mechanical sleeve seals.
 - e. Sleeves.
 - f. Escutcheons.
 - g. Grout.
 - h. Plumbing demolition.
 - i. Equipment installation requirements common to equipment sections.
 - j. Painting and finishing.
 - k. Concrete bases.
 - l. Supports and anchorages.

C. Definitions

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.
5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
6. The following are industry abbreviations for plastic materials:
 - a. ABS: Acrylonitrile-butadiene-styrene plastic.
 - b. CPVC: Chlorinated polyvinyl chloride plastic.
 - c. PE: Polyethylene plastic.
 - d. PVC: Polyvinyl chloride plastic.
7. The following are industry abbreviations for rubber materials:
 - a. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - b. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Welding certificates.

E. Quality Assurance

1. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

2. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - a. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
3. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

F. Delivery, Storage, And Handling

1. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
2. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.2 PRODUCTS

A. Pipe, Tube, And Fittings

1. Refer to individual Division 14 for pipe, tube, and fitting materials and joining methods.
2. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

B. Joining Materials

1. Refer to individual Division 14 for special joining materials not listed below.
2. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - b. AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
3. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
4. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
5. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
6. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
7. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
8. Solvent Cements for Joining Plastic Piping:
 - a. ABS Piping: ASTM D 2235.
 - b. CPVC Piping: ASTM F 493.
 - c. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - d. PVC to ABS Piping Transition: ASTM D 3138.
9. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

C. Transition Fittings

1. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
 - a. Underground Piping **NPS 1-1/2 (DN 40)** and Smaller: Manufactured fitting or coupling.

- b. Underground Piping **NPS 2 (DN 50)** and Larger: AWWA C219, metal sleeve-type coupling.
 - c. Aboveground Pressure Piping: Pipe fitting.
 2. Plastic-to-Metal Transition Fittings: CPVC **OR** PVC, **as directed**, one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 3. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
 4. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC **OR** PVC, **as directed**, four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.
 5. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.
- D. Dielectric Fittings
1. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
 2. Insulating Material: Suitable for system fluid, pressure, and temperature.
 3. Dielectric Unions: Factory-fabricated, union assembly, for **250-psig (1725-kPa)** minimum working pressure at **180 deg F (82 deg C)**.
 4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure as required to suit system pressures.
 5. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - a. Separate companion flanges and steel bolts and nuts shall have **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure where required to suit system pressures.
 6. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
 7. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
- E. Mechanical Sleeve Seals
1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.
- F. Sleeves
1. Galvanized-Steel Sheet: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
 5. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
 6. PVC Pipe: ASTM D 1785, Schedule 40.

7. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

G. Escutcheons

1. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
2. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
3. One-Piece, Cast-Brass Type: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
4. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
5. One-Piece, Stamped-Steel Type: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
6. Split-Plate, Stamped-Steel Type: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
7. One-Piece, Floor-Plate Type: Cast-iron floor plate.
8. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

H. Grout

1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Plumbing Demolition

1. Refer to Division 01 Section(s) "Cutting And Patching" AND Division 02 Section(s) "Selective Structure Demolition" for general demolition requirements and procedures.
2. Disconnect, demolish, and remove plumbing systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.
3. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

B. Piping Systems - Common Requirements

1. Install piping according to the following requirements and Division 14 specifying piping systems.
2. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

3. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
6. Install piping to permit valve servicing.
7. Install piping at indicated slopes.
8. Install piping free of sags and bends.
9. Install fittings for changes in direction and branch connections.
10. Install piping to allow application of insulation.
11. Select system components with pressure rating equal to or greater than system operating pressure.
12. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - 2) Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - 3) Insulated Piping: One-piece, stamped-steel type with spring clips.
 - 4) Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - a) One-piece, cast-brass type with polished chrome-plated finish.
OR
One-piece, stamped-steel type.
 - 5) Bare Piping at Ceiling Penetrations in Finished Spaces:
 - a) One-piece **OR** Split-casting, **as directed**, cast-brass type with polished chrome-plated finish.
OR
One-piece, stamped-steel type **OR** Split-plate, stamped-steel type with concealed hinge, **as directed**, and set screw.
 - 6) Bare Piping in Unfinished Service Spaces:
 - a) One-piece, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
One-piece, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw **OR** spring clips, **as directed**.
 - 7) Bare Piping in Equipment Rooms:
 - a) One-piece, cast-brass type.
OR
One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - 8) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
 - b. Existing Piping: Use the following:
 - 1) Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
 - 2) Insulated Piping: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - a) Split-casting, cast-brass type with chrome-plated finish.
OR
Split-plate, stamped-steel type with concealed hinge and spring clips.
 - 4) Bare Piping at Ceiling Penetrations in Finished Spaces:
 - a) Split-casting, cast-brass type with chrome-plated finish.
OR
Split-plate, stamped-steel type with concealed hinge and set screw.
 - 5) Bare Piping in Unfinished Service Spaces:
 - a) Split-casting, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR

- Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw or spring clips.
- 6) Bare Piping in Equipment Rooms:
 - a) Split-casting, cast-brass type.
OR
Split-plate, stamped-steel type with set screw or spring clips.
 - 7) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
13. Sleeves are not required for core-drilled holes.
 14. Permanent sleeves are not required for holes formed by removable PE sleeves.
 15. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 16. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - a. Cut sleeves to length for mounting flush with both surfaces.
 - 1) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - b. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - c. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 1) PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - 2) Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum-board partitions.
 - 3) Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - a) Seal space outside of sleeve fittings with grout.
 - d. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
 17. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Install steel pipe for sleeves smaller than **6 inches (150 mm)** in diameter.
 - b. Install cast-iron "wall pipes" for sleeves **6 inches (150 mm)** and larger in diameter.
 - c. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 18. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
 19. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
 20. Verify final equipment locations for roughing-in.
 21. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

- C. Piping Joint Construction
1. Join pipe and fittings according to the following requirements and Division 14 specifying piping systems.
 2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 4. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
 5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 6. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 7. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Para. 1.1 "Quality Assurance" Article.
 8. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
 9. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 - c. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - d. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - e. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - f. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
 10. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
 11. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
 12. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - a. Plain-End Pipe and Fittings: Use butt fusion.
 - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
 13. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
- D. Piping Connections
1. Make connections according to the following, unless otherwise indicated:
 - a. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - b. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - c. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - d. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
- E. Equipment Installation - Common Requirements
1. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

2. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
3. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
4. Install equipment to allow right of way for piping installed at required slope.

F. Painting

1. Painting of plumbing systems, equipment, and components is specified in Division 09 Section(s) "Exterior Painting" AND "Interior Painting".
2. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

G. Concrete Bases

1. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of the base.
 - c. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - f. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - g. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".

H. Erection Of Metal Supports And Anchorages

1. Refer to Division 05 Section "Metal Fabrications" for structural steel.
2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.
3. Field Welding: Comply with AWS D1.1.

I. Erection Of Wood Supports And Anchorages

1. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor plumbing materials and equipment.
2. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
3. Attach to substrates as required to support applied loads.

J. Grouting

1. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.
2. Clean surfaces that will come into contact with grout.
3. Provide forms as required for placement of grout.
4. Avoid air entrapment during placement of grout.
5. Place grout, completely filling equipment bases.
6. Place grout on concrete bases and provide smooth bearing surface for equipment.
7. Place grout around anchors.
8. Cure placed grout.

END OF SECTION 01 95 99 99b

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SECTION 01 95 99 99c - STORM DRAINAGE PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for storm drainage piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes:
 - a. Pipe, tube, and fittings.
 - b. Special pipe fittings.
 - c. Encasement for underground metal piping.

C. Performance Requirements

1. Components and installation shall be capable of withstanding the following minimum working-pressure, unless otherwise indicated:
 - a. Storm Drainage Piping: 10-foot head of water (30 kPa).
 - b. Storm Drainage, Force-Main Piping: 50 psig (345 kPa) OR 100 psig (690 kPa) OR 150 psig (1035 kPa), as directed.
2. Seismic Performance: Soil, waste, and vent piping and support and installation shall be capable of withstanding the effects of seismic events determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
3. Shop Drawings: For controlled-flow OR siphonic roof drainage system, as directed by the Owner. Include calculations, plans, and details. Controlled-Flow Storm Drainage System: Include calculations, plans, and details.
4. Seismic Qualification Certificates: For storm drainage piping, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Field quality-control inspection and test reports.

E. Quality Assurance

1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
2. Comply with NSF 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-drain" for plastic drain piping and "NSF-sewer" for plastic sewer piping.

F. Project Conditions

1. Interruption of Existing Storm-Drainage Service: Do not interrupt service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of storm-drainage service.

- b. Do not proceed with interruption of storm-drainage service without the Owner's written permission.

1.2 PRODUCTS

A. Piping Materials

1. Refer to Part 1.3 "Piping Applications" Article for applications of pipe, tube, fitting, and joining methods for specific services, service locations, and pipe sizes.

B. Hub-And-Spigot, Cast-Iron Soil Pipe And Fittings

1. Pipe and Fittings: ASTM A 74, Service and Extra-Heavy class(es).
2. Gaskets: ASTM C 564, rubber.
3. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

C. Hubless Cast-Iron Soil Pipe And Fittings

1. Pipe and Fittings: ASTM A 888 or CISPI 301.
2. Shielded Couplings: ASTM C 1277 assembly of metal shield or housing, corrosion-resistant fasteners, and rubber sleeve with integral, center pipe stop.
 - a. Standard, Shielded, Stainless-Steel Couplings: CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve.
 - b. Heavy-Duty, Shielded, Stainless-Steel Couplings: With stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.
 - c. Heavy-Duty, Shielded, Cast-Iron Couplings: ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve.
3. Rigid, Unshielded Couplings: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling molded from ASTM C 1440, TPE material with corrosion-resistant-metal tension band and tightening mechanism on each end.

D. Galvanized-Steel Pipe And Fittings

1. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade A or B, Standard Weight or Schedule 40, galvanized. Include ends matching joining method.
2. Drainage Fittings: ASME B16.12, galvanized, **as directed**, threaded, cast-iron drainage pattern.
3. Pressure Fittings:
 - a. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized, seamless steel pipe. Include ends matching joining method.
 - b. Malleable-Iron Unions: ASME B16.39; Class 150; hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
 - c. Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, galvanized, **as directed**, standard pattern.
 - d. Cast-Iron Flanges: ASME B16.1, Class 125.
 - e. Cast-Iron, Flanged Fittings: ASME B16.1, Class 125, galvanized, **as directed**.
4. Grooved-Joint Systems:
 - a. Grooved-End, Steel-Piping Fittings: ASTM A 47/A 47M, galvanized, **as directed**, malleable-iron casting; ASTM A 106, galvanized-steel pipe; or ASTM A 536, galvanized, **as directed**, ductile-iron casting; with dimensions matching steel pipe.
 - b. Grooved-End, Steel-Piping Couplings: AWWA C606, for steel-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.

E. Ductile-Iron, Pipe and Fittings

1. Ductile-Iron, Mechanical-Joint Piping
 - a. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
 - b. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.

- c. Glands, Gaskets, and Bolts: AWWA C111/A121.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 2. Ductile-Iron, Push-on-Joint,
 - a. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot end, unless grooved or flanged ends are indicated.
 - b. Ductile-Iron Fittings: AWWA C110/A21.10, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
 - c. Gaskets: AWWA C111/A21.11, rubber.
 3. Ductile Iron, Grooved-Joint Piping:
 - a. Ductile-Iron Pipe: AWWA C151/A21.51 with round-cut-grooved ends according to AWWA C606.
 - b. Ductile-Iron-Pipe Appurtenances:
 - 1) Grooved-End, Ductile-Iron Fittings: ASTM A 536, ductile-iron castings with dimensions matching pipe. AWWA C110/A21.10 ductile-iron pipe or AWWA C153/A21.53 ductile-iron fittings and complying with AWWA C606 for grooved ends.
 - 2) Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F 1476, Type I. Include ferrous housing sections with continuous curved keys, EPDM-rubber center-leg gasket suitable for hot and cold water, and bolts and nuts.
- F. Copper Tube And Fittings
1. Copper DWV Tube: ASTM B 306, drainage tube, drawn temper.
 2. Copper Drainage Fittings: ASME B16.23, cast-copper or ASME B16.29, wrought-copper, solder-joint fittings.
 3. Hard Copper Tube: **ASTM B 88, Types L and M (ASTM B 88M, Types B and C)**, water tube, drawn temper.
 4. Soft Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)**, water tube, annealed temper.
 5. Copper Pressure Fittings:
 - a. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - b. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 6. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 - a. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - b. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
 7. Solder: ASTM B 32, lead free with ASTM B 813, water-flushable flux.
- G. ABS Pipe And Fittings
1. Solid-Wall ABS Pipe: ASTM D 2661, Schedule 40.
 2. Cellular-Core ABS Pipe: ASTM F 628, Schedule 40.
 3. ABS Socket Fittings: ASTM D 2661, made to ASTM D 3311, drain, waste, and vent patterns.
 4. Solvent Cement: ASTM D 2235
 - a. Use ABS solvent cement that has a VOC content of 325 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. PVC Pipe And Fittings
1. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.
 2. Cellular-Core PVC Pipe: ASTM F 891, Schedule 40.
 3. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
 4. Adhesive Primer: ASTM F 656.
 - a. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 5. Solvent Cement: ASTM D 2564.

- a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

I. Specialty Pipe Fittings

1. Transition Couplings:

- a. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
- b. Fitting-Type Transition Couplings: Manufactured piping coupling or specified-piping-system fitting.
- c. Unshielded, Nonpressure Transition Couplings:
 - 1) Standard: ASTM C 1173.
 - 2) Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 3) Sleeve Materials:
 - a) For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - b) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - c) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- d. Shielded, Nonpressure Transition Couplings:
 - 1) Standard: ASTM C 1460.
 - 2) Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
- e. Pressure Transition Couplings:
 - f. Standard: AWWA C219.
 - g. Description: Metal, sleeve-type couplings same size as, with pressure rating at least equal to and ends compatible with, pipes to be joined.
 - h. Center-Sleeve Material: Manufacturer's standard **OR** Carbon steel **OR** Stainless steel **OR** Ductile iron **OR** Malleable iron, **as directed**.
 - i. Gasket Material: Natural or synthetic rubber.
 - j. Metal Component Finish: Corrosion-resistant coating or material.

2. Dielectric Fittings:

- a. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- b. Dielectric Unions:
 - 1) Description:
 - a) Standard: ASSE 1079.
 - b) Pressure Rating: **150 psig (1035 kPa) OR 250 psig (1725 kPa) at 180 deg F (82 deg C), as directed.**
 - c) End Connections: Solder-joint copper alloy and threaded ferrous.
- c. Dielectric Flanges:
 - 1) Description:
 - a) Standard: ASSE 1079.
 - b) Factory-fabricated, bolted, companion-flange assembly.
 - c) Pressure Rating: **150 psig (1035 kPa) OR 175 psig (1200 kPa) minimum OR 300 psig (2070 kPa), as directed.**
 - d) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
- d. Dielectric-Flange Insulating Kits:
 - 1) Description:
 - a) Nonconducting materials for field assembly of companion flanges.

- b) Pressure Rating: **150 psig (1035 kPa)**
- c) Gasket: Neoprene or phenolic.
- d) Bolt Sleeves: Phenolic or polyethylene.
- e) Washers: Phenolic with steel-backing washers.
- e. Dielectric Nipples:
 - 1) Description:
 - a) Electroplated steel nipple complying with ASTM F 1545.
 - b) Pressure Rating: **300 psig (2070 kPa) at 225 deg F (107 deg C)**.
 - c) End Connections: Male threaded or grooved.
 - d) Lining: Inert and noncorrosive, propylene.

J. Encasement For Underground Metal Piping

- 1. Description: ASTM A 674 or AWWA C105
- 2. Material: High-density, crosslaminated PE film of **0.004-inch (0.10-mm) OR LLDPE film of 0.008-inch (0.20-mm), as directed**, minimum thickness.
- 3. Form: Sheet **OR** Tube, **as directed**.
- 4. Color: Black **OR** Natural, **as directed**.

1.3 EXECUTION

A. Earth Moving

- 1. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

B. Piping Installation

- 1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations from layout are approved on coordination drawings.
- 2. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- 3. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- 4. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- 5. Install piping to permit valve servicing.
- 6. Install piping at indicated slopes.
- 7. Install piping free of sags and bends.
- 8. Install fittings for changes in direction and branch connections.
- 9. Install piping to allow application of insulation.
- 10. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
- 11. Make changes in direction for storm drainage piping using appropriate branches, bends, and long-sweep bends. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.
- 12. Lay buried building storm drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.
- 13. Install storm drainage piping at the following minimum slopes unless otherwise indicated:
 - a. Building Storm Drain: 1 percent **OR** 2 percent, **as directed**, downward in direction of flow for piping **NPS 3 (DN 80)** and smaller; 1 percent **OR** 2 percent, **as directed**, downward in direction of flow for piping **NPS 4 (DN 100)** and larger.

- b. Horizontal Storm-Drainage Piping: **2 percent** downward in direction of flow.
- 14. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - a. Install encasement on underground piping according to ASTM A 674 or AWWA C105.
- 15. Install steel piping according to applicable plumbing code.
- 16. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."
- 17. Install aboveground ABS piping according to ASTM D 2661.
- 18. Install aboveground PVC piping according to ASTM D 2665.
- 19. Install underground ABS and PVC piping according to ASTM D 2321.
- 20. Install engineered controlled-flow **OR** siphonic, **as directed**, drain specialties and storm drainage piping in locations indicated.
- 21. Install underground, ductile-iron, force-main piping according to AWWA C600. Install buried piping inside building between wall and floor penetrations and connection to storm sewer piping outside building with restrained joints. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 - a. Install encasement on piping according to ASTM A 674 or AWWA C105.
- 22. Install underground, copper, force-main tubing according to CDA's "Copper Tube Handbook."
 - a. Install encasement on piping according to ASTM A 674 or AWWA C105.
- 23. Install force mains at elevations indicated.
- 24. Plumbing Specialties:
 - a. Install backwater valves in storm drainage gravity-flow piping. Comply with requirements for backwater valves specified in Division 33 Section "Storm Utility Drainage Piping".
 - b. Install cleanouts at grade and extend to where building storm drains connect to building storm sewers in storm drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in storm drainage force-main piping. Comply with requirements for cleanouts specified in Division 33 Section "Storm Utility Drainage Piping".
 - c. Install drains in storm drainage gravity-flow piping. Comply with requirements for drains specified in Division 33 Section "Storm Utility Drainage Piping".
- 25. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- 26. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Common Work Results For Plumbing".
- 27. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Common Work Results For Plumbing".
- 28. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Common Work Results For Plumbing".

C. Joint Construction

- 1. Basic piping joint construction requirements are specified in Division 22 Section "Common Work Results For Plumbing".
- 2. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- 3. Hub-and-Spigot, Cast-Iron Soil Piping Calked Joints: Join according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
- 4. Hubless Cast-Iron Soil Piping Coupled Joints: Join according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
- 5. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

6. Join copper tube and fittings with soldered joints according to ASTM B 828 procedure. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.
 7. Grooved Joints: Cut groove ends of pipe according to AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fittings. Install coupling housing sections, over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
 8. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
 9. Plastic, Nonpressure-Piping, Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 Appendixes.
 - c. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.
- D. Specialty Pipe Fitting Installation
1. Transition Couplings:
 - a. Install transition couplings at joints of piping with small differences in OD's.
 - b. In Drainage Piping: Unshielded **OR** Shielded, **as directed** nonpressure transition couplings.
 - c. In Aboveground Force-Main Piping: Fitting-type transition couplings.
 - d. In Underground Force-Main Piping:
 - 1) **NPS 1-1/2 (DN 40)** and Smaller: Fitting-type transition couplings.
 - 2) **NPS 2 (DN 50)** and Larger: Pressure transition couplings.
 2. Dielectric Fittings:
 - a. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 - b. Dielectric Fittings for **NPS 2 (DN 50)** and Smaller: Use dielectric nipples **OR** unions, **as directed**.
 - c. Dielectric Fittings for **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Use dielectric flanges **OR** flange kits **OR** nipples, **as directed**.
 - d. Dielectric Fittings for **NPS 5 (DN 125)** and Larger: Use dielectric flange kits.
- E. Valve Installation
1. General valve installation requirements are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 2. Shutoff Valves: Install shutoff valve on each sump pump discharge.
 - a. Install gate or full-port ball valve for piping **NPS 2 (DN 50)** and smaller.
 - b. Install gate valve for piping **NPS 2-1/2 (DN 65)** and larger.
 3. Check Valves: Install swing check valve, between pump and shutoff valve, on each sump pump discharge.
 4. Backwater Valves: Install backwater valves in piping subject to backflow.
 - a. Horizontal Piping: Horizontal backwater valves. Use normally closed type, unless otherwise indicated.
 - b. Install backwater valves in accessible locations.
 - c. Comply with requirements for backwater valve specified in Division 22 Section "Storm Drainage Piping Specialties".
- F. Hanger And Support Installation
1. Comply with requirements for seismic-restraint devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
 2. Comply with requirements for pipe hangers and supports and installation specified in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment".
 - a. Install carbon-steel pipe hangers for horizontal piping in noncorrosive environments.
 - b. Install stainless-steel **OR** fiberglass pipe hangers, **as directed**, for horizontal piping in corrosive environments.
 - c. Install carbon-steel pipe support clamps for vertical piping in noncorrosive environments.

- d. Install stainless-steel pipe support clamps for vertical piping in corrosive environments.
 - e. Vertical Piping: MSS Type 8 or Type 42, clamps.
 - f. Individual, Straight, Horizontal Piping Runs:
 - 1) 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
 - 2) Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
 - 3) Longer Than 100 Feet (30 m), if Indicated: MSS Type 49, spring cushion rolls.
 - g. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - h. Base of Vertical Piping: MSS Type 52, spring hangers.
3. Support horizontal piping and tubing within 12 inches (300 mm) of each fitting, valve, and coupling.
 4. Support vertical piping and tubing at base and at each floor.
 5. Rod diameter may be reduced 1 size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.
 6. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch (13-mm) rod.
 - c. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1500 mm) with 5/8-inch (16-mm) rod.
 - d. NPS 6 (DN 150): 60 inches (1500 mm) with 3/4-inch (19-mm) rod.
 - e. NPS 8 to NPS 12 (DN 200 to DN 300): 60 inches (1500 mm) with 7/8-inch (22-mm) rod.
 - f. Spacing for 10-foot (3-m) lengths may be increased to 10 feet (3 m). Spacing for fittings is limited to 60 inches (1500 mm).
 7. Install supports for vertical cast-iron soil piping every 15 feet (4.5 m).
 8. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/4 (DN 32): 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
 - c. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
 - d. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
 - e. NPS 3 (DN 80): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.
 - f. NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.7 m) with 5/8-inch (16-mm) rod.
 - g. NPS 6 (DN 150): 12 feet (3.7 m) with 3/4-inch (19-mm) rod.
 - h. NPS 8 to NPS 12 (DN 200 to DN 300): 12 feet (3.7 m) with 7/8-inch (22-mm) rod.
 9. Install supports for vertical steel piping every 15 feet (4.5 m).
 10. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/4 (DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
 - c. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
 - d. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.
 - e. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.
 - f. NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.
 11. Install supports for vertical copper tubing every 10 feet (3 m).
 12. Install hangers for ABS and PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 3 (DN 80): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.
 - c. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.
 - d. NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.
 - e. NPS 8 to NPS 12 (DN 200 to DN 300): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.
 13. Install supports for vertical ABS and PVC piping every 48 inches (1200 mm).

14. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

G. Connections

1. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Connect interior storm drainage piping to exterior storm drainage piping. Use transition fitting to join dissimilar piping materials.
3. Connect storm drainage piping to roof drains and storm drainage specialties.
 - a. Install test tees (wall cleanouts) in conductors near floor, and floor cleanouts with cover flush with floor.
 - b. Install horizontal backwater valves with cleanout cover flush with floor **OR** in pit with pit cover flush with floor, **as directed**.
 - c. Comply with requirements for backwater valves, cleanouts and drains specified in Division 22 Section "Storm Drainage Piping Specialties".
4. Connect force-main piping to the following:
 - a. Storm Sewer: To exterior force main or storm manhole.
 - b. Sump Pumps: To sump pump discharge.
5. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
6. Make connections according to the following unless otherwise indicated:
 - a. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - b. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment.

H. Identification

1. Identify exposed storm drainage piping. Comply with requirements for identification specified in Division 22 Section "Identification For Plumbing Piping And Equipment".

I. Field Quality Control

1. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.
 - a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in.
 - b. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
2. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.
3. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
4. Test storm drainage piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - a. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
 - b. Leave uncovered and unconcealed new, altered, extended, or replaced storm drainage piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - c. Test Procedure: Test storm drainage piping, except outside leaders, **as directed**, on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than **10-foot head of water (30 kPa)**. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
 - d. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - e. Prepare reports for tests and required corrective action.

5. Test force-main piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
 - a. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - b. Cap and subject piping to static-water pressure of **50 psig (345 kPa)** above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - c. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 - d. Prepare reports for tests and required corrective action.

- J. Cleaning
 1. Clean interior of piping. Remove dirt and debris as work progresses.
 2. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
 3. Place plugs in ends of uncompleted piping at end of day and when work stops.

- K. Piping Schedule
 1. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
 2. Aboveground storm drainage piping **NPS 6 (DN 150)** and smaller shall be any of the following:
 - a. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - b. Hubless, cast-iron soil pipe and fittings; **CISPI, heavy-duty**, hubless-piping couplings; and coupled joints.
 - c. Galvanized-steel pipe, drainage fittings, and threaded joints.
 - d. Copper tube and fittings in first subparagraph below are only available in NPS 1-1/4 to NPS 8 (DN 32 to DN 200).
 - e. Copper DWV tube, copper drainage fittings, and soldered joints.
 - f. Solid-wall **OR** Cellular-core ABS pipe, **as directed**, ABS socket fittings, and solvent-cemented joints.
 - g. Solid-wall **OR** Cellular-core PVC pipe, **as directed**, PVC socket fittings, and solvent-cemented joints.
 - h. Dissimilar Pipe-Material Couplings: Unshielded **OR** Shielded, **as directed**, nonpressure transition couplings.
 3. Aboveground, storm drainage piping **NPS 8 (DN 200)** and larger shall be any of the following:
 - a. Service class, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 - b. Hubless, cast-iron soil pipe and fittings; **CISPI, heavy-duty**, hubless-piping couplings; and coupled joints.
 - c. Galvanized-steel pipe, drainage fittings, and threaded joints.
 - d. Copper DWV tube, copper drainage fittings, and soldered joints.
 - e. Solid-wall **OR** Cellular-core PVC pipe, **as directed**, PVC socket fittings, and solvent-cemented joints.
 - f. Dissimilar Pipe-Material Couplings: Unshielded **OR** Shielded, **as directed**, nonpressure transition couplings.
 4. Underground storm drainage piping **NPS 6 (DN 150)** and smaller shall be **any of** the following:
 - a. Extra Heavy **OR** Service class, **as directed**, cast-iron soil pipe and fittings; gaskets; and gasketed **OR** calking materials; and calked joints, **as directed**.
 - b. Hubless, cast-iron soil pipe and fittings; **CISPI, heavy-duty, cast-iron**, hubless-piping couplings; and coupled joints.
 - c. Solid-wall **OR** Cellular-core ABS pipe, **as directed**, ABS socket fittings, and solvent-cemented joints.
 - d. **Solid-wall OR Cellular-core** PVC pipe, **as directed**, PVC socket fittings, and solvent-cemented joints.

- e. Dissimilar Pipe-Material Couplings: Unshielded **OR** Shielded, **as directed**, nonpressure transition couplings.
5. Underground, storm drainage piping **NPS 8 (DN 200) and larger** shall be **any of** the following:
 - a. Extra Heavy **OR** Service class, **as directed**, cast-iron soil pipe and fittings; gaskets; and gasketed **OR** calking materials; and calked joints **as directed**.
 - b. Hubless, cast-iron soil pipe and fittings; **CISPI, heavy-duty, cast-iron**, hubless-piping couplings; and coupled joints.
 - c. **Solid-wall OR Cellular-core** PVC pipe, **as directed**, PVC socket fittings, and solvent-cemented joints.
 - d. Cellular-core, sewer and drain series, PVC pipe; PVC socket fittings; and solvent-cemented joints.
 - e. Dissimilar Pipe-Material Couplings: **Unshielded OR Shielded, as directed**, nonpressure transition couplings.
6. Aboveground storm drainage force mains **NPS 1-1/2 and NPS 2 (DN 40 and DN 50)** shall be **any of** the following:
 - a. Hard copper tube, copper pressure fittings, and soldered joints.
 - b. Galvanized-steel pipe, pressure fittings, and threaded joints.
7. Aboveground storm drainage force mains **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)** shall be any of the following:
 - a. Hard copper tube, copper pressure fittings, and soldered joints.
 - b. Galvanized-steel pipe, pressure fittings, and threaded joints.
 - c. Grooved-end, galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.
 - d. Fitting-type transition couplings if dissimilar pipe materials.
8. Underground storm drainage force mains **NPS 4 (DN 100)** and smaller shall be any of the following:
 - a. Hard **OR** Soft, **as directed** copper tube; **wrought-copper** pressure fittings; and soldered joints.
 - b. Ductile-iron, mechanical-joint piping and mechanical joints.
 - c. Ductile-iron, push-on-joint piping and push-on joints.
 - d. Ductile-iron, grooved-joint piping and grooved joints.
 - e. Fitting-type transition coupling for piping smaller than **NPS 1-1/2 (DN 40)** and pressure transition coupling for **NPS 1-1/2 (DN 40)** and larger if dissimilar pipe materials.
9. Underground storm drainage force mains **NPS 5 (DN 125)** and larger shall be any of the following:
 - a. Hard copper tube; **wrought-copper** pressure fittings; and soldered joints.
 - b. Ductile-iron, mechanical-joint piping and mechanical joints.
 - c. Ductile-iron, push-on-joint piping and push-on joints.
 - d. Ductile-iron, grooved-joint piping and grooved joints.
 - e. Pressure transition couplings if dissimilar pipe materials.

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SECTION 01 95 99 99d - COMPRESSED-AIR PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for compressed-air piping for laboratory and healthcare facilities. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Compressed-air piping and specialties for nonmedical laboratory facilities, designated "laboratory air," operating at **50 psig (345 kPa) OR 100 psig (690 kPa) OR 125 psig (860 kPa), as directed.**
 - b. Medical air piping and specialties, designated "medical air," operating at **50 to 55 psig (345 to 380 kPa).**
 - c. Dental air piping and specialties, designated "dental air," operating at **80 to 100 psig (550 to 690 kPa).**
 - d. Gas-powered-tool air piping and specialties, designated "instrument air," operating at **175 psig (1200 kPa).**
 - e. Healthcare laboratory air piping and specialties, designated "medical laboratory air," operating at **100 psig (690 kPa).**

C. Definitions

1. D.I.S.S.: Diameter-index safety system.
2. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
3. Medical Compressed-Air Piping Systems: Include medical air, dental air, instrument air, and medical laboratory air piping systems.

D. Submittals

1. Product Data: For the following:
 - a. Compressed-air tubes and fittings.
 - b. Compressed-air valves and valve boxes.
 - c. Medical compressed-air service connections.
 - d. Medical compressed-air pressure control panels.
 - e. Medical compressed-air manifolds.
 - f. Medical compressed-air alarm system components.
2. Shop Drawings: Diagram power, signal, and control wiring.
3. Piping Material Certification: Signed by Installer certifying that medical compressed-air piping materials comply with NFPA 99 requirements.
4. Brazing certificates.
5. Field quality-control test reports.
6. Operation and maintenance data.

E. Quality Assurance

1. Installer Qualifications:
 - a. Medical Compressed-Air Piping Systems for Healthcare Facilities: Qualify installers according to ASSE Standard #6010.
 - b. Pressure-Seal Joining Procedure for Copper Tubing: Qualify operators according to training provided by Viega; Plumbing and Heating Systems.

2. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization **OR** is an NRTL, **as directed**, and that is acceptable to authorities having jurisdiction.
 - a. Qualify testing personnel according to ASSE Standard #6020 for inspectors and ASSE Standard #6030 for verifiers.
3. Source Limitations: Obtain compressed-air service connections of same type and from same manufacturer as service connections provided for in Division 22 Section "Gas Piping For Laboratory And Healthcare Facilities".
4. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
6. ASME Compliance:
 - a. Comply with ASME B31.1, "Power Piping," for laboratory compressed-air piping operating at more than **150 psig (1035 kPa)**.
 - b. Comply with ASME B31.9, "Building Services Piping," for laboratory compressed-air piping operating at **150 psig (1035 kPa)** or less.
7. Comply with NFPA 99, "Health Care Facilities," for medical compressed-air system materials and installation in healthcare facilities.

F. Project Conditions

1. Interruption of Existing Laboratory and Medical Compressed-Air Service(s): Do not interrupt laboratory or medical compressed-air service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of laboratory and medical compressed-air service(s).
 - b. Do not proceed with interruption of laboratory and medical compressed-air service(s) without the Owner's written permission.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. Copper Medical Gas Tube: ASTM B 819, Type K **OR** Type L, **as directed**, seamless, drawn temper, that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and in blue for Type L tube.
 - a. General Requirements for Copper Fittings: Manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.
 - b. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, with dimensions for brazed joints.
 - c. Copper Unions: ASME B16.22 or MSS SP-123, wrought copper or cast-copper alloy.
 - d. Press-Type Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
2. Memory-Metal Couplings: Cryogenic compression fitting made of ASTM F 2063, nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.

3. Copper Water Tube: **ASTM B 88, Type M (ASTM B 88M, Type C)**, seamless, drawn temper.
 - a. Copper Fittings: ASME B16.18, cast-copper or ASME B16.22, wrought-copper, solder-joint pressure type.
 - b. Press-Type Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
 4. PVC Pipe: ASTM D 1785, Schedule 40.
 - a. PVC Fittings: ASTM D 2466, Schedule 40, socket type.
- B. Joining Materials**
1. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 2. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
 3. Threaded-Joint Tape: PTFE.
 4. Solvent Cement for Joining PVC Piping: ASTM D 2564. Include primer complying with ASTM F 656.
- C. Valves**
1. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.
 2. Ball Valves: MSS SP-110, 3-piece body, brass or bronze.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Ball: Full-port, chrome-plated brass.
 - c. Seats: PTFE or TFE.
 - d. Handle: Lever type with locking device, **as directed**.
 - e. Stem: Blowout proof with PTFE or TFE seal.
 - f. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 3. Check Valves: In-line pattern, bronze.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Operation: Spring loaded.
 - c. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 4. Zone Valves: MSS SP-110, 3-piece-body, brass or bronze ball valve with gage.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Ball: Full-port, chrome-plated brass.
 - c. Seats: PTFE or TFE.
 - d. Handle: Lever type with locking device, **as directed**.
 - e. Stem: Blowout proof with PTFE or TFE seal.
 - f. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 - g. Pressure Gage: Manufacturer installed on one copper-tube extension.
 5. Zone Valve Boxes: Formed steel with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.
 - a. Interior Finish: Factory-applied white enamel.
 - b. Cover Plate: Aluminum or extruded-anodized aluminum **OR** Satin-chrome finish steel **OR** Stainless steel with NAAMM AMP 503, No. 4 finish, **as directed**, with frangible or removable windows.
 - c. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

OR

Zone Valve Boxes: Formed or extruded aluminum with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.

- a. Interior Finish: Factory-applied white enamel.
 - b. Cover Plate: Aluminum or extruded-anodized aluminum **OR** Stainless steel with NAAMM AMP 503, No. 4 finish, **as directed**, with frangible or removable windows.
 - c. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.
 6. Safety Valves: Bronze-body, ASME-construction, poppet, pressure-relief type with settings to match system requirements.
 7. Pressure Regulators: Bronze body and trim; spring-loaded, diaphragm-operated relieving type; manual pressure-setting adjustment; rated for **250-psig (1725-kPa)** minimum inlet pressure; and capable of controlling delivered air pressure within **0.5 psig for each 10-psig (5.0 kPa for each 100-kPa)** inlet pressure.
 8. Automatic Drain Valves: Stainless-steel body and internal parts, rated for **200-psig (1380-kPa)** minimum working pressure, capable of automatic discharge of collected condensate. Include mounting bracket where wall mounting is indicated, **as directed**.
- D. Medical Compressed-Air Service Connections
1. Connection Devices: For specific medical compressed-air pressure and service listed. Include roughing-in assemblies, finishing assemblies, and cover plates. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate. Furnish recessed-type units made for concealed piping unless otherwise indicated.
 - a. Roughing-in Assembly:
 - 1) Steel outlet box for recessed mounting and concealed piping.
 - 2) Brass-body outlet block with secondary check valve that will prevent gas flow when primary valve is removed.
 - 3) Double seals that will prevent air leakage.
 - 4) ASTM B 819, **NPS 3/8 (DN 10)** copper outlet tube brazed to valve with service marking and tube-end dust cap.
 - b. Finishing Assembly:
 - 1) Brass housing with primary check valve.
 - 2) Double seals that will prevent air leakage.
 - 3) Cover plate with gas-service label.
 - c. Quick-Coupler Service Connections: Pressure outlet with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.
 - d. D.I.S.S. Service Connections: Pressure outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.
 - 1) Medical Air Service Connections: CGA V-5, D.I.S.S. No. 1160.
 - 2) Instrument Air Service Connections: CGA V-5, D.I.S.S. No. 1160.
 - e. Cover Plates: One piece, stainless steel, with NAAMM AMP 503, No. 4 finish **OR** metal, with chrome-plated finish **OR** anodized aluminum, **as directed**, and permanent, color-coded, identifying label matching corresponding service.
- E. Medical Compressed-Air Pressure Control Panels
1. Description: Steel box and support brackets for recessed roughing in with stainless-steel or anodized-aluminum cover plate with printed operating instructions. Include manifold assembly consisting of inlet supply valve, inlet supply pressure gage, line-pressure control regulator, outlet supply pressure gage, D.I.S.S. service connection, and piping outlet for remote service connection.
 - a. Minimum Working Pressure: **200 psig (1380 kPa)**.
 - b. Line-Pressure Control Regulator: Self-relieving diaphragm type with precision manual adjustment.
 - c. Pressure Gages: **0- to 300-psig (0- to 2070-kPa)** range.

- d. Service Connection: CGA V-5, D.I.S.S. No. 1160, instrument air outlet.
- e. Before final assembly, provide temporary dust shield and U-tube for testing.
- f. Label cover plate "Air Pressure Control."

F. Medical Compressed-Air Manifolds

1. General Requirements for Medical Compressed-Air Manifolds: Comply with NFPA 99, Ch. 5, "Manifolds for Gas Cylinders without Reserve Supply."
2. Central Control Panel Unit: Weatherproof cabinet, supply and delivery pressure gages, electrical alarm system connections and transformer, indicator lights or devices, manifold connection, pressure changeover switch, line-pressure regulator, shutoff valves, and safety valve.
3. Manifold and Headers: Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks. Units include design for **2000-psig (13.8-MPa)** minimum inlet pressure. Include cylinder bank headers with inlet (pigtail) connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gage.
4. Compressed-Air Cylinders: Will be furnished by the Owner **OR** Number and type of compressed-air cylinders required for complete manifold systems, **as directed**.
5. Operation: Automatic, pressure-switch-activated changeover from one cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder bank header.
6. Mounting: Wall with mounting brackets for manifold control cabinet and headers **OR** Floor with support legs for manifold control cabinet, **as directed**.
7. Label manifold control unit with permanent label identifying compressed air and system operating pressure.
8. Medical Air Manifolds: For 4 cylinders and **1250-cu. ft./h (9.85-L/s)** **OR** 8 cylinders and **2500-cu. ft./h (19.7-L/s)**, **as directed**, capacity at **55-psig (380-kPa)** line pressure.
9. Instrument Air Manifolds: For 8 cylinders and **2000-cu. ft./h (15.7-L/s)** **OR** 12 cylinders and **3000-cu. ft./h (23.6-L/s)**, **as directed**, capacity at **200-psig (1380-kPa)** minimum line pressure.

G. Medical Compressed-Air-Piping Alarm Systems

1. Panels for medical compressed-air piping systems may be combined in single panels with medical vacuum and medical gas piping systems.
2. Components: Designed for continuous service and to operate on power supplied from 120 **OR** 240 **OR** 277, **as directed**,-V ac power source to alarm panels and with connections for low-voltage wiring to remote sensing devices. Include step-down transformers if required.
3. Dew Point Monitors: Continuous line monitoring, having panel with gage or digital display, pipeline sensing element, electrical connections for alarm system, factory- or field-installed valved bypass, and visual and cancelable audio signal for dryer site and master alarm panels. Alarm signals when pressure dew point rises above **39 deg F (4 deg C)** at **55 psig (380 kPa)**.
 - a. Operation: Chilled-mirror method **OR** Chilled-mirror method or hygrometer moisture analyzer with sensor probe **OR** Hygrometer moisture analyzer with sensor probe, **as directed**.
4. Pressure Switches or Transducer Sensors: Continuous line monitoring with electrical connections for alarm system.
 - a. Low-Pressure Operating Range: **0- to 100-psig (0- to 690-kPa)**.
 - b. High-Pressure Operating Range: Up to **250-psig (1725-kPa)**.
5. Carbon Monoxide Monitors: Panel with gage or digital display, pipeline sensing element, electrical connections for alarm system, and factory- or field-installed valved bypass. Alarm signals when carbon monoxide level rises above 10 ppm.
6. General Requirements for Medical Compressed-Air Alarm Panels: Factory wired with audible and color-coded visible signals to indicate specified functions.
 - a. Mounting: Exposed, surface **OR** Recessed, **as directed**, installation.
 - b. Enclosures: Fabricated from minimum **0.047-inch- (1.2-mm-)** thick steel or minimum **0.05-inch- (1.27-mm-)** thick aluminum, with knockouts for electrical and piping connections.
7. Master Alarm Panels: Separate trouble alarm signals, pressure gages, and indicators for medical compressed-air piping systems.

- a. Include alarm signals when the following conditions exist:
 - 1) Medical Air: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa), backup air compressor is in operation, pressure drop across filter assembly increases more than 2 psig (13.8 kPa), dew point rises above 39 deg F (4 deg C) at 55 psig (380 kPa), carbon monoxide level rises above 10 ppm, and high water level is reached in receiver for liquid-ring, medical air compressor systems.
 - 2) Dental Air: Pressure drops below 65 psig (450 kPa) or rises above 110 psig (760 kPa), backup air compressor is in operation, pressure drop across filter assembly increases more than 2 psig (13.8 kPa), dew point rises above 50 deg F (10 deg C) at 125 psig (860 kPa), and carbon monoxide level rises above 10 ppm.
 - 3) Instrument Air: Pressure drops below 165 psig (1140 kPa) or rises above 185 psig (1275 kPa).
 - 4) Medical Laboratory Air: Pressure drops below 90 psig (630 kPa) or rises above 110 psig (760 kPa).
 8. Anesthetizing-Area Alarm Panels: Separate trouble alarm signals, pressure gages, and indicators for medical compressed-air piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Medical Air: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa).
 - 2) Instrument Air: Pressure drops below 165 psig (1140 kPa) or rises above 185 psig (1275 kPa).
 9. Area Alarm Panels: Separate trouble alarm signals, pressure gages, and indicators for medical compressed-air piping systems.
 - a. Include alarm signals when the following condition exists:
 - 1) Medical Air: Pressure drops below 40 psig (275 kPa) or rises above 60 psig (415 kPa).
 10. Dental-Area Alarm Panels: Separate trouble alarm signals, pressure gages, and indicators for medical compressed-air piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Dental Air: Pressure drops below 65 psig (450 kPa) or rises above 110 psig (760 kPa), backup air compressor is in operation, pressure drop across filter assembly increases more than 2 psig (13.8 kPa), dew point rises above 50 deg F (10 deg C) at 125 psig (860 kPa), and carbon monoxide level rises above 10 ppm.
 - 2) Instrument Air: Pressure drops below 165 psig (1140 kPa) or rises above 185 psig (1275 kPa).
 11. Medical Laboratory Area Alarm Panels: Separate trouble alarm signals, pressure gages,; and indicators for medical compressed-air piping systems.
 - a. Include alarm signals when the following condition exists:
 - 1) Medical Laboratory Air: Pressure drops below 90 psig (630 kPa) or rises above 110 psig (760 kPa).
- H. Computer Interface Cabinet
1. Description: Wall-mounting, welded-steel control cabinet with gasketed door, mounting brackets, grounding device, and white-enamel finish for connection of medical compressed-air- piping-system alarms to facility computer. Include factory-installed signal circuit boards, power transformer, circuit breaker, wiring terminal board, and internal wiring capable of interfacing 20, **as directed**, alarm signals.
- I. Compressed-Air-Cylinder Storage Racks
1. Wall Storage Racks: Fabricate racks with chain restraints for upright cylinders as indicated or provide equivalent manufactured wall racks.
 2. Freestanding Storage Racks: Fabricate racks as indicated or provide equivalent manufactured storage racks.

- J. Flexible Pipe Connectors
1. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - a. Working-Pressure Rating: **200 psig (1380 kPa) OR 250 psig (1725 kPa), as directed**, minimum.
 - b. End Connections: Threaded copper pipe or plain-end copper tube.
- K. Sleeves
1. Galvanized-Steel Sheet: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 2. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- L. Escutcheons
1. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
 2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 3. One-Piece, Cast-Brass Escutcheons: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
 4. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
 5. One-Piece, Stamped-Steel Escutcheons: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 6. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 7. One-Piece, Floor-Plate Escutcheons: Cast iron.
 8. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.
- M. Grout
1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.
- N. Nitrogen
1. Description: Comply with USP 28 - NF 23 for oil-free dry nitrogen.

1.3 EXECUTION

- A. Piping Applications
1. Connect new tubing to existing tubing with memory-metal couplings.
 2. Laboratory Air Piping: Use one of the following piping materials for each size range:
 - a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
 3. Medical Air Piping: Use Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.

4. Dental Air Piping: Use Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
5. Instrument Air Piping:
 - a. **NPS 3 (DN 80)** and Smaller: Use Type K **OR** Type L, **as directed**, copper medical gas tube; wrought-copper fittings; and brazed joints.
 - b. **NPS 3-1/2 (DN 90)** and Larger: Use Type K, copper medical gas tube; wrought-copper fittings; and brazed joints.
6. Medical Laboratory Air Piping: Use Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
7. Drain Piping: Use one of the following piping materials:
 - a. Copper water tube, cast- or wrought-copper fittings, and soldered **OR** press-type fittings, and pressure-sealed, **as directed**, joints.
 - b. PVC pipe, PVC fittings, and solvent-cemented joints.

B. Piping Installation

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Comply with ASSE Standard #6010 for installation of compressed-air piping.
3. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.
6. Install piping adjacent to equipment and specialties to allow service and maintenance.
7. Install air and drain piping with 1 percent slope downward in direction of flow.
8. Install nipples, unions, special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below unless otherwise indicated.
9. Install eccentric reducers, if available, where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
10. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.
11. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Division 22 Section "Meters And Gages For Plumbing Piping".
12. Install piping to permit valve servicing.
13. Install piping free of sags and bends.
14. Install fittings for changes in direction and branch connections.
15. Install medical compressed-air piping to medical compressed-air service connections specified in this Section, to medical compressed-air service connections in equipment specified in Division 22 Section "Gas Piping For Laboratory And Healthcare Facilities", and to equipment specified in other Sections requiring medical compressed-air service.
16. Install seismic restraints on compressed-air piping. Seismic-restraint devices are specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
17. Install compressed-air service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.
18. Connect compressed-air piping to air compressors and to compressed-air outlets and equipment requiring compressed-air service.
19. Install unions in copper compressed-air tubing adjacent to each valve and at final connection to each piece of equipment, machine, and specialty.

- C. Valve Installation
1. Install shutoff valve at each connection to and from compressed-air equipment and specialties.
 2. Install check valves to maintain correct direction of compressed-air flow from compressed-air equipment.
 3. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.
 4. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.
 5. Install safety valves on compressed-air receivers where required by NFPA 99 and where recommended by specialty manufacturers.
 6. Install pressure regulators on compressed-air piping where reduced pressure is required.
 7. Install automatic drain valves on equipment, specialties, and piping with drain connection. Run drain piping to floor drain so contents spill over or into it.
 8. Install flexible pipe connectors in discharge piping and in inlet air piping from remote air-inlet filter, **as directed**, of each air compressor.
- D. Joint Construction
1. Ream ends of PVC pipes and remove burrs.
 2. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
 3. Threaded Joints: Apply appropriate tape to external pipe threads.
 4. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter. Continuously purge joint with oil-free dry nitrogen during brazing.
 5. Soldered Joints: Apply ASTM B 813, water-flushable flux to tube end. Join copper tube and fittings according to ASTM B 828.
 6. Pressure-Sealed Joints: Join copper tube and press-type fittings with tools recommended by fitting manufacturer.
 7. Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of memory-metal coupling joints.
 8. Solvent-Cemented Joints: Clean and dry joining surfaces. Join PVC pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. Apply primer and join according to ASME B31.9 for solvent-cemented joints, and ASTM D 2672.
- E. Compressed-Air Service Component Installation
1. Install compressed-air pressure control panel in walls. Attach to substrate.
 2. Install compressed-air manifolds on concrete base, **as directed**, anchored to substrate.
 3. Install compressed-air cylinders and connect to manifold piping.
 4. Install compressed-air manifolds with seismic restraints as indicated.
 5. Install compressed-air-cylinder wall storage racks attached to substrate.
- F. Medical Compressed-Air-Piping Alarm System Installation
1. Alarm panels for medical compressed-air piping systems may be combined in single panels with medical vacuum piping systems and medical gas piping systems.
 2. Install alarm system components for medical compressed-air-piping according to and in locations required by NFPA 99.
 3. Install area and master alarm panels for medical compressed-air piping system where indicated.
 4. Install computer interface cabinet with connection to medical compressed-air-piping alarm system and to facility computer.
- G. Sleeve Installation
1. Sleeves are not required for core-drilled holes.
 2. Permanent sleeves are not required for holes formed by removable PE sleeves.

3. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs using galvanized-steel pipe **OR** galvanized-steel sheet **OR** stack sleeve fittings **OR** PVC pipe, **as directed**.
 - a. Wall Penetrations: Cut sleeves to length for mounting flush with both surfaces.
 - b. Floor Penetrations: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

OR

Install sleeves in new walls and slabs as new walls and slabs are constructed.
4. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - b. Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger penetrating gypsum board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
5. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".

H. Escutcheon Installation

1. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set screw **OR** stamped steel with set screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - 3) Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set screw **OR** One piece or split plate, stamped steel with set screw **OR** Split plate, stamped steel with set screw, **as directed**.
 - 4) Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - 5) Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - 6) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
 - b. Existing Piping:
 - 1) Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - 2) Insulated Piping: Split plate, stamped steel with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.

- 4) Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set screw, **as directed**.
- 5) Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set screw or spring clips, **as directed**.
- 6) Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set screw or spring clips, **as directed**.
- 7) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

I. Hanger And Support Installation

1. Comply with requirements in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment" for seismic-restraint devices.
2. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for pipe hanger and support devices.
3. Vertical Piping: MSS Type 8 or 42, clamps.
4. Individual, Straight, Horizontal Piping Runs:
 - a. **100 Feet (30 m)** and Less: MSS Type 1, adjustable, steel, clevis hangers.
 - b. Longer Than **100 Feet (30 m)**: MSS Type 43, adjustable, roller hangers.
5. Multiple, Straight, Horizontal Piping Runs **100 Feet (30 m)** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for trapeze hangers.
6. Base of Vertical Piping: MSS Type 52, spring hangers.
7. Support horizontal piping within **12 inches (300 mm)** of each fitting and coupling.
8. Rod diameter may be reduced 1 size for double-rod hangers, with **3/8-inch (10-mm)** minimum rods.
9. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1/4 (DN 8): 60 inches (1500 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm)** with **3/8-inch (10-mm)** rod.
 - c. **NPS 3/4 (DN 20): 84 inches (2100 mm)** with **3/8-inch (10-mm)** rod.
 - d. **NPS 1 (DN 25): 96 inches (2400 mm)** with **3/8-inch (10-mm)** rod.
 - e. **NPS 1-1/4 (DN 32): 108 inches (2700 mm)** with **3/8-inch (10-mm)** rod.
 - f. **NPS 1-1/2 (DN 40): 10 feet (3 m)** with **3/8-inch (10-mm)** rod.
 - g. **NPS 2 (DN 50): 11 feet (3.4 m)** with **3/8-inch (10-mm)** rod.
 - h. **NPS 2-1/2 (DN 65): 13 feet (4 m)** with **1/2-inch (13-mm)** rod.
 - i. **NPS 3 (DN 80): 14 feet (4.3 m)** with **1/2-inch (13-mm)** rod.
 - j. **NPS 3-1/2 (DN 90): 15 feet (4.6 m)** with **1/2-inch (13-mm)** rod.
 - k. **NPS 4 (DN 100): 16 feet (4.9 m)** with **1/2-inch (13-mm)** rod.
 - l. **NPS 5 (DN 125): 18 feet (5.5 m)** with **1/2-inch (13-mm)** rod.
 - m. **NPS 6 (DN 150): 20 feet (6 m)** with **5/8-inch (16-mm)** rod.
 - n. **NPS 8 (DN 200): 23 feet (7 m)** with **3/4-inch (19-mm)** rod.
10. Install supports for vertical copper tubing every **10 feet (3 m)**.

J. Labeling And Identification

1. Install identifying labels and devices for nonmedical laboratory compressed-air piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification For Plumbing Piping And Equipment".
2. Install identifying labels and devices for medical compressed-air piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:
 - a. Medical Air: Black letters on yellow background.

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- b. Dental Air: Black letters on yellow-and-white diagonal stripe background.
 - c. Instrument Air: White letters on red background.
 - d. Medical Laboratory Air: Black letters on yellow-and-white checkerboard background.
- K. Field Quality Control For Compressed-Air Piping In Nonmedical Laboratory Facilities
- 1. Perform tests and inspections of compressed-air piping in nonmedical laboratory facilities and prepare test reports.
 - 2. Tests and Inspections:
 - a. Piping Leak Tests for Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry nitrogen to pressure of **50 psig (345 kPa)** above system operating pressure, but not less than **150 psig (1035 kPa)**. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - b. Repair leaks and retest until no leaks exist.
 - c. Inspect filters and pressure regulators for proper operation.
- L. Field Quality Control For Medical Compressed-Air Piping In Healthcare Facilities
- 1. Perform tests and inspections of medical compressed-air piping systems in healthcare facilities and prepare test reports.
 - 2. Tests and Inspections:
 - a. Medical Compressed-Air Testing Coordination: Perform tests, inspections, verifications, and certification of medical compressed-air piping systems concurrently with tests, inspections, and certification of medical vacuum piping and medical gas piping systems.
 - b. Preparation: Perform the following Installer tests according to requirements in NFPA 99 and ASSE Standard #6010:
 - 1) Initial blowdown.
 - 2) Initial pressure test.
 - 3) Cross-connection test.
 - 4) Piping purge test.
 - 5) Standing pressure test for positive-pressure medical compressed-air piping.
 - 6) Repair leaks and retest until no leaks exist.
 - c. System Verification: Comply with requirements in NFPA 99, ASSE Standard #6020, and ASSE Standard #6030 for verification of medical compressed-air piping systems and perform the following tests and inspections:
 - 1) Standing pressure test.
 - 2) Individual-pressurization **OR** Individual-pressurization or pressure-differential **OR** Pressure-differential, **as directed**, cross-connection test.
 - 3) Valve test.
 - 4) Master and area alarm tests.
 - 5) Piping purge test.
 - 6) Piping particulate test.
 - 7) Piping purity test.
 - 8) Final tie-in test.
 - 9) Operational pressure test.
 - 10) Medical air purity test.
 - 11) Verify correct labeling of equipment and components.
 - d. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:
 - 1) Inspections performed.
 - 2) Procedures, materials, and gases used.
 - 3) Test methods used.
 - 4) Results of tests.
 - 3. Remove and replace components that do not pass tests and inspections and retest as specified above.

END OF SECTION 01 95 99 99d

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SECTION 01 95 99 99e - VACUUM PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for vacuum piping for laboratory and healthcare facilities. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Laboratory low-vacuum piping and specialties, designated "laboratory low vacuum" operating at **12 inches mercury (40.6 kPa vacuum) OR 20 inches mercury (67.7 kPa vacuum), as directed.**
 - b. Laboratory high-vacuum piping and specialties, designated "laboratory high vacuum" operating at **24 inches mercury (81.3 kPa vacuum) OR 29 inches mercury (98.2 kPa vacuum), as directed.**
 - c. Medical surgical vacuum piping and specialties, designated "medical vacuum" operating at **15 inches mercury (380 mm mercury or 50.7 kPa vacuum) OR 20 inches mercury (510 mm mercury or 67.7 kPa vacuum) OR 30 inches mercury (760 mm mercury or 101.4 kPa vacuum), as directed.**
 - d. Waste anesthetic gas disposal piping and specialties, designated "WAGD evacuation" operating at **14 inches mercury (355 mm mercury or 47.2 kPa vacuum) OR 15 inches mercury (380 mm mercury or 50.7 kPa vacuum), as directed.**
 - e. Dental vacuum piping and specialties, designated "dental vacuum" operating at **10 inches mercury (255 mm mercury or 33.8 kPa vacuum) OR 12 inches mercury (305 mm mercury or 40.6 kPa vacuum), as directed.**
 - f. Oral-evacuation piping and specialties, designated "HVE" operating at **5 inches mercury (127 mm mercury or 16.9 kPa vacuum) OR 8 inches mercury (203 mm mercury or 27.0 kPa vacuum), as directed.**
 - g. Healthcare laboratory vacuum piping and specialties, designated "medical laboratory vacuum" operating at **12 inches mercury (40.6 kPa vacuum) OR 20 inches mercury (67.7 kPa vacuum) OR 24 inches mercury (81.3 kPa vacuum), as directed.**

C. Definitions

1. D.I.S.S.: Diameter-index safety system.
2. HVE: High-volume (oral) evacuation.
3. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
4. WAGD: Waste anesthetic gas disposal.
5. Medical vacuum piping systems include medical vacuum, WAGD evacuation, dental vacuum, HVE, and medical laboratory vacuum piping systems.

D. Submittals

1. Product Data: For the following:
 - a. Vacuum pipes **OR** tubes, **as directed**, and fittings.
 - b. Vacuum valves and valve boxes.
 - c. Medical vacuum service connections and vacuum-bottle brackets.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
3. Shop Drawings: Diagram power, signal, and control wiring.

4. Piping Material Certification: Signed by Installer certifying that medical vacuum piping materials comply with NFPA 99 requirements.
5. Qualification Data: For Installer and testing agency.
6. Brazing certificates.
7. Field quality-control test reports.
8. Operation and maintenance data.

E. Quality Assurance

1. Installer Qualifications:
 - a. Medical Vacuum Piping Systems for Healthcare Facilities: Qualify installers according to ASSE Standard #6010.
 - b. Extruded-Tee Outlet Procedure: Qualify operators according to training provided by T-DRILL Industries Inc., for making branch outlets.
 - c. Pressure-Seal Joining Procedure for Copper Tubing: Qualify operators according to training provided by Viega; Plumbing and Heating Systems.
2. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the vacuum piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL, and that is acceptable to authorities having jurisdiction.
 - a. Qualify testing personnel according to ASSE Standard #6020 for inspectors and ASSE Standard #6030 for verifiers.
3. Source Limitations: Obtain vacuum service connections of same type and from same manufacture as service connections provided for in Division 22 Section "Gas Piping For Laboratory And Healthcare Facilities".
4. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
6. Comply with ASME B31.9, "Building Services Piping," for vacuum piping in laboratory facilities.
7. NFPA Compliance: Comply with NFPA 99, "Health Care Facilities," for medical vacuum system materials and installation in healthcare facilities.

F. Project Conditions

1. Interruption of Existing Laboratory or Medical Vacuum Service(s): Do not interrupt laboratory or medical vacuum service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of laboratory or medical vacuum service(s).
 - b. Do not proceed with interruption of laboratory or medical vacuum service(s) without the Owner's written permission.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. Copper Medical Gas Tube: ASTM B 819, Type L, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in blue.
 - a. General Requirements for Copper Fittings: Manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.

- b. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, with dimensions for brazed joints.
 - c. Copper Unions: ASME B16.22 or MSS SP-123, wrought copper or cast-copper alloy.
 - d. Press-Type Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
 2. Copper Water Tube: **ASTM B 88, Type M (ASTM B 88M, Type C)**, seamless, drawn temper.
 - a. Cast-Copper Fittings: ASME B16.18, solder-joint pressure type.
 - b. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type.
 - c. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150.
 - d. Copper Unions: ASME B16.22 or MSS SP-123, wrought copper or cast-copper alloy.
 - e. Press-Type Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
 3. Extruded-Tee Outlets: ASTM F 2014 procedure for making branch outlets in copper tube.
 4. Memory-Metal Couplings: Cryogenic compression fitting made of ASTM F 2063, nickel-titanium, shape-memory alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.
 5. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.
 - a. PVC Pressure Fittings: ASTM D 2466, Schedule 40 and ASTM D 2467, Schedule 80; socket type.
- B. Joining Materials**
1. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 2. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
 3. Threaded-Joint Tape: PTFE.
 4. Pipe-Flange Gasket Materials: ASME B16.21, nonmetallic, flat, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness, full-face type.
 5. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.
 6. Solvent Cement for Joining PVC Piping: ASTM D 2564. Include primer complying with ASTM F 656.
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Valves**
1. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.
 - a. Exception: Factory cleaning and bagging are not required for valves for WAGD service.
 2. Copper-Alloy Ball Valves: MSS SP-110, 3-piece body, brass or bronze.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Ball: Full-port, chrome-plated brass.
 - c. Seats: PTFE or TFE.
 - d. Handle: Lever type with locking device, **as directed**.
 - e. Stem: Blowout proof with PTFE or TFE seal.
 - f. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 3. Bronze Check Valves: In-line pattern.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Operation: Spring loaded.

- c. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 4. Zone Valves: MSS SP-110, 3-piece-body, brass or bronze ball valve with gage.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Ball: Full-port, chrome-plated brass.
 - c. Seats: PTFE or TFE.
 - d. Handle: Lever type with locking device, **as directed**.
 - e. Stem: Blowout proof with PTFE or TFE seal.
 - f. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 - g. Vacuum Gage: Manufacturer installed on one copper-tube extension.
 5. Zone Valve Boxes: Formed steel with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with vacuum gages and in sizes required to permit manual operation of valves.
 - a. Interior Finish: Factory-applied white enamel.
 - b. Cover Plate: Aluminum or extruded-anodized aluminum **OR** Satin-chrome finish steel **OR** Stainless steel with NAAMM AMP 503, No. 4 finish, **as directed**, with frangible or removable windows.
 - c. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.
 6. Zone Valve Boxes: Formed or extruded aluminum with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with vacuum gages and in sizes required to permit manual operation of valves.
 - a. Interior Finish: Factory-applied white enamel.
 - b. Cover Plate: Aluminum or extruded-anodized aluminum **OR** Stainless steel with NAAMM AMP 503, No. 4 finish, **as directed**, with frangible or removable windows.
 - c. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.
 7. PVC Ball Valves: MSS SP-122, with union ends and **150-psig (1035-kPa)** minimum working-pressure rating and suitable for vacuum service.
 8. PVC Butterfly Valves: Lug type with lever handle and **150-psig (1035-kPa)** minimum working-pressure rating and suitable for vacuum service.
 9. PVC Check Valves: Ball-, in-line-, piston-, or swing-check design with flanged or union ends and **70-psig (480-kPa) OR 100-psig (690-kPa)**, **as directed**, minimum working-pressure rating and suitable for vacuum service.
 10. Safety Valves: Bronze-body, ASME-construction, pressure-relief type with settings to match system requirements.
 11. Automatic Drain Valves: Stainless-steel body and internal parts, rated for **200-psig (1380-kPa)** minimum working pressure, capable of automatic discharge of collected condensate. Include mounting bracket where wall mounting is indicated.
- D. Medical Vacuum Service Connections
1. Connection Devices: For specific medical vacuum service listed. Include roughing-in assemblies, finishing assemblies, and cover plates. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate. Furnish recessed-type units made for concealed piping unless otherwise indicated.
 - a. Roughing-in Assembly:
 - 1) Steel outlet box for recessed mounting and concealed piping.
 - 2) Brass-body inlet block.
 - 3) Seals that will prevent vacuum leakage.
 - 4) ASTM B 819, **NPS 3/8 (DN 10)** copper outlet tube brazed to valve with service marking and tube-end dust cap.
 - b. Finishing Assembly:
 - 1) Brass housing with primary check valve.
 - 2) Seals that will prevent vacuum leakage.
 - 3) Cover plate with gas-service label.

- c. Quick-Coupler Service Connections: Suction inlets for medical vacuum **OR** medical vacuum and WAGD evacuation **OR** WAGD evacuation, **as directed**, service outlets with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.
 - d. D.I.S.S. Service Connections: Suction inlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.
 - 1) Medical Vacuum Service Connections: CGA V-5, D.I.S.S. No. 1220.
 - 2) WAGD Evacuation Service Connections: CGA V-5, D.I.S.S. No. 2220.
 - e. Vacuum Bottle Brackets: One piece, with pattern and finish matching corresponding service cover plate.
 - f. Cover Plates: One piece, stainless steel, with NAAMM AMP 503, No. 4 finish **OR** metal, with chrome-plated finish **OR** anodized aluminum, **as directed**, and permanent, color-coded, identifying label matching corresponding service.
- E. Medical Vacuum Piping Alarm Systems
- 1. Panels for medical vacuum piping systems may be combined in single panels with medical compressed-air and medical gas piping systems.
 - 2. Components: Designed for continuous service and to operate on power supplied from 120-V **OR** 240-V **OR** 277-V, **as directed**, ac power source to alarm panels and with connections for low-voltage wiring to remote sensing devices. Include step-down transformers if required.
 - 3. Vacuum Switches or Transducer Sensors: Continuous line monitoring with electrical connections for alarm system.
 - a. Vacuum Operating Range: **0- to 30-in. Hg (0- to 101-kPa vacuum)**.
 - 4. General Requirements for Medical Vacuum Alarm Panels: Factory wired with audible and color-coded visible signals to indicate specified functions.
 - a. Mounting: Exposed, surface **OR** Recessed, **as directed**, installation.
 - b. Enclosures: Fabricated from minimum **0.047-inch- (1.2-mm-)** thick steel or minimum **0.05-inch- (1.27-mm-)** thick aluminum, with knockouts for electrical and piping connections.
 - 5. Master Alarm Panels: With separate trouble alarm signals, vacuum gages, and indicators for medical vacuum piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Medical Vacuum: Vacuum drops below **12-in. Hg (40 kPa vacuum)** and backup vacuum pump is in operation.
 - 2) WAGD Evacuation: Vacuum drops below **12-in. Hg (40 kPa vacuum)**.
 - 3) Dental Vacuum: Vacuum drops below **6-in. Hg (20 kPa vacuum)** and backup vacuum producer is in operation.
 - 4) HVE: **4-in. Hg (13 kPa vacuum)** and backup vacuum producer is in operation.
 - 5) Medical Laboratory Vacuum: Vacuum drops below **10-in. Hg (34 kPa vacuum)**.
 - 6. Anesthetizing-Area Alarm Panels: Separate trouble alarm signals; vacuum gages; and indicators for medical vacuum piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Medical Vacuum: Vacuum drops below **12-in. Hg (40 kPa vacuum)**.
 - 2) WAGD Evacuation: Vacuum drops below **12-in. Hg (40 kPa vacuum)**.
 - 7. Area Alarm Panels: Separate trouble alarm signals; vacuum gages; and indicators for medical vacuum piping systems.
 - a. Include alarm signals when the following condition exists:
 - 1) Medical Vacuum: Vacuum drops below **12-in. Hg (40 kPa vacuum)**.
 - 8. Dental Area Alarm Panels: Separate trouble alarm signals; vacuum gages; and indicators for medical vacuum piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Dental Vacuum: Vacuum drops below **6-in. Hg (20 kPa vacuum)** and backup vacuum producer is in operation.
 - 2) HVE: **4-in. Hg (13 kPa vacuum)** and backup vacuum producer is in operation.

9. Medical Laboratory Area Alarm Panels: Separate trouble alarm signals; vacuum gages; and indicators for medical vacuum piping systems.
 - a. Include alarm signals when the following condition exists:
 - 1) Medical Vacuum: Vacuum drops below **12-in. Hg (40 kPa vacuum)**.
- F. Computer Interface Cabinet
 1. Description: Wall-mounting, welded-steel, control cabinet with gasketed door, mounting brackets, grounding device, and white-enamel finish for connection of medical vacuum piping system alarms to facility computer. Include factory-installed signal circuit boards, power transformer, circuit breaker, wiring terminal board, and internal wiring capable of interfacing 20 alarm signals.
- G. Flexible Pipe Connectors
 1. Description: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - a. Working-Pressure Rating: **200 psig (1380 kPa) OR 250 psig (1725 kPa), as directed**, minimum.
 - b. End Connections: Threaded copper pipe or plain-end copper tube.
- H. Sleeves
 1. Galvanized-Steel Sheet: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 2. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- I. Escutcheons
 1. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
 2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 3. One-Piece, Cast-Brass Escutcheons: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
 4. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
 5. One-Piece, Stamped-Steel Escutcheons: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 6. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 7. One-Piece, Floor-Plate Escutcheons: Cast iron.
 8. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.
- J. Grout
 1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.
- K. Nitrogen
 1. Description: Comply with USP 28 - NF 23 for oil-free dry nitrogen.

1.3 EXECUTION

A. Preparation

1. Cleaning of Medical Gas Tubing: If manufacturer-cleaned and -capped fittings or tubing are not available or if precleaned fittings or tubing must be recleaned because of exposure, have supplier or separate agency acceptable to authorities having jurisdiction perform the following procedures:
 - a. Clean medical gas tube and fittings, valves, gages, and other components of oil, grease, and other readily oxidizable materials as required for oxygen service according to CGA G-4.1, "Cleaning Equipment for Oxygen Service."
 - b. Wash medical gas tubing and components in hot, alkaline-cleaner-water solution of sodium carbonate or trisodium phosphate in proportion of **1 lb (0.453 kg)** of chemical to **3 gal. (11.3 L)** of water.
 - 1) Scrub to ensure complete cleaning.
 - 2) Rinse with clean, hot water to remove cleaning solution.

B. Piping Applications

1. Connect new copper tubing to existing tubing with memory-metal couplings.
2. Nonhealthcare Laboratory Low Vacuum Piping: Use one of the following piping materials for each size range:
 - a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
3. Nonhealthcare Laboratory High Vacuum Piping: Use one of the following piping materials for each size range:
 - a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
4. Medical Vacuum Piping: Use one of the following piping materials for each size range:
 - a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed joints.
5. WAGD Evacuation Piping: Use one of the following piping materials for each size range:
 - a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed joints.
6. Dental Vacuum Piping: Use one of the following piping materials for each size range:
 - a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
7. HVE Piping: Use one of the following piping materials for each size range:

- a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 4 (DN 100)** and Smaller: Schedule 40 PVC pipe, Schedule 40 PVC fittings **OR** Schedule 80 PVC pipe, Schedule 80 PVC fittings, **as directed**, and solvent-cemented joints.
 - d. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - e. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Schedule 40 PVC pipe, Schedule 40 PVC fittings **OR** Schedule 80 PVC pipe, Schedule 80 PVC fittings, **as directed**, and solvent-cemented joints.
8. Medical Laboratory Vacuum Piping: Use one of the following piping materials for each size range:
- a. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed joints.
 - b. **NPS 4 (DN 100)** and Smaller: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; press-type fittings; and pressure-sealed joints.
 - c. **NPS 5 to NPS 8 (DN 125 to DN 200)**: Type L, copper medical gas **OR M (C)** copper water, **as directed**, tube; wrought-copper fittings; and brazed joints.
9. Drain Piping: Use one of the following piping materials:
- a. Copper water tube, cast- or wrought-copper fittings, and soldered **OR** press-type fittings, and pressure-sealed, **as directed**, joints.
 - b. PVC pipe, PVC fittings, and solvent-cemented joints.

C. Piping Installation

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of vacuum piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Comply with ASSE Standard #6010 for installation of vacuum piping.
3. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.
6. Install piping adjacent to equipment and specialties to allow service and maintenance.
7. Install vacuum and drain piping with 1 percent slope downward in direction of flow.
8. Install nipples, unions, and special fittings, and valves with pressure ratings same as or higher than piping pressure rating used in applications below unless otherwise indicated.
9. Install eccentric reducers, if available, where vacuum piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
10. Provide drain leg and drain trap at end of each main and branch and at low points.
11. Install thermometer and vacuum gage on inlet piping to each vacuum producer and on each receiver and separator, **as directed**. Comply with requirements in Division 22 Section "Meters And Gages For Plumbing Piping".
12. Install piping to permit valve servicing.
13. Install piping free of sags and bends.
14. Install fittings for changes in direction and for branch connections. Extruded-tee branch outlets in copper tubing may be made where specified.
15. Install medical vacuum piping to medical vacuum service connections specified in this Section and to equipment specified in other Sections requiring medical vacuum service.

16. Install seismic restraints on vacuum piping. Seismic-restraint devices are specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
17. Install medical vacuum service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.
18. Install medical vacuum bottle bracket adjacent to each wall-mounted medical vacuum service connection suction inlet.
19. Connect vacuum piping to vacuum producers and to equipment requiring vacuum service.
20. Install unions, in copper vacuum tubing adjacent to each valve and at final connection to each piece of equipment, machine, and specialty.
21. Install unions, in PVC vacuum piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment, machine, and specialty.
22. Install flanges, in PVC vacuum piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment, machine, and specialty.

D. Valve Applications

1. Valves for Copper Vacuum Tubing: Use copper alloy ball and bronze check types.
2. Valves for PVC Vacuum Piping:
 - a. **NPS 4 (DN 100)** and Smaller: Use copper alloy ball and bronze **OR** PVC ball, butterfly, and, **as directed**, check types.
 - b. **NPS 5 (DN 125)** and Larger: Use PVC butterfly and check types.

E. Valve Installation

1. Install shutoff valve at each connection to and from vacuum equipment and specialties.
2. Install check valves to maintain correct direction of vacuum flow to vacuum-producing equipment.
3. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.
4. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.
5. Install safety valves on vacuum receivers, where required by NFPA 99, and where recommended by specialty manufacturers.
6. Install automatic drain valves on equipment, specialties, and piping with drain connection. Run drain piping to floor drain, so contents spill over or into it.
7. Install flexible pipe connectors in suction inlet piping to each vacuum producer.

F. Joint Construction

1. Ream ends of pipes and tubes and remove burrs.
2. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
4. Threaded Joints: Apply appropriate tape to external pipe threads.
5. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter. Continuously purge joint with oil-free dry nitrogen during brazing.
6. Soldered Joints: Apply ASTM B 813, water-flushable flux to tube end. Join copper tube and fittings according to ASTM B 828.
7. Extruded-Tee Outlets: Form branches in copper tube according to ASTM F 2014, with tools recommended by procedure manufacture.
8. Flanged Joints:
 - a. Copper Tubing: Install flange on copper tubes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
 - b. PVC Piping: Install PVC flange on PVC pipes. Use pipe-flange gasket between flanges. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
9. Pressure-Sealed Joints: Join copper tube and copper and copper-alloy fittings with tools recommended by fitting manufacturer.
10. Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of memory-metal coupling joints.
11. Solvent-Cemented Joints: Clean and dry joining surfaces. Join PVC pipe and fittings according to the following:

- a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. Apply primer and join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2672.
- G. Medical Vacuum Piping Alarm System Installation
1. Panels for medical vacuum piping systems may be combined in single panels with medical compressed-air piping systems and medical gas piping systems.
 2. Install medical vacuum piping system alarm system components in locations required by and according to NFPA 99.
 3. Install medical vacuum piping system area and master alarm panels where indicated.
 4. Install computer interface cabinet with connection to medical vacuum piping alarm system and to facility computer.
- H. Sleeve Installation
1. Sleeves are not required for core-drilled holes.
 2. Permanent sleeves are not required for holes formed by removable PE sleeves.
 3. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs using galvanized-steel pipe **OR** galvanized-steel sheet **OR** stack sleeve fittings **OR** PVC pipe, **as directed**.
 - a. Wall Penetrations: Cut sleeves to length for mounting flush with both surfaces.
 - b. Floor Penetrations: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
- OR**
- Install sleeves in new walls and slabs as new walls and slabs are constructed.
4. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - b. Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 5. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
- I. Escutcheon Installation
1. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set screw **OR** stamped steel with set screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - 3) Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One-piece, stamped steel with set screw **OR** One piece or split plate, stamped steel with set screw **OR** Split plate, stamped steel with set screw, **as directed**.

- 4) Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
- 5) Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
- 6) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
- b. Existing Piping:
 - 1) Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - 2) Insulated Piping: Split plate, stamped steel with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - 4) Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set screw, **as directed**.
 - 5) Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set screw or spring clips, **as directed**.
 - 6) Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set screw or spring clips, **as directed**.
 - 7) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

J. Hanger And Support Installation

1. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for pipe hanger and support devices.
2. Vertical Piping: MSS Type 8 or 42, clamps.
3. Individual, Straight, Horizontal Piping Runs:
 - a. **100 Feet (30 m)** and Less: MSS Type 1, adjustable, steel, clevis hangers.
 - b. Longer Than **100 Feet (30 m)**: MSS Type 43, adjustable, roller hangers.
4. Multiple, Straight, Horizontal Piping Runs **100 Feet (30 m)** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for trapeze hangers.
5. Base of Vertical Piping: MSS Type 52, spring hangers.
6. Support horizontal piping within **12 inches (300 mm)** of each fitting and coupling.
7. Rod diameter may be reduced 1 size for double-rod hangers, with **3/8-inch (10-mm)** minimum rods.
8. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1/4 (DN 8): 60 inches (1500 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm)** with **3/8-inch (10-mm)** rod.
 - c. **NPS 3/4 (DN 20): 84 inches (2100 mm)** with **3/8-inch (10-mm)** rod.
 - d. **NPS 1 (DN 25): 96 inches (2400 mm)** with **3/8-inch (10-mm)** rod.
 - e. **NPS 1-1/4 (DN 32): 108 inches (2700 mm)** with **3/8-inch (10-mm)** rod.
 - f. **NPS 1-1/2 (DN 40): 10 feet (3 m)** with **3/8-inch (10-mm)** rod.
 - g. **NPS 2 (DN 50): 11 feet (3.4 m)** with **3/8-inch (10-mm)** rod.
 - h. **NPS 2-1/2 (DN 65): 13 feet (4 m)** with **1/2-inch (13-mm)** rod.
 - i. **NPS 3 (DN 80): 14 feet (4.3 m)** with **1/2-inch (13-mm)** rod.
 - j. **NPS 3-1/2 (DN 90): 15 feet (4.6 m)** with **1/2-inch (13-mm)** rod.
 - k. **NPS 4 (DN 100): 16 feet (4.9 m)** with **1/2-inch (13-mm)** rod.
 - l. **NPS 5 (DN 125): 18 feet (5.5 m)** with **1/2-inch (13-mm)** rod.

- m. NPS 6 (DN 150): 20 feet (6 m) with 5/8-inch (16-mm) rod.
 - n. NPS 8 (DN 200): 23 feet (7 m) with 3/4-inch (19-mm) rod.
 9. Install supports for vertical copper tubing every 10 feet (3 m).
 10. Install hangers **OR** vinyl-coated hangers, **as directed**, for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1 (DN 25) and Smaller: 30 inches (760 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 1-1/2 to NPS 2 (DN 40 to DN 50): 36 inches (900 mm) with 3/8-inch (10-mm) rod.
 - c. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): 42 inches (1150 mm) with 1/2-inch (13-mm) rod.
 - d. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1220 mm) with 1/2-inch (13-mm) rod.
 - e. NPS 6 and NPS 8 (DN 150 and DN 200): 54 inches (1350 mm) with 5/8-inch (16-mm) rod.
 11. Install supports for vertical PVC piping every 48 inches (1220 mm).
- K. Labeling And Identification
1. Install identifying labels and devices for laboratory vacuum piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification For Plumbing Piping And Equipment".
 2. Install identifying labels and devices for medical vacuum piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:
 - a. Medical Vacuum: Black letters on white background.
 - b. WAGD: White letters on violet background.
 - c. Dental Vacuum: Black boxed letters on white-and-black diagonal stripe background.
 - d. HVE: Black boxed letters on white-and-black diagonal stripe background.
 - e. Medical Laboratory Vacuum: Black boxed letters on white-and-black checkerboard background.
- L. Field Quality Control For Laboratory Facility Nonmedical Vacuum Piping
1. Perform tests and inspections of vacuum piping in nonmedical laboratory facilities.
 2. Tests and Inspections:
 - a. Piping Leak Tests for Vacuum Piping: Test new and modified parts of existing piping. Cap and fill vacuum piping with oil-free, dry nitrogen. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - 1) Test Pressure for Copper Tubing: 100 psig (690 kPa) **OR** 150 psig (1035 kPa), **as directed**.
 - 2) Test Pressure for PVC Piping: 50 psig (345 kPa) **OR** 100 psig (690 kPa), **as directed**.
 - b. Repair leaks and retest until no leaks exist.
 - c. Inspect filters for proper operation.
 3. Prepare test reports.
- M. Field Quality Control For Healthcare Facility Medical Vacuum Piping
1. Perform tests and inspections of medical vacuum piping systems in healthcare facilities and prepare test reports.
 2. Tests and Inspections:
 - a. Medical Vacuum Testing Coordination: Perform tests, inspections, verifications, and certification of medical vacuum piping systems concurrently with tests, inspections, and certification of medical compressed-air piping and medical gas piping systems.
 - b. Perform the following Installer tests according to requirements in NFPA 99 and ASSE Standard #6010:
 - 1) Initial blow down.
 - 2) Initial pressure test.
 - 3) Cross-connection test.
 - 4) Piping purge test.

- 5) Standing pressure test for vacuum systems.
 - 6) Repair leaks and retest until no leaks exist.
 - c. System Verification: Comply with requirements in NFPA 99, ASSE Standard #6020, and ASSE Standard #6030 for verification of medical vacuum piping systems and perform the following tests and inspections:
 - 1) Standing pressure test.
 - 2) Individual-pressurization **OR** Pressure-differential, **as directed**, cross-connection test.
 - 3) Valve test.
 - 4) Master and area alarm tests.
 - 5) Piping purge test.
 - 6) Final tie-in test.
 - 7) Operational vacuum test.
 - 8) Verify correct labeling of equipment and components.
 - d. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:
 - 1) Inspections performed.
 - 2) Procedures, materials, and gases used.
 - 3) Test methods used.
 - 4) Results of tests.
 3. Remove and replace components that do not pass tests and inspections and retest as specified above.
- N. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain medical vacuum alarm systems.

END OF SECTION 01 95 99 99e

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SECTION 01 95 99 99f - GAS PIPING FOR LABORATORY AND HEALTHCARE FACILITIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gas piping for laboratory and healthcare facilities. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Carbon dioxide piping and specialties designated "medical carbon dioxide" operating at **50 to 55 psig (345 to 380 kPa)**.
 - b. Helium piping, designated "medical helium" operating at **50 to 55 psig (345 to 380 kPa)**.
 - c. Nitrogen piping and specialties designated "medical nitrogen" operating at **160 to 185 psig (1100 to 1275 kPa) OR higher than 200 psig (1380 kPa), as directed**.
 - d. Nitrous oxide piping and specialties designated "medical nitrous oxide" operating at **50 to 55 psig (345 to 380 kPa)**.
 - e. Oxygen piping and specialties designated "medical oxygen" operating at **50 to 55 psig (345 to 380 kPa)**.

C. Definitions

1. CR: Chlorosulfonated polyethylene synthetic rubber.
2. D.I.S.S.: Diameter-index safety system.
3. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
4. Medical gas piping systems include medical carbon dioxide, medical helium, medical nitrogen, medical nitrous oxide, and medical oxygen nonflammable gas for healthcare facility patient care or for healthcare laboratory applications.
5. Specialty Gas: Gas, other than medical gas, for nonmedical laboratory facility applications.

D. Performance Requirements

1. Seismic Performance: Gas manifolds, Bulk gas storage tanks, Gas manifolds and bulk gas storage tanks, and piping shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

E. Submittals

1. Product Data: For the following:
 - a. Tubes and fittings.
 - b. Valves and valve boxes.
 - c. Medical gas service connections.
 - d. Electrical service connections.
 - e. Patient service consoles.
 - f. Medical nitrogen pressure control panels.
 - g. Ceiling columns. Include integral service connections.
 - h. Ceiling hose assemblies. Include integral service connections.
 - i. Gas manifolds.
 - j. Bulk gas storage tanks. Include rated capacities and operating weights.
 - k. Medical gas alarm system components.
 - l. Gas cylinder storage racks.
2. Shop Drawings: Diagram power, signal, and control wiring.

3. Piping Material Certification: Signed by Installer certifying that medical gas piping materials comply with NFPA 99 requirements.
 4. Brazing certificates.
 5. Manufacturer Seismic Qualification Certification: Submit certification that gas manifolds and bulk gas storage tanks, accessories, and components will withstand seismic forces defined in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment". Include the following:
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 6. Certificates of Shop Inspection and Data Report for Bulk Gas Storage Tanks: As required by ASME Boiler and Pressure Vessel Code.
 7. Field quality-control test reports.
 8. Operation and maintenance data.
- F. Quality Assurance
1. Installer Qualifications:
 - a. Medical Gas Piping Systems for Healthcare Facilities: Qualify installers according to ASSE Standard #6010 for installers.
 2. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the medical gas piping testing indicated, that is a member of the Medical Gas Professional Healthcare Organization or is an NRTL as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - a. Qualify testing personnel according to ASSE Standard #6020 for inspectors and ASSE Standard #6030 for verifiers.
 3. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications"; or AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 5. ASME Compliance: Fabricate and label bulk medical gas storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 6. NFPA Compliance:
 - a. Comply with NFPA 50, "Bulk Oxygen Systems at Consumer Sites," for bulk oxygen storage tanks.
 - b. Comply with NFPA 99, "Health Care Facilities," for medical gas piping system materials and installation.
 7. CGA Compliance: Comply with CGA G-8.1, "Nitrous Oxide Systems at Consumer Sites," for bulk nitrous oxide storage tanks.
 8. UL Compliance:
 - a. Comply with UL 498, "Attachment Plugs and Receptacles," for electrical service connections.
 - b. Comply with UL 544, "Medical and Dental Equipment," for medical gas specialties.
- G. Project Conditions
1. Interruption of Existing Specialty and Medical Gas Service(s): Do not interrupt specialty or medical gas service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of specialty and medical gas service(s).
 - b. Do not proceed with interruption of specialty and medical gas service(s) without the Owner's written permission.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. Copper Medical Gas Tube: ASTM B 819, Type K **OR** Type L, **as directed**, seamless, drawn temper that has been manufacturer cleaned, purged, and sealed for medical gas service or according to CGA G-4.1 for oxygen service. Include standard color marking "OXY," "MED," "OXY/MED," "OXY/ACR," or "ACR/MED" in green for Type K tube and blue for Type L tube.
 - a. General Requirements for Copper Fittings: Manufacturer cleaned, purged, and bagged for oxygen service according to CGA G-4.1.
 - b. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, with dimensions for brazed joints.
 - c. Copper Unions: ASME B16.22 or MSS SP-123, wrought copper or cast-copper alloy.
 - d. Press-Type Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
 - e. Memory-Metal Couplings: Cryogenic compression fitting made of ASTM F 2063, nickel-titanium, shape-memory-alloy, and that has been manufacturer cleaned, purged, and sealed for oxygen service according to CGA G-4.1.
2. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.
 - a. PVC Fittings: ASTM D 2466, Schedule 40 **OR** ASTM D 2467, Schedule 80, **as directed**; socket type.

B. Joining Materials

1. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys.
2. Threaded-Joint Tape: PTFE.
3. Solvent Cement for Joining PVC Piping: ASTM D 2564. Include primer complying with ASTM F 656.

C. Valves

1. General Requirements for Valves: Manufacturer cleaned, purged, and bagged according to CGA G-4.1 for oxygen service.
2. Ball Valves: MSS SP-110, 3-piece body, brass or bronze.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Ball: Full-port, chrome-plated brass.
 - c. Seats: PTFE or TFE.
 - d. Handle: Lever type with locking device, **as directed**.
 - e. Stem: Blowout proof with PTFE or TFE seal.
 - f. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
3. Check Valves: In-line pattern, bronze.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Operation: Spring loaded.
 - c. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
4. Zone Valves: MSS SP-110, 3-piece-body, brass or bronze ball valve with gage.
 - a. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - b. Ball: Full-port, chrome-plated brass.
 - c. Seats: PTFE or TFE.
 - d. Handle: Lever type with locking device, **as directed**.
 - e. Stem: Blowout proof with PTFE or TFE seal.
 - f. Ends: Manufacturer-installed ASTM B 819, copper-tube extensions.
 - g. Pressure Gage: Manufacturer-installed on one copper-tube extension.
5. Zone Valve Boxes: Formed steel with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.
 - a. Interior Finish: Factory-applied white enamel.

- b. Cover Plate: Aluminum or extruded-anodized aluminum **OR** Satin-chrome finish steel **OR** Stainless steel with NAAMM AMP 503, No. 4 finish, **as directed**, with frangible or removable windows.
- c. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.

OR

Zone Valve Boxes: Formed or extruded aluminum with anchors for recessed mounting, holes with grommets in box sides for tubing extension protection, and of size for single or multiple valves with pressure gages and in sizes required to permit manual operation of valves.

- a. Interior Finish: Factory-applied white enamel.
 - b. Cover Plate: Aluminum or extruded-anodized aluminum **OR** Stainless steel with NAAMM AMP 503, No. 4 finish, **as directed**, with frangible or removable windows.
 - c. Valve-Box Windows: Clear or tinted transparent plastic with labeling that includes rooms served, according to NFPA 99.
6. Emergency Oxygen Connections: Low-pressure oxygen inlet assembly for connection to building oxygen piping systems.
- a. Enclosure: Weatherproof hinged locking cover with caption similar to "Emergency Low-Pressure Gaseous Oxygen Inlet."
 - b. Inlet: Manufacturer-installed, **NPS 1 or NPS 1-1/4 (DN 25 or DN 32)**, ASTM B 819, copper tubing with **NPS 1 (DN 25)** minimum ball valve and plugged inlet.
 - c. Safety Valve: Bronze-body, pressure relief valve set at **75 or 80 psig (520 or 550 kPa)**.
 - d. Instrumentation: Pressure gage.
7. Safety Valves: Bronze-body, ASME-construction, poppet, pressure-relief type with settings to match system requirements.
8. Pressure Regulators: Bronze **OR** Stainless-steel, **as directed**, body and trim; spring-loaded, diaphragm-operated, relieving type; manual pressure-setting adjustment; rated for **250-psig (1725-kPa)** minimum inlet pressure; and capable of controlling delivered gas pressure within **0.5 psig for each 10-psig (5.0 kPa for each 100-kPa)** inlet pressure.

D. Medical Gas Service Connections

1. General Requirements for Medical Gas Service Connections: For specific medical gas pressure and suction service listed. Include roughing-in assemblies, finishing assemblies, and cover plates. Individual cover plates are not required if service connection is in multiple unit or assembly with cover plate. Furnish recessed-type units made for concealed piping unless otherwise indicated.
- a. Roughing-in Assembly:
 - 1) Steel outlet box for recessed mounting and concealed piping.
 - 2) Brass-body outlet block with secondary check valve that will prevent gas flow when primary valve is removed. Suction inlets to be without secondary valve.
 - 3) Double seals that will prevent gas leakage.
 - 4) ASTM B 819, **NPS 3/8 (DN 10)** copper outlet tube brazed to valve with service marking and tube-end dust cap.
 - b. Finishing Assembly:
 - 1) Brass housing with primary check valve.
 - 2) Double seals that will prevent gas leakage.
 - 3) Cover plate with gas-service label.
 - c. Quick-Coupler Service Connections: Pressure outlets for carbon dioxide, nitrous oxide, oxygen, and **Medical gas** or as directed by the Owner service connections with noninterchangeable keyed indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment, and with positive-locking ring that retains equipment stem in valve during use.
 - d. D.I.S.S. Service Connections: Pressure outlets, complying with CGA V-5, with threaded indexing to prevent interchange between services, constructed to permit one-handed connection and removal of equipment.
 - 1) Medical Carbon Dioxide Service Connections: D.I.S.S. No. 1080.

- 2) Medical Helium Service Connections: D.I.S.S. No. 1060.
 - 3) Medical Nitrogen Service Connections: D.I.S.S. No. 1120.
 - 4) Medical Nitrous Oxide Service Connections: D.I.S.S. No. 1040.
 - 5) Medical Oxygen Service Connections: D.I.S.S. No. 1240.
 - e. Cover Plates: One piece, stainless steel, with NAAMM AMP 503, No. 4 finish **OR** metal, with chrome-plated finish **OR** anodized aluminum, **as directed**, and permanent, color-coded, identifying label matching corresponding service.
- E. Electrical Service Connections
1. Power Outlets: UL 498, Hospital Grade, 125-V receptacles; color selected. Include the following configurations complying with NEMA WD 1:
 - a. L5-20R, locking type, 20 A, single or duplex.
 - b. L5-20R, isolated ground, locking type, 20 A, single or duplex.
 - c. Explosion proof, 20 A, 2 pole, 3 wire, single; suitable for Class I, Group C hazardous location and interchangeable with receptacles used in nonhazardous areas; flush mounted.
 - d. 5-20R, straight blade, 20 A, duplex.
 - e. 5-20R, isolated ground, straight blade, 20 A, duplex.
 2. Electrical Accessory Outlets: Provide the following configured receptacles in color selected:
 - a. Patient Equipment Ground Jack: Single pole, 30 A.
 - b. Patient Monitoring: Single, 5 and 37 pin.
 3. Wall Outlet Cover Plates: One piece, stainless steel, with NAAMM AMP 503, No. 4 finish **OR** metal, with chrome-plated finish **OR** anodized aluminum, **as directed**, and permanent identifying label.
- F. Patient Service Consoles
1. General Requirements for Patient Service Consoles: Recessed- or semirecessed-mounting wall units with medical gas service connections as specified in "Medical Gas Service Connections" Article and electrical service connections as specified in "Electrical Service Connections" Article, **as directed**. Include labels indicating services, and the following:
 - a. Recessed- or semirecessed-mounting steel console box or mounting bracket.
 - b. Concealed supplies.
 - c. Cover Plate: One piece, anodized aluminum **OR** stainless steel, **as directed**, and permanent identifying label with service connections for the following:
 - 1) Medical Air: Quick-coupler pressure outlet.
 - 2) Medical Oxygen: Quick-coupler pressure outlet.
 - 3) Medical Vacuum: Quick-coupler suction inlet.
 - 4) Medical vacuum bottle bracket.
 - 5) L5-20R, locking type, 20 A, single **OR** duplex, **as directed**.
- G. Medical Nitrogen Pressure Control Panels
1. Description: Steel box and support brackets for recessed roughing-in with stainless-steel or anodized-aluminum cover plate with printed operating instructions. Include manifold assembly consisting of inlet supply valve, inlet supply pressure gage, line-pressure control regulator, outlet supply pressure gage, D.I.S.S. service connection, and piping outlet for remote service connection.
 - a. Minimum Working Pressure: **200 psig (1380 kPa)**.
 - b. Line-Pressure Control Regulator: Self-relieving diaphragm type with precision manual adjustment.
 - c. Pressure Gages: **0- to 300-psig (0- to 2070-kPa)** range.
 - d. Service Connection: CGA V-5, D.I.S.S. No. 1120, nitrogen outlet.
 - e. Before final assembly, provide temporary dust shield and U-tube for testing.
 - f. Label cover plate "Nitrogen Pressure Control."
- H. Ceiling Columns
1. General Requirements for Ceiling Columns: Ceiling-mounting units with medical gas service connections as specified in "Medical Gas Service Connections" Article and electrical service

connections as specified in "Electrical Service Connections" Article, **as directed**. Include labels indicating services, and the following:

- a. Ceiling-Mounting Plate: Manufacturer's standard plate or roughing-in assembly.
 - b. Exposed Surfaces: Minimum **0.0375-inch- (0.95-mm-)** thick stainless steel with NAAMM AMP 503, No. 4 directional polish.
 - c. Servicing: Include access panels or means of removing shroud.
 - d. Blank cover plates for cutouts not having service connections.
 - e. ASTM B 819, **NPS 3/8 (DN 10)** copper-tube extensions for connection to medical gas systems.
 - f. Service Connections: Type and number indicated.
 - g. Dust Covers: For medical gas service connection.
2. Rigid Ceiling Columns: **44-inch- (1120-mm-)** long, rectangular fixed column section with 2 **OR 4, as directed**, double intravenous medication hooks. Include **0.078-inch- (2.0-mm-)** thick, stainless-steel bottom plate with the following service connections:
- a. Instrument Air: One D.I.S.S. No. 1160 pressure outlet(s).
 - b. Medical Air: One quick-coupler **OR** D.I.S.S. No. 1160, **as directed**, pressure outlet(s).
 - c. Medical Carbon Dioxide: One quick-coupler **OR** D.I.S.S. No. 1080, **as directed**, pressure outlet(s).
 - d. Medical Helium: One D.I.S.S. No. 1060, pressure outlet(s).
 - e. Medical Nitrogen: One D.I.S.S. No. 1120 pressure outlet(s).
 - f. Medical Nitrous Oxide: One quick-coupler **OR** D.I.S.S. No. 1040, **as directed**, pressure outlet(s).
 - g. Medical Oxygen: Two quick-coupler **OR** D.I.S.S. No. 1240, **as directed**, pressure outlets.
 - h. Medical Vacuum: Two quick-coupler **OR** D.I.S.S. No. 1220, **as directed**, suction inlets.
 - i. Vacuum Bottle Brackets: Two.
 - j. WAGD Evacuation: One quick-coupler **OR** D.I.S.S. No. 2220, **as directed**, suction inlet(s).
 - k. Power: 2 **OR 4, as directed**, L5-20R, locking-type, 20-A, single receptacles.
 - l. Patient Equipment: 2 **OR 4, as directed**, ground-jack, single-pole, 30-A receptacles.
3. Retractable Ceiling Columns: Manually adjustable using release and lock handles capable of locking column in all positions from fully retracted to fully extended; **15-inch- (380-mm-)** long, rectangular counterbalanced telescoping section with 2 **OR 4, as directed**, double intravenous medication hooks; and **36-inch- (915-mm-)** long, fixed column section. Include **0.078-inch- (2.0-mm-)** thick, stainless-steel bottom plate with the following service connections:
- a. Instrument Air: One D.I.S.S. No. 1160 pressure outlet(s).
 - b. Medical Air: One quick-coupler **OR** D.I.S.S. No. 1160, **as directed**, pressure outlet(s).
 - c. Medical Carbon Dioxide: One quick-coupler **OR** D.I.S.S. No. 1080, **as directed**, pressure outlet(s).
 - d. Medical Helium: One D.I.S.S. No. 1060, pressure outlet(s).
 - e. Medical Nitrogen: One D.I.S.S. No. 1120 pressure outlet(s).
 - f. Medical Nitrous Oxide: One quick-coupler **OR** D.I.S.S. No. 1040, **as directed**, pressure outlet(s).
 - g. Medical Oxygen: Two quick-coupler **OR** D.I.S.S. No. 1240, **as directed**, pressure outlets.
 - h. Medical Vacuum: Two quick-coupler **OR** D.I.S.S. No. 1220, **as directed**, suction inlets.
 - i. Vacuum Bottle Brackets: Two.
 - j. WAGD Evacuation: One quick-coupler **OR** D.I.S.S. No. 2220, **as directed**, suction inlet(s).
 - k. Power: 2 **OR 4, as directed**, L5-20R, locking-type, 20-A, single receptacles.
 - l. Patient Equipment: 2 **OR 4, as directed**, ground-jack, single-pole, 30-A receptacles.
- I. Ceiling Hose Assemblies
1. Ceiling Hose Assemblies, General: Ceiling-mounting units with medical gas service connections as specified in "Medical Gas Service Connections" Article and electrical service connections as specified in "Electrical Service Connections" Article, **as directed**. Include labels indicating services, and the following:
 - a. Ceiling-Mounting Plate: Manufacturer's standard plate or roughing-in assembly.

- b. Exposed Surfaces: Minimum **0.0375-inch- (0.95-mm-)** thick stainless steel with NAAMM AMP 503, No. 4 directional polish.
 - c. Servicing: Include access panels or means of removing shroud.
 - d. Blank cover plates for cutouts not having service connections.
 - e. ASTM B 819, **NPS 3/8 (DN 10)** copper-tube extensions for connection to medical gas systems.
 - f. Service Connections: Type and number indicated.
 - g. Dust Covers: For medical gas service connection.
 2. Hose-Reel Service Assemblies: Individual, concealed, retractable hose-reel units with stainless-steel face plates, steel mounting boxes, factory- or field-fabricated mounting brackets, and color-coded service hoses with adjustable stops and service connections matching hoses. Include **15 feet (4.5 m)** minimum of conductive, CR, **1/4- or 5/16-inch- (6.4- or 7.9-mm-)** ID, medical gas hoses rated for **200-psig (1380-kPa)** minimum working pressure, and the following service connections:
 - a. Instrument Air Hose: D.I.S.S. No. 1160 pressure outlet.
 - b. Medical Air Hose: Quick-coupler **OR** D.I.S.S. No. 1160, **as directed**, pressure outlet.
 - c. Medical Carbon Dioxide Hose: Quick-coupler **OR** D.I.S.S. No. 1080, **as directed**, pressure outlet.
 - d. Medical Nitrogen Hose: D.I.S.S. No. 1120 pressure outlet.
 - e. Medical Nitrous Oxide Hose: Quick-coupler **OR** D.I.S.S. No. 1040, **as directed**, pressure outlet.
 - f. Medical Oxygen Hose: Quick-coupler **OR** D.I.S.S. No. 1240, **as directed**, pressure outlet.
 - g. Medical Vacuum Hose: Quick-coupler **OR** D.I.S.S. No. 1220, **as directed**, suction inlet.
 - h. WAGD Evacuation Hose: Quick-coupler **OR** D.I.S.S. No. 2220, **as directed**, suction inlet.
 - i. Power: L5-20R, locking-type, 20-A, single, power receptacle.
 3. Fixed Hose Service Assemblies: Individual, concealed hose connection with stainless-steel face plates, steel mounting boxes, factory- or field-fabricated mounting brackets, and color-coded service hoses with retractor device and service connections matching hoses. Include **72 inches (1830 mm)** of conductive, CR, **1/4- or 5/16-inch- (6.4- or 7.9-mm-)**, ID, medical gas hoses rated for **200-psig (1380-kPa)** minimum working pressure, and the following service hose connections:
 - a. Instrument Air Hose: D.I.S.S. No. 1160 pressure outlet.
 - b. Medical Air Hose: Quick-coupler **OR** D.I.S.S. No. 1160, **as directed**, pressure outlet.
 - c. Medical Carbon Dioxide Hose: Quick-coupler **OR** D.I.S.S. No. 1080, **as directed**, pressure outlet.
 - d. Medical Nitrogen Hose: D.I.S.S. No. 1120 pressure outlet.
 - e. Medical Nitrous Oxide Hose: Quick-coupler **OR** D.I.S.S. No. 1040, **as directed**, pressure outlet.
 - f. Medical Oxygen Hose: Quick-coupler **OR** D.I.S.S. No. 1240, **as directed**, pressure outlet.
 - g. Medical Vacuum Hose: Quick-coupler **OR** D.I.S.S. No. 1220, **as directed**, suction inlet.
 - h. WAGD Evacuation Hose: Quick-coupler **OR** D.I.S.S. No. 2220, **as directed**, suction inlet.
 - i. Power: L5-20R, locking-type, 20-A, single, power receptacle.
- J. Gas Manifolds
1. Simplex Specialty Gas Manifolds:
 - a. Control Panel Unit: Weatherproof cabinet, supply and delivery pressure gages, electrical alarm system connections and transformer, indicator lights or devices, manifold connection, line-pressure regulator, shutoff valves, and safety valve.
 - b. Manifold and Header: Nonferrous-metal header for number of cylinders indicated. Units include design for **2000-psig (13.8-MPa)** minimum inlet pressure. Include cylinder bank header with inlet (pigtail) connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gage.
 - c. **Specialty gas** as directed by the Owner Manifold: For **Number cylinders** as directed by the Owner capacity at **55-psig (380-kPa)** line pressure, with electric heater or orifice design that will prevent freezing during high demand.
 - d. Specialty Gas Cylinders: Will be furnished by the Owner **OR** Number and type of medical gas cylinders required for complete manifold systems, **as directed**.

- e. Label manifold control unit with permanent label identifying specialty gas type and system operating pressure.
 - f. Mounting: Wall with mounting brackets for manifold control cabinet and header **OR** Floor with support legs for manifold control cabinet, **as directed**.
2. Duplex Specialty Gas Manifolds:
- a. Central Control Panel Unit: Weatherproof cabinet, supply and delivery pressure gages, electrical alarm system connections and transformer, indicator lights or devices, manifold connection, line-pressure regulator, shutoff valves, and safety valve.
 - b. Manifold and Headers: Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks. Units include design for **2000-psig (13.8-MPa)** minimum inlet pressure. Include cylinder bank headers with inlet (pigtail) connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gage.
 - c. Operation: Automatic, pressure-switch-activated changeover from one cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder bank header.
 - d. **Specialty gas** as directed by the Owner Manifold: For **Number cylinders** as directed by the Owner capacity at **55-psig (380-kPa)** line pressure, with electric heater or orifice design that will prevent freezing during high demand.
 - e. Specialty Gas Cylinders: Will be furnished by the Owner **OR** Number and type of medical gas cylinders required for complete manifold systems, **as directed**.
 - f. Label manifold control unit with permanent label identifying specialty gas type and system operating pressure.
 - g. Mounting: Wall with mounting brackets for manifold control cabinet and headers **OR** Floor with support legs for manifold control cabinet, **as directed**.
3. Medical Gas Manifolds: Comply with NFPA 99, Ch. 5, for high-pressure medical gas cylinders.
- a. Central Control Panel Unit: Weatherproof cabinet, supply and delivery pressure gages, electrical alarm system connections and transformer, indicator lights or devices, manifold connection, pressure changeover switch, line-pressure regulator, shutoff valves, and safety valve.
 - b. Manifold and Headers: Duplex, nonferrous-metal header for number of cylinders indicated, divided into two equal banks. Units include design for **2000-psig (13.8-MPa)** minimum inlet pressure, except nitrous oxide manifolds may be designed for **800 psig (5520 kPa)** and carbon dioxide manifolds may be designed for **1500 psig (10.35 MPa)**. Include cylinder bank headers with inlet (pigtail) connections complying with CGA V-1, individual inlet check valves, shutoff valve, pressure regulator, check valve, and pressure gage.
 - c. Operation: Automatic, pressure-switch-activated changeover from one cylinder bank to the other when first bank becomes exhausted, without line-pressure fluctuation or resetting of regulators and without supply interruption by shutoff of either cylinder bank header.
 - d. Medical Carbon Dioxide Manifolds: For 2 cylinders and **250-cfh (1.97-L/s)** **OR** 4 cylinders and **500-cfh (3.94-L/s)**, **as directed**, capacity at **55-psig (380-kPa)** line pressure.
 - e. Medical Helium Manifolds: For 2 cylinders and **250-cfh (1.97-L/s)** **OR** 4 cylinders and **500-cfh (3.94-L/s)**, **as directed**, capacity at **55-psig (380-kPa)** line pressure.
 - f. Medical Nitrous Oxide Manifolds: For 8 cylinders and **1333-cfh (10.5-L/s)** **OR** 12 cylinders and **2000-cfh (15.7-L/s)**, **as directed**, capacity at **55-psig (380-kPa)** line pressure, with electric heater or orifice design that will prevent freezing during high demand.
 - g. Medical Nitrogen Manifolds: For 8 cylinders and **2000-cfh (15.7-L/s)** **OR** 12 cylinders and **3000-cfh (23.6-L/s)**, **as directed**, capacity at **180-psig (1240-kPa)** **OR** higher than **200-psig (1380-kPa)**, **as directed**, line pressure.
 - h. Medical Oxygen Manifolds: For 12 cylinders and **1500-cfh (11.8-L/s)** **OR** 20 cylinders **2500-cfh (19.7-L/s)**, **as directed**, capacity at **55-psig (380-kPa)**, **as directed**, line pressure.
 - i. Medical Gas Cylinders: Will be furnished by the Owner **OR** Number and type of medical gas cylinders required for complete manifold systems, **as directed**.
 - j. Label manifold control unit with permanent label identifying medical gas type and system operating pressure.

- k. Mounting: Wall with mounting brackets for manifold control cabinet and headers **OR** Floor with support legs for manifold control cabinet, **as directed**.
- K. Bulk Gas Storage Tanks
1. Bulk Specialty Gas Storage Tanks:
 2. Bulk Medical Gas Storage Tanks:
 - a. Bulk Medical Gas Storage Tank Systems: Bulk storage tank with connections for alarm system, continuous supply, and reserve supply that will operate only during emergencies, complying with NFPA 99, "Health Care Facilities."
 - b. Controls: Include actuating switch for alarm system connection and means for automatic actuating of reserve supply.
 - c. Bulk Medical Gas Storage Tanks: Vertical mounting, double-wall construction with inner vessel fabricated according to ASME Boiler and Pressure Vessel Code for unfired pressure vessels and suitable for medical gas service. Include insulation and vacuum seal between walls. Fabricate outer shell from carbon steel with factory-applied manufacturer's standard protective paint finish suitable for exterior installation. Include the following features, specialties, and components:
 - 1) Safety Valves: ASME construction with pressure setting to correspond to tank working pressure and as required for component or system being protected.
 - 2) Pressure Gages: For tank pressure and facility service line pressure.
 - 3) Contents Gage: High- and low-level indicator with electric signal circuit connection.
 - 4) Drain Valves: For piping, inner vessel, and outer shell.
 - 5) Fill Assembly: Fill connection, piping, valves, relief devices, and controls.
 - 6) Facility Service Assembly: Piping, valves, relief devices, vaporizer, shutoff valve, pressure regulator, line shutoff valve or check valve, and reserve supply connection for connection to building service piping.
 - 7) Include permanent label showing medical gas type, storage tank capacity, tank pressure rating, vaporizer capacity, and operating instructions.
 - 8) Liquid Oxygen Storage Tank: Nickel-steel or stainless-steel inner vessel with **250-psig (1725-kPa)** minimum working pressure. Include electric **OR** steam **OR** ambient vaporizer, **as directed**.
 - 9) Liquid Nitrous Oxide Storage Tank: Steel-alloy inner vessel with **300-psig (2070-kPa)** minimum working pressure. Include electric **OR** steam, **as directed**, vaporizer.
 - d. Oxygen Reserve Supply: Manifold header for high-pressure cylinders, fabricated from copper-tube or brass pipe and fittings and suitable for pressures up to **4000 psig (27.6 MPa)**. Include header inlet connections complying with CGA V-1, with individual inlet check valves, header shutoff valve, header pressure regulator, line shutoff valve or check valve, pressure gage, and inlet connections for number of cylinders indicated.
 - e. Nitrous Oxide Reserve Supply: Manifold header for high-pressure cylinders, fabricated from copper-tube or brass pipe and fittings and suitable for pressures up to **4000 psig (27.6 MPa)**. Include header inlet connections complying with CGA V-1, with individual inlet check valves, header shutoff valve, header pressure regulator, line shutoff valve or check valve, pressure gage, inlet connections for number of cylinders indicated, and electric heater.
- L. Medical Gas Piping Alarm Systems
1. Panels for medical gas piping systems may be combined in single panels with medical compressed-air and medical vacuum piping systems.
 2. Components: Designed for continuous service and to operate on power supplied from 120 **OR** 240 **OR** 277, **as directed**,-V ac power source to alarm panels and with connections for low-voltage wiring to remote sensing devices. Include step-down transformers if required.
 3. Pressure Switches or Pressure Transducer Sensors: Continuous line monitoring with electrical connections for alarm system.
 - a. Low-Pressure Operating Range: **0- to 100-psig (0- to 690-kPa)**.
 - b. High-Pressure Operating Range: Up to **250-psig (1725-kPa)**.

4. General Requirements for Medical Gas Alarm Panels: Factory wired with audible and color-coded visible signals to indicate specified functions.
 - a. Mounting: Exposed, surface **OR** Recessed, **as directed**, installation.
 - b. Enclosures: Fabricated from minimum **0.047-inch- (1.2-mm-)** thick steel or minimum **0.05-inch- (1.27-mm-)** thick aluminum, with knockouts for electrical and piping connections.
5. Master Alarm Panels: With separate trouble alarm signals, pressure gages, and indicators for medical gas piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Medical Carbon Dioxide: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)** and changeover is made to alternate bank.
 - 2) Medical Helium: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)** and changeover is made to alternate bank.
 - 3) Medical Nitrogen: Pressure drops below **145 psig (1000 kPa)** or rises above **200 psig (1380 kPa)** and changeover is made to alternate bank.
 - 4) Medical Nitrous Oxide (for bulk oxygen storage tank system with cylinder reserve): Liquid level is low, pressure downstream from main shutoff valve drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**, changeover is made to reserve, reserve is in use, and reserve level is low.
 - 5) Medical Nitrous Oxide (for nitrous oxide manifold system): Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)** and changeover is made to alternate bank.
 - 6) Medical Oxygen (for bulk oxygen storage tank system with cylinder reserve): Liquid level is low, pressure downstream from main shutoff valve drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**, changeover is made to reserve, reserve is in use, reserve level is low, and reserve pressure is low.
 - 7) Medical Oxygen (for oxygen manifold system): Pressure downstream from main shutoff valve drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)** and changeover is made to alternate bank.
6. Anesthetizing-Area Alarm Panels: Separate trouble alarm signals; pressure gages; and indicators for medical gas piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Medical Carbon Dioxide: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
 - 2) Medical Helium: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
 - 3) Medical Nitrous Oxide: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
 - 4) Medical Nitrogen: Pressure drops below **145 psig (1000 kPa)** or rises above **200 psig (1380 kPa)**.
 - 5) Medical Oxygen: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
7. Area Alarm Panels: Separate trouble alarm signals; pressure and vacuum gages; and indicators for medical gas piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Oxygen: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
8. Dental Area Alarm Panels: Separate trouble alarm signals; pressure and vacuum gages; and indicators for medical gas piping systems.
 - a. Include alarm signals when the following conditions exist:
 - 1) Medical Nitrogen: Pressure drops below **145 psig (1000 kPa)** or rises above **200 psig (1380 kPa)** and changeover is made to alternate bank.
 - 2) Medical Nitrous Oxide (for bulk nitrous oxide storage tank system with cylinder reserve): Liquid level is low, pressure downstream from main shutoff valve drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**, changeover is made to reserve, reserve is in use, and reserve level is low.

- 3) Medical Nitrous Oxide (for nitrous oxide manifold system): Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)** and changeover is made to alternate bank.
 - 4) Medical Oxygen (for bulk oxygen storage tank system with cylinder reserve): Liquid level is low, pressure downstream from main shutoff valve drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**, changeover is made to reserve, reserve is in use, reserve level is low, and reserve pressure is low.
 - 5) Medical Oxygen (for nitrous oxide manifold system): Pressure downstream from main shutoff valve drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)** and changeover is made to alternate bank.
9. Medical Laboratory Area Alarm Panels: Separate trouble alarm signals; pressure and vacuum gages; and indicators for medical gas piping systems.
- a. Include alarm signals when the following conditions exist:
 - 1) Medical Carbon Dioxide: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
 - 2) Medical Helium: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
 - 3) Medical Oxygen: Pressure drops below **40 psig (275 kPa)** or rises above **60 psig (415 kPa)**.
- M. Computer Interface Cabinet
1. Description: Wall-mounting, welded-steel, control cabinet with gasketed door, mounting brackets, grounding device, and white-enamel finish for connection of medical gas system alarms to facility computer. Include factory-installed signal circuit boards, power transformer, circuit breaker, wiring terminal board, and internal wiring capable of interfacing 20, **as directed**, alarm signals.
- N. Gas Cylinder Storage Racks
1. Wall Storage Racks: Fabricate racks with chain restraints for upright cylinders as indicated or provide equivalent manufactured wall racks.
 2. Freestanding Storage Racks: Fabricate racks as indicated or provide equivalent manufactured storage racks.
- O. Sleeves
1. Galvanized-Steel Sheet: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 2. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- P. Escutcheons
1. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
 2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 3. One-Piece, Cast-Brass Escutcheons: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
 4. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
 5. One-Piece, Stamped-Steel Escutcheons: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 6. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 7. One-Piece, Floor-Plate Escutcheons: Cast iron.
 8. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.
- Q. Grout

1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

R. Nitrogen

1. Description: Comply with USP 28 - NF 23 for oil-free dry nitrogen.

1.3 EXECUTION

A. Earthwork

1. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling and for underground warning tapes.

B. Piping Applications

1. Nonhealthcare, Specialty Gas Piping: Type L, copper medical gas tube; wrought-copper fittings; and brazed **OR** press-type fittings and pressure-sealed, **as directed**, joints.
2. Nonhealthcare, Specialty Gas Piping **NPS 2-1/2 (DN 65)** and Smaller: Type K **OR** Type L, **as directed**, copper medical gas tube; wrought-copper fittings; and brazed **OR** press-type fittings and pressure-sealed, **as directed**, joints.
3. Nonhealthcare, Specialty Gas Piping **NPS 3 (DN 80)** and Larger: Type K, copper tube; wrought-copper fittings; and brazed **OR** press-type fittings and pressure-sealed, **as directed**, joints.
4. Medical Gas Piping: Use Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
5. Medical Gas Piping Except Nitrogen: Use Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
6. Medical Nitrogen Piping: Type L, copper medical gas tube; wrought-copper fittings; and brazed joints.
7. Medical Nitrogen Piping **NPS 2-1/2 (DN 65)** and Smaller: Type K **OR** Type L, **as directed**, copper medical gas tube; wrought-copper fittings; and brazed joints.
8. Medical Nitrogen Piping **NPS 3 (DN 80)** and Larger: Type K, copper tube; wrought-copper fittings; and brazed joints.
9. Protective Conduit: Use PVC pipe, PVC fittings, and solvent-cemented joints.

C. Piping Installation

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of gas piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Comply with ASSE Standard #6010 for installation of medical gas piping.
3. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and coordinate with other services occupying that space.
6. Install piping adjacent to equipment and specialties to allow service and maintenance.
7. Install nipples, unions, and special fittings, and valves with pressure ratings same as or higher than system pressure rating used in applications below unless otherwise indicated.
8. Install piping to permit valve servicing.
9. Install piping free of sags and bends.
10. Install fittings for changes in direction and branch connections.

11. Install medical gas piping to medical gas service connections specified in this Section, to medical gas service connections in equipment specified in this Section, and to equipment specified in other Sections requiring medical gas service.
 12. Install exterior, buried medical gas piping in protective conduit fabricated with PVC pipe and fittings. Do not extend conduit through foundation wall.
 13. Install seismic restraints on gas piping. Seismic-restraint devices are specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
 14. Install medical gas service connections recessed in walls. Attach roughing-in assembly to substrate; attach finishing assembly to roughing-in assembly.
 15. Connect gas piping to gas sources and to gas outlets and equipment requiring gas service.
 16. Install unions, in copper tubing adjacent to each valve and at final connection to each piece of equipment and specialty.
- D. Valve Installation
1. Install shutoff valve at each connection to gas laboratory and healthcare equipment and specialties.
 2. Install check valves to maintain correct direction of gas flow from laboratory and healthcare gas supplies.
 3. Install valve boxes recessed in wall and anchored to substrate. Single boxes may be used for multiple valves that serve same area or function.
 4. Install zone valves and gages in valve boxes. Rotate valves to angle that prevents closure of cover when valve is in closed position.
 5. Install pressure regulators on gas piping where reduced pressure is required.
 6. Install emergency oxygen connection with pressure relief valve and full-size discharge piping to outside, with check valve downstream from pressure relief valve and with ball valve and check valve in supply main from bulk oxygen storage tank.
- E. Joint Construction
1. Ream ends of PVC pipes and remove burrs.
 2. Remove scale, slag, dirt, and debris from outside of cleaned tubing and fittings before assembly.
 3. Threaded Joints: Apply appropriate tape to external pipe threads.
 4. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter. Continuously purge joint with oil-free, dry nitrogen during brazing.
 5. Pressure-Sealed Joints: Join copper tube and press-type fittings with tools recommended by fitting manufacturer.
 6. Memory-Metal Coupling Joints: Join new copper tube to existing tube according to procedures developed by fitting manufacturer for installation of memory-metal coupling joints.
 7. Solvent-Cemented Joints: Clean and dry joining surfaces. Join PVC pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. Apply primer and join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2672.
- F. Gas Service Component Installation
1. Assemble patient service console with service connections. Install with supplies concealed, in walls. Attach console box or mounting bracket to substrate.
 2. Install nitrogen pressure-control panels in walls. Attach to substrate.
 3. Assemble ceiling columns and install anchored to substrate. Provide structural steel, hanger rods, anchors, and fasteners in addition to components furnished with specialties necessary to fabricate supports.
 4. Assemble ceiling assemblies and install anchored to substrate. Provide structural steel, hanger rods, anchors, and fasteners in addition to components furnished with specialties necessary to fabricate supports.
 5. Install gas manifolds on concrete base, **as directed**, anchored to substrate.
 6. Install gas cylinders and connect to manifold piping.

7. Install gas manifolds with seismic restraints as indicated.
 8. Install bulk gas storage tanks and reserve supply tanks level on concrete bases. Set tanks and connect gas piping to tanks according to applicable requirements in NFPA 50 for bulk oxygen storage systems, **as directed**. Install tanks level and plumb, firmly anchored to concrete bases; maintain NFPA 50 and tank manufacturer's recommended clearances. Orient tanks so controls and devices are accessible for servicing.
 9. Install bulk gas storage tanks and reserve supply tanks with seismic restraints.
- G. Medical Gas Piping Alarm System Installation
1. Install medical gas alarm system components in locations required by and according to NFPA 99.
 2. Install medical gas area and master alarm panels where indicated.
 3. Install computer interface cabinet with connection to medical gas piping alarm system and facility computer.
- H. Sleeve Installation
1. Sleeves are not required for core-drilled holes.
 2. Permanent sleeves are not required for holes formed by removable PE sleeves.
 3. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs using galvanized-steel pipe **OR** galvanized-steel sheet **OR** stack sleeve fittings **OR** PVC pipe, **as directed**.
 - a. Wall Penetrations: Cut sleeves to length for mounting flush with both surfaces.
 - b. Floor Penetrations: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
- OR**
- Install sleeves in new walls and slabs as new walls and slabs are constructed.
4. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - b. Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - 1) Seal space outside of sleeve fittings with grout.
 5. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
- I. Escutcheon Installation
1. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set screw **OR** stamped steel with set screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - 3) Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set screw **OR** One piece or split plate, stamped steel with set screw **OR** Split plate, stamped steel with set screw, **as directed**.

- 4) Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - 5) Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - 6) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
 - b. Existing Piping:
 - 1) Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - 2) Insulated Piping: Split plate, stamped steel with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - 4) Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set screw, **as directed**.
 - 5) Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set screw or spring clips, **as directed**.
 - 6) Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set screw or spring clips, **as directed**.
 - 7) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.
- J. Hanger And Support Installation
1. Comply with requirements in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment" for seismic-restraint devices.
 2. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for pipe hanger and support devices.
 3. Vertical Piping: MSS Type 8 or 42, clamps.
 4. Individual, Straight, Horizontal Piping Runs:
 - a. **100 Feet (30 m)** and Less: MSS Type 1, adjustable, steel, clevis hangers.
 - b. Longer Than **100 Feet (30 m)**: MSS Type 43, adjustable, roller hangers.
 5. Multiple, Straight, Horizontal Piping Runs **100 Feet (30 m)** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for trapeze hangers.
 6. Base of Vertical Piping: MSS Type 52, spring hangers.
 7. Support horizontal piping within **12 inches (300 mm)** of each fitting and coupling.
 8. Rod diameter may be reduced 1 size for double-rod hangers, with **3/8-inch (10-mm)** minimum rods.
 9. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1/4 (DN 8): 60 inches (1500 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 3/8 and NPS 1/2 (DN 10 and DN 15): 72 inches (1800 mm)** with **3/8-inch (10-mm)** rod.
 - c. **NPS 3/4 (DN 20): 84 inches (2100 mm)** with **3/8-inch (10-mm)** rod.
 - d. **NPS 1 (DN 25): 96 inches (2400 mm)** with **3/8-inch (10-mm)** rod.
 - e. **NPS 1-1/4 (DN 32): 108 inches (2700 mm)** with **3/8-inch (10-mm)** rod.
 - f. **NPS 1-1/2 (DN 40): 10 feet (3 m)** with **3/8-inch (10-mm)** rod.
 - g. **NPS 2 (DN 50): 11 feet (3.4 m)** with **3/8-inch (10-mm)** rod.
 - h. **NPS 2-1/2 (DN 65): 13 feet (4 m)** with **1/2-inch (13-mm)** rod.
 - i. **NPS 3 (DN 80): 14 feet (4.3 m)** with **1/2-inch (13-mm)** rod.
 - j. **NPS 3-1/2 (DN 90): 15 feet (4.6 m)** with **1/2-inch (13-mm)** rod.

- k. NPS 4 (DN 100): 16 feet (4.9 m) with 1/2-inch (13-mm) rod.
 - l. NPS 5 (DN 125): 18 feet (5.5 m) with 1/2-inch (13-mm) rod.
 - m. NPS 6 (DN 150): 20 feet (6 m) with 5/8-inch (16-mm) rod.
 - n. NPS 8 (DN 200): 23 feet (7 m) with 3/4-inch (19-mm) rod.
10. Install supports for vertical copper tubing every 10 feet (3 m).
- K. Labeling And Identification
1. Install identifying labels and devices for specialty gas piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification For Plumbing Piping And Equipment".
 2. Install identifying labels and devices for healthcare medical gas piping systems according to NFPA 99. Use the following or similar captions and color-coding for piping products where required by NFPA 99:
 - a. Carbon Dioxide: Black or white letters on gray background.
 - b. Helium: White letters on brown background.
 - c. Nitrogen: White letters on black background.
 - d. Nitrous Oxide: White letters on blue background.
 - e. Oxygen: White letters on green background or green letters on white background.
- L. Field Quality Control For Laboratory Facility Specialty Gas
1. Perform field tests and inspections of specialty gas piping for nonhealthcare laboratory facilities and prepare test reports.
 2. Tests and Inspections:
 - a. Piping Leak Tests for Specialty Gas Piping: Test new and modified parts of existing piping. Cap and fill specialty gas piping with oil-free, dry nitrogen to pressure of 50 psig (345 kPa) above system operating pressure, but not less than 150 psig (1035 kPa). Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - b. Repair leaks and retest until no leaks exist.
 - c. Inspect specialty gas regulators for proper operation.
- M. Field Quality Control For Healthcare Facility Medical Gas
1. Perform tests and inspections of medical gas piping systems in healthcare facilities and prepare test reports.
 2. Tests and Inspections:
 - a. Medical Gas Piping Testing Coordination: Perform tests, inspections, verifications, and certification of medical gas piping systems concurrently with tests, inspections, and certification of medical compressed-air piping and medical vacuum piping systems.
 - b. Preparation: Perform the following Installer tests according to requirements in NFPA 99 and ASSE Standard #6010:
 - 1) Initial blow down.
 - 2) Initial pressure test.
 - 3) Cross-connection test.
 - 4) Piping purge test.
 - 5) Standing pressure test for positive pressure medical gas piping.
 - 6) Standing pressure test for vacuum systems.
 - 7) Repair leaks and retest until no leaks exist.
 - c. System Verification: Comply with requirements in NFPA 99, ASSE Standard #6020, and ASSE Standard #6030 for verification of medical gas piping systems and perform the following tests and inspections:
 - 1) Standing pressure test.
 - 2) Individual-pressurization **OR** Pressure-differential, **as directed**, cross-connection test.
 - 3) Valve test.
 - 4) Master and area alarm tests.
 - 5) Piping purge test.

- 6) Piping particulate test.
 - 7) Piping purity test.
 - 8) Final tie-in test.
 - 9) Operational pressure test.
 - 10) Medical gas concentration test.
 - 11) Medical air purity test.
 - 12) Verify correct labeling of equipment and components.
 - 13) Verify the following source equipment:
 - a) Medical gas supply sources.
- d. Testing Certification: Certify that specified tests, inspections, and procedures have been performed and certify report results. Include the following:
- 1) Inspections performed.
 - 2) Procedures, materials, and gases used.
 - 3) Test methods used.
 - 4) Results of tests.
3. Remove and replace components that do not pass tests and inspections and retest as specified above.

END OF SECTION 01 95 99 99f

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SECTION 01 95 99 99g - COMMON WORK RESULTS FOR HVAC

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common work results for HVAC. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Piping materials and installation instructions common to most piping systems.
 - b. Transition fittings.
 - c. Dielectric fittings.
 - d. Mechanical sleeve seals.
 - e. Sleeves.
 - f. Escutcheons.
 - g. Grout.
 - h. HVAC demolition.
 - i. Equipment installation requirements common to equipment sections.
 - j. Painting and finishing.
 - k. Concrete bases.
 - l. Supports and anchorages.

C. Definitions

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspace, and tunnels.
2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
4. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.
5. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
6. The following are industry abbreviations for plastic materials:
 - a. CPVC: Chlorinated polyvinyl chloride plastic.
 - b. PE: Polyethylene plastic.
 - c. PVC: Polyvinyl chloride plastic.
7. The following are industry abbreviations for rubber materials:
 - a. EPDM: Ethylene-propylene-diene terpolymer rubber.
 - b. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Welding certificates.

E. Quality Assurance

1. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."
2. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

- a. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
3. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

F. Delivery, Storage, And Handling

1. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
2. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.2 PRODUCTS

A. Pipe, Tube, And Fittings

1. Refer to individual Division 21 for pipe, tube, and fitting materials and joining methods.
2. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

B. Joining Materials

1. Refer to individual Division 21 for special joining materials not listed below.
2. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - b. AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
3. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
4. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
5. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
6. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.
7. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
8. Solvent Cements for Joining Plastic Piping:
 - a. CPVC Piping: ASTM F 493.
 - b. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
9. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

C. Transition Fittings

1. Plastic-to-Metal Transition Fittings: CPVC **OR** PVC, **as directed**, one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
2. Plastic-to-Metal Transition Adaptors: One-piece fitting with manufacturer's SDR 11 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint end.
3. Plastic-to-Metal Transition Unions: MSS SP-107, CPVC **OR** PVC, **as directed**, four-part union. Include brass end, solvent-cement-joint end, rubber O-ring, and union nut.

- D. Dielectric Fittings
1. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
 2. Insulating Material: Suitable for system fluid, pressure, and temperature.
 3. Dielectric Unions: Factory-fabricated, union assembly, for **250-psig (1725-kPa)** minimum working pressure at **180 deg F (82 deg C)**.
 4. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure as required to suit system pressures.
 5. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - a. Separate companion flanges and steel bolts and nuts shall have **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure where required to suit system pressures.
 6. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
 7. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
- E. Mechanical Sleeve Seals
1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.
- F. Sleeves
1. Galvanized-Steel Sheet: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 2. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.
 3. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 4. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
 5. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.
 6. PVC Pipe: ASTM D 1785, Schedule 40.
 7. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.
- G. Escutcheons
1. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.
 2. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 3. One-Piece, Cast-Brass Type: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.
 4. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass **OR** Polished chrome-plated and rough brass, **as directed**.

5. One-Piece, Stamped-Steel Type: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
6. Split-Plate, Stamped-Steel Type: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
7. One-Piece, Floor-Plate Type: Cast-iron floor plate.
8. Split-Casting, Floor-Plate Type: Cast brass with concealed hinge and set screw.

H. Grout

1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. HVAC Demolition

1. Refer to Division 01 Section(s) "Cutting And Patching" AND Division 02 Section(s) "Selective Structure Demolition" for general demolition requirements and procedures.
2. Disconnect, demolish, and remove HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - d. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
 - e. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - f. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - g. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.
3. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

B. Piping Systems - Common Requirements

1. Install piping according to the following requirements and Division 21 specifying piping systems.
2. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
3. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
6. Install piping to permit valve servicing.
7. Install piping at indicated slopes.
8. Install piping free of sags and bends.
9. Install fittings for changes in direction and branch connections.

10. Install piping to allow application of insulation.
 11. Select system components with pressure rating equal to or greater than system operating pressure.
 12. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - 2) Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
 - 3) Insulated Piping: One-piece, stamped-steel type with spring clips.
 - 4) Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - a) One-piece, cast-brass type with polished chrome-plated finish.
OR
One-piece, stamped-steel type.
 - 5) Bare Piping at Ceiling Penetrations in Finished Spaces:
 - a) One-piece **OR** Split-casting, **as directed**, cast-brass type with polished chrome-plated finish.
OR
One-piece, stamped-steel type **OR** Split-plate, stamped-steel type with concealed hinge, **as directed**, and set screw.
 - 6) Bare Piping in Unfinished Service Spaces:
 - a) One-piece, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
One-piece, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw **OR** spring clips, **as directed**.
 - 7) Bare Piping in Equipment Rooms:
 - a) One-piece, cast-brass type.
OR
One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - 8) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
 - b. Existing Piping: Use the following:
 - 1) Chrome-Plated Piping: Split-casting, cast-brass type with chrome-plated finish.
 - 2) Insulated Piping: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces:
 - a) Split-casting, cast-brass type with chrome-plated finish.
OR
Split-plate, stamped-steel type with concealed hinge and spring clips.
 - 4) Bare Piping at Ceiling Penetrations in Finished Spaces:
 - a) Split-casting, cast-brass type with chrome-plated finish.
OR
Split-plate, stamped-steel type with concealed hinge and set screw.
 - 5) Bare Piping in Unfinished Service Spaces:
 - a) Split-casting, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw or spring clips.
 - 6) Bare Piping in Equipment Rooms:
 - a) Split-casting, cast-brass type.
OR
Split-plate, stamped-steel type with set screw or spring clips.
 - 7) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
13. Sleeves are not required for core-drilled holes.
14. Permanent sleeves are not required for holes formed by removable PE sleeves.

15. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
16. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.
 - a. Cut sleeves to length for mounting flush with both surfaces.
 - 1) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 - b. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - c. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - 1) PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - 2) Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum-board partitions.
 - 3) Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - a) Seal space outside of sleeve fittings with grout.
 - d. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
17. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Install steel pipe for sleeves smaller than **6 inches (150 mm)** in diameter.
 - b. Install cast-iron "wall pipes" for sleeves **6 inches (150 mm)** and larger in diameter.
 - c. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
18. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
19. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
20. Verify final equipment locations for roughing-in.
21. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

C. Piping Joint Construction

1. Join pipe and fittings according to the following requirements and Division 21 specifying piping systems.
2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
4. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

6. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 7. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Para. 1.1 "Quality Assurance" Article.
 8. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
 9. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - c. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - d. PVC Nonpressure Piping: Join according to ASTM D 2855.
 10. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
 11. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
 12. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - a. Plain-End Pipe and Fittings: Use butt fusion.
 - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
 13. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
- D. Piping Connections
1. Make connections according to the following, unless otherwise indicated:
 - a. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - b. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - c. Dry Piping Systems: Install dielectric unions and flanges to connect piping materials of dissimilar metals.
 - d. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.
- E. Equipment Installation - Common Requirements
1. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
 2. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
 3. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
 4. Install equipment to allow right of way for piping installed at required slope.
- F. Painting
1. Painting of HVAC systems, equipment, and components is specified in Division 09 Section(s) "Exterior Painting" AND "Interior Painting".
 2. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

- G. Concrete Bases
1. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of the base.
 - c. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - f. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - g. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".
- H. Erection Of Metal Supports And Anchorages
1. Refer to Division 05 Section "Metal Fabrications" for structural steel.
 2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.
 3. Field Welding: Comply with AWS D1.1.
- I. Erection Of Wood Supports And Anchorages
1. Cut, fit, and place wood grounds, nailers, blocking, and anchorages to support, and anchor HVAC materials and equipment.
 2. Select fastener sizes that will not penetrate members if opposite side will be exposed to view or will receive finish materials. Tighten connections between members. Install fasteners without splitting wood members.
 3. Attach to substrates as required to support applied loads.
- J. Grouting
1. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.
 2. Clean surfaces that will come into contact with grout.
 3. Provide forms as required for placement of grout.
 4. Avoid air entrapment during placement of grout.
 5. Place grout, completely filling equipment bases.
 6. Place grout on concrete bases and provide smooth bearing surface for equipment.
 7. Place grout around anchors.
 8. Cure placed grout.

END OF SECTION 01 95 99 99g

SECTION 01 95 99 99h - WATER SUPPLY WELLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for water supply wells. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Cable-tool, Rotary drilled, Reverse-rotary drilled, and Driven water supply wells.
 - b. Jet, Line-shaft, and Submersible well pumps.

C. Definitions

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. PA: Polyamide (nylon) plastic.
3. PE: Polyethylene plastic.
4. PP: Polypropylene plastic.
5. PVC: Polyvinyl chloride plastic.

D. Submittals

1. Product Data: Submit certified performance curves and rated capacities of selected well pumps and furnished specialties for each type and size of well pump indicated.
2. Shop Drawings: Show layout and connections for well pumps.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Field quality-control reports.
4. Operation and maintenance data.

E. Quality Assurance

1. Well Driller Qualifications: An experienced water supply well driller licensed in the jurisdiction where Project is located.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Comply with AWWA A100 for water supply wells.

F. Project Conditions

1. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - a. Notify the Owner no fewer than seven days in advance of proposed interruption of water service.
 - b. Do not proceed with interruption of water service without the Owner's written permission.
2. Well Drilling Water: Provide temporary water and piping for drilling purposes. Provide necessary piping for water supply.

1.2 PRODUCTS

A. Well Casings

1. Steel Casing: AWWA C200, single ply, steel pipe with threaded ends and threaded couplings for threaded joints.

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2. ABS Casing: ASTM F 480, ABS, Schedule 40 **OR** 80, **as directed**, bell-and-spigot pipe and couplings for solvent-cemented joints.
 3. PVC Casing: ASTM F 480 and NSF 14, **as directed**, PVC, Schedule 40 **OR** 80, **as directed**, bell-and-spigot pipe and couplings for solvent-cemented joints. Include NSF listing mark "NSF wc," **as directed**.
 4. Pitless Adapter: Fitting, of shape required to fit onto casing, with waterproof seals.
 5. Pitless Unit: Factory-assembled equipment that includes pitless adapter.
 6. Well Seals: Casing cap, with holes for piping and cables, that fits into top of casing and is removable, waterproof, and vermin proof.
- B. Grout
1. Cement: ASTM C 150, Type II.
 2. Aggregates: ASTM C 33, fine and coarse grades.
 3. Water: Potable.
- C. Water Well Screens
1. Screen Material: Fabricated of ASTM A 666, Type 304 stainless steel, welded; with continuous-slot, V-shaped openings that widen inwardly **OR** tube; with slotted or perforated surface and designed for well-screen applications, **as directed**.
 - a. Screen Couplings: Butt-type, stainless-steel coupling rings.
 - b. Screen Fittings: Screen, with necessary fittings, closes bottom and makes tight seal between top of screen and well casing.
 - c. Maximum Entering Velocity: **0.1 fps (0.03 m/s)**.
- D. Pack Materials
1. Coarse, uniformly graded filter sand, maximum **1/8 inch (3 mm)** in diameter.
 2. Fine gravel, maximum **1/4 inch (6 mm)** in diameter.
- E. Jet-Type Well Pumps
1. Description: Shallow **OR** Deep, **as directed**,-well-design, jet well pump; self-priming; centrifugal pump capable of continuous operation; with the following features:
 - a. Housing: Cast iron.
 - b. Impeller: Single stage **OR** Multistage, **as directed**, centrifugal; fabricated of corrosion-resistant materials.
 - c. Seals: Mechanical.
 - d. Shaft: Stainless steel.
 - e. Motor: Manufacturer's standard, NEMA MG 1 motor, panel, and accessories.
 - f. Motor Controls: Electronic; variable speed.
 - g. Check valve, ejector, and pressure-control valve.
 2. Pump Accessories:
 - a. Compression Tanks: Comply with requirements in Division 22 Section "Facility Indoor Potable-water Storage Tanks" **OR** Precharged butyl rubber diaphragm, steel shell, fused polymeric lining, and **100-psig (690-kPa)** working pressure, **as directed**.
 - b. Pressure Switches: For pump control; for installation in piping.
 - c. Water Piping: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends.
 - 1) Cast-Iron Fittings: ASME B16.4, threaded, galvanized.
 - d. Water Piping: ASTM D 2239, SIDR Numbers 5.3, 7, or 9 PE pipe; made with PE compound number required to give pressure rating not less than **160 psig (1100 kPa) OR 200 psig (1380 kPa)**, **as directed**. Include NSF listing mark "NSF pw."
 - 1) Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated, male insert ends matching inside of pipe. Include bands or crimp rings.
- F. Line-Shaft Well Pumps
1. Description: Line-shaft, water **OR** oil, **as directed**,-lubricated, vertical-turbine well pump complying with HI 2.1-2.2 and HI 2.3; with the following features:

- a. Impeller Material: Stainless steel **OR** Carbon steel **OR** Bronze, **as directed**.
- b. Motor: Full-voltage starting, vertical hollow- or solid-shaft, squirrel-cage induction type complying with ANSI C50.10.
- c. Pump Base: Cast iron or fabricated steel.
- d. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel threaded couplings.

G. Submersible Well Pumps

1. Description: Submersible, vertical-turbine well pump complying with HI 2.1-2.2 and HI 2.3; with the following features:
 - a. Impeller Material: Stainless steel **OR** Silicon bronze, **as directed**.
 - b. Motor: Capable of continuous operation under water, with protected submersible power cable.
 - c. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel threaded couplings.
 - d. Discharge Piping: ASTM D 2239, SDR Numbers 5.3, 7, or 9 PE pipe; made with PE compound number required to give pressure rating not less than **160 psig (1100 kPa) OR 200 psig (1380 kPa), as directed**. Include NSF listing mark "NSF pw."
 - 1) Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated, male insert ends matching inside of pipe. Include bands or crimp rings.

H. Motors

1. General requirements for motors are specified in Division 22 Section "Common Motor Requirements For Plumbing Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.

1.3 EXECUTION

A. Preparation

1. Pilot-Hole Data: Review pilot-hole test analysis furnished by the Owner.
2. Neighborhood Well Data: Review operating and test analyses.

B. Installation

1. Construct well using cable-tool **OR** rotary drilling **OR** reverse-rotary drilling **OR** driven, **as directed**, method.
2. Take samples of substrata formation at **10-foot (3-m)** intervals and at changes in formation throughout entire depth of each water supply well. Carefully preserve samples on-site in glass jars properly labeled for identification.
3. If selecting rotary drilled or reverse-rotary drilled method, excavate for mud pit or provide aboveground structure, acceptable to authorities having jurisdiction, to allow settlement of cuttings and circulation of drill fluids back to well without discharging to on-site waterways.
4. Enlarge pilot hole and install permanent casing, screen, and grout. Install first section of casing with hardened steel driving shoe of an OD slightly larger than casing couplings if threaded couplings are used.
5. Set casing and liners round, plumb, and true to line.
6. Join casing pipe as follows:
 - a. Ream ends of pipe and remove burrs.
 - b. Remove scale, slag, dirt, and debris from inside and outside casing before installation.
 - c. Cut bevel in ends of steel casing pipe and make threaded joints.
 - d. Clean and make solvent-cemented joints for ABS and PVC casings.
7. If rotary drilled or reverse-rotary drilled well, mix grout in proportions of **1 cu. ft. (0.03 cu. m)** or a **94-lb (42.6-kg)** sack of cement with **5 to 6 gal. (19 to 23 L)** of water. Bentonite clay may be added

in amounts of 3 to 5 lb/cu. ft. (1.4 to 2.3 kg/0.03 cu. m) for a 94-lb (42.6-kg) sack of cement. If bentonite clay is added, water may be increased to 6.5 gal./cu. ft. (25 L/0.03 cu. m) of cement.

8. If rotary drilled or reverse-rotary drilled well, place grout continuously, from bottom to top surface, to ensure filling of annular space in one operation. Do not perform other operations in well within 72 hours after grouting of casing. When quick-setting cement is used, this period may be reduced to 24 hours.
9. Provide permanent casing with temporary well cap. Install with top of casing 36 inches (910 mm) above finished grade, **as directed**.
10. Develop wells to maximum yield per foot (meter) of drawdown.
 - a. Extract maximum practical quantity of sand, drill fluid, and other fine materials from water-bearing formation.
 - b. Avoid settlement and disturbance of strata above water-bearing formation.
 - c. Do not disturb sealing around well casings.
 - d. Continue developing wells until water contains no more than 2 ppm of sand by weight when pumped at maximum testing rate.
11. Install jet well pumps with ejector in or attached to pump housing. Place check valve on suction line to prevent drainage of compression tank.
12. Install jet well pumps and pressure and suction lines. Install ejector where pressure and suction lines connect above well screen. Install check valve in suction line, or install foot valve below ejector, to prevent drainage of compression tank.
13. Install line-shaft **OR** submersible, **as directed**, well pumps according to HI 2.1-2.4 and provide access for periodic maintenance.
 - a. Before lowering permanent pump into well, lower a dummy pump that is slightly longer and wider than permanent pump to determine that permanent pump can be installed. Correct alignment problems.
 - b. Before lowering permanent pump into well, start pump to verify correct rotation.
 - c. Securely tighten discharge piping joints.
 - d. Locate line-shaft well pump near well bottom; locate motor above grade. Install driver plate to correctly align motor and pump.
 - e. Connect motor to submersible pump and locate near well bottom.
 - 1) Connect power cable while connection points are dry and undamaged.
 - 2) Do not damage power cable during installation; use cable clamps that do not have sharp edges.
 - 3) Install water-sealed surface plate that will support pump and piping.

C. Connections

1. Piping installation requirements are specified in Division 22 Section "Facility Water Distribution Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
 - a. Connect piping between well pump and water piping.
 - b. Connect water distribution system in trench to well pipe at pitless adapter **OR** unit, **as directed**.
 - c. Connect building water distribution to well pipe inside well house.
2. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
3. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

D. Well Abandonment

1. Comply with AWWA A100 when abandoning water supply wells. Fill and seal holes and casings and restore ground surface to finished grade.
OR
Follow well-abandonment procedures of authorities having jurisdiction. Restore ground surface to finished grade.

E. Field Quality Control

1. Plumbness and Alignment Testing: Comply with AWWA A100.
 2. Furnish samples of water-bearing formation to testing laboratory and well-screen manufacturer for mechanical sieve analysis.
 3. Prepare reports on static level of ground water, level of water for various pumping rates, and depth to water-bearing strata.
 4. Performance Testing: Conduct final pumping tests after wells have been constructed, cleaned, and tested for plumbness and alignment.
 - a. Provide discharge piping to conduct water to locations where disposal will not create a nuisance or endanger adjacent property. Comply with requirements of authorities having jurisdiction.
 - b. Measure elevation to water level in wells.
 - c. Perform two bailer or air-ejection tests to determine expected yield. Test at depths with sufficient quantity of water to satisfy desired yields.
 - d. Test Pump: Variable capacity test pump with capacity equal to maximum expected yields at pressure equal to drawdown in wells, plus losses in pump columns and discharge pipes.
 - e. Start and adjust test pumps and equipment to required pumping rates.
 - f. Record readings of water levels in wells and pumping rates at 30-minute maximum intervals throughout 24-hour minimum period.
 - g. Record maximum yields when drawdown is **60 inches (1500 mm)** above top of suction screens after designated times.
 - h. Operate pumping units continuously for eight hours after maximum drawdown is reached.
 - i. Record returning water levels in wells and plot curves of well recovery rates.
 - j. Remove sand, stones, and other foreign materials that may become deposited in wells after completing final tests.
 5. Water Analysis Testing:
 - a. Engage] a qualified testing agency to make bacteriological, physical, and chemical analyses of water from each finished well and report the results. Make analyses according to requirements of authorities having jurisdiction.
OR
Analyze water sample from each finished well for bacteriological, physical, and chemical quality and report the results. Make analyses according to requirements of authorities having jurisdiction.
- F. Cleaning
1. Disinfect water supply wells according to AWWA A100 and AWWA C654 before testing well pumps.
OR
Follow water supply well disinfection procedures required by authorities having jurisdiction before testing well pumps.
- G. Protection
1. Water Quality Protection: Prevent well contamination, including undesirable physical and chemical characteristics.
 2. Ensure that mud pit will not leak or overflow into streams or wetlands. When well is accepted, remove mud and solids in mud pit from Project site and restore site to finished grade.
 3. Provide casings, seals, sterilizing agents, and other materials to eliminate contamination; shut off contaminated water.
 4. Exercise care to prevent breakdown or collapse of strata overlaying that from which water is to be drawn.
 5. Protect water supply wells to prevent tampering and introducing foreign matter. Retain temporary well cap until installation is complete.

END OF SECTION 01 95 99 99h

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Task	Specification	Specification Description
01 95 99 99	01 00 00 00	General Requirements
01 95 99 99	01 22 16 00	No Specification Required
01 95 99 99	08 53 13 00	Vinyl Windows
01 95 99 99	01 95 99 92h	Gypsum Board
01 95 99 99	01 95 09 00	Cork Flooring
01 95 99 99	09 65 16 23	Resilient Sheet Flooring
01 95 99 99	22 11 16 00	Domestic Water Piping
01 95 99 99	22 13 16 00	Sanitary Waste And Vent Piping
01 95 99 99	23 21 13 23a	Hydronic Piping
01 95 99 99	26 05 33 00	Raceways And Boxes
01 95 99 99	26 05 39 00	Underfloor Raceways For Electrical Systems
01 95 99 99	26 51 00 00	Interior Lighting
01 95 99 99	31 13 16 00	Tree Protection And Trimming
01 95 99 99	32 31 13 13	Chain-Link Fences And Gates
01 95 99 99	33 14 00 00	Water Distribution
01 95 99 99	33 31 11 00	Sanitary Sewerage
01 00 00 00MOD000	01 00 00 00	General Requirements

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SECTION 02 41 13 13 - PORTLAND CEMENT CONCRETE REMOVAL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for portland cement concrete removal. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Section Includes:

1. Provide all labor, materials and equipment required for the removal work and disposal of existing Portland Cement Concrete indicated on the drawings and specified, including but not limited to the following:
 - a. Saw cutting existing concrete pavements, sidewalks, driveways, curbs and gutters noted on drawings to be removed.
 - b. Saw cutting existing concrete sidewalks for new tree pit openings (refer to drawings for locations).
 - c. Saw cutting existing bituminous paving noted on drawings to be removed.
 - d. Removal and disposal of demolished concrete sidewalks, driveways, curbs and gutters, including concrete removed for new tree pit openings.
 - e. Removal and disposal of demolished bituminous paving.
 - f. All excavating, rough grading and compacting as required to establish subgrade for new sidewalks, and Subgrade and Sub-Base for driveways.
 - g. Providing, placing and grading sand fill under new sidewalks. Top of compacted subgrades shall allow for the placement of sidewalks plus thickness of sand fill.
 - h. Removal and disposal of excavated material.

C. Special Requirements:

1. Protection: Provide protection barricades, maintain all lights and signals and other measures as required by federal, state, and municipal laws, for the full period of demolition operations and remove same when directed. In removing work, perform all work required to protect and maintain adjacent property, streets, alleys, sidewalks, curbs, and other structures remaining in place.

1.2 PRODUCTS

A. Backfilling Material:

1. Sand: Natural sand, with the following gradation: 100% passing the 1 sieve-, 65-100% passing the No. 4 sieve; 40-90% passing the No. 10 sieve- 30-80% passing the No. 16 sieve- 10-50% passing the No. 50 sieve; 0-30% passing the No. 100 sieve, and 0-10% passing the No. 200 sieve.
2. Crushed Stone: Crushed stone having a #57 crusher run gradation.

1.3 EXECUTION

A. Demolition:

1. The contractor shall accept the site as it finds it and shall inform itself as to the character and types of work to be removed. The Owner assumes no responsibility for the condition of the existing construction to be removed or demolished.
2. No demolition shall be commenced until a program of operations has been coordinated with the Owner, except that preparatory work may be started if specifically approved by the Owner.

02 - Existing Conditions



3. Operations shall be done in such manner as to avoid hazards to persons and property and interference with use of adjacent areas or interruption of free passage to and from such areas. Maintain Pedestrian access to all private entrances where construction of new sidewalks is in progress. Provide temporary walk ways or other means as required to maintain entry into the private properties, complying with all laws and ordinances and as approved by the Owner. Care shall be taken to prevent the spread of dust and flying particles.
4. Demolition and removal work shall be executed in a careful and orderly manner. Accumulation of rubbish will not be permitted.
5. After work is started, it shall be continued to completion at a rate that will allow the balance of the work to be completed within the time specified. If extra shifts are necessary beyond regular working hours, the work shall proceed with a minimum of nuisance to surrounding properties.
6. Contractor shall determine the nature and extent of demolition that will be necessary by comparing the drawings with the existing field conditions. It is expressly understood that this contract includes all work of a demolition nature that may be required or necessary for a full and complete execution of the work, whether particularly referred to herein or not.

B. Removal And Excavation:

1. When removing existing sidewalks, driveways, curbs and gutters provisions shall be made for satisfactory transition between replacements and the portion remaining in place. The contractor shall saw cut to a minimum depth of 1-1/2 inches with a concrete sawing machine to prevent the surface from spalling when the concrete is broken out. This work shall be done in such a manner that a straight joint will be secured.
2. It shall be the responsibility of the contractor to determine the thickness of the existing sidewalk to be removed. No additional compensation will be allowed because of variations from the assumed thickness or from the thickness shown on the plans.
3. After existing concrete sidewalks and driveways have been removed, excavate to depth required for sand fill.
4. The bottoms of all excavations shall be properly leveled off and all loose materials shall be removed from excavations. All wood, timber and organic materials, that are exposed at the bottom of all excavations, shall be removed and the area backfilled with sand and compacted.
5. Any excess or unauthorized excavation shall be backfilled with sand and compacted, at no additional cost to the Owner.
6. No backfill shall be placed in standing water, on frozen ground or on surfaces which have not been approved by the Commissioner.
7. Backfilling for all areas shall be approved material. Backfill shall be compacted to 95% maximum density in accordance with ASTM D 1557.
8. Contractor shall determine the nature and extent of excavation work that will be necessary by comparing the drawings with the existing areas to be excavated. It is expressly understood that this contract includes all work of an excavation nature that may be required or necessary for a complete execution of all excavation work, whether particularly referred to herein or not.

C. Disposal Of Materials:

1. All demolished and unsuitable materials, including excavated earth removed to establish required grade elevations shall be disposed of legally in such a manner that public or private property will not be damaged or endangered.

D. Clean-Up:

1. On completion of the demolition work, excavation work and before acceptance by the Owner, clean the areas affected, including areas outside the limits of the contractor's work area where permission to work has been granted. Remove surplus construction material or debris resulting from the demolition work and excavation work, and dispose of legally off the site.
2. Access routes to and from the site shall be kept clean of debris resulting from the work.

END OF SECTION 02 41 13 13

Task	Specification	Specification Description
02 41 13 13	02 41 19 13	Selective Demolition

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SECTION 02 41 16 13 - BUILDING DEMOLITION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for building demolition. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Demolition and removal of buildings and site improvements.
 - b. Abandoning in place **OR** Removing, **as directed**, below-grade construction.
 - c. Disconnecting, capping or sealing, and abandoning in-place **OR** removing, **as directed**, site utilities.
 - d. Salvaging items for reuse by the Owner.

C. Definitions

1. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.
2. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to the Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

D. Materials Ownership

1. Unless otherwise indicated, demolition waste becomes property of Contractor.
2. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to the Owner that may be uncovered during demolition remain the property of the Owner.
 - a. Carefully salvage in a manner to prevent damage and promptly return to the Owner.

E. Informational Submittals

1. Qualification Data: For refrigerant recovery technician.
2. Proposed Protection Measures: Submit informational report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control, **as directed**. Indicate proposed locations and construction of barriers.
 - a. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain.
3. Schedule of Building Demolition Activities: Indicate the following:
 - a. Detailed sequence of demolition work, with starting and ending dates for each activity.
 - b. Temporary interruption of utility services.
 - c. Shutoff and capping or re-routing of utility services.
4. Inventory: Submit a list of items to be removed and salvaged and deliver to the Owner prior to start of demolition.
5. Predemolition Photographs **OR** Video, **as directed**: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by building demolition operations. Submit before the Work begins.
6. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
7. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that

recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

F. Quality Assurance

1. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
2. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
3. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
4. Predemolition Conference: Conduct conference at Project site.
 - a. Inspect and discuss condition of construction to be demolished.
 - b. Review structural load limitations of existing structures.
 - c. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Review and finalize protection requirements.
 - e. Review procedures for noise control and dust control.
 - f. Review procedures for protection of adjacent buildings.
 - g. Review items to be salvaged and returned to the Owner.

G. Project Conditions

1. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
2. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
 - a. Provide not less than 72 hours' notice of activities that will affect operations of adjacent occupied buildings.
 - b. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
 - 1) Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.
3. the Owner assumes no responsibility for buildings and structures to be demolished.
 - a. Conditions existing at time of inspection for bidding purpose will be maintained by the Owner as far as practical.
 - b. Before building demolition, the Owner will remove certain items, as directed by the Owner.
4. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - a. Hazardous materials will be removed by the Owner before start of the Work.
 - b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and the Owner. Hazardous materials will be removed by the Owner under a separate contract.

OR

Hazardous Materials: Hazardous materials are present in buildings and structures to be demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.

- a. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - b. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - c. the Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.
5. On-site storage or sale of removed items or materials is not permitted.

H. Coordination

1. Arrange demolition schedule so as not to interfere with the Owner's on-site operations **OR** operations of adjacent occupied buildings, **as directed**.

1.2 PRODUCTS

A. Soil Materials

1. Satisfactory Soils: Satisfactory Soils: For soils which is to be used for backfilling voids that result from demolition operations in below-grade areas, comply with requirements in Division 31 Section "Earth Moving".

1.3 EXECUTION

A. Examination

1. Verify that utilities have been disconnected and capped before starting demolition operations.
2. Review Project Record Documents of existing construction provided by the Owner. the Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
3. Inventory and record the condition of items to be removed and salvaged. Provide photographs **OR** video, **as directed**, of conditions that might be misconstrued as damage caused by salvage operations.
4. Perform **OR** Engage a professional engineer to perform, **as directed**, an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
 - a. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
5. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

B. Preparation

1. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
2. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
 - a. the Owner will arrange to shut off indicated utilities when requested by Contractor.
OR
Arrange to shut off indicated utilities with utility companies, **as directed**.
 - b. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
 - c. Cut off pipe or conduit a minimum of **24 inches (610 mm)** below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

OR

Existing Utilities: Refer to Division 22 AND Division 26 for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing, **as directed**.

3. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
 - a. Strengthen or add new supports when required during progress of demolition.
4. Salvaged Items: Comply with the following:
 - a. Clean salvaged items of dirt and demolition debris.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to the Owner.
 - d. Transport items to storage area designated by the Owner **OR** indicated on Drawings, **as directed**.
 - e. Protect items from damage during transport and storage.

- C. Protection
1. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.
 2. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
 - a. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by the Owner and authorities having jurisdiction.
 - b. Provide temporary services during interruptions to existing utilities, as acceptable to the Owner and authorities having jurisdiction.
 - 1) Provide at least 72 hours' notice to occupants of affected buildings if shutdown of service is required during changeover.
 3. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction, and as indicated. Comply with requirements in Division 01 Section "Temporary Facilities And Controls".
 - a. Protect adjacent buildings and facilities from damage due to demolition activities.
 - b. Protect existing site improvements, appurtenances, and landscaping to remain.
 - c. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
 - d. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - e. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
 - f. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
 - g. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.
 4. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.
- D. Demolition, General
1. General: Demolish indicated existing buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - a. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
 - b. Maintain fire watch during and for a specified time after flame cutting operations as directed by the Owner.
 - c. Maintain adequate ventilation when using cutting torches.
 - d. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 2. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.
 3. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - a. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
 - b. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.
 4. Explosives: Use of explosives is not permitted, **unless directed otherwise**.

E. Demolition By Mechanical Means

1. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - a. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.
3. Salvage: Items to be salvaged are indicated on Drawings **OR** below, **as directed**:
 - a. Doors and door hardware.
 - b. Windows.
 - c. Cabinets.
 - d. Mirrors.
 - e. Chalkboards.
 - f. Tackboards.
 - g. Marker boards.
 - h. Plumbing fixtures.
 - i. Other items as directed.
4. Below-Grade Construction: Abandon foundation walls and other below-grade construction. Cut below-grade construction flush with grade.

OR

Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending **5 feet (1.5 m)** outside footprint indicated for new construction. Abandon below-grade construction outside this area.

 - a. Remove below-grade construction, including basements, foundation walls, and footings, completely **OR** to at least **6 inches (150 mm)** below grade **OR** to at least **12 inches (300 mm)** below grade **OR** to depths indicated, **as directed**.

OR

Below-Grade Construction: Demolish foundation walls and other below-grade construction.

 - b. Remove below-grade construction, including basements, foundation walls, and footings, completely **OR** to at least **6 inches (150 mm)** below grade **OR** to at least **12 inches (300 mm)** below grade **OR** to depths indicated, **as directed**.
5. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.

OR

Existing Utilities: Demolish existing utilities and below-grade utility structures that are within **5 feet (1.5 m)** outside footprint indicated for new construction. Abandon utilities outside this area.

 - a. Fill abandoned utility structures with satisfactory soil materials **OR** recycled pulverized concrete, **as directed**, according to backfill requirements in Division 31 Section "Earth Moving".
 - b. Piping: Disconnect piping at unions, flanges, valves, or fittings.
 - c. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

OR

Existing Utilities: Demolish and remove existing utilities and below-grade utility structures.

 - a. Piping: Disconnect piping at unions, flanges, valves, or fittings.
 - b. Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

F. Demolition By Explosives – ONLY IF APPROVED BY THE OWNER

1. Explosives: Perform explosive demolition according to governing regulations.
 - a. Obtain written permission from authorities having jurisdiction before bringing explosives to, or using explosives on, Project site.
 - b. Do not damage adjacent structures, property, or site improvements when using explosives.
2. Comply with recommendation in Explosives Consultant's report.

02 - Existing Conditions



- G. Site Restoration
1. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.
OR
Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials **OR** recycled pulverized concrete **OR** recycled pulverized masonry, **as directed**, according to backfill requirements in Division 31 Section "Earth Moving".
 2. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.
- H. Repairs
1. Promptly repair damage to adjacent buildings caused by demolition operations.
- I. Disposal Of Demolished Materials
1. Remove demolition waste materials from Project site and legally dispose of them in EPA approved landfill acceptable to authorities having jurisdiction. See Division 01 Section "Construction Waste Management And Disposal" for recycling and disposal of demolition waste.
 - a. Do not allow demolished materials to accumulate on-site.
 - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 2. Do not burn demolished materials.
- J. Cleaning
1. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
 - a. Clean roadways of debris caused by debris transport.

END OF SECTION 02 41 16 13

Task	Specification	Specification Description
02 41 16 13	02 41 13 13	Portland Cement Concrete Removal
02 41 16 13	02 41 19 13	Selective Demolition

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SECTION 02 41 19 13 - SELECTIVE DEMOLITION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for selective demolition. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Demolition and removal of selected portions of building or structure.
 - b. Demolition and removal of selected site elements.
 - c. Salvage of existing items to be reused or recycled.

C. Definitions

1. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
2. Remove and Salvage: Detach items from existing construction and deliver them to the Owner ready for reuse, **as directed**.
3. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
4. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

D. Materials Ownership

1. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to the Owner that may be encountered during selective demolition remain the Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to the Owner.
 - a. Coordinate with the Owner's archaeologist **OR** historical adviser, **as directed**, who will establish special procedures for removal and salvage.

E. Submittals

1. Qualification Data: For demolition firm, professional engineer, refrigerant recovery technician, **as directed**.
2. Schedule of Selective Demolition Activities: Indicate the following:
 - a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure the Owner's building manager's and other tenants' on-site operations are uninterrupted.
 - b. Interruption of utility services. Indicate how long utility services will be interrupted.
 - c. Coordination for shutoff, capping, and continuation of utility services.
 - d. Use of elevator and stairs.
 - e. Locations of proposed dust- and noise-control temporary partitions and means of egress, including for other tenants affected by selective demolition operations.
 - f. Coordination of the Owner's continuing occupancy of portions of existing building and of the Owner's partial occupancy of completed Work.
 - g. Means of protection for items to remain and items in path of waste removal from building.
3. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.

4. Predemolition Photographs or Videotapes: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Submit before Work begins.
5. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
 - a. Comply with submittal requirements in Division 01 Section "Construction Waste Management And Disposal".

F. Quality Assurance

1. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.
2. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
3. LEED Requirements for Building Reuse:
 - a. Credit MR 1.1 and 1.2, **as directed**: Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
 - b. Credit MR 1.3: Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
 - c. Credit MR 1.2 and 1.3, **as directed**: Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
4. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
5. Standards: Comply with ANSI A10.6 and NFPA 241.
6. Predemolition Conference: Conduct conference at Project site. Review methods and procedures related to selective demolition including, but not limited to, the following:
 - a. Inspect and discuss condition of construction to be selectively demolished.
 - b. Review structural load limitations of existing structure.
 - c. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - e. Review areas where existing construction is to remain and requires protection.

G. Project Conditions

1. the Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so the Owner's operations will not be disrupted.
2. Conditions existing at time of inspection for bidding purpose will be maintained by the Owner as far as practical.
 - a. Before selective demolition, items will be removed as directed by the Owner.
3. Notify the Owner of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
4. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - a. Hazardous materials will be removed by the Owner before start of the Work **OR** have been removed by the Owner under a separate contract, **as directed**.
 - b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner. the Owner will remove hazardous materials under a separate contract.

OR

5. Hazardous Materials: It is unknown whether hazardous materials will be encountered in the Work.
 - a. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify the Owner and the Owner. the Owner will remove hazardous materials under a separate contract.
6. Hazardous Materials (if asbestos abatement is part of Work of this Contract): Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - a. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - b. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
7. Storage or sale of removed items or materials on-site is not permitted.
8. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - a. Maintain fire-protection facilities in service during selective demolition operations.

H. Warranty

1. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION

A. Utility Services And Mechanical/Electrical Systems

1. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
2. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - a. the Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - b. Arrange to shut off indicated utilities with utility companies.
 - c. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - d. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
 - 1) Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

B. Preparation

1. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
2. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - a. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - b. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.

- c. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - d. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - e. Comply with requirements for temporary enclosures, dust control, heating, and cooling.
3. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
- a. Strengthen or add new supports when required during progress of selective demolition.

C. Selective Demolition, General

1. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - a. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - b. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - c. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - d. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
 - e. Maintain adequate ventilation when using cutting torches.
 - f. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - g. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 - h. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 - i. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management And Disposal".
2. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without the Owner's approval.
 - a. Building Structure and Shell: 75 **OR** 100, **as directed**, percent.
 - b. Nonshell Elements: 50 percent.
3. Removed and Salvaged Items:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers.
 - c. Store items in a secure area until delivery to the Owner.
 - d. Transport items to the Owner's storage area on-site **OR** off-site **OR** designated by the Owner **OR** indicated on Drawings, **as directed**.
 - e. Protect items from damage during transport and storage.
4. Removed and Reinstalled Items:
 - a. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
 - b. Pack or crate items after cleaning and repairing. Identify contents of containers.
 - c. Protect items from damage during transport and storage.

- d. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
 5. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by the Owner, items may be removed to a suitable, protected storage location during selective demolition and cleaned, **as directed**, and reinstalled in their original locations after selective demolition operations are complete.
- D. Selective Demolition Procedures For Specific Materials
1. Concrete: Demolish in small sections. Cut concrete to a depth of at least **3/4 inch (19 mm)** at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.
OR
Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.
 2. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
 3. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
 4. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
 - a. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
 5. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 07 for new roofing requirements.
 - a. Remove existing roof membrane, flashings, copings, and roof accessories.
 - b. Remove existing roofing system down to substrate.
 6. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.
- E. Disposal Of Demolished Materials
1. General: Except for items or materials indicated to be recycled, **as directed**, reused, salvaged, reinstalled, or otherwise indicated to remain the Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 - a. Do not allow demolished materials to accumulate on-site.
 - b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 - c. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - d. Comply with requirements specified in Division 01 Section "Construction Waste Management And Disposal".
 2. Burning: Do not burn demolished materials.
OR
Burning: Burning of demolished materials will be permitted only at designated areas on the Owner's property, **as directed**, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
 3. Disposal: Transport demolished materials and dispose of at designated spoil areas on the Owner's property.
OR
Disposal: Transport demolished materials off the Owner's property and legally dispose of them.
- F. Cleaning

02 - Existing Conditions



1. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

G. Selective Demolition Schedule

1. Existing Items **OR** Construction, **as directed**, to Be Removed, as directed by the Owner.
2. Existing Items to Be Removed and Salvaged, as directed by the Owner.
3. Existing Items to Be Removed and Reinstalled, as directed by the Owner.
4. Existing Items to Remain, as directed by the Owner.

END OF SECTION 02 41 19 13

Task	Specification	Specification Description
02 41 19 13	01 71 23 16	Cutting and Patching
02 41 19 13	02 41 13 13	Portland Cement Concrete Removal
02 41 19 13	02 41 16 13	Building Demolition
02 41 19 16	02 41 13 13	Portland Cement Concrete Removal
02 41 19 16	02 41 16 13	Building Demolition
02 41 19 16	02 41 19 13	Selective Demolition

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SECTION 02 58 13 00 - SNOW AND OTHER TEMPORARY FENCING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of snow and other temporary fencing. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop drawings shall be submitted for approval.

1.2 PRODUCTS

A. Pickets:

1. Size: Wood pickets shall be 3/8 inch thick, 1-1/2 inches wide, and 48 inches high.
2. Coating: Red oil paint or stain.
3. Spacing: Approximately 2 inches apart.
4. Attachment: Bind together with 3 double strands of wire.

B. Framework:

1. Materials: Wire shall be 13 ga. galvanized steel, complying with ASTM A 641.
2. Types: The framework shall consist of 3 parallel double strands of wire twisted between pickets to hold them securely in place.
3. Wire Connectors: Wire for attaching fabric to metal posts shall be 9 ga.
4. Staples and Nails shall comply with Fed. Spec. FF-N-105. Staples and nails shall be zinc-coated and of sufficient length for purpose required.

C. Gates:

1. Frame: Frame shall consist of 2 parallel horizontal wooden members with pickets attached at two-inch spacing.
2. Bracing: 2 wooden members laced diagonally on the gate between the frame boards.
3. Hardware shall include 2 strap hinges, latching device, and stop bar, all of zinc-coated steel, in compliance with ASTM A 153.

D. Supports:

1. Steel: Line posts and uprights shall be drive type, T sections, and provided with suitable anchor plate. The sections shall be hot-rolled steel complying with ASTM A 702, galvanized in compliance with ASTM A 123. The T sections shall have the following minimum sizes:

Post Length (Feet) Post Weight (Pounds)

5	7.32
5 1/2	7.99
6	8.65
6 1/2	9.32
7	9.98
7 1/2	10.64
8	11.31
9	12.64
10	13.97

2. Wood: Posts shall be cut from cedar, Douglas fir, pine, or other approved species of timber. Posts shall be peeled, treated, dressed, and cured. All wood posts and braces shall be given a pressure preservative treatment in a closed retort. The treatment shall comply with Fed. Spec. TT-W-571. Wood cut or sawed after treatment shall have the cut surfaces well brush-coated with the preservative used in the treatment.
3. Braces: Steel braces shall have same configuration as line posts and uprights without the anchor plate. Wood braces shall be treated No. 2 or better grade, Douglas fir or southern yellow pine. Braces shall meet all of the requirements for wood posts.
4. Location: Posts shall be evenly spaced to adequately support the fence framework.

1.3 EXECUTION

A. Installation

1. Wood Posts: Hold in line in a true vertical position by temporary bracing until backfilling is completed. Compact by hand tamping or other suitable methods to a density comparable to that of adjacent ground.
2. Steel Posts: Hold in a vertical position and drive to the required depths by an approved post driver. Post tops shall not be damaged during driving.
3. Corner, Brace, Or End Panels: Construct corner, brace, or end panels at the beginning and terminal ends, at gate openings, at all intersections, and at all corners or changes in horizontal alignment of fences, in existing fence on both sides of junction with new fence (except when junction is at a corner already braced).
4. Pull Posts shall be constructed when the distance of unbraced fencing exceeds 640 feet. Pull posts shall be spaced equidistant in the fence at intervals of 640 feet or less.
5. Framework Installation: Stretch to proper tension and securely fasten to posts. Top and bottom wires of fabric shall be tied or stapled to each post. Tie or staple every other wire to alternating posts. Every wire shall be tied or stapled to corner, pull, end, and gate posts. Wire for tied fabrics shall be 9 ga.
6. Picket Replacement: Where required, new pickets shall be securely fastened into the existing wire framework using 13 ga. galvanized wire.
7. Restretching Existing Fabric: Fabric designated to be restretched shall be restretched to proper tension and refastened to posts. Excess fabric extending beyond the post shall be removed.

END OF SECTION 02 58 13 00

Task	Specification	Specification Description
02 61 00 00	02 61 13 00	Excavation And Handling Of Contaminated Material

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SECTION 02 61 13 00 - EXCAVATION AND HANDLING OF CONTAMINATED MATERIAL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for excavation and handling of contaminated material. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Separate cross-sections of each area before and after excavation and after backfilling.
2. Product Data: Work Plan within 30 calendar days after notice to proceed. No work at the site, with the exception of site inspections and surveys, shall be performed until the Work Plan is approved. The Contractor shall allow 30 calendar days in the schedule for the Owner's review. No adjustment for time or money will be made if resubmittals of the Work Plan are required due to deficiencies in the plan. At a minimum, the Work Plan shall include:
 - a. Schedule of activities.
 - b. Method of excavation and equipment to be used.
 - c. Shoring or side-wall slopes proposed.
 - d. Dewatering plan.
 - e. Storage methods and locations for liquid and solid contaminated material.
 - f. Borrow sources and haul routes.
 - g. Decontamination procedures.
 - h. Spill contingency plan.
3. Closure Report: Three (3) copies of the Closure Report within 14 calendar days of work completion at the site.
4. Test Reports
 - a. Backfill
 - b. Surveys
 - c. Confirmation Sampling and Analysis
 - d. Sampling of Stored Material
 - e. Sampling Liquid
 - f. Compaction
 - g. Test results.

C. Surveys

1. Surveys shall be performed immediately prior to and after excavation of contaminated material to determine the volume of contaminated material removed. Surveys shall also be performed immediately after backfill of each excavation. The Contractor shall provide cross-sections on **25 foot (7.6 meter)** intervals and at break points for all excavated areas. Locations of confirmation samples shall also be surveyed and shown on the drawings.

D. Regulatory Requirements

1. Permits and Licenses: The Contractor shall obtain required federal, state, and local permits for excavation and storage of contaminated material. Permits shall be obtained at no additional cost the Owner.
2. Air Emissions: Air emissions shall be monitored and controlled in accordance with the Owner's Environmental Requirements.

E. Chemical Testing

1. Required sampling and chemical analysis shall be conducted in accordance with local requirements and the Owner's requirements.

F. Scheduling

1. The Contractor shall notify the Owner five (5) calendar days prior to the start of excavation of contaminated material. The Owner will **OR** The Contractor shall, **as directed**, be responsible for contacting regulatory agencies in accordance with the applicable reporting requirements.

1.2 PRODUCTS

A. Backfill

1. Backfill material shall be obtained from the location indicated on the drawings **OR** offsite sources approved by the Owner, **as directed**. Backfill shall be classified in accordance with ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, ML, MH, CL, or CH and shall be free from roots and other organic matter, trash, debris, snow, ice or frozen materials. Backfill material shall be tested for the parameters listed below at a frequency of once per 3000 **cubic yards (cubic meters)**. A minimum of one set of classification tests shall be performed per borrow source. One backfill sample per borrow source shall also be collected and tested for the chemical parameters listed below.

<u>Physical Parameter</u>	<u>Test Method</u>
Grain Size	ASTM D 422
Compaction	ASTM D 698

Backfill shall not be used until borrow source chemical and physical test results have been submitted and approved.

B. Spill Response Materials

1. The Contractor shall provide appropriate spill response materials including, but not limited to the following: containers, adsorbents, shovels, and personal protective equipment. Spill response materials shall be available at all times when contaminated materials/wastes are being handled or transported. Spill response materials shall be compatible with the type of materials and contaminants being handled.

1.3 EXECUTION

A. Existing Structures And Utilities

1. No excavation shall be performed until site utilities have been field located. The Contractor shall take the necessary precautions to ensure no damage occurs to existing structures and utilities. Damage to existing structures and utilities resulting from the Contractor's operations shall be repaired at no additional cost to the Owner. Utilities encountered that were not previously shown or otherwise located shall not be disturbed without approval from the Owner.

B. Clearing

1. Clearing shall be performed to the limits shown on the drawings in accordance with Division 2 Section "Site Clearing."

C. Contaminated Material Removal

1. Excavation: Areas of contamination shall be excavated to the depth and extent shown on the drawings and not more than **0.2 feet (60 mm)** beyond the depth and extent shown on the drawings unless directed by the Owner. Excavation shall be performed in a manner that will limit spills and the potential for contaminated material to be mixed with uncontaminated material. An excavation log describing visible signs of contamination encountered shall be maintained for each area of excavation. Excavation logs shall be prepared in accordance with ASTM D 5434.
2. Shoring: If workers must enter the excavation, it shall be evaluated, shored, sloped or braced as required by U.S. Army Corps of Engineers (USACE) EM 385-1-1 and U.S. National Archives and Records Administration (NARA) 29 CFR 1926 section 650.

3. Dewatering: Surface water shall be diverted to prevent entry into the excavation. Dewatering shall be limited to that necessary to assure adequate access, a safe excavation, prevent the spread of contamination, and to ensure that compaction requirements can be met. No dewatering shall be performed without prior approval of the Owner.
- D. Confirmation Sampling And Analysis
1. the Owner shall be present to inspect the removal of contaminated material from each site. After all material suspected of being contaminated has been removed, the excavation shall be examined for evidence of contamination. If the excavation appears to be free of contamination, field analysis shall be used to determine the presence of contamination using a real time vapor monitoring instrument **OR** immunoassay field kits, **as directed**. Excavation of additional material shall be as directed by the Owner. After all suspected contaminated material is removed, confirmation samples shall be collected and analyzed.
 2. Samples shall be collected at a frequency as directed by the Owner. A minimum of one sample shall be collected from the bottom and each side wall of the excavation. Based on test results, the Contractor shall propose any additional excavation which may be required to remove material which is contaminated above action levels. Additional excavation shall be subject to approval by the Owner. Locations of samples shall be marked in the field and documented on the as-built drawings.
- E. Contaminated Material Storage
1. Material shall be placed in temporary storage immediately after excavation **OR** after treatment while awaiting test results, **as directed**. The following paragraphs describe acceptable methods of material storage. Storage units shall be in good condition and constructed of materials that are compatible with the material or liquid to be stored. If multiple storage units are required, each unit shall be clearly labeled with an identification number and a written log shall be kept to track the source of contaminated material in each temporary storage unit.
 2. Stockpiles
 - a. Stockpiles shall be constructed to isolate stored contaminated material from the environment. The maximum stockpile size shall be as directed by the Owner. Stockpiles shall be constructed to include:
 - 1) A chemically resistant geomembrane liner free of holes and other damage. Non-reinforced geomembrane liners shall have a minimum thickness of **20 mils (0.5 mm)**. Scrim reinforced geomembrane liners shall have a minimum weight of **40 lbs. per 1000 square feet (20 kg/100 square meters)**. The ground surface on which the geomembrane is to be placed shall be free of rocks greater than **0.5 inches (12 mm)** in diameter and any other object which could damage the membrane.
 - 2) Geomembrane cover free of holes or other damage to prevent precipitation from entering the stockpile. Non-reinforced geomembrane covers shall have a minimum thickness of **10 mils (0.25 mm)**. Scrim reinforced geomembrane covers shall have a minimum weight of **26 lbs. per 1000 square feet (13 kg/100 square meters)**. The cover material shall be extended over the berms and anchored or ballasted to prevent it from being removed or damaged by wind.
 - 3) Berms surrounding the stockpile, a minimum of **12 inches (300 mm)** in height. Vehicle access points shall also be bermed.
 - 4) The liner system shall be sloped to allow collection of leachate. Storage and removal of liquid which collects in the stockpile, in accordance with paragraph Liquid Storage.
 3. Roll-Off Units: Roll-off units used to temporarily store contaminated material shall be water tight. A cover shall be placed over the units to prevent precipitation from contacting the stored material. The units shall be located as shown on the drawings. Liquid which collects inside the units shall be removed and stored in accordance with paragraph Liquid Storage.
 4. Liquid Storage: Liquid collected from excavations and stockpiles shall be temporarily stored in **55 gallon barrels (220 L barrels) OR 500 gallon tanks (2000 L tanks)**, **as directed**. Liquid storage containers shall be water-tight and shall be located as shown on the drawings.

- F. Sampling
1. Sampling of Stored Material
 - a. Samples of stored material shall be collected at a frequency as directed by the Owner.
 - b. Stored material with contaminant levels that exceed the action levels shall be treated offsite. Analyses for contaminated material to be taken to an offsite treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Owner. Additional sampling and analyses to the extent required by the approved offsite treatment, storage or disposal (TSD) facility shall be the responsibility of the Contractor and shall be performed at no additional cost to the Owner **OR** subject to approval by the Owner, **as directed**.
OR
Stored material with contaminant levels that exceed the action levels shall be treated onsite.
 2. Sampling Liquid
 - a. Liquid collected from excavations **OR** storage areas **OR** decontamination facilities, **as directed**, shall be sampled at a frequency of once for every **500 gallons (2,000 L)** of liquid collected.
 - b. Liquid with contaminant levels that exceed action levels shall be treated offsite. Analyses for contaminated liquid to be taken to an offsite treatment facility shall conform to local, state, and federal criteria as well as to the requirements of the treatment facility. Documentation of all analyses performed shall be furnished to the Owner. Additional sampling and analysis to the extent required by the approved offsite treatment, storage or disposal (TSD) facility receiving the material shall be the responsibility of the Contractor and shall be performed at no additional cost to the Owner **OR** subject to approval by the Owner.
OR
Liquid with contaminant levels that exceed action levels shall be treated onsite.
 3. Sampling Beneath Storage Units
 - a. Samples from beneath each storage unit shall be collected prior to construction of and after removal of the storage unit. Samples shall be collected at a frequency as directed by the Owner from a depth interval of **0 to 0.5 feet (0 to 0.15 m)**.
 - b. Based on test results, soil which has become contaminated above action levels shall be removed at no additional cost to the Owner. Contaminated material which is removed from beneath the storage unit shall be handled in accordance with paragraph Sampling of Stored Material. as directed by the Owner and at no additional cost to the Owner, additional sampling and testing shall be performed to verify areas of contamination found beneath stockpiles have been cleaned up to below action levels.
- G. Spills
1. In the event of a spill or release of a hazardous substance (as designated in NARA 40 CFR 302), pollutant, contaminant, or oil (as governed by the Oil Pollution Act [OPA], 33 U.S.C. 2701 et seq.), the Contractor shall notify the Owner immediately. If the spill exceeds the reporting threshold, the Contractor shall follow the pre-established procedures as described in the Contingency Plan for immediate reporting and containment. Immediate containment actions shall be taken to minimize the effect of any spill or leak. Cleanup shall be in accordance with applicable federal, state, and local regulations. as directed by the Owner, additional sampling and testing shall be performed to verify spills have been cleaned up. Spill cleanup and testing shall be done at no additional cost to the Owner.
- H. Backfilling
1. Confirmation Test Results: Excavations shall be backfilled immediately after all contaminated materials have been removed and confirmation test results have been approved. Backfill shall be placed and compacted to the lines and grades shown on the drawings.

2. **Compaction:** Approved backfill shall be placed in lifts with a maximum loose thickness of **8 inches (200 mm)**. Soil shall be compacted to 90 percent of ASTM D 698 **OR** ASTM D 1557, **as directed**, maximum dry density. Density tests shall be performed at a frequency of once per **10,000 square feet (930 square meters)** per lift. A minimum of one density test shall be performed on each lift of backfill placed. Field in-place dry density shall be determined in accordance with ASTM D 1556, ASTM D 2167, or ASTM D 2922. If ASTM D 2922 is used, a minimum of one in ten tests shall be checked using ASTM D 1556 or ASTM D 2167. Test results from ASTM D 1556 or ASTM D 2167 shall govern if there is a discrepancy with the ASTM D 2922 test results.
 - I. **Disposal Requirements**
 1. Offsite disposal of contaminated material shall be in accordance with Division 2 Section "Disposal of Hazardous Materials."
 - J. **Closure Report**
 1. Three copies of a Closure Report shall be prepared and submitted within 14 calendar days of completing work at the site. The report shall be labeled with the contract number, project name, location, date, and name of general contractor. The Closure Report shall include the following information as a minimum:
 - a. A cover letter signed by a responsible company official **OR** Professional Engineer registered in the state of the work who is a responsible company official, **as directed**, certifying that all services involved have been performed in accordance with the terms and conditions of the contract documents and regulatory requirements.
 - b. A narrative report including, but not limited to, the following:
 - 1) site conditions, ground water elevation, and cleanup criteria;
 - 2) excavation logs;
 - 3) field screening readings;
 - 4) quantity of materials removed from each area of contamination;
 - 5) quantity of water/product removed during dewatering;
 - 6) sampling locations and sampling methods;
 - 7) sample collection data such as time of collection and method of preservation;
 - 8) sample chain-of-custody forms; and
 - 9) source of backfill.
 - c. Copies of all chemical and physical test results.
 - d. Copies of all manifests and land disposal restriction notifications.
 - e. Copies of all certifications of final disposal signed by the responsible disposal facility official.
 - f. Waste profile sheets.
 - g. Scale drawings showing limits of each excavation, limits of contamination, known underground utilities within **50 feet (15 m)** of excavation, sample locations, and sample identification numbers. On-site stockpile, storage, treatment, loading, and disposal areas shall also be shown on the drawings.
 - h. **Progress Photographs.** Color photographs shall be used to document progress of the work. A minimum of four views of the site showing the location of the area of contamination, entrance/exit road, and any other notable site conditions shall be taken before work begins. After work has been started, activities at each work location shall be photographically recorded daily **OR** weekly, **as directed**. Photographs shall be a minimum of **3 x 5 inches (76.2 x 127.0 mm)** and shall include:
 - 1) Soil removal and sampling.
 - 2) Dewatering operations.
 - 3) Unanticipated events such as spills and the discovery of additional contaminated material.
 - 4) Contaminated material/water storage, handling, treatment, and transport.
 - 5) Site or task-specific employee respiratory and personal protection.
 - 6) Fill placement and grading.

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- 7) Post-construction photographs. After completion of work at each site, the Contractor shall take a minimum of four views of each excavation site. A digital version of all photos shown in the report shall be included with the Closure Report. Photographs shall be a minimum of 3 inches by 5 inches (76mm by 127 mm) and shall be mounted back-to-back in double face plastic sleeves punched to fit standard three ring binders. Each print shall have an information box attached. The box shall be typewritten and arranged as follows:
- Project Name: Direction of View:
 - Location: Date/Time:
 - Photograph No.: Description of View:

END OF SECTION 02 61 13 00

SECTION 02 61 13 00a - PRECISION TESTING OF UNDERGROUND FUEL OIL TANKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor and equipment for the precision testing of underground fuel oil tanks. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS - (Not Used)

1.3 EXECUTION

- A. The Contractor shall furnish all the necessary labor and equipment to complete the Precision Fuel Oil Tank Testing at various buildings under the jurisdiction of the Owner. The pertinent quantity and the capacity of the tanks will be listed on each Job Order. When the contractor elects to use a volumetric tank tester, it shall be responsible to fill up and "top off" tank to a maximum of 100 gallons prior to the start of testing. The cost to "top off" tank will be the contractor's responsibility.
- B. The Contractor shall provide the material and labor necessary for the drilling and tapping of the existing oil tank manhole cover and the installation of new air bleeder valves. The air bleeder valve shall be a Hoffman Specialty #40 or #41 or their approved equal.
- C. Coordination of Work: Prior to performing any test, the contractor shall notify the Owner of the scheduled test date. Designated personnel from the Owner shall take necessary actions to coordinate fuel oil delivery and shall inform the contractor of the date and time of the fuel delivery. The contractor shall ascertain that the tanks are filled to capacity and shall be responsible to have the tanks "topped off" up to a maximum of 100 gallons prior to the start of testing. The contractor shall make arrangements to perform the testing within forty-eight (48) hours of notification that the oil tank has been filled. The Contractor's responsibility to "top off" tank only applies when the contractor elects to utilize a volumetric tank tester.
- D. Test Equipment: The Contractor shall be limited to using state approved Precision Testing methods equal to the following:
 - Ainlay Tank Tegrity Tester
 - Horner EZY 3
 - Hunter Leak Lokator
 - Tank Auditor
 - Petro Tite
- E. Test Results: The Contractor will be required to submit written reports of test results as noted below.
 1. The test reports' format shall be approved by the testing equipment manufacturer and the state.
 2. The Contractor shall submit one (1) type written report within seven (7) days of completion of the testing to the Owner.
 3. The Contractor shall submit one copy of the report to the state within thirty (30) days of completion of the testing. Proof of submission shall be appended to the request for payment.
 4. The test results shall include, but not be limited to:
 - a. Name and/or Number of Building
 - b. Address of Building

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- c. Date and Time of Test
 - d. Results of test including (Actual Data Calculations Graphs)
 - e. Test Method
 - f. Name and address of Contractor
 - g. Signature of test technician
5. Should the test indicate a leakage condition, the contractor shall perform the following:
- a. Initiate procedure to isolate piping from tank and determine the source of the leak. This work shall be performed after notification of the Owner.
 - b. Submit a written proposal and cost estimate for work required to be performed to repair leak. Recommended proposal shall be submitted to the Owner within 48-hours after determining source of leak. No repair work shall proceed without authorization by the Owner.
 - c. Notify the state of leak discovered in underground buried tank. This notification shall take place within 2 hours of determining source of leak.
 - d. In these cases, the Owner may direct the Contractor to complete the work or exercise its option to perform the required work by its own forces or under separate contract.
6. After completion of the remedial work when applicable, the contractor shall perform a re-test, and shall issue a final test report in aforementioned format. The contractor shall be paid 50% of the bid unit price for the re-test.

END OF SECTION 02 61 13 00a

SECTION 02 61 13 00b - HYDROSTATIC PRESSURE TESTING OF AIR RECEIVING TANKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor and equipment for the hydrostatic pressure testing of air receiving tanks. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS - (Not Used)

1.3 EXECUTION

A. General

1. Disconnect all piping and remove safety valve from air receiving tank and temporarily plug all openings on the disconnected tank.
2. Perform hydrostatic test at not less than twice the charging pressure, at 70 degrees Fahrenheit, for fifteen (15) minutes in accordance with the Administrative Code of the applicable Authority.
3. Test shall be performed in the presence of a representative of the Inspection Unit. Contractor shall notify the Owner's Inspection Unit seventy-two (72) hours prior to test.
4. At the completion of each test, contractor shall reconnect all piping and reinstall all removed equipment.
5. The Contractor shall issue an affidavit of test to the Owner. The affidavit shall state the date of test, testing pressure and the maximum working pressure allowable until the next test.
6. Furnish and install a glass enclosed aluminum frame of suitable size to display affidavit. Frame shall be open at the top for easy access to affidavit. Frame shall be firmly affixed in a permanent location adjacent to receiver tank as directed by the Owner.

B. Intent: Pursuant to the provisions of the Administrative Code of applicable Authority, and in the interest of public safety, the Owner requires that:

1. All compressed air tanks shall be tested by a person who has received a Certificate of Fitness from the Owner to conduct such a test in the manner and to the pressure set forth in the code before being continued in use.
2. Licensed testers shall submit ten (10) day notice of appointments to the Owner.
3. A sworn statement by the person conducting the test, in proper affidavit form, attesting to the completion of such test, shall be filed with the Owner's office and a copy thereof posted on the premises.
4. The submission of such an affidavit or posting a copy thereof, where the required test has not been carried out in accordance with the foregoing provisions of law, shall be cause for the revocation of the Certificate of Fitness, denial of the required permits to maintain and operate equipment and may also subject the individual to criminal liability for filing a false affidavit and a fine of up to five hundred dollars, imprisonment of up to six months, or both.

END OF SECTION 02 61 13 00b

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Task	Specification	Specification Description
02 61 13 00	02 41 19 13	Selective Demolition
02 61 13 00	02 65 00 00	Underground Storage Tank Removal
02 61 26 00	01 95 99 92	Disposal Of Hazardous Materials
02 61 26 00	02 82 33 00	Removal Of Friable Asbestos-Containing Materials

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SECTION 02 65 00 00 - UNDERGROUND STORAGE TANK REMOVAL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor and equipment for the underground storage tank removal. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Work Plan: The Work Plan within 30 days after notice to proceed. The Contractor shall allow 30 days in the schedule for the Owner's review and approval. No adjustment for time or money will be made for resubmittals required as a result of noncompliance.
2. Qualifications: A document indicating that the Contractor meets the specified requirements.
3. Reports
 - a. Backfill Material.
 - b. Tank Contents Verification.
 - c. Contaminated Water Disposal.
 - d. Soil Examination, Testing, and Analysis.
 - e. Reports including the chain-of-custody records.
 - f. Backfilling.
 - g. Copies of all laboratory and field test reports.
 - h. Tank Closure Report: 3 copies of the report for each UST site opened, prepared in a standard 3-ring binder, within 14 days of completing work at each site. Each binder shall be labeled with contract number, project name, location and tank number; each binder shall be indexed. A copy of the report shall be furnished to the Installation Environmental Coordinator.
4. Records
 - a. Salvage Rights: A record of the disposition of salvaged materials at the end of the contract.
5. Qualifications
 - a. The Contractor shall have a minimum of 2 years of tank removal experience and shall be certified by the State in which the Project is located for tank removal work.
 - b. Laboratory Services: For laboratory services the Contractor shall be validated in accordance with state certification requirements.
 - c. Support Staff: The Contractor shall identify all staff involved for the various components, including personnel collecting and shipping samples. The qualifications of these staff members shall be detailed by the Contractor.

C. Regulatory Requirements

1. Permits and Licenses: The Contractor, as required or as directed by the Owner, shall obtain local, state, or federal permits and licenses that directly impact the Contractor's ability to perform the work prior to commencing removal operations.
2. Statutes and Regulations: Tank closures shall be carried out in accordance with 40 CFR 280, 40 CFR 262, 40 CFR 264, and 40 CFR 265 as well as the applicable local and State regulations. Hazardous material and/or waste shall be transported in accordance with applicable local and State regulations.

D. Project/Site Conditions: See the Detailed Scope of Work

1. Sequencing and Scheduling: The Contractor shall notify the Installation Environmental Coordinator and the Owner 5 days prior to tank removal. The Contractor shall be responsible for contacting the Implementation Agency (IA) in accordance with the applicable reporting requirements.

2. Work Plan

- a. The Contractor shall develop, implement, maintain, and supervise as part of the work, a comprehensive plan for tank removal and related operations. As a minimum the plan shall include, but not be limited to, excavation, removal, and ultimate disposal of the tank, its contents, and any contaminated materials. The Work Plan shall be based on work experience, on the requirements of this specification, and on the following references from the American Petroleum Institute:

API RP 1604.
API Standard 2015.
API RP 2003.
API Publication 2217A.
API Publication 2219.

No work at the site, with the exception of site inspections and mobilization, shall be performed until the Work Plan is approved. At a minimum, the Work Plan shall include:

- 1) Discussion of the removal approach, tank cleaning, and tank cutting procedures.
- 2) A Sampling and Analysis Plan.
- 3) Methods to be employed for product, sludge, vapor, and pumpable liquid removal; purging and inerting; and storage methods proposed for control of surface water.
- 4) Treatment options.
- 5) Identification of waste, tank and contaminated soil transporters and means of transportation.
- 6) Treatment, disposal, and alternate facilities, and means of treatment, disposal or remediation.
- 7) Borrow source.
- 8) Spill prevention plan.
- 9) Spill contingency plan.
- 10) Decontamination procedures, shoring plan, and safety measures.

1.2 PRODUCTS

A. Backfill Material

1. Backfill shall be classified in accordance with ASTM D 2487 as GW, GP, GM, GC, SW, SP, SM, SC, MH, CL, or CH and shall be free from roots and other organic matter, trash, debris, snow, ice or frozen materials. If off-site materials are used, soil classification test results shall be approved prior to bringing the material onsite. The testing frequency for backfill material shall be 1 per 1000 cubic yards or a minimum of 1 test. Non-contaminated material removed from the excavation shall be used for backfill in accordance with Paragraph BACKFILLING.

1.3 EXECUTION

A. General Requirements

1. Safety Guidelines: Personnel shall abide by the safety guidelines specified in Division 01.
2. Burning and Explosives: Use of explosives or burning debris will not be allowed.
3. Protection of Existing Structures and Utilities: The Contractor shall take all necessary precautions to avoid damage to existing structures, their appurtenances, monitoring wells, or utilities that may be affected by work activities. Any damage to utilities or monitoring wells resulting from the Contractor's operations shall be repaired at no expense to the Owner. The Contractor shall coordinate with the installation to locate underground utilities prior to beginning construction. Utilities encountered which were not previously shown or otherwise located shall not be disturbed without approval from the Owner.
4. Shoring: Shoring requirements shall be provided.

B. Tank Contents Verification

1. Sampling: Tank product, pumpable liquids, tank coatings and sludge shall be sampled by the Contractor. If the data is not adequate, additional sampling and analysis to the extent required by the approved permitted treatment, storage or disposal (TSD) facility receiving the material shall be the responsibility of the Contractor. Meeting all regulatory requirements, including the preparation of hazardous materials and waste for transportation shall be the responsibility of the Contractor.
 2. Analysis: Tank contents shall be tested by the Contractor for the parameters listed herein. Analyses shall include total petroleum hydrocarbons (TPH), benzene, ethylbenzene, toluene and xylene (BETX), and lead.
 3. Characterization: Prior to removing any of the tank contents, the contents shall be characterized to determine if the tank contents must be disposed as a hazardous or special waste or in a special manner based on local, state, and Federal disposal regulations. Tank product, pumpable liquids, and sludge shall be characterized in accordance with 40 CFR 261 and 40 CFR 279. The waste contents determination and accompanying test results for each phase present in the tank shall be submitted to the Owner. The Contractor shall be responsible for any additional requirements identified by the disposal facility. The tank contents shall not be removed until approval is given by the Owner.
- C. Clearing, Grubbing And Removals
1. Areas designated for clearing and grubbing shall be cleared of all trees, stumps, down timber, brush, rubbish, roots larger than 75 mm (3 inches) in diameter, and matted roots prior to commencing operations. Concrete or asphalt pavement shall be saw cut at the limits of removal, broken and removed with the resulting debris disposed of as directed by the Owner. Chain link fence shall be removed and salvaged for reuse or disposed of off-site, as directed by the Owner.
- D. Topsoil
1. Uncontaminated topsoil shall be stripped and stockpiled separately for reuse at a location approved by the Owner if it meets the requirements of clean fill given in Paragraph BACKFILLING. Additional topsoil in excess of that produced by excavation shall be obtained where directed by the Owner. All areas disturbed by tank removal operations, other than areas to receive pavement or similar surface under this contract, shall be topsoiled. Topsoil shall be used wherever directed by the Owner.
- E. Preparations For Excavation: Before excavating, the Contractor shall drain product piping back to the tank, remove residual liquids trapped in the product lines, and remove all product from the tank; and the tank shall be purged and vented in accordance with API RP 1604, and as specified herein.
1. Removal of Product, Pumpable Liquids, and Sludge: Tank product, pumpable liquids, and sludge shall be contained, and stored onsite, prior to disposal. Contaminated water shall be treated as specified. Tank product, pumpable liquids, and sludge shall be analyzed and segregated to recover reusable products by the Owner prior to being transported to the designated location or treatment, storage and disposal (TSD) facility. Tank product, pumpable liquids, and sludge shall be removed and disposed of by the Contractor. No Owner facilities shall be used for permanent storage or disposal of the wastes. Temporary storage on Owner's facilities will be allowed only until testing is complete, manifests (if necessary) are complete, and transportation is arranged. The Contractor shall be responsible for obtaining all required permits. Usable product shall be the property of the Contractor. The Contractor shall provide approved containers, vehicles, equipment, labor, signs, labels, placards and manifests and associated land disposal restriction notices and notifications, necessary for accomplishment of the work, including materials necessary for cleaning up spills that could occur from tank removal operations.
 2. Contaminated Water Disposal:
 - a. Sampling, Analysis, and Containment
 - 1) Contaminated water shall be sampled and analyzed both prior to and after treatment. Contaminated water produced from excavation operations and tank pumping treated onsite, shall be analyzed for pH; benzene, ethylbenzene, toluene, and xylene (BETX); total lead; oil and grease; total petroleum hydrocarbons (TPH). Sampling and analysis shall be performed prior to disposal for every 200,000 L

- (50,000 gallons) of contaminated water treated. Analysis for contaminated water to be taken to an off-site treatment facility shall conform to the requirements of the treatment facility with documentation of all analyses performed furnished to the Owner in accordance with paragraph RECORDS.
- 2) Contaminated water shall be contained, stored onsite, and analyzed and disposed of by the Contractor in accordance with applicable Federal and state disposal regulations. The Contractor shall provide approved containers, vehicles, equipment, labor, signs, labels, placards and manifests and associated land disposal notices and notifications, necessary for accomplishment of the work.
 - b. Treatment: Contaminated water shall be treated by oil water separation, filtering, air stripping and activated carbon, or other means as approved by the Owner. If contaminated water is to be treated onsite, the proposed treatment shall be specified in the Work Plan and submitted for approval. Temporary storage and treatment equipment shall be installed at a location approved by the Owner. Treated effluent shall be sampled and analyzed and the results approved by the Owner before discharge to the sanitary sewer or the surface. Effluent shall be treated and discharged in accordance with the discharge permit.
- F. Purging And Inerting: After the tank and piping contents have been removed, but prior to excavation beyond the top of the tank, the Contractor shall disconnect all the piping (except the piping needed to purge or inert the tank). Flammable and toxic vapors shall be purged from the tank or the tank made inert in accordance with API RP 1604, with the exceptions that filling with water shall not be used and, if dry ice is employed, the Contractor shall use a minimum of 1.8 kg per 500 L (3 pounds per 100 gallons) of tank volume. The tank atmosphere shall be continuously monitored for combustible vapors if the tank is purged, or continuously monitored for oxygen if the tank is inerted.
- G. Excavation: Excavation areas, as well as work near roadways, shall be marked as directed by the Owner.
 1. Exploratory Trenches: Exploratory trenches shall be excavated as necessary to determine the tank location, limits and the location of ancillary equipment.
 2. Tank Excavation: Excavation around the perimeter of the tank shall be performed limiting the amount of potentially petroleum contaminated soil that could be mixed with previously uncontaminated soil. Petroleum contaminated soil shall be segregated in separate stockpiles. The Contractor shall maintain around the tank an excavation of sufficient size to allow workers ample room to complete the work, but also protect the workers from sliding or cave-ins. Sheet piling, bracing, or shoring shall be installed in the absence of adequate side slopes if there is a need for workers to enter the excavated area. Surface water shall be diverted to prevent direct entry into the excavation. Dewatering of the excavation may require a discharge permit by the State and shall be limited to allow adequate access to the tank and piping, to assure a safe excavation, and to ensure that compaction and moisture requirements are met during backfilling. Dewatering may result in the production of petroleum contaminated water and/or free product. Free product shall be recovered from the groundwater only as part of necessary dewatering.
 3. Piping Excavation: Excavation shall be performed as necessary to remove tank piping and ancillary equipment in accordance with paragraphs: Shoring, Tank Excavation, and Open Excavations.
 4. Open Excavations: Open excavations and stockpile areas shall be secured while awaiting confirmation test results from the soil beneath the tank. The excavation shall be backfilled as soon as possible after tank and contaminated soil removals have been completed and confirmation samples have been taken. The Contractor shall divert surface water around excavations to prevent water from directly entering into the excavation.
 5. Stockpiles: Uncontaminated excavated soil and petroleum contaminated soil that is not a state-regulated hazardous waste shall be stockpiled and used for backfill in the tank excavation prior to using borrow material or disposed of off-site. Excavated material that is regulated by the state as a hazardous waste shall be considered contaminated and shall be placed in containers such as drums, roll-offs or dumpsters for sampling in accordance with paragraph Stockpiled Material

Sampling. Uncontaminated soil shall be stockpiled separately from the contaminated soil, a safe distance away from, but adjacent to, the excavation.

H. Removal Of Piping, Ancillary Equipment, And Tank

1. Piping and Ancillary Equipment: All piping and ancillary equipment shall be disconnected from the tank. The piping shall be removed completely (interior and exterior of the tank). All tank ancillary equipment and piping connections shall be capped, except those connections necessary to inert the tank within the excavation zone. The piping exterior and ancillary equipment shall be cleaned to remove all soil and inspected for signs of corrosion and leakage. The Contractor shall ensure no spillage of the piping contents occurs, as specified in the Work Plan, and as required in paragraph SPILLS. If the soil under and around the tank pad is contaminated, the tank pad shall be removed and disposed of off-site at an approved non-hazardous or hazardous waste facility, as required. If the soil under and around the tank pad is not contaminated, the tank pad shall remain in place.
2. Tank: The tank shall be removed from the excavation and the exterior cleaned to remove all soil and inspected for signs of corrosion, structural damage, or leakage. All materials coming into contact with the tank, or in the vicinity of the excavation such as shovels, slings and tools shall be of the non-sparking type. After removal from the excavation, the tank shall be placed on a level surface at an approved location and secured with wood blocks to prevent movement.
3. Contaminated Soil, Tank and Piping Excavation Examination: After the tank has been removed from the ground, the adjacent and underlying soil shall be examined for any evidence of leakage. The soil shall be visually inspected for staining after removal of all obviously contaminated soil, then screened for the presence of volatile and/or semi-volatile contamination using a real time vapor monitoring instrument or immunoassay field kits, as required. Uncontaminated soil or petroleum contaminated soil not regulated by the state as hazardous waste shall be transported off-site for disposal. Contaminated soil or suspected contaminated soil shall be containerized. the Owner shall determine the extent of the contaminated soil to be removed from each site. The Contractor shall report any evidence indicating that the amount of contaminated soil may exceed the individual site limit specified, to the Owner the same day it is discovered. If minimal additional excavation is required, the Owner may allow the Contractor to proceed. If extensive contamination is encountered, the excavation shall be sampled and backfilled in accordance with paragraph BACKFILLING. After the known contaminated soil is removed, the excavation shall be sampled and analyzed.

I. Tank Cleaning

1. Exterior: Soil shall be removed from the exterior of the tank, piping, and associated equipment to eliminate soil deposition on roadways during transportation to a temporary storage area, ensure markings will adhere to the surfaces, and simplify tank cutting. Soil shall be removed using non-sparking tools. Removed uncontaminated soil and soil not regulated by the state as a hazardous waste shall be recovered and used as backfill in the former tank excavation. Soil believed to be contaminated shall be removed and containerized.
2. Temporary Storage: If the tank is stored after the tank exterior is cleaned and ancillary equipment is removed, and prior to being cut into sections, the tank shall be labeled as directed in API RP 1604, placed on blocks, and temporarily stored in the area of the existing tank site. Prior to cleaning the tank interior the tank atmosphere shall be monitored for combustible vapors and purged or inerted if combustible vapors are detected.
3. Interior:
 - a. The tank interior shall be cleaned using a high pressure (greater than 500 psi (3.45 Mpa)), low volume (less than 2 gpm (0.13 L/s)) water spray or steam cleaned until all loose scale and sludge is removed, and contamination, in the form of a sheen, is no longer visible in the effluent stream. The interior surfaces of piping shall also be cleaned, to the extent possible, using the same method used for cleaning the tank. Contaminated water generated from interior cleaning operations (of both piping and tank) shall not exceed the following quantities for each UST cleaned:

UST VOLUME (LITERS)

PERCENT OF UST VOLUME

3,785 or less	5
37,850 or less	5 or 378 L, whichever is less
75,700 or less	1 or 568 L, whichever is less
greater than 75,700	1 or 946 L, whichever is less

UST VOLUME (GALLONS)	PERCENT OF UST VOLUME
1,000 or less	5
10,000 or less	5 or 100 gal., whichever is less
20,000 or less	1 or 150 gal., whichever is less
greater than 20,000	1 or 250 gal., whichever is less.

b. All contaminated water resulting from cleaning operations shall be handled in accordance with paragraph Contaminated Water Disposal. Cleaning shall be accomplished eliminating, to the greatest extent possible, the need for personnel to enter the tank. Cleaning shall be done using specially designed tank cleaning equipment which allows the tank to be cleaned prior to cutting into sections without requiring personnel to enter the tank or, if less specialized equipment is used, the tank shall be partially dissected to overcome confined space entry hazards.

J. Soil Examination, Testing, And Analysis

1. Tank Excavation Sampling Procedures: After soil known to be contaminated has been removed or after soil excavation is complete, the excavation shall be sampled with procedures, number, location, and methodology in accordance with state regulations. Samples shall be obtained from the pits, in accordance with ASTM D 1587, using a backhoe with a Shelby tube attached to the bucket.
2. Stockpiled Material Sampling: Sampling locations, number and specific procedures shall be as required by the implementing agency and the disposal facility.
3. Analysis: Soil samples from the excavation and stockpiled material shall be tested in accordance with the approved Sampling and Analysis Plan for the following parameters: total petroleum hydrocarbon (TPH); benzene, ethylbenzene, toluene, xylene (BETX); toxicity characteristic leaching procedure (TCLP). Copies of all test results shall be provided to the Owner.

K. Backfilling: The tank area and any other excavations shall be backfilled only after the soil test results have been approved. Contaminated soil removal shall be complete after the bottom of the tank excavation is determined to have soil contamination levels below the state standards of approval by the Owner. The excavation shall be dewatered if necessary. Stockpiled material subjected to chemical confirmation testing shall be used as backfill if it is found to conform to the requirements of clean fill per appropriate state and local regulations. Backfill consisting of clean fill shall be placed in layers with a maximum loose thickness of 200 mm (8 inches) and compacted to 90 percent maximum density for cohesive soils and 95 percent maximum density for cohesionless soils. Density tests shall be performed by an approved commercial testing laboratory or by facilities furnished by the Contractor. Test results shall be attached to contractor's Quality Control Report. A minimum of 1 density test shall be performed on each lift. Laboratory tests for moisture density relations shall be determined in accordance with ASTM D 1557, Method B, C, or D, or ASTM D 3017. A mechanical tamper may be used provided that the results are correlated with those obtained by the hand tamper. Field in-place density shall be determined in accordance with ASTM D 1556, ASTM D 2922, or ASTM D 2167.

L. Disposal Requirements

1. Treatment, Disposal, and Recycling: Disposal of hazardous or special wastes shall be in accordance with all local, State, and Federal solid and hazardous waste laws and regulations; and conditions specified herein. This work shall include all necessary personnel, labor, transportation, packaging, detailed analyses (if required for disposal, manifesting or completing waste profile sheets), equipment, and reports. Product and pumpable liquids removed from the tank shall be recycled to the greatest extent practicable. The tanks removed shall be disposed of

- at one of the state approved facilities. Each tank disposed of in this manner shall be manifested as required by the State to document delivery and acceptance at the disposal facility.
2. Tank and Ancillary Equipment Disposal: After the tank, piping, and ancillary equipment have been removed from the excavation and the tank cleaned, the tank shall be cut into sections with no dimension greater than 1500 mm (5 feet). Tank and piping sections shall be disposed of in a State approved off-site disposal facility or in a salvage yard. The tank shall be cut into sections prior to being taken from the tank removal site. The Contractor shall not sell the tank intact. Ancillary equipment shall be disposed of at an approved off-site disposal facility or a salvage yard. Piping shall be disconnected from the tank and removed or grouted full of a portland cement and water slurry consisting of 22.7 L (6 gallons) of clean water per 42.6 kg (94 pound) sack of portland cement, thoroughly mixed and free of lumps, unless otherwise indicated.
 3. Transportation of Wastes: Transportation shall be provided in accordance with Department of Transportation (DOT) Hazardous Material Regulations and State and local requirements, including obtaining all necessary permits, licenses, and approvals. Evidence that a State licensed hazardous waste or waste transporter is being used shall be included in the SUBMITTALS.
 4. Salvage Rights: The Contractor shall retain the rights to salvage value of recycled or reclaimed product and metal not otherwise identified, so long as the requirements of 40 CFR 266 and 40 CFR 279, or the applicable State requirements are met. At the end of the contract, the Contractor shall provide documentation on the disposition of salvaged materials.
 5. Records: Records shall be maintained of all waste determinations, including appropriate results of analyses performed, substances and sample location, the time of collection, and other pertinent data as required by 40 CFR 280, Section 74 and 40 CFR 262 Subpart D. Transportation, treatment, disposal methods and dates, the quantities of waste, the names and addresses of each transporter and the disposal or reclamation facility, shall also be recorded and available for inspection, as well as copies of the following documents:
 - a. Manifests.
 - b. Waste analyses or waste profile sheets.
 - c. Certifications of final treatment/disposal signed by the responsible disposal facility official.
 - d. Land disposal notification records required under 40 CFR 268 for hazardous wastes.
 6. Hazardous/Special Waste Manifests: Manifesting shall conform to Federal, State and local requirements.
 7. Documentation of Treatment or Disposal: The wastes, other than recyclable or reclaimable product or metal, shall be taken to a treatment, storage, or disposal facility which has EPA or appropriate state permits and hazardous or special waste identification numbers and complies with the provisions of the disposal regulations. Documentation of acceptance of special waste by a facility legally permitted to treat or dispose of those materials shall be furnished to the Owner not later than 5 working days following the delivery of those materials to the facility; and a copy shall be included in the Tank Closure Report. A statement of agreement from the proposed treatment, storage or disposal facility and certified transporters to accept hazardous or special wastes shall be furnished to the Owner not less than 14 days before transporting any wastes. If the Contractor selects a different facility than is identified in the contract, documentation shall be provided for approval to certify that the facility is authorized and meets the standards specified in 40 CFR 264.
- M. Spills: Immediate containment actions shall be taken as necessary to minimize effect of any spill or leak. Cleanup shall be in accordance with applicable Federal, State, local laws and regulations, and district policy at no additional cost to the Owner.
- N. Tank Closure Report: Tank Closure Reports shall include the following information as a minimum:
1. A cover letter signed by a Professional Engineer registered in the State in which the Project is located certifying that all services involved have been performed in accordance with the terms and conditions of this specification.
 2. A narrative report describing what was encountered at each site, including:
 - a. condition of the UST.
 - b. any visible evidence of leaks or stained soils.
 - c. results of vapor monitoring readings.

- d. actions taken including quantities of materials treated or removed.
 - e. reasons for selecting sample locations.
 - f. sample locations.
 - g. collection data such as time of collection and method of preservation.
 - h. reasons for backfilling site.
 - i. whether or not groundwater was encountered.
- 3. Copies of all analyses performed for disposal.
 - 4. Copies of all waste analyses or waste profile sheets.
 - 5. Copies of all certifications of final disposal signed by the responsible disposal installation official.
 - 6. Information on who sampled, analyzed, transported, and accepted all wastes encountered, including copies of manifests, waste profile sheets, land disposal restriction, notification and certification forms, certificates of disposal, and other pertinent documentation.
 - 7. Copies of all analyses performed for confirmation that underlying soil is not contaminated, with copies of chain-of-custody for each sample. Analyses shall give the identification number of the sample used. Sample identification numbers shall correspond to those provided on the one-line drawings.
 - 8. Scaled one-line drawings showing tank locations, limits of excavation, limits of contamination, underground utilities within 15 m (50 feet) sample locations, and sample identification numbers.
 - 9. Progress Photographs. The Contractor shall take a minimum of 4 views of the site showing such things as the location of each tank, entrance/exit road, and any other notable site condition before work begins. After work has been started at the site, the Contractor shall photographically record activities at each work location daily. Photographs shall be 76.2 x 127.0 mm (3 x 5 inches) and shall include:
 - a. Soil removal, handling, and sampling.
 - b. Unanticipated events such as discovery of additional contaminated areas.
 - c. Soil stockpile area.
 - d. Tank.
 - e. Site or task-specific employee respiratory and personal protection.
 - f. Fill placement and grading.
 - g. Post-construction photographs. After completion of work at each site, the Contractor shall take a minimum of four (4) views of the site. Prints shall illustrate the condition and location of work and the state of progress. The photographs shall be mounted and enclosed back-to-back in a double face plastic sleeve punched to fit standard three ring binders. Each color print shall show an information box, 40 x 90 mm (1-1/2 x 3-1/2 inches). The information box for the 76.2 x 127.0 mm (3 x 5 inch) photographs shall be scaled down accordingly, or taped to the bottom of the photo. The box shall be typewritten and arranged as follows:
 - Project No.
 - Contract No.
 - Location
 - Contractor/Photographer
 - Photograph No. Date/Time:
 - Description
 - Direction of View

END OF SECTION 02 65 00 00

Task	Specification	Specification Description
02 65 00 00	02 41 19 13	Selective Demolition
02 65 00 00	02 61 13 00	Excavation And Handling Of Contaminated Material
02 65 00 00	02 61 13 00a	Precision Testing Of Underground Fuel Oil Tanks
02 65 00 00	02 61 13 00b	Hydrostatic Pressure Testing Of Air Receiving Tanks
02 81 00 00	01 95 99 92	Disposal Of Hazardous Materials
02 81 00 00	02 61 13 00	Excavation And Handling Of Contaminated Material

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SECTION 02 82 16 00 - ENCAPSULATION (LOCK-DOWN) OF ASBESTOS-CONTAINING MATERIALS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for encapsulation (lock-down) of asbestos-containing materials. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: Manufacturers technical information including label analysis and application instructions for each material proposed for use.
2. Installation Instructions: Manufacturer's installation instructions with specific project requirements noted.
3. Performance Warrantee: Manufacturers performance guarantee.
4. Material Safety Data Sheet: Material Safety Data Sheet in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for each surfactant and encapsulating material proposed for use on the work. Include a separate attachment for each sheet indicating the specific worker protective equipment proposed for use with the material indicated.

C. Delivery And Storage: Deliver materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:

1. Name or title of material
2. Manufacturer's stock number and date of manufacture
3. Manufacturer's name
4. Thinning instructions
5. Application instructions
6. Deliver materials together with a copy of the OSHA Material
7. Safety Data Sheet for the material.

D. Job Conditions: Apply encapsulating materials only when environmental conditions in the work area are as required by the manufacturer's instructions.

E. Quality Assurance

1. Testing: Test material to be encapsulated using methods set forth in ASTM E1494 "Standard Practice for Encapsulants for Spray-or-Trowel-Applied Friable Asbestos- Containing Building Materials."

F. Warranty

1. Performance Warranty: Contractor shall submit written Performance Warranty, executed by the contractor, agreeing to repair/replace spray-on work which has cracked, fallen from substrate, or otherwise deteriorated to a condition where it would not perform effectively for its intended purposes due substantially to defective materials or workmanship and not due to abuse by occupants, improper maintenance, unforeseeable ambient exposures or other causes beyond anticipated conditions and contractors control. Warranty period shall be for at least one year after date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Encapsulant system shall be an acrylic, elastomeric type, spray, brush or roller-applied, tinted penetrating or tinted bridging type, specifically designed for application to asbestos-containing material. System shall be equal to Global Encasement System as manufactured by GLOBAL Encasement Inc., 132-32nd Street, Union City, NJ 07087 U.S.A., Tel. (800) 266-3982/(201) 902-9770.
 - a. All encasement topcoat materials shall be warranted to be heavy-bodied, from the same manufacturer, and shall be long lasting, highly-pure (low VOC) materials that remain flexible, chalk resistant and resist cracking, peeling, algae and fungus that can cause future indoor air quality concerns.
 - b. To allow for building movement without cracking or disturbing fibrous materials, coating systems shall have passed testing to ASTM standards for adhesion, permeability, aged flexibility and with aged elasticity for the encasement system of over 250%.
 - c. Coatings shall be Class A Fire Rated, water-based, non-toxic, safe and easy to use, contain no hazardous ingredients by OSHA definition, comply with all known building codes and be non-flammable.
 - d. Coating materials shall have low VOC (Volatile Organic Compound) content.
 - e. Coating materials shall not release health threatening toxic smoke and fumes in a fire and shall comply with all known building codes.
 - f. Coating materials shall have passed the following testing standards:
 - 1) ASTM E 119 fire tests demonstrating that applying a multi-layer system over fireproofing does not adversely affect the fireproof rating of the fireproofing (3 hour test).
 - 2) UPITT Combustion Toxicity Test proving nothing toxic is released in a fire.
 - 3) ASTM E 84 and E162 fire tests for "Class A" - Surface Flammability and Burning Characteristics (Flame Spread = 0, Smoke Developed = 5).
 - 4) "Pull-off Adhesion" test per ASTM E736 equals or exceeds 9,950 lbs./sq. ft. (89.1 lbs./sq. in.).
 - 5) ASTM D 1653 and E96 "Water Vapor Permeability" (showing the rate that water vapor can pass through the system).
 - 6) Impact Resistance, "Tensile Strength" shall exceed 150 psi; "Elongation" shall exceed 250%.
 - 7) System shall be mildew resistant, impact resistant, scrub resistant, non-yellowing, non-chalking, highly blister resistant, rust resistant, highly chemical resistant and shall remain flexible after 1000 hour ASTM Accelerated Weather testing.
 - 8) Water-Based materials (low VOC) Volatile Organic Content of Primer-Sealer-Neutralizer = 0.1 g/L (0.001 lb./gal.) and Encasement Top Coat = 0.1 g/L (0.001 lb./gal.) as tested by EPA Method 24.
 - 9) Materials comply with applicable standards for installation on interior and/or exterior surfaces of a building.
 - 10) Encasement Systems shall provide additional water-proofing protection.
- B. Related Materials:
 1. Elastomeric architectural sealants, caulking compounds, primers, and similar materials shall be approved by the manufacturer of the encasement coatings. All materials used shall be applied in accordance with its manufacturer's recommendations.
- C. Applicable Standards
 1. Product shall be rated as acceptable for use intended when field tested in accordance with ASTM E 1494.

1.3 EXECUTION

A. General

Encapsulation (Lock-Down) Of Asbestos-Containing Materials

1. Prior to applying any encapsulating material in Work Areas, Contractor shall obtain final visual inspection approval by the Project Administrator.
 2. Prior to applying any encapsulating material, Contractor shall ensure that application of the sealer will not cause the base material to fail and allow the sealed material to fall of its own weight or separate from the substrate. Should Contractor doubt the ability of the installation to support the sealant, request direction from the Owner's Representative before proceeding with the encapsulating work.
 3. Do Not Commence Application of encapsulating materials until all removal work within the work area has been completed.
- B. Worker Protection
1. Before beginning work with any material for which a Material Safety Data Sheet has been submitted provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.
- C. Application
1. Comply with all manufacturer's instructions for particular conditions of installation. Consult with manufacturer's technical representative for conditions not covered.
 2. Encapsulate all surfaces in full compliance with manufacturer's procedures.
 3. At completion of Encapsulation and before removal of Work Area enclosures and Pressure Differential System, decontaminate space in accordance with requirements of manufacturer's instructions.
 4. Remove all debris from the project site and restore area to proper conditions by cleaning all surfaces in accordance with manufacturer's written recommendations.
 5. At completion of work submit manufacturer's record of inspection of completed work and Manufacturers Performance Guarantee executed by both manufacturer and Contractor.

END OF SECTION 02 82 16 00

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SECTION 02 82 33 00 - REMOVAL OF FRIABLE ASBESTOS-CONTAINING MATERIALS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for removal of friable asbestos-containing materials. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Description

1. Furnish all labor, materials, facilities, equipment, services, employee training and testing, permits and agreements necessary to perform the work required for asbestos removal, encapsulation, repair, clean-up, decontamination, re-insulation and all other work in accordance with these specifications, in accordance with the latest regulations from the U.S. Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the recommendations of National Institute of Occupational Safety and Health (NIOSH), and any other applicable federal, state and local government regulations. Whenever there is a conflict or overlap of the above references, the most stringent provision is applicable.
2. The work specified herein shall be performed by competent persons trained, knowledgeable and qualified in the state-of-the-art techniques of asbestos abatement, handling and subsequent cleaning of contaminated areas.

C. Scope

1. The quantities of materials and limits of abatement work area(s) shall be verified by the asbestos contractor.

D. Asbestos Hazard

1. Asbestos-containing material when damaged or disturbed is subject to fiber releases. Wet methods are a primary means of controlling fiber release.
2. Strict compliance with each of the provisions outlined in these specifications for the encapsulation, repair and handling of asbestos-containing material is of great importance, because:
 - a. The inhalation of airborne asbestos fibers can cause a very serious and often fatal disease.
 - b. Workers may not be aware they are inhaling asbestos fibers.
 - c. Symptoms of the disease do not appear for many years.
 - d. Only the Contractor and its employees can prevent the inhalation of asbestos fibers, which can lead to the development of asbestos-related disease.
 - e. No insurance is available to provide for asbestos-related disease.

E. Other Hazardous Material

1. Contractor shall comply with OSHA 29 CFR 1926.62 - Lead in Construction when demolishing any equipment or architectural component identified as lead-containing or lead-based paint. The work of this project is considered a demolition activity.
2. the Owner anticipates that a substantial amount of the Project will involve lead paint.

F. Qualifications

1. the Owner and the Owner's Representative will verify and approve the experience of the Asbestos Abatement Contractor based upon submission at the time of bidding by Contractor evidence of the following:
 - a. Experience: Provide the names and locations of at least three asbestos abatement projects of comparable size and complexity comparable with this work. Provide the names

and telephone numbers of contact person at previous projects. Provide the final air monitoring decontamination fiber levels achieved.

- b. Personnel: Provide the name(s) of "Competent Person" as defined by OSHA 29 CFR 1926.32(f) - Asbestos. Demonstrate the education and specialized training with successful completion of examination of an EPA approved course. Provide evidence of participation in five projects of complexity comparable with this project.
- c. Licensing and Certification: The Contractor must hold a current, valid asbestos license issued by the State in which the work is to be performed.

G. Notices And Record Keeping

1. Contractor shall maintain for at least 30 years, a record for each asbestos project in which the Contractor engages. Each record shall include the following information: name, address, and social security number of all personnel involved with the project, the name address and social security number of the OSHA "Competent Person" who will supervise the work, the amount of asbestos material that was removed, repaired, encapsulated or disturbed, the commencement and completion date of the work, copies of Hazardous Waste Manifest(s), personal air monitoring results and any other appropriate information.
2. The Contractor shall send written notification as required by USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61, Subpart M) to the Owner, at least 10 working days prior to beginning any work on asbestos-containing materials.
3. Include the following information:
 - a. Name and address of the Owner or operator.
 - b. Description of the facility being demolished or renovated, including the size, age, and prior use of the facility.
 - c. Estimate of the approximate amount of asbestos material present in the facility in terms of linear feet of pipe, and surface area on other facility components. For facilities in which the amount of asbestos materials is less than 80 linear meters (260 linear feet) on pipes and less than 15 square meters (160 square feet) on other facility components, explain techniques of estimation.
 - d. Location of the facility being demolished or renovated.
 - e. Scheduled starting and completion dates of demolition or renovation.
 - f. Nature of planned demolition or renovation and method(s) to be used.
 - g. Procedures to be used to comply with the requirements of USEPA National Emission Standards for Hazardous Air Pollutants (NESHAPS) Asbestos Regulations (40 CFR 61 Subpart M).
 - h. Name and location of the waste disposal site where the asbestos waste material will be deposited.
4. Prior to commencement of work, the Contractor shall submit the following documents to the Owner's Representative. No work will be allowed to start until these documents have been approved:
 - a. The schedule of the work, including manpower, length and number of work shifts. Schedule shall be coordinated with the Owner's full occupancy of all areas of the building.
 - b. Satisfactory proof that written notification has been provided to the EPA regional office and the Owner.
 - c. Proof that all required permits, disposal site locations, and arrangements for transportation and disposal of asbestos-contaminated materials, supplies and the like have been obtained.
 - d. Complete a worker certificate indicating that all employees have had instruction and training on the hazards of asbestos exposure, the use and fitting of respirators, protective dress, wet and dry decontamination procedures, entry and exit from work areas, and all aspects of work procedures and protective measures.
 - e. Documentation indicating that all employees have received appropriate medical examinations and have successfully passed fit testing for the respirator to be worn. As a

- minimum, medical exams must be consistent with OSHA 29 CFR 1926.1101(K)(9)(viii)(G)-Asbestos Regulation.
- f. Samples of signs to be used in and around the work area to comply with OSHA 29 CFR 1926.1101(K)(9)(viii)(I)- Asbestos regulations and as required by federal, state and municipal regulations.
 - g. Material Safety Data Sheets (OSHA form 174 or equivalent) for all chemicals used during work performed under this section.
 - h. Encapsulation data and encapsulation procedures.
 - i. Design of pressure differential system including calculation used to arrive at the number of machines necessary to achieve one air change per every 10 minutes.
 - j. Location of personnel and material decontamination units for each work area.
5. Contractor shall provide written notification to the Owner's Representative of its intent to start work at least five days in advance. In no case will the Contractor start work until authorization to proceed is given.
 6. During the work, Contractor shall maintain a daily log which will be kept at the job site. Items to be included in the daily log shall include but are not limited to the following:
 - a. Meetings, purpose, attendees, discussions, items of resolution.
 - b. Visitations, authorized and unauthorized.
 - c. Sign-in sheets of all personnel entering and leaving the work area.
 - d. Special or unusual events (i.e., barrier breaching equipment failures).
 - e. Personal air monitoring results.
 - f. Two copies of the daily log are required for Project Closeout.
- H. Terminology (Definitions)
1. Abatement - Procedures to control fiber release from asbestos-containing materials. Includes removal, enclosure or encapsulation.
 2. Air Lock - A system for permitting ingress or egress without permitting air movement between any two adjacent areas consisting of two curtained doorways. The air lock must be maintained in an uncontaminated condition at all times.
 3. Air Monitoring; - The process of measuring the asbestos fiber content of a specific volume of air in a stated period of time using methods approved or recommended by OSHA, EPA, NIOSH or other method approved by the Owner or the Owner's Representative.
 4. Amended water - Water to which a surfactant has been added.
 5. Asbestos - A generic name given to a number of naturally occurring hydrated mineral silicates that possess a unique crystalline structure, are incombustible in air, and are separable into fibers. Asbestos includes the asbestiform varieties of Chrysotile (serpentine), Crocidolite (Riebeckite), Amosite (Cummingtonite-Grunente), Anthophyllite, Actinolite, and Tremolite.
 6. Asbestos-containing material (ACM) - Any material that contains more than 1 percent asbestos by weight as determined by Polarized Light Microscopy (PLM).
 7. Authorized Visitor - the Owner or its designated representative, or a representative of any regulatory or other agency having jurisdiction over the project.
 8. Class I - Asbestos work means activities involving the removal of thermal systems insulation (TSI) and surfacing ACM and PACM.
 9. Class II - Asbestos work means activities involving the removal of ACM which is not TSI or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.
 10. Class III - Asbestos work means repair and maintenance operations where "ACM" including TSI and surfacing ACM and PACM is likely to be disturbed.
 11. Class IV - Asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean-up dust, waste and debris resulting from Class I, II and III activities.
 12. Critical Barrier - A unit of temporary construction which provides the only separation between an asbestos work area and an adjacent, potentially occupied, space. The critical barrier is composed of at least one intact sheet of polyethylene sheeting.

13. Decontamination Enclosure System - A series of connected rooms with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment. A decontamination system contains at least two air locks.
 14. Disposal - All procedures necessary to transport and deposit the asbestos-contaminated material stripped and removed from the building in a waste disposal site in compliance with applicable federal, state, and local regulations.
 15. Disposal Site - A site approved by the EPA for the disposal of asbestos-containing wastes.
 16. Encapsulant - A liquid which can be applied to asbestos-containing materials and which controls the possible release of fibers from the materials.
 17. Encapsulation - The use of an agent to seal the surface (bridging encapsulant) or penetrate the bulk (penetrating encapsulant) of the asbestos-containing material.
 18. HEPA -High Efficiency Particulate Air - A type of filter which is 99.97% efficient at filtering particles of 0.3 micrometers in diameter.
 19. HEPA Vacuum Equipment - Vacuuming equipment equipped with a HEPA filter in the exhaust outlet, and so designed and maintained that 99.97% of all particles of 0.3 micrometer in diameter in the inlet air are collected and retained.
 20. Negative Pressure Respirators - Respirators which function by the wearer breathing in air through a filter.
 21. NIOSH - National Institute of Occupational Safety and Health.
 22. the Owner's Representative - Authorized Consultants
 23. Permissible Exposure Level (PEL) - A level of airborne fibers specified by OSHA as an occupational exposure standard for asbestos. It is 0.1 f/cc of air, eight-hour TWA, as measured by Phase Contrast Microscopy.
 24. Repair - The restoration of damaged or deteriorated asbestos-containing material to intact condition.
 25. Respirator Protection Program - A set of procedures and equipment required by OSHA if employees wear negative pressure respirators or if fiber levels are above the PEL.
 26. Surfactant - Chemical wetting agent added to water to improve penetration, thus reducing the amount of water required for a given operation or area, and enhancing the effect of the water in reducing fiber release.
 27. Thermal Systems Insulation - Material applied to pipes, fittings, boilers, breeching, tanks, ducts or other interior structural components to prevent heat loss or gain, or water condensation, or for other purposes.
 28. Wet Cleaning - The process of eliminating asbestos contamination from building surfaces and objects by using cloths and mops or other cleaning tools that have been dampened with clean water and afterwards disposing of these cleaning tools as asbestos-contaminated waste.
- I. Permits And Licenses:
1. The Contractor must maintain current licenses as required by applicable state or local jurisdictions for the removal, transporting, disposal or other regulated activity relative to the work of this contract.
- J. Regulations
1. This section sets forth governmental regulations and industry standards which are included and incorporated herein by reference and made a part of the specifications. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.
 2. Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made a part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.
 3. The Contractor shall assume full responsibility and liability for the compliance with all applicable federal, state, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site. The Contractor

is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable federal, state, and local regulations. The Contractor shall hold the Owner and the Owner's Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health or other regulation on the part of itself, its employees, or its Sub-Contractors.

4. Federal requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to the following regulations:
 - a. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA), including but not limited to:
 - 1) U.S. Department of Labor, OSHA, including, but not limited to:
 - a) Occupational Exposure to Asbestos, Tremolite, Anthophyllite and Actinolite; Final Rules
Title 29, Part 1910, Section 1001
Part 1926, Section 1101 of the Code of Federal Regulations
 - b) Respiratory Protection
Title 29, Part 1910, Section 134 of the Code of Federal Regulations
 - c) Construction Industry
Title 29, Part 1926.1011, of the Code of Federal Regulation
 - d) Access to Employee Exposure and Medical Records
Title 29, Part 1910, Section 2 of the Code of Federal Regulations
 - e) Hazard Communication
Title 29, Part 1910, Section 1200 of the Code of Federal Regulations
 - f) Specifications for Accident Prevention Signs and Tags
Title 29, Part 1910, Section 145 of the Code of Federal Regulations
 - 2) U.S. Environmental Protection Agency (EPA) including, but not limited to:
 - a) Asbestos Abatement Projects Rule
40 CFR Part 762
CPTS 62044, FRL 2843-9
Federal Register, Vol. 50 No. 134, July 12, 1985
P28530-28540
 - b) Regulation for Asbestos
Title 40, Part 61, Subpart A of the Code of Federal Regulations
 - c) National Emission Standard for Asbestos
Title 40, Part 61, Subpart M (Revised Subpart B) of the Code of Federal Regulations
 - 3) State requirements which govern asbestos abatement work and/or hauling and disposal of asbestos waste materials.
 - 4) Contractor shall abide by all local requirements which govern asbestos abatement work or hauling and disposal of asbestos waste materials including the following:
 - a) American National Standards Institute (ANSI)
1430 Broadway
New York, NY 10018
(212) 354-3300
 - b) Fundamentals Governing the Design and Operation of Local Exhaust Systems Publication Z9.2-79
 - c) Practices for Respiratory Protection Publication Z288.2-80
 - d) American Society for Testing and Materials (ASTM)
1916 Race Street
Philadelphia, PA 19103
(215) 299-5400
 - e) Specification for Encapsulants for Friable Asbestos-Containing Building Materials
 - f) Safety and Health Requirements Relating to Occupational Exposure to Asbestos

- K. the Owner's Representative
1. the Owner's Representative is authorized by the Owner to perform the following:
 - a. Have free access to all asbestos work areas.
 - b. To assist in interpretation of procedures.
 - c. To advise on all provisions of the contract documents pertaining to the control of asbestos.
 - d. To stop work if, in the course of performing their monitoring duties, an instance of substantial nonconformance with the contract documents is observed.
 - e. To stop work if a situation presenting a health hazard to workers or the Owner's employees or occupants of the building is observed.
 - f. To act as the Owner's liaison in technical matters involving the asbestos-related work.
 - g. To perform air sampling inside and outside the asbestos work area during the project. The Contractor shall cooperate fully with the Owner's Representative, its agents and employees, and ensure cooperation of its workers during collection of air samples and work area inspections.
 - h. the Owner's Representative role in advising the Owner on environmental health matters does not relieve the Contractor's obligation to comply with all applicable health and safety regulations. Air monitoring results generated by the Owner's Representative shall not be used by the Contractor to represent compliance with regulatory agency requirements for monitoring of worker's exposure to airborne asbestos, nor shall any other activity on the part of the Owner's Representative represent the Contractor's compliance with applicable health and safety regulations.
- L. Pre-Construction Conference
1. An initial progress meeting recognized as "Pre-Construction Conference" shall be held prior to start of any work. Contractor shall meet at project site, with General Superintendent, the Owner, the Owner's Representative, and other entities concerned with asbestos abatement work. Record discussions and agreements and furnish copy to each participant. Provide at least 72 hours advance notice to all participants prior to convening Pre-Construction Conference.
 2. This is an organizational meeting, to review responsibilities and personnel assignments, to locate the containment and decontamination areas; and temporary facilities including power, light, water, etc.
 3. Submit waivers on forms, and executed in a manner acceptable to the Owner. Administrative requirements that must proceed or coincide with Contractor's submittal for final payment shall consist of the following:
 - a. Completion of project closeout requirements.
 - b. Completion of items specified for completion beyond time of Final Completion (regardless of whether special payment application was previously made).
 - c. Assurance, satisfactory to the Owner, that unsettled claims will be settled and that work not actually completed and accepted will be completed without undue delay.
 - d. Transmittal of required project construction records to the Owner.
 - e. Landfill receipts for all asbestos-containing material.
 - f. Proof, satisfactory to the Owner, that taxes, fees and similar obligations of Contractor have been paid.
 - g. Removal of temporary facilities, services, surplus materials, rubbish and similar elements.
 - h. Consent of surety for final payment.
- M. Project Closeout
1. Project closeout is the term used to describe certain collective project requirements that indicate completion of the work to be fulfilled near the end of the contract time. Also, in preparation for final acceptance of the work by the Owner, as well as, final payment to the Contractor and the normal termination of the Contract.
 2. Include supporting documentation for completion as indicated in these contract documents.
 3. Submit a statement on accounting of changes to the Contract Sum.
 4. Advise the Owner of pending insurance change-over requirements.

5. Submit specific warranties, workmanship and maintenance bonds, maintenance agreements, final certifications and similar documents.
6. Obtain and submit releases enabling the Owner's full, unrestricted use of the work area and access to services and utilities. Where required, include occupancy permits, operating certificates and similar releases.
7. Results of the completed inspection will form the initial "punch-list" for final acceptance.
8. A complete record, certified by the testing laboratory, of all personal air monitoring results.
9. Complete the following cleaning operations as outlined in Paragraph "Decontamination Procedures" before requesting the Owner's Representative inspection for certification of Final Completion.
 - a. Remove exposed labels in finished spaces which are not required as permanent labels on materials supplied as part of the work, except for "Asbestos", "Asbestos Free", or Thermal Insulation Labels specified elsewhere.
 - b. Clean transparent materials, affected by the work including mirrors and window/door glass, to a polished condition, removing substances which are noticeably vision-obscuring materials. Replace broken glass and damaged transparent materials.
 - c. Clean exposed hard-surfaced finishes affected by the work, to a dirt-free condition, free of dust, stains, films and similar distracting substances. Except as otherwise indicated, avoid disturbance of natural weathering of exterior surfaces. Restore reflective surfaces to original reflective condition.
 - d. Clean plumbing fixtures affected by the work to a sanitary condition, free of stains including those resulting from water exposure.
 - e. Replace all HVAC filters using materials supplied by the Owner or clean non-replaceable filters after minimum of two days of operation of HVAC equipment.
 - f. Clean light fixtures and lamps, which have been affected by the work so as to function with full efficiency. Replace lamps where inoperable.
 - g. Repair any damage to wall, ceiling and floor surfaces caused by installation and removal of the polyethylene sheeting.

N. Personnel Protection

1. Prior to commencement of work, the workers shall be instructed and be knowledgeable in the areas described in Paragraph "Submittals and Notices" having to do with employees.
2. Worker Protection - shall comply with 29 CFR 1910.134 (Respiratory Protection).
 - a. Because there is no known safe level of exposure to asbestos, it is prudent to reduce worker's exposures to as low a level as possible. Proper respiratory protection is critical in minimizing exposure.
 - b. Workers shall be provided, as a minimum, with personally issued and marked respirators equipped with high efficiency particulate filters approved by NIOSH to be worn in the designated work area and/or whenever a potential exposure to asbestos exists. Sufficient filters shall be provided for replacement as required by the workers or applicable regulations. Disposable respirators shall not be used.
 - c. No worker shall be exposed to levels greater than 0.01 f/cc as determined by the protection factor of the respirator worn and the work area fiber levels.
 - d. Whenever powered purifying respirator protection is used, a sufficient supply of replacement batteries and HEPA filter cartridges shall be provided to the workers.
 - e. Air monitoring required by OSHA is work of the Contractor and not covered in this specification. Contractor shall post, on a daily basis, results of the air monitoring results from the previous shift. A complete record, certified by the testing laboratory, of all personal air monitoring tests and results will be furnished to the Owner and the Owner's Representative prior to Contractor's Request for Final Payment.
 - f. During encapsulation operations or usage of other organic base aerosols (e.g., spray glue, expanding foam), workers shall be provided with combination cartridges consisting of organic vapor and HEPA sections.

5. If any air sample taken outside of the work area exceeds the 0.01 f/cc of air, Contractor shall immediately and automatically stop all work. If this air sample was taken inside the building and outside of critical barriers around the work area, immediately erect new critical barriers to isolate the affected area from the balance of the building. Erect Critical Barriers at the next existing structural isolation of the involved space (e.g., wall, ceiling, and floor). Leave Critical Barriers in place until completion of work and insure that the operation of the negative pressure system in the work area results in a flow of air from the balance of the building into the affected area.
6. If the exit from the clean room of the personnel decontamination unit enters the affected area, establish a temporary decontamination facility consisting of a shower room and changing room. After cleaning and decontamination of the affected area remove the shower room and leave the changing room in place as an air lock.
7. After certification of visual inspection in the work area, remove critical barriers separating the work area from the affected area. Final air samples will be taken within the entire area.
8. The following procedure will be used to resolve any disputes regarding fiber types when a project has been stopped due to excessive airborne fiber counts. "Airborne Fibers" referred to above include all fibers regardless of composition as counted in the Phase Contrast Microscopy (PCM) NIOSH 7400 Method procedures. If work has stopped due to high airborne fiber counts, air samples will be secured in the same area by the Owner's Representative for analysis by electron microscopy. "Airborne fibers" counted in samples analyzed by Scanning or Transmission Electron Microscopy (TEM) shall be only asbestos fibers, but of any diameter and length. Subsequent to analysis by Electron Microscopy the number of airborne fibers shall be determined by multiplying the number of fibers, regardless of composition, counted by the PCM NIOSH 7400 Method procedure by a number equal to asbestos fibers counted divided by all fibers counted in the electron microscopy analysis.
9. If electron microscopy is used to arrive at the basis for determining airborne fiber counts in accordance with the above paragraph, and if the average of airborne asbestos fibers in all samples taken exceeds 0.1 f/cc, or if any one sample exceeds 0.2 f/cc, then the cost of such analysis will be born by the Contractor, at no additional cost to the Owner.
10. the Owner's Representative will secure at least the following air samples to establish a base line before start of work involving large enclosures:

Location Sampled	Number of Samples	Analysis Method	Detection Limit f/cc	Minimum Volume Liters	Rate LPM
Each Work Area	1	PCM	0.01	1,900	2-16
Outside Each Work Area	1-3	PCM	0.01	1,900	2-16

11. Base Line is an action level expressed in f/cc, which is ten percent greater than the largest of the following:
 - a. Average of the samples collected on cellulose ester filters outside each work area.
 - b. Average of the samples collected on cellulose ester filters outside the building.
 - c. 0.01 fibers per cubic centimeter.
12. Daily: From start of work of Paragraph "Temporary Enclosure" through the work of Paragraph "Project Decontamination," the Owner may be taking the following samples on a daily basis. The location of each air sample will be determined by the Owner's Representative.
 - a. Baseline
 - b. Work Area
13. For larger enclosures samples will be collected on 25 mm cassettes with the following filter medial:

PCM: 0.8 micrometer mixed cellulose ester.

Location Sampled	Number of Samples	Analysis Method	Detection Limit f/cc	Minimum Volume Liters	Rate LPM
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02 - Existing Conditions



Each Work Area	2	PCM	0.01	1,900 as required by conditions	2-16
Outside Each Work Area Critical Barrier	1	PCM	0.01	1,900	2-16
Clean Room	1	PCM	0.01	1,900	2-16
Equip Decon	1	PCM	0.01	1,900	2-16

14. Additional samples may be taken at the Owner or the Owner's Representative discretion. If airborne fiber counts exceed allowed limits, additional samples will be taken as necessary to monitor fiber levels.
15. The services of a testing laboratory will be employed by the Owner to perform laboratory analysis of the air samples. Samples will be sent daily so that verbal reports on air samples can be obtained in a timely manner. A complete record, certified by the testing laboratory, of all air monitoring tests and results will be furnished to the Owner's Representative, the Owner and the Contractor.
16. Air samples may be analyzed on site by the Owner's Representative, if they are to be analyzed by the NIOSH 7400 Method.
17. Cellulose ester filters will be analyzed using the PCM NIOSH 7400 Method. Thus analysis will be carried out at a laboratory located off the job site.
18. At the completion of the work in occupied areas and prior to the dismantling of the isolation system, final air clearance will be conducted by the Owner's Representative.
19. Decontamination of the work area will be considered complete when all samples indicate fiber levels are less than 0.01 f/cc of air as analyzed by PCM NIOSH 7400 Method or an average of less than 70 structures per square millimeter of filter area as analyzed by TEM; Level II AHERA Method.
20. The Contractor may conduct its own air monitoring and laboratory testing. If it elects to do this the cost of such air monitoring and laboratory testing shall be included in the Contract Sum.

P. Equipment Removal Procedures

1. Clean all external surfaces of contaminated waste containers and equipment thoroughly by wet sponging or HEPA vacuuming before moving such items into the equipment decontamination enclosure system washroom for final cleaning and removal to uncontaminated areas. Ensure that personnel do not leave the work areas through the equipment decontamination enclosure system.

Q. Disposal Activities

1. It is the responsibility of the Contractor to comply with current federal, state and local regulations concerning the waste handling, transportation, and disposal of asbestos-containing material (ACM) and accompanying solvents or residues.
2. The Contractor will document actual disposal of the waste at the designated landfill by completing Disposal Certificate or submitting proof of landfill receipt.

1.2 PRODUCTS

A. Materials

1. All Contractor's equipment delivered to the site shall be free of asbestos contamination.
2. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.
3. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Materials that become contaminated shall be disposed of in accordance with applicable regulations.

4. Polyethylene flame retardant sheet of 6-mil thickness shall be used unless otherwise specified. Polyethylene sheeting shall be sized to minimize the frequency of joints. Polyethylene sheeting must satisfy the National Fire Prevention Association Standard 701, "Small Scale Fire Test for Flame Resistant Textile and Film."
5. Adhesive tape shall be capable of sealing joints of adjacent sheets of polyethylene and for use in attachment of polyethylene sheet to finished or unfinished surfaces of similar materials and shall be capable of adhering under dry and wet conditions, including use of amended water. Contractor shall use adhesive tape compatible with finished surfaces.
6. Protective devices such as, but not limited to, disposable clothing, respirators, gloves, hard hats, etc. shall be used.
7. Wetting agent shall be a mixture of 50/50 polyoxyethylene ether and polyglycol ester or equivalent commercial product.
8. Encapsulant materials shall be the bridging and penetrating type and conform with the following characteristics:
 - a. Encapsulants shall not be solvent-based or utilize a hydrocarbon in the liquid in which the solid parts of the encapsulant are suspended.
 - b. Encapsulant shall not be flammable.
9. A non-hardening lagging sealer for enclosing and sealing raw exposed edges and surfaces of asbestos-containing materials.
10. Pre-mixed or job mixed insulating plaster manufactured for use on plumbing equipment shall be used when repairing damaged thermal insulation material.
11. Non-woven fibrous glass mat and open weave glass fiber mat cloth for repair of thermal systems insulation.
12. Fire retardant sealant shall prevent fire, smoke, water and toxic fumes from penetrating through sealants. Sealant shall have a flame spread, smoke and fuel contribution of zero, and shall be ASTM and Underwriter's Laboratory (UL) rated for three hours for standard method of fire test for fire stop systems.

B. Tools And Equipment

1. Provide suitable tools for repair and encapsulation of asbestos-containing materials and for removal of asbestos-containing materials that are beyond repair. Wire brushes shall not be used as a means of removing or cleaning asbestos-containing materials from surfaces, if they are used as the surface is being sprayed with water or amended water.
2. Provide sufficient number of HEPA-filtered vacuum cleaners equipped with pick-up adapters, steel floor wands, crevice tools, and carpet tools.
3. Airless sprayers capable of spraying amended water shall be provided in sufficient number to allow continuous uninterrupted work.
4. Asbestos filtration devices shall utilize high efficiency particulate air (HEPA) filtration systems.
5. Transportation equipment, as required, shall be suitable for loading, temporary storage, and unloading of contaminated waste without exposure to persons or property, and shall be quiet in motion if used within the building.

1.3 EXECUTION

A. Safety Procedures For Power And Lighting

1. The use of wet methods for removal, repair, encapsulation or cleaning procedures increases the potential for electrical shock when working around electrical panels, conduit, light fixtures, alarm systems, junction boxes, transformers, etc. In coordination with the Owner, de-energize as much electrical equipment as possible to prevent electrical shock to employees performing the work. The Contractor shall use the following precautions:
 - a. Use non-conductive tools and vacuum attachments.
 - b. Utilize "hot line" covers over energized cables and power lines when possible.

- c. Ensure all electrical equipment in use is properly grounded before the job starts. Check outlets, wiring, extension cords and power pickups.
- d. Avoid stringing wiring across floors. Elevate wiring if possible.
- e. Ensure electrical outlets are tightly sealed and taped to avoid water spray.
- f. Determine operating voltages of equipment and lines before working on or near energized parts.
- g. Energized parts must be insulated or guarded from employee contact and other conductive objects. Extension cords must be three-wire type and connected to a Ground Fault Interrupter (GFI) circuit.
- h. Lock or secure de-energized circuits at panel and post warning signs.
- i. Seal heating vents with two layers of polyethylene sheeting prior to the start of work. The Contractor shall repair any damage caused by Contractor's operations to duct work, grilles, dampers, louvers or HVAC equipment at the completion of the work at Contractor's expense. Coordinate all lock out and or de-energizing with the Owner.

B. Temporary Facilities

1. Use qualified tradesmen for installation of temporary services and facilities. Locate temporary services and facilities where they will serve the entire project adequately and result in minimum interference with the performance of the work and operations of the building. Coordinate all installations and shut downs with building owner.
2. Relocate, modify and extend services and facilities as required during the course of work so as to accommodate the entire work of the project.
3. Provide new or used materials and equipment that are undamaged and in serviceable condition. Provide only materials and equipment that are recognized as being suitable for the intended use, by compliance with appropriate standards.
4. During the erection and/or moving of scaffolding, care must be exercised so that the polyethylene floor covering is not damaged.
5. Clean, as necessary, debris from non-slip surfaces.
6. At the completion of abatement work, clean all construction aids within the work area, wrap in one layer of 6-mil polyethylene sheet and seal before removal from the work area.
7. Temporary water service connections to the Owner's water system shall include back flow protection. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered.
8. Employ heavy-duty abrasion-resistant hoses with a pressure rating 50 percent greater than the maximum pressure of the water distribution system to provide water into each work area and to each Decontamination Unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment.
9. Electrical Services shall comply with applicable NEMA, NECA and UL standards and governing regulations for materials and layout of temporary electric service.
10. Provide a weatherproof, grounded temporary electric power service and distribution system of sufficient size, capacity, and power characteristics to accommodate performance of work during the construction period. Install temporary lighting adequate to provide sufficient illumination for safe work and traffic conditions in every area of work.
11. Provide receptacle outlets equipped with ground fault circuit interrupters, reset button and pilot light, for plug-in connection of power tools and equipment.
12. Use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas of work. All cords shall be elevated off the floor inside the containment area.
13. Temporary wiring in the work area shall be type UL non-metallic sheathed cable located overhead and exposed for surveillance. Do not wire temporary lighting with plain, exposed (insulated) electrical conductors. Provide liquid tight enclosures or boxes for wiring devices.

14. Provide Type "A" fire extinguishers for temporary offices and similar spaces where there is minimal danger of electrical or grease-oil-flammable liquid fires. In other locations provide type "ABC" dry chemical extinguishers, or a combination of several extinguishers of NFPA recommended types for the exposures in each case.
15. Use of the Owner's existing toilet facilities, as indicated, will be permitted, so long as these facilities are properly cleaned and maintained in a condition acceptable to the Owner. At Final Completion, restore these facilities to the condition prevalent at the time of initial use. All provisions of these specifications regarding leaving the work area must be met.
16. When mini-enclosures area being used all of the requirements above will be enforced by the Owner's Representative. The construction and set-up of the mini-enclosures may be done by the Abatement Contractor.

C. Pressure Differential System

1. Before start of work Contractor shall submit design of pressure differential system to the Owner's Representative for review. Do not begin work until system has been approved by the Owner's Representative. Include in the submittal the following:
 - a. Number of pressure differential machines required and the calculations necessary to determine the number of machines.
 - b. Description of projected air-flow within work area and methods required to provide adequate air flow in all portions of the work area.
2. If the enclosure is not a mini-enclosure, the Contractor must supply the required number of asbestos air filtration units to the site in accordance with these specifications. Each unit shall include the following:
 - a. Cabinet constructed of steel or other durable materials able to withstand damage from rough handling and transportation. The width of the cabinet should be less than 30 inches to fit through standard-size doorways. Cabinet shall be factory sealed to prevent asbestos-containing dust from being released during use, transport, or maintenance. Access to and replacement of all air filters shall be from intake end. Unit shall be mounted on casters or wheels.
 - b. Rate capacity of fan according to useable air-moving capacity under actual operating conditions. Use centrifugal-type fan.
 - c. The final filter shall be the HEPA type. The filter media (folded into closely pleated panels) must be completely sealed on all edges with a structurally rigid frame.
 - d. A continuous rubber gasket shall be located between the filter and the filter housing to form a tight seal.
 - e. Provide HEPA Units that are individually tested and certified on site by an independent testing agency to have an efficiency of not less than 99.97 percent when challenged with 0.3 m dioctylphthlaate (DOP) particles when tested in accordance with Military Standard Number 2182 and Army Instruction Manual 136-300-175A. Provide filters that bear a UL586 label to indicate ability to perform under specified conditions.
 - f. Pre-filters, which protect the final filter by removing the larger particles, are required to prolong the operating life of the HEPA filter. Two stages of pre-filtration are required. The first-stage pre-filter shall be a low-efficiency type (e.g., for particles 10 microns and larger). The second-stage (or intermediate) filter shall have a medium efficiency (e.g., effective for particles down to 5 microns). Pre-filters and intermediate filters shall be installed either on or in the intake grid of the unit and held in place with special housings or clamps.
 - g. Each unit shall be equipped with a Magnahelic gauge or manometer to measure the pressure drop across filters and indicate when filters have become loaded and need to be changed. A table indicating the useable air-handling capacity for various static pressure readings on the Magnahelic gauge shall be affixed near the gauge for reference, or the Magnahelic reading indicating at what point the filters should be changed, noting Cubic Feet per Minute (CFM) air delivery at that point. Provide units equipped with an elapsed time meter to show the total accumulated hours of operation.

- e. Use a differential pressure meter or manometer to demonstrate a pressure difference of at least 0.02 inches (as allowed) of water across every barrier separating the work area from the balance of the building or outside. This is not required in the case of a mini enclosure.
14. Start exhaust units before beginning work (before any asbestos-containing material is disturbed). After abatement work has begun, run units continuously to maintain a constant negative pressure until decontamination of the work area is complete. Do not turn off units at the end of the work shift or when abatement operations temporarily stop.
15. Do not shut down pressure differential system during encapsulating procedures, unless authorized by the Owner's Representative in writing. Start abatement work at a location farthest from the exhaust units and proceed toward them. If an electric power failure occurs, immediately stop all abatement work and do not resume until power is restored and exhaust units are operating again.
16. At completion of abatement work, allow exhaust units to run as specified to remove airborne fibers that may have been generated during abatement work and cleanup and to purge the work area with clean makeup air. The units may be required to run for a longer time after decontamination, if dry or only partially wetted asbestos material was encountered during any abatement work. In the case of a mini-enclosure the vacuum may be removed and the entrance sealed following encapsulation until the clearance sample is collected.
17. Prior to final air test, remove pre-filter and wipe out inside lip of negative air machine.
18. When a final inspection and the results of final air tests indicate that the area has been decontaminated, exhaust units may be removed from the work area. Before removal from the work area, remove and properly dispose of pre-filter, and seal Intake to the machine with 6-mil polyethylene to prevent environmental contamination from the filters.

D. Work Area Preparation

1. The work area is the location where asbestos-abatement work occurs. It is a variable of the extent of work of the contract. It may be a portion of a room, a single room, or a complex of rooms. A "work area" is considered contaminated during the work, and must be isolated from the balance of the building, and decontaminated at the completion of the asbestos-control work.
2. Pre-clean fixed objects, walls and floor surfaces within the proposed work areas using HEPA filtered vacuum equipment and wet cleaning methods as appropriate.
3. Seal all openings, supply and exhaust vents, and convectors within ten feet of the work area with 6-mil polyethylene sheeting secured and completely sealed with plastic adhesion tape.
4. Contact fire control agencies to review procedures prior to start of work.
5. Provide flame resistant polyethylene sheeting that conforms to requirements set forth by the National Fire Protection Association Standard 701, Small Scale Fire Test for Flame-resistant Textiles and Films. Provide largest size possible to minimize seams, four- or six- mils thick, frosted or black.
6. Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene and supporting surface.
7. Completely isolate the work area from other parts of the building so as to prevent asbestos-containing dust or debris from passing beyond the isolated area. Should the area beyond the work area(s) become contaminated with asbestos-containing dust or debris as a consequence of the work, clean those areas in accordance with the procedures indicated in Paragraph "Decontamination Procedures." All such required cleaning or decontamination shall be performed at no additional cost to the Owner.
8. Place all tools (i.e., scaffolding, staging) necessary for the work in the area to be isolated prior to erection of plastic sheeting temporary enclosure.
9. Disable ventilation systems or any other system bringing air into or out of the work area. Disable system by disconnecting wires, removing circuit breakers, by lockable switch or other positive means that will prevent accidental premature restarting of equipment.
10. Remove and dispose of all electrical and mechanical items, such as lighting fixtures, clocks, diffusers, registers, escutcheon plates, etc., which cover any part of the surface on which work is to be performed.

11. All general construction items such as cabinets, casework, doors and window trim, moldings, ceilings, trim, etc., which cover the surface of the work as required to prevent interference with the work. To be performed by the Owner: clean, decontaminate and reinstall all such materials, upon completion of all removal work with materials, finishes, and workmanship to match existing installations before start of work.
12. Permit Access to the work area only through the Decontamination Unit. All other means of access shall be closed off and sealed and warning signs displayed on the clean side of the sealed access.
13. Provide Warning Signs at each visual and physical barriers reading as follows in both English and Spanish:

<u>Legend</u>	<u>Notation</u>
KEEP OUT	3" Sans Serif Gothic or Block
BEYOND THIS POINT	1" Sans Serif Gothic or Block
ASBESTOS ABATEMENT WORK	1" Sans Serif Gothic or Block
IN PROGRESS	1" Sans Serif Gothic or Block
BREATHING ASBESTOS DUST MAY BE HAZARDOUS TO YOUR HEALTH	14 Point Gothic

14. Alternate methods of containing the work area may be submitted to the Owner's Representative for approval. Do not proceed with any such method(s) without prior written approval of the Owner's Representative.
15. Individually seal all ventilation openings (supply and exhaust), lighting fixtures, clocks, doorways, windows, convectors and speakers, and other openings into the work area with plastic adhesion tape alone or with polyethylene sheeting at least 4-mil in thickness, taped securely in place with plastic adhesion tape. Maintain seal until all work including Project Decontamination is completed. Take care in sealing off lighting fixtures to avoid melting or burning of sheeting.
16. Provide sheet plastic barriers at least 6-mil in thickness as required to completely seal openings from the work area into adjacent areas. Seal the perimeter of all sheet plastic barriers with plastic adhesion tape or spray cement.
17. Where applicable, construct framing of the containment out of fire treated wood or aluminum studs. Mini-enclosure frames may be constructed of Polyvinyl Chloride (PVC) tubing.
18. Cover all walls in work area extending to the underside of the ceiling grid system with one layer of polyethylene sheeting, at least 6-mil in thickness, mechanically supported and sealed with plastic adhesion tape or spray-glue in the same manner as "Critical Barrier" sheet plastic barriers. Tape all joints with plastic adhesion tape. Contractor shall be responsible for repair of damaged wall finishes.
19. Cover floor with two layers of 6-mil polyethylene sheeting (exclude for floor tile and adhesive).
20. Provide Pressure Differential System per Paragraph "Pressure Differential System."
21. If the enclosure barrier is breached in any manner that could allow the passage of asbestos debris or airborne fibers, then add the affected area to the work area, enclose it as required by this section of the specification and decontaminate it as described in Paragraph "Decontamination Procedures."
22. Establishing a Mini-Containment area:
 - a. Establish work area so that unauthorized entry is prevented; Construct a two-compartment fire treated wood frame around work area; install one layer 6-mil polyethylene sheeting to structural members and two layers 6 mil polyethylene sheeting to the floor. Exception: no floor required if mini-containment is being constructed to perform a floor tile activity. Seal all edges to wall, ceiling, and floor surfaces with duct tape. Install viewing inspection windows, where feasible.
 - b. Seal all penetrations with duct tape such as pipes, electrical conduit, or ducts contained within the mini-containment.

- c. Install triple 6-mil polyethylene flaps at both doorways. Place portable sprayer with clean water, disposable towels, and pre-labeled disposal bag in air lock.
- d. Install appropriate signs on outside of mini-containment area.
- e. Install HEPA vacuum; extend hose into mini-containment area for general vacuuming, negative air, and cleaning of disposal suit.
- f. Accumulate all loose materials for disposal. Place in approved container. Apply appropriate labels. Adequately wet clean all wall, floor, tool and equipment surfaces.
- g. Abatement worker must wear two disposable suits. Remove outer suit in work area and place in a plastic bag. Enter air lock.
- h. In air lock, wet wipe respirator and wash hands with clean water. Remove respirator and place in a clean plastic bag. Proceed to remote shower unit where inner suit may be removed.

E. Worker Protection

- 1. This section describes the equipment and procedures required for protecting workers against asbestos contamination and other work place hazards except for respiratory protection.
- 2. Respiratory Protection is specified in Paragraph "Respiratory Protection."
- 3. Train in accordance with EPA's Model Accreditation Plan, 40 CFR 763 - Asbestos, all workers in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. Include but do not limit the topics covered in the course to the following:
 - a. Methods of recognizing asbestos.
 - b. Health effects associated with asbestos.
 - c. Relationship between smoking and asbestos in producing lung cancer.
 - d. Nature of operations that could result in exposure to asbestos.
- 4. Importance of and instruction in the use of necessary protective controls, practices and procedures to minimize exposure including:

Engineering controls
 Work practices
 Respirators
 Housekeeping procedures
 Hygiene facilities
 Protective clothing
 Decontamination procedures
 Emergency procedures
 Waste disposal procedures
 Appropriate work practices for the work
 Requirements of medical surveillance program
 Review of OSHA 29 CFR 1926.1101(k)(9)(viii)(G) - Asbestos
 Pressure differential systems
 Work practices including hands on or on job training
 Personal decontamination procedures
 Air monitoring, personal and area

- 5. Provide medical examinations for all workers who may encounter an airborne fiber level of 0.1 f/cc or greater for an 8 hour time weighted average. In the absence of specific airborne fiber data, provide medical examination for all workers who will enter the work area for any reason. Examination shall, at minimum, meet OSHA requirements as set forth in 29 CFR 1926.1101(k)(9)(viii)(G) - Asbestos. In addition, provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.
- 6. Before start of work Contractor shall submit the following to the Owner's Representative for review. Do not start work until receipt of the Owner's Representative.

- a. An original signed copy of the Certificate of Worker's Acknowledgement found at the end of this specification, for each worker who is to be at the job site or enter the work area.
 - b. Courses outline or name of institution providing the worker training course.
 - c. Report from medical examination conducted within last 12 months as part of compliance with OSHA medical surveillance requirements for each worker who is to enter the work area.
7. Provide disposable full-body coveralls and disposable head covers, and require that they be worn by all workers in the work area. Provide a sufficient number for all required changes, for all workers in the work area.
 8. Provide work boots with non-skid soles, and where required by OSHA, foot protectives, for all workers. Provide boots at no cost to workers. Paint uppers of all boots red with water proof enamel. Do not allow boots to be removed from the work area for any reason, after being contaminated with asbestos-containing material. Dispose of boots as asbestos contaminated waste at the end of the work.
 9. Provide head protectives (hard hats) as required by OSHA for all workers, and provide four spares for use by the Owner's Representative, and the Owner. Label hats with same warning labels as used on disposal bags. Require hard hats to be worn at all times that work is in progress that may potentially cause head injury. Provide hard hats with plastic strap type suspension. Require hats to remain in the work area throughout the work. Thoroughly clean, decontaminate and bag hats before removing them from work area at the end of the work.
 10. Provide eye protectives (goggles) as required by OSHA for all workers involved in scraping, spraying, or any other activity which may potentially cause eye injury.
 11. Provide work gloves to all workers and require that they be worn at all times in the work area. Do not remove gloves from work area. Dispose of gloves as asbestos contaminated waste at the end of the work.
 12. Respirators, disposable coveralls, head covers, and footwear covers shall be provided by the contractor for the Owner, the Owner's Representative, and other authorized representatives who may inspect the job site.
 13. Provide worker protection as required by the most stringent OSHA and/or EPA standards applicable to the work. The following procedures are minimums to be adhered to regardless of fiber count in the work area.
 14. Each time work is entered, remove all street clothes in the changing room of the Personnel Decontamination Unit and put on new disposable coverall, new head cover, and a clean respirator. Proceed through shower room to equipment room and put on work boots.
 15. In the event a mini-enclosure is used refer to Paragraph "Work Area Preparation" for personal decontamination procedures.

F. Respiratory Protection

1. Instruct and train each worker involved in asbestos abatement or maintenance and repair of friable asbestos-containing materials in proper respiratory use and require that each worker always wear a respirator, properly fitted on the face in the work area from the start of any operation which may cause airborne asbestos fibers until the work area is completely decontaminated. Use respiratory protection appropriate for the fiber level encountered in the work place or as required for other toxic or oxygen-deficient situations encountered.
2. Except to the extent that more stringent requirements are written directly into the Contract Documents, the following regulations and standards have the same force and effect (and are made a part of the Contract Documents by reference) as if copied directly into the Contract Documents, or as if published copies were bound herewith. Where there is a conflict in requirements set forth in these regulations and standards meet the more stringent requirement.
 - a. OSHA - U.S. Department of Labor Occupational Safety and Health Administration, Safety and Health Standards 29 CFR 1910, Section 1001 and Section 1910.134.29 CFR 1926.
 - b. ANSI - American National Standard Practices for Respiratory Protection. ANSI Z88.2-1980.
 - c. NIOSH - National Institute for Occupational Safety and Health.

d. MSHA - Mine Safety and Health Administration.

G. Type Of Respiratory Protection Required

1. Provide Respiratory Protection as indicated in paragraph below. Where paragraph below does not apply, determine the proper level of protection by dividing the expected or actual airborne fiber count in the work area by the "protection factors" given below. The level of respiratory protection which supplies an airborne fiber level inside the respirator, at the breathing zone of the wearer, at or below 0.01 fibers/cubic centimeter is the minimum level of protection allowed.
2. Eight-hour Time Weighted Average (TWA) of asbestos fibers to which any worker may be exposed shall not exceed 0.1 fibers/cubic centimeter.
3. For purposes of this section fibers are defined as all fibers regardless of composition as counted in the OSHA Reference Method (ORM), NIOSH P&CAM 239 or 7400 procedure, or asbestos fibers of any size as counted using either a scanning or transmission electron microscope.
4. Require that respiratory protection be used at all times that there is any possibility of disturbance of asbestos-containing materials whether intentional or accidental.
5. Require that a respirator be worn by anyone in a work area at all times, regardless of activity, during a period that starts with any operation which could cause airborne fibers until the area has been cleared for re-occupancy.

H. Respiratory Protection Factor

<u>Respirator Type</u>	<u>Protection Factor</u>
Air purifying: Negative pressure respirator High efficiency filter Half facepiece	10
Air purifying: Negative pressure respirator High efficiency filter Full facepiece	50
Powered-air purifying (PAPR): Positive pressure respirator High efficiency filter Half or Full facepiece	100
Type C supplied air: Positive pressure respirator continuous-flow Half or full facepiece	100
Type C supplied air: Positive pressure respirator pressure demand Full facepiece	1000
Type C supplied air: Positive pressure respirator pressure demand Full facepiece Equipped with an auxiliary positive pressure Self-contained breathing apparatus (SCBA)	over 1000
Self-contained breathing apparatus (SCBA): Positive Pressure respirator	over 1000

Pressure demand
Full facepiece

- I. Air Purifying Respirator
 1. Provide half face or full face type respirators. Equip full-face respirators with a nose cup or other anti-fogging device as would be appropriate for use in air temperatures less than 32 degrees Fahrenheit.
 2. Provide, at a minimum, HEPA type filters labeled with NIOSH and MSHA certification for "Radionuclides, Radon Daughters, Dust, Fumes, Mists including Asbestos-Containing Dusts and Mists" and color coded in accordance with ANSI Z228.2 (1980). In addition, a chemical cartridge section may be added, if required, for solvents, etc., in use. In this case, provide cartridges that have each section of the combination canister labeled with the appropriate color code and NIOSH/MSHA Certification.
 3. Supply with a sufficient quantity of respirator filters approved for asbestos, so that workers can change filters during the work day. Require that respirators be wet-rinsed, and filters discarded, each time a worker leaves the work area. Require that new filters be installed each time a worker re-enters the work area. Store respirators and filters at the job site in the changing room and protect totally from exposure to asbestos prior to their use. Do not use single use, disposable or quarterface respirators.
- J. Powered Air Purifying Respirator (PAPR)
 1. Provide full-facepiece type respirators. Provide nose-cups for full-facepiece respirators. Provide, at a minimum, HEPA type cartridges approved by NIOSH/MSHA and certified for use in atmospheres containing asbestos dusts.
 2. Provide, at a minimum, one extra battery pack for each respirator so that one can be charging while one is in use.
 3. Provide non-cloth belts capable of being decontaminated in shower.
 4. Supply with a sufficient quantity of high efficiency respirator filters approved for asbestos so that workers can change filters at any time that flow through the face piece decreases to the level at which the manufacturer recommends filter replacement. Require that regardless of flow, filter cartridges be replaced after 40 hours of use. Require that HEPA elements in filter cartridges be protected from wetting during showering. Require entire exterior housing of respirator including blower unit, filter cartridges, hoses, battery pack, face mask, belt, and cords to be washed each time a worker leaves the work area. Caution should be used to avoid shorting battery pack during washing.
- K. Required Respiratory Protection
 1. Regardless of airborne fiber levels, require the following minimum level of respiratory protection:
 - a. Half-face air purifying respirators may be used during set-up of the containment and removal of the material so long as fiber counts inside the respirator do not exceed .01 f/cc fibers per cubic centimeter.
- L. Decontamination Units -Three-Stage
 1. Provide a Personnel Decontamination Unit consisting of a serial arrangement of rooms or spaces, Changing Room, Shower Room, Equipment Room adjacent to each full containment area.
 2. Require all persons without exception to pass through this decontamination unit for entry into and exiting from the work area for any purpose. Do not remove equipment or materials through Personnel Decontamination Unit.
 3. Changing (Clean) Room:
 - a. Provide a room that is physically and visually separated from the rest of the building for the purpose of changing into protective clothing.
 - b. Locate so that access to work area from changing room is through shower room.

- c. Separate changing room from the building by a double-sheeted polyethylene flapped doorway.
- d. Provide sub-panel at changing room to accommodate all removal equipment. Power sub-panel directly from a building electrical panel. Connect all electrical branch circuits in decontamination unit and particularly any pumps in shower room to a ground-fault circuit protection device.
- 4. Shower Room:
 - a. Provide a completely water tight operational shower to be used for transit by cleanly dressed workers heading for the work area from the changing room, or for showering by workers headed out of the work area after undressing in the equipment room.
 - b. Construct room by providing a shower pan and two shower walls in a configuration that will cause water running down walls to drip into pan. Install a freely draining wood floor in shower pan at elevation of top of pan.
 - c. Separate this room from rest of building, drying room and airlock with airtight walls fabricated of 6-mil polyethylene.
 - d. Provide splash proof entrances to Drying Room and Airlock.
- 5. Equipment Room (contaminated area):
 - a. Require work equipment, footwear and additional contaminated work clothing to be left here. This is a change and transit area for workers. Separate this room from the work area by a 6-mil polyethylene flap doorway.
 - b. Separate this room from the rest of the building, the shower room and work area with air tight walls fabricated of 6-mil polyethylene.
- 6. Clean Room: Provide Clean Room to isolate the holding room from the building exterior.
- 7. Load-out Area:
 - a. The load-out area is the transfer area from the building to a truck or dumpster.
 - b. Wet wipe bags before they are passed through the equipment decon-chamber.
 - c. When cleaning is complete pass items into holding room. Close all doorways except the doorway between the holding room and the Clean Room.
 - d. Workers from the area outside the containment area enter holding area and remove decontaminated equipment and/or containers for disposal.
 - e. Require these workers to wear full protective clothing and appropriate respiratory protection.
 - f. At no time is a worker from an uncontaminated area to enter the enclosure when a removal worker is inside.
 - g. Post an approximately 20 inch x 14 inch manufactured caution sign at each entrance to the work area displaying the following legend with letter sizes and styles of a visibility required by OSHA 29 CFR 1926.1101(k)(9)(viii)(J) - Asbestos.

LEGEND
DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED
IN THIS AREA

- h. Provide spacing between respective lines at least equal to the height of the respective upper line.
- i. Additional Signage: Shall also be posted in accordance with OSHA 29 CFR 1926.1101(k)(9)(viii)(J) - Asbestos

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING
ARE REQUIRED IN THIS AREA
DANGER
ASBESTOS
CANCER AND LUNG HAZARD
KEEP OUT

- j. Post an approximately 10 inch by 14 inch manufactured sign at each entrance to each work area displaying the following legend with letter sizes and styles of a visibility at least equal to the following:

<u>LEGEND</u>	<u>NOTATION</u>
No Food, Beverages or Tobacco Permitted	3/4 inch Block
All Persons Shall Don Protective Clothing (Coverings) Before Entering the Work Area	3/4 inch Block
All Persons Shall Shower Immediately After Leaving Work Area and Before Entering the Changing Area	3/4 inch Block

M. Decontamination Procedures

1. Contractor shall require all workers and visitors to adhere to the following personal decontamination procedures whenever they leave the work area:
 - a. Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the work area.
 - b. When exiting area, remove disposable coveralls, disposable head covers, and disposable footwear covers or boots in the Equipment Room.
 - c. Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 - 1) Thoroughly wet body including hair and face. If using a PAPR, hold blower unit above head to keep canisters dry.
 - 2) With respirator still in place thoroughly wash body, hair, respirator face piece, and all parts of the respirator except the blower unit and battery pack on a PAPR. Pay particular attention to seal between face and respirator and under straps.
 - 3) Take a deep breath, hold it and/or exhale slowly, completely wet hair, face, and respirator. While still holding breath, remove respirator and hold it away from face before starting to breathe.
 - 4) Carefully wash face-piece of respirator inside and out.
 - d. If using PAPR, shut down in the following sequence, first cap inlets to filter cartridges, then turn off blower unit (this sequence will help keep debris which has collected on the inlet side of filter from dislodging and contaminating the outside of the unit). Thoroughly wash blower unit and hoses. Carefully wash battery pack with wet rag. Be extremely cautious of getting water in battery pack as this will short out and destroy battery.
 - 1) Shower completely with soap and water.
 - 2) Rinse thoroughly.
 - 3) Rinse shower room walls and floor prior to exit.
 - 4) Proceed from shower to changing room and change into street clothes or into new disposable work items.

- e. Require that all workers use the following decontamination procedure as a minimum requirement whenever leaving the work area with a half or full face cartridge type respirator:
 - 1) When exiting area, remove disposable coveralls, disposable headcovers, and disposable footwear covers or boots in the equipment room.
 - 2) Still wearing respirators, proceed to showers. Showering is mandatory. Care must be taken to follow reasonable procedures in removing the respirator and filters to avoid asbestos fibers while showering. The following procedure is required as a minimum:
 - 3) Thoroughly wet body from neck down.
 - 4) Wet hair as thoroughly as possible without wetting the respirator filter if using an air purifying type respirator.
 - 5) Take a deep breath, hold it and/or exhale slowly, complete wetting of hair, thoroughly wetting face, respirator and filter (air purifying respirator). While still holding breath, remove respirator and hold it away from face before starting to breath.
 - 6) Dispose of wet filters from air purifying respirator.
 - 7) Carefully wash facepiece of respirator inside and out.
 - 8) Shower completely with soap and water.
 - 9) Rinse thoroughly.
 - 10) Rinse shower room walls and floor prior to exit.
 - 11) Proceed from shower to changing room and change into street clothes or into new disposable work items.

N. Project Decontamination

1. If the asbestos abatement work is on damaged or friable materials, then the building space is deemed contaminated before start of the work and in need of decontamination. In this case, the procedure includes two cleanings of the primary barrier plastic prior to its removal and two cleanings of the room surfaces to remove any new or existing contamination.
2. Work of this section includes the decontamination of air in the work area which has been, or may have been contaminated by the elevated airborne asbestos fiber levels generated during abatement activities, or which may previously have had elevated fiber levels due to friable materials in the space.
3. Work of this section also includes the cleaning, decontamination, and removal of temporary facilities installed prior to abatement work and decontamination of all surfaces (ceiling, walls, floor) of the work area, and all furniture or equipment in the work area.
4. First Cleaning
 - a. Carry out a first cleaning of all surfaces of the work area including items of remaining sheeting, tools, scaffolding and/or staging by use of damp-cleaning and mopping, and/or a HEPA filtered vacuum. (Note: A HEPA vacuum will fail if used with wet material). Do not perform dry dusting or dry sweeping. Use each surface of a cleaning cloth one time only and then dispose as contaminated waste. Continue this cleaning until there is no visible debris from removed materials on plastic sheeting or other surfaces. Upon authorization of the Owner's Representative proceed with encapsulation of substrate.
 - b. Perform encapsulation of substrate where required at this time. Maintain pressure differential system in operation during encapsulation work. Allow encapsulant to dry before proceeding with removal of Secondary layer of plastic.
5. Second Cleaning
 - a. Upon authorization of the Owner's Representative, remove all Primary Barrier sheeting and Material Decontamination Unit, if there is one, leaving only the following:
 - 1) Critical Barrier which forms the sole barrier between the work area and other portions of the building or outside.
 - 2) Critical Barrier Sheeting over lighting fixtures and clocks, ventilation openings, doorways, convectors, speakers and other openings.

- 3) Personnel Decontamination Unit.
 - 4) Pressure Differential System in continuous operation.
 - b. Remove all filters in Air Handling System(s) and dispose of as asbestos-containing waste.
 6. Final Cleaning: Carry out a final cleaning of all surfaces in the work in the same manner as the first cleaning immediately after removal of primary plastic. This cleaning is now being applied to existing room surfaces. Take care to avoid water marks or other damage to surfaces.
 7. Visual Inspection: Perform a complete visual inspection with the Owner's Representative of the entire work area including decontamination unit, all plastic sheeting, seals over ventilation openings, doorways, windows, and other openings; look for debris from any sources, residue on surfaces, dust or other matter. If any such debris, residue, dust or other matter is found repeat cleaning and continue decontamination procedure from that point. When the area is visually clean, complete the certification at the end of this section.
 8. Final Air Sampling
 - a. After the work area is found to be visually clean, air samples will be taken and analyzed in accordance with the procedures set forth in Paragraph "Powered Air Purifying Respirator (PAPR).
 - b. If Release Criteria are not met, repeat cleaning and continue decontamination procedure from that point.
 - c. If Release Criteria is met, remove the interior of the decontamination unit leaving in place only the Critical Barriers separating the work area from the rest of the building and the operating negative pressure system.
 - d. Any small quantities of residual material found upon removal of the plastic sheeting shall be removed with a HEPA filtered vacuum cleaner and local area protection. If significant quantities, as determined by the Owner's Representative, are found then the entire area affected shall be decontaminated as specified herein for the cleaning.
- O. Work Area Clearance
 1. Air Monitoring
 - a. Visual Inspection is required as a prerequisite of air testing.
 - b. To determine if the elevated airborne asbestos structure concentration during abatement operations have been reduced to the specified level, the Owner's Representative will secure samples and analyze them according to the following procedures.
 2. Aggressive Sampling
 - a. All air samples will be taken using aggressive sampling techniques as follows. (There are no standards available for flow rate of leaf blowers or large fans. However, this information is not critical to the success of the procedure).
 - b. Before sampling pumps are started, the exhaust from forced-air equipment (leaf blower with at least 1 horsepower electric motor) will be swept against all walls, ceilings, floors, ledges and other surfaces in the room. This procedure will be continued for five minutes per 10,000 cubic feet of room volume.
 - c. Air samples will be collected in areas subject to normal air circulation away from room corners, obstructed locations, and sites near windows, doors or vents.
 3. Schedule of Air Samples
 - a. General: The number and volume of air samples taken and analytical methods used by the Owner's Representative will be in accordance with the following schedule. Sample volumes given may vary depending upon the analytical instruments used. In each homogeneous work area after completion of all cleaning work, samples will be taken and analyzed by either PCM or TEM analysis.
 - b. Transmission Electron Microscopy (TEM) Samples:
 - 1) In each homogeneous work area after completion of all cleaning work, samples will be taken and analyzed by either PCM or TEM analysis as follows:
 - 2) Samples will be collected on 25 mm cassettes with filter media: TEM - 0.45 micrometer mixed cellulose ester or 0.40 micrometer polycarbonate, with 5.0 micron mixed cellulose ester backing filter.

Location Sampled	Number of Samples	Detection Limit (f/cc)	Minimum Volume (Liters)	Rate LPM
Each Work Area	5	0.005	1,300	2-10

- 3) TEM Analysis will be performed using the analysis method set forth in the AHERA Regulation 40 CFR Part 763 Appendix A.
- 4) Asbestos Structures referred to in this Section include asbestos fibers, bundles, clusters, or matrices, as defined by method of analysis.
- 5) Decontamination of the work site is complete when all the sample results are below 0.01 fibers per cubic centimeters (f/cc) of air or 70 structures per square millimeter.
- c. Phase Contrast Microscopy (PCM) Samples:
 - 1) In each homogeneous work area after completion of all cleaning work, samples may be taken and analyzed as follows:
 - 2) Samples will be analyzed by PCM for clearance in areas where ceiling tile and/or pipe insulation are removed
 - 3) Samples will be collected on 25 mm cassettes with filter media: PCM - 0.8 micrometer mixed cellulose ester.

Location Sampled	Number of Samples	Detection Limit (s/cc)	Minimum Volume (Liters)	Rate LPM
Each Work Area	1-5	0.01	2,400	2-10

- 4) PCM Analysis: Fibers on each filter will be measured using the NIOSH 7400 Method entitled "Fibers" published in the NIOSH Manual of Analytical Methods, 3rd Edition, Second Supplement, August 1987.
- 5) Fibers: Referred to in this section include fibers regardless of composition as counted by the phase contrast microscopy method used
- 6) Decontamination of the work site is complete when all the sample results are below 0.01 fibers per cubic centimeters (f/cc) of air or 70 structures per square millimeter.
- 4. Failure of Clearance Sampling: Should results from analysis of final clearance air samples not meet the specified criteria, Contractor will be responsible for the payment of all costs, including Consultant's time for subsequent clearance air sampling. The costs associated with subsequent re-sampling for final clearance shall be deducted from the Contractor's final payment of the contract amount.

P. Removal Of Pipe Insulation

- 1. The work of this section applied to the removal of asbestos-containing Pipe Insulation.
 - a. Place one layer of 6-mil fire retardant polyethylene sheeting directly below the work. The sheet shall be of sufficient size to completely wrap the pipe once it has been removed.
 - b. Thoroughly wet the ends of the pipe with amended water and scrape off a minimum of 6 inches of asbestos wrap from both ends of the pipe. Immediately place the wetted material into pre-labeled asbestos disposal bag(s).
 - c. Detach the pipe at each scraped end and place the pipe onto one sheet of 6-mil fire retardant polyethylene sheeting. Wrap the pipe with the 6-mil fire retardant polyethylene sheeting. Contractor shall wrap the pipe with a second sheet of 6-mil, fire retardant polyethylene sheeting and label as asbestos-containing material. Dispose of the bag(s) and duct in accordance with the Paragraph "Handling and Disposal of Asbestos Contaminated Waste" of this specification.
 - d. Upon clearance from the Owner's Representative, Contractor shall remove the 6-trail, fire retardant polyethylene sheeting from the openings.

Q. Glove Bag Removal

1. The work of this section applies to full containment or glovebag removal.
2. Isolate the area in accordance with Paragraph "Temporary Facilities."
3. Construct a decontamination unit as described in Paragraph "Decontamination Units" and attach to the work area.
4. Set up pressure differential isolation and ventilation of the work area in accordance to Paragraph "Pressure Differential System."
 - a. Upon approval of the enclosure by the Owner's Representative, Contractor may proceed to remove the material using the following method.
 - b. Thoroughly wet to satisfaction of the Owner's Representative, asbestos-containing insulation to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet the substrate without causing excess dripping. Allow time for removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions. If insulation is covered with canvas, Contractor will wet the exterior covering and slice it with utility knife while saturating the material.
 - c. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels using commercially available "foggers."
 - d. Remove saturated asbestos-containing material in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into disposal bags. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside and move to wash down station adjacent to material decontamination unit.
 - e. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing.
 - f. Contractor must always clean area of visible asbestos debris prior to end of shift.
5. These procedures shall be followed to remove pipe insulation elbows:
 - a. Install critical barriers to isolate the work site. Install 2 or 3 Stage Decontamination Units.
 - b. HEPA vacuum the work site.
 - c. Provide negative air machine in addition to those required, in the vicinity of the work. Arrange so that exhaust is into the work area, oriented in a direction away from the work. Extend a 2-inch diameter flexible non-collapsing duct from the intake end to a point no more than 4'-0" from any scraping or brushing activity.
 - d. Locate intake of duct so that airflow is horizontally and slightly downward into intake. Replace primary filter on negative air machine at an interval of no greater than 30 minutes. Allow no more than one scraping or brushing activity per negative air machine.
 - e. Check pipe where the work will be performed. Wrap damaged (broken lagging, hanging, etc.), pipe in 6 mil plastic and "candy-stripe" with duct tape. Place one layer of duct tape around undamaged pipe at each end where the glovebag will be attached.
 - f. Place necessary tools into pouch located inside glovebag. This will usually include: bone saw, utility knife, rags, scrub brush, wire cutters, tin snips and pre-wetted cloth.
 - g. Place one strip of plastic adhesion tape along the edge of the open top slit of glove bag for reinforcement.
 - h. Place the glove bag around section of pipe to be worked on and staple top together through reinforcing tape. Next, tape the ends of glovebag to pipe itself, where previously covered with plastic or tape.
 - i. Use smoke tube and aspirator bulb to test seal. Place tube into water sleeve (two-inch opening to glovebag) squeezing bulb and filling bag with visible smoke. Remove smoke tube and twist water sleeve closed. While holding the water sleeve tightly, gently squeeze glovebag and by using a flashlight, look for smoke leaking out, (especially at the top and ends of the glovebag). If leaks are found, tape closed using plastic adhesion tape and re-test.
 - j. Insert wand from garden sprayer through water sleeve. Plastic adhesion tape water sleeve tightly around the wand to prevent leakage.

- k. One person places its hands into the long-sleeved gloves while the second person directs garden sprayer at the work.
 - l. Use bone saw, if required, to cut insulation at each end of the section to be removed. A bone saw is a serrated heavy gauge wire with ring-type handles at each end. Throughout this process, spray amended water or removal encapsulant on the cutting area to keep dust to a minimum.
 - m. Remove insulation using putty knives or other tools. Place pieces in bottom of bag without dropping.
 - n. Rinse all tools with water inside the bag and place back into pouch.
 - o. Using scrub brush, rags and water, scrub and wipe down the exposed pipe. (Inexpensive horse rub-down mittens work well for this).
 - p. Remove water wand from water sleeve and attach the small nozzle from HEPA-filtered vacuum. Turn on the vacuum only briefly to collapse the bag.
 - q. Remove the vacuum nozzle, twist water sleeve closed and seal with plastic adhesion tape.
- R. Handling And Disposal Of Asbestos-Containing Waste
- 1. All waste and asbestos contaminated waste shall be double bagged in pre-labeled 6-mil airtight puncture resistant bags. Labeling shall be in accordance with OSHA and EPA requirements.
 - a. Bags of asbestos-containing waste shall be sealed with tape in the work area. Asbestos waste shall not be allowed to dry out prior to sealing bags. While in the work area, bags shall be decontaminated of any bulk debris by wet wiping. Bags shall be pre-labeled in accordance with OSHA and EPA.
 - b. The Contractor shall ensure that the sealed bags are transported to the waste disposal site.
 - 2. The Contractor shall establish a manifest system to enable the Owner to report the quantity of asbestos waste being deposited at the landfill. Contractor shall report the quantity of waste in pounds or tons as appropriate. The Contractor must be able to demonstrate custody over all asbestos waste from the time it is removed from the work area until it is deposited at the land fill.
 - a. Copies of the manifest and any receipts generated during the handling and disposal process shall be provided to the Owner's Representative and the Owner.
 - b. Final manifest and documents must be provided to the Owner's Representative and the Owner within two weeks of the removal of the asbestos materials from the site by the waste hauler.
- S. Encapsulation Of Asbestos-Containing Materials
- 1. General provisions of Contract, including General and Supplementary Conditions and Division 01, apply to work of this section.
 - a. The work includes the sealing of all piping or vessels from which asbestos-containing insulation has been removed with one coat of a lock down encapsulant.
 - b. Where repair work is being performed, the end will be sealed with a minimum of one coat of bridging encapsulant.
 - 2. Submittals
 - a. Product Data: Submit manufacturer's technical information including label analysis and application instructions for each material proposed for use.
 - b. Installation Instructions: Submit manufacturer's installation instructions with specific project requirements noted.
 - c. Performance Warrantee: Submit manufacturer's performance guarantee.
 - d. Certification: Submit written approval of entity installing the encapsulant from encapsulant manufacturer.
 - e. Material Safety Data Sheet: Submit the Material Safety Data Sheet, or equivalent, in accordance with the OSHA Hazard Communication Standard (29 CFR 1910.1200) for each surfactant and encapsulating material proposed for use on the work. Include a separate attachment for each sheet indicating the specific worker protective equipment proposed for use with the material indicated.

3. Deliver materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information:
 - a. Name or title of material
 - b. Manufacturer's stock number and date of manufacture
 - c. Manufacturer's name
 - d. Thinning Instructions
 - e. Application Instructions
4. Deliver materials together with a copy of the OSHA Material Safety Data Sheet for the material.
5. Job Conditions
 - a. Apply encapsulating materials only when environmental conditions in the work area are as required by the manufacturer's instructions.
6. Quality Assurance
 - a. Installation of Spray-on Encapsulation Materials: Install spray-on materials by a firm and personnel approved by the manufacturer of the primary materials.
 - b. Testing: Test material to be encapsulated using methods set forth in ASTM E1494 "Standard Practice for Encapsulants Spray-or-Trowel-Applied for Friable Asbestos-Containing Building Materials."
 - c. Performance Warranty: Submit written Performance Warranty, executed by the manufacturer and co-signed by the Contractor, agreeing to repair/replace spray-on work which has cracked, fallen from substrate, or otherwise deteriorated to a condition where it would not perform effectively for its intended purposes due substantially to defective materials or workmanship and not due to abuse by occupants, improper maintenance, non-foreseeable ambient exposures or other causes beyond anticipated conditions and manufacturer's/contractor's control.
 - d. Compatibility: Selection and use of encapsulant shall be compatible with replacement materials. Submit manufacturer's data indicating compatibility with replacement materials.
7. Product Selection
 - a. Encapsulants: Provide penetrating or bridging type encapsulants specifically designed for application to asbestos-containing material.
 - b. Standards: Product shall be rated as acceptable for use intended when field tested in accordance with ASTM E1494 "Standard Practice for Encapsulants Spray-or-Trowel-Applied for Friable Asbestos-Containing Building Materials."
 - c. Fire Safety: Use only materials that have a flame spread index of less than 25, when dry, when tested in accordance with ASTM E84.
8. Manufacturers
 - a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products, which may be incorporated in the work, include, but are not limited to the following:
 - 1) Penetrating Encapsulants: As currently accepted by the EPA. Refer to most recent EPA approval list.
 - 2) Bridging Encapsulants: As currently accepted by the EPA. Refer to most recent EPA approval list.
9. General
 - a. Prior to applying any encapsulating material, ensure that application of the sealer will not cause the base material to fail and allow the sealed material to fall of its own weight or separate from the substrate. Should Contractor doubt the ability of the installation to support the sealant, request direction from the Owner's Representative before proceeding with the encapsulating work.
 - b. Do Not Commence Application of encapsulating materials until all removal work within the work area has been completed.
10. Worker Protection
 - a. Before beginning work with any material for which a Material Safety Data Sheet has been submitted, provide workers with the required protective equipment. Require that appropriate protective equipment be used at all times.

- b. In addition to protective breathing equipment required by OSHA requirements or by this specification, use painting pre-filters on respirators to protect the dust filters when organic solvent based encapsulants are used.
11. Substrate
- a. Apply lock down encapsulant to all substrate after all asbestos-containing materials have been removed. Apply in strict accordance with the manufacturer's printed instructions for use of the encapsulation as an asbestos coating. Any deviations from such printed instructions shall be approved by the Owner's Representative in writing prior to commencing work.
 - b. Apply encapsulant with an airless spray gun with air pressure and nozzle orifice as recommended by the encapsulant manufacturer.
- T. Removal Of Floor Tile
- 1. This section applies to the removal of floor tile.
 - a. Prior to start of work, wet wipe all surfaces including floor tile to remove any visible dust.
 - b. Isolate the room by sealing hallway or doors and installing critical barriers on all ducting, windows and other penetrations of the room, in the specified area. Install a splash guard a minimum of 4 feet high on the walls of the room with one layer of 6-mil fire retardant poly.
 - c. Install a two-stage decontamination configuration contiguous (under certain conditions may be remote) with the work in accordance with Paragraph "Decontamination Units."
 - d. Using water or amended water in a Hudson-type sprayer or garden sprayer, lightly mist the area where the material is to be removed. This may take several passes with the hose of the sprayer. Allow time for the water to soak into the material.
 - e. Immediately place individual tiles in proper asbestos disposal bags. Vacuum collapse the bag, twist the neck of the bag, tape with duct tape, fold the twisted portion over onto itself and tape again. Wipe the outside of the bag with clean damp cloths and place the bag into a second pre-labeled disposal bag. Tape shut the second bag.
- U. Removal Of Fireproofing
- 1. The work of this section applies to the removal of all asbestos containing fireproofing including all over-spray that may be located on concrete block, columns, metal deck, beams, fixtures conduit and ducting.
 - a. Isolate the floor per Paragraph "Temporary Enclosure."
 - b. Construct a decontamination unit as described in Paragraph "Decontamination Units" and attach to the work area.
 - c. Set up pressure differential isolation and ventilation of the work area in accordance to Paragraph "Temporary Pressure Differential and Air Circulation System."
 - d. Upon approval of the enclosure by the Owner's Representative, contractor may proceed to remove the material using the following method.
 - e. Pre-clean columns, beams, electrical, mechanical and plumbing systems in the work area using wet wipe and HEPA vacuuming methods. Mask off with flame retardant polyethylene sheeting to protect from contamination during bulk abatement.
 - f. Thoroughly wet to satisfaction of the Owner's Representative, asbestos-containing fireproofing to be removed prior to stripping and/or tooling to reduce fiber dispersal into the air. Accomplish wetting by a fine spray (mist) of amended water or removal encapsulant. Saturate material sufficiently to wet the substrate without causing excess dripping. Allow time for removal encapsulant to penetrate material thoroughly. If amended water is used, spray material repeatedly during the work process to maintain a continuously wet condition. If a removal encapsulant is used, apply in strict accordance with manufacturer's written instructions.
 - g. Mist work area continuously with amended water whenever necessary to reduce airborne fiber levels using commercially available "foggers."
 - h. Remove saturated asbestos-containing material in small sections from all areas. Do not allow material to dry out. As it is removed, simultaneously pack material while still wet into

disposal bags. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside and move to wash down station adjacent to material decontamination unit.

- i. Evacuate air from disposal bags with a HEPA filtered vacuum cleaner before sealing.
- j. Provide Pressure Differential Machine in addition to those required in Paragraph "Pressure Differential System," in the vicinity of the work. Arrange so that exhaust is into the work area, oriented in a direction away from the work. Extend a 12" diameter flexible non-collapsing duct from the intake end to a point no more than 4'-0" from any scraping or brushing activity.
- k. Locate intake of duct so that air flow is horizontally and slightly down-ward into intake. Replace primary filter on pressure differential machine at an interval of no greater than 30 minutes. Allow no more than one scraping or brushing activity per pressure differential machine.

V. Removal Of Wall Plaster: HEPA vacuum work site.

1. Place two layers of 6-mil flame retardant polyethylene sheeting on the floor adjacent to the wall to be demolished. Pull the wall down in manageable sections onto the polyethylene sheeting. Control dust and fiber release by misting the air and lightly wetting the material with amended water from a Hudson-type sprayer or garden sprayer as it is demolished.
2. Wrap the first layer of polyethylene sheeting around the material and seal with duct tape. Wrap the second layer of polyethylene sheeting around the bundle and seal with duct tape.
3. Label and dispose of the entire bundle.
4. Provide Pressure Differential Machine in addition to those required in Paragraph "Pressure Differential System," in the vicinity of the work. Arrange so that exhaust is into the work area, oriented in a direction away from the work. Extend a 12-inch diameter flexible non-collapsing duct from the intake end to a point no more than 4'-0" from any scraping or brushing activity.
5. Locate intake of duct so that air flow is horizontally and slightly down-ward into intake. Replace primary filter on negative air machine at an interval of no greater than 30 minutes.

W. Clean-Up Of Asbestos-Containing Debris On Ceiling Tile Or Solid Ceiling

1. This section applies to the decontamination of the entire plaster ceiling, removal of existing fiberglass on duct work and removal of all batt insulation covering the existing plaster ceiling.
 - a. Isolate the floor per Paragraph "Temporary Facilities."
 - b. Construct a decontamination unit as described in Paragraph "Decontamination Units" and attach to the work area. General Contractor will give direction regarding exact location of decontamination unit(s).
 - c. Set up pressure differential isolation and ventilation of the work area in accordance to Paragraph "Temporary Pressure Differential and Air Circulation System."
 - d. Upon approval of the enclosure by the Owner's Representative, contractor may proceed to remove the material using the following method:
2. These procedures shall be followed to for clean up of asbestos-containing debris on existing plaster ceiling:
 - a. This work will be performed prior to the removal of fireproofing. The isolation of the work area is considered essential to the pre-cleaning activities for the total area. Isolate the area in accordance with Paragraph "Temporary Facilities."
 - b. Remove asbestos-containing debris and fiberglass batt and duct insulation and decontaminate the area using the following procedures:
 - 1) Remove all small debris with the HEPA vacuum.
 - 2) Gently mist all fiberglass insulation, remove from ducts and ceiling and place into pre-labeled hazardous disposal bags and dispose of in accordance with Paragraph "Disposal of Asbestos Containing Waste Material."
 - 3) Exposure of ducting will expose all fireproofing overspray, this material may be removed during the removal of fireproofing from decks and beams.

- 4) Pick up all large visible debris on the ceiling or any horizontal surfaces and place in the bottom of a 6-mil polyethylene disposal bag conforming to the requirements of Paragraph "Disposal of Asbestos-Containing Waste." Place pieces in the bag without dropping and avoiding unnecessary disturbance and release of material.
 - 5) HEPA vacuum the entire plaster ceiling surface.
 - c. Upon completion of the decontamination of the area request a visual inspection of the ceiling and other horizontal surfaces. This area will be considered a portion of work area for the duration of the work and will be included in the final encapsulation of the area.
- X. Removal Of Adhesive: This section applies to the removal of all asbestos-containing floor tile and adhesive, sheet vinyl flooring, vinyl floor tile, and baseboard adhesive, etc.
1. Ensure that workers are equipped with proper respiratory protection. In addition to the HEPA cartridges, respirators must also be equipped with organic solvent cartridges.
 2. Provide HEPA filtered fan units in the vicinity of the work. Arrange so that units exhaust outside the building. Replace primary filters on HEPA filtered fan units at an interval of no greater than 30 minutes.
 3. Apply adhesive removal solvent as recommended by manufacturer after removal of floor tile has been completed.
 4. Provide tile adhesive (mastic) remover that meets the following criteria:
 - a. Flash Point: 122E or greater.
 - b. Special Precautions: No heavy smoke generated if ignited.
 - c. Health Effects: Limited to mild skin rash or eye irritation.
 - d. Respiratory Protection: MSHA - NIOSH approved Organic vapor cartridges in conjunction with standard HEPA filters.
 - e. Petroleum Distillates: None.
 - f. Odor: Pine, Citrus or none.

Use of diesel fuel in the removal of tile and baseboard adhesive is strictly prohibited.

5. Remove adhesive in small sections from all areas. Do not allow material to dry out. As adhesive is removed, simultaneously pack rags contaminated with adhesive material into disposal bags. Twist neck of bags, bend over and seal with minimum three wraps of duct tape. Clean outside of bag and move to material decontamination unit.
6. Upon completion of adhesive removal, thoroughly clean bare substrate of all solvent residue.
7. Place adhesive residue in proper asbestos disposal bags. Vacuum collapse the bag, twist the neck of the bag, tape with duct tape, fold the twisted portion over onto itself and tape again. Wipe the outside of the bag with clean damp cloths and place bag into second pre-labeled disposal bag. Tape shut the second bag.

CERTIFICATE OF WORKER'S ACKNOWLEDGEMENT

PROJECT NAME: _____

PROJECT ADDRESS: _____

CONTRACTOR: _____

WORKING WITH ASBESTOS CAN BE DANGEROUS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER IF YOU SMOKE AND INHALE ASBESTOS FIBERS, THE CHANCE THAT YOU WILL DEVELOP LUNG CANCER IS GREATER THAN THAT OF THE NON-SMOKING PUBLIC.

Your employer's contract with the Owner for the above project requires that: You be supplied with the proper respirator and be trained in its use. You be trained in safe work practices and in the use of the equipment found on the job. You receive a medical examination. These things are to have been done at no cost to you. By signing this certification you are assuring the Owner that your employer has met these obligations to you.

RESPIRATORY PROTECTION: I have been trained in the proper use of respirators, and informed of the type respirator to be used on the above referenced project. I have a copy of the written respiratory protection manual issued by my employers. I have been equipped at no cost with the respirator to be used on the above project.

TRAINING COURSE: I have been trained in the dangers inherent in handling asbestos and breathing asbestos dust and in proper work procedures and personal and area protective measures. The topics covered in the course included the following:

- Physical characteristics of asbestos
- Health hazards associated with asbestos
- Respiratory protection
- Use of protective equipment
- Pressure differential systems
- Work practices including hands-on or on-the-job training
- Personal decontamination procedures
- Air monitoring, personal and area

MEDICAL EXAMINATION: I have had a medical examination within the last 12 months which was paid for by my employer. This examination included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray.

Signature _____ Witness _____

Printed Name _____ Social Security Number _____

CERTIFICATION OF VISUAL INSPECTION

AREA _____

In accordance with Paragraph "Project Decontamination" the Contractor hereby certifies that it has visually inspected the work area (all surfaces including pipes, beams, ledges, walls, ceiling and floor, Decontamination Unit, sheet plastic, etc.) and has found no dust, debris or residue.

By: _____

Signature _____ Date _____

Print Name _____

Print Title _____

OWNER'S REPRESENTATIVE CERTIFICATION

the Owner's Representative hereby certifies that it has accompanied the Contractor on its visual inspection and verifies that this inspection has been thorough and to the best of its knowledge and belief, the Contractor's certification above is a true and honest one.

Signature _____ Date _____

Print Name _____

Print Title _____

RESPIRATORY PROTECTION PROGRAM

Project Name _____

Location _____

Date _____

Based upon airborne asbestos-fiber counts encountered on previous projects of similar type working on materials similar to those found on the above referenced project. The following level of respiratory protection is proposed for the indicated operations to maintain an Airborne Fiber Count (as measured by the NIOSH 7400 Method) below the specified Permissible Exposure Limit (PEL) inside the respirator face piece.

Operation	Anticipated f/cc	Respiratory Protection	Protection Factor	f/cc in Mask
Installing sheet plastic				
Removing trim in contact with asbestos-containing material				
Removal of architectural finish or fireproofing				
Removal of pipe insulation				
Removal of fitting insulation				
Encapsulation of pipe and boiler insulation				
Gross debris removal				
Cleaning "primary" sheet plastic				
Cleaning "critical" barrier				
Removing Decontamination Unit				
Other				

The Contractor certifies that to the best of its knowledge and belief the above represent a true and accurate representation of Airborne Fiber Counts to be expected for the operations indicated, and are based upon airborne fiber data from past projects with similar materials and operations.

Contractor _____

Signature _____

Date _____

Print Name _____

Title _____

END OF SECTION 02 82 33 00

Task	Specification	Specification Description
02 82 33 00	01 22 16 00	No Specification Required
02 82 33 00	01 95 99 92	Disposal Of Hazardous Materials
02 82 33 00	02 82 16 00	Encapsulation (Lock-Down) Of Asbestos-Containing Materials
02 82 33 00	01 95 99 92a	Removal Of Nonfriable Asbestos-Containing Materials

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SECTION 02 83 19 13 - REMOVAL AND DISPOSAL OF LEAD-CONTAINING PAINT

1.1 GENERAL

A. Description Of Work

1. This specification covers the removal and disposal of lead-based or lead-containing paint. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Definitions

1. Action Level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period in an occupational/industrial environment.
2. Area Sampling: Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel.
3. Competent Person (CP): As used in this section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. An industrial hygienist or safety professional certified for comprehensive practice by the American Board of Industrial Hygiene or by the Board of Certified Safety Professionals is the best choice.
4. Contaminated Room: Room for removal of contaminated personal protective equipment (PPE).
5. Decontamination Shower Facility: That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.
6. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.
7. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.
8. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps.
9. Lead-Based Paint (LBP): Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.
10. Lead-Based Paint Hazard (LBP Hazard): Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.
11. Lead-Containing Paint (LCP): Lead-based paint or other similar surface coating containing lead or lead compound in excess of 0.06 percent by weight of the total nonvolatile content of the paint.
12. Lead Control Area: An enclosed area or structure, constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of lead-based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.
13. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a work day, the PEL shall be determined by the following formula:

$$\text{PEL (micrograms/cubic meter of air)} = 400/\text{No. hrs. worked per day.}$$
14. Personal Sampling: Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. Breathing zone shall be considered an area within a hemisphere, forward of the shoulders, with a radius of **6 to 9 inches (150 to 225 mm)** and centered at the nose or mouth of an employee.

15. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside boundary."

C. Submittals: Submit the following:

1. Product Data:
 - a. Vacuum filters
 - b. Respirators
2. Test Reports
 - a. Sampling results
 - b. Assessment data report
3. Certificates
 - a. Qualifications of CP
 - b. Testing laboratory</SUB> qualifications
 - c. Third party consultant qualifications
 - d. Lead-Based Paint/Lead-Containing Paint Removal Plan including CP approval (signature, date, and certification number)
 - e. Rental equipment notification
 - f. Respiratory protection program
 - g. Hazard communication program
 - h. EPA approved hazardous waste treatment or disposal facility for lead disposal
 - i. Hazardous waste management plan
 - j. Vacuum filters
4. Manufacturer's Instructions
 - a. Chemicals and equipment
 - b. Materials
 - c. Material safety data sheets for all chemicals
5. Closeout Submittals
 - a. Completed and signed hazardous waste manifest from treatment or disposal facility
 - b. Certification of medical examinations
 - c. Employee training certification

D. Qualifications Of CP

1. Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph entitled "Competent Person (CP) Responsibilities." Provide previous experience of the CP. Submit proper documentation that the CP is trained and licensed and certified in accordance with Federal, State, and local laws.

E. Third Party Consultant Qualifications

1. Submit the name, address, and telephone number of the third party consultant selected to perform the wipe sampling for determining concentrations of lead in dust or soil sampling. Submit proper documentation that the consultant is trained and certified as an inspector technician or inspector/risk assessor by the USEPA authorized State (or local) certification and accreditation program.

F. Testing Laboratory

1. Submit the name, address, and telephone number of the testing laboratory selected to perform the air and wipe and soil sampling, testing, and reporting of airborne concentrations of lead. Use a laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLAP) by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis.

G. Lead-Based Paint/Lead-Containing Paint Removal Plan (LBP/LCPRP)

1. Submit a detailed job-specific plan of the work procedures to be used in the removal of LBP/LCP. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and paint debris disposal plan, air sampling plan, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air and baseline lead dust/soil concentrations are not reached or exceeded outside of the lead control area. Include site preparation and cleanup procedures. Include occupational and environmental sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan.
- H. Occupational And Environmental Sampling Results
1. Submit occupational and environmental sampling results to the the Owner within three working days of collection, signed by the testing laboratory responsible official, the employee that performed the sampling, and the CP.
 - a. The sampling results shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures in accordance with 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead.
 - b. Submit worker exposure data conducted during the task based trigger operations of 29 CFR 1926.62.
 - c. The initial monitoring shall determine the requirements for further monitoring and the need to fully implement the control and protective requirements including the compliance program (LBP/LCP) in accordance with 29 CFR 1926.62.
- I. Occupational And Environmental Assessment Data Report:
1. Some LBP/LCP removal work may not require full implementation of the requirements of 29 CFR 1926.62. Based on the experience of the Contractor and/or the use of a specific process or method for performing the work, the Contractor may be able to provide historic data (previous 12 months) to demonstrate that airborne exposures are controlled below the action level. Such methods or controls shall be fully presented in the LBP/LCPRP. To reduce the full implementation of 29 CFR 1926.62, the Contractor shall provide documentation in an Assessment Data Report.
 2. Submit occupational and environmental assessment report to the the Owner prior to start of work, signed by the testing laboratory responsible official, and the CP.
 - a. Submit a report that supports the determination regarding the reduction of the need to fully implement the requirements of 29 CFR 1926.62 and supporting the LBP/LCP. The exposure assessment shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures in accordance with 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead for stated work.
 - b. Submit worker exposure data conducted during the task based trigger operations of 29 CFR 1926.62 with a complete process description in supporting a negative assessment.
 - c. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the compliance program (LBP/LCPRP) in accordance with 29 CFR 1926.62.
- J. Quality Assurance
1. Medical Examinations: Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103.

- a. Medical Records: Maintain complete and accurate medical records of employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.
- b. Medical Surveillance: Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62.
2. Competent Person (CP) Responsibilities
 - a. Certify training as meeting all federal, State, and local requirements.
 - b. Review and approve lead-based paint/lead-containing paint removal plan for conformance to the applicable referenced standards.
 - c. Continuously inspect lead-based paint removal work for conformance with the approved plan.
 - d. Perform air and wipe sampling.
 - e. Ensure work is performed in strict accordance with specifications at all times.
 - f. Control work to prevent hazardous exposure to human beings and to the environment at all times.
 - g. Certify the conditions of the work as called for elsewhere in this specification.
3. Training: Train each employee performing paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations.
 - a. Training Certification: Submit a certificate for each employee, signed and dated by the approved training source, stating that the employee has received the required lead training.
4. Respiratory Protection Program
 - a. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.
 - b. Establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.
5. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.
6. Hazardous Waste Management: The Hazardous Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations and address:
 - a. Identification and classification of hazardous wastes associated with the work.
 - b. Estimated quantities of wastes to be generated and disposed of.
 - c. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of EPA, or State and local hazardous waste permit applications or permits or manifests, as required, and EPA Identification numbers.
 - d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
 - e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
 - f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.
 - g. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
 - h. Unit cost for hazardous waste disposal according to this plan.
7. Environmental, Safety and Health Compliance: In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 29 CFR 1926.62. Submit matters regarding interpretation of standards to the the Owner for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply.

8. Pre-Construction Conference: Along with the CP, meet with the the Owner to discuss in detail the hazardous waste management plan and the lead-based paint/lead-containing paint removal plan, including work procedures and precautions for the removal plan.

K. Equipment

1. Respirators: Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62.
2. Special Protective Clothing: Furnish personnel who will be exposed to lead-contaminated dust with proper disposable uncontaminated, reusable protective whole body clothing, head covering, gloves, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.
3. Rental Equipment Notification: If rental equipment is to be used during lead-based paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the the Owner.
4. Vacuum Filters: UL 586 labeled HEPA filters.
5. Equipment for Owner's Personnel: Furnish the the Owner with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the paint removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor. Respiratory protection for the the Owner will be provided by the Owner.

L. Removal

1. Title to Materials: Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of in accordance with Division 02 Section(s) "Selective Structure Demolition" OR "Structure Demolition", except as specified herein.

1.2 PRODUCT

A. Chemicals

1. Submit applicable Material Safety Data Sheets for all chemicals used in paint removal work. Use the least toxic product approved by the the Owner.

B. Materials

1. The soluble metal content and the total metal content shall not exceed values which would cause a material to be classified as a hazardous waste.

1.3 EXECUTION

A. Protection

1. Notification: Notify the the Owner 20 days prior to the start of any paint removal work.
2. Lead Control Area Requirements
 - a. If LBP will be removed by means which will not likely create airborne, lead-containing dust (such as careful wet scraping or chemical stripping), establish a lead control area by situating critical barriers and physical boundaries around the area or structure where LBP/LCP removal operations will be performed.
 - b. If removal practice will create airborne, lead-containing dust (such as sanding, abrasive blasting, thermal cutting, demolition, or needle gun use), utilize full containment procedures - Contain removal operations by the use of critical barriers and HEPA filtered exhaust **OR** a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the CP, **as directed**. For containment areas larger than **1,000 square feet (100 square meters)** install a minimum of two **18 inch (450 mm)** square viewing

- ports. Locate ports to provide a view of the required work from the exterior of the enclosed contaminated area. Glaze ports with laminated safety glass.
3. Protection of Existing Work to Remain: Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.
 4. Boundary Requirements: Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.
 - a. Physical Boundary: Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.
 - b. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.
 5. Furnishings:
 - a. The Owner will remove furniture and equipment from the building before lead-based paint removal work begins.
OR
Furniture and equipment will remain in the building. Protect and cover furnishings or remove furnishings from the work area and store in a location approved by the the Owner.
OR
Existing furniture and equipment is lead contaminated, decontaminate, dispose of as lead contaminated waste.
 6. Heating, Ventilating and Air Conditioning (HVAC) Systems: Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil (0.15 mm) plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area. Provide temporary HVAC system for areas in which HVAC has been shut down outside the lead control area.
 7. Decontamination Shower Facility: Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.
 8. Eye Wash Station: Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.
 9. Mechanical Ventilation System
 - a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62.
 - b. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters or other collection systems, approved by the CP. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with ANSI Z9.2.
 - c. Vent local exhaust outside the building only and away from building ventilation intakes.
 - d. Use locally exhausted, power actuated, paint removal tools.
 10. Personnel Protection: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.
- B. Work Procedures: Perform removal of lead-based paint in accordance with approved lead-based paint/lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with 29 CFR 1926.62, except as specified herein. Dispose of removed paint chips and associated waste in compliance with Environmental Protection Agency (EPA), federal, State, and local requirements.
1. Personnel Exiting Procedures: Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:

- a. Vacuum themselves off.
 - b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.
 - c. Shower **OR** Wash hands and face at the site, **as directed**, don appropriate disposable or uncontaminated reusable clothing; move to an appropriate facility; shower.
 - d. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.
2. Air and Wipe Sampling
- a. Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling shall be directed or performed by the CP.
 - 1) The CP shall be on the job site directing the air and non-clearance wipe sampling and inspecting the lead-based paint removal work to ensure that the requirements of the contract have been satisfied during the entire lead-based paint removal operation.
 - 2) Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
 - 3) Submit results of air samples, signed by the CP, within 72 hours after the air samples are taken. Notify the the Owner immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.
 - 4) For high profile, sensitive work such as present in family housing, child care facilities, administrative buildings, kitchens, barracks, etc., surface dust sampling to determine clearance (i.e., that the work has not contaminated surfaces within and adjacent to the control area) should be performed by a third party to reduce a conflict of interest. Samples must be conducted by an individual not paid or employed or otherwise compensated by the LBP/LCP removal Contractor. State or local regulations may require third party testing if the LBP/LCP removal operation is considered a lead hazard reduction activity.
 - 5) Before any work begins, collect and analyze baseline or soil wipe samples in accordance with methods defined in federal, State, and local standards inside and outside of the physical boundary to assess the degree of dust contamination in the facility prior to lead-based paint removal.
 - b. Air Sampling During Paint Removal Work: Conduct area air sampling daily, on each shift in which lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Sufficient area monitoring shall be conducted to ensure unprotected personnel are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, stop work, correct the condition(s) causing the increased levels. Notify the the Owner immediately. Determine if condition(s) require any further change in work methods. Removal work shall resume only after approval is given by the CP and the the Owner. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.
3. Lead-Based Paint Removal
- a. Manual or power sanding of interior and exterior surfaces is not permitted. Provide methodology for removing LBP in work plan. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions necessary to minimize damage to the underlying substrate.
 - b. Avoid flash rusting or deterioration of the substrate. Provide surface preparations for painting in accord with Division 07.
 - c. Provide methodology for removing LBP/LCP removal processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this LBP/LCP removal process in the LBP/LCPRP.

- d. Indoor Lead Paint Removal: Perform manual **OR** mechanical **OR** thermal **OR** chemical, **as directed**, paint removal in lead control areas using enclosures, barriers, or containments and powered locally exhausted paint removal tools. Collect residue and/or debris for disposal in accordance with federal, State, and local requirements.
 - e. Outdoor Lead Paint Removal: Perform outdoor removal as indicated in federal, State, and local regulations and in the LBP/CPRP. The worksite preparation (barriers or containments) shall be job dependent and presented in the LBP/LCPRP.
 - f. Sampling After Paint Removal: After the visual inspection, conduct soil sampling if bare soil is present during external removal operations and collect air samples inside and outside the lead control area to determine the airborne levels of lead inside and outside the work area. Collect wipe samples according to the HUD protocol contained in HUD Guidelines to determine the lead content of settled dust and dirt in micrograms per **square foot (square meter)** of surface area and parts per million (ppm) or micrograms per gram ($\mu\text{g/g}$) for soil.
4. Cleanup and Disposal
- a. Cleanup: Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the CP. Reclean areas showing dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP shall then certify in writing that the area has been cleaned of lead contamination before restarting work.
 - b. Clearance Certification
 - 1) The CP shall certify in writing that the final air samples collected inside and outside the lead control area are less than 30 micrograms per cubic meter of air; the respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62 and 40 CFR 745; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped off boundary and warning signs prior to the the Owner's acknowledgement of receipt of the CP certification.
 - 2) A third party consultant shall certify surface wipe sample results collected inside and outside the work area are less than 100 micrograms per **square foot (0.1 square meter)** on uncarpeted floors, less than 500 micrograms per **square foot (0.1 square meter)** on interior window sills and less than 800 micrograms per **square foot (0.1 square meter)** on window troughs **OR** not significantly greater than the initial surface loading determined prior to work, **as directed**.
 - 3) For exterior paint removal work, soil samples taken at the exterior of the work site shall be used to determine if soil lead levels had increased at a statistically significant level (significant at the 95 percent confidence limit) from the soil lead levels prior to the work. If soil lead levels do show a statistically significant increase above any applicable Federal or State standard for lead in soil, the soil shall be remediated back to the pre-work level.
 - c. Testing of Lead-Based Paint Residue and Used Abrasive: Test paint residue and used abrasive in accordance with 40 CFR 261 for hazardous waste.
 - d. Disposal
 - 1) Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261. Dispose of lead-contaminated waste material at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Owner's property.

- 2) Store waste materials in U.S. Department of Transportation (49 CFR 178) approved **55 gallon (208 liter)** drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. The the Owner or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.
- 3) Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.
- 4) All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and Federal, State, or local regulations. Ensure waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.
5. Disposal Documentation: Submit written evidence that the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and State or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.
6. Payment for Hazardous Waste: Payment for disposal of hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials delivered is returned and a copy is furnished to the Owner.

END OF SECTION 02 83 19 13

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Task	Specification	Specification Description
02 83 19 13	01 95 99 92b	Lead Paint Related Abatement Procedures
02 83 19 13	01 95 99 92c	XRF Testing For Lead-Based Paint
02 83 19 13	01 95 99 92d	Lead Dust Wipe, Air And Tcpl Sampling And Analysis
02 83 33 13	01 95 99 92b	Lead Paint Related Abatement Procedures
02 83 33 13	02 83 19 13	Removal And Disposal Of Lead-Containing Paint
02 83 33 13	01 95 99 92c	XRF Testing For Lead-Based Paint
02 83 33 13	01 95 99 92d	Lead Dust Wipe, Air And Tcpl Sampling And Analysis

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SECTION 02 84 16 00 - REMOVAL OF FLUORESCENT LIGHT BALLASTS/CAPACITORS AND FLUORESCENT LIGHT TUBES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for removal of fluorescent light ballasts/capacitors and fluorescent light tubes. Products shall be as follows or as directed by the the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Before Start of Work: Submit the following to the Owner's Representative for review. Do not start work until these submittals are returned with Owner's Representative's approval.
 - a. Copy of State or local license for hazardous waste hauler;
 - b. Certification of at least one on-site supervisor which has satisfactorily completed the OSHA 40 Hour Health and Safety Course for Handling Hazardous Materials;
 - c. Certificates of workers which have successfully completed at least the OSHA 40-Hour Health and Safety Course for Hazardous Materials;
 - d. List of employees scheduled to perform this work;
 - e. Schedule of start and finish times and dates for this work;
 - f. Name and address of landfill where these waste materials are to be deposited (include contact person and telephone numbers);
 - g. Material Safety Data Sheets for all materials requiring removal;
 - h. If contractor introduces any chemical into the work environmental, a MSDS for that chemical is required before use;
 - i. Transporter must have notified the EPA and/or the appropriate local government agency in advance of its intentions to transport PCB's, mercury and cadmium, and receive an identification number pursuant to the Toxic Substance Control Act (TSCA); and
 - j. Contingency Plan for handling emergency spills or leaks.

1.2 PRODUCTS

A. Materials

1. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 4.0 and 6.0 mil thick, clear, frosted, or black.
2. Duct Tape: Provide duct tape in 3" widths, witty an adhesive which is formulated to stick aggressively to sheet polyethylene.
3. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
4. Disposal Bays: Provide 6 mil thick leak-tight polyethylene bags.
5. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.
6. **Drums:** Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA EPA (40 CFR Parts 264265 and 300), and DOT regulations (49 CFR Parts 171-178). Use of damaged drums will not be allowed.

1.3 EXECUTION

A. General

1. Where necessary, scaffolding shall be erected to fully access all applicable fluorescent light ballasts/capacitors and tubes. At no time will the ballasts/capacitors and tubes be allowed to drop onto the floor. Contractor must take care to protect from dropping the ballasts/capacitors and fluorescent tubes.
2. Prior to removing ballasts/capacitors and fluorescent tubes, contractor shall ensure that all electrical service to lights has been shut off, and locked out. Temporary lighting shall be erected to adequately illuminate work areas.
3. Depending on height of light fixtures, contractor shall utilize at least a 2-person per team system. The fluorescent light tubes shall be removed and passed to the appropriate number of workers required to lower the tubes to the floor without breaking them.
4. The worker on the floor shall lay the tubes in cardboard boxes large enough to hold a small quantity of tubes. Worker shall take care to not damage the tubes while they are lowered into the box. Once the box is full, it shall be wrapped with two layers of 6 mil thick polyethylene sheeting and sealed with duct tape.
5. Contractor may choose to either remove the fluorescent light ballasts/capacitors in-place or lower the lighting fixtures for easy access. The ballasts/capacitors shall be removed from the fixtures. Electrical wiring leading from the ballasts/capacitors shall be cut away. Ballasts/capacitors shall be placed in 55-gallon drums lined with at least two 6 mil thick polyethylene bags. Be careful not to overfill the drums so that they remain manageable. Once the drums have been filled to the acceptable level, seal the lid onto the top of the drum, and affix appropriate labels. Transport drums via hand dollies.

B. Worker Protection

1. As a minimum, while working with the ballasts/capacitors and light tubes, workers shall utilize impervious gloves adequate for the use with hazardous materials. If light ballasts/capacitors and/or light tubes are damaged, and/or exposure to these materials may reach the OSHA PEL or AGGIH threshold limit value (TLV), the contractor shall be required to provide impervious full body protection and respiratory protection. However, contractor is required to verify the type of protection required prior to working with these materials, and have written approval by Owner's Representative prior to beginning.
2. In addition, workers shall not smoke, drink or eat in these areas during work activities.

C. Storage Of Fluorescent Light Ballasts/Capacitors And Light Tubes

1. Once the containers holding the ballasts/capacitors and light tubes have been filled and sealed, they shall be stored in designated areas as agreed upon by the Owners Representative and Contractor. They shall not be allowed to be stored on-site in transportation vehicles until the time for them to be transported to the hazardous waste incinerators or landfill facility.

END OF SECTION 02 84 16 00

Task	Specification	Specification Description
02 84 16 00	26 51 00 00	Interior Lighting
02 84 16 00	26 56 00 00	Exterior Lighting
02 86 00 00	02 41 19 13	Selective Demolition
02 86 00 00	01 95 99 92	Disposal Of Hazardous Materials
02 86 00 00	02 61 13 00	Excavation And Handling Of Contaminated Material
02 86 00 00	02 65 00 00	Underground Storage Tank Removal
02 86 00 00	02 61 13 00a	Precision Testing Of Underground Fuel Oil Tanks
02 86 00 00	02 61 13 00b	Hydrostatic Pressure Testing Of Air Receiving Tanks

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SECTION 02 87 13 33 - MOLD REMEDIATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the removal and disposal of mold. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. List of all personnel to be involved in the work with their training and certifications.
2. List of all products and procedures proposed for use in performance of the work.
3. Test reports.
4. Certificates.

C. References

1. U.S. EPA "Mold Remediation in Schools and Commercial Buildings"
2. U.S. EPA "A Brief Guide to Mold, Moisture, and Your Home"

D. Quality Assurance

1. Conform to all Federal, State, and Local regulations which govern the handling and disposal of mold materials.

1.2 PRODUCT - (Not Used)

1.3 EXECUTION

- #### **A. Environmental Assessment:** The presence of mold, water damage, or musty odors shall be addressed immediately. In all instances, any source(s) of water must be stopped and the extent of water damaged determined. Water damaged materials shall be dried and repaired. Mold damaged materials shall be remediated in accordance with this document.

1. **Visual Inspection:** A visual inspection is the most important initial step in identifying a possible contamination problem. The extent of any water damage and mold growth shall be visually assessed. This assessment is important in determining remedial strategies. Ventilation systems shall also be visually checked, particularly for damp filters but also for damp conditions elsewhere in the system and overall cleanliness. Ceiling tiles, gypsum wallboard (sheetrock), cardboard, paper, and other cellulosic surfaces shall be given careful attention during a visual inspection. The use of equipment such as a boroscope, to view spaces in ductwork or behind walls, or a moisture meter, to detect moisture in building materials, may be helpful in identifying hidden sources of fungal growth and the extent of water damage.
2. **Bulk/Surface Sampling**
 - a. Bulk or surface sampling is not required to undertake a remediation. Remediation of visually identified fungal contamination shall proceed without further evaluation.
 - b. Bulk or surface samples may need to be collected to identify specific fungal contaminants as part of a medical evaluation if occupants are experiencing symptoms which may be related to fungal exposure or to identify the presence or absence of mold if a visual inspection is equivocal (e.g., discoloration, and staining).
 - c. An individual trained in appropriate sampling methodology shall perform bulk or surface sampling. Bulk samples shall be collected from visibly moldy surfaces by scraping or cutting materials with a clean tool into a clean plastic bag. Surface samples shall be collected by wiping a measured area with a sterile swab or by stripping the suspect surface

with clear tape. Surface sampling is less destructive than bulk sampling. Other sampling methods may also be available. A laboratory specializing in mycology shall be consulted for specific sampling and delivery instructions.

3. Air Monitoring
 - a. Air sampling for fungi shall not be part of a routine assessment. This is because decisions about appropriate remediation strategies can usually be made on the basis of a visual inspection. In addition, air-sampling methods for some fungi are prone to false negative results and therefore cannot be used to definitively rule out contamination.
 - b. Air monitoring may be necessary if an individual(s) has been diagnosed with a disease that is or may be associated with a fungal exposure (e.g., pulmonary hemorrhage/hemosiderosis, and aspergillosis).
 - c. Air monitoring may be necessary if there is evidence from a visual inspection or bulk sampling that ventilation systems may be contaminated. The purpose of such air monitoring is to assess the extent of contamination throughout a building. It is preferable to conduct sampling while ventilation systems are operating.
 - d. Air monitoring may be necessary if the presence of mold is suspected (e.g., musty odors) but cannot be identified by a visual inspection or bulk sampling (e.g., mold growth behind walls). The purpose of such air monitoring is to determine the location and/or extent of contamination.
 - e. If air monitoring is performed, for comparative purposes, outdoor air samples shall be collected concurrently at an air intake, if possible, and at a location representative of outdoor air. For additional information on air sampling, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."
 - f. Personnel conducting the sampling shall be trained in proper air sampling methods for microbial contaminants. A laboratory specializing in mycology shall be consulted for specific sampling and shipping instructions.
4. Analysis of Environmental Samples
 - a. Microscopic identification of the spores/colonies requires considerable expertise. These services are not routinely available from commercial laboratories. Documented quality control in the laboratories used for analysis of the bulk/surface and air samples is necessary. The American Industrial Hygiene Association (AIHA) offers accreditation to microbial laboratories (Environmental Microbiology Laboratory Accreditation Program (EMLAP)). Accredited laboratories must participate in quarterly proficiency testing (Environmental Microbiology Proficiency Analytical Testing Program (EMPAT)).
5. Evaluation of bulk/surface and air sampling data shall be performed by an experienced health professional. The presence of few or trace amounts of fungal spores in bulk/surface sampling shall be considered background. Amounts greater than this or the presence of fungal fragments (e.g., hyphae, and conidiophores) may suggest fungal colonization, growth, and/or accumulation at or near the sampled location. Air samples shall be evaluated by means of comparison (i.e., indoors to outdoors) and by fungal type (e.g., genera, and species). In general, the levels and types of fungi found should be similar indoors (in non-problem buildings) as compared to the outdoor air. Differences in the levels or types of fungi found in air samples may indicate that moisture sources and resultant fungal growth may be problematic.

B. Remediation

1. General
 - a. **In all situations, the underlying cause of water accumulation must be rectified or fungal growth will recur.** Any initial water infiltration shall be stopped and cleaned immediately. An immediate response (within 24 to 48 hours) and thorough clean up, drying, and/or removal of water damaged materials will prevent or limit mold growth. If the source of water is elevated humidity, relative humidity shall be maintained at levels below 60% to inhibit mold growth. Emphasis shall be on ensuring proper repairs of the building infrastructure, so that water damage and moisture buildup does not recur.
 - b. Five different levels of abatement are described below. The size of the area impacted by fungal contamination primarily determines the type of remediation. The sizing levels below

are based on professional judgment and practicality; currently there is not adequate data to relate the extent of contamination to frequency or severity of health effects. **The goal of remediation is to remove or clean contaminated materials in a way that prevents the emission of fungi and dust contaminated with fungi from leaving a work area and entering an occupied or non-abatement area, while protecting the health of workers performing the abatement.** The listed remediation methods were designed to achieve this goal, however, due to the general nature of these methods it is the responsibility of the people conducting remediation to ensure the methods enacted are adequate. The listed remediation methods are not meant to exclude other similarly effective methods. Any changes to the remediation methods listed in these guidelines, however, shall be carefully considered prior to implementation.

- c. Non-porous (e.g., metals, glass, and hard plastics) and semi-porous (e.g., wood, and concrete) materials that are structurally sound and are visibly moldy can be cleaned and reused. Cleaning shall be done using a detergent solution. Porous materials such as ceiling tiles and insulation, and wallboards with more than a small area of contamination shall be removed and discarded. Porous materials (e.g., wallboard, and fabrics) that can be cleaned, can be reused, but should be discarded if possible. A professional restoration consultant shall be contacted when restoring porous materials with more than a small area of fungal contamination. All materials to be reused shall be dry and visibly free from mold. Routine inspections shall be conducted to confirm the effectiveness of remediation work.
 - d. The use of gaseous, vapor-phase, or aerosolized biocides for remedial purposes is **not** recommended. The use of biocides in this manner can pose health concerns for people in occupied spaces of the building and for people returning to the treated space if used improperly. Furthermore, the effectiveness of these treatments is unproven and does not address the possible health concerns from the presence of the remaining non-viable mold. For additional information on the use of biocides for remedial purposes, refer to the American Conference of Governmental Industrial Hygienists' document, "Bioaerosols: Assessment and Control."
2. **Level I: Small Isolated Areas** (10 sq. ft or less) - e.g., ceiling tiles, small areas on walls
- a. Remediation can be conducted by regular building maintenance staff. Such persons shall receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).
 - b. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.
 - c. The work area shall be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons recovering from recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity, pneumonitis, and severe allergies).
 - d. Containment of the work area is not necessary. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
 - e. Contaminated materials that cannot be cleaned shall be removed from the building in a sealed plastic bag. There are no special requirements for the disposal of moldy materials.
 - f. The work area and areas used by remedial workers for egress shall be cleaned with a damp cloth and/or mop and a detergent solution.
 - g. All areas shall be left dry and visibly free from contamination and debris.
3. **Level II: Mid-Sized Isolated Areas** (10 - 30 sq. ft.) - e.g., individual wallboard panels.
- a. Remediation can be conducted by regular building maintenance staff. Such persons shall receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).
 - b. Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.

- c. The work area shall be unoccupied. Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity, pneumonitis, and severe allergies).
 - d. The work area shall be covered with a plastic sheet(s) and sealed with tape before remediation, to contain dust/debris.
 - e. Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
 - f. Contaminated materials that cannot be cleaned shall be removed from the building in sealed plastic bags. There are no special requirements for the disposal of moldy materials.
 - g. The work area and areas used by remedial workers for egress shall be HEPA vacuumed (a vacuum equipped with a High-Efficiency Particulate Air filter) and cleaned with a damp cloth and/or mop and a detergent solution.
 - h. All areas shall be left dry and visibly free from contamination and debris.
4. **Level III: Large Isolated Areas** (30 - 100 square feet) - e.g., several wallboard panels.
- a. A health and safety professional with experience performing microbial investigations shall be consulted prior to remediation activities to provide oversight for the project.
 - b. The following procedures *at a minimum* are recommended:
 - 1) Personnel trained in the handling of hazardous materials and equipped with respiratory protection, (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.
 - 2) The work area and areas directly adjacent shall be covered with a plastic sheet(s) and taped before remediation, to contain dust/debris.
 - 3) Seal ventilation ducts/grills in the work area and areas directly adjacent with plastic sheeting.
 - 4) The work area and areas directly adjacent shall be unoccupied. Further vacating of people from spaces near the work area is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity, pneumonitis, and severe allergies).
 - 5) Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
 - 6) Contaminated materials that cannot be cleaned shall be removed from the building in sealed plastic bags. There are no special requirements for the disposal of moldy materials.
 - 7) The work area and surrounding areas shall be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.
 - 8) All areas shall be left dry and visibly free from contamination and debris.
 - c. If abatement procedures are expected to generate a lot of dust (e.g., abrasive cleaning of contaminated surfaces, demolition of plaster walls) or the visible concentration of the fungi is heavy (blanket coverage as opposed to patchy), then it is recommended that the remediation procedures for Level IV are followed.
5. **Level IV: Extensive Contamination** (greater than 100 contiguous square feet in an area)
- a. A health and safety professional with experience performing microbial investigations shall be consulted prior to remediation activities to provide oversight for the project. The following procedures are recommended:
 - 1) Personnel trained in the handling of hazardous materials equipped with:
 - a) Full-face respirators with high efficiency particulate air (HEPA) cartridges
 - b) Disposable protective clothing covering both head and shoes
 - c) Gloves
 - 2) Containment of the affected area:

- a) Complete isolation of work area from occupied spaces using plastic sheeting sealed with duct tape (including ventilation ducts/grills, fixtures, and any other openings)
 - b) The use of an exhaust fan with a HEPA filter to generate negative pressurization
 - c) Airlocks and decontamination room
 - 3) Vacating people from spaces adjacent to the work area is not necessary but is recommended in the presence of infants (less than 12 months old), persons having undergone recent surgery, immune suppressed people, or people with chronic inflammatory lung diseases (e.g., asthma, hypersensitivity, pneumonitis, and severe allergies).
 - 4) Contaminated materials that cannot be cleaned shall be removed from the building in sealed plastic bags. The outside of the bags shall be cleaned with a damp cloth and a detergent solution or HEPA vacuumed in the decontamination chamber prior to their transport to uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.
 - 5) The contained area and decontamination room shall be HEPA vacuumed and cleaned with a damp cloth and/or mop with a detergent solution and be visibly clean prior to the removal of isolation barriers.
 - 6) Air monitoring shall be conducted prior to occupancy to determine if the area is fit to reoccupy.
6. **Level V: Remediation of HVAC Systems**
- a. A Small Isolated Area of Contamination (<10 square feet) in the HVAC System
 - 1) Remediation can be conducted by regular building maintenance staff. Such persons shall receive training on proper clean up methods, personal protection, and potential health hazards. This training can be performed as part of a program to comply with the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200).
 - 2) Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended. Gloves and eye protection shall be worn.
 - 3) The HVAC system shall be shut down prior to any remedial activities.
 - 4) The work area shall be covered with a plastic sheet(s) and sealed with tape before remediation, to contain dust/debris.
 - 5) Dust suppression methods, such as misting (not soaking) surfaces prior to remediation, are recommended.
 - 6) Growth supporting materials that are contaminated, such as the paper on the insulation of interior lined ducts and filters, shall be removed. Other contaminated materials that cannot be cleaned shall be removed in sealed plastic bags. There are no special requirements for the disposal of moldy materials.
 - 7) The work area and areas immediately surrounding the work area shall be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution.
 - 8) All areas shall be left dry and visibly free from contamination and debris.
 - 9) A variety of biocides are recommended by HVAC manufacturers for use with HVAC components, such as, cooling coils and condensation pans. HVAC manufacturers shall be consulted for the products they recommend for use in their systems.
 - b. Areas of Contamination (>10 square feet) in the HVAC System: A health and safety professional with experience performing microbial investigations shall be consulted prior to remediation activities to provide oversight for remediation projects involving more than a small isolated area in an HVAC system. The following procedures are recommended:
 - 1) Personnel trained in the handling of hazardous materials equipped with:
 - a) Respiratory protection (e.g., N95 disposable respirator), in accordance with the OSHA respiratory protection standard (29 CFR 1910.134), is recommended.
 - b) Gloves and eye protection

- c) Full-face respirators with HEPA cartridges and disposable protective clothing covering both head and shoes shall be worn if contamination is greater than 30 square feet.
 - 2) The HVAC system shall be shut down prior to any remedial activities.
 - 3) Containment of the affected area:
 - a) Complete isolation of work area from the other areas of the HVAC system using plastic sheeting sealed with duct tape.
 - b) The use of an exhaust fan with a HEPA filter to generate negative pressurization.
 - c) Airlocks and decontamination room if contamination is greater than 30 square feet.
 - 4) Growth supporting materials that are contaminated, such as the paper on the insulation of interior lined ducts and filters, shall be removed. Other contaminated materials that cannot be cleaned should be removed in sealed plastic bags. When a decontamination chamber is present, the outside of the bags shall be cleaned with a damp cloth and a detergent solution or HEPA vacuumed prior to their transport to uncontaminated areas of the building. There are no special requirements for the disposal of moldy materials.
 - 5) The contained area and decontamination room shall be HEPA vacuumed and cleaned with a damp cloth and/or mop and a detergent solution prior to the removal of isolation barriers.
 - 6) All areas shall be left dry and visibly free from contamination and debris.
 - 7) Air monitoring shall be conducted prior to re-occupancy with the HVAC system in operation to determine if the area(s) served by the system are fit to reoccupy.
 - 8) A variety of biocides are recommended by HVAC manufacturers for use with HVAC components, such as, cooling coils and condensation pans. HVAC manufacturers shall be consulted for the products they recommend for use in their systems.
7. Hazard Communication: When fungal growth requiring large-scale remediation is found, the building owner, management, and/or employer shall notify occupants in the affected area(s) of its presence. Notification shall include a description of the remedial measures to be taken and a timetable for completion. Group meetings held before and after remediation with full disclosure of plans and results can be an effective communication mechanism. Individuals with persistent health problems that appear to be related to bioaerosol exposure should see their physicians for a referral to practitioners who are trained in occupational/environmental medicine or related specialties and are knowledgeable about these types of exposures. Individuals seeking medical attention shall be provided with a copy of all inspection results and interpretation to give to their medical practitioners.

END OF SECTION 02 87 13 33

SECTION 02 87 16 13 - BIRD AND BIRD WASTE ABATEMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for bird and bird waste abatement. Products shall be as follows or as directed by the the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary Of Work

1. Work Included - Conventional Enclosure for Removal of Birds and Bird Waste
 - a. Seal off penetrations on perimeter walls into the work area (critical barriers) and establish a decontamination facility for workers.
 - b. Coordinate activities with the demolition and well capping activities.
2. Work Included - Removal and disposal of birds and bird waste.
 - a. Establish work area by installing construction barrier tape around removal area.
 - b. Remove and properly dispose of bulk contamination debris.
 - c. Mist bird waste and contaminated material with Biocide or the equivalent (i.e. Sanogene, Oxine, or Envirocon).
 - d. Remove and properly dispose of contaminated waste material from all building components.
 - e. Utilize low pressure washers or scrub brushes to clean all wall surfaces of bird waste.

C. Quality Criteria

1. Qualifications for Performance of Work
 - a. Contractor (or subcontractor engaged to perform the Work of this Section) shall:
 - 1) Be a licensed bird waste abatement contractor in accordance with the Statutes of the State in which the work is to be performed. Submit notarized documentation confirming current licensure.
 - 2) Have a record of not less than five years successful experience in bird waste removal or asbestos removal.
2. Reference Standards
 - a. Acknowledge, by the executing of the Contract, awareness and familiarity with the contents and requirements of the following regulations, codes, and standards, and assume responsibility for the performance of the Work in strict compliance therewith and for every instance of failure to comply therewith.
 - b. Where conflict among requirements or with the Contract Documents exists, the more stringent requirements shall apply.
 - 1) USEPA Regional National Emissions Standards for Hazardous Air Pollutants (NESHAPS)
 - 2) U.S. Occupational and Safety and Health Administration (OSHA)
 - 3) U.S. EPA Office of Pesticide and Toxic Substances Guidance Document
 - 4) U.S. Department of Transportation, Hazardous Substances: Final Rule (49 CFR 171 and 172), Federal Register November 21, 1986 and corrected February 17, 1987.
 - 5) Statutes of the State in which the Work is to be Performed: Licensure for Asbestos Consultants and Contractors.
 - 6) All state, county, and city codes and ordinances as applicable. Make available for review at the site one copy of EPA, OSHA, and applicable State, County, and City Regulations governing the Work.
3. Patent/Copyright Compliance: Contractor shall determine the applicability of any process patents that may be employed and shall be responsible for the payment of all fees, royalties and licenses that may be required for the use of any patented or licensed process. Contractor shall hold the Owner, Engineer and Testing Laboratory harmless for failure to obtain any licenses and to pay any applicable fees and royalties.

- D. Product Handling
1. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name.
 2. Store all materials subject to damage off the ground, away from wet or damp surfaces, and under cover sufficient to prevent damage or contamination.
 3. Remove from the premises all damaged or deteriorating materials. Dispose of materials that become contaminated with waste in accordance with applicable regulatory standards.
- E. Worksite Conditions
1. Worker and Visitor Procedures: The Contractor is hereby advised that the birds and bird wastes have been determined to cause diseases by inhalation and Contractor shall provide workers and qualified visitors with respirators that, as a minimum, shall meet the requirements of current applicable OSHA regulations, and protective clothing during preparation of system of enclosures, prior to commencing, during actual removal, and until final clean-up is completed. Also all personnel assigned to work on this project shall attend a training/awareness class for the purpose of explaining the hazards of improperly handling these materials and proper control measures to take in order to protect themselves.
- F. Personnel Protection
1. General
 - a. Provide respiratory protection in accordance with OSHA regulations 29 CFR 1910-134 and in accordance with the following paragraphs.
 - 1) Prior to commencement of work, all workers shall be instructed by the Contractor and shall be knowledgeable in the appropriate procedures of personnel protection and waste removal.
 - 2) Where respirators with disposable filters are used, provide sufficient filters for replacement as necessary by the workers, or as required by applicable regulations.
 - 3) Permit no visitors, except for governmental inspectors having jurisdiction, or as authorized by Engineer or the Owner, in the work areas after commencement of waste disturbance or removal. Provide authorized visitors with suitable respirators.
 - 4) Provide workers with sufficient sets of protective disposable clothing, consisting of full-body coveralls, head covers, gloves, and foot covers, of sizes to properly fit individual workers.
 - 5) Provide authorized visitors with a set of suitable protective disposable clothing, headgear, eye protection, and/or footwear of sizes to properly fit visitors whenever they are required to enter the work area, to a maximum of six sets per day.
 - 6) Provide, in addition to respirators and protective clothing provided for authorized visitors, protective clothing and respirators for use by Testing Laboratory's representative. Furnish protective clothing in as many sets as required for full-time monitoring by Testing Laboratory.
 - 7) Provide and post the decontamination and work procedures to be followed by workers.
 2. Respiratory Protection Program
 - a. Maintain a respiratory protection program that contains all the elements of the OSHA regulations. Provide a copy to the Engineer for approval.
 - b. Appoint a respiratory protection program administrator, who shall be responsible for the program, maintaining all documentation, instructing workers and providing fit tests. Respiratory protection administrator is to be qualified under OSHA requirements and to have attended and passed, as a minimum, OSHA training institute 2-week course on respiratory protection or NIOSH course "Occupational Respiratory Protection." Respiratory protection program administrator is to be on-site daily during abatement activities. All written programs and directions are to be in English and/or the language of the abatement workers if they are not fluent in English.
 - c. The Contractor is advised that the minimum respiratory requirements as called for in this section and on any drawings/sketches shall be applied unless reported measures indicate

that a lower form of respiratory protection is acceptable according to the appropriate OSHA regulations and the more strict sections of the specification.

3. Respiratory Protection Requirements
 - a. Workers shall be provided with respiratory protection equipment. The respirators are to be sanitized and maintained in accordance with the manufacturer's specification. Appropriate respirator selection will be dependent upon the work to be performed and the level of exposure, as given below.
 - b. For the clean-up, as a minimum, the use of full-faced air-purifying respirators is required for all preparation, removal and cleaning work.
 - c. This specification requires that workers shall wear suitable respiratory protection at all times whenever a potential for exposure to bird and bird waste exists.

1.2 PRODUCTS

A. Materials

1. Polyethylene/Plastic sheeting shall be of the thicknesses specified, not less than 6 mil, in sizes to minimize the frequency of joints. Utilize reinforced plastic sheeting in specified thicknesses on floors.
2. Tape shall be glass fiber or other type capable of sealing joints of adjacent sheets of plastic and for attachment of plastic sheet to finished or unfinished surfaces of dissimilar materials under both dry and wet conditions.
3. Sodium Hypochlorite ("bleach")
4. Impermeable Containers shall be suitable to receive and retain contaminated materials until disposal at an approved site and shall be labeled in accordance with U.S. DOT 49 CFR 171 and 172, and containers shall be both air- and water-tight. Use a minimum of two types of impermeable containers: 1) six millimeter-thick (mil) plastic bags sized to fit within the drum; and 2) metal or fiber drums with tightly fitting lids.
5. Other Materials: Provide all other materials, such as lumber, nails, and hardware, that may be required to construct and dismantle the decontamination area and the barriers that isolate the work area(s).
6. Caulking shall be non-shrinking caulk to be used where insulated pipes continue through areas such as walls and ceilings. Contractor shall determine and submit proof that caulk proposed for use is compatible with the temperature conditions of the surfaces to which it is to be applied.
 - a. Tools And Equipment
 - 1) Water Sprayer - utilize airless or other low pressure sprayer for amended water application.
 - 2) Air Purifying Equipment (for internal recirculation in the work area) shall be HEPA Filtration Systems or Electronic Precipitators. Ensure that no internal air movement system or purification equipment exhausts contaminated air from the work area(s) outside the work area.
 - 3) Diminished Air Pressure Equipment shall comply with ANSI 29.2-7, local exhaust ventilation.
 - 4) Scaffolding shall be as required to accomplish the specified work and shall meet all applicable safety regulations.
 - 5) Transportation - as required for loading, temporary storage, transit, and unloading of contaminated waste without exposure to persons or property.

1.3 EXECUTION

A. Procedures

1. All personnel assigned to perform the work shall attend a training/awareness class for the purpose of explaining the hazards of improperly handling the waste and the proper control measures to take in order to protect themselves. These work procedures shall be discussed with

02 - Existing Conditions



- each individual followed by the individual acknowledging receipt of this training by completing the pertinent information on a Hazardous Awareness Training Form
2. The majority of diseases related to bird waste is related to the inhalation of the airborne dust released by the waste. All personnel performing removal/decontamination waste shall therefore wear Powered Air Purifying Respirators (PAPR) equipped with combination Organic Vapor and High Efficiency Particulate Air (HEPA) filters while handling the waste.
 3. Workers shall wear non-porous gloves and boots during all preparatory and removal operations.
 4. When entering the building, the removal/decontamination personnel shall mist all surfaces having visible remnants of waste, using a diluted sodium hypochlorite ("bleach") and water solution. This solution shall be diluted at a ratio of 10 parts water to 1 part bleach for a 10 to 1 ration (10:1). The waste shall be continuously misted during occupancy in order to keep airborne dust emissions from the waste to a minimum.
 5. Remove all birds from the building and seal all openings into the building. The main purpose of this is to eliminate the availability for future bird access into the building. The openings may be temporarily sealed or closed up in many ways, including boarding up windows/doors, polyethylene sheeting, or other convenient and cost effective means. It is not the intention of this task to complete seal the building airtight.
 6. Designate an area of the facility for the purpose of storing the waste prior to loading for transportation to the appropriate landfill. The area designated shall have easy access to the door which will be utilized as the waste load-out.

END OF SECTION 02 87 16 13

Task	Specification	Specification Description
02 89 00 00	01 22 16 00	No Specification Required
02 89 00 00	01 95 99 92b	Lead Paint Related Abatement Procedures
02 89 00 00	02 83 19 13	Removal And Disposal Of Lead-Containing Paint
02 89 00 00	01 95 99 92c	XRF Testing For Lead-Based Paint
02 89 00 00	01 95 99 92d	Lead Dust Wipe, Air And Tcpl Sampling And Analysis
02 90 55 00	01 22 16 00	No Specification Required

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SECTION 03 01 30 71 - CONCRETE REHABILITATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for concrete rehabilitation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Removal of deteriorated concrete and reinforcement and subsequent replacement and patching.
 - b. Floor joint repair.
 - c. Epoxy crack injection.
 - d. Corrosion-inhibiting treatment.
 - e. Polymer overlays.
 - f. Polymer sealers.
 - g. Steel structural reinforcement.
 - h. Composite structural reinforcement.

C. Submittals

1. Product Data: For each type of product indicated. Include material descriptions, chemical composition, physical properties, test data, and mixing, preparation, and application instructions.
2. Formwork and Shoring Drawings: Prepared by or under the supervision of a qualified professional engineer detailing formwork and temporary shoring and supports. Include schedule and sequence for erection and removal relative to removal of deteriorated concrete and reinforcement and subsequent repair and reinforcement.
3. Samples: Cured Samples of overlay and patching materials.
4. Rehabilitation Program: For each phase of rehabilitation process, including protection of surrounding materials and Project site during operations. Describe in detail materials, methods, equipment, and sequence of operations to be used for each phase of the Work.
 - a. If alternative materials and methods to those indicated are proposed for any phase of rehabilitation work, submit substitution request and provide a written description of proposed materials and methods, including evidence of successful use on other comparable projects, and a testing program to demonstrate their effectiveness for this Project.

D. Delivery, Storage, And Handling

1. Deliver materials to Project site in manufacturer's original and unopened containers, labeled with type and name of products and manufacturers.
2. Comply with manufacturer's written instructions for minimum and maximum temperature requirements and other conditions for storage.
3. Store cementitious materials off the ground, under cover, and in a dry location.
4. Store aggregates, covered and in a dry location, where grading and other required characteristics can be maintained and contamination avoided.

E. Project Conditions

1. Environmental Limitations for Epoxies: Do not apply when air and substrate temperatures are outside limits permitted by manufacturer. During hot weather, cool epoxy components before mixing, store mixed products in shade, and cool unused mixed products to retard setting. Do not apply to wet substrates unless approved by manufacturer.

- a. Use only Class A epoxies when substrate temperatures are below or are expected to go below **40 deg F (5 deg C)** within 8 hours.
 - b. Use only Class A or B epoxies when substrate temperatures are below or are expected to go below **60 deg F (16 deg C)** within 8 hours.
 - c. Use only Class C epoxies when substrate temperatures are above and are expected to stay above **60 deg F (16 deg C)** for 8 hours.
2. Cold-Weather Requirements for Cementitious Materials:
- a. Do not apply unless air temperature is above **40 deg F (5 deg C)** and will remain so for at least 48 hours after completion of Work.
OR
Comply with the following procedures:
 - 1) When air temperature is below **40 deg F (5 deg C)**, heat patching material ingredients and existing concrete to produce temperatures between **40 and 90 deg F (5 and 32 deg C)**.
 - 2) When mean daily air temperature is between **25 and 40 deg F (minus 4 and plus 5 deg C)**, cover completed Work with weather-resistant insulating blankets for 48 hours after repair or provide enclosure and heat to maintain temperatures above **32 deg F (0 deg C)** within the enclosure for 48 hours after repair.
 - 3) When mean daily air temperature is below **25 deg F (minus 4 deg C)**, provide enclosure and heat to maintain temperatures above **32 deg F (0 deg C)** within the enclosure for 48 hours after repair.
3. Hot-Weather Requirements for Cementitious Materials: Protect repair work when temperature and humidity conditions produce excessive evaporation of water from patching materials. Provide artificial shade and wind breaks, and use cooled materials as required. Do not apply to substrates with temperatures of **90 deg F (32 deg C)** and above.
4. Environmental Limitations for High-Molecular-Weight Methacrylate Sealers: Do not apply when concrete surface temperature is below **55 deg F (13 deg C)** or above **75 deg F (24 deg C) OR 90 deg F (32 deg C)**, **as directed**. Apply only to dry substrates **OR** substrates that have been dry for at least 72 hours.

1.2 PRODUCTS

A. Bonding Agents

1. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Product that consists of water-insensitive epoxy adhesive, portland cement, and water-based solution of corrosion-inhibiting chemicals that forms a protective film on steel reinforcement.
2. Epoxy Bonding Agent: ASTM C 881/C 881M, Type II **OR** V, **as directed**.
 - a. Thin Film Open Time: Not less than two **OR** six **OR** 24, **as directed**, hours.
3. Latex Bonding Agent: ASTM C 1059, Type I **OR** II **OR** II at exterior locations and where indicated, Type I at other locations, **as directed**.
4. Mortar Scrub-Coat: 1 part portland cement complying with ASTM C 150, Type I, II, or III and 1 part fine aggregate complying with ASTM C 144, except 100 percent passing a **No. 16 (1.18-mm)** sieve.

B. Patching Mortar

1. Patching Mortar, General:
 - a. Overhead Patching Mortar: For overhead repairs, use patching mortar recommended by manufacturer for overhead use and as specified in this Article.
 - b. Coarse Aggregate for Adding to Patching Mortar: Washed aggregate complying with ASTM C 33, Size No. 8, Class 5S. Add only as permitted by patching mortar manufacturer.
2. Job-Mixed Patching Mortar: 1 part portland cement complying with ASTM C 150, Type I, II, or III and 2-1/2 parts fine aggregate complying with ASTM C 144, except 100 percent passing a **No. 16 (1.18-mm)** sieve.

3. Cementitious Patching Mortar: Packaged, dry mix complying with ASTM C 928.
4. Polymer-Modified, Cementitious Patching Mortar: Packaged, dry mix complying with ASTM C 928, that contains a non-redispersible latex additive as either a dry powder or a separate liquid that is added during mixing.
5. Polymer-Modified, Silica-Fume-Enhanced, Cementitious Patching Mortar: Packaged, dry mix complying with ASTM C 928, that contains silica fume complying with ASTM C 1240 and a non-redispersible latex additive as either a dry powder or a separate liquid that is added during mixing.

C. Concrete

1. Concrete Materials and Admixtures: Comply with Division 03 Section "Cast-in-place Concrete".
2. Steel and Fiber Reinforcement and Reinforcement Accessories: Comply with Division 03 Section "Cast-in-place Concrete".
3. Form-Facing Materials: Comply with Division 03 Section "Cast-in-place Concrete".
4. Shotcrete: Comply with Division 03 Section "Shotcrete".
5. Preplaced Aggregate: Washed aggregate complying with ASTM C 33, Class 5S, with 95 to 100 percent passing a 1-1/2-inch (37.5-mm) sieve, 40 to 80 percent passing a 1-inch (25-mm) sieve, 20 to 45 percent passing a 3/4-inch (19-mm) sieve, 0 to 10 percent passing a 1/2-inch (12.5-mm) sieve, and 0 to 2 percent passing a 3/8-inch (9.5-mm) sieve **OR** 100 percent passing a 1-1/2-inch (37.5-mm) sieve, 95 to 100 percent passing a 1-inch (25-mm) sieve, 40 to 80 percent passing a 3/4-inch (19-mm) sieve, 0 to 15 percent passing a 1/2-inch (12.5-mm) sieve, and 0 to 2 percent passing a 3/8-inch (9.5-mm) sieve, **as directed**.
6. Fine Aggregate for Grout Used with Preplaced Aggregate: Fine aggregate complying with ASTM C 33, but with 100 percent passing a No. 8 (2.36-mm) sieve, 95 to 100 percent passing a No. 16 (1.18-mm) sieve, 55 to 80 percent passing a No. 30 (0.6-mm) sieve, 30 to 55 percent passing a No. 50 (0.3-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, 0 to 10 percent passing a No. 200 (0.075-mm) sieve, and having a fineness modulus of 1.30 to 2.10.
7. Grout Fluidifier for Grout Used with Preplaced Aggregate: ASTM C 937.
8. Portland Cement for Grout Used with Preplaced Aggregate: ASTM C 150.
9. Pozzolans for Grout Used with Preplaced Aggregate: ASTM C 618.

D. Miscellaneous Materials

1. Epoxy Joint Filler: 2-component, semirigid, 100 percent solids, epoxy resin with a Type A Shore durometer hardness of at least 80 per ASTM D 2240.
2. Polyurea Joint Filler: 2-component, semirigid, 100 percent solids, polyurea resin with a Type A Shore durometer hardness of at least 80 per ASTM D 2240.
3. Epoxy Crack Injection Adhesive: ASTM C 881/C 881M, Type I **OR** IV, **as directed**, Grade 1, except for gel time **OR** solvent free, **as directed**.
4. Capping Adhesive: Product manufactured for use with crack injection adhesive by same manufacturer.
5. Corrosion-Inhibiting Treatment Materials: Water-based solution of alkaline corrosion-inhibiting chemicals that penetrates concrete by diffusion and forms a protective film on steel reinforcement.
6. Polymer Overlay: Epoxy adhesive complying with ASTM C 881/C 881M, Type III.
7. Aggregate for Use with Polymer Overlay: Oven-dried, washed silica sand complying with ACI 503.3.
8. Polymer Sealer: Low-viscosity epoxy or high-molecular-weight methacrylate penetrating sealer recommended by manufacturer for application to exterior concrete traffic surfaces.
9. Methylmethacrylate Sealer/Brighteners: Clear low-viscosity sealer recommended by manufacturer for sealing exterior exposed-aggregate concrete, and formulated to bring out color of aggregates and give concrete a wet look.
10. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - a. After fabricating, prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

- b. For minimum protection to steel after preparation, apply one coat of lead- and chromate-free, modified-alkyd primer complying with MPI#76 and one coat of alkyd-gloss enamel complying with MPI#96.
- c. After preparation, apply two-coat high-performance coating system consisting of organic zinc-rich primer, complying with SSPC-Paint 20 or SSPC-Paint 29 and topcoat of high-build, urethane or epoxy coating recommended by manufacturer for application over specified zinc-rich primer. Comply with coating manufacturer's written directions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
11. Bolts, Nuts, and Washers: Carbon steel; **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, for bolts; **ASTM A 563 (ASTM A 563M)**, Grade A, for nuts; and **ASTM F 436 (ASTM F 436M)** for washers; hot-dip or mechanically zinc coated.
12. Postinstalled Anchors: Chemical or expansion anchors, made from stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4)** for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to four times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
13. Composite Structural Reinforcement: Manufacturer's system consisting of carbon **OR** glass, **as directed**,-fiber reinforcement in the form of preimpregnated sheets or tow sheet with field-applied saturant, and epoxy primers, fillers, adhesives, saturants, and topcoats, designed for use as external structural reinforcement for concrete.

E. Mixes

1. Mix products, in clean containers, according to manufacturer's written instructions.
 - a. Add clean silica sand and coarse aggregates to products only as recommended by manufacturer.
 - b. Do not add water, thinners, or additives unless recommended by manufacturer.
 - c. When practical, use manufacturer's premeasured packages to ensure that materials are mixed in proper proportions. When premeasured packages are not used, measure ingredients using graduated measuring containers; do not estimate quantities or use shovel or trowel as unit of measure.
 - d. Do not mix more materials than can be used within recommended open time. Discard materials that have begun to set.
2. Mortar Scrub-Coat: Mix with enough water to provide consistency of thick cream.
3. Dry-Pack Mortar: Mix with just enough liquid to form damp cohesive mixture that can be squeezed by hand into a ball but is not plastic.
4. Concrete: Comply with Division 03 Section "Cast-in-place Concrete".
5. Shotcrete: Comply with Division 03 Section "Shotcrete".
6. Grout for Use with Preplaced Aggregate: Proportion according to ASTM C 938. Add grout fluidifier to mixing water followed by cementitious materials and then fine aggregate.

1.3 EXECUTION

A. Examination

1. Notify the Owner seven days in advance of dates when areas of deteriorated or delaminated concrete and deteriorated reinforcing bars will be located.
2. Locate areas of deteriorated or delaminated concrete using hammer or chain drag sounding and mark boundaries. Mark areas for removal by simplifying and squaring off boundaries. At columns and walls make boundaries level and plumb, unless otherwise indicated.
3. Locate at least three reinforcing bars using a pachometer, and drill test holes to determine depth of cover. Calibrate pachometer, using depth of cover measurements, and verify depth of cover in removal areas using pachometer.

B. Preparation

1. Protect people, motor vehicles, equipment, surrounding construction, Project site, plants, and surrounding buildings from injury resulting from concrete rehabilitation work.
 - a. Erect and maintain temporary protective covers over pedestrian walkways and at points of entrance and exit for people and vehicles, unless such areas are made inaccessible during the course of concrete rehabilitation work. Construct covers of tightly fitted, **3/4-inch (19-mm)** exterior-grade plywood supported at **16 inches (405 mm)** o.c. and covered with asphalt roll roofing.
 - b. Protect adjacent equipment and surfaces by covering them with heavy polyethylene film and waterproof masking tape or a liquid strippable masking agent. If practical, remove items, store, and reinstall after potentially damaging operations are complete.
 - c. Neutralize and collect alkaline and acid wastes according to requirements of authorities having jurisdiction, and dispose of by legal means off the Owner's property.
 - d. Dispose of runoff from wet operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
 - e. Collect runoff from wet operations and dispose of by legal means off the Owner's property.
2. Shoring: Install temporary supports before beginning concrete removal.
3. Concrete Removal:
 - a. Saw-cut perimeter of areas indicated for removal to a depth of at least **1/2 inch (13 mm)**. Make cuts perpendicular to concrete surfaces and no deeper than cover on reinforcement.
 - b. Remove deteriorated and delaminated concrete by breaking up and dislodging from reinforcement.
 - c. Remove additional concrete, if necessary, to provide a depth of removal of at least **1/2 inch (13 mm)** over entire removal area.
 - d. Where half or more of the perimeter of reinforcing bar is exposed, bond between reinforcing bar and surrounding concrete is broken, or reinforcing bar is corroded, remove concrete from entire perimeter of bar and to provide at least a **3/4-inch (19-mm)** clearance around bar.
 - e. Test areas where concrete has been removed by tapping with hammer, and remove additional concrete until unsound and disbonded concrete is completely removed.
 - f. Provide fractured aggregate surfaces with a profile of at least **1/8 inch (3 mm)** that are approximately perpendicular or parallel to original concrete surfaces. At columns and walls, make top and bottom surfaces level, unless otherwise directed.
 - g. Thoroughly clean removal areas of loose concrete, dust, and debris.
4. Reinforcing Bar Preparation: Remove loose and flaking rust from reinforcing bars by high-pressure water cleaning **OR** abrasive blast cleaning **OR** needle scaling **OR** wire brushing, **as directed**, until only tightly bonded light rust remains.
 - a. Where section loss of reinforcing bar is more than 25 percent, or 20 percent in 2 or more adjacent bars, cut bars and remove and replace. Remove additional concrete as necessary to provide at least **3/4-inch (19-mm)** clearance at existing and replacement bars. Splice replacement bars to existing bars according to **ACI 318 (ACI 318M)**, by lapping, welding, or using mechanical couplings.
5. Preparation of Floor Joints for Repair: Saw-cut joints full width to edges and depth of spalls, but not less than **3/4 inch (19 mm) OR 1 inch (25 mm) OR 2 inches (50 mm)**, **as directed**, deep. Clean out debris and loose concrete; vacuum or blow clear with compressed air.
6. Surface Preparation for Corrosion-Inhibiting Treatment: Clean concrete by low-pressure water cleaning **OR** detergent scrubbing **OR** sand blasting, **as directed**, to remove dirt, oils, films, and other materials detrimental to treatment application. Allow surface to dry before applying corrosion-inhibiting treatment.
7. Surface Preparation for Overlays: Remove delaminated material and deteriorated concrete surface material. Roughen surface of concrete by sand blasting **OR** shot blasting **OR** scarifying **OR** needle scaling **OR** high-pressure water jetting **OR** scabbling **OR** flame blasting **OR** milling, **as directed**, to produce a surface profile matching **CSP 3 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9**, **as directed**, per ICRI 03732. Sweep and vacuum roughened surface to remove debris followed by low-pressure water cleaning.

8. Surface Preparation for Sealers: Clean concrete by shot blasting **OR** low-pressure water cleaning **OR** detergent scrubbing, **as directed**, to remove dirt, oils, films, and other materials detrimental to sealer application.
9. Surface Preparation for Sealers: Acid etch surface of concrete to produce a surface profile matching CSP 1 per ICRI 03732. Prepare surface for acid etching by detergent scrubbing to remove oils and films that may prevent acid penetration.
 - a. Remove excess acid solution, reaction products, and debris by squeegeeing or vacuuming.
 - b. Scrub surface with an alkaline detergent, rinse, and squeegee or vacuum.
 - c. Check acidity of surface with pH test paper and continue rinsing until pH is acceptable.
 - d. When pH is acceptable and surface is clean, vacuum dry.
10. Surface Preparation for Composite Structural Reinforcement: Remove delaminated material and deteriorated concrete surface material. Clean concrete where reinforcement and epoxy patching mortar is to be applied by low-pressure water cleaning **OR** detergent scrubbing, **as directed**, to remove dirt, oils, films, and other materials detrimental to epoxy application. Roughen surface of concrete by sand blasting.

C. Application

1. General: Comply with manufacturer's written instructions and recommendations for application of products, including surface preparation.
2. Epoxy-Modified, Cementitious Bonding and Anticorrosion Agent: Apply to reinforcing bars and concrete by stiff brush or hopper spray according to manufacturer's written instructions. Apply to reinforcing bars in two coats, allowing first coat to dry two to three hours before applying second coat. Allow to dry before placing patching mortar or concrete.
3. Epoxy Bonding Agent: Apply to reinforcing bars and concrete by brush, roller, or spray according to manufacturer's written instructions, leaving no pinholes or other uncoated areas. Apply to reinforcing bars in at least two coats, allowing first coat to dry before applying second coat. Apply patching mortar or concrete while epoxy is still tacky. If epoxy dries, recoat before placing patching mortar or concrete.
4. Latex Bonding Agent, Type II: Mix with portland cement and scrub into concrete surface according to manufacturer's written instructions. Apply patching mortar or concrete while bonding agent is still wet. If bonding agent dries, recoat before placing patching mortar or concrete.
5. Latex Bonding Agent, Type I: Apply to concrete by brush roller or spray. Allow to dry before placing patching mortar or concrete.
6. Mortar Scrub-Coat: Dampen repair area and surrounding concrete **6 inches (150 mm)** beyond repair area. Remove standing water and apply scrub-coat with a brush, scrubbing it into surface and thoroughly coating repair area. If scrub-coat dries, recoat before applying patching mortar or concrete.
7. Patching Mortar: Unless otherwise recommended by manufacturer, apply as follows:
 - a. Wet substrate thoroughly and then remove standing water. Scrub a slurry of neat patching mortar mixed with latex bonding agent into substrate, filling pores and voids.
 - b. Place patching mortar by troweling toward edges of patch to force intimate contact with edge surfaces. For large patches, fill edges first and then work toward center, always troweling toward edges of patch. At fully exposed reinforcing bars, force patching mortar to fill space behind bars by compacting with trowel from sides of bars.
 - c. For vertical patching, place material in lifts of not more than **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**, nor less than **1/8 inch (3 mm) OR 1/4 inch (6 mm)**, **as directed**. Do not feather edge.
 - d. For overhead patching, place material in lifts of not more than **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, nor less than **1/8 inch (3 mm) OR 1/4 inch (6 mm)**, **as directed**. Do not feather edge.
 - e. After each lift is placed, consolidate material and screed surface.
 - f. Where multiple lifts are used, score surface of lifts to provide a rough surface for application of subsequent lifts. Allow each lift to reach final set before placing subsequent lifts.

- g. Allow surfaces of lifts that are to remain exposed to become firm and then finish to a smooth **OR** rough, **as directed**, surface with a wood or sponge float **OR** broom or burlap drag, **as directed**.
- h. Wet-cure cementitious patching materials, including polymer-modified, cementitious patching materials, for not less than seven days by water-fog spray or water-saturated absorptive cover.
- 8. Dry-Pack Mortar: Use for deep cavities and where indicated. Unless otherwise recommended by manufacturer, apply as follows:
 - a. Provide forms where necessary to confine patch to required shape.
 - b. Wet substrate and forms thoroughly and then remove standing water.
 - c. Place dry-pack mortar into cavity by hand, and compact into place with a hardwood drive stick and mallet or hammer. Do not place more material at a time than can be properly compacted. Continue placing and compacting until patch is approximately level with surrounding surface.
 - d. After cavity is filled and patch is compacted, trowel surface to match profile and finish of surrounding concrete. A thin coat of patching mortar may be troweled into the surface of patch to help obtain required finish.
 - e. Wet-cure patch for not less than seven days by water-fog spray or water-saturated absorptive cover.
- 9. Concrete: Place according to Division 03 Section "Cast-in-place Concrete" and as follows:
 - a. Apply epoxy-modified, cementitious bonding and anticorrosion agent **OR** epoxy bonding agent, **as directed**, to reinforcement and concrete substrate.
 - b. Apply latex bonding agent **OR** Type I, latex bonding agent **OR** mortar scrub-coat, **as directed**, to concrete substrate.
 - c. Use vibrators to consolidate concrete as it is placed.
 - d. At unformed surfaces, screed concrete to produce a surface that when finished with patching mortar will match required profile and surrounding concrete.
 - e. Where indicated place concrete by form and pump method.
 - 1) Design and construct forms to resist pumping pressure in addition to weight of wet concrete. Seal joints and seams in forms and junctions of forms with existing concrete.
 - 2) Pump concrete into place, releasing air from forms as concrete is introduced. When formed space is full, close air vents and pressurize to **14 psi (96 kPa)**.
 - f. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
 - g. Fill placement cavities with dry-pack mortar and repair voids with patching mortar. Finish to match surrounding concrete.
- 10. Shotcrete: Place according to Division 03 Section "Shotcrete" and as follows:
 - a. Apply epoxy-modified, cementitious bonding and anticorrosion agent **OR** epoxy bonding agent, **as directed**, to reinforcement and concrete substrate.
 - b. Apply latex bonding agent **OR** Type I, latex bonding agent **OR** mortar scrub-coat, **as directed**, to concrete substrate.
 - c. Screed and finish shotcrete to produce a surface matching required profile and surrounding concrete.
- 11. Grouted Preplaced Aggregate Concrete: Use for column and wall repairs **OR** where indicated, **as directed**. Place as follows:
 - a. Design and construct forms to resist pumping pressure in addition to weight of wet grout. Seal joints and seams in forms and junctions of forms with existing concrete.
 - b. Apply epoxy-modified, cementitious bonding and anticorrosion agent **OR** epoxy bonding agent, **as directed**, to reinforcement and concrete substrate.
 - c. Place aggregate in forms, consolidating aggregate as it is placed. Pack aggregate into upper areas of forms to achieve intimate contact with concrete surfaces.
 - d. Fill forms with water to thoroughly dampen aggregate and substrates. Drain water from forms before placing grout.

- e. Pump grout into place at bottom of preplaced aggregate, forcing grout upward. Release air from forms at top as grout is introduced. When formed space is full and grout flows from air vents, close vents and pressurize to **14 psi (96 kPa)**.
- f. Wet-cure concrete for not less than seven days by leaving forms in place or keeping surfaces continuously wet by water-fog spray or water-saturated absorptive cover.
- g. Repair voids with patching mortar and finish to match surrounding concrete.
12. Joint Filler: Install in nonmoving floor joints where indicated.
 - a. Install filler to a depth of at least **3/4 inch (19 mm) OR 1 inch (25 mm) OR 2 inches (50 mm), as directed**. Use fine silica sand no more than **1/4 inch (6 mm)** deep to close base of joint. Do not use sealant backer rods or compressible fillers below joint filler.
 - b. Install filler so that when cured, it is flush at top surface of adjacent concrete. If necessary, overfill joint and remove excess when filler has cured.
13. Epoxy Crack Injection: Comply with manufacturer's written instructions and the following:
 - a. Clean areas to receive capping adhesive of oil, dirt, and other substances that would interfere with bond, and clean cracks with oil-free compressed air or low-pressure water to remove loose particles.
 - b. Place injection ports as recommended by epoxy manufacturer, spacing no farther apart than thickness of member being injected. Seal injection ports in place with capping adhesive.
 - c. Seal cracks at exposed surfaces with a ribbon of capping adhesive at least **1/4 inch (6 mm)** thick by **1 inch (25 mm)** wider than crack.
 - d. Inject cracks wider than **0.003 inch (0.075 mm)** to a depth of **8 inches (200 mm)** or to a width of less than **0.003 inch (0.075 mm)**, whichever is less.
 - e. Inject epoxy adhesive, beginning at widest part of crack and working toward narrower parts. Inject adhesive into ports to refusal, capping adjacent ports when they extrude epoxy. Cap injected ports and inject through adjacent ports until crack is filled.
 - f. After epoxy adhesive has set, remove injection ports and grind surfaces smooth.
14. Corrosion-Inhibiting Treatment: Apply by brush, roller, or airless spray in two coats at manufacturer's recommended application rate. Remove film of excess treatment by high-pressure washing before patching treated concrete or applying a sealer or overlay.
15. Polymer Overlay: Apply according to ACI 503.3.
 - a. Apply to traffic-bearing surfaces, including parking areas and walks.
16. Polymer Sealer: Apply by brush, roller, or airless spray at manufacturer's recommended application rate.
 - a. Apply to traffic-bearing surfaces, including parking areas and walks.
17. Methylmethacrylate Sealer/Brighteners: Apply by brush, roller, or airless spray at manufacturer's recommended application rate.
 - a. Apply to exterior concrete surfaces that are exposed to view, excluding traffic-bearing surfaces.
18. Composite Structural Reinforcement Using Preimpregnated Fiber Sheet: Unless otherwise recommended by manufacturer, apply as follows:
 - a. Patch surface defects with epoxy mortar and allow to set before beginning reinforcement application.
 - b. Apply epoxy adhesive to a thickness of **1/16 inch (1.6 mm)** to prepared concrete surfaces in areas where composite structural reinforcement will be applied.
 - c. Clean preimpregnated fiber sheet with acetone or other suitable solvent, and apply epoxy adhesive to a thickness of **1/16 inch (1.6 mm)**.
 - d. Apply adhesive-coated fiber sheet to adhesive-coated concrete within open time of epoxy adhesive, and roll with a hard rubber roller until fiber sheet is fully embedded in adhesive, air pockets are removed, and adhesive is forced out from beneath fiber sheet at edges.
 - e. Apply additional layers as indicated using same procedure.
19. Composite Structural Reinforcement Using Fiber Tow Sheet and Saturant: Unless otherwise recommended by manufacturer, apply as follows:
 - a. Apply epoxy primer using brush or short nap roller to prepared concrete surfaces in areas where composite structural reinforcement will be applied.

- b. After primer has set, patch surface defects with epoxy filler and allow to set before beginning reinforcement application.
 - c. Apply epoxy saturant to fiber tow sheet or primed and patched surface with **3/8-inch- (10-mm-)** nap roller. Apply fiber tow sheet to primed and patched surface while saturant is still wet, using pressure roller to remove air pockets. Remove paper backing from fiber tow sheet and apply additional epoxy as needed to fully saturate tow sheet.
 - d. Apply additional layers as indicated, fully saturating each with epoxy.
 - e. After saturant has cured, apply protective topcoat by brush, roller or spray.
- D. Field Quality Control
- 1. Testing Agency: Engage a qualified testing agency to sample materials and perform tests as follows:
 - a. Patching Mortar, Packaged Mixes: **<Insert number>** randomly selected samples tested according to ASTM C 928.
 - b. Patching Mortar, Field Mixed: **<Insert number>** randomly selected samples tested for compressive strength according to ASTM C 109/C 109M.
 - c. Concrete: As specified in Division 03 Section "Cast-in-place Concrete".
 - d. Shotcrete: As specified in Division 03 Section "Shotcrete".
 - e. Grouted Preplaced Aggregate: Tested for compressive strength of grout according to ASTM C 942.
 - 1) Testing Frequency: One sample for each **25 cu. yd. (19 cu. m)** of grout or fraction thereof, but not less than one sample for each day's work.
 - f. Joint Filler: Core drilled samples to verify proper installation.
 - 1) Testing Frequency: One sample for each **100 feet (30 m)** of joint filled.
 - 2) Where samples are taken, fill holes with joint filler.
 - g. Epoxy Crack Injection: Core drilled samples to verify proper installation.
 - 1) Testing Frequency: 3 samples from mockup and 1 sample for each **100 feet (30 m)** of crack injected.
 - 2) Where samples are taken, fill holes with epoxy mortar.

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SECTION 03 01 30 71a - SELF-ADHERING SHEET WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for self-adhering sheet waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Modified bituminous sheet waterproofing.
 - b. Modified bituminous sheet waterproofing, fabric reinforced.
 - c. Modified bituminous deck paving sheet waterproofing.
 - d. Modified bituminous composite panel waterproofing.
 - e. Adhesive-coated HDPE sheet waterproofing.
 - f. Molded-sheet drainage panels.
 - g. Insulation.
 - h. Plaza deck pavers and paver pedestals.

C. Submittals

1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
2. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
3. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
4. Special warranties.
5. LEED Submittals:
 - a. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
 - b. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1) Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
 - c. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1) **8-by-8-inch (200-by-200-mm)** square of waterproofing and flashing sheet.
 - 2) **8-by-8-inch (200-by-200-mm)** square of insulation.
 - 3) **4-by-4-inch (100-by-100-mm)** square of drainage panel.
 - 4) Plaza-deck paver, **4-by-4-inch (100-by-100-mm)** square **OR** full sized, **as directed**, in each color and texture required.
 - 5) Paver pedestal assembly.

D. Quality Assurance

1. Installer Qualifications: A firm that is approved or licensed by **OR** acceptable to, **as directed**, waterproofing manufacturer for installation of waterproofing required for this Project.
2. Preinstallation Conference: Conduct conference at Project site.

- a. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

E. Delivery, Storage, And Handling

1. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
2. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
3. Remove and replace liquid materials that cannot be applied within their stated shelf life.
4. Store rolls according to manufacturer's written instructions.
5. Protect stored materials from direct sunlight.

F. Project Conditions

1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

G. Warranty

1. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - a. Warranty Period: Three **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Modified Bituminous Sheet Waterproofing

1. Modified Bituminous Sheet: Not less than **60-mil- (1.5-mm-)** thick, self-adhering sheet consisting of **56 mils (1.4 mm)** of rubberized asphalt laminated to a **4-mil- (0.10-mm-)** thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - a. Physical Properties:
 - 1) Tensile Strength: **250 psi (1.7 MPa)** minimum; ASTM D 412, Die C, modified.
 - 2) Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - 3) Low-Temperature Flexibility: Pass at **minus 20 deg F (minus 29 deg C)**; ASTM D 1970.
 - 4) Crack Cycling: Unaffected after 100 cycles of **1/8-inch (3-mm)** movement; ASTM C 836.
 - 5) Puncture Resistance: **40 lbf (180 N)** minimum; ASTM E 154.
 - 6) Hydrostatic-Head Resistance: **150 feet (45 m)** minimum; ASTM D 5385.
 - 7) Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at **70 deg F (21 deg C)**; ASTM D 570.
 - 8) Vapor Permeance: **0.05 perms (2.9 ng/Pa x s x sq. m)**; ASTM E 96, Water Method.
2. Modified Bituminous Sheet, Fabric Reinforced: **60-mil- (1.5-mm-)** thick, self-adhering sheet consisting of rubberized-asphalt membrane embedded in spun-bonded polyester or fiberglass nonwoven fabric reinforcement laminated to a **0.50-mil- (0.01-mm-)** thick polyester film with release liner on adhesive side.
 - a. Physical Properties:
 - 1) Pliability: No cracks when bent 180 degrees over a **1-inch (25-mm)** mandrel at **minus 25 deg F (minus 32 deg C)**; ASTM D 146.
 - 2) Hydrostatic-Head Resistance: **150 feet (45 m)** minimum.
 - 3) Vapor Permeance: **0.05 perms (2.9 ng/Pa x s x sq. m)**; ASTM E 96, Water Method.

- B. Modified Bituminous Deck Paving Sheet Waterproofing
1. Modified Bituminous Deck Paving Sheet: Provide one of the products described below, **as directed**:
 - a. **65-mil- (1.6-mm-)** thick, self-adhering sheets consisting of **53 to 56 mils (1.3 to 1.4 mm)** of rubberized asphalt laminated to a heat-resisting, **9- to 12-mil- (0.2- to 0.3-mm-)** thick, woven polypropylene geotextile reinforcement with release liner on adhesive side.
 - b. **70-mil- (1.8-mm-)** thick, self-adhering sheets consisting of rubberized asphalt embedded in inert fabric reinforcement laminated to a reflective geotextile protective topping with release liner on adhesive side.
 - c. **60-mil- (1.5-mm-)** thick, self-adhering sheets consisting of rubberized asphalt embedded in nonwoven **OR** woven, **as directed**, fiberglass fabric reinforcement laminated to a **0.50-mil- (0.01-mm-)** thick polyester mat with release liner on adhesive side.
 - d. Physical Properties:
 - 1) Tensile Strength, Membrane: **50 lbf/in (8.75 kN/m)** minimum; ASTM D 882.
 - 2) Pliability: Unaffected when bent 180 degrees over a **1/4-inch (6.4-mm)** mandrel at **minus 15 deg F (minus 26 deg C)**; ASTM D 146.
 - 3) Puncture Resistance, Mesh: **200 lbf (890 N)** minimum; ASTM E 154.
- C. Modified Bituminous Composite Panel Waterproofing
1. Modified Bituminous Composite Panel: **90-mil- (2.2-mm-)** thick, multilaminated panel consisting of a protection course bonded to an asphalt saturated carrier sheet bonded to a rubberized asphalt waterproofing self-adhering membrane with release liner.
- D. Adhesive-Coated HDPE Sheet Waterproofing
1. Adhesive-Coated HDPE Sheet for Vertical Applications: **32-mil- (0.8-mm-)** thick, uniform, flexible sheets consisting of **16-mil- (0.4-mm-)** thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, and a release liner with the following physical properties:
 - a. Tensile Strength, Film: **4000 psi (27.6 MPa)** minimum; ASTM D 412.
 - b. Low-Temperature Flexibility: Pass at **minus 10 deg F (minus 23 deg C)**; ASTM D 1970.
 - c. Peel Adhesion to Concrete: **5 lbf/in. (875 N/m)**; ASTM D 903, modified.
 - d. Lap Adhesion: **2.5 lbf/in. (440 N/m)**; ASTM D 1876, modified.
 - e. Hydrostatic-Head Resistance: **231 feet (70 m)**; ASTM D 5385, modified.
 - f. Vapor Permeance: **0.01 perms (0.6 ng/Pa x s x sq. m)**; ASTM E 96, Water Method.
 - g. Water Absorption: 0.5 percent; ASTM D 570.
 2. Adhesive-Coated HDPE Sheet for Horizontal Applications: **46-mil- (1.2-mm-)** thick, uniform, flexible sheets consisting of **30-mil- (0.76-mm-)** thick, HDPE sheet coated with a pressure-sensitive rubber adhesive, a protective adhesive coating, a detackifying surface treatment, an uncoated self-adhering side lap strip, and a release liner with the following physical properties:
 - a. Tensile Strength, Film: **4000 psi (27.6 MPa)** minimum; ASTM D 412.
 - b. Low-Temperature Flexibility: Pass at **minus 10 deg F (minus 23 deg C)**; ASTM D 1970.
 - c. Peel Adhesion to Concrete: **5 lbf/in. (875 N/m)**; ASTM D 903, modified.
 - d. Lap Adhesion: **2.5 lbf/in. (440 N/m)**; ASTM D 1876, modified.
 - e. Hydrostatic-Head Resistance: **231 feet (70 m)**; ASTM D 5385, modified.
 - f. Vapor Permeance: **0.01 perms (0.6 ng/Pa x s x sq. m)**; ASTM E 96, Water Method.
 - g. Water Absorption: 0.5 percent; ASTM D 570.
- E. Auxiliary Materials
1. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - a. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
 2. Primer: Liquid waterborne **OR** solvent-borne, **as directed**, primer recommended for substrate by manufacturer of sheet waterproofing material.
 3. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.

4. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, trowel grade or low viscosity.
 5. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
 6. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
 7. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
 - a. Detail Tape: Two-sided, pressure-sensitive, self-adhering reinforced tape, 4-1/2 inches (114 mm) wide, with a tack-free protective adhesive coating on one side and release film on self-adhering side.
 - b. Detail Strips: 62.5-mil- (1.58-mm-) thick, felt-reinforced self-adhesive strip, 9 inches (229 mm) wide, with release film on adhesive side.
 8. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.
 9. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - a. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
 - b. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.
 10. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced one side or both sides with plastic film, nominal thickness 1/4 inch (6 mm), with compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.
 11. Protection Course: Unfaced, fan-folded, extruded-polystyrene board insulation, nominal thickness 1/4 inch (6 mm) with compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621.
 12. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.
 13. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, 1-inch (25-mm) minimum thickness.
- F. Molded-Sheet Drainage Panels
1. Molded-Sheet Drainage Panel: Comply with Division 33 Section "Subdrainage".
 2. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).
 3. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding No. 40 (0.425-mm) sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than 2.8 gpm per ft. (35 L/min. per m).
- G. Insulation
1. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, square or shiplap edged.
 - a. Type IV, 25-psi (173-kPa) minimum compressive strength.
 - b. Type VI, 40-psi (276-kPa) minimum compressive strength.
 - c. Type VII, 60-psi (414-kPa) minimum compressive strength.
 - d. Type V, 100-psi (690-kPa) minimum compressive strength.
 2. Unfaced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, 25-psi (173-kPa) or Type VI, 40-psi (276-kPa) minimum compressive

- strength; unfaced; fabricated with shiplap or channel edges and with 1 side having grooved drainage channels.
3. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa)** or Type VI, **40-psi (276-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with 1 side having grooved drainage channels faced with nonwoven geotextile filter fabric.
 4. Unfaced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa)** **OR** Type VII, **60-psi (414-kPa)**, **as directed**, minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with 1 side having ribbed drainage channels.
 5. Geotextile-Faced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, **60-psi (414-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with 1 side having grooved drainage channels faced with manufacturer's standard, nonwoven geotextile filter fabric.
- H. Plaza Deck Pavers
1. Plaza Deck Pavers: Brick **OR** Concrete **OR** Asphalt-Block, **as directed**, pavers specified in Division 32 Section "Unit Paving".
 2. Plaza Deck Pavers: Granite **OR** Limestone **OR** Marble **OR** Quartz-Based Stone **OR** Slate, **as directed**, pavers specified in Division 09 Section "Stone Flooring".
 3. Plaza Deck Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, manufactured for use as plaza deck pavers; minimum compressive strength **7500 psi (52 mpa)** **or** **6500 psi (45 mpa)**, **as directed**, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 - a. Thickness: **1-5/8 inches (41 mm)** **OR** **1-3/4 inches (45 mm)** **OR** **2 inches (51 mm)** **OR** **2-3/8 inches (60 mm)**, **as directed**.
 - b. Face Size: **8-7/8 inches (225 mm)** square **OR** **9 inches (229 mm)** square **OR** **9 by 18 inches (229 by 457 mm)** **OR** **12 inches (305 mm)** square **OR** **12 by 24 inches (305 by 610 mm)** **OR** **18 inches (457 mm)** square **OR** **24 inches (610 mm)** square **OR** As indicated, **as directed**.
 - c. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 4. Setting Bed: Provide aggregate **OR** mortar **OR** bituminous, **as directed**, setting-bed materials specified in Division 32 Section "Unit Paving".
 5. Paver Pedestals: Paver manufacturer's standard SBR rubber, HDPE, or polyurethane paver support assembly, including fixed-height **OR** adjustable or stackable, **as directed**, pedestals, shims, and spacer tabs for joint spacing of **1/8 inch (3 mm)** **OR** **3/16 inch (5 mm)** **OR** **1/8 to 3/16 inch (3 to 5 mm)**, **as directed**.
 - a. Concrete Fill: ACI 301, compressive strength of **5000 psi (34 MPa)** at 28 days and air content of 6 percent.

1.3 EXECUTION

- A. Surface Preparation
1. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
 2. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
 3. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
 4. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
 5. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

- a. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of **1/16 inch (1.6 mm)** or **1/8 inch (3 mm)** for modified bituminous deck paving waterproofing.
 6. Bridge and cover isolation joints, expansion joints, and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips.
 - a. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.
 7. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
 - a. Install membrane strips centered over vertical inside corners. Install **3/4-inch (19-mm)** fillets of liquid membrane on horizontal inside corners and as follows:
 - 1) At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
 - 2) At plaza deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
 8. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.
- B. Modified Bituminous Sheet Waterproofing Application
1. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.
 2. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
 3. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform **2-1/2-inch- (64-mm-)** minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 - a. When ambient and substrate temperatures range between **25 and 40 deg F (minus 4 and plus 5 deg C)**, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than **60 deg F (16 deg C)**.
 4. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths to provide a minimum of 2 thicknesses of sheet membrane over areas to receive waterproofing.
 5. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
 6. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
 7. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
 8. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
 9. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending **6 inches (150 mm)** beyond repaired areas in all directions.
 10. Install protection course with butted joints over waterproofing membrane immediately.
 - a. Molded-sheet drainage panels **OR** Insulation drainage panels **OR** Board insulation, **as directed**, may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
 11. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- C. Modified Bituminous Deck Paving Sheet Waterproofing Application
1. Install modified bituminous deck paving sheets according to waterproofing manufacturer's written instructions.
 2. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

3. Apply and firmly adhere sheets over areas to receive waterproofing. Accurately align sheets and maintain uniform **2-1/2-inch- (64-mm-)** minimum lap widths and **6-inch (150-mm)** end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
 4. Apply sheet waterproofing from low point to high point of decks to ensure that side laps shed water.
 5. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
 6. Seal edges of sheet waterproofing terminations with mastic.
 7. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
 8. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending **6 inches (150 mm)** beyond repaired areas in all directions.
 9. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- D. Modified Bituminous Composite Panel Waterproofing Application
1. Install modified bituminous composite panels according to waterproofing manufacturer's written instructions.
 2. Apply primer to substrate at required rate and allow to dry. Limit priming to areas that will be covered by waterproofing in same day. Reprime areas exposed for more than 24 hours.
 3. Install and firmly adhere composite panels over area to receive waterproofing. Accurately align and butt vertical and horizontal joints.
 4. Seal vertical and horizontal butt joints and exposed top, side, and bottom edges at composite panel waterproofing terminations with detail strips.
 5. Correct deficiencies in or remove composite panel waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair detail strips.
- E. Adhesive-Coated HDPE Sheet Waterproofing Application
1. Install adhesive-coated HDPE sheets according to manufacturer's written instructions.
 2. Place and secure molded-sheet drainage panels over substrate. Lap edges and ends of geotextile to maintain continuity.
 3. Vertical Applications: Install adhesive-coated HDPE sheet with HDPE face against substrate. Accurately align sheets and maintain uniform **3-inch- (75-mm-)** minimum lap widths and end laps. Overlap and seal seams and stagger and tape end laps to ensure watertight installation. Mechanically fasten to substrate.
 - a. Securely fasten top termination of membrane with continuous metal termination bar anchored into substrate and cover with detailing tape.
 4. Horizontal Applications: Install adhesive-coated HDPE sheet with HDPE face against substrate. Accurately align sheets and maintain uniform **3-inch- (75-mm-)** minimum lap widths and end laps. Overlap and seal seams. Overlap, stagger, and seal end laps with detail tape to ensure watertight installation.
 5. Corners: Seal lapped terminations and cut edges of sheet waterproofing at inside and outside corners with detail tape.
 6. Seal penetrations through sheet waterproofing to provide watertight seal with detail tape patches or wraps and a liquid-membrane troweling.
 7. Install sheet waterproofing and auxiliary materials to produce a continuous watertight tie into adjacent waterproofing.
 8. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Tape perimeter of damaged or nonconforming area extending **6 inches (150 mm)** beyond repaired areas in all directions. Apply a patch of sheet waterproofing and firmly secure with detail tape.
 9. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- F. Molded-Sheet Drainage Panel Installation
1. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives or mechanical

fasteners that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

- a. For vertical applications, install board insulation **OR** protection course, **as directed**, before installing drainage panels.

G. Insulation Installation

1. Install one or more layers of board insulation to achieve required thickness and insulation drainage panels over waterproofed surfaces. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.
2. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.
3. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

H. Plaza Deck Paver Installation

1. Setting Bed: Install setting bed in locations and of thickness indicated to comply with requirements in Division 32 Section(s) "Unit Paving" OR Division 09 Section(s) "Stone Flooring", **as directed**.
2. Install concrete pavers in locations indicated according to manufacturer's written instructions.
3. Accurately install fixed **OR** adjustable, **as directed**, -height paver pedestals and accessories in locations and to elevations required. Adjust for final level and slope with shims.
 - a. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.
4. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - a. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
5. Install pavers to not vary more than **1/16 inch (1.6 mm)** in elevation between adjacent pavers or more than **1/16 inch (1.6 mm)** from surface plane elevation of individual paver.
6. Maintain tolerances of paving installation within **1/4 inch in 10 feet (1:48)** of surface plane in any direction.

I. Field Quality Control

1. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood to an average depth of **2-1/2 inches (64 mm)** with a minimum depth of **1 inch (25 mm)** and not exceeding a depth of **4 inches (100 mm)**. Maintain **2 inches (51 mm)** of clearance from top of sheet flashings.
 - b. Flood each area for 24 **OR** 48 **OR** 72, **as directed**, hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
2. Engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

J. Protection And Cleaning

1. Do not permit foot or vehicular traffic on unprotected membrane.
2. Protect waterproofing from damage and wear during remainder of construction period.
3. Protect installed board insulation **OR** insulation drainage panels, **as directed**, from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
4. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 03 01 30 71a

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Task	Specification	Specification Description
03 01 30 71	01 22 16 00	No Specification Required

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SECTION 03 05 13 00 - CAST-IN-PLACE CONCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cast-in-place concrete. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - a. Footings.
 - b. Foundation walls.
 - c. Slabs-on-grade.
 - d. Suspended slabs.
 - e. Concrete toppings.
 - f. Building frame members.
 - g. Building walls.

C. Definitions

1. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements and for equivalent concrete mixtures that do not contain portland cement replacements.
3. Design Mixtures: For each concrete mixture.
4. Shop Drawings: For steel reinforcement and formwork. Material test reports **OR** certificates, **as directed**.

E. Quality Assurance

1. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
2. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, **as directed**, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
3. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - a. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 **OR** Sections 1 through 5 and Section 7, "Lightweight Concrete", **as directed**.
 - b. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
4. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

5. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement, **as directed**.
2. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.2 PRODUCTS

A. Form-Facing Materials

1. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
2. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
3. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
4. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
5. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
6. Chamfer Strips: Wood, metal, PVC, or rubber strips, **3/4 by 3/4 inch (19 by 19 mm)**, minimum.
7. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
8. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - a. Formulate form-release agent with rust inhibitor for steel form-facing materials.
9. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - a. Furnish units that will leave no corrodible metal closer than **1 inch (25 mm)** to the plane of exposed concrete surface.
 - b. Furnish ties that, when removed, will leave holes no larger than **1 inch (25 mm)** in diameter in concrete surface.
 - c. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

B. Steel Reinforcement

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than **25 OR 60, as directed**, percent.
2. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
3. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
4. Galvanized Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420) OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 767/A 767M, Class I **OR** II, **as directed**, zinc coated after fabrication and bending.
5. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420) OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 775/A 775M **OR** ASTM A 934/A 934M, **as directed**, epoxy coated, with less than 2 percent damaged coating in each **12-inch (300-mm)** bar length.
6. Stainless-Steel Reinforcing Bars: ASTM A 955/A 955M, **Grade 60 (Grade 420)**, Type 304 **OR** 316L, **as directed**, deformed.

7. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, **Grade 60 (Grade 420) OR** ASTM A 706/A 706M, **as directed**, deformed bars, assembled with clips.
 8. Plain-Steel Wire: ASTM A 82, as drawn **OR** galvanized, **as directed**.
 9. Deformed-Steel Wire: ASTM A 496.
 10. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, as-drawn, plain-steel-wire **OR** deformed-steel wire, **as directed**, with less than 2 percent damaged coating in each **12-inch (300-mm)** wire length.
 11. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, plain, fabricated from as-drawn steel wire into flat sheets.
 12. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
 13. Galvanized-Steel Welded Wire Reinforcement: ASTM A 1064, plain, fabricated from galvanized steel wire into flat sheets.
 14. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A coated, Type 1, plain **OR** deformed, **as directed**, steel.
- C. Reinforcement Accessories
1. Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, plain-steel bars, cut bars true to length with ends square and free of burrs.
 2. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, plain-steel bars, ASTM A 775/A 775M epoxy coated.
 3. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
 4. Zinc Repair Material: ASTM A 780, zinc-based solder, paint containing zinc dust, or sprayed zinc.
 5. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
 - b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
 - c. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.
- D. Concrete Materials
1. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - a. Portland Cement: ASTM C 150, Type I **OR** II **OR** I/II **OR** III **OR** V, **as directed**, gray **OR** white, **as directed**. Supplement with the following:
 - 1) Fly Ash: ASTM C 618, Class C **OR** F, **as directed**.
 - 2) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** IP, portland-pozzolan **OR** I (PM), pozzolan-modified portland **OR** I (SM), slag-modified Portland, **as directed**, cement.
 2. Silica Fume: ASTM C 1240, amorphous silica.
 3. Normal-Weight Aggregates: ASTM C 33, graded, **1-1/2-inch (38-mm) OR 1-inch (25-mm) OR 3/4-inch (19-mm)**, **as directed**, nominal maximum coarse-aggregate size.
 - a. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 4. Lightweight Aggregate: ASTM C 330, **1-inch (25-mm) OR 3/4-inch (19-mm) OR 1/2-inch (13-mm) OR 3/8-inch (10-mm)**, **as directed**, nominal maximum aggregate size.
 5. Water: ASTM C 94/C 94M and potable, **as directed**.
- E. Admixtures
1. Air-Entraining Admixture: ASTM C 260.

2. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - b. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - d. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - e. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - f. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
 3. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
 4. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
 5. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, **as directed**, nonfading, and resistant to lime and other alkalis.
 - a. Color: As indicated by manufacturer's designation **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
- F. Fiber Reinforcement
1. Carbon-Steel Fiber: ASTM A 820, deformed, minimum of **1.5 inches (38 mm) OR 2 inches (50 mm) OR 2.4 inches (60 mm)**, **as directed**, long, and aspect ratio of 35 to 40 **OR** 45 to 50 **OR** 60 to 65, **as directed**.
 - a. Fiber: Type 1, cold-drawn wire **OR** 2, cut sheet, **as directed**.
 2. Synthetic Micro-Fiber: Monofilament or fibrillated polypropylene micro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/ C 1116M , Type III, **1/2 to 1-1/2 inches (13 to 38 mm) OR 1 to 2-1/4 inches (25 to 57 mm)** long.
 3. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, **1 to 2-1/4 inches (25 to 57 mm)** long.
- G. Waterstops
1. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, **as directed**, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
 - a. Profile: Flat, dumbbell with center bulb **OR** Flat, dumbbell without center bulb **OR** Ribbed with center bulb **OR** Ribbed without center bulb **OR** As indicated, **as directed**.
 - b. Dimensions: **4 inches by 3/16 inch thick (100 mm by 4.75 mm thick) OR 6 inches by 3/8 inch thick (150 mm by 10 mm thick) OR 9 inches by 3/8 inch thick (225 mm by 10 mm thick)**, **as directed**; nontapered.
 2. Chemically Resistant Flexible Waterstops: Thermoplastic elastomer rubber waterstops with factory-installed metal eyelets, **as directed**, for embedding in concrete to prevent passage of fluids through joints; resistant to oils, solvents, and chemicals. Factory fabricate corners, intersections, and directional changes.
 - a. Profile: Flat, dumbbell with center bulb **OR** Flat, dumbbell without center bulb **OR** Ribbed with center bulb **OR** Ribbed without center bulb **OR** As indicated, **as directed**.
 - b. Dimensions: **4 inches by 3/16 inch thick (100 mm by 4.75 mm thick) OR 6 inches by 3/16 inch thick (150 mm by 4.75 mm thick) OR 6 inches by 3/8 inch thick (150 mm by 10 mm thick) OR 9 inches by 3/16 inch thick (225 mm by 4.75 mm thick) OR 9 inches by 3/8 inch thick (225 mm by 10 mm thick)**, **as directed**; nontapered.
 3. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, **as directed**, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

- a. Profile: Flat, dumbbell with center bulb **OR** Flat, dumbbell without center bulb **OR** Ribbed with center bulb **OR** Ribbed without center bulb **OR** As indicated, **as directed**.
 - b. Dimensions: **4 inches by 3/16 inch thick (100 mm by 4.75 mm thick) OR 6 inches by 3/8 inch thick (150 mm by 10 mm thick) OR 9 inches by 3/8 inch thick (225 mm by 10 mm thick), as directed**; nontapered.
 4. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, **3/4 by 1 inch (19 by 25 mm)**.
 5. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, **3/8 by 3/4 inch (10 by 19 mm)**.
- H. Vapor Retarders
1. Plastic Vapor Retarder:
 - a. ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - b. ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - c. ASTM E 1745, Class C, or polyethylene sheet, ASTM D 4397, not less than **10 mils (0.25 mm) thick, as directed**. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
 2. Bituminous Vapor Retarder: **110-mil- (2.8-mm-)** thick, semiflexible, 7-ply sheet membrane consisting of reinforced core and carrier sheet with fortified asphalt layers, protective weathercoating, and removable plastic release liner. Furnish manufacturer's accessories including bonding asphalt, pointing mastics, and self-adhering joint tape.
 - a. Water-Vapor Permeance: **0.00 grains/h x sq. ft. x inches Hg (0.00 ng/Pa x s x sq. m)**; ASTM E 154.
 - b. Tensile Strength: **140 lbf/in. (24.5 kN/m)**; ASTM E 154.
 - c. Puncture Resistance: **90 lbf (400N)**; ASTM E 154.
 3. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a **1-1/2-inch (37.5-mm)** sieve and 0 to 5 percent passing a **No. 8 (2.36-mm)** sieve.
 4. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a **3/8-inch (9.5-mm)** sieve, 10 to 30 percent passing a **No. 100 (0.15-mm)** sieve, and at least 5 percent passing **No. 200 (0.075-mm)** sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.
- I. Floor And Slab Treatments
1. Slip-Resistive Emery Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive, crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials with 100 percent passing **3/8-inch (9.5-mm) OR No. 4 (4.75-mm) OR No. 8 (2.36-mm), as directed**, sieve.
 2. Slip-Resistive Aluminum Granule Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of not less than 95 percent fused aluminum-oxide granules.
 3. Emery Dry-Shake Floor Hardener: Pigmented **OR** Unpigmented, **as directed**, factory-packaged, dry combination of portland cement, graded emery aggregate, and plasticizing admixture; with emery aggregate consisting of no less than 60 percent of total aggregate content.
 - a. Color: As indicated by manufacturer's designation **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 4. Metallic Dry-Shake Floor Hardener: Pigmented **OR** Unpigmented, **as directed**, factory-packaged, dry combination of portland cement, graded metallic aggregate, rust inhibitors, and plasticizing admixture; with metallic aggregate consisting of no less than 65 percent of total aggregate content.

- a. Color: As indicated by manufacturer's designation **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 5. Unpigmented Mineral Dry-Shake Floor Hardener: Factory-packaged dry combination of portland cement, graded quartz aggregate, and plasticizing admixture.
 6. Pigmented Mineral Dry-Shake Floor Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
 - a. Color: As indicated by manufacturer's designation **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 7. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
- J. Liquid Floor Treatments
1. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
 2. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
- K. Curing Materials
1. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd. (305 g/sq. m)** when dry.
 3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 4. Water: Potable.
 5. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 6. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering, **as directed**.
 7. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering, **as directed**.
 8. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
 9. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.
- L. Related Materials
1. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber **OR** ASTM D 1752, cork or self-expanding cork, **as directed**.
 2. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 **OR** aromatic polyurea with a Type A shore durometer hardness range of 90 to 95, **as directed**, per ASTM D 2240.
 3. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
 4. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - a. Types I and II, non-load bearing **OR** IV and V, load bearing, **as directed**, for bonding hardened or freshly mixed concrete to hardened concrete.
 5. Reglets: Fabricate reglets of not less than **0.0217-inch- (0.55-mm-)** thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

6. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than **0.0336 inch (0.85 mm)** thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

M. Repair Materials

1. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/8 inch (3.2 mm)** and that can be feathered at edges to match adjacent floor elevations.
 - a. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - b. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - c. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch (3.2 to 6 mm)** or coarse sand as recommended by underlayment manufacturer.
 - d. Compressive Strength: Not less than **4100 psi (29 MPa)** at 28 days when tested according to ASTM C 109/C 109M.
2. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from **1/8 inch (3.2 mm)** and that can be feathered at edges to match adjacent floor elevations.
 - a. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - b. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - c. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch (3.2 to 6 mm)** or coarse sand as recommended by topping manufacturer.
 - d. Compressive Strength: Not less than **5000 psi (34.5 MPa)** at 28 days when tested according to ASTM C 109/C 109M.

N. Concrete Mixtures, General

1. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - a. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
2. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent **OR** Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows, **as directed**
 - a. Fly Ash: 25 percent.
 - b. Combined Fly Ash and Pozzolan: 25 percent.
 - c. Ground Granulated Blast-Furnace Slag: 50 percent.
 - d. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
 - e. Silica Fume: 10 percent.
 - f. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
 - g. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
3. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 **OR** 0.15 **OR** 0.30 **OR** 1.00, **as directed**, percent by weight of cement.
4. Admixtures: Use admixtures according to manufacturer's written instructions.
 - a. Use water-reducing **OR** high-range water-reducing **OR** plasticizing, **as directed**, admixture in concrete, as required, for placement and workability.
 - b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

- c. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - d. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
5. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

O. Concrete Mixtures For Building Elements

1. Footings: Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: 5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed, at 28 days.
 - b. Maximum Water-Cementitious Materials Ratio: 0.50 OR 0.45 OR 0.40, as directed.
 - c. Slump Limit: 4 inches (100 mm) OR 5 inches (125 mm) OR 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, as directed, plus or minus 1 inch (25 mm).
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) OR 3/4-inch (19-mm), as directed, nominal maximum aggregate size.
2. Foundation Walls: Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: 5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed, at 28 days.
 - b. Maximum Water-Cementitious Materials Ratio: 0.50 OR 0.45 OR 0.40, as directed.
 - c. Slump Limit: 4 inches (100 mm) OR 5 inches (125 mm) OR 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, as directed, plus or minus 1 inch (25 mm).
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) OR 3/4-inch (19-mm), as directed, nominal maximum aggregate size.
3. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: 5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed, at 28 days.
 - b. Minimum Cementitious Materials Content: 470 lb/cu. yd. (279 kg/cu. m) OR 520 lb/cu. yd. (309 kg/cu. m) OR 540 lb/cu. yd. (320 kg/cu. m), as directed.
 - c. Slump Limit: 4 inches (100 mm) OR 5 inches (125 mm), as directed, plus or minus 1 inch (25 mm).
 - d. Air Content
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) OR 3/4-inch (19-mm), as directed, nominal maximum aggregate size.
 - 3) Do not allow air content of troweled finished floors to exceed 3 percent.
 - e. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of 50 lb/cu. yd. (29.7 kg/cu. m).
 - f. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m) OR 1.5 lb/cu. yd. (0.90 kg/cu. m), as directed.
4. Suspended Slabs: Proportion normal-weight concrete mixture as follows:
 - a. Minimum Compressive Strength: 5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed, at 28 days.

- b. Minimum Cementitious Materials Content: **470 lb/cu. yd. (279 kg/cu. m) OR 520 lb/cu. yd. (309 kg/cu. m) OR 540 lb/cu. yd. (320 kg/cu. m), as directed.**
 - c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm), as directed**, plus or minus **1 inch (25 mm)**.
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for **1-1/2-inch (38-mm)** nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for **1-inch (25-mm) OR 3/4-inch (19-mm), as directed**, nominal maximum aggregate size.
 - 3) Do not allow air content of troweled finished floors to exceed 3 percent.
 - e. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of **50 lb/cu. yd. (29.7 kg/cu. m)**.
 - f. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than **1.0 lb/cu. yd. (0.60 kg/cu. m) OR 1.5 lb/cu. yd. (0.90 kg/cu. m), as directed.**
5. Suspended Slabs: Proportion structural lightweight concrete mixture as follows:
- a. Minimum Compressive Strength: **5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed**, at 28 days.
 - b. Calculated Equilibrium Unit Weight: **115 lb/cu. ft. (1842 kg/cu. m) OR 110 lb/cu. ft. (1762 kg/cu. m) OR 105 lb/cu. ft. (1682 kg/cu. m), as directed**, plus or minus **3 lb/cu. ft. (48.1 kg/cu. m)** as determined by ASTM C 567.
 - c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm), as directed**, plus or minus **1 inch (25 mm)**.
 - d. Air Content:
 - 1) 6 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size greater than **3/8 inch (10 mm)**.
 - 2) 7 percent, plus or minus 2 percent at point of delivery for nominal maximum aggregate size **3/8 inch (10 mm)** or less.
 - 3) Do not allow air content of troweled finished floors to exceed 3 percent.
 - e. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of **50 lb/cu. yd. (29.7 kg/cu. m)**.
 - f. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than **1.0 lb/cu. yd. (0.60 kg/cu. m) OR 1.5 lb/cu. yd. (0.90 kg/cu. m), as directed.**
6. Concrete Toppings: Proportion normal-weight concrete mixture as follows:
- a. Minimum Compressive Strength: **5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed**, at 28 days.
 - b. Minimum Cementitious Materials Content: **470 lb/cu. yd. (279 kg/cu. m) OR 520 lb/cu. yd. (309 kg/cu. m) OR 540 lb/cu. yd. (320 kg/cu. m), as directed.**
 - c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm), as directed**, plus or minus **1 inch (25 mm)**.
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for **1-1/2-inch (38-mm)** nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for **1-inch (25-mm) OR 3/4-inch (19-mm), as directed**, nominal maximum aggregate size.
 - 3) Do not allow air content of troweled finished toppings to exceed 3 percent.
 - e. Steel-Fiber Reinforcement: Add to concrete mixture, according to manufacturer's written instructions, at a rate of **50 lb/cu. yd. (29.7 kg/cu. m)**.
 - f. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than **1.0 lb/cu. yd. (0.60 kg/cu. m) OR 1.5 lb/cu. yd. (0.90 kg/cu. m), as directed.**
7. Building Frame Members: Proportion normal-weight concrete mixture as follows:
- a. Minimum Compressive Strength: **5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed**, at 28 days.
 - b. Maximum Water-Cementitious Materials Ratio: **0.50 OR 0.45 OR 0.40, as directed.**

- c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm) OR 8 inches (200 mm)** for concrete with verified slump of **2 to 4 inches (50 to 100 mm)** before adding high-range water-reducing admixture or plasticizing admixture, **as directed**, plus or minus **1 inch (25 mm)**.
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for **1-1/2-inch (38-mm)** nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for **1-inch (25-mm) OR 3/4-inch (19-mm)**, **as directed**, nominal maximum aggregate size.
8. Building Walls: Proportion normal-weight concrete mixture as follows:
- a. Minimum Compressive Strength: **5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa)**, **as directed**, at 28 days.
 - b. Maximum Water-Cementitious Materials Ratio: **0.50 OR 0.45 OR 0.40**, **as directed**.
 - c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm) OR 8 inches (200 mm)** for concrete with verified slump of **2 to 4 inches (50 to 100 mm)** before adding high-range water-reducing admixture or plasticizing admixture, **as directed**, plus or minus **1 inch (25 mm)**.
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for **1-1/2-inch (38-mm)** nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for **1-inch (25-mm) OR 3/4-inch (19-mm)**, **as directed**, nominal maximum aggregate size.
- P. Fabricating Reinforcement
- 1. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- Q. Concrete Mixing
- 1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, **as directed**, and furnish batch ticket information.
 - a. When air temperature is between **85 and 90 deg F (30 and 32 deg C)**, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F (32 deg C)**, reduce mixing and delivery time to 60 minutes.
 - 2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - a. For mixer capacity of **1 cu. yd. (0.76 cu. m)** or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - b. For mixer capacity larger than **1 cu. yd. (0.76 cu. m)**, increase mixing time by 15 seconds for each additional **1 cu. yd. (0.76 cu. m)**.
 - c. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

1.3 EXECUTION

A. Formwork

- 1. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- 2. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- 3. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - a. Class A, **1/8 inch (3.2 mm)** for smooth-formed finished surfaces.

1. Comply with **ACI 318 (ACI 318M)** and ACI 301 for design, installation, and removal of shoring and reshoring.
 - a. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
 2. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
 3. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.
- E. Vapor Retarders
1. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - a. Lap joints **6 inches (150 mm)** and seal with manufacturer's recommended tape.
 2. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.
 3. Granular Course: Cover vapor retarder with granular fill **OR** fine-graded granular material, **as directed**, moisten, and compact with mechanical equipment to elevation tolerances of plus **0 inch (0 mm)** or minus **3/4 inch (19 mm)**.
 - a. Place and compact a **1/2-inch- (13-mm-)** thick layer of fine-graded granular material over granular fill.
- F. Steel Reinforcement
1. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - a. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
 3. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 - a. Weld reinforcing bars according to AWS D1.4, where indicated.
 4. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
 5. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
 6. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.
 7. Zinc-Coated Reinforcement: Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized steel wire ties to fasten zinc-coated steel reinforcement.
- G. Joints
1. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Owner.
 - a. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - b. Form keyed joints as indicated. Embed keys at least **1-1/2 inches (38 mm)** into concrete.
 - c. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - d. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

- e. Space vertical joints in walls, **as directed**. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - f. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - g. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 3. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - a. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of **1/8 inch (3.2 mm)**. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - b. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3.2-mm-)** wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 4. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - a. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
 - b. Terminate full-width joint-filler strips not less than **1/2 inch (13 mm)** or more than **1 inch (25 mm)** below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants", are indicated.
 - c. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
 5. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- H. Waterstops
1. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
 2. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.
- I. Concrete Placement
1. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
 2. Do not add water to concrete during delivery, at Project site, or during placement unless approved by the Owner.
 3. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - a. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
 4. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - a. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - b. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - c. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least **6**

inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

5. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - a. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - b. Maintain reinforcement in position on chairs during concrete placement.
 - c. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - d. Slope surfaces uniformly to drains where required.
 - e. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
 6. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - a. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - b. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
 7. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - a. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- J. Finishing Formed Surfaces
1. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - a. Apply to concrete surfaces not exposed to public view.
 2. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - a. Apply to concrete surfaces exposed to public view, **OR** to receive a rubbed finish, **OR** to be covered with a coating or covering material applied directly to concrete, **as directed**.
 3. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - a. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - b. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

- c. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
 4. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- K. Finishing Floors And Slabs
1. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
 2. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of **1/4 inch (6 mm)** in 1 direction.
 - a. Apply scratch finish to surfaces indicated and to receive concrete floor toppings **OR** to receive mortar setting beds for bonded cementitious floor finishes, **as directed**.
 3. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - a. Apply float finish to surfaces indicated **OR** to receive trowel finish **OR** to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo, **as directed**.
 4. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 - a. Apply a trowel finish to surfaces indicated **OR** exposed to view **OR** to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system, **as directed**.
 - b. Finish surfaces to the following tolerances, according to **ASTM E 1155 (ASTM E 1155M)**, for a randomly trafficked floor surface:
 - 1) Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
 - 2) Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - 3) Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - 4) Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.
 - c. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, **10-foot- (3.05-m-)** long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed **1/4 inch (6 mm) OR 3/16 inch (4.8 mm) OR 1/8 inch (3.2 mm), as directed**.
 5. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated **OR** where ceramic or quarry tile is to be installed by either thickset or thin-set method, **as directed**. While concrete is still plastic, slightly scarify surface with a fine broom.
 - a. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
 6. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 - a. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with the Owner before application.

7. Slip-Resistive Finish: Before final floating, apply slip-resistive aggregate **OR** aluminum granule, **as directed**, finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
 - a. Uniformly spread **25 lb/100 sq. ft. (12 kg/10 sq. m)** of dampened slip-resistive aggregate **OR** aluminum granules, **as directed**, over surface in 1 or 2 applications. Tamp aggregate flush with surface, but do not force below surface.
 - b. After broadcasting and tamping, apply float finish.
 - c. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aggregate **OR** aluminum granules, **as directed**.
 8. Dry-Shake Floor Hardener Finish: After initial floating, apply dry-shake floor hardener to surfaces according to manufacturer's written instructions and as follows:
 - a. Uniformly apply dry-shake floor hardener at a rate of **100 lb/100 sq. ft. (49 kg/10 sq. m)**, **as directed**, unless greater amount is recommended by manufacturer.
 - b. Uniformly distribute approximately two-thirds of dry-shake floor hardener over surface by hand or with mechanical spreader, and embed by power floating. Follow power floating with a second dry-shake floor hardener application, uniformly distributing remainder of material, and embed by power floating.
 - c. After final floating, apply a trowel finish. Cure concrete with curing compound recommended by dry-shake floor hardener manufacturer and apply immediately after final finishing.
- L. Miscellaneous Concrete Items
1. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
 2. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
 3. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.
 4. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.
- M. Concrete Protecting And Curing
1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
 2. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching **0.2 lb/sq. ft. x h (1 kg/sq. m x h)** before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
 3. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
 4. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
 5. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - a. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - 1) Water.
 - 2) Continuous water-fog spray.

- 3) Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with **12-inch (300-mm)** lap over adjacent absorptive covers.
 - b. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches (300 mm)**, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - 1) Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - 2) Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - 3) Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 - c. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 1) After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.
 - d. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
- N. Liquid Floor Treatments
1. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
 - a. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - b. Do not apply to concrete that is less than three **OR** seven **OR** 14 **OR** 28, **as directed**, days' old.
 - c. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.
 2. Polished Concrete Floor Treatment: Apply polished concrete finish system to cured and prepared slabs to match.
 - a. Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate to match.
 - b. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
 - c. Continue polishing with progressively finer grit diamond polishing pads to gloss level to match approved mockup.
 - d. Control and dispose of waste products produced by grinding and polishing operations.
 - e. Neutralize and clean polished floor surfaces.
 3. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.
- O. Joint Filling
1. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - a. Defer joint filling until concrete has aged at least one **OR** six, **as directed**, month(s). Do not fill joints until construction traffic has permanently ceased.

2. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
3. Install semirigid joint filler full depth in saw-cut joints and at least **2 inches (50 mm)** deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

P. Concrete Surface Repairs

1. Defective Concrete: Repair and patch defective areas when approved by the Owner. Remove and replace concrete that cannot be repaired and patched to the Owner's approval.
2. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a **No. 16 (1.18-mm)** sieve, using only enough water for handling and placing.
3. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - a. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than **1/2 inch (13 mm)** in any dimension in solid concrete, but not less than **1 inch (25 mm)** in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - b. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - c. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by the Owner.
4. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 - a. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of **0.01 inch (0.25 mm)** wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 - b. After concrete has cured at least 14 days, correct high areas by grinding.
 - c. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 - d. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 - e. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of **1/4 inch (6 mm)** to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 - f. Repair defective areas, except random cracks and single holes **1 inch (25 mm)** or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a **3/4-inch (19-mm)** clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 - g. Repair random cracks and single holes **1 inch (25 mm)** or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt,

and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

5. Perform structural repairs of concrete, subject to the Owner's approval, using epoxy adhesive and patching mortar.
6. Repair materials and installation not specified above may be used, subject to the Owner's approval.

Q. Field Quality Control

1. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
2. Inspections:
 - a. Steel reinforcement placement.
 - b. Steel reinforcement welding.
 - c. Headed bolts and studs.
 - d. Verification of use of required design mixture.
 - e. Concrete placement, including conveying and depositing.
 - f. Curing procedures and maintenance of curing temperature.
 - g. Verification of concrete strength before removal of shores and forms from beams and slabs.
3. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - a. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
 - 1) When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - b. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - c. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete, **as directed**; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - d. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - e. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - f. Compression Test Specimens: ASTM C 31/C 31M.
 - 1) Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - 2) Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 - g. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - 1) Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - 2) A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 - h. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 - i. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength

and no compressive-strength test value falls below specified compressive strength by more than **500 psi (3.4 MPa)**.

- j. Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - k. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but will not be used as sole basis for approval or rejection of concrete.
 - l. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Owner. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by the Owner.
 - m. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - n. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.
4. Measure floor and slab flatness and levelness according to **ASTM E 1155 (ASTM E 1155M)** within 24 **OR** 48, **as directed**, hours of finishing.
- R. Protection Of Liquid Floor Treatments
- 1. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 05 13 00

Task	Specification	Specification Description
03 11 13 00	01 22 16 00	No Specification Required
03 11 13 00	03 05 13 00	Cast-In-Place Concrete

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SECTION 03 11 16 13 - CAST-IN-PLACE ARCHITECTURAL CONCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cast-in-place architectural concrete. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section specifies cast-in-place architectural concrete including form facings, reinforcement accessories, concrete materials, concrete mixture design, placement procedures, and finishes.

C. Definitions

1. **Cast-in-Place Architectural Concrete:** Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
2. **Cementitious Materials:** Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
3. **Design Reference Sample:** Sample designated by the Owner in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
4. **Reveal:** Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

D. Submittals

1. **Product Data:** For each type of product indicated.
2. **LEED Submittals:**
 - a. **Product Data for Credit MR 4.1 and Credit MR 4.2, as directed:** For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. **Design Mixtures for Credit ID 1.1:** For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements and for equivalent concrete mixtures that do not contain portland cement replacements.
3. **Design Mixtures:** For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - a. Indicate amounts of mixing water to be withheld for later addition at Project site.
4. **Formwork Shop Drawings:** Show formwork construction including form-facing joints, rustications, construction and contraction joints, form joint-sealant details, form tie locations and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete.
5. **Placement Schedule:** Submit concrete placement schedule before start of placement operations. Include locations of all joints including construction joints.
6. **Samples:** For each of the following materials:
 - a. Form-facing panel.
 - b. Form ties.
 - c. Form liners.
 - d. Coarse- and fine-aggregate gradations.
 - e. Chamfers and rustications.
7. **Material test reports OR certificates, as directed.**

E. Quality Assurance

1. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
2. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - b. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
3. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - a. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 **OR** Sections 1 through 5 and Section 6, "Architectural Concrete", **as directed**.
 - b. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."
4. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under sample submittals. Produce a minimum of 3 sets of full-scale panels, cast vertically, approximately **48 by 48 by 6 inches (1200 by 1200 by 150 mm)** minimum, to demonstrate the expected range of finish, color, and texture variations.
5. Preinstallation Conference: Conduct conference at Project site.

1.2 PRODUCTS**A. Form-Facing Materials**

1. General: Comply with Division 03 Section "Cast-in-place Concrete" for formwork and other form-facing material requirements.
2. Form-Facing Panels for As-Cast **OR** Exposed-Aggregate, **as directed**, Finishes: Steel, glass-fiber-reinforced plastic, or other approved nonabsorptive panel materials that will provide continuous, true, and smooth architectural concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
3. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will provide surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
4. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
5. Form Liners: Units of face design, texture, arrangement, and configuration indicated **OR** to match design reference sample, **as directed**. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent surface treatments of concrete.
6. Rustication Strips: Metal, rigid plastic, or dressed wood with sides beveled and back kerfed; nonstaining; in longest practicable lengths.
7. Chamfer Strips: Metal, rigid plastic, elastomeric rubber, or dressed wood, **3/4 by 3/4 inch (19 by 19 mm)**, minimum; nonstaining; in longest practicable lengths.
8. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum **1/4 inch (6 mm)** thick.
9. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or S, Grade NS, that adheres to form joint substrates.
10. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.

11. Form-Release Agent: Commercially formulated colorless form-release agent that will not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments of those surfaces.
 - a. Formulate form-release agent with rust inhibitor for steel form-facing materials.
 12. Surface Retarder: Chemical liquid set retarder, for application on form-facing materials, capable of temporarily delaying final hardening of newly placed concrete surface to depth of reveal specified.
 13. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic **OR** internally disconnecting **OR** removable, **as directed**, ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - a. Furnish ties with tapered tie cone spreaders, **as directed**, that, when removed, will leave holes **3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm), as directed**, in diameter on concrete surface.
 - b. Furnish internally disconnecting ties that will leave no metal closer than **1-1/2 inches (38 mm)**, after exposing aggregate, **as directed**, from the architectural concrete surface.
 - c. Furnish glass-fiber-reinforced plastic ties, not less than **1/2 inch (13 mm)** in diameter, of color to match the Owner's sample **OR** selected by the Owner from manufacturer's full range, **as directed**.
 - d. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- B. Steel Reinforcement And Accessories**
1. General: Comply with Division 03 Section "Cast-in-place Concrete" for steel reinforcement and other requirements for reinforcement accessories.
 2. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than **25 OR 60, as directed**, percent.
 3. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."
 - a. Where legs of wire bar supports contact forms, use gray, all-plastic **OR** CRSI Class 1, gray, plastic-protected **OR** CRSI Class 2, stainless-steel, **as directed**, bar supports.
- C. Concrete Materials**
1. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - a. Portland Cement: ASTM C 150, Type I **OR** II **OR** I/II **OR** III, **as directed**, gray **OR** white, **as directed**. Supplement with the following:, **as directed**
 - 1) Fly Ash: ASTM C 618, Class C **OR** F, **as directed**.
 - 2) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - 3) Silica Fume: ASTM C 1240, amorphous silica.
 - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** IP, portland-pozzolan **OR** (PM), pozzolan-modified Portland **OR** I (SM), slag-modified Portland, **as directed**, cement.
 2. Normal-Weight Aggregates: ASTM C 33, Class 5S **OR** 5M **OR** 1N, **as directed**, coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials, **as directed**.
 - a. Maximum Coarse Aggregate Size: **1 inch (25 mm) OR 3/4 inch (19 mm) OR 1/2 inch (13 mm) OR 3/8 inch (10 mm), as directed**.
 - b. Gradation: Uniformly **OR** Gap, **as directed**, graded.
 3. Normal-Weight Fine Aggregate: ASTM C 33 **OR** ASTM C 144, **as directed**, manufactured or natural sand, from same source for entire Project.
 4. Water: Potable, complying with ASTM C 94/C 94M except free of wash water from mixer washout operations.

D. Admixtures

1. Air-Entraining Admixture: ASTM C 260.
2. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - b. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - d. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - e. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - f. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
3. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, **as directed**, nonfading, and resistant to lime and other alkalis.
 - a. Color: As indicated by manufacturer's designation **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.

E. Curing Materials

1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd. (305 g/sq. m)** when dry.
2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
3. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
 - a. For integrally colored concrete, curing compound shall be pigmented type, **as directed**, approved by color pigment manufacturer.
 - b. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

F. Repair Materials

1. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
2. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
 - a. Types I and II, non-load bearing **OR** IV and V, load bearing, **as directed**, for bonding hardened or freshly mixed concrete to hardened concrete.

G. Concrete Mixtures, General

1. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - a. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
2. Proportion concrete mixtures as follows:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed.**
 - b. Maximum Water-Cementitious Materials Ratio: 0.46.
 - c. Slump Limit: **3 inches (75 mm) OR 4 inches (100 mm) OR 8 inches (200 mm)** for concrete with verified slump of **2 to 4 inches (50 to 100 mm)** before adding high-range water-reducing admixture or plasticizing admixture, **as directed**, plus or minus **1 inch (25 mm)**.
 - d. Air Content:
 - 1) 5-1/2 percent, plus or minus 1.5 percent at point of delivery for **1-1/2-inch (38-mm)** nominal maximum aggregate size.
 - 2) 6 percent, plus or minus 1.5 percent at point of delivery for **1-inch (25-mm) OR 3/4-inch (19-mm), as directed**, nominal maximum aggregate size.
3. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica

- fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent, **as directed**.
4. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 **OR** 0.15 **OR** 0.30 **OR** 1.00, **as directed**, percent by weight of cement.
 5. Admixtures: Use admixtures according to manufacturer's written instructions.
 6. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

H. Concrete Mixing

1. Ready-Mixed or Site-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
 - a. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
 - b. When air temperature is between **85 and 90 deg F (30 and 32 deg C)**, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F (32 deg C)**, reduce mixing and delivery time to 60 minutes.

1.3 EXECUTION

A. Formwork

1. General: Comply with Division 03 Section "Cast-in-place Concrete" for formwork, embedded items, and shoring and reshoring.
2. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
3. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - a. Class A, **1/8 inch (3.2 mm) OR B, 1/4 inch (6 mm) OR C, 1/2 inch (13 mm), as directed**.
4. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - a. In addition to ACI 117, comply with additional tolerances as directed by the Owner.
5. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
 - a. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
 - b. Do not use rust-stained steel form-facing material.
6. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
7. Chamfer **OR** Do not chamfer, **as directed**, exterior corners and edges of cast-in-place architectural concrete.
8. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.
9. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
10. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
11. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
12. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
13. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.
14. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting.

Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

B. Reinforcement And Inserts

1. General: Comply with Division 03 Section "Cast-in-place Concrete" for fabricating and installing steel reinforcement. Securely fasten steel reinforcement and wire ties against shifting during concrete placement.
2. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

C. Removing And Reusing Forms

1. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than **50 deg F (10 deg C)** for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - a. Schedule form removal to maintain surface appearance that matches approved field sample panels.
 - b. Cut off and grind glass-fiber-reinforced plastic form ties flush with surface of concrete.
2. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved 28-day design compressive strength **OR** at least 70 percent of 28-day design compressive strength, **as directed**. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
3. Clean and repair surfaces of forms to be reused in the Work. Do not use split, frayed, delaminated, or otherwise damaged form-facing material. Apply new form-release agent.
4. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for cast-in-place architectural concrete surfaces.

D. Joints

1. Construction Joints: Install construction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Owner.
 - a. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated.
 - b. Form keyed joints as indicated. Embed keys at least **1-1/2 inches (38 mm)** into concrete, **as directed**. Align construction joint within rustications attached to form-facing material.
 - c. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - d. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - e. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - f. Use bonding agent **OR** epoxy-bonding adhesive, **as directed**, at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
2. Contraction Joints: Form weakened-plane contraction joints true to line with faces perpendicular to surface plane of cast-in-place architectural concrete so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Owner.

E. Concrete Placement

1. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not add water to concrete during delivery, at Project site, or during placement unless approved by the Owner.
3. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

- a. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
 4. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
 - a. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - b. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
 - c. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least **6 inches (150 mm)** into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.
 5. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - a. When average high and low temperature is expected to fall below **40 deg F (4.4 deg C)** for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - b. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
 - d. Do not use chemical accelerators unless otherwise specified and approved in design mixtures.
 6. Hot-Weather Placement: Comply with ACI 301 and as follows:
 - a. Maintain concrete temperature below **90 deg F (32 deg C)** at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- F. Finishes, General
1. Architectural Concrete Finish: Match the Owner's design reference sample, identified and described as indicated, to satisfaction of the Owner.
 2. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.
 - a. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
 3. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.
- G. As-Cast Formed Finishes
1. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections exceeding specified limits on formed-surface irregularities.
 2. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Remove fins and other projections exceeding specified limits on formed-surface irregularities. Repair **OR** Do not repair, **as directed**, and patch tie holes and defects.
 3. Rubbed Finish: Apply the following to smooth-form-finished as-cast concrete where indicated:
 - a. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - b. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland

cement in amounts determined by trial patches so color of dry grout will match surrounding concrete. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

- c. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match surrounding concrete. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
4. Form-Liner Finish: Produce a textured surface free of pockets, streaks, and honeycombs, and of uniform appearance, color, and texture.

H. Exposed-Aggregate Finishes

1. Scrubbed Finish: After concrete has achieved a compressive strength of from **1000 to 1500 psi (6.9 to 10.3 MPa)**, apply scrubbed finish. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Maintain continuity of finish on each surface or area of Work. Remove only enough concrete mortar from surfaces to match design reference sample.
2. High-Pressure Water-Jet Finish: Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of **4500 psi (31 MPa)**. Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
 - a. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in reveal projection to match design reference sample.
3. Abrasive-Blast Finish: Perform abrasive blasting after compressive strength of concrete exceeds **2000 psi (13.8 MPa)**. Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.
 - a. Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample.
 - b. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample.
 - c. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample, as follows:
 - 1) Brush: Remove cement matrix to dull surface sheen and expose face of fine aggregate; with no significant reveal.
 - 2) Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of **1/16 inch (1.5 mm)**.
 - 3) Medium: Generally expose coarse aggregate; with slight reveal, a maximum of **1/4 inch (6 mm)**.
 - 4) Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter; with reveal range of **1/4 to 1/2 inch (6 to 13 mm)**.
4. Bushhammer Finish: Allow concrete to cure at least 14 days before starting bushhammer surface finish operations.
 - a. Surface Continuity: Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances of cut as shown on Drawings or to match design reference sample or mockup.
 - b. Surface Cut: Maintain required depth of cut and general aggregate exposure. Use power tool with hammer attachments for large, flat surfaces, and use hand hammers for small areas, at corners and edges, and for restricted locations where power tools cannot reach.
 - c. Remove impressions of formwork and form facings with exception of tie holes.

- I. Concrete Protecting And Curing
 - 1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
 - 2. Begin curing cast-in-place architectural concrete immediately after removing forms from **OR** applying as-cast formed finishes to, **as directed**, concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
 - a. Moisture Curing: Keep exposed surfaces of cast-in-place architectural concrete continuously moist for not less than seven days with the following materials:
 - 1) Water.
 - 2) Continuous water-fog spray.
 - 3) Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with **12-inch (300-mm)** lap over adjacent absorptive covers.
 - b. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches (300 mm)**, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period; use cover material and waterproof tape.
 - c. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
- J. Field Quality Control
 - 1. General: Comply with Division 03 Section "Cast-in-place Concrete" for field quality-control requirements.
- K. Repairs, Protection, And Cleaning
 - 1. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by the Owner. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
 - a. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to the Owner's approval.
 - 2. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
 - 3. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.
 - 4. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
 - 5. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.
 - a. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

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SECTION 03 11 16 13a - RUSTICATED CONCRETE FINISHES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of rusticated concrete finishes. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
2. Sample: A sample of finish expected shall be erected on site. Completed work shall approximate the sample. Work determined by the contracting officer not to be similar shall be removed and replaced without further expense to the Owner.

1.2 PRODUCTS

- A. Overlaid Plywood: DOC PS 1, B-B High Density Overlaid Concrete Form, Class I.
- B. Plywood: DOC PS 1, B-B (Concrete Form) Plywood, Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection mark.
- C. Chamfer Strips: Clear white pine with surface against concrete to be planed, metal, PVC, or rubber.
- D. Form Liners: Provide commercially available molds and form-facing materials of metal, plastic, mood, or another material that is nonreactive with concrete and dimensionally stable to produce repetitive concrete surfaces.

1.3 EXECUTION

- A. Form Construction: Forms shall be constructed to provide required sizes, shapes, lines, and dimensions and to provide continuous, straight, smooth exposed surfaces. Forms shall be fabricated for easy removal without hammering or prying against concrete surfaces. The number of joints shall be minimized. Joints shall be made watertight to prevent leakage of cement paste. Provisions shall be made for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, inserts, and other features required in the work.
- B. Form Coatings: Forms shall be oiled with form-coating compounds that will not bond with, stain, nor adversely effect concrete surfaces, and will not impair subsequent treatments of concrete surfaces.
- C. Finish: Fins and other projections shall be completely removed and smoothed. A smooth rubbed finish shall be provided not less than one day after form removal.

END OF SECTION 03 11 16 13a

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Task	Specification	Specification Description
03 11 16 13	03 05 13 00	Cast-In-Place Concrete
03 11 23 00	01 22 16 00	No Specification Required
03 11 23 00	03 05 13 00	Cast-In-Place Concrete
03 15 13 13	03 05 13 00	Cast-In-Place Concrete
03 15 13 16	03 05 13 00	Cast-In-Place Concrete
03 15 16 00	03 05 13 00	Cast-In-Place Concrete
03 15 19 00	05 50 00 00	Metal Fabrications
03 21 11 00	03 05 13 00	Cast-In-Place Concrete
03 21 16 00	03 05 13 00	Cast-In-Place Concrete

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SECTION 03 30 53 00 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for miscellaneous cast-in-place concrete. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes cast-in-place concrete, including reinforcement, concrete materials, mixture design, placement procedures, and finishes.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements. For each design mixture submitted, include an equivalent concrete mixture that does not contain portland cement replacements, to determine amount of portland cement replaced.
3. Other Action Submittal:
 - a. Design Mixtures: For each concrete mixture.

D. Quality Assurance

1. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
2. Comply with the following sections of **ACI 301 (ACI 301M)**, unless modified by requirements in the Contract Documents:
 - a. "General Requirements."
 - b. "Formwork and Formwork Accessories."
 - c. "Reinforcement and Reinforcement Supports."
 - d. "Concrete Mixtures."
 - e. "Handling, Placing, and Constructing."
 - f. "Lightweight Concrete."
3. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.2 PRODUCTS

A. Formwork

1. Furnish formwork and formwork accessories according to **ACI 301 (ACI 301M)**.

B. Steel Reinforcement

1. Recycled Content: Provide steel reinforcement with an average recycled content of steel products so that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
3. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

4. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from as-drawn steel wire into flat sheets.
5. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

C. Concrete Materials

1. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source throughout Project:
 - a. Portland Cement: ASTM C 150, Type I **OR** Type II **OR** Type I/II **OR** Type III **OR** Type V, **as directed**. Supplement with the following, **as directed**:
 - 1) Fly Ash: ASTM C 618, Class C or F.
 - 2) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** Type IP, portland-pozzolan **OR** Type I (PM), pozzolan-modified portland **OR** Type I (SM), slag-modified Portland, **as directed**, cement.
2. Normal-Weight Aggregate: ASTM C 33, graded, **1-1/2-inch (38-mm)** nominal maximum aggregate size.
3. Lightweight Aggregate: ASTM C 330, **1-inch (25-mm)** nominal maximum aggregate size.
4. Water: ASTM C 94/C 94M.
5. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, **1/2 to 1-1/2 inches (13 to 38 mm)** long.

D. Admixtures

1. Air-Entraining Admixture: ASTM C 260.
2. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - b. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - d. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - e. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - f. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

E. Related Materials

1. Vapor Retarder: Plastic sheet, ASTM E 1745, Class A or B.
OR
Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than **10 mils (0.25 mm)** thick; or plastic sheet, ASTM E 1745, Class C.
2. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber, or ASTM D 1752, cork or self-expanding cork.

F. Curing Materials

1. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth or cotton mats.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Water: Potable.
5. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
6. Clear, Waterborne **OR** Solvent-Borne, **as directed**, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

G. Concrete Mixtures

1. Comply with **ACI 301 (ACI 301M)** requirements for concrete mixtures.

2. Normal-Weight Concrete: Prepare design mixes, proportioned according to **ACI 301 (ACI 301M)**, as follows:
 - a. Minimum Compressive Strength: **4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa)**, as directed, at 28 days.
 - b. Maximum Water-Cementitious Materials Ratio: **0.50 OR 0.45**, as directed.
 - c. Cementitious Materials: Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - d. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm) OR 8 inches (200 mm)** for concrete with verified slump of **2 to 4 inches (50 to 100 mm)** before adding high-range water-reducing admixture or plasticizing admixture, as directed, plus or minus **1 inch (25 mm)**.
 - e. Air Content: Maintain within range permitted by **ACI 301 (ACI 301M)**. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.
3. Structural Lightweight Concrete Mix: ASTM C 330, proportioned to produce concrete with a minimum compressive strength of **3000 psi (20.7 MPa)** at 28 days and a calculated equilibrium unit weight of **110 lb/cu. ft. (1762 kg/cu. m)** plus or minus **3 lb/cu. ft. (48.1 kg/cu. m)**, as determined by ASTM C 567. Concrete slump at point of placement shall be the minimum necessary for efficient mixing, placing, and finishing.
 - a. Limit slump to **5 inches (125 mm)** for troweled slabs and **4 inches (100 mm)** for other slabs.
4. Synthetic Fiber: Uniformly disperse in concrete mix at manufacturer's recommended rate but not less than a rate of **1.0 lb/cu. yd. (0.60 kg/cu. m) OR 1.5 lb/cu. yd. (0.90 kg/cu. m)**, as directed.

H. Concrete Mixing

1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116, as directed, and furnish batch ticket information.
 - a. When air temperature is above **90 deg F (32 deg C)**, reduce mixing and delivery time to 60 minutes.
2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - a. For mixer capacity of **1 cu. yd. (0.76 cu. m)** or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - b. For mixer capacity larger than **1 cu. yd. (0.76 cu. m)**, increase mixing time by 15 seconds for each additional **1 cu. yd. (0.76 cu. m)**.
 - c. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mix type, mix time, quantity, and amount of water added. Record approximate location of final deposit in structure.

1.3 EXECUTION

A. Formwork

1. Design, construct, erect, brace, and maintain formwork according to **ACI 301 (ACI 301M)**.

B. Embedded Items

1. Place and secure anchorage devices and other embedded items required for adjoining work attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

C. Vapor Retarders

1. Install, protect, and repair vapor retarders according to ASTM E 1643; place sheets in position with longest dimension parallel with direction of pour.
 - a. Lap joints **6 inches (150 mm)** and seal with manufacturer's recommended adhesive or joint tape.

- D. Steel Reinforcement
1. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - a. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- E. Joints
1. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by the Owner.
 3. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:
 - a. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with groover tool to a radius of **1/8 inch (3.2 mm)**. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover marks on concrete surfaces.
 - b. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3.2-mm-)** wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
 4. Isolation Joints: Install joint-filler strips at junctions with slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - a. Extend joint fillers full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
- F. Concrete Placement
1. Comply with **ACI 301 (ACI 301M)** for placing concrete.
 2. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of **ACI 301 (ACI 301M)**.
OR
Do not add water to concrete during delivery, at Project site, or during placement.
 3. Consolidate concrete with mechanical vibrating equipment.
- G. Finishing Formed Surfaces
1. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding **1/2 inch (13 mm)**.
 - a. Apply to concrete surfaces not exposed to public view, **as directed**.
 2. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding **1/8 inch (3 mm)**.
 - a. Apply to concrete surfaces exposed to public view, **OR** to receive a rubbed finish, **OR** to be covered with a coating or covering material applied directly to concrete, **as directed**.
 3. Rubbed Finish: Apply the following rubbed finish, defined in **ACI 301 (ACI 301M)**, to smooth-formed finished as-cast concrete where indicated:
 - a. Smooth-rubbed finish.
 - b. Grout-cleaned finish.
 - c. Cork-floated finish.
 4. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- H. Finishing Unformed Surfaces

1. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
 2. Screed surfaces with a straightedge and strike off. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.
 - a. Do not further disturb surfaces before starting finishing operations.
 3. Scratch Finish: Apply scratch finish to surfaces indicated and surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes, unless otherwise indicated.
 4. Float Finish: Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.
 5. Trowel Finish: Apply a hard trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system.
 6. Trowel and Fine-Broom Finish: Apply a partial trowel finish, stopping after second troweling, to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set methods. Immediately after second troweling, and when concrete is still plastic, slightly scarify surface with a fine broom.
 7. Nonslip Broom Finish: Apply a nonslip broom finish to surfaces indicated and to exterior concrete platforms, steps, and ramps. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
- I. Concrete Protecting And Curing
1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with **ACI 301 (ACI 301M)** for hot-weather protection during curing.
 2. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching **0.2 lb/sq. ft. x h (1 kg/sq. m x h)** before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
 3. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
 4. Curing Methods: Cure formed and unformed concrete for at least seven days by one or a combination of the following methods:
 - a. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - 1) Water.
 - 2) Continuous water-fog spray.
 - 3) Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with **12-inch (300-mm)** lap over adjacent absorptive covers.
 - b. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches (300 mm)**, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - c. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - d. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

- J. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Tests: Perform according to **ACI 301 (ACI 301M)**.
 - a. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding **5 cu. yd. (4 cu. m)** but less than **25 cu. yd. (19 cu. m)**, plus one set for each additional **50 cu. yd. (38 cu. m)** or fraction thereof.
OR
Testing Frequency: One composite sample shall be obtained for each **100 cu. yd. (76 cu. m)** or fraction thereof of each concrete mix placed each day.
- K. Repairs
1. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 03 30 53 00

Task	Specification	Specification Description
03 30 53 00	03 05 13 00	Cast-In-Place Concrete

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SECTION 03 31 13 00 - PORTLAND CEMENT CONCRETE OVERLAYS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of Portland cement concrete overlays. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Coarse Aggregate:

1. Composition: Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, a combination thereof, or crushed blast-furnace slag.
2. Particle Shape: Particles of the coarse aggregate shall be generally spherical or cubical in shape. The quantity of flat and elongated particles in any size group shall not exceed 20 percent by weight as determined by ASTM D 3398.
3. Gradation: The maximum size of coarse aggregate shall be the lesser of 1/4 of the pavement thickness or 2 inches nominal size. Gradation limits are specified in ASTM C 136.
4. Deleterious Substances: The amount of deleterious substances in the coarse aggregate shall not exceed the limits, defined in ASTM C 117 and C 123.

- #### B. Fine Aggregate shall consist of natural sand, manufactured sand, or a combination of natural and manufactured sand and shall be composed of clean, hard, durable particles. Particles of the fine aggregate shall be generally spherical or cubical in shape. Gradation limits are specified in ASTM C 136.

- #### C. Portland Cement shall be Type I in compliance with ASTM C 150.

- #### D. Air-Entraining Admixture shall be in compliance with ASTM C 260. Concrete mixtures shall have air content by volume of concrete of 4 to 7 percent based on measurements made immediately after discharge from the mixer.

- #### E. Concrete Mixture shall have a nominal slump of 2 inches with a maximum of 3 inches and a 28-day flexural strength of not less than 650 psi.

- #### F. Joint and Crack Sealing Materials: Joint filler, joint sealant, and crack sealant shall comply with the following:

1. Expansion Joint Fillers shall comply with ASTM D 1751 or D 1752 or shall be resin impregnated fiberboard in compliance with the physical requirements of ASTM D 1752.
2. Type I Sealant shall comply with Fed. Spec. SS-S-200, except that sealant may be furnished as a ready-mixed liquid.
3. Type II Sealant shall comply with Fed. Spec. SS-S-1401.
4. Type V Sealant shall comply with COE CRD-C-527 and may be either a single- or multiple-component material.

- #### G. Epoxy-Resin Materials: Materials used in epoxy-resin grout, mortar, and concrete shall comply with the following:

1. Epoxy-Resin Grout shall be a two-compound material formulated to comply with ASTM C 881.

2. Epoxy-Resin Concrete shall be composed of epoxy-resin binder and uniformly graded aggregate in compliance with ASTM C 144. The maximum size of aggregate shall be 3/8 or 1/2 inch.

H. Dowels shall be plain steel bars complying with ASTM A 499.

1.3 EXECUTION

A. Preparation of Existing Surface: The Contractor shall raise and reset all structures such as manhole frames, valve boxes, drainage structures, etc. to meet the required grade. Bonding course shall be applied to the area prepared to receive overlay and shall be of epoxy-resin grout and Portland cement mortar.

B. Concrete Placement: Concrete shall be placed within 45 minutes from the time all ingredients are charged into the mixing drum.

C. Vibration: In the final phases of placing, surface vibrating equipment shall be used, and the duration of vibration shall not exceed 20 seconds.

D. Joints shall be saw cut and in alignment with underlying existing joints.

E. Finishing:

1. Transverse Finishing: Immediately after placement, concrete shall be accurately struck off and screeded to such elevation that when consolidated and finished, the surface of the pavement will be free from porous places and will be at the required grade. The finishing machine shall make at least two trips over each area of pavement to compact the concrete and produce a surface of uniform texture, true to grade.
2. Longitudinal Floating: After completion of the transverse finishing, the longitudinal mechanical float shall be operated to smooth and finish the pavement to grade.
3. Hand Finishing shall be with an approved strike and tamping template and a longitudinal float.
4. Straightedge Finishing: After the longitudinal floating is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated by means of long-handled wood floats and straightedges. The final finish shall be made with the straightedges, which shall be used to float the entire pavement surface.
5. Burlap Drag Finishing: When most of the water glaze or sheen has disappeared and before the concrete becomes nonplastic, drag the surface of the pavement in the direction of the concrete placement with a multiple-ply burlap drag.
6. Edging: After other finishing has been completed, the edges of slabs along the forms and at the joints shall be carefully finished with an edging tool to form a smooth rounded surface of the required radius.

F. Concrete Curing and Protection:

1. Concrete Curing Methods shall consist of mat method, impervious sheeting method, or liquid membrane curing method.
2. Concrete Protection: Protect repaired areas against damage prior to final acceptance. Traffic shall be excluded from repaired areas.

END OF SECTION 03 31 13 00

SECTION 03 31 13 00a - STEEL REINFORCED PORTLAND CEMENT CONCRETE OVERLAYS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of steel reinforced Portland cement concrete overlays. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Coarse Aggregate:

1. Composition: Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, a combination thereof, or crushed blast-furnace slag.
2. Particle Shape: Particles of the coarse aggregate shall be generally spherical or cubical in shape. The quantity of flat and elongated particles in any size group shall not exceed 20 percent by weight as determined by ASTM D 3398.
3. Gradation: The maximum size of coarse aggregate shall be the lesser of 1/4 of the pavement thickness or 2 inches nominal size. Gradation limits are specified in ASTM C 136.
4. Deleterious Substances: The amount of deleterious substances in the coarse aggregate shall not exceed the limits, defined in ASTM C 117 and C 123.

- #### B. Fine Aggregate shall consist of natural sand, manufactured sand, or a combination of natural and manufactured sand and shall be composed of clean, hard, durable particles. Particles of the fine aggregate shall be generally spherical or cubical in shape. Gradation limits are specified in ASTM C 136.

- #### C. Portland Cement shall be Type I in compliance with ASTM C 150.

- #### D. Air-Entraining Admixture shall be in compliance with ASTM C 260. Concrete mixtures shall have air content by volume of concrete of 4 to 7 percent based on measurements made immediately after discharge from the mixer.

- #### E. Concrete Mixture shall have a nominal slump of 2 inches with a maximum of 3 inches and a 28-day flexural strength of not less than 650 psi.

- #### F. Joint and Crack Sealing Materials: Joint filler, joint sealant, and crack sealant shall comply with the following:

1. Expansion Joint Fillers shall comply with ASTM D 1751 or D 1752 or shall be resin impregnated fiberboard in compliance with the physical requirements of ASTM D 1752.
2. Type I Sealant shall comply with Fed. Spec. SS-S-200, except that sealant may be furnished as a ready-mixed liquid.
3. Type II Sealant shall comply with Fed. Spec. SS-S-1401.
4. Type V Sealant shall comply with COE CRD-C-527 and may be either a single- or multiple-component material.

- #### G. Epoxy-Resin Materials: Materials used in epoxy-resin grout, mortar, and concrete shall comply with the following:

1. Epoxy-Resin Grout shall be a two-compound material formulated to comply with ASTM C 881.
2. Epoxy-Resin Concrete shall be composed of epoxy-resin binder and uniformly graded aggregate in compliance with ASTM C 144. The maximum size of aggregate shall be 3/8 or 1/2 inch.

H. Steel Reinforcement: All reinforcement shall be free from loose flaky rust, loose scale, oil, grease, mud, or other coatings that might reduce bond. Bar mats shall comply with ASTM A 184. Welded steel wire fabric shall comply with ASTM A 1064. Tie bars shall be deformed bars in compliance with ASTM A 615, A 616, or A 617. Dowels shall be plain steel bars complying with ASTM A 499.

1.3 EXECUTION

A. Preparation of Existing Surface: The Contractor shall raise and reset all structures such as manhole frames, valve boxes, drainage structures, etc. to meet the required grade. Bonding course shall be applied to the area prepared to receive overlay and shall be of epoxy-resin grout and Portland cement mortar.

B. Reinforcement Steel shall be installed by the strike-off method wherein the concrete is deposited on the subgrade and struck to the indicated elevation of the steel. The reinforcement shall be laid upon the prestruck surface.

C. Concrete Placement: Concrete shall be placed within 45 minutes from the time all ingredients are charged into the mixing drum.

D. Vibration: In the final phases of placing, surface vibrating equipment shall be used, and the duration of vibration shall not exceed 20 seconds.

E. Joints shall be saw cut and in alignment with underlying existing joints.

F. Finishing:

1. Transverse Finishing: Immediately after placement, concrete shall be accurately struck off and screeded to such elevation that when consolidated and finished, the surface of the pavement will be free from porous places and will be at the required grade. The finishing machine shall make at least two trips over each area of pavement to compact the concrete and produce a surface of uniform texture, true to grade.
2. Longitudinal Floating: After completion of the transverse finishing, the longitudinal mechanical float shall be operated to smooth and finish the pavement to grade.
3. Hand Finishing shall be with an approved strike and tamping template and a longitudinal float.
4. Straightedge Finishing: After the longitudinal floating is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated by means of long-handled wood floats and straightedges. The final finish shall be made with the straightedges, which shall be used to float the entire pavement surface.
5. Burlap Drag Finishing: When most of the water glaze or sheen has disappeared and before the concrete becomes nonplastic, drag the surface of the pavement in the direction of the concrete placement with a multiple-ply burlap drag.
6. Edging: After other finishing has been completed, the edges of slabs along the forms and at the joints shall be carefully finished with an edging tool to form a smooth rounded surface of the required radius.

G. Concrete Curing and Protection:

1. Concrete Curing Methods shall consist of mat method, impervious sheeting method, or liquid membrane curing method.
2. Concrete Protection: Protect repaired areas against damage prior to final acceptance. Traffic shall be excluded from repaired areas.

END OF SECTION 03 31 13 00a

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SECTION 03 31 13 00b - FIBER REINFORCED PORTLAND CEMENT CONCRETE OVERLAYS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of fiber reinforced Portland cement concrete overlays. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Coarse Aggregate:

1. Composition: Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, a combination thereof, or crushed blast-furnace slag.
2. Particle Shape: Particles of the coarse aggregate shall be generally spherical or cubical in shape. The quantity of flat and elongated particles in any size group shall not exceed 20 percent by weight as determined by ASTM D 3398.
3. Gradation: The maximum size of coarse aggregate shall be the lesser of 1/4 of the pavement thickness or 2 inches nominal size. Gradation limits are specified in ASTM C 136.
4. Deleterious Substances: The amount of deleterious substances in the coarse aggregate shall not exceed the limits, defined in ASTM C 117 and C 123.

- #### **B. Fine Aggregate shall consist of natural sand, manufactured sand, or a combination of natural and manufactured sand and shall be composed of clean, hard, durable particles. Particles of the fine aggregate shall be generally spherical or cubical in shape. Gradation limits are specified in ASTM C 136.**

- #### **C. Portland Cement shall be Type I in compliance with ASTM C 150.**

- #### **D. Air-Entraining Admixture shall be in compliance with ASTM C 260. Concrete mixtures shall have air content by volume of concrete of 4 to 7 percent based on measurements made immediately after discharge from the mixer.**

- #### **E. Concrete Mixture shall have a nominal slump of 2 inches with a maximum of 3 inches and a 28-day flexural strength of not less than 650 psi.**

- #### **F. Joint and Crack Sealing Materials: Joint filler, joint sealant, and crack sealant shall comply with the following:**

1. Expansion Joint Fillers shall comply with ASTM D 1751 or D 1752 or shall be resin impregnated fiberboard in compliance with the physical requirements of ASTM D 1752.
2. Type I Sealant shall comply with Fed. Spec. SS-S-200, except that sealant may be furnished as a ready-mixed liquid.
3. Type II Sealant shall comply with Fed. Spec. SS-S-1401.
4. Type V Sealant shall comply with COE CRD-C-527 and may be either a single- or multiple-component material.

- #### **G. Epoxy-Resin Materials: Materials used in epoxy-resin grout, mortar, and concrete shall comply with the following:**

1. Epoxy-Resin Grout shall be a two-compound material formulated to comply with ASTM C 881.
2. Epoxy-Resin Concrete shall be composed of epoxy-resin binder and uniformly graded aggregate in compliance with ASTM C 144. The maximum size of aggregate shall be 3/8 or 1/2 inch.

H. Steel Fibers: The fibers shall be made from low carbon steel. The following sizes of steel are acceptable:

1. 0.010-inch x 0.022-inch flat steel fiber,
2. 0.010-inch x 0.50-inch round steel fiber,
3. 0.016-inch x 1.0-inch round steel fiber,
4. 0.016-inch x 0.75-inch round steel fiber with 0.010-inch x 0.020-inch flat section along the length of the fiber
5. 2.5-inch x 0.025-inch round steel fibers.

1.3 EXECUTION

A. Preparation of Existing Surface: The Contractor shall raise and reset all structures such as manhole frames, valve boxes, drainage structures, etc. to meet the required grade. Bonding course shall be applied to the area prepared to receive overlay and shall be of epoxy-resin grout and Portland cement mortar.

B. Reinforcement Steel shall be installed by the strike-off method wherein the concrete is deposited on the subgrade and struck to the indicated elevation of the steel. The reinforcement shall be laid upon the prestruck surface.

C. Concrete Placement: Concrete shall be placed within 45 minutes from the time all ingredients are charged into the mixing drum.

D. Vibration: In the final phases of placing, surface vibrating equipment shall be used, and the duration of vibration shall not exceed 20 seconds.

E. Joints shall be saw cut and in alignment with underlying existing joints.

F. Finishing:

1. Transverse Finishing: Immediately after placement, concrete shall be accurately struck off and screeded to such elevation that when consolidated and finished, the surface of the pavement will be free from porous places and will be at the required grade. The finishing machine shall make at least two trips over each area of pavement to compact the concrete and produce a surface of uniform texture, true to grade.
2. Longitudinal Floating: After completion of the transverse finishing, the longitudinal mechanical float shall be operated to smooth and finish the pavement to grade.
3. Hand Finishing shall be with an approved strike and tamping template and a longitudinal float.
4. Straightedge Finishing: After the longitudinal floating is completed but while the concrete is still plastic, minor irregularities and score marks in the pavement surface shall be eliminated by means of long-handled wood floats and straightedges. The final finish shall be made with the straightedges, which shall be used to float the entire pavement surface.
5. Broom Finishing: Burlap drag finishing will not be allowed as this brings the steel fibers to the surface. Finishing shall be accomplished using a stiff broom.
6. Edging: After other finishing has been completed, the edges of slabs along the forms and at the joints shall be carefully finished with an edging tool to form a smooth rounded surface of the required radius.

G. Concrete Curing and Protection:

1. Concrete Curing Methods shall consist of mat method, impervious sheeting method, or liquid membrane curing method.

2. Concrete Protection: Protect repaired areas against damage prior to final acceptance. Traffic shall be excluded from repaired areas.

END OF SECTION 03 31 13 00b

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SECTION 03 31 13 00c - ROLLER COMPACTED CONCRETE PAVEMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of roller compacted concrete pavement. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Cementitious Materials:

1. Portland cement shall conform to ASTM C 150, Type I. Low alkali is to be used with aggregates when directed. In lieu of low-alkali cement, the Contractor may use a combination of Portland cement that does not meet the low-alkali requirement with a suitable pozzolan or ground granulated blast-furnace slag (GGBFS) provided the following requirement is met. The expansion of the proposed combination shall be equal to or less than the expansion of a low-alkali cement meeting the requirements of ASTM C 150 when tested in conformance with ASTM C 441. These two tests shall be performed concurrently at an independent certified laboratory at the Contractor's expense. the Owner reserves the right to confirm the test results and to adjust the percentage of pozzolan or GGBFS in the combination to suit other requirements at no additional cost to the Owner. Portland cement shall be furnished in bulk.
2. Pozzolan shall conform to ASTM C 618, and, in addition, limits in Table 2A, Uniformity Requirements (for air content) shall apply to all fly ash. Table 1A, Supplementary Optional Chemical Requirement for Maximum Alkalies, shall apply when it is to be used with aggregates listed to require low-alkali cement. Pozzolan shall be furnished in bulk.
3. The temperature of the cementitious materials as delivered to the site shall not exceed 150 degrees F.

B. Admixtures: All chemical admixtures furnished as liquids shall be in a solution of suitable viscosity and dilution for field use as determined by the Owner.

1. Water-Reducing Admixture (WRA) shall meet the requirements of ASTM C 494, Type D.
2. Air-entraining admixture shall conform to ASTM C 260.

C. Water for washing aggregates and for mixing and curing concrete shall be free from injurious amounts of oil, acid, salt, alkali, organic matter, or other deleterious substances and shall comply with COE CRD-C 400.

D. Aggregates

1. Composition: Fine aggregate shall consist of natural sand, manufactured sand, or a combination of natural and manufactured sands. Coarse aggregate shall consist of gravel, crushed gravel, crushed stone, air-cooled blast-furnace slag, or a combination thereof.

OR

All concrete mixtures will be proportioned by the Owner except that proportions for the slipformed facing concrete mixture will be selected by the Contractor. RCC shall be composed of cementitious materials, water, fine and coarse aggregates, and possibly admixtures. The cementitious material shall be portland cement, or portland cement in combination with pozzolan. An admixture when approved or directed will be a water-reducing/retarding admixture. Air-entraining admixture will be used in the bedding concrete and other conventional concrete.

1.3 EXECUTION

- A. **Concrete Mixing Plant:** A continuous mixing plant(s) shall be capable of producing RCC of the same quality and uniformity as would be produced in a conventional redi-mix batch plant and shall be capable of producing a uniform continuous product (at both maximum and minimum production rates) that is mixed so that complete intermingling of all ingredients occurs without balling, segregation, and wet or dry portions.
- B. **Trucks:** Truck mixers or agitators used for transporting central-mixed conventional concrete shall conform to the applicable requirements of ASTM C 94. Truck mixers shall not be used to transport concrete with larger than 37.5 mm (1-1/2-inch) nominal maximum size aggregate (NMSA) or 2 inch slump, or less. Nonagitator trucks may be used for transporting conventional central-mixed concrete over a smooth road when the hauling time is less than 15 minutes and the slump is less than 3 inches. Bodies of nonagitator trucks shall be smooth, water-tight, metal containers specifically designed to transport concrete, shaped with rounded corners to minimize segregation.
- C. **Belt Conveyors:** Belt conveyors shall be designed and operated to assure a uniform flow of concrete from mixer or delivery truck to final place of deposit without segregation of ingredients or loss of mortar and shall be provided with positive means for preventing segregation of the concrete or loss of mortar at transfer points and the point of placing. The NMSA required in mixture proportions furnished by the Owner will not be changed to accommodate the belt width.
- D. **Spreading and Remixing Equipment:** The primary spreading procedure shall be accomplished by dozer. Graders or other equipment not specified may be used to facilitate the RCC spreading process only when approved. For open, unrestricted areas, the dozer shall be a minimum size and weight equivalent to a Caterpillar D-6. For restricted placement areas, such as placement of RCC near the dam crest or next to abutments, the dozer shall have as a minimum a size and weight equivalent to a Caterpillar D-4. There shall be a minimum of one operating dozer for each 200 cubic yards of RCC placed each hour. The dozers shall be equipped with well-maintained grousers. A front-end loader with operator shall be available to assist with deposition and spreading of RCC as needed in confined areas. The equipment shall be maintained in good operating condition. The equipment shall not leak or drip oil, grease, or other visible contaminants onto the RCC surface. All equipment used for spreading and remixing that leaves the surface of the structure for maintenance or repairs or, for any other reason, must be cleaned of all contaminants by an approved method before returning to the structure surface. Under no conditions shall a dozer or other tracked vehicle be operated on other than fresh uncompacted RCC except to facilitate startup operations for each lift and by approved procedures.
- E. **Compaction Equipment:**
1. Self-propelled vibratory rollers shall be used for primary rolling and shall be double-drum. They shall transmit a dynamic impact to the surface through a smooth steel drum by means of revolving weights, eccentric shafts, or other equivalent methods. The compactor shall have a minimum gross mass of 20,000 pounds and shall produce a minimum dynamic force of 350 pounds per linear inch of drum width. The operating frequency shall be variable in the approximate range of 1,700 to 3,000 cycles per minute. The amplitude shall be adjustable between 0.015 and 0.04 inches. The roller shall be capable of full compaction in both forward and reverse directions. The roller shall be operated at speeds not exceeding 2.2 ft/s. Within the range of the operating capability of the equipment, the Owner may direct or approve variations to the frequency, amplitude, and speed of operation which result in the specified density at the fastest production rate.
 2. Small vibratory rollers shall be used to compact the RCC where the larger vibratory rollers specified above cannot maneuver. The rollers shall compact the RCC to the required density and shall be so demonstrated during construction of the test section. Small vibratory rollers cannot compact the RCC to the same density and thickness as the primary rollers. When small rollers are used, total lift thickness of the RCC layer or lift shall be reduced to not over 6 inches

- uncompacted thickness to permit adequate compaction. Rollers shall have independent speed and vibration controls and shall be capable of a wide range of speed adjustments.
3. The tampers shall compact the RCC to the required density and shall be so demonstrated during construction of the test section. Tampers cannot compact the RCC to the same density and thickness as the primary rollers. When tampers are used, thickness of each RCC layer that is to be compacted shall be reduced to not more than 6 inches uncompacted thickness to assure adequate compaction.
- F. **Placing During Rain:** RCC shall not be placed during rainfall of 0.1 inch/hr or more. During periods of lesser rainfall, placement of RCC may continue if, in the opinion of the Owner, no damage to the RCC is occurring. Work shall commence only after excess free surface water and contaminated paste or RCC have been removed. The surface shall have gained sufficient strength (no less than 4 hours after the RCC placement was suspended) to prevent rutting, pumping, intermixing of rainwater with the RCC, or other damage to the RCC. When the RCC surface has been contaminated or damaged in any manner, the RCC surface shall be washed to break up and remove laitance and/or mud-like coatings from the surface. Any undercut coarse aggregate shall be removed. All waste shall be removed and disposed of in an approved manner.
- G. **Hot-Weather Placement:** In hot-weather placement the temperature of the RCC shall be controlled so that it does not exceed 75.0 degrees F when placed. Placement shall be suspended as soon as the RCC temperature exceeds 75 degrees F. Measures that can be taken to prevent temperatures exceeding 75 degrees F include, but are not limited to; 1.) chilling mixing water, 2.) sprinkling aggregate stockpiles, 3.) use of a canopy to shade the RCC placement areas, 4.) placing during nighttime and early morning hours, or 5.) restricting placements to cloudy days. Use of any of these systems shall not be reason for extension of completion dates specified in these specifications. In addition, to prevent potential damage to the RCC due to hot-weather related placement conditions, all RCC operation shall be suspended between June 15 and October 31, unless directed otherwise.

END OF SECTION 03 31 13 00c

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Task	Specification	Specification Description
03 31 13 00	03 05 13 00	Cast-In-Place Concrete
03 31 13 00	32 13 13 33	Cement Concrete Pavement
03 35 13 00	03 05 13 00	Cast-In-Place Concrete
03 35 16 00	03 05 13 00	Cast-In-Place Concrete
03 35 19 00	03 05 13 00	Cast-In-Place Concrete

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SECTION 03 35 23 00 - EXPOSED AGGREGATE SURFACE CONCRETE WALLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of exposed aggregate surface concrete walls. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Submit product data and manufacturer's application instruction.
2. Shop drawings shall be submitted for approval.

1.2 PRODUCTS

A. Concrete Materials and Mixing

1. Portland Cement: ASTM C 150, Type 1 or 1A.
 - a. Shrinkage-Compensating Cement: Portland cement containing a stable expansive chemical compound such as calcium sulfoaluminate.
 - b. Aggregate: ASTM C 33; aggregate for exposed aggregate concrete shall match existing, if appropriate.
 - c. Admixtures: Submit manufacturer's literature for all admixtures proposed for the work.
 - d. Curing Compounds: ASTM C 309, Type 1.
 - e. Epoxy Bonding Agent: Sika or approved equal.

B. Concrete Formwork, Reinforcement, and Accessories

1. Formwork: Plywood form and liners shall be minimum grade B-B High Density Concrete Form Overlay, Class I, complying with ANSI A199.1.
2. Reinforcement:
 - a. Reinforcement Bars: ASTM A 615, Grade 40 or Grade 60.
 - b. Welded Wire Fabric: ASTM A 1064. Where welded wire fabric is needed, use No. 6 gauge wire at 6-inch spacing in each direction.
 - c. Accessories for proper installation of reinforcement shall comply with CRSI "Manual of Standard Practice for Reinforced Concrete Construction."
 - d. Reinforcement fabrication shall comply with ACI 318 and ACI 315.

C. Curing and Climatic Conditions

1. Comply with ACI 306 and ACI 305 for protecting and curing concrete in cold and hot weather.
2. Immediately after finishing, begin curing flatwork by covering with constantly saturated moisture retaining fabrics, impervious sheeting, or membrane curing compounds.
3. Apply membrane curing compounds as required.

1.3 EXECUTION

A. Preparation when attaching to existing surfaces:

1. Remove all defective material by chipping and cutting to sound concrete in order to secure a solid foundation.
2. Square cut or undercut the edges to a minimum depth of one inch to form key.
3. Cut concrete out from behind exposed reinforcing bars and rods.
4. All exposed reinforcing shall be cleaned of rust and primed.

B. Installation

1. Formwork requirements:
 - a. Formwork shall comply with ACI 347. Joints in forms shall be horizontal or vertical.
 - b. Use plywood, fiberglass, or metal forms.
2. Reinforcement shall be repaired when rusted through. Rods at least 12 inches long shall be wired to the failed rods. In closing gaps, rods shall lap existing rods by at least 12 inches or 30 diameters, whichever is greater.
3. Mixing and transporting concrete: Ready-mixed concrete shall be mixed and delivered to the project in compliance with ASTM C 94. Job-mixed concrete shall comply with the requirements of ACI 318.
4. Mixing epoxy-resin patching mortar: Mix thoroughly with a power mixer at low speeds (150 - 400 rpm) until material attains uniform color and consistency (minimum time of two to three minutes at 70 F).

END OF SECTION 03 35 23 00

Task	Specification	Specification Description
03 35 23 00	03 05 13 00	Cast-In-Place Concrete
03 35 26 00	03 05 13 00	Cast-In-Place Concrete
03 35 33 00	03 05 13 00	Cast-In-Place Concrete
03 35 63 00	03 05 13 00	Cast-In-Place Concrete
03 35 66 00	03 05 13 00	Cast-In-Place Concrete
03 35 83 00	03 05 13 00	Cast-In-Place Concrete

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SECTION 03 37 13 00 - SHOTCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for shotcrete. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes shotcrete applied by dry-mix or wet-mix process.

C. Definitions

1. Shotcrete: Mortar or concrete pneumatically projected onto a surface at high velocity.
2. Dry-Mix Shotcrete: Shotcrete with most of the water added at nozzle.
3. Wet-Mix Shotcrete: Shotcrete with ingredients, including mixing water, mixed before introduction into delivery hose.

D. Submittals

1. Product Data: For manufactured materials and products including reinforcement and forming accessories, shotcrete materials, admixtures, and curing compounds.
2. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
3. Shop Drawings: For details of fabricating, bending, and placing reinforcement. Include support and anchor details, number and location of splices, and special reinforcement required for openings through shotcrete structures.
4. Samples: Approximately **24 by 24 by 2 inches (600 by 600 by 50 mm)**, to illustrate quality of finishes, colors, and textures of exposed surfaces of shotcrete.
5. Design Mixes: For each shotcrete mix.
6. Material Test Reports: For shotcrete materials.
7. Material Certificates: For each material item, signed by manufacturers.
8. Field quality-control test reports.

E. Quality Assurance

1. Installer Qualifications: A qualified installer employing nozzle operators for the Project, each of whom attains mean core grades not exceeding 2.5, according to ACI 506.2, on preconstruction tests **OR** is ACI Shotcrete Nozzleman certified in Dry-Mix Process for Vertical Position **OR** is ACI Shotcrete Nozzleman certified in Dry-Mix Process for Vertical and Overhead Positions **OR** is ACI Shotcrete Nozzleman certified in Wet-Mix Process for Vertical Position **OR** is ACI Shotcrete Nozzleman certified in Wet-Mix Process for Vertical and Overhead Positions as appropriate to the required shotcrete work, **as directed**.
2. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, and acceptable to authorities having jurisdiction, **as directed**.
3. Comply with provisions of the following, unless more stringent requirements are indicated:
 - a. ACI 301, "Specifications for Structural Concrete."
 - b. ACI 506.2, "Specification for Shotcrete."
4. Preinstallation Conference: Conduct conference at Project site.
5. Shotcrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design shotcrete mixtures.

F. Project Conditions

1. Cold-Weather Shotcreting: Protect shotcrete work from physical damage or reduced strength caused by frost, freezing, or low temperatures according to ACI 306.1 and as follows:
 - a. Discontinue shotcreting when ambient temperature is 40 deg F (4.4 deg C) and falling. Uniformly heat water and aggregates before mixing to obtain a shotcrete shooting temperature of not less than 50 deg F (10 deg C) and not more than 90 deg F (32 deg C).
 - b. Do not use frozen materials or materials containing ice or snow.
 - c. Do not place shotcrete on frozen surfaces or surfaces containing frozen materials.
 - d. Do not use calcium chloride, salt, or other materials containing antifreeze agents.
2. Hot-Weather Shotcreting: Mix, place, and protect shotcrete according to ACI 305R when hot-weather conditions and high temperatures would seriously impair quality and strength of shotcrete, and as follows:
 - a. Cool ingredients before mixing to maintain shotcrete temperature at time of placement below 100 deg F (38 deg C) for dry mix or 90 deg F (32 deg C) for wet mix.
 - b. Reduce temperature of reinforcing steel and receiving surfaces below 100 deg F (38 deg C) before shotcreting.

1.2 PRODUCTS

A. Form Materials

1. Forms: Form-facing panels that will provide continuous, straight, smooth, concrete surfaces. Furnish panels in largest practicable sizes to minimize number of joints.

B. Reinforcing Materials

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 **OR** 60, **as directed** percent.
2. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
3. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
4. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II, zinc coated, hot-dip galvanized after fabrication and bending, as follows:
 - a. Steel Reinforcement: ASTM A 615/A 615M, Grade 60 (Grade 420) **OR** ASTM A 706/A 706M, **as directed**, deformed.
5. Plain-Steel Wire: ASTM A 82, as drawn **OR** galvanized, **as directed**.
6. Plain-Steel-Welded Wire Fabric: ASTM A 1064, fabricated from as-drawn **OR** galvanized, **as directed**, steel wire into flat sheets.
7. Deformed-Steel-Welded Wire Fabric: ASTM A 497, flat sheet.
8. Supports: Bolsters, chairs, spacers, ties, and other devices for spacing, supporting, and fastening reinforcing steel in place according to CRSI's "Manual of Standard Practice" and as follows:
 - a. For uncoated reinforcement, use all-plastic **OR** CRSI Class 1, plastic-protected **OR** CRSI Class 2, stainless-steel, **as directed**, bar supports.
 - b. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire **OR** all-plastic, **as directed**, bar supports.
 - c. Retain paragraph and subparagraph below if devices are required to anchor, support, or space steel reinforcement.
9. Reinforcing Anchors: ASTM A 36/A 36M, unheaded rods or ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), hex-head bolts; carbon steel; and carbon-steel nuts.
 - a. Finish: Plain, uncoated **OR** Hot-dip zinc coating, ASTM A 153/A 153M, Class C, **as directed**.

C. Shotcrete Materials

1. Portland Cement: ASTM C 150, Type I **OR** III, **as directed**. Use only one brand and type of cement for Project.

- a. Fly Ash: ASTM C 618, Class C or F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 2. Blended Hydraulic Cement: ASTM C 595, Type IS **OR** IP **OR** I(PM) **OR** I(SM), **as directed**.
 3. Silica Fume: ASTM C 1240, amorphous silica.
 4. Normal-Weight Aggregates: ASTM C 33, from a single source, and as follows:
 - a. Aggregate Gradation: ACI 506R, Gradation No. 1 with 100 percent passing **3/8-inch (10-mm)** **OR** 2 with 100 percent passing **1/2-inch (13-mm)**, **as directed**, sieve.
 - b. Coarse-Aggregate Class: 3S **OR** 3M **OR** 1N, **as directed**.
 5. Lightweight Aggregates: ASTM C 330.
 - a. Aggregate Gradation: ACI 506R, Gradation No. 1 with 100 percent passing **3/8-inch (10-mm)** **OR** 2 with 100 percent passing **1/2-inch (13-mm)**, **as directed** sieve.
 6. Coloring Agent: ASTM C 979, synthetic mineral-oxide pigments or colored, water-reducing admixtures, free of carbon black; color stable, nonfading, and resistant to lime and other alkalis.
 - a. Color: As indicated by manufacturer's designation **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 7. Water: Potable, complying with ASTM C 94/C 94M, free from deleterious materials that may affect color stability, setting, or strength of shotcrete.
 8. Carbon-Steel Fiber: ASTM C 1116, Type 1, carbon-steel fiber and ASTM A 820, Type 1, cold-drawn wire **OR** cut sheet, **as directed**, not less than **1 inch (25 mm)** long.
 9. Synthetic Fiber: Fibrillated polypropylene fibers engineered and designed for use in shotcrete, complying with ASTM C 1116, Type III, not less than **3/4 inch (19 mm)** long.
 10. Ground Wire: High-strength steel wire, 0.8 to 1 mm in diameter.
 11. Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- D. Chemical Admixtures
1. General: ASTM C 1141, Class A or B, but limited to the following admixture materials. Provide admixtures for shotcrete that contains not more than 0.1 percent chloride ions. Certify compatibility of admixtures with each other and with other cementitious materials.
 - a. Air-Entraining Admixture: ASTM C 260.
 - b. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - d. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 - e. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - f. Accelerating Admixture: ASTM C 494/C 494M, Type C.
- E. Curing Materials
1. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd. (305 g/sq. m)** dry.
 2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 3. Water: Potable.
 4. Clear, Waterborne **OR** Solvent-Borne, **as directed**, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.
- F. Shotcrete Mixtures, General
1. Prepare design mixes for each type and strength of shotcrete.
 - a. Limit use of fly ash **OR** ground granulated blast-furnace slag **OR** silica fume, **as directed**, to not exceed, in combination, 25 percent of portland cement by weight.
 2. Limit water-soluble chloride ions to maximum percentage by weight of cement or cementitious materials permitted by ACI 301.
 3. Admixtures: When included in shotcrete design mixes, use admixtures and retarding admixtures according to manufacturer's written instructions.
 4. Carbon-Steel Fiber: Uniformly disperse in shotcrete mix, according to manufacturer's written instructions, at a rate of **50 lb/cu. yd. (30 kg/cu. m)** **OR** **100 lb/cu. yd. (60 kg/cu. m)**, **as directed**.
 5. Synthetic Fiber: Uniformly disperse in shotcrete mix, according to manufacturer's written instructions, at a rate of **1.5 lb/cu. yd. (0.90 kg/cu. m)** **OR** **5 lb/cu. yd. (3 kg/cu. m)**, **as directed**.

6. Design-Mix Adjustments: Subject to compliance with requirements, shotcrete design-mix adjustments may be proposed when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

G. Shotcrete Mixtures

1. Proportion dry mixtures by field test data methods and wet mixtures according to ACI 211.1 and ACI 301, using materials to be used on Project, to provide shotcrete with the following properties:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa), as directed.**
 - b. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight, wet-mix shotcrete having an air content before pumping of **7 OR 8, as directed**, percent with a tolerance of plus or minus 1-1/2 percent.

H. Shotcrete Equipment

1. Mixing Equipment: Capable of thoroughly mixing shotcrete materials in sufficient quantities to maintain continuous placement.
2. Dry-Mix Delivery Equipment: Capable of discharging aggregate-cement mixture into delivery hose under close control and maintaining continuous stream of uniformly mixed materials at required velocity to discharge nozzle. Equip discharge nozzle with manually operated water-injection system for directing even distribution of water to aggregate-cement mixture.
 - a. Provide uniform, steady supply of clean, compressed air to maintain constant nozzle velocity while simultaneously operating blow pipe for cleaning away rebound.
 - b. Provide water supply with uniform pressure at discharge nozzle to ensure uniform mixing with aggregate-cement mix. Provide water pump to system if line water pressure is inadequate.
3. Wet-Mix Delivery Equipment: Capable of discharging aggregate-cement-water mixture accurately, uniformly, and continuously.

I. Batching And Mixing

1. Dry-Mix Process: Measure mix proportions by weight batching according to ASTM C 94/C 94M or by volume batching complying with ASTM C 685/C 685M requirements.
 - a. In volume batching, adjust fine-aggregate volume for bulking. Test fine-aggregate moisture content at least once daily to determine extent of bulking.
 - b. Prepackaged shotcrete materials may be used at Contractor's option. Predampen prepackaged shotcrete materials and mix before use.
2. Wet-Mix Process: Measure, batch, mix, and deliver shotcrete according to ASTM C 94/C 94M and ASTM C 1116, **as directed**, and furnish batch ticket information.
 - a. Comply with ASTM C 685/C 685M when shotcrete ingredients are delivered dry and proportioned and mixed on-site.

1.3 EXECUTION

A. Preparation

1. Concrete or Masonry: Before applying shotcrete, remove unsound or loose materials and contaminants that may inhibit shotcrete bonding. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and **1/2 inch (13 mm)** deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces before shotcreting.
 - a. Abrasive blast or hydroblast existing surfaces that do not require chipping to remove paint, oil, grease, or other contaminants and to provide roughened surface for proper shotcrete bonding.
2. Earth: Compact and trim to line and grade before placing shotcrete. Do not place shotcrete on frozen surfaces. Dampen surfaces before shotcreting.

3. Rock: Clean rock surfaces of loose materials, mud, and other foreign matter that might weaken shotcrete bonding.
 4. Steel: Clean steel surfaces by abrasive blasting according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- B. Forms
1. General: Design, erect, support, brace, and maintain forms, according to ACI 301, to support shotcrete and construction loads and to facilitate shotcreting. Construct forms so shotcrete members and structures are secured to prevent excessive vibration or deflection during shotcreting.
 - a. Fabricate forms to be readily removable without impact, shock, or damage to shotcrete surfaces and adjacent materials.
 - b. Construct forms to required sizes, shapes, lines, and dimensions using ground wires and depth gages to obtain accurate alignment, location, and grades in finished structures. Construct forms to prevent mortar leakage but permit escape of air and rebound during shotcreting. Provide for openings, offsets, blocking, screeds, anchorages, inserts, and other features required in the Work.
 2. Form openings, chases, recesses, bulkheads, keyways, and screeds in formwork. Determine sizes and locations from trades providing such items. Accurately place and securely support items built into forms.
- C. Steel Reinforcement
1. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 2. Clean reinforcement of loose rust and mill scale, earth, ice, and other materials that weaken shotcrete bonding.
 3. Securely embed reinforcing anchors into existing substrates, located as required.
 4. Accurately position, support, and rigidly secure reinforcement against displacement by formwork, construction, or shotcreting. Locate and support reinforcement by metal chairs, runners, bolsters, spacers, and hangers, as required.
 5. Place reinforcement to obtain minimum coverage for shotcrete protection. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during shotcreting. Set wire ties with ends directed into shotcrete, not toward exposed shotcrete surfaces.
 6. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
- D. Joints
1. Construction Joints: Locate and install construction joints tapered to a 1:1 slope where joint is not subject to compression loads and square where joint is perpendicular to main reinforcement. Continue reinforcement through construction joints, unless otherwise indicated.
 2. Contraction Joints: Construct contraction joints in shotcrete using saw cuts **1/8-inch- (3-mm-)** wide-by-1/3 slab depth or joint-filler strips **1/4-inch- (6-mm-)** wide-by-1/3 shotcrete depth, unless otherwise indicated.
 - a. After shotcrete has cured, remove strip inserts and clean groove of loose debris.
 - b. Space joints at **15 feet (4.5 m)** o.c. **OR** centers indicated, **as directed**, horizontally and vertically.
 - c. Tool edges round on each side of strip inserts if floated or troweled finishes are required.
- E. Alignment Control
1. Ground Wires: Install ground wires to establish thickness and planes of shotcrete surfaces. Install ground wires at corners and offsets not established by forms. Pull ground wires taut and position adjustment devices to permit additional tightening.
- F. Embedded Items

1. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by shotcrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

G. Application

1. Apply temporary protective coverings and protect adjacent surfaces against deposit of rebound and overspray or impact from nozzle stream.
2. Moisten wood forms immediately before placing shotcrete where form coatings are not used.
3. Apply shotcrete according to ACI 506.2.
4. Apply dry-mix shotcrete materials within 45 minutes after predampening and wet-mix shotcrete materials within 90 minutes after batching.
5. Deposit shotcrete continuously in multiple passes, to required thickness, without cold joints and laminations developing. Place shotcrete with nozzle held perpendicular to receiving surface. Begin shotcreting in corners and recesses.
6. Remove and dispose of rebound and overspray materials during shotcreting to maintain clean surfaces and to prevent rebound entrapment.
7. Maintain reinforcement in position during shotcreting. Place shotcrete to completely encase reinforcement and other embedded items. Maintain steel reinforcement free of overspray and prevent buildup against front face during shotcreting.
8. Do not place subsequent lifts until previous lift of shotcrete is capable of supporting new shotcrete.
9. Do not permit shotcrete to sag, slough, or dislodge.
10. Remove hardened overspray, rebound, and laitance from shotcrete surfaces to receive additional layers of shotcrete; dampen surfaces before shotcreting.
11. Do not disturb shotcrete surfaces before beginning finishing operations.
12. Remove ground wires or other alignment control devices after shotcrete placement.
13. Shotcrete Core Grade: Apply shotcrete to achieve mean core grades not exceeding 2.5 according to ACI 506.2, with no single core grade exceeding 3.0.
14. Installation Tolerances: Place shotcrete without exceeding installation tolerances permitted by ACI 117R, increased by a factor of 2.

H. Surface Finishes

1. General: Finish shotcrete according to descriptions in ACI 506R for the following finishes:
2. Natural Finish:
 - a. Gun Finish: Natural undisturbed finish.
 - b. Rod Finish: Rough-textured finish obtained by cutting or screeding exposed face of shotcrete to plane by rod or straightedge after initial set, and wood-float finished **OR** and steel-trowel finished **as directed**.
 - c. Broom Finish: Rough-textured finish obtained by screeding exposed face of shotcrete to required plane by rod, cutting screed, or trowel, and brooming after initial set.
3. Flash-Coat Finish: After screeding and rodding surface, apply up to **1/4-inch (6-mm)** coat of shotcrete using ACI 506R, Gradation No. 1, fine-screened sand modified with maximum aggregate size not exceeding **No. 4 (4.75-mm)** sieve to provide a finely textured finish.
4. Flash-Coat and Final Finish: After screeding and rodding surface, apply up to **1/4-inch (6-mm)** coat of shotcrete using ACI 506R, Gradation No. 1, fine-screened sand modified with maximum aggregate size not exceeding **No. 4 (4.75-mm)** sieve and apply wood-float **OR** rubber-float **OR** brush-float **OR** steel-trowel, **as directed**, finish.
5. Finish-Coat Finish: After screeding and rodding surface, apply shotcrete finish coat, **1/4 to 1 inch (6 to 25 mm)** thick, using ACI 506R, Gradation No. 1, fine-screened sand modified with maximum aggregate size not exceeding **No. 4 (4.75-mm)** sieve to provide a finish of uniform texture and appearance.
6. Finish-Coat and Final Finish: After screeding and rodding surface, apply shotcrete finish coat, **1/4 to 1 inch (6 to 25 mm)** thick, using ACI 506R, Gradation No. 1, fine-screened sand modified with

maximum aggregate size not exceeding **No. 4 (4.75-mm)** sieve and apply wood-float **OR** rubber-float **OR** brush-float **OR** steel-trowel, **as directed**, finish.

I. Curing

1. Protect freshly placed shotcrete from premature drying and excessive cold or hot temperatures.
2. Start initial curing as soon as free water has disappeared from shotcrete surface after placing and finishing.
3. Curing Exposed Surfaces: Cure shotcrete by one of the following methods:
 - a. Moisture Curing: Keep surfaces continuously moist for at least seven days with water, continuous water-fog spray, water-saturated absorptive covers, or moisture-retaining covers. Lap and seal sides and ends of covers.
 - b. Curing Compound: Apply curing compound uniformly in continuous operation by power spray according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 1) Apply curing compound to natural- or gun-finished shotcrete at rate of **1 gal./100 sq. ft. (1 L/2.5 sq. m)**.
4. Curing Formed Surfaces: Cure formed shotcrete surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

J. Form Removal

1. Forms not supporting weight of shotcrete may be removed after curing at not less than **50 deg F (10 deg C)** for 24 consecutive hours after gunning, provided shotcrete is hard enough not to be damaged by form-removal operations and provided curing and protecting operations are maintained.
 - a. Leave forms supporting weight of shotcrete in place until shotcrete has attained design compressive strength. Determine compressive strength of in-place shotcrete by testing representative field-cured specimens of shotcrete.
 - b. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
2. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing materials are unacceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

K. Field Quality Control

1. Engage a qualified independent testing agency to sample materials, visually grade cores, perform tests, and submit reports during shotcreting.
2. Air Content: ASTM C 173/C 173M, volumetric method or ASTM C 231, pressure method; 1 test for each compressive-strength test for each mix of air-entrained, wet-mix shotcrete measured before pumping.
3. Shotcrete Temperature: ASTM C 1064/C 1064M; 1 test hourly when air temperature is **40 deg F (4.4 deg C)** and below and when **80 deg F (27 deg C)** and above, and 1 test for each set of compressive-strength specimens.
4. Test Panels: Make a test panel, reinforced as in structure, for each shotcrete mix and for each workday or for every **50 cu. yd. (38 cu. m)** of shotcrete placed; whichever is less. Produce test panels with dimensions of **24 by 24 inches (600 by 600 mm)** minimum and of average thickness of shotcrete, but not less than **4-1/2 inches (115 mm)**. From each test panel, testing agency will obtain six test specimens: one set of three specimens unreinforced and one set of three specimens reinforced.
 - a. Test each set of unreinforced specimens for compressive strength according to ASTM C 1140 and construction testing requirements in ACI 506.2.
 - b. Visually inspect each set of reinforced shotcrete cores taken from test panels and determine mean core grades according to ACI 506.2.

5. In-Place Shotcrete: Take a set of 3 unreinforced cores for each mix and for each workday or for every 50 cu. yd. (38 cu. m) of shotcrete placed; whichever is less. Test cores for compressive strength according to ACI 506.2 and ASTM C 42. Do not cut steel reinforcement.
 6. Strength of shotcrete will be considered satisfactory when mean compressive strength of each set of 3 unreinforced cores equals or exceeds 85 percent of specified compressive strength, with no individual core less than 75 percent of specified compressive strength.
 - a. Mean compressive strength of each set of 3 unreinforced cubes shall equal or exceed design compressive strength with no individual cube less than 88 percent of specified compressive strength.
- L. Repairs
1. Remove and replace shotcrete that is delaminated or exhibits laminations, voids, or sand/rock pockets exceeding limits for specified core grade of shotcrete.
 - a. Remove unsound or loose materials and contaminants that may inhibit bond of shotcrete repairs. Chip or scarify areas to be repaired to extent necessary to provide sound substrate. Cut edges square and 1/2 inch (13 mm) deep at perimeter of work, tapering remaining shoulder at 1:1 slope into cavity to eliminate square shoulders. Dampen surfaces and apply new shotcrete.
 2. Repair core holes from in-place testing according to repair provisions in ACI 301 and match adjacent finish, texture, and color.
- M. Cleaning
1. Remove and dispose of rebound and overspray materials from final shotcrete surfaces and areas not intended for shotcrete placement.

END OF SECTION 03 37 13 00

SECTION 03 37 13 00a - GLASS FIBER REINFORCED CONCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for glass-fiber-reinforced precast concrete panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes glass-fiber-reinforced concrete (GFRC) panels consisting of GFRC panel frames, anchors, and connection hardware.
 - a. GFRC panels include wall units, window wall units, mullions, column covers, fascia units, cornices, and soffits.

C. Definitions

1. Design Reference Sample: Sample of approved GFRC color, finish, and texture; preapproved by the Owner.

D. Performance Requirements

1. Structural Performance: Provide GFRC panels, including panel frames, anchors, and connections, capable of withstanding the following design loads as well as the effects of thermal- and moisture-induced volume changes, according to load factors and combinations established in PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - a. Design Loads: As required to meet Project requirements.
 - b. Deflection Limits: Design panel frames to withstand design loads without lateral deflections greater than 1/240 of wall span.
 - c. Thermal Movements: Provide for thermal movements resulting from annual ambient temperature changes of **100 deg F (56 deg C)**.
 - d. Design panel frames and connections to accommodate deflections and other building movements.
 - e. Design panel frames to transfer window loads to building structure.

E. Submittals

1. Product Data: For each type of product indicated. Include GFRC design mixes.
2. Shop Drawings: Show fabrication and installation details for GFRC panels including the following:
 - a. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - b. Panel elevations, sections, and dimensions.
 - c. Thickness of facing mix, GFRC backing, and bonding pads for typical panels.
 - d. Finishes.
 - e. Joint and connection details.
 - f. Erection details.
 - g. Panel frame details for typical panels including sizes, spacings, thickness, and yield strength of various members.
 - h. Location and details of connection hardware attached to structure.
 - i. Size, location, and details of flex, gravity, and seismic anchors for typical panels.
 - j. Other items sprayed into panels.
 - k. Erection sequence for special conditions.
 - l. Relationship to adjacent materials.
 - m. Description of loose, cast-in, and field hardware.

3. Samples: Representative of finished exposed face of GFRC showing the full range of colors and textures specified, **12 by 12 inches (305 by 305 mm)** and of actual thickness.
4. Qualification Data: For qualified GFRC manufacturer, including proof of current Precast/Prestressed Concrete Institute (PCI) or Architectural Precast Association (APA) Plant Certification.
5. Welding certificates.
6. Steel Sheet Certification: For steel sheet used in cold-formed steel panel framing.
7. Mill Certificates: For structural-steel shapes and hollow structural sections used in panel framing.
8. Source Quality-Control Program: For GFRC manufacturer.
9. Source Quality-Control Test Reports: For GFRC, inserts, and anchors.

F. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for Group G - Glass Fiber Reinforced Concrete or that participates in APA's Plant Certification Program and is certified for GFRC production.
 - a. Manufacturer's responsibility includes fabricating and installing GFRC panels and providing professional engineering services needed to assume engineering responsibility for GFRC panels.
 - b. Engineering responsibility includes preparation of Shop Drawings and comprehensive engineering analysis, based on GFRC production test values, by a qualified professional engineer experienced in GFRC design.
2. Steel Sheet Certifications: Obtain mill certificates signed by manufacturers of steel sheet, or test reports from a qualified testing agency, indicating that steel sheet used in cold-formed metal panel framing complies with requirements including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.
3. Mill Certificates: Obtain certified mill test reports from manufacturer of structural-steel shapes and hollow structural sections used in panel framing indicating compliance of these products with requirements.
4. Source Limitations: Obtain GFRC panels from single source from single manufacturer.
5. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."
6. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:
 - a. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - b. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."
7. AISC Specifications: Comply with AISC's "Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design" **OR** "Load and Resistance Factor Design Specification for Structural Steel Buildings" **OR** "Specification for the Design of Steel Hollow Structural Sections," **as directed**, if using structural-steel shapes or hollow structural sections for panel frames.
8. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Handle and transport GFRC panels to avoid damage.
 - a. Place nonstaining resilient spacers between panels.
 - b. Support panels on nonstaining material during shipment.
 - c. Protect panels from dirt and damage during handling and transport.
2. Store GFRC panels to protect from contact with soil, staining, and physical damage.
 - a. Store panels with nonstaining resilient supports in same positions as when transported.
 - b. Store panels on firm, level, and smooth surfaces.
 - c. Place stored panels so identification marks are clearly visible.

1.2 PRODUCTS

A. Mold Materials

1. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true GFRC surfaces; nonreactive with GFRC and capable of producing required finish surfaces.
 - a. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.
2. Form Liners: Units of face design, texture, arrangement, and configuration indicated **OR** to match GFRC design reference sample, **as directed**. Provide solid backing and form supports to ensure that form liners remain in place during GFRC application. Use with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.
3. Surface Retarder: Chemical liquid set retarder capable of temporarily delaying hardening of newly placed GFRC face mix to depth of reveal specified.

B. GFRC Materials

1. Portland Cement: ASTM C 150; Type I, II, or III.
 - a. For surfaces exposed to view in finished structure, use gray **OR** white, **as directed**, of same type, brand, and source throughout GFRC production.
 - b. Metakaolin: ASTM C 618, Class N.
2. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, **1 to 2 inches (25 to 50 mm)** long, specifically produced for use in GFRC, and complying with PCI MNL 130.
3. Sand: Washed and dried silica, complying with composition requirements in ASTM C 144; passing **No. 20 (0.85-mm)** sieve with a maximum of 2 percent passing **No. 100 (0.15-mm)** sieve.
4. Facing Aggregate: ASTM C 33, except for gradation, and PCI MNL 130, **1/4-inch (6-mm)** maximum size.
 - a. Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match sample.
5. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.
6. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of GFRC and complying with chemical limits of PCI MNL 130.
7. Polymer-Curing Admixture: Acrylic thermoplastic copolymer dispersion complying with PCI MNL 130.
8. Air-Entraining Admixture: ASTM C 260, containing not more than 0.1 percent chloride ions.
9. Chemical Admixtures: ASTM C 494/C 494M, containing not more than 0.1 percent chloride ions.

C. Anchors, Connectors, And Miscellaneous Materials

1. Stainless-Steel Plates: ASTM A 240/A 240M or ASTM A 666, Type 304.
2. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M. Finish steel shapes and plates less than **3/16 inch (4.76 mm)** thick as follows:
 - a. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable **OR** electrodeposition according to ASTM B 633, SC 3, **as directed**.
OR
Finish: Shop primed with MPI#79 **OR** SSPC-Paint 25, **as directed**, on surfaces prepared to comply with SSPC-SP 2, "Hand Tool Cleaning," or better.
3. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
4. Carbon-Steel Bars: ASTM A 108, AISI Grade 1018. Finish steel bars less than **3/16 inch (4.76 mm)** thick as follows:
 - a. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable **OR** electrodeposition according to ASTM B 633, SC 3, **as directed**.

- b. Finish: Shop primed with MPI#79 **OR** SSPC-Paint 25, **as directed**, on surfaces prepared to comply with SSPC-SP 2, "Hand Tool Cleaning," or better.
 5. Malleable-Iron Castings: ASTM A 47/ A 47M, **Grade 32510 (Grade 22010)**.
 6. Carbon-Steel Castings: ASTM A 27/A 27M, **Grade 60-30 (Grade 415-205)**.
 7. Bolts: **ASTM A 307 or ASTM A 325 (ASTM F 568M or ASTM A 325M)**.
 - a. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, and ASTM A 153/A 153M, as applicable **OR** electrodeposition according to ASTM B 633, SC 3, **as directed**.
 8. Reglets: PVC extrusions **OR** Stainless steel, ASTM A 240/A 240M, Type 304, **0.016 inch (0.40 mm)** thick, **as directed**.
- D. Panel Frame Materials
1. Cold-Formed Steel Framing: Manufacturer's standard C-shaped steel studs, complying with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members," minimum uncoated steel thickness of **0.053 inch (1.34 mm)** of web depth indicated, with stiffened flanges, U-shaped steel track, and of the following steel sheet:
 - a. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, structural-steel sheet, **G60 (Z180) OR G90 (Z275)**, **as directed**, zinc coating, of grade required by structural performance of framing.
 - b. Painted, Nonmetallic-Coated Steel Sheet: ASTM A 1011/A 1011M, hot rolled; or ASTM A 1008/A 1008M, cold rolled; nonmetallic coated according to ASTM A 1003/A 1003M; of grade required by structural performance of framing.
 2. Hollow Structural Sections: Steel tubing, ASTM A 500, Grade B, or ASTM A 513. Finish hollow structural sections with wall thickness less than **3/16 inch (4.76 mm)** as follows:
 - a. Organic Zinc-Rich Primer: SSPC-Paint 20 on surfaces prepared to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Primer: MPI#79 **OR** SSPC-Paint 25, **as directed**, on surfaces prepared to comply with SSPC-SP 2, "Hand Tool Cleaning," or better.
 3. Steel Channels and Angles: ASTM A 36/A 36M, finished as follows:
 - a. Organic Zinc-Rich Primer: SSPC-Paint 20 on surfaces prepared to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Primer: MPI#79 **OR** SSPC-Paint 25, **as directed**, on surfaces prepared to comply with SSPC-SP 2, "Hand Tool Cleaning," or better.
- E. GFRC Mixes
1. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.
 2. Face Mix: Proportion face mix of portland cement, sand, facing aggregates, and admixtures to comply with design requirements.
 3. Mist Coat: Portland cement, sand slurry, and admixtures; of same proportions as backing mix without glass fibers.
 4. Polymer-Curing Admixture: 6 to 7 percent by weight of polymer-curing admixture solids to dry portland cement.
 5. Air Content: 8 to 10 percent; ASTM C 185.
 6. Coloring Admixture: Not to exceed 10 percent of cement weight.
- F. Panel Frame Fabrication
1. Fabricate panel frames and accessories plumb, square, true to line, and with components securely fastened, according to Shop Drawings and requirements in this Section.
 - a. Fabricate panel frames using jigs or templates.
 - b. Cut cold-formed metal framing members by sawing or shearing; do not torch cut.
 - c. Fasten cold-formed metal framing members by welding. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- d. Fasten framing members of hollow structural sections, steel channels, or steel angles by welding. Comply with AWS D1.1/D1.1M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - e. Weld flex, gravity, and seismic anchors to panel frames.
 2. Reinforce, stiffen, and brace framing assemblies, if necessary, to withstand handling, delivery, and erection stresses. Lift fabricated assemblies in a manner that prevents damage or significant distortion.
 3. Galvanizing Repair: Touch up accessible damaged galvanized surfaces according to ASTM A 780.
 4. Painting Repair: Touch up accessible damaged painted surfaces using same primer.
- G. Mold Fabrication
1. Construct molds that will result in finished GFRC complying with profiles, dimensions, and tolerances indicated, without damaging GFRC during stripping. Construct molds to prevent water leakage and loss of cement paste.
 - a. Coat contact surfaces of molds with form-release agent.
 - b. Coat contact surfaces of molds with surface retarder.
 2. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during GFRC application. Coat form liner with form-release agent.
 3. Locate, place, and secure flashing reglets accurately.
- H. GFRC Fabrication
1. Proportioning and Mixing: For backing mix, meter sand/cement slurry and glass fibers to spray head at rates to achieve design mix proportions and glass-fiber content according to PCI MNL 130 procedures.
 2. Spray Application: Comply with general procedures as follows:
 - a. Spray mist coat over molds to a nominal thickness of **1/8 inch (3 mm)** on planar surfaces.
 - b. Spray or place face mix in thickness indicated on Shop Drawings.
 - c. Proceed with spraying backing mix before face mix **OR** mist coat, **as directed**, has set, using procedures that produce a uniform thickness and even distribution of glass fibers and matrix.
 - d. Consolidate backing mix by rolling or other technique to achieve complete encapsulation of glass fibers and compaction.
 - e. Measure thickness with a pin gage or other acceptable method at least once for each **5 sq. ft. (0.5 sq. m)** of panel surface. Take not less than six measurements per panel.
 3. Hand form and consolidate intricate details, incorporate formers or infill materials, and over spray before material reaches initial set to ensure complete bonding.
 4. Attach panel frame to GFRC before initial set of GFRC backing, maintaining a minimum clearance of **1/2 inch (13 mm)** from GFRC backing, and without anchors protruding into GFRC backing.
 5. Build up homogeneous GFRC bonding pads over anchor feet, maintaining a minimum thickness of **1/2 inch (13 mm)** over tops of anchor feet, before initial set of GFRC backing.
 6. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide sufficient anchorage and embedment to comply with design requirements.
 7. Curing: Employ initial curing method that will ensure sufficient strength for removing units from mold. Comply with PCI MNL 130 procedures.
 8. Panel Identification: Mark each GFRC panel to correspond with identification mark on Shop Drawings. Mark each panel with its casting date.
- I. Fabrication Tolerances
1. Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with PCI MNL 130 for dimension, position, and tolerances.
OR

Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with the following dimensional tolerances. For dimensional tolerances not listed below, comply with PCI MNL 130.

- a. Overall Height and Width of Units, Measured at the Face Adjacent to Mold: As follows:
 - 1) 10 feet (3 m) or less, plus or minus 1/8 inch (3 mm).
 - 2) More than 10 feet (3 m), plus or minus 1/8 inch per 10 feet (3 mm per 3 m); 1/4 inch (6 mm) maximum.
 - b. Edge Return Thickness: Plus 1/2 inch (13 mm), minus 0 inch (0 mm).
 - c. Architectural Facing Thickness: Plus 1/8 inch (3 mm), minus 0 inch (0 mm).
 - d. Backing Thickness: Plus 1/4 inch (6 mm), minus 0 inch (0 mm).
 - e. Panel Depth from Face of Skin to Back of Panel Frame or Integral Rib: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).
 - f. Angular Variation of Plane of Side Mold: Plus or minus 1/32 inch per 3 inches (0.8 mm per 75 mm) of depth or plus or minus 1/16 inch (1.5 mm) total, whichever is greater.
 - g. Variation from Square or Designated Skew (Difference in Length of Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches (3 mm per 1800 mm) or plus or minus 1/4 inch (6 mm) total, whichever is greater.
 - h. Local Smoothness: 1/4 inch per 10 feet (6 mm per 3 m).
 - i. Bowing: Not to exceed L/240 unless unit meets erection tolerances using connection adjustments.
 - j. Length and Width of Block Outs and Openings within One Unit: Plus or minus 1/4 inch (6 mm).
 - k. Location of Window Opening within Panel: Plus or minus 1/4 inch (6 mm).
 - l. Maximum Permissible Warpage of One Corner out of the Plane of the Other Three: 1/16 inch per 12 inches (1.5 mm per 305 mm) of distance from nearest adjacent corner.
2. Position Tolerances: Measured from datum line locations, as indicated on Shop Drawings.
 - a. Panel Frame and Track: Plus or minus 1/4 inch (6 mm).
 - b. Flashing Reglets at Edge of Panel: Plus or minus 1/4 inch (6 mm).
 - c. Inserts: Plus or minus 1/2 inch (13 mm).
 - d. Special Handling Devices: Plus or minus 3 inches (75 mm).
 - e. Location of Bearing Devices: Plus or minus 1/4 inch (6 mm).
 - f. Blockouts: Plus or minus 3/8 inch (10 mm).
 3. Panel Frame Tolerances: As follows:
 - a. Vertical and Horizontal Alignment: 1/4 inch per 10 feet (6 mm per 3 m).
 - b. Spacing of Framing Member: Plus or minus 3/8 inch (10 mm).
 - c. Squareness of Frame: Difference in length of diagonals of 3/8 inch (10 mm).
 - d. Overall Size of Frame: Plus or minus 3/8 inch (10 mm).

J. Finishes

1. Finish exposed-face surfaces of GFRC as follows to match approved design reference sample. Panel faces shall be free of joint marks, grain, or other obvious defects.
 - a. Design Reference Sample: <Insert description and identify manufacturer and code number of sample>.
 - b. As-Cast-Surface Finish: Provide free of sand streaks, honeycombs, and excessive air voids, with uniform color and texture.
 - c. Textured-Surface Finish: Impart by form liners to provide surfaces free of sand streaks, honeycombs, and excessive air voids, with uniform color and texture.
 - d. Retarded Finish: Use chemical-retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
 - e. Sand- or Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
 - f. Acid-Etched Finish: Use acid and hot-water solution equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.

K. Source Quality Control

1. **Quality-Control Testing:** Establish and maintain a quality-control program for manufacturing GFRC panels according to PCI MNL 130.
 - a. Test materials and inspect production techniques.
 - b. Quality-control program shall monitor glass-fiber content, spray rate, unit weight, product physical properties, anchor pull-off and shear strength, and curing period and conditions.
 - c. Prepare test specimens and test according to ASTM C 1228, PCI MNL 130, and PCI MNL 128 procedures.
 - d. Test GFRC inserts and anchors according to ASTM C 1230 to validate design values.
 - e. Produce test boards at a rate not less than one per work shift per operator for each spray machine and for each mix design.
 - 1) For each test board, determine glass-fiber content according to ASTM C 1229, and flexural yield and ultimate strength according to ASTM C 947.

1.3 EXECUTION

A. Examination

1. Examine structure and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Erection

1. Install clips, hangers, and other accessories required for connecting GFRC panels to supporting members and backup materials.
2. Lift GFRC panels and install without damage.
3. Install GFRC panels level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
 - a. Maintain horizontal and vertical joint alignment and uniform joint width.
 - b. Remove projecting hoisting devices.
4. Connect GFRC panels in position by bolting or welding, or both, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.
5. **Welding:** Comply with applicable AWS D1.1/D1.1M and AWS D1.3 requirements for welding, appearance, quality of welds, and methods used in correcting welding work.
 - a. Protect GFRC panels from damage by field welding or cutting operations, and provide noncombustible shields as required.
6. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.

C. Erection Tolerances

1. Erect GFRC panels to comply with the following noncumulative tolerances:
 - a. Plan Location from Building Grid Datum: Plus or minus **1/2 inch (13 mm)**.
 - b. Top Elevation from Nominal Top Elevation: As follows:
 - 1) Exposed Individual Panel: Plus or minus **1/4 inch (6 mm)**.
 - 2) Nonexposed Individual Panel: Plus or minus **1/2 inch (13 mm)**.
 - 3) Exposed Panel Relative to Adjacent Panel: **1/4 inch (6 mm)**.
 - 4) Nonexposed Panel Relative to Adjacent Panel: **1/2 inch (13 mm)**.
 - c. Support Elevation from Nominal Elevation: As follows:
 - 1) Maximum Low: **1/2 inch (13 mm)**.
 - 2) Maximum High: **1/4 inch (6 mm)**.
 - d. Maximum Plumb Variation over the Lesser of Height of Structure or **100 Feet (30 m): 1 inch (25 mm)**.
 - e. Plumb in Any **10 Feet (3 m)** of Element Height: **1/4 inch (6 mm)**.
 - f. Maximum Jog in Alignment of Matching Edges: **1/4 inch (6 mm)**.
 - g. Maximum Jog in Alignment of Matching Faces: **1/4 inch (6 mm)**.

- h. Face Width of Joint: As follows (governs over joint taper):
 - 1) Panel Dimension **20 Feet (6 m)** or Less: Plus or minus **1/4 inch (6 mm)**.
 - 2) Panel Dimension More Than **20 Feet (6 m)**: Plus or minus **5/16 inch (8 mm)**.
- i. Maximum Joint Taper: **3/8 inch (10 mm)**.
- j. Joint Taper in **10 Feet (3 m)**: **1/4 inch (6 mm)**.
- k. Differential Bowing, as Erected, between Adjacent Members of Same Design: **1/4 inch (6 mm)**.

D. Repairs

- 1. Repairs will be permitted provided structural adequacy of GFRC panel and appearance are not impaired, as approved by the Owner.
- 2. Mix patching materials and repair GFRC so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces.
- 3. Prepare and repair accessible damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- 4. Wire brush, clean, and paint accessible weld areas on prime-painted components with same type of shop primer.
- 5. Remove and replace damaged GFRC panels when repairs do not comply with requirements.

E. Cleaning And Protection

- 1. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.

END OF SECTION 03 37 13 00a

Task	Specification	Specification Description
03 37 16 00	03 05 13 00	Cast-In-Place Concrete
03 37 16 00	03 11 16 13	Cast-In-Place Architectural Concrete
03 39 13 00	03 11 16 13	Cast-In-Place Architectural Concrete
03 39 23 23	03 05 13 00	Cast-In-Place Concrete

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SECTION 03 48 29 00 - PLANT-PRECAST STRUCTURAL CONCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for plant-precast structural concrete. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Precast structural concrete.
 - b. Precast structural concrete with thin-brick or stone facings.
 - c. Precast structural concrete with commercial architectural finish.

C. Definition

1. Design Reference Sample: Sample of approved precast structural concrete color, finish, and texture, preapproved by the Owner.

D. Performance Requirements

1. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.
 - a. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements and for equivalent concrete mixtures that do not contain portland cement replacements.
3. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
4. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
5. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Qualification Data: For Installer **OR** fabricator **OR** testing agency, **as directed**.
7. Welding certificates.
8. Material Certificates.
9. Material Test Reports.
10. Source quality-control reports.
11. Field quality-control and special inspection, **as directed**, reports.

F. Quality Assurance

1. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 - a. Participates in PCI's Plant Certification program and is designated a PCI-certified plant as follows:
 - 1) Group C, Category C1 - Precast Concrete Products (no prestressed reinforcement) **OR** Category C2 - Prestressed Hollowcore and Repetitively Produced Products **OR** Category C3 - Prestressed Straight Strand Structural Members **OR** Category C4 - Prestressed Deflected Strand Structural Members, **as directed**.
 - 2) Group CA, Category C1A - Precast Concrete Products (no prestressed reinforcement) **OR** Category C2A - Prestressed Hollowcore and Repetitively Produced Products **OR** Category C3A - Prestressed Straight-Strand Structural Members **OR** Category C4A - Prestressed Deflected-Strand Structural Members, **as directed**.
2. Design Standards: Comply with **ACI 318 (ACI 318M)** and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
3. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
4. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D.1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.4, "Structural Welding Code - Reinforcing Steel."
5. Fire-Resistance Calculations: Where indicated, provide precast structural concrete units whose fire resistance meets the prescriptive requirements of authorities having jurisdiction or has been calculated according to ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies," **OR** PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," **as directed**, and is acceptable to authorities having jurisdiction.
6. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.
2. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
 - a. Store units with dunnage across full width of each bearing point unless otherwise indicated.
 - b. Place adequate dunnage of even thickness between each unit.
 - c. Place stored units so identification marks are clearly visible, and units can be inspected.
3. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.
4. Lift and support units only at designated points shown on Shop Drawings.

H. Coordination

1. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

1.2 PRODUCTS

A. Mold Materials

1. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - a. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
 2. Form Liners: Units of face design, texture, arrangement, and configuration indicated **OR** to match those used for precast concrete design reference sample, **as directed**. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
 3. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.
- B. Reinforcing Materials**
1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 **OR** 60, **as directed**, percent.
 2. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
 3. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
 4. Galvanized Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)** **OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized, and chromate wash treated after fabrication and bending, **as directed**.
 5. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)** **OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 775/A 775M **OR** ASTM A 934/A 934M, **as directed**, epoxy coated, with less than 2 percent damaged coating in each **12-inch (300-mm)** bar length.
 6. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, **Grade 60 (Grade 420)** **OR** ASTM A 706/A 706M, **as directed**, deformed bars, assembled with clips.
 7. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, fabricated from as-drawn steel **OR** galvanized-steel, **as directed**, wire into flat sheets.
 8. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
 9. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain **OR** deformed, **as directed**, flat sheet, Type 1 bendable **OR** Type 2 nonbendable, **as directed**, coating.
 10. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.
- C. Prestressing Tendons**
1. Pretensioning Strand: ASTM A 416/A 416M, **Grade 250 (Grade 1720)** or **Grade 270 (Grade 1860)**, uncoated, 7-wire **OR** ASTM A 886/A 886M, **Grade 270 (Grade 1860)**, indented, 7-wire, **as directed**, low-relaxation strand.
 2. Unbonded Post-Tensioning Strand: ASTM A 416/A 416M, **Grade 270 (Grade 1860)**, uncoated, 7-wire, low-relaxation strand.
 - a. Coat unbonded post-tensioning strand with post-tensioning coating complying with ACI 423.6 and sheath with polypropylene tendon sheathing complying with ACI 423.6. Include anchorage devices and coupler assemblies.
 3. Post-Tensioning Bars: ASTM A 722, uncoated high-strength steel bar.
- D. Concrete Materials**
1. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
 - a. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
 2. Supplementary Cementitious Materials:
 - a. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - b. Metakaolin Admixture: ASTM C 618, Class N.

- c. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
 - d. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 3. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 5S **OR** Class 5M **OR** Class 4S **OR** Class 4M, **as directed**. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - a. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - 1) Gradation: Uniformly graded **OR** Gap graded **OR** To match design reference sample, **as directed**.
 - b. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate unless otherwise approved by the Owner.
 4. Lightweight Aggregates: Except as modified by PCI MNL 116, ASTM C 330, with absorption less than 11 percent.
 5. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
 6. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
 7. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 8. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 - a. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
 - b. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - d. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 - e. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - f. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - g. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M.
 9. Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
- E. Steel Connection Materials
1. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
 2. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
 3. Carbon-Steel Plate: ASTM A 283/A 283M.
 4. Malleable-Iron Castings: ASTM A 47/A 47M.
 5. Carbon-Steel Castings: ASTM A 27/A 27M, **Grade 60-30 (Grade 415-205)**.
 6. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
 7. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
 8. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, **Grade 65 (Grade 450)**.
 9. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
 10. Carbon-Steel Bolts and Studs: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; carbon-steel, hex-head bolts and studs; carbon-steel nuts, **ASTM A 563 (ASTM A 563M)**; and flat, unhardened steel washers, ASTM F 844.
 11. High-Strength Bolts and Nuts: **ASTM A 325 (ASTM A 325M)** or **ASTM A 490 (ASTM A 490M)**, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, **ASTM A 563 (ASTM A 563M)**; and hardened carbon-steel washers, **ASTM F 436 (ASTM F 436M)**.
 - a. Do not zinc coat **ASTM A 490 (ASTM A 490M)** bolts.
 12. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, **as directed**, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M

or ASTM A 153/A 153M **OR** electrodeposition according to ASTM B 633, SC 3, Types 1 and 2, **as directed**.

- a. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 - b. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
13. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 **OR** SSPC-Paint 25, **as directed**, according to SSPC-PA 1.
14. Welding Electrodes: Comply with AWS standards.
15. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.
- F. Stainless-Steel Connection Materials
1. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.
 2. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.
 3. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 116.
- G. Bearing Pads
1. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application, **as directed**:
 - a. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength **2250 psi (15.5 MPa)**, ASTM D 412.
 - b. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D 2240; capable of supporting a compressive stress of **3000 psi (20.7 MPa)** with no cracking, splitting, or delaminating in the internal portions of pad. Test 1 specimen for every 200 pads used in Project.
 - c. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; 80 to 100 Shore, Type A durometer hardness, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Specifications," Division II, Section 18.10.2; or with MIL-C-882E.
 - d. Frictionless Pads: Tetrafluoroethylene, glass-fiber reinforced, bonded to stainless- or mild-steel plate, of type required for in-service stress.
 - e. High-Density Plastic: Multimonomer, nonleaching, plastic strip.
- H. Grout Materials
1. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
 2. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.
 3. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.
- I. Thin-Brick Units And Accessories

1. Thin-Brick Units: ASTM C 216, Type FBX or ASTM C 1088, Grade Exterior, Type TBX, not less than **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick with a tolerance of plus or minus **1/16 inch (1.6 mm)**, and as follows:
 - a. Face Color and Texture: Match the Owner's samples **OR** Medium brown, wire cut **OR** Full-range red, sand molded **OR** Gray, velour, **as directed**.
 - b. Face Size:
 - 1) **2-1/4 inches (57 mm)** high by **8 inches (203 mm)** long.
 - 2) **2-1/4 inches (57 mm)** high by **7-1/2 to 7-5/8 inches (190 to 194 mm)** long.
 - 3) **2-3/4 to 2-13/16 inches (70 to 71 mm)** high by **7-1/2 to 7-5/8 inches (190 to 194 mm)** long.
 - 4) **3-1/2 to 3-5/8 inches (89 to 92 mm)** high by **7-1/2 to 7-5/8 inches (190 to 194 mm)** long.
 - 5) **3-1/2 to 3-5/8 inches (89 to 92 mm)** high by **11-1/2 to 11-5/8 inches (292 to 295 mm)** long.
 - c. Where indicated to "match existing," provide thin brick matching color, texture, and face size of existing adjacent brick work.
 - d. Face Size:
 - 1) 57 mm high by 190 mm long.
 - 2) 70 mm high by 190 mm long.
 - 3) 90 mm high by 190 mm long.
 - 4) 90 mm high by 290 mm long.
 - e. Special Shapes: Include corners, edge corners, and end edge corners.
 - f. Initial Rate of Absorption: Less than **30 g/30 sq. in. (30 g/194 sq. cm)** per minute; ASTM C 67.
 - g. Efflorescence: Tested according to ASTM C 67 and rated "not effloresced."
 - h. Surface Coating: Thin brick with colors or textures applied as coatings shall withstand 50 cycles of freezing and thawing; ASTM C 67 with no observable difference in applied finish when viewed from **10 feet (3 m)**.
 - i. Back Surface Texture: Scored, combed, wire roughened, ribbed, keybacked, or dovetailed.
 2. Sand-Cement Mortar: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144. Mix at ratio of 1 part cement to 4 parts sand, by volume, with minimum water required for placement.
 3. Latex-Portland Cement Pointing Grout: ANSI A118.6 and as follows:
 - a. Dry-grout mixture, factory prepared, of portland cement, graded aggregate, and dry, redispersible, ethylene-vinyl-acetate additive for mixing with water; uniformly colored.
 - b. Commercial portland cement grout, factory prepared, with liquid styrene-butadiene rubber or acrylic-resin latex additive; uniformly colored.
 - c. Colors: As indicated by manufacturer's designations **OR** Match the Owner's samples **OR** As selected by the Owner from manufacturer's full range, **as directed**.
- J. Stone Materials And Accessories
1. Stone facing for precast structural concrete is specified in Division 04 Section "Exterior Stone Cladding".
 2. Anchors: Stainless steel, ASTM A 666, Type 304, of temper and diameter required to support loads without exceeding allowable design stresses.
 - a. Fit each anchor leg with neoprene grommet collar of width at least twice the diameter and of length at least five times the diameter of anchor.
 3. Sealant Filler: ASTM C 920, low-modulus, multicomponent, nonsag urethane sealant complying with requirements in Division 07 Section "Joint Sealants" and that is nonstaining to stone substrate.
 4. Epoxy Filler: ASTM C 881/C 881M, 100 percent solids, sand-filled nonshrinking, nonstaining of type, class, and grade to suit application.
 - a. Elastomeric Anchor Sleeve: **1/2 inch (13 mm)** long; 60 Shore, Type A durometer hardness; ASTM D 2240.

5. Bond Breaker: Preformed, compressible, resilient, nonstaining, nonwaxing, closed-cell polyethylene foam pad, nonabsorbent to liquid and gas, **1/8 inch (3.2 mm)** thick **OR** Polyethylene sheet, ASTM D 4397, **6 to 10 mils (0.15 to 0.25 mm)** thick, **as directed**.
- K. Insulated Flat Wall Panel Accessories
1. Molded-Polystyrene Board Insulation: ASTM C 578, Type I, **0.90 lb/cu. ft. (15 kg/cu. m)** **OR** Type VIII, **1.15 lb/cu. ft. (18 kg/cu. m)** **OR** Type II, **1.35 lb/cu. ft. (22 kg/cu. m)**, **as directed**; square **OR** ship-lap, **as directed**, edges; with R-value and thickness as directed by the Owner.
 2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.60 lb/cu. ft. (26 kg/cu. m)** **OR** Type X, **1.30 lb/cu. ft. (21 kg/cu. m)** **OR** Type VI, **1.80 lb/cu. ft. (29 kg/cu. m)**, **as directed**; square **OR** ship-lap, **as directed**, edges; with R-value and thickness as directed by the Owner.
 3. Polyisocyanurate Board Insulation: ASTM C 591, Type I, **1.8 lb/cu. ft. (29 kg/cu. m)** **OR** Type IV, **2 lb/cu. ft. (32 kg/cu. m)** **OR** Type II, **2.5 lb/cu. ft. (40 kg/cu. m)**, **as directed**, unfaced, with R-value and thickness as directed by the Owner.
 4. Wythe Connectors: Glass-fiber connectors **OR** Vinyl-ester polymer connectors **OR** Polypropylene pin connectors **OR** Stainless-steel pin connectors **OR** Bent galvanized reinforcing bars **OR** Galvanized welded wire trusses **OR** Galvanized bent wire connectors **OR** Cylindrical metal sleeve anchors, **as directed**, manufactured to connect wythes of precast concrete panels.
- L. Concrete Mixtures
1. Prepare design mixtures for each type of precast concrete required.
 - a. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
 - b. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight; metakaolin and silica fume to 10 percent of portland cement by weight.
 2. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
 3. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by **ACI 318 (ACI 318M)** or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
 4. Normal-Weight Concrete Mixtures: Proportion face mixtures **OR** face and backup mixtures **OR** full-depth mixture, **as directed**, by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa)**.
 - b. Maximum Water-Cementitious Materials Ratio: 0.45.
 5. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.
 6. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa)**.
 - b. Unit Weight: Calculated equilibrium unit weight of **115 lb/cu. ft. (1842 kg/cu. m)**, plus or minus **3 lb/cu. ft. (48 kg/cu. m)**, according to ASTM C 567.
 7. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
 8. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
 9. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.
- M. Mold Fabrication
1. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and

denstioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.

- a. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
2. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - a. Form joints are not permitted on faces exposed to view in the finished work.
 - b. Edge and Corner Treatment: Uniformly chamfered **OR** radiused, **as directed**.

N. Thin-Brick Facings

1. Place form-liner templates accurately to provide grid for thin-brick facings. Provide solid backing and supports to maintain stability of liners while placing thin bricks and during concrete placement.
2. Securely place thin-brick units face down into form-liner pockets and place concrete backing mixture.
3. Completely fill joint cavities between thin-brick units with sand-cement mortar, and place precast concrete backing mixture while sand-cement mortar is still fluid enough to ensure bond.
4. Mix and install pointing grout according to ANSI A108.10. Completely fill joint cavities between thin-brick units with pointing grout, and compress into place without spreading pointing grout onto faces of thin-brick units. Remove excess pointing grout immediately to prevent staining of brick.
 - a. Tool joints to a slightly concave shape **OR** grapevine shape **OR** V-shape, **as directed**, when pointing grout is thumbprint hard.
5. Clean faces and joints of brick facing.

O. Stone Facings

1. Clean stone surfaces before placing in molds to remove soil, stains, and foreign materials. Use cleaning methods and materials recommended by stone supplier.
2. Accurately position stone facings to comply with requirements and in locations indicated on Shop Drawings. Install anchors, supports, and other attachments indicated or necessary to secure stone in place. Keep concrete reinforcement a minimum of **3/4 inch (19 mm)** from the back surface of stone. Use continuous spacers to obtain uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.
 - a. Stone to Precast Anchorages: Provide anchors in numbers, types and locations required to satisfy specified performance criteria, but not less than 2 anchors per stone unit of less than **2 sq. ft. (0.19 sq. m)** in area and 4 anchors per unit of less than **12 sq. ft. (1.1 sq. m)** in area; for units larger than **12 sq. ft. (1.1 sq. m)** in area, provide anchors spaced not more than **24 inches (600 mm)** o.c. horizontally and vertically. Locate anchors a minimum of **6 inches (150 mm)** from stone edge.
3. Fill anchor holes with sealant filler and install anchors **OR** epoxy filler and install anchors with elastomeric anchor sleeve at back surface of stone, **as directed**.
 - a. Install polyethylene sheet to prevent bond between back of stone facing and concrete substrate and to ensure no passage of precast matrix to stone surface.
 - b. Install **1/8-inch (3-mm)** polyethylene-foam bond breaker to prevent bond between back of stone facing and concrete substrate and to ensure no passage of precast matrix to stone surface. Maintain minimum projection requirements of stone anchors into concrete substrate.

P. Fabrication

1. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.

- a. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
2. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
3. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
4. Cast-in openings larger than **10 inches (250 mm)** in any dimension. Do not drill or cut openings or prestressing strand without the Owner's approval.
5. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
 - a. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
 - b. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 - c. Place reinforcement to maintain at least **3/4-inch (19-mm)** minimum coverage. Increase cover requirements according to **ACI 318 (ACI 318M)** when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - d. Place reinforcing steel and prestressing strand to maintain at least **3/4-inch (19-mm)** minimum concrete cover. Increase cover requirements for reinforcing steel to **1-1/2 inches (38 mm)** when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - e. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
6. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.
7. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
 - a. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete.
 - b. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
 - c. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
 - d. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
 - e. Protect strand ends and anchorages with a minimum of **1-inch- (25-mm-)** thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.
8. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
9. Place face mixture to a minimum thickness after consolidation of the greater of **1 inch (25 mm)** or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
10. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
 - a. Place backup concrete mixture to ensure bond with face-mixture concrete.

11. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
 - a. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
12. Comply with ACI 306.1 procedures for cold-weather concrete placement.
13. Comply with PCI MNL 116 procedures for hot-weather concrete placement.
14. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.
15. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
16. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet the Owner's approval.

Q. Casting Insulated Wall Panels

1. Cast and screed wythe supported by mold.
2. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
3. Cast and screed top wythe to meet required finish.

R. Fabrication Tolerances

1. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.
2. Brick-Faced Precast Structural Concrete Units: Restrict the following misalignments to 2 percent of number of bricks in a unit:
 - a. Alignment of Mortar Joints:
 - 1) Jog in Alignment: **1/8 inch (3 mm)**.
 - 2) Alignment with Panel Centerline: Plus or minus **1/8 inch (3 mm)**.
 - b. Variation in Width of Exposed Mortar Joints: Plus or minus **1/8 inch (3 mm)**.
 - c. Tipping of Individual Bricks from the Panel Plane of Exposed Brick Surface: Plus **1/16 inch (1.6 mm)**; minus **1/4 inch (6 mm)** less than or equal to depth of form-liner joint.
 - d. Exposed Brick Surface Parallel to Primary Control Surface of Panel: Plus **1/4 inch (6 mm)**; minus **1/8 inch (3 mm)**.
 - e. Individual Brick Step in Face from Panel Plane of Exposed Brick Surface: Plus **1/16 inch (1.6 mm)**; minus **1/4 inch (6 mm)** less than or equal to depth of form-liner joint.
3. Stone Veneer-Faced Precast Structural Concrete Units:
 - a. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated: Plus or minus **1/4 inch (6 mm)**.
 - b. Variation in Joint Width: **1/8 inch in 36 inches (3 mm in 900 mm)** or a quarter of nominal joint width, whichever is less.
 - c. Variation in Plane between Adjacent Stone Units (Lipping): **1/16-inch (1.6-mm)** difference between planes of adjacent units.

S. Commercial Finishes

1. Commercial Grade: Remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to **3/16 inch (5 mm)**.

2. Standard Grade: Normal plant-run finish produced in molds that impart a smooth finish to concrete. Surface holes smaller than **1/2 inch (13 mm)** caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are permitted. Fill air holes greater than **1/4 inch (6 mm)** in width that occur more than once per **2 sq. in (1300 sq. mm)**. Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Limit joint offsets to **1/8 inch (3 mm)**.
3. Grade B Finish: Fill air pockets and holes larger than **1/4 inch (6 mm)** in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than **1/8 inch (3 mm)** in width that occur more than once per **2 sq. in. (1300 sq. mm)**. Grind smooth form offsets or fins larger than **1/8 inch (3 mm)**. Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.
4. Grade A Finish: Fill surface blemishes with the exception of air holes **1/16 inch (1.6 mm)** in width or smaller, and form marks where the surface deviation is less than **1/16 inch (1.6 mm)**. Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.
5. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.
6. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
7. Apply roughened surface finish according to **ACI 318 (ACI 318M)** to precast concrete units that will receive concrete topping after installation.

T. Commercial Architectural Finishes

1. Manufacture member faces free of joint marks, grain, and other obvious defects with corners, including false joints, uniform, straight, and sharp. Finish exposed-face surfaces of precast concrete units to match approved design reference sample **OR** sample panels, **as directed**, and as follows:
 - a. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
 - b. Smooth-Surface Finish: Provide surfaces free of excessive air voids, sand streaks, and honeycombs, with uniform color and texture.
 - c. Textured-Surface Finish: Impart by form liners or inserts to provide surfaces free of pockets, streaks, and honeycombs, with uniform color and texture.
 - d. Bushhammer Finish: Use power or hand tools to remove matrix and fracture coarse aggregates.
 - e. Exposed-Aggregate Finish: Use chemical-retarding agents applied to concrete molds and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
 - f. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
 - g. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attack.
 - h. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
 - i. Polished Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
 - j. Sand-Embedment Finish: Use selected stones placed in a sand bed in bottom of mold, with sand removed after curing.

U. Source Quality Control

1. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements.
 - a. Test and inspect self-consolidating concrete according to PCI TR-6.

2. Strength of precast structural concrete units will be considered deficient if units fail to comply with **ACI 318 (ACI 318M)** requirements for concrete strength.
3. If there is evidence that strength of precast concrete units may be deficient or may not comply with **ACI 318 (ACI 318M)** requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
 - a. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by the Owner.
 - b. Cores will be tested in an air-dry condition or, if units will be wet under service conditions, test cores after immersion in water in a wet condition.
 - c. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
 - d. Test results will be made in writing on same day that tests are performed, with copies to the Owner, Contractor, and precast concrete fabricator. Test reports will include the following:
 - 1) Project identification name and number.
 - 2) Date when tests were performed.
 - 3) Name of precast concrete fabricator.
 - 4) Name of concrete testing agency.
 - 5) Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
4. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
5. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to the Owner's approval. the Owner reserves the right to reject precast units that do not match approved samples and sample panels.

1.3 EXECUTION

A. Installation

1. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
2. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
 - a. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - b. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - c. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - d. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
3. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 - a. Do not permit connections to disrupt continuity of roof flashing.
4. Field cutting of precast units is not permitted without approval of the the Owner.

5. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
 6. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - a. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 - b. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum **4.0-mil- (0.1-mm-)** thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
 - c. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
 - d. Remove, reweld, or repair incomplete and defective welds.
 7. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
 - a. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
 8. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.
 - a. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
 - b. Fill joints completely without seepage to other surfaces.
 - c. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
 - d. Place grout end cap or dam in voids at ends of hollow-core slabs.
 - e. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
 - f. Keep grouted joints damp for not less than 24 hours after initial set.
- B. Erection Tolerances
1. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
 2. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by the Owner.
- C. Field Quality Control
1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. Erection of precast structural concrete members.
 2. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 3. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
 4. Testing agency will report test results promptly and in writing to Contractor and the Owner.
 5. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
 6. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 7. Prepare test and inspection reports.
- D. Repairs
1. Repair precast structural concrete units if permitted by the Owner.
 - a. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.

2. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of **20 feet (6 m)**.
3. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
4. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
5. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by the Owner.

E. Cleaning

1. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
2. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - a. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
 - b. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 03 48 29 00

Task	Specification	Specification Description
03 48 49 00	03 48 29 00	Plant-Precast Structural Concrete

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SECTION 03 51 13 00 - CEMENTITIOUS WOOD-FIBER DECK

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cementitious wood-fiber deck. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Monolithic cementitious wood-fiber units.
 - b. Composite cementitious wood-fiber units.
 - c. Insulated composite cementitious wood-fiber units.
 - d. Subpurlin tees.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication and installation details for cementitious wood-fiber deck. Include details at supports, reinforcement at openings, and attachment to other work.
3. Samples: Show texture, finish, and edge and end configurations of monolithic **OR** composite **OR** insulated composite, **as directed**, cementitious wood-fiber units, **12 inches (305 mm) OR 24 inches (610 mm)**, **as directed**, long by width of unit.
 - a. Include unit with galvanized steel edge channel.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Provide cementitious wood-fiber units that comply with the following requirements:
 - a. Fire-response testing performed by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction and that performs testing and follow-up services.
 - b. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indices of 25 and 50, respectively, as determined by testing identical products per ASTM E 84.
 - c. Fire-resistance-rated assemblies indicated by design designations from UL's "Fire Resistance Directory," ITS's "Directory of Listed Products," or the listings of another testing and inspecting agency are identical in materials and construction to those tested per ASTM E 119.
 - d. Products are identified with appropriate markings of applicable testing and inspecting agency.

E. Delivery, Storage, And Handling

1. Protect cementitious wood-fiber units from moisture.
2. Store units on elevated platforms at the Project site in a dry, well-ventilated, covered space and stack according to manufacturer's written recommendations.
3. Handle units to prevent chipping, breaking, cracking, staining, soiling, warping, or other physical damage. Discard damaged units at time of installation.

1.2 PRODUCTS

A. Materials

1. Cementitious Wood-Fiber Units, General: Manufacturer's standard factory-cast structural units complying with the following requirements:

- a. Composition: Chemically processed long wood fibers mixed with Portland cement, ASTM C 150, Type III or magnesium oxysulfate hydraulic cement, pressure bonded to produce units of thicknesses and sizes indicated:
 - b. Properties: As follows, determined according to test method indicated:
 - 1) Noise Reduction Coefficient: NRC 0.55 **OR** 0.60 **OR** 0.65 **OR** 0.70 **OR** 0.75 **OR** 0.80, **as directed**; ASTM C 423.
 - 2) Light Reflectance: 60 percent; ASTM E 1349.
 - c. Finish: Manufacturer's standard natural or prime-painted finish.
2. Oriented-Strand-Board Sheathing: APA-rated sheathing, Exposure 1 complying with DOC PS 2.
 3. Polyisocyanurate-Foam Insulation: 2 lb/cu. ft. (32 kg/cu. m) nominal density, 35 lbf/sq. in. (240 kPa) compressive strength per ASTM D 1621.
 4. Extruded-Polystyrene Insulation: ASTM C 578, Type IV.
 5. Expanded-Polystyrene Insulation: ASTM C 578, Type I.
- B. Monolithic Cementitious Wood-Fiber Units
1. Tile: Manufacturer's standard rabbet-edged, cementitious wood-fiber units.
 2. Plank: Manufacturer's standard tongue-and-groove-edged, cementitious wood-fiber units.
 3. Channel-Reinforced Plank: Manufacturer's standard tongue-and-groove-edged, cementitious wood-fiber planks with factory-installed, cold-formed, 0.0598-inch- (1.52-mm-) thick, galvanized steel channel set in grooved edge.
 4. Concealed-Tee Plank: Manufacturer's standard cementitious wood-fiber units, with edges kerfed, back rabbeted, and beveled.
- C. Composite Cementitious Wood-Fiber Units
1. Composite Tile: Manufacturer's standard factory-laminated composite deck units consisting of a rabbet-edged, cementitious wood-fiber tile base and top layer of oriented-strand-board sheathing, 7/16 inch (11 mm) thick.
 2. Composite Plank: Manufacturer's standard factory-laminated composite deck units consisting of a standard tongue-and-groove-edged, cementitious wood-fiber plank base and top layer of oriented-strand-board sheathing, 7/16 inch (11 mm) thick.
 3. Composite Channel-Reinforced Plank: Manufacturer's standard factory-laminated composite deck units consisting of a standard tongue-and-groove-edged, cementitious wood-fiber plank base with factory-installed, cold-formed, 0.0598-inch- (1.52-mm-) thick, galvanized steel channel set in grooved edge, and top layer of oriented-strand-board sheathing, 7/16 inch (11 mm) thick.
- D. Insulated Composite Cementitious Wood-Fiber Units
1. Insulated Composite Tile: Manufacturer's standard factory-laminated composite deck units consisting of a rabbet-edged, cementitious wood-fiber tile base, insulation, and top layer; and as follows:
 - a. Insulation: Polyisocyanurate **OR** Extruded polystyrene **OR** Expanded polystyrene, **as directed**.
 - b. Top Layer: Manufacturer's standard asphalt-free, glass-fiber-reinforced, black felt facing **OR** 7/16-inch- (11-mm-) thick, oriented-strand board, **as directed**.
 2. Insulated Composite Plank: Manufacturer's standard factory-laminated composite deck units consisting of a standard tongue-and-groove-edged, cementitious wood-fiber plank base, insulation, and top layer; and as follows:
 - a. Insulation: Polyisocyanurate **OR** Extruded polystyrene **OR** Expanded polystyrene, **as directed**.
 - b. Top Layer: Manufacturer's standard asphalt-free, glass-fiber-reinforced, black felt facing **OR** 7/16-inch- (11-mm-) thick, oriented-strand-board, **as directed**.
 3. Insulated Composite Channel-Reinforced Plank: Manufacturer's standard factory-laminated composite deck units consisting of a standard tongue-and-groove-edged, cementitious wood-fiber plank base with factory-installed, cold-formed, 0.0598-inch- (1.52-mm-) thick, galvanized steel channel set in grooved edge, insulation, and top layer; and as follows:

- a. Insulation: Polyisocyanurate **OR** Extruded polystyrene **OR** Expanded polystyrene, **as directed**.
 - b. Top Layer: Manufacturer's standard asphalt-free, glass-fiber-reinforced, black felt facing **OR 7/16-inch- (11-mm-)** thick, oriented-strand board, **as directed**.
- E. Subpurlins
1. Bulb-Tee Subpurlins: Hot-rolled steel bulb tees complying with ASTM A 499 of length required to span three support spacings; shop painted with metal primer.
- F. Accessories
1. Gypsum Concrete Grout: Factory-packaged, gypsum concrete grout formulation recommended by cementitious wood-fiber unit manufacturer with a minimum compressive strength of **500 psi (3.45 MPa)**.
 2. Anchor Clips: Manufacturer's standard formed anchor clips of **0.0478-inch- (1.21-mm-)** thick minimum, galvanized steel sheet, of type and configuration required for deck system indicated.
 3. Screws: Manufacturer's recommended corrosion-resistant screw fasteners and washers, self-drilling, self-tapping, of length required for deck and structural framing indicated.
 4. Nails: Manufacturer's recommended corrosion-resistant nails of size and length required for deck and structural framing indicated.
 5. Adhesive: Manufacturer's recommended construction adhesive complying with APA AFG-01.
 6. Filler Strips: Insulation strips, same as used in manufacture of insulated composite cementitious wood-fiber units.
 7. Polyethylene Film: **0.004 inch (0.10 mm)** thick, complying with ASTM D 4397.

1.3 EXECUTION

- A. Installation
1. Comply with manufacturer's written instructions for installing cementitious wood-fiber deck.
 - a. Install fastenings according to manufacturer's written instructions, unless otherwise indicated **OR** as indicated, **as directed**.
 2. Deck Interruptions: Provide barrier seals or blocking at overhangs to form wind seals and at partitions and walls to form sound seals, unless otherwise indicated.
- B. Form-Deck Installation
1. Tile and Subpurlin Form Deck: Space subpurlin members as indicated. Attach subpurlins to each support with **3/4-inch- (19-mm-)** long minimum, fillet welds on both sides of flanges at ends of members and on alternate sides at intermediate structural supports.
 - a. Lay tile with rabbeted edges supported on subpurlins, and shim or block in place to prevent dislocation during placing of fill.
 - b. Lay tile with square-cut ends concealed and supported on cross subpurlins **OR** over supporting purlins or beams, **as directed**.
 - c. Lay tile with tongue-and-groove ends exposed in pattern indicated.
 - d. Fill void with gypsum concrete grout where edge joints meet subpurlins. Strike grout flush with top of tile and feather uneven top surfaces to a plane.
 - e. Provide shoring of sufficient strength to withstand weight of cast-in-place fill and construction traffic. Design, install, and remove shoring according to Division 03 Section "Cast-in-place Concrete".
 2. Plank Form Deck: Install planks progressively with long dimension perpendicular to supports and with end joints in alternate rows, staggered and centered over supports, unless otherwise indicated. Tightly nest tongue-and-groove edges and tightly butt end joints.
 - a. Cut panels to provide starter units.
 - b. Continuously support plank edges and ends at perimeter of building and at openings in deck.

- c. Provide shoring of sufficient strength to withstand weight of cast-in-place fill and construction traffic. Design, install, and remove shoring according to Division 03 Section "Cast-in-place Concrete".
 - d. Cover exposed edges and ends of form planks with polyethylene film before pouring cast-in-place fill to prevent paste or mixing water from penetrating deck and seeping through to bottom face. Remove exposed film after cast-in-place fill has set.
3. Concealed-Tee Plank Deck: Install planks progressively with long dimension perpendicular to supports and with end joints in alternate rows, staggered and centered over supports, unless otherwise indicated. Install flange of bulb tee into kerfed edge and tightly butt adjoining plank to engage other flange. Tightly nest tongue-and-groove **OR** butt square, **as directed**, end joints.
- a. Cut panels to provide starter units.
 - b. Continuously support plank edges and ends at perimeter of building and at openings in deck.
 - c. Fill void with gypsum concrete grout where edge joints meet subpurlins. Strike grout flush with top of plank and feather uneven top surfaces to a plane.
 - d. Provide shoring of sufficient strength to withstand weight of cast-in-place fill and construction traffic. Design, install, and remove shoring according to Division 03 Section "Cast-in-place Concrete".

C. Roof Deck Installation

1. Tile and Subpurlin Roof Deck: Space subpurlin members as indicated. Attach subpurlins to each support with **3/4-inch- (19-mm-)** long minimum, fillet welds on both sides of flanges at ends of members and on alternate sides at intermediate structural supports.
- a. Lay tile with rabbeted edges supported on subpurlins.
 - b. Lay tile with square-cut ends concealed and supported on cross subpurlins **OR** over supporting purlins or beams, **as directed**.
 - c. Lay tile with tongue-and-groove ends exposed in pattern indicated.
 - d. Fill void with gypsum concrete grout where edge joints meet subpurlins. Strike grout flush with top of tile and feather uneven top surfaces to a plane.
 - e. Fill void with gypsum concrete grout where edge joints meet subpurlins. Strike grout flush with top surface of cementitious wood-fiber base. Fill remainder of joint with filler strips of insulation.
2. Plank Roof Deck: Install planks progressively with long dimension perpendicular to supports and with end joints in alternate rows, staggered and centered over supports, unless otherwise indicated. Tightly nest tongue-and-groove edges and tightly butt end joints.
- a. Cut panels to provide starter units.
 - b. Continuously support plank edges and ends at perimeter of building and at openings in deck.
 - c. Mechanically fasten planks to supports and perimeter members.
 - d. Adhesively and mechanically fasten planks to supports and perimeter members. Apply adhesive to tongue-and-groove edges.
3. Concealed-Tee Plank Roof Deck: Install planks progressively with long dimension perpendicular to supports and with end joints in alternate rows, staggered and centered over supports, unless otherwise indicated. Install flange of bulb tee into kerfed edge and tightly butt adjoining plank to engage other flange. Tightly nest tongue-and-groove **OR** butt square, **as directed**, end joints.
- a. Cut panels to provide starter units.
 - b. Continuously support plank edges and ends at perimeter of building and at openings in deck.
 - c. Mechanically fasten planks to supports and perimeter members.
 - d. Adhesively and mechanically fasten planks to supports and perimeter members. Apply adhesive to tongue-and-groove edges.
 - e. Fill void with gypsum concrete grout where edge joints meet subpurlins. Strike grout flush with top of plank and feather uneven top surfaces to a plane.

D. Cleaning And Protection

1. Protect top surfaces of deck from damage caused by construction operations.
2. Protect exposed bottom surfaces of deck from soiling and damage during handling and construction.
3. Clean exposed bottom surfaces of completed deck and touch up minor damage to surfaces as approved.
4. Provide final protection and maintain conditions in a manner acceptable to manufacturer and Installer that ensures that cementitious wood-fiber deck is without damage or deterioration at time of Final Completion.
5. Remove and replace deteriorated and damaged deck units.

END OF SECTION 03 51 13 00

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SECTION 03 51 16 00 - PRECAST LIGHTWEIGHT ROOF SLABS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of precast lightweight roof deck concrete channels, concrete planks, and gypsum planks. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

- A. Channel Slabs: Slabs shall be composed of Portland cement and lightweight aggregate with minimum compressive strength 3,750 psi. Legs shall be reinforced with deformed bars; web shall have welded wire fabric reinforcement. Channels shall support a 30 psf live load plus a 20 psf superimposed dead load.
- B. Concrete Planks: Planks shall be composed of Portland cement and lightweight aggregate with a minimum compressive strength of 3,750 psi. Planks shall be reinforced with welded wire fabric. Planks shall support a 30 psf live load plus a 20 psf superimposed dead load.
- C. Gypsum Planks shall conform to ASTM C 956, factory-laminated to 2-inch thickness, 2-foot wide panels. Planks shall be continuously supported along sides.
- D. Subpurlins shall be bulb-ties, ASTM A 440.
- E. Grout shall be lightweight concrete or gypsum concrete.

1.3 EXECUTION

- A. Concrete Channels and Planks shall be securely attached to support steel or concrete by metal clips or other approved attachments; minimum support bearing shall be 4 inches. Open joints between channels or planks shall be filled with lightweight concrete grout. Planks with tongue and groove edges may not require grouting.
- B. Gypsum Planks shall be snugly fit between bulb-tee subpurlins. Subpurlins shall be tack-welded or screw-attached to supporting steel or weld bar cast in supporting concrete. Joints at bulb-tees shall be grouted with gypsum grout.

END OF SECTION 03 51 16 00

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SECTION 03 51 16 00a - GYPSUM CONCRETE DECKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of gypsum concrete decks. Products shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

A. Gypsum Concrete: ASTM C 317, Class A.

B. Formboards:

1. Gypsum Board: ASTM C 318.
2. Mineral Fiber Board: ASTM C612.
3. Glass Fiber Board: Lightweight, rigid, composed of pressed glass fibers.

C. Bulb Tees: ASTM A 499, Grade 50.

D. Reinforcing Mesh:

1. Welded Wire Fabric: ASTM A 1064, galvanized, 12 x 48-W0.5 x W0.5.
2. Woven Wire Fabric: ASTM A 82, galvanized, 19 gauge wire, 2-inch hexagonal mesh.

1.3 EXECUTION

- A. Support System: Sub-purlins shall be spaced to support formboards and rigidly attached to main supports. Formboards shall fit snugly at sub-purlins and at wall, curbs, and openings.
- B. Reinforcement: Lay wire fabric continuously over sub-purlins. Do not lap side of reinforcement.
- C. Gypsum Concrete: Gypsum concrete shall be placed continuously without interruption until entire panel or section is complete. Immediately after placement, screed, level, and trowel smooth.

END OF SECTION 03 51 16 00a

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SECTION 03 51 16 00b - GYPSUM PLANK DECKING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gypsum plank decking for interstitial decks **OR** fire rated interstitial decks, **as directed**, and roof decks. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Fire Tests: Fire tests, data and certifications substantiating that Gypsum Plank Decking complies with fire rating requirements.
2. Shop Drawings: Show typical plank layouts, perimeter and framed opening supports and details of construction, installation, fastenings and grouting.
3. Manufacturer's Literature and Data: Each item specified.
4. Load tables for sub-purlins.

C. Quality Control

1. Work performed by experienced, qualified installers approved by manufacturer of gypsum plank.
2. Gypsum materials products of one manufacturer.

D. Delivery And Storage

1. Deliver materials in original packages, containers, or bundles bearing brand name and name of manufacturer.
2. Store materials in a manner that prevents damage before use. When stored under tarpaulins, provide ventilation to prevent moisture accumulation under tarpaulin.
3. Store gypsum planks flat and off ground. Handle and stack in a manner to prevent damage to face, ends, and edges and keep dry until used.
4. Store gypsum concrete off ground and keep dry until used.

1.2 PRODUCTS

A. Materials

1. Structural Steel Tee Sub-purlins:
 - a. Open web truss-tees, hot-rolled bulb-tees or folded sheet metal tees as required by design loads, spans and fire ratings.
 - b. Flanges: Provide **5/8-inch (16 mm)** minimum bearing for gypsum planks.
 - c. Galvanize or factory coat sub-purlins with manufacturer's standard primer.
 - d. Open web truss-tees: Fabricate from cold-formed steel wire conforming to ASTM A82.
 - e. Hot-rolled bulb-tees: Rail-shaped, fabricated from hot-rolled steel conforming to ASTM A36/A36M or ASTM A499.
 - f. Folded sheet metal tees: Fabricate from sheet steel conforming to ASTM A653 and ASTM A568/A568M.
2. Cross-Tees:
 - a. Cold-Formed, Fabrication from sheet steel conforming to ASTM A653/A653M or ASTM A568/A568M.
 - b. Size: **1-1/4-inches (30 mm)** by **1/2-inch (13 mm)** by **0.023-inch (0.6 mm)** thick by **24-inches (600 mm)** long.
 - c. Tees shall be galvanized or factory coated with manufacturer's standard primer.
3. Gypsum Deck Plank:
 - a. Fabricated of gypsum board: ASTM C442.

- b. Nominal Size: **2-inches (50 mm) OR 2-5/8-inches (65 mm)**, **as directed**, thick by **24-inches (600 mm)** wide by main purlin span. Where possible, length should span two main purlin spans.
 - c. Factory laminate from two **1-inch (25 mm)** thick gypsum panels with top panel edge set back along sub-purlin edge not more than **1/2-inch (13 mm)**.
 - d. Offset edges encased in water-resistant paper.
 4. Gypsum Deck Panels: ASTM C36, Type "X", **5/8-inch (16 mm)** thick by **24-inches (600 mm)** wide by main purlin span.
 5. Grout: Gypsum Concrete: ASTM C317, Class A, **500 psi (3.5 MPa)** minimum compressive strength.
 6. Miscellaneous Materials: Adhesives, mastics, cements, tapes and primers shall be as recommended by the gypsum plank manufacturer and shall be compatible with the material to which they are to be bonded.
- B. Deck System
1. Interstitial deck: Provide two-hour fire rating as tested by gypsum plank manufacturer under ASTM E119.
 2. Roof Deck: Provide one hour **OR 1-1/2 hour**, **as directed**, fire rating per tested assembly by Underwriters' Laboratory Inc. or other testing.

1.3 EXECUTION

A. Installation

1. Weld per AWS D1.1.
2. Sub-purlins:
 - a. Space at approximately **24-5/8-inches (650 mm)** on center to provide minimum **5/8 inch (16 mm)** continuous bearing for gypsum plank or deck.
 - b. Install framing of openings.
 - c. Touch up welds with same type of rust-inhibitive paint used for primer.
 - d. Interstitial Decks: Use **3/4-inch (19 mm)** fillet welds on both sides of sub-purlins at math purlin.
 - e. Roof Decks: Use minimum **1/2-inch (13 mm)** fillet welds on alternate sides of sub-purlins, both sides at end joints to main purlins.
 - f. For fire rated roof decks weld per fire test assembly.
3. For Two Hour fire rated interstitial decks **OR** fire-rated roof decks, **as directed**.
 - a. Place gypsum deck panels on bottom flanges of sub-purlins with **5/8-inch (16 mm)** minimum continuous bearing.
 - b. Place gypsum deck plank over gypsum deck panels, with off-set edges "up" to form a "T" receptacle for gypsum grout.
 - c. Cut to fit around openings shown.
 - d. Install plank to conform to fire test assembly.
4. Gypsum Deck Plank for Roof Decks:
 - a. Place plank on lower flanges of sub-purlins or other framing with ends and edges supported.
 - b. Stagger joints in adjacent courses.
 - c. Support end joints with cross-tees not supported by framing.
 - d. Cut plank to fit at ends and framed openings.
5. Provide continuous **5/8-inch (16 mm)** minimum bearing for plank support at deck perimeter, plank ends and openings exceeding **8-inches (200 mm)**.
6. Grout:
 - a. Mix gypsum concrete thoroughly using a minimum amount of water to form a thick, pourable consistency.
 - b. Fill edge joints to slight excess with single pour at sub-purlins.
 - 1) Grout end joints on single span system against steel framing.

- 2) After initial set, strike of excess to form smooth, flush joint.
 - 3) Form cant strips and curbs where shown.
- c. Fill joints at roof ridges, hips and valleys.
7. Patching:
 - a. Fill with grout and smooth any surface damage to gypsum plank.
 - b. Remove and replace cracked, broken, and plank damaged beyond repair.
8. Cleaning and Protection:
 - a. Upon completion of gypsum plank decking, remove, debris and sweep surface clean. Leave ready for subsequent work.
 - b. Protect finished deck from weather and subsequent construction operations.
 - c. Provide hardboard or plywood temporary protection over decking subject to repetitive impact or wheeled loads.

END OF SECTION 03 51 16 00b

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SECTION 03 53 14 00 - CONCRETE FLOOR TOPPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for concrete floor topping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Emery-aggregate concrete floor topping.
 - b. Iron-aggregate concrete floor topping.

C. Submittals

1. Product Data: For each type of product indicated.
2. Product Test Reports.
3. Field quality-control test reports.

D. Quality Assurance

1. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
2. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage, mixing with other components, and application.
2. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

F. Project Conditions

1. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete floor topping performance.
 - a. Place concrete floor topping only when ambient temperature and temperature of base slabs are between **50 and 86 deg F (10 and 30 deg C)**.
2. Close areas to traffic during topping application and, after application, for time period recommended in writing by manufacturer.

1.2 PRODUCTS

A. Concrete Floor Toppings

1. Emery-Aggregate Concrete Floor Topping: Factory-prepared and dry-packaged mixture of graded, crushed emery aggregate containing not less than 50 percent aluminum oxide, not less than 24 percent ferric oxide, and not more than 8 percent silica; portland cement or blended hydraulic cement; plasticizers; and other admixtures to which only water needs to be added at Project site.
 - a. Compressive Strength (28 Days): **10,000 psi (69 MPa)**; ASTM C 109/C 109M.
2. Iron-Aggregate Concrete Floor Topping: Factory-prepared and dry-packaged mixture of graded iron aggregate, portland cement, plasticizers, and other admixtures to which only water needs to be added at Project site.

a. Compressive Strength (28 Days): **12,000 psi (83 MPa)**; ASTM C 109/C 109M.

B. Curing Materials

1. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.
2. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd. (305 g/sq. m)** when dry.
3. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
4. Water: Potable.
5. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 25 percent solids content, minimum.

C. Related Materials

1. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A Shore durometer hardness of 80 **OR** aromatic polyurea with a Type A Shore durometer hardness range of 90 to 95, **as directed**, per ASTM D 2240.
2. Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
3. Portland Cement: ASTM C 150, Type I or II.
4. Sand: ASTM C 404, fine aggregate passing **No. 16 (1.18-mm)** sieve.
5. Water: Potable.
6. Acrylic-Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
7. Epoxy Adhesive: ASTM C 881/C 881M, Type V, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements.

D. Mixing

1. Bonding Slurry: Mix portland cement with water to a thick paint consistency.
OR
Bonding Slurry: Mix 1 part portland cement and 1-1/2 **OR** 2 **OR** 2-1/2, **as directed**, parts sand with water and an acrylic-bonding agent according to manufacturer's written instructions, **as directed**, to a thick paint consistency.
2. Floor Topping: Mix concrete floor topping materials and water in appropriate drum-type batch machine mixer or truck mixer according to manufacturer's written instructions.

1.3 EXECUTION

A. Examination

1. Examine substrates, with Installer present, for conditions affecting performance of concrete floor topping.
2. Verify that base concrete slabs comply with scratch finish requirements specified in Division 03 Section "Cast-in-place Concrete".
3. Verify that base slabs are visibly dry and free of moisture. Test for capillary moisture by the plastic sheet method according to ASTM D 4263.
4. Proceed with application only after unsatisfactory conditions have been corrected.

B. Preparation

1. Existing Concrete: Remove existing surface treatments and deteriorated and unsound concrete. Mechanically abrade base slabs to produce a heavily scarified surface profile with an amplitude of **1/4 inch (6 mm.)**
 - a. Prepare and clean existing base slabs according to concrete floor topping manufacturer's written instructions. Fill voids, cracks, and cavities in base slabs.
 - b. Mechanically remove contaminants from existing concrete that might impair bond of floor topping.

- c. Saw cut contraction and construction joints in existing concrete to a depth of **1/2 inch (13 mm)** and fill with semirigid joint filler.
 - d. To both sides of joint edges and at perimeter of existing base slab mechanically remove a **4-inch- (100-mm-)** wide and **0- to 1-inch (0- to 25-mm-)** deep, tapered wedge of concrete and retexture surface **OR** install concrete nails in manufacturer's recommended staggered pattern, **as directed**.
2. Install joint-filler strips where topping abuts vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - a. Extend joint-filler strips full width and depth of joint, terminating flush with topping surface, unless otherwise indicated.
 - b. Terminate full-width, joint-filler strips **1/2 inch (13 mm)** below topping surface where joint sealants, specified in Division 07 Section "Joint Sealants", are indicated.
 - c. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- C. Floor Topping Application
1. Start floor topping application in presence of manufacturer's technical representative.
 2. Monolithic Floor Topping: After textured-float finish is applied to fresh concrete of base slabs specified in Division 03 Section "Cast-in-place Concrete", place concrete floor topping while concrete is still plastic.
 3. Deferred Floor Topping: Within 72 hours of placing base slabs, mix and scrub bonding slurry into dampened concrete to a thickness of **1/16 to 1/8 inch (1.6 to 3 mm)**, without puddling. Place floor topping while slurry is still tacky.
 4. Existing Concrete: Apply epoxy-bonding adhesive, mixed according to manufacturer's written instructions, and scrub into dry base slabs to a thickness of **1/16 to 1/8 inch (1.6 to 3 mm)**, without puddling. Place floor topping while adhesive is still tacky.
 5. Place concrete floor topping continuously in a single layer, tamping and consolidating to achieve tight contact with bonding surface. Do not permit cold joints or seams to develop within pour strip.
 - a. Screed surface with a straightedge and strike off to correct elevations.
 - b. Slope surfaces uniformly where indicated.
 - c. Begin initial floating using bull floats to form a uniform and open-textured surface plane free of humps or hollows.
 6. Finishing: Consolidate surface with power-driven floats as soon as concrete floor topping can support equipment and operator. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until concrete floor topping surface has a uniform, smooth, granular texture.
 - 1) Hard Trowel Finish: After floating surface, apply first trowel finish and consolidate concrete floor topping by power-driven trowel without allowing blisters to develop. Continue troweling passes and restraighten until surface is smooth and uniform in texture.
 - 2) Finish surfaces to specified overall values of flatness, F(F) 25; and levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and levelness, F(L) 15, and measure **OR** notify independent testing agency to permit measurement, **as directed**, within 24 hours according to **ASTM E 1155 (ASTM E 1155M)** for a randomly trafficked floor surface.
 - 3) Finish and measure surface so gap at any point between surface and an unlevelled freestanding **10-foot- (3-m-)** long straightedge, resting on 2 high spots and placed anywhere on the surface, does not exceed **1/4 inch (6 mm)**.
 7. Construction Joints: Construct joints true to line with faces perpendicular to surface plane of concrete floor topping, at locations indicated or as approved by the Owner.
 - a. Coat face of construction joint with epoxy adhesive at locations where concrete floor topping is placed against hardened or partially hardened concrete floor topping.
 8. Contraction Joints: Form weakened-plane contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3-mm-)** wide joints into concrete

floor topping when cutting action will not tear, abrade, or otherwise damage surface and before random contraction cracks develop.

- a. Form joints in concrete floor topping over contraction joints in base slabs, unless otherwise indicated.
- b. Construct contraction joints for a combined depth equal to topping thickness and not less than one-fourth of base-slab thickness.
- c. Construct contraction joints for a depth equal to one-half of concrete floor topping thickness, but not less than **1/2 inch (13 mm)** deep.

D. Protecting And Curing

1. General: Protect freshly placed concrete floor topping from premature drying and excessive cold or hot temperatures.
2. Evaporation Retarder: Apply evaporation retarder to concrete floor topping surfaces in hot, dry, or windy conditions before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying floor topping, but before float finishing.
3. Begin curing immediately after finishing concrete floor topping. Cure by one or a combination of the following methods, according to concrete floor topping manufacturer's written instructions:
 - a. Moisture Curing: Keep surfaces continuously moist for not less than 7 days with water **OR** continuous water-fog spray **OR** absorptive cover, water saturated and kept continuously wet. Cover topping surfaces and edges with **12-inch (300-mm)** lap over adjacent absorptive covers, **as directed**.
 - b. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least **12 inches (300 mm)**, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - c. Curing Compound: Apply uniformly in two coats in continuous operations by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

E. Joint Filling

1. Prepare and clean contraction joints and install semirigid joint filler, according to manufacturer's written instructions, once topping has fully cured.
2. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
3. Install semirigid joint filler full depth of contraction joints. Overfill joint and trim semirigid joint filler flush with top of joint after hardening.

F. Repairs

1. Defective Topping: Repair and patch defective concrete floor topping areas, including areas that have not bonded to concrete substrate.

G. Field Quality Control

1. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
2. Testing Services: Testing and inspecting of completed applications of concrete floor toppings shall take place in successive stages, in areas of extent and using methods as follows:
 - a. Sample Sets: At point of placement, a set of 3 molded-cube samples shall be taken from the topping mix for the first **1000 sq. ft. (93 sq. m)**, plus 1 set of samples for each subsequent **5000 sq. ft. (464 sq. m)** of topping, or fraction thereof, but not less than 6 samples for each day's placement. Samples shall be tested according to ASTM C 109/C 109M for compliance with compressive-strength requirements.

- b. Concrete floor topping shall be tested for delamination by dragging a steel chain over the surface.
 - c. Concrete floor topping shall be tested for compliance with surface flatness and levelness tolerances.
3. Remove and replace applications of concrete floor topping where test results indicate that it does not comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 03 53 14 00

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Task	Specification	Specification Description
03 53 19 00	03 53 14 00	Concrete Floor Topping

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SECTION 03 54 16 00 - CEMENT-BASED UNDERLAYMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hydraulic cement-based underlayment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes hydraulic-cement-based, polymer-modified, self-leveling underlayment for application below interior floor coverings.

C. Action Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit IEQ 4.2: For priming and sealing coatings, documentation including printed statement of VOC content.
3. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.

D. Informational Submittals

1. Qualification Data: For qualified Installer.
2. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.
3. Minutes of preinstallation conference.

E. Quality Assurance

1. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
2. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.
3. Fire-Resistance Ratings: Where indicated, provide hydraulic-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
4. Sound Transmission Characteristics: Where indicated, provide hydraulic-cement underlayment systems identical to those of assemblies tested for STC and IIC ratings per ASTM E 90 and ASTM E 492 by a qualified testing agency.

F. Delivery, Storage, And Handling

1. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

G. Project Conditions

1. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 - a. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between **50 and 80 deg F (10 and 27 deg C)**.

1.2 PRODUCTS

A. Hydraulic-Cement-Based Underlayments

1. Underlayment: Hydraulic-cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thicknesses of **1/4 inch (6 mm)** and that can be feathered at edges to match adjacent floor elevations.
 - a. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 - b. Compressive Strength: Not less than **4100 psi (28 MPa)** at 28 days when tested according to ASTM C 109/C 109M.
 - c. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer formulated for use with underlayment when applied to substrate and conditions indicated.
2. Aggregate: Well-graded, washed gravel, **1/8 to 1/4 inch (3 to 6 mm)**; or coarse sand as recommended by underlayment manufacturer.
 - a. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
3. Water: Potable and at a temperature of not more than **70 deg F (21 deg C)**.
4. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
5. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
6. Corrosion-Resistant Coating: Recommended in writing by underlayment manufacturer for metal substrates.

B. Accessories

1. Sound Mat
2. Sound Reduction Board

1.3 EXECUTION

A. Examination

1. Examine substrates, with Installer present, for conditions affecting performance.
 - a. Proceed with application only after unsatisfactory conditions have been corrected.

B. Preparation

1. General: Prepare and clean substrate according to manufacturer's written instructions.
 - a. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
 - b. Fill substrate voids to prevent underlayment from leaking.
2. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
 - a. Moisture Testing: Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates do not exceed a maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/100 sq. m)** in 24 hours.
3. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
 - a. Install underlayment reinforcement recommended in writing by manufacturer.
4. Metal Substrates: Mechanically remove, according to manufacturer's written instructions, rust, foreign matter, and other contaminants that might impair underlayment bond. Apply corrosion-resistant coating compatible with underlayment if recommended in writing by underlayment manufacturer.

5. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
6. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.
7. Sound Control Mat and Board: Install sound control materials according to manufacturer's written instructions.
 - a. Do not install mechanical fasteners that penetrate through the sound control materials.

C. Application

1. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - a. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - b. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
2. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
3. Apply underlayment to produce uniform, level surface.
 - a. Apply a final layer without aggregate to product surface.
 - b. Feather edges to match adjacent floor elevations.
4. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
5. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
6. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

D. Protection

1. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION 03 54 16 00

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Task	Specification	Specification Description
03 61 16 00	01 22 16 00	No Specification Required
03 62 13 00	03 48 29 00	Plant-Precast Structural Concrete
03 62 16 00	03 48 29 00	Plant-Precast Structural Concrete
03 63 00 00	03 37 13 00	Shotcrete
03 64 23 00	03 48 29 00	Plant-Precast Structural Concrete
03 64 26 00	01 22 16 00	No Specification Required

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SECTION 04 01 20 91 - CLAY MASONRY RESTORATION AND CLEANING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for clay masonry restoration and cleaning. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes maintenance of unit masonry consisting of brick and terra cotta clay masonry restoration and cleaning as follows:
 - a. Unused anchor removal.
 - b. Repairing unit masonry, including replacing units.
 - c. Painting steel uncovered during the work.
 - d. Reanchoring veneers.
 - e. Repointing joints.
 - f. Preliminary cleaning, including removing plant growth.
 - g. Cleaning exposed unit masonry surfaces.
2. Owner-Furnished Material: Salvaged brick (if salvaged brick is available from the Owner for reuse).

C. Definitions

1. Very Low-Pressure Spray: Under 100 psi (690 kPa).
2. Low-Pressure Spray: 100 to 400 psi (690 to 2750 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
3. Medium-Pressure Spray: 400 to 800 psi (2750 to 5510 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
4. High-Pressure Spray: 800 to 1200 psi (5510 to 8250 kPa); 4 to 6 gpm (0.25 to 0.4 L/s).
5. Saturation Coefficient: Ratio of the weight of water absorbed during immersion in cold water to weight absorbed during immersion in boiling water; used as an indication of resistance of masonry units to freezing and thawing.

D. Preconstruction Testing

1. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on masonry units as follows.
 - a. Existing Brick and Terra Cotta: Test each type of existing masonry unit indicated for replacement, according to testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction). Carefully remove five existing units from locations designated by the Owner. Take testing samples from these units.
 - b. Existing Mortar: Test according to ASTM C 295, modified as agreed by testing service and the Owner for Project requirements, to determine proportional composition of original ingredients, sizes and colors of aggregates, and approximate strength. Use X-ray diffraction, infrared spectroscopy, and differential thermal analysis as necessary to supplement microscopical methods. Carefully remove existing mortar from within joints at five locations designated by the Owner or testing service.
 - c. Temporary Patch: as directed by the Owner, provide temporary materials at locations from which existing samples were taken.
 - d. Replacement Brick and Terra Cotta: Test each proposed type of replacement masonry unit, according to sampling and testing methods in ASTM C 67 for compressive strength, 24-hour cold-water absorption, 5-hour boil absorption, saturation coefficient, and initial rate of absorption (suction).

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For the following:
 - a. Full-size patterns with complete dimensions for new terra cotta units, specially molded brick shapes, and brick arches and their jointing, showing relation of existing to new units.
 - b. Setting number of each new terra cotta unit and its location on the structure in annotated plans and elevations.
 - c. Provisions for expansion joints or other sealant joints.
 - d. Provisions for flashing, lighting fixtures, conduits, and weep holes as required.
 - e. Replacement and repair anchors. Include details of anchors within individual masonry units, with locations of anchors and dimensions of holes and recesses in units required for anchors.
3. Samples: For each exposed product and for each color and texture specified.
4. Preconstruction Test Reports.

F. Quality Assurance

1. Restoration Specialist Qualifications: Engage an experienced, preapproved masonry restoration and cleaning firm to perform work of this Section. Firm shall have completed work similar in material, design, and extent to that indicated for this Project with a record of successful in-service performance. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.
 - a. At Contractor's option, work may be divided between two specialist firms: one for cleaning work and one for repair work.
 - b. Field Supervision: Restoration specialist firms shall maintain experienced full-time supervisors on Project site during times that clay masonry restoration and cleaning work is in progress. Supervisors shall not be changed during Project except for causes beyond the control of restoration specialist firm.
 - c. Restoration Worker Qualifications: Persons who are experienced and specialize in restoration work of types they will be performing. When masonry units are being patched, assign at least one worker among those performing patching work who is trained and certified by manufacturer of patching compound to apply its products.
2. Terra Cotta Manufacturer Qualifications: A firm regularly engaged in manufacturing custom architectural terra cotta units for building restoration purposes, of same type and of similar size, complexity, and tolerances as those required for the Work.
3. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
 - a. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than 2 adjacent whole units or approximately **48 inches (1200 mm)** in least dimension. Erect sample areas in existing walls unless otherwise indicated, to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:
 - 1) Replacement:
 - a) Four brick units replaced.
 - b) Four terra cotta units replaced.
 - 2) Reanchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
 - 3) Patching: Three small holes at least **1 inch (25 mm)** in diameter **OR** as directed, **as directed**, for each type of masonry material indicated to be patched, so as to leave no evidence of repair.
 - 4) Widening Joints: Widen a joint in 2 separate locations, each approximately **12 inches (300 mm)** long **OR** as directed, **as directed**.
 - b. Repointing: Rake out joints in 2 separate areas, each approximately **36 inches (900 mm)** high by **48 inches (1200 mm)** wide **OR** as indicated, **as directed**, for each type of repointing required and repoint one of the areas.

- c. Cleaning: Clean an area approximately **25 sq. ft. (2.3 sq. m)** **OR** as indicated, **as directed**, for each type of masonry and surface condition.
4. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
2. Deliver each piece of terra cotta with code mark or setting number on unexposed face, corresponding to Shop Drawings, using nonstaining paint.
3. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
4. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
5. Store hydrated lime in manufacturer's original and unopened containers. Discard lime if containers have been damaged or have been opened for more than two days.
6. Store lime putty covered with water in sealed containers.
7. Store sand where grading and other required characteristics can be maintained and contamination avoided.

H. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.
2. Repair masonry units and repoint mortar joints only when air temperature is between **40 and 90 deg F (4 and 32 deg C)** and is predicted to remain so for at least 7 days after completion of the Work unless otherwise indicated.
3. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated:
 - a. When air temperature is below **40 deg F (4 deg C)**, heat mortar ingredients, masonry repair materials, and existing masonry walls to produce temperatures between **40 and 120 deg F (4 and 49 deg C)**.
 - b. When mean daily air temperature is below **40 deg F (4 deg C)**, provide enclosure and heat to maintain temperatures above **32 deg F (0 deg C)** within the enclosure for 7 days after repair and pointing.
 - c. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of **90 deg F (32 deg C)** and above unless otherwise indicated.
4. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
5. Clean masonry surfaces only when air temperature is **40 deg F (4 deg C)** and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.2 PRODUCTS

A. Masonry Materials

1. Face Brick: Provide face brick, including specially molded, ground, cut, or sawed shapes where required to complete masonry restoration work.
 - a. Provide units with physical properties, colors, color variation within units, surface texture, size, and shape to match existing brickwork.
 - 1) Physical Properties per ASTM C 67:
 - 2) For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.

- b. Special Shapes:
 - 1) Provide specially molded, 100 percent solid shapes for applications where core holes or "frogs" could be exposed to view or weather when in final position and where shapes produced by sawing would result in sawed surfaces being exposed to view.
 - 2) Provide specially ground units, shaped to match patterns, for arches and where indicated.
 - 3) Mechanical chopping or breaking brick, or bonding pieces of brick together by adhesive, are not acceptable procedures for fabricating special shapes.
 - c. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C 216, Type FBX **OR** Comply with tolerance requirements in ASTM C 216, Type FBS, **as directed**.
2. Building Brick: Provide building brick complying with ASTM C 62, of same vertical dimension as face brick, for masonry work concealed from view.
- a. Grade SW where in contact with earth.
 - b. Grade SW, MW, or NW for concealed backup.
3. Salvaged Brick: Obtain salvaged brick from the Owner from location shown on Drawings. Clean off residual mortar.
4. Glazed Terra Cotta: Provide new terra cotta units to match existing terra cotta units in body composition, physical properties, color, gloss, surface texture, thickness, profile, dimensions, and composition of surface glaze.
- a. Physical Properties: Provide units with tested physical properties within 10 percent of those determined from preconstruction testing of selected existing units.
 - 1) Physical Properties per ASTM C 67:
 - b. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C 212, Type FTX.
5. Brownstone Terra Cotta: Provide new, unglazed, brownstone terra cotta units to match existing terra cotta units in body composition, physical properties, colors, color variation within units, surface texture, unit profile, and dimensions.
- a. Physical Properties: Provide units with tested physical properties within 10 percent of those determined from preconstruction testing of selected existing units.
 - b. Physical Properties per ASTM C 67:
 - c. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C 212, Type FTX.
 - d. For existing terra cotta that exhibits a range of colors or color variation within units, provide terra cotta that proportionally matches that range and variation rather than terra cotta that matches an individual color within that range.
- B. Mortar Materials
- 1. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.
 - a. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.
 - 2. Hydrated Lime: ASTM C 207, Type S.
 - 3. Factory-Prepared Lime Putty: ASTM C 1489.
 - 4. Quicklime: ASTM C 5, pulverized lime.
 - 5. Mortar Sand: ASTM C 144 unless otherwise indicated.
 - a. Color: Provide natural sand or ground marble, granite, or other sound stone of color necessary to produce required mortar color.
 - b. For pointing mortar, provide sand with rounded edges.
 - c. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.
 - 6. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.
 - 7. Water: Potable.

C. Manufactured Repair Materials

1. **Masonry Patching Compound:** Factory-mixed cementitious product that is custom manufactured for patching masonry.
 - a. Use formulation that is vapor- and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.
 - b. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.
 - c. Formulate patching compound used for patching brick and terra cotta in colors and textures to match each masonry unit being patched.
2. **Terra Cotta Glaze Replacement:** A high-solids, nonyellowing, fade-resistant, waterborne polyurethane or epoxy coating intended for exterior use as terra cotta glaze replacement. Product shall be custom mixed by manufacturer to match color and gloss of existing terra cotta glaze.

D. Paint Removers

1. **Alkaline Paste Paint Remover:** Manufacturer's standard alkaline paste formulation for removing paint coatings from masonry.
2. **Covered or Skin-Forming Alkaline Paint Remover:** Manufacturer's standard covered or skin-forming alkaline formulation for removing paint coatings from masonry.
3. **Solvent-Type Paint Remover:** Manufacturer's standard water-rinsable, solvent-type gel formulation for removing paint coatings from masonry.
4. **Low-Odor, Solvent-Type Paint Remover:** Manufacturer's standard low-odor, water-rinsable solvent-type gel formulation, containing no methanol or methylene chloride, for removing paint coatings from masonry.

E. Cleaning Materials

1. **Water:** Potable.
2. **Hot Water:** Water heated to a temperature of **140 to 160 deg F (60 to 71 deg C)**.
3. **Job-Mixed Detergent Solution:** Solution prepared by mixing **2 cups (0.5 L)** of tetrasodium polyphosphate, **1/2 cup (125 mL)** of laundry detergent, and **20 quarts (20 L)** of hot water for every **5 gal. (20 L)** of solution required.
4. **Job-Mixed Mold, Mildew, and Algae Remover:** Solution prepared by mixing **2 cups (0.5 L)** of tetrasodium polyphosphate, **5 quarts (5 L)** of 5 percent sodium hypochlorite (bleach), and **15 quarts (15 L)** of hot water for every **5 gal. (20 L)** of solution required.
5. **Nonacidic Gel Cleaner:** Manufacturer's standard gel formulation, with pH between 6 and 9, that contains detergents with chelating agents and is specifically formulated for cleaning masonry surfaces.
6. **Nonacidic Liquid Cleaner:** Manufacturer's standard mildly alkaline liquid cleaner formulated for removing mold, mildew, and other organic soiling from ordinary building materials, including polished stone, brick, aluminum, plastics, and wood.
7. **Mild Acidic Cleaner:** Manufacturer's standard mildly acidic cleaner containing no muriatic (hydrochloric), hydrofluoric, or sulfuric acid; or ammonium bifluoride or chlorine bleaches.
8. **Acidic Cleaner:** Manufacturer's standard acidic masonry cleaner composed of hydrofluoric acid or ammonium bifluoride blended with other acids, detergents, wetting agents, and inhibitors.
9. **Two-Part Chemical Cleaner:** Manufacturer's standard system consisting of potassium or sodium hydroxide based, alkaline prewash cleaner and acidic afterwash cleaner that does not contain hydrofluoric acid.

F. Accessory Materials

1. **Liquid Strippable Masking Agent:** Manufacturer's standard liquid, film-forming, strippable masking material for protecting glass, metal, and polished stone surfaces from damaging effects of acidic and alkaline masonry cleaners.
2. **Terra Cotta Anchors:** Type and size indicated or, if not indicated, to match existing anchors in size and type. Fabricate anchors from Type 304 **OR** Type 316, **as directed**, stainless steel.

3. Masonry Repair Anchors, Expansion Type: Mechanical fasteners designed for masonry veneer stabilization consisting of **1/4-inch- (6-mm-)** diameter, Type 304 **OR** Type 316, **as directed**, stainless-steel rod with brass expanding shells at each end and water-shedding washer in the middle. Expanding shells shall be designed to provide positive mechanical anchorage to veneer on one end and backup masonry on the other.
4. Masonry Repair Anchors, Spiral Type: Type 304 **OR** Type 316, **as directed**, stainless-steel spiral rods designed to anchor to backing and veneer. Anchors are flexible in plane of veneer but rigid perpendicular to it.
 - a. Provide adhesive-installed anchors complete with manufacturer's standard epoxy adhesive and injection tubes, or other devices required for installation.
 - b. Provide driven-in anchors designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer.
5. Masonry Repair Anchors, Rod/Screen Tube Type: Stainless-steel screen tube with or without Type 304 **OR** Type 316, **as directed**, stainless-steel rod, adhesive installed by injection with manufacturer's standard epoxy adhesive, complete with other devices required for installation.
6. Sealant Materials:
 - a. Provide manufacturer's standard chemically curing, elastomeric sealant(s) of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants".
 - 1) Single-component, nonsag urethane sealant.
 - b. Colors: Provide colors of exposed sealants to match colors of masonry adjoining installed sealant unless otherwise indicated.
 - c. Ground-Mortar Aggregate: Custom crushed and ground pointing mortar sand or existing mortar retrieved from joints. Grind to a particle size that matches the adjacent mortar aggregate and color. Remove all fines passing the 100 sieve.
7. Joint-Sealant Backing:
 - a. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) or Type B (bicellular material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - b. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where acceptable.
8. Setting Buttons: Resilient plastic buttons, nonstaining to masonry, sized to suit joint thicknesses and bed depths of masonry units without intruding into required depths of pointing materials.
9. Masking Tape: Nonstaining, nonabsorbent material, compatible with pointing mortar, joint primers, sealants, and surfaces adjacent to joints; that will easily come off entirely, including adhesive.
10. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer or SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating.
 - a. Use coating requiring no better than SSPC-SP 2, "Hand Tool Cleaning" **OR** SSPC-SP 3, "Power Tool Cleaning" **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning", **as directed**, surface preparation according to manufacturer's literature or certified statement.
 - b. Use coating with a VOC content of **420 g/L (3.5 lb/gal.)** or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
11. Miscellaneous Products: Select materials and methods of use based on the following, subject to approval of a mockup:
 - a. Previous effectiveness in performing the work involved.
 - b. Little possibility of damaging exposed surfaces.
 - c. Consistency of each application.
 - d. Uniformity of the resulting overall appearance.
 - e. Do not use products or tools that could do the following:
 - 1) Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.

- 2) Leave a residue on surfaces.

G. Mortar Mixes

1. Preparing Lime Putty: Slake quicklime and prepare lime putty according to appendix to ASTM C 5 and manufacturer's written instructions.
2. Measurement and Mixing: Measure cementitious materials and sand in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean, mechanical batch mixer.
 - a. Mixing Pointing Mortar: Thoroughly mix cementitious materials and sand together before adding any water. Then mix again adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material.
3. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without the Owner's approval.
 - a. Mortar Pigments: Where mortar pigments are indicated, do not exceed a pigment-to-cement ratio of 1:10 by weight.
4. Do not use admixtures in mortar unless otherwise indicated.
5. Mortar Proportions: Mix mortar materials in the following proportions:
 - a. Pointing Mortar for Brick: 1 part portland cement, 2 parts lime, and 6 parts sand **OR** 1 part portland cement, 6 parts lime, and 12 parts sand, **as directed**.
 - 1) Add mortar pigments to produce mortar colors required.
 - b. Pointing Mortar for Terra Cotta: 1 part white portland cement, 1 part lime, and 6 parts sand.
 - 1) Add mortar pigments to produce mortar colors required.
 - c. Rebuilding (Setting) Mortar: Same as pointing mortar except mortar pigments are not required, **as directed**.
 - d. Rebuilding (Setting) Mortar: 1 part portland cement, 2 parts lime, and 6 parts sand **OR** 1 part portland cement, 6 parts lime, and 12 parts sand, **as directed**.
 - e. Rebuilding (Setting) Mortar: Comply with ASTM C 270, Proportion Specification, Type N unless otherwise indicated; with cementitious material limited to portland cement and lime.

H. Chemical Cleaning Solutions

1. Dilute chemical cleaners with water to produce solutions not exceeding concentration recommended by chemical-cleaner manufacturer.
2. Acidic Cleaner Solution for Brick and Brownstone Terra Cotta: Dilute with water to produce hydrofluoric acid content of 3 percent or less, but not greater than that recommended by chemical-cleaner manufacturer.
3. Acidic Cleaner Solution for Glazed Terra Cotta: Dilute with water to concentration demonstrated by testing that does not etch or otherwise damage terra cotta surface, but not greater than that recommended by chemical-cleaner manufacturer.

1.3 EXECUTION

A. Protection

1. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.
 - a. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.
2. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

- a. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
 - b. Keep wall wet below area being cleaned to prevent streaking from runoff.
 - c. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
 - d. Neutralize and collect alkaline and acid wastes for disposal off the Owner's property.
 - e. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
3. Prevent mortar from staining face of surrounding masonry and other surfaces.
 - a. Cover sills, ledges, and projections to protect from mortar droppings.
 - b. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
 - c. Immediately remove mortar in contact with exposed masonry and other surfaces.
 - d. Clean mortar splatters from scaffolding at end of each day.
 4. Remove gutters and downspouts adjacent to masonry and store where indicated during masonry restoration and cleaning. Reinstall when masonry restoration and cleaning are complete.
 - a. Provide temporary rain drainage during work as indicated to direct water away from building.
- B. Unused Anchor Removal
1. Remove masonry anchors, brackets, wood nailers, and other extraneous items no longer in use unless identified as historically significant or indicated to remain.
 - a. Remove items carefully to avoid spalling or cracking masonry.
 - b. Where directed, if an item cannot be removed without damaging surrounding masonry, do the following:
 - 1) Cut or grind off item approximately **3/4 inch (20 mm)** beneath surface and core drill a recess of same depth in surrounding masonry as close around item as practical.
 - 2) Immediately paint exposed end of item with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended dry film thickness per coat. Keep paint off sides of recess.
 - c. Patch the hole where each item was removed unless directed to remove and replace the masonry unit.
- C. Brick Removal And Replacement
1. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
 - a. When removing single bricks, remove material from center of brick and work toward outside edges.
 2. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
 3. Notify the Owner of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
 4. Remove in an undamaged condition as many whole bricks as possible.
 - a. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
 - b. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
 - c. Store brick for reuse. Store off ground, on skids, and protected from weather.
 - d. Deliver cleaned brick not required for reuse to the Owner unless otherwise indicated.
 5. Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.

6. Replace removed damaged brick with other removed brick and salvaged brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.
 7. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - a. Maintain joint width for replacement units to match existing joints.
 - b. Use setting buttons or shims to set units accurately spaced with uniform joints.
 8. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than **30 g/30 sq. in. per min. (30 g/194 sq. cm per min.)**. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
 - a. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 - b. Rake out mortar used for laying brick before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
 - c. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.
- D. Terra Cotta Removal And Replacement
1. At locations indicated, remove terra cotta units that are damaged, spalled, or deteriorated. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.
 2. Support and protect remaining masonry that was supported by removed units. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.
 3. Notify the Owner of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.
 4. Clean masonry surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
 5. Install replacement units into bonding and coursing pattern of existing units.
 - a. Do not cut or grind glazed terra cotta.
 - b. If minor cutting of replacement brownstone terra cotta is required, use a motor-driven grinder or saw designed to cut masonry with clean, sharp, unchipped edges. Do not cut or grind more than **1/8 inch (3 mm)** along any edge.
 - c. Use setting buttons or shims to set units accurately spaced with uniform joints.
 6. Set replacement units in a full bed of mortar. Replace existing anchors with new anchors of size and type indicated.
 - a. Embed anchors in mortar and fill voids behind units with mortar.
 - b. Tool exposed mortar joints in repaired areas to match joints of surrounding existing terra cotta.
 - c. Rake out mortar used for laying terra cotta before mortar sets and point new mortar joints in repaired area to comply with requirements for repointing existing masonry, and at same time as repointing of surrounding area.
 - d. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.
- E. Reanchoring Veneers
1. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions. Install at not more than **16 inches (400 mm)** o.c. vertically and **32 inches (800 mm)** o.c. horizontally unless otherwise indicated. Install at locations to avoid penetrating flashing.
 2. Recess anchors at least **5/8 inch (16 mm)** from surface of mortar joint and fill recess with pointing mortar.
- F. Painting Steel Uncovered During The Work

1. Inspect steel exposed during masonry removal. Where the Owner determines that it is structural, or for other reasons cannot be totally removed, prepare and paint it as follows:
 - a. Remove paint, rust, and other contaminants according to SSPC-SP 2, "Hand Tool Cleaning" **OR** SSPC-SP 3, "Power Tool Cleaning" **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning", **as directed**, as applicable to meet paint manufacturer's recommended preparation.
 - b. Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
2. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than **1/16 inch (1.6 mm)**, notify the Owner before proceeding.

G. Masonry Unit Patching

1. Patch the following masonry units unless another type of replacement or repair is indicated:
 - a. Units indicated to be patched.
 - b. Units with holes.
 - c. Units with chipped edges or corners.
 - d. Units with small areas of deep deterioration.
2. Remove and replace existing patches unless otherwise indicated or approved by the Owner.
3. Patching Bricks:
 - a. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least **1/4 inch (6 mm)** thick, but not less than recommended by patching compound manufacturer.
 - b. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
 - c. Mix patching compound in individual batches to match each unit being patched. Combine one or more colors of patching compound, as needed, to produce exact match.
 - d. Rinse surface to be patched and leave damp, but without standing water.
 - e. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
 - f. Place patching compound in layers as recommended by patching compound manufacturer, but not less than **1/4 inch (6 mm)** or more than **2 inches (50 mm)** thick. Roughen surface of each layer to provide a key for next layer.
 - g. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
 - h. Keep each layer damp for 72 hours or until patching compound has set.
4. Patching Terra Cotta:
 - a. Remove deteriorated material as determined by sounding gently with a small hammer. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least **1/4 inch (6 mm)** thick, but not less than recommended by patching compound manufacturer.
 - b. Where mortar joints adjacent to patch are open, fill back of joints with pointing mortar and allow to cure before patching terra cotta. Leave space for pointing joints according to "Repointing Masonry" Article.
 - c. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of unit.
 - d. Rinse surface to be patched and leave damp, but without standing water.
 - e. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
 - f. Place patching compound in layers as recommended by patching compound manufacturer, but not less than **1/4 inch (6 mm)** or more than **2 inches (50 mm)** thick. Roughen surface of each layer to provide a key for next layer.
 - g. Do not apply patching compound over mortar joints. If patching compound bridges mortar joints, cut out joints after patching compound hardens.

6. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical-cleaner manufacturer's written instructions; use brush or spray application. Do not spray apply at pressures exceeding **50 psi (345 kPa)**. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
 7. Rinse off chemical residue and soil by working upward from bottom to top of each treated area at each stage or scaffold setting. Periodically during each rinse, test pH of rinse water running off of cleaned area to determine that chemical cleaner is completely removed.
 - a. Apply neutralizing agent and repeat rinse if necessary to produce tested pH of between 6.7 and 7.5.
 8. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.
- J. Preliminary Cleaning
1. Removing Plant Growth: Completely remove visible plant, moss, and shrub growth from masonry surfaces. Carefully remove plants, creepers, and vegetation by cutting at roots and allowing to dry as long as possible before removal. Remove loose soil and debris from open masonry joints to whatever depth they occur.
 2. Preliminary Cleaning: Before beginning general cleaning, remove extraneous substances that are resistant to cleaning methods being used. Extraneous substances include paint, calking, asphalt, and tar.
 - a. Carefully remove heavy accumulations of material from surface of masonry with a sharp chisel. Do not scratch or chip masonry surface.
 - b. Remove paint and calking with alkaline paint remover.
 - 1) Comply with requirements in "Paint Removal" Article.
 - 2) Repeat application up to two times if needed.
 - c. Remove asphalt and tar with solvent-type paint remover.
 - 1) Comply with requirements in "Paint Removal" Article.
 - 2) Apply paint remover only to asphalt and tar by brush without prewetting.
 - 3) Allow paint remover to remain on surface for 10 to 30 minutes.
 - 4) Repeat application if needed.
- K. Paint Removal
1. Paint Removal with Alkaline Paste Paint Remover:
 - a. Remove loose and peeling paint using low **OR** medium **OR** high, **as directed**,-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - b. Apply paint remover to dry, painted masonry with brushes.
 - c. Allow paint remover to remain on surface for period recommended by manufacturer.
 - d. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**,-pressure spray to remove chemicals and paint residue.
 - e. Repeat process if necessary to remove all paint.
 - f. Apply acidic cleaner or manufacturer's recommended afterwash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical cleaner or afterwash manufacturer.
 - g. Rinse with cold water applied by low **OR** medium **OR** high, **as directed**,-pressure spray to remove chemicals and soil.
 2. Paint Removal with Covered or Skin-Forming Alkaline Paint Remover:
 - a. Remove loose and peeling paint using low **OR** medium **OR** high, **as directed**,-pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - b. Apply paint remover to dry, painted masonry with trowel, spatula, or as recommended by manufacturer.
 - c. Apply cover, if required by manufacturer, per manufacturer's written instructions.
 - d. Allow paint remover to remain on surface for period recommended by manufacturer or as determined in test panels.
 - e. Scrape off paint and remover and collect for disposal.

- f. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and paint residue.
 - g. Use alkaline paste paint remover, according to "Paint Removal with Alkaline Paste Paint Remover" Paragraph, if necessary to remove remaining paint.
 - h. Apply acidic cleaner or manufacturer's recommended afterwash to masonry, while surface is still wet, using low-pressure spray equipment or soft-fiber brush. Let cleaner or afterwash remain on surface as a neutralizing agent for period recommended by chemical-cleaner or afterwash manufacturer.
 - i. Rinse with cold water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
3. Paint Removal with Solvent-Type Paint Remover:
 - a. Remove loose and peeling paint using low **OR** medium **OR** high, **as directed**, -pressure spray, scrapers, stiff brushes, or a combination of these. Let surface dry thoroughly.
 - b. Apply thick coating of paint remover to painted masonry with natural-fiber cleaning brush, deep-nap roller, or large paint brush.
 - c. Allow paint remover to remain on surface for period recommended by manufacturer. Agitate periodically with stiff-fiber brush.
 - d. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and paint residue.
- L. Cleaning Brickwork
1. Cold-Water Soak:
 - a. Apply cold water by intermittent spraying to keep surface moist.
 - b. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
 - c. Apply water in cycles with at least 30 minutes between cycles.
 - d. Continue spraying until surface encrustation has softened sufficiently to permit its removal by water wash, as indicated by cleaning tests.
 - e. Continue spraying for 72 hours.
 - f. Remove soil and softened surface encrustation from masonry with cold water applied by low-pressure spray.
 2. Cold-Water Wash: Use cold water applied by low **OR** medium **OR** high, **as directed**, -pressure spray.
 3. Hot-Water Wash: Use hot water applied by low **OR** medium **OR** high, **as directed**, -pressure spray.
 4. Steam Cleaning: Apply steam at very low pressures not exceeding **30 psi (207 kPa) OR 80 psi (550 kPa)**, **as directed**. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.
 5. Detergent Cleaning:
 - a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
 - c. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove detergent solution and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
 6. Mold, Mildew, and Algae Removal:
 - a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply mold, mildew, and algae remover by brush or low-pressure spray.
 - c. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet.

- d. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove mold, mildew, and algae remover and soil.
 - e. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
7. Nonacidic Gel Chemical Cleaning:
- a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply nonacidic gel cleaner in **1/8-inch (3-mm)** thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.
 - c. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - d. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
 - e. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - f. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
8. Nonacidic Liquid Chemical Cleaning:
- a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply cleaner to masonry in two applications, **as directed**, by brush or low-pressure spray. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - 3) Two to three minutes.
 - c. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
9. Mild Acidic **OR** Acidic, **as directed**, Chemical Cleaning:
- a. Wet masonry with cold water applied by low-pressure spray.
 - b. Apply cleaner to masonry in two applications, **as directed**, by brush or low-pressure spray. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - 3) Two to three minutes.
 - c. Rinse with cold water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use a steam cleaning.
- M. Cleaning Brownstone Terra Cotta
1. Cold-Water Soak:
 - a. Apply cold water by intermittent spraying to keep surface moist.
 - b. Use perforated hoses or other means that will apply a fine water mist to entire surface being cleaned.
 - c. Apply water in cycles with at least 30 minutes between cycles.
 - d. Continue spraying until surface encrustation has softened sufficiently to permit its removal by water wash, as indicated by cleaning tests.
 - e. Continue spraying for 72 hours.
 - f. Remove soil and softened surface encrustation from masonry with cold water applied by low-pressure spray.

2. Cold-Water Wash: Use cold water applied by low **OR** medium **OR** high, **as directed**, -pressure spray.
3. Hot-Water Wash: Use hot water applied by low **OR** medium **OR** high, **as directed**, -pressure spray.
4. Steam Cleaning: Apply steam at very low pressures not exceeding **30 psi (207 kPa) OR 80 psi (550 kPa)**, **as directed**. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.
5. Detergent Cleaning:
 - a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Scrub masonry with detergent solution using medium-soft brushes until soil is thoroughly dislodged and can be removed by rinsing. Use small brushes to remove soil from mortar joints and crevices. Dip brush in solution often to ensure that adequate fresh detergent is used and that masonry surface remains wet.
 - c. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove detergent solution and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
6. Mold, Mildew, and Algae Removal:
 - a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply mold, mildew, and algae remover by brush or low-pressure spray.
 - c. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet.
 - d. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove mold, mildew, and algae remover and soil.
 - e. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.
7. Nonacidic Gel Chemical Cleaning:
 - a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply nonacidic gel cleaner in **1/8-inch (3-mm)** thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.
 - c. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - d. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
 - e. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - f. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
8. Nonacidic Liquid Chemical Cleaning:
 - a. Wet masonry with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply cleaner to masonry in two applications, **as directed**, by brush or low-pressure spray. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - 3) Two to three minutes.
 - c. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
9. Mild Acidic **OR** Acidic, **as directed**, Chemical Cleaning:
 - a. Wet masonry with cold water applied by low-pressure spray.

- b. Apply cleaner to masonry in two applications, **as directed**, by brush or low-pressure spray. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - 3) Two to three minutes.
- c. Rinse with cold water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
- d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use a steam cleaning.

N. Cleaning Glazed Terra Cotta

- 1. Hot-Water Wash: Use hot water applied by low **OR** medium **OR** high, **as directed**, -pressure spray.
- 2. Steam Cleaning: Apply steam at very low pressures not exceeding **30 psi (207 kPa) OR 80 psi (550 kPa), as directed**. Remove dirt softened by steam with wood scrapers, stiff-nylon or -fiber brushes, or cold-water wash, as indicated by cleaning tests.
- 3. Nonacidic Gel Chemical Cleaning:
 - a. Wet terra cotta with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply nonacidic gel cleaner in **1/8-inch (3-mm)** thickness by brush, working into joints and crevices. Apply quickly and do not brush out excessively so area will be uniformly covered with fresh cleaner and dwell time will be uniform throughout area being cleaned.
 - c. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - d. Remove bulk of nonacidic gel cleaner by squeegeeing into containers for disposal.
 - e. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - f. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- 4. Nonacidic Liquid Chemical Cleaning:
 - a. Wet terra cotta with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply cleaner to terra cotta in two applications, **as directed**. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - 3) Two to three minutes.
 - c. Rinse with cold **OR** hot, **as directed**, water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.
- 5. Mild Acidic Chemical Cleaning:
 - a. Wet terra cotta with cold water applied by low-pressure spray.
 - b. Apply cleaner to terra cotta in two applications, **as directed**. Let cleaner remain on surface for period indicated below:
 - 1) As recommended by chemical-cleaner manufacturer.
 - 2) As established by mockup.
 - 3) Two to three minutes.
 - c. Rinse with cold water applied by low **OR** medium **OR** high, **as directed**, -pressure spray to remove chemicals and soil.
 - d. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

6. Two-Part Chemical Cleaning:
 - a. Wet terra cotta with cold **OR** hot, **as directed**, water applied by low-pressure spray.
 - b. Apply alkaline prewash cleaner to terra cotta by brush or roller. Let cleaner remain on surface for period recommended by chemical-cleaner manufacturer unless otherwise indicated.
 - c. Rinse with cold **OR** hot, **as directed**, water applied by medium-pressure spray to remove chemicals and soil.
 - d. Apply acidic afterwash cleaner to terra cotta in two applications, **as directed**, while surface is still wet, using low-pressure spray equipment, deep-nap roller or soft-fiber brush. Let neutralizer remain on surface for period recommended by manufacturer unless otherwise indicated.
 - e. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.
 - f. Repeat cleaning procedure above where required to produce cleaning effect established by mockup. Do not repeat more than once. If additional cleaning is required, use steam cleaning.

- O. Repointing Masonry
 1. Rake out and repoint joints to the following extent:
 - a. All joints in areas indicated.
 - b. Joints where mortar is missing or where they contain holes.
 - c. Cracked joints where cracks can be penetrated at least **1/4 inch (6 mm)** by a knife blade **0.027 inch (0.7 mm)** thick.
 - d. Cracked joints where cracks are **1/16 inch (1.6 mm) OR 1/8 inch (3 mm)**, **as directed**, or more in width and of any depth.
 - e. Joints where they sound hollow when tapped by metal object.
 - f. Joints where they are worn back **1/4 inch (6 mm)** or more from surface.
 - g. Joints where they are deteriorated to point that mortar can be easily removed by hand, without tools.
 - h. Joints where they have been filled with substances other than mortar.
 - i. Joints indicated as sealant-filled joints.
 2. Do not rake out and repoint joints where not required.
 3. Rake out joints as follows, according to procedures demonstrated in approved mockup:
 - a. Remove mortar from joints to depth of joint width plus **1/8 inch (3 mm) OR 2 times joint width OR 2-1/2 times joint width, as directed**, but not less than **1/2 inch (13 mm)** or not less than that required to expose sound, unweathered mortar.
 - b. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
 - c. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by the Owner.
 - 1) Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without the Owner's written approval based on approved quality-control program.
 - 2) Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.
 4. Notify the Owner of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
 5. Pointing with Mortar:
 - a. Rinse joint surfaces with water to remove dust and mortar particles. Time rinsing application so, at time of pointing, joint surfaces are damp but free of standing water. If rinse water dries, dampen joint surfaces before pointing.
 - b. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than **3/8 inch (9 mm)** until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.

- c. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than **3/8 inch (9 mm)**. Fully compact each layer and allow to become thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
 - d. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
 - e. Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
 - 1) Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - 2) Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
 - f. Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
6. Pointing with Sealant:
- a. After raking out, keep joints dry and free of mortar and debris.
 - b. Clean and prepare joint surfaces according to Division 07 Section "Joint Sealants". Prime joint surfaces unless sealant manufacturer recommends against priming. Do not allow primer to spill or migrate onto adjoining surfaces.
 - c. Fill sealant joints with specified joint sealant according to Division 07 Section "Joint Sealants" and the following:
 - 1) Install cylindrical sealant backing beneath the sealant, except where space is insufficient. There, install bond-breaker tape.
 - 2) Install sealant using only proven installation techniques that will ensure that sealant will be deposited in a uniform, continuous ribbon, without gaps or air pockets, and with complete wetting of the joint bond surfaces equally on both sides. Fill joint flush with surrounding masonry and matching the contour of adjoining mortar joints.
 - 3) Install sealant as recommended by sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
 - a) Fill joints to a depth equal to joint width, but not more than **1/2 inch (13 mm)** deep or less than **1/4 inch (6 mm)** deep.
 - 4) Immediately after first tooling, apply ground-mortar aggregate to sealant, gently pushing aggregate into the surface of sealant. Retool sealant to form smooth, uniform beads, slightly concave. Remove excess sealant and aggregate from surfaces adjacent to joint.
 - 5) Do not allow sealant to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces, particularly rough textures. Remove excess and spillage of sealant promptly as the work progresses. Clean adjoining surfaces by the means necessary to eliminate evidence of spillage, without damage to adjoining surfaces or finishes, as demonstrated in an approved mockup.
 - d. Cure sealant according to Division 07 Section "Joint Sealants".
7. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.
- P. Final Cleaning
- 1. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
 - a. Do not use metal scrapers or brushes.
 - b. Do not use acidic or alkaline cleaners.
 - 2. Wash adjacent woodwork and other nonmasonry surfaces. Use detergent and soft brushes or cloths.

3. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
4. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

Q. Field Quality Control

1. Inspectors: Engage qualified independent inspectors to perform inspections and prepare test reports. Allow inspectors use of lift devices and scaffolding, as needed, to perform inspections.
2. the Owner's Project Representatives: the Owner will assign Project representatives to help carry out the Owner's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow the Owner's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
3. Notify inspectors and the Owner's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until inspectors and the Owner's Project representatives have had reasonable opportunity to make inspections and observations of work areas at lift device or scaffold location.

END OF SECTION 04 01 20 91

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Task	Specification	Specification Description
04 01 20 91	03 01 30 71	Concrete Rehabilitation
04 01 20 91	04 20 00 00	Unit Masonry Assemblies
04 01 50 52	04 01 20 91	Clay Masonry Restoration And Cleaning
04 05 13 26	04 20 00 00	Unit Masonry Assemblies
04 05 16 26	04 20 00 00	Unit Masonry Assemblies
04 05 19 13	04 20 00 00	Unit Masonry Assemblies
04 05 19 16	04 20 00 00	Unit Masonry Assemblies
04 05 23 13	04 20 00 00	Unit Masonry Assemblies
04 05 23 16	01 22 16 00	No Specification Required
04 05 23 16	01 95 07 00a	Sheet Metal Flashing And Trim

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SECTION 04 20 00 00 - UNIT MASONRY ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for unit masonry assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes unit masonry assemblies consisting of the following:
 - a. Concrete masonry units (CMUs).
 - b. Decorative concrete masonry units.
 - c. Pre-faced concrete masonry units.
 - d. Concrete brick.
 - e. Face brick.
 - f. Building (common) brick.
 - g. Hollow brick.
 - h. Glazed brick.
 - i. Structural-clay facing tile.
 - j. Firebox brick.
 - k. Clay flue lining units.
 - l. Stone trim units.
 - m. Mortar and grout.
 - n. Reinforcing steel.
 - o. Masonry joint reinforcement.
 - p. Ties and anchors.
 - q. Embedded flashing.
 - r. Miscellaneous masonry accessories.
 - s. Masonry-cell insulation.
 - t. Cavity-wall insulation.

C. Definitions

1. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

D. Performance Requirements

1. Provide structural unit masonry that develops indicated net-area compressive strengths (f'_m) at 28 days.
2. Determine net-area compressive strength (f'_m) of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602 **OR** Tables 2105.2 in the International Building Code, **as directed.**
OR
Determine net-area compressive strength (f'_m) of masonry by testing masonry prisms according to ASTM C 1314 **OR** IBC Standard, **as directed.**

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For reinforcing steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
3. Samples for each type and color of exposed masonry units and colored mortars.

4. Material Certificates: For each type of product indicated. Include statements of material properties indicating compliance with requirements including compliance with standards and type designations within standards.
 5. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - a. For masonry units include material test reports substantiating compliance with requirements.
 6. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.
- F. Quality Assurance
1. Preconstruction Testing Service: Engage a qualified independent testing agency to perform preconstruction testing indicated below.
 - a. Clay Masonry Unit Test: For each type of unit required, per ASTM C 67.
 - b. Concrete Masonry Unit Test: For each type of unit required, per ASTM C 140.
 - c. Mortar Test (Property Specification): For each mix required, per ASTM C 780 **OR** IBC Standard, **as directed**.
 - d. Grout Test (Compressive Strength): For each mix required, per ASTM C 1019 **OR** IBC Standard, **as directed**.
 2. Fire-Resistance Ratings: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by other means, as acceptable to authorities having jurisdiction.
 3. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects.
 - a. Build sample panels for each type of exposed unit masonry construction **OR** typical exterior wall, **as directed**, in sizes approximately **48 inches (1200 mm)** long by **48 inches (1200 mm)** high.
- G. Delivery, Storage, And Handling
1. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
 2. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
 3. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
 4. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
 5. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.
- H. Project Conditions
1. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602 **OR** Section 2104.3 in the International Building Code, **as directed**.
 2. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.2 PRODUCTS

A. Concrete Masonry Units (CMUs)

1. Shapes: Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Integral Water Repellent: Provide units made with liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength for exposed units and where indicated.
3. Concrete Masonry Units: ASTM C 90 **OR** IBC Standard, **as directed**.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **1900 psi (13.1 MPa) OR 2150 psi (14.8 MPa) OR 2800 psi (19.3 MPa) OR 3050 psi (21.0 MPa), as directed**.
 - b. Weight Classification: Lightweight **OR** Medium weight **OR** Normal weight, **as directed**.
4. Decorative Concrete Masonry Units: ASTM C 90 **OR** IBC Standard, **as directed**.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **1900 psi (13.1 MPa) OR 2150 psi (14.8 MPa) OR 2800 psi (19.3 MPa) OR 3050 psi (21.0 MPa), as directed**.
 - b. Weight Classification: Lightweight **OR** Medium weight **OR** Normal weight, **as directed**.
 - c. Pattern and Texture:
 - 1) Standard pattern, ground finish.
 - 2) Standard pattern, split-face finish.
 - 3) Standard pattern, split-ribbed finish.
 - 4) Scored vertically, standard finish.
 - 5) Triple scored vertically, standard finish.
5. Pre-faced Concrete Masonry Units: Lightweight hollow **OR** solid, **as directed**, concrete units complying with ASTM C 90 **OR** IBC Standard, **as directed**, with manufacturer's standard smooth resinous facing complying with ASTM C 744.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **1900 psi (13.1 MPa) OR 2150 psi (14.8 MPa) OR 2800 psi (19.3 MPa) OR 3050 psi (21.0 MPa), as directed**.
 - b. Size: Manufactured with pre-faced surfaces having **1/16-inch- (1.5-mm-)** wide returns of facing to create **1/4-inch- (6.5-mm-)** wide mortar joints with modular coursing.
6. Concrete Building Brick: ASTM C 55 **OR** IBC Standard, **as directed**.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **2500 psi (17.3 MPa) OR 3500 psi (24.1 MPa), as directed**.
 - b. Weight Classification: Lightweight **OR** Medium weight **OR** Normal weight, **as directed**.

B. Concrete And Masonry Lintels

1. General: Provide either concrete or masonry lintels, at Contractor's option, complying with requirements below.
2. Concrete Lintels:
 - a. Precast units matching concrete masonry units and with reinforcing bars indicated or required to support loads indicated.
OR
Precast or formed-in-place concrete lintels complying with requirements in Division 03 Section "Cast-in-place Concrete".
3. Masonry Lintels: Made from bond beam concrete masonry units with reinforcing bars placed as indicated and filled with coarse grout.

C. Brick

1. General: Provide shapes indicated and as follows:
 - a. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - b. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

2. Face Brick: ASTM C 216 **OR** IBC Standard, **as directed**, Grade SW **OR** MW or SW, **as directed**, Type FBX **OR** FBS **OR** FBA, **as directed**.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **3000 psi (20.7 MPa) OR 4400 psi (30.3 MPa) OR 5500 psi (37.9 MPa) OR 6400 psi (44.1 MPa) OR 8000 psi (55.2 MPa) OR 8400 psi (57.9 MPa)**, **as directed**.
 - b. Initial Rate of Absorption: Less than **30 g/30 sq. in. (30 g/194 sq. cm)** per minute when tested per ASTM C 67.
 - c. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - d. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from **10 feet (3 m)**.
 - e. Size: **As directed**.
 3. Building (Common) Brick: ASTM C 62 **OR** IBC Standard, **as directed**, Grade SW **OR** MW or SW **OR** NW, MW, or SW, **as directed**.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **3000 psi (20.7 MPa) OR 4400 psi (30.3 MPa) OR 5500 psi (37.9 MPa) OR 6400 psi (44.1 MPa) OR 8000 psi (55.2 MPa) OR 8400 psi (57.9 MPa)**, **as directed**.
 - b. Size: Match size of face brick.
 4. Hollow Brick: ASTM C 652 **OR** IBC Standard, **as directed**, Grade SW **OR** MW or SW, **as directed**, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area) **OR** H60V (void areas between 40 and 60 percent of gross cross-sectional area) , **as directed**, Type HBX **OR** HBS **OR** HBA **OR** HBB, **as directed**.
 - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of **3000 psi (20.7 MPa) OR 4400 psi (30.3 MPa) OR 5500 psi (37.9 MPa) OR 6400 psi (44.1 MPa) OR 8000 psi (55.2 MPa) OR 8400 psi (57.9 MPa)**, **as directed**.
 - b. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 - c. Surface Coating: Brick with colors or textures produced by application of coatings shall withstand 50 cycles of freezing and thawing per ASTM C 67 with no observable difference in the applied finish when viewed from **10 feet (3 m)**.
 - d. Size: **As directed**.
 5. Glazed Face Brick: ASTM C 216 **OR** IBC Standard, **as directed**, Grade SW **OR** MW or SW, **as directed**, Type FBX **OR** FBS **OR** FBA, **as directed**; with glaze complying with ASTM C 126.
 6. Glazed Face Brick: ASTM C 1405, Class Exterior **OR** Interior, **as directed**, Grade S (Select) **OR** SS (Select Sized or Ground Edge), **as directed**.
 7. Glazed Face Brick: Either ASTM C 1405, Class Exterior **OR** Interior, **as directed**, Grade S (Select) or ASTM C 216 **OR** IBC Standard, **as directed**, Grade SW **OR** MW or SW, **as directed**, Type FBX; with glaze complying with ASTM C 126.
 8. Glazed Hollow Brick: Hollow brick complying with ASTM C 652 **OR** IBC , **as directed**, Grade SW **OR** MW or SW, **as directed**, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area) **OR** H60V (void areas between 40 and 60 percent of gross cross-sectional area), **as directed**, Type HBX **OR** HBS **OR** HBA, **as directed**; with glaze complying with ASTM C 126.
 - a. Size: **As directed**.
 - b. Provide Type I (single-faced units) where only one finished face is exposed when units are installed, and Type II (double-faced units) where two opposite finished faces are exposed when units are installed.
- D. Structural-Clay Facing Tile
1. General:
 - a. Provide solid, multicored, or hollow units, with shape and direction of cores optional, unless otherwise indicated.
 - b. Provide multicored units designed for use in reinforced, grouted masonry.
 - c. Provide special shapes where required for corners, jambs, coved bases, sills, and other special conditions indicated that cannot be produced by sawing standard units.

2. Glazed Structural-Clay Facing Tile: ASTM C 126, Grade S (Select) **OR** SS (Select Sized or Ground Edged), **as directed**.
 - a. Size: **As directed**.
 - b. Provide Type I (single-faced units) where only one finished face is exposed when units are installed, and Type II (double-faced units) where two opposite finished faces are exposed when units are installed.
 3. Unglazed Structural-Clay Facing Tile: ASTM C 212, Type FTX **OR** FTS, **as directed**, Standard **OR** Special-Duty, **as directed**, class.
 - a. Number of Faces: Single faced where only one finished face is exposed when units are installed **OR** Double faced where both finished faces are exposed when units are installed, **as directed**.
- E. Fireplace And Chimney Lining Units
1. Firebox Brick: ASTM C 1261, size required to produce lining thickness indicated.
 2. Clay Flue Lining Units: ASTM C 315.
- F. Stone Trim Units
1. Granite: ASTM C 615.
 - a. Description: Fine **OR** Medium, **as directed**,-grained, white **OR** pink **OR** gray **OR** black, **as directed**, stone. Uniform pattern, without veining.
 2. Limestone: ASTM C 568, Classification I Low **OR** II Medium **OR** III High, **as directed**,-Density.
 3. Marble: ASTM C 503, Classification I Calcite **OR** II Dolomite **OR** III Serpentine **OR** IV Travertine, **as directed**.
 - a. Description: Uniform, fine- to medium-grained, white stone with only slight veining.
 4. Quartz-Based Stone: ASTM C 616, Classification I Sandstone **OR** II Quartzitic Sandstone **OR** III Quartzite, **as directed**.
 5. Finish: Polished **OR** Honed **OR** Smooth **OR** Machine tooled, 4 bats per 1 inch (25 mm) **OR** Machine tooled, 6 bats per 1 inch (25 mm) **OR** Machine tooled, 8 bats per 1 inch (25 mm) **OR** Chat sawed **OR** Split face **OR** Rock face (pitched face), **as directed**.
 - a. Finish for Tops of Sills and Soffits of Lintels: Sand rubbed **OR** Split face, **as directed**.
 6. Provide stone units accurately shaped, with exposed faces dressed true, and with beds and joints at right angles to faces.
 - a. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
 - b. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
 - c. For marble, comply with recommendations in MIA's "Dimensional Stone--Design Manual IV."
- G. Mortar And Grout Materials
1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
 2. Hydrated Lime: ASTM C 207 **OR** IBC Standard, **as directed**, Type S.
 3. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
 4. Masonry Cement: ASTM C 91 **OR** IBC Standard, **as directed**.
 5. Mortar Cement: ASTM C 1329 **OR** IBC Standard, **as directed**.
 6. Mortar Pigments: Iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
 7. Colored Cement Product: Packaged blend made from portland cement and lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - a. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - b. Pigments shall not exceed 10 percent of portland cement by weight.
 - c. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
 8. Aggregate for Mortar: ASTM C 144.

- a. For joints less than **1/4 inch (6.5 mm)** thick, use aggregate graded with 100 percent passing the **No. 16 (1.18-mm)** sieve.
 - b. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
 - c. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - d. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
9. Aggregate for Grout: ASTM C 404.
 10. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units.
 11. Refractory Mortar Mix: Ground fireclay or non-water-soluble, calcium aluminate, medium-duty refractory mortar that passes ASTM C 199 test; or an equivalent product acceptable to authorities having jurisdiction.
 12. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 13. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer.
 14. Water: Potable.
- H. Reinforcement
1. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, **Grade 60 (Grade 420)**.
 2. Masonry Joint Reinforcement, General: ASTM A 951 **OR** IBC Standard, **as directed**.
 - a. Interior Walls: Mill- **OR** Hot-dip, **as directed**, galvanized, carbon steel.
 - b. Exterior Walls: Hot-dip galvanized, carbon **OR** Stainless, **as directed**, steel.
 - c. Wire Size for Side Rods: W1.7 or **0.148-inch (3.8-mm)** **OR** W2.8 or **0.188-inch (4.8-mm)**, **as directed**, diameter.
 - d. Wire Size for Cross Rods: W1.7 or **0.148-inch (3.8-mm)** **OR** W2.8 or **0.188-inch (4.8-mm)**, **as directed** diameter.
 - e. Wire Size for Veneer Ties: W1.7 or **0.148-inch (3.8-mm)** **OR** W2.8 or **0.188-inch (4.8-mm)**, **as directed** diameter.
 - f. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than **16 inches (407 mm)** o.c.
 - g. Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.
 - h. Multiwythe Masonry:
 - 1) Ladder type with 1 side rod at each face shell of hollow masonry units more than **4 inches (100 mm)** in width, plus 1 side rod at each wythe of masonry **4 inches (100 mm)** or less in width.
 - 2) Tab type, with 1 side rod at each face shell of backing wythe and with rectangular tabs sized to extend at least halfway through facing wythe but with at least **5/8-inch (16-mm)** cover on outside face.
 - 3) Adjustable (two-piece) type, with one side rod at each face shell of backing wythe and with ties that extend into facing wythe. Ties engage eyes or slots in reinforcement and extend at least halfway through facing wythe but with at least **5/8-inch (16-mm)** cover on outside face. Ties have hooks or clips to engage a continuous wire in the facing wythe.
 - i. Veneers Anchored with Seismic Masonry-Veneer Anchors: Single **0.188-inch- (4.8-mm-)** diameter, hot-dip galvanized, carbon-steel continuous wire.
- I. Ties And Anchors
1. Materials:
 - a. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 641/A 641M, Class 1 coating.
 - b. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82; with ASTM A 153/A 153M, Class B-2 coating.

- c. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 **OR** 316, **as directed**.
- d. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, **G60 (Z180)** zinc coating.
- e. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
- f. Stainless-Steel Sheet: ASTM A 666, Type 304 **OR** 316, **as directed**.
- g. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- h. Stainless Steel bars: ASTM A 276 or ASTM a 666, Type 304.
2. Corrugated Metal Ties: Metal strips not less than **7/8 inch (22 mm)** wide with corrugations having a wavelength of **0.3 to 0.5 inch (7.6 to 12.7 mm)** and an amplitude of **0.06 to 0.10 inch (1.5 to 2.5 mm)** made from steel sheet, galvanized after fabrication **OR** stainless-steel sheet, **as directed**, not less than **0.043 inch (1.1 mm) OR 0.053 inch (1.3 mm) OR 0.067 inch (1.7 mm) OR 0.097 inch (2.5 mm)**, **as directed**, thick. Ties made from galvanized steel sheet may be used in interior walls, unless otherwise indicated.
3. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least **5/8-inch (16-mm)** cover on outside face. Outer ends of wires are bent 90 degrees and extend **2 inches (50 mm)** parallel to face of veneer.
4. Individual Wire Ties: Rectangular units with closed ends and not less than **4 inches (100 mm)** wide.
 - a. Z-shaped ties with ends bent 90 degrees to provide hooks not less than **2 inches (50 mm)** long may be used for masonry constructed from solid units or hollow units laid with cells horizontal.
 - b. Where wythes do not align **OR** are of different materials, **as directed**, use adjustable ties with pintle-and-eye connections having a maximum adjustment of **1-1/4 inches (32 mm)**.
 - c. Wire: Fabricate from **3/16-inch- (4.8-mm-) OR 1/4-inch- (6.4-mm-)**, **as directed**, diameter, hot-dip galvanized steel **OR** stainless-steel, **as directed**, wire. Mill-galvanized wire ties may be used in interior walls, unless otherwise indicated.
5. Adjustable Anchors for Connecting to Structure: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - a. Anchor Section for Welding to Steel Frame: Crimped **1/4-inch- (6.4-mm-)** diameter, hot-dip galvanized steel **OR** stainless-steel, **as directed**, wire. Mill-galvanized wire may be used at interior walls, unless otherwise indicated.
 - b. Tie Section for Steel Frame: Triangular-shaped wire tie, sized to extend within **1 inch (25 mm)** of masonry face, made from **0.188-inch- (4.8-mm-) OR 0.25-inch- (6.4-mm-)**, **as directed**, diameter, hot-dip galvanized steel **OR** stainless-steel, **as directed** wire. Mill-galvanized wire may be used at interior walls, unless otherwise indicated.
 - c. Connector Section for Concrete: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from **0.053-inch- (1.3-mm-)** thick, steel sheet, galvanized after fabrication **OR 0.097-inch- (2.5-mm-)** thick, steel sheet, galvanized after fabrication **OR 0.062-inch- (1.6-mm-)** thick, stainless-steel sheet **OR 0.109-inch- (2.8-mm-)** thick, stainless-steel sheet, **as directed**. **0.064-inch- (1.6-mm-) OR 0.108-inch- (2.7-mm-)**, **as directed**, thick, galvanized sheet may be used at interior walls, unless otherwise indicated.
 - d. Tie Section for Concrete: Corrugated metal ties with dovetail tabs for inserting into dovetail slots in concrete and sized to extend to within **1 inch (25 mm)** of masonry face.
6. Partition Top anchors: **0.097-inch- (2.5-mm-)** thick metal plate with **3/8-inch- (10-mm-)** diameter metal rod **6 inches (150 mm)** long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication **OR** stainless-steel, **as directed**.
7. Rigid Anchors: Fabricate from steel bars **1-1/2 inches (38 mm)** wide by **1/4 inch (6.4 mm)** thick by **24 inches (600 mm)** long, with ends turned up **2 inches (50 mm)** or with cross pins.
 - a. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M **OR** Epoxy coating **0.020 inch (0.51 mm)** thick **OR** Rust-inhibitive paint, **as directed**.
8. Stone Anchors: Fabricate dowels, cramps, and other stone anchors from stainless steel.
9. Adjustable Masonry-Veneer Anchors

- a. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - 1) Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
- b. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
 - 1) Anchor Section:
 - a) Rib-stiffened, sheet metal plate with screw holes top and bottom, and slotted holes for inserting wire tie.
 - b) Sheet metal plate with screw holes top and bottom and with raised rib-stiffened strap, stamped into center to provide a slot between strap and plate for inserting wire tie.
 - c) Gasketed sheet metal plate with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
 - 2) Fabricate sheet metal anchor sections and other sheet metal parts from 0.067-inch- (1.7-mm-) thick, steel sheet, galvanized after fabrication OR 0.097-inch- (2.5-mm-) thick, steel sheet, galvanized after fabrication OR 0.078-inch- (2.0-mm-) thick, stainless-steel sheet OR 0.109-inch- (2.8-mm-) thick, stainless-steel sheet, **as directed**.
 - 3) Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from 0.188-inch- (4.8-mm-) OR 0.25-inch- (6.4-mm-), **as directed**, diameter, hot-dip galvanized steel OR stainless-steel, **as directed**, wire.
- c. Slip-in, Masonry-Veneer Anchors: Units consisting of a wire tie section and an anchor section designed to interlock with metal studs and be slipped into place as sheathing is installed.
 - 1) Wire-Type Anchor: Bent wire anchor section with an eye to receive the wire tie. Wire tie has a vertical leg that slips into the eye of anchor section and allows vertical adjustment. Both sections are made from 3/16-inch (4.8-mm), hot-dip galvanized wire.
 - 2) Strap-and-Wire Type Anchor: Flat metal strap with notch to interlock with flange of metal stud and two holes for inserting vertical legs of wire tie specially formed to fit anchor section. Strap is made from 0.067-inch- (1.7-mm-) thick, steel sheet, galvanized after fabrication; anchor wire tie is made from 3/16-inch (4.8-mm), hot-dip galvanized wire.
- d. Seismic Masonry-Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in the veneer mortar joint.
 - 1) Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, and slotted holes for inserting connector section.
 - 2) Connector Section: Rib-stiffened, sheet metal bent plate; sheet metal clip; or wire tie and rigid extruded vinyl clip designed to engage continuous wire. Size connector to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face.
 - 3) Fabricate sheet metal anchor sections and other sheet metal parts from 0.067-inch- (1.7-mm-) thick, steel sheet, galvanized after fabrication OR 0.097-inch- (2.5-mm-) thick, steel sheet, galvanized after fabrication OR 0.078-inch- (2.0-mm-) thick, stainless-steel sheet OR 0.109-inch- (2.8-mm-) thick, stainless-steel sheet, **as directed**.

- 4) Fabricate wire connector sections from **0.188-inch- (4.8-mm-)** **-OR 0.25-inch- (6.4-mm-)**, **as directed**, diameter, hot-dip galvanized, carbon **OR** stainless, **as directed**, steel wire.
 - e. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, **No. 10 (4.8-mm)** diameter by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
 - f. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, **No. 10 (4.8-mm)** diameter by length required to penetrate steel stud flange with not less than three exposed threads.
- J. Miscellaneous Anchors
1. Unit Type Inserts in Concrete: Cast-iron or malleable-iron wedge-type inserts.
 2. Dovetail Slots in Concrete: Furnish dovetail slots with filler strips, of slot size indicated, fabricated from **0.034-inch (0.9-mm)**, galvanized steel sheet.
 3. Anchor Bolts: Headed or L-shaped steel bolts complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
 4. Postinstalled Anchors: Provide chemical or torque-controlled expansion anchors, with capability to sustain, without failure, a load equal to six times the load imposed when installed in solid or grouted unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - a. Corrosion Protection:
 - 1) Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild).
 - 2) Stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4)** for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
- K. Embedded Flashing Materials
1. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual OR Division 07 Section "Sheet Metal Flashing And Trim" as directed.
 - a. Stainless Steel: ASTM A 240/A 240M, Type 304, **0.016 inch (0.4 mm)** thick.
 - b. Copper: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet, **10-oz./sq. ft. (3-kg/sq. m)** weight or **0.0135 inch (0.34 mm)** thick for fully concealed flashing; **16-oz./sq. ft. (5-kg/sq. m)** weight or **0.0216 inch (0.55 mm)** thick elsewhere.
 - c. Fabricate continuous flashings in sections **96 inches (2400 mm)** long minimum, but not exceeding **12 feet (3.6 m)**. Provide splice plates at joints of formed, smooth metal flashing.
 - d. Fabricate through-wall metal flashing embedded in masonry from stainless steel **OR** copper, **as directed**, with ribs at **3-inch (75-mm)** intervals along length of flashing to provide an integral mortar bond.
 - e. Metal Drip Edges: Fabricate from stainless steel. Extend at least **3 inches (75 mm)** into wall and **1/2 inch (13 mm)** out from wall, with outer edge bent down 30 degrees and hemmed.
 - f. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least **3 inches (75 mm)** into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for **3/4 inch (19 mm)** and down into joint **3/8 inch (10 mm)** to form a stop for retaining sealant backer rod.
 - g. Metal Expansion-Joint Strips: Fabricate from stainless steel **OR** copper, **as directed**, to shapes indicated.
 2. Flexible Flashing: For flashing not exposed to the exterior, use one of the following, unless otherwise indicated:

- a. Copper-Laminated Flashing: **5-oz./sq. ft. (1.5-kg/sq. m) OR 7-oz./sq. ft. (2-kg/sq. m), as directed**, copper sheet bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - b. Asphalt-Coated Copper Flashing: **5-oz./sq. ft. (1.5-kg/sq. m) OR 7-oz./sq. ft. (2-kg/sq. m), as directed**, copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.
 - c. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.030 inch (0.8 mm) OR 0.040 inch (1.0 mm), as directed**.
 - d. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy **0.025 inch (0.6 mm)** thick, with a **0.015-inch- (0.4-mm-)** thick coating of rubberized-asphalt adhesive.
 - e. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, **0.040 inch (1.0 mm)** thick.
3. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.
 4. Solder and Sealants for Sheet Metal Flashings:
 - a. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - b. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 - c. Elastomeric Sealant: ASTM C 920, chemically curing urethane **OR** polysulfide silicone **as directed**, sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
 5. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer.
- L. Miscellaneous Masonry Accessories
1. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; formulated from neoprene, urethane or PVC.
 2. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall.
 3. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
 4. Weep/Vent Products: Use one of the following, unless otherwise indicated:
 - a. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, **1/4 to 3/8 inch (6 to 10 mm)** in diameter, in length required to produce **2-inch (50-mm)** exposure on exterior and **18 inches (450 mm)** in cavity between wythes. Use only for weeps.
 - b. Round Plastic Weep/Vent Tubing: Medium-density polyethylene, **3/8-inch (9-mm)** OD by **4 inches (100 mm)** long.
 - c. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, **3/8 by 1-1/2 by 3-1/2 inches (9 by 38 by 89 mm)** long.
 - d. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth **1/8 inch (3 mm)** less than depth of outer wythe, in color selected from manufacturer's standard.
 - e. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth **1/8 inch (3 mm)** less than depth of outer wythe; in color selected from manufacturer's standard.
 - f. Aluminum Weep Hole/Vent: One-piece, L-shaped units made from sheet aluminum, designed to fit into a head joint and consisting of a vertical channel with louvers stamped in web and with a top flap to keep mortar out of the head joint; painted before installation to

- comply with Division 09 Section(s) "Exterior Painting" OR "Interior Painting", in color approved to match that of mortar.
- g. Vinyl Weep Hole/Vent: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into a head joint and consisting of a louvered vertical leg, flexible wings to seal against ends of masonry units, and a top flap to keep mortar out of the head joint; in color approved by Architect to match that of mortar.
5. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - a. Provide one of the following configurations:
 - 1) Strips, full-depth of cavity and **10 inches (250 mm)** wide, with dovetail shaped notches **7 inches (175 mm)** deep.
 - 2) Strips, not less than **1-1/2 inches (38 mm)** thick and **10 inches (250 mm)** wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
 - 3) Sheets or strips full depth of cavity and installed to full height of cavity.
 6. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from **0.142-inch (3.6-mm)** steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.
- M. Insulation
1. Loose-Granular Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).
 2. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I. Provide specially shaped units designed for installing in cores of masonry units.
 3. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV **OR X, as directed**, closed-cell product extruded with an integral skin.
 4. Molded-Polystyrene Board Insulation: ASTM C 578, Type I.
 5. Polyisocyanurate Board Insulation: ASTM C 1289, Type I (aluminum-foil-faced), Class 2 (glass-fiber-reinforced).
 6. Adhesive: Type recommended by insulation board manufacturer for application indicated.
- N. Masonry Cleaners
1. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains from new masonry without damaging masonry. Use product approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
- O. Mortar And Grout Mixes
1. General: Do not use admixtures, unless otherwise indicated.
 - a. Do not use calcium chloride in mortar or grout.
 - b. Limit cementitious materials in mortar for exterior and reinforced masonry to portland cement and lime.
 - c. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 2. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
 3. Mortar for Unit Masonry: Comply with ASTM C 270 **OR** BIA Technical Notes 8A **OR** IBC Standard, **as directed**, Proportion Specification.
 4. Mortar for Unit Masonry: Comply with ASTM C 270 **OR** BIA Technical Notes 8A **OR** IBC Standard, **as directed**, Property Specification.
 - a. For masonry below grade or in contact with earth, use Type M **OR** S, **as directed**.
 - b. For reinforced masonry, use Type S **OR** N, **as directed**.
 - c. For mortar parge coats, use Type S or N.

- d. For exterior, above-grade, load-bearing and non-load-bearing walls and parapet walls; for interior load-bearing walls; for interior non-load-bearing partitions; and for other applications where another type is not indicated, use Type N.
- e. For interior non-load-bearing partitions, Type O may be used instead of Type N.
5. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - a. Pigments shall not exceed 10 percent of portland cement by weight.
 - b. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
6. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
7. Grout for Unit Masonry: Comply with ASTM C 476 **OR** IBC Standard, **as directed**.
 - a. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 **OR** Table 21-C in the International Building Code, **as directed**, for dimensions of grout spaces and pour height.
 - b. Provide grout with a slump of **8 to 11 inches (200 to 280 mm)** as measured according to ASTM C 143/C 143M.
8. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

1.3 EXECUTION

A. Installation, General

1. Use full-size units without cutting if possible. If cutting is required, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
2. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
3. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
4. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds **30 g/30 sq. in. (30 g/194 sq. cm)** per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
5. Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and with the following:
 - a. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.
 - b. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, or **1/2 inch (12 mm)** maximum.

B. Laying Masonry Walls

1. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
2. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal **4-inch (100-mm)** horizontal face dimensions at corners or jambs.
3. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
4. Fill space between steel frames and masonry solidly with mortar, unless otherwise indicated.
5. Fill cores in hollow concrete masonry units with grout **24 inches (600 mm)** under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

C. Mortar Bedding And Jointing

1. Lay hollow brick and concrete masonry units as follows:
 - a. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - b. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - c. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - d. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
 2. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
 3. Lay structural-clay tile as follows:
 - a. Lay vertical-cell units with full head joints, unless otherwise indicated. Provide bed joints with full mortar coverage on face shells and webs.
 - b. Lay horizontal-cell units with full bed joints, unless otherwise indicated. Keep drainage channels, if any, free of mortar. Form head joints with sufficient mortar so excess will be squeezed out as units are placed in position.
 - c. Maintain joint thicknesses indicated except for minor variations required to maintain bond alignment. If not indicated, lay walls with **1/4- to 3/8-inch- (6- to 10-mm-)** thick joints.
 - d. Where epoxy-mortar pointed joints are indicated, rake out setting mortar to a uniform depth of **1/4 inch (6 mm)** and point with epoxy mortar.
 4. Set firebox brick in full bed of refractory mortar with full head joints. Form joints by buttering both surfaces of adjoining brick and sliding it into place. Make joints just wide enough to accommodate variations in size of brick, approximately **1/8 inch (3 mm)**. Tool joints smooth on surfaces exposed to fire or smoke.
 5. Install clay flue liners to comply with ASTM C 1283. Install flue liners ahead of surrounding masonry. Set clay flue liners in full bed of refractory mortar **1/16 to 1/8 inch (1.6 to 3 mm)** thick. Strike joints flush on inside of flue to provide smooth surface. Maintain expansion space between flue liner and surrounding masonry except where surrounding masonry is required to provide lateral support for flue liners.
 6. Set stone **OR** cast-stone, **as directed**, trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 7. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.
 8. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.
- D. Composite Masonry
1. Bond wythes of composite masonry together using one of the following methods:
 - a. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for **4.5 sq. ft. (0.42 sq. m) OR 2.67 sq. ft. (0.25 sq. m)**, **as directed**, of wall area spaced not to exceed **36 inches (914 mm) OR 24 inches (610 mm)**, **as directed**, o.c. horizontally and **16 inches (406 mm)** o.c. vertically. Stagger ties in alternate courses. Provide additional ties within **12 inches (305 mm)** of openings and space not more than **36 inches (915 mm)** apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than **24 inches (610 mm)** o.c. vertically.
 - 1) Where bed joints of wythes do not align, use adjustable (two-piece) type ties.
 - b. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - 1) Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes **OR** tab-type reinforcement, **as directed**.
 - 2) Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
 2. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
 3. Collar Joints in Clay Tile Masonry: After each course is laid, fill the vertical, longitudinal joint between wythes solidly with mortar at exterior walls, except cavity walls, and interior walls and partitions.

4. Corners: Provide interlocking masonry unit bond in each wythe and course at corners, unless otherwise indicated.
 5. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 - a. Provide individual metal ties not more than **8 inches (203 mm) OR 16 inches (406 mm), as directed**, o.c.
 - b. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped units.
 - c. Provide rigid metal anchors not more than **24 inches (610 mm) OR 48 inches (1220 mm), as directed**, o.c. If used with hollow masonry units, embed ends in mortar-filled cores.
- E. Cavity Walls
1. Bond wythes of cavity walls together using one of the following methods:
 - a. Individual Metal Ties: Provide ties as shown installed in horizontal joints, but not less than one metal tie for **4.5 sq. ft. (0.42 sq. m) OR 2.67 sq. ft. (0.25 sq. m), as directed**, of wall area spaced not to exceed **36 inches (914 mm) OR 24 inches (610 mm), as directed**, o.c. horizontally and **16 inches (406 mm)** o.c. vertically. Stagger ties in alternate courses. Provide additional ties within **12 inches (305 mm)** of openings and space not more than **36 inches (915 mm)** apart around perimeter of openings. At intersecting and abutting walls, provide ties at no more than **24 inches (610 mm)** o.c. vertically.
 - b. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - 1) Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes **OR** tab-type reinforcement, **as directed**.
 - 2) Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties.
 - 3) Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
 - c. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.
 2. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
 3. Parge cavity face of backup wythe in a single coat approximately 3/8 inch (10 mm) thick. Trowel face of parge coat smooth.
OR
Coat cavity face of backup wythe to comply with Division 07 Section "Bituminous Dampproofing".
- F. Installing Cavity-Wall Insulation: Place small dabs of adhesive, spaced approximately **12 inches (300 mm)** o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit insulation between wall ties and other confining obstructions, with edges butted tightly. Press units firmly against inside wythe of masonry.
- G. Masonry-Cell Insulation
1. Pour granular insulation into cavities to fill void spaces. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close the ports after filling has been confirmed. Limit the fall of insulation to 1 story in height, but not more than **20 feet (6 m)**.
 2. Install molded-polystyrene insulation units into masonry unit cells before laying units.
- H. Masonry Joint Reinforcement
1. General: Install in mortar with a minimum cover of **5/8 inch (16 mm)** on exterior side of walls, **1/2 inch (13 mm)** elsewhere. Lap reinforcement a minimum of **6 inches (150 mm)**.
 2. Interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
 3. Provide continuity at wall intersections by using prefabricated T-shaped units.
 4. Provide continuity at corners by using prefabricated L-shaped units.

- I. Anchoring Masonry To Structural Members
 1. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:
 - a. Provide an open space not less than **1/2 inch (13 mm) OR 1 inch (25 mm), as directed**, in width between masonry and structural member, unless otherwise indicated.
 - b. Anchor masonry to structural members with anchors embedded in masonry joints and attached to structure.
 - c. Space anchors as indicated, but not more than **24 inches (610 mm) o.c. vertically** and **36 inches (915 mm) o.c. horizontally**.

- J. Anchoring Masonry Veneers
 1. Anchor masonry veneers to wall framing **OR** concrete and masonry backup, **as directed**, with seismic masonry-veneer anchors to comply with the following requirements:
 - a. Fasten screw-attached and seismic anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners.
 - b. Insert slip-in anchors in metal studs as sheathing is installed. Provide one anchor at each stud in each horizontal joint between sheathing boards.
 - c. Embed tie sections **OR** connector sections and continuous wire, **as directed**, in masonry joints. Provide not less than **2 inches (50 mm)** of air space between back of masonry veneer and face of sheathing.
 - d. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 - e. Space anchors as indicated, but not more than **16 inches (406 mm) o.c. vertically** and **32 inches (813 mm) OR 24 inches (610 mm), as directed**, o.c. horizontally with not less than 1 anchor for each **3.5 sq. ft. (0.33 sq. m) OR 2.67 sq. ft. (0.25 sq. m), as directed**, of wall area. Install additional anchors within **12 inches (305 mm)** of openings and at intervals, not exceeding **36 inches (914 mm)**, around perimeter.

- K. Control And Expansion Joints
 1. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
 2. Provide horizontal, pressure-relieving joints by either leaving an air space or inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants", but not less than **3/8 inch (10 mm)**.
 - a. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

- L. Lintels
 1. Provide concrete or masonry lintels where shown and where openings of more than **12 inches (305 mm)** for brick-size units and **24 inches (610 mm)** for block-size units are shown without structural steel or other supporting lintels.
 2. Provide minimum bearing of **8 inches (200 mm)** at each jamb, unless otherwise indicated.

- M. Flashing, Weep Holes, Cavity Drainage, And Vents
 1. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
 2. Install flashing as follows, unless otherwise indicated:
 - a. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing as recommended by flashing manufacturer.
 - b. At lintels and shelf angles, extend flashing a minimum of **6 inches (150 mm)** into masonry at each end. At heads and sills, extend flashing **6 inches (150 mm)** at ends and turn up not less than **2 inches (50 mm)** to form end dams.

- c. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing **1/2 inch (13 mm)** back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 - d. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing **1/2 inch (13 mm)** back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
 3. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
 4. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
 5. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - a. Use specified weep/vent products or open head joints to form weep holes.
 - b. Space weep holes **24 inches (600 mm)** o.c., unless otherwise indicated.
 - c. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
 6. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in Part 2 "Miscellaneous Masonry Accessories" Article.
 7. Install vents in head joints in exterior wythes at spacing indicated. Use specified weep/vent products or open head joints to form vents.
 - a. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.
- N. Reinforced Unit Masonry Installation
1. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - a. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - b. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
 2. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602 **OR** Section 2104.5 in the International Building Code, **as directed**.
 - a. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - b. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 **OR** Section 2104.6 in the International Building Code, **as directed**, for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - c. Limit height of vertical grout pours to not more than **60 inches (1520 mm)**.
- O. Field Quality Control
1. Inspectors: Engage qualified independent inspectors to perform inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform inspections.
 - a. Place grout only after inspectors have verified compliance of grout spaces and grades, sizes, and locations of reinforcement.
 2. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections indicated below and prepare test reports:
 3. Testing Frequency: One set of tests for each **5000 sq. ft. (465 sq. m)** of wall area or portion thereof.
 4. Clay Masonry Unit Test: For each type of unit provided, per ASTM C 67.

5. Concrete Masonry Unit Test: For each type of unit provided, per ASTM C 140.
 6. Mortar Test (Property Specification): For each mix provided, per ASTM C 780 **OR** IBC Standard, **as directed**. Test mortar for mortar air content and compressive strength.
 7. Grout Test (Compressive Strength): For each mix provided, per ASTM C 1019 **OR** IBC Standard, **as directed**.
- P. Parging
1. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of **3/4 inch (19 mm)** with a steel-trowel finish. Form a wash at top of parging and a cove at bottom. Damp-cure parging for at least 24 hours and protect parging until cured.
- Q. Cleaning
1. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
 2. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - a. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - b. Protect adjacent surfaces from contact with cleaner.
 - c. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - d. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - e. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 - f. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
- R. Masonry Waste Disposal
1. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - a. Do not dispose of masonry waste as fill within **18 inches (450 mm)** of finished grade.
 - b. Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off the Owner's property.

END OF SECTION 04 20 00 00

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Task	Specification	Specification Description
04 21 13 00	04 20 00 00	Unit Masonry Assemblies
04 21 19 00	04 20 00 00	Unit Masonry Assemblies
04 21 26 00	04 20 00 00	Unit Masonry Assemblies
04 21 29 00	04 20 00 00	Unit Masonry Assemblies
04 22 23 13	04 20 00 00	Unit Masonry Assemblies
04 22 23 23	04 20 00 00	Unit Masonry Assemblies
04 22 23 26	04 20 00 00	Unit Masonry Assemblies
04 22 23 29	04 20 00 00	Unit Masonry Assemblies
04 22 23 31	04 20 00 00	Unit Masonry Assemblies

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SECTION 04 23 13 00 - GLASS UNIT MASONRY ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for glass unit masonry assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes
 - a. Glass block set in mortar.
 - b. Glass block set in silicone sealant.
 - c. Glass block set in glass-block grid systems.

C. Performance Requirements

1. Structural Performance: Provide glass-block grid systems capable of withstanding the effects of gravity loads and the loads and stresses within limits and under conditions indicated.

D. Action Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit IEQ 4.1: For sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
 - b. Laboratory Test Reports for Credit IEQ 4: For sealants used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
3. Shop Drawings: Show fabrication and installation details for glass unit masonry, including vertical and horizontal coursing, anchors, reinforcement, and expansion strips and glass-block grid systems.
4. Provide Samples for each form, pattern, and color of glass block and color of joint material and glass-block grid material indicated or selected by the Owner.
5. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, documentation including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Informational Submittals

1. Qualification Data: For qualified professional engineer.

F. Quality Assurance

1. Fire-Rated Glass Unit Masonry Assemblies: Assemblies listed by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 **OR** IBC Standard 715, **as directed**.
 - a. Test Pressure: Test at atmospheric pressure **OR** After 10 minutes into the test, neutral pressure level in furnace shall be located so that at least two-thirds of test specimen is above the neutral pressure plane, **as directed**.

G. Delivery, Storage, And Handling

1. Store glass block in unopened cartons on elevated platforms, under cover, and in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.

2. Store glass-block grid materials in unopened cartons in an enclosed, dry location.
3. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
4. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
5. Store accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

H. Project Conditions

1. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below **40 deg F (5 deg C)** or when joint substrates are wet.
2. Weather Limitations: Proceed with installation of glass unit masonry assemblies only when ambient and material temperatures are **40 deg F (5 deg C)** or higher.
 - a. Maintain temperature in installation areas at **40 deg F (5 deg C)** or above for 48 hours after installing.

I. Sequencing And Scheduling

1. Sequence and coordinate completion of glass unit masonry assemblies so sealants can be installed immediately after mortar has attained final set.

1.2 PRODUCTS

A. Glass Block

1. Hollow Glass Block: Hollow units made from transparent glass, with manufacturer's standard edge coating.
 - a. Glass Color: As selected from manufacturer's full range.
 - b. Pattern:
 - 1) Smooth, undistorted inner and outer faces.
 - 2) Wavy, light-diffusive design on inner faces, and smooth outer faces.
 - 3) Fluted, light-diffusive design, horizontal on one inner face, vertical on other; and smooth outer faces.
 - 4) Linear prismatic design, horizontal on one inner face, vertical on other; and smooth outer faces.
 - 5) Prismatic pyramid, light-diffusive design on inner faces, and smooth outer faces.
 - 6) As indicated by manufacturer's designation.
 - 7) Manufacturer's standard decorative pattern to match sample.
 - 8) As selected from manufacturer's full range.
 - 9) Custom decorative pattern to match design.
 - c. Edge-Coating Color: As selected from manufacturer's full range.
 - d. Sizes: Manufacturer's standard sizes corresponding to nominal sizes indicated on Drawings.
 - e. Thick-Faced Units: Units with faces at least **3/4 inch (19 mm)** thick.
2. Solid Glass Block: Colorless, transparent, solid glass blocks with smooth **OR** stippled, **as directed**, faces and manufacturer's standard edge coating.
 - a. Square-Block Size: **5-3/4 inches (146 mm) OR 7-3/4 inches (197 mm) OR 11-3/4 inches (299 mm) as directed**, square by **1-1/2 inches (38 mm) OR 3 inches (76 mm)** thick, actual size, **as directed**.
 - b. Rectangular-Block Size: **3 by 7-3/4 inches (76 by 197 mm) OR 5-3/4 by 7-3/4 inches (146 by 197 mm), as directed by 1-1/2 inches (38 mm) OR 3 inches (76 mm)** thick, actual size, **as directed**.
3. Glass Paver Block: Transparent, colorless, pressed glass units, with a smooth top surface and a decorative, light-diffusing, patterned bottom surface; **6 inches (152 mm) square by 1 inch (25 mm) OR 4-3/4 inches (120 mm) square by 1-9/16 inches (40 mm) OR 6-5/16 inches (160 mm) square by 1-3/16 inches (30 mm) OR 7-1/2 inches (190 mm) square by 1-1-15/16**

inches (50 mm) OR 7-1/2 inches (190 mm) square by 2-3/4 inches (70 mm) OR 7-7/8 inches (200 mm) square by 7/8 inch (22 mm) OR 7-7/8 inches (200 mm) square by 1-15/16 inches (50 mm) OR 4-5/8 inches (117 mm) in diameter by 2-3/8 inches (60 mm) thick, actual size, as directed.

a.

B. Glass-Block Grid Systems

1. General: Aluminum extrusions complying with **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T6 or Alloy 6463-T6, forming a grid system and frame designed for application indicated.
2. Window and Wall System: Aluminum T-bar grid with tubular frame and vinyl glass-block boots.
 - a. Finish: As selected from manufacturer's full range.
 - b. Glass-Block Size: **7-3/4 inches (197 mm)** square by **3-1/8 inches (79 mm)** thick.
 - c. Provide self-flashing, **as directed**, aluminum exterior frame covers with vinyl thermal break.
 - d. Provide extruded-aluminum frame receivers (corner starters) at heads, jambs, and sills.
 - e. Provide extruded-aluminum mullions where indicated.
 - f. Provide aluminum trim and closures as indicated.
3. Skylight System: Aluminum T-bar grid with tubular frame; vinyl thermal break; extruded-aluminum, curb-mounting frame and counterflashing; and vinyl glass-block boots.
 - a. Finish: As selected from manufacturer's full range.
 - b. Glass-Block Size: **7-3/4 inches (197 mm)** square by **3-1/8 inches (79 mm)** thick.
4. Floor System: Aluminum tubular grid and frame with glass-block boots made from UV- and oil-resistant EPDM.
 - a. Finish: Class II, clear-anodized finish; complying with AAMA 611.
 - b. Glass-Paver-Block Size: **6 inches (152 mm)** square by **1 inch (25 mm)** thick.
5. Sealant: Product recommended by glass-block grid system manufacturer.
 - a. Provide sealants for use inside the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Mortar Materials

1. Portland Cement: ASTM C 150, Type I or Type II, natural color or white cement as required to produce mortar color indicated.
 - a. Where joints are indicated to be raked out and pointed, gray cement may be used for setting mortar.
2. Hydrated Lime: ASTM C 207, Type S.
3. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207, Type S.
4. Masonry Cement: ASTM C 91.
5. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortar.
6. Colored Cement Product: Packaged blend made from portland cement and lime **OR** masonry cement, **as directed**, and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - a. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - b. Pigments shall not exceed 10 percent of portland cement **OR** 5 percent of masonry cement, **as directed**, by weight.
7. Aggregate: ASTM C 144, with 100 percent passing **No. 8 (2.36-mm)** sieve.
 - a. For pointing mortar and joints narrower than **1/4 inch (6 mm)**, use aggregate graded with 100 percent passing **No. 16 (1.18-mm)** sieve.
 - b. White Aggregates: Natural white sand or crushed white stone.
 - c. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
8. Water-Repellent Admixture: Manufacturer's standard dry mixture of stearates, water-reducing agents, and fine aggregates intended to reduce capillarity in mortar.

9. Water-Repellent Admixture: Liquid polymeric water-repellent mortar admixture that does not reduce flexural bond strength of mortar.
10. Water: Potable.

D. Glass Unit Masonry Accessories

1. Panel Reinforcement: Ladder-type units, butt welded, not lapped and welded; complying with ASTM A 951 in straight lengths of not less than **10 feet (3 m)**, and as follows:
 - a. Interior Walls: Hot-dip galvanized, carbon-steel wire.
 - b. Exterior Walls: Hot-dip galvanized, carbon-steel **OR** Stainless-steel, **as directed**, wire.
 - c. Wire Size: W1.7 or **0.148-inch (3.8-mm)** diameter.
 - d. Width: **2 inches (50 mm) OR 1-5/8 inches (40 mm), as directed.**
 - e. Spacing of Cross Rods: Not more than **16 inches (407 mm)** apart.
2. Panel Anchors: Glass-block manufacturer's standard perforated steel strips, **0.0359 inch (0.9 mm)** by **1-3/4 inches (44 mm)** wide by **24 inches (600 mm)** long, hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M.
3. Mortarless Installation System: System of aluminum or plastic perimeter framing, anchors, and spacers designed for installing glass block with sealant-filled joints.
4. Fasteners, General: Unless otherwise indicated, provide Type 304 or Type 316 stainless-steel fasteners at exterior walls and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at interior walls. Select fasteners for type, grade, and class required.
5. Carbon-Steel Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)** with hex nuts, **ASTM A 563 (ASTM A 563M)**, if applicable.
6. Stainless-Steel Bolts: **ASTM F 593 (ASTM F 738M)**, Alloy Group **1 or 2 (A1 or A4)** with hex nuts, **ASTM F 594 (ASTM F 836M)**, if applicable.
7. Postinstalled Anchors: Provide powder-actuated fasteners **OR** metal expansion sleeve anchors **OR** metal impact expansion anchors, **as directed**, of type and size necessary for installation indicated, as recommended by manufacturer, unless otherwise indicated.
8. Asphalt Emulsion: Cold-applied asphalt emulsion complying with ASTM D 1187 or ASTM D 1227.
9. Mineral-Fiber Expansion Strips: Mineral-fiber strips, complying with requirements of fire-rated assembly listing and glass-block manufacturer.
 - a. Use for fire-rated assemblies.
10. Plastic-Foam Expansion Strips: Polyethylene foam complying with requirements of glass-block manufacturer; **3/8 inch (9 mm)** thick by **4 inches (100 mm) OR 3-1/2 inches (89 mm) OR 2-1/2 inches (63 mm)** wide, **as directed**.
 - a. Use plastic-foam expansion strips for non-fire-rated assemblies **OR** fire-rated and non-fire-rated assemblies, **as directed**.
11. Sealants: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants".
 - a. Single-component, neutral-curing **OR** acid-curing, **as directed**, silicone sealant.
 - b. Single-component, nonsag urethane sealant.
 - c. Multicomponent, nonsag polysulfide sealant.
 - d. Provide sealants for use inside the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - e. Sealant Accessories: Provide sealant accessories, including primers, bond-breaker tape, and cylindrical sealant backing, that comply with applicable requirements in Division 07 Section "Joint Sealants".

E. Mortar Mixes

1. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, or antifreeze compounds, unless otherwise indicated.
 - a. Do not use calcium chloride in mortar.
 - b. For mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.

- c. For pointing mortar in exterior panels, use water-repellent admixture according to admixture manufacturer's written instructions.
- d. Limit cementitious materials in mortar to portland cement and lime.
2. Mortar for Glass Unit Masonry Assemblies: Provide mortar, mixed according to glass-block manufacturer's listing with testing and inspecting agency, for fire-resistance rating indicated.
OR
Mortar for Glass Unit Masonry Assemblies: Comply with ASTM C 270, Proportion Specification for Type S mortar.
 - a. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Mix mortar to produce a stiff but workable consistency that is drier than mortar for brick or concrete masonry. Discard mortar when it has reached initial set.
3. Pigmented Mortar: Use colored cement product **OR** Select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products, **as directed**.
 - a. Pigments shall not exceed 10 percent of portland cement by weight.
 - b. Pigments shall not exceed 5 percent of masonry cement by weight.
 - c. Mix to match sample.
4. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - a. Mix to match sample.

1.3 EXECUTION

A. Examination

1. Examine sills, jambs, and heads surrounding glass unit masonry assemblies for compliance with requirements for installation tolerances and other conditions affecting performance.
 - a. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installing Glass Block With Mortar

1. Apply a heavy coat of asphalt emulsion to sill and adhere expansion strips to jambs and heads with asphalt emulsion. Allow asphalt emulsion to dry before placing mortar. Trim expansion strips to width required to fit glass block and to full lengths of heads and jambs.
2. Set glass block with completely filled bed and head joints, with no furrowing, accurately spaced and coordinated with other construction. Maintain **1/4-inch (6-mm) OR 3/8-inch (10-mm), as directed**, exposed joint widths, unless otherwise indicated.
3. Install panel reinforcement in horizontal joints at spacing indicated and continuously from end to end of panels; comply with the following requirements:
 - a. Vertical Spacing of Panel Reinforcement for Exterior Panels: Every other course but not more than **16 inches (407 mm)** o.c., starting with first course above sill **OR** As indicated on Drawings, **as directed**.
 - b. Vertical Spacing of Panel Reinforcement for Interior Panels: Not more than **16 inches (407 mm)** o.c. **OR** As indicated on Drawings, **as directed**.
 - c. Do not bridge expansion joints with panel reinforcement.
 - d. Place panel reinforcement in joints immediately above and below all openings within glass unit masonry assemblies.
 - e. Lap panel reinforcement not less than **6 inches (150 mm)** if more than 1 length is necessary.
 - f. Embed panel reinforcement in mortar bed by placing lower half of mortar bed first, pressing panel reinforcement into place and covering with upper half of mortar bed.
4. Install panel anchors at locations indicated and in same horizontal joints where panel reinforcement occurs. Extend panel anchors at least **12 inches (300 mm)** into joints, and bend within expansion joints at edges of panels and across the head. Attach panel anchors as follows:
 - a. For in-place unit masonry assemblies and concrete, attach panel anchors with **1/4-inch- (6-mm-)** diameter bolt-size, postinstalled anchors, 2 per panel anchor.

- b. For new unit masonry assemblies, embed other ends of panel anchors, after bending portions crossing expansion joint, in horizontal mortar joints closest in elevation to joints in glass unit masonry assemblies containing panel anchors.
 - c. For steel members, attach panel anchors with **1/4-inch- (6-mm-)** diameter through bolts and nuts or bolts in tapped holes in steel members.
5. Use rubber mallet to tap units into position. Do not use steel tools, and do not allow units to come into contact with metal accessories and frames.
 6. Use plastic spacers **OR** temporary wedges, **as directed**, in mortar joints to produce uniform joint widths and to prevent mortar from being squeezed out of joints.
 - a. If temporary wedges are used, remove them after mortar has set and fill voids with mortar.
 7. Keep expansion joints free of mortar.
 8. Rake out joints indicated to be pointed to a uniform depth sufficient to accommodate pointing material, but not less than joint width.
 - a. If temporary wedges are used, remove them before raking out and pointing joints.
 - b. Point joints at exterior face **OR** both faces, **as directed**, of exterior panels with mortar.
 - c. Point joints at exterior face **OR** both faces, **as directed**, of exterior panels with sealant.
 - d. Point joints at both faces of exterior and interior panels with sealant.
 9. Point joints with mortar by filling raked joints and voids. Place and compact pointing mortar in layers not more than **3/8 inch (10 mm)** thick. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
 - a. Tool exposed joints slightly concave when pointing mortar is thumbprint hard. Use a smooth plastic jointer larger than joint width.
 10. Point joints by filling with sealant to comply with requirements in Division 07 Section "Joint Sealants".
 11. Clean glass unit masonry assemblies as work progresses. Remove mortar fins and smears immediately, using a clean, wet sponge or a scrub brush with stiff fiber bristles. Do not use harsh cleaners, acids, abrasives, steel wool, or wire brushes when removing mortar or cleaning glass unit masonry assemblies.
 12. Install sealant at jambs, heads, mullions and other locations indicated. Prepare joints, including installation of primer and bond-breaker tape or cylindrical sealant backing, and apply elastomeric sealants to comply with requirements in Division 07 Section "Joint Sealants".
 13. Construction Tolerances: Set glass block to comply with the following tolerances:
 - a. Variation from Plumb: For lines and surfaces of vertical elements and arris, do not exceed **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (9 mm in 6 m)**, or **1/2 inch in 40 feet (12 mm in 12 m)** or more.
 - b. Variation from Level: For bed joints, and other conspicuous lines, do not exceed **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)** or **1/2 inch in 40 feet (12 mm in 12 m)** or more.
 - c. Variation of Location in Plan: For location of elements in plan do not vary from that indicated by more than plus or minus **1/4 inch (6 mm)**.
 - d. Variation in Mortar-Joint Thickness: Do not vary from joint thickness indicated by more than plus or minus **1/16 inch (1.5 mm)**.
 - e. For faces of adjacent exposed units, do not vary from flush alignment by more than **1/16 inch (1.5 mm)**.
- C. Installing Glass Block With Sealant
1. General: Install mortarless glass-block systems according to manufacturer's written instructions.
 - a. Fasten frames and anchors or clips securely to surrounding construction.
 - b. Shim starting track as needed to make it level.
 - c. Adhere glass block to starting track and spacers with silicone sealant.
 2. After glass blocks are installed, apply sealant to completely fill channel around each glass block, and tool flush with exterior surface. Remove excess sealant and smears.
- D. Glass-Block Grid System Installation
1. General: Install glass-block grid systems according to manufacturer's written instructions.

2. Window and Wall System Installation: Assemble grid system, apply continuous sealant bead to back of window Z-bar, place in position, adjust as needed to make grid level and plumb, and fasten to substrate.
 - a. Insert glass blocks into vinyl glass-block boots and carefully insert into grid from exterior side. Install blocks firmly against T-bars without deforming boots.
 - b. Apply sealant to completely fill channel around each glass block, and tool flush with exterior surface. Remove excess sealant and smears.
3. Skylight System Installation: Assemble grid system, apply continuous sealant bead to top of supporting curb, place in position, adjust as needed to bring grid true to line, and fasten to substrate.
 - a. Insert glass blocks into vinyl glass-block boots and carefully insert into grid from exterior side. Install blocks firmly against T-bars without deforming boots.
 - b. Apply sealant to completely fill channel around each glass block, and tool flush with exterior surface. Remove excess sealant and smears.
4. Floor System Installation: Assemble grid system in position, adjusting supports as needed to level grid as system is assembled, and fasten to substrate.
 - a. Insert glass blocks into glass-block boots and install in grid. Install blocks flush with adjoining floor surfaces and aluminum grid.
 - b. Apply sealant to completely fill channel around each glass block and joints of aluminum grid. Tool sealant flush with exterior surface and remove excess sealant and smears.

E. Cleaning

1. On surfaces adjacent to glass unit masonry assemblies, remove mortar, sealants, and other residue resulting from glass-block installation, in a manner approved by manufacturers of materials involved.
2. Remove excess sealants with commercial solvents of type recommended by sealant manufacturer. Exercise care not to damage sealant in joints.
3. Perform final cleaning of glass unit masonry assemblies when surface is not exposed to direct sunlight. Start at top of panel using generous amounts of clean water. Remove water with clean, dry, soft cloths; change cloths frequently to eliminate dried mortar particles and aggregate.

END OF SECTION 04 23 13 00

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Task	Specification	Specification Description
04 23 13 00	04 20 00 00	Unit Masonry Assemblies

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SECTION 04 41 00 00 - DIMENSION STONE CLADDING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for dimension stone cladding. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following types of dimension stone:
 - a. Panels set with individual anchors.
 - b. Panels mechanically anchored on prefabricated steel trusses.
 - c. Panels mechanically anchored on prefabricated steel strongback frames.
 - d. Panels mechanically anchored on prefabricated steel stud frames.
 - e. Panels mechanically anchored (field installed) on a metal-grid system.
 - f. Panels set in architectural precast concrete.
 - g. Panels glazed into aluminum curtain-wall framing system.
 - h. Trim units, including bands, copings, sills, jambs and soffits.
 - i. Units with carving or inscriptions.

C. Definitions

1. Definitions contained in ASTM C 119 apply to this Section.
2. Dimension Stone Cladding System: An exterior wall covering system consisting of dimension stone panels and trim together with anchors, backup structure, secondary weather barrier (sheathing), mortar, adhesives, fasteners, and sealants used to secure the stone to building structure and to produce a weather-resistant covering.
 - a. Backup structure includes prefabricated steel trusses **OR** prefabricated steel strongback frames **OR** prefabricated steel stud frames **OR** metal-grid system **OR** miscellaneous steel framing required to secure stone to building structure, **as directed**.

D. Performance Requirements

1. General: Design stone anchors and anchoring systems according to ASTM C 1242.
2. Structural Performance: Provide dimension stone cladding system capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - a. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - 1) Uniform pressure of **20 lbf/sq. ft. (957 Pa) OR 30 lbf/sq. ft. (1436 Pa)**, **as directed**, acting inward or outward.
 - b. Equipment Loads: Allow for loads due to window cleaning and maintenance equipment.
3. Seismic Performance: Provide dimension stone cladding system capable of withstanding the effects of earthquake motions determined according to ASCE 7.
4. Safety Factors for Stone: Design dimension stone cladding system to withstand loads indicated without exceeding allowable working stress of stone determined by dividing stone's average ultimate strength, as established by testing, by the following safety factors:
 - a. Safety Factor for Granite: **3, as directed**.
 - b. Safety Factor for Oolitic Limestone: **8, as directed**.
 - c. Safety Factor for Dolomitic Limestone: **6, as directed**.
 - d. Safety Factor for Marble: **5, as directed**.
 - e. Safety Factor for Quartz-Based Stone: **6, as directed**.
 - f. Safety Factor for Serpentine: **6, as directed**.
 - g. Safety Factor for Slate: **5, as directed**.
 - h. Safety Factor for Travertine: **8, as directed**.

- i. Safety Factor for Concentrated Stresses: 4 for granite and 10 for stone varieties other than granite.

E. Submittals

1. Product Data: For each variety of stone, stone accessory, and other manufactured products indicated.
2. Shop Drawings: Show fabrication and installation details for dimension stone cladding system, including dimensions and profiles of stone units.
 - a. Show locations and details of joints both within dimension stone cladding system and between dimension stone cladding system and other construction.
 - b. Show locations and details of anchors and backup structure.
 - c. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Stone Samples: Sets for each color, grade, finish, and variety of stone required; not less than **12 inches (300 mm)** square.
4. Colored Pointing Mortar Samples: For each color required.
5. Sealant Samples for Verification: For each type and color of joint sealant required.
6. Material Test Reports: From a qualified independent testing agency, as follows:
 - a. Stone Test Reports: For each stone variety proposed for use on Project, provide test data indicating compliance with required physical properties, other than abrasion resistance, according to referenced ASTM standards. Base reports on testing done within previous five **OR** three, **as directed**, years.
7. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with cold-weather requirements.

F. Quality Assurance

1. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
2. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry.
3. Preconstruction Stone Testing: Engage a qualified independent testing agency to perform preconstruction testing indicated below.
 - a. Furnish test specimens that are representative of materials proposed for incorporation into the Work.
 - b. Physical Property Tests: For each stone variety proposed for use on Project, tested for compliance with physical property requirements, other than abrasion resistance, according to referenced ASTM standards.
 - c. Flexural Strength Tests: For each combination of stone variety, thickness, orientation of cut, and finish, proposed for use on Project, tested according to ASTM C 880, in both wet and dry conditions.
 - d. Anchorage Tests: For each combination of stone variety, orientation of cut, finish, and anchor type proposed for use on Project, tested according to ASTM C 1354.
4. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - a. Build mockups of typical exterior wall with dimension stone cladding, approximately **72 inches (1800 mm)** long by **48 inches (1200 mm)** high **OR 15 feet (4.5 m)** long by **10 feet (3 m)** high, **as directed**.

G. Delivery, Storage, And Handling

1. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
 - a. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.

- b. Store stone on wood skids or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.
2. Mark stone units, on surface that will be concealed after installation, with designations used on Shop Drawings to identify individual stone units. Orient markings on vertical panels so that they are right side up when units are installed.
3. Deliver sealants to Project site in original unopened containers labeled with manufacturer's name, product name and designation, color, expiration period, pot life, curing time, and mixing instructions for multicomponent materials.
4. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
5. Store aggregates in locations where grading and other required characteristics can be maintained and where contamination can be avoided.

H. Project Conditions

1. Environmental Limitations for Mortar: Do not use frozen materials or materials mixed or coated with ice or frost. Remove and replace dimension stone cladding damaged by frost or freezing conditions. Comply with cold- and hot-weather construction and protection requirements for masonry contained in ACI 530.1/ASCE 6/TMS 602.
2. Environmental Limitations for Sealants: Do not install sealants when ambient and substrate temperatures are outside limits permitted by sealant manufacturer or below **40 deg F (5 deg C)** or when joint substrates are wet.

1.2 PRODUCTS

A. Granite

1. Granite: Comply with ASTM C 615.
2. Finish: Polished **OR** Honed **OR** Thermal **OR** As indicated **OR** Match sample, **as directed**.
3. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.

B. Limestone

1. Limestone: Comply with ASTM C 568.
 - a. Classification: I Low-Density **OR** II Medium-Density **OR** II Medium-Density, except change requirements per ASTM C 568 for absorption by weight, density, compressive strength, and modulus of rupture to, respectively, 5 percent maximum, **150 lb/cu. ft. (2400 kg/cu. m)** minimum, **8000 psi (55 MPa)**, and **800 psi (5.5 MPa)** minimum **OR** III High-Density, **as directed**.
 - b. Description: Dolomitic **OR** Oolitic **OR** Shell, **as directed**, limestone.
2. Indiana Oolitic Limestone Grade and Color: Select, buff **OR** Select, gray **OR** Standard, buff **OR** Standard, gray **OR** Rustic, buff **OR** Rustic, gray **OR** Variegated, **as directed**, according to grade and color classification established by ILI.
3. Finish: Smooth **OR** Sand rubbed **OR** Machine tooled, 4 bats per **1 inch (25 mm)** **OR** Machine tooled, 6 bats per **1 inch (25 mm)** **OR** Machine tooled, 8 bats per **1 inch (25 mm)** **OR** As indicated **OR** Match sample, **as directed**.
4. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.

C. Marble

1. Marble: Comply with ASTM C 503, Classification I Calcite **OR** II Dolomite, **as directed**.
2. Finish: Polished **OR** Honed **OR** As indicated **OR** Match sample, **as directed**.
3. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.

D. Quartz-Based Stone

1. Quartz-Based Stone: Comply with ASTM C 616, Classification I Sandstone **OR** II Quartzitic Sandstone **OR** III Quartzite, **as directed**.

2. Finish: Sand rubbed **OR** Natural cleft **OR** Thermal **OR** As indicated **OR** Match sample, **as directed**.
 3. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
- E. Serpentine
1. Serpentine: Comply with ASTM C 1526, Classification I Exterior **OR** II Interior, **as directed**.
 2. Finish: Polished **OR** Honed **OR** As indicated **OR** Match sample, **as directed**.
 3. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
- F. Slate
1. Slate: Comply with ASTM C 629, Classification I Exterior **OR** II Interior, **as directed**, with a fine, even grain and unfading color, **as directed**, from clear, sound stock.
 2. Finish: Honed **OR** Sand rubbed **OR** Natural cleft **OR** As indicated **OR** Match sample, **as directed**.
 3. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
- G. Travertine
1. Travertine: Comply with ASTM C 1527, Classification I Exterior **OR** II Interior, **as directed**.
 2. Finish: Polished **OR** Honed **OR** As indicated **OR** Match sample, **as directed**.
 3. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
 4. Mortar Materials
 5. Portland Cement: ASTM C 150, Type I or Type II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - a. Low-Alkali Cement: Portland cement for use with limestone shall contain not more than 0.60 percent total alkali when tested according to ASTM C 114.
 6. Hydrated Lime: ASTM C 207.
 7. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III, and hydrated lime complying with ASTM C 207.
 8. Colored Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III; hydrated lime complying with ASTM C 207; and mortar pigments. Use a mix of formulation required to produce color indicated or, if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of portland cement by weight.
 9. Aggregate: ASTM C 144; except for joints narrower than **1/4 inch (6 mm)** and pointing mortar, use aggregate graded with 100 percent passing **No. 16 (1.18-mm)** sieve.
 - a. White Aggregates: Natural white sand or ground white stone.
 - b. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.
 10. Mortar Pigments: Natural and synthetic iron oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.
 11. Water: Potable.
- H. Anchors And Fasteners
1. Fabricate anchors, including shelf angles, **as directed**, from stainless steel, ASTM A 666, Type 304 **OR** 316, **as directed**. Fabricate dowels and pins from stainless steel, ASTM A 276, Type 304 **OR** 316, **as directed**.
 2. Fabricate shelf angles for limestone from hot-dip galvanized steel, ASTM A 36/A 36M for materials and ASTM A 123/A 123M for galvanizing.
 3. Cast-in-Place Concrete Inserts: Steel, cast iron, or malleable iron adjustable inserts, with bolts, nuts, washers, and shims; all hot-dip galvanized or mechanically zinc coated, with capability to sustain, without failure, a load equal to 4 times the loads imposed as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 4. Postinstalled Anchor Bolts for Concrete and Masonry: Chemical anchors **OR** torque-controlled expansion anchors **OR** undercut anchors, **as directed**, made from stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and**

- ASTM F 836M, Alloy Group A1 or A4) for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
5. Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers.
 - a. For stainless steel, use stainless-steel bolts, nuts, and washers; ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4).
 - b. For galvanized steel shelf angles and backup structure, use carbon steel bolts, nuts, and washers; ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), for bolts; ASTM A 563 (ASTM A 563M), Grade A, for nuts; and ASTM F 436 (ASTM F 436M) for washers; all hot-dip or mechanically zinc coated.
 6. Weld Plates for Installation in Concrete: Comply with Division 05 Section "Metal Fabrications".
- I. Framing For Backup Structure
1. Steel Trusses **OR** Strongback Frames **OR** Miscellaneous Steel Framing, **as directed**: For framing members in contact with stone fabricate from same material and finish specified for anchors. For framing members not in contact with stone, comply with requirements indicated below:
 - a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M, minimum thickness of 3/16 inch (5 mm).
 - b. Steel Tubing: ASTM A 500 (cold formed), or ASTM A 513, Type 5 (mandrel drawn), minimum thickness of 3/16 inch (5 mm).
 - c. Slotted Channel Framing: Cold-formed metal channels with continuous slot complying with MFMA-3, made from galvanized steel complying with ASTM A 653/A 653M, structural steel, Grade 33 (Grade 230), with G90 (Z275) coating, and not less than 0.108-inch (2.74-mm) nominal thickness **OR** steel sheet complying with ASTM A 1008/A 1008M, structural steel, Grade 33 (Grade 230), not less than 0.105-inch (2.66-mm) nominal thickness, hot-dip galvanized after fabrication to comply with ASTM A 123/A 123M, **as directed**.
 2. Prefabricated Steel Stud Frames: Galvanized steel wall framing complying with Division 05 Section "Cold-formed Metal Framing".
 - a. Secondary Weather Barrier (Sheathing): Galvanized steel sheet complying with ASTM A 653/A 653M, commercial steel, coating designation G90 (Z275).
 3. Metal-Grid Systems: Provide manufacturer's standard integrated system that combines metal struts, fittings, fasteners, and stone anchors and that is engineered expressly for mechanically installing dimension stone cladding and that complies with the following requirements:
 - a. Struts: Cold-formed metal channels with continuous slot complying with MFMA-3, of size and shape required for application indicated, made from galvanized steel complying with ASTM A 653/A 653M, with G90 (Z275) coating, and not less than 0.108-inch (2.74-mm) nominal thickness **OR** steel sheet complying with ASTM A 1008/A 1008M, not less than 0.105-inch (2.66-mm) nominal thickness, hot-dip galvanized after fabrication to comply with ASTM A 123/A 123M, **as directed**.
 - b. Fittings and Fasteners: System manufacturer's standard components of design, size, and material required to securely attach struts to building structure, by method indicated or selected, and stone anchors to struts, as well as to prevent galvanic corrosion. Fabricate components in contact with stone from same material specified for anchors.
 - c. Stone Anchors: Shapes and sizes standard with system manufacturer, complying with "Anchors and Fasteners" Article.
- J. Stone Accessories
1. Setting Shims: Strips of resilient plastic or vulcanized neoprene, Type A Shore durometer hardness of 50 to 70, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.

2. Setting Buttons: Resilient plastic buttons, nonstaining to stone, sized to suit joint thicknesses and bed depths of stone units without intruding into required depths of pointing materials.
3. Concealed Sheet Metal Flashing: Fabricate from zinc-tin alloy-coated, **as directed**, stainless steel in thicknesses indicated, but not less than **0.0156 inch (0.4 mm)** thick. Comply with requirements specified in Division 07 Section "Sheet Metal Flashing And Trim".
4. Cementitious Dampproofing for Limestone: Provide cementitious formulations that are recommended by ILI and that are nonstaining to stone, compatible with joint sealants, and noncorrosive to anchors and attachments.
5. Weep and Vent Tubes: Medium-density polyethylene tubing, **1/4-inch (6-mm) OD OR Rectangular**, cellular, polypropylene or clear butyrate extrusion, **3/8 by 1-1/2 inches (9 by 38 mm)**, **as directed**, and of length required to extend from exterior face of stone to cavity behind.
6. Plastic Weep Hole/Vents: One-piece, flexible extrusion manufactured from UV-resistant polypropylene copolymer, designed to weep moisture in masonry cavity to exterior, in color selected from manufacturer's standard.
7. Wicking Material: Absorbent rope, made from cotton or UV-resistant synthetic fiber, **1/4 to 3/8 inch (6 to 10 mm)** in diameter, in length required to produce **2-inch (50-mm)** exposure on exterior and **18 inches (450 mm)** in cavity between wythes.
8. Sealants for Joints in Dimension Stone Cladding: Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and do not stain stone.
 - a. Multicomponent **OR** Single-component, **as directed**, nonsag, polysulfide sealant.
 - b. Multicomponent **OR** Single-component, **as directed**, nonsag, urethane sealant.
 - c. Single-component, neutral-curing silicone sealant.
 - d. Colors: Provide colors of exposed sealants to comply with the following requirement:
 - 1) Match color of sample **OR** Match color of stone **OR** Provide color as indicated by manufacturer's designations **OR** Provide color as selected from manufacturer's full range, **as directed**.
9. Sealant for Filling Kerfs: Same sealant used for joints in dimension stone **OR** Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and that do not stain stone, **as directed**.
 - a. Single-component, nonsag, urethane sealant; Class 25, Use T (traffic), and Use M (masonry).
 - b. Single-component, nonsag, neutral-curing, medium to high modulus, silicone sealant; Class 25, Use NT (nontraffic), and Use M (masonry).

K. Stone Fabrication

1. General: Fabricate stone units in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
 - a. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
 - b. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
 - c. For marble, comply with recommendations in MIA's "Dimensional Stone--Design Manual IV."
2. Control depth of stone and back check to maintain minimum clearance of **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, between backs of stone units and surfaces or projections of structural members, fireproofing (if any), backup walls, and other work behind stone.
3. Dress joints (bed and vertical) straight and at right angle to face, unless otherwise indicated. Shape beds to fit supports.
4. Cut and drill sinkages and holes in stone for anchors, fasteners, supports, and lifting devices as indicated or needed to set stone securely in place.
5. Finish exposed faces and edges of stone, except sawed reveals, to comply with requirements indicated for finish and to match approved samples and mockups.
6. Cut stone to produce uniform joints **3/8 inch (10 mm) OR 1/2 inch (13 mm)**, **as directed**, wide and in locations indicated.

7. Contiguous Work: Provide chases, reveals, reglets, openings, and similar features as required to accommodate contiguous work.
 8. Fabricate molded work, including washes and drips, to produce stone shapes with a uniform profile throughout entire unit length, with precisely formed arris slightly eased to prevent snipping, and with matching profile at joints between units.
- L. Fabrication Of Backup Structure
1. Fabrication of Steel Trusses **OR** Strongback Frames **OR** Miscellaneous Steel Framing, **as directed**: Fabricate in shop to comply with AISC's "Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design," to accommodate construction tolerances specified, and as indicated on Shop Drawings.
 - a. Weld shop connections to comply with applicable provisions of AWS D1.1/D1.1M.
 - b. Fabricate joints to exclude water or to permit its escape to building exterior, at locations where water could accumulate because of condensation or other causes.
 - c. Hot-dip galvanize backup structure after fabrication to comply with ASTM A 123/A 123M.
 2. Fabrication of Prefabricated Steel Stud Frames: Fabricate and assemble by welding to comply with requirements in Division 05 Section "Cold-formed Metal Framing".
 - a. Weld secondary weather barrier (sheathing) to outside face of steel stud frames. Use continuous welds at all four edges of sheets to provide continuous weather seal.
 - b. For assemblies made from galvanized steel, clean welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- M. Shop-Painted Steel Finishes
1. General: Paint uncoated steel backup structure before delivering to Project site to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel."
 2. Surface Preparation: After completing fabrication of steel items, prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 3. Apply two-coat high-performance coating system consisting of organic zinc-rich primer, complying with SSPC-Paint 20 or SSPC-Paint 29 and topcoat of high-build urethane or epoxy coating recommended by manufacturer for application over specified zinc-rich primer.
- N. Mortar Mixes
1. General: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 - a. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.
 - b. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
 2. Portland Cement-Lime Setting Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated below:
 - a. Set granite with Type S mortar.
 - b. Set limestone with Type N mortar.
 - c. Set marble with Type S mortar.
 - d. Set quartz-based stone with Type S **OR** N, **as directed**, mortar.
 - e. Set serpentine with Type S mortar.
 - f. Set slate with Type S mortar.
 - g. Set travertine with Type N mortar.
 - h. Backparge travertine with Type O mortar.
 3. Pointing Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated. Provide pointing mortar mixed to match sample and complying with the following:

- a. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
- b. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
- c. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.
- d. Point granite with Type S **OR** N, **as directed**, mortar.
- e. Point limestone with Type N **OR** O, **as directed**, mortar.
- f. Point marble with Type N **OR** O, **as directed**, mortar.
- g. Point quartz-based stone with Type N **OR** O, **as directed**, mortar.
- h. Point serpentine with Type N **OR** O, **as directed**, mortar.
- i. Point slate with Type N mortar.
- j. Point travertine with Type N **OR** O, **as directed**, mortar.

1.3 EXECUTION

A. Installing Backup Structure

1. Installing Steel Trusses **OR** Strongback Frames **OR** Miscellaneous Steel Framing, **as directed**: Comply with AISC's "Specification for Structural Steel Buildings - Allowable Stress Design and Plastic Design," and install to accommodate construction tolerances specified and as indicated on Shop Drawings.
 - a. Maintain erection tolerances of backup structure within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - b. For prefabricated units to which stone has been installed before erection, maintain tolerances of stone faces and edges as specified in "Installation Tolerances" Article.
2. Installing Prefabricated Steel Stud Frames: Install by welding to steel weld-plates anchored in concrete **OR** by welding to structural-steel frame **OR** by bolting to structural-steel frame, **as directed**, to comply with requirements in Division 05 Section "Cold-formed Metal Framing".
 - a. Install prefabricated steel stud frames level, plumb, and true to line with no variation in plane or alignment exceeding **1/16 inch (1.5 mm)** and no variation in position exceeding **1/8 inch (3 mm)**.
 - b. For prefabricated frames to which stone has been installed before erection, maintain tolerances of stone faces and edges as specified in "Installation Tolerances" Article.
3. Installing Metal-Grid Systems: Comply with manufacturer's written instructions to provide integrated system that combines metal struts, fittings, fasteners, and stone anchors.
 - a. Fasten struts by bolting to inserts in concrete or steel angle clips bolted to steel framing.
 - b. Fasten stone supports and anchors by bolting to struts.
 - c. Shim and adjust struts and stone supports and anchors to provide grid that is level, plumb, and true to line with no variation in plane or alignment exceeding **1/16 inch (1.5 mm)** and no variation in position exceeding **1/8 inch (3 mm)**.

B. Setting Dimension Stone Cladding, General

1. Before setting stone clean surfaces that are dirty or stained by removing soil, stains, and foreign materials. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.
2. Coat limestone with dampproofing to extent indicated below:
 - a. Stone at Grade: Beds, joints, and back surfaces to at least **12 inches (300 mm)** above finish-grade elevations.
 - b. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
 - c. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing while handling and setting stone.
3. Parge back side of travertine panels with mortar not less than **3/8 inch (10 mm)** thick.

4. Execute dimension stone cladding installation by skilled mechanics and employ skilled stone fitters at Project site to do necessary field cutting as stone is set.
 - a. Use power saws with diamond blades to cut stone. Produce lines cut straight and true, with edges eased slightly to prevent snipping.
 5. Contiguous Work: Provide reveals, reglets, and openings as required to accommodate contiguous work.
 6. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure dimension stone cladding in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.
 7. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - a. Sealing expansion and other joints is specified in Division 07 Section "Joint Sealants".
 - b. Keep expansion joints free of mortar and other rigid materials.
 8. Install concealed flashing at continuous shelf angles, lintels, ledges, and similar obstructions to downward flow of water to divert water to building exterior.
 9. Keep cavities open where unfilled space is indicated between back of stone units and backup wall; do not fill cavities with mortar or grout.
 - a. Place weep holes in joints where moisture may accumulate, including base of cavity walls, above shelf angles, and flashing. Locate weep holes at intervals not exceeding **24 inches (600 mm)**. Use weep and vent tubes **OR** plastic weep hole/vents **OR** wicking material, **as directed**.
 - b. Place vents in cavity walls at tops of cavities, below shelf angles and flashing, and at intervals not exceeding **20 feet (6 m)** vertically. Locate vents in joints at intervals not exceeding **60 inches (1500 mm)** horizontally. Use weep and vent tubes **OR** plastic weep hole/vents, **as directed**.
- C. Setting Mechanically Anchored Dimension Stone Cladding
1. Attach anchors securely to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
 2. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant indicated for filling kerfs.
 3. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.
- D. Setting Dimension Stone Cladding With Mortar
1. Set stone in full bed of mortar with head joints filled, unless otherwise indicated.
 - a. Use setting buttons of adequate size, in sufficient quantity, and of thickness required to maintain uniform joint width and to prevent mortar from extruding. Hold buttons back from face of stone a distance at least equal to width of joint, but not less than depth of pointing materials.
 - b. Do not set heavy units or projecting courses until mortar in courses below has hardened enough to resist being squeezed out of joint.
 - c. Support and brace projecting stones until wall above is in place and mortar has set.
 - d. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
 2. Embed ends of sills in mortar; leave remainder of joint open until final pointing.
 3. Rake out joints for pointing with mortar to depths of not less than **1/2 inch (12 mm)**. Rake joints to uniform depths with square bottoms and clean sides.
 4. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply first layer of pointing mortar in layers not more than **3/8 inch (10 mm)** until a uniform depth is formed.

5. Point stone joints by placing pointing mortar in layers not more than **3/8 inch (10 mm)**. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.
 6. Tool joints with a round jointer having a diameter **1/8 inch (3 mm)** larger than width of joint, when pointing mortar is thumbprint hard.
 7. Rake out mortar from sealant-pointed joints to depths of not less than **1/2 inch (12 mm)** nor less than that required for sealant and sealant backing. Rake joints to uniform depths with square bottoms and clean sides.
 8. Set the following dimension stone cladding with unfilled head joints for installing joint sealants:
 - a. Cornices.
 - b. Copings.
 - c. Belt and other projecting courses.
- E. Joint-Sealant Installation
1. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants".
- F. Installation Tolerances
1. Variation from Plumb: For vertical lines and surfaces of walls, do not exceed **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (10 mm in 6 m)**, or **1/2 inch in 40 feet (12 mm in 12 m)** or more. For external corners, corners and jambs within **20 feet (6 m)** of an entrance, expansion joints, and other conspicuous lines, do not exceed **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, or **3/8 inch in 40 feet (10 mm in 12 m)** or more.
 2. Variation from Level: For lintels, sills, water tables, parapets, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, or **3/8 inch (10 mm)** maximum.
 3. Variation of Linear Building Line: For positions shown in plan and related portions of walls and partitions, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or **1/2 inch in 40 feet (12 mm in 12 m)** or more.
 4. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus **1/4 inch (6 mm)**.
 5. Variation in Joint Width: Do not vary from average joint width more than plus or minus **1/8 inch (3 mm)** or a quarter of nominal joint width, whichever is less. For joints within **60 inches (1500 mm)** of each other, do not vary more than **1/8 inch (3 mm)** or a quarter of nominal joint width, whichever is less from one to the other.
 6. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed **1/16-inch (1.5-mm)** difference between planes of adjacent units.
- G. Adjusting And Cleaning
1. Remove and replace broken, chipped, stained, or otherwise damaged stone, defective joints, and dimension stone cladding that does not match approved samples and mockups. Damaged stone may be repaired if the Owner approves methods and results.
 2. Replace in a manner that results in dimension stone cladding's matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
 3. In-Progress Cleaning: Clean dimension stone cladding as work progresses. Remove mortar fins and smears before tooling joints. Remove excess sealant and smears as sealant is installed.
 4. Final Cleaning: Clean dimension stone cladding no fewer than six days after completion of pointing and sealing, using clean water and stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning agents containing caustic compounds or abrasives, or other materials or methods that could damage stone.

END OF SECTION 04 41 00 00

SECTION 04 41 00 00a - INTERIOR STONE FACING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for interior stone facing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following interior applications of dimension stone:
 - a. Wall paneling.
 - b. Wainscot paneling.
 - c. Column facing.
 - d. Window stools.
 - e. Base.
 - f. Trim.
 - g. Benches.

C. Performance Requirements

1. General: Design stone anchors and anchoring systems according to ASTM C 1242.
2. Seismic Performance: Provide interior stone facing system capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

D. Submittals

1. Product Data: For each variety of stone, installation materials, and other manufactured products.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Samples:
 - a. For Each Stone Type: Include two **OR** three **OR** four **OR** five, **as directed**, or more Samples in each set and show the full range of variations in appearance characteristics expected in completed Work.
 - b. For each color of grout and pointing mortar required.
4. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
5. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage stone.
6. Maintenance data.

E. Quality Assurance

1. Installer Qualifications: An installer who employs experienced stone setters who are skilled in installing interior stone facing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
 - a. Installer's responsibilities include fabricating and installing interior stone facing, including anchoring system, and providing professional engineering services needed to assume engineering responsibility.
 - b. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

2. Source Limitations for Stone: Obtain each variety of stone, regardless of finish, from a single quarry, whether specified in this Section or in another Section, with resources to provide materials of consistent quality in appearance and physical properties.

F. Delivery, Storage, And Handling

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood A-frames or pallets with nonstaining separators and nonstaining, waterproof covers. Ventilate under covers to prevent condensation.
3. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.2 PRODUCTS

A. Granite

1. Granite: Comply with ASTM C 615.
2. Description: Uniform, fine-grained **OR** medium-grained, **as directed**, white **OR** pink **OR** gray **OR** black, **as directed**, stone with **OR** without, **as directed**, veining.
3. Cut: Vein **OR** Fleuri, **as directed**, cut.
 - a. Orientation of Veining: Horizontal **OR** Vertical **OR** As indicated, **as directed**.
4. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
5. Finish: polished **OR** Honed **OR** Thermal **OR** As indicated **OR** Match sample, **as directed**.

B. Limestone

1. Limestone: Comply with ASTM C 568.
 - a. Classification: I Low-Density **OR** II Medium-Density **OR** III High-Density, **as directed**.
 - b. Description: Dolomitic **OR** Oolitic **OR** Shell, **as directed**, limestone.
2. Cut: Vein **OR** Fleuri, **as directed**, cut.
 - a. Orientation of Veining: Horizontal **OR** Vertical **OR** As indicated, **as directed**.
3. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
4. Finish: Smooth **OR** Sand rubbed **OR** Machine tooled, 4 bats per 1 inch (25 mm) **OR** Machine tooled, 6 bats per 1 inch (25 mm) **OR** Machine tooled, 8 bats per 1 inch (25 mm) **OR** As indicated **OR** Match sample, **as directed**.

C. Marble

1. Marble: Comply with ASTM C 503.
2. Description: Uniform, fine- to medium-grained, white stone with only slight veining.
3. Cut: Vein **OR** Fleuri, **as directed**, cut.
 - a. Orientation of Veining: Horizontal **OR** Vertical **OR** As indicated, **as directed**.
4. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
5. Finish: Polished **OR** Honed **OR** As indicated **OR** Match sample, **as directed**.

D. Quartz-Based Stone

1. Quartz-Based Stone: Comply with ASTM C 616, Classification I Sandstone **OR** II Quartzitic Sandstone **OR** III Quartzite, **as directed**.
2. Finish: Sand rubbed **OR** Natural cleft **OR** Thermal **OR** As indicated **OR** Match sample, **as directed**.

E. Serpentine

1. Serpentine: Comply with ASTM C 1526, Classification I Exterior **OR** II Interior, **as directed**.
2. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
3. Finish: Polished **OR** Honed **OR** As indicated **OR** Match sample, **as directed**.

F. Slate

1. Slate: Comply with ASTM C 629, Classification I Exterior **OR** II Interior, **as directed**, with a fine, even grain and unfading color, from clear, sound stock.
 - a. Color: Black **OR** Blue-black **OR** Gray **OR** Blue-gray **OR** Green **OR** Purple **OR** Mottled purple and green **OR** Red, **as directed**.
 2. Finish: Honed **OR** Sand rubbed **OR** Natural cleft **OR** As indicated **OR** Match sample, **as directed**.
- G. Travertine
1. Travertine: Comply with ASTM C 1527, Classification I Exterior **OR** II Interior, **as directed**.
 2. Cut: Vein **OR** Fleuri, **as directed**, cut.
 - a. Orientation of Veining: Horizontal **OR** Vertical **OR** As indicated, **as directed**.
 3. Cut stone from one block or contiguous, matched blocks in which natural markings occur.
 4. Filling: Fill pores on faces of stone with cementitious filler of color selected **OR** matching sample, **as directed**.
 5. Finish: Polished **OR** Honed **OR** As indicated **OR** Match sample, **as directed**.
- H. Setting Materials
1. Molding Plaster: ASTM C 59/C 59M.
 2. Portland Cement: ASTM C 150, Type I or II.
 - a. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
 3. Hydrated Lime: ASTM C 207, Type S.
 4. Aggregate: ASTM C 144.
 5. Water: Potable.
 6. Adhesives, General: Use only adhesives formulated for stone and ceramic tile and recommended by their manufacturer for the application indicated.
 7. Organic Adhesive: ANSI A136.1, Type I, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 8. Water-Cleanable Epoxy Adhesive: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 9. Stone Adhesive: 2-part, epoxy-resin or polyester-resin stone adhesive with an initial set time of not more than 2 hours at **70 deg F (21 deg C)**, and with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - a. Color: Clear **OR** Match stone, **as directed**.
- I. Grout
1. Grout Colors: Match stone **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 2. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce required color.
 3. Standard Sanded Cement Grout: ANSI A118.6.
 4. Standard Unsanded Cement Grout: ANSI A118.6.
 5. Polymer-Modified Tile Grout: ANSI A118.7.
 - a. Polymer Type: Ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients.
 - b. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
 - c. Polymer Type: Either ethylene vinyl acetate, in dry, redispersible form, prepackaged with other dry ingredients, or acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
 - d. Grout Type: Sanded **OR** Unsanded, **as directed**.
 6. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.
- J. Pointing Mortar Materials

1. Portland Cement: ASTM C 150, Type I or II. Provide natural color or white cement as required to produce mortar color indicated.
 - a. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
2. Hydrated Lime: ASTM C 207, Type S.
3. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207, Type S.
4. Colored Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or Type III; hydrated lime complying with ASTM C 207, Type S; and mortar pigments. Use a mix of formulation required to produce color indicated or, if not indicated, as selected from manufacturer's standard formulations. Pigments shall not exceed 10 percent of portland cement by weight.
5. Aggregate: ASTM C 144, except with 100 percent passing **No. 16 (1.18-mm)** sieve.
 - a. White Aggregates: Natural white sand or ground white stone.
 - b. Colored Aggregates: Natural-colored sand or ground marble, granite, or other durable stone; of color necessary to produce required mortar color.
6. Mortar Pigments: Natural and synthetic iron oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in mortar and containing no carbon black.
7. Water: Potable.

K. Sealants

1. Joint Sealants: Manufacturer's standard sealants of characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and will not stain the stone they are applied to.
 - a. Single-component, mildew-resistant, neutral-curing **OR** acid-curing, **as directed**, silicone sealant.
 - b. Single-component, nonsag urethane sealant.
 - c. Latex Sealant.
 - d. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - e. Colors: Provide colors of exposed sealants to match colors of grout in stone adjoining sealed joints, unless otherwise indicated.
2. Sealant for Filling Kerfs: Same sealant used for joints in dimension stone **OR** Manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and that do not stain stone, **as directed**.
 - a. Single-component, nonsag, urethane sealant; Class 25, Use T (traffic), and Use M (masonry).
 - b. Single-component, nonsag, neutral-curing, medium to high modulus, silicone sealant; Class 25, Use NT (nontraffic), and Use M (masonry).
 - c. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

L. Stone Anchors And Attachments

1. Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304.
 - a. Fasteners for Stainless-Steel Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593 (ASTM F 738M)** for bolts and **ASTM F 594 (ASTM F 836M)** for nuts, Alloy Group **1 (A1)**.
2. Fabricate dowels from stainless steel, ASTM A 276, Type 304.
3. Fabricate anchors from extruded aluminum, **ASTM B 221 (ASTM B 221M)**, alloy and temper as required to support loads imposed without exceeding allowable design stresses, but not less than strength and durability properties of Alloy 6063-T6.
 - a. Fasteners for Extruded-Aluminum Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593 (ASTM F 738M)** for bolts and **ASTM F 594 (ASTM F 836M)** for nuts, Alloy Group **1 (A1)**.

4. Anchor Support Grids: Roll-formed steel channels, of size and shape required for application indicated, formed from galvanized steel sheet not less than **0.108 inch (2.8 mm)** thick and complying with ASTM A 653/A 653M, **G90 (Z275)**.
 - a. Fittings and Fasteners: System manufacturer's standard components of design, size, and material required to securely attach grids to building structure and stone anchors to grids. Fabricate components in contact with stone from same material specified for anchors.
5. Wire Tiebacks: No. 9 AWG copper or copper-alloy or **0.120-inch- (3.0-mm-)** diameter, stainless-steel wire.
6. Dovetail Slots: Furnish dovetail slots with filler strips of slot size required to receive anchors provided, fabricated from **0.0336-inch- (0.85-mm-)** thick, galvanized steel sheet complying with ASTM A 653/A 653M, **G90 (Z275)**.
7. Direct-Mount Anchoring Systems: Stainless-steel or aluminum stone anchors designed to be applied directly to wall surfaces or to metal grids. System is secured to wall framing, furring, or sheet-metal reinforcing strips built into wall with stainless-steel self-drilling screws. Anchors fit into kerfs or holes in edges of interior stone facing panels and do not need setting spots.

M. Stone Accessories

1. Temporary Setting Shims: Rigid plastic shims, nonstaining to stone, sized to suit joint thickness.
2. Setting Shims for Direct-Mount Anchoring Systems: Strips of resilient plastic or neoprene, nonstaining to stone, of thickness needed to prevent point loading of stone on anchors and of depths to suit anchors without intruding into required depths of pointing materials.
3. Cleaner: Stone cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.
4. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.

N. Stone Fabrication, General

1. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
 - a. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by the Owner.
2. Fabricate interior stone facing in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
 - a. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
 - b. For marble, comply with recommendations in MIA's "Dimension Stone--Design Manual."
 - c. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
3. Cut stone to produce pieces of thickness, size, and shape indicated and to comply with fabrication and construction tolerances recommended by applicable stone association.
 - a. Where items are installed with adhesive or where edges of stone is visible in the finished work, make items uniform in thickness and of identical thickness for each type of item; gage back of stone if necessary.
 - b. Clean sawed backs of stones to remove rust stains and iron particles.
 - c. Dress joints straight and at right angle to face, unless otherwise indicated.
 - d. Cut and drill sinkages and holes in stone for anchors, supports, and lifting devices as indicated or needed to set stone securely in place; shape beds to fit supports.
 - e. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
4. Fabricate molded work to produce stone shapes with a uniform profile throughout entire unit length and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units.
 - a. Produce moldings with machines having abrasive shaping wheels made to reverse contour of molding shape; do not sculpt moldings.
 - b. Miter moldings at corners, unless otherwise indicated, with edges of miters slightly eased at outside corners.

5. Finish exposed faces and edges of stone to comply with requirements indicated for finish of each type of stone required and to match approved Samples.
 6. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.
 - a. Grade and mark stone for overall uniform appearance when assembled in place. Natural variations in appearance are acceptable if installed stone units match range of colors and other appearance characteristics represented in approved Samples.
- O. Stone Paneling And Column Facing
1. Arrange panels in shop or other suitable space in proposed orientation and sequence for examination by the Owner. Mark units with temporary sequence numbers to indicate position in proposed layout.
 - a. Lay out one elevation at a time if approved by the Owner.
 - b. Notify the Owner seven days in advance of date and time when layout will be available for viewing.
 - c. Provide lighting of similar type and level as that of final installation for viewing layout, unless otherwise approved by the Owner.
 - d. Rearrange panels as directed by the Owner until layout is approved.
 - e. Do not trim nonmodular-size units to less than modular size until after the Owner's approval of layout, unless otherwise approved by the Owner.
 - f. Mark backs of units and Shop Drawings with sequence numbers based on approved layout. Mark backs of units to indicate orientation of units in completed Work.
 2. Nominal Thickness: **3/4 inch (20 mm) OR 7/8 inch (21 mm) OR 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 2 inches (50 mm), as directed**, unless otherwise indicated.
 3. Maintain minimum clearances of **3/4 inch (20 mm) OR 1 inch (25 mm), as directed**, between backs of panels and structural members, fireproofing if any, backup walls, and other work behind stone. Do not back check stone less than **1 inch (25 mm)** thick.
 4. Joints: **1/16-inch- (1.5-mm-) wide grouted OR 1/8-inch- (3-mm-) wide grouted OR 1/8-inch- (3-mm-) wide, sealant-filled OR 1/4-inch- (6-mm-) wide, mortar-pointed OR 1/4-inch- (6-mm-) wide, sealant-filled OR 3/8-inch- (10-mm-) wide, mortar-pointed OR 3/8-inch- (10-mm-) wide, sealant-filled, as directed**, joints.
 5. Quirk-miter corners, unless otherwise indicated. Install anchorage in top and bottom bed joints of corner units.
 6. Carve and cut inscriptions and decorative surfaces according to Shop Drawings. Use skilled stone carvers experienced in the successful performance of work similar to that indicated.
 7. Abrasively etch inscriptions and decorative surfaces according to Shop Drawings.
 8. Laser etch inscriptions and decorative surfaces according to Shop Drawings.
 9. Pattern Arrangement: Fabricate and arrange panels with veining and other natural markings to comply with the following requirements:
 - a. Arrange panels with veining horizontal.
 - b. Arrange panels with veining vertical.
 - c. Arrange panels with veining as indicated on Drawings.
 - d. Arrange panels in blend pattern.
 - e. Book match units, single-course height.
 - f. Book match units, both vertically and horizontally.
 - g. Book match units in each course. No matching is required between successive courses.
 - h. Slip match units, single-course height.
 - i. Slip match units, both vertically and horizontally.
 - j. Slip match units in each course. No matching is required between successive courses.
- P. Stone Window Stools, Base, And Trim
1. Window Stools:
 - a. Nominal Thickness: **3/4 inch (20 mm) OR 7/8 inch (22 mm) OR 1-1/4 inches (32 mm), as directed**, unless otherwise indicated.

- b. Edge Detail: Straight, slightly eased at corners **OR 3/8-inch (10-mm)** bevel at top edge, bottom corner slightly eased **OR 3/8-inch (10-mm)** radius at top edge, bottom corner slightly eased **OR 3/4-inch (20-mm)** bullnose **OR 1-1/2-inch (40-mm)** laminated bullnose **OR As indicated, as directed.**
 - c. Ends: Extend stools beyond opening same distance as stool overhang and finish ends to match exposed edge.
 - d. Joints: **1/16-inch- (1.5-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide, sealant-filled joints **OR Bonded joints, 1/32 inch (0.8 mm)** or less in width, **as directed.**
 - e. Assemble window stools by bonding joints with stone adhesive. Mask areas adjacent to joints to prevent adhesive smears. Clamp units to temporary bracing to ensure that window stools are properly aligned and joints are minimum width.
2. Base:
- a. Nominal Thickness: **3/4 inch (20 mm) OR 7/8 inch (22 mm) OR 1-1/4 inches (32 mm), as directed,** unless otherwise indicated.
 - b. Top-Edge Detail: Straight, slightly eased at corner **OR 3/8-inch (10-mm)** bevel **OR 3/4-inch (20-mm)** radius **OR 3/8-inch (10-mm)** radius **OR As indicated, as directed.**
 - c. Ends: Butt ends into casings **OR Butt ends into opening frames OR Return ends to depth of adjacent finish with edge detail same as top edge, as directed,** unless otherwise indicated.
 - d. Joints: **1/16-inch- (1.5-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide, sealant-filled joints **OR Bonded joints, 1/32 inch (0.8 mm)** or less in width, **as directed.**
 - 1) Locate joints at midpoints between adjacent paneling joints, unless otherwise indicated.
3. Flat Trim:
- a. Nominal Thickness: **3/4 inch (20 mm) OR 7/8 inch (22 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (40 mm), as directed,** unless otherwise indicated.
 - b. Edge Detail: Straight, slightly eased at corners **OR 3/8-inch (10-mm)** bevels **OR 3/4-inch (20-mm)** radii **OR 3/8-inch (10-mm)** radii **OR As indicated, as directed.**
 - c. Joints: **1/16-inch- (1.5-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide, sealant-filled joints **OR Bonded joints, 1/32 inch (0.8 mm)** or less in width, **as directed.**
4. Molded Trim:
- a. Profile: Match profiles indicated on Drawings **OR existing, as directed.**
 - b. Joints: **1/16-inch- (1.5-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide grouted joints **OR 1/8-inch- (3-mm-)** wide, sealant-filled joints **OR Bonded joints, 1/32 inch (0.8 mm)** or less in width, **as directed.**
- Q. Stone Benches
- 1. Tops:
 - a. Nominal Thickness: **3/4 inch (20 mm) OR 7/8 inch (22 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (40 mm) OR 2 inches (50 mm), as directed,** unless otherwise indicated.
 - b. Edge Detail: Straight, slightly eased at corners **OR 3/8-inch (10-mm)** bevel at top edge, bottom corner slightly eased **OR 3/8-inch (10-mm)** radius at top edge, bottom corner slightly eased **OR 3/8-inch (10-mm)** bevel at top and bottom edges **OR full bullnose OR As indicated, as directed.**
 - c. Corner Detail: Match top edge **OR Square, slightly eased OR As indicated, as directed.**
 - d. Bottom Surface Finish: Smooth.
 - 2. Pedestals:
 - a. Nominal Thickness: **4 inches (100 mm),** unless otherwise indicated.
 - b. Edge Detail: Straight, slightly eased at corners **OR 3/8-inch (10-mm)** bevel at corners **OR 3/8-inch (10-mm)** radius at corners **OR full bullnose OR As indicated, as directed.**
 - 3. Base: Stone facing applied to concrete **OR masonry, as directed.**
 - a. Nominal Stone Thickness: **3/4 inch (20 mm) OR 7/8 inch (22 mm) OR 1-1/4 inches (32 mm), as directed,** unless otherwise indicated.

- b. Joints: **1/16-inch- (1.5-mm-)** wide grouted **OR 1/8-inch- (3-mm-)** wide grouted **OR 1/4-inch- (6-mm-)** wide, mortar-pointed **OR 3/8-inch- (10-mm-)** wide, mortar-pointed, **as directed**, joints.

R. Mixes

- 1. Spotting Plaster: Stiff mix of molding plaster and water.
- 2. Mortar: Comply with referenced standards and with manufacturers' written instructions for mix proportions, mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortar of uniform quality and with optimum performance characteristics.
 - a. Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride.
 - b. Combine and thoroughly mix cementitious materials, water, and aggregates in a mechanical batch mixer, unless otherwise indicated. Discard mortar when it has reached initial set.
- 3. Setting Mortar: Comply with ASTM C 270, Proportion Specification.
 - a. Type: **N OR O, as directed.**
 - b. Mix Proportions: 1 part portland cement and 2-1/2 to 4 parts lime with aggregate ratio of 2-1/4 to 3 times volume of cement and lime.
- 4. Pointing Mortar: Comply with ASTM C 270, Proportion Specification, for types of mortar indicated. Provide pointing mortar mixed to match the Owner's sample and complying with the following:
 - a. Pigmented Pointing Mortar: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
 - b. Packaged Portland Cement-Lime Mix Mortar: Use portland cement-lime mix of selected color.
 - c. Colored-Aggregate Pointing Mortar: Produce color required by combining colored aggregates with portland cement of selected color.
 - d. Type: **N OR O, as directed.**
 - e. Mix Proportions: 1 part portland cement and 2-1/2 to 4 parts lime with aggregate ratio of 2-1/4 to 3 times volume of cement and lime.
- 5. Grout: Comply with mixing requirements of referenced ANSI standards and with manufacturer's written instructions.

1.3 EXECUTION

A. Preparation

- 1. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Setting Of Stone, General

- 1. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight and true, with edges eased slightly to prevent snipping.
- 2. Contiguous Work: Provide reveals and openings as required to accommodate contiguous work.
- 3. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure stone in place. Shim and adjust anchors, supports, and accessories to set stone accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
- 4. Erect stone units level, plumb, and true with uniform joint widths. Use temporary shims to maintain joint width.

5. Provide expansion, control, and pressure-relieving joints of widths and at locations indicated.
 - a. Sealing of expansion, control, and pressure-relieving joints is specified in Division 07 Section "Joint Sealants".
 - b. Keep expansion, control, and pressure-relieving joints free of plaster, mortar, grout, and other rigid materials.

- C. Construction Tolerances
 1. Variation from Plumb: For vertical lines and surfaces, do not exceed **1/8 inch in 96 inches (3 mm in 2400 mm)**, **1/4 inch (6 mm)** maximum.
 2. Variation from Level: For lintels, sills, chair rails, horizontal bands, horizontal grooves, and other conspicuous lines, do not exceed **1/8 inch in 10 feet (3 mm in 3 m)**, **1/4 inch in 20 feet (6 mm in 6 m)**, **3/8 inch (10 mm)** maximum.
 3. Variation of Linear Building Line: For position shown in plan and related portion of walls and partitions, do not exceed **1/8 inch in 96 inches (3 mm in 2400 mm)**, **1/4 inch in 20 feet (6 mm in 6 m)**, **3/8 inch (10 mm)** maximum.
 4. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated, do not exceed plus or minus **1/8 inch (3 mm)**.
 5. Variation in Joint Width: Do not vary joint thickness more than **1/16 inch (1.5 mm)** or 1/4 of nominal joint width, whichever is less.
 6. Variation in Plane between Adjacent Stone Units (Lipping): Do not exceed **1/32-inch (0.8-mm)** difference between planes of adjacent units.

- D. Installation Of Stone Paneling And Column Facing
 1. Set units firmly against setting spots. Locate setting spots at anchors and spaced not more than **18 inches (450 mm)** apart across back of unit, but provide no fewer than 1 setting spot per **2 sq. ft. (0.18 sq. m)**, unless otherwise indicated.
 - a. Moisture Exposure: Use portland cement mortar for setting spots where stone is applied to inside face of exterior walls and at other locations where stone or cavity will be exposed to moisture.
 2. Set units on direct-mount anchoring system with anchors securely attached to stone and to backup surfaces. Comply with recommendations in ASTM C 1242.
 - a. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with sealant indicated for filling kerfs.
 - b. Set stone supported on clips or continuous angles on resilient setting shims. Use material of thickness required to maintain uniform joint widths and to prevent point loading of stone on anchors. Hold shims back from face of stone a distance at least equal to width of joint.
 3. Minimum Anchors: Provide anchors at a maximum of **24 inches (600 mm)** o.c. around perimeter of interior stone facing panels with a minimum of 4 anchors per panel.
 4. Minimum Anchors: Provide a minimum of 4 anchors per panel up to **12 sq. ft. (1.1 sq. m)** in face area, plus a minimum of 2 additional anchors for each additional **8 sq. ft. (0.7 sq. m)**.
 5. Grout **OR** Point, **as directed**, joints after setting.

- E. Installation Of Stone Window Stools, Base, And Trim
 1. Stone Window Stools: Set stone window stools on masonry in a full bed of mortar.
OR
Stone Window Stools: Set stone window stools on wood or metal framing or wood blocking in a full bed of organic **OR** water-cleanable epoxy, **as directed**, adhesive. Hold adhesive back from exposed edges of joints to allow for grouting **OR** pointing with sealant, **as directed**.
 2. Where window stools are too long to be installed in one piece, assemble by bonding joints with stone adhesive as units are set. Mask areas adjacent to joints to prevent adhesive smears. Clamp units in place to ensure that window stools are properly aligned and joints are minimum width.
 3. Where joints are indicated in window stools maintain alignment across joints. Use temporary shims as necessary to maintain joint width.

4. Stone Base and Trim at Walls with Stone Paneling: Set units by adhering to interior stone facing with water-cleanable epoxy adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
OR
Stone Base and Trim at Walls with Stone Paneling: Set units firmly against setting spots. Located setting spots at anchors and spaced not more than **18 inches (450 mm)** apart, unless otherwise indicated. Provide no fewer than 2 anchors per piece for stone trim up to **48 inches (1200 mm)** in length, plus 1 additional anchor for each additional **24 inches (600 mm)** of length.
 5. Stone Base and Trim at Walls without Stone Paneling: Adhere units to plywood backing with full spread of water-cleanable epoxy adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
OR
Stone Base and Trim at Walls without Stone Paneling: Adhere units to gypsum board with full spread of organic **OR** water-cleanable epoxy, **as directed**, adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
 6. Assemble stone base and trim by bonding joints with stone adhesive as units are set. Mask areas adjacent to joints to prevent adhesive smears. Clamp units in place to ensure that surfaces are properly aligned and joints are minimum width.
 7. Grout **OR** Point, **as directed**, joints after setting.
- F. Installation Of Stone Benches
1. Stone Pedestals: Set pedestals on concrete subfloor **OR** stone flooring, **as directed**, in a full bed of mortar. Anchor pedestals with no fewer than two **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, dowels, extending not less than **2 inches (50 mm)** into pedestals and **2 inches (50 mm) OR 4 inches (100 mm)**, **as directed**, into floor construction. Solidly fill space around dowels with mortar.
OR
Stone Pedestals: Set pedestals on stone flooring in a full bed of water-cleanable epoxy adhesive. Anchor pedestals with no fewer than two **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, dowels, extending not less than **2 inches (50 mm)** into pedestals and **2 inches (50 mm)** into floor construction. Solidly fill space around dowels with adhesive. Hold adhesive back from exposed edges to allow for grouting.
 2. Stone Bench Tops: Set tops on pedestals **OR** concrete or masonry bases, **as directed**, in a full bed of mortar. Anchor tops with no fewer than two **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, dowels, extending not less than **2 inches (50 mm)** into pedestals **OR** bases, **as directed**, and half of thickness into the tops. Solidly fill space around dowels with mortar.
OR
Stone Bench Tops: Set stone bench tops on pedestals **OR** concrete or masonry bases, **as directed**, in a full bed of water-cleanable epoxy adhesive. Anchor tops with no fewer than two **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, dowels, extending not less than **2 inches (50 mm)** into pedestals **OR** bases, **as directed**, and half of thickness into the tops. Solidly fill space around dowels with adhesive. Hold adhesive back from exposed edges of joints to allow for grouting.
 3. Stone Base: Apply stone facing to concrete or masonry bases by setting in a full spread of mortar **OR** water-cleanable epoxy adhesive, **as directed**.
 - a. Provide no fewer than 2 anchors per piece for stone base up to **48 inches (1200 mm)** in length, plus 1 additional anchor for each additional **24 inches (600 mm)** of length.
 - b. Hold adhesive back from exposed edges of joints to allow for grouting.
- G. Grouting Joints
1. Grout stone to comply with ANSI A108.10.
 - a. Use sanded grout mixture for joints wider than **1/8 inch (3 mm)**.
 - b. Use unsanded grout mixture for joints **1/8 inch (3 mm)** and narrower.
 2. Remove temporary shims before grouting.
 3. Tool joints uniformly and smoothly with plastic tool.

- H. Pointing Joints With Mortar
 - 1. Prepare stone-joint surfaces for pointing with mortar by removing temporary shims, dust, and mortar particles. Where setting spots occur at joints, rake out excess setting mortar or plaster to a depth of not less than **1/2 inch (13 mm)**.
 - 2. Point stone joints by placing pointing mortar in layers not more than **3/8 inch (10 mm)**. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer. Apply mortar first to areas where depths are greater than surrounding areas until a uniform depth is formed.
 - 3. Tool joints when pointing mortar is thumbprint hard. Use a round jointer having a diameter **1/8 inch (3 mm)** larger than width of joint.

- I. Joint-Sealant Installation
 - 1. Prepare joints and apply sealants of type and at locations indicated to comply with applicable requirements in Division 07 Section "Joint Sealants". Remove temporary shims before applying sealants.

- J. Adjusting And Cleaning
 - 1. In-Progress Cleaning: Clean interior stone facing as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
 - 2. Remove and replace interior stone facing of the following description:
 - a. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by the Owner.
 - b. Defective stone facing.
 - c. Defective joints, including misaligned joints.
 - d. Interior stone facing and joints not matching approved Samples.
 - e. Interior stone facing not complying with other requirements indicated.
 - 3. Replace in a manner that results in interior stone facing's matching approved Samples, complying with other requirements, and showing no evidence of replacement.
 - 4. Clean interior stone facing no fewer than six days after completion of grouting and pointing, using clean water and soft rags or stiff-bristle fiber brushes. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.
 - 5. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions and recommendations.

- K. Protection
 - 1. Protect stone surfaces, edges, and corners from construction damage. Use securely fastened untreated wood, plywood, or heavy cardboard to prevent damage.
 - 2. Before inspection for Final Completion, remove protective coverings and clean surfaces.

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SECTION 04 42 43 00 - STONE MASONRY

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for stone masonry. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes the following applications of stone masonry:
 - a. Anchored or Adhered to concrete backup.
 - b. Anchored or Adhered to unit masonry backup.
 - c. Anchored or Adhered to wood framing and sheathing.
 - d. Anchored or Adhered to cold-formed metal framing and sheathing.

C. Submittals

1. Product Data: For each type of product indicated.
 - a. For stone varieties proposed for use on Project, include test data indicating compliance with physical properties specified or required by referenced ASTM standards.
2. Samples:
 - a. For each stone type indicated.
 - b. For each color of mortar required.

D. Delivery, Storage, And Handling

1. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
2. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
3. Deliver preblended, dry mortar mix in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.
4. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

E. Project Conditions

1. Protection of Stone Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed stone masonry when construction is not in progress.
 - a. Extend cover a minimum of **24 inches (600 mm)** down both sides and hold cover securely in place.
2. Stain Prevention: Immediately remove mortar and soil to prevent them from staining the face of stone masonry.
 - a. Protect base of walls from rain-splashed mud and mortar splatter by coverings spread on the ground and over the wall surface.
 - b. Protect sills, ledges, and projections from mortar droppings.
 - c. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - d. Turn scaffold boards near the wall on edge at end of each day to prevent rain from splashing mortar and dirt on completed stone masonry.
3. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace stone masonry damaged by

frost or freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

- a. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is **40 deg F (4 deg C)** and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
4. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1.2 PRODUCTS

A. Granite

1. Granite: Comply with ASTM C 615.

B. Limestone

1. Limestone: Comply with ASTM C 568.

C. Quartz-Based Stone

1. Quartz-Based Stone: Comply with ASTM C 616, Classification I Sandstone **OR** II Quartzitic Sandstone **OR** III Quartzite, **as directed**.

D. Mortar Materials

1. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - a. Low-Alkali Cement: Not more than 0.60 percent total alkali when tested according to ASTM C 114.
2. Hydrated Lime: ASTM C 207, Type S.
3. Portland Cement-Lime Mix: Packaged blend of portland cement complying with ASTM C 150, Type I or III, and hydrated lime complying with ASTM C 207.
4. Mortar Cement: ASTM C 1329.
5. Masonry Cement: ASTM C 91.
6. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes. Use only pigments with a record of satisfactory performance in stone masonry mortar.
7. Colored Cement Product: Packaged blend made from portland cement and lime **OR** masonry cement **OR** mortar cement, **as directed**, and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - a. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
8. Aggregate: ASTM C 144 and as follows:
 - a. For pointing mortar, use aggregate graded with 100 percent passing **No. 16 (1.18-mm)** sieve.
 - b. White Aggregates: Natural white sand or ground white stone.
 - c. Colored Aggregates: Natural-colored sand or ground marble, granite, or other sound stone; of color necessary to produce required mortar color.
9. Latex Additive: Manufacturer's standard **OR** acrylic-resin **OR** styrene-butadiene-rubber, **as directed**, water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement mortar bed, and not containing a retarder.
10. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
11. Water: Potable.

E. Veneer Anchors

1. Materials:
 - a. Hot-Dip Galvanized-Steel Wire: ASTM A 82, with ASTM A 153/A 153M, Class B-2.
 - b. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 **OR** Type 316, **as directed**.
 - c. Hot-Dip Galvanized-Steel Sheet: ASTM A 1008/A 1008M, cold-rolled, carbon-steel sheet hot-dip galvanized after fabrication to comply with ASTM A 153/A 153M, Class B-2.
 - d. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 **OR** Type 316, **as directed**.
2. Size: Sufficient to extend at least halfway, but not less than **1-1/2 inches (38 mm)**, through stone masonry and with at least **5/8-inch (16-mm)** cover on outside face.
3. Wire Veneer Anchors: Wire ties formed from W1.7 or **0.148-inch- (3.8-mm-)** diameter, hot-dip galvanized **OR** stainless, **as directed**, -steel wire.
4. Corrugated-Metal Veneer Anchors: Not less than **0.030-inch- (0.76-mm-)** thick by **7/8-inch- (22-mm-)** wide hot-dip galvanized **OR** stainless, **as directed**, -steel sheet with corrugations having a wavelength of **0.3 to 0.5 inch (7.6 to 13 mm)** and an amplitude of **0.06 to 0.10 inch (1.5 to 2.5 mm)**.
5. Adjustable, Screw-Attached Veneer Anchors: Units consisting of a wire tie section and a metal anchor section that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a **100-lbf (445-N)** load in both tension and compression without deforming or developing play in excess of **0.05 inch (1.3 mm)**.
 - b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, **2-3/4 inches (70 mm)** wide by **3 inches (75 mm)** high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit veneer anchor section.
 - c. Anchor Section: Sheet metal plate, **1-1/4 inches (32 mm)** wide by **6 inches (150 mm) OR 9 inches (225 mm)**, **as directed**, long, with screw holes top and bottom and with raised rib-stiffened strap, **5/8 inch (16 mm)** wide by **3-5/8 inches (92 mm) OR 5-1/2 inches (140 mm)**, **as directed**, long, stamped into center to provide a slot between strap and plate for inserting wire tie.
 - d. Anchor Section: Gasketed sheet metal plate, **1-1/4 inches (32 mm)** wide by **6 inches (150 mm)** long, with screw holes top and bottom; top and bottom ends bent to form pronged legs of length to match thickness of insulation or sheathing; and raised rib-stiffened strap, **5/8 inch (16 mm)** wide by **6 inches (150 mm)** long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
 - e. Anchor Section: Zinc-alloy barrel section with flanged head with eye and corrosion-resistant, self-drilling screw. Eye designed to receive wire tie and to serve as head for drilling fastener into framing. Barrel length to suit sheathing thickness, allowing screw to seat directly against framing with flanged head covering hole in sheathing.
 - f. Fabricate sheet metal anchor sections and other sheet metal parts from **0.067-inch- (1.7-mm-)** thick, steel sheet, galvanized after fabrication **OR 0.097-inch- (2.5-mm-)** thick, steel sheet, galvanized after fabrication **OR 0.078-inch- (2.0-mm-)** thick, stainless-steel sheet **OR 0.109-inch- (2.8-mm-)** thick, stainless-steel sheet, **as directed**.
 - g. Wire Ties: Triangular-, rectangular-, or T-shaped wire ties fabricated from **0.188-inch- (4.8-mm-) OR 0.25-inch- (6.4-mm-)**, **as directed**, diameter, hot-dip galvanized **OR** stainless, **as directed**, -steel wire.
6. Seismic Veneer Anchors: Units consisting of a metal anchor section and a connector section designed to engage a continuous wire embedded in stone masonry mortar joint.
 - a. Structural Performance Characteristics: Capable of withstanding a **100-lbf (445-N)** load in both tension and compression without deforming or developing play in excess of **0.05 inch (1.3 mm)**.
 - b. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, **2-3/4 inches (70 mm)** wide by **3 inches (75 mm)** high; with projecting tabs having slotted holes for inserting vertical leg of connector section.

- c. Connector Section: Rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire. Size connector to extend at least halfway through stone masonry but with at least **5/8-inch (16-mm)** cover on outside face.
 - d. Anchor Section: Rib-stiffened, sheet metal plate with screw holes top and bottom, **2-3/4 inches (70 mm)** wide by **3 inches (75 mm)** high; with projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section. Size wire tie to extend at least **1-1/2 inches (38 mm)** into stone masonry but with at least **5/8-inch (16-mm)** cover on outside face.
 - e. Connector Section: Sheet metal clip welded to wire tie with integral tabs designed to engage continuous wire.
 - f. Anchor Section: Gasketed sheet metal plate, **1-1/4 inches (32 mm)** wide by **6 inches (150 mm)** long, with screw holes top and bottom; top and bottom ends bent to form pronged legs to bridge insulation or sheathing and contact studs; and raised rib-stiffened strap, **5/8 inch (16 mm)** wide by **6 inches (150 mm)** long, stamped into center to provide a slot between strap and plate for inserting wire tie. Provide anchor manufacturer's standard, self-adhering, modified bituminous gaskets manufactured to fit behind anchor plate and extend beyond pronged legs.
 - g. Connector Section: Triangular wire tie and rigid PVC extrusion with snap-in grooves for inserting continuous wire.
 - h. Fabricate sheet metal anchor sections and other sheet metal parts from **0.067-inch- (1.7-mm-)** thick, steel sheet, galvanized after fabrication **OR 0.097-inch- (2.5-mm-)** thick, steel sheet, galvanized after fabrication **OR 0.078-inch- (2.0-mm-)** thick, stainless-steel sheet **OR 0.109-inch- (2.8-mm-)** thick, stainless-steel sheet, **as directed**.
 - i. Fabricate wire connector sections from **0.188-inch- (4.8-mm-)** **OR 0.25-inch- (6.4-mm-)**, **as directed**, diameter, hot-dip galvanized, carbon **OR stainless, as directed**,-steel wire.
 - j. Continuous Wire: **0.188-inch- (4.8-mm-)** diameter, hot-dip galvanized **OR stainless, as directed**,-steel wire.
7. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene washer, **No. 10 (4.8-mm diameter)** by length required to penetrate steel stud flange with not less than 3 exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
 8. Stainless-Steel Drill Screws for Steel Studs: Proprietary fastener consisting of carbon-steel drill point and 300 Series stainless-steel shank, complying with ASTM C 954 except manufactured with hex washer head and neoprene washer, **No. 10 (4.8-mm diameter)** by length required to penetrate steel stud flange with not less than three exposed threads.
 9. Polymer-Coated, Steel Drill Screws for Wood Studs: Self-drilling, bugle-head or wafer-head wood screws recommended by veneer anchor manufacturer for fastening to wood studs; not less than **No. 10 (4.8-mm diameter)**, **1-1/2 inches (38 mm)** long, and with organic polymer coating with salt-spray resistance to red rust of more than 500 hours per ASTM B 117.
 10. Polymer-Coated, Steel Tapping Screws for Concrete Masonry: Self-tapping screws with specially designed threads for tapping and wedging into masonry, with hex washer head and neoprene washer, **3/16-inch (4.8-mm)** diameter by **1-1/2-inch (38-mm)** length, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
- F. Stone Trim Anchors
1. Stone Trim Anchors: Units fabricated with tabs or dowels designed to engage kerfs or holes in stone trim units and holes for fasteners or postinstalled anchor bolts for fastening to substrates or framing as indicated.
 2. Materials: Fabricate anchors from stainless steel, ASTM A 240/A 240M, Type 304. Fabricate dowels from stainless steel, ASTM A 276, Type 304.
 3. Fasteners for Stone Trim Anchors: Annealed stainless-steel bolts, nuts, and washers; **ASTM F 593 (ASTM F 738M)** for bolts and **ASTM F 594 (ASTM F 836M)** for nuts, **Alloy Group 1 (A1)**.

4. Postinstalled Anchor Bolts for Fastening Stone Trim Anchors: Chemical anchors **OR** torque-controlled expansion anchors **OR** undercut anchors, **as directed**, made from stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group A1 or A4)** for bolts and nuts; ASTM A 666 or ASTM A 276, Type 304 or 316, for anchors.
- G. Embedded Flashing Materials
1. Metal Flashing: Provide metal flashing, where flashing is exposed or partly exposed and where indicated, complying with SMACNA's "Architectural Sheet Metal Manual **OR** Division 07 Section "Sheet Metal Flashing And Trim", **as directed**, and as follows:
 - a. Stainless Steel: ASTM A 240/A 240M, Type 304, **0.016 inch (0.4 mm)** thick.
 - b. Copper: ASTM B 370, Temper H00 or H01, cold-rolled copper sheet, **10-oz./sq. ft. (3-kg/sq. m)** weight or **0.0135 inch (0.34 mm)** thick for fully concealed flashing; **16-oz./sq. ft. (5-kg/sq. m)** weight or **0.0216 inch (0.55 mm)** thick elsewhere.
 - c. Fabricate continuous flashings in sections **96 inches (2400 mm)** long minimum, but not exceeding **12 feet (3.6 m)**. Provide splice plates at joints of formed, smooth metal flashing.
 - d. Fabricate through-wall metal flashing embedded in masonry from stainless steel **OR** copper, **as directed**, with ribs at **3-inch (75-mm)** intervals along length of flashing to provide an integral mortar bond.
 - e. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
 - f. Fabricate through-wall flashing with drip edge where **OR** unless otherwise, **as directed**, indicated. Fabricate by extending flashing **1/2 inch (13 mm)** out from wall, with outer edge bent down 30 degrees and hemmed, **as directed**.
 - g. Fabricate through-wall flashing with sealant stop where **OR** unless otherwise, **as directed**, indicated. Fabricate by bending metal back on itself **3/4 inch (19 mm)** at exterior face of wall and down into joint **3/8 inch (10 mm)** to form a stop for retaining sealant backer rod.
 - h. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least **3 inches (75 mm)** into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam will shed water.
 - i. Metal Drip Edges: Fabricate from stainless steel. Extend at least **3 inches (75 mm)** into wall and **1/2 inch (13 mm)** out from wall, with outer edge bent down 30 degrees and hemmed, **as directed**.
 - j. Metal Flashing Terminations: Fabricate from stainless steel. Extend at least **3 inches (75 mm)** into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for **3/4 inch (19 mm)** and down into joint **3/8 inch (10 mm)** to form a stop for retaining sealant backer rod.
 - k. Metal Expansion-Joint Strips: Fabricate from stainless steel **OR** copper, **as directed**, to shapes indicated.
 2. Flexible Flashing: For flashing not exposed to the exterior, use one of the following unless otherwise indicated:
 - a. Copper-Laminated Flashing: **5-oz./sq. ft. (1.5-kg/sq. m) OR 7-oz./sq. ft. (2-kg/sq. m)**, **as directed**, copper sheet bonded with asphalt between 2 layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 - b. Asphalt-Coated Copper Flashing: **5-oz./sq. ft. (1.5-kg/sq. m) OR 7-oz./sq. ft. (2-kg/sq. m)**, **as directed**, copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.
 - c. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than **0.030 inch (0.8 mm) OR 0.040 inch (1.0 mm)**, **as directed**.
 - d. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymers alloy as follows:
 - 1) Monolithic Sheet: Elastomeric thermoplastic flashing, **0.040 inch (1.0 mm)** thick.

- 2) Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch (0.6 mm) thick, with a 0.015-inch- (0.4-mm-) thick coating of rubberized-asphalt adhesive.
- 3) Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch (0.6 mm) thick, with a 0.015-inch- (0.4-mm-) thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches (38 mm) from edge.
 - a) Color: Gray **OR** White **OR** Tan/buff **OR** Black, **as directed**.
- 4) Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- e. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637, 0.040 inch (1.0 mm) thick.
3. Solder and Sealants for Sheet Metal Flashings
 - a. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - b. Solder for Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 - c. Elastomeric Sealant: ASTM C 920, chemically curing urethane **OR** polysulfide **OR** silicone, **as directed**, sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
4. Adhesives, Primers, and Seam Tapes for Flexible Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

H. Miscellaneous Masonry Accessories

1. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene **OR** urethane **OR** PVC, **as directed**.
2. Cementitious Dampproofing: Cementitious formulations that are recommended by ILI and that are nonstaining to stone, compatible with joint sealants, and noncorrosive to veneer anchors and attachments.
3. Asphalt Dampproofing: Cut-back asphalt complying with ASTM D 4479, Type I **OR** asphalt emulsion complying with ASTM D 1227, Type III or IV, **as directed**.
4. Weep Hole/Vent Products: Use one of the following unless otherwise indicated:
 - a. Wicking Material: Absorbent rope, made from cotton **OR** UV-resistant synthetic fiber, **as directed**, 1/4 to 3/8 inch (6 to 10 mm) in diameter, in length required to produce 2-inch (50-mm) exposure on exterior and 18 inches (450 mm) in cavity behind stone masonry. Use only for weep holes.
 - b. Round Plastic Tubing: Medium-density polyethylene, 3/8-inch (10-mm) OD by thickness of stone masonry.
 - c. Rectangular Plastic Tubing: Clear butyrate, 3/8 by 1-1/2 inches (10 by 38 mm) by thickness of stone masonry.
 - d. Mesh Weep Holes/Vents: Free-draining mesh; made from polyethylene strands, full width of head joint and 2 inches (50 mm) high by thickness of stone masonry; in color selected from manufacturer's standard.
 - e. Aluminum Weep Holes/Vents: One-piece, L-shaped units made from sheet aluminum, designed to fit into head joint and consisting of vertical channel with louvers stamped in web and with top flap to keep mortar out of head joint; painted to comply with Division 07, before installation, in color approved to match that of mortar.
 - f. Vinyl Weep Holes/Vents: One-piece, offset, T-shaped units made from flexible, injection-molded PVC, designed to fit into head joint and consisting of louvered vertical leg, flexible wings to seal against ends of stone units, and top flap to keep mortar out of head joint; in color approved to match that of mortar.
5. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
 - a. Provide one of the following configurations:

- 1) Strips, full-depth of cavity and **10 inches (250 mm)** wide, with dovetail shaped notches **7 inches (175 mm)** deep that prevent mesh from being clogged with mortar droppings.
 - 2) Strips, not less than **3/4 inch (19 mm) OR 1-1/2 inches (38 mm)**, **as directed**, thick and **10 inches (250 mm)** wide, with dimpled surface designed to catch mortar droppings and prevent weep holes from being clogged with mortar.
 - 3) Sheets or strips full depth of cavity and installed to full height of cavity.
 - 4) Sheets or strips not less than **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick and installed to full height of cavity with additional strips **4 inches (100 mm)** high at weep holes and thick enough to fill entire depth of cavity and prevent weep holes from being clogged with mortar.
6. Expanded Metal Lath: **3.4 lb/sq. yd. (1.8 kg/sq. m)**, self-furring, diamond-mesh lath complying with ASTM C 847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, **G60 (Z180)**.
 7. Woven-Wire Lath: ASTM C 1032, fabricated into **1-1/2-inch (38-mm)** hexagonal-shaped mesh with minimum **0.0510-inch- (1.3-mm-)** diameter, galvanized-steel wire.
 8. Welded-Wire Lath: ASTM C 933, fabricated into **2-by-2-inch (50-by-50-mm)** mesh with minimum **0.0625-inch- (1.6-mm-)** diameter, galvanized-steel wire.
 9. Lath Attachment Devices: Material and type required by ASTM C 1063 for installations indicated.
- I. Cavity-Wall Insulation
1. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV **OR** Type X, **as directed**, closed-cell product extruded with an integral skin.
 2. Extruded-Polystyrene Board Insulation with Increased R-Value: ASTM C 578, Type IV, but with an aged thermal resistance (R-value) for **1-inch (25-mm)** thickness of **5.6 deg F x h x sq. ft./Btu at 75 deg F (1.0 K x sq. m/W at 24 deg C)** at 5 years; closed-cell product with a carbon-black filler and extruded with an integral skin.
 3. Molded-Polystyrene Board Insulation: ASTM C 578, Type I.
 4. Polyisocyanurate Board Insulation: ASTM C 1289, Type I (aluminum-foil faced), Class 2 (glass-fiber reinforced).
 5. Adhesive: Type recommended by insulation board manufacturer for application indicated.
- J. Masonry Cleaners
1. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar and grout stains, efflorescence, and other new construction stains from stone masonry surfaces without discoloring or damaging masonry surfaces; expressly approved for intended use by cleaner manufacturer and stone producer.
- K. Mortar Mixes
1. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
 - a. Do not use calcium chloride.
 - b. Limit cementitious materials in mortar to portland cement **OR** mortar cement, **as directed**, and lime.
 - c. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
 - d. Mixing Pointing Mortar: Thoroughly mix cementitious and aggregate materials together before adding water. Then mix again, adding only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for one to two hours. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within 30 minutes of final mixing; do not retemper or use partially hardened material.
 2. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

3. Mortar for Stone Masonry: Comply with ASTM C 270, Proportion **OR** Property, **as directed**, Specification.
 - a. Mortar for Setting Stone: Type S **OR** Type N, **as directed**.
 - b. Mortar for Pointing Stone: Type N **OR** Type O, **as directed**.
4. Latex-Modified Portland Cement Setting Mortar: Proportion and mix portland cement, aggregate, and latex additive to comply with latex-additive manufacturer's written instructions.
5. Cement-Paste Bond Coat: Mix either neat cement and water or cement, sand, and water to a consistency similar to that of thick cream.
 - a. For latex-modified portland cement setting-bed mortar, substitute latex admixture for part or all of water, according to latex-additive manufacturer's written instructions.
6. Mortar for Scratch Coat over Metal Lath: 1 part portland cement, 1/2 part lime, 5 parts loose damp sand, and enough water to produce a workable consistency.
7. Mortar for Scratch Coat over Unit Masonry: 1 part portland cement, 1 part lime, 7 parts loose damp sand, and enough water to produce a workable consistency.
8. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - a. Pigments shall not exceed 10 percent of portland cement by weight.
 - b. Pigments shall not exceed 5 percent of masonry cement **OR** mortar cement, **as directed**, by weight.
 - c. Mix to match sample.
9. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - a. Mix to match sample.

L. Fabrication

1. Fabricate stone to comply with sizes, shapes, and tolerances recommended by applicable stone association or, if none, by stone source, for faces, edges, beds, and backs.
 - a. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
 - b. For limestone, comply with recommendations in ILI's "Indiana Limestone Handbook."
2. Cut **OR** Select, **as directed**, stone to produce pieces of thickness, size, and shape indicated, including details on Drawings. Dress joints (bed and vertical) straight and at right angle to face unless otherwise indicated.
3. Cut and drill sinkages and holes in stone for anchors and supports.
4. Carefully inspect stone at quarry or fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units before shipment.
 - a. Clean sawed backs of stone to remove rust stains and iron particles.
5. Gage backs of stones for adhered veneer if more than **81 sq. in. (522 sq. cm)** in area.
6. Thickness of Stone: Provide thickness indicated, but not less than the following:
 - a. Thickness for anchored veneer: **4 inches (100 mm)** plus or minus **1/4 inch (6 mm)** **OR** **1/2 inch (13 mm)**, **as directed**. Thickness does not include projection of pitched faces.
 - b. Thickness for adhered veneer: **1 inch (25 mm)** plus or minus **1/8 inch (3 mm)** **OR** **1/4 inch (6 mm)**, **as directed**.
7. Shape stone for type of masonry (pattern) as follows:
 - a. Sawed-bed, range ashlar with uniform course heights and uniform lengths as indicated on Drawings.
 - b. Sawed-bed, range ashlar with uniform course heights as indicated on Drawings and with random lengths.
 - c. Sawed-bed, broken-range ashlar with uniform course heights as indicated on Drawings and with random lengths.
 - d. Sawed **OR** Split, **as directed**, -bed, random-range ashlar with random course heights and random lengths (interrupted coursed).
 - e. Coursed rubble.
 - f. Uncoursed rubble (fieldstone).
 - g. Polygonal or mosaic.

8. Finish exposed faces and edges of stone to comply with requirements indicated for finish and to match approved samples and mockups.
 - a. Finish: Split face **OR** Rock face (pitched face) **OR** Natural cleft **OR** Mixed split face and seam face **OR** Mixed split face, seam face, and rock face (pitched face) **OR** Smooth **OR** Sand rubbed **OR** As indicated, **as directed**.
 - b. Finish for Sills: Smooth **OR** Sand rubbed **OR** Split face with sand-rubbed washes **OR** Rock face (pitched face) with sand-rubbed washes **OR** Rock face (pitched face) with tooled (boasted) washes, **as directed**
 - c. Finish for Lintels: Smooth **OR** Sand rubbed **OR** Split face **OR** Rock face (pitched face), **as directed**.
 - d. Finish for Copings: Smooth **OR** Sand rubbed **OR** Split faces **OR** Rock face (pitched face), front and back; sand-rubbed top **OR** Rock face (pitched face), front and back; tooled (boasted) top, **as directed**.
 - 1) Finish exposed ends of copings same as front and back faces.

1.3 EXECUTION

A. Preparation

1. Accurately mark stud centerlines on face of weather-resistant sheathing paper before beginning stone installation.
2. Coat concrete and unit masonry backup with asphalt dampproofing.
3. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives.

B. Setting Of Stone Masonry, General

1. Perform necessary field cutting and trimming as stone is set.
 - a. Use power saws to cut stone that is fabricated with saw-cut surfaces. Cut lines straight and true, with edges eased slightly to prevent snipping.
 - b. Use hammer and chisel to split stone that is fabricated with split surfaces. Make edges straight and true, matching similar surfaces that were shop or quarry fabricated.
 - c. Pitch face at field-split edges as needed to match stones that are not field split.
2. Sort stone before it is placed in wall to remove stone that does not comply with requirements relating to aesthetic effects, physical properties, or fabrication, or that is otherwise unsuitable for intended use.
3. Arrange stones in range ashlar pattern with course heights as indicated, uniform **OR** random, **as directed** lengths, and uniform joint widths, with offset between vertical joints as indicated.
4. Arrange stones in broken-range ashlar pattern with uniform course heights, random lengths, and uniform joint widths.
5. Arrange stones in three-course, random-range ashlar pattern with random course heights, random lengths (interrupted coursed), and uniform joint widths.
6. Arrange stones in coursed **OR** uncoursed, **as directed**, rubble pattern with joint widths within tolerances indicated. Insert small stones into spaces between larger stones as needed to produce joints as uniform in width as practical, **as directed**.
7. Arrange stones in polygonal (mosaic) pattern with uniform joint widths.
8. Arrange stones with color and size variations uniformly dispersed for an evenly blended appearance.
9. Set stone to comply with requirements indicated on Drawings. Install supports, fasteners, and other attachments indicated or necessary to secure stone masonry in place. Set stone accurately in locations indicated with edges and faces aligned according to established relationships and indicated tolerances.
10. Maintain uniform joint widths except for variations due to different stone sizes and where minor variations are required to maintain bond alignment if any. Lay walls with joints not less than **1/4 inch (6 mm) OR 3/8 inch (10 mm)**, **as directed**, at narrowest points or more than **3/8 inch (10**

- mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm) OR 1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed, at widest points.
11. Provide sealant joints of widths and at locations indicated.
 - a. Keep sealant joints free of mortar and other rigid materials.
 - b. Sealing joints is specified in Division 07 Section "Joint Sealants".
 12. Install metal expansion strips in sealant joints at locations indicated. Build flanges of expansion strips into masonry by embedding in mortar between stone masonry and backup wythe. Lap each joint 4 inches (100 mm) in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
 13. Install embedded flashing and weep holes, as directed, at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
 - a. At stud-framed walls, extend flashing through stone masonry, up the face of sheathing at least 8 inches (200 mm) OR 12 inches (300 mm) OR 16 inches (400 mm), as directed, and behind weather-resistant sheathing paper.
 - b. At multiwythe masonry walls, including cavity walls, extend flashing through stone masonry, turned up a minimum of 4 inches (100 mm) OR 8 inches (200 mm) OR 12 inches (300 mm) OR 16 inches (400 mm), as directed, and extend into or through inner wythe to comply with requirements in Division 04 Section "Unit Masonry".
 - c. At concrete backing, extend flashing through stone masonry, turned up a minimum of 4 inches (100 mm) OR 6 inches (150 mm) OR 8 inches (200 mm) OR 12 inches (300 mm), as directed, and insert in reglet. Reglets are specified Division 07 Section "Sheet Metal Flashing And Trim".
 - d. At lintels and shelf angles, extend flashing full length of angles but not less than 6 inches (150 mm) into masonry at each end.
 - e. At sills, extend flashing not less than 4 inches (100 mm) at ends.
 - f. At ends of head and sill flashing turn up not less than 2 inches (50 mm) to form end dams.
 - g. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
 - h. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
 - i. Extend sheet metal flashing 1/2 inch (13 mm) beyond face of masonry at exterior and turn flashing down to form a drip.
 - j. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 - k. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
 - l. Cut flexible flashing flush with face of wall after masonry wall construction is completed.
 14. Coat limestone with cementitious dampproofing as follows:
 - a. Stone at Grade: Beds, joints, and back surfaces to at least 12 inches (300 mm) above finish-grade elevations.
 - b. Stone Extending below Grade: Beds, joints, back surfaces, and face surfaces below grade.
 - c. Allow cementitious dampproofing formulations to cure before setting dampproofed stone. Do not damage or remove dampproofing in the course of handling and setting stone.
 15. Place weep holes and vents in joints where moisture may accumulate, including at base of cavity walls, above shelf angles, and at flashing.
 - a. Use wicking material OR round plastic tubing OR rectangular plastic tubing OR mesh weep holes/vents OR aluminum weep holes/vents OR vinyl weep holes/vents OR open head joints, as directed, to form weep holes.

- b. Use wicking material to form weep holes above flashing in stone sills. Turn wicking down at lip of sill to be as inconspicuous as possible.
 - c. Space weep holes **16 inches (400 mm) OR 24 inches (600 mm), as directed**, o.c.
 - d. Space weep holes formed from plastic tubing **OR** wicking material, **as directed**, **16 inches (400 mm)** o.c.
 - e. Trim wicking material used in weep holes flush with outside face of wall after mortar has set.
 - f. Place pea gravel in cavities as soon as practical to a height of not less than **2 inches (50 mm)** above top of flashing, to maintain drainage.
 - g. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.
16. Install vents in vertical head joints at the top of each continuous cavity at spacing indicated. Use round plastic tubing **OR** rectangular plastic tubing **OR** mesh weep holes/vents **OR** aluminum weep holes/vents **OR** vinyl weep holes/vents **OR** open head joints, **as directed**, to form vents.
- a. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

C. Construction Tolerances

1. Variation from Plumb: For vertical lines and surfaces, do not exceed **1/4 inch in 10 feet (6 mm in 3 m)**, **3/8 inch in 20 feet (10 mm in 6 m)**, or **1/2 inch in 40 feet (13 mm in 12 m)** or more. For external corners, expansion joints, control joints, and other conspicuous lines, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or **1/2 inch in 40 feet (13 mm in 12 m)** or more.
2. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves, and other conspicuous lines, do not exceed **1/4 inch in 20 feet (6 mm in 6 m)** or **1/2 inch in 40 feet (13 mm in 12 m)** or more.
3. Variation of Linear Building Line: For position shown in plan, do not exceed **1/2 inch in 20 feet (13 mm in 6 m)** or **3/4 inch in 40 feet (19 mm in 12 m)** or more.
4. For rough stone, measure variation from level, plumb, and position shown in plan as variation of the average plane of the face of each stone from level, plumb, or dimensioned plane.
5. Variation in Mortar-Joint Thickness: Do not vary from joint size range indicated.
6. Variation in Plane between Adjacent Stones for Rough Stone: Do not exceed one-half of tolerance specified for thickness of stone.

D. Installation Of Anchored Stone Masonry

1. Anchor stone masonry to concrete with corrugated-metal veneer anchors unless otherwise indicated. Secure anchors by inserting dovetailed ends into dovetail slots in concrete.
2. Anchor stone masonry to unit masonry with corrugated-metal **OR** individual wire, **as directed**, veneer anchors unless otherwise indicated. Embed anchors in unit masonry mortar joints or grouted cells for distance at least one-half of unit masonry thickness.
3. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement by inserting pintles into eyes of masonry joint reinforcement projecting from unit masonry.
4. Anchor stone masonry to unit masonry with wire anchors unless otherwise indicated. Connect anchors to masonry joint reinforcement with vertical rods inserted through anchors and through eyes of masonry joint reinforcement projecting from unit masonry.
5. Anchor stone masonry to unit masonry with adjustable, screw-attached **OR** seismic, **as directed**, veneer anchors unless otherwise indicated. Fasten anchors to unit masonry with two screws.
6. Anchor stone masonry to stud framing with adjustable, screw-attached **OR** seismic, **as directed**, veneer anchors unless otherwise indicated. Fasten anchors through sheathing to framing with two screws.
7. Anchor stone masonry to stud framing with screw-attached veneer anchors unless otherwise indicated.
8. Anchor stone masonry to wood stud framing with corrugated-metal veneer anchors unless otherwise indicated. Fasten anchors through sheathing to studs with corrosion-resistant roofing nails.

9. Anchor stone masonry to wood stud framing with wire anchors unless otherwise indicated. Fasten anchors through sheathing to wood studs with corrosion-resistant roofing nails.
 10. Anchor stone masonry to metal stud framing with wire anchors unless otherwise indicated. Tie anchors to studs.
 11. Embed veneer anchors in mortar joints of stone masonry at least halfway, but not less than **1-1/2 inches (38 mm)**, through stone masonry and with at least **5/8-inch (16-mm)** cover on outside face.
 - a. Install continuous wire reinforcement in horizontal joints and attach to seismic veneer anchors as stone is set.
 12. Space anchors to provide not less than 1 anchor per **2 sq. ft. (0.2 sq. m)** of wall area. Install additional anchors within **12 inches (300 mm)** of openings, sealant joints, and perimeter at intervals not exceeding **12 inches (300 mm)**.
 13. Space anchors not more than **16 inches (400 mm)** o.c. vertically and **24 inches (600 mm)** o.c. horizontally. Install additional anchors within **12 inches (300 mm)** of openings, sealant joints, and perimeter at intervals not exceeding **12 inches (300 mm)**.
 14. Anchor stone trim with stone trim anchors where indicated. Install anchors by fastening to substrate and inserting tabs and dowels into kerfs and holes in stone units. Provide compressible filler in ends of dowel holes and bottoms of kerfs to prevent end bearing of dowels and anchor tabs on stone. Fill remainder of anchor holes and kerfs with mortar.
 15. Set stone in full bed of mortar with full head joints unless otherwise indicated. Build anchors into mortar joints as stone is set.
 16. Fill collar joint **OR** space between back of stone masonry and weather-resistant sheathing paper, **as directed**, with mortar as stone is set.
 17. Provide **1-inch (25-mm) OR 2-inch (50-mm)**, **as directed**, cavity between stone masonry and backup construction unless otherwise indicated. Keep cavity free of mortar droppings and debris.
 - a. Place mortar spots in cavity at veneer anchors to maintain spacing.
 - b. Slope beds toward cavity to minimize mortar protrusions into cavity.
 - c. Do not attempt to trowel or remove mortar fins protruding into cavity.
 18. Rake out joints for pointing with mortar to depth of not less than **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.
- E. Installation Of Adhered Stone Masonry Veneer
1. Install flashing over sheathing and behind weather-resistant sheathing paper by fastening through sheathing into framing.
 2. Install lath over weather-resistant sheathing paper by fastening through sheathing into framing to comply with ASTM C 1063.
 3. Install lath over unit masonry and concrete to comply with ASTM C 1063.
 4. Install scratch coat over metal lath **3/8 inch (10 mm)** thick to comply with ASTM C 926.
 5. Coat backs of stone units and face of scratch coat **OR** masonry backup, **as directed**, with cement-paste bond coat, then butter both surfaces with setting mortar. Use sufficient setting mortar so a slight excess will be forced out the edges of stone units as they are set. Tap units into place, completely filling space between units and scratch coat **OR** masonry backup, **as directed**.
 6. Rake out joints for pointing with mortar to depth of not less than **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, before setting mortar has hardened. Rake joints to uniform depths with square bottoms and clean sides.
- F. Pointing
1. Prepare stone-joint surfaces for pointing with mortar by removing dust and mortar particles. Where setting mortar was removed to depths greater than surrounding areas, apply pointing mortar in layers not more than **3/8 inch (10 mm)** deep until a uniform depth is formed.
 2. Point stone joints by placing and compacting pointing mortar in layers not more than **3/8 inch (10 mm)** deep. Compact each layer thoroughly and allow to become thumbprint hard before applying next layer.

3. Tool joints, when pointing mortar is thumbprint hard, with a smooth jointing tool to produce the following joint profile:
 - a. Joint Profile: Concave **OR** Smooth, flat face slightly below edges of stone **OR** Smooth, flat face recessed **1/4 inch (6 mm)** below edges of stone (raked joint) **OR** Flush, with a **3/8-inch (10-mm)** half-round raised bead in middle of joint **OR** As indicated, **as directed**.

- G. Adjusting And Cleaning
 1. Remove and replace stone masonry of the following description:
 - a. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved.
 - b. Defective joints.
 - c. Stone masonry not matching approved samples and mockups.
 - d. Stone masonry not complying with other requirements indicated.
 2. Replace in a manner that results in stone masonry matching approved samples and mockups, complying with other requirements, and showing no evidence of replacement.
 3. In-Progress Cleaning: Clean stone masonry as work progresses. Remove mortar fins and smears before tooling joints.
 4. Final Cleaning: After mortar is thoroughly set and cured, clean stone masonry as follows:
 - a. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - b. Test cleaning methods on mockup; leave one-half of panel uncleaned for comparison purposes. Obtain approval of sample cleaning before cleaning stone masonry.
 - c. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
 - d. Wet wall surfaces with water before applying cleaner; remove cleaner promptly by rinsing thoroughly with clear water.
 - e. Clean stone masonry by bucket and brush hand-cleaning method described in BIA Technical Note No. 20 Revised II, using job-mixed detergent solution.
 - f. Clean stone masonry with proprietary acidic cleaner applied according to manufacturer's written instructions.
 - g. Clean limestone masonry to comply with recommendations in ILI's "Indiana Limestone Handbook."

- H. Excess Materials And Waste
 1. Disposal as Fill Material: Dispose of clean masonry waste, including mortar and excess or soil-contaminated sand, by crushing and mixing with fill material as fill is placed.
 - a. Crush masonry waste to less than **4 inches (100 mm)** in greatest dimension.
 - b. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Division 31 Section "Earth Moving".
 - c. Do not dispose of masonry waste as fill within **18 inches (450 mm)** of finished grade.
 2. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other waste, and legally dispose of off the Owner's property.

END OF SECTION 04 42 43 00

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Task	Specification	Specification Description
04 42 43 00	04 41 00 00	Dimension Stone Cladding
04 42 43 00	04 41 00 00a	Interior Stone Facing
04 43 16 00	01 22 16 00	No Specification Required
04 43 16 00	04 41 00 00	Dimension Stone Cladding
04 43 16 00	04 42 43 00	Stone Masonry
04 43 16 00	04 41 00 00a	Interior Stone Facing

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SECTION 04 72 00 00 - ARCHITECTURAL PRECAST CONCRETE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for architectural precast concrete. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Architectural precast concrete cladding and load-bearing units.
 - b. Insulated, architectural precast concrete units.
 - c. Brick-faced, architectural precast concrete units.
 - d. Stone-faced, architectural precast concrete units.

C. Definition

1. Design Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by the Owner.

D. Performance Requirements

1. Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:
 - a. Loads: As indicated.

E. Submittals

1. Product Data: For each type of product indicated.
2. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
3. Shop Drawings: Detail fabrication and installation of architectural precast concrete units. Indicate locations, plans, elevations, dimensions, shapes, and cross sections of each unit. Indicate joints, reveals, and extent and location of each surface finish. Indicate details at building corners.

NOTE: The following paragraph is not required if Architect or Engineer assumes or is required by law to assume design responsibility.

 - a. Comprehensive engineering analysis signed and sealed **OR** certified, **as directed**, by the qualified professional engineer responsible for its preparation. Show governing panel types, connections, and types of reinforcement, including special reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from architectural precast concrete.
4. Samples: For each type of finish indicated on exposed surfaces of architectural precast concrete units, in sets of 3, illustrating full range of finish, color, and texture variations expected; approximately **12 by 12 by 2 inches (300 by 300 by 50 mm)**.
5. Welding certificates.
6. Material Test Reports: For aggregates.
7. Material Certificates: Signed by manufacturers:
8. Field quality-control test and special inspection reports.

F. Quality Assurance

1. Fabricator Qualifications: A firm that assumes responsibility for engineering architectural precast concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

- a. Participates in PCI's plant certification program and is designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units or participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant.
2. Design Standards: Comply with **ACI 318 (ACI 318M)** and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.
3. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."
4. Welding: Qualify procedures and personnel according to AWS D1.1/D.1.1M, "Structural Welding Code - Steel"; and AWS D1.4, "Structural Welding Code - Reinforcing Steel."
5. Calculated Fire-Test-Response Characteristics: Where indicated, provide architectural precast concrete units whose fire resistance has been calculated according to ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies," **OR** PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," **as directed**, and is acceptable to authorities having jurisdiction.
6. Sample Panels: After sample approval and before fabricating architectural precast concrete units, produce a minimum of 2 sample panels approximately **16 sq. ft. (1.5 sq. m)** in area for review by the Owner. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.

G. Delivery, Storage, And Handling

1. Deliver architectural precast concrete units in such quantities and at such times to limit unloading units temporarily on the ground.
2. Support units during shipment on nonstaining shock-absorbing material.
3. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
4. Place stored units so identification marks are clearly visible, and units can be inspected.
5. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
6. Lift and support units only at designated points shown on Shop Drawings.

1.2 PRODUCTS

A. Mold Materials

1. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
 - a. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
2. Form Liners: Units of face design, texture, arrangement, and configuration indicated **OR** to match those used for precast concrete design reference sample, **as directed**. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
3. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

B. Reinforcing Materials

1. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
2. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

3. Galvanized Reinforcing Bars: ASTM A 615/A 615M, **Grade 60** (Grade 420) **OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized, and chromate wash treated after fabrication and bending, **as directed**.
 4. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, **Grade 60** (Grade 420) **OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M epoxy coated.
 5. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, **Grade 60** (Grade 420) **OR** ASTM A 706/A 706M, **as directed**, deformed bars, assembled with clips.
 6. Plain-Steel Welded Wire Reinforcement: ASTM A 1064, fabricated from as-drawn **OR** galvanized, **as directed**, steel wire into flat sheets.
 7. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
 8. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain **OR** deformed, **as directed**, flat sheet, Type 1 bendable **OR** 2 nonbendable, **as directed**, coating.
 9. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.
- C. Prestressing Tendons
1. Prestressing Strand: ASTM A 416/A 416M, **Grade 270** (Grade 1860), uncoated, 7-wire, low-relaxation strand.
 - a. Coat unbonded post-tensioning strand with corrosion inhibitor passing ASTM D 1743 and sheath with polypropylene tendon sheathing. Include anchorage devices and coupler assemblies.
- D. Concrete Materials
1. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
 - a. For surfaces exposed to view in finished structure, mix gray with white cement, of same type, brand, and mill source.
 2. Supplementary Cementitious Materials:
 - a. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - b. Metakaolin Admixture: ASTM C 618, Class N.
 - c. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
 - d. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 3. Normal-Weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
 - a. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
 - 1) Gradation: Uniformly graded **OR** Gap graded **OR** To match design reference sample, **as directed**.
 - b. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate, unless otherwise approved by the Owner.
 4. Lightweight Aggregates: Except as modified by PCI MNL 117, ASTM C 330, with absorption less than 11 percent.
 5. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
 6. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
 7. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
 8. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
 - a. Water-Reducing Admixtures: ASTM C 494/C 494M, Type A.
 - b. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.

- d. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
- e. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- f. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
- g. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017 M.

E. Steel Connection Materials

1. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
2. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 117, Table 3.2.3.
3. Carbon-Steel Plate: ASTM A 283/A 283M.
4. Malleable Iron Castings: ASTM A 47/A 47M.
5. Carbon-Steel Castings: ASTM A 27/A 27M, **Grade 60-30 (Grade 415-205)**.
6. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
7. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
8. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, **Grade 65 (Grade 450)**.
9. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
10. Carbon-Steel Bolts and Studs: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; carbon-steel, hex-head bolts and studs; carbon-steel nuts, **ASTM A 563 (ASTM A 563M)**; and flat, unhardened steel washers, ASTM F 844.
11. High-Strength Bolts and Nuts: **ASTM A 325 (ASTM A 325M)**, Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, **ASTM A 563 (ASTM A 563M)**; and hardened carbon-steel washers, **ASTM F 436 (ASTM F 436M)**.
12. Zinc-Coated Finish: For exterior steel items, steel in exterior walls, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M **OR** electrodeposition according to ASTM B 633, SC 3, Types 1 and 2, **as directed**.
 - a. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 - b. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035A or SSPC-Paint 20.
13. Shop-Primed Finish: Prepare surfaces of nongalvanized steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3 and shop-apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 **OR** SSPC-Paint 25, **as directed**, according to SSPC-PA 1.
14. Welding Electrodes: Comply with AWS standards.

F. Stainless-Steel Connection Materials

1. Stainless-Steel Plate: ASTM A 666, Type 304, of grade suitable for application.
2. Stainless-Steel Bolts and Studs: ASTM F 593, Alloy 304 or 316, hex-head bolts and studs; stainless-steel nuts; and flat, stainless-steel washers.
 - a. Lubricate threaded parts of stainless-steel bolts with an antiseize thread lubricant during assembly.
3. Stainless-Steel-Headed Studs: ASTM A 276, with minimum mechanical properties of PCI MNL 117, Table 3.2.3.

G. Bearing Pads

1. Provide one of the following bearing pads for architectural precast concrete units as recommended by precast fabricator for application:
 - a. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, Type A durometer hardness of 50 to 70, ASTM D 2240, minimum tensile strength **2250 psi (15.5 MPa)**, ASTM D 412.

- b. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Type A durometer hardness of 70 to 90, ASTM D 2240; capable of supporting a compressive stress of **3000 psi (20.7 MPa)** with no cracking, splitting, or delaminating in the internal portions of pad. Test one specimen for every 200 pads used in Project.
 - c. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; Type A durometer hardness of 80 to 100, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Design Specifications, Division II, Section 18.10.2, or with MIL-C-882E.
 - d. Frictionless Pads: Tetrafluoroethylene (Teflon), glass-fiber reinforced, bonded to stainless or mild-steel plate, of type required for in-service stress.
 - e. High-Density Plastic: Multimonomer, nonleaching, plastic strip.
- H. Accessories
1. Reglets: Specified in Division 07 Section "Sheet Metal Flashing And Trim".
OR
Reglets: PVC extrusions, **OR** Stainless steel, Type 302 or 304, **OR** Copper, **as directed**, felt or fiber filled, or with face opening of slots covered.
 2. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install architectural precast concrete units.
- I. Grout Materials
1. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
 2. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.
 3. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin; ASTM C 881/C 881M, of type, grade, and class to suit requirements.
- J. Thin Brick Units And Accessories
1. Thin Brick Units: ASTM C 216, Type FBX or ASTM C 1088, Grade Exterior, Type TBX, not less than **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick with a tolerance of plus or minus **1/16 inch (1.6 mm)**, and as follows:
 - a. Face Size: **2-1/4 inches (57 mm)** high by **8 inches (203 mm)** long.
 - b. Face Size: **2-1/4 inches (57 mm)** high by **7-1/2 to 7-5/8 inches (190 to 194 mm)** long.
 - c. Face Size: **2-3/4 to 2-13/16 inches (70 to 71 mm)** high by **7-1/2 to 7-5/8 inches (190 to 194 mm)** long.
 - d. Face Size: **3-1/2 to 3-5/8 inches (89 to 92 mm)** high by **7-1/2 to 7-5/8 inches (190 to 194 mm)** long.
 - e. Face Size: **3-1/2 to 3-5/8 inches (89 to 92 mm)** high by **11-1/2 to 11-5/8 inches (292 to 295 mm)** long.
 - f. Where indicated to "match existing," provide thin brick matching color, texture, and face size of existing adjacent brick work.
 - g. Face Size: 57 mm high by 190 mm long.
 - h. Face Size: 70 mm high by 190 mm long.
 - i. Face Size: 90 mm high by 190 mm long.
 - j. Face Size: 90 mm high by 290 mm long.
 - k. Special Shapes: Include corners, edge corners, and end edge corners.
 - l. Initial Rate of Absorption: Less than **30 g/30 sq. in. (30 g/194 sq. cm)** per minute; ASTM C 67.
 - m. Efflorescence: Tested according to ASTM C 67 and rated "not effloresced."

- n. Surface Coating: Thin brick with colors or textures applied as coatings shall withstand 50 cycles of freezing and thawing; ASTM C 67 with no observable difference in applied finish when viewed from **10 feet (3 m)**.
 - o. Face Color and Texture: Match approved samples **OR** Medium brown, wire cut **OR** Full-range red, sand molded **OR** Gray, velour, **as directed**.
 - p. Back Surface Texture: Scored, combed, wire roughened, ribbed, keybacked, or dovetailed.
2. Sand-Cement Mortar: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144. Mix at ratio of 1 part cement to 4 parts sand, by volume, with minimum water required for placement.
 3. Latex-Portland Cement Pointing Grout: ANSI A118.6 and as follows:
 - a. Dry-grout mixture, factory prepared, of portland cement, graded aggregate, and dry, redispersible, ethylene-vinyl-acetate additive for mixing with water; uniformly colored.
 - b. Commercial portland cement grout, factory prepared, with liquid styrene-butadiene rubber or acrylic-resin latex additive; uniformly colored.
 - c. Colors: As selected by the Owner from manufacturer's full range.
- K. Stone Materials And Accessories
1. Stone facing for architectural precast concrete is specified in Division 04 Section "Exterior Stone Cladding".
 2. Anchors: Stainless steel, ASTM A 666, Type 304, of temper and diameter required to support loads without exceeding allowable design stresses.
 - a. Fit each anchor leg with neoprene grommet collar of width at least twice the diameter and of length at least five times the diameter of anchor.
 3. Sealant Filler: ASTM C 920, low-modulus, multicomponent, nonsag urethane sealant complying with requirements in Division 07 Section "Joint Sealants" and that is nonstaining to stone substrate.
 4. Epoxy Filler: ASTM C 881/C 881M, 100 percent solids, sand-filled nonshrinking, nonstaining of type, class, and grade to suit application.
 - a. Elastomeric Anchor Sleeve: **1/2 inch (13 mm)** long, Type A durometer hardness of 60, ASTM D 2240.
 5. Bond Breaker: Preformed, compressible, resilient, nonstaining, nonwaxing, closed-cell polyethylene foam pad, nonabsorbent to liquid and gas, **1/8 inch (3.2 mm)** thick **OR** Polyethylene sheet, ASTM D 4397, **6 to 10 mils (0.15 to 0.25 mm)** thick, **as directed**.
- L. Insulated Panel Accessories
1. Molded-Polystyrene Board Insulation: ASTM C 578, Type I, **0.90 lb/cu. ft. (15 kg/cu. m)** **OR** VIII, **1.15 lb/cu. ft. (18 kg/cu. m)** **OR** II, **1.35 lb/cu. ft. (22 kg/cu. m)**, **as directed**; square **OR** ship-lap, **as directed**, edges; with R-value and thickness as required to meet Project requirements.
 2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.60 lb/cu. ft. (26 kg/cu. m)** **OR** X, **1.30 lb/cu. ft. (21 kg/cu. m)** **OR** VI, **1.80 lb/cu. ft. (29 kg/cu. m)**, **as directed**; square **OR** ship-lap, **as directed**, edges; with R-value and thickness as required to meet Project requirements.
 3. Polyisocyanurate Board Insulation: ASTM C 591, Type I, **1.8 lb/cu. ft. (29 kg/cu. m)** **OR** IV, **2 lb/cu. ft. (32 kg/cu. m)** **OR** II, **2.5 lb/cu. ft. (40 kg/cu. m)**, **as directed**, unfaced, with R-value and thickness as required to meet Project requirements.
 4. Wythe Connectors: Glass-fiber and vinyl-ester polymer connectors **OR** Polypropylene pin connectors **OR** Stainless-steel pin connectors **OR** Bent galvanized reinforcing bars or galvanized welded wire trusses **OR** Cylindrical metal sleeve anchors, **as directed**, manufactured to connect wythes of precast concrete panels.
- M. Concrete Mixtures
1. Prepare design mixtures for each type of precast concrete required.
 - a. Limit use of fly ash and silica fume to 20 percent of portland cement by weight; limit metakaolin and silica fume to 10 percent of portland cement by weight.

2. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at architectural precast concrete fabricator's option.
3. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by **ACI 318 (ACI 318M)** or PCI MNL 117 when tested according to ASTM C 1218/C 1218M.
4. Normal-Weight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa)** minimum.
 - b. Maximum Water-Cementitious Materials Ratio: 0.45.
5. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 117.
6. Lightweight Concrete Backup Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa)**.
 - b. Unit Weight: Calculated equilibrium unit weight of **115 lb/cu. ft. (1842 kg/cu. m)**, plus or minus **3 lb/cu. ft. (48 kg/cu. m)**, according to ASTM C 567.
7. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 117.
8. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

N. Mold Fabrication

1. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
 - a. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
2. Maintain molds to provide completed architectural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - a. Form joints are not permitted on faces exposed to view in the finished work.
 - b. Edge and Corner Treatment: Uniformly chamfered **OR** radiused, **as directed**.

O. Thin Brick Facings

NOTE: The following 2 paragraphs are not applicable if bonding back of thin brick directly to concrete instead of using mortar.

1. Place form liner templates accurately to provide grid for thin brick facings. Provide solid backing and supports to maintain stability of liners while placing thin bricks and during concrete placement.
2. Securely place thin brick units face down into form liner pockets and place concrete backing mixture.
3. Completely fill joint cavities between thin brick units with sand-cement mortar, and place precast concrete backing mixture while sand-cement mortar is still fluid enough to ensure bond.
4. Mix and install grout according to ANSI A108.10. Completely fill joint cavities between thin brick units with grout, and compress into place without spreading grout onto faces of thin brick units. Remove excess grout immediately to prevent staining of brick.
 - a. Tool joints to a slightly concave **OR** grapevine **OR** V-, **as directed**, shape when pointing grout is thumbprint hard.
5. Clean faces and joints of brick facing.

P. Stone Facings

1. Accurately position stone facings to comply with requirements and in locations indicated on Shop Drawings. Install anchors, supports, and other attachments indicated or necessary to secure

stone in place. Keep concrete reinforcement a minimum of **3/4 inch (19 mm)** from the back surface of stone. Use continuous spacers to obtain uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances.

- a. Stone to Precast Anchorages: Provide anchors in numbers, types and locations required to satisfy specified performance criteria, but not less than 2 anchors per stone unit of less than **2 sq. ft. (0.19 sq. m)** in area and 4 anchors per unit of less than **12 sq. ft. (1.1 sq. m)** in area; for units larger than **12 sq. ft. (1.1 sq. m)** in area, provide anchors spaced not more than **24 inches (600 mm)** o.c. horizontally and vertically. Locate anchors a minimum of **6 inches (150 mm)** from stone edge.
2. Fill anchor holes with sealant filler and install anchors **OR** epoxy filler and install anchors with elastomeric anchor sleeve at back surface of stone, **as directed**.
 - a. Install polyethylene sheet to prevent bond between back of stone facing and concrete substrate and to ensure no passage of precast matrix to stone surface.
OR
Install **1/8-inch (3-mm)** polyethylene-foam bond breaker to prevent bond between back of stone facing and concrete substrate and to ensure no passage of precast matrix to stone surface. Maintain minimum projection requirements of stone anchors into concrete substrate.

Q. Fabrication

1. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
 - a. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
2. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing architectural precast concrete units to supporting and adjacent construction.
3. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.
4. Cast-in openings larger than **10 inches (250 mm)** in any dimension. Do not drill or cut openings or prestressing strand without the Owner's approval.
5. Reinforcement: Comply with recommendations in PCI MNL 117 for fabricating, placing, and supporting reinforcement.
 - a. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcing exceeds limits specified in ASTM A 775/A 775M, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
 - b. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
 - c. Place reinforcement to maintain at least **3/4-inch (19-mm)** minimum coverage. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - d. Place reinforcing steel and prestressing strand to maintain at least **3/4-inch (19-mm)** minimum concrete cover. Increase cover requirements for reinforcing steel to **1-1/2 inches (38 mm)** when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 - e. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.

6. Reinforce architectural precast concrete units to resist handling, transportation, and erection stresses.
 7. Prestress tendons for architectural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 117.
 - a. Delay detensioning or post-tensioning of precast, prestressed architectural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete.
 - b. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
 - c. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
 - d. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
 8. Comply with requirements in PCI MNL 117 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
 9. Place face mixture to a minimum thickness after consolidation of the greater of **1 inch (25 mm)** or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
 10. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
 - a. Place backup concrete mixture to ensure bond with face-mixture concrete.
 11. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 117.
 - a. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
 12. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
 13. Identify pickup points of architectural precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each architectural precast concrete unit on a surface that will not show in finished structure.
 14. Cure concrete, according to requirements in PCI MNL 117, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
 15. Discard and replace architectural precast concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 117 and the Owner's approval.
- R. Insulated Panel Casting
1. Cast and screed supported wythe over mold.
 2. Place insulation boards abutting edges and ends of adjacent boards. Insert wythe connectors through insulation, and consolidate concrete around connectors according to connector manufacturer's written instructions.
 3. Cast and screed top wythe to meet required finish.
- S. Fabrication Tolerances
1. Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- OR**
- Fabricate architectural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished panel complies with the following product tolerances:

- a. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - 1) 10 feet (3 m) or under, plus or minus 1/8 inch (3 mm).
 - 2) 10 to 20 feet (3 to 6 m), plus 1/8 inch (3 mm), minus 3/16 inch (5 mm).
 - 3) 20 to 40 feet (6 to 12 m), plus or minus 1/4 inch (6 mm).
 - 4) Each additional 10 feet (3 m), plus or minus 1/16 inch (1.5 mm).
- b. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - 1) 10 feet (3 m) or under, plus or minus 1/4 inch (6 mm).
 - 2) 10 to 20 feet (3 to 6 m), plus 1/4 inch (6 mm), minus 3/8 inch (10 mm).
 - 3) 20 to 40 feet (6 to 12 m), plus or minus 3/8 inch (10 mm).
 - 4) Each additional 10 feet (3 m), plus or minus 1/8 inch (3 mm).
- c. Total Thickness or Flange Thickness: Plus 1/4 inch (6 mm), minus 1/8 inch (3 mm).
- d. Rib Thickness: Plus or minus 1/8 inch (3 mm).
- e. Rib to Edge of Flange: Plus or minus 1/8 inch (3 mm).
- f. Distance between Ribs: Plus or minus 1/8 inch (3 mm).
- g. Variation from Square or Designated Skew (Difference in Length of the Two Diagonal Measurements): Plus or minus 1/8 inch per 72 inches (3 mm per 1830 mm) or 1/2 inch (13 mm) total, whichever is greater.
- h. Length and Width of Block-outs and Openings within One Unit: Plus or minus 1/4 inch (6 mm).
- i. Location and Dimension of Block-outs Hidden from View and Used for HVAC and Utility Penetrations: Plus or minus 3/4 inch (19 mm).
- j. Dimensions of Haunches: Plus or minus 1/4 inch (6 mm).
- k. Haunch Bearing Surface Deviation from Specified Plane: Plus or minus 1/8 inch (3 mm).
- l. Difference in Relative Position of Adjacent Haunch Bearing Surfaces from Specified Relative Position: Plus or minus 1/4 inch (6 mm).
- m. Bowing: Plus or minus L/360, maximum 1 inch (25 mm).
- n. Local Smoothness: 1/4 inch per 10 feet (6 mm per 3 m).
- o. Warping: 1/16 inch per 12 inches (1.5 mm per 300 mm) of distance from nearest adjacent corner.
- p. Tipping and Flushness of Plates: Plus or minus 1/4 inch (6 mm).
- q. Dimensions of Architectural Features and Rustications: Plus or minus 1/8 inch (3 mm).
2. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
 - a. Weld Plates: Plus or minus 1 inch (25 mm).
 - b. Inserts: Plus or minus 1/2 inch (13 mm).
 - c. Handling Devices: Plus or minus 3 inches (75 mm).
 - d. Reinforcing Steel and Welded Wire Fabric: Plus or minus 1/4 inch (6 mm) where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch (13 mm).
 - e. Reinforcing Steel Extending out of Member: Plus or minus 1/2 inch (13 mm) of plan dimensions.
 - f. Tendons: Plus or minus 1/4 inch (6 mm), vertical; plus or minus 1 inch (25 mm), horizontal.
 - g. Location of Rustication Joints: Plus or minus 1/8 inch (3 mm).
 - h. Location of Opening within Panel: Plus or minus 1/4 inch (6 mm).
 - i. Location of Flashing Reglets: Plus or minus 1/4 inch (6 mm).
 - j. Location of Flashing Reglets at Edge of Panel: Plus or minus 1/8 inch (3 mm).
 - k. Reglets for Glazing Gaskets: Plus or minus 1/8 inch (3 mm).
 - l. Electrical Outlets, Hose Bibs: Plus or minus 1/2 inch (13 mm).
 - m. Location of Bearing Surface from End of Member: Plus or minus 1/4 inch (6 mm).
 - n. Allowable Rotation of Plate, Channel Inserts, and Electrical Boxes: 2-degree rotation or 1/4 inch (6 mm) maximum over the full dimension of unit.
 - o. Position of Sleeve: Plus or minus 1/2 inch (13 mm).
 - p. Location of Window Washer Track or Buttons: Plus or minus 1/8 inch (3 mm).

3. Brick-Faced Architectural Precast Concrete Units: Restrict the following misalignments to 2 percent of number of bricks in a unit.
 - a. Alignment of Mortar Joints:
 - 1) Jog in Alignment: **1/8 inch (3 mm)**.
 - 2) Alignment with Panel Centerline: Plus or minus **1/8 inch (3 mm)**.
 - b. Variation in Width of Exposed Mortar Joints: Plus or minus **1/8 inch (3 mm)**.
 - c. Tipping of Individual Bricks from the Panel Plane of Exposed Brick Surface: Plus **1/16 inch (1.5 mm)**; minus **1/4 inch (6 mm)** less than or equal to depth of form liner joint.
 - d. Exposed Brick Surface Parallel to Primary Control Surface of Panel: Plus **1/4 inch (6 mm)**; minus **1/8 inch (3 mm)**.
 - e. Individual Brick Step in Face from Panel Plane of Exposed Brick Surface: Plus **1/16 inch (1.5 mm)**; minus **1/4 inch (6 mm)** less than or equal to depth of form liner joint.
4. Stone Veneer-Faced Architectural Precast Concrete Units (for smooth-finished stone):
 - a. Variation in Cross-Sectional Dimensions: For thickness of walls from dimensions indicated: Plus or minus **1/4 inch (6 mm)**.
 - b. Variation in Joint Width: **1/8 inch in 36 inches (3 mm in 900 mm)** or a quarter of nominal joint width, whichever is less.
 - c. Variation in Plane between Adjacent Stone Units (Lipping): **1/16 inch (1.5 mm)** difference between planes of adjacent units.

T. Finishes

1. Panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform, straight, and sharp. Finish exposed-face surfaces of architectural precast concrete units to match approved design reference sample **OR** sample panels, **as directed**, and as follows:
 - a. PCI's "Architectural Precast Concrete - Color and Texture Selection Guide," of plate numbers indicated.
 - b. As-Cast Surface Finish: Provide surfaces free of pockets, sand streaks, and honeycombs.
 - c. Textured-Surface Finish: Impart by form liners or inserts to provide surfaces free of pockets, streaks, and honeycombs, with uniform color and texture.
 - d. Bushhammer Finish: Use power or hand tools to remove matrix and fracture coarse aggregates.
 - e. Exposed-Aggregate Finish: Use chemical retarding agents applied to concrete forms and washing and brushing procedures to expose aggregate and surrounding matrix surfaces after form removal.
 - f. Abrasive-Blast Finish: Use abrasive grit, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces.
 - g. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces. Protect hardware, connections, and insulation from acid attack.
 - h. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
 - i. Polished Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.
 - j. Sand-Embedment Finish: Use selected stones placed in a sand bed in bottom of mold, with sand removed after curing.
2. Finish exposed top **OR** bottom, **as directed**, and back, **as directed**, surfaces of architectural precast concrete units to match face-surface finish.
OR
Finish exposed top **OR** bottom, **as directed**, and back, **as directed**, surfaces of architectural precast concrete units by smooth, steel-trowel finish.
3. Finish unexposed surfaces of architectural precast concrete units by float finish.

U. Source Quality Control

1. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 117 requirements. If using self-consolidating concrete, also test and inspect according to PCI TR-6,

"Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."

2. Strength of precast concrete units will be considered deficient if units fail to comply with **ACI 318 (ACI 318M)** requirements for concrete strength.
3. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with **ACI 318 (ACI 318M)** requirements, precaster will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
 - a. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by the Owner.
 - b. Cores will be tested in an air-dry condition.
 - c. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
 - d. Test results will be made in writing on same day that tests are performed, with copies to the Owner, Contractor, and precast concrete fabricator. Test reports will include the following:
 - 1) Project identification name and number.
 - 2) Date when tests were performed.
 - 3) Name of precast concrete fabricator.
 - 4) Name of concrete testing agency.
 - 5) Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
4. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

1.3 EXECUTION

A. Installation

1. Install clips, hangers, bearing pads, and other accessories required for connecting architectural precast concrete units to supporting members and backup materials.
2. Erect architectural precast concrete level, plumb, and square within specified allowable tolerances. Provide temporary supports and bracing as required to maintain position, stability, and alignment as units are being permanently connected.
 - a. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - b. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - c. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - d. Unless otherwise indicated, maintain uniform joint widths of **3/4 inch (19 mm)**.
3. Connect architectural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
 - a. Do not permit connections to disrupt continuity of roof flashing.
4. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - a. Protect architectural precast concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
 - b. Welds not specified shall be continuous fillet welds, using no less than the minimum fillet as specified by AWS.

- c. Clean weld-affected metal surfaces with chipping hammer followed by brushing, and apply a minimum **4.0-mil- (0.1-mm-)** thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
OR
Clean weld-affected metal surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
 - d. Remove, reweld, or repair incomplete and defective welds.
 5. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
 - a. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
 6. Grouting Connections: Grout connections where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
- B. Erection Tolerances
1. Erect architectural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 117, Appendix I.
- C. Field Quality Control
1. Special Inspections: Engage a qualified special inspector to perform the following special inspections and prepare reports:
 - a. Erection of precast concrete members.
 2. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
 3. Field welds will be subject to visual inspections and nondestructive testing according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
 4. Testing agency will report test results promptly and in writing to Contractor and the Owner.
 5. Repair or remove and replace work where tests and inspections indicate that it does not comply with specified requirements.
 6. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Repairs
1. Repair architectural precast concrete units if permitted by the Owner. the Owner reserves the right to reject repaired units that do not comply with requirements.
 2. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of **20 feet (6 m)**.
 3. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
 4. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
 5. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.
- E. Cleaning
1. Clean surfaces of precast concrete units exposed to view.
 2. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.
 3. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.

04 - Masonry



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- a. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
 - b. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 04 72 00 00

Task	Specification	Specification Description
04 72 00 00	03 48 29 00	Plant-Precast Structural Concrete
04 72 00 00	04 20 00 00	Unit Masonry Assemblies

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Task	Specification	Specification Description
05 05 19 00	01 22 16 00	No Specification Required
05 05 19 00	05 50 00 00	Metal Fabrications

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SECTION 05 05 21 00 - STRUCTURAL STEEL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for structural steel. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Structural steel.
 - b. Prefabricated building columns.
 - c. Grout.

C. Definitions

1. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
2. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
3. Heavy Sections: Rolled and built-up sections as follows:
 - a. Shapes included in ASTM A 6/A 6M with flanges thicker than **1-1/2 inches (38 mm)**.
 - b. Welded built-up members with plates thicker than **2 inches (50 mm)**.
 - c. Column base plates thicker than **2 inches (50 mm)**.
4. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.
5. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

D. Performance Requirements

1. Connections: Provide details of connections **OR** simple shear connections, **as directed**, required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering design by a qualified professional engineer, **as directed**, to withstand loads indicated and comply with other information and restrictions indicated.
 - a. Select and complete connections using schematic details indicated and AISC 360.
 - b. Use LRFD; data are given at factored-load level **OR** ASD; data are given at service-load level, **as directed**.
2. Moment Connections: Type PR, partially **OR** FR, fully, **as directed**, restrained.
3. Construction: Moment frame **OR** Braced frame **OR** Shear wall system **OR** Combined system of moment frame and braced frame **OR** Combined system of moment frame and shear walls **OR** Combined system of braced frame and shear walls **OR** Combined system of moment frame, braced frame, and shear walls, **as directed**.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

3. Shop Drawings: Show fabrication of structural-steel components.
 - a. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - b. Include embedment drawings.
 - c. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - d. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 - e. Identify members and connections of the seismic-load-resisting system.
 - f. Indicate locations and dimensions of protected zones.
 - g. Identify demand critical welds.
 - h. For structural-steel connections indicated to comply with design loads, include structural design data signed and sealed by the qualified professional engineer responsible for their preparation, **as directed**.
 4. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified **OR** qualified by testing, **as directed**, including the following:
 - a. Power source (constant current or constant voltage).
 - b. Electrode manufacturer and trade name, for demand critical welds.
 5. Qualification Data: For qualified Installer **OR** fabricator **OR** professional engineer **OR** testing agency, **as directed**.
 6. Welding certificates.
 7. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
 8. Mill test reports for structural steel, including chemical and physical properties.
 9. Product Test Reports: For the following:
 - a. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - b. Direct-tension indicators.
 - c. Tension-control, high-strength bolt-nut-washer assemblies.
 - d. Shear stud connectors.
 - e. Shop primers.
 - f. Nonshrink grout.
 10. Source quality-control reports.
- F. Quality Assurance
1. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
 2. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE **OR** CSE, **as directed**.
 3. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 **OR** P2 **OR** P3, **as directed**, or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
 4. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - a. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
 5. Comply with applicable provisions of the following specifications and documents:
 - a. AISC 303.
 - b. AISC 341 and AISC 341s1.
 - c. AISC 360.
 - d. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 6. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - a. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
2. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
 - a. Fasteners may be repackaged provided the Owner's testing and inspecting agency observes repackaging and seals containers.
 - b. Clean and relubricate bolts and nuts that become dry or rusty before use.
 - c. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

H. Coordination

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
2. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.2 PRODUCTS

A. Structural-Steel Materials

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 **OR** 50, **as directed**, percent.
OR
Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:
 - a. W-Shapes: 60 percent.
 - b. Channels, Angles, M **OR** S, **as directed**, -Shapes: 60 percent.
 - c. Plate and Bar: 25 percent.
 - d. Cold-Formed Hollow Structural Sections: 25 percent.
 - e. Steel Pipe: 25 percent.
 - f. All Other Steel Materials: 25 percent.
2. W-Shapes: ASTM A 992/A 992M **OR** ASTM A 572/A 572M, Grade 50 (345) **OR** ASTM A 529/A 529M, Grade 50 (345) **OR** ASTM A 913/A 913M, Grade 50 (345), **as directed**.
3. Channels, Angles, M **OR** S, **as directed**, -Shapes: ASTM A 36/A 36M **OR** ASTM A 572/A 572M, Grade 50 (345) **OR** ASTM A 529/A 529M, Grade 50 (345) **OR** ASTM A 913/A 913M, Grade 50 (345), **as directed**.
4. Plate and Bar: ASTM A 36/A 36M **OR** ASTM A 572/A 572M, Grade 50 (345) **OR** ASTM A 529/A 529M, Grade 50 (345), **as directed**.
5. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50 (345).
6. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B **OR** C, **as directed**, structural tubing.
7. Corrosion-Resisting Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.
8. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
 - a. Weight Class: Standard **OR** Extra strong **OR** Double-extra strong, **as directed**.
 - b. Finish: Black **OR** Galvanized **OR** Black except where indicated to be galvanized, **as directed**.

9. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
10. Steel Forgings: ASTM A 668/A 668M.
11. Welding Electrodes: Comply with AWS requirements.

B. Bolts, Connectors, And Anchors

1. High-Strength Bolts, Nuts, and Washers: **ASTM A 325 (ASTM A 325M)**, Type 1, heavy-hex steel structural bolts; **ASTM A 563, Grade C, (ASTM A 563M, Class 8S)** heavy-hex carbon-steel nuts; and **ASTM F 436 (ASTM F 436M)**, Type 1, hardened carbon-steel washers; all with plain finish.
 - a. Direct-Tension Indicators: **ASTM F 959, Type 325 (ASTM F 959M, Type 8.8)**, compressible-washer type with plain finish.
2. High-Strength Bolts, Nuts, and Washers: **ASTM A 490 (ASTM A 490M)**, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends, **as directed**; **ASTM A 563, Grade DH, (ASTM A 563M, Class 10S)** heavy-hex carbon-steel nuts; and **ASTM F 436 (ASTM F 436M)**, Type 1, hardened carbon-steel washers with plain finish.
 - a. Direct-Tension Indicators: **ASTM F 959, Type 490 (ASTM F 959M, Type 10.9)**, compressible-washer type with plain finish.
3. Zinc-Coated High-Strength Bolts, Nuts, and Washers: **ASTM A 325 (ASTM A 325M)**, Type 1, heavy-hex steel structural bolts; **ASTM A 563, Grade DH (ASTM A 563M, Class 10S)** heavy-hex carbon-steel nuts; and **ASTM F 436 (ASTM F 436M)**, Type 1, hardened carbon-steel washers.
 - a. Finish: Hot-dip zinc coating **OR** Mechanically deposited zinc coating, **as directed**.
 - b. Direct-Tension Indicators: **ASTM F 959, Type 325 (ASTM F 959M, Type 8.8)**, compressible-washer type with mechanically deposited zinc coating **OR** mechanically deposited zinc coating, baked epoxy-coated, **as directed**, finish.
4. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex **OR** round, **as directed**, head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - a. Finish: Plain **OR** Mechanically deposited zinc coating, **as directed**.
5. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
6. Unheaded Anchor Rods: ASTM F 1554, Grade 36 **OR** ASTM F 1554, Grade 55, weldable **OR** ASTM A 354 **OR** ASTM A 449 **OR** ASTM A 572/A 572M, Grade 50 (345) **OR** ASTM A 36/A 36M, **as directed**.
 - a. Configuration: Straight **OR** Hooked, **as directed**.
 - b. Nuts: **ASTM A 563 (ASTM A 563M)** hex **OR** heavy-hex, **as directed**, carbon steel.
 - c. Plate Washers: ASTM A 36/A 36M carbon steel.
 - d. Washers: **ASTM F 436 (ASTM F 436M)**, Type 1, hardened carbon steel.
 - e. Finish: Plain **OR** Hot-dip zinc coating, ASTM A 153/A 153M, Class C **OR** Mechanically deposited zinc coating, ASTM B 695, Class 50, **as directed**.
7. Headed Anchor Rods: ASTM F 1554, Grade 36 **OR** ASTM F 1554, Grade 55, weldable **OR** ASTM A 354 **OR** ASTM A 449, **as directed**, straight.
 - a. Nuts: **ASTM A 563 (ASTM A 563M)** hex **OR** heavy-hex, **as directed**, carbon steel.
 - b. Plate Washers: ASTM A 36/A 36M carbon steel.
 - c. Washers: **ASTM F 436 (ASTM F 436M)**, Type 1, hardened carbon steel.
 - d. Finish: Plain **OR** Hot-dip zinc coating, ASTM A 153/A 153M, Class C **OR** Mechanically deposited zinc coating, ASTM B 695, Class 50, **as directed**.
8. Threaded Rods: ASTM A 36/A 36M **OR** ASTM A 193/A 193M, Grade B7 **OR** ASTM A 354, Grade BD **OR** ASTM A 449 **OR** ASTM A 572/A 572M, Grade 50 (345), **as directed**.
 - a. Nuts: **ASTM A 563 (ASTM A 563M)** hex **OR** heavy-hex, **as directed**, carbon steel.
 - b. Washers: **ASTM F 436 (ASTM F 436M)**, Type 1, hardened **OR** ASTM A 36/A 36M, **as directed**, carbon steel.
 - c. Finish: Plain **OR** Hot-dip zinc coating, ASTM A 153/A 153M, Class C **OR** Mechanically deposited zinc coating, ASTM B 695, Class 50, **as directed**.
9. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.
10. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

11. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.
 12. Structural Slide Bearings: Low-friction assemblies, of configuration indicated, that provide vertical transfer of loads and allow horizontal movement perpendicular to plane of expansion joint while resisting movement within plane of expansion joint.
 - a. Mating Surfaces: PTFE and PTFE **OR** PTFE and mirror-finished stainless steel, **as directed**.
 - b. Coefficient of Friction: Not more than 0.03 **OR** 0.04 **OR** 0.05 **OR** 0.06 **OR** 0.10 **OR** 0.12, **as directed**.
 - c. Design Load: Not less than **2,000 psi (13.7 MPa) OR 5,000 psi (34 MPa) OR 6,000 psi (41 MPa), as directed**.
 - d. Total Movement Capability: **2 inches (50 mm)**.
- C. Primer
1. Primer: Comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
OR
Primer: SSPC-Paint 25, Type I **OR** Type II, **as directed**, zinc oxide, alkyd, linseed oil primer.
OR
Primer: SSPC-Paint 25 BCS, Type I **OR** Type II, **as directed**, zinc oxide, alkyd, linseed oil primer.
OR
Primer: SSPC-Paint 23, latex primer.
OR
Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat, **as directed**.
 2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 **OR** ASTM A 780, **as directed**.
- D. Grout
1. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
 2. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
- E. Fabrication
1. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - a. Camber structural-steel members where indicated.
 - b. Fabricate beams with rolling camber up.
 - c. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 - d. Mark and match-mark materials for field assembly.
 - e. If shop priming is required, complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 2. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 - a. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
 3. Bolt Holes: Cut, drill, mechanically thermal cut, **as directed**, or punch standard bolt holes perpendicular to metal surfaces.
 4. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
 5. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning" **OR** SSPC-SP 2, "Hand Tool Cleaning" **OR** SSPC-SP 3, "Power Tool Cleaning", **as directed**.
 6. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

7. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural steel. Straighten as required to provide uniform, square, and true members in completed wall framing.
 8. Welded Door Frames: Build up welded door frames attached to structural steel. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than **10 inches (250 mm)** o.c. unless otherwise indicated.
 9. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - a. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning, **unless directed otherwise**.
 - b. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - c. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- F. Shop Connections
1. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - a. Joint Type: Snug tightened **OR** Pretensioned **OR** Slip critical, **as directed**.
 2. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M, **as directed**, for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - a. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
- G. Prefabricated Building Columns
1. Prefabricated building columns consisting of load-bearing structural-steel members protected by concrete fireproofing encased in an outer non-load-bearing steel shell.
 2. Fire-Resistance Ratings: Provide prefabricated building column listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing according to ASTM E 119.
 - a. Fire-Resistance Rating: 4 hours **OR** 3 hours **OR** 2 hours **OR** As indicated, **as directed**.
- H. Shop Priming
1. If shop priming is required, shop prime steel surfaces except the following:
 - a. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of **2 inches (50 mm)**.
 - b. Surfaces to be field welded.
 - c. Surfaces to be high-strength bolted with slip-critical connections.
 - d. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - e. Galvanized surfaces.
 2. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - a. SSPC-SP 2, "Hand Tool Cleaning."
 - b. SSPC-SP 3, "Power Tool Cleaning."
 - c. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
 - d. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 - e. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
 - f. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - g. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 - h. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 - i. SSPC-SP 8, "Pickling."
 3. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of **1.5**

- mils (0.038 mm).** Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
- a. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - b. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.
4. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than **1.5 mils (0.038 mm)**.
- I. Galvanizing
1. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - a. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 - b. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.
- J. Source Quality Control
1. Testing Agency: Engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
 - a. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 2. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 3. Bolted Connections: Shop-bolted connections will be inspected **OR** tested and inspected, **as directed**, according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
 4. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
 5. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - a. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - b. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- 1.3 EXECUTION
- A. Examination
1. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - a. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Preparation
1. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in

intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

- a. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

C. Erection

1. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
2. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - a. Set plates for structural members on wedges, shims, or setting nuts as required.
 - b. Weld plate washers to top of baseplate.
 - c. Snug-tighten **OR** Pretension, **as directed**, anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - d. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts, **as directed**.
3. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
4. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - a. Level and plumb individual members of structure.
 - b. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
5. Splice members only where indicated.
6. Do not use thermal cutting during erection unless approved by the Owner. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
7. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
8. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

D. Field Connections

1. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - a. Joint Type: Snug tightened **OR** Pretensioned **OR** Slip critical, **as directed**.
2. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M, **as directed**, for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - a. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - b. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
 - c. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

E. Prefabricated Building Columns

1. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

F. Field Quality Control

1. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
2. Bolted Connections: Bolted connections will be inspected **OR** tested and inspected, **as directed**, according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
3. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - a. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3) Ultrasonic Inspection: ASTM E 164.
 - 4) Radiographic Inspection: ASTM E 94.
4. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - a. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 - b. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
5. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

G. Repairs And Protection

1. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
2. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

OR

Touchup Painting: Cleaning and touchup painting are specified in Division 07.

END OF SECTION 05 05 21 00

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Task	Specification	Specification Description
05 05 23 00	01 22 16 00	No Specification Required
05 05 23 00	05 05 21 00	Structural Steel
05 05 23 00	05 50 00 00	Metal Fabrications

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SECTION 05 12 23 00 - COLD-FORMED METAL FRAMING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cold-formed metal framing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Exterior load-bearing wall framing.
 - b. Interior load-bearing wall framing.
 - c. Exterior non-load-bearing wall framing.
 - d. Floor joist framing.
 - e. Roof trusses.
 - f. Roof rafter framing.
 - g. Ceiling joist framing.

C. Performance Requirements

1. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - a. Design Loads: **As directed.**
 - b. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - 1) Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/240 **OR** 1/360 **OR** 1/600 **OR** 1/720, **as directed**, of the wall height.
 - 2) Interior Load-Bearing Wall Framing: Horizontal deflection of 1/240 **OR** 1/360, **as directed**, of the wall height under a horizontal load of **5 lbf/sq. ft. (239 Pa)**.
 - 3) Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 **OR** 1/360 **OR** 1/600 **OR** 1/720, **as directed**, of the wall height.
 - 4) Floor Joist Framing: Vertical deflection of 1/480 for live loads and 1/360 for total loads of the span.
 - 5) Roof Trusses: Vertical deflection of 1/240 **OR** 1/360, **as directed**, of the span.
 - 6) Scissor Roof Trusses: Horizontal deflection of **1-1/4 inches (32 mm)** <Insert dimension> at reactions.
 - 7) Roof Rafter Framing: Horizontal deflection of 1/240 **OR** 1/360, **as directed**, of the horizontally projected span.
 - 8) Ceiling Joist Framing: Vertical deflection of 1/240 **OR** 1/360, **as directed**, of the span.
 - c. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of **120 deg F (67 deg C)**.
 - d. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - 1) Upward and downward movement of **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**.
2. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
 - a. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."

- b. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- c. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

D. Submittals

- 1. Product Data: For each type of product and accessory indicated.
- 2. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
- 3. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
 - a. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 4. Welding certificates.
- 5. Qualification data.
- 6. Product test reports.
- 7. Research/evaluation reports.

E. Quality Assurance

- 1. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- 2. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- 3. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- 4. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, **as directed**, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.
- 5. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- 6. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- 7. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 - a. Comply with AISI's "Standard for Cold-Formed Steel Framing - Truss Design."
 - b. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- 8. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings" as applicable.
- 9. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

- 1. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- 2. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

1.2 PRODUCTS

A. Materials

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - a. Grade: **ST33H (ST230H) OR ST50H (ST340H) OR** As required by structural performance, **as directed**.
 - b. Coating: **G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90) OR G90 (Z275)** or equivalent, **as directed**.
3. Steel Sheet for Vertical Deflection **OR** Drift, **as directed**, Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
 - a. Grade: **50 (340)**, Class 1 or 2 **OR** As required by structural performance, **as directed**.
 - b. Coating: **G90 (Z275)**.

B. Load-Bearing Wall Framing

1. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.
2. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges.
3. Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths indicated, punched, with stiffened flanges.
4. Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths indicated.

C. Exterior Non-Load-Bearing Wall Framing

1. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges.
2. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges.
3. Vertical Deflection Clips: Manufacturer's standard bypass **OR** head, **as directed**, clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
4. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.
5. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 - a. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.
 - b. Inner Track: Of web depth indicated, and as follows:
6. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

D. Floor Joist Framing

1. Steel Joists: Manufacturer's standard C-shaped steel joists, of web depths indicated, unpunched, **OR** punched, **OR** punched, with enlarged service holes, **as directed**, with stiffened flanges, and as follows:
2. Steel Joist Track: Manufacturer's standard U-shaped steel joist track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

E. Roof Trusses

1. Roof Truss Members:

- a. Manufacturer's standard-shape steel sections.
OR
Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges.
- F. Roof-Rafter Framing
 - 1. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges.
 - 2. Built-up Members: Built-up members of manufacturer's standard C-shaped steel section, with stiffened flanges, nested into a U-shaped steel section joist track, with unstiffened flanges; unpunched; of web depths indicated.
- G. Ceiling Joist Framing
 - 1. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, **OR** punched with enlarged service holes, **as directed**, with stiffened flanges, and as follows:
- H. Framing Accessories
 - 1. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
 - 2. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - a. Supplementary framing.
 - b. Bracing, bridging, and solid blocking.
 - c. Web stiffeners.
 - d. Anchor clips.
 - e. End clips.
 - f. Foundation clips.
 - g. Gusset plates.
 - h. Stud kickers, knee braces, and girts.
 - i. Joist hangers and end closures.
 - j. Hole reinforcing plates.
 - k. Backer plates.
- I. Anchors, Clips, And Fasteners
 - 1. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
 - 2. Anchor Bolts: ASTM F 1554, Grade 36 **OR** 55, **as directed**, threaded carbon-steel hex-headed bolts **OR** headless, hooked bolts **OR** headless bolts, with encased end threaded, **as directed**, and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C **OR** mechanically deposition according to ASTM B 695, Class 50, **as directed**.
 - 3. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - 4. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
 - 5. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
 - a. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
 - 6. Welding Electrodes: Comply with AWS standards.
- J. Miscellaneous Materials

1. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035 **OR** ASTM A 780, **as directed**.
2. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
3. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
4. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
5. Sealer Gaskets: Closed-cell neoprene foam, **1/4 inch (6.4 mm)** thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

K. Fabrication

1. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - a. Fabricate framing assemblies using jigs or templates.
 - b. Cut framing members by sawing or shearing; do not torch cut.
 - c. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - 1) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 2) Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - d. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
2. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
3. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of **1/8 inch in 10 feet (1:960)** and as follows:
 - a. Spacing: Space individual framing members no more than plus or minus **1/8 inch (3 mm)** from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - b. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of **1/8 inch (3 mm)**.

1.3 EXECUTION

A. Preparation

1. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
2. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
3. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
4. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

B. Installation, General

1. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

2. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
 3. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - a. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding **1/16 inch (1.6 mm)**.
 4. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - a. Cut framing members by sawing or shearing; do not torch cut.
 - b. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - 1) Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 2) Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
 5. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
 6. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
 7. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
 8. Install insulation, specified in Division 07 Section "Thermal Insulation", in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 9. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
 10. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of **1/8 inch in 10 feet (1:960)** and as follows:
 - a. Space individual framing members no more than plus or minus **1/8 inch (3 mm)** from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- C. Load-Bearing Wall Installation
1. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
 - a. Anchor Spacing: **24 inches (610 mm) OR 32 inches (813 mm) OR To match stud spacing OR As shown on Shop Drawings, as directed.**
 2. Squarely seat studs against top and bottom tracks with gap not exceeding of **1/8 inch (3 mm)** between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
 - a. Stud Spacing:
 - 1) **12 inches (305 mm) OR 16 inches (406 mm) OR 19.2 inches (488 mm) OR 24 inches (610 mm) OR As indicated, as directed.**
 - 2) **300 mm OR 400 mm OR 600 mm OR As indicated, as directed.**
 3. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
 4. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
 5. Align floor and roof framing over studs. Where framing cannot be aligned, continuously reinforce track to transfer loads.
 6. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.

7. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.
 - a. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
 - b. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
 8. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
 - a. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
 9. Install horizontal bridging in stud system, spaced **48 inches (1220 mm)** **OR** as indicated **OR** as indicated on Shop Drawings, **as directed**. Fasten at each stud intersection.
 - a. Bridging:
 - 1) Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs with a minimum of 2 screws into each flange of the clip angle for framing members up to **6 inches (150 mm)** deep.
OR
Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
OR
Proprietary bridging bars installed according to manufacturer's written instructions.
 10. Install steel sheet diagonal bracing straps to both stud flanges, terminate at and fasten to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple studs at ends of bracing and anchor to structure.
 11. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.
- D. Exterior Non-Load-Bearing Wall Installation
1. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
 2. Fasten both flanges of studs to bottom **OR** top and bottom, **as directed**, track, unless otherwise indicated. Space studs as follows:
 - a. Stud Spacing:
 - 1) **12 inches (305 mm)** **OR** **16 inches (406 mm)** **OR** **19.2 inches (488 mm)** **OR** **24 inches (610 mm)** **OR** As indicated, **as directed**.
 - 2) 300 mm **OR** 400 mm **OR** 480 mm **OR** 600 mm **OR** As indicated, **as directed**.
 3. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
 4. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - a. Install single-leg deflection tracks and anchor to building structure.
 - b. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - c. Connect vertical deflection clips to bypassing **OR** infill, **as directed**, studs and anchor to building structure.
 - d. Connect drift clips to cold formed metal framing and anchor to building structure.
 5. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than **48 inches (1220 mm)** apart. Fasten at each stud intersection.
 - a. Top Bridging for Single Deflection Track: Install row of horizontal bridging within **12 inches (305 mm)** **OR** **18 inches (450 mm)**, **as directed**, of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or

stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

1) Install solid blocking at **96-inch (2440-mm)** centers **OR** centers indicated **OR** centers indicated on Shop Drawings, **as directed**.

b. Bridging:

1) Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.

OR

Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.

OR

Proprietary bridging bars installed according to manufacturer's written instructions.

6. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

E. Joist Installation

1. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.

2. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.

a. Install joists over supporting frame with a minimum end bearing of **1-1/2 inches (38 mm)**.

b. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.

3. Space joists not more than **2 inches (51 mm)** from abutting walls, and as follows:

a. Joist Spacing:

1) **12 inches (305 mm) OR 16 inches (406 mm) OR 19.2 inches (488 mm) OR 24 inches (610 mm) OR As indicated, as directed.**

2) **300 mm OR 400 mm OR 480 mm OR 600 mm OR As indicated, as directed.**

4. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.

5. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated **OR** as indicated on Shop Drawings, **as directed**.

a. Install web stiffeners to transfer axial loads of walls above.

6. Install bridging at intervals indicated **OR** indicated on Shop Drawings, **as directed**. Fasten bridging at each joist intersection as follows:

a. Bridging:

1) Joist-track solid blocking of width and thickness indicated, secured to joist webs.

OR

Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.

7. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.

8. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

F. Truss Installation

1. Install, bridge, and brace trusses according to Shop Drawings and requirements in this Section.

2. Truss Spacing:

a. **16 inches (406 mm) OR 19.2 inches (488 mm) OR 24 inches (610 mm) OR 32 inches (813 mm) OR 48 inches (1220 mm) OR As indicated, as directed.**

b. **400 mm OR 480 mm OR 600 mm OR 800 mm OR 1200 mm, as directed.**

3. Do not alter, cut, or remove framing members or connections of trusses.
 4. Erect trusses with plane of truss webs plumb and parallel to each other, align, and accurately position at spacings indicated.
 5. Erect trusses without damaging framing members or connections.
 6. Align webs of bottom chords and load-bearing studs or continuously reinforce track to transfer loads to structure. Anchor trusses securely at all bearing points.
 7. Install continuous bridging and permanently brace trusses as indicated on Shop Drawings and designed according to LGSEA's Technical Note 551e, "Design Guide for Permanent Bracing of Cold-Formed Steel Trusses," **as directed**.
- G. Field Quality Control
1. Testing: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 2. Field and shop welds will be subject to testing and inspecting.
 3. Testing agency will report test results promptly and in writing to Contractor and the Owner.
 4. Remove and replace work where test results indicate that it does not comply with specified requirements.
 5. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- H. Repairs And Protection
1. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
 2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Final Completion.

END OF SECTION 05 12 23 00

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Task	Specification	Specification Description
05 12 23 00	05 05 21 00	Structural Steel
05 12 23 00	05 50 00 00	Metal Fabrications
05 13 00 00	05 50 00 00	Metal Fabrications

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SECTION 05 14 13 00 - STRUCTURAL ALUMINUM

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for structural aluminum. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Performance Requirements

1. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-aluminum fabricator to withstand loads indicated and comply with other information and restrictions indicated.
 - a. Select and complete connections using schematic details indicated and in accordance with minimum mechanical properties and applicable buckling formula constants published by The Aluminum Association's "Aluminum Construction Manual."

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication of structural-aluminum components.
3. Welding certificates.
4. Mill test reports.
5. Source quality-control test reports.

D. Quality Assurance

1. Fabricator Qualifications: A qualified fabricator who has provided successful structural aluminum fabrication for a minimum of 5 years.
2. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code--Aluminum."
3. Comply with applicable provisions of The Aluminum Association's "Aluminum Construction Manual."
4. Preinstallation Conference: Conduct conference at Project site.

1.2 PRODUCTS

A. Structural-Aluminum Materials

1. W-Shapes, Channels, Angles, Plate and Bar, Cold-Formed Hollow Structural Sections, and Pipe: Structural shapes indicating minimum mechanical properties and applicable buckling formula constants are listed in Table 3.3.1, Section 3, of "Specifications for Aluminum Structures," Construction Manual Series Section 1, as published by The Aluminum Association. Applicable ASTM Designations include B209, B210, B211, B221, B241, B247, B308, and B429
2. Allowable Stresses:
 - a. Building Type Structures: Basic allowable tensile stresses for buildings, structural supports for highway signs, luminaires, traffic signals and similar structures shall be the lesser of the minimum yield strength divided by a factor of safety of 1.65, or the minimum ultimate tensile strength divided by a factor of safety of 1.95. Other allowable stresses for buildings and similar structures shall be based upon the factors of safety shown in Table 3.3.3 of "Specifications for Aluminum Structures."
 - b. Bridge Type Structures: Basic allowable tensile stresses for bridge type structures shall be the lesser of the minimum yield strength divided by a factor of safety of 1.85, or the minimum ultimate tensile strength divided by a factor of safety of 2.2. Other allowable

stresses for bridge and similar structures shall be based upon the factors of safety shown in Table 3.3.3 of "Specifications for Aluminum Structures."

3. Welding Electrodes: Comply with AWS requirements.

B. Bolts and Connectors

1. Rivets and Bolts:

- a. Aluminum alloys used for rivets and bolts shall be those listed in Tables 5.1.1b and 5.1.1c of "Specifications for Aluminum Structures."
- b. Nuts:
 - 1) For bolts 1/4" and smaller: Alloy 2024-T4. For improved corrosion resistance, apply 0.0002" minimum thickness anodic coating.
 - 2) For bolts larger than 1/4": 6061-T6 or 6262-T9.
 - 3) Flat Washers: Alclad 2024-T4.
 - 4) Spring Lock Washers: Alloy 7075-T6.
- c. Steel Bolts: Hot-dip galvanized, electro-galvanized, cadmium plated or aluminized steel bolts and Series 300 stainless steel bolts may be used instead of aluminum bolts. Plating thickness on steel shall be adequate to provide corrosion protection for the anticipated environ and service life.

C. Grout

1. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404, Size No. 2. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
2. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
3. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

D. Fabrication

1. Structural Aluminum: Fabricate and assemble in shop to greatest extent possible. Fabricate according to The Aluminum Association's "Aluminum Construction Manual."

E. Source Quality Control

1. Engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports. Comply with testing and inspection requirements of Part 1.3, Article "Field Quality Control."
2. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

1.3 EXECUTION

A. Erection

1. Examination: Verify elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments, with erector present, for compliance with requirements.
 - a. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Set structural aluminum accurately in locations and to elevations indicated and according to The Aluminum Association's "Aluminum Construction Manual."
3. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting base and bearing plates. Clean bottom surface of base and bearing plates.
 - a. Set base and bearing plates for structural members on wedges, shims, or setting nuts as required.

- b. Weld plate washers to top of base plate.
 - c. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of base or bearing plate before packing with grout.
 - d. Promptly pack grout solidly between bearing surfaces and base or bearing plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
4. Maintain erection tolerances of structural aluminum within The Aluminum Association's "Aluminum Construction Manual."
- B. Field Connections
1. Bolts: Shop install bolts according to The Aluminum Association's "Aluminum Construction Manual" for type of bolt and type of joint specified.
 2. Weld Connections: Comply with AWS D1.2 for welding procedure specifications, tolerances, appearance, and quality of welds and for methods used in correcting welding work.
 - a. Comply with The Aluminum Association's "Aluminum Construction Manual" for bearing, adequacy of temporary connections, and alignment.
- C. Field Quality Control
1. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
 2. Bolted Connections: Shop-bolted connections shall be tested and inspected according to The Aluminum Association's "Aluminum Construction Manual."
 3. Welded Connections: Field welds shall be visually inspected according to AWS D1.2.
 - a. In addition to visual inspection, field welds shall be tested according to AWS D1.2.
 4. Correct deficiencies in Work that test reports and inspections indicate are not in compliance with the Contract Documents.

END OF SECTION 05 14 13 00

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Task	Specification	Specification Description
05 14 13 00	01 22 16 00	No Specification Required

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SECTION 05 15 16 00 - ORNAMENTAL METAL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for ornamental metal. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Decorative window security bars.
 - b. Decorative mechanical grilles and frames.
 - c. Decorative-metal-clad, hollow-metal doors and frames.
 - d. Custom door pulls.
 - e. Combination hall push-button stations.
 - f. Metal reveals at wood paneling.
 - g. Cast-metal rosettes at marble joints.

C. Submittals

1. Product Data: For each type of product indicated, including finishing materials.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
3. Shop Drawings: Show fabrication and installation details for decorative metal.
 - a. Include plans, elevations, component details, and attachments to other work.
 - b. Indicate materials and profiles of each decorative metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
4. Patterns, Models, or Plaster Castings: Made from proposed patterns for each design of custom casting required.
5. Samples: For each type of exposed finish required.
 - a. Sections of linear shapes.
 - b. Full-size Samples of castings and forgings.
 - 1) For custom castings, submit finished Samples showing ability to reproduce detail, cast-metal color, and quality of finish. Samples may be of similar previous work.
 - c. Samples of welded and brazed joints showing quality of workmanship and color matching of materials.
6. Qualification Data: For qualified fabricator **OR** organic-coating applicator **OR** anodic finisher **OR** powder-coating applicator, **as directed**.
7. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
8. Welding certificates.

D. Quality Assurance

1. Fabricator Qualifications: A firm experienced in producing decorative metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
2. Installer Qualifications: Fabricator of products.

3. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings, of type indicated, to aluminum extrusions and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
 4. Anodic Finisher Qualifications: A firm experienced in successfully applying anodic finishes of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
 5. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
 6. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - d. AWS D1.6, "Structural Welding Code - Stainless Steel."
 7. Preinstallation Conference: Conduct conference at Project site.
- E. Delivery, Storage, And Handling
1. Store decorative metal in a well-ventilated area, away from uncured concrete and masonry, and protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.
 2. Deliver and store cast-metal products in wooden crates surrounded by sufficient packing material to ensure that products will not be cracked or otherwise damaged.
- F. Project Conditions
1. Field Measurements: Verify actual locations of walls and other construction contiguous with decorative metal by field measurements before fabrication and indicate measurements on Shop Drawings.
- G. Coordination
1. Coordinate installation of anchorages for decorative metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- 1.2 PRODUCTS
- A. Metals, General
1. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. Provide materials without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Aluminum
1. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
 - a. Extruded Bars and Shapes: **ASTM B 221** (ASTM B 221M), Alloy 6063-T5/T52.
 - b. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
 - c. Drawn Seamless Tubing: **ASTM B 210** (ASTM B 210M) or ASTM B 483/B 483M, Alloy 6063-T832.
 - d. Plate and Sheet: **ASTM B 209** (ASTM B 209M), Alloy 3003-H14 **OR** Alloy 5005-H32 **OR** Alloy 6061-T6, **as directed**.
 - e. Die and Hand Forgings: **ASTM B 247** (ASTM B 247M), Alloy 6061-T6.
 - f. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.
- C. Copper Alloys

1. Copper and Copper Alloys, General: Provide alloys indicated and temper to suit application and forming methods but with strength and stiffness not less than H01 (quarter-hard) for plate, sheet, strip, and bars and H55 (light-drawn) for tube and pipe.
2. Extruded Shapes, Bronze: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
3. Extruded Shapes, Brass: ASTM B 249/B 249M, Alloy UNS No. C36000 (free-cutting brass).
4. Extruded Shapes, Nickel Silver: ASTM B 249/B 249M, Alloy UNS No. C79600.
5. Seamless Pipe, Bronze: ASTM B 43, Alloy UNS No. C23000 (red brass, 85 percent copper).
6. Seamless Tube, Bronze: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C23000 (red brass, 85 percent copper).
7. Seamless Tube, Brass: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
8. Seamless Tube, Copper: **ASTM B 75 (ASTM B 75M)**, Alloy UNS No. C12200 (phosphorous deoxidized, high residual phosphorous copper).
9. Castings, Bronze: ASTM B 62, Alloy UNS No. C83600 (85-5-5-5 or No. 1 composition commercial red brass) or ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
10. Castings, Brass: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).
11. Castings, Copper: ASTM B 824, with a minimum of 99.9 percent copper.
12. Castings, Nickel Silver: ASTM B 584, Alloy UNS No. C97300 (12 percent leaded nickel silver).
13. Plate, Sheet, Strip, and Bars; Bronze: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).
14. Plate, Sheet, Strip, and Bars; Brass: ASTM B 36/B 36M, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
15. Plate, Sheet, Strip, and Bars; Copper: ASTM B 152/B 152M, Alloy UNS No. C11000 (electrolytic tough pitch copper) or UNS No. C12200 (phosphorous deoxidized, high-residual phosphorous copper).

D. Stainless Steel

1. Tubing: ASTM A 554, Grade MT 304 **OR** Grade MT 316 **OR** Grade MT 316L, **as directed**.
2. Pipe: ASTM A 312/A 312M, Grade TP 304 **OR** Grade TP 316 **OR** Grade TP 316L, **as directed**.
3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20 **OR** Grade CF 8M or CF 3M, **as directed**.
4. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304 **OR** Type 316 **OR** Type 316L, **as directed**.
5. Bars and Shapes: ASTM A 276, Type 304 **OR** Type 316 **OR** Type 316L, **as directed**.
6. Wire Rope and Fittings:
 - a. Wire Rope: 1-by-19 **OR** 7-by-7 **OR** 7-by-19, **as directed**, wire rope made from wire complying with ASTM A 492, Type 316.
 - b. Wire-Rope Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

E. Steel And Iron

1. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Tubing: ASTM A 500 (cold formed) or ASTM A 513, Type 5 (mandrel drawn).
3. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
4. Plates, Shapes, and Bars: ASTM A 36/A 36M.
5. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M unless otherwise indicated.
6. Steel Sheet, Cold Rolled: ASTM A 1008/A 1008M, either commercial steel or structural steel, exposed.

F. Titanium

1. Titanium Strip, Sheet, and Plate: ASTM B 265, Grade 1.
2. Titanium Bars: ASTM B 348, Grade 1.

G. Fasteners

1. Fastener Materials: Unless otherwise indicated, provide the following:
 - a. Aluminum Items: Aluminum **OR** Type 304 stainless-steel **OR** Type 316 stainless-steel, **as directed**, fasteners.
 - b. Copper-Alloy (Bronze) Items: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed, muntz metal (Alloy 280) fasteners where exposed.
 - c. Copper-Alloy (Brass) Items: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed, brass (Alloy 260 or 360) fasteners where exposed.
 - d. Stainless-Steel Items: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
 - e. Titanium Items: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
 - f. Uncoated-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed, Type 304 stainless-steel fasteners where exposed.
 - g. Galvanized-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
 - h. Dissimilar Metals: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
2. Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.
3. Provide concealed fasteners for interconnecting components and for attaching decorative metal items to other work unless otherwise indicated **OR** exposed fasteners are unavoidable, **as directed**.
 - a. Provide Phillips **OR** tamper-resistant **OR** square or hex socket, **as directed**, flat-head machine screws for exposed fasteners unless otherwise indicated.
4. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
5. Post-Installed Anchors: Torque-controlled expansion type or chemical type.
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5 unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group **1 (A1) OR Group 2 (A4)**, **as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.

H. Miscellaneous Materials

1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - a. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
2. Brazing Rods: For copper alloys, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
3. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
4. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
5. Lacquer for Copper Alloys: Clear, acrylic lacquer specially developed for coating copper-alloy products.
6. Shop Primers: Provide primers that comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings", **as directed**.
7. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
8. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

9. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MPI#26 **OR** Vinyl wash primer complying with MPI#80 **OR** Water-based galvanized metal primer complying with MPI#134, **as directed**.
10. Intermediate Coats and Topcoats for Steel: Provide products that comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
11. Epoxy Intermediate Coat for Steel: Complying with MPI#77 and compatible with primer and topcoat.
12. Polyurethane Topcoat for Steel: Complying with MPI#72 and compatible with undercoat.
13. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

I. Fabrication, General

1. Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
2. Make up wire-rope assemblies in the shop to field-measured dimensions with fittings machine swaged. Minimize amount of turnbuckle take-up used for dimensional adjustment so maximum amount is available for tensioning wire ropes. Tag wire-rope assemblies and fittings to identify installation locations and orientations for coordinated installation.
3. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.
4. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
5. Form simple and compound curves in bars, pipe, tubing, and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.
6. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
7. Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.
8. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
9. Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as needed to receive finish hardware, screws, and similar items unless otherwise indicated.
10. Comply with AWS for recommended practices in shop welding and brazing. Weld and braze behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
 - a. Where welding and brazing cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint **OR** Type 2 Welds: completely sanded joint, some undercutting and pinholes okay **OR** Type 3 Welds: partially dressed weld with spatter removed **OR** Type 4 Welds: good quality, uniform undressed weld with minimal splatter, **as directed**.
11. Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks.

J. Decorative Window Security Bars

1. General: Fabricate decorative window grilles to designs indicated from steel bars and shapes of sizes and profiles indicated. Form steel bars by bending, forging, coping, mitering, and welding.
2. Welding: Interconnect grille members with full-length, full-penetration welds unless otherwise indicated. Use welding method that is appropriate for metal and finish indicated and that

develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

3. Brackets, Fittings, and Anchors: Provide wall brackets, fittings, and anchors to connect decorative window grilles to other work unless otherwise indicated.
 - a. Furnish inserts and other anchorage devices to connect decorative window grilles to concrete and masonry work. Coordinate anchorage devices with supporting structure.
 - b. Fabricate anchorage devices that are capable of withstanding loads indicated.

K. Decorative Mechanical Grilles

1. Fabricate decorative grilles from perforated aluminum **OR** brass **OR** bronze **OR** stainless-steel **OR** steel, **as directed**, sheet or plate of thickness, size, and pattern indicated. Form perforations by punching, cutting, or drilling to produce openings of sizes and shapes indicated. Roll, press, and grind perforated metal to flatten and to remove burrs and deformations.
 - a. Form perforations to match existing grilles.
OR
Drawings indicate perforated metal patterns required and are based on products of one manufacturer. Perforated metal patterns produced by other manufacturers may be considered, provided deviations are minor and do not change design concept as judged solely by the Owner.
2. Drill and countersink grilles for mounting screws at **2 inches (50 mm)** from corners and at **10 inches (250 mm)** or less o.c. Provide units with oval-head wood **OR** self-tapping machine, **as directed**, screws.
3. Fabricate grille frames from extruded aluminum **OR** brass **OR** bronze, **as directed**, of profiles, and to sizes and shapes indicated. Miter frame members at corners and connect with concealed splice plates welded **OR** brazed, **as directed**, to back of frames.
 - a. Secure grilles in frames with **0.5-inch- (12-mm-)** long welds **OR** brazing, **as directed**, along perimeter of grilles at **4 inches (100 mm)** o.c.
 - b. Provide frame profiles to match existing frames.
OR
Drawings indicate frame profiles required and are based on products of one manufacturer. Similar frame profiles produced by other manufacturers may be considered, provided deviations are minor and do not change design concept as judged solely by the Owner.
4. Drill and countersink frames for mounting screws at **4 inches (100 mm)** from corners and at **16 inches (400 mm)** or less o.c. Provide units with oval-head wood **OR** self-tapping machine, **as directed**, screws.

L. Decorative-Metal-Clad Doors And Frames

1. Laminate **0.0403-inch- (1.0-mm-)** thick, muntz-metal **OR** **0.0403-inch- (1.0-mm-)** thick, brass **OR** **0.0375-inch- (0.95-mm-)** thick, stainless-steel **OR** **0.024-inch- (0.6-mm-)** thick, titanium, **as directed**, sheets to outside face of hollow-metal doors and frames at locations and to comply with details indicated. Use adhesive recommended by metal fabricator that will fully bond metal to metal and that will prevent telegraphing and oil canning.
 - a. Hollow-metal doors and frames are specified in Division 8 Section "Steel Doors and Frames."

M. Custom Door Pulls

1. Fabricate custom door pulls from brass **OR** bronze **OR** stainless-steel, **as directed**, bar stock of profile indicated, fabricated to shapes indicated. Form curves by bending to produce uniform curvature of radii indicated; maintain profile of member throughout entire bend without buckling, twisting, or otherwise deforming exposed surfaces. Where radii of bends are too small to avoid buckling, grind bars after bending to restore original profile. Drill and tap door pulls to receive through bolts for attachment to doors.
2. Fabricate backing plates for custom door pulls from **1/8-inch (3.2-mm)** brass **OR** bronze **OR** stainless-steel, **as directed**, sheet. Cut to shape indicated and bevel edges at a 45-degree angle for one-half thickness of metal. Drill and countersink holes where indicated for screws and bolts.

3. Provide units with oval-head through bolts for mounting pulls and with oval-head wood screws for mounting backing plates.
- N. Combination Hall Push-Button Stations
1. Fabricate units of brass **OR** bronze **OR** stainless steel, **as directed**, to comply with details indicated. Coordinate with requirements in Division 14 Section "Electric Traction Elevators" to provide integrated, closely fitted assemblies.
 - a. Fabricate faceplates from **1/8-inch- (3.2-mm-)** thick sheet with edges beveled at a 45-degree angle for one-half thickness of metal.
 - b. Provide units with rectangular, split-bowl trash receptacle, designed for recess mounting in nominal **4-inch (100-mm)** wall depth. Fabricate recessed cabinets, top rings, and split bowls of same metal as face of units; fabricate removable receptacles of drawn aluminum. Nominal dimensions of units are **10 by 10 by 3-1/2 inches (250 by 250 by 90 mm)** in depth.
 - c. Provide units with emergency pictorial signs and text, complying with requirements of authorities having jurisdiction, indicating that in fire emergency, elevators should not be used and that stairways should be used instead. Engrave pictorial sign and text into front surface of faceplates to a depth of **1/16 inch (1.6 mm)** with engraving painted red. Make signs **5 inches (125 mm)** wide by **8 inches (200 mm)** high.
 - d. Provide cutouts in faceplates of units for push buttons of elevator hall push-button station, card reader, **as directed**, and elevator key switches. Coordinate locations and sizes of cutouts so additional faceplate is not required and so faces of push buttons are flush with fronts of faceplates and key switches project beyond faceplate only by depth of bezel.
- O. Metal Reveals
1. Fabricate metal reveals for wood paneling from **3/4-by-3/4-by-1/16-inch (19-by-19-by-3-mm)** extruded-bronze **OR** **3/4-by-3/4-by-0.025-inch (19-by-19-by-0.6-mm)** brake-formed, stainless-steel **OR** **3/4-by-3/4-by-0.015-inch (19-by-19-by-0.4-mm)** brake-formed titanium, **as directed**, channels. Drill for mounting screws **6 inches (150 mm)** from ends of channels and not more than **24 inches (600 mm)** o.c. Locate mounting screws at same heights for all channels. Provide black-finished, **as directed**, hex-socket, wafer-head screws for mounting reveals.
- P. Cast-Metal Rosettes
1. Fabricate cast-metal rosettes to design indicated from aluminum **OR** brass **OR** bronze **OR** nickel silver, **as directed**. Drill and tap castings for threaded mounting studs.
 - a. Provide custom castings to match design indicated.
 - b. Manufacturer's stock castings may be considered, provided deviations are minor and do not change design concept as judged solely by the Owner.
 - c. Drawings indicate cast-metal rosette designs required and are based on products of one manufacturer. Castings produced by other manufacturers may be considered, provided deviations are minor and do not change design concept as judged solely by the Owner.
- Q. Finishes, General
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- R. Aluminum Finishes
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.

- a. Color: Champagne **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
4. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
5. Siliconized Polyester Finish: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
6. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

OR

High-Performance Organic Finish: Three **OR** Four, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- b. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

S. Copper-Alloy Finishes

1. Finish designations for copper alloys comply with the system established for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
2. Buffed Finish: M21 (Mechanical Finish: buffed, smooth specular).
3. Hand-Rubbed Finish: M31-M34 (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed).
4. Medium-Satin Finish: M32 (Mechanical Finish: directionally textured, medium satin).
5. Fine-Matte Finish: M42 (Mechanical Finish: nondirectional finish, fine matte).
6. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below):
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
7. Hand-Rubbed Finish, Lacquered: M31-M34-O6x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic, air drying, as specified below):
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
8. Medium-Satin Finish, Lacquered: M32-O6x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below):
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
9. Fine-Matte Finish, Lacquered: M42-O6x (Mechanical Finish: nondirectional finish, fine matte; Coating: clear organic, air drying, as specified below):

- a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 10. Statuary Conversion Coating over Satin Finish: M31-C55 (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide), with color matching the Owner's sample.
 11. Patina Conversion Coating: M36-C12-C52 (Mechanical Finish: directionally textured, uniform; Chemical Finish: nonetched cleaned, degreased; Chemical Finish: conversion coating, ammonium sulfate), with color matching the Owner's sample.
 12. Statuary Conversion Coating, Bright Relieved and Lacquered: M12-C55-M2x-O6x (Mechanical Finish: matte finish, as cast; Chemical Finish: conversion coating, sulfide; Mechanical Finish: buffed, as specified; Coating: clear, organic, air drying, as specified below), with color matching the Owner's sample:
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 13. Blackened, Bright Relieved, and Lacquered: M33-O60-M2x-O6x (Mechanical Finish: directionally textured, coarse satin; Coating: black, air drying; Mechanical Finish: buffed, as specified; Coating: clear, organic, air drying, as specified below), with blackening and buffing matching the Owner's sample:
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
- T. **Stainless-Steel Finishes**
1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
 4. Directional Satin Finish: No. 4.
 5. Dull Satin Finish: No. 6.
 6. Reflective, Directional Polish: No. 7.
 7. Mirrorlike Reflective, Nondirectional Polish: No. 8.
 8. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 9. Sputter-Coated Finish: Titanium nitride coating deposited by magnetic sputter-coating process over indicated mechanical finish.
 10. Colored, Oxide-Film Finish: Clear, oxide interference film produced by degreasing and then immersing in a mixture of chromic and sulfuric acids.
 - a. Product: Subject to compliance with requirements, provide INCO colored stainless-steel finish as developed and licensed by International Nickel Co., Ltd.
 - b. Color: Match the Owner's sample **OR** As selected from finisher's full range, **as directed**.
- U. **Steel And Iron Finishes**
1. Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.
 - a. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
 - b. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - c. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
 2. Preparing Galvanized Items for Shop Priming: After galvanizing, thoroughly clean decorative metal of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

3. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" **OR** SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning" **OR** requirements indicated below, **as directed**:
 - a. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Interiors (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - a. Shop prime uncoated ferrous-metal surfaces with universal shop primer **OR** primers specified in Division 07, **as directed**, unless zinc-rich primer is **OR** primers specified in Division 09 Section "High-performance Coatings" are, **as directed**, indicated.
 - b. Do not apply primer to galvanized surfaces.
5. Shop-Painted Finish: Comply with Division 09 Section(s) "Exterior Painting" **OR** "High-performance Coatings", **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
6. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
7. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
 - a. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
 - c. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**.
 - d. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
8. Powder-Coat Finish: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
 - a. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
 - b. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
 - c. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**.
 - d. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

V. Titanium Finishes

1. General: Fabricate items from finished titanium stock, taking care not to damage finish during fabrication. Protect finish as needed during fabrication by applying a strippable, temporary protective covering.
2. Dull Matte Finish: Pickled and annealed.
3. Bright Matte Finish: Vacuum annealed.

1.3 EXECUTION

A. Examination

1. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative metal.

2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Installation, General
1. Provide anchorage devices and fasteners where needed to secure decorative metal to in-place construction.
 2. Perform cutting, drilling, and fitting required to install decorative metal. Set products accurately in location, alignment, and elevation, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.
 3. Fit exposed connections accurately together to form tight, hairline joints or, where indicated, uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for proper shop fitting and jointing of decorative metal, restore finishes to eliminate evidence of such corrective work.
 4. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
 5. Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.
 6. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work yet to be performed at same location.
 - a. Retain protective coverings intact; remove coverings simultaneously from similarly finished items to preclude nonuniform oxidation and discoloration.
 7. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding and requirements for welding and for finishing welded connections in "Fabrication, General" Article. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 8. Field Brazing: Comply with requirements for brazing and for finishing brazed connections in "Fabrication, General" Article. Braze connections that are not to be left as exposed joints but cannot be shop brazed because of shipping size limitations.
 9. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Installing Decorative Window Security Bars
1. Fasten security bar frames to concrete and masonry walls with cast-in-place or postinstalled anchors. Peen exposed threads of anchors to prevent removal of security bars.
- D. Installing Decorative Mechanical Grilles
1. Mount decorative grilles at heights and in positions indicated, adjusting ductwork to be centered on grilles if any.
 - a. Secure to framing and blocking with specified fasteners.
 - b. On marble, brick, and other solid surfaces, secure with wood screws in lead plugs.
- E. Installing Decorative-Metal-Clad, Hollow-Metal Doors And Frames
1. Install doors and frames to comply with requirements specified in Division 08 Section "Hollow Metal Doors And Frames".
- F. Installing Custom Door Pulls
1. Install door pulls at heights and locations shown. Install with backing plates on both sides of doors. Fasten backing plates to doors with oval-head wood **OR** self-tapping metal, **as directed**, screws and secure pulls through doors and backing plates with oval-head machine screws.
- G. Installing Combination Hall Push-Button Stations
1. Coordinate installation of combination hall push-button stations with installation of related elevator signal equipment components specified in Division 14 Section "Electric Traction Elevators". Secure units in place with faceplate overlapping surrounding wall finish and drawn into contact with surrounding wall finish at entire perimeter of faceplate.

- H. Installing Metal Reveals At Wood Paneling
 - 1. Install metal reveals between wood panels as paneling is installed. Secure to wood grounds with specified screws.

- I. Installing Cast-Metal Rosettes At Marble Joints
 - 1. Install cast-metal rosettes at intersections of marble joints where indicated. Install only after marble work is complete and joints are grouted. Secure to wall by drilling a **3/4-inch- (19-mm-)** round hole at intersection of marble joints and by filling hole with molding plaster into which threaded stud is embedded. Angle drill and rotate so bottom of hole is larger than at surface.
 - a. Secure rosettes in place with masking tape until plaster sets. After plaster has set, remove masking tape and adhesive residue.

- J. Cleaning And Protection
 - 1. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
 - 2. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
 - 3. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

OR

Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed.**
 - 4. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
 - 5. Protect finishes of decorative metal from damage during construction period with temporary protective coverings approved by decorative metal fabricator. Remove protective covering at time of Final Completion.
 - 6. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 15 16 00

Task	Specification	Specification Description
05 15 16 00	05 50 00 00	Metal Fabrications
05 15 19 00	05 15 16 00	Ornamental Metal
05 41 00 00	05 12 23 00	Cold-Formed Metal Framing
05 43 00 00	01 22 16 00	No Specification Required
05 43 00 00	05 12 23 00	Cold-Formed Metal Framing
05 43 00 00	05 50 00 00	Metal Fabrications

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SECTION 05 50 00 00 - METAL FABRICATIONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for metal fabrications. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Steel framing and supports for ceiling-hung toilet compartments.
 - b. Steel framing and supports for operable partitions.
 - c. Steel framing and supports for overhead doors and grilles.
 - d. Steel framing and supports for countertops.
 - e. Steel framing and supports for mechanical and electrical equipment.
 - f. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - g. Steel framing and supports (outriggers) for window-washing equipment including mounting brackets and anchorages.
OR
Mounting brackets and anchorages for window-washing equipment.
 - h. Elevator machine beams, hoist beams, and divider beams.
 - i. Steel shapes for supporting elevator door sills.
 - j. Steel girders for supporting wood frame construction.
 - k. Steel pipe columns for supporting wood frame construction.
 - l. Prefabricated building columns.
 - m. Shelf angles.
 - n. Metal ladders.
 - o. Ladder safety cages.
 - p. Alternating tread devices.
 - q. Metal ships' ladders and pipe crossovers.
 - r. Metal floor plate and supports.
 - s. Structural-steel door frames.
 - t. Miscellaneous steel trim including steel angle corner guards, steel edgings, and loading-dock edge angles.
 - u. Metal bollards.
 - v. Pipe **OR** Downspout, **as directed**, guards.
 - w. Abrasive metal nosings, treads, and thresholds.
 - x. Cast-iron wheel guards.
 - y. Metal downspout boots.
 - z. Loose bearing and leveling plates for applications where they are not specified in other Sections.
2. Products furnished, but not installed, under this Section:
 - a. Loose steel lintels.
 - b. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - c. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Performance Requirements

1. Delegated Design: Design ladders and alternating tread devices, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
3. Structural Performance of Alternating Tread Devices: Alternating tread devices shall withstand the effects of loads and stresses within limits and under conditions specified in ICC's International Building Code.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

D. Submittals

1. Product Data: For the following:
 - a. Nonslip aggregates and nonslip-aggregate surface finishes.
 - b. Prefabricated building columns.
 - c. Metal nosings and treads.
 - d. Paint products.
 - e. Grout.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - a. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
4. Samples: For each type and finish of extruded nosing and tread.
5. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Qualification Data: For qualified professional engineer.
7. Mill Certificates: Signed by manufacturers of stainless-steel certifying that products furnished comply with requirements.
8. Welding certificates.
9. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."

F. Project Conditions

1. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

G. Coordination

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
2. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.2 PRODUCTS

A. Metals, General

1. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Ferrous Metals

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** Type 316L, **as directed**.
4. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 **OR** Type 316L, **as directed**.
5. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
6. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
7. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallurgically bonded to steel.
8. Steel Tubing: ASTM A 500, cold-formed steel tubing.
9. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
10. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - a. Size of Channels: **1-5/8 by 1-5/8 inches (41 by 41 mm) OR** As indicated, **as directed**.
 - b. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B **OR** structural steel, **Grade 33 (Grade 230), as directed, with G90 (Z275) coating; 0.108-inch (2.8-mm) (12 gage) OR 0.079-inch (2-mm) (14 gage) OR 0.064-inch (1.6-mm) (16 gage), as directed, nominal thickness.**
OR
Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B **OR** structural steel, **Grade 33 (Grade 230), as directed; 0.0966-inch (2.5-mm) (12 gage) OR 0.0677-inch (1.7-mm) (14 gage) OR 0.0528-inch (1.35-mm) (16 gage), as directed, minimum thickness; unfinished OR coated with rust-inhibitive, baked-on, acrylic enamel OR hot-dip galvanized after fabrication, as directed.**
11. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

C. Nonferrous Metals

1. Aluminum Plate and Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6.
2. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T6.
3. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
4. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
5. Bronze Plate, Sheet, Strip, and Bars: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).
6. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
7. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

8. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.
9. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

D. Fasteners

1. General: Unless otherwise indicated, provide Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - a. Provide stainless-steel fasteners for fastening aluminum.
 - b. Provide stainless-steel fasteners for fastening stainless steel.
 - c. Provide stainless-steel fasteners for fastening nickel silver.
 - d. Provide bronze fasteners for fastening bronze.
2. Steel Bolts and Nuts: Regular hexagon-head bolts, **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with hex nuts, **ASTM A 563 (ASTM A 563M)**; and, where indicated, flat washers.
3. Steel Bolts and Nuts: Regular hexagon-head bolts, **ASTM A 325, Type 3 (ASTM A 325M, Type 3)**; with hex nuts, **ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3)**; and, where indicated, flat washers.
4. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**; with hex nuts, **ASTM F 594 (ASTM F 836M)**; and, where indicated, flat washers; Alloy Group **1 (A1) OR Group 2 (A4), as directed**.
5. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - a. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
6. Eyebolts: ASTM A 489.
7. Machine Screws: **ASME B18.6.3 (ASME B18.6.7M)**.
8. Lag Screws: **ASME B18.2.1 (ASME B18.2.3.8M)**.
9. Wood Screws: Flat head, ASME B18.6.1.
10. Plain Washers: Round, **ASME B18.22.1 (ASME B18.22M)**.
11. Lock Washers: Helical, spring type, **ASME B18.21.1 (ASME B18.21.2M)**.
12. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
13. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
14. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group **1 (A1) OR Group 2 (A4), as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.
15. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, **1-5/8 by 7/8 inches (41 by 22 mm)** by length indicated with anchor straps or studs not less than **3 inches (75 mm)** long at not more than **8 inches (200 mm)** o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

E. Miscellaneous Materials

1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

2. Shop Primers: Provide primers that comply with Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
3. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
4. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
5. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
6. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
7. Nonshrink, Metallic Grout: Factory-packaged, ferrous-aggregate grout complying with ASTM C 1107, specifically recommended by manufacturer for heavy-duty loading applications.
8. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
9. Concrete: Comply with requirements in Division 03 Section "Cast-in-place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of **3000 psi (20 MPa)**.

F. Fabrication, General

1. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
2. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
3. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
4. Form exposed work with accurate angles and surfaces and straight edges.
5. Weld corners and seams continuously to comply with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
6. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
7. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
8. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
9. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - a. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, **1/8 by 1-1/2 inches (3.2 by 38 mm)**, with a minimum **6-inch (150-mm)** embedment and **2-inch (50-mm)** hook, not less than **8 inches (200 mm)** from ends and corners of units and **24 inches (600 mm)** o.c., unless otherwise indicated.

G. Miscellaneous Framing And Supports

1. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

2. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
 - a. Fabricate units from slotted channel framing where indicated.
 - b. Furnish inserts for units installed after concrete is placed.
3. Fabricate supports for operable partitions from continuous steel beams of sizes indicated **OR** recommended by partition manufacturer, **as directed**, with attached bearing plates, anchors, and braces as indicated **OR** recommended by partition manufacturer, **as directed**. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
4. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
 - a. Provide bearing plates welded to beams where indicated.
 - b. Drill or punch girders and plates for field-bolted connections where indicated.
 - c. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at **24 inches (600 mm) o.c.**
5. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
 - a. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
 - b. Unless otherwise indicated, provide **1/2-inch (12.7-mm)** baseplates with four **5/8-inch (16-mm)** anchor bolts and **1/4-inch (6.4-mm)** top plates.
6. Galvanize miscellaneous framing and supports where indicated.
OR
Prime miscellaneous framing and supports with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**, where indicated.

H. Prefabricated Building Columns

1. General: Provide prefabricated building columns consisting of load-bearing structural-steel members protected by concrete fireproofing encased in an outer non-load-bearing steel shell. Fabricate connections to comply with details shown or as needed to suit type of structure indicated.
2. Fire-Resistance Ratings: Provide prefabricated building columns listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for ratings indicated, based on testing according to ASTM E 119.
 - a. Fire-Resistance Rating: 4 hours **OR** 3 hours **OR** 2 hours **OR** As indicated, **as directed**.

I. Shelf Angles

1. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive **3/4-inch (19-mm)** bolts, spaced not more than **6 inches (150 mm)** from ends and **24 inches (600 mm) o.c.**, unless otherwise indicated.
 - a. Provide mitered and welded units at corners.
 - b. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately **2 inches (50 mm)** larger than expansion or control joint.
2. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
3. Galvanize shelf angles located in exterior walls.
OR
Prime shelf angles located in exterior walls with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
4. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

J. Metal Ladders

1. General:
 - a. Comply with ANSI A14.3 unless otherwise indicated.
 - b. For elevator pit ladders, comply with ASME A17.1.
 2. Steel Ladders:
 - a. Space siderails **16 inches (406 mm) OR 18 inches (457 mm), as directed**, apart unless otherwise indicated.
 - b. Space siderails of elevator pit ladders **12 inches (300 mm)** apart.
 - c. Siderails: Continuous, **3/8-by-2-1/2-inch (9.5-by-64-mm) OR 1/2-by-2-1/2-inch (12.7-by-64-mm), as directed**, steel flat bars, with eased edges.
 - d. Rungs: **3/4-inch- (19-mm-) diameter OR 3/4-inch- (19-mm-) square OR 1-inch- (25-mm-) diameter OR 1-inch- (25-mm-) square, as directed**, steel bars.
 - e. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - f. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
 - g. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
 - h. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than **1/2 inch (12 mm) OR 3/4 inch (19 mm), as directed**, in least dimension.
 - i. Support each ladder at top and bottom and not more than **60 inches (1500 mm)** o.c. with welded or bolted steel brackets.
 - j. Galvanize ladders **OR** exterior ladders, **as directed**, including brackets and fasteners.
OR
Prime ladders **OR** exterior ladders, **as directed**, including brackets and fasteners, with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
 3. Aluminum Ladders:
 - a. Space siderails **16 inches (406 mm) OR 18 inches (457 mm), as directed**, apart unless otherwise indicated.
 - b. Siderails: Continuous extruded-aluminum channels or tubes, not less than **2-1/2 inches (64 mm)** deep, **3/4 inch (19 mm)** wide, and **1/8 inch (3.2 mm)** thick.
 - c. Rungs: Extruded-aluminum tubes, not less than **3/4 inch (19 mm)** deep and not less than **1/8 inch (3.2 mm)** thick, with ribbed tread surfaces.
 - d. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.
 - e. Provide platforms as indicated fabricated from pressure-locked aluminum bar grating or extruded-aluminum plank grating, supported by extruded-aluminum framing. Limit openings in gratings to no more than **1/2 inch (12 mm) OR 3/4 inch (19 mm), as directed**, in least dimension.
 - f. Support each ladder at top and bottom and not more than **60 inches (1500 mm)** o.c. with welded or bolted aluminum brackets.
 - g. Provide minimum **72-inch- (1830-mm-) high**, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.
- K. Ladder Safety Cages
1. General:
 - a. Fabricate ladder safety cages to comply with ANSI A14.3 **OR** OSHA regulations, **as directed**. Assemble by welding or with stainless-steel fasteners.
 - b. Provide primary hoops at tops and bottoms of cages and spaced not more than **20 feet (6 m)** o.c. Provide secondary intermediate hoops spaced not more than **48 inches (1200 mm)** o.c. between primary hoops.
 - c. Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless-steel fasteners unless otherwise indicated.
 2. Steel Ladder Safety Cages:
 - a. Primary Hoops: **1/4-by-4-inch (6.4-by-100-mm)** flat bar hoops.

- b. Secondary Intermediate Hoops: **1/4-by-2-inch (6.4-by-50-mm)** flat bar hoops.
- c. Vertical Bars: **3/16-by-1-1/2-inch (4.8-by-38-mm)** flat bars secured to each hoop.
- d. Galvanize ladder safety cages, including brackets and fasteners.

OR

Prime ladder safety cages, including brackets and fasteners, with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.

- 3. Aluminum Ladder Safety Cages:
 - a. Primary Hoops: **1/4-by-4-inch (6.4-by-100-mm)** flat bar hoops.
 - b. Secondary Intermediate Hoops: **1/4-by-2-inch (6.4-by-50-mm)** flat bar hoops.
 - c. Vertical Bars: **1/4-by-2-inch (6.4-by-50-mm)** flat bars secured to each hoop.

L. Alternating Tread Devices

- 1. Alternating Tread Devices: Fabricate alternating tread devices to comply with ICC's International Building Code. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
 - a. Fabricate from steel **OR** stainless steel **OR** aluminum, **as directed**, and assemble by welding or with stainless-steel fasteners.
 - b. Comply with applicable railing requirements in Division 05 Section "Pipe And Tube Railings".
- 2. Galvanize steel **OR** exterior steel, **as directed**, alternating tread devices, including treads, railings, brackets, and fasteners.

OR

Prime steel **OR** exterior steel, **as directed**, alternating tread devices, including treads, railings, brackets, and fasteners, with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.

M. Metal Ships' Ladders And Pipe Crossovers

- 1. Provide metal ships' ladders and pipe crossovers where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
 - a. Fabricate ships' ladders and pipe crossovers, including railings from steel **OR** stainless steel **OR** aluminum, **as directed**.
 - b. Fabricate treads **OR** treads and platforms, **as directed**, from welded or pressure-locked steel bar grating **OR** pressure-locked stainless-steel bar grating **OR** pressure-locked aluminum bar grating **OR** extruded-aluminum plank grating, **as directed**. Limit openings in gratings to no more than **1/2 inch (12 mm) OR 3/4 inch (19 mm)**, **as directed**, in least dimension.
 - c. Fabricate treads **OR** treads and platforms, **as directed**, from rolled-steel floor plate **OR** rolled-stainless-steel floor plate **OR** rolled-aluminum-alloy tread plate **OR** abrasive-surface floor plate, **as directed**.
 - d. Comply with applicable railing requirements in Division 5 Section "Pipe and Tube Railings."
- 2. Galvanize steel **OR** exterior steel, **as directed**, ships' ladders and pipe crossovers, including treads, railings, brackets, and fasteners.

OR

Prime steel **OR** exterior steel, **as directed**, ships' ladders and pipe crossovers, including treads, railings, brackets, and fasteners, with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.

N. Metal Floor Plate

- 1. Fabricate from rolled-steel floor **OR** rolled-stainless-steel floor **OR** rolled-aluminum-alloy tread **OR** abrasive-surface floor, **as directed**, plate of thickness indicated below:
 - a. Thickness: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR 1/4 inch (6.4 mm) OR 5/16 inch (8 mm) OR 3/8 inch (9.5 mm) OR** As indicated, **as directed**.
- 2. Provide grating sections where indicated fabricated from welded or pressure-locked steel bar grating **OR** pressure-locked stainless steel bar grating **OR** pressure-locked aluminum bar grating

- OR** extruded-aluminum plank grating, **as directed**. Limit openings in gratings to no more than **1/2 inch (12 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, in least dimension.
3. Provide steel **OR** stainless-steel **OR** aluminum, **as directed**, angle supports as indicated.
 4. Include steel **OR** stainless-steel **OR** aluminum, **as directed**, angle stiffeners, and fixed and removable sections as indicated.
 5. Provide flush steel **OR** stainless-steel **OR** aluminum, **as directed**, bar drop handles for lifting removable sections, one at each end of each section.
- O. Structural-Steel Door Frames
1. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with **5/8-by-1-1/2-inch (16-by-38-mm)** steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than **10 inches (250 mm)** o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.
 - a. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
 2. Extend bottom of frames to floor elevation indicated with steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.
 3. Galvanize steel **OR** exterior steel, **as directed**, frames.
OR
Prime steel **OR** exterior steel, **as directed**, frames with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- P. Miscellaneous Steel Trim
1. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
 2. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - a. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
 3. Galvanize miscellaneous steel **OR** exterior miscellaneous steel, **as directed**, trim.
OR
Prime miscellaneous steel **OR** exterior miscellaneous steel, **as directed**, trim with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- Q. Metal Bollards
1. Fabricate metal bollards from Schedule 40 steel pipe **OR** Schedule 80 steel pipe **OR** **1/4-inch (6.4-mm)** wall-thickness rectangular steel tubing **OR** steel shapes, as indicated, **as directed**.
 - a. Cap bollards with **1/4-inch- (6.4-mm-)** thick steel plate (not required if bollards are concrete filled).
 - b. Where bollards are indicated to receive controls for door operators, provide necessary cutouts for controls and holes for wire.
 - c. Where bollards are indicated to receive light fixtures, provide necessary cutouts for fixtures and holes for wire.
 2. Fabricate bollards with **3/8-inch- (9.5-mm-)** thick steel baseplates for bolting to concrete slab (for mounting bollards on structural slab or on existing pavement). Drill baseplates at all four corners for **3/4-inch (19-mm)** anchor bolts.
 - a. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
 3. Fabricate sleeves for bollard anchorage from steel pipe or tubing with **1/4-inch- (6.4-mm-)** thick steel plate welded to bottom of sleeve. Make sleeves not less than **8 inches (200 mm)** deep and **3/4 inch (19 mm)** larger than OD of bollard.

4. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch (6.4-mm) wall-thickness steel tubing with an OD approximately 1/16 inch (1.5 mm) less than ID of bollards. Match drill sleeve and bollard for 3/4 inch (19 mm) steel machine bolt.
 5. Prime bollards with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- R. Pipe Or Downspout Guards
1. Fabricate pipe **OR** downspout, **as directed**, guards from 3/8-inch- (9.5-mm-) thick by 12-inch- (300-mm-) wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch (50-mm) clearance between pipe and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.
 2. Galvanize pipe **OR** downspout, **as directed**, guards.
OR
Prime pipe **OR** downspout, **as directed**, guards with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- S. Abrasive Metal Nosings, Treads And Thresholds
1. Cast-Metal Units: Cast iron **OR** aluminum **OR** bronze (leaded red or semired brass) **OR** nickel silver (leaded nickel bronze), **as directed**, with an integral-abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - a. Nosings: Cross-hatched units, 4 inches (100 mm) wide with 1/4-inch (6-mm) **OR** 1-inch (25-mm), **as directed**, lip, for casting into concrete steps.
OR
Nosings: Cross-hatched units, 1-1/2 by 1-1/2 inches (38 by 38 mm), for casting into concrete curbs.
 - b. Treads: Cross-hatched units, full depth of tread with 3/4-by-3/4-inch (19-by-19-mm) nosing, for application over bent plate treads or existing stairs.
 - c. Thresholds: Fluted-saddle-type units, 5 inches (125 mm) wide by 1/2 inch (12 mm) high, with tapered edges.
OR
Thresholds: Fluted-interlocking- (hook-strip-) type units, 5 inches (125 mm) wide by 5/8 inch (16 mm) high, with tapered edge.
OR
Thresholds: Plain-stepped- (stop-) type units, 5 inches (125 mm) wide by 1/2 inch (12 mm) high, with 1/2-inch (12-mm) step.
 2. Extruded Units: Aluminum **OR** Bronze, **as directed**, with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - a. Provide ribbed units, with abrasive filler strips projecting 1/16 inch (1.5 mm) above aluminum extrusion.
OR
Provide solid-abrasive-type units without ribs.
 - b. Nosings: Square-back units, 1-7/8 inches (48 mm) **OR** 3 inches (75 mm) **OR** 4 inches (100 mm), **as directed**, wide, for casting into concrete steps.
OR
Nosings: Beveled-back units, 3 inches (75 mm) **OR** 4 inches (100 mm), **as directed**, wide with 1-3/8-inch (35-mm) lip, for surface mounting on existing stairs.
OR
Nosings: Two-piece units, 3 inches (75 mm) wide, with subchannel for casting into concrete steps.
 - c. Treads: Square **OR** Beveled, **as directed**, -back units, full depth of tread with 1-3/8-inch (35-mm) lip, for application over existing stairs.
 3. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

4. Drill for mechanical anchors and countersink. Locate holes not more than **4 inches (100 mm)** from ends and not more than **12 inches (300 mm)** o.c., evenly spaced between ends, unless otherwise indicated. Provide closer spacing if recommended by manufacturer.
 - a. Provide two rows of holes for units more than **5 inches (125 mm)** wide, with two holes aligned at ends and intermediate holes staggered.
 5. Apply bituminous paint to concealed surfaces of cast-metal units.
 6. Apply clear lacquer to concealed surfaces of extruded units.
- T. Cast-Iron Wheel Guards
1. Provide wheel guards made from cast iron, **3/4 inch (19 mm)** thick, hollow-core construction, of size and shape indicated. Provide holes for countersunk anchor bolts and grouting.
 2. Prime cast iron wheel guards with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- U. Metal Downspout Boots
1. Provide downspout boots made from cast iron **OR** cast aluminum, **as directed**, in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.
 - a. Outlet: Vertical, to discharge into pipe **OR** Horizontal, to discharge into pipe **OR** At 35 degrees from horizontal, to discharge onto splash block or pavement, **as directed**.
 2. Prime cast iron downspout boots with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- V. Loose Bearing And Leveling Plates
1. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
 2. Galvanize plates.
OR
Prime plates with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- W. Loose Steel Lintels
1. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
 2. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than **8 inches (200 mm)** unless otherwise indicated.
 3. Galvanize loose steel lintels located in exterior walls.
 4. Prime loose steel lintels located in exterior walls with zinc-rich primer **OR** primer specified in Division 09 Section "High-performance Coatings", **as directed**.
- X. Steel Weld Plates And Angles
1. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.
- Y. Finishes, General
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Finish metal fabrications after assembly.
 3. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.
- Z. Steel And Iron Finishes

1. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
2. Shop prime iron and steel items not indicated to be galvanized, **as directed**, unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - a. Shop prime with universal shop primer **OR** primers specified in Division 07, **as directed**, unless zinc-rich primer is **OR** primers specified in Division 09 Section "High-performance Coatings" are, **as directed**, indicated.
3. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" **OR** SSPC-SP 3, "Power Tool Cleaning" **OR** requirements indicated below, **as directed**:
 - a. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - c. Items Indicated to Receive Primers Specified in Division 9 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - d. Other Items: SSPC-SP 3, "Power Tool Cleaning."
4. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

AA. Aluminum Finishes

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
3. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

1.3 EXECUTION

A. Installation, General

1. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
2. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
3. Field Welding: Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
4. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
5. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

6. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - a. Cast Aluminum: Heavy coat of bituminous paint.
 - b. Extruded Aluminum: Two coats of clear lacquer.

- B. Installing Miscellaneous Framing And Supports
 1. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
 2. Anchor supports for operable partitions securely to and rigidly brace from building structure.
 3. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.
 - a. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.
 4. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.
 - a. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

- C. Installing Prefabricated Building Columns
 1. Install prefabricated building columns to comply with AISC's "Specification for Structural Steel Buildings" and with requirements applicable to listing and labeling for fire-resistance rating indicated.

- D. Installing Metal Bollards
 1. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 - a. Do not fill removable bollards with concrete.
 2. Anchor bollards to existing construction with expansion anchors **OR** anchor bolts **OR** through bolts, **as directed**. Provide four **3/4-inch (19-mm)** bolts at each bollard unless otherwise indicated.
 - a. Embed anchor bolts at least **4 inches (100 mm)** in concrete.
 3. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete **OR** in formed or core-drilled holes not less than **8 inches (200 mm)** deep and **3/4 inch (19 mm)** larger than OD of bollard, **as directed**. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately **1/8 inch (3 mm)** toward bollard.
 4. Anchor bollards in place with concrete footings. Center and align bollards in holes **3 inches (75 mm)** above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
 5. Anchor internal sleeves for removable bollards in concrete by inserting into pipe sleeves preset into concrete **OR** formed or core-drilled holes not less than **8 inches (200 mm)** deep and **3/4 inch (19 mm)** larger than OD of sleeve, **as directed**. Fill annular space around internal sleeves solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately **1/8 inch (3 mm)** toward internal sleeve.
 6. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes **3 inches (75 mm)** above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
 7. Place removable bollards over internal sleeves and secure with **3/4-inch (19-mm)** machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. the Owner will furnish padlocks.
 8. Fill bollards solidly with concrete, mounding top surface to shed water.
 - a. Do not fill removable bollards with concrete.

- E. Installing Pipe Guards

1. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four **3/4-inch (19-mm)** bolts at each pipe guard. Mount pipe guards with top edge **26 inches (660 mm)** above driving surface.
- F. Installing Nosings, Treads, And Thresholds
1. Center nosings on tread widths unless otherwise indicated.
 2. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
 3. Seal thresholds exposed to exterior with elastomeric sealant complying with Division 07 Section "Joint Sealants" to provide a watertight installation.
- G. Installing Cast-Iron Wheel Guards
1. Anchor wheel guards to concrete or masonry construction to comply with manufacturer's written instructions. Fill cores solidly with concrete.
- H. Installing Bearing And Leveling Plates
1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
 2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 - a. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations unless otherwise indicated.
 - b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.
- I. Adjusting And Cleaning
1. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

OR

Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07.
 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00 00

SECTION 05 51 13 00 - METAL STAIRS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for metal stairs. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Preassembled steel stairs with concrete-filled, precast concrete, epoxy-resin-filled, and abrasive-coating-finished formed-metal treads.
 - b. Industrial-type stairs with steel floor plate and grating treads.
 - c. Ornamental steel-framed stairs.
 - d. Railings and Steel tube railings attached to metal stairs.
 - e. Handrails and Steel tube handrails attached to walls adjacent to metal stairs.
 - f. Railing gates at the level of exit discharge.

C. Performance Requirements

1. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - a. The following are based on the 2006 International Building Code (IBC):
 - 1) Uniform Load: **100 lbf/sq. ft. (4.79 kN/sq. m)**.
 - 2) Concentrated Load: **300 lbf (1.33 kN)** applied on an area of **4 sq. in. (2580 sq. mm)**.
 - 3) Uniform and concentrated loads need not be assumed to act concurrently.
 - b. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above, **as applicable**.
 - c. Limit deflection of treads, platforms, and framing members to **L/240 OR L/360, as directed**, or **1/4 inch (6.4 mm)**, whichever is less. Preassembled steel stair manufacturers usually design stairs to L/240; retaining L/360 will decrease bounce and may be required to prevent cracking of plaster or gypsum board soffits. If brittle materials such as marble, granite, or ceramic tiles are used on treads and platforms, deflection limit should be reduced to L/720.
3. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated. The following loads are based on the 2006 IBC.
 - a. Handrails and Top Rails of Guards:
 - 1) Uniform load of **50 lbf/ ft. (0.73 kN/m)** applied in any direction.
 - 2) Concentrated load of **200 lbf (0.89 kN)** applied in any direction.
 - 3) Uniform and concentrated loads need not be assumed to act concurrently.
 - b. Infill of Guards:
 - 1) Concentrated load of **50 lbf (0.22 kN)** applied horizontally on an area of **1 sq. ft. (0.093 sq. m)**.
 - 2) Infill load and other loads need not be assumed to act concurrently.
4. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. Component Importance Factor is 1.5.

D. Submittals

1. Product Data: For metal stairs and the following:

- a. Prefilled metal-pan stair treads.
 - b. Precast concrete treads.
 - c. Epoxy-resin-filled stair treads.
 - d. Nonslip aggregates and nonslip-aggregate finishes.
 - e. Abrasive nosings.
 - f. Metal floor plate treads.
 - g. Paint products.
 - h. Grout.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
 3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 4. Samples: For the following products, in manufacturer's standard sizes:
 - a. Precast concrete treads.
 - b. Epoxy-resin-filled stair treads.
 - c. Stair treads with nonslip-aggregate surface finish.
 - d. Metal floor plate treads.
 - e. Grating treads.
 - f. Abrasive nosings.
 5. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 6. Qualification Data: For qualified professional engineer **OR** testing agency, **as directed**.
 7. Welding certificates.
 8. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
 9. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs and railings.
 - a. Test railings according ASTM E 894 and ASTM E 935.
- E. Quality Assurance
1. Installer Qualifications: Fabricator of products.
 2. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
 - a. Preassembled Stairs:
 - 1) Commercial class - typical enclosed stair (welds are required to be smooth).
 - 2) Service class - economy enclosed stair.
 - b. Industrial-Type Stairs: Industrial class - typical for exposed locations in industrial facilities or for exterior stairs.
 - c. Ornamental Stairs: Architectural class - ornamental stairs in exposed locations (joints are required to be concealed to maximum extent possible).
 3. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 4. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
- F. Coordination
1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
 2. Coordinate installation of anchorages for metal stairs. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items

with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

3. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

1.2 PRODUCTS

A. Metals, General

1. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Ferrous Metals

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Steel Tubing: ASTM A 500 (cold formed) **OR** ASTM A 513, **as directed**.
4. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
5. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallurgically bonded to steel.
6. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
7. Wire Rod for Grating Crossbars: **ASTM A 510 (ASTM A 510M)**.
8. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
9. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, either commercial steel, Type B, or structural steel, **Grade 25 (Grade 170)**, unless another grade is required by design loads; exposed.
10. Uncoated, Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, either commercial steel, Type B, or structural steel, **Grade 30 (Grade 205)**, unless another grade is required by design loads.
11. Galvanized-Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating, either commercial steel, Type B, or structural steel, **Grade 33 (Grade 230)**, unless another grade is required by design loads.
12. Expanded-Metal, Carbon Steel: ASTM F 1267, Type I (expanded) **OR** Type II (expanded and flattened), **as directed**, Class 1 (uncoated).
 - a. Style Designation: 3/4 number 13 **OR** 1-1/2 number 10, **as directed**.
13. Perforated Metal: Cold-rolled steel sheet, ASTM A 1008/A 1008M, or hot-rolled steel sheet, ASTM A 1011/A 1011M, commercial steel Type B, **0.060 inch (1.52 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows **OR** with **1/8-by-1-inch (3.2-by-25.4-mm)** round end slotted holes in staggered rows, **as directed**.
14. Perforated Metal: Galvanized-steel sheet, ASTM A 653/A 653M, **G90 (Z275)** coating, commercial steel Type B, **0.064 inch (1.63 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows.
15. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, **2-inch (50-mm)** woven-wire mesh, made from **0.135-inch (3.5-mm)** nominal diameter wire complying with **ASTM A 510 (ASTM A 510M)**.

C. Nonferrous Metals

1. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T6.
2. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
3. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
4. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).

5. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

D. Abrasive Nosings

1. Cast-Metal Units: Cast iron **OR** aluminum **OR** bronze **OR** nickel silver, **as directed**, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - a. Configuration: Cross-hatched units, **3 inches (75 mm) OR 4 inches (100 mm), as directed**, wide without lip.
OR
Configuration: Cross-hatched angle-shaped units, same depth as bar-grating treads and **1 to 1-1/2 inches (25 to 38 mm)** wide.
2. Extruded Units: Aluminum **OR** Bronze, **as directed**, units with abrasive filler consisting of aluminum oxide, silicon carbide, or a combination of both, in an epoxy-resin binder. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - a. Provide ribbed units, with abrasive filler strips projecting **1/16 inch (1.5 mm)** above aluminum extrusion.
OR
Provide solid-abrasive-type units without ribs.
 - b. Nosings: Square-back units, **1-7/8 inches (48 mm) OR 3 inches (75 mm) OR 4 inches (100 mm), as directed**, wide, without lip.
OR
Nosings: Two-piece units, **3 inches (75 mm)** wide, with subchannel for casting into concrete.
3. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.
4. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.
5. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

E. Fasteners

1. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
2. Bolts and Nuts: Regular hexagon-head bolts, **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with hex nuts, **ASTM A 563 (ASTM A 563M)**; and, where indicated, flat washers.
3. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, **ASTM A 563 (ASTM A 563M)**; and, where indicated, flat washers.
 - a. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs **OR** stairs indicated to be galvanized **OR** stairs indicated to be shop primed with zinc-rich primer, **as directed**.
4. Machine Screws: **ASME B18.6.3 (ASME B18.6.7M)**.
5. Lag Screws: **ASME B18.2.1 (ASME B18.2.3.8M)**.
6. Plain Washers: Round, **ASME B18.22.1 (ASME B18.22M)**.
7. Lock Washers: Helical, spring type, **ASME B18.21.1 (ASME B18.21.2M)**.
8. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group **1 (A1) OR Group 2 (A4), as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.

F. Miscellaneous Materials

1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 2. Shop Primers: Provide primers that comply with Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
 3. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
 4. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
 5. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
 6. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
 7. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
 8. Concrete Materials and Properties: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of **3000 psi (20 MPa)** unless otherwise indicated.
 9. Nonslip-Aggregate Concrete Finish: Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and nonglazing; unaffected by freezing, moisture, or cleaning materials.
 10. Welded Wire Fabric: ASTM A 1064/A 1064M, **6 by 6 inches (152 by 152 mm)**, W1.4 by W1.4, unless otherwise indicated.
- G. Precast Concrete Treads
1. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of **5000 psi (35 MPa)** and a total air content of not less than 4 percent or more than 6 percent.
 2. Reinforcing Wire Fabric: Galvanized, welded wire fabric, **2 by 2 inches (50 by 50 mm)** by **0.062-inch- (1.6-mm-)** diameter wire; comply with ASTM A 1064/A 1064M and ASTM A 82/A 82M, except for minimum wire size.
- H. Fabrication, General
1. Provide complete stair assemblies, including metal framing, hangers, struts, railings, **as directed**, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - a. Join components by welding unless otherwise indicated.
 - b. Use connections that maintain structural value of joined pieces.
 - c. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
 2. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
 3. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
 4. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 5. Form exposed work with accurate angles and surfaces and straight edges.
 6. Weld connections to comply with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Weld exposed corners and seams continuously unless otherwise indicated.

- e. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint **OR** Type 2 welds: completely sanded joint, some undercutting and pinholes okay **OR** Type 3 welds: partially dressed weld with spatter removed **OR** Type 4 welds: good quality, uniform undressed weld with minimal splatter, **as directed**.
 - 7. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
 - 8. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- I. Steel-Framed Stairs
- 1. Stair Framing:
 - a. Fabricate stringers of steel plates **OR** channels **OR** tubes, **as directed**.
 - 1) Provide closures for exposed ends of channel **OR** tube, **as directed**, stringers.
 - b. Construct platforms of steel plate **OR** channel **OR** tube, **as directed**, headers and miscellaneous framing members as needed to comply with performance requirements **OR** indicated, **as directed**.
 - c. Weld or bolt, **as directed**, stringers to headers; weld or bolt, **as directed**, framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 - d. Where stairs are enclosed by gypsum board **OR** gypsum board shaft-wall, **as directed**, assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.
 - e. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
 - 2. Metal-Pan Stairs: Form risers, subreads pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than **0.067 inch (1.7 mm)** **OR** indicated, **as directed**.
 - a. Steel Sheet: Uncoated cold **OR** hot, **as directed**,-rolled steel sheet unless otherwise indicated.
OR
Steel Sheet: Galvanized-steel sheet, where indicated.
 - b. Directly weld metal pans to stringers; locate welds on top of subreads where they will be concealed by concrete fill. Do not weld risers to stringers.
OR
Attach risers and subreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 - c. Shape metal pans to include nosing integral with riser.
 - d. Attach abrasive nosings to risers.
 - e. At Contractor's option, provide stair assemblies with metal-pan subreads filled with reinforced concrete during fabrication.
 - f. Provide epoxy-resin-filled treads, reinforced with glass fibers, with slip-resistant, abrasive surface.
 - g. Provide subplatforms of configuration indicated or, if not indicated, the same as subreads. Weld subplatforms to platform framing.
 - 1) Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.
 - 3. Abrasive-Coating-Finished, Formed-Metal Stairs: Form risers, treads, and platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.097 inch (2.5 mm) **OR** indicated, **as directed**.
 - a. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
 - b. Directly weld risers and treads to stringers; locate welds on underside of stairs.

- c. Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.
 - d. Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.
 4. Metal Floor Plate Stairs: Form treads and platforms to configurations shown from rolled-steel **OR** abrasive-surface, **as directed**, floor plate of thickness needed to comply with performance requirements, but not less than **1/4 inch (6.4 mm)** **OR** needed to comply with performance requirements, but not less than **3/16 inch (4.8 mm)** **OR** needed to comply with performance requirements, but not less than **1/8 inch (3.2 mm)** **OR** indicated, **as directed**.
 - a. Form treads with integral nosing and back edge stiffener. Form risers of same material as treads.
OR
Form treads with integral nosing and back edge stiffener. Form risers from steel sheet not less than **0.097 inch (2.5 mm)** thick, welded to tread nosings and stiffeners and to platforms.
OR
Form treads with integral nosing and back edge stiffener, and with open risers.
 - b. Weld steel supporting brackets to stringers and weld treads to brackets.
 - c. Fabricate platforms with integral nosings matching treads and weld to platform framing.
 5. Metal Bar-Grating Stairs: Form treads and platforms to configurations shown from metal bar grating; fabricate to comply with NAAMM MBG 531, "Metal Bar Grating Manual."
 - a. Fabricate treads and platforms from welded or pressure-locked steel grating with **1-1/4-by-3/16-inch (32-by-5-mm)** bearing bars at **15/16 inch (24 mm)** o.c. **OR** **1-by-3/16-inch (25-by-5-mm)** bearing bars at **11/16 inch (17 mm)** o.c. **OR** **1-by-1/8-inch (25-by-3-mm)** bearing bars at **7/16 inch (11 mm)** o.c., **as directed**, and crossbars at **4 inches (100 mm)** o.c.
OR
Fabricate treads and platforms from welded or pressure-locked steel grating with openings in gratings no more than **5/16 inch (8 mm)** **OR** **1/2 inch (12 mm)** **OR** **3/4 inch (19 mm)**, **as directed**, in least dimension.
 - b. Surface: Plain **OR** Serrated, **as directed**.
 - c. Finish: Shop primed **OR** Painted **OR** Galvanized, **as directed**.
 - d. Fabricate grating treads with rolled-steel floor plate **OR** cast abrasive, **as directed**, nosing and with steel angle or steel plate carrier at each end for stringer connections. Secure treads to stringers with bolts.
 - e. Fabricate grating platforms with nosing matching that on grating treads. Provide toeplates at open-sided edges of grating platforms. Weld grating to platform framing.
- J. Stair Railings
1. Comply with applicable requirements in Division 05 Section(s) "Pipe And Tube Railings" OR "Decorative Metal Railings", **as directed**.
 - a. Fabricate newels of square steel tubing and provide newel caps of pressed steel **OR** gray-iron castings, **as directed**, as shown.
 - b. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
 - c. Connect posts to stair framing by direct welding unless otherwise indicated.
 2. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 - a. Rails and Posts: **1-5/8-inch- (41-mm-)** diameter **OR** **1-1/2-inch- (38-mm-)** square, **as directed**, top and bottom rails and **1-1/2-inch- (38-mm-)** square posts.
 - b. Picket Infill: **1/2-inch- (13-mm-)** square pickets spaced less than **4 inches (100 mm)** clear.
 - c. Expanded-Metal Infill: Expanded-metal panels edged with U-shaped channels made from steel sheet not less than **0.043 inch (1.1 mm)** thick. Orient expanded metal with long dimension of diamonds parallel to top rail **OR** perpendicular to top rail **OR** vertical, **as directed**.

- d. Perforated-Metal Infill: Perforated-metal panels edged with U-shaped channels made from metal sheet, of same metal as perforated metal and not less than **0.043 inch (1.1 mm)** thick. Orient perforated metal with pattern parallel to top rail **OR** perpendicular to top rail **OR** horizontal **OR** vertical **OR** as indicated on Drawings, **as directed**.
 - e. Mesh Infill: Woven wire mesh crimped into **1-by-1/2-by-1/8-inch (25-by-13-by-3-mm)** steel channel frames. Orient wire mesh with diamonds vertical **OR** wires perpendicular and parallel to top rail **OR** wires horizontal and vertical, **as directed**.
 - f. Intermediate Rails Infill: **1-5/8-inch- (41-mm-)** diameter **OR** **1-1/2-inch- (38-mm-)** square, **as directed**, intermediate rails spaced less than **12 inches (305 mm)** **OR** **21 inches (533 mm)**, **as directed**, clear.
 - g. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing **OR** spring, **as directed**, hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
3. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - a. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint **OR** Type 2 welds: completely sanded joint, some undercutting and pinholes okay **OR** Type 3 welds: partially dressed weld with spatter removed **OR** Type 4 welds: good quality, uniform undressed weld with minimal splatter, **as directed**.
 4. Form changes in direction of railings as follows:
 - a. As detailed.
OR
By bending or by inserting prefabricated elbow fittings.
OR
By flush bends or by inserting prefabricated flush-elbow fittings.
OR
By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
OR
By inserting prefabricated elbow fittings **OR** flush-elbow fittings **OR** elbow fittings of radius indicated, **as directed**.
 5. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
 6. Close exposed ends of railing members with prefabricated end fittings.
 7. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is **1/4 inch (6 mm)** or less.
 8. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 - a. Connect posts to stair framing by direct welding unless otherwise indicated.
 - b. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
 - c. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
 9. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

K. Finishes

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Finish metal stairs after assembly.
3. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - b. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
4. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" **OR** SSPC-SP 3, "Power Tool Cleaning" **OR** minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products, **as directed**:
 - a. Exterior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" for stairs that are to receive zinc-rich primer or primer specified in Division 09 Section "High-performance Coatings".
OR
Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."
5. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

1.3 EXECUTION

A. Installation, General

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
2. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
3. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
4. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
5. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
6. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
7. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-place Concrete"
 - a. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.
8. Install precast concrete treads with adhesive supplied by manufacturer.

B. Installing Metal Stairs With Grouted Baseplates

1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
2. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

- a. Use nonmetallic, nonshrink grout unless otherwise indicated.
- b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

C. Installing Railings

- 1. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
 - a. Anchor posts to steel by welding directly to steel supporting members.
 - b. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- 2. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt **OR** with predrilled hole for exposed bolt anchorage, **as directed**. Provide bracket with **1-1/2-inch (38-mm)** clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements **OR** as follows, **as directed**:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated, **as directed**, wood backing between studs. Coordinate with stud installation to locate backing members.

OR

For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

OR

For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

D. Adjusting And Cleaning

- 1. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

OR

Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
- 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 51 13 00

SECTION 05 51 13 00a - FABRICATED SPIRAL STAIRS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fabricated spiral stairs. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes fabricated spiral stairs with steel central-supporting columns and radiating treads.

C. Performance Requirements

1. Delegated Design: Design fabricated spiral stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance of Stairs: Fabricated spiral stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7:
 - a. Uniform Load: **40 lbf/sq. ft. (1.92 kN/sq. m) OR 100 lbf/sq. ft. (4.79 kN/sq. m), as directed.**
 - b. Concentrated Load: **300 lbf (1.33 kN)** applied on an area of **4 sq. in. (2580 sq. mm).**
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 - d. Railing Loads: Stairs shall withstand stresses resulting from railing loads in addition to loads specified above.
3. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7:
 - a. Handrails:
 - 1) Uniform load of **20 lbf/ft. (0.29 kN/m) OR 50 lbf/ft. (0.73 kN/m), as directed,** applied in any direction.
 - 2) Concentrated load of **200 lbf (0.89 kN)** applied in any direction.
 - 3) Uniform and concentrated loads need not be assumed to act concurrently.
 - b. Top Rails of Guards:
 - 1) Uniform load of **20 lbf/ft. (0.29 kN/m)** applied in any direction **OR 50 lbf/ft. (0.73 kN/m)** applied in any direction **OR 50 lbf/ft. (0.73 kN/m)** applied horizontally and concurrently, with **100 lbf/ft. (1.46 kN/m)** applied vertically downward, **as directed.**
 - 2) Concentrated load of **200 lbf (0.89 kN)** applied in any direction.
 - 3) Uniform and concentrated loads need not be assumed to act concurrently.
 - c. Infill of Guards:
 - 1) Concentrated load of **50 lbf (0.22 kN) OR 200 lbf (0.89 kN), as directed,** applied horizontally on an area of **1 sq. ft. (0.093 sq. m).**
 - 2) Uniform load of **25 lbf/sq. ft. (1.2 kN/sq. m)** applied horizontally.
 - 3) Infill load and other loads need not be assumed to act concurrently.
4. Seismic Performance: Fabricated spiral stairs shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. Component Importance Factor is **1.5 OR 1.0, as directed.**
5. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.

D. Submittals

1. Product Data: For each type of product indicated.

2. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
3. Shop Drawings.
4. Samples: For the following products, in manufacturer's standard sizes:
 - a. Treads.
 - b. Metal with painted finish.
 - c. Railing members.
5. Delegated-Design Submittal: For fabricated spiral stairs indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Welding certificates.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.2 PRODUCTS

A. Materials

1. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
2. Brackets, Flanges, and Anchors: Same metal and finish as supported item unless otherwise indicated.
3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
4. Steel Bars for Grating Treads and Platforms: ASTM A 36/A 36M or ASTM A 1011/A 1011M.
5. Wire Rod for Grating Crossbars: **ASTM A 510 (ASTM A 510M)**.
6. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or Grade D.
7. Steel Pipe Columns: ASTM A 53/A 53M, Schedule 40. Provide Schedule 80 for columns larger than **NPS 4 (DN 100)** and where required to support loads.
8. Steel Pipe Railings: ASTM A 53/A 53M, Schedule 40.
9. Steel Tubing: Either cold-formed steel tubing complying with ASTM A 500 or mandrel-drawn mechanical tubing complying with ASTM A 513, Type 5.
10. Iron Castings: Either gray iron complying with ASTM A 48/A 48M or malleable iron complying with ASTM A 47/A 47M unless otherwise indicated or required by structural loads.
11. Aluminum Sheet and Plate: **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6.
12. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
13. Aluminum Pipe and Structural Round Tubing: ASTM B 429, Alloy 6063-T6.
14. Extruded-Aluminum Tubing: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5/T52.
15. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.0-F.
16. Extruded-Bronze Handrails: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
17. Seamless Bronze Tubing: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C23000 (red brass, 85 percent copper).
18. Seamless Brass Tubing: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
19. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.

B. Miscellaneous Materials

1. Fasteners: For connecting stair components and for anchoring stairs to other construction, select fasteners of the type, grade, and class required to produce connections capable of withstanding design loadings.
 - a. For aluminum, provide fasteners fabricated from Type 304 stainless steel.
 - b. For steel and cast iron, use plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
2. Lacquer for Copper Alloys: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products.
3. Shop Primers: Provide primers that comply with Division 09 Section(s) "Exterior Painting" OR "Interior Painting" **as directed**.
4. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with finish paint systems indicated.
5. Shop Primer for Galvanized Steel: Primer formulated for use over zinc-coated metal and compatible with finish paint systems indicated.
6. Shop Primer for Aluminum: Primer formulated for use over aluminum and compatible with finish paint systems indicated.
7. Wood for Stair Treads, Handrails, and Platforms: Unless directed otherwise, laminated red oak, sanded to 120-grit smoothness. Apply uniform coat of manufacturer's standard clear sealer.
8. Rubber Wearing Surfaces: Manufacturer's standard, **1/4-inch- (6-mm-)** thick, molded-rubber covering in pattern and color indicated or, if not indicated, as selected by the Owner from manufacturer's standard colors and patterns.

C. Fabrication

1. Assemble spiral stairs in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
2. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
3. Form work true to line and level with accurate angles and surfaces.
4. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
5. Cut, reinforce, drill, and tap as needed to receive hardware, screws, and similar items.
6. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove flux immediately.
 - d. Provide Type 1 **OR** Type 2 **OR** Type 3, **as directed**, welds according to NOMMA Guideline 1, "Joint Finishes."
 - e. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and, except for fillet welds, welded surface matches contours of adjoining surfaces.
7. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
8. Fabricate center column from steel **OR** aluminum, **as directed**, pipe welded to baseplate for anchorage to floor structure. Brace column at upper floors by means of landings attached to column and floor structure unless otherwise indicated. Provide cap for column if top is exposed.
9. Provide cast-aluminum **OR** cast-iron, **as directed**, treads and platforms, **as directed**, with integral frames, legs, and hubs.
 - a. Provide treads and platforms, **as directed**, with abrasive surfaces.
10. Provide steel-bar grating treads and platforms, **as directed**, with welded hubs and as follows:
 - a. Radial grating treads.

- OR
Abrasive OR Rolled-steel, floor-plate, **as directed**, nosings.
- OR
Straight flanges and welded-on legs.
- OR
Tapered flanges without legs.
11. Provide formed steel OR aluminum, **as directed**, -plate treads and platforms, **as directed**, welded to hubs or center column and as follows:
- a. Straight flanges and welded-on legs.
- OR
Tapered flanges without legs.
- OR
Pan treads without legs.
- OR
One-piece treads and risers, without legs.
- OR
Rolled-steel, floor-plate wearing surfaces.
- OR
Aluminum-alloy, rolled tread-plate wearing surfaces.
- OR
Smooth steel-plate wearing surfaces.
- OR
Rubber wearing surfaces.
- OR
Plywood subread for covering with finish flooring specified in another Section.
12. Provide steel-framed treads and platforms, **as directed**, welded to hubs or center column and without legs; wearing surface as follows:
- a. Cast iron with integral abrasive.
- OR
Smooth steel plate with integral abrasive.
- OR
Wood.
- OR
Plywood insert for covering with finish flooring specified in another Section.
13. Railings: Provide railing system indicated, uniformly bent to spiral shape, and continuing at top to form guardrail around floor opening.
- a. Space balusters less than 4 inches (102 mm), clear.
- OR
Space balusters to provide one baluster per tread, but spaced less than 21 inches (533 mm), clear.
- b. Space intermediate rails less than 4 inches (101 mm) OR 21 inches (533 mm), **as directed**, clear.
- c. Locate bottom rail so that a 6-inch- (152-mm-) diameter sphere cannot pass between the stair and rail.
- d. Fabricate top rail from 1-1/4- to 2-inch- (32- to 51-mm-) OD steel pipe or round tubing.
- OR
Fabricate top rail from steel of shape and size indicated.
- OR
Fabricate top rail from 1-1/4- to 2-inch- (32- to 51-mm-) OD round aluminum OR bronze OR brass OR stainless-steel, **as directed**, tubing.
- OR
Fabricate top rail from extruded bronze of shape and size indicated.
- OR
Fabricate top rail from wood of shape and size indicated.

- e. Fabricate balusters from **7/8-inch- (22-mm-)** OD **OR 1-inch- (25-mm-)** OD **OR 1-1/4-inch- (32-mm-)** OD steel pipe or round tubing.
OR
 Fabricate balusters from **1/2-inch- (13-mm-)** OD **OR 5/8-inch- (16-mm-)** OD round steel bars **OR** tubing, **as directed**.
OR
 Fabricate balusters from **1/2-inch- (13-mm-)** **OR 5/8-inch- (16-mm-)** **OR 3/4-inch- (19-mm-)**, **as directed**, square steel bars **OR** tubing, **as directed**.
OR
 Fabricate balusters from **5/8-inch- (16-mm-)** OD **OR 3/4-inch- (19-mm-)** OD, **as directed**, round aluminum tubing.
- f. Fabricate intermediate rails from **7/8-inch- (22-mm-)** OD **OR 1-inch- (25-mm-)** OD **OR 1-1/4-inch- (32-mm-)** OD, **as directed**, steel pipe or round tubing.
OR
 Fabricate intermediate rails from steel pipe or round tubing same size as top rail.
OR
 Fabricate intermediate rails from **5/8-inch- (16-mm-)** OD **OR 3/4-inch- (19-mm-)** OD, **as directed**, round steel bars **OR** tubing, **as directed**.
OR
 Fabricate intermediate rails from **5/8-inch- (16-mm-)** OD **OR 3/4-inch- (19-mm-)** OD **OR 1-inch- (25-mm-)** OD **OR 1-1/4-inch- (32-mm-)** OD, **as directed**, round aluminum tubing.
OR
 Fabricate intermediate rails from round aluminum tubing same size as top rail.

D. Steel And Iron Finishes

- 1. Galvanized Finish: Hot-dip galvanize stairs after fabrication to comply with ASTM A 123/A 123M.
- 2. Preparation for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- 3. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC's surface-preparation specifications and environmental exposure conditions of installed stairs:
 - a. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Interiors (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
- 4. Apply shop primer to prepared surfaces of handrails and railing components unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

E. Aluminum Finishes

- 1. Conversion-Coated and Factory-Primed Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid chromate-fluoride-phosphate conversion coating; Organic Coating: shop primer).
 - a. Apply shop primer with a minimum dry film thickness of **1.5 mils (0.04 mm)**.
- 2. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected by the Owner from manufacturer's full range.

F. Stainless-Steel Finishes

- 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- 2. Polished Finishes: Grind and polish surfaces to produce uniform finish indicated, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
 - d. Reflective, Directional Polish: No. 7.

- e. Mirrorlike Reflective, Nondirectional Polish: No. 8.

G. Copper-Alloy Finishes

1. Finish designations for copper alloys comply with the system established for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
2. Buffed Finish: M21 (Mechanical Finish: buffed, smooth specular).
3. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below).
4. Medium-Satin Finish, Lacquered: M32-O6x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below).
 - a. Clear Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
5. Statuary Conversion Coating over Satin Finish: M31-C55 (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide).
 - a. Color: Match the Owner's sample.

1.3 EXECUTION

A. Installation

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where needed for securing fabricated spiral stairs to in-place construction; include threaded fasteners for concrete and masonry inserts, through bolts, lag bolts, wood screws, and other connectors as required.
2. Assemble fabricated spiral stair components to comply with manufacturer's written instructions, with each component aligned and in correct relation to each other, securely anchored to the supporting column and adjacent structure.
3. Do not cut, alter, or drill stair components in the field that do not fit properly. Return components that do not fit to manufacturer for adjustment.
4. Install fabricated spiral stairs accurately in location, alignment, and elevation; level and plumb; and according to manufacturer's written instructions.
5. Install fabricated spiral stairs by welding to steel structure or to weld plates cast into concrete unless otherwise indicated.
6. Field Welding:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

B. Cleaning And Protection

1. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint and paint exposed areas with same material.
2. For galvanized surfaces, clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780.
 - a. Paint repaired areas with same material used for shop painting.
3. Protect finished tread surfaces during construction by covering with **1/2-inch- (13-mm-)** thick plywood secured with plastic strapping or another nonmarring fastening method.

END OF SECTION 05 51 13 00a

Task	Specification	Specification Description
05 51 13 00	05 50 00 00	Metal Fabrications
05 51 19 00	05 50 00 00	Metal Fabrications
05 51 19 00	05 51 13 00	Metal Stairs
05 51 19 00	05 51 13 00a	Fabricated Spiral Stairs
05 51 33 13	05 50 00 00	Metal Fabrications
05 51 33 13	05 52 13 00	Pipe And Tube Railings
05 51 33 16	05 50 00 00	Metal Fabrications
05 51 33 23	05 50 00 00	Metal Fabrications
05 51 33 23	05 52 13 00	Pipe And Tube Railings

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SECTION 05 52 13 00 - PIPE AND TUBE RAILINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for pipe and tube railings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Steel pipe and tube railings.
 - b. Aluminum pipe and tube railings.
 - c. Stainless-steel pipe and tube railings.

C. Performance Requirements

1. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - a. Steel: 72 percent of minimum yield strength.
 - b. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
 - c. Stainless Steel: 60 percent of minimum yield strength.
3. Structural Performance: Railings shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated. Following loads are examples only and are based on the 2006 International Building Code (IBC).
 - a. Handrails and Top Rails of Guards:
 - 1) Uniform load of **50 lbf/ ft. (0.73 kN/m)** applied in any direction.
 - 2) Concentrated load of **200 lbf (0.89 kN)** applied in any direction.
 - 3) Uniform and concentrated loads need not be assumed to act concurrently.
 - b. Infill of Guards:
 - 1) Concentrated load of **50 lbf (0.22 kN)** applied horizontally on an area of **1 sq. ft. (0.093 sq. m)**.
 - 2) Infill load and other loads need not be assumed to act concurrently.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - a. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
5. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Submittals

1. Product Data: For the following:
 - a. Manufacturer's product lines of mechanically connected railings.
 - b. Railing brackets.
 - c. Grout, anchoring cement, and paint products.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

4. Samples: For each type of exposed finish required.
 - a. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - b. Fittings and brackets.
 - c. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - 1) Show method of finishing **OR** connecting, **as directed**, members at intersections.
5. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Qualification Data: For qualified professional engineer **OR** testing agency, .
7. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
8. Welding certificates.
9. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
10. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

E. Quality Assurance

1. Source Limitations: Obtain each type of railing from single source from single manufacturer.
2. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."

F. Project Conditions

1. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

G. Coordination And Scheduling

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
2. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
3. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

1.2 PRODUCTS

A. Metals, General

1. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
2. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

B. Steel And Iron

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
3. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - a. Provide galvanized finish for exterior installations and where indicated.
4. Plates, Shapes, and Bars: ASTM A 36/A 36M.
5. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
6. Expanded Metal: ASTM F 1267, Type I (expanded) **OR** Type II (expanded and flattened), **as directed**, Class 1 (uncoated).
 - a. Style Designation: 3/4 number 13 **OR** 1-1/2 number 10, **as directed**.
7. Perforated Metal: Cold-rolled steel sheet, ASTM A 1008/A 1008M, or hot-rolled steel sheet, ASTM A 1011/A 1011M, commercial steel Type B, **0.060 inch (1.52 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows.
8. Perforated Metal: Galvanized-steel sheet, ASTM A 653/A 653M, **G90 (Z275)** coating, commercial steel Type B, **0.064 inch (1.63 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows **OR** with **1/8-by-1-inch (3.2-by-25.4-mm)** round end slotted holes in staggered rows, **as directed**.
9. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, **2-inch (50-mm)** woven-wire mesh, made from **0.135-inch (3.5-mm)** nominal diameter wire complying with **ASTM A 510 (ASTM A 510M)**.

C. Aluminum

1. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
2. Extruded Bars and Tubing: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5/T52.
3. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
 - a. Provide Standard Weight (Schedule 40) pipe, unless otherwise indicated.
4. Drawn Seamless Tubing: **ASTM B 210 (ASTM B 210M)**, Alloy 6063-T832.
5. Plate and Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6.
6. Die and Hand Forgings: **ASTM B 247 (ASTM B 247M)**, Alloy 6061-T6.
7. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.
8. Perforated Metal: Aluminum sheet, **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6, **0.063 inch (1.60 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows.
9. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, **2-inch (50-mm)** woven-wire mesh, made from **0.162-inch (4.1-mm)** nominal diameter wire complying with **ASTM B 211 (ASTM B 211M)**, Alloy 6061-T94.

D. Stainless Steel

1. Tubing: ASTM A 554, Grade MT 304 **OR** Grade MT 316L, **as directed**.
2. Pipe: ASTM A 312/A 312M, Grade TP 304 **OR** Grade TP 316L, **as directed**.
3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20 **OR** Grade CF 8M or CF 3M, **as directed**.
4. Plate and Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** Type 316L, **as directed**.
5. Expanded Metal: ASTM F 1267, Type I (expanded) **OR** Type II (expanded and flattened), **as directed**, Class 3 (corrosion-resistant steel), made from stainless-steel sheet, ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** Type 316, **as directed**.
 - a. Style Designation: 3/4 number 13 **OR** 1-1/2 number 10, **as directed**.
6. Perforated Metal: Stainless-steel sheet, ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** Type 316L, **as directed**, **0.062 inch (1.59 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows.
7. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, **2-inch (50-mm)** woven-wire mesh, made from **0.135-inch (3.5-mm)** nominal diameter wire complying with ASTM A 580/A 580M, Type 304 **OR** Type 316, **as directed**.

E. Fasteners

1. General: Provide the following:
 - a. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5 for zinc coating.
 - b. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.
 - c. Aluminum Railings: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
 - d. Stainless-Steel Railings: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
2. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads, **as directed**.
3. Fasteners for Interconnecting Railing Components:
 - a. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
OR
Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 - b. Provide Phillips **OR** tamper-resistant **OR** square or hex socket, **as directed**, flat-head machine screws for exposed fasteners unless otherwise indicated.
4. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - a. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group **1 (A1) OR Group 2 (A4)**, **as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.

F. Miscellaneous Materials

1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - a. For aluminum and stainless-steel railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
2. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
3. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
4. Shop Primers: Provide primers that comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
5. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
6. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
7. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MPI#26 **OR** Vinyl wash primer complying with MPI#80 **OR** Water based galvanized metal primer complying with MPI#134, **as directed**.
8. Intermediate Coats and Topcoats: Provide products that comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
9. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
10. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

11. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
12. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
13. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - a. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

G. Fabrication

1. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
2. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
3. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
4. Form work true to line and level with accurate angles and surfaces.
5. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
6. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
7. Connections: Fabricate railings with welded **OR** nonwelded, **as directed**, connections unless otherwise indicated.
8. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove flux immediately.
 - d. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
9. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
10. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - a. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
11. Form changes in direction as follows:
 - a. As detailed.
OR
By bending or by inserting prefabricated elbow fittings.
OR
By flush bends or by inserting prefabricated flush-elbow fittings.
OR
By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
12. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
13. Close exposed ends of railing members with prefabricated end fittings.

14. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is **1/4 inch (6 mm)** or less.
15. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - a. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
16. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
17. For railing posts set in concrete, provide steel **OR** stainless-steel, **as directed**, sleeves not less than **6 inches (150 mm)** long with inside dimensions not less than **1/2 inch (13 mm)** greater than outside dimensions of post, with metal plate forming bottom closure.
18. For removable railing posts, fabricate slip-fit sockets from steel **OR** stainless-steel, **as directed**, tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - a. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
19. Expanded-Metal Infill Panels: Fabricate infill panels from expanded metal made from same metal as railings in which they are installed.
 - a. Edge panels with U-shaped channels made from metal sheet, of same metal as expanded metal and not less than **0.043 inch (1.1 mm)** thick.
 - b. Orient expanded metal with long dimension of diamonds parallel to top rail **OR** perpendicular to top rail **OR** horizontal **OR** vertical, **as directed**.
20. Perforated-Metal Infill Panels: Fabricate infill panels from perforated metal made from steel **OR** galvanized steel **OR** aluminum **OR** stainless steel **OR** same metal as railings in which they are installed, **as directed**.
 - a. Edge panels with U-shaped channels made from metal sheet, of same metal as perforated metal and not less than **0.043 inch (1.1 mm)** thick.
 - b. Orient perforated metal with pattern parallel to top rail **OR** perpendicular to top rail **OR** horizontal **OR** vertical **OR** as indicated on Drawings, **as directed**.
21. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into **1-by-1/2-by-1/8-inch (25-by-13-by-3-mm)** metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.
 - a. Orient wire mesh with diamonds vertical **OR** wires perpendicular and parallel to top rail **OR** wires horizontal and vertical, **as directed**.
22. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

H. Finishes, General

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
4. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

I. Steel And Iron Finishes

1. Galvanized Railings:

- a. Hot-dip galvanize steel **OR** exterior steel, **as directed**, and iron railings, including hardware, after fabrication.
OR
Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.
 - b. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - c. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
 - d. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - e. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
 2. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
 3. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
 4. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
 5. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" **OR** SSPC-SP 3, "Power Tool Cleaning" **OR** requirements indicated below, **as directed**:
 - a. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - c. Railings Indicated to Receive Primers Specified in Division 9 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - d. Other Railings: SSPC-SP 3, "Power Tool Cleaning."
 6. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - a. Shop prime uncoated railings with universal shop primer **OR** primers specified in Division 07, **as directed**, unless zinc-rich primer is **OR** primers specified in Division 09 Section "High-performance Coatings" are, **as directed**, indicated.
 - b. Do not apply primer to galvanized surfaces.
 7. Shop-Painted Finish: Comply with Division 09 Section(s) "Exterior Painting" **OR** "High-performance Coatings", **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 8. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- J. Aluminum Finishes
1. Mechanical Finish: AA-M12 (Mechanical Finish: nonspecular as fabricated).
 2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
 4. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

- a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
5. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

OR

 High-Performance Organic Finish: Three **OR** Four, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

K. Stainless-Steel Finishes

1. Remove tool and die marks and stretch lines, or blend into finish.
2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
3. 180-Grit Polished Finish: Oil-ground, uniform, directionally textured finish.
4. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
5. Polished and Buffed Finish: Oil-ground, 180-grit finish followed by buffing.
6. Directional Satin Finish: No. 4.
7. Dull Satin Finish: No. 6.
8. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1.3 EXECUTION

A. Examination

1. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

B. Installation, General

1. Fit exposed connections together to form tight, hairline joints.
2. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - a. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - b. Set posts plumb within a tolerance of **1/16 inch in 3 feet (2 mm in 1 m)**.
 - c. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed **1/4 inch in 12 feet (5 mm in 3 m)**.
3. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
4. Adjust railings before anchoring to ensure matching alignment at abutting joints.
5. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

C. Railing Connections

1. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
 2. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.
 3. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending **2 inches (50 mm)** beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within **6 inches (150 mm)** of post.
- D. Anchoring Posts
1. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
 2. Form or core-drill holes not less than **5 inches (125 mm)** deep and **3/4 inch (20 mm)** larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
 3. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material **OR** attached to post with set screws, **as directed**.
OR
Leave anchorage joint exposed with **1/8-inch (3-mm)** buildup, sloped away from post **OR** anchoring material flush with adjacent surface, **as directed**.
 4. Anchor posts to metal surfaces with oval flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - a. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.
 - b. For stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
 - c. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
 5. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.
- E. Attaching Railings
1. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends or connected to railing ends using nonwelded connections.
 2. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.
 3. Attach railings to wall with wall brackets, except where end flanges are used. Provide brackets with **1-1/2-inch (38-mm)** clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt **OR** predrilled hole for exposed bolt anchorage, **as directed**.
 - b. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 4. Secure wall brackets and railing end flanges to building construction as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated, **as directed**, wood backing between studs. Coordinate with stud installation to locate backing members.
- OR**

For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

OR

For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

F. Adjusting And Cleaning

1. Clean aluminum and stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.
2. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.
3. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
4. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

G. Protection

1. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Final Completion.

END OF SECTION 05 52 13 00

Task	Specification	Specification Description
05 52 13 00	05 50 00 00	Metal Fabrications

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SECTION 05 53 13 00 - GRATINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gratings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Metal bar gratings.
 - b. Expanded-metal gratings.
 - c. Formed-metal plank gratings.
 - d. Extruded-aluminum plank gratings.
 - e. Glass-fiber-reinforced plastic gratings.
 - f. Metal frames and supports for gratings.

C. Performance Requirements

1. Delegated Design: Design gratings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Gratings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.
 - a. Loads in subparagraphs below are examples based on the 2006 International Building Code and ASCE/SEI 7. Adjust to local Project requirements.
 - 1) Floors (light manufacturing): Uniform load of **125 lbf/sq. ft. (6.00 kN/sq. m)** or concentrated load of **2000 lbf (8.90 kN)**, whichever produces the greater stress.
 - 2) Floors (heavy manufacturing): Uniform load of **250 lbf/sq. ft. (11.97 kN/sq. m)** or concentrated load of **3000 lbf (13.40 kN)**, whichever produces the greater stress.
 - 3) Walkways and Elevated Platforms Other Than Exits: Uniform load of **60 lbf/sq. ft. (2.87 kN/sq. m)**.
 - 4) Walkways and Elevated Platforms Used as Exits: Uniform load of **100 lbf/sq. ft. (4.79 kN/sq. m)**.
 - 5) Sidewalks and Vehicular Driveways, Subject to Trucking: Uniform load of **250 lbf/sq. ft. (11.97 kN/sq. m)** or concentrated load of **8000 lbf (35.60 kN)**, whichever produces the greater stress.
 - 6) Limit deflection to **L/240 OR L/360, as directed**, or **1/4 inch (6.4 mm)**, whichever is less.
3. Seismic Performance: Provide gratings capable of withstanding the effects of earthquake motions determined according to ASCE/SEI 7.

D. Submittals

1. Product Data: For the following:
 - a. Formed-metal plank gratings.
 - b. Extruded-aluminum plank gratings.
 - c. Glass-fiber-reinforced plastic gratings.
 - d. Clips and anchorage devices for gratings.
 - e. Paint products.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
3. Shop Drawings: Include plans, sections, details, and attachments to other work.

4. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Qualification Data: For qualified professional engineer.
6. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
7. Welding certificates.
8. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

E. Quality Assurance

1. Metal Bar Grating Standards: Comply with NAAMM MBG 531, "Metal Bar Grating Manual" and NAAMM MBG 532, "Heavy-Duty Metal Bar Grating Manual."
2. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - d. AWS D1.6, "Structural Welding Code - Stainless Steel."

F. Project Conditions

1. Field Measurements: Verify actual locations of walls and other construction contiguous with gratings by field measurements before fabrication.

G. Coordination

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
2. Coordinate installation of anchorages for gratings, grating frames, and supports. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.2 PRODUCTS

A. Ferrous Metals

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Steel Bars for Bar Gratings: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
4. Wire Rod for Bar Grating Crossbars: **ASTM A 510 (ASTM A 510M)**.
5. Uncoated Steel Sheet: ASTM A 1011/A 1011M, structural steel, **Grade 30 (Grade 205)**.
6. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, **Grade 33 (Grade 230)**, with **G90 (Z275)** coating.
7. Expanded-Metal Carbon Steel: ASTM F 1267, Class 1.
8. Expanded-Metal Galvanized Steel: ASTM F 1267, Class 2, Grade A.
9. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304 **OR** Type 316, **as directed**.
10. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304 **OR** Type 316, **as directed**.
11. Expanded-Metal Stainless Steel: ASTM F 1267, Class 3, made from stainless-steel sheet, ASTM A 666, Type 304 **OR** Type 316, **as directed**.

B. Aluminum

1. Aluminum, General: Provide alloy and temper recommended by aluminum producer for type of use indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.
 2. Extruded Bars and Shapes: **ASTM B 221 (ASTM B 221M)**, alloys as follows:
 - a. 6061-T6 or 6063-T6, for bearing bars of gratings and shapes.
 - b. 6061-T1, for grating crossbars.
 3. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 5052-H32.
- C. Fasteners
1. General: Unless otherwise indicated, provide Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - a. Provide stainless-steel fasteners for fastening aluminum.
 - b. Provide stainless steel fasteners for fastening stainless steel.
 2. Steel Bolts and Nuts: Regular hexagon-head bolts, **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with hex nuts, **ASTM A 563 (ASTM A 563M)**; and, where indicated, flat washers.
 3. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts, and, where indicated, flat washers; **ASTM F 593 (ASTM F 738M)** for bolts and **ASTM F 594 (ASTM F 836M)** for nuts, Alloy Group **1 (A1) OR Group 2 (A4)**, **as directed**.
 4. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, **ASTM A 563 (ASTM A 563M)**; and, where indicated, flat washers.
 - a. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
 5. Plain Washers: Round, **ASME B18.22.1 (ASME B18.22M)**.
 6. Lock Washers: Helical, spring type, **ASME B18.21.1 (ASME B18.21.2M)**.
 7. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group **1 (A1) OR Group 2 (A4)**, **as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.
- D. Miscellaneous Materials
1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy that is welded.
 2. Shop Primers: Provide primers that comply with Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
 3. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
 4. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
 5. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
 6. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Fabrication
1. Shop Assembly: Fabricate grating sections in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling

limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

2. Cut, drill, and punch material cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
3. Form from materials of size, thickness, and shapes indicated, but not less than that needed to support indicated loads.
4. Fit exposed connections accurately together to form hairline joints.
5. Welding: Comply with AWS recommendations and the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
6. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space the anchoring devices to secure gratings, frames, and supports rigidly in place and to support indicated loads.
 - a. Fabricate toeplates to fit grating units and weld to units in shop unless otherwise indicated.
OR
Fabricate toeplates for attaching in the field.
 - b. Toeplate Height: **4 inches (100 mm)** unless otherwise indicated.

F. Metal Bar Gratings

1. Welded Steel Grating:
 - a. Bearing Bar Spacing: **7/16 or 1/2 inch (11 or 13 mm) OR 11/16 inch (17 mm) OR 15/16 inch (24 mm) OR 1-3/16 inches (30 mm) OR 1-3/8 inches (35 mm) OR 1-7/8 inches (48 mm) OR 2-3/8 inches (60 mm), as directed, o.c.**
 - b. Bearing Bar Depth: **3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm) OR 3 inches (76 mm) OR 3-1/2 inches (89 mm) OR 4 inches (102 mm) OR 4-1/2 inches (114 mm) OR 5 inches (127 mm) OR As required to comply with structural performance requirements, as directed.**
 - c. Bearing Bar Thickness: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR 1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR As required to comply with structural performance requirements, as directed.**
 - d. Crossbar Spacing: **2 inches (51 mm) OR 4 inches (102 mm), as directed, o.c.**
 - e. Grating Mark W-11-4 (1 x 3/16) STEEL: **1-by-3/16-inch (25-by-4.8-mm) bearing bars at 11/16 inch (18 mm) o.c., and crossbars at 4 inches (102 mm) o.c.**
 - f. Grating Mark W-15-4 (1 x 1/8) STEEL: **1-by-1/8-inch (25-by-3.2-mm) bearing bars at 15/16 inch (24 mm) o.c., and crossbars at 4 inches (102 mm) o.c.**
 - g. Grating Mark W-19-4 (1-1/4 x 3/16) STEEL: **1-1/4-by-3/16-inch (32-by-4.8-mm) bearing bars at 1-3/16 inches (30 mm) o.c., and crossbars at 4 inches (102 mm) o.c.**
 - h. Grating Mark W-19-4 (1-1/2 x 3/16) STEEL: **1-1/2-by-3/16-inch (38-by-4.8-mm) bearing bars at 1-3/16 inches (30 mm) o.c., and crossbars at 4 inches (102 mm) o.c.**
 - i. Grating Mark W-19-4 (2 x 1/4) STEEL: **2-by-1/4-inch (51-by-6.4-mm) bearing bars at 1-3/16 inches (30 mm) o.c., and crossbars at 4 inches (102 mm) o.c.**
 - j. Grating Mark W-30-4 (5 x 3/8) STEEL: **5-by-3/8-inch (127-by-9.5-mm) bearing bars at 1-7/8 inches (60 mm) o.c., and crossbars at 4 inches (102 mm) o.c.**
 - k. Grating Mark: As indicated.
 - l. Traffic Surface: Plain **OR** Serrated **OR** Knurled **OR** Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive **OR** As indicated, **as directed.**
 - m. Steel Finish: Shop primed **OR** Hot-dip galvanized with a coating weight of not less than **1.8 oz./sq. ft. (550 g/sq. m)** of coated surface, **as directed.**
2. Pressure-Locked Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.

- a. Bearing Bar Spacing: **7/16 or 1/2 inch (11 or 13 mm) OR 11/16 inch (17 mm) OR 15/16 inch (24 mm) OR 1-3/16 inches (30 mm), as directed**, o.c.
 - b. Bearing Bar Depth: **3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - c. Bearing Bar Thickness: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - d. Crossbar Spacing: **2 inches (51 mm) OR 4 inches (102 mm), as directed**, o.c.
 - e. Grating Mark P-11-4 (1 x 3/16) STEEL: **1-by-3/16-inch (25-by-4.8-mm)** bearing bars at **11/16 inch (18 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - f. Grating Mark P-15-4 (1-1/4 x 1/8) STEEL: **1-1/4-by-1/8-inch (32-by-3.2-mm)** bearing bars at **15/16 inch (24 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - g. Grating Mark P-19-4 (1-1/2 x 3/16) STEEL: **1-1/2-by-3/16-inch (38-by-4.8-mm)** bearing bars at **1-3/16 inches (30 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - h. Grating Mark: As indicated.
 - i. Traffic Surface: Plain **OR** Serrated **OR** Knurled **OR** Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive **OR** As indicated, **as directed**.
 - j. Steel Finish: Shop primed **OR** Hot-dip galvanized with a coating weight of not less than **1.8 oz./sq. ft. (550 g/sq. m)** of coated surface, **as directed**.
3. Riveted Steel Grating:
- a. Bearing Bar Spacing: **3/4 inch (19 mm) OR 1-1/8 inches (29 mm) OR 2-5/16 inches (59 mm), as directed**, clear.
 - b. Bearing Bar Depth: **3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm) OR 3 inches (76 mm) OR 3-1/2 inches (89 mm) OR 4 inches (102 mm) OR 4-1/2 inches (114 mm) OR 5 inches (127 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - c. Bearing Bar Thickness: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR 1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - d. Rivet Spacing: **3-1/2 inches (89 mm) OR 5 inches (127 mm) OR 7 inches (178 mm), as directed**, o.c. along bearing bar.
 - e. Grating Mark R-12-3-1/2 (1 x 1/8) STEEL: **1-by-1/8-inch (25-by-3.2-mm)** bearing bars with **3/4-inch (19-mm)** clear space between bearing bars, and rivets at **3-1/2 inches (89 mm)** o.c. along bearing bar.
 - f. Grating Mark R-18-7 (1-1/2 x 3/16) STEEL: **1-1/2-by-3/16-inch (38-by-4.8-mm)** bearing bars with **1-1/8-inch (29-mm)** clear space between bearing bars, and rivets at **7 inches (178 mm)** o.c. along bearing bar.
 - g. Grating Mark R-37-5 (4 x 1/4) STEEL: **4-by-1/4-inch (102-by-6.4-mm)** bearing bars with **2-5/16-inch (59-mm)** clear space between bearing bars, and rivets at **5 inches (127 mm)** o.c. along bearing bar.
 - h. Grating Mark R-37-5 (5 x 3/8) STEEL: **5-by-3/8-inch (127-by-9.5-mm)** bearing bars with **2-5/16-inch (59-mm)** clear space between bearing bars, and rivets at **5 inches (127 mm)** o.c. along bearing bar.
 - i. Grating Mark: As indicated.
 - j. Traffic Surface: Plain **OR** Serrated **OR** Knurled **OR** Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive **OR** As indicated, **as directed**.
 - k. Steel Finish: Shop primed **OR** Hot-dip galvanized with a coating weight of not less than **1.8 oz./sq. ft. (550 g/sq. m)** of coated surface, **as directed**.
4. Pressure-Locked, Stainless-Steel Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars, **as directed**.
- a. Bearing Bar Spacing: **7/16 or 1/2 inch (11 or 13 mm) OR 11/16 inch (17 mm) OR 15/16 inch (24 mm) OR 1-3/16 inches (30 mm) OR 1-3/8 inches (35 mm) OR 1-7/8 inches (48 mm) OR 2-3/8 inches (60 mm), as directed**, o.c.

- b. Bearing Bar Depth: **3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm) OR 3 inches (76 mm) OR 3-1/2 inches (89 mm) OR 4 inches (102 mm) OR 4-1/2 inches (114 mm) OR 5 inches (127 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - c. Bearing Bar Thickness: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR 1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - d. Crossbar Spacing: **2 inches (51 mm) OR 4 inches (102 mm), as directed**, o.c.
 - e. Grating Mark P-11-4 (1 x 3/16) STAINLESS STEEL: **1-by-3/16-inch (25-by-4.8-mm)** bearing bars at **11/16 inch (18 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - f. Grating Mark P-15-2 (1 x 1/8) STAINLESS STEEL: **1-by-1/8-inch (25-by-3.2-mm)** bearing bars at **15/16 inch (24 mm)** o.c., and crossbars at **2 inches (51 mm)** o.c.
 - g. Grating Mark P-19-4 (1-1/2 x 3/16) STAINLESS STEEL: **1-1/2-by-3/16-inch (38-by-4.8-mm)** bearing bars at **1-3/16 inches (30 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - h. Grating Mark P-30-4 (3 x 3/8) STAINLESS STEEL: **3-by-3/8-inch (76-by-9.5-mm)** bearing bars at **1-7/8 inches (48 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - i. Grating Mark: As indicated.
 - j. Traffic Surface: Plain **OR** Serrated **OR** Knurled **OR** Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive **OR** As indicated, **as directed**.
 - k. Finish: Mill finish **OR** Abrasive blasted **OR** Electropolished, **as directed**.
5. Pressure-Locked, Rectangular Bar Aluminum Grating: Fabricated by pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.
- a. Bearing Bar Spacing: **7/16 or 1/2 inch (11 or 13 mm) OR 11/16 inch (17.5 mm) OR 15/16 inch (24 mm) OR 1-3/16 inches (30 mm), as directed**, o.c.
 - b. Bearing Bar Depth: **1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - c. Bearing Bar Thickness: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR 1/4 inch (6.4 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - d. Crossbar Spacing: **2 inches (51 mm) OR 4 inches (102 mm), as directed**, o.c.
 - e. Grating Mark P-7-4 (1 x 1/8) ALUMINUM: **1-by-1/8-inch (25-by-3.2-mm)** bearing bars at **7/16 inch (11 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - f. Grating Mark P-11-4 (1 x 3/16) ALUMINUM: **1-by-3/16-inch (25-by-4.8-mm)** bearing bars at **11/16 inch (18 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - g. Grating Mark P-15-4 (1-1/2 x 3/16) ALUMINUM: **1-1/2-by-3/16-inch (38-by-4.8-mm)** bearing bars at **15/16 inch (24 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - h. Grating Mark P-19-4 (2 x 3/16) ALUMINUM: **2-by-3/16-inch (51-by-4.8-mm)** bearing bars at **1-3/16 inches (30 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - i. Grating Mark: As indicated.
 - j. Traffic Surface: Plain **OR** Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive **OR** As indicated, **as directed**.
 - k. Aluminum Finish: Mill finish **OR** Class I, clear, anodized finish, **as directed**.
6. Pressure-Locked, Aluminum I-Bar Grating: Fabricated by swaging crossbars between bearing bars.
- a. Bearing Bar Spacing: **7/16 or 1/2 inch (11 or 13 mm) OR 11/16 inch (17 mm) OR 15/16 inch (24 mm) OR 1-3/16 inches (30 mm), as directed**, o.c.
 - b. Bearing Bar Depth: **1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm) OR** As required to comply with structural performance requirements, **as directed**.
 - c. Bearing Bar Flange Width: **1/4 inch (6.4 mm)**.
 - d. Crossbar Spacing: **2 inches (51 mm) OR 4 inches (102 mm), as directed**, o.c.
 - e. Grating Mark P-11-4 (1 I-Bar) ALUMINUM: **1-inch (25-mm) I-bar** bearing bars at **11/16 inch (18 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.

- f. Grating Mark P-15-2 (1 I-Bar) ALUMINUM: **1-inch (25-mm)** I-bar bearing bars at **15/16 inch (24 mm)** o.c., and crossbars at **2 inches (51 mm)** o.c.
 - g. Grating Mark P-19-4 (1-1/2 I-Bar) ALUMINUM: **1-1/2-inch (38-mm)** I-bar bearing bars at **1-3/16 inches (30 mm)** o.c., and crossbars at **4 inches (102 mm)** o.c.
 - h. Grating Mark: As indicated.
 - i. Traffic Surface: Plain **OR** Grooved **OR** Applied abrasive finish consisting of aluminum-oxide aggregate in an epoxy-resin adhesive **OR** As indicated, **as directed**.
 - j. Aluminum Finish: Mill finish **OR** Class I, clear, anodized finish, **as directed**.
7. Removable Grating Sections: Fabricate with banding bars attached by welding to entire perimeter of each section. Include anchors and fasteners of type indicated or, if not indicated, as recommended by manufacturer for attaching to supports.
- a. Provide no fewer than four weld lugs for each heavy-duty grating section, with each lug shop welded to two bearing bars.
 - b. Provide no fewer than four saddle clips for each grating section composed of rectangular bearing bars **3/16 inch (4.8 mm)** or less in thickness and spaced **15/16 inch (24 mm)** or more o.c., with each clip designed and fabricated to fit over two bearing bars.
 - c. Provide no fewer than four weld lugs for each grating section composed of rectangular bearing bars **3/16 inch (4.8 mm)** or less in thickness and spaced less than **15/16 inch (24 mm)** o.c., with each lug shop welded to three or more bearing bars. Interrupt intermediate bearing bars as necessary for fasteners securing grating to supports.
 - d. Provide no fewer than four flange blocks for each section of aluminum I-bar grating, with block designed to fit over lower flange of I-shaped bearing bars.
 - e. Furnish threaded bolts with nuts and washers for securing grating to supports.
 - f. Furnish self-drilling fasteners with washers for securing grating to supports.
 - g. Furnish galvanized malleable-iron flange clamp with galvanized bolt for securing grating to supports. Furnish as a system designed to be installed from above grating by one person.
8. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
- a. Edge-band openings in grating that interrupt four or more bearing bars with bars of same size and material as bearing bars.
9. Do not notch bearing bars at supports to maintain elevation.
- G. Expanded-Metal Gratings
1. Provide expanded-metal gratings in material, finish, style, size, thickness, weight, and type indicated or, if not indicated, as recommended by manufacturer for indicated applications and as needed to support indicated loads.
 - a. Material: Steel **OR** Stainless steel **OR** Aluminum, **as directed**.
 - b. Steel Finish: Unfinished, oiled **OR** Shop primed **OR** Galvanized, **as directed**.
 - c. Stainless-Steel Finish: Mill finish, as fabricated.
 - d. Aluminum Finish: Mill finish, as fabricated.
 - e. Style Designation (for steel): 4.27 lb **OR** 3/4 number 9, **as directed**.
 - f. Style Designation (for stainless steel): 1-1/2 number 9 **OR** 3/4 number 9, **as directed**.
 - g. Size (for aluminum): 2 lb **OR** 3/4 0.188 **OR** 1-1/2 0.125, **as directed**.
 - h. Type: I, expanded **OR** II, expanded and flattened, **as directed**.
 2. Fabricate cutouts in grating sections for penetrations of sizes and at locations indicated. Cut openings neatly and accurately to size. Edge-band openings with bars having a thickness not less than overall grating thickness at contact points.
 3. Where gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld a strap collar not less than **1/8 inch (3 mm)** thick to the cut ends. Divide panels into sections only to extent required for installation where grating platforms and runways are to be placed around previously installed pipe, ducts, and structural members.
- H. Formed-Metal Plank Gratings
1. C-shaped channels rolled from heavy sheet metal of thickness indicated, and punched in serrated diamond shape to produce raised slip-resistant surface and drainage holes.

- a. Channel Width: 4-3/4 inches (121 mm) OR 7 inches (178 mm) OR 9-1/2 inches (241 mm) OR 11-3/4 inches (298 mm) OR 18-3/4 inches (476 mm) OR 24 inches (610 mm) OR As indicated OR As required to comply with structural performance requirements, **as directed**.
 - b. Channel Depth: 1-1/2 inches (38 mm) OR 2 inches (51 mm) OR 2-1/2 inches (64 mm) OR 3 inches (76 mm) OR As indicated OR As required to comply with structural performance requirements, **as directed**.
 - c. Material: 0.074-inch- (1.9-mm-) thick steel sheet, shop primed OR 0.104-inch- (2.65-mm-) thick steel sheet, shop primed OR 0.079-inch- (2.0-mm-) thick, hot-dip galvanized-steel sheet OR 0.108-inch- (2.8-mm-) thick, hot-dip galvanized-steel sheet OR 0.074-inch- (1.9-mm-) thick steel sheet, hot-dip galvanized after fabrication OR 0.104-inch- (2.65-mm-) thick steel sheet, hot-dip galvanized after fabrication OR 0.062-inch- (1.6-mm-) thick, stainless-steel sheet OR 0.078-inch- (2.0-mm-) thick, stainless-steel sheet OR 0.080-inch- (2.0-mm-) thick aluminum sheet OR 0.100-inch- (2.5-mm-) thick aluminum sheet, **as directed**.
2. Fabricate cutouts in grating sections for penetrations of sizes and at locations indicated. Cut openings neatly and accurately to size. Edge-band openings with metal sheet or bars having a thickness not less than grating material.
 3. Where gratings are pierced by pipes, ducts, and structural members, cut openings neatly and accurately to size and weld a strap collar not less than 1/8 inch (3 mm) thick to the cut ends. Divide panels into sections only to extent required for installation where grating platforms and runways are to be placed around previously installed pipe, ducts, and structural members.
- I. Extruded-Aluminum Plank Gratings
1. Provide extruded-aluminum plank gratings in type, size, and finish indicated or, if not indicated, as recommended by manufacturer for indicated applications and as needed to support indicated loads.
 - a. Type: Extruded-aluminum planks approximately 6 inches (152 mm) wide with multiple flanges approximately 1.2 inches (30 mm) o.c., acting as bearing bars connected by a web that serves as a walking surface. Top surface has raised ribs to increase slip resistance.
 - b. Depth: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (51 mm) OR As required to comply with structural performance requirements, **as directed**.
 - c. Perforations: None OR Rectangular, 19/32 by 3 inches (15 by 76 mm), with adjacent rows staggered OR 19/32 inch (15 mm) square, with adjacent rows aligned, **as directed**.
 - d. Finish: Mill finish, as fabricated.
 2. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.
- J. Glass-Fiber-Reinforced Plastic Gratings
1. Molded Glass-Fiber-Reinforced Gratings: Bar gratings made by placing glass-fiber strands that have been saturated with thermosetting plastic resin in molds in alternating directions to form interlocking bars without voids and with a high resin content.
 - a. Configuration: 1-1/2-inch- (38-mm-) square mesh, 1 inch (25 mm) thick OR 1-1/2-inch- (38-mm-) square mesh, 1-1/4 inches (32 mm) thick OR 1-1/2-inch- (38-mm-) square mesh, 1-1/2 inches (38 mm) thick OR 2-inch- (51-mm-) square mesh, 2 inches (51 mm) thick OR 1-1/2-inch- (38-mm-) square mesh, thickness as required to comply with structural performance requirements OR As required to comply with structural performance requirements, **as directed**.
 - b. Weight: 2.5 lb/sq. ft. (12.2 kg/sq. m) OR 2.7 lb/sq. ft. (13.2 kg/sq. m) OR 3.2 lb/sq. ft. (15.6 kg/sq. m) OR 3.5 lb/sq. ft. (17.1 kg/sq. m) OR 3.7 lb/sq. ft. (18.1 kg/sq. m) OR 4.1 lb/sq. ft. (20.0 kg/sq. m) OR 5.0 lb/sq. ft. (24.4 kg/sq. m), **as directed**.
 - c. Resin: Polyester OR Vinylester, **as directed**.
 - 1) Flame-Spread Index: 25 or less when tested according to ASTM E 84.
 - 2) U.S.D.A. Acceptance: Accepted for food-processing applications.
 - d. Color: Beige OR Gray OR Green OR Orange OR Yellow OR Manufacturer's standard, **as directed**.
 - e. Traffic Surface: Plain, meniscus OR Applied abrasive finish OR As indicated, **as directed**.

2. Pultruded Glass-Fiber-Reinforced Gratings: Bar gratings assembled from components made by simultaneously pulling glass fibers and extruding thermosetting plastic resin through a heated die under pressure to produce a product without voids and with a high glass-fiber content.
 - a. Configuration: I4010; 1-inch (25-mm) I-bars spaced 1 inch (25 mm) o.c. (40 percent open) **OR** I6010; 1-inch (25-mm) I-bars spaced 1-1/2 inches (38 mm) o.c. (60 percent open) **OR** I4015; 1-1/2-inch (38-mm) I-bars spaced 1 inch (25 mm) o.c. (40 percent open) **OR** I6015; 1-1/2-inch (38-mm) I-bars spaced 1-1/2 inches (38 mm) o.c. (60 percent open) **OR** T3320; 2-inch (51-mm) T-bars spaced 1-1/2 inches (38 mm) o.c. (33 percent open) **OR** T5020; 2-inch (51-mm) T-bars spaced 2 inches (51 mm) o.c. (50 percent open) **OR** As required to comply with structural performance requirements, **as directed**.
 - b. Weight: 2.35 lb/sq. ft. (11.5 kg/sq. m) **OR** 2.83 lb/sq. ft. (13.8 kg/sq. m) **OR** 3.10 lb/sq. ft. (15.1 kg/sq. m) **OR** 3.41 lb/sq. ft. (16.6 kg/sq. m) **OR** 4.10 lb/sq. ft. (20.0 kg/sq. m) **OR** 4.13 lb/sq. ft. (20.2 kg/sq. m), **as directed**.
 - c. Resin Type: Polyester **OR** Vinylester, **as directed**.
 - 1) Flame-Spread Index: 25 or less when tested according to ASTM E 84.
 - 2) U.S.D.A. Acceptance: Accepted for food processing applications.
 - d. Color: Beige **OR** Gray **OR** Green **OR** Orange **OR** Yellow **OR** Manufacturer's standard, **as directed**.
 - e. Traffic Surface: Plain, grooved **OR** Applied abrasive finish **OR** As indicated, **as directed**.
3. Fabricate cutouts in grating sections for penetrations indicated. Arrange cutouts to permit grating removal without disturbing items penetrating gratings.

K. Grating Frames And Supports

1. Frames and Supports for Metal Gratings: Fabricate from metal shapes, plates, and bars of welded construction to sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter and weld connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
 - a. Unless otherwise indicated, fabricate from same basic metal as gratings.
 - b. Equip units indicated to be cast into concrete or built into masonry with integrally welded anchors. Unless otherwise indicated, space anchors 24 inches (600 mm) o.c. and provide minimum anchor units in the form of steel straps 1-1/4 inches (32 mm) wide by 1/4 inch (6 mm) thick by 8 inches (200 mm) long.
2. Frames and Supports for Glass-Fiber-Reinforced Plastic Gratings: Fabricate from glass-fiber-reinforced plastic shapes of sizes, shapes, and profiles indicated and as necessary to receive gratings. Miter connections for perimeter angle frames. Cut, drill, and tap units to receive hardware and similar items.
 - a. Unless otherwise indicated, use shapes made from same resin as gratings.
 - b. Equip units indicated to be cast into concrete or built into masonry with integral anchors.
3. Galvanize steel frames and supports in the following locations:
 - a. Exterior.
 - b. Interior, where indicated.

L. Aluminum Finishes

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

M. Steel Finishes

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Finish gratings, frames, and supports after assembly.
3. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

- a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
4. Shop prime gratings, frames and supports not indicated to be galvanized unless otherwise indicated.
 - a. Shop prime with universal shop primer **OR** primers specified in Division 07, **as directed**, unless zinc-rich primer is **OR** primers specified in Division 09 Section "High-performance Coatings" are, **as directed**, indicated.
5. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" **OR** SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning" **OR** requirements indicated below, **as directed**:
 - a. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - c. Items Indicated to Receive Primers Specified in Division 9 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - d. Other Items: SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
6. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1.3 EXECUTION

A. Installation, General

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing gratings to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
2. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing gratings. Set units accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry.
4. Fit exposed connections accurately together to form hairline joints.
 - a. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade the surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
5. Attach toeplates to gratings by welding at locations indicated.
6. Field Welding: Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
7. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Installing Metal Bar Gratings

1. General: Install gratings to comply with recommendations of referenced metal bar grating standards that apply to grating types and bar sizes indicated, including installation clearances and standard anchoring details.
2. Attach removable units to supporting members with type and size of clips and fasteners indicated or, if not indicated, as recommended by grating manufacturer for type of installation conditions shown.
3. Attach nonremovable units to supporting members by welding where both materials are same; otherwise, fasten by bolting as indicated above.

- C. Installing Expanded-Metal Gratings
1. General: Comply with manufacturer's written instructions for installing gratings.
 2. Place units with straight edge of bond up and with long direction of diamond-shaped openings parallel to direction of span.
 3. Attach removable units to supporting members by bolting at **6-inch (150-mm)** intervals.
 4. Attach nonremovable units to supporting members by welding unless otherwise indicated. Space welds at **6-inch (150-mm)** intervals.
 5. Attach aluminum units to steel supporting members by bolting at **6-inch (150-mm)** intervals.
 6. Butt edges parallel to long direction of diamond-shaped openings and weld at every second bond point. Place individual grating sections so diamonds of one piece are aligned with those of adjacent sections.
- D. Installing Metal Plank Gratings
1. General: Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard anchor clips and hold-down devices for bolted connections.
 2. Attach removable units to supporting members by bolting at every point of contact.
 3. Attach nonremovable units to supporting members by welding unless otherwise indicated. Comply with manufacturer's written instructions for size and spacing of welds.
 4. Attach aluminum units to steel supporting members by bolting at side channels at every point of contact and by bolting intermediate planks at each end on alternate sides. Bolt adjacent planks together at midspan.
- E. Installing Glass-Fiber-Reinforced Plastic Gratings
1. Comply with manufacturer's written instructions for installing gratings. Use manufacturer's standard stainless-steel anchor clips and hold-down devices for bolted connections.
- F. Adjusting And Cleaning
1. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 requirements for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

OR

Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07.
 2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 53 13 00

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Task	Specification	Specification Description
05 53 13 00	01 22 16 00	No Specification Required
05 53 13 00	05 50 00 00	Metal Fabrications
05 54 00 00	05 50 00 00	Metal Fabrications
05 55 13 00	05 50 00 00	Metal Fabrications
05 55 13 00	05 51 13 00	Metal Stairs
05 55 13 00	05 51 13 00a	Fabricated Spiral Stairs
05 55 16 00	05 50 00 00	Metal Fabrications
05 55 16 00	05 51 13 00	Metal Stairs
05 55 16 00	05 51 13 00a	Fabricated Spiral Stairs
05 56 00 00	05 50 00 00	Metal Fabrications
05 58 16 00	05 15 16 00	Ornamental Metal
05 58 16 00	05 75 00 00	Ornamental Formed Metal
05 59 65 00	01 22 16 00	No Specification Required
05 73 00 00	05 75 00 00	Ornamental Formed Metal

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SECTION 05 73 23 00 - MISCELLANEOUS ORNAMENTAL METALS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of Trap Pit Doors; Access to Pipe Trenches; Subway Type Gratings; Manhole, Catch and Retention Basins, Hoods; Iron Fences and Railways, Wicket Guard and Fence; Pipe Railings; Chimney Caps; Cast Iron Sills; Expansion Joints; Chimney Cleanout Doors; Ladders; Ladder Rungs; Retractable Ladders and Balconies, Staircases and Counter-Balanced Stairs; Vent Back Frames in Exhaust Opening of Toilet Rooms; Grilles in Exhaust Openings in Toilet Rooms; Access Doors, Dressing Compartment Seat Frames; Stainless Steel; Lumber Rack; Ganging Rods; Auditorium Loudspeaker Grilles; Bronze Saddles (Exterior), Bronze Expansion Saddles (Interior); Bronze Pipe and Tubes; Aluminum Hat and Coat Racks and Hook Strips; Aluminum Angles for Showers; Aluminum Railings; Miscellaneous Ornamental Metal Work; Hardware.

B. Submittals/Shop Drawings

1. Show all locations, markings, quantities, materials, sizes and shapes.
2. Indicate all methods of connecting, anchoring, fastening, bracing and attaching work of other trades.
3. Do not fabricate until approval of Shop Drawing.
4. Product Design Data: For each type of product indicated in 1.2.

C. Quality Assurance

1. Retractable Ladders, Balconies, and Staircases: For use as a supplemental escape device up to 30 feet (9144 mm), comply with requirements of:
 - a. Underwriters Laboratories Inc. for use as a supplementary means of egress; provide UL listing data.
 - b. ICC International Building Code.
 - c. ICC International Fire Code.
2. For use as a mechanical equipment ladder, comply with requirements of ICC International Mechanical Code.
3. Provide Evaluation Reports showing compliance.

D. Product Handling

1. Before shipment to the job, all finished shall be adequately protected for transporting and erecting periods.
2. Replace damaged items with the approval of the Owner and at no additional cost to the Owner.

1.2 PRODUCTS

A. Frame and Covers

1. Aluminum: ASTM B 221, 6063-T6.
2. Bronze: ASTM B 455, Alloy C 38500.
3. Stainless Steel: ASTM A 167, Type 304.

B. Gratings

1. Aluminum Grating, Banding, and Kick Plate: Rectangular, pressure-locked bearing bars, ASTM B 221, 6063-T6, mill finish.
2. Steel Grating:
3. Grating: Rectangular, welded, ASTM A 569.
4. Bands and Kick Plate: ASTM A 36.
5. Finish: Galvanized, ASTM A 386, or painted with fabricator's standard shop primer.

- C. Castings (Frames, Covers, Steps, and Sills)
 - 1. Gray Iron: ASTM A 48, Class 30. Malleable Iron, ASTM A 47.
 - 2. Steel: ASTM A 36; Galvanized, ASTM A 386.
 - 3. Aluminum: ASTM B 26, 356-T6.
 - 4. Stainless Steel: ASTM A 743, Grade CF8 or CF20
 - 5. Bronze: ASTM B 455, Alloy C38500 and ASTM B 135, Alloy C2800.
 - 6. Corner Protection: Steel angles with anchors, ASTM A 36; Galvanized, ASTM A 386.
 - 7. Ventilation Boxes: Extruded Aluminum, ASTM B 221, 6063-T6.

- D. Pipe and Tube Railings and Ladders
 - 1. Post and rails: Steel pipe, ASTM A 53, Type E or S, Grade B, Schedule 40.
 - 2. Bars and Rungs: ASTM A 36.
 - 3. Finish: Galvanized, ASTM A 386 or shop primer, Fed. Spec. TT-P-86, Type I or II; TT-P-615, Type I, II, or V; TT-P-645.
 - 4. Aluminum: ASTM B 221, 6063-T6, T-52.
 - 5. Steel: ASTM A 36, A 500, A 501.
 - 6. Stainless Steel: ASTM A 544, Grade MT304; ASTM A 312, Grade TP304; ASTM A 167, Type 304.

- E. Retractable Ladders and Balconies
 - 1. Ladders
 - a. Maintenance-free, aluminum and stainless steel construction.
 - b. Rungs: Extruded aluminum, 6005-T5 and 6005-T6 alloy.
 - c. Stiles: Extruded aluminum, 6063-T6 alloy.
 - d. Support 1,000 pounds (454 kg) per rung individually and 200 pounds per 6 feet (90 kg per 1.83 m) of length simultaneously.
 - e. Ground support of gravity loads; building wall support for lateral stability.
 - f. Provide deployment handle at each access level.
 - g. Provide removable deployment handle at lower access point; provide locking hub and padlock.
 - h. Provide dual safety rails at ladders with access from both sides.
 - i. Provide reinforcement channel where ladders extend beyond wall support, such as at parapets and roof tops, or where ladder spans open areas in excess of 5 feet (1524 mm) between attachment points.
 - j. Height: As directed.
 - 2. Balconies
 - a. Aluminum, 6063-T6 alloy.
 - b. Provide aluminum access balconies at locations as directed.
 - c. Size: As directed.
 - d. Railing: 42-inch (1,067 mm) rail 2 sides, restraining chain 1 side.
 - e. Platform Capacity: 100 pounds per square foot (488 kg/square m), unless directed otherwise.
 - f. Railing Capacity: Uniform load of not less than 50 pounds per lineal foot (74.5 kg per lineal m), unless directed otherwise.
 - g. Balustrade: Not less than 36 inches (914 mm) high.
 - h. Pickets and Rails: Configured not to pass a sphere 4 inches (100 mm) in diameter. Exception; triangular openings formed by riser, tread, and rail, configured not to pass a sphere 6 inches (150 mm) in diameter.
 - 3. Factory Finish: Clear anodized **OR** Manufacturer's standard shop-applied enamel **OR** As selected from manufacturer's standard colors **OR** Match paint sample supplied by the Owner, **as directed**.

- F. Staircases and Counter-Balanced Stairs
 - 1. Provide aluminum staircases, platforms, and counter-balanced stairs at locations indicated on the drawings.
 - 2. Platform Capacity: 100 pounds per square foot (488 kg/square m), unless directed otherwise.

3. Railing Capacity: Uniform load of not less than 50 pounds per lineal foot (74.5 kg per lineal m), unless directed otherwise.
4. Required Width: Minimum 36 inches (914 mm).
5. Stair Rise: 4 inches (102 mm) minimum, 10 inches (254 mm) maximum.
6. Treads: 10 inches (254 mm) in depth.
7. Balustrade: Not less than 36 inches (914 mm) high.
8. Pickets and Rails: Configured not to pass a sphere 4 inches (101.6 mm) in diameter.
 - a. Exception: Triangular openings formed by riser, tread, and rail configured not to pass a sphere 6 inches (152.4 mm) in diameter.
 - b. Rail Projection: 3-1/2 inches (89 mm) maximum from each side of stairway into required width.

1.3 EXECUTION

A. Trap Pit Doors

1. Furnish and set trap pit doors and frames flush with the finish floors, pavement, grade or as otherwise required. Doors for interior pits shall be of 1/4 inch checkered steel plate set in angle frames having mitered and welded corners and angle seat for covers, provided with bronze lifting handles. Doors and frames for exterior pits shall be of cast iron and hinged with 3-1/2 x 5 inch extra heavy bronze hinges. All doors shall be provided with locking devices.

B. Access to Pipe Trenches

1. Checkered or flat steel plate access doors to pipe trenches below cellar floors shall be made in accordance with detail. Include angle iron frame, anchors, hardware, etc., complete. The steel plate access doors shall be flush with the adjoining floors. Hinges shall be approved bronze flush type. Provide bronze lift handle and approved locking device for each access door.
2. Doors shall be covered with resilient tile where required. Where cement floors occur, top of steel cover shall be flush, but depressed for other finishes as required by the thickness of floor finish. **See other Sections of Specifications for Finish.**
3. All doors under this section unless otherwise specified, shall be secured in place with bronze square shank locking device and brass deck plate with slot and socket holes. Furnish six (6) wrenches for brass deck plates for each different size of locking device.

C. Manhole, Catch and Retention Basins, Hoods

1. Furnish cast iron manhole covers, catch basin covers and cast iron hoods for masonry, manholes, catch basins and retention basins furnished and installed under Division 22 OR Division 28.
2. Manhole covers and frames for catch basins shall be of cast iron, with locking device and key, equal to Flockhart Company No. 35-139.
3. Covers and frames for catch basins shall be of cast iron, with locking device and key, equal to Flockhart Company No. 35-328.
4. Covers and frames for catch basins shall be of cast iron, with locking device and key, equal to Flockhart Company No. 18-919.
5. Cast iron hoods for catch basins and manhole shall be equal to Flockhart Company pattern number indicated.

D. Iron Fences and Railings

1. Furnish and erect iron railings, fences, and gates. Materials of fences and railings shall be medium steel, shapes as required.
2. Posts and braces shall be leaded into cast-iron shoes, which shall be embedded in the concrete pavements or blocks. Center picket of each panel of 6 foot fence shall be leaded 2 inches into curb or pavement. Fences and railings on stone copings, platforms, steps or check blocks shall be leaded into sockets cut in same. Gates shall be hung with hinges. Provide all hasps required for locking gates in both open and closed positions. Double and quadruple gates shall also be furnished with sliding lever bolts and galvanized, malleable iron catches having pipe anchor and

drain embedded in concrete. Gates shall be locked open or closed with Type C Padlocks. Rivet the padlocks to the gates as required. Single gates require 1 padlock; double gates, 2 padlocks; quadruple gates, 4 padlocks.

3. Furnish cast-iron shoes for fence posts and set them at the proper time so that they may be cast into the concrete footing and pavements with top flush with finished surfaces.
4. Folding swing gates shall have fast pin to hold in closed position.
5. Unless otherwise required center rails and side rails on outside steps shall be made of 1-1/4 inch solid posts with 2-1/2 inch by 1/2 inch horizontal flats spaced as required, with top rail of two bronze, aluminum or steel channels and steel stiffener. Post at upper level of center railings shall be of malleable cast iron of height required, tapering from 1-3/4 inches at bottom to 1-1/4 inches at top, with finial. All posts shall be leaded-in 4 inches in cheeks and steps.

E. Wicket Guard and Fence

1. Furnish and install wicket guard fence 12 inches high constructed of 1/2 inch round bent steel rods welded together, to form a continuous wicket fence around the concrete curbing at seeded and planted areas. This guard fence shall be set in concrete footing specified under Division 03 Section "Cast-in-place Concrete".

F. Pipe Railings

1. Furnish and erect wrought iron or steel pipe railings and hand rails together with all fittings, flanges, collars, brackets, bolts, etc. of sizes required, all put together and secured in place in a thorough manner. All pipe railings shall be welded assembly, with continuous "V" joints, full thickness of pipe wall, welds filled solid and ground smooth. All radii, curves, sweeps, bends, etc., as indicated on details for pipe fitting assembly shall be maintained in the welded assembly. For pipe handrails in connection with stairs, see Division 05 Section "Pipe And Tube Railings".
2. Center pipe rails and free standing end pipe railings on outside concrete steps shall be made of 1-1/2 inch nominal diameter pipe and have pipe uprights with cast-iron collar and cap fittings secured in place with tap screws. The uprights shall be leaded-in pipe sleeves. Upright at upper level of center radii shall be of 2 inch nominal diameter pipe with approved cap.
3. Handrails at side of outside steps against walls shall be 1 inch nominal diameter pipes, with returns against wall at ends, and supported on galvanized cast-iron brackets and wall plates same as specified for egress stair.
4. Handrails at side of outside steps against iron fences shall be 1 inch nominal diameter, with returns at ends and supported on wrought iron brackets and plates. Handrails at area walls shall be 1-1/4 inch nominal diameter.
5. All outside pipe railings and handrails including fittings, etc., shall be galvanized after fabrication.
6. Furnish the combined pipe sleeve and base plate and turn over same for setting in concrete work.
7. Exterior barrier rails (at areaways, etc.) shall be of 1-1/2 inch nominal diameter pipe; interior barrier rails (at pits, changes in floor levels, etc.) shall be 1-1/4 inch nominal diameter.

G. Chimney Caps

1. Chimneys shall be provided with cast-iron caps.

H. Cast-Iron Sills

1. Furnish cast-iron sills for exterior doors of bulkheads, etc. The sills shall be set in a bed of cement and be substantially secured with bolts or expansion bolts.

I. Expansion Joints

1. Furnish and install all rolled steel members with required anchors at structural expansion joints through slabs. Items cast in concrete shall be furnished when required for setting. Provide bronze plates as required; top surfaces of plates shall be "BRONZOGKIT" or approved equal.

J. Chimney Cleanout Doors

1. Furnish to the mason proper cleanout doors of sizes indicated for chimneys, of 10 gauge steel plate and steel flats. The doors shall have angle-iron frames with strap anchors. Hang door with two 4 x 4 inch steel hinges and secure door with a latch.
- K. Ladders
1. Furnish and set ladders 18 inches wide, constructed with steel plate stringers, 3/4 inch diameter single rung treads let in and welded to stringers, angle and flat braces, and when required shall have pipe hand rails all riveted together. Secure ladders with angle clip and expansion bolts at top, bottom and elsewhere as required.
- L. Ladder Rungs
1. When ladder rungs are indicated built into mason work, furnish to the mason 5/8 inch galvanized wrought-iron ladder rungs.
 2. Ladder rungs in concrete shall be 15 inches wide and shall be built into concrete every 14 inches in height projecting into walls 4 inches on each side.
 3. Ladder rungs in brickwork of chimney shall be 18 inches wide, and shall be built into brickwork every 5 courses in height, project 8 inches beyond face of wall and continue 8 inches into wall with a 2 inch return. First rung shall start 10 feet above roof level at chimney.
- M. Retractable Ladders, Staircases and Counter-Balanced Stairs
1. Fabrication: Shop fabricate and assemble to maximum extent practicable for installation on-site with minimal labor.
 2. Accessories
 - a. Provide brackets, spacers, etc, necessary for a complete installation.
 - 1) Brackets: 6063-T6 aluminum alloy.
 - 2) Pivot Pins, Springs, Masonry Bolts, Fasteners, and Base Plates: Stainless steel.
 - b. Provide removable deployment handle at lower access point of retractable ladders.
OR
Provide removable deployment handle at lower access point of retractable ladders and locking hub and padlock.
 - c. Fasteners for securement to wood construction: Stainless steel lag bolts; 3/8-inch (9.5 mm) diameter, 4-inches (100 mm) minimum embedment.
 - d. Fasteners for securement to steel construction: Stainless steel bolts, nuts, and washers; 3/8-inch (9.5 mm) diameter.
 3. Footing: Install concrete footing in accordance with manufacturer's requirements, and in compliance with Division 03 Section "Cast-in-place Concrete".
 4. Install components in strict compliance with manufacturer's instructions.
 5. Adjust And Clean
 - a. Adjust operating parts for smooth deployment and storage.
 - b. Remove scraps and debris; leave project site in clean and orderly condition.
 - c. Instruct Owner's representative in proper operation.
- N. Vent Back Frames in Exhaust Opening of Toilet Rooms
1. Furnish and install 12 gauge bent steel frames in exhaust openings in partitions of toilet rooms. Frames shall be set plumb in partitions to receive the vent grilles. Baffle plates are not required.
- O. Grilles in Exhaust Openings
1. Furnish and set in frames at exhaust openings in toilet partitions, approved pressed steel bar type grilles with baked on primer, as manufactured by Tuttle and Bailey, Catalog No. T-80, or approved equal. Grilles shall be secured with tap screws to the frame. The bars of grilles shall be fixed and of rigid construction and shall be set at the angle required. Submit sample of grille for approval.
 2. Furnish and install individually adjustable shutters attached to grille frames, in certain toilets where required. Grilles shall be bar type, equal to Register and Grille Mfg. Co. No. 3311 or Tuttle and Bailey No. A-77.

3. In general, vent openings are provided in partitions of all toilet rooms back of water closets; however, certain smaller toilets, are mechanically vented by means of vent openings in ceiling or in partitions close to ceilings.

P. Access Doors

1. Access doors and frames that are to be furnished and installed as part of the work of this Contract shall be furnished and installed under Division 08 Section "Access Doors And Frames".
2. Access doors and frames that are to be furnished and installed in metal lath and plaster walls and ceilings as part of the work of this Contract shall be constructed of high grade sheet steel with 16 gauge frames and 14 gauge doors. Doors shall be equipped with concealed hinges and cylinder locks all keyed alike (furnish six (6) keys); doors in ceilings may have screwdriver operated type of lock. Doors shall have one piece plain trim set flush with finish surface. Stock doors manufactured by Columbia Metal Product Co., Karp Metal Products Co., or approved equal complying with the specifications, may be accepted. Submit sample for approval if not already approved.

Q. Dressing Compartment Seat Frames

1. Where seats are indicated in dressing compartments, furnish and set 1/4 x 1-1/2 inch flat galvanized bent steel brackets.

R. Stainless Steel

1. Stainless Steel and Cabinet Top Supports: Furnish and install adjustable, stainless steel tubing forming legs to support the tops of sinks and cabinets together with the stainless steel screens, collars, plates, etc., of sizes required. The screens shall be wrapped around and tap screwed to the legs of sink tubing.
2. Stainless Steel Jambs at Dressing Compartments: Furnish and install 14 gauge stainless steel tube jambs at doors to dressing compartments adjoining shower stalls. These jambs shall be anchored to the structural facing tile partition with 14 gauge stainless steel straps.
3. Package Slide: Furnish and install stainless steel half round strips and anchors (type 304 (18-8)) for package slide to Receiving Room. Strips shall be plug welded to anchors.
4. Angle and Channel Guards: Furnish and install angle and channel guards in the kitchen and auxiliary areas. Guards shall be 12 gauge stainless steel satin finish of length and dimensions required, secured in place with oval head stainless steel bolts in expansion shields.
5. Stainless Steel Shelf: Furnish and install stainless steel shelves complete with brackets, of gauges required, generally in helps' locker room, over sinks in locker rooms, in eraser cleaning closets, art room and medical office.
Note: All stainless steel shall be chrome nickel cold rolled alloy designated by trade name Stainless Steel 18-8, No. 4 Finish; it shall contain a minimum of 18% chromium, 8% nickel, and not more than 0.12% carbon, non-magnetic (straight chrome iron not accepted).

S. Lumber Rack

1. Furnish a lumber rack for the woodworking room and general crafts shop, constructed with angles and provided with chains and hoods as required.

T. Hanging Rods

1. Furnish and erect hanging rods of diameters required of wrought-iron or steel pipe supported on approved hangers, brackets or flanges cabinets, closets and elsewhere throughout the building where required.

U. Auditorium Loudspeaker Grilles

1. Furnish and install complete, two (2) loudspeaker grilles in Auditorium. Grilles shall be equal to Blumcraft Deluxe-Line. Grille facets shall have a bronze anodized finish on faces and brushed finish on backs. Supporting bars #258 to have dull black anodized finish.
2. Frame of grilles shall be equal to Blumcraft's trim section WF-4, anodized black, and be secured to masonry with stainless steel screws (slack painted heads) in expansion shields.

3. Sub-frame shall be formed from 1/4" thick aluminum bar with corners mitered, continuously welded and ground smooth and firmly secured in place. Provide continuous piano hinge with 3/16" stop angle.
 4. The inside surface of grille shall be entirely covered with black grille cloth equal to "Acousticloth", as manufactured by Merlang or "Lumite", as manufactured by Chicopee. Grille cloth shall be fastened in place. Submit samples for approval.
 5. Include continuous angles and all other angles, plates, bars and reinforcing channels, all as required.
 6. Contractor is to verify all dimensions at job before fabricating any of the work.
 7. Loudspeaker enclosure and sound absorbing blanket will be furnished and installed as part of the work of Division 27 Section "Public Address And Mass Notification Systems".
- V. Bronze Saddles (Exterior)
1. All exterior door saddles shall be of bronze unless otherwise indicated. White bronze shall be provided for aluminum doors. Finish shall be "Bronzogrit" or an approved equal.
- W. Bronze Expansion Saddles (Interior)
1. Furnish and install bronze expansion saddles generally in the following areas: doors opening off auditorium platform or stage; gymnasium; dance room. None required in store room. Saddles shall consist of bronze flats, plates, and angle clips. Installation shall allow for 3/4 inch expansion. Exposed surfaces of plates and flats shall be "Bronzogrit" or approved equal.
- X. Bronze Pipe and Tubes
1. Furnish 1 inch square bronze tubes in toilet rooms and pipe spaces. Tubes shall be turned over to mason for installation. Tubes shall be of proper length (not less than full thickness of wall) and provided with bronze wire bars at one end.
- Y. Aluminum Hat and Coat Racks and Hook Strips
1. Furnish and install hat and coat racks and hook strips in locations required. Racks and hook strips shall be constructed of aluminum channels, flats and tubing of sizes required, toggle or expansion bolted to walls to suit conditions. Aluminum shall have alumilite finish.
 2. Submit shop drawings for approval.
- Z. Aluminum Angles for Showers
1. Furnish and install aluminum angle bracing as required. Angles shall have alumilite finish. Submit shop drawings for approval prior to fabrication.
- AA. Aluminum Railings
1. Center and side rails and wall handrails shall be of aluminum when required. Posts and horizontal members shall be solid. Posts shall be 1-1/2 inches square, extend through intermediate rails, secured to top rail with 3/8 inch stud bolts; posts at upper level shall be of height indicated, tapering from 1-3/4 inches at bottom to 1-1/4 inches at top, with finial. Posts shall be solidly set with molten sulphur or other approved non-electrolytic material into a combination 1/4 inch pipe sleeve and base plate welded to same, sleeve shall be welded to stair stringer or tread to suit condition, or set in concrete sub-stair.
 2. Exterior Aluminum Railings shall be constructed required. Aluminum posts shall be solid 1-1/2 inches square, extend through bottom rail, let into top rail and continuously welded. Center railing shall have tapered aluminum post of size and taper as required for "center rail". Rails shall be formed to shape indicated from, 3" x 1" solid aluminum flats with rounded edges.
 3. Roof railing shall be as required.
 4. Grab bars in toilets where indicated.
 5. All aluminum railings shall have finish equal to 204-C2 Aluminum Co. of America.
- BB. Miscellaneous Ornamental Metal Work
1. Include all other ornamental metal work. Submit shop drawings for approval.

CC. Hardware

1. All hardware specified under Ornamental Metal Work shall match the approved samples in the office of the Owner. One sample of each item shall be submitted for approval of the Owner.
2. The key to all locks furnished under Ornamental Metal Work shall be provided with brass tags attached to the key with a strong metal ring or link and be similar to the tags specified under Hardware. The tags shall have stamped upon them the letters the Owner and the name or number of the room, closets, etc., for which the keys are intended.
3. All type C padlocks mentioned in this Section will be furnished as specified under Hardware. The Contractor for Ornamental Metal Work shall rivet padlock chains referred to in this Section in place.

DD. Painting

1. All Ornamental Metal Work and cast-iron work excepting cast-iron work to be set in concrete and galvanized items shall be thoroughly cleaned and painted one shop coat specified in Division 07.
2. After installation, all damaged surfaces of shop coat and all rough surfaces shall be scraped or sanded smooth and then touched up.

END OF SECTION 05 73 23 00

SECTION 05 73 23 00a - ORNAMENTAL RAILINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for ornamental railings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Aluminum decorative railings with stainless-steel, wire-rope guard infill, **as directed**.
 - b. Copper-alloy decorative railings.
 - c. Stainless-steel decorative railings with stainless-steel, wire-rope guard infill, **as directed**.
 - d. Steel and iron decorative railings with stainless-steel, wire-rope guard infill, **as directed**.
 - e. Glass- and plastic-supported railings.
 - f. Post-supported railings with glass infill.
 - g. Illuminated decorative railings.

C. Definitions

1. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

D. Performance Requirements

1. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:
 - a. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.
 - b. Copper Alloys: 60 percent of minimum yield strength.
 - c. Stainless Steel: 60 percent of minimum yield strength.
 - d. Steel: 72 percent of minimum yield strength.
 - e. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA's Aluminum Curtain Wall Series No. 12, "Structural Properties of Glass."
 - 1) Requirement above is based on the 2006 International Building Code (IBC) for safety factor of 4.
3. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - a. Loads below are based on the 2006 International Building Code (IBC).
 - 1) Handrails and Top Rails of Guards:
 - a) Uniform load of **50 lbf/ft. (0.73 kN/m)** applied in any direction.
 - b) Concentrated load of **200 lbf (0.89 kN)** applied in any direction.
 - c) Uniform and concentrated loads need not be assumed to act concurrently.
 - 2) Infill of Guards:
 - a) Concentrated load of **50 lbf (0.22 kN)** applied horizontally on an area of **1 sq. ft. (0.093 sq. m)**.
 - b) Infill load and other loads need not be assumed to act concurrently.
 - 3) Glass-Supported Railings: Support each section of top rail by a minimum of three glass panels or by other means so top rail will remain in place if any one panel fails.

4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
5. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

E. Submittals

1. Product Data: For the following:
 - a. Manufacturer's product lines of railings assembled from standard components.
 - b. Grout, anchoring cement, and paint products.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. For illuminated railings, include wiring diagrams and roughing-in details.
4. Samples: For each type of exposed finish required.
 - a. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
 - b. Each type of glass required.
 - c. Fittings and brackets.
 - d. Welded connections.
 - e. Brazed connections.
 - f. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.
5. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Qualification Data: For qualified professional engineer **OR** testing agency, **as directed**.
7. Mill Certificates: Signed by manufacturers of stainless-steel products certifying that products furnished comply with requirements.
8. Welding certificates.
9. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

F. Quality Assurance

1. Source Limitations: Obtain each type of railing from single source from single manufacturer.
2. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.
 - a. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
3. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."

4. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC **OR** the SGCC or another certification agency acceptable to authorities having jurisdiction **OR** manufacturer, **as directed**. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
6. Preinstallation Conference: Conduct conference at Project site.

G. Project Conditions

1. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

H. Coordination And Scheduling

1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
2. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
3. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not suit structural performance requirements.

1.2 PRODUCTS

A. Metals, General

1. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
2. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
 - a. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.
 - b. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.
 - c. Provide formed-steel brackets with predrilled hole for bolted anchorage and with snap-on cover that matches rail finish and conceals bracket base and bolt head.
 - d. Provide extruded-aluminum brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

B. Aluminum

1. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.
2. Extruded Bars and Shapes, Including Extruded Tubing: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5/T52.
3. Extruded Structural Pipe and Round Tubing: ASTM B 429/B 429M, Alloy 6063-T6.
 - a. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
4. Drawn Seamless Tubing: **ASTM B 210 (ASTM B 210M)**, Alloy 6063-T832.
5. Plate and Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 5005-H32 **OR** Alloy 6061-T6, **as directed**.
6. Die and Hand Forgings: **ASTM B 247 (ASTM B 247M)**, Alloy 6061-T6.
7. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.
8. Perforated Metal: Aluminum sheet, **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6, **0.063 inch (1.60 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows.

9. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, **2-inch (50-mm)** woven-wire mesh, made from **0.162-inch (4.1-mm)** nominal diameter wire complying with **ASTM B 211 (ASTM B 211M)**, Alloy 6061-T94.

C. Copper Alloys

1. Copper and Copper Alloys, General: Provide alloys indicated and with temper to suit application and forming methods, but with strength and stiffness not less than Temper H01 (quarter hard) for plate, sheet, strip, and bars and Temper H55 (light drawn) for tube and pipe.
2. Extruded Shapes, Bronze: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
3. Extruded Shapes, Brass: ASTM B 249/B 249M, Alloy UNS No. C36000 (free-cutting brass).
4. Extruded Shapes, Nickel Silver: ASTM B 249/B 249M, Alloy UNS No. C79600.
5. Seamless Pipe, Bronze: ASTM B 43, Alloy UNS No. C23000 (red brass, 85 percent copper).
6. Seamless Tube, Bronze: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C23000 (red brass, 85 percent copper).
7. Seamless Tube, Brass: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
8. Seamless Tube, Copper: **ASTM B 75 (ASTM B 75M)**, Alloy UNS No. C12200 (phosphorous deoxidized, high residual phosphorous copper).
9. Castings, Bronze: Composition bronze castings complying with ASTM B 62, Alloy UNS No. C83600 (85-5-5-5 or No. 1 composition commercial red brass) or sand castings complying with ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
10. Castings, Brass: Sand castings complying with ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).
11. Castings, Copper: ASTM B 824, with a minimum of 99.9 percent copper.
12. Castings, Nickel Silver: ASTM B 584, Alloy UNS No. C97300 (12 percent leaded nickel silver).
13. Plate, Sheet, Strip, and Bars; Bronze: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper).
14. Plate, Sheet, Strip, and Bars; Brass: ASTM B 36/B 36M, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
15. Plate, Sheet, Strip, and Bars; Copper: ASTM B 152/B 152M, Alloy UNS No. C11000 (electrolytic tough pitch copper) or Alloy UNS No. C12200 (phosphorous deoxidized, high-residual phosphorous copper).

D. Stainless Steel

1. Tubing: ASTM A 554, Grade MT 304 **OR** Grade MT 316 **OR** Grade MT 316L, **as directed**.
2. Pipe: ASTM A 312/A 312M, Grade TP 304 **OR** Grade TP 316 **OR** Grade TP 316L, **as directed**.
3. Castings: ASTM A 743/A 743M, Grade CF 8 or CF 20 **OR** Grade CF 8M or CF 3M, **as directed**.
4. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304 **OR** Type 316 **OR** Type 316L, **as directed**.
5. Bars and Shapes: ASTM A 276, Type 304 **OR** Type 316 **OR** Type 316L, **as directed**.
6. Wire Rope and Fittings:
 - a. Wire Rope: 1-by-19 **OR** 7-by-7 **OR** 7-by-19, **as directed**, wire rope made from wire complying with ASTM A 492, Type 316.
 - b. Wire-Rope Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
7. Expanded Metal: ASTM F 1267, Type I (expanded) **OR** Type II (expanded and flattened), **as directed**, Class 3 (corrosion-resisting steel), made from stainless-steel sheet complying with ASTM A 666, Type 304 **OR** Type 316, **as directed**.
 - a. Style Designation: 3/4 number 13 **OR** 1-1/2 number 10, **as directed**.
8. Perforated Metal: Stainless-steel sheet, ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** Type 316L, **as directed**, **0.062 inch (1.59 mm)** thick, with **1/4-inch (6.4-mm)** holes **3/8 inch (9.5 mm)** o.c. in staggered rows.

9. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, 2-inch (50-mm) woven-wire mesh, made from 0.135-inch (3.5-mm) nominal diameter wire complying with ASTM A 580/A 580M, Type 304 **OR** Type 316, **as directed**.
- E. Steel And Iron
1. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 2. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
 3. Bars: Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
 4. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 5. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
 6. Expanded Metal: ASTM F 1267, Type I (expanded) **OR** Type II (expanded and flattened), **as directed**, Class 1 (uncoated).
 - a. Style Designation: 3/4 number 13 **OR** 1-1/2 number 10, **as directed**.
 7. Perforated Metal: Cold-rolled steel sheet, ASTM A 1008/A 1008M, or hot-rolled steel sheet, ASTM A 1011/A 1011M, commercial steel Type B, 0.060 inch (1.52 mm) thick, with 1/4-inch (6.4-mm) holes 3/8 inch (9.5 mm) o.c. in staggered rows.

OR

 Perforated Metal: Galvanized-steel sheet, ASTM A 653/A 653M, G90 (Z275) coating, commercial steel Type B, 0.064 inch (1.63 mm) thick, with 1/4-inch (6.4-mm) holes 3/8 inch (9.5 mm) o.c. in staggered rows **OR** with 1/8-by-1-inch (3.2-by-25.4-mm) round end slotted holes in staggered rows, **as directed**.
 8. Woven-Wire Mesh: Intermediate-crimp, diamond **OR** square, **as directed**, pattern, 2-inch (50-mm) woven-wire mesh, made from 0.135-inch (3.5-mm) nominal diameter wire complying with ASTM A 510 (ASTM A 510M).
- F. Glass And Glazing Materials
1. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent flat glass), Quality-Q3. Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR 1201 for Category II materials.
 - a. Glass Color: Clear **OR** Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - b. Thickness for Structural Glass Balusters: As required by structural loads, but not less than 12.0 **OR** 19.0, **as directed**, mm.
 - c. Thickness for Glass Infill Panels: As required by structural loads, but not less than 6.0 **OR** 10.0, **as directed**, mm.

OR

 Thickness: As indicated on Drawings.
 2. Laminated Glass: ASTM C 1172, Condition A (uncoated), Type I (transparent flat glass), Quality-Q3 with two plies of glass and polyvinyl butyral interlayer not less than 0.060 inch (1.52 mm) thick.
 - a. Kind: LA (laminated annealed) **OR** LHS (laminated heat strengthened) **OR** LT (laminated tempered) **OR** As indicated, **as directed**.
 - b. Glass Color: Clear **OR** Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - c. Interlayer Color: Clear **OR** Blue-green **OR** Bronze light **OR** Gray **OR** As selected from manufacturer's full range, **as directed**.
 - d. Glass Plies for Structural Glass Balusters: Thickness required by structural loads, but not less than 6.0 **OR** 8.0, **as directed**, mm thick, each.
 - e. Glass Plies for Glass Infill Panels: Thickness required by structural loads, but not less than 3.0 **OR** 4.0 **OR** 5.0, **as directed**, mm, each.
 3. Ceramic-Coated Glass: Heat-treated float glass, Condition C; with ceramic enamel applied by silk-screened process; complying with Specification No. 95-1-31 in GANA's "Engineering Standards Manual" and with other requirements specified.

- a. Glass Color: Clear **OR** Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray **OR** As selected from manufacturer's full range, **as directed**.
 4. Plastic Structural Glazing: Uncoated, transparent, monolithic acrylic sheet complying with ASTM D 4802, Category A-1 or A-2 (cell cast or continuous cast), Finish 1 (smooth or polished), and as follows:
 - a. Color: Colorless (clear) **OR** Blue **OR** Blue-green **OR** Bronze **OR** Gray **OR** Green **OR** Match glass, **as directed**.
 - b. Thickness: 12.0 mm **OR** Match glass thickness, **as directed**.
 5. Glazing Cement and Accessories for Structural Glazing: Glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal subrails.
 - a. Glazing Cement: Nonshrinking organic cement designed for curing by passing an electric current through metal subrail holding glass panel, as standard with manufacturer.
 6. Glazing Gaskets for Glass Infill Panels: Glazing gaskets and related accessories recommended or supplied by railing manufacturer for installing glass infill panels in post-supported railings.
- G. Fasteners
1. Fastener Materials: Unless otherwise indicated, provide the following:
 - a. Aluminum Components: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
 - b. Copper-Alloy (Bronze) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed; muntz metal (Alloy 280) fasteners where exposed.
 - c. Copper-Alloy (Brass) Components: Silicon bronze (Alloy 651 or Alloy 655) fasteners where concealed; brass (Alloy 260 or Alloy 360) fasteners where exposed.
 - d. Stainless-Steel Components: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
 - e. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
 - f. Galvanized-Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
 - g. Dissimilar Metals: Type 304 **OR** Type 316, **as directed**, stainless-steel fasteners.
 2. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads, **as directed**.
 3. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated **OR** exposed fasteners are unavoidable **OR** exposed fasteners are the standard fastening method for railings indicated, **as directed**.
 - a. Provide Phillips **OR** tamper-resistant **OR** square or hex socket, **as directed**, flat-head machine screws for exposed fasteners unless otherwise indicated.
 4. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 5. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (**A1**) **OR** Group 2 (**A4**), **as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.
- H. Miscellaneous Materials
1. Wood Rails: Clear, straight-grained hardwood rails secured to recessed **OR** exposed, **as directed**, metal subrail.
 - a. Species: Ash **OR** Cherry **OR** Red oak **OR** Walnut **OR** White oak, **as directed**.

- b. Finish: Manufacturer's standard **OR** Transparent polyurethane **OR** Penetrating oil **OR** Acrylic impregnated, **as directed**.
- c. Staining: None **OR** Match the Owner's sample **OR** As selected from manufacturer's full range, **as directed**.
- d. Profile: Square, 1-3/4 by 1-3/4 inches (45 by 45 mm) with edges eased to 1/4-inch (6-mm) radius **OR** Rectangular, 1-3/4 by 5 inches (45 by 127 mm) with edges eased to 1/4-inch (6-mm) radius **OR** Round, 2-inch (50-mm) diameter **OR** As indicated, **as directed**.

OR

Wood Rails: Hardwood rails complying with Division 06 Section "Interior Architectural Woodwork"

- 2. Electrical Components: Provide internal, fluorescent light fixtures and electrical components, required as part of illuminated railings, that comply with NFPA 70 and that are listed and labeled by UL.
- 3. Plastic Handrail Caps: Thermoplastic rail covering, color as indicated or, if not indicated, as selected by the Owner from manufacturer's standard colors.
- 4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - a. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- 5. Brazing Rods: For copper-alloy railings, provide type and alloy as recommended by producer of metal to be brazed and as required for color match, strength, and compatibility in fabricated items.
- 6. Lacquer for Copper Alloys: Clear acrylic lacquer specially developed for coating copper-alloy products.
- 7. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- 8. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- 9. Shop Primers: Provide primers that comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
- 10. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- 11. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- 12. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MPI#26 **OR** Vinyl wash primer complying with MPI#80 **OR** Water-based galvanized metal primer complying with MPI#134, **as directed**.
- 13. Intermediate Coats and Topcoats: Provide products that comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
- 14. Epoxy Intermediate Coat: Complying with MPI#77 and compatible with primer and topcoat.
- 15. Polyurethane Topcoat: Complying with MPI#72 and compatible with undercoat.
- 16. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- 17. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- 18. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - a. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

I. Fabrication

- 1. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

2. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.
3. Make up wire-rope assemblies in the shop to field-measured dimensions with fittings machine swaged. Minimize amount of turnbuckle take-up used for dimensional adjustment so maximum amount is available for tensioning wire ropes. Tag wire-rope assemblies and fittings to identify installation locations and orientations for coordinated installation.
4. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately **1/32 inch (1 mm)** unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
5. Form work true to line and level with accurate angles and surfaces.
6. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
7. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
8. Connections: Fabricate railings with welded or nonwelded connections unless otherwise indicated.
9. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove flux immediately.
 - d. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
10. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
11. Brazed Connections: Connect copper-alloy railings by brazing. Cope components at connections to provide close fit, or use fittings designed for this purpose. Braze corners and seams continuously.
 - a. Use materials and methods that match color of base metal, minimize distortion, and develop maximum strength and corrosion resistance.
 - b. Remove flux immediately.
 - c. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and brazed surface matches contours of adjoining surfaces.
12. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - a. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
13. Form changes in direction as follows:
 - a. As detailed.
OR
By bending or by inserting prefabricated elbow fittings.
OR
By flush bends or by inserting prefabricated flush-elbow fittings.
OR
By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
OR
By bending to smallest radius that will not result in distortion of railing member.
14. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
15. Close exposed ends of hollow railing members with prefabricated end fittings.

16. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is **1/4 inch (6 mm)** or less.
 17. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
 - a. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
 18. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.
 19. For railing posts set in concrete, provide steel **OR** stainless-steel, **as directed**, sleeves not less than **6 inches (150 mm)** long with inside dimensions not less than **1/2 inch (13 mm)** greater than outside dimensions of post, with metal plate forming bottom closure.
 20. For removable railing posts, fabricate slip-fit sockets from steel **OR** stainless-steel, **as directed**, tube or pipe whose ID is sized for a close fit with posts; limit movement of post without lateral load, measured at top, to not more than one-fortieth of post height. Provide socket covers designed and fabricated to resist being dislodged.
 - a. Provide chain with eye, snap hook, and staple across gaps formed by removable railing sections at locations indicated. Fabricate from same metal as railings.
 21. Expanded-Metal Infill Panels: Fabricate infill panels from stainless-steel **OR** steel, **as directed**, expanded metal unless otherwise indicated.
 - a. Edge panels with U-shaped channels made from same metal as infill; not less than **0.043 inch (1.1 mm)** thick.
 - b. Orient expanded metal with long dimension of diamonds parallel to top rail **OR** perpendicular to top rail **OR** horizontal **OR** vertical, **as directed**.
 22. Perforated-Metal Infill Panels: Fabricate infill panels from perforated metal made from steel **OR** galvanized steel **OR** aluminum **OR** stainless steel **OR** same metal as railings in which they are installed, **as directed**.
 - a. Edge panels with U-shaped channels made from metal sheet, of same metal as perforated metal and not less than **0.043 inch (1.1 mm)** thick.
 - b. Orient perforated metal with pattern parallel to top rail **OR** perpendicular to top rail **OR** horizontal **OR** vertical **OR** as indicated on Drawings, **as directed**.
 23. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into **1-by-1/2-by-1/8-inch (25-by-13-by-3-mm)** metal channel frames.
 - a. Make wire mesh and frames from aluminum **OR** stainless steel **OR** steel, **as directed**, unless otherwise indicated.
 - b. Orient wire mesh with diamonds vertical **OR** wires perpendicular and parallel to top rail **OR** wires horizontal and vertical, **as directed**.
 24. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.
- J. Glazing Panel Fabrication
1. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
 - a. Clean-cut or flat-grind edges at butt-glazed sealant joints to produce square edges with slight chamfers at junctions of edges and faces
 - b. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.
 2. Structural Glass Balusters: Factory-bond glass to aluminum base and top-rail channels in railing manufacturer's plant using glazing cement to comply with manufacturer's written specifications, unless field glazing is standard with manufacturer.
 3. Structural Balusters: Provide tempered **OR** laminated, heat-strengthened **OR** laminated, tempered, **as directed**, glass panels for both straight and curved sections, **as directed**.
OR

Structural Balusters: Provide thermoformed, curved, plastic glazing panels for curved sections and tempered **OR** laminated, heat-strengthened **OR** laminated, tempered, **as directed**, glass panels for straight sections.

OR

Infill Panels: Provide tempered **OR** laminated, annealed **OR** laminated, heat-strengthened **OR** laminated, tempered, **as directed**, glass panels for both straight and curved sections, **as directed**.

K. Illuminated Railings

1. General: Comply with requirements in this Section for aluminum railings with welded connections.
2. Illuminated Units: Provide internal illumination using concealed, internally wired, fluorescent-strip fixture system to illuminate walking surfaces adjacent to railings without light leaks. Make provisions for servicing and for concealed connection to electric service. Coordinate electrical characteristics with those of the power supply provided.
 - a. Fluorescent Tubes: Provide number of tubes indicated or required by railing length.
 - b. Diffusers: UV-stabilized acrylic diffusers matching profile of railings.
 - c. Ballasts: Energy-saving, high power factor, Class P, electromagnetic type; designed for use with high-output lamps, and with automatic-reset thermal protection. Ballasts comply with ANSI C82.1, bear Certified Ballast Manufacturer Certification labels, and are rated for **0 deg F (minus 17 deg C) OR minus 20 deg F (minus 29 deg C), as directed**, starting temperature.

L. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
4. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

M. Aluminum Finishes

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Mechanical Finish: AA-M3x (Mechanical Finish: as specified); sand top rails, handrails, and intermediate rails in one direction only, parallel to length of railing, with 120- and 320-grit abrasive. After installation, polish railings with No. 0 steel wool immersed in paste wax, then rub to a luster with a soft dry cloth.
3. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
4. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Champagne **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
5. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

6. Siliconized Polyester Finish: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
7. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

OR

High-Performance Organic Finish: Three **OR** Four, **as directed**,-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- b. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

N. Copper-Alloy Finishes

1. Finish designations for copper alloys comply with the system for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
2. Buffed Finish: M21 (Mechanical Finish: buffed, smooth specular).
3. Hand-Rubbed Finish: M31-M34 (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed).
4. Medium-Satin Finish: M32 (Mechanical Finish: directionally textured, medium satin).
5. Fine-Matte Finish: M42 (Mechanical Finish: nondirectional finish, fine matte).
6. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
7. Hand-Rubbed Finish, Lacquered: M31-M34-O6x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
8. Medium-Satin Finish, Lacquered: M32-O6x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
9. Fine-Matte Finish, Lacquered: M42-O6x (Mechanical Finish: nondirectional finish, fine matte; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
10. Statuary Conversion Coating over Satin Finish: M31-C55 (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide), with color matching the Owner's sample.
11. Patina Conversion Coating: M36-C12-C52 (Mechanical Finish: directionally textured, uniform; Chemical Finish: nonetched cleaned, degreased; Chemical Finish: conversion coating, ammonium sulfate), with color matching the Owner's sample.

O. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
3. Directional Satin Finish: No. 4.
4. Dull Satin Finish: No. 6.
5. Satin, Reflective, Directional Polish: No. 7.
6. Mirrorlike Reflective, Nondirectional Polish: No. 8.
7. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
8. Sputter-Coated Finish: Titanium nitride coating deposited by magnetic sputter-coating process over indicated mechanical finish.

P. Steel And Iron Finishes

1. Galvanized Railings:
 - a. Hot-dip galvanize steel **OR** exterior steel, **as directed**, and iron railings, including hardware, after fabrication.
 - b. Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.
 - c. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.
 - d. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.
 - e. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - f. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
2. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.
3. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
4. For nongalvanized-steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
5. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" **OR** SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning" **OR** requirements indicated below, **as directed**:
 - a. Exterior Railings: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Railings Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - c. Railings Indicated to Receive Primers Specified in Division 9 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - d. Other Railings: SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
6. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
 - a. Shop prime uncoated railings with universal shop primer **OR** primers specified in Division 07, **as directed**, unless zinc-rich primer is **OR** primers specified in Division 09 Section "High-performance Coatings" are, **as directed**, indicated.
 - b. Do not apply primer to galvanized surfaces.
7. Shop-Painted Finish: Comply with Division 09 Section(s) "Exterior Painting" **OR** "High-performance Coatings", **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
8. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.

- a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
9. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
 - a. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
 - c. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**.
 - d. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
10. Powder-Coat Finish: Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:
 - a. Prepare galvanized metal by thoroughly removing grease, dirt, oil, flux, and other foreign matter.
 - b. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.
 - c. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**.
 - d. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

B. Installation, General

1. Fit exposed connections together to form tight, hairline joints.
2. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
 - a. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - b. Set posts plumb within a tolerance of **1/16 inch in 3 feet (2 mm in 1 m)**.
 - c. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed **1/4 inch in 12 feet (5 mm in 3 m)**.
3. Corrosion Protection: Coat concealed surfaces of aluminum and copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
4. Adjust railings before anchoring to ensure matching alignment at abutting joints.
5. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

C. Railing Connections

1. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.
2. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending **2 inches (50 mm)** beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within **6 inches (150 mm)** of post.

D. Anchoring Posts

1. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
2. Form or core-drill holes not less than **5 inches (125 mm)** deep and **3/4 inch (20 mm)** larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
3. Cover anchorage joint with flange of same metal as post, welded to post after placing anchoring material **OR** attached to post with set screws, **as directed**.
OR
Leave anchorage joint exposed with **1/8-inch (3-mm)** buildup, sloped away from post **OR** anchoring material flush with adjacent surface, **as directed**.
4. Anchor posts to metal surfaces with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:
 - a. For aluminum railings, attach posts as indicated using fittings designed and engineered for this purpose.
 - b. For copper-alloy railings, attach posts as indicated using fittings designed and engineered for this purpose.
 - c. For stainless-steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
 - d. For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.
5. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

E. Attaching Railings

1. Anchor railing ends to concrete and masonry with sleeves concealed within **OR** flanges connected to **OR** brackets on underside of rails connected to, **as directed**, railing ends and anchored to wall construction with anchors and bolts.
2. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends using nonwelded connections.
3. Attach handrails to walls with wall brackets except where end flanges are used. Provide brackets with **1-1/2-inch (38-mm)** clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
 - a. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt **OR** predrilled hole for exposed bolt anchorage, **as directed**.
 - b. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
4. Secure wall brackets and railing end flanges to building construction as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated, **as directed**, wood backing between studs. Coordinate with stud installation to locate backing members.
OR
For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements using self-tapping screws of size and type required to support structural loads.

OR

For steel-framed partitions, fasten brackets with toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

F. Installing Glass Panels

1. **Glass-Supported Railings:** Install assembly to comply with railing manufacturer's written instructions.
 - a. Attach base channel to building structure, then insert and connect factory-fabricated and -assembled glass panels if glass was bonded to base and top rail channels in factory.
 - b. Attach base channel to building structure, then insert glass into base channel and bond with glazing cement unless glass was bonded to base and top rail channels in factory.
 - 1) Support glass panels in base channel at quarter points with channel-shaped setting blocks that also act as shims to maintain uniform space for glazing cement. Fill remaining space in base channel with glazing cement for uniform support of glass.
 - c. Adjust spacing of glass panels so gaps between panels are equal before securing in position.
 - d. Erect glass railings under direct supervision of manufacturer's authorized technical personnel.
2. **Post-Supported Glass Railings:** Install assembly to comply with railing manufacturer's written instructions and with requirements in other Part 1.3 articles. Erect posts and other metal railing components, then set factory-cut glass panels. Do not cut, drill, or alter glass panels in field. Protect edges from damage.

G. Installing Plastic Handrail Caps

1. Apply plastic handrail caps to top rails and handrails, where indicated, complying with manufacturer's written instructions for cutting, mounting, forming, welding, cleaning, applying end caps, and finishing.
2. Minimize number of joints in plastic caps by installing in lengths as long as possible. Allow for shortening of plastic cap caused by welding and splicing process; butt ends together to produce hairline joint.
 - a. Continuously weld, splice, miter, and end-cap joints using cap manufacturer's electric welding iron designed for this purpose. Remove welding flash while material is still soft.
 - b. Weld only prongs on underside of plastic cap at splice, miter, and end-cap joints. After cutting plastic cap, dress ends with file to produce a hairline fit between abutting sections. After mounting cap, polish top surface with cap manufacturer's solvent designed for this purpose until joint becomes almost invisible.

H. Field Quality Control

1. **Testing Agency:** Perform field tests and inspections and prepare test reports.
2. **Extent and Testing Methodology:** Randomly select completed railing assemblies for testing that are representative of different railing designs and conditions in the completed Work. Railings will be tested according to ASTM E 894 and ASTM E 935 for compliance with performance requirements.
3. Remove and replace railings where test results indicate that they do not comply with specified requirements unless they can be repaired in a manner satisfactory to the Owner and will comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Cleaning

1. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
2. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.

3. Clean and polish glass and plastic glazing as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Final Completion.
4. Clean wood rails and plastic handrail caps by wiping with a damp cloth and then wiping dry.
5. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.

OR

Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
6. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

J. Protection

1. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Final Completion.
2. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 23 00a

Task	Specification	Specification Description
05 73 23 00	05 15 16 00	Ornamental Metal
05 73 23 00	05 75 00 00	Ornamental Formed Metal

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SECTION 05 75 00 00 - ORNAMENTAL FORMED METAL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for ornamental formed metal. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Beam wraps.
 - b. Closures and trim.
 - c. Column covers.
 - d. Decorative-metal-clad, hollow-metal doors and frames.
 - e. Elevator cab and entrance finishes.
 - f. Escalator enclosures.
 - g. Filler panels at demountable partitions and/or between dissimilar construction.
 - h. Heating-cooling unit enclosures.
 - i. Lighting coves.
 - j. Metal base.
 - k. Mullion cladding.
 - l. Pipe system covers.
 - m. Pockets for window treatment.
 - n. Window stools.
 - o. Exterior fins.
 - p. Exterior formed-metal-shaped panels.
 - q. Exterior sunshades.
 - r. Exterior trellises.
 - s. Exterior window covers.
 - t. Metal shapes as part of roof construction.

C. Performance Requirements

1. Delegated Design: Design exterior decorative formed metal items, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Decorative formed metal items, including anchors and connections, shall withstand the effects of gravity loads and the following loads and stresses without exceeding the allowable design working stress of materials involved and without exhibiting permanent deformation in any components:
 - a. Wind Loads on Exterior Items: As indicated on Drawings **OR 20 lbf/sq. ft. (957 Pa) OR 30 lbf/sq. ft. (1436 Pa) OR** As required to meet local Project requirements.
 - b. Live Loads on Heating-Cooling Unit Enclosures: **100 lbf/sq. ft. (4.8 kN/sq. m)** or a concentrated load of **300 lbf (1.3 kN)** on an area of **4 sq. in. (26 sq. cm)**, whichever produces the greater stress.
3. Seismic Performance: Exterior decorative formed metal items, including anchors and connections, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. Component Importance Factor is 1.0.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- a. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- 5. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

D. Submittals

- 1. Product Data: For each type of product indicated. Include finishing materials.
- 2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
- 3. Shop Drawings: Show fabrication and installation details for decorative formed metal.
 - a. Include plans, elevations, component details, and attachments to other work.
 - b. Indicate materials and profiles of each decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
- 4. Samples: For each type of exposed finish required, prepared on 6-inch- (150-mm-) square Samples of metal of same thickness and material indicated for the Work.
- 5. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 6. Coordination Drawings: For decorative formed metal elements that house items specified in other Sections. Show dimensions of housed items, including locations of housing penetrations and attachments, and necessary clearances.
- 7. Qualification Data: For qualified Installer, fabricator, organic-coating applicator, anodic finisher, powder-coating applicator and professional engineer.
- 8. Mill Certificates: Signed by stainless-steel manufacturers certifying that products furnished comply with requirements.
- 9. Welding certificates.
- 10. Maintenance Data: For mirrorlike stainless-steel finish and statuary conversion coating copper-alloy finish to include in maintenance manuals.

E. Quality Assurance

- 1. Fabricator Qualifications: A firm experienced in producing decorative formed metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- 2. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings of type indicated to metals of types indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- 3. Anodic Finisher Qualifications: A firm experienced in successfully applying anodic finishes of type indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- 4. Powder-Coating Applicator Qualifications: A firm experienced in successfully applying powder coatings of type indicated to metals of types indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- 5. Installer Qualifications: Fabricator of products.
- 6. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - d. AWS D1.6, "Structural Welding Code - Stainless Steel."

7. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they stain or bond to finished surfaces.
2. Store products on elevated platforms in a dry location.

G. Project Conditions

1. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

H. Coordination

1. Coordinate installation of anchorages for decorative formed metal items. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
2. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion, and other causes.

1.2 PRODUCTS

A. Sheet Metal

1. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.
2. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
3. Aluminum Sheet: Flat sheet complying with **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H32.
4. Galvanized-Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating, either commercial steel or forming steel.
5. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, exposed or electrolytic zinc-coated, ASTM A 879/A 879M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
6. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** Type 316, **as directed**, stretcher-leveled standard of flatness.
7. Bronze Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper) or Alloy UNS No. C23000 (red brass, 85 percent copper).
8. Brass Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000 (cartridge brass, 70 percent copper).
9. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper.
10. Titanium Sheet: ASTM B 265, Grade 1.

B. Miscellaneous Materials

1. Gaskets: As required to seal joints in decorative formed metal and remain airtight **OR** weathertight, **as directed**; as recommended in writing by decorative formed metal manufacturer.
 - a. ASTM D 1056, Type 1, Class A, grade as recommended by gasket manufacturer to obtain seal for application indicated.
 - b. Closed-cell polyurethane foam, adhesive on two sides, release paper protected.
2. Sealants, Exterior: ASTM C 920; elastomeric silicone **OR** polyurethane **OR** polysulfide, **as directed**, sealant; of type, grade, class, and use classifications required to seal joints in

- decorative formed metal and remain weathertight; and as recommended in writing by decorative formed metal manufacturer.
3. Sealants, Interior: Nonsag, paintable, nonstaining, latex sealant complying with ASTM C 834; of type and grade required to seal joints in decorative formed metal; and as recommended in writing by decorative formed metal manufacturer.
 - a. Use sealant that has a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 4. Filler Metal and Electrodes: Provide type and alloy of filler metal and electrodes as recommended by producer of metal to be welded or brazed and as necessary for strength, corrosion resistance, and compatibility in fabricated items.
 - a. Use filler metals that will match the color of metal being joined and will not cause discoloration.
 5. Fasteners: Fabricated from same basic metal and alloy as fastened metal unless otherwise indicated. Do not use metals that are incompatible with materials joined.
 - a. Provide concealed fasteners for interconnecting decorative formed metal items and for attaching them to other work unless otherwise indicated **OR** exposed fasteners are unavoidable or are the standard fastening method, **as directed**.
 - b. Provide Phillips **OR** tamper-resistant **OR** square or hex socket, **as directed**, flat-head machine screws for exposed fasteners unless otherwise indicated.
 6. Structural Anchors: For applications indicated to comply with certain design loads, provide chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 7. Nonstructural Anchors: For applications not indicated to comply with design loads, provide powder-actuated fasteners **OR** metal expansion sleeve anchors **OR** metal-impact expansion anchors, **as directed**, of type, size, and material necessary for type of load and installation indicated, as recommended by manufacturer, unless otherwise indicated.
 8. Anchor Materials:
 - a. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or **ASTM F 1941 (ASTM F 1941M)**, Class Fe/Zn 5, unless otherwise indicated.
 - b. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group **1 (A1) OR Group 2 (A4)**, **as directed**, stainless-steel bolts, **ASTM F 593 (ASTM F 738M)**, and nuts, **ASTM F 594 (ASTM F 836M)**.
 9. Sound-Deadening Materials:
 - a. Insulation: Unfaced, mineral-fiber blanket insulation complying with ASTM C 665, Type I, and passing ASTM E 136 test.
 - b. Mastic: Cold-applied asphalt emulsion complying with ASTM D 1187.
 10. Backing Materials: Provided or recommended by decorative formed metal manufacturer.
 11. Laminating Adhesive: Adhesive recommended by metal fabricator that will fully bond metal to metal and that will prevent telegraphing and oil canning and is compatible with substrate and noncombustible after curing.
 - a. Contact Adhesive: VOC content of not more than 80 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Metal-to-Metal Adhesive: VOC content of not more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - c. Multipurpose Construction Adhesive: VOC content of not more than 70 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - d. Special-Purpose Contact Adhesive: (Contact adhesive used to bond melamine-covered board, metal, unsupported vinyl, ultrahigh molecular weight polyethylene, and rubber or wood veneer, 1/16 inch thick or less, to any surface): 250 g/L.
 12. Isolation Coating: Manufacturer's standard alkali-resistant coating **OR** bituminous paint **OR** epoxy coating, **as directed**.

C. Paints And Coatings

1. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
2. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
3. Lacquer for Copper Alloys: Clear, acrylic lacquer specially developed for coating copper-alloy products.
4. Shop Primers: Comply with Division 07 OR Division 09 Section(s) "High-performance Coatings", **as directed**.
5. Universal Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
6. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
7. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MPI#26 **OR** Vinyl wash primer complying with MPI#80 **OR** Water-based galvanized metal primer complying with MPI#134, **as directed**.
8. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Fabrication, General

1. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
2. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
3. Form metal to profiles indicated, in maximum lengths to minimize joints. Produce flat, flush surfaces without cracking or grain separation at bends. Fold back exposed edges of unsupported sheet metal to form a **1/2-inch- (12-mm-)** wide hem on the concealed side, or ease edges to a radius of approximately **1/32 inch (1 mm)** and support with concealed stiffeners.
4. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.
 - a. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
5. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce decorative formed metal items as needed to attach and support other construction.
6. Provide support framing, mounting and attachment clips, splice sleeves, fasteners, and accessories needed to install decorative formed metal items.
7. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.
 - a. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

E. Beam Wraps

1. Form beam wraps from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Baked enamel or powder coat **OR** Siliconized polyester **OR** High-performance organic coating **OR** Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - b. Steel Sheet: **0.060 inch (1.52 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Powder coat, **as directed**.

- c. Stainless-Steel Sheet: **0.050 inch (1.27 mm)** OR Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: No. 2B OR No. 4 OR No. 6 OR No. 7 OR No. 8, **as directed**.
 2. Fabricate with calk stop angle to retain backer rod and sealant.
- F. Closures And Trim
1. Form closures and trim from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction, with weathertight joints at exterior installations.
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)** OR Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Baked enamel or powder coat OR Siliconized polyester OR High-performance organic coating OR Mill OR Clear anodic OR Color anodic, **as directed**.
 - b. Galvanized-Steel Sheet: **0.052 inch (1.32 mm)** OR Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Factory primed OR Baked enamel OR Siliconized polyester OR High-performance organic coating OR Powder coat, **as directed**.
 - c. Steel Sheet: **0.048 inch (1.21 mm)** OR Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Factory primed OR Baked enamel OR Powder coat, **as directed**.
 - d. Closures and trim may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view and not exposed to weather.
 2. Conceal fasteners where possible; otherwise, locate where they are as inconspicuous as possible. Size fasteners to support closures and trim, with fasteners spaced to prevent buckling or waviness in finished surfaces.
 3. Drill and tap holes needed for securing closures and trim to other surfaces.
 4. Incorporate gaskets where indicated or needed for concealed, continuous seal at abutting surfaces.
 5. Miter or cope trim members at corners and reinforce with bent metal splice plates to form tight joints.
- G. Column Covers
1. Spackled-Seam Type: Form column covers from **0.125-inch (3.2-mm)** aluminum, rolled to radii indicated. Taper edges of adjoining pieces of column covers, for taping and spackling, to **0.094-inch (2.4-mm)** thickness in approximately **1 inch (25 mm)** of width. Punch tapered edges for gypsum board screws at **1/2 inch (12 mm)** o.c., and mill grooves in tapered edge to improve bond with joint compound.
 - a. Support Framing: At vertical joints, provide **1-1/2-by-3-5/8-inch (38-by-89-mm)** steel channel support posts formed from **0.040-inch (1.0-mm)** galvanized steel.
 - b. Joint Treatment Materials: Provide joint treatment compounds and reinforcing tape complying with requirements in Division 9 Section "Gypsum Board."
 2. Snap-Together Type: Form column covers to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that will engage continuous mounting clips.
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)** OR Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Baked enamel or powder coat OR Siliconized polyester OR High-performance organic coating OR Mill OR Clear anodic OR Color anodic, **as directed**.
 - b. Steel Sheet: **0.060 inch (1.52 mm)** OR Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Factory primed OR Baked enamel OR Powder coat, **as directed**.
 - c. Stainless-Steel Sheet: **0.050 inch (1.27 mm)** OR Thickness required to comply with performance requirements, **as directed**.

- 1) Finish: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.
 - d. Bronze Sheet: **0.051 inch (1.29 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Statuary conversion coating over satin finish, **as directed**.
 - e. Brass Sheet: **0.051 inch (1.29 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: Buffed **OR** Hand-rubbed, **as directed**, finish, lacquered.
 - f. Column covers may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view.
 - g. Form returns at vertical joints to provide hairline V-joints.

OR

Form returns at vertical joints to provide **1/2-inch- (12-mm-)** **OR** **3/4-inch- (18-mm-)**, **as directed**, wide reveal at joints. Provide snap-in metal filler strips at reveals that leave reveals **1/2 inch (12 mm)** deep **OR** flush, **as directed**.

OR

Form returns at vertical joints to accommodate backer rod and sealant.
 - h. Fabricate column covers with hairline horizontal V-joints produced by forming returns on mating ends of column cover sections. Locate horizontal joints as indicated.

OR

Fabricate column covers without horizontal joints.

OR

Fabricate column covers with horizontal butt joints, tightly fitted and backed with a sleeve for field splicing with adhesive.

OR

Fabricate column covers with **1/2-inch- (12-mm-)** wide, **as directed**, reveals at horizontal joints produced by forming returns on mating ends of column cover sections. Provide snap-in metal filler strips at reveals matching reveals at vertical joints. Locate horizontal joints as indicated.
 - i. Fabricate base **OR** ceiling, **as directed**, ring to match **OR** contrast with, **as directed**, column covers.
 - j. Fabricate with calk stop/stiffener ring.
 - k. Apply manufacturer's recommended sound-deadening insulation **OR** mastic, **as directed**, to backs of column covers.
- H. Decorative-Metal-Clad Doors And Frames
- 1. Laminate metal sheets, of type and thickness indicated below, to faces of hollow-metal doors and frames and elevator entrances where indicated:
 - a. Bronze Sheet: **0.040 inch (1.02 mm)**.
 - 1) Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Statuary conversion coating over satin finish, lacquered, **as directed**.
 - b. Brass Sheet: **0.040 inch (1.02 mm)**.
 - 1) Finish: Buffed **OR** Hand-rubbed, **as directed**, finish lacquered.
 - c. Stainless-Steel Sheet: **0.038 inch (0.95 mm)**.
 - 1) Finish: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.
 - d. Titanium Sheet: **0.025 inch (0.64 mm)**.
 - 1) Finish: Dull **OR** Bright, **as directed**, matte.
- I. Escalator Enclosures
- 1. Form escalator enclosures from metal of type and thickness indicated below. Coordinate size of enclosures, location of cutouts, and method of attachment to adjoining construction.
 - a. Stainless-Steel Sheet: **0.062 inch (1.59 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 1) Finish: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.
 - b. Bronze Sheet: **0.081 inch (2.05 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.

- 1) Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Statuary conversion coating over satin finish, **as directed**.

J. Filler Panels

1. Form filler panels for closing ends of partition systems and for other applications indicated. Form from two sheets of metal of type and thickness indicated below, separated by channels formed from the same material, producing a panel of same thickness as partitions **OR** mullions, **as directed**, unless otherwise indicated. Incorporate reveals, trim, and concealed anchorages for attaching to adjacent surfaces.
 - a. Galvanized-Steel Sheet: **0.064 inch (1.63 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - b. Steel Sheet: **0.060 inch (1.52 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Powder coat, **as directed**.
 - c. Filler panels may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view.
2. Fill interior of panel with sound-deadening insulation permanently attached to inside panel faces.
3. Adhesively attach gaskets to filler panel edges where they abut mullions or glazing. Use **1-inch-(25-mm-)** square material, unless otherwise indicated, set approximately **1/4 inch (6 mm)** into channeled edge of filler panel.

OR

Attach gaskets to all edges of panels that abut adjacent surfaces to form a continuous seal. Use compressible gaskets or mastic sealing tape, applied to center of panel edges to be concealed from view, unless otherwise indicated.
4. Do not mechanically fasten filler panels to mullions.

K. Heating-Cooling Unit Enclosures

1. Fabricate heating-cooling unit enclosures from metal of type and thickness indicated below:
 - a. Galvanized-Steel Sheet:
 - 1) Framing: **0.108 inch (2.74 mm)** **OR** Thickness required to comply with performance requirements.
 - 2) Sills and Stools: **0.079 inch (2.01 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 3) Front Panels and Bases: **0.064 inch (1.63 mm)**.
 - 4) Concealed Panels and Trim: **0.040 inch (1.02 mm)**.
 - 5) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - b. Steel Sheet:
 - 1) Framing: **0.105 inch (2.66 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 2) Sills and Stools: **0.075 inch (1.90 mm)** **OR** Thickness required to comply with performance requirements, **as directed**.
 - 3) Front Panels and Bases: **0.060 inch (1.52 mm)**.
 - 4) Concealed Panels and Trim: **0.036 inch (0.91 mm)**.
 - 5) Finish: Factory primed **OR** Baked enamel **OR** Powder coat, **as directed**.
2. Weld seams and connections unless otherwise indicated or unless other methods are necessary for access to heating and cooling equipment.
3. Incorporate stiffeners or laminated backing using noncombustible materials as needed for strength and rigidity.
 - a. Fill space between stiffeners with sound-deadening insulation attached to face sheet with insulation adhesive unless otherwise indicated.

OR

Coat concealed faces of metal panels more than **6 inches (150 mm)** wide with a heavy coating of sound-deadening mastic applied at the minimum rate of **20 sq. ft./gal. (0.5 sq. m/L)**.

4. Provide louvers and grilles of size, type, and materials indicated.
 - a. For removable grilles, use modular units with recessed openings formed into surfaces of enclosures and without blank filler panels between grilles, so face panels and stools are continuous. Fabricate removable grilles and openings to precise tolerances to produce well-fitted assemblies free of warp or rattle, with grilles supported continuously along parallel edges and with tops flush with top of enclosure.
 5. Incorporate removable tops and fronts where indicated or needed for access to heating-cooling units and to piping, ductwork, controls, and electrical service, with panels and openings as follows:
 - a. Fabricate with a fitting tolerance of not less than **1/32 inch (0.8 mm)** and not more than **1/16 inch (1.6 mm)** at each edge, with face of panels flush with adjoining fixed surfaces of enclosure.
 - b. Form panels for easy removal without interfering with adjoining construction or furniture. Hold panels in place with concealed clips and hardware that prevent warp and rattle.
 6. Incorporate hinged access panels in enclosures for access to heating-cooling unit controls, as either separate elements or integrated with grille openings, as indicated or needed.
 7. Coordinate construction, configuration, and dimensions of enclosures with those of heating-cooling units. Provide support for heating-cooling units and controls where indicated. Provide blind knockouts and supports for piping, ductwork, control lines, electrical conduit, and wiring where indicated or needed.
 8. Locate fixed surfaces of enclosure to coincide precisely with window mullions and partition system terminations. Provide closures at ends of units, at recessed openings in base of units, and at other locations where needed to conceal unfinished wall or floor surfaces, piping, conduit, ductwork, or heating-cooling units.
 - a. Provide built-in partitions (bulkheads) within enclosures between heating-cooling units, located to coincide with mullions and partition system terminations. Seal partitions to faces of enclosures with compressible gaskets or mastic sealing tape, and cover both sides of partitions with sound-deadening insulation attached to partitions with insulation adhesive.
- L. Lighting Coves
1. Form lighting coves from metal of type and thickness indicated below. Coordinate size of coves, location of cutouts for electrical wiring, and method of attachment to adjoining construction.
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)**.
 - 1) Finish: Baked enamel or powder coat **OR** Siliconized polyester **OR** High-performance organic coating **OR** Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - b. Galvanized-Steel Sheet: **0.052 inch (1.32 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - c. Steel Sheet: **0.048 inch (1.21 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Powder coat, **as directed**.
 - d. Fabricate light coves with hairline butt joints **OR** tapered edges for taping and spackling, **as directed**.
 - e. Provide mitered corners, factory welded with backplates **OR** factory endcaps, **as directed**.
 - f. Lighting coves may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view.
- M. Metal Base
1. Form metal base from metal of type and thickness indicated below:
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)**.
 - 1) Finish: Baked enamel or powder coat **OR** Siliconized polyester **OR** High-performance organic coating **OR** Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - b. Stainless-Steel Sheet: **0.050 inch (1.27 mm)**.
 - 1) Finish: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.

- N. Mullion Cladding
1. Form mullion cladding from metal of type and thickness indicated below. Fabricate to fit tightly to adjoining construction.
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)**.
 - 1) Finish: Baked enamel or powder coat **OR** Siliconized polyester **OR** High-performance organic coating **OR** Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - b. Galvanized-Steel Sheet: **0.052 inch (1.32 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - c. Stainless-Steel Sheet: **0.050 inch (1.27 mm)**.
 - 1) Finish: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.
- O. Pipe System Covers
1. Form pipe system covers from metal of type and thickness indicated below. Coordinate size of covers, location of cutouts for piping, and method of attachment to adjoining construction.
 - a. Galvanized-Steel Sheet: **0.052 inch (1.32 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - b. Steel Sheet: **0.048 inch (1.21 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Powder coat, **as directed**.
- P. Pockets For Window Treatment
1. Form pockets from metal of type and thickness indicated below, with end closures. Coordinate dimensions and attachment methods with window treatment equipment, window frames, ceiling suspension system, and other related construction to produce a coordinated, closely fitting assembly.
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)**.
 - 1) Finish: Baked enamel or powder coat **OR** Siliconized polyester **OR** High-performance organic coating **OR** Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - b. Galvanized-Steel Sheet: **0.052 inch (1.32 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - c. Steel Sheet: **0.048 inch (1.21 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Powder coat, **as directed**.
 - d. Pockets for window treatment may be fabricated from prefinished metal sheet in lieu of finishing after fabrication provided unfinished edges are concealed from view.
 2. Reinforce pockets for attaching window treatment equipment and hardware, or increase metal thickness.
 3. Divide continuous pockets with built-in partitions located to separate adjoining drapery and blind units, to coincide with window mullions, and to receive filler panels at ends of partitions.
- Q. Window Stools
1. Form window stools from metal of type and thickness indicated below, with end closures:
 - a. Aluminum Sheet: **0.063 inch (1.60 mm)**.
 - 1) Finish: Baked enamel or powder coat **OR** Siliconized polyester **OR** High-performance organic coating **OR** Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - b. Galvanized-Steel Sheet: **0.052 inch (1.32 mm)**.
 - 1) Finish: Factory primed **OR** Baked enamel **OR** Siliconized polyester **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - c. Stainless-Steel Sheet: **0.050 inch (1.27 mm) OR 1.3 mm, as directed**.
 - 1) Finish: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.
 - d. Bronze Sheet: **0.051 inch (1.29 mm)**.

- 1) Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Statuary conversion coating over satin finish, **as directed**.
 2. Weld seams at end closures.
OR
Braze seams at end closures.
 3. Apply sound-deadening insulation **OR** mastic, **as directed**, to underside of window stools.
- R. General Finish Requirements
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Complete mechanical finishes of flat sheet metal surfaces before fabrication where possible. After fabrication, finish all joints, bends, abrasions, and other surface blemishes to match sheet finish.
 3. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 4. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
 5. Finish items indicated on Drawings after assembly.
 6. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- S. Aluminum Finishes
1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Champagne **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
 4. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 5. Siliconized Polyester Finish: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 6. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

OR

 High-Performance Organic Finish: Three **OR** Four, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

T. Galvanized-Steel Sheet Finishes

1. Preparing Galvanized Items for Factory Priming: Thoroughly clean galvanized decorative formed metal of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
2. Preparing Galvanized Items for Factory Finishing: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
3. Repairing Galvanized Surfaces: Clean welds and abraded areas and repair galvanizing to comply with ASTM A 780.
4. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
5. Factory-Painted Finish: Comply with Division 09 Section(s) "Exterior Painting" OR "High-performance Coatings", **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
6. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
7. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**. Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
8. Siliconized-Polyester Coating: Immediately after cleaning and pretreating, apply manufacturer's standard epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
9. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

OR

High-Performance Organic Finish: Three **OR** Four, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

U. Steel Sheet Finishes

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."
2. Pretreatment: Immediately after cleaning, apply a conversion coating of type suited to organic coating applied over it.

3. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply shop primer to prepared surfaces of items unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
4. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
5. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**. Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

V. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
4. Directional Satin Finish: No. 4.
5. Dull Satin Finish: No. 6.
6. Satin, Reflective, Directional Polish: No. 7.
7. Mirrorlike Reflective, Nondirectional Polish: No. 8 finish.
8. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

W. Copper-Alloy Finishes

1. Finish designations for copper alloys comply with the system established for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
2. Buffed Finish: M21 (Mechanical Finish: buffed, smooth specular).
3. Hand-Rubbed Finish: M31-M34 (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed).
4. Medium-Satin Finish: M32 (Mechanical Finish: directionally textured, medium satin).
5. Fine-Matte Finish: M42 (Mechanical Finish: nondirectional finish, fine matte).
6. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
7. Hand-Rubbed Finish, Lacquered: M31-M34-O6x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
8. Medium-Satin Finish, Lacquered: M32-O6x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
9. Fine-Matte Finish, Lacquered: M42-O6x (Mechanical Finish: nondirectional finish, fine matte; Coating: clear organic, air drying, as specified below).

- a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
- 10. Statuary Conversion Coating over Satin Finish: M31-C55 (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide), with color matching the Owner's sample.
- 11. Statuary Conversion Coating over Satin Finish, Lacquered: M31-C55-O6x (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide; Coating: clear, organic, air drying, as specified below) , with color matching the Owner's sample:
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.

X. Titanium Finishes

- 1. General: Fabricate items from finished titanium sheet, taking care not to damage finish during fabrication. Protect finish as needed during fabrication by applying a strippable, temporary protective covering.
- 2. Dull Matte Finish: Pickled and annealed.
- 3. Bright Matte Finish: Vacuum annealed.

1.3 EXECUTION

A. Examination

- 1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.
- 2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

- 1. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, drilling, and fitting required to install decorative formed metal.
 - a. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- 2. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where needed to protect metal surfaces and to make a weathertight connection.
- 3. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- 4. Install concealed gaskets, joint fillers, insulation, sealants, and flashings, as the Work progresses, to make exterior decorative formed metal items weatherproof.
- 5. Install concealed gaskets, joint fillers, sealants, and insulation, as the Work progresses, to make interior decorative formed metal items soundproof or lightproof as applicable to type of fabrication indicated.
- 6. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.
- 7. Install decorative-formed-metal-clad doors and frames to comply with requirements specified in Division 08 Section "Hollow Metal Doors And Frames".
- 8. Apply joint treatment at joints of spackled-seam-type metal column covers. Comply with requirements in Division 09 Section "Gypsum Board".

C. Adjusting And Cleaning

- 1. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.

2. Clean copper alloys according to metal finisher's written instructions in a manner that leaves an undamaged and uniform finish matching approved Sample.
 3. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.
 4. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 07 OR Division 09 Section(s) "High-performance Coatings" **OR** Division 07 AND Division 09 Section(s) "High-performance Coatings", **as directed**.
 5. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.
- D. Protection
1. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Final Completion.

END OF SECTION 05 75 00 00

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Task	Specification	Specification Description
05 75 00 00	05 15 16 00	Ornamental Metal
05 75 00 00	05 73 23 00	Miscellaneous Ornamental Metals

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SECTION 06 01 40 91 - DOOR HARDWARE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for door hardware. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Mechanical door hardware for the following:
 - 1) Swinging doors.
 - 2) Sliding doors.
 - 3) Folding doors.
 - b. Cylinders for doors specified in other Sections.
 - c. Electrified door hardware.
2. Products furnished, but not installed, under this Section include the products listed below. Coordinating, purchasing, delivering, and scheduling remain requirements of this Section.
 - a. Pivots, thresholds, weather stripping, and cylinders for locks specified in other Sections.
 - b. Permanent cores to be installed by the Owner.

C. Action Submittals

1. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Shop Drawings: Details of electrified door hardware, indicating the following:
 - a. Wiring Diagrams: For power, signal, and control wiring and including the following:
 - 1) Details of interface of electrified door hardware and building safety and security systems.
 - 2) Schematic diagram of systems that interface with electrified door hardware.
 - 3) Point-to-point wiring.
 - 4) Risers.
 - 5) Elevations doors controlled by electrified door hardware.
 - b. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
3. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.
4. Samples for Verification: For exposed door hardware of each type required, in each finish specified, prepared on Samples of size indicated below. Tag Samples with full description for coordination with the door hardware schedule. Submit Samples before, or concurrent with, submission of door hardware schedule.
 - a. Sample Size: Full-size units or minimum **2-by-4-inch (51-by-102-mm)** Samples for sheet and **4-inch (102-mm)** long Samples for other products.
 - 1) Full-size Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
5. Other Action Submittals:
 - a. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

- 1) Submittal Sequence: Submit door hardware schedule after or concurrent with submissions of Product Data, Samples, and Shop Drawings, **as directed**. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate the fabrication of other work that is critical in Project construction schedule.
 - 2) Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule." Double space entries, and number and date each page.
 - 3) Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - 4) Content: Include the following information:
 - a) Identification number, location, hand, fire rating, size, and material of each door and frame.
 - b) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - c) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - d) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - e) Fastenings and other pertinent information.
 - f) Explanation of abbreviations, symbols, and codes contained in schedule.
 - g) Mounting locations for door hardware.
 - h) List of related door devices specified in other Sections for each door and frame.
- b. Keying Schedule: Prepared by or under the supervision of Installer, detailing the Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.
- D. Informational Submittals
1. Qualification Data: For Installer and Architectural Hardware Consultant.
 2. Product Certificates: For electrified door hardware, from the manufacturer.
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.
 4. Warranty: Special warranty specified in this Section.
- E. Closeout Submittals
1. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.
- F. Quality Assurance
1. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
 - a. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and the Owner about door hardware and keying
 2. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant **OR** one who meets the requirements necessary for certification, **as directed**, and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
 3. Source Limitations: Obtain each type of door hardware from a single manufacturer.
 - a. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that

- are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.
4. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing, for fire protection ratings indicated, based on testing at positive pressure according to NFPA 252 **OR** UL 10C, unless otherwise indicated.
 5. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - a. Air Leakage Rate: Maximum air leakage of **0.3 cfm/sq. ft. (3 cu. m per minute/sq. m)** at the tested pressure differential of **0.3-inch wg (75 Pa)** of water.
 6. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
 7. Means of Egress Doors: Latches do not require more than **15 lbf (67 N)** to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
 8. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines **OR** ICC/ANSI A117.1 **OR** HUD's "Fair Housing Accessibility Guidelines", **as directed**.
 - a. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than **5 lbf (22.2 N)**.
 - b. Comply with the following maximum opening-force requirements:
 - 1) Interior, Non-Fire-Rated Hinged Doors: **5 lbf (22.2 N)** applied perpendicular to door.
 - 2) Sliding or Folding Doors: **5 lbf (22.2 N)** applied parallel to door at latch.
 - 3) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - c. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than **1/2 inch (13 mm)** high and **3/4 inch (19 mm)** high for exterior sliding doors.
 - d. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point **3 inches (75 mm)** from the latch, measured to the leading edge of the door.
 9. Keying Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management And Coordination". In addition to the Owner, Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and Owner's security consultant. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
 10. Preinstallation Conference: conduct conference at Project site.
 - a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Inspect and discuss preparatory work performed by other trades.
 - c. Inspect and discuss electrical roughing in for electrified door hardware.
 - d. Review sequence of operation for each type of electrified door hardware.
 - e. Review required testing, inspecting, and certifying procedures.
- G. Delivery, Storage, And Handling
1. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
 2. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 3. Deliver keys to manufacturer of key control system for subsequent delivery to the Owner.
 4. Deliver keys and permanent cores to the Owner by registered mail or overnight package service.

H. Coordination

1. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete. Concrete, reinforcement, and formwork requirements are specified in Division 03.
2. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
3. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.
4. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.
5. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

I. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including excessive deflection, cracking, or breakage.
 - 2) Faulty operation of doors and door hardware.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - b. Warranty Period: Three years from date of Final Completion, except as follows:
 - 1) Electromagnetic or Delayed-Egress Locks: Five years from date of Final Completion.
 - 2) Exit Devices: Two years from date of Final Completion.
 - 3) Manual Closers: 10 years from date of Final Completion.
 - 4) Concealed Floor Closers: Five **OR** 10 **OR** 25 years from date of Final Completion, **as directed**.

J. Maintenance Service

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
2. Maintenance Service: Beginning at Final Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

1.2 PRODUCTS

A. Scheduled Door Hardware

1. General: Provide door hardware for each door indicated in Part 1.3 "Door Hardware Sets" Article to comply with requirements in this Section.
 - a. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
 - b. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
2. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 1.3 "Door Hardware Sets" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 1.2.

B. Hinges

1. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.
2. Antifriction-Bearing Hinges:
 - a. Mounting: Full-Mortise (Butt) **OR** Half mortise **OR** Full surface **OR** Half surface, **as directed**.
 - b. Bearing Material: Manufacturer's standard antifriction bearing **OR** Ball bearing, **as directed**.
 - c. Grade: Grade 1 (heavy weight) **OR** Grade 2 (standard weight), **as directed**.
 - d. Base and Pin Metal:
 - 1) Exterior Hinges: Stainless steel with stainless-steel pin **OR** Brass with stainless-steel pin body and brass protruding heads, **as directed**.
 - 2) Interior Hinges: Brass with stainless-steel pin body and brass protruding heads **OR** Steel with steel pin **OR** Stainless steel with stainless-steel pin, **as directed**.
 - 3) Hinges for Fire-Rated Assemblies: Steel with steel pin **OR** Stainless steel with stainless-steel pin, **as directed**.
 - e. Pins: Non-rising loose unless otherwise indicated **OR** Maximum security **OR** Nonremovable, **as directed**.
 - 1) Outswinging Exterior Doors: Maximum security **OR** Nonremovable, **as directed**.
 - 2) Outswinging Corridor Doors with Locks: Maximum security **OR** Nonremovable, **as directed**.
 - f. Tips: Flat button **OR** Hospital **OR** Oval **OR** Ball **OR** Steeple **OR** Urn **OR** Acorn, **as directed**.
 - g. Corners: Square **OR** 5/32-inch (4-mm) radius **OR** 1/4-inch (6-mm) radius **OR** 5/8-inch (16-mm) radius, **as directed**.
 - h. Options: Raised barrel **OR** Reverse safety stud **OR** Safety stud, **as directed**.
3. Electrified Antifriction-Bearing Hinges: Full-mortise mounting.
 - a. Bearing Material: Manufacturer's standard antifriction bearing **OR** Ball bearing, **as directed**.
 - b. Grade: Grade 1 (heavy weight) **OR** Grade 2 (standard weight), **as directed**.
 - c. Base and Pin Metal:
 - 1) Exterior Hinges: Stainless steel with stainless-steel pin **OR** Brass with stainless-steel pin body and brass protruding heads, **as directed**.
 - 2) Interior Hinges: Brass with stainless-steel pin body and brass protruding heads **OR** Steel with steel pin **OR** Stainless steel with stainless-steel pin, **as directed**.
 - 3) Hinges for Fire-Rated Assemblies: Steel with steel pin **OR** Stainless steel with stainless-steel pin, **as directed**.
 - d. Pins: Non-rising loose unless otherwise indicated **OR** Maximum security **OR** Nonremovable, **as directed**.
 - 1) Outswinging Exterior Doors: Maximum security **OR** Nonremovable, **as directed**.
 - 2) Outswinging Corridor Doors with Locks: Maximum security **OR** Nonremovable, **as directed**.
 - e. Tips: Flat button **OR** Hospital **OR** Oval **OR** Ball **OR** Steeple **OR** Urn **OR** Acorn, **as directed**.
 - f. Corners: Square **OR** 5/32-inch (4-mm) radius **OR** 1/4-inch (6-mm) radius **OR** 5/8-inch (16-mm) radius, **as directed**.
 - g. Options: Raised barrel **OR** Reverse safety stud **OR** Safety stud, **as directed**.
 - h. Electric Option: Concealed electric through wires **OR** Concealed electric through wires with monitor **OR** Concealed electric monitor **OR** Concealed air transfer **OR** Concealed switch **OR** Exposed electric switch **OR** Exposed electric contacts, **as directed**.
4. Plain-Bearing Hinges: Grade 3 (standard weight).
 - a. Mounting: Full mortise (butts) **OR** Half mortise **OR** Full surface **OR** Half surface, **as directed**.
 - b. Base and Pin Metal: Brass with stainless-steel pin body and brass protruding heads **OR** Steel with steel pin, **as directed**.

- c. Pins: Non-rising loose unless otherwise indicated **OR** Maximum security **OR** Nonremovable, **as directed**.
 - 1) Outswinging Corridor Doors with Locks: Maximum security **OR** Nonremovable, **as directed**.
 - d. Tips: Flat button **OR** Hospital **OR** Oval **OR** Ball **OR** Steeple **OR** Urn **OR** Acorn, **as directed**.
 - e. Corners: Square **OR 5/32-inch (4-mm) radius OR 1/4-inch (6-mm) radius OR 5/8-inch (16-mm) radius, as directed**.
 - f. Options: Raised barrel, **as directed**.
5. Electrified Plain-Bearing Hinges: Grade 3 (standard weight); full-mortise mounting.
- a. Mounting: Full mortise (butts) **OR** Half mortise **OR** Full surface **OR** Half surface, **as directed**.
 - b. Pins: Non-rising loose unless otherwise indicated **OR** Maximum security **OR** Nonremovable, **as directed**.
 - 1) Outswinging Corridor Doors with Locks: Maximum security **OR** Nonremovable, **as directed**.
 - c. Tips: Flat button **OR** Hospital **OR** Oval **OR** Ball **OR** Steeple **OR** Urn **OR** Acorn, **as directed**.
 - d. Corners: Square **OR 5/32-inch (4-mm) radius OR 1/4-inch (6-mm) radius OR 5/8-inch (16-mm) radius, as directed**.
 - e. Options: Raised barrel, **as directed**.
 - f. Electric Option: Concealed electric through wires **OR** Concealed electric through wires with monitor **OR** Concealed electric monitor **OR** Concealed air transfer **OR** Concealed switch **OR** Exposed electric switch **OR** Exposed electric contacts, **as directed**.
6. Swing-Clear Hinges: Reversible.
- a. Mounting: Full mortise (butts) **OR** Half mortise **OR** Full surface **OR** Half surface, **as directed**.
 - b. Bearing, and Grade: Antifriction bearing, Grade 1 (heavy weight) **OR** Antifriction bearing, Grade 2 (standard weight) **OR** Plain bearing, Grade 3 (standard weight), **as directed**.
 - c. Base Metal: Wrought brass or bronze **OR** Stainless steel **OR** Wrought, forged, or cast steel, or malleable iron, **as directed**.
 - d. Pins: Non-rising loose unless otherwise indicated **OR** Maximum security **OR** Nonremovable, **as directed**.
 - 1) Outswinging Exterior Doors: Maximum security **OR** Nonremovable, **as directed**.
 - 2) Outswinging Corridor Doors with Locks: Maximum security **OR** Nonremovable, **as directed**.
 - e. Tips: Flat button **OR** Hospital, **as directed**.
 - f. Corners: Square **OR 5/32-inch (4-mm) radius OR 1/4-inch (6-mm) radius OR 5/8-inch (16-mm) radius, as directed**.
 - g. Options: Raised barrel **OR** Reverse safety stud **OR** Safety stud, **as directed**.
7. Slip-in-Type Hinges: Full-mortise mounting.
- a. Bearing and Grade: Antifriction, Grade 1 (heavy weight) **OR** Antifriction, Grade 2 (standard weight) **OR** Plain, Grade 3 (standard weight), **as directed**.
 - b. Base Metal: Wrought brass or bronze **OR** Stainless steel **OR** Wrought, forged, or cast steel, or malleable iron, **as directed**.
 - c. Swaging: **5/16-inch (7.9-mm) swaging OR 3/16-inch (4.8-mm) swaging, handed, as directed**.
8. Anchor Hinge Set: Grade 1 (heavy weight); consisting of one anchor hinge plus two full-mortise hinges; antifriction bearing; handed; nonremovable pins; flat-button tips.
- a. Base Metal: Wrought brass or bronze **OR** Stainless steel **OR** Wrought, forged, or cast steel, or malleable iron, **as directed**.
 - b. Electric Option for Center Hinge: Concealed electric through wires **OR** Concealed electric switch, **as directed**.

9. Pocket Hinges: Antifriction bearing; Grade 1 (heavy weight); jamb leaf visible when door is closed and both leaves concealed when door is in pocket; type required for application indicated; cast steel.
 10. Double-Acting Pivot-Hinge Set: Grade 2; wrought, forged, or cast steel or malleable iron base metal; consisting of a top pivot and a bottom pivot, each with jamb brackets, and bottom pivot with thrust steel bearing.
- C. Self-Closing Hinges And Pivots
1. Self-Closing Hinges and Pivots: BHMA A156.17.
 2. Spring Hinges: Grade 1 **OR** Grade 2, **as directed**; wrought steel, with torsion spring.
 - a. Type: Single **OR** Double, **as directed** acting.
 - b. Mounting: Full mortise (butts) **OR** Half mortise **OR** Full surface **OR** Half surface, **as directed**.
 3. Horizontal-Spring Pivot Sets: Grade 3; double acting; non-handed; consisting of wrought steel bottom pivot hinge with antifriction bearing and nylon top pivot and socket.
 - a. Type: Hold-open **OR** Non-hold open, **as directed**.
 - b. Tension: Adjustable **OR** Fixed, **as directed**.
 - c. Bottom Pivot Trim: Steel **OR** Brass, **as directed**.
 - d. Bottom Plate: For bottom hinge attachment to floor **OR** jamb, **as directed**.
 4. Gate-Spring Pivot Sets: Grade 1; double acting; non-handed; consisting of bottom pivot with door and jamb bracket and top pivot assembly with jamb bracket.
 - a. Mounting: Mortise **OR** Surface, **as directed**.
 - b. Tension: Adjustable **OR** Fixed, **as directed**.
 - c. Base Metal: Cast, forged, or extruded brass or bronze **OR** Malleable iron, **as directed**.
 5. Gravity Pivot Sets: Grade 3; double acting; surface mounting; non-handed; consisting of bottom pivot with door and jamb bracket and top pivot assembly with jamb bracket.
 - a. Tension: Adjustable **OR** Fixed, **as directed**.
 - b. Base Metal: Wrought brass or bronze **OR** Steel, **as directed**.
- D. Center-Hung And Offset Pivots
1. Center-Hung and Offset Pivots: BHMA A156.4.
 2. Center-Hung Pivot Sets: Grade 1.
 - a. Top Pivots: Walking-beam type with retractable pin and oil-impregnated bronze bearing; mortised into door and frame.
 - b. Bottom Pivots: Surface floor mounted, **OR** Recessed in floor in cement case, **OR** Mortised into jamb, **as directed** and mortised into door; with thrust ball **OR** needle bearings, **as directed**.
 - c. Base Metal: Brass **OR** Bronze **OR** Steel, **as directed**.
 3. Offset Pivot Sets: Grade 1 **OR** 2, **as directed**.
 - a. Offset: **3/4 inch (19 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**.
 - b. Top Pivot: Full-mortise **OR** Half-surface **OR** Full-surface mounting, **as directed**; walking-beam type with retractable pin and oil-impregnated bronze bearing.
 - 1) Knuckle: Standard **OR** Asylum type, **as directed**.
 - 2) Option: With screw holes designed to straddle lead in the center of lead-lined door.
 - c. Bottom Pivot: Surface floor mounted, **OR** Recessed in floor in cement case, **OR** Mortised into jamb, **as directed** and mortised into door; with thrust ball **OR** needle, **as directed** bearing.
 - d. Base Metal: Brass **OR** Bronze **OR** Stainless steel **OR** Steel, **as directed**.
 4. Offset Intermediate Pivots: Grade 1; for use with offset pivot sets; with oil-impregnated bronze bearings.
 - a. Mounting: Full mortise, **3/4 inch (19 mm)** offset **OR** Full mortise, **1-1/2 inches (38 mm)** offset **OR** Half mortise **OR** Half surface **OR** Full surface, **as directed**.
 - b. Knuckle: Standard **OR** Asylum type, **as directed**.
 - c. Option: With screw holes designed to straddle lead in the center of lead-lined door.
 - d. Electric Option: Concealed monitoring **OR** Concealed power transfer **OR** Concealed power transfer for use with electrical panic devices and locks, **as directed**.

- e. Base Metal: Brass **OR** Bronze **OR** Stainless steel **OR** Steel, **as directed**.
- 5. Pocket Pivots: Grade 1; full-mortise mounting; non-handed; allows door to nest in pocket with door surface flush with corridor wall when open; maximum 90-degree swing.
 - a. Base Metal: Bronze **OR** Stainless steel **OR** Steel, **as directed**.
 - b. Electric Option: Concealed power transfer in one hinge per door.
- E. Continuous Hinges
 - 1. Continuous Hinges: BHMA A156.26; minimum **0.120-inch- (3.0-mm-)** thick, hinge leaves with minimum overall width of **4 inches (102 mm)**; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
 - 2. Pin-and-Barrel-Type Hinges:
 - a. Grade: Grade 1-150 **OR** 1-300 **OR** 1-600 **OR** 2-150 **OR** 2-300 **OR** 2-600 **OR** 3-150 **OR** 3-300, **as directed**.
 - b. Exterior Hinges: Stainless steel.
 - c. Interior Hinges: Stainless steel **OR** Steel **OR** Aluminum, **as directed**.
 - d. Hinges for Fire-Rated Assemblies: Stainless steel with steel fire pins to hold fire-rated doors in place if required by tested listing **OR** Steel, **as directed**.
 - e. Type: Concealed leaf **OR** Swing clear **OR** Full surface with removable continuous caps over fasteners **OR** Half mortise, concealed door leaf and with removable continuous cap over fasteners on jamb leaf **OR** Half surface, concealed jamb leaf and with removable continuous cap over fasteners on door leaf, **as directed**.
 - f. Electric Option: Electric monitoring switch **OR** Electric through wires and monitor **OR** Electric through wires **OR** Concealed power transfer **OR** Exposed power transfer contact switch, **as directed**.
 - 3. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
 - a. Grade: Grade 1-150 **OR** 1-300 **OR** 1-600 **OR** 2-150 **OR** 2-300 **OR** 2-600 **OR** 3-150 **OR** 3-300, **as directed**.
 - b. Hinges for Fire-Rated Assemblies: With steel fire pins to hold fire-rated doors in place if required by tested listing.
 - c. Mounting: Concealed leaf **OR** Swing clear **OR** Full surface, with removable continuous caps over fasteners **OR** Half surface, concealed jamb leaf and with removable continuous cap over fasteners on door leaf, **as directed**.
 - d. Electric Option: Electric monitor **OR** Electric through wires and monitor **OR** Electric through wires **OR** Electric power transfer **OR** Exposed switch **OR** Exposed contact **OR** Removable electric through wires, **as directed**.
- F. Mechanical Locks And Latches
 - 1. Lock Functions: As indicated in door hardware schedule.
 - 2. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - a. Bored Locks: Minimum **1/2-inch (13-mm)** latchbolt throw.
 - b. Mortise Locks: Minimum **3/4-inch (19-mm)** latchbolt throw.
 - c. Deadbolts: Minimum **1-inch (25-mm) OR 1.25-inch (32-mm)** bolt throw, **as directed**.
 - 3. Lock Backset: **2-3/4 inches (70 mm)**, unless otherwise indicated.
 - 4. Lock Trim:
 - a. Description: As indicated on Drawings, **as directed**.
 - b. Levers: Wrought **OR** Forged **OR** Cast, **as directed**.
 - c. Knobs: Wrought **OR** Forged **OR** Cast, **as directed**.
 - d. Escutcheons (Roses): Wrought **OR** Forged **OR** Cast, **as directed**.
 - e. Dummy Trim: Match knob **OR** lever, lock trim and escutcheons.
 - f. Operating Device: Lever **OR** Knob, **as directed** with escutcheons (roses).
 - 5. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

- a. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
- b. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
- c. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
- d. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.
- 6. Bored Locks: BHMA A156.2; Grade 1 **OR 2, as directed**; Series 4000.
- 7. Mortise Locks: BHMA A156.13; Operational **OR Security, as directed** Grade 1 **OR 2, as directed**; stamped steel case with steel or brass parts; Series 1000.
- 8. Interconnected Locks: BHMA A156.12; Grade 1 **OR 2, as directed**; Series 5000.
- 9. Roller Latches: BHMA A156.16; Grade 1; rolling plunger that engages socket or catch, with adjustable roller projection.
 - a. Material: Brass **OR Bronze, as directed**.
 - b. Mounting: Surface **OR Mortise, as directed**.
- 10. Push-Pull Latches: Bored, BHMA A156.2; Series 4000 **OR Mortise, BHMA A156.13, as directed**; Grade 1 **OR 2, as directed**; with paddle handles that retract latchbolt; capable of being mounted vertically or horizontally.
 - a. Lever and Escutcheon Material: Brass **OR Bronze OR Stainless steel OR Aluminum, as directed**.
 - b. Lettering: Engrave with the words "Pull" and "Push."
 - c. Lead Lining: **0.047 inch (1.2 mm)** thick for escutcheon plate.

G. Auxiliary Locks

- 1. Bored Auxiliary Locks: BHMA A156.5: Grade 1 **OR 2, as directed**; with strike that suits frame.
 - a. Backset: **2-3/8 inches (60 mm) OR 2-3/4 inches (70 mm), as directed**.
 - b. Material: Aluminum **OR Brass OR Bronze OR Stainless steel OR Zinc alloy, as directed**.
 - c. Deadlatches: Deadlocking latchbolt operated by key either side **OR key outside and turn inside OR turn inside with no cylinder, as directed**.
 - d. Deadlocks: Deadbolt operated by key either side **OR key outside and turn inside OR turn inside with no cylinder OR key outside, no trim inside, as directed**.
- 2. Mortise Auxiliary Locks: BHMA A156.5; Grade 1 **OR 2, as directed**; with strike that suits frame.
 - a. Backset: **2-3/4 inches (70 mm)**.
 - b. Material: Aluminum **OR Brass OR Bronze OR Stainless steel OR Zinc alloy, as directed**.
 - c. Deadlocks: Deadbolt operated by key either side **OR outside and turn inside OR one side, as directed**.
 - d. Deadlatches: Latchbolt and auxiliary deadlatch operated by key either side **OR outside and turn inside, as directed**.
 - e. Deadlocks for Sliding Doors: Expanding- or interlocking-type deadbolt operated by key either side **OR outside and turn inside OR one side, as directed**.
 - f. Deadlatches for Sliding Doors: Hook-type latchbolt operated by key either side **OR outside and handle inside, as directed**.
- 3. Narrow Stile Auxiliary Locks: BHMA A156.5; Grade 1 **OR 2, as directed**; with strike that suits frame.
 - a. Backset: **0.98 inch (25 mm) OR 1.125 inches (29 mm) OR 1.25 inches (32 mm) OR 1.5 inches (38 mm) OR 1.75 inches (44 mm) OR 2 inches (51 mm) OR 2.25 inches (57 mm) OR 2.5 inches (64 mm), as directed**.
 - b. Strike: Flat **OR Flat with extra-long lip OR Radius OR Radius with weatherstrip OR Bevel, as directed**.
 - c. Case Material: Steel **OR Stainless steel, as directed**.
 - d. Armored Front and Strike Material: Aluminum **OR Brass OR Bronze OR Stainless steel, as directed**.
 - e. Deadlock: Deadlocking bolt.
 - 1) Operation: Key both sides **OR outside and operating trim inside, as directed**.
 - 2) Door Application: Swinging **OR Sliding door, as directed**.
 - f. Deadlatch: Latchbolt with auxiliary deadlatch operated by key outside and paddle or lever inside; for single swinging doors.

- g. Multipoint Lock: Deadlocking bolt for pairs of swinging doors.
 - 1) Operation: Key both sides **OR** outside and turn, lever, or knob inside, **as directed**.
 - 2) Type: Two **OR** Three point, **as directed**.
- h. Latch/Lock: Deadbolt and latchbolt; both operated by key both sides; inside handle operates only latchbolt.
- 4. Push-Button Combination Locks: BHMA A156.5; cylindrical; Grade 1 **OR** mortise; Grade 2, **as directed**; lock opens by entering a one- to five-digit code by pushing correct buttons in correct sequence; automatically relocks when door is closed; with strike that suits frame.
 - a. Lockset Configuration: Standard **OR** Privacy with inside push button, **as directed**.
 - b. Auxiliary Lock Configuration: Deadbolt **OR** Deadlocking latch **OR** Deadlocking rim latch, **as directed**.
 - c. Override: By key cylinder.
- H. Electric Strikes
 - 1. Electric Strikes: BHMA A156.31; Grade 1 **OR** 2, **as directed**; with faceplate to suit lock and frame.
 - a. Material: Steel **OR** Stainless steel **OR** Zinc-aluminum alloy, **as directed**.
 - b. Mounting: Mortised **OR** Semirim mounted **OR** Rim mounted, **as directed**.
 - 2. Fire-Rated Door Assemblies: Use fail-secure electric strikes with fire-rated devices.
 - 3. Monitoring: Mechanical latchbolt **OR** Infrared latchbolt **OR** Mechanical strike **OR** Infrared strike, **as directed**.
 - 4. Options: Lip extension kit.
- I. Electromagnetic Locks
 - 1. Electromagnetic Locks: BHMA A156.23; electrically powered; with electromagnet attached to frame and armature plate attached to door; full-exterior or full-interior type, as required by application indicated.
 - a. Direct-Hold Type: Lock mounted on bottom of header; strike flush mounted on door push side **OR** face of header; strike angle mounted on door pull side **OR** side of jamb; strike flush mounted on door push side, **as directed**.
 - b. Shear Type: Lock mounted on face of header; strike angle mounted on door **OR** mortised in header; strike mortised in top of door **OR** mortised in jamb; strike mortised in edge of door **OR** mortised in bottom of door; strike mortised in floor **OR** mortised in floor; strike mortised in bottom of door, **as directed**.
 - c. Strength Ranking: 1500 lbf (6672 N) **OR** 1000 lbf (4448 N) **OR** 500 lbf (2224 N), **as directed**.
 - d. Inductive Kickback Peak Voltage: Not more than 53 **OR** 0 V, **as directed**.
 - e. Residual Magnetism: Not more than 4 lbf (18 N) **OR** 0 lbf (0 N), **as directed** to separate door from magnet.
 - f. Options:
 - 1) Magnetic bond sensor.
 - 2) Continuous housing for full width of door.
 - 3) Continuous housing for full height of door.
 - 4) Single LED indicators.
 - 5) Double LED indicators.
 - 6) Adjustable time delay with automatic relock.
 - 7) Integral door position switch.
 - 2. Delayed-Egress Electromagnetic Locks: BHMA A156.24, electrically powered, with electromagnet attached to frame and armature plate attached to door; depressing push bar for more than 3 seconds initiates irreversible alarm and 15-second delay for egress. When integrated with fire alarm, fire alarm voids 15-second delay.
 - a. Grade: Security Grade, activated from secure side of door by initiating device **OR** Movement Grade, activated by door movement as initiating device, **as directed**.
- J. Electromechanical Locks

1. Electromechanical Locks: BHMA A156.25; Grade 1 **OR** 2, **as directed**; motor or solenoid driven; bored **OR** mortise latchbolt **OR** mortise deadbolt **OR** mortise deadlocking latchbolt, **as directed**; with strike that suits frame.
- K. Self-Contained Electronic Locks
1. Self-Contained Electronic Locks: BHMA A156.25, bored **OR** mortise, **as directed**; with internal, battery-powered, self-contained electronic locks; consisting of complete lockset, motor-driven lock mechanism, and actuating device; enclosed in zinc-dichromate-plated, wrought-steel case, and strike that suits frame. Provide key override, low-battery detection and warning, LED status indicators, and ability to program at the lock.
 - a. Actuating Device: Digital keypad **OR** Magnetic-stripe card reader, **as directed**.
 - 1) Card: Manufacturer's standard **OR** 0.030-inch- (0.76-mm-) thick PVC or polyester **OR** Custom, **as directed**.
 - 2) Accessory: Card encoder and software.
 - b. Faceplate Material: Wrought brass **OR** Wrought bronze **OR** Stainless steel, **as directed**.
 - c. Trim: Lever **OR** Knob **OR** Match trim specified for mechanical locks, **as directed**.
 - d. Function: Latch with **OR** Deadbolt with **OR** Latch without **OR** Deadbolt without, **as directed** key.
- L. Exit Locks And Exit Alarms
1. Exit Locks and Alarms: BHMA A156.29, Grade 1.
 2. Exit Locks: Surface mounted; battery powered, housed in metal case; with manufacturer's standard strike that suits frame; with red-and-white lettering reading "EMERGENCY EXIT PUSH TO OPEN--ALARM WILL SOUND."
 - a. Single-Door **OR** Pairs-of-Door Type, **as directed**: Activated by arm, push plate, or paddle **OR** horizontal bar, **as directed**.
 - b. Options:
 - 1) Low-battery alert.
 - 2) Outside key control.
 - 3) Audible alarm that sounds when unauthorized use of door occurs.
 - 4) Silent alarm with remote signal capability for connection to remote indicating panel.
 - 5) Strike: Surface **OR** Mortise, **as directed**.
 3. Stand-Alone Exit Alarms: Surface mounted on door **OR** Mounted separate from door and activated by door movement switch, **as directed**.
 - a. Options:
 - 1) Low-battery alert.
 - 2) Outside key control.
 - 3) Audible alarm that sounds when unauthorized use of door occurs.
 - 4) Automatic rearming after authorized use, with adjustable time delay, **as directed**.
 - 5) Remote signal capability for connection to remote indicating panel.
- M. Surface Bolts
1. Surface Bolts: BHMA A156.16.
 2. Half-Round Surface Bolts: Grade 1 **OR** 2, **as directed**, 6-inch (152-mm) polished-brass or burnished-steel, half-round rod and knob; minimum 7/8-inch (22-mm) throw; with universal strike.
 3. Interlocking Surface Bolts: Grade 1 **OR** 2, **as directed**, 6-inch (152-mm) extruded-brass or aluminum, interlocking track and rod; minimum 15/16-inch (24-mm) throw; with universal or mortise strike.
 4. Fire-Rated Surface Bolts: Grade 1 **OR** 2, **as directed**, 8-inch (203-mm) steel bolt with 2 steel guides; minimum 1-inch (25-mm) throw; listed and labeled for fire-rated doors; with universal strike.
 5. Dutch-Door Surface Bolts: Grade 1 **OR** 2, **as directed**, polished-brass bolt and knob, minimum 3/4-inch (19-mm) throw, with standard strike.
- N. Manual Flush Bolts

1. Manual Flush Bolts: BHMA A156.16; minimum **3/4-inch (19-mm)** throw; designed for mortising into door edge.
 2. Manual-Extension Flush Bolts: Grade 1 **OR 2, as directed**, fabricated from extruded brass or aluminum, with **12-inch (305-mm)** rod actuated by flat lever; listed and labeled for fire-rated doors, **as directed**. Provide with matching **OR** dustproof strike, **as directed**.
 3. Slide Flush Bolts: Grade 1 **OR 2, as directed**, cast brass, with rod actuated by slide. Provide with matching **OR** dustproof strike, **as directed**.
 4. Tubular Bolts: Grade 1 **OR 2, as directed**, polished-brass or polished-bronze, oval turn knob and escutcheon; minimum **9/16-inch (14-mm)** steel bolt with **1/2-inch (13-mm)** throw. Provide with matching **OR** dustproof strike, **as directed**.
 5. Dustproof Strikes: Locking type, Grade 1, polished wrought brass, with **3/4-inch- (19-mm-)** diameter, spring-tension plunger.
- O. Automatic And Self-Latching Flush Bolts
1. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum **3/4-inch (19-mm)** throw; designed for mortising into door edge.
 2. Automatic Flush Bolts: Grade 1 **OR 2, as directed**, fabricated from steel and brass components, with spring-activated bolts that automatically retract when active leaf is opened and that automatically engage when active door depresses bolt trigger; listed and labeled for fire-rated doors, **as directed**. Provide brass or stainless-steel cover plate, top and bottom matching **OR** dustproof strikes, **as directed**, guides, guide supports, wear plates, and shims.
 3. Self-Latching Flush Bolts: Grade 1 **OR 2, as directed**, fabricated from steel and brass components, with spring-activated bolts that automatically engage when active door depresses trigger; listed and labeled for fire-rated doors, **as directed**. Bolts are manually retracted by a slide in the bolt face. Provide brass or stainless-steel cover plate, matching **OR** dustproof, **as directed** top and bottom strikes, guides, guide supports, wear plates, and shims.
 4. Dustproof Strikes: Locking type, Grade 1, polished wrought brass, with **3/4-inch- (19-mm-)** diameter, spring-tension plunger.
- P. Exit Devices And Auxiliary Items
1. Exit Devices and Auxiliary Items: BHMA A156.3.
 2. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
 3. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
 4. Rim Exit Devices: Grade 1 **OR 2, as directed**.
 - a. Type: Type 1, rim **OR** Type 4, narrow stile **OR** Type 28, incorporating a deadbolt, **as directed**.
 - b. Grade: Grade 1 **OR 2, as directed**.
 - c. Actuating Bar: Cross bar **OR** Push pad **OR** Narrow-stile push pad, **as directed**.
 - d. Material: Brass **OR** Bronze **OR** Stainless steel **OR** Aluminum **OR** Wrought steel, **as directed**.
 - e. Electrified Options:
 - 1) Pushpad monitor switch.
 - 2) Double-pushpad monitor switch.
 - 3) Electric locking and unlocking.
 - 4) Delayed egress.
 - 5) Alarm.
 5. Mortise Exit Devices: Grade 1 **OR 2, as directed**.
 - a. Type: Type 3 **OR** Type 10, narrow stile, **as directed**.
 - b. Grade: Grade 1 **OR 2, as directed**.
 - c. Actuating Bar: Cross bar **OR** Push pad **OR** Narrow-stile push pad, **as directed**.
 - d. Material: Brass **OR** Bronze **OR** Stainless steel **OR** Aluminum **OR** Wrought steel, **as directed**.

- e. Electrified Options:
 - 1) Pushpad monitor switch.
 - 2) Double-pushpad monitor switch.
 - 3) Electric locking and unlocking.
 - 4) Delayed egress.
 - 5) Alarm.
- 6. Surface Vertical-Rod Exit Devices: Grade 1 **OR 2, as directed.**
 - a. Type: Type 2 **OR** Type 5, narrow stile, **as directed.**
 - b. Grade: Grade 1 OR 2, as directed.
 - c. Actuating Bar: Cross bar **OR** Push pad **OR** Narrow-stile push pad, **as directed.**
 - d. Material: Brass **OR** Bronze **OR** Stainless steel **OR** Aluminum **OR** Wrought steel, **as directed.**
 - e. Configuration: Top and bottom rods **OR** Top rod, **as directed.**
 - f. Electrified Options:
 - 1) Pushpad monitor switch.
 - 2) Double-pushpad monitor switch.
 - 3) Electric locking and unlocking.
 - 4) Delayed egress.
 - 5) Alarm.
- 7. Concealed Vertical-Rod Exit Devices: Grade 1 **OR 2, as directed.**
 - a. Type: Type 6, narrow stile **OR** Type 7, for wood doors **OR** Type 8, for metal doors, **as directed.**
 - b. Grade: Grade 1 OR 2, as directed.
 - c. Actuating Bar: Cross bar **OR** Push pad **OR** Narrow-stile push pad, **as directed.**
 - d. Material: Brass **OR** Bronze **OR** Stainless steel **OR** Aluminum **OR** Wrought steel, **as directed.**
 - e. Electrified Options:
 - 1) Pushpad monitor switch.
 - 2) Double-pushpad monitor switch.
 - 3) Electric locking and unlocking.
 - 4) Delayed egress.
 - 5) Alarm.
- 8. Combination Exit Devices: Grade 1 **OR 2, as directed.**
 - a. Type: Type 9, rim and surface vertical rod **OR** Type 11, mortise and surface vertical rod **OR** Type 12, mortise and concealed vertical rod, **as directed.**
 - b. Grade: Grade 1 OR 2, as directed.
 - c. Actuating Bar: Cross bar **OR** Push pad **OR** Narrow-stile push pad, **as directed.**
 - d. Material: Brass **OR** Bronze **OR** Stainless steel **OR** Aluminum **OR** Wrought steel, **as directed.**
 - e. Electrified Options:
 - 1) Pushpad monitor switch.
 - 2) Double-pushpad monitor switch.
 - 3) Electric locking and unlocking.
 - 4) Delayed egress.
 - 5) Alarm.
- 9. Automatic Latching Two-Point Bolts: Grade 1.
 - a. Type: Type 23, concealed **OR** Type 24, surface, **as directed.**
 - b. Material: Brass **OR** Bronze **OR** Stainless steel, **as directed.**
- 10. Extension Flush Bolt Sets: BHMA A156.3; Grade 1.
 - a. Type: Type 25, automatic **OR** Type 27, self-latching, **as directed.**
 - b. Material: Brass **OR** Bronze **OR** Stainless steel, **as directed.**
- 11. Electronic Exit Bars: Nonlatching electronic actuating (releasing) device activated by an adjustable capacitance sensor and with no moving parts; listed and labeled as panic exit hardware. Fabricate bar from extruded aluminum, and provide door and frame transfer device and 16 feet (4.9 m) of cord to route wiring off the door frame.

12. Extruded-Aluminum Removable Mullions: With malleable-iron top and bottom retainers, and prepared for strikes as follows:
 - a. Strikes: Two standard recessed strikes **OR** Two monitor strikes **OR** One standard and one electric strike, **as directed**.
13. Tube-Steel Removable Mullions: With malleable-iron top and bottom retainers, and prepared for strikes as follows:
 - a. Strikes: Two standard recessed strikes **OR** Two monitor strikes **OR** One standard and one electric strike, **as directed**.
14. Fire-Exit Removable Mullions: Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire and panic protection, based on testing according to UL 305 and NFPA 252. Use mullions only with exit devices for which they have been tested.
15. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 - a. Operation: Rigid **OR** Movable **OR** Movable with monitor switch, **as directed**.
16. Exit Device Outside Trim: Lever **OR** Lever with cylinder **OR** Knob **OR** Knob with cylinder **OR** Pull **OR** Pull with cylinder **OR** Thumb turn with cylinder, **as directed**; material and finish to match locksets, unless otherwise indicated.
 - a. Match design for lock trim, unless otherwise indicated.
17. Through-Bolt Fasteners: For exit devices and trim on metal doors **OR** non-fire-rated wood doors **OR** fire-rated wood doors, **as directed**.

Q. Lock Cylinders

1. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
2. Standard Lock Cylinders: BHMA A156.5; Grade 1 **OR** 1A **OR** 2, **as directed**; permanent cores that are interchangeable **OR** removable, **as directed**; face finished to match lockset.
 - a. Number of Pins: Five **OR** Six **OR** Seven, **as directed**.
 - b. Type: Mortise **OR** Rim **OR** Bored-lock, **as directed** type.
3. High-Security Lock Cylinders: BHMA A156.30; Grade 1 **OR** 2 **OR** 3, **as directed**; Type M, mechanical **OR** E, electrical, **as directed**; permanent cores that are removable; face finished to match lockset.
 - a. Number of Pins: Six **OR** Seven, **as directed**.
 - b. Type: Mortise **OR** Rim **OR** Bored-lock, **as directed** type.
4. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.
5. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.

R. Keying

1. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - a. No Master Key System: Only change keys operate cylinder.
 - b. Master Key System: Change keys and a master key operate cylinders.
 - c. Grand Master Key System: Change keys, a master key, and a grand master key operate cylinders.
 - d. Great-Grand Master Key System: Change keys, a master key, a grand master key, and a great-grand master key operate cylinders.
 - e. Existing System:
 - 1) Master key or grand master key locks to Owner's existing system.
 - 2) Re-key Owner's existing master key system into new keying system.
 - f. Keyed Alike: Key all cylinders to same change key.
2. Keys: Nickel silver **OR** Brass, **as directed**.
 - a. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:

- 1) Notation: "DO NOT DUPLICATE." **OR** Information to be furnished by Owner., **as directed**
 - b. Quantity: In addition to one extra key blank for each lock, provide the following:
 - 1) Cylinder Change Keys: Three.
 - 2) Master Keys: Five.
 - 3) Grand Master Keys: Five.
 - 4) Great-Grand Master Keys: Five.
- S. Key Control System
1. Key Control Cabinet: BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
 - a. Multiple-Drawer Cabinet: Cabinet with drawers equipped with key-holding panels and key envelope storage, and progressive-type ball-bearing suspension slides. Include single cylinder lock to lock all drawers.
 - b. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.
 - c. Portable Cabinet: Tray for mounting in file cabinet, equipped with key-holding panels, envelopes, and cross-index system.
 2. Key Lock Boxes: Designed for storage of two **OR** 10 keys, **as directed**, with tamper switches to connect to intrusion detection system, **as directed**.
 3. Cross-Index System: Multiple **OR** Single, **as directed**-index system for recording key information. Include three receipt forms for each key-holding hook. Set up by key control manufacturer **OR** Installer, **as directed**.
 4. Key Control System Software: BHMA A156.5, Grade 1; multiple-index system for recording and reporting key-holder listings, tracking keys and lock and key history, and printing receipts for transactions. Include instruction manual.
- T. Operating Trim
1. Operating Trim: BHMA A156.6; aluminum **OR** brass **OR** bronze **OR** stainless steel, **as directed**, unless otherwise indicated.
 2. Flat Push Plates: **0.050 inch (1.3 mm) OR 1/8 inch (3.2 mm)** thick, **as directed**, **4 inches wide by 16 inches high (102 mm wide by 406 mm high)**, with square corners and beveled edges; secured with exposed screws.
 3. Push-Pull Plates: **1/8 inch (3.2 mm)** thick, **3-1/2 inches wide by 15-3/4 inches high (89 mm wide by 400 mm high)**, with square corners, beveled edges, and raised integral lip; secured with exposed screws.
 4. Straight Door Pulls: With minimum clearance of **1-1/2 inches (38 mm)** from face of door.
 - a. Type: **3/4-inch (19-mm)** constant-diameter **OR** variable-diameter **OR** flattened-round **OR** hospital-type pull, **as directed**.
 - b. Mounting: Surface applied with concealed fasteners **OR** Through bolted with oval-head machine screws and countersunk washers **OR** Back to back with threaded sleeves, **as directed**.
 - c. Overall Length: **9 inches (229 mm)**, **as directed**.
 5. Offset Door Pulls: **1-inch (25-mm)** constant-diameter pull with minimum clearance of **2-1/4 inches (57 mm)** from face of door and offset of **2 inches (51 mm)**.
 - a. Mounting: Surface applied with concealed fasteners **OR** Through bolted with oval-head machine screws and countersunk washers **OR** Back to back with threaded sleeves, **as directed**.
 - b. Overall Length: **9 inches (229 mm)**.
 6. Flush Door Pulls: Mortised **1/2 inch (13 mm)** deep; secured with screws.
 - a. Shape: Rectangular with rectangular recess.
 - b. Size: **3-1/2 inches wide by 4-3/4 inches high (89 mm wide by 121 mm high)**.
 7. Straight Pull-Plate Door Pulls: **0.050-inch- (1.3-mm-)** thick plate, **4 inches wide by 16 inches high (102 mm wide by 406 mm high)** with square corners and beveled edges; pull with minimum clearance of **1-1/2 inches (38 mm)** from face of door.

- a. Type: **3/4-inch (19-mm)** constant-diameter **OR** variable-diameter **OR** flattened-round **OR** hospital-type pull, **as directed**.
 - b. Mounting: Surface applied with concealed fasteners **OR** Through bolted with oval-head machine screws and countersunk washers **OR** Back to back with threaded sleeves, **as directed**.
 - c. Overall Pull Length: **9 inches (229 mm)**.
8. Offset Push-Pull Door Pulls: **0.050-inch- (1.3-mm-)** thick plate, **4 inches wide by 16 inches high (102 mm wide by 406 mm high)** with square corners and beveled edges; **1-inch (25-mm)** constant-diameter pull with minimum clearance of **2-1/4 inches (57 mm)** from face of door and offset of **2 inches (51 mm)**.
 - a. Overall Pull Length: **9 inches (229 mm)**.
 9. Single Push Bar: Horizontal bar, with minimum clearance of **1-1/2 inches (38 mm)** from face of door.
 - a. Shape and Size: **1-inch (25-mm)** constant-diameter round bar **OR** Minimum **3/8-by-1-1/4-inch (10-by-32-mm)** flat bar, **as directed**.
 - b. Mounting: Surface applied with concealed fasteners **OR** Through bolted with oval-head machine screws and countersunk washers, **as directed**.
 10. Double Pull Bar: Two horizontal bars connected by matching vertical pull bar and spaced at **8 inches (200 mm)** o.c.; with minimum clearance of **1-1/2 inches (38 mm)** from face of door.
 - a. Shape and Size: **1-inch (25-mm)** constant-diameter round bars **OR** Minimum **3/8-by- 1-1/4-inch (10-by-32-mm)** flat bars, **as directed**.
 - b. Mounting: Surface applied with concealed fasteners **OR** Through bolted with oval-head machine screws and countersunk washers, **as directed**.

U. Accessories For Pairs Of Doors

1. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release; and with internal override.
2. Carry-Open Bars: BHMA A156.3; prevent the inactive leaf from opening before the active leaf; provide polished brass or bronze carry-open bars with strike plate for inactive leaves of pairs of doors unless automatic or self-latching bolts are used.
3. Flat Overlapping Astragals: BHMA A156.22; flat primed steel **OR** zinc-plated steel **OR** aluminum **OR** stainless steel **OR** brass metal bar, **as directed**, surface mounted on face of door with screws; minimum **1/8 inch (3.2 mm)** thick by **2 inches (51 mm)** wide by full height of door.
4. Rigid, Housed Astragals: BHMA A156.22; gasket material held in place by metal housing; fastened to face of door with screws.
 - a. Gasket Material: Closed-cell sponge silicone **OR** Closed-cell sponge neoprene **OR** Neoprene **OR** Silicone bulb, **as directed**.
 - b. Housing Material: Aluminum **OR** Copper alloy (brass or bronze), **as directed**.
5. Overlapping-with-Gasket Astragals: BHMA A156.22; T-shaped metal, surface mounted on edge of door with screws; with integral gasket and base metal as follows:
 - a. Base Metal: Primed steel **OR** Zinc-plated steel **OR** Aluminum **OR** Stainless steel, **as directed**.
 - b. Gasket Material: Vinyl **OR** Silicone **OR** Sponge neoprene **OR** Brush pile **OR** Polypropylene, **as directed**.

V. Surface Closers

1. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
2. Cast-Aluminum Surface Closers: Grade 1 **OR** 2, **as directed**; Traditional Type with mechanism enclosed in cast-aluminum alloy shell.
 - a. Mounting: Hinge side **OR** Opposite hinge side **OR** Parallel arm **OR** Bracket, **as directed**.

- b. Type: Regular arm **OR** Fusible-link holder arm **OR** Two-point hold-open arm **OR** Delayed action closing, **as directed**.
 - c. Backcheck: Factory preset **OR** Adjustable, **as directed**, effective between 60 and 85 degrees of door opening.
 - 3. Surface Closer without Cover: Grade 1 **OR** 2 Modern Type, **as directed**.
 - a. Mounting: Hinge side **OR** Opposite hinge side **OR** Parallel arm **OR** Bracket **OR** Hinge side top jamb **OR** Opposite side top jamb, **as directed**.
 - b. Type: Regular arm **OR** Hold open **OR** Fusible-link holder arm **OR** Slide track arm **OR** Dead stop **OR** Dead stop hold open **OR** Delayed action closing, **as directed**.
 - c. Backcheck: Factory preset **OR** Adjustable, **as directed**, effective between 60 and 85 degrees of door opening.
 - d. Closing Power Adjustment: At least 50 **OR** 35 **OR** 15 percent more than minimum tested value, **as directed**.
 - 4. Surface Closer with Cover: Grade 1 **OR** 2 Modern Type, **as directed**; with mechanism enclosed in cover.
 - a. Mounting: Hinge side **OR** Opposite hinge side **OR** Parallel arm **OR** Bracket **OR** Hinge side, top jamb **OR** Opposite side, top jamb, **as directed**.
 - b. Type: Regular arm **OR** Hold open **OR** Fusible-link holder arm **OR** Slide track arm **OR** Dead stop **OR** Dead stop hold open **OR** Delayed action closing, **as directed**.
 - c. Backcheck: Factory preset **OR** Adjustable, **as directed**, effective between 60 and 85 degrees of door opening.
 - d. Cover Material: Aluminum **OR** Plated steel **OR** Molded plastic, **as directed**.
 - e. Closing Power Adjustment: At least 50 **OR** 35 **OR** 15 percent more than minimum tested value, **as directed**.
- W. Concealed Closers
- 1. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 2. Concealed-in-Door Closer: Grade 1 **OR** 2, **as directed**; mortised into top rail of minimum **1-3/4-inch- (44-mm-)** thick doors and track mortised into head frame; with double lever arm indicated.
 - a. Type: Surface shoe **OR** Mortised soffit plate, **as directed**.
 - b. Arm: Regular **OR** Hold open, **as directed**.
 - c. Closing Power Adjustment: At least 50 **OR** 35 **OR** 15 percent more than minimum tested value, **as directed**.
 - 3. Concealed Overhead Closer: Grade 1 **OR** 2, **as directed**; mortised into head frame; with cast-metal body and exposed cover plate.
 - a. Type: Exposed arm with surface shoe, single acting **OR** Concealed arm and track, butt or pivot hung, single acting **OR** Concealed arm and track, center pivoted, single acting **OR** Concealed arm and track, center pivoted, double acting, **as directed**.
 - b. Arm: Regular **OR** Automatic hold open **OR** Manually selected hold open **OR** Fusible-link holder arm, **as directed**.
 - c. Track: Regular **OR** Automatic hold open **OR** Manually selected hold open, **as directed**.
 - d. Cover Plate Material: Aluminum **OR** Plated steel, **as directed**.
 - e. Backcheck: Factory preset **OR** Adjustable, **as directed**.
 - f. Closing Power Adjustment: At least 50 **OR** 35 percent more than minimum tested value, **as directed**.
 - 4. Concealed Floor Closer: Grade 1 **OR** 2, **as directed**; with cement case and cast-iron closer body case and top pivot; for single **OR** double-acting doors, **as directed**.
 - a. Type: Center pivoted; include top pivot **OR** Offset pivoted; include top pivot **OR** Independently hung, **as directed**.
 - b. Fire Rated: Listed for use with labeled fire-rated doors where indicated.
 - c. Function: Regular **OR** Automatic hold open **OR** Manually selected hold open **OR** Delayed action closing, **as directed**.

- d. Backcheck: Factory preset **OR** Adjustable, **as directed**.
 - e. Closing Power Adjustment: At least 50 **OR** 35 percent more than minimum tested value, **as directed**.
 - f. Case Depth: Regular, **4 inches (100 mm)** **OR** Shallow, **2 inches (50 mm)**, **as directed**.
 - g. Floor Plates: Provide flush cover plates matching door hardware finish **OR** recessed floor plates with insert of floor finish material and extended closer spindle to accommodate thickness of floor finish, **as directed** unless thresholds are indicated.
 - 1) Material: Aluminum **OR** Plated steel, **as directed**.
- X. Closer Holder Release Devices
- 1. Closer Holder Release Devices: BHMA A156.15; Grade 1; closer connected with separate or integral releasing and fire- or smoke-detecting devices. Door shall become self-closing on interruption of signal to release device. Automatic release is activated by smoke detection system **OR** loss of power, **as directed**.
 - a. Type: Single-point hold open **OR** Multiple-point hold open **OR** Free-swinging release, **as directed**.
 - b. Mounting: Surface mounted on face of door **OR** Surface mounted on face of top jamb **OR** Surface mounted on stop **OR** Mortised into top rail of door **OR** Mortised into top jamb **OR** Recessed into floor, **as directed**.
 - c. Options: Adjustable backcheck **OR** Integral smoke detector **OR** Adjustable spring power **OR** Adjustable hold-open manual release force, **as directed**.
- Y. Mechanical Stops And Holders
- 1. Wall- and Floor-Mounted Stops: BHMA A156.16; polished cast brass, bronze, or aluminum base metal, **as directed**.
 - 2. Rigid-Type Floor Stop: Grade 1 **OR** 2, **as directed**; with rubber bumper; for surface-screw **OR** expansion-shield, **as directed** application.
 - 3. Dome-Type Floor Stop: Grade 1 **OR** 2, **as directed**; with minimum **1-inch- (25-mm-)** high bumper for doors without threshold and **1-3/8-inch- (35-mm-)** high bumper for doors with threshold; provide with extruded aluminum riser for carpet installations.
 - 4. Combination Floor Stop and Holder: Grade 1 **OR** 2, **as directed**; for surface-screw **OR** expansion-shield application, **as directed**; with semiautomatic hold open **OR** automatic hold open and release by pushing door, **as directed**.
 - 5. Manual Combination Floor Stop and Holder: Grade 1 **OR** 2, **as directed**; **3-1/2 inches (89 mm)** long, with holder, keeper, and rubber bumper; for surface-screw **OR** expansion-shield application, **as directed**.
 - 6. Chain Door Stops: Grade 2; welded chain, each end attached to compression springs, both covered with protective sleeve; for surface-screw application.
 - 7. Wall Bumpers: Grade 1 **OR** 2, **as directed**; with rubber bumper; **2-1/2-inch (64-mm)** diameter, minimum **3/4-inch (19-mm)** projection from wall; with backplate for concealed fastener installation; with convex **OR** concave, **as directed** bumper configuration.
 - 8. Roller-Type Wall Bumpers: Grade 1 **OR** 2, **as directed**; minimum **4-3/8-inch (111-mm)** projection from wall; for surface-screw application.
 - 9. Lever-Type Door Holders: Grade 1 **OR** 2, **as directed**; minimum **4-inch- (102-mm-)** long arm that swings up and remains in vertical position; with replaceable rubber tip; for surface-screw application.
 - 10. Plunger-Type Door Holders: Grade 1 **OR** 2, **as directed**; minimum **1-1/8-inch (29-mm)** plunger throw; with replaceable rubber tip; for surface-screw application.
- Z. Electromagnetic Stops And Holders
- 1. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted electromagnetic single **OR** floor-mounted electromagnet single **OR** floor-mounted electromagnet double unit, **as directed** with strike plate attached to swinging door; coordinated with fire detectors and interface with fire alarm system for labeled fire-rated door assemblies.

AA. Overhead Stops And Holders

1. Overhead Stops and Holders: BHMA A156.8.
2. Overhead Concealed Slide Holders: Type 1; Grade 1 **OR 2, as directed**; hold open and release by push and pull of door unless control is set in inactive position; with stop, shock absorber, and adjustable holding pressure; for single **OR** double, **as directed**-acting doors opening 110 degrees.
3. Overhead Concealed Slide Stops: Type 1; Grade 1 **OR 2, as directed**; release by push and pull of door unless control is set in inactive position; with stop, shock absorber, and adjustable holding pressure; for single **OR** double, **as directed**-acting doors opening 110 degrees.
4. Overhead Surface-Mounted Slide Holders: Type 2; Grade 1 **OR 2, as directed**; hold open and release by push and pull of door unless control is set in inactive position; with stop, shock absorber, and adjustable holding pressure; for single-acting doors opening 110 degrees.
5. Overhead Surface-Mounted, Concealed Slide Stops: Type 2; Grade 1 **OR 2, as directed**; release by push and pull of door unless control is set in inactive position; with stop, shock absorber, and adjustable holding pressure; for single-acting doors opening 110 degrees.
6. Overhead Surface-Mounted, Jointed-Arm Holders: Type 3; Grade 1 **OR 2, as directed**; hold open and release by push and pull of door; control capable of being set in inactive position; with stop and shock absorber; for single-acting doors opening 110 degrees.
7. Overhead Surface-Mounted, Jointed-Arm Stops: Type 3; Grade 1 **OR 2, as directed**; release by push and pull of door; control capable of being set in inactive position; with stop and shock absorber; for single-acting doors opening 110 degrees.
8. Overhead Concealed, Friction Slide Holders: Type 4; Grade 1 **OR 2, as directed**; with frictional element held under adjustable pressure, free-acting shoulder pivots, and shock absorber; for single **OR** double, **as directed**-acting doors opening 110 degrees.
9. Overhead Concealed, Nonfriction Slide Stops: Type 4; Grade 1 **OR 2, as directed**; with nonfrictional element held under adjustable pressure and shock absorber; for single **OR** double, **as directed**-acting doors opening 110 degrees.
10. Overhead Concealed, Nonfriction Slide Holders: Type 4; Grade 1 **OR 2, as directed**; with nonfrictional element held under adjustable pressure, automatic hold-open, and shock absorber; for single **OR** double, **as directed**-acting doors opening 110 degrees.
11. Overhead Surface-Mounted, Friction Slide Holders: Type 5; Grade 1 **OR 2, as directed**; with frictional element held under adjustable pressure, free-acting shoulder pivots, and shock absorber; for single-acting doors opening 110 degrees.
12. Overhead Surface-Mounted, Nonfriction Slide Stops: Type 5; Grade 1 **OR 2, as directed**; with nonfrictional element held under adjustable pressure and shock absorber; for single-acting doors opening 110 degrees.
13. Overhead Surface-Mounted, Nonfriction Slide Holders: Type 5; Grade 1 **OR 2, as directed**; with nonfrictional element held under adjustable pressure, automatic hold-open, and shock absorber; for single-acting doors opening 110 degrees.
14. Overhead Surface-Mounted Rod Holders: Type 8; Grade 1 **OR 2, as directed**; hold open and release by push and pull of door unless roller cam is set in inactive position; with stop, shock absorber, and adjustable spring tension; for single-acting doors opening 110 degrees.
15. Overhead Surface-Mounted Rod Stops: Type 8; Grade 1 **OR 2, as directed**; release by push and pull of door unless roller cam is set in inactive position; with stop, shock absorber, and adjustable spring tension; for single-acting doors opening 110 degrees.
16. Overhead Surface-Mounted Cantilever Holders: Type 9; Grade 1 **OR 2, as directed**; hold open and release by push and pull of door or thumb turn; with stop and shock absorber; for single-acting doors opening 110 degrees.
17. Overhead Surface-Mounted Cantilever Stops: Type 9; Grade 1 **OR 2, as directed**; release by push and pull of door or thumb turn; with stop and shock absorber; for single-acting doors opening 110 degrees.

BB. Door Gasketing

1. Door Gasketing: BHMA A156.22; air leakage not to exceed **0.50 cfm per foot (0.000774 cu. m/s per m)** of crack length for gasketing other than for smoke control, as tested according to

ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

2. Adhesive-Backed Perimeter Gasketing: Vinyl bulb **OR** Sponge silicone **OR** Silicone **OR** Neoprene bulb **OR** Sponge neoprene gasket material, **as directed** applied to frame rabbet with self-adhesive.
3. Spring-Metal Perimeter Gasketing: Minimum **0.008-inch- (0.20-mm-)** thick brass or bronze **OR** **0.008-inch- (0.20-mm-)** thick stainless steel **OR** **0.012-inch- (0.30-mm-)** thick aluminum gasket material, **as directed** fastened to frame rabbet with nails or screws.
4. Rigid, Housed, Perimeter Gasketing: Sponge silicone **OR** Sponge neoprene **OR** Silicone bulb **OR** Polyurethane bulb **OR** Vinyl bulb **OR** Vinyl brush **OR** Nylon brush **OR** Thermoplastic elastomer, **as directed** gasket material held in place by aluminum **OR** brass or bronze **OR** stainless steel, **as directed** housing; fastened to frame stop with screws.
5. Adjustable, Housed, Perimeter Gasketing: Screw-adjustable sponge silicone **OR** sponge neoprene **OR** silicone bulb **OR** polyurethane bulb **OR** vinyl bulb **OR** vinyl brush **OR** nylon brush **OR** thermoplastic elastomer gasket material, **as directed**, held in place by aluminum **OR** brass or bronze **OR** stainless steel housing, **as directed**; fastened to frame stop with screws.
6. Interlocking Perimeter Gasketing: Minimum **0.018-inch- (0.46-mm-)** thick zinc **OR** **0.015-inch- (0.38-mm-)** thick bronze gasket material, **as directed** consisting of two pieces, one fastened to door and one fastened to frame, that interlock when door is closed; mounted with screws.
7. Overlapping Astragals for Meeting Stiles: EPDM strip **OR** Vinyl strip **OR** Nylon brush gasket material, **as directed** held in place by aluminum **OR** bronze, **as directed** housing and overlapping when doors are closed; mounted to face of meeting stile with screws; surface mounted to each **OR** one door, **as directed**.
8. Meeting Astragals for Meeting Stiles: Silicone bulb **OR** Neoprene bulb **OR** Vinyl bulb **OR** Nylon brush **OR** Brush pile **OR** Thermoplastic elastomer gasket material, **as directed** held in place by aluminum **OR** bronze housing, **as directed** mounted with screws.
 - a. Mounting: Surface mounted on face of each door **OR** Surface mounted on face of one door **OR** Semimortised into edge of each door **OR** Semimortised into edge of one door **OR** Mortised into edge of each door **OR** Mortised into edge of one door, **as directed**.
9. Adjustable Astragals for Meeting Stiles: Screw-adjustable silicone **OR** neoprene **OR** vinyl **OR** vinyl-covered magnet **OR** brush pile **OR** thermoplastic elastomer gasket material, **as directed** held in place by aluminum **OR** bronze housing, **as directed** mounted with screws.
 - a. Mounting: Surface mounted on face **OR** Semimortised into edge **OR** Mortised into edge of each door, **as directed**.
10. Door Sweeps: Neoprene **OR** Vinyl **OR** Nylon brush **OR** Polyurethane **OR** Silicone gasket material, **as directed** held in place by flat aluminum **OR** bronze, **as directed** housing or flange; surface mounted to face of door with screws.
11. Door Shoes: Vinyl **OR** Thermoplastic elastomer **OR** Neoprene **OR** Brush pile gasket material, **as directed** held in place by aluminum **OR** bronze housing, **as directed**; mounted to bottom edge of door with screws.
 - a. Extended Housing: One side **OR** Both sides of door, **as directed**.
 - b. Mounting: Surface mounted on **OR** Mortised into bottom edge of door, **as directed**.
12. Automatic Door Bottoms: Sponge neoprene **OR** Sponge silicone **OR** Thermoplastic elastomer **OR** Nylon brush gasket material, **as directed** held in place by aluminum **OR** bronze **OR** aluminum lined with **0.047-inch (1.2-mm)** thick lead housing, **as directed** that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.
 - a. Mounting: Surface mounted on face **OR** Semimortised into bottom **OR** Mortised into bottom of door, **as directed**.
 - b. Type: Low-closing-force type for doors required to meet accessibility requirements.

CC. Thresholds

1. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.
2. Compressing-Top Thresholds: Metal member with compressible vinyl seal on top of threshold that seals against bottom of door; and base metal of aluminum **OR** extruded bronze **OR** stainless steel, **as directed**.

3. Saddle Thresholds:
 - a. Type: Smooth top **OR** Fluted top **OR** Fluted top and offset **OR** Thermal break and fluted top **OR** Applied gasketed stop and fluted top **OR** Carpet separator with fluted top **OR** Fluted top, barrier free, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze **OR** Stainless steel, **as directed**.
 4. Half-Saddle Thresholds: Fluted-top metal member; and base metal of aluminum **OR** extruded bronze, **as directed**.
 5. Interlocking Thresholds: Fluted-top metal member with integral lip designed to engage a hook strip applied to door.
 - a. Type: Single lip **OR** Double lip **OR** Double-lip water return **OR** Double-lip water return with aluminum pan **OR** Single lip with thermal barrier, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze, **as directed**.
 6. Latching/Rabbeted Thresholds:
 - a. Type: Fluted **OR** Smooth **OR** Offset with fluted top, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze, **as directed**.
 7. Latching/Rabbeted Thresholds with Gasket: Fluted-top metal member with gasket.
 - a. Type: Offset **OR** Thermal barrier, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze, **as directed**.
 - c. Gasket Material: Vinyl **OR** Silicone **OR** Neoprene **OR** Brush pile **OR** Closed-cell sponge neoprene, **as directed**.
 8. Latching/Rabbeted Panic Thresholds:
 - a. Type: Fluted, barrier free **OR** Fluted with gasket top, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze, **as directed**.
 9. Plate Thresholds: Solid metal plate.
 - a. Top Surface: Fluted **OR** Fluted with slip-resistant abrasive, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded brass or bronze **OR** Stainless steel, **as directed**.
 10. Ramped Thresholds: Modular, interlocking, sloped, fluted-top metal assemblies with closed return ends; 1:12 slope.
 - a. Top Surface: Fluted **OR** Fluted with slip-resistant abrasive, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze, **as directed**.
 11. Saddle Thresholds for Floor Closers: Fluted top.
 - a. Type: Type A, for center-hung doors; ends not mitered **OR** Type B, for offset-hung doors; ends not mitered **OR** Type C, for center-hung doors; ends mitered **OR** Type D, for offset-hung doors; ends mitered, **as directed**.
 - b. Base Metal: Aluminum **OR** Extruded bronze, **as directed**.
- DD. Sliding Door Hardware
1. Sliding Door Hardware: BHMA A156.14; consisting of complete sets including rails, hangers, supports, bumpers, floor guides, and accessories indicated.
 2. Horizontal Sliding Door Hardware: Grade 1; rated for minimum door weight of **240 lb (109 kg) OR 320 lb (145 kg) OR 450 lb (205 kg) OR 560 lb (254 kg) OR 640 lb (290 kg) OR 800 lb (363 kg) OR 1000 lb (455 kg) OR 1500 lb (681 kg)**, **as directed**.
 - a. Material: Wrought steel **OR** Galvanized steel or anodized aluminum, **as directed**.
 - b. Rail: Box without mounting brackets **OR** Box with attached mounting brackets **OR** Box with attached flashing **OR** Round without mounting brackets **OR** Round with attached mounting brackets, **as directed**.
 - c. Rail Supports: Single sidewall **OR** Double sidewall **OR** Triple sidewall **OR** Single overhead **OR** Single overhead parallel **OR** Single overhead cross-ear **OR** Double overhead cross-ear **OR** Triple overhead cross-ear style, **as directed**.
 - 1) Provide intermediate, end, and splice type track supports as required by rail configuration and door weight indicated.
 - d. Hanger Configuration: Four-wheel truck **OR** hanger assembly with top mounting plate **OR** hanger assembly with drop bolt **OR** hanger assembly with single drop strap **OR** hanger assembly with double drop strap, **as directed**.
 - 1) Wheel Assembly: Steel wheels with ball bearings.
 - e. Accessories:

- 1) Continuous bottom guide.
 - 2) Guide rail and guide rail brackets as required by rail configuration.
 - 3) Bow handle, minimum **6 inches (150 mm)** in overall length.
 - 4) Flush pull, minimum **4 by 5-1/2 by 3/4 inch (100 by 140 by 19 mm)**, mortised into door.
 - 5) Cane bolt, minimum **1/2-inch (13-mm)** diameter by **12 inches (305 mm)** long.
 - 6) Stay roller, minimum **2-inch- (50-mm-)** diameter wheel.
 - 7) Floor center stop of cast iron.
 - 8) End guide and stop.
 - 9) Parallel door floor guides.
 - 10) Door stop.
 - 11) Sliding door latch.
 - 12) Bumper shoe, minimum **0.0598-inch (1.5-mm)** thickness.
 - 13) Cremona bolt with lever handle, minimum **1/2-inch- (13-mm-)** diameter oval or round rod, and rod guides at **24 inches (610 mm)** o.c.
 - 14) Top spring bolt, minimum **6 inches (150 mm) OR 8 inches (200 mm), as directed;** malleable iron and with angle or surface strike and **24-inch (610-mm)** chain.
 - 15) Foot bolt minimum **6 inches (150 mm) OR 8 inches (200 mm), as directed;** wrought steel, cast iron, or malleable iron.
3. Bypassing Sliding Door Hardware: Rails and door hardware that allow vertical adjustment and rated for doors weighing up to **120 lb (54 kg)** (Grade 1) **OR 80 lb (36 kg)** (Grade 1) **OR 40 lb (18 kg)** (Grade 2), **as directed.**
- a. Rail Material: Galvanized wrought steel **OR** Extruded aluminum, **as directed.**
 - b. Rail Configuration: V-grooved double leg **OR** V-grooved double leg with fascia **OR** I-beam, **as directed.**
 - c. Mounting: Top hung **OR** Bottom supporting with overhead guide, **as directed.**
 - d. Wheel Assembly: Two wheel or four wheel, with roller bearings.
 - e. Pulls: Flush, mortised into door **OR** Cast, forged, or extruded brass or bronze surface-applied type **OR** Wrought brass or bronze edge type, mortised into edge of door **OR** Sliding door latch **OR** Sliding door lock with emergency release, **as directed.**
 - f. Accessories:
 - 1) Bumper stops; wrought steel.
 - 2) Floor guides.
4. Pocket Sliding Door Hardware: Grade 1; rated for doors weighing up to **120 lb (54 kg) OR 80 lb (36 kg), as directed,** overhead box rails and door hardware that allows vertical adjustment.
- a. Rail Material: Galvanized wrought steel **OR** Extruded aluminum, **as directed.**
 - b. Door Type: Single **OR** Biparting, **as directed.**
 - c. Rail Configuration: V-grooved double leg **OR** I-beam, **as directed.**
 - d. Wheel Assembly: Two wheel or four wheel, roller bearings.
 - e. Pulls: Flush, mortised into door **OR** Cast, forged, or extruded brass or bronze surface-applied type **OR** Wrought brass or bronze edge type, mortised into edge of door **OR** Sliding door latch **OR** Sliding door lock with emergency release, **as directed.**
 - f. Accessories:
 - 1) Bumper stops; wrought steel.
 - 2) Floor guides installed within pocket.
- EE. Folding Door Hardware
1. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.
 2. Bifolding Door Hardware: Rated for door panels weighing up to **50 lb (23 kg)** (Grade 1) **OR 30 lb (14 kg)** (Grade 2), **as directed;** with rails and door hardware that allow horizontal and vertical adjustment.
 - a. Rail Material: Galvanized wrought steel **OR** Extruded aluminum, **as directed.**
 - b. Rail Configuration: V-grooved double leg **OR** V-grooved double leg with fascia **OR** I-beam, **as directed.**

- c. Mounting: Surface mounted overhead **OR** Top and bottom hung, **as directed**.
- d. Wheel Assembly: Two wheel or four wheel, with roller bearings.
- 3. Multiple Folding Door Hardware: Rated for door panels weighing up to **50 lb (23 kg)** (Grade 1) **OR 30 lb (14 kg)** (Grade 2), **as directed**; with rails and door hardware that allows horizontal and vertical adjustment.
 - a. Rail Material: Galvanized wrought steel **OR** Extruded aluminum, **as directed**.
 - b. Rail Configuration: V-grooved double leg **OR** V-grooved double leg with fascia **OR** I-beam, **as directed**.
 - c. Mounting: Surface mounted overhead **OR** Top and bottom hung, **as directed**.
 - d. Wheel Assembly: Two wheel or four wheel, with roller bearing.

FF. Metal Protective Trim Units

- 1. Metal Protective Trim Units: BHMA A156.6; fabricated from **0.050-inch- (1.3-mm-)** thick aluminum **OR** brass **OR** bronze **OR** stainless steel, **as directed**; with manufacturer's standard machine or self-tapping screw fasteners.
- 2. Armor Plates: **36 inches (914 mm)** **OR 40 inches (1016 mm)** **OR 42 inches (1067 mm)** high, **as directed by** door width with allowance for frame stops.
- 3. Kick Plates: **8 inches (203 mm)** **OR 10 inches (254 mm)** **OR 12 inches (305 mm)** high, **as directed by** door width with allowance for frame stops.
- 4. Mop Plates: **4 inches (102 mm)** **OR 6 inches (152 mm)** high, **as directed by 1 inch (25 mm)** less than door width.
- 5. Stretcher Plates: **6 inches (152 mm)** **OR 8 inches (203 mm)** high, **as directed by** door width with allowance for frame stops.
- 6. Nonmortise Angle Door Edging: **48-inch- (1220-mm-)** **OR 42-inch- (1067-mm-)** high, **as directed by** minimum **0.050-inch- (1.3-mm-)** thick metal sheet formed into angle shape; with **1-1/4-inch (32-mm)** length of leg on face of door; for surface mounting on door.
 - a. Leg Offset: To accommodate door protection plate of type indicated.
- 7. Mortise Angle Door Edging: **48-inch- (1220-mm)** **OR 42-inch- (1067-mm-)** high, **as directed by** minimum **0.050-inch- (1.3-mm-)** thick metal sheet formed into angle shape; with **7/8-inch (22-mm)** length of leg on face of door; for mortise application into edge of door.
- 8. Nonmortise Cap Door Edging: **48-inch- (1220-mm)** **OR 42-inch- (1067-mm-)** high, **as directed by** minimum **0.050-inch- (1.3-mm-)** thick metal sheet formed into "U" shape; with **1-1/4-inch (32-mm)** length of leg on faces of door; for surface mounting on door.
 - a. Leg Offset: To accommodate door protection plate of type indicated.
- 9. Mortise Cap Door Edging: **48-inch- (1220-mm)** **OR 42-inch- (1067-mm-)** high, **as directed by** minimum **0.050-inch- (1.3-mm-)** thick metal sheet formed into "U" shape; with **7/8-inch (22-mm)** length of leg on faces of door; for mortise application into edge of door.

GG. Plastic Protection Plates

- 1. Plastic Protection Plates: BHMA A156.6; fabricated with four sides beveled; plastic laminate; **1/8 inch (3.2 mm)** thick; NEMA LD 3, Grade HGS **OR** rigid plastic; **0.060-inch- (1.5-mm-)** thick, PVC or acrylic-modified vinyl plastic **OR** acrylic; **1/8 inch (3.2 mm)** thick, **as directed**.
- 2. Armor Plates: **36 inches (914 mm)** **OR 40 inches (1016 mm)** **OR 42 inches (1067 mm)**, high, **as directed by** door width with allowance for frame stops.
- 3. Kick Plates: **8 inches (203 mm)** **OR 10 inches (254 mm)** **OR 12 inches (305 mm)** high **as directed by** door width with allowance for frame stops.
- 4. Mop Plates: **4 inches (102 mm)** **OR 6 inches (152 mm)** high **as directed by 1 inch (25 mm)** less than door width.
- 5. Stretcher Plates: **6 inches (152 mm)** **OR 8 inches (203 mm)** high **as directed by** door width with allowance for frame stops.
- 6. Colors and Textures: As selected by Architect from manufacturer's full range **OR** Match Architect's sample **OR** As indicated by manufacturer's designations in the door hardware schedule, **as directed**.

HH. Auxiliary Door Hardware

- 1. Auxiliary Hardware: BHMA A156.16.

2. Chain Door Guards: Grade 1 **OR 2 OR 3, as directed**; polished cast brass or bronze or extruded brass; with plate slotted to receive **6-inch- (150-mm-)** long welded chain secured to an anchor plate. Guard allows door to be opened **3 inches (75 mm)** with chain engaged in slotted plate. Equip with chain holder.
 3. Rod-Type Door Guards: Grade 1 **OR 2 OR 3, as directed**; straight door-mounted rod that engages U-shaped, jamb-mounted rod. U-shaped rod can swing 180 degrees away from door; rod limits door opening when engaged. Fabricated from polished cast brass **OR** bronze **OR** aluminum, **as directed**.
 4. Coat Hooks: Grade 1 **OR 2 OR 3, as directed**; two curved hooks with rounded ends; **3-inch (75-mm)** projection from wall; for surface-screw application; fabricated from polished cast brass **OR** polished cast bronze **OR** burnished cast aluminum, **as directed**.
 5. Garment Hooks: Grade 1 **OR 2 OR 3, as directed**; one long hat hook and one small coat hook; **3-3/4-inch (95-mm)** projection from wall with **7-inch (178-mm)** overall height; for surface-screw application; fabricated from polished cast brass **OR** burnished cast aluminum, **as directed**.
 6. Door Knockers: Grade 1; solid brass with engraved number and nameplates, **as directed**.
 7. Wide-Angle Door Viewers: Grade 1 **OR 2 OR 3, as directed**; solid brass with optical glass lenses; adjustable to door thickness and permitting 1-way observation with minimum 190-degree viewing angle.
 8. Fire-Rated Door Viewers: Solid brass with optical glass lenses; listed and labeled for use in fire-rated door assemblies; adjustable to door thickness, and permitting 1-way observation with minimum 120 **OR** 150 **OR** 190-degree viewing angle **as directed**.
 9. House Numbers: Grade 1; wrought, cast, or forged brass; **4 inches (102 mm)** high; for screw application.
 10. Letter Box Plates: Grade 1 **OR 2 OR 3, as directed**; with spring-loaded front plate with brass spring and inside covered gravity flap or hood; fabricated from wrought brass **OR** wrought bronze **OR** aluminum, **as directed**.
 - a. Regular Size, Inswinging: Minimum **0.036-inch (0.9-mm)** metal thickness, with minimum **7-by-1-5/8-inch (178-by-41-mm)** opening.
 - b. Regular Size, Outswinging: Minimum **0.036-inch (0.9-mm)** metal thickness, with minimum **7-by-1-1/2-inch (178-by-38-mm)** opening.
 - c. Magazine Size, Outswinging: Minimum **0.051-inch (1.3-mm)** metal thickness, with minimum **11-by-1-7/8-inch (279-by-48-mm)** opening.
 11. Silencers for Wood Door Frames: Grade 1; neoprene or rubber; minimum **5/8 by 3/4 inch (16 by 19 mm)**; fabricated for drilled-in application to frame.
 12. Silencers for Metal Door Frames: Grade 1; neoprene or rubber; minimum diameter **1/2 inch (13 mm)**; fabricated for drilled-in application to frame.
- II. Auxiliary Electrified Door Hardware
1. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; listed and labeled for use with fire alarm systems.
 2. Monitor Strikes: Cast strike with toggle **OR** Dustbox monitor for installation under standard strike, **as directed**.
 3. Door Position Switches: Magnetically operated reed switch designed for concealed mounting.
 4. Door and Frame Transfer Devices: Steel housing for mortise in hinge stile of door, with flexible tube for wiring bundle; accommodating doors that swing open to 120 degrees.
- JJ. FABRICATION
1. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by the Owner.
 - a. Manufacturer's identification is permitted on rim of lock cylinders only.
 2. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness.

- Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
3. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - a. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 4. Fire-Rated Applications:
 - a. Wood or Machine Screws: For the following:
 - 1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames, as directed.
 - 2) Strike plates to frames.
 - 3) Closers to doors and frames.
 - b. Steel Through Bolts: For the following unless door blocking is provided:
 - 1) Surface hinges to doors.
 - 2) Closers to doors and frames.
 - 3) Surface-mounted exit devices.
 5. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 6. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 7. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

KK. FINISHES

1. Provide finishes complying with BHMA A156.18.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Examination

1. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
2. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Steel Doors and Frames: For Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI/SDI A250.6.
2. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

C. Installation

1. Mounting Heights: Mount door hardware units at heights indicated on Drawings **OR** as follows, **as directed**, unless otherwise indicated or required to comply with governing regulations.
 - a. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - b. Custom Steel Doors and Frames: HMMA 831.
 - c. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 2. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - a. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - b. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 3. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every **30 inches (750 mm)** of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
 4. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every **30 inches (750 mm)** of door height greater than **90 inches (2286 mm)**.
 5. Lock Cylinders: Install construction cores to secure building and areas during construction period.
 - a. Replace construction cores with permanent cores as directed by the Owner.
 - b. Furnish permanent cores to the Owner for installation.
 6. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
 7. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings **OR** in equipment room, **as directed**. Verify location with the Owner.
 - a. Configuration: Provide one power supply for each door opening **OR** least number of power supplies required to adequately serve doors, **as directed**.
 8. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants".
 9. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.
 10. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 11. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
 12. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
- D. Field Quality Control
1. Independent Architectural Hardware Consultant: Engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - a. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.
- E. Adjusting
1. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - a. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.

- b. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - c. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
 - 2. Occupancy Adjustment: Approximately three **OR** six months, **as directed**, after date of Final Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.
- F. Cleaning And Protection
- 1. Clean adjacent surfaces soiled by door hardware installation.
 - 2. Clean operating items as necessary to restore proper function and finish.
 - 3. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Final Completion.
- G. Demonstration
- 1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration And Training".

END OF SECTION 06 01 40 91

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SECTION 06 05 23 00 - TIMBER BRIDGE COMPONENTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of timber bridge components. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Timber for Bridges shall comply with the specifications for timber bridges contained in the standard specifications of the state in which the work occurs, AASHTO's "Standard Specifications for Highway Bridges," and National Forest Products Association's "National Design Specification for Wood Construction."

- B. Preservative Treatment shall comply with the specifications for preservative treatment contained in the standard specifications of the state in which the work occurs, and American Wood-Preservers' Association's "Book of Standards." All timber shall be treated unless specified otherwise.

C. Hardware and Castings:

1. Castings: Cast steel shall comply with ASTM A 27, Grade 70-36, or gray iron castings shall comply with AASHTO M105 Class No. 30, unless otherwise specified.
2. Hardware:
 - a. Machine Bolts, Drift-Bolts, and Dowels may be either wrought iron or rolled steel. Machine bolts shall have the square heads and nuts unless otherwise specified.
 - b. Cast Washers shall be made of malleable or gray iron. The outside diameter shall not be less than 3 1/2 times the bolt diameter and its thickness equal to the bolt diameter. Plate washers shall be made of wrought iron or rolled steel. The outside diameter shall not be less than 3 1/2 times the bolt diameter, and they shall not be less than 1/4 inch thick.
 - c. Nails and Spikes shall be hot-dip zinc coated per ASTM A 153 or of Type 304 stainless steel.
 - d. Finish: Unless otherwise specified, all hardware for treated timber bridges shall be galvanized or cadmium-plated. Galvanizing shall comply with ASTM A 123 or A 153. Cadmium plating of steel shall comply with ASTM B 766.

- D. Timber Connectors shall be ring type or plate type and shall be galvanized in compliance with ASTM A 123 or A 153.

1. Split Ring: Fabricated from hot rolled steel sheet complying with ASTM A 570 (ASTM A 570M), Grade 33 of standard manufacture.
2. Tooth Ring: Stamped cold form 16-gauge steel sheet fabricated from hot rolled steel sheet complying with ASTM A 570 (ASTM A 570M), Grade 33 standard manufacture.
3. Shear-Plate Timber Connectors:
 - a. Pressed Steel Type shall be fabricated from hot rolled steel sheet complying with ASTM A 570 (ASTM A 570M), Grade 33. Shear plates shall be of standard manufacture.
 - b. Malleable Iron Type shall be ASTM A 47, Grade No. 32510 (ASTM A 47M, Grade 22010). Casting shall be of standard manufacture.

- E. Structural Glue-Laminated Timber shall comply with DOC PS 20, American Structural Lumber Standard, AITC 190.1 and AITC 111. Lumber for laminating shall be of such stress grade as to provide glue-laminated members with allowable stress values of 2,000 psi in bending, 1,600 psi in tension, 1,500 psi in compression parallel to grain, and 385 psi in compression perpendicular to grain for dry condition of service.
 - 1. Adhesives shall meet requirements for wet condition of service.
 - 2. Surfaces of Members shall be sealed with a penetration sealer or sealed with a sealer coat.
- F. Ties: Fabricate strap ties from hot-rolled steel sheet complying with ASTM A 570 (ASTM A 570M). Hot dip galvanize after fabrication to comply with ASTM A 123 or ASTM A 153 (ASTM A 153M).
- G. Asphalt Cement shall comply with ASTM D946 for penetration-graded material.
- H. Surface Coarse Aggregate shall be ASTM D 692, except the gradation shall be as follows:

<u>Sieve Percent</u>	<u>Size Passing (Wt.)</u>
1/2 in.	100
3/8 in.	94-100
No. 4	15-45
No. 16	0-4

1.3 EXECUTION

- A. Preparation:
 - 1. Traffic Control: When traffic is maintained on bridge under repair or is directed over a temporary run-around, furnish, erect, and maintain all barricades, flags, torches, lights, guardrails, temporary pavement markings, and traffic control signs required for the protection of the public and for the direction of traffic. Number, type, color, size and placement of all traffic control color, size, and placement of all traffic control devices and the use of a flagman shall comply with USDOT FHA MUTCD "Traffic Controls for Highway Construction and Maintenance Operations." All traffic control devices in advance of the construction limits shall also be the responsibility of the Contractor.
 - 2. Treated Timber: Give all cuts, abrasions, and holes made after treatment 2 applications of 60 percent creosote oil and 40 percent roofing pitch or brush coat with 2 applications of hot creosote oil and covered with hot roofing pitch. Any unfilled holes, after being treated with preservative oil, shall be plugged with treated plugs.
- B. Erection:
 - 1. Holes:
 - a. Drift Bolts and Dowels: Bore holes for round drift bolts and dowels with a bit 1/16 inch less in diameter than the bolt or dowel to be used. The diameter of holes for square drift bolts or dowels shall be equal to the least dimension of the bolt or dowel.
 - b. Machine Bolts and Rods: Bore holes for field fabrication with a bit the same diameter as the bolt. Holes for fabrication prior to treatment shall be 1/16 inch larger than the bolt diameter.
 - c. Lag Screws: Bore hole with a bit not larger than the body of the screw at the base of the thread.
 - 2. Nuts and Washers: Use a washer of the size and type specified under all bolt heads and nuts except carriage bolts. The nuts of all bolts shall be locked by scoring threads after they have been finally tightened.
 - 3. Countersinking: Paint all recesses in treated timber formed for countersinking with hot creosote oil. Fill recesses likely to collect injurious materials with hot pitch.
 - 4. Framing: All lumber and timber shall be accurately cut and framed to a close fit in such manner that the joints will have even bearing over the entire contact surfaces. Place stringers in position so that knots near edges will be in the top portions of the stringer. Screw type fastenings shall be

screwed into place for the entire length of the fastener. Install the split ring and the shear plate in grooves cut by the Contractor. Force the toothed ring into the contact surfaces of the timbers jointed by means of pressure equipment.

5. Nailing: Nails and spikes shall be driven with just sufficient force to set the heads flush with the surface of the wood.

C. Maintenance and Repair Methods:

1. Timber Deck:
 - a. Remove Existing Plank Floor Deck and Fasteners and replace with new planks and fasteners. Lay the floor planks at 45 degrees to centerline of roadway. When more than one length of plank is required, stagger joints between abutting ends at least 3 feet in any two adjacent lines of plank.
 - b. Standard Wrought Washers shall be used under the heads of all lag screws and under the heads or nuts of all machine bolts. Where machine bolts are used for fastening the floor plank all nuts used shall be locknuts. Countersink heads of all lag screws and bolts in the surface of the floor. Fill recesses formed for countersinking with hot pitch.
 - c. Bituminous Surface Coat: Clean the floor of foreign materials. Apply asphalt cement at a temperature of 275 F to 350 F and at a rate of approximately 1/4 gallon per square yard of surface. The deck shall be dry at the time of bitumen application. Cover the entire surface with a thin coating of aggregate in a sufficient quantity to take up any free bitumen.
2. Hardware: Remove all corrosion by sandblasting or wire brushing. Replace all loose bolts and screws, adding washers as required. Replace deteriorated hardware.
3. Metal Tread Plates: Remove and replace treads as directed. Before installing treads, remove high spots and rough spots in the plank floor so that the treads will be in contact with the floor for their full length and width. Treads shall be laid in a heavy mop coat of asphalt filler. Treads shall be laid with a space of 1/4 inch between adjacent ends and shall be fastened by means of 3/8-inch galvanized bolts. Where bolts cannot be used, use 3/8-inch by 3-inch galvanized lag screws.
4. Timber Railroad Bridge Deck: Remove defective ties and guardrail, including fasteners, and replace with similar ties, guardrail, and fasteners as directed.
5. Repair of Structural Timber Members: Repair, including removal and replacement, shall be as directed.

END OF SECTION 06 05 23 00

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SECTION 06 05 23 00a - HEAVY TIMBER CONSTRUCTION

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for heavy timber construction. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes framing using timbers and round wood poles.

C. Definitions

1. Timbers: Lumber of **5 inches nominal (114 mm actual)** or greater in least dimension.
2. Poles: Round wood members, called either "poles" or "posts" in the referenced standards.
3. Inspection agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA - Northeastern Lumber Manufacturers Association.
 - b. NHLA - National Hardwood Lumber Association.
 - c. NLGA - National Lumber Grades Authority.
 - d. SPIB - Southern Pine Inspection Bureau.
 - e. WCLIB - West Coast Lumber Inspection Bureau.
 - f. WWPA - Western Wood Products Association.

D. Submittals

1. Product Data: For preservative-treated wood products and timber connectors.
 - a. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - b. For timber connectors, include installation instructions.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood products comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
3. Shop Drawings: For heavy timber construction. Show layout, dimensions of each member, and details of connections.
4. Certificates of Inspection: Issued by lumber grading agency for exposed timber not marked with grade stamp.

E. Quality Assurance

1. Timber Standard: Comply with AITC 108, "Standard for Heavy Timber Construction."
2. Forest Certification: Provide wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

F. Delivery, Storage, And Handling

1. Schedule delivery of heavy timber construction to avoid extended on-site storage and to avoid delaying the Work.
2. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings.

1.2 PRODUCTS

A. Timber

1. General: Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable.
 - a. Factory mark each item of timber with grade stamp of grading agency.
 - b. For exposed timber indicated to receive a stained or natural finish, apply grade stamps to surfaces that will not be exposed to view, or omit grade stamps and provide certificates of grade compliance issued by grading agency.
2. Timber Species and Grade: Any species and grade that, for moisture content provided, complies with required structural properties.
 - a. Allowable Stress Ratings for **12-Inch Nominal (286-mm Actual)** Depth: Fb **1500 psi (10.3 MPa)** and E **1,500,000 psi (10 340 MPa)** **OR** Fb **1300 psi (9.0 MPa)** and E **1,300,000 psi (8 960 MPa)** **OR** As indicated on Drawings, **as directed**.
3. Moisture Content: Provide timber with 19 percent maximum moisture content at time of dressing or provide timber that is unseasoned at time of dressing but with 19 percent maximum moisture content at time of installation, **as directed**.
4. Dressing: Provide dressed timber (S4S) **OR** timber that is rough sawn (Rgh), **as directed**, unless otherwise indicated.
5. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
6. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

B. Round Wood Poles

1. Round Wood Poles: Clean-peeled wood poles complying with ASTM D 3200; with at least 80 percent of inner bark removed and with knots and limbs cut flush with the surface.

C. Preservative Treatment

1. Pressure treat timber with waterborne preservative according to AWPAC15 requirements for "sawn building poles and posts as structural members."
 - a. Timber that is not in contact with the ground and is continuously protected from liquid water may be treated with inorganic boron (SBX) according to AWPAC31 instead of AWPAC15.
 - b. Treatment with CCA shall include post-treatment fixation process.
2. Pressure treat poles with waterborne preservative to comply with AWPAC4.
 - a. Treatment with CCA shall include post-treatment fixation process.
3. Preservative Chemicals: Acceptable to authorities having jurisdiction.
 - a. Do not use chemicals containing arsenic or chromium except for marine (saltwater) applications.
4. Use process that includes water-repellent treatment.
5. Use process that does not include water repellents or other substances that might interfere with application of indicated finishes.
6. After treatment, redry timber and poles to 19 percent maximum moisture content.
7. Mark treated timber and poles with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
 - a. For exposed items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed or omit marking and provide certificates of treatment compliance issued by inspection agency.
8. Application: Treat all heavy timber construction unless otherwise indicated **OR** Treat items indicated on Drawings and the following, **as directed**:
 - a. Sills and similar members in contact with masonry or concrete.
 - b. Timber framing members less than **18 inches (460 mm)** above grade.

D. Timber Connectors

1. General: Unless otherwise indicated, fabricate from the following materials:

- a. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
 - b. Round steel bars complying with ASTM A 575, Grade M 1020.
 - c. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.
 - d. Stainless-steel plate and flat bars complying with ASTM A 666, Type 304 **OR** Type 316, **as directed**.
 - e. Stainless-steel bars and shapes complying with ASTM A 276, Type 304 **OR** Type 316, **as directed**.
 - f. Stainless-steel sheet complying with ASTM A 666, Type 304 **OR** Type 316, **as directed**.
2. Fabricate beam seats from steel **OR** stainless steel, **as directed**, with **0.239-inch (6-mm) OR 3/16-inch (8-mm) OR 3/8-inch (9.5-mm)**, **as directed**, bearing plates, **3/4-inch- (19-mm-)** diameter-by-**12-inch- (300-mm-)** long deformed bar anchors, and **0.239-inch (6-mm)** side plates.
 3. Fabricate beam hangers from steel **OR** stainless steel, **as directed**, with **0.179-inch (4.6-mm)** stirrups and **0.239-inch (6-mm)** top plates.
 4. Fabricate strap ties from steel **OR** stainless steel, **as directed**, **2-1/2 inches (63 mm)** wide by **0.179 inch (4.6 mm) OR 3 inches (75 mm)** wide by **0.239 inch (6 mm)**, **as directed**, thick.
 5. Fabricate tie rods from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668/A 668M.
 6. Provide bolts, **3/4 inch (19 mm)** unless otherwise indicated, complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; provide nuts complying with **ASTM A 563 (ASTM A 563M)**; and, where indicated, provide flat washers.
 7. Provide shear plates, **2-5/8 inches (66.7 mm) OR 4 inches (102 mm)**, **as directed**, in diameter, complying with ASTM D 5933.
 8. Finish steel assemblies and fasteners with rust-inhibitive primer, **2-mil (0.05-mm)** dry film thickness.
 9. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Fabrication

1. Camber: Fabricate horizontal members and inclined members with a slope of less than 1:1, with natural convex bow (crown) up, to provide camber.
2. Shop fabricate members by cutting and restoring exposed surfaces to match specified surfacing. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
3. Pre-drill for fasteners and assembly of units.
4. Where preservative-treated members are indicated, fabricate (cut, drill, surface, and sand) before treatment to greatest extent possible. Where fabrication must be done after treatment, apply a field-treatment preservative to comply with AWPA M4.
 - a. Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
 - b. Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
5. Coat crosscuts with end sealer.
6. Seal Coat: After fabricating and surfacing each unit, apply a saturation coat of penetrating sealer on surfaces of each unit except for treated wood where the treatment included a water repellent.

1.3 EXECUTION

A. Installation

1. General: Erect heavy timber construction true and plumb. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
 - a. Install heavy timber construction to comply with Shop Drawings.
 - b. Install horizontal and sloping members with crown edge up and provide not less than **4 inches (102 mm)** of bearing on supports. Provide continuous members unless otherwise indicated; tie together over supports if not continuous.

- c. Handle and temporarily support heavy timber construction to prevent surface damage, compression, and other effects that might interfere with indicated finish.
 2. Framing Built into Masonry: Provide **1/2-inch (13-mm)** clearance at tops, sides, and ends of members built into masonry, bevel cut ends **3 inches (76 mm)**; do not embed more than **4 inches (102 mm)** unless otherwise indicated.
 3. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.
OR
Fit members by cutting and restoring exposed surfaces to match specified surfacing. Predrill for fasteners and assembly of units.
 - a. Finish exposed surfaces to remove planing or surfacing marks, and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
 - b. Coat crosscuts with end sealer.
 - c. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.
 - 1) Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
 - 2) Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
 4. Install timber connectors as indicated.
 - a. Unless otherwise indicated, install bolts with same orientation within each connection and in similar connections.
 - b. Install bolts with orientation as indicated or, if not indicated, as directed by the Owner.
- B. Adjusting
1. Repair damaged surfaces and finishes after completing erection. Replace damaged heavy timber construction if repairs are not approved by the Owner.

END OF SECTION 06 05 23 00a

Task	Specification	Specification Description
06 05 23 00	06 10 00 00	Rough Carpentry
06 05 23 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 06 10 00 00 - ROUGH CARPENTRY

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for rough carpentry. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Framing with dimension lumber.
 - b. Framing with timber.
 - c. Framing with engineered wood products.
 - d. Rooftop equipment bases and support curbs.
 - e. Wood blocking, cants, and nailers.
 - f. Wood furring and grounds.
 - g. Wood sleepers.
 - h. Utility shelving.
 - i. Plywood backing panels.

C. Definitions

1. Exposed Framing: Framing not concealed by other construction.
2. Dimension Lumber: Lumber of **2 inches nominal (38 mm actual)** or greater but less than **5 inches nominal (114 mm actual)** in least dimension.
3. Timber: Lumber of **5 inches nominal (114 mm actual)** or greater in least dimension.
4. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association.
 - b. NLGA: National Lumber Grades Authority.
 - c. RIS: Redwood Inspection Service.
 - d. SPIB: The Southern Pine Inspection Bureau.
 - e. WCLIB: West Coast Lumber Inspection Bureau.
 - f. WWSA: Western Wood Products Association.

D. Submittals

1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - c. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - d. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
2. LEED Submittals:

- a. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.
 - c. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
3. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
4. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
- a. Wood-preservative-treated wood.
 - b. Fire-retardant-treated wood.
 - c. Engineered wood products.
 - d. Power-driven fasteners.
 - e. Powder-actuated fasteners.
 - f. Expansion anchors.
 - g. Metal framing anchors.

E. Quality Assurance

1. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - a. Dimension lumber framing.
 - b. Timber.
 - c. Laminated-veneer lumber.
 - d. Parallel-strand lumber.
 - e. Prefabricated wood I-joists.
 - f. Rim boards.
 - g. Miscellaneous lumber.

F. Delivery, Storage, And Handling

1. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

1.2 PRODUCTS

A. Wood Products, General

1. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - a. Factory mark each piece of lumber with grade stamp of grading agency.
 - b. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - c. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - d. Provide dressed lumber, S4S, unless otherwise indicated.

2. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - a. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Wood-Preservative-Treated Lumber**
1. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
 - a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - b. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
 2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
 3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 4. Application: Treat all rough carpentry, unless otherwise indicated, **OR** items indicated on Drawings, and the following, **as directed**:
 - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - d. Wood framing members that are less than **18 inches (460 mm)** above the ground in crawlspaces or unexcavated areas.
 - e. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Fire-Retardant-Treated Materials**
1. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).
 - a. Use Exterior type for exterior locations and where indicated.
 - b. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 - c. Use Interior Type A, unless otherwise indicated.
 2. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 3. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
 4. Application: Treat all rough carpentry, unless otherwise indicated, **OR** items indicated on Drawings, and the following, **as directed**:
 - a. Framing for raised platforms.
 - b. Concealed blocking.
 - c. Framing for non-load-bearing partitions.

- d. Framing for non-load-bearing exterior walls.
- e. Roof construction.
- f. Plywood backing panels.

D. Dimension Lumber Framing

1. Maximum Moisture Content: 15 percent **OR** 19 percent **OR** 15 percent for 2-inch nominal (38-mm actual) thickness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness **OR** 15 percent for 2-inch nominal (38-mm actual) thickness or less, no limit for more than 2-inch nominal (38-mm actual) thickness **OR** 19 percent for 2-inch nominal (38-mm actual) thickness or less, no limit for more than 2-inch nominal (38-mm actual) thickness, **as directed**.
2. Non-Load-Bearing Interior Partitions: Construction or No. 2 **OR** Construction, Stud, or No. 3 **OR** Standard, Stud, or No. 3, **as directed**, grade of any species.
3. Exterior and Load-Bearing Walls **OR** Framing Other Than Non-Load-Bearing Interior Partitions **OR** Framing Other Than Interior Partitions, **as directed**: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) **OR** 1,300,000 psi (8970 MPa) **OR** 1,100,000 psi (7590 MPa) **OR** 1,000,000 psi (6900 MPa) **OR** 900,000 psi (6210 MPa), **as directed**, and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) **OR** 850 psi (5.86 MPa) **OR** 700 psi (4.83 MPa) **OR** 600 psi (4.14 MPa) **OR** 500 psi (3.45 MPa), **as directed**, for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.
4. Ceiling Joists (Non-Load-Bearing): Construction or No. 2 **OR** Construction, Stud, or No. 3 **OR** Standard, Stud, or No. 3, **as directed**, grade of any species.
5. Joists, Rafters, and Other Framing Not Listed Above: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) **OR** 1,300,000 psi (8970 MPa) **OR** 1,100,000 psi (7590 MPa) **OR** 1,000,000 psi (6900 MPa) **OR** 900,000 psi (6210 MPa), **as directed**, and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) **OR** 850 psi (5.86 MPa) **OR** 700 psi (4.83 MPa) **OR** 600 psi (4.14 MPa) **OR** 500 psi (3.45 MPa), **as directed**, for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.
6. Exposed Exterior **OR** Interior, **as directed**, Framing Indicated to Receive a Stained or Natural Finish: Provide material hand-selected for uniformity of appearance and freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot-holes, shake, splits, torn grain, and wane.
 - a. Species and Grade: As indicated above for load-bearing construction of same type.
 - b. Species and Grade: Hem-fir (north), Select Structural **OR** No. 1, **as directed**, grade; NLGA.
 - c. Species and Grade: Southern pine, Select Structural **OR** No. 1 **OR** No. 2, **as directed**, grade; SPIB.
 - d. Species and Grade: Douglas fir-larch; Select Structural **OR** No. 1, **as directed**, grade; WCLIB, or WWPA.
 - e. Species and Grade: Mixed southern pine, Select Structural **OR** No. 1 **OR** No. 2, **as directed**, grade; SPIB.
 - f. Species and Grade: Spruce-pine-fir, Select Structural **OR** No. 1, **as directed**, grade; NLGA.
 - g. Species and Grade: Douglas fir-south; Select Structural **OR** No. 1, **as directed**, grade; WWPA.
 - h. Species and Grade: Hem-fir; Select Structural **OR** No. 1, **as directed**, grade; WCLIB, or WWPA.
 - i. Species and Grade: Douglas fir-larch (north); Select Structural **OR** No. 1, **as directed**, grade; NLGA.
 - j. Species and Grade: Spruce-pine-fir (south), Select Structural **OR** No. 1, **as directed**, grade; NeLMA, WCLIB, or WWPA.
 - k. Species and Grade: Eastern hemlock-balsam fir or eastern hemlock-tamarack; Select Structural **OR** No. 1, **as directed**, grade; NeLMA.
 - l. Species and Grade: Beech-birch-hickory, Select Structural **OR** No. 1, **as directed**, grade; NeLMA.

- m. Species and Grade: Northern red oak, Select Structural **OR** No. 1, **as directed**, grade; NeLMA.
 - n. Species and Grade: Redwood, Clear Heart Structural **OR** Clear Structural **OR** Select Structural **OR** No. 1, **as directed**, grade; RIS.
 - o. Species and Grade: Mixed oak, Select Structural **OR** No. 1, **as directed**, grade; NeLMA.
 - p. Species and Grade: Mixed maple, Select Structural **OR** No. 1, **as directed**, grade; NeLMA.
 - q. Species and Grade: Western cedars, Select Structural **OR** No. 1, **as directed**, grade; WCLIB, or WWPA.
- E. Timber Framing
- 1. Provide timber framing complying with the following requirements, according to grading rules of grading agency indicated:
 - a. Species and Grade: Douglas fir-larch, Douglas fir-larch (north), or Douglas fir-south; Select Structural **OR** No. 1, **as directed**, grade; NLGA, WCLIB, or WWPA.
 - b. Species and Grade: Eastern hemlock, eastern hemlock-tamarack, or eastern hemlock-tamarack (north); Select Structural **OR** No. 1, **as directed**, grade; NeLMA or NLGA.
 - c. Species and Grade: Hem-fir or hem-fir (north), Select Structural **OR** No. 1, **as directed**, grade; NLGA, WCLIB, or WWPA.
 - d. Species and Grade: Mixed maple, Select Structural **OR** No. 1, **as directed**, grade; NeLMA.
 - e. Species and Grade: Mixed oak, Select Structural **OR** No. 1, **as directed**, grade; NeLMA.
 - f. Species and Grade: Southern pine, Select Structural **OR** No. 1, **as directed**, grade; SPIB.
 - g. Maximum Moisture Content: 20 **OR** 23, **as directed**, percent.
 - h. Additional Restriction: Free of heart centers.
- F. Engineered Wood Products
- 1. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.
 - a. Extreme Fiber Stress in Bending, Edgewise: 3100 psi (21.3 MPa) **OR** 2900 psi (20.0 MPa) **OR** 2600 psi (17.9 MPa) **OR** 2250 psi (15.5 MPa), **as directed**, for 12-inch nominal- (286-mm actual-) depth members.
 - b. Modulus of Elasticity, Edgewise: 2,000,000 psi (13 700 MPa) **OR** 1,800,000 psi (12 400 MPa) **OR** 1,500,000 psi (10 300 MPa), **as directed**.
 - 2. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.
 - a. Extreme Fiber Stress in Bending, Edgewise: 2900 psi (20 MPa) for 12-inch nominal- (286-mm actual-) depth members.
 - b. Modulus of Elasticity, Edgewise: 2,200,000 psi (15 100 MPa).
 - 3. Wood I-Joists: Prefabricated units, I-shaped in cross section, made with solid or structural composite lumber flanges and wood-based structural panel webs, let into and bonded to flanges. Provide units complying with material requirements of and with structural capacities established and monitored according to ASTM D 5055.
 - a. Provide I-joists manufactured without urea formaldehyde.
 - b. Web Material: Either oriented strand board or plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1 **OR** Plywood, complying with DOC PS 1 or DOC PS 2, Exposure 1 **OR** Plywood, complying with DOC PS 1, Exterior grade, **as directed**.
 - c. Structural Properties: Provide units with depths and design values not less than those indicated.
 - d. Provide units complying with APA PRI-400, factory marked with APA trademark indicating nominal joist depth, joist class, span ratings, mill identification, and compliance with APA standard.

4. Rim Boards: Product designed to be used as a load-bearing member and to brace wood I-joists at bearing ends, complying with research/evaluation report for I-joists.
 - a. Manufacturer: Provide products by same manufacturer as I-joists.
 - b. Material: All-veneer product **OR** glued-laminated wood **OR** product made from any combination solid lumber, wood strands, and veneers, **as directed**. Provide rim boards made without urea formaldehyde.
 - c. Thickness: **1 inch (25 mm) OR 1-1/8 inches (28 mm) OR 1-1/4 inches (32 mm), as directed**.
 - d. Provide performance-rated product complying with APA PRR-401, rim board **OR** rim board plus, **as directed**, grade, factory marked with APA trademark indicating thickness, grade, and compliance with APA standard.

- G. Miscellaneous Lumber
 1. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - a. Blocking.
 - b. Nailers.
 - c. Rooftop equipment bases and support curbs.
 - d. Cants.
 - e. Furring.
 - f. Grounds.
 - g. Utility shelving.
 2. For items of dimension lumber size, provide Construction or No. 2 **OR** Standard, Stud, or No. 3, **as directed**, grade lumber with 15 **OR** 19, **as directed**, percent maximum moisture content of any species.
 3. For items of dimension lumber size, provide Construction or No. 2 **OR** Standard, Stud, or No. 3, **as directed**, grade lumber with 15 **OR** 19, **as directed**, percent maximum moisture content and any of the following species:
 - a. Hem-fir (north); NLGA.
 - b. Mixed southern pine; SPIB.
 - c. Spruce-pine-fir; NLGA.
 - d. Hem-fir; WCLIB, or WWPA.
 - e. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 - f. Western woods; WCLIB or WWPA.
 - g. Northern species; NLGA.
 - h. Eastern softwoods; NeLMA.
 4. For exposed boards, provide lumber with 15 **OR** 19, **as directed**, percent maximum moisture content and any of the following species and grades:
 - a. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or 2 Common (Sterling) **OR** Standard or No. 3 Common, **as directed**, grade; NeLMA, NLGA, WCLIB, or WWPA.
 - b. Mixed southern pine, No. 1 **OR** 2, **as directed**, grade; SPIB.
 - c. Hem-fir or hem-fir (north), Select Merchantable or No. 1 Common **OR** Construction or No. 2 Common, **as directed**, grade; NLGA, WCLIB, or WWPA.
 - d. Spruce-pine-fir (south) or spruce-pine-fir, Select Merchantable or No. 1 Common **OR** Construction or No. 2 Common, **as directed**, grade; NeLMA, NLGA, WCLIB, or WWPA.
 5. For concealed boards, provide lumber with 15 **OR** 19, **as directed**, percent maximum moisture content and any of the following species and grades:
 - a. Mixed southern pine, No. 2 **OR** 3, **as directed**, grade; SPIB.
 - b. Hem-fir or hem-fir (north), Construction or 2 Common **OR** Standard or 3 Common, **as directed**, grade; NLGA, WCLIB, or WWPA.
 - c. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common **OR** Standard or 3 Common, **as directed**, grade; NeLMA, NLGA, WCLIB, or WWPA.
 - d. Eastern softwoods, No. 2 **OR** 3, **as directed**, Common grade; NeLMA.
 - e. Northern species, No. 2 **OR** 3, **as directed**, Common grade; NLGA.

- f. Western woods, Construction or No. 2 Common **OR** Standard or No. 3 Common, **as directed**, grade; WCLIB or WWPA.
 6. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
 7. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
 8. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
- H. Plywood Backing Panels
1. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, **as directed**, in thickness indicated or, if not indicated, not less than **1/2-inch (13-mm)** nominal thickness.
- I. Fasteners
1. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - a. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M **OR** of Type 304 stainless steel, **as directed**.
 2. Nails, Brads, and Staples: ASTM F 1667.
 3. Power-Driven Fasteners: NES NER-272.
 4. Wood Screws: ASME B18.6.1.
 5. Lag Bolts: **ASME B18.2.1 (ASME B18.2.3.8M)**.
 6. Bolts: Steel bolts complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers.
 7. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - a. Material:
 - 1) Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
OR
Stainless steel with bolts and nuts complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4)**.
- J. Metal Framing Anchors
1. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated **OR** of basis-of-design products, **as directed**. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
 2. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, **G60 (Z180)** coating designation.
 - a. Use for interior locations where stainless steel is not indicated.
 3. Stainless-Steel Sheet: ASTM A 666, Type 304 **OR** 316, **as directed**.
 - a. Use for exterior locations and where indicated.
 4. Joist Hangers: U-shaped joist hangers with **2-inch- (50-mm-)** long seat and **1-1/4-inch- (32-mm-)** wide nailing flanges at least 85 percent of joist depth.
 5. I-Joist Hangers: U-shaped joist hangers with **2-inch- (50-mm-)** long seat and **1-1/4-inch- (32-mm-)** wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.
 6. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 7. Bridging: Rigid, V-section, nailless type, **0.050 inch (1.3 mm)** thick, length to suit joist size and spacing.

8. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post **1 inch (25 mm)** above base and with **2-inch- (50-mm-)** minimum side cover, socket **0.062 inch (1.6 mm)** thick, and standoff and adjustment plates **0.108 inch (2.8 mm)** thick.
9. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
10. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, **1-1/2 inches (38 mm)** wide by **0.050 inch (1.3 mm)** thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
11. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, **2-1/4 inches (57 mm)** wide by **0.062 inch (1.6 mm)** thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
12. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, **1-1/4 inches (32 mm)** wide by **0.050 inch (1.3 mm)** thick by **36 inches (914 mm)** long.
13. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
14. Wall Bracing:
 - a. T-shaped bracing made for letting into studs in saw kerf, **1-1/8 inches (29 mm)** wide by **9/16 inch (14 mm)** deep by **0.034 inch (0.85 mm)** thick with hemmed edges.
OR
Wall Bracing: Angle bracing made for letting into studs in saw kerf, **15/16 by 15/16 by 0.040 inch (24 by 24 by 1 mm)** thick with hemmed edges.

K. Miscellaneous Materials

1. Sill-Sealer Gaskets:
 - a. Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; **1-inch (25-mm)** nominal thickness, compressible to **1/32 inch (0.8 mm)**; selected from manufacturer's standard widths to suit width of sill members indicated.
OR
Closed-cell neoprene foam, **1/4 inch (6.4 mm)** thick, selected from manufacturer's standard widths to suit width of sill members indicated.
2. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - a. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

1.3 EXECUTION

A. Installation, General

1. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
2. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
3. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
4. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
5. Do not splice structural members between supports, unless otherwise indicated.

6. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - a. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than **16 inches (406 mm)** o.c.
 7. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - a. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than **96 inches (2438 mm)** o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - b. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than **96 inches (2438 mm)** o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and **2-inch nominal- (38-mm actual-)** thickness.
 - c. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than **100 sq. ft. (9.3 sq. m)** and to solidly fill space below partitions.
 - d. Fire block concealed spaces behind combustible cornices and exterior trim at not more than **20 feet (6 m)** o.c.
 8. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 9. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - a. Use inorganic boron for items that are continuously protected from liquid water.
 - b. Use copper naphthenate for items not continuously protected from liquid water.
 10. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - a. NES NER-272 for power-driven fasteners.
 - b. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - c. "Nailing Schedule," and Tables in Section 2304, of ICC's International Building Code.
 - d. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - e. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - f. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.
 11. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
 12. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.
 - a. Comply with approved **OR** indicated, **as directed**, fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
 - b. Use finishing nails, unless otherwise indicated. Do not countersink nail heads **OR** Countersink nail heads and fill holes with wood filler, **as directed**.
- B. Wood Ground, Sleeper, Blocking, And Nailer Installation
1. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
 2. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

3. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than **1-1/2 inches (38 mm)** wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.
- C. Wood Furring Installation
1. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
 2. Furring to Receive Plywood or Hardboard Paneling: Install **1-by-3-inch nominal- (19-by-63-mm actual-)** size furring horizontally **OR** vertically **OR** horizontally and vertically, **as directed**, at **24 inches (610 mm) OR 600 mm, as directed**, o.c.
 3. Furring to Receive Gypsum Board **OR** Plaster Lath, **as directed**: Install **1-by-2-inch nominal- (19-by-38-mm actual-)** size furring vertically at **16 inches (406 mm) OR 400 mm, as directed**, o.c.
- D. Wall And Partition Framing Installation
1. General: Provide single bottom plate and double top plates using members of **2-inch nominal (38-mm actual)** thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.
 - a. For exterior walls, provide **2-by-6-inch nominal- (38-by-140-mm actual-)** **OR 2-by-4-inch nominal- (38-by-89-mm actual-), as directed**, size wood studs spaced **24 inches (610 mm) OR 16 inches (406 mm) OR 600 mm OR 400 mm, as directed**, o.c., unless otherwise indicated.
 - b. For interior partitions and walls, provide **2-by-6-inch nominal- (38-by-140-mm actual-)** **OR 2-by-4-inch nominal- (38-by-89-mm actual-)** **OR 2-by-3-inch nominal- (38-by-64-mm actual-), as directed**, size wood studs spaced **24 inches (610 mm) OR 16 inches (406 mm) OR 600 mm OR 400 mm, as directed**, o.c., unless otherwise indicated.
 - c. Provide continuous horizontal blocking at midheight of partitions more than **96 inches (2438 mm)** high, using members of **2-inch nominal (38-mm actual)** thickness and of same width as wall or partitions.
 2. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
 3. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
 - a. For non-load-bearing partitions, provide double-jamb studs and headers not less than **4-inch nominal (89-mm actual)** depth for openings **48 inches (1200 mm)** and less in width, **6-inch nominal (140-mm actual)** depth for openings **48 to 72 inches (1200 to 1800 mm)** in width, **8-inch nominal (184-mm actual)** depth for openings **72 to 120 inches (1800 to 3000 mm)** in width, and not less than **10-inch nominal (235-mm actual)** depth for openings **10 to 12 feet (3 to 3.6 m)** in width.
 - b. For load-bearing walls, provide double-jamb studs for openings **60 inches (1500 mm)** and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated or, if not indicated, according to Table R502.5(1) or Table R502.5(2), as applicable, in ICC's International Residential Code for One- and Two-Family Dwellings.
 4. Provide diagonal bracing in exterior walls, at both walls of each external corner **OR** walls, at locations indicated, **as directed**, at 45-degree angle, full-story height, unless otherwise indicated. Use **1-by-4-inch nominal- (19-by-89-mm actual-)** size boards, let-in flush with faces of studs **OR** metal wall bracing, let into studs in saw kerf, **as directed**.
- E. Floor Joist Framing Installation
1. General: Install floor joists with crown edge up and support ends of each member with not less than **1-1/2 inches (38 mm)** of bearing on wood or metal, or **3 inches (76 mm)** on masonry. Attach floor joists as follows:
 - a. Where supported on wood members, by toe nailing or by using metal framing anchors.

- b. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
 2. Fire Cuts: At joists built into masonry, bevel cut ends **3 inches (76 mm)** and do not embed more than **4 inches (102 mm)**.
 3. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds **48 inches (1200 mm)**.
 4. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than **2 inches (50 mm)** from top or bottom.
 5. Provide solid blocking of **2-inch nominal (38-mm actual)** thickness by depth of joist at ends of joists unless nailed to header or band.
 6. Lap members framing from opposite sides of beams, girders, or partitions not less than **4 inches (102 mm)** or securely tie opposing members together. Provide solid blocking of **2-inch nominal (38-mm actual)** thickness by depth of joist over supports.
 7. Anchor members paralleling masonry with **1/4-by-1-1/4-inch (6.4-by-32-mm)** metal strap anchors spaced not more than **96 inches (2438 mm)** o.c., extending over and fastening to 3 joists. Embed anchors at least **4 inches (102 mm)** into grouted masonry with ends bent at right angles and extending **4 inches (102 mm)** beyond bend.
 8. Provide solid blocking between joists under jamb studs for openings.
 9. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
 - a. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
 10. Provide bridging of type indicated below, at intervals of **96 inches (2438 mm)** o.c., between joists.
 - a. Diagonal wood bridging formed from bevel-cut, **1-by-3-inch nominal- (19-by-64-mm actual-)** size lumber, double-crossed and nailed at both ends to joists.
 - b. Steel bridging installed to comply with bridging manufacturer's written instructions.
- F. Ceiling Joist And Rafter Framing Installation
1. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - a. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide **1-by-8-inch nominal- (19-by-184-mm actual-)** size or **2-by-4-inch nominal- (38-by-89-mm actual-)** size stringers spaced **48 inches (1200 mm)** o.c. crosswise over main ceiling joists.
 2. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - a. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and **2 inches (50 mm)** deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - b. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and **2 inches (50 mm)** deeper. Bevel ends of jack rafters for full bearing against hip rafter.
 3. Provide collar beams (ties) as indicated or, if not indicated, provide **1-by-6-inch nominal- (19-by-140-mm actual-)** size boards between every third pair of rafters, but not more than **48 inches (1219 mm)** o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
 4. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.
- G. Timber Framing Installation

1. Install timber with crown edge up and provide not less than **4 inches (102 mm)** of bearing on supports. Provide continuous members, unless otherwise indicated; tie together over supports as indicated if not continuous.
2. Where beams or girders are framed into pockets of exterior concrete or masonry walls, provide **1/2-inch (13-mm)** air space at sides and ends of wood members.
3. Install wood posts using metal anchors indicated.
4. Treat ends of timber beams and posts exposed to weather by dipping in water-repellent preservative for 15 minutes.

H. Stair Framing Installation

1. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
 - a. Stringer Size: **2-by-12-inch nominal- (38-by-286-mm actual-)** size, minimum.
 - b. Stringer Material: Laminated-veneer lumber **OR** parallel-strand lumber **OR** solid lumber, **as directed**.
 - c. Notching: Notch stringers to receive treads, risers, and supports; leave at least **3-1/2 inches (89 mm)** of effective depth.
 - d. Stringer Spacing: At least 3 stringers for each **36-inch (914-mm)** clear width of stair.
2. Provide stair framing with no more than **3/16-inch (4.7-mm)** variation between adjacent treads and risers and no more than **3/8-inch (9.5-mm)** variation between largest and smallest treads and risers within each flight.

I. Protection

1. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
2. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00 00

SECTION 06 10 00 00a - MISCELLANEOUS CARPENTRY

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for miscellaneous carpentry. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Framing with dimension lumber.
 - b. Rooftop equipment bases and support curbs.
 - c. Wood blocking, cants, and nailers.
 - d. Wood furring and grounds.
 - e. Wood sleepers.
 - f. Interior wood trim.
 - g. Wood shelving and clothes rods.
 - h. Plywood backing panels.

C. Definitions

1. Dimension Lumber: Lumber of **2 inches nominal (38 mm actual)** or greater but less than **5 inches nominal (114 mm actual)** in least dimension.
2. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association.
 - b. NHLA: National Hardwood Lumber Association.
 - c. NLGA: National Lumber Grades Authority.
 - d. SPIB: The Southern Pine Inspection Bureau.
 - e. WCLIB: West Coast Lumber Inspection Bureau.
 - f. WWPA: Western Wood Products Association.

D. Submittals

1. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - c. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - d. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.4: For composite-wood products, documentation indicating that product contains no urea formaldehyde.

- c. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
- 3. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - a. Preservative-treated wood.
 - b. Fire-retardant-treated wood.
 - c. Power-driven fasteners.
 - d. Powder-actuated fasteners.
 - e. Expansion anchors.
 - f. Metal framing anchors.

E. Quality Assurance

- 1. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":
 - a. Dimension lumber framing.
 - b. Miscellaneous lumber.
 - c. Interior wood trim.
 - d. Shelving and clothes rods.

F. Delivery, Storage, And Handling

- 1. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- 2. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

1.2 PRODUCTS

A. Wood Products, General

- 1. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - a. Factory mark each piece of lumber with grade stamp of grading agency.
 - b. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - c. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - d. Provide dressed lumber, S4S, unless otherwise indicated.

B. Wood-Preservative-Treated Materials

- 1. Preservative Treatment by Pressure Process: AWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPA C31 with inorganic boron (SBX).
 - a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - b. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
 3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 4. Application: Treat all miscellaneous carpentry, unless otherwise indicated **OR** items indicated on Drawings, and the following, **as directed**:
 - a. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - b. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - c. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - d. Wood framing members that are less than **18 inches (460 mm)** above the ground in crawl spaces or unexcavated areas.
 - e. Wood floor plates that are installed over concrete slabs-on-grade.
- C. Fire-Retardant-Treated Materials
1. General: Comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood).
 - a. Use treatment that does not promote corrosion of metal fasteners.
 - b. Use Exterior type for exterior locations and where indicated.
 - c. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
 - d. Use Interior Type A, unless otherwise indicated.
 2. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 3. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
 4. Application: Treat all miscellaneous carpentry, unless otherwise indicated **OR** items indicated on Drawings, and the following, **as directed**:
 - a. Framing for raised platforms.
 - b. Concealed blocking.
 - c. Roof construction.
 - d. Plywood backing panels.
- D. Dimension Lumber Framing
1. Maximum Moisture Content: 15 percent **OR** 19 percent **OR** 15 percent for **2-inch nominal (38-mm actual)** thickness or less, 19 percent for more than **2-inch nominal (38-mm actual)** thickness, **as directed**.
 2. Non-Load-Bearing Interior Partitions: Construction or No. 2 **OR** Construction, Stud, or No. 3 **OR** Standard, Stud, or No. 3, **as directed**, grade of any species.
 3. Other Framing: No. 2 **OR** Construction or No. 2 **OR** Construction, Stud, or No., **as directed**, grade and any of the following species:
 - a. Hem-fir (north); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Mixed southern pine; SPIB.
 - e. Spruce-pine-fir; NLGA.
 - f. Douglas fir-south; WWPA.
 - g. Hem-fir; WCLIB or WWPA.

- h. Douglas fir-larch (north); NLGA.
- i. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

E. Miscellaneous Lumber

1. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - a. Blocking.
 - b. Nailers.
 - c. Rooftop equipment bases and support curbs.
 - d. Cants.
 - e. Furring.
 - f. Grounds.
 - g. Utility shelving.
2. For items of dimension lumber size, provide Construction or No. 2 **OR** Standard, Stud, or No. 3, **as directed**, grade lumber with 15 **OR** 19, **as directed**, percent maximum moisture content of any species.
3. For exposed boards, provide lumber with 15 **OR** 19, **as directed**, percent maximum moisture content and any of the following species and grades:
 - a. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or 2 Common (Sterling) **OR** Standard or No. 3 Common, **as directed**, grade; NeLMA, NLGA, WCLIB, or WWPA.
 - b. Mixed southern pine, No. 1 **OR** 2, **as directed**, grade; SPIB.
 - c. Hem-fir or hem-fir (north), Select Merchantable or No. 1 Common **OR** Construction or No. 2 Common, **as directed**, grade; NLGA, WCLIB, or WWPA.
 - d. Spruce-pine-fir (south) or spruce-pine-fir, Select Merchantable or No. 1 Common **OR** Construction or No. 2 Common, **as directed**, grade; NeLMA, NLGA, WCLIB, or WWPA.
4. For concealed boards, provide lumber with 15 **OR** 19, **as directed**, percent maximum moisture content and any of the following species and grades:
 - a. Mixed southern pine, No. 2 **OR** 3, **as directed**, grade; SPIB.
 - b. Hem-fir or hem-fir (north), Construction or 2 Common **OR** Standard or 3 Common, **as directed**, grade; NLGA, WCLIB, or WWPA.
 - c. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common **OR** Standard or 3 Common, **as directed**, grade; NeLMA, NLGA, WCLIB, or WWPA.
 - d. Eastern softwoods, No. 2 **OR** 3, **as directed**, Common grade; NELMA.
 - e. Northern species, No. 2 **OR** 3, **as directed**, Common grade; NLGA.
 - f. Western woods, Construction or No. 2 Common **OR** Standard or No. 3 Common, **as directed**, grade; WCLIB or WWPA.
5. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
6. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
7. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

F. Interior Wood Trim

1. General: Provide kiln-dried finished (surfaced) material without finger-jointing, unless otherwise indicated.
2. Softwood Lumber Trim for Transparent (Stain or Clear) Finish: Provide one of the following species and grade:
 - a. Grade C Select **OR** D Select **OR** Finish **OR** Premium, **as directed**, eastern white pine; NeLMA or NLGA.
 - b. Grade C Select (Choice) **OR** D Select (Quality) **OR** 1 Common (Colonial) **OR** 2 Common (Sterling), **as directed**, Idaho white, lodgepole, ponderosa, or sugar pine; NLGA or WWPA.

- c. Grade Superior or C & Btr **OR** Prime or D, **as directed**, Finish Douglas fir-larch or Douglas fir-south; NLGA, WCLIB, or WHPA.
 - d. Clear Heart **OR** Grade A **OR** Grade B, **as directed**, western red cedar; NLGA, WCLIB, or WHPA.
3. Hardwood Lumber Trim for Transparent (Stain or Clear) Finish: Clear red oak **OR** white maple, **as directed**, selected for compatible grain and color, **as directed**.
 4. Lumber Trim for Opaque (Painted) Finish: Either finger-jointed or solid lumber, of one of the following species and grades:
 - a. Grade D Select **OR** Finish **OR** Premium, **as directed**, eastern white pine; NeLMA or NLGA.
 - b. Grade D Select (Quality) **OR** 1 Common (Colonial) **OR** 2 Common (Sterling), **as directed**, Idaho white, lodgepole, ponderosa, or sugar pine; NLGA or WHPA.
 - c. Grade A **OR** B, **as directed**, Finish aspen, basswood, cottonwood, gum, magnolia, red alder, soft maple, sycamore, tupelo, or yellow poplar; NHLA.
 5. Moldings: Made to patterns included in WMMPA WM 7 and graded according to WMMPA WM 4.
 - a. Moldings for Transparent (Stain or Clear) Finish: N-grade eastern white, Idaho white, lodgepole, ponderosa, or sugar pine **OR** western red cedar **OR** Douglas fir **OR** red oak **OR** white maple, **as directed**, selected for compatible grain and color.
 - b. Moldings for Opaque (Painted) Finish: P-grade eastern white, Idaho white, lodgepole, ponderosa, or sugar pine **OR** aspen, basswood, cottonwood, gum, magnolia, soft maple, tupelo, or yellow poplar **OR** primed medium-density fiberboard, **as directed**.
- G. Shelving And Clothes Rods
1. Shelving: Made from one of the following materials, **3/4-inch (19-mm)** thick. Do not use particleboard or medium-density fiberboard that contains urea formaldehyde.
 - a. Melamine-faced particleboard with radiused and filled front edge.
 - b. Particleboard with radiused and filled **OR** solid-wood, **as directed**, front edge.
 - c. Medium-density fiberboard with radiused **OR** solid-wood, **as directed**, front edge.
 - d. Wood boards of same species and grade indicated above for interior lumber trim for opaque **OR** transparent, **as directed**, finish.
 2. Shelf Cleats: **3/4-by-3-1/2-inch (19-by-89-mm)** boards **OR** **3/4-by-5-1/2-inch (19-by-140-mm)** boards with hole and notch to receive clothes rods, **as directed**, of same species and grade indicated above for interior lumber trim for opaque finish.
 3. Shelf Brackets: Prime-painted formed steel with provision to support clothes rod where rod is indicated.
 4. Clothes Rods:
 - a. **1-1/2-inch- (38-mm-)** diameter, clear, kiln-dried hardwood rods **OR** clear, kiln-dried softwood rods; either Douglas fir or southern pine **OR** aluminum tubes, **as directed**.
OR
1-1/4-inch- (32-mm-) diameter, chrome-plated steel **OR** stainless-steel, **as directed**, tubes.
 5. Rod Flanges: Clear, kiln-dried hardwood turnings **OR** Clear, kiln-dried softwood turnings **OR** Aluminum **OR** Chrome-plated steel **OR** Stainless steel, **as directed**.
- H. Plywood Backing Panels
1. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, **as directed**, in thickness indicated or, if not indicated, not less than **1/2-inch (13-mm)** nominal thickness.
- I. Fasteners
1. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - a. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M **OR** of Type 304 stainless steel, **as directed**.
 2. Nails, Brads, and Staples: ASTM F 1667.
 3. Power-Driven Fasteners: NES NER-272.

4. Wood Screws: ASME B18.6.1.
 5. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 6. Lag Bolts: **ASME B18.2.1 (ASME B18.2.3.8M)**.
 7. Bolts: Steel bolts complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers.
 8. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - a. Material:
 - 1) Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
OR
Stainless steel with bolts and nuts complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4)**.
- J. Metal Framing Anchors
1. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, **G60 (Z180)** coating designation.
 - a. Use for interior locations where stainless steel is not indicated.
 2. Stainless-Steel Sheet: ASTM A 666, Type 304 **OR** 316, **as directed**.
 - a. Use for exterior locations and where indicated.
- K. Miscellaneous Materials
1. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - a. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.3 EXECUTION

A. Installation, General

1. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
2. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
3. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
4. Do not splice structural members between supports, unless otherwise indicated.
5. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - a. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than **16 inches (406 mm)** o.c.
6. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - a. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than **96 inches (2438 mm)** o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - b. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than **96 inches (2438 mm)** o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and **2-inch nominal- (38-mm actual-)** thickness.

- c. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than **100 sq. ft. (9.3 sq. m)** and to solidly fill space below partitions.
 - d. Fire block concealed spaces behind combustible cornices and exterior trim at not more than **20 feet (6 m)** o.c.
 7. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
 8. Comply with AWWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - a. Use inorganic boron for items that are continuously protected from liquid water.
 - b. Use copper naphthenate for items not continuously protected from liquid water.
 9. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - a. NES NER-272 for power-driven fasteners.
 - b. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - c. "Nailing Schedule," and Tables in Section 2304 of the ICC's International Building Code.
 - d. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - e. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 - f. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.
 10. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- B. Wood Ground, Sleeper, Blocking, And Nailer Installation**
1. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
 2. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
 3. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than **1-1/2 inches (38 mm)** wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.
- C. Wood Furring Installation**
1. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
 2. Furring to Receive Plywood or Hardboard Paneling: Install **1-by-3-inch nominal- (19-by-63-mm actual-)** size furring horizontally **OR** vertically **OR** horizontally and vertically, **as directed**, at **24 inches (610 mm) OR 600 mm, as directed**, o.c.
 3. Furring to Receive Gypsum Board **OR** Plaster Lath, **as directed**: Install **1-by-2-inch nominal- (19-by-38-mm actual-)** size furring vertically at **16 inches (406 mm) OR 400 mm, as directed**, o.c.
- D. Wood Trim Installation**
1. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than **24 inches (610 mm)** long except where necessary. Stagger joints in adjacent and related standing and running trim. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.
 - a. Match color and grain pattern across joints.
 - b. Install trim after gypsum board joint-finishing operations are completed.

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- c. Drill pilot holes in hardwood before fastening to prevent splitting. Fasten to prevent movement or warping. Countersink fastener heads and fill holes.
- d. Install to tolerance of **1/8 inch in 96 inches (3 mm in 2438 mm)** for level and plumb. Install adjoining finish carpentry with **1/32-inch (0.8-mm)** maximum offset for flush installation and **1/16-inch (1.6-mm)** maximum offset for reveal installation.

E. Protection

1. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
2. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00 00a

Task	Specification	Specification Description
06 11 00 00	06 10 00 00a	Miscellaneous Carpentry
06 11 13 00	06 10 00 00	Rough Carpentry
06 11 13 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 06 11 16 00 - ROUGH CARPENTRY RENOVATION

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for rough carpentry renovation. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

A. Quality Assurance

1. Regulatory Requirements:

- a. Fire Retardant Treated Lumber and Plywood: Bear UL FR-S classification label.
- b. Preservative Treated Wood: Provide all heart redwood, cedar, or cyprus; or preservative-treated wood at following conditions in accordance with applicable building code:
 - 1) Wood framing, woodwork, and plywood up to and including subflooring at first-floor level of structures having crawl spaces, when bottoms of such items are 150 mm (6 inches) or less from earth underneath.
 - 2) Exterior wood steps, platforms, and railings.
 - 3) Wood sills, soles, plates, furring, and sleepers that are less than 150 mm (6 inches) from earth, furring and nailers that are set into or in contact with concrete or masonry.
 - 4) Nailers, edge strips, crickets, curbs, and cants for roof decks.
 - 5) Furring strips used on walls or partitions below grade and exterior walls above grade.
 - 6) Wood members used for rough framing of openings in exterior concrete or masonry walls.

B. Delivery, Storage, And Handling

1. General: Deliver material to site, off-load, and handle in manner that will not damage material. Store material off ground and cover with waterproof covering. Provide adequate ventilation.
 - a. Interior Fire-Retardant Treated Wood: Keep dry at all times. Replace material that has become wet. Store off ground, in building, or covered with unbroken water-tight cover in storage yard, during transit, and at job site. Keep ventilated to avoid moisture condensation.

C. Project Conditions

1. Environmental Requirements: Execute demolition and renovation in manner to limit unnecessary dust and noise, and in compliance with applicable codes and federal or state requirements. Burning of materials on site not allowed.
2. Existing Conditions: See Detailed Scope of Work. Do not interfere with use of occupied buildings or portions of buildings. Maintain free and safe passage to and from occupied areas.
3. Protection:
 - a. Provide necessary temporary shoring and bracing to support and protect portions of existing buildings during demolition operations. Leave such shoring in place until permanent supports have been installed. Be solely responsible for design, safety, and adequacy of temporary shoring and bracing and its ability to carry load for which intended.
 - b. Contractor: Protect grounds, plantings, buildings, and any other facilities or property from damage caused by construction operations.

4. Safety: Cease operations at endangered area, and notify the Owner immediately if safety of structure appears to be endangered. Take precautions to properly support structure. Do not resume work in endangered area until safety is restored.

D. Scheduling And Sequencing

1. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

1.3 PRODUCTS

A. Materials

1. Materials for Patching, Extending, and Matching:
 - a. Provide same products or types of construction as in existing structure, as needed to patch, extend, or match existing work.
 - 1) Generally, Contract Documents will not define products or standards of workmanship present in existing construction. Determine products by inspection and testing as necessary, and required workmanship by reference to existing as sample of comparison.
 - 2) Patching, extending, and matching existing work and systems shall result in complete, finished system.
 - b. Presence of product, finish, or type of construction requires that patching, extending, or matching be performed as necessary to make work complete and consistent.
2. Lumber: Each Piece of Lumber: Grade stamped by recognized association or independent inspection agency certified by American Lumber Standards Committee's Board of Review.
 - a. New Replacement Studs and Joists: Match existing and complies with Reference Standards.
 - b. Wood Studs and Joists: No. 2 Grade or better.
 - c. Sill Plates on Concrete: All heart redwood, cedar, or cyprus: or preservative-treated wood.
 - d. Blocking and Furring: Standard Grade or Better.
 - e. Preservative-Treated: AWPB LP-2, pressure-treated with waterborne preservative. Penta or creosote not allowed.
 - 1) Treat drilled holes and cuts across grain in accordance with AWPB M4.
 - f. Fire-Retardant Treated:
 - 1) Lumber: AWPB C20 Interior Type A.
 - 2) Plywood: AWPB C27 Interior Type A.
 - 3) Bear UL FR-S classification label.
 - g. Pressure-Treated Lumber: Bear AWPB Quality Mark C-2.
 - h. Seasoning: Kiln dry to following (including treated material):
 - i. Lumber Up to 50 mm (2 inches): 19 percent or less moisture content.
 - j. Preservative- and Fire-Retardant Treated Material: Mill or rip material parallel to grain prior to treatment.
3. Plywood: PS-1: Each panel identified with APA grade trademark.
 - a. Subfloor: APA Rated Sheathing, Tongue and groove, Exposure 1 (interior with exterior glue).
 - 1) Span Rating: Not less than spacing of framing members.
 - 2) Thickness: In accordance with APA Recommendations.
 - b. Roof Sheathing: APA Rated Sheathing, Exposure 1 (interior with exterior glue).
 - 1) Span Rating: Not less than spacing of framing members.
 - 2) Thickness: In accordance with APA Recommendations.
 - c. Wall Sheathing: APA CD, Exposure 1 (Interior with exterior glue).
 - 1) Span Rating: Not less than spacing of framing members.
 - 2) Thickness: As indicated.
 - d. Panel Edge Clips: Extruded aluminum or hot-dipped galvanized steel, H-shaped clips to prevent differential deflection of roof sheathing.
 - e. Fire-Retardant Treated Plywood: Bear UL FR-S classification label.

- 1) Interior Plywood Fire Retardant Treatment: AWPA C27 Interior Type A.
- 2) Exterior Plywood Fire Retardant Treatment: AWPA C27 Exterior Type.
- f. Seasoning: Kiln dry plywood to 15 percent or less moisture content.
 - 1) Pressure Treated Plywood: Kiln dry lumber after treatment.
- g. Nails: Type and size as recommended by APA.
4. Metal Framing Anchors: Punched and formed for nailing so that nails will be stressed in shear only.
 - a. General: Provide with nails and bolts according to manufacturers requirements.
 - 1) Nails: Zinc coated.
 - b. Types: As indicated and as required to accommodate framing.
 - c. Sizes: Of sufficient size and strength to develop full strength of supported member in accordance with applicable building code.
 - d. Metal Bridging: Minimum No. 16 U.S. Standard gage.
 - e. Finish: Hot-dipped galvanized.
5. Anchor Bolts: Furnish anchors to be built into concrete and masonry for anchorage of wood.
6. Rough Hardware: Provide necessary bolts, screws, nails, clips, plates, straps, hangers, etc., necessary for completion of renovation work. Provide correct material of proper size and strength for purpose intended, conforming to Reference Standards and applicable building codes.
 - a. Exterior Locations and for Fire-Retardant- and Preservative-Treated Wood: Provide galvanized rough hardware.
7. Vapor Barrier at Crawl Spaces: ASTM D 2103, 0.15 mm (6 mil) polyethylene sheeting.
8. Insulation: Type and R-value to comply with applicable codes and regulations.
 - a. Blanket Insulation: ASTM C 665 fiberglass blankets. Exposed insulation shall be foil-faced with flame-spread rating of 25 or less in accordance with ASTM E 84, where required by applicable codes and regulations.

1.4 EXECUTION

- A. Examination
 1. Units, Spaces, and Areas to be Renovated: Comply with Detailed Scope of Work.
 - a. Verify that surfaces to receive rough carpentry are prepared to require grades and dimensions.
- B. Preparation
 1. Dust Protection: Comply with Detailed Scope of Work.
 2. Building Occupation: Carry out demolition and renovation work to cause as little inconvenience to occupants as possible. See Detailed Scope of Work.
 3. Protection: See Detailed Scope of Work.
 4. Selective Demolition: Comply with Detailed Scope of Work.
- C. Laying Out Work
 1. Discrepancies: Verify dimensions and elevations indicated in layout of existing work.
 - a. Prior to commencing work, carefully compare and check Drawings (if any) for discrepancies in locations or elevations of work to be executed.
 - b. Refer discrepancies among Drawings (if any), Specifications, and existing conditions to the Owner for adjustment before work affected is performed.
 - 1) Failure to make such notification shall place responsibility on Contractor to carry out work in satisfactory, workmanlike manner.
 2. Contractor: Responsible for location and elevation of construction contemplated by Construction Documents.
- D. Performance
 1. Patching: Patch and extend existing work using skilled mechanics who are capable of matching existing quality of workmanship.

- a. Quality of Patched or Extended Work: Not less than specified for new work. If similar new work is not specified, equal to existing work.
2. General: Perform in accordance with AF&PA National Design Specification for Wood Construction, latest Edition.
 - a. Framing: Erect plumb, level and true and rigidly anchor in place. Cut framing square on bearings, closely fit, accurately set to required lines and levels.
 - b. Nail or spike members in accordance with applicable codes.
 - c. Framing: 400 mm (16 inches) OC unless otherwise indicated.
 - d. Shims: Do not use shims for leveling on wood or metal bearings. Use steel or slate shims with full bearing on masonry or concrete.
 - e. Do not splice framing members between bearing points.
 - f. Metal Framing Anchors: Install where required for proper connections in accordance with manufacturer recommendations. Drive nail in each nail hole provided in anchor.
3. Wood Framing:
 - a. Openings: Frame members for passage of pipes and ducts to avoid cutting structural members. Do not cut, notch, or bore framing members for passage of pipes or conduits without the Owner's permission. Reinforce framing members as directed where damaged by cuffing.
 - b. Firestopping: Firestop concealed spaces in framing. No shutoff by framing members to prevent drafts from one space to another. Use 50 mm (2 inch) nominal thick accurately fit wood blocking to fill opening.
 - c. Joists and Beams: Sizes and spacing as indicated.
 - 1) Set crown edge-up with 90 mm (3-1/2 inch) bearing unless noted otherwise.
 - 2) Toe nail joists to wood sills with 16d nails both sides or secure with metal connectors. Lap and spike joists over supports.
 - 3) Double joists to form headers and trimmers at openings over 1,200 mm (4 feet) and support with metal joist hangers.
 - 4) Provide joist hangers at joists framing into flush wood beams.
 - d. Provide blocking or suitable edge support between members as necessary to support edges of sheathing.
 - e. Replace warped lumber in walls and joists prior to installation of finish surface.
4. Anchors: Unless otherwise indicated, bolt plates firmly to concrete or masonry with anchor bolts in accordance with applicable code.
 - a. In Masonry: Embed anchor bolts minimum 400 mm (16 inches) and provide each with nut and 50 mm (2 inch) diameter washer at bottom end. Grout bolts with mortar.
 - b. In Concrete: Embed anchor bolts minimum 200 mm (8 inches) and provide each with nut and 50 mm (2 inch) diameter washer at bottom end. 90 degree bent end may be substituted for nut and washer.
5. Wood Studs: Install at 400 mm (16 inches) OC with single bottom plate and double top plate with joints staggered.
 - a. Double studs at openings and triple at corners and intersections. Double headers with double trimmers over openings.
6. Plywood Sheathing: Install in accordance with APA Recommendations.
 - a. Provide space at end and side joints as recommended by APA.
 - b. Install panels with face grain perpendicular to supports with end-joints supported. Stagger ends of adjacent sheets 1 200 mm (4 feet) where possible.
 - c. Where support spacing exceeds maximum span for unsupported edge, provide adequate blocking, tongue and groove edges, or panel edge clips, in accordance with APA E30-L.
 - d. Nail in accordance with APA's Recommendations.
7. Preservative- and Fire-Retardant Material: Milling or ripping material parallel to grain not allowed unless material is treated after milling or ripping.
 - a. Preservative-Treated Material: Treat drilled holes and cuts across grain in accordance with AWPA M4.

E. Flooring Work

1. Defective Joists and Subfloor: Remove defective joists and subfloor which no longer satisfy structural requirements with new material to fulfill their structural function.
 - a. Remove ceiling, subfloor, and joists in safe manner and at minimum inconvenience to residents.
 - b. Splice, strengthen, support, or replace rotted or otherwise defective joists to fulfill their anticipated structural function.
 - c. New Replacement Joists: Comply with requirements of appropriate section specifying new flooring, including flooring manufacturer's recommendations.
 - d. Ceiling Replacement: Include removal and replacement of ceiling finish to match existing.
 - 1) Glue and screw new ceiling material to bottom of joists.
 - 2) Paint entire ceiling of space affected by replacement matching color of existing walls in accordance with Division 9 Section "Painting."
 - e. Crawl-Space Insulation: Replace insulation damaged by or removed during construction operations. If there is no existing insulation, provide new insulation, where required.
 - 1) Insulation: Type and R-value to comply with applicable codes and regulations.
 - f. New Replacement Subfloor: Install in accordance with APA Recommendations and with requirements of appropriate section specifying new flooring, including flooring manufacturer's recommendations.
 - 1) Glue and nail new subfloor to joists.
 - 2) Nail in accordance with APA's Recommendations and sufficiently to avoid squeaking floors.
 - g. Base at walls: Replace wood base (including coves and corner rounds) with new wood base to match existing.
 2. Above-Grade Floors to Receive Resilient Flooring: Examine to ensure that vapor-barrier sheet is laid over ground, sheets lapped, edge joints sealed and sufficient cross ventilation exists to insure dryness.
 - a. If vapor barrier does not cover ground in crawl space, install vapor barrier in accordance with applicable codes and regulations.
 - 1) Completely cover ground at crawl spaces with minimum 150 mm (6 inch) lapped joints.
 - 2) Tape all lapped joints with water-resistive tape in accordance with manufacturer's recommendations.
 - 3) Protect vapor barrier from puncture and displacement. Lay heavy objects such as pieces of masonry at intervals not over 1 200 mm (4 feet) OC at lapped joints to hold in place. If punctures occur in vapor barrier, repair by placing patches of vapor-barrier material over punctures and taping all lapped joints.
 - b. If crawl space does not have enough ventilation, install additional vents in accordance with applicable codes and regulations.
 3. Floors Damaged by Construction Operations: Patch floor damage to match existing floor surfaces, and comply with requirements for new flooring.
- F. Roofing Work
1. Removal of Existing Roofing: Roofing may contain asbestos fibers. Comply with applicable codes, laws, and regulations regarding asbestos materials.
 2. Defective Rafters and Sheathing: Remove defective rafters and sheathing which no longer satisfy structural requirements with new material to match existing.
 - a. Remove sheathing and rafters in safe manner and at minimum inconvenience to residents.
 - b. Splice, strengthen, support, or replace rotted or otherwise defective rafters to fulfill their anticipated structural function.
 - c. New Replacement Sheathing: Install in accordance with APA Recommendations and with requirements of applicable Division 7 roofing Sections.
 - 1) Nail in accordance with APA's Recommendations.
- G. Blocking And Furring
1. Blocking: Install wood blocking as required for proper support of hardware, bath accessories, cabinets, and other wall-mounted items.

- a. Set true to line, level, or plumb, well-secured in stud wall and flush with back of drywall or other wall finish.
- b. Coordinate exact locations with other sections.
2. Rough Wood Bucks: Set true and plumb and anchor to concrete or masonry with steel straps extending into wall minimum 200 mm (8 inches). Place anchors near top and bottom of buck and space uniformly at maximum 600 mm (24 inches) OC. Provide nominal 50 mm (2 inch) thick if not indicated.
3. Wood Furring: Install wood furring on masonry or concrete walls in sizes and spacing as indicated on Drawings (if any). Provide minimum 25 mm by 75-mm (1 inch by 3 inch) nominal furring strips spaced at maximum of 400 mm (16 inches) OC if not indicated.
 - a. Securely fasten wood furring at maximum 900 mm (3 feet) OC with toggle or expansion bolts, cut concrete nails or ramset anchors as required. Do not use wood plugs.
 - b. Install furring around openings and at corners.
 - c. Erect furring plumb and level, and shim out as required to provide true, even plane with surfaces suitable to receive required finish.

END OF SECTION 06 11 16 00

Task	Specification	Specification Description
06 11 16 00	01 22 16 00	No Specification Required
06 11 16 00	06 10 00 00	Rough Carpentry
06 11 16 00	06 10 00 00a	Miscellaneous Carpentry
06 13 00 00	06 10 00 00a	Miscellaneous Carpentry
06 13 23 00	06 10 00 00a	Miscellaneous Carpentry
06 15 00 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 06 15 13 00 - EXTERIOR ROUGH CARPENTRY

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for exterior rough carpentry. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Elevated decks including wood decking, plastic decking, stairs, railings, and support framing.
 - b. Wood benches.

C. Definitions

1. Boards: Lumber of less than **2 inches nominal (38 mm actual)** in thickness and **2 inches nominal (38 mm actual)** or greater width.
2. Dimension Lumber: Lumber of **2 inches nominal (38 mm actual)** or greater but less than **5 inches nominal (114 mm actual)** in least dimension.
3. Timber: Lumber of **5 inches nominal (114 mm actual)** or greater in least dimension.
4. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association.
 - b. NLGA: National Lumber Grades Authority.
 - c. RIS: Redwood Inspection Service.
 - d. SPIB: The Southern Pine Inspection Bureau.
 - e. WCLIB: West Coast Lumber Inspection Bureau.
 - f. WWPA: Western Wood Products Association.

D. Submittals

1. Product Data: For preservative-treated wood products, plastic decking, and metal framing anchors.
2. LEED Submittal:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood products comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
3. Material Certificates:
 - a. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
 - b. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.
4. Evaluation Reports: For the following, from an approved organization/model code, as directed by the Owner:
 - a. Preservative-treated wood products.
 - b. Plastic decking.
 - c. Expansion anchors.
 - d. Metal framing anchors.
 - e. Decking fasteners.

E. Quality Assurance

1. Forest Certification: Provide wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

- F. Delivery, Storage, And Handling
 - 1. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
 - 2. Handle and store plastic lumber to comply with manufacturer's written instructions.

1.2 PRODUCTS

A. Lumber, General

- 1. Lumber: Comply with DOC PS 20 and with applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by ALSC's Board of Review. Provide lumber graded by an agency certified by ALSC's Board of Review to inspect and grade lumber under the rules indicated.
 - a. Factory mark each item with grade stamp of grading agency.
 - b. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - c. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
 - d. Provide dressed lumber, S4S, unless otherwise indicated.

B. Dimension Lumber

- 1. Maximum Moisture Content: 15 percent **OR** 19 percent **OR** 15 percent for 2-inch nominal (38-mm actual) thickness or less; 19 percent for more than 2-inch nominal (38-mm actual) thickness **OR** 15 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness **OR** 19 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness, **as directed**.
- 2. Deck and Stair Framing: Select Structural **OR** No. 1 **OR** No. 2 **OR** Construction or No. 2 **OR** Construction, Stud, or No. 3, **as directed**, grade and as selected from the following species:
 - a. Hem-fir (North); NLGA.
 - b. Southern pine; SPIB.
 - c. Douglas fir-larch; WCLIB or WWPA.
 - d. Mixed southern pine; SPIB.
 - e. Spruce-pine-fir; NLGA.
 - f. Douglas fir-south; WWPA.
 - g. Hem-fir; WCLIB or WWPA.
 - h. Douglas fir-larch (North); NLGA.
 - i. Spruce-pine-fir (South); NeLMA, WCLIB, or WWPA.

OR

Deck and Stair Framing: Any species and grade with a modulus of elasticity of at least 1,500,000 psi (10 350 MPa) **OR** 1,300,000 psi (8970 MPa) **OR** 1,100,000 psi (7590 MPa) **OR** 1,000,000 psi (6900 MPa) **OR** 900,000 psi (6210 MPa), **as directed**, and an extreme fiber stress in bending of at least 1000 psi (6.9 MPa) **OR** 850 psi (5.86 MPa) **OR** 700 psi (4.83 MPa) **OR** 600 psi (4.14 MPa) **OR** 500 psi (3.45 MPa), **as directed**, for 2-inch nominal (38-mm actual) thickness and 12-inch nominal (286-mm actual) width for single-member use.

- 3. Dimension Lumber Posts: No. 2 **OR** Construction or No. 2 **OR** Construction, Stud, or No. 3, **as directed**, grade and as selected from the following species:
 - a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.
 - e. Northern species; NLGA.
 - f. Eastern softwoods; NeLMA.

- g. Western woods; WCLIB or WWPA.
 - 4. Dimension Lumber Decking and Stair Treads: No. 2 **OR** Construction or No. 2, **as directed**, grade and as selected from the following species:
 - a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Redwood; RIS.

OR

Dimension Lumber Decking and Stair Treads: Deck Heart or Construction Heart **OR** Deck Common or Construction Common, **as directed**, redwood; RIS.
 - 5. Dimension Lumber Railing Members: Select Structural **OR** No. 1 **OR** No. 2 **OR** Construction or No. 2, **as directed**, grade and as selected from the following species:
 - a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Redwood; RIS.
 - e. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.

OR

Dimension Lumber Railing Members: Heart Clear **OR** Heart B or Select Heart, **as directed**, redwood; RIS.
 - 6. Dimension Lumber for Benches: Select Structural **OR** No. 1, **as directed**, grade and as selected from the following species:
 - a. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.
 - b. Douglas fir-larch, Douglas fir-larch (North), or Douglas fir-south; NLGA, WCLIB, or WWPA.
 - c. Mixed southern pine; SPIB.
 - d. Redwood; RIS.
 - e. Spruce-pine-fir or spruce-pine-fir (South); NeLMA, NLGA, WCLIB, or WWPA.

OR

Dimension Lumber for Benches: Heart Clear **OR** Heart B or Select Heart, **as directed**, redwood; RIS.
- C. Boards
- 1. Maximum Moisture Content: 15 **OR** 19, **as directed**, percent.
 - 2. Board Decking and Stair Treads: ~~1-1/4-inch-~~ (32-mm-) thick radius-edged decking of any of the following species and grades:
 - a. Douglas fir-larch or Douglas fir-south, Patio 1 **OR** Patio 2, **as directed**, WWPA.
 - b. Douglas fir-larch, Select Dex **OR** Commercial Dex, **as directed**, WCLIB.
 - c. Douglas fir-larch (North), Select Patio **OR** Commercial Patio, **as directed**, NLGA.
 - d. Hem-fir, Patio 1 **OR** Patio 2, **as directed**, WWPA.
 - e. Hem-fir, Select Dex **OR** Commercial Dex, **as directed**, WCLIB.
 - f. Hem-fir (North), Select Patio **OR** Commercial Patio, **as directed**, NLGA.
 - g. Redwood, Heart Clear **OR** Heart B or Select Heart, **as directed**; RIS.
 - h. Southern pine, Premium **OR** Standard, **as directed**, SPIB.
 - i. Western red cedar, Patio 1 **OR** Patio 2, **as directed**, WWPA.
 - j. Western red cedar, Select Dex **OR** Commercial Dex, **as directed**, WCLIB.
 - k. Western red cedar (North), Select Patio **OR** Commercial Patio, **as directed**, NLGA.
 - 3. Railing Boards: Any of the following species and grades:
 - a. Douglas fir, C & Btr finish or C Select; NLGA, WCLIB, or WWPA.
 - b. Hem-fir, C & Btr finish or C Select; NLGA, WCLIB, or WWPA.
 - c. Redwood, Heart Clear **OR** Heart B or Select Heart, **as directed**; RIS.
 - d. Southern pine, B & B finish; SPIB.
 - 4. Boards for Benches: Any of the following species and grades:
 - a. Douglas fir, C & Btr finish or C Select; NLGA, WCLIB, or WWPA.
 - b. Hem-fir, C & Btr finish or C Select; NLGA, WCLIB, or WWPA.
 - c. Redwood, Heart Clear **OR** Heart B or Select Heart, **as directed**; RIS.

- d. Southern pine, Edge Grain B & B finish **OR** Near Rift B & B finish **OR** B & B finish, **as directed**; SPIB.

D. Timber

- 1. Maximum Moisture Content: 19 percent **OR** No limit, **as directed**.
- 2. Dressing: Provide dressed timber (S4S) or timber that is rough sawn (Rgh) unless otherwise indicated.
- 3. Timber Posts:
 - a. Balsam fir, Douglas fir-larch, Douglas fir-larch (North), eastern hemlock tamarack (North), hem-fir, southern pine, western hemlock, or western hemlock (North); No. 1 **OR** No. 2, **as directed**, NeLMA, NLGA, SPIB, WCLIB, or WWPA.
 - b. Alaska cedar; No. 1 **OR** No. 2, **as directed**, WCLIB.
 - c. Southern pine; No. 1 **OR** No. 2, **as directed**, SPIB.

E. Round Wood Poles

- 1. Round Wood Poles: Clean-peeled wood poles complying with ASTM D 3200; with at least 80 percent of inner bark removed and with knots and limbs cut flush with the surface.
- 2. Species: as directed by the Owner.

F. Preservative Treatment

- 1. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA C2.
- 2. Pressure treat timber with waterborne preservative according to AWPA C15 requirements for "sawn building poles and posts as structural members."
 - a. Treatment with CCA shall include post-treatment fixation process.
- 3. Pressure treat poles with waterborne preservative to comply with AWPA C4.
 - a. Treatment with CCA shall include post-treatment fixation process.
- 4. Preservative Chemicals: Acceptable to authorities having jurisdiction.
 - a. Do not use chemicals containing arsenic or chromium except for timber posts **OR** except for poles, **as directed**.
- 5. Use process that includes water-repellent treatment.
OR
Use process that does not include water repellents or other substances that might interfere with application of indicated finishes.
- 6. After treatment, redry boards, dimension lumber, timber, and poles to 19 percent maximum moisture content.
- 7. Mark treated wood with treatment quality mark of an inspection agency approved by ALSC's Board of Review.
 - a. For items indicated to receive a stained or natural finish, mark each piece on surface that will not be exposed or omit marking and provide certificates of treatment compliance issued by inspection agency.
- 8. Application: Treat all exterior rough carpentry unless otherwise indicated **OR** Treat items indicated on Drawings and the following, **as directed**:
 - a. Framing members less than **18 inches (460 mm)** above grade.
 - b. Sills and ledgers.
 - c. Members in contact with masonry or concrete.
 - d. Posts.
 - e. Round wood poles.
 - f. Decking.
 - g. Stair treads.

G. Plastic Decking

- 1. Plastic Lumber, General: Products acceptable to authorities having jurisdiction and for which current model code evaluation reports exist that show compliance with building code in effect for Project for indicated occupancy and type of construction.

- a. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, shall not be less than design loads and spans indicated.
 2. Composite Plastic Lumber: Solid or hollow shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
 - a. Configuration: Provide product with grooved edges designed for fastening with concealed splines.
 - b. Surface Texture: Woodgrain **OR** Smooth **OR** Manufacturer's standard, **as directed**.
 - c. Color: As selected from manufacturer's full range.
 3. All-Plastic Lumber: Solid or hollow shapes made from high-density polyethylene (HDPE) **OR** PVC **OR** polystyrene **OR** cellular PVC, **as directed**, with no cellulose fiber.
 - a. Configuration: Provide product with grooved edges designed for fastening with concealed splines **OR** tongue-and-groove edges designed for concealed fastening, **as directed**.
 - b. Surface Texture: Woodgrain **OR** Smooth **OR** Manufacturer's standard, **as directed**.
 - c. Color: As selected from manufacturer's full range.
- H. Fasteners
1. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than **1-1/2 inches (38 mm)** into wood substrate.
 - a. Use stainless steel **OR** fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or ASTM F 2329, **as directed**, unless otherwise indicated.
 - b. For pressure-preservative-treated wood, use stainless-steel fasteners.
 - c. For plastic **OR** wood, **as directed**, decking, use stainless-steel fasteners where fasteners are exposed to view.
 - d. For redwood, use brass/bronze **OR** stainless-steel **OR** hot-dip galvanized-steel, **as directed**, fasteners.
 2. Nails: ASTM F 1667.
 3. Power-Driven Fasteners: NES NER-272.
 4. Wood Screws: ASME B18.6.1.
 5. Lag Screws: **ASME B18.2.1 (ASME B18.2.3.8M)**.
 6. Carbon-Steel Bolts: **ASTM A 307 (ASTM F 568M)** with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers all hot-dip zinc coated.
 7. Stainless-Steel Bolts: **ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or A4)**; with **ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or A4)** hex nuts and, where indicated, flat washers.
 8. Postinstalled Anchors: Stainless-steel, chemical or torque-controlled expansion anchors with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - a. Stainless-steel bolts and nuts complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4)**.
- I. Metal Framing Anchors
1. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated on Drawings **OR** of basis-of-design products, **as directed**. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
 2. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, **G60 (Z180) OR G90 (Z270) OR G185 (Z550)**, **as directed**, coating designation.
 3. Stainless-Steel Sheet: ASTM A 666, Type 304 **OR** Type 316, **as directed**.
 4. Joist Hangers: U-shaped, with **2-inch- (50-mm-)** long seat and **1-1/4-inch- (32-mm-)** wide nailing flanges at least 85 percent of joist depth.
 5. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.

6. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post **1 inch (25 mm)** above base and with **2-inch- (50-mm-)** minimum side cover, socket **0.062 inch (1.6 mm)** thick, and standoff and adjustment plates **0.108 inch (2.8 mm)** thick.
7. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.

J. Concealed Decking Fasteners

1. Deck Splines: Plastic splines designed to fit in grooves routed into the sides of decking material and be fastened to deck framing with screws. Splines provide uniform spacing of decking material. Splines are made from UV-resistant polypropylene.
2. Deck Clips: Black oxide coated stainless-steel clips designed to be fastened to deck framing with screws, and to secure decking material with teeth that also provide uniform spacing of decking material.
3. Deck Tracks: Formed metal strips designed to be fastened to deck framing and to secure decking material from underside with screws. Made from epoxy powder-coated, hot-dip galvanized steel **OR** stainless steel, **as directed**.

1.3 EXECUTION

A. Preparation

1. Clean substrates of projections and substances detrimental to application.
2. Prime lumber to be painted, including both faces and edges. Cut to required lengths and prime ends. Comply with requirements in Division 09 Section "Exterior Painting".

B. Installation, General

1. Set exterior rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit exterior rough carpentry to other construction; scribe and cope as needed for accurate fit.
2. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction" unless otherwise indicated.
3. Install wood decking and stair treads with crown up (bark side down).
4. Install plastic lumber to comply with manufacturer's written instructions.
5. Secure decking to framing with concealed decking fasteners.
6. Install metal framing anchors to comply with manufacturer's written instructions.
7. Do not splice structural members between supports unless otherwise indicated.
8. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
9. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
10. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - a. Use inorganic boron (SBX) for items that are continuously protected from liquid water.
 - b. Use copper naphthenate for items not continuously protected from liquid water.
11. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - a. NES NER-272 for power-driven fasteners.
 - b. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - c. "Nailing Schedule," and Tables in Section 2304 of the ICC's International Building Code.
 - d. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 - e. Table R602.3(1), "Fastener Schedule for Structural Members" and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
12. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view. Make tight connections

between members. Install fasteners without splitting wood; do not countersink nail heads unless otherwise indicated.

13. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

C. Elevated Deck Joist Framing Installation

1. General: Install joists with crown edge up and support ends of each member with not less than **1-1/2 inches (38 mm)** of bearing on wood or metal, or **3 inches (76 mm)** on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.
2. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds **48 inches (1200 mm)**.
3. Lap members framing from opposite sides of beams or girders not less than **4 inches (102 mm)** or securely tie opposing members together. Provide solid blocking of **2-inch nominal (38-mm actual)** thickness by depth of joist over supports.
4. Provide solid blocking of **2-inch nominal (38-mm actual)** thickness by depth of joist at intervals of **96 inches (2438 mm)** o.c., between joists.

D. Stair Installation

1. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
 - a. Stringer Size: **2 by 12 inches nominal (38 by 286 mm actual)**, minimum.
 - b. Notching: Notch stringers to receive treads, risers, and supports; leave at least **3-1/2 inches (89 mm)** of effective depth.
 - c. Stringer Spacing: At least three stringers for each **36-inch (914-mm)** clear width of stair.
2. Provide stair framing with no more than **3/16-inch (4.7-mm)** variation between adjacent treads and risers and no more than **3/8-inch (9.5-mm)** variation between largest and smallest treads and risers within each flight.
3. Treads and Risers: Secure by gluing and nailing **OR** screwing, **as directed**, to carriages. Countersink fastener heads, fill flush, and sand filler. Extend treads over carriages and finish with bullnose edge.

E. Railing Installation

1. Balusters: Fit to railings, glue, and nail **OR** screw, **as directed**, in place. Countersink fastener heads, fill flush, and sand filler.
2. Newel Posts: Secure to stringers and risers with through bolts **OR** lag screws **OR** countersunk-head wood screws and glue, **as directed**.
3. Railings: Secure wall rails with metal brackets. Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts and glue.

END OF SECTION 06 15 13 00

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SECTION 06 15 13 00a - WOOD DECKING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wood decking. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Solid-sawn wood roof and floor decking.
 - b. Glued-laminated wood roof and floor decking.

C. Submittals

1. Product Data: For each type of product indicated.
 - a. For glued-laminated wood decking, include installation instructions and data on lumber, adhesives, and fabrication.
 - b. For preservative-treated wood products, include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For sealants and installation adhesives, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.4: For laminating adhesive used for glued-laminated decking, indicating that product contains no urea formaldehyde.

D. Quality Assurance

1. Standard for Solid-Sawn Wood Decking: Comply with AITC 112.

E. Delivery, Storage, And Handling

1. Schedule delivery of wood decking to avoid extended on-site storage and to avoid delaying the Work.
2. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings. Stack wood decking with surfaces that are to be exposed in the final Work protected from exposure to sunlight.

1.2 PRODUCTS

A. Wood Decking, General

1. General: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
2. Moisture Content: Provide wood decking with 15 **OR** 19, **as directed**, percent maximum moisture content at time of dressing.

B. Solid-Sawn Wood Decking

1. Decking Species: Alaska cedar **OR** Balsam fir **OR** Douglas fir-larch or Douglas fir-larch (North) **OR** Eastern spruce **OR** Hem-fir or hem-fir (North) **OR** Southern pine, **as directed**.
2. Decking Nominal Size: 2x6 **OR** 2x8 **OR** 3x6 **OR** 4x6, **as directed**.
3. Decking Grade:
 - a. Select(ed) **OR** Commercial, **as directed**, Decking.
OR

Dense Standard **OR** Dense Select **OR** Select **OR** Dense Commercial **OR** Commercial, **as directed**, Decking.

OR

Select(ed) Decking or Select Dex **OR** Commercial Decking or Commercial Dex, **as directed**.

4. Grade Stamps: Factory mark each item with grade stamp of grading agency. Apply grade stamp to surfaces that will not be exposed to view.
5. Face Surface: Rough sanded or wire brushed **OR** Saw textured **OR** Smooth, **as directed**.
6. Edge Pattern: Beaded edge **OR** Bullnosed **OR** Channel grooved **OR** Vee grooved, **as directed**.
7. Preservative Treatment: Pressure treat solid-sawn wood decking according to AWPA C31 with inorganic boron (SBX) and redry wood to 15 **OR** 19, **as directed**, percent maximum moisture content.

C. Glued-Laminated Wood Decking

1. Face Species: Alaska cedar **OR** Douglas fir-larch or Douglas fir-larch (North) **OR** Ponderosa pine **OR** Southern pine **OR** Western cedars or western cedars (North), **as directed**.
2. Decking Nominal Size: 2x6 **OR** 2x8 **OR** 3x6 **OR** 3x8 **OR** 4x6 **OR** 4x8 **OR** 5x6 **OR** 5x8, **as directed**.
3. Decking Configuration: For glued-laminated wood decking indicated to be of diaphragm design and construction, provide tongue-and-groove configuration that complies with research/evaluation report.
4. Face Grade:
 - a. Custom or Supreme: Clear face is required. Occasional pieces may contain a small knot or minor characteristic that does not detract from the overall appearance.
OR
Decorative: Sound knots and natural characteristics are allowed, including chipped edge knots, short end splits, seasoning checks, and some pin holes. Face knot holes, stain, end splits, skip, roller split, and planer burn are not allowed.
OR
Service: Face knot holes, stain, end splits, skip, roller split, planer burn, and other nonstrength-reducing characteristics are allowed. Strength-reducing characteristics are not allowed.
5. Face Surface: Rough sanded or wire brushed **OR** Saw textured **OR** Smooth, **as directed**.
6. Edge Pattern: Beaded edge **OR** Bullnosed **OR** Channel grooved **OR** Vee grooved, **as directed**.
7. Laminating Adhesive: Wet-use type complying with ASTM D 2559.
 - a. Use adhesive that contains no urea-formaldehyde resins.
8. Preservative Treatment: Pressure treat lumber before gluing according to AWPA C28 for aboveground use.
 - a. Use oxine copper (copper-8-quinolinolate) in a light petroleum solvent.
OR
Use copper naphthenate in a light petroleum solvent.
OR
Use waterborne preservative that is acceptable to authorities having jurisdiction and that contains no arsenic or chromium. After treating, redry wood to 15 **OR** 19, **as directed**, percent maximum moisture content.
OR
Use preservative solution without water repellents or substances that might interfere with application of indicated finishes.
OR
After dressing and fabricating decking, apply copper naphthenate according to AWPA M4 to surfaces cut to a depth of more than **1/16 inch (1.5 mm)**.

D. Accessory Materials

1. Fasteners for Solid-Sawn Decking: Provide fastener size and type complying with decking standard for thickness of deck used.

2. Fasteners for Glued-Laminated Decking: Provide fastener size and type complying with requirements in "Installation" Article for installing laminated decking.
3. Nails: Common; complying with ASTM F 1667, Type I, Style 10.
4. Spikes: Round; complying with ASTM F 1667, Type III, Style 3.
5. Fastener Material: Hot-dip galvanized **OR** Stainless, **as directed**, steel.
6. Bolts for Anchoring Decking to Walls:
 - a. Carbon steel; complying with **ASTM A 307 (ASTM F 568M)** with ASTM A 563/A 563M hex nuts and, where indicated, flat washers, all hot-dip zinc coated, **as directed**.
OR
Stainless steel; complying with **ASTM F 593, Alloy Group 1 or 2 (ASTM F 738M, Grade A1 or A4)**; with **ASTM F 594, Alloy Group 1 or 2 (ASTM F 836M, Grade A1 or A4)** hex nuts and, where indicated, flat washers.
7. Installation Adhesive: For glued-laminated wood decking indicated to be of diaphragm design and construction, provide adhesive that complies with research/evaluation report.
 - a. Use adhesive that has a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. Sealant: Latex sealant compatible with substrates **OR** Elastomeric joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates, **as directed**.
 - a. Use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. Penetrating Sealer: Clear sanding sealer complying with Division 09 Section "Staining And Transparent Finishing" and compatible with topcoats specified for use over it.

E. Fabrication

1. Shop Fabrication: Where preservative-treated decking is indicated, complete cutting, trimming, surfacing, and sanding before treating.
2. Predrill decking for lateral spiking to adjacent units to comply with referenced decking standard.
3. Seal Coat: After fabricating and surfacing decking, apply a saturation coat of penetrating sealer in fabrication shop, **as directed**.

1.3 EXECUTION

A. Installation

1. Install solid-sawn wood decking to comply with referenced decking standard.
 - a. Locate end joints for two-span continuous lay-up **OR** combination simple and two-span continuous lay-up **OR** controlled random lay-up **OR** lay-up indicated, **as directed**.
2. Install laminated wood decking to comply with manufacturer's written instructions.
 - a. Locate end joints for two-span continuous lay-up **OR** combination simple and two-span continuous lay-up **OR** controlled random lay-up **OR** lay-up indicated, **as directed**.
 - b. Nail each course of glued-laminated wood decking at each support with one nail slant nailed above the tongue and one nail straight nailed through the face.
 - 1) Use 12d nails for 2x6 and 2x8 decking.
 - 2) Use 30d nails for 3x6 and 3x8 decking.
 - 3) Use 60d nails for 4x6 and 4x8 decking. Predrill decking to prevent splitting.
 - 4) Use 30d tongue nails in bottom tongue and **3/8-inch (10-mm)** face spikes for 5x6 and 5x8 decking. Predrill decking at spikes to prevent splitting.
 - c. Slant nail each course of glued-laminated wood decking to the tongue of the adjacent course at **30 inches (750 mm)** o.c. and within **12 inches (300 mm)** of the end of each unit. Stagger nailing in adjacent courses **15 inches (380 mm)**.
 - 1) Use 6d nails for 2x6 and 2x8 decking.
 - 2) Use 8d nails for 3x6 and 3x8 decking.
 - 3) Use 10d nails for 4x6 and 4x8 decking.
 - 4) Use 16d nails for 5x6 and 5x8 decking.

06 - Wood, Plastics, and Composites



- d. Glue adjoining decking courses together by applying a **3/8-inch (10-mm)** bead of adhesive on the top of tongues according to research/evaluation report.
 3. Anchor wood roof decking, where supported on walls, with bolts as indicated.
 4. Where preservative-treated decking must be cut during erection, apply a field-treatment preservative to comply with AWWPA M4.
 - a. For solid-sawn decking, use inorganic boron (SBX).
 - b. For laminated decking, use copper naphthenate.
 5. Apply joint sealant to seal roof decking at exterior walls at the following locations:
 - a. Between decking and supports located at exterior walls.
 - b. Between decking and exterior walls that butt against underside of decking.
 - c. Between tongues and grooves of decking over exterior walls and supports at exterior walls.
- B. Adjusting
1. Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by the Owner.
- C. Protection
1. Provide temporary waterproof covering as the Work progresses to protect roof decking until roofing is applied.

END OF SECTION 06 15 13 00a

Task	Specification	Specification Description
06 15 13 00	06 11 16 00	Rough Carpentry Renovation
06 15 13 00	06 10 00 00	Rough Carpentry
06 15 13 00	06 10 00 00a	Miscellaneous Carpentry
06 16 00 00	06 10 00 00a	Miscellaneous Carpentry
06 16 23 00	06 10 00 00	Rough Carpentry
06 16 23 00	06 10 00 00a	Miscellaneous Carpentry
06 16 23 00	01 95 99 92e	Sheathing
06 16 33 00	06 10 00 00	Rough Carpentry
06 16 33 00	06 10 00 00a	Miscellaneous Carpentry
06 16 33 00	01 95 99 92e	Sheathing
06 16 43 00	06 11 16 00	Rough Carpentry Renovation
06 16 43 00	06 10 00 00	Rough Carpentry
06 16 43 00	06 10 00 00a	Miscellaneous Carpentry
06 16 43 00	01 95 99 92e	Sheathing
06 17 00 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 06 17 13 00 - STRUCTURAL GLUED-LAMINATED TIMBER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for structural glued-laminated timber. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes framing using structural glued-laminated timber.

C. Definitions

1. Structural Glued-Laminated (Glulam) Timber: An engineered, stress-rated timber product assembled from selected and prepared wood laminations bonded together with adhesives and with the grain of the laminations approximately parallel longitudinally.

D. Performance Requirements

1. Delegated Design: Design structural glued-laminated timber and connectors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Structural glued-laminated timber and connectors shall withstand the effects of structural loads shown on Drawings without exceeding allowable design working stresses listed in AITC 117 or determined according to ASTM D 3737 and acceptable to authorities having jurisdiction.
3. Seismic Performance: Structural glued-laminated timber and connectors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used for structural glued-laminated timber complies with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
 - b. Product Data for Credit EQ 4.4: For laminating adhesive used for structural glued-laminated timber, indicating that product contains no urea formaldehyde.
3. Delegated-Design Submittal: For structural glued-laminated timber and timber connectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

F. Quality Assurance

1. Manufacturer Qualifications: Provide factory-glued structural units produced by an AITC- or APA-licensed firm that is certified for chain of custody by an FSC-accredited certification body.
 - a. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that will not be exposed in the completed Work.
2. Quality Standard: Comply with AITC A190.1.

3. Forest Certification: Provide structural glued-laminated timber produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

G. Delivery, Storage, And Handling

1. General: Comply with provisions in AITC 111.
2. Individually wrap members using plastic-coated paper covering with water-resistant seams.

1.2 PRODUCTS

A. Structural Glued-Laminated Timber

1. General: Provide structural glued-laminated timber that complies with AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.
 - a. Provide structural glued-laminated timber made from solid lumber laminations; do not use laminated veneer lumber.
 - b. Provide structural glued-laminated timber made with wet-use adhesive complying with ASTM D 2559.
 - 1) Use adhesive that contains no urea-formaldehyde resins.
2. Species and Grades for Structural Glued-Laminated Timber:
 - a. Alaska cedar **OR** Douglas fir-larch **OR** Southern pine **OR** Any species, **as directed**, in grades needed to comply with "Performance Requirements" Article.
OR
Alaska cedar **OR** Douglas fir-larch **OR** Southern pine **OR** Any species, **as directed**, that complies with structural properties **OR** combination symbols **OR** beam stress classifications, **as directed**, indicated.
3. Species and Grades for Beams and Purlins:
 - a. Species and Beam Stress Classification: Ponderosa pine, 16F-1.3E **OR** Alaska cedar, 20F-1.5E **OR** Eastern spruce, 20F-1.5E **OR** Any species, 20F-1.5E **OR** Any species, 24F-1.7E **OR** Douglas fir-larch, 24F-1.8E **OR** Southern pine, 24F-1.8E **OR** Douglas fir-larch or southern pine, 24F-1.8E **OR** Southern pine, 30F-2.1E, **as directed**.
 - b. Lay-up: Balanced **OR** Either balanced or unbalanced, **as directed**.
4. Species and Grades for Columns and Truss Members:
 - a. Species and Combination Symbol: Alaska cedar, 70 **OR** Douglas fir-larch, 1 **OR** Douglas fir-larch, 3 **OR** Southern pine, 47 **OR** Southern pine, 50, **as directed**.
5. Appearance Grade: Premium **OR** Architectural **OR** Industrial **OR** Framing, **as directed**, complying with AITC 110.
6. Preservative Treatment after Fabrication: Where preservative-treated structural glued-laminated timber is indicated, pressure treat after fabrication according to AWPA C28.
 - a. Use oxine copper (copper-8-quinolinolate) in a light petroleum solvent.
OR
Use copper naphthenate in a light petroleum solvent.
OR
Use preservative solution without water repellents or substances that might interfere with application of indicated finishes.
OR
Do not incise structural glued-laminated timber.
7. Preservative Treatment before Fabrication: Where preservative-treated structural glued-laminated timber is indicated, pressure treat lumber before gluing according to AWPA C28.
 - a. Use oxine copper (copper-8-quinolinolate) in a light petroleum solvent.
OR
Use copper naphthenate in a light petroleum solvent.
OR
Use a waterborne preservative that is acceptable to authorities having jurisdiction and that contains no arsenic or chromium.

OR

Use preservative solution without water repellents or substances that might interfere with application of indicated finishes.

OR

Do not incise wood used for producing structural glued-laminated timber.

OR

After dressing and fabricating members, apply a field-treatment preservative to comply with AWPA M4 to surfaces cut to a depth of more than **1/16 inch (1.5 mm)**.

1) Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.

OR

Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

8. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
9. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.

B. Timber Connectors

1. General: Unless otherwise indicated, fabricate from the following materials:
 - a. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
 - b. Round steel bars complying with ASTM A 575, Grade M 1020.
 - c. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.
 - d. Stainless-steel plate and flat bars complying with ASTM A 666, Type 304 **OR** Type 316, **as directed**.
 - e. Stainless-steel bars and shapes complying with ASTM A 276, Type 304 **OR** Type 316, **as directed**.
 - f. Stainless-steel sheet complying with ASTM A 666, Type 304 **OR** Type 316, **as directed**.
2. Fabricate beam seats from steel **OR** stainless steel, **as directed**, with **0.239-inch (6-mm) OR 3/16-inch (5-mm) OR 3/8-inch (9.5-mm)**, **as directed**, bearing plates, **3/4-inch- (19-mm-)** diameter-by-**12-inch- (300-mm-)** long deformed bar anchors, and **0.239-inch (6-mm)** side plates.
3. Fabricate arch base shoes from steel **OR** stainless steel, **as directed**, with **1-inch (25-mm)** base plates and **3/8-inch (9.5-mm)** side plates.
4. Fabricate beam hangers from steel **OR** stainless steel, **as directed**, with **0.179-inch (4.6-mm)** stirrups and **0.239-inch (6-mm)** top plates.
5. Fabricate hinge connectors from steel **OR** stainless steel, **as directed**, with **0.179-inch (4.6-mm)** side plates and **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, top and bottom plates.
6. Fabricate strap ties from steel **OR** stainless steel, **as directed**, **2-1/2 inches (63 mm)** wide by **0.179 inch (4.6 mm) OR 3 inches (75 mm)** wide by **0.239 inch (6 mm)**, **as directed**, thick.
7. Fabricate tie rods from round steel bars with upset threads connected with forged-steel turnbuckles complying with ASTM A 668/A 668M.
8. Provide bolts, **3/4 inch (19 mm)** unless otherwise indicated, complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; nuts complying with **ASTM A 563 (ASTM A 563M)**; and, where indicated, flat washers.
9. Provide shear plates, **2-5/8 inches (66.7 mm) OR 4 inches (102 mm)**, **as directed**, in diameter, complying with ASTM D 5933.
10. Finish steel assemblies and fasteners with rust-inhibitive primer, **2-mil (0.05-mm)** dry film thickness.
11. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.

C. Fabrication

1. Shop fabricate for connections to greatest extent possible, including cutting to length and drilling bolt holes.

- a. Dress exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
2. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.
3. End-Cut Sealing: Immediately after end cutting each member to final length and after preservative treatment, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.
4. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit, except for preservative-treated wood where treatment included a water repellent.

D. Factory Finishing

1. Wiped Stain Finish: Manufacturer's standard, dry-appearance, penetrating acrylic stain and sealer; oven dried and resistant to mildew and fungus.
 - a. Color: As selected by the Owner from manufacturer's full range.
2. Clear Finish: Manufacturer's standard, two-coat, clear conversion varnish finish; oven dried and resistant to mildew and fungus.

1.3 EXECUTION

A. Installation

1. General: Erect structural glued-laminated timber true and plumb, and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
 - a. Lift with padded slings and protect corners with wood blocking.
 - b. Install structural glued-laminated timber to comply with Shop Drawings.
 - c. Install timber connectors as indicated.
2. Framing Built into Masonry: Provide 1/2-inch (13-mm) clearance at tops, sides, and ends of members built into masonry; bevel cut ends 3 inches (76 mm); and do not embed more than 4 inches (102 mm) unless otherwise indicated.
3. Fit structural glued-laminated timber by cutting and restoring exposed surfaces to match specified surfacing and finishing.
 - a. Predrill for fasteners using timber connectors as templates.
 - b. Dress exposed surfaces to remove planing or surfacing marks and to provide a finish equivalent to that produced by machine sanding with No. 120 grit sandpaper.
 - c. Coat cross cuts with end sealer.
 - d. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.
 - 1) Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
OR
Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.
4. Cutting: Avoid cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.
 - a. Where preservative-treated members must be cut during erection, apply a field-treatment preservative to comply with AWPA M4.
 - 1) Use inorganic boron (SBX) treatment for members not in contact with the ground and continuously protected from liquid water.
OR
Use copper naphthenate treatment for members in contact with the ground or not continuously protected from liquid water.

B. Adjusting

1. Repair damaged surfaces and finishes after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by the Owner.
- C. Protection
1. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose including protection from weather, sunlight, soiling, and damage from work of other trades.
 - a. Coordinate wrapping removal with finishing work specified in Division 07. Retain wrapping where it can serve as a painting shield.

END OF SECTION 06 17 13 00

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Task	Specification	Specification Description
06 17 13 00	06 05 23 00	Timber Bridge Components
06 17 13 00	06 10 00 00	Rough Carpentry
06 17 13 00	06 10 00 00a	Miscellaneous Carpentry
06 17 23 00	06 11 16 00	Rough Carpentry Renovation
06 17 23 00	06 10 00 00	Rough Carpentry
06 17 23 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 06 17 33 00 - METAL-PLATE-CONNECTED WOOD TRUSSES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for metal-plate-connected wood trusses. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Wood roof trusses.
 - b. Wood floor trusses.
 - c. Wood girder trusses.
 - d. Wood truss bracing.
 - e. Metal truss accessories.

C. Definitions

1. Metal-Plate-Connected Wood Trusses: Planar structural units consisting of metal-plate-connected members fabricated from dimension lumber and cut and assembled before delivery to Project site.
2. TPI: Truss Plate Institute, Inc.
3. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - a. NeLMA: Northeastern Lumber Manufacturers' Association.
 - b. NLGA: National Lumber Grades Authority.
 - c. SPIB: The Southern Pine Inspection Bureau.
 - d. WCLIB: West Coast Lumber Inspection Bureau.
 - e. WWPA: Western Wood Products Association.

D. Performance Requirements

1. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.
 - a. Design Loads: As indicated.
 - b. Maximum Deflection Under Design Loads:
 - 1) Roof Trusses: Vertical deflection of 1/180 **OR** 1/240 **OR** 1/360, **as directed**, of span.
 - 2) Floor Trusses: Vertical deflection of 1/360 **OR** 1/480 **OR** 1/600, **as directed**, of span.

E. Submittals

1. Product Data: For wood-preservative-treated lumber, fire-retardant treated lumber, metal-plate connectors, metal truss accessories, and fasteners.
 - a. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - b. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - c. For fire-retardant treatments specified to be High-Temperature (HT) type, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

- d. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to truss fabricator.
 - e. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
 2. Shop Drawings: Prepared by or under the supervision of a qualified professional engineer. Show fabrication and installation details for trusses.
 - a. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
 - b. Indicate sizes, stress grades, and species of lumber.
 - c. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
 - d. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
 - e. Show splice details and bearing details.
 - f. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 3. LEED Submittal:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used to produce metal-plate-connected wood trusses complies with forest certification requirements. Include evidence that mill is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
 4. Qualification Data: For metal-plate manufacturer, professional engineer, fabricator, and Installer.
 5. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
 - a. Wood-preservative-treated lumber.
 - b. Fire-retardant-treated wood.
 - c. Metal-plate connectors.
 - d. Metal truss accessories.
- F. Quality Assurance
1. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
 - a. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - b. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 2. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to the Owner and authorities having jurisdiction.
 3. Comply with applicable requirements and recommendations of the following publications:
 - a. TPI 1, "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - b. TPI DSB, "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - c. TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
 4. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
 5. Forest Certification: Provide metal-plate-connected wood trusses produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- G. Delivery, Storage, And Handling

1. Handle and store trusses to comply with recommendations of TPI HIB, "Commentary and Recommendations for Handling, Installing & Bracing Metal Plate Connected Wood Trusses."
 - a. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
 - b. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
 - c. Provide for air circulation around stacks and under coverings.
2. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.2 PRODUCTS

A. Dimension Lumber

1. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - a. Factory mark each piece of lumber with grade stamp of grading agency.
 - b. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency.
 - c. Provide dressed lumber, S4S.
 - d. Provide dry lumber with 19 **OR** 15, **as directed**, percent maximum moisture content at time of dressing.
2. Grade and Species: For truss chord and web members, provide dimension lumber of any species, graded visually or mechanically, and capable of supporting required loads without exceeding allowable design values according to AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."
3. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Division 06 Section(s) "Rough Carpentry" OR "Miscellaneous Rough Carpentry", **as directed**.

B. Wood-Preservative-Treated Lumber

1. Preservative Treatment by Pressure Process: AWPA C2, except that trusses that are not in contact with the ground and are continuously protected from liquid water may be made from lumber treated according to AWPA C31 with inorganic boron (SBX).
 - a. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - b. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
2. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
3. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - a. For exposed trusses indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
4. Application: Treat all trusses, unless otherwise indicated **OR** trusses where indicated on Drawings, **as directed**.

C. Fire-Retardant-Treated Wood

1. General: Comply with performance requirements in AWPA C20.
 - a. Use Exterior type for exterior locations and where indicated.
 - b. Use Interior Type A, High Temperature (HT) for enclosed roof trusses and where indicated.
 - c. Use Interior Type A, unless otherwise indicated.
2. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

- a. For exposed trusses and bracing indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
 3. For exposed trusses indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
 4. Application: Treat all trusses, unless otherwise indicated **OR** items indicated on Drawings, and the following, **as directed**:
 - a. Floor trusses for bowling lanes and raised platforms.
 - b. Roof trusses.
- D. Metal Connector Plates
1. General: Fabricate connector plates to comply with TPI 1.
 2. Hot-Dip Galvanized Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); **G60 (Z180)** coating designation; and not less than **0.036 inch (0.9 mm)** thick.
 - a. Use for interior locations where stainless steel is not indicated.
 3. Stainless-Steel Sheet: ASTM A 666, Type 304 **OR** 316, **as directed**, and not less than **0.035 inch (0.88 mm)** thick.
 - a. Use for exterior locations and where indicated.
- E. Fasteners
1. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - a. Where trusses are exposed to weather, in ground contact, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M **OR** of Type 304 stainless steel, **as directed**.
 2. Nails, Brads, and Staples: ASTM F 1667.
 3. Power-Driven Fasteners: NES NER-272.
 4. Wood Screws: ASME B18.6.1.
 5. Lag Bolts: **ASME B18.2.1 (ASME B18.2.3.8M)**.
 6. Bolts: Steel bolts complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers.
 7. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - a. Material:
 - 1) Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
OR
Stainless steel with bolts and nuts complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4)**.
- F. Metal Truss Accessories
1. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated **OR** of basis-of-design products, **as directed**. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
 2. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, **G60 (Z180)** coating designation.
 - a. Use for interior locations where stainless steel is not indicated.
 3. Stainless-Steel Sheet: ASTM A 666, Type 304 **OR** 316, **as directed**.
 - a. Use for exterior locations and where indicated.

4. Truss Tie-Downs: Bent strap tie for fastening roof trusses to wall studs below, **1-1/2 inches (38 mm)** wide by **0.050 inch (1.3 mm)** thick. Tie fastens to one side of truss, top plates, and side of stud below.
5. Truss Tie-Downs (Hurricane or Seismic Ties):
 - a. Bent strap tie for fastening roof trusses to wall studs below, **2-1/4 inches (57 mm)** wide by **0.062 inch (1.6 mm)** thick. Tie fits over top of truss and fastens to both sides of truss, top plates, and one side of stud below.
OR
Bent strap tie for fastening roof trusses to wall studs below, **2-1/2 inches (63 mm)** wide by **0.062 inch (1.6 mm)** thick. Tie fits over top of truss and fastens to both sides of truss, inside face of top plates, and both sides of stud below.
6. Roof Truss Clips: Angle clips for bracing bottom chord of roof trusses at non-load-bearing walls, **1-1/4 inches (32 mm)** wide by **0.050 inch (1.3 mm)** thick. Clip is fastened to truss through slotted holes to allow for truss deflection.
7. Floor Truss Hangers: U-shaped hangers, full depth of floor truss, with **1-3/4-inch- (44-mm-)** long seat; formed from metal strap **0.062 inch (1.6 mm)** thick with tabs bent to extend over and be fastened to supporting member.
8. Roof Truss Bracing/Spacers: U-shaped channels, **1-1/2 inches (38 mm)** wide by **1 inch (25 mm)** deep by **0.040 inch (1.0 mm)** thick, made to fit between 2 adjacent trusses and accurately space them apart, and with tabs having metal teeth for fastening to trusses.

G. Miscellaneous Materials

1. Galvanizing Repair Paint: SSPC-Paint 20, with dry film containing a minimum of 94 percent zinc dust by weight.
2. Protective Coatings: SSPC-Paint 22, epoxy-polyamide primer **OR** SSPC-Paint 16, coal-tar epoxy-polyamide paint, **as directed**.

H. Fabrication

1. Cut truss members to accurate lengths, angles, and sizes to produce close-fitting joints.
2. Fabricate metal connector plates to sizes, configurations, thicknesses, and anchorage details required to withstand design loads for types of joint designs indicated.
3. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - a. Fabricate wood trusses within manufacturing tolerances in TPI 1.
4. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

1.3 EXECUTION

A. Installation

1. Install wood trusses only after supporting construction is in place and is braced and secured.
2. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
3. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
4. Install and brace trusses according to TPI recommendations and as indicated.
5. Install trusses plumb, square, and true to line and securely fasten to supporting construction.
6. Space trusses **16 inches (406 mm)** o.c. **OR 24 inches (610 mm)** o.c. **OR** as indicated, **as directed**; adjust and align trusses in location before permanently fastening.
7. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in truss accessories according to manufacturer's fastening schedules and written instructions.
8. Securely connect each truss ply required for forming built-up girder trusses.
 - a. Anchor trusses to girder trusses as indicated.

9. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - a. Install bracing to comply with Division 06 Section(s) "Rough Carpentry" OR "Miscellaneous Rough Carpentry", **as directed**.
 - b. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.
 10. Install wood trusses within installation tolerances in TPI 1.
 11. Do not cut or remove truss members.
 12. Replace wood trusses that are damaged or do not meet requirements.
 - a. Do not alter trusses in field.
- B. Repairs And Protection
1. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
 2. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
 3. Repair damaged galvanized coatings on exposed surfaces with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
 4. Protective Coating: Clean and prepare exposed surfaces of metal connector plates. Brush apply primer, when part of coating system, and one coat of protective coating.
 - a. Apply materials to provide minimum dry film thickness recommended by coating system manufacturer.

END OF SECTION 06 17 33 00

Task	Specification	Specification Description
06 17 33 00	06 10 00 00a	Miscellaneous Carpentry
06 17 43 00	06 05 23 00	Timber Bridge Components
06 17 43 00	06 10 00 00	Rough Carpentry
06 17 43 00	06 10 00 00a	Miscellaneous Carpentry
06 17 43 00	06 17 13 00	Structural Glued-Laminated Timber
06 17 53 00	06 10 00 00a	Miscellaneous Carpentry
06 17 53 00	06 17 33 00	Metal-Plate-Connected Wood Trusses
06 18 00 00	06 10 00 00a	Miscellaneous Carpentry
06 18 13 00	06 10 00 00a	Miscellaneous Carpentry
06 18 13 00	06 15 13 00a	Wood Decking
06 18 13 00	06 17 13 00	Structural Glued-Laminated Timber
06 18 16 00	06 05 23 00	Timber Bridge Components
06 18 16 00	06 10 00 00	Rough Carpentry
06 18 16 00	06 10 00 00a	Miscellaneous Carpentry
06 18 16 00	06 17 13 00	Structural Glued-Laminated Timber
06 20 23 00	01 22 16 00	No Specification Required
06 22 13 00	06 10 00 00a	Miscellaneous Carpentry
06 22 13 00	01 95 06 00	Exterior Finish Carpentry
06 22 13 00	01 95 06 00a	Interior Finish Carpentry

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SECTION 06 25 16 00 - PANELING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for paneling. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Board paneling.
 - b. Flush wood paneling.
 - c. Plastic-laminate-clad flush paneling.
 - d. Stile and rail wood paneling.

C. Definitions

1. Paneling includes wood furring, blocking, and shims for installing paneling, unless concealed within other construction before paneling installation.

D. Submittals

1. Product Data: For each type of product indicated, including finishing materials and processes.
 - a. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
2. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.
 - a. For paneling produced from premanufactured sets, show finished panel sizes, set numbers, sequence numbers within sets, and method of cutting panels to produce indicated sizes.
 - b. For paneling veneered in fabrication shop, show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 - c. Apply WI-certified compliance label to first page of Shop Drawings, **as directed**.
3. Samples:
 - a. Lumber and panel products for transparent finish, for each species and cut, finished on one side and one edge.
 - b. Veneer leaves representative of and selected from flitches to be used for transparent-finished paneling.
 - c. Veneer-faced panel products with or for transparent finish, for each species and cut. Include at least one face-veneer seam and finish as specified.
 - d. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with 1/2 of exposed surface finished.
 - e. Plastic laminates, **8 by 10 inches (200 by 250 mm)**, for each type, color, pattern, and surface finish, with 1 sample applied to core material.
 - f. Corner pieces for stile and rail paneling, **18 inches (450 mm)** high by **18 inches (450 mm)** wide by **6 inches (150 mm)** deep.
4. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For installation adhesives, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.4: For composite-wood products and fabrication adhesives, documentation indicating that products contain no urea formaldehyde.

- c. Product Data for Credit(s) MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - d. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
5. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates **OR** WIC-certified compliance certificates, **as directed**.

E. Quality Assurance

- 1. Installer Qualifications: Fabricator of products.
- 2. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" **OR** WIC's "Manual of Millwork," **as directed**.
 - a. Provide AWI Quality Certification Program labels and certificates for woodwork, including installation.
 - b. Provide WIC-certified compliance labels and certificates for woodwork, including installation.
- 3. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- 4. Forest Certification: Provide paneling produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- 5. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

- 1. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. If paneling must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

G. Project Conditions

- 1. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.2 PRODUCTS

A. Materials

- 1. General: Provide materials that comply with requirements of AWI's **OR** WIC's, **as directed**, quality standard for quality grade specified, unless otherwise indicated.
- 2. Wood Products: Comply with the following:
 - a. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
 - b. Particleboard: ANSI A208.1, Grade M-2 **OR** M-2-Exterior Glue, **as directed**.
 - c. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.

- d. Softwood Plywood: DOC PS 1, Medium Density Overlay.
 - e. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
 3. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
 4. Adhesives: Do not use adhesives that contain urea formaldehyde.
 5. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement **OR** Contact cement **OR** PVA **OR** Urea formaldehyde **OR** Resorcinol, **as directed**.
 - a. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.
 6. VOC Limits for installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Wood Glues: 30 g/L.
 - b. Panel Adhesives: 50 g/L.
 - c. Contact Adhesive: 80 g/L.
 - d. Special Purpose Contact Adhesive (contact adhesive that is used to bond melamine covered board, metal, unsupported vinyl, Teflon, ultra-high molecular weight polyethylene, rubber or wood veneer 1/16 inch or less in thickness to any surface): 250 g/L.
- B. Fire-Retardant-Treated Materials**
1. General: Where fire-retardant-treated materials are indicated, use materials that are acceptable to authorities having jurisdiction and that comply with requirements in this Article and with fire-test-response characteristics specified.
 - a. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
 - b. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - c. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWWA C20 (lumber) and AWWA C27 (plywood). Use the following treatment type:
 - a. Exterior Type: Organic-resin-based formulation thermally set in wood by kiln drying.
 - b. Interior Type A: Low-hygroscopic formulation.
 - c. Mill lumber after treatment, within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking plant certified by testing and inspecting agency.
 - d. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
 - e. Kiln-dry materials before and after treatment to levels required for untreated materials.
 3. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
 4. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.
- C. Installation Materials**
1. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, fire-retardant-treated, **as directed**, kiln-dried to less than 15 percent moisture content.

2. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

D. Fabrication, General

1. Paneling Grade: Provide Premium **OR** Custom **OR** Economy, **as directed**, grade paneling complying with referenced quality standard.
2. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
3. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
4. Arrange paneling in shop or other suitable space in proposed sequence for examination by the Owner. Mark units with temporary sequence numbers to indicate position in proposed layout.
 - a. Lay out one elevation at a time if approved by the Owner.
 - b. Notify the Owner seven days in advance of the date and time when layout will be available for viewing.
 - c. Provide lighting of similar type and level as that of final installation for viewing layout, unless otherwise approved by the Owner.
 - d. Rearrange paneling as directed by the Owner until layout is approved.
 - e. Do not trim end units and other nonmodular size units to less than modular size until after the Owner's approval of layout. Indicate trimming by masking edges of units with nonmarking material.
 - f. Obtain the Owner's approval of layout before start of assembly. Mark units and Shop Drawings with assembly sequence numbers based on approved layout.
5. Complete fabrication, including assembly and finishing, **as directed**, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
6. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

E. Board Paneling For Transparent Finish

1. Grade: Provide Premium **OR** Custom **OR** Economy, **as directed**.
2. Wood Species and Cut: Hickory, quarter sawn **OR** Red gum, plain sawn **OR** Western white pine, plain sawn **OR** Cypress, plain sawn, **as directed**.
3. Pattern: 1-by-6, vee joint, tongue and groove, **5-1/16-inch (129-mm)** coverage **OR** 1-by-8, pickwick paneling (WWPA Pattern WP-2), **6-3/4-inch (172-mm)** coverage **OR** 1-by-4, beaded ceiling, **3-3/16-inch (81-mm)** coverage **OR** As indicated, **as directed**.
4. Shop fabricate board paneling in lengths to provide pieces that are uninterrupted by joints **OR** random-lengths, **as directed**. Machine edges of boards to provide joint profiles indicated.
5. Preassemble board paneling into largest units that can be delivered into installation areas using permanent or temporary backing members as indicated. To maximum extent possible, fabricate units in sizes determined by field measurements of existing conditions and that will avoid fitting in the field; make provision for separate scribing pieces to be fitted to adjoining finished surfaces. Provide shop-prepared detachable pieces for forming joints with other units at Project site and with other types of architectural woodwork.

F. Board Paneling For Opaque Finish

1. Grade: Provide Premium **OR** Custom **OR** Economy, **as directed**.
2. Wood Species: Eastern white pine, sugar pine, or western white pine **OR** Any closed-grain hardwood, **as directed**.

3. Pattern: 1-by-6, vee joint, tongue and groove, **5-1/16-inch (129-mm)** coverage **OR** 1-by-8, pickwick paneling (WWPA Pattern WP-2), **6-3/4-inch (172-mm)** coverage **OR** 1-by-4, beaded ceiling, **3-3/16-inch (81-mm)** coverage **OR** As indicated, **as directed**.
 4. Shop fabricate board paneling in lengths to provide pieces that are uninterrupted by joints **OR** random-lengths, **as directed**. Machine edges of boards to provide joint profiles indicated.
 5. Preassemble board paneling into largest units that can be delivered into installation areas using permanent or temporary backing members as indicated. To maximum extent possible, fabricate units in sizes determined by field measurements of existing conditions and that will avoid fitting in the field; make provision for separate scribing pieces to be fitted to adjoining finished surfaces. Provide shop-prepared detachable pieces for forming joints with other units at Project site and with other types of architectural woodwork.
- G. Flush Wood Paneling For Transparent Finish
1. Grade: Provide Premium **OR** Custom **OR** Economy, **as directed**.
 2. Wood Species and Cut: White oak, rift sliced **OR** Cherry, plain sliced **OR** Butternut, plain sliced **OR** Avodire, quarter sliced, **as directed**.
 - a. Lumber Trim and Edges: At paneling fabricator's option, trim and edges indicated as solid wood (except moldings) may be either lumber or veneered construction of same species and cut as panel faces and compatible with grain and color of panel faces.
 3. Matching of Adjacent Veneer Leaves: Book **OR** Slip **OR** Random, **as directed** match.
 4. Matching within Panel Face: Running **OR** Balance **OR** Center-balance, **as directed**, match.
 5. Panel-Matching Method:
 - a. No matching is required between panels. Select and arrange panels for similarity of grain pattern and color between adjacent panels.

OR

 Premanufactured sets used full width **OR** Premanufactured sets selectively reduced in width **OR** Sequence-matched, uniform-size sets **OR** Blueprint-matched panels and components, **as directed**, within each separate area.
 6. Vertical Panel-Matching Method: Continuous match; veneer leaves of upper panels are continuations of veneer leaves of lower panels **OR** Vertical book match; veneer leaves are individually book matched from lower panels to upper panels **OR** Vertical slip match; veneer leaves are individually slip matched from lower panels to upper panels **OR** Panel vertical book match; panels are book matched from lower panels to upper panels **OR** Panel vertical slip match; panels are slip matched from lower panels to upper panels, **as directed**.
 7. Panel Core Construction: Hardwood veneer-core plywood **OR** Particleboard or medium-density fiberboard **OR** Fire-retardant particleboard or fire-retardant, medium-density fiberboard, **as directed**.
 8. Exposed Panel Edges: Solid wood or wood veneer matching faces **OR** Legs of metal channels forming reveals **OR** Bronze flat bars **1/16 inch (1.6 mm)** thick by depth of panels, **as directed**.
 9. Panel Reveals: Matte black plastic laminate **OR** Bronze sheet **OR** Stainless-steel sheet **OR** Bronze channels, **1 by 1 by 1/8 inch (25.4 by 25.4 by 3.2 mm)** thick **OR** Stainless-steel channels, **1 by 1 by 1/16 inch (25.4 by 25.4 by 1.6 mm)** thick, **as directed**.
 10. Fire-Retardant-Treated Paneling: Provide panels consisting of wood-veneer and fire-retardant particleboard or fire-retardant, medium-density fiberboard. Panels shall have a flame-spread index of 75 **OR** 25, **as directed**, or less and a smoke-developed index of 450 or less per ASTM E 84.
 - a. Provide paneling of **3/4-inch (19-mm)** minimum thickness.
- H. Plastic-Laminate-Clad Flush Paneling
1. Grade: Provide Premium **OR** Custom **OR** Economy, **as directed**.
 2. Plastic-Laminate Cladding: High-pressure decorative laminate, in the following grades:
 - a. Faces: Grade HGS **OR** VGS **OR** SGF **OR** HGF **OR** VGF, **as directed**.
 - b. Backs: Grade BKH **OR** BKV **OR** BKL, **as directed**.
 - c. Exposed Edges: Same as faces or Grade VGS.
 3. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed surfaces complying with the following requirements:

- a. As indicated by manufacturer's designations.
 - b. Match the Owner's samples.
 - c. As selected by the Owner from laminate manufacturer's full range in the following categories:
 - 1) Solid colors, gloss **OR** matte, **as directed**, finish.
 - 2) Solid colors with core same color as surface, gloss **OR** matte, **as directed**, finish.
 - 3) Wood grains, gloss **OR** matte, **as directed**, finish.
 - 4) Patterns, gloss **OR** matte, **as directed**, finish.
 4. Panel Core Construction: Particleboard or medium-density fiberboard **OR** Fire-retardant particleboard or fire-retardant, medium-density fiberboard, **as directed**.
 5. Fire-Retardant-Treated Paneling: Provide panels consisting of fire-retardant plastic laminate and fire-retardant particleboard or fire-retardant, medium-density fiberboard. Panels shall have a flame-spread index of 75 **OR** 25, **as directed**, or less and a smoke-developed index of 450 or less per ASTM E 84.
 - a. Provide paneling of **3/4-inch (19-mm)** minimum thickness.
- I. Stile And Rail Wood Paneling For Transparent Finish
1. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 2. Wood Species: White oak, rift sawn/sliced **OR** Figured English ash, quarter sawn/sliced **OR** Butternut, plain sawn/sliced **OR** Figured red gum, plain-sawn/sliced panels, quarter-sawn/sliced stiles and rails, **as directed**.
 3. Stiles and Rails: At fabricator's option, stiles and rails may be either lumber or veneered construction with edges banded or with lumber moldings, as indicated, to conceal core and veneer joints.
 4. Panels: Flat panels **OR** Raised panels with veneered faces and solid lumber rims **OR** Raised panels with veneered faces extending across rims **OR** Raised panels made from edge-glued solid lumber, **as directed**.
 5. Insert Panels:
 - a. Blueprint matched in a horizontal sequence for adjacent panels and doors, with continuous vertical matching between adjacent panels. Book and balance **OR** Book, balance, and center, **as directed**, match face-veneer leaves within each panel.
OR
Cut panels from premanufactured, sequence-matched sets of book-matched veneered panels. Cut panels with an even **OR** even or odd, **as directed**, number of veneer leaves centered in each panel and with each of the remainders at least half as wide as the full veneer leaves, **as directed**. Cut panels with continuous matching between vertically adjacent panels; veneer leaves of upper panels are continuations of veneer leaves of panels below them.
OR
Book and balance match face veneers within panels. No matching is required between adjacent panels; select and arrange panels for similarity of grain pattern and color between adjacent panels.
 6. Shop assemble stile and rail paneling into largest units practical for delivery and installation. Provide shop-prepared detachable joints for necessary field connections. Sand and pull joints tight in shop so field joints will comply with joint tolerances for specified grade. Unless otherwise indicated, provide continuous mortise-and-tenon joints between panel units and provide removable temporary protection for joints during handling and delivery.
 - a. Outside Corner of Stile and Rail Paneling: Shop prepare using lock-mitered or mitered-and-splined construction. Assemble, sand, and glue in shop, if site conditions permit.
- J. Stile And Rail Wood Paneling For Opaque Finish
1. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 2. Wood Species: Any closed-grain hardwood **OR** Eastern white pine, ponderosa pine, sugar pine, or western white pine, **as directed**.

3. Stiles and Rails: Either solid lumber or particleboard, shop filled on face, with veneered or lumber-banded edges, at paneling fabricator's option.
4. Flat Insert Panels: Medium-density fiberboard or particleboard with shop-filled face.
5. Raised Insert Panels: Medium-density overlaid softwood plywood (Exterior) APA MDO EXT, machined to profile indicated and shop filled on exposed machined surfaces **OR** Medium-density fiberboard, machined to profile indicated, **as directed**.
6. Provide fire-retardant treatment of stile and rail paneling as indicated below. For components of paneling fabricated from solid lumber, mill pieces before treatment.
 - a. For stiles and rails, use fire-retardant-treated lumber or fire-retardant medium-density fiberboard.
 - b. For built-up stiles and rails, use fire-retardant particleboard with fire-retardant lumber edge-bands or fire-retardant medium-density fiberboard.
 - c. For insert panels, use fire-retardant medium-density fiberboard.

OR
For insert panels, use fire-retardant particleboard with closed-grain hardwood veneer on face and back.
7. Shop assemble stile and rail paneling into largest units practical for delivery and installation. Provide shop-prepared detachable joints for necessary field connections. Sand and pull joints tight in shop so field joints will comply with joint tolerances for specified grade. Unless otherwise indicated, provide continuous mortise-and-tenon joints between panel units and provide removable temporary protection for joints during handling and delivery.
 - a. Outside Corner of Stile and Rail Paneling: Shop prepare using lock-mitered or mitered-and-splined construction. Assemble, sand, and glue in shop, if site conditions permit.

K. Shop Finishing

1. Grade: Provide finishes of same grades as paneling to be finished.
2. General:
 - a. Finish paneling at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

OR
Shop finish transparent-finished paneling at fabrication shop as specified in this Section. Refer to Division 07 for finishing of opaque-finished paneling.

OR
Drawings indicate paneling that is required to be shop finished. Finish such paneling at fabrication shop as specified in this Section. Refer to Division 07 for finishing paneling not indicated to be shop finished.
3. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished paneling specified to be field finished. Refer to Division 07 for material and application requirements.
4. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.
 - a. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling. Concealed surfaces of plastic-laminate-clad paneling do not require backpriming when surfaced with plastic laminate.
5. Transparent Finish:
 - a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. AWI Finish System: TR-0, synthetic penetrating oil **OR** TR-3, cellulose acetate butyrate or water-reducible acrylic lacquer **OR** TR-4, conversion varnish **OR** TR-5, catalyzed vinyl lacquer, **as directed**.
 - c. WIC Finish System: 2, water-reducible acrylic lacquer **OR** 3b., catalyzed vinyl lacquer **OR** 4, conversion varnish **OR** 6, penetrating oil, **as directed**.
 - d. Staining: None required **OR** Match approved sample for color **OR** Match the Owner's sample, **as directed**.
 - e. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.

- f. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 - g. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
 - 1) Apply wash-coat sealer after staining and before filling.
 - h. Sheen: Flat, 15-30 **OR** Satin, 31-45 **OR** Semigloss, 46-60 **OR** Gloss, 61-100, **as directed**, gloss units measured on 60-degree gloss meter per ASTM D 523.
6. Opaque Finish: Comply with requirements indicated below for grade, finish system, color, effect, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523.
- a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. AWI Finish System: OP-4, conversion varnish **OR** OP-5, catalyzed vinyl, **as directed**.
 - c. WIC Finish System: 3b., catalyzed vinyl lacquer **OR** 4, conversion varnish **OR** 7a., synthetic enamel, **as directed**.
 - d. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - e. Sheen: Flat, 10-25 **OR** Satin, 30-50 **OR** Semigloss, 55-75 **OR** Gloss, 80-100, **as directed**, gloss units.

1.3 EXECUTION

A. Preparation

- 1. Before installation, condition paneling to average prevailing humidity conditions in installation areas.
- 2. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

B. Installation

- 1. Grade: Install paneling to comply with requirements for same grade specified in Part 1.2 for fabrication of type of paneling involved.
- 2. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**. Install with no more than **1/16 inch in 96-inch (1.6 mm in 2400-mm)** vertical cup or bow and **1/8 inch in 96-inch (3 mm in 2400-mm)** horizontal variation from a true plane.
 - a. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding **1/32 inch (0.8 mm) OR 1/16 inch (1.5 mm), as directed**.
- 3. Scribe and cut paneling to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- 4. Anchor paneling to supporting substrate with concealed panel-hanger clips **OR** splined connection strips **OR** blind nailing, **as directed**. Do not use face fastening unless covered by trim **OR** otherwise indicated, **as directed**.
- 5. Complete finishing work specified in this Section to extent not completed at shop or before installation of paneling. Fill nail holes with matching filler where exposed. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.
- 6. Refer to Division 07 for final finishing of installed paneling.

C. Adjusting And Cleaning

- 1. Repair damaged and defective paneling, where possible, to eliminate functional and visual defects; where not possible to repair, replace paneling. Adjust for uniform appearance.
- 2. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 25 16 00

SECTION 06 41 13 00 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1 SUMMARY

A. Section Includes:

1. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
2. Shop finishing of architectural wood cabinets.

2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products cabinet hardware and accessories and finishing materials and processes.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

C. Samples:

1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
3. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
4. Exposed cabinet hardware and accessories, one unit for each type and finish.

3 INFORMATIONAL SUBMITTALS

A. Woodwork Quality Standard Compliance Certificates: WI Certified Compliance Program certificates.

4 QUALITY ASSURANCE

A. Fabricator Qualifications: Licensee of WI's Certified Compliance Program.

B. Installer Qualifications: Licensee of WI's Certified Compliance Program.

PART 2 - PRODUCTS

1 ARCHITECTURAL WOOD CABINETS, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide labels and certificates from WI certification program indicating that woodwork, including installation, complies with requirements of grades specified.

2 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Grade: Custom.
- B. Type of Construction: Frameless.
- C. Cabinet and Door and Drawer Front Interface Style: Flush overlay.
 - 1. Door Name: "Bronco" by Decorative Specialties. Solid maple frame with 1/4" plywood center panel.
 - 2. Drawer Front: Solid maple slab with same edge detail as door.
 - 3. Provide rubber stops at ends and backs of doors.
 - 4. The reveal dimension shall be consistent across the cabinet elevation. The doors and drawer faces shall align.
- D. Wood for Exposed Surfaces: As indicated.
 - 1. Species: Maple.
 - 2. Cut: Plain sliced/plain sawn.
 - 3. Grain Direction: Vertically for drawer fronts, doors, and fixed panels As indicated.
 - 4. Matching of Veneer Leaves: match.
 - 5. Veneer Matching within Panel Face: Running match.
- E. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
 - 2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces.
 - 3. Drawer Bottoms: Hardwood plywood.
 - 4. Provide rubber stops at ends and backs of doors.
- F. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.
- G. No particle board or MDF is to be used.

3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Wood Moisture Content: 5 to 10 percent.
- B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
 - 1. Composite Wood and Agrifiber Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 2. Softwood Plywood: DOC PS 1, medium-density overlay.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.

4. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
- 4 CABINET HARDWARE AND ACCESSORIES
- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets .
 - B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.
 - C. Back-Mounted Pulls: BHMA A156.9, B02011.
 - D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
 - E. Catches: Magnetic catches, BHMA A156.9, B03141.
 - F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
 - G. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
 - H. Drawer Slides: BHMA A156.9.
 1. Grade 1HD-100 and Grade 1HD-200: Side mounted; full-extension type; zinc-plated-steel ball-bearing slides.
 2. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
 3. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
 - I. Door and Drawer Silencers: BHMA A156.16, L03011.
 - J. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
 2. Satin Stainless Steel: BHMA 630.
- 5 MISCELLANEOUS MATERIALS
- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
 - B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
 - C. Adhesives: Do not use adhesives that contain urea formaldehyde.
 - D. Adhesives: Use adhesives that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

6 FABRICATION

- A. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

7 SHOP FINISHING

- A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Finish Materials: Use finish materials that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

PART 3 - EXECUTION

1 PREPARATION

- A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
- E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
 2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
- F. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

END OF SECTION 06 41 13 00

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Task	Specification	Specification Description
06 41 13 00	01 95 06 00b	Interior Architectural Woodwork
06 41 93 00	06 01 40 91	Door Hardware
06 42 13 00	06 25 16 00	Paneling
06 42 16 00	06 25 16 00	Paneling

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SECTION 06 42 19 00 - PLASTIC PANELING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for plastic paneling. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes glass-fiber reinforced plastic (FRP) wall paneling and trim accessories.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content and chemical components.
 - b. Product Data for Credit EQ 4.4: For laminating adhesive and composite wood products used in factory-laminated plastic panels, indicating that product contains no urea formaldehyde.
3. Samples: For plastic paneling and trim accessories.

D. Quality Assurance

1. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 **OR** 200, **as directed**, or less.
 - b. Smoke-Developed Index: 450 or less.
 - c. Testing Agency: Acceptable to authorities having jurisdiction **OR** FM Approvals **OR** UL, **as directed**.

1.2 PRODUCTS

A. Plastic Sheet Paneling

1. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319.
 - a. Nominal Thickness: Not less than **0.075 inch (1.9 mm) OR 0.09 inch (2.3 mm) OR 0.12 inch (3.0 mm), as directed**.
 - b. Surface Finish: Smooth **OR** Molded pebble texture **OR** Smooth surface with filled grooves at **4 inches (102 mm)** o.c. to resemble tile **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - c. Color: White **OR** As selected by the Owner from manufacturer's full range, **as directed**.

B. Factory-Laminated Plastic Panels

1. General: Gelcoat-finished, glass-fiber reinforced plastic panels complying with ASTM D 5319, laminated to plywood **OR** oriented strand board **OR** fire-retardant particleboard **OR** gypsum board **OR** high-impact gypsum board **OR** moisture- and mold-resistant gypsum board, **as directed**.
 - a. Glass-Fiber Reinforced Plastic Panel Nominal Thickness: Not less than **0.03 inch (0.76 mm) OR 0.05 inch (1.3 mm) OR 0.075 inch (1.9 mm) OR 0.09 inch (2.3 mm), as directed**.
 - b. Surface Finish: Smooth **OR** Molded pebble texture **OR** Smooth surface with filled grooves at **4 inches (102 mm)** o.c. to resemble tile **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - c. Color: White **OR** As selected by the Owner from manufacturer's full range, **as directed**.

- d. Plywood: DOC PS 1, Exterior B-C, **1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm) OR 5/8 inch (15.9 mm) OR 3/4 inch (19.1 mm)**, **as directed**, thick.
- e. Oriented Strand Board: DOC PS 2, **1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm) OR 3/4 inch (19.1 mm)**, **as directed**, thick.
- f. Fire-Retardant Particleboard: Product complying with ANSI A208.1, Grade M-S, except for modulus of rupture; with flame-spread index of 25 or less per ASTM E 84; and **3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm)**, **as directed**, thick.
- g. Gypsum Board: ASTM C 1396/C 1396M, Regular, **1/2 inch (12.7 mm) OR Type X, 5/8 inch (15.9 mm)**, **as directed**.
- h. High-Impact Gypsum Board: ASTM C 1396/C 1396M, **5/8 inch (15.9 mm)**, with Type X core, and **0.010-inch (0.254-mm) OR 0.020-inch (0.508-mm) OR 0.030-inch (0.762-mm) OR 0.081-inch (2.057-mm)**, **as directed**, plastic film laminated to back side for greater resistance to through penetration (impact resistance).
- i. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M or ASTM C 1178/C 1178M, **5/8 inch (15.9 mm)**, Type X, with moisture- and mold-resistant core and surfaces.
- j. Laminating Adhesive: Manufacturers standard adhesive that does not contain urea formaldehyde.

C. Accessories

- 1. Trim Accessories: Manufacturer's standard one-piece **OR** two-piece, snap-on, **as directed**, vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - a. Color: White **OR** Match panels **OR** As selected by the Owner from manufacturer's full range, **as directed**.
- 2. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- 3. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- 4. Adhesive: As recommended by plastic paneling manufacturer.
 - a. VOC Content: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 5. Sealant: Single-component, mildew-resistant, neutral-curing silicone **OR** Single-component, mildew-resistant, acid-curing silicone **OR** Latex, **as directed**, sealant recommended by plastic paneling manufacturer and complying with requirements in Division 07 Section "Joint Sealants".
 - a. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.3 EXECUTION

A. Preparation

- 1. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
- 2. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- 3. Clean substrates of substances that could impair bond of adhesive, including oil, grease, dirt, and dust.
- 4. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- 5. Lay out paneling before installing. Locate panel joints where indicated **OR** to provide equal panels at ends of walls not less than half the width of full panels **OR** so that trimmed panels at corners are not less than **12 inches (300 mm)** wide, **as directed**.
 - a. Mark plumb lines on substrate at trim accessory **OR** panel joint, **as directed**, locations for accurate installation.

- b. Locate trim accessories **OR** panel joints, **as directed**, to allow clearance at panel edges according to manufacturer's written instructions.

B. Installation

1. Install plastic paneling according to manufacturer's written instructions.
OR
Install panels in a full spread of adhesive.
OR
Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.
 - a. Drill oversized fastener holes in panels and center fasteners in holes.
 - b. Apply sealant to fastener holes before installing fasteners.
2. Install factory-laminated panels using concealed mounting splines in panel joints.
3. Install trim accessories with adhesive and nails or staples. Do not fasten through panels.
4. Fill grooves in trim accessories with sealant before installing panels and bed inside corner trim in a bead of sealant.
5. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
6. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
7. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06 42 19 00

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Task	Specification	Specification Description
06 42 19 00	06 25 16 00	Paneling
06 43 16 00	01 95 06 00b	Interior Architectural Woodwork
06 44 39 00	01 95 06 00b	Interior Architectural Woodwork
06 46 13 00	06 10 00 00a	Miscellaneous Carpentry
06 46 13 00	01 95 06 00	Exterior Finish Carpentry
06 46 13 00	01 95 06 00a	Interior Finish Carpentry
06 46 19 00	01 22 16 00	No Specification Required
06 46 19 00	06 10 00 00a	Miscellaneous Carpentry
06 46 19 00	01 95 06 00	Exterior Finish Carpentry
06 46 19 00	01 95 06 00a	Interior Finish Carpentry
06 46 19 00	01 95 06 00b	Interior Architectural Woodwork
06 46 23 00	01 95 06 00b	Interior Architectural Woodwork
06 46 26 00	01 95 06 00b	Interior Architectural Woodwork
06 46 29 00	01 95 99 92f	Exterior Architectural Woodwork
06 46 29 00	01 95 06 00b	Interior Architectural Woodwork
06 46 36 00	01 95 06 00b	Interior Architectural Woodwork
06 48 13 00	08 14 00 00	Wood Doors
06 48 16 00	08 14 00 00	Wood Doors

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SECTION 06 51 13 00 - STRUCTURAL PLASTIC LUMBER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of structural plastic lumber. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Basic Uses

1. Structural plastic lumber products are used in a variety of commercial and marine applications and are often the product of choice for exterior applications where resistance to salt and fresh water, marine borers, and other environmentally harsh conditions is required. Due to the unique composition of structural plastic lumber, the product can be used for a number of structural members in commercial and shoreline timberwork.
2. It is well suited for:
 - a. Dock and deck planks
 - b. Wale timbers
 - c. Sheet piling
 - d. Camels
 - e. Pilings
 - f. Fenders
 - g. Channel markers
 - h. Posts, beams, and joists

C. Submittals

1. Product Data and Certificates: For each product indicated.
 - a. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
2. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.
 - a. Show details full size.
 - b. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
 - c. Apply WI Certified Compliance Program label to first page of Shop Drawings.
3. Samples for initial selection for high-pressure decorative laminates.
4. Samples for verification for plastic laminates, **8 by 10 inches (200 by 250 mm) OR 12 by 12 inches (300 by 300 mm), as directed**, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
5. Qualification Data: For Installer **OR** Fabricator, **as directed**.
6. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates **OR** WI Certified Compliance Program certificates, **as directed**.
7. Evaluation Reports: For fire-retardant-treated materials from ICC-ES.

D. Limitations

1. This type of plastic lumber product has a significantly higher modulus of elasticity (MOE) than conventional forms of plastic lumber. However, the MOE of structural plastic lumber is lower than wood timber in good condition; therefore, it is important to evaluate the suitability of this product for specific uses. It is recommended that an engineering study be performed prior to use of structural plastic lumber products for structural applications. Building code regulations vary by region, so all users should consult local building and safety codes prior to installation for specific requirements.

- E. Quality Assurance
 - 1. Structural plastic lumber shall meet applicable standards established by ASTM for recycled plastic lumber and hygrothermal testing.
 - 2. Plastic lumber shall meet flammability standards established by ASTM.

1.2 PRODUCTS

- A. Materials
 - 1. Structural plastic lumber shall be a high-performance construction material consisting of a patented formula of recycled plastic, fiberglass, and selected additives. The plastic raw material utilized in structural plastic lumber is derived from post-consumer bottle waste such as milk and detergent bottles. This material is compounded into a consistent, reinforced plastic timber product using reactive compatibilizers, creating a strong and stable plastic/fiber matrix.
 - 2. Colors, sizes, and shapes of structural plastic lumber shall be selected from manufacturer's standard.

1.3 EXECUTION

- A. Installation
 - 1. Structural plastic lumber can be fabricated and installed with the same tools used to work wood lumber. The product will cut and drill very cleanly, as there is no grain to split or chip, or knots to bind tools and bend fasteners. It is reinforced with glass fibers, and precautions should be taken when fabricating this product. Maintain adequate ventilation when generating fabrication dust, and personal respiratory protection such as dust masks should be employed during fabrication, as well as safety glasses or goggles.
 - 2. Pilings and sheet piling products can be driven with piledriving equipment such as vibratory hammers, land-based or barge-mounted drop hammers, or waterjets. For sheet piling installations, backfill soils should always be analyzed to determine that the proper amount of force would be exerted on the sheet piling system. For shoreline timberwork applications, structural plastic lumber is used with conventional hardware such as stainless or galvanized bolts, tie rods, nuts, washers, and anchor systems.
 - 3. When utilizing structural plastic lumber products for decking, pay careful attention to joist spacing and joist spans. Consult manufacturer for allowable live loads, deflection limits, joist spacing, and joist spans.
- B. Maintenance
 - 1. Structural plastic lumber products are unaffected by most corrosive substances and will not absorb moisture. To maintain the original finish, clean the lumber with soap and water. No sealing or painting is required; as a general rule, paint will not adhere well to these products.
 - 2. Clean graffiti from the plastic lumber with the use of a conventional all-purpose cleaner or petroleum-based cleaner. If the skin or surface layer of plastic lumber becomes marred or blemished, sand off the top skin. The surface can also be buffed to eliminate abrasions.

END OF SECTION 06 51 13 00

SECTION 06 51 13 00a - PLASTIC LUMBER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of plastic lumber. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Basic Uses

1. For both residential and municipal applications, high-density polyethylene (HDPE) products are well suited for decking, porch flooring, docks, piers, furnishings, fencing, and lawn and garden items. HDPE products are cost-effective alternatives for ground contact and animal contact, wet, and environmentally harsh conditions.

C. Submittals

1. Product Data and Certificates: For each product indicated.
 - a. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
2. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.
 - a. Show details full size.
 - b. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
 - c. Apply WI Certified Compliance Program label to first page of Shop Drawings.
3. Samples for initial selection for high-pressure decorative laminates.
4. Samples for verification for plastic laminates, **8 by 10 inches (200 by 250 mm) OR 12 by 12 inches (300 by 300 mm), as directed**, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
5. Qualification Data: For Installer **OR** Fabricator, **as directed**.
6. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates **OR** WI Certified Compliance Program certificates, **as directed**.
7. Evaluation Reports: For fire-retardant-treated materials from ICC-ES.

D. Limitations

1. Plastic lumber has less rigidity (modulus of elasticity) and greater elongation than wood lumber. Therefore, it is not recommended for use as a true structural member. Examples of applications that are inappropriate would be load-bearing walls, deck framing, and floor joists. It is recommended that an engineering study be performed prior to use of HDPE products if the application involves structural requirements. For commercial applications where the system design calls for concentrated loads, structural plastic lumber should be considered.
2. When utilizing HDPE products for decking or flooring, pay careful attention to joist spacing and joist spans. Consult manufacturer for allowable live loads, deflection limits, joist spacing, and joist spans.

E. Quality Assurance

1. Plastic lumber shall meet applicable standards established by ASTM for recycled plastic lumber and hygrothermal testing.
2. Plastic lumber shall pass testing by UL and meet flammability standards established by ASTM.

1.2 PRODUCTS

A. Materials

1. High-density polyethylene (HDPE), UV-inhibited pigment systems, foaming compounds, and selected process additives, shall be derived from post-consumer bottle waste, such as milk and detergent bottles, then compounded into a rigid board stock material, with the resulting finished product containing minimum 75% recycled plastic by weight.
2. Plastic lumber shall have exceptional resistance to corrosive substances, oil and fuels, insects, fungi, salt spray, and other environmental stresses. They shall not absorb moisture; nor shall they rot, splinter, or crack.
3. HDPE products shall be manufactured in standard dimensional lumber sizes, and shapes.
4. Color of plastic lumber shall be selected from manufacturer's standard colors.

1.3 EXECUTION

A. Installation

1. HDPE products shall have the capability of being fabricated and installed with the same tools used to work wood lumber. The product shall cut and drill very cleanly, as there is no grain to split or chip. It shall not be necessary to pre-drill the plastic lumber when fastening. Stainless steel or coated decking nails and screws are recommended for use with HDPE products. Screws offer the best form of attachment; however, nails and staples may also be utilized in some applications.
2. The use of full length boards is suggested to avoid unattractive butt-to-butt joints.
3. HDPE products offer multiple deck board attachment options to accommodate expansion and contraction concerns in different climatic conditions and to address specific installation parameters. These options include:
 - a. Tongue and groove deck board attachment with toe screwing options.
 - b. Direct screw attachment with feature strip options.
 - c. Floating attachment with clip options.
 - d. Floating attachment with groove & groove options.

B. Maintenance

1. HDPE products are unaffected by most corrosive substances and will not absorb moisture. To maintain the original finish, clean the lumber with soap and water. No sealing or painting is required; as a general rule, paint will not adhere to HDPE products.
2. Clean graffiti from the plastic lumber with the use of a conventional all-purpose cleaner or petroleum-based cleaner.
3. If the skin or surface layer of an HDPE product becomes marred or blemished, sand off the top skin. The surface can also be buffed to eliminate abrasions.

END OF SECTION 06 51 13 00a

SECTION 06 51 13 00b - COMPOSITE PLASTIC LUMBER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of composite plastic lumber. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Basic Uses

1. Composite plastic lumber or boards are well designed for deck, porch, boardwalk, dock, and similar applications. These boards may also be used for many lumber applications, where a non-load bearing member is required. This material is particularly well suited for outdoor uses due to its durability characteristics. Composite boards have many beneficial properties for decking applications, including:
 - a. Low moisture absorption.
 - b. No rotting, splitting or splintering.
 - c. Inherent termite and UV resistance.
 - d. Excellent dimensional stability and wet/dry traction.
 - e. No toxic compounds (CCA) to leach into soil or groundwater.
 - f. Workability and appearance of natural lumber products.

C. Submittals

1. Product Data and Certificates: For each product indicated.
 - a. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.
2. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.
 - a. Show details full size.
 - b. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
 - c. Apply WI Certified Compliance Program label to first page of Shop Drawings.
3. Samples for initial selection for high-pressure decorative laminates.
4. Samples for verification for plastic laminates, **8 by 10 inches (200 by 250 mm) OR 12 by 12 inches (300 by 300 mm), as directed**, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
5. Qualification Data: For Installer **OR** Fabricator, **as directed**.
6. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates **OR** WI Certified Compliance Program certificates, **as directed**.
7. Evaluation Reports: For fire-retardant-treated materials from ICC-ES.

D. Limitations

1. Composite plastic lumber has less rigidity (modulus of elasticity) than wood lumber and is more flexible. Therefore, this material should not be employed as a structural component unless an engineering study indicates that its use is appropriate. These boards are not intended to be used as joists, beams, studs, columns or stringers.
2. When utilizing composite plastic lumber products for decking, pay careful attention to joist spacing and joist spans. Consult manufacturer for allowable live loads, deflection limits, joist spacing, and joist spans.

E. Quality Assurance

1. Composite plastic lumber shall meet applicable standards established by ASTM for recycled plastic lumber.

2. Plastic lumber shall meet flammability standards established by ASTM.

F. Handling

1. This material is more flexible and more dense than wood, which should be considered when handling boards.
2. Storing boards on uneven or unsupported surfaces may lead to deformation of the material. Therefore, always store boards on a flat surface, or support with dunnage on centers of 24" or less.

1.2 PRODUCTS

A. Materials

1. Composite plastic lumber products shall be composed of approximately 65% recycled wood/natural fiber and 35% recycled plastic, with selected process additives. The plastic raw material utilized in this product is recycled plastic. It shall be processed to a uniform feedstock, compounded with recovered fibers and extruded into a rigid board product.
2. Colors and sizes of composite plastic lumber shall be selected from manufacturer's standard.

1.3 EXECUTION

A. Installation

1. Composite plastic lumber products shall have the capability of being fabricated and installed with the same tools used to work wood lumber. The product shall cut and drill very cleanly, as there is no grain to split or chip. For best results, use carbide-tipped blades and bits.
2. For optimum water drainage, allow a gap of 3/16" to 1/4" between boards.
3. Both nails and screws may be used to attach USPL composite boards; stainless steel or coated screw type fasteners are recommended.
4. #8, 2 1/2" stainless steel or ceramic-coated deck screws are recommended for 5/4x6 boards, and #10, 3" stainless steel or ceramic-coated deck screws are recommended for 2x6 boards for best results.
5. In cold weather, consider pre-drilling screw holes. Do not use fasteners within 3/4" of the edge of a board. Pneumatic nail guns work with this material.

B. Maintenance

1. Composite boards will weather to a lighter hue during the first few months; fading may take much longer in shaded areas.
2. To clean dirt and most stains from the deck boards, use common deck cleaners available in hardware stores, home centers and lumberyards. Oil stains from grills and foods may require the use of a degreasing cleaner or light sanding to remove the stain. Mold and mildew are common on many exterior surfaces, and they may form on composite plastic lumber. Use common deck washes that contain sodium hypochlorite for best cleaning results.

END OF SECTION 06 51 13 00b



06 - Wood, Plastics, and Composites

Task	Specification	Specification Description
06 65 00 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 06 74 13 00 - PULTRUDED FIBERGLASS INDUSTRIAL GRATING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for pultruded fiberglass industrial grating. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop drawings of all fabricated gratings and accessories in accordance with the provisions of this Section.
2. Manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication of and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.
3. Manufacturer's published literature including structural design data, structural properties data, grating load/deflection tables, corrosion resistance tables, certificates of compliance, test reports as applicable, concrete anchor systems and their allowable load tables, and design calculations for systems not sized or designed in the contract documents.
4. Sample pieces of each item specified herein for acceptance as to quality and color. Sample pieces shall be manufactured by the method to be used in the work.

C. Quality Assurance

1. All items to be provided under this Section shall be furnished only by manufacturers having experience in the design and manufacture of similar products and systems. If requested, experience shall be demonstrated by a record of at least five (5) previous, separate, similar successful installations in the last five (5) years.

D. Product Delivery And Storage

1. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
2. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

1.2 PRODUCTS

A. General

1. All FRP items furnished under this Section shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified or required.
2. Fiberglass reinforcement shall be a combination of continuous roving, continuous strand mat, and surfacing veil in sufficient quantities as needed by the application and/or physical properties required.
3. Resins shall be vinyl ester or isophthalic with chemical formulations as necessary to provide the corrosion resistance, strength and other physical properties as required.

4. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
5. All pultruded structural shapes shall be further protected from ultraviolet (UV) light with 1) integral UV inhibitors in the resin and 2) a synthetic surfacing veil to help produce a resin rich surface.
6. All FRP products shall have a tested flame spread rating of 15 or less per ASTM E-84 Tunnel Test. Gratings shall also have a tested burn time of less than 30 seconds and an extent of burn rate of less than or equal to 10 millimeters per ASTM D-635.
7. All grating clips shall be manufactured of Type 316SS (stainless steel).

B. Pultruded Grating

1. Manufacture: Grating components shall be high strength and high stiffness pultruded elements having a maximum of 70% and a minimum of 60% glass content (by weight) of continuous roving and continuous strand mat fiberglass reinforcements. The finished surface of the product shall be provided with a surfacing veil to provide a resin rich surface which improves corrosion resistance and resistance to ultraviolet degradation. Bearing bars shall be interlocked and epoxied in place with a two piece cross rod system to provide a mechanical and chemical lock.
2. Non-slip surfacing: Grating shall be provided with a quartz grit bonded and baked to the top surface of the finished grating product.
3. Fire rating: Grating shall be fire retardant with a tested flame spread rating of 15 or less when tested in accordance with ASTM E 84. Manufacturer may be required to provide certification of ASTM E84 test on grating panels from an independent testing laboratory. Certification shall be dated within the past two years. Test data shall be from full scale testing of actual production grating, of the same type and material supplied on the project. Test data performed only on the base resin shall not be acceptable.
4. Resin system: The resin system used in the manufacture of the grating shall be VEFR, vinyl ester or ISOFR, isophthalic. Manufacturer may be required to submit corrosion data from tests performed on actual grating products in standard chemical environments. Corrosion resistance data of the base resin from the manufacturer is not a true indicator of grating corrosion resistance and shall not be accepted.
5. Color: Gray or Yellow.
6. Depth: 2" deep load bars with a tolerance of plus or minus 1/32".
7. Mesh Configuration: 2" load bar spacing, 6" tie bar spacing on centers.
8. Load/Deflection: Grating shall meet manufacturer's published safe recommended loadings with deflection not to exceed the following:
 - a. Uniform distributed load over a 66" span: 50 pounds per square foot, with a maximum deflection of 0.13".
9. Substitutions: Other products of equal strength, stiffness, corrosion resistance and overall quality may be submitted with the proper supporting data to the engineer for approval.

C. Grating Fabrication

1. Measurements: Grating supplied shall meet the minimum dimensional requirements as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by grating manufacturer to complete the work.
 - a. Determine correct size and locations of required holes or cutouts from field dimensions before grating fabrication.
2. Layout: Each grating section shall be readily removable, except where indicated on drawings. Manufacturer to provide openings and holes where located on the contract drawings. Grating supports shall be provided at openings in the grating by contractor where necessary to meet load/deflection requirements specified herein. Grating openings which fit around protrusions (pipes, cables, machinery, etc.) shall be discontinuous at approximately the centerline of opening so each section of grating is readily removable. Gratings shall be fabricated free from warps, twists, or other defects which affect appearance and serviceability.

3. Sealing: All shop fabricated grating cuts shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated grating cuts shall be coated similarly by the contractor in accordance with the manufacturer's instructions.
4. Hardware: Type 316 stainless steel hold-down clips shall be provided and spaced at a maximum of four feet apart with a minimum of four per piece of grating, or as recommended by the manufacturer.

1.3 EXECUTION

A. Inspection

1. Shop inspection is authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided.
2. The grating shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits.

B. Installation

1. Contractor shall install gratings in accordance with manufacturer's assembly drawings. Lock grating panels securely in place with hold-down fasteners as specified herein. Field cut and drill fiberglass reinforced plastic products with carbide or diamond tipped bits and blades. Seal cut or drilled surfaces in accordance with manufacturer's instructions. Follow manufacturer's instructions when cutting or drilling fiberglass products or using resin products; provide adequate ventilation.

END OF SECTION 06 74 13 00

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06 - Wood, Plastics, and Composites

Task	Specification	Specification Description
06 74 13 00	05 53 13 00	Gratings

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SECTION 06 82 00 00 - PULTRUDED FIBERGLASS STRUCTURAL SHAPES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of pultruded fiberglass structural shapes. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop drawings of all fabricated structural systems and accessories.
2. Manufacturer's shop drawings clearly showing material sizes, types, styles, part or catalog numbers, complete details for the fabrication of and erection of components including, but not limited to, location, lengths, type and sizes of fasteners, clip angles, member sizes, and connection details.
3. Manufacturer's published literature including structural design data, structural properties data, corrosion resistance tables, certificates of compliance, test reports as applicable, and design calculations for systems not sized or designed in the contract documents, sealed by a Professional Engineer.
4. Sample pieces of each item specified herein for acceptance as to quality and color. Sample pieces shall be manufactured by the method to be used in the work.

C. Quality Assurance

1. All items to be provided under this Section shall be furnished only by manufacturers having experience in the design and manufacture of similar products and systems. If requested, experience shall be demonstrated by a record of at least five (5) previous, separate, similar successful installations in the last five (5) years.

D. Product Delivery and Storage

1. Delivery of Materials: Manufactured materials shall be delivered in original, unbroken pallets, packages, containers, or bundles bearing the label of the manufacturer. Adhesives, resins and their catalysts and hardeners shall be crated or boxed separately and noted as such to facilitate their movement to a dry indoor storage facility.
2. Storage of Products: All materials shall be carefully handled to prevent them from abrasion, cracking, chipping, twisting, other deformations, and other types of damage. Store items in an enclosed area and free from contact with soil and water. Store adhesives, resins and their catalysts and hardeners in dry indoor storage facilities between 70 and 85 degrees Fahrenheit (21 to 29 degrees Celsius) until they are required.

1.2 PRODUCTS

A. Materials

1. All structural shapes shall be manufactured by the pultrusion process with a glass content minimum of 45%, maximum of 55% by weight for maximum sunlight and chemical resistance. The structural shapes shall be composed of fiberglass reinforcement and resin in qualities, quantities, properties, arrangements and dimensions as necessary to meet the design requirements and dimensions as specified in the Contract Documents.
2. Fiberglass reinforcement shall be a combination of continuous roving, continuous strand mat, and surfacing veil in sufficient quantities as needed by the application and/or physical properties required.
3. Resins shall be ISO, non-fire retardant isophthalic polyester; ISOFR, fire retardant isophthalic polyester or VEFR, vinyl ester, with chemical formulation necessary to provide the corrosion resistance, strength and other physical properties as required.

4. All finished surfaces of FRP items and fabrications shall be smooth, resin-rich, free of voids and without dry spots, cracks, crazes or unreinforced areas. All glass fibers shall be well covered with resin to protect against their exposure due to wear or weathering.
5. All pultruded structural shapes shall be further protected from ultraviolet (UV) attack with 1) integral UV inhibitors in the resin and 2) a synthetic surfacing veil to help produce a resin rich surface.
6. All FRP products shall have a tested flame spread rating of 25 or less per ASTM E-84 Tunnel Test.

B. Pultruded structural shapes shall have the minimum longitudinal mechanical properties listed below:

Property	ASTM Method	Value	Units
Tensile Strength	D-638	30,000 (206)	psi (MPa)
Tensile Modulus	D-638	2.5 x 10 ⁶ (17.2)	psi (GPa)
Flexural Strength	D-790	30,000 (206)	psi (MPa)
Flexural Modulus	D-790	1.8 x 10 ⁶ (12.4)	psi (GPa)
Flexural Modulus (Full Section)	N/A	2.8 x 10 ⁶ (19.3)	psi (GPa)
Short Beam Shear (Transverse)	D-2344	4,500 (31)	psi (MPa)
Shear Modulus (Transverse)	N/A	4.5 x 10 ⁵ (3.1)	psi (GPa)
Coefficient of Thermal Expansion	D-696	8.0 x 10 ⁻⁶ (1.4 x 10 ⁻⁶)	in/in/°F (cm/cm/°C)
Flame Spread	E-84	25 or less	N/A

1.3 EXECUTION

A. Fabrication

1. Measurements: Structural Shapes supplied shall meet the minimum dimensional requirements as shown or specified. The Contractor shall provide and/or verify measurements in field for work fabricated to fit field conditions as required by manufacturer to complete the work. Determine correct size and locations of required holes or coping from field dimensions before structural shape fabrication.
2. Sealing: All shop fabricated cuts or drilling shall be coated with vinyl ester resin to provide maximum corrosion resistance. All field fabricated cuts or drilling shall be coated similarly by the contractor in accordance with the manufacturer's instructions.
3. Hardware: Type 316 stainless steel connection hardware shall be provided.

B. Inspection

1. Shop inspection shall be authorized as required by the Owner and shall be at Owner's expense. The fabricator shall give ample notice to Contractor prior to the beginning of any fabrication work so that inspection may be provided.
2. The structural shapes shall be as free, as commercially possible, from visual defects such as foreign inclusions, delamination, blisters, resin burns, air bubbles and pits.

END OF SECTION 06 82 00 00

SECTION 07 05 13 00 - BUILT-UP COAL-TAR ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for built-up coal-tar roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Built-up coal-tar roofing.
 - b. Vapor retarder.
 - c. Roof insulation.
2. Section includes the installation of insulation strips in ribs of acoustical roof deck. Insulation strips are furnished under Division 05 Section "Steel Decking".

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to built-up roofing.
2. Bitumen: A generic term for either asphalt or coal-tar pitch.
3. Hot Coal-Tar Pitch: Coal-tar pitch heated to its equiviscous temperature, the temperature at which its viscosity is 25 centipoise for either mopping or mechanical application, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.
4. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.

D. Performance Requirements

1. General Performance: Installed built-up roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Built-up roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by built-up roofing manufacturer based on testing and field experience.
3. Roofing System Design (if built-up roofing system is to be designed to withstand uplift pressure established by ASCE/SEI 7): Provide built-up roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - a. Corner Uplift Pressure: as directed by the Owner.
 - b. Perimeter Uplift Pressure: as directed by the Owner.
 - c. Field-of-Roof Uplift Pressure: as directed by the Owner.
4. FM Approvals Listing (if Project is FM Global insured or if FM Approvals requirements will set a minimum quality standard): Provide built-up roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a built-up roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120, **as directed**.
 - b. Hail Resistance Rating: MH **OR** SH, **as directed**.

5. Energy Performance (if required for LEED-NC Credit SS 7.2): Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
6. Energy Performance (for roofs that must comply with the DOE's ENERGY STAR requirements): Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
7. Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRR-1.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings: For built-up roofing. Include plans, elevations, sections, details, and attachments to other work.
 - a. Base flashings and built-up terminations.
 - b. Tapered insulation, including slopes.
 - c. Crickets, saddles, and tapered edge strips, including slopes.
 - d. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
4. Samples: For the following products:
 - a. Built-up roofing materials, including base sheet, ply sheet and flashing sheet, of color specified.
 - b. Roof insulation.
 - c. **3 lb (1.5 kg)** of aggregate surfacing material in gradation and color indicated.
 - d. Walkway pads.
 - e. Six insulation fasteners of each type, length, and finish.
5. Qualification Data: For qualified Installer and manufacturer.
6. Manufacturer Certificates: Signed by roofing manufacturer certifying that built-up roofing complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
7. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of built-up roofing.
8. Research/Evaluation Reports: For components of built-up roofing, from the ICC-ES **OR** other applicable model code organization, **as directed**.
9. Maintenance Data: For built-up roofing to include in maintenance manuals.
10. Warranties: Sample of special warranties.

F. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is UL listed **OR** FM Approvals approved, **as directed**, for built-up roofing identical to that used for this Project.
2. Installer Qualifications (if Project is FM Global insured and if a certified roofing installer is required): A qualified firm that is approved, authorized, or licensed by built-up roofing manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
3. Source Limitations (if required to comply with FM Approvals, UL, or another building code, or to comply with provisions of manufacturer's special warranty): Obtain components including roof insulation and fasteners for built-up roofing from same manufacturer as built-up roofing or approved by built-up roofing manufacturer.
4. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical built-up roofing materials

by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

5. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
6. Preinstallation Roofing Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

H. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.

I. Warranty

1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of built-up roofing that fail in materials or workmanship within specified warranty period.
 - a. Special warranty includes built-up roofing membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, roof pavers, and other components of built-up roofing.
 - b. Warranty Period: 10 **OR** 15 **OR** 20 **OR** 25 **OR** 30, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Base-Sheet Materials

1. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
2. Base Sheet: ASTM D 4601, Type I **OR** II, **as directed**, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.
OR
Base Sheet: ASTM D 4897, Type II, venting, nonperforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface.
OR
Base Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

B. Roofing Membrane Plies

1. Ply Sheet: ASTM D 227, coal-tar-saturated organic felt.
OR

Ply Sheet: ASTM D 4990, Type I, coal-tar-impregnated, glass-fiber felt and the physical properties of ASTM D 2178, Type IV **OR** VI, **as directed**.

C. Base Flashing Sheet Materials

1. Backer Sheet: ASTM D 2178, Type IV, asphalt-impregnated, glass-fiber felt.
OR
Backer Sheet: Roofing manufacturer's standard spun-bonded, nonwoven, polyester-reinforced fabric, of standard color and weight, suitable for application method specified.
2. Granule-Surfaced Flashing Sheet: ASTM D 6164, Grade G, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granular surfaced base flashing; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
3. Polyester Flashing Sheet: Roofing manufacturer's standard asphalt-coated, polyester-reinforced fabric, base flashing, suitable for application method specified.
4. Fabric Termination: Roofing manufacturer's standard polyester cloth, suitable for application and for reinforcing top seal of base flashing.

D. Bitumen Materials

1. Asphalt Primer: ASTM D 41.
OR
Coal-Tar Primer: ASTM D 43.
2. Coal-Tar Pitch: ASTM D 450, Type I.
3. Roofing Asphalt: ASTM D 312, Type III **OR** IV **OR** III or IV as recommended by built-up roofing manufacturer for application, **as directed**.
OR
Roofing Asphalt: ASTM D 6152, SEBS modified.

E. Auxiliary Built-Up Roofing Materials

1. General: Auxiliary materials recommended by built-up roofing manufacturer for intended use and compatible with built-up roofing.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesives: 80 g/L.
 - 6) Other Adhesives: 250 g/L.
 - 7) Nonmembrane Roof Sealants: 300 g/L.
 - 8) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 9) Sealant Primers for Porous Substrates: 775 g/L.
2. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up base flashings.
3. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.
4. SBS-Modified Asphalt Flashing Cement: Roofing manufacturer's standard, asbestos free, of consistency required for application.
5. Coal-Tar Roofing Cement: ASTM D 5643, coal-tar-based roofing cement, asbestos free.
6. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening built-up roofing components

to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.

7. Metal Flashing Sheet: Metal flashing sheet is specified in Division 07 Section "Sheet Metal Flashing And Trim".
8. Metal Termination Bars: Roofing manufacturer's standard predrilled stainless-steel or aluminum bars, approximately **1 by 1/8 inch (25 by 3 mm)** thick; with anchors.
9. Roof Coatings: ASTM D 2824, Type I, nonfibered **OR** III, fibered, asbestos-free, **as directed**, aluminum-pigmented asphaltic coating.
OR
Roof Coatings: ASTM D 6083, acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces.
 - a. Color: White **OR** Gray **OR** Buff, **as directed**.
10. Aggregate Surfacing: ASTM D 1863, No. 6 or No. 67, clean, dry, opaque, water-worn gravel or crushed stone, free of sharp edges **OR** crushed slag, free of sharp edges, **as directed**.
11. Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition **OR** Polymer-modified, reconstituted solid-rubber, surface-textured, **as directed**, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to built-up roofing manufacturer, **3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, thick, minimum.
12. Miscellaneous Accessories: Provide miscellaneous accessories recommended by built-up roofing manufacturer.

F. Substrate Boards

1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR Type X, 5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick, seal coated.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

G. Vapor Retarder

1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
OR
Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
2. Laminated Sheet: Kraft paper/polyethylene laminate, two layers, reinforced with woven fiberglass yarn, laminated and edge reinforced, with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
3. Self-Adhering Sheet Vapor Retarder: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, polyethylene film laminated to layer of rubberized asphalt adhesive; maximum permeance rating of **0.1 perm (6 ng/Pa x s x sq. m)**; cold-applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
OR
Self-Adhering Sheet Vapor Retarder: **30- to 40-mil- (0.76- to 1.0-mm-)** thick, polyethylene film laminated to layer of butyl rubber adhesive; maximum permeance rating of **0.1 perm (6 ng/Pa x s**

x sq. m); cold-applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

4. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt impregnated.

H. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR** Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
3. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other surface.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass mat faced gypsum board facer, **1/4 inch (6 mm)** thick.
4. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
5. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
6. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
7. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/8 inch per 12 inches (1:96) OR 1/4 inch per 12 inches (1:48)**, **as directed**, unless otherwise indicated.
8. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

I. Insulation Accessories

1. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
4. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
5. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
6. Insulation Cant Strips: ASTM C 728, perlite insulation board.
OR
Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
7. Wood Nailer Strips: Comply with requirements in Division 6 Section "Rough Carpentry" **OR** "Miscellaneous Carpentry", **as directed**.
8. Tapered Edge Strips: ASTM C 728, perlite insulation board.
OR
Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
9. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR

Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.

OR

Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, as directed, thick, factory primed, as directed.

OR

Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, as directed, thick.

10. Substrate Joint Tape: **6- or 8-inch- (150- or 200-mm-)** wide, coated, glass fiber.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - a. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - b. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - c. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 5 Section "Steel Deck."
 - d. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of **1/16 inch (1.6 mm)** out of plane relative to adjoining deck.
 - e. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - f. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 1) Test for moisture by pouring **1 pint (0.5 L)** of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
 - g. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Prime surface of concrete deck with asphalt **OR** coal-tar, as directed, primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
4. Install insulation strips in ribs of acoustical roof decks according to acoustical roof deck manufacturer's written instructions.

C. Substrate Board Installation

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.

OR

 Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to built-up roofing manufacturers' written instructions.

D. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.
2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:
 - a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
3. Self-Adhering Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of **3-1/2 inches (90 mm)** and **6 inches (150 mm)**, respectively. Seal laps by rolling.
4. Built-up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
5. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into built-up roofing system.

E. Insulation Installation

1. Comply with built-up roofing manufacturer's written instructions for installing roof insulation.
2. Install one lapped base sheet course and mechanically fasten to substrate according to built-up roofing manufacturer's written instructions.
3. Nailer Strips: Mechanically fasten **4-inch nominal- (89-mm actual-)** width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck, spaced **16 feet (4.88 m)** apart for roof slopes greater than **1/4 inch per 12 inches (1:48) OR 1/2 inch per 12 inches (1:24)**, **as directed**.
4. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of built-up roofing with vertical surfaces or angle changes greater than 45 degrees.
5. Install tapered insulation under area of roofing to conform to slopes indicated.
6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
7. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite board insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
8. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
9. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
10. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR

Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

OR

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

11. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If number of fasteners will be based on ASCE/SEI 7's uplift pressure, fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
12. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If fastening is calculated from ASCE/SEI 7's uplift pressure, fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - c. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.

OR

Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

OR

Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

13. If cover boards will be field installed over roof insulation and immediately below built-up roofing, install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck, **as directed**. Tape joints if required by roofing manufacturer.
 - a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
- OR**
- b. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Apply hot roofing asphalt to underside and immediately bond cover board to substrate.

F. Built-Up Roofing Installation, General

1. If referencing NRCA's roof assembly identification matrix system, install roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
 - a. Install roofing system BU-3 **OR 4 OR 5, as directed**, -N **OR I OR C, as directed**, -A-A, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Roofing and Waterproofing Manual" and requirements in this Section.
2. For roofing that exceeds requirements of NRCA's roof assemblies, install built-up roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing" and as follows:
 - a. Deck Type: N (nailable) **OR I (insulated) OR C (concrete or nonnailable), as directed.**
 - b. Base Sheet: 1 **OR 1**, installed over sheathing paper, **as directed.**
 - c. Number of Organic Felt Ply Sheets: 2 **OR 3 OR 4, as directed.**
 - d. Number of Glass Fiber Ply Sheets: 1, top ply **OR 2 OR 3 OR 4, as directed.**
 - e. Surfacing Type: A (aggregate).

3. Start installation of built-up roofing in presence of manufacturer's technical personnel.
 4. Where roof slope exceeds **1/4 inch per 12 inches (1:48) OR 1/2 inch per 12 inches (1:24)**, **as directed**, install built-up roofing sheets parallel with slope.
 - a. Backnail built-up roofing sheets to nailer strips **OR** substrate, **as directed**, according to roofing manufacturer's written instructions.
 5. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
 6. Coordinate installation of built-up roofing so insulation and other components of built-up roofing not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - a. Provide tie-offs at end of each day's work to cover exposed built-up roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
 - b. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - c. Remove and discard temporary seals before beginning work on adjoining roofing.
 7. Bitumen Heating: Do not raise bitumen temperature above equiviscous temperature range more than one hour before time of application. Do not exceed bitumen manufacturer's recommended temperature limits during bitumen heating. Do not heat bitumen within **25 deg F (14 deg C)** of flash point. Discard bitumen maintained for more than 4 hours at a temperature exceeding **325 deg F (163 deg C)** for coal-tar pitch or finished blowing temperature for roofing asphalt, **as directed**.
 - a. Mopping Weights: For interply and other moppings, unless otherwise indicated, apply solid moppings of hot coal-tar pitch between ply sheets at a minimum rate of **20 lb/100 sq. ft. (1 kg/sq. m)**.
 8. SEBS-Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing manufacturer's written instructions.
 9. Substrate-Joint Penetrations: Prevent bitumen and adhesives from penetrating substrate joints, entering building, or damaging built-up roofing components or adjacent building construction.
- G. Roofing Membrane Installation
1. If sheathing paper is required over wood decks by built-up roofing manufacturer, loosely lay one course of sheathing paper, lapping edges and ends a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 2. Install lapped base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 - a. Mechanically fasten to substrate, for nailable substrate.
OR
Spot- or strip-mop to substrate with hot roofing asphalt.
OR
Adhere to substrate in a solid mopping of hot roofing asphalt **OR** uniform coating of cold-applied adhesive, **as directed**, for nonnailable or insulated substrates.
 3. Monolithic Membrane: Install two **OR** three **OR** four, **as directed**, ply sheets starting at low point of roofing system. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants. Embed each ply sheet in a solid mopping of hot coal-tar pitch to form a uniform membrane without ply sheets touching.
OR
Composite Membrane: Install two **OR** three **OR** four, **as directed**, organic felt ply sheets starting at low point of roofing system. Align organic felt ply sheets without stretching. Shingle side laps of organic felt ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water.
 - a. Install finish layer of one lapped coal-tar, glass-fiber ply sheet course over shingled organic felt ply sheets, starting at low point of built-up roofing. Offset laps from laps of preceding

- ply sheets and align coal-tar, glass-fiber ply sheet without stretching. Lap in direction to shed water.
- b. Extend ply sheets over and terminate beyond cants.
 - c. Embed each ply sheet in a solid mopping of hot coal-tar pitch applied at rate required by built-up roofing manufacturer, to form a uniform membrane without ply sheets touching.
4. If delayed flood coating and aggregate surfacing of coal-tar, glass-fiber membrane or finish layer are permitted, glaze-coat roofing membrane surface with hot coal-tar pitch applied at a rate of **10 to 15 lb/100 sq. ft. (0.5 to 0.75 kg/sq. m)** if aggregate surfacing is not applied immediately.
 5. Aggregate Surfacing: If surfacing roofing membrane with aggregate, promptly after installing and testing roofing membrane, base flashing, and stripping, flood-coat roof surface with **70 lb/100 sq. ft. (3.5 kg/sq. m)** of hot coal-tar pitch. While flood coat is hot and fluid, cast the following average weight of aggregate in a uniform course:
 - a. Aggregate Weight: **400 lb/100 sq. ft. (20 kg/sq. m)** for gravel or crushed stone or **300 lb/100 sq. ft. (15 kg/sq. m)** for slag.
 - b. Sweep loose aggregate from roof surface and apply another flood coat of not less than **85 lb/100 sq. ft. (4.15 kg/sq. m)** of hot coal-tar pitch. While flood coat is hot and fluid, apply a uniform course of aggregate at the following rate. Sweep away loose aggregate and fully embed aggregate by lightly rolling into finished roof surface.
 - 1) Aggregate Weight: **300 lb/100 sq. ft. (15 kg/sq. m)** for gravel or crushed stone **200 lb/100 sq. ft. (10 kg/sq. m)** for slag, average.
 6. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.
 - a. Sweep away loose aggregate surfacing and set walkway pads in additional flood coat of hot coal-tar pitch.
- H. Flashing And Stripping Installation
1. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to built-up roofing manufacturer's written instructions and as follows:
 - a. Prime substrates with asphalt primer if required by built-up roofing manufacturer.
 - b. Backer Sheet Application: Install single backer sheet and adhere to substrate in a solid mopping of hot roofing asphalt **OR** asphalt roofing cement **OR** SBS-modified asphalt roofing cement **OR** cold-applied adhesive, **as directed**.
OR
Backer Sheet Application: Install two **OR** three, **as directed**, backer sheets and adhere to substrate in a solid mopping of hot roofing asphalt **OR** asphalt roofing cement, **as directed**.
 - c. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than **425 deg F (218 deg C)**. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in SBS-modified asphalt roofing cement **OR** asphalt roofing cement, **as directed**.
 2. Extend base flashing up walls or parapets a minimum of **8 inches (200 mm)** above built-up roofing and **4 inches (100 mm)** onto field of built-up roofing.
 3. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - a. Securely fasten top termination of base flashing with continuous metal termination bar anchored into substrate.
 - b. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement, **as directed**.
 4. Apply roof coatings to smooth base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method.
 5. Install stripping, according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
 - a. Flashing-Sheet Stripping: Install flashing-sheet stripping in a cold-applied adhesive or in a solid mopping of hot coal-tar pitch and extend onto roofing membrane.

OR

Built-up Stripping: Install stripping of not less than two roofing membrane ply sheets, setting each ply in a continuous coal-tar roofing cement or in a solid mopping of hot coal-tar pitch, and extend onto roofing membrane **4 inches (100 mm)** and **6 inches (150 mm)**, respectively.

6. Roof Drains: Set **30-by-30-inch (760-by-760-mm)** metal flashing in bed of asphalt roofing cement on completed built-up roofing. Cover metal flashing with built-up roofing cap-sheet stripping and extend a minimum of **4 inches (100 mm)** **OR** **6 inches (150 mm)**, **as directed**, beyond edge of metal flashing onto field of built-up roofing. Clamp built-up roofing, metal flashing, and stripping into roof-drain clamping ring.

- a. Flashing-Sheet Stripping: Install flashing-sheet stripping in cold-applied adhesive or in a solid mopping of hot coal-tar pitch and extend onto roofing membrane.

OR

Built-up Stripping: Install stripping of not less than 2 roofing membrane ply sheets, setting each ply in a continuous coating of coal-tar roofing cement or in a solid mopping of hot coal-tar pitch, and extend onto roofing membrane **4 inches (100 mm)** and **6 inches (150 mm)**, respectively.

I. Field Quality Control

1. Testing Agency: Perform roof tests and inspections, observe flood tests, and prepare test reports.
2. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of built-up roofing as follows:
 - a. Approximate quantities of components within built-up roofing will be determined according to ASTM D 3617.
 - b. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
 - c. Repair areas where test cuts were made according to built-up roofing manufacturer's written instructions.
3. Flood Testing: Flood test each roofing membrane area for leaks, according to recommendations in ASTM D 5957, after completing roofing and flashing but before overlying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood to an average depth of **2-1/2 inches (65 mm)** with a minimum depth of **1 inch (25 mm)** and not exceeding a depth of **4 inches (100 mm)**. Maintain **2 inches (50 mm)** of clearance from top of base flashing.
 - b. Flood each area for **24 OR 48 OR 72, as directed**, hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until roofing and flashing installations are watertight.
4. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.
 - a. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

J. Protecting And Cleaning

1. Protect built-up roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner.
2. Correct deficiencies in or remove built-up roofing that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 05 13 00

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Task	Specification	Specification Description
07 05 13 00	01 95 99 92g	Preparation for Re-Roofing
07 05 13 00	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 05 13 00	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 05 13 00	07 53 16 00	CSPE Membrane Roofing
07 05 13 00	07 53 23 00	EPDM Membrane Roofing

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SECTION 07 11 13 00 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for bituminous dampproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 SUMMARY

- A. Section Includes:
 - 1. Hot-applied asphalt dampproofing.
 - 2. Cold-applied, cut-back-asphalt dampproofing.
 - 3. Cold-applied, emulsified-asphalt dampproofing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
 - 1. Product Data for Credit IEQ 4.2: For dampproofing, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For dampproofing, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course, molded-sheet drainage panels and auxiliary materials recommended in writing by manufacturer of primary materials.

- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 HOT-APPLIED ASPHALT DAMPPROOFING

- A. Hot-Applied Asphalt: ASTM D 449, Type II **OR** Type III, **as directed**.
- B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Low-Emitting Materials: Dampproofing shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

- A. Trowel Coats: ASTM D 4586, Type I, Class 1, fibered.
- B. Brush and Spray Coats: ASTM D 4479, Type I, fibered or nonfibered.
- C. VOC Content: 250 **OR** 300, **as directed**, g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Low-Emitting Materials: Dampproofing shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Trowel Coats: ASTM D 1227, Type II, Class 1.
- B. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- C. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
- D. VOC Content: Zero **OR** 30 g/L or less, **as directed**.
- E. Low-Emitting Materials: Dampproofing shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.5 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Cut-Back-Asphalt Primer: ASTM D 41.
- C. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.

1. Primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

- D. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- E. Patching Compound: Epoxy or latex-modified repair mortar **OR** Asbestos-free fibered mastic, **as directed**, of type recommended in writing by dampproofing manufacturer.
- F. Protection Course: ASTM D 6506, **1/8-inch- (3-mm-)** thick, semirigid sheets of fiberglass or mineral-reinforced-asphalitic core, pressure laminated between two asphalt-saturated fibrous liners.
- G. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on one side or both sides with plastic film, nominal thickness **1/4 inch (6 mm)**, with a compressive strength of not less than **8 psi (55 kPa)** per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.
- H. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, **1/2 inch (13 mm)** thick.
- I. Protection Course: Smooth-surfaced roll roofing complying with ASTM D 6380, Class S, Type III.

2.6 MOLDED-SHEET DRAINAGE PANELS

- A. Molded-Sheet Drainage Panel: Comply with Section 334600 "Subdrainage."
- B. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Composite subsurface drainage panel consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding **No. 70 (0.21-mm)** sieve laminated to one side of the core; and with a vertical flow rate of **9 to 15 gpm per ft. (112 to 188 L/min. per m)**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
 1. Test for surface moisture according to ASTM D 4263.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

- B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.
- C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections; cover with asphalt-coated glass fabric.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
 - 1. Apply dampproofing to provide continuous plane of protection.
 - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of **6 inches (150 mm)** over outside face of footing.
 - 1. Extend dampproofing **12 inches (300 mm)** onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 2. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an **8-inch- (200-mm-)** wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least **1/4 inch (6 mm)** onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
 - 1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
 - 2. Lap dampproofing at least **1/4 inch (6 mm)** onto shelf angles supporting veneer.
- D. Where dampproofing interior face of above-grade, exterior concrete and masonry single-wythe masonry walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.

3.4 HOT-APPLIED ASPHALT DAMPPROOFING

- A. Do not apply hot asphalt when substrate condition causes foaming.
- B. Kettle Temperature: Comply with dampproofing-material manufacturer's written instructions, and keep at least **25 deg F (14 deg C)** below the flash point.
- C. Prime masonry and other porous substrates.
- D. Apply a uniform coat of hot asphalt by mopping or spraying at not less than **20 lb or 2.5 gal./100 sq. ft. (1 kg or 1 L/sq. m)**.
 - 1. Apply a second coat to below-grade foundation walls and where first application has failed to produce a smooth surface and uninterrupted coverage. Apply second coat at the rate specified for first coat.

3.5 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

- A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than **1.25 gal./100 sq. ft. (0.5 L/sq. m)** for first coat and **1 gal./100 sq. ft. (0.4 L/sq. m)** for second coat or one trowel coat at not less than **4 gal./100 sq. ft. (1.6 L/sq. m)**.
- B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than **1.25 gal./100 sq. ft. (0.5 L/sq. m)** for first coat and **1 gal./100 sq. ft. (0.4 L/sq. m)** for second coat or primer and one trowel coat at not less than **4 gal./100 sq. ft. (1.6 L/sq. m)**.
- C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than **1.25 gal./100 sq. ft. (0.5 L/sq. m)**.
- D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than **1.25 gal./100 sq. ft. (0.5 L/sq. m)**.
- E. Concrete Backup for Brick Veneer Assemblies, Stone Veneer Assemblies and Dimension Stone Cladding: Apply one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.
- F. Masonry Backup for Brick Veneer Assemblies, Stone Veneer Assemblies and Dimension Stone Cladding: Apply primer and one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.
- G. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.

3.6 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than **1.5 gal./100 sq. ft. (0.6 L/sq. m)** for first coat and **1 gal./100 sq. ft. (0.4 L/sq. m)** for second coat one fibered brush or spray coat at not less than **3 gal./100 sq. ft. (1.2 L/sq. m)** or one trowel coat at not less than **4 gal./100 sq. ft. (1.6 L/sq. m)**.
- B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than **1.5 gal./100 sq. ft. (0.6 L/sq. m)** for first coat and **1 gal./100 sq. ft. (0.4 L/sq. m)** for second coat primer and one fibered brush or spray coat at not less than **3 gal./100 sq. ft. (1.2 L/sq. m)** or primer and one trowel coat at not less than **5 gal./100 sq. ft. (2 L/sq. m)**.
- C. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than **1.25 gal./100 sq. ft. (0.5 L/sq. m)**.
- D. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than **1.25 gal./100 sq. ft. (0.5 L/sq. m)**.
- E. Concrete Backup for Brick Veneer Assemblies, Stone Veneer Assemblies and Dimension Stone Cladding: Apply one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.
- F. Masonry Backup for Brick Veneer Assemblies, Stone Veneer Assemblies and Dimension Stone Cladding: Apply primer and one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.
- G. Exterior Face of Inner Wythe of Cavity Walls: Apply primer and one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.
- H. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m)**.

07 - Thermal And Moisture Protection



- I. Interior Face of Single-Wythe Exterior Masonry Walls: Where above grade and indicated to be furred and finished, apply primer and one brush or spray coat at not less than **1 gal./100 sq. ft. (0.4 L/sq. m).**

3.7 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
 2. Install protection course on same day **OR** within 24 hours, **as directed**, of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.8 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate dampproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 1. Install protection course before installing drainage panels.

3.9 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 11 13 00

SECTION 07 11 13 00a - COLD FLUID-APPLIED WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for cold fluid-applied waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Single-component polyurethane waterproofing.
 - b. Two-component polyurethane waterproofing.
 - c. Polyester waterproofing.
 - d. Latex-rubber waterproofing.
 - e. Molded-sheet drainage panels.
 - f. Insulation.
 - g. Plaza deck pavers.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
3. Product test reports.

D. Quality Assurance

1. Installer Qualifications: A firm that is approved or licensed by **OR** acceptable to, **as directed**, waterproofing manufacturer for installation of waterproofing required for this Project.
2. Preinstallation Conference: Conduct conference at Project site.
 - a. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and flashings, installation procedures, testing and inspection procedures, and protection and repairs.

E. Delivery, Storage, And Handling

1. Deliver liquid materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.
2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
3. Remove and replace liquid materials that cannot be applied within their stated shelf life.
4. Protect stored materials from direct sunlight.

F. Project Conditions

1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, when relative humidity exceeds 85 percent, or when temperatures are less than **5 deg F (3 deg C)** above dew point.

G. Warranty

1. Special Manufacturer's Warranty: Manufacturer's standard form in which waterproofing manufacturer and Installer agree to repair or replace waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

- A. Single-Component Polyurethane Waterproofing
 1. Single-Component, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 2. Single-Component, Reinforced, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 3. Single-Component, Unmodified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
- B. Two-Component Polyurethane Waterproofing
 1. Two-Component, Modified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 2. Two-Component, Unmodified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 3. Two-Component, Reinforced, Unmodified Polyurethane Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
- C. Polyester Waterproofing
 1. Two-Component, Reinforced, Unsaturated Polyester Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
- D. Latex-Rubber Waterproofing
 1. Two-Component, Unreinforced, Latex-Rubber Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
 2. Two-Component, Reinforced, Latex-Rubber Waterproofing: Comply with ASTM C 836 and with manufacturer's written physical requirements.
- E. Auxiliary Materials
 1. General: Provide auxiliary materials recommended by manufacturer to be compatible with one another and with waterproofing, as demonstrated by waterproofing manufacturer, based on testing and field experience.
 2. Primer: Manufacturer's standard, factory-formulated polyurethane or epoxy primer.
 3. Sheet Flashing: **50-mil- (1.3-mm-)** minimum, nonstaining, uncured sheet neoprene.
 - a. Adhesive: Manufacturer's recommended contact adhesive.
 4. Membrane-Reinforcing Fabric: Nonwoven, needle-punched white polyester fabric, **6-oz./sq. yd. (200-g/sq. m) OR 5-oz./sq. yd. (169-g/sq. m) OR 3.2-oz./sq. yd. (109-g/sq. m) OR** manufacturer's standard, **as directed**, weight.
 5. Joint Reinforcing Strip: Manufacturer's recommended fiberglass mesh or polyester fabric.
 6. Joint Sealant: Multicomponent polyurethane sealant, compatible with waterproofing, complying with ASTM C 920 Type M, Class 25; Grade NS for sloping and vertical applications or Grade P for deck applications; Use NT exposure; and as recommended by manufacturer for substrate and joint conditions.
 - a. Backer Rod: Closed-cell polyethylene foam.
- F. Protection Course
 1. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:

- a. Thickness: **1/8 inch (3 mm)**, nominal, for vertical applications; **1/4 inch (6 mm)**, nominal, elsewhere.
 - b. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.
 2. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced one or both side(s) with plastic film, nominal thickness of **1/4 inch (6 mm)**, with compressive strength not less than **8 psi (55 kPa)** per ASTM D 1621 and maximum water absorption by volume of 0.6 percent per ASTM C 272.
 3. Protection Course: Unfaced, fan-folded, rigid, extruded-polystyrene board insulation; nominal thickness of **1/4 inch (6 mm)** with compressive strength of not less than **8 psi (55 kPa)** per ASTM D 1621.
 4. Protection Course: Fan folded, with a core of molded-polystyrene board insulation faced both sides with plastic film, nominal thickness of **1/4 inch (6 mm) OR 3/8 inch (9.5 mm) OR 1/2 inch (13 mm), as directed**, with compressive strength not less than **12 psi (83 kPa)** per ASTM D 1621 and water absorption by volume of less than 1 percent per ASTM C 272.
 5. Protection Course: Unfaced, extruded-polystyrene board insulation; ASTM C 578, Type X, **1/2 inch (13 mm)** thick.
 6. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, **0.90-lb/cu. ft. (15-kg/cu. m)** minimum density, **1-inch (25-mm)** minimum thickness.
- G. Molded-Sheet Drainage Panels
1. Molded-Sheet Drainage Panel: Comply with Division 33 Section "Subdrainage".
 2. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding **No. 70 (0.21-mm)** sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of **9 to 15 gpm per ft. (112 to 188 L/min. per m)**.
 3. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding **No. 40 (0.43-mm)** sieve, laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than **2.8 gpm per ft. (35 L/min. per m)**.
- H. Insulation
1. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, square or shiplap edged.
 - a. Type IV, **25-psi (173-kPa)** minimum compressive strength.
 - b. Type VI, **40-psi (276-kPa)** minimum compressive strength.
 - c. Type VII, **60-psi (414-kPa)** minimum compressive strength.
 - d. Type V, **100-psi (690-kPa)** minimum compressive strength.
 2. Unfaced, Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa) OR Type VI, 40-psi (276-kPa), as directed**, minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
 3. Geotextile-Faced, Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa) OR Type VI, 40-psi (276-kPa), as directed**, minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with a nonwoven-geotextile filter fabric.
 4. Unfaced, Plaza Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa) OR Type VII, 60-psi (414-kPa), as directed**, minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.
 5. Geotextile-Faced, Plaza Deck, Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, **60-psi (414-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with manufacturer's standard, nonwoven-geotextile filter fabric.

- I. Plaza Deck Pavers
 1. Plaza Deck Pavers: Brick **OR** Concrete **OR** Asphalt-block, **as directed**, pavers specified in Division 32 Section "Unit Paving".
 2. Plaza Deck Pavers: Granite **OR** Limestone **OR** Marble **OR** Quartz-based stone **OR** Slate, **as directed**, pavers specified in Division 09 Section "Stone Flooring".
 3. Plaza Deck Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, manufactured for use as plaza deck pavers; minimum compressive strength of **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 - a. Thickness: **1-5/8 inches (41 mm) OR 1-3/4 inches (45 mm) OR 2 inches (51 mm) OR 2-3/8 inches (60 mm)**, **as directed**.
 - b. Face Size: **8-7/8 inches (225 mm) square OR 9 inches (229 mm) square OR 9-by-18 inches (229-by-457 mm) OR 12 inches (305 mm) square OR 12-by-24 inches (305-by-610 mm) OR 18 inches (457 mm) square OR 24 inches (610 mm) square OR As indicated, as directed**.
 - c. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 4. Setting Bed: Provide aggregate **OR** mortar **OR** bituminous, **as directed**, setting-bed materials specified in Division 32 Section "Unit Paving".
 5. Paver Pedestals: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including fixed-height **OR** adjustable or stackable, **as directed**, pedestals, shims, and spacer tabs for joint spacing of **1/8 inch (3 mm) OR 3/16 inch (5 mm) OR 1/8 to 3/16 inch (3 to 5 mm)**, **as directed**.
 - a. Concrete Fill: ACI 301, compressive strength of **5000 psi (34 MPa)** at 28 days and air content of 6 percent.

1.3 EXECUTION

- A. Surface Preparation
 1. Clean and prepare substrate according to manufacturer's written recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.
 2. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or overspray affecting other construction.
 3. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
 4. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, acid residues, and other penetrating contaminants or film-forming coatings from concrete.
 - a. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
 5. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- B. Preparation At Terminations And Penetrations
 1. Prepare vertical and horizontal surfaces at terminations and penetrations through waterproofing and at expansion joints, drains, and sleeves according to ASTM C 898 **OR** ASTM C 1471, **as directed**, and manufacturer's written instructions.
 2. Prime substrate unless otherwise instructed by waterproofing manufacturer.
 3. Apply waterproofing in two separate applications, and embed a joint reinforcing strip in the first preparation coat when recommended by waterproofing manufacturer.

- a. Provide sealant cants around penetrations and at inside corners of deck-to-wall butt joints when recommended by waterproofing manufacturer.
- C. Joint And Crack Treatment
1. Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 898 **OR** ASTM C 1471, **as directed**, and waterproofing manufacturer's written instructions. Remove dust and dirt from joints and cracks, complying with ASTM D 4258, before coating surfaces.
 - a. Comply with ASTM C 1193 for joint-sealant installation.
 - b. Apply bond breaker between sealant and preparation strip.
 - c. Prime substrate and apply a single thickness of preparation strip extending a minimum of **3 inches (75 mm)** along each side of joint. Apply waterproofing in two separate applications and embed a joint reinforcing strip in the first preparation coat.
 2. Install sheet flashing and bond to deck and wall substrates where indicated or required according to waterproofing manufacturer's written instructions.
 - a. Extend sheet flashings onto perpendicular surfaces and other work penetrating substrate according to ASTM C 898.
- D. Waterproofing Application
1. Apply waterproofing according to ASTM C 898 **OR** ASTM C 1471, **as directed**, and manufacturer's written instructions.
 2. Start installing waterproofing in presence of manufacturer's technical representative.
 3. Apply primer over prepared substrate.
 4. Unreinforced Waterproofing Applications: Mix materials and apply waterproofing by spray, roller, notched squeegee, trowel, or other application method suitable to slope of substrate.
 - a. Apply one or more coats of waterproofing to obtain a seamless membrane free of entrapped gases, with an average dry film thickness of **60 mils (1.5 mm)** and a minimum dry film thickness of **50 mils (1.3 mm)** at any point **OR 120 mils (3 mm), as directed**.
 - b. Apply waterproofing to prepared wall terminations and vertical surfaces.
 - c. Verify wet film thickness of waterproofing every **100 sq. ft. (9.3 sq. m)**.
 5. Reinforced Waterproofing Applications: Mix materials and apply waterproofing by roller, notched squeegee, trowel, or other suitable application method.
 - a. Apply first coat of waterproofing, embed membrane-reinforcing fabric, and apply second coat of waterproofing to completely saturate reinforcing fabric and to obtain a seamless reinforced membrane free of entrapped gases, with an average dry film total thickness of **70 mils (1.8 mm) OR 80 mils (2 mm) OR 120 mils (3 mm) as directed**, .
 - b. Apply reinforced waterproofing to prepared wall terminations and vertical surfaces.
 - c. Verify wet film thickness of waterproofing every **100 sq. ft. (9.3 sq. m)**.
 6. Install protection course with butted joints over nominally cured membrane before starting subsequent construction operations.
 - a. Molded-sheet drainage panels **OR** Insulation drainage panels **OR** Board insulation, **as directed**, may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer.
- E. Molded-Sheet Drainage Panel Installation
1. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives or mechanical fasteners that do not penetrate waterproofing. Lap edges and ends of geotextile fabric to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - a. For vertical applications, install board insulation **OR** protection course, **as directed**, before installing drainage panels.
- F. Insulation Installation
1. Install one or more layers of board insulation to achieve required thickness **OR** insulation drainage panels, **as directed**, over waterproofed surfaces. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.

2. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use type of adhesive recommended in writing by insulation manufacturer.
3. On horizontal surfaces, place insulation units unadhered according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

G. Plaza Deck Paver Installation

1. Setting Bed: Install setting bed in locations and of thickness indicated to comply with requirements in Division 32 Section(s) "Unit Paving" OR Division 09 Section(s) "Stone Flooring", **as directed**.
2. Install concrete pavers, in locations indicated, according to manufacturer's written instructions.
3. Accurately install fixed **OR** adjustable, **as directed**, -height paver pedestals in locations and to elevations required. Adjust for final level and slope with shims.
 - a. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.
4. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - a. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
5. Install pavers to not vary more than **1/16 inch (1.6 mm)** in elevation between adjacent pavers or more than **1/16 inch (1.6 mm)** from surface plane elevation of individual paver.
6. Maintain tolerances of paving installation within **1/4 inch in 10 feet (1:48)** of surface plane in any direction.

H. Field Quality Control

1. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood to an average depth of **2-1/2 inches (64 mm)** with a minimum depth of **1 inch (25 mm)** and not exceeding a depth of **4 inches (100 mm)**. Maintain **2 inches (50 mm)** of clearance from top of sheet flashings.
 - b. Flood each area for **24 OR 48 OR 72, as directed**, hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until waterproofing installation is watertight.
2. Engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

I. Curing, Protection, And Cleaning

1. Cure waterproofing according to manufacturer's written recommendations, taking care to prevent contamination and damage during application stages and curing.
 - a. Do not permit foot or vehicular traffic on unprotected membrane.
2. Protect waterproofing from damage and wear during remainder of construction period.
3. Protect installed board insulation **OR** insulation drainage panels, **as directed**, from damage due to ultraviolet light, harmful weather exposures, physical abuse, and other causes. Immediately after installation, provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction.
4. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 11 13 00a

SECTION 07 13 13 00 - BITUMINOUS WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for bituminous waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

C. Delivery, Storage And Handling

1. Waterproofing materials shall be delivered to the project site in the original sealed containers bearing the name of the manufacturer, contents and brand name. Asphalt shall be protected from freezing in a weathertight enclosure. Reinforcement fabrics shall be protected from moisture damage and moisture absorption in a weathertight enclosure or shall be stored off the ground on pallets, and covered on top and all sides with breathable-type canvas tarpaulins. Plastic sheets cause condensation buildup and therefore shall not be used to cover waterproofing materials. Damaged or deteriorated materials shall be removed from project site.

D. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit waterproofing to be performed according to manufacturers' written instructions.
2. Ventilation: Provide adequate ventilation during application of waterproofing in enclosed spaces. Maintain ventilation until waterproofing has cured.

1.2 PRODUCTS

A. Asphalt Waterproofing

1. Primer: Primer for hot-applied asphalt waterproofing shall conform to ASTM D41, asbestos-free, non-fibrated, manufactured with highly ductile soft asphalts and selected hydrocarbons.
2. Above-Grade Hot-Applied Asphalt: For above-grade applications where asphalt will not be exposed to temperatures exceeding 122 degrees F (50 degrees C), hot-applied asphalt for membrane waterproofing system shall conform to ASTM D449, Type II. For above-grade applications where asphalt will be exposed to sunlight and temperatures exceeding 122 degrees F (50 degrees C), hot-applied asphalt shall conform to ASTM D449, Type III.
3. Below-Grade Hot-Applied Asphalt: Hot-applied asphalt for below-grade applications shall conform to ASTM D449, Type I, asbestos-free, manufactured from crude petroleum, suitable for use with membrane waterproofing systems.
4. Reinforcement Fabrics
 - a. Cotton Fabrics: Cotton fabrics shall be woven entirely of cotton conforming with ASTM D173, thoroughly and uniformly saturated with asphalt.
 - b. Woven Burlap Fabrics: Woven burlap fabrics shall be composed of 100 percent jute fiber and two cotton threads at each selvage conforming with ASTM D1327, thoroughly and uniformly saturated with asphalt. The fabric mesh shall not be completely closed or sealed by the process of saturation. Sufficient porosity shall be maintained to allow successive moppings of the plying asphalt to seep through. The surface shall not be coated or covered with talc or any other substances that will interfere with the adhesion between fabric and plying asphalt. The fabric surface shall be uniformly smooth and free of

irregularities, folds and knots. The finished woven burlap fabrics shall be free of ragged edges, untrue edges, breaks or cracks, and other visible external defects.

- c. Glass Fabrics: Glass fabrics shall conform to ASTM D1668 Type I, asphalt-treated woven glass waterproofing fabrics coated with asphalt.
- d. Flashing Cement: Flashing cement shall conform to ASTM D4586, Type I, trowel grade, asbestos free, manufactured from asphalts characterized as adhesive, healing and ductile.

B. Insulation Boards

1. Insulation boards shall conform to ASTM C208 cellulosic fiber boards, construction grade, **1/2 inch (13 mm)** thick, fibrous-felted homogeneous panel. Insulation boards shall be manufactured from ligno-cellulosic fibers (wood or cane) by a felting or molding process, asphalt-saturated or coated, with a density of **10 to 31 psf (49 to 151 kg/square meter)**. Surfaces of insulation boards shall be free of cracks, lumps, excessive departure from planeness, or other defects that adversely affect performance.

1.3 EXECUTION

A. Surface Preparation

1. Surfaces scheduled for bituminous waterproofing shall be prepared in accordance with waterproofing manufacturer's recommendations. Surface preparation shall be approved prior to waterproofing application.
2. Protection of Surrounding Areas: Before starting the waterproofing work, the surrounding areas and surfaces shall be protected from spillage and migration of asphalt onto other work. Drains and conductors shall be protected from clogging with asphalt.
3. Masonry Surfaces: Surfaces shall be free of oil, grease, dirt, laitance, loose material, frost, debris and other contaminants. Mortar joints shall be flush and free of extraneous mortar and chipped or broken masonry.
4. Concrete Surfaces: Surfaces shall be properly cured, free of form release agents, oil, grease, dirt, laitance, loose material, frost, debris and other contaminants. Form ties shall be cut flush with surface. Sharp protrusions and form match lines shall be removed. Holes, voids, spalled areas and cracks which can damage waterproofing materials shall be repaired. Rough surfaces shall be parged with a well-adhering coat of cement mortar.
5. Metal Surfaces: Surfaces shall be dry and be free of rust, scale, loose paint, oil, grease, dirt, frost and debris.

B. Hot-Applied Asphalt Waterproofing

1. Asphalt waterproofing shall be applied when the ambient temperature is **40 degrees F (4 degrees C)** or above. Heating kettles and tanks shall be provided with automatic thermostatic control capable of maintaining asphalt temperature. Controls shall be calibrated and maintained in working order for duration of work. At time of application, asphalt shall not be heated above the equiviscous temperature (EVT) recommended by manufacturer. Immediately before use, temperature shall be measured with a portable thermometer at the point of application. EVT and flashpoint temperatures of asphalt in kettle shall be conspicuously posted on kettle. Asphalt with a temperature not conforming to the manufacturer's recommendations shall be returned to the kettle. Asphalt overheated by more than **50 degrees F (10 degrees C)** for more than 1 hour shall be removed from site.
2. Below-Grade Wall Waterproofing: Waterproofing for foundation walls shall consist of a 1-ply **OR** 2-ply **OR** 3-ply **OR** 4-ply **OR** 5-ply, **as directed**, hot-applied asphalt membrane system. Fabrics shall be installed using the "shingle" method. Joints shall be caulked prior to primer applications. Primer shall be applied at a rate of **1/2 gallon per 100 square feet (0.2 L/square meter)**. Fabrics shall be overlapped at ends and staggered a minimum **10 inch (250 mm)** for 1-ply **OR** **19 inch (480 mm)** for 2-ply **OR** **24 inch (610 mm)** for 3-ply **OR** **27 inch (685 mm)** for 4-ply **OR** **30 inch (750 mm)** for 5-ply, **as directed**, system. End-to-end taping is not acceptable. Each fabric shall be firmly embedded into a solid uniform coating of hot asphalt at a rate of **20 pounds per 100 square**

feet (0.98 kg/square meter) by pressing with broom. Fabrics shall not touch fabrics. Hot asphalt shall penetrate each fabric to provide the required adhesion. Asphalt between fabrics shall not be excessive to prevent slippage. Waterproofing system consisting of two or more fabrics shall be provided with fabric reinforcement at corners, angles, over construction joints, and in locations where waterproofing fabrics are subject to unusual stress.

3. Floor Waterproofing: Primer shall be applied at a rate of 1/2 gallon per 100 square feet (0.2 L/square meter). Primer shall not be left in puddles. Primer shall be dry to the touch before application of asphalt. Where slab abuts walls, first reinforcing fabric shall extend 6 inches (150 mm) minimum on slab and 8 inches (200 mm) on wall. At vertical corners, first fabric shall extend minimum 5 inches (125 mm) from corner on each side. Second fabric shall lap the first fabric 2 inches (50 mm) minimum. At floor drains, and elsewhere as indicated, the fabric shall extend into a clamping device, set in a heavy coating of flashing cement, and securely clamped.

C. Flood Testing

1. Prior to concealment, waterproofed floors over occupied spaces shall be tested for watertightness. Drains shall be plugged and floors shall be submerged with 3 inches (75 mm) of clean water. Water shall be permitted to stand for a minimum of 24 hours. If leaks occur, water shall be drained and repairs made. Upon completion of repairs, floors shall be flooded with 3 inches (75 mm) of clean water and flood testing shall be repeated for minimum of 24 hours from the time each leak is repaired. Waterproofing system shall be completely watertight, and shall be approved in writing before covering up with other materials. Additional coats of asphalt are not an acceptable method for repairing leaks.

D. Clean-Up

1. Surfaces of other work which are stained with waterproofing materials shall be cleaned with a cleaner recommended by waterproofing manufacturer.

E. Protection Of Completed Work

1. Floor Waterproofing: The completed waterproofing work shall be protected from damage during and after construction. Protective covering shall be placed immediately before proceeding with the work which will conceal the waterproofing.
2. Wall Waterproofing: Waterproofing against which backfill is to be placed shall be protected with a single layer of insulation board. Insulation boards shall be pressed into the final mopping while the asphalt is still hot, with edges of boards placed into moderate contact and joints staggered. For two-layer installation, joints in second layer shall be staggered over joints in first layer. Where surfaced insulation board is used, the surfaced side shall face outward. Boards shall be carefully and neatly fitted around projections, and shall cover the entire surface of the waterproofing materials. Waterproofing system not covered with protection board shall be protected to prevent damage from subsequent building operations. Installed boards shall not remain exposed at the end of a work day.

END OF SECTION 07 13 13 00

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Task	Specification	Specification Description
07 13 13 00	07 11 13 00	Bituminous Dampproofing

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SECTION 07 13 53 00 - ELASTOMERIC SHEET WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for elastomeric sheet waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Butyl rubber sheet waterproofing.
 - b. EPDM rubber sheet waterproofing.
 - c. Molded-sheet drainage panels.
 - d. Insulation.
 - e. Plaza deck pavers and paver pedestals.

C. Submittals

1. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
2. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
3. Product test reports.
4. Special warranties.

D. Quality Assurance

1. Installer Qualifications: A firm that is approved or licensed by **OR** acceptable to, **as directed**, waterproofing manufacturer for installation of units required for this Project.
2. Preinstallation Conference: Conduct conference at Project site.
 - a. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

E. Delivery, Storage, And Handling

1. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
2. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
3. Remove and replace liquid materials that cannot be applied within their stated shelf life.
4. Store rolls according to manufacturer's written instructions.
5. Protect stored materials from direct sunlight.

F. Project Conditions

1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.

G. Warranty

1. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Sheet Waterproofing

1. Butyl Rubber Sheet: ASTM D 6134, Type II, **60-mil- (1.5-mm-)** **OR 90-mil- (2.3-mm-)** **OR 120-mil- (3.0-mm-)**, **as directed**, thick flexible sheet, unreinforced, formed from isobutylene-isoprene rubber.
2. EPDM Rubber Sheet: ASTM D 6134, Type I, **60-mil- (1.5-mm-)** thick flexible sheet, unreinforced, formed from EPDM.

B. Auxiliary Materials

1. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - a. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
2. Concealed Sheet Flashing: Same material, construction, and thickness as sheet waterproofing or **60-mil- (1.5-mm-)** thick, uncured EPDM as required by manufacturer.
3. Exposed Sheet Flashing: **60-mil- (1.5-mm-)** thick EPDM, cured or uncured, as required by manufacturer.
4. Bonding Adhesives: Adhesive for bonding polymeric sheets and sheet flashings to substrates and projections.
5. Splicing Cement and Cleaner: Single-component butyl splicing cement and solvent-based splice cleaner.
 - a. Butyl Gum Tape: **30-mil- (0.76-mm-)** thick-by-**6-1/4-inch- (160-mm-)** wide, uncured butyl with polyethylene release film.
6. Lap Sealant: Single-component sealant.
7. In-Seam Sealant: Single-component sealant.
8. Water Cutoff Mastic: Butyl mastic sealant.
9. Waterproofing and Sheet Flashing Accessories: Provide sealants, pourable sealers, cone and vent flashings, inside and outside corner flashings, termination reglets, and other accessories recommended by waterproofing manufacturer for intended use.
10. Metal Termination Bars: Manufacturer's standard aluminum bars, approximately **1 inch (25 mm)** wide, prepunched, with zinc-alloy-body fasteners and stainless-steel pins.
11. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - a. Thickness: **1/8 inch (3 mm)**, nominal, for vertical applications; **1/4 inch (6 mm)**, nominal, elsewhere.
 - b. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for type of protection course.
12. Protection Course:
 - a. Faced, fan folded, with a core of extruded-polystyrene board insulation sandwiched between 2 sheets of plastic film, nominal thickness **1/4 inch (6 mm)**, with compressive strength of not less than **8 psi (55 kPa)** per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.
 - b. Unfaced, fan-folded, extruded-polystyrene board insulation, nominal thickness **1/4 inch (6 mm)** with compressive strength of not less than **8 psi (55 kPa)** per ASTM D 1621.
 - c. Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, **1/2 inch (13 mm)** thick.
 - d. Molded-polystyrene board insulation, ASTM C 578, Type I, **0.90-lb/cu. ft. (15-kg/cu. m)** minimum density, **1-inch (25-mm)** minimum thickness.

- C. Molded-Sheet Drainage Panels
1. Molded-Sheet Drainage Panel: Comply with Division 33 Section "Subdrainage".
 2. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding **No. 70 (0.21-mm)** sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of **9 to 15 gpm per ft. (112 to 188 L/min. per m)**.
 3. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding **No. 40 (0.425-mm)** sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than **2.8 gpm per ft. (35 L/min. per m)**.
- D. Insulation
1. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, square or shiplap edged.
 - a. Type IV, **25-psi (173-kPa)** minimum compressive strength.
 - b. Type VI, **40-psi (276-kPa)** minimum compressive strength.
 - c. Type VII, **60-psi (414-kPa)** minimum compressive strength.
 - d. Type V, **100-psi (690-kPa)** minimum compressive strength.
 2. Unfaced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa)** or Type VI, **40-psi (276-kPa)** minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with 1 side having grooved drainage channels.
 3. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa)** or Type VI, **40-psi (276-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with 1 side having grooved drainage channels faced with nonwoven geotextile filter fabric.
 4. Unfaced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa)** **OR** Type VII, **60-psi (414-kPa)**, **as directed**, minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with 1 side having ribbed drainage channels.
 5. Geotextile-Faced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, **60-psi (414-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with 1 side having grooved drainage channels faced with manufacturer's standard, nonwoven geotextile filter fabric.
- E. Plaza Deck Pavers
1. Plaza Deck Pavers: Brick **OR** Concrete **OR** Asphalt-block, **as directed**, pavers specified in Division 32 Section "Unit Paving".
 2. Plaza Deck Pavers: Granite **OR** Limestone **OR** Marble **OR** Quartz-based stone **OR** Slate, **as directed**, pavers specified in Division 09 Section "Stone Flooring".
 3. Plaza Deck Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, manufactured for use as plaza deck pavers; minimum compressive strength **7500 psi (52 MPa)** **OR** **6500 psi (45 MPa)**, **as directed**, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 - a. Color: As selected from manufacturer's full range.
 4. Setting Bed: Provide aggregate **OR** mortar **OR** bituminous, **as directed**, setting-bed materials specified in Division 32 Section "Unit Paving".
 5. Paver Pedestals: Paver manufacturer's standard SBR rubber, HDPE, or polyurethane paver support assembly, including fixed-height **OR** adjustable or stackable, **as directed**, pedestals, shims, and spacer tabs for joint spacing of **1/8 inch (3 mm)** **OR** **3/16 inch (5 mm)** **OR** **1/8 to 3/16 inch (3 to 5 mm)**, **as directed**.
 - a. Concrete Fill: ACI 301, compressive strength of **5000 psi (34 MPa)** at 28 days and air content of 6 percent.

1.3 EXECUTION

A. Surface Preparation

1. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
2. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
3. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
4. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
5. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
6. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions.

B. Fully Adhered Sheet Installation

1. Install fully adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions and recommendations in ASTM D 5843.
2. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
3. Apply bonding adhesive to substrates at required rate and allow to partially dry.
4. Apply bonding adhesive to sheets and firmly adhere sheets to substrates. Do not apply bonding adhesive to splice area of sheet.
5. Install fully adhered sheets and auxiliary materials to tie into existing waterproofing.
6. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.
7. Horizontal Application: Apply sheets with side laps shingled with slope of deck where possible.
 - a. Spread sealant bed over deck drain flange at deck drains and securely seal sheet waterproofing in place with clamping ring.

C. Partially Adhered Sheet Installation

1. Install partially adhered sheets over entire area to receive waterproofing according to manufacturer's written instructions.
2. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
3. Apply bonding adhesive to the following areas of substrates and to each sheet at required rate and allow to partially dry:
 - a. Upper 25 percent of length of each sheet and **18 inches (457 mm)** around perimeter of each sheet.
4. Firmly adhere sheets to substrate. Do not apply bonding adhesive to splice area of sheet.
5. Install partially adhered sheets and auxiliary materials to tie into existing waterproofing.
6. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.

D. Compartmented, Loosely Laid Sheet Installation

1. Install compartmented, loosely laid sheets over entire area to receive waterproofing according to manufacturer's written instructions.
2. Accurately align sheets and maintain uniform side and end laps of minimum dimensions required. Stagger end laps.
3. Apply continuous beads of water cutoff mastic, of size recommended by waterproofing manufacturer, to substrates in a **60-by-60-inch (1500-by-1500-mm)** grid pattern before installing sheet.

4. Apply sheets with side laps shingled with slope of deck where possible.
 5. Spread sealant bed over deck drain flange at deck drains and securely seal sheet waterproofing in place with clamping ring.
 6. Install compartmented, loosely laid sheets and auxiliary materials to tie into existing waterproofing.
 7. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending beyond repaired areas in all directions.
- E. Seam Installation
1. Cement Splice: Clean splice areas, apply splicing cement and in-seam sealant, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to produce a splice not less than **6 inches (150 mm)** wide and to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet terminations.
 2. Cement and Tape Splice: Clean splice areas, apply splicing cement and butyl gum tape, and firmly roll side and end laps of overlapping sheets according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet terminations.
- F. Sheet Flashing Installation
1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to waterproofing manufacturer's written instructions.
 2. Form wall flashings using exposed sheet flashing.
 3. Extend deck sheet waterproofing to form wall flashings.
 - a. Flash penetrations and field-formed inside and outside corners with uncured sheet flashing.
 - b. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
 4. Cover expansion joints and discontinuous deck-to-wall or deck-to-deck joints by extending deck sheet waterproofing over joints.
 5. Terminate and seal top of sheet flashings with mechanically anchored termination bars.
- G. Protection Course Installation
1. Install protection course over waterproofing membrane according to manufacturer's written instructions and before beginning subsequent construction operations. Minimize exposure of membrane.
 - a. Molded-sheet drainage panels **OR** Insulation drainage panels **OR** Board insulation, **as directed**, may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer.
- H. Molded-Sheet Drainage Panel Installation
1. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives or mechanical fasteners that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - a. For vertical applications, install board insulation **OR** protection course, **as directed**, before installing drainage panels.
- I. Insulation Installation
1. Install one or more layers of board insulation to achieve required thickness and insulation drainage panels over waterproofed surfaces. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.
 2. On vertical surfaces, place and secure insulation units according to manufacturer's written instructions.

3. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
- J. Plaza Deck Paver Installation
1. Setting Bed: Install setting bed in locations and of thickness indicated to comply with requirements in Division 32 Section(s) "Unit Paving" OR Division 09 Section(s) "Stone Flooring", **as directed**.
 2. Install concrete pavers in locations indicated according to manufacturer's written instructions.
 3. Accurately install fixed **OR** adjustable, **as directed**, -height paver pedestals and accessories in locations and to elevations required. Adjust for final level and slope with shims.
 - a. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.
 4. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - a. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
 5. Install pavers to not vary more than **1/16 inch (1.6 mm)** in elevation between adjacent pavers or more than **1/16 inch (1.6 mm)** from surface plane elevation of individual paver.
 6. Maintain tolerances of paving installation within **1/4 inch in 10 feet (1:48)** of surface plane in any direction.
- K. Protection And Cleaning
1. Do not permit foot or vehicular traffic on unprotected membrane.
 2. Protect waterproofing from damage and wear during remainder of construction period.
 3. Protect installed board insulation **OR** insulation drainage panels, **as directed**, from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
 4. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 53 00

Task	Specification	Specification Description
07 13 53 00	03 01 30 71a	Self-Adhering Sheet Waterproofing

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SECTION 07 14 13 00 - HOT FLUID-APPLIED RUBBERIZED ASPHALT WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for hot fluid-applied rubberized asphalt waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Rubberized-asphalt waterproofing membrane, unreinforced and reinforced.
 - b. Molded-sheet drainage panels.
 - c. Insulation.
 - d. Plaza deck pavers.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show locations and extent of waterproofing. Include details for substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins to adjoining waterproofing, and other termination conditions.
 - a. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
3. Product test reports.
4. Sample warranties

D. Quality Assurance

1. Installer Qualifications: A firm that is approved or licensed by **OR** acceptable to, **as directed**, manufacturer for installation of waterproofing required for this Project and is eligible to receive special warranties specified.
2. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer.
2. Remove and replace liquid materials that cannot be applied within their stated shelf life.
3. Protect stored materials from direct sunlight.

F. Project Conditions

1. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate, or when temperature is below **0 deg F (minus 18 deg C)**.
 - a. Do not apply waterproofing in snow, rain, fog, or mist.
2. Maintain adequate ventilation during application and curing of waterproofing materials.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within five **OR 10, as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Waterproofing Membrane

1. Hot Fluid-Applied, Rubberized-Asphalt Waterproofing Membrane: Single component; 100 percent solids; hot fluid-applied, rubberized asphalt.

B. Flashing Sheet Materials

1. Elastomeric Flashing Sheet: **50-mil- (1.3-mm-)** minimum, uncured sheet neoprene as follows:
 - a. Tensile Strength: **1400 psi (9.6 MPa)** minimum; ASTM D 412, Die C.
 - b. Elongation: 300 percent minimum; ASTM D 412.
 - c. Tear Resistance: **125 psi (860 kPa)** minimum; ASTM D 624, Die C.
 - d. Brittleness: Does not break at minus **30 deg F (34 deg C)**; ASTM D 2137.

C. Auxiliary Materials

1. Primer: ASTM D 41, asphaltic primer.
2. Elastomeric Sheet: **50-mil- (1.3-mm-)** minimum, uncured sheet neoprene as follows:
 - a. Tensile Strength: **1400 psi (9.6 MPa)** minimum; ASTM D 412, Die C.
 - b. Elongation: 300 percent minimum; ASTM D 412.
 - c. Tear Resistance: **125 psi (860 kPa)** minimum; ASTM D 624, Die C.
 - d. Brittleness: Does not break at minus **30 deg F (34 deg C)**; ASTM D 2137.
3. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum termination bars; approximately **1 by 1/8 inch (25 by 3 mm)** thick; with anchors.
4. Sealants and Accessories: Manufacturer's recommended sealants and accessories.
5. Reinforcing Fabric: Manufacturer's recommended, spun-bonded polyester fabric.
6. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and nominal thickness of **1/8 inch (3 mm) OR 1/4 inch (6 mm), as directed.**
7. Protection Course: Manufacturer's standard, **80- to 90-mil- (2.0- to 2.3-mm-)** thick, fiberglass-reinforced rubberized asphalt or modified bituminous sheet.

D. Molded-Sheet Drainage Panels

1. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding **No. 70 (0.21-mm)** sieve, laminated to one side with **OR** without, **as directed**, a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of **9 to 15 gpm/ft. (112 to 188 L/min. per m).**
2. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding **No. 40 (0.43-mm)** sieve, laminated to one side with **OR** without, **as directed**, a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than **2.8 gpm/ft. (35 L/min. per m).**

E. Insulation

1. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, square **OR** shiplap, **as directed**, edged.
 - a. Type IV, **25-psi (173-kPa)** minimum compressive strength.
 - b. Type VI, **40-psi (276-kPa)** minimum compressive strength.
 - c. Type VII, **60-psi (414-kPa)** minimum compressive strength.
 - d. Type V, **100-psi (690-kPa)** minimum compressive strength.
2. Unfaced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa) OR Type VI, 40-psi (276-kPa), as directed**, minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.

3. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type IV, **25-psi (173-kPa) OR Type VI, 40-psi (276-kPa), as directed**, minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with a nonwoven, geotextile filter fabric.
4. Unfaced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa) OR Type VII, 60-psi (414-kPa), as directed**, minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.
5. Geotextile-Faced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VII, **60-psi (414-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with a nonwoven, geotextile filter fabric.

F. Plaza Deck Pavers

1. Plaza Deck Pavers:
 - a. Brick **OR** Concrete **OR** Asphalt-block, **as directed**, pavers specified in Division 32 Section "Unit Paving".
OR
Granite **OR** Limestone **OR** Marble **OR** Quartz-based stone **OR** Slate, **as directed**, pavers specified in Division 09 Section "Stone Flooring".
OR
Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm), as directed**, manufactured for use as plaza deck pavers; minimum compressive strength **7500 psi (52 MPa) OR 6500 psi (45 MPa), as directed**, ASTM C 140; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.
 - 1) Thickness: **1-5/8 inches (41 mm) OR 1-3/4 inches (45 mm) OR 2 inches (51 mm) OR 2-3/8 inches (60 mm), as directed.**
 - 2) Face Size: **8-7/8 inches (225 mm) square OR 9 inches (229 mm) square OR 9 by 18 inches (229 by 457 mm) OR 12 inches (305 mm) square OR 12 by 24 inches (305 by 610 mm) OR 18 inches (457 mm) square OR 24 inches (610 mm) square, as directed.**
 - 3) Color: As selected from manufacturer's full range.
2. Setting Bed: Provide aggregate **OR** mortar **OR** bituminous, **as directed**, setting-bed materials specified in Division 32 Section "Unit Paving".
3. Paver Supports: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including fixed-height **OR** adjustable or stackable, **as directed**, pedestals, shims, and spacer tabs for joint spacing of **1/8 inch (3 mm) OR 3/16 inch (5 mm), as directed.**
 - a. Concrete Fill: ACI 301, compressive strength of **5000 psi (34 MPa)** at 28 days, and air content of 6 percent.

1.3 EXECUTION

A. Preparation

1. Clean and prepare substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for waterproofing application.
2. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
3. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
4. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

- a. Abrasive blast clean concrete surfaces uniformly to expose top surface of fine aggregate according to ASTM D 4259 with a self-contained, recirculating, blast-cleaning apparatus. Remove material to provide a sound surface free of laitance, glaze, efflorescence, curing compounds, concrete hardeners, or form-release agents. Remove remaining loose material and clean surfaces according to ASTM D 4258.
 5. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- B. Joints, Cracks, And Terminations
1. Prepare and treat substrates to receive waterproofing membrane, including joints and cracks, deck drains, corners, and penetrations according to manufacturer's written instructions.
 - a. Rout and fill joints and cracks in substrate. Before filling, remove dust and dirt according to ASTM D 4258.
 - b. Adhere strip of elastomeric sheet to substrate in a layer of hot rubberized asphalt. Extend elastomeric sheet a minimum of **6 inches (150 mm)** on each side of moving joints and cracks or joints and cracks exceeding **1/8 inch (3 mm)** thick, and beyond deck drains and penetrations. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
 - c. Embed strip of reinforcing fabric into a layer of hot rubberized asphalt. Extend reinforcing fabric a minimum of **6 inches (150 mm)** on each side of nonmoving joints and cracks not exceeding **1/8 inch (3 mm)** thick, and beyond roof drains and penetrations.
 - 1) Apply second layer of hot fluid-applied, rubberized asphalt over reinforcing fabric.
 2. At expansion joints and discontinuous deck-to-wall or deck-to-deck joints, bridge joints with elastomeric sheet extended a minimum of **6 inches (150 mm)** on each side of joints and adhere to substrates in a layer of hot rubberized asphalt. Apply second layer of hot fluid-applied, rubberized asphalt over elastomeric sheet.
- C. Flashing Installation
1. Install elastomeric flashing sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
 2. Prime substrate with asphalt primer.
 3. Install elastomeric flashing sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
 4. Extend elastomeric flashing sheet up walls or parapets a minimum of **8 inches (200 mm)** above plaza deck pavers and **6 inches (150 mm)** onto deck to be waterproofed.
 5. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of roofing.
- D. Membrane Application
1. Apply primer, at manufacturer's recommended rate, over prepared substrate and allow to dry.
 2. Heat and apply rubberized asphalt according to manufacturer's written instructions.
 - a. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
 3. Start application with manufacturer's authorized representative present.
 4. Unreinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to form a uniform, unreinforced, seamless membrane, **180-mil (4.5-mm)** minimum thickness **OR 180-mil (4.5-mm)** average thickness, but not less than **125 mil (3.2 mm)** thick, **as directed**.
 5. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of **90 mils (2.3 mm)**; embed reinforcing fabric, overlapping sheets **2 inches (50 mm)**; spread another **125-mil- (3.2-mm-)** thick layer to provide a uniform, reinforced, seamless membrane **215 mils (5.5 mm)** thick.
 6. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.

7. Cover waterproofing with protection course with overlapped joints before membrane is subject to backfilling **OR** construction or vehicular traffic, **as directed**.

- E. Molded-Sheet Drainage Panel Installation
 1. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate according to manufacturer's written instructions. Use methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - a. For vertical applications, install board insulation **OR** protection course, **as directed**, before installing drainage panels.

- F. Insulation Installation
 1. Install one or more layers of board insulation to achieve required thickness and insulation drainage panels over waterproofed surfaces. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.
 2. On vertical surfaces, set insulation units into rubberized asphalt according to manufacturer's written instructions.
 3. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

- G. Plaza Deck Paver Installation
 1. Setting Bed: Install setting bed in locations and of thickness indicated to comply with requirements in Division 32 Section(s) "Unit Paving" **OR** Division 09 Section(s) "Stone Flooring", **as directed**.
 2. Install concrete pavers in locations indicated according to manufacturer's written instructions.
 3. Accurately install fixed-height **OR** adjustable-height, **as directed**, paver pedestals and accessories in locations and to elevations required. Adjust for final level and slope with shims.
 - a. Fill paver pedestal with concrete mix, strike smooth with top of pedestal, and cure according to ACI 301.
 4. Loosely lay pavers on pedestals, maintaining a uniform open joint width. Tightly seat pavers against spacers to eliminate lateral movement or drift of paving assembly. Align joint patterns parallel in each direction.
 - a. Lay out pavers to avoid less-than-half-width pavers at perimeter or other terminations.
 5. Install pavers to not vary more than **1/16 inch (1.6 mm)** in elevation between adjacent pavers or more than **1/16 inch (1.6 mm)** from surface plane elevation of individual paver.
 6. Maintain tolerances of paving installation within **1/4 inch in 10 feet (1:48)** of surface plane in any direction.

- H. Cleaning And Protection
 1. Protect waterproofing from damage and wear during remainder of construction period.
 2. Protect installed board insulation **OR** insulation drainage panels, **as directed**, from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation will be subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
 3. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 14 13 00

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SECTION 07 16 13 00 - MODIFIED CEMENT WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for modified cement waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes polymer-modified cement waterproofing for positive or negative-side application to concrete, concrete unit masonry, and clay masonry.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions and installation instructions for polymer-modified cement waterproofing.
2. Samples: For each type of polymer-modified cement waterproofing indicated.
3. Qualification Data: For Applicator.
4. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.
5. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for each type of polymer-modified cement waterproofing.
6. Field quality-control reports.

D. Quality Assurance

1. Applicator Qualifications: A firm experienced in applying polymer-modified cement waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.
2. Preinstallation Conference: Conduct conference at Project site.

E. Project Conditions

1. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit polymer-modified cement waterproofing to be performed according to manufacturer's written instructions.
2. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
3. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at **40 deg F (4.4 deg C)** or above during work and cure period, and space is well ventilated and kept free of water.

1.2 PRODUCTS

A. Field-Mixed, Polymer-Modified Cement Waterproofing

1. Admixture for Field Mixing: Manufacturer's standard polymer admixture for mixing with portland cement and sand to produce a waterproof coating that is suitable for vertical and horizontal applications below or above grade, is breathable, resists positive-side **OR** negative-side, **as directed**, hydrostatic pressure, has VOC content complying with limits of authorities having jurisdiction, and has properties meeting or exceeding the criteria specified below.

- a. Water Permeability: Maximum zero for water at **30 feet (9 m)** when tested according to CE CRD-C 48.
 - b. Compressive Strength: Minimum **4000 psi (27.6 MPa)** at 28 days when tested according to ASTM C 109/C 109M.
 - c. Flexural Strength: Minimum **710 psi (4.8 MPa)** at 28 days when tested according to ASTM C 348.
 - d. Bond Strength: Minimum **220 psi (1.5 MPa)** at 14 days when tested according to ASTM C 321.
- B. Prepackaged, Polymer-Modified Cement Waterproofing
1. Negative-Side, Polymer-Modified Cement Waterproofing: Manufacturer's proprietary blend of dry cementitious and other ingredients for mixing with potable water **OR** polymer admixture, **as directed**, to produce a waterproof coating that is suitable for vertical and horizontal applications below or above grade, is breathable, resists negative-side hydrostatic pressure, has VOC content complying with limits of authorities having jurisdiction, and has properties meeting or exceeding the criteria specified below.
 - a. Water Permeability: Maximum zero for water at **30 feet (9 m)** when tested according to CE CRD-C 48.
 - b. Compressive Strength: Minimum **4000 psi (27.6 MPa)** at 28 days when tested according to ASTM C 109/C 109M.
 - c. Flexural Strength: Minimum **710 psi (4.8 MPa)** at 28 days when tested according to ASTM C 348.
 - d. Bond Strength: Minimum **220 psi (1.5 MPa)** at 14 days when tested according to ASTM C 321.
 - e. Color: White **OR** Gray **OR** As selected from full range **OR** As indicated in a color schedule, **as directed**.
 2. Positive-Side, Polymer-Modified Cement Waterproofing: Manufacturer's proprietary blend of dry cementitious and other ingredients for mixing with potable water or polymer admixture to produce a waterproof coating that is suitable for vertical and horizontal applications below or above grade, is breathable, resists positive-side hydrostatic pressure, has VOC content complying with limits of authorities having jurisdiction, and has properties meeting or exceeding the criteria specified below.
 - a. Water Permeability: Maximum zero for water at **30 feet (9 m)** when tested according to CE CRD-C 48.
 - b. Compressive Strength: Minimum **4000 psi (27.6 MPa)** at 28 days when tested according to ASTM C 109/C 109M.
 - c. Flexural Strength: Minimum **710 psi (4.8 MPa)** at 28 days when tested according to ASTM C 348.
 - d. Bond Strength: Minimum **220 psi (1.5 MPa)** at 14 days when tested according to ASTM C 321.
 - e. Color: White **OR** Gray **OR** As selected from full range **OR** As indicated in a color schedule, **as directed**.
- C. Accessory Materials
1. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
 2. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
 3. Portland Cement: ASTM C 150, Type I.
 4. Slurry-Coat and Protective-Topping Sand: ASTM C 144.

5. Trowel-Coat Sand: ASTM C 33, fine aggregate.
6. Polymer Admixture for Protective Topping: Polymer bonding agent and admixture designed to improve adhesion to prepared substrates and to not create a vapor barrier.
7. Water: Potable.

D. Mixes

1. Field-Mixed, Polymer-Modified Cement Waterproofing: Add polymer admixture to portland cement and sand according to manufacturer's written instructions. Blend together with mechanical mixer or by hand to required consistency.
OR
Prepackaged, Polymer-Modified Cement Waterproofing: Add prepackaged dry ingredients to mixing liquid according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.
2. Protective Topping: Measure, batch, and mix portland cement and sand in the proportion of 1:3 and water gaged with a polymer admixture. Blend together with mechanical mixer to required consistency.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
2. Proceed with application only after unsatisfactory conditions have been corrected.
3. Notify the Owner in writing of active leaks or defects that would affect system performance.

B. Preparation

1. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.
2. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
3. Stop active water leaks with plugging compound according to waterproofing manufacturer's written instructions.
4. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.
 - a. At holes and cracks in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and approximately **1 inch (25.4 mm)** deep. Fill reveal with patching compound flush with surface.
5. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
 - a. Clean concrete surfaces according to ASTM D 4258.
 - 1) Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
 - 2) Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
 - b. Clean concrete unit masonry surfaces according to ASTM D 4261.
 - 1) Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
 - 2) Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of **1/16 inch (1.6 mm)**.
 - c. Clean clay masonry surfaces according to ASTM D 5703.

- d. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

C. Application

1. General: Comply with waterproofing manufacturer's written instructions for application and curing.
 - a. Saturate surface with water for several hours prior to application with water and maintain damp condition until applying waterproofing. Remove standing water.
 - b. Apply waterproofing to surfaces indicated on Drawings.
 - c. Number of Coats: Number required for specified water permeability **OR Two OR Three, as directed.**
 - 1) Coating Thickness: Maximum application thickness of **47 mils (1.2 mm)** per coat for total thickness as required for specified water permeability **OR of 100 mils (2.5 mm), as directed.**
 - 2) Apply first coat as a slurry with brush or roller, and apply subsequent coats with brush, roller, spray, or trowel.
 - 3) Vigorously work first coat onto the substrate, forcing the material into surface voids. Apply each subsequent coat into full contact with previous coat.
 - 4) Allow manufacturer's recommended time between coats. Dampen surface between coats.
2. Final Coat Finish: Smooth troweled **OR Brushed OR Textured, as directed.**
3. Curing: Air-cure waterproofing for not less than five days immediately after application and prior to being placed in service.
4. Curing: Moist-cure waterproofing for not less than three days immediately after application has set, followed by air drying prior to being placed in service unless otherwise recommended in writing by manufacturer.
5. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:
 - a. Onto columns integral with treated walls.
 - b. Onto interior nontreated walls intersecting exterior treated walls, for a distance of **24 inches (600 mm)** for cast-in-place concrete and **48 inches (1200 mm)** for masonry.
 - c. Onto exterior walls and onto both exterior and interior columns, for a height of **12 inches (300 mm)**, where floors, but not walls, are treated.
 - d. Onto every substrate in areas indicated for treatment, including pipe trenches, pipe chases, pits, sumps, and similar offsets and features.
6. Protective Floor Topping: Apply **1-inch- (25.4-mm-)** thick, protective topping over floor surfaces.

D. Field Quality Control

1. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 07 16 13 00

SECTION 07 16 16 00 - CRYSTALLINE WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for crystalline waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes crystalline waterproofing for positive or negative-side application to concrete and concrete unit masonry.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions and installation instructions for crystalline waterproofing.
2. Qualification Data: For Applicator.
3. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.
4. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for crystalline waterproofing.
5. Field quality-control reports.

D. Quality Assurance

1. Applicator Qualifications: A firm experienced in applying crystalline waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.
2. Preinstallation Conference: Conduct conference at Project site.

E. Project Conditions

1. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit crystalline waterproofing to be performed according to manufacturer's written instructions.
2. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
3. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at **40 deg F (4.4 deg C)** or above during work and cure period, and space is well ventilated and kept free of water.

1.2 PRODUCTS

A. Waterproofing Materials

1. Crystalline Waterproofing: Prepackaged, gray-colored **OR** white-colored, **as directed**, proprietary blend of portland cement, specially treated sand, and active chemicals that, when mixed with water and applied, penetrates into concrete and concrete unit masonry and reacts chemically with the byproducts of cement hydration in the presence of water to develop crystalline growth within substrate capillaries to produce an impervious, dense, waterproof substrate; that has VOC content complying with limits of authorities having jurisdiction; with properties meeting or exceeding the criteria specified below.

- a. Water Permeability: Maximum zero for water at **30 feet (9 m)** when tested according to CE CRD-C 48.
- b. Compressive Strength: Minimum **4000 psi (27.6 MPa)** at 28 days when tested according to ASTM C 109/C 109M.

B. Accessory Materials

1. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs, reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
2. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
3. Portland Cement: ASTM C 150, Type I.
4. Sand: ASTM C 144.
5. Polymer Admixture for Protective Topping: Polymer bonding agent and admixture designed to improve adhesion to prepared substrates and not to create a vapor barrier.
6. Water: Potable.

C. Mixes

1. Crystalline Waterproofing: Add prepackaged dry ingredients to water according to manufacturer's written instructions. Mix together with mechanical mixer or by hand to required consistency.
2. Protective Topping: Measure, batch, and mix portland cement and sand in the proportion of 1:3 and water gaged with a polymer admixture. Blend together with mechanical mixer to required consistency.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
2. Proceed with application only after unsatisfactory conditions have been corrected.
3. Notify the Owner in writing of active leaks or defects that would affect system performance.

B. Preparation

1. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.
2. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
3. Stop active water leaks with plugging compound according to waterproofing manufacturer's written instructions.
4. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.
 - a. At holes and cracks in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and approximately **1 inch (25.4 mm)** deep. Fill reveal with patching compound flush with surface.
5. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
 - a. Clean concrete surfaces according to ASTM D 4258.

- 1) Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
- 2) Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
- b. Clean concrete unit masonry surfaces according to ASTM D 4261.
 - 1) Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.
 - 2) Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of **1/16 inch (1.6 mm)**.
- c. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.

C. Application

1. General: Comply with waterproofing manufacturer's written instructions for application and curing.
 - a. Saturate surface with water for several hours prior to application and maintain damp condition until applying waterproofing. Remove standing water.
 - b. Apply waterproofing to surfaces indicated on Drawings.
 - c. Number of Coats: Number required for specified water permeability **OR Two OR Three, as directed.**
 - d. Application Method: Brush **OR Spray, as directed.** Apply to ensure that each coat fills voids and is in full contact with substrate or previous coat.
 - e. Dampen surface between coats.
2. Final Coat Finish: Smooth **OR Brushed OR Spray Textured, as directed.**
3. Curing: Moist-cure waterproofing for three, **as directed,** days immediately after final coat has set, followed by air drying, unless otherwise recommended in writing by manufacturer.
4. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:
 - a. Onto columns integral with treated walls.
 - 1) Onto interior nontreated walls intersecting exterior treated walls, for a distance of **24 inches (600 mm)** for cast-in-place concrete and **48 inches (1200 mm)** for masonry.
 - 2) Onto exterior walls and onto both exterior and interior columns, for a height of **12 inches (300 mm)**, where floors, but not walls, are treated.
 - 3) Onto every substrate in areas indicated for treatment, including pipe trenches, pipe chases, pits, sumps, and similar offsets and features.
5. Protective Topping: Apply **1-inch- (25.4-mm-)** thick, protective topping over floor surfaces.

D. Field Quality Control

1. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 07 16 16 00

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SECTION 07 16 19 00 - METAL-OXIDE WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for metal-oxide waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes metal-oxide waterproofing for positive or negative-side application to concrete, concrete unit masonry, and clay masonry.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions and installation instructions for metal-oxide waterproofing.
2. Qualification Data: For Applicator.
3. Product Certificates: For waterproofing, patching, and plugging materials, from manufacturer.
4. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for metal-oxide waterproofing.
5. Field quality-control reports.

D. Quality Assurance

1. Applicator Qualifications: A firm experienced in applying metal-oxide waterproofing similar in material, design, and extent to that indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and that employs workers trained and approved by manufacturer.
2. Preinstallation Conference: Conduct conference at Project site.

E. Project Conditions

1. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit metal-oxide waterproofing to be performed according to manufacturer's written instructions.
2. Proceed with waterproofing work only after pipe sleeves, vents, curbs, inserts, drains, and other projections through the substrate to be waterproofed have been completed. Proceed only after substrate defects, including honeycombs, voids, and cracks, have been repaired to provide a sound substrate free of forming materials, including reveal inserts.
3. Ambient Conditions: Proceed with waterproofing work only if temperature is maintained at **40 deg F (4.4 deg C)** or above during work and cure period, and space is well ventilated and kept free of water.

1.2 PRODUCTS

A. Waterproofing Materials

1. Metal-Oxide Waterproofing Compound: A product specifically formulated for waterproofing concrete and masonry substrates; containing pulverized iron and a chemical oxidizing agent to cause the iron particles to rust and grow in size in the presence of water; with VOC content complying with limits of authorities having jurisdiction.

B. Accessory Materials

1. Patching Compound: Factory-premixed cementitious repair mortar, crack filler, or sealant recommended by waterproofing manufacturer for filling and patching tie holes, honeycombs,

reveals, and other imperfections; compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.

2. Plugging Compound: Factory-premixed cementitious compound with hydrophobic properties and recommended by waterproofing manufacturer; resistant to water and moisture but vapor permeable for all standard applications (vertical, overhead, and horizontal surfaces not exposed to vehicular traffic); compatible with substrate and other materials indicated; and VOC content complying with limits of authorities having jurisdiction.
3. Portland Cement: ASTM C 150, Type I.
4. Sand: ASTM C 144.
5. Water: Potable.

C. Mixes

1. Metal-Oxide Coats: Add metal-oxide waterproofing compound to portland cement, sand, and water according to manufacturer's written instructions. Blend together with mechanical mixer or by hand to required consistency for each coat.
2. Protection Coat: Field mix protection coat consisting of portland cement and sand as recommended by same manufacturer as metal-oxide waterproofing according to manufacturer's written instructions for application over waterproofing. Measure, batch, and mix materials with potable water. Blend together with mechanical mixer to required consistency.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Applicator present, for suitable conditions where waterproofing is to be applied.
2. Proceed with application only after unsatisfactory conditions have been corrected.
3. Notify the Owner in writing of active leaks or defects that would affect system performance.

B. Preparation

1. Protect other work from damage caused by cleaning, preparation, and application of waterproofing. Provide temporary enclosure to confine spraying operation and to ensure adequate ambient temperatures and ventilation conditions for application.
2. Do not allow waterproofing, patching, and plugging materials to enter reveals or annular spaces intended for resilient sealants or gaskets, such as joint spaces between pipes and pipe sleeves.
3. Stop active water leaks with plugging compound according to waterproofing manufacturer's written instructions.
4. Repair damaged or unsatisfactory substrate with patching compound according to manufacturer's written instructions.
 - a. At holes and cracks in substrate, remove loosened chips and cut reveal with sides perpendicular to surface, not tapered, and approximately **1 inch (25.4 mm)** deep. Fill reveal with patching compound flush with surface.
5. Surface Preparation: Comply with waterproofing manufacturer's written instructions to remove efflorescence, chalk, dust, dirt, mortar spatter, grease, oils, paint, curing compounds, and form-release agents to ensure that waterproofing bonds to surfaces.
 - a. Clean concrete surfaces according to ASTM D 4258.
 - 1) Scratch- and Float-Finished Concrete: Etch with 10 percent muriatic (hydrochloric) acid solution according to ASTM D 4260.
 - 2) Prepare smooth-formed and trowel-finished concrete by mechanical abrading or abrasive-blast cleaning according to ASTM D 4259.
 - b. Clean concrete unit masonry surfaces according to ASTM D 4261.
 - 1) Lightweight Concrete Unit Masonry: Etch with 10 percent muriatic (hydrochloric) acid solution or abrade surface by wire brushing. Remove acid residue until pH readings of water after rinse are not more than 1.0 pH lower or 2.0 pH higher than pH of water before rinse.

- 2) Medium- and Normal-Weight Concrete Unit Masonry: Sandblast or bushhammer to a depth of **1/16 inch (1.6 mm)**.
 - c. Clean clay masonry surfaces according to ASTM D 5703.
 - d. Concrete Joints: Clean reveals according to waterproofing manufacturer's written instructions.
- C. Application
1. General: Comply with waterproofing manufacturer's written instructions for application and curing.
 - a. Saturate surface for several hours prior to application with water and maintain damp condition until applying waterproofing. Remove standing water.
 - b. Apply waterproofing to surfaces indicated on Drawings.
 - c. Number of Metal-Oxide Coats: Number required for specified water permeability **OR Two OR Three, as directed**.
 - d. Application Method: Brush apply the waterproofing, vigorously working first coat onto the substrate and forcing the material into surface voids. Brush each subsequent coat into full contact with previous coat.
 - e. Dampen surface between coats.
 - f. Allow each coat to set for 24 hours between coats.
 - g. Protection Coat: Apply to a thickness of **1/8 inch (3 mm) OR 1/4 inch (6 mm), as directed**, for walls and **1 inch (25 mm)** for floors.
 2. Final Coat Finish: Smooth **OR** Brushed **OR** Textured, **as directed**.
 3. Curing: Moist-cure waterproofing for three days immediately after final coat has set, followed by air drying prior to being placed in service, unless otherwise recommended in writing by manufacturer.
 4. Waterproofing Treatment Extensions: Extend waterproofing treatment as follows:
 - a. Onto columns integral with treated walls.
 - b. Onto interior nontreated walls intersecting exterior treated walls, for a distance of **24 inches (600 mm)** for cast-in-place concrete and **48 inches (1200 mm)** for masonry.
 - c. Onto exterior walls and onto both exterior and interior columns, for a height of **12 inches (300 mm)**, where floors, but not walls, are treated.
 - d. Onto every substrate in areas indicated for treatment, including pipe trenches, pipe chases, pits, sumps, and similar offsets and features.
- D. Field Quality Control
1. Inspection: Engage manufacturer's representative to inspect completed application and provide a written report that application complies with manufacturer's written instructions.

END OF SECTION 07 16 19 00

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SECTION 07 17 13 00 - BENTONITE WATERPROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for bentonite waterproofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Bentonite waterproofing.
 - b. Molded-sheet drainage panels.
 - c. Insulation.

C. Submittals

1. Product Data: For each type of product indicated. Include product specifications and manufacturer's written installation instructions.
2. Shop Drawings: Show installation details for interface with other work.
3. Samples: For each of the following products, in sizes indicated:
 - a. Waterproofing: **6 inches (150 mm)** square.
 - b. Drainage Panels: **6 inches (150 mm)** square.
 - c. Insulation: **6 inches (150 mm)** square.
4. Material Certificates: For each type of bentonite waterproofing, from manufacturer.
5. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency **OR** a qualified testing agency, **as directed**, for bentonite waterproofing.
6. Field quality-control reports.
7. Warranty: Sample of special warranty.

D. Quality Assurance

1. Source Limitations: Obtain bentonite waterproofing system from single source from single manufacturer. Obtain accessory products used with bentonite waterproofing from sources acceptable to bentonite waterproofing manufacturer.
2. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials to Project site in manufacturer's original unopened and undamaged containers.
2. Store materials in a dry, well-ventilated space.
3. Remove and replace bentonite materials that have been prematurely exposed to moisture.

F. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit bentonite waterproofing to be installed according to manufacturers' written instructions and warranty requirements.
 - a. Do not apply waterproofing materials to surfaces where ice or frost is visible. Do not apply bentonite waterproofing materials in areas with standing water.
 - b. Placing bentonite clay products in panel or composite form on damp surfaces is allowed if approved in writing by manufacturer.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree(s) to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Geotextile/Bentonite Sheets

1. Geotextile/Bentonite Waterproofing: Minimum of **1.0 lb/sq. ft. (5 kg/sq. m)** of bentonite clay granules between two layers of geotextile polypropylene fabric, one woven and one nonwoven, needle punched and heat fused together.
 - a. Grab Tensile Strength: **95 lbf (422 N)** according to ASTM D 4632.
2. Contaminant-Resistant Geotextile/Bentonite Waterproofing: Minimum of **1.0 lb/sq. ft. (5 kg/sq. m)** of bentonite clay granules specially formulated for use in saltwater or contaminated ground water, between two layers of geotextile polypropylene fabric, one woven and one nonwoven, needle punched and heat fused together.
 - a. Grab Tensile Strength: **95 lbf (422 N)** according to ASTM D 4632.
3. Geotextile-Geomembrane/Bentonite Waterproofing: Minimum of **1.0 lb/sq. ft. (5 kg/sq. m)** of bentonite clay granules between two layers of geotextile polypropylene fabric, one woven and one nonwoven, needle punched and heat fused together; and the woven fabric coated with a low-permeable polypropylene geomembrane.
 - a. Grab Tensile Strength: **95 lbf (422 N)** according to ASTM D 4632.
4. Composite Geotextile-HDPE/Bentonite Membrane: Minimum of **1.1 lb/sq. ft. (5.4 kg/sq. m)** of bentonite clay granules bonded to nonwoven geotextile polypropylene fabric, with HDPE bonded to surface of nonwoven fabric.
 - a. Grab Tensile Strength: **120 lbf (534 N)** according to ASTM D 4632.
 - b. Puncture Resistance: **140 lbf (620 N)** according to ASTM D 4833.
 - c. Vapor Permeance: 0.03 perms according to ASTM E 96.
5. Contaminant-Resistant Composite Geotextile-HDPE/Bentonite Membrane: Minimum of **1.1 lb/sq. ft. (5.4 kg/sq. m)** of bentonite clay granules specially formulated for use in saltwater or contaminated ground water, bonded to nonwoven geotextile polypropylene fabric, with HDPE bonded to surface of nonwoven fabric.
 - a. Grab Tensile Strength: **120 lbf (534 N)** according to ASTM D 4632.
 - b. Puncture Resistance: **140 lbf (620 N)** according to ASTM D 4833.
 - c. Vapor Permeance: 0.03 perms according to ASTM E 96.

B. Composite HDPE/Bentonite Membrane

1. Composite HDPE/Bentonite Membrane: Minimum **90-mil- (2.3-mm-)** thick membrane consisting of a **12-mil- (0.5-mm-)** thick, HDPE geomembrane liner bonded to a layer of bentonite clay granules **78 mils (1.9 mm)** thick.
 - a. Puncture Resistance: **169 lbf (752 N)** according to ASTM E 154.
 - b. Vapor Permeance: 0.03 perms according to ASTM E 96.
2. Composite HDPE/Bentonite Membrane with Protective Facing: Minimum **170-mil- (4.3-mm-)** thick membrane consisting of HDPE geomembrane liner bonded to a layer of bentonite clay granules and with a spun polypropylene facing.
 - a. Puncture Resistance: **169 lbf (752 N)** according to ASTM E 154.
 - b. Vapor Permeance: 0.03 perms according to ASTM E 96.
3. Composite HDPE/Bentonite-Polymer Membrane: Minimum **200-mil- (5-mm-)** thick membrane consisting of HDPE geomembrane liner bonded to a layer of bentonite-polymer clay granules.
 - a. Puncture Resistance: **75 lbf (334 N)** according to ASTM D 4833.
 - b. Vapor Permeance: 0.005 perms according to ASTM E 96.
4. Composite Gastight HDPE/Bentonite Membrane: Minimum **150-mil- (3.8-mm-)** thick membrane consisting of a **60-mil- (1.5-mm-)** thick, HDPE geomembrane liner bonded to a layer of bentonite clay.

- a. Puncture Resistance: **169 lbf (752 N)** according to ASTM E 154.
 - b. Vapor Permeance: 0.03 perms according to ASTM E 96.
5. Composite Saline/Alkaline HDPE/Bentonite Membrane: Minimum **150-mil- (3.8-mm-)** thick membrane consisting of a **60-mil- (1.5-mm-)** thick, HDPE geomembrane liner bonded to a layer of bentonite clay granules.
 - a. Puncture Resistance: **169 lbf (752 N)** according to ASTM E 154.
 - b. Vapor Permeance: 0.03 perms according to ASTM E 96.
- C. Composite Geotextile-HDPE/Bentonite Membrane
 1. Geotextile/Bentonite-Polymer Waterproofing: Minimum **250-mil- (6.4-mm-)** thick membrane of bentonite-polymer clay granules between two layers of geotextile polypropylene fabric, one woven and one nonwoven, needle punched and heat fused together.
 - a. Puncture Resistance: **75 lbf (334 N)** according to ASTM D 4833.
 - b. Vapor Permeance: 0.005 perms according to ASTM E 96.
- D. Bentonite Panels
 1. Standard Panels: **3/16-inch- (5-mm-)** thick, corrugated kraft-paper panels with a minimum of **1.0 lb/sq. ft. (5 kg/sq. m)** of bentonite confined in corrugations of boards.
 2. Coated Panels: **3/16-inch- (5-mm-)** thick, corrugated kraft-paper panels specially coated to resist premature hydration due to incidental moisture; filled with a minimum of **1.0 lb/sq. ft. (5 kg/sq. m)** of bentonite.
 3. Contaminant-Resistant Panels: **3/16-inch- (5-mm-)** thick, corrugated kraft-paper panels with a minimum of **1.0 lb/sq. ft. (5 kg/sq. m)** of contaminant-resistant granular bentonite specially formulated for use in contaminated ground-water conditions; confined in corrugations of boards.
- E. Installation Accessories
 1. Granular Bentonite: Sodium bentonite clay containing a minimum of 90 percent montmorillonite (hydrated aluminum silicate), with a minimum of 90 percent passing a **No. 20 (0.85-mm)** sieve.
 2. Bentonite Mastic: Trowelable consistency, bentonite compound, specifically formulated for application at joints and penetrations.
 3. Granular Bentonite Tubes: Manufacturer's standard **2-inch- (50-mm-)** diameter, water-soluble tube containing approximately **1.5 lb/ft. (2.2 kg/m)** of bentonite; hermetically sealed; designed specifically for placing on wall footings at line of joint with exterior base of wall.
 4. Termination Bar: Extruded-aluminum or formed-stainless-steel bars with upper flange to receive sealant.
 5. Plastic Protection Sheet: Polyethylene sheeting complying with ASTM D 4397; thickness recommended by waterproofing manufacturer to suit application but at least **6 mils (0.15 mm)** thick.
 6. Cement Grout Patching Material: Manufacturer's recommended grout mix compatible with substrate being patched.
 7. Masonry Fasteners: Case-hardened nails or hardened-steel, powder-actuated fasteners. Depending on manufacturer's written requirements, provide **1/2- or 1-inch- (13- or 25-mm-)** diameter washers under fastener heads.
 8. Sealants: As recommended in writing by waterproofing manufacturer. Comply with requirements specified in Division 7 Section "Joint Sealants."
 9. Tapes: Waterproofing manufacturer's recommended tape for joints between sheets, membranes, or panels.
 10. Adhesive: Water-based adhesive used to secure waterproofing to both vertical and horizontal surfaces.
 11. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners, and as follows:
 - a. Thickness: **1/8 inch (3 mm)**, nominal, for vertical applications; **1/4 inch (6 mm)**, nominal, elsewhere.
 12. Geotextile Protection Course: As recommended by waterproofing manufacturer.
 13. Molded-Sheet Drainage Panel: Comply with Division 33 Section "Subdrainage".

14. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding **No. 70 (0.21-mm)** sieve laminated to one side with **OR** without, **as directed**, a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of **9 to 15 gpm per foot (112 to 188 L/min. per m)**.
15. Woven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a woven-geotextile facing with an apparent opening size not exceeding **No. 40 (0.425-mm)** sieve laminated to one side with **OR** without, **as directed**, a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a horizontal flow rate not less than **2.8 gpm per foot (35 L/min. per m)**.
16. Board Insulation: Extruded-polystyrene board insulation complying with ASTM C 578, square **OR** shiplap, **as directed**, edged.
 - a. Type VI, **40-psi (276-kPa)** minimum compressive strength.
 - b. Type VII, **60-psi (414-kPa)** minimum compressive strength.
 - c. Type V, **100-psi (690-kPa)** minimum compressive strength.
17. Unfaced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa)** minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
18. Geotextile-Faced Wall Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa)** minimum compressive strength; fabricated with tongue-and-groove edges and with one side having grooved drainage channels faced with nonwoven geotextile filter fabric.
19. Unfaced Plaza Deck Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, **40-psi (276-kPa)** **OR** Type VII, **60-psi (414-kPa)**, **as directed**, minimum compressive strength; unfaced; fabricated with shiplapped or channel edges and with one side having ribbed drainage channels.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations affecting performance of bentonite waterproofing.
2. Verify that substrate is complete and that work that will penetrate waterproofing is complete and rigidly installed.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Coordinate work in the vicinity of waterproofing to ensure proper conditions for installing the waterproofing system and to prevent damage to waterproofing after installation.
2. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
3. Horizontal Concrete Surfaces: Remove debris, standing water, oily substances, mud, and similar substances that could impair the bonding ability of concrete or the effectiveness of waterproofing. Fill voids, cracks greater than **1/8 inch (3 mm)**, honeycomb areas, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
4. Excavation Support and Protection System: If water is seeping, use plastic protection sheets or other suitable means to prevent wetting the bentonite waterproofing. Fill minor gaps and spaces **1/8 inch (3 mm)** wide or wider with wood, metal, concrete, or other appropriate filling material. Cover or fill large voids and crevices with cement mortar according to manufacturer's written instructions.

- C. Installation, General
1. Install waterproofing and accessories according to manufacturer's written instructions.
 - a. Apply granular bentonite around penetrations in horizontal surfaces and changes in plane according to manufacturer's details in preparation for granular bentonite tubes and mastic.
 - b. Apply granular bentonite tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
 2. Apply granular bentonite tubes continuously on footing against base of wall to be waterproofed according to manufacturer's written instructions.
 3. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts according to manufacturer's written instructions.
 4. Install protection course before backfilling or placing overburden when recommended by waterproofing manufacturer.
- D. Geotextile/Bentonite Sheet Installation
1. General: Install a continuous layer of waterproofing sheets directly against concrete to be waterproofed. Lap ends and edges a minimum of **4 inches (100 mm)** on horizontal and vertical substrates. Stagger end joints between sheets a minimum of **24 inches (600 mm)**. Fasten seams by stapling to adjacent sheet or nailing to substrate.
 2. Below Structural Slabs-on-Grade: Place waterproofing sheets on compacted substrate with ends and edges lapped and stapled.
 - a. Install a layer of waterproofing sheets under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of **8 inches (200 mm)** up or beyond perimeter slab forms.
 3. Concrete Walls: Starting at bottom of wall, apply waterproofing sheets horizontally with primary backing side against wall. Secure with masonry fasteners spaced according to manufacturer's written instructions. Extend to bottom of footing, grade beam, or wall, and secure.
 - a. Termination at Grade: Extend waterproofing sheets to within **2 inches (50 mm)** of finish grade unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.
OR
Termination at Grade: Fasten top edge of waterproofing sheets to wall and protect top edge with sheet metal counterflashing. Cover waterproofing with a lapped course of plastic protection sheets if backfilling does not proceed immediately.
 4. Excavation Support and Protection (Permanent Shoring): Encase tieback rods, nuts, and plates, using bentonite mastic and waterproofing sheets, according to waterproofing manufacturer's written instructions for each configuration.
 - a. Install a layer of waterproofing sheets, with ends and edges lapped and nailed to shoring. Cover waterproofing with plastic protection sheets if needed for protection from precipitation; remove plastic sheets before placing concrete.
 - b. Inspect and repair waterproofing after reinforcing steel has been placed. Coordinate and control concrete placement to avoid damage to waterproofing.
- E. Composite HDPE/Bentonite Membrane Installation
1. General: Install a continuous layer of waterproofing membrane with ends and edges lapped a minimum of **3 inches (75 mm)**. Stagger end joints between membranes. Seal joints with permanent seam tape.
 2. Below Structural Slabs-on-Grade: Apply waterproofing membrane with HDPE side down and staple ends and edges.
 - a. Install under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of **8 inches (200 mm)** up or beyond perimeter slab forms.
 - b. Protect waterproofing from damage caused by reinforcing bar supports with sharp edges.
 3. Slabs: Starting at lowest point, install a continuous layer of waterproofing membrane, with ends and edges lapped a minimum of **2 inches (50 mm)**.
 4. Vertical Concrete or Masonry Walls: Apply mastic around penetrations and form continuous **2-inch (50-mm)** cant at intersection of footings and walls with mastic.

- a. Starting at lowest point, install a layer of waterproofing membrane horizontally, extending a minimum of **6 inches (150 mm)** onto the footing. Lap membrane ends and edges a minimum of **2 inches (50 mm)**.
 - b. Secure membrane to wall with adhesive or washer-headed fasteners, and tape terminations of membrane at grade.
5. Excavation Support and Protection: Cut, clean, and treat tiebacks and similar projections. Encase tieback rods, nuts, and plates. If water is present, cover shoring and lagging with plastic protection sheets.
- a. Starting at lowest point, install a layer of waterproofing membrane, with ends and edges lapped and nailed to shoring.
6. Horizontal Roofs, Plazas, and between Slabs: Starting at lowest point, install a layer of waterproofing membrane, with ends and edges lapped and taped a minimum of **3 inches (75 mm)**.
- a. Prime concrete substrates. Primer may be omitted on concrete surfaces that comply with requirements for dryness, surface texture, and freedom from imperfections.
 - b. Install bentonite side of membrane against the material to be waterproofed.
 - c. Terminations at Vertical Surfaces: Provide a fillet or cant at intersection of horizontal and vertical substrates. Extend waterproofing membrane to top of curb or to a minimum of **6 inches (150 mm)** above plane of waterproofing; secure with manufacturer's recommended tape.
 - d. Cover waterproofing with a plastic slip-sheet.
- F. Composite Geotextile-HDPE/Bentonite Membrane Installation
1. General: Install a continuous layer of waterproofing membrane with ends and edges lapped a minimum of **3 inches (75 mm)**. Stagger end joints between membranes. Seal joints with permanent seam tape.
 2. Below Structural Slabs-on-Grade: Apply waterproofing membrane with HDPE side down and staple ends and edges.
 - a. Install under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of **8 inches (200 mm)** up or beyond perimeter slab forms.
 - b. Protect waterproofing from damage caused by reinforcing bar supports with sharp edges.
 3. Concrete Walls: Starting at bottom of wall, apply waterproofing membrane with HDPE side facing Installer; overlap sheets **3 inches (75 mm)**. Secure with powder-actuated fasteners or case-hardened nails. Extend to bottom of footing, grade beam, or wall, and secure.
 - a. Termination at Grade: Extend waterproofing membrane to within **2 inches (50 mm)** of finish grade unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.
 4. Excavation Support and Protection (Permanent Shoring): Cut, clean, and treat tiebacks and similar projections. Encase tieback rods, nuts, and plates. If water is present, cover shoring and lagging with plastic protection sheets; remove plastic sheets before placing concrete.
 - a. Starting at lowest point, install a layer of waterproofing membrane, with ends and edges lapped and mechanically secured to shoring.
 - b. Inspect and repair waterproofing membrane after reinforcing steel has been placed. Coordinate and control concrete placement to avoid damage to waterproofing.
 5. Horizontal Slabs, Roofs, and Plazas: Starting at lowest point, install a layer of waterproofing membrane, with ends and edges lapped and taped a minimum of **3 inches (75 mm)**.
 - a. Clean overlap area and apply waterproof tape, rolling the exposed edge to seal to sheet below.
 - b. Turn edges up and seal to vertical surfaces.
 - c. Cover waterproofing with a plastic slip-sheet.
- G. Bentonite Panel Installation

1. General: Install a continuous layer of bentonite waterproofing panels with ends and edges lapped a minimum of **1-1/2 inches (38 mm)** unless otherwise indicated. Stagger joints in adjoining panel rows.
 - a. Install a double layer of waterproofing panels, with ends and edges butted instead of lapped and with second layer of joints staggered over first. Staple panels together to hold them in place.
 2. Concrete Walls: Starting at bottom of wall, apply waterproofing panels with ends and edges lapped and with vertical joints staggered. Secure with fasteners or adhesive recommended in writing by manufacturer. Extend to bottom of footing, grade beam, or wall.
 - a. Horizontal-to-Vertical Transitions: Install granular bentonite tubes immediately before backfilling and compact backfill over the joint.
 - b. Termination at Grade: Extend waterproofing panels to within **2 inches (50 mm)** of finish grade unless otherwise indicated. Secure top edge with termination bar. Apply sealant to top edge of termination bar.
OR
Termination at Grade: Fasten top edge of waterproofing panels to wall and protect top edge with sheet metal counterflashing.
 - c. Cover waterproofing panels with a lapped course of plastic protection sheets; remove plastic sheets before backfilling.
- H. Molded-Sheet Drainage Panel Installation
1. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate. Use adhesives or mechanical fasteners that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 - a. For vertical applications, install board insulation **OR** protection course, **as directed**, before installing drainage panels.
- I. Insulation Installation
1. Install one or more layers of board insulation to achieve required thickness and insulation drainage panels over waterproofed surfaces. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.
 2. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.
 3. On horizontal surfaces, loosely lay insulation units. Stagger end joints and tightly abut insulation units.
- J. Field Quality Control
1. Inspection: Arrange for manufacturer's representative to inspect completed waterproofing installation before covering with other construction and provide written report that installation complies with manufacturer's written instructions.
 - a. Remove and replace applications of bentonite waterproofing where inspection indicates that it does not comply with specified requirements.
 2. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after completing waterproofing but before overlaying construction is placed. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood to an average depth of **2-1/2 inches (64 mm)** with a minimum depth of **1 inch (25 mm)** but not exceeding a depth of **4 inches (100 mm)**. Maintain **2 inches (50 mm)** of clearance from top of membrane flashings.
 - b. Flood each area for 24 **OR** 48, **as directed**, hours.
 - c. After flood testing, repair leaks, repeat flood test, and make further repairs until waterproofing installation is watertight.
 3. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.

07 - Thermal And Moisture Protection



END OF SECTION 07 17 13 00

SECTION 07 19 13 00 - WATER REPELLENTS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for water repellents. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes penetrating and film-forming water-repellent coatings for the following vertical and horizontal surfaces:
 - a. Concrete (unpainted).
 - b. Cast stone.
 - c. Brick masonry.
 - d. Concrete unit masonry (unpainted and unglazed).
 - e. Portland cement plaster (stucco).
 - f. Stonework.

C. Performance Requirements

1. Performance Testing: Provide water repellents that comply with test-performance requirements indicated, as evidenced by reports of tests performed by manufacturer **OR** based on Project-specific preconstruction testing, **as directed**, by a qualified independent testing agency on manufacturer's standard products applied to substrates simulating those on Project using same application methods to be used for Project.
 - a. Engage testing agency to perform preconstruction tests on laboratory mockups.
 - b. Select sizes and configurations of assemblies to adequately demonstrate capability of water repellents to comply with performance requirements.
 - c. Notify the Owner seven days in advance of the dates and times when assemblies will be constructed.
2. Absorption: Minimum 80 **OR** 90, **as directed**, percent reduction of absorption after 24 hours in comparison of treated and untreated specimens.
 - a. Brick: ASTM C 67.
 - b. Stone: ASTM C 97.
 - c. Concrete Unit Masonry: ASTM C 140.
 - d. Hardened Concrete: ASTM C 642.
3. Water-Vapor Transmission: Maximum 10 percent reduction in rate of vapor transmission in comparison of treated and untreated specimens, per ASTM E 96.
4. Permeability: Minimum 80 percent water-vapor transmission in comparison of treated and untreated specimens, per ASTM D 1653.
5. Water Penetration and Leakage through Masonry: Maximum 90 percent reduction in leakage rate in comparison of treated and untreated specimens, per ASTM E 514.
6. Durability: Maximum 5 percent loss of water repellency after 2500 hours of weathering in comparison to specimens before weathering, per ASTM G 154.
 - a. Reduction of Water Absorption: 80 percent.
 - b. Reduction in Chloride Content: 80 percent.

D. Submittals

1. Product Data: For each type of product indicated.
2. Product test reports.

E. Quality Assurance

1. Installer Qualifications: An employer of workers trained and approved by manufacturer.

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency specified in Part 1.1 "Performance Requirements" Article within specified warranty period.
 - a. Warranty Period: Two **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Penetrating Water Repellents

1. Silane, Penetrating Water Repellent: Clear, monomeric compound containing 20 percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with **3.3 lb/gal. (400 g/L)** or less of VOCs.
2. Silane, Penetrating Water Repellent: Clear, monomeric compound containing 20 percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with **5 lb/gal. (600 g/L)** or less of VOCs.
3. Silane, Penetrating Water Repellent: Pigmented, monomeric compound containing 20 percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with **5 lb/gal. (600 g/L)** or less of VOCs.
4. Silane, Penetrating Water Repellent: Clear, monomeric compound containing 20 percent or more solids of alkyltrialkoxysilanes; with alcohol, mineral spirits, water, or other proprietary solvent carrier; and with more than **5 lb/gal. (600 g/L)** of VOCs.
5. Siloxane, Penetrating Water Repellent: Clear, oligomeric alkylalkoxysiloxanes containing 10 percent or more solids; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with **3.3 lb/gal. (400 g/L)** or less of VOCs.
6. Siloxane, Penetrating Water Repellent: Clear, oligomeric alkylalkoxysiloxanes containing 10 percent or more solids; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with **5 lb/gal. (600 g/L)** or less of VOCs.
7. Siloxane, Penetrating Water Repellent: Clear, oligomeric alkylalkoxysiloxanes containing 10 percent or more solids; with alcohol, ethanol, mineral spirits, water, or other proprietary solvent carrier; and with more than **5 lb/gal. (600 g/L)** of VOCs.
8. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blends with **3.3 lb/gal. (400 g/L)** or less of VOCs.
9. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blends with **5 lb/gal. (600 g/L)** or less of VOCs.
10. Proprietary-Blend, Penetrating Water Repellent: Clear, consisting of 1 or several different resins (silanes or siloxanes), polymers, stearates, or oils plus other compounds or products of components; and with **3.3 lb/gal. (400 g/L)** or less of VOCs.
11. Proprietary-Blend, Penetrating Water Repellent: Clear, consisting of 1 or several different resins (silanes or siloxanes), polymers, stearates, or oils plus other compounds or products of components; and with **5 lb/gal. (600 g/L)** or less of VOCs.

B. Film-Forming Water Repellents

1. Silicone Sealer, Film-Forming Water Repellent: Clear, polymerized, silicone-resin water repellent for dense substrates; with a solvent- or water-based solution containing not less than 3 and up to 5 percent solids by weight; and with **3.3 lb/gal. (400 g/L)** or less of VOCs.
2. Silicone-Sealer, Film-Forming Water Repellent: Clear, polymerized, silicone-resin water repellent for dense substrates; with a solvent- or water-based solution containing not less than 3 and up to 5 percent solids by weight; and with **5 lb/gal. (600 g/L)** or less of VOCs.
3. Proprietary-Blend, Film-Forming Water Repellent: Clear, consisting of 1 or several different resins, acrylics, polymers, stearates, or oils plus other compounds or products of components; and with **3.3 lb/gal. (400 g/L)** or less of VOCs.
4. Proprietary-Blend, Film-Forming Water Repellent: Clear, consisting of 1 or several different resins, acrylics, polymers, stearates, or oils plus other compounds or products of components; and with **5 lb/gal. (600 g/L)** or less of VOCs.

5. Siliconate, Film-Forming Water Repellent: Clear, with **3.3 lb/gal. (400 g/L)** or less of VOCs.
6. Acrylic, Film-Forming Water Repellent: Clear **OR** Pigmented, **as directed**, breathing coating of acrylic resins; with a water-based, solvent-based, or acrylic emulsion solution containing less than 15 percent solids by volume; and with **3.3 lb/gal. (400 g/L)** or less of VOCs.
 - a. Colors: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
7. Acrylic, Film-Forming Water Repellent: Pigmented, with **5 lb/gal. (600 g/L)** or less of VOCs.
 - a. Colors: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Preparation

1. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water-repellent manufacturer's written instructions, to ensure that surface is dry enough.
 - a. Cast-in-Place Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
 - b. Clay Brick Masonry: Clean clay brick masonry per ASTM D 5703.
2. Test for pH level, according to water-repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
3. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
4. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
 - a. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Application

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
2. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.
 - a. Precast Concrete: At Contractor's option, first application of water repellent on precast concrete units may be completed before installing units. Mask sealant-bond surfaces to prevent water repellent from migrating onto joint surfaces.
3. Apply a second saturation spray coating, as directed, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

C. Cleaning

1. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

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Task	Specification	Specification Description
07 19 16 00	07 19 13 00	Water Repellents

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SECTION 07 21 13 13 - MODIFIED BITUMOUS PROTECTED MEMBRANE ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for modified bituminous protected membrane roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes APP-modified and SBS-modified bituminous protected membrane roofing.

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
2. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: If membrane roofing system is to be designed to withstand uplift pressure established by ASCE/SEI 7, provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - a. Corner Uplift Pressure: as directed by the Owner.
 - b. Perimeter Uplift Pressure: as directed by the Owner.
 - c. Field-of-Roof Uplift Pressure: as directed by the Owner.
4. FM Approvals Listing: If Project is FM Global insured or if FM Approvals requirements will set a minimum quality standard, provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120, **as directed.**
 - b. Hail Resistance Rating: MH **OR** SH, **as directed.**
5. Energy Performance (if required for LEED-NC Credit SS 7.2): Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

OR

Energy Performance (for roofs that must comply with the DOE's ENERGY STAR requirements): Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

OR

Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial Solar Reflectance not less than 0.70 and Thermal Emittance not less than 0.75 when tested according to CRR-1.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - a. Base flashings and membrane terminations.
 - b. Tapered insulation, including slopes.
 - c. Crickets, saddles, and tapered edge strips, including slopes.
4. Samples: For the following products:
 - a. Sheet roofing materials, including base sheet, base-ply sheet, roofing membrane sheet, flashing backer sheet, membrane cap sheet and flashing sheet, of color specified.
 - b. Roof insulation.
 - c. **10 lb (4.5 kg)** of aggregate ballast in gradation and color indicated.
 - d. Roof paver, full sized, in each color and texture required.
5. Qualification Data: For qualified Installer and manufacturer.
6. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
7. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
8. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES or applicable model code organization.
9. Maintenance Data: For roofing system to include in maintenance manuals.
10. Warranties: Sample of special warranties.

F. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is UL listed **OR** FM Approvals approved, **as directed**, for membrane roofing system identical to that used for this Project.
2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
3. Source Limitations: Obtain components including roof insulation and fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
4. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
5. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
6. Preinstallation Roofing Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

H. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

I. Warranty

1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - a. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, roof pavers, and other components of membrane roofing system.
 - b. Warranty Period: 10 **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. APP-Modified Asphalt-Sheet Materials

1. Roofing Membrane Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
2. Smooth-Surfaced Roofing Membrane Cap Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
OR
Granule-Surfaced Roofing Membrane Cap Sheet: ASTM D 6222, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified.

B. SBS-Modified Asphalt-Sheet Materials

1. Roofing Membrane Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
2. Smooth-Surfaced Roofing Membrane Cap Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
OR

Granule-Surface Roofing Membrane Cap Sheet: ASTM D 6164, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified.

OR

Metal-Foil-Surfaced Roofing Membrane Cap Sheet: ASTM D 6298, metal-foil surfaced SBS-modified asphalt sheet (reinforced with glass fibers); suitable for application method specified, and as follows:

a. Foil Surfacing: Aluminum **OR** Copper **OR** Stainless steel, **as directed**.

C. Base-Sheet Materials

1. Base Sheet: ASTM D 4601, Type II, SBS-modified asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.

a. Weight: 25 lb/100 sq. ft. (1.2 kg/sq. m) **OR** 40 lb/100 sq. ft. (1.95 kg/sq. m) **OR** 50 lb/100 sq. ft. (2.4 kg/sq. m) **OR** 60 lb/100 sq. ft. (2.9 kg/sq. m) **OR** 75 lb/100 sq. ft. (3.7 kg/sq. m), **as directed**, minimum.

OR

Base Sheet: ASTM D 4601, Type I **OR** Type II, **as directed**, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR

Base Sheet: ASTM D 4897, Type II, venting, nonperforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface.

OR

Base Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

D. Base-Ply Sheet Materials

1. Glass-Fiber Base-Ply Sheet: ASTM D 2178, Type IV **OR** Type VI, **as directed**, asphalt-impregnated, glass-fiber felt.

E. Base Flashing Sheet Materials

1. Backer Sheet: ASTM D 4601, Type I **OR** Type II, **as directed**, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR

Backer Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

OR

Backer Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.

OR

Backer Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.

2. Smooth-Surfaced Flashing Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.

3. Granule-Surfaced Flashing Sheet (for use with APP-modified roofing membranes): ASTM D 6222, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with polyester

fabric) **OR** ASTM D 6223, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:

- a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
4. Granule-Surfaced Flashing Sheet (for use with SBS-modified roofing membranes): ASTM D 6164, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
5. Metal-Foil-Surfaced Flashing Sheet: ASTM D 6298, metal-foil surfaced SBS-modified asphalt sheet (reinforced with glass fibers); suitable for application method specified, and as follows:
 - a. Foil Surfacing: Aluminum **OR** Copper **OR** Stainless steel **OR** Aluminum, fluoropolymer coated finish, of color and gloss selected from manufacturer's full range, **as directed**.
6. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

F. Auxiliary Roofing Membrane Materials

1. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing membrane.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Multipurpose Construction Adhesives: 70 g/L.
 - 3) Fiberglass Adhesives: 80 g/L.
 - 4) Contact Adhesives: 80 g/L.
 - 5) Other Adhesives: 250 g/L.
 - 6) Nonmembrane Roof Sealants: 300 g/L.
 - 7) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 8) Sealant Primers for Porous Substrates: 775 g/L.
2. Asphalt Primer: ASTM D 41.
3. Roofing Asphalt: ASTM D 312, Type III **OR** Type IV **OR** Type III or IV as recommended by roofing manufacturer for application, **as directed**.
OR
Roofing Asphalt: ASTM D 6152, SEBS modified.
4. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings.
5. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.
6. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.
7. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
8. Insulation Cant Strips: ASTM C 728, perlite insulation board.
OR
Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
9. Metal Flashing Sheet: As specified in Division 7 Section "Sheet Metal Flashing and Trim."

10. Roofing Granules: Ceramic-coated **OR** Slate, **as directed**, roofing granules, No. 11 screen size with 100 percent passing **No. 8 (2.36-mm)** sieve and 98 percent of mass retained on **No. 40 (0.425-mm)** sieve, color to match roofing membrane.
11. Separator Sheet: Polyethylene sheet, **4 mils (0.1 mm)** thick, minimum.
12. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

G. Coating Materials

1. Roof Coating: ASTM D 1227, Type II, Class 1, mineral-colloid-emulsified, fibered **OR** Class 2, chemically emulsified, filled or fibered, **as directed**, asphalt emulsion, asbestos free.
OR
Roof Coating: ASTM D 1227, Type III, Class 1, mineral-colloid-emulsified **OR** Class 2, chemically emulsified, **as directed**, asphalt emulsion, nonfibered.
OR
Roof Coating: ASTM D 2824, Type I, nonfibered **OR** Type III, fibered, asbestos-free, **as directed**, aluminum-pigmented asphaltic coating.
OR
Roof Coating: Acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces and complying with ASTM D 6083.
 - a. Color: White **OR** Gray **OR** Buff, **as directed**.

H. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type VI, **1.8 lb/cu. ft. (29 kg/cu. m)** **OR** Type VII, **2.2 lb/cu. ft. (35 kg/cu. m)**, **as directed**, with two or four edges rabbeted.
3. Mortar-Faced, Extruded-Polystyrene Board Insulation: ASTM C 578, Type VI, **1.8-lb/cu. ft. (29-kg/cu. m)** minimum density, with tongue-and-groove edges on long dimension, and latex-modified cement mortar topping, **3/8 inch (9 mm)** thick, **4.5 lb/sq. ft. (19.5 kg/sq. m)** **OR** **15/16 inch (23 mm)** thick, **11 lb/sq. ft. (53.7 kg/sq. m)**, **as directed**.

I. Insulation Accessories

1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
2. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.
3. Metal Securement System: Perimeter securement flashing and strapping fabricated from stainless steel, a minimum of **0.031 inch (0.8 mm)** thick. Provide fasteners as recommended by mortar-faced insulation manufacturer.

J. Ballast

1. Aggregate Ballast: Washed, crushed stone or smooth stone that will withstand weather exposure without significant deterioration and will not contribute to membrane degradation; of the following size:
 - a. Size: ASTM D 448, Size 5, ranging in size from **1/2 to 1 inch (13 to 25 mm)**.
 - b. Size: ASTM D 448, Size 4, ranging in size from **3/4 to 1-1/2 inches (19 to 38 mm)**.
 - c. Size: ASTM D 448, Size 2, ranging in size from **1-1/2 to 2-1/2 inches (38 to 63 mm)**.
2. Interlocking Roof Pavers: Interlocking, lightweight concrete units, specially factory cast for use as roof ballast; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled. Size and weight shall be as directed.
 - a. Compressive Strength: **2500 psi (17 MPa)** **OR** **5000 psi (34 MPa)**, **as directed**, minimum.
 - b. Colors and Textures: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

3. Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: **24 by 24 inches (600 by 600 mm)**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: Weight shall be as directed.
 - c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, minimum; ASTM C 140.
 - d. Colors and Textures: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - e. Paver Supports: Integral corner pedestals.
OR
Paver Supports: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including fixed-height **OR** adjustable or stackable, **as directed**, pedestals, shims, and spacer tabs for joint spacing of **1/8 inch (3 mm) OR 3/16 inch (5 mm) OR 1/8 to 3/16 inch (3 to 5 mm)**, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - a. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - b. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations.
 - c. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - d. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 1) Test for moisture by pouring **1 pint (0.5 L)** of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
 - e. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Prime surface of concrete deck with asphalt primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.

C. Roofing Membrane Installation, General

1. If referencing NRCA's roof assembly identification matrix system, install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - a. Install roofing system **MBA OR S, as directed,-4-C-T OR M OR L, as directed,-P**, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Roofing and Waterproofing Manual" and requirements in this Section.

2. For roof system that exceeds requirements of NRCA's roof assemblies, install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
 - a. Membrane: A (APP) **OR** S (SBS), **as directed**.
 - b. Deck Type: C (concrete or nonnailable).
 - c. Adhering Method: T (torched) **OR** M (mopped) **OR** L (cold-applied adhesive), **as directed**.
 - d. Base Sheet: One.
 - e. Number of Glass-Fiber Base-Ply Sheets: One.
 - f. Number of Modified Asphalt Sheets: Two.
 - g. Surfacing Type: P (protected).
 3. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
 4. Where roof slope exceeds **1/2 inch per 12 inches (1:24) OR 3/4 inch per 12 inches (1:18)**, **as directed**, install roofing membrane sheets parallel with slope.
 - a. Backnail roofing membrane sheets to nailer strips according to roofing system manufacturer's written instructions.
 5. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
 6. Coordinate installing roofing system so components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - a. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
 - b. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - c. Remove and discard temporary seals before beginning work on adjoining roofing.
 7. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within **25 deg F (14 deg C)** of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.

OR

Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing system manufacturer's written instructions.
 8. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- D. Base-Sheet Installation
1. Install lapped base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 - a. Spot- or strip-mop to substrate with hot roofing asphalt.

OR

Adhere to substrate in a solid mopping of hot roofing asphalt **OR** uniform coating of cold-applied adhesive, **as directed**.
- E. Base-Ply Sheet Installation
1. Install glass-fiber base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Extend glass-fiber base-ply sheets over and terminate beyond cants. Embed each glass-fiber base-ply sheet in a continuous void-free mopping of hot roofing asphalt, to form a uniform membrane without glass-fiber base-ply sheets touching.
- F. Modified Bituminous Membrane Installation

1. Install modified bituminous roofing membrane sheet and cap sheet according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants.
 - a. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
 2. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - a. Repair tears and voids in laps and lapped seams not completely sealed.
 - b. Apply roofing granules to cover exuded bead at laps while bead is hot.
 3. Install roofing membrane sheets so side and end laps shed water.
- G. Flashing And Stripping Installation
1. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions and as follows:
 - a. Prime substrates with asphalt primer if required by roofing system manufacturer.
 - b. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive, **as directed**.
OR
Backer Sheet Application: Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive at rate required by roofing system manufacturer, **as directed**.
 - c. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in asphalt roofing cement at rate required by roofing system manufacturer.
OR
Flashing Sheet Application: Torch apply flashing sheet to substrate.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than **425 deg F (218 deg C)**. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
 2. Extend base flashing up walls or parapets a minimum of **8 inches (200 mm)** above roofing membrane and **4 inches (100 mm)** onto field of roofing membrane.
 3. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - a. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement, **as directed**.
 4. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.
 5. Roof Drains: Set **30-by-30-inch (760-by-760-mm)** metal flashing in bed of roofing-manufacturer-approved asphaltic adhesive on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 - a. Install stripping according to roofing system manufacturer's written instructions.
- H. Coating Installation
1. Apply coatings to base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method.
- I. Insulation Installation
1. Loosely lay separator sheet over cooled roofing membrane, with minimum **2-inch (50-mm)** side laps and **4-inch (100-mm)** end laps.

2. Loosely lay board insulation units over roofing membrane, with long joints of insulation in continuous straight lines and with end joints staggered between rows. Abut edges and ends between units.
3. Install one or more layers of insulation to achieve required thickness over roofing membrane. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.
 - a. Where overall insulation thickness is **2 inches (50 mm)** or more, install required thickness in two or more layers with joints of each succeeding layer staggered over joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
4. Install geotextile fabric over insulation, overlapping edges and ends at least **12 inches (300 mm)**. Do not lap ends of fabric sheets within **72 inches (1800 mm)** of roof perimeter. Extend fabric **2 to 3 inches (50 to 75 mm)** above ballast at perimeter and penetrations. Apply additional layer of fabric around penetrations to prevent aggregate from getting between penetration and insulation. Do not cover drains or restrict water flow to drains.

J. Ballast Installation

1. To roofed area, apply aggregate ballast uniformly over geotextile fabric at rate required by insulation manufacturer, but not less than the following, carefully spreading aggregate to not damage roofing membrane and base flashings. Install roof-paver ballast according to insulation manufacturer's written instructions, **as directed**. Apply ballast as insulation is installed, leaving roofing membrane insulated and ballasted at end of workday.
 - a. Ballast (Dow's "Standard Design"): **15 lb/sq. ft. (75 kg/sq. m) OR 20 lb/sq. ft. (100 kg/sq. m), as directed**, Size 5 aggregate within **102 inches (2600 mm)** of roof perimeter and corners and **24 inches (600 mm)** of roof penetrations; **10 lb/sq. ft. (50 kg/sq. m)**, Size 5 aggregate elsewhere.
 - 1) If partially replacing aggregate ballast with roof pavers, install one row of roof pavers in lieu of aggregate ballast at roof perimeter, corners, and penetrations.
 - b. Ballast (for Dow's "Design #1"): **15 lb/sq. ft. (75 kg/sq. m) OR 20 lb/sq. ft. (100 kg/sq. m), as directed**, Size 4 aggregate within **102 inches (2600 mm)** of roof perimeter and corners and **24 inches (600 mm)** of roof penetrations; **12 lb/sq. ft. (60 kg/sq. m)**, Size 4 aggregate elsewhere.
 - c. Ballast (for Dow's "Design #1") (if combining aggregate ballast with roof pavers): **12 lb/sq. ft. (60 kg/sq. m)**, Size 4 aggregate to field of roof; install two rows of roof pavers at roof perimeter, corners, and penetrations according to insulation manufacturer's written instructions.
 - d. Ballast (for Dow's "Design #2") (for aggregate ballast with roof pavers at corners): **15 lb/sq. ft. (75 kg/sq. m) OR 20 lb/sq. ft. (100 kg/sq. m), as directed**, Size 2 aggregate within **102 inches (2600 mm)** of roof perimeter and **24 inches (600 mm)** of roof penetrations; **13 lb/sq. ft. (65 kg/sq. m)**, Size 2 aggregate to field of roof; and install three rows of roof pavers at corners of roof according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to center of first perimeter corner row of roof pavers.
 - e. Ballast (for Dow's "Design #2") (if combining aggregate ballast with roof pavers at roof perimeters, corners, and penetrations): **13 lb/sq. ft. (65 kg/sq. m)**, Size 2 aggregate to field of roof and install three rows of concrete pavers at roof perimeter, corners, and penetrations according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to center of first perimeter and perimeter corner row of roof pavers.
 - f. Ballast (for Dow's "Design #3"): **15 lb/sq. ft. (75 kg/sq. m) OR 20 lb/sq. ft. (100 kg/sq. m), as directed**, Size 2 aggregate within **24 inches (600 mm)** of roof penetrations; **13 lb/sq. ft. (65 kg/sq. m)**, Size 2 aggregate to field of roof; and install four rows of roof pavers at roof perimeter and corners according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to center of first two perimeter and perimeter corner rows of roof pavers.
2. Walkway Pavers: Install walkways formed from one row **OR** two rows, **as directed**, of roof pavers, loosely laid and butted.

- K. Roof-Paver Installation
1. Interlocking Roof Pavers: Install interlocking roof pavers over roofed area according to manufacturer's written instructions.
 2. For Dow's Technote 508 "Standard Design" and "Design #1", install roof pavers over roofed area according to insulation manufacturer's written instructions.
 3. For Dow's Technote 508 "Standard Design" and "Design #2", install roof pavers over roofed area according to insulation manufacturer's written instructions. Mechanically fasten roof-paver metal straps to center of first perimeter and first perimeter corner row of roof pavers.
 4. For Dow's Technote 508 "Standard Design" and "Design #3", install roof pavers over roofed area according to insulation manufacturer's written instructions. Mechanically fasten roof-paver metal straps to center of first two perimeters and first two perimeter corner rows of roof pavers.
 5. Install roof pavers on pedestals set according to pedestal manufacturer's written instructions.
- L. Mortar-Faced Board Insulation Installation
1. Install mortar-faced board insulation loosely laid, according to manufacturer's written instructions, with tongue-and-groove joints nested. Stagger end joints of adjoining rows and abut insulation.
 - a. Mechanically fasten metal securement strapping at penetrations and at perimeter edges of mortar-faced board insulation.
 - b. Over mortar-faced board insulation, install roof pavers on roof perimeter and corners according to manufacturer's written instructions.
 2. Install one row **OR** two rows, **as directed**, of **24-inch- (600-mm-)** wide roof pavers to roof perimeter, corners, and penetrations according to mortar-faced board insulation manufacturer's written instructions.
- M. Field Quality Control
1. Testing Agency: Perform tests and inspections and to prepare reports.
 2. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - a. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
 - b. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - c. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.
 3. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - a. Notify the Owner and Owner 48 hours in advance of date and time of inspection.
 4. Roofing system will be considered defective if it does not pass tests and inspections.
 - a. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- N. Protecting And Cleaning
1. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner and Owner.
 2. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
 3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 21 13 13

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Task	Specification	Specification Description
07 21 13 13	07 51 13 00	Built-Up Asphalt Roofing
07 21 13 13	07 05 13 00	Built-Up Coal-Tar Roofing
07 21 13 13	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 21 13 13	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 21 13 13	07 53 16 00	CSPE Membrane Roofing
07 21 13 13	07 53 23 00	EPDM Membrane Roofing
07 21 13 16	07 51 13 00	Built-Up Asphalt Roofing
07 21 13 16	07 05 13 00	Built-Up Coal-Tar Roofing
07 21 13 16	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 21 13 16	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 21 13 16	07 53 16 00	CSPE Membrane Roofing
07 21 13 16	07 53 23 00	EPDM Membrane Roofing
07 21 13 19	07 51 13 00	Built-Up Asphalt Roofing
07 21 13 19	07 05 13 00	Built-Up Coal-Tar Roofing
07 21 13 19	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 21 13 19	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 21 13 19	07 53 16 00	CSPE Membrane Roofing
07 21 13 19	07 53 23 00	EPDM Membrane Roofing

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SECTION 07 21 16 00 - BUILDING INSULATION

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for building insulation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Perimeter insulation under slabs-on-grade.
 - b. Perimeter wall insulation (supporting backfill).
 - c. Cavity-wall insulation.
 - d. Concealed building insulation.
 - e. Exposed building insulation.
 - f. Loose-fill building insulation.
 - g. Self-supported, spray-applied cellulosic insulation.
 - h. Radiant barriers.
 - i. Vapor retarders.
 - j. Sound attenuation insulation.

C. Definitions

1. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

D. Performance Requirements

1. Plenum Rating: Provide glass-fiber **OR** slag-wool-fiber/rock-wool-fiber, **as directed**, insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
 - a. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at **2500-fpm (13-m/s)** air velocity.
 - b. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with *Chaetomium globosum* on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

E. Submittals

1. Product Data: For each type of product indicated.
2. Samples: Full-size units for each type of exposed insulation indicated.
3. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
4. Product test reports.
5. Research/Evaluation Reports: For foam-plastic insulation.

F. Quality Assurance

1. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - a. Surface-Burning Characteristics: ASTM E 84.
 - b. Fire-Resistance Ratings: ASTM E 119.
 - c. Combustion Characteristics: ASTM E 136.

G. Delivery, Storage, And Handling

1. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
2. Protect plastic insulation as follows:
 - a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - b. Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.2 PRODUCTS

A. Foam-Plastic Board Insulation

1. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
 - a. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m), unless otherwise indicated.
 - b. Type X, 1.30 lb/cu. ft. (21 kg/cu. m).
 - c. Type VI, 1.80 lb/cu. ft. (29 kg/cu. m).
 - d. Type VII, 2.20 lb/cu. ft. (35 kg/cu. m).
 - e. Type V, 3.00 lb/cu. ft. (48 kg/cu. m).
2. Extruded-Polystyrene Drainage Panels: ASTM C 578, of type and density indicated below and fabricated with one side having a matrix of drainage and edge channels.
 - a. Type IV, 1.60 lb/cu. ft. (26 kg/cu. m).
 - b. Type VI, 1.80 lb/cu. ft. (29 kg/cu. m).
 - c. Type VII, 2.20 lb/cu. ft. (35 kg/cu. m).
3. Fabric-Faced, Extruded-Polystyrene Drainage Panels: ASTM C 578, Type VI, with a density of 1.80 lb/cu. ft. (29 kg/cu. m), faced with insulation manufacturer's standard nonwoven filtration fabric and fabricated with 1 side having a matrix of drainage and edge channels.
4. Molded-Polystyrene Board Insulation: ASTM C 578, of type and density indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively:
 - a. Type I, 0.90 lb/cu. ft. (15 kg/cu. m).
 - b. Type VIII, 1.15 lb/cu. ft. (18 kg/cu. m).
 - c. Type II, 1.35 lb/cu. ft. (22 kg/cu. m).
5. Foil-Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1 **OR** 2, **as directed**, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core on thicknesses up to 4 inches (101 mm).

B. Cellular-Glass Insulation

1. Cellular-Glass Insulation: ASTM C 552 Type I (flat block) **OR** IV (board) faced on both sides with manufacturer's special kraft-paper sheets laminated to glass block with asphalt, **as directed**, with unfaced insulation passing ASTM E 136 for combustion characteristics.

C. Glass-Fiber Board Insulation

1. Unfaced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA; ASTM C 553, Types I, II, and III; or ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, passing ASTM E 136 for combustion characteristics; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 1.0 lb/cu. ft. (16 kg/cu. m), thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F (25.7 K x m/W at 24 deg C).
 - b. Nominal density of not less than 1.5 lb/cu. ft. (24 kg/cu. m) nor more than 1.7 lb/cu. ft. (27 kg/cu. m), thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
2. Foil-Faced, Flexible Glass-Fiber Board Insulation: ASTM C 612, Type IA or ASTM C 553, Types I, II, and III; faced on 1 side with foil-scrim-kraft vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 1.0 lb/cu. ft. (16 kg/cu. m), thermal resistivity of 3.7 deg F x h x sq. ft./Btu x in. at 75 deg F (25.7 K x m/W at 24 deg C).
 - b. Nominal density of not less than 1.5 lb/cu. ft. (24 kg/cu. m) nor more than 1.7 lb/cu. ft. (27 kg/cu. m), thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
3. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - b. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - c. Nominal density of 4.25 lb/cu. ft. (68 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - d. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.4 deg F x h x sq. ft./Btu x in. at 75 deg F (30.5 K x m/W at 24 deg C).
4. Foil-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; faced on 1 side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - b. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - c. Nominal density of 4.25 lb/cu. ft. (68 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - d. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of not less than 4.34 deg F x h x sq. ft./Btu x in. at 75 deg F (30.1 K x m/W at 24 deg C).
5. Glass-Mat-Faced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; faced on 1 side with black glass-fiber mat or black polymer finish; maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 4.2 deg F x h x sq. ft./Btu x in. at 75 deg F (29.1 K x m/W at 24 deg C).
 - b. Nominal density of 2.25 lb/cu. ft. (36 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - c. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
 - d. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), thermal resistivity of 4.5 deg F x h x sq. ft./Btu x in. at 75 deg F (31.2 K x m/W at 24 deg C).

D. Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation

1. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612, maximum flame-spread and smoke-developed indexes of 15 and 0, respectively; passing ASTM E 136 for combustion characteristics; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
 - b. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).
 - c. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30.2 K x m/W at 24 deg C).
 - d. Fiber Color: Regular color, unless otherwise indicated.
 - e. Fiber Color: Darkened, where indicated.
 2. Foil-Faced, Slag-Wool-Fiber/Rock-Wool-Fiber Board Insulation: ASTM C 612; faced on 1 side with foil-scrim or foil-scrim-polyethylene vapor retarder; with maximum flame-spread and smoke-developed indexes of 25 and 5, respectively; and of the following nominal density and thermal resistivity:
 - a. Nominal density of 4 lb/cu. ft. (64 kg/cu. m), Types IA and IB, thermal resistivity of 4 deg F x h x sq. ft./Btu x in. at 75 deg F (27.7 K x m/W at 24 deg C).
 - b. Nominal density of 6 lb/cu. ft. (96 kg/cu. m), Type II, thermal resistivity of 4.16 deg F x h x sq. ft./Btu x in. at 75 deg F (28.8 K x m/W at 24 deg C).
 - c. Nominal density of 8 lb/cu. ft. (128 kg/cu. m), Type III, thermal resistivity of 4.35 deg F x h x sq. ft./Btu x in. at 75 deg F (30.2 K x m/W at 24 deg C).
- E. Glass-Fiber Blanket Insulation
1. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
 2. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene **OR** polypropylene-scrim-kraft, **as directed**, vapor-retarder membrane on 1 face.
 3. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated:
 - a. 3-1/2 inches (89 mm) thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C) **OR** 13 deg F x h x sq. ft./Btu at 75 deg F (2.3 K x sq. m/W at 24 deg C), **as directed**.
 - b. 3-5/8 inches (92 mm) thick with a thermal resistance of 11 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C).
 - c. 5-1/2 inches (140 mm) thick with a thermal resistance of 19 deg F x h x sq. ft./Btu at 75 deg F (3.3 K x sq. m/W at 24 deg C).
 - d. 6-1/2 inches (165 mm) thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F (3.7 K x sq. m/W at 24 deg C).
 - e. 9-1/2 inches (241 mm) **OR** 10 inches (254 mm) **OR** 10-1/4 inches (260 mm), **as directed**, thick with a thermal resistance of 30 deg F x h x sq. ft./Btu at 75 deg F (5.2 K x sq. m/W at 24 deg C).
- F. Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation
1. Unfaced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
 2. Faced, Slag-Wool-Fiber/Rock-Wool-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.

3. Where slag-wool-fiber/rock-wool-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt form with thermal resistances indicated:
 - a. **1-1/2 inches (38 mm)** thick with a thermal resistance of **6 deg F x h x sq. ft./Btu at 75 deg F (1 K x sq. m/W at 24 deg C)**.
 - b. **3-1/2 inches (89 mm)** thick with a thermal resistance of **13 deg F x h x sq. ft./Btu at 75 deg F (2.3 K x sq. m/W at 24 deg C)**.
 - c. **4 inches (101 mm)** thick with a thermal resistance of **16 deg F x h x sq. ft./Btu at 75 deg F (2.8 K x sq. m/W at 24 deg C)**.
 - d. **5-1/4 inches (133 mm)** thick with a thermal resistance of **19 deg F x h x sq. ft./Btu at 75 deg F (3.3 K x sq. m/W at 24 deg C)**.
 - e. **6 inches (152 mm)** thick with a thermal resistance of **22 deg F x h x sq. ft./Btu at 75 deg F (3.9 K x sq. m/W at 24 deg C)**.

- G. Loose-Fill Insulation
 1. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.
 2. Glass-Fiber Loose-Fill Insulation: ASTM C 764, Type I for pneumatic application or Type II for poured application; with maximum flame-spread and smoke-developed indexes of 5.

- H. Spray-Applied Cellulosic Insulation
 1. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), **OR** Type II (materials containing a dry adhesive activated by water during installation; intended only for enclosed or covered applications), **OR** Type III (materials containing an adhesive mixed with water during application; intended for application on attic floors), **as directed**, chemically treated for flame-resistance, processing, and handling characteristics.

- I. Radiant Barriers
 1. Interior Radiation Control Coating: ASTM C 1321. Silver-colored, not thickness-dependent, low-emissivity solvent-based **OR** water-based, **as directed**, coating, formulated for adherence to substrates indicated and with a surface emittance value of 0.25 or less as measured per ASTM C 1371.
 2. Sheet Radiant Barriers: ASTM C 1313 and as follows:
 - a. Sheet Construction: Foil on one side of substrate **OR** Foil on both sides of substrate **OR** Vacuum metallizing on substrate, **as directed**.
 - b. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes of 5 and 10, respectively.
 - c. Water-Vapor Transmission: 1 perm, maximum **OR** 5 perms or greater, **as directed**.

- J. Vapor Retarders
 1. Polyethylene Vapor Retarders: ASTM D 4397, **6 mils (0.15 mm)** thick, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 2. Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nylon cord or polyester scrim and weighing not less than **25 lb/1000 sq. ft. (12 kg/100 sq. m)**, with maximum permeance rating of **0.0507 perm (2.9 ng/Pa x s x sq. m)**.
 3. Fire-Retardant, Reinforced-Polyethylene Vapor Retarders: 2 outer layers of polyethylene film laminated to an inner reinforcing layer consisting of either nonwoven grid of nylon cord or polyester scrim and weighing not less than **22 lb/1000 sq. ft. (10 kg/100 sq. m)**, with maximum permeance rating of **0.1317 perm (7.56 ng/Pa x s x sq. m)** and with flame-spread and smoke-developed indexes of not more than 5 and 60, respectively.
 4. Foil-Polyester-Film Vapor Retarders: 2 layers of **0.5-mil- (0.013-mm-)** thick polyester film laminated to an inner layer of **1-mil- (0.025-mm-)** thick aluminum foil, with maximum water-vapor transmission rate in flat condition of 0.0 g/h x sq. m and with maximum flame-spread and smoke-developed indexes of 5.

5. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
6. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
7. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
8. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and with demonstrated capability to bond vapor retarders securely to substrates indicated.

K. Auxiliary Insulating Materials

1. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.
2. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.
3. Asphalt Coating for Cellular-Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by manufacturer of cellular-glass block insulation.
4. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

L. Insulation Fasteners

1. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - a. Plate: Perforated galvanized carbon-steel sheet, **0.030 inch (0.762 mm)** thick by **2 inches (50 mm)** square.
 - b. Spindle: Copper-coated, low carbon steel; fully annealed; **0.105 inch (2.67 mm)** in diameter; length to suit depth of insulation indicated.
2. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
 - a. Angle: Formed from **0.030-inch- (0.762-mm-)** thick, perforated, galvanized carbon-steel sheet with each leg **2 inches (50 mm)** square.
 - b. Spindle: Copper-coated, low carbon steel; fully annealed; **0.105 inch (2.67 mm)** in diameter; length to suit depth of insulation indicated.
3. Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch- (0.41-mm-)** thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than **1-1/2 inches (38 mm)** square or in diameter.
 - a. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - 1) Crawlspace.
 - 2) Ceiling plenums.
 - 3) Attic spaces.
 - 4) Where indicated.
4. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of **1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (76 mm)**, **as directed**, between face of insulation and substrate to which anchor is attached.
5. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

1.3 EXECUTION

A. Preparation

1. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

- B. Installation, General
1. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
 2. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
 3. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
 4. Water-Piping Coordination: If water piping is located within insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.
 5. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.
- C. Installation Of Perimeter And Under-Slab Insulation
1. On vertical surfaces, set insulation units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer.
 - a. If not otherwise indicated, extend insulation a minimum of **24 inches (610 mm)** below exterior grade line.
 2. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 3. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection course with joints butted. Set in adhesive according to insulation manufacturer's written instructions.
 4. Protect top surface of horizontal insulation from damage during concrete work by applying protection course with joints butted.
- D. Installation Of Cavity-Wall Insulation
1. On units of foam-plastic board insulation, install pads of adhesive spaced approximately **24 inches (610 mm)** o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates indicated.
 - a. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry".
 2. Install units of cellular-glass insulation with closely fitting joints using method indicated:
 - a. Gob Method: Apply 4 gobs of adhesive per unit and set units firmly against inside wythe of masonry or other construction as shown. Apply gobs at each corner; spread gobs to form pads **4 inches (101 mm)** in diameter by **1/4 inch (6 mm)** thick.
 - b. Serrated-Trowel Method: Apply adhesive to entire surface of each cellular-glass insulation unit with serrated trowel complying with insulation manufacturer's written instructions.
 - c. Coat edges of insulation units with full bed of adhesive to seal joints between insulation and between insulation and adjoining construction.
 - d. Coat exterior face (cold face) of installed cellular-glass block insulation course with asphalt coating.
- E. Installation Of General Building Insulation
1. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
 2. Seal joints between foam-plastic insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.
 3. Set vapor-retarder-faced units with vapor retarder to warm-in-winter side **OR** in location indicated, **as directed**, of construction, unless otherwise indicated.

- a. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
4. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
 - a. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
 - b. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - c. Maintain **3-inch (76-mm)** clearance of insulation around recessed lighting fixtures.
 - d. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - e. For metal-framed wall cavities where cavity heights exceed **96 inches (2438 mm)**, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
 - f. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
 - 1) With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
OR
With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
5. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
 - a. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
 - b. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
 - c. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
 - d. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
6. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
 - a. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
 - b. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.
7. Place loose-fill insulation into spaces indicated, by pouring **OR** by machine blowing, **as directed**, to comply with ASTM C 1015. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
 - a. For cellulosic-fiber loose-fill insulation, comply with the Cellulose Insulation Manufacturers Association's Special Report #3, "Standard Practice for Installing Cellulose Insulation."
8. Apply self-supported, spray-applied cellulosic insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make it flush with face of studs by using method recommended by insulation manufacturer.

9. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately **2.5 lb/cu. ft. (40 kg/cu. m)**.
- F. Installation Of Insulation In Ceilings For Sound Attenuation
 1. Install **3-inch- (76-mm-)** thick, unfaced glass-fiber **OR** slag-wool-fiber/rock-wool-fiber, **as directed**, blanket insulation over suspended ceilings at partitions in a width that extends insulation **48 inches (1219 mm)** on either side of partition.
OR
Install **1-1/2-inch- (38-mm-)** thick, unfaced glass-fiber **OR** slag-wool-fiber/rock-wool-fiber, **as directed**, blanket insulation over suspended ceilings so that insulation extends over entire ceiling.
- G. Installation Of Radiant Barriers
 1. Install interior radiation control coating system according to ASTM C 1321.
 2. Install sheet radiant barriers in locations indicated according to ASTM C 1158.
- H. Installation Of Vapor Retarders
 1. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
 2. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners **16 inches (400 mm) o.c.**
 3. Before installing vapor retarder, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 4. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
 5. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
 6. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.
- I. Protection
 1. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 16 00

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Task	Specification	Specification Description
07 21 23 00	07 21 16 00	Building Insulation
07 21 26 00	07 21 16 00	Building Insulation
07 21 29 00	07 21 16 00	Building Insulation

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SECTION 07 22 16 00 - ROOF AND DECK INSULATION

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for roof and deck insulation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Definition

1. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mopping application and 75 centipoise for mechanical application, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.

C. Submittals

1. Product Data: For each product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
3. Samples: For each product included in roofing system.
4. Research/evaluation reports.
5. Maintenance data.

D. Quality Assurance

1. For all new construction projects and renovation projects that modify the exterior envelope of a building, submit documents and energy analysis that verifies compliance of the project with the State Energy Code. All insulation products shall be Factory Mutual Research Approved.
2. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products.
3. Source Limitations: Obtain components for roofing system from or approved by roofing system manufacturer.
4. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Exterior Fire-Test Exposure: Class A, **unless directed otherwise to be Class B, OR Class C**; ASTM E 108, for application and roof slopes indicated.
5. Preinstallation Conference: Conduct conference at Project site.

- E. Performance - In addition to compliance with the State Energy Code, construction assemblies must have the following minimum R-values:

Built Up Roof: 20

- F. Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within 20 years, **unless directed otherwise to be 15 years, OR 10 years**, from date of Final Completion. Failure includes roof leaks.

1.2 PRODUCTS

- A. All insulation products shall be specified to meet the maximum flame spread, maximum smoke spread and combustion criteria of the NIFPA Codes and ASTM standards. Expanded polystyrene board insulation may not be used.

- B. Bitumen Materials
1. Asphalt Primer: ASTM D 41.
 2. Coal-Tar Primer: ASTM D 43.
 3. Coal-Tar Pitch: ASTM D 450, Type I.
 4. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by built-up roofing system manufacturer for application.
- C. Roof Insulation (select from the following)
1. Extruded-Polystyrene Board Insulation: ASTM C 578
 - a. Type IV, 1.6-lb/cu. ft. (26-kg/cu. m) minimum density, square edged.
 - b. Type X, 1.3-lb/cu. ft. (21-kg/cu. m) minimum density, square edged.
 2. Extruded-Polystyrene Board Insulation: ASTM C 578, for installation above the membrane of a protected membrane roofing system
 - a. Type VI, 1.8 lb/cu. ft. (29 kg/cu. m) with 2 or 4 edges rabbeted.
 - b. Type VII, 2.2 lb/cu. ft. (35 kg/cu. m) with 2 or 4 edges rabbeted.
 3. Mortar-Faced, Extruded-Polystyrene Board Insulation: ASTM C 578, Type VI, 1.8-lb/cu. ft. (29-kg/cu. m) minimum density, with tongue-and-groove edges on long dimension, and latex-modified cement mortar topping.
 - a. 3/8 inch (9 mm) thick, 4 lb/sq. ft. (19.5 kg/sq. m)
 - b. 15/16 inch (23 mm) thick, 11 lb/sq. ft. (53.7 kg/sq. m).
 4. Molded-Polystyrene Board Insulation: ASTM C 578
 - a. Type II, 1.35-lb/cu. ft. (22-kg/cu. m) minimum density.
 - b. Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) minimum density.
 - c. Type IX, 1.8-lb/cu. ft. (29-kg/cu. m) minimum density.
 5. Composite Molded-Polystyrene Board Insulation: ASTM C 578 minimum density, with factory-applied facings, of ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board, asphalt coated, 1/2 inch (13 mm) thick.
 - a. Type II, 1.35-lb/cu. ft. (22-kg/cu. m).
 - b. Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m).
 - c. Type IX, 1.8-lb/cu. ft. (29-kg/cu. m).
 6. Polyisocyanurate Board Insulation: ASTM C 1289, Type II.
 - a. Type I, Class 1 aluminum foil facer on both major surfaces.
 - b. Type II, felt or glass-fiber mat facer on both major surfaces.
 7. Composite Polyisocyanurate Board Insulation: ASTM C 1289, faced with insulation board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
 - a. Type III (perlite-insulation-board facer)
 - 1) 1/2 inch (13 mm) thick.
 - 2) 3/4 inch (19 mm) thick.
 - b. Type IV (cellulosic-fiber-insulation-board facer), Grade 1, 1/2 inch (13 mm) thick.
 8. Perlite Board Insulation: ASTM C 728; composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal-coated.
 9. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, fibrous-felted wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
 10. Glass-Fiber-Board Insulation: ASTM C 726, combining glass fibers with thermosetting resin binders, faced on one side with asphalt-coated fiberglass scrim and kraft paper.
 11. Cellular-Glass Board Insulation: ASTM C 552, Type IV, faced on both sides with manufacturer's standard kraft-paper sheets.
 12. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48), unless otherwise indicated.
 13. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- D. Insulation Accessories

1. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
 2. Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere roof insulation to substrate.
 3. Insulation Cant Strips:
 - a. ASTM C 728, perlite insulation board.
 - b. ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
 4. Wood Nailer Strips: Comply with requirements in Division 6 Section "Rough Carpentry" **OR** "Miscellaneous Carpentry."
 5. Tapered Edge Strips:
 - a. ASTM C 728, perlite insulation board.
 - b. ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
 - c. ASTM C 726, glass-fiber insulation board.
 6. Cover Board:
 - a. ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
 - b. ASTM C 728, perlite insulation board, **3/4 inch (19 mm)** thick, with top surface seal-coated.
 - c. ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate.
 - 1) **1/4 inch (6 mm)** thick.
 - 2) **1/2 inch (13 mm)** thick.
 - d. ASTM C 726, glass-fiber rigid insulation, faced on one side with asphalt-coated fiberglass scrim and kraft paper, **3/4 inch (19 mm)** thick.
 7. Substrate Joint Tape: **6- or 8-inch- (150- or 200-mm-)** wide, coated, glass-fiber joint tape.
 8. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric mat, water permeable and resistant to ultraviolet degradation, type and weight as recommended by roofing system manufacturer for application.
 9. Metal Securement System: Perimeter securement flashing and strapping fabricated from stainless steel, a minimum of **0.031 inch (0.8 mm)** thick. Provide fasteners as recommended by mortar-faced insulation manufacturer.
- E. Protected Membrane Roofing Aggregate Ballast
1. Aggregate Ballast: Provide aggregate ballast that will withstand weather exposure without significant deterioration and not contribute to membrane degradation, of the following type and size:
 - a. Aggregate Type: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone or crushed gravel or crushed stone.
 - b. Size:
 - 1) ASTM D 448, Size 4, ranging from **3/4 to 1-1/2 inches (19 to 38 mm)**.
 - 2) ASTM D 448, Size 2, ranging from **1-1/2 to 2-1/2 inches (38 to 63 mm)**.
 - 3) ASTM D 448, Size 3, ranging from **1 to 2 inches (25 to 50 mm)**.
- F. Protected Membrane Roofing Paver Ballast
1. Lightweight Roof Pavers: Interlocking, lightweight concrete units, specially factory cast for use as roof ballast; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled; and as follows:
 - a. Size:
 - 1) **8 by 16 inches (200 by 400 mm)**.
 - 2) **12 by 12 inches (300 by 300 mm)**.
 - 3) **12 by 16-1/2 inches (300 by 420 mm)**.
 - 4) **12 by 18 inches (300 by 450 mm)**.
 - b. Weight: **11 lb/sq. ft. (53.7 kg/sq. m)**, minimum.
 - c. Compressive Strength:
 - 1) **2500 psi (17 MPa)**, minimum.
 - 2) **5000 psi (34 MPa)**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

2. Heavyweight Roof Pavers: Heavyweight, hydraulically pressed, concrete units, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Shape:
 - 1) Square edged.
 - 2) Top edges beveled **3/16 inch (5 mm)**.
 - b. Size: Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - 1) **24 by 24 inches (600 by 600 mm)**.
 - 2) **12 by 12 inches (300 by 300 mm)**.
 - 3) **18 by 18 inches (450 by 450 mm)**.
 - c. Weight: ANSI/SPRI RP-4, System 1, all locations, and System 2, field of roof, allow roof pavers weighing 18 lb/sq. ft. (90 kg/sq. m) or more. System 3 requires roof pavers weighing 22 lb/sq. ft. (110 kg/sq. m) or more.
 - d. Compressive Strength:
 - 1) **7500 psi (52 MPa)**, minimum.
 - 2) **6500 psi (45 MPa)**, minimum.
 - e. Colors and Textures: As selected from manufacturer's full range.
 - f. Paver Supports: Integral corner pedestals.
 - g. Paver Supports: Paver manufacturer's standard SBR rubber, high-density polyethylene, or polyurethane paver support assembly, including pedestals, shims, and spacer tabs.
 - 1) Pedestals:
 - a) Fixed-height.
 - b) Adjustable or stackable.
 - 2) Joint spacing of spacer tabs:
 - a) **1/8 inch (3 mm)**.
 - b) **3/16 inch (5 mm)**.
 - c) **1/8 to 3/16 inch (3 to 5 mm)**.

1.3 EXECUTION

A. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Prime surface of concrete deck with asphalt or coal-tar, as applicable, primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
4. Install acoustical roof deck rib insulation strips, specified in Division 5 Section "Steel Deck," according to acoustical roof deck manufacturer's written instructions.

B. Insulation Installation

1. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
2. Comply with roofing system manufacturer's written instructions for installing roof insulation.
3. If mechanically fastening base sheet to substrate before adhering first layer of insulation, install one lapped course of base sheet and mechanically fasten to substrate according to roofing system manufacturer's written instructions.
4. Nailer Strips: Mechanically fasten **4-inch nominal- (89-mm actual-)** width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:
 - a. **16 feet (4.88 m)** apart for roof slopes greater than **1 inch per 12 inches (1:12)** but less than **3 inches per 12 inches (3:12)**.

- b. **48 inches (1220 mm)** apart for roof slopes greater than **3 inches per 12 inches (3:12)**.
 5. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of built-up roofing membrane system with vertical surfaces or angle changes greater than 45 degrees.
 6. Install tapered insulation under area of roofing to conform to slopes indicated.
 7. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
 8. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **1-1/2 inches (38 mm)** for perlite and glass fiber, **2 inches (50 mm)** for polyisocyanurate and molded and extruded polystyrene, and **3 inches (75 mm)** for cellular glass, install 2 or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 9. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 10. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
 11. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt or coal-tar, as applicable, primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt, **unless directed otherwise to be** coal-tar pitch, **OR** in a cold fluid-applied adhesive.
 12. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type, **unless directed otherwise to be**
 Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Install subsequent layers of insulation in a solid mopping of hot roofing asphalt, **unless directed otherwise to be** coal-tar pitch, **OR** in a cold fluid-applied adhesive.
 13. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck. Tape joints if required by roofing system manufacturer.
 - a. Fasten to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Apply hot roofing asphalt, **unless directed otherwise to be** coal-tar pitch, to underside and immediately bond cover board to substrate.
- C. Protected Membrane Roofing Insulation And Ballast Installation
 1. Loosely lay separator sheet over cooled roofing membrane, with minimum **2-inch (50-mm)** side laps and **4-inch (150-mm)** end laps.
 2. Insulation: For extruded-polystyrene insulation over membrane, loosely lay board insulation units over roofing membrane, with long joints of insulation in a continuous straight line and with end joints staggered between rows. Abut edges and ends between units. Install to achieve required insulation thickness over roofing membrane. Cut and fit to within **3/4 inch (19 mm)** of projections and penetrations.
 - a. Where overall insulation thickness is **2 inches (50 mm)** or more, install required thickness in 2 or more layers with joints of each succeeding layer staggered over joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - b. Install protection mat over insulation, overlapping edges and ends at least **12 inches (300 mm)**. Do not lap ends of fabric sheets within **72 inches (1800 mm)** of roof perimeter. Extend fabric **2 to 3 inches (50 to 75 mm)** above ballast at perimeter and penetrations. Apply additional protection mat layer around penetrations to prevent aggregate from getting between penetrations and insulation. Do not cover drains or restrict water flow to drains.

3. Aggregate Ballast: If using aggregate ballast over protection mat and insulation, apply aggregate ballast uniformly at roofing system manufacturer's recommended rate, but not less than the following, spreading with care to minimize possibility of damage to roofing membrane. Leave roof insulation ballasted at the end of the workday.
 - a. Ballast Weight:
 - 1) Size 4 aggregate, 10 lb/sq. ft. (50 kg/sq. m).
 - 2) Size 2 aggregate, 13 lb/sq. ft. (65 kg/sq. m), at corners and perimeter; Size 4 aggregate, 10 lb/sq. ft. (50 kg/sq. m), elsewhere.
4. Roof-Paver Ballast: Install lightweight roof-paver ballast according to manufacturer's written instructions.
5. Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions, on roof corners and perimeter as defined by ANSI/SPRI RP-4. Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of 13 lb/sq. ft. (65 kg/sq. m).
 - a. Install roof pavers on pedestals set according to pedestal manufacturer's written instructions.
6. Roof-Paver Walkways: Install heavyweight roof pavers according to manufacturer's written instructions.
7. Mortar-Faced Extruded Insulation: Install mortar-faced extruded insulation loosely laid, according to manufacturer's written instructions, with tongue-and-groove joints nested. Stagger end joints of adjoining rows and abut insulation.
 - a. If ANSI/SPRI RP-4, System 1 design is required, install heavyweight roof pavers over mortar-faced extruded insulation to a width not less than 24 inches (600 mm) on roof perimeter as defined by ANSI/SPRI RP-4.
 - b. If ANSI/SPRI RP-4, System 2 design is required, install heavyweight roof pavers over mortar-faced extruded insulation on roof corners and perimeter as defined by ANSI/SPRI RP-4.
 - c. If perimeter mechanical securement is required, mechanically fasten strapping and perimeter edge securement system over mortar-faced extruded insulation according to manufacturer's written instructions.

D. Self-Adhering Modified Bituminous Membrane Roofing & Hot Fluid-Applied Roofing

1. Ballast Installation
 - a. Apply ballast uniformly over fabric mat at rate required by insulation manufacturer, but not less than the following, carefully spreading aggregate to minimize possibility of damage to membrane. Apply ballast as insulation is installed, leaving roofing membrane insulated and ballasted at end of workday.

NOTE: "Ballast" subparagraphs below are based on Dow Technote 508a. Revise if using SPRI RP-4 as basis of design if requirements vary. First subparagraph corresponds to Dow's standard design.

- 1) Ballast: 15 lb/sq. ft. (75 kg/sq. m), Size 5 aggregate within 48 inches (1200 mm) of roof perimeter and 24 inches (600 mm) of roof penetrations; 10 lb/sq. ft. (50 kg/sq. m), Size 5 aggregate elsewhere.
 - a) Install one row of roof pavers in lieu of aggregate ballast to roof perimeter and penetrations.
- 2) Ballast: 15 lb/sq. ft. (75 kg/sq. m), Size 4 aggregate within 48 inches (1200 mm) of roof perimeter and 24 inches (600 mm) of roof penetrations; 12 lb/sq. ft. (60 kg/sq. m), Size 4 aggregate elsewhere.

NOTE: Retain subparagraph above or first subparagraph below for Dow's "Design #1." Revise roof perimeter and penetration loads above to 20 lb/sq. ft. (100 kg/sq. m) for insulation 3 inches (75 mm) or thicker. Retain below if combining aggregate ballast with roof pavers, 24 by 24 by 2 inches (600 by 600 by 50 mm), at

roof perimeter and penetrations. Coordinate size of roof pavers with "Roof Pavers" Article.

- 3) Ballast: 12 lb/sq. ft. (60 kg/sq. m), Size 4 aggregate to field of roof; lay 2 rows of roof pavers at roof perimeters and penetrations according to insulation manufacturer's written instructions.
- 4) Ballast: 15 lb/sq. ft. (75 kg/sq. m), Size 2 aggregate within 48 inches (1200 mm) of roof perimeter and 24 inches (600 mm) of roof penetrations; 13 lb/sq. ft. (65 kg/sq. m), Size 2 aggregate to field of roof; lay 3 rows of roof pavers to corners of roof according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to first row of corner edge roof pavers.

NOTE: Retain subparagraph above or below for Dow's "Design #2." Roof pavers and strapping below are required at corners. Revise roof perimeter and penetration loads to 20 lb/sq. ft. (100 kg/sq. m) for insulation 3 inches (75 mm) or thicker. Retain below if combining aggregate ballast with roof pavers, 24 by 24 by 2 inches (600 by 600 by 50 mm), at roof perimeter, corners, and penetrations. Coordinate size of roof pavers with "Roof Pavers" Article.

- 5) Ballast: 13 lb/sq. ft. (65 kg/sq. m), Size 2 aggregate to field of roof; lay 3 rows of concrete pavers at roof perimeter, corners, and penetrations according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to first row of perimeter and corner edge roof pavers.

NOTE: Retain subparagraph below for Dow's "Design #3." Revise roof penetration loads to 20 lb/sq. ft. (100 kg/sq. m) for insulation 3 inches (75 mm) or thicker. Retain below if combining aggregate ballast with roof pavers, 24 by 24 by 2 inches (600 by 600 by 50 mm), at roof perimeter, corners, and penetrations. Coordinate size of roof pavers with "Roof Pavers" Article.

- 6) Ballast: 15 lb/sq. ft. (75 kg/sq. m), Size 2 aggregate within 24 inches (600 mm) of roof penetrations; 13 lb/sq. ft. (65 kg/sq. m), Size 2 aggregate to field of roof; lay 4 rows of roof pavers along roof perimeter and at corners according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to first two rows of perimeter and corner edge roof pavers.
- 7) Walkway Pavers: Lay roof-paver walkways using roof pavers of size indicated or, if not indicated, of manufacturer's standard size.

2. Roof-Paver Installation

- a. Lay roof-paver ballast according to insulation manufacturer's written instructions (Dow's "Standard Design" and "Design #1").
- b. Lay roof-paver ballast according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to first row of perimeter edge pavers (Dow's "Design #2").
- c. Lay roof-paver ballast according to insulation manufacturer's written instructions. Mechanically fasten securement strapping to first two rows of perimeter edge pavers (Dow's "Design #3").
 - 1) Install roof pavers on pedestals set according to pedestal manufacturer's written instructions.
- d. Over mortar-faced board insulation, lay a 24-inch- (600-mm-) wide ballast strip of roof pavers to roof perimeter. Adhere roof pavers to surface of mortar-faced board insulation according to mortar-faced board insulation manufacturer's written instructions.
- e. Over mortar-faced board insulation, lay roof pavers on roof perimeter and corners. Adhere roof pavers to surface of mortar-faced board insulation according to mortar-faced board insulation manufacturer's written instructions.

07 - Thermal And Moisture Protection



END OF SECTION 07 22 16 00

Task	Specification	Specification Description
07 22 16 00	07 51 13 00	Built-Up Asphalt Roofing
07 22 16 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 22 16 00	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 22 16 00	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 22 16 00	07 53 16 00	CSPE Membrane Roofing
07 22 16 00	07 53 23 00	EPDM Membrane Roofing

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SECTION 07 24 13 00 - POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for polymer-based exterior insulation and finish systems (EIFS). Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Exterior insulation and finish system (EIFS) applied over concrete, masonry, exterior cement board, gypsum sheathing, and plywood sheathing.
 - b. Prefabricated panels consisting of EIFS applied over exterior cement board and gypsum sheathing on metal framing.
2. Products furnished, but not installed under this Section, include anchors and other attachment devices to be cast in concrete and embedded in masonry assemblies.

C. System Description

1. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.

D. Performance Requirements

1. EIFS Performance: Comply with the following:
 - a. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 - b. Weathertightness: Resistant to water penetration from exterior into EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish.
2. Class PB EIFS: Provide EIFS having physical properties and structural performance that comply with the following:
 - a. Abrasion Resistance: Sample consisting of **1-inch- (25.4-mm-)** thick EIFS mounted on **1/2-inch- (12.7-mm-)** thick gypsum board; cured for a minimum of 28 days; and showing no cracking, checking, or loss of film integrity after exposure to **528 quarts (500 L)** of sand when tested per ASTM D 968, Method A.
 - b. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
 - c. Accelerated Weathering: Five samples per ICC-ES AC219 showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, delamination, or other characteristics that might affect performance as a wall cladding after testing for 2000 hours when viewed under 5 times magnification per ASTM G 153 or ASTM G 154 **OR** ASTM G 153 or ASTM G 155, **as directed**.
 - d. Freeze-Thaw: No surface changes, cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination, or indications of delamination between components when viewed under 5 times magnification after 60 cycles per EIMA 101.01 **OR** 10 cycles per ICC-ES AC219, **as directed**.
 - e. Mildew Resistance of Finish Coat: Sample applied to **2-by-2-inch (50.8-by-50.8-mm)** clean glass substrate, cured for 28 days, and showing no growth when tested per ASTM D 3273 and evaluated according to ASTM D 3274.

**Polymer-Based Exterior Insulation And Finish System
(EIFS)**

- f. Salt-Spray Resistance: No deleterious affects when tested according to ICC-ES AC219.
 - g. Tensile Adhesion: No failure in the EIFS, adhesive, base coat, or finish coat when tested per EIMA 101.03 **OR** ICC-ES AC219, **as directed**.
 - h. Water Penetration: Sample consisting of **1-inch- (25.4-mm-)** thick EIFS mounted on **1/2-inch- (12.7-mm-)**thick gypsum board, cured for 28 days, and showing no water penetration into the plane of the base coat to expanded-polystyrene board interface of the test specimen after 15 minutes at **6.24 lbf/sq. ft. (299 Pa)** of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
 - i. Water Resistance: Three samples, each consisting of **1-inch- (25.4-mm-)** thick EIFS mounted on **1/2-inch- (12.7-mm-)** thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
 - j. Wind-Driven-Rain Resistance: Resist wind-driven rain according to ICC-ES AC219.
 - k. Impact Resistance: Sample consisting of **1-inch- (25.4-mm-)** thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following:
 - 1) Standard Impact Resistance: **25 to 49 inch-lb (2.8 to 5.6 J)**.
 - 2) Medium Impact Resistance: **50 to 89 inch-lb (5.7 to 10.1 J)**.
 - 3) High Impact Resistance: **90 to 150 inch-lb (10.2 to 17 J)**.
 - 4) Ultra-High Impact Resistance: More than **150 inch-lb (17 J)**.
 - l. Structural Performance Testing: EIFS assembly and components shall comply with ICC-ES AC219 when tested per ASTM E 330.
3. Performance of Prefabricated Panels: Prefabricated panels shall be designed as follows and withstand the structural performance indicated for Class PB EIFS and thermal movement limits indicated below without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- a. Delegated Design: Design prefabricated panels, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - b. Structural Performance: EIFS shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - 1) Wind Loads: Uniform pressure as indicated on Drawings.
 - c. Deflection Limits: Design prefabricated panels to withstand design loads without deflections greater than 1/240.
 - d. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1) Temperature Change (Range): **100 deg F (55 deg C)**.
- E. Submittals
- 1. Product Data: For each type and component of EIFS indicated.
 - 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants used inside the weatherproofing system, including printed statement of VOC content.
 - 3. Shop Drawings: For EIFS. Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, lifting points for prefabricated panels, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
 - 4. Panel Schedule: For prefabricated panel fabrication.
 - 5. Samples: For each exposed product and for each color and texture specified.
 - 6. Delegated-Design Submittal: For prefabricated panels indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 7. Material or product certificates.

8. Product test reports.
 9. Compatibility and Adhesion Test Reports: For joint sealants from sealant manufacturer indicating the following:
 - a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
 10. Field quality-control reports and special inspection reports.
 11. Evaluation reports
 12. Maintenance data.
- F. Quality Assurance
1. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.
 2. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.
 3. Fire-Test-Response Characteristics: Provide EIFS and system components with the following fire-test-response characteristics as determined by testing identical EIFS and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - a. Fire-Resistance Characteristics: Per ASTM E 119.
 - b. Full-Scale Multistory Fire Test: Per IBC Standard.
 - c. Full-Scale Diversified Fire Test: Per ASTM E 108 modified for testing vertical walls.
 - d. Intermediate-Scale Multistory Fire Test: Per NFPA 285 **OR** IBC Standard, **as directed**.
 - e. Radiant Heat Exposure: No ignition of EIFS when tested according to NFPA 268.
 - f. Potential Heat: Acceptable level when tested according to NFPA 259.
 - g. Surface-Burning Characteristics: Provide insulation board, adhesives, base coats, and finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84 **OR** IBC Standard, **as directed**.
 4. Preinstallation Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
 2. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - a. Stack insulation board flat and off the ground.
 - b. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
- H. Project Conditions
1. Weather Limitations: Maintain ambient temperatures above **40 deg F (4.4 deg C)** for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.2 PRODUCTS

A. Materials

1. Compatibility: Provide adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
2. Prefabricated Panels: Comply with requirements in Division 05 Section "Cold-formed Metal Framing" for metal framing and with requirements in Division 06 Section "Sheathing" for gypsum sheathing and weather-resistant sheathing paper.
3. Exterior Cement Board: Not less than **5/16-inch- (8-mm-)** OR **7/16-inch- (11-mm-)**, as directed, thick, fiber cement board complying with ASTM C 1186, Type A, for exterior applications.
 - a. Fasteners: Wafer-head or flat-head steel drill screws complying with ASTM C 954, with an organic-polymer coating or other corrosion-protective coating having a salt-spray resistance of more than 500 hours per ASTM B 117.
 - 1) Size and Length: As recommended by sheathing manufacturer for type and thickness of sheathing board to be attached.
4. Primer/Sealer: EIFS manufacturer's standard substrate conditioner with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
5. Flexible-Membrane Flashing: Cold-applied, fully self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
6. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate; with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24); and complying with one of the following:
 - a. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
 - b. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
 - c. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.
7. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
 - a. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
 - b. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
 - c. Dimensions: Provide insulation boards not more than **24 by 48 inches (610 by 1219 mm)** and in thickness indicated, but not more than **4 inches (102 mm)** thick or less than thickness allowed by ASTM C 1397.
 - d. Foam Shapes: Provide with profiles and dimensions indicated on Drawings.
8. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, complying with ASTM D 578 and the following:
 - a. Standard-Impact Reinforcing Mesh: Not less than **4.0 oz./sq. yd. (136 g/sq. m)**.
 - b. Intermediate-Impact Reinforcing Mesh: Not less than **10 oz./sq. yd. (339 g/sq. m)** OR **12.0 oz./sq. yd. (407 g/sq. m)**, as directed.
 - c. High-Impact Reinforcing Mesh: Not less than **15 oz./sq. yd. (509 g/sq. m)**.
 - d. Heavy-Duty Reinforcing Mesh: Not less than **20 oz./sq. yd. (678 g/sq. m)**.
 - e. Strip Reinforcing Mesh: Not less than **3.75 oz./sq. yd. (127 g/sq. m)**.
 - f. Detail Reinforcing Mesh: Not less than **4.0 oz./sq. yd. (136 g/sq. m)**.
 - g. Corner Reinforcing Mesh: Not less than **7.2 oz./sq. yd. (244 g/sq. m)**.

9. Base-Coat Materials: EIFS manufacturer's standard mixture complying with one of the following:
 - a. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 - b. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 - c. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 - d. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
10. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) complying with one of the following:
 - a. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 - b. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
11. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
12. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating **OR** standard acrylic-based coating with enhanced mildew resistance **OR** siliconized acrylic-based coating, **as directed**, complying with the following:
 - a. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 - b. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, and fillers used with stone particles for embedding in finish coat to produce an applied-aggregate finish.
 - 1) Aggregate: Marble chips of size and color as selected by the Owner from manufacturer's full range.
 - c. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
 - d. Colors: As selected by the Owner from manufacturer's full range.
13. Water: Potable.
14. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
 - a. For attachment to steel studs from **0.033 to 0.112 inch (0.84 to 2.84 mm)** in thickness, provide steel drill screws complying with ASTM C 954.
 - b. For attachment to light-gage steel framing members not less than **0.0179 inch (0.45 mm)** in thickness, provide steel drill screws complying with ASTM C 1002.
 - c. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.
 - d. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
 - e. For attachment, provide manufacturer's standard fasteners suitable for substrate.
15. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.
 - a. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.

- b. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
 - c. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
 - d. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.
 - e. Parapet Cap Flashing: Type for both flashing and covering parapet top with design complying with ASTM C 1397.
- B. Elastomeric Sealants
1. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
 - a. Multicomponent, nonsag urethane sealant.
 - b. Single-component, nonsag, neutral-curing silicone sealant.
 - c. Provide sealants, used inside the weatherproofing system, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants".
 3. Sealant Color: As selected by the Owner from manufacturer's full range.
- C. Mixing
1. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.
- D. Panel Fabrication
1. Panel Framing: Fabricate panel framing to comply with requirements in Division 05 Section "Cold-formed Metal Framing".
 - a. Connect panel framing by welding unless otherwise indicated.
 - b. Connections: Provide connections capable of adjustment, complying with erection tolerance requirements, to anchor panels to structure.
 2. Exterior Cement Board: Install on metal framing to comply with requirements in "Exterior Cement-Board Installation" Article.
 3. EIFS Application: Apply EIFS to sheathed metal-framed panels to comply with requirements in "Trim Installation," "Insulation Installation," "Base-Coat Installation," and "Finish-Coat Installation" articles and as follows:
 - a. Wrap base coat and reinforcing mesh at edges of panels and extend coverage not less than **4 inches (100 mm)** over backs of panels unless otherwise indicated.
 - b. Wrap base coat and reinforcing mesh at edges of panels and extend coverage not less than full thickness to cover edges of metal framing unless otherwise indicated.
 - c. Continue finish coat around corners at edges of panels, unless otherwise indicated, and extend to location indicated for sealant application. Do not extend finish coat over surfaces where sealant will be applied.
 - d. Continue finish coat around corners at edges of panels and extend over edges to cover base coat unless otherwise indicated.
 4. Panel Fabrication Tolerances: Comply with the following:
 - a. Overall Height and Width: Plus or minus **1/8 inch (3.2 mm)**.
 - b. Cumulative Height and Width over Length of Building: Not more than **3/8 inch (9.6 mm)**.
 - c. Openings within One Unit: Plus or minus **1/8 inch (3.2 mm)** for window and door frames.

- d. Out of Square: Plus or minus **1/8 inch (3.2 mm)**.
- e. Locations of Reveals and Architectural Features: Plus or minus **1/8 inch (3.2 mm)**.
- f. Thickness: Plus or minus **1/16 inch (1.6 mm)**.
- g. Flatness: Not more than **1/8 inch in 8 feet (3.2 mm in 2.4 m)** across face of panel.

1.3 EXECUTION

A. Preparation

1. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
2. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.
3. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.
 - a. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

B. Exterior Cement-Board Installation

1. Exterior Cement Board: Install on metal framing to comply with cement-board manufacturer's written instructions and evaluation report acceptable to authorities having jurisdiction. Install board with steel drill screws spaced no more than **8 inches (203 mm)** o.c. along framing with perimeter fasteners at least **3/8 inch (9.6 mm)** but less than **5/8 inch (15.9 mm)** from edges of boards.

C. EIFS Installation, General

1. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

D. Substrate Protection Application

1. Primer/Sealer: Apply over gypsum sheathing substrates to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.
2. Waterproof Adhesive/Base Coat: Apply over sloped surfaces **OR** window sills **OR** parapets **OR** where indicated on Drawings, **as directed**, to protect substrates from degradation.
3. Flexible-Membrane Flashing: Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.

E. Trim Installation

1. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at window sills, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.
 - a. Drip Screed/Track: Use at bottom edges of EIFS unless otherwise indicated.
 - b. Window Sill Flashing: Use at windows unless otherwise indicated.
 - c. Expansion Joint: Use where indicated on Drawings.
 - d. Casing Bead: Use at other locations.
 - e. Parapet Cap Flashing: Use where indicated on Drawings.

F. Insulation Installation

1. Board Insulation: Adhesively **OR** Mechanically **OR** Adhesively and mechanically, **as directed**, attach insulation to substrate in compliance with ASTM C 1397, EIFS manufacturer's written instructions, and the following:

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- a. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than **1/4 inch (6.4 mm)** for factory mixed and not less than **3/8 inch (9.6 mm)** for field mixed, measured from surface of insulation before placement.
- b. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
- c. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
- d. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
 - 1) Steel Framing: **5/16 inch (8 mm)**.
 - 2) Wood Framing: **1 inch (25 mm)**.
 - 3) Concrete and Masonry: **1 inch (25 mm)**.
- e. Apply insulation over dry substrates in courses with long edges of boards oriented horizontally.
- f. Begin first course of insulation from a level base line and work upward.
- g. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
- h. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than **12 inches (300 mm)** wide or **6 inches (150 mm)** high. Offset joints not less than **6 inches (150 mm)** from corners of window and door openings and not less than **4 inches (100 mm)** from aesthetic reveals.
 - 1) Adhesive Attachment: Offset joints of insulation not less than **6 inches (150 mm)** from horizontal and **4 inches (100 mm)** from vertical joints in sheathing.
 - 2) Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
- i. Interlock ends at internal and external corners.
- j. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than **1/16 inch (1.6 mm)** occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
- k. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
- l. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than **1/32 inch (0.8 mm) OR 1/16 inch (1.6 mm)**, **as directed**, from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than **1/16 inch (1.6 mm)**.
- m. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than **3/4 inch (19 mm)**.
- n. Install foam shapes and attach to sheathing **OR** structure, **as directed**.
- o. Interrupt insulation for expansion joints where indicated.
- p. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
- q. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between

- casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
- r. After installing insulation and before applying reinforcing mesh, fully wrap board edges with strip reinforcing mesh. Cover edges of board and extend encapsulating mesh not less than **2-1/2 inches (64 mm)** over front and back face unless otherwise indicated on Drawings.
 - s. Treat exposed edges of insulation as follows:
 - 1) Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - 2) Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
 - 3) At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
 - t. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and EIFS protective-coating lamina.
2. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
- a. At expansion joints in substrates behind EIFS.
 - b. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
 - c. At floor lines in multilevel wood-framed construction.
 - d. Where wall height or building shape changes.
 - e. Where EIFS manufacturer requires joints in long continuous elevations.
 - f. Where panels abut one another.
- G. Base-Coat Installation
1. Base Coat: Apply to exposed surfaces of insulation and foam shapes in minimum thickness recommended in writing by EIFS manufacturer, but not less than **1/16-inch (1.6-mm)** dry-coat thickness.
 2. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than **2-1/2 inches (64 mm)** or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within **8 inches (204 mm)** of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
 - a. Standard-impact reinforcing mesh unless otherwise indicated.
 - b. Intermediate-impact reinforcing mesh where indicated.
 - c. High-impact reinforcing mesh where indicated.
 - d. Heavy-duty reinforcing mesh where indicated.
 3. Double-Layer Reinforcing Mesh Application: Where indicated, apply second base coat and second layer of standard-impact **OR** intermediate-impact, **as directed**, reinforcing mesh, overlapped not less than **2-1/2 inches (64 mm)** or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.
 4. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending **4 inches (100 mm)** beyond perimeter. Apply additional **9-by-12-inch (230-by-300-mm)** strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply **8-inch- (200-mm-)** wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than **4 inches (100 mm)** on each side of corners.
 - a. At aesthetic reveals, apply strip reinforcing mesh not less than **8 inches (200 mm)** wide.
 - b. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
 5. Foam Shapes: Fully embed reinforcing mesh in base coat.
 6. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.

- H. Finish-Coat Installation
 1. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.
 2. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - a. Texture: As selected by the Owner from manufacturer's full range.
 - b. Embed aggregate in finish coat according to EIFS manufacturer's written instructions to produce a uniform applied-aggregate finish of color and texture matching approved sample.
 3. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

- I. Installation Of Prefabricated Panels
 1. General: Install panels according to Shop Drawings. Install by welding metal framing to structural-steel frame **OR** by welding to steel-weld plates anchored in concrete, **as directed**, to comply with requirements in Division 05 Section "Cold-formed Metal Framing" unless otherwise indicated.
 - a. Lift panels only as indicated on Shop Drawings.
 - b. Do not warp or stress panels by forcing alignment.
 - c. Adjust connections to align panels and maintain correct and uniform joint widths.
 - d. Install bracing as panels are erected. Weld securely to panel framing and to structure.
 2. Erection Tolerances: Install panels level, plumb, and true to line with no variation in plane or alignment exceeding **1/16 inch (1.6 mm)** and no variation in position exceeding **1/8 inch (3.2 mm)**.
 - a. Maintain clearance between panels required for installing joint sealants.

- J. Installation Of Joint Sealants
 1. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C 1481.
 - a. Apply joint sealants after base coat has cured but before applying finish coat.
 - b. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
 - c. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
 - d. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - e. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
 - f. Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.

- K. Field Quality Control
 1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. According to ICC-ES AC24 **OR** ICC-ES AC219, **as directed**.
 2. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 3. EIFS Tests and Inspections: For the following:
 - a. According to ICC-ES AC24 **OR** ICC-ES AC219, **as directed**.
 4. Prefabricated Panels: Test and inspect field welds.
 5. Remove and replace EIFS where test results indicate that EIFS do not comply with specified requirements.
 6. Prepare test and inspection reports.

- L. Cleaning And Protection

1. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07 24 13 00

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SECTION 07 24 13 00a - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for water drainage exterior insulation and finish system (EIFS). Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes water-drainage exterior insulation and finish system (EIFS) applied over water-resistant coating over sheathing, weather-resistant sheathing paper over sheathing, weather-resistant sheathing paper over exterior cement board, and exterior cement board over weather-resistant sheathing paper.

C. System Description

1. Class PB EIFS: A non-load-bearing, exterior wall cladding system that consists of an insulation board attached adhesively, mechanically, or both to the substrate; an integrally reinforced base coat; and a textured protective finish coat.
2. Water-Drainage EIFS: EIFS with a means that allows water entering into an EIFS assembly to drain to the exterior.

D. Performance Requirements

1. EIFS Performance: Comply with the following:
 - a. Bond Integrity: Free from bond failure within EIFS components or between system and supporting wall construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
 - b. Weathertightness: Resistant to water penetration from exterior into water-drainage EIFS and assemblies behind it or through them into interior of building that results in deterioration of thermal-insulating effectiveness or other degradation of EIFS and assemblies behind it, including substrates, supporting wall construction, and interior finish, and including a means that allows water entering into an EIFS assembly to drain to the exterior.
2. Class PB EIFS: Provide EIFS having physical properties and structural performance that comply with the following:
 - a. Abrasion Resistance: Sample consisting of **1-inch- (25.4-mm-)** thick EIFS mounted on **1/2-inch- (12.7-mm-)** thick gypsum board; cured for a minimum of 28 days; and showing no cracking, checking, or loss of film integrity after exposure to **528 quarts (500 L)** of sand when tested per ASTM D 968, Method A.
 - b. Absorption-Freeze Resistance: No visible deleterious effects and negligible weight loss after 60 cycles per EIMA 101.01.
 - c. Accelerated Weathering: Five samples per ICC-ES AC235 showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, delamination, or other characteristics that might affect performance as a wall cladding after testing for 2000 hours when viewed under 5 times magnification per ASTM G 153 or ASTM G 154 **OR** ASTM G 153 or ASTM G 155, **as directed**.
 - d. Freeze-Thaw: No surface changes, cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination, or indications of delamination between components when viewed under 5 times magnification after 60 cycles per EIMA 101.01 **OR** 10 cycles per ICC-ES AC235, **as directed**.

- e. Mildew Resistance of Finish Coat: Sample applied to 2-by-2-inch (50.8-by-50.8-mm) clean glass substrate, cured for 28 days, and showing no growth when tested per ASTM D 3273 and evaluated according to ASTM D 3274.
- f. Salt-Spray Resistance: No deleterious affects when tested according to ICC-ES AC235.
- g. Tensile Adhesion: No failure in the EIFS, adhesive, base coat, or finish coat when tested per EIMA 101.03 **OR** ICC-ES AC235, **as directed**.
- h. Water Penetration: Sample consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board, cured for 28 days, and showing no water penetration into the plane of the base coat to expanded polystyrene board interface of the test specimen after 15 minutes at 6.24 lbf/sq. ft. (299 Pa) of air pressure difference or 20 percent of positive design wind pressure, whichever is greater, across the specimen during a test period when tested per EIMA 101.02.
- i. Water Resistance: Three samples, each consisting of 1-inch- (25.4-mm-) thick EIFS mounted on 1/2-inch- (12.7-mm-) thick gypsum board; cured for 28 days; and showing no cracking, checking, crazing, erosion, rusting, blistering, peeling, or delamination after testing for 14 days per ASTM D 2247.
- j. Impact Resistance: Sample consisting of 1-inch- (25.4-mm-) thick EIFS when constructed, conditioned, and tested per EIMA 101.86; and meeting or exceeding the following:
 - 1) Standard Impact Resistance: 25 to 49 inch-lb (2.8 to 5.6 J).
 - 2) Medium Impact Resistance: 50 to 89 inch-lb (5.7 to 10.1 J).
 - 3) High Impact Resistance: 90 to 150 inch-lb (10.2 to 17 J).
 - 4) Ultra-High Impact Resistance: More than 150 inch-lb (17 J).
- k. Drainage: According to ICC-ES AC24 **OR** ICC-ES AC235, **as directed**.
- l. Structural Performance Testing: EIFS assembly and components shall comply with ICC-ES AC235 when tested per ASTM E 330.

E. Submittals

- 1. Product Data: For each type and component of EIFS indicated.
- 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants used inside the weatherproofing system, including printed statement of VOC content.
- 3. Shop Drawings: For EIFS. Include plans, elevations, sections, details of components, details of penetration and termination, flashing details, joint locations and configurations, fastening and anchorage details including mechanical fasteners, and connections and attachments to other work.
- 4. Samples: For each exposed product and for each color and texture specified.
- 5. Material or product certificates.
- 6. Product test reports.
- 7. Compatibility and Adhesion Test Reports: For joint sealants from sealant manufacturer indicating the following:
 - a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- 8. Field quality-control reports and special inspection reports.
- 9. Evaluation reports
- 10. Maintenance data.

F. Quality Assurance

- 1. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.
- 2. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with system components.

3. Fire-Test-Response Characteristics: Provide EIFS and system components with the following fire-test-response characteristics as determined by testing identical EIFS and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - a. Fire-Resistance Characteristics: Per ASTM E 119.
 - b. Full-Scale Multistory Fire Test: Per IBC Standard.
 - c. Full-Scale Diversified Fire Test: Per ASTM E 108 modified for testing vertical walls.
 - d. Intermediate-Scale Multistory Fire Test: Per FPA 285 **OR** IBC Standard, **as directed**.
 - e. Radiant Heat Exposure: No ignition of EIFS when tested according to NFPA 268.
 - f. Potential Heat: Acceptable level when tested according to NFPA 259.
 - g. Surface-Burning Characteristics: Provide insulation board, adhesives, base coats, and finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84 **OR** IBC Standard, **as directed**.
4. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
2. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
 - a. Stack insulation board flat and off the ground.
 - b. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

H. Project Conditions

1. Weather Limitations: Maintain ambient temperatures above **40 deg F (4.4 deg C)** for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1.2 PRODUCTS

A. Materials

1. Compatibility: Provide water-resistive coating, adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by EIFS manufacturer for Project.
2. Exterior Cement Board: Not less than **5/16-inch- (8-mm-) OR 7/16-inch- (11-mm-)**, **as directed** thick, fiber cement board complying with ASTM C 1186, Type A, for exterior applications.
 - a. Fasteners: Wafer-head or flat-head steel drill screws complying with ASTM C 954, with an organic-polymer coating or other corrosion-protective coating having a salt-spray resistance of more than 500 hours per ASTM B 117.
 - 1) Size and Length: As recommended by sheathing manufacturer for type and thickness of sheathing board to be attached.
3. Water-Resistive Coatings: EIFS manufacturer's standard formulation and accessories for use as water/weather-resistive barriers, compatible with substrate, and complying with physical and performance criteria of ICC-ES AC209 **OR** ICC-ES AC212, **as directed**.
 - a. Sheathing Joint Tape **OR** Compound and Tape, **as directed**: Type recommended by EIFS manufacturer for sealing joints between and penetrations through sheathing.

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- b. VOC Content of Coatings Used as Insulation Adhesive: 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Primer/Sealer: EIFS manufacturer's standard substrate conditioner with VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), designed to seal substrates from moisture penetration and to improve the bond between substrate of type indicated and adhesive used for application of insulation.
5. Flexible-Membrane Flashing: Cold-applied, fully self-adhering, self-healing, rubberized-asphalt and polyethylene-film composite sheet or tape and primer; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer.
6. Drainage Mat: Three-dimensional, nonwoven, entangled filament, nylon or plastic **OR** Woven or fused, self-furring, PVC mesh lath, **as directed**, mat designed to drain incidental moisture by gravity; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
7. Spacers: Closed-cell polyethylene **OR** Woven or fused, self-furring, PVC mesh lath, **as directed** furring strips; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
8. Insulation Adhesive: EIFS manufacturer's standard formulation designed for indicated use; compatible with substrate; with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24); and complying with one of the following:
 - a. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, and polymer-based adhesive specified for base coat.
 - b. Factory-blended dry formulation of portland cement, dry polymer admixture, and fillers specified for base coat.
 - c. Factory-mixed noncementitious formulation designed for adhesive attachment of insulation to substrates of type indicated, as recommended by EIFS manufacturer.
9. Molded, Rigid Cellular Polystyrene Board Insulation: Comply with ASTM C 578, Type I; EIFS manufacturer's requirements; and EIMA's "EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board" for most stringent requirements for material performance and qualities of insulation, including dimensions and permissible variations, and the following:
 - a. Aging: Before cutting and shipping, age insulation in block form by air drying for not less than six weeks or by another method approved by EIMA that produces equivalent results.
 - b. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, per ASTM E 84.
 - c. Dimensions: Provide insulation boards not more than **24 by 48 inches (610 by 1219 mm)** and in thickness indicated but not more than **4 inches (102 mm)** thick or less than thickness allowed by ASTM C 1397.
 - d. Channeled Board Insulation: EIFS manufacturer's standard factory-fabricated profile with linear, vertical drainage channels, slots, or waves on the back side of board.
 - e. Board Insulation Closure Blocks: EIFS manufacturer's standard density, size, and configuration.
 - f. Foam Shapes: Provide with profiles and dimensions indicated on Drawings.
10. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than **120 lbf/in. (21 dN/cm)** per ASTM E 2098 **OR** EIMA 105.01, **as directed**; complying with ASTM D 578 and the following:
 - a. Standard-Impact Reinforcing Mesh: Not less than **4.0 oz./sq. yd. (136 g/sq. m)**.
 - b. Intermediate-Impact Reinforcing Mesh: Not less than **10 oz./sq. yd. (339 g/sq. m) OR 12.0 oz./sq. yd. (407 g/sq. m), as directed**.
 - c. High-Impact Reinforcing Mesh: Not less than **15 oz./sq. yd. (509 g/sq. m)**.
 - d. Heavy-Duty Reinforcing Mesh: Not less than **20 oz./sq. yd. (678 g/sq. m)**.
 - e. Strip Reinforcing Mesh: Not less than **3.75 oz./sq. yd. (127 g/sq. m)**.
 - f. Detail Reinforcing Mesh: Not less than **4.0 oz./sq. yd. (136 g/sq. m)**.

- g. Corner Reinforcing Mesh: Not less than **7.2 oz./sq. yd. (244 g/sq. m)**.
11. Base-Coat Materials: EIFS manufacturer's standard mixture complying with one of the following requirements:
 - a. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 - b. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 - c. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
 - d. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
 12. Waterproof Adhesive/Base-Coat Materials: EIFS manufacturer's standard waterproof formulation with VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with one of the following:
 - a. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
 - b. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
 13. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.
 14. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating **OR** standard acrylic-based coating with enhanced mildew resistance **OR** siliconized acrylic-based coating, **as directed**, complying with the following:
 - a. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, sound stone particles, and fillers.
 - b. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, and fillers used with stone particles for embedding in finish coat to produce an applied-aggregate finish.
 - 1) Aggregate: Marble chips of size and as selected by the Owner from manufacturer's full range.
 - c. Sealer: Manufacturer's waterproof, clear acrylic-based sealer for protecting finish coat.
 - d. Colors: As selected by the Owner from manufacturer's full range.
 15. Water: Potable.
 16. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:
 - a. For attachment to steel studs from **0.033 to 0.112 inch (0.84 to 2.84 mm)** in thickness, provide steel drill screws complying with ASTM C 954.
 - b. For attachment to light-gage steel framing members not less than **0.0179 inch (0.45 mm)** in thickness, provide steel drill screws complying with ASTM C 1002.
 - c. For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.
 - d. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.
 - e. For attachment, provide manufacturer's standard fasteners suitable for substrate.
 17. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D 1784, manufacturer's standard Cell Class for use intended, and ASTM C 1063.

- a. Casing Bead: Prefabricated, one-piece type for attachment behind insulation, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
- b. Drip Screed/Track: Prefabricated, one-piece type for attachment behind insulation with face leg extended to form a drip, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg.
- c. Weep Screed/Track: Prefabricated, one-piece type for attachment behind insulation with perforated face leg extended to form a drip and weep holes in track bottom, of depth required to suit thickness of coating and insulation, with face leg perforated for bonding to coating and back leg; designed to drain incidental moisture that gets into wall construction to the exterior at terminations of EIFS with drainage.
- d. Expansion Joint: Prefabricated, one-piece V profile; designed to relieve stress of movement.
- e. Window Sill Flashing: Prefabricated type for both flashing and sloping sill over framing beneath windows; with end and back dams; designed to direct water to exterior.
- f. Parapet Cap Flashing: Type for both flashing and covering parapet top with design complying with ASTM C 1397.

B. Elastomeric Sealants

1. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481 and with requirements in Division 07 Section "Joint Sealants" for products corresponding to description indicated below:
 - a. Multicomponent, nonsag urethane sealant.
 - b. Single-component, nonsag, neutral-curing silicone sealant.
 - c. Provide sealants, for use inside the weatherproofing system, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Preformed Foam Sealant Products: Provide sealant compatible with adjacent materials and complying with requirements in Division 07 Section "Joint Sealants".
3. Sealant Color: As selected by the Owner from manufacturer's full range.

C. Mixing

1. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

1.3 EXECUTION

A. Preparation

1. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
2. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.
3. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

B. Exterior Cement-Board Installation

1. Exterior Cement Board: Install on metal framing to comply with cement-board manufacturer's written instructions and evaluation report acceptable to authorities having jurisdiction. Install

board with steel drill screws spaced no more than **8 inches (203 mm)** o.c. along framing with perimeter fasteners at least **3/8 inch (9.6 mm)** but less than **5/8 inch (15.9 mm)** from edges of boards.

- C. EIFS Installation, General
 - 1. Comply with EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.
- D. Substrate Protection Application
 - 1. Primer/Sealer: Apply over gypsum sheathing substrates to protect substrates from degradation and where required by EIFS manufacturer for improving adhesion of insulation to substrate.
 - 2. Water-Resistive Coatings: Apply over substrates to protect substrates from degradation and to provide water-/weather-resistive barrier.
 - a. Tape and seal joints, exposed edges, terminations, and inside and outside corners of sheathing unless otherwise indicated by EIFS manufacturer's written instructions.
 - 3. Waterproof Adhesive/Base Coat: Apply over sloped surfaces **OR** window sills **OR** parapets **OR** where indicated on Drawings, **as directed**, to protect substrates from degradation.
 - 4. Flexible-Membrane Flashing: Install over weather-resistive barrier, applied and lapped to shed water; seal at openings, penetrations, terminations, and where indicated by EIFS manufacturer's written instructions to protect wall assembly from degradation. Prime substrates, if required, and install flashing to comply with EIFS manufacturer's written instructions and details.
- E. Trim Installation
 - 1. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, at window sills, and elsewhere as indicated, according to EIFS manufacturer's written instructions. Coordinate with installation of insulation.
 - a. Weep Screed/Track: Use at bottom termination edges, at window and door heads, and at floor line expansion joints of water-drainage EIFS unless otherwise indicated.
 - b. Window Sill Flashing: Use at windows unless otherwise indicated.
 - c. Expansion Joint: Use where indicated on Drawings.
 - d. Casing Bead: Use at other locations.
 - e. Parapet Cap Flashing: Use where indicated on Drawings.
- F. Drainage Mat Installation
 - 1. Drainage Mat: Apply wrinkle free, continuously, with edges butted **OR** overlapped, **as directed**, and adhesively secured **OR** mechanically secured with fasteners, **as directed**, over water-/weather-resistive barrier according to manufacturer's written instructions.
- G. Insulation Installation
 - 1. Board Insulation: Adhesively **OR** Mechanically **OR** Adhesively and mechanically, **as directed**, attach insulation to substrate in compliance with ASTM C 1397, EIFS manufacturer's written instructions, and the following:
 - a. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of sheathing with adhesive once insulation is adhered to sheathing unless EIFS manufacturer's written instructions specify using primer/sealer with ribbon-and-dab method. Apply adhesive to a thickness of not less than **1/4 inch (6.4 mm)** for factory mixed and not less than **3/8 inch (9.6 mm)** for field mixed, measured from surface of insulation before placement.
 - b. Apply adhesive to insulation by notched-trowel method in a manner that results in coating the entire surface of drainage mat with adhesive once insulation is adhered to drainage mat.
 - c. Apply adhesive to ridges on back of insulation by notched-trowel method in a manner that results in full adhesive contact over the entire surface of ridges, leaving channels free of adhesive once insulation is adhered to substrate.

- d. Press and slide insulation into place. Apply pressure over the entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
- e. Allow adhered insulation to remain undisturbed for period recommended by EIFS manufacturer, but not less than 24 hours, before installing mechanical fasteners, beginning rasping and sanding insulation, or applying base coat and reinforcing mesh.
- f. Mechanically attach insulation to substrate by method complying with EIFS manufacturer's written instructions. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
 - 1) Steel Framing: **5/16 inch (8 mm)**.
 - 2) Wood Framing: **1 inch (25 mm)**.
 - 3) Concrete and Masonry: **1 inch (25 mm)**.
- g. Apply insulation over drainage mat and dry substrates in courses with long edges of boards oriented horizontally.
- h. Begin first course of insulation from a level base line and work upward.
- i. Begin first course of insulation from screed/track and work upward. Work from perimeter casing beads toward interior of panels if possible.
- j. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints so no piece of insulation is less than **12 inches (300 mm)** wide or **6 inches (150 mm)** high. Offset joints not less than **6 inches (150 mm)** from corners of window and door openings and not less than **4 inches (100 mm)** from aesthetic reveals.
 - 1) Adhesive Attachment: Offset joints of insulation not less than **6 inches (150 mm)** from horizontal and **4 inches (100 mm)** from vertical joints in sheathing.
 - 2) Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
- k. Place insulation with adhesive strips and channels, slots, or waves aligned in the vertical position for drainage. Align drainage channels, slots, or waves with channels, slots, or waves in insulation boards above and below.
- l. Interlock ends at internal and external corners.
- m. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than **1/16 inch (1.6 mm)** occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
- n. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
- o. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than **1/32 inch (0.8 mm) OR 1/16 inch (1.6 mm)**, **as directed**, from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than **1/16 inch (1.6 mm)**.
- p. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce insulation thickness at aesthetic reveals to less than **3/4 inch (19 mm)**.
- q. Install foam shapes and attach to sheathing **OR** structure, **as directed**.
- r. Interrupt insulation for expansion joints where indicated.
- s. Install insulation closure blocks using ribbon-and-dab method to create air zones where indicated.
- t. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
- u. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.

- v. After installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than **2-1/2 inches (64 mm)** over front and back face unless otherwise indicated on Drawings.
 - w. Treat exposed edges of insulation as follows:
 - 1) Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - 2) Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
 - 3) At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
 - x. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-/weather-resistive barrier.
 - 2. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
 - a. At expansion joints in substrates behind EIFS.
 - b. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
 - c. At floor lines in multilevel wood-framed construction.
 - d. Where wall height or building shape changes.
 - e. Where EIFS manufacturer requires joints in long continuous elevations.
- H. Base-Coat Installation
- 1. Base Coat: Apply to exposed surfaces of insulation and foam shapes in minimum thickness recommended in writing by EIFS manufacturer, but not less than **1/16-inch (1.6-mm)** dry-coat thickness.
 - 2. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than **2-1/2 inches (64 mm)** or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within **8 inches (204 mm)** of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
 - a. Standard-impact reinforcing mesh unless otherwise indicated.
 - b. Intermediate-impact reinforcing mesh where indicated.
 - c. High-impact reinforcing mesh where indicated.
 - d. Heavy-duty reinforcing mesh where indicated.
 - 3. Double-Layer Reinforcing Mesh Application: Where indicated, apply second base coat and second layer of standard-impact **OR** intermediate-impact, **as directed**, reinforcing mesh, overlapped not less than **2-1/2 inches (64 mm)** or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions in same manner as first application. Do not apply until first base coat has cured.
 - 4. Additional Reinforcing Mesh: Apply strip reinforcing mesh around openings extending **4 inches (100 mm)** beyond perimeter. Apply additional **9-by-12-inch (230-by-300-mm)** strip reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply **8-inch- (200-mm-)** wide strip reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than **4 inches (100 mm)** on each side of corners.
 - a. At aesthetic reveals, apply strip reinforcing mesh not less than **8 inches (200 mm)** wide.
 - b. Embed strip reinforcing mesh in base coat before applying first layer of reinforcing mesh.
 - 5. Foam Shapes: Fully embed reinforcing mesh in base coat.
 - 6. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application except without reinforcing mesh. Do not apply until first base coat has cured.
- I. Finish-Coat Installation
- 1. Primer: Apply over dry base coat according to EIFS manufacturer's written instructions.

2. Finish Coat: Apply over dry primed base coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - a. Texture: As selected by the Owner from manufacturer's full range.
 - b. Embed aggregate in finish coat according to EIFS manufacturer's written instructions to produce a uniform applied-aggregate finish of color and texture matching approved sample.
 3. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.
- J. Installation Of Joint Sealants
1. Prepare joints and apply sealants, of type and at locations indicated, to comply with applicable requirements in Division 07 Section "Joint Sealants" and in ASTM C 1481.
 - a. Apply joint sealants after base coat has cured but before applying finish coat.
 - b. Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.
 - c. Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.
 - d. Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.
 - e. Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.
 - f. Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.
- K. Field Quality Control
1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. According to ICC-ES AC24 **OR** ICC-ES AC235, **as directed**.
 2. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 3. EIFS Tests and Inspections: For the following:
 - a. According to ICC-ES AC24 **OR** ICC-ES AC235, **as directed**.
 4. Remove and replace EIFS where test results indicate that EIFS do not comply with specified requirements.
 5. Prepare test and inspection reports.
- L. Cleaning And Protection
1. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07 24 13 00a



07 - Thermal And Moisture Protection

Task	Specification	Specification Description
07 26 13 00	06 10 00 00	Rough Carpentry

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SECTION 07 31 13 13 - ASPHALT SHINGLES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for asphalt shingles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Asphalt shingles.
 - b. Underlayment.

C. Definition

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each exposed product and for each color and blend specified.
3. Product test reports.
4. Research/evaluation reports.
5. Maintenance data.
6. Warranties: Sample of special warranties.

E. Quality Assurance

1. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - a. Exterior Fire-Test Exposure: Class A **OR** Class C, **as directed**; ASTM E 108 or UL 790, for application and roof slopes indicated.
2. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double stack rolls.
 - a. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
2. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

G. Warranty

1. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - a. Material Warranty Period: 25 **OR** 30 **OR** 35 **OR** 40, **as directed**, years from date of Final Completion, prorated, with first three **OR** five **OR** 12, **as directed**, years nonprorated.
 - b. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 60 mph (27 m/s) **OR** 75 mph (33 m/s) **OR** 80 mph (36 m/s) **OR** 100 mph (45 m/s), **as directed**, for five **OR** 10, **as directed**, years from date of Final Completion.

- c. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor five **OR** 10, **as directed**, years from date of Final Completion.
- d. Workmanship Warranty Period: 10 **OR** 12, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Glass-Fiber-Reinforced Asphalt Shingles

- 1. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 - a. Butt Edge: Straight **OR** Notched **OR** Crenelated, **as directed**, cut.
 - b. Strip Size: Manufacturer's standard.
 - c. Algae Resistance: Granules treated to resist algae discoloration.
 - d. Color and Blends: As selected by the Owner from manufacturer's full range.
- 2. Laminated-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; complying with UL 2218, Class IV.
 - a. Butt Edge: Straight **OR** Notched **OR** Crenelated, **as directed**, cut.
 - b. Strip Size: Manufacturer's standard.
 - c. Algae Resistance: Granules treated to resist algae discoloration.
 - d. Color and Blends: As selected by the Owner from manufacturer's full range.
- 3. Multitab-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 - a. Tab Arrangement: Three tabs, regularly spaced **OR** Four tabs, regularly spaced **OR** Five tabs, randomly spaced, **as directed**.
 - b. Cutout Shape: Square **OR** Tapered, **as directed**.
 - c. Butt Edge: Straight **OR** Stagger, **as directed**, cut.
 - d. Strip Size: Manufacturer's standard.
 - e. Algae Resistance: Granules treated to resist algae discoloration.
 - f. Color and Blends: As selected by the Owner from manufacturer's full range.
- 4. Three-Tab-Strip, SBS-Modified Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing; complying with UL 2218, Class IV.
 - a. Strip Size: Manufacturer's standard.
 - b. Algae Resistance: Granules treated to resist algae discoloration.
 - c. Color and Blends: As selected by the Owner from manufacturer's full range.
- 5. No-Cutout-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, self-sealing, square, and single tab.
 - a. Butt Edge: Stagger **OR** Straight, **as directed**, cut.
 - b. Strip Size: Manufacturer's standard.
 - c. Algae Resistance: Granules treated to resist algae discoloration.
 - d. Color and Blends: As selected by the Owner from manufacturer's full range.
- 6. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles **OR** Site-fabricated units cut from asphalt shingle strips. Trim each side of lapped portion of unit to taper approximately **1 inch (25 mm)**, **as directed**.

B. Organic-Felt-Reinforced Asphalt Shingles

- 1. Laminated-Strip Asphalt Shingles: ASTM D 225, laminated, multi-ply overlay construction, organic-felt reinforced, mineral-granule surfaced, and self-sealing; complying with requirements in ASTM D 3161 for wind resistance.
 - a. Butt Edge: Straight **OR** Notched **OR** Crenelated, **as directed**, cut.
 - b. Strip Size: Manufacturer's standard.
 - c. Algae Resistance: Granules treated to resist algae discoloration.
 - d. Color and Blends: As selected by the Owner from manufacturer's full range.

2. Multitab-Strip Asphalt Shingles: ASTM D 225, organic-felt reinforced, mineral-granule surfaced, and self-sealing; complying with requirements in ASTM D 3161 for wind resistance.
 - a. Tab Arrangement: Three tabs, regularly spaced **OR** Four tabs, regularly spaced **OR** Six tabs, regularly spaced, scalloped edge, **as directed**.
 - b. Strip Size: Manufacturer's standard.
 - c. Algae Resistance: Granules treated to resist algae discoloration.
 - d. Color and Blends: As selected by the Owner from manufacturer's full range.
 3. No-Cutout-Strip Asphalt Shingles: ASTM D 225, organic-felt reinforced, mineral-granule surfaced, self-sealing, square, and single tab; complying with requirements in ASTM D 3161 for wind resistance.
 - a. Butt Edge: Stagger **OR** Straight, **as directed**, cut.
 - b. Strip Size: Manufacturer's standard.
 - c. Color and Blends: As selected by the Owner from manufacturer's full range.
 4. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles **OR** Site-fabricated units cut from asphalt shingle strips. Trim each side of lapped portion of unit to taper approximately **1 inch (25 mm)**, **as directed**.
- C. Underlayment Materials
1. Felt: ASTM D 226 **OR** ASTM D 4869, **as directed**, Type I **OR** Type II, **as directed**, asphalt-saturated organic felts, nonperforated.
 2. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of **55-mil- (1.4-mm-)** thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 3. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 4. Self-Adhering Sheet Underlayment, High Temperature: Minimum of **30- to 40-mil- (0.76- to 1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 - a. Thermal Stability: Stable after testing at **240 deg F (116 deg C)**; ASTM D 1970.
 - b. Low-Temperature Flexibility: Passes after testing at minus **20 deg F (29 deg C)**; ASTM D 1970.
 5. Granular-Surfaced Valley Lining: ASTM D 6380, Class M, organic-felt-based **OR** ASTM D 3909, mineral-granular-surfaced, glass-felt-based, **as directed**, asphalt roll roofing; **36 inches (914 mm)** wide.
- D. Ridge Vents
1. Rigid Ridge Vent: Manufacturer's standard, rigid section high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles; for use under ridge shingles.
 2. Flexible Ridge Vent: Manufacturer's standard, compression-resisting, three-dimensional, open-nylon or polyester-mat filter bonded to a nonwoven, nonwicking, geotextile fabric cover.
- E. Accessories
1. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
 2. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum **0.120-inch- (3-mm-)** diameter, barbed **OR** smooth, **as directed**, shank, sharp-pointed, with a minimum **3/8-inch- (9.5-mm-)** diameter flat head and of sufficient length to penetrate **3/4 inch (19 mm)** into solid wood decking or extend at least **1/8 inch (3 mm)** through OSB or plywood sheathing.
 - a. Where nails are in contact with metal flashing, use nails made from same metal as flashing.

3. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, **1-inch (25-mm)** minimum diameter.

F. Metal Flashing And Trim

1. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Sheet Metal: Copper **OR** Stainless steel **OR** Zinc-tin alloy-coated stainless steel **OR** Zinc-tin alloy-coated steel **OR** Zinc-tin alloy-coated copper **OR** Anodized aluminum **OR** Aluminum, mill finished, **as directed**.
2. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of the item.
 - a. Apron Flashings: Fabricate with lower flange a minimum of **4 inches (100 mm) OR 5 inches (125 mm)**, **as directed**, over and **4 inches (100 mm)** beyond each side of downslope asphalt shingles and **6 inches (150 mm)** up the vertical surface.
 - b. Step Flashings: Fabricate with a headlap of **2 inches (50 mm)** and a minimum extension of **4 inches (100 mm) OR 5 inches (125 mm)**, **as directed**, over the underlying asphalt shingle and up the vertical surface.
 - c. Cricket **OR** Backer, **as directed**, Flashings: Fabricate with concealed flange extending a minimum of **18 inches (450 mm) OR 24 inches (600 mm)**, **as directed**, beneath upslope asphalt shingles and **6 inches (150 mm)** beyond each side of chimney **OR** skylight, **as directed**, and **6 inches (150 mm)** above the roof plane.
 - d. Open-Valley Flashings: Fabricate in lengths not exceeding **10 feet (3 m)** with **1-inch- (25-mm-)** high, inverted-V profile at center of valley and equal flange widths of **10 inches (250 mm) OR 12 inches (300 mm)**, **as directed**.
 - e. Drip Edges: Fabricate in lengths not exceeding **10 feet (3 m)** with **2-inch (50-mm)** roof-deck flange and **1-1/2-inch (38-mm)** fascia flange with **3/8-inch (9.6-mm)** drip at lower edge.
3. Vent Pipe Flashings: ASTM B 749, Type L51121, at least **1/16 inch (1.6 mm)** thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least **4 inches (100 mm)** from pipe onto roof.

1.3 EXECUTION

A. Underlayment Installation

1. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
2. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - a. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water. Lap ends of felt not less than **6 inches (150 mm)** over self-adhering sheet underlayment.
 - b. Install fasteners at no more than **36 inch (900 mm)** o.c. where the basic wind speed is equal to or greater than 110 mph (176 km/h).
3. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a **19-inch- (485-mm-)** wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses **19 inches (485 mm)** in shingle fashion. Lap ends a minimum of **6 inches (150 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.

- a. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof **OR** at locations indicated on Drawings, **as directed**.
 - b. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water.
 - c. Terminate felt underlayment flush **OR** extended up not less than **4 inches (100 mm)**, **as directed**, against sidewalls, curbs, chimneys, and other roof projections.
 - d. Install fasteners at no more than **36 inch (900 mm)** o.c. where the basic wind speed is equal to or greater than **110 mph (176 km/h)**.
4. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below **OR** on Drawings, **as directed**, lapped in direction to shed water. Lap sides not less than **3-1/2 inches (89 mm)**. Lap ends not less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Roll laps with roller. Cover underlayment within seven days.
- a. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - b. Eaves: Extend from edges of eaves **24 inches (600 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - c. Rakes: Extend from edges of rake **24 inches (600 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - d. Valleys: Extend from lowest to highest point **18 inches (450 mm)** on each side.
 - e. Hips: Extend **18 inches (450 mm)** on each side.
 - f. Ridges: Extend **36 inches (914 mm)** on each side without obstructing continuous ridge vent slot.
 - g. Sidewalls: Extend beyond sidewall **18 inches (450 mm)**, and return vertically against sidewall not less than **4 inches (100 mm)**.
 - h. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element **18 inches (450 mm)**, and return vertically against penetrating element not less than **4 inches (100 mm)**.
 - i. Roof Slope Transitions: Extend **18 inches (450 mm)** on each roof slope.
5. Concealed, Woven **OR** Closed-Cut, **as directed**, Valley Lining: Comply with NRCA's recommendations. Install a **36-inch- (914-mm-)** wide felt underlayment centered in valley. Fasten to roof deck with felt underlayment **OR** roofing, **as directed**, nails.
- a. Lap roof-deck felt underlayment over valley felt underlayment at least **6 inches (150 mm)**.
 - b. Install a **36-inch- (914-mm-)** wide strip of granular-surfaced valley lining centered in valley, with granular-surface face up. Lap ends of strips at least **12 inches (300 mm)** in direction to shed water, and seal with asphalt roofing cement. Fasten to roof deck with roofing nails.
6. Metal-Flushed, Open-Valley Underlayment: Install two layers of **36-inch- (914-mm-)** wide felt underlayment centered in valley. Stagger end laps between layers at least **72 inches (1830 mm)**. Lap ends of each layer at least **12 inches (300 mm)** in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment **OR** roofing, **as directed**, nails.
- a. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least **6 inches (150 mm)**.
7. Granular-Surfaced, Open-Valley Lining: Comply with NRCA's recommendations. Install a **36-inch- (914-mm-)** wide felt underlayment centered in valley. Fasten to roof deck with felt underlayment **OR** roofing, **as directed**, nails.
- a. Lap roof-deck felt underlayment over valley felt underlayment at least **6 inches (150 mm)**.
 - b. Install an **18-inch- (450-mm-)** wide strip of valley lining centered in valley, with granular-surface face down. Install a second **36-inch- (914-mm-)** wide strip of valley lining centered in valley, with granular-surface face up. Lap ends of each strip at least **12 inches (300 mm)** in direction to shed water, and seal with asphalt roofing cement. Stagger end laps between succeeding strips at least **72 inches (1830 mm)**. Fasten each strip to roof deck with roofing nails.

B. Metal Flashing Installation

1. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
2. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
3. Step Flashings: Install with a headlap of **2 inches (50 mm)** and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
4. Cricket **OR** Backer, **as directed**, Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.
5. Open-Valley Flashings: Install centered in valleys, lapping ends at least **8 inches (200 mm)** in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - a. Secure hemmed flange edges into metal cleats spaced **12 inches (300 mm)** apart and fastened to roof deck.
 - b. Adhere **9-inch- (225-mm-)** wide strip of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
6. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
7. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
8. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

C. Asphalt Shingle Installation

1. General: Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
2. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed **OR** at least **7 inches (175 mm)** wide, **as directed**, with self-sealing strip face up at roof edge.
 - a. Extend asphalt shingles **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, over fasciae at eaves and rakes.
 - b. Install starter strip along rake edge.
3. For Three-Tab- And Other Multitab-Strip Asphalt Shingles: Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with **4-inch (100-mm) OR 5-inch (125-mm) OR 6-inch (150-mm) OR 1/2-tab OR 1/3-tab OR** manufacturer's recommended, **as directed**, offset pattern at succeeding courses, maintaining uniform exposure.
4. For Laminated-Strip And No-Cutout-Strip Asphalt Shingles: Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
5. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
6. Fasten asphalt shingle strips with a minimum of four **OR** five **OR** six, **as directed**, roofing nails located according to manufacturer's written instructions.
 - a. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
 - b. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 - c. When ambient temperature during installation is below **50 deg F (10 deg C)**, seal asphalt shingles with asphalt roofing cement spots.
7. Woven Valleys: Extend succeeding asphalt shingle courses from both sides of valley **12 inches (300 mm)** beyond center of valley, weaving intersecting shingle-strip courses over each other. Use one-piece shingle strips without joints in valley.

- a. Do not nail asphalt shingles within **6 inches (150 mm)** of valley center.
8. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley **12 inches (300 mm)** beyond center of valley. Use one-piece shingle strips without joints in valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line **2 inches (50 mm)** short of valley centerline. Trim upper concealed corners of cut-back shingle strips.
 - a. Do not nail asphalt shingles within **6 inches (150 mm)** of valley center.
 - b. Set trimmed, concealed-corner asphalt shingles in a **3-inch- (75-mm-)** wide bed of asphalt roofing cement.
9. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley **OR** Widen exposed portion of open valley **1/8 inch in 12 inches (1:96)**, **as directed**, from highest to lowest point.
 - a. Set valley edge of asphalt shingles in a **3-inch- (75-mm-)** wide bed of asphalt roofing cement.
 - b. Do not nail asphalt shingles to metal open-valley flashings.
10. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
11. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.
 - a. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

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SECTION 07 31 16 00 - METAL SHINGLES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for metal shingles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Metal-shingle panels.
 - b. Individual metal shingles.
 - c. Underlayment.
 - d. Ridge vents.
 - e. Snow guards.

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Performance Requirements

1. General Performance: Metal shingles shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
2. Wind-Uplift Resistance: Provide metal-shingle assemblies that comply with the following wind-uplift requirements.
 - a. Class: 15 **OR** 30 **OR** 60 **OR** 90, **as directed**, when tested according to UL 580.
 - b. Uplift Resistance: **75 lbf/sq. ft. (3.6 kPa) OR 120 lbf/sq. ft. (5.75 kPa) OR 165 lbf/sq. ft. (7.9 kPa), as directed**, when tested according to UL 1897.
3. Impact Resistance: Class 3 **OR** Class 4, **as directed**, when tested according to UL 2218.
4. Energy Performance, Solar Reflectance (for LEED-NC Credit SS 7.2): Provide shingles with Solar Reflectance Index not less than 29 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
5. Energy Performance, ENERGY STAR: Provide roofing system that is listed on the DOE's "Roof Products Qualified Product List" for steep-slope roof products.
6. Recycled Content: Provide metal shingles with recycled content so that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 50 percent by weight.

E. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For metal shingles, documentation indicating compliance with Solar Reflectance Index requirement.
 - b. Product Data for Credit(s) MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.

3. Shop Drawings: For metal shingles. Show roof plans and wall elevations, **as directed**; sections at hips, gables, ridges, valleys, and eaves; details of metal shingles, flashing, trim, and accessories; and attachments to other work.
 4. Samples: Full-size components of each type of metal shingle indicated, including visible accessories.
 5. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency or performed by a qualified testing agency, for metal shingles, demonstrating compliance with requirements specified in "Performance Requirements" Article.
 6. Warranty: Sample of special warranties.
- F. Quality Assurance
1. Source Limitations: Obtain metal shingles from single source from single manufacturer.
 2. Fire-Test Exposure Rating: Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical products per test method UL 790 or ASTM E 108 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 3. Preinstallation Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Do not store metal-shingle materials in contact with other materials that might cause staining, denting, or other surface damage. Store metal-shingle materials away from uncured concrete and masonry.
 2. Protect strippable protective covering on metal shingles from exposure to sunlight and high humidity, except to the extent necessary for the period of metal-shingle installation.
- H. Project Conditions
1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be performed according to manufacturer's written instructions and warranty requirements.
 - a. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.
- I. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal shingles and accessories that fail in materials within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including wind uplift.
 - 2) Water penetration and hail perforation.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - b. Materials-Only Warranty Period: 15 **OR** 25 **OR** 50, **as directed**, years from date of Final Completion.
 2. Special Project Warranty: Roofing Installer's Warranty, signed by roofing Installer, covering Work of this Section, in which Installer agrees to repair or replace components of roofing that fail in materials or workmanship within the following warranty period:
 - a. Warranty Period: Two **OR** Five, **as directed**, years from date of Final Completion.
 3. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal shingles that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - a. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - 1) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - 2) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - 3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - b. Warranty Period: 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Sheet Metal Materials

1. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - a. Mill Finish: Uncoated aluminum sheet.
 - b. High-Performance Organic Coating (Coil-Coated Finishes): Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 2) Three-Coat Fluoropolymer: AAMA 620. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
 - 3) Concealed Surface: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat and with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: **ASTM A 792/A 792M, Class AZ50 coating designation, Grade 37 (Class AZM150 coating designation, Grade 255)**; structural quality.
 - a. Mill Finish: Satin-finish, aluminum-zinc alloy-coated steel sheet without additional coating.
 - b. Granular-Coating Finish: Entire upper surface of shingle, including flange edges, coated with ceramic-colored quartz granules or crushed stone chips bonded to shingle with a resin adhesive and sealed with a clear overglaze.
3. Zinc-Coated (Galvanized) Steel Sheet: **ASTM A 653/A 653M, G90 (Z275)** coating designation; structural quality.
 - a. Mill Finish: Zinc-coated (galvanized) steel sheet without additional coating **OR** with manufacturer's standard mill-phosphatized finish, **as directed**.
 - b. High-Performance Organic Coating, (Coil-Coated Finishes): Prepainted by the coil-coating process to comply with **ASTM A 755/A 755M**. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 2) Three-Coat Fluoropolymer: AAMA 621. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
4. Copper Sheet: **ASTM B 370**; Temper H00, cold rolled, unless Temper 060 is required for forming.
 - a. Mill Finish: Nonpatinated and exposed.
 - b. Pre-Patinated Finish: Dark brown **OR** Verdigris, **as directed**, pre-patinated according to **ASTM B 882**.
5. Zinc-Alloy Sheet: Alloy of 99.995 percent pure electrolytic high-grade zinc with alloy additives of copper (0.08 to 0.20 percent), titanium (0.07 to 0.12 percent), and aluminum (0.015 percent) **OR** Zinc alloy consisting of 99 percent pure zinc with 0.08 to 1.00 percent copper, 0.06 to 0.20 percent titanium, and up to 0.015 percent aluminum, **as directed**; with manufacturer's standard factory-applied, flexible, protective back coating.
 - a. Bright-Rolled Finish: Uncoated, bright-rolled zinc-alloy sheet.
 - b. Preweathered Finish: Factory-applied preweathering to uniform color.

B. Metal Shingles

1. Aluminum Shingles: Factory-formed, interlocking shingle panels **OR** individual shingles, **as directed**.
 - a. Shingle Panels: Stamped panels resembling multiple shakes **OR** shingles **OR** Spanish tiles **OR** flat tiles **OR** scalloped tiles, **as directed**.

- 1) Material: Formed aluminum, **0.020 inch (0.51 mm)** thick **OR 0.032 inch (0.81 mm)** thick **OR** thickness as needed to meet performance requirements, **as directed**.
- 2) Reinforcement: Manufacturer's standard insert material in units to increase rigidity.
- 3) Exposure: **48 by 12 inches (1219 by 305 mm)**.
- 4) Finish: Mill **OR** High-performance organic coating.
- 5) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- b. Individual Shingles: Rectangular **OR** Diamond, **as directed**, shingle units.
 - 1) Material: Formed aluminum, **0.020 inch (0.51 mm)** thick **OR 0.032 inch (0.81 mm)** thick **OR** thickness as needed to meet performance requirements, **as directed**.
 - 2) Reinforcement: Manufacturer's standard insert material in units to increase rigidity.
 - 3) Exposure: **14 by 14 inches (356 by 356 mm)**.
 - 4) Finish: Mill **OR** High-performance organic coating, **as directed**.
 - 5) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
2. Steel Shingles: Factory-formed, interlocking shingle panels **OR** individual shingles, **as directed**.
 - a. Shingle Panels: Stamped panels resembling multiple shakes **OR** shingles **OR** Spanish tiles **OR** flat tiles **OR** scalloped tiles, **as directed**.
 - 1) Material: Aluminum-zinc alloy-coated **OR** Zinc-coated (galvanized), **as directed**, steel sheet, nominal **0.022 inch (0.56 mm)** thick **OR 0.028 inch (0.71 mm)** thick **OR** thickness as needed to meet performance requirements, **as directed**.
 - 2) Exposure: **47-1/4 by 15-13/16 inches (1200 by 402 mm)**.
 - 3) Finish: Mill **OR** Granular coating **OR** High-performance organic coating, **as directed**.
 - 4) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Individual Shingles: Rectangular shingle units.
 - 1) Material: Aluminum-zinc alloy coated **OR** Zinc-coated (galvanized), **as directed**, steel sheet, nominal **0.022 inch (0.56 mm)** thick **OR 0.028 inch (0.71 mm)** thick **OR** thickness as needed to meet performance requirements, **as directed**.
 - 2) Exposure: **9 by 12 inches (229 by 305 mm)**.
 - 3) Finish: Mill **OR** Granular coating **OR** High-performance organic coating, **as directed**.
 - 4) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
3. Copper Shingles: Factory-formed, interlocking shingle panels **OR** individual shingles, **as directed**.
 - a. Shingle Panels: Stamped panels resembling multiple shakes **OR** shingles, **as directed**.
 - 1) Material: Copper sheet, **12 oz./sq. ft. (0.41 mm thick) OR 16 oz./sq. ft. (0.55 mm thick) OR weight (thickness)** as needed to meet performance requirements, **as directed**.
 - 2) Exposure: **33-1/4 by 10 inches (845 by 254 mm)**.
 - 3) Finish: Mill **OR** Pre-patinated dark brown **OR** Pre-patinated verdigris, **as directed**.
 - b. Individual Shingles: Rectangular **OR** Diamond, **as directed**, shingle units.
 - 1) Material: Copper sheet, **12 oz./sq. ft. (0.41 mm thick) OR 16 oz./sq. ft. (0.55 mm-thick) OR weight (thickness)** as needed to meet performance requirements, **as directed**.
 - 2) Exposure: **9-1/2 by 7-1/4 inches (241 by 184 mm)**.
 - 3) Finish: Mill **OR** Pre-patinated dark brown **OR** Pre-patinated verdigris, **as directed**.
4. Zinc Shingles: Factory-formed, interlocking shingle panels **OR** individual shingles, **as directed**.
 - a. Shingle Panels: Stamped panels resembling multiple shakes **OR** shingles, **as directed**.
 - 1) Material: Zinc-alloy sheet, **0.027 inch (0.70 mm)** thick **OR** thickness as needed to meet performance requirements, **as directed**.
 - 2) Exposure: **47-1/4 by 15-13/16 inches (1200 by 402 mm)**, **as directed**.
 - 3) Finish: Bright rolled **OR** Preweathered gray **OR** Preweathered black, **as directed**.

- b. Individual Shingles: Rectangular **OR** Diamond, **as directed**, shingle units.
 - 1) Material: Zinc-alloy sheet, **0.027 inch (0.70 mm)** thick **OR** thickness as needed to meet performance requirements, **as directed**.
 - 2) Exposure: **14 by 14 inches (356 by 356 mm)**.
 - 3) Finish: Bright rolled **OR** Preweathered gray **OR** Preweathered black, **as directed**.

- C. Underlayment
 1. Felt Underlayment: ASTM D 226 or ASTM D 4869, Type I **OR** Type II, **as directed**, asphalt-saturated organic felt, nonperforated.
 2. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, a minimum of **40-mil- (1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 3. Self-Adhering Sheet Underlayment, High Temperature: A minimum of **30- to 40-mil- (0.76- to 1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment and when recommended by underlayment manufacturer.
 - a. Thermal Stability: Stable after testing at **240 deg F (116 deg C)**; ASTM D 1970.
 - b. Low-Temperature Flexibility: Passes after testing at minus **20 deg F (29 deg C)**; ASTM D 1970.
 4. Slip Sheet: Building paper, **3-lb/100 sq. ft. (0.16-kg/sq. m)** minimum, rosin sized.

- D. Accessories
 1. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other accessory items as required for a complete roofing system and as recommended by metal-shingle manufacturer unless otherwise indicated.
 2. Sheet Metal Flashing and Trim: Metal-shingle manufacturer's flashing and trim components matching shingle material, color, and finish unless otherwise indicated or recommended in writing by metal-shingle manufacturer. Fabricate to sizes and configurations shown or required. Unless otherwise indicated, fabricate sheet metal flashing and trim to comply with recommendations that apply to design, dimensions, metal, and other characteristics of the item in SMACNA's "Architectural Sheet Metal Manual."
 3. Ridge Vents: Metal-shingle manufacturer's continuous vented ridge caps matching material and finish of metal shingles with insect screen or insect-resisting geotextile filter strips and with external deflector baffles; for use with specified metal shingles.
 - a. Minimum Net Free Area: As required to satisfy Project requirements.
 - b. Accessories: Splices, end caps, and other accessories matching metal and finish.
 4. Snow Guards: Stop-type **OR** Bar-type, **as directed**, prefabricated aluminum **OR** copper **OR** cast-bronze **OR** zinc **OR** stainless-steel, **as directed**, units, designed to be installed without penetrating metal shingles.
 - a. Attachment: Designed to be attached to surface of metal shingles using construction adhesive, silicone or polyurethane sealant, or adhesive tape **OR** mechanically anchored through predrilled holes concealed by the metal shingles, **as directed**.
 - b. Finish: Matching the metal shingles.
 5. Wood Battens: Pressure-preservative-treated wood complying with requirements in Division 6 Section "Rough Carpentry" **OR** "Miscellaneous Carpentry", **as directed**.
 - a. Contoured Rigid Foam: Manufacturers standard rigid foam formed to match underside contour of metal shingles.
 6. Metal Battens: Hat channels formed from zinc-coated (galvanized) steel sheet; ASTM A 653/A 653M, G90 (Z275) coating designation, not less than **0.025-inch (0.64-mm)** nominal thickness, and complying with requirements in Division 5 Section Cold-Formed Metal Framing."
 7. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
 8. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.

9. Sealant: ASTM C 920, one-part elastomeric polymer joint sealant as recommended by metal-shingle manufacturer for installation indicated; of type, grade, class, and use classifications required to seal joints in metal shingles and remain watertight. Where sealant will be exposed, provide in color matching shingle.
10. Sheet Metal Fasteners: Noncorrosive screws, nails, and anchors designed to withstand design loads as recommended in writing by metal-shingle manufacturer.
 - a. Exposed Fasteners: Heads matching color of metal shingles using plastic caps or factory-applied coating. Provide metal-backed neoprene or EPDM washers under heads of exposed fasteners bearing on weather side of shingles.
 - b. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - c. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - d. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - e. Fasteners for Aluminum-Zinc Alloy-Coated **OR** Zinc-Coated, **as directed**, Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M, ASTM F 2329, or Series 300 stainless steel.
 - f. Fasteners for Copper Sheet: Copper, hardware bronze, or Series 300 stainless steel.
 - g. Fasteners for Zinc Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M, ASTM F 2329, or Series 300 stainless steel.
11. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, **1-inch (25-mm)** minimum diameter.
 - a. Where nails are in contact with metal shingles or flashing, use nails made from same metal as metal shingles.
12. Wood Batten Nails: ASTM F 1667; common or box, steel wire, flat head, and smooth shank; hot-dip galvanized.

E. General Finish Requirements

1. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - a. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking, that tops of fasteners are flush with surface, and that installation is within flatness tolerances.
 - b. Verify that substrate is sound, dry to the maximum moisture content recommended by metal-shingle manufacturer, smooth, clean, sloped for drainage, and completely anchored and that provision has been made for flashings and penetrations through metal shingles.
 - c. Verify that vent stacks and other penetrations through metal shingles have been installed and are securely fastened.
2. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Underlayment Installation

1. General: Comply with metal-shingle and underlayment manufacturers' written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 2. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment nails.
 - a. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water. Lap ends of felt not less than **6 inches (152 mm)** over self-adhering sheet underlayment.
 3. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a **19-inch- (485-mm-)** wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses **19 inches (485 mm)** in shingle fashion. Lap ends a minimum of **6 inches (152 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment nails.
 - a. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof **OR** at locations indicated on Drawings, **as directed**.
 - b. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water.
 - c. Terminate felt underlayment flush **OR** extended up not less than **4 inches (100 mm)**, **as directed**, against sidewalls, curbs, chimneys, and other roof projections.
 4. Self-Adhering Sheet Underlayment: Install wrinkle free; comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below **OR** on Drawings, **as directed**, lapped in direction to shed water. Lap sides not less than **3-1/2 inches (89 mm)**. Lap ends not less than **6 inches (152 mm)**, staggered **24 inches (610 mm)** between courses. Roll laps with roller. Cover underlayment within seven days.
 - a. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - b. Eaves: Extend from edges of eaves **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - c. Rakes: Extend from edges of rakes **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - d. Valleys: Extend from lowest to highest point **18 inches (455 mm)** on each side.
 - e. Hips: Extend **18 inches (455 mm)** on each side.
 - f. Ridges: Extend **36 inches (914 mm)** on each side without obstructing continuous ridge vent slot.
 - g. Sidewalls: Extend **18 inches (455 mm)** beyond sidewalls and return vertically against sidewalls not less than **4 inches (100 mm)**.
 - h. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend **18 inches (455 mm)** beyond penetrating elements and return vertically against penetrating elements not less than **4 inches (100 mm)**.
 - i. Roof-Slope Transitions: Extend **18 inches (455 mm)** on each roof slope.
 5. Metal-Flushed, Open-Valley Underlayment: Install one layer of **36-inch- (914-mm-)** wide felt underlayment or self-adhering sheet underlayment centered in valley and running the full length of valley in addition to the underlayment required for metal shingles. Stagger end laps between layers and lap ends of each layer at least **12 inches (305 mm)** in direction to shed water.
 - a. Solidly cement valley felt underlayment with asphalt roofing cement to the underlayment required for metal shingles.
 6. Apply slip sheet with adhesive or tape before installing metal flashing and shingles.
- C. Metal-Shingle Installation
1. General: Install metal shingles according to manufacturer's written instructions applicable to products and applications indicated; install level, plumb, and true to line.

2. Felt Interlayment: Install **18-inch- (455-mm-)** wide strip of felt underlayment over top portion of first and each succeeding course. Stagger fasten to roof deck with felt underlayment nails.
 3. Maintain uniform exposure and coursing of metal shingles throughout roof.
 4. Apply sealant between shingles, flashing, trim, and exposed fasteners to achieve a weathertight system.
 5. Interlock and overlap shingles and stagger end joints from **OR** align joints of tile-form, **as directed**, shingle courses above and below.
 6. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by manufacturer of metal shingles or of the metals in contact.
 - a. Do not use graphite pencils to mark metal surfaces.
- D. Accessory Installation
1. General: Install accessories according to manufacturers' written instructions unless more stringent requirements are indicated.
 2. Metal Flashings and Trim: Install metal flashings and trim according to recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual" unless more stringent requirements are indicated.
 3. Ridge Vents: Install ridge vents with end closures at locations indicated.
 4. Stop-Type Snow Guards: Install rows of snow guards at locations indicated. Space rows apart horizontally, beginning from gutter. Space snow guards apart in each row, offsetting by half this dimension between succeeding rows.
 5. Bar-Type Snow Guards: Install rows of snow guards at locations indicated. Space rows apart horizontally, beginning from gutter.
 6. Battens: Install battens according to metal-shingle manufacturer's written instructions and as needed to meet performance requirements.
 - a. Wood Battens: Install **nominal 2-by-2-inch (38-by-38-mm)** wood battens horizontally over installed underlayment with ends separated by **1/2 inch (13 mm)**, at spacing required by metal-shingle manufacturer, and securely fasten to roof deck with wood batten nails.
 - b. Metal Battens: Install **1-1/2-inch (38-mm)** metal battens horizontally over installed underlayment with ends separated by **1/2 inch (13 mm)**, at spacing required by metal-shingle manufacturer, and securely fasten to roof deck with sheet metal fasteners.
 - c. Intermediate Battens: Install **nominal 1-inch- (19-mm-)** thick wood battens with double strip of contoured rigid foam horizontally with ends separated by **1/2 inch (13 mm)**, at spacing required by metal-shingle manufacturer to uniformly support underside of metal shingles between main battens, and securely fasten to roof deck with wood batten nails.
 7. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by manufacturer of metal shingles or of the metals in contact.
- E. Erection Tolerances
1. Installation Tolerances: Shim and align metal shingles within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
OR
Installation Tolerances: Shim and align metal shingles within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- F. Adjusting And Cleaning
1. Remove and replace damaged or deformed metal shingles or metal shingles that do not comply with specified requirements. Replace shingles with damaged or deteriorated finishes and other components of the Work that cannot be successfully repaired by finish touchup or similar minor repair procedures.

2. Remove temporary protective coverings and strippable films as metal shingles are installed unless otherwise indicated in manufacturer's written installation instructions.
3. On completion of installation, clean exposed surfaces of metal shingles according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Remove excess sealants. Maintain metal shingles in a clean condition during construction.
4. Remove excess metal shingles and debris from Project site.

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SECTION 07 31 26 00 - SLATE SHINGLES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for slate shingles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Slate shingles.
 - b. Underlayment.
 - c. Snow guards.

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Submittals

1. Product Data: For each type of product indicated.
2. Samples
 - a. Slate Shingle: Full size, of each color, size, texture, and shape.
 - b. Ridge Cap **OR** Vent, **as directed**: 12-inch- (305-mm-) long Sample.
 - c. Fasteners: Three fasteners of each type, length, and finish.
 - d. Exposed Valley Lining: 12 inches (305 mm) square.
 - e. Snow Guard: Full-size unit **OR** Base, bracket, and 12-inch- (300-mm-) long rail, **as directed**.
3. Warranty: Sample of special warranty.

E. Quality Assurance

1. Source Limitations: Obtain each color of slate shingle from single quarry capable of producing slate of consistent quality in appearance and physical properties.
2. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double stack rolls.
 - a. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
2. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

G. Warranty

1. Special Warranty: Standard form in which roofing Installer agrees to repair or replace slate roofing that fails in materials or workmanship within two **OR** five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Slate Shingles

1. Slate Shingles: ASTM C 406, Grade S1 **OR** Grade S2, **as directed**; hard, dense, and sound; chamfered edges, with nail holes machine punched or drilled and countersunk. No broken or

cracked slates, no broken exposed corners, and no broken corners on covered ends that could sacrifice nailing strength or laying of a watertight roof.

- a. Thickness: Nominal **3/16 inch (5 mm) OR 3/16 to 1/4 inch (5 to 6 mm) OR 1/4 to 3/8 inch (6 to 10 mm) OR 3/8 to 1/2 inch (10 to 13 mm), as directed.**
 - b. Surface Texture: Smooth **OR** Rough, **as directed.**
 - c. Size: **24 inches (610 mm) long by 14 inches (355 mm) OR 12 inches (305 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - d. Size: **22 inches (560 mm) long by 14 inches (355 mm) OR 12 inches (305 mm) OR 11 inches (280 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - e. Size: **20 inches (510 mm) long by 14 inches (355 mm) OR 12 inches (305 mm) OR 11 inches (280 mm) OR 10 inches (255 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - f. Size: **18 inches (455 mm) long by 14 inches (355 mm) OR 12 inches (305 mm) OR 11 inches (280 mm) OR 10 inches (255 mm) OR 9 inches (230 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - g. Size: **16 inches (405 mm) long by 14 inches (355 mm) OR 12 inches (305 mm) OR 11 inches (280 mm) OR 10 inches (255 mm) OR 9 inches (230 mm) OR 8 inches (205 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - h. Size: **14 inches (355 mm) long by 12 inches (305 mm) OR 11 inches (280 mm) OR 10 inches (255 mm) OR 9 inches (230 mm) OR 8 inches (205 mm) OR 7 inches (180 mm) OR** random widths, but not less than one-half-length, **as directed** wide.
 - i. Size: **12 inches (305 mm) long by 12 inches (305 mm) OR 10 inches (255 mm) OR 9 inches (230 mm) OR 8 inches (205 mm) OR 7 inches (180 mm) OR 6 inches (152 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - j. Size: **10 inches (255 mm) by 10 inches (255 mm) OR 9 inches (230 mm) OR 8 inches (205 mm) OR 7 inches (180 mm) OR 6 inches (152 mm) OR** random widths, but not less than one-half-length, **as directed,** wide.
 - k. Nail Holes: Two **OR** Four, **as directed,** per shingle.
 - l. Butt Shape: Standard square cut.
 - m. Cut Butt Shape: Standard square cut and pointed **OR** deep bevel **OR** shallow bevel **OR** deep scallop **OR** shallow scallop **OR** round, **as directed.**
 - n. Color: Black **OR** Gray **OR** Purple **OR** Green **OR** Blue black **OR** Blue gray **OR** Mottled purple and green **OR** Red **OR** Match samples **OR** As selected from manufacturer's full range, **as directed.**
 - o. Weather-Exposure Color Change: Unfading **OR** Weathering, **as directed.**
2. Starter Slate: Slate shingles with chamfered nail holes front-side punched.
 - a. Length: Exposure of slate shingle plus head lap.
 3. Ridge Slate: Slate shingles fabricated with vertical **OR** horizontal, **as directed,** grain orientation.

B. Underlayment Materials

1. Felt Underlayment: ASTM D 226, Type I **OR** Type II, **as directed,** asphalt-saturated organic felt, unperforated.
2. Felt Underlayment: ASTM D 2626, asphalt-saturated and -coated organic felt, mineral surfaced, unperforated.
3. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of **55-mil- (1.4-mm-)** thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed.**
4. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed.**
5. Self-Adhering Sheet Underlayment, High Temperature: Minimum of **30- to 40-mil- (0.76- to 1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or

SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.

- a. Thermal Stability: Stable after testing at **240 deg F (116 deg C)**; ASTM D 1970.
- b. Low-Temperature Flexibility: Passes after testing at minus **20 deg F (29 deg C)**; ASTM D 1970.

C. Snow Guards

1. Snow-Guard Pads: Fabricated copper **OR** cast-bronze **OR** zinc **OR** stainless-steel **OR** aluminum, **as directed**, units, designed to be installed without penetrating slate shingles, and complete with predrilled holes or hooks for anchoring.
2. Snow-Guard Rails: Units fabricated from metal baseplate anchored to adjustable **OR** fixed, **as directed**, bracket and equipped with two **OR** three, **as directed**, bars.
 - a. Brackets and Baseplate: Aluminum **OR** Bronze or brass **OR** Stainless steel, **as directed**.
 - b. Bars: Aluminum, mill finished **OR** Aluminum, clear anodized **OR** Stainless steel, mill finished, **as directed**.

D. Accessories

1. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
2. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.
3. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** polysulfide **OR** silicone, **as directed**, polymer sealant; of type, grade, class, and use classifications required to seal joints in slate-shingle roofing and remain watertight.
4. Slating Nails: ASTM F 1667, copper, **OR** aluminum-alloy, **OR** stainless-steel, **OR** cut-brass, **as directed**, smooth shanked, wire nails; **0.135-inch (3.4-mm)** minimum thickness; sharp pointed; with **3/8-inch- (10-mm-)** minimum diameter flat head; of sufficient length to penetrate a minimum of **3/4 inch (19 mm)** into sheathing.
 - a. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
5. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire nails with low-profile capped heads or disc caps, **1-inch (25-mm)** minimum diameter.
6. Wood Nailer Strips and Eave Cants: Comply with requirements in Division 06 Section(s) "Rough Carpentry" **OR** "Miscellaneous Rough Carpentry", **as directed**.
7. Ridge Cap **OR** Vent, **as directed**: Custom-fabricated metal covers with noncorrosive components complete with internal anchoring lag screws, compression plates, and snap-on caps and slate retention channels, **as directed**.
 - a. Type: Cap, nonventilating **OR** Vent, with ventilating mesh providing net-free area of **18 sq. in./ft. (380 sq. cm/m)** **OR** Vent, with ventilating mesh providing net-free area of **18 sq. in./ft. (380 sq. cm/m)** and external baffles, **as directed**.
 - b. Metal Components: Copper, **20-oz./sq. ft.- (0.7-mm-)** thick sheet **OR** Aluminum, **0.050-inch- (1.3-mm-)** thick sheet, with manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin on exposed surfaces, **as directed**.
 - c. Accessories: Splices, end caps, and other accessories of matching metal and finish.
8. Track- and Clip-Attachment System: Custom-fabricated slate-shingle attachment system designed for use with notched-slate shingles consisting of extruded-aluminum, **OR** formed stainless-steel, **as directed**, perforated Z-track, screws, and spring clips for anchoring slate to roof deck.

E. Metal Flashing And Trim

1. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Sheet Metal: Copper **OR** Stainless steel **OR** Zinc-tin alloy-coated stainless steel **OR** Zinc-tin alloy-coated steel **OR** Zinc-tin alloy-coated copper **OR** Anodized aluminum **OR** Aluminum, mill finished, **as directed**.

2. Fabricate sheet metal flashing and trim to comply with recommendations that apply to design, dimensions, metal, and other characteristics of the item in SMACNA's "Architectural Sheet Metal Manual."
 - a. Apron Flashings: Fabricate with lower flange extending a minimum of **4 inches (100 mm) OR 6 inches (152 mm), as directed**, over and **4 inches (100 mm)** beyond each side of downslope slate shingles and **6 inches (152 mm)** up the vertical surface.
 - b. Step Flashings: Fabricate with a head lap of **3 inches (75 mm)** and a minimum extension of **4 inches (100 mm) OR 5 inches (127 mm), as directed**, both horizontally and vertically.
 - c. Cricket **OR** Backer, **as directed**, Flashings: Fabricate with concealed flange extending a minimum of **18 inches (455 mm) OR 24 inches (610 mm), as directed**, beneath upslope slate shingles and **6 inches (152 mm)** beyond each side of chimney **OR** skylight, **as directed**, and **6 inches (152 mm)** above the roof plane.
 - d. Hip Flashings: Fabricate to length of slate shingle and to extend **3 inches (75 mm), as directed**, beyond joint of hip shingle with adjoining roof shingle.
 - e. Open-Valley Flashings: Fabricate in lengths not exceeding **10 feet (3 m)** with **1-inch- (25-mm-)** high, inverted-V profile at center of valley and equal flange widths of **10 inches (255 mm) OR 12 inches (305 mm), as directed**.
 - f. Closed-Valley Flashings: Fabricate in lengths not exceeding **10 feet (3 m)** and equal flange widths of **10 inches (255 mm) OR 12 inches (305 mm), as directed**.
 - g. Drip Edges: Fabricate in lengths not exceeding **10 feet (3 m)** with **2-inch (50-mm)** roof-deck flange and **1-1/2-inch (38-mm)** fascia flange with **3/8-inch (10-mm)** drip at lower edge.
3. Vent-Pipe Flashings: ASTM B 749, Type L51121, at least **1/16 inch (1.6 mm)** thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least **4 inches (100 mm)** from pipe onto roof.

1.3 EXECUTION

A. Underlayment Installation

1. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
2. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment nails.
 - a. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water. Lap ends of felt not less than **6 inches (152 mm)** over self-adhering sheet underlayment.
3. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a **19-inch- (485-mm-)** wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses **19 inches (485 mm)** in shingle fashion. Lap ends a minimum of **6 inches (152 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment nails.
 - a. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof **OR** at locations indicated on Drawings, **as directed**.
 - b. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water.
 - c. Terminate felt underlayment flush **OR** extended up not less than **4 inches (100 mm), as directed**, against sidewalls, curbs, chimneys, and other roof projections.
4. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below **OR** on Drawings, **as directed**, lapped in direction to shed water. Lap

sides not less than **3-1/2 inches (89 mm)**. Lap ends not less than **6 inches (152 mm)**, staggered **24 inches (600 mm)** between courses. Roll laps with roller. Cover underlayment within seven days.

- a. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - b. Eaves: Extend from edges of eaves **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - c. Rakes: Extend from edges of rakes **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - d. Valleys: Extend from lowest to highest point **18 inches (455 mm)** on each side.
 - e. Hips: Extend **18 inches (455 mm)** on each side.
 - f. Ridges: Extend **36 inches (914 mm)** on each side without obstructing continuous ridge vent slot, **as directed**.
 - g. Sidewalls: Extend **18 inches (455 mm)** beyond sidewalls and return vertically against sidewalls not less than **4 inches (100 mm)**.
 - h. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend **18 inches (455 mm)** beyond penetrating elements and return vertically against penetrating elements not less than **4 inches (100 mm)**.
 - i. Roof-Slope Transitions: Extend **18 inches (455 mm)** on each roof slope.
5. Metal-Flashed, Open-Valley Underlayment: Install two layers of **36-inch- (914-mm-)** wide felt underlayment centered in valley. Stagger end laps between layers at least **72 inches (1830 mm)**. Lap ends of each layer at least **12 inches (305 mm)** in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment nails.
- a. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least **6 inches (152 mm)**.

B. Metal Flashing Installation

1. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Install metal flashings according to recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
2. Apron Flashings: Extend lower flange over and beyond each side of downslope slate shingles and up the vertical surface.
3. Step Flashings: Install with a head lap of **3 inches (75 mm)** and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying slate shingle. Fasten to roof deck only.
4. Cricket **OR** Backer, **as directed**, Flashings: Install against the roof-penetrating element, extending concealed flange beneath upslope slate shingles and beyond each side.
5. Hip Flashings: Install centrally over hip with lower edge of flashing concealed by butt of overlying slate shingle. Fasten to roof deck.
6. Open **OR** Closed, **as directed**, -Valley Flashings: Install centrally in valleys, lapping ends at least **8 inches (205 mm)** in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - a. Secure hemmed flange edges into metal cleats spaced **12 inches (305 mm)** apart and fastened to roof deck.
 - b. Adhere **9-inch- (230-mm-)** wide strips of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
7. Rake Drip Edges: Install over underlayment and fasten to roof deck.
8. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.
9. Pipe Flashings: Form flashing around pipe penetrations and slate shingles. Fasten and seal to slate shingles.

C. Slate-Shingle Installation

1. General: Beginning at eaves, install slate shingles according to manufacturer's written instructions and to details and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
 - a. Install wood nailer strip cant at eave edges.

- b. Install shingle starter course chamfered face down.
2. Install first and succeeding shingle courses with chamfered face up. Install full-width first course at rake edge.
 - a. Offset joints of uniform-width slate shingles by half the shingle width in succeeding courses.
 - b. Offset joints of random-width slate shingles a minimum of **3 inches (75 mm)** in succeeding courses.
3. Maintain a **3-inch- (75-mm-)** **OR 4-inch- (100-mm-)**, **as directed**, minimum head lap between succeeding shingle courses.
4. Maintain uniform exposure of shingle courses between eaves and ridge **OR** midway between eaves and ridge and increase head lap of succeeding shingle courses to ensure uniform exposure on remaining shingle courses, **as directed**.
5. Extend shingle starter course and first course **1 inch (25 mm)** **OR 2 inches (50 mm)**, **as directed**, over fascia at eaves.
6. Extend shingle starter course and succeeding courses **1 inch (25 mm)** over fascia at rakes.
7. Cut and fit slate neatly around roof vents, pipes, ventilators, and other projections through roof.
8. Hang slate with two **OR** four, **as directed**, slating nails for each shingle with nail heads lightly touching slate. Do not drive nails home drawing slates downward or leave nail head protruding enough to interfere with overlapping shingle above.
 - a. For vented ridge, terminate slate shingles leaving uniform air space on each side of ridge apex.
9. Ridges: Install ridge slate in saddle **OR** strip saddle **OR** combing, **as directed**, configuration.
 - a. Install and anchor wood nailer strips of thicknesses to match abutting courses of slate shingles, terminating nailer strip **3 to 4 inches (75 to 100 mm)** from the eave. Cover with felt underlayment strip, extending to underlying slate but concealed by ridge slate.
 - b. Lay ridge slate in bed of asphalt roofing cement **OR** butyl sealant, **as directed**.
 - c. Anchor ridge slate to supporting wood nailer strip with two **OR** four, **as directed**, nails for each slate shingle without nails penetrating underlying slate.
 - d. Extend combing slate over leeward ridge slate by **1/8 to 1/4 inch (3 to 6 mm)**. Seal ridge joint with elastomeric sealant.
 - e. Cover heads of exposed nails at final ridge shingle with asphalt roofing cement **OR** butyl sealant, **as directed**.
10. Hips: Install and anchor slate hips in saddle **OR** mitered **OR** fantail, **as directed**, configuration.
 - a. Install and anchor wood nailer strips of thickness to match abutting courses of slate shingles. Cover nailer strip with felt underlayment strip, extending on to underlying slate but concealed by hip slate. Anchor hip slate to nailer strip with two nails located in upper third of hip-slate length.
 - b. Notch starter shingle and first shingle course at hip to fit around nailer strips so no wood is exposed at ridge eave.
 - c. Lay hip slate in bed of asphalt roofing cement **OR** butyl sealant, **as directed**.
 - d. Seal hip centerline joint with elastomeric sealant.
11. Open Valleys: Cut slate shingles to form straight lines at open valleys, trimming upper concealed corners of shingles. Maintain uniform width of exposed open valley **OR** Widen exposed portion of open valley **1/8 inch in 12 inches (1:96)**, **as directed**, from highest to lowest point.
 - a. Do not nail shingles to valley metal flashings.
12. Closed Valleys: Cut slate shingles to form straight lines at closed valleys, trimming upper concealed corners of shingles. Maintain uniform gap at centerline of valley of **1/2 to 3/4 inch (13 to 19 mm)** **OR 3/4 to 1 inch (19 to 25 mm)**, **as directed**.
 - a. Do not nail shingles to valley metal flashings.

D. Snow-Guard Installation

1. Snow-Guard Pads: Install rows of snow-guard pads at locations indicated according to manufacturer's written installation instructions. Space rows apart horizontally, beginning from gutter. Space snow guards apart in each row, offsetting by half this dimension between succeeding rows.

2. Snow-Guard Rails: Install rows of snow-guard rails at locations indicated according to manufacturer's written installation instructions. Space rows apart horizontally, beginning from gutter.

- E. Accessories Installation
 1. Ridge Caps **OR** Vents, **as directed**: Install units according to manufacturer's written instructions.
 - a. Install slate shingles into retention channels, butting adjacent shingles.

- F. Adjusting And Cleaning
 1. Remove and replace damaged or broken slate shingles.
 2. Remove excess slate and debris from Project site.

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SECTION 07 31 29 13 - WOOD SHINGLES AND SHAKES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for wood shingles and shakes. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Wood roof shingles and shakes.
 - b. Wood wall shingles and shakes.
 - c. Wood-shingle-clad panels.
 - d. Underlayment.

C. Definitions

1. CSSB: Cedar Shake & Shingle Bureau.
2. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood shingles and shakes comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating costs for each certified wood product.
3. Samples: For each type of wood shingle, shake, ridge and hip unit, and ridge vent indicated.
4. Research/Evaluation Reports: For wood shingles and shakes, from the ICC, **as directed**.
5. Maintenance Data: For wood shingles and shakes to include in maintenance manuals.
6. Warranties: Sample of special warranties.

E. Quality Assurance

1. Grading Agency Qualifications: An independent testing and inspecting agency recognized by authorities having jurisdiction as qualified to label wood shingles and shakes for compliance with referenced grading rules.
2. Forest Certification: Provide shingles and shakes produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
3. Fire-Resistance Characteristics: Where indicated, provide wood shingles and shakes and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - a. Exterior Fire-Test Exposure: Class B **OR** Class C, **as directed**; UL 790 or ASTM E 108 with ASTM D 2898, for application and roof slopes indicated.
4. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double stack rolls.
 - a. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.

2. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

G. Warranty

1. Special Warranty: CSSB's standard form in which CSSB agrees to repair or replace wood shingles and shakes that fail in materials within specified warranty period. Material failures include manufacturing defects that result in leaks.
 - a. Materials-Only Warranty Period: 20 **OR** 25, **as directed**, years for shingles and shakes, and 20 years for manufactured ridge and hip units, from date of Final Completion.

1.2 PRODUCTS

A. Roof Shingles

1. Cedar Roof Shingles: Smooth-sawn western red cedar shingles.
 - a. Grading Standards: CSSB's "Grading Rules for Certigrade Red Cedar Shingles."
 - b. Grade: No. 1, with starter courses of No. 1 **OR** No. 2 **OR** No. 3, **as directed**.
 - c. Size: 16 inches (405 mm) long; 0.40 inch (10 mm) thick **OR** 18 inches (455 mm) long; 0.45 inch (11 mm) thick **OR** 24 inches (610 mm) long; 0.50 inch (13 mm) thick, **as directed**, at butt.
2. Ridge and Hip, **as directed**, Units: Manufactured **OR** Site-fabricated, **as directed**, units of same thickness as roof shingle, 7 inches (180 mm) wide; beveled, alternately overlapped, and nailed.
 - a. Grade: No. 1.
 - b. Length: 16 inches (405 mm) **OR** 18 inches (455 mm), **as directed**.
3. Fancy-Butt Roof Shingles: Clear heartwood red cedar, No. 1 grade, with butt shape indicated.
 - a. Butt Shape: Diagonal **OR** Half Cove **OR** Diamond **OR** Round **OR** Hexagonal **OR** Octagonal **OR** Arrow **OR** Square **OR** Fish Scale, **as directed**.
 - b. Grading Standards: CSSB's "Grading Rules for Certigrade Red Cedar Shingles."
 - c. Size: 16 inches (405 mm) long; 5 inches (127 mm) wide **OR** 18 inches (455 mm) long; 5 inches (127 mm) wide, **as directed**, by manufacturer's standard thickness.

B. Roof Shakes

1. Cedar Roof Shakes: Handsplit and resawn western red cedar shakes; split face and sawn back.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Split Resawn Cedar Shakes."
 - b. Grade: Premium, **OR** No. 1, **as directed**, with starter courses of Premium **OR** No. 1, **as directed**.
 - c. Length: 18 inches (455 mm), **OR** 24 inches (610 mm), **as directed**, with 15-inch- (380-mm-) long starter course.
 - d. Thickness: 1/2 inch (13 mm) **OR** 3/4 inch (19 mm), **as directed**, at butt.
2. Cedar Roof Shakes: Tapersawn western red cedar shakes; sawn both sides.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Sawn Tapersawn Cedar Shakes."
 - b. Grade: Premium, **OR** No. 1, **as directed**, with starter courses of Premium **OR** No. 1 **OR** No. 2, **as directed**.
 - c. Length: 18 inches (455 mm), **OR** 24 inches (610 mm), **as directed**, with 15-inch- (380-mm-) long starter course.
 - d. Thickness: 5/8 inch (16 mm) **OR** 3/4 inch (19 mm), **as directed**, at butt.
3. Cedar Roof Shakes: Tapersplit western red cedar shakes; handsplit.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Split Resawn Cedar Shakes."
 - b. Grade: Premium, with premium starter courses.
 - c. Length: 24 inches (610 mm), with 15-inch- (380-mm-) long starter course.
 - d. Thickness: 1/2 inch (13 mm) at butt.
4. Cedar Roof Shakes: Straightsplit western red cedar shakes; machine split or handsplit.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Split Resawn Cedar Shakes."
 - b. Grade: Premium, with premium starter courses.

- c. Length: **18 inches (455 mm) OR 24 inches (610 mm), as directed**, with **15-inch- (380-mm-)** long starter course.
- d. Thickness: **3/8 to 1/2 inch (10 to 13 mm)** at butt.
- 5. Ridge and Hip, **as directed**, Units: Manufactured **OR** Site-fabricated, **as directed**, units of same grade as shake, **9 inches (230 mm)** wide; beveled, alternately overlapped, and nailed.
 - a. Type: Handsplit and resawn **OR** Tapersawn, **as directed**.
 - b. Length: **18 inches (455 mm) OR 24 inches (610 mm), as directed**.
 - c. Thickness: **5/8 inch (16 mm) OR 3/4 inch (19 mm), as directed**, at butt.

C. Wall Shingles

- 1. Cedar Wall Shingles: Smooth-sawn western red cedar shingles.
 - a. Grading Standards: CSSB's "Grading Rules for Certigrade Red Cedar Shingles."
 - b. Grade: No. 1 **OR** No. 2 **OR** No. 3, **as directed**.
 - c. Size: **16 inches (405 mm)** long; **0.40 inch (10 mm)** thick **OR 18 inches (455 mm)** long; **0.45 inch (11 mm)** thick **OR 24 inches (610 mm)** long; **0.50 inch (13 mm)** thick, **as directed**, at butt.
 - d. Undercourse Shingle Grade: No. 3 **OR** Undercoursing, **as directed**.
 - e. Undercourse Shingle Size: **16 inches (405 mm)** long; **0.40 inch (10 mm)** thick **OR 18 inches (455 mm)** long; **0.45 inch (11 mm)** thick, **as directed**, at butt.
- 2. Cedar Wall Shingles: Rebuted and rejoined, smooth-sawn **OR** sanded, **as directed**, western red cedar shingles.
 - a. Grading Standards: CSSB's "Grading Rules for Certigrade Red Cedar Shingles."
 - b. Grade: No. 1 **OR** No. 2, **as directed**.
 - c. Size: **16 inches (405 mm)** long; **0.40 inch (10 mm)** thick **OR 18 inches (455 mm)** long; **0.45 inch (11 mm)** thick **OR 24 inches (610 mm)** long; **0.50 inch (13 mm)** thick, **as directed**, at butt.
 - d. Undercourse Shingle Grade: No. 3 **OR** Undercoursing, **as directed**.
 - e. Undercourse Shingle Size: **16 inches (405 mm)** long; **0.40 inch (10 mm)** thick **OR 18 inches (455 mm)** long; **0.45 inch (11 mm)** thick, **as directed**, at butt.
- 3. Cedar Wall Shingles: Rebuted and rejoined, machine-grooved, smooth-sawn western red cedar.
 - a. Grading Standards: CSSB's "Grading Rules for Certigrade Red Cedar Shingles."
 - b. Grade: No. 1.
 - c. Size: **16 inches (405 mm)** long; **0.40 inch (10 mm)** thick **OR 18 inches (455 mm)** long; **0.45 inch (11 mm)** thick **OR 24 inches (610 mm)** long; **0.50 inch (13 mm)** thick, **as directed**, at butt.
 - d. Undercourse Shingle Grade: No. 3 **OR** Undercoursing, **as directed**.
 - e. Undercourse Shingle Size: **16 inches (405 mm)** long; **0.40 inch (10 mm)** thick **OR 18 inches (455 mm)** long; **0.45 inch (11 mm)** thick, **as directed**, at butt.
- 4. Fancy-Butt Wall Shingles: Clear heartwood red cedar, No. 1 grade, with butt shape indicated.
 - a. Butt Shape: Diagonal **OR** Half Cove **OR** Diamond **OR** Round **OR** Hexagonal **OR** Octagonal **OR** Arrow **OR** Square **OR** Fish Scale, **as directed**.
 - b. Grading Standards: CSSB's "Grading Rules for Certigrade Red Cedar Shingles."
 - c. Size: **16 inches (405 mm)** long; **5 inches (127 mm)** wide **OR 18 inches (455 mm)** long; **5 inches (127 mm)** wide, **as directed**, by manufacturer's standard thickness.
- 5. Cedar Wall Shingle Finish: Unfinished **OR** Semitransparent penetrating stain, oil based, factory applied **OR** Semisolid penetrating stain, oil based, factory applied **OR** Oil-based primer, stain blocking, factory applied, **as directed**.

D. Wall Shakes

- 1. Cedar Wall Shakes: Handsplit and resawn western red cedar shakes; split face and sawn back.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Split Resawn Cedar Shakes."
 - b. Outer Course Grade: Premium **OR** No. 1, **as directed**.
 - c. Starter Course **OR** Undercourse, **as directed**, Grade: No. 1 **OR** Standard, **as directed**.
 - d. Length: **18 inches (455 mm) OR 24 inches (610 mm), as directed**.
 - e. Thickness: **1/2 inch (13 mm) OR 3/4 inch (19 mm), as directed**, at butt.
- 2. Cedar Wall Shakes: Tapersawn western red cedar shakes; sawn both sides.

- a. Grading Standard: CSSB's "Grading Rules for Certi-Sawn Tapersawn Cedar Shakes."
 - b. Outer Course Grade: Premium **OR** No. 1 **OR** No. 2, **as directed**.
 - c. Starter Course **OR** Undercourse, **as directed**, Grade: No. 1 **OR** No. 2 **OR** No. 3, **as directed**.
 - d. Length: 18 inches (455 mm) **OR** 24 inches (610 mm), **as directed**.
 - e. Thickness: 5/8 inch (16 mm) **OR** 3/4 inch (19 mm), **as directed**, at butt.
3. Cedar Wall Shakes: Tapersplit western red cedar shakes; handsplit.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Split Resawn Cedar Shakes."
 - b. Grade: Premium.
 - c. Length: 24 inches (610 mm).
 - d. Thickness: 1/2 inch (13 mm) at butt.
 - e. Undercourse Shingle Grade: No. 3 **OR** Undercoursing, **as directed**.
 - f. Undercourse Shingle Size: 16 inches (405 mm) long; 0.40 inch (10 mm) thick **OR** 18 inches (455 mm) long; 0.45 inch (11 mm) thick, **as directed**, at butt.
 4. Cedar Wall Shakes: Straightsplit western red cedar shakes; machine split or handsplit.
 - a. Grading Standard: CSSB's "Grading Rules for Certi-Split Resawn Cedar Shakes."
 - b. Grade: Premium.
 - c. Length: 18 inches (455 mm) **OR** 24 inches (610 mm), **as directed**.
 - d. Thickness: 3/8 to 1/2 inch (10 to 13 mm) at butt.
 - e. Undercourse Shingle Grade: No. 3 **OR** Undercoursing, **as directed**.
 - f. Undercourse Shingle Size: 16 inches (405 mm) long; 0.40 inch (10 mm) thick **OR** 18 inches (455 mm) long; 0.45 inch (11 mm) thick, **as directed**, at butt.
 5. Cedar Wall Shake Finish: Unfinished **OR** Semitransparent penetrating stain, oil based, factory applied **OR** Semisolid penetrating stain, oil based, factory applied **OR** Oil-based primer, stain blocking, factory applied, **as directed**.
- E. Wood-Shingle-Clad Panels
1. Cedar Shingle Panels: Clear, vertical-grain, western red cedar shingles bonded with exterior-type adhesives to 5/16-inch- (8-mm-) thick, 96-inch- (2400-mm-) long, DOC PS 1 Exterior C-D plywood panels.
 - a. Number of Courses per Panel: One **OR** Two **OR** Three **OR** Four, **as directed**.
 - b. Butt Style: Straight line **OR** Staggered, **as directed**.
 - c. Fancy-Butt Style: Diagonal **OR** Half Cove **OR** Diamond **OR** Round **OR** Hexagonal **OR** Octagonal **OR** Arrow **OR** Square **OR** Fish Scale, **as directed**.
 - d. Exposure: 4-1/2 inches (115 mm) **OR** 5 inches (127 mm) **OR** 7 inches (180 mm), **as directed**, per course.
 2. Prefabricated Corners: Flush **OR** Flush, with staggered ends **OR** Add-on, **as directed**, type.
- F. Wood Treatments
1. Fire-Retardant Treatment: Exterior-type pressure treatment complying with AWPA C1, **as directed**.
 2. Pressure-Preservative Treatment: AWPA C34, chromated copper arsenate (CCA) pressure treatment; a minimum of 0.40 lb/cu. ft. (6.4 kg/cu. m).
 3. Identification: Attach a label to each bundle of wood shingles or shakes; identify manufacturer, references to model-code approval, type of product, grade, dimensions, and approved grading agency.
 - a. Include chemical treatment, method of application, purpose of treatment, and warranties available.
- G. Underlayment Materials
1. Felt Underlayment: ASTM D 226 **OR** ASTM D 4869, **as directed**, Type I **OR** Type II, **as directed**, asphalt-saturated organic felt.
 2. Felt Interlayment: ASTM D 226 **OR** ASTM D 4869, **as directed**, Type I **OR** Type II, **as directed**, asphalt-saturated organic felt.

3. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, a minimum of **55-mil- (1.4-mm-)** thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.
 4. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, a minimum of **40-mil- (1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.
- H. Ridge Vents
1. Rigid Ridge Vent: Manufacturer's standard rigid section, high-density polypropylene or other UV-stabilized plastic ridge vent with nonwoven geotextile filter strips and external deflector baffles, **as directed**; for use under ridge shingles and shakes.
 2. Flexible Ridge Vent: Manufacturer's standard, compression-resisting, three-dimensional, open-nylon or polyester-mat filter bonded to a nonwoven, nonwicking, geotextile fabric cover, **as directed**; for use under roof shingles and shakes.
- I. Accessories
1. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
 2. Drainage Mat: Manufacturer's standard, compression-resisting, three-dimensional, nonwoven, entangled filament, nylon mat designed to permit air movement and drain incidental moisture by gravity.
 3. Roofing Nails: ASTM F 1667, aluminum **OR** stainless-steel **OR** hot-dip galvanized-steel, **as directed**, wire nails, sharp pointed, and of sufficient length to penetrate a minimum of **3/4 inch (19 mm)** into sheathing.
 - a. Use box **OR** shingle, **as directed**, -type nails for wood shingles.
 - b. Use box-type nails for wood shakes.
 - c. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
 4. Roofing Staples: Type 304 or Type 316, stainless-steel staples, **0.05-inch (1.3-mm)** thick, with a minimum of **7/16-inch (11-mm)** crown width, of sufficient length to penetrate a minimum of **3/4 inch (19 mm)** into sheathing.
 5. Felt Underlayment and Interlayment, **as directed**, Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire nails; with **1-inch- (25-mm-)** minimum diameter, low-profile capped heads or disc caps.
 6. Wood Lath Strip: Western red cedar, clear heartwood, a minimum of **1-1/2 inches (38 mm)** wide.
- J. Metal Flashing And Trim
1. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim"
 - a. Sheet Metal: Copper **OR** Stainless steel **OR** Zinc-tin alloy-coated stainless steel **OR** Zinc-tin alloy-coated steel **OR** Zinc-tin alloy-coated copper **OR** Anodized aluminum **OR** Aluminum, mill finished, **as directed**.
 2. Fabricate sheet metal flashing and trim to comply with recommendations that apply to design, dimensions, metal, and other characteristics of the item in SMACNA's "Architectural Sheet Metal Manual."
 - a. Apron Flashings: Fabricate with lower flange extending a minimum of **4 inches (100 mm) OR 6 inches (152 mm)**, **as directed**, over and **4 inches (100 mm)** beyond each side of downslope wood roofing and **6 inches (152 mm)** up the vertical surface.
 - b. Step Flashings: Fabricate with a head lap of **3 inches (75 mm)** and a minimum extension of **4 inches (100 mm) OR 5 inches (127 mm)**, **as directed**, both horizontally and vertically.
 - c. Cricket **OR** Backer, **as directed**, Flashings: Fabricate with concealed flange extending a minimum of **18 inches (455 mm) OR 24 inches (610 mm)**, **as directed**, beneath upslope wood roofing and **6 inches (152 mm)** beyond each side of chimney **OR** skylight, **as directed**, and **6 inches (152 mm)** above the roof plane.

- d. Open-Valley Flashings: Fabricate in lengths not exceeding 10 feet (3 m) with 1-inch- (25-mm-) high, inverted-V profile at center of valley and equal flange widths of 10 inches (255 mm) **OR** 12 inches (305 mm), **as directed**.
- e. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m) with 2-inch (50-mm) roof-deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (10-mm) drip at lower edge.
3. Vent-Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch (1.6 mm) thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches (100 mm) from pipe onto roof.

1.3 EXECUTION

A. Underlayment Installation

1. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
2. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches (50 mm) over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt underlayment nails.
 - a. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water. Lap ends of felt not less than 6 inches (152 mm) over self-adhering sheet underlayment.
3. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a 19-inch- (485-mm-) wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses 19 inches (485 mm) in shingle fashion. Lap ends a minimum of 6 inches (152 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with felt underlayment nails.
 - a. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof **OR** at locations indicated on Drawings, **as directed**.
 - b. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than 3 inches (75 mm) in direction to shed water.
 - c. Terminate felt underlayment flush **OR** extended up not less than 4 inches (100 mm), **as directed**, against sidewalls, curbs, chimneys, and other roof projections.
4. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below **OR** on Drawings, **as directed**, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (152 mm), staggered 24 inches (610 mm) between courses. Roll laps with roller. Cover underlayment within seven days.
 - a. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - b. Eaves: Extend from edges of eaves 24 inches (610 mm) **OR** 36 inches (914 mm), **as directed**, beyond interior face of exterior wall.
 - c. Rakes: Extend from edges of rakes 24 inches (610 mm) **OR** 36 inches (914 mm), **as directed**, beyond interior face of exterior wall.
 - d. Valleys: Extend from lowest to highest point 18 inches (455 mm) on each side.
 - e. Hips: Extend 18 inches (455 mm) on each side.
 - f. Ridges: Extend 36 inches (914 mm) on each side without obstructing continuous ridge vent slot, **as directed**.
 - g. Sidewalls: Extend 18 inches (455 mm) beyond sidewalls and return vertically against sidewalls not less than 4 inches (100 mm).

- h. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend **18 inches (455 mm)** beyond penetrating elements and return vertically against penetrating elements not less than **4 inches (100 mm)**.
 - i. Roof-Slope Transitions: Extend **18 inches (455 mm)** on each roof slope.
 - 5. Metal-Flashed, Open-Valley Underlayment: Install two layers of **36-inch- (914-mm-)** wide felt underlayment centered in valley. Stagger end laps between layers at least **72 inches (1830 mm)**. Lap ends of each layer at least **12 inches (305 mm)** in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment nails.
 - a. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least **6 inches (152 mm)**.
- B. Metal Flashing Installation**
- 1. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Install metal flashings according to recommendations for wood roofing in NRCA's "The NRCA Roofing and Waterproofing Manual."
 - 2. Apron Flashings: Extend lower flange over and beyond each side of downslope wood roofing and up the vertical surface.
 - 3. Step Flashings: Install with a head lap of **3 inches (75 mm)** and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying shingle or shake. Fasten to roof deck only.
 - 4. Cricket **OR** Backer, **as directed**, Flashings: Install against the roof-penetrating element, extending concealed flange beneath upslope wood roofing and beyond each side.
 - 5. Open-Valley Flashings: Install centrally in valleys, lapping ends at least **8 inches (205 mm)** in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - a. Secure hemmed flange edges into metal cleats spaced **12 inches (305 mm)** apart and fastened to roof deck.
 - b. Adhere **9-inch- (230-mm-)** wide strip of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
 - 6. Rake Drip Edges: Install over underlayment and fasten to roof deck.
 - 7. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.
 - 8. Pipe Flashings: Form flashing around pipe penetrations and wood roofing. Fasten and seal to wood roofing.
- C. Roof-Shingle Installation**
- 1. General: Install wood-shingle roofing according to manufacturer's written instructions and to recommendations in CSSB's "New Roof Construction Manual" and NRCA's "The NRCA Roofing and Waterproofing Manual."
 - 2. Install drainage mat perpendicular to roof slope in parallel courses, butting edges and ends to form a continuous layer, and fasten to roof deck.
 - 3. Install single **OR** double, **as directed**, -layer wood-shingle starter course along lowest roof edge. Extend starter course **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, over fascia and **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, over rake edge.
 - a. Offset joints of double-layer starter course a minimum of **1-1/2 inches (38 mm)**.
 - 4. Install first course of wood shingles directly over starter course and in continuous straight-line courses across roof deck. Install second and succeeding courses of wood shingles in continuous straight-line courses across roof deck. Extend **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, over rake edge.
 - a. Offset joints between shingles in succeeding courses a minimum of **1-1/2 inches (38 mm)**. Limit alignment of vertical joints in every third course to not exceed 10 percent of joints.
 - b. Space shingles a minimum of **1/4 inch (6 mm)** and a maximum of **3/8 inch (10 mm)** apart.
 - c. Fasten each shingle with two nails **OR** staples, **as directed**, spaced **3/4 to 1 inch (19 to 25 mm)** from edge of shingle and **1-1/2 to 2 inches (38 to 50 mm)** above butt line of succeeding course. Drive fasteners flush with top surface of shingles without crushing wood.

- d. Maintain weather exposure of **5 inches (127 mm)** for **16-inch- (405-mm-)** **OR** **5-1/2 inches (140 mm)** for **18-inch- (455-mm-)** **OR** **7-1/2 inches (190 mm)** for **24-inch- (610-mm-)**, **as directed**, long shingles.
 5. Open Valleys: Cut and fit wood shingles at open valleys, trimming upper concealed corners of shingles. Maintain uniform width of exposed open valley **OR** Widen exposed portion of open valley **1/8 inch in 12 inches (1:96)**, **as directed**, from highest to lowest point.
 6. Fancy-Butt Shingles: Install one **OR** two **OR** three, **as directed**, courses of fancy-butt shingles in continuous straight-line courses across roof deck. Center each shingle in succeeding courses between the two shingles below it with **1/8-inch (3-mm)** space between shingles.
 - a. Maintain weather exposure of **5 inches (127 mm)**.
 7. Ridge Vents: Install continuous ridge vents over wood shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate roof sheathing.
 8. Ridge and Hip, **as directed**, Units: Install units over wood shingles trimmed at apex. Maintain same exposure dimension of units as roof-shingle exposure. Lap units at ridges to shed water away from direction of prevailing winds. Alternate overlaps of units and fasten with concealed roofing nails of sufficient length to penetrate sheathing.
 - a. Install concealed strip of felt underlayment over apex shingles and fasten with felt underlayment nails.
 - b. Fasten ridge units to cover ridge vent without obstructing airflow.
- D. Roof-Shake Installation
1. General: Install wood-shake roofing according to manufacturer's written instructions and to recommendations in CSSB's "New Roof Construction Manual" and NRCA's "The NRCA Roofing and Waterproofing Manual."
 2. Install drainage mat perpendicular to roof slope in parallel courses, butting edges and ends to form a continuous layer, and fasten to roof deck.
 3. Install single **OR** double, **as directed**, layer wood-shake starter course along lowest roof edge. Extend starter course **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**, over fascia and **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**, over rake edge.
 - a. Offset joints of double-layer starter course a minimum of **1-1/2 inches (38 mm)**.
 4. Install first course of wood shakes directly over starter course and in continuous straight-line courses across roof deck. Install second and succeeding courses of wood shakes in continuous straight-line courses across roof deck. Extend **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**, over rake edge.
 - a. Install **18-inch- (455-mm-)** wide strip of felt interlayment over top portion of first and each succeeding course. Set bottom edge of felt interlayment at a distance of twice the weather-exposure dimension above the shake butt. Stagger fasten to roof deck with felt underlayment nails.
 - b. Offset joints between shakes in succeeding courses a minimum of **1-1/2 inches (38 mm)**.
 - c. Space shakes a minimum of **3/8 inch (10 mm)** and a maximum of **5/8 inch (16 mm)** apart.
 - d. Fasten each shake with two nails **OR** staples, **as directed**, spaced **3/4 to 1 inch (19 to 25 mm)** from edge of shake and **1-1/2 to 2 inches (38 to 50 mm)** above butt line of succeeding course. Drive fasteners flush with top surface of shakes without crushing wood.
 - e. Maintain weather exposure of **5-1/2 inches (140 mm)** for **18-inch- (455-mm-)** **OR** **7-1/2 inches (190 mm)** for **18-inch- (455-mm-)** **OR** **7-1/2 inches (190 mm)** for **24-inch- (610-mm-)** **OR** **10 inches (255 mm)** for **24-inch- (610-mm-)**, **as directed**, long shakes.
 5. Open Valleys: Cut and fit wood shakes at open valleys, trimming upper concealed corners of shakes. Maintain uniform width of exposed open valley **OR** Widen exposed portion of open valley **1/8 inch in 12 inches (1:96)**, **as directed**, from highest to lowest point.
 6. Ridge Vents: Install continuous ridge vents over wood shakes according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.
 7. Ridge and Hip, **as directed**, Units: Install units over wood shakes trimmed at apex. Maintain same exposure dimension of units as roof-shake exposure. Lap units at ridges to shed water away from direction of prevailing winds. Alternate overlaps of units and fasten with concealed roofing nails of sufficient length to penetrate sheathing.

- a. Install concealed strip of felt underlayment over apex shakes and fasten with felt underlayment nails.
 - b. Fasten ridge units to cover ridge vent without obstructing airflow.
- E. Wall-Shingle Installation, Single Coursed
1. Install wood wall shingles according to manufacturer's written instructions and recommendations in CSSB's "Exterior and Interior Wall Manual."
 2. Install drainage mat horizontally, in parallel courses, over surface to receive wood shingles, butting edges and ends to form a continuous layer; fasten to wall sheathing.
 3. Install wood shingles, beginning at base of wall, with a double-layer starter course in a continuous straight line. Offset joints of double-layer starter course a minimum of **1-1/2 inches (38 mm)**.
 - a. Extend starter course **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, below top of foundation wall.
 4. Install first course of wood shingles over starter course. Install second and succeeding courses of wood shingles. Offset joints between shingles in succeeding courses a minimum of **1-1/2 inches (38 mm)**.
 - a. Install shingles in continuous straight-line courses.
OR
Install shingle courses with butt lines staggered **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, from true butt line.
 - b. Install primed shingles with sides abutting **OR** Space shingles **1/8 to 1/4 inch (3 to 6 mm)** apart, **as directed**.
 - c. Fasten each shingle with two concealed nails **OR** staples driven parallel to butt, **as directed**, spaced **3/4 to 1 inch (19 to 25 mm)** from edge of shingle and **1 inch (25 mm)** above butt line of succeeding course. For shingles wider than **8 inches (205 mm)**, add two concealed fasteners, spaced **1 inch (25 mm)** apart, to the center of shingle. Drive fasteners flush with top surface of shingles without crushing wood.
 - d. Maintain weather exposure of **7-1/2 inches (190 mm)** for **16-inch- (405-mm-) OR 8-1/2 inches (215 mm)** for **18-inch- (455-mm-) OR 11-1/2 inches (290 mm)** for **24-inch- (610-mm-)**, **as directed**, long shingles.
 - e. Interior Corner Treatment: Butted against wood stop **OR** Laced with flashing behind, **as directed**.
 - f. Exterior Corner Treatment: Butted against corner boards **OR** Laced **OR** Mitered, **as directed**.
 5. Fancy-Butt Shingles: Install fancy-butt shingles where indicated, in continuous straight-line courses along wall. Center each shingle in succeeding courses between the two shingles below it with primed shingles abutting **OR 1/8-inch (3-mm)** space between shingles, **as directed**.
 - a. Maintain weather exposure of **7-1/2 inches (190 mm)**.
 - b. Interior Corner Treatment: Butted against wood stop.
 - c. Exterior Corner Treatment: Butted against corner boards **OR** Mitered, **as directed**.
- F. Wall-Shingle Installation, Double Coursed
1. Install wood wall shingles in continuous straight-line courses according to manufacturer's written instructions and recommendations in CSSB's "Exterior and Interior Wall Manual."
 2. Install drainage mat horizontally, in parallel courses, over surface to receive wood shingles, butting edges and ends to form a continuous layer; fasten to wall sheathing.
 3. Install double-layer undercourse of wood shingles beginning at base of wall. Offset joints of each undercourse layer a minimum of **1-1/2 inches (38 mm)**. Fasten with a single center-and-top nail **OR** staple driven parallel to butt, **as directed**.
 - a. Extend undercourse **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, below top of foundation wall.
 - b. Fasten two layers of lath wood strips at base of undercourse to match thickness of double-layer undercourse. Extend **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, below top of foundation wall.
 4. Install succeeding undercourse layers against wood lath strip, **as directed**. Offset joints between undercourse and outer course a minimum of **1-1/2 inches (38 mm)**.

- a. Fasten with a single center-and-top nail **OR** staple driven parallel to butt, **as directed**.
5. Install single wood lath strip on first and succeeding outer courses to match thickness of undercourse and at height that results in specified outer course weather exposure.
6. Install first and succeeding outer courses of wood shingles directly over undercourses, projecting **1/2 inch (13 mm)** below undercourse **OR** lath strips, **as directed**. Offset joints between shingles and undercourse a minimum of **1-1/2 inches (38 mm)**. Offset joints between shingles in succeeding outer courses a minimum of **1-1/2 inches (38 mm)**.
 - a. Install primed outer shingles with sides abutting **OR** Space outer shingles **1/8 to 1/4 inch (3 to 6 mm)** apart, **as directed**.
 - b. Fasten each shingle with two exposed nails **OR** staples driven parallel to butt, **as directed**, spaced **3/4 to 1 inch (19 to 25 mm)** from edge of shingle and **2 inches (50 mm)** above butt line of succeeding course. For outer course shingles wider than **8 inches (205 mm)**, add two concealed fasteners, spaced **1 inch (25 mm)** apart, to the center of shingle. Drive fasteners flush with top surface of shingles without crushing wood.
 - c. Maintain weather exposure of **12 inches (305 mm)** for **16-inch- (405-mm-)** **OR** **14 inches (355 mm)** for **18-inch- (455-mm-)** **OR** **16 inches (405 mm)** for **24-inch- (610-mm-)**, **as directed**, long shingles.
 - d. Interior Corner Treatment: Butted against wood stop **OR** Laced with flashing behind, **as directed**.
 - e. Exterior Corner Treatment: Butted against corner boards **OR** Laced **OR** Mitered, **as directed**.
- G. Wall-Shake Installation, Single Coursed
 1. Install wood wall shakes according to manufacturer's written instructions and recommendations in CSSB's "Exterior and Interior Wall Manual."
 2. Install drainage mat horizontally, in parallel courses, over surface to receive wood shakes, butting edges and ends to form a continuous layer; fasten to wall sheathing.
 3. Install wood shakes, beginning at base of wall, with a double-layer starter course in a continuous straight line. Offset joints of double-layer starter course a minimum of **1-1/2 inches (38 mm)**.
 - a. Extend starter course **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**, below top of foundation wall.
 4. Install first course of wood shakes over starter course. Install second and succeeding course of wood shakes. Offset joints between shakes in succeeding courses a minimum of **1-1/2 inches (38 mm)**.
 - a. Install shakes in continuous straight-line courses.
OR
Install shake courses with butt lines staggered **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**, from true butt line.
 - b. Install primed shakes with sides abutting **OR** Space shingles **1/8 to 1/4 inch (3 to 6 mm)** apart, **as directed**.
 - c. Fasten each shake with two concealed nails **OR** staples driven parallel to butt, **as directed**, spaced **3/4 to 1 inch (19 to 25 mm)** from edge of shake and **1 inch (25 mm)** above butt line of succeeding course. For shakes wider than **8 inches (205 mm)**, add two concealed fasteners, spaced **1 inch (25 mm)** apart, to the center of shake. Drive fasteners flush with top surface of shakes without crushing wood.
 - d. Maintain weather exposure of **7-1/2 inches (190 mm)** for **16-inch- (405-mm-)** **OR** **8-1/2 inches (215 mm)** for **18-inch- (455-mm-)** **OR** **11-1/2 inches (290 mm)** for **24-inch- (610-mm-)**, **as directed**, long shakes.
 - e. Interior Corner Treatment: Butted against wood stop **OR** Laced with flashing behind, **as directed**.
 - f. Exterior Corner Treatment: Butted against corner boards **OR** Laced **OR** Mitered, **as directed**.
- H. Wall-Shake Installation, Double Coursed

1. Install wood wall shakes in continuous straight-line courses according to manufacturer's written instructions and recommendations in CSSB's "Exterior and Interior Wall Manual."
 2. Install drainage mat horizontally, in parallel courses, over surface to receive wood shakes, butting edges and ends to form a continuous layer; fasten to wall sheathing.
 3. Install double-layer undercourse of wood shingles beginning at base of wall. Offset joints of each undercourse layer a minimum of **1-1/2 inches (38 mm)**. Fasten with a single center-and-top nail **OR** staple driven parallel to butt, **as directed**.
 - a. Extend undercourse **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, below top of foundation wall.
 - b. Fasten two layers of lath wood strips at base of undercourse to match thickness of double-layer undercourse. Extend **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, below top of foundation wall.
 4. Install succeeding undercourse layers against wood lath strip, **as directed**. Offset joints between undercourse and outer course a minimum of **1-1/2 inches (38 mm)**.
 - a. Fasten with a single center-and-top nail **OR** staple driven parallel to butt, **as directed**.
 5. Install single wood lath strip on first and succeeding outer courses to match thickness of undercourse and at height that results in specified outer course weather exposure.
 6. Install first and succeeding outer courses of wood shakes directly over undercourses, projecting **1/2 inch (13 mm)** below undercourse **OR** lath strips, **as directed**. Offset joints between shakes and undercourse shingles a minimum of **1-1/2 inches (38 mm)**. Offset joints between shakes in succeeding outer courses a minimum of **1-1/2 inches (38 mm)**.
 - a. Install primed outer shakes with sides abutting **OR** Space outer shakes **1/4 to 3/8 inch (6 to 10 mm)** apart, **as directed**.
 - b. Fasten each shake with two exposed nails **OR** staples driven parallel to butt, **as directed**, spaced **3/4 to 1 inch (19 to 25 mm)** from edge of shake and **2 inches (50 mm)** above butt line of succeeding course. For shakes wider than **8 inches (205 mm)**, add two concealed fasteners, spaced **1 inch (25 mm)** apart, to the center of shake. Drive fasteners flush with top surface of shake without crushing wood.
 - c. Maintain weather exposure of **12 inches (305 mm)** for **16-inch- (405-mm-) OR 14 inches (355 mm)** for **18-inch- (455-mm-) OR 18 inches (455 mm)** for **24-inch- (610-mm-)**, **as directed**, long shakes.
 - d. Interior Corner Treatment: Butted against wood stop **OR** Laced with flashing behind, **as directed**.
 - e. Exterior Corner Treatment: Butted against corner boards **OR** Laced **OR** Mitered, **as directed**.
- I. Wood-Shingle-Clad Panel Installation
1. Install wood-shingle-clad panels and corner units, **as directed**, according to manufacturer's written instructions.
 2. Install panels level, plumb, true, and aligned with adjacent materials.
 3. Install panels working from the lowest level to the top of the wall area.

END OF SECTION 07 31 29 13

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Task	Specification	Specification Description
07 31 29 16	07 31 29 13	Wood Shingles And Shakes
07 31 29 17	01 22 16 00	No Specification Required

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SECTION 07 31 33 00 - COMPOSITE RUBBER SHINGLES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for composite rubber shingles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.
2. Furnish and install this Majestic Slate Tile Roof System in strict accordance with specifications and drawings approved by EcoStar.
3. Metal flashing work is not covered in this specification since EcoStar does **NOT** warrant metal flashing. EcoStar advises that metal flashing and securement of metal should be to industry standards (SMACNA) to prevent the metal from pulling free or buckling. EcoStar also suggests that all flashing metal be copper, stainless steel or an equally long-term material.
4. EcoStar Attic Guard Ridge Ventilation product must be used on those projects that will be using a ridge ventilation system. If a ridge ventilation system is not to be used on the project, another form of ventilation may be used, but will not be covered by any EcoStar warranties. EcoStar advises that a ridge style venting system be utilized to insure the best possible air movement and to provide the best aesthetic appearance to the roofing system.

B. Definitions

1. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

C. Submittals

1. Submit an "EcoStar Gold Star Project Survey" to EcoStar Technical Department for approval **PRIOR** to the job start to enable the Technical Department to approve and assign a job number to the project.
2. The "EcoStar Gold Star Project Survey Form" must be filled out completely and accurately to include any prior deviations approved from this specification, including a roof drawing showing all dimensions, all penetrations, and roof slope.
3. When an EcoStar Gold Star Warranty is desired, EcoStar must be contacted **PRIOR** to project bid and installation. Information may be required for wind design and slope requirements.
4. Product Data: For each type of product indicated.
5. Samples: For the following products, of sizes indicated.
 - a. Composite Rubber Shingle: Full size, of each color, size, texture, and shape.
 - b. Ridge Vent System: **12 inches (300 mm)** long.
 - c. Fasteners: Three fasteners of each type, length, and finish.
 - d. Underlayment: **12 inches (300 mm)** square.

D. Quality Assurance

1. To qualify for an EcoStar Gold Star Warranty, an authorized EcoStar Gold Star Applicator must install system.
2. There shall be no deviation made from this specification without written approval from EcoStar prior to the start of the roofing project.
3. For an EcoStar Gold Star Warranty, upon completion of the installation, an inspection must be conducted by a Technical Representative of EcoStar to ascertain that the roofing system has been installed according to EcoStar's most current published specifications and details. This inspection is not intended to be a Final Inspection for the benefit of the Owner, but for the benefit of EcoStar to determine whether a warranty shall be issued.
4. Class C Testing Requirements:
 - a. Fire Resistance - UL 790 Test Standard
 - b. Class 4 Impact Resistance - UL 2218 Test Standard

- c. 110 mph wind load - PA100-95 Test Standard
- d. Wind uplift - 105 lbs / sq ft - UL 1897 Test Standard
- 5. Class A Testing Requirements:
 - a. Fire Resistance - UL 790 Test Standard
 - b. Class 4 Impact Resistance - UL 2218 Test Standard

E. Product Delivery, Storage And Handling

- 1. Deliver materials in original unopened packages.
- 2. Packages shall be labeled with manufacturer's name, brand name, installation instructions and identification of various items.
- 3. All tile materials must be stored between 45° F. and 80° F. If exposed to lower temperatures, restore to 45° F minimum temperature before using.
- 4. Store all materials in a dry protected area. Damaged materials must **NOT** be used. Installed materials found to be damaged shall be replaced at Gold Star Authorized Applicator's expense.

F. Job Conditions (Cautions And Warnings)

- 1. Contact EcoStar Technical Department for procedures when installing a Majestic Slate Tile Roof System during temperatures less than 45° F.
- 2. Do not install the Majestic Slate Tile Roof System directly over existing asphalt shingles or existing tile roof systems. All existing roof materials **MUST** be removed prior to installation of the Majestic Slate Tile System.
- 3. Roofing surface must be free of ice, water, or snow prior to and during the roofing project.

G. Warranty

- 1. Roofing materials manufacturer will provide the warranty for those materials supplied by the manufacturer when the project is completed by a manufacturer's authorized applicator and all required materials have been utilized within the roof system.
- 2. Only when a manufacturer's technical representative has inspected and approved the completed installation will a warranty be issued.
- 3. The warranty is available for all types of buildings and structures.
- 4. The warranty period is expressed on the warranty certificate, which reflects the inclusive dates of coverage.
- 5. The warranty does **NOT** cover the aesthetic appearance of the Majestic Slate - Tiles. Care should be taken by the authorized applicator to ensure that proper blending of the tiles occurs. When improper blending occurs the aesthetic appearance of the roof can be effected negatively. Blending should occur from a minimum of seven bundles from each pallet. It is highly suggested that all material be on site to blend from.
- 6. Only products supplied by EcoStar, a Division of Carlisle SynTec Incorporated, are included in the warranty unless otherwise specified and approved in writing by EcoStar, a Division of Carlisle SynTec Incorporated.

1.2 PRODUCTS

A. Manufacturer

- 1. All Components of the Majestic Slate - Tile Roof System are to be products manufactured or supplied by EcoStar, a Division of Carlisle SynTec Incorporated, or approved equivalent.

B. Class C Tile Roofing System

- 1. Slate Tiles/Shingles: Tiles made of Starloy™, 100% recycled rubber and plastic compound, 12" wide by 18" long with a nominal thickness of 1/4". Weight shall be determined by the following acceptable tile exposures:

7"	241 - 258 lbs per square
6-1/2"	259 - 278 lbs per square
6"	280 - 300 lbs per square

- a. Color: As selected from manufacturer's standard colors, unless directed otherwise.
 - 2. Underlayment
 - a. AquaGuard - a roofing underlayment recognized for use as an alternative to Type 30 roofing underlayment, consisting of spunbonded polypropylene coated with a layer of U.V. stabilized polypropylene on both sides, meeting requirements of ASTM D2626, referred to as 30 lb and without perforations.
 - b. Glacier Guard ice and water underlayment - Granular Surface (55 mil), Smooth Surface (40 mil), or Smooth Surface High Temperature (40 mil), a composite membrane consisting of fiberglass reinforced rubberized asphalt laminated to an impermeable polyethylene film layer (Smooth Surface and Smooth Surface High Temperature) or coated with a granular surface providing maximum skid resistance (Granular Surface).
- C. Class A Tile Roofing System
 - 1. Slate Tiles/Shingles: Tiles made of Starloy™, 100% recycled rubber and plastic compound, 12" wide by 18" long with a nominal thickness of 1/4". Weight shall be determined by the following acceptable tile exposures:

7"	258 - 276 lbs per square
6-1/2"	278 - 294 lbs per square
6"	300 - 321 lbs per square

 - a. Color: As selected from manufacturer's standard colors, unless directed otherwise.
 - 2. Underlayment
 - a. VersaShield - One layer of Elk VersaShield meeting or exceeding the requirements of ASTM D226.
 - b. Glacier Guard ice & water underlayment - Granular Surface (55 mil), Smooth Surface (40 mil), or Smooth Surface High Temperature (40 mil), a composite membrane consisting of fiberglass reinforced rubberized asphalt laminated to an impermeable polyethylene film layer (Smooth Surface and Smooth Surface High Temperature) or coated with a granular surface providing maximum skid resistance (Granular Surface).
- D. Fasteners
 - 1. AquaGuard/VersaShield
 - a. Roofing nails with one inch (1") diameter round or square head, plastic or metal, and 3/4" long shank. Metal parts of fastener are to be corrosion resistant.
 - 2. Tile Fasteners
 - a. EcoStar Roofing Nail with a 3/8" diameter head and a minimum of 1-1/2" long shank made from stainless steel. Nails can be supplied either as a hand drive style or in coils for use in pneumatic tools.

1.3 EXECUTION

A. Substrate Criteria

- 1. The Building owner or the Owner's Representative is responsible for providing and determining that the substrate is suitable to receive the Majestic Slate Tile Roof System and the authorized EcoStar Gold Star Applicator should not proceed until all defects have been corrected.
- 2. The Majestic Slate Roof System may only be applied over:
 - a. Minimum 1/2" plywood or OSB decking
 - b. Minimum 1" tongue and groove wood decking
 - c. Approved metal deck systems - for specifics contact roofing materials manufacturer.
- 3. Minimum slope of substrate for installation of Majestic Slate Roof System shall be a minimum of 3/12 for 6" exposure installation and a minimum of 6/12 for 7" exposure installation. Contact the EcoStar Technical Department for approval of applications on lower slopes or exceptions to this requirement.

B. Substrate Preparation

1. The Building Owner or the Owner's Representative is responsible for ensuring that all wet or damaged substrate has been removed in a re-roofing application.
2. Existing roof material **MUST** be removed and a clean substrate free of foreign material be provided prior to the installation of the Majestic Slate Tile Roof System. Majestic Slate Tiles may **NOT** be installed directly over any existing roof material or system.

C. Installation

1. Flashing and Sheet Metal:
 - a. Install sheet metal and flashing metal in all valleys and where required on projections furnish in accordance with Division 07 Section "Sheet Metal Flashing And Trim".
 - b. Where required, install metal starter strip at all eaves and roof edges. Furnish metal in accordance with Division 07 Section "Sheet Metal Flashing And Trim".
 - c. The roofing materials manufacturer suggests that all metal work be made from copper, stainless steel or an equally long-term material.
2. Underlayment:
 - a. AquaGuard:
 - 1) Apply 41.5" wide sheet over complete deck, lapping the area covered with Glacier Guard ice and water underlayment. Lap end joints 6" and side joints 4" and double through valleys.
 - 2) Do not leave exposed to weather more than 90 days after beginning of installation without written approval of the Owner.
 - 3) Do not leave any fastener heads exposed. Nail only in areas to be covered by lapping of underlayment.
 - b. VersaShield:
 - 1) Apply 42" wide sheet over complete deck, covering the entire roof deck **INCLUDING** those areas with Glacier Guard Ice & Water underlayment. Lap end joints 4" and side joints 6".
 - 2) Lap the VersaShield 6" from both sides over all hips, valleys, and ridges.
 - 3) Where the roof meets a vertical surface, carry the VersaShield 3" to 4" up the surface.
 - 4) Do not leave exposed to weather more than **60** days after beginning of installation without written approval of the Owner.
 - 5) Do not leave any fastener heads exposed. Nail only in areas to be covered by lapping of underlayment.
 - c. Glacier Guard Ice and water underlayment:
 - 1) Lap end joints 6" and side joints 3.5"
 - 2) Apply continuous 36" wide sheet in valley centered over valley.
 - 3) Apply rows of 36" wide sheets along all eaves and rakes. Lap end joints 6" and side joints 3.5".
 - 4) Apply rows of 36" wide sheets along and around all dormers and roof projections. Lap end joints 6" and side joints 3.5".
 - 5) When applicable install as far as it can be installed on any head walls or vertical walls a minimum of 12".
 - 6) Do not leave Glacier Guard Granular Surface exposed to weather more than 14 days after beginning of installation. Do not leave Glacier Guard Smooth Surface exposed to weather more than 30 days after beginning of installation. Do not leave Glacier Guard Smooth Surface High Temp exposed to the weather more than 60 days after the beginning of installation.
3. Tile/Shingle Installation
 - a. After installing underlayment and before installing the tiles, clean the surface of debris and dirt.
 - b. Beginning at the eave, install a layer of tiles gapped a minimum of 3/8" between tiles and any projections, with two roofing fasteners per tile (in location shown on tiles). This layer of tiles will become the starter row. Install another layer of tiles in the same manner as the first with the exception of the second layer having a 1/2 tile offset to the first layer.

- c. Continue installing tiles per the chosen exposure.
- d. Care must be taken to place tiles so color variations are evenly distributed over the entire roof area. Tiles between bundles and pallets **MUST** be shuffled to insure even distribution of color variations. "Patchy" or "Blotching" in appearance is not acceptable and the applicator will be required to correct. It is recommended that work not begin until all roofing materials have been delivered to the job site.
- e. It is the responsibility of the applicator to ensure that all tiles are bent back in a downward curve prior to installation. **Do not install tiles with an upward curve.**
- f. Either an open or closed valley design may be used.
 - 1) With an open valley design leave a minimum of 2" on each side of the center of the valley exposed and uncovered by the roof tiles. A V-Style or W-Style Valley metal may be used.
 - 2) With a closed valley design cut the tiles in a straight line to fit no closer than 3/8" against tile of adjoining roof slope.
- g. Minimum Fastening - No less than 2 approved fasteners per tile, with a minimum length of 1-1/2", shall be used.
- h. CAUTION: When using a pneumatic nailer, care shall be taken to ensure that nails are not over driven causing the tiles to curl upward. If tiles have been installed with over-driven nails causing the ends of the tile to curve upward, tiles will never lay flat. Over-driven tiles must be removed and re-nailed properly.
- i. Install EcoStar Attic Guard ridge vent system per the manufacturer's application instructions, and then place the Majestic Slate - Universal Hip/Ridge Tile over the ridge vent. A minimum 2.5" stainless steel, hand-driven EcoStar fastener should be used on a ventilated hip/ridge to fasten the hip/ridge tile to the deck. A minimum 2" stainless steel, hand-driven EcoStar fastener should be used on an unventilated hip/ridge to fasten the hip/ridge tile to the deck. Place fasteners in the location marked on the tile. Majestic Slate - Universal Hip/Ridge Tile must be installed with 6" exposure.
- j. Tiles may not be installed if the tiles have been stored in temperatures lower than 45° F. If tiles have been stored in temperatures below 45° F., tiles must be brought back to an ambient material temperature of 45° F. As the temperature rises, tiles will expand beyond the designed installation pattern if the product is installed while cold or frozen.
- k. Do not install tiles directly adjacent to each other. A minimum gap of 3/8" must be maintained between installed tiles.
- l. After the initial row of tiles has been installed, it is recommended that a chalk line be placed parallel to the roof edge and running perpendicular to the first row of tiles. This chalk line will ensure that the tiles stay true and plumb to the roof edge throughout installation.
- m. Care must be taken to minimize foot traffic over completed areas of the roof. Tiles will show mud and dirt and cause appearance problems. The removal of dirt and debris is the responsibility of the applicator.
- n. Tiles can be slippery when wet, caution should be exhibited with early morning dew and after rain. The tile manufacturer suggests the use of toe boards and OSHA approved harnesses and safety equipment at all time.
- o. Upon completion of the roof system installation, inspect and remove all debris from roof, sweep clean and wash with a mild, non-bleaching detergent.

END OF SECTION 07 31 33 00

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Task	Specification	Specification Description
07 31 33 00	01 22 16 00	No Specification Required

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SECTION 07 32 13 00 - CLAY ROOF TILES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for clay roof tiles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Clay roof tiles.
 - b. Underlayment.
 - c. Snow guards.

C. Definitions

1. Roofing Terminology: See ASTM D 1079, glossaries in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Test Reports for Credit SS 7.2: For clay roof tiles, documentation indicating compliance with Solar Reflectance Index requirement.
3. Samples: For each type of clay roof tile and accessory tile indicated.
4. Material test reports.
5. Research/evaluation reports.
6. Maintenance data.
7. Warranties: Sample of special warranties.

E. Quality Assurance

1. Fire-Test-Response Characteristics: Provide clay roof tiles and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - a. Exterior Fire-Test Exposure: Class A **OR** Class B **OR** Class C, **as directed**; UL 790 or ASTM E 108, for application and roof slopes indicated.
2. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double stack rolls.
 - a. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
2. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

G. Warranty

1. Special Warranty: Standard form in which manufacturer agrees to repair or replace clay roof tiles that fail in materials within specified warranty period.
 - a. Materials-Only Warranty Period: 50 years from date of Final Completion.

1.2 PRODUCTS

A. Clay Roof Tiles

1. Clay Roof Tiles: ASTM C 1167, molded- or extruded-clay roof tile units of shape and configuration indicated, kiln fired to vitrification, and free of surface imperfections. Provide with fastening holes prepunched at factory before firing.
 - a. Durability: Grade 1 **OR** Grade 2 **OR** Grade 3, **as directed**.
 - b. High-Profile Shape: Type I, Spanish or "S" **OR** Type I, tapered mission, two piece **OR** Type I, straight mission, two piece **OR** Type I, straight barrel mission, two piece **OR** Type I, Greek, two piece **OR** Type I, Roman, two piece, **as directed**.
 - c. Low-Profile Shape: Type II, French interlocking.
 - d. Flat Shape: Type III, flat shingle **OR** Type III, flat interlocking, **as directed**.
 - 1) Provide clay roof tiles of diminishing widths for circular bays or round towers.
 - e. Solar Reflectance Index: Provide clay roof tile with Solar Reflectance Index not less than 29 when calculated according to ASTM E 1980, based on testing of identical products by a qualified testing agency.
 - f. Finish and Texture: Matte, smooth **OR** Matte, striated **OR** Glazed, smooth, **as directed**.
 - g. Color: Terra cotta **OR** Brown **OR** Red **OR** Blended red **OR** Buff, **as directed**.
 - h. High **OR** Low, **as directed**, -Profile-Shape Accessory Tiles: Ridge, ridge vent, ridge end, hip and hip starter, header course, L-shaped rake edge, roll rake edge, starter, end band, terminal, eave closure, and top fixture, **as directed**, units, in color matching clay roof tiles.
 - i. Flat-Shape Accessory Tiles: Ridge and closed ridge end, hip and hip starter, header course, L-shaped rake edge, starter, end band, and terminal, **as directed**, units, in color matching clay roof tiles.

B. Accessories

1. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
2. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.
3. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** silicone, **as directed**, -based joint sealant; Type M **OR** Type S, **as directed**, Grade NS, Class 25, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.
4. Roofing Asphalt: ASTM D 312, Type IV.
5. Cold-Applied Adhesive: Manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with underlayments.
6. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended for application by clay roof tile manufacturer.
OR
Mortar: ASTM C 270, Type M, natural color **OR** with ASTM C 979, pigmented mortar matching the color of clay roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar, **as directed**.
7. Eave Closure: Manufacturer's standard EPDM **OR** copper **OR** stainless-steel **OR** galvanized-steel **OR** aluminum, mill finish, **as directed**, eave closure formed to shape of clay roof tile.
8. Wood Nailers, Beveled Cant Strips and Wood Battens: Comply with requirements for pressure-preservative-treated wood in Division 06 Section(s) "Rough Carpentry" **OR** "Miscellaneous Rough Carpentry", **as directed**.
9. Mesh Fabric: **18-by-14 (1.1-by-1.4-mm)** mesh of PVC-coated, glass-fiber thread.

C. Fasteners

1. Roofing Nails: ASTM F 1667, copper, **0.135-inch- (3.4-mm-)** **OR** aluminum, **0.1055-inch- (2.7-mm-)** **OR** hot-dip galvanized-steel, **0.1055-inch- (2.7-mm-)**, **as directed**, diameter shank, sharp-pointed, conventional roofing nails with barbed shanks; minimum **3/8-inch- (10-mm-)** diameter head; of sufficient length to penetrate **3/4 inch (19 mm)** into wood battens **OR** solid wood decking **OR** roof-deck sheathing, **as directed**.

- a. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
 2. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, **1-inch (25-mm)** minimum diameter.
 3. Wood Batten Nails: ASTM F 1667; common or box, steel wire, flat head, and smooth shank.
 4. Wire Ties: Copper **OR** Brass **OR** Stainless steel, **as directed**, **0.083-inch (2.1-mm)** minimum diameter.
 5. Twisted-Wire-Tie System: Continuously twisted, two-wire unit with loops formed **6 inches (152 mm)** apart, minimum **0.1-inch- (2.5-mm-)** diameter brass wire and **0.06-inch- (1.5-mm-)** diameter brass tie wires **OR** **0.1-inch- (2.5-mm-)** diameter copper wire and **0.06-inch- (1.5-mm-)** diameter brass tie wires **OR** **0.083-inch- (2.1-mm-)** diameter stainless-steel wire and **0.037-inch- (0.94-mm-)** diameter stainless-steel tie wires **OR** **0.083-inch- (2.1-mm-)** diameter galvanized-steel wire and **0.037-inch- (0.94-mm-)** diameter galvanized-steel tie wires, **as directed**, with matching-metal folding clip anchors.
 6. Single-Line, Wire-Tie System: Interconnecting eave-to-ridge system, minimum **0.1-inch- (2.5-mm-)** diameter brass **OR** **0.09-inch- (2.3-mm-)** diameter galvanized-steel, **as directed**, wire, preformed to accommodate clay roof tile type and application indicated.
 7. Hook Nails: One-piece wind lock and clay roof tile fastener system, minimum **0.1-inch- (2.5-mm-)** diameter brass **OR** **0.09-inch- (2.3-mm-)** diameter galvanized-steel, **as directed**, wire, for direct deck nailing.
 8. Tile Locks: Brass **OR** Copper **OR** Stainless-steel **OR** Hot-dip galvanized-steel, **as directed**, **0.1-inch- (2.5-mm-)** diameter wire device designed to secure butt edges of overlaid clay roof tiles.
 9. Storm Clips: Brass **OR** Stainless-steel **OR** Hot-dip galvanized-steel, **as directed**, strap-type, **0.04-by-1/2-inch (1.0-by-13-mm)**, L-shaped retainer clips designed to secure side edges of clay roof tiles. Provide with two fastener holes in base flange.
- D. Underlayment Materials
1. Felt Underlayment: ASTM D 226, Type II, asphalt-saturated organic felt, unperforated.
 2. Felt Underlayment: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides, unperforated.
 3. Roll Roofing Underlayment: ASTM D 6380, Class M, Type II, asphalt-saturated and -coated organic felt, mineral-granule surfaced.
 4. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, a minimum of **55-mil- (1.4-mm-)** thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.
 5. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, a minimum of **40-mil- (1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.
- E. Snow Guards
1. Snow-Guard Pads: Fabricated copper **OR** cast-bronze **OR** zinc **OR** stainless-steel **OR** aluminum, **as directed**, units, designed to be installed without penetrating roof tiles, and complete with predrilled holes or hooks for anchoring.
 2. Snow-Guard Rails: Units fabricated from metal baseplate anchored to adjustable **OR** fixed, **as directed**, bracket and equipped with two **OR** three, **as directed**, bars.
 - a. Brackets and Baseplate: Aluminum **OR** Bronze or brass **OR** Stainless steel, **as directed**.
 - b. Bars: Aluminum, mill finished **OR** Aluminum, clear anodized **OR** Stainless steel, mill finished, **as directed**.
- F. Metal Flashing And Trim
1. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Sheet Metal: Copper **OR** Stainless steel **OR** Zinc-tin alloy-coated stainless steel **OR** Zinc-tin alloy-coated steel **OR** Zinc-tin alloy-coated copper **OR** Anodized aluminum **OR** Aluminum, mill finished, **as directed**.

2. Fabricate sheet metal flashing and trim to comply with recommendations that apply to design, dimensions, metal, and other characteristics of the item in SMACNA's "Architectural Sheet Metal Manual."
 - a. Apron Flashings: Fabricate with lower flange extending a minimum of **4 inches (100 mm)** **OR 6 inches (152 mm)**, **as directed**, over and **4 inches (100 mm)** beyond each side of downslope tile roofing and **6 inches (152 mm)** up the vertical surface.
 - b. Step Flashings: Fabricate with a head lap of **3 inches (75 mm)** and a minimum extension of **4 inches (100 mm)** **OR 5 inches (127 mm)**, **as directed**, both horizontally and vertically.
 - c. Channel Flashings: Fabricate with vertical surface extending a minimum of **4 inches (100 mm)** **OR 5 inches (127 mm)**, **as directed**, above the clay roof tile and **4 inches (100 mm)** **OR 6 inches (152 mm)**, **as directed**, beneath the tile roofing, with a **1-inch- (25-mm-)** high vertical return to form a runoff channel.
 - d. Rake Pan Flashings: Fabricate with vertical surface extending over fasciae and **6 inches (152 mm)** beneath the tile roofing, with a **1-inch- (25-mm-)** high vertical return to form a runoff channel.
 - e. Cricket **OR** Backer, **as directed**, Flashings: Fabricate with concealed flange extending a minimum of **18 inches (455 mm)** **OR 24 inches (610 mm)**, **as directed**, beneath upslope tile roofing, **6 inches (152 mm)** beyond each side of chimney **OR** skylight, **as directed**, and **6 inches (152 mm)** above the roof plane.
 - f. Closed **OR** Open, **as directed**, -Valley Flashings: Fabricate in lengths not exceeding **10 feet (3 m)**, with **1-inch- (25-mm-)** high, inverted-V profile at center of valley and with equal flange widths of **10 inches (255 mm)** **OR 12 inches (305 mm)**, **as directed**.
 - g. Drip Edges: Fabricate in lengths not exceeding **10 feet (3 m)**, with **2-inch (50-mm)** roof-deck flange and **1-1/2-inch (38-mm)** fascia flange with **3/8-inch (10-mm)** drip at lower edge.
3. Sheet Metal Ridge Vent: Fabricate from **16-oz./sq. ft.- (0.55-mm-)** thick copper sheet, terminating each side in V-shaped external baffles with venting holes producing net-free ventilating area of **2.65 sq. in./ft. (56 sq. cm/m)**.
4. Vent-Pipe Flashings: ASTM B 749, Type L51121, at least **1/16 inch (1.6 mm)** thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least **4 inches (100 mm)** from pipe onto roof.

1.3 EXECUTION

A. Underlayment Installation

1. General: Comply with clay roof tile manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
 - a. Cover ridge **OR** hip, **as directed**, wood nailers with underlayment strips.
2. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - a. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water. Lap ends of felt not less than **6 inches (152 mm)** over self-adhering sheet underlayment.
3. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a **19-inch- (485-mm-)** wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses **19 inches (485 mm)** in shingle fashion. Lap ends a minimum of **6 inches (152 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - a. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof **OR** at locations indicated on Drawings, **as directed**.

- b. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water.
- 4. Double-Layer Felt/Roll Roofing Underlayment:
 - a. Install single layer of felt underlayment on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - b. Install roll roofing underlayment, in parallel courses, in same direction as felt underlayment. Lap ends a minimum of **6 inches (152 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**.
 - 1) Mechanically fasten over felt underlayment.
 - 2) Adhere to felt underlayment with solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature **OR** uniform coating of cold-applied adhesive **OR** uniform coating of asphalt roofing cement, **as directed**.
 - c. Terminate felt underlayment flush **OR** extended up not less than **4 inches (100 mm)**, **as directed**, against chimneys, sidewalls, curbs, and other projections.
- 5. Self-Adhering Sheet Underlayment: Install wrinkle free; comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below **OR** on Drawings, **as directed**, lapped in direction to shed water. Lap sides not less than **3-1/2 inches (89 mm)**. Lap ends not less than **6 inches (152 mm)**, staggered **24 inches (610 mm)** between succeeding courses. Roll laps with roller. Cover underlayment within seven days.
 - a. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - b. Extend self-adhering sheet underlayment over entire roof deck.

OR
Extend self-adhering sheet underlayment over roof deck as follows:

 - 1) Eaves: Extend from edges of eaves **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - 2) Rakes: Extend from edges of rakes **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - 3) Valleys: Extend from lowest to highest point **18 inches (455 mm)** on each side.
 - 4) Hips: Extend **18 inches (455 mm)** on each side.
 - 5) Ridges: Extend **36 inches (914 mm)** on each side without obstructing continuous ridge vent slot, **as directed**.
 - 6) Sidewalls: Extend **18 inches (455 mm)** beyond sidewalls and return vertically against sidewalls not less than **4 inches (100 mm)**.
 - 7) Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend **18 inches (455 mm)** beyond penetrating elements and return vertically against penetrating elements not less than **4 inches (100 mm)**.
 - 8) Roof-Slope Transitions: Extend **18 inches (455 mm)** on each roof slope.
- 6. Double-Layer Felt/Self-Adhering Sheet Underlayment:
 - a. Install single layer of felt underlayment on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - b. Install self-adhering sheet underlayment, wrinkle free, on felt underlayment. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Lap sides not less than **3-1/2 inches (89 mm)** in direction to shed water. Lap ends not less than **6 inches (152 mm)**, staggered **24 inches (610 mm)** between succeeding courses. Roll laps with roller. Cover underlayment within seven days.
- 7. Metal-Flushed, Open-Valley Underlayment: Install two layers of **36-inch- (914-mm-)** wide felt underlayment centered in valley. Stagger end laps between layers at least **72 inches (1830 mm)**. Lap ends of each layer at least **12 inches (305 mm)** in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment nails.
 - a. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least **6 inches (152 mm)**.

B. Metal Flashing Installation

1. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Install metal flashings according to clay roof tile manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
2. Apron Flashings: Extend lower flange over and beyond each side of downslope tile roofing and up the vertical surface.
3. Step Flashings: Install with a head lap of **3 inches (75 mm)** and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying tile. Fasten to roof deck only.
4. Cricket **OR** Backer, **as directed**, Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope tile roofing and beyond each side.
5. Open-Valley Flashings: Install centrally in valleys, lapping ends at least **8 inches (205 mm)** in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - a. Secure hemmed flange edges into metal cleats spaced **12 inches (305 mm)** apart and fastened to roof deck.
 - b. Adhere **9-inch- (230-mm-)** wide strips of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
6. Channel Flashings: Install over underlayment and fasten to roof deck.
7. Rake Pan Flashings: Install over underlayment and fasten to roof deck.
8. Rake Drip Edges: Install over underlayment and fasten to roof deck.
9. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.
10. Pipe Flashings: Form flashing around pipe penetrations and tile roofing. Fasten and seal to tile roofing.
11. Sheet Metal Ridge Vents: Install centrally, and mechanically fasten to wood ridge. Adhere each side to clay roof tile with elastomeric sealant.
 - a. Install fabric mesh over roof-deck air ventilation gaps to prevent insect entry.

C. Wood Nailers And Battens, **as directed**

1. Install wood nailers at ridges **OR** hips **OR** rakes, **as directed**, and securely fasten to roof deck.
2. Install beveled wood cant at eaves and securely fasten to roof deck.
3. Install nominal **1-by-2-inch (25-by-50-mm)** wood battens horizontally over **1/2-inch- (13-mm-)** high, pressure-preservative-treated wood lath strips **OR** in **48-inch (1200-mm)** lengths with ends separated by **1/2 inch (13 mm)**, **as directed**, at spacing required by clay roof tile manufacturer, and securely fasten to roof deck.
 - a. Install nominal **1-by-2-inch (25-by-50-mm)** wood counter battens vertically spaced **24 inches (610 mm)** apart and securely fasten to roof deck.

D. Clay Roof Tile Installation

1. General: Install clay roof tiles according to manufacturer's written instructions, to recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and to NRCA's "The NRCA Roofing and Waterproofing Manual".
 - a. Maintain uniform exposure and coursing of clay roof tiles throughout roof.
 - b. Extend tiles **2 inches (50 mm)** over eave fasciae.
 - c. Nail Fastening: Drive nails to clear the clay roof tile so the tile hangs from the nail and is not drawn up.
 - 1) Install wire through nail holes of cut tiles that cannot be nailed directly to roof deck, and fasten to nails driven into deck.
 - d. Wire-Tie Fastening: Install wire-tie systems and fasten clay roof tiles according to manufacturer's written instructions.
 - e. Foam-Adhesive **OR** Mortar, **as directed**, Setting: Install clay roof tile according to TRI/FRSA's "Concrete and Clay Roof Tile Installation Manual."
 - f. Install storm clips to capture edges of longitudinal sides of clay roof tiles and securely fasten to roof deck.

- g. Install clay roof tile locks to support and lock overlying tile butts to underlying tiles.
- h. Cut and fit clay roof tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.
- i. Install clay roof tiles with color blend approved by the Owner.
- 2. Flat Shingle Clay Roof Tile Installation:
 - a. Maintain **2-inch (50-mm)** head lap between succeeding courses of clay roof tiles.
 - b. Offset joints by half the clay roof tile width in succeeding courses.
 - c. Extend clay roof tiles **1 inch (25 mm)** over fasciae at rakes.
 - d. Install ridge tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Close voids where ridge tiles meet clay roof tiles with ridge closure tiles **OR** mortar struck with face of ridge cover tiles, **as directed**.
 - e. Install hip tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Fill voids with mortar where hip tiles meet clay roof tiles, and strike mortar flush with face of hip cover tiles.
- 3. Flat Interlocking Clay Roof Tile Installation:
 - a. Provide minimum **3-inch (75-mm)** lap between succeeding courses of clay roof tiles.
 - b. Offset joints by half the clay roof tile width in succeeding courses.
 - c. Install L-shaped rake tiles.
 - d. Install ridge tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Close voids where ridge tiles meet clay roof tiles with ridge closure tiles **OR** mortar struck with face of ridge cover tiles, **as directed**.
 - e. Install hip tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Fill voids with mortar where hip tiles meet clay roof tiles, and strike mortar flush with face of hip cover tiles.
- 4. Low-Profile, Interlocking Clay Roof Tile Installation:
 - a. Provide minimum **3-inch (75-mm)** lap between succeeding courses of clay roof tiles.
 - b. Install L-shaped rake tiles.
 - c. Install ridge tiles with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
- 5. High-Profile Clay Roof Tile Installation:
 - a. Install tile **OR** sheet metal **OR** EPDM, **as directed**, eave closure.
 - b. Provide minimum **3-inch (75-mm)** lap between succeeding courses of clay roof tiles.
 - c. Install L-shaped **OR** roll, **as directed**, rake tiles.
 - d. Install ridge tiles with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
- 6. Open Valleys: Cut clay roof tiles at open valleys to form straight lines. Maintain uniform width of exposed open valley **OR** Widen exposed portion of open valley **1/8 inch in 12 inches (1:96)**, **as directed**, from highest to lowest point.
 - a. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
 - b. Do not nail tiles to metal flashings.
- 7. Closed Valleys: Cut clay roof tiles at closed valleys to form straight lines, trimming upper concealed corners of tiles. Maintain uniform gap at centerline of valley of **1/2 to 3/4 inch (13 to 19 mm)** **OR** **3/4 to 1 inch (19 to 25 mm)**, **as directed**.
 - a. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
 - b. Do not nail tiles to metal flashings.
- E. Snow-Guard Installation
 - 1. Snow-Guard Pads: Install rows of snow-guard pads at locations indicated, according to manufacturer's written installation instructions. Space rows apart horizontally, beginning from

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gutter. Space snow guards apart in each row, offsetting by half this dimension between succeeding rows.

2. Snow-Guard Rails: Install rows of snow-guard rails at locations indicated, according to manufacturer's written installation instructions. Space rows apart horizontally, beginning from gutter.

F. Adjusting And Cleaning

1. Remove and replace damaged or broken clay roof tiles.
2. Remove excess clay roof tiles and debris from Project site.

END OF SECTION 07 32 13 00

SECTION 07 32 16 00 - CONCRETE ROOF TILES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for concrete roof tiles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Concrete roof tiles.
 - b. Underlayment.
 - c. Snow guards.

C. Definitions

1. Roofing Terminology: See ASTM D 1079, glossaries in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Test Reports for Credit SS 7.2: For concrete roof tiles, documentation indicating compliance with Solar Reflectance Index requirement.
3. Samples: For each type of concrete roof tile and accessory tile indicated.
4. Material test reports.
5. Research/evaluation reports.
6. Maintenance data.
7. Warranties: Sample of special warranties.

E. Quality Assurance

1. Fire-Test-Response Characteristics: Provide concrete roof tiles and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - a. Exterior Fire-Test Exposure: Class A **OR** Class B **OR** Class C, **as directed**; UL 790 or ASTM E 108, for application and roof slopes indicated.
2. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store underlayment rolls on end, on pallets or other raised surfaces. Do not double stack rolls.
 - a. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
2. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

G. Warranty

1. Special Warranty: Standard form in which manufacturer agrees to repair or replace concrete roof tiles that fail in materials within specified warranty period.
 - a. Materials-Only Warranty Period: 50 years from date of Final Completion.

1.2 PRODUCTS

A. Concrete Roof Tiles

1. Concrete Roof Tiles: ASTM C 1492, molded- or extruded-concrete roof tile units of shape and configuration indicated, with integral color, and free of surface imperfections. Provide with fastening holes prepunched at factory.
 - a. Weight: Normal **OR** Medium **OR** Light, **as directed**.
 - b. High-Profile Shape: Type I, Spanish or "S".
 - c. Medium-Profile Shape: Type II, French interlocking.
 - d. Low-Profile Shape: Type III, flat shingle **OR** Type III, flat interlocking, **as directed**.
 - e. Side Configuration: Interlocking **OR** Noninterlocking, **as directed**.
 - f. Solar Reflectance Index: Provide concrete roof tiles with Solar Reflectance Index not less than 29 when calculated according to ASTM E 1980, based on testing of identical products by a qualified testing agency.
 - g. Colors, Blends, and Patterns: As selected from manufacturer's full range.
 - h. Finish and Texture: Matte, smooth **OR** Matte, striated **OR** Glazed, smooth, **as directed**.
 - i. Color: Brown **OR** White **OR** Red **OR** Pale red **OR** Green **OR** Gray **OR** Buff, **as directed**.
 - j. High **OR** Medium, **as directed**, -Profile-Shape Accessory Tiles: Ridge, ridge vent, ridge end, hip and hip starter, header course, L-shaped rake edge, roll rake edge, starter, end band, and terminal, **as directed**, units, in color matching concrete roof tiles.
 - k. Low-Profile-Shape Accessory Tiles: Ridge and closed ridge end, hip and hip starter, header course, L-shaped rake edge, starter, end band, and terminal, **as directed**, units, in color matching concrete roof tiles.

B. Accessories

1. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
2. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.
3. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** silicone, **as directed**, -based joint sealant; Type M **OR** Type S, **as directed**, Grade NS, Class 25, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O.
4. Roofing Asphalt: ASTM D 312, Type IV.
5. Cold-Applied Adhesive: Manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with underlayments.
6. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended for application by concrete roof tile manufacturer.
OR
Mortar: ASTM C 270, Type M, natural color **OR** with ASTM C 979, pigmented mortar matching the color of concrete roof tiles for exposed-to-view mortar, and natural color for concealed-from-view mortar, **as directed**.
7. Eave Closure: Manufacturer's standard EPDM **OR** copper **OR** stainless-steel **OR** galvanized-steel **OR** aluminum, mill finish, **as directed**, eave closure formed to shape of concrete roof tiles.
8. Ridge Closure: Manufacturer's standard EPDM ridge closure, formed to shape of concrete roof tiles.
9. Wood Nailers, Beveled Cant Strips and Wood Battens: Comply with requirements for pressure-preservative-treated wood in Division 06 Section(s) "Rough Carpentry" **OR** "Miscellaneous Rough Carpentry", **as directed**.
10. Mesh Fabric: **18-by-14 (1.1-by-1.4-mm)** mesh of PVC-coated, glass-fiber thread.

C. Fasteners

1. Roofing Nails: ASTM F 1667, copper, **0.135-inch- (3.4-mm-)** **OR** aluminum, **0.1055-inch- (2.7-mm-)** **OR** hot-dip galvanized-steel, **0.1055-inch- (2.7-mm-)**, **as directed**, diameter shank, sharp-pointed, conventional roofing nails with barbed shanks; minimum **3/8-inch- (10-mm-)** diameter head; of sufficient length to penetrate **3/4 inch (19 mm)** into wood battens **OR** solid-wood decking **OR** roof-deck sheathing, **as directed**.

- a. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
 2. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, **1-inch (25-mm)** minimum diameter.
 3. Wood Batten Nails: ASTM F 1667; common or box, steel wire, flat head, and smooth shank.
 4. Wire Ties: Copper **OR** Brass **OR** Stainless steel, **as directed**, **0.083-inch (2.1-mm)** minimum diameter.
 5. Twisted-Wire-Tie System: Continuously twisted, two-wire unit with loops formed **6 inches (152 mm)** apart, minimum **0.1-inch- (2.5-mm-)** diameter brass wire and **0.06-inch- (1.5-mm-)** diameter brass tie wires **OR** **0.1-inch- (2.5-mm-)** diameter copper wire and **0.06-inch- (1.5-mm-)** diameter brass tie wires **OR** **0.083-inch- (2.1-mm-)** diameter stainless-steel wire and **0.037-inch- (0.94-mm-)** diameter stainless-steel tie wires **OR** **0.083-inch- (2.1-mm-)** diameter galvanized-steel wire and **0.037-inch- (0.94-mm-)** diameter galvanized-steel tie wires, **as directed**, with matching-metal folding clip anchors.
 6. Hook Nails: One-piece wind lock and concrete roof tile fastener system, minimum **0.1-inch- (2.5-mm-)** diameter brass **OR** **0.09-inch- (2.3-mm-)** diameter galvanized-steel, **as directed**, wire, for direct deck nailing.
 7. Tile Locks: Brass **OR** Copper **OR** Stainless-steel **OR** Hot-dip galvanized-steel, **as directed**, **0.1-inch- (2.5-mm-)** diameter wire device designed to secure butt edges of overlaid concrete roof tiles.
 8. Storm Clips: Brass **OR** Stainless-steel **OR** Hot-dip galvanized-steel, **as directed**, strap-type, **0.04-by-1/2-inch (1.0-by-13-mm)**, L-shaped retainer clips designed to secure side edges of concrete roof tiles. Provide with two fastener holes in base flange.
- D. Underlayment Materials
1. Felt Underlayment: ASTM D 226, Type II, asphalt-saturated organic felt, unperforated.
 2. Felt Underlayment: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides, unperforated.
 3. Roll Roofing Underlayment: ASTM D 6380, Class M, Type II, asphalt-saturated and -coated organic felt, mineral-granule surfaced.
 4. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, a minimum of **55-mil- (1.4-mm-)** thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.
 5. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment, **as directed**.
- E. Snow Guards
1. Snow-Guard Pads: Fabricated copper **OR** cast-bronze **OR** zinc **OR** stainless-steel **OR** aluminum, **as directed**, units, designed to be installed without penetrating roof tiles, and complete with predrilled holes or hooks for anchoring.
 2. Snow-Guard Rails: Units fabricated from metal baseplate anchored to adjustable **OR** fixed, **as directed**, bracket and equipped with two **OR** three, **as directed**, bars.
 - a. Brackets and Baseplate: Aluminum **OR** Bronze or brass **OR** Stainless steel, **as directed**.
 - b. Bars: Aluminum, mill finished **OR** Aluminum, clear anodized **OR** Stainless steel, mill finished, **as directed**.
- F. Metal Flashing And Trim
1. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Sheet Metal: Copper **OR** Stainless steel **OR** Zinc-tin alloy-coated stainless steel **OR** Zinc-tin alloy-coated steel **OR** Zinc-tin alloy-coated copper **OR** Anodized aluminum **OR** Aluminum, mill finished, **as directed**.

2. Fabricate sheet metal flashing and trim to comply with recommendations that apply to design, dimensions, metal, and other characteristics of the item in SMACNA's "Architectural Sheet Metal Manual."
 - a. Apron Flashings: Fabricate with lower flange extending a minimum of **4 inches (100 mm)** **OR 6 inches (152 mm)**, **as directed**, over and **4 inches (100 mm)** beyond each side of downslope tile roofing and **6 inches (152 mm)** up the vertical surface.
 - b. Step Flashings: Fabricate with a head lap of **3 inches (75 mm)** and a minimum extension of **4 inches (100 mm)** **OR 5 inches (127 mm)**, **as directed**, both horizontally and vertically.
 - c. Channel Flashings: Fabricate with vertical surface extending a minimum of **4 inches (100 mm)** **OR 5 inches (127 mm)**, **as directed**, above the concrete roof tile and **4 inches (100 mm)** **OR 6 inches (152 mm)**, **as directed**, beneath the tile roofing, with a **1-inch- (25-mm-)** high vertical return to form a runoff channel.
 - d. Rake Pan Flashings: Fabricate with vertical surface extending over fasciae and **6 inches (152 mm)** beneath the tile roofing, with a **1-inch- (25-mm-)** high vertical return to form a runoff channel.
 - e. Cricket **OR** Backer, **as directed**, Flashings: Fabricate with concealed flange extending a minimum of **18 inches (455 mm)** **OR 24 inches (610 mm)**, **as directed**, beneath upslope tile roofing, **6 inches (152 mm)** beyond each side of chimney **OR** skylight, **as directed**, and **6 inches (152 mm)** above the roof plane.
 - f. Closed **OR** Open, **as directed**, -Valley Flashings: Fabricate in lengths not exceeding **10 feet (3 m)**, with **1-inch- (25-mm-)** high, inverted-V profile at center of valley and with equal flange widths of **10 inches (255 mm)** **OR 12 inches (305 mm)**, **as directed**.
 - g. Drip Edges: Fabricate in lengths not exceeding **10 feet (3 m)**, with **2-inch (50-mm)** roof-deck flange and **1-1/2-inch (38-mm)** fascia flange with **3/8-inch (10-mm)** drip at lower edge.
3. Vent-Pipe Flashings: ASTM B 749, Type L51121, at least **1/16 inch (1.6 mm)** thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least **4 inches (100 mm)** from pipe onto roof.

1.3 EXECUTION

A. Underlayment Installation

1. General: Comply with concrete roof tile manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
 - a. Cover ridge **OR** hip, **as directed**, wood nailers with underlayment strips.
2. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - a. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water. Lap ends of felt not less than **6 inches (152 mm)** over self-adhering sheet underlayment.
3. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a **19-inch- (485-mm-)** wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses **19 inches (485 mm)** in shingle fashion. Lap ends a minimum of **6 inches (152 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - a. Apply a continuous layer of asphalt roofing cement over starter course and on felt underlayment surface to be concealed by succeeding courses as each felt course is installed. Apply over entire roof **OR** at locations indicated on Drawings, **as directed**.
 - b. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than **3 inches (75 mm)** in direction to shed water.

4. Double-Layer Felt/Roll Roofing Underlayment:
 - a. Install single layer of felt underlayment on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - b. Install roll roofing underlayment, in parallel courses, in same direction as felt underlayment. Lap ends a minimum of **6 inches (152 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**.
 - 1) Mechanically fasten over felt underlayment.
 - 2) Adhere to felt underlayment with solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature **OR** uniform coating of cold-applied adhesive **OR** uniform coating of asphalt roofing cement, **as directed**.
 - c. Terminate felt underlayment flush **OR** extended up not less than **4 inches (100 mm)**, **as directed**, against chimneys, sidewalls, curbs, and other projections.
5. Self-Adhering Sheet Underlayment: Install wrinkle free; comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below **OR** on Drawings, **as directed**, lapped in direction to shed water. Lap sides not less than **3-1/2 inches (89 mm)**. Lap ends not less than **6 inches (152 mm)**, staggered **24 inches (610 mm)** between succeeding courses. Roll laps with roller. Cover underlayment within seven days.
 - a. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - b. Extend self-adhering sheet underlayment over entire roof deck.

OR

Extend self-adhering sheet underlayment over roof deck as follows:

 - 1) Eaves: Extend from edges of eaves **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - 2) Rakes: Extend from edges of rakes **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior face of exterior wall.
 - 3) Valleys: Extend from lowest to highest point **18 inches (455 mm)** on each side.
 - 4) Hips: Extend **18 inches (455 mm)** on each side.
 - 5) Ridges: Extend **36 inches (914 mm)** on each side without obstructing continuous ridge vent slot, **as directed**.
 - 6) Sidewalls: Extend **18 inches (455 mm)** beyond sidewalls and return vertically against sidewalls not less than **4 inches (100 mm)**.
 - 7) Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend **18 inches (455 mm)** beyond penetrating elements and return vertically against penetrating elements not less than **4 inches (100 mm)**.
 - 8) Roof-Slope Transitions: Extend **18 inches (455 mm)** on each roof slope.
6. Double-Layer Felt/Self-Adhering Sheet Underlayment:
 - a. Install single layer of felt underlayment on roof deck parallel with and starting at the eaves. Lap sides a minimum of **2 inches (50 mm)** over underlying course. Lap ends a minimum of **4 inches (100 mm)**. Stagger end laps between succeeding courses at least **72 inches (1830 mm)**. Fasten with felt underlayment **OR** roofing, **as directed**, nails.
 - b. Install self-adhering sheet underlayment, wrinkle free, on felt underlayment. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Lap sides not less than **3-1/2 inches (89 mm)** in direction to shed water. Lap ends not less than **6 inches (152 mm)**, staggered **24 inches (610 mm)** between succeeding courses. Roll laps with roller. Cover underlayment within seven days.
7. Metal-Flushed, Open-Valley Underlayment: Install two layers of **36-inch- (914-mm-)** wide felt underlayment centered in valley. Stagger end laps between layers at least **72 inches (1830 mm)**. Lap ends of each layer at least **12 inches (305 mm)** in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with felt underlayment nails.
 - a. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least **6 inches (152 mm)**.

B. Metal Flashing Installation

1. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 - a. Install metal flashings according to concrete roof tile manufacturer's written instructions and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
 2. Apron Flashings: Extend lower flange over and beyond each side of downslope tile roofing and up the vertical surface.
 3. Step Flashings: Install with a head lap of **3 inches (75 mm)** and extend both horizontally and vertically. Install with lower edge of flashing just upslope of, and concealed by, butt of overlying tile. Fasten to roof deck only.
 4. Cricket **OR** Backer, **as directed**, Flashings: Install against roof-penetrating elements, extending concealed flange beneath upslope tile roofing and beyond each side.
 5. Open-Valley Flashings: Install centrally in valleys, lapping ends at least **8 inches (205 mm)** in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - a. Secure hemmed flange edges into metal cleats spaced **12 inches (305 mm)** apart and fastened to roof deck.
 - b. Adhere **9-inch- (230-mm-)** wide strips of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
 6. Channel Flashings: Install over underlayment and fasten to roof deck.
 7. Rake Pan Flashings: Install over underlayment and fasten to roof deck.
 8. Rake Drip Edges: Install over underlayment and fasten to roof deck.
 9. Eave Drip Edges: Install beneath underlayment and fasten to roof deck.
 10. Pipe Flashings: Form flashing around pipe penetrations and tile roofing. Fasten and seal to tile roofing.
 11. Sheet Metal Ridge Vents: Install centrally, and mechanically fasten to wood ridge. Adhere each side to concrete roof tile with elastomeric sealant.
 - a. Install fabric mesh over roof-deck air ventilation gaps to prevent insect entry.
- C. Wood Nailers And Battens, **as directed**
1. Install wood nailers at ridges **OR** hips **OR** rakes, **as directed**, and securely fasten to roof deck.
 2. Install beveled wood cant at eaves and securely fasten to roof deck.
 3. Install nominal **1-by-2-inch (25-by-50-mm)** wood battens horizontally over **1/2-inch- (13-mm-)** high, pressure-preservative-treated wood lath strips **OR** in **48-inch (1200-mm)** lengths with ends separated by **1/2 inch (13 mm)**, **as directed**, at spacing required by concrete roof tile manufacturer, and securely fasten to roof deck.
 - a. Install nominal **1-by-2-inch (25-by-50-mm)** wood counter battens vertically spaced **24 inches (610 mm)** apart and securely fasten to roof deck.
- D. Concrete Roof Tile Installation
1. General: Install concrete roof tiles according to manufacturer's written instructions, to recommendations in TRI/WSRCA's "Concrete and Clay Roof Tile Design Criteria Installation Manual for Moderate Climate Regions," and to NRCA's "The NRCA Roofing and Waterproofing Manual."
 - a. Maintain uniform exposure and coursing of concrete roof tiles throughout roof.
 - b. Extend tiles **2 inches (50 mm)** over eave fasciae.
 - c. Nail Fastening: Drive nails to clear the concrete roof tile so the tile hangs from the nail and is not drawn up.
 - 1) Install wire through nail holes of cut tiles that cannot be nailed directly to roof deck, and fasten to nails driven into deck.
 - d. Wire-Tie Fastening: Install wire-tie systems and fasten concrete roof tiles according to manufacturer's written instructions.
 - e. Foam-Adhesive **OR** Mortar, **as directed**, Setting: Install concrete roof tiles according to TRI/FRSA's "Concrete and Clay Roof Tile Installation Manual."
 - f. Install storm clips to capture edges of longitudinal sides of concrete roof tiles and securely fasten to roof deck.
 - g. Install concrete roof tile locks to support and lock overlying tile butts to underlying tiles.

- h. Cut and fit concrete roof tiles neatly around roof vents, pipes, ventilators, and other projections through roof. Fill voids with mortar.
 - i. Install concrete roof tiles with color blend approved by the Owner.
 2. Flat Shingle Concrete Roof Tile Installation:
 - a. Maintain **2-inch (50-mm)** head lap between succeeding courses of concrete roof tiles.
 - b. Offset joints by half the concrete roof tile width in succeeding courses.
 - c. Extend concrete roof tiles **1 inch (25 mm)** over fasciae at rakes.
 - d. Install ridge tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Close voids where ridge tiles meet concrete roof tiles with ridge closure tiles **OR** mortar struck with face of ridge cover tiles, **as directed**.
 - e. Install hip tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Fill voids with mortar where hip tiles meet concrete roof tiles, and strike mortar flush with face of hip cover tiles.
 3. Flat Interlocking Concrete Roof Tile Installation:
 - a. Provide minimum **3-inch (75-mm)** lap between succeeding courses of concrete roof tiles.
 - b. Offset joints by half the concrete roof tile width in succeeding courses.
 - c. Install L-shaped rake tiles.
 - d. Install ridge tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Close voids where ridge tiles meet concrete roof tiles with ridge closure tiles **OR** mortar struck with face of ridge cover tiles, **as directed**.
 - e. Install hip tiles in V-ridge **OR** saddle **OR** mitered, **as directed**, configuration. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 - 1) Fill voids with mortar where hip tiles meets concrete roof tiles, and strike mortar flush with face of hip cover tiles.
 4. Low-Profile, Interlocking Concrete Roof Tile Installation:
 - a. Provide minimum **3-inch (75-mm)** lap between succeeding courses of concrete roof tiles.
 - b. Install L-shaped rake tiles.
 - c. Install ridge tiles with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 5. High-Profile Concrete Roof Tile Installation:
 - a. Install tile **OR** sheet metal **OR** EPDM, **as directed**, eave closure.
 - b. Provide minimum **3-inch (75-mm)** lap between succeeding courses of concrete roof tiles.
 - c. Install L-shaped **OR** roll, **as directed**, rake tiles.
 - d. Install ridge tiles with laps facing away from prevailing wind. Seal laps with asphalt roofing cement **OR** butyl sealant **OR** elastomeric sealant, **as directed**.
 6. Open Valleys: Cut concrete roof tiles at open valleys to form straight lines. Maintain uniform width of exposed open valley **OR** Widen exposed portion of open valley **1/8 inch in 12 inches (1:96)**, **as directed**, from highest to lowest point.
 - a. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
 - b. Do not nail tiles to metal flashings.
 7. Closed Valleys: Cut concrete roof tiles at closed valleys to form straight lines, trimming upper concealed corners of tiles. Maintain uniform gap at centerline of valley of **1/2 to 3/4 inch (13 to 19 mm)** **OR** **3/4 to 1 inch (19 to 25 mm)**, **as directed**.
 - a. Drill or notch cut valley tiles and wire-tie to fastener placed clear of valley metal flashings.
 - b. Do not nail tiles to metal flashings.
- E. Snow-Guard Installation
1. Snow-Guard Pads: Install rows of snow-guard pads at locations indicated, according to manufacturer's written installation instructions. Space rows apart horizontally, beginning from gutter. Space snow guards apart in each row, offsetting by half this dimension between succeeding rows.

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2. Snow-Guard Rails: Install rows of snow-guard rails at locations indicated, according to manufacturer's written installation instructions. Space rows apart horizontally, beginning from gutter.

F. Adjusting And Cleaning

1. Remove and replace damaged or broken concrete roof tiles.
2. Remove excess concrete roof tiles and debris from Project site.

END OF SECTION 07 32 16 00

Task	Specification	Specification Description
07 34 00 00	07 31 13 13	Asphalt Shingles
07 34 00 00	07 31 16 00	Metal Shingles
07 34 00 00	07 31 26 00	Slate Shingles
07 34 00 00	07 31 29 13	Wood Shingles And Shakes
07 34 00 00	07 32 13 00	Clay Roof Tiles

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SECTION 07 41 13 00 - METAL ROOF PANELS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for metal roof panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Exposed-fastener, lap-seam metal roof panels.
 - b. Concealed-fastener, lap-seam metal roof panels.
 - c. Standing-seam metal roof panels.
 - d. Batten-seam metal roof panels.
 - e. Horizontal-seam (Bermuda-type) metal roof panels.
 - f. Foamed-insulation-core metal roof panels.
 - g. Metal soffit panels.

C. Definitions

1. Metal Roof Panel Assembly: Metal roof panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight roofing system.

D. Performance Requirements

1. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
2. Delegated Design: Design metal roof panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Air Infiltration: Air leakage through assembly of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** of roof area when tested according to ASTM E 1680 at the following test-pressure difference:
 - a. Test-Pressure Difference (for roofs with slopes of 30 degrees or less): Negative **1.57 lbf/sq. ft. (75 Pa)**.
 - b. Test-Pressure Difference (for roofs with slopes steeper than 30 degrees): Positive and negative **1.57 lbf/sq. ft. (75 Pa)**.
 - c. Positive Preload Test-Pressure Difference: Greater than or equal to **15.0 lbf/sq. ft. (720 Pa)** and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 - d. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.
4. Water Penetration: No water penetration when tested according to ASTM E 1646 at the following test-pressure difference:
 - a. Test-Pressure Difference (for roofs with slopes of 30 degrees or less): **2.86 lbf/sq. ft. (137 Pa)**.
 - b. Test-Pressure Difference (for roofs with slopes steeper than 30 degrees): 20 percent of positive design wind pressure, but not less than **6.24 lbf/sq. ft. (300 Pa)** and not more than **12.0 lbf/sq. ft. (575 Pa)**.
 - c. Positive Preload Test-Pressure Difference: Greater than or equal to **15.0 lbf/sq. ft. (720 Pa)** and the greater of 75 percent of building live load or 50 percent of building design positive wind-pressure difference.
 - d. Negative Preload Test-Pressure Difference: 50 percent of design wind-uplift-pressure difference.

5. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
6. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - a. Uplift Rating: UL 30 **OR** UL 60 **OR** UL 90, **as directed**.
7. FMG Listing: Provide metal roof panels and component materials that comply with requirements in FMG 4471 as part of a panel roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120, **as directed**.
 - b. Hail Resistance: MH **OR** SH, **as directed**.
8. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
 - a. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - 1) Uniform pressure of 20 lbf/sq. ft. (957 Pa) **OR** 30 lbf/sq. ft. (1436 Pa), **as directed**, acting inward or outward.
OR
Uniform pressure as indicated on Drawings.
 - b. Snow Loads: 25 lbf/sq. ft. (1197 Pa) **OR** 30 lbf/sq. ft. (1436 Pa) **OR** 35 lbf/sq. ft. (1676 Pa), **as directed**.
 - c. Deflection Limits: Metal roof panel assemblies shall withstand wind and snow loads with vertical deflections no greater than 1/180 **OR** 1/240, **as directed**, of the span.
9. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
10. Thermal Performance: Provide insulated metal roof panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 518.
11. Energy Performance
 - a. Provide roof panels with solar reflectance index not less than 78 **OR** 29, **as directed**, when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
OR
Energy Performance: Provide roof panels that are listed on the U.S. Department of Energy's ENERGY STAR Roof Products Qualified Product List for low-slope **OR** steep-slope, **as directed**, roof products.
OR
Energy Performance: Provide roof panels with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof panels, indicating that panels comply with solar reflectance index requirement.
 - b. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: Indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
3. Shop Drawings: Show fabrication and installation layouts of metal roof panels; details of edge conditions, side-seam and endlap joints, panel profiles, corners, anchorages, trim, flashings, closures, and accessories; and special details. Distinguish between factory- and field-assembled work.
4. Samples: For each type of exposed finish required.

5. Delegated-Design Submittal: For metal roof panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Snow Retention System Calculations: Include calculation of number and location of snow guards based on snow load, roof slope, panel length and finish, and seam type and spacing.
 6. Coordination Drawings: Roof plans, drawn to scale, based on input from installers of the items involved.
 7. Manufacturer Certificates: Signed by manufacturer certifying that roof panels comply with energy performance requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of meeting performance requirements.
 8. Product test reports.
 9. Field quality-control reports.
 10. Maintenance data.
 11. Warranties: Samples of special warranties.
- F. Quality Assurance
1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 2. Surface-Burning Characteristics: Provide metal roof panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 3. Fire-Resistance Ratings: Where indicated, provide metal roof panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
 - b. Combustion Characteristics: ASTM E 136.
 4. Preinstallation Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver components, sheets, metal roof panels, and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
 2. Unload, store, and erect metal roof panels in a manner to prevent bending, warping, twisting, and surface damage.
 3. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting, or other surface damage.
 4. Protect strippable protective covering on metal roof panels from exposure to sunlight and high humidity, except to extent necessary for period of metal roof panel installation.
 5. Protect foam-plastic insulation as follows:
 - a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.
- H. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail in materials or workmanship within two years from date of Final Completion.

2. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal roof panels that show evidence of deterioration of factory-applied finishes within 10 **OR** 20, **as directed**, years from date of Final Completion.
3. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace metal roof panel assemblies that fail to remain weathertight, including leaks, within five **OR** 10, **as directed**, years from date of Final Completion.
4. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within 20 years from date of Final Completion.

1.2 PRODUCTS

A. Panel Materials

1. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Recycled Content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 - b. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation; structural quality.
 - c. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275)**; structural quality.
 - d. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - e. Exposed Coil-Coated Finish:
 - 1) 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) 3-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) 4-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 621. 2-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 621. 3-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 621. 2-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.97 mm)** for topcoat.

- f. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
2. Aluminum Sheet: Coil-coated sheet, **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - b. Exposed Coil-Coated Finish:
 - 1) 2-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) 3-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) 4-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 620. 2-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 620. 3-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 620. 2-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.97 mm)** for topcoat.
 - c. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
3. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper.
 - a. Exposed Finish: Apply the following finish, as specified or indicated on Drawings:
 - 1) Natural finish.
 - 2) Brushed Satin: CDA M32-06x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below):
 - 3) Mirror Polished: CDA M22-06x (Mechanical Finish: buffed, specular; Coating: clear organic, air drying, as specified below):
 - a) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 - 4) Pre-patinated: ASTM B 882. Copper sheets artificially aged by chemical reaction to convert surface to inorganic crystalline structure with color range and durability of naturally formed patina.
4. Panel Sealants:

- a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
 - b. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; and as recommended in writing by metal roof panel manufacturer.
 - c. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.
- B. Field-Installed Thermal Insulation
1. Polyethylene Vapor Retarders: ASTM D 4397, **6 mils (0.15 mm)** thick, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 2. Unfaced, Polyisocyanurate Board Insulation: ASTM C 591, Type II, compressive strength of **35 psi (240 kPa)**, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed.
 3. Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I, Class 1 aluminum foil **OR** Type II, Class 1 or 2 felt or glass-fiber mat, Grade 3 **OR** Type V, oriented-strand-board facing, **as directed**, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core.
 4. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.60-lb/cu. ft. (26-kg/cu. m)** minimum density unless otherwise indicated; with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively.
 5. Molded-Polystyrene Board Insulation: ASTM C 578, Type I, **0.9 lb/cu. ft. (15 kg/cu. m)** **OR** Type II, **1.35 lb/cu. ft. (22 kg/cu. m)**, **as directed**, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively.
 6. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; and with a nominal density of **3 lb/cu. ft. (48 kg/cu. m)**.
 7. Mineral-Fiber-Blanket Insulation: ASTM C 665, type indicated below; consisting of fibers manufactured from glass, slag wool, or rock wool.
 - a. Type I (blankets without membrane covering), passing ASTM E 136 for combustion characteristics.
 - b. Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 - c. Type III (blankets with reflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 8. Metal Building Insulation: ASTM C 991, Type I, or NAIMA 202 **OR** ASTM C 991, Type II, **as directed**, glass-fiber-blanket insulation; **0.5-lb/cu. ft. (8-kg/cu. m)** density; **2-inch- (50-mm-)** wide, continuous, vapor-tight edge tabs; and with a flame-spread index of 25 or less.
 - a. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than **0.02 perm (1.15 ng/Pa x s x sq. m)** when tested according to ASTM E 96, Desiccant Method:
 - 1) Composition: Polypropylene faced, scrim reinforced, and kraft-paper backing **OR** Foil faced, scrim reinforced, and kraft-paper backing with vapor-retarder coating **OR** Polypropylene faced, scrim reinforced, and foil backing **OR** Vinyl faced, scrim reinforced, and foil backing **OR** Vinyl faced, scrim reinforced, and polyester backing, **as directed**.
 - b. Insulation Retainer Strips: **0.019-inch- (0.48-mm-)** thick, formed, galvanized-steel or PVC retainer clips colored to match insulation facing.
 - c. Thermal Spacer Blocks: Fabricated from extruded polystyrene, **1 inch (25 mm)** thick.
- C. Underlayment Materials
1. Self-Adhering, High-Temperature Sheet: **30 to 40 mils (0.76 to 1.0 mm)** thick minimum, consisting of slip-resisting, polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - a. Thermal Stability: Stable after testing at **240 deg F (116 deg C)**; ASTM D 1970.

- a. Material: Zinc-coated (galvanized) steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by Architect from manufacturer's full range.
 - c. Material: Aluminum sheet, 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by Architect from manufacturer's full range.
 - d. Panel Coverage: 21.3 inches (541 mm) OR 29.3 inches (744 mm) OR 34.67 inches (881 mm) OR 37.3 inches (947 mm) OR 42.67 inches (1084 mm) OR 45.3 inches (1151 mm), as directed.
 - e. Panel Height: 0.5 inch (13 mm) OR 0.875 inch (22 mm), as directed.
3. Tapered-Rib-Profile, Exposed-Fastener Metal Roof Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced OR flat pan, as directed, between major ribs.
- a. Material: Zinc-coated (galvanized) steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Material: Copper sheet, 16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed.
 - 1) Exterior Finish: Brushed satin (lacquered) OR Mirror polished, as directed.
 - e. Major-Rib Spacing: 6 inches (152 mm) OR 8 inches (203 mm) OR 9 inches (229 mm) OR 12 inches (305 mm), as directed, o.c.
 - f. Panel Coverage: 24 inches (610 mm) OR 36 inches (914 mm), as directed.
 - g. Panel Height: 0.625 inch (16 mm) OR 0.75 inch (19 mm) OR 1.0 inch (25 mm) OR 1.25 inches (32 mm) OR 1.5 inches (38 mm), as directed.

4. Vee-Rib-Profile, Exposed-Fastener Metal Roof Panels: Formed with raised, V-shaped ribs and recesses that are approximately same size, evenly spaced across panel width, and with rib/recess sides angled at approximately 45 degrees.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm) OR 0.064-inch (1.63-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm) OR 0.064-inch (1.63-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Rib Spacing: **5.3 inches (135 mm) OR 7.2 inches (183 mm) OR 12 inches (305 mm)**, as directed, o.c.
 - e. Panel Coverage: **30 inches (762 mm) OR 32 inches (813 mm) OR 36 inches (914 mm) OR 40 inches (1016 mm)**, as directed.
 - f. Panel Height: **1.375 inches (35 mm) OR 1.5 inches (38 mm) OR 1.75 inches (44 mm) OR 2.0 inches (51 mm) OR 3.0 inches (76 mm)**, as directed.
5. Box-Rib-Profile, Exposed-Fastener Metal Roof Panels: Formed with raised, box-shaped ribs that are wider than recesses, evenly spaced across panel width, and with rib/recess sides angled 60 degrees or more.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Rib Spacing: **2.67 inches (68 mm) OR 4.0 inches (102 mm) OR 5.3 inches (135 mm) OR 6.0 inches (152 mm)**, as directed, o.c.
 - e. Panel Coverage: **24 inches (610 mm) OR 28 inches (711 mm) OR 30 inches (762 mm) OR 32 inches (813 mm) OR 36 inches (914 mm)**, as directed.

- f. Panel Height: **0.625 inch (16 mm) OR 1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 2.0 inches (51 mm), as directed.**
- 6. Deep-Box-Rib-Profile, Exposed-Fastener Metal Roof Panels: Formed with raised, box-shaped ribs that are wider than recesses, evenly spaced across panel width, and with rib/recess sides angled more than 60 degrees.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm) OR 0.064-inch (1.63-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm) OR 0.064-inch (1.63-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm), as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Rib Spacing: **12 inches (305 mm), as directed**, o.c.
 - e. Panel Coverage: **24 inches (610 mm), as directed**.
 - f. Panel Height: **3 inches (76 mm) OR 4 inches (102 mm), as directed**.
- H. Concealed-Fastener, Lap-Seam Metal Roof Panels
 - 1. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
 - 2. Tapered-Rib-Profile, Concealed-Fastener Metal Roof Panels: Formed with raised, trapezoidal major rib at panel edge and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between major rib and panel edge.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.

- d. Panel Coverage: **12 inches (305 mm) OR 16 inches (406 mm) OR 18 inches (457 mm), as directed.**
- e. Panel Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 1.75 inches (44 mm), as directed.**
- 3. Standing-Seam-Profile, Concealed-Fastener Metal Roof Panels: Formed with raised, curved-top, standing-seam-shaped major rib at panel edge and intermediate stiffening ribs symmetrically spaced **OR flat pan, as directed**, between major rib and panel edge.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed**.
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, **as directed**.
 - e. Panel Coverage: **10 inches (254 mm) OR 12 inches (305 mm) OR 16 inches (406 mm) OR 18 inches (457 mm), as directed.**
 - f. Panel Height: **1.0 inch (25 mm) OR 1.25 inches (32 mm) OR 1.5 inches (38 mm), as directed.**
- 4. Batten-Seam-Profile, Concealed-Fastener Metal Roof Panels: Formed with raised, batten-seam-shaped major rib at panel edge and intermediate stiffening ribs symmetrically spaced **OR flat pan, as directed**, between major rib and panel edge.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Panel Coverage: **10 inches (254 mm) OR 12 inches (305 mm) OR 14 inches (356 mm) OR 15 inches (381 mm) OR 18 inches (457 mm) OR 24 inches (610 mm) OR 36 inches (914 mm), as directed.**

- e. Panel Height: **0.75 inch (19 mm) OR 1.25 inches (32 mm) OR 1.5 inches (38 mm), as directed.**
 - f. Batten Width: **1.5 inches (38 mm) OR 2.0 inches (51 mm), as directed.**
- I. Standing-Seam Metal Roof Panels
- 1. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 - a. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
 - b. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1637.
 - 2. Vertical-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR flat pan, as directed**, between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and snapping panels together.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed**,.
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, **as directed**.
 - e. Batten: Same material, finish, and color as roof panels.
 - f. Clips: Fixed **OR** Floating to accommodate thermal movement, **as directed**.
 - 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-), as directed**, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-) OR 0.062-inch- (1.59-mm-), as directed**, thick, stainless-steel sheet.
 - g. Panel Coverage: **10 inches (254 mm) OR 12 inches (305 mm) OR 14 inches (356 mm) OR 16 inches (406 mm) OR 18 inches (457 mm) OR 24 inches (610 mm), as directed.**
 - h. Panel Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 1.75 inches (44 mm), as directed.**
 - 3. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR flat pan, as directed**, between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.

- a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness)**, as directed.
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, as directed.
 - e. Batten: Same material, finish, and color as roof panels.
 - f. Clips: Fixed **OR** Floating to accommodate thermal movement, as directed.
 - 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-)**, as directed, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-) OR 0.062-inch- (1.59-mm-)**, as directed, thick, stainless-steel sheet.
 - g. Joint Type: Single folded **OR** Double folded **OR** As standard with manufacturer, as directed.
 - h. Panel Coverage: **12 inches (305 mm) OR 14 inches (356 mm) OR 16 inches (406 mm) OR 18 inches (457 mm) OR 20 inches (508 mm) OR 24 inches (610 mm)**, as directed.
 - i. Panel Height: **1.5 inches (38 mm) OR 2.0 inches (51 mm) OR 2.5 inches (64 mm)**, as directed.
4. Trapezoidal-Rib, Snap-Joint, Standing-Seam Metal Roof Panels: Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, as directed, between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and snapping panels together.
- a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 28-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Clips: Fixed **OR** Floating to accommodate thermal movement, as directed.
 - 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-)**, as directed, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.

- d. Panel Coverage: 12 inches (305 mm) OR 18 inches (457 mm) OR 24 inches (610 mm), as directed.
- e. Panel Height: 3 inches (76 mm).
- 5. Trapezoidal-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with raised trapezoidal ribs at panel edges and intermediate stiffening ribs symmetrically spaced OR flat pan, as directed, between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and mechanically seaming panels together.
 - a. Material: Zinc-coated (galvanized) steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Clips: Fixed OR Floating to accommodate thermal movement, as directed.
 - 1) Material: 0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-), as directed, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - d. Joint Type: Single folded OR Double folded OR As standard with manufacturer, as directed.
 - e. Panel Coverage: 12 inches (305 mm) OR 18 inches (457 mm) OR 24 inches (610 mm), as directed.
 - f. Panel Height: 2.7 inches (69 mm) OR 3.0 inches (76 mm), as directed.
- 6. Integral-Standing-Seam Metal Roof Panels: Formed with integral ribs at panel edges and intermediate stiffening ribs symmetrically spaced OR flat pan, as directed, between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and lapping and interconnecting side edges of adjacent panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Material: Copper sheet, 16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed.
 - 1) Exterior Finish: Brushed satin (lacquered) OR Mirror polished, as directed.
 - e. Clips: Fixed OR Floating to accommodate thermal movement, as directed.

- 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-), as directed**, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-) OR 0.062-inch- (1.59-mm-), as directed**, thick, stainless-steel sheet.
 - f. Panel Coverage: **12 inches (305 mm) OR 16 inches (406 mm) OR 18 inches (457 mm), as directed.**
 - g. Panel Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 2.0 inches (51 mm), as directed.**
- J. Batten-Seam Metal Roof Panels
1. General: Provide factory-formed metal roof panel assembly designed to be installed by covering vertical side edges of adjacent panels with battens and mechanically attaching panels to supports using concealed clips. Include battens and accessories required for weathertight installation.
 2. Narrow-Profile, Snap-on-Batten-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR flat pan, as directed**, between ribs; designed for independent installation by mechanically attaching panels to supports using concealed clips located under 1 side of panels and engaging opposite edge of adjacent panels, and installation of **3/8-to-1/2-inch- (10-to-13-mm-)** wide, snap-on battens over panel joints.
 - a. Panel Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Panel Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Panel Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Panel Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed.**
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, **as directed**.
 - e. Batten Material: Same material, finish, and color as roof panels.
 - f. Clips: One **OR** Two, **as directed**, piece.
 - 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-), as directed**, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-) OR 0.062-inch- (1.59-mm-), as directed**, thick, stainless-steel sheet.
 - g. Sealant: Factory applied in top **OR** on each side, **as directed**, of battens.
 - h. Panel Coverage: **12 inches (305 mm) OR 14 inches (356 mm) OR 16 inches (406 mm) OR 18 inches (457 mm) OR 20 inches (508 mm), as directed.**
 - i. Batten Height: **1.0 inch (25 mm) OR 1.25 inches (32 mm) OR 1.5 inches (38 mm) OR 1.75 inches (44 mm) OR 2.0 inches (51 mm), as directed.**
 3. Wide-Profile, Snap-on-Batten-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR flat pan, as directed**, between ribs; designed for independent installation by mechanically attaching panels to supports using concealed clips located between and engaging edges of adjacent panels, and installing snap-on battens over panel joints.

- a. Panel Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Panel Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Panel Material: Aluminum sheet, **0.024 inch (0.061 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Panel Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness)**, as directed.
 - 1) Exterior Finish: Brushed satin (lacquered) OR Mirror polished, as directed.
 - e. Batten Material: Same material, finish, and color as roof panels.
 - f. Clips: One piece.
 - 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-)**, as directed, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-) OR 0.062-inch- (1.59-mm-)**, as directed, thick, stainless-steel sheet.
 - g. Sealant: Factory applied on each side of battens.
 - h. Panel Coverage: **12 inches (305 mm) OR 14 inches (356 mm) OR 16 inches (406 mm) OR 18 inches (457 mm) OR 22 inches (559 mm) OR 24 inches (610 mm)**, as directed.
 - i. Batten Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 1.75 inches (44 mm) OR 1.88 inches (48 mm) OR 2.0 inches (51 mm)**, as directed.
4. Seamed-Batten Metal Roof Panels: Formed with vertical ribs at panel edges and intermediate stiffening ribs symmetrically spaced OR smooth, flat pan, as directed, between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels, and installing mechanically seamed battens over panel joints.
- a. Panel Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Panel Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Panel Material: Aluminum sheet, **0.024 inch (0.061 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As selected by the Owner from manufacturer's full range.

- d. Panel Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed.**
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, **as directed.**
 - e. Batten Material: Same material, finish, and color as roof panels.
 - f. Clips: One **OR** Two, **as directed**, piece.
 - 1) Material: **0.028-inch- (0.71-mm-) OR 0.064-inch- (1.63-mm-), as directed**, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-) OR 0.062-inch- (1.59-mm-), as directed**, thick, stainless-steel sheet.
 - g. Sealant: Factory applied on each side of clips under battens.
 - h. Panel Coverage: **12 inches (305 mm) OR 16 inches (406 mm) OR 18 inches (457 mm), as directed.**
 - i. Batten Height: **2.0 inches (51 mm) OR 2.375 inches (60 mm) OR 3.0 inches (76 mm), as directed.**
- K. Horizontal-Seam (Bermuda-Type) Metal Roof Panels
- 1. Horizontal-Seam (Bermuda-Type) Metal Roof Panels: Formed with horizontal seam at panel edges and smooth, flat pan; designed to be installed in sequential installation by engaging lower edge of each panel to upper edge of panel below and mechanically attaching panels to supports using concealed clips located under upper edge of panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer, **as directed.**
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer, **as directed.**
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm)** thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer, **as directed.**
 - 2) Color: As selected by the Owner from manufacturer's full range.
 - d. Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed.**
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, **as directed.**
 - e. Clips: One piece.
 - 1) Material: **0.028-inch- (0.71-mm-)** nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - 2) Material: **0.025-inch- (0.64-mm-)** thick, stainless-steel sheet.
 - f. Seal: Factory-applied sealant or vinyl weatherseal in seam.
 - g. Exposure: **9.5 inches (241 mm) OR 11 inches (279 mm), as directed**, nominal.
 - h. Seam Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm), as directed.**
- L. Foamed-Insulation-Core Metal Roof Panels
- 1. General: Provide factory-formed and -assembled metal roof panels fabricated from two sheets of metal with insulation core foamed-in-place during fabrication with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
 - a. Panel Performance:
 - 1) Flatwise Tensile Strength: **30 psi (200 kPa)** when tested according to ASTM C 297/C 297M.

- 2) Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for 7 days at **140 deg F (60 deg C)** and 100 percent relative humidity according to ASTM D 2126.
- 3) Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at **200 deg F (93 deg C)** according to ASTM D 2126.
- 4) Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at minus **20 deg F (29 deg C)** according to ASTM D 2126.
- 5) Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a **20-lbf/sq. ft. (958-kPa)** positive and negative wind load and with deflection of L/180 for 2 million cycles.
- 6) Autoclave: No delamination when exposed to **2-psi (13.8-kPa)** pressure at a temperature of **212 deg F (100 deg C)** for 2-1/2 hours.
- 7) Fire-Test-Response Characteristics: Class A according to ASTM E 108.
- b. Insulation Core: Modified isocyanurate or polyurethane foam using a non-CFC blowing agent, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.
 - 1) Closed-Cell Content: 90 percent when tested according to ASTM D 2856.
 - 2) Density: **2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m)** when tested according to ASTM D 1622.
 - 3) Compressive Strength: Minimum **20 psi (140 kPa)** when tested according to ASTM D 1621.
 - 4) Shear Strength: **26 psi (179 kPa)** when tested according to ASTM C 273.
2. Lap-Seam-Profile, Foamed-Insulation-Core Metal Roof Panels: Formed for lapping side edges of adjacent panels and mechanically attaching to supports using exposed fasteners in side laps.
 - a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.
 - 3) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - a) Color: As selected by the Owner from manufacturer's full range.
 - 4) Interior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - a) Color: As selected by the Owner from manufacturer's full range.
 - b. Batten: Same material, finish, and color as exterior facings of roof panels.
 - c. Panel Coverage: **24 inches (610 mm) OR 30 inches (762 mm) OR 36 inches (914 mm) OR 39.6 inches (1000 mm) OR 40 inches (1016 mm) OR 44.5 inches (1130 mm), as directed**.
 - d. Panel Thickness: **1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 2.0 inches (51 mm) OR 2.5 inches (64 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm), as directed**.
3. Standing-Seam-Profile, Foamed-Insulation-Core Metal Roof Panels: Formed with vertical tongue-and-groove ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between ribs; designed for sequential installation by interlocking tongue-and-groove panel edges and mechanically attaching panels to supports using concealed clips located between and engaging edges of adjacent panels, and mechanically seaming panels together.
 - a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm), as directed**, nominal thickness.

- 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 3) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - a) Color: As selected by the Owner from manufacturer's full range.
 - 4) Interior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - a) Color: As selected by the Owner from manufacturer's full range.
 - b. Joint Type: Single folded **OR** Double folded **OR** As standard with manufacturer, as directed.
 - c. Panel Coverage: **36 inches (914 mm) OR 42 inches (1067 mm)**, as directed.
 - d. Panel Thickness: **2.0 inches (51 mm) OR 2.5 inches (64 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm)**, as directed.
4. Batten-Seam-Profile, Foamed-Insulation-Core Metal Roof Panels: Formed with vertical or tapered tongue-and-groove ribs at panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, as directed, between ribs; designed for sequential installation by interlocking tongue-and-groove panel edges and mechanically attaching panels to supports using concealed clips located between and engaging edges of adjacent panels, and installing snap-on battens over panel joints.
- a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm)** nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm)** nominal thickness.
 - 3) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - a) Color: As selected by the Owner from manufacturer's full range.
 - 4) Interior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - a) Color: As selected by the Owner from manufacturer's full range.
 - b. Batten: Same material, finish, and color as exterior facings of roof panels.
 - c. Clips: One piece; **0.064-inch- (1.63-mm-) OR 0.097-inch- (2.50-mm-)**, as directed, nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 - d. Panel Coverage: **36 inches (914 mm) OR 39.6 inches (1000 mm)**, as directed.
 - e. Panel Thickness: **1.75 inches (44 mm) OR 2.0 inches (51 mm) OR 2.5 inches (64 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm)**, as directed.

M. Metal Soffit Panels

1. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
2. Metal Soffit Panels: Match profile and material of metal roof panels.
 - a. Finish: Match finish and color of metal roof panels **OR** Match finish and color of metal wall panels **OR** As indicated on Drawings, as directed.
 - b. Sealant: Factory applied within interlocking joint.
3. Flush-Profile Metal Soffit Panels: Solid **OR** Perforated, as directed, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, as directed, between panel edges; with flush joint between panels.
 - a. Material: Same material, finish, and color as metal roof panels.

- b. Material: Zinc-coated (galvanized) steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels OR Match finish and color of metal wall panels OR As selected by the Owner from manufacturer's full range, as directed.
- c. Material: Aluminum-zinc alloy-coated steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels OR Match finish and color of metal wall panels OR As selected by the Owner from manufacturer's full range, as directed.
- d. Material: Aluminum sheet, 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels OR Match finish and color of metal wall panels OR As selected by the Owner from manufacturer's full range, as directed.
- e. Material: Copper sheet, 16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness), as directed.
 - 1) Exterior Finish: Brushed satin (lacquered) OR Mirror polished, as directed.
- f. Panel Coverage: 8 inches (203 mm) OR 12 inches (305 mm) OR 16 inches (406 mm) OR 20 inches (508 mm), as directed.
- g. Panel Height: 0.875 inch (22 mm) OR 1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 3.0 inches (76 mm), as directed.
- h. Sealant: Factory applied within interlocking joint.
- 4. Reveal-Joint-Profile Metal Soffit Panels: Solid OR Perforated, as directed, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced OR flat pan, as directed, between panel edges; with recessed reveal joint between panels.
 - a. Material: Same material, finish, and color as metal roof panels.
 - b. Material: Zinc-coated (galvanized) steel sheet, 0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels OR Match finish and color of metal wall panels OR As selected by the Owner from manufacturer's full range, as directed.
 - c. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch (0.71-mm) nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels OR Match finish and color of metal wall panels OR As selected by the Owner from manufacturer's full range, as directed.

- d. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels **OR** Match finish and color of metal wall panels **OR** As selected by the Owner from manufacturer's full range, as directed.
- e. Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness) OR 20-oz./sq. ft. weight (0.68-mm thickness)**, as directed.
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, as directed.
- f. Panel Coverage: **8 inches (203 mm) OR 12 inches (305 mm) OR 16 inches (406 mm) OR 20 inches (508 mm)**, as directed.
- g. Panel Height: **0.75 inch (19 mm) OR 1.0 inch (25 mm) OR 1.5 inches (38 mm)**, as directed.
- 5. V-Groove-Profile Metal Soffit Panels: Solid **OR** Perforated, as directed, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, flat pan, as directed, between panel edges; with V-groove joint between panels.
 - a. Material: Same material, finish, and color as metal roof panels.
 - b. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels **OR** Match finish and color of metal wall panels **OR** As selected by the Owner from manufacturer's full range, as directed.
 - c. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels **OR** Match finish and color of metal wall panels **OR** As selected by the Owner from manufacturer's full range, as directed.
 - d. Material: Aluminum sheet, **0.024 inch (0.65 mm) OR 0.032 inch (0.81 mm)**, as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - 2) Color: Match finish and color of metal roof panels **OR** Match finish and color of metal wall panels **OR** As selected by the Owner from manufacturer's full range, as directed.
 - e. Panel Coverage: **6 inches (152 mm) OR 12 inches (305 mm) OR 14 inches (356 mm)**, as directed.
 - f. Panel Height: **0.375 inch (10 mm) OR 0.44 inch (11 mm) OR 0.50 inch (13 mm) OR 0.625 inch (16 mm)**, as directed.

N. Accessories

- 1. Roof Panel Accessories: Provide components approved by roof panel manufacturer and as required for a complete metal roof panel assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.
 - a. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal roof panels.

- b. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum **1-inch- (25-mm-)** thick, flexible closure strips; cut or premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 - c. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 2. Flashing and Trim: Formed from same material as roof panels, prepainted with coil coating, minimum **0.018 inch (0.45 mm)** thick. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal roof panels.
 3. Gutters: Formed from same material roof panels. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum **96-inch- (2400-mm-)** long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of **36 inches (900 mm)** o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match metal roof panels **OR** roof fascia and rake trim, **as directed**.
 4. Downspouts: Formed from same material as roof panels. Fabricate in **10-foot- (3-m-)** long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual". Finish downspouts to match gutters.
 5. Roof Curbs: Fabricated from same material as roof panels, minimum **0.048 inch (1.2 mm)** thick; with bottom of skirt profiled to match roof panel profiles, and welded top box and integral full-length cricket. Fabricate curb subframing of minimum **0.0598-inch- (1.5-mm-)** thick, angle-, C-, or Z-shaped steel sheet. Fabricate curb and subframing to withstand indicated loads, of size and height indicated. Finish roof curbs to match metal roof panels.
 - a. Insulate roof curb with **1-inch- (25-mm-)** thick, rigid insulation.
- O. Snow Guards
1. Snow Guards: Prefabricated, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
 - a. Surface-Mounted, Plastic, Stop-Type Snow Guards: Clear **OR** Integral color, **as directed**, polycarbonate stops designed for attachment to pan surface of metal roof panels using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
 - b. Surface-Mounted, Metal, Stop-Type Snow Guards: Cast-aluminum stops designed for attachment to pan surface of metal roof panel using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
 - c. Surface-Mounted, Copper, Stop-Type Snow Guards: Bronze-alloy stops designed for attachment to pan surface of copper roof panel using solder.
 - d. Seam-Mounted, Stop-Type Snow Guards: Cast-aluminum **OR** Malleable-iron **OR** Clear polycarbonate **OR** Colored polycarbonate, **as directed**, stops designed for attachment to vertical ribs of standing-seam metal roof panels with stainless-steel set screws.
 - e. Seam-Mounted, Bar-Type Snow Guards: Aluminum **OR** stainless-steel, **as directed**, rods or bars held in place by stainless-steel clamps attached to vertical ribs of standing-seam metal roof panels.
 - 1) Aluminum Finish: Mill **OR** Clear anodized, **as directed**.
 - 2) Stainless-Steel Finish: Mill **OR** No. 2B **OR** No. 4, **as directed**.
- P. Fabrication
1. Fabricate and finish metal roof panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
 2. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

3. Fabricate metal roof panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will seal weathertight and minimize noise from movements within panel assembly.
4. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - b. End Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - c. End Seams for Other Than Aluminum: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - d. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - e. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - f. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA's "Architectural Sheet Metal Manual" or by metal roof panel manufacturer for application, but not less than thickness of metal being secured.

Q. Finishes

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Preparation

1. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
2. Substrate Board: Install substrate boards over roof deck **OR** sheathing, **as directed**, on entire roof surface. Attach with substrate-board fasteners.
 - a. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - b. Comply with UL **OR** FMG, **as directed**, requirements for fire-rated construction.
3. Miscellaneous Framing: Install subpurlins, eave angles, furring, and other miscellaneous roof panel support members and anchorage according to metal roof panel manufacturer's written instructions.
 - a. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

B. Underlayment Installation

1. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated below **OR** on Drawings, **as directed**, wrinkle free, in shingle fashion to shed water, and with end laps of not less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Overlap side edges not less than **3-1/2 inches (90 mm)**. Extend underlayment into gutter trough. Roll laps with roller. Cover underlayment within 14 days.
 - a. Roof perimeter for a distance up from eaves of **24 inches (600 mm) OR 36 inches (914 mm)**, **as directed**, beyond interior wall line.

- b. Valleys, from lowest point to highest point, for a distance on each side of **18 inches (460 mm)**, **as directed**. Overlap ends of sheets not less than **6 inches (150 mm)**.
 - c. Rake edges for a distance of **18 inches (460 mm)**.
 - d. Hips and ridges for a distance on each side of **12 inches (300 mm)**.
 - e. Roof to wall intersections for a distance from wall of **18 inches (460 mm)**.
 - f. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of **18 inches (460 mm)**.
2. Felt Underlayment: Apply at locations indicated below **OR** on Drawings, **as directed**, in shingle fashion to shed water, and with lapped joints of not less than **2 inches (50 mm)**.
 - a. Apply over entire roof surface.
 - b. Apply on roof not covered by self-adhering sheet underlayment. Lap over edges of self-adhering sheet underlayment not less than **3 inches (75 mm)**, in shingle fashion to shed water.
 3. Apply slip sheet over underlayment before installing metal roof panels.
 4. Install flashings to cover underlayment to comply with requirements specified in Division 07 Section "Sheet Metal Flashing And Trim".
- C. Thermal Insulation Installation
1. Polyethylene Vapor Retarder: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Repair tears or punctures immediately before concealment by other work.
 2. Board Insulation: Extend insulation in thickness indicated to cover entire roof. Comply with installation requirements in Division 07 Section "Thermal Insulation".
 - a. Erect insulation and hold in place with Z-shaped furring members spaced **24 inches (610 mm) OR 600 mm, as directed**, o.c. Securely attach narrow flanges of furring members to roof deck with screws spaced **24 inches (600 mm) o.c.**
 3. Blanket Insulation: Install insulation concurrently with metal roof panel installation, in thickness indicated to cover entire roof, according to manufacturer's written instructions and as follows:
 - a. Set vapor-retarder-faced units with vapor retarder to warm side **OR** in location indicated, **as directed**, of construction unless otherwise indicated. Do not obstruct ventilation spaces.
 - b. Tape joints and ruptures in vapor retarder and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
 - c. Install blankets straight and true in one-piece lengths with both sets of facing tabs sealed. Comply with the following installation method:
 - 1) Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Hold in place by panels fastened to secondary framing.
 - 2) Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder facing tabs up and over purlin, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Hold in place with bands and crossbands below insulation.
 - 3) Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing members. Install layer of filler insulation over first layer to fill space formed by roof panel standoffs. Hold in place by panels fastened to standoffs.
 - 4) Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder facing tabs up and over purlins, overlapping adjoining facing of next insulation course maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
 - d. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
 - e. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.

D. Metal Roof Panel Installation, General

1. Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
2. Thermal Movement. Rigidly fasten metal roof panels to structure at one and only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction. Predrill panels for fasteners.
 - a. Point of Fixity: Fasten each panel along a single line of fixing located at eave **OR** ridge **OR** center of panel length **OR** locations indicated on Drawings, **as directed**.
 - b. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
3. Install metal roof panels as follows:
 - a. Commence metal roof panel installation and install minimum of 300 sq. ft. (27.8 sq. m.) in presence of factory-authorized representative.
 - b. Field cutting of metal panels by torch is not permitted.
 - c. Install panels perpendicular to purlins.
 - d. Locate and space fastenings in uniform vertical and horizontal alignment.
 - e. Provide metal closures at rake edges **OR** rake walls, **as directed**, and each side of ridge **OR** ridge and hip, **as directed**, caps.
 - f. Flash and seal metal roof panels with weather closures at eaves, rakes, and perimeter of all openings.
 - g. Install ridge **OR** ridge and hip, **as directed**, caps as metal roof panel work proceeds.
 - h. End Splices: Locate panel end splices over, but not attached to, structural supports. Stagger panel end splices to avoid a four-panel splice condition.
 - i. Install metal flashing to allow moisture to run over and off metal roof panels.
4. Fasteners:
 - a. Steel Roof Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized-steel fasteners for surfaces exposed to the interior.
 - b. Aluminum Roof Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 - c. Copper Roof Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
5. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
6. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
 - a. Coat back side of roof panels with bituminous coating where roof panels will contact wood, ferrous metal, or cementitious construction.
7. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal roof panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal roof panel manufacturer.
 - a. Seal metal roof panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal roof panel manufacturer.
 - b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".

E. Metal Roof Panel Installation

1. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - a. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - b. Lap ribbed or fluted sheets one full rib corrugation.
 - c. Provide metal-backed neoprene or EPDM washers under heads of exposed fasteners bearing on weather side of metal roof panels.

- d. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - e. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 - f. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
 - g. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weatherproof to driving rains.
 - h. At panel end splices, nest panels with minimum **6-inch (150-mm)** end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
2. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - a. Install clips to supports with self-tapping fasteners.
 - b. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 - c. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 - d. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 3. Batten-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each batten-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - a. Install clips to supports with self-drilling fasteners.
 - b. Apply battens to metal roof panel seams, fully engaged to provide weathertight joints.
 4. Horizontal-Seam (Bermuda-Type) Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each horizontal-seam joint at location, spacing, and with fasteners recommended by manufacturer. Start at eave and work upward toward ridge.
 - a. Install clips to supports with self-drilling fasteners.
- F. Foamed-Insulation-Core Metal Roof Panel Installation
1. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal roof panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
 2. Lap-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - a. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - b. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of insulated metal roof panels.
 - c. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - d. Provide sealant tape at lapped joints of insulated metal roof panels and between panels and protruding equipment, vents, and accessories.
 - e. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weatherproof to driving rains.
 - f. Apply snap-on battens to insulated metal roof panel seams to conceal fasteners.
 3. Standing-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - a. Install clips to supports with self-tapping fasteners.

- b. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so cleat, insulated metal roof panel, and factory-applied side-lap sealant are completely engaged.
 - 4. Batten-Seam, Foamed-Insulation-Core Metal Roof Panels: Fasten insulated metal roof panels to supports with concealed clips at each batten-seam joint at location, spacing, and with fasteners recommended by manufacturer.
 - a. Apply battens to insulated metal roof panel seams, fully engaged to provide weathertight joints.
- G. Metal Soffit Panel Installation
 - 1. In addition to complying with requirements in "Metal Roof Panel Installation, General" Article, install metal soffit panels to comply with requirements in this article.
 - 2. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
 - a. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
 - 3. Metal Fascia Panels: Align bottom of panels and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- H. Accessory Installation
 - 1. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - a. Install components required for a complete metal roof panel assembly including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - a. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - b. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with mastic sealant (concealed within joints).
 - 3. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than **36 inches (914 mm)** o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
 - 4. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely **1 inch (25 mm)** away from walls; locate fasteners at top and bottom and at approximately **60 inches (1500 mm)** o.c. in between.
 - a. Provide elbows at base of downspouts to direct water away from building.
 - b. Connect downspouts to underground drainage system indicated.
 - 5. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.
 - 6. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.
- I. Snow Guard Installation

07 - Thermal And Moisture Protection



1. Stop-Type Snow Guards: Attach snow guards to metal roof panels with adhesive, sealant, or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate metal roof panels.
 - a. Provide rows of snow guards, at locations indicated on Drawings, spaced apart, beginning from gutter, with each snow guard centered between panel ribs.
 2. Bar-Type Snow Guards: Attach bar supports to vertical ribs of standing-seam metal roof panels with clamps or set screws. Do not use fasteners that will penetrate metal roof panels.
 - a. Provide rows of snow guards, at locations indicated on Drawings, spaced apart, beginning from gutter.
- J. Erection Tolerances
1. Installation Tolerances: Shim and align metal roof panel units within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
- K. Field Quality Control
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect metal roof panel installation, including accessories. Report results in writing.
 2. Remove and replace applications of metal roof panels where inspections indicate that they do not comply with specified requirements.
 3. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- L. Cleaning
1. Remove temporary protective coverings and strippable films, if any, as metal roof panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal roof panel installation, clean finished surfaces as recommended by metal roof panel manufacturer. Maintain in a clean condition during construction.
 2. Replace metal roof panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13 00

SECTION 07 41 13 00a - SHEET METAL ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for sheet metal roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Flat-seam metal roofing, custom fabricated.
 - b. Standing-seam metal roofing, custom fabricated **OR** on-site, roll formed, **as directed**.
 - c. Batten-seam metal roofing, custom fabricated **OR** on-site, roll formed, **as directed**.
 - d. Horizontal-seam (Bermuda-type) metal roofing, custom fabricated.

C. Performance Requirements

1. General Performance: Sheet metal roofing system including, but not limited to, metal roof panels, cleats, clips, anchors and fasteners, sheet metal flashing integral with sheet metal roofing, fascia panels, trim, battens, **as directed**, underlayment, and accessories shall comply with requirements indicated without failure due to defective manufacture, fabrication, installation, or other defects in construction. Sheet metal roofing shall remain watertight.
2. Thermal Movements: Provide sheet metal roofing that allows for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
3. Energy Performance: Provide metal roofing with solar reflectance index not less than 78 **OR** 29, **as directed**, when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Test Reports for Credit SS 7.2: For roof panels, indicating that panels comply with Solar Reflectance Index requirement.
3. Shop Drawings: Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, expansion joint locations, and keyed details. Distinguish between shop- and field-assembled work.
 - a. Include details for forming, joining, and securing sheet metal roofing, including pattern of seams, termination points, fixed points, expansion joints, roof penetrations, edge conditions, special conditions, connections to adjoining work, and details of accessory items.
4. Samples: For each exposed product and for each finish specified.
5. Coordination Drawings: Roof plans drawn to scale with coordinated details for penetrations and roof-mounted items.
6. Portable Roll-Forming Equipment Certificate: Issued by UL for equipment manufacturer's portable roll-forming equipment capable of producing panels that comply with UL requirements.
7. Product test reports.
8. Maintenance data.
9. Warranties: Sample of special warranties.

E. Quality Assurance

1. Roll-Formed Sheet Metal Roofing Fabricator Qualifications: Fabricator authorized by portable roll-forming equipment manufacturer to fabricate and install sheet metal roofing units required for this Project, and who maintains current UL certification of its portable roll-forming equipment.
2. UL-Certified, Portable Roll-Forming Equipment: UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for Class 30 **OR** Class 60 **OR** Class 90, **as directed**, wind-uplift resistance. Maintain UL certification of portable roll-forming equipment for duration of sheet metal roofing work.
3. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
4. Copper Roofing Standard: Comply with CDA's "Copper in Architecture Handbook." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
5. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Do not store sheet metal roofing materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal roofing materials away from uncured concrete and masonry.
2. Protect strippable protective covering on sheet metal roofing from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal roofing installation.

G. Warranty

1. Special Warranty: Warranty form at the end of this Section in which Installer agrees to repair or replace components of sheet metal roofing that fail in materials or workmanship within two years from date of Final Completion.
2. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory-applied finishes within 20 **OR** 10, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Roofing Sheet Metals

1. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
2. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation; structural quality.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275)**; structural quality.
 - c. Thickness: Nominal **0.022 inch (0.56 mm) OR 0.028 inch (0.71 mm)**, **as directed**, unless otherwise indicated.
 - 1) Batten Caps: Nominal **0.028 inch (0.71 mm)** thick.
 - d. Surface: Smooth, flat **OR** Embossed, **as directed**.
 - e. Exposed Coil-Coated Finish:
 - 1) Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) Four-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat,

- and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 4) Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mils (0.97 mm)** for topcoat.
- f. Color: As selected from manufacturer's full range.
 - g. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
3. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 - a. Thickness: **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, **as directed**, unless otherwise indicated.
 - 1) Batten Caps: **0.050 inch (1.27 mm)** thick.
 - b. As-Milled Finish: Mill **OR** One-side bright mill **OR** Standard one-side bright **OR** Standard two-side bright, **as directed**, finish.
 - c. Alclad Finish: Metallurgically bonded surfacing to both sides, forming a composite aluminum sheet with reflective luster.
 - d. Surface: Smooth, flat **OR** Embossed, **as directed**.
 - e. Factory Prime Coating: Where painting after installation is indicated, pretreat with white or light-colored, factory-applied, baked-on epoxy primer coat; minimum dry film thickness of **0.2 mil (0.005 mm)**.
 - f. Exposed Coil-Coated Finish:
 - 1) Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) Four-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 620. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight

- in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
- 6) FEVE Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.97 mm)** for topcoat.
- g. Color: As selected from manufacturer's full range.
 - h. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
4. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, **16 oz./sq. ft. (0.55 mm thick) OR 20 oz./sq. ft. (0.70 mm thick)**, **as directed**, unless otherwise indicated.
 - a. Batten Caps: **20 oz./sq. ft. (0.70 mm thick)**.
 - b. Non-Patinated Exposed Finish: Mill
 - c. Non-Patinated Exposed, Lacquered Finish: Finish designations for copper alloys comply with the system defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
 - 1) Brushed Satin (Lacquered): M32-06x (Mechanical Finish: directionally textured, medium satin; with clear organic coating); coating of "Incralac" waterborne **OR** solvent-borne, **as directed**, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to a total thickness of **1 mil (0.025 mm)**.
 - 2) Mirror Polished (Lacquered): M22-06x (Mechanical Finish: buffed, specular; with clear organic coating); coating of "Incralac" waterborne **OR** solvent-borne, **as directed**, air-drying, methyl methacrylate copolymer lacquer with UV inhibitor, applied by air spray in two coats per manufacturer's written instructions to a total thickness of **1 mil (0.025 mm)**.
 - d. Pre-Patinated Copper-Sheet Finish: Dark brown **OR** Verdigris, **as directed**, pre-patinated according to ASTM B 882.
 5. Zinc-Tin Alloy-Coated Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin).
 - a. Weight (Thickness): **16-oz./sq. ft. (0.55-mm) OR 20-oz./sq. ft. (0.70-mm)**, **as directed**, uncoated **weight (thickness)**, with **0.787-mil (0.020-mm)** coating thickness applied to each side.
 - 1) Batten Caps: **20-oz./sq. ft. (0.70-mm)** uncoated **weight (thickness)**, with **0.787-mil (0.020-mm)** coating thickness applied to each side unless otherwise indicated.
 6. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
 - a. Thickness: **0.016 inch (0.40 mm) OR 0.019 inch (0.48 mm)**, **as directed**, unless otherwise indicated.
 - 1) Batten Caps: **0.019 inch (0.48 mm)** thick.
 - b. Surface: Smooth, flat **OR** Embossed, **as directed**.
 - c. Finish: 2D (dull, cold rolled) **OR** 2B (bright, cold rolled) **OR** 3 (coarse, polished directional satin) **OR** 4 (polished directional satin), **as directed**.
 - 1) Remove tool and die marks and stretch lines or blend into finish.
 - 2) Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 - 3) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

7. Zinc-Tin Alloy-Coated Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead-soft, fully annealed stainless-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin), with factory-applied gray preweathering.
 - a. Thickness: **0.015-inch (0.38-mm) OR 0.018-inch (0.46-mm) OR 0.024-inch (0.61-mm)**, **as directed**, minimum uncoated thickness, with **0.787-mil (0.020-mm)** coating thickness applied to each side.
 - 1) Batten Caps: **0.018-inch- (0.46-mm-)** minimum uncoated thickness, with **0.787-mil (0.020-mm)** coating thickness applied to each side unless otherwise indicated.
 8. Zinc-Tin Alloy-Coated Steel Sheet: ASTM A 625/A 625M; single-reduced, black-steel sheet, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent tin), with factory-applied shop coat, **as directed**.
 - a. Thickness: **0.012-inch (0.31-mm) OR 0.014-inch (0.36-mm)**, **as directed**, uncoated thickness, with **0.787-mil (0.020-mm)** coating thickness applied to each side.
 - 1) Batten Caps: **0.014-inch (0.36-mm)** uncoated thickness, with **0.787-mil (0.020-mm)** coating thickness applied to each side unless otherwise indicated.
 - b. Exposed Coil-Coated Finish: Manufacturer's standard two-coat fluoropolymer complying with performance requirements in AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Color: As selected from manufacturer's full range.
 - c. Field-Applied Finish: Manufacturer's standard waterborne acrylic emulsion paint primer and finish coat.
 - 1) Color: As selected from manufacturer's full range.
 9. Zinc Sheet: Zinc, 99 percent pure, alloyed with a maximum of 1 percent copper and titanium; with manufacturer's standard factory-applied, flexible, protective back coating.
 - a. Thickness: **0.027 inch (0.70 mm) OR 0.032 inch (0.80 mm)**, **as directed**, unless otherwise indicated.
 - 1) Batten Caps: **0.032 inch (0.80 mm)** thick.
 - b. Finish: Bright rolled **OR** Preweathered gray **OR** Preweathered black, **as directed**.
 10. Titanium Sheet: ASTM B 265, Grade 1.
 - a. Thickness: **0.015 inch (0.38 mm) OR 0.020 inch (0.51 mm)**, **as directed**, unless otherwise indicated.
 - 1) Batten Caps: **0.020 inch (0.51 mm)** thick.
 - b. Surface: Smooth, flat **OR** Embossed, **as directed**.
 - c. Finish: Low **OR** Medium, **as directed**, matte.
 - d. Color Anodic Finish (Light-Interference Phenomenon): Silver **OR** Gold **OR** Purple **OR** Blue **OR** Match sample **OR** As selected from manufacturer's full range of colors and color densities, **as directed**.
- B. Underlayment Materials
1. Polyethylene Sheet: **6-mil- (0.15-mm-)** thick polyethylene sheet complying with ASTM D 4397.
 2. Felts: ASTM D 226, Type II (No. 30) **OR** Type I (No. 15), **as directed**, asphalt-saturated organic felts.
 3. Self-Adhering, High-Temperature Sheet: Minimum **30 to 40 mils (0.76 to 1.0 mm)** thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - a. Thermal Stability: ASTM D 1970; stable after testing at **240 deg F (116 deg C)**.
 - b. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus **20 deg F (29 deg C)**.
 4. Slip Sheet: Building paper, **3-lb/100 sq. ft. (0.16-kg/sq. m)** minimum, rosin sized.
- C. Miscellaneous Materials

1. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
2. Wood Battens: Lumber complying with requirements in Division 05 Section(s) "Maintenance Of Decorative Metal" OR Division 06 Section(s) "Miscellaneous Rough Carpentry", **as directed**, and treated with exterior-type fire retardant.
3. Snap-On Seams: Provide snap-on seams integrated with panel-edge profile as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
4. Snap-on Batten Caps: Provide batten clips integrated with snap-on caps as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
5. Fasteners: Wood screws, annular-threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.
 - a. General:
 - 1) Exposed Fasteners: Heads matching color of sheet metal roofing using plastic caps or factory-applied coating.
 - 2) Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - 3) Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - b. Fasteners for Zinc-Coated **OR** Aluminum-Zinc Alloy-Coated, **as directed**, Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M, ASTM F 2329, or Series 300 stainless steel.
 - c. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
 - d. Fasteners for Copper **OR** Zinc-Tin Alloy-Coated Copper, **as directed**, Sheet: Copper, hardware bronze, or Series 300 stainless steel.
 - e. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
 - f. Fasteners for Zinc-Tin Alloy-Coated Steel **OR** Stainless-Steel, **as directed**, Sheet: Series 300 stainless steel.
 - g. Fasteners for Zinc Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M, ASTM F 2329, or Series 300 stainless steel.
 - h. Fasteners for Titanium Sheet: Titanium or Series 300 stainless steel.
6. Solder:
 - a. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.
 - b. For Copper: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead.
 - c. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
 - d. For Zinc-Tin Alloy-Coated Steel **OR** Stainless Steel **OR** Copper, **as directed**: ASTM B 32, 100 percent tin.
 - e. For Zinc: ASTM B 32, 40 percent tin and 60 percent lead with low antimony, as recommended by manufacturer.
7. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
8. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** polysulfide **OR** silicone, **as directed**, polymer sealant as recommended by portable roll-forming equipment manufacturer for installation indicated, **as directed**; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.
9. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

10. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. Accessories

1. Sheet Metal Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, clips, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items. Match material and finish of sheet metal roofing unless otherwise indicated.
 - a. Provide accessories as recommended by portable roll-forming equipment manufacturer to produce sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article.
 - b. Cleats: For mechanically seaming into joints and formed from the following materials:
 - 1) Metallic-Coated Steel **OR** Aluminum, **as directed**, Roofing: **0.0250-inch- (0.64-mm-), as directed**, thick stainless steel.
 - 2) Copper **OR** Zinc-Tin Alloy-Coated Copper, **as directed**, Roofing: **16-oz./sq. ft. (0.55-mm), as directed**, copper sheet.
 - 3) Stainless-Steel **OR** Titanium, **as directed**, Roofing: **0.0250-inch- (0.64-mm-), as directed**, thick stainless steel.
 - 4) Zinc-Tin Alloy-Coated Stainless-Steel **OR** Zinc-Tin Alloy-Coated Steel, **as directed**, Roofing: Manufacturer's preformed cleats or cleats fabricated from manufacturer's thickest flat-stock sheet.
 - 5) Zinc Roofing: Manufacturer's preformed stainless-steel cleats.
 - c. Clips: Minimum **0.0625-inch- (1.6-mm-)** thick, stainless-steel panel clips designed to withstand negative-load requirements.
 - d. Backing Plates: Plates at roofing splices, fabricated from material recommended by SMACNA.
 - e. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin foam or closed-cell laminated polyethylene; minimum **1-inch- (25-mm-)** thick, flexible-closure strips; cut or premolded to match sheet metal roofing profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
 - f. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing, minimum **0.018 inch (0.46 mm)** thick.
2. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
3. Roof Curbs: Fabricated from same material and finish as sheet metal roofing, minimum thickness matching the sheet metal roofing; with bottom of skirt profiled to match roof panel profiles; with weatherproof top box and integral full-length cricket. Fabricate curb subframing of nominal **0.062-inch- (1.59-mm-)** thick, angle-, C-, or Z-shaped galvanized steel or stainless-steel sheet. Fabricate curb and subframing to withstand indicated loads of size and height indicated. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
 - a. Insulate curbs with **1-inch- (25-mm-)** thick, rigid insulation.
 - b. Install wood nailers at tops of curbs.

E. Snow Guards

1. Snow Guards, General: Prefabricated, noncorrosive units designed to be installed without penetrating sheet metal roofing; complete with predrilled holes, clamps, or hooks for anchoring.
2. Surface-Mounted, Plastic, Stop-Type Snow Guards: Clear **OR** Integral-color, **as directed**, polycarbonate stops designed for attachment to panel surface of sheet metal roofing using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
3. Surface-Mounted, Metal, Stop-Type Snow Guards: Cast-aluminum stops designed for attachment to panel surface of sheet metal roofing using construction adhesive, silicone or polyurethane sealant, or adhesive tape.
4. Surface-Mounted, Copper, Stop-Type Snow Guards: Bronze-alloy stops designed for attachment to panel surface of copper roofing using solder.
5. Seam-Mounted, Stop-Type Snow Guards: Cast-aluminum **OR** Malleable-iron **OR** Clear polycarbonate **OR** Colored polycarbonate, **as directed**, stops designed for attachment to vertical ribs of standing-seam sheet metal roofing with stainless-steel set screws.

6. Seam-Mounted, Bar-Type Snow Guards: Rail- or fence-type assembly consisting of aluminum or stainless-steel rods, bars, or pipe held in place by stainless-steel clamps attached to vertical ribs of standing-seam sheet metal roofing.
 - a. Aluminum Finish: Mill **OR** Clear anodized, **as directed**.
 - b. Stainless-Steel Finish: Mill **OR** Enamel, **as directed**.

F. Fabrication

1. General: Custom fabricate sheet metal roofing to comply with details shown and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions (panel width and seam height), geometry, metal thickness, and other characteristics of installation indicated. Fabricate sheet metal roofing and accessories at the shop to greatest extent possible.
 - a. Flat-Seam Roofing: Form flat-seam panels from metal sheets **20 by 28 inches (510 by 710 mm)** with **1/2-inch (13-mm)** notched and folded edges.
 - b. Standing-Seam Roofing: Form standing-seam panels with finished seam height of **1 inch (25 mm) OR of 1-1/2 inches (38 mm) OR as indicated, as directed**.
 - c. Batten-Seam Roofing: Form batten-seam panels with sides turned up **2-1/8 inches (54 mm) OR as indicated, as directed**, with **1/2-inch (13-mm)** flange turned toward center of pan.
 - d. Horizontal-Seam (Bermuda-Type) Roofing: Form horizontal-seam (Bermuda-type) panels with upper edges turned up and extending above batten **1/2 inch (13 mm)**.
2. General: Fabricate roll-formed sheet metal roofing panels with UL-certified, portable roll-forming equipment capable of producing roofing panels for sheet metal roofing assemblies that comply with UL 580 for wind-uplift resistance classification specified in "Quality Assurance" Article. Fabricate roll-formed sheet metal according to equipment manufacturer's written instructions and to comply with details shown.
3. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to a tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
4. Fabrication Tolerances: Fabricate sheet metal roofing that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
5. Form exposed sheet metal work to fit substrates without excessive oil canning, buckling, and tool marks; true to line and levels indicated; and with exposed edges folded back to form hems.
 - a. Lay out sheet metal roofing so transverse seams, if required, are made in direction of flow with higher panels overlapping lower panels.
 - b. Offset transverse seams from each other **12 inches (300 mm)** minimum.
 - c. Fold and cleat eaves and transverse seams in the shop.
 - d. Form and fabricate sheets, seams, strips, cleats, valleys, ridges, edge treatments, integral flashings, and other components of metal roofing to profiles, patterns, and drainage arrangements shown on Drawings and as required for leakproof construction.
6. Expansion Provisions: Fabricate sheet metal roofing to allow for expansion in running work sufficient to prevent leakage, damage, and deterioration of the Work. Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with butyl sealant concealed within joints.
7. Sealant Joints: Where movable, nonexpansion-type joints are indicated or required to produce weathertight seams, form metal to provide for proper installation of elastomeric sealant in compliance with SMACNA standards.
8. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of the metals in contact.
9. Sheet Metal Accessories: Custom fabricate flashings and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

- a. Form exposed sheet metal accessories without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - b. Seams:
 - 1) Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
OR
Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength, **as directed**.
 - c. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
 - d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - e. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
10. Do not use graphite pencils to mark metal surfaces.

1.3 EXECUTION

A. Preparation

1. Lay out and nail battens to wood sheathing **OR** screw battens to wood sheathing **OR** screw battens to metal deck, **as directed**, before installation of sheet metal roofing.
 - a. Space fasteners not more than **18 inches (457 mm)** o.c.
 - b. Space fasteners as required by portable roll-forming equipment manufacturer for specified UL classification for wind-uplift resistance.
2. Zinc-Tin Alloy-Coated Steel Roofing: For roofing with 3:12 slopes or less, paint underside of shop-coated, zinc-tin alloy-coated steel, before installation, with zinc-tin alloy-coated steel primer, applied at a dry film thickness of not less than **2.5 mils (0.06 mm)**. Comply with manufacturer's written instructions. This is in addition to the shop coating.

B. Underlayment Installation

1. Polyethylene Sheet: Install polyethylene sheet on roof sheathing under sheet metal roofing. Use adhesive for anchorage to minimize use of mechanical fasteners under sheet metal roofing. Apply at locations indicated on Drawings, in shingle fashion to shed water, with lapped and taped joints of not less than **2 inches (50 mm)**.
2. Felt Underlayment: Install felt underlayment on roof sheathing under sheet metal roofing. Use adhesive for temporary anchorage to minimize use of mechanical fasteners under sheet metal roofing. Apply at locations indicated, in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.
 - a. Apply from eave to ridge.
OR
Apply on roof not covered by self-adhering sheet underlayment. Lap edges of self-adhering sheet underlayment not less than **3 inches (75 mm)**, in shingle fashion to shed water.
3. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof sheathing under sheet metal roofing. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply over entire roof **OR** at locations indicated, **as directed**, in shingle fashion to shed water, with end laps of not less than **6 inches (150 mm)** staggered **24 inches (600 mm)** between courses. Overlap side edges not less than **3-1/2 inches (90 mm)**. Roll laps with roller. Cover underlayment within 14 days.
 - a. Roof perimeter for a distance up from eaves of **24 inches (600 mm) OR 36 inches (900 mm)**, **as directed**, beyond interior wall line.

- b. Valleys, from lowest to highest point, for a distance on each side of **18 inches (460 mm)**. Overlap ends of sheets not less than **6 inches (150 mm)**.
 - c. Rake edges for a distance of **18 inches (460 mm)**.
 - d. Hips and ridges for a distance on each side of **12 inches (300 mm)**.
 - e. Roof to wall intersections for a distance from wall of **18 inches (460 mm)**.
 - f. Around dormers, chimneys, skylights, and other penetrating elements for a distance from element of **18 inches (460 mm)**.
4. Install flashings to cover underlayment to comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim".
 5. Apply slip sheet before installing sheet metal roofing.

C. Installation, General

1. General: Anchor sheet metal roofing and other components of the Work securely in place, with provisions for thermal and structural movement. Install fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing.
 - a. Field cutting of sheet metal roofing by torch is not permitted.
 - b. Provide metal closures at peaks, rake edges, rake walls, eaves, and each side of ridge and hip caps, **as directed**.
 - c. Flash and seal sheet metal roofing with closure strips at eaves, rakes, and perimeter of all openings. Fasten with self-tapping screws.
 - d. Locate and space fastenings in uniform vertical and horizontal alignment. Predrill panels for fasteners.
 - e. Install ridge **OR** ridge and hip, **as directed**, caps as sheet metal roofing work proceeds.
 - f. Locate roofing splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition. Install backing plates at roofing splices.
 - g. Install sealant tape where indicated.
 - h. Lap metal flashing over sheet metal roofing to allow moisture to run over and off the material.
 - i. Do not use graphite pencils to mark metal surfaces.
2. Thermal Movement. Rigidly fasten metal roof panels to structure at only one location for each panel. Allow remainder of panel to move freely for thermal expansion and contraction.
 - a. Point of Fixity: Fasten each panel along a single line of fixing located at eave **OR** ridge **OR** center of panel length **OR** locations indicated on Drawings, **as directed**.
 - b. Avoid attaching accessories through roof panels in a manner that will inhibit thermal movement.
3. Fasteners: Use fasteners of sizes that will penetrate wood sheathing not less than **1-1/4 inches (32 mm)** for nails and not less than **3/4 inch (19 mm)** for wood screws **OR** metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance, **as directed**.
4. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying self-adhering sheet underlayment to each contact surface, or by other permanent separation as recommended by SMACNA.
 - a. Coat back side of uncoated aluminum and stainless-steel sheet metal roofing with bituminous coating where roofing will contact wood, ferrous metal, or cementitious construction.
5. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
6. Fasciae: Align bottom of sheet metal roofing and fasten with blind rivets, bolts, or self-tapping screws. Flash and seal sheet metal roofing with closure strips where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.

D. Custom-Fabricated Sheet Metal Roofing Installation

1. Fabricate and install work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant. Fold back sheet metal to form a hem on concealed side of exposed edges unless otherwise indicated.
 - a. Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation.
 - b. Fasten cleats not more than **12 inches (300 mm)** o.c. Bend tabs over fastener head.
 - c. Provide expansion-type cleats and clips for roof panels that exceed **30 feet (9.1 m)** in length.
2. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.
 - a. Where sealant-filled joints are used, embed hooked flanges of joint members not less than **1 inch (25 mm)** into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below **40 deg F (4 deg C)**.
 - b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
3. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches (38 mm)**, except reduce pre-tinning where pre-tinned surface would show in completed Work.
 - a. Do not solder metallic-coated steel **OR** aluminum **OR** titanium sheet.
 - b. Do not pre-tin zinc-tin alloy-coated stainless steel **OR** zinc-tin alloy-coated copper.
 - c. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
 - d. Stainless-Steel Roofing: Tin edges of uncoated sheets, using solder for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
 - e. Copper Roofing: Tin edges of uncoated copper sheets, using solder for copper.
4. Rivets: Rivet joints in uncoated aluminum **OR** zinc, **as directed**, where indicated and where necessary for strength.
5. Flat-Seam Roofing: Attach flat-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge. After panels are in place, mallet seams and solder.
 - a. Attach roofing panels with cleats spaced not more than **24 inches (610 mm)** o.c.. Lock and solder panels to base flashing.
 - b. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at **12 inches (305 mm)** o.c. Lock panels to edge flashing and solder **OR** apply sealant, **as directed**.
6. Standing-Seam Roofing: Attach standing-seam metal panels to substrate with cleats, double fastened at **12 inches (305 mm)** o.c. Install panels reaching from eave to ridge before moving to adjacent panels. Before panels are interlocked, apply continuous bead of sealant to top of flange of lower panel. Lock standing seams by folding over twice so cleat and panel edges are completely engaged.
 - a. Lock each panel to panel below with soldered **OR** sealed, **as directed**, transverse seam.
 - b. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge at gutters.
OR
Loose-lock panels at eave edges to continuous edge flashing exposed **24 inches (610 mm)** from roof edge. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at **12 inches (305 mm)** o.c. Lock panels to edge flashing.
 - c. Leave seams upright **OR** Fold over seams, **as directed**, after locking at ridges and hips.
7. Batten-Seam Roofing: Attach batten-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge. Hold cleats in place with battens and fold edges of cleats over to hold panels. After panels are in place and before batten cap is installed, apply continuous

bead of sealant to top of flanges of each panel. Install batten cap covering batten and panel edges and fold batten cap and panel together so batten cap and panel edges are completely engaged.

- a. Hook each panel to panel below with soldered **OR** sealed, **as directed**, transverse seam.
- b. Splay upturned edges of panels away from base of battens to provide expansion capability.
- c. Close batten ends with metal closures. Fold together with panel edges and end of batten cap.
- d. Loose-lock panels at eave edges to continuous cleats and flanges at roof edge at gutters.

OR

Loose-lock panels at eave edges to continuous edge flashing exposed **24 inches (610 mm)** from roof edge. Attach edge flashing to face of roof edge with continuous cleat fastened to roof substrate at **12 inches (305 mm)** o.c. Lock panels to edge flashing.

8. Horizontal-Seam (Bermuda-Type) Roofing: Attach horizontal-seam metal panels to substrate with cleats, starting at eave and working upward toward ridge. Attach cleats to battens, spaced at **8 inches (203 mm)** o.c. Lock lower edge of each panel to upper edge of panel below, folding seam over to engage cleat and panel edges. After first fold, mallet seams against batten, leaving joint slightly angled to form drip.
 - a. Hook end of each panel to adjacent panel with soldered **OR** sealed, **as directed**, cross seam.
 - b. Hook panel at eave edge to continuous cleat.
 - c. Join ridges and hips with a standing seam and leave seams upright **OR** fold over seams, **as directed**, after locking.
9. Field Painting: Paint exposed surfaces of zinc-tin alloy-coated steel with one coat of zinc-tin alloy-coated steel primer and one coat of zinc-tin alloy-coated steel finish coat as soon as possible after installation; apply each coat at a dry film thickness of not less than **2.5 mils (0.06 mm)**. Comply with manufacturer's written instructions.

E. On-Site, Roll-Formed Sheet Metal Roofing Installation

1. General: Install on-site, roll-formed sheet metal roofing fabricated from UL-certified equipment to comply with equipment manufacturer's written instructions for UL wind-uplift resistance class indicated. Provide sheet metal roofing of full length from eave to ridge unless otherwise restricted by on-site or shipping limitations.
2. Standing-Seam Sheet Metal Roofing: Fasten sheet metal roofing to supports with concealed clips at each standing-seam joint at location, at spacing, and with fasteners recommended by manufacturer of portable roll-forming equipment.
 - a. Install clips to substrate with self-tapping fasteners.
 - b. Install pressure plates at locations indicated in equipment manufacturer's written installation instructions.
 - c. Before panels are joined, apply continuous bead of sealant to top of flange of lower panel.
 - d. Snap-On Seam: Nest standing seams and fasten together by interlocking and completely engaging field-applied sealant.

OR

Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so cleat, sheet metal roofing, and field-applied sealant are completely engaged.
3. Batten-Seam Sheet Metal Roofing: Fasten sheet metal roofing to supports with concealed clips at each batten-seam joint at location, at spacing, and with fasteners recommended by manufacturer of portable roll-forming equipment.
 - a. Install clips to substrate with self-drilling fasteners.
 - b. After panels are in place and before batten cap is installed, apply continuous bead of sealant to top of flange of each panel.
 - c. Apply snap-on batten caps to sheet metal roofing seams, fully engaged to provide weathertight joints.
4. Seal joints as shown and as required for watertight construction. For roofing with 3:12 slopes or less, use cleats at transverse seams.

- a. Where sealant-filled joints are used, embed hooked flanges of joint members not less than **1 inch (25 mm)** into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below **40 deg F (4 deg C)**.
- b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".

F. Accessory Installation

1. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - a. Install components required for a complete sheet metal roofing assembly including trim, copings, seam covers, flashings, sealants, gaskets, fillers, metal closures, closure strips, and similar items.
 - b. Install accessories integral to sheet metal roofing that are specified in Division 07 Section "Sheet Metal Flashing And Trim" to comply with that Section's requirements.
2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - a. Install flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
 - b. Install continuous strip of self-adhering underlayment at edge of continuous flashing overlapping self-adhering underlayment, where "continuous seal strip" is indicated in SMACNA's "Architectural Sheet Metal Manual," and where indicated on Drawings.
 - c. Install exposed flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - d. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, and filled with butyl sealant concealed within joints.
3. Pipe Flashing: Form flashing around pipe penetration and sheet metal roofing. Fasten and seal to sheet metal roofing as recommended by SMACNA.
4. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet sheet metal roofing.
5. Stop-Type Snow Guards: Attach snow guards to sheet metal roofing with adhesive or adhesive tape, as recommended by manufacturer. Do not use fasteners that will penetrate sheet metal roofing.
 - a. Provide rows of snow guards, at locations indicated on Drawings, spaced apart, beginning up from roof edge at gutter, with each snow guard centered between sheet metal roofing ribs, **as directed**.
6. Bar-Type Snow Guards: Attach bar supports to vertical ribs of standing-seam sheet metal roofing with clamps or set screws. Do not use fasteners that will penetrate sheet metal roofing.
 - a. Provide rows of snow guards, at locations indicated on Drawings, spaced apart, beginning up from roof edge at gutter.

G. Erection Tolerances

1. Installation Tolerances: Shim and align sheet metal roofing within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.

07 - Thermal And Moisture Protection



OR

Installation Tolerances: Shim and align sheet metal roofing within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

H. Cleaning And Protection

1. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
2. Clean and neutralize flux materials. Clean off excess solder.
3. Clean off excess sealants.
4. Remove temporary protective coverings and strippable films as sheet metal roofing is installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal roofing installation, clean finished surfaces as recommended by sheet metal roofing manufacturer. Maintain sheet metal roofing in a clean condition during construction.
5. Replace sheet metal roofing components that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13 00a

Task	Specification	Specification Description
07 41 33 00	07 41 13 00	Metal Roof Panels
07 42 13 00	07 41 13 00	Metal Roof Panels

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SECTION 07 42 13 19 - GLAZING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for glazing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
 - a. Windows.
 - b. Doors.
 - c. Glazed curtain walls.
 - d. Storefront framing.
 - e. Glazed entrances.
 - f. Sloped glazing.
 - g. Skylights.
 - h. Interior borrowed lites.

C. Definitions

1. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
2. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
3. Interspace: Space between lites of an insulating-glass unit.

D. Performance Requirements

1. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
2. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 **OR** ICC's 2003 International Building Code, **as directed**, by a qualified professional engineer, using the following design criteria:
 - a. Design Wind Pressures: As indicated on Drawings.
OR
Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s), as directed.**
 - 2) Importance Factor.
 - 3) Exposure Category: **B OR C OR D, as directed.**
 - b. Design Snow Loads: As indicated on Drawings, **as directed.**
 - c. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - d. Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass to resist each of the following combinations of loads:
 - 1) Outward design wind pressure minus the weight of the glass. Base design on glass type factors for short-duration load.
 - 2) Inward design wind pressure plus the weight of the glass plus half of the design snow load. Base design on glass type factors for short-duration load.

- 3) Half of the inward design wind pressure plus the weight of the glass plus the design snow load. Base design on glass type factors for long-duration load.
 - e. Glass Type Factors for Wired, Patterned, and Sandblasted Glass:
 - 1) Short-Duration Glass Type Factor for Wired Glass: 0.5.
 - 2) Long-Duration Glass Type Factor for Wired Glass: 0.3.
 - 3) Short-Duration Glass Type Factor for Patterned Glass: 1.0.
 - 4) Long-Duration Glass Type Factor for Patterned Glass: 0.6.
 - 5) Short-Duration Glass Type Factor for Sandblasted Glass: 0.5.
 - f. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 - g. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 - h. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or **1 inch (25 mm)**, whichever is less.
 - i. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
- a. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
- E. Preconstruction Testing
1. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - a. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - b. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - c. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - d. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - e. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.
- F. Submittals
1. Product Data: For each glass product and glazing material indicated.
 2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
 3. Glass Samples: For each type of glass product other than clear monolithic vision glass **OR** the following products, **as directed**; **12 inches (300 mm)** square.
 - a. Tinted glass.
 - b. Patterned glass.
 - c. Coated glass.
 - d. Wired glass.
 - e. Fire-resistive glazing products.
 - f. Laminated glass with colored interlayer.
 - g. Insulating glass.
 4. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in **12-inch (300-mm)** lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system, **as directed**.

5. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
6. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
7. Qualification Data: For installers, manufacturers of insulating-glass units with sputter-coated, low-e coatings, glass testing agency and sealant testing agency.
8. Product Certificates: For glass and glazing products, from manufacturer.
9. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for tinted glass, coated glass, insulating glass, glazing sealants and glazing gaskets.
 - a. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
10. Preconstruction adhesion and compatibility test report.
11. Warranties: Sample of special warranties.

G. Quality Assurance

1. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified, **as directed**, by coated-glass manufacturer.
2. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
3. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
4. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
5. Source Limitations for Glass: Obtain ultraclear float glass, tinted float glass, coated float glass, laminated glass and insulating glass from single source from single manufacturer for each glass type.
6. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
7. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - a. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - b. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 - c. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - d. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
8. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC **OR** the SGCC or another certification agency acceptable to authorities having jurisdiction **OR** the manufacturer, **as directed**. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
9. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of **450 deg F (250 deg C)**, and the fire-resistance rating in minutes.
10. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
11. Preinstallation Conference: Conduct conference at Project site.

H. Delivery, Storage, And Handling

1. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
2. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

I. Project Conditions

1. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - a. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below **40 deg F (4.4 deg C)**.

J. Warranty

1. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - a. Warranty Period: 10 years from date of Final Completion.
2. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - a. Warranty Period: Five **OR** 10, **as directed**, years from date of Final Completion.
3. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 - a. Warranty Period: 10 years from date of Final Completion.

1.2 PRODUCTS

A. Glass Products, General

1. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
 - a. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
 - b. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
2. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article, **as directed**. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article, **as directed**. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
3. Windborne-Debris-Impact Resistance: Provide exterior glazing that passes basic **OR** enhanced, **as directed**, -protection testing requirements in ASTM E 1996 for Wind Zone 1 **OR** Wind Zone 2 **OR** Wind Zone 3 **OR** Wind Zone 4, **as directed**, when tested according to ASTM E 1886. Test

specimens shall be no smaller in width and length than glazing indicated for use on the Project and shall be installed in same manner as glazing indicated for use on the Project.

- a. Large-Missile Test: For glazing located within **30 feet (9.1 m)** of grade.
- b. Small-Missile Test: For glazing located more than **30 feet (9.1 m)** above grade.

OR

Large-Missile Test: For all glazing, regardless of height above grade.

4. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - a. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick **OR** of thickness indicated, **as directed**.
 - b. For laminated-glass lites, properties are based on products of construction indicated.
 - c. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - d. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as **Btu/sq. ft. x h x deg F (W/sq. m x K)**.
 - e. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - f. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

B. Glass Products

1. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
2. Ultraclear Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I, complying with other requirements specified and with visible light transmission not less than 91 percent and solar heat gain coefficient not less than 0.87, **as directed**.
3. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - b. For uncoated glass, comply with requirements for Condition A.
 - c. For coated vision glass, comply with requirements for Condition C (other coated glass).
4. Pyrolytic-Coated, Self-Cleaning, Low-Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
5. Uncoated Tinted Float Glass: Class 2, complying with other requirements specified.
 - a. Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - b. Visible Light Transmittance: as directed by the Owner.
6. Polished Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 1, Quality-Q6, complying with ANSI Z97.1, Class C.
 - a. Mesh: M1 (diamond) **OR** M2 (square), **as directed**.
7. Film-Faced Polished Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 1, Quality-Q6 and complying with testing requirements in 16 CFR 1201 for Category II materials.
 - a. Mesh: M1 (diamond) **OR** M2 (square), **as directed**.
8. Patterned Glass: ASTM C 1036, Type II, Class 1 (clear), Form 3; Quality-Q6, Finish F1 (patterned one side) **OR** Finish F2 (patterned both sides), **as directed**, Pattern P1 (linear) **OR** Pattern P2 (geometric) **OR** Pattern P3 (random) **OR** Pattern P4 (special), **as directed**.
9. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II, Class 1 (clear), Form 3; Quality-Q6, Finish F1 (patterned one side) **OR** Finish F2 (patterned both sides), **as directed**, Pattern P1 (linear) **OR** Pattern P2 (geometric) **OR** Pattern P3 (random) **OR** Pattern P4 (special), **as directed**.
10. Patterned Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 2, Quality-Q6, Finish F1 (patterned one side) **OR** Finish F2 (patterned both sides), **as directed**, Mesh M1 (diamond), Pattern P1 (linear) **OR** Pattern P2 (geometric) **OR** Pattern P3 (random) **OR** Pattern P4 (special), **as directed**.

11. Ceramic-Coated Vision Glass: Heat-treated float glass, Condition C; with ceramic enamel applied by silk-screened process; complying with Specification No. 95-1-31 in GANA's Tempering Division's "Engineering Standards Manual" and with other requirements specified.
 - a. Glass: Clear float **OR** Ultraclear float **OR** Tinted float, **as directed**.
 - b. Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - c. Ceramic Coating Color and Pattern: As selected from manufacturer's full range.
12. Reflective-Coated Vision Glass: ASTM C 1376, coated by pyrolytic process **OR** vacuum deposition (sputter-coating) process, **as directed**, and complying with other requirements specified.
 - a. Kind: Kind CV (coated vision glass), except that Kind CO (coated overhead glass) may be used where the lower edge of the glass is more than **6 feet (1.8 m)** above the adjacent floor level or cannot be approached closer than **10 feet (3.0 m)**.
 - b. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
 - c. Glass: Clear float **OR** Tinted float, **as directed**.
 - d. Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - e. Visible Light Transmittance:
 - f. Outdoor Visible Reflectance: as directed by the Owner.
 - g. Self-Cleaning, Low-Maintenance Coating: Pyrolytic coating on first surface.
13. Ceramic-Coated Spandrel Glass: ASTM C 1048, Condition B, Type I, Quality-Q3, and complying with other requirements specified.
 - a. Glass: Clear float **OR** Ultraclear float **OR** Tinted float, **as directed**.
 - b. Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - c. Ceramic Coating Color: As selected from manufacturer's full range.
14. Silicone-Coated Spandrel Glass: ASTM C 1048, Condition C, Type I, Quality-Q3, and complying with other requirements specified.
 - a. Glass: Clear float **OR** Ultraclear float **OR** Tinted float, **as directed**.
 - b. Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - c. Silicone Coating Color: As selected from manufacturer's full range.
15. Reflective-Coated Spandrel Glass: ASTM C 1376, Kind CS; coated by pyrolytic process **OR** vacuum deposition (sputter-coating) process, **as directed**, and complying with other requirements specified.
 - a. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
 - b. Glass: Clear float **OR** Ultraclear float **OR** Tinted float, **as directed**.
 - c. Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - d. Visible Light Transmittance: as directed by the Owner.
 - e. Outdoor Visible Reflectance: as directed by the Owner.

C. Laminated Glass

1. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - a. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
 - b. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - c. Interlayer Color: Clear unless otherwise indicated.
2. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph in "Glass Products, General" Article, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - a. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:

- 1) Polyvinyl butyral interlayer.
 - 2) Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
 - 3) Ionoplast interlayer.
 - 4) Cast-in-place and cured-transparent-resin interlayer.
 - 5) Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.
- b. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - c. Interlayer Color: Clear unless otherwise indicated.
3. Glass: Comply with applicable requirements in "Glass Products" Article as indicated by designations in "Laminated-Glass Types" Article.
- D. Insulating Glass
1. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - a. Sealing System: Dual seal, with manufacturer's standard **OR** polyisobutylene and polysulfide **OR** polyisobutylene and silicone **OR** polyisobutylene and hot-melt butyl **OR** polyisobutylene and polyurethane, **as directed**, primary and secondary.
 - b. Spacer: Manufacturer's standard spacer material and construction **OR** Aluminum with mill or clear anodic finish **OR** Aluminum with black, color anodic finish **OR** Aluminum with bronze, color anodic finish **OR** Aluminum with powdered metal paint finish in color selected **OR** Galvanized steel **OR** Stainless steel **OR** Polypropylene covered stainless steel in color selected **OR** Thermally broken aluminum **OR** Nonmetallic laminate **OR** Nonmetallic tube, **as directed**.
 - c. Desiccant: Molecular sieve or silica gel, or blend of both.
 2. Glass: Comply with applicable requirements in "Glass Products" Article and in "Laminated Glass" Article, **as directed**, as indicated by designations in "Insulating-Glass Types" Article and in "Insulating-Laminated-Glass Types" Article, **as directed**.
- E. Fire-Protection-Rated Glazing
1. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.
 2. Monolithic Ceramic Glazing: Clear, ceramic flat glass; **3/16-inch (5-mm)** nominal thickness.
 3. Film-Faced Ceramic Glazing: Clear, ceramic flat glass; **3/16-inch (5-mm)** nominal thickness; faced on one surface with a clear glazing film; complying with testing requirements in 16 CFR 1201 for Category II materials.
 4. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; **5/16-inch (8-mm)** total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.
 5. Fire-Protection-Rated Tempered Glass: **1/4-inch- (6.4-mm-) OR 3/8-inch- (9.5-mm-) OR 1/2-inch- (12.7-mm-)**, **as directed**, thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.
 6. Fire-Protection-Rated Laminated Glass: **5/16-inch- (8-mm-)** thick, fire-protection-rated laminated glass, complying with testing requirements in 16 CFR 1201 for Category II materials.
 7. Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, clear float glass; with intumescent interlayers; complying with testing requirements in 16 CFR 1201 for Category II materials.
 8. Gel-Filled, Double Glazing Units: Double glazing units made from two lites of uncoated, clear, fully tempered float glass; with a perimeter metal spacer separating lites and dual-edge seal enclosing a cavity filled with clear, fully transparent, heat-absorbing gel; complying with testing requirements in 16 CFR 1201 for Category II materials.
- F. Glazing Gaskets

1. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 - a. Neoprene complying with ASTM C 864.
 - b. EPDM complying with ASTM C 864.
 - c. Silicone complying with ASTM C 1115.
 - d. Thermoplastic polyolefin rubber complying with ASTM C 1115.
2. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 - a. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
3. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

G. Glazing Sealants

1. General:
 - a. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - b. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - c. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 - d. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
2. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
3. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
4. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
5. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
6. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

H. Glazing Tapes

1. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - a. AAMA 804.3 tape, where indicated.
 - b. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - c. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
2. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

- I. Miscellaneous Glazing Materials
 1. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
 2. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
 3. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
 4. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 5. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
 6. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
 7. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

- J. Fabrication Of Glazing Units
 1. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 2. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
 3. Grind smooth and polish exposed glass edges and corners.

- K. Monolithic-Glass Types
 1. Glass Type: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Provide safety glazing labeling.
 2. Glass Type: Ultraclear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Provide safety glazing labeling.
 3. Glass Type: Pyrolytic-coated, self-cleaning, low-maintenance, clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Provide safety glazing labeling.
 4. Glass Type: Tinted float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Winter Nighttime U-Factor: as directed by the Owner.
 - c. Summer Daytime U-Factor: as directed by the Owner.
 - d. Solar Heat Gain Coefficient: as directed by the Owner.
 - e. Provide safety glazing labeling.
 5. Glass Type: Polished wired glass.
 - a. Thickness: 6.0 mm.
 6. Glass Type: Patterned glass.
 - a. Thickness: 4.0 **OR** 5.0 **OR** 6.0, **as directed**, mm.
 7. Glass Type: Tempered patterned glass.
 - a. Thickness: 4.0 **OR** 5.0 **OR** 6.0, **as directed**, mm.
 - b. Provide safety glazing labeling.
 8. Glass Type: Patterned wired glass.
 - a. Thickness: 6.0 mm.

9. Glass Type: Ceramic-coated vision glass, heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Coating Location: Second surface.
 - c. Winter Nighttime U-Factor: as directed by the Owner.
 - d. Summer Daytime U-Factor: as directed by the Owner.
 - e. Solar Heat Gain Coefficient: as directed by the Owner.
 - f. Provide safety glazing labeling.
10. Glass Type: Reflective-coated vision glass, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Coating Location: First **OR** Second, **as directed**, surface.
 - c. Winter Nighttime U-Factor: as directed by the Owner.
 - d. Summer Daytime U-Factor: as directed by the Owner.
 - e. Solar Heat Gain Coefficient: as directed by the Owner.
 - f. Provide safety glazing labeling.
11. Glass Type: Ceramic-coated spandrel glass, heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Coating Location: Second surface.
 - c. Winter Nighttime U-Factor: as directed by the Owner.
 - d. Summer Daytime U-Factor: as directed by the Owner.
 - e. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.
12. Glass Type: Silicone-coated spandrel glass, heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Coating Location: Second surface.
 - c. Winter Nighttime U-Factor: as directed by the Owner.
 - d. Summer Daytime U-Factor: as directed by the Owner.
 - e. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.
13. Glass Type: Reflective-coated spandrel glass, heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness: 6.0 mm.
 - b. Coating Location: First **OR** Second, **as directed**, surface.
 - c. Winter Nighttime U-Factor: as directed by the Owner.
 - d. Summer Daytime U-Factor: as directed by the Owner.
 - e. Fallout Resistance: Passes fallout-resistance test in ASTM C 1048 for an assembly of glass and adhered reinforcing material.
 - f. Factory apply manufacturer's standard opacifier of the following material to coated second surface of lites, with resulting products complying with Specification No. 89-1-6 in GANA's Tempering Division's "Engineering Standards Manual":
 - 1) Manufacturer's standard opacifier material.

OR
Polyester film laminated to glass with solvent-based adhesive.

L. Laminated-Glass Types

1. Glass Type: Clear laminated glass with two plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** ultraclear float glass **OR** ultraclear heat-strengthened float glass **OR** ultraclear fully tempered float glass, **as directed**.
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.

- c. Provide safety glazing labeling.
2. Glass Type: Antireflective-coated clear laminated glass with two plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** ultraclear float glass **OR** ultraclear heat-strengthened float glass **OR** ultraclear fully tempered float glass, **as directed**.
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Visible Reflectance: Less than 2 percent.
 - d. Winter Nighttime U-Factor: as directed by the Owner.
 - e. Summer Daytime U-Factor: as directed by the Owner.
 - f.
 - g. Solar Heat Gain Coefficient: as directed by the Owner.
 - h.
 - i. Provide safety glazing labeling.
3. Glass Type: Tinted laminated glass with two plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**, with outer ply Class 2 (tinted) and inner ply Class 1 (clear).
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Winter Nighttime U-Factor: as directed by the Owner.
 - d.
 - e. Summer Daytime U-Factor: as directed by the Owner.
 - f.
 - g. Solar Heat Gain Coefficient: as directed by the Owner.
 - h.
 - i. Provide safety glazing labeling.
4. Glass Type: Tinted laminated glass with two plies of clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**, and tinted interlayer.
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Interlayer Color: Blue-green **OR** Bronze light **OR** Gray, **as directed**.
 - d. Winter Nighttime U-Factor: as directed by the Owner.
 - e.
 - f. Summer Daytime U-Factor: as directed by the Owner.
 - g.
 - h. Solar Heat Gain Coefficient: as directed by the Owner.
 - i. Provide safety glazing labeling.
5. Glass Type: Ceramic-coated, laminated vision glass with two plies of heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Coating Location: Second **OR** Third **OR** Fourth, **as directed**, surface.
 - d. Winter Nighttime U-Factor: as directed by the Owner.
 - e.
 - f. Summer Daytime U-Factor: as directed by the Owner.
 - g.
 - h. Solar Heat Gain Coefficient: as directed by the Owner.
 - i.
 - j. Provide safety glazing labeling.

6. Glass Type: Reflective-coated, laminated vision glass with two plies of heat-strengthened float glass **OR** fully tempered float glass, **as directed**, with inner ply Class 1 (clear).
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Coating Location: First **OR** Second **OR** Third, **as directed**, surface.
 - d. Winter Nighttime U-Factor: as directed by the Owner.
 - e.
 - f. Summer Daytime U-Factor: as directed by the Owner.
 - g.
 - h. Solar Heat Gain Coefficient: as directed by the Owner.
 - i. Provide safety glazing labeling.
7. Glass Type: Low-e-coated, laminated vision glass with two plies of clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Low-E Coating: Pyrolytic on second **OR** Pyrolytic on third **OR** Sputtered on second **OR** Sputtered on third **OR** Pyrolytic or sputtered on second or third, **as directed**, surface.
 - d. Visible Light Transmittance: as directed by the Owner.
 - e.
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i.
 - j. Solar Heat Gain Coefficient: as directed by the Owner.
 - k.
 - l. Provide safety glazing labeling.
8. Glass Type: Reflective-coated, laminated spandrel glass with two plies of heat-strengthened float glass **OR** fully tempered float glass, **as directed**, with inner ply Class 1 (clear).
 - a. Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.29 mm), **as directed**.
 - c. Coating Location: First **OR** Second **OR** Third, **as directed**, surface.
 - d. Winter Nighttime U-Factor: as directed by the Owner.
 - e.
 - f. Summer Daytime U-Factor: as directed by the Owner.
 - g.

M. Insulating-Glass Types

1. Glass Type: Clear insulating glass.
 - a. Overall Unit Thickness: 1 inch (25 mm) **OR** 5/8 inch (16 mm), **as directed**.
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed**.
 - c. Outdoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass, **as directed**.
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i. Provide safety glazing labeling.

2. Glass Type: Ultraclear insulating glass.
 - a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed.**
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed.**
 - c. Outdoor Lite: Ultraclear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - d. Interspace Content: Air **OR** Argon, **as directed.**
 - e. Indoor Lite: Ultraclear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i.
 - j. Provide safety glazing labeling.
3. Glass Type: Pyrolytic-coated, self-cleaning, low-maintenance, clear insulating glass.
 - a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed.**
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed.**
 - c. Outdoor Lite: Pyrolytic-coated, self-cleaning, low-maintenance, clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - d. Interspace Content: Air **OR** Argon, **as directed.**
 - e. Indoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass, **as directed.**
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g. Summer Daytime U-Factor: as directed by the Owner.
 - h. Provide safety glazing labeling.
4. Glass Type: Low-e-coated, clear insulating glass.
 - a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed.**
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed.**
 - c. Outdoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed.**
 - d. Interspace Content: Air **OR** Argon, **as directed.**
 - e. Indoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed.**
 - f. Low-E Coating: Pyrolytic on second **OR** Pyrolytic on third **OR** Sputtered on second **OR** Sputtered on third **OR** Pyrolytic or sputtered on second or third, **as directed**, surface.
 - g. Visible Light Transmittance: as directed by the Owner.
 - h. Winter Nighttime U-Factor: as directed by the Owner.
 - i. Summer Daytime U-Factor: as directed by the Owner.
 - j. Solar Heat Gain Coefficient: as directed by the Owner.
 - k. Provide safety glazing labeling.
5. Glass Type: Tinted insulating glass.
 - a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed.**
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed.**
 - c. Outdoor Lite: Tinted float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - d. Interspace Content: Air **OR** Argon, **as directed.**
 - e. Indoor Lite: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g. Summer Daytime U-Factor: as directed by the Owner.
 - h. Solar Heat Gain Coefficient: as directed by the Owner.
 - i. Provide safety glazing labeling.
6. Glass Type: Low-e-coated, tinted insulating glass.
 - a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed.**
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed.**

- c. Outdoor Lite: Tinted float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - f. Low-E Coating: Pyrolytic on second **OR** Pyrolytic on third **OR** Sputtered on second **OR** Sputtered on third **OR** Pyrolytic or sputtered on second or third, **as directed**, surface.
 - g. Visible Light Transmittance: as directed by the Owner.
 - h. Winter Nighttime U-Factor: as directed by the Owner.
 - i. Summer Daytime U-Factor: as directed by the Owner.
 - j. Solar Heat Gain Coefficient: as directed by the Owner.
 - k. Provide safety glazing labeling.
7. Glass Type: Ceramic-coated, insulating vision glass.
- a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed**.
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed**.
 - c. Outdoor Lite: Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed**.
 - f. Coating Location: Second **OR** Third **OR** Fourth, **as directed**, surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i. Solar Heat Gain Coefficient: as directed by the Owner.
 - j. Provide safety glazing labeling.
8. Glass Type: Reflective-coated, clear insulating glass.
- a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed**.
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed**.
 - c. Outdoor Lite: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - f. Coating Location: First **OR** Second **OR** Third, **as directed**, surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i. Solar Heat Gain Coefficient: as directed by the Owner.
 - j. Provide safety glazing labeling.
9. Glass Type: Reflective-coated, tinted insulating glass.
- a. Overall Unit Thickness: **1 inch (25 mm) OR 5/8 inch (16 mm), as directed**.
 - b. Thickness of Each Glass Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed**.
 - c. Outdoor Lite: Tinted float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - f. Coating Location: First **OR** Second **OR** Third, **as directed**, surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i. Solar Heat Gain Coefficient: as directed by the Owner.
 - j. Provide safety glazing labeling.
10. Glass Type: Ceramic-coated **OR** Silicone-coated, **as directed**, insulating spandrel glass.
- a. Overall Unit Thickness: **1 inch (25 mm)**.
 - b. Thickness of Each Glass Lite: 5.0 mm **OR** 6.0 mm, **as directed**.

- c. Outdoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed**.
 - f. Coating Location: Fourth surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
11. Glass Type: Ceramic-coated **OR** Silicone-coated, **as directed**, low-e, insulating spandrel glass.
- a. Overall Unit Thickness: **1 inch (25 mm)**.
 - b. Thickness of Each Glass Lite: 5.0 mm **OR** 6.0 mm, **as directed**.
 - c. Outdoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass **OR** Ultraclear float glass **OR** Ultraclear heat-strengthened float glass **OR** Ultraclear fully tempered float glass, **as directed**.
 - f. Low-E Coating: Pyrolytic on second **OR** Pyrolytic on third **OR** Sputtered on second **OR** Sputtered on third **OR** Pyrolytic or sputtered on second or third, **as directed**, surface.
 - g. Opaque Coating Location: Fourth surface.
 - h. Winter Nighttime U-Factor: as directed by the Owner.
 - i. Summer Daytime U-Factor: as directed by the Owner.
12. Glass Type: Ceramic-coated **OR** Silicone-coated, **as directed**, tinted, insulating spandrel glass.
- a. Overall Unit Thickness: **1 inch (25 mm)**.
 - b. Thickness of Each Glass Lite: 5.0 mm **OR** 6.0 mm.
 - c. Outdoor Lite: Tinted float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Clear float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - f. Coating Location: Fourth surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
- N. Insulating-Laminated-Glass Types
- 1. Glass Type: Clear insulating laminated glass.
 - a. Overall Unit Thickness: **1-3/16 inch (30 mm) OR 1 inch (25 mm) OR 3/4 inch (19 mm)**, **as directed**.
 - b. Thickness of Outdoor Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm, **as directed**.
 - c. Outdoor Lite: Heat-strengthened float glass **OR** Fully tempered float glass, **as directed**.
 - d. Interspace Content: Air **OR** Argon, **as directed**.
 - e. Indoor Lite: Clear laminated glass with two plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed**.
 - 1) Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - 2) Interlayer Thickness: **0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.29 mm)**, **as directed**.
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g. Summer Daytime U-Factor: as directed by the Owner.
 - h. Solar Heat Gain Coefficient: as directed by the Owner.
 - i. Provide safety glazing labeling.
 - 2. Glass Type: Low-e-coated, clear insulating laminated glass.

- a. Overall Unit Thickness: 1-3/16 inch (30 mm) OR 1 inch (25 mm) OR 3/4 inch (19 mm), as directed.
 - b. Thickness of Outdoor Lite: 3.0 mm OR 4.0 mm OR 5.0 mm OR 6.0 mm, as directed.
 - c. Outdoor Lite: Heat-strengthened float glass OR Fully tempered float glass, as directed.
 - d. Interspace Content: Air OR Argon, as directed.
 - e. Indoor Lite: Clear laminated glass with two plies of float glass OR heat-strengthened float glass OR fully tempered float glass, as directed.
 - 1) Thickness of Each Glass Ply: 3.0 mm OR 4.0 mm OR 5.0 mm OR 6.0 mm OR As indicated, as directed.
 - 2) Interlayer Thickness: 0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.29 mm), as directed.
 - f. Low-E Coating: Pyrolytic on second OR Pyrolytic on third OR Sputtered on second OR Sputtered on third OR Pyrolytic or sputtered on second or third, as directed, surface.
 - g. Visible Light Transmittance: as directed by the Owner.
 - h. Winter Nighttime U-Factor: as directed by the Owner.
 - i. Summer Daytime U-Factor: as directed by the Owner.
 - j. Solar Heat Gain Coefficient: as directed by the Owner.
 - k. Provide safety glazing labeling.
3. Glass Type: Tinted, insulating laminated glass.
- a. Overall Unit Thickness: 1-3/16 inch (30 mm) OR 1 inch (25 mm) OR 3/4 inch (19 mm), as directed.
 - b. Thickness of Outdoor Lite: 3.0 mm OR 4.0 mm OR 5.0 mm OR 6.0 mm, as directed.
 - c. Outdoor Lite: Tinted heat-strengthened float glass OR fully tempered float glass, as directed.
 - d. Interspace Content: Air OR Argon, as directed.
 - e. Indoor Lite: Clear laminated glass with two plies of float glass OR heat-strengthened float glass OR fully tempered float glass, as directed.
 - 1) Thickness of Each Glass Ply: 3.0 mm OR 4.0 mm OR 5.0 mm OR 6.0 mm OR As indicated, as directed.
 - 2) Interlayer Thickness: 0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.29 mm), as directed.
 - f. Winter Nighttime U-Factor: as directed by the Owner.
 - g. Summer Daytime U-Factor: as directed by the Owner.
 - h. Solar Heat Gain Coefficient: as directed by the Owner.
 - i. Provide safety glazing labeling.
4. Glass Type: Low-e-coated, tinted, insulating laminated glass.
- a. Overall Unit Thickness: 1-3/16 inch (30 mm) OR 1 inch (25 mm) OR 3/4 inch (19 mm), as directed.
 - b. Thickness of Outdoor Lite: 3.0 mm OR 4.0 mm OR 5.0 mm OR 6.0 mm, as directed.
 - c. Outdoor Lite: Tinted heat-strengthened float glass OR fully tempered float glass, as directed.
 - d. Interspace Content: Air OR Argon, as directed.
 - e. Indoor Lite: Clear laminated glass with two plies of float glass OR heat-strengthened float glass OR fully tempered float glass, as directed.
 - 1) Thickness of Each Glass Ply: 3.0 mm OR 4.0 mm OR 5.0 mm OR 6.0 mm OR As indicated, as directed.
 - 2) Interlayer Thickness: 0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.29 mm), as directed.
 - f. Low-E Coating: Pyrolytic on second OR Pyrolytic on third OR Sputtered on second OR Sputtered on third OR Pyrolytic or sputtered on second or third, as directed, surface.
 - g. Visible Light Transmittance: as directed by the Owner.
 - h. Winter Nighttime U-Factor: as directed by the Owner.
 - i. Summer Daytime U-Factor: as directed by the Owner.
 - j. Solar Heat Gain Coefficient: as directed by the Owner.
 - k. Provide safety glazing labeling.

5. Glass Type: Reflective-coated, clear, insulating laminated glass.
 - a. Overall Unit Thickness: **1-3/16 inch (30 mm) OR 1 inch (25 mm), as directed.**
 - b. Thickness of Outdoor Lite: 6.0 mm.
 - c. Outdoor Lite: Clear heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - d. Interspace Content: Air **OR** Argon, **as directed.**
 - e. Indoor Lite: Clear laminated glass with two plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - 1) Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed.**
 - 2) Interlayer Thickness: **0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.29 mm), as directed.**
 - f. Coating Location: First **OR** Second **OR** Third, **as directed**, surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i. Solar Heat Gain Coefficient: as directed by the Owner.
 - j. Provide safety glazing labeling.
 6. Glass Type: Reflective-coated, tinted, insulating laminated glass.
 - a. Overall Unit Thickness: **1-3/16 inch (30 mm) OR 1 inch (25 mm), as directed.**
 - b. Thickness of Outdoor Lite: 6.0 mm.
 - c. Outdoor Lite: Tinted heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - d. Interspace Content: Air **OR** Argon, **as directed.**
 - e. Indoor Lite: Clear laminated glass with two plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass, **as directed.**
 - 1) Thickness of Each Glass Ply: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed.**
 - 2) Interlayer Thickness: **0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.29 mm), as directed.**
 - f. Coating Location: First **OR** Second **OR** Third, **as directed**, surface.
 - g. Winter Nighttime U-Factor: as directed by the Owner.
 - h. Summer Daytime U-Factor: as directed by the Owner.
 - i. Solar Heat Gain Coefficient: as directed by the Owner.
 - j. Provide safety glazing labeling.
- O. Fire-Protection-Rated Glazing Types
1. Glass Type: 20-minute fire-rated glazing without hose-stream test; monolithic ceramic glazing **OR** film-faced ceramic glazing **OR** laminated ceramic glazing **OR** fire-protection-rated tempered glass **OR** fire-protection-rated laminated glass **OR** gel-filled, double glazing units, **as directed.**
 - a. Provide safety glazing labeling.
 2. Glass Type: 20-minute fire-rated glazing with hose-stream test; monolithic ceramic glazing **OR** film-faced ceramic glazing **OR** laminated ceramic glazing **OR** gel-filled, double glazing units, **as directed.**
 - a. Provide safety glazing labeling.
 3. Glass Type: 45-minute **OR** 60-minute **OR** 90-minute **OR** 120-minute, **as directed**, fire-rated glazing; monolithic ceramic glazing **OR** film-faced ceramic glazing **OR** laminated ceramic glazing **OR** laminated glass with intumescent interlayers **OR** gel-filled, double glazing units, **as directed.**
 - a. Provide safety glazing labeling.
 4. Glass Type: 45-minute **OR** 60-minute **OR** 90-minute **OR** 120-minute, **as directed**, fire-rated glazing with **450 deg F (250 deg C)** temperature rise limitation; laminated glass with intumescent interlayers **OR** gel-filled, double glazing units, **as directed.**
 - a. Provide safety glazing labeling.

1.3 EXECUTION

A. Examination

1. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - a. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - b. Presence and functioning of weep systems.
 - c. Minimum required face and edge clearances.
 - d. Effective sealing between joints of glass-framing members.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
2. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

C. Glazing, General

1. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
2. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
3. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
4. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
5. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
6. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
7. Provide spacers for glass lites where length plus width is larger than **50 inches (1270 mm)**.
 - a. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - b. Provide **1/8-inch (3-mm)** minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
8. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
9. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
10. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
11. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
12. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

- D. Tape Glazing
1. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
 2. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
 3. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
 4. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 5. Do not remove release paper from tape until right before each glazing unit is installed.
 6. Apply heel bead of elastomeric sealant.
 7. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 8. Apply cap bead of elastomeric sealant over exposed edge of tape.
- E. Gasket Glazing (Dry)
1. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 2. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 3. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 4. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 5. Install gaskets so they protrude past face of glazing stops.
- F. Sealant Glazing (Wet)
1. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
 2. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
 3. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- G. Lock-Strip Gasket Glazing
1. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system unless otherwise indicated.
- H. Cleaning And Protection
1. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
 2. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

07 - Thermal And Moisture Protection



3. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
4. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
5. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Final Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 07 42 13 19

SECTION 07 42 93 00 - SIDING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for siding. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Aluminum, Fiber-cement, and Vinyl siding.
 - b. Aluminum, Fiber-cement, and Vinyl soffit.

C. Submittals

1. Product Data: For each type of product indicated.
 - a. For vinyl siding, include VSI's official certification logo printed on product data.
2. Samples: For siding and soffit including related accessories.
3. Qualification Data: For qualified vinyl siding Installer.
4. Product certificates.
5. Product test reports.
6. Research/evaluation reports
7. Maintenance data.
8. Warranty: Sample of special warranty.

D. Quality Assurance

1. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
2. Vinyl Siding Installer Qualifications: A qualified installer who employs a VSI-Certified Installer on Project.
3. Vinyl Siding Certification Program: Provide vinyl siding products that are listed in VSI's list of certified products.
4. Source Limitations: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, from single source from single manufacturer.
5. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Store materials in a dry, well-ventilated, weathertight place.

F. Warranty

1. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding and/or soffit that fail(s) in materials or workmanship within 10 **OR** 25 **OR** 50, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Aluminum Siding

1. General: Formed and coated aluminum siding complying with AAMA 1402.
2. Horizontal Pattern: **8-inch (203-mm)** exposure in plain, single-board **OR** beaded-edge, single-board **OR** plain, double-board, **4-inch (102-mm)**, **as directed**, style.
3. Horizontal Pattern: **10-inch (254-mm)** exposure in plain, **OR** Dutch-lap, **as directed**, double, **5-inch (127-mm)** board style.

4. Vertical Pattern: 12-inch (300-mm) exposure in board-and-batten, single-board style.
 5. Vertical Pattern: 16-inch (400-mm) exposure in V-grooved, triple, 5-1/3-inch (135-mm) board style.
 6. Texture: Smooth **OR** Wood grain, **as directed**.
 7. Nominal Thickness: 0.019 inch (0.5 mm) **OR** 0.024 inch (0.6 mm), **as directed**.
 8. Insulation: Manufacturer's standard integral insulation panels.
 9. Finish: Manufacturer's standard three-coat PVDF **OR** primer and baked-on acrylic **OR** primer and baked-on polyester, **as directed**.
 - a. Colors: As selected by the Owner from manufacturer's full range of industry colors.
- B. Fiber-Cement Siding
1. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 - a. Horizontal Pattern: Boards 5-1/4 inches (133 mm) **OR** 6-1/4 to 6-1/2 inches (159 to 165 mm) **OR** 7-1/4 to 7-1/2 inches (184 to 190 mm) **OR** 8-1/4 to 8-1/2 inches (210 to 216 mm) **OR** 9-1/4 to 9-1/2 inches (235 to 241 mm), **as directed**, wide in plain **OR** beaded-edge, **as directed**, style.
 - 1) Texture: Smooth **OR** Rough sawn **OR** Wood grain, **as directed**.
 - b. Vertical Pattern: 48-inch- (1200-mm-) wide sheets with wood-grain texture and grooves 8 inches (203 mm) **OR** 12 inches (300 mm), **as directed**, o.c.
 - c. Shingle Pattern: 48-inch- (1200-mm-) wide, straight-edge notched **OR** staggered-edge notched, **as directed**, sheets with wood-grain texture.
 - d. Panel Texture: 48-inch- (1200-mm-) wide sheets with smooth **OR** stucco **OR** wood-grain, **as directed**, texture.
 - e. Factory Priming: Manufacturer's standard acrylic primer.
- C. Vinyl Siding
1. General: Integrally colored vinyl siding complying with ASTM D 3679.
 2. Horizontal Pattern: 6-1/2- or 7-inch (165- or 178-mm) exposure in beaded-edge, single-board style.
 3. Horizontal Pattern: 8-inch (203-mm) exposure in plain, single-board **OR** double board, 4-inch (102-mm) **OR** triple board, 2-2/3-inch (68-mm), **as directed**, style.
 4. Horizontal Pattern: 8-inch (203-mm) exposure in Dutch-lap, double, 4-inch (102-mm) board style.
 5. Horizontal Pattern: 9-inch (229-mm) exposure in plain, double board, 4-1/2-inch (114-mm) **OR** triple board, 3-inch (76-mm), **as directed**, style.
 6. Horizontal Pattern: 9-inch (229-mm) exposure in Dutch-lap, double, 4-1/2-inch (114-mm) board style.
 7. Horizontal Pattern: 10-inch (254-mm) exposure in plain, **OR** Dutch-lap, **as directed**, double, 5-inch (127-mm) board style.
 8. Vertical Pattern: 6-inch (152-mm) exposure in V-grooved, single-board style.
 9. Vertical Pattern: 8-inch (203-mm) exposure in beaded-edge, double, 4-inch (102-mm) board style.
 10. Vertical Pattern: 10-inch (254-mm) exposure in V-grooved, double, 5-inch (127-mm) board style.
 11. Vertical Pattern: 12-inch (300-mm) exposure in V-grooved, double board, 6-inch (152-mm) **OR** triple board, 4-inch (102-mm), **as directed**, style.
 12. Shingle Pattern: 48-inch- (1200-mm-) wide, straight-edge notched **OR** staggered-edge notched **OR** half-round edge **OR** octagon edge, **as directed**, sheets with wood-grain texture.
 13. Texture: Smooth **OR** Wood grain, **as directed**.
 14. Nominal Thickness: 0.040 inch (1.0 mm) **OR** 0.044 inch (1.1 mm), **as directed**.
 15. Minimum Profile Depth (Butt Thickness): 1/2 inch (13 mm) **OR** 5/8 inch (16 mm) **OR** 3/4 inch (19 mm), **as directed**.
 16. Nailing Hem: Double thickness.
 17. Finish: Wood-grain print with clear protective coating containing not less than 70 percent PVDF.
 - a. Colors: As selected by the Owner from manufacturer's full range of industry colors.

- D. Aluminum Soffit
1. General: Formed and coated aluminum soffit complying with AAMA 1402.
 2. Pattern: 6-inch (152-mm) exposure in V-grooved, single-board style.
 3. Pattern: 10-inch (254-mm) exposure in V-grooved, double, 5-inch (127-mm) board style.
 4. Pattern: 12-inch (300-mm) exposure in V-grooved, double, 6-inch (152-mm) board style.
 5. Pattern: 16-inch (400-mm) exposure in V-grooved, triple board, 5-1/3-inch (135-mm) **OR** quadruple board, 4-inch (102-mm), **as directed**, style.
 6. Texture: Smooth **OR** Wood grain, **as directed**.
 7. Ventilation: Provide perforated **OR** unperforated, **as directed**, soffit unless otherwise indicated.
 8. Nominal Thickness: 0.019 inch (0.5 mm) **OR** 0.024 inch (0.6 mm), **as directed**.
 9. Finish: Manufacturer's standard three-coat PVDF **OR** primer and baked-on acrylic **OR** primer and baked-on polyester, **as directed**.
 - a. Colors: As selected by the Owner from manufacturer's full range of industry colors **OR** Match adjacent siding, **as directed**.
- E. Fiber-Cement Soffit
1. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.
 2. Pattern: 12-inch- (300-mm-) **OR** 16-inch- (400-mm-) **OR** 24-inch- (600-mm-), **as directed**, wide sheets with smooth **OR** wood-grain, **as directed**, texture.
 3. Ventilation: Provide perforated **OR** unperforated, **as directed**, soffit unless otherwise indicated.
 4. Factory Priming: Manufacturer's standard acrylic primer.
- F. Vinyl Soffit
1. General: Integrally colored vinyl soffit complying with ASTM D 4477.
 2. Pattern: 6-inch (152-mm) exposure in V-grooved, single-board **OR** beaded-edge, triple board, 2-inch (51-mm), **as directed**, style.
 3. Pattern: 8-inch (203-mm) exposure in V-grooved, double, 4-inch (102-mm) board style.
 4. Pattern: 10-inch (254-mm) exposure in V-grooved, double, 5-inch (127-mm) board style.
 5. Pattern: 12-inch (300-mm) exposure in V-grooved, double board, 6-inch (152-mm) **OR** triple board, 4-inch (102-mm), **as directed**, style.
 6. Texture: Smooth **OR** Wood grain, **as directed**.
 7. Ventilation: Provide perforated **OR** unperforated, **as directed**, soffit unless otherwise indicated.
 8. Nominal Thickness: 0.035 inch (0.9 mm) **OR** 0.040 inch (1.0 mm) **OR** 0.044 inch (1.1 mm), **as directed**.
 9. Minimum Profile Depth: 1/2 inch (13 mm) **OR** 5/8 inch (16 mm) **OR** 3/4 inch (19 mm), **as directed**.
 10. Colors: As selected by the Owner from manufacturer's full range of industry colors **OR** Match adjacent siding, **as directed**.
- G. Accessories
1. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
 - a. Provide accessories made from same material as **OR** matching color and texture of, **as directed**, adjacent siding unless otherwise indicated.
 2. Aluminum Accessories: Where aluminum accessories are indicated, provide accessories complying with AAMA 1402.
 - a. Texture: Smooth **OR** Wood grain, **as directed**.
 - b. Nominal Thickness: 0.019 inch (0.5 mm) **OR** 0.024 inch (0.6 mm), **as directed**.
 - c. Finish: Manufacturer's standard three-coat PVDF **OR** primer and baked-on acrylic **OR** primer and baked-on polyester, **as directed**.
 3. Vinyl Accessories: Integrally colored vinyl accessories complying with ASTM D 3679 except for wind-load resistance.
 - a. Texture: Smooth **OR** Wood grain, **as directed**.

4. Decorative Accessories: Provide the following aluminum **OR** fiber-cement **OR** vinyl, **as directed**, decorative accessories as indicated:
 - a. Corner posts with fluted faces, **as directed**.
 - b. Door and window casings with fluted faces, **as directed**, and corner rosettes, **as directed**.
 - c. Entrance and window head pediments.
 - d. Pilasters with fluted faces, **as directed**.
 - e. Shutters with paneled **OR** louvered, **as directed**, faces.
 - f. Louvers.
 - g. Lattice.
 - h. Fasciae.
 - i. Moldings and trim.
5. Colors for Decorative Accessories: As selected by the Owner from manufacturer's full range of industry colors **OR** Match adjacent siding, **as directed**.
6. Flashing: Provide aluminum **OR** stainless-steel, **as directed**, flashing complying with Division 07 Section "Sheet Metal Flashing And Trim" at window and door heads and where indicated.
 - a. Finish for Aluminum Flashing: Same as aluminum siding **OR** Siliconized polyester coating, same color as siding **OR** High-performance organic finish, same color as siding **OR** Factory-prime coating, **as directed**.
7. Fasteners:
 - a. For fastening to wood, use siding nails **OR** ribbed bugle-head screws, **as directed**, of sufficient length to penetrate a minimum of **1 inch (25 mm)** into substrate.
 - b. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of **1/4 inch (6 mm)**, or three screw-threads, into substrate.
 - c. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
 - d. For fastening fiber cement, use hot-dip galvanized **OR** stainless-steel, **as directed**, fasteners.
 - e. For fastening vinyl, use aluminum **OR** hot-dip galvanized **OR** stainless-steel, **as directed**, fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
8. Insect Screening for Soffit Vents: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh **OR** PVC-coated, glass-fiber fabric, **18-by-14 or 18-by-16 (1.4-by-1.8- or 1.4-by-1.6-mm)** mesh **OR** Stainless steel, **18-by-18 (1.4-by-1.4-mm)** mesh, **as directed**.
9. Continuous Soffit Vents: Aluminum, hat-channel shape, with stamped louvers **OR** perforations, **as directed**; **2 inches (51 mm)** wide and not less than **96 inches (2438 mm)** long.
 - a. Net-Free Area: **4 sq. in./linear ft. (280 sq. cm/m)** **OR** **6 sq. in./linear ft. (420 sq. cm/m)** **OR** **8 sq. in./linear ft. (560 sq. cm/m)**, **as directed**.
 - b. Finish: Mill finish **OR** White paint **OR** Brown paint, **as directed**.
10. Round Soffit Vents: Stamped aluminum louvered vents, **2 inches (51 mm)** **OR** **2-1/2 inches (64 mm)** **OR** **3 inches (76 mm)** **OR** **4 inches (102 mm)**, **as directed**, in diameter, made to be inserted into round holes cut into soffit.
 - a. Finish: Mill finish **OR** White paint **OR** Brown paint, **as directed**.

1.3 EXECUTION

A. Preparation

1. Clean substrates of projections and substances detrimental to application.

B. Installation

1. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - a. Do not install damaged components.
 - b. Center nails in elongated nailing slots without binding siding to allow for thermal movement.

2. Install aluminum siding and soffit and related accessories according to AAMA 1402.
 - a. Install fasteners no more than **24 inches (600 mm)** o.c.
 3. Install fiber-cement siding and soffit and related accessories.
 - a. Install fasteners no more than **24 inches (600 mm)** o.c.
 4. Install vinyl siding and soffit and related accessories according to ASTM D 4756.
 - a. Install fasteners for horizontal vinyl siding no more than **16 inches (400 mm)** o.c.
 - b. Install fasteners for vertical vinyl siding no more than **12 inches (300 mm)** o.c.
 5. Install joint sealants as specified in Division 07 Section "Joint Sealants" and to produce a weathertight installation.
 6. Where aluminum siding will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
- C. Adjusting And Cleaning
1. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
 2. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 42 93 00

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SECTION 07 46 16 00 - METAL PLATE WALL PANELS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for metal plate wall panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes metal plate wall panels.

C. Definition

1. Metal Plate Wall Panel Assembly: Metal plate wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

D. Performance Requirements

1. General Performance: Metal plate wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
2. Delegated Design: Design metal plate wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Air Infiltration: Air leakage through assembly of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** of wall area when tested according to ASTM E 283 at the following test-pressure difference:
 - a. Test-Pressure Difference: **1.57 lbf/sq. ft. (75 Pa)** which is equivalent to a 25-mph (40-km/h) wind.
4. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 - a. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)** which is equivalent to a 50-mph (80-km/h) wind.
5. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than **6.24 lbf/sq. ft. (300 Pa)** {which is equivalent to a 50-mph (80-km/h) wind} and not more than **12 lbf/sq. ft. (575 Pa)**.
 - a. Water Leakage: As defined according to AAMA 501.1.
OR
 Water Leakage: Uncontrolled water infiltrating the system or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
6. Structural Performance: Provide metal plate wall panel assemblies capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
 - a. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - 1) Uniform pressure of **20 lbf/sq. ft. (957 Pa)** **OR** **30 lbf/sq. ft. (1436 Pa)**, **as directed**, acting inward or outward.
OR
 Uniform pressure as indicated on Drawings.
 - b. Deflection Limits: Metal plate wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 **OR** 1/240, **as directed**, of the span.

7. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication and installation layouts of metal plate wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish among factory-, shop-, and field-assembled work.
3. Samples: For each type of exposed finish required.
4. Delegated-Design Submittal: For metal plate wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Coordination Drawings: Exterior elevations, drawn to scale and coordinating penetrations and wall-mounted items.
6. Product Test Reports.
7. Field quality-control reports.
8. Maintenance Data.
9. Warranties: Sample of special warranties.

F. Quality Assurance

1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
2. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
3. Fire-Resistance Ratings: Where indicated, provide metal plate wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
4. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver components, metal plate wall panels, and other manufactured items so as not to be damaged or deformed. Package panels for protection during transportation and handling.
2. Unload, store, and erect metal plate wall panels in a manner to prevent bending, warping, twisting, and surface damage.
3. Stack metal plate wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store panels to ensure dryness, with positive slope for drainage of water. Do not store panels in contact with other materials that might cause staining, denting, or other surface damage.
4. Retain strippable protective covering on metal plate wall panel for period of installation.
5. Protect foam-plastic insulation as follows:
 - a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal plate wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Two years from date of Final Completion.

2. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal plate wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - a. Finish Warranty Period:
 - 1) 20 years from date of Final Completion for fluoropolymer finish.
 - 2) 10 years from date of Final Completion for siliconized polyester.

1.2 PRODUCTS

A. Panel Materials

1. Aluminum Plate: **ASTM B 209 (ASTM B 209M)**. Alloy and temper as recommended by manufacturer for application.
2. Copper Plate: ASTM B 152/B 152M, solid copper alloy.
3. Panel Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal plate wall panels and remain weathertight; and as recommended in writing by panel manufacturer.

B. Miscellaneous Metal Framing

1. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, **G40 (Z120)** hot-dip galvanized **OR** ASTM A 653/A 653M, **G60 (Z180)** hot-dip galvanized, **as directed**, or coating with equivalent corrosion resistance unless otherwise indicated.
2. Subgirts: Manufacturer's standard C- or Z-shaped sections, **0.064-inch (1.63-mm)** nominal thickness.
3. Zee Clips: **0.079-inch (2.01-mm)** nominal thickness.
4. Base or Sill Angles **OR** Channels, **as directed**: **0.079-inch (2.01-mm)** nominal thickness.
5. Hat-Shaped, Rigid Furring Channels:
 - a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.025 inch (0.64 mm) OR 0.040 inch (1.02 mm), as directed.**
 - b. Depth: As indicated **OR** **7/8 inch (22 mm) OR 1-1/2 inches (38 mm), as directed.**
6. Cold-Rolled Furring Channels: Minimum **1/2-inch- (13-mm-)** wide flange.
 - a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.064 inch (1.63 mm), as directed.**
 - b. Depth: As indicated **OR** **3/4 inch (19 mm), as directed.**
 - c. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with nominal thickness of **0.040 inch (1.02 mm).**
 - d. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.57-mm-)** diameter wire, or double strand of **0.048-inch- (1.22-mm-)** diameter wire.
7. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

C. Miscellaneous Materials

1. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by manufacturer for type of use and finish indicated.
2. Panel Fasteners: Self-tapping screws; bolts and nuts; self-locking rivets and bolts; end-welded studs; and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

D. Metal Plate Wall Panels

1. Metal Plate Wall Panels: Provide factory-formed, metal plate wall panels fabricated from single sheets of metal formed into profile for installation method indicated. Include attachment system components, panel stiffeners, and accessories required for weathertight system.

- a. Material: Tension-leveled, smooth aluminum sheet, **ASTM B 209 (ASTM B 209M), 0.120 inch (3.05 mm) OR 0.125 inch (3.18 mm) OR 0.1875 inch (4.76 mm) OR 0.190 inch (4.82 mm), as directed**, thick.
 - b. Panel Depth: **2 inches (51 mm) OR** As indicated on Drawings, **as directed**.
 - c. Exterior Finish: Two-coat fluoropolymer **OR** Three-coat fluoropolymer **OR** Four-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
2. Attachment System Components: Formed from extruded aluminum.
 - a. Provide internal drainage system that allows individual panels to be installed and removed without disturbing adjacent panels.
 - b. Include manufacturer's standard subgirts, perimeter extrusions, tracks, and drainage channels, panel stiffeners, panel clips and anchor channels, **as applicable**.
 - c. Alignment Pins: Stainless steel.
- E. Accessories
1. Metal Plate Wall Panel Accessories: Provide components required for a complete metal plate wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of panels unless otherwise indicated.
 2. Flashing and Trim: Same material, finish, and color as adjacent metal plate wall panels, minimum **0.030 inch (0.76 mm)** thick unless otherwise indicated.
- F. Fabrication
1. General: Fabricate and finish metal plate wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
 2. Fabricate metal plate wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
 3. Metal Plate Wall Panels: Fabricate panels with panel stiffeners as required to comply with deflection limits. Weld and grind panel corners smooth. Fabricate panels to the following dimensional tolerances:
 - a. Length and Width: Plus or minus **0.032 inch (0.81 mm)** up to **48 inches (1219 mm)**; **0.064 inch (1.63 mm)** more than **48 inches (1219 mm)**.
 - b. Diagonal: Plus or minus **0.1875 inch (4.76 mm)**.
 - c. Panel Bow: Not more than 0.2 percent of panel width or length up to **0.1875 inch (4.76 mm)** maximum.
 - d. Thickness: Plus or minus **0.008 inch (0.2 mm)**.
 - e. Squareness: **0.1875-inch (4.76-mm)** difference between diagonal measurements.
 - f. Camber: **0.032 inch (0.81 mm)**.
 4. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - b. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - c. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - d. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.

- e. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - f. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal plate wall panel manufacturer.
 - 1) Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal plate wall panel manufacturer for application, but not less than thickness of metal being secured.
- G. General Finish Requirements
- 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - 3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- H. Aluminum Finishes
- 1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Four-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4. Mica Fluoropolymer: AAMA 2605. 2-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5. Metallic Fluoropolymer: AAMA 2605. 3-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6. FEVE Fluoropolymer: AAMA 2605. 2-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 - 8. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - 9. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
- I. Copper-Alloy Finishes
- 1. Exposed Finish: Mill.
 - 2. Exposed Finish: Finish designations prefixed by CDA comply with the system established by the Copper Development Association for designating copper-alloy finish systems.
 - a. Brushed Satin: CDA M32-06x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below):

- 1) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in 2 coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
- b. Mirror Polished: CDA M22-06x (Mechanical Finish: buffed, specular; Coating: clear organic, air drying, as specified below):
 - 1) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in 2 coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.

1.3 EXECUTION

A. Preparation

1. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous metal plate wall panel support members and anchorage according to ASTM C 754 and panel manufacturer's written instructions.

B. Metal Plate Wall Panel Installation

1. General: Install metal plate wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - a. Commence metal plate wall panel installation and install minimum of **300 sq. ft. (27.8 sq. m)** in presence of factory-authorized representative.
 - b. Shim or otherwise plumb substrates receiving metal plate wall panels.
 - c. Flash and seal metal plate wall panels with weather closures at perimeter of all openings. Do not begin installation until weather barrier and flashings that will be concealed by panels are installed.
 - d. Install flashing and trim as metal plate wall panel work proceeds.
 - e. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
 - f. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
2. Fasteners:
 - a. Aluminum Plate Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 - b. Copper Plate Wall Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal plate wall panel manufacturer.
4. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall plate panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by panel manufacturer.
 - a. Seal metal plate wall panel end laps with double beads of sealant, full width of panel. Seal side joints where recommended by panel manufacturer.
 - b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
5. Attachment System, General: Install attachment system required to support metal plate wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 - a. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
6. Flange-Attachment Installation: Attach metal plate wall panels, formed with extended perimeter flanges, to supports at locations, spacings, and with fasteners recommended by manufacturer.

- a. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants".
- b. Seal horizontal and vertical joints between adjacent panels with manufacturer's standard gaskets.
7. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach flanges of metal plate wall panels to panel clips with fasteners **OR** by welding, **as directed**, as recommended by manufacturer.
 - a. Seal horizontal and vertical joints between adjacent metal plate wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants".
 - b. Seal horizontal and vertical joints between adjacent metal plate wall panels with manufacturer's standard gaskets.
8. Subgirt-and-Spline Installation: Provide manufacturer's standard subgirts and splines that provide support and complete secondary drainage system, draining to the exterior at horizontal joints. Install support system at locations, spacings, and with fasteners recommended by manufacturer. Attach metal plate wall panels by interlocking perimeter extrusions attached to panels with subgirts and splines. Fully engage integral subgirt-and-spline gaskets and leave horizontal and vertical joints with open reveal. Terminate edge of panels flush with perimeter extrusions.
 - a. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 - b. Do not apply sealants to joints unless otherwise indicated on Drawings.
9. Track-Support Installation: Provide manufacturer's standard horizontal tracks and vertical tracks **OR** drain channels, **as directed**, that provide support and complete secondary drainage system, draining to the exterior at horizontal joints through drain tube. Install support system at locations, spacings, and with fasteners recommended by manufacturer. Attach metal plate wall panels to tracks by interlocking panel edges with manufacturer's standard "T" clips.
 - a. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 - b. Seal horizontal and vertical joints between adjacent metal plate wall panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Division 07 Section "Joint Sealants".
10. Rail-Support Installation: Provide manufacturer's standard interlocking rails that provide support and complete secondary drainage system, draining to the exterior at horizontal joints. Install rails at locations, spacings, and with fasteners recommended by manufacturer. Attach metal plate wall panels by overlapping and interlocking support rails with perimeter rails attached to panels. Apply sealant, foam sealant, and tape sealant at locations recommended by manufacturer. Leave horizontal and vertical joints with open reveal.
 - a. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 - b. Install backer plates before installing support rails.
 - c. Do not apply sealants to joints unless otherwise indicated on Drawings.
11. Rainscreen-Principle Installation: Provide manufacturer's standard pressure-equalized, rainscreen-principle system with vertical channel that provides support and complete secondary drainage system, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal plate wall panels by engaging horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.
 - a. Install metal plate wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
 - b. Do not apply sealants to joints unless otherwise indicated on Drawings.

C. Accessory Installation

1. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - a. Install components required for a complete metal plate wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - a. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - b. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (610 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with mastic sealant (concealed within joints).

D. Erection Tolerances

1. Installation Tolerances: Shim and align metal plate wall panel units within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)**, nonaccumulative, on level, plumb, and location lines as indicated and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.

E. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than **6.24 lbf/sq. ft. (300 Pa)**.
3. Water-Spray Test: After completing the installation of **75-foot- (23-m-)** by-2-story minimum area of metal plate wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by the Owner.
4. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust completed metal plate wall panel installation, including accessories.
5. Metal plate wall panels will be considered defective if they do not pass tests and inspections.
6. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
7. Prepare test and inspection reports.

F. Cleaning

1. Remove temporary protective coverings and strippable films, if any, as metal plate wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal plate wall panel installation, clean finished surfaces as recommended by panel manufacturer. Maintain in a clean condition during construction.
2. After metal plate wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
3. Replace metal plate wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 46 16 00

SECTION 07 46 16 00a - METAL WALL PANELS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for metal wall panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Exposed-fastener, lap-seam metal wall panels.
 - b. Concealed-fastener, lap-seam metal wall panels.
 - c. Metal liner panels.
 - d. Metal soffit panels.

C. Definition

1. Metal Wall Panel Assembly: Metal wall panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories necessary for a complete weathertight wall system.

D. Performance Requirements

1. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
2. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Air Infiltration: Air leakage through assembly of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** of wall area when tested according to ASTM E 283 at the following test-pressure difference:
 - a. Test-Pressure Difference: **1.57 lbf/sq. ft. (75 Pa)**.
4. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 - a. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)** which is equivalent to a **50-mph (80-km/h)** wind.
5. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than **6.24 lbf/sq. ft. (300 Pa)** (which is equivalent to a **50-mph (80-km/h)** wind) and not more than **12 lbf/sq. ft. (575 Pa)**.
 - a. Water Leakage: As defined according to AAMA 501.1.
OR
Water Leakage: Uncontrolled water infiltrating the system or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
6. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
 - a. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - 1) Uniform pressure of **20 lbf/sq. ft. (957 Pa)** **OR** **30 lbf/sq. ft. (1436 Pa)**, **as directed**, acting inward or outward.
OR
Uniform pressure as indicated on Drawings.

- b. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 **OR** 1/240, **as directed**, of the span.
- 7. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

E. Submittals

- 1. Product Data: For each type of product indicated.
- 2. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
- 3. Samples: For each type of exposed finish required.
- 4. Delegated-Design Submittal: For metal wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- 5. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items.
- 6. Product Test Reports.
- 7. Field quality-control reports.
- 8. Maintenance Data.
- 9. Warranties: Sample of special warranties.

F. Quality Assurance

- 1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- 2. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- 3. Fire-Resistance Ratings: Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- 4. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

- 1. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
- 2. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
- 3. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
- 4. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.
- 5. Protect foam-plastic insulation as follows:
 - a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - b. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - c. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Two years from date of Final Completion.
2. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - a. Finish Warranty Period:
 - 1) 20 years from date of Final Completion for fluoropolymer finish.
 - 2) 10 years from date of Final Completion for siliconized polyester.

1.2 PRODUCTS

A. Panel Materials

1. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation; structural quality.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275)**; structural quality.
 - c. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - d. Exposed Coil-Coated Finish:
 - 1) 2-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) 3-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) 4-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 621. 2-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 621. 3-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 621. 2-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized-Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.97 mm)** for topcoat.
 - e. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.

2. Aluminum Sheet: Coil-coated sheet, **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - b. Exposed Coil-Coated Finish:
 - 1) 2-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) 3-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) 4-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 620. 2-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 620. 3-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 620. 2-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized-Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.97 mm)** for topcoat.
 - c. Exposed Anodized Finish:
 - 1) Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 - 2) Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - d. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
3. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper.
 - a. Exposed Finish: Apply the following finish, as specified or indicated on Drawings.
 - 1) Natural finish.
 - 2) Brushed Satin: CDA M32-06x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below):
 - a) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 - 3) Mirror Polished: CDA M22-06x (Mechanical Finish: buffed, specular; Coating: clear organic, air drying, as specified below):
 - a) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in two coats per

- manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
- 4) Pre-patinated: ASTM B 882. Copper sheets artificially aged by chemical reaction to convert surface to inorganic crystalline structure with color range and durability of naturally-formed patina.
4. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 **OR** 316, **as directed**, fully annealed.
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3) Directional Satin Finish: No. 4.
 - c. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
 5. Panel Sealants:
 - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
 - b. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
 - c. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.
- B. Field-Installed Thermal Insulation
1. Unfaced, Polyisocyanurate Board Insulation: ASTM C 591, Type II, compressive strength of **35 psi (241 kPa)**, with maximum flame-spread index of 75 and smoke-developed index of 450.
 2. Faced, Polyisocyanurate Board Insulation: ASTM C 1289, Type I (foil facing), Class 1 or 2 **OR** Type II (asphalt felt or glass-fiber mat facing), Class 2 or 3, Grade 3, **as directed**, with maximum flame-spread index of 75 and smoke-developed index of 450, based on tests performed on unfaced core.
 3. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.60-lb/cu. ft. (26-kg/cu. m)**, with maximum flame-spread index of 75 and smoke-developed index of 450.
 4. Molded-Polystyrene Board Insulation: ASTM C 578, Type I, **0.9 lb/cu. ft. (15 kg/cu. m) OR** Type II, **1.35 lb/cu. ft. (22 kg/cu. m)**, **as directed**, with maximum flame-spread index of 75 and smoke-developed index of 450.
 5. Unfaced, Glass-Fiber Board Insulation: ASTM C 612, Type IA or Types IA and IB; with maximum flame-spread index of 25 and smoke-developed index of 50, and with a nominal density of **3 lb/cu. ft. (48 kg/cu. m)**.
 6. Mineral-Fiber-Blanket Insulation: ASTM C 665, type indicated below; consisting of fibers manufactured from glass **OR** slag or rock wool, **as directed**.
 - a. Type I (blankets without membrane covering), passing ASTM E 136 for combustion characteristics.
 - b. Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 - c. Type III (blankets with reflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 7. Metal Building Insulation: ASTM C 991, Type I; or NAIMA 202 **OR** ASTM C 991, Type II, **as directed**, glass-fiber-blanket insulation; **0.5-lb/cu. ft. (8-kg/cu. m)** density; **2-inch- (50-mm-)** wide, continuous, vapor-tight edge tabs; and with a flame-spread index of 25 or less.
 - a. Vapor-Retarder Facing: ASTM C 1136, with permeance not greater than **0.02 perm (1.15 ng/Pa x s x sq. m)** when tested according to ASTM E 96, Desiccant Method:
 - 1) Composition: Polypropylene faced, scrim reinforced, and kraft-paper backing **OR** Foil faced, scrim reinforced, and kraft-paper backing with vapor-retarder coating **OR** Polypropylene faced, scrim reinforced, and foil backing **OR** Vinyl faced, scrim reinforced, and foil backing **OR** Vinyl faced, scrim reinforced, and polyester backing, **as directed**.

- b. Insulation Retainer Strips: **0.019-inch- (0.48-mm-)** thick, formed galvanized steel or PVC retainer clips colored to match insulation facing.

C. Miscellaneous Metal Framing

1. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, **G40 (Z120)** hot-dip galvanized **OR** ASTM A 653/A 653M, **G60 (Z180)** hot-dip galvanized, **as directed**, or coating with equivalent corrosion resistance unless otherwise indicated.
2. Subgirts: Manufacturer's standard C- or Z-shaped sections, **0.064-inch (1.63-mm)** nominal thickness.
3. Zee Clips: **0.079-inch (2.01-mm)** nominal thickness.
4. Base or Sill Angles **OR** Channels, **as directed**: **0.079-inch (2.01-mm)** nominal thickness.
5. Hat-Shaped, Rigid Furring Channels:
 - a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.025 inch (0.64 mm) OR 0.040 inch (1.02 mm), as directed.**
 - b. Depth: As indicated **OR** **7/8 inch (22 mm) OR 1-1/2 inches (38 mm), as directed.**
6. Cold-Rolled Furring Channels: Minimum **1/2-inch- (13-mm-)** wide flange.
 - a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.064 inch (1.63 mm), as directed.**
 - b. Depth: As indicated **OR** **3/4 inch (19 mm), as directed.**
 - c. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with **0.040-inch (1.02-mm)** nominal thickness.
 - d. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.57-mm-)** diameter wire, or double strand of **0.048-inch- (1.22-mm-)** diameter wire.
7. Z-Shaped Furring: With slotted or nonslotted web, face flange of **1-1/4 inches (32 mm)**, wall attachment flange of **7/8 inch (22 mm)**, and depth required to fit insulation thickness indicated.
 - a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.025 inch (0.64 mm), as directed.**
8. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

D. Miscellaneous Materials

1. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.

E. Exposed-Fastener, Lap-Seam Metal Wall Panels

1. General: Provide factory-formed metal wall panels designed to be field assembled by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps. Include accessories required for weathertight installation.
2. Corrugated-Profile, Exposed-Fastener Metal Wall Panels: Formed with alternating curved ribs spaced at **2.67 inches (68 mm)** o.c. across width of panel.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed.**
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed.**
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.

- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
- 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- d. Panel Coverage: **21.3 inches (541 mm) OR 29.3 inches (744 mm) OR 34.6 inches (881 mm) OR 37.3 inches (947 mm) OR 42.6 inches (1084 mm) OR 45.3 inches (1151 mm)**, **as directed**.
- e. Panel Height: **0.5 inch (13 mm) OR 0.875 inch (22 mm)**, **as directed**.
3. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between major ribs.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Major-Rib Spacing: **6 inches (152 mm) OR 8 inches (203 mm) OR 9 inches (229 mm) OR 12 inches (305 mm)**, **as directed**, o.c.
 - e. Panel Coverage: **24 inches (610 mm) OR 36 inches (914 mm)**, **as directed**.
 - f. Panel Height: **0.625 inch (16 mm) OR 0.75 inch (19 mm) OR 1.0 inch (25 mm) OR 1.25 inches (32 mm) OR 1.5 inches (38 mm)**, **as directed**.
4. Reverse-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with recessed, trapezoidal major valleys and intermediate stiffening valleys symmetrically spaced **OR** flat pan, **as directed**, between major valleys.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.

- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
- 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- c. Major-Rib Spacing: **12 inches (305 mm)** o.c.
- d. Panel Coverage: **36 inches (914 mm)**.
- e. Panel Height: **1.25 inches (32 mm)**.
5. Vee-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, V-shaped ribs and recesses that are approximately same size, evenly spaced across panel width, and with rib/recess sides angled at approximately 45 degrees.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)** **OR** **0.064-inch (1.63-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)** **OR** **0.064-inch (1.63-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.02 mm)** **OR** **0.050 inch (1.27 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Rib Spacing: **5.3 inches (135 mm)** **OR** **7.2 inches (183 mm)** **OR** **12 inches (305 mm)**, **as directed**, o.c.
 - e. Panel Coverage: **30 inches (762 mm)** **OR** **32 inches (813 mm)** **OR** **36 inches (914 mm)** **OR** **40 inches (1016 mm)**, **as directed**.
 - f. Panel Height: **1.375 inches (35 mm)** **OR** **1.5 inches (38 mm)** **OR** **1.75 inches (44 mm)** **OR** **2.0 inches (51 mm)** **OR** **3.0 inches (76 mm)**, **as directed**.
6. Box-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, box-shaped ribs, evenly spaced across panel width, and with rib/recess sides angled 60 degrees or more.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.

- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
- 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- b. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- d. Rib Spacing: **2.67 inches (68 mm) OR 4.0 inches (102 mm) OR 5.3 inches (135 mm) OR 6.0 inches (152 mm)**, **as directed**, o.c.
- e. Panel Coverage: **24 inches (610 mm) OR 28 inches (711 mm) OR 30 inches (762 mm) OR 32 inches (813 mm) OR 36 inches (914 mm)**, **as directed**.
- f. Panel Height: **0.625 inch (16 mm) OR 1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 2.0 inches (51 mm)**, **as directed**.
7. Deep-Box-Rib-Profile, Exposed-Fastener Metal Wall Panels: Formed with raised, box-shaped ribs, evenly spaced across panel width, and with rib/recess sides angled more than 60 degrees.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm) OR 0.064-inch (1.63-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm) OR 0.064-inch (1.63-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Rib Spacing: **12 inches (305 mm)** o.c.
 - e. Panel Coverage: **24 inches (610 mm)**.
 - f. Panel Height: **3.0 inches (76 mm) OR 4.0 inches (102 mm)**, **as directed**.

- F. Concealed-Fastener, Lap-Seam Metal Wall Panels
1. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
 2. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges; with flush joint between panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Panel Coverage: **12 inches (305 mm)**, **as directed**.
 - e. Panel Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm)**, **as directed**.
 3. Reveal-Joint, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges; with narrow reveal joint between panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE

- fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
- 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Panel Coverage: **12 inches (305 mm)**.
 - e. Panel Height: **1.0 inch (25 mm) OR 1.5 inches (38 mm)**, **as directed**.
4. Wide-Reveal-Joint, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and stepped profile between panel edges resulting in wide reveal joint between panels.
- a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Panel Coverage: **12 inches (305 mm)**.
 - e. Panel Height: **1.5 inches (38 mm)**.
5. V-Groove-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges.
- a. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Panel Coverage: **6 inches (152 mm) OR 8 inches (203 mm) OR 12 inches (305 mm)**, **as directed**.
 - d. Panel Height: **0.625 inch (16 mm) OR 1.25 inches (32 mm)**, **as directed**.
6. Tapered-Rib-Profile, Concealed-Fastener Metal Wall Panels: Formed with raised, trapezoidal major ribs and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between major ribs.

- a. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As indicated by manufacturer's designations OR Match samples OR As selected from manufacturer's full range, as directed.
- b. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch (0.71-mm) nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As indicated by manufacturer's designations OR Match samples OR As selected from manufacturer's full range, as directed.
- c. Panel Coverage: 12 inches (305 mm) OR 14 inches (356 mm), as directed.
- d. Panel Height: 1.0 inch (25 mm) OR 1.5 inches (38 mm), as directed.
- 7. Curved-Rib-Profile, Concealed-Fastener Metal Wall Panels: Formed with raised, curved-side major ribs and flat pan between major ribs; with reveal joint between panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As indicated by manufacturer's designations OR Match samples OR As selected from manufacturer's full range, as directed.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As indicated by manufacturer's designations OR Match samples OR As selected from manufacturer's full range, as directed.
 - c. Material: Aluminum sheet, 0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm), as directed, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol OR Clear anodized OR Color anodized, as directed.
 - 2) Color: As indicated by manufacturer's designations OR Match samples OR As selected from manufacturer's full range, as directed.
 - d. Panel Coverage: 12 inches (305 mm).
 - e. Panel Height: 0.875 inch (22 mm) OR 1.5 inches (38 mm), as directed.
- 8. Creased-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and center-creased pan between panel edges; with flush joint between panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer OR 3-coat fluoropolymer OR 4-coat fluoropolymer OR Mica fluoropolymer OR Metallic fluoropolymer OR FEVE fluoropolymer OR Siliconized polyester OR Plastisol, as directed.
 - 2) Color: As indicated by manufacturer's designations OR Match samples OR As selected from manufacturer's full range, as directed.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm), as directed, nominal thickness.

- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
- 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- c. Material: Aluminum sheet, 0.032 inch (0.81 mm) **OR** 0.040 inch (1.02 mm), **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- d. Panel Coverage: 12 inches (305 mm).
- e. Panel Height: 1.5 inches (38 mm).
9. Creased-Rib-Profile, Concealed-Fastener Metal Wall Panels: Formed with raised, center-creased, trapezoidal major ribs; with reveal joint between panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch (0.71-mm) **OR** 0.034-inch (0.86-mm) **OR** 0.040-inch (1.02-mm) **OR** 0.052-inch (1.32-mm), **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, 0.028-inch (0.71-mm) **OR** 0.034-inch (0.86-mm) **OR** 0.040-inch (1.02-mm) **OR** 0.052-inch (1.32-mm), **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, 0.032 inch (0.81 mm) **OR** 0.040 inch (1.02 mm), **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Panel Coverage: 12 inches (305 mm).
 - e. Panel Height: 0.875 inch (22 mm) **OR** 1.5 inches (38 mm), **as directed**.
- G. Metal Liner Panels
 1. General: Provide factory-formed metal liner panels designed for interior side of metal wall panel assemblies and field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for a complete installation.
 2. Flush-Profile Metal Liner Panels: Solid **OR** Perforated, **as directed**, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges; with flush joint between panels.
 - a. Material: Zinc-coated (galvanized) steel sheet, 0.028-inch (0.71-mm) **OR** 0.034-inch (0.86-mm) **OR** 0.040-inch (1.02-mm) **OR** 0.052-inch (1.32-mm), **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.

- 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum sheet, **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.02 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Panel Coverage: **12 inches (305 mm)** **OR** **16 inches (406 mm)** **OR** **24 inches (610 mm)** **OR** **36 inches (914 mm)**, **as directed**.
 - e. Panel Height: **1.5 inches (38 mm)** **OR** **2.0 inches (51 mm)** **OR** **3.0 inches (76 mm)**, **as directed**.
 - f. Acoustical Performance: Where sound-absorption requirement is indicated, fabricate interior liner panels with **1/8-inch- (3-mm-)** diameter holes uniformly spaced approximately **1000 holes/sq. ft. (10 750 holes/sq. m)**.
 - 1) NRC of not less than **0.65** **OR** **0.85** **OR** **1.00**, **as directed**, when tested according to ASTM C 423.
- H. Metal Soffit Panels
1. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
 2. Metal Soffit Panels: Match profile and material of metal wall panels.
 - a. Finish: Match finish and color of metal wall panels **OR** As indicated on Drawings, **as directed**.
 - b. Sealant: Factory applied within interlocking joint.
 3. Flush-Profile Metal Soffit Panels: Solid **OR** Perforated, **as directed**, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges; with flush joint between panels.
 - a. Material: Same material, finish, and color as metal wall panels.
 - b. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.

- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
- 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- d. Material: Aluminum sheet, **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.02 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
- e. Material: Copper sheet, **16-oz./sq. ft. weight (0.55-mm thickness)** **OR** **20-oz./sq. ft. weight (0.68-mm thickness)**, **as directed**.
 - 1) Exterior Finish: Brushed satin (lacquered) **OR** Mirror polished, **as directed**.
- f. Panel Coverage: **8 inches (203 mm)** **OR** **12 inches (305 mm)** **OR** **16 inches (406 mm)** **OR** **20 inches (508 mm)**, **as directed**.
- g. Panel Height: **0.875 inch (22 mm)** **OR** **1.0 inch (25 mm)** **OR** **1.5 inches (38 mm)** **OR** **3.0 inches (76 mm)**, **as directed**.
- h. Sealant: Factory applied within interlocking joint.
4. Reveal-Joint-Profile Metal Soffit Panels: Solid **OR** Perforated, **as directed**, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges; with recessed reveal joint between panels.
 - a. Material: Same material, finish, and color as metal wall panels.
 - b. Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm)** **OR** **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - c. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed**.
 - 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - d. Material: Aluminum sheet, **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.02 mm)**, **as directed**, thick.
 - 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - e. Panel Coverage: **8 inches (203 mm)** **OR** **12 inches (305 mm)** **OR** **16 inches (406 mm)** **OR** **20 inches (508 mm)**, **as directed**.

- f. Panel Height: **0.75 inch (19 mm) OR 1.0 inch (25 mm) OR 1.5 inches (38 mm), as directed.**
5. V-Groove-Profile Metal Soffit Panels: Solid **OR** Perforated, **as directed**, panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced **OR** flat pan, **as directed**, between panel edges; with V-groove joint between panels.
- a. Material: Same material, finish, and color as metal wall panels.
- b. Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed.**
- 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed.**
- c. Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, **as directed.**
- 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed.**
- d. Material: Aluminum sheet, **0.024 inch (0.65 mm) OR 0.032 inch (0.81 mm), as directed**, thick.
- 1) Exterior Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**
- 2) Color: Match finish and color of metal wall panels **OR** As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed.**
- e. Panel Coverage: **6 inches (152 mm) OR 12 inches (305 mm) OR 14 inches (356 mm), as directed.**
- f. Panel Height: **0.375 inch (10 mm) OR 0.44 inch (11 mm) OR 0.50 inch (13 mm) OR 0.625 inch (16 mm), as directed.**
- I. Accessories
1. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
- a. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
- b. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- c. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum **1-inch- (25-mm-)** thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
2. Flashing and Trim: Formed from **0.018-inch (0.46-mm)** minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

J. Fabrication

1. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
2. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
3. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
4. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
5. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - b. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - c. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - d. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - e. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - f. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - 1) Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

K. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Preparation

1. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.
 - a. Soffit Framing: Wire-tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

B. Thermal Insulation Installation

1. Board Insulation: Extend insulation in thickness indicated to cover entire wall. Comply with installation requirements in Division 07 Section "Thermal Insulation".

- a. Erect insulation horizontally and hold in place with Z-shaped furring members spaced **24 inches (610 mm)** o.c. Attach furring members to substrate with screws spaced **24 inches (610 mm)** o.c.
- b. Retain insulation in place by metal clips and straps or integral pockets within panels, spaced at intervals according to insulation manufacturer's instructions. Maintain cavity width between insulation and metal liner panel of dimension indicated.
2. Blanket Insulation: Install insulation concurrently with metal wall panel installation, in thickness indicated to cover entire wall, according to manufacturer's written instructions and as follows:
 - a. Set vapor-retarder-faced insulation with vapor-retarder facing building exterior **OR** building interior **OR** as indicated on Drawings, **as directed**. Do not obstruct ventilation spaces, except for firestopping.
 - b. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
 - c. Install insulation straight and true in one-piece lengths. Comply with the following installation method:
 - 1) Over-Framing Installation: Extend insulation over and perpendicular to top flange of framing members.
 - d. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with framing to hold insulation in place.

C. Metal Wall Panel Installation

1. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - a. Commence metal wall panel installation and install minimum of **300 sq. ft. (27.8 sq. m.)** in presence of factory-authorized representative.
 - b. Shim or otherwise plumb substrates receiving metal wall panels.
 - c. Flash and seal metal wall panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
 - d. Install screw fasteners in predrilled holes.
 - e. Locate and space fastenings in uniform vertical and horizontal alignment.
 - f. Install flashing and trim as metal wall panel work proceeds.
 - g. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - h. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
 - i. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - j. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
2. Fasteners:
 - a. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
 - b. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized steel fasteners for surfaces exposed to the interior.
 - c. Copper Wall Panels: Use copper, stainless-steel or hardware-bronze fasteners.
 - d. Stainless-Steel Wall Panels: Use stainless-steel fasteners.
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.
4. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

- a. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
- b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
5. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - a. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - b. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
 - c. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - d. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 - e. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
 - f. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps; on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weathertight.
 - g. At panel splices, nest panels with minimum **6-inch (152-mm)** end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
6. Zee Clips: Provide Zee clips of size indicated or, if not indicated, as required to act as standoff from subgirts for thickness of insulation indicated. Attach to subgirts with fasteners.
7. Metal Liner Panels: Install panels on exterior side of girts with girts exposed to the interior **OR** interior side of girts with flush appearance on the inside **OR** girts as indicated on Drawings, **as directed**.
8. Fire-Rated Metal Wall Panel Assemblies: Install metal liner panels on exterior side of girts, fastening through faces of panels, with girts exposed to the interior. Install subgirts horizontally, fastened to legs of metal liner panels. Install substrate board as indicated in Division 06 Section "Sheathing", in number of layers required for fire rating, over subgirts, attached with board fasteners. Install second set of subgirts horizontally, fastened through substrate board into first set of subgirts. Install exterior metal wall panels, fastened to second set of subgirts.
 - a. Comply with UL **OR** FMG, **as directed**, requirements for fire-rated construction.
- D. Metal Soffit Panel Installation
 1. In addition to complying with requirements of "Metal Wall Panel Installation, General" Article, install metal soffit panels to comply with the requirements of this article.
 2. Metal Soffit Panels: Provide metal soffit panels full width of soffits. Install panels perpendicular to support framing.
 - a. Flash and seal panels with weather closures where metal soffit panels meet walls and at perimeter of all openings.
- E. Accessory Installation
 1. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - a. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 2. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - a. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form

hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.

- b. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (605 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with mastic sealant (concealed within joints).

F. Field Quality Control

1. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports, **as directed by the Owner**.
2. Water Penetration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than **6.24 lbf/sq. ft. (300 Pa)**.
3. Water-Spray Test: After completing the installation of **75-foot- (23-m-)** by-2-story minimum area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by the Owner.
4. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.
5. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
6. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

G. Cleaning And Protection

1. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
2. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
3. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 46 16 00a

Task	Specification	Specification Description
07 46 16 00	07 41 13 00	Metal Roof Panels
07 46 16 00	07 42 93 00	Siding
07 46 19 00	07 41 13 00	Metal Roof Panels
07 46 19 00	07 46 16 00	Metal Plate Wall Panels
07 46 19 00	07 42 93 00	Siding
07 46 19 00	07 46 16 00a	Metal Wall Panels
07 46 23 00	06 10 00 00	Rough Carpentry
07 46 23 00	06 10 00 00a	Miscellaneous Carpentry
07 46 23 00	01 95 99 92e	Sheathing
07 46 29 00	06 10 00 00	Rough Carpentry
07 46 29 00	06 10 00 00a	Miscellaneous Carpentry
07 46 29 00	01 95 99 92e	Sheathing
07 46 33 00	07 42 93 00	Siding
07 46 46 00	01 22 16 00	No Specification Required
07 46 46 00	01 95 99 92f	Exterior Architectural Woodwork
07 46 46 00	01 95 06 00b	Interior Architectural Woodwork
07 46 46 00	07 42 93 00	Siding

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SECTION 07 46 63 00 - INSULATED-CORE METAL WALL PANELS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for insulated-core metal wall panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Foamed-insulation-core metal wall panels.
 - b. Laminated-insulation-core metal wall panels.
 - c. Honeycomb-core metal wall panels.

C. Definitions

1. Metal Wall Panel Assembly: Insulated-core metal wall panels, attachment system components, miscellaneous metal framing, and accessories necessary for a complete weathertight wall system.

D. Performance Requirements

1. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
2. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Air Infiltration: Air leakage through assembly of not more than **0.06 cfm/sq. ft. (0.3 L/s per sq. m)** of wall area when tested according to ASTM E 283 at the following test-pressure difference:
 - a. Test-Pressure Difference: **1.57 lbf/sq. ft. (75 Pa)** which is equivalent to a 25-mph (40-km/h) wind.
4. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
 - a. Test-Pressure Difference: **6.24 lbf/sq. ft. (300 Pa)** which is equivalent to a 50-mph (80-km/h) wind.
5. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than **6.24 lbf/sq. ft. (299 Pa)** and not more than **12 lbf/sq. ft. (575 Pa)**.
 - a. Water Leakage: As defined according to AAMA 501.1.
OR
Water Leakage: Uncontrolled water infiltrating the system or appearing on system's normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.
6. Structural Performance: Metal wall panel assemblies shall withstand the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 330:
 - a. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - 1) Uniform pressure of **20 lbf/sq. ft. (958 Pa) OR 30 lbf/sq. ft. (1436 Pa), as directed**, acting inward or outward.
OR
Uniform pressure as indicated on Drawings.

- b. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/180 **OR** 1/240, **as directed**, of the span.
 - 7. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
 - 8. Thermal Performance: Provide insulated metal wall panel assemblies with thermal-resistance value (R-value) indicated when tested according to ASTM C 518.
- E. Submittals
- 1. Product Data: For each type of product indicated.
 - 2. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop-, and field-assembled work.
 - 3. Samples: For each type of exposed finish required.
 - 4. Delegated-Design Submittal: For metal wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 5. Coordination Drawings: Exterior elevations, drawn to scale, and coordinating penetrations and wall-mounted items.
 - 6. Product Test Reports.
 - 7. Field quality-control reports.
 - 8. Maintenance Data.
 - 9. Warranties: Sample of special warranties.
- F. Quality Assurance
- 1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - 2. Fire-Test-Response Characteristics: Provide metal wall panels and system components with the following fire-test-response characteristics as determined by testing identical panels and system components per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - a. Fire-Resistance Characteristics: Provide materials and construction tested for fire resistance per ASTM E 119.
 - b. Intermediate-Scale Multistory Fire Test: Tested mockup, representative of completed multistory wall assembly of which wall panel is a part, complies with NFPA 285 for test method and required fire-test-response characteristics of exterior non-load-bearing wall panel assemblies.
 - c. Radiant Heat Exposure: No ignition when tested according to NFPA 268.
 - d. Potential Heat: Acceptable level when tested according to NFPA 259.
 - e. Surface-Burning Characteristics: Provide wall panels with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84.
 - 3. Preinstallation Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
- 1. Deliver components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed. Package metal wall panels for protection during transportation and handling.
 - 2. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.
 - 3. Stack metal wall panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal wall panels to ensure dryness, with positive slope for

- drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage.
4. Retain strippable protective covering on metal wall panels for period of metal wall panel installation.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Two years from date of Final Completion.
2. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - a. Finish Warranty Period:
 - 1) 20 years from date of Final Completion for fluoropolymer finish.
 - 2) 10 years from date of Final Completion for siliconized polyester.

1.2 PRODUCTS

A. Panel Materials

1. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation; structural quality.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275)**; structural quality.
 - c. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - d. Exposed Coil-Coated Finish:
 - 1) Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) Four-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 621. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 621. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- 7) Siliconized-Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
- 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.097 mm)** for topcoat.
- e. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
2. Aluminum Sheet: Coil-coated sheet, **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - b. Exposed Coil-Coated Finishes:
 - 1) Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2) Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3) Four-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat and clear coats. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 4) Mica Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish with suspended mica flakes containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 5) Metallic Fluoropolymer: AAMA 620. Three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 6) FEVE Fluoropolymer: AAMA 620. Two-coat fluoropolymer finish containing 100 percent fluorinated ethylene vinyl ether resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 7) Siliconized-Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
 - 8) Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than **0.2 mil (0.005 mm)** for primer and **3.8 mil (0.097 mm)** for topcoat.
 - c. Exposed Anodized Finish:
 - 1) Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 - 2) Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - d. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
3. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 temper.
 - a. Exposed Finish: Apply the following finish, as specified or indicated on Drawings.
 - 1) Natural finish.

- 2) Brushed Satin: CDA M32-06x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic, air drying, as specified below):
 - a) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 - 3) Mirror Polished: CDA M22-06x (Mechanical Finish: buffed, specular; Coating: clear organic, air drying, as specified below):
 - a) Clear, Organic Coating: Clear, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 - 4) Pre-patinated: ASTM B 882. Copper sheets artificially aged by chemical reaction to convert surface to inorganic crystalline structure with color range and durability of naturally-formed patina.
 4. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304 **OR** 316, **as directed**, fully annealed.
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finish: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3) Directional Satin Finish: No. 4.
 - c. Bright, Cold-Rolled, Unpolished Finish: No. 2B.
 5. Panel Sealants:
 - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
 - b. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
 - c. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.
- B. Insulation For Panel Cores
1. Polyisocyanurate Insulation: Closed cell, modified polyisocyanurate foam using a non-CFC blowing agent, foamed-in-place **OR** board, **as directed**, type, with maximum flame-spread index of 25 and smoke-developed index of 450.
 - a. Closed-Cell Content: 90 percent when tested according to ASTM D 2856.
 2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.60-lb/cu. ft. (26-kg/cu. m)** minimum density, unless otherwise indicated; with maximum flame-spread index of 25 and smoke-developed index of 450.
 3. Molded-Polystyrene Board Insulation: ASTM C 578, Type I, **0.9 lb/cu. ft. (14 kg/cu. m)** **OR** Type II, **1.35 lb/cu. ft. (22 kg/cu. m)**, Class 2 or 3, Grade 3, **as directed**, with maximum flame-spread index of 25 and smoke-developed index of 450.
- C. Miscellaneous Metal Framing
1. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, **G40 (Z120)** hot-dip galvanized **OR** ASTM A 653/A 653M, **G60 (Z180)** hot-dip galvanized, **as directed**, or coating with equivalent corrosion resistance unless otherwise indicated.
 2. Subgirts: Manufacturer's standard C- or Z-shaped sections, **0.064-inch (1.63-mm)** nominal thickness.
 3. Zee Clips: **0.079-inch (2.01-mm)** nominal thickness.
 4. Base or Sill Angles **OR** Channels, **as directed**: **0.079-inch (2.01-mm)** nominal thickness.
 5. Hat-Shaped, Rigid Furring Channels:

- a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.025 inch (0.64 mm) OR 0.040 inch (1.02 mm), as directed.**
 - b. Depth: As indicated **OR** **7/8 inch (21 mm) OR 1-1/2 inches (38 mm), as directed.**
 6. Cold-Rolled Furring Channels: Minimum **1/2-inch- (13-mm-)** wide flange.
 - a. Nominal Thickness: As indicated **OR** As required to meet performance requirements **OR** **0.064 inch (1.63 mm), as directed.**
 - b. Depth: As indicated **OR** **3/4 inch (19 mm), as directed.**
 - c. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with **0.040-inch (1.02-mm)** nominal thickness.
 7. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.062-inch- (1.52-mm-)** diameter wire, or double strand of **0.048-inch- (1.22-mm-)** diameter wire.
 8. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.
- D. Miscellaneous Materials
1. Panel Fasteners: Self-tapping screws; bolts and nuts; self-locking rivets and bolts; end-welded studs; and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating. Provide EPDM, PVC, or neoprene sealing washers.
 2. Backer Board: Hardboard complying with AHA A135.4, Class 1 tempered, **1/8 inch (3 mm) OR 1/4 inch (6 mm), as directed**, thick unless otherwise indicated.
- E. Foamed-Insulation-Core Metal Wall Panels
1. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
 - a. Panel Performance:
 - 1) Flatwise Tensile Strength: **30 psi (207 kPa)** when tested according to ASTM C 297.
 - 2) Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for 7 days at **140 deg F (60 deg C)** and 100 percent relative humidity according to ASTM D 2126.
 - 3) Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at **200 deg F (93 deg C)** according to ASTM D 2126.
 - 4) Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at minus **20 deg F (29 deg C)** according to ASTM D 2126.
 - 5) Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a **20-lbf/sq. ft. (958-kPa)** positive and negative wind load and with deflection of L/180 for 2 million cycles.
 - 6) Autoclave: No delamination when exposed to **2-psi (13.8-kPa)** pressure at a temperature of **212 deg F (100 deg C)** for 2-1/2 hours.
 - b. Polyisocyanurate Insulation-Core Performance:
 - 1) Density: **2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m)** when tested according to ASTM D 1622.
 - 2) Compressive Strength: Minimum **20 psi (138 kPa)** when tested according to ASTM D 1621.
 - 3) Shear Strength: **26 psi (179 kPa)** when tested according to ASTM C 273.
 2. Exposed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with raised, trapezoidal major rib at panel edge and two intermediate stiffening ribs symmetrically spaced between major rib and panel edge; designed for lapping side edges of adjacent panels and mechanically attaching to supports using exposed fasteners in side laps.
 - a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.

- 1) Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 3) Backer Board: On back side of exterior facing.
 - 4) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, as directed.
 - 5) Interior Facing Finish: Manufacturer's standard white polyester.
 - b. Snap-On Batten: Same material, finish, and color as exterior facings of wall panels.
 - c. Panel Coverage: **36 inches (914 mm) OR 40 inches (1016 mm)**, as directed, nominal.
 - d. Panel Thickness: **1.0 inch (25 mm) OR 1.5 inches (38 mm) OR 2.0 inches (51 mm) OR 2.5 inches (64 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm)**, as directed.
 - e. Thermal-Resistance Value (R-Value): as directed by the Owner.
3. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
- a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, as directed, nominal thickness.
 - 3) Material: Stainless-steel sheet, **0.031 inch (0.79 mm) OR 0.038 inch (0.97 mm)**, as directed, thick with No. 4 **OR** 2B, as directed, finish.
 - 4) Backer Board: On back side of exterior facing.
 - 5) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol, as directed.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, as directed.
 - 6) Interior Facing Finish: Manufacturer's standard siliconized polyester.
 - 7) Exterior Surface: Smooth, flat **OR** Striated **OR** Shallow ribs **OR** Shallow V grooves, as directed.
 - b. Panel Coverage: **24 inches (610 mm) OR 30 inches (762 mm) OR 36 inches (914 mm) OR 39.37 inches (1000 mm) OR 42 inches (1067 mm)**, as directed, nominal.
 - c. Panel Thickness: **2.0 inches (51 mm) OR 2.5 inches (64 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm)**, as directed.
 - d. Thermal-Resistance Value (R-Value): as directed by the Owner.
- F. Laminated-Insulation-Core Metal Wall Panels
1. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and core material laminated or otherwise securely bonded to facing sheets during fabrication without use of contact adhesives, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
 - a. Panel Performance:
 - 1) Flatwise Tensile Strength: **27 psi (186 kPa)** when tested according to ASTM C 297.
 - 2) Humid Aging: Volume increase not greater than 6.0 percent and no delamination or metal corrosion when tested for 7 days at **140 deg F (60 deg C)** and 100 percent relative humidity according to ASTM D 2126.
 - 3) Heat Aging: Volume increase not greater than 2.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at **200 deg F (93 deg C)** according to ASTM D 2126.

- 4) Cold Aging: Volume decrease not more than 1.0 percent and no delamination, surface blistering, or permanent bowing when tested for 7 days at minus **20 deg F (29 deg C)** according to ASTM D 2126.
- 5) Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a **20-lbf/sq. ft. (958-kPa)** positive and negative wind load and with deflection of L/180 for 2 million cycles.
- 6) Autoclave: No delamination when exposed to **2-psi (13.8-kPa)** pressure at a temperature of **212 deg F (100 deg C)** for 2-1/2 hours.
- b. Polyisocyanurate Insulation-Core Performance:
 - 1) Density: **1.8 to 2.3 lb/cu. ft. (29 to 37 kg/cu. m)** when tested according to ASTM D 1622.
 - 2) Compressive Strength: Minimum **20 psi (138 kPa)** when tested according to ASTM D 1621.
 - 3) Shear Strength: **24 psi (164 kPa)** when tested according to ASTM C 273.
2. Wrapped-Edge, Laminated-Insulation-Core Metal Wall Panels: Formed with flush exterior panel facing wrapped over panel edges; designed for independent installation by mechanically attaching panels to supports using staggered, concealed side clips engaging panel edges **OR** through extended panel edges to supports using concealed fasteners, **as directed**; with sealant **OR** gasketed, **as directed**, joints.
 - a. Exterior Facing:
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm) OR 0.063 inch (1.60 mm) OR 0.080 inch (2.03 mm)**, **as directed**, thick.
 - 4) Surface: Smooth, flat **OR** Embossed, **as directed**.
 - 5) Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Interior Facing:
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm)**, **as directed**, thick.
 - 4) Finish: Manufacturer's standard primer or white polyester.
 - c. Core Material: Polyisocyanurate **OR** Extruded-polystyrene **OR** Expanded-polystyrene, **as directed**, board insulation.
 - 1) Backer Board: **0.125-inch- (3-mm-) OR 0.250-inch- (6-mm-)**, **as directed**, thick hardboard behind exterior facing for increased impact resistance.
 - d. Clips: Manufacturer's standard one piece, formed from zinc-coated (galvanized) steel **OR** aluminum-zinc alloy-coated steel **OR** stainless steel, **as directed**.
 - e. Gaskets: Extruded, dry seal silicone.
 - f. Sealant: Manufacturer's standard silicone.
 - g. Panel Thickness: **1.0 inch (25 mm) OR 2.0 inches (51 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm)**, **as directed**.
 - h. Thermal-Resistance Value (R-Value): as directed by the Owner.

3. Shiplap-Edge, Laminated-Insulation-Core Metal Wall Panels: Formed with flush exterior panel facing and with shiplap edges; designed for sequential installation by mechanically attaching panels to supports using concealed clips and fasteners; with factory-applied sealant **OR** gaskets, **as directed**, in side laps.
 - a. Exterior Facing:
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm) OR 0.063 inch (1.60 mm)**, **as directed**, thick.
 - 4) Surface: Smooth, flat **OR** Embossed, **as directed**.
 - 5) Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - b. Interior Facing:
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm)**, **as directed**, thick.
 - 4) Finish: Manufacturer's standard primer or white polyester.
 - c. Core Material: Polyisocyanurate **OR** Extruded-polystyrene **OR** Expanded-polystyrene, **as directed**, board insulation.
 - 1) Backer Board: **0.125-inch- (3-mm-) OR 0.250-inch- (6-mm-)**, **as directed**, thick hardboard behind exterior facing for increased impact resistance.
 - d. Clips: Manufacturer's standard one piece, formed from zinc-coated (galvanized) steel **OR** aluminum-zinc alloy-coated steel **OR** stainless steel, **as directed**.
 - e. Gaskets: Extruded, dry seal silicone.
 - f. Sealant: Manufacturer's standard silicone.
 - g. Panel Thickness: **1.0 inch (25 mm) OR 2.0 inches (51 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm)**, **as directed**.
 - h. Thermal-Resistance Value (R-Value): as directed by the Owner.
4. Framed-Edge, Laminated-Insulation-Core Metal Wall Panels: Formed with flush exterior panel facing and integral, extruded edge members; designed for independent installation by mechanically attaching panels to supports through edge framing using concealed fasteners; with gasketed joints.
 - a. Exterior Facing:
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71 mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm)**, **as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm) OR 0.063 inch (1.60 mm) OR 0.080 inch (2.03 mm)**, **as directed**, thick.
 - 4) Surface: Smooth, flat **OR** Embossed, **as directed**.
 - 5) Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.

- b. Interior Facing:
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 - 4) Finish: Manufacturer's standard primer or white polyester.
 - c. Core Material: Polyisocyanurate **OR** Extruded-polystyrene **OR** Expanded-polystyrene, **as directed**, board insulation.
 - 1) Backer Board: **0.125-inch- (3.18-mm-) OR 0.250-inch- (6-mm-), as directed**, thick hardboard behind exterior facing for increased impact resistance.
 - d. Edge Members: Extruded aluminum, not less than **0.063-inch (1.60-mm)** wall thickness.
 - e. Gaskets: Extruded, dry seal silicone.
 - f. Panel Thickness: **1.0 inch (25 mm) OR 2.0 inches (51 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm) OR 5.0 inches (127 mm) OR 6.0 inches (152 mm), as directed.**
 - g. Thermal-Resistance Value (R-Value): as directed by the Owner.
- G. Honeycomb-Core Metal Wall Panels
- 1. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and honeycomb-core material laminated or otherwise securely bonded to facing sheets during fabrication without use of contact adhesives or pinch rollers, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.
 - a. Panel Performance:
 - 1) Fatigue: No evidence of delamination, core cracking, or permanent bowing when tested to a **20-lbf/sq. ft. (958-kPa)** positive and negative wind load and with deflection of L/180 for 2 million cycles.
 - 2) Autoclave: No delamination when exposed to **2-psi (13.8-kPa)** pressure at a temperature of **212 deg F (100 deg C)** for 2-1/2 hours.
 - 2. Wrapped-Edge, Honeycomb-Core Metal Wall Panels: Formed with flush exterior panel facing wrapped over panel edges; designed for independent installation by mechanically attaching panels to supports using staggered, concealed side clips engaging panel edges **OR** through extended panel edges to supports using concealed fasteners, **as directed**; with sealant **OR** gasketed, **as directed**, joints.
 - a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm) OR 0.063 inch (1.60 mm), as directed**, thick.
 - 4) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - 5) Interior Facing Finish: Manufacturer's standard primer or polyester.
 - b. Kraft-Paper Honeycomb Core: Manufacturer's standard phenolic-resin impregnated paper, with not less than 15 percent resin content by weight and chemically treated for fire resistance; with maximum **1/2-inch (13-mm)** cell size.
 - c. Aluminum Honeycomb Core: Manufacturer's standard **0.003-inch- (0.08-mm-)** thick, commercial grade aluminum with maximum **3/4-inch (19-mm)** cell size.

- d. Clips: Manufacturer's standard one piece, formed from zinc-coated (galvanized) steel **OR** aluminum-zinc alloy-coated steel **OR** stainless steel, **as directed**.
 - e. Gaskets: Extruded, dry seal silicone.
 - f. Sealant: Manufacturer's standard silicone.
 - g. Panel Thickness: **0.25 inch (6 mm) OR 1.0 inch (25 mm) OR 2.0 inches (51 mm) OR 3.0 inches (76 mm) OR 4.0 inches (102 mm), as directed.**
3. Shiplap-Edge, Honeycomb-Core Metal Wall Panels: Formed with flush exterior panel facing and with shiplap edges; designed for sequential installation by mechanically attaching panels to supports using concealed clips and fasteners; with factory-applied sealant **OR** gaskets, **as directed**, in side laps.
- a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 2) Material: Aluminum-zinc alloy-coated steel sheet, **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm) OR 0.040-inch (1.02-mm), as directed**, nominal thickness.
 - 3) Material: Aluminum sheet, **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm) OR 0.063 inch (1.60 mm), as directed**, thick.
 - 4) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - 5) Interior Facing Finish: Manufacturer's standard primer or polyester.
 - b. Kraft-Paper Honeycomb Core: Manufacturer's standard phenolic-resin-impregnated paper, with not less than 15 percent resin content by weight and chemically treated for fire resistance; with maximum **1/2-inch (13-mm)** cell size.
 - c. Aluminum Honeycomb Core: Manufacturer's standard **0.003-inch- (0.08-mm-)** thick, commercial grade aluminum with maximum **3/4-inch (19-mm)** cell size.
 - d. Clips: Manufacturer's standard one piece, formed from zinc-coated (galvanized) steel **OR** aluminum-zinc alloy-coated steel **OR** stainless steel, **as directed**.
 - e. Gaskets: Extruded, dry seal silicone.
 - f. Sealant: Manufacturer's standard silicone.
 - g. Panel Thickness: **1.0 inch (25 mm) OR 1.25 inches (32 mm) OR 2.0 inches (51 mm), as directed.**
4. Framed-Edge, Honeycomb-Core Metal Wall Panels: Formed with flush exterior panel facing and integral, extruded edge members; designed for independent installation by mechanically attaching panels to supports through edge framing using concealed fasteners; with gasketed joints.
- a. Facings: Fabricate panel with exterior and interior facings of same material and thickness.
 - 1) Material: Zinc-coated (galvanized) steel sheet, **0.028-inch (0.71-mm)** nominal thickness.
 - 2) Material: Aluminum sheet, **0.040 inch (1.02 mm) OR 0.063 inch (1.60 mm), as directed**, thick.
 - 3) Exterior Facing Finish: 2-coat fluoropolymer **OR** 3-coat fluoropolymer **OR** 4-coat fluoropolymer **OR** Mica fluoropolymer **OR** Metallic fluoropolymer **OR** FEVE fluoropolymer **OR** Siliconized polyester **OR** Plastisol **OR** Clear anodized **OR** Color anodized, **as directed**.
 - a) Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 - 4) Interior Facing Finish: Manufacturer's standard primer or polyester.
 - b. Kraft-Paper Honeycomb Core: Manufacturer's standard phenolic-resin-impregnated paper, with not less than 15 percent resin content by weight and chemically treated for fire resistance; with maximum **1/2-inch (13-mm)** cell size.
 - c. Aluminum Honeycomb Core: Manufacturer's standard **0.003-inch- (0.08-mm-)** thick, commercial grade aluminum with maximum **3/4-inch (19-mm)** cell size.

- d. Edge Members: Extruded aluminum, not less than 0.063-inch (1.6-mm) wall thickness.
- e. Gaskets: Extruded, dry seal silicone.
- f. Panel Thickness: 1.0 inch (25 mm) OR 2.0 inches (51 mm) OR 3.0 inches (76 mm), as directed.

H. Accessories

- 1. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
 - a. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 - b. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - c. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- 2. Flashing and Trim: Formed from 0.018-inch- (0.46-mm-) minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.

I. Fabrication

- 1. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- 2. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- 3. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- 4. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that will minimize noise from movements within panel assembly.
- 5. Honeycomb-Core Metal Wall Panels: Fabricate panels using manufacturer's standard thermosetting structural adhesive in a lamination process that bonds panel under minimum 10-psi (69-kPa) pressure. Use of contact adhesives with pinch-roll process is not acceptable.
 - a. Panel Bow Tolerance: Not more than 0.5 percent of panel width or length.
- 6. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - b. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - c. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - d. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - e. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

- f. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - 1) Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

J. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Preparation

1. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorages according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

B. Metal Wall Panel Installation, General

1. General: Install metal wall panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - a. Commence metal wall panel installation and install minimum of **300 sq. ft. (27.9 sq. m.)** in presence of factory-authorized representative.
 - b. Shim or otherwise plumb substrates receiving metal wall panels.
 - c. Flash and seal metal wall panels with weather closures at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
 - d. Install screw fasteners in predrilled holes.
 - e. Locate and space fastenings in uniform vertical and horizontal alignment.
 - f. Install flashing and trim as metal wall panel work proceeds.
 - g. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - h. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
 - i. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - j. Provide weathertight escutcheons for pipe and conduit penetrating exterior walls.
2. Fasteners:
 - a. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized steel fasteners for surfaces exposed to the interior.
 - b. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized steel fasteners for surfaces exposed to the interior.
 - c. Copper Wall Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
 - d. Stainless-Steel Wall Panels: Use stainless-steel fasteners.
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action as recommended by metal wall panel manufacturer.

4. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weathertight performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
 - a. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
 - b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
- C. Insulated-Core Metal Wall Panel Installation
1. General: Apply continuous ribbon of sealant to panel joint on concealed side of insulated-core metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels for weather seal.
 - a. Fasten insulated-core metal wall panels to supports with fasteners at each lapped joint at location and spacing and with fasteners recommended by manufacturer.
 - b. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
 - c. Provide metal-backed washers under heads of exposed fasteners on weather side of insulated metal wall panels.
 - d. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 - e. Provide sealant tape at lapped joints of insulated metal wall panels and between panels and protruding equipment, vents, and accessories.
 - f. Apply a continuous ribbon of sealant tape to panel side laps and elsewhere as needed to make panels weathertight.
 - g. Apply snap-on battens to exposed-fastener, insulated-core metal wall panel seams to conceal fasteners.
 2. Foamed-Insulation-Core Metal Wall Panels: Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.
 - a. Install clips to supports with self-tapping fasteners.
 3. Laminated-Insulation-Core Metal Wall Panels:
 - a. Wrapped-Edge Panels: Mechanically attach wall panels to supports using staggered, concealed side clips engaging wrapped panel edges. Install clips to supports with self-tapping fasteners. Seal joints with backer rod and sealant **OR** manufacturer's standard gaskets, **as directed**.
 - b. Wrapped-Edge Panels: Mechanically attach wall panels through extended edge of panels to supports using self-tapping fasteners. Seal joints with backer rod and sealant **OR** manufacturer's standard gaskets, **as directed**.
 - c. Shiplap-Edge Panels: Mechanically attach wall panels to supports using staggered, concealed side clips engaging tongue-and-groove panel edges. Install clips to supports with self-tapping fasteners.
 - 1) Horizontal Joints: Maintain reveal joint of consistent width **OR** Seal joints with backer rod and sealant **OR** Seal joints with manufacturer's standard gaskets, **as directed**.
 - 2) Vertical Joints: Maintain reveal joint of consistent width **OR** Seal joints with backer rod and sealant **OR** Seal joints with manufacturer's standard gaskets, **as directed**.
 - d. Framed-Edge Panels: Mechanically attach wall panels through integral, extruded edge members to supports using self-tapping fasteners. Seal joints with manufacturer's standard gaskets.
 4. Honeycomb-Core Metal Wall Panels:
 - a. Wrapped-Edge Panels: Mechanically attach wall panels to supports using staggered, concealed side clips engaging wrapped panel edges. Install clips to supports with self-tapping fasteners. Seal joints with backer rod and sealant **OR** manufacturer's standard gaskets, **as directed**.

- b. **Wrapped-Edge Panels:** Mechanically attach wall panels through extended edge of panels to supports using self-tapping fasteners. Seal joints with backer rod and sealant **OR** manufacturer's standard gaskets, **as directed**.
 - c. **Shiplap-Edge Panels:** Mechanically attach wall panels to supports using staggered, concealed side clips engaging tongue-and-groove panel edges. Install clips to supports with self-tapping fasteners.
 - 1) **Horizontal Joints:** Maintain reveal joint of consistent width **OR** Seal joints with backer rod and sealant **OR** Seal joints with manufacturer's standard gaskets, **as directed**.
 - 2) **Vertical Joints:** Maintain reveal joint of consistent width **OR** Seal joints with backer rod and sealant **OR** Seal joints with manufacturer's standard gaskets, **as directed**.
 - d. **Framed-Edge Panels:** Mechanically attach wall panels through integral, extruded edge members to supports using self-tapping fasteners. Seal joints with manufacturer's standard gaskets.
- D. **Accessory Installation**
- 1. **General:** Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - a. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. **Flashing and Trim:** Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
 - a. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 - b. **Expansion Provisions:** Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (605 mm)** of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with mastic sealant (concealed within joints).
- E. **Field Quality Control**
- 1. **Testing Agency:** Engage a qualified testing agency to perform tests and inspections.
 - 2. **Water Penetration:** Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 1105 at minimum differential pressure of 20 percent of inward-acting, wind-load design pressure as defined by SEI/ASCE 7, but not less than **6.24 lbf/sq. ft. (299 Pa)**.
 - 3. **Water-Spray Test:** After completing the installation of **75-foot- (23-m-)** by-2-story minimum area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a 2-bay area directed by the Owner.
 - 4. **Manufacturer's Field Service:** Engage a factory-authorized service representative to inspect and test completed metal wall panel installation, including accessories.
 - 5. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
 - 6. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- F. **Cleaning And Protection**
- 1. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed unless otherwise indicated in manufacturer's written installation instructions. On

07 - Thermal And Moisture Protection



- completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
2. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
 3. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 46 63 00



07 - Thermal And Moisture Protection

Task	Specification	Specification Description
07 46 63 00	07 46 16 00a	Metal Wall Panels

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SECTION 07 51 13 00 - BUILT-UP ASPHALT ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for built-up asphalt roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Built-up asphalt roofing.
 - b. Vapor retarder.
 - c. Roof insulation.
2. Section includes the installation of insulation strips in ribs of acoustical roof deck. Insulation strips are furnished under Division 5 Section "Steel Deck."

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to built-up roofing.
2. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.

D. Performance Requirements

1. General Performance: Installed built-up roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Built-up roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by built-up roofing manufacturer based on testing and field experience.
3. Roofing System Design: Provide built-up roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
4. FM Approvals Listing: Provide built-up roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a built-up roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120, **as directed.**
 - b. Hail Resistance Rating: MH **OR** SH, **as directed.**
5. Energy Performance (for LEED-NC Credit SS 7.2): Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
6. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
7. Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.
 2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 3. Shop Drawings: For built-up roofing. Include plans, elevations, sections, details, and attachments to other work.
 - a. Base flashings and built-up terminations.
 - b. Tapered insulation, including slopes.
 - c. Crickets, saddles, and tapered edge strips, including slopes.
 - d. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 4. Samples: For the following products:
 - a. Built-up roofing materials, including base sheet, ply sheet, cap sheet, and flashing sheet, of color specified.
 - b. Roof insulation.
 - c. **3 lb (1.5 kg)** of aggregate surfacing material in gradation and color indicated.
 - d. Roof paver, full sized, in each color and texture required.
 - e. Walkway pads.
 - f. Six insulation fasteners of each type, length, and finish.
 5. Qualification Data: For qualified Installer and manufacturer.
 6. Manufacturer Certificates: Signed by roofing manufacturer certifying that built-up roofing complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 7. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of built-up roofing.
 8. Research/Evaluation Reports: For components of built-up roofing, from the ICC-ES.
 9. Maintenance Data: For built-up roofing to include in maintenance manuals.
 10. Warranties: Sample of special warranties.
- F. Quality Assurance
1. Manufacturer Qualifications: A qualified manufacturer that is UL listed **OR** FM Approvals approved, **as directed**, for built-up roofing identical to that used for this Project.
 2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by built-up roofing manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 3. Source Limitations: Obtain components including roof insulation and fasteners for built-up roofing from same manufacturer as built-up roofing or approved by built-up roofing manufacturer.
 4. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical built-up roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
 5. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 6. Preinstallation Roofing Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
 2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer. Protect stored liquid material from direct sunlight.

- a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 - 3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 - 4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- H. Project Conditions
- 1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing to be installed according to manufacturer's written instructions and warranty requirements.
- I. Warranty
- 1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of built-up roofing that fail in materials or workmanship within specified warranty period.
 - a. Special warranty includes built-up roofing membrane, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, roof pavers, and other components of built-up roofing.
 - b. Warranty Period: 10 **OR** 15 **OR** 20 **OR** 25 **OR** 30, **as directed**, years from date of Final Completion.
 - 2. Special Project Warranty: Submit roofing Installer's warranty, signed by Installer, covering the Work of this Section, including all components of built-up roofing such as built-up roofing membrane, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
 - a. Warranty Period: Two years from date of Final Completion.

1.2 PRODUCTS

A. Built-Up Roofing Manufacturers

B. Base-Sheet Materials

- 1. Sheathing Paper: Red-rosin type, minimum **3 lb/100 sq. ft. (0.16 kg/sq. m)**.
- 2. Base Sheet: ASTM D 4601, Type II, SBS-modified, asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.
 - a. Weight: **25 lb/100 sq. ft. (1.2 kg/sq. m) OR 40 lb/100 sq. ft. (1.95 kg/sq. m) OR 50 lb/100 sq. ft. (2.4 kg/sq. m) OR 60 lb/100 sq. ft. (3.0 kg/sq. m) OR 75 lb/100 sq. ft. (3.7 kg/sq. m)**, **as directed**, minimum.

OR

Base Sheet: ASTM D 4601, Type I **OR** II, **as directed**, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR

Base Sheet: ASTM D 4897, Type II, venting, nonperforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface.

OR

Base Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

C. Roofing Membrane Plies

- 1. Ply Sheet: ASTM D 2178, Type IV **OR** VI, **as directed**, asphalt-impregnated, glass-fiber felt.
- 2. Cap Sheet: ASTM D 3909, asphalt-impregnated and -coated, glass-fiber cap sheet, with white coarse mineral-granule top surfacing and fine mineral surfacing on bottom surface.

D. Base Flashing Sheet Materials

1. Backer Sheet: ASTM D 2178, Type IV **OR** VI, **as directed**, asphalt-impregnated, glass-fiber felt.
OR
Backer Sheet: ASTM D 4601, Type I **OR** II, **as directed**, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.
OR
Backer Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.
2. Granule-Surfaced Flashing Sheet: ASTM D 6164, Grade G, Type I or II, polyester-reinforced **OR** ASTM D 6163, Grade G, Type I or II, glass-fiber-reinforced **OR** ASTM D 6162, Grade G, Type I or II, composite polyester-reinforced and glass-fiber-reinforced, **as directed**, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
3. Metal-Foil-Surfaced Flashing Sheet: ASTM D 6298, glass-fiber-reinforced, SBS-modified asphalt sheet; metal-foil surfaced; suitable for application method specified, and as follows:
 - a. Foil Surfacing: Aluminum **OR** Copper **OR** Stainless steel **OR** Aluminum, fluoropolymer coated finish, of color and gloss selected from manufacturer's full range, **as directed**.
4. Smooth-Surfaced Flashing Sheet: ASTM D 6222, Grade S, Type I or II, polyester-reinforced **OR** ASTM D 6223, Grade S, Type I or II, composite polyester-reinforced and glass-fiber-reinforced, **as directed**, APP-modified asphalt sheet; smooth surfaced; suitable for application method specified.
OR
Granule-Surfaced Flashing Sheet: ASTM D 6222, Grade G, Type I or II, polyester-reinforced **OR** ASTM D 6223, Grade G, Type I or II, composite polyester-reinforced and glass-fiber-reinforced, **as directed**, APP-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
5. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

E. Asphalt Materials

1. Asphalt Primer: ASTM D 41.
2. Roofing Asphalt: ASTM D 312, Type III **OR** IV **OR** III or IV as recommended by built-up roofing manufacturer for application, **as directed**.
3. Roofing Asphalt: ASTM D 6152, SEBS modified.

F. Auxiliary Built-Up Roofing Materials

1. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with built-up roofing.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesives: 80 g/L.
 - 6) Other Adhesives: 250 g/L.
 - 7) Nonmembrane Roof Sealants: 300 g/L.
 - 8) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 9) Sealant Primers for Porous Substrates: 775 g/L.

2. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up base flashings.
3. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.
4. Mastic Sealant: Polyisobutylene, plain or modified bitumen, nonhardening, nonmigrating, nonskinning, and nondrying.
5. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening built-up roofing components to substrate, tested by manufacturer for required pullout strength, and acceptable to roofing manufacturer.
6. Metal Flashing Sheet: Metal flashing sheet is specified in Division 7 Section "Sheet Metal Flashing and Trim."
7. Aggregate Surfacing: ASTM D 1863, No. 6 or No. 67, clean, dry, opaque, water-worn gravel or crushed stone, free of sharp edges **OR** crushed slag, free of sharp edges, **as directed**.
8. Miscellaneous Accessories: Provide miscellaneous accessories recommended by built-up roofing manufacturer.

G. Substrate Boards

1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR** Type X, **5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick, seal coated.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

H. Vapor Retarder

1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
OR
Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
2. Laminated Sheet: Kraft paper/polyethylene laminate, two layers, reinforced with woven fiberglass yarn, laminated and edge reinforced, with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
3. Self-Adhering Sheet Vapor Retarder: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, polyethylene film laminated to layer of rubberized asphalt adhesive; maximum permeance rating of **0.1 perm (6 ng/Pa x s x sq. m)**; cold-applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
OR
Self-Adhering Sheet Vapor Retarder: **30- to 40-mil- (0.76- to 1.0-mm-)** thick, polyethylene film laminated to layer of butyl rubber adhesive; maximum permeance rating of **0.1 perm (6 ng/Pa x s x sq. m)**; cold-applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
4. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt impregnated.

I. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.6-lb/cu. ft. (26-kg/cu. m) OR X, 1.3-lb/cu. ft. (21-kg/cu. m), as directed**, minimum density, square edged.
3. Molded-Polystyrene Board Insulation: ASTM C 578 Type II, **1.35-lb/cu. ft. (22-kg/cu. m) OR VIII, 1.15-lb/cu. ft. (18-kg/cu. m) OR IX, 1.8-lb/cu. ft. (29-kg/cu. m), as directed**, minimum density.
4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m) OR Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) OR Type IX, 1.8-lb/cu. ft. (29-kg/cu. m), as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, **1/2 inch (13 mm)** thick.
OR
Facer: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR** Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface as indicated below by type, and felt or glass-fiber mat facer on the other surface.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass mat faced gypsum board facer, **1/4 inch (6 mm)** thick.
7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48)** unless otherwise indicated.
11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

J. Insulation Accessories

1. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate and acceptable to roofing manufacturer.
3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
OR
Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
OR
Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
4. Insulation Cant Strips: ASTM C 728, perlite insulation board.
5. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

6. Wood Nailer Strips: Comply with requirements in Division 6 Section "Rough Carpentry" **OR** "Miscellaneous Carpentry", **as directed**.
 7. Tapered Edge Strips: ASTM C 728, perlite insulation board.
OR
Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
 8. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR
Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
OR
Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
 9. Substrate Joint Tape: **6- or 8-inch- (150- or 200-mm-)** wide, coated, glass fiber.
- K. Coating Materials
1. Roof Coating: ASTM D 1227, Type II Class 1, mineral-colloid-emulsified, fibered **OR** 2, chemically emulsified, filled or fibered, **as directed**, asphalt emulsion, asbestos free.
OR
Roof Coating: ASTM D 1227, Type III, Class 1, mineral-colloid-emulsified **OR** 2, chemically emulsified, **as directed**, asphalt emulsion, nonfibered.
OR
Roof Coating: ASTM D 2824, Type I, nonfibered **OR** III, fibered, asbestos-free, **as directed**, aluminum-pigmented asphaltic coating.
OR
Roof Coating: Acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces and complying with ASTM D 6083 **OR** the following, **as directed**:
 - a. Initial Percent Elongation (Break): Not less than 60 percent at **0 deg F (-18 deg C)** and 200 percent at **73 deg F (23 deg C)** when tested according to ASTM D 2370.
 - b. Initial Tensile Strength (Maximum Stress): Not less than **100 psi (1.38 MPa)** at **73 deg F (23 deg C)** and **200 psi (2.76 MPa)** at **0 deg F (-18 deg C)** when tested according to ASTM D 2370.
 - c. Final Percent Elongation (Break) after Accelerated Weathering 1000 hrs.: Not less than 40 percent at **0 deg F (-18 deg C)** and 100 percent at **73 deg F (23 deg C)** when tested according to ASTM D 2370.
 - d. Permeance: Not more than 50 perms when measured according to ASTM D 1653.
 - e. Accelerated Weathering 1000 hrs.: No cracking or checking when tested according to ASTM D 4798.
 - f. Color: White **OR** Gray **OR** Buff, **as directed**.
- L. Walkways
1. Walkway Pads: Mineral-granule-surfaced, reinforced asphaltic composition **OR** Polymer-modified, reconstituted solid-rubber, surface-textured, **as directed**, slip-resisting pads, manufactured as a traffic pad for foot traffic and acceptable to roofing manufacturer, **3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, thick, minimum.
 2. Walkway Cap Sheet Strips: ASTM D 6164, Grade G, Type I or II, polyester-reinforced **OR** ASTM D 6163, Grade G, Type I or II, glass-fiber-reinforced **OR** ASTM D 6162, Grade G, Type I or II, composite polyester-reinforced and glass-fiber-reinforced, **as directed**, SBS-modified asphalt sheet; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
 3. Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not

greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:

- a. Size: **24 by 24 inches (600 by 600 mm)**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
- b. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, minimum; ASTM C 140.
- c. Colors and Textures: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - a. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - b. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - c. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking".
 - d. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of **1/16 inch (1.6 mm)** out of plane relative to adjoining deck.
 - e. Verify that minimum concrete drying period recommended by roofing manufacturer has passed.
 - f. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 1) Test for moisture by pouring **1 pint (0.5 L)** of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
 - g. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Prime surface of concrete deck with asphalt primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
4. Install insulation strips in ribs of acoustical roof decks according to acoustical roof deck manufacturer's written instructions.

C. Substrate Board Installation

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to built-up roofing manufacturer's written instructions.

D. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.

OR

Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:

 - a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.

OR

Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.

OR

Self-Adhering Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of **3-1/2 inches (90 mm)** and **6 inches (150 mm)**, respectively. Seal laps by rolling.

OR

Built-up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
2. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into built-up roofing.

E. Insulation Installation

1. Comply with built-up roofing manufacturer's written instructions for installing roof insulation.
2. Install one lapped base sheet course and mechanically fasten to substrate according to built-up roofing manufacturer's written instructions.
3. Nailers Strips: Mechanically fasten **4-inch nominal- (89-mm actual-)** width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:
 - a. **16 feet (4.88 m)** apart for roof slopes greater than **1 inch per 12 inches (1:12)** but less than **3 inches per 12 inches (3:12)**.
 - b. **48 inches (1220 mm)** apart for roof slopes greater **3 inches per 12 inches (3:12)**.
4. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of built-up roofing with vertical surfaces or angle changes greater than 45 degrees.
5. Install tapered insulation under area of roofing to conform to slopes indicated.
6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
7. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite board insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
8. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
9. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
10. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.

- b. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 - c. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
11. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
- a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If number of fasteners will be based on ASCE/SEI 7's uplift pressure, fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
12. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
- a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If number of fasteners will be based on ASCE/SEI 7's uplift pressure, fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - c. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
13. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck, **as directed**. Tape joints if required by roofing manufacturer.
- a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 - c. Apply hot roofing asphalt to underside and immediately bond cover board to substrate.
- F. Built-Up Roofing Installation, General
1. Install roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
- a. Install roofing system BU-3 **OR** 4 **OR** 5, **as directed**, -N **OR** I **OR** C, **as directed**, -A-A **OR** S **OR** M, **as directed**, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Roofing and Waterproofing Manual" and requirements in this Section.
OR
Install roofing membrane according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing" and as follows:
 - a. Deck Type: N (nailable) **OR** I (insulated) **OR** C (concrete or nonnailable), **as directed**.
 - b. Base Sheet: 1 **OR** 1, installed over sheathing paper, **as directed**.
 - c. Number of Ply Sheets: 2 **OR** 3 **OR** 4, **as directed**.

- d. Surfacing Type: A (aggregate) **OR** S (asphalt surfacing or coating) **OR** M (mineral-granule-surfaced cap sheet), **as directed**.
 - 1) Mineral-granule-surfaced cap sheet is in addition to number of ply sheets specified.
 2. Start installation of built-up roofing in presence of manufacturer's technical personnel.
 3. Where roof slope exceeds **1/2 inch per 12 inches (1:24)** **OR** **3/4 inch per 12 inches (1:18)**, **as directed**, install built-up roofing sheets parallel with slope.
 - a. Backnail built-up roofing sheets to nailer strips **OR** substrate, **as directed**, according to roofing manufacturer's written instructions.
 4. Cooperate with testing agencies engaged or required to perform services for installing roofing.
 5. Coordinate installation of roofing so insulation and other components of built-up roofing not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - a. Provide tie-offs at end of each day's work to cover exposed built-up roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt with joints and edges sealed.
 - b. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 - c. Remove and discard temporary seals before beginning work on adjoining roofing.
 6. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within **25 deg F (14 deg C)** of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.

OR

Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing manufacturer's written instructions.
 7. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging built-up roofing components or adjacent building construction.
- G. Roofing Membrane Installation
1. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 2. Install lapped base sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 - a. Mechanically fasten to substrate.

OR

Spot- or strip-mop to substrate with hot roofing asphalt.

OR

Adhere to substrate in a solid mopping of hot roofing asphalt, **as directed**.
 3. Install two **OR** three **OR** four, **as directed**, ply sheets starting at low point of roofing. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
 - a. Embed each ply sheet in a solid mopping of hot roofing asphalt applied at rate required by roofing manufacturer, to form a uniform membrane without ply sheets touching.
 4. Cap Sheet: Install lapped granulated cap sheet starting at low point of roofing. Offset laps from laps of preceding ply sheets and align cap sheet without stretching. Lap in direction to shed water. Extend cap sheet over and terminate beyond cants.
 - a. Embed cap sheet in a solid mopping of hot roofing asphalt applied at rate required by built-up roofing manufacturer.
 5. Aggregate Surfacing: Promptly after installing and testing roofing membrane, base flashing, and stripping, flood-coat roof surface with **60 lb/100 sq. ft. (3.0 kg/sq. m)** of hot roofing asphalt. While flood coat is hot and fluid, cast the following average weight of aggregate in a uniform course:
 - a. Aggregate Weight: **400 lb/100 sq. ft. (20 kg/sq. m)** **OR** **300 lb/100 sq. ft. (15 kg/sq. m)**, **as directed**.

- b. If aggregate surfacing is delayed, promptly apply glaze coat of hot roofing asphalt at a rate of **10 lb/100 sq. ft. (0.5 kg/sq. m)**.
 6. Glaze-coat roofing membrane surface with hot roofing asphalt applied at a rate of **10 to 15 lb/100 sq. ft. (0.5 to 0.75 kg/sq. m)**.
- H. Flashing And Stripping Installation
1. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to built-up roofing manufacturer's written instructions and as follows:
 - a. Prime substrates with asphalt primer if required by built-up roofing manufacturer.
 - b. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over built-up roofing at cants in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive, **as directed**.
OR
Backer Sheet Application: Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive, **as directed**.
 - c. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than **425 deg F (218 deg C)**. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in asphalt roofing cement at rate required by roofing manufacturer.
OR
Flashing Sheet Application: Torch apply flashing sheet to substrate.
 2. Extend base flashing up walls or parapets a minimum of **8 inches (200 mm)** above built-up roofing and **4 inches (100 mm)** onto field of built-up roofing.
 3. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - a. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement.
 4. Install stripping, according to roofing manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
 - a. Flashing-Sheet Stripping: Install flashing-sheet stripping in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt applied at not less than **425 deg F (218 deg C)**, and extend onto roofing membrane.
OR
Flashing-Sheet Stripping: Install flashing-sheet stripping by heat welding and extend onto roofing membrane.
OR
Built-up Stripping: Install stripping of not less than two roofing membrane ply sheets, setting each ply in a continuous coating of asphalt roofing cement or in a solid mopping of hot roofing asphalt, and extend onto roofing membrane **4 inches (100 mm)** and **6 inches (150 mm)**, respectively.
 5. Roof Drains: Set **30-by-30-inch (760-by-760-mm)** metal flashing in bed of asphalt roofing cement on completed built-up roofing. Cover metal flashing with built-up roofing cap-sheet stripping and extend a minimum of **4 inches (100 mm)** **OR** **6 inches (150 mm)**, **as directed**, beyond edge of metal flashing onto field of built-up roofing. Clamp built-up roofing, metal flashing, and stripping into roof-drain clamping ring.
 - a. Install stripping according to roofing manufacturer's written instructions.
- I. Coating Installation

1. Apply coating to built-up roofing and base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method to provide a dry film thickness of not less than **20 mils (0.5 mm)**.
- J. Walkway Installation
1. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size, according to walkway pad manufacturer's written instructions.
 - a. Set walkway pads in additional pour coat of hot roofing asphalt after sweeping away loose aggregate surfacing.
 2. Walkway Cap Sheet Strips: Install walkway cap sheet strips, approximately **36 inches (900 mm)** wide and in lengths not exceeding **10 feet (3 m)**, leaving a space of **6 inches (150 mm)** between strips, over built-up roofing. Adhere in hot roofing asphalt.
 3. Roof-Paver Walkways: Install walkway roof pavers according to roofing manufacturer's written instructions in locations indicated, to form walkways. Leave **3 inches (75 mm)** of space between adjacent roof pavers.
- K. Field Quality Control
1. Testing Agency: Perform roof tests and inspections and to prepare test reports.
 2. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of built-up roofing as follows:
 - a. Approximate quantities of components within built-up roofing will be determined according to ASTM D 3617.
 - b. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."
 - c. Repair areas where test cuts were made according to roofing manufacturer's written instructions.
 3. Repair or remove and replace components of built-up roofing where test results or inspections indicate that they do not comply with specified requirements.
 - a. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- L. Protecting And Cleaning
1. Protect built-up roofing from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and the Owner.
 2. Correct deficiencies in or remove built-up roofing that does not comply with requirements, repair substrates, and repair or reinstall roofing to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
 3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 51 13 00

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Task	Specification	Specification Description
07 51 13 00	06 10 00 00a	Miscellaneous Carpentry
07 51 13 00	01 95 99 92g	Preparation for Re-Roofing
07 51 13 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 51 13 00	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 51 13 00	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 51 13 00	07 53 23 00	EPDM Membrane Roofing

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SECTION 07 52 13 00 - APP-MODIFIED BITUMINOUS MEMBRANE ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for atactic-polypropylene (APP) modified bituminous membrane roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Atactic-polypropylene (APP) modified bituminous membrane roofing.
 - b. Hybrid roofing system that combines built-up ply sheets with APP-modified bituminous membrane.
 - c. Vapor retarder.
 - d. Roof insulation.
2. Section includes the installation of insulation strips in ribs of acoustical roof deck. Insulation strips are furnished under Division 05 Section "Steel Decking".

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
2. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: If membrane roofing system is to be designed to withstand uplift pressure established by ASCE/SEI 7, provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - a. Corner Uplift Pressure: as directed by the Owner.
 - b. Perimeter Uplift Pressure: as directed by the Owner.
 - c. Field-of-Roof Uplift Pressure: as directed by the Owner.
4. FM Approvals Listing: If Project is FM Global insured or if FM Approvals requirements will set a minimum quality standard, provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120, **as directed**.
 - b. Hail Resistance Rating: MH **OR** SH, **as directed**.
5. Energy Performance (if required for LEED-NC Credit SS 7.2): Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

OR

Energy Performance (for roofs that must comply with DOE's ENERGY STAR requirements): Provide roofing system that is listed on DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

OR

Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial Solar Reflectance not less than 0.70 and Thermal Emittance not less than 0.75 when tested according to Cool Roof Rating Council's CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - a. Base flashings and membrane terminations.
 - b. Tapered insulation, including slopes.
 - c. Crickets, saddles, and tapered edge strips, including slopes.
 - d. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
4. Samples: For the following products:
 - a. Sheet roofing materials, including base sheet, base-ply sheet, roofing membrane sheet, flashing backer sheet, membrane cap sheet and flashing sheet, of color specified.
 - b. Roof insulation.
 - c. Walkway pads or rolls.
 - d. Six insulation fasteners of each type, length, and finish.
5. Qualification Data: For qualified Installer, manufacturer and testing agency.
6. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
7. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
8. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES **OR** applicable model code organization, **as directed**.
9. Maintenance Data: For roofing system to include in maintenance manuals.
10. Warranties: Sample of special warranties.

F. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is UL listed **OR** FM Approvals approved, **as directed**, for membrane roofing system identical to that used for this Project.
2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
3. Source Limitations: Obtain components including roof insulation and fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
4. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
5. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

6. Preinstallation Roofing Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

H. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

I. Warranty

1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - a. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of membrane roofing system.
 - b. Warranty Period: 10 **OR** 15 **OR** 20 **OR** 25 **OR** 30, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. APP-Modified Asphalt-Sheet Materials

1. Roofing Membrane Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
2. Smooth-Surfaced Roofing Membrane Cap Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
OR
Granule-Surfaced Roofing Membrane Cap Sheet: ASTM D 6222, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Material: Mineral ceramic coated **OR** slate, **as directed**.
 - b. Granule Color: White **OR** Gray **OR** Tan, **as directed**.

B. Base-Sheet Materials

1. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).
2. Base Sheet: ASTM D 4601, Type II, SBS-modified, asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.

- a. Weight: **25 lb/100 sq. ft. (1.2 kg/sq. m) OR 40 lb/100 sq. ft. (1.95 kg/sq. m) OR 50 lb/100 sq. ft. (2.4 kg/sq. m) OR 60 lb/100 sq. ft. (2.9 kg/sq. m) OR 75 lb/100 sq. ft. (3.7 kg/sq. m), as directed**, minimum.

OR

Base Sheet: ASTM D 4601, Type I **OR** Type II, **as directed**, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR

Base Sheet: ASTM D 4897, Type II, venting, nonperforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface.

OR

Base Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

C. Base-Ply Sheet Materials

1. Glass-Fiber Base-Ply Sheet: ASTM D 2178, Type IV **OR** Type VI, **as directed**, asphalt-impregnated, glass-fiber felt.

D. Base Flashing Sheet Materials

1. Backer Sheet: ASTM D 4601, Type I **OR** Type II, **a directed**, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR

Backer Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

OR

Backer Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.

2. Smooth-Surfaced Flashing Sheet: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.

OR

Granule-Surfaced Flashing Sheet: ASTM D 6222, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:

- a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.
3. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.

E. Auxiliary Roofing Membrane Materials

1. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
- a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
- 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesive: 80 g/L.

- 6) Other Adhesives: 250 g/L.
 - 7) Nonmembrane Roof Sealants: 300 g/L.
 - 8) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 9) Sealant Primers for Porous Substrates: 775 g/L.
2. Asphalt Primer: ASTM D 41.
 3. Roofing Asphalt: ASTM D 312, Type III **OR** Type IV **OR** Type III or IV as recommended by roofing system manufacturer for application, **as directed**.
OR
Roofing Asphalt: ASTM D 6152, SEBS modified.
 4. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings.
 5. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
 6. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
 7. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
 8. Metal Flashing Sheet: As specified in Division 07 Section "Sheet Metal Flashing And Trim".
 9. Roofing Granules: Ceramic-coated **OR** Slate, **as directed**, roofing granules, No. 11 screen size with 100 percent passing **No. 8 (2.36-mm)** sieve and 98 percent of mass retained on **No. 40 (0.425-mm)** sieve, color to match roofing membrane.
 10. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.
- F. Substrate Boards
1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR** Type X, **5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick, seal coated.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.
- G. Vapor Retarder
1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
OR
Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
 2. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn, with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
 3. Self-Adhering Sheet Vapor Retarder: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, polyethylene film laminated to layer of rubberized asphalt adhesive; maximum permeance rating

of 0.1 perm (6 ng/Pa x s x sq. m); cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

OR

Self-Adhering Sheet Vapor Retarder: 30- to 40-mil- (0.76- to 1.0-mm-) thick, polyethylene film laminated to layer of butyl rubber adhesive; maximum permeance rating of 0.1 perm (6 ng/Pa x s x sq. m); cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.

4. Glass-Fiber Felt: ASTM D 2178, Type IV, asphalt impregnated.

H. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. (26-kg/cu. m) **OR** Type X, 1.3-lb/cu. ft. (21-kg/cu. m), **as directed**, minimum density, square edged.
3. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, 1.35-lb/cu. ft. (22-kg/cu. m) **OR** Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) **OR** Type IX, 1.8-lb/cu. ft. (29-kg/cu. m), **as directed**, minimum density.
4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, 1.35-lb/cu. ft. (22-kg/cu. m) **OR** Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) **OR** Type IX, 1.8-lb/cu. ft. (29-kg/cu. m), **as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, 1/2 inch (13 mm) thick.

OR

 - a. Facer: DOC PS 2, Exposure 1, OSB, 7/16 inch (11 mm) thick.
5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR** Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board, as indicated below by type, on one major surface and felt or glass-fiber mat facer on the other surface.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, 1/2 inch (13 mm) thick.
 - b. Type V, OSB facer, 7/16 inch (11 mm) thick.
 - c. Type VII, glass-mat-faced gypsum board facer, 1/4 inch (6 mm) thick.
7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

I. Insulation Accessories

1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards, **as directed**, to substrate, and acceptable to roofing system manufacturer.
3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.

OR

Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one-component or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

OR

Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.

4. Insulation Cant Strips: ASTM C 728, perlite insulation board.

OR

Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

5. Wood Nailer Strips: Comply with requirements in Division 06 Section(s) "Rough Carpentry" OR "Miscellaneous Rough Carpentry", **as directed**.

6. Tapered Edge Strips: ASTM C 728, perlite insulation board.

OR

Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.

7. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.

OR

Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.

OR

Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.

OR

Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.

8. Substrate Joint Tape: **6- or 8-inch- (150- or 200-mm-)** wide, coated, glass-fiber joint tape.

J. Coating Materials

1. Roof Coating: ASTM D 1227, Type II, Class 1, mineral-colloid-emulsified, fibered **OR** Class 2, chemically emulsified, filled or fibered, **as directed**, asphalt emulsion, asbestos free.
2. Roof Coating: ASTM D 1227, Type III, Class 1, mineral-colloid-emulsified **OR** Class 2, chemically emulsified, **as directed**, asphalt emulsion, nonfibered.
3. Roof Coating: ASTM D 2824, Type I, nonfibered **OR** Type III, fibered, asbestos-free, **as directed**, aluminum-pigmented asphaltic coating.
4. Roof Coating: Acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces and complying with ASTM D 6083.
 - a. Color: White **OR** Gray **OR** Buff, **as directed**.

K. Walkways

1. Walkway Pads: Reinforced asphaltic composition pads with slip-resisting mineral-granule surface **OR** Polymer-modified, reconstituted rubber pads with slip-resisting textured surface, **as directed**, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, **3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, thick, minimum.
2. Walkway Backer Strips: ASTM D 6222, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade S, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
3. Walkway Cap Sheet Strips: ASTM D 6222, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6223, Grade G, Type I or II, APP-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Material: Mineral ceramic coated **OR** slate, **as directed**.
 - b. Granule Color: White **OR** Gray **OR** Tan, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - a. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - b. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - c. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking".
 - d. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - e. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 1) Test for moisture by pouring **1 pint (0.5 L)** of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
 - f. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 - g. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of **1/16 inch (1.6 mm)** out of plane relative to adjoining deck.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Prime surface of concrete deck with asphalt primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
4. Install insulation strips in ribs of acoustical roof deck according to acoustical roof deck manufacturer's written instructions.

C. Substrate Board Installation

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

D. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.
2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:

- a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
 3. Self-Adhering Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of **3-1/2 inches (90 mm)** and **6 inches (150 mm)**, respectively. Seal laps by rolling.
 4. Built-up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 5. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.
- E. Insulation Installation
1. Comply with roofing system manufacturer's written instructions for installing roof insulation.
 2. If mechanically fastening base sheet to substrate before adhering first layer of insulation, install one lapped base-sheet course and mechanically fasten to substrate according to roofing system manufacturer's written instructions.
 3. Nailers Strips: Mechanically fasten **4-inch nominal- (89-mm actual-)** width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:
 - a. **16 feet (4.88 m)** apart for roof slopes steeper than **1 inch per 12 inches (1:12)** but less than **3 inches per 12 inches (3:12)**.
 - b. **48 inches (1220 mm)** apart for roof slopes steeper than **3 inches per 12 inches (3:12)**.
 4. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes more than 45 degrees.
 5. Install tapered insulation under area of roofing to conform to slopes indicated.
 6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
 7. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or more, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 8. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 9. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
 10. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 11. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

- a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If number of fasteners will be based on ASCE/SEI 7's uplift pressure or SPRI's factored-design uplift pressure, fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
12. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
- a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If fastening is calculated from ASCE/SEI 7's uplift pressure or SPRI's factored-design uplift pressure, fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 1) Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 - c. If cover boards will be field installed over roof insulation and immediately below roofing membrane, install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of **6 inches (150 mm)** in each direction from joints of insulation below. Loosely butt cover boards together and fasten to roof deck, **as directed**. Tape joints if required by roofing system manufacturer.
 - 1) Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 - 2) Apply hot roofing asphalt to underside, and immediately bond cover board to substrate.
- F. Roofing Membrane Installation, General
1. If referencing NRCA's roof assembly identification matrix system, install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - a. Install roofing system **MBA OR MBAH, as directed,-3 OR 4, as directed,-N OR I OR C, as directed,-T OR L, as directed,-S OR M, as directed**, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Roofing and Waterproofing Manual" and to requirements in this Section.
 2. For roof system that exceeds requirements of NRCA's roof assemblies, install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
 - a. Deck Type: N (nailable) **OR I (insulated) OR C (concrete or nonnailable), as directed**.
 - b. Adhering Method: T (torched) **OR L (cold-applied adhesive), as directed**.
 - c. Base Sheet: One **OR One**, installed over sheathing paper, **as directed**.
 - d. Number of Glass-Fiber Base-Ply Sheets: One **OR Two, as directed**.
 - e. Number of APP-Modified Asphalt Sheets: One **OR Two, as directed**.
 - f. Surfacing Type: S (smooth) **OR M (mineral-granule-surfaced cap sheet), as directed**.

3. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
 4. Where roof slope exceeds **1/2 inch per 12 inches (1:24) OR 3/4 inch per 12 inches (1:18)**, **as directed**, install roofing membrane sheets parallel with slope.
 - a. Backnail roofing membrane sheets to nailer strips **OR** substrate, **as directed**, according to roofing system manufacturer's written instructions.
 5. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
 6. Coordinate installation of roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - a. At end of each day's work, provide tie-offs to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 - b. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - c. Remove and discard temporary seals before beginning work on adjoining roofing.
 7. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within **25 deg F (14 deg C)** of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.
OR
Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing system manufacturer's written instructions.
 8. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- G. Base-Sheet Installation
1. If sheathing paper is required over wood decks by roofing system manufacturer, loosely lay one course of sheathing paper, lapping edges and ends a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 2. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 - a. Mechanically fasten to substrate, for nailable substrate.
OR
Spot- or strip-mop to substrate with hot roofing asphalt.
OR
Adhere to substrate in a solid mopping of hot roofing asphalt **OR** uniform coating of cold-applied adhesive, **as directed**, for nonnailable or insulated substrates.
- H. Base-Ply Sheet Installation
1. Install glass-fiber base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Extend sheets over and terminate beyond cants.
 - a. Shingle side laps of glass-fiber base-ply sheets uniformly to ensure that required number of glass-fiber base-ply sheets covers substrate at any point. Shingle in direction to shed water.
 - b. Embed each glass-fiber base-ply sheet in a continuous void-free mopping of hot roofing asphalt to form a uniform membrane without glass-fiber base-ply sheets touching.
- I. APP-Modified Bituminous Membrane Installation
1. Install modified bituminous roofing membrane cap sheet **OR** sheet and cap sheet, **as directed**, according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:

- a. Adhere to substrate in cold-applied adhesive.
OR
Torch apply to substrate.
 - b. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
 2. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - a. Repair tears and voids in laps and lapped seams not completely sealed.
 - b. Apply roofing granules to cover exuded bead at laps while bead is hot.
 3. Install roofing membrane sheets so side and end laps shed water.
- J. Flashing And Stripping Installation
1. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:
 - a. Prime substrates with asphalt primer if required by roofing system manufacturer.
 - b. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in cold-applied adhesive, **as directed**.
OR
Backer Sheet Application: Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive at rate required by roofing system manufacturer, **as directed**.
 - c. Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in asphalt roofing cement at rate required by roofing system manufacturer.
OR
Flashing Sheet Application: Torch apply flashing sheet to substrate.
 2. Extend base flashing up walls or parapets a minimum of **8 inches (200 mm)** above roofing membrane and **4 inches (100 mm)** onto field of roofing membrane.
 3. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - a. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement, **as directed**.
 4. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.
 5. Roof Drains: Set **30-by-30-inch- (760-by-760-mm-)** square metal flashing in bed of roofing-manufacturer-approved asphaltic adhesive on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of **4 inches (100 mm)** **OR 6 inches (150 mm)**, **as directed**, beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.
 - a. Install stripping according to roofing system manufacturer's written instructions.
- K. Coating Installation
1. Apply coating to roofing membrane **OR** roofing membrane and base flashings, **as directed**, according to manufacturer's written instructions, by spray, roller, or other suitable application method to provide a dry film thickness of not less than **20 mils (0.5 mm)**, **as directed**.
- L. Walkway Installation
1. Walkway Pads: Install walkway pads in cold-applied adhesive, using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.
 2. Walkway Strips: Install walkway cap sheet **OR** backer and cap sheet, **as directed**, strips over roofing membrane using same application method as used for roofing membrane cap sheet.

M. Field Quality Control

1. Testing Agency: Perform tests and inspections and to prepare test reports.
2. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - a. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
 - b. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - c. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.
3. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - a. Notify the Owner 48 hours in advance of date and time of inspection.
4. Roofing system will be considered defective if it does not pass tests and inspections.
 - a. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

N. Protecting And Cleaning

1. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner.
2. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 52 13 00

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07 - Thermal And Moisture Protection

Task	Specification	Specification Description
07 52 13 00	01 95 99 92g	Preparation for Re-Roofing

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SECTION 07 52 16 00 - SBS-MODIFIED BITUMINOUS MEMBRANE ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for styrene-butadiene-styrene (SBS) modified bituminous membrane roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Styrene-butadiene-styrene (SBS) modified bituminous membrane roofing.
 - b. Hybrid roofing system that combines built-up ply sheets with SBS-modified bituminous membrane roofing.
 - c. Vapor retarder.
 - d. Roof insulation.
2. Section includes the installation of insulation strips in ribs of acoustical roof deck. Insulation strips are furnished under Division 05 Section "Steel Decking".

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
2. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mop-applied roofing asphalt and 75 centipoise for mechanical spreader-applied roofing asphalt, within a range of plus or minus **25 deg F (14 deg C)**, measured at the mop cart or mechanical spreader immediately before application.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: If membrane roofing system is to be designed to withstand uplift pressure established by ASCE/SEI 7, provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
 - a. Corner Uplift Pressure: as directed by the Owner .
 - b. Perimeter Uplift Pressure: as directed by the Owner .
 - c. Field-of-Roof Uplift Pressure: as directed by the Owner .
4. FM Approvals Listing: If Project is FM Global insured or if FM Approvals requirements will set a minimum quality standard, provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120, **as directed**.
 - b. Hail Resistance Rating: MH **OR** SH, **as directed**.

5. Energy Performance (if required for LEED-NC Credit SS 7.2): Provide roofing system with initial Solar Reflectance Index not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
 6. Energy Performance (for roofs that must comply with DOE's ENERGY STAR requirements): Provide roofing system that is listed on DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
 7. Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial Solar Reflectance not less than 0.70 and Thermal Emittance not less than 0.75 when tested according to Cool Roof Rating Council's CRRR-1.
- E. Submittals
1. Product Data: For each type of product indicated.
 2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - a. Base flashings and membrane terminations.
 - b. Tapered insulation, including slopes.
 - c. Crickets, saddles, and tapered edge strips, including slopes.
 - d. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
 4. Samples: For the following products:
 - a. Sheet roofing materials, including base sheet, base-ply sheet, roofing membrane sheet, flashing backer sheet, membrane cap sheet and flashing sheet, of color specified.
 - b. Roof insulation.
 - c. **3 lb (1.5 kg)** of aggregate surfacing material in gradation and color indicated.
 - d. Walkway pads or rolls.
 - e. Six insulation fasteners of each type, length, and finish.
 5. Qualification Data: For qualified Installer, manufacturer and testing agency.
 6. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
 7. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
 8. Research/Evaluation Reports: For components of membrane roofing system, from the ICC-ES **OR** applicable model code organization, **as directed**.
 9. Maintenance Data: For roofing system to include in maintenance manuals.
 10. Warranties: Sample of special warranties.
- F. Quality Assurance
1. Manufacturer Qualifications: A qualified manufacturer that is UL listed **OR** FM Approvals approved, **as directed**, for membrane roofing system identical to that used for this Project.
 2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 3. Source Limitations: Obtain components including roof insulation and fasteners for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
 4. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.

5. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
6. Preinstallation Roofing Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

H. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

I. Warranty

1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period.
 - a. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories, and other components of membrane roofing system.
 - b. Warranty Period: 10 **OR** 15 **OR** 20 **OR** 25 **OR** 30, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. SBS-Modified Asphalt-Sheet Materials

1. Roofing Membrane Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
2. Smooth-Surfaced Roofing Membrane Cap Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
OR
Granule-Surface Roofing Membrane Cap Sheet: ASTM D 6164, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.

3. Metal-Foil-Surfaced Roofing Membrane Cap Sheet: ASTM D 6298, metal-foil surfaced SBS-modified asphalt sheet (reinforced with glass fibers); suitable for application method specified, and as follows:
 - a. Foil Surfacing: Aluminum **OR** Copper **OR** Stainless steel **OR** Aluminum, fluoropolymer-coated finish, of color and gloss selected from manufacturer's full range, **as directed**.
- B. Base-Sheet Materials
 1. Sheathing Paper: Red-rosin type, minimum **3 lb/100 sq. ft. (0.16 kg/sq. m)**.
 2. Base Sheet: ASTM D 4601, Type II, SBS-modified, asphalt-impregnated and -coated sheet, with glass-fiber-reinforcing mat, dusted with fine mineral surfacing on both sides.
 - a. Weight: **25 lb/100 sq. ft. (1.2 kg/sq. m) OR 40 lb/100 sq. ft. (1.95 kg/sq. m) OR 50 lb/100 sq. ft. (2.4 kg/sq. m) OR 60 lb/100 sq. ft. (2.9 kg/sq. m) OR 75 lb/100 sq. ft. (3.7 kg/sq. m)**, **as directed**, minimum.

OR
Base Sheet: ASTM D 4601, Type I **OR** Type II, **as directed**, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR
Base Sheet: ASTM D 4897, Type II, venting, nonperforated, heavyweight, asphalt-impregnated and -coated, glass-fiber base sheet with coarse granular surfacing or embossed venting channels on bottom surface.

OR
Base Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.
- C. Base-Ply Sheet Materials
 1. Glass-Fiber Base-Ply Sheet: ASTM D 2178, Type IV **OR** Type VI, **as directed**, asphalt-impregnated, glass-fiber felt.
- D. Base Flashing Sheet Materials
 1. Backer Sheet: ASTM D 4601, Type I **OR** Type II, **as directed**, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

OR
Backer Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

OR
Backer Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade S, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; smooth surfaced; suitable for application method specified.
 2. Granule-Surfaced Flashing Sheet: ASTM D 6164, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.

OR
Metal-Foil-Surfaced Flashing Sheet: ASTM D 6298, metal-foil surfaced SBS-modified asphalt sheet (reinforced with glass fibers); suitable for application method specified, and as follows:
 - a. Foil Surfacing: Aluminum **OR** Copper **OR** Stainless steel **OR** Aluminum, fluoropolymer-coated finish, of color and gloss selected from manufacturer's full range, **as directed**.
 3. Glass-Fiber Fabric: Woven glass-fiber cloth, treated with asphalt, complying with ASTM D 1668, Type I.
- E. Auxiliary Roofing Membrane Materials

1. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing membrane.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesive: 80 g/L.
 - 6) Other Adhesives: 250 g/L.
 - 7) Nonmembrane Roof Sealants: 300 g/L.
 - 8) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 9) Sealant Primers for Porous Substrates: 775 g/L.
 2. Asphalt Primer: ASTM D 41.
 3. Roofing Asphalt: ASTM D 312, Type III **OR** Type IV **OR** Type III or IV as recommended by roofing system manufacturer for application, **as directed**.
OR
Roofing Asphalt: ASTM D 6152, SEBS modified.
 4. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with roofing membrane and base flashings.
 5. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing system manufacturer for application.
 6. Mastic Sealant: Polyisobutylene, plain or modified bitumen; nonhardening, nonmigrating, nonskinning, and nondrying.
 7. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.
 8. Metal Flashing Sheet: As specified in Division 07 Section "Sheet Metal Flashing And Trim".
 9. Roofing Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing **No. 8 (2.36-mm)** sieve and 98 percent of mass retained on **No. 40 (0.425-mm)** sieve, color to match roofing membrane.
 10. Aggregate Surfacing: ASTM D 1863, No. 6 or No. 67, clean, dry, opaque, water-worn gravel or crushed stone, free of sharp edges **OR** crushed slag, free of sharp edges, **as directed**.
 11. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.
- F. Substrate Boards
1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR Type X, 5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick, seal coated.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

G. Vapor Retarder

1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
OR
Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
2. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn, with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
3. Self-Adhering Sheet Vapor Retarder: ASTM D 1970, minimum of **40-mil- (1.0-mm-)** thick, polyethylene film laminated to layer of rubberized asphalt adhesive; maximum permeance rating of **0.1 perm (6 ng/Pa x s x sq. m)**; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
OR
Self-Adhering Sheet Vapor Retarder: **30- to 40-mil- (0.76- to 1.0-mm-)** thick, polyethylene film laminated to layer of butyl rubber adhesive; maximum permeance rating of **0.1 perm (6 ng/Pa x s x sq. m)**; cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor-retarder manufacturer.
4. Glass-Fiber Felt: ASTM D 2178, Type IV, asphalt impregnated.

H. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.6-lb/cu. ft. (26-kg/cu. m)** **OR** Type X, **1.3-lb/cu. ft. (21-kg/cu. m)**, **as directed**, minimum density, square edged.
3. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m)** **OR** Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m)** **OR** Type IX, **1.8-lb/cu. ft. (29-kg/cu. m)**, **as directed**, minimum density.
4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m)** **OR** Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m)** **OR** Type IX, **1.8-lb/cu. ft. (29-kg/cu. m)**, **as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, **1/2 inch (13 mm)** thick.
OR
Facer: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR** Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board, as indicated below by type, on one major surface and felt or glass-fiber mat facer on the other surface.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass-mat-faced gypsum board facer, **1/4 inch (6 mm)** thick.
7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.

10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48)** unless otherwise indicated.
 11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- I. Insulation Accessories
1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.
 3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphaltic, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
OR
Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one-component or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
OR
Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 4. Insulation Cant Strips: ASTM C 728, perlite insulation board.
OR
Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
 5. Wood Nailer Strips: Comply with requirements in Division 06 Section(s) "Rough Carpentry" OR "Miscellaneous Rough Carpentry", **as directed**.
 6. Tapered Edge Strips: ASTM C 728, perlite insulation board.
OR
Tapered Edge Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
 7. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR
Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
OR
Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick, factory primed, **as directed**.
OR
Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick.
 8. Substrate Joint Tape: **6- or 8-inch- (150- or 200-mm-)** wide, coated, glass-fiber joint tape.
- J. Walkways
1. Walkway Pads: Reinforced asphaltic composition pads with slip-resisting mineral-granule surface **OR** Polymer-modified, reconstituted rubber pads with slip-resisting textured surface, **as directed**, manufactured as a traffic pad for foot traffic and acceptable to roofing system manufacturer, **3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 3/4 inch (19 mm), as directed**, thick, minimum.
 2. Walkway Cap Sheet Strips: ASTM D 6164, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with polyester fabric) **OR** ASTM D 6163, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with glass fibers) **OR** ASTM D 6162, Grade G, Type I or II, SBS-modified asphalt sheet (reinforced with a combination of polyester fabric and glass fibers), **as directed**; granular surfaced; suitable for application method specified, and as follows:
 - a. Granule Color: White **OR** Gray **OR** Tan, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - a. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - b. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - c. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 5 Section "Steel Deck."
 - d. Verify that minimum concrete drying period recommended by roofing system manufacturer has passed.
 - e. Verify that concrete substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 1) Test for moisture by pouring **1 pint (0.5 L)** of hot roofing asphalt on deck at start of each day's work and at start of each roof area or plane. Do not proceed with roofing work if test sample foams or can be easily and cleanly stripped after cooling.
 - f. Verify that concrete-curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 - g. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of **1/16 inch (1.6 mm)** out of plane relative to adjoining deck.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Prime surface of concrete deck with asphalt primer at a rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
4. Install insulation strips in ribs of acoustical roof decks according to acoustical roof deck manufacturer's written instructions.

C. Substrate Board Installation

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

D. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.
2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:

- a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
 3. Self-Adhering Sheet Vapor Retarder: Prime substrate if required by manufacturer. Install self-adhering sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of **3-1/2 inches (90 mm)** and **6 inches (150 mm)**, respectively. Seal laps by rolling.
 4. Built-up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 5. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.
- E. Insulation Installation
1. Comply with roofing system manufacturer's written instructions for installing roof insulation.
 2. Install one lapped base-sheet course and mechanically fasten to substrate according to roofing system manufacturer's written instructions.
 3. Nailer Strips: Mechanically fasten **4-inch nominal- (89-mm actual-)** width wood nailer strips of same thickness as insulation perpendicular to sloped roof deck at the following spacing:
 - a. **16 feet (4.88 m)** apart for roof slopes steeper than **1 inch per 12 inches (1:12)** but less than **3 inches per 12 inches (3:12)**.
 - b. **48 inches (1220 mm)** apart for roof slopes steeper than **3 inches per 12 inches (3:12)**.
 4. Insulation Cant Strips: Install and secure preformed 45-degree insulation cant strips at junctures of roofing membrane system with vertical surfaces or angle changes more than 45 degrees.
 5. Install tapered insulation under area of roofing to conform to slopes indicated.
 6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
 7. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or more, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 8. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 9. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
 10. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 11. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

- a. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
 - b. If number of fasteners will be based on ASCE/SEI 7's uplift pressure or SPRI's factored design uplift pressure, fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
12. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
13. If Project is FM Global insured or if FM Approvals requirements are proposed as a performance standard, fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
14. If fastening is calculated from ASCE/SEI 7's uplift pressure or SPRI's factored design uplift pressure, fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
- a. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- F. If cover boards will be field installed over roof insulation and immediately below roofing membrane, install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints a minimum of **6 inches (150 mm)** in each direction from joints of insulation below. Loosely butt cover boards together and fasten to roof deck, **as directed**. Tape joints if required by roofing system manufacturer.
- a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Apply hot roofing asphalt to underside, and immediately bond cover board to substrate.
- G. Roofing Membrane Installation, General
1. If referencing NRCA's roof assembly identification matrix system, install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - a. Install roofing system MBS **OR** MBSH, **as directed**, -2 **OR** 3 **OR** 4, **as directed**, -N **OR** I **OR** C, **as directed**, -T **OR** M **OR** L, **as directed**, -A **OR** M **OR** F, **as directed**, according to roof assembly identification matrix and roof assembly layout illustrations in NRCA's "The NRCA Roofing and Waterproofing Manual" and to requirements in this Section.
 2. For roof system that exceeds requirements of NRCA's roof assemblies, install roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing" and as follows:
 - a. Deck Type: N (nailable) **OR** I (insulated) **OR** C (concrete or nonnailable), **as directed**.
 - b. Adhering Method: T (torched) **OR** M (mopped) **OR** L (cold-applied adhesive), **as directed**.
 - c. Base Sheet: One **OR** One, installed over sheathing paper, **as directed**.
 - d. Number of Glass-Fiber Base-Ply Sheets: One **OR** Two, **as directed**.
 - e. Number of SBS-Modified Asphalt Sheets: One **OR** Two, **as directed**.

- f. Surfacing Type: A (aggregate) **OR** M (mineral-granule-surfaced cap sheet) **OR** F (foil-surfaced cap sheet), **as directed**.
 3. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.
 4. Where roof slope exceeds **1/2 inch per 12 inches (1:24) OR 3/4 inch per 12 inches (1:18)**, **as directed**, install roofing membrane sheets parallel with slope.
 - a. Backnail roofing membrane sheets to nailer strips **OR** substrate, **as directed**, according to roofing system manufacturer's written instructions.
 5. Cooperate with testing agencies engaged or required to perform services for installing roofing system.
 6. Coordinate installation of roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 - a. At end of each day's work, provide tie-offs to cover exposed roofing membrane sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 - b. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.
 - c. Remove and discard temporary seals before beginning work on adjoining roofing.
 7. Asphalt Heating: Do not raise roofing asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed roofing asphalt manufacturer's recommended temperature limits during roofing asphalt heating. Do not heat roofing asphalt within **25 deg F (14 deg C)** of flash point. Discard roofing asphalt maintained at a temperature exceeding finished blowing temperature for more than four hours.

OR

Asphalt Heating: Heat and apply SEBS-modified roofing asphalt according to roofing system manufacturer's written instructions.
 8. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.
- H. Base-Sheet Installation
1. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 2. Install lapped base-sheet course, extending sheet over and terminating beyond cants. Attach base sheet as follows:
 - a. Mechanically fasten to substrate, for nailable substrate.

OR

Spot- or strip-mop to substrate with hot roofing asphalt.

OR

Adhere to substrate in a solid mopping of hot roofing asphalt **OR** uniform coating of cold-applied adhesive, **as directed**, for nonnailable or insulated substrates.
- I. Base-Ply Sheet Installation
1. Install glass-fiber base-ply sheets according to roofing system manufacturer's written instructions starting at low point of roofing system. Align glass-fiber base-ply sheets without stretching. Extend sheets over and terminate beyond cants.
 - a. Shingle side laps of glass-fiber base-ply sheets uniformly to ensure that required number of glass-fiber base-ply sheets covers substrate at any point. Shingle in direction to shed water.
 - b. Embed each glass-fiber base-ply sheet in a continuous void-free mopping of hot roofing asphalt to form a uniform membrane without glass-fiber base-ply sheets touching.
- J. SBS-Modified Bituminous Membrane Installation

1. Install modified bituminous roofing membrane cap sheet **OR** sheet and cap sheet, **as directed**, according to roofing manufacturer's written instructions, starting at low point of roofing system. Extend roofing membrane sheets over and terminate beyond cants, installing as follows:
 - a. Adhere to substrate in a solid mopping of hot roofing asphalt applied at not less than **425 deg F (218 deg C)**.
OR
Adhere to substrate in cold-applied adhesive.
OR
Torch apply to substrate.
 - b. Unroll roofing membrane sheets and allow them to relax for minimum time period required by manufacturer.
2. Laps: Accurately align roofing membrane sheets, without stretching, and maintain uniform side and end laps. Stagger end laps. Completely bond and seal laps, leaving no voids.
 - a. Repair tears and voids in laps and lapped seams not completely sealed.
 - b. Apply roofing granules to cover exuded bead at laps while bead is hot.
3. Install roofing membrane sheets so side and end laps shed water.
4. Aggregate Surfacing: Promptly after installing and testing roofing membrane, base flashing, and stripping, flood-coat roof surface with **60 lb/100 sq. ft. (3 kg/sq. m)** of hot roofing asphalt. While flood coat is hot and fluid, cast the following average weight of aggregate in a uniform course:
 - a. Aggregate Weight: **400 lb/100 sq. ft. (20 kg/sq. m)** for gravel or crushed stone or **300 lb/100 sq. ft. (15 kg/sq. m)** for slag.

K. Flashing And Stripping Installation

1. Install base flashing over cant strips and other sloped and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to roofing system manufacturer's written instructions, and as follows:
 - a. Prime substrates with asphalt primer if required by roofing system manufacturer.
 - b. Backer Sheet Application: Mechanically fasten backer sheet to walls or parapets. Adhere backer sheet over roofing membrane at cants in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive, **as directed**.
OR
Backer Sheet Application: Adhere backer sheet to substrate in a solid mopping of hot roofing asphalt **OR** cold-applied adhesive at rate required by roofing system manufacturer, **as directed**.
 - c. Flashing Sheet Application: Adhere flashing sheet to substrate in a solid mopping of hot roofing asphalt applied at not less than **425 deg F (218 deg C)**. Apply hot roofing asphalt to back of flashing sheet if recommended by roofing system manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in cold-applied adhesive at rate required by roofing system manufacturer.
OR
Flashing Sheet Application: Adhere flashing sheet to substrate in asphalt roofing cement at rate required by roofing system manufacturer.
OR
Flashing Sheet Application: Torch apply flashing sheet to substrate.
2. Extend base flashing up walls or parapets a minimum of **8 inches (200 mm)** above roofing membrane and **4 inches (100 mm)** onto field of roofing membrane.
3. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - a. Seal top termination of base flashing with a strip of glass-fiber fabric set in asphalt roofing cement, **as directed**.
4. Install roofing membrane cap-sheet stripping where metal flanges and edgings are set on membrane roofing according to roofing system manufacturer's written instructions.
5. Roof Drains: Set **30-by-30-inch- (760-by-760-mm-)** square metal flashing in bed of asphalt roofing cement on completed roofing membrane. Cover metal flashing with roofing membrane cap-sheet stripping and extend a minimum of **4 inches (100 mm) OR 6 inches (150 mm), as**

directed, beyond edge of metal flashing onto field of roofing membrane. Clamp roofing membrane, metal flashing, and stripping into roof-drain clamping ring.

- a. Install stripping according to roofing system manufacturer's written instructions.

L. Walkway Installation

1. Walkway Pads: Install walkway pads using units of size indicated or, if not indicated, of manufacturer's standard size according to walkway pad manufacturer's written instructions.

- a. Set walkway pads in cold-applied adhesive.

OR

Set walkway pads in additional pour coat of hot roofing asphalt after aggregate surfacing of modified bituminous roofing membrane.

2. Walkway Cap Sheet Strips: Install walkway cap sheet strips over roofing membrane using same application method as used for roofing membrane cap sheet. Install walkway cap sheet strips before flood coat and aggregate surface is applied, **as directed**.

M. Field Quality Control

1. Testing Agency: Perform tests and inspections and to prepare test reports.
2. Test Cuts: Test specimens will be removed to evaluate problems observed during quality-assurance inspections of roofing membrane as follows:
 - a. Approximate quantities of components within roofing membrane will be determined according to ASTM D 3617.
 - b. Test specimens will be examined for interply voids according to ASTM D 3617 and to comply with criteria established in Appendix 3 in ARMA/NRCA's "Quality Control Guidelines for the Application of Polymer Modified Bitumen Roofing."
 - c. Repair areas where test cuts were made according to roofing system manufacturer's written instructions.
3. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - a. Notify the Owner 48 hours in advance of date and time of inspection.
4. Roofing system will be considered defective if it does not pass tests and inspections.
 - a. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

N. Protecting And Cleaning

1. Protect roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner.
2. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 52 16 00

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Task	Specification	Specification Description
07 52 16 00	01 95 99 92g	Preparation for Re-Roofing

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SECTION 07 53 16 00 - CSPE MEMBRANE ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for chlorosulfonate-polyethylene (CSPE) roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Adhered CSPE membrane roofing system.
 - b. Mechanically fastened CSPE membrane roofing system.
 - c. Loosely laid and ballasted CSPE membrane roofing system.
 - d. Vapor retarder.
 - e. Roof insulation.
2. Section includes the installation of acoustical roof deck rib insulation strips furnished under Division 05 Section "Steel Decking".

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
4. FM Approvals Listing, **as directed**: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120 **OR** Class 1A-135 **OR** Class 1A-150 **OR** Class 1A-165, **as directed**.
 - b. Hail Resistance: MH **OR** SH, **as directed**.
5. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 **OR** 29, **as directed**, when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
6. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low **OR** steep, **as directed**, -slope roof products.
7. Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.

2. LEED Submittals:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 4. Samples: For each product included in the roofing system.
 5. Research/evaluation reports.
 6. Field quality-control reports.
 7. Maintenance data.
 8. Warranties: Sample of special warranties.
- F. Quality Assurance
1. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 2. Source Limitations: Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
 3. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
 4. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 5. Preinstallation Roofing Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
 2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- H. Project Conditions
1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- I. Warranty
1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within 10 **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. CSPE Membrane Roofing

1. CSPE: ASTM D 5019, Type 1, Grade 2, **45-mil- (1.1-mm-)** thick, reinforced, flexible uncured sheet formed from CSPE, and as follows:
 - a. Exposed Face Color: White **OR** Blue **OR** Light gray **OR** Tan, **as directed**.

B. Auxiliary Membrane Roofing Materials

1. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesive: 80 g/L.
 - 6) Single-Ply Roof Membrane Sealants: 450 g/L.
 - 7) Nonmembrane Roof Sealants: 300 g/L.
 - 8) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 9) Sealant Primers for Porous Substrates: 775 g/L.
 - 10) Other Adhesives and Sealants: 250 g/L.
2. Sheet Flashing: **45-mil- (1.1-mm-)** thick, reinforced and **55-mil- (1.4-mm-)** thick, non-reinforced CSPE as recommended by roofing system manufacturer for intended use.
3. Bonding Adhesive: Manufacturer's standard, water based, **as directed**.
4. Slip Sheet: Manufacturer's standard, of thickness required for application.
5. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately **1 by 1/8 inch (25 by 3 mm)** thick; with anchors.
6. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately **1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick)**, prepunched.
7. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
8. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

C. Substrate Boards

1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR Type X, 5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick, seal coated.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

D. Vapor Retarder

1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
 - b. Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
2. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
3. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt impregnated.

E. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by CSPE membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.6-lb/cu. ft. (26-kg/cu. m)** OR Type X, **1.3-lb/cu. ft. (21-kg/cu. m)**, **as directed**, minimum density, square edged.
3. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m)** OR Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m)** OR Type IX, **1.8-lb/cu. ft. (29-kg/cu. m)**, **as directed**, minimum density.
4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m)** OR Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m)** OR Type IX, **1.8-lb/cu. ft. (29-kg/cu. m)**, **as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, **1/2 inch (13 mm)** thick.
OR
Facer: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 OR Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass mat faced gypsum board facer, **1/4 inch (6 mm)** thick.
7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48)** unless otherwise indicated.
11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

F. Insulation Accessories

1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards, **as directed**, to substrate, and acceptable to roofing system manufacturer.

3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphalt, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 4. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 5. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 6. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR
Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
OR
Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick, factory primed, **as directed**.
OR
Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick.
 7. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.
- G. Asphalt Materials
1. Roofing Asphalt: ASTM D 312, Type III or Type IV **OR** ASTM D 6152, SEBS modified, **as directed**.
 2. Asphalt Primer: ASTM D 41.
- H. Aggregate Ballast (for loosely laid and aggregate-ballasted installations)
1. Aggregate Ballast: Provide aggregate ballast that will withstand weather exposure without significant deterioration and will not contribute to membrane degradation, of the following type and size:
 - a. Aggregate Type: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone **OR** Crushed gravel or crushed stone, **as directed**.
 - b. Size: ASTM D 448, Size 4, ranging in size from **3/4 to 1-1/2 inches (19 to 38 mm)**.
OR
Size: ASTM D 448, Size 2, ranging in size from **1-1/2 to 2-1/2 inches (38 to 63 mm)**.
OR
Size: ASTM D 448, Size 3, ranging in size from **1 to 2 inches (25 to 50 mm)**.
- I. Roof Pavers
1. Lightweight Roof Pavers: Interlocking, lightweight concrete units, specially factory cast for use as roof ballast; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled; and as follows:
 - a. Size: 8 by 16 inches (200 by 400 mm) **OR** 12 by 12 inches (300 by 300 mm) **OR** 12 by 16-1/2 inches (300 by 420 mm) **OR** 12 by 18 inches (300 by 450 mm), **as directed**.
 - b. Weight: At least 10 lb/sq. ft. (50 kg/sq. m) but not exceeding 18 lb/sq. ft. (90 kg/sq. m).
 - c. Compressive Strength: **2500 psi (17 MPa) OR 5000 psi (34 MPa), as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.
 2. Heavyweight Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm), as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:

- a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm), as directed.** Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
- b. Weight: **18 lb/sq. ft. (90 kg/sq. m) OR 22 lb/sq. ft. (110 kg/sq. m), as directed.**
- c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa), as directed,** minimum.
- d. Colors and Textures: As selected from manufacturer's full range.

J. Walkways

1. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads **OR** rolls, **as directed**, approximately **3/16 inch (5 mm)** thick, and acceptable to membrane roofing system manufacturer.
2. Walkway Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm), as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm), as directed.** Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m) OR 22 lb/sq. ft. (110 kg/sq. m), as directed.**
 - c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa), as directed,** minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

1.3 EXECUTION

A. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
4. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking", according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

B. Substrate Board

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

C. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed.**

2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:
 - a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
3. Built-Up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
4. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

D. Insulation Installation

1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
2. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
3. Install tapered insulation under area of roofing to conform to slopes indicated.
4. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
5. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
7. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 - c. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
8. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
9. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.

OR

Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.

- b. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.

OR

Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

OR

Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

10. Loosely Laid Insulation: Loosely lay insulation units over substrate.
11. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck, **as directed**.
 - a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
- OR**
12. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
12. Install slip sheet over insulation **OR** cover board, **as directed**, and immediately beneath membrane roofing.

E. Adhered Membrane Roofing Installation

1. Adhere membrane **OR** fabric-backed membrane, **as directed**, roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
2. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
5. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
6. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
7. Seams: Clean seam areas, overlap membrane roofing, and weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation. Complete welding of seams within 24 hours of exposing CSPE sheet or before curing of CSPE sheet has begun. Weld seams as follows:
 - a. Weld Method: Hot air **OR** Solvent, **as directed**.
 - b. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - c. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - d. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
8. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
9. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system.

F. Mechanically Fastened Membrane Roofing Installation

1. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - a. For in-splice attachment, install membranes roofing with long dimension perpendicular to steel roof deck flutes.

2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.
5. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
6. In-Seam Attachment: Secure one edge of CSPE sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten CSPE sheet to roof deck.
7. Seams: Clean seam areas, overlap membrane roofing, and weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation. Complete welding of seams within 24 hours of exposing CSPE sheet or before curing of CSPE sheet has begun. Weld seams as follows:
 - a. Weld Method: Hot air **OR** Solvent, **as directed**.
 - b. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - c. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - d. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
8. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
9. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system.

G. Loosely Laid And Ballasted Membrane Roofing Installation

1. Loosely lay membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - a. Comply with requirements in SPRI RP-4 for System 1 **OR** System 2 **OR** System 3, **as directed**.
2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Mechanically fasten or adhere perimeter of membrane roofing according to requirements in SPRI RP-4.
OR
Mechanically fasten **OR** adhere, **as directed**, membrane roofing at corners, perimeters, and transitions according to requirements in SPRI RP-4.
 - a. At corners and perimeters, omit aggregate ballast leaving membrane roofing exposed.
 - b. At corners and perimeters, adhere a second layer of membrane roofing.
5. Apply membrane roofing with side laps shingled with slope of deck where possible.
6. Seams: Clean seam areas, overlap membrane roofing, and weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation. Complete welding of seams within 24 hours of exposing CSPE sheet or before curing of CSPE sheet has begun. Weld seams as follows:
 - a. Weld Method: Hot air **OR** Solvent, **as directed**.
 - b. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - c. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - d. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
7. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
8. Install membrane roofing and auxiliary materials to tie in to existing roofing.
9. Install protection mat over membrane roofing, overlapping a minimum of **6 inches (150 mm)**. Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of **12 inches (300 mm)**.

10. Aggregate Ballast: Apply uniformly over membrane roofing at the rate required by membrane roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to membrane roofing system. Lay ballast as membrane roofing is installed, leaving membrane roofing ballasted at the end of the workday.
 - a. Ballast Weight: Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m).**
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m)**, at corners and perimeter; Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m)**, elsewhere.
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m).**
 11. Roof-Paver Ballast: Install lightweight **OR** heavyweight, **as directed**, roof-paver ballast according to manufacturer's written instructions.
OR
Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter.
 - a. Install Size 4 aggregate ballast elsewhere on roofing at a minimum rate of **10 lb/sq. ft. (50 kg/sq. m).**
OR
Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of **13 lb/sq. ft. (65 kg/sq. m).**
- H. Base Flashing Installation
1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
 2. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
 3. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
 4. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation. Complete welding of seams within 24 hours of exposing CSPE sheet or before curing of CSPE sheet has begun.
 5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars, **as directed**.
- I. Walkway Installation
1. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
 2. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave **3 inches (75 mm)** of space between adjacent roof pavers.
- J. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform inspections.
 2. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 3. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
 4. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- K. Protecting And Cleaning
1. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for

- deterioration and damage, describing its nature and extent in a written report, with copies to Owner.
2. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
 3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 53 16 00

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Task	Specification	Specification Description
07 53 16 00	01 95 99 92g	Preparation for Re-Roofing
07 53 16 00	07 51 13 00	Built-Up Asphalt Roofing
07 53 16 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 53 16 00	07 53 23 00	EPDM Membrane Roofing

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SECTION 07 53 23 00 - EPDM MEMBRANE ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for ethylene-propylene-diene-monomer (EPDM) roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Adhered EPDM membrane roofing system.
 - b. Mechanically fastened EPDM membrane roofing system.
 - c. Loosely laid and ballasted EPDM membrane roofing system.
 - d. Vapor retarder.
 - e. Roof insulation.
2. Section includes the installation of acoustical roof deck rib insulation strips furnished under Division 05 Section "Steel Decking".

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
4. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals' markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120 **OR** Class 1A-135 **OR** Class 1A-150 **OR** Class 1A-165, **as directed**.
 - b. Hail Resistance: MH **OR** SH, **as directed**.
5. Energy Performance (for "cool-roof" performance): Provide roofing system with initial Solar Reflectance Index not less than 78 **OR** 29, **as directed**, when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency, **as directed**.
6. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low **OR** steep, **as directed**, -slope roof products, **as directed**.
7. Energy Performance: Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:

- a. Product Test Reports for Credit SS 7.2: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 4. Samples: For each product included in the roofing system.
 5. Manufacturer Certificate: Signed by roofing manufacturer certifying that membrane roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of complying with performance requirements.
 6. Research/evaluation reports.
 7. Field quality-control reports.
 8. Maintenance data.
 9. Warranties: Sample of special warranties.
- F. Quality Assurance
1. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 2. Source Limitations: Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
 3. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
 4. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 5. Preinstallation Roofing Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
 2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- H. Project Conditions
1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- I. Warranty
1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within 10 **OR** 15 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. EPDM Membrane Roofing

1. EPDM: ASTM D 4637, Type I, non-reinforced, **OR** Type II, scrim or fabric internally reinforced, **as directed**, uniform, flexible EPDM sheet.
 - a. Thickness: **45 mils (1.1 mm) OR 60 mils (1.5 mm) OR 75 mils (1.9 mm) OR 90 mils (2.2 mm)**, **as directed**, nominal.
 - b. Exposed Face Color: Black **OR** White on black, **as directed**.
2. Fabric-Backed EPDM: ASTM D 4637, Type III, non-reinforced, uniform, flexible EPDM sheet, laminated to a nonwoven polyester fabric backing except at selvages.
 - a. Composite Thickness: **90 mils (2.3 mm) OR 100 mils (2.5 mm) OR 105 mils (2.7 mm) OR 115 mils (2.9 mm)**, **as directed**, nominal.
 - b. Exposed Face Color: Black **OR** White on black, **as directed**.

B. Auxiliary Membrane Roofing Materials

1. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesive: 80 g/L.
 - 6) Single-Ply Roof Membrane Sealants: 450 g/L.
 - 7) Nonmembrane Roof Sealants: 300 g/L.
 - 8) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 9) Sealant Primers for Porous Substrates: 775 g/L.
 - 10) Other Adhesives and Sealants: 250 g/L.
2. Sheet Flashing: **60-mil- (1.5-mm-)** thick EPDM, partially cured or cured, according to application.
3. Protection Sheet: Epichlorohydrin or neoprene non-reinforced flexible sheet, **55- to 60-mil- (1.4- to 1.5-mm-)** thick, recommended by EPDM manufacturer for resistance to hydrocarbons, non-aromatic solvents, grease, and oil.
4. Bonding Adhesive: Manufacturer's standard, water based, **as directed**.
5. Modified Asphaltic Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard modified asphalt, asbestos-free, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
6. Water-Based, Fabric-Backed Membrane Adhesive: Roofing system manufacturer's standard water-based, cold-applied adhesive formulated for compatibility and use with fabric-backed membrane roofing.
7. Low-Rise, Urethane, Fabric-Backed Membrane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with fabric-backed membrane roofing.
8. Seaming Material: Single-component, butyl splicing adhesive and splice cleaner **OR** Manufacturer's standard, synthetic-rubber polymer primer and **3-inch- (75-mm-)** wide minimum, butyl splice tape with release film, **as directed**.
9. Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing, **as directed**.
10. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
11. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately **1 by 1/8 inch (25 by 3 mm)** thick; with anchors.
12. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately **1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick)**, prepunched.

13. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.
 14. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
 15. Liquid coating, specifically formulated for coating EPDM membrane roofing, as follows:
 - a. Type: Acrylic emulsion **OR** Hypalon, **as directed**.
 - b. Color: White **OR** Gray **OR** Tan **OR** As selected from manufacturer's full range, **as directed**.
- C. Substrate Boards
1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm)** **OR** **1/2 inch (13 mm)** **OR** Type X, **5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm)** **OR** **3/8 inch (10 mm)** **OR** **1/2 inch (13 mm)** **OR** **5/8 inch (16 mm)**, **as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm)** **OR** **1 inch (25 mm)**, **as directed**, thick, seal coated.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.
- D. Vapor Retarder
1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
 - b. Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
 2. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
 3. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt impregnated.
- E. Roof Insulation
1. General: Preformed roof insulation boards manufactured or approved by EPDM membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
 2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.6-lb/cu. ft. (26-kg/cu. m)** **OR** Type X, **1.3-lb/cu. ft. (21-kg/cu. m)**, **as directed**, minimum density, square edged.
 3. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m)** **OR** Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m)** **OR** Type IX, **1.8-lb/cu. ft. (29-kg/cu. m)**, **as directed**, minimum density.
 4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m)** **OR** Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m)** **OR** Type IX, **1.8-lb/cu. ft. (29-kg/cu. m)**, **as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, **1/2 inch (13 mm)** thick.
OR
Facer: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.

5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR** Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
 - a. Type IV, cellulosic-fiber-insulation-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass mat faced gypsum board facer, **1/4 inch (6 mm)** thick.
7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48)** unless otherwise indicated.
11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

F. Insulation Accessories

1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards, **as directed**, to substrate, and acceptable to roofing system manufacturer.
3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphalt, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
4. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
5. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
6. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR
Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
OR
Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
7. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

G. Asphalt Materials

1. Roofing Asphalt: ASTM D 312, Type III or Type IV **OR** ASTM D 6152, SEBS modified, **as directed**.
2. Asphalt Primer: ASTM D 41.

H. Aggregate Ballast (for loosely laid and aggregate-ballasted installations)

1. Aggregate Ballast: Provide aggregate ballast that will withstand weather exposure without significant deterioration and will not contribute to membrane degradation, of the following type and size:
 - a. Aggregate Type: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone **OR** Crushed gravel or crushed stone, **as directed**.
 - b. Size: ASTM D 448, Size 4, ranging in size from **3/4 to 1-1/2 inches (19 to 38 mm)**.
OR
Size: ASTM D 448, Size 2, ranging in size from **1-1/2 to 2-1/2 inches (38 to 63 mm)**.
OR
Size: ASTM D 448, Size 3, ranging in size from **1 to 2 inches (25 to 50 mm)**.
- I. Roof Pavers
 1. Lightweight Roof Pavers: Interlocking, lightweight concrete units, specially factory cast for use as roof ballast; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled; and as follows:
 - a. Size: 8 by 16 inches (200 by 400 mm) **OR** 12 by 12 inches (300 by 300 mm) **OR** 12 by 16-1/2 inches (300 by 420 mm) **OR** 12 by 18 inches (300 by 450 mm), **as directed**.
 - b. Weight: At least 10 lb/sq. ft. (50 kg/sq. m) but not exceeding 18 lb/sq. ft. (90 kg/sq. m).
 - c. Compressive Strength: **2500 psi (17 MPa) OR 5000 psi (34 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.
 2. Rubber Roof Pavers: Interlocking, lightweight rubber units, **24 by 24 by 2-1/4 inches (600 by 600 by 57 mm)**, **6 lb/sq. ft. (30 kg/sq. m)** specially manufactured for use as roof ballast; with grooved back for four-way drainage, beveled and doweled; and as follows:
 - a. Perimeter Securement Strip: Manufacturer's standard coated steel sheet channel **OR** aluminum sheet channel **OR** mill-finish aluminum sheet hold down **OR** coated aluminum sheet hold down, color as selected, **as directed**, and fasteners.
 - b. Color: Black **OR** Gray **OR** Terra cotta, **as directed**.
 3. Heavyweight Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm)**, **as directed**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m) OR 22 lb/sq. ft. (110 kg/sq. m)**, **as directed**.
 - c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.
- J. Walkways
 1. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads **OR** rolls, **as directed**, approximately **3/16 inch (5 mm)** thick, and acceptable to membrane roofing system manufacturer.
 2. Walkway Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm)**, **as directed**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m) OR 22 lb/sq. ft. (110 kg/sq. m)**, **as directed**.
 - c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

1.3 EXECUTION

A. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
4. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking", according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

B. Substrate Board

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

C. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.
2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:
 - a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
3. Built-Up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
4. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

D. Insulation Installation

1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
2. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
3. Install tapered insulation under area of roofing to conform to slopes indicated.
4. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.

- a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 5. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
 7. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 - c. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

OR

Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 8. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.

OR

Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
 9. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.

OR

Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.

OR

Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.

OR

Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 10. Loosely Laid Insulation: Loosely lay insulation units over substrate.
 11. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck, **as directed**.
 - a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.

OR

Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
- E. Adhered Membrane Roofing Installation
1. Adhere membrane **OR** fabric-backed membrane, **as directed**, roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

2. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
5. Hot Roofing Asphalt: Apply a solid mopping of hot roofing asphalt to substrate at temperature and rate required by manufacturer and install fabric-backed membrane roofing. Do not apply to splice area of membrane roofing.

OR

Fabric-Backed Membrane Adhesive: Apply to substrate at rate required by manufacturer and install fabric-backed membrane roofing.

6. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeters.
7. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
8. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
 - a. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.
9. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
10. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
11. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
12. Install membrane roofing and auxiliary materials to tie in to existing membrane roofing to maintain weather-tightness of transition and to not void warranty for existing membrane roofing system.
13. Adhere protection sheet over membrane roofing at locations indicated.

F. Mechanically Fastened Membrane Roofing Installation

1. Mechanically fasten membrane roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
 - a. For in-splice attachment, install membrane roofing with long dimension perpendicular to steel roof deck flutes.
2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.
5. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
6. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
 - a. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.
7. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
8. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

9. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
10. In-Splice Attachment: Secure one edge of membrane roofing using fastening plates or metal battens centered within membrane splice and mechanically fasten membrane roofing to roof deck. Field splice seam.
OR
Through-Membrane Attachment: Secure membrane roofing using fastening plates or metal battens and mechanically fasten membrane roofing to roof deck. Cover battens and fasteners with a continuous cover strip.
11. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weather-tightness of transition and to not void warranty for existing membrane roofing system.
12. Adhere protection sheet over membrane roofing at locations indicated.

G. Loosely Laid And Ballasted Membrane Roofing Installation

1. Loosely lay membrane roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.
 - a. Comply with requirements in SPRI RP-4 for System 1 **OR** System 2 **OR** System 3, **as directed**.
2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Mechanically fasten or adhere perimeter of membrane roofing according to requirements in SPRI RP-4.
OR
Mechanically fasten or adhere membrane roofing at corners, perimeters, and transitions according to requirements in SPRI RP-4.
 - a. At corners and perimeters, omit aggregate ballast leaving membrane roofing exposed.
 - b. At corners and perimeters, adhere a second layer of membrane roofing
5. Apply membrane roofing with side laps shingled with slope of deck where possible.
6. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
 - a. Apply a continuous bead of in-seam sealant before closing splice if required by membrane roofing system manufacturer.
7. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping membrane roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of membrane roofing terminations.
8. Leave seams uncovered until inspected by membrane roofing system manufacturer **OR** testing agency, **as directed**.
9. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
10. Spread sealant or mastic bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
11. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weather-tightness of transition and to not void warranty for existing membrane roofing system.
12. Adhere protection sheet over membrane roofing at locations indicated.
13. Install protection mat over membrane roofing, overlapping a minimum of **6 inches (150 mm)**. Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of **12 inches (300 mm)**.
14. Aggregate Ballast, **as directed**: Apply uniformly over membrane roofing at the rate required by membrane roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to membrane roofing system. Lay ballast as membrane roofing is installed, leaving membrane roofing ballasted at the end of the workday.

- a. Ballast Weight: Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m).**
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m)**, at corners and perimeter; Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m)**, elsewhere.
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m).**
- 15. Roof-Paver Ballast: Install lightweight **OR** heavyweight, **as directed**, roof-paver ballast according to manufacturer's written instructions.
OR
Roof-Paver Ballast: Install rubber roof-paver ballast according to manufacturer's written instructions, in locations indicated.
 - a. Install perimeter paver edge securement.
OR
Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter.
 - b. Install Size 4 aggregate ballast elsewhere on roofing at a minimum rate of **10 lb/sq. ft. (50 kg/sq. m).**
OR
Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of **13 lb/sq. ft. (65 kg/sq. m).**
- H. Base Flashing Installation
 - 1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
 - 2. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
 - 3. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
 - 4. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
 - 5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars, **as directed**.
- I. Coating Installation
 - 1. Apply coatings to membrane roofing **OR** base flashings, **as directed**, according to manufacturer's written recommendations, by spray, roller, or other suitable application method.
- J. Walkway Installation
 - 1. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
 - 2. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave **3 inches (75 mm)** of space between adjacent roof pavers.
- K. Field Quality Control
 - 1. Testing Agency: Engage a qualified independent testing agency to perform inspections.
 - 2. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 - 3. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
 - 4. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- L. Protecting And Cleaning

07 - Thermal And Moisture Protection



1. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner.
2. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 53 23 00

Task	Specification	Specification Description
07 53 23 00	01 95 99 92g	Preparation for Re-Roofing
07 53 23 00	07 51 13 00	Built-Up Asphalt Roofing
07 53 23 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 53 29 00	01 95 99 92g	Preparation for Re-Roofing
07 53 29 00	07 51 13 00	Built-Up Asphalt Roofing
07 53 29 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 53 29 00	07 53 23 00	EPDM Membrane Roofing

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SECTION 07 54 19 00 - POLYVINYL-CHLORIDE (PVC) ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for polyvinyl-chloride (PVC) roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Adhered PVC membrane roofing system.
 - b. Mechanically fastened PVC membrane roofing system.
 - c. Loosely laid and ballasted PVC membrane roofing system.
 - d. Vapor retarder.
 - e. Roof insulation.
2. Section includes the installation of acoustical roof deck rib insulation strips furnished under Division 05 Section "Steel Decking".

C. Definitions

1. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
4. FM Approvals Listing, **as directed**: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120 **OR** Class 1A-135 **OR** Class 1A-150 **OR** Class 1A-165, **as directed**.
 - b. Hail Resistance: MH **OR** SH, **as directed**.
5. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 **OR** 29, **as directed**, when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
6. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low **OR** steep, **as directed**, -slope roof products.
7. Energy Performance(for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.

2. LEED Submittals:
 - a. Product Data for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 4. Samples: For each product included in the roofing system.
 5. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 6. Research/evaluation reports.
 7. Field quality-control reports.
 8. Maintenance data.
 9. Warranties: Sample of special warranties.
- F. Quality Assurance
1. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 2. Source Limitations: Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
 3. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
 4. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 5. Preinstallation Roofing Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
 2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- H. Project Conditions
1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- I. Warranty
1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within 10 **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. PVC Membrane Roofing

1. PVC Sheet: ASTM D 4434, Type II, Grade I, glass fiber reinforced, felt backed.
 - a. Thickness: **48 mils (1.2 mm)**, minimum **OR 60 mils (1.5 mm)**, nominal **OR 72 mils (1.8 mm) OR 80 mils (2.0 mm) OR 96 mils (2.4 mm)**, **as directed**.
 - b. Exposed Face Color: Gray.

OR
- PVC Sheet: ASTM D 4434, Type III, fabric reinforced and fabric backed, **as directed**.
 - a. Thickness: **45 mils (1.1 mm)**, minimum **OR 48 mils (1.2 mm) OR 50 mils (1.27 mm) OR 60 mils (1.5 mm)**, nominal **OR 72 mils (1.8 mm) OR 80 mils (2.0 mm) OR 100 mils (2.5 mm)**, **as directed**.
 - b. Exposed Face Color: White **OR** Gray, **as directed**.

OR
- PVC Sheet: ASTM D 4434, Type IV, fabric reinforced and fabric backed, **as directed**.
 - a. Thickness: **36 mils (0.9 mm)**, minimum **OR 40 mils (1.0 mm)**, nominal **OR 50 mils (1.27 mm) OR 60 mils (1.5 mm)**, nominal **OR 72 mils (1.8 mm) OR 80 mils (2.0 mm) OR 100 mils (2.5 mm)**, **as directed**.
 - b. Exposed Face Color: White **OR** Gray, **as directed**.

B. Auxiliary Membrane Roofing Materials

1. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesive: 80 g/L.
 - 6) Other Adhesives: 250 g/L.
 - 7) PVC Welding Compounds: 510 g/L.
 - 8) Adhesive Primer for Plastic: 650 g/L.
 - 9) Single-Ply Roof Membrane Sealants: 450 g/L.
 - 10) Nonmembrane Roof Sealants: 300 g/L.
 - 11) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 12) Sealant Primers for Porous Substrates: 775 g/L.
2. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.
3. Bonding Adhesive: Manufacturer's standard, water based, **as directed**.
4. Slip Sheet: Manufacturer's standard, of thickness required for application.
5. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately **1 by 1/8 inch (25 by 3 mm)** thick; with anchors.
6. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately **1 inch wide by 0.05 inch (25 mm wide by 1.3 mm)** thick, prepunched.
7. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
8. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

C. Substrate Boards

1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR Type X, 5/8 inch (16 mm), as directed**, thick.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick.
OR
Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm), as directed**, thick, seal coated.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.
- D. Vapor Retarder
1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
OR
Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
 2. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
 3. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt impregnated.
- E. Roof Insulation
1. General: Preformed roof insulation boards manufactured or approved by PVC membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
 2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.6-lb/cu. ft. (26-kg/cu. m) OR Type X, 1.3-lb/cu. ft. (21-kg/cu. m), as directed**, minimum density, square edged.
 3. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m) OR Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) OR Type IX, 1.8-lb/cu. ft. (29-kg/cu. m), as directed**, minimum density.
 4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m) OR Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) OR Type IX, 1.8-lb/cu. ft. (29-kg/cu. m), as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, **1/2 inch (13 mm)** thick.
OR
Facer: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
 5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR Type II, Class I, Grade 3, as directed**, felt or glass-fiber mat facer on both major surfaces.
 6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass mat faced gypsum board facer, **1/4 inch (6 mm)** thick.
 7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.

8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
 9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
 10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48), as directed**, unless otherwise indicated.
 11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.
- F. Insulation Accessories
1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards, **as directed**, to substrate, and acceptable to roofing system manufacturer.
 3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphalt, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 4. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 5. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 6. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR
Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
OR
Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick, factory primed, **as directed**.
OR
Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick.
 7. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.
- G. Asphalt Materials
1. Roofing Asphalt: ASTM D 312, Type III or Type IV **OR** ASTM D 6152, SEBS modified, **as directed**.
 2. Asphalt Primer: ASTM D 41.
- H. Aggregate Ballast (for loosely laid and aggregate-ballasted installations)
1. Aggregate Ballast: Provide aggregate ballast that will withstand weather exposure without significant deterioration and will not contribute to membrane degradation, of the following type and size:
 - a. Aggregate Type: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone **OR** Crushed gravel or crushed stone, **as directed**.
 - b. Size: ASTM D 448, Size 4, ranging in size from **3/4 to 1-1/2 inches (19 to 38 mm)**.
OR
Size: ASTM D 448, Size 2, ranging in size from **1-1/2 to 2-1/2 inches (38 to 63 mm)**.
OR
Size: ASTM D 448, Size 3, ranging in size from **1 to 2 inches (25 to 50 mm)**.

I. Roof Pavers

1. Lightweight Roof Pavers: Interlocking, lightweight concrete units, specially factory cast for use as roof ballast; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled; and as follows:
 - a. Size: 8 by 16 inches (200 by 400 mm) **OR** 12 by 12 inches (300 by 300 mm) **OR** 12 by 16-1/2 inches (300 by 420 mm) **OR** 12 by 18 inches (300 by 450 mm), **as directed**.
 - b. Weight: At least 10 lb/sq. ft. (50 kg/sq. m) but not exceeding 18 lb/sq. ft. (90 kg/sq. m).
 - c. Compressive Strength: **2500 psi (17 MPa) OR 5000 psi (34 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.
2. Heavyweight Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm)**, **as directed**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m) OR 22 lb/sq. ft. (110 kg/sq. m)**, **as directed**.
 - c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

J. Walkways

1. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads **OR** rolls, **as directed**, approximately **3/16 inch (5 mm)** thick, and acceptable to membrane roofing system manufacturer.
2. Walkway Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm)**, **as directed**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m) OR 22 lb/sq. ft. (110 kg/sq. m)**, **as directed**.
 - c. Compressive Strength: **7500 psi (52 MPa) OR 6500 psi (45 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

1.3 EXECUTION

A. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
4. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking", according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

B. Substrate Board

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.

- a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.
- C. Vapor-Retarder Installation
1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.
 2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:
 - a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
 3. Built-up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 4. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.
- D. Insulation Installation
1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
 2. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
 3. Install tapered insulation under area of roofing to conform to slopes indicated.
 4. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
 5. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
 6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
 7. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 - c. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - d. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

8. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.
 9. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 10. Loosely Laid Insulation: Loosely lay insulation units over substrate.
 11. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck, **as directed**.
 - a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 12. Install slip sheet over insulation **OR** cover board, **as directed**, and immediately beneath membrane roofing.
- E. Adhered Membrane Roofing Installation
1. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
 - a. Install sheet according to ASTM D 5036.
 2. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
 3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
 4. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
 5. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
 6. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
 7. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - a. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - b. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - c. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

8. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
 9. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system.
- F. Mechanically Fastened Membrane Roofing Installation
1. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - a. Install sheet according to ASTM D 5082.
 - b. For in-splice attachment, install membranes roofing with long dimension perpendicular to steel roof deck flutes.
 2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
 3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
 4. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.
 5. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
 6. In-Seam Attachment: Secure one edge of PVC sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten PVC sheet to roof deck.
 7. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - a. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - b. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - c. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
 8. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
 9. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system.
- G. Loosely Laid And Ballasted Membrane Roofing Installation
1. Loosely lay membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - a. Comply with requirements in SPRI RP-4 for System 1 **OR** System 2 **OR** System 3, **as directed**.
 2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
 3. Accurately align membrane roofing, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
 4. Mechanically fasten or adhere perimeter of membrane roofing according to requirements in SPRI RP-4.
OR
Mechanically fasten **OR** adhere, **as directed**, membrane roofing at corners, perimeters, and transitions according to requirements in SPRI RP-4.
 - a. At corners and perimeters, omit aggregate ballast leaving membrane roofing exposed.
OR
At corners and perimeters, adhere a second layer of membrane roofing.
 5. Apply membrane roofing with side laps shingled with slope of deck where possible.
 6. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - a. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - b. Verify field strength of seams a minimum of twice daily and repair seam sample areas.

- c. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
 7. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
 8. Install membrane roofing and auxiliary materials to tie in to existing roofing.
 9. Install protection mat over membrane roofing, overlapping a minimum of **6 inches (150 mm)**. Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of **12 inches (300 mm)**.
 10. Aggregate Ballast: Apply uniformly over membrane roofing at the rate required by membrane roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to membrane roofing system. Lay ballast as membrane roofing is installed, leaving membrane roofing ballasted at the end of the workday.
 - a. Ballast Weight: Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m)**.
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m)**, at corners and perimeter; Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m)**, elsewhere.
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m)**.
 11. Roof-Paver Ballast: Install lightweight **OR** heavyweight, **as directed**, roof-paver ballast according to manufacturer's written instructions.
OR
Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter.
 - a. Install Size 4 aggregate ballast elsewhere on roofing at a minimum rate of **10 lb/sq. ft. (50 kg/sq. m)**.
OR
Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of **13 lb/sq. ft. (65 kg/sq. m)**.
- H. Base Flashing Installation
1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
 2. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
 3. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
 4. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
 5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars, **as directed**.
- I. Walkway Installation
1. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
 2. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave **3 inches (75 mm)** of space between adjacent roof pavers.
- J. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 3. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

4. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- K. Protecting And Cleaning
1. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner.
 2. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
 3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 19 00

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Task	Specification	Specification Description
07 54 19 00	01 95 99 92g	Preparation for Re-Roofing

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SECTION 07 54 23 00 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for thermoplastic polyolefin (TPO) roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Adhered TPO membrane roofing system.
 - b. Mechanically fastened TPO membrane roofing system.
 - c. Loosely laid and ballasted TPO membrane roofing system.
 - d. Vapor retarder.
 - e. Roof insulation.
2. Section includes the installation of acoustical roof deck rib insulation strips furnished under Division 05 Section "Steel Decking".

C. Definitions

1. TPO: Thermoplastic polyolefin.
2. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

D. Performance Requirements

1. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
2. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience.
3. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.
4. FM Approvals Listing, **as directed**: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR** Class 1A-75 **OR** Class 1A-90 **OR** Class 1A-105 **OR** Class 1A-120 **OR** Class 1A-135 **OR** Class 1A-150 **OR** Class 1A-165, **as directed**.
 - b. Hail Resistance: MH **OR** SH, **as directed**.
5. Energy Performance: Provide roofing system with initial Solar Reflectance Index not less than 78 **OR** 29, **as directed**, when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
6. Energy Performance: Provide roofing system that is listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low **OR** steep, **as directed**, -slope roof products.
7. Energy Performance (for roofs that must comply with California Energy Commission's CEC-Title 24): Provide roofing system with initial solar reflectance not less than 0.70 and emissivity not less than 0.75 when tested according to CRRC-1.

E. Submittals

1. Product Data: For each type of product indicated.
 2. LEED Submittals:
 - a. Product Data for Credit SS 7.2: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 3. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 4. Samples: For each product included in the roofing system.
 5. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements.
 6. Research/evaluation reports.
 7. Field quality-control reports.
 8. Maintenance data.
 9. Warranties: Sample of special warranties.
- F. Quality Assurance
1. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 2. Source Limitations: Obtain components for membrane roofing system from same manufacturer as membrane roofing or approved by membrane roofing manufacturer.
 3. Exterior Fire-Test Exposure: ASTM E 108, Class A **OR** Class B **OR** Class C, **as directed**; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
 4. Fire-Resistance Ratings: Where indicated, provide fire-resistance-rated roof assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 5. Preinstallation Roofing Conference: Conduct conference at Project site.
- G. Delivery, Storage, And Handling
1. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
 2. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
 3. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
 4. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.
- H. Project Conditions
1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- I. Warranty

1. Special Warranty: Manufacturer's standard or customized form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within 10 **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. TPO Membrane Roofing

1. Fabric-Reinforced Thermoplastic Polyolefin Sheet: ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible fabric backed, **as directed**, TPO sheet.
 - a. Thickness: **45 mils (1.1 mm) OR 60 mils (1.5 mm), as directed**, nominal.
 - b. Exposed Face Color: Black **OR** Gray **OR** Tan **OR** White, **as directed**.

B. Auxiliary Membrane Roofing Materials

1. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
 - a. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - b. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Plastic Foam Adhesives: 50 g/L.
 - 2) Gypsum Board and Panel Adhesives: 50 g/L.
 - 3) Multipurpose Construction Adhesives: 70 g/L.
 - 4) Fiberglass Adhesives: 80 g/L.
 - 5) Contact Adhesive: 80 g/L.
 - 6) Other Adhesives: 250 g/L.
 - 7) Single-Ply Roof Membrane Sealants: 450 g/L.
 - 8) Nonmembrane Roof Sealants: 300 g/L.
 - 9) Sealant Primers for Nonporous Substrates: 250 g/L.
 - 10) Sealant Primers for Porous Substrates: 775 g/L.
2. Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, **55 mils (1.4 mm)** thick, minimum, of same color as sheet membrane.
3. Bonding Adhesive: Manufacturer's standard, water based, **as directed**.
4. Slip Sheet: Manufacturer's standard, of thickness required for application.
5. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately **1 by 1/8 inch (25 by 3 mm)** thick; with anchors.
6. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately **1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick)**, prepunched.
7. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
8. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

C. Substrate Boards

1. Substrate Board: ASTM C 1396/C 1396M, Type X gypsum board, **5/8 inch (16 mm)** thick.
OR
Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR Type X, 5/8 inch (16 mm), as directed**, thick.
OR
Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm), as directed**, thick.
OR

Substrate Board: ASTM C 728, perlite board, **3/4 inch (19 mm) OR 1 inch (25 mm), as directed**, thick, seal coated.

2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate board to roof deck.

D. Vapor Retarder

1. Polyethylene Film: ASTM D 4397, **6 mils (0.15 mm)** thick, minimum, with maximum permeance rating of **0.13 perm (7.5 ng/Pa x s x sq. m)**.
 - a. Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
OR
Adhesive: Manufacturer's standard lap adhesive, FM Approvals approved for vapor-retarder application.
2. Laminated Sheet: Kraft paper, two layers, laminated with asphalt and edge reinforced with woven fiberglass yarn with maximum permeance rating of **0.50 perm (29 ng/Pa x s x sq. m)** and with manufacturer's standard adhesive, **as directed**.
3. Glass-Fiber Felts: ASTM D 2178, Type IV, asphalt impregnated.

E. Roof Insulation

1. General: Preformed roof insulation boards manufactured or approved by TPO membrane roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Approvals-approved roof insulation, **as directed**.
2. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, **1.6-lb/cu. ft. (26-kg/cu. m) OR** Type X, **1.3-lb/cu. ft. (21-kg/cu. m), as directed**, minimum density, square edged.
3. Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m) OR** Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m) OR** Type IX, **1.8-lb/cu. ft. (29-kg/cu. m), as directed**, minimum density.
4. Composite Molded-Polystyrene Board Insulation: ASTM C 578, Type II, **1.35-lb/cu. ft. (22-kg/cu. m) OR** Type VIII, **1.15-lb/cu. ft. (18-kg/cu. m) OR** Type IX, **1.8-lb/cu. ft. (29-kg/cu. m), as directed**, minimum density, with factory-applied facings, as follows:
 - a. Facer: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, asphalt coated, **1/2 inch (13 mm)** thick.
OR
Facer: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
5. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2 **OR** Type II, Class I, Grade 3, **as directed**, felt or glass-fiber mat facer on both major surfaces.
6. Composite Polyisocyanurate Board Insulation: ASTM C 1289, with factory-applied facing board on one major surface, as indicated below by type, and felt or glass-fiber mat facer on the other.
 - a. Type IV, cellulosic-fiber-insulating-board facer, Grade 2, **1/2 inch (13 mm)** thick.
 - b. Type V, OSB facer, **7/16 inch (11 mm)** thick.
 - c. Type VII, glass mat faced gypsum board facer, **1/4 inch (6 mm)** thick.
7. Perlite Board Insulation: ASTM C 728, rigid, mineral-aggregate thermal insulation board composed of expanded perlite, cellulosic fibers, binders, and waterproofing agents with top surface seal coated.
8. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 2, fibrous-felted, rigid insulation boards of wood fiber or other cellulosic-fiber and water-resistant binders, asphalt impregnated, chemically treated for deterioration.
9. Cellular-Glass Board Insulation: ASTM C 552, Type IV, rigid, cellular-glass thermal board insulation faced with manufacturer's standard kraft-paper sheets.
10. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of **1/4 inch per 12 inches (1:48)** unless otherwise indicated.
11. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

F. Insulation Accessories

1. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with membrane roofing.
 2. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards, **as directed**, to substrate, and acceptable to roofing system manufacturer.
 3. Modified Asphaltic Insulation Adhesive: Insulation manufacturer's recommended modified asphalt, asbestos-free, cold-applied adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 4. Bead-Applied Insulation Adhesive: Insulation manufacturer's recommended bead-applied, low-rise, one- or multicomponent urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 5. Full-Spread Applied Insulation Adhesive: Insulation manufacturer's recommended spray-applied, low-rise, two-component urethane adhesive formulated to attach roof insulation to substrate or to another insulation layer.
 6. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, **1/2 inch (13 mm)** thick.
OR
Cover Board: DOC PS 2, Exposure 1, OSB, **7/16 inch (11 mm)** thick.
OR
Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick, factory primed, **as directed**.
OR
Cover Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, **1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, **as directed**, thick.
 7. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.
- G. Asphalt Materials
1. Roofing Asphalt: ASTM D 312, Type III or Type IV **OR** ASTM D 6152, SEBS modified, **as directed**.
 2. Asphalt Primer: ASTM D 41.
- H. Aggregate Ballast (for loosely laid and aggregate-ballasted installations)
1. Aggregate Ballast: Provide aggregate ballast that will withstand weather exposure without significant deterioration and will not contribute to membrane degradation, of the following type and size:
 - a. Aggregate Type: Smooth, washed, riverbed gravel or other acceptable smooth-faced stone **OR** Crushed gravel or crushed stone, **as directed**.
 - b. Size: ASTM D 448, Size 4, ranging in size from **3/4 to 1-1/2 inches (19 to 38 mm)**.
OR
Size: ASTM D 448, Size 2, ranging in size from **1-1/2 to 2-1/2 inches (38 to 63 mm)**.
OR
Size: ASTM D 448, Size 3, ranging in size from **1 to 2 inches (25 to 50 mm)**.
- I. Roof Pavers
1. Lightweight Roof Pavers: Interlocking, lightweight concrete units, specially factory cast for use as roof ballast; grooved back, with four-way drainage capability; beveled, doweled, or otherwise profiled; and as follows:
 - a. Size: 8 by 16 inches (200 by 400 mm) **OR** 12 by 12 inches (300 by 300 mm) **OR** 12 by 16-1/2 inches (300 by 420 mm) **OR** 12 by 18 inches (300 by 450 mm), **as directed**.
 - b. Weight: At least 10 lb/sq. ft. (50 kg/sq. m) but not exceeding 18 lb/sq. ft. (90 kg/sq. m).
 - c. Compressive Strength: **2500 psi (17 MPa) OR 5000 psi (34 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

2. Heavyweight Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm)**, **as directed**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m)** **OR 22 lb/sq. ft. (110 kg/sq. m)**, **as directed**.
 - c. Compressive Strength: **7500 psi (52 MPa)** **OR 6500 psi (45 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

J. Walkways

1. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads **OR** rolls, **as directed**, approximately **3/16 inch (5 mm)** thick, and acceptable to membrane roofing system manufacturer.
2. Walkway Roof Pavers: Heavyweight, hydraulically pressed, concrete units, square edged **OR** with top edges beveled **3/16 inch (5 mm)**, **as directed**, factory cast for use as roof pavers; absorption not greater than 5 percent, ASTM C 140; no breakage and maximum 1 percent mass loss when tested for freeze-thaw resistance, ASTM C 67; and as follows:
 - a. Size: 12 by 12 inches (300 by 300 mm) **OR** 18 by 18 inches (450 by 450 mm) **OR 24 by 24 inches (600 by 600 mm)**, **as directed**. Manufacture pavers to dimensional tolerances of plus or minus **1/16 inch (1.6 mm)** in length, height, and thickness.
 - b. Weight: **18 lb/sq. ft. (90 kg/sq. m)** **OR 22 lb/sq. ft. (110 kg/sq. m)**, **as directed**.
 - c. Compressive Strength: **7500 psi (52 MPa)** **OR 6500 psi (45 MPa)**, **as directed**, minimum.
 - d. Colors and Textures: As selected from manufacturer's full range.

1.3 EXECUTION

A. Preparation

1. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
2. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
3. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
4. Install acoustical roof deck rib insulation strips, specified in Division 05 Section "Steel Decking", according to acoustical roof deck manufacturer's written instructions, immediately before installation of overlying construction and to remain dry.

B. Substrate Board

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten substrate board to top flanges of steel deck according to recommendations in FM Approvals' "RoofNav" and FM Global Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification.
OR
Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

C. Vapor-Retarder Installation

1. Polyethylene Film: Loosely lay polyethylene-film vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively.
 - a. Continuously seal side and end laps with tape **OR** adhesive, **as directed**.
2. Laminate Sheet: Install laminate-sheet vapor retarder in a single layer over area to receive vapor retarder, side and end lapping each sheet a minimum of **2 inches (50 mm)** and **6 inches (150 mm)**, respectively. Bond vapor retarder to substrate as follows:
 - a. Apply adhesive at rate recommended by vapor-retarder manufacturer. Seal laps with adhesive.
OR
Apply ribbons of hot roofing asphalt at spacing, temperature, and rate recommended by vapor-retarder manufacturer. Seal laps with hot roofing asphalt.
3. Built-up Vapor Retarder: Install two glass-fiber felt plies lapping each felt **19 inches (483 mm)** over preceding felt. Embed each felt in a solid mopping of hot roofing asphalt. Glaze-coat completed surface with hot roofing asphalt. Apply hot roofing asphalt within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
4. Completely seal vapor retarder at terminations, obstructions, and penetrations to prevent air movement into membrane roofing system.

D. Insulation Installation

1. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
2. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
3. Install tapered insulation under area of roofing to conform to slopes indicated.
4. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is **2.7 inches (68 mm)** or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of **6 inches (150 mm)** in each direction.
 - a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
5. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
6. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding **1/4 inch (6 mm)** with insulation.
 - a. Cut and fit insulation within **1/4 inch (6 mm)** of nailers, projections, and penetrations.
7. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - a. Prime surface of concrete deck with asphalt primer at rate of **3/4 gal./100 sq. ft. (0.3 L/sq. m)** and allow primer to dry.
 - b. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
 - c. Set each layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - d. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
8. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

9. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - a. Fasten first layer of insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - b. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus **25 deg F (14 deg C)** of equiviscous temperature.
OR
Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
OR
Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
 10. Loosely Laid Insulation: Loosely lay insulation units over substrate.
 11. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of **6 inches (150 mm)** in each direction. Loosely butt cover boards together and fasten to roof deck, **as directed**.
 - a. Fasten cover boards according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification.
OR
Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.
 12. Install slip sheet over insulation **OR** cover board, **as directed**, and immediately beneath membrane roofing.
- E. Adhered Membrane Roofing Installation
1. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
 2. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
 3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
 4. Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area of membrane roofing.
 5. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
 6. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
 7. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - a. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - b. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - c. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
 8. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
 9. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system, **as directed**.
- F. Mechanically Fastened Membrane Roofing Installation

1. Mechanically fasten membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - a. For in-splice attachment, install membranes roofing with long dimension perpendicular to steel roof deck flutes.
2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Mechanically fasten or adhere membrane roofing securely at terminations, penetrations, and perimeter of roofing.
5. Apply membrane roofing with side laps shingled with slope of roof deck where possible.
6. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within membrane seam and mechanically fasten TPO sheet to roof deck.
7. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - a. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - b. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - c. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
8. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
9. Install membrane roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system.

G. Loosely Laid And Ballasted Membrane Roofing Installation

1. Loosely lay membrane roofing over area to receive roofing and install according to roofing system manufacturer's written instructions.
 - a. Comply with requirements in SPRI RP-4 for System 1 **OR** System 2 **OR** System 3, **as directed**.
2. Start installation of membrane roofing in presence of roofing system manufacturer's technical personnel.
3. Accurately align membrane roofing, without stretching, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
4. Mechanically fasten or adhere perimeter of membrane roofing according to requirements in SPRI RP-4.
OR
Mechanically fasten **OR** adhere, **as directed**, membrane roofing at corners, perimeters, and transitions according to requirements in SPRI RP-4.
 - a. At corners and perimeters, omit aggregate ballast leaving membrane roofing exposed.
OR
At corners and perimeters, adhere a second layer of membrane roofing.
5. Apply membrane roofing with side laps shingled with slope of deck where possible.
6. Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - a. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - b. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - c. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
7. Spread sealant bed over deck drain flange at roof drains and securely seal membrane roofing in place with clamping ring.
8. Install membrane roofing and auxiliary materials to tie in to existing roofing.
9. Install protection mat over membrane roofing, overlapping a minimum of **6 inches (150 mm)**. Install an additional protection mat layer at projections, pipes, vents, and drains, overlapping a minimum of **12 inches (300 mm)**.

10. Aggregate Ballast: Apply uniformly over membrane roofing at the rate required by membrane roofing system manufacturer, but not less than the following, spreading with care to minimize possibility of damage to membrane roofing system. Lay ballast as membrane roofing is installed, leaving membrane roofing ballasted at the end of the workday.
 - a. Ballast Weight: Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m).**
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m)**, at corners and perimeter; Size 4 aggregate, **10 lb/sq. ft. (50 kg/sq. m)**, elsewhere.
OR
Ballast Weight: Size 2 aggregate, **13 lb/sq. ft. (65 kg/sq. m).**
 11. Roof-Paver Ballast: Install lightweight **OR** heavyweight, **as directed**, roof-paver ballast according to manufacturer's written instructions.
OR
Roof-Paver and Aggregate Ballast: Install heavyweight roof pavers according to manufacturer's written instructions on roof corners and perimeter.
 - a. Install Size 4 aggregate ballast elsewhere on roofing at a minimum rate of **10 lb/sq. ft. (50 kg/sq. m).**
OR
Install Size 2 aggregate ballast elsewhere on roofing at a minimum rate of **13 lb/sq. ft. (65 kg/sq. m).**
- H. Base Flashing Installation
1. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
 2. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
 3. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
 4. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
 5. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars, **as directed**.
- I. Walkway Installation
1. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.
 2. Roof-Paver Walkways: Install walkway roof pavers according to manufacturer's written instructions in locations indicated, to form walkways. Leave **3 inches (75 mm)** of space between adjacent roof pavers.
- J. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
 3. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
 4. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- K. Protecting And Cleaning
1. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to the Owner.

2. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Final Completion and according to warranty requirements.
3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 54 23 00

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Task	Specification	Specification Description
07 54 23 00	01 95 99 92g	Preparation for Re-Roofing
07 56 00 00	01 95 99 92g	Preparation for Re-Roofing
07 56 00 00	07 51 13 00	Built-Up Asphalt Roofing
07 56 00 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 56 00 00	07 53 23 00	EPDM Membrane Roofing
07 56 00 00	07 54 19 00	Polyvinyl-Chloride (PVC) Roofing
07 56 00 00	07 57 00 00	Coated Foamed Roofing

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SECTION 07 57 00 00 - COATED FOAMED ROOFING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for coated foamed roofing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Spray-applied, polyurethane foam insulation.
 - b. Elastomeric roof coatings.
 - c. Mineral granules.
 - d. Aggregate.
 - e. Walkways.

C. Performance Requirements

1. Watertightness: Provide coated foamed roofing that is watertight and will not permit the passage of water.
2. Material Compatibility: Provide polyurethane foam, elastomeric coatings, and miscellaneous roofing materials that are compatible with one another and able to bond to substrate under conditions of service and application required, as demonstrated by coated foamed roofing manufacturer based on testing and field experience.
3. Roofing System Design: Provide a coated foamed roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to SEI/ASCE 7.
4. FMG Listing: Provide roofing system and component materials that comply with requirements in FMG 4450 for steel roof decks and FMG 4470 for roof covers as part of a foamed roofing system and that are listed in FMG's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
 - a. Fire/Windstorm Classification: Class 1A-60 **OR 75 OR 90 OR 105 OR 120, as directed.**
 - b. Hail-Resistance Classification: MH **OR SH, as directed.**
5. Energy Performance: Provide roofing system with Solar Reflectance Index not less than 78 **OR 29, as directed**, when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Test Reports for Credit SS 7.2: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirement.
3. Samples: For each exposed product and for each color and texture specified.
4. Research/evaluation reports.
5. Maintenance data.
6. Warranty: Sample of special warranty.
7. Warranty: Sample of special warranty.

E. Quality Assurance

1. Installer Qualifications: A qualified installer who is approved, authorized, or licensed by roof coating manufacturer for installation of manufacturer's product over polyurethane foam.

- a. Engage an installer who participates in and who has fulfilled requirements of the SPFA Accreditation Program for company accreditation and individual applicator accreditation for personnel assigned to work on Project.
 2. Source Limitations: Obtain polyurethane foam materials from single source or producer and coating products from single, coated foamed roofing manufacturer.
 3. Fire-Test-Response Characteristics: Provide coated foamed roofing systems with the fire-test-response characteristics indicated, as determined by testing identical systems per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes of 75 and 450, respectively; ASTM E 84.
 - b. Exterior Fire-Test Exposure: ASTM E 108; Class A.
 - c. Fire-Resistance Ratings: ASTM E 119, determined for coated polyurethane foam roofing as part of a roof assembly.
 4. Comply with recommendations in NRCA's "Quality Control Guidelines for the Application of Spray Polyurethane Foam Roofing."
 5. Comply with recommendations in SPFA AY 104, "Spray Polyurethane Foam Systems for New and Remedial Roofing."
 6. Preinstallation Conference: Conduct conference at Project site.
- F. Delivery, Storage, And Handling
1. Deliver materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.
 2. Store materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by manufacturer. Protect stored materials from direct sunlight.
 3. Remove and replace material that cannot be applied within its stated shelf life.
- G. Warranty
1. Special Warranty: Coated foamed roofing manufacturer's standard form in which manufacturer agrees to repair or replace coated foamed roofing that does not comply with requirements or that does not remain watertight within five **OR 10, as directed**, years from date of Final Completion.
- ### 1.2 PRODUCTS
- A. Polyurethane Foam
1. Polyurethane Foam: Rigid cellular polyurethane, spray applied, produced by the catalyzed chemical reaction of polyisocyanates with polyhydroxyls, with stabilizers, fire retardants, and blowing agents added; and complying with ASTM C 1029, Type III, as certified by a qualified independent testing agency.
 - a. In-Place Density: **2.8 to 3.0 lb/cu. ft. (44.9 to 48.1 kg/cu. m)**; ASTM D 1622.
 - b. Surface-Burning Characteristic: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1) Flame-Spread Index: 75 or less.
- B. Urethane Coatings
1. Urethane Coatings: Liquid urethane elastomeric coating system, specifically formulated for coating spray polyurethane roofing, of the following composition, coat type, and topcoat color and complying with specified performance and physical requirements.
 - a. Base-Coat Composition and Type: One-component **OR** Two-component, **as directed**, aromatic urethane.

- b. Topcoat Composition and Type: One-component **OR** Two-component, **as directed**, aromatic **OR** aliphatic, **as directed**, urethane.
 - c. Topcoat Color: White **OR** Gray **OR** Tan **OR** Copper **OR** Black, **as directed**.
 - d. Topcoat Color at Walkways: White **OR** Gray **OR** Tan **OR** Copper **OR** Black, **as directed**.
 - e. Tensile Strength: **400 psi (2.8 MPa)** per ASTM D 412.
 - f. Elongation: 300 percent at **75 deg F (24 deg C)** per ASTM D 412.
 - g. Permanent Set at Break: 30 percent maximum per ASTM D 412.
 - h. Tear Resistance: **100 lbf/inch (17.5 kN/m)** per ASTM D 1004.
 - i. Water Absorption: 3 percent maximum by weight, 168 hours at **75 deg F (24 deg C)** per ASTM D 471.
 - j. Permeance:
 - 1) Minimum **0.7 perms (40.2 ng/Pa x s x sq. m)** at **20 mils (0.5 mm)** thick per ASTM E 96.
OR
Minimum **5.0 perms (286 ng/Pa x s x sq. m)** at **20 mils (0.5 mm)** thick per ASTM E 96.
- C. Silicone Coatings
- 1. Silicone Coatings: Liquid silicone elastomeric coating system, complying with ASTM D 6694 and specifically formulated for coating spray polyurethane roofing.
 - a. Base-Coat and Topcoat Composition: One-component **OR** Two-component, **as directed**, silicone.
 - b. Topcoat Color: White **OR** Gray, **as directed**.
 - c. Topcoat Color at Walkways: White **OR** Gray, **as directed**.
 - d. Permeance: Minimum **5.0 perms (286 ng/Pa x s x sq. m)** at **20 mils (0.5 mm)** thick per ASTM E 96.
- D. Acrylic Coatings
- 1. Acrylic Coatings: Liquid acrylic elastomeric emulsion coating system, complying with ASTM D 6083 and specifically formulated for coating spray polyurethane roofing.
 - a. Topcoat Color: White **OR** Gray **OR** Buff, **as directed**.
 - b. Topcoat Color at Walkways: White **OR** Gray **OR** Buff, **as directed**.
 - c. Permeance: Minimum **5.0 perms (286 ng/Pa x s x sq. m)** at **20 mils (0.5 mm)** thick per ASTM E 96.
- E. Substrate Board
- 1. Thermal Barrier:
 - a. Glass-mat, water-resistant gypsum board, ASTM C 1177/C 1177M, **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 5/8 inch (16 mm)**, Type X, **as directed**.
 - b. ASTM C 36/C 36M, **5/8-inch (16-mm)** gypsum board base, Type X.
 - 2. Recovery Board and Fasteners: As recommended by polyurethane foam manufacturer, and meeting the requirements of Division 07 Section "Preparation For Re-roofing".
 - 3. Thermal-Barrier Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FMG 4470, and designed and sized for fastening thermal barrier to substrate.
- F. Auxiliary Materials
- 1. Primer: Polyurethane foam manufacturer's standard factory-formulated primer.
 - 2. Vapor Retarder: Fluid applied **OR** Bituminous membrane **OR** As recommended by coated foamed roofing manufacturer, **as directed**.
 - 3. Mineral Granules: Ceramic-coated roofing granules, No. 11 screen size with 100 percent passing **No. 8 (2.36-mm)** sieve and 98 percent of mass retained by **No. 40 (0.42-mm)** sieve.
 - a. Color: Buff white **OR** Gray **OR** Green **OR** Red, **as directed**.
 - 4. Aggregate: Coarse mineral aggregate, **3/4 inch (19 mm)** maximum, ASTM D 1863, No. 7 or No. 67 gradation.

5. Reinforcement: Flexible polyester or fiberglass mat of weight, type, and composition recommended by roof coating manufacturer for embedment in liquid coating.
6. Walkway Pads: Factory formed of nonwoven PVC strands, porous, UV stabilized, of **5/16-inch (8-mm)** nominal thickness, and approved by roof coating manufacturer. Provide pad sizes indicated.
 - a. Color: Yellow **OR** Gray **OR** Blue **OR** Orange **OR** Green, **as directed**.
7. Sealant: ASTM C 920, Class 25, Use NT, Grade NS, Type M, multicomponent urethane **OR** Type S, one-component, neutral- or acid-curing silicone, **as directed**, and as recommended by coated foamed roofing manufacturer for substrate and joint conditions and for compatibility with roofing materials.
8. Sheet Flashing and Accessories: Types recommended by coated foamed roofing manufacturer, provided at locations indicated and as recommended by coated foamed roofing manufacturer.

1.3 EXECUTION

A. Substrate Board

1. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
 - a. Fasten thermal barrier to top flanges of steel deck according to recommendations in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - b. Fasten thermal barrier to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to coated foamed roofing manufacturer's written instructions.
 - c. Install recovery board according to coated foamed roofing manufacturer's written instructions and the requirements of Division 07 Section "Preparation For Re-roofing". Fasten through existing roofing to roof structure as indicated. Space fasteners for wind-uplift conditions at Project site **OR** as indicated, **as directed**.

B. Surface Preparation

1. Clean and prepare substrate according to coated foamed roofing manufacturer's written instructions. Provide clean, dust-free, dew-free, and dry substrate for coated foamed roofing application.
2. Remove grease, oil, form-release agents, curing compounds, and other contaminants from substrate.
3. Prepare substrate for recovering according to Division 07 Section "Preparation For Re-roofing" and to coated foamed roofing manufacturer's written instructions.
4. Cover and mask adjoining surfaces not receiving coated foamed roofing to prevent overspray or spillage affecting other construction. Close off roof drains, removing roof-drain plugs when no work is being done or when rain is forecast.
 - a. Remove masking after polyurethane foam application and remask adjoining substrates before coating.
5. Prime substrate if recommended by coated foamed roofing manufacturer.
6. Fill, cover, or tape joints and cracks in substrate that exceed a width of **1/4 inch (6 mm)**. Remove dust and dirt from joints and cracks before applying polyurethane foam.
7. Install vapor retarder according to coated foamed roofing manufacturer's written instructions.

C. Polyurethane Foam Application

1. General: Mix and apply polyurethane foam according to ASTM D 5469 and coated foamed roofing manufacturer's written instructions.
 - a. Fill irregularities and areas of ponding.
 - b. Apply the required full thickness of polyurethane foam in any specific area on same day.
 - c. Apply only the area of polyurethane foam that can be covered on same day with required base coating.
 - d. Apply polyurethane foam to avoid overspray beyond immediate area of work.

2. Apply polyurethane foam in lift thicknesses not less than **1/2 inch (13 mm)** and not more than **1-1/2 inches (38 mm)**.
3. Uniformly apply total thickness of polyurethane foam indicated, but not less than **1 inch (25 mm)**, to a surface tolerance of plus **1/4 inch (6 mm)** and no minus.
4. Apply polyurethane foam to roof penetrations, terminations, and vertical surfaces as indicated. Unless otherwise indicated, extend polyurethane foam at least **4 inches (100 mm)** above elevation of adjacent roof field.
5. Surface Finish: Provide finished surface of polyurethane foam within the following range of surface textures as defined by ASTM D 5469:
 - a. Texture: Smooth to orange peel **OR** coarse orange peel **OR** rippling verge of popcorn, **as directed**.
6. Remove and replace polyurethane foam not complying with minimum surface-texture limitations. Remove defective thickness and prepare and reapply polyurethane foam with acceptable, uniform results.

D. Coating Application

1. Allow polyurethane foam substrate to cure for a minimum of two hours and remove dust, dirt, water, and other contaminants before applying coating.
2. Apply coating system to polyurethane foam, in two or more coats and according to roof coating manufacturer's written instructions, by spray, roller, or other suitable application method.
3. Apply base coat and one or more topcoats to obtain a uniform, seamless membrane free of blisters and pinholes. Apply each coat at right angles to preceding coat, using contrasting colors for successive coats.
 - a. Apply base coat on same day as polyurethane foam is applied and allow it to cure.
 - b. Apply topcoat(s) after removing dust, dirt, water, and other contaminants from base coat.
 - c. Urethane Coating: Apply base coat and topcoat to a minimum dry film thickness recommend by coated foamed roofing manufacturer **OR** of **25 mils (0.64 mm)** **OR** of **30 mils (0.76 mm)** **OR** of **35 mils (0.89 mm)**, **as directed**.
 - d. Silicone Coating: Apply base coat and topcoat to a minimum dry film thickness recommend by coated foamed roofing manufacturer **OR** of **20 mils (0.50 mm)** **OR** of **22 mils (0.56 mm)** **OR** of **26 mils (0.66 mm)** **OR** of **30 mils (0.76 mm)**, **as directed**.
 - e. Acrylic Coating: Apply base coat and topcoat to a minimum dry film thickness recommend by coated foamed roofing manufacturer **OR** of **25 mils (0.64 mm)** **OR** of **28 mils (0.71 mm)** **OR** of **32 mils (0.81 mm)**, **as directed**.
4. Apply coating system at wall terminations and vertical surfaces to extend beyond polyurethane foam by **4 inches (100 mm)**, minimum.
5. Mineral Granules: Apply mineral granules over wet topcoat using pressure equipment at the rate of **0.5 lb/sq. ft. (2.45 kg/sq. m)**. Remove excess granules after topcoat has cured.
6. Sealant: Apply sealant to perimeter and other terminations where indicated or required by coated foamed roofing manufacturer.
7. Walkways: Install roof walkways in pattern and locations indicated. Mask off completed roof coating adjacent to walkways and apply one or two additional topcoats to achieve a minimum dry film thickness recommended by coated foamed roofing manufacturer. Spread mineral granules uniformly at a rate of **0.5 lb/sq. ft. (2.45 kg/sq. m)** into final wet coating. Remove masking and excess granules after topcoat has cured.
8. Walkways: Install roof walkways in pattern and locations indicated. Mask off completed roof coating adjacent to walkways and apply one additional topcoat to achieve a minimum dry film thickness recommended by coated foamed roofing manufacturer. Lay reinforcing fabric into wet coating and apply another topcoat, completely filling fabric. Spread mineral granules uniformly at a rate of **0.5 lb/sq. ft. (2.45 kg/sq. m)** into final wet coating. Remove masking and excess granules after topcoat has cured.
9. Walkways: Install walkway pads in pattern and locations indicated. Adhere walkway pads to substrate with compatible adhesive according to coated foamed roofing manufacturer's written instructions.
10. Aggregate: Apply aggregate uniformly over coated polyurethane foam at coated foamed roofing manufacturer's recommended rate, but not less than **6 lb/sq. ft. (29 kg/sq. m)** and a minimum

07 - Thermal And Moisture Protection



thickness of **3/4 inch (19 mm)**. Spread with care to prevent puncturing coating and to minimize damage to substrate foam.

- E. Field Quality Control
 - 1. Correct deficiencies in, or remove, foam or coatings that do not comply with requirements; fill and repair substrates and reapply materials.
 - 2. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with requirements.
 - 3. Refill cores, repair slits, and recoat test areas.
- F. Repair And Recoating
 - 1. Repair and recoat coated foamed roofing according to ASTM D 6705 and coated foamed roofing manufacturer's written instructions.
- G. Curing, Protecting, And Cleaning
 - 1. Cure coatings according to coated foamed roofing manufacturer's written instructions, taking care to prevent contamination and damage during application stages and curing. Do not permit traffic on uncured coatings.
 - 2. Protect coated foamed roofing from damage and wear during remainder of construction period.
 - 3. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 57 00 00

Task	Specification	Specification Description
07 57 13 00	07 57 00 00	Coated Foamed Roofing
07 58 00 00	07 51 13 00	Built-Up Asphalt Roofing
07 62 13 00	01 95 07 00a	Sheet Metal Flashing And Trim
07 63 00 00	01 95 07 00a	Sheet Metal Flashing And Trim
07 63 00 00	01 95 99 99a	Common Work Results for Fire Suppression
07 63 00 00	01 95 99 99b	Common Work Results for Plumbing
07 63 00 00	01 95 99 99g	Common Work Results for HVAC
07 65 16 00	07 51 13 00	Built-Up Asphalt Roofing
07 65 16 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 65 16 00	07 53 23 00	EPDM Membrane Roofing
07 65 16 00	07 57 00 00	Coated Foamed Roofing
07 71 13 00	01 95 07 00a	Sheet Metal Flashing And Trim

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SECTION 07 71 23 00 - MANUFACTURED ROOF SPECIALTIES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for manufactured roof specialties. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Copings.
 - b. Roof-edge flashings.
 - c. Roof-edge drainage systems.
 - d. Reglets and counterflashings.

C. Performance Requirements

1. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
2. FM Approvals' Listing (if Project is FM Global insured or if FM Approvals' requirements set a minimum quality standard): Manufacture and install copings and roof-edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-60 **OR** Class 1-75 **OR** Class 1-90 **OR** Class 1-105 **OR** Class 1-120, **as directed**. Identify materials with FM Approvals' markings.
3. SPRI Wind Design Standard (if Project is governed by the IBC or if SPRI ES-1 sets a minimum quality standard): Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressures:
 - a. Design Pressure: As indicated on Drawings **OR** As directed.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

D. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Shop Drawings: For roof specialties. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work. Include the following:
 - a. Details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
 - b. Pattern of seams and layout of fasteners, cleats, clips, and other attachments.
 - c. Details of termination points and assemblies, including fixed points.
 - d. Details of special conditions.
3. Samples: For copings **OR** roof-edge flashings **OR** roof-edge drainage systems **OR** reglets and counterflashings, **as directed**, made from **12-inch (300-mm)** lengths of full-size components including fasteners, cover joints, accessories, and attachments.
4. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for copings and roof-edge flashings.

5. Maintenance Data: For roofing specialties to include in maintenance manuals.
6. Warranty: Sample of special warranty.

E. Quality Assurance

1. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
2. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof specialties installation.

G. Warranty

1. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - a. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - 1) Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - 2) Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - 3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - b. Finish Warranty Period: **20 OR 10, as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Exposed Metals

1. Copper Sheet: ASTM B 370, cold-rolled copper sheet, H00 or H01 temper.
 - a. Non-Patinated Exposed Finish: Mill.
 - b. Pre-Patinated Copper-Sheet Finish: Pre-patinated according to ASTM B 882.
2. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.
 - a. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - b. Mill Finish: As manufactured.
 - c. Exposed Coil-Coated Finishes: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Two-Coat Fluoropolymer: AAMA 620. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 2) Three-Coat Fluoropolymer: AAMA 620. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
 - 3) Concealed Surface: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
 - d. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - e. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
3. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:
 - a. Exposed High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- 1) Two-Coat Fluoropolymer: AAMA 2604 **OR** AAMA 2605, **as directed**. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 2) Three-Coat Fluoropolymer: AAMA 2605. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
 - b. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
 - c. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
 4. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
 5. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation.
 - a. Surface: Smooth, flat **OR** Embossed, **as directed**, finish.
 - b. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 - c. Exposed Coil-Coated Finishes: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Two-Coat Fluoropolymer: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.
 - 2) Three-Coat Fluoropolymer: AAMA 621. System consisting of primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent PVDF resin by weight.
- B. Concealed Metals**
1. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
 2. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
 3. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
 4. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating designation.
- C. Underlayment Materials**
1. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 2. Self-Adhering, High-Temperature Sheet: Minimum **30 to 40 mils (0.76 to 1.0 mm)** thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - a. Thermal Stability: ASTM D 1970; stable after testing at **240 deg F (116 deg C)**.
 - b. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus **20 deg F (29 deg C)**.
 3. Polyethylene Sheet: **6-mil- (0.15-mm-)** thick polyethylene sheet complying with ASTM D 4397.
 4. Slip Sheet: Building paper, **3-lb/100 sq. ft. (0.16-kg/sq. m)** minimum, rosin sized.
- D. Miscellaneous Materials**
1. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
 2. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
 - a. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
 - b. Fasteners for Copper Sheet: Copper, hardware bronze, or passivated Series 300 stainless steel.
 - c. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.
 - d. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

- e. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.
 - 3. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** silicone, **as directed**, polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
 - 4. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
 - 5. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
 - 6. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
 - 7. Solder for Copper: ASTM B 32, lead-free solder **OR** Grade Sn50, 50 percent tin and 50 percent lead, **as directed**.
- E. Copings
- 1. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding **12 feet (3.6 m)**, concealed anchorage; corner units, end cap units, and concealed splice plates with same finish as coping caps.
 - a. Coping-Cap Material: Copper, **20 oz./sq. ft. (0.68 mm thick)** **OR weight (thickness)** as required to meet performance requirements, **as directed**.
 - 1) Finish: Non-patinated, mill **OR** Pre-patinated dark brown **OR** Pre-patinated verdigris, **as directed**.

OR

Coping-Cap Material: Formed **OR** Extruded, **as directed**, aluminum, **0.040 inch (1.02 mm)** thick **OR 0.050 inch (1.27 mm)** thick **OR 0.063 inch (1.60 mm)** thick **OR 0.080 inch (2.03 mm)** thick **OR 0.125 inch (3.18 mm)** thick **OR** thickness as required to meet performance requirements, **as directed**.
 - 1) Finish: Mill **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer **OR** Clear anodic **OR** Color anodic, **as directed**.
 - 2) Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

OR

Coping-Cap Material: Zinc-coated steel, nominal **0.028-inch (0.71-mm)** thickness **OR 0.034-inch (0.86-mm)** thickness **OR** thickness as required to meet performance requirements, **as directed**.
- 1) Finish: Mill phosphatized for field painting **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- b. Corners: Factory mitered and soldered **OR** continuously welded **OR** mechanically clinched and sealed watertight, **as directed**.
- c. Special Fabrications: Radiussed sections **OR** Arched sections **OR** Bullnose face leg **OR** Two-way sloped coping cap, **as directed**.
- d. Coping-Cap Attachment Method: Snap-on **OR** Face leg hooked to continuous cleat with back leg fastener exposed, **as directed**, fabricated from coping-cap material.
- e. Snap-on-Coping Anchor Plates: Concealed, galvanized-steel sheet, **12 inches (300 mm)** wide, with integral cleats.

OR

Face Leg Cleats: Concealed, continuous galvanized-steel sheet **OR** stainless steel, **as directed**.
- F. Roof-Edge Flashings
- 1. Canted Roof-Edge and Fascia **OR** Fascia and Gravel Stop, **as directed**: Manufactured, two-piece, roof-edge fascia consisting of snap-on **OR** compression-clamped, **as directed**, metal fascia cover in section lengths not exceeding **12 feet (3.6 m)** and a continuous formed

- galvanized-steel sheet cant, **0.028 inch (0.71 mm)** thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.
- a. Fascia Cover: Fabricated from the following exposed metal:
 - 1) Formed Aluminum: **0.040 inch (1.02 mm)** thick **OR** **0.050 inch (1.27 mm)** thick **OR** **0.063 inch (1.60 mm)** thick **OR** Thickness as required to meet performance requirements, **as directed**.
 - 2) Extruded Aluminum: **0.080 inch (2.03 mm)** thick **OR** Thickness as required to meet performance requirements, **as directed**.
 - 3) Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** thickness **OR** **0.034-inch (0.86-mm)** thickness **OR** thickness as required to meet performance requirements, **as directed**.
 - b. Corners: Factory mitered and soldered **OR** continuously welded **OR** mechanically clinched and sealed watertight, **as directed**.
 - c. Splice Plates: Concealed **OR** Exposed, **as directed**, of same material, finish, and shape as fascia cover.
 - d. Special Fabrications: Radiussed sections **OR** Arched sections **OR** Bullnose fascia cover **OR** Cornice fascia cover **OR** Cove fascia cover, **as directed**.
 - e. Fascia Accessories: Fascia extenders with continuous hold-down cleats **OR** Wall cap **OR** Soffit trim **OR** Overflow scuppers **OR** Overflow scuppers with perforated screens **OR** Spillout scuppers **OR** Downspout scuppers with integral conductor head and downspout adapters **OR** Downspout scuppers with integral conductor head and downspout adapters and perforated screens, **as directed**.
2. Roof-Edge Fascia: Manufactured, two-piece, roof-edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding **12 feet (3.6 m)** and a continuous formed- or extruded-aluminum anchor bar with integral drip-edge cleat to engage fascia cover. Provide matching corner units.
 - a. Fascia Cover: Fabricated from the following exposed metal:
 - 1) Formed Aluminum: **0.032 inch (0.81 mm)** thick **OR** **0.040 inch (1.02 mm)** thick **OR** **0.050 inch (1.27 mm)** thick **OR** **0.063 inch (1.60 mm)** thick **OR** Thickness as required to meet performance requirements, **as directed**.
 - 2) Zinc-Coated Steel: Nominal **0.028 inch (0.71 mm)** thick **OR** **0.034 inch (0.86 mm)** thick **OR** thickness as required to meet performance requirements, **as directed**.
 - b. Corners: Factory mitered and soldered **OR** continuously welded **OR** mechanically clinched and sealed watertight, **as directed**.
 - c. Splice Plates: Concealed **OR** Exposed, **as directed**, of same material, finish, and shape as fascia cover.
 - d. Special Fabrications: Radiussed sections **OR** Arched sections **OR** Bullnose fascia cover **OR** Cornice fascia cover **OR** Cove fascia cover, **as directed**.
 - e. Fascia Accessories: Fascia extenders with continuous hold-down cleats **OR** Wall cap **OR** Soffit trim **OR** Overflow scuppers **OR** Overflow scuppers with perforated screens **OR** Spillout scuppers **OR** Downspout scuppers with integral conductor head and downspout adapters **OR** Downspout scuppers with integral conductor head and downspout adapters and perforated screens, **as directed**.
 3. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding **12 feet (3.6 m)**, with a horizontal flange and vertical leg, drain-through, **as directed**, fascia terminating in a drip edge, **as directed**, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.
 - a. Fabricate from the following exposed metal:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick)** **OR** **Weight (thickness)** as required to meet performance requirements, **as directed**.
 - 2) Formed Aluminum: **0.032 inch (0.81 mm)** thick **OR** **0.040 inch (1.02 mm)** thick **OR** **0.050 inch (1.27 mm)** thick **OR** Thickness as required to meet performance requirements, **as directed**.
 - 3) Extruded Aluminum: **0.080 inch (2.03 mm)** thick **OR** Thickness as required to meet performance requirements, **as directed**.

- 4) Stainless Steel: **0.025 inch (0.64 mm)** thick **OR** Thickness as required to meet performance requirements, **as directed**.
- 5) Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** thickness **OR** **0.034-inch (0.86-mm)** thickness **OR** thickness as required to meet performance requirements, **as directed**.
- b. Corners: Factory mitered and soldered **OR** continuously welded **OR** mechanically clinched and sealed watertight, **as directed**.
- c. Accessories: Fascia extenders with continuous hold-down cleats **OR** Wall cap **OR** Soffit trim, **as directed**.
4. Copper Finish: Non-patinated, mill **OR** Pre-patinated dark brown **OR** Pre-patinated verdigris, **as directed**.
5. Aluminum Finish: Mill **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer **OR** Clear anodic **OR** Color anodic, **as directed**.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
6. Stainless-Steel Finish: No. 2B (bright, cold rolled) **OR** No. 3 (coarse, polished directional satin) **OR** No. 4 (bright, polished directional satin), **as directed**.
7. Zinc-Coated Steel Finish: Mill phosphatized for field painting **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer, **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

G. Roof-Edge Drainage Systems

1. Gutters: Manufactured in uniform section lengths not exceeding **12 feet (3.6 m)**, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least **1 inch (25 mm)** above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.
 - a. Fabricate from the following exposed metal:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick)** **OR** **20 oz./sq. ft. (0.68 mm thick)**, **as directed**.
 - 2) Formed Aluminum: **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.02 mm)** **OR** **0.050 inch (1.27 mm)** **OR** **0.063 inch (1.60 mm)**, **as directed**, thick.
 - 3) Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** **OR** **0.034-inch (0.86-mm)**, **as directed**, thickness.
 - b. Gutter Profile: Style A **OR** Style B **OR** Style F **OR** Style G **OR** Style H **OR** Style I **OR** Style K **OR** Style K highback **OR** Half-round single bead **OR** Half-round highback **OR** Quarter round **OR** Ogee **OR** As indicated, **as directed**, according to SMACNA's "Architectural Sheet Metal Manual."
 - c. Embossed Surface: Embossed with design as indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - d. Applied Fascia Cover (Concealed Gutter): Exposed, formed copper, **16 oz./sq. ft. (0.55 mm thick)** **OR** aluminum, **0.040 inch (1.02 mm)** thick, **as directed**, with factory-mitered corners, ends, and concealed splice joints.
 - e. Corners: Factory mitered and soldered **OR** continuously welded **OR** mechanically clinched and sealed watertight, **as directed**.
 - f. Gutter Supports: Gutter brackets **OR** Straps **OR** Spikes and ferrules **OR** Manufacturer's standard supports as selected by the Owner, **as directed**, with finish matching the gutters.
 - g. Special Fabrications: Radiussed sections.
 - h. Gutter Accessories: Continuous screened leaf guard with sheet metal frame **OR** Continuous hinged leaf guard of solid metal designed to shed leaves **OR** Continuous snap-in plastic leaf guard **OR** Bronze wire ball downspout strainer **OR** Wire ball downspout strainer **OR** Flat ends **OR** Bullnose ends for half-round gutter, **as directed**.
2. Downspouts: Plain round **OR** Corrugated round **OR** Plain rectangular **OR** Corrugated rectangular **OR** Open-face rectangular, **as directed**, complete with machine-cripped **OR** mitered **OR**

smooth-curve, **as directed**, elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

- a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Formed Aluminum: **0.032 inch (0.81 mm) OR 0.040 inch (1.02 mm) OR 0.050 inch (1.27 mm) OR 0.063 inch (1.60 mm)**, **as directed**, thick.
 - c. Extruded Aluminum: **0.125 inch (3.18 mm)** thick.
 - d. Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm) OR 0.034-inch (0.86-mm)**, **as directed**, thickness.
3. Parapet Scuppers: Manufactured with closure flange trim to exterior, **4-inch- (100-mm-)** wide wall flanges to interior, and base extending **4 inches (100 mm)** beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scuppers, **as directed**.
 - a. Fabricate from the following exposed metal:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - 2) Formed Aluminum: **0.032 inch (0.81 mm)** thick.
 - 3) Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - 4) Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** thickness.
 4. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim, **as directed**, and built-in overflow, **as directed**.
 - a. Fabricate from the following exposed metal:
 - 1) Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - 2) Formed Aluminum: **0.032 inch (0.81 mm)** thick.
 - 3) Stainless Steel: **0.016 inch (0.40 mm)** thick.
 - 4) Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** thickness.
 5. Splash Pans: Fabricate from the following exposed metal:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Formed Aluminum: **0.040 inch (1.02 mm)** thick.
 - c. Stainless Steel: **0.019 inch (0.48 mm)** thick.
 - d. Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** thickness.
 6. Copper Finish: Non-patinated, mill **OR** Pre-patinated dark brown **OR** Pre-patinated verdigris, **as directed**.
 7. Aluminum Finish: Mill **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer **OR** Clear anodic **OR** Color anodic, **as directed**.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full rang, **as directed**.
 8. Stainless-Steel Finish: No. 2B (bright, cold rolled, unpolished) **OR** No. 3 (coarse, polished directional satin) **OR** No. 4 (bright, polished directional satin), **as directed**.
 9. Zinc-Coated Steel Finish: Mill phosphatized for field painting **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer, **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

H. Reglets And Counterflashings

1. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Formed Aluminum: **0.024 inch (0.61 mm) OR 0.050 inch (1.27 mm)**, **as directed**, thick.
 - c. Stainless Steel: **0.019 inch (0.48 mm) OR 0.025 inch (0.64 mm)**, **as directed**, thick.
 - d. Zinc-Coated Steel: Nominal **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm)**, **as directed**, thickness.
 - e. Corners: Factory mitered and soldered **OR** continuously welded **OR** mechanically clinched and sealed watertight, **as directed**.
 - f. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

- g. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
 - h. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
 - i. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
 - j. Multiuse Type, Embedded: For multiuse embedment in cast-in-place concrete **OR** masonry mortar joints, **as directed**.
2. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by **4 inches (100 mm)** and in lengths not exceeding **12 feet (3.6 m)** designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
 - a. Copper: **16 oz./sq. ft. (0.55 mm thick)**.
 - b. Formed Aluminum: **0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed**, thick.
 - c. Stainless Steel: **0.019 inch (0.48 mm) OR 0.025 inch (0.64 mm), as directed**, thick.
 - d. Zinc-Coated Steel: Nominal **0.022-inch (0.56-mm) OR 0.028-inch (0.71-mm), as directed**, thickness.
 3. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 4. Copper Finish: Non-patinated, mill **OR** Pre-patinated dark brown **OR** Pre-patinated verdigris, **as directed**.
 5. Aluminum Finish: Mill **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer **OR** Clear anodic **OR** Color anodic, **as directed**.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 6. Stainless-Steel Finish: No. 2B (bright, cold rolled, unpolished) **OR** No. 3 (coarse, polished directional satin) **OR** No. 4 (bright, polished directional satin), **as directed**.
 7. Zinc-Coated Steel Finish: Mill phosphatized for field painting **OR** Two-coat fluoropolymer **OR** Three-coat fluoropolymer, **as directed**.
 - a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- I. General Finish Requirements
 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
2. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
3. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Underlayment Installation

1. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.
2. Self-Adhering Sheet Underlayment: Install wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water. Overlap edges not less than **3-1/2 inches (90 mm)**. Roll laps with roller. Cover underlayment within 14 days.
3. Polyethylene Sheet: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped and taped joints of not less than **2 inches (50 mm)**.
4. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than **2 inches (50 mm)**.

C. Installation, General

1. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete roof-specialty systems.
 - a. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - b. Provide uniform, neat seams with minimum exposure of solder and sealant.
 - c. Install roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
 - d. Torch cutting of roof specialties is not permitted.
 - e. Do not use graphite pencils to mark metal surfaces.
2. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - a. Coat concealed side of uncoated aluminum and stainless-steel roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - b. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet **OR** self-adhering, high-temperature sheet underlayment **OR** polyethylene sheet, **as directed**.
 - c. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
3. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.
 - a. Space movement joints at a maximum of **12 feet (3.6 m)** with no joints within **18 inches (450 mm)** of corners or intersections unless otherwise shown on Drawings.
 - b. When ambient temperature at time of installation is between **40 and 70 deg F (4 and 21 deg C)**, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.
4. Fastener Sizes: Use fasteners of sizes that will penetrate wood blocking or sheathing not less than **1-1/4 inches (32 mm)** for nails and not less than **3/4 inch (19 mm)** for wood screws **OR** substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance, **as directed**.
5. Seal joints with elastomeric **OR** butyl, **as directed**, sealant as required by roofing-specialty manufacturer.
6. Seal joints as required for watertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below **40 deg F (4 deg C)**.
7. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of **1-1/2 inches (38 mm)** except reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow

solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

D. Coping Installation

1. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
2. Anchor copings to meet performance requirements.
 - a. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at **30-inch (760-mm)** centers **OR 40-inch (1015-mm)** centers **OR** manufacturer's required spacing that meets performance requirements, **as directed**.
 - b. Interlock face leg drip edge into continuous cleat anchored to substrate at **24-inch (600-mm)** centers **OR 16-inch (400-mm)** centers **OR** manufacturer's required spacing that meets performance requirements, **as directed**. Anchor back leg of coping with screw fasteners and elastomeric washers at **24-inch (600-mm)** centers **OR 16-inch (400-mm)** centers **OR** manufacturer's required spacing that meets performance requirements, **as directed**.

E. Roof-Edge Flashing Installation

1. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
2. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

F. Roof-Edge Drainage-System Installation

1. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
2. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than **12 inches (305 mm)** **OR 24 inches (610 mm)** **OR 30 inches (762 mm)**, **as directed**, apart. Attach ends with rivets and seal with sealant **OR** solder, **as directed**, to make watertight. Slope to downspouts.
 - a. Install gutter with expansion joints at locations indicated but not exceeding **50 feet (15.2 m)** apart. Install expansion joint caps.
 - b. Install continuous leaf guards on gutters with noncorrosive fasteners, removable **OR** hinged to swing open, **as directed**, for cleaning gutters.
3. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and **1 inch (25 mm)** away from walls; locate fasteners at top and bottom and at approximately **60 inches (1500 mm)** o.c.
 - a. Provide elbows at base of downspout to direct water away from building.
OR
Connect downspouts to underground drainage system indicated.
4. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement **OR** elastomeric sealant, **as directed**.
5. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 - a. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 - b. Loosely lock front edge of scupper with conductor head.
 - c. Seal or solder exterior wall scupper flanges into back of conductor head.
6. Conductor Heads: Anchor securely to wall with elevation of conductor top edge **1 inch (25 mm)** below scupper **OR** gutter, **as directed**, discharge.

G. Reglet And Counterflashing Installation

1. General: Coordinate installation of reglets and counterflashings with installation of base flashings.

2. Embedded Reglets: See Division 03 Section "Cast-in-place Concrete" and Division 04 Section "Unit Masonry" for installation of reglets.
 3. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap **4 inches (100 mm)** over top edge of base flashings.
 4. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap **4 inches (100 mm)** over top edge of base flashings. Lap counterflashing joints a minimum of **4 inches (100 mm)** and bed with elastomeric **OR** butyl, **as directed**, sealant. Fit counterflashings tightly to base flashings.
- H. Cleaning And Protection
1. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
 2. Clean and neutralize flux materials. Clean off excess solder and sealants.
 3. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
 4. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 23 00

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Task	Specification	Specification Description
07 71 23 00	01 22 16 00	No Specification Required
07 71 23 00	05 73 23 00	Miscellaneous Ornamental Metals
07 71 23 00	01 95 07 00a	Sheet Metal Flashing And Trim
07 71 26 00	01 95 07 00a	Sheet Metal Flashing And Trim
07 72 13 00	23 34 23 00	Power Ventilators
07 72 13 00	23 37 23 13	Intake and Relief Ventilators
07 72 13 00	23 74 16 13	Packaged, Outdoor, Central-Station Air-Handling Units

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SECTION 07 72 23 00 - ROOF ACCESSORIES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for roof accessories. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Roof curbs.
 - b. Equipment supports.
 - c. Roof hatches.
 - d. Dropout-type heat and smoke vents.
 - e. Hatch-type heat and smoke vents.
 - f. Gravity ventilators.
 - g. Roof supports.
 - h. Roof walkways.
 - i. Preformed flashings.

C. Submittals

1. Product Data: For each type of roof accessory indicated.
2. Shop Drawings: Show fabrication and installation details for roof accessories.
3. Samples: For each type of exposed factory-applied color finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.

D. Quality Assurance

1. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

E. Delivery, Storage, And Handling

1. Pack, handle, and ship roof accessories properly labeled in heavy-duty packaging to prevent damage.

F. Warranty

1. Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof accessories that show evidence of deterioration of factory-applied finishes within 20 years from date of Final Completion.

1.2 PRODUCTS

A. Metal Materials

1. Galvanized Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coated and mill phosphatized for field painting.
2. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **AZ50 (AZM150)** coated.
3. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755/A 755M.
 - a. Galvanized Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coated.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, **Class AZ50 (Class AZM150)** coated.

- c. Exposed Finishes: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.
 4. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by manufacturer for type of use and mill finish. Coil-coat finish as follows:
 - a. Factory-Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of **0.2 mil (0.005 mm)**.
 - b. Clear **OR** Color, **as directed**, Anodic Finish: Architectural Class II, complying with AAMA 611.
 - 1) Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** Champagne, **as directed**.
 - c. Baked-Enamel Finish: Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**, medium gloss.
 - 1) Color and Gloss: As selected from manufacturer's full range.
 - d. High-Performance Organic Finish: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.
 - 1) Color and Gloss: As selected from manufacturer's full range.
 - e. Powder-Coat Finish: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard baked-polymer thermosetting powder finish.
 - 1) Color and Gloss: As selected from manufacturer's full range.
 5. Stainless-Steel Shapes or Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 or Type 316, No. 2D finish.
 6. Aluminum Extrusions and Tubes: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by manufacturer for type of use, mill finished.
 7. Steel Shapes: ASTM A 36/A 36M, hot-dip galvanized to comply with ASTM A 123/A 123M, unless otherwise indicated.
 8. Steel Tube: ASTM A 500, round tube, baked-enamel finished.
 9. Galvanized Steel Tube: ASTM A 500, round tube, hot-dip galvanized to comply with ASTM A 123/A 123M.
 10. Galvanized Steel Pipe: ASTM A 53/A 53M.
- B. Miscellaneous Materials
1. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, category as standard with manufacturer, Type UVA (formulated with UV absorber), Finish 1 (smooth or polished).
 2. Polycarbonate Glazing: Thermoformable, monolithic polycarbonate sheets manufactured by extrusion process, burglar-resistance rated per UL 972 with an average impact strength of **12 to 16 ft-lbf/in. (640 to 854 J/m)** of width when tested according to ASTM D 256, Method A (Izod).
 3. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, **1 inch (25 mm)** thick.
 4. Glass-Fiber Board Insulation: ASTM C 726, **1 inch (25 mm)** thick.
 5. Polyisocyanurate Board Insulation: ASTM C 1289, **1 inch (25 mm)** thick.
 6. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than **1-1/2 inches (38 mm)** thick.
 7. Security Grilles: **3/4-inch- (19-mm-)** diameter, ASTM A 1011/A 1011M steel bars spaced **6 inches (150 mm)** o.c. in 1 direction and **12 inches (300 mm)** o.c. in the other; factory primed.
 - a. Factory Finish:
 - 1) Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2) Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
 - 3) Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer; selected for resistance to normal atmospheric

corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

8. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for **15-mil (0.4-mm)** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
9. Polyethylene Sheet: **6-mil- (0.15-mm-)** thick, polyethylene sheet complying with ASTM D 4397.
10. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 - a. Slip Sheet: Rosin-sized paper, minimum **3 lb/100 sq. ft. (0.16 kg/sq. m)**.
11. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by roof accessory manufacturer. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners.
12. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
13. Elastomeric Sealant: ASTM C 920, polyurethane **OR** polysulfide **OR** silicone, **as directed**, sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
14. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, and heavy bodied for hooked-type expansion joints with limited movement.
15. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

C. Roof Curbs

1. Roof Curbs: Provide metal roof curbs, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Fabricate with welded or sealed mechanical corner joints, with integral metal cant, **OR** stepped integral metal cant raised the thickness of roof insulation, **as directed**, and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
 - a. Load Requirements: As required to satisfy local code requirements.
 - b. Material:
 - 1) Galvanized **OR** Aluminum-zinc alloy-coated, **as directed**, steel sheet, **0.052 inch (1.32 mm) OR 0.079 inch (2.0 mm), as directed**, thick.
 - 2) Aluminum sheet, **0.090 inch (2.28 mm)** thick.
 - 3) Stainless-steel sheet, **0.078 inch (1.98 mm)** thick.
 - c. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - d. Liner: Same material as curb, of manufacturer's standard thickness and finish.
 - e. Factory install wood nailers at tops of curbs.
 - f. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 - g. Factory insulate curbs with **1-1/2-inch- (38-mm-)** thick, cellulosic-fiber **OR** glass-fiber, **as directed**, board insulation.
 - h. Curb height may be determined by adding thickness of roof insulation and minimum base flashing height recommended by roofing membrane manufacturer. Fabricate units to minimum height of **12 inches (300 mm)**, unless otherwise indicated.
 - i. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

D. Equipment Supports

1. Equipment Supports: Provide metal equipment supports, internally reinforced and capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported. Fabricate with welded or sealed mechanical corner joints, with integral metal

cant **OR** stepped integral metal cant raised the thickness of roof insulation, **as directed**, and integral formed mounting flange at perimeter bottom. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

- a. Load Requirements: As required to satisfy local code requirements.
- b. Material:
 - 1) Galvanized **OR** Aluminum-zinc alloy-coated, **as directed**, steel sheet, **0.052 inch (1.32 mm) OR 0.079 inch (2.0 mm)**, **as directed**, thick.
 - 2) Aluminum sheet, **0.090 inch (2.28 mm)** thick.
 - 3) Stainless-steel sheet, **0.078 inch (1.98 mm)** thick.
- c. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
- d. Factory-install continuous wood nailers **3-1/2 inches (90 mm) OR 5-1/2 inches (140 mm)**, **as directed**, wide at tops of equipment supports.
- e. Metal Counterflashing: Manufacturer's standard removable counterflashing, fabricated of same metal and finish as equipment support.
- f. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
- g. Fabricate units to minimum height of **12 inches (300 mm)**, unless otherwise indicated.
- h. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units.

E. Roof Hatches

1. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated single-wall **OR** double-wall, **as directed**, curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
 - a. Loads: Fabricate roof hatches to withstand **40-lbf/sq. ft. (1.9-kPa)** external and **20-lbf/sq. ft. (0.95-kPa)** internal loads.
 - b. Type and Size: Single-leaf lid, **30 by 36 inches (750 by 900 mm) OR 30 by 54 inches (750 by 1370 mm) OR 30 by 96 inches (750 by 2440 mm)**, **as directed**.
 - c. Type and Size: Double-leaf lid, **72 by 96 inches (1830 by 2440 mm)**.
 - d. Curb and Lid Material:
 - 1) Galvanized **OR** Aluminum-zinc alloy-coated, **as directed**, steel sheet, **0.079 inch (2.0 mm)** thick.
 - 2) Aluminum sheet, **0.090 inch (2.28 mm)** thick.
 - 3) Stainless-steel sheet, **0.078 inch (1.98 mm)** thick.
 - e. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - f. Insulation: Cellulosic-fiber **OR** Glass-fiber **OR** Polyisocyanurate, **as directed**, board.
 - g. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
 - h. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
 - i. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 - j. Fabricate units to minimum height of **12 inches (300 mm)**, unless otherwise indicated.
 - k. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate hatch curbs with height constant **OR** tapered to match slope to level tops of units, **as directed**.
 - l. Hardware: Galvanized steel **OR** Stainless-steel, **as directed**, spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
 - 1) Provide 2-point latch on covers larger than **84 inches (2130 mm)**.
 - 2) Provide remote-control operation.

- m. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.
 - n. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
- F. Heat And Smoke Vents
1. Dropout-Type Heat and Smoke Vents: Manufacturer's standard gravity-operated, automatic smoke and heat vents with integral double-wall insulated curbs and frame with welded or sealed mechanical corner joints, integral condensation gutter, cap flashing, and heat-sensitive dome glazing that will deform and drop out of vent opening within 5 minutes of exposure to a simulated fire represented by a time-temperature gradient that reaches an air temperature of **500 deg F (260 deg C)** within 5 minutes.
 - a. Loads: Fabricate heat and smoke vents to withstand a minimum **40-lbf/sq. ft. (1.9-kPa)** external live load and **30-lbf/sq. ft. (1.4-kPa)** uplift.
 - 1) Dome glazing shall have a thickness capable of resisting **40-lbf/sq. ft. (1.9-kPa)** external and **20-lbf/sq. ft. (0.95-kPa)** internal loads.
 - b. Regulatory Requirements: Comply with UL 793 and NFPA 204.
 - c. Heat and Smoke Vent Compliance: Provide units that have been tested and UL listed **OR** FMG approved, **as directed**.
 - d. Integral Curb and Framing Material:
 - 1) Galvanized **OR** Aluminum-zinc alloy-coated, **as directed**, steel sheet, **0.079 inch (2.0 mm)** thick.
 - 2) Aluminum sheet, **0.090 inch (2.28 mm)** thick.
 - 3) Stainless-steel sheet, **0.078 inch (1.98 mm)** thick.
 - e. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Finish: Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
 - f. Insulation: Cellulosic-fiber **OR** Glass-fiber **OR** Polyisocyanurate, **as directed**, board.
 - g. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
 - h. Fabricate integral curbs to minimum height of **12 inches (300 mm)**, unless otherwise indicated.
 - i. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curbs with height constant **OR** tapered to match slope to level tops of units, **as directed**.
 - j. Dome Glazing: Single **OR** Double, **as directed**, acrylic **OR** polycarbonate, **as directed**, glazing.
 - 1) Single-Dome Color: Colorless, transparent **OR** White, translucent **OR** Gray tinted, transparent **OR** Bronze tinted, transparent, **as directed**.
 - 2) Outer Double-Dome Color: Colorless, transparent **OR** White, translucent **OR** Gray tinted, transparent **OR** Bronze tinted, transparent, **as directed**.
 - 3) Inner Double-Dome Color: Colorless, transparent **OR** White, translucent **OR** Gray tinted, transparent **OR** Bronze tinted, transparent, **as directed**.
 2. Hatch-Type Heat and Smoke Vents: Manufacturer's standard single-leaf **OR** double-leaf, **as directed**, hatch-type heat and smoke vents with integral double-wall insulated curbs and frame, with welded or sealed mechanical corner joints, integral condensation gutter, and cap flashing. Fabricate with insulated double-wall lid, continuous weathertight perimeter lid gaskets, and equip with automatic self-lifting mechanisms, UL-listed fusible links rated at **165 deg F (74 deg C)** **OR** fire-suppression system **OR** smoke-detection system, **as directed**, and corrosion-resistant or hot-dip galvanized hardware including hinges, hold-open devices, and independent manual-release devices for inside and outside operation of lids.
 - a. Loads: Fabricate heat and smoke vent to withstand a minimum **40-lbf/sq. ft. (1.9-kPa)** external live load and **30-lbf/sq. ft. (1.4-kPa)** uplift.
 - 1) When release is actuated, lid shall open against **10-lbf/sq. ft. (0.5-kPa)** snow or wind load and lock in position.

- b. Regulatory Requirements: UL 793 and NFPA 204.
- c. Heat and Smoke Vent Compliance: Provide units that have been tested and UL listed **OR** FMG approved, **as directed**.
- d. Fire Resistance of Lids: UL Class A rating.
- e. Integral Curb, Framing, and Lid Material:
 - 1) Galvanized **OR** Aluminum-zinc alloy-coated, **as directed**, steel sheet, **0.079 inch (2.0 mm)** thick.
 - 2) Aluminum sheet, **0.090 inch (2.28 mm)** thick.
 - 3) Stainless-steel sheet, **0.078 inch (1.98 mm)** thick.
- f. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
- g. Insulation: Cellulosic-fiber **OR** Glass-fiber **OR** Polyisocyanurate, **as directed**, board.
- h. Fabricate integral curbs to minimum height of **12 inches (300 mm)**, unless otherwise indicated.
- i. Sloping Roofs: Where slope of roof deck exceeds 1:48, fabricate curbs with height constant **OR** tapered to match slope to level tops of units, **as directed**.

G. Gravity Ventilators

- 1. Low-Profile, Cylindrical-Style Gravity Ventilators: Manufacturer's standard unit fabricated from the following materials, with manufacturer's standard welded or sealed mechanical joints:
 - a. Provide integral base flange, vent cylinder, cylinder bird screen, and rain cap **OR** hood, **as directed**.
 - b. Dimensions: As indicated.
 - c. Style: As indicated.
 - d. Bird Screens: Manufacturer's standard mesh with rewireable frame.
 - e. Insect Screens: Manufacturer's standard mesh with rewireable frame.
 - f. Vent Cylinder, Base Flange, and Rain-Cap **OR** Hood, **as directed** Material: Galvanized steel **OR** Aluminum **OR** Stainless-steel, **as directed**, sheet, of manufacturer's standard thickness.
 - g. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
- 2. Low-Profile, Louvered Penthouse-Style Gravity Ventilators: Manufacturer's standard unit fabricated from the following materials, with manufacturer's standard welded or sealed mechanical joints:
 - a. Provide integral frame with base flange, weathertight cap, louver bird screen, and weatherproof sidewall louvers.
 - b. Dimensions: As indicated.
 - c. Style: As indicated.
 - d. Bird Screens: Manufacturer's standard mesh with rewireable frame.
 - e. Insect Screens: Manufacturer's standard mesh with rewireable frame.
 - f. Integral Frame, Base Flange, Weathertight Cap, and Louver Material: Galvanized steel **OR** Aluminum **OR** Stainless-steel, **as directed**, sheet, of manufacturer's standard thickness.
 - g. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
- 3. Directional Louvered Pedestal-Style Gravity Ventilators: Manufacturer's standard unit fabricated from the following materials, with manufacturer's standard welded or sealed mechanical joints:
 - a. Provide integral weathertight base cap, integral outlet duct, weathertight sidewalls, bird screen, and weatherproof sidewall louver.

- b. Dimensions: As indicated.
 - c. Style: As indicated.
 - d. Bird Screens: Manufacturer's standard mesh with rewireable frame.
 - e. Insect Screens: Manufacturer's standard mesh with rewireable frame.
 - f. Weathertight Base Cap, Outlet Duct, Sidewall, and Louver Material: Galvanized steel **OR** Aluminum **OR** Stainless-steel, **as directed**, sheet, of manufacturer's standard thickness.
 - g. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.
4. Turbine-Style Gravity Ventilators: Manufacturer's standard unit fabricated from the following materials, with manufacturer's standard welded or sealed mechanical joints:
- a. Provide integral weathertight base cap, outlet duct, and rotating louvered turbine.
 - b. Dimensions: As indicated.
 - c. Style: As indicated.
 - d. Bird Screens: Manufacturer's standard mesh with rewireable frame.
 - e. Insect Screens: Manufacturer's standard mesh with rewireable frame.
 - f. Weathertight Base Cap, Outlet Duct, and Turbine Material: Galvanized steel **OR** Aluminum, **as directed**, sheet, of manufacturer's standard thickness.
 - g. Finish:
 - 1) Prime painted **OR** Baked enamel **OR** High-performance organic coating **OR** Powder coat, **as directed**.
 - 2) Mill **OR** Clear anodic **OR** Color anodic, **as directed**.

H. Roof Supports

- 1. Pipe Roof Supports: Adjustable height, extruded-aluminum tube, urethane insulation filled, **2 inches (50 mm)** in diameter, with aluminum base plates and manufacturer's recommended hardware for mounting to structure **OR** structural roof deck, **as directed**, and extruded-aluminum carrier assemblies, suitable for quantity of pipe runs and sizes, with EPDM end caps. Include manufacturer's standard hardware for mounting to structure or structural roof deck.
 - a. Pipe Support Height: As indicated.
 - b. Pipe Roller Assembly: Stainless-steel roller assembly sized for supported pipes with extruded aluminum.
 - c. Pipe Support Flashing: Insulated **OR** Uninsulated, **as directed**, sleeve flashings with integral base flange, and EPDM grommetted top seal and base seals.
 - 1) Metal: Aluminum sheet, **0.064 inch (1.6 mm)** thick **OR** Copper sheet, **16 oz. (0.55 mm)** thick, **as directed**.
- 2. Terrace Lighting Roof Supports: Epoxy-coated hollow structural section steel pipe support, urethane insulation filled, with epoxy-coated steel base plates and manufacturer's recommended hardware for mounting to structure **OR** structural roof deck, **as directed**, **14 inches (356 mm) OR 18 inches (457 mm)**, **as directed**, high, with galvanized threaded cap.
 - a. Lighting Pole Mounting: Stainless-steel lighting pole adapter **OR** Epoxy-coated steel plate with stainless-steel studs, **as directed**.
 - b. Pipe Support Flashing: Insulated **OR** Uninsulated, , metal sleeve flashings with integral base flange, and EPDM grommetted top seal and base seals.
 - 1) Metal: Aluminum sheet, **0.064 inch (1.6 mm)** thick **OR** Copper sheet, **16 oz. (0.55 mm)** thick, **as directed**.
- 3. Light-Duty Pipe Roof Supports: Extruded-aluminum base assembly and Type 304 stainless-steel roller assembly for pipe sizes indicated, including manufacturer's standard hardware for mounting to structure or structural roof deck.
- 4. Duct Roof Supports: **2-inch- (50-mm-)** diameter, extruded-aluminum, urethane-insulated supports, including manufacturer's standard hardware for mounting to structure or structural roof deck.

I. Roof Walkways

1. Roof Walkway: Multiple C-shaped-channel formed-metal planks, as follows, with upper surface punched in serrated diamond or rectangular shapes to produce raised slip-resistant surface and drainage holes. Provide support framing, brackets, connectors, nosings, and other accessories and components needed for complete installation. Include step units for changes in elevation.
 - a. Plank Width: **4-3/4 inches (121 mm) OR 7 inches (178 mm) OR 9-1/2 inches (241 mm) OR 11-3/4 inches (298 mm) OR 18-3/4 inches (476 mm) OR 24 inches (610 mm) OR** As indicated, **as directed**.
 - b. Walkway Width: As indicated.
 - c. Channel Depth: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 2-1/2 inches (64 mm) OR 3 inches (76 mm) OR** As indicated., **as directed**
 - d. Metal Material: **-0.079-inch- (2.0-mm-)** thick, hot-dip galvanized steel sheet **OR 0.108-inch- (2.8-mm-)** thick, hot-dip galvanized steel sheet **OR 0.062-inch- (1.6-mm-)** thick, stainless-steel sheet **OR 0.078-inch- (1.98-mm-)** thick, stainless-steel sheet **OR 0.080-inch- (2.03-mm-)** thick, mill-finished aluminum sheet **OR 0.100-inch- (2.5-mm-)** thick, mill-finished aluminum sheet, **as directed**.
 - e. Provide isolation pads attached to supports so supports are completely isolated from roof membrane surface.

J. Preformed Flashings

1. Exhaust Vent Flashings: Double-wall metal flashing sleeve, urethane insulation filled, with integral deck flange, **12 inches (300 mm)** high, with removable metal hood and slotted **OR** perforated, **as directed**, metal collar, and as follows:
 - a. Metal: Aluminum sheet, **0.064 inch (1.6 mm)** thick, mill finished **OR** Copper sheet, **16 oz. (0.55 mm thick)**, **as directed**.
 - b. Diameter: As indicated.
2. Vent Stack Flashing: Metal flashing sleeve, with integral deck flange, uninsulated, and as follows:
 - a. Metal: Aluminum sheet, **0.064 inch (1.6 mm)** thick, mill finished **OR** Copper sheet, **16 oz. (0.55 mm thick)**, **as directed**.
 - b. Height: As indicated..
 - c. Diameter: As indicated.

1.3 EXECUTION

A. Installation

1. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
2. Install roof accessories to fit substrates and to result in watertight performance.
3. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - a. Coat concealed side of uncoated aluminum **OR** stainless-steel, **as directed**, roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - b. Underlayment: Where installing exposed-to-view components of roof accessories directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
 - c. Bed flanges in thick coat of asphalt roofing cement where required by roof accessory manufacturers for waterproof performance.
4. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.

5. Seal joints with elastomeric **OR** butyl, **as directed**, sealant as required by manufacturer of roof accessories.

END OF SECTION 07 72 23 00

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Task	Specification	Specification Description
07 72 26 00	07 72 23 00	Roof Accessories
07 72 33 00	07 72 23 00	Roof Accessories
07 72 36 00	07 72 23 00	Roof Accessories
07 72 63 00	01 22 16 00	No Specification Required
07 73 00 00	07 51 13 00	Built-Up Asphalt Roofing
07 73 00 00	07 05 13 00	Built-Up Coal-Tar Roofing
07 73 00 00	07 52 13 00	APP-Modified Bituminous Membrane Roofing
07 73 00 00	07 52 16 00	SBS-Modified Bituminous Membrane Roofing
07 73 00 00	07 53 16 00	CSPE Membrane Roofing
07 73 00 00	07 53 23 00	EPDM Membrane Roofing
07 76 16 00	01 22 16 00	No Specification Required

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SECTION 07 81 16 00 - SPRAYED FIRE-RESISTIVE MATERIALS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for sprayed fire-resistive materials. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Concealed SFRM.
 - b. Exposed SFRM.
 - c. Exposed intumescent mastic fire-resistive coatings.

C. Definitions

1. SFRM: Sprayed fire-resistive material.
2. Concealed: Fire-resistive materials applied to surfaces that are concealed from view behind other construction when the Work is completed and have not been defined as exposed, **as directed**.
3. Exposed: Fire-resistive materials applied to surfaces that are exposed to view when the Work is completed, that are accessible through suspended ceilings **OR** that are in elevator shafts and machine rooms **OR** that are in mechanical rooms **OR** that are in air-handling plenums **OR** and that are identified as exposed on Drawings, **as directed**.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show extent of sprayed fire-resistive material for each construction and fire-resistance rating, applicable fire-resistive design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction, and minimum thicknesses.
3. Product certificates **OR** test reports, **as directed**.
4. Compatibility and adhesion test reports.
5. Research/evaluation reports.
6. Field quality-control test and special inspection, **as directed**, reports.

E. Quality Assurance

1. Installer Qualifications: A qualified installer approved by SFRM manufacturer to install manufacturer's products. A manufacturer's willingness to sell its SFRM to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
2. SFRM Testing: By a qualified testing and inspecting agency engaged by Contractor or manufacturer to test for compliance with specified requirements for performance and test methods.
 - a. SFRMs are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Testing is performed on specimens of SFRMs that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
 - c. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.

3. Compatibility and Adhesion Testing: Engage a qualified testing and inspecting agency to test for compliance with requirements for specified performance and test methods.
 - a. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - b. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with SFRM.
4. Fire-Test-Response Characteristics: Where indicated, provide products identical to those tested for fire resistance per ASTM E 119 by a testing agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - b. Identify products with appropriate markings of applicable testing and inspecting agency.
5. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
6. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire-resistance ratings applicable to Project.
2. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
3. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from Project site and discard wet or deteriorated materials.

G. Project Conditions

1. Environmental Limitations: Do not apply SFRM when ambient or substrate temperature is **40 deg F (4 deg C)** or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
2. Ventilation: Ventilate building spaces during and after application of SFRM. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.

H. Warranty

1. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace SFRMs that fail in materials or workmanship within two years from date of Final Completion.

1.2 PRODUCTS

A. Concealed SFRM

1. Material Composition: Manufacturer's standard product, as follows **OR** either of the following, **as directed**:
 - a. Concealed Cementitious SFRM: Factory-mixed, dry formulation of gypsum or portland cement binders, additives, and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
 - b. Concealed Sprayed-Fiber Fire-Resistive Material: Factory-mixed, dry formulation of inorganic binders, mineral fibers, fillers, and additives conveyed in a dry state by pneumatic equipment and mixed with water at spray nozzle to form a damp, as-applied product.
2. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:

- a. Dry Density: **15 lb/cu. ft. (240 kg/cu. m)** for average and individual densities, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
 - b. Thickness: Minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than **0.375 inch (9 mm)**, per ASTM E 605:
 - 1) Where the referenced fire-resistance design lists a thickness of **1 inch (25 mm)** or more, the minimum allowable individual thickness of SFRM is the design thickness minus **0.25 inch (6 mm)**.
 - 2) Where the referenced fire-resistance design lists a thickness of less than **1 inch (25 mm)** but more than **0.375 inch (9 mm)**, the minimum allowable individual thickness of SFRM is the greater of **0.375 inch (9 mm)** or 75 percent of the design thickness.
 - 3) No reduction in average thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than **15 lb/cu. ft. (240 kg/cu. m)**.
 - c. Bond Strength: **150 lbf/sq. ft. (7.2 kPa)** minimum per ASTM E 736 based on laboratory testing of **0.75-inch (19-mm)** minimum thickness of SFRM.
 - d. Compressive Strength: **5.21 lbf/sq. in. (35.9 kPa)** minimum per ASTM E 761. Minimum thickness of SFRM tested shall be **0.75 inch (19 mm)** and minimum dry density shall be as specified but not less than **15 lb/cu. ft. (240 kg/cu. m)**.
 - e. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
 - f. Deflection: No cracking, spalling, or delamination per ASTM E 759.
 - g. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
 - h. Air Erosion: Maximum weight loss of **0.025 g/sq. ft. (0.270 g/sq. m)** in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of SFRM is **0.75 inch (19 mm)**, maximum dry density is **15 lb/cu. ft. (240 kg/cu. m)**, test specimens are not prepured by mechanically induced air velocities, and tests are terminated after 24 hours.
 - i. Fire-Test-Response Characteristics: Provide SFRM with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1) Flame-Spread Index: 10 or less.
 - 2) Smoke-Developed Index: 0.
 - j. Fungal Resistance: No observed growth on specimens per ASTM G 21.
- B. Exposed SFRM
1. Material Composition: Manufacturer's standard product, as follows:
 - a. Exposed Cementitious SFRM: Factory-mixed, dry, cement aggregate formulation; or chloride-free formulation of gypsum or portland cement binders, additives, and inorganic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
 - b. Exposed Sprayed-Fiber Fire-Resistive Material: Factory-mixed, dry formulation of inorganic binders, mineral fibers, fillers, and additives conveyed in a dry state by pneumatic equipment and mixed with water at spray nozzle to form a damp, as-applied product.
 2. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
 - a. Dry Density: Values for average and individual densities as required for fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method," but with an average density of not less than **22 lb/cu. ft. (352 kg/cu. m)**.
 - b. Bond Strength: **434 lbf/sq. ft. (21 kPa)** minimum per ASTM E 736.
 - c. Compressive Strength: **51 lbf/sq. in. (351 kPa)** minimum per ASTM E 761.
 - d. Dry Density: Values for average and individual densities as required for fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method," but with an average density of not less than **39 lb/cu. ft. (625 kg/cu. m)**.
 - e. Bond Strength: **1000 lbf/sq. ft. (48 kPa)** minimum per ASTM E 736.

- f. Compressive Strength: **300 lbf/sq. in. (2067 kPa)** minimum per ASTM E 761.
 - g. Corrosion Resistance: No evidence of corrosion per ASTM E 937.
 - h. Deflection: No cracking, spalling, or delamination per ASTM E 759.
 - i. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
 - j. Air Erosion: Maximum weight loss of **0.025 g/sq. ft. (0.270 g/sq. m)** per ASTM E 859.
 - k. Combustion Characteristics: Passes ASTM E 136.
 - l. Fire-Test-Response Characteristics: Provide SFRM with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1) Flame-Spread Index: 10 or less.
 - 2) Smoke-Developed Index: 0.
 - m. Fungal Resistance: No observed growth on specimens per ASTM G 21.
 - n. For exterior applications of SFRM, provide formulation listed and labeled by testing and inspecting agency acceptable to authorities having jurisdiction for surfaces exposed to exterior.
- C. Exposed Intumescent Mastic Fire-Resistive Coatings
- 1. Fire-Resistive, Intumescent Mastic Coating: Factory-mixed formulation.
 - a. Water-Based Formulation: Approved by manufacturer and authorities having jurisdiction and investigated for Interior General **OR** Conditioned Interior Space, **as directed**, Purpose by UL.
 - b. Non-Water-Based Formulation: Approved by manufacturer and UL or another testing and inspecting agency acceptable to authorities having jurisdiction and investigated for Interior General Purpose by UL **OR** investigated for Interior General Purpose and Exterior Use by UL **OR** tested per ASTM E 1529 **OR** tested per UL 1709, **as directed**.
 - c. Multicomponent system consisting of intumescent base coat and topcoat.
 - 2. Color and Gloss: As selected from manufacturer's full range.
- D. Auxiliary Fire-Resistive Materials
- 1. General: Provide auxiliary fire-resistive materials that are compatible with SFRM and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
 - 2. Substrate Primers: For use on each substrate and with each sprayed fire-resistive product, provide primer that complies with one or more of the following requirements:
 - a. Primer's bond strength complies with requirements specified in UL's "Fire Resistance Directory" for coating materials based on a series of bond tests per ASTM E 736.
 - b. Primer is identical to those used in assemblies tested for fire-test-response characteristics of SFRM per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Adhesive for Bonding Fire-Resistive Material: Product approved by manufacturer of SFRM.
 - 4. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required to comply with fire-resistance designs indicated and fire-resistive material manufacturer's written recommendations. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive SFRM.
 - 5. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by manufacturer of SFRM.
 - 6. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by manufacturer of intumescent mastic coating fire-resistive material. Include pins and attachment.
 - 7. Sealer for Sprayed-Fiber Fire-Resistive Material: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by manufacturer of sprayed-fiber fire-resistive material.
 - 8. Topcoat: Type recommended in writing by manufacturer of each SFRM for application over concealed **OR** exposed, **as directed**, SFRM.

9. Cement-Based Topcoat: Factory-mixed, cementitious hardcoat formulation recommended in writing by manufacturer of SFRM for trowel or spray application over concealed **OR** exposed, **as directed**, SFRM.
10. Veneer-Plaster Topcoat: Factory-mixed formulation of a latex-modified, portland cement-based veneer plaster recommended in writing by manufacturer of SFRM for trowel or spray application over concealed **OR** exposed, **as directed**, SFRM.
11. Water-Based Permeable Topcoat: Factory-mixed formulation recommended in writing by manufacturer of SFRM for brush, roller, or spray application over concealed **OR** exposed, **as directed**, SFRM. Provide application at a rate of **120 sq. ft./gal. (3 sq. m/L) OR 60 sq. ft./gal. (1.5 sq. m/L) OR 30 sq. ft./gal. (0.75 sq. m/L), as directed.**

1.3 EXECUTION

A. Preparation

1. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
2. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, and incompatible primers, paints, and encapsulants.
3. Prime substrates where recommended in writing by SFRM manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive SFRM.
4. For exposed applications, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of SFRM. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

B. Application, General

1. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
2. Apply SFRM that is identical to products tested as specified in Part 1.1 "Quality Assurance" Article and substantiated by test reports, with respect to rate of application, accelerator use, sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.
3. Install metal lath and reinforcing fabric, as required, to comply with fire-resistance ratings and fire-resistive material manufacturer's written recommendations for conditions of exposure and intended use. Securely attach lath and fabric, as required, to substrate in position required for support and reinforcement of fire-resistive material. Use anchorage devices of type recommended in writing by SFRM manufacturer. Attach accessories where indicated or required for secure attachment of lath and fabric, as required, to substrate.
4. Coat substrates with bonding adhesive before applying fire-resistive material where required to achieve fire-resistance rating or as recommended in writing by SFRM manufacturer for material and application indicated.
5. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by SFRM manufacturer, install body of fire-resistive covering in a single course.
6. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by SFRM manufacturer.
7. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply SFRM that differs in color from that of encapsulant over which it is applied.
8. Where sealers are used, apply products that are tinted to differentiate them from SFRM over which they are applied.

C. Application, Concealed SFRM

1. Apply concealed SFRM in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if specified in Part 1.2 "Concealed SFRM" Article.
 2. Apply water overspray to concealed sprayed-fiber fire-resistive material as required to obtain designated fire-resistance rating and where indicated.
 3. Cure concealed SFRM according to product manufacturer's written recommendations.
 4. Apply sealer to concealed SFRM where indicated.
 5. Apply topcoat to concealed SFRM where indicated.
- D. Application, Exposed SFRM
1. Apply exposed SFRM in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if indicated.
 - a. For steel beams and bracing, provide a thickness of not less than **1 inch (25 mm)**.
 - b. For metal floor or roof decks, provide a thickness of not less than **1/2 inch (13 mm)**.
 2. Provide a uniform finish complying with description indicated for each type of material and matching the Owner's sample or, if none, finish approved for field-erected mockup.
 3. Apply exposed cementitious SFRM to produce the following finish:
 - a. Spray-textured finish with no further treatment.
 - b. Even, spray-textured finish, produced by rolling flat surfaces of fire-protected members with a damp paint roller to remove drippings and excessive roughness.
 - c. Skip-troweled finish with leveled surface, smoothed-out texture, and neat edges.
 - d. Smooth, troweled finish with surface markings eliminated and edges squared.
 4. Apply exposed sprayed-fiber fire-resistive material to produce the following finish:
 - a. Spray-textured finish.
 - b. Sealer where indicated.
 - c. Topcoat where indicated.
 5. Cure exposed SFRM according to product manufacturer's written recommendations.
- E. Application, Exposed Intumescent Mastic Fire-Resistive Coatings
1. Apply exposed intumescent mastic fire-resistive coatings in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition.
 2. Apply intumescent mastic fire-resistive coating as follows:
 - a. Install reinforcing fabric as required to obtain designated fire-resistance rating and where indicated.
 - b. Finish: Spray-textured finish with no further treatment.
 - c. Finish: Even, spray-textured finish produced by lightly rolling flat surfaces of fire-protected members before fire-resistive material dries, to smooth out surface irregularities and to seal in surface fibers.
- F. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
 - a. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
 2. Tests and Inspections: Testing and inspecting of completed applications of SFRM shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of SFRM for the next area until test results for previously completed applications of SFRM show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.
 - a. Thickness for Floor, Roof, and Wall Assemblies: For each **1000-sq. ft. (93-sq. m)** area, or partial area, on each floor, from the average of 4 measurements from a **144-sq. in. (0.093-sq. m)** sample area, with sample width of not less than **6 inches (152 mm)** per ASTM E 605.

- b. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
 - c. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 605 or AWC Technical Manual 12-A, Section 5.4.5, "Displacement Method."
 - d. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: For each 10,000-sq. ft. (929 sq. m) area, or partial area, on each floor, cohesion and adhesion from one sample of size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 736.
 - 1) Field test SFRM that is applied to flanges of wide-flange, structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
 - 2) If surfaces of structural steel receiving SFRM are primed or otherwise painted for coating materials, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 150 lbf/sq. ft. (7.2 kPa) minimum per ASTM E 736.
 - e. If testing finds applications of SFRM are not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
3. Remove and replace applications of SFRM that do not pass tests and inspections for cohesion and adhesion, for density, or for both and retest as specified above.
 4. Apply additional SFRM, per manufacturer's written instructions, where test results indicate that thickness does not comply with specified requirements, and retest as specified above.
- G. Cleaning, Protecting, And Repair
1. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
 2. Protect SFRM, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Final Completion.
 3. Coordinate application of SFRM with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect SFRM and patch any damaged or removed areas.
 4. Repair or replace work that has not successfully protected steel.

END OF SECTION 07 81 16 00

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Task	Specification	Specification Description
07 81 23 00	07 81 16 00	Sprayed Fire-Resistive Materials
07 81 33 00	07 81 16 00	Sprayed Fire-Resistive Materials

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SECTION 07 84 13 16 - FIRESTOPPING

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for firestopping. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

- A. System Description
 - 1. Performance Requirements: Comply with following:
 - a. Firestopping: Consist of material or combination of materials to form effective barrier against spread of flame, smoke, and gases, and maintain integrity of fire-resistance rated walls, partitions, floors, and ceiling-floor assemblies at penetrations.
 - 1) Penetrations: Include annular space around pipes, ducts, chimneys, tubes, conduit, wires, cables, and vents.
- B. Submittals
 - 1. Product Data:
 - a. Composition and performance characteristics.
 - b. List of FM, UL, or WH classification number of systems installed.
 - 2. Quality Assurance/Control Submittals:
 - a. Test Reports: If not FM, UL, or WH listed, submit certified test results for ASTM E 814 tests by UL, FM, WH, or other accredited independent laboratory demonstrating compliance of firestopping with specified requirements.
 - b. Manufacturers installation instructions.
- C. Quality Assurance
 - 1. Regulatory Requirements: Comply with applicable building-code requirements for firestopping.
- D. Delivery, Storage, And Handling
 - 1. Packing, Shipping, Handling, and Unloading: Deliver in original, unopened containers with manufacturer's labels.
 - a. Products: FM, UL, or WH labeled and FM, UL, or WHI listed.
 - 2. Storage and Protection: Store firestopping materials in accordance with manufacturer's recommendations.

1.3 PRODUCTS

- A. Fire-Rated Penetration Sealant Systems
 - 1. Firestopping Materials: Commercially manufactured asbestos-free products complying with following minimum requirements:
 - a. Material:
 - 1) Flame Spread: ASTM E 84 or UL 723, 25 or less.
 - 2) Smoke Developed Rating: ASTM E 84 or UL 723, 50 or less.
 - 3) Material: Approved firestopping material as listed in UL 05, FM P7825, or WH Certified Listing.
 - b. Material Properties:

- 1) Contain no flammable or toxic solvents and have no dangerous or flammable outgassing during the drying or curing of products.
- 2) Non-toxic to human beings at all stages of application and during fire conditions.
- 3) Water-resistant after drying or curing and unaffected by high humidity, condensation, or transient water exposure.
- c. Devices and systems requiring heat activation to seal opening created by burning or melting of penetrant shall exhibit demonstrated ability to function as required for floors and walls of construction and thickness similar to those to be firestopped.
2. Firestopping System Requirements: Materials from single manufacturer capable of maintaining effective barrier against flame, smoke, and gases in accordance with ASTM E 814 and UL 1479.
 - a. Fire-Resistance Rating: Equal or greater than fire-resistance rating of assembly in which it is being placed.
 - b. F Ratings: Equal to or greater than fire-resistance rating of assembly penetrated.
 - c. T Ratings: Equal to or greater than fire-resistance rating of assembly penetrated at following locations:
 - 1) Penetrations located outside of wall cavities.
 - 2) Penetrations located outside of fire-resistive shaft enclosures.
 - 3) Penetrations located in enclosures with doors required to have temperature-rise rating.
 - 4) Penetrations with penetrating hems larger than 100 mm (4 inch) diameter nominal pipe or 10 320 sq. mm (16 square inches) in cross-sectional area.
 - d. System: Listed in UL 05, FM 7825, or WH Certified Listing, or tested by approved laboratory in accordance with ASTM E 814.
 - e. System: Suitable for firestopping of penetrations made by steel, glass, plastic, and insulated pipe.
 - f. Penetration by Insulated Pipe: Does not require removal of insulation.

1.4 EXECUTION

A. Examination

1. Verification of Conditions:
 - a. Existing Conditions: Examine penetrations before beginning installation.
 - b. Do not proceed with installation until conditions are satisfactory.

B. Installation

1. Fire-Rated Penetration Sealant Systems: Install in accordance with UL 05, FM P7825, or WH systems and manufacturers recommendations to maintain required fire-separation rating.
 - a. Preparation: Clean surfaces in contact with firestopping materials that may affect proper fitting or required fire rating. Prime if required. Dam void if required.
 - b. Penetrations: Completely fill void with sealant materials to smooth surface, flush with adjacent surfaces and in contact with surfaces formed by openings and penetrating items ensuring adhesion. Provide sealant in thickness to achieve required fire rating and smoke barrier.
 - c. Firestopping at Voids 100 mm (4 inches) or More in Any Direction: Capable of supporting same load as floor is designed to support or protected by permanent barrier.
 - d. Remove any excess sealant from adjacent surfaces.
2. Firestopping: Provide at following locations:
 - a. Penetrations of duct, chimney, conduit, tubing, cable, and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.
 - b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.
 - c. Gaps at intersection of fire-rated floor slabs and walls.
 - d. Gaps at perimeter of fire-rated walls and partitions, such as between top of walls and bottom of floor or roof decks.
 - e. Construction joints in fire-rated floors, walls, and partitions.

- f. Other locations where required to maintain fire-resistance rating of the construction.
 - g. Other locations as indicated on Drawings (if any).
- C. Field Quality Control
- 1. Inspection: Examine areas to be firestopped prior to concealing or enclosing to ensure proper installation.
 - a. Keep areas of firestopping work accessible until inspection by authorities having jurisdiction over work.

END OF SECTION 07 84 13 16

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SECTION 07 84 13 16a - THROUGH-PENETRATION FIRESTOP SYSTEMS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for through-penetration firestop systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes through-penetration firestop systems for penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items.

C. Performance Requirements

1. General: For penetrations through fire-resistance-rated constructions, including both empty openings and openings containing penetrating items, provide through-penetration firestop systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated.
2. Rated Systems: Provide through-penetration firestop systems with the following ratings determined per ASTM E 814 or UL 1479:
 - a. F-Rated Systems: Provide through-penetration firestop systems with F-ratings indicated, but not less than that equaling or exceeding fire-resistance rating of constructions penetrated.
 - b. T-Rated Systems: For the following conditions, provide through-penetration firestop systems with T-ratings indicated, as well as F-ratings, where systems protect penetrating items exposed to potential contact with adjacent materials in occupiable floor areas:
 - 1) Penetrations located outside wall cavities.
 - 2) Penetrations located outside fire-resistance-rated shaft enclosures.
 - c. L-Rated Systems: Where through-penetration firestop systems are indicated in smoke barriers, provide **OR** Provide, **as directed**, through-penetration firestop systems with L-ratings indicated **OR** of not more than, **as directed**, **3.0 cfm/sq. ft (0.01524cu. m/s x sq. m)** at both ambient temperatures and **400 deg F (204 deg C)**.
3. For through-penetration firestop systems exposed to view, traffic, moisture, and physical damage, provide products that, after curing, do not deteriorate when exposed to these conditions both during and after construction.
 - a. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 - b. For floor penetrations with annular spaces exceeding **4 inches (100 mm)** in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved, either by installing floor plates or by other means.
 - c. For penetrations involving insulated piping, provide through-penetration firestop systems not requiring removal of insulation.
4. For through-penetration firestop systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For each through-penetration firestop system, submit documentation, including illustrations, from a qualified testing and inspecting agency, showing each type of construction condition penetrated, relationships to adjoining construction, and type of penetrating item.

- a. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular through-penetration firestop condition, submit illustration, with modifications marked, approved by through-penetration firestop system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

E. Quality Assurance

1. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
2. Fire-Test-Response Characteristics: Provide through-penetration firestop systems that comply with the following requirements and those specified in Part 1.1 "Performance Requirements" Article:
 - a. Firestopping tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL **OR** OPL **OR** ITS, **as directed**, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.
 - b. Through-penetration firestop systems are identical to those tested per testing standard referenced in "Part 1.1 Performance Requirements" Article. Provide rated systems bearing classification marking of qualified testing and inspecting agency.
3. Coordinate construction of openings and penetrating items to ensure that through-penetration firestop systems are installed according to specified requirements.
4. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by the Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

F. Delivery, Storage, And Handling

1. Deliver through-penetration firestop system products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life if applicable, qualified testing and inspecting agency's classification marking applicable to Project, curing time, and mixing instructions for multicomponent materials.
2. Store and handle materials for through-penetration firestop systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.2 PRODUCTS

A. Firestopping

1. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
2. Accessories: Provide components for each through-penetration firestop system that are needed to install fill materials and to comply with Part 1.1 "Performance Requirements" Article. Use only components specified by through-penetration firestop system manufacturer and approved by qualified testing and inspecting agency for firestop systems indicated. Accessories include, but are not limited to, the following items:
 - a. Permanent forming/damming/backing materials, including the following:
 - 1) Slag-/rock-wool-fiber insulation.
 - 2) Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - 3) Fire-rated form board.
 - 4) Fillers for sealants.
 - b. Temporary forming materials.
 - c. Substrate primers.

- d. Collars.
- e. Steel sleeves.

B. Fill Materials

1. **General:** Provide through-penetration firestop systems containing the types of fill materials indicated in the Through-Penetration Firestop System Schedule at the end of Part 1.3 by referencing the types of materials described in this Article. Fill materials are those referred to in directories of referenced testing and inspecting agencies as "fill," "void," or "cavity" materials.
2. **Cast-in-Place Firestop Devices:** Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
3. **Latex Sealants:** Single-component latex formulations that after cure do not re-emulsify during exposure to moisture.
4. **Firestop Devices:** Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
5. **Intumescent Composite Sheets:** Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized steel sheet.
6. **Intumescent Putties:** Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
7. **Intumescent Wrap Strips:** Single-component intumescent elastomeric sheets with aluminum foil on one side.
8. **Mortars:** Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
9. **Pillows/Bags:** Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives.
10. **Silicone Foams:** Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
11. **Silicone Sealants:** Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - a. **Grade:** Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and other surfaces requiring a nonslumping, gunnable sealant, unless indicated firestop system limits use to nonsag grade for both opening conditions.
 - b. **Grade for Horizontal Surfaces:** Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces.
 - c. **Grade for Vertical Surfaces:** Nonsag formulation for openings in vertical and other surfaces.

- C. Mixing:** For those products requiring mixing before application, comply with through-penetration firestop system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

1.3 EXECUTION

A. Through-Penetration Firestop System Installation

1. **General:** Install through-penetration firestop systems to comply with Part 1.1 "Performance Requirements" Article and with firestop system manufacturer's written installation instructions and published drawings for products and applications indicated.

2. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - a. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.
 3. Install fill materials for firestop systems by proven techniques to produce the following results:
 - a. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - b. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - c. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.
 4. Identification: Identify through-penetration firestop systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within **6 inches (150 mm)** of edge of the firestop systems so that labels will be visible to anyone seeking to remove penetrating items or firestop systems. Use mechanical fasteners for metal labels. Include the following information on labels:
 - a. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage."
 - b. Contractor's name, address, and phone number.
 - c. Through-penetration firestop system designation of applicable testing and inspecting agency.
 - d. Date of installation.
 - e. Through-penetration firestop system manufacturer's name.
 - f. Installer's name.
- B. Field Quality Control
1. Inspecting Agency: Engage an independent inspecting agency to inspect through-penetration firestops. Independent inspecting agency shall comply with ASTM E 2174 requirements including those related to qualifications, conducting inspections, and preparing test reports.
 2. Where deficiencies are found, repair or replace through-penetration firestop systems so they comply with requirements.
 3. Proceed with enclosing through-penetration firestop systems with other construction only after inspection reports are issued and firestop installations comply with requirements.
- C. Cleaning And Protecting
1. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.
 2. Provide final protection and maintain conditions during and after installation that ensure that through-penetration firestop systems are without damage or deterioration at time of Final Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce systems complying with specified requirements.
- D. Through-Penetration Firestop System Schedule
1. Choices in the following paragraphs which are contained within brackets shall be as required to satisfy building and local code requirements.
 2. Where UL-classified systems are indicated, they refer to alpha-alpha-numeric designations listed in UL's "Fire Resistance Directory" under product Category XHEZ.
 3. Where OPL-classified systems are indicated, they refer to alpha-numeric design numbers in OPL's "Directory of Listed Building Products, Materials, & Assemblies."
 4. Where ITS-listed systems are indicated, they refer to design numbers listed in ITS's "Directory of Listed Products," "Firestop Systems" Section.

5. Firestop Systems with No Penetrating Items:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [F-A-] [W-J-] [W-L-] [0001-0999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type G.
 - c. ITS-Listed Systems: ITS design number(s) or as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Silicone sealant.
 - 3) Intumescent putty.
 - 4) Mortar.
6. Firestop Systems for Metallic Pipes, Conduit, or Tubing:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [C-BK-] [F-A-] [F-B-] [F-C-] [W-J-] [W-K-] [W-L-] [1001-1999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type A.
 - c. ITS-Listed Systems: ITS design number(s) or as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Silicone sealant.
 - 3) Intumescent putty.
 - 4) Mortar.
7. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [F-A-] [F-B-] [F-C-] [W-J-] [W-L-] [2001-2999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type B.
 - c. ITS-Listed Systems: ITS design number(s) or as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Silicone sealant.
 - 3) Intumescent putty.
 - 4) Intumescent wrap strips.
 - 5) Firestop device.
8. Firestop Systems for Electrical Cables:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [F-A-] [F-B-] [F-C-] [W-J-] [W-L-] [3001-3999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type D.
 - c. ITS-Listed Systems: ITS design number(s) as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Silicone sealant.
 - 3) Intumescent putty.
 - 4) Silicone foam.
 - 5) Pillows/bags.
9. Firestop Systems for Cable Trays:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [F-A-] [F-B-] [F-C-] [W-J-] [W-K-] [W-L-] [4001-4999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type D.
 - c. ITS-Listed Systems: ITS design number(s) as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Intumescent putty.
 - 3) Silicone foam.

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- 4) Pillows/bags.
- 5) Mortar.
10. Firestop Systems for Insulated Pipes:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [F-A-] [F-C-] [W-J-] [W-L-] [5001-5999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type C.
 - c. ITS-Listed Systems: ITS design number(s) as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Intumescent putty.
 - 3) Silicone foam.
 - 4) Intumescent wrap strips.
11. Firestop Systems for Miscellaneous Electrical Penetrants:
 - a. UL-Classified Systems: [C-AJ-] [F-A-] [W-L-] [6001-6999] or as directed by the Owner .
 - b. OPL-Classified Systems: FS [F] [W] or as directed by the Owner , Penetrating Item Type E.
 - c. ITS-Listed Systems: ITS design number(s) or as directed by the Owner .
 - d. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Intumescent putty.
 - 3) Mortar.
12. Firestop Systems for Miscellaneous Mechanical Penetrants:
 - a. UL-Classified Systems: [C-AJ-] [F-C-] [W-J-] [W-L-] [7001-7999] or as directed by the Owner .
 - b. ITS-Listed Systems: ITS design number(s) as directed by the Owner .
 - c. Type of Fill Materials: One or both of the following:
 - 1) Latex sealant.
 - 2) Mortar.
13. Firestop Systems for Groupings of Penetrants:
 - a. UL-Classified Systems: [C-AJ-] [C-BJ-] [F-A-] [F-C-] [W-J-] [W-L-] [8001-8999] or as directed by the Owner .
 - b. ITS-Listed Systems: ITS design number(s) as directed by the Owner .
 - c. Type of Fill Materials: One or more of the following:
 - 1) Latex sealant.
 - 2) Mortar.
 - 3) Intumescent wrap strips.
 - 4) Firestop device.
 - 5) Intumescent composite sheet.

END OF SECTION 07 84 13 16a

Task	Specification	Specification Description
07 84 13 16	07 84 43 00	Fire-Resistive Joint Systems
07 84 13 19	07 84 13 16	Firestopping
07 84 13 19	07 84 13 16a	Through-Penetration Firestop Systems
07 84 13 19	07 84 43 00	Fire-Resistive Joint Systems
07 84 16 00	03 05 13 00	Cast-In-Place Concrete

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SECTION 07 84 43 00 - FIRE-RESISTIVE JOINT SYSTEMS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for fire-resistive joint systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fire-resistive joint systems for the following:
 - a. Floor-to-floor joints.
 - b. Floor-to-wall joints.
 - c. Head-of-wall joints.
 - d. Wall-to-wall joints.
 - e. Perimeter fire-resistive joint systems consisting of floor-to-wall joints between perimeter edge of fire-resistance-rated floor assemblies and exterior curtain walls.

C. Performance Requirements

1. General: Provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed.
2. Joint Systems in and between Fire-Resistance-Rated Constructions: Provide systems with assembly ratings equaling or exceeding the fire-resistance ratings of construction that they join, and with movement capabilities and L-ratings indicated as determined by UL 2079.
 - a. Load-bearing capabilities as determined by evaluation during the time of test.
3. Perimeter Fire-Resistive Joint Systems: For joints between edges of fire-resistance-rated floor assemblies and exterior curtain walls, provide systems of type and with ratings indicated below and those indicated in the Fire-Resistive Joint System Schedule at the end of Part 1.3, as determined by IBC Standard **OR** NFPA 285, **as directed**, and UL 2079.
 - a. UL-Listed, Perimeter Fire-Containment Systems: Integrity ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
 - b. OPL-Listed, Perimeter Fire-Barrier Systems: F-ratings equaling or exceeding fire-resistance ratings of floor or floor/ceiling assembly forming one side of joint.
4. For fire-resistive systems exposed to view, provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

D. Submittals

1. Product Data: For each product indicated.
2. Shop Drawings: For each fire-resistive joint system.
3. Qualification Data: For Installer.
4. Field quality-control test reports.
5. Evaluation Reports: Evidence of fire-resistive joint systems' compliance with ICBO ES AC30, from the ICBO Evaluation Service.
6. Research/Evaluation Reports: For each type of fire-resistive joint system.

E. Quality Assurance

1. Installer Qualifications: A firm that has been approved by FMG according to FMG 4991, "Approval of Firestop Contractors."
2. Installation Responsibility: Assign installation of through-penetration firestop systems and fire-resistive joint systems in Project to a single qualified installer.
3. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in Part 1 "Performance Requirements" Article:

- a. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL **OR** OPL, **as directed**, or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.
- b. Fire-resistive joint systems are identical to those tested per methods indicated in Part 1 "Performance Requirements" Article and comply with the following:
 - 1) Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
 - 2) Fire-resistive joint systems correspond to those indicated by referencing system designations of the qualified testing and inspecting agency.
4. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.
5. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

F. Delivery, Storage, And Handling

1. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
2. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.2 PRODUCTS

A. Fire-Resistive Joint Systems

1. **Compatibility:** Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
2. **Accessories:** Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

1.3 EXECUTION

A. Installation

1. Install fire-resistive joint systems to comply with Part 1.1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.
2. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

B. Field Quality Control

1. **Inspecting Agency:** Engage a qualified independent inspecting agency to inspect fire-resistive joint systems and prepare inspection reports.
2. **Testing Services:** Inspecting of completed installations of fire-resistive joint systems shall take place in successive stages as installation of fire-resistive joint systems proceeds. Do not proceed with installation of joint systems for the next area until inspecting agency determines completed work shows compliance with requirements.

- a. Inspecting agency shall state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.
 3. Remove and replace fire-resistive joint systems where inspections indicate that they do not comply with specified requirements.
 4. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and fire-resistive joint systems comply with requirements.
- C. Fire-Resistive Joint System Schedule
1. Designation System for Joints in or between Fire-Resistance-Rated Constructions: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHBN.
 2. Designation System for Joints at the Intersection of Fire-Resistance-Rated Floor or Floor/Ceiling Assembly and an Exterior Curtain-Wall Assembly: Alphanumeric systems listed in UL's "Fire Resistance Directory" under Product Category XHDG **OR** OPL's "Directory of Listed Building Products, Materials, & Assemblies" as perimeter fire-barrier systems, **as directed**.

END OF SECTION 07 84 43 00

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Task	Specification	Specification Description
07 84 43 00	07 84 13 16	Firestopping
07 84 43 00	07 84 13 16a	Through-Penetration Firestop Systems

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SECTION 07 84 56 13 - BOARD FIRE PROTECTION

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for board fire protection. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Calcium silicate board fire protection.
 - b. Mineral-fiber board fire protection.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Structural framing plans indicating the following:
 - a. Locations and types of surface preparations required before applying board fire protection.
 - b. Extent of board fire protection for each construction and fire-resistance rating, including the following:
 - 1) Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - a) For steel joist assemblies, include applicable fire-resistance design designations, with each steel joist tested with same maximum tensile stress as each steel joist indicated on Drawings **OR** in a schedule, **as directed**. Design designations with steel joists tested at lower maximum tensile stress than those indicated are not permitted.
 - 2) Minimum thicknesses needed to achieve required fire-resistance ratings of structural components and assemblies.
 - 3) Treatment of sprayed fire-resistive material after application.
3. Product Certificates: For each type of board fire protection, from manufacturer.
4. Research/Evaluation Reports: For board fire protection.

D. Quality Assurance

1. Source Limitations: Obtain board fire-protection materials from single source from single manufacturer.
2. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" **OR** UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency, **as directed**, acceptable to authorities having jurisdiction, for board fireproofing serving as direct-applied protection tested per ASTM E 119.

E. Coordination

1. Coordinate installation of board fire protection with other construction specified in other Sections.
 - a. Do not install board fire protection on structural members until piping and other construction behind fire-resistive materials have been completed, uninterrupted coverage of fire-resistive materials can be provided, and the need for subsequent cutting and patching of fire-resistive materials has been eliminated.
 - b. Do not install enclosing or concealing construction until after board fire protection has been applied and inspected by authorities having jurisdiction.

1.2 PRODUCTS

A. Board Fire Protection

1. Calcium Silicate Board: Rigid board containing no asbestos and consisting primarily of lime, silica, inert fillers, and cellulosic reinforcing fibers; of thickness required to produce fire-resistance rating indicated; with flame-spread and smoke-developed indexes of zero per ASTM E 84; passing ASTM E 136 for combustion characteristics.
 - a. Finish: Sanded finish on both sides **OR** one side, **as directed**.
2. Mineral-Fiber Board: Unfaced **OR** Foil-faced **OR** Fiberglass mat-faced, **as directed**, rigid board produced by combining slag-wool/rock-wool fibers with thermosetting resin binders passing ASTM E 136 for combustion characteristics; of thickness required to produce fire-resistance rating indicated.
 - a. Maximum Density: **8 lb/cu. ft. (128 kg/cu. m) OR 10 lb/cu. ft. (160 kg/cu. m) OR 12 lb/cu. ft. (192 kg/cu. m), as directed**, per ASTM C 612.
 - b. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of 15 **OR** zero, **as directed**, and 5 **OR** zero, **as directed**, respectively, per ASTM E 84.

B. Accessories

1. Anchorage Accessories: Provide manufacturer's standard board-anchorage components complying with related design of UL or of another testing and inspecting agency acceptable to authorities having jurisdiction.
2. Joint Treatment and Finishing Materials: For exposed calcium silicate board applications, provide joint treatment tape and joint compounds recommended in writing by board manufacturer for finishing surfaces.

1.3 EXECUTION

A. Preparation

1. Remove rust and scale from steel substrates at welded steel stud anchorage locations.

B. Installation

1. Install board fire protection according to manufacturer's written instructions.
2. Install board fire protection to comply with requirements for layer thicknesses and number, construction of joints and corners, and anchorage methods applicable to fire-resistance-rated assemblies indicated.
3. Finish exposed calcium silicate board to comply with board manufacturer's written instructions and as follows:
 - a. At joints in calcium silicate board, embed tape in joint compound and apply first, fill, and finish coats of joint compounds over tape, fastener heads, and accessories.
 - b. Apply a thin, uniform skim coat of joint compound over entire surface.
 - c. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges.

C. Protection

1. Replace or repair board fire protection that has been cut away to facilitate other construction. Maintain complete coverage of full thickness on members and substrates protected by board fire protection.
 - a. Provide final protection and maintain conditions in a manner acceptable to Installer, manufacturer, and authorities having jurisdiction to ensure that board fire protection is without damage or deterioration at time of Final Completion.

END OF SECTION 07 84 56 13

Task	Specification	Specification Description
07 84 56 13	07 81 16 00	Sprayed Fire-Resistive Materials

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SECTION 07 91 23 00 - JOINT SEALANTS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for joint sealants. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Silicone joint sealants.
 - b. Urethane joint sealants.
 - c. Polysulfide joint sealants.
 - d. Latex joint sealants.
 - e. Solvent-release-curing joint sealants.
 - f. Preformed joint sealants.
 - g. Acoustical joint sealants.

C. Preconstruction Testing

1. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - a. Use ASTM C 1087 **OR** manufacturer's standard test method, **as directed**, to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - b. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - c. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - d. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - e. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.
2. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - a. Locate test joints where indicated on Project or, if not indicated, as directed by the Owner.
 - b. Conduct field tests for each application indicated below:
 - 1) Each kind of sealant and joint substrate indicated.
 - c. Notify the Owner seven days in advance of dates and times when test joints will be erected.
 - d. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - 1) Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - e. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - f. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with

requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

D. Submittals

1. Product Data: For each joint-sealant product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.
3. Samples: For each kind and color of joint sealant required, provide Samples with joint sealants in **1/2-inch- (13-mm-)** wide joints formed between two **6-inch- (150-mm-)** long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
4. Joint-Sealant Schedule: Include the following information:
 - a. Joint-sealant application, joint location, and designation.
 - b. Joint-sealant manufacturer and product name.
 - c. Joint-sealant formulation.
 - d. Joint-sealant color.
5. Qualification Data: For qualified Installer and testing agency.
6. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
7. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
8. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
9. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - a. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - b. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
10. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
11. Field-Adhesion Test Reports: For each sealant application tested.
12. Warranties: Sample of special warranties.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
3. Product Testing: Test joint sealants using a qualified testing agency.
 - a. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
 - b. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
4. Preinstallation Conference: Conduct conference at Project site.

F. Project Conditions

1. Do not proceed with installation of joint sealants under the following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below **40 deg F (5 deg C, as directed)**.
 - b. When joint substrates are wet.
 - c. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.

- d. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

G. Warranty

- 1. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - a. Warranty Period: Two years from date of Final Completion.
- 2. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - a. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - b. Disintegration of joint substrates from natural causes exceeding design specifications.
 - c. Mechanical damage caused by individuals, tools, or other outside agents.
 - d. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

1.2 PRODUCTS

A. Materials, General

- 1. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- 2. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - a. Architectural Sealants: 250 g/L.
 - b. Sealant Primers for Nonporous Substrates: 250 g/L.
 - c. Sealant Primers for Porous Substrates: 775 g/L.
- 3. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - a. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- 4. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- 5. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- 6. Colors of Exposed Joint Sealants: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

B. Silicone Joint Sealants

- 1. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
- 2. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
- 3. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
- 4. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

5. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.
6. Single-Component, Pourable, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade P, Class 100/50, for Use T.
7. Multicomponent, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
8. Multicomponent, Pourable, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type M, Grade P, Class 100/50, for Use T.
9. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
10. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

C. Urethane Joint Sealants

1. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
2. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
3. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
4. Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use T.
5. Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Use T.
6. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
7. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.
8. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use T.
9. Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
10. Immersible, Single-Component, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses T and I.
11. Immersible, Single-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type S, Grade P, Class 25, for Uses T and I.
12. Immersible Multicomponent, Nonsag, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Uses T and I.
13. Immersible Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T and I.

D. Polysulfide Joint Sealants

1. Single-Component, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
2. Multicomponent, Nonsag, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT.
3. Multicomponent, Nonsag, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T.
4. Multicomponent, Pourable, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.
5. Immersible, Multicomponent Nonsag, Traffic-Grade, Polysulfide Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T and Use I.

E. Latex Joint Sealants

1. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

- F. Solvent-Release-Curing Joint Sealants
 - 1. Acrylic-Based Joint Sealant: ASTM C 1311.
 - 2. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.

- G. Preformed Joint Sealants
 - 1. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
 - 2. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.

- H. Acoustical Joint Sealants
 - 1. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

- I. Joint Sealant Backing
 - 1. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
 - 2. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) **OR** Type O (open-cell material) **OR** Type B (bicellular material with a surface skin) **OR** any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, **as directed**, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
 - 3. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

- J. Miscellaneous Materials
 - 1. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
 - 2. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
 - 3. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

1.3 EXECUTION

- A. Examination
 - 1. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

- B. Preparation
 - 1. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

- a. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - b. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - 1) Concrete.
 - 2) Masonry.
 - 3) Unglazed surfaces of ceramic tile.
 - 4) Exterior insulation and finish systems.
 - c. Remove laitance and form-release agents from concrete.
 - d. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - 1) Metal.
 - 2) Glass.
 - 3) Porcelain enamel.
 - 4) Glazed surfaces of ceramic tile.
2. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
 3. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

C. Installation Of Joint Sealants

1. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
2. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
3. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of sealant backings.
 - b. Do not stretch, twist, puncture, or tear sealant backings.
 - c. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
4. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
5. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - a. Place sealants so they directly contact and fully wet joint substrates.
 - b. Completely fill recesses in each joint configuration.
 - c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
6. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - a. Remove excess sealant from surfaces adjacent to joints.

- b. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - c. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - d. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - e. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - 1) Use masking tape to protect surfaces adjacent to recessed tooled joints.
 - 7. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
 - a. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 - b. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than **3/8 inch (10 mm)**. Hold edge of sealant bead **1/4 inch (6 mm)** inside masking tape.
 - c. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 - d. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
 - 8. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
 - 9. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.
- D. Field Quality Control
- 1. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - a. Extent of Testing: Test completed and cured sealant joints as follows:
 - 1) Perform 10 tests for the first **1000 feet (300 m)** of joint length for each kind of sealant and joint substrate.
 - 2) Perform 1 test for each **1000 feet (300 m)** of joint length thereafter or 1 test per each floor per elevation.
 - b. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - c. Inspect tested joints and report on the following:
 - 1) Whether sealants filled joint cavities and are free of voids.
 - 2) Whether sealant dimensions and configurations comply with specified requirements.
 - 3) Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
 - d. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 - e. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

2. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.
- E. Cleaning
1. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- F. Protection
1. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Final Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.
- G. Joint-Sealant Schedule
1. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - a. Joint Locations:
 - 1) Control and expansion joints in brick pavers.
 - 2) Isolation and contraction joints in cast-in-place concrete slabs.
 - 3) Joints between plant-precast architectural concrete paving units.
 - 4) Joints in stone paving units, including steps.
 - 5) Tile control and expansion joints.
 - 6) Joints between different materials listed above.
 - 7) Other joints as indicated.
 - b. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing **OR** Single component, pourable, traffic grade, neutral curing **OR** Multicomponent, pourable, traffic grade, neutral curing, **as directed**.
 - c. Urethane Joint Sealant: Single component, nonsag, traffic grade **OR** Single component, pourable, traffic grade **OR** Multicomponent, nonsag, traffic grade, Class 50 **OR** Multicomponent, nonsag, traffic grade, Class 25, **as directed**.
 - d. Polysulfide Joint Sealant: Multicomponent, nonsag, traffic grade **OR** Multicomponent, pourable, traffic grade, **as directed**.
 - e. Preformed Joint Sealant: Preformed foam sealant.
 - f. Joint-Sealant Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range of colors, **as directed**.
 2. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
 - a. Joint Locations:
 - 1) Joints in pedestrian plazas.
 - 2) Joints in swimming pool decks.
 - 3) Other joints as indicated.
 - b. Urethane Joint Sealant: Immersible, single component, nonsag, traffic grade **OR** Immersible, single component, pourable, traffic grade **OR** Immersible, multicomponent, nonsag, traffic grade **OR** Immersible, multicomponent, pourable, traffic grade, **as directed**.
 - c. Polysulfide Joint Sealant: Immersible, multicomponent, nonsag, traffic grade.
 - d. Joint-Sealant Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range of colors, **as directed**.
 3. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - a. Joint Locations:
 - 1) Construction joints in cast-in-place concrete.
 - 2) Joints between plant-precast architectural concrete units.
 - 3) Control and expansion joints in unit masonry.
 - 4) Joints in dimension stone cladding.

- 5) Joints in glass unit masonry assemblies.
- 6) Joints in exterior insulation and finish systems.
- 7) Joints between metal panels.
- 8) Joints between different materials listed above.
- 9) Perimeter joints between materials listed above and frames of doors, windows and louvers.
- 10) Control and expansion joints in ceilings and other overhead surfaces.
- 11) Other joints as indicated.
- b. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50 **OR** Single component, nonsag, neutral curing, Class 50 **OR** Single component, nonsag, neutral curing, Class 25 **OR** Single component, nonsag, acid curing **OR** Multicomponent, nonsag, neutral curing, **as directed**.
- c. Urethane Joint Sealant: Single component, nonsag, Class 100/50 **OR** Single component, nonsag, Class 50 **OR** Single component, nonsag, Class 25 **OR** Multicomponent, nonsag,, Class 50 **OR** Multicomponent, nonsag,, Class 25, **as directed**.
- d. Polysulfide Joint Sealant: Single component, nonsag **OR** Multicomponent, nonsag, **as directed**.
- e. Preformed Joint Sealant: Preformed silicone **OR** Preformed foam, **as directed**.
- f. Joint-Sealant Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range of colors, **as directed**.
4. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
 - a. Joint Locations:
 - 1) Isolation joints in cast-in-place concrete slabs.
 - 2) Control and expansion joints in stone flooring.
 - 3) Control and expansion joints in brick flooring.
 - 4) Control and expansion joints in tile flooring.
 - 5) Other joints as indicated.
 - b. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing **OR** Single component, pourable, traffic grade, neutral curing **OR** Multicomponent, pourable, traffic grade, neutral curing, **as directed**.
 - c. Urethane Joint Sealant: Single component, nonsag, traffic grade **OR** Single component, pourable, traffic grade **OR** Multicomponent, nonsag, traffic grade, Class 50 **OR** Multicomponent, nonsag, traffic grade, Class 25, **as directed**.
 - d. Polysulfide Joint Sealant: Multicomponent, nonsag, traffic grade **OR** Multicomponent, pourable, traffic grade, **as directed**.
 - e. Preformed Joint Sealant: Preformed foam.
 - f. Joint-Sealant Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range of colors, **as directed**.
5. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - a. Joint Locations:
 - 1) Control and expansion joints on exposed interior surfaces of exterior walls.
 - 2) Perimeter joints of exterior openings where indicated.
 - 3) Tile control and expansion joints.
 - 4) Vertical joints on exposed surfaces of interior unit masonry and concrete walls and partitions.
 - 5) Joints on underside of plant-precast structural concrete beams and planks.
 - 6) Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
 - 7) Other joints as indicated.
 - b. Joint Sealant: Latex **OR** Acrylic based **OR** Butyl rubber based, **as directed**.
 - c. Joint-Sealant Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range of colors, **as directed**.
6. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - a. Joint Sealant Location:
 - 1) Joints between plumbing fixtures and adjoining walls, floors, and counters.

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- 2) Tile control and expansion joints where indicated.
- 3) Other joints as indicated.
- b. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone **OR** Single component, nonsag, mildew resistant, acid curing, **as directed**.
- c. Joint-Sealant Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range of colors, **as directed**.
- 7. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces.
 - a. Joint Location:
 - 1) Acoustical joints where indicated.
 - 2) Other joints as indicated.
 - b. Joint Sealant: Acoustical.
 - c. Joint-Sealant Color: As selected from manufacturer's full range.

END OF SECTION 07 91 23 00

Task	Specification	Specification Description
07 91 26 00	07 91 23 00	Joint Sealants
07 92 13 00	07 91 23 00	Joint Sealants
07 92 19 00	07 91 23 00	Joint Sealants

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SECTION 07 95 13 13 - ARCHITECTURAL JOINT SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for architectural joint systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.
2. See Division 03 Section "Cast-in-place Concrete" for cast-in architectural-joint-system frames furnished, but not installed, in this Section.

B. Definitions

1. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
2. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.
3. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint opening typically expressed in numerical values (mm or inches) or a percentage (plus or minus) of nominal value of joint width.
4. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

C. Submittals

1. Shop Drawings: Provide placement drawings, including line diagrams and details, and a tabular schedule of architectural joint systems.

D. Quality Assurance

1. Accessibility Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines (ADAAG)" and ICC A117.1.
2. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

1.2 PRODUCTS

A. Materials

1. Aluminum: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5 for extrusions; **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6 for sheet and plate.
 - a. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
 - b. Mill Finish.
 - c. Clear Anodic Finish: Class II, clear anodic coating **OR** Class I, clear anodic coating, **as directed**, complying with AAMA 611.
 - d. Color Anodic Finish: Class II, color anodic coating **OR** Class I, color anodic coating, **as directed**, complying with AAMA 611.
 - e. High-Performance Organic Finish (Two-Coat Fluoropolymer): Comply with AAMA 2604 and with coating and resin manufacturers' written instructions.
2. Stainless Steel: ASTM A 666, Type 304 for plates, sheet, and strips.
3. Brass: ASTM B 36/B 36M, UNS Alloy C26000 for half hard sheet and coil.

4. Bronze: ASTM B 455, Alloy C38500 for extrusions; Alloy C23000 red brass for plates.
 5. Moisture Barrier: PVC , minimum 30 mils thick **OR** EPDM, minimum 45 mils thick **OR** Santoprene, **as directed**.
 6. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.
 7. Compression Seals: ASTM E 1612; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.
 8. Strip Seals: ASTM E 1783; preformed elastomeric membrane or tubular extrusions having an internal baffle system and secured in or over a joint by a metal locking rail.
 9. Cellular Foam Seals: Extruded, compressible foam designed to function under compression.
 10. Elastomeric Concrete: Modified epoxy or polyurethane extended into a prepackaged aggregate blend, specifically designed for bonding to concrete substrates.
 11. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to meet performance criteria for required rating period.
 12. Accessories: Manufacturer's standard anchors, fasteners, and other accessories as required for complete installations.
- B. Architectural Joint Systems, General
1. General: Provide joint systems of design indicated.
 - a. Furnish in longest practicable lengths to minimize splicing. Install with hairline mitered corners where joint changes direction.
 - b. Include factory-fabricated closure materials and transition pieces to provide continuous joint systems.
 2. Design architectural joint systems for the following size and movement characteristics:
 - a. Nominal Joint Width: As indicated on Drawings **OR** As scheduled, **as directed**.
 - b. Movement Capability: Plus or minus 25 percent **OR** Plus or minus 50 percent **OR** Plus or minus 100 percent **OR** As indicated on Drawings **OR** As scheduled, **as directed**.
 - c. Type of Movement: As indicated on Drawings **OR** As scheduled **OR** Thermal **OR** Seismic **OR** Wind sway, **as directed**.
- C. Architectural Joint Systems For Building Interiors
1. Floor-to-Floor and Floor-to-Wall Joint Systems:
 - a. Type: Cover plate **OR** Center plate **OR** Glide plate **OR** Hidden sightline **OR** Pan **OR** Surface mounted, **as directed**.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel **OR** Bronze **OR** Brass, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** No. 2B **OR** No, 4, **as directed**.
 - b) Color: As selected from manufacturer's full range.
 - b. Type: Elastomeric **OR** Dual elastomeric, **as directed**, seal.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel **OR** Bronze **OR** Brass, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** No. 2B **OR** No, 4, **as directed**.
 - b) Color: As selected from manufacturer's full range.
 - 2) Seal Material: Santoprene.
 - a) Color: As selected from manufacturer's full range.
 - c. Cover-Plate Design:
 - 1) Plain **OR** Serrated **OR** Abrasive filled, **as directed**.
 - 2) Recessed to accept field-applied finish materials.
 - a) Recess Depth: To accommodate adjacent flooring.
 - d. Attachment Method: Mechanical anchors **OR** Cast in, **as directed**.
 - e. Load Capacity: Standard **OR** Heavy **OR** Extra heavy, **as directed**, duty.
 - f. Fire-Resistance Rating: Match adjacent construction.
 - g. Moisture Barrier: Manufacturer's standard.
 2. Wall-to-Wall and Wall Corner Joint Systems:

- a. Type: Vertical cover plate **OR** Glide plate **OR** Hidden sightline **OR** Snap-on cover **OR** Clip-in cover, **as directed**.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel **OR** Bronze **OR** Brass, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** No. 2B **OR** No. 4, **as directed**.
 - b) Color: As selected from manufacturer's full range.
 - b. Type: Elastomeric seal **OR** Dual elastomeric seal **OR** Accordion, **as directed**.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel **OR** Bronze **OR** Brass, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** No. 2B **OR** No. 4, **as directed**.
 - b) Color: As selected from manufacturer's full range.
 - 2) Seal Material: Santoprene **OR** PVC, **as directed**.
 - a) Color: As selected from manufacturer's full range.
 - c. Type: Flat seal.
 - 1) Seal Material: Santoprene.
 - a) Color: As selected from manufacturer's full range.
 - d. Fire-Resistance Rating: Match adjacent construction.
 - e. Moisture Barrier: Manufacturer's standard.
3. Wall-to-Ceiling and Ceiling-to-Ceiling Joint Systems:
- a. Type: Cover plate **OR** Glide plate **OR** Snap-on cover **OR** Clip-in cover, **as directed**.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel **OR** Bronze **OR** Brass, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** No. 2B **OR** No. 4, **as directed**.
 - b) Color: As selected from manufacturer's full range.
 - b. Type: Elastomeric seal **OR** Dual elastomeric seal **OR** Accordion, **as directed**.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel **OR** Bronze **OR** Brass, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear Color: As selected from manufacturer's full range.
 - b) Seal Material: Santoprene **OR** PVC, **as directed**.
 - c) Color: As selected from manufacturer's full range.
 - c. Type: Flat seal.
 - 1) Seal Material: Santoprene.
 - a) Color: As selected from manufacturer's full range.
 - d. Fire-Resistance Rating: Match adjacent construction.
 - e. Moisture Barrier: Manufacturer's standard.
- D. Architectural Joint Systems For Building Exteriors
1. Architectural Joint Systems for Exterior Walls and Soffits:
 - a. Type: Vertical cover-plate.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** Class I, color anodic **OR** Class II, color anodic **OR** High-performance organic **OR** No. 2B **OR** No. 4, **as directed**.
 - b) Color: As selected from full range of industry colors and color densities.
 - 2) Secondary Seal: Manufacturer's standard extruded-elastomeric seal designed to prevent water and moisture infiltration.
 - b. Type: Flat seal.
 - 1) Seal Material: Santoprene.
 - a) Color: As selected from manufacturer's full range.
 - 2) Secondary Seal: Manufacturer's standard extruded-elastomeric seal designed to prevent water and moisture infiltration.
 - 3) Pantograph Mechanism: Manufacturer's standard nylon pantographic wind-load support mechanism with stainless-steel fasteners.
 - c. Type: Preformed cellular foam.

- 1) Foam Material: Manufacturer's standard **OR** Non-extruded, low-density, crosslinked, nitrogen-blown, ethylene-vinyl-acetate copolymer **OR** Polyurethane, **as directed**.
 - a) Color: As selected from manufacturer's full range.
 - d. Fire-Resistance Rating: Match adjacent construction.
- E. Architectural Joint Systems For Open-Air Structures
- 1. Slab-to-Slab Joint Systems for Parking Structures **OR** Plaza Decks **OR** Stadiums, **as directed**:
 - a. Type: Metal plate.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** Class I, color anodic **OR** Class II, color anodic **OR** High-performance organic **OR** No. 2B **OR** No. 4, **as directed**.
 - b) Color: As selected from full range of industry colors and color densities.
 - b. Type: Sealant T-joint **OR** Rubber pad **OR** Compression seal **OR** Strip seal **OR** Winged seal **OR** Epoxy-bonded seal **OR** Split-slab membrane, **as directed**.
 - 1) Seal Material: Santoprene **OR** Neoprene **OR** Silicone **OR** EPDM **OR** PVC **OR** Manufacturer's standard, **as directed**.
 - a) Color: As selected from manufacturer's full range.
 - c. Attachment Method: Mechanical anchors **OR** Cast in **OR** Elastomeric concrete header **OR** Compressed, epoxy adhered **OR** Compressed, lubricant adhesive adhered, **as directed**.
 - d. Load Capacity: Heavy **OR** Extra heavy, **as directed**, duty.
 - e. Fire-Resistance Rating: Match adjacent construction.
 - f. Gutter: Flexible, fabric-reinforced neoprene gutter system with drain tubes.
 - 2. Slab-to-Wall Joint Systems for Parking Structures **OR** Plaza Decks **OR** Stadiums, **as directed**:
 - a. Type: Metal plate.
 - 1) Exposed Metal: Aluminum **OR** Stainless steel, **as directed**.
 - a) Finish: Manufacturer's standard finish **OR** Mill **OR** Class I, clear anodic **OR** Class II, clear anodic **OR** Class I, color anodic **OR** Class II, color anodic **OR** High-performance organic **OR** No. 2B **OR** No. 4, **as directed**.
 - b) Color: As selected from full range of industry colors and color densities.
 - b. Type: Sealant T-joint **OR** Rubber pad **OR** Compression seal **OR** Strip seal **OR** Winged seal **OR** Epoxy-bonded seal **OR** Split-slab membrane, **as directed**.
 - 1) Seal Material: Santoprene **OR** Neoprene **OR** Silicone **OR** EPDM **OR** PVC **OR** Manufacturer's standard, **as directed**.
 - a) Color: As selected from manufacturer's full range.
 - c. Attachment Method: Mechanical anchors **OR** Cast in **OR** Elastomeric concrete header **OR** Compressed, epoxy adhered **OR** Compressed, lubricant adhesive adhered, **as directed**.
 - d. Fire-Resistance Rating: Match adjacent construction.
 - e. Gutter: Flexible, fabric reinforced neoprene gutter system with drain tubes.
 - 3. Wall-to-Wall Joint Systems for Parking Structures **OR** Plaza Decks **OR** Stadiums, **as directed**:
 - a. Type: Compression seal.
 - 1) Seal Material: Santoprene **OR** Neoprene **OR** Silicone **OR** EPDM **OR** PVC **OR** Manufacturer's standard, **as directed**.
 - a) Color: As selected from manufacturer's full range.
 - b. Type: Preformed cellular foam.
 - 1) Foam Material: Manufacturer's standard **OR** Non-extruded, low-density, crosslinked, nitrogen-blown, ethylene-vinyl-acetate copolymer **OR** Polyurethane, **as directed**.
 - a) Color: As selected from manufacturer's full range.
 - c. Attachment Method: Mechanical anchors **OR** Cast in **OR** Compressed, epoxy adhered **OR** Compressed, lubricant adhesive adhered, **as directed**.
 - d. Fire-Resistance Rating: Match adjacent construction.
- F. Finishes

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

1.3 EXECUTION

A. Installation

1. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.
2. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.
 - a. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 - b. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 - c. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 - d. Locate in continuous contact with adjacent surfaces.
 - e. Support underside of frames continuously to prevent vertical deflection when in service.
 - f. Locate anchors at interval recommended by manufacturer, but not less than **3 inches (75 mm)** from each end and not more than **24 inches (600 mm)** o.c.
3. Seals in Metal Frames: Install elastomeric seals in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
 - a. Provide in continuous lengths for straight sections.
 - b. Seal transitions according to manufacturer's written instructions.
4. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer to both frame interfaces **OR** sides of slabs, **as directed**, before installing compression seals.
5. Foam Seals: Install with adhesive recommended by manufacturer.
6. Epoxy-Bonded Seals: Pressurize seal for time period and to pressure recommended by manufacturer. Do not overpressurize.
7. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.
8. Fire-Resistance-Rated Assemblies: Coordinate so complete assemblies comply with assembly performance requirements.
 - a. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
9. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings.

B. Protection

1. Do not remove protective covering until finish work in adjacent areas is complete.
2. Protect the installation from damage by work of other Sections.

END OF SECTION 07 95 13 13

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SECTION 07 95 13 16 - ROOF EXPANSION ASSEMBLIES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for roof expansion assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Metal-flanged, bellows-type roof expansion assemblies.
 - b. Aluminum roof expansion assemblies.
 - c. Seismic roof expansion assemblies.

C. Performance Requirements

1. General: Provide roof expansion assemblies that, when installed, remain watertight within movement limitations specified by manufacturer.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, joints, splices, locations of joints and splices, intersections, transitions, fittings, and attachments to other work. Where joint assemblies change planes, provide isometric drawings depicting how components interconnect to achieve continuity.
3. Samples: For each type of exposed factory-applied finish required, prepared on Samples of size to adequately show color.
4. Research/Evaluation Reports: For roof expansion assemblies.
5. Warranties: Special warranties specified in this Section.

E. Quality Assurance

1. Fire-Test-Response Characteristics: Provide fire-barrier assemblies with fire-test-response characteristics not less than that of adjacent construction, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Assemblies shall be capable of anticipated movement while maintaining fire rating. Identify assemblies with appropriate markings of applicable testing and inspecting agency.
 - a. Fire-Resistance Ratings: UL 2079 **OR** ASTM E 119, **as directed**.

F. Warranty

1. Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace roof expansion assemblies that leak, deteriorate in excess of rates specified in manufacturer's published product literature, or otherwise fail to perform within Two years from date of Final Completion.
2. Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied fluoropolymer finishes within 20 years from date of Final Completion.

1.2 PRODUCTS

A. Metals

1. Galvanized Steel Sheet: ASTM A 653/A 653M, hot-dip zinc-coating designation **G90 (Z275)**, stretcher-leveled standard of flatness and either commercial or forming steel, minimum **0.019 inch (0.5 mm)** thick.
 2. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness, minimum **0.015 inch (0.4 mm)** thick.
 3. Copper Sheet: ASTM B 370, Temper H00 (cold rolled) unless Temper 060 is required for forming, minimum **16 oz./sq. ft. (0.55 mm thick)**.
 4. Sheet Aluminum: **ASTM B 209 (ASTM B 209M)**; Alloy 3003-H14, 5052-H32, or 6061-T6; minimum **0.032 inch (0.8 mm)** thick.
 5. Extruded Aluminum: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5 or 6063-T52, minimum **0.040 inch (1.0 mm)** thick.
 6. Aluminum Finishes:
 - a. Mill Finish: AA-M10 (Mechanical Finish: as fabricated; no other applied finish unless buffing is required to removed scratches, welding, or grinding produced in fabrication process).
 - b. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 - c. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - d. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker).
 - e. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1) Color: As selected from manufacturer's full range.
 - f. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.
 - 1) Color and Gloss: As selected from manufacturer's full range.
- B. Miscellaneous Materials
1. Roof Cement: ASTM D 4586, Type II.
 2. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane **OR** polysulfide **OR** silicone, **as directed**, polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and to remain watertight.
 3. Mineral-Fiber Blanket: ASTM C 665.
 4. Flexible Cellular Sponge or Expanded Rubber: ASTM D 1056.
 5. Silicone Extrusions: Classified according to ASTM D 2000, UV stabilized, and do not propagate flame.
 6. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
 - a. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
- C. Fire Barriers
1. Fire Barriers: Devices complying with requirements specified in Part 1.1 "Quality Assurance" Article for fire-test-response characteristics and designed for dynamic structural movement

without material degradation or fatigue when tested according to ASTM E 1399. Provide roof expansion assemblies with manufacturer's continuous, standard, flexible fire-barrier seals in back of joint system at locations indicated to provide fire-resistance rating not less than rating of adjacent construction.

D. Bellows-Type Roof Expansion Assemblies

1. **Metal-Flanged, Bellows-Type Roof Expansion Assemblies:** Provide manufacturer's standard assemblies of sizes and types indicated, with prefabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, adhesives, coatings, and other components as recommended by roof expansion assembly manufacturer for complete installation. Fabricate assemblies specifically for roof-to-roof **OR** roof-to-wall **OR** curb-to-curb **OR** curb-to-wall, **as directed**, applications.
2. Provide assemblies consisting of exposed polymeric sheet over foam bellows, securely anchored at both edges to **3- to 4-inch- (76- to 100-mm-)** wide sheet metal nailing flanges, either flat or angle formed to fit cant or curbs as required. Insulate bellows with closed-cell, flexible rubber or plastic foam not less than **5/16 inch (8 mm)** thick; adhere bellows to underside of polymeric sheet.
 - a. **Polymeric Sheet:** Manufacturer's standard **OR** Neoprene, **60 mils (1.5 mm)** thick **OR** EPDM, **60 mils (1.5 mm)** thick, black **OR** EPDM, **60 mils (1.5 mm)** thick, white **OR** Reinforced chlorinated polyethylene, **30 mils (0.8 mm)** thick **OR** Chlorosulfonated polyethylene, **36 mils (0.9 mm)** thick **OR** Glass-reinforced PVC, **40 to 50 mils (1.0 to 1.3 mm)** thick, **as directed**.
 - b. **Metal Flanges:** Zinc-coated (galvanized) steel, minimum **0.019 inch (0.5 mm)** thick **OR** Copper, minimum **16 oz./sq. ft. (0.55 mm thick)** **OR** Stainless steel, minimum **0.015 inch (0.4 mm)** thick **OR** Sheet aluminum, minimum **0.032 inch (0.8 mm)** thick, mill finish, **as directed**.
 - 1) **Mortar Flanges:** Where flanges will be embedded in concrete or mortar, provide manufacturer's standard perforated-metal mortar flanges.
 - c. **Moisture Barrier:** Manufacturer's standard, flexible, continuous, polymeric moisture barrier looped under roof expansion assemblies at locations indicated. Fill space with blanket-type, mineral-fiber insulation.
 - d. **Fire Barrier:** Provide manufacturer's standard fire barrier.

E. Aluminum Roof Expansion Assemblies

1. **Aluminum Roof Expansion Assemblies:** Provide assemblies consisting of aluminum base members with sloped cants and provisions for anchoring and sealing to roofing membrane or flashing in a waterproof-sealed joint. Provide free-to-move, extruded-aluminum cover plate anchored against displacement and waterproofed by integral seals. Provide prefabricated units for corner and joint intersections and horizontal and vertical transitions, including those to other building expansion joints, splicing units, adhesives, coatings, and other components as recommended by roof expansion assembly manufacturer for complete installation. Fabricate assemblies specifically for curb-to-curb **OR** wall, **as directed**, applications.
 - a. **Base Frame Members:** Extruded aluminum with mill **OR** anodic **OR** high-performance organic, **as directed**, finish.
 - b. **Extruded-Aluminum Covers:** Minimum **0.080 inch (2.03 mm)** **OR** **0.125 inch (3 mm)**, **as directed**, thick, with mill **OR** clear anodic **OR** color anodic **OR** high-performance organic, **as directed**, finish.
 - c. **Formed-Aluminum Covers:** Minimum **0.078 inch (2 mm)** thick, with mill **OR** clear anodic **OR** color anodic **OR** high-performance organic, **as directed**, finish.
 - d. **Moisture Barrier:**
 - 1) Semiconcealed, captive, polymeric sheet bellows unit of neoprene, EPDM, reinforced chlorinated polyethylene, or PVC, not less than **30 mils (0.8 mm)** thick.
 - 2) Semiconcealed, captive gaskets at both curb members, of neoprene, EPDM, or PVC, with spring-loaded mechanism to maintain positive pressure between gaskets and curb cap.
 - e. **Fire Barrier:** Provide manufacturer's standard fire barrier.

- F. Seismic Roof Expansion Assemblies
1. General: Provide manufacturer's assemblies designed to accommodate seismic movement. Provide prefabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints, splicing units, inner seals, adhesives, coatings, and other components as recommended by roof expansion assembly manufacturer for complete installation. Fabricate assemblies specifically for roof-to-roof **OR** roof-to-wall **OR** curb-mounted, **as directed**, applications.
 2. Extruded Seals: Two continuous, single-layered elastomeric profiles made of a vinyl inner seal and silicone **OR** neoprene **OR** Santoprene, **as directed**, outer seal, both seals retained in a pair of compatible extruded-aluminum frames.
 - a. Exterior Seal Color: As selected from manufacturer's full range.
 3. Aluminum Roof Expansion Assemblies: Assemblies consisting of pairs of aluminum curb units with sloped cants and provisions for anchoring and sealing to roofing membrane or flashing in a waterproof-sealed joint. Provide free-to-move, extruded-aluminum curb cap anchored against displacement and waterproofed by integral seals, with interior of expansion joint filled with blanket-type mineral-fiber insulation.
 - a. Base Frame Members: Extruded aluminum with mill **OR** clear anodic **OR** color anodic **OR** high-performance organic, **as directed**, finish.
 - b. Extruded-Aluminum Covers: Minimum **0.080 inch (2.03 mm)** **OR** **0.125 inch (3 mm)**, **as directed**, thick, with mill **OR** clear anodic **OR** color anodic **OR** high-performance organic, **as directed**, finish.
 - c. Formed-Aluminum Covers: Minimum **0.078 inch (2 mm)** thick, with mill **OR** clear anodic **OR** color anodic **OR** high-performance organic, **as directed**, finish.
 - d. Moisture Barrier:
 - 1) Semiconcealed, captive, polymeric sheet bellows unit of neoprene, EPDM, reinforced chlorinated polyethylene, or PVC, not less than **30 mils (0.8 mm)** thick.
 - 2) Semiconcealed, captive gaskets at both curb members, of neoprene, EPDM, or PVC, with spring-loaded mechanism to maintain positive pressure between gaskets and curb cap.
 - e. Fire Barrier: Provide manufacturer's standard fire barrier.

1.3 EXECUTION

- A. Installation
1. Comply with manufacturer's written instructions for handling and installing roof expansion assemblies and materials unless more stringent requirements are indicated.
 2. Coordinate installation of roof expansion assembly materials and associated work so complete assemblies comply with assembly performance requirements.
 3. Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of roof expansion assembly, including transitions and end joints.
 4. Extend roof expansion assemblies over curbs, parapets, cornices, gutters, valleys, fasciae, and other elements in the construction profile, with factory-fabricated intersections and transitions to provide continuous, uninterrupted, waterproof roof expansion assemblies.
 - a. Install factory-fabricated transitions between roof expansion assemblies and building architectural joint systems, specified in Division 07 Section "Expansion Control", to provide continuous, uninterrupted, watertight construction.
 5. Splice roof expansion assemblies with materials provided by roof expansion assembly manufacturer for this purpose, according to manufacturer's written instructions, to provide continuous, uninterrupted, waterproof roof expansion assemblies.
 6. Provide uniform profile of roof expansion assembly throughout length of each installation; do not stretch polymeric sheets.
 7. Install mineral-fiber blanket insulation to fill joint space within joint and moisture barrier.
 8. Bed anchorage flanges in cement or sealant recommended by manufacturer and securely nail to curbs and cant strips as recommended by manufacturer but not less than **6 inches (150 mm)** o.c.

9. Anchor roof expansion assemblies complying with manufacturer's written instructions.
 10. Embed flanges not less than **4 inches (100 mm)** in bituminous membranes, with hot bitumen or roof cement. Cover with stripping material and install according to requirements in roofing section.
 11. On single-ply roofing, install roof expansion assemblies complying with manufacturer's written instructions. Anchor to cants or curbs and seal to membrane with sealant compatible with roofing membrane and roof expansion assembly. Cover flanges with stripping or flashing and install according to requirements in roofing section.
- B. Protection
1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensures that roof expansion assemblies are without damage or deterioration at time of Final Completion.

END OF SECTION 07 95 13 16

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Task	Specification	Specification Description
07 95 13 16	07 95 13 13	Architectural Joint Systems

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SECTION 08 01 11 61 - STEEL DOORS AND FRAMES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for steel doors and frames. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Standard hollow metal doors and frames.
 - b. Custom hollow metal doors and frames.

C. Definitions

1. Minimum Thickness: Minimum thickness of base metal without coatings.
2. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.
3. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
3. Samples for Verification: For each type of exposed finish required.
4. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.
5. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
6. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

E. Quality Assurance

1. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure **OR** as close to neutral pressure as possible, **as directed**, according to NFPA 252 **OR** IBC Standard 716.5, **as directed**, or UL 10B **OR** UL 10C, **as directed**.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - b. Temperature-Rise Limit: Where indicated **OR** At vertical exit enclosures and exit passageways, **as directed**, provide doors that have a maximum transmitted temperature end point of not more than **450 deg F (250 deg C)** above ambient after 30 minutes of standard fire-test exposure.
2. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9 **OR** IBC Standard 716.5, **as directed**. Label each individual glazed lite.
3. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784 **OR** IBC Standard 716.5, **as directed**.

F. Delivery, Storage, And Handling

1. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - a. Provide additional protection to prevent damage to finish of factory-finished units.
2. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
3. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum **4-inch- (102-mm-)** high wood blocking. Do not store in a manner that traps excess humidity.
 - a. Provide minimum **1/4-inch (6-mm)** space between each stacked door to permit air circulation.

1.2 PRODUCTS

A. Materials

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
2. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
3. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum **A40 (ZF120) OR G60 (Z180) or A60 (ZF180)**, **as directed**, metallic coating.
4. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), **40Z (12G)** coating designation; mill phosphatized.
 - a. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
5. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
6. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
7. Grout: ASTM C 476, except with a maximum slump of **4 inches (102 mm)**, as measured according to ASTM C 143/C 143M.
8. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with **6- to 12-lb/cu. ft. (96- to 192-kg/cu. m)** density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
9. Glazing: Comply with requirements in Division 08 Section "Glazing".
10. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for **15-mil (0.4-mm)** dry film thickness per coat.

B. Standard Hollow Metal Doors

1. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - a. Design: Flush panel **OR** Embossed panel **OR** As indicated, **as directed**.
 - b. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - 1) Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 2) Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than **4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W) OR 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W) OR 12.3 deg F x h x sq. ft./Btu (2.166 K x sq. m/W)**, **as directed**, when tested according to ASTM C 1363.
 - a) Locations: Exterior doors and interior doors where indicated, **as directed**.

- c. Vertical Edges for Single-Acting Doors: Beveled edge **OR** Square edge **OR** Manufacturer's standard, **as directed**.
 - 1) Beveled Edge: **1/8 inch in 2 inches (3 mm in 50 mm)**.
 - d. Vertical Edges for Double-Acting Doors: Round vertical edges with **2-1/8-inch (54-mm)** radius.
 - e. Top and Bottom Edges: Closed with flush or inverted **0.042-inch- (1.0-mm-)** thick, end closures or channels of same material as face sheets.
 - f. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
2. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - a. Level 1 and Physical Performance Level C (Standard Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless), **as directed**.
 - 1) Width: **1-3/4 inches (44.5 mm) OR 1-3/8 inches (34.9 mm) OR** As indicated on Drawings, **as directed**.
 - b. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless), **as directed**.
 - c. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless) **OR** Model 3 (Stile and Rail), **as directed**.
 - d. Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless), **as directed**.
 3. Interior Doors: Face sheets fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - a. Level 1 and Physical Performance Level C (Standard Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless), **as directed**.
 - 1) Width: **1-3/4 inches (44.5 mm) OR 1-3/8 inches (34.9 mm) OR** As indicated on Drawings, **as directed**.
 - b. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless), **as directed**.
 - c. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless) **OR** Model 3 (Stile and Rail), **as directed**.
 - d. Level 4 and Physical Performance Level A (Maximum Duty), Model 1 (Full Flush) **OR** Model 2 (Seamless), **as directed**.
 4. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
 5. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- C. Standard Hollow Metal Frames
1. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
 2. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - a. Fabricate frames with mitered or coped corners.
 - b. Fabricate frames as knocked down **OR** face welded **OR** full profile welded, **as directed**, unless otherwise indicated.
 - c. Frames for Level 1 Steel Doors: **0.042-inch- (1.0-mm-)** thick steel sheet.
 - d. Frames for Level 2 Steel Doors: **0.053-inch- (1.3-mm-)** thick steel sheet.
 - e. Frames for Level 3 Steel Doors: **0.053-inch- (1.3-mm-)** thick steel sheet.
 - f. Frames for Level 4 Steel Doors: **0.067-inch- (1.7-mm-)** thick steel sheet.
 3. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 - a. Fabricate frames with mitered or coped corners.
 - b. Fabricate frames as knocked down **OR** face welded **OR** full profile welded, **as directed**, unless otherwise indicated.
 - c. Fabricate knocked-down, drywall slip-on frames for in-place gypsum board partitions, **as directed**.

- d. Frames for Level 1 Steel Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
 - e. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
 - f. Frames for Level 3 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
 - g. Frames for Level 4 Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.
 - h. Frames for Wood Doors: 0.042-inch- (1.0-mm-) OR 0.053-inch- (1.3-mm-) OR 0.067-inch- (1.7-mm-), **as directed**, thick steel sheet.
 - i. Frames for Borrowed Lights: 0.042-inch- (1.0-mm-) thick steel sheet OR 0.053-inch- (1.3-mm-) thick steel sheet OR 0.067-inch- (1.7-mm-) thick steel sheet OR Same as adjacent door frame, **as directed**.
4. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.
- D. Custom Hollow Metal Doors
1. General: Provide doors not less than 1-3/4 inches (44.5 mm) thick, of seamless hollow construction unless otherwise indicated. Construct doors with smooth surfaces without visible joints or seams on exposed faces. Comply with ANSI/NAAMM-HMMA 861.
 2. Exterior Door Face Sheets: Fabricated from metallic-coated steel sheet, minimum 0.053 inch (1.3 mm) thick.
 3. Interior Door Face Sheets: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated, minimum 0.042 inch (1.0 mm) thick.
 4. Core Construction: Provide thermal-resistance-rated cores for exterior doors and interior doors where indicated, **as directed**.
 - a. Steel-Stiffened Core: 0.026-inch- (0.7-mm-) thick, steel vertical stiffeners of same material as face sheets extending full-door height, with vertical webs spaced not more than 6 inches (152 mm) apart, spot welded to face sheets a maximum of 5 inches (127 mm) o.c. Spaces filled between stiffeners with glass- or mineral-fiber insulation.
 - 1) Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - 2) Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W) OR 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W), **as directed**, when tested according to ASTM C 1363.
 5. Vertical Edges for Single-Acting Doors: Beveled 1/8 inch in 2 inches (3 mm in 50 mm).
 6. Vertical Edges for Double-Acting Doors: Round vertical edges with 2-1/8-inch (54-mm) radius.
 7. Top and Bottom Channels: Closed with continuous channels, minimum 0.053 inch (1.3 mm) thick, of same material as face sheets and spot welded to both face sheets.
 8. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as door face sheets.
- E. Custom Hollow Metal Frames
1. General: Fabricate frames of construction indicated. Close contact edges of corner joints tight with faces mitered and stops butted or mitered. Continuously weld faces and soffits and finish faces smooth. Comply with ANSI/NAAMM-HMMA 861.
 - a. Door Frames for Openings 48 Inches (1219 mm) Wide or Less: Fabricated from 0.053-inch- (1.3-mm-) thick steel sheet.
 - b. Door Frames for Openings More Than 48 Inches (1219 mm) Wide: Fabricated from 0.067-inch- (1.7-mm-) thick steel sheet.
 - c. Sidelight and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - d. Borrowed-Light Frames: Fabricated from 0.053-inch- (1.3-mm-) thick steel sheet.
 2. Exterior Frames: Formed from metallic-coated steel sheet.
 3. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 4. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 861 with reinforcing plates from same material as frame.

5. Head Reinforcement: Provide minimum **0.093-inch- (2.3-mm-)** thick, steel channel or angle stiffener for opening widths more than **48 inches (1219 mm)**.
- F. Frame Anchors
1. Jamb Anchors:
 - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than **0.042 inch (1.0 mm)** thick, with corrugated or perforated straps not less than **2 inches (50 mm)** wide by **10 inches (250 mm)** long; or wire anchors not less than **0.177 inch (4.5 mm)** thick.
 - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than **0.042 inch (1.0 mm)** thick.
 - c. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
 - d. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum **3/8-inch- (9.5-mm-)** diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
 2. Floor Anchors: Formed from same material as frames, not less than **0.042 inch (1.0 mm)** thick, and as follows:
 - a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - b. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than **2-inch (50-mm)** height adjustment. Terminate bottom of frames at finish floor surface.
- G. Hollow Metal Panels
1. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal work.
- H. Stops And Moldings
1. Moldings for Glazed Lites in Doors: Minimum **0.032 inch (0.8 mm)** thick, fabricated from same material as door face sheet in which they are installed.
 2. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of **5/8 inch (16 mm)** high unless otherwise indicated.
 3. Loose Stops for Glazed Lites in Frames: Minimum **0.032 inch (0.8 mm)** thick, fabricated from same material as frames in which they are installed.
 4. Terminated Stops: Where indicated on interior door frames, terminate stops **6 inches (152 mm)** above finish floor with a 45-degree **OR** 90-degree, **as directed**, angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.
- I. Louvers
1. Provide louvers for interior doors, where indicated, that comply with SDI 111C, with blades or baffles formed of **0.020-inch- (0.5-mm-)** thick, cold-rolled steel sheet set into **0.032-inch- (0.8-mm-)** thick steel frame.
 - a. Sightproof Louver: Stationary louvers constructed with inverted V-shaped or Y-shaped blades.
 - b. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other, any angle.
 - c. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same testing and inspecting agency that established fire-resistance rating of door assembly.
- J. Accessories
1. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.
 2. Ceiling Struts: Minimum **1/4-inch-thick by 1-inch- (6.4-mm-thick by 25.4-mm-)** wide steel.
 3. Grout Guards: Formed from same material as frames, not less than **0.016 inch (0.4 mm)** thick.

K. Fabrication

1. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
2. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117 **OR** ANSI/NAAMM-HMMA 861, **as directed**.
3. Hollow Metal Doors:
 - a. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.
 - b. Glazed Lites: Factory cut openings in doors.
 - c. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum **3/4 inch (19 mm)** beyond edge of door on which astragal is mounted.
4. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - a. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - b. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - c. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - d. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - e. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - f. Jamb Anchors: Provide number and spacing of anchors as follows:
 - 1) Masonry Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - a) Two anchors per jamb up to **60 inches (1524 mm)** high.
 - b) Three anchors per jamb from **60 to 90 inches (1524 to 2286 mm)** high.
 - c) Four anchors per jamb from **90 to 120 inches (2286 to 3048 mm)** high.
 - d) Four anchors per jamb plus 1 additional anchor per jamb for each **24 inches (610 mm)** or fraction thereof above **120 inches (3048 mm)** high.
 - 2) Stud-Wall Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - a) Three anchors per jamb up to **60 inches (1524 mm)** high.
 - b) Four anchors per jamb from **60 to 90 inches (1524 to 2286 mm)** high.
 - c) Five anchors per jamb from **90 to 96 inches (2286 to 2438 mm)** high.
 - d) Five anchors per jamb plus 1 additional anchor per jamb for each **24 inches (610 mm)** or fraction thereof above **96 inches (2438 mm)** high.
 - e) Two anchors per head for frames above **42 inches (1066 mm)** wide and mounted in metal-stud partitions.
 - 3) Compression Type: Not less than two anchors in each jamb.
 - 4) Postinstalled Expansion Type: Locate anchors not more than **6 inches (152 mm)** from top and bottom of frame. Space anchors not more than **26 inches (660 mm)** o.c.
 - g. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - 1) Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - 2) Double-Door Frames: Drill stop in head jamb to receive two door silencers.

5. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
6. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware".
 - a. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8 **OR** ANSI/NAAMM-HMMA 861.
 - b. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - c. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - d. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26.
7. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - a. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - b. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - c. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - d. Provide loose stops and moldings on inside of hollow metal work.
 - e. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

L. Steel Finishes

1. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
2. Factory-Applied Paint Finish: Manufacturer's standard, complying with ANSI/SDI A250.3 for performance and acceptance criteria.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

1. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
2. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11 **OR** HMMA 840, **as directed**.
 - a. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - 1) At fire-protection-rated openings, install frames according to NFPA 80.
 - 2) Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - 3) Install frames with removable glazing stops located on secure side of opening.
 - 4) Install door silencers in frames before grouting.
 - 5) Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - 6) Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

- 7) Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
 - b. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
 - 1) Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - c. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - d. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 - e. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 - f. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - g. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - h. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
 - i. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1) Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2) Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of wall.
 - 3) Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4) Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs at floor.
 3. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - a. Non-Fire-Rated Standard Steel Doors:
 - 1) Jambs and Head: **1/8 inch (3 mm)** plus or minus **1/16 inch (1.6 mm)**.
 - 2) Between Edges of Pairs of Doors: **1/8 inch (3 mm)** plus or minus **1/16 inch (1.6 mm)**.
 - 3) Between Bottom of Door and Top of Threshold: Maximum **3/8 inch (9.5 mm)**.
 - 4) Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum **3/4 inch (19 mm)**.
 - b. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - c. Smoke-Control Doors: Install doors according to NFPA 105 **OR** IBC Standard 716.5, **as directed**.
 4. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.
 - a. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than **9 inches (230 mm)** o.c. and not more than **2 inches (50 mm)** o.c. from each corner.
- B. Adjusting And Cleaning
1. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
 2. Remove grout and other bonding material from hollow metal work immediately after installation.

3. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
4. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 01 11 61

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SECTION 08 01 11 61a - STEEL ENTRY DOORS

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for steel entry doors. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

A. Definitions

1. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by the Owner.

B. System Description

1. Door Assemblies: Include doors, frames, and hardware
 - a. Provide with fire rating as indicated or specified.
 - b. Door and Frame Assemblies: Comply with dimensional requirements of SDI 100.
 - c. Exterior Doors: Sealed, weatherstripped and provided with thresholds.
2. Insulated Entry Door System (Assembly) Performance Requirements:
 - a. Mechanical Properties: Comply with ANSI/SDI A151.1, Level C (250,000 cycles).
 - b. Air Infiltration: ANSI/ISDSI 101 and ASTM E 283, not exceed 0.029 cu m/s/mm (0.20 CFM/foot) of crack length at test pressure of 75 Pa (1.57 PSF).
 - c. Water Resistance: ANSI/ISDSI 104 and ASTM E 331, no leakage at test pressure of 75 Pa (1.57 PSF).
 - d. Thermal Performance: ANSI/ISDSI 107, minimum acceptance criteria as defined in standard except U-Value of 1.42 W/sq. m C (0.25 BTU/HR/SF degree F).
 - e. Acoustical Performance: ANSI/ISDSI 103, Minimum Sound Transmission Class (STC) of 24.
3. Hollow Core Heavy Duty System (Assembly) Performance Requirements:
 - a. Mechanical Properties: Comply with ANSI/SDI A151.1, Level B (500,000 cycles).
 - b. Air Infiltration: SDI 116 and ASTM E 283, not exceed 0.072 cu m/s/mm (0.50 CFM/foot) of crack length at test pressure of 75 Pa (1.57 PSF).
 - c. Water Resistance: ASTM E 331, no leakage at test pressure of 75 Pa (1.57 PSF).
4. Insulated Heavy Duty Door System (Assembly) Performance Requirements:
 - a. Mechanical Properties: Comply with ANSI/SDI A151.1, Level B (500,000 cycles).
 - b. Air Infiltration: ANSI/ISDSI 101/ASTM E 283, not exceed 0.029 cu m/s/mm (0.20 CFM/foot) of crack length at test pressure of 75 Pa (1.57 PSF).
 - c. Water Resistance: ANSI/ISDSI 104 and ASTM E 331, no leakage at test pressure of 75 Pa (1.57 PSF).
 - d. Thermal Performance: ANSI/ISDSI 107, minimum acceptance criteria as defined in standard except U-Value of 1.42 W/sq. m C (0.25 BTU/HR SF degree F) is required.
 - e. Acoustical Performance: ANSI/ISDSI 103, Minimum Sound Transmission Class (STC) of 24.
5. Security Door System (Assembly) Performance Requirements:
 - a. Mechanical Properties: Comply with ANSI/SDI A151.1, Level A (1,000,000 cycles).
 - b. Air Infiltration: SDI 116 and ASTM E 283, not exceed 0.72 cu m/s/mm (0.50 CFM/foot) of crack length at test pressure of 75 Pa (1.57 PSF).
 - c. Water Resistance: ASTM E 331, no leakage at test pressure of 75 Pa (1.57 PSF).
 - d. Forced Entry: ASTM F 476, Grade 40.

- C. Submittals
1. Product Data.
 2. Shop Drawings:
 - a. Include details showing recommendations for installation of doors. Include size of fasteners, spacing, minimum penetration of fasteners into load-bearing material and maximum clearance between frame and rough opening.
 3. Samples: Submit full set of finish color samples for color selection.
 - a. For Supply and Deliver Only Contract: Submit one full size sample of each type of steel entry door with specified finish for acceptance.
 4. Quality Assurance/Control Submittals:
 - a. Test Reports: Results of testing by accredited independent laboratory demonstrating compliance of door systems with specified performance requirements.
 - 1) Indicate that tests were performed in accordance with standard referenced.
 - 2) Weak Link Testing. Submit reports for each model door in its weakest condition in order to qualify superior variations of same model.
 - b. Certificates: Manufacturer's written certification that door systems meet or exceed specified requirements.
 - c. Manufacturer's installation instructions.
 5. Closeout Submittals:
 - a. Operation and maintenance data.
 - b. Special warranty.
- D. Quality Assurance
1. Regulatory Requirements: Comply with following:
 - a. Fire Rated Label: Determined using ASTM E 152 and bear label of UL or other recognized fire rating program.
 - b. Glazing Materials: Comply with CPSC 16 CFR 1201 or ANSI Z97.1.
 - c. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4151-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (42 USC §§ 12101, et seq.) and implementing regulations (28 CFR Part 35).
 2. Certifications:
 - a. Door Systems: Meet or exceed performance requirements and other requirements specified and be labeled under HUD accepted Materials Releases.
 - b. Some Material Releases (MR) do not include all of performance requirements specified. Therefore, additional testing, certification may be required for submission with HUD Material Releases.
 - 1) Material Releases are part of HUD Technical Suitability of Building Products Program. Contact: Department of Housing and Urban Development, Manufactured Housing and Construction Standards, 451 7th Street, SW, Washington, D.C. 20410-8000.
 3. Mock-ups: Install one mock-up of each type of entry door system including doors, frames, hardware, weatherstripping, thresholds, and accessories.
 - a. Location: As directed.
 - b. Approved Mock-up: Standard for rest of work.
 - c. Approved Mock-up: May remain part of completed project.
- E. Delivery, Storage, And Handling
1. Packing, Shipping, Handling, and Unloading: Pack materials at manufacturing plant to prevent damage during shipping.

2. Acceptance at Site: Inspect door systems upon delivery. Replace damaged or defective materials before installation.

F. Project Conditions

1. Field Measurements: Field measure openings for door systems before start of fabrication.

G. Scheduling And Sequencing

1. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

H. Warranty

1. Special Warranty: Provide one year written warranty covering materials and installation for steel entry doors.
 - a. Warranty: Include coverage of hardware.
 - 1) Glazing not included.
 - 2) Defects resulting from vandalism not included.
 - b. For Supply and Delivery Only Contract:
 - 1) Contractor: Agrees to supply and deliver to the Owner, free of charge, any required replacement parts that can be readily installed by the Owner without special tools.
 - 2) Contractor: Agrees to supply and deliver free of charge, complete replacement door, when defective part or parts cannot be installed without use of special tools.
 - c. For Supply and Install Contract:
 - 1) Contractor: Agrees to supply and install, free of charge, any required replacement parts or complete replacement door.

1.3 PRODUCTS

A. Doors

1. Doors: Consist of two steel face sheets, wood or steel stiles and rails with full support lock reinforcement.
 - a. Thickness: Nominal 44.4 mm (1-3/4 inch)
 - b. Steel Face: Minimum of 24 gage (0.57 mm) galvanized and bonderized steel.
 - c. Wood Stiles and Rails: Kiln dried clear Ponderosa Pine, Douglas Fir, or equal.
 - d. Embossed Designs: Emboss 24 gage (0.57 mm) doors and 18 gage (1.07 mm) doors to achieve scheduled or indicated designs.
2. Hollow Core Heavy Duty Doors: Fabricated of 18 gage (1.07 mm) minimum steel face sheets, stiles, top and bottom closures.
 - a. Comply with Performance Requirements in this Section.
 - b. Fire Rating: When required, provide B Label, 1-1/2 hour fire rating.
3. Insulated Heavy Duty Doors: Fabricated of 18 gage (1.07 mm) minimum steel face sheets, stiles, top and bottom closures.
 - a. Comply with Performance Requirements in this Section.
 - b. Fire Rating: When required, provide B Label, 1-1/2 hour fire rating.
4. Security Doors: Comply with SDI 100, Models 1, 1A, 2, or 2A, minimum 16 gage (1.35 mm) steel face sheets .
 - a. Comply with Performance Requirements in this Section.
 - b. Fire Rating: When required, provide B Label, 1-1/2 hour fire rating.
5. Hardware Preparation:
 - a. Door System: Facilitate installation of standard cylindrical and/or full mortise locks with multiple point throw if specified.
 - b. 24 gage (0.57 mm) Doors: Prepare to receive three 102 mm (4 inch) full mortise or bun hinges flush with edge of door.
 - c. 18 Gage (1.07 mm) and Heavier Doors: Prepare to receive three 114 mm (4-1/2 inch) full mortise or butt hinges flush with edge of door.
6. Insulated Doors: Solid foam core of polyurethane, or polystyrene.
 - a. Core: Fully adhere to steel face sheets, stiles, rails and lock block and completely fill void.

B. Frames

1. Wood Frames: Kiln dried Ponderosa Pine, toxic treated, and primed.
2. Steel Frames and/or Adapter Frames: Minimum of 18 gage (1.07 mm) galvanized bonderized steel, pre-drilled and reinforced for hinges as required.
 - a. Shape of Frame: Generally L-shaped.
3. Hollow Core Heavy Duty Door Frames: Fabricated of 16 gage (1.35 mm) minimum thickness.
 - a. When required, provide B Label, 1-1/2 hour fire rating.
4. Insulated Heavy Duty Door Frames: Fabricated of 16 gage (1.35 mm) minimum thickness.
 - a. When required, provide B Label, 1-1/2 hour fire rating.
5. Security Door Frames: Comply with SDI 100, minimum of 14 gage (1.70 mm) galvanized bonderized steel, pre-drilled and reinforced for hinges as required.
 - a. When required, provide B Label, 1-1/2 hour fire rating.
 - b. Comply with Performance Requirements in this Section.
6. Frames: Weatherstripped at head, jambs and threshold.

C. Hardware

1. General: Comply with ANSI/BHMA A156.1 and applicable accessibility regulatory requirements and perform functions for which it was intended.
2. Butts and Hinges: ANSI/BHMA A156.1, as scheduled.
 - a. Install non-rising pins (NRP) on out-swing doors.
 - b. Self Closing: ANSI/BHMA A156.17.
 - c. Security Door Comply with Performance Requirements in this Section.
3. Fire Rate Doors Hardware: Comply with NFPA 80.
 - a. Exit Doors: Comply with NFPA 101 (Life Safety Code) for exit doors, as well as other requirements specified.
 - b. Labeling and Listing: Listed in UL Building Materials Directory.
 - 1) In Lieu of UL Labeling and Listing: Test reports from nationally recognized testing agency showing that hardware has been tested in accordance with UL test methods and conforms to NFPA requirements.
 - c. Install minimum latch throw as specified on label of individual door.
 - d. Provide hardware listed by UL, except where heavier materials, larger sizes or higher grades are specified.
 - e. Closers: ANSI/BHMA A156.4.
4. Lock Sets: As scheduled. Comply with following standards:
 - a. Bored and Preassembled Locks and Latches: ANSI/BHMA A156.2, Grade 2.
 - b. Dead Bolt: ANSI/BHMA A156.5.
 - c. Mortise Locks and Latches: ANSI/BHMA A156.13, Grade 1 or Security Grade, single or multiple throw.
 - d. Interconnected Deadlock and Passage Set: ANSI/BHMA A156.12, Grade 2.
 - e. Cylindrical Lock: Grade 2, cylindrical deadbolt lock/passage set combination.
 - f. Security Door Locksets: ANSI/BHMA A156.13 Security Grade or UL 437 Key locks.
 - 1) Comply with Performance Requirements in this Section.
 - g. Keys: Provide two keys for each lock provided. Provide master keying and keying alike on any locks as directed at no additional charge.
 - h. Locks: Provide with interchangeable cores.
5. Door Viewers: ANSI/BHMA A156.16.

D. Accessories

1. Glazing Materials: Comply with CPSC 16 CFR 1201 or ANSI Z97.1.
 - a. Glass: ASTM C 1036, Type 1, Class 1, Glazing B Quality.
 - 1) Fire Rated Doors: ASTM C 1036, Type 11, Class 1, Glazing Quality, wired glass.
 - b. Tempered Glass: ASTM C 1048, Kind FT. Condition A, Type 1, Class 1, Glazing B Quality.
 - c. Plastic: Extruded polycarbonate clear sheets, minimum 3 mm (0.118 inch) thick with following characteristics:
 - 1) Impact Resistance: ASTM D 256, Method A, 12-18 foot-pound per inch.

- 2) Elongation/Modulus of Elasticity: ASTM D 638, 110 percent maximum/340,000 PSI.
 - 3) Heat Deflection: ASTM D 648, 132.2 degrees C (270 degrees F) at 264 PSI.
 - 4) Abrasion Resistance: Coated on both surfaces to produce abrasion resistance of 3-19 percent maximum haze increase for 500 revolutions of CS-1 OF wheel per ASTM D 1044.
 - d. Insulating Glass Units: HUD UM 82 and ASTM E 774, Class C.
 - 1) Provide insulating glass units in insulated doors and insulated heavy duty doors.
 - e. Glass Thickness: In accordance with AAMA 1002.10 Appendix, minimum 5 mm (3/16 inch).
 - 1) Design Wind Pressures: Determined in accordance with applicable codes and regulations.
 - f. Glass: Labeled to show name of manufacturer and type.
 2. Joint Sealants:
 - a. Exterior Joint Sealant: AAMA 800, Type 808.3 Exterior Perimeter Sealing Compound.
 - b. Back-up Material: Standard preformed and pre-compressed foam material, round rod or semi-circular type, permanently elastic, mildew resistant, nonmigratory, nonstaining, and compatible with joint substrates and with sealant.
 - 1) Materials impregnated with oil, solvents, or bituminous materials not allowed.
 - 2) Provide type as recommended by sealant manufacturer for particular installation.
 - 3) Material: Neoprene, butyl, polyurethane, vinyl, or polyethylene rod.
 - c. Interior Joint Sealant: ASTM C 834, latex acrylic.
 3. Weatherstripping and Thresholds: Comply with FS 00-A-200-9D, Alloy 6063-T-5; ASTM D 2287, Grade as required; MIL-S-6855, Class 11, Grade 40 (Solid neoprene); and MIL-R-6130C, Type 11, Grade C (Sponge neoprene).
 - a. Weatherstripping for Doors and Frames: Adjustable types with replaceable contact stops. Types are listed below:
 - 1) Type A1 (for bottom of door with threshold greater than 6 mm (1/4 inch)): Solid neoprene or vinyl strips mounted in extruded aluminum retainers.
 - 2) Type B (for bottom of door with thresholds less than 6 mm (1/4 inch) in height): Curved vinyl strips with extruded aluminum retainers.
 - 3) Type C (for door frame heads and jambs): Extruded aluminum retainer with extruded solid vinyl insert.
 - 4) Type D1 (for door frame heads and jambs): Closed cell sponge neoprene or vinyl strip with leveled edge mounted in extruded aluminum retainer.
 - b. Rain Drips: Extruded aluminum with sufficient projection.
 - c. Fasteners: Cad plated steel, brass plated steel, black oxide plated steel, or stainless steel.
 - 1) Threshold to Concrete: Provide lead expansion shields.
 - 2) Exposed Finish: Match finish of weatherstrip.
- E. Finishes
1. Entry Door System: Clean and free from serious surface blemishes.
 - a. Exposed Surfaces: ASTM A 525 hot dipped galvanized, minimum A40 (or G60) Electrolytic Class B coating weight.
 - b. Primer: Factory final finished including primer meeting performance requirements of ANSI A224.1.
 - c. Finish Coat: One of the following as specified or scheduled:
 - 1) Factory Finished: Electrostatically factory applied baked on enamel finish.
 - a) Color: As selected from manufacturers' list of colors.
 - 2) Field painted under Division 9 Section "Painting."
- F. Source Quality Control
1. Testing: Performed by accredited independent testing laboratory.
 2. Shop Tests:
 - a. Mechanical Properties Tests: ANSI/SDI A151.1, perform on lightest gage frame and leaf.
 - 1) Security Doors: ASTM F 476.
 - 2) Doors with Glass Lites: Mechanical test not required.

- b. Air Infiltration and Water Resistance Tests: Perform on door with largest glass lite. Retest variations in frame to leaf sealing system.
 - 1) Air Infiltration Tests: ANSI/ISDSI 101, SDI 116, and ASTM E 283.
 - 2) Water Resistance Tests: ANSI/ISDSI 104 and ASTM E 331.
- c. Thermal Performance Tests: Perform on heaviest gage frame and leaf with largest area of glass. Retest variation in thermal design aspects of door such as different insulation, type of thermal break, or type of frame.
 - 1) Thermal Performance Tests: ANSI/ISDSI 107 and SDI 113.
- d. Test Sample Size for Door System: Minimum 914 mm (36 inches) by 1 727 mm (68 inches), complete with hardware and subframe.

1.4 EXECUTION

A. Examination

- 1. Site Verification of Conditions:
 - a. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - b. Existing Conditions: Examine openings before beginning installation.
 - c. Do not proceed with installation until conditions are satisfactory.

B. Preparation

- 1. Protection: Protect adjacent elements from damage and disfiguration in accordance with Detailed Scope of Work.
 - a. Contractor: Responsible for damage to grounds, plantings, buildings and any other facilities or property caused by construction operations.
 - b. Adequately enclose and protect against weather any interior space where installation is incomplete at end of working day.
 - c. Repair or replace damaged elements in accordance with Detailed Scope of Work.
- 2. Existing Entry Doors: Remove existing entry doors and debris from site in accordance with Detailed Scope of Work.
- 3. Prepare existing openings in accordance with ANSI/ISDSI 102, SDI 105, ASTM E 737, manufacturer's recommendations, and approved Shop Drawings.

C. Installation

- 1. General: Install in accordance with ANSI/ISDSI 102, SDI 105, ASTM E 737, manufacturer's recommendations, and approved Shop Drawings.
 - a. Install doors and frames securely, water tight, straight, plumb and level without distortion.
- 2. Weatherstripping and Thresholds: Accurately cut, fit, align, and secure to maintain weatherproof seal without hampering operation of door.
 - a. Rain Drips: Install on door heads which are not protected by canopy or soffit.
 - b. Secure thresholds to concrete with stainless screws or equal and lead expansion shields.
 - c. Blocking: Provide as necessary to secure hardware. Prime cut wood surfaces with wood sealer before weatherstripping is installed.
- 3. Joint Sealants: Apply in accordance with manufacturers recommendations.
 - a. Surfaces to be Sealed: Clean, dry and free of any foreign matter that would degrade adhesion. Remove existing caulking and joint sealants from areas to receive new joint sealant.
 - b. Prime cleaned surfaces in accordance with sealant manufacturer's recommendations.
 - c. Protect surfaces adjacent to joints by masking tape before applying sealant. Remove tape upon finishing sealing work.
 - d. Seal door frames and thresholds where joining other materials on exterior and interior with joint sealant to accomplish weather-tight installation.
 - e. Maximum Width of Sealed Joint: 13 mm (1/2 inch).

D. Adjusting And Cleaning

1. Adjusting: At completion of job, check, adjust, and lubricate hardware as required and leave doors and hardware in proper operating condition.
 2. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean doors, after installation is completed, to remove foreign matter and surface blemishes.
 - b. Scratched or Abraded Surfaces: Touch-up with rust inhibitor primer and enamel paint compatible with factory finish.
- E. Protection
1. Installed Work: Protect doors from damage after installation.

END OF SECTION 08 01 11 61a

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SECTION 08 01 52 61 - WOOD WINDOWS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for wood windows. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fixed and operable wood-framed windows of the following type:
 - a. Unfinished.
 - b. Aluminum clad.
 - c. Vinyl clad.

C. Definitions

1. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - a. AW: Architectural.
 - b. HC: Heavy Commercial.
 - c. C: Commercial.
 - d. LC: Light Commercial.
 - e. R: Residential.
2. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - a. Design pressure number in **pounds force per square foot (pascals)** used to determine the structural test pressure and water test pressure.
3. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
4. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

D. Performance Requirements

1. General: Provide wood windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size required by AAMA/WDMA 101/I.S.2/NAFS.
2. Structural Performance: Provide wood windows capable of withstanding the effects of the following loads based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
 - a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in **miles per hour (meters per second)** at **33 feet (10 m)** above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s), as directed.**
 - 2) Importance Factor: **I OR II OR III OR IV, as directed.**
 - 3) Exposure Category: **A OR B OR C OR D, as directed.**
 - b. Deflection: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or **3/4 inch (19 mm)**, whichever is less, at design pressure based on testing performed according to AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Deflection Test or structural computations.
3. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 **OR AAMA 506, as directed**, and requirements of authorities having jurisdiction.

E. Submittals

1. Product Data: For each type of wood window indicated.
2. LEED Submittal:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood windows comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
3. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details.
4. Samples: For each exposed finish.
5. Product Schedule: Use same designations indicated on Drawings.
6. Product test reports.
7. Maintenance data.

F. Quality Assurance

1. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.
2. Manufacturer Qualifications: A qualified manufacturer who is certified for chain of custody by an FSC-accredited certification body.
3. Forest Certification: Provide windows made with not less than 70 percent of wood products **OR** all wood products, **as directed**, obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
4. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - a. Provide AAMA-certified **OR** WDMA-certified, **as directed**, wood windows with an attached label.
5. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
6. Preinstallation Conference: Conduct conference at Project site.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period:
 - 1) Window: Two **OR** Three, **as directed**, years from date of Final Completion.
 - 2) Glazing: Five **OR** 10, **as directed**, years from date of Final Completion.
 - 3) Metal Finish: Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Wood: Clear ponderosa pine or another suitable fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than 1/32 inch (0.8 mm) deep by 2 inches (51 mm) wide; water-repellent preservative treated.
2. Aluminum Extrusions and Rolled Aluminum for Cladding: Manufacturer's standard formed sheet or extruded-aluminum cladding, mechanically bonded to exterior exposed wood members. Provide aluminum alloy and temper recommended by wood window manufacturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi (150-MPa) ultimate tensile strength, and not less than 16,000-psi (110-MPa) minimum yield strength.
 - a. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- b. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- c. Baked-Enamel Finish for Extrusions and Sheet: Manufacturer's standard baked enamel complying with AAMA 2603 and paint manufacturer's written specifications for cleaning, conversion coating, and painting.
 - 1) Color: White **OR** Bronze **OR** Brown **OR** Beige **OR** Gray **OR** Green **OR** As selected from manufacturer's full range **OR** Custom color as selected, **as directed**.
- d. High-Performance Organic Finish for Extrusions and Sheet: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604.
 - a) Color and Gloss: As selected from manufacturer's full range.
- e. Baked-Enamel Finish for Coil: Manufacturer's standard baked enamel complying with AAMA 620 and paint manufacturer's written specifications for cleaning, conversion coating, and painting.
 - 1) Color: White **OR** Bronze **OR** Brown **OR** Beige **OR** Gray **OR** Green **OR** As selected from manufacturer's full range **OR** Custom color as selected, **as directed**.
- 3. Vinyl for Cladding: Consisting of a rigid PVC sheath, made from PVC complying with ASTM D 4726, not less than **35-mil (0.9-mm)** average thickness, in permanent, integral color, white **OR** bronze **OR** tan, **as directed**, finish, mechanically bonded to exterior wood sash and frame members.
- 4. Wood Trim and Glazing Stops: Material and finish to match frame members.
- 5. Clad Trim and Glazing Stops: Hollow extrusions **OR** Roll-formed sheet material **OR** Clad-wood material, **as directed**, and finish to match clad frame members.
- 6. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with wood window members, cladding, trim, hardware, anchors, and other components.
 - a. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- 7. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- 8. Reinforcing Members: Aluminum, or nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- 9. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action and for complete concealment when wood window is closed.
 - a. Weather-Stripping Material:
 - 1) Elastomeric cellular preformed gaskets complying with ASTM C 509.
 - 2) Dense elastomeric gaskets complying with ASTM C 864.
 - 3) Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.
- 10. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
 - a. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
- 11. Replaceable Weather Seals: Comply with AAMA 701/702.

B. Window

1. Window Type: Casement **OR** Double hung **OR** Fixed **OR** Horizontal sliding **OR** Projected awning **OR** Single hung **OR** Bay **OR** Bow **OR** Specialty product **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
2. AAMA/WDMA Performance Requirements: Provide wood windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.
 - a. Performance Class and Grade: R15 **OR** 20 **OR** 25, **as directed**.
 - b. Performance Class and Grade: LC25 **OR** 30 **OR** 35, **as directed**.
 - c. Performance Class and Grade: C30 **OR** 35 **OR** 40, **as directed**.
 - d. Performance Class and Grade: HC40 **OR** 45 **OR** 50, **as directed**.
 - e. Performance Class and Grade: AW40 **OR** 45 **OR** 50, **as directed**.
 - f. Performance Class and Grade: As indicated.
3. Condensation-Resistance Factor (CRF): Provide wood windows tested for thermal performance according to AAMA 1503, showing a CRF of 45 **OR** 52, **as directed**.
4. Thermal Transmittance: Provide wood windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503 **OR** ASTM E 1423 **OR** NFRC 100, **as directed**.
 - a. U-Factor: 0.35 Btu/sq. ft. x h x deg F (2.0 W/sq. m x K) **OR** 0.40 Btu/sq. ft. x h x deg F (2.3 W/sq. m x K) **OR** 0.43 Btu/sq. ft. x h x deg F (2.5 W/sq. m x K) **OR** 0.60 Btu/sq. ft. x h x deg F (3.4 W/sq. m x K), **as directed**, or less.
5. Solar Heat-Gain Coefficient (SHGC): Provide wood windows with a whole-window SHGC maximum of 0.40 **OR** 0.50 **OR** 0.55, **as directed**, determined according to NFRC 200 procedures.
6. Sound Transmission Class (STC): Provide glazed windows rated for not less than 26 **OR** 30 **OR** 35, **as directed**, STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
7. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
 - a. Maximum Rate:
 - 1) 0.3 cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 1.57 lbf/sq. ft. (75 Pa) which is equivalent to 25-mph (40-km/h) wind speed and is typically used to test R, C, and LC performance classes.
 - 2) 0.3 cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 6.24 lbf/sq. ft. (300 Pa) which is equivalent to a 50-mph (80-km/h) wind speed and is typically used to test HC and AW performance classes.
 - b. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
 - c. Test Pressure:
 - 1) 15 percent of positive design pressure, but not less than 2.86 lbf/sq. ft. (140 Pa) or more than 15 lbf/sq. ft. (720 Pa).
 - 2) 20 percent of positive design pressure, but not more than 15 lbf/sq. ft. (720 Pa).
8. Forced-Entry Resistance: Comply with Performance Grade 10 **OR** 20 **OR** 30 **OR** 40, **as directed**, requirements when tested according to ASTM F 588.
9. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.
10. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

C. Glazing

1. Glass and Glazing Materials: Refer to Division 08 Section "Glazing" for glass units and glazing requirements applicable to glazed wood window units.
2. Glass: Clear, insulating-glass units **OR** Clear, insulating-glass units, with low-E coating pyrolytic on second surface or sputtered on second or third surface, **OR** Clear, insulating-glass units,

- argon gas filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface, **as directed**, complying with Division 08 Section "Glazing".
3. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal **OR** Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance **OR** Manufacturer's standard factory-glazing system as indicated in Division 08 Section "Glazing", **as directed**.
 4. Dual-Glazing System for Venetian Blinds: Manufacturer's standard dual-glazing system with 2 lites of clear float glass, complying with ASTM C 1036, Type I, Quality q3, glazed independently into the sash and separated by a minimum dead-air space of **1-1/2 inches (38 mm)**.
 5. Triple-Glazing System for Venetian Blinds: Manufacturer's standard insulated glass of type specified, combined with an auxiliary lite of clear float glass, complying with ASTM C 1036, Type I, Quality q3, retained in a separate glazing channel or frame and separated from insulated-glass unit by a minimum dead-air space of **1-1/2 inches (38 mm)**.
- D. Hardware
1. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with wood and aluminum cladding, **as directed**; designed to smoothly operate, tightly close, and securely lock wood windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide solid bronze **OR** extruded, cast, or wrought aluminum **OR** die-cast zinc with special coating finish **OR** nonmagnetic stainless steel, **as directed**.
 2. Counterbalancing Mechanism: Comply with AAMA 902.
 - a. Sash-Balance Type: Concealed, tape-spring **OR** spiral-tube **OR** spring-loaded, block-and-tackle, **as directed**, type, of size and capacity to hold sash stationary at any open position.
 3. Sill Cap/Track: Extruded-aluminum track with natural anodized finish **OR** Rigid PVC or other weather-resistant plastic track with manufacturer's standard integral color, **as directed**, of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
 4. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide custodial locks, **as directed**.
 5. Roller Assemblies: Low-friction design.
 6. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.
 7. Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A.
 - a. Operation Function: All ventilators move simultaneously and securely close at both jambs without using additional manually controlled locking devices.
 8. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.
 - a. Locking mechanism and handles for manual operation.
 - b. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.
 9. Limit Devices: Provide concealed friction adjustor, adjustable stay bar **OR** concealed support arms with adjustable, limited, hold-open, **as directed**, limit devices designed to restrict sash or ventilator opening.
 - a. Safety Devices: Limit clear opening to **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, for ventilation; with custodial key release.
 10. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than **60 inches (1500 mm)** above floor; 1 pole operator and pole hanger per room that has operable windows more than **72 inches (1800 mm)** above floor.
- E. Insect Screens
1. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully

integrate with window frame. Locate screens on inside **OR** outside, **as directed**, of window and provide for each operable exterior sash or ventilator.

- a. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 **OR** Architectural C-24 **OR** Monumental M-32, **as directed**, class.
2. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, adjustable rollers, **as directed**, and removable PVC spline/anchor concealing edge of frame.
 - a. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
 - b. Finish:
 - 1) Anodized aluminum **OR** Baked-on organic coating, **as directed**, in manufacturer's standard color **OR** in color selected from manufacturer's full range, **as directed**.
OR
Manufacturer's standard.
3. Glass-Fiber Mesh Fabric: **18-by-14 (1.1-by-1.4-mm)** or **18-by-16 (1.0-by-1.1-mm)** **OR** **20-by-20 (0.85-by-0.85-mm)** or **20-by-30 (0.85-by-0.42-mm)**, **as directed**, mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; in the following color. Comply with ASTM D 3656.
 - a. Mesh Color: Charcoal gray **OR** Silver gray **OR** Aquamarine, **as directed**.
4. Aluminum Wire Fabric: **18-by-16 (1.1-by-1.3-mm)** mesh of **0.011-inch- (0.28-mm-)** diameter, coated aluminum wire.
 - a. Wire-Fabric Finish: Natural bright **OR** Charcoal gray **OR** Black, **as directed**.
5. Wickets: Provide sliding **OR** hinged, **as directed**, wickets, framed and trimmed for a tight fit and for durability during handling.

F. Accessories

1. Dividers (False Muntins): Provide dividers in designs indicated for each sash lite, one per sash, removable from the exposed surface of interior lite of the sash **OR** two per sash, removable from the exposed surfaces of interior and exterior lites of the sash, **as directed**, and one permanently located between glazing lites in the airspace, **as directed**.
 - a. Material: Extruded, rigid PVC **OR** Prefinished wood, **as directed**.
 - b. Design: Rectangular **OR** Diamond, **as directed**.
 - c. Color: White **OR** Bronze, **as directed**.
2. Storm Panels: Provide removable auxiliary glazing panels of clear float glass for each fixed and operating sash of window units. Glass shall comply with ASTM C 1036, Type I, Quality q3. Provide glass of thickness required to comply with requirements in Division 08 Section "Glazing". Frame, preglaze, and attach storm windows to the sash according to manufacturer's published standards. Omit storm panels on sash glazed with insulating glass, **as directed**.
3. Integral Louver Blinds: Provide remotely operated horizontal louver blinds in the space between two panes of glass. Construct blinds of aluminum slats, approximately **1 inch (25 mm)** wide, with polyester fiber cords, equipped for tilting, raising, and lowering by standard operating hardware located on inside face of sash.

G. Fabrication

1. Fabricate wood windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
2. Fabricate wood windows that are reglazable without dismantling sash or ventilator framing.
3. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.
 - a. Double-Hung Windows: Provide weather stripping only at horizontal rails of operable sash.
4. Factory machine windows for openings and for hardware that is not surface applied.
5. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances

and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

6. Factory-Glazed Fabrication: Except for light sizes in excess of **100 united inches (2500 mm width plus length)**, glaze wood windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.
7. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
8. Bow **OR** Bay, **as directed**, Windows: Provide wood windows in configuration indicated. Provide window frames, fixed and operating sash, operating hardware, and other trim and components necessary for a complete, secure, and weathertight installation, including the following:
 - a. Angled mullion posts with interior and exterior trim.
 - b. Angled interior and exterior extension and trim.
 - c. Clear pine head and seat boards.
 - d. Top and bottom plywood platforms.
 - e. Exterior head and sill casings and trim.
 - f. Support brackets.
9. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

H. Wood Finishes

1. Factory-Primed Windows: Provide manufacturer's standard factory-prime coat complying with WDMA T.M. 11 on exposed exterior **OR** interior **OR** exterior and interior, **as directed**, wood surfaces.
2. Factory-Finished Windows: Provide manufacturer's standard factory finish complying with WDMA T.M. 12. Apply finish to exposed exterior and interior wood surfaces.
 - a. Color: White **OR** Brown **OR** Gray **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

1. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
2. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
3. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
4. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

B. Adjusting, Cleaning, And Protection

1. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
2. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
3. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
4. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

08 - Openings



5. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 08 01 52 61

Task	Specification	Specification Description
08 01 81 10	07 42 13 19	Glazing
08 05 13 00	01 22 16 00	No Specification Required
08 05 13 00	08 01 11 61	Steel Doors And Frames
08 05 13 00	08 14 00 00	Wood Doors
08 05 13 00	08 14 16 00	Flush Wood Doors
08 05 13 00	08 34 73 00	Sound Control Doors

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SECTION 08 11 63 13 - STEEL STORM DOORS

DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for steel storm doors. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

GENERAL

Definitions

1. Supply and Delivery only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by Owner.

System Description

2. Performance Requirements: Comply with following:
 - a. Steel Storm Doors: Largest steel storm door size: Meet or exceed performance requirements of Section 2.1 (CSD-1) of ANSI/AAMA 1102.7 and ASTM B 117.
 - b. Steel Storm Doors: Completely assembled storm door measuring at least 914 mm (36 inches) wide x 2 032 mm (80 inches) high with necessary braces and hardware:
 - 1) Sag Test: Meet or exceed ANSI/AAMA 1102.7 Sag Test.
 - 2) Forced Entry Resistance Test: Meet or exceed ANSI/SMA 6001 Paragraph 4.2.4.3 for Heavy Type.
 - 3) Storm Door Screen Insert: Completely assembled screen of 914 mm (36 inches) by 1 524 mm (60 inches) size with necessary braces: Meet or exceed ANSI/SMA 6001 Paragraph 4.2.4.1 Impact Test performance requirements for Medium Type.
 - c. Steel Screen Doors: Completely assembled screen door measuring at least 914 mm (36 inches) wide by 2 032 mm (80 inches) high with necessary braces and hardware:
 - 1) Impact Test: Meet or exceed performance requirements of ANSI/SMA 6001 Paragraph 4.2.4.1 for Medium Type.
 - 2) Sag Test: Meet or exceed ANSI/AAMA 1102.7 Sag Test.
 - d. Door Finish: Subjected to ASTM B117 Salt Spray Fog Test for minimum of 250 hours. Cut tubular section open to check finish performance.

Submittals

3. Product Data.
4. Shop Drawings:
 - a. Include exploded view of manufactured door, similar to ANSI/AAMA 1102.7, page 12.
 - b. Indicate fabrication of all parts, metal thickness, installation details, fastening, and sealing.
 - c. Include sections of typical members and details of latching devices.
5. Samples: Submit full set of finish color samples for color selection.
 - a. For Supply and Deliver Only Contract: Submit one full size sample of each type of storm door with specified finish for acceptance.
6. Quality Assurance/Control Submittals:
 - a. Certificates: Manufacturer's written third party certification that storm doors meet or exceed ANSI/AAMA 1102.7 (CSD-1), Paragraph 2.1.6.5 of ANSI/SMA 6001, ASTM B117, and other specified requirements.
 - b. Manufacturer's installation instructions.
7. Closeout Submittals:
 - a. Operation and maintenance data.
 - b. Special warranty.

Quality Assurance

- 8. Regulatory Requirements: Comply with following:
 - a. Glazing Materials: Comply with CPSC 16 CFR 1201 or ANSI Z97.1.
 - b. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
- 9. Certifications: Comply with ANSI Z34.2.
- 10. Mock-ups: For Supply and Install Contract: Install one full size mock-up of each type of storm door with specified finish for acceptance.
 - a. Location: As directed.
 - b. Approved Mock-up: Standard for rest of work.
 - c. Approved Mock-up: May remain part of completed project.

Delivery, Storage, And Handling

- 11. Packing, Shipping, Handling, and Unloading: Pack materials at manufacturing plant to prevent damage during shipping.
 - a. Screens: Label attached signifying compliance with ANSI/AAMA 1102.7 (CSD-1), ANSI/SMA 6001, ASTM B 117 performance requirements.
 - 1) Labels: Include manufacturers name and code identifying plant location and validation date.
 - 2) Labels: Affixed to inside of vertical member of each door.
- 12. Acceptance at Site: Inspect storm doors upon delivery. Replace damaged or defective materials before installation.
- 13. Storage and Protection: Store storm doors in manner to protect from weather and other damage.

Project Conditions

- 14. Field Measurements: Field measure openings for storm doors before start of fabrication.

Scheduling And Sequencing

- 15. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

Warranty

- 16. Special Warranty: Provide one year written covering materials and installation for storm doors.
 - a. Warranty: Include coverage of inserts, closers, chains, hardware, and latches.
 - 1) Screening and glazing not included.
 - 2) Defects resulting from vandalism not included.
 - b. For Supply and Delivery Only Contract:
 - 1) Contractor: Agrees to supply and deliver to Owner, free of charge, any required replacement parts that can be readily installed by Owner without special tools.
 - 2) Contractor: Agrees to supply and deliver free of charge, complete replacement door, when defective part or parts cannot be installed without use of special tools.
 - c. For Supply and Install Contract:
 - 1) Contractor: Agrees to supply and install, free of charge, any required replacement parts or complete replacement door.

PRODUCTS

Steelstorm Doors

17. Storm Doors: Type(s) and size(s) indicated, specified, or scheduled manufactured of steel and provided with pro-hung aluminum frame liner (Z-bar) to fit entrance door apertures requiring frame sizes of 762 mm (30 inches) to 940 mm (37 inches) in width and 2 007 mm (79 inches) to 2 134 mm (84 inches) in height.
 - a. Storm Doors: Complete with Z-bar frame liner, glazing, replaceable screen insert, durable steel kick plate, adjustable sill sweep, and necessary hardware.
 - b. Assembly: Secure and workmanlike manner permitting storm door to perform properly and assuring its neat and weather-resistant construction.
18. Materials:
 - a. Master Frame: Minimum 22 gage (0.85 mm) roll formed steel, or 16 gage (1.6 mm) tubular steel as applicable to item specified.
 - b. Fasteners: Stainless, cadmium plated, or zinc-plated steel screws, nuts, washers, bolts and other miscellaneous fastening devices and hardware in accordance with ASTM B 633 or ASTM B 766.
 - c. Kick Plate: Minimum 18 gage (1.3 mm) embossed galvanized panel for roll formed frame or 16 gage (1.6 mm) flat galvanized steel sheet for tubular steel frame.
 - d. Screen Insert:
 - 1) Screening: ANSI/SMA 6001, Paragraph 4.2.4.1, Medium Type, 12 x 12 stainless steel, at least 0.58 mm (0.023 inch) diameter.
 - 2) Screen Frame: Roll formed or tubular lock seam type formed from not less than 25 gage (0.53 mm) hot dipped galvanized steel or extruded aluminum.
 - e. Glazing Bead, Storm Door Sweep and Screen Spline: Polyvinyl chloride (PVC) or equal material
 - f. Frame Liner (Z-bar): Extruded aluminum, 6063 J5.
 - g. Weatherstripping: Wool pile, or vinyl.
19. Glazing Materials: Comply with CPSC 16 CFR 1201 or ANSI Z97.1.
 - a. Tempered Glass: ASTM C 1048, Kind FT. Condition A, Type 1, Class 1, Glazing B Quality.
 - b. Plastic: Extruded polycarbonate clear sheets, minimum 4.5 mm (0.177 inch) thick with following characteristics:
 - 1) Impact Resistance: ASTM D 256, Method A, 12-18 foot-pound per inch.
 - 2) Elongation/Modulus of Elasticity: ASTM D 638, 110 percent maximum 340,000 PSI.
 - 3) Heat Deflection: ASTM D 648, 132.2 degrees C (270 degrees F) at 264 PSI.
 - 4) Abrasion Resistance: Coated on both surfaces to produce abrasion resistance of 3-19 percent maximum haze increase for 500 revolutions of CS-1 OF wheel per ASTM D 1044.
 - c. Glass Thickness: In accordance with ANSI/AAMA 1002.10 Appendix, minimum 5 mm (3/16 inch).
 - 1) Design Wind Pressures: Determined in accordance with applicable codes and regulations.
 - d. Glass: Labeled to show name of manufacturer and type.
 - e. Glazing Material: Installed in rigid removable steel or extruded aluminum subframe.
20. Construction:
 - a. Master Frame: Roll Formed tubular lock-seam construction formed from 22 gage (0.85 m) hot dipped galvanized steel.
 - 1) Comers: Either mitered or butt-jointed and rigidly fastened together by brazing or welding. Insert steel gussets at comers of mitered or butt-jointed storm doors when edge brazing is used.
 - 2) Welded tubular galvanized steel of 16 gage (1.6 mm) wall thickness is not required to use comer blocks or gussets.
 - b. Transom Rail (mullion): Accurately machined or accurately fit frame and rigidly welded to side of stiles.
 - 1) Kick Plate: Rigidly retained in place by steel or aluminum spline.
 - c. Glazing Frames: Mitered joints with comer gussets securely staked or brazed at comers.
 - 1) Inserts: Securely held in door.
 - 2) Provide positive contact between inserts and master frame to stop passage of insects and to prevent rattling.

- d. Screen Inserts: Constructed to withstand performance requirements of ANSI/SMA 6001, Heavy Type.
 - 1) Screen Frames: Rolled, tubular lock seam construction or extruded aluminum.
 - e. Adjustable Expander: Installed at bottom of each storm door to receive vinyl sweep.
 - 1) Adjustment Limit: Minimum 7.9 mm (5/16 inch).
 - 2) Vinyl Door Sweep: Installed in entire length of expander.
 - f. Frame Liner (Z-bar): Track to receive weather stripping and necessary installation holes.
 - 1) Head Section of Frame Liner: Formed to function as drip cap.
21. Dimensions:
- a. Widths across Master Frames:
 - 1) For Roll Form Door Minimum 70 mm (2-3/4 inches).
 - 2) For Tubular Doors: Minimum 51 mm (2 inches) with 23.7 mm (15/16 inch) minimum thickness.
 - b. Mullion Bar Following minimum widths across:
 - 1) Roll Form Door 48 mm (1-7/8 inches).
 - 2) Tubular Door: 23.7 mm (15/16 inch). Frame Liner: Minimum 27 mm (1-1/16 inch) return offset on outside face for side flange width for bearing against door buck. Wall Thickness of Frame Liner: Minimum 1.57 mm (0.062 inch). Storm Door: Supported by adequate reinforcing ribs.
 - c. Insert Frame: Maximum 4.8 mm (1/8 inch) overall clearance in width and height and interchangeable in storm doors having same nominal size.
 - d. Master Frame Dimensions: Manufacturing tolerance of plus or minus 4.8 mm (1/8 inch).
22. Hardware: Stainless steel, aluminum or other non-corrosive material.
- a. Cadmium or Zinc Plated Steel: ASTM B 633 or ASTM B 766.
 - b. Include latch equipped with exterior handle, interior locking mechanism with anti-lockout feature, adjustable heavy duty door closer, necessary screws, and hurricane chain with spring.
 - c. Hinges: Install one of following hinge types on each frame liner and storm door:
 - 1) At least 4 concealed 304 stainless steel hinges on bronze oilite bearings, each minimum 75 mm (3 inches) long.
 - 2) At least 3 surface-mounted (H) type galvanized steel hinges.

Accessories

23. Joint Sealant: AAMA 800, Type 808.3 Exterior Perimeter Sealing Compound.

Finishes

24. Finish: Baked enamel or polyester poly powder coat applied to phosphatized, zinc impregnated or coated hot dipped galvanized steel.
- a. Finish: Not show fading or corrosion when exposed to salt-spray test specified in this Section.

Source Quality Control

25. Testing: Performed by accredited independent testing laboratory.

EXECUTION**Examination**

26. Site Verification of Conditions:
- a. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - b. Existing Conditions: Examine openings before beginning installation.
 - c. Verify that surfaces to receive storm doors are clean.

Preparation

27. Protection: Protect adjacent elements from damage and disfiguration in accordance with Detailed Scope of Work.
 - a. Contractor: Responsible for damage to grounds, plantings, buildings and any other facilities or property caused by construction operations.
 - b. Repair or replace damaged elements in accordance with Detailed Scope of Work.
28. Existing Storm Doors: Remove existing screen and storm doors and debris from site in accordance with Detailed Scope of Work.
29. Prime Door Jambs of Existing Prime Doors: Prepare as necessary to provide for straight, plumb, level, tight and aesthetically appealing installation of steel storm doors.
 - a. Preparatory Work: Include, but not limited to repair of iambs, filling holes and/or dents, removing peeling and scaling paint, etc.

Installation

30. General: Install in accordance with ASTM E 737, manufacturer's recommendations, Reference Standards, and approved Shop Drawings.
 - a. Securely fasten doors in place to straight, plumb and level condition, without distortion of door or door frame, and make final adjustments for proper operation and satisfactory weatherstrip contact and seal.
 - b. In high wind areas, install storm door hinges on side to prevailing wind as directed.
31. Joint Sealants: Apply in accordance with manufacturers recommendations.
 - a. Surfaces to be Sealed: Clean, dry and free of any foreign matter that would degrade adhesion. Remove existing caulking and joint sealants from areas to receive new joint sealant.
 - b. Prime cleaned surfaces in accordance with sealant manufacturers recommendations.
 - c. Protect surfaces adjacent to joints by masking tape before applying sealant. Remove tape upon finishing sealing work.
 - d. Seal joints between perimeter of door frame and underlying or surrounding construction with joint sealant to accomplish weather-tight installation.
 - e. Maximum Width of Sealed Joint: 13 mm (1/2 inch).
32. Dissimilar Materials: Isolate materials from incompatible materials as necessary to prevent deterioration.
 - a. Separate dissimilar metals with bituminous paint, suitable sealant, nonabsorptive plastic or elastomeric tape, or gasket between surfaces.

Adjusting And Cleaning

33. Adjusting: At completion of job, check, adjust, and lubricate hardware as required and leave storm doors and hardware in proper operating condition.
34. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean storm doors after installation is completed to remove foreign matter and surface blemishes.
 - b. Scratched or Abraded Surfaces: Touch-up with rust inhibitor primer and enamel paint compatible with factory finish.

Protection

35. Installed Work: Protect storm doors from damage after installation.

END OF SECTION 08 11 63 13

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SECTION 08 11 63 13a - SECURITY WINDOW SCREENS AND DOORS

DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for security window screens and doors. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

GENERAL

Definitions

1. Type of Screens (Frames and Screening): Light, Medium, and Heavy Types: As defined by and comply with requirements of ANSI/SMA 6001.
2. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by Owner.

System Description

3. Performance Requirements: Comply with following:
 - a. Screens: Comply with ANSI/SMA 6001 performance requirements for Type specified or scheduled.
 - 1) Sag Test Described in ANSI/SMA 6001 Paragraph 4.2.4.2: Applicable to vertical or side hinged operable window screens only.
 - b. Operable Screens: Tested with emergency egress locking system:
 - 1) Screens: Meet or exceed ANSI/SMA 6001 performance requirements for Type specified or scheduled.
 - c. Security Screen Insert for Storm Doors: Completely assembled screen of 914 mm (36 inches) by 1 524 mm (60 inches) size with necessary braces:
 - 1) Impact Test: Meet or exceed ANSI/SMA 6001 Paragraph 4.2.4.1 performance requirements for Heavy Type.
 - d. Security Screen Doors: Completely assembled screen door measuring at least 914 mm (36 inches) wide by 2 032 mm (80 inches) high with necessary braces and hardware:
 - 1) Impact Test: Meet or exceed performance requirements of ANSI/SMA 6001 Paragraph 4.2.4.1 for Heavy Type.
 - 2) Sag Test: Meet or exceed ANSI/AAMA 1102.7 Sag Test.

Submittals

4. Product Data
5. Shop Drawings: Include standard details showing recommendations for installation. Include size of fasteners, maximum dimensions from each end, center-to-center spacing on all four sides, minimum penetration of fasteners into loading material, and maximum clearance between frame and rough opening.
6. Samples: Submit full set of samples of finish colors for color selection.
 - a. For Supply and Deliver Only Contract: Submit one full size sample of each type of security window screen and screen door with specified finish for acceptance.
7. Quality Assurance/Control Submittals:
 - a. Certificates: Manufacturers written certification that security window screens and door screens meet or exceed ANSI/SMA 6001 and other specified requirements.
 - b. Manufacturer's installation instructions.
8. Closeout Submittals:
 - a. Operation and maintenance data.
 - b. Special warranty.

Quality Assurance

- 9. Regulatory Requirements:
 - a. Egress Requirements: Comply with applicable codes and regulations.
 - b. Provide emergency egress, single point locking release, and bit key lock fire entry from exterior as and where required by applicable codes and regulations.
 - c. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
- 10. Certifications: Comply with ANSI Z34.2.
- 11. Mock-ups: For Supply and Install Contract: Install one full size mock-up of each type of security window screen and screen door with specified finish for acceptance.
 - a. Locations: As directed.
 - b. Approved Mock-ups: Standard for rest of work.
 - c. Approved Mock-ups: May remain part of completed project.

Delivery, Storage, And Handling

- 12. Packing, Shipping, Handling, and Unloading: Pack materials at manufacturing plant to prevent damage during shipping.
 - a. Screens: Label attached signifying compliance with ANSI/SMA 6001 performance requirements.
- 13. Acceptance at Site: Inspect screens upon delivery. Replace damaged or defective materials before installation.
- 14. Storage and Protection: Store screens in manner to protect from weather and other damage.

Project Conditions

- 15. Field Measurements: Field measure openings for screens before start of fabrication.

Scheduling And Sequencing

- 16. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

Warranty

- 17. Special Warranty: Provide one year written covering materials and installation for security window screens and screen doors.
 - a. Warranty: Include coverage of inserts, hardware, and latches.
 - 1) Screening not included.
 - 2) Defects resulting from vandalism not included.
 - b. For Supply and Delivery Only Contract:
 - 1) Contractor: Agrees to supply and deliver to Owner, free of charge, any required replacement parts that can be readily installed by Owner without special tools.
 - 2) Contractor: Agrees to supply and deliver free of charge, complete replacement security window screen or screen door, when defective part or parts cannot be installed without use of special tools.
 - c. For Supply and Install Contract:
 - 1) Contractor: Agrees to supply and install, free of charge, any required replacement parts or complete replacement screen.

PRODUCTS

Security Window Screens And Screen Doors

18. General: Manufactured of commercially accepted materials, free from blemishes, dents, and scratches or any other defects, which are visible when viewed at distance of 1 800 mm (6 ft), or which might otherwise affect their serviceability or appearance.
 - a. Screens: Type(s) and size(s) indicated, specified, or scheduled with necessary hardware, anchors, and equipment.
 - b. Screens: Label attached signifying compliance with ANSI/SMA 6001 requirements.
19. Framing and Cross Brace Members: Made of material which will provide sufficient strength to meet performance requirements of ANSI/SMA 6001, Types as specified or scheduled.
 - a. Thickness: Thickness necessary to provide durability and meet performance requirements.
 - b. Material: Steel or aluminum as specified or scheduled complying with applicable Federal Specification or ASTM tests and specifications for chemical, physical or mechanical properties.
 - c. Light Type: Mechanical comers acceptable.
 - d. Medium and Heavy Type: Provide continuously face welded corner joints.
20. Screening: ANSI/SMA 6001 Section 4.3.1, type 304 stainless steel (carbon steel not allowed), Types as specified and scheduled.
 - a. Light Type: Minimum 16 by 16 mesh, 0.46 mm (0.018 inch) diameter.
 - b. Medium Type: Minimum 12 by 12 mesh, 0.58 mm (0.023 inch) diameter.
 - c. Heavy Type: Minimum 12 by 12 mesh, 0.71 mm (0.028 inch) diameter with tensile (high tensile) strength of 1.43 kg per lineal mm width (800 pounds per linear inch width).
 - d. Certification: Provide certificate of compliance with specified requirements.
 - e. Assembly: Assembled in secure manner to perform as specified to assure neat construction.
 - 1) Welding or Brazing Flux: Completely removed immediately upon completion of welding or brazing operation.
 - f. Window Screens: Include warning label indicating that screen will not stop child from falling out of window in accordance with SMA 7001.
21. Operable Screens: Frame, or frame and subframe assembly, as required, scribe angles (where required), hinged main frame as required, screening, egress locking system from interior, and concealed hinges.
 - a. Screening: Type as specified or scheduled.
 - b. Main and Subframes: Steel or extruded aluminum as specified or scheduled and shall conceal locking mechanism from exterior, Type as specified or scheduled.
 - 1) Aluminum: ANSI/SMA 1004, extruded aluminum.
 - c. Operable Screens: May be mounted with vertically or horizontally positioned hinge as indicated.
 - d. Operating Hardware: Releasable from interior but properly guarded to prevent access from exterior when window is open.
22. Fixed Screens:
 - a. Fixed Frame: Steel or extruded aluminum as specified or scheduled.
 - b. Screening: Type as specified or scheduled.
23. Storm Door Screen Inserts: Main frame for application to existing storm door.
 - a. Frames: Steel or extruded aluminum as specified or scheduled.
 - b. Screening: ANSI/SMA 6001 Heavy Type.
24. Security Screen Doors: Fully assembled pre-hung doors with Z-bar frame, sill expanders with necessary hardware.
 - a. Doors Frames: Steel or extruded aluminum as specified or scheduled, ANSI/SMA 6001 Heavy Type.
 - b. Screening: ANSI/SMA 6001 Heavy Type.

Aluminum Security Screen Doors

25. Aluminum Screen Doors: Type(s) and size(s) indicated, specified, or scheduled manufactured and provided with prehung aluminum frame line (Z-bar) to fit entrance door apertures requiring frame sizes of 762 mm (30 inches) to 940 mm (37 inches) in width and 2 007 mm (79 inches) to 2 134 mm (84 inches) in height.
 - a. Doors: Sized to fit existing openings.

26. Materials:
 - a. Master Frame and Mullions: ANSI/SMA 3001, extruded aluminum and minimum 151 kPa (22,000 PSI) tensile strength.
 - b. Kick Plate: Embossed or Corrugated Aluminum: Minimum 1.27 mm (0.50 inch) embossed or corrugated thickness, fabricated of minimum 1.02 mm (0.040 inch) thick material.
 - c. Screening: Secure by use of aluminum spline integrally mounted and secured with fasteners.
27. Bottom of Door: Provide bottom expander door sweep of non-hardening rubber or extruded vinyl plastic, adjustable to 15.8 mm (5/8 inch).
 - a. Bottom Expander: Minimum 1.4 mm (0.055 inch) wall thickness.
28. Door Master Frame Construction: Mitered joint construction and joined at corners by welding or mechanical joints.
 - a. Frame Members: Minimum 60 mm (2-3/8 inch) width across flat surface and minimum 31 mm (1-1/4 inch) thickness.
 - b. Wall Thickness: Minimum 1.57 mm (0.062 inch).
 - c. Mitered Comer Joint Construction: inert gas tungsten arc or heliarc welding to provide screen doors to comply with performance requirements.
 - 1) Weld: Penetrate on both exterior and interior sides of joint.
 - 2) Dress weld beads and flat surfaces (edge surfaces not included) to smooth flush surface within satin finish.
 - 3) Minimum Width of Weld: 9.5 mm (3/8 inch) prior to dressing.
 - 4) Minimum Penetration of Weld Build-up: Minimum of 2.4 mm (3/32 inch).
 - d. Mechanical Comer Joints: Screw boss or gusset construction using screw fasteners standard to manufacturer to provide screen doors to comply with performance requirements.
 - e. Master Frame Dimensions: Manufacturing tolerance of plus/minus 4.8 mm (1/8 inch).
 - f. Extrusion Tolerances: In accordance with Aluminum Extruded Products Division of Aluminum Association standards.
29. Mullion Bars: Hollow extruded shape designed to permit being used as kick panel mullion or as upper mullion.
 - a. Mullion Bars: Minimum 50 mm (2 inch) width across flat surface and minimum 31 mm (1-1/4 inch) thickness.
 - b. Wall Thickness: Minimum 1.57 mm (0.062 inch).
 - c. Mullions: Accurately machined to fit frame and joined to side stiles by inert gas tungsten arc or heliarc welding or by mechanical clip designed for compatibility.
 - d. Dress weld beads down to make smooth flush surface.
 - e. Provide main frame and mullion bar with 4.8 mm (3/16 inch) deep grooves to accommodate kick plate.
 - f. Utilize weather resisting cement utilized to provide maximum strength and rigidity.
30. Head and Side Z-bars: Designed to receive weatherstripping.
 - a. Z-bars: Prepunched installation holes and hinges attached with machine screws.
 - b. Head Section: Formed to function as drip cap.
 - c. Frame Liner: Z-bar of extruded aluminum, minimum 1.57 mm (0.062 inch) wall thickness.
 - d. Weatherstripping: Wool pile or vinyl.
31. Each Door: Three hinges attached to pre-punched Z-bar.
 - a. Hinges: Full or 1/2 surface hinges, with three bronze oilite bushings per hinge.

Steel Security Screen Doors

32. Steel Screen Doors: Type(s) and size(s) indicated, specified, or scheduled manufactured of steel and provided with pre-hung aluminum frame liner (Z-bar) to fit entrance door apertures requiring frame sizes of 762 mm (30 inches) to 940 mm (37 inches) in width and 2 007 mm (79 inches) to 2 134 mm (84 inches) in height.
33. Materials:
 - a. Master Frame: Not be less than 22 gage (0.85 mm) roll formed steel, or 16 gage (1.6 mm) tubular steel as applicable to hem specified.

- b. Kick Plate: At least 18 gage (1.3 mm) embossed galvanized panel for roll formed frame or 16 gage (1.6 mm) flat galvanized steel sheet for tubular steel frame.
 - c. Screen Insert:
 - 1) Screening: Secured with fasteners.
 - 2) Screen Frame: Roll formed or tubular lock seam type formed from not less than 25 gage (0.53 mm) hot dipped galvanized steel or extruded aluminum.
 - d. Door Sweep Spline: Polyvinyl chloride (PVC) or equal material
 - e. Frame Liner (Z-bar): Extruded aluminum, 6063 J5.
 - f. Weatherstripping: Wool pile, or vinyl.
34. Construction:
- a. Master Frame: Roll Formed tubular lock-seam construction formed from 22 gage (0.85 mm) hot dipped galvanized steel.
 - 1) Corners: Either mitered or butt-jointed and rigidly fastened together by brazing or welding. Insert steel gussets at corners of mitered or butt-jointed screen doors when edge brazing is used.
 - 2) Welded tubular galvanized steel of 16 gage (1.6 mm) wall thickness is not required to use corner blocks or gussets.
 - b. Transom Rail (mullion): Accurately machined or fit frame and rigidly welded to side of stiles.
 - 1) Kick Plate: Rigidly retained in place by steel or aluminum spline, or form fitted.
 - c. Adjustable Expander Installed at bottom of each screen door to receive vinyl sweep.
 - 1) Adjustment Limit: At least 7.9 mm (5/16 inch).
 - 2) Vinyl Door Sweep: Installed in entire length of expander.
 - d. Frame Liner (Z-bar): Track to receive weather stripping and necessary installation holes.
 - 1) Head Section of Frame Liner Formed to function as drip cap.
35. Dimensions:
- a. Widths across Master Frames:
 - 1) For Roll Form Door: Minimum 70 mm (2-3/4 inches).
 - 2) For Tubular Doors: Minimum 51 mm (2 inches) with 23.7 mm (15/16 inch) minimum thickness.
 - b. Mullion Bar: Following minimum widths across:
 - 1) Roll Form Door: 48 mm (1-7/8 inches).
 - 2) Tubular Door: 23.7 mm (15/16 inch). Frame Liner: Not less than 27 mm (1-1/16 inch) return offset on outside face for side flange width for bearing against door buck. Wall Thickness of Frame Liner: Minimum 1.57 mm (0.062 inch). Screen Door: Supported adequate reinforcing ribs.
 - c. Master Frame Dimensions: Manufacturing tolerance of plus or minus 4.8 mm (1/8 inch).
36. Hinges: Install one of following hinge types on each frame liner and screen door:
- a. At least four concealed 304 stainless steel hinges on bronze oilite bearings, each minimum 75 mm (3 inches) long.
 - b. At least three surface-mounted (H) type galvanized steel hinges.

Accessories

37. Hardware: Designed to afford ease of operation, perform functions for which it is intended, and securely attached to screen.
- a. Materials: Stainless steel, aluminum, or made corrosion resistant by plating.
 - 1) Material: Compatible with frame material.
 - 2) Stainless Steel: Alloys of 302, and 304.
 - 3) Aluminum: Extrusions from commercially produced 6063-T5 alloy.
 - 4) Cadmium or Zinc Plated Steel: ASTM B 633 or ASTM B 766.
 - 5) Plastic parts not allowed.
 - b. Fasteners: Stainless, cadmium plated, or zinc-plated steel screws, nuts, washers, bolts, and other miscellaneous fastening devices and hardware.
 - c. Hinges: Concealed from exterior, with compression guards, and of sufficient strength to comply with performance requirements of ANSI/SMA 6001.

- d. Locking System: Non-corrosive materials permitting emergency egress and of sufficient strength to comply with performance requirements of ANSI/SMA 6001.
 - 1) Provide single point release as and where required by applicable codes and regulations.
 - 2) Provide bit key lock fire entry from exterior if required by applicable codes and regulations.
 - 3) Locking Hardware: Remain completely concealed from exterior viewing and tampering with lock bolts positively locked when in thrown position, so that they cannot be operated from direct pressure on bolts.
- 38. Security Screen Door Hardware: Include latch with exterior handle, interior locking mechanism with anti-lockout feature, adjustable heavy duty door closer, necessary screws, and hurricane chain with spring.
- 39. Window Screens: Include warning label that screen will not stop child from falling out of window in accordance with SMA 7001.
- 40. Anchors: Non-magnetic stainless steel or other non-corrosive material compatible with screen.
 - a. Anchors Exposed when Screen is Closed and Locked: Non-removable security type.

Finishes

- 41. Screens: Factory applied baked on enamel or polyester powder coat finish.
 - a. Exposed Surfaces: Clean and free from serious surface blemishes.
 - b. Dress and finish exposed welded joints.
 - c. Color: As selected from manufacturers standard colors.

Source Quality Control

- 42. Testing: Performed by accredited independent testing laboratory.

EXECUTION**Examination**

- 43. Site Verification of Conditions:
 - a. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - b. Existing Conditions: Examine openings before beginning installation.
 - c. Verify that surfaces to receive security screens are clean.
 - d. Do not proceed with installation until conditions are satisfactory.

Preparation

- 44. Protection: Protect adjacent elements from damage and disfiguration in accordance with Detailed Scope of Work.
 - a. Contractor: Responsible for damage to grounds, plantings, buildings and any other facilities or property caused by construction operations.
 - b. Repair or replace damaged elements in accordance with Detailed Scope of Work.
- 45. Existing Window Screens and Screen Doors: Remove existing window screens and screen doors and debris from site in accordance with Detailed Scope of Work.
- 46. Preparation: Prepare openings and existing frames in accordance with ASTM E 737 for storm doors and storm windows.
 - a. Existing Window and Door Jambs: Prepare as necessary to provide for straight, plumb, level, tight and aesthetically appealing installation of new window screens and screen doors.
 - b. Preparatory Work: Include, but not limited to repair of jambs, filling holes and/or dents, removing peeling and scaling paint, etc.

Installation

- 47. General: Install in accordance with ASTM E 737 for storm doors and storm windows, manufacturers recommendations, Reference Standards, and approved Shop Drawings.

- a. Window Screens and Screen Doors: Securely anchor in place to straight, plumb and level condition, without distortion.
 - b. Comply with applicable codes and regulations regarding egress requirements and fireman entry.
48. Dissimilar Materials: Isolate materials from incompatible materials as necessary to prevent deterioration.
- a. Separate dissimilar metals with bituminous paint, suitable sealant, nonabsorptive plastic or elastomeric tape, or gasket between surfaces.
 - b. Coat aluminum in direct contact with concrete, masonry, steel, or other non-compatible materials with bituminous paint, zinc chromate primer, or other suitable insulating material.

Adjusting And Cleaning

- 49. Adjusting: At completion of job, check, adjust, and lubricate hardware as required and leave window screens, screen doors, and hardware in proper operating condition.
- 50. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean window screens and screen doors after installation is completed to remove foreign matter and surface blemishes.
 - b. Scratched or Abraded Surfaces: Touch-up with rust inhibitor primer and enamel paint compatible with factory finish.

Protection

- 51. Installed Work: Protect window screens and screen doors from damage after installation.

END OF SECTION 08 11 63 13a

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SECTION 08 11 63 23 - ALUMINUM STORM DOORS

DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for aluminum storm doors. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

GENERAL

Definitions

1. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by Owner

System Description

2. Performance Requirements: Comply with following:
 - a. Aluminum Storm Doors: ANSI/AAMA 1102.7, Performance Class 25 - 1.2 kPa (25 PSF) Design Pressure, 1.8 kPa (37.5 PSF) Test Pressure.
 - b. Stainless Steel Screen Insert: Completely assembled screen of 914 mm (36 inches) by 1 524 mm (60 inches) size with necessary braces:
 - 1) Impact Test: Meet or exceed ANSI/SMA 6001 Paragraph 4.2.4.1 performance requirements for Medium Type.
 - c. Aluminum Screen Doors: Completely assembled screen door measuring at least 914 mm (36 inches) wide by 2 032 mm (80 inches) high with necessary braces and hardware:
 - 1) Impact Test: Meet or exceed performance requirements of ANSI/SMA 6001 Paragraph 4.2.4.1 for Medium Type.
 - 2) Sag Test: Meet or exceed ANSI/AAMA 1102.7 Sag Test.

Submittals

3. Product Data.
4. Shop Drawings:
 - a. Include exploded view of manufactured door, similar to AAMA 1102.7, page 12.
 - b. Indicate fabrication of all parts, metal thickness, installation details, fastening, and sealing.
 - c. Include sections of typical members and details of latching devices.
5. Samples: Submit full set of finish color samples for color selection.
 - a. For Supply and Deliver Only Contract: Submit one full size sample of each type of storm door with specified finish for acceptance.
6. Quality Assurance/Control Submittals:
 - a. Certificates: Manufacturers written third party certification that storm doors meet or exceed ANSI/AAMA 1102.7, HUD 39a, and other specified requirements.
 - b. Manufacturers installation instructions.
7. Closeout Submittals:
 - a. Operation and maintenance data.
 - b. Special warranty.

Quality Assurance

8. Regulatory Requirements: Comply with following:
 - a. Glazing Materials: Comply with CPSC 16 CFR 1201 or ANSI Z97.1.
 - b. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).

- a) Uniform Federal Accessibility Standards (UFAS).
- 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
- 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
- 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
- 9. Certifications: Comply with HUD 39a, ANSI Z34.1, and HUD 24 CFR 200.935.
- 10. Mock-ups: For Supply and Install Contract: Install one full size mock-up of each type of storm door with specified finish for acceptance.
 - a. Location: As directed.
 - b. Approved Mock-up: Standard for rest of work.
 - c. Approved Mock-up: May remain part of completed project.

Delivery, Storage, And Handling

- 11. Packing, Shipping, Handling, and Unloading: Pack materials at manufacturing plant to prevent damage during shipping.
 - a. Storm Doors: Label in accordance with HUD UM 39a signifying compliance with ANSI/AAMA 1102.7 performance requirements.
- 12. Acceptance at Site: Inspect storm doors upon delivery. Replace damaged or defective materials before installation.
- 13. Storage and Protection: Store storm doors in manner to protect from weather and other damage.

Project Conditions

- 14. Field Measurements: Field measure openings for storm doors before start of fabrication.

Scheduling And Sequencing

- 15. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

Warranty

- 16. Special Warranty: Provide one year written covering materials and installation for storm doors.
 - a. Warranty: Include coverage of inserts, closers, chains, hardware, and latches.
 - 1) Screening and glazing not included.
 - 2) Defects resulting from vandalism riot included.
 - b. For Supply and Delivery Only Contract:
 - 1) Contractor: Agrees to supply and deliver to Owner, free of charge, any required replacement parts that can be readily installed by Owner without special tools.
 - 2) Contractor: Agrees to supply and deliver free of charge, complete replacement door, when defective part or parts cannot be installed without use of special tools.
 - c. For Supply and Install Contract:
 - 1) Contractor: Agrees to supply and install, free of charge, any required replacement parts or complete replacement storm door.

PRODUCTS

Aluminum Storm And Screen Doors

- 17. Storm Doors: Type(s) and size(s) indicated, specified, or scheduled with mechanical or welded comer construction complete with tempered glass or plastic glazing inserts where storm glazing is specified or scheduled, screen inserts where specified or scheduled, durable metal kick panel, push plate, adjustable bottom expander with sill sweep, necessary hardware, fasteners, and miscellaneous equipment.
 - a. Screen Doors: Meet or exceed Performance Requirements in this Section.
 - b. Storm Doors: Meet or exceed applicable requirements of AAMA/ANSI 1102.7, Performance Class 60 and HUD UM 39a.
 - c. Storm Doors: Self-storing or seasonal replacement as specified or scheduled.

- d. Door Construction: Not necessary to remove door from its installed position to reglaze, rescreen, or replace kick plate, push plate, or protective grille.
- e. Glazed Sash and Glazing Materials: Permit reglazing without special tools.
- f. Doors: Sized to fit existing openings.
- 18. Finished Master Frame, Extruded Screen Insert Frame and Z-bar: Minimum 1.4 mm (0.055 inch) wall thickness.
 - a. Z-bar: Adequate reinforcing ribs to support door.
- 19. Glazing Materials: Comply with CPSC 16 CFR 1201 or ANSI Z97.1.
 - a. Tempered Glass: ASTM C 1048, Kind FT, Condition A, Type 1, Class 1, Glazing B Quality.
 - b. Plastic: Extruded polycarbonate clear sheets, minimum 4.5 mm (0.177 inch) thick with following characteristics:
 - 1) Impact Resistance: ASTM D 256, Method A, 12-18 foot-pound per inch.
 - 2) Elongation/Modulus of Elasticity: ASTM D 638, 110 percent maximum/340,000 PSI.
 - 3) Heat Deflection: ASTM D 648, 132.2 degrees C (270 degrees F) at 264 PSI.
 - 4) Abrasion Resistance: Coated on both surfaces to produce abrasion resistance of 3-19 percent maximum haze increase for 500 revolutions of CS-1 OF wheel per ASTM D 1044.
 - c. Glass Thickness: In accordance with AAMA 1002.10 Appendix, minimum 5 mm (3/16 inch).
 - 1) Design Wind Pressures: Determined in accordance with applicable codes and regulations.
 - d. Glass: Labeled to show name of manufacturer and type.
 - e. Glazing Material: Installed in rigid removable aluminum sub-frame.
- 20. Screens: Manufacturer's standard design.
 - a. Screens Not Part of Door Frame: Extruded aluminum frames, of suitable alloy, and of sufficient rigidity, crossbraced as required, to lie flat against door and to prevent excessive bow in frame members and sag in screening.
 - 1) Screen Spline: Firmly jointed in secure manner.
 - b. Screening: Aluminum Wire Fabric: One of following as specified or scheduled:
 - 1) Regular Aluminum: FS RR-W-365, Type VII, 18 x 16 or 18 by 18 regular, 0.28 mm (0.011 inch) wire.
 - 2) Heavy Aluminum: FS RR-W-365, Type VII, 18 x 14 regular, 0.33 mm (0.013 inch) wire.
 - c. When screen is completely assembled with insect screening and spline in place, outside dimension as measured from midpoint of opposite framing members shall not vary more than 4.8 mm (3/16 inch) from outside dimension as measured at extreme ends of such framing members.
 - d. Screening: Fastened to frame in manner to permit replacement of screening.
- 21. Stainless Steel Screen: As specified or scheduled:
 - a. Screen Frames: Rolled, tubular lock seam construction formed from not less than 25 gage (0.53 mm) hot-dipped galvanized steel or 0.66 mm (0.026 inch) minimum aluminum extruded 6063-T5 alloy (with galvanic protection).
 - b. Screening: Stainless Steel: ANSI/SMA 6001 Medium Type, 12 x 12 mesh stainless steel with wire diameter of 0.58 mm (0.023 inch).
 - c. Provide screen with fastening devices for application to specific windows for which they are intended and of sufficient strength to perform satisfactorily.
- 22. Bottom of Door: Provide bottom expander door sweep of non-hardening rubber or extruded vinyl plastic, adjustable to 15.8 mm (5/8 inch).
 - a. Bottom Expander: Minimum 1.4 mm (0.055 inch) wall thickness.
- 23. Kick Plate: Embossed or Corrugated Aluminum: Minimum 1.27 mm (0.50 inch) embossed or corrugated thickness, fabricated of minimum 1.02 mm (0.040 inch) thick material.
- 24. Hardware: Aluminum, stainless steel, or other non-corrosive materials compatible with aluminum.
 - a. Cadmium or Zinc Plated Steel: ASTM B 633 or ASTM B 766.
 - b. Include latch with exterior handle and interior locking mechanism with anti-lockout feature, adjustable heavy duty door closer, necessary screws, hurricane chain with spring.
 - c. Each Door: 3 hinges attached to Z-bar.

- d. Hinges: Full or 1/2 surface hinges, with 3 bronze bushings per hinge.
- 25. Optional Accessories:
 - a. Optional Protective Grille: Perforated aluminum sheet, 0.61 mm (0.24 inches) minimum thickness, riveted or screwed to door frame to completely cover exterior of screen.
 - b. Optional Pushplate: Embossed aluminum strip 150 mm (6 inches) high, 1.02 mm (0.040 inch) minimum thickness.
 - 1) Overall Height of Mullions and Pushplate: Minimum of 200 mm (8 inches) and installed opposite and centered with latch.

Hollow Core Aluminum Storm Doors

- 26. Door: Hollow extruded smooth surface master frame, 2 hollow extruded smooth surface mullion or cross bars; 2 extruded screen frame inserts, extruded side and head Z-bars, and extruded external telescoping bottom expander.
 - a. Extrusions: Manufactured from 6063-T5 extruded aluminum alloy, minimum 1.57 mm (0.062 inch) thick, minimum 151 600 kPa (22,000 PSI) tensile strength.
 - b. Glazing Strip, Bottom Sweep, Screening Spline and Z-bar Seal: Virgin polyvinyl plastic.
- 27. Door Master Frame Comer Construction: Mitered joint construction and joined at comers by welding or mechanical joints.
 - a. Mitered Comer Joint Construction: Inert gas tungsten arc or heliarc welding to provide storm doors to comply with performance requirements.
 - 1) Weld: Penetrate on both exterior and interior sides of joint.
 - 2) Dress weld beads and flat surfaces (edge surfaces not included) to smooth flush surface within satin finish.
 - 3) Minimum Width of Weld: 9.5 mm (3/8 inch) prior to dressing.
 - 4) Minimum Penetration of Weld Build-up: Minimum of 2.4 mm (3/32 inch).
 - b. Mechanical Comer Joints: Screw boss or gusset construction using screw fasteners standard to manufacturer to provide storm doors to comply with Performance Requirements in this Section.
- 28. Mullion Bars: Hollow extruded shape designed to permit being used as kick panel mullion or as upper mullion.
 - a. Mullions: Accurately machined to fit frame and joined to side stiles by inert gas tungsten arc or heliarc welding.
 - b. Dress weld beads down to make smooth flush surface.
 - c. Provide top surface of extrusions for both center and bottom mullion bars with channel to accommodate inserts.
 - d. Provide main frame and mullion bar with 4.8 mm (3/16 inch) deep grooves to accommodate kick plate.
 - e. Utilize weather resisting cement utilized to provide maximum strength and rigidity and rattle proof operation.
 - f. Bottom Mullion Bar: Receive top of kick plate.
 - g. Mullion Bar: Same thickness as frame and have minimum 50 mm (2 inch) face.
- 29. Head and Side Z-bars: Designed to receive vinyl plastic closure strip for maximum seal against air and dust infiltration.
 - a. Head Z-bar: Designed and extruded to also function as drip cap over top of door.
 - b. Z-bars: Prepunched installation holes and hinges attached with machine screws.
- 30. Finished Master Frame: Minimum 60 mm (2-3/8 inch) width across flat surface and minimum 25 mm (1 inch) thickness.
 - a. Mullion Bars: Minimum 50 mm (2 inch) width across flat surface and minimum 25 mm (1 inch) thickness.
 - b. Wall Thickness: Minimum 1.4 mm (0.055 inch).
 - c. Extruded Screen Insert Frames: 19 mm (3/4 inch) wide, minimum 7.9 mm (5/16 inch) thick, and minimum 1.57 mm (0.062 inch) wall thickness.
 - d. Z-bars: Minimum 1.4 mm (0.055 inch) wall thickness plus adequate reinforcing ribs to support door.

- e. Insert Frame: Fabricated to have minimum overall clearance of 4.8 mm (1/8 inch) in width and height, and interchangeable in doors of same nominal size.
- f. Master Frame Dimensions: Manufacturing tolerance of plus/minus 4.8 mm (1/8 inch).
- g. Extrusion Tolerances: In accordance with Aluminum Extruded Products Division of Aluminum Association standards.
- 31. Glazing Insert Frames: Extruded with mitered joint construction secured at comers by staking into comer gussets.
 - a. Inserts: Equal height making them interchangeable on doors with upper and lower openings.
 - b. Inserts: Held in door by aluminum clips and machine screws.
 - c. Install maximum of 6 rivnuts into door per insert.
 - d. Install rivnuts in master frame, 2 on each side and top of each insert, located not to interfere with installation of door closer or safety chain.
 - e. Insert: Positive contact with master frame to stop passage of insects and prevent rattling.
- 32. Screening Insert Frames: Extruded tubular with mitered joint construction and secured at comers by staking into comer gussets.
 - a. Make square comer gussets of 0.46 mm (0.180 inch) minimum extruded aluminum to fit firmly against extruded insert frames to minimize twist and distortion.
 - b. Insert screening into groove provided in frame and secure by vinyl spline.
 - c. Inserts in Doors with Upper and Lower Openings: Equal height making them interchangeable, and secured into master frame by same method as specified for glazed inserts.
- 33. Hinges: 3 knuckle construction, not less than 98 mm (3-7/8 inches) in length, with minimum of 3 prepunched screw holes in hinge leaf of minimum thickness 0.31 mm (0.120 inch) plus adequate longitudinal reinforcing ribs to support door.
 - a. Each Door: Supported with not less than 4 built-in type hinges employing raised knuckle on extruded Z-bar to receive half-extruded aluminum hinge leaf joined at knuckle by using 2 stainless steel or cadmium plated steel pins pivoting through oilite or nylon bushings.
 - b. Pins: Held securely in place by cadmium plated steel compression springs.
 - c. Hinge: Allow door to open 180 degrees.

Solid Core (Laminated) Storm Door

- 34. Materials:
 - a. Main Frame and Glass Edge Surround Members (if not part of main frame): Aluminum of sufficient strength to comply with performance requirements of ANSI/AAMA 1102.7.
 - b. Reinforcing Members: Aluminum or other non-corrosive materials compatible with aluminum.
 - 1) Carbon Steel: Cadmium or zinc-plated in accordance with ASTM B 633 or ASTM B 766.
- 35. Finished Master Frame: Extruded screen insert frame and Z-bar minimum 1.4 mm (0.055 inch) wall thickness.
 - a. Z-bar: Adequate reinforcing ribs to support door.
- 36. Door: Laminated construction consisting of minimum 19.1 mm (3/4 inch) thick particle board, grade 1-M-3 with seamless aluminum skins bonded together.
 - a. Particle Board Core Material: Completely sealed with polyurethane for moisture protection.
 - b. Ureaformaldehyde binders not allowed.
- 37. Screws, Nuts, Washers, Bolts, Rivets and Other Fastening Devices: Aluminum, stainless steel or other non-corrosive materials compatible with aluminum.
 - a. Cadmium or Zinc-plated Steel: ASTM B 633 or ASTM B 766.
- 38. Weatherstrip: Weatherstrip Z-bars with woven pile so that there is no metal to metal contact between main frame and Z-bar.
 - a. Install weatherstripping in specially extruded ports and in accordance with AAMA 701.2.
- 39. Anti-galling Devices: Non-corrosive materials compatible with aluminum and of sufficient strength to perform as designed.

Accessories

40. Joint Sealant: AAMA 800, Type 808.3 Exterior Perimeter Sealing Compound.

Finishes

41. Finish:
- a. Aluminum Finish: Provide one of following as specified or scheduled:
 - 1) Factory applied pigmented organic coating, AAMA 603.8.
 - a) Color: As selected from manufacturer's standard colors.
 - 2) Clear Anodized: Factory applied anodic coating, AAMA 607.1, Class 1.
 - b. Exposed Surfaces of Aluminum Members: Clean and free from serious surface blemishes.
 - c. Dress and finish exposed welded joints.

Source Quality Control

42. Testing: Performed under Third Party Administrator in compliance with HUD 39a, ANSI Z34.1, and HUD 24 CFR 200.935.

EXECUTION**Examination**

43. Site Verification of Conditions:
- a. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - b. Existing Conditions: Examine openings before beginning installation.
 - c. Verify that surfaces to receive storm doors are clean.
 - d. Do not proceed with installation until conditions are satisfactory.

Preparation

44. Protection: Protect adjacent elements from damage and disfiguration in accordance with Detailed Scope of Work.
- a. Contractor: Responsible for damage to grounds, plantings, buildings and any other facilities or property caused by construction operations.
 - b. Repair or replace damaged elements in accordance with Detailed Scope of Work.
45. Existing Storm Doors: Remove existing screen and storm doors and debris from site in accordance with Detailed Scope of Work.
46. Preparation: Prepare openings and existing frames in accordance with ASTM E 737.
- a. Prime Door Jambs of Existing Prime Doors: Prepare as necessary to provide for straight, plumb, level, tight and aesthetically appealing installation of new storm doors.
 - b. Preparatory Work: Include, but not limited to repair of jambs, filling holes and/or dents, removing peeling and scaling paint, etc.

Installation

47. General: Install in accordance with ASTM E 737, manufacturer's recommendations, Reference Standards, and approved Shop Drawings.
- a. Securely fasten storm doors in place to straight, plumb and level condition, without distortion of door or door frame, and make final adjustments for proper operation and satisfactory weatherstrip contact and seal.
 - b. In high wind areas, install storm door hinges on side to prevailing wind as directed.
48. Joint Sealants: Apply in accordance with manufacturer's recommendations.
- a. Surfaces to be Sealed: Clean, dry and free of any foreign matter that would degrade adhesion. Remove existing caulking and joint sealants from areas to receive new joint sealant.
 - b. Prime cleaned surfaces in accordance with sealant manufacturer's recommendations.
 - c. Protect surfaces adjacent to joints by masking tape before applying sealant. Remove tape upon finishing sealing work.
 - d. Seal joints between perimeter of storm door frame and underlying or surrounding construction with joint sealant to accomplish weather-tight installation.

- e. Maximum Width of Sealed Joint: 13 mm (1/2 inch).
- 49. Dissimilar Materials: Isolate materials from incompatible materials as necessary to prevent deterioration.
 - a. Separate dissimilar metals with bituminous paint, suitable sealant, nonabsorptive plastic or elastomeric tape, or gasket between surfaces.
 - b. Coat aluminum in direct contact with concrete, masonry, steel, or other non-compatible materials with bituminous paint, zinc chromate primer, or other suitable insulating material.

Adjusting And Cleaning

- 50. Adjusting: At completion of job, check, adjust, and lubricate hardware as required and leave storm doors and hardware in proper operating condition.
- 51. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean storm doors after installation is completed to remove foreign matter and surface blemishes.
 - b. Scratched or Abraded Surfaces: Touch-up with rust inhibitor primer and enamel paint compatible with factory finish.

Protection

- 52. Installed Work: Protect storm doors from damage after installation.

END OF SECTION 08 11 63 23

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SECTION 08 11 73 00 - SLIDING METAL FIRE DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for sliding metal fire doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Single-leaf, power-operated and manually operated sliding door with or without pass door.
 - b. Biparting, power-operated and manually operated sliding door with or without pass door.
 - c. Multiple-leaf, power-operated and manually operated sliding door with or without pass door.

C. Performance Requirements

1. Structural Performance: Provide horizontal sliding doors capable of withstanding the effects of gravity loads and the following loads and stresses without evidencing permanent deformation of door components:
 - a. Wind Load: Uniform pressure (velocity pressure) of **20 lbf/sq. ft. (960 Pa)**, **unless required otherwise by the location of the work**, acting inward or outward.

D. Submittals

1. Product Data: For each type of product indicated.
 - a. Fire-Rated Doors: Include description of fire-release system including testing and resetting instructions.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
3. Product Certificates: For sliding metal fire doors, signed by product manufacturer.
4. Oversize Construction Certification: For door assemblies required to be fire rated and that exceed size limitations of labeled assemblies, signed by authorized representative of testing agency.
5. Operation and Maintenance Data: For sliding metal fire doors to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

1. Fire-Rated Sliding Door Assemblies: Provide assemblies complying with NFPA 80 that are identical to door assemblies tested for fire-test-response characteristics according to NFPA 252 or UL 10B, and that are listed and labeled for fire ratings indicated by UL, FMG, ITS, or another testing agency acceptable to authorities having jurisdiction.
 - a. Test Pressure: Test at as close to neutral pressure as possible.
 - b. Oversize Fire-Rated Sliding Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with all standard construction requirements of tested and labeled fire-rated door assemblies except for size.
 - c. Provide units with labels showing **250 deg F (139 deg C) OR 450 deg F (250 deg C) OR 650 deg F (361 deg C)**, **as directed**, temperature-rise ratings.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Materials

1. Cold-Rolled Steel Sheets: ASTM A 1008/A 1008M, Commercial Steel (CS), or Drawing Steel (DS), Type B, exposed, matte finish.
2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with **A60 (ZF180) OR A90 (ZF275), as directed**, zinc-iron-alloy (galvannealed) coating or **G90 (Z275) OR G60 (Z180), as directed**, zinc coating; restricted flatness.
3. Stainless-Steel Sheets: ASTM A 240/A 240M, Type 304 **OR 316, as directed**; stretcher-leveled standard of flatness; No. 4 satin **OR 6 dull, as directed**, finish.
4. Hardware and Fasteners: Manufacturer's standard units **OR** Hot-dip galvanize per ASTM A 153/A 153M where items are used on galvanized steel exterior doors **OR** Stainless steel **OR** Stainless steel where indicated, **as directed**.

B. Sliding Metal Fire Doors

1. Overhead-Supported Doors: Provide composite **OR** hollow-metal **OR** tubular-frame, **as directed**, type construction fire door assemblies with wall-mounted overhead track support and the following fire-protection rating and panel facing sheet material and thickness:
2. Bottom-Support Doors: Provide bottom-support, tubular-frame-type construction fire door assemblies with floor track, top guides, and the following fire-protection rating, temperature-rise rating, and face sheet material and thickness:
 - a. Fire-Protection Rating: 4 hours **OR** 3 hours **OR** 1-1/2 hours **OR** 3/4 hour **OR** As indicated, **as directed**.
 - b. Panel Facing:
 - 1) Steel: **0.033-inch (0.8-mm) OR 0.043-inch (1.1-mm) OR 0.053-inch (1.35-mm) OR 0.067-inch (1.7-mm), as directed**, minimum thickness.
 - 2) Metallic-Coated Steel: **0.040-inch (1.0-mm) OR 0.052-inch (1.3-mm) OR 0.064-inch (1.6-mm) OR 0.079-inch (2.0-mm), as directed**, nominal thickness.
 - 3) Stainless Steel: **0.038-inch (0.96-mm) OR 0.050-inch (1.3-mm) OR 0.062-inch (1.57-mm) OR 0.078-inch (1.98-mm), as directed**, nominal thickness.
3. Operating Hardware: Manufacturer's standard, labeled, automatic-closing-type, sliding fire door assemblies complete with track, adjustable roller guides, binders, floor stops, cables, sheaves, counterweights, and fusible links. Furnish necessary hangers, fittings, and fasteners required for attaching hardware to door and for door sliding operation, including latch or handle for manual operation. Provide hot-dip galvanized steel **OR** electrogalvanized steel **OR** factory-prime-painted steel **OR** stainless-steel, **as directed**, hardware.
4. Weight Boxes: **0.064-inch- (1.6-mm-)** thick, metallic-coated steel counterweight boxes or guards; size as required for counterweights and clearance.
5. Crush Plates: **3/16-inch-thick by 6-inch-wide (4.8-mm-thick by 150-mm-wide)**, continuous steel plates on hollow concrete masonry walls.
6. Track Hood: Formed, metallic-coated steel sheet **OR** stainless-steel, **as directed**; size as required for clearance and to protect tracks on exterior installations.
7. Weather Stripping: UL-classified, brush-style weather stripping with attachments for mounting at head, jambs, and bottom surface of door.
8. Motorized Operator: UL-approved, high-starting torque, reversing motor and adjustable speed operator with thermal-overload protection. Include fusible-link release to disengage operator and to allow door to close automatically.
 - a. Design operator for current characteristics of electrical service supplied. Provide UL-listed, 1/2-hp, 208- to 230-V ac, single-phase **OR** 208-V ac, 3-phase **OR** 220-V ac, 3-phase **OR** 480-V ac, 3-phase, **as directed**, 60-cycle motor with NEMA 250, Type 1 enclosure and 24-V ac, secondary control voltage.
 - b. Equip door for completely automatic operation with clutch, speed reducer, brake, limit switches, electric reverse edge, brackets, bolts, and release for manual operation. Control equipment includes two pull cords **OR** two 3-button control stations with push buttons labeled "OPEN," "CLOSE," and "STOP" **OR** two motion detectors **OR** two loop detectors

OR two photoelectric obstruction detectors **OR** time delay for closing, **as directed**, and electric interlock for pass door.

9. Interconnecting Device: Device for connecting fusible links for doors on both sides of wall.
10. Door Release Devices: Electromagnetic release devices compatible with smoke detectors or building's fire alarm system.
11. Fire Detection: Provide early warning, photoelectric smoke detectors or ionization detectors to be coupled to electromagnetic door release devices.
12. Pass Door: UL-listed swing door and frame.
13. Pass Door Hardware: Factory installed with one and one-half pairs of mortise spring hinges **OR** butt hinges and closer, **as directed**, and mortise latchset **OR** mortise lock **OR** exit device **OR** panic device, **as directed**.
 - a. Provide hardware complying with Division 08 Section "Door Hardware".
14. Vision Panels: Factory fabricated in door with integral removable glass stops. Provide UL-approved, wired glass panels or other fire-resistive glazing product acceptable to authorities having jurisdiction; do not exceed area allowed for door rating.

C. Fabrication

1. Composite-Type Doors: Fabricate in modular panels. Bond face materials to both sides of core and reinforce perimeter with minimum **0.043-inch- (1.1-mm-)** thick, internal steel channel. Encase panel edges with minimum **0.067-inch- (1.7-mm-)** thick, steel channel. Back joints in face sheets with minimum **0.043-inch- (1.1-mm-)** thick, steel H column. Connect panels with H column and cover plate. Attach armor edges and astragals to doors.
2. Hollow-Metal Doors: Bond face materials to both sides of core and reinforce perimeter with minimum **0.043-inch- (1.1-mm-)** thick, internal steel channel. Back joints in face sheets with minimum **0.043-inch- (1.1-mm-)** thick, steel H column. Weld and fill joints and grind exposed welds smooth. Attach armor edges and astragals to doors.
3. Tubular-Frame Doors: Fabricate perimeter frame and internal stiffeners of minimum **0.043-inch- (1.1-mm-)** thick steel tubes. Miter corner joints in frame and weld frame and stiffener joints. Locate joints in face sheets over stiffeners. Weld and fill joints and grind exposed welds smooth. Attach armor edges and astragals to doors.
4. Core Construction: Provide core materials complying with fire-protection-rating and temperature-rise requirements.
 - a. Resin-impregnated honeycomb.
 - b. Mineral-fiber board.
 - c. Urethane.
 - d. Fiberglass.
 - e. Calcium silicate
 - f. Inorganic mineral.
 - g. Manufacturer's standard.

D. Steel Finishes

1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Preparation for Shop Priming: After galvanizing, thoroughly clean metal of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate pretreatment.
3. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of sliding metal fire doors:
 - a. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Interiors (SSPC Zone 1A): SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. Prime Finish: Immediately after cleaning and pretreating, apply manufacturer's standard rust-inhibiting primer on **OR** zinc-rich primer on metallic-coated, **as directed**, steel doors for field painting.
5. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with

paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.

- a. Color and Gloss: As selected from manufacturer's full range.

1.3 EXECUTION

A. Installation

1. Install sliding metal fire doors according to NFPA 80 and manufacturer's written instructions for type of door operation indicated and fire-protection rating required.
 - a. Interface fire-detection devices with building's fire alarm system.
2. Drill necessary holes cleanly, with no broken areas or spalls, for installation of fasteners in concrete or masonry. Remove and replace damaged masonry as directed.

B. Adjusting And Cleaning

1. Operate sliding metal fire doors on completion of installation to ensure satisfactory operation. Check moving parts for proper alignment and lubrication. Make adjustments for smooth, easy operation.
 - a. Test door closing when activated by detector or alarm-connected, fire-release system. Reset door-closing mechanism after successful test.
2. Clean surfaces and refinish abraded or damaged surfaces to match factory finish.

END OF SECTION 08 11 73 00

SECTION 08 12 13 13 - STAINLESS STEEL DOORS AND FRAMES

1.1 GENERAL

A. Description

1. This specification covers the furnishing and installation of stainless steel doors and frames. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Stainless-steel, hollow-metal doors and panels.
 - b. Stainless-steel, hollow-metal frames.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
2. Shop Drawings: Include the following:
 - a. Elevations of each door design.
 - b. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - c. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - d. Locations of reinforcement and preparations for hardware.
 - e. Details of each different wall opening condition.
 - f. Details of anchorages, joints, field splices, and connections.
 - g. Details of accessories.
 - h. Details of moldings, removable stops, and glazing.
 - i. Details of conduit and preparations for power, signal, and control systems.
3. Samples:
 - a. Finishes: For each type of exposed finish required, prepared on Samples of not less than **3 by 5 inches (75 by 125 mm)**.
 - b. Doors: Include section of vertical-edge, top, and bottom construction; core construction; glazing; and hinge and other applied hardware reinforcement.
 - c. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.
4. Schedule: Provide a schedule of stainless-steel, hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with a door hardware schedule.
5. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
6. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of stainless-steel, hollow-metal door and frame assembly.

D. Quality Assurance

1. Source Limitations: Obtain stainless-steel, hollow-metal work from single source from single manufacturer.
2. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - b. Temperature-Rise Limit: Where indicated **OR** At vertical exit enclosures and exit passageways, **as directed**, provide doors that have a maximum transmitted temperature

end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.

3. Smoke- and Draft-Control Door Assemblies: Where indicated **OR** At corridors, smoke barriers, and smoke partitions, **as directed**, provide assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 - a. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
4. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies that are listed and labeled, by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite. Install in compliance with NFPA 80.
5. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
2. Shipping Spreaders: Deliver welded frames with two removable spreader bars across bottom of frames, tack welded or mechanically attached to jambs and mullions.
3. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (100-mm-) high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 - a. If wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

F. Project Conditions

1. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

G. Coordination

1. Coordinate installation of anchorages for stainless-steel frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.2 PRODUCTS

A. Stainless-Steel Doors

1. Description: Stainless-steel doors, not less than 1-3/4 inches (44 mm) thick, of seamed **OR** seamless, **as directed**, hollow-metal construction. Construct doors with smooth, flush surfaces without visible joints or seams on faces.
 - a. Face Sheets: Fabricate from 0.050-inch- (1.27-mm-) **OR** 0.062-inch- (1.59-mm-) **OR** 0.078-inch- (1.98-mm-), **as directed**, thick, stainless-steel sheet.
 - b. Core Construction: Fabricate doors with core indicated.
 - 1) Welded Steel-Stiffened Core: 0.031-inch- (0.79-mm-) thick, stainless-steel **OR** 0.030-inch- (0.76-mm-) nominal thickness uncoated steel **OR** 0.034-inch- (0.86-mm-) nominal thickness metallic-coated steel, **as directed**, vertical stiffeners extending full-door height, spaced not more than 6 inches (152 mm) apart, spot welded to face sheets a maximum of 5 inches (127 mm) o.c. Fill spaces between stiffeners with mineral-fiber insulation.
 - 2) Laminated Core: Honeycomb of resin-impregnated kraft paper with maximum 1-inch (25.4-mm) cells or foam-plastic insulation fastened to face sheets with waterproof adhesive.
 - a) Foam-Plastic Insulated Doors: Thermal-resistance value (R-value) of not less than 4.0 deg F x h x sq. ft./Btu (0.704 K x sq. m/W) **OR** 6.0 deg F x h x sq.

- ft./Btu (1.057 K x sq. m/W) OR 12.3 deg F x h x sq. ft./Btu (2.166 K x sq. m/W), as directed**, when tested according to ASTM C 1363.
- i. Locations: Exterior doors and interior doors, where indicated.
 - 3) Laminated Steel-Stiffened Core: **0.031-inch- (0.79-mm-)** thick, stainless-steel **OR 0.030-inch- (0.76-mm-)** nominal thickness uncoated steel **OR 0.034-inch- (0.86-mm-)** nominal thickness metallic-coated steel, **as directed**, vertical stiffeners extending full-door height, spaced not more than **6 inches (152 mm)** apart, fastened to face sheets with waterproof adhesive. Fill spaces between stiffeners with mineral-fiber insulation.
 - 4) Fire-Rated Door Core: As required to provide fire-protection and temperature-rise ratings indicated.
 - c. Vertical Edges for Single-Acting Doors: Beveled **1/8 inch in 2 inches (3 mm in 50 mm)**.
 - d. Vertical Edges for Double-Acting Doors: Round vertical edges with **2-1/8-inch (54-mm)** radius.
 - e. Moldings for Glazed Lites in Doors: **0.038-inch- (0.95-mm-)** thick stainless steel.
 - f. Loose Stops for Glazed Lites in Doors: **0.038-inch- (0.95-mm-)** thick stainless steel.
 - g. Top and Bottom Channels: Closed with continuous channels, **0.062-inch- (1.59-mm-)** thick stainless steel **OR 0.060-inch- (1.52-mm-)** nominal thickness uncoated steel **OR 0.064-inch- (1.63-mm-)** nominal thickness metallic-coated steel, **as directed**.
 - 1) Spot welded to both face sheets.
OR
Securely fastened using adhesive.
 - h. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless **OR** uncoated **OR** metallic-coated, **as directed**, steel.
 - i. Electrical Hardware Enclosures: Provide enclosures and junction boxes within doors for electrically operated door hardware, interconnected with UL-approved, **1/2-inch- (12.7-mm-)** diameter conduit and connectors.
 - 1) Where indicated for installation of wiring, provide access plates to junction boxes, fabricate from same material and thickness as face sheet and fasten with at least four security fasteners spaced not more than **6 inches (152 mm)** o.c.
 2. Performance: Level A, ANSI A250.4.
 3. Materials:
 - a. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304 **OR** Type 316 **OR** Type 317LMN **OR** 904L, **as directed**.
 - b. Steel Sheet: ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, Commercial Steel (CS), Type B.
 - c. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum **G60 (Z180)** or **A60 (ZF180)** metallic coating.
 - d. Foam-Plastic Insulation: Manufacturer's standard polystyrene **OR** urethane, **as directed**, board insulation with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within door.
 - e. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.
 4. Stainless-Steel Finishes:
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3) Directional Satin Finish: No. 4.
 - 4) Dull Satin Finish: No. 6.
 - 5) Mirrorlike Reflective, Nondirectional Polish: No. 8.
 - c. Bright, Cold-Rolled, Unpolished Finish: No. 2B. Factory primed for field finish, **as directed**.

- B. Stainless-Steel Panels
1. Provide stainless-steel panels of same construction, materials, and finish as specified for adjoining stainless-steel doors.
- C. Stainless-Steel Frames
1. Description: Fabricate stainless-steel frames of construction indicated, with faces of corners mitered and contact edges closed tight.
 - a. Door Frames: Machine mitered, faces only welded **OR** Saw mitered and full (continuously) welded **OR** Machine mitered and full welded **OR** Knock down **OR** Slip on **OR** As indicated, **as directed**.
 - 1) Weld frames according to HMMA 820.
 - b. Sidelight, Transom and Borrowed-Light Frames: Machine mitered, faces only welded **OR** Saw mitered and full (continuously) welded **OR** Machine mitered and full welded, **as directed**.
 - c. Door Frames for Openings **48 Inches (1219 mm)** Wide or Less: Fabricate from **0.062-inch- (1.59-mm-)** **OR** **0.078-inch- (1.98-mm-)** **OR** **0.109-inch- (2.78-mm-)**, **as directed**, thick, stainless-steel sheet.
 - d. Door Frames for Openings More Than **48 Inches (1219 mm)** Wide: Fabricate from **0.078-inch- (1.98-mm-)** **OR** **0.109-inch- (2.78-mm-)**, **as directed**, thick, stainless-steel sheet.
 - e. Borrowed-Light Frames: Fabricate from **0.062-inch- (1.59-mm-)** **OR** **0.078-inch- (1.98-mm-)** **OR** **0.109-inch- (2.78-mm-)**, **as directed**, thick, stainless-steel sheet.
 - f. Sidelight and Transom Frames: Fabricate from stainless-steel sheet of same thickness as adjacent door frame.
 - g. Glazing and Panel Stops: Formed integral with stainless-steel frames, minimum **5/8 inch (16 mm)** high, unless otherwise indicated.
 - h. Loose Stops for Glazed Lites and Panels: **0.038-inch- (0.95-mm-)** thick stainless steel.
 - i. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 866 with reinforcing plates from stainless **OR** uncoated **OR** metallic-coated, **as directed**, steel.
 - j. Head Reinforcement: **0.109-inch- (2.78-mm-)** thick, stainless-steel channel or angle stiffener for openings widths more than **48 inches (1219 mm)**.
 - k. Jamb Anchors:
 - 1) Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than **0.062-inch- (1.59-mm-)** thick stainless steel **OR** **0.060-inch- (1.52-mm-)** nominal thickness uncoated steel **OR** **0.064-inch- (1.63-mm-)** nominal thickness metallic-coated steel, **as directed**, with corrugated or perforated straps not less than **2 inches (50 mm)** wide by **10 inches (250 mm)** long; or wire anchors not less than **0.156 inch (4.0 mm)** thick.
 - 2) Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than **0.050-inch- (1.27-mm-)** thick stainless steel **OR** **0.048-inch- (1.21-mm-)** nominal thickness uncoated steel **OR** **0.052-inch- (1.32-mm-)** nominal thickness metallic-coated steel, **as directed**.
 - 3) Compression Type for Slip-on Frames: Fabricate adjustable compression anchors from stainless **OR** uncoated **OR** metallic-coated, **as directed**, steel.
 - 4) Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum **3/8-inch- (9.5-mm-)** diameter, stainless-steel **OR** uncoated steel **OR** metallic-coated steel, **as directed**, bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
 - l. Floor Anchors: Not less than **0.078-inch- (1.98-mm-)** thick stainless steel **OR** **0.075-inch- (1.90-mm-)** nominal thickness uncoated steel **OR** **0.079-inch- (2.01-mm-)** nominal thickness metallic-coated steel, **as directed**, and as follows:
 - 1) Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2) Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than **2-inch (50-mm)** height adjustment. Terminate bottom of frames at finish floor surface.

- m. Ceiling Struts: Minimum **3/8-inch-thick by 2-inch-** (9.5-mm-thick by 50-mm-) wide from stainless **OR** uncoated **OR** metallic-coated, **as directed**, steel.
 - n. Plaster Guards: Not less than **0.019-inch-** (0.48-mm-) thick stainless steel **OR** **0.018-inch-** (0.46-mm-) nominal thickness uncoated steel **OR** **0.022-inch-** (0.56-mm-) nominal thickness metallic-coated steel, **as directed**.
2. Performance: Level A, ANSI A250.4.
3. Materials:
- a. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304 **OR** Type 316 **OR** Type 317LMN **OR** 904L, **as directed**.
 - b. Steel Sheet: ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, Commercial Steel (CS), Type B.
 - c. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum **G60 (Z180)** or **A60 (ZF180)** metallic coating.
 - d. Frame Anchors: Stainless-steel sheet. Same type as door face.
OR
Frame Anchors: Steel sheet **OR** Metallic-coated steel sheet, **as directed**, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
 - e. Inserts, Bolts, and Anchor Fasteners: Stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4)** for bolts and nuts.
OR
Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.
4. Finishes:
- a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - 3) Directional Satin Finish: No. 4.
 - 4) Dull Satin Finish: No. 6.
 - 5) Mirrorlike Reflective, Nondirectional Polish: No. 8.
 - c. Bright, Cold-Rolled, Unpolished Finish: No. 2B. Factory primed for field finish, **as directed**.
- D. Accessories
- 1. Glazing: Comply with requirements in Division 08 Section "Glazing".
 - 2. Grout: Comply with ASTM C 476, with a slump of not more than **4 inches (102 mm)** as measured according to ASTM C 143/C 143M.
 - 3. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for **15-mil (0.4-mm)** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
 - 4. Mineral Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.
- E. Fabrication
- 1. Stainless-Steel Door Fabrication: Stainless-steel doors to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 - a. Seamed Edge Construction: Both vertical door edges joined by visible, continuous interlocking seam (lock seam) full height of door.
OR
Seamed Edge Construction: Both vertical door edges joined by visible seam that is projection, spot, or tack welded on inside edges of door at minimum **6 inches (152 mm)** o.c.

- b. Seamless Edge Construction: Door face sheets joined at vertical edges by continuous weld extending full height of door; with edges ground and polished, providing smooth, flush surfaces with no visible seams.
- c. Exterior Doors: Close top edges flush and seal joints against water penetration. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
- d. Stops and Moldings: Factory cut openings in doors. Provide stops and moldings around glazed lites. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1) Glazed Lites: Provide fixed stops and moldings welded on secure side of door.
 - 2) Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.
- e. Hardware Preparation: Factory prepare stainless-steel doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 8 Section "Door Hardware".
 - 1) Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
- f. Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
- g. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 866.
2. Stainless-Steel Frame Fabrication: Fabricate stainless-steel frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - a. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
 - b. Mullions, Rails and Transom Bars: Provide closed tubular members with no visible face seams or joints. Fasten members at crossings and to jambs by butt welding according to joint designs in HMMA 820.
 - 1) Provide false head member to receive lower ceiling where frames extend to finish ceilings of different heights.
 - c. Provide countersunk, flat-, or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - d. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - e. Jamb Anchors: Provide number and spacing of anchors as follows:
 - 1) Masonry Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - a) Two anchors per jamb up to **60 inches (1524 mm)** in height.
 - b) Three anchors per jamb from **60 to 90 inches (1524 to 2286 mm)** in height.
 - c) Four anchors per jamb from **90 to 96 inches (2286 to 2438 mm)** in height.
 - d) Four anchors per jamb plus one additional anchor per jamb for each **24 inches (610 mm)** or fraction thereof more than **96 inches (2438 mm)** in height.
 - 2) Stud-Wall Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - a) Three anchors per jamb up to **60 inches (1524 mm)** in height.
 - b) Four anchors per jamb from **60 to 90 inches (1524 to 2286 mm)** in height.
 - c) Five anchors per jamb from **90 to 96 inches (2286 to 2438 mm)** in height.
 - d) Five anchors per jamb plus one additional anchor per jamb for each **24 inches (610 mm)** or fraction thereof more than **96 inches (2438 mm)** in height.
 - e) Two anchors per head for frames more than **42 inches (1066 mm)** wide and mounted in metal-stud partitions.

- 3) Compression Type: Not less than two anchors in each jamb.
- 4) Postinstalled Expansion Type: Locate anchors not more than **6 inches (152 mm)** from top and bottom of frame. Space anchors not more than **26 inches (660 mm)** o.c.
- f. Head Reinforcement: For frames more than **48 inches (1219 mm)** wide, provide continuous head reinforcement for full width of opening, welded to back of frame at head.
- g. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Provide plastic plugs to keep holes clear during construction.
 - 1) Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - 2) Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- h. Stops and Moldings: Provide stops and moldings around glazed lites and solid panels where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1) Single Glazed Lites: Provide fixed stops and moldings welded on secure side of door or frame.
 - 2) Multiple Glazed Lites: Provide fixed and removable stops and moldings such that each lite is capable of being removed independently.
 - 3) Coordinate rabbet width between fixed and removable stops with type of glazing or panel and type of installation indicated.
 - 4) Terminated Stops: Where indicated for interior door frames, terminate stops **6 inches (152 mm)** above finish floor with a 45 **OR** 90, **as directed**,-degree angle cut, and close open end of stop with stainless-steel sheet closure. Cover opening in extension of frame with welded-stainless-steel filler plate, with welds ground smooth and flush with frame.
- i. Hardware Preparation: Factory prepare stainless-steel frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware (scheduled By Describing Products)".
 - 1) Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
 - 2) Locate hardware as indicated, or if not indicated, according to HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
- j. Plaster Guards: Weld guards to frame at back of hardware mortises and mounting holes in frames to be grouted.
- k. Tolerances: Fabricate frames to tolerances indicated in ANSI/NAAMM-HMMA 866.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stainless-steel doors and frames.
2. Examine roughing-in for embedded and built-in anchors to verify actual locations of stainless-steel, door-frame connections before frame installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
2. Prior to installation and with installation spreaders in place, adjust and securely brace stainless-steel door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of wall.

- c. Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a perpendicular line from head to floor.
3. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

C. Installation

1. General: Install stainless-steel doors and frames plumb, rigid, properly aligned, and securely fastened in place; comply with ANSI/NAAMM-HMMA 866 and manufacturer's written instructions.
2. Stainless-Steel Frames: Install stainless-steel frames of size and profile indicated.
 - a. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - 1) At fire-protection-rated openings, install frames according to NFPA 80.
 - 2) Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
 - 3) Install frames with removable glazing stops located on secure side of opening.
 - 4) Install door silencers in frames before grouting.
 - 5) Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - 6) Check plumb, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 7) Apply corrosion-resistant coating to backs of grout-filled frames.
 - b. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - 1) Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors, if so indicated and approved on Shop Drawings.
 - c. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - d. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - e. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - f. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
 - g. Grouted Frames: Solidly fill space between frames and substrate with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 - h. Installation Tolerances: Adjust stainless-steel frames for squareness, alignment, twist, and plumb to the following tolerances:
 - 1) Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2) Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of wall.
 - 3) Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4) Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs at floor.
3. Stainless-Steel Doors: Fit non-fire-rated doors accurately in frames with the following clearances:
 - a. Non-Fire-Rated Doors:

- 1) Jambs and Head: **1/8 inch (3 mm)** plus or minus **1/16 inch (1.6 mm)**.
 - 2) Between Edges of Pairs of Doors: **1/8 inch (3 mm)** plus or minus **1/16 inch (1.6 mm)**.
 - 3) Between Bottom of Door and Top of Threshold: Maximum **3/8 inch (9.5 mm)**.
 - 4) Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum **3/4 inch (19 mm)**.
- b. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - c. Smoke-Control Doors: Install doors according to NFPA 105.
4. Glazing: Install glazing in sidelights, transoms, and borrowed lights to comply with installation requirements in Division 08 Section "Glazing".
- a. Secure stops with countersunk, flat-, or oval-head machine screws spaced uniformly not more than **9 inches (230 mm)** o.c., and not more than **2 inches (50 mm)** o.c. from each corner.
- D. Adjusting And Cleaning
1. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work including stainless-steel doors or frames that are warped, bowed, or otherwise unacceptable.
 2. Clean grout and other bonding material off stainless-steel doors and frames immediately after installation.
 3. Stainless-Steel Touchup: Immediately after erection, smooth any abraded areas of stainless steel and polish to match undamaged finish.

END OF SECTION 08 12 13 13

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Task	Specification	Specification Description
08 12 13 13	08 01 11 61	Steel Doors And Frames
08 12 13 13	08 01 11 61a	Steel Entry Doors
08 13 13 13	08 01 11 61	Steel Doors And Frames
08 13 13 13	08 12 13 13	Stainless Steel Doors And Frames

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SECTION 08 14 00 00 - WOOD DOORS

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for wood doors. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

A. Definitions

1. Supply-and-Delivery-Only Contract: Includes supply and delivery to site FOB destination. Freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by the Owner.
2. Supply-and-Install Contract: Includes supply, delivery to site FOB destination, freight prepaid, unloading and handling at site, and installation.

B. System Description

1. Door Assemblies: Include doors, frames, and hardware.
 - a. Provide with fire rating as indicated or specified.
2. Security Entry Door System (Assembly) Performance Requirements:
 - a. Forced Entry: ASTM F 476, Grade 40.

C. Submittals

1. Shop Drawings:
 - a. Indicate location, size, elevation, details of construction, marks used to identify doors, location and extent of hardware blocking, fire rating, factory preparation requirements for each door type. Drawings shall include catalog cuts or descriptive data for weatherstripping and thresholds to be used.
2. Quality Assurance/Control Submittals:
 - a. Test Reports: Results of testing by accredited independent laboratory demonstrating compliance of door systems with specified performance requirements.
 - 1) Indicate that tests were performed in accordance with standard referenced.
 - b. Certificates: Manufacturer's written certification that door systems meet or exceed specified requirements.
 - c. Manufacturer's installation instructions.
3. Closeout Submittals:
 - a. Operation and maintenance data.
 - b. Special warranty.

D. Quality Assurance

1. Regulatory Requirements: Comply with following:
 - a. Fire-Rated Label: Determined using ASTM E 152, and bear label of UL or other recognized fire-rating program acceptable to authorities having jurisdiction,
 - 1) If any door or frame scheduled to be fire-rated cannot qualify for appropriate labeling because of its design, hardware, or any other reason, advise the Owner prior to submission of bids.
 - b. Accessibility: (Required for accessible units only, including main building entrances.)
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).

- 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations (24 CFR Part 8).
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
2. Mock-ups: Install one mock-up of each type of door system, including doors, frames, hardware, thresholds, and accessories.
- a. Location: As directed.
 - b. Approved Mock-up: Standard for rest of work, and may remain part of completed project.

E. Delivery, Storage, And Handling

1. Packing, Shipping, Handling, and Unloading: Pack materials at manufacturing plant to prevent damage during shipping.
 - a. Delivery: Do not deliver doors to building until it is entirely enclosed, drywall and concrete work is completed, and humidity in building has reached average relative humidity of locality.
 - b. Storage: Stack doors flat and off floor in manner to prevent warping or twisting, and to provide ventilation. Do not drag doors across one another.
 - c. Protection: Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration, and from extremes in temperature and humidity. Comply with "On-site Care" recommendations of NWWDA Care and Finishing of Wood Doors, and with manufacturer's recommendations.
2. Acceptance at Site: Inspect door systems upon delivery. Replace damaged or defective materials before installation.

F. Project Conditions

1. Field Measurements: Field measure openings for door systems before start of fabrication.

G. Scheduling And Sequencing

1. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

H. Warranty

1. Special Warranty:
 - a. Swinging Doors and Standard Closet Doors Warranty: Provide one-year written warranty covering materials and installation for wood doors.
 - 1) Include coverage of hardware.
 - 2) Cover warping (bow, cup, or twist), photographing of construction below face veneers, tolerance limitations of NWWDA I.S. 1-A.
 - 3) Cover delamination.
 - 4) Glazing not included.
 - 5) Defects resulting from vandalism not included.
 - b. Heavy-Duty Closet Doors Warranty: Provide manufacturer's five-year written warranty covering materials and installation for bifold closet doors.
 - c. For Supply-and-Delivery-Only Contract:
 - 1) Contractor: Agrees to supply and deliver to the Owner, free of charge, any required replacement parts that can be readily installed by the Owner without special tools.
 - 2) Contractor: Agrees to supply and deliver to the Owner, free of charge, complete replacement door, when defective part or parts cannot be installed without use of special tools.
 - d. For Supply-and-Install Contract: Contractor: Agrees to supply and install. free of charge, any required replacement parts or complete replacement door.

1.3 PRODUCTS

A. Door Frames

1. Wood Frames: Kiln dried Ponderosa Pine, toxic-treated, and primed.
 - a. Applied stops are permitted, unless otherwise indicated.
 2. Steel Frames:
 - a. Steel: ASTM A 366 cold rolled steel.
 - b. Steel Frames and/or Adapter Frames: Minimum of 18 gage (1.07 mm) galvanized bonderized steel, pre-drilled and reinforced for hinges as required.
 - 1) Shape of Frame: Generally L-shaped.
 - c. Heavy-Duty Door Frames: 16 gage (1.35 mm) minimum thickness.
 - 1) When required, provide B-Label, 1-1 /2 hour fire rating.
 - d. Security Door Frames: Comply with SDI 100, minimum of 14 gage (1.70 mm) galvanized bonderized steel, pre-drilled and reinforced for hinges as required.
 - 1) When required, provide B-Label, 1-1 /2 hour fire rating.
 - 2) Comply with Performance Requirements in this Section.
 - e. Preparation for Hardware: Machine and reinforce frames for attachment of hardware, including mortising, drilling, and tapping for hinges and mortised hardware.
 - f. Frame Anchors: Provide jamb anchors as suitable for wall conditions and floor anchors, minimum 18 gage.
 - 1) Provide welded type frames with temporary spreader bars.
- B. Interior Wood Swinging Doors**
1. Standard Products: Doors shall be of type, size, and design indicated, and shall be standard products of manufacturers regularly engaged in manufacture of wood doors.
 - a. Marking: Each door shall bear stamp, brand. or other identifying mark indicating quality and construction of door. Identifying mark or separate certification shall include identification of standard on which construction of door is based, and identity of manufacturing plant.
 2. Interior Wood Doors: NWWDA I.S. 1-A.
 - a. Thickness: 44.4 mm (1-3/4 inch) unless otherwise indicated or scheduled.
 - b. Adhesives: NWWDA I.S. 1-A, Type II.
 - c. Prefitting: Provide doors prefitted or unfitted at option of Contractor.
 - d. Faces, stiles, and rails bonded to cores.
 3. Core Construction:
 - a. Solid Core Door NWWDA Construction Type: One of following (as specified):
 - 1) PC-5 or PC-7 (5- or 7-ply) with particleboard core, bonded.
 - a) Stiles: Full core thickness and minimum 34 mm (1-3/8 inch) face width.
 - 2) SLC-5 or SLC-7 (5- or 7-ply) provide with glued wood-block core, bonded.
 - a) Stiles: Full core thickness and minimum 19 mm (3/4 inch) face width.
 - 3) Stiles and Rails: Top and bottom rails for particleboard and wood-block core doors shall have minimum 29 mm (1-1/8 inch) face width by full core thickness.
 - b. Hollow-Core Doors: NWWDA IHC (Institutional Hollow Core) or SHC (Standard Hollow Core), as specified.
 - 1) Provide with heavy-duty wood stiles, rails, lock blocks and other reinforcement inside core as required to allow for secure screw attachment of hardware.
 - 2) Hinge Stile: Minimum 25 mm (1 inch) minimum thick.
 - c. Stile Edge Bands: Mill option specie.
 - 1) No visible finger-joints acceptable in stile edge bands.
 - 2) When used, locate finger-joints under hardware.
 - d. Fire-Rated Door NWWDA Construction Type: As required for fire rating indicated or scheduled.
 - 1) Mineral Core Doors: Provide with heavy duty wood stiles, rails, lock blocks, and other reinforcement inside core as required to allow for secure screw attachment of hardware including closers and exit devices.
 - a) Reinforcement Blocking: In compliance with manufacturer's labeling requirements.
 - 2) Provide factory prefitting and premachining as required for fire-rated labels.

- 3) Means of Egress Fire Doors: Provide doors with maximum 232 degrees C (450 degree F) temperature rise rating in 30 minutes of fire exposure.
 - e. Wood Stiles, Rails, Lock Blocks, and Other Reinforcement: Wood:
 - 1) Rail Blocks: Not less than 125 mm (5 inches) wide by full core thickness.
 - 2) Split Resistance: NWWDA TM-5, average of ten test samples shall be not less than 225 load kilograms (500 load pounds).
 - 3) Direct Screw Withdrawal: NWWDA TM-10, average of ten test samples shall be not less than 315 load kilograms (700 load pounds) when tested for direct screw withdrawal using steel, fully threaded wood screw.
 - 4) Cycle/Swing: NWWDA TM-7. 200,000 cycles with no loose hinge screws or other visible signs of failure.
 - f. Under Cutting: Preserve full bottom rail.
 4. Face Panels:
 - a. Painted Finish: NWWDA I.S. 1-A, minimum 3 mm (1/8 inch) thick hardboard.
 - b. Plastic Laminate Finish: NEMA LD 3, high pressure decorative laminate, Grade GP50, 1.3 mm (0.050 inch) thick.
 - 1) Faces: Adhesively apply over minimum 3 mm (1/8 inch) thick hardboard.
 - 2) Edges: Adhesively apply plastic laminate matching face panels.
 - 3) Color and Pattern: As selected.
- C. Hardware
1. General: Comply with ANSI/BHMA A156.1 and applicable accessibility regulatory requirements and perform functions for which it was intended.
 2. Butts and Hinges: ANSI/BHMA A156.1, as scheduled.
 - a. Install non-rising pins (NRP) on out-swing residential unit entry doors.
 - b. Self Closing: ANSI/BHMA A156.17.
 - c. Security Door: Comply with Performance Requirements in this Section.
 3. Fire-Rated Door Hardware: Comply with NFPA 80.
 - a. Exit Doors: Comply with NFPA 101 (Life Safety Code) for exit doors, as well as other requirements specified.
 - b. Labeling and Listing: Listed in UL Building Materials Directory.
 - 1) In Lieu of UL Labeling and Listing: Test reports from nationally recognized testing agency showing that hardware has been tested in accordance with UL test methods and conforms to NFPA requirements.
 - c. Install minimum latch throw as specified on label of individual door.
 - d. Provide hardware listed by UL, except where heavier materials, larger sizes, or higher grades are specified.
 - e. Closers: ANSI/BHMA A156.4.
 4. Lock Sets and Passage Sets: As scheduled. Comply with following standards:
 - a. Bored and Preassembled Locks and Latches: ANSI/BHMA A156.2, Grade 2.
 - b. Dead Bolt: ANSI/BHMA A156.5.
 - c. Mortise Locks and Latches: ANSI/BHMA A156.13, Grade 1 or Security Grade, single or multiple throw.
 - d. Interconnected Deadlock and Passage Set: ANSI/BHMA A156.12, Grade 2.
 - e. Cylindrical Lock: Grade 2 cylindrical deadbolt lock/passage set combination.
 - f. Security Door Locksets: ANSI/BHMA A156.13 Security Grade or UL 437 Key locks.
 - 1) Comply with Performance Requirements in this Section.
 - g. Keys: Provide two keys for each lock provided. Provide master keying and keying alike on any locks as directed at no additional charge.
 - h. Locks: Provide with interchangeable cores.
 5. Door Viewers: ANSI/BHMA A156.16.
- D. Factory Fitting And Machining
1. Doors: Prefit, bevel, mortise, and machine doors at factory in accordance with NWWDA I.S. 1-A.

- a. Comply with hardware schedules and door frame Shop Drawings with hardware templates to ensure proper fit of doors and hardware.
 - 1) Take accurate field measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with machining in factory.
 - b. Machine doors for hardware requiring cutting of doors.
 - c. Fit doors to frame bevel lock edge of doors (1/8 inch) for each (2 inches) of door thickness.
 - d. Finish all surfaces, including both faces, top and bottom and edges of doors smooth to touch.
2. Edge Sealing: Seal wood end grain exposed at edges and cutouts of doors against moisture penetration prior to shipment.
 - a. Sealer: Two coats of spar varnish or other sealer recommended by door manufacturer.
 3. Tolerances: Comply with NWWDA tolerance requirements for prefitting.
- E. Door Assemblies
1. Prehung Swinging Doors: Prehung door with matching wood frame complete with hinges, lockset or passage set, and other hardware, as indicated or specified.
 2. Fire-Rated Doors and Frames: NFPA 80 and bear identifying label of UL or nationally recognized testing agency qualified to perform certification programs indicating that units conform to requirements for class indicated.
 - a. Labels: Metal with raised or incised markings.
 - b. Hardware: As required to maintain fire rating and receive label.
 3. Security Entry Frames and Doors:
 - a. Comply with Performance Requirements in this Section.
 - b. Fire Rating: When required, provide B-Label, 1-1/2 hour fire rating.
- F. Closet Doors
1. Heavy-Duty Bifold Closet Doors: Particleboard bifold doors, prime painted, factory premachined, complete with manufacturer's standard hardware to provide complete operating bifold doors.
 - a. Panels: 721 kg/ cubic m (45 PCF) industrial-grade particle board, 19.1 mm (3/4 inch) thick.
 - 1) Long Edges: Plasticized.
 - 2) Room Side: Filled and prime painted.
 - 3) Closet Side: Prime painted.
 - 4) Exposed Surfaces Finish: Painted or plastic laminate as indicated or scheduled.
 - b. Track: No. 6063-T6 extruded aluminum, 20.5 mm (13/16 inch) by 32 mm (1-1/4 inch).
 - 1) Track Guides: Delrin.
 - c. Hardware: Factory-applied to doors and track.
 - 1) Pivot and Mounting Hardware: 14 gage cold-rolled steel, carbonized for strength and durability.
 - 2) Top Pivot and Guide Pins: 75 mm (3 inch) removable compensating pins.
 - 3) Toggle Pivot: Ensure doors remain in place.
 - 4) Spring Enclosure: Provide positive closing with little effort and keep doors closed.
 - 5) Bottom Pivot: Carry weight of door, floor-mounted, and designed for vertical and horizontal adjustment.
 - 6) Panel Brackets: Wrap-around feature to eliminate unnecessary stress on screws.
 - 7) Panels: Hinged together with continuous piano hinges inserted into routed grooves and secured with tempered pins.
 - 8) Pulls: As selected from manufacturer's standards.
 - d. Doors: Comply with accessibility requirements (as specified).
 2. Standard Bifold Closet Doors: Provide complete manufacturer's standard hardware, including tracks, hinges, guides, and pulls to provide complete operating bifold doors.
 - a. Hollow-Core Doors: NWWDA I.S. 1-A and NWWDA IHC (Institutional Hollow Core).
 - 1) Provide with heavy-duty wood stiles, rails, lock blocks and other reinforcement inside core as required to allow for secure screw attachment of hardware.
 - b. Doors: 34.9 mm (1-3/8 inch) thick unless otherwise indicated.
 - c. Surface-Mounted Pulls: As selected from manufacturer standards.

3. Standard Sliding Closet Doors: Provide complete manufacturer's standard hardware, including tracks, guides, and pulls to provide complete operating sliding doors.
 - a. Hollow-Core Doors: NWWDA I.S. 1-A and NWWDA IHC (Institutional Hollow Core).
 - 1) Provide with heavy-duty wood stiles, rails, lock blocks and other reinforcement inside core as required to allow for secure screw attachment of hardware.
 - b. Doors: 34.9 mm (1-3/8 inch) thick unless otherwise indicated.
 - c. Recessed Pulls: As selected from manufacturer standards.
4. Standard Closet Door Face Panels:
 - a. Painted Finish: NWWDA I.S. 1-A, minimum 3 mm (1/8 inch) thick hardboard.
 - b. Plastic Laminate Finish: NEMA LD 3, high-pressure decorative laminate, Grade GP50, 1.3 mm (0.050 inch) thick.
 - 1) Faces: Adhesively apply over minimum 3 mm (1/8 inch) thick hardboard.
 - 2) Edges: Adhesively apply plastic laminate matching face panels.
 - 3) Color and Pattern: As selected.

G. Finishes

1. Painted Wood Finish: One of following as indicated or scheduled:
 - a. Factory Finish: NWWDA System No. 10-Conversion Varnish.
 - 1) Color: As selected.
 - b. Field Finish: Factory primed for field paint under Division 9 Section "Painting."
2. Painted Steel Finish: Clean and free from serious surface blemishes.
 - a. Exposed Surfaces: ASTM A 591 electrolytic zinc-coated steel, Class A.
 - b. Primer: ANSI A224.1, factory-applied primer.
 - c. Finish Coat: One of following as specified or scheduled:
 - 1) Factory Finish: Electrostatically factory applied baked-on enamel finish.
 - a) Color: As selected from manufacturer's list of colors.
 - 2) Field Finish: Factory-primed for field paint under Division 9 Section "Painting."

1.4 EXECUTION**A. Examination**

1. Site Verification of Conditions:
 - a. Existing Conditions: Examine openings before beginning installation.
 - b. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - c. Before installation of doors, verify that frames are proper size, location, type, and swing characteristics for door, and are installed with plumb jambs and level heads as required for proper installation of doors.
 - d. Reject doors with defects.
 - e. Do not proceed with installation until conditions are satisfactory.

B. Preparation

1. Protection: Protect adjacent elements from damage and disfiguration in accordance with Detailed Scope of Work.
 - a. Contractor: Responsible for damage to buildings and any other facilities or property caused by construction operations.
 - b. Repair or replace damaged elements in accordance with Detailed Scope of Work.
2. Existing Doors: Remove existing doors and debris from site in accordance with Detailed Scope of Work.
3. Preparation: Prepare existing openings in accordance with ASTM E 737, manufacturer's recommendations, and approved Shop Drawings.
4. Wood Door Preparation:
 - a. Conditioning: Condition wood doors to average humidity in installation area prior to hanging.

- b. Prefitting: Prefit wood doors to frames and machine for hardware to whatever extent not previously worked at factory as required for proper fit and uniform clearance at each edge.
 - c. Sealing: Before installation of hardware on wood doors, brush apply sealer to all job site cut or planed surfaces.
- C. Door Frame Installation
- 1. Door Frames: Install in accordance with ASTM E 737, manufacturer's recommendations, and approved Shop Drawings.
 - a. Set frames accurately in accordance with details, straight and free of twist with head level, jambs plumb, and without distortion. Rigidly anchor to walls and partitions and securely brace until surrounding work is completed.
 - 2. Wood Frames: Set plumb and square, and rigidly anchor in place using finish type nails. Provide double wedge blocking near top, bottom, and midpoint of each jamb.
 - 3. Steel Frames: Comply with SDI 105:
 - a. Fire-Rated Openings: Place frames and provide clearances in accordance with NFPA 80 and GA 253.
 - b. Field Welds: Make welds full length of joints. Remove splatter, and grind exposed welds to match adjacent surfaces. Provide the Owner with ample notice to review welds before finish operations begin.
 - c. Wherever possible, leave spreader bars in place until frames are securely anchored.
- D. Wood Door Installation
- 1. General: Install doors in accordance with NWWDA I.S. 1-A, ASTM E 737, manufacturer's recommendations, and approved Shop Drawings.
 - a. Install doors and frames securely, straight, plumb, and level without distortion.
 - 2. Wood Doors: Install wood doors in accordance with manufacturers recommendations.
 - a. Prefit Doors: Fit to frames for uniform clearance at each edge.
 - b. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors.
 - c. Hanging: After sizing doors, fit and machine for hardware as scheduled.
 - 1) Hang doors to be free of binding, with hardware functioning properly.
 - d. Clearances for Nonfire-Rated Doors:
 - 1) Jamb: 3 mm (1/8 inch), 3 mm (1/8 inch) bevel in 50 mm (2 inches).
 - 2) Head: 3 mm (1/8 inch).
 - 3) Bottom at Decorative Floor Finish or Covering: 13 mm (1/2 inch).
 - 4) Bottom at Threshold: 6 mm (1/4 inch) between bottom of door and top of threshold.
 - e. Clearances for Fire Rated Doors: Comply with NFPA 80 and local code.
 - 1) Bevel fire-rated doors 3 mm in 50 mm (1/8 inch in 2 inches) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
 - f. Seal cut surfaces after fitting and machining as specified above.
 - 3. Fire-Rated Doors:
 - a. Installation, Hardware, and Operational Characteristics: Comply with NFPA 80, NFPA 101, and manufacturer's recommendations.
 - b. Factory-Applied Labels: Remain intact where installed. Do not trim labeled hinge stile edge and top edge of door.
 - 1) Do not paint over labels.
 - c. Clearances for Fire-Rated Doors: Comply with NFPA 80 and local code.
 - 1) Lockstile Edge and Bottom Edge: May be trimmed only to extent recommended by door manufacturer.
 - 2) Bevel fire-rated doors 3 mm in 50 mm (1/8 inch in 2 inches) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
 - d. Seal cut surfaces after fitting and machining as specified above.
- E. Hardware Installation

1. General: Install hardware in accordance with SDI 109, DHI recommended locations, and manufacturers recommendations.
2. Fastening: Furnish items of hardware with attachment screws, bolts, nuts, etc., as required to attach hardware to type of material involved and with finish to match adjacent hardware.
 - a. Make attachments to metal by template machine screws.
 - b. Through-bolt hardware such as door closers, forearm shoes of closers, holding devices, and panic hardware mounted on doors or panels.
 - c. Attach hardware to masonry or concrete with expansion bolts or similar drilled anchors to develop full strength of attached device. Set expansion anchors in solid masonry, not mortar joints.
3. Accessories:
 - a. Smoke Seals and Sound-stripping: Run full height of both jambs and full width of head.
 - b. Thresholds: Run full width of opening. Install thresholds with continuous threshold anchors cast into slab and set in sealant.

F. Door Assemblies Installation

1. Prehung Wood Doors in Frames with Hardware: Install in accordance with manufacturer's recommendations.
2. Bifold Closet Doors with Hardware: Install in accordance with manufacturers recommendations.
3. Sliding Closet Doors with Hardware: Install in accordance with manufacturer's recommendations.

G. Adjusting And Cleaning

1. Adjusting: At completion of job, check, adjust, and lubricate hardware as required, and leave doors and hardware in proper operating condition.
 - a. Operation: Rehang or replace doors which do not swing or operate freely.
2. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean doors after installation to remove foreign matter and surface blemishes.
 - b. Scratched or Abraded Painted Surfaces: Touch-up with primer and enamel paint compatible with factory finish.

H. Protection

1. Installed Work: Protect doors from damage after installation, as recommended by door manufacturer, to ensure that doors will be without damage or deterioration at project completion.
2. Replacement: Refinish or replace doors damaged during installation.
 - a. Causes for Rejection of Wood Doors: Include warp, chips, scratches, or gouges of veneer, and finish defects.

END OF SECTION 08 14 00 00

SECTION 08 14 16 00 - FLUSH WOOD DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for flush wood doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Solid-core doors and transom panels with wood-veneer, medium-density-overlay, hardboard or MDF, and plastic-laminate faces.
 - b. Hollow-core doors with wood-veneer, hardboard or MDF, and plastic-laminate faces.
 - c. Shop priming and Factory finishing flush wood doors.
 - d. Factory fitting flush wood doors to frames and factory machining for hardware.

C. Submittals

1. Product Data: For each type of door indicated. Include factory-finishing specifications.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that flush wood doors comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
 - b. Product Data for Credit EQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
3. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - a. Indicate dimensions and locations of mortises and holes for hardware.
 - b. Indicate dimensions and locations of cutouts.
 - c. Indicate requirements for veneer matching.
 - d. Indicate doors to be factory finished and finish requirements.
 - e. Indicate fire-protection ratings for fire-rated doors.
4. Samples: For plastic-laminate door faces and factory-finished doors.

D. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
2. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated" **OR** WDMA I.S.1-A, "Architectural Wood Flush Doors" **OR** WI's "Manual of Millwork", **as directed**.
3. Forest Certification: Provide doors made with cores **OR** veneers **OR** not less than 70 percent of wood products **OR** all wood products, **as directed**, obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
4. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure **OR** as close to neutral pressure as possible, **as directed**, according to NFPA 252 **OR** IBC Standard 716.5 **OR** UL 10B **OR** UL 10C, **as directed**.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

- b. Temperature-Rise Limit: Where indicated **OR** At vertical exit enclosures and exit passageways, **as directed**, provide doors that have a maximum transmitted temperature end point of not more than **450 deg F (250 deg C)** above ambient after 30 minutes of standard fire-test exposure.
 - 5. Preinstallation Conference: Conduct conference at Project site.
- E. Delivery, Storage, And Handling
- 1. Comply with requirements of referenced standard and manufacturer's written instructions.
 - 2. Package doors individually in plastic bags or cardboard cartons **OR** cardboard cartons and wrap bundles of doors in plastic sheeting, **as directed**.
 - 3. Mark each door on bottom **OR** top and bottom, **as directed**, rail with opening number used on Shop Drawings.
- F. Warranty
- 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Solid-Core Exterior Doors: Two **OR** Five, **as directed**, years from date of Final Completion.
 - b. Warranty Period for Solid-Core Interior Doors: Life of installation.
 - c. Warranty Period for Hollow-Core Interior Doors: One **OR** Two, **as directed**, year(s) from date of Final Completion.

1.2 PRODUCTS

- A. Door Construction, General
- 1. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
 - 2. WDMA I.S.1-A Performance Grade:
 - a. Heavy Duty unless otherwise indicated.
 - b. Extra Heavy Duty: Classrooms, public toilets, janitor's closets, assembly spaces, exits, patient rooms, and where indicated.
 - c. Standard Duty: Closets (not including janitor's closets), private toilets, and where indicated.
 - 3. Particleboard-Core Doors:
 - a. Particleboard:
 - 1) ANSI A208.1, Grade LD-1 **OR** Grade LD-2, **as directed**, made with binder containing no urea-formaldehyde resin, **as directed**.
 - OR**
 - Straw-based particleboard complying with ANSI A208.1, Grade LD-2 or M-2, except for density.
 - b. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
 - c. Provide doors with glued-wood-stave **OR** structural-composite-lumber, **as directed**, cores instead of particleboard cores for doors indicated to receive exit devices.
 - 4. Structural-Composite-Lumber-Core Doors:
 - a. Structural Composite Lumber: WDMA I.S.10.
 - 1) Screw Withdrawal, Face: **700 lbf (3100 N)**.
 - 2) Screw Withdrawal, Edge: **400 lbf (1780 N)**.
 - 5. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - a. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.

- f. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions, **as directed**.
 - g. Room Match:
 - 1) Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by **10 feet (3 m) OR 20 feet (6 m), as directed**, or more.
OR
Provide door faces of compatible color and grain within each separate room or area of building.
 - h. Transom Match: Continuous match **OR** End match **OR** As indicated, **as directed**.
 - i. Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling. Comply with requirements in Division 06 Section(s) "Interior Architectural Woodwork" **OR** "Wood Paneling", **as directed**.
 - j. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Same species as faces or a compatible species **OR** Same species as faces **OR** Applied wood-veneer edges of same species as faces and covering edges of faces **OR** Applied wood edges of same species as faces and covering edges of crossbands, **as directed**.
 - k. Core: Particleboard **OR** Glued wood stave **OR** Nonglued wood stave **OR** Structural composite lumber, **as directed**.
 - l. Construction:
 - 1) Five **OR** Five or seven, **as directed**, plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press, **as directed**.
OR
Seven plies, either bonded or nonbonded construction.
3. Interior Hollow-Core Doors:
- a. Grade: Premium, with Grade AA faces **OR** Premium, with Grade A faces **OR** Custom (Grade A faces) **OR** Economy (Grade B faces), **as directed**.
 - b. Species: Anigre **OR** Select white ash **OR** Figured select white ash **OR** Select white birch **OR** Cherry **OR** Select red gum **OR** Figured select red gum **OR** Select white maple **OR** Red oak **OR** Persimmon **OR** Sapele **OR** Sycamore **OR** Walnut **OR** White oak **OR** Ucuuba (Virola Duckei) **OR** Cupiuba (Goupia glabra), **as directed**.
 - c. Cut: Rotary cut **OR** Plain sliced (flat sliced) **OR** Quarter sliced **OR** Rift cut, **as directed**.
 - d. Match between Veneer Leaves: Book **OR** Slip **OR** Pleasing, **as directed**, match.
 - e. Assembly of Veneer Leaves on Door Faces: Center-balance **OR** Balance **OR** Running, **as directed**, match.
 - f. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions, **as directed**.
 - g. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Same species as faces or a compatible species **OR** Same species as faces **OR** Applied wood-veneer edges of same species as faces and covering edges of faces **OR** Applied wood edges of same species as faces and covering edges of crossbands, **as directed**.
 - h. Construction: Seven plies.
- C. Doors For Opaque Finish
- 1. Exterior Solid-Core Doors:
 - a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. Faces: Medium-density overlay **OR** Any closed-grain hardwood of mill option, **as directed**.
 - 1) Apply medium-density overlay to standard-thickness, closed-grain, hardwood face veneers **OR** directly to high-density hardboard crossbands, **as directed**.
 - c. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Any closed-grain hardwood.
 - d. Core: Particleboard **OR** Glued wood stave **OR** Structural composite lumber, **as directed**.

- e. Construction: Five **OR** Five or seven, **as directed**, plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press, **as directed**.
- f. Adhesives: Type I per WDMA TM-6.
- 2. Interior Solid-Core Doors:
 - a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. Faces: Medium-density overlay **OR** Any closed-grain hardwood of mill option **OR** Hardboard or MDF, **as directed**.
 - 1) Apply medium-density overlay to standard-thickness, closed-grain, hardwood face veneers **OR** directly to high-density hardboard crossbands, **as directed**.
 - 2) Hardboard Faces: AHA A135.4, Class 1 (tempered) or Class 2 (standard).
 - 3) MDF Faces: ANSI A208.2, Grade 150 or 160.
 - c. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Any closed-grain hardwood.
 - d. Core: Particleboard **OR** Glued wood stave **OR** Nonglued wood stave **OR** Structural composite lumber, **as directed**.
 - e. Construction:
 - 1) Three **OR** Five **OR** Five or seven, **as directed**, plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press, **as directed**.
OR
Three **OR** Seven, **as directed**, plies, either bonded or nonbonded construction.
- 3. Interior Hollow-Core Doors:
 - a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. Faces: Medium-density overlay **OR** Any closed-grain hardwood of mill option **OR** Hardboard or MDF, **as directed**.
 - 1) Hardboard Faces: AHA A135.4, Class 1 (tempered) or Class 2 (standard).
 - 2) MDF Faces: ANSI A208.2, Grade 150 or 160.
 - c. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Any closed-grain hardwood.
 - d. Construction: Three **OR** Seven, **as directed**, plies.
- D. Plastic-Laminate-Faced Doors
 - 1. Interior Solid-Core Doors:
 - a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS **OR** Grade HSH, **as directed**.
 - c. Colors, Patterns, and Finishes: As indicated **OR** As selected from laminate manufacturer's full range of products, **as directed**.
 - d. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Hardwood edges for staining to match faces **OR** Hardwood edges for painting **OR** Plastic laminate that matches faces, applied before faces **OR** Impact-resistant polymer edging, applied after faces, **as directed**.
 - 1) Polymer Edging Color: Beige **OR** Brown **OR** Same color as faces, **as directed**.
 - e. Core: Particleboard **OR** Glued wood stave **OR** Structural composite lumber, **as directed**.
 - f. Construction:
 - 1) Three plies. Stiles and rails are bonded to core, then entire unit abrasive planed before faces are applied. Faces are bonded to core using a hot press, **as directed**.
OR
Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press, **as directed**.
 - 2. Interior Hollow-Core Doors:
 - a. Grade: Premium **OR** Custom **OR** Economy, **as directed**.
 - b. Plastic-Laminate Faces: High-pressure decorative laminates complying with NEMA LD 3, Grade HGS **OR** Grade HSH, **as directed**.
 - c. Colors, Patterns, and Finishes: As indicated **OR** As selected from laminate manufacturer's full range of products, **as directed**.

- d. Exposed Vertical **OR** Vertical and Top, **as directed**, Edges: Hardwood edges for staining to match faces **OR** Hardwood edges for painting **OR** Plastic laminate that matches faces, applied before faces **OR** Impact-resistant polymer edging, applied after faces, **as directed**.
 - 1) Polymer Edging Color: Beige **OR** Brown **OR** Same color as faces, **as directed**.
 - e. Construction: Plastic-laminate faces glued directly to core.
- E. Louvers And Light Frames
- 1. Wood Louvers: Door manufacturer's standard solid-wood louvers unless otherwise indicated.
 - a. Wood Species: Same species as door faces **OR** Species compatible with door faces **OR** Any closed-grain hardwood, **as directed**.
 - 2. Metal Louvers:
 - a. Blade Type: Vision-proof, inverted V **OR** Vision-proof, inverted Y **OR** Darkroom-type, double inverted V, **as directed**.
 - b. Metal and Finish:
 - 1) Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish **OR** with baked-enamel- or powder-coated finish, **as directed**.
OR
Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.
OR
Extruded aluminum with light bronze **OR** medium bronze **OR** dark bronze **OR** black, **as directed**, Class II, color anodic finish, AA-M12C22A32/A34.
 - 3. Louvers for Fire-Rated Doors: Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less.
 - a. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish **OR** with baked-enamel- or powder-coated finish, **as directed**.
 - 4. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.
 - a. Wood Species: Same species as door faces **OR** Species compatible with door faces **OR** Any closed-grain hardwood, **as directed**.
 - b. Profile: Flush rectangular beads **OR** Recessed tapered beads **OR** Recessed tapered beads with exposed banding **OR** Lipped tapered beads **OR** Manufacturer's standard shape, **as directed**.
 - c. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
 - 5. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
 - 6. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint finish **OR** with baked-enamel- or powder-coated finish, **as directed**; and approved for use in doors of fire-protection rating indicated.
- F. Fabrication
- 1. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - a. Comply with requirements in NFPA 80 for fire-rated doors.
 - 2. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - a. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - b. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

3. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - a. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, **as directed**, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
 4. Openings: Cut and trim openings through doors in factory.
 - a. Light Openings: Trim openings with moldings of material and profile indicated.
 - b. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing".
 - c. Louvers: Factory install louvers in prepared openings.
 5. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before shop priming **OR** factory finishing, **as directed**.
 - a. Flash top of outswinging doors (with manufacturer's standard metal flashing).
- G. Shop Priming
1. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section(s) "Exterior Painting" OR "Interior Painting", **as directed**. Seal all four edges, edges of cutouts, and mortises with primer.
 2. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section(s) "Exterior Painting" OR "Interior Painting" OR "Staining And Transparent Finishing", **as directed**. Seal all four edges, edges of cutouts, and mortises with first coat of finish.
- H. Factory Finishing
1. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - a. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom **OR** top and bottom, **as directed**, edges, edges of cutouts, and mortises.
 2. Finish doors at factory.
OR
Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.
OR
Finish doors at factory where indicated in schedules or on Drawings as factory finished.
 3. Transparent Finish:
 - a. Grade: Premium **OR** Custom, **as directed**.
 - b. Finish:
 - 1) AWI conversion varnish **OR** catalyzed polyurethane, **as directed**, system.
OR
WDMA TR-4 conversion varnish **OR** TR-6 catalyzed polyurethane, **as directed**.
OR
WI System 4 clear conversion varnish **OR** 5 catalyzed polyurethane **OR** 8 UV-curable coating, **as directed**.
 - c. Staining: Match sample **OR** As selected from manufacturer's full range **OR** None required, **as directed**.
 - d. Effect: Open-grain finish **OR** Filled finish **OR** Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores, **as directed**.
 - e. Sheen: Satin **OR** Semigloss, **as directed**.
 4. Opaque Finish:
 - a. Grade: Premium **OR** Custom, **as directed**.
 - b. Finish:
 - 1) AWI conversion varnish **OR** catalyzed polyurethane, **as directed**, system.
OR
WDMA OP-4 conversion varnish **OR** OP-6 catalyzed polyurethane, **as directed**.

OR

WI System 4 conversion varnish **OR** 5 catalyzed polyurethane **OR** 8 UV-curable coating, **as directed**.

- c. Color: Match sample **OR** As selected from manufacturer's full range, **as directed**.
- d. Sheen: Satin **OR** Semigloss **OR** Gloss, **as directed**.

1.3 EXECUTION

A. Installation

- 1. Hardware: For installation, see Division 08 Section "Door Hardware".
- 2. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - a. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- 3. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - a. Clearances: Provide **1/8 inch (3.2 mm)** at heads, jambs, and between pairs of doors. Provide **1/8 inch (3.2 mm)** from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide **1/4 inch (6.4 mm)** from bottom of door to top of threshold unless otherwise indicated.
 - 1) Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock and hinge edges.
 - c. Bevel fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- 4. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- 5. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

B. Adjusting

- 1. Operation: Rehang or replace doors that do not swing or operate freely.
- 2. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16 00

SECTION 08 14 16 00a - STILE AND RAIL WOOD DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for stile and rail wood doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Exterior stile and rail wood doors and sidelites.
 - b. Interior stile and rail wood doors.
 - c. Interior fire-rated, stile and rail wood doors.
 - d. Interior fire-rated, wood door and sidelite frames.
 - e. Priming and Finishing stile and rail wood doors.
 - f. Fitting stile and rail wood doors to frames and machining for hardware.
 - g. Prehanging doors in frames.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood used for stile and rail wood doors complies with forest certification requirements.
 - 1) Include statement indicating costs for each certified wood product.
 - b. Product Data for Credit EQ 4.4: For adhesives and composite wood materials, documentation indicating that products contain no urea formaldehyde.
3. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and other pertinent data.
4. Samples: Representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.

D. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
2. Forest Certification: Provide doors made with veneers **OR** not less than 70 percent of wood products **OR** all wood products, **as directed**, obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
3. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure **OR** as close to neutral pressure as possible, **as directed**, according to NFPA 252 **OR** IBC Standard 716.5 **OR** UL 10B **OR** UL 10C, **as directed**.
 - a. Temperature-Rise Limit: Where indicated **OR** At vertical exit enclosures and exit passageways, **as directed**, provide doors that have a maximum transmitted temperature end point of not more than **450 deg F (250 deg C)** above ambient after 30 minutes of standard fire-test exposure.
4. Safety Glass: Provide products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

E. Delivery, Storage, And Handling

1. Comply with manufacturer's written instructions and requirements of quality standard referenced in Part 1.2.

2. Package doors individually in opaque plastic bags or cardboard cartons.
3. Mark each door on top and bottom edge with opening number used on Shop Drawings.

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than **1/4 inch (6.4 mm)** in a **42-by-84-inch (1067-by-2134-mm)** section.
 - a. Warranty shall be in effect during the following period of time from date of Final Completion:
 - 1) Exterior Doors: None **OR** One year **OR** Two years **OR** Five years, **as directed**.
 - 2) Interior Doors: One year **OR** Five years **OR** Life of installation, **as directed**.
 - 3) Insulated **OR** Insulating Leaded, **as directed**, Glass Vision Panels: Three **OR** Five, **as directed**, years.

1.2 PRODUCTS

A. Materials

1. General: Use only materials that comply with referenced standards and other requirements specified.
 - a. Assemble exterior doors and sidelites, including components, with wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.
 - b. Assemble interior doors, frames, and sidelites, including components, with either dry-use or wet-use adhesives complying with ASTM D 5572 for finger joints and with ASTM D 5751 for joints other than finger joints.
2. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea-formaldehyde resins.
3. Panel Products: Any of the following:
 - a. Particleboard made from wood particles, with binder containing no urea-formaldehyde resin, complying with ANSI A208.1, Grade M-2.
OR
Particleboard made from straw, complying with ANSI A208.1, Grade M-2, except for density.
 - b. Medium-density fiberboard made from wood fiber, with binder containing no urea-formaldehyde resin, complying with ANSI A208.2, Grade 130.
 - c. Hardboard, complying with AHA A135.4.
 - d. Veneer core plywood, made with adhesive containing no urea-formaldehyde resin.

B. Exterior Stile And Rail Wood Doors

1. Exterior Stile and Rail Wood Doors: Stock exterior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and with other requirements specified.
 - a. Finish and Grade: Transparent and Premium or Select **OR** Opaque and Standard, **as directed**.
 - b. Wood Species: Idaho white, lodgepole, ponderosa, or sugar pine **OR** Manufacturer's standard softwood species and cut, **as directed**.
 - c. Stile and Rail Construction: Edge-glued solid lumber **OR** veneered, structural composite lumber **OR** veneered edge- and end-glued lumber, **as directed**.
 - d. Panel Construction: Edge-glued solid lumber **OR** veneered panel product, **as directed**.
 - e. Raised-Panel Thickness: Manufacturer's standard, but not less than that required by WDMA I.S.6 for design group indicated **OR** As indicated, **as directed**.
 - f. Molding Profile (Sticking): Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed**.
 - g. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick **OR** laminated glass made from two lites of 3.0-mm-thick annealed glass **OR** insulating-glass units made from two

- lites of 3.0-mm-thick, fully tempered glass with 1/4-inch (6.4-mm) interspace, **as directed**, complying with Division 08 Section "Glazing".
- h. WDMA Design Group: 1-3/4 Front Entrance Doors (Exterior) **OR** 1-3/4 Thermal (Insulated-Glass) Doors (Exterior) **OR** 8'-0" High Doors **OR** Side Lights **OR** 1-3/4 and 1-3/8 Entrance Doors (Exterior) **OR** Combination Doors **OR** Screen Doors, **as directed**.
 - i. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6 and grade specified. Include panel design number if applicable.
2. Exterior Stile and Rail Wood Doors: Stock **OR** Custom, **as directed**, exterior doors complying with AWI's "Architectural Woodwork Quality Standards," **OR** WI's "Manual of Millwork," **OR** WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," **as directed**, and with other requirements specified.
- a. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
 - b. Grade: Premium **OR** Custom, **as directed**.
 - c. Finish: Transparent **OR** Opaque, **as directed**.
 - d. Wood Species and Cut for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced **OR** Douglas fir or western hemlock, quarter sawed/sliced (vertical grain) **OR** Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels **OR** Species indicated in schedule, plain sawed/sliced, **as directed**.
 - e. Door Construction for Transparent Finish:
 - 1) Stile and Rail Construction:
 - a) Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
OR
Veneered, structural composite lumber or veneered, edge- and end-glued clear lumber, **as directed**. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces. Use veneers not less than 1/16 inch (1.6 mm) thick, **as directed**.
 - 2) Raised-Panel Construction:
 - a) Clear lumber; edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
OR
Edge-glued, clear lumber; glued to both sides of a wood-based panel product. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
OR
Veneered, wood-based panel product with mitered, raised rims made from matching clear lumber.
OR
Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
 - f. Door Construction for Opaque Finish:
 - 1) Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
OR
Stile and Rail Construction: Veneered, structural composite lumber or veneered edge- and end-glued lumber, **as directed**.
 - 2) Raised-Panel Construction: Clear softwood lumber; edge glued for width.
OR
Raised-Panel Construction: Veneered, wood-based panel product.
 - g. Stile and Rail Widths: As indicated **OR** Manufacturer's standard, but not less than the following, **as directed**:
 - 1) Stiles, Top and Intermediate Rails: 5-3/8 inches (137 mm).
 - 2) Bottom Rails: 11-3/8 inches (289 mm).

- h. Raised-Panel Thickness: As indicated **OR 1-3/4 inches (44 mm) OR 1-3/8 inches (35 mm) OR** Manufacturer's standard, but not less than **1-1/8 inches (29 mm), as directed.**
 - i. Molding Profile (Sticking): Bead and cove **OR** Ogee **OR** Ovalo **OR** Recessed bevel **OR** Recessed square **OR** Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed.**
 - j. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick **OR** laminated glass made from two lites of 3.0-mm-thick annealed glass **OR** insulating-glass units made from two lites of 3.0-mm-thick, fully tempered glass with **1/4-inch (6.4-mm)** interspace, **as directed,** complying with Division 08 Section "Glazing".
 - k. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
OR
Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
 - l. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.
- C. Interior Stile And Rail Wood Doors
1. Interior Stile and Rail Wood Doors: Stock interior doors complying with WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," and with other requirements specified.
 - a. Finish and Grade: Transparent and Premium or Select **OR** Opaque and Standard, **as directed.**
 - b. Wood Species: Idaho white, lodgepole, ponderosa, or sugar pine **OR** Douglas fir or western hemlock, vertical sawed/sliced **OR** Red oak, quarter sawed/sliced **OR** Manufacturer's standard softwood species and cut, **as directed.**
 - c. Stile and Rail Construction: Edge-glued solid lumber **OR** veneered, structural composite lumber **OR** veneered edge- and end-glued lumber, **as directed.**
 - d. Raised-Panel Construction: Edge-glued solid lumber **OR** Veneered panel product **OR** shaped, medium-density fiberboard, **as directed.**
 - e. Flat-Panel Construction: Veneered panel product **OR** hardboard or medium-density fiberboard, **as directed.**
 - f. Raised-Panel Thickness: Manufacturer's standard, but not less than that required by WDMA I.S.6 for design group indicated **OR** As indicated, **as directed.**
 - g. Flat-Panel Thickness: Manufacturer's standard, but not less than that required by WDMA I.S.6 for design group indicated **OR** As indicated, **as directed.**
 - h. Molding Profile (Sticking): Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed.**
 - i. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick **OR** laminated glass made from two lites of 3.0-mm-thick annealed glass, **as directed,** complying with Division 08 Section "Glazing".
 - j. WDMA Design Group: 1-3/8 Interior Panel Doors **OR** French Doors **OR** 8'-0" High Doors **OR** Bifold Doors, **as directed.**
 - k. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6 and grade specified. Include panel design number if applicable.
 2. Interior Stile and Rail Wood Doors: Stock **OR** Custom, **as directed,** interior doors complying with AWI's "Architectural Woodwork Quality Standards," **OR** WI's "Manual of Millwork," **OR** WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," **as directed,** and with other requirements specified.
 - a. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
 - b. Grade: Premium **OR** Custom, **as directed.**
 - c. Finish: Transparent **OR** Opaque, **as directed.**
 - d. Wood Species and Cut for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced **OR** Douglas fir or western hemlock, quarter sawed/sliced

- (vertical grain) **OR** Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels **OR** Species indicated in schedule, plain sawed/sliced, **as directed**.
- e. Door Construction for Transparent Finish:
- 1) Stile and Rail Construction: Clear lumber; may be edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
OR
Stile and Rail Construction: Veneered, structural composite lumber **OR** veneered, edge- and end-glued clear lumber, **as directed**. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces. Use veneers not less than **1/16 inch (1.6 mm)** thick, **as directed**.
 - 2) Raised-Panel Construction: Clear lumber; edge glued for width. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
OR
Raised-Panel Construction: Edge-glued, clear lumber; glued to both sides of a wood-based panel product. Select lumber for similarity of grain and color, and arrange for optimum match between adjacent pieces.
OR
Raised-Panel Construction: Veneered, wood-based panel product with mitered, raised rims made from matching clear lumber.
OR
Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
 - 3) Flat-Panel Construction: Veneered, wood-based panel product.
- f. Door Construction for Opaque Finish:
- 1) Stile and Rail Construction: Clear softwood; may be edge glued for width and finger jointed.
OR
Stile and Rail Construction: Veneered, structural composite lumber **OR** veneered edge- and end-glued lumber, **as directed**.
 - 2) Raised-Panel Construction: Clear softwood lumber; edge glued for width.
OR
Raised-Panel Construction: Shaped, medium-density fiberboard.
 - 3) Flat-Panel Construction: Veneered, wood-based panel product **OR** Medium-density fiberboard, **as directed**.
- g. Stile and Rail Widths: As indicated **OR** Manufacturer's standard, but not less than the following, **as directed**:
- 1) Stiles, Top and Intermediate Rails: **4-1/2 inches (114 mm)**.
 - 2) Bottom Rails: **9 inches (229 mm)**.
- h. Raised-Panel Thickness: As indicated **OR** **1-3/4 inches (44 mm)** **OR** **1-3/8 inches (35 mm)** **OR** Manufacturer's standard, but not less than **1-1/8 inches (29 mm)** **OR** Manufacturer's standard, but not less than **3/4 inch (19 mm)**, **as directed**.
- i. Flat-Panel Thickness: As indicated **OR** **1/2 inch (13 mm)** **OR** **3/8 inch (10 mm)** **OR** **1/4 inch (6.4 mm)**, **as directed**.
- j. Molding Profile (Sticking): Bead and cove **OR** Ogee **OR** Ovalo **OR** Recessed bevel **OR** Recessed square **OR** Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed**.
- k. Glass: Uncoated, clear, fully tempered float glass, 5.0 mm thick **OR** laminated glass made from two lites of 3.0-mm-thick annealed glass, **as directed**, complying with Division 08 Section "Glazing".
- l. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
OR
Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.

- m. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.
3. Interior Stile and Rail Wood Doors: Fire-rated (20-minute rating) doors complying with AWI's "Architectural Woodwork Quality Standards," **OR** WI's "Manual of Millwork," **OR** WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," **as directed**, and with other requirements specified.
- a. Panel Designs: Indicated by Drawings. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
 - b. Grade: Premium **OR** Custom, **as directed**.
 - c. Finish: Transparent **OR** Opaque, **as directed**.
 - d. Wood Species and Cut for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced **OR** Douglas fir or western hemlock, quarter sawed/sliced (vertical grain) **OR** Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels **OR** Species indicated in schedule, plain sawed/sliced, **as directed**.
 - e. Door Construction for Transparent Finish: **1-3/4-inch- (44-mm-)** thick stiles and rails and veneered flat panels not less than **5/8 inch (16 mm)** thick **OR** raised panels not less than **1-1/8 inches (29 mm)** thick, **as directed**.
 - 1) Stile and Rail Construction: Veneered, structural composite lumber **OR** veneered, edge- and end-glued clear lumber, **as directed**. Select veneers for similarity of grain and color, and arrange for optimum match between adjacent pieces. Use veneers not less than **1/16 inch (1.6 mm)** thick, **as directed**.
 - 2) Raised-Panel Construction: Veneered, shaped, wood-based panel product with veneer conforming to raised-panel shape.
 - 3) Flat-Panel Construction: Veneered, wood-based panel product.
 - f. Door Construction for Opaque Finish: **1-3/4-inch- (44-mm-)** thick stiles and rails and veneered flat panels not less than **5/8 inch (16 mm)** thick **OR** raised panels not less than **1-1/8 inches (29 mm)** thick, **as directed**.
 - 1) Stile and Rail Construction: Veneered, structural composite lumber **OR** veneered edge- and end-glued lumber, **as directed**.
 - 2) Raised-Panel Construction: Shaped, medium-density fiberboard.
 - 3) Flat-Panel Construction: Veneered, wood-based panel product **OR** Medium-density fiberboard, **as directed**.
 - g. Stile and Rail Widths: As indicated **OR** Manufacturer's standard, but not less than the following, **as directed**:
 - 1) Stiles, Top and Intermediate Rails: **4-1/2 inches (114 mm)**.
 - 2) Bottom Rails: **9 inches (229 mm)**.
 - h. Molding Profile (Sticking): Bead and cove **OR** Ogee **OR** Ovalo **OR** Recessed bevel **OR** Recessed square **OR** Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed**.
 - i. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
OR
Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
 - j. Mark, label, or otherwise identify stile and rail wood doors as complying with WDMA I.S.6A and grade specified.
4. Interior Stile and Rail Wood Doors: Fire-rated (45-minute rating) doors complying with AWI's "Architectural Woodwork Quality Standards," **OR** WI's "Manual of Millwork," **as directed**, and with other requirements specified.
- a. Panel Designs: Indicate by Drawings. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
 - b. Grade: Premium **OR** Custom, **as directed**.
 - c. Finish: Transparent **OR** Opaque, **as directed**.

- d. Wood Species and Cut for Transparent Finish: Idaho white, lodgepole, ponderosa, or sugar pine, plain sawed/sliced **OR** Douglas fir or western hemlock, quarter sawed/sliced (vertical grain) **OR** Red oak, quarter sawed/sliced stiles and rails, plain sawed/sliced panels **OR** Species indicated in schedule, plain sawed/sliced, **as directed**.
 - e. Interior Fire-Rated Door Construction: **1-3/4-inch- (44-mm-)** thick, edged and veneered mineral-core stiles and rails and **1-1/8-inch- (29-mm-)** thick, veneered mineral-core raised panels.
 - f. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: **550 lbf (2440 N) OR 475 lbf (2110 N) OR 400 lbf (1780 N), as directed**, per NWWDA T.M.-10.
 - g. Stile and Rail Widths: As indicated **OR** Manufacturer's standard, but not less than the following, **as directed**:
 - 1) Stiles, Top and Intermediate Rails: **4-1/2 inches (114 mm)**.
 - 2) Bottom Rails: **9 inches (229 mm)**.
 - h. Molding Profile (Sticking): Bead and cove **OR** Ogee **OR** Ovalo **OR** Recessed bevel **OR** Recessed square **OR** Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed**.
 - i. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
OR
Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
- D. Interior Fire-Rated Wood Door Frames
1. Interior Fire-Rated Wood Door Frames: Frames, complete with casings **OR** sidelite frames and casings, **as directed**, fabricated from solid fire-retardant-treated wood or from veneered fire-retardant particleboard, fire-retardant medium-density fiberboard, or mineral board.
 2. Species: Red oak **OR** White oak **OR** White maple **OR** Cherry, **as directed**.
- E. Stile And Rail Wood Door Fabrication
1. Fabricate stile and rail wood doors in sizes indicated for field fitting.
 2. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels unless otherwise indicated:
 - a. Clearances: Provide **1/8 inch (3 mm)** at heads, jambs, and between pairs of doors. Provide **1/2 inch (13 mm)** from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide not more than **3/8 inch (10 mm)** from bottom of door to top of threshold.
 - 1) Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock and hinge edges.
 - c. Bevel fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** on lock edge; trim stiles and rails only to extent permitted by labeling agency.
 3. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W Series standards, and hardware templates.
 4. Glazed Openings: Trim openings indicated for glazing with solid wood moldings, with one side removable. Miter wood moldings at corner joints.
OR
Glazed Openings: Glaze doors at factory with glass of type and thickness indicated, complying with Division 08 Section "Glazing". Install glass using manufacturer's standard elastomeric glazing sealant complying with ASTM C 920. Secure glass in place with removable wood moldings. Miter wood moldings at corner joints.
 5. Transom and Side Panels: Fabricate panels to match adjoining doors in materials, finish, and quality of construction.

6. Exterior Doors: Factory treat exterior doors after fabrication with water-repellent preservative to comply with WDMA I.S.4. Flash top of outswinging doors with manufacturer's standard metal flashing.
 7. Prehung Doors: Provide stile and rail doors as prehung units including doors, frames, weather stripping, **as directed**, and hardware.
 - a. Provide wood door frames, other than fire-rated wood door frames, that comply with Division 06 Section(s) "Interior Finish Carpentry" OR "Interior Architectural Woodwork", **as directed**.
 - b. Provide hardware, including weather stripping and thresholds, that complies with Division 08 Section "Door Hardware".
- F. Shop Priming
1. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section(s) "Exterior Painting" OR "Interior Painting", **as directed**. Seal all four edges, edges of cutouts, and mortises with primer.
 2. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "Staining And Transparent Finishing". Seal all four edges, edges of cutouts, and mortises with first coat of finish.
- G. Finishing
1. Finish wood doors at factory **OR** woodworking shop, **as directed**.
OR
Finish wood doors at factory **OR** woodworking shop, **as directed**, that are indicated to receive transparent finish. Wood doors that are indicated to receive opaque finish may be field finished.
OR
Finish wood doors at factory **OR** woodworking shop, **as directed**, where indicated in schedules or on Drawings. Wood doors that are not indicated to be factory **OR** shop, **as directed**, finished may be field finished.
 2. For doors indicated to be factory **OR** shop, **as directed**, finished, comply with AWI's "Architectural Woodwork Quality Standards," **OR** WI's "Manual of Millwork," **OR** WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," **as directed**, and with other requirements specified.
 - a. Finish faces and all four edges of doors, including mortises and cutouts. Stains and fillers may be omitted on bottom **OR** top and bottom, **as directed**, edges, edges of cutouts, and mortises.
 3. Transparent Finish:
 - a. Grade: Premium **OR** Custom, **as directed**.
 - b. Finish: AWI conversion varnish **OR** AWI catalyzed polyurethane, **as directed**, system.
OR
Finish: WDMA TR-4 conversion varnish **OR** WDMA TR-6 catalyzed polyurethane, **as directed**.
OR
Finish: WI System 4 clear conversion varnish **OR** WI System 5 catalyzed polyurethane **OR** WI System 8 UV-curable coating, **as directed**.
 - c. Staining: Match sample **OR** As selected from manufacturer's full range **OR** None required, **as directed**.
 - d. Effect: Open-grain finish **OR** Filled finish **OR** Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores, **as directed**.
 - e. Sheen: Satin **OR** Semigloss, **as directed**.
 4. Opaque Finish:
 - a. Grade: Premium **OR** Custom, **as directed**.
 - b. Finish: AWI conversion varnish **OR** AWI catalyzed polyurethane, **as directed**, system.
OR
Finish: WDMA OP-4 conversion varnish **OR** WDMA OP-6 catalyzed polyurethane, **as directed**.

OR

Finish: WI System 4 conversion varnish **OR** WI System 5 catalyzed polyurethane **OR** WI System 8 UV-curable coating, **as directed**.

- c. Color: Match sample **OR** As selected from manufacturer's full range, **as directed**.
- d. Sheen: Satin **OR** Semigloss **OR** Gloss, **as directed**.

1.3 EXECUTION

A. Installation

1. Install fire-rated wood door frames level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - a. Countersink fasteners, fill surface flush, and sand smooth.
2. Hardware: For installation, see Division 08 Section "Door Hardware".
3. Install wood doors to comply with manufacturer's written instructions, WDMA I.S.6, "Industry Standard for Wood Stile and Rail Doors," **OR** AWI's "Architectural Woodwork Quality Standards," **OR** WI's "Manual of Millwork," **OR** WDMA I.S.6A, "Industry Standard for Architectural Stile and Rail Doors," **as directed**, and other requirements specified.
 - a. Provide WI-Certified Compliance Certificate for Installation.
 - b. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
4. Field-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
 - a. Clearances: Provide **1/8 inch (3 mm)** at heads, jambs, and between pairs of doors. Provide **1/8 inch (3 mm) OR 1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1/2 inch (13 mm)**, **as directed**, from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide **1/4 inch (6 mm) OR 3/8 inch (10 mm)**, **as directed**, from bottom of door to top of threshold.
 - 1) Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** at lock and hinge edges.
 - c. Bevel fire-rated doors **1/8 inch in 2 inches (3-1/2 degrees)** on lock edge; trim stiles and rails only to extent permitted by labeling agency.
5. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
6. Factory-Finished **OR** Shop-Finished, **as directed**, Doors: Restore finish before installation if fitting or machining is required at Project site.

B. Adjusting

1. Operation: Rehang or replace doors that do not swing or operate freely.
2. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16 00a

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Task	Specification	Specification Description
08 14 23 16	08 14 16 00	Flush Wood Doors
08 14 23 16	08 14 16 00a	Stile And Rail Wood Doors
08 14 23 19	08 14 16 00	Flush Wood Doors
08 14 23 19	08 14 16 00a	Stile And Rail Wood Doors
08 14 66 00	01 22 16 00	No Specification Required
08 14 73 00	08 14 00 00	Wood Doors
08 14 73 00	08 14 16 00	Flush Wood Doors

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SECTION 08 16 13 00 - FIBERGLASS REINFORCED PLASTIC (FRP) DOORS AND FRAMES

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for fiberglass reinforced plastic (FRP) doors and frames. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Fire Rated Fiberglass reinforced Plastic (FRP) Doors certified by Intertek Testing Services for Warnock- Hersey in 45, 60 and 90-minute ratings, meeting all specifications of UL 10(c) fire door test standards. Category A and B.
 - 1) Category A doors are labeled for compliance with IBC Standard (Positive Pressure) and do not require the application of an additional edge sealing system.
 - 2) Category B doors are labeled to require the installation of a listed edge sealing system to meet the requirements of IBC Standard (Positive Pressure). This seal must be installed per the manufacturers instructions and may be factory or field applied.
 - 3) Category B constructed doors, if requested and with certain restrictions, may be provided with an UL 10 (b) label (Negative Pressure) and at a later date can be upgraded to a UL 10 (c) category B label (Positive Pressure) with the application of a listed seal system.
 - b. Fire Rated Fiberglass Resin Transfer Molded Door Frames certified by Intertek Testing Services for Warnock- Hersey in 45, 60 and 90-minute ratings, meeting all specifications of UL 10(c) fire door test standards, Category C.
 - c. Fire Rated Fiberglass reinforced Plastic (FRP) Doors and Fiberglass Resin Transfer Molded Door Frames certified by Intertek Testing Services for Warnock- Hersey in 20, 45, 60 and 90-minute ratings, meeting all specifications of UL 10(b) fire door test standards.

C. Quality Assurance

1. Manufacturer Qualifications: A company specialized in the manufacture of fiberglass reinforced plastic (FRP) doors and frames as specified herein with a minimum of 25 years documented experience and with a record of successful in-service performance for the applications as required for this project.
2. Installer Qualifications: An experienced installer who has completed fire rated fiberglass door and frame installations similar in material, design, and extent to those indicated and whose work has resulted in construction with a record of successful in-service performance.
3. Source Limitations: Obtain fiberglass reinforced plastic doors and frames through one source fabricated from a single manufacturer, including fire rated fiberglass frames.
4. Source Limitations: Hardware and accessories for all FRP doors as specified in Division 08 Section "Door Hardware" should be provided and installed by the fiberglass door and frame manufacturer.
5. Source Limitations: Glass for windows in doors shall be furnished and installed by door and frame manufacturer in accordance with related section, Division 08 Section "Glazing".

D. Submittals

1. Product technical data including:
 - a. Acknowledgment that products submitted meet requirements of standards referenced
 - b. Manufacturer shall provide certificate of compliance with current local and federal regulations as it applies to the manufacturing process.
 - c. Manufacturer's installation instructions.

- d. Schedule of doors and frames indicating the specific reference numbers as used on drawings, door type, frame type, size, handing and applicable hardware.
- e. Details of core and edge construction. Include factory-construction specifications.
- f. Certification of manufacturer's qualifications.
2. Submittal drawings for customer approval shall be submitted prior to manufacture and will include the following information and formatting.
 - a. Summary door schedule indicating the specific reference numbers as used on owner's drawings, with columns noting door type, frame type, size, handing, accessories and hardware.
 - b. A drawing depicting front and rear door elevations showing hardware with bill of material for each door.
 - c. Drawing showing dimensional location of each hardware item and size of each door.
 - d. Individual part drawing and specifications for each hardware item and FRP part or product.
 - e. Construction and mounting detail for each frame type.
3. Samples:
 - a. Provide one 21 x 18 inch completely assembled (hinged) door and frame corner section, with faces and edges representing typical color and finish. One edge should be exposed for view of interior door and frame composition.
4. Operation and Maintenance Manuals:
 - a. Include recommended methods and frequency for maintaining optimum condition of fiberglass doors and frames under anticipated traffic and use conditions.
 - b. Include one set of final as built drawings with the same requirements as mentioned above.
 - c. Include certificate of warranty for door and frame listing specific door registration numbers.
 - d. Include hardware data sheets and hardware manufacturer's warranties.

E. Delivery, Storage, And Handling

1. Each door and frame should be delivered individually crated for protection from damage in cardboard containers, clearly marked with project information, door location, specific reference number as shown on drawings, and shipping information. Each crate should contain all fasteners necessary for installation as well as complete installation instructions.
2. Doors should be stored in the original container out of inclement weather for protection against the elements.
3. Handle doors pursuant to the manufacturer's recommendations as posted on outside of crate.

F. Warranty

1. Warranty all fiberglass doors and frames for a period of 25 years against failure due to corrosion. Additionally, warranty all fiberglass doors and frames on materials and workmanship for a period of 10 years, including warp, separation or delamination, and expansion of the core.

1.2 PRODUCTS

A. Acceptable Manufacturers: Subject to compliance with the Contract Documents, the following manufacturers are acceptable:

1. Chem-Pruf Door Co., Ltd., P.O. Box 4560, Brownsville, Texas 78523 Phone: 1-800-444-6924, Fax: 956-544-7943, Website: www.chem-pruf.com
2. Substitutions may be considered, provided manufacturer can comply with the specifications as written herein. Requests for substitution must be submitted in writing no less than 10 days prior to bid date.

B. FRP Doors

1. Fire rated Fiberglass reinforced Plastic (FRP) Doors certified by Intertek Testing Services for Warnock-Hersey in 20, 45, 60 and 90 minute ratings meeting all specifications of UL 10(c) and UL 10(b) fire door test standards.

2. Doors shall be made of fiberglass reinforced plastic (FRP) using chemically proven fire retardant resins resistant to contaminants typically found in the environment for which these specifications are written. Doors shall be 1-3/4 inch thick and of flush construction, having no seams or cracks. All doors up to 4'-0 x 8'-0 shall have equal diagonal measurements with a maximum tolerance of +/-1/32 inch.
3. Door Plates shall be molded in one continuous piece, starting with a 25-mil gelcoat of the color specified, integrally molded with at least two layers of 1.5 ounce per square foot fiberglass. This will yield a plate ratio of 30/70 glass to resin.
4. Stiles and Rails Core shall be banded with firestop per factory drawings.
5. Core material shall be fire resistant mineral core placed within band structure allowing no voids within.
6. Finish of door and frame shall be identical in color and texture. At time of manufacture, 25 mil of resin rich gelcoat must be integrally molded into both the door and frame. Secondary painting to achieve color is not acceptable.
7. Window openings shall be provided for at time of manufacture and shall be completely sealed so that the interior of the door is not exposed to the environment. Window kits shall be fire rated per U.L. for rating of opening and function.

C. Frames

1. Frames shall be fiberglass and manufactured using the resin transfer method in closed rigid molds to assure uniformity in color and size. Beginning with a minimum 25-mil gel coat and a minimum of two layers continuous strand fiberglass mat saturated with fire retardant resin, the frame will be of one-piece construction with molded stop. All frame profiles shall have a core of firestop and mineral core. Frames must be fiberglass. Frames of dissimilar materials, such as metal or stainless steel will not be accepted.
2. Finish of frame shall be identical in color and texture to the door. 25-mil resin rich gel coat will be integrally molded into the frame at time of manufacture. Secondary painting to achieve color is not acceptable.
3. Jamb/Header connection shall be coped by CNC for tight fit.
4. Internal Reinforcement shall be continuous within the structure to allow for mounting of specified hardware.
5. Mortises for hardware shall be accurately machined by CNC to hold dimensions in all three axis.
6. Hinge pockets shall be accurately machined by CNC to facilitate heavy-duty hinges at all hinge locations, using spacers when standard weight hinges are used.

D. Hardware

1. See Division 08 Section "Door Hardware".
2. Due to the special nature of the material in this section, all related hardware as specified must be furnished and installed by the door and frame manufacturer.

1.3 EXECUTION

A. Installation Conditions

1. Verification of Conditions
 - a. Openings are correctly prepared to receive doors and frames.
 - b. Openings are correct size and depth in accordance with shop drawings or submittals.
2. Installer's Examination
 - a. Have the installer examine conditions under which construction activities of this section are to be performed and submit a written report if conditions are unacceptable.
 - b. Transmit two copies of the installer's report to the architect within 24 hours of receipt.
 - c. Beginning construction activities of this section before unacceptable conditions have been corrected is prohibited.

B. Installation

08 - Openings



1. Install door-opening assemblies in accordance with shop drawings and manufacturer's printed installation instructions, using installation methods and materials specified in installation instructions.
 2. Field alteration of doors or frames to accommodate field conditions is strictly prohibited.
 3. Site tolerances: Maintain plumb and level tolerance specified in manufacturers printed installation instructions.
 4. Fire labeled doors and frames must be installed in strict accordance with manufacturer's instructions and the latest revision of NFPA 80.
 5. UL 10 (c) Category B doors require field-applied seal per manufacture's instructions.
- C. Adjusting
1. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
 2. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions.
- D. Cleaning
1. Clean surfaces of door opening assemblies and exposed door hardware in accordance with respective manufacturer's maintenance instructions.
- E. Protection Of Installed Products
1. Protect door opening assemblies and door hardware from damage by subsequent construction activities until final inspection.

END OF SECTION 08 16 13 00

Task	Specification	Specification Description
08 16 13 00	08 01 11 61	Steel Doors And Frames
08 16 13 00	08 01 11 61a	Steel Entry Doors
08 16 13 00	08 12 13 13	Stainless Steel Doors And Frames
08 17 23 00	08 14 00 00	Wood Doors
08 17 23 00	08 14 16 00	Flush Wood Doors

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SECTION 08 18 16 00 - SLIDING ALUMINUM-FRAMED GLASS DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for sliding aluminum-framed glass doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes sliding aluminum-framed glass doors for exterior locations.

C. Performance Requirements

1. General: Provide sliding aluminum-framed glass doors capable of complying with performance requirements indicated, based on testing manufacturer's sliding doors that are representative of those specified, and that are of minimum test size indicated below:
 - a. Size required by AAMA/WDMA/CSA 101/I.S.2/A440 for gateway performance **OR** optional performance grade **OR** gateway performance for both gateway performance and optional performance grade, **as directed**.
OR
Size indicated on Drawings **OR** in a schedule, **as directed**.
2. Structural Performance: Provide sliding aluminum-framed glass doors capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA/CSA 101/I.S.2/A440, Uniform Load Structural Test:
 - a. Design Wind Loads: Determine design wind loads under conditions indicated according to ASCE/SEI 7.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s), as directed**.
 - 2) Importance Factor.
 - 3) Exposure Category: **B OR C OR D, as directed**.
 - b. Deflection Limits: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or **3/4 inch (19 mm)**, whichever is less, at design pressure based on testing performed according to AAMA/WDMA/CSA 101/I.S.2/A440, Uniform Load Deflection Test, or structural computations.
3. Windborne-Debris Resistance: Provide sliding aluminum-framed glass doors capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing sliding aluminum-frames glass doors identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 **OR** AAMA 506, **as directed**, and requirements of authorities having jurisdiction.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

D. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
2. Shop Drawings: For sliding aluminum-framed glass doors. Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and the following:
 - a. Mullion details for fenestration combinations including reinforcement and stiffeners.
 - b. Joinery details.
 - c. Expansion provisions.

- d. Flashing and drainage details.
- e. Weather-stripping details.
- f. Thermal-break details.
- g. Glazing details.
- h. Accessories.
- 3. Samples: For sliding aluminum-framed glass doors and components required, prepared on Samples of size indicated below:
 - a. Main Framing Member: **12-inch- (300-mm-)** long section with weather stripping, **as directed**, glazing bead and factory-applied color finish.
 - b. Hardware: Full-size units with factory-applied finish.
- 4. Delegated-Design Submittal: For sliding aluminum-framed glass doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation and used to determine the following:
 - a. Structural test pressures and design pressures from wind loads indicated.
 - b. Deflection limitations of glass framing systems.
- 5. Qualification Data: For qualified Installer, manufacturer, professional engineer and testing agency.
- 6. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each class, grade, and size of sliding aluminum-framed glass door. Test results based on use of downsized test doors will not be accepted, **as directed**.
- 7. Field quality-control reports.
- 8. Maintenance Data: For finishes, weather stripping, operable panels, and operating hardware to include in maintenance manuals.
- 9. Warranty: Sample of special warranty.

E. Quality Assurance

- 1. Manufacturer Qualifications: A manufacturer capable of fabricating sliding aluminum-framed glass doors that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- 2. Installer Qualifications: An installer acceptable to sliding door manufacturer for installation of units required for this Project.
 - a. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility including preparation of data for sliding aluminum-framed glass doors, including Shop Drawings and Designated-Design Submittal, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- 3. Source Limitations: Obtain sliding aluminum-framed glass doors from single source from single manufacturer.
- 4. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of sliding aluminum-framed glass doors. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.

OR

Product Options: Drawings indicate size, profiles, and dimensional requirements of sliding aluminum-framed glass doors and are based on the specific system indicated. Do not modify size and dimensional requirements.
 - a. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
- 5. Fenestration Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440, "Standard/Specification for Windows, Doors, and Unit Skylights," for minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.

- a. Provide AAMA **OR** WDMA, **as directed**, -certified, sliding aluminum-framed glass doors with an attached label.
 - 6. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201.
 - a. Subject to compliance with requirements, permanently mark safety glass with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction.
 - 7. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
 - 8. Preinstallation Conference: Conduct conference at Project site.
- F. Project Conditions
- 1. Field Measurements: Verify actual dimensions of sliding aluminum-framed glass door openings by field measurements before fabrication.
- G. Warranty
- 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sliding aluminum-framed glass doors that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure to meet performance requirements.
 - 2) Structural failures including excessive deflection.
 - 3) Water leakage or air infiltration.
 - 4) Faulty operation of movable sash and hardware.
 - 5) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 6) Deterioration of insulating glass and laminated glass as defined in Division 8 Section "Glazing."
 - b. Warranty Period:
 - 1) Sliding Door: Three **OR** Five, **as directed**, years from date of Final Completion.
 - 2) Glazing: 10 **OR** 20, **as directed**, years from date of Final Completion.
 - 3) Metal Finish: Five **OR** 10 **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Materials

- 1. Aluminum Extrusions: Provide alloy and temper recommended by sliding aluminum-framed glass door manufacturer for strength, corrosion resistance, and application of required finish. Comply with AAMA/WDMA/CSA 101/I.S.2/A440.
- 2. Fasteners: Provide fasteners of aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive for SC 3 severe service conditions and compatible with members, trim, hardware, anchors, and other components of sliding aluminum-framed glass doors. Comply with AAMA/WDMA/CSA 101/I.S.2/A440.
 - a. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- 3. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for sliding aluminum-framed glass doors, complying with ASTM B 456 or ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- 4. Reinforcing Members: Provide aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel reinforcing members that are noncorrosive for SC 3 severe service conditions and that comply with AAMA/WDMA/CSA 101/I.S.2/A440; provide sufficient strength to withstand design pressure indicated.

5. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when sliding aluminum-framed glass door is closed.
 - a. Weather-Stripping Material: Closed-cell elastomeric, preformed gaskets complying with ASTM C 509.
OR
Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
OR
Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA/CSA 101/I.S.2/A440.
6. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701.
 - a. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 702.
7. Sealant: For sealants required within fabricated sliding doors, provide sliding aluminum-framed glass door manufacturer's standard, permanently elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

B. Sliding Door

1. AAMA/WDMA/CSA Performance Requirements: Provide sliding aluminum-framed glass doors of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 unless more stringent performance requirements are indicated.
 - a. Performance Class and Grade: R15 **OR** 20 **OR** 25, **as directed**.
 - b. Performance Class and Grade: LC25 **OR** 30 **OR** 35, **as directed**.
 - c. Performance Class and Grade: C30 **OR** 35 **OR** 40, **as directed**.
 - d. Performance Class and Grade: HC40 **OR** 45 **OR** 50, **as directed**.
 - e. Performance Class and Grade: AW40 **OR** 45 **OR** 50, **as directed**.
 - f. Performance Class and Grade: As indicated.
2. Condensation Resistance: Provide sliding aluminum-framed glass doors with a minimum CRF when tested according to AAMA 1503 **OR** CR determined according to NFRC 500, **as directed**, of 45 **OR** 52, **as directed**.
3. Thermal Transmittance: Provide sliding aluminum-framed glass doors with a maximum whole fenestration product U-factor indicated, when tested according to AAMA 1503 **OR** determined according to ASTM E 1423 **OR** determined according to NFRC 100, **as directed**.
 - a. U-Factor: 0.35 **OR** 0.40 **OR** 0.65, **as directed**, **Btu/sq. ft. x h x deg F (W/sq. m x K)**.
4. Solar Heat-Gain Coefficient (SHGC): Provide sliding aluminum-framed glass doors with a whole-fenestration product SHGC maximum of 0.40 **OR** 0.55, **as directed**, determined according to NFRC 200.
5. Acoustical Performance: Provide sliding aluminum-framed glass doors with an STC **OR** OITC, **as directed**, rating of 29 **OR** 34, **as directed**, when tested according to and determined by ASTM E 90 and ASTM E 413 **OR** ASTM E 1425 and ASTM E 1332, **as directed**, respectively.
6. Air Leakage Resistance: Maximum rate not more than indicated when tested according to AAMA/WDMA/CSA 101/I.S.2/A440, Air Leakage Resistance Test.
 - a. Maximum Rate: 0.3 cfm/sq. ft. (1.5 L/s x sq. m) of area at an inward test pressure of 1.6 lbf/sq. ft. (75 Pa), [equivalent to 25-mph (11-m/s) wind speed and typically used to test R, C, LC, and HC (sliding seal units) performance classes].
OR
Maximum Rate: 0.3 cfm/sq. ft. (1.5 L/s x sq. m) of area at an inward test pressure of 6.2 lbf/sq. ft. (300 Pa), [equivalent to a 50-mph (22-m/s) wind speed and typically used to test AW (sliding seal units) performance classes].
7. Water Penetration Resistance: No water leakage as defined in the AAMA/WDMA/CSA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA/CSA 101/I.S.2/A440, Water Penetration Resistance Test.

- a. Test Pressure: 15 percent of positive design pressure, but not less than **2.9 lbf/sq. ft. (140 Pa)** or more than **12 lbf/sq. ft. (580 Pa)**, (if performance equal to minimum for all other classes set by AAMA/WDMA/CSA 101/I.S.2/A440 is required).
 - b. Test Pressure: 20 percent of positive design pressure, but not more than **12 lbf/sq. ft. (580 Pa)**, (if performance equal to minimum for AW class sliding doors set by AAMA/WDMA/CSA 101/I.S.2/A440 is required).
 8. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 842 (if AAMA/WDMA/CSA 101/I.S.2/A440 is the method selected for specifying sliding door performance).
 9. Life-Cycle Testing (for AW class sliding doors only): Tested according to and complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 10. Operating Force and Auxiliary (Durability) Tests: Tested according to and complying with AAMA/WDMA/CSA 101/I.S.2/A440.
- C. Glazing
1. Glass and Glazing System: Comply with Division 08 Section "Glazing" for safety glass, insulating-glass units, laminated glass, and glazing requirements applicable to glazed sliding aluminum-framed glass doors.
- D. Hardware
1. Comply with AAMA/WDMA/CSA 101/I.S.2/A440.
- E. Insect Screens
1. General: Design sliding aluminum-framed glass doors and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with door frame. Locate screens on the inside **OR** outside, **as directed**, of door and provide for each operable door panel. Comply with SMA 1201.
 2. Insect Screen Frames: Manufacturer's standard extruded-aluminum **OR** formed-tubular-aluminum, **as directed**, members, with mitered or coped joints, concealed fasteners, adjustable rollers, and removable PVC or PE spline/anchor concealing edge of mesh.
 - a. Finish: Anodized aluminum **OR** Baked-on organic coating, **as directed**, in manufacturer's standard color.
OR
Finish: Anodized aluminum **OR** Baked-on organic coating, **as directed**, in color selected from manufacturer's full range.
OR
Finish: Manufacturer's standard.
 3. Glass-Fiber Mesh Fabric: ASTM D 3656, 18-by-14 or 18-by-16 **OR** 20-by-20 or 20-by-30, **as directed**, count per **sq. in. (645-sq. mm)** mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration.
 - a. Mesh Color: Charcoal gray **OR** Silver gray **OR** Aquamarine, **as directed**.
 4. Aluminum Wire Fabric: 18-by-16 count per **sq. in. (645-sq. mm)** mesh of **0.011-inch- (0.28-mm-)** diameter, coated aluminum wire.
 - a. Wire-Fabric Finish: Natural bright **OR** Charcoal gray **OR** Black, **as directed**.
 5. Hardware: Extruded, cast, or wrought aluminum **OR** Die-cast zinc with special coating finish **OR** Cadmium-plated steel **OR** Zinc-plated steel **OR** Nonmagnetic stainless steel, **as directed**.
 - a. Lock: Manufacturer's standard pull and keyless locking device on each movable panel, lockable from inside only. Adjust locking device to allow unobstructed movement of panel across adjacent panel in direction indicated.
- F. Fabrication
1. Fabricate sliding aluminum-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
 2. Fabricate sliding aluminum-framed glass doors that are reglazable without dismantling panel framing.

3. Thermally Improved Construction: Fabricate sliding aluminum-framed glass doors with an integral, concealed, low-conductance thermal barrier; locate between exterior materials and door members exposed on interior side, and in a manner that eliminates direct metal-to-metal contact.
 - a. Provide thermal-break construction that has been in use for not less than three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show adequate strength and security of glass retention.
 - b. Provide thermal barriers tested according to AAMA 505; determine the allowable design shear flow per the appendix in AAMA 505.
 - c. Provide hardware with low conductivity, or provide nonmetallic material for hardware bridging thermal breaks at frame.
4. Weather Stripping: Provide operable panels with a double row of sliding weather stripping in horizontal rails and single-row **OR** double-row, **as directed**, weather stripping in meeting or jamb stiles. Provide compression-type weather stripping at the perimeter of each movable panel where sliding-type weather stripping is not appropriate.
 - a. Provide weather stripping locked into extruded grooves in door panels or frames.
5. Weep Holes: Provide weep holes and internal drainage passages to conduct infiltrating water to exterior.
6. Factory-Glazed Fabrication: Glaze sliding aluminum-framed glass doors in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440.
7. Glazing Stops: Provide snap-on glazing stops coordinated with Division 8 Section "Glazing" and with glazing system indicated. Provide glazing stops to match panel frames.

G. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

H. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
4. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
5. High-Performance Organic Finish: Three **OR** Four, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
 - a. Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.
 - b. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within **3 inches (76 mm)** of opening.
 - c. Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges or offsets at joints.
2. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.
3. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight sliding aluminum-framed glass door installation.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing doors, hardware, accessories, and other components.
2. Install sliding aluminum-framed glass doors level, plumb, square, true to line, without distortion, warp or rack of frames and panels, or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction.
3. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.
4. Install sliding aluminum-framed glass doors and components to drain condensation, water penetrating joints, and moisture migrating within doors to the exterior.
5. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E 2112, Section 5.12 "Dissimilar Materials."

C. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Tests and Inspections:
 - a. Testing Methodology: Testing of sliding aluminum-framed glass doors for air penetration resistance and water resistance will be performed according to AAMA 502, Test Method A **OR** Test Method B, **as directed**, by applying same test pressures required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - b. Testing Extent: Three sliding aluminum-framed glass doors as selected by the Owner and a qualified independent testing and inspecting agency. Sliding doors shall be tested immediately after installation.
3. Sliding aluminum-framed glass door will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports according to AAMA 502. Testing agency will interpret test results and state in each report whether tested work complies with or deviates from requirements.

D. Adjusting, Cleaning, And Protection

1. Lubricate hardware and moving parts.

2. Adjust operating panels and screens to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and a weathertight closure.
3. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
4. Clean aluminum surfaces immediately after installing sliding doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, and clean surfaces.
5. Clean glass immediately after installing sliding aluminum-framed glass doors. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
6. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
7. Protect sliding door surfaces from contact with contaminating substances resulting from construction operations. During construction, monitor sliding door surfaces adjacent to and below exterior concrete and masonry surfaces for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact sliding door surfaces, remove contaminants immediately according to manufacturer's written instructions.
8. Refinish or replace sliding aluminum-framed glass doors with damaged finishes.
9. Replace damaged components.

END OF SECTION 08 18 16 00

SECTION 08 18 16 00a - SLIDING WOOD-FRAMED GLASS DOORS

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 SUMMARY

A. Section Includes:

1. Aluminum-clad sliding wood-framed glass doors.
2. Vinyl-clad sliding wood-framed glass doors.
3. Unclad sliding wood-framed glass doors.

B. Related Requirements:

1. Section 085200 "Wood Windows" for related wood-framed transom and sidelite windows and mullions.
2. **[Section 087100 "Door Hardware"] [Section 087111 "Door Hardware (Descriptive Specification)"]** for hardware not specified in Section 083219.
3. Section 099300 "Staining and Transparent Finishing" for on-site finishing of unfinished sliding wood-framed glass doors.
4. **[Section 099113 "Exterior Painting"] [and] [Section 099123 "Interior Painting"]** for on-site finishing of **[unfinished] [and] [factory-primed]** sliding wood-framed glass doors.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.

B. Sustainable Design Submittals:

1. Chain-of-Custody Certificates: For certified wood products. Include statement of costs.

C. Shop Drawings: For sliding wood-framed glass doors.

1. Include plans, elevations, sections, and details.
2. Detail attachments to other work, and between units, if any.

3. Include hardware and required clearances.
- D. Samples: For each exposed product and for each color specified, **12-inch-long (300-mm-long)** section with weather stripping, glazing bead, and factory-applied color finish.
- E. Samples for Initial Selection: For units with factory-applied color finishes.
 1. Include Samples of hardware and accessories involving color selection.
- F. Samples for Verification: For sliding wood-framed glass doors and components required, prepared on Samples of size indicated below:
 1. Main Framing Member: **12-inch-long (300-mm-long)** section with weather stripping, glazing bead, and factory-applied color finish.
 2. Hardware: Full-size units with factory-applied finish.
- G. Product Schedule: For sliding wood-framed glass doors. **[Use same designations indicated on Drawings.]**

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **[Installer] [and] [testing agency]**.
- B. Product Test Reports: For each sliding wood-framed glass door, for tests performed by **[manufacturer and witnessed by a qualified testing agency] [a qualified testing agency]**, and for each class and performance grade indicated, tested at AAMA gateway size.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For **[finishes]** weather stripping, operable panels, and operating hardware to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to sliding wood-framed glass door manufacturer for installation of units required for this Project.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Build mockup for sliding wood-framed glass doors, as shown on Drawings.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless the Owner specifically approves such deviations in writing.

1.8 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace sliding wood-framed glass doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection.
 - c. Excessive water leakage or air infiltration.
 - d. Faulty operation of movable panels and hardware.
 - e. Deterioration of wood, metals, finishes, vinyl, and other materials beyond normal weathering.
 - f. Failure of insulating glass[**and laminated glass**].
 - g. .
 2. Warranty Period:
 - a. Sliding Door: [**Two**] [**Three**] [**Five**] years from date of Substantial Completion.
 - b. Insulating Glass: [**10**] [**20**] years from date of Substantial Completion.
 - c. Laminated Glass: [**Five**] years from date of Substantial Completion.
 - d. Metal Finish: [**Five**] [**10**] [**20**] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain sliding wood-framed glass doors from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
1. Product Certification: AAMA certified with label attached to each door.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
1. Minimum Performance Class: [**Class R**] [**Class LC**] [**Class CW**] [**As indicated on Drawings**].
 2. Minimum Performance Grade: [**Grade 15**] [**Grade 20**] [**Grade 25**] [**Grade 30**] [**Grade 35**] [**Grade 40**] [**Grade 45**] [**Grade 50**] [**As indicated on Drawings**].
- C. Thermal Transmittance: NFRC 100 maximum total fenestration product U-factor of [**0.32 Btu/sq. ft. x h x deg F (1.83 W/sq. m x K)**] [**0.54 Btu/sq. ft. x h x deg F (3.06 W/sq. m x K)**] [**0.56 Btu/sq. ft. x h x deg F (3.17 W/sq. m x K)**].
- D. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum total fenestration product SHGC of [**0.30**] [**0.27**].

- E. Sound Transmission Class (STC): Rated for not less than **[28] [32]** STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.
- F. Outside-Inside Transmission Class (OITC): Rated for not less than **[23] [27] [29]** OITC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E1332.
- G. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone **[1] [2] [3] [4]** for **[basic] [enhanced]** protection.
 - 1. Large-Missile Test: For glazing located within **[30 feet (9.1 m)]** of grade.
 - 2. Small-Missile Test: For glazing located between 30 feet (9.1 m) and **[60 feet (18.3 m)]** above grade.

2.3 ALUMINUM-CLAD SLIDING WOOD-FRAMED GLASS DOORS

- A.
- B. Exterior Surfaces: Aluminum cladding with **[manufacturer's standard baked-on enamel finish] [manufacturer's standard high-performance organic finish] [manufacturer's standard fluoropolymer two-coat system with fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight and complying with AAMA 2605]**.
 - 1. Color: **[As selected by the Owner from manufacturer's full range]**.
- C. Interior Surfaces: **[Unfinished] [Manufacturer's standard factory-applied primer] [Manufacturer's standard factory-applied color finish] [Manufacturer's standard stain-and varnish-finish]**.
 - 1. Wood Species: **[Manufacturer's standard species] [Pine] [Mahogany] [Fir] [Alder] [Oak] [Cherry]** or as directed by the Owner .
 - 2. Color: **[As selected by the Owner from manufacturer's full range]**.
- D. Frames and Door Panels: Fabricate from wood components complying with indicated requirements. Provide factory-assembled **[narrow-profile] [standard-profile] [wide-profile]** door panels and **[factory-assembled] [or] [field-assembled]** frames.
 - 1. True Divided Lites: Provide glazing with true muntins resulting in individually glazed lites, in pattern indicated.
- E. **Certified Wood**: Wood doors shall **[contain not less than 60 percent] [be made from]** certified wood tracked through a chain-of-custody process. Certified wood documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the World Trade Organization's "Technical Barriers to Trade."
- F. Wood Components: Manufacturer's standard LVL or fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than **1/32 inch (0.8 mm)** deep by **2 inches (51 mm)** wide; water-repellent preservative treated.
- G. Trim and Glazing Stops: Material and finish to match **[frame members] [cladding]**.
- H. Mullions: Provide mullions and mullion casing and cover plates as shown, matching door units, complete with anchors for support to structure and installation of sliding wood-framed glass door units. Allow for erection tolerances and provide for movement of door units due to thermal expansion and

building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of door units.

- I. Integral Nailing Fin: Aluminum nailing fins for securing frame to structure; provide sufficient strength to withstand design pressure indicated.
- J. Drip Caps: Extruded aluminum, factory fabricated and finished to match door frame; designed to direct water away from building when installed horizontally at head of sliding wood-framed glass doors.
- K. Threshold and Sill Cap/Track: Provide [**pultruded fiberglass threshold with polycarbonate track**] [**extruded-aluminum threshold and track**] [**extruded-aluminum threshold and track with nonmagnetic stainless-steel cover**] [**manufacturer's standard threshold and track**] or as directed by the Owner . of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to exterior.
 1. Color: [**Bronze**] [**Black**] [**Beige**] [**Mill finish**] [**Manufacturer's standard**].
 2. Low-Profile Floor Track: ADA-ABA compliant.

2.4 VINYL-CLAD SLIDING WOOD-FRAMED GLASS DOORS

- A.
- B. Exterior Surfaces: Vinyl-clad frames; vinyl-clad or high performance color-coated finish door panels.
 1. Color: [**As selected by the Owner from manufacturer's full range**].
- C. Interior Surfaces: [**Unfinished**] [**Manufacturer's standard factory-applied primer**] [**Manufacturer's standard factory-applied color finish**] [**Manufacturer's standard stain-and-varnish finish**].
 1. Wood Species: [**Manufacturer's standard species**] [**Pine**] [**Mahogany**] [**Fir**] [**Alder**] [**Oak**] [**Cherry**] or as directed by the Owner .
 2. Color: [**As selected by the Owner from manufacturer's full range**].
- D. Frames and Door Panels: Fabricate from wood components complying with indicated requirements. Provide factory-assembled [**narrow-profile**] [**standard-profile**] [**wide-profile**] door panels and [**factory-assembled**] [**or**] [**field-assembled**] frames.
 1. True Divided Lites: Provide glazing with true muntins resulting in individually glazed lites, in pattern indicated.
- E. **Certified Wood**: Wood doors shall [**contain not less than 60 percent**] [**be made from**] certified wood tracked through a chain-of-custody process. Certified wood documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the World Trade Organization's "Technical Barriers to Trade."
- F. Wood Components: Manufacturer's standard LVL or fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than **1/32 inch (0.8 mm)** deep by **2 inches (51 mm)** wide; water-repellent preservative treated.
- G. Trim and Glazing Stops: Material and finish to match [**frame members**] [**cladding**].
- H. Mullions: Provide mullions and mullion casing and cover plates as shown, matching door units, complete with anchors for support to structure and installation of sliding wood-framed glass door units.

Allow for erection tolerances and provide for movement of door units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of door units.

- I. Integral Nailing Fin: PVC nailing fins for securing frame to structure; provide sufficient strength to withstand design pressure indicated.
- J. Drip Caps: Extruded aluminum, factory fabricated and finished to match door frame; designed to direct water away from building when installed horizontally at head of sliding wood-framed glass doors.
- K. Threshold and Sill Cap/Track: Provide [**pultruded fiberglass threshold with polycarbonate track**] [**extruded-aluminum threshold and track**] [**extruded-aluminum threshold and track with nonmagnetic stainless-steel cover**] [**manufacturer's standard threshold and track**] or as directed by the Owner of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to exterior.
 - 1. Color: [**Bronze**] [**Black**] [**Beige**] [**Mill finish**] [**Manufacturer's standard**].
 - 2. Low-Profile Floor Track: ADA-ABA compliant.

2.5 UNCLAD SLIDING WOOD-FRAMED GLASS DOORS

- A.
- B. Exterior Surfaces: [**Manufacturer's standard factory-applied primer**] [**Manufacturer's standard factory-applied color finish**] [**Unfinished**].
 - 1. Wood Species: [**Manufacturer's standard paint-grade species**] [**Pine**] [**Mahogany**] or as directed by the Owner .
 - 2. Color: [**As selected by the Owner from manufacturer's full range**].
- C. Interior Surfaces: [**Unfinished**] [**Manufacturer's standard factory-applied primer**] [**Manufacturer's standard factory-applied color finish**] [**Manufacturer's standard stain-and-varnish finish**].
 - 1. Wood Species: [**Pine**] [**Mahogany**] [**Fir**] [**Alder**] [**Oak**] [**Cherry**] [**Manufacturer's standard paint-grade species**] or as directed by the Owner .
 - 2. Color: [**As selected by the Owner from manufacturer's full range**].
- D. Frames and Door Panels: Fabricate from wood components complying with indicated requirements. Provide factory-assembled [**narrow-profile**] [**standard-profile**] [**wide-profile**] door panels and [**factory-assembled**] [**or**] [**field-assembled**] frames.
 - 1. True Divided Lites: Provide glazing with true muntins resulting in individually glazed lites, in pattern indicated.
- E. **Certified Wood**: Wood doors shall [**contain not less than 60 percent**] [**be made from**] certified wood tracked through a chain-of-custody process. Certified wood documentation shall be provided by sources certified through a forest certification system with principles, criteria, and standards developed using ISO/IEC Guide 59 or the World Trade Organization's "Technical Barriers to Trade."
- F. Wood Components: Manufacturer's standard LVL or fine-grained wood lumber complying with AAMA/WDMA/CSA 101/I.S.2/A440; kiln dried to a moisture content of not more than 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than **1/32 inch (0.8 mm)** deep by **2 inches (51 mm)** wide; water-repellent preservative treated.

- G. Trim and Glazing Stops: Material and finish to match **[frame members]** **[cladding]**.
- H. Mullions: Provide mullions and mullion casing and cover plates as shown, matching door units, complete with anchors for support to structure and installation of sliding wood-framed glass door units. Allow for erection tolerances and provide for movement of door units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of door units.
- I. Integral Nailing Fin: **[PVC]** **[Aluminum]** nailing fins for securing frame to structure; provide sufficient strength to withstand design pressure indicated.
- J. Drip Caps: Extruded aluminum, factory fabricated and finished to match door frame; designed to direct water away from building when installed horizontally at head of sliding wood-framed glass doors.
- K. Threshold and Sill Cap/Track: Provide **[pultruded fiberglass threshold with polycarbonate track]** **[extruded-aluminum threshold and track]** **[extruded-aluminum threshold and track with nonmagnetic stainless-steel cover]** **[manufacturer's standard threshold and track]** or as directed by the Owner of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to exterior.
 - 1. Color: **[Bronze]** **[Black]** **[Beige]** **[Mill finish]** **[Manufacturer's standard]**.
 - 2. Low-Profile Floor Track: ADA-ABA compliant.

2.6 GLAZING

- A. Glass and Glazing: Manufacturer's standard glazing system that produces weathertight seal. **[Comply with requirements for windborne-debris resistance.]** or as directed by the Owner .
 - 1. Glass: ASTM C1036, Type 1, q3, Category II safety glass complying with testing requirements in 16 CFR 1201.
 - 2. Safety Glazing Labeling: Permanently mark safety glazing with certification label of **[the SGCC]** **[the SGCC or another certification agency acceptable to authorities having jurisdiction]** **[or]** **[the manufacturer]**. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
 - 3. Tint: **[Clear]** **[Gray]** **[Bronze]** **[Green]** or as directed by the Owner .
 - 4. Insulating-Glass Units: ASTM E2190[, **certified through IgCC as complying with requirements of IgCC]**.
 - a. Filling: Fill space between glass lites with **[air]** **[argon]**.
 - b. Lites: **[Two]** **[Three]**.
 - c. Low-E Coating: **[Manufacturer's standard]** **[Pyrolytic on second surface]** **[Sputtered on second surface]** **[Sputtered on third surface]** **[Sputtered on second or third surface]** or as directed by the Owner .
 - d. Integral Louver Blinds: Glass manufacturer's standard horizontal louver blinds with aluminum slats and polyester fiber cords, located in space between glass lites, and operated by hardware located on inside face of door panel.
 - 1) Operation: **[Tilt only]** **[Tilt, raising, and lowering]**.
 - 2) Color: **[As indicated by manufacturer's designations]** **[Match the Owner's sample]** **[As selected by the Owner from manufacturer's full range]**.
 - 5. Dual Glazing:
 - a. Interior Lite: **[Glass]**.
 - b. Exterior Lite: **[Glass]** **[Insulating-glass unit]**.

2.7 HARDWARE

- A. General: Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with wood **[and aluminum cladding]** complying with AAMA 907; designed to smoothly operate, tightly close, and securely lock sliding wood-framed glass doors; and sized to accommodate panel weight and dimensions.
- B. Door Pulls: Provide manufacturer's standard **[metal] [wood] [metal or wood]** pull grips.
- C. Lock: Install manufacturer's keyed cylinder lock and **[multipoint]** locking device on each movable panel, lockable from the inside **[only] [and outside]**. Adjust locking device to allow unobstructed movement of the panel across adjacent panel in the direction indicated.
 - 1. Keying System: **[All cylinders keyed alike] [Keyed to match other building entrances]** or as directed by the Owner .
- D. Security Foot Bolt: Provide security foot-operated dead bolt attached to bottom rail of movable sliding door panels to lock the panel when fully closed and when partially open to permit ventilation.
- E. Limit Stops: Resilient rubber.

2.8 INSECT SCREENS

- A. General: Design sliding wood-framed glass doors to accommodate screens in a tight-fitting, removable arrangement fully integrated with door frame. Locate screens on the **[inside] [outside]** of door and provide for each operable door panel. Comply with SMA 1201.
- B. Insect Screen Frames: Manufacturer's standard **[extruded-aluminum] [or] [formed-tubular-aluminum]** members, with mitered or coped joints, concealed fasteners, adjustable rollers, and removable PVC or PE spline/anchor concealing edge of mesh. Provide finish to match door frame.
- C. Glass-Fiber Mesh Fabric: ASTM D3656, **[18-by-14 or 18-by-16] [20-by-20 or 20-by-30]** count per **sq. in. (645-sq.-mm)** mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D3656.
 - 1. Mesh Color: **[Manufacturer's standard] [Charcoal gray] [Silver gray]**.
- D. Aluminum Wire Fabric: **18-by-16 (1.1-by-1.3-mm)** mesh of **0.011-inch-diameter (0.28-mm-diameter)** coated aluminum wire.
 - 1. Wire-Fabric Finish: **[Manufacturer's standard] [Natural bright] [Charcoal gray] [Black]**.
- E. Hardware: Manufacturer's standard noncorrosive metal.
 - 1. Lock: Manufacturer's standard pull and keyless locking device on each movable panel, lockable from inside only designed to allow unobstructed movement of panel across adjacent panel.

2.9 ACCESSORIES

- A. Grilles (False Muntins): Provide grilles in designs indicated, for removable application to inside of each panel lite.

1. Type: **[Interior, removable] [Exterior and interior, removable] [Exterior and interior, adhered to glass] [with between-glass grille]**.
 2. Material: To match adjacent finish of door panel.
 3. Design: **[Rectangular] [Diamond] [as indicated on Drawings]** or as directed by the Owner .
 4. Bar Width: Not less than **[3/4 inch (19 mm)] [7/8 inch (22 mm)] [1-1/8 inches (28 mm)]** wide.
 5. Bar Profile: **[Beveled] [Ovolo] [Square]**.
 6. Color: **[White] [Bronze] [As selected by the Owner from manufacturer's full range]**.
- B. Fasteners: Noncorrosive and compatible with door members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.
- C. Anchors, Clips, and Accessories: Provide anchors, clips, and accessories of aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron for sliding wood-framed glass doors, complying with ASTM B456 or ASTM B633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
1. Windborne-Debris Resistance: Provide anchors of same design used in windborne-debris resistance testing.

2.10 FABRICATION

- A. Fabricate sliding wood-framed glass doors in sizes indicated. Include a complete system for assembling components and anchoring doors.
- B. Fabricate sliding wood-framed glass doors that are reglazable without dismantling panel framing.
- C. Weather Stripping: Provide full-perimeter weather stripping for each door panel unless otherwise indicated.
- D. Factory-machine sliding wood-framed glass doors for openings and hardware that is not surface applied.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.
- F. Factory-Glazed Fabrication: Glaze sliding wood-framed glass doors in the factory.

2.11 WOOD FINISHES

- A. Factory-Applied Primer: Provide manufacturer's standard factory-applied prime coat complying with WDMA T.M. 11. **Specific requirements for factory-applied prime coat if any as directed by the Owner** on exposed **[exterior] [and] [interior]** wood surfaces.
- B. Factory-Applied Color Finish: Provide manufacturer's standard factory-applied finish **[complying with WDMA T.M. 12]** or as directed by the Owner . Apply finish to exposed **[exterior] [and] [interior]** wood surfaces.
 1. Color: **[White] [Brown] [Gray] [As selected by the Owner from manufacturer's full range]**.

2.12 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: **[As indicated by manufacturer's designations] [Match the Owner's sample] [As selected by the Owner from manufacturer's full range]**.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with **[AAMA 2604] [AAMA 2605]** and containing not less than **[50] [70]** percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: **[As indicated by manufacturer's designations] [Match the Owner's sample] [As selected by the Owner from manufacturer's full range]**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of threshold substrate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight sliding door installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing sliding doors, hardware, accessories, and other components.
- B. Windborne-Debris Resistance: Anchor sliding wood-framed glass doors that have been tested for windborne-debris resistance to structure using anchoring method, fastener type, and fastening frequency identical to that used in windborne-debris resistance testing.
- C. Install sliding wood-framed glass doors level, plumb, square, true to line, without distortion, without warp or rack of frames and panels, and without impeding thermal movement; anchored securely in place to structural support; and in proper relation to wall flashing, vapor retarders, air barriers, water/weather barriers, and other adjacent construction. Comply with ASTM E2112.
- D. Set sill members in bed of sealant or with gaskets, as indicated, to provide weathertight construction.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to ASTM E2112, Section 5.12, "Dissimilar Materials."

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Testing Services: Test and inspect installed sliding wood-framed glass doors as follows:
 - 1. Testing Methodology: Test sliding wood-framed glass doors for air infiltration and water resistance according to AAMA 502.
 - 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: **[1.5]** times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 - 3. Water-Resistance Testing:
 - a. Test Pressure: **[Two-thirds]** times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 - 4. Testing Extent: **[Three] [Three mockup]** or as directed by the Owner sliding wood-framed glass doors of each type as selected by the Owner and a qualified independent testing and inspecting agency. Conduct tests after perimeter sealants have cured.
 - 5. Test Reports: Prepared according to AAMA 502.
- C. Sliding wood-framed glass door will be considered defective if it does not pass tests and inspections.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Lubricate hardware and moving parts.
- B. Adjust operating panels and screens to provide a tight fit at contact points and weather stripping for smooth operation, without binding, and weathertight closure.
- C. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
- D. Clean exposed surfaces immediately after installing sliding wood-framed glass doors. Avoid damaging protective coatings and finishes. Remove nonpermanent labels, excess sealants, glazing materials, dirt, and other substances.
- E. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- F. Protect sliding wood-framed glass door surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact sliding wood-framed glass door surfaces, remove contaminants immediately according to manufacturer's written instructions.
- G. Refinish or replace sliding doors with damaged finishes.

08 - Openings



H. Replace damaged components.

END OF SECTION 08 18 16 00a

SECTION 08 31 13 00 - ACCESS DOORS AND FRAMES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for access doors and frames. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Access doors and frames for walls and ceilings.
 - b. Floor access doors and frames.

C. Submittals

1. Product Data: For each type of access door and frame indicated.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
3. Samples: For each door face material in specified finish.
4. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

D. Quality Assurance

1. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 that are identical to access door and frame assemblies tested for fire-test-response characteristics per the following test method and that are listed and labeled by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. NFPA 252 or UL 10B for vertical access doors and frames.
 - b. ASTM E 119 or UL 263 for horizontal access doors and frames.

1.2 PRODUCTS

A. Steel Materials

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - a. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - b. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
 - a. ASTM A 123/A 123M, for galvanizing steel and iron products
 - b. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
3. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
4. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS) with **A60 (ZF180)** zinc-iron-alloy (galvannealed) coating or **G60 (Z180)** mill-phosphatized zinc coating.
5. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - a. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - b. Surface Preparation for Metallic-Coated Steel Sheet: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds,

mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.

- 1) Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
 - c. Factory-Primed Finish: Apply shop primer immediately after cleaning and pretreating.
 - d. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
 - e. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**. Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
6. Drywall Beads: Edge trim formed from **0.0299-inch (0.76-mm)** zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
 7. Plaster Beads: Casing bead formed from **0.0299-inch (0.76-mm)** zinc-coated steel sheet with flange formed out of expanded metal lath and in size to suit thickness of plaster.
- B. Stainless-Steel Materials
1. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.
 2. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304 **OR** 316 **OR** Type 317LMN **OR** 904L, **as directed**. Remove tool and die marks and stretch lines or blend into finish.
 - a. Finish: Directional Satin Finish, No. 4 **OR** Manufacturer's standard, **as directed**.
- C. Aluminum Materials
1. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T6, mill finish.
 2. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6, mill finish.
 3. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**.
 - a. Mill Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
 - b. Anodic Finish: Class II, clear anodic coating complying with AAMA 611 **OR** Class I, clear anodic coating complying with AAMA 611, **as directed**.
 - c. Baked-Enamel Finish: Manufacturer's standard.
- D. Access Doors And Frames For Walls And Ceilings
1. Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
 - a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal, set flush with exposed face flange of frame.
 - c. Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal with **1-inch- (25-mm-)** **OR** **1-1/4-inch- (32-mm-)**, **as directed**, wide, surface-mounted trim.
 - d. Hinges: Spring-loaded, concealed-pin type **OR** Continuous piano, **as directed**.
 - e. Latch: Cam latch **OR** Slam latch **OR** Self-latching bolt, **as directed**, operated by screwdriver **OR** knurled knob **OR** hex head wrench **OR** pinned hex head wrench **OR** spanner head wrench **OR** flush key **OR** ring turn, **as directed**, with interior release.
 - f. Lock: Cylinder **OR** Mortise cylinder, **as directed**.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
 2. Flush Access Doors and Trimless Frames: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
 - a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal, set flush with surrounding finish surfaces.

- c. Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal with drywall **OR** plaster, **as directed**, bead flange.
 - d. Hinges: Spring-loaded, concealed-pin type **OR** Continuous piano, **as directed**.
 - e. Latch: Cam latch **OR** Slam latch **OR** Self-latching bolt, **as directed**, operated by screwdriver **OR** knurled knob **OR** hex head wrench **OR** pinned hex head wrench **OR** spanner head wrench **OR** flush key **OR** ring turn, **as directed**, with interior release.
 - f. Lock: Cylinder **OR** Mortise cylinder, **as directed**.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
3. Recessed Access Doors and Trimless Frames: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal in the form of a pan recessed **5/8 inch (16 mm) OR 1 inch (25 mm)**, **as directed**, for gypsum board **OR** plaster **OR** acoustical tile, **as directed**, infill.
 - c. Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal with drywall bead for gypsum board surfaces **OR** with plaster bead for plaster surfaces **OR** designed for insertion into acoustical tile ceiling, **as directed**.
 - d. Hinges: Spring-loaded, concealed-pin type **OR** Concealed pivoting rod hinge, **as directed**.
 - e. Latch: Cam latch **OR** Slam latch **OR** Self-latching bolt, **as directed**, operated by screwdriver **OR** knurled knob **OR** hex head wrench **OR** pinned hex head wrench **OR** spanner head wrench **OR** flush key **OR** ring turn, **as directed**, with interior release.
 - f. Lock: Cylinder **OR** Mortise cylinder, **as directed**.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
4. Aluminum Flush Access Doors and Frames with Exposed Trim: Fabricated from aluminum sheet and extruded-aluminum shapes.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.080-inch- (2.0-mm-)**, **as directed**, thick aluminum sheet.
 - c. Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick extruded aluminum with **1-1/4-inch- (32-mm-)** wide rolled flange.
 - d. Hinges: Concealed continuous aluminum.
 - e. Latch: Screwdriver-operated cam latch.
5. Lightweight Flush Access Doors and Frames with Exposed Trim: Fabricated from lightweight metal.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.018-inch- (0.45-mm-)** thick steel sheet.
 - c. Frame: Minimum **0.045-inch- (1.1-mm-)** thick extruded aluminum with **1-1/4-inch- (32-mm-)** wide rolled flange.
 - d. Hinges: Continuous piano.
 - e. Latch: Screwdriver-operated cam latch.
6. Plastic Flush Access Doors and Frames with Exposed Trim: Fabricated from **1/8-inch- (3.2-mm-)** thick high-impact plastic with UV stabilizer.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Flush to frame with rounded corners.
 - c. Frame: 1 piece, **3/4 inch (19 mm)** deep.
 - d. Latch: Snap latch.
 - e. Finish: White with textured exposed surfaces.
7. Exterior Flush Access Doors and Frames with Exposed Trim: Weatherproof with extruded door gasket.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.040-inch- (1.0-mm-)**, **as directed**, thick, metallic-coated steel sheet; flush panel construction with manufacturer's standard **2-inch- (50-mm-)** thick fiberglass insulation.
 - c. Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick extruded aluminum.
 - d. Hinges: Continuous piano, zinc plated.

- e. Lock: Dual-action handles with key lock.
8. Fire-Rated, Insulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.
 - Temperature Rise Rating: **250 deg F (139 deg C)** at the end of 30 minutes.
 - Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of **0.036 inch (0.9 mm)**, **as directed**.
 - Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal with **1-inch- (25-mm-)**, **as directed**, wide, surface-mounted trim.
 - Hinges: Concealed-pin type **OR** Continuous piano, **as directed**.
 - Automatic Closer: Spring type.
 - Latch: Self-latching device operated by knurled knob **OR** flush key **OR** ring turn, **as directed**, with interior release.
 - Lock: Self-latching device with cylinder **OR** mortise cylinder, **as directed**, lock.
 - Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
9. Fire-Rated, Insulated, Flush Access Doors and Trimless Frames: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.
 - Temperature Rise Rating: **250 deg F (139 deg C)** at the end of 30 minutes.
 - Door: Flush panel with a core of mineral-fiber insulation enclosed in sheet metal with a minimum thickness of **0.036 inch (0.9 mm)**, **as directed**.
 - Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal with drywall **OR** plaster, **as directed**, bead.
 - Hinges: Concealed-pin type **OR** Continuous piano, **as directed**.
 - Automatic Closer: Spring type.
 - Latch: Self-latching device operated by knurled knob **OR** flush key **OR** ring turn, **as directed**, with interior release.
 - Lock: Self-latching device with cylinder **OR** mortise cylinder, **as directed**, lock.
 - Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
10. Fire Rated, Uninsulated, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- Locations: Wall surfaces.
 - Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.
 - Door: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal, flush construction.
 - Frame: Minimum **0.060-inch- (1.5-mm-)**, **as directed**, thick sheet metal with **1-inch- (25-mm-)** **OR** **1-1/4-inch- (32-mm-)**, **as directed**, wide, surface-mounted trim.
 - Hinges: Concealed-pin type **OR** Continuous piano, **as directed**.
 - Automatic Closer: Spring type.
 - Latch: Self-latching device operated by knurled knob **OR** flush key **OR** ring turn, **as directed**, with interior release.
 - Lock: Self-latching device with cylinder **OR** mortise cylinder, **as directed**, lock.
 - Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
11. Medium-Security, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - Door: Minimum **0.105-inch- (2.7-mm-)** thick sheet metal, flush construction.

- c. Frame: Minimum **0.105-inch- (2.7-mm-)** thick sheet metal with **1-inch- (25-mm-)** **OR** **1-1/4-inch- (32-mm-)**, **as directed**, wide, surface-mounted trim.
 - d. Hinges: Concealed continuous piano.
 - e. Lock: Detention.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
12. Medium-Security, Flush Access Doors with Trimless Frames: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.105-inch- (2.7-mm-)** thick sheet metal, flush construction.
 - c. Frame: Minimum **0.105-inch- (2.7-mm-)** thick sheet metal with drywall **OR** plaster, **as directed**, bead.
 - d. Hinges: Concealed continuous piano.
 - e. Lock: Detention.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
13. High-Security, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet and angles.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.135-inch- (3.4-mm-)** thick sheet metal, flush construction.
 - c. Frame: Minimum **3/16-by-2-by-2-inch (4.7-by-50-by-50-mm)** angle welded with joints ground smooth.
 - d. Hinges: Heavy-duty steel welded to door and frame.
 - e. Lock: Heavy-duty, detention deadbolt.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
14. Maximum-Security, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet and angles.
- a. Locations: Wall **OR** Ceiling **OR** Wall and ceiling, **as directed**, surfaces.
 - b. Door: Minimum **0.180-inch- (4.55-mm-)** thick sheet metal, flush construction.
 - c. Frame: Minimum **3/16-by-2-by-2-by-3-inch (4.7-by-50-by-50-by-76-mm)** angle welded with joints ground smooth.
 - d. Hinges: Heavy-duty steel welded to door and frame.
 - e. Lock: Heavy-duty detention deadbolt.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
15. Fire-Rated, Insulated, Medium-Security, Flush Access Doors and Frames with Exposed Trim: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- a. Locations: Wall surfaces.
 - b. Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.
 - c. Temperature Rise Rating: **250 deg F (139 deg C)** at the end of 30 minutes.
 - d. Door: Flush panel with a core of **2-inch- (50-mm-)** thick, mineral-fiber insulation enclosed in sheet metal with a minimum thickness of **0.075 inch (1.9 mm)**.
 - e. Frame: Minimum **0.060-inch- (1.5-mm-)** thick sheet metal with **1-inch- (25-mm-)** **OR** **1-1/4-inch- (32-mm-)**, **as directed**, wide, surface-mounted trim.
 - f. Hinges: Concealed-pin type **OR** Continuous piano, **as directed**.
 - g. Automatic Closer: Spring type.
 - h. Lock: Self-latching device with detention lock.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".
16. Fire-Rated, Insulated, Medium-Security, Flush Access Doors with Trimless Frames: Fabricated from steel **OR** metallic-coated steel **OR** stainless-steel, **as directed**, sheet.
- a. Locations: Wall surfaces.
 - b. Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.

- c. Temperature Rise Rating: 250 deg F (139 deg C) at the end of 30 minutes.
- d. Door: Flush panel with a core of 2-inch- (50-mm-) thick, mineral-fiber insulation enclosed in sheet metal with a minimum thickness of 0.075 inch (1.9 mm).
- e. Frame: Minimum 0.060-inch- (1.5-mm-) thick sheet metal with drywall **OR** plaster, **as directed**, bead.
- f. Hinges: Concealed-pin type **OR** Continuous piano, **as directed**.
- g. Automatic Closer: Spring type.
- h. Lock: Self-latching device with detention lock.
 - 1) Lock Preparation: Prepare door panel to accept cylinder specified in Division 08 Section "Door Hardware".

E. Floor Access Doors And Frames

1. Floor Doors, General: Equip each door with adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with red vinyl grip that allows for one-handed closure, and recessed lift handle.
2. Aluminum Floor Door: Single **OR** Double, **as directed**, -leaf opening. Extruded-aluminum angle frame with 1/4-inch- (6.4-mm-) thick, diamond-pattern, aluminum tread plate door; nonwatertight; loading capacity to support 150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load **OR** 300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load **OR** AASHTO H20 concentrated wheel load, without impact, **as directed**.
3. Watertight Aluminum Floor Door: Single **OR** Double, **as directed**, -leaf opening. Extruded-aluminum gutter frame with NPS 1-1/2 (DN 40) drainage coupling and 1/4-inch- (6.4-mm-) thick, diamond-pattern, aluminum tread plate door; watertight; loading capacity to support 150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load **OR** 300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load **OR** AASHTO H20 concentrated wheel load, without impact, **as directed**.
4. Steel Angle-Frame Floor Door: Single **OR** Double, **as directed**, -leaf opening. Prime-painted structural **OR** Galvanized structural **OR** Stainless, **as directed**, -steel frame with 3/16- or 1/4-inch- (4.8- or 6.4-mm-) **OR** 3/16-inch- (4.8-mm-) **OR** 1/4-inch- (6.4-mm-), **as directed**, thick, diamond-pattern, prime-painted structural **OR** galvanized structural **OR** stainless, **as directed**, -steel tread plate door; nonwatertight; loading capacity to support 150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load **OR** 300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load **OR** AASHTO H20 concentrated wheel, **as directed**, load.
 - a. Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.
 - b. Finish painted in yellow with wording "FIRE DOOR - DO NOT STORE MATERIALS ON SURFACE."
5. Watertight Steel Gutter-Frame Floor Door: Single **OR** Double, **as directed**, -leaf opening. Prime-painted structural **OR** Galvanized structural **OR** Stainless, **as directed**, -steel channel frame forming gutter with NPS 1-1/2 (DN 40) drainage coupling and 3/16- or 1/4-inch- (4.8- or 6.4-mm-) **OR** 3/16-inch- (4.8-mm-) **OR** 1/4-inch- (6.4-mm-), **as directed**, thick, diamond-pattern, prime-painted structural **OR** galvanized structural **OR** stainless, **as directed**, -steel tread plate door; watertight; loading capacity to support 150-lbf/sq. ft. (7.2-kN/sq. m) pedestrian live load **OR** 300-lbf/sq. ft. (14.4-kN/sq. m) pedestrian live load **OR** AASHTO H20 concentrated wheel, **as directed**, load.
 - a. Fire-Resistance Rating: Not less than that indicated **OR** that of adjacent construction **OR** 45 minutes **OR** 1 hour **OR** 1-1/2 hours **OR** 2 hours **OR** 3 hours, **as directed**.
 - b. Finish painted in yellow with wording "FIRE DOOR - DO NOT STORE MATERIALS ON SURFACE."
6. Hardware: Provide the following:
 - a. Hinges: Heavy-duty, zinc-coated steel **OR** aluminum **OR** stainless-steel **OR** brass, **as directed**, butt hinges with stainless-steel pins.
 - b. Latch: Stainless-steel slam latch.
 - c. Lock: Staple for a padlock **OR** Recessed hasp **OR** Keyed deadlock bolt **OR** Hasp and staple, **as directed**.

- d. Hardware Material: Manufacturer's standard **OR** Stainless steel, including latch and lifting mechanism assemblies, hold-open arms, and all brackets, hinges, pins, and fasteners, **as directed**.
 - 7. Insulation: Fiberglass **OR** Urethane, **as directed**, with liner pan.
 - 8. Safety Accessories: Safety chains **OR** net **OR** railing, **as directed**.
- F. Fabrication
- 1. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
 - 2. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
 - 3. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
 - 4. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
 - 5. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - a. For cylinder lock, furnish two keys per lock and key all locks alike.
 - b. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
 - 6. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

1.3 EXECUTION

- A. Installation
- 1. Comply with manufacturer's written instructions for installing access doors and frames.
 - 2. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
 - 3. Install doors flush with adjacent finish surfaces or recessed to receive finish material.
- B. Adjusting And Cleaning
- 1. Adjust doors and hardware after installation for proper operation.
 - 2. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13 00

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Task	Specification	Specification Description
08 31 13 00	01 22 16 00	No Specification Required
08 33 16 00	08 33 26 00	Overhead Coiling Grilles

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SECTION 08 33 23 11 - OVERHEAD COILING DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for overhead coiling doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Service doors with integral pass doors.
 - b. Insulated service doors with integral pass doors.
 - c. Counter doors.
 - d. Fire-rated service doors with integral pass doors.
 - e. Fire-rated, insulated service doors with integral pass doors.
 - f. Fire-rated counter doors.

C. Performance Requirements

1. Delegated Design: Design overhead coiling doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance, Exterior Doors: Exterior overhead coiling doors shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
 - a. Wind Loads: As indicated on Drawings **OR** Uniform pressure (velocity pressure) of **20 lbf/sq. ft. (960 Pa)**, acting inward and outward, **as directed**.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s)**, **as directed**.
 - 2) Importance Factor: **<Insert factor>**.
 - 3) Exposure Category: **A OR B OR C OR D**, **as directed**.
 - b. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
3. Operability under Wind Load: Design overhead coiling doors to remain operable under design **OR** uniform pressure (velocity pressure) of **20 lbf/sq. ft. (960 Pa)**, **as directed**, wind load, acting inward and outward.
4. Windborne-Debris-Impact-Resistance Performance: Provide glazed and impact-protective overhead coiling doors that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996.
 - a. Large Missile Test: For overhead coiling doors located within **30 feet (9.144 m)** of grade.
 - b. Small Missile Test: For overhead coiling doors located more than **30 feet (9.144 m)** above grade.
5. Seismic Performance: Overhead coiling doors shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
6. Operation Cycles: Provide overhead coiling door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

D. Submittals

1. Product Data: For each type and size of overhead coiling door and accessory.

2. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Show locations of replaceable fusible links.
 - c. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For each exposed product and for each color and texture specified.
4. Delegated-Design Submittal: For overhead coiling doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Qualification Data: For qualified Installer.
6. Seismic Qualification Certificates: For overhead coiling doors, accessories, and components, from manufacturer.
7. Oversize Construction Certification: For door assemblies required to be fire-rated and that exceed size limitations of labeled assemblies.
8. Maintenance Data.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
2. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 **OR** IBC Standard 716.5 **OR** UL 10B, **as directed**.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - b. Temperature-Rise Limit: Where indicated **OR** At vertical exit enclosures and exit passageways, **as directed**, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
 - c. Smoke Control: Where indicated **OR** In corridors and smoke barriers, **as directed**, provide doors that are listed and labeled with the letter "S" on the fire-rating label by a qualified testing agency for smoke- and draft-control based on testing according to IBC Standard 716.5 **OR** UL 1784, **as directed**; with maximum air-leakage rate of 3.0 cfm/sq. ft. (0.01524 cu. m/s x sq. m) of door opening at 0.10 inch wg (24.9 Pa) for both ambient and elevated temperature tests.
3. Sound-Control Doors: Assemblies that have been fabricated and tested to control the passage of sound and have minimum certified STC rating according to ASTM E 413.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines **OR** ICC/ANSI A117.1, **as directed**.

1.2 PRODUCTS

A. Door Curtain Materials And Construction

1. Door Curtains: Fabricate overhead coiling-door curtain of interlocking metal slats, designed to withstand wind loading indicated, in a continuous length for width of door without splices. Unless otherwise indicated, provide slats of thickness and mechanical properties recommended by door manufacturer for performance, size, and type of door indicated, and as follows:

- a. Steel Door Curtain Slats: Zinc-coated (galvanized), cold-rolled structural steel sheet; complying with ASTM A 653/A 653M, with **G90 (Z275)** zinc coating; nominal sheet thickness (coated) of **0.028 inch (0.71 mm)** and as required to meet requirements.
 - b. Stainless-Steel Door Curtain Slats: ASTM A 666, Type 304; sheet thickness of **0.025 inch (0.64 mm)** and as required to meet requirements.
 - c. Aluminum Door Curtain Slats: **ASTM B 209 (ASTM B 209M)** sheet or **ASTM B 221 (ASTM B 221M)** extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of **0.050 inch (1.27 mm)** and as required to meet requirements.
 - d. Vision-Panel Glazing: Manufacturer's standard clear glazing, fabricated from transparent acrylic sheet or fire-protection rated glass as required for type of door; set in glazing channel secured to curtain slats.
 - e. Insulation: Fill slats for insulated doors with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within slat faces.
 - f. Metal Interior Curtain-Slat Facing: Match metal of exterior curtain-slat face.
 - g. Plastic Interior Curtain-Slat Facing: Extruded PVC plastic with maximum flame-spread index of 25 **OR 75 OR 200, as directed**, and smoke-developed index of 450, according to ASTM E 84.
 - h. Gasket Seal: Provide insulated slats with manufacturer's standard interior-to-exterior thermal break or with continuous gaskets between slats.
2. Endlocks and Windlocks for Service Doors: Malleable-iron casings galvanized after fabrication, secured to curtain slats with galvanized rivets or high-strength nylon. Provide locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
 3. Endlocks for Counter Doors: Manufacturer's standard locks on not less than alternate curtain slats for curtain alignment and resistance against lateral movement.
 4. Bottom Bar for Service Doors: Consisting of two angles, each not less than **1-1/2 by 1-1/2 by 1/8 inch (38 by 38 by 3 mm)** thick; fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
 5. Bottom Bar for Counter Doors: Manufacturer's standard continuous channel or tubular shape, fabricated from manufacturer's standard hot-dip galvanized steel, stainless steel, or aluminum extrusions to match curtain slats and finish.
 6. Astragal for Interior Doors: Equip each door bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
 7. Curtain Jamb Guides: Manufacturer's standard angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for guide adjustment. Provide removable stops on guides to prevent overtravel of curtain, and a continuous bar for holding windlocks.
 - a. Removable Posts and Jamb Guides for Counter Doors: Manufacturer's standard.
 8. Pass Door(s): Door and frame assembly constructed integrally with the coiling-door assembly and bearing the same fire rating. Complying with egress and accessibility requirements of authorities having jurisdiction.
 - a. Door Frame and Integral Jamb Guide: Fabricate of angles or channels and angles of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading.
 - b. Hinged Frame: Hinged pass door and frame that swings out of the way, as a unit, to allow use of the full coiling-door opening width. One jamb of the pass-door frame is hinged and the other jamb includes a guide for the lower, narrower part of the coiling-door curtain.
 - c. Rigid Frame: Rigid pass door and frame that are built into the rigid, lower part of the door curtain and that raise with the curtain.
 - d. Locking Hardware:
 - 1) Lockset **OR** Exit Hardware: As specified in Division 08 Section "Door Hardware" **OR** As selected from manufacturer's full range, **as directed**.

- 2) Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware" **OR** standard with manufacturer, **as directed**, and keyed to building keying system, **as directed**.
- 3) Keys: Two **OR** Three, **as directed**, for each cylinder.
- e. Thresholds: Equip pass doors with integral thresholds that comply with egress and accessibility requirements of authorities having jurisdiction.

B. Hood

1. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - a. Galvanized Steel: Nominal **0.028-inch- (0.71-mm-)** thick, hot-dip galvanized steel sheet with **G90 (Z275)** zinc coating, complying with ASTM A 653/A 653M.
 - b. Stainless Steel: **0.025-inch- (0.64-mm-)** thick stainless-steel sheet, Type 304, complying with ASTM A 666.
 - c. Aluminum: **0.040-inch- (1.02-mm-)** thick aluminum sheet complying with **ASTM B 209 (ASTM B 209M)**, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.
 - d. Include automatic drop baffle on fire-rated doors to guard against passage of smoke or flame.
 - e. Exterior-Mounted Doors: Fabricate hood to act as weather protection and with a perimeter sealant-joint-bead profile for applying joint sealant.

C. Counter Doors

1. Integral Frame, Hood, and Fascia for Counter Door: Welded sheet metal assembly of the following sheet metal:
 - a. Galvanized Steel: Nominal **0.064-inch- (1.63-mm-)** thick, hot-dip galvanized steel sheet with **G90 (Z275)** zinc coating, complying with ASTM A 653/A 653M.
 - b. Stainless Steel: **0.062-inch- (1.59-mm-)** thick stainless-steel sheet, Type 304, complying with ASTM A 666.
2. Integral Metal Sill for Counter Door: Fabricate sills as integral part of frame assembly of Type 304 stainless steel in manufacturer's standard thickness with No. 4 finish.
3. Fire-Rated, Laminate Counter: Fire-door manufacturer's high-pressure decorative laminate-covered countertop, UL or ITS tested and labeled for 1-1/2-hour fire rating for approved use with fire-door assembly.

D. Locking Devices

1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
2. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - a. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware" **OR** standard with manufacturer, **as directed**, and keyed to building keying system, **as directed**.
 - b. Keys: Provide Two **OR** Three, **as directed**, for each cylinder.
3. Chain Lock Keeper: Suitable for padlock.
4. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

E. Curtain Accessories

1. Smoke Seals: Equip each fire-rated door with smoke-seal perimeter gaskets for smoke and draft control as required for door listing and labeling by a qualified testing agency.

2. Weatherseals: Equip each exterior door with weather-stripping gaskets fitted to entire perimeter of door for a weathertight installation, unless otherwise indicated.
 - a. At door head, use **1/8-inch- (3-mm-)** thick, replaceable, continuous sheet secured to inside of hood.
 - b. At door jambs, use replaceable, adjustable, continuous, flexible, **1/8-inch- (3-mm-)** thick seals of flexible vinyl, rubber, or neoprene.
 3. Push/Pull Handles: Equip each push-up-operated or emergency-operated door with lifting handles on each side of door, finished to match door.
 - a. Provide pull-down straps or pole hooks for doors more than **84 inches (2130 mm)** high.
 4. Automatic-Closing Device for Fire-Rated Doors: Equip each fire-rated door with an automatic-closing device that is inoperative during normal door operations and that has a governor unit complying with NFPA 80 and an easily tested and reset release mechanism designed to be activated by the following:
 - a. Replaceable fusible links with temperature rise and melting point of **165 deg F (74 deg C)** interconnected and mounted on both sides of door opening.
 - b. Manufacturer's standard UL-labeled smoke detector and door-holder-release devices.
 - c. Manufacturer's standard UL-labeled heat detector and door-holder-release devices.
 - d. Building fire-detection and -alarm systems and manufacturer's standard door-holder-release devices.
- F. Counterbalancing Mechanism
1. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
 2. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than **0.03 in./ft. (2.5 mm/m)** of span under full load.
 3. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
 4. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
 5. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.
- G. Manual Door Operators
1. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
 2. Push-up Door Operation: Design counterbalance mechanism so required lift or pull for door operation does not exceed **25 lbf (111 N)**.
 3. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum **25 lbf (111 N) OR 30 lbf (133 N)**, **as directed**, force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.
 4. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than **25 lbf (111 N) OR 30 lbf (133 N)**, **as directed**, force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.
- H. Electric Door Operators
1. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - a. Comply with NFPA 70.

- b. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
 2. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
 3. Door Operator Location(s): Operator location indicated for each door.
 - a. Top-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
 - b. Front-of-Hood Mounted: Operator is mounted to the right or left door head plate with the operator on coil side of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.
 - c. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of door and connected to door drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
 - d. Bench Mounted: Operator is mounted to the right or left door head plate and connected to the door drive shaft with drive chain and sprockets. Side room is required for this type of mounting.
 - e. Through-Wall Mounted: Operator is mounted on other side of wall from coil side of door.
 4. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements For Equipment", unless otherwise indicated.
 - a. Electrical Characteristics:
 - 1) Phase: Single phase **OR** Polyphase, **as directed**.
 - 2) Volts: 115 **OR** 208 **OR** 230 **OR** 460, **as directed**, V.
 - 3) Hertz: 60.
 - b. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 - c. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than **8 in./sec. (203 mm/s)** and not more than **12 in./sec. (305 mm/s)**, without exceeding nameplate ratings or service factor.
 - d. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - e. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 5. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
 6. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. For non-fire-rated doors, activation of device immediately stops and reverses downward door travel. For fire-rated doors, activation delays closing.
 - a. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - 1) Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
 - b. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - 1) Self-Monitoring Type: Four-wire configured device designed to interface with door operator control circuit to detect damage to or disconnection of sensor edge.
 7. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."

- a. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - b. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
 8. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed **25 lbf (111 N) OR 30 lbf (133 N), as directed.**
 9. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 10. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
 11. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.
 12. Radio-Control System: Consisting of the following:
 - a. Three-channel universal coaxial receiver to open, close, and stop door; one **OR** two, **as directed**, per operator.
 - b. Multifunction remote control.
 - c. Remote-antenna mounting kit.
- I. Door Assembly
1. Service **OR** Insulated Service **OR** Counter, **as directed**, Door: Overhead coiling door formed with curtain of interlocking metal slats.
 2. Operation Cycles: Not less than 10,000 **OR** 20,000 **OR** 50,000 **OR** 100,000, **as directed.**
 - a. Include tamperproof cycle counter.
 3. STC Rating: 26.
 4. Curtain R-Value: **4.5 deg F x h x sq. ft./Btu (0.792 K x sq. m/W) OR 5.0 deg F x h x sq. ft./Btu (0.881 K x sq. m/W) OR 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W), as directed.**
 5. Door Curtain Material: Galvanized steel **OR** Stainless steel **OR** Aluminum, **as directed.**
 6. Door Curtain Slats: Curved **OR** Flat, **as directed**, profile slats of **1-1/4-inch (32-mm) OR 1-1/2-inch (38-mm) OR 1-7/8-inch (48-mm) OR 2-5/8-inch (67-mm) OR 3-1/4-inch (83-mm), as directed**, center-to-center height.
 - a. Perforated Slats: Approximately **1/16-inch (1.6-mm)** pinholes **OR 3/32-inch (2.4-mm)** pinholes **OR 7/8-inch- (22-mm-)** wide by **3/8-inch- (10-mm-)** high slots, **as directed.**
 - b. Fenestrated Slats: Approximately **3- by 5/8-inch (76- by 16-mm) OR 4- by 5/8-inch (102- by 16-mm) OR 10- by 1-5/8-inch (254- by 41-mm), as directed**, openings spaced approximately **1-1/2 inches (38 mm)** apart and beginning **12 inches (305 mm)** from jamb guides.
 - c. Vision Panels: Approximately **10- by 1-5/8-inch (254- by 41-mm)** openings spaced approximately **2 inches (51 mm)** apart and beginning **12 inches (305 mm)** from end guides; in two **OR** three, **as directed**, rows of slats at height indicated on Drawings; installed with insulated, **as directed**, vision-panel glazing.
 - d. Insulated-Slat Interior Facing: Metal **OR** Plastic, **as directed.**
 7. Curtain Jamb Guides: Galvanized steel **OR** Stainless steel **OR** Aluminum, **as directed**, with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise. Provide removable post(s) and jamb guides where shown on Drawings.
 8. Pass Door(s): Hinged **OR** Rigid, **as directed**, frame with lockset **OR** exit hardware, **as directed.**
 9. Hood: Match curtain material and finish **OR** Galvanized steel **OR** Stainless steel **OR** Aluminum, **as directed.**
 - a. Shape: Round **OR** Square **OR** As shown on Drawings, **as directed.**
 - b. Mounting: Face of wall **OR** Between jambs **OR** As shown on Drawings, **as directed.**
 10. Integral Frame, Hood, and Fascia for Counter Door: Galvanized steel **OR** Stainless steel, **as directed.**

- a. Mounting: Face of wall **OR** Between jambs **OR** As shown on Drawings, **as directed**.
 11. Sill Configuration for Counter Door: No sill **OR** Integral metal sill, **as directed**.
 12. Locking Devices: Equip door with slide bolt for padlock **OR** locking device assembly, **as directed**, and chain lock keeper, **as directed**.
 - a. Locking Device Assembly: Single-jamb side **OR** Cremone type, both jamb sides, **as directed**, locking bars, operable from inside with thumb turn **OR** outside with cylinder **OR** outside only, with cylinder **OR** inside and outside with cylinders, **as directed**.
 13. Manual Door Operator: Push-up operation **OR** Chain-hoist operator **OR** Manufacturer's standard crank operator **OR** Awning-crank operator **OR** Wall-crank operator, **as directed**.
 - a. Provide operator with through-wall shaft operation.
 - b. Provide operator with manufacturer's standard removable operating arm.
 14. Electric Door Operator:
 - a. Usage Classification: Heavy duty, 60 to 90 cycles per hour **OR** Standard duty, up to 60 cycles per hour **OR** Medium duty, up to 15 cycles per hour **OR** Light duty, up to 10 cycles per hour, **as directed**.
 - b. Operator Location: Top of hood **OR** Front of hood **OR** Wall **OR** Bench **OR** Through wall **OR** As shown on Drawings, **as directed**.
 - c. Motor Exposure: Interior **OR** Exterior, wet, and humid, **as directed**.
 - d. Emergency Manual Operation: Push-up **OR** Chain **OR** Crank, **as directed**, type.
 - e. Obstruction-Detection Device: Automatic photoelectric sensor **OR** electric sensor edge on bottom bar **OR** pneumatic sensor edge on bottom bar, **as directed**; self-monitoring type, **as directed**.
 - 1) Sensor Edge Bulb Color: Black **OR** As selected from manufacturer's full range, **as directed**.
 - f. Remote-Control Station: Interior **OR** Exterior **OR** Where shown on Drawings, **as directed**.
 - g. Other Equipment: Audible and visual signals **OR** Radio-control system, **as directed**.
 15. Door Finish:
 - a. Aluminum Finish: Mill **OR** Clear anodized **OR** Light bronze anodized **OR** Medium bronze anodized **OR** Dark bronze anodized **OR** Black anodized **OR** Anodized color matching sample **OR** Anodized color as selected from full range of industry colors and color densities, **as directed**.
 - b. Baked-Enamel or Powder-Coated Finish: Color as indicated by manufacturer's designations **OR** Color matching sample **OR** Color as selected from manufacturer's full range, **as directed**.
 - c. Factory Prime Finish: Manufacturer's standard color.
 - d. Stainless-Steel Finish: No. 2B (bright, cold rolled) **OR** No. 4 (polished directional satin), **as directed**.
 - e. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face **OR** PVC plastic, **as directed**.
- J. Fire-Rated Door Assembly
1. Fire-Rated Service **OR** Insulated Service **OR** Counter, **as directed**, Door: Overhead fire-rated coiling door formed with curtain of interlocking metal slats.
 2. Operation Cycles: Not less than 10,000 **OR** 20,000 **OR** 50,000 **OR** 100,000, **as directed**.
 - a. Include tamperproof cycle counter.
 3. Fire Rating: 3/4 hour **OR** 1 hour **OR** 1-1/2 hours **OR** 3 hours **OR** 4 hours, **as directed**, with temperature-rise limit, **as directed**, and with smoke control, **as directed**.
 4. STC Rating: 27.
 5. Curtain R-Value: 4.5 deg F x h x sq. ft./Btu (0.792 K x sq. m/W) **OR** 5.0 deg F x h x sq. ft./Btu (0.881 K x sq. m/W) **OR** 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W), **as directed**.
 6. Door Curtain Material: Galvanized steel **OR** Stainless steel, **as directed**.
 7. Door Curtain Slats: Curved **OR** Flat, **as directed**, profile slats of 1-1/4-inch (32-mm) **OR** 1-1/2-inch (38-mm) **OR** 1-7/8-inch (48-mm) **OR** 2-5/8-inch (67-mm) **OR** 3-1/4-inch (83-mm), **as directed**, center-to-center height.

- a. Vision Panels: Approximately **10- by 1-5/8-inch (254- by 41-mm)** openings spaced approximately **2 inches (51 mm)** apart and beginning **12 inches (305 mm)** from end guides; in two **OR** three, **as directed**, rows of slats at height indicated on Drawings; installed with fire-rated vision-panel glazing.
 - b. Insulated-Slat Interior Facing: Metal.
 8. Curtain Jamb Guides: Galvanized steel **OR** Stainless steel, **as directed**, with exposed finish matching curtain slats.
 9. Pass Door(s): Hinged **OR** Rigid, **as directed**, frame with lockset **OR** exit hardware, **as directed**.
 10. Hood: Match curtain material and finish **OR** Galvanized steel **OR** Stainless steel, **as directed**.
 - a. Shape: Round **OR** Square **OR** As shown on Drawings, **as directed**.
 - b. Mounting: Face of wall **OR** Between jambs **OR** As shown on Drawings, **as directed**.
 11. Integral Frame, Hood, and Fascia for Counter Door: Galvanized steel **OR** Stainless steel, **as directed**.
 - a. Mounting: Face of wall **OR** Between jambs **OR** As shown on Drawings, **as directed**.
 12. Sill Configuration for Fire-Rated Counter Door: No sill **OR** Integral metal sill **OR** Fire-rated, laminate counter, **as directed**.
 - a. High-Pressure Decorative Laminate: Match color, pattern, and finish as indicated by manufacturer's designations **OR** of sample **OR** as selected from manufacturer's full range, **as directed**.
 13. Locking Devices: Equip door with slide bolt for padlock **OR** locking device assembly, **as directed**, and chain lock keeper, **as directed**.
 - a. Locking Device Assembly: Single-jamb side **OR** Cremone type, both jamb sides, **as directed**, locking bars, operable from inside with thumbturn **OR** outside with cylinder **OR** outside only, with cylinder **OR** inside and outside with cylinders, **as directed**.
 14. Manual Door Operator: Push-up operation **OR** Chain-hoist operator **OR** Manufacturer's standard crank operator **OR** Awning-crank operator **OR** Wall-crank operator, **as directed**.
 - a. Provide operator with through-wall shaft operation.
 - b. Provide operator with manufacturer's standard removable operating arm.
 15. Electric Door Operator:
 - a. Usage Classification: Heavy duty, 60 to 90 cycles per hour **OR** Standard duty, up to 60 cycles per hour **OR** Medium duty, up to 15 cycles per hour **OR** Light duty, up to 10 cycles per hour, **as directed**.
 - b. Operator Location: Top of hood **OR** Front of hood **OR** Wall **OR** Bench **OR** Through wall **OR** As shown on Drawings, **as directed**.
 - c. Motor Exposure: Interior **OR** Exterior, wet, and humid, **as directed**.
 - d. Emergency Manual Operation: Push-up **OR** Chain **OR** Crank, **as directed**, type.
 - e. Obstruction Detection Device: Automatic photoelectric sensor **OR** electric sensor edge on bottom bar **OR** pneumatic sensor edge on bottom bar, **as directed**; self-monitoring type, **as directed**.
 - 1) Sensor Edge Bulb Color: Black **OR** As selected from manufacturer's full range, **as directed**.
 - f. Remote-Control Station: Interior **OR** Exterior **OR** Where shown on Drawings, **as directed**.
 - g. Other Equipment: Audible and visual signals **OR** Radio-control system, **as directed**.
 16. Door Finish:
 - a. Baked-Enamel or Powder-Coated Finish: Color as indicated by manufacturer's designations **OR** Color matching sample **OR** Color as selected from manufacturer's full range, **as directed**.
 - b. Factory Prime Finish: Manufacturer's standard color.
 - c. Stainless-Steel Finish: No. 2B (bright, cold rolled) **OR** No. 4 (polished directional satin), **as directed**.
 - d. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.
- K. General Finish Requirements
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

L. Aluminum Finishes

1. Mill Finish: Manufacturer's standard.
2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
4. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

M. Steel And Galvanized-Steel Finishes

1. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
2. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

N. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

1.3 EXECUTION

A. Installation

1. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
2. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
3. Accessibility: Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
4. Fire-Rated Doors: Install according to NFPA 80.
5. Smoke-Control Doors: Install according to NFPA 80 and NFPA 105.

B. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Perform installation and startup checks according to manufacturer's written instructions.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - c. Test door closing when activated by detector or alarm-connected fire-release system. Reset door-closing mechanism after successful test.

C. Adjusting

1. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.

2. Lubricate bearings and sliding parts as recommended by manufacturer.
3. Adjust seals to provide weathertight fit around entire perimeter.

END OF SECTION 08 33 23 11

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Task	Specification	Specification Description
08 33 23 11	08 33 26 00	Overhead Coiling Grilles
08 33 23 13	01 22 16 00	No Specification Required

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SECTION 08 33 26 00 - OVERHEAD COILING GRILLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for overhead coiling grilles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Open-curtain overhead coiling grilles.
 - b. Closed-curtain overhead coiling grilles.

C. Performance Requirements

1. Delegated Design: Design overhead coiling grilles, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Seismic Performance: Overhead coiling grilles shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. Seismic Component Importance Factor: **1.5 OR 1.0, as directed.**
3. Operation Cycles: Provide overhead coiling grille components and operators capable of operating for not less than number of cycles indicated for each grille. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

D. Submittals

1. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:
 - a. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
 - b. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
2. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For each type of exposed finish required, prepared on Samples of size indicated below.
 - a. Open-Curtain Grille: **18-inch- (457-mm-)** square assembly with full-size components consisting of rods, spacers, and links as required to illustrate each assembly, including glazed inserts, **as directed.**
 - b. Closed-Curtain Grille: **18-inch- (457-mm-)** square assembly with full-size components consisting of ribs and infill as required to illustrate each assembly.
 - c. Bottom Bar: **6 inches (150 mm)** long with sensor edge, **as directed.**
 - d. Guides: **6 inches (150 mm)** long.
 - e. Mounting Frame: **6 inches (150 mm)** long.
 - f. Brackets: **6 inches (150 mm)** square.
 - g. Hood: **6 inches (150 mm)** square.

4. Delegated-Design Submittal: For overhead coiling grilles indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of seismic restraints.
 - b. Summary of forces and loads on walls and jambs.
5. Qualification Data: For qualified Installer.
6. Seismic Qualification Certificates: For overhead coiling grilles, accessories, and components, from manufacturer.
7. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
2. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.
 - a. Obtain operators and controls from overhead coiling grille manufacturer.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.2 PRODUCTS

A. Grille Curtain Materials And Construction

1. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.
 - a. Aluminum Grille Curtain: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 - b. Stainless-Steel Grille Curtain: ASTM A 666, Type 300 series.
 - c. Steel Grille Curtain: Hot-dip zinc-coated (galvanized) complying with ASTM A 123/A 123M, or electrogalvanized complying with ASTM 653/A 653M, and phosphatized before fabrication.
 - d. Glazing Insert: Manufacturer's standard glazing of clear polycarbonate sheet secured by the curtain links.
2. Closed-Curtain Grilles: Fabricate curtain as a series of horizontal double-C ribs, spaced at regular intervals, that alternate with continuous horizontal infill panels secured by the ribs.
 - a. Aluminum Horizontal Ribs: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 - b. Glass Panels: Uncoated, clear, heat-treated, fully tempered float glass; complying with ASTM C 1048, Condition A, Type I, Class I, Quality q3, Kind FT; manufacturer's standard panel dimensions and thickness.
 - c. Plastic Panels: Fire-retardant polycarbonate sheet manufactured by the extrusion process; UV resistant; manufacturer's standard panel dimensions and thickness.
 - d. Aluminum Panels: **ASTM B 209 (ASTM B 209M)**, alloy and temper standard with manufacturer for type of use and finish indicated; manufacturer's standard panel dimensions and thickness; finished to match ribs.
 - 1) Perforations: Manufacturer's standard pinholes.
3. Endlocks: Continuous end links, chains, or other devices at ends of rods; locking and retaining grille curtain in guides against excessive pressures, maintaining grille curtain alignment, and preventing lateral movement.
4. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, finished to match grille.

- a. Astragal: Equip each grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
 - b. Provide motor-operated grilles with combination bottom astragal and sensor edge.
 5. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.
 - a. Removable Posts and Jamb Guides: Manufacturer's standard.
- B. Hoods And Accessories
 1. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.
 - a. Galvanized Steel: Nominal **0.028-inch- (0.71-mm-)** thick, hot-dip galvanized steel sheet with G90 (Z275) zinc coating, complying with ASTM A 653/A 653M.
 - b. Stainless Steel: **0.025-inch- (0.64-mm-)** thick stainless-steel sheet, Type 304, complying with ASTM A 666.
 - c. Aluminum: **0.040-inch- (1.02-mm-)** thick aluminum sheet complying with **ASTM B 209 (ASTM B 209M)**, of alloy and temper recommended by manufacturer and finisher for type of use and finish indicated.
 2. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling, unless otherwise indicated.
 3. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A 36/A 36M structural-steel tubes or shapes, hot-dip galvanized per ASTM A 123/A 123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.
 4. Push/Pull Handles: Equip each push-up-operated or emergency-operated grille with lifting handles on each side of grille, finished to match grille.
 - a. Provide pull-down straps or pole hooks for grilles more than **84 inches (2130 mm)** high.
- C. Locking Devices
 1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.
 2. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - a. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware" **OR** standard with manufacturer, **as directed**, and keyed to building keying system, **as directed**.
 - b. Keys: Two **OR** Three, **as directed**, for each cylinder.
 3. Chain Lock Keeper: Suitable for padlock.
 4. Safety Interlock Switch: Equip power-operated grilles with safety interlock switch to disengage power supply when grille is locked.
- D. Counterbalancing Mechanism
 1. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
 2. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than **0.03 in./ft. (2.5 mm/m)** of span under full load.

3. Spring Balance: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.
4. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
5. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

E. Manual Grille Operators

1. Equip grille with manufacturer's recommended manual grille operator unless another type of grille operator is indicated.
2. Push-up Grille Operation: Design counterbalance mechanism so required lift or pull for grille operation does not exceed **25 lbf (111 N)**.
3. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum **25 lbf (111 N) OR 30 lbf (133 N)**, **as directed**, force for grille operation. Provide alloy-steel hand chain with chain holder secured to operator guide.
4. Crank Operator: Consisting of crank and crank gearbox, steel crank drive shaft, and gear-reduction unit, of type indicated. Size gears to require not more than **25 lbf (111 N) OR 30 lbf (133 N)**, **as directed**, force to turn crank. Fabricate gearbox to be oil tight and to completely enclose operating mechanism. Provide manufacturer's standard crank-locking device.

F. Electric Grille Operators

1. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation-cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.
 - a. Comply with NFPA 70.
 - b. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
2. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.
3. Grille Operator Location(s): Operator location indicated for each grille.
 - a. Top-of-Hood Mounted: Operator is mounted to the right or left grille head plate with the operator on top of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.
 - b. Front-of-Hood Mounted: Operator is mounted to the right or left grille head plate with the operator on coil side of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.
 - c. Wall Mounted: Operator is mounted to the inside front wall on the left or right side of grille and connected to grille drive shaft with drive chain and sprockets. Side room is required for this type of mounting. Wall mounted operator can also be mounted above or below shaft; if above shaft, headroom is required.
 - d. Bench Mounted: Operator is mounted to the right or left grille head plate and connected to the grille drive shaft with drive chain and sprockets. Side room is required for this type of mounting.
 - e. Through-Wall Mounted: Operator is mounted on other side of wall from coil-side of grille.
4. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements For Equipment" unless otherwise indicated.
 - a. Electrical Characteristics:
 - 1) Phase: Single phase **OR** Polyphase, **as directed**.
 - 2) Volts: 115 **OR** 208 **OR** 230 **OR** 460, **as directed**, V.
 - 3) Hertz: 60.
 - b. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.

- c. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate grille in either direction from any position, at a speed not less than **8 in./sec. (203 mm/s)** and not more than **12 in./sec. (305 mm/s)**, without exceeding nameplate ratings or service factor.
 - d. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - e. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 5. Limit Switches: Equip each motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.
 6. Obstruction Detection Device: Equip motorized grille with indicated external automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.
 - a. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in grille opening without contact between grille and obstruction.
 - 1) Self-Monitoring Type: Designed to interface with grille operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, grille closes only with sustained pressure on close button.
 - b. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - 1) Self-Monitoring Type: Four-wire configured device designed to interface with grille operator control circuit to detect damage to or disconnection of sensing device.
 7. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - a. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - b. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type; NEMA ICS 6, Type 4 enclosure, key operated.
 8. Emergency Manual Operation: Equip each electrically powered grille with capability for emergency manual operation. Design manual mechanism so required force for grille operation does not exceed **25 lbf (111 N) OR 30 lbf (133 N), as directed**.
 9. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 10. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
 11. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.
 12. Emergency-Egress Release: Flush, wall-mounted handle mechanism, for ADA-ABA-compliant egress feature, not dependent on electric power. The release allows an unlocked grille to partially open without affecting limit switches to permit passage, and it automatically resets motor drive upon return of handle to original position.
 13. Self-Opening Mechanism: Automatic release mechanism triggered by smoke detector, **OR** emergency push-button station, **as directed**, fire alarm or power failure. When activated, the grille self opens by means of a fail-safe operator to the fully open position without the need of power operation or battery backup systems. When the alarm is cleared **OR** emergency push-button is reset, and the alarm is cleared, **as directed**, and power is restored, the grille will operate normally.
- G. Open-Curtain Grille Assembly
1. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.
 2. Operation Cycles: Not less than 10,000 **OR** 20,000 **OR** 50,000 **OR** 100,000, **as directed**.

- a. Include tamperproof cycle counter.
3. Grille Curtain Material: Aluminum **OR** Stainless steel **OR** Galvanized steel, **as directed**.
 - a. Space rods at approximately **1-1/2 inches (38 mm) OR 2 inches (51 mm) OR 3 inches (76 mm), as directed**, o.c.
 - b. Space links approximately **3 inches (76 mm) OR 6 inches (152 mm) OR 9 inches (228 mm), as directed**, apart in a straight in-line **OR** brick (staggered), **as directed**, pattern.
 - c. Glazing Inserts: Manufacturer's standard.
 - d. Spacers: Metal tubes matching curtain material **OR** PVC, **as directed**.
4. Curtain Jamb Guides: Aluminum **OR** Stainless steel **OR** Galvanized steel, **as directed**, with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise. Provide removable post(s) and jamb guides where shown on Drawings, **as directed**.
5. Hood: Match curtain material and finish **OR** Aluminum **OR** Stainless steel **OR** Galvanized steel, **as directed**.
 - a. Shape: Round **OR** Square **OR** As shown on Drawings, **as directed**.
 - b. Mounting: Face of wall **OR** Between jambs **OR** On mounting frame **OR** As shown on Drawings, **as directed**.
6. Locking Devices: Equip grille with slide bolt for padlock **OR** locking device assembly, **as directed**, and chain lock keeper, **as directed**.
 - a. Locking Device Assembly: Single-jamb side **OR** Cremone type, both jamb sides, **as directed**, locking bars, operable from inside with thumb turn **OR** outside with cylinder **OR** outside only, with cylinder **OR** inside and outside with cylinders, **as directed**.
7. Manual Grille Operator: Push-up operation **OR** Chain-hoist operator **OR** Manufacturer's standard crank operator **OR** Awning-crank operator **OR** Wall-crank operator, **as directed**.
 - a. Provide operator with through-wall shaft operation.
 - b. Provide operator with manufacturer's standard removable operating arm.
8. Electric Grille Operator:
 - a. Usage Classification: Heavy duty, 60 to 90 cycles per hour **OR** Standard duty, up to 60 cycles per hour **OR** Medium duty, up to 15 cycles per hour **OR** Light duty, up to 10 cycles per hour, **as directed**.
 - b. Operator Location: Top of hood **OR** Front of hood **OR** Wall **OR** Bench **OR** Through wall **OR** As shown on Drawings, **as directed**.
 - c. Motor Exposure: Interior **OR** Exterior, wet, and humid, **as directed**.
 - d. Emergency Manual Operation: Push-up **OR** Chain **OR** Crank, **as directed**, type.
 - e. Obstruction-Detection Device: Automatic photoelectric sensor **OR** electric sensor edge on bottom bar **OR** pneumatic sensor edge on bottom bar, **as directed**; self-monitoring type, **as directed**.
 - 1) Sensor Edge Bulb Color: Black **OR** As selected from manufacturer's full range, **as directed**.
 - f. Remote-Control Station: Interior **OR** Exterior **OR** Where shown on Drawings, **as directed**.
 - g. Other Equipment: Audible and visual signals **OR** Emergency-egress release **OR** Self-opening mechanism, **as directed**.
9. Grille Finish:
 - a. Aluminum Finish: Mill **OR** Clear anodized **OR** Light bronze anodized **OR** Medium bronze anodized **OR** Dark bronze anodized **OR** Black anodized **OR** Anodized color matching sample **OR** Anodized color as selected from full range of industry colors and color densities, **as directed**.
 - b. Baked-Enamel or Powder-Coated Finish: Color as indicated by manufacturer's designations **OR** Color matching sample **OR** Color as selected from manufacturer's full range, **as directed**.
 - c. Factory Prime Finish: Manufacturer's standard color.
 - d. Stainless-Steel Finish: No. 2B (bright, cold rolled) **OR** No. 4 (polished directional satin), **as directed**.
 - e. PVC Spacers: Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.

H. Closed-Curtain Grille Assembly

1. Closed-Curtain Grille: Overhead coiling grille with a curtain having a series of horizontal ribs alternating with continuous horizontal infill panels secured by the ribs.
2. Operation Cycles: Not less than 10,000 **OR** 20,000 **OR** 50,000 **OR** 100,000, **as directed**.
 - a. Include tamperproof cycle counter.
3. Grille Curtain Material: Aluminum ribs with continuous inserts indicated.
 - a. Space ribs at approximately **3 inches (76 mm)**, **as directed**, o.c.
 - b. Inserts: Glass panels.
 - c. Inserts: Clear, transparent **OR** Translucent, **as directed**, plastic panels.
 - d. Inserts: Solid **OR** Perforated, **as directed**, aluminum panels.
4. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise. Provide removable post(s) and jamb guides where shown on Drawings, **as directed**.
5. Hood: Match curtain material and finish **OR** Aluminum **OR** Stainless steel **OR** Galvanized steel, **as directed**.
 - a. Shape: Round **OR** Square **OR** As shown on Drawings, **as directed**.
 - b. Mounting: Face of wall **OR** Between jambs **OR** On mounting frame **OR** As shown on Drawings, **as directed**.
6. Locking Devices: Equip grille with slide bolt for padlock **OR** locking device assembly, **as directed**, and chain lock keeper, **as directed**.
 - a. Locking Device Assembly: Single-jamb side **OR** Cremone type, both jamb sides, **as directed**, locking bars, operable from inside with thumbturn **OR** outside with cylinder **OR** outside only, with cylinder **OR** inside and outside with cylinders, **as directed**.
7. Manual Grille Operator: Push-up operation **OR** Chain-hoist operator **OR** Manufacturer's standard crank operator **OR** Awning-crank operator **OR** Wall-crank operator, **as directed**.
 - a. Provide operator with through-wall shaft operation.
 - b. Provide operator with manufacturer's standard removable operating arm.
8. Electric Grille Operator:
 - a. Usage Classification: Heavy duty, 60 to 90 cycles per hour **OR** Standard duty, up to 60 cycles per hour **OR** Medium duty, up to 15 cycles per hour **OR** Light duty, up to 10 cycles per hour, **as directed**.
 - b. Operator Location: Top of hood **OR** Front of hood **OR** Wall **OR** Bench **OR** Through wall **OR** As shown on Drawings, **as directed**.
 - c. Motor Exposure: Interior **OR** Exterior, wet, and humid, **as directed**.
 - d. Emergency Manual Operation: Push-up **OR** Chain **OR** Crank, **as directed**, type.
 - e. Obstruction-Detection Device: Automatic photoelectric sensor **OR** electric sensor edge on bottom bar **OR** pneumatic sensor edge on bottom bar, **as directed**; self-monitoring type, **as directed**.
 - 1) Sensor Edge Bulb Color: Black **OR** As selected from manufacturer's full range, **as directed**.
 - f. Remote-Control Station: Interior **OR** Exterior **OR** Where shown on Drawings, **as directed**.
 - g. Other Equipment: Audible and visual signals **OR** Emergency-egress release **OR** Self-opening mechanism, **as directed**.
9. Grille Finish:
 - a. Aluminum Finish: Mill **OR** Clear anodized **OR** Light bronze anodized **OR** Medium bronze anodized **OR** Dark bronze anodized **OR** Black anodized **OR** Anodized color matching sample **OR** Anodized color as selected from full range of industry colors and color densities, **as directed**.
 - b. Baked-Enamel or Powder-Coated Finish: Color as indicated by manufacturer's designations **OR** Color matching sample **OR** Color as selected from manufacturer's full range, **as directed**.
 - c. Factory Prime Finish: Manufacturer's standard color.
 - d. Stainless-Steel Finish: No. 2B (bright, cold rolled) **OR** No. 4 (polished directional satin), **as directed**.

I. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

J. Aluminum Finishes

1. Mill Finish: Manufacturer's standard.
2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
4. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

K. Steel And Galvanized-Steel Finishes

1. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
2. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

L. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

1.3 EXECUTION

A. Examination

1. Examine substrates areas and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
2. Examine locations of electrical connections.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
2. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.
3. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

C. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Perform installation and startup checks according to manufacturer's written instructions.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- c. Test grille opening when activated by detector, fire-alarm system, emergency-egress release, or self-opening mechanism as required. Reset grille-opening mechanism after successful test.

- D. Adjusting
 - 1. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.
 - 2. Lubricate bearings and sliding parts as recommended by manufacturer.

- E. Demonstration
 - 1. Train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 08 33 26 00

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SECTION 08 33 36 00 - SIDE COILING GRILLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for side coiling grilles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Performance Requirements

1. Operation-Cycle Requirements: Provide side coiling grille components and operators capable of operating for not less than 10,000 **OR** 20,000, **as directed**, cycles and for 10 cycles per day.

C. Submittals

1. Product Data: For each type and size of side coiling grille and accessory.
2. Shop Drawings: Include plans, elevations, sections, details, and attachment to other work.
3. Samples: For each exposed finish.

D. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100.

1.2 PRODUCTS

A. Grille Curtain Materials And Construction

1. Grille Curtain: Network of **1/4-inch- (6-mm-) OR 5/16-inch- (8-mm-), as directed**, minimum diameter horizontal rods, or rods covered with tube spacers. Interconnect rods by vertical links approximately **5/8 inch (16 mm)** wide and rotating on rods.
 - a. Space rods at approximately **1-1/2 inches (38 mm)** o.c.
 - b. Space links approximately **3 inches (76 mm)** apart in a straight in-line **OR** staggered, **as directed**, pattern.
 - c. Steel Grille Curtain: Hot-dip zinc-coated (galvanized), complying with ASTM A 123/A 123M, or electrogalvanized complying with ASTM 653/A 653M, and phosphatized before fabrication.
 - d. Stainless-Steel Grille Curtain: ASTM A 666, Type 300 series.
 - e. Aluminum Grille Curtain: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
2. Top Track: Extruded aluminum channel mechanically attached to a support angle with provisions for take-up bolts to compensate for a maximum deflection of 1/2-inch.
3. Bottom Track: Manufacturer's standard, finished to match grille.
4. Coil Box: Entirely enclose coiled grille, operating mechanism, supporting disk and the drum around which the grille will coil.
5. Power Operated Grille: Safety interlock switch to disengage power supply when grille is locked.
6. Manual Grille Operator: Crank or Push-Pull.
7. Electric Grille Operator: Manufacturer's standard type, size, and capacity for grille and operation-cycle requirements specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking grille, and accessories. Comply with NFPA 70.
 - a. Disconnect Device: Hand-operated for automatically engaging chain and sprocket operator and releasing brake for emergency manual operation while disconnecting motor,

without affecting timing of limit switch. Mount to be accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

- b. Grille-Operator Type: Wall- or bracket-mounted unit with electric motor, gear-reduction drive, and chain and sprocket secondary drive.
- 8. Electric Motors: High-starting torque, reversible, continuous-duty, polyphase, Class A insulated, electric motors complying with NEMA MG 1; with overload protection; sized to start, accelerate, and operate grille in either direction from any position, at not less than **2/3 fps (0.2 m/s)** and not more than **1 fps (0.3 m/s)**, without exceeding nameplate ratings or service factor. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
 - a. Open dripproof-type motor, and controller with NEMA ICS 6, Type 1 enclosure.
 - b. Totally enclosed, nonventilated or fan-cooled motor, fitted with plugged drain, and controller with NEMA ICS 6, Type 4 enclosure where indicated.
- 9. Remote-Control Station: Momentary-contact **OR** Sustained-pressure, **as directed**, three-button control station; fully guarded, weatherproof (if for exterior location), key operated.
- 10. Obstruction Detection Device: External automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses grille travel.
- 11. Provide electric operators with ADA-compliant audible alarm and visual indicator lights.

B. Finishes

- 1. Aluminum Anodic Finish: Mill finish **OR** Class II, clear anodic coating complying with AAMA 611, **as directed**.
- 2. Galvanized Steel Finish: Manufacturer's standard primer **OR** Powder-coat finish, **as directed**.
 - a. Color and Gloss: As selected from manufacturer's full range.
 - b. Painting is specified in Division 09 Section(s) "Interior Painting" **OR** "Staining And Transparent Finishing".
- 3. Stainless-Steel Finish: Bright, cold-rolled, unpolished finish: No. 2B finish **OR** Bright, directional polish: No. 4 finish, **as directed**.

1.3 EXECUTION

A. Installation

- 1. General: Install side coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports.
- 2. Lubricate bearings and sliding parts; adjust grilles to operate easily, free of warp, twist, or distortion.

END OF SECTION 08 33 36 00

SECTION 08 34 53 00 - DETENTION DOORS AND FRAMES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for detention doors and frames. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Swinging detention doors.
 - b. Sliding detention doors.
 - c. Detention panels.
 - d. Detention frames.

C. Definitions

1. Minimum-Thickness Steel: Indicated as the specified minimum thicknesses for base metal without coatings, according to HMMA 803.
2. Nominal-Thickness Stainless Steel: Indicated as the specified thicknesses for which over- and under-thickness tolerances apply, according to ASTM A 480/A 480M.
3. Nominal Surface of Floor Covering: Top surface of floor; for resilient tile and carpet, nominal surface of floor covering is defined as top of concrete slab.

D. Performance Requirements

1. Detention Doors and Frame Assemblies: Provide detention doors and frames that comply with the following, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project:
 - a. Security Grade: Comply with Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, according to ASTM F 1450.
 - b. Bullet Resistance: Comply with Level 3 rating when tested according to UL 752.
 - 1) Listed and labeled, by a testing agency acceptable to authorities having jurisdiction, as bullet resisting.
 - c. Tool-Attack Resistance: Comply with small-tool-attack-resistance rating when tested according to UL 437 and UL 1034.
2. Detention Frames: Provide sidelight and borrowed-light detention frames that comply with ASTM F 1592 and removable stop test according to HMMA 863, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.

E. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, label compliance, fire-resistance rating, and temperature-rise ratings, and finishes for each type of detention doors and frames specified.
2. Shop Drawings: In addition to requirements below, provide a schedule using same reference numbers for details and openings as those on Drawings:
 - a. Elevations of each door design.
 - b. Direction of swing **OR** slide, **as directed**.
 - c. Inmate and non-inmate sides.
 - d. Details of doors, including vertical and horizontal edge details, and metal thicknesses.
 - e. Details of frames, including dimensioned profiles, and metal thicknesses.
 - f. Locations of reinforcement and preparations for hardware.
 - g. Details of each different wall opening condition.
 - h. Details of anchorages, joints, field splices, and connections.

- i. Details of food-pass openings, louvers, speaking apertures, and gun ports.
- j. Details of moldings, removable stops, and glazing.
- k. Details of conduit, junction boxes, and preparations for electrified and pneumatic door hardware.
- 3. Samples:
 - a. For each type of exposed finish required.
 - b. For the following items to demonstrate compliance with requirements for quality of materials and construction:
 - 1) Detention Doors: Show vertical-edge, top, and bottom construction; insulation; face stiffeners; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
 - 2) Detention Frames: Show profile, welded corner joint, welded hinge reinforcement, grout-cover boxes, floor and wall anchors, and silencers. Include separate section showing fixed steel panels and glazing if applicable.
- 4. Coordination Drawings: Drawings of each detention door and frame, drawn to scale, on which connections and interface with electrified and pneumatic control systems are shown.
- 5. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.
- 6. Welding certificates.
- 7. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for detention doors and frames. Indicate metal thickness of each component of tested assembly and describe construction methods.
- 8. Field quality-control reports documenting inspections of installed products.

F. Quality Assurance

- 1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."
- 2. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure **OR** as close to neutral pressure as possible, **as directed**, according to NFPA 252 **OR** IBC Standard 716.5 **OR** UL 10B **OR** UL 10C, **as directed**.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - b. Temperature-Rise Limit: Where indicated **OR** At vertical exit enclosures and exit passageways, **as directed**, provide doors that have a maximum transmitted temperature end point of not more than **450 deg F (250 deg C)** above ambient after 30 minutes of standard fire-test exposure.
- 3. Fire-Rated Detention Sidelight and Borrow-Light Frames: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- 4. Smoke-Control Detention Door Assemblies: Comply with NFPA 105.

G. Delivery, Storage, And Handling

- 1. Deliver detention doors and frames palleted, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
- 2. Deliver detention frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- 3. Inspect units, on delivery, for damage. Minor damage may be repaired provided refinished items match new work and are approved by Architect; otherwise, remove and replace damaged items as directed.

4. Store detention doors and frames under cover at building site. Place units in a vertical position with heads up, spaced by blocking, on minimum **4-inch- (102-mm-)** high wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 - a. Provide minimum **1/4-inch (6-mm)** space between each stacked unit to permit air circulation.

H. Maintenance Tools

1. Tool Kit: Provide six sets of tools for use with security fasteners, each packaged in a compartmented kit configured for easy handling and storage.

1.2 PRODUCTS

A. Materials

1. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
2. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B.
3. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with **G60 (Z180)** zinc (galvanized) or **A60 (ZF180)** zinc-iron-alloy (galvannealed) coating designation.
4. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304.
5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
6. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
7. Masonry Anchors: Fabricated from same steel sheet as door face.
8. Embedded Anchors: Fabricated from mild steel shapes and plates, hot-dip galvanized according to ASTM A 153/A 153M.
9. Postinstalled Expansion Anchors: With capability to sustain, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - a. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
 - b. Corrosion Protection: Stainless-steel components complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4)** for bolts and nuts; ASTM A 276 or ASTM A 666, Type 304 or 316, for anchors.
 - c. Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
10. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
11. Glazing: Comply with Division 08 Section "Security Glazing".
12. Grout: Comply with ASTM C 476, with a slump of not more than **4 inches (102 mm)** as measured according to ASTM C 143/C 143M.
13. Insulation: Slag-wool-fiber/rock-wool-fiber or glass-fiber blanket insulation. ASTM C 665, Type I (unfaced); with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics. Minimum **1.5-lb/cu. ft. (24-kg/cu. m)** density.
14. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for **15-mil (0.4-mm)** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

B. Detention Doors

1. General: Provide flush-design detention doors of seamless hollow construction, **2 inches (51 mm)** thick unless otherwise indicated. Construct detention doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges.
 - a. For single-acting swinging detention doors, bevel both vertical edges **1/8 inch in 2 inches (3 mm in 51 mm)**.
 - b. For sliding detention doors, square both vertical edges.
2. Core Construction: Provide the following core construction of same material as detention door face sheets, welded to both detention door faces:

- a. Steel-Stiffened Core: 0.042-inch- (1.0-mm-) thick, steel vertical stiffeners extending full-door height, with vertical webs spaced not more than 4 inches (102 mm) apart, spot welded to face sheets a maximum of 3 inches (76 mm) o.c. Fill spaces between stiffeners with insulation.
- b. Truss-Stiffened Core: 0.013-inch- (0.3-mm-) thick, steel, truncated triangular stiffeners extending between face sheets and for full height and width of door; with stiffeners welded to face sheets not more than 3 inches (76 mm) o.c. vertically and 2-3/4 inches (70 mm) horizontally. Fill spaces between stiffeners with insulation.
3. Vertical Edge Channels: 0.123-inch- (3.1-mm-) thick, continuous channel of same material as detention door face sheets, extending full-door height at each vertical edge; welded to top and bottom channels to create a fully welded perimeter channel. Noncontiguous channel is permitted to accommodate lock-edge hardware only if lock reinforcement is welded to and made integral with channel.
4. Top and Bottom Channels: 0.123-inch- (3.1-mm-) thick metal channel of same material as detention door face sheets, spot welded, not more than 4 inches (102 mm) o.c., to face sheets.
 - a. Reinforce top edge of detention door with 0.053-inch- (1.3-mm-) thick closing channel, inverted and nesting in top channel; welded so channel web is flush with top door edges.
5. Hardware Reinforcement: Fabricate reinforcing plates from same material as detention door face sheets to comply with the following minimum thicknesses:
 - a. Full-Mortise Hinges and Pivots: 0.187 inch (4.7 mm) thick.
 - b. Maximum-Security Surface Hinges: 0.250 inch (6.3 mm) thick.
 - c. Strike Reinforcements: 0.187 inch (4.7 mm) thick.
 - d. Slide-Device Hanger Attachments: As recommended by device manufacturer.
 - e. Lock Fronts, Concealed Holders, and Surface-Mounted Closers: 0.093 inch (2.3 mm) thick.
 - f. All Other Surface-Mounted Hardware: 0.093 inch (2.3 mm) thick.
 - g. Lock Pockets: 0.123 inch (3.1 mm) thick at non-inmate side, welded to face sheet.
6. Hardware Enclosures: Provide enclosures and junction boxes for electrically operated detention door hardware of same material as detention door face sheets, interconnected with UL-approved, 1/2-inch- (13-mm-) diameter conduit and connectors.
 - a. Where indicated for installation of wiring, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least 4 security fasteners spaced not more than 6 inches (152 mm) o.c.
7. Interior Detention Door Face Sheets: Fabricated from cold-rolled steel sheets **OR** metallic-coated steel sheets **OR** stainless-steel sheets, **as directed**.
 - a. Security Grade 1: 0.093-inch- (2.3-mm-) minimum-thickness steel **OR** 0.109-inch (2.8-mm) nominal-thickness stainless steel, **as directed**.
 - b. Security Grade 2: 0.093-inch- (2.3-mm-) minimum-thickness steel **OR** 0.109-inch (2.8-mm) nominal-thickness stainless steel, **as directed**.
 - c. Security Grade 3: 0.067-inch- (1.7-mm-) minimum-thickness steel **OR** 0.078-inch (2.0-mm) nominal-thickness stainless steel, **as directed**.
 - d. Security Grade 4: 0.067-inch- (1.7-mm-) minimum-thickness steel **OR** 0.078-inch (2.0-mm) nominal-thickness stainless steel, **as directed**.
8. Exterior Detention Door Face Sheets: Fabricated from metallic-coated steel sheets **OR** stainless-steel sheets, **as directed**.
 - a. Security Grade 1: 0.093-inch- (2.3-mm-) minimum-thickness steel **OR** 0.109-inch (2.8-mm) nominal-thickness stainless steel, **as directed**.
 - b. Security Grade 2: 0.093-inch- (2.3-mm-) minimum-thickness steel **OR** 0.109-inch (2.8-mm) nominal-thickness stainless steel, **as directed**.
 - c. Security Grade 3: 0.067-inch- (1.7-mm-) minimum-thickness steel **OR** 0.078-inch (2.0-mm) nominal-thickness stainless steel, **as directed**.
 - d. Security Grade 4: 0.067-inch- (1.7-mm-) minimum-thickness steel **OR** 0.078-inch (2.0-mm) nominal-thickness stainless steel, **as directed**.

C. Detention Panels

1. Provide fixed detention panels of same materials, construction, and finish as specified for adjoining detention frame.

D. Detention Frames

1. General: Provide fully welded detention frames with integral stops, of seamless construction without visible joints or seams. Fabricate detention frames with contact edges closed tight and corners mitered, reinforced, and continuously welded full depth and width of detention frame.
2. Provide two temporary steel spreaders spot welded to bottom of jambs to act as bracing during shipping and storage. Remove prior to installation.
3. Stop Height: Provide minimum stop height of **0.625 inch (16 mm) OR 0.750 inch (19 mm), as directed**, for detention door openings and minimum stop height of **1-1/4 inches (32 mm)** in security glazing or detention panel openings unless otherwise indicated.
4. Interior Detention Frames: Fabricated from cold-rolled steel sheets **OR** metallic-coated steel sheets where indicated **OR** stainless-steel sheets for stainless-steel detention doors, **as directed**.
 - a. Security Grade 1: **0.093-inch- (2.3-mm-)** minimum-thickness steel **OR 0.109-inch (2.8-mm)** nominal-thickness stainless steel, **as directed**.
 - b. Security Grade 2: **0.093-inch- (2.3-mm-)** minimum-thickness steel **OR 0.109-inch (2.8-mm)** nominal-thickness stainless steel, **as directed**.
 - c. Security Grade 3: **0.067-inch- (1.7-mm-)** minimum-thickness steel **OR 0.078-inch (2.0-mm)** nominal-thickness stainless steel, **as directed**.
 - d. Security Grade 4: **0.067-inch- (1.7-mm-)** minimum-thickness steel **OR 0.078-inch (2.0-mm)** nominal-thickness stainless steel, **as directed**.
5. Exterior Detention Frames: Fabricated from metallic-coated steel sheets **OR** stainless-steel sheets for stainless-steel detention doors, **as directed**.
 - a. Security Grade 1: **0.093-inch- (2.3-mm-)** minimum-thickness steel **OR 0.109-inch (2.8-mm)** nominal-thickness stainless steel, **as directed**.
 - b. Security Grade 2: **0.093-inch- (2.3-mm-)** minimum-thickness steel **OR 0.109-inch (2.8-mm)** nominal-thickness stainless steel, **as directed**.
 - c. Security Grade 3: **0.067-inch- (1.7-mm-)** minimum-thickness steel **OR 0.078-inch (2.0-mm)** nominal-thickness stainless steel, **as directed**.
 - d. Security Grade 4: **0.067-inch- (1.7-mm-)** minimum-thickness steel **OR 0.078-inch (2.0-mm)** nominal-thickness stainless steel, **as directed**.
6. Hardware Reinforcement: Fabricate reinforcing plates from same material as detention frame to comply with the following minimum thicknesses:
 - a. Hinges and Pivots: **0.187 inch (4.7 mm)** thick by **1-1/2 inches (38 mm)** wide by **10 inches (254 mm)** long.
 - b. Strikes, Flush Bolts, and Closers: **0.187 inch (4.7 mm)** thick.
 - c. Surface-Mounted Hardware: **0.093 inch (2.3 mm)** thick.
 - d. Lock Pockets: **0.123 inch (3.1 mm)** thick at non-inmate side, welded to face sheet. Provide **0.123-inch- (3.1-mm-)** thick, lock protection plate for attachment to lock pocket with security fasteners.
7. Hardware Enclosures: Provide enclosures and junction boxes for electrically operated detention door hardware, interconnected with UL-approved, **1/2-inch- (13-mm-)** diameter conduit and connectors.
 - a. Where indicated for installation of wiring, provide access plates to junction boxes, fabricated from same material and thickness as face sheet and fastened with at least 4 security fasteners spaced not more than **6 inches (152 mm)** o.c.
8. Mullions and Transom Bars: Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between detention frame members with concealed clip angles or sleeves of same metal and thickness as detention frame.
9. Jamb Anchors: Weld jamb anchors to detention frames near hinges and directly opposite on strike jamb or as required to secure detention frames to adjacent construction.
 - a. Number of Anchors: Provide two anchors per jamb plus the following:
 - 1) Detention Door Frames: One additional anchor for each **18 inches (457 mm)**, or fraction thereof, above **54 inches (1372 mm)** in height.

- 2) Detention Frames with Security Glazing or Detention Panels: One additional anchor for each **18 inches (457 mm)**, or fraction thereof, above **36 inches (914 mm)** in height.
- b. Masonry Anchors: Adjustable, corrugated or perforated, strap-and-stirrup anchors to suit detention frame size; formed of same material and thickness as detention frame; with strap not less than **2 inches (51 mm)** wide by **10 inches (254 mm)** long.
- c. Embedded Anchors: Provide detention frames with removable faces at jambs where embedded anchors are indicated. Anchors consist of three parts:
 - 1) Embedded Plates: Steel plates, **0.188 inch thick by 4 inches wide by 6 inches (4.7 mm thick by 102 mm wide by 152 mm)** long. Continuously weld 2 steel bars, **1/2 inch (13 mm)** in diameter and **10 inches (254 mm)** long with **2-inch (51-mm)** 90-degree turndown on ends, to the embedded end of each plate. Weld steel angles, **0.188 inch thick by 2 by 2 by 4 inches (4.7 mm thick by 51 by 51 by 102 mm)** long, to the exposed end of each plate. Embed at locations to match frame angles.
 - 2) Frame Angles: Steel angles, **0.188 inch thick by 2 by 2 by 4 inches (4.7 mm thick by 51 by 51 by 102 mm)** long, welded to detention frames with **1-inch- (25-mm-)** long welds at each end of angle.
 - 3) Connector Angles: Steel angles, of size required, to connect frame angles and embedded plates.
- d. Postinstalled Expansion Anchors: Minimum **1/2-inch- (13-mm-)** diameter concealed bolts with expansion shields or inserts. Provide conduit spacer from detention frame to wall, welded to detention frame. Reinforce detention frames at anchor locations.
10. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, formed of same material and thickness as detention frame, and as follows:
 - a. Monolithic Concrete Slabs: Clip anchors, with two holes to receive fasteners, welded to bottom of jambs and mullions with at least four spot welds per anchor.
 - b. Separate Topping Concrete Slabs: Adjustable anchors with extension clips, allowing not less than **2-inch (51-mm)** height adjustment, welded to jambs and mullions with at least 4 spot welds per anchor. Terminate bottom of detention frames at finish floor surface.
11. Rubber Door Silencers: Except on weather-stripped detention doors, drill stops in strike jambs to receive three silencers on single-detention-door frames and drill head jamb stop to receive two silencers on double-detention-door frames. Keep holes clear during construction.
12. Grout Guards: Provide factory-installed grout guards of same material as detention frame, welded to detention frame at back of hardware cutouts, silencers, and glazing-stop screw preparations to close off interior of openings and prevent mortar or other materials from obstructing hardware operation or installation.

E. Moldings And Stops

1. Provide fixed moldings on inmate side of glazed openings and removable stops on non-inmate side.
 - a. Height: As required to provide minimum **1-inch (25-mm)** glass engagement, but not less than **1-1/4 inches (32 mm)**.
 - b. Fixed Moldings: Formed from same material as detention door and frame face sheets, but not less than **0.093-inch- (2.3-mm-)** thick, spot welded to face sheets a maximum of **5 inches (127 mm)** o.c.
 - c. Removable Stops: Formed from **0.123-inch- (3.1-mm-)** thick angle, of same material as detention door face sheets. Secure with button head security fasteners spaced uniformly not more than **9 inches (229 mm) OR 6 inches (152 mm)**, **as directed**, o.c. and not more than **2 inches (51 mm)** from each corner, and as necessary to satisfy performance requirements. Form corners with notched or mitered hairline joints.
2. Coordinate rabbet width between fixed and removable stops with type of glass or panel and type of installation indicated.

F. Accessories

1. Pass-Through Openings: Fabricate flush openings using **0.093-inch- (2.3-mm-)** thick interior channels of same material as detention door faces, inverted to be flush with openings, welded to inside of both face sheets and with corners fully welded. Mount shutters on non-inmate side of detention doors. Reinforce for locks and food-pass hinges.
 - a. Inset Shutters: Fabricate from 2 steel plates, **0.123 inch (3.1 mm)** thick, of same material as detention door face sheets, spot welded together and sized to inset inside opening and to prevent inmate tampering of lock and hinges.
 - b. Overlapping Shutters: For surface application on non-inmate side of door. Fabricate from a single steel plate, of same material as detention door face sheets, **0.187 inch (4.7 mm)** thick, sized to overlap food-pass openings **1/2 inch (13 mm)**.
 2. Detention Door Louvers: Fabricate flush louver openings using **0.093-inch- (2.3-mm-)** thick, interior steel channels of same material as detention door faces, welded to inside of both detention door face sheets and with corners fully welded. Provide welded, inverted V- or Y-shaped vanes allowing specified airflow, fabricated from same material as detention door face sheets, **0.093 inch (2.3 mm)** thick, and spaced so no rigid flat instrument can pass through.
 - a. Reinforcement: Reinforce louvers that exceed **18 inches (457 mm)** in height at louver midpoint with **1/4-by-1-1/2-inch- (6.3-by-38-mm-)** square, vertical rectangular steel bar or **3/4-inch- (19-mm-)** diameter, vertical steel bar.
 - b. Airflow: Airflow and static-pressure loss **as directed**.
 - c. Exterior Detention Door Insect Screens: Fabricated from **12-by-12 (2.1-by-2.1-mm)** mesh of **0.028-inch- (0.71-mm-)** diameter, stainless-steel wire or from perforated metal of same material and thickness as detention door face sheet with **1/8-inch- (3-mm-)** diameter holes spaced **1 inch (25 mm)** o.c.; where indicated.
 3. Speaking Apertures: Consisting of a rectangular pattern of holes, minimum **1 inch high by 4 inches wide (25 mm high by 102 mm wide)**, with holes **1/4 inch (6 mm)** in diameter. Locate holes in both face sheets directly across from each other and spaced not more than **1 inch (25 mm)** o.c. vertically and horizontally. Provide **0.067-inch- (1.7-mm-)** thick, pressed-steel baffles in interior of detention door between hole patterns to prevent passage of objects.
 4. Gun Ports: Fabricate units to comply with UL 752 and to resist same security level as detention doors in which they are installed.
- G. Security Fasteners
1. Security Fasteners: Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator.
 2. Drive-System Type, Head Style, Material, and Protective Coating: Provide as required for assembly, installation, and strength, and as follows:
 - a. Drive-System Types: Pinned Torx-Plus **OR** Pinned Torx, **as directed**.
 - b. Fastener Strength: **Grade 8 (Class 10.9)**.
 - c. Socket Button Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - d. Socket Flat Countersunk Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - e. Socket Head Cap Fasteners:
 - 1) Heat-treated alloy steel, **ASTM A 574 (ASTM A 574M)**.
 - 2) Stainless steel, **ASTM F 837 (ASTM F 837M)**, Group 1 CW.
 - f. Protective Coatings for Heat-Treated Alloy Steel:
 - 1) Zinc and clear trivalent chromium, for exterior applications and interior applications where indicated.
 - 2) Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide unless otherwise indicated.
- H. Fabrication
1. Fabricate detention doors and frames rigid, neat in appearance, and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of

metal. Weld exposed joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

2. Tolerances: Fabricate detention doors and frames to comply with manufacturing tolerances indicated in HMMA 863.
3. Fabricate multiple-opening detention frames with mullions that have closed tubular shapes and with no visible seams or joints.
4. Exterior Detention Doors: Provide weep-hole openings in bottom of detention doors to permit entrapped moisture to escape. Seal joints in top edges of detention doors against water penetration.
5. Hardware Preparation: Factory prepare detention doors and frames to receive mortised hardware, including cutouts, reinforcement, mortising, drilling, and tapping, according to final door hardware schedule and templates provided by detention door hardware supplier.
 - a. Reinforce detention doors and frames to receive surface-mounted door hardware. Drilling and tapping may be done at Project site.
 - b. Locate door hardware as indicated or, if not indicated, according to HMMA 831.
6. Factory cut openings in detention doors.
7. Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

I. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Finish detention doors and frames after assembly.

J. Metallic-Coated Steel Sheet Finishes

1. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SPPC-Paint 20, to comply with ASTM A 780.
2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than **0.7 mils (0.02 mm)**.
 - a. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free primer complying with ANSI A250.10 acceptance criteria; recommended by primer manufacturer for zinc-coated steel; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

K. Steel Sheet Finishes

1. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning"; remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 3, "Power Tool Cleaning," or SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Factory Priming for Field-Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment. Apply a smooth coat of even consistency to provide a uniform dry film thickness of not less than **0.7 mils (0.02 mm)**.
 - a. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, corrosion-inhibiting, lead- and chromate-free, universal primer complying with ANSI A250.10 acceptance criteria; compatible with substrate and field-applied finish paint system indicated; and providing a sound foundation for field-applied topcoats despite prolonged exposure.

L. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.

1.3 EXECUTION

A. Preparation

1. Remove welded-in shipping spreaders installed at factory.
2. Prior to installation and with shipping spreaders removed, adjust detention frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb and perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of face.
 - c. Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of door rabbet.
 - d. Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a perpendicular line from head to floor.

B. Installation

1. General: Install detention doors and frames plumb, rigid, properly aligned, and securely fastened in place, complying with Drawings, schedules, and manufacturer's written recommendations.
2. Anchorage: Set detention frame anchorage devices according to details on Shop Drawings and per anchorage device manufacturer's written instructions.
 - a. Masonry Anchors: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
 - b. Embedded Anchors: Install embedded plates in wall surrounding frame openings to match frame angle locations.
 - c. Postinstalled Expansion Anchors: Drill holes in existing construction at locations to match bolt locations and install bolt expansion shields or inserts.
3. Assemble detention frames fabricated in sections. Install angle splices at each corner, of same material and thickness as detention frame, and extend at least **4 inches (102 mm)** on both sides of joint.
 - a. Field splice only at approved locations. Weld, grind, and finish as required to conceal evidence of splicing on exposed faces.
 - b. Continuously weld and finish smooth joints between faces of abutted, multiple-opening, detention frame members.
 - c. Field Welding: Comply with the following requirements:
 - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2) Obtain fusion without undercut or overlap.
 - 3) Remove welding flux immediately.
 - 4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
4. Apply bituminous coating to backs of frames prior to filling with grout.
5. Placing Detention Frames: Install detention frames of sizes and profiles indicated. Set detention frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
 - a. Embedded Anchors: Remove jamb faces from detention frames and set detention frames into opening. Weld steel connector angle to frame angle and to embedded plate with **1-**

- inch- (25-mm-)** long welds at each end of connector angle to form a rigid frame assembly solidly anchored. Reinstall jamb faces using security fasteners.
- b. Postinstalled Expansion Anchors: Install bolt. After bolt is tightened, weld bolt head to provide nonremovable condition. Grind, dress, and finish smooth welded bolt head.
 - c. At fire-rated openings, install detention frames according to NFPA 80.
 - d. Install detention frames with removable stops located on non-inmate side of opening.
6. Grout: Fully grout detention frame jambs and heads. Completely fill space between frames and adjacent substrates. Hand trowel grout and take other precautions, including bracing detention frames, to ensure that frames are not deformed or damaged by grout forces.
 7. Swinging Detention Doors: Fit non-fire-rated detention doors accurately in their frames, with the following clearances:
 - a. Between Doors and Frames at Jambs and Head: **1/8 inch (3.2 mm)**.
 - b. Between Edges of Pairs of Doors: **1/8 inch (3.2 mm)**.
 - c. At Door Sills with Threshold: **3/8 inch (9.5 mm)**.
 - d. At Door Sills without Threshold: **3/4 inch (19.1 mm)**.
 - e. Between Door Bottom and Nominal Surface of Floor Covering: **1/2 inch (12.7 mm)**.
 8. Sliding Detention Doors: Fit sliding detention doors in their frames according to manufacturer's written instructions and as required to allow doors to slide without binding.
 9. Fire-Rated Detention Doors: Install with clearances as specified in NFPA 80.
 10. Smoke-Control Detention Doors: Install according to NFPA 105.
 11. Installation Tolerances: Comply with installation tolerances indicated in HMMA 863.
 12. Glazing: Comply with installation requirements in Division 08 Section "Security Glazing", unless otherwise indicated.
- C. Field Quality Control
1. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
 2. Remove and replace detention work where inspections indicate that work does not comply with specified requirements.
 3. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
 4. Prepare field quality-control certification that states installed products and their installation comply with requirements in the Contract Documents.
 5. Select one detention door at random from detention doors delivered to Project and have it cut in half or otherwise taken apart for verification that construction complies with requirements.
 6. Test Method: Verify weld strength by prying or chiseling door apart at edge seams, end channels, or stiffeners. Not more than five percent of welds may fail test.
 - a. If tested door fails, replace or rework all detention doors to bring them into compliance at Contractor's expense.
 - b. If tested door passes, replace tested door at Contractor's expense.
- D. Adjusting And Cleaning
1. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including detention doors and frames that are warped, bowed, or otherwise unacceptable.
 2. Clean grout and other bonding material off detention doors and frames immediately after installation.
 3. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
 - a. After finishing smooth field welds, apply air-drying primer.
 4. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
 5. Stainless-Steel Surfaces: Clean surfaces according to manufacturer's written instructions.

END OF SECTION 08 34 53 00

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SECTION 08 34 53 00a - SECURITY GRILLES

DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for security grilles. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

GENERAL

System Description

1. Performance Requirements: Comply with following:
 - a. Performance Tests: Conducted by accredited independent testing laboratory in accordance with specified requirements in this Section.
 - 1) Source Quality Control Performance Tests: Conducted in shop or laboratory by accredited independent laboratory.
 - 2) Field Quality Performance Tests: Conducted in field.
 - b. Test Grilles: Completely assembled grille, including hardware, mounted vertically in accordance with manufacturer's recommendations.
 - 1) Test Grille Size: 914 mm (36 inches) wide by 1 219 mm (48 inches) high.
2. Bar Type Security Grilles:
 - a. Impact Test: Test Grille: Withstand impact force of 111 N (25 foot-pounds) with no breaking of welds or bar separation exceeding 127 mm (5 inches).
 - b. Bar Separation Test: Test Grille: Withstand bar separation test force of 227 kg (500 pounds) with no breaking of welds or bar separation exceeding 127 mm (5 inches).
 - c. Sag Test: If grille is equipped with side (jamb) hinges, Test Grille in Fully Extended Position: Withstand sag load of 34 kg (75 pounds) with permanent set after load removal not exceeding 1.6 mm (0.063 inch).
 - d. Forced Entry Resistance Test: If grille is equipped with side (jamb) hinges, test in closed position. Grille shall withstand forced entry loads and shall not be rendered openable throughout test.
3. Window Type Security Grilles:
 - a. Operating Force: Operating Panels: Operate with force exceeding 16 kg (35 pounds) after panel is in motion.
 - b. Impact Test: Test Grille: Withstand impact force of 111 N (25 foot-pounds). Sheet of double strength glass placed 76 mm (3 inches) behind grille material shall remain uncracked or unbroken after impact. No damage occurs that would allow entry through grille.
 - c. Forced Entry Resistance Test: If grille is operable, test grille in closed position. Grille shall withstand forced entry loads and shall not be rendered openable throughout test.
4. Child Guard Security Grilles:
 - a. Impact Test: Test Grille: Withstand impact force of 67 N (15 foot- pounds) with no weld or fastener breakage or bar separation exceeding 127 mm (5 inches).
 - b. Bar Separation Test: Withstand bar separation test force of 23 kg (50 pounds) with no weld or fastener breakage or bar separation exceeding 127 mm (5 inches).
5. Security Guard Security Grilles:
 - a. Impact Test: Test Grille in Fully Extended Position: Withstand impact force of 111 N (25 foot-pounds) with no weld or fastener breakage or bar separation exceeding 127 mm (5 inches).
 - b. Bar Separation Test: Withstand bar separation test force of 23 kg (50 pounds) with no breaking of welds or bar separation exceeding 127 mm (5 inches).

- c. Sag Test: If grille is operable and equipped with side (jamb) hinges, test grille in fully extended position. Grille shall withstand sag load of 34 kg (75 pounds) with permanent set after load removal not exceeding 1.6 mm (0.063 inch).
- d. Forced Entry Resistance Test: If grille is operable, test grille in closed position. Grille shall withstand forced entry loads and shall not be rendered openable throughout test.

Submittals

- 6. Product Data:
- 7. Shop Drawings:
 - a. Include standard details showing recommendations for installation.
 - b. Include size of fasteners, maximum spacing from each end, center-to-center spacing on all four sides, minimum penetration of fasteners into load-bearing material and maximum clearance between frame and rough opening.
- 8. Samples: Submit full set of finish color samples for color selection.
- 9. Quality Assurance/Control Submittals:
 - a. Test Reports: Results of testing by accredited independent laboratory demonstrating compliance of security grilles with specified performance requirements.
 - b. Certificates: Manufacturer's written certification that security grilles meet or exceed specified performance requirements.
- 10. Closeout Submittals:
 - a. Special warranty.

Quality Assurance

- 11. Certifications: Comply with ANSI Z34.2.
- 12. Regulatory Requirements:
 - a. Egress Requirements and Fireman Access: Comply with applicable codes and regulations.
 - 1) Accessibility: Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
- 13. Mock-ups: For Supply and Install Contract: Install one full size mock-up of each type of security grille with specified finish for acceptance.
 - a. Locations: As directed.
 - b. Approved Mock-ups: Standard for rest of work.
 - c. Approved Mock-ups: May remain part of completed project.

Delivery, Storage, And Handling

- 14. Packing, Shipping, Handling, and Unloading: Pack materials at manufacturing plant to prevent damage during shipping.
- 15. Acceptance at Site: Inspect security grilles upon delivery. Replace damaged or defective materials before installation.
- 16. Storage and Protection: Store security grilles in manner to protect from weather and other damage.

Project Conditions

- 17. Field Measurements: Field measure openings for security grilles before start of fabrication.

Scheduling And Sequencing

- 18. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

Warranty

- 19. Special Warranty: Provide one year written covering materials and installation for security grilles.

- a. Warranty: Include coverage of hardware.
- b. Contractor: Agrees to supply and install, free of charge, any required replacement parts or complete replacement security grille.

PRODUCTS

Security Grilles: KANE Screens, or approved equivalent.

- 20. General: Type(s) and size(s) indicated, specified, or scheduled with necessary hardware, anchors and equipment.
 - a. Egress Requirements and Fireman Access: Comply with applicable codes and regulations.
- 21. Materials:
 - a. Aluminum: ASTM B 221 commercial quality and of proper alloy for grille construction, free from defects impairing strength and/or durability.
 - 1) Zinc Limit: 3.0 percent in order to assure that cladding is anodic to core.
 - 2) Aluminum Extrusions: Minimum ultimate tensile strength of 151 600 kPa (22,000 PSI) and maximum yield strength of 110 300 kPa (16,000 PSI).
 - b. Steel :
 - 1) Shapes, Plates and Bars: ASTM A 36 or ASTM A 569.
 - 2) Steel Pipe: ASTM A 53.

Accessories

- 22. Hardware: Designed to perform functions for which it is intended and securely attached to grille.
 - a. Operable Grilles: Equipped with locks capable of meeting specified forced-entry requirements.
 - b. Locks: Releasable from interior but properly guarded to prevent access from exterior when window is open.
- 23. Anchoring Devices Used in Erection of Grilles: Nonmagnetic stainless steel or other noncorrosive material compatible with grille.
 - a. Anchors Exposed when Grille is Closed and Locked: Non-removable security type.
- 24. Fasteners:
 - a. Screws, Nuts, Washers, Bolts, Rivets, and Other Miscellaneous Fastening Devices Incorporated in Grilles: Nonmagnetic stainless steel or other corrosion resistant materials compatible with security grille and of sufficient strength to perform functions for which they are used.
 - b. Fasteners Concealed when Grille is installed and Closed: Magnetic stainless steel having chromium content of not less than 16 percent.
 - c. Fasteners Concealed when Grille is installed and Open: ASTM B 766 cadmium plated steel, ASTM B 633 zinc plated steel, or ASTM B 456 nickel or chrome plated steel.

Fabrication

- 25. Security Grilles: Fabricated of aluminum or steel and assembled in secure and workmanlike manner to perform as specified and to assure neat construction.
 - a. Welding or Brazing Flux: Completely removed immediately upon completion of welding or brazing operation.
 - b. Grilles: Constructed to reject passage of 102 mm (4 inch) diameter sphere at every space and interval when installed.
 - c. Grille Swing Width for Side Mounting: Maximum of 900 mm (3 feet). For opening in excess of 900 mm (3 feet), provide combination of fixed and operable grilles.
 - d. Grilles: Meet or exceed specified performance requirements in this Section.
 - e. Grilles: Comply with applicable fire codes.
- 26. Bar Type Security Grilles: Constructed of rigid aluminum or steel bars and of construction to meet or exceed specified performance requirements in this Section.
 - a. Fixed and Operable Bar Type Security Grilles: May be jamb or side hinged for egress.
- 27. Window Type Security Grilles: Constructed of aluminum or steel frame with two movable vent frames.

- a. Vent Frames: Glazed with vinyl coated expanded carbon steel, No. 9 - 38 mm (1-1/2 inch) diamond pattern or equal.
 - b. Grilles: Constructed in manner to meet or exceed specified performance requirements in this Section.
28. Child Guard Security Grilles: Constructed of aluminum or steel bar or tubes and constructed to adjust and mount to exterior track of existing double or single hung windows.
- a. Grilles: Constructed in manner to meet or exceed specified performance requirements in this Section.
29. Security Guard Security Grilles: Constructed of aluminum or steel bars or tubes and constructed to adjust and mount to exterior of existing double or single hung window.
- a. Fixed and Operable Window Guard Security Grilles: May be jamb or side hinged, or top hinged, for egress.
 - b. Grilles: Constructed in manner to meet or exceed specified performance requirements in this Section.

Finishes

30. Grilles: Factory applied baked on enamel painted finish.
- a. Exposed Surfaces: Clean and free from serious surface blemishes.
 - b. Dress and finish exposed welded joints.
 - c. Steel: Rust resistive primer under baked on enamel.
 - d. Color: As selected from manufacturer's standard colors.

Source Quality Control

31. Testing: Performed by accredited independent testing laboratory. Use following HUD test procedures to determine if security grilles comply with specified performance requirements in this Section:
32. Sag Test for Side Mounted Grilles: Mount test grille into rigid frame to prevent movement of grille frame during loading.
- a. Fully Assembled Grille: Opened to 90 degrees or to its open stop.
 - b. Test Load: Applied vertically at point 760mm (30 inches) from face of frame on operating portion of grille.
 - c. Load: Maintained for period of 3 minutes.
 - d. After removal of load, measure permanent sag at point of load application.
33. Impact Test: Mount test grille into rigid frame per manufacturer's recommendations.
- a. One Impact: Made at center of grille or point deemed most susceptible to impact by testing agency.
 - b. Application of Impact Load: Made using 275 mm (11 inch) diameter sphere on free-swinging pendulum.
 - c. Impact: Made at bottom of pendulum arc.
 - d. Impact for Window Type Grille: Made at center of interior sash.
34. Bar Separation Test: Subject test grille to separation test at its weakest point of resistance.
- a. Separation Load: Applied by means of pneumatic or hydraulic cylinder with adequate controls to apply load slowly to avoid quick impact.
 - b. Load: Maintained for period of 10 seconds before release.
35. Forced Entry Resistance Test: Mount test grille into rigid frame to prevent movement of grille during test.
- a. Test Loads: Applied at point within 150 mm (6 inches) of locking mechanism in direction tending to open grille.
 - b. Load A of 34 kg (75 pounds) and Load B of 68 kg (150 pounds): Applied simultaneously, held for 10 seconds and released.
 - c. Load A of 34 kg (75 pounds): Applied vertically upward.
 - d. Load B of 68 kg (150 pounds): Applied perpendicular to face of grille in opening direction.
 - e. Load C of 34 kg (75 pounds): Applied horizontally from load point toward jamb opposite load.

EXECUTION

Examination

36. Site Verification of Conditions:
 - a. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - b. Existing Conditions: Examine openings before beginning installation.
 - c. Do not proceed with installation until conditions are satisfactory.

Preparation

37. Protection: Protect adjacent elements from damage and disfiguration in accordance with Detailed Scope of Work.
 - a. Contractor: Responsible for damage to grounds, plantings, buildings and any other facilities or property caused by construction operations.
 - b. Repair or replace damaged elements in accordance with Detailed Scope of Work.
38. Existing Security Grilles: Remove existing grilles and debris from site in accordance with Detailed Scope of Work.
39. Preparation: Prepare openings and existing frames as required to comply with Performance Requirements.

Installation

40. General: Install in accordance with manufacturer's recommendations, Reference Standards, and approved Shop Drawings to comply with Performance Requirements.
 - a. Security Grilles: Securely anchor in place to straight, plumb and level condition, without distortion.
 - b. Egress Requirements and Fireman Access: Comply with applicable codes and regulations.
41. Dissimilar Materials: Isolate materials from incompatible materials as necessary to prevent deterioration.
 - a. Separate dissimilar metals with bituminous paint, suitable sealant, non-absorptive plastic or elastomeric tape, or gasket between surfaces.
 - 1) Coat aluminum in direct contact with concrete, masonry, steel, or other non-compatible materials with bituminous paint, zinc chromate primer, or other suitable insulating material.

Field Quality Control

42. Field Testing: Contractor shall have field testing of installed security grilles conducted by a testing agency in accordance with performance test described under Performance Requirements in this Section and Source Quality Control in this Section. Tests will be modified as required for field conditions.
 - a. Contractor: Provide incidental labor facilities necessary to facilitate inspections and tests.
 - b. Costs of Testing:
 - 1) By Contractor: Initial tests with failures and subsequent tests as required because of test failures. Costs shall include costs of Architect/Engineer and other consultants for observations of tests and corrective work.
 - c. Corrective Measures: Meet standards of quality of specified security grille and subject to acceptance of the Owner.

Adjusting And Cleaning

43. Adjusting: At completion of job, check, adjust, and lubricate hardware as required and leave security grilles and hardware in proper operating condition.
44. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean security grilles after installation is completed to remove foreign matter and surface blemishes.
 - b. Scratched or Abraded Surfaces: Touch-up with rust inhibitor primer and enamel paint compatible with factory finish.

Protection

08 - Openings



45. Installed Work: Protect security grilles from damage after installation.

END OF SECTION 08 34 53 00a

Task	Specification	Specification Description
08 34 53 00	08 11 63 13a	Security Window Screens and Doors

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SECTION 08 34 73 00 - SOUND CONTROL DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for sound-control door assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Steel sound-control doors.
 - b. Wood sound-control doors.
 - c. Steel frames and sound-control seals.

C. Submittals

1. Product Data: For each type of product indicated. Include sound ratings, construction details, material descriptions, core descriptions, fire-resistance rating, temperature-rise ratings, and finishes.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood doors comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body, **as directed**.
 - b. Product Data for Credit EQ 4.4: For adhesives and composite wood products, indicating that product contains no urea formaldehyde.
3. Shop Drawings: Include the following:
 - a. Elevations of each door design.
 - b. Details of sound-control seals, door bottoms, and thresholds.
 - c. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - d. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - e. Locations of reinforcement and preparations for hardware.
 - f. Details of each different wall opening condition.
 - g. Details of anchorages, joints, field splices, and connections.
 - h. Details of accessories.
 - i. Details of moldings, removable stops, and glazing.
 - j. Details of conduit and preparations for power, signal, and control systems.
4. Samples:
 - a. Finishes: For each type of exposed finish required, prepared on Samples of not less than **3 by 5 inches (75 by 125 mm)**.
 - b. Doors: Include section of vertical-edge, top, and bottom construction; automatic door bottom or gasket; core construction; glazing; and hinge and other applied hardware reinforcement.
 - c. Frames: Include profile, corner joint, floor and wall anchors, and seals. Include separate section showing fixed sound panels if applicable.
5. Schedule: Provide a schedule of sound-control door assemblies prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with the Door Hardware Schedule.
6. Qualification Data: For qualified Installer, manufacturer, and acoustical testing agency.
7. Product Certificates: For each type of sound-control door assembly, from manufacturer.
8. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of sound-control door assembly.
9. Field quality-control reports.
10. Maintenance Data: For sound-control door assemblies to include in maintenance manuals.

11. Warranty: Samples of special warranty.

D. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
2. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
3. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.
4. Source Limitations: Obtain sound-control door assemblies, including doors, frames, sound-control seals, hinges (when integral for sound control), thresholds, and other items essential for sound control, from single source from single manufacturer.
5. Sound Rating: Provide sound-control door assemblies identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, and have the following minimum rating:
 - a. STC Rating: As indicated on Drawings **OR** As indicated in the Door Schedule, **as directed**, as determined by ASTM E 413 when tested in an operable condition according to ASTM E 90 and ASTM E 1408.
6. Forest Certification: Provide doors made with cores **OR** veneers **OR** not less than 70 percent of wood products **OR** all wood products, **as directed**, obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
7. Fire-Rated Door Assemblies: Assemblies listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
8. Smoke- and Draft-Control Door Assemblies: Where indicated **OR** At corridors, smoke barriers, and smoke partitions, **as directed**, provide assemblies tested according to UL 1784.
 - a. Air-Leakage Rate: Maximum air leakage of **0.3 cfm/sq. ft. (3 cu. m/m x sq. m)** at the tested pressure differential of **0.3-inch wg (75 Pa)** of water.
9. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - a. Provide additional protection to prevent damage to finish of factory-finished wood doors.
2. Shipping Spreaders: Deliver welded frames with two removable spreader bars across bottom of frames, tack welded or mechanically attached to jambs and mullions.
3. Store doors and frames under cover at Project site. Place units in a vertical position with heads up, spaced by blocking, on minimum **4-inch- (100-mm-)** high, wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber.
 - a. If wrappers on doors become wet, remove cartons immediately. Provide a minimum of **1/4-inch (6-mm)** space between each stacked door to permit air circulation.

F. Project Conditions

1. Environmental Limitations: Do not deliver or install wood sound-control wood doors until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
2. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

G. Coordination

1. Coordinate installation of anchorages for sound-control door assemblies. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound-control door assemblies that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure to meet sound rating requirements.
 - 2) Faulty operation of sound seals.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal use or weathering.
 - 4) Wood doors that are warped (bow, cup, or twist) more than **1/4 inch (6 mm)** in a **42-by-84-inch (1067-by-2134-mm)** section, or show telegraphing of core construction in face veneers exceeding **0.01 inch in a 3-inch (0.25 mm in a 75-mm)** span.
 - b. Warranty Period for Steel Doors: Five years from date of Final Completion.
 - c. Warranty Period for Wood Doors: Two years from date of Final Completion.

1.2 PRODUCTS

A. Steel Sound-Control Doors

1. Description: Provide flush-design sound-control doors, **1-3/4 inches (44 mm)** thick, of seamless construction; with manufacturer's standard sound-retardant core as required to provide STC **OR** STC and fire, **as directed**, rating indicated. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges. Fabricate according to ANSI/NAAMM-HMMA 865.
 - a. Exterior Doors: Fabricate from metallic-coated steel sheet **0.052-inch (1.32-mm)** nominal thickness, or thicker as required to provide STC rating indicated.
 - b. Interior Doors: Fabricate from cold-rolled steel sheet unless otherwise indicated, **0.048-inch (1.21-mm)** nominal thickness, or thicker as required to achieve STC rating indicated.
 - c. Loose Stops for Glazed Lites in Doors: Same material as face sheets.
 - d. Top and Bottom Channels: Closed with continuous channels of same material as face sheets, spot welded to face sheets not more than **6 inches (150 mm)** o.c.
 - e. Hardware Reinforcement: Same material as face sheets.
2. Materials:
 - a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - b. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
 - c. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with **G60 (Z180)** zinc (galvanized) or **A40 (ZF120)** zinc-iron-alloy (galvannealed) coating designation.
 - d. Glazing: As required by sound-control door assembly manufacturer to comply with sound-control **OR** sound-control and fire-rated-door labeling, **as directed**, requirements.
3. Finishes:
 - a. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1) Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 - b. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with ANSI/SDI A250.3 for performance and acceptance criteria.

- 1) Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

B. Wood Sound-Control Doors

1. Description: Provide flush-design sound-control doors, **1-3/4 inches (44 mm)** thick; with manufacturer's standard sound-retardant core as required to provide STC **OR** STC and fire, **as directed**, rating indicated. Fabricate according to WDMA 1.S.1-A.
2. Materials: Comply with Division 08 Section(s) "Flush Wood Doors" **OR** "Stile And Rail Wood Doors", **as directed**, for grade, faces, veneer matching, fabrication, finishing, and other requirements unless otherwise indicated.
 - a. Glazing: As required by sound-control door assembly manufacturer to comply with sound-control **OR** sound-control and fire-rated-door labeling, **as directed**, requirements.
3. Finishes:
 - a. Factory finish sound-control wood doors to match doors specified in Division 08 Section(s) "Flush Wood Doors" **OR** "Stile And Rail Wood Doors", **as directed**.

C. Sound-Control Panels

1. Provide sound-control panels of same materials, construction, sound rating, and finish as specified for adjoining sound-control steel **OR** wood, **as directed**, doors.

D. Sound-Control Frames

1. Description: Fabricate sound-control door frames with corners mitered, reinforced, and continuously welded full depth and width of frame. Fabricate according to ANSI/NAAMM-HMMA 865.
 - a. Weld frames according to NAAMM-HMMA 820.
 - b. Exterior Frames: Fabricate from metallic-coated steel sheet **0.079-inch (2.01-mm)** nominal thickness, or thicker as required to provide STC rating indicated.
 - c. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, **0.075-inch (1.90-mm)** nominal thickness, or thicker as required to provide STC rating indicated.
 - d. Sound-Control Panel Stops: Formed integral with frames, a minimum of **5/8 inch (16 mm)** high, unless otherwise indicated.
 - e. Hardware Reinforcement: Fabricate according to ANSI/NAAMM-HMMA 865 of same material as face sheets.
 - f. Head Reinforcement: Reinforce frames with metallic-coated steel channel or angle stiffener, **0.108-inch (2.74-mm)** nominal thickness, welded to head.
 - g. Jamb Anchors:
 - 1) Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than **0.064-inch (1.63-mm)** nominal thickness metallic-coated steel with corrugated or perforated straps not less than **2 inches (50 mm)** wide by **10 inches (250 mm)** long; or wire anchors not less than **0.156 inch (4.0 mm)** thick.
 - 2) Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than **0.048-inch (1.21-mm)** nominal thickness uncoated steel unless otherwise indicated.
 - 3) Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum **3/8-inch-(9.5-mm-)** diameter, metallic-coated steel bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
 - h. Floor Anchors: Not less than **0.079-inch (2.01-mm)** nominal thickness metallic-coated steel, and as follows:
 - 1) Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2) Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than **2-inch (50-mm)** height adjustment. Terminate bottom of frames at finish floor surface.
 - i. Ceiling Struts: Minimum **3/8-inch-thick by 2-inch- (9.5-mm-thick by 50-mm-)** wide uncoated steel unless otherwise indicated.
 - j. Plaster Guards: Metallic-coated steel sheet, not less than **0.026 inch (0.6 mm)** thick.

2. Materials:
 - a. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - b. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
 - c. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with **G60 (Z180)** zinc (galvanized) or **A40 (ZF120)** zinc-iron-alloy (galvannealed) coating designation.
 - d. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.
 - e. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M or ASTM F 2329.
 - f. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching sound-control door frames of type indicated.
 - g. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.
3. Finishes:
 - a. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1) Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 - b. Factory-Applied Paint Finish: Manufacturer's standard primer and finish coats, complying with ANSI/SDI A250.3 for performance and acceptance criteria.
 - 1) Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

E. Sound-Control Hardware

1. Description: Provide manufacturer's standard sound-control system, including head and jamb seals, door bottoms, cam-lift hinges, and thresholds, as required by testing to achieve STC **OR** STC and fire, **as directed**, rating indicated.
 - a. Compression Seals: One-piece units; consisting of closed-cell sponge neoprene seal held in place by metal retainer; with retainer cover of same material as door frame; attached to door frame with concealed screws.
OR
Magnetic Seals: One-piece units; consisting of closed-cell sponge neoprene seal and resiliently mounted magnet held in place by metal retainer; with retainer cover of same material as door frame; attached to door frame with concealed screws.
 - b. Automatic Door Bottoms: Neoprene or silicone gasket, held in place by metal housing, that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.
 - 1) Mounting: Mortised or semimortised into bottom of door or surface mounted on face of door as required by testing to achieve STC rating indicated.
OR
Door Bottoms: Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.
 - c. Cam-Lift Hinges: Full-mortise template type that raises door **1/2 inch (13 mm)** when door is fully open; with hardened pin; fabricated from stainless steel.
 - d. Thresholds: Flat, smooth, unfluted type as recommended by manufacturer; fabricated from aluminum **OR** stainless steel **OR** solid wood matching wood door faces, **as directed**.
 - 1) Finish: Clear **OR** Color, **as directed**, anodic finish.
 - 2) Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
2. Other Hardware: Comply with requirements in Division 08 Section "Door Hardware".

- F. Sound-Control Accessories
1. Glazing: Comply with requirements in Division 08 Section "Glazing"
 2. Grout: Comply with ASTM C 476, with a slump of not more than **4 inches (102 mm)** as measured according to ASTM C 143/C 143M.
 3. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for **15-mil (0.4-mm)** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- G. Fabrication
1. Sound-Control Steel Door Fabrication: Sound-control doors to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal.
 - a. Seamless Edge Construction: Fabricate doors with faces joined at vertical edges by welding; welds shall be ground, filled, and dressed to make them invisible and to provide a smooth, flush surface.
 - b. Exterior Doors: Close top edges flush and seal joints against water penetration. Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
 - c. Glazed Lites: Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated. Provide fixed stops and moldings welded on secure side of door.
 - d. Hardware Preparation: Factory prepare sound-control doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in "Door Hardware".
 - 1) Reinforce doors to receive nontemplated mortised and surface-mounted door hardware.
 - 2) Locate door hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
 - e. Tolerances: Fabricate doors to tolerances indicated in ANSI/NAAMM-HMMA 865.
 2. Sound-Control Wood Door Fabrication: Factory fit doors to suit frame-opening sizes indicated, with uniform clearances and bevels according to referenced quality standard, unless otherwise indicated. Comply with final door hardware schedules and hardware templates.
 - a. Comply with clearance requirements in NFPA 80 for fire-rated doors.
 - b. Locate door hardware as indicated, or if not indicated, according to DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 1) Coordinate measurements of hardware mortises in steel frames to verify dimensions and alignment before factory machining.
 3. Sound-Control Frame Fabrication: Fabricate sound-control frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
 - a. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
 - b. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - c. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - d. Jamb Anchors: Provide number and spacing of anchors as follows:
 - 1) Masonry Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - a) Two anchors per jamb up to **60 inches (1524 mm)** in height.
 - b) Three anchors per jamb from **60 to 90 inches (1524 to 2286 mm)** in height.

- c) Four anchors per jamb from **90 to 96 inches (2286 to 2438 mm)** in height.
- d) Four anchors per jamb plus one additional anchor per jamb for each **24 inches (610 mm)** or fraction thereof more than **96 inches (2438 mm)** in height.
- 2) Stud Wall Type: Locate anchors not more than **18 inches (457 mm)** from top and bottom of frame. Space anchors not more than **32 inches (813 mm)** o.c. and as follows:
 - a) Three anchors per jamb up to **60 inches (1524 mm)** in height.
 - b) Four anchors per jamb from **60 to 90 inches (1524 to 2286 mm)** in height.
 - c) Five anchors per jamb from **90 to 96 inches (2286 to 2438 mm)** in height.
 - d) Five anchors per jamb plus one additional anchor per jamb for each **24 inches (610 mm)** or fraction thereof more than **96 inches (2438 mm)** in height.
 - e) Two anchors per head for frames more than **42 inches (1066 mm)** wide and mounted in metal stud partitions.
- 3) Postinstalled Expansion Type: Locate anchors not more than **6 inches (152 mm)** from top and bottom of frame. Space anchors not more than **26 inches (660 mm)** o.c.
- e. Head Reinforcement: For frames more than **48 inches (1219 mm)** wide, provide continuous head reinforcement for full width of opening, welded to back of frame at head.
- f. Hardware Preparation: Factory prepare sound-control frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping, according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware".
 - 1) Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
 - 2) Locate hardware as indicated, or if not indicated, according to NAAMM-HMMA 831, "Recommended Hardware Locations for Custom Hollow Metal Doors and Frames."
- g. Plaster Guards: Weld guards to frame at back of hardware cutouts and glazing-stop screw and sound-control seal preparations to close off interior of openings in frames to be grouted.
- h. Tolerances: Fabricate frames to tolerances indicated in ANSI/NAAMM-HMMA 865.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of sound-control door assemblies.
2. Examine roughing-in for embedded and built-in anchors to verify actual locations of sound-control door frame connections before frame installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
2. Prior to installation and with installation spreaders in place, adjust and securely brace sound-control door frames to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a perpendicular line from head to floor.

3. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

C. Installation

1. General: Install sound-control door assemblies plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
2. Frames: Install sound-control door frames in sizes and profiles indicated.
 - a. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - 1) At fire-rated openings, install frames according to NFPA 80.
 - 2) At openings requiring smoke and draft control, install frames according to NFPA 105.
 - 3) Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.
 - 4) Install sound-control frames with removable glazing stops located on secure side of opening.
 - 5) Remove temporary braces only after frames or bucks have been properly set and secured.
 - 6) Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
 - 7) Apply corrosion-resistant coatings coating to backs of frames to be filled with mortar, grout, and plaster containing antifreezing agents.
 - b. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor and secure with postinstalled expansion anchors.
 - 1) Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors, if so indicated and approved on Shop Drawings.
 - c. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
 - d. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - e. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - f. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
 - g. Grouted Frames: Solidly fill space between frames and substrate with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
 - h. Installation Tolerances: Adjust sound-control door frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1) Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2) Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of wall.
 - 3) Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4) Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a perpendicular line from head to floor.
3. Doors: Fit sound-control doors accurately in frames, within clearances indicated below. Shim as necessary.

- a. Non-Fire-Rated Doors: Fit non-fire-rated doors accurately in frames with the following clearances:
 - 1) Jamb: 1/8 inch (3 mm).
 - 2) Head with Butt Hinges: 1/8 inch (3 mm).
 - 3) Head with Cam-Lift Hinges: As required by manufacturer, but not more than 3/8 inch (9.5 mm).
 - 4) Sill: Manufacturer's standard.
 - 5) Between Edges of Pairs of Doors: 1/8 inch (3 mm).
 - b. Fire-Rated Doors: Install fire-rated doors with clearances according to NFPA 80.
 4. Sound-Control Seals: Where seals have been prefit and preinstalled in the factory and subsequently removed for shipping, reinstall seals and adjust according to manufacturer's written instructions.
 5. Cam-Lift Hinges: Install hinges according to manufacturer's written instructions.
 6. Thresholds: Set thresholds in full bed of sealant complying with requirements in Division 7 Section "Joint Sealants."
 7. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with sound-control door assembly manufacturer's written instructions.
 - a. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c., and not more than 2 inches (50 mm) o.c. from each corner.
- D. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Testing Services: Acoustical testing and inspecting agency shall select one sound-control door at random from sound-control door assemblies that are completely installed and perform testing for verification that assembly complies with STC rating requirements.
 - a. Field tests shall be conducted according to ASTM E 336, with results calculated according to ASTM E 413. Acceptable field STC values shall be within 5 dB of laboratory STC values.
 - b. Inspection Report: Acoustical testing agency shall submit report in writing to the Owner and Contractor within 24 hours after testing.
 - c. If tested door fails, replace or rework all sound-control door assemblies to bring them into compliance at Contractor's expense.
 - 1) Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 3. Prepare test and inspection reports.
- E. Adjusting And Cleaning
1. Final Adjustments: Check and adjust seals, door bottoms, and other sound-control hardware items right before final inspection. Leave work in complete and proper operating condition.
 2. Remove and replace defective work, including defective or damaged sound seals and doors and frames that are warped, bowed, or otherwise unacceptable.
 - a. Adjust gaskets, gasket retainers, and retainer covers to provide contact required to achieve STC rating.
 3. Clean grout off sound-control door frames immediately after installation.
 4. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.
 5. Metallic-Coated Surfaces: Clean abraded areas of doors and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 34 73 00

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Task	Specification	Specification Description
08 34 73 13	08 01 11 61	Steel Doors And Frames
08 34 73 13	08 01 11 61a	Steel Entry Doors
08 34 73 13	08 12 13 13	Stainless Steel Doors And Frames
08 34 73 13	08 34 73 00	Sound Control Doors
08 34 73 16	08 34 73 00	Sound Control Doors

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SECTION 08 35 13 13 - FOLDING DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for folding doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Accordion folding doors.
 - b. Panel folding doors.
 - c. Bifold doors.
 - d. Bifold mirror doors.
 - e. Fire-rated folding doors.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, attachments to other work.
 - a. Fire-Release System: Describe system, including testing and resetting instructions.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For each exposed product and for each color and texture specified.
4. Product Schedule: For folding doors. Use same designations indicated on Drawings.
5. Product certificates.
6. Maintenance data.

D. Quality Assurance

1. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.
2. Fire-Rated Folding Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing according to NFPA 252 **OR** IBC Standard 716.5 **OR** UL 10B, **as directed**.
 - a. Oversize Fire-Rated Folding Doors: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
3. Project Conditions
 - a. Environmental Limitations: Do not deliver or install folding doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - b. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication

1.2 PRODUCTS

A. Accordion Folding Doors

1. General: Top-supported, horizontal-sliding, manually operated accordion folding doors, with chain controlling the spacing and extension of pantographic or X-type accordion folding frames.

- Inner and outer covers are continuous surface facings that attach to and completely cover the folding frames and are pleated as the door is retracted.
2. Outer Covering: Of type indicated below, complying with indicated surface-burning characteristics; attached to door support frames in a concealed manner at sufficient intervals to prevent sagging and separation and to permit on-site removal and repair, with vertical seams located in valleys and material hemmed at top and bottom.
 - a. Vinyl reinforced with woven backing weighing not less than **20 oz./linear yd. (567 g/m)**.
 - 1) Color, Texture, and Pattern: As selected from manufacturer's full range.
 - b. Fabric weighing not less than **16 oz./linear yd. (496 g/m)**, treated to resist stains.
 - 1) Color, Texture, and Pattern: As selected from manufacturer's full range.
 - c. Manufacturer's standard nonwoven carpet, needle punched with fused fibers to prevent unraveling.
 - 1) Color, Texture, and Pattern: As selected from manufacturer's full range.
 3. Sweep Seals: Manufacturer's standard top and bottom sweep seals on both **OR** one, **as directed**, side(s).
 4. Carriers: Four-wheel carriers at lead post and two-wheel carriers at intermediate spacing, as necessary for size and weight of partition, to ensure secure, easy, and quiet operation.
 - a. Doors **96 Inches (2438 mm)** High or Less: Nylon wheels on steel shafts.
 - b. Doors More Than **96 Inches (2438 mm)** High: Ball-bearing wheels with nylon tread and steel shafts.
 5. Tracks: Manufacturer's standard metal track made of extruded aluminum or formed steel with factory-applied, corrosion-resistant finish. Limit track deflection, independent of structural supporting system, to no more than 80 percent of bottom clearance. Design and fabricate track to support accordion folding doors and enable their operation without damage to track, folding unit, or adjacent surfaces; complying with the following requirements:
 - a. Head Trim: Prefinished wood molding for surface-mounted tracks.
 - b. Center stop for center-opening partitions.
 - c. Galvanized-steel sheet or aluminum subchannel for forming pocket for recessed suspension track.
 - d. Metal ceiling contact guard to protect finished ceiling surface from damage by moving top sweep seals; with finish matching other exposed metal.
 - e. Curved track sections with ceiling clips to accommodate configuration indicated.
 - f. Glide switch to divert door to auxiliary track.
 - g. Pivot switch to change track direction.
 - h. Cross-track switch to allow one door to cross another.
 6. Hardware: Manufacturer's standard heavy-duty, manually operated metal pulls and latches as follows:
 - a. Finish: Clear-anodized aluminum **OR** Satin stainless steel **OR** Dull chromium-finish brass **OR** Dull chromium-finish steel, **as directed**.
 - b. Latch: Operable from both **OR** one, **as directed**, side(s) of closed door with coin-slot release on opposite side, **as directed**.
 - c. Lock: Manufacturer's standard key-operated cylinder lock, operable from both sides **OR** Manufacturer's standard key-operated cylinder lock, operable from one side; privacy lock on other side **OR** Deadlock to receive cylinder, operable from both sides. Refer to Division 08 Section "Door Hardware" for cylinder requirements **OR** Deadlock to receive cylinder, operable from both sides, **as directed**.
 - d. Foot bolts on lead post where indicated. Secure to post to avoid interference with seals.
 7. Jamb Molding: Manufacturer's standard wood or metal molding at closing jamb as required for light-tight jamb closure.
 8. Lead Posts and Jamb Posts: Not less than **0.048-inch- (1.2-mm-)** thick steel **OR** extruded aluminum, **as directed**, formed for rigidity and light seal at supporting construction.
 - a. Nonferrous jamb strip for single-operating partitions to ensure tight closure by engaging rubber bumper on lead post.
 9. Meeting Post: Fixed single jamb for single-stacked doors **OR** Center meeting post for center-opening doors, **as directed**.

10. Stacking: Tiebacks to maintain door in stacked position.
11. Stacking Configuration: Stack single doors at one end of opening **OR** center-opening doors at both ends of opening **OR** doors in pockets with hinged pocket doors, **as directed**.
12. Opening Size: As directed or as indicated on Drawings.

B. Panel Folding Doors

1. General: Top-supported, horizontal-sliding, manually operated panel folding doors, with panels joined by continuous hinge connectors for the full height of panels.
2. Core Material and Thickness: Manufacturer's standard.
3. Panel Width: **4-inch (100-mm) OR 5-inch (125-mm) OR 6-inch (150-mm) OR 8-inch (200-mm), as directed**, nominal width.
4. Panel Facing: Facings that comply with indicated surface-burning characteristics.
 - a. Vinyl Facing: Vinyl not less than **7 mils (0.175 mm)** thick, factory bonded to core.
 - 1) Color and Texture: As selected from manufacturer's full range.
 - b. Vinyl Facing with Woven Backing: Vinyl reinforced with woven backing weighing not less than **12 oz./linear yd. (372 g/m)**, factory bonded to core.
 - 1) Color and Texture: As selected from manufacturer's full range.
 - c. Plastic-Laminate Facing: Grade VGS, high-pressure plastic laminate complying with NEMA LD 3; adhesive applied under pressure to core.
 - 1) Color, Texture, and Pattern: As selected from manufacturer's full range.
 - d. Wood-Veneer Facing: as directed by the Owner, wood veneer, laminated to core, with manufacturer's standard clear **OR** stained, **as directed**, transparent finish.
 - 1) Stain Color: As selected from manufacturer's full range.
5. Carriers: Four-wheel carriers at lead post and two-wheel carriers at intermediate spacing, as necessary for size and weight of partition, to ensure secure, easy, and quiet operation.
 - a. Panels **5 Inches (125 mm)** Wide or Less: Nylon wheels and axles.
 - b. Panels More Than **5 Inches (125 mm)** Wide: Ball-bearing wheels with nylon tread and steel shafts.
6. Tracks: Manufacturer's standard surface-mounted **OR** recessed, **as directed**, extruded-aluminum or steel track with factory-applied, corrosion-resistant finish. Limit track deflection, independent of structural supporting system, to no more than 80 percent of bottom clearance. Design and fabricate track to support operation without damage to track, folding unit, or adjacent surfaces; complying with the following requirements:
 - a. Prefinished ceiling guard/channel for recessed tracks.
 - b. Center stop for biparting partitions.
 - c. Galvanized-steel sheet or aluminum subchannel for forming pocket for recessed suspension track.
 - d. Nonferrous jamb strip for single-operating partitions to ensure tight closure by engaging rubber bumper on lead post.
 - e. Curved track sections to accommodate configuration indicated.
 - f. Glide switch to divert door to auxiliary track.
 - g. Pivot switch to change track direction.
 - h. Cross-track switch to allow one door to cross another.
7. Hinge Connector: Manufacturer's standard extruded-vinyl hinge connector.
 - a. Color: As selected from manufacturer's full range **OR** Match or coordinate with facing color, **as directed**.
8. Hardware: Manufacturer's standard heavy-duty, manually operated metal pulls and latches as follows:
 - a. Finish: Clear-anodized aluminum **OR** Satin stainless steel **OR** Dull chromium-finish brass **OR** Dull chromium-finish steel, **as directed**.
 - b. Latch: Operable from both **OR** one, **as directed**, side(s) of closed door.
 - c. Lock: Manufacturer's standard key-operated cylinder lock, operable from both sides **OR** Manufacturer's standard key-operated cylinder lock, operable from one side; privacy lock on other side **OR** Deadlock to receive cylinder, operable from both sides. Refer to Division 08 Section "Door Hardware" for cylinder requirements **OR** Deadlock to receive cylinder, operable from both sides, **as directed**.

- d. Foot bolts on lead post where indicated. Secure to post to avoid interference with seals.
 9. Jamb Molding: Manufacturer's standard wood or metal molding at closing jamb as required for light-tight jamb closure.
 - a. Wood: Match species and finish of panel facing.
 - b. Metal: Manufacturer's standard finish.
 10. Wood Track Molding: Manufacturer's standard wood molding on each side of surface-mounted track to match species and finish of panel facings. Install with tight, hairline joints with all fasteners concealed.
 11. Meeting Post: Fixed single jamb for single-stacked doors **OR** Center meeting post for biparting doors, **as directed**.
 12. Stacking: Tiebacks to maintain door in stacked position.
- C. Bifold Doors
1. General: Metal folding doors hinged together in pairs and supported on pivots at jamb, with floor and overhead track and door guide pins.
 2. Metal Panels: Sizes as indicated, formed from nominal **0.024-inch- (0.6-mm-)** thick, cold-rolled steel sheet. Channel form vertical edges and weld cross bracing to panel and channel-formed edges.
 - a. Surface Profile: Fully louvered **OR** Flush **OR** Paneled **OR** Louvered and paneled, **as directed**.
 - b. Configuration: Two **OR** Four, **as directed**, -panel bifold.
 - c. Sheet Metal Texture: Smooth **OR** Simulated leather, **as directed**.
 - d. Protective Finish: Hot-dip galvanized coating applied to panels, stiffeners, hinges, and decorative trim.
 - e. Baked Finish: Baked-enamel factory finish in white **OR** ivory **OR** custom color as selected, **as directed**.
 3. Hardware: Manufacturer's standard felt pads, screws, and pulls in standard finish. Hinges, pivots, and manufacturer's standard wheels factory installed and as follows:
 - a. Hinges: 3 self-aligning hinges.
 - b. Guides and Pivots: Not less than **5/16-inch- (7.9-mm-)** diameter, adjustable screw-type, weight-bearing, zinc-plated pivot rod held in place by nylon rod clamp assemblies; with not less than **1/4-inch- (6.4-mm-)** diameter, spring-loaded, self-aligning, zinc-plated steel guide rods and top pivot rods held in place by nylon sleeves.
 - c. Track: Prefinished rolled steel with baked-enamel paint finish **OR** Aluminum extrusion, Alloy 6063-T5, **0.05 inch (1.3 mm)** thick, with manufacturer's standard metal finish, **as directed**.
- D. Bifold Mirror Doors
1. General: Folding doors hinged together in pairs and supported on pivots at jamb, with floor and overhead track and door guide pins.
 2. Steel-Panel Door Construction: Sizes as indicated, flush profile, formed from nominal **0.024-inch- (0.6-mm-)** thick, cold-rolled steel sheet. Channel form vertical edges and weld cross bracing to panel- and channel-formed edges. Attach mirrored glass facing to steel sheet by means of mechanically attached channels at top and bottom and by dual-faced cushion tape.
 - a. Configuration: Two **OR** Four, **as directed**, -panel bifold.
 - b. Protective Finish: Hot-dip galvanized coating applied to panels, stiffeners, hinges, and decorative trim.
 - c. Baked Finish: Baked-enamel factory finish in white **OR** custom color as selected, **as directed**.
 3. Metal-Framed Door Construction: Aluminum **OR** Steel, **as directed**, stiles and mechanically fitted rails with screw-attached stiffeners and with mirrored-glass facing attached securely to frames.
 - a. Panel Style: Exposed **OR** Concealed, **as directed**, frame.
 - b. Configuration: Two **OR** Four, **as directed**, -panel bifold.

- c. Baked Finish: Electrostatically applied, baked-enamel factory finish in white **OR** custom color as selected, **as directed**.
 - d. Bright, Reflective Metallic Finish: Chrome **OR** Gold **OR** Selected from manufacturer's full range, **as directed**.
 4. Mirror Facing: Smooth **OR** Beveled, **as directed**, -edged, silvered, mirrored, film-backed safety glass complying with 16 CFR 1201 for Category II safety glass; with ASTM C 1036 for Type I (transparent, flat), Class 1 (clear), Quality q2 (mirror) annealed float glass; with the following:
 - a. Glass Thickness: 3 mm thick for doors up to **84 inches (2133 mm)** in height **OR** 4 mm thick for doors with height more than **84 inches (2133 mm)**, **as directed**.
 - b. Edge Protection: Vertical mirror edges protected by metal **OR** Mylar, **as directed**, trim.
 - c. Film-Backed Safety Mirrors: Apply film backing with pressure-sensitive adhesive coating over mirror-backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.
 5. Hardware: Manufacturer's standard felt pads, screws, and pulls in standard finish. Hinges, pivots, and manufacturer's standard wheels factory installed and as follows:
 - a. Hinges: 3 self-aligning hinges.
 - b. Guides and Pivots: Manufacturer's standard.
 - c. Guides and Pivots: Spring-loaded, zinc-plated steel guides and tops, and adjustable bottom pivot pins with nylon bushings and tips.
 - d. Guides and Pivots: Not less than **5/16-inch- (7.9-mm-)** diameter, adjustable screw-type, weight-bearing, zinc-plated pivot rod held in place by nylon rod clamp assemblies; with not less than **1/4-inch- (6.4-mm-)** diameter, spring-loaded, self-aligning, zinc-plated steel guide rods and top pivot rods held in place by nylon sleeves.
 6. Track: Prefinished rolled steel with baked-enamel paint finish **OR** Aluminum extrusion, Alloy 6063-T5, **0.05 inch (1.3 mm)** thick, with manufacturer's standard metal finish, **as directed**.
- E. Fire-Rated Folding Doors
1. General: Electrically **OR** Gravity-, **as directed**, operated, automatic- or self-closing, UL- or ITS-listed, biparting folding fire-rated assembly; top supported from overhead track or dual tracks without floor guides; complete with hardware, seals, track, closing devices, releasing devices, controls, pocket doors, and accessories necessary for intended operation and complying with the following requirements:
 - a. Assembly remains in normal open (stacked) position. Signal from fire-alarm system initiates self-closing operation.
 - b. Controls allow manual operation in either conventional or emergency mode. When opened manually during emergency mode, control mechanism automatically closes assembly.
 2. Fire Rating: 1 **OR** 1-1/2 **OR** 3, **as directed**, hour(s).
 3. Panel Construction: Formed-steel **OR** Formed stainless-steel, **as directed**, sheet panels connected by formed-steel **OR** formed stainless-steel, **as directed**, hinges.
 4. Fire Insulation:
 - a. Cover interior surface of both series of panels in parallel panel doors with continuous fire-resistive blanket secured to each panel with metal clip system.
 - b. Extend fire insulation from bottom edge of panels to tracks and meet at interior centers of fixed jamb and lead post, forming an effective fire barrier.
 5. Perimeter Seals and Closures: Manufacturer's standard vinyl or neoprene vertical seals, horizontal top and bottom seals, and closures identical to products tested for fire rating indicated, and forming an effective smoke and draft seal.
 6. Track and Trolley System: 1 track or 2 parallel steel tracks on **8-inch (200-mm)** centers, with ball-bearing roller trolleys and adjustable steel hanger rods for overhead support; designed for type of operation, size, and weight of fire-rated folding door indicated. Provide a continuous system of track sections and accessories identical to products tested for fire rating indicated, to accommodate configuration and layout indicated for door operation and storage.
 7. Lead Posts: Formed from not less than **0.026-inch (0.66-mm-)** thick steel **OR** stainless-steel, **as directed**, sheet, connected to door panels by specially adapted panels and equipped with manufacturer's standard handle on each side.
 8. Electric Operators and Controls:

- a. Operators: Factory-assembled power-drive unit consisting of motor, remote-located, **as directed**, control panel, limit switches, torque-limiting devices, clutch, reversing magnetic motor operator, leading-edge obstruction detectors, and key-switch control for conventional operation.
 - 1) Motor: 1/2 hp, controlled by reversing magnetic starter and equipped with overload protection.
 - 2) Limit Switches: To prevent overtravel.
 - 3) Roller Chain or Cable: Connected to lead posts by means of vertical stabilizer bar assembly.
 - 4) Drive Mechanism: Protected by torque limiter and emergency clutch.
 - 5) Travel Speed: **18 inches (450 mm)** per second, maximum; **6 inches (150 mm)** per second, minimum.
 - b. In case of fire, closing system is activated by building's fire- and smoke-detection equipment and automatically closes fire-rated folding doors.
 - c. Electrical Service: Equip for 120 V, single phase, 60-cycle ac.
 - d. Battery: Electrical current connects through relay to battery charger that continuously charges 12-V dc battery and automatically maintains battery at capacity. Automatic audible signal device sounds off if battery falls below or exceeds proper charge, power loss has occurred, or high-ac line voltage has been experienced.
 - e. Leading-Edge Obstruction Detector:
 - 1) Equip with pressure-sensitive leading edge that, on contact with an obstruction, causes door to stop and pause before attempting to re-close.
 - 2) Disable leading-edge obstruction detector until fire-rated folding door has opened pocket door.
 - f. Fire-rated folding doors can be manually opened at any time by pushing against leading edge.
 - g. Audible alarm sounds at automatic closing of door.
9. Accessories:
- a. Vision panels.
 - b. Exit Hardware: Located on both sides of fire-rated folding door. In emergency mode, slight pressure on hardware causes door to open a minimum of **32 inches (812 mm)**, pause for 3 seconds, and then automatically close. Furnish hardware that can be field programmable to allow automatic opening distances of up to the entire opening width. In conventional mode, hardware is used to operate door and move it back into storage pocket.
10. Finishes:
- a. Baked-enamel finish for panels and hinges in colors selected from manufacturer's full range.
 - b. Manufacturer's standard finish for handles.
11. Pocket Door:
- a. Solid-core pocket doors with reverse-action spring **OR** continuous, **as directed**, hinge; 90-degree minimum swing.
 - b. Face Finish: Match adjacent finishes.
 - c. Magnetic Catch: Holding force of no more than **30 lbf (133 N)**.
 - d. Maximum Opening Force: **50 lbf (222 N)**.
 - e. Bumper on interior side of pocket door as required by fire-rated folding door manufacturer to prevent interference with opening or retracting operation of fire-rated folding door.
 - f. Coordinate pocket door sizes with fire-rated folding door manufacturer.

1.3 EXECUTION

A. Preparation

1. For folding doors supported by or anchored to permanent construction, advise installers of specific requirements for placement of anchorage devices. Furnish installers of other work with templates and drawings showing locations of anchorage devices and similar items.
 2. In path of fire-rated folding doors, level floor with header to tolerance of plus or minus **1/16 inch (1.6 mm)** across opening; grind or fill floor as necessary.
- B. Installation**
1. General: Install folding doors complying with manufacturer's written installation instructions. Install track in one piece.
 - a. Comply with NFPA 80 for installing fire-rated folding doors.
 2. Standard Floor Clearances: **1/4 to 3/4 inch (6.4 to 19 mm)** maximum (above floor finish).
 - a. Comply with NFPA 80 for clearances required for fire-rated folding doors.
 3. Coordinate provisions for electrical service, sensing devices, and final connections for fire-rated folding doors.
- C. Adjusting**
1. Adjust units as necessary to ensure smooth, quiet operation without warping or binding. Adjust hardware to function smoothly. Confirm that latches engage accurately and securely without forcing or binding.
 - a. Fire-Rated Folding Doors: Verify that all operations are functional and comply with requirements of authorities having jurisdiction.
 2. Pocket Doors: Adjust to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.
- D. Demonstration**
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fire-rated folding doors.

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SECTION 08 36 13 00 - SECTIONAL OVERHEAD DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for sectional overhead doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes manually **OR** electrically, **as directed**, operated sectional doors with integral pass doors, **as directed**.

C. Performance Requirements

1. General Performance: Sectional doors shall meet performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
2. Delegated Design: Design sectional doors, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Structural Performance: Exterior sectional doors shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Wind Loads: As indicated on Drawings **OR** Uniform pressure (velocity pressure) of **20 lbf/sq. ft. (960 Pa)**, acting inward and outward, **as directed**.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s)**, **as directed**.
 - 2) Exposure Category: **A OR B OR C OR D**, **as directed**.
 - b. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components. Deflection of door in horizontal position (open) shall not exceed 1/120 of the door width.
4. Air Infiltration: Maximum rate not more than indicated when tested according to ASTM E 283 **OR** DASMA 105, **as directed**.
 - a. Air Infiltration: Maximum rate of **0.08 cfm/sq. ft. (0.406 L/s per sq. m)** at **15 and 25 mph (24.1 and 40.2 km/h)**.
5. Windborne-Debris-Impact-Resistance Performance: Provide sectional doors **OR** glazed sectional doors, **as directed**, that pass large-missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and ASTM E 1996 **OR** DASMA 115, **as directed**.
6. Seismic Performance: Sectional doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."
 - b. Seismic Component Importance Factor: **1.5 OR 1.0**, **as directed**.
7. Operation Cycles: Provide sectional door components and operators capable of operating for not less than number of cycles indicated for each door. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.

D. Submittals

1. Product Data: For each type and size of sectional door and accessory.
2. LEED Submittal:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that flush wood doors comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body, **as directed**. Include statement indicating costs for each certified wood product.

3. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
4. Samples: For each exposed product and for each color and texture specified.
5. Delegated-Design Submittal: For sectional doors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Seismic Qualification Certificates: For sectional doors, accessories, and components, from manufacturer.
7. Maintenance data.
8. Warranties: Sample of special warranties.

E. Quality Assurance

1. Wood Door Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
2. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
3. Forest Certification: Provide wood doors made with not less than 70 percent of wood products **OR** all wood products, **as directed**, obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. Standard for Sectional Doors: Fabricate sectional doors to comply with DASMA 102 unless otherwise indicated.
6. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1, **as directed**.

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within Two **OR** Five, **as directed**, years from date of Final Completion.
2. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within 10 years from date of Final Completion.

1.2 PRODUCTS

A. Steel Door Sections

1. Exterior Section Faces and Frames: Fabricate from zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated zinc coating and thickness.
 - a. Fabricate section faces from single sheets to provide sections not more than **24 inches (610 mm)** high and of indicated thickness. Roll horizontal meeting edges to a continuous, interlocking, keyed, rabbeted, shiplap, or tongue-in-groove weathertight seal, with a reinforcing flange return.
 - b. For insulated doors, provide sections with continuous thermal-break construction, separating the exterior and interior faces of door.
2. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than **0.064-inch- (1.63-mm-)** nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than

- 0.064-inch- (1.63-mm-)** thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than **48 inches (1219 mm)** apart.
3. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile and allowing installation of astragal, **as directed**.
 4. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Provide galvanized-steel bars, struts, trusses, or strip steel, formed to depth and bolted or welded in place. Ensure that reinforcement does not obstruct vision lites, **as directed**.
 5. Provide reinforcement for hardware attachment.
 6. Board Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polystyrene or polyurethane board insulation, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84; or with glass-fiber-board insulation. Secure insulation to exterior face sheet. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
 - a. Interior Facing Material:
 - 1) Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.
 - 2) Manufacturer's standard prefinished hardboard panel, **1/8 inch (3 mm)** thick and complying with ANSI A135.5.
 7. Foamed-in-Place Thermal Insulation: Insulate interior of steel sections with door manufacturer's standard CFC-free polyurethane insulation, foamed in place to completely fill interior of section and pressure bonded to face sheets to prevent delamination under wind load, and with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely within steel sections that incorporate the following interior facing material, with no exposed insulation:
 - a. Interior Facing Material:
 - 1) Zinc-coated (galvanized), cold-rolled, commercial steel (CS) sheet, complying with ASTM A 653/A 653M, with indicated thickness.
 - 2) Manufacturer's standard prefinished hardboard panel, **1/8 inch (3 mm)** thick and complying with ANSI A135.5.
 8. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.
- B. Wood Door Sections**
1. Paneled Sections: Fabricate stiles and rails of clear, vertical-grain, straight, kiln-dried Douglas fir, West Coast hemlock, or Sitka spruce, not less than **1-3/4 inches (44 mm)** thick. Form meeting rails to provide rabbeted, weathertight-seal joint.
 - a. Panel Inserts: Tempered hardboard, **1/4 inch (6 mm)** thick, smooth on two sides, complying with ANSI A135.4.
 - b. Glazed Panel Inserts: 6-mm-thick, clear float glass, complying with ASTM C 1036, Type I, Class 1, Quality Q3, with removable glazing stops of same wood as stiles and rails.
 2. Flush Sections: Construct flush wood door sections with top, bottom, and end closures of clear, vertical-grain, straight, kiln-dried Douglas fir, West Coast hemlock, or Sitka spruce. Provide wood blocking to receive hardware, end stiles, and frames for glazing, glued and doweled in place. Form meeting rails to provide rabbeted weathertight-seal joint.
 - a. Core: Manufacturer's standard polystyrene or polyurethane board insulation or honeycomb core complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Bond to facing.
 - b. Facing: **1/8-inch- (3-mm-)** thick, tempered hardboard complying with ANSI A135.4 and smooth on one side.
 3. Fabricate sections of mortise-and-tenon construction with waterproof glue and steel dowels, or of rabbeted construction with waterproof glue and steel dowels and pins.
 4. Reinforce sections with continuous horizontal and diagonal galvanized-steel members as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.

5. Treat wood door members after machining with water-repellent preservative formulation according to WDMA I.S. 4.
6. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, deformation, and delamination.
7. Factory prime door sections with one coat of exterior primer compatible with field-applied finish, applied at a minimum dry film thickness of **1 mil (0.025 mm)**.

C. Aluminum Door Sections

1. Sections: Construct door sections with stiles and rails formed from extruded-aluminum shapes, complying with **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by manufacturer for type of use and finish indicated, with wall thickness not less than **0.065 inch (1.7 mm)** for door section **1-3/4 inches (44 mm)** deep. Fabricate sections with stile and rail dimensions and profiles shown on Drawings. Join stiles and rails by welding or with concealed, **1/4-inch- (6-mm-)** minimum diameter, aluminum or nonmagnetic stainless-steel through bolts, full height of door section. Form meeting rails to provide a weathertight-seal joint.
 - a. Reinforce sections with continuous horizontal and diagonal reinforcement, as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.
 - b. Provide reinforcement for hardware attachment.
2. Solid Panels: Fabricate of aluminum sheet, complying with **ASTM B 209 (ASTM B 209M)**, alloy and temper standard with manufacturer for type of use and finish indicated, not less than **0.040 inch (1.02 mm)** thick, set in continuous vinyl channel retained with rigid, snap-in, extruded-vinyl moldings or with rubber or neoprene glazing gasket with aluminum stop.
3. Full-Vision Sections: Manufacturer's standard, tubular, aluminum-framed section fully glazed with 6-mm-thick, clear acrylic glazing set in vinyl, rubber, or neoprene glazing channel and with removable extruded-vinyl or aluminum stops.

D. Translucent Door Sections

1. Construct door sections of not less than **0.063-inch- (1.6-mm-)** thick, extruded-aluminum stiles and rails complying with **ASTM B 221 (ASTM B 221M)** and with alloy and temper recommended by manufacturer for type of use and finish indicated, to provide door sections at least **1-3/4 inches (44 mm)** deep. Fabricate units with overlapped or interlocked weathertight-seal joints at meeting rails. Reinforce or truss each section as required for strength and rigidity. Provide reinforcement for hardware attachment.
2. Provide translucent, ribbed, glass-fiber-reinforced plastic panels, secured and sealed watertight to framing, and reinforced to meet performance requirements.

E. Tracks, Supports, And Accessories

1. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances shown on Drawings, and complying with ASTM A 653/A 653M for minimum **G60 (Z180)** zinc coating. Provide complete track assembly including brackets, bracing, and reinforcement for rigid support of ball-bearing roller guides for required door type and size. Slot vertical sections of track spaced **2 inches (51 mm)** apart for door-drop safety device. Slope tracks at proper angle from vertical or design tracks to ensure tight closure at jambs when door unit is closed.
2. Track Reinforcement and Supports: Galvanized-steel track reinforcement and support members, complying with ASTM A 36/A 36M and ASTM A 123/A 123M. Secure, reinforce, and support tracks as required for door size and weight to provide strength and rigidity without sag, sway, and vibration during opening and closing of doors.
 - a. Vertical Track Assembly: Track with continuous reinforcing angle attached to track and attached to wall with jamb brackets **OR** wall jamb brackets attached to track and attached to wall, **as directed**.
 - b. Horizontal Track Assembly: Track with continuous reinforcing angle attached to track and supported at points from curve in track to end of track by laterally braced attachments to overhead structural members.

3. Removable Center Posts: Manufacturer's standard carry-away **OR** roll-away **OR** swing-up, **as directed**, type for multiple doors in one opening.
 4. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.
 5. Windows: Manufacturer's standard window units of type and size indicated and in arrangement shown. Set glazing in vinyl, rubber, or neoprene glazing channel for metal-framed doors and elastic glazing compound for wood doors, as required. Provide removable stops of same material as door-section frames.
 6. Pass Doors: Manufacturer's standard pass doors where indicated, complete with glazing, operating hardware, and mortise lock. Construct pass doors of same materials, design, and finish as sectional door assembly.
 - a. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware" **OR** standard with manufacturer, **as directed**, and keyed to building keying system, **as directed**.
 - b. Keys: Two **OR** Three, **as directed**, for each cylinder.
- F. Hardware
1. General: Provide heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
 2. Hinges: Heavy-duty, galvanized-steel hinges of not less than **0.079-inch- (2.01-mm-)** nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible. Provide double-end hinges where required, for doors over **16 feet (4.88 m)** wide unless otherwise recommended by door manufacturer.
 3. Rollers: Heavy-duty rollers with steel ball-bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide **3-inch- (76-mm-)** diameter roller tires for **3-inch- (76-mm-)** wide track and **2-inch- (51-mm-)** diameter roller tires for **2-inch- (51-mm-)** wide track.
 4. Push/Pull Handles: For push-up or emergency-operated doors, provide galvanized-steel lifting handles on each side of door.
- G. Locking Devices
1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
 2. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - a. Lock Cylinders: Provide cylinders specified in Division 08 Section "Door Hardware" **OR** standard with manufacturer, **as directed**, and keyed to building keying system, **as directed**.
 - b. Keys: Two **OR** Three, **as directed**, for each cylinder.
 3. Chain Lock Keeper: Suitable for padlock.
 4. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- H. Counterbalance Mechanism
1. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
 2. Weight Counterbalance: Counterbalance mechanism consisting of filled pipe weights that move vertically in a galvanized-steel weight pipe. Connect pipe weights with cable to weight-cable drums mounted on torsion shaft made of steel tube or solid steel.
 3. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance

mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint bracket for shafts up to **16 feet (4.88 m)** long and two additional brackets at one-third points to support shafts more than **16 feet (4.88 m)** long unless closer spacing is recommended by door manufacturer.

4. Cables: Galvanized-steel lifting cables with cable safety factor of at least 5 **OR 7, as directed**, to 1.
5. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.
6. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
7. Provide a spring bumper at each horizontal track to cushion door at end of opening operation.

I. Manual Door Operators

1. Equip door with manufacturer's recommended manual door operator unless another type of door operator is indicated.
2. Push-up Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed **25 lbf (111 N)**.
3. Chain-Hoist Operator: Consisting of endless steel hand chain, chain-pocket wheel and guard, and gear-reduction unit with a maximum **25-lbf (111-N) OR 35-lbf (155-N), as directed**, force for door operation. Provide alloy-steel hand chain with chain holder secured to operator guide.

J. Electric Door Operators

1. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
 - a. Comply with NFPA 70.
 - b. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
2. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.
3. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
 - a. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.
 - b. Jackshaft, Center Mounted: Jackshaft operator mounted on the inside front wall above door and connected to torsion shaft with an adjustable coupling or drive chain.
 - c. Jackshaft, Side Mounted: Jackshaft operator mounted on the inside front wall on right or left side of door and connected to torsion shaft with an adjustable coupling or drive chain.
4. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 11 Section "Common Motor Requirements For Equipment", unless otherwise indicated.
 - a. Electrical Characteristics:
 - 1) Phase: Single phase **OR Polyphase, as directed**.
 - 2) Volts: 115 **OR 208 OR 230 OR 460, as directed**, V.
 - 3) Hertz: 60.
 - b. Motor Type and Controller: Reversible motor and controller (disconnect switch) for motor exposure indicated.
 - c. Motor Size: Minimum size as indicated. If not indicated, large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than **8 in./sec. (203 mm/s)** and not more than **12 in./sec. (305 mm/s)**, without exceeding nameplate ratings or service factor.

- d. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
 - e. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
 - f. Use adjustable motor-mounting bases for belt-driven operators.
 - 5. Limit Switches: Equip each motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
 - 6. Obstruction Detection Device: Equip motorized door with indicated external automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
 - a. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
 - 1) Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensor device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.
 - b. Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.
 - 1) Self-Monitoring Type: Four-wire configured device designed to interface with door-operator control circuit to detect damage to or disconnection of sensor edge.
 - 7. Remote-Control Station: Momentary-contact, three-button control station with push-button controls labeled "Open," "Close," and "Stop."
 - a. Interior units, full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
 - b. Exterior units, full-guarded, standard-duty, surface-mounted, weatherproof type, NEMA ICS 6, Type 4 enclosure, key operated.
 - 8. Emergency Manual Operation: Equip each electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed **25 lbf (111 N) OR 35 lbf (155 N), as directed.**
 - 9. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 - 10. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
 - 11. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with regulatory requirements for accessibility.
 - 12. Radio-Control System: Consisting of the following:
 - a. Three-channel universal coaxial receiver to open, close, and stop door; one **OR** two, **as directed**, per operator.
OR
Multifunction remote control.
OR
Remote antenna and mounting kit.
- K. Door Assembly
- 1. Steel **OR** Wood **OR** Aluminum **OR** Full-Vision Aluminum **OR** Translucent, **as directed**, Sectional Door: Sectional door formed with hinged sections.
 - 2. Operation Cycles: Not less than 10,000 **OR** 20,000 **OR** 50,000 **OR** 100,000, **as directed.**
 - 3. R-Value **OR** Installed R-Valu, **as directed**: **4.5 deg F x h x sq. ft./Btu (0.792 K x sq. m/W) OR 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W) OR 12.0 deg F x h x sq. ft./Btu (2.113 K x sq. m/W) OR 15.0 deg F x h x sq. ft./Btu (2.642 K x sq. m/W) OR 17.5 deg F x h x sq. ft./Btu (3.082 K x sq. m/W), as directed.**
 - 4. Steel Sections: Zinc-coated (galvanized) steel sheet with **G60 (Z180) OR G90 (Z275), as directed**, zinc coating.

- a. Section Thickness: **1-3/8 inches (35 mm) OR 1-3/4 inches (44 mm) OR 2 inches (51 mm), as directed.**
- b. Exterior-Face, Steel Sheet Thickness: **0.064-inch- (1.63-mm-) OR 0.040-inch- (1.02-mm-) OR 0.028-inch- (0.71-mm-) OR 0.022-inch- (0.56-mm-) OR 0.019-inch- (0.48-mm-), as directed,** nominal coated thickness.
 - 1) Surface:
 - a) Flat.
OR
Manufacturer's standard, grooved **OR** ribbed **OR** paneled **OR** wood-grain embossed, **as directed.**
- c. Insulation: Board **OR** Foamed in place, **as directed.**
- d. Interior Facing Material: Zinc-coated (galvanized) steel sheet of **0.028-inch- (0.71-mm-) OR 0.022-inch- (0.56-mm-) OR 0.019-inch- (0.48-mm-) OR** manufacturer's recommended thickness to meet performance requirements, **as directed,** nominal coated thickness.
- e. Interior Facing Material: Hardboard panel.
5. Wood Sections: Paneled **OR** Flush, **as directed,** and with manufacturer's standard insulation, **as directed.**
6. Aluminum Sections: Solid panels **OR** Full vision, **as directed,** with manufacturer's standard, nonglazed panels across bottom section of door, **as directed.**
7. Translucent Sections: Manufacturer's standard with manufacturer's standard, nonglazed panels across bottom section of door, **as directed.**
8. Track Configuration: Standard-lift **OR** Low-headroom **OR** High-lift **OR** Vertical-lift **OR** Contour, **as directed,** track with removable center post shared with adjacent door, **as directed.**
9. Weatherseals: Fitted to bottom and top and around entire perimeter of door. Provide combination bottom weatherseal and sensor edge, **as directed.**
10. Windows: Approximately **24 by 7 inches (610 by 178 mm) OR 24 by 11 inches (610 by 279 mm), as directed,** with curved corners, **OR** with square corners, **as directed,** and spaced apart the approximate distance as indicated on Drawings; in one row **OR** two rows, **as directed,** at height indicated on Drawings; installed with glazing **OR** insulated glazing, **as directed,** of the following type:
 - a. Clear Float Glass: 3 mm thick and complying with ASTM C 1036, Type I, Class 1, Quality Q3.
 - b. Clear Acrylic Plastic: 3 mm thick, transparent, smooth or polished, and formulated to be UV resistant.
 - c. Clear Polycarbonate Plastic: 3-mm-thick, transparent, fire-retardant, UV-resistant, polycarbonate sheet manufactured by extrusion process.
 - d. Insulating Glass: Manufacturer's standard.
11. Pass Door: As shown.
12. Roller-Tire Material: Case-hardened steel **OR** Neoprene or bronze **OR** Manufacturer's standard, **as directed.**
13. Locking Devices: Equip door with slide bolt for padlock **OR** locking device assembly, **as directed,** and chain lock keeper, **as directed.**
 - a. Locking Device Assembly: Single-jamb side **OR** Cremone type, both jamb sides, **as directed,** locking bars, operable from inside with thumbturn **OR** outside with cylinder **OR** outside only, with cylinder **OR** inside and outside, with cylinders, **as directed.**
14. Counterbalance Type: Torsion spring **OR** Weight counterbalance, **as directed.**
15. Manual Door Operator: Push-up operation **OR** Chain-hoist operator, **as directed.**
16. Electric Door Operator:
 - a. Usage Classification: Heavy duty, 60 to 90 cycles per hour **OR** Standard duty, up to 60 cycles per hour **OR** Medium duty, up to 15 cycles per hour **OR** Light duty, up to 10 cycles per hour, **as directed.**
 - b. Operator Type: Trolley **OR** Jackshaft, center mounted **OR** Jackshaft, side mounted **OR** As shown on Drawings, **as directed.**
 - c. Motor Exposure: Interior, clean, and dry **OR** Exterior, dusty, wet, or humid, **as directed.**
 - d. Emergency Manual Operation: Push-up **OR** Chain, **as directed,** type.

- e. Obstruction-Detection Device: Automatic photoelectric sensor **OR** electric sensor edge on bottom bar **OR** pneumatic sensor edge on bottom bar, **as directed**; self-monitoring type, **as directed**.
 - 1) Sensor Edge Bulb Color: Black **OR** As selected from manufacturer's full range, **as directed**.
 - f. Remote-Control Station: Interior **OR** Exterior **OR** Where shown on Drawings, **as directed**.
 - g. Other Equipment: Audible and visual signals **OR** Radio-control system, **as directed**.
 - 17. Door Finish:
 - a. Aluminum Finish: Clear anodized **OR** Bronze anodized **OR** Anodized color matching sample **OR** Anodized color as selected from manufacturer's full range, **as directed**.
 - b. Baked-Enamel or Powder-Coated Finish: Color and gloss as selected from manufacturer's full range.
 - c. Factory Prime Finish: Manufacturer's standard color.
 - d. Finish of Interior Facing Material: Match finish of exterior section face **OR** Finish as selected from manufacturer's full range, **as directed**.
 - L. General Finish Requirements
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
 - M. Aluminum Finishes
 - 1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 - 2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - 3. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.
 - N. Steel And Galvanized-Steel Finishes
 - 1. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
 - 2. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.
- 1.3 EXECUTION
- A. Installation
 - 1. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
 - 2. Tracks:
 - a. Fasten vertical track assembly to opening jambs and framing, spaced not more than **24 inches (610 mm)** apart.
 - b. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
 - c. Repair galvanized coating on tracks according to ASTM A 780.
 - 3. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

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B. Startup Services

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Adjusting

1. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
2. Lubricate bearings and sliding parts as recommended by manufacturer.
3. Adjust doors and seals to provide weathertight fit around entire perimeter.
4. Align and adjust motors, pulleys, belts, sprockets, chains, and controls according to manufacturer's written instructions.
5. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780.

END OF SECTION 08 36 13 00

Task	Specification	Specification Description
08 36 13 00	08 33 23 11	Overhead Coiling Doors

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SECTION 08 38 13 00 - FLEXIBLE DOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of flexible doors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop drawings shall be submitted for approval.

1.2 PRODUCTS

- #### A. General: Each new door unit shall be a complete unit produced by one manufacturer including hardware, accessories, mounting, and installation components.

B. Door Panels: Door panels shall be constructed of the following materials.

1. Heavy-Duty, Abrasive-Resistant Rubber, 60 durometer, roto-cured process, 2,200 psi tensile strength. Panel thickness shall be 1/2- inch. Lower door panel shall be reinforced with additional rubber extrusions bonded horizontally to the door facing on 8 inch centers.
2. Flexible Polycarbonate transparent panels 1/2 inch thick.
3. Flexible Polyvinylchloride (PVC) transparent panels min. 0.196 inch (5mm) thick.
4. Flexible Polyvinylchloride (PVC) opaque panels min. 0.196 inch (5mm) thick.

- #### C. Door Facings shall be high strength fabric reinforced vinyl bonded to door frame. Facing shall not be mechanically fastened.

- #### D. The Vision Panels shall be double glazed, damage resistant with optical clarity exceeding 90%. Vision Panels shall be mounted flush.

- #### E. Door Panels shall be single or double-acting, as required.

- #### F. Panel Frame: Framing materials to which door panels shall be secured shall be galvanized steel, ASTM A525, 11 gauge. Door panels shall be suspended between L-shaped rolled formed rails and stiles by removable bolt and nut connectors.

G. Hardware shall conform to the requirements of ASTM A 164 or ASTM A 386, as required.

1. Hinges shall be adjustable spring-type gravity self-lubricating hinges.
2. Magnetic Catch shall be provided at door overlap at pair of door panels to give positive closure.
3. Header and Jamb Seals shall be door mounted PVC seals at head and jamb.
4. Bumpers shall be center or bottom bumpers.
5. Jamb Guards shall be formed steel guards to enclose and protect lower hinge hardware and closures.

- #### H. Door Jamb shall be constructed of steel tube, ASTM A 500, with integral wall anchors, galvanized in compliance with ASTM A 386 or stainless steel bent plate, Type 304, with integral wall anchors, as required.

- #### I. Finish: All ferrous metal parts shall be finish-coated with polyurethane paint.

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- J. Fire Hazard Classification: All door material shall have a fire hazard classification determined by ASTM E 84. Provide materials with the following fire hazard classifications:
 - Flame spread not more than 25.
 - Smoke developed not more than 50.

- K. Vertical PVC Vinyl Strip Doors
 - 1. Door shall consist of overlapping transparent minimum PVC strips with pre-punched galvanized hanger brackets which mate with formed metal arms on the universal hardware.
 - 2. Hardware shall provide full swivel action. A cover plate shall prevent accidental removal.
 - 3. End Strips shall be orange to frame opening. Strips shall have rounded edges and overlap to form a seal.

1.3 EXECUTION

- A. Products shall be installed per manufacturer's written instruction. Products shall be firmly attached to adjacent materials. Products shall be installed level and plumb and shall be demonstrated to operate properly and as intended for a complete installation.

END OF SECTION 08 38 13 00

Task	Specification	Specification Description
08 38 16 00	08 01 11 61	Steel Doors And Frames
08 38 16 00	08 01 11 61a	Steel Entry Doors
08 38 16 00	08 12 13 13	Stainless Steel Doors And Frames
08 38 19 00	08 01 11 61	Steel Doors And Frames
08 38 19 00	08 01 11 61a	Steel Entry Doors
08 38 19 00	08 12 13 13	Stainless Steel Doors And Frames

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SECTION 08 42 13 00 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for aluminum framed entrances and storefronts. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Exterior and interior storefront framing.
 - b. Storefront framing for window walls.
 - c. Storefront framing for ribbon walls.
 - d. Storefront framing for punched openings.
 - e. Exterior and interior manual-swing entrance doors and door-frame units.

C. Definitions

1. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

D. Performance Requirements

1. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
 - a. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
 - b. Dimensional tolerances of building frame and other adjacent construction.
 - c. Failure includes the following:
 - 1) Deflection exceeding specified limits.
 - 2) Thermal stresses transferring to building structure.
 - 3) Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - 4) Glazing-to-glazing contact.
 - 5) Noise or vibration created by wind and by thermal and structural movements.
 - 6) Loosening or weakening of fasteners, attachments, and other components.
 - 7) Sealant failure.
 - 8) Failure of operating units.
2. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Structural Loads:
 - a. Wind Loads: As indicated on Drawings **OR as directed.**
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s), as directed.**
 - 2) Exposure Category: **A OR B OR C OR D, as directed.**
4. Deflection of Framing Members:
 - a. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite **OR** 1/175 of clear span for spans up to **13 feet 6 inches (4.1 m)** and to 1/240 of clear span plus **1/4 inch (6.35 mm)** for spans greater than **13 feet 6 inches (4.1 m)**, **as directed**, or an

- amount that restricts edge deflection of individual glazing lites to **3/4 inch (19 mm)**, whichever is less.
- b. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or **1/8 inch (3.2 mm)**, whichever is smaller **OR** amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components directly below them to less than **1/8 inch (3.2 mm)** and clearance between members and operable units directly below them to less than **1/16 inch (1.5 mm)**, **as directed**.
5. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
 - a. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
 - b. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - c. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.
 6. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 **OR** AAMA 506, **as directed**.
 - a. Large-Missile Impact: For aluminum-framed systems located within **30 feet (9.1 m)** of grade.
 - b. Small-Missile Impact: For aluminum-framed systems located more than **30 feet (9.1 m)** above grade.
 7. Story Drift: Provide aluminum-framed systems that accommodate design displacement of adjacent stories indicated.
 - a. Design Displacement: As indicated on Drawings **OR as directed**.
 - b. Test Performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 at design displacement and 1.5 times design displacement.
 8. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of **0.06 cfm/sq. ft. (0.03 L/s per sq. m)** of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of **1.57 lbf/sq. ft. (75 Pa)** **OR** **6.24 lbf/sq. ft. (300 Pa)**, **as directed**.
 9. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa)**.
 10. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa)**.
 - a. Maximum Water Leakage: According to AAMA 501.1 **OR** No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation, **as directed**. Water leakage does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.
 11. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
 - b. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

- 1) High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of **180 deg F (82 deg C)**.
 - 2) Low Exterior Ambient-Air Temperature: **0 deg F (minus 18 deg C)**.
 - c. Interior Ambient-Air Temperature: **75 deg F (24 deg C)**.
 12. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than **45 OR 53, as directed**, when tested according to AAMA 1503.
 13. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than **0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) OR 0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K), as directed**, when tested according to AAMA 1503.
 14. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:
 - a. Sound Transmission Class (STC): Minimum **26 OR 30 OR 35, as directed**, STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
 - b. Outdoor-Indoor Transmission Class (OITC): Minimum **26 OR 30 OR 34, as directed**, OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
 15. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by aluminum-framed systems without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - a. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - b. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
 16. Structural-Sealant Joints: Designed to produce tensile or shear stress of less than **20 psi (138 kPa)**.
- E. Submittals
1. Product Data: For each type of product indicated.
 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants used inside of the weatherproofing system, including printed statement of VOC content.
 3. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
 - b. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
 4. Samples: For each type of exposed finish required.
 5. Other Action Submittals:
 - a. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
 6. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 7. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 8. Welding certificates.

9. Product Test Reports.
10. Quality-Control Program for Structural-Sealant-Glazed System: Include reports.
11. Field quality-control reports.
12. Maintenance Data.
13. Warranties: Sample of special warranties.

F. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
3. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
4. Quality-Control Program for Structural-Sealant-Glazed System: Develop quality control program specifically for Project. Document quality-control procedures and verify results for aluminum-framed systems. Comply with ASTM C 1401 recommendations including, but not limited to, system material-qualification procedures, preconstruction sealant-testing program, procedures for system fabrication and installation, and intervals of reviews and checks.
5. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
 - a. Do not revise intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If revisions are proposed, submit comprehensive explanatory data to the Owner for review.
6. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1, **as directed**.
7. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
8. Structural-Sealant Glazing: Comply with ASTM C 1401, "Guide for Structural Sealant Glazing" for design and installation of structural-sealant-glazed systems.
9. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.
10. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
11. Preinstallation Conference: Conduct conference at Project site.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within two **OR** five **OR** 10, **as directed**, years from date of Final Completion.
2. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion. Warranty does not include normal weathering.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.

- b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221** (ASTM B 221M).
 - c. Extruded Structural Pipe and Tubes: ASTM B 429.
 - d. Structural Profiles: ASTM B 308/B 308M.
 - e. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
- a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.
- B. Framing Systems**
1. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
- a. Construction: Nonthermal **OR** Thermally improved **OR** Thermally broken **OR** Structurally glazed, **as directed**.
 - b. Glazing System: Retained mechanically with gaskets on four sides **OR** Retained by structural sealant at vertical edges and mechanically with gaskets at horizontal edges, **as directed**.
 - c. Glazing Plane: As indicated **OR** Front **OR** Center **OR** Back **OR** Multiplane, **as directed**.
2. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
3. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
- a. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - b. Reinforce members as required to receive fastener threads.
 - c. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system **OR** fabricated from stainless steel, **as directed**.
4. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.
5. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials **OR** Dead-soft, **0.018-inch- (0.457-mm-)** thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer, **as directed**.
6. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.
- a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Glazing Systems**
1. Glazing: As specified in Division 08 Section "Glazing".
2. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.
3. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.
4. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
5. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
- a. Structural Sealant: ASTM C 1184, single-component neutral-curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in aluminum-framed systems indicated.
 - 1) Provide sealants for use inside of the weatherproofing system that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- 2) Color: Black **OR** As selected from manufacturer's full range of colors, **as directed**.
 - b. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
 - 1) Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Color: Matching structural sealant.
- D. Entrance Door Systems
1. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
 - a. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) **OR** 2-inch (50.8-mm) overall thickness, with minimum 0.188-inch- (4.8-mm-) **OR** 2- to 2-1/4-inch (50.8- to 57.2-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-), **as directed**, thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
 - 1) Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
 - b. Door Design: As indicated **OR** Narrow stile; 2-1/8-inch (54-mm) nominal width **OR** Medium stile; 3-1/2-inch (88.9-mm) nominal width **OR** Wide stile; 5-inch (127-mm) nominal width, **as directed**.
 - 1) Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
 - c. Glazing Stops and Gaskets: Beveled **OR** Square, **as directed**, snap-on, extruded-aluminum stops and preformed gaskets.
 - 1) Provide nonremovable glazing stops on outside of door.
- E. Entrance Door Hardware
1. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule **OR** and entrance door hardware sets indicated in "Entrance Door Hardware Sets" Article, **as directed**, for each entrance door to comply with requirements in this Section.
 - a. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products **OR** products equivalent in function and comparable in quality to named products **OR** products complying with BHMA standard referenced, **as directed**.
 - b. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 - c. Opening-Force Requirements:
 - 1) Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf ((133 N)) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
 - 2) Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
 2. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 - a. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
 3. Opening-Force Requirements:
 - a. Delayed-Egress Locks: Lock releases within 15 seconds after applying a force of not more than 15 lbf (67 N) for not more than 3 seconds.
 - b. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.
 4. Pivot Hinges: BHMA A156.4, Grade 1.
 - a. Offset-Pivot Hinges: Provide top, bottom, and intermediate offset pivots at each door leaf.

5. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
 - a. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
 - b. Exterior Hinges: Stainless steel, with stainless-steel pin **OR** Nonferrous, **as directed**.
 - c. Quantities:
 - 1) For doors up to **87 inches (2210 mm)** high, provide 3 hinges per leaf.
 - 2) For doors more than **87 and up to 120 inches (2210 and up to 3048 mm)** high, provide 4 hinges per leaf.
 6. Continuous-Gear Hinges: Manufacturer's standard with stainless-steel bearings between knuckles, fabricated to full height of door and frame.
 7. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
 8. Manual Flush Bolts: BHMA A156.16, Grade 1.
 9. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.
 10. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
 11. Cylinders: As specified in Division 08 Section "Door Hardware" **OR** BHMA A156.5, Grade 1, **as directed**.
 - a. Keying: No master **OR** Master, **as directed**, key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" **OR** to be furnished by Owner, **as directed**.
 12. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
 13. Operating Trim: BHMA A156.6.
 14. Removable Mullions: BHMA A156.3, extruded aluminum.
 - a. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.
 15. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.
 16. Concealed Overhead Holders: BHMA A156.8, Grade 1.
 17. Surface-Mounted Holders: BHMA A156.16, Grade 1.
 18. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
 19. Weather Stripping: Manufacturer's standard replaceable components.
 - a. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
 - b. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
 20. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
 21. Silencers: BHMA A156.16, Grade 1.
 22. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of **1/2 inch (13 mm)**.
 23. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.
- F. Accessory Materials
1. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Division 07 Section "Joint Sealants".
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

G. Fabrication

1. Form or extrude aluminum shapes before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
3. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
 - d. Physical and thermal isolation of glazing from framing members.
 - e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - f. Provisions for field replacement of glazing from exterior **OR** interior **OR** interior for vision glass and exterior for spandrel glazing or metal panels, **as directed**.
 - g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
4. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
5. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.
6. Storefront Framing: Fabricate components for assembly using shear-block system **OR** screw-spline system **OR** head-and-sill-receptor system with shear blocks at intermediate horizontal members, **as directed**.
7. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - a. At exterior doors, provide compression weather stripping at fixed stops.
 - b. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
8. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - a. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - b. At exterior doors, provide weather sweeps applied to door bottoms.
9. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
10. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

H. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Champagne **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and color densities, **as directed**.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

- a. Color and Gloss: Match sample **OR** As selected from manufacturer's full range, **as directed**.
- 4. High-Performance Organic Finish:
 - a. 2-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
OR
3-coat **OR** 4-coat, **as directed**, fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Color and Gloss: Match sample **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

- 1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmovement joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
 - f. Seal joints watertight unless otherwise indicated.
- 2. Metal Protection:
 - a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
 - b. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- 3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- 4. Set continuous sill members and flashing in full sealant bed as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.
- 5. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- 6. Install glazing as specified in Division 08 Section "Glazing".
 - a. Structural-Sealant Glazing:
 - 1) Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 2) Install weatherseal sealant according to Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- 7. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
 - a. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
 - b. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- 8. Install perimeter joint sealants as specified in Division 07 Section "Joint Sealants" to produce weathertight installation.

B. Erection Tolerances

1. Install aluminum-framed systems to comply with the following maximum erection tolerances:
 - a. Location and Plane: Limit variation from true location and plane to **1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm)** over total length.
 - b. Alignment:
 - 1) Where surfaces abut in line, limit offset from true alignment to **1/16 inch (1.5 mm)**.
 - 2) Where surfaces meet at corners, limit offset from true alignment to **1/32 inch (0.8 mm)**.
 2. Diagonal Measurements: Limit difference between diagonal measurements to **1/8 inch (3 mm)**.
- C. Field Quality Control
1. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
 2. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 - a. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.
 - 1) Destructive Test Method A, "Hand Pull Tab (Destructive)," in ASTM C 1401, Appendix X2, shall be used.
 - a) A minimum of two **OR** four **OR** six, **as directed**, areas on each building face shall be tested.
 - b) Repair installation areas damaged by testing.
 - b. Structural-Sealant Glazing Inspection: After installation of aluminum-framed systems is complete, structural-sealant glazing shall be inspected and evaluated according to recommendations in ASTM C 1401.
 - c. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing under "Performance Requirements" Article, but not more than **0.09 cfm/sq. ft. (0.03 L/s per sq. m)**, of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure difference of **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed**.
 - d. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform and cyclic static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing under "Performance Requirements" Article, but not less than **4.18 lbf/sq. ft. (200 Pa)**, and shall not evidence water penetration.
 - e. Water Spray Test: Before installation of interior finishes has begun, a minimum area of **75 feet (23 m)** by 1 story of aluminum-framed systems designated by the Owner shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 3. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
 4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 5. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
 6. Prepare test and inspection reports.
- D. Adjusting
1. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.
 - a. For entrance doors accessible to people with disabilities, adjust closers to provide a 3-second closer sweep period for doors to move from a 70-degree open position to **3 inches (75 mm)** from the latch, measured to the leading door edge.

END OF SECTION 08 42 13 00

SECTION 08 44 13 00 - GLAZED ALUMINUM CURTAIN WALLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for glazed aluminum curtain walls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes conventionally glazed aluminum curtain walls installed as stick, unitized, and unit-and-mullion assemblies.

C. Performance Requirements

1. General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - a. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings **OR as directed**, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - b. Failure also includes the following:
 - 1) Thermal stresses transferring to building structure.
 - 2) Glass breakage.
 - 3) Noise or vibration created by wind and thermal and structural movements.
 - 4) Loosening or weakening of fasteners, attachments, and other components.
 - 5) Failure of operating units.
2. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Structural Loads:
 - a. Wind Loads: As indicated on Drawings **OR as directed**.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s), as directed.**
 - 2) Exposure Category: A **OR B OR C OR D, as directed.**
 - b. Blast Loads: As indicated on Drawings **OR as directed**.
 - c. Periodic Maintenance-Equipment Loads: As indicated on Drawings **OR as directed**.
4. Structural-Test Performance: Test according to ASTM E 330 as follows:
 - a. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - b. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - c. Test Durations: As required by design wind velocity, but not less than 10 seconds.
5. Deflection of Framing Members: At design wind pressure, as follows:
 - a. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite **OR** 1/175 of clear span for spans up to **13 feet 6 inches (4.1 m)** and to 1/240 of clear span plus **1/4 inch (6.35 mm)** for spans greater than **13 feet 6 inches (4.1 m)**, **as directed**, or an amount that restricts edge deflection of individual glazing lites to **3/4 inch (19 mm)**, whichever is less.

- b. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller **OR** amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm), **as directed**.
 - 1) Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.
- c. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to two times the length of cantilevered member, divided by 175.
- 6. Windborne-Debris-Impact-Resistance Performance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone 1 **OR** Zone 2 **OR** Zone 3 **OR** Zone 4, **as directed**.
 - a. Large-Missile Test: For glazed openings located within 30 feet (9.1 m) of grade.
 - b. Small-Missile Test: For glazed openings located more than 30 feet (9.1 m) above grade.
- 7. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. Component Importance Factor is 1.5 **OR** 1.0, **as directed**.
- 8. Story Drift: Accommodate design displacement of adjacent stories indicated.
 - a. Design Displacement: As indicated on Drawings **OR as directed**.
 - b. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement, **as directed**.
- 9. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa) **OR** 10 lbf/sq. ft. (480 Pa) **OR** 15 lbf/sq. ft. (720 Pa), **as directed**.
- 10. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa) **OR** 10 lbf/sq. ft. (480 Pa) **OR** 15 lbf/sq. ft. (720 Pa), **as directed**.
 - a. Maximum Water Leakage: According to AAMA 501.1 **OR** No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation, **as directed**. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
- 11. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
 - b. Test Interior Ambient-Air Temperature: 75 deg F (24 deg C).
 - c. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
- 12. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.
 - a. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) **OR** 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) **OR** 0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K), **as directed**, as determined according to NFRC 100.
 - b. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 **OR** 0.40 **OR** 0.45, **as directed**, as determined according to NFRC 200.
 - c. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 0.30 cfm/sq. ft. (1.50 L/s per sq. m) of fixed wall area as determined according to ASTM E 283 at a minimum static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa) **OR** 6.24 lbf/sq. ft. (300 Pa), **as directed**.

- d. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC- certified condensation resistance rating of no less than 15 **OR** 25 **OR** 35 **OR** 45, **as directed**, as determined according to NFRC 500.
 13. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics:
 - a. Outdoor-Indoor Transmission Class: Minimum 26 **OR** 30 **OR** 34, **as directed**, when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
- D. Submittals
1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
 3. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
 - a. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - b. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - 1) Joinery, including concealed welds.
 - 2) Anchorage.
 - 3) Expansion provisions.
 - 4) Glazing.
 - 5) Flashing and drainage.
 4. Samples: For each type of exposed finish required.
 5. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 6. Qualification Data: For qualified Installer and testing agency, **as directed**.
 7. Seismic Qualification Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 8. Welding certificates.
 9. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components, from manufacturer.
 - a. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
 10. Product test reports.
 11. Field quality-control reports.
 12. Maintenance data.
 13. Warranties: Sample of special warranties.
- E. Quality Assurance
1. Manufacturer Qualifications: A manufacturer capable of fabricating glazed aluminum curtain walls that meet or exceed energy performance requirements indicated and of documenting this performance by certification, labeling, and inclusion in lists.
 2. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 3. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
 4. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

5. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
6. Energy Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - a. Provide NFRC-certified glazed aluminum curtain walls with an attached label.
7. Preinstallation Conference: Conduct conference at Project site.

F. Warranty

1. Special Assembly Warranty: Standard form in which manufacturer **OR** Installer, **as directed**, agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within Two **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
2. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429.
 - d. Structural Profiles: ASTM B 308/B 308M.
 - e. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

B. Framing

1. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - a. Construction: Nonthermal **OR** Thermally improved **OR** Thermally broken, **as directed**.
 - b. Glazing System: Retained mechanically with gaskets on four sides.
 - c. Glazing Plane: Front.
2. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
3. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - a. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - b. Reinforce members as required to receive fastener threads.
 - c. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system **OR** fabricated from 300 series stainless steel, **as directed**.
4. Anchors: Three-way adjustable anchors with minimum adjustment of **1 inch (25.4 mm)** that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

- a. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
 5. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials **OR** Dead-soft, **0.018-inch- (0.457-mm-)** thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer, **as directed**.
 6. Framing Sealants: Manufacturer's standard sealants.
- C. Glazing
1. Glazing: Comply with Division 08 Section "Glazing".
 2. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers **OR** Comply with Division 08 Section "Glazing", **as directed**.
 3. Glazing Sealants: As recommended by manufacturer **OR** Comply with Division 08 Section "Glazing", **as directed**.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Insulated Spandrel Panels
1. Insulated Spandrel Panels: Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.
 - a. Overall Panel Thickness: As indicated **OR 1 inch (25.4 mm), as directed**.
 - b. Exterior Skin: Aluminum.
 - 1) Thickness: Manufacturer's standard for finish and texture indicated.
 - 2) Finish: Matching framing system.
 - 3) Texture: Smooth **OR** Embossed, **as directed**.
 - 4) Backing Sheet: **1/8-inch- (3.2-mm-)** thick, tempered hardboard **OR 0.157-inch- (4-mm-)** thick, cement board **OR 0.125-inch- (3.2-mm-)** thick, corrugated, high-density polyethylene, **as directed**.
 - c. Interior Skin: Aluminum **OR** Manufacturer's standard galvanized-steel sheet, **as directed**.
 - 1) Thickness: Manufacturer's standard for finish and texture indicated.
 - 2) Finish: Matching curtain-wall framing **OR** Low-gloss, white baked enamel **OR** Mill finish, **as directed**.
 - 3) Texture: Smooth **OR** Embossed, **as directed**.
 - 4) Backing Sheet: **1/8-inch- (3.2-mm-)** thick, tempered hardboard **OR 0.157-inch- (4-mm-)** thick, cement board **OR 1/2-inch- (12.7-mm-)** thick, gypsum board with proprietary fire-resistance-rated core **OR 0.125-inch- (3.2-mm-)** thick, corrugated, high-density polyethylene, **as directed**.
 - d. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board **OR** extruded-polystyrene board **OR** expanded-perlite, mineral-insulation board, **as directed**.
 - e. Surface-Burning Characteristics: For exposed interior surfaces of panels, when tested according to ASTM E 84 as follows:
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 450 or less.
- E. Operable Units
1. Venting Windows: Comply with Division 08 Section "Aluminum Windows".
 2. Doors: Comply with Division 08 Section "Aluminum-framed Entrances And Storefronts".
- F. Accessory Materials
1. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.
- G. Fabrication
1. Form or extrude aluminum shapes before finishing.

2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
3. Fabricate components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Physical and thermal isolation of glazing from framing members.
 - d. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - e. Provisions for field replacement of glazing from exterior **OR** interior **OR** interior for vision glass and exterior for spandrel glazing or metal panels, **as directed**.
 - f. Provisions for safety railings mounted on interior face of mullions **OR** between mullions at interior, **as directed**.
 - g. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - h. Components curved to indicated radii.
4. Fabricate components that, when assembled, have the following characteristics:
 - a. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - b. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
5. Curtain-Wall Framing: Fabricate components for assembly using shear-block system **OR** screw-spline system **OR** head-and-sill-receptor system with shear blocks at intermediate horizontal members, **as directed**.
6. Factory-Assembled Frame Units:
 - a. Rigidly secure nonmovement joints.
 - b. Seal joints watertight unless otherwise indicated.
 - c. Install glazing to comply with requirements in Division 08 Section "Glazing".
7. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

H. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Champagne **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and color densities, **as directed**.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
4. High-Performance Organic Finish:
 - a. Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
OR
Three-coat **OR** Four-coat, **as directed**, fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

OR

Two-coat fluoropolymer finish complying with AAMA 2604 and containing 100 percent FEVE resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- b. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmovement joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - f. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - g. Seal joints watertight unless otherwise indicated.
2. Metal Protection:
 - a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - b. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
4. Install components plumb and true in alignment with established lines and grades.
5. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.
6. Install glazing as specified in Division 08 Section "Glazing".

B. Erection Tolerances

1. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - a. Plumb: **1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6 mm in 12 m).**
 - b. Level: **1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).**
 - c. Alignment:
 - 1) Where surfaces abut in line or are separated by reveal or protruding element up to **1/2 inch (12.7 mm)** wide, limit offset from true alignment to **1/16 inch (1.6 mm).**
 - 2) Where surfaces are separated by reveal or protruding element from **1/2 to 1 inch (12.7 to 25.4 mm)** wide, limit offset from true alignment to **1/8 inch (3.2 mm).**
 - 3) Where surfaces are separated by reveal or protruding element of **1 inch (25.4 mm)** wide or more, limit offset from true alignment to **1/4 inch (6 mm).**
 - d. Location: Limit variation from plane to **1/8 inch in 12 feet (3.2 mm in 3.7 m); 1/2 inch (12.7 mm)** over total length.

C. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Testing Services: Testing and inspecting of representative areas of glazed aluminum curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
 - a. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article, but not more than **0.50 cfm/sq. ft.**

(2.25 L/s per sq. m), of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed.

- 1) Test Area: One bay wide, but not less than 30 feet (9.1 m), by one story of glazed aluminum curtain wall.
 - 2) Perform a minimum of two OR three, as directed, tests in areas as directed by the Owner.
OR
Perform tests in each test area as directed by the Owner. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - b. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft. (300 Pa), and shall not evidence water penetration.
 - 1) Test Area: One bay wide, but not less than 30 feet (9.1 m), by one story of glazed aluminum curtain wall.
 - 2) Perform a minimum of two OR three, as directed, tests in areas as directed by the Owner.
OR
Perform tests in each test area as directed by the Owner. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - c. Water Spray Test: Before installation of interior finishes has begun, areas designated by the Owner shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - 1) Test Area: A minimum area of 75 feet (23 m) by one story of glazed aluminum curtain wall.
3. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
 4. Prepare test and inspection reports.

END OF SECTION 08 44 13 00

SECTION 08 44 13 00a - STRUCTURAL-SEALANT-GLAZED CURTAIN WALLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for structural-sealant-glazed curtain walls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Factory-glazed **OR** Field-glazed, **as directed**, two-sided structural-sealant-glazed curtain-wall assemblies.
 - b. Factory-glazed, four-sided structural-sealant-glazed curtain-wall assemblies.

C. Performance Requirements

1. General Performance: Comply with performance requirements specified, as determined by testing manufacturer's standard of structural-sealant-glazed curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - a. Structural-sealant-glazed curtain walls shall withstand movements of supporting structure indicated on Drawings, **OR as directed**, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - b. Failure also includes the following:
 - 1) Thermal stresses transferring to building structure.
 - 2) Glass breakage.
 - 3) Noise or vibration created by wind and thermal and structural movements.
 - 4) Loosening or weakening of fasteners, attachments, and other components.
 - 5) Failure of operating units.
2. Delegated Design: Design structural-sealant-glazed curtain walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Structural Loads:
 - a. Wind Loads: As indicated on Drawings **OR as directed**.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s), as directed.**
 - 2) Exposure Category: **A OR B OR C OR D, as directed.**
 - b. Blast Loads: As indicated on Drawings **OR as directed**.
 - c. Periodic Maintenance-Equipment Loads: As indicated on Drawings **OR as directed**.
4. Structural-Test Performance: Provide structural-sealant-glazed curtain walls tested according to ASTM E 330 as follows:
 - a. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - b. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
 - c. Test Durations: As required by design wind velocity, but not less than 10 seconds.
5. Deflection of Framing Members: At design wind pressure, as follows:
 - a. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite **OR** 1/175 of clear span for spans up to **13 feet 6 inches (4.1 m)** and to 1/240 of clear span plus **1/4 inch (6.35 mm)** for spans greater than **13 feet 6 inches (4.1 m), as directed**, or an

- amount that restricts edge deflection of individual glazing lites to **3/4 inch (19 mm)**, whichever is less.
- b. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or **1/8 inch (3.2 mm)**, whichever is smaller **OR** amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than **1/8 inch (3.2 mm)**, **as directed**.
 - 1) Operable Units: Provide a minimum **1/16-inch (1.6-mm)** clearance between framing members and operable units.
 - c. Cantilever Deflection: Where framing members overhang an anchor point, limit deflection to 2 times the length of cantilevered member divided by 175.
6. Windborne-Debris-Impact-Resistance Performance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone 1 **OR** Zone 2 **OR** Zone 3 **OR** Zone 4, **as directed**.
 - a. Large-Missile Test: For glazed openings located within **30 feet (9.1 m)** of grade.
 - b. Small-Missile Test: For glazed openings located more than **30 feet (9.1 m)** above grade.
 7. Seismic Performance: Structural-sealant-glazed curtain walls shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. Component Importance Factor is 1.5 **OR** 1.0, **as directed**.
 8. Story Drift: Accommodate design displacement of adjacent stories indicated.
 - a. Design Displacement: As indicated on Drawings **OR as directed**.
 - b. Test Performance: Meets criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement, **as directed**.
 9. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa) OR 10 lbf/sq. ft. (480 Pa) OR 15 lbf/sq. ft. (720 Pa)**, **as directed**.
 10. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa) OR 10 lbf/sq. ft. (480 Pa) OR 15 lbf/sq. ft. (720 Pa)**, **as directed**.
 - a. Maximum Water Leakage: According to AAMA 501.1 **OR** No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation, **as directed**. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
 11. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
 - b. Test Interior Ambient-Air Temperature: **75 deg F (24 deg C)**.
 - c. Test Performance: No buckling, stress on glass, sealant failure, or excess stress on framing, anchors, and fasteners and no reduction of performance when tested according to AAMA 501.5.
 12. Energy Performance: Structural-sealant-glazed curtain walls shall have certified and labeled energy performance ratings according to NFRC.
 - a. Thermal Transmittance (U-Factor): Fixed glazing and framing areas shall have U-factor of not more than **0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) OR 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) OR 0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K)**, **as directed**, as determined according to NFRC 100.
 - b. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a SHGC of no greater than 0.35 **OR** 0.40 **OR** 0.45, **as directed**, as determined according to NFRC 200.
 - c. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of **0.30 cfm/sq. ft. (1.50 L/s per sq. m)** of fixed wall area as determined according to ASTM E 283

- at a minimum static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed.**
- d. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified CR rating of no less than **15 OR 25 OR 35 OR 45, as directed**, as determined according to NFRC 500
 13. Sound Transmission: Fixed glazing and framing areas shall have the following sound-transmission characteristics:
 - a. Outdoor-Indoor Transmission Class: Minimum **26 OR 30 OR 34, as directed**, when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
 14. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant-glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - a. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - b. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
 15. Structural-Sealant Joints:
 - a. Designed to carry gravity loads of glazing.
 - b. Designed to produce tensile or shear stress of less than **20 psi (138 kPa)**.
 - c. Design reviewed and approved by structural-sealant manufacturer.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
3. Shop Drawings: For structural-sealant-glazed curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
 - a. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - b. Include full-size isometric details of each vertical-to-horizontal intersection of structural-sealant-glazed curtain walls, showing the following:
 - 1) Joinery, including concealed welds.
 - 2) Anchorage.
 - 3) Expansion provisions.
 - 4) Glazing.
 - 5) Flashing and drainage.
4. Samples: For each type of exposed finish required.
5. Delegated-Design Submittal: For structural-sealant-glazed curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
6. Qualification Data: For qualified Installer and testing agency.
7. Seismic Qualification Certificates: For structural-sealant-glazed curtain walls, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
8. Welding certificates.
9. Energy-Performance Certificates: For structural-sealant-glazed curtain walls, accessories, and components, from manufacturer.
 - a. Basis for Certification: NFRC-certified energy-performance values for each structural-sealant-glazed curtain wall.
10. Product test reports.
11. Preconstruction sealant test reports.

12. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
13. Source quality-control reports.
14. Field quality-control reports.
15. Maintenance Data: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C 1401 recommendations for postinstallation-phase quality-control program.
16. Warranties: Sample of special warranties.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
3. Product Options: Information on Drawings and in Specifications establishes requirements for assemblies' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
4. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of structural-sealant-glazed curtain walls.
5. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
6. Energy-Performance Standards: Comply with NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - a. Provide NFRC-certified, structural-sealant-glazed curtain walls with an attached label.
7. Preinstallation Conference: Conduct conference at Project site.

F. Warranty

1. Special Assembly Warranty: Standard form in which manufacturer **OR** Installer, **as directed** agrees to repair or replace components of structural-sealant-glazed curtain walls that do not comply with requirements or that fail in materials or workmanship within Two **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
2. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429.
 - d. Structural Profiles: ASTM B 308/B 308M.
 - e. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

B. Framing

1. Framing Members: Manufacturer's standard formed- or extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.
2. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - a. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - b. Reinforce members as required to receive fastener threads.
 - c. Use exposed fasteners with countersunk Phillips screw heads finished to match framing system **OR** fabricated from Series 300 stainless steel, **as directed**.
3. Anchors: Three-way adjustable anchors, with minimum adjustment of **1 inch (25.4 mm)**, that accommodate fabrication and installation tolerances in material and finish and are compatible with adjoining materials and recommended by manufacturer.
 - a. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
4. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials **OR** Dead-soft, **0.018-inch- (0.457-mm-)** thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer, **as directed**.
5. Framing Sealants: Manufacturer's standard sealants with VOC content of 250g/L or less when calculated according to 40 CFR 59, Subpart D (EPA method 24), **as directed**.

C. Glazing

1. Glazing: Comply with Division 08 Section "Glazing".
2. Glazing Gaskets, Spacers, Setting Blocks, Sealant Backings, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types compatible with sealants and suitable for joint movement and assembly performance requirements.
3. Glazing Sealants: For structural-sealant-glazed curtain walls, as recommended by manufacturer for joint type, and as follows:
 - a. Structural Sealant: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.
 - 1) Provide sealants for use inside of the weatherproofing system that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Color: Black **OR** Gray **OR** As selected from manufacturer's full range of colors, **as directed**.
 - b. Weatherseal Sealant: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
 - 1) Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Color: Matching structural sealant.

D. Operable Units

1. Venting Windows: Comply with Division 08 Section "Aluminum Windows".
2. Doors: Comply with Division 08 Section "Aluminum-framed Entrances And Storefronts".

E. Accessory Materials

1. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.
2. Cleaning Agent and Cloth: As recommended by structural-sealant manufacturer.

F. Fabrication

1. Form or extrude aluminum shapes before finishing.
2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
3. Fabricate components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Physical and thermal isolation of glazing from framing members.
 - d. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - e. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - f. Provisions for field replacement of glazing from exterior **OR** interior **OR** interior for vision glass and exterior for spandrel glazing or metal panels, **as directed**. Include accommodations for using temporary support device (dutchman) to retain glazing in place while sealant cures.
 - g. Provisions for safety railings mounted on interior face of mullions **OR** between mullions at interior, **as directed**.
 - h. Components curved to indicated radii.
 - i. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within structural-sealant-glazed curtain wall to exterior.
4. Factory-Assembled Frame Units:
 - a. Rigidly secure nonmovement joints.
 - b. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
 - c. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - d. Seal joints watertight unless otherwise indicated.
 - e. Install glazing to comply with requirements in Division 08 Section "Glazing".
5. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

G. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Champagne **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and color densities, **as directed**.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected from manufacturer's full range, **as directed**.
4. High-Performance Organic Finish:
 - a. Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
OR
Three-coat **OR** Four-coat, **as directed**, fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
OR

Two-coat fluoropolymer finish complying with AAMA 2604 and containing 100 percent FEVE resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- b. Color and Gloss: As selected from manufacturer's full range.

H. Source Quality Control

- 1. Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

1.3 EXECUTION

A. Installation

- 1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmoving joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion, electrolytic deterioration, and impediments to movement of joints.
 - f. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - g. Seal joints watertight unless otherwise indicated.
- 2. Metal Protection:
 - a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - b. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- 3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within structural-sealant-glazed curtain walls to exterior.
- 4. Install components plumb and true in alignment with established lines and grades.
- 5. Install operable units level and plumb, securely anchored, and without distortion. Adjust weatherstripping contact and hardware movement to produce proper operation.
- 6. Install glazing as specified in Division 08 Section "Glazing". Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
- 7. Install weatherseal sealant according to Division 07 Section "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

B. Erection Tolerances

- 1. Erection Tolerances: Install to comply with the following nonaccumulating maximum tolerances:
 - a. Plumb: **1/8 inch in 10 feet (3 mm in 3 m); 1/4 inch in 40 feet (6 mm in 12 m).**
 - b. Level: **1/8 inch in 20 feet (3 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).**
 - c. Alignment:
 - 1) Where surfaces abut in line or are separated by reveal or protruding element up to **1/2 inch (12.7 mm)** wide, limit offset from true alignment to **1/16 inch (1.6 mm).**
 - 2) Where surfaces are separated by reveal or protruding element from **1/2 to 1 inch (12.7 to 25.4 mm)** wide, limit offset from true alignment to **1/8 inch (3.2 mm).**
 - 3) Where surfaces are separated by reveal or protruding element of **1 inch (25.4 mm)** wide or more, limit offset from true alignment to **1/4 inch (6 mm).**
 - d. Location: Limit variation from plane to **1/8 inch in 12 feet (3 mm in 3.7 m); 1/2 inch (12.7 mm)** over total length.

- C. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Testing Services: Testing and inspecting of representative areas of structural-sealant-glazed curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
 - a. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
 - 1) Test a minimum of two **OR** four **OR** six, **as directed**, areas on each building facade.
 - 2) Repair installation areas damaged by testing.
 - b. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article, but not more than **0.50 cfm/sq. ft. (2.25 L/s per sq. m)**, of fixed wall area when tested according to ASTM E 783 at a minimum static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed**.
 - 1) Test Area: One bay wide, but not less than **30 feet (9.1 m)**, by one story of structural-sealant-glazed curtain wall.
 - 2) Perform a minimum of two **OR** three, **as directed**, tests in areas as directed by the Owner.
OR
Perform tests in each test area as directed by the Owner. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - c. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than **6.24 lbf/sq. ft. (300 Pa)**, and shall not evidence water penetration.
 - 1) Test Area: One bay wide, but not less than **30 feet (9.1 m)**, by one story of structural-sealant-glazed curtain wall.
 - 2) Perform a minimum of two **OR** three, **as directed**, tests in areas as directed by the Owner.
OR
Perform tests in each test area as directed by the Owner. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 - d. Water Spray Test: Before installation of interior finishes has begun, areas designated by the Owner shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - 1) Test Area: A minimum area of **75 feet (23 m)** by one story of structural-sealant-glazed curtain wall.
 3. Structural-sealant-glazed curtain walls will be considered defective if they do not pass tests and inspections.
 4. Prepare test and inspection reports.

END OF SECTION 08 44 13 00a

SECTION 08 44 13 00b - SLOPED GLAZING ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for sloped glazing systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Conventionally glazed sloped glazing assemblies.
 - b. Two-sided, structural-sealant-glazed sloped glazing assemblies.
 - c. Four-sided, structural-sealant-glazed sloped glazing assemblies.

C. Performance Requirements

1. General Performance: Sloped glazing assemblies shall withstand movements of supporting structure (where applicable) without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - a. Sloped Glazing Assemblies: Comply with performance requirements specified, as determined by testing manufacturer's standard assemblies representing those indicated for this Project.
 - b. Failures also include, but are not limited to, the following:
 - 1) Thermal stresses transferring to building structure.
 - 2) Glass breakage.
 - 3) Noise or vibration created by wind and thermal and structural movements.
 - 4) Loosening or weakening of fasteners, attachments, and other components.
 - 5) Failure of operating units.
 - 6) Glazing-to-glazing contact.
2. Delegated Design: Design sloped glazing assemblies, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Structural Performance: Sloped glazing assemblies shall withstand the wind loads, the effects of gravity loads, and loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Wind Loads: As indicated on Drawings **OR as directed**.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s), as directed.**
 - 2) Exposure Category: **A OR B OR C OR D, as directed.**
 - b. Snow Loads: As indicated on Drawings **OR as directed**.
 - c. Concentrated Live Loads: As indicated on Drawings **OR as directed**, applied to framing members at locations that will produce greatest stress or deflection.
 - d. Uniform Live Loads: As indicated on Drawings **OR as directed**.
 - e. Load Combinations: Calculate according to requirements of applicable code indicated on Drawings **OR as directed**.
 - f. Blast Loads: As indicated on Drawings **OR as directed**.
 - g. Periodic Maintenance-Equipment Loads: As indicated on Drawings **OR as directed**.
4. Structural Performance: Provide sloped glazing assemblies tested according to ASTM E 330, as follows:
 - a. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.

- b. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
- c. Test Durations: As required by design wind velocity, but not less than 10 seconds.
5. Deflection of Framing Members: At design wind pressure, as follows:
 - a. Deflection Normal to Glazing Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding L/175 of the glass edge length for each individual glazing lite **OR** 1/175 of clear span for spans up to **13 feet 6 inches (4.1 m)** and to 1/240 of clear span plus **1/4 inch (6.35 mm)** for spans more than **13 feet 6 inches (4.1 m)**, **as directed**, or an amount that restricts edge deflection of individual glazing lites to **3/4 inch (19.1 mm)**, whichever is less.
 - b. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or **1/8 inch (3.2 mm)**, whichever is smaller **OR** amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than **1/8 inch (3.2 mm)**, **as directed**.
6. Flexural Members: Design for lateral bracing of compression flanges by cross members with minimum depth equal to 50 percent of braced flexural member. Glazing does not provide lateral support.
7. Windborne-Debris-Impact-Resistance Performance: Pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 for Wind Zone 1 **OR** Zone 2 **OR** Zone 3 **OR** Zone 4, **as directed**.
 - a. Large-Missile Test: For glazed openings located within **30 feet (9.1 m)** of grade.
 - b. Small-Missile Test: For glazed openings located more than **30 feet (9.1 m)** above grade.
8. Seismic Performance: Sloped glazing assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. Component Importance Factor is 1.5 **OR** 1.0, **as directed**.
9. Story Drift: Accommodate design displacement of adjacent stories indicated.
 - a. Design Displacement: As indicated on Drawings **OR as directed**.
 - b. Test Performance: Meet criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
10. Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa) OR 10 lbf/sq. ft. (480 Pa) OR 15 lbf/sq. ft. (720 Pa)**, **as directed**.
11. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than **6.24 lbf/sq. ft. (300 Pa) OR 10 lbf/sq. ft. (480 Pa) OR 15 lbf/sq. ft. (720 Pa)**, **as directed**.
 - a. Maximum Water Leakage: According to AAMA 501.1 **OR** No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation, **as directed**. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.
12. Thermal Movements: Allow for thermal movements from the following maximum change (range) in ambient and surface temperature:
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
 - b. Test Interior Ambient-Air Temperature: **75 deg F (24 deg C)**.
 - c. Test Performance: No buckling, stress on glass, sealant failure, or excess stress on framing, anchors, and fasteners and no reduction of performance when tested according to AAMA 501.5.
13. Energy Performance: Sloped glazing assemblies shall have certified and labeled energy-performance ratings according to the NFRC.

- a. Thermal Transmittance (U-Factor): Fixed glazing and framing areas shall have U-factor of not more than **0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) OR 0.57 Btu/sq. ft. x h x deg F (3.23 W/sq. m x K) OR 0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K)**, as directed, as determined according to NFRC 100.
 - b. Solar Heat-Gain Coefficient: Fixed glazing and framing areas shall have an SHGC of not more than **0.35 OR 0.40 OR 0.45**, as directed, as determined according to NFRC 200.
 - c. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of **0.30 cfm/sq. ft. (1.50 L/s per sq. m)** of fixed area as determined according to ASTM E 283 at a minimum static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa)**, as directed.
 - d. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified CR rating of not less than **15 OR 25 OR 35 OR 45**, as directed, as determined according to NFRC 500.
14. Sound Transmission: Fixed glazing and framing areas shall have the following characteristics:
 - a. Outdoor-Indoor Transmission Class: Minimum **26 OR 30 OR 34**, as directed, when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.
 15. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by structural-sealant glazing without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
 - a. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - b. Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
 16. Structural-Sealant Joints:
 - a. Designed to carry gravity loads of glazing.
 - b. Designed to produce tensile or shear stress of less than **20 psi (138 kPa)**.
 - c. Design reviewed and approved by structural-sealant manufacturer.
- D. Submittals
1. Product Data: For each type of product indicated.
 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For glazing sealants used inside the weatherproofing system, including printed statement of VOC content.
 3. Shop Drawings: For sloped glazing assemblies. Include plans, elevations, sections, details, and attachments to other work.
 - a. Include details of provisions for assembly expansion and contraction and for draining moisture within the assembly to the exterior.
 - b. Include full-size isometric details of each vertical-to-horizontal intersection of assembly, showing the following:
 - 1) Joinery including concealed welds.
 - 2) Anchorage.
 - 3) Expansion provisions.
 - 4) Glazing.
 - 5) Flashing and drainage.
 4. Samples: For each type of exposed finish required.
 5. Delegated-Design Submittal: For sloped glazing assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 6. Qualification Data: For qualified Installer and testing agency.
 7. Seismic Qualification Certificates: For sloped glazing assemblies, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 8. Welding certificates.

9. Product test reports.
10. Preconstruction sealant test reports.
11. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.
12. Source quality-control reports.
13. Field quality-control reports.
14. Maintenance data.
15. Warranties: Sample of special warranties.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
3. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
4. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation.
5. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
6. NFRC Certification: Provide NFRC-certified and -labeled sloped glazing assemblies.
7. Preinstallation Conference: Conduct conference at Project site.

F. Warranty

1. Special Assembly Warranty: Standard form in which manufacturer **OR** Installer, **as directed**, agrees to repair or replace components of sloped glazing assemblies that do not comply with requirements or that fail in materials or workmanship within Two **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
2. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429.
 - d. Structural Profiles: ASTM B 308/B 308M.
 - e. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
2. Steel Reinforcement: With manufacturer's standard, zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
 - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
 - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

B. Framing

1. Framing Members: Manufacturer's standard, formed- or extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

- a. Framing-Member Type: Self-supporting **OR** Skin type, supported by structural-steel members indicated, **as directed**.
- b. Glass Retention: Field-installed pressure caps on four sides **OR** Field-installed structural sealant at horizontal members (purlins) and pressure caps at rafters **OR** Factory-installed structural sealant on four sides, **as directed**.
2. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - a. Include snap-on aluminum trim that conceals fasteners.
3. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning assembly components.
4. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - a. At pressure caps, use ASTM A 193/A 193M stainless-steel screws.
 - b. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - c. Reinforce members as required to receive fastener threads.
 - d. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system **OR** fabricated from Series 300 stainless steel, **as directed**.
5. Anchors: Three-way adjustable anchors, with minimum adjustment of **1 inch (25 mm)**, that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials, and recommended by manufacturer.
 - a. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with requirements in ASTM A 123/A 123M or ASTM A 153/A 153M.
6. Anchor Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, galvanized steel.
7. Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials **OR** Dead-soft, **0.018-inch- (0.457-mm-)** thick stainless steel, ASTM A 240/A 240M; of type recommended by manufacturer, **as directed**.
8. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than **0.040 inch (1.016 mm) OR 0.060 inch (1.524 mm)**, **as directed**, thick.
9. Framing Sealants: Manufacturer's standard.

C. Glazing

1. General: Comply with Division 08 Section "Glazing".
2. Glazing Gaskets: Manufacturer's standard resilient elastomeric glazing gaskets, setting blocks, and shims or spacers **OR** As specified in Division 08 Section "Glazing", **as directed**.
3. Glazing Sealants: As recommended by manufacturer **OR** Comply with Division 08 Section "Glazing", **as directed**.
 - a. Provide sealants for use inside the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Glazing Sealants: For structural-sealant glazing, as recommended by manufacturer for joint type, and as follows:
 - a. Structural Sealant: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant, and approved by structural-sealant manufacturer for use in sloped glazing assemblies indicated.
 - 1) Provide sealants for use inside the weatherproofing system that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Color: Black **OR** Gray **OR** As selected from manufacturer's full range of colors, **as directed**.
 - b. Weatherseal Sealant: ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and sloped glazing assembly manufacturers for this use.
 - 1) Provide sealants for use inside the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- 2) Color: Matching structural sealant.
 5. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- D. Accessory Materials
1. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 33 requirements except containing no asbestos, formulated for **30-mil (0.76-mm)** thickness per coat.
 2. Cleaning Agent and Cloth: As recommended by structural-sealant manufacturer.
- E. Fabrication
1. Form or extrude aluminum shapes before finishing.
 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 3. Fabricate components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Physical and thermal isolation of glazing from framing members.
 - d. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - e. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - f. Components curved to indicated radii.
 - g. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
 4. Fabricate continuous, one-piece-type aluminum sill closures with weep holes.
 5. Four-Sided, Structural-Sealant-Glazed Frame Units:
 - a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
 - b. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - c. Seal joints watertight unless otherwise indicated.
 - d. Factory install glazing to comply with requirements in Division 08 Section "Glazing".
 6. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.
- F. Aluminum Finishes
1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Champagne **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and color densities, **as directed**.
 3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected from manufacturer's full range, **as directed**.
 4. High-Performance Organic Finish:
 - a. Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
OR
Three-coat **OR** Four-coat, **as directed**, fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both

color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

OR

Two-coat fluoropolymer finish complying with AAMA 2604 and containing 100 percent FEVE resin in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

- b. Color and Gloss: As selected from manufacturer's full range.

G. Source Quality Control

- 1. Four-Sided, Structural-Sealant Glazing: Perform quality-control procedures complying with recommendations in ASTM C 1401 including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

1.3 EXECUTION

A. Installation

- 1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmovement joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion, electrolytic deterioration, and impediments to movement of joints.
 - f. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - g. Seal joints watertight unless otherwise indicated.
- 2. Metal Protection:
 - a. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - b. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
 - c. Where aluminum will contact pressure-treated wood, separate dissimilar materials by method recommended by sloped glazing assembly manufacturer.
- 3. Install continuous sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.
- 4. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the sloped glazing assembly to exterior.
- 5. Install components plumb and true in alignment with established lines and grades.
- 6. Install glazing as specified in Division 08 Section "Glazing".
 - a. Two-Sided, Structural-Sealant Glazing:
 - 1) Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 2) Install weatherseal sealant according to Division 08 Section "Glazing" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

B. Erection Tolerances

- 1. General: Install sloped glazing assemblies to comply with the following maximum tolerances:
 - a. Level: **1/8 inch in 20 feet (3 mm in 6 m); 1/4 inch in 40 feet (6 mm in 12 m).**
 - b. Alignment: Limit offset from true alignment to **1/32 inch (0.8 mm)** where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than **3 inches (76 mm)**; otherwise limit offset to **1/8 inch (3 mm).**

- c. Location and Plane: Limit variation from true location and plane to **1/8 inch in 12 feet (3 mm in 3.7 m)**; **1/2 inch (13 mm)** over total length.

C. Field Quality Control

- 1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- 2. Testing Services: Testing and inspecting of representative areas of sloped glazing assemblies shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
 - a. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
 - 1) Test a minimum of two **OR** four **OR** six, **as directed**, areas on each assembly face.
 - 2) Repair installation areas damaged by testing.
 - b. Air Infiltration: Areas shall be tested for air leakage of 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article, but not more than **0.50 cfm/sq. ft. (2.25 L/s per sq. m)**, of assembly surface area when tested according to ASTM E 783 at a minimum static-air-pressure differential of **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed**.
 - 1) Test Area: One bay wide, but not less than **30 by 30 feet (9.1 by 9.1 m)** of sloped glazing assembly.
 - 2) Perform a minimum of two **OR** three, **as directed**, tests in areas as directed by the Owner.
OR
Perform tests in each test area as directed by the Owner. Perform at least three tests prior to 10, 35, and 70 percent completion.
 - c. Water Penetration: Areas shall be tested according to ASTM E 1105 at a minimum uniform and cyclic static-air-pressure difference of 0.67 times the static-air-pressure difference specified for laboratory testing in "Performance Requirements" Article, but not less than **6.24 lbf/sq. ft. (300 Pa)**, and shall not evidence water penetration.
 - 1) Test Area: One bay wide, but not less than **30 by 30 feet (9.1 by 9.1 m)** of sloped glazing assembly.
 - 2) Perform a minimum of two **OR** three tests in areas as directed by the Owner.
OR
Perform tests in each test area as directed by the Owner. Perform at least three tests prior to 10, 35, and 70 percent completion.
 - d. Water-Spray Test: Before installation of interior finishes has begun, areas designated by the Owner shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - 1) Test Area: A minimum area of **30 by 30 feet (9.1 by 9.1 m)** of sloped glazing assembly.
- 3. Sloped glazing assemblies will be considered defective if they do not pass tests and inspections.
- 4. Prepare test and inspection reports.

END OF SECTION 08 44 13 00b

SECTION 08 45 23 00 - STRUCTURED-POLYCARBONATE-PANEL ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for structured-polycarbonate-panel assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes aluminum-framed assemblies glazed with multiwalled (structured) polycarbonate panels as follows:
 - a. Wall assemblies.
 - b. Roof (sloped, overhead) assemblies.
 - c. Skylight assemblies.

C. Performance Requirements

1. Provide assemblies, including anchorage, capable of withstanding, without failure, the effects of the following:
 - a. Structural loads.
 - b. Thermal movements.
 - c. Movements of supporting structure.
 - d. Dimensional tolerances of building frame and other adjacent construction.
2. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Water leakage.
 - c. Thermal stresses transferred to building structure.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.

D. Structural Loads:

- a. Wind Loads: As indicated by structural design data on Drawings **OR as directed**.
 - b. Snow Loads: As indicated by structural design data on Drawings **OR as directed**.
 - c. Concentrated Live Loads on Overhead Assemblies: **300 lbf (1334 N)** applied to assemblies at locations that will produce greatest stress or deflection.
 - d. Seismic Loads: As indicated by earthquake design data on Drawings **OR as directed**.
 - e. Load Combinations: Calculate according to requirements of applicable code indicated on Drawings **OR as directed**.
2. Deflection of Assemblies:
 - a. Vertical Assemblies: Limited to 1/100 of clear span for each assembly component.
 - b. Overhead Assemblies: Limited to 1/100 **OR** 1/180, **as directed**, of clear span for each assembly component.
 3. Roof Assemblies: Class A **OR B OR C, as directed**, per ASTM E 108 or UL 790.
 4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

E. Performance Testing

1. Provide assemblies that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified independent testing agency.

2. Structural-Performance Test: ASTM E 330.
 - a. Performance at Design Load: When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - b. Performance at Maximum Test Load: When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main supporting members exceeding 0.2 percent of span.
 - c. Test Durations: As required by design wind velocity but not less than 10 seconds.
3. Air-Infiltration Test: ASTM E 283.
 - a. Minimum Static-Air-Pressure Difference: **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed.**
 - b. Maximum Air Leakage: **0.06 cfm/sq. ft. (0.30 L/s per sq. m).**
4. Test for Water Penetration under Static Pressure: ASTM E 331.
 - a. Minimum Static-Air-Pressure Difference: 20 percent of positive wind-load design pressure, but not less than **15 lbf/sq. ft. (718 Pa).**
 - b. Water Leakage: None.
5. Test for Water Penetration under Dynamic Pressure: AAMA 501.1.
 - a. Dynamic Pressure: 20 percent of positive wind-load design pressure, but not less than **15 lbf/sq. ft. (718 Pa).**
 - b. Water Leakage: None, as defined by AAMA 501.1 **OR** No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation, **as directed.** Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

F. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For sealants used inside of the weatherproofing system, documentation including printed statement of VOC content.
3. Shop Drawings: For assemblies. Include plans, elevations, sections, details, and attachments to other work.
 - a. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Samples: For each exposed finish.
5. Field quality-control test reports.
6. Product test reports.
7. Maintenance data.
8. Special warranties specified in this Section.

G. Quality Assurance

1. Installer Qualifications: Entity capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
2. Fire-Test-Response Characteristics: Where fire-test-response characteristics are indicated for assemblies and components, provide products identical to those tested per test method indicated by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
3. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
4. Preinstallation Conference: Conduct conference at Project site.

H. Warranty

1. Special Assembly Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of assemblies that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including, but not limited to, excessive deflection.

- 2) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- 3) Water leakage.
- b. Warranty Period: Two **OR** Five, **as directed**, years from date of Final Completion.
2. Special Structured-Polycarbonate-Panel Warranty: Manufacturer's standard form agreeing to replace polycarbonate sheet that breaks or develops defects from normal use that are attributed to manufacturing process and not to practices for maintaining and cleaning products contrary to manufacturer's written instructions.
 - a. Defects include, but are not limited to, the following:
 - 1) Delamination.
 - 2) Color changes from original in excess of 3.0 units Delta E when measured per ASTM D 2244.
 - 3) Losses in light transmission beyond 6 percent from original when measured per ASTM D 1003.
 - b. Warranty Period: 10 years from date of Final Completion.
3. Special Aluminum-Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - a. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
 - b. Warranty Period: Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Aluminum Framing Systems

1. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429.
2. Components: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.
 - a. Construction: One-piece extruded-aluminum components **OR** Thermally broken; framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by a material of low thermal conductance, **as directed**.
3. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than **0.040 inch (1.016 mm) OR 0.060 inch (1.524 mm)**, **as directed**, thick.
4. Framing Gaskets: Manufacturer's standard.
5. Framing Sealants: As recommended in writing by manufacturer **OR** specified in Division 07 Section "Joint Sealants", **as directed**.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.
 - a. At closures, retaining caps, or battens, use ASTM A 193/A 193M, 300 series stainless-steel screws.
 - b. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - c. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.
7. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
8. Anchor Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, hot-dip zinc coating, ASTM A 153/A 153M, Class C **OR** mechanically deposited zinc coating, ASTM B 695, Class 50, **as directed**.

9. Framing System Fabrication:
 - a. Fabricate components before finishing.
 - b. Fabricate components that, when assembled, have the following characteristics:
 - 1) Profiles that are sharp, straight, and free of defects or deformations.
 - 2) Accurately fitted joints with ends coped or mitered.
 - 3) Internal guttering systems or other means to drain water passing joints, condensation occurring within components, and moisture migrating within assembly to exterior.
 - c. Fabricate sill closures with weep holes and for installation as continuous component.
 - d. Reinforce components as required to receive fastener threads.
 - e. Weld components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

- B. Structured Polycarbonate Panels
 1. General: Translucent, extruded-polycarbonate sheet with cellular cross section that provides isolated airspaces and that is coextruded with a UV-protective layer.
 - a. Plastic Self-Ignition Temperature: **650 deg F (343 deg C)** or more per ASTM D 1929.
 - b. Burning Extent: **1 inch (25 mm)** or less per ASTM D 635.
 - c. Burning Rate: **2.5 in/.min. (1.06 mm/s)** or less per ASTM D 635.
 - d. Smoke-Developed Index: 450 or less per ASTM E 84, or 75 or less per ASTM D 2843.
 - e. Flame-Spread Index: Not more than 25 per ASTM E 84.
 - f. Exterior-Fire-Exposure Class: Class A **OR B OR C, as directed**, per ASTM E 108 or UL 790.
 2. Panel U-Factor: Not more than **0.73 (4.15) OR 0.63 (3.58) OR 0.48 (2.73) OR 0.38 (2.16) OR 0.24 (1.36) OR 0.22 (1.25)**, **as directed**, measured in **Btu/sq. ft. x h x deg F (W/sq. m x K)** according to ASTM C 1363 and using procedures described in ASTM C 1199 and ASTM E 1423.
 3. Color Stability: Not more than 3.0 units Delta E when measured according to ASTM D 2244 after outdoor weathering according to procedures in ASTM D 1435.
 - a. Outdoor Weathering Conditions: 60 months in Arizona or 120 months in a moderate North American climate.
 4. Impact Resistance: No failure at impact of **200 ft. x lbf (271 J)** according to free-falling-ball impact test using a **3-1/2-inch- (89-mm-)** diameter, **6.3-lb (2.9-kg)** ball.

- C. Accessory Materials
 1. Insulating Materials: Specified in Division 07 Section "Thermal Insulation".
 2. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.

- D. Aluminum Finishes
 1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 3. Aluminum Anodic Finish: Class I, clear anodic coating complying with AAMA 611 **OR** Class I, color anodic coating complying with AAMA 611, **as directed**.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and densities, **as directed**.
 4. Aluminum High-Performance Organic Finish: Two-coat **OR** Three-coat, **as directed**, thermocured system with fluoropolymer topcoats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 **OR** AAMA 2605, **as directed**.
 - a. Color and Gloss: As selected from manufacturer's full range.

1.3 EXECUTION

A. Installation

1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmovement joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - f. Weld aluminum components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - g. Seal joints watertight, unless otherwise indicated.
2. Metal Protection: Where aluminum components will contact dissimilar materials, protect against galvanic action by painting contact surfaces with bituminous paint or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
3. Install continuous aluminum sill closures with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.
4. Install components to drain water passing joints, condensation occurring within aluminum members, and moisture migrating within assembly to exterior.
5. Install components plumb and true in alignment with established lines and elevations.
6. Install insulation materials as specified in Division 07 Section "Thermal Insulation".
7. Erection Tolerances: Install assemblies to comply with the following maximum tolerances:
 - a. Alignment: Limit offset from true alignment to **1/32 inch (0.8 mm)** where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than **3 inches (76 mm)**; otherwise, limit offset to **1/8 inch (3.2 mm)**.
 - b. Location and Plane: Limit variation from true location and plane to **1/8 inch in 12 feet (3.2 mm in 3.7 m)**; **1/2 inch (13 mm)** over total length.

B. Field Quality Control

1. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
2. Testing Services: Testing and inspecting of representative areas to determine compliance of installed assemblies with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 - a. Water Penetration under Static Pressure: Before installation of interior finishes has begun, areas shall be tested according to ASTM E 1105.
 - 1) Test Procedures: Test under uniform and cyclic static air pressure.
 - 2) Static-Air-Pressure Difference: as directed by the Owner.
 - 3) Water Penetration: None.
 - b. Water-Spray Test: Before installation of interior finishes has begun, assemblies shall be tested according to AAMA 501.2 and shall not evidence water penetration.
3. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 08 45 23 00

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SECTION 08 45 23 00a - FIBERGLASS-SANDWICH-PANEL ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for fiberglass-sandwich-panel assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes assemblies incorporating fiberglass sandwich panels and aluminum frame systems as follows:
 - a. Wall assemblies.
 - b. Roof (sloped, overhead) assemblies.
 - c. Skylight assemblies.

C. Performance Requirements

1. Provide assemblies, including anchorage, capable of withstanding, without failure, the effects of the following:
 - a. Structural loads.
 - b. Thermal movements.
 - c. Movements of supporting structure.
 - d. Dimensional tolerances of building frame and other adjacent construction.
2. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Water leakage.
 - c. Thermal stresses transferred to building structure.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Loosening or weakening of fasteners, attachments, and other components.
 - f. Delamination of fiberglass-sandwich-panel faces from panel cores.
3. Structural Loads:
 - a. Wind Loads: As indicated by structural design data on Drawings **OR as directed**.
 - b. Snow Loads: As indicated by structural design data on Drawings **OR as directed**.
 - c. Concentrated Live Loads on Overhead Assemblies: **300 lbf (1334 N)** applied to assemblies at locations that will produce greatest stress or deflection.
 - d. Seismic Loads: As indicated by earthquake design data on Drawings **OR as directed**.
 - e. Load Combinations: Calculate according to requirements of applicable code indicated on Drawings **OR as directed**.
4. Deflection of Assemblies:
 - a. Vertical Assemblies: Limited to 1/60 **OR** 1/90 **OR** 1/180, **as directed**, of clear span for each assembly component.
 - b. Overhead Assemblies: Limited to 1/60 **OR** 1/90 **OR** 1/180, **as directed**, of clear span for each assembly component.
5. Roof Assemblies: Class A per ASTM E 108 or UL 790.
6. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

D. Performance Testing

1. Provide assemblies that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified independent testing agency.
 2. Structural-Performance Test: ASTM E 330.
 - a. Performance at Design Load: When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - b. Performance at Maximum Test Load: When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main supporting members exceeding 0.2 percent of span.
 - c. Test Durations: As required by design wind velocity but not less than 10 seconds.
 3. Air-Infiltration Test: ASTM E 283.
 - a. Minimum Static-Air-Pressure Difference: **1.57 lbf/sq. ft. (75 Pa) OR 6.24 lbf/sq. ft. (300 Pa), as directed.**
 - b. Maximum Air Leakage: **0.06 cfm/sq. ft. (0.30 L/s per sq. m), as directed.**
 4. Test for Water Penetration under Static Pressure: ASTM E 331.
 - a. Minimum Static-Air-Pressure Difference: 20 percent of positive wind-load design pressure, but not less than **10 lbf/sq. ft. (479 Pa).**
 - b. Water Leakage: None.
 5. Test for Water Penetration under Dynamic Pressure: AAMA 501.1.
 - a. Dynamic Pressure: 20 percent of positive wind-load design pressure, but not less than **15 lbf/sq. ft. (718 Pa).**
 - b. Water Leakage: None, as defined by AAMA 501.1 **OR** No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation, **as directed.** Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.
 6. Water-Penetration, Wind-Driven-Rain Test: Wind-driven-rain test in ICBO ES AC07, "Special Roofing Systems."
 - a. Water Leakage: None.
- E. Submittals
1. Product Data: For each type of product indicated.
 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For sealants used inside of the weatherproofing system, documentation including printed statement of VOC content.
 3. Shop Drawings: For assemblies. Include plans, elevations, sections, details, and attachments to other work.
 - a. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 4. Field quality-control test reports.
 5. Product test reports.
 6. Maintenance data.
 7. Special warranties specified in this Section.
- F. Quality Assurance
1. Installer Qualifications: Entity capable of assuming engineering responsibility, including preparation of Shop Drawings, and performing work of this Section and who is acceptable to manufacturer.
 2. Manufacturer Qualifications: For fiberglass sandwich panels, a qualified manufacturer whose facilities, processes, and products are monitored by an independent, accredited quality-control agency for compliance with applicable requirements in ICBO ES AC04, "Sandwich Panels."
 3. Fire-Test-Response Characteristics: Where fire-test-response characteristics are indicated for assemblies and components, provide products identical to those tested per test method indicated by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

4. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
5. NFRC Certification: Provide fiberglass sandwich panels that are certified for U-factors indicated according to NFRC 100 and listed in its "National Fenestration Council Incorporated - Certified Products Directory."
6. Preinstallation Conference: Conduct conference at Project site.

G. Warranty

1. Special Assembly Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of assemblies that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including, but not limited to, excessive deflection.
 - 2) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 3) Water leakage.
 - b. Warranty Period: Two **OR** Five, **as directed**, years from date of Final Completion.
2. Special Fiberglass-Sandwich-Panel Warranty: Manufacturer's standard form in which manufacturer agrees to replace panels that exhibit defects in materials or workmanship.
 - a. Defects include, but are not limited to, the following:
 - 1) Fiberbloom.
 - 2) Delamination of coating, if any, from exterior face sheet.
 - 3) Discoloration of exterior face sheet of more than 8.0 units Delta E when measured according ASTM D 2244.
 - 4) Delamination of panel face sheets from panel cores.
 - b. Warranty Period: 10 years from date of Final Completion.
3. Special Aluminum-Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - a. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
 - b. Warranty Period: Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Aluminum Frame Systems

1. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Extruded Structural Pipe and Tubes: **ASTM B 429**.
2. Components: Manufacturer's standard extruded-aluminum members of thickness required and reinforced as required to support imposed loads.
 - a. Construction: One-piece extruded-aluminum components **OR** Thermally broken; framing members are composite assemblies of two separate extruded-aluminum components permanently bonded by a material of low thermal conductance, **as directed**.
3. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than **0.040 inch (1.016 mm) OR 0.060 inch (1.524 mm)**, **as directed**, thick.
4. Frame-System Gaskets: Manufacturer's standard.
5. Frame-System Sealants: As recommended in writing by manufacturer **OR** specified in Division 07 Section "Joint Sealants", **as directed**.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.

- a. At closures, retaining caps, or battens, use ASTM A 193/A 193M, 300 series stainless-steel screws.
 - b. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - c. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.
7. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
 8. Anchor Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, hot-dip zinc coating, ASTM A 153/A 153M, Class C **OR** mechanically deposited zinc coating, ASTM B 695, Class 50, **as directed**.
 9. Frame System Fabrication:
 - a. Fabricate components before finishing.
 - b. Fabricate components that, when assembled, have the following characteristics:
 - 1) Profiles that are sharp, straight, and free of defects or deformations.
 - 2) Accurately fitted joints with ends coped or mitered.
 - 3) Internal guttering systems or other means to drain water passing joints, condensation occurring within components, and moisture migrating within the assembly to exterior.
 - c. Fabricate sill closures with weep holes and for installation as continuous component.
 - d. Reinforce components as required to receive fastener threads.
 - e. Weld components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- B. Fiberglass Sandwich Panels
1. Panel Construction: Assembly of uniformly colored, translucent, thermoset, fiberglass-reinforced-polymer face sheets bonded to both sides of a grid core and complying with requirements applicable to panel materials in ICBO ES AC04, "Sandwich Panels."
 - a. Face-Sheet, Self-Ignition Temperature: **650 deg F (343 deg C)** or more per ASTM D 1929.
 - b. Face-Sheet Burning Extent: **1 inch (25 mm)** or less per ASTM D 635.
 - c. Face-Sheet, Smoke-Developed Index: 450 or less per ASTM E 84.
 - d. Interior Face-Sheet, Flame-Spread Index: Not more than 25 **OR** 75, **as directed**, per ASTM E 84.
 - e. Roof-Covering Class: Class A **OR** Class A, burning brand test (only), **as directed**, per ASTM E 108 or UL 790.
 2. Panel Thickness: **2-3/4 inches (70 mm) OR 1-1/2 to 1-9/16 inches (38 to 40 mm), as directed.**
 3. Panel U-Factor: Not more than **0.70 (3.97) OR 0.53 (3.01) OR 0.44 (2.50) OR 0.40 (2.27) OR 0.29 (1.65) OR 0.28 (1.59) OR 0.26 (1.48) OR 0.24 (1.36) OR 0.23 (1.31) OR 0.22 (1.25) OR 0.18 (1.02) OR 0.15 (0.85) OR 0.14 (0.79) OR 0.10 (0.57)**, **as directed**, measured in **Btu/sq. ft. x h x deg F (W/sq. m x K)** according to NFRC 100 or ASTM C 1363 using procedures described in ASTM C 1199 and ASTM E 1423.
 4. Panel Strength Characteristics:
 - a. Maximum Panel Deflection: **3-1/2 inches (89 mm)** when a **4-by-12-foot (1.2-by-3.6-m)** panel is tested according to ASTM E 72 at **34 lbf/ sq. ft. (1.6 kPa)**, with a maximum **0.090-inch (2.3-mm)** set deflection after 5 minutes.
 - b. Panel Support Strength: Capable of supporting, without failure, a **300-lbf (1334 N)** concentrated load when applied to a **3-inch- (76-mm-)** diameter disk according to ASTM E 661.
 5. Grid Core: Mechanically interlocked extruded-aluminum I-beams, with a minimum flange width of **7/16 inch (11.1 mm)**.
 - a. Extruded Aluminum: **ASTM B 221 (ASTM B 221M)**, in alloy and temper recommended in writing by manufacturer.

- b. I-Beam Construction: One-piece extruded-aluminum components **OR** Thermally broken; two separate extruded-aluminum components permanently bonded by a material of low thermal conductance, **as directed**.
 - c. Grid Pattern: Inline rectangle, nominal **12 by 24 inches (305 by 610 mm)** **OR** Staggered rectangle, nominal **12 by 24 inches (305 by 610 mm)** **OR** Square, nominal **12 inches (305 mm)** **OR** As indicated on Drawings, **as directed**.
6. Exterior Face Sheet:
- a. Thickness: **0.070 inches (1.778 mm)** **OR** **0.060 inches (1.524 mm)** **OR** **0.052 inches (1.321 mm)**, **as directed**.
 - b. Color: White **OR** Crystal **OR** As selected from manufacturer's full range, **as directed**.
 - c. Color Stability: Not more than 3.0 **OR** 4.0 **OR** 7.0, **as directed**, units Delta E when measured according to ASTM D 2244 after outdoor weathering in southern Florida according to procedures in ASTM D 1435 with panels mounted facing south and as follows:
 - 1) Panel Mounting Angle: Not more than 5 **OR** 45, **as directed**, degrees from horizontal.
 - 2) Exposure Period: 60 months **OR** 30 months **OR** 60 months for vertical assemblies, 30 months for components of Class A roof assemblies, **as directed**.
 - d. Erosion Protection: Manufacturer's standard **OR** Integral, embedded glass erosion barrier **OR** Surface-applied, polyvinyl fluoride film not less than **1.0 mils (0.03 mm)** thick, **as directed**.
 - e. Impact Resistance: No fracture or tear at impact of **60 ft. x lbf (81 J)** **OR** **70 ft. x lbf (95 J)** **OR** **230 ft. x lbf (312 J)**, **as directed**, by a **3-1/4-inch- (83-mm-)** diameter, **5-lb (2.3-kg)** free-falling ball according to test procedure in UL 972.
7. Interior Face Sheet:
- a. Thickness: **0.045 inch (1.143 mm)** **OR** **0.060 inch (1.524 mm)**, **as directed**.
 - b. Color: White **OR** Crystal **OR** As selected from manufacturer's full range, **as directed**.
8. Fiberglass-Sandwich-Panel Adhesive: ASTM D 2559.
- a. Compatible with facing and core materials.
 - b. Tensile and shear bond strength of aged adhesive ensures permanent adhesion of facings to cores, as evidenced by testing according to ASTM C 297 and ASTM D 1002 after accelerated aging procedures that comply with aging requirements for adhesives with high resistance to moisture in ICBO ES AC05, "Sandwich Panel Adhesives."
9. Panel Fabrication: Factory assemble and seal panels.
- a. Laminate face sheets to grid core under a controlled process using heat and pressure to produce straight adhesive bonding lines that cover width of core members and that have sharp edges.
 - 1) White spots indicating lack of bond at intersections of grid-core members are limited in number to 4 for every **40 sq. ft. (3.7 sq. m)** of panel and limited in diameter to **3/64 inch (1.2 mm)**.
 - b. Fabricate with grid pattern that is symmetrical about centerlines of each panel.
 - c. Fabricate panel to allow condensation within panel to escape.
 - d. Reinforce panel corners.
- C. Accessory Materials
- 1. Insulating Materials: Specified in Division 07 Section "Thermal Insulation".
 - 2. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.
- D. Aluminum Finishes
- 1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - 3. Aluminum Anodic Finish: Class I, clear anodic coating complying with AAMA 611 **OR** Class I, color anodic coating complying with AAMA 611, **as directed**.

- a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and densities, **as directed**.
- 4. Aluminum High-Performance Organic Finish: Two-coat **OR** Three-coat, **as directed**, thermocured system with fluoropolymer topcoats containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604 **OR** AAMA 2605, **as directed**.
 - a. Color: Match sample **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

- 1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmovement joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - f. Weld aluminum components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - g. Seal joints watertight, unless otherwise indicated.
- 2. Metal Protection: Where aluminum components will contact dissimilar materials, protect against galvanic action by painting contact surfaces with bituminous paint or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
- 3. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.
- 4. Install components to drain water passing joints, condensation occurring within aluminum members and panels, and moisture migrating within assembly to exterior.
- 5. Install components plumb and true in alignment with established lines and elevations.
- 6. Install insulation materials as specified in Division 07 Section "Thermal Insulation".
- 7. Erection Tolerances: Install assemblies to comply with the following maximum tolerances:
 - a. Alignment: Limit offset from true alignment to **1/32 inch (0.8 mm)** where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than **3 inches (76 mm)**; otherwise, limit offset to **1/8 inch (3.2 mm)**.
 - b. Location and Plane: Limit variation from true location and plane to **1/8 inch in 12 feet (3.2 mm in 3.7 m)**; **1/2 inch (13 mm)** over total length.

B. Field Quality Control

- 1. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- 2. Testing Services: Testing and inspecting of representative areas to determine compliance of installed assemblies with specified requirements shall take place as follows and in successive stages as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
 - a. Water Penetration under Static Pressure: Before installation of interior finishes has begun, areas shall be tested according to ASTM E 1105.
 - 1) Test Procedures: Test under uniform and cyclic static air pressure.
 - 2) Static-Air-Pressure Difference: as directed by the Owner.
 - 3) Water Penetration: None.
 - b. Water-Spray Test: Before installation of interior finishes has begun, assemblies shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- 3. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.

4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 08 45 23 00a

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SECTION 08 45 23 00b - UNIT SKYLIGHTS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for unit skylights. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Self-flashing unit skylights with integral curb.
 - b. Unit skylights mounted on prefabricated **OR** site-built, **as directed**, curbs.

C. Performance Requirements

1. AAMA/WDMA Performance Requirements: Provide unit skylights of performance class and grade indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.
 - a. Performance Class and Grade:
 - 1) SKG-R15/15-1200x1200 **OR** SKP-R15/15-1200x1200, **as directed**.
 - 2) SKG-C30/30-1200x1200 **OR** SKP-C30/30-1200x1200, **as directed**.
 - 3) SKG-HC40/40-1200x2500 **OR** SKP-HC40/40-1200x2500, **as directed**.
 - 4) As indicated.
 2. Windborne-Debris-Impact-Resistance Performance: Provide unit skylights that pass missile-impact and cyclic-pressure tests when tested according to ASTM E 1886 and testing information in ASTM E 1996 **OR** AAMA 506, **as directed**.
 - a. Large-Missile Impact: For unit skylights located within **30 feet (9.1 m)** of grade.
 - b. Small-Missile Impact: For unit skylights located more than **30 feet (9.1 m)** above grade.

D. Submittals

1. Product Data: For each type of unit skylight indicated.
2. Shop Drawings: For unit skylight work. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.
 - a. Unit Skylight Operating System: Show locations, mounting, and details for installing operator components and controls.
 - b. Unit Skylight Operating System: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - c. Wiring Diagrams: For power, signal, and control wiring for electric motors of operable unit skylights.
3. Samples: For each type of exposed finish required, in a representative section of each unit skylight in manufacturer's standard size.
4. Qualification Data.
5. Product Test Reports.
6. Field quality-control reports.
7. Maintenance Data: For unit skylights and unit skylight operating system to include in maintenance manuals.
8. Warranty: Sample of special warranty.

E. Quality Assurance

1. Manufacturer Qualifications: A manufacturer capable of fabricating unit skylights that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.

2. Installer Qualifications: An installer acceptable to unit skylight manufacturer for installation of units required for this Project.
 3. Surface-Burning Characteristics of Plastic Glazing: Provide plastic glazing sheets identical to those tested for fire-exposure behavior per test method indicated below by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - a. Self-Ignition Temperature: **650 deg F (343 deg C)** or more for plastic sheets in thickness indicated when tested per ASTM D 1929.
 - b. Smoke-Production Characteristics: Comply with either requirement below:
 - 1) Smoke-Developed Index: 450 or less when tested per ASTM E 84 on plastic sheets in manner indicated for use.
 - 2) Smoke Density: 75 or less when tested per ASTM D 2843 on plastic sheets in thickness indicated for use.
 - c. Burning Characteristics: Tested per ASTM D 635.
 - 1) Acrylic Glazing: Class CC2, burning rate of **2-1/2 inches (64 mm)** per minute or less for nominal thickness of **0.060 inch (1.5 mm)** or thickness indicated for use.
 - 2) Polycarbonate Glazing: Class CC1, burning extent of **1 inch (25 mm)** or less for nominal thickness of **0.060 inch (1.5 mm)** or thickness indicated for use.
 - 3) Polycarbonate-Insulating-Panel Glazing: Class CC2, burning rate of **2-1/2 inches (64 mm)** per minute or less for nominal thickness of **0.060 inch (1.5 mm)** or thickness indicated for use.
 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 5. Unit Skylight Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - a. Provide AAMA-certified unit skylights with an attached label.
 6. Preinstallation Conference: Conduct conference at Project site.
- F. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of unit skylights that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum Components:
 - a. Sheets: **ASTM B 209 (ASTM B 209M)**, alloy and temper to suit forming operations and finish requirements but with not less than the strength and durability of alclad Alloy 3005-H25.
 - b. Extruded Shapes: **ASTM B 221 (ASTM B 221M)**, alloy and temper to suit structural and finish requirements but with not less than the strength and durability of Alloy 6063-T52.
2. Fasteners: Same metal as metal being fastened, nonmagnetic stainless steel, or other noncorrosive metal as recommended by manufacturer. Finish exposed fasteners to match material being fastened.
 - a. Where removal of exterior exposed fasteners might allow access to building, provide nonremovable fastener heads.

B. Glazing

1. Acrylic Glazing: ASTM D 4802, thermoformable, monolithic sheet, category as standard with manufacturer, Finish 1 (smooth or polished), Type UVF (formulated with UV absorber).
 - a. Single-Glazing Profile: Dome, 25 percent rise **OR** Pyramid, 30-degree slope, **as directed**.

- 1) Thickness: As indicated **OR** Not less than thickness required to exceed performance requirements, **as directed**.
 - 2) Color: Colorless, transparent **OR** White, translucent **OR** Bronze-tinted, transparent **OR** Gray-tinted, transparent, **as directed**.
 - b. Double-Glazing Profile: Dome, 25 percent rise **OR** Pyramid, 30-degree slope, **as directed**.
 - 1) Thicknesses: As indicated **OR** Not less than thicknesses required to exceed performance requirements, **as directed**.
 - 2) Outer Glazing Color: Colorless, transparent **OR** White, translucent **OR** Bronze-tinted, transparent **OR** Gray-tinted, transparent, **as directed**.
 - 3) Inner Glazing Color: Colorless, transparent **OR** White, translucent **OR** Bronze-tinted, transparent **OR** Gray-tinted, transparent, **as directed**.
 2. Polycarbonate Glazing: Thermoformable, extruded monolithic sheets, UV resistant, burglar-resistance rated per UL 972, and with average impact strength of **12 to 16 ft-lb/in. (640 to 854 J/m)** of width when tested per ASTM D 256, Test Method A (Izod).
 - a. Single-Glazing Profile: Dome, 25 percent rise **OR** Pyramid, 30-degree slope, **as directed**.
 - 1) Thickness: As indicated **OR** Not less than thickness required to exceed performance requirements, **as directed**.
 - 2) Color: As indicated by manufacturer's designations **OR** As selected from full range of industry colors, **as directed**.
 - b. Double-Glazing Profile: Dome, 25 percent rise **OR** Pyramid, 30-degree slope, **as directed**.
 - 1) Thicknesses: As indicated **OR** Not less than thicknesses required to exceed performance requirements, **as directed**.
 - 2) Inner Glazing Color: As indicated by manufacturer's designations **OR** As selected from full range of industry colors, **as directed**.
 - 3) Outer Glazing Color: As indicated by manufacturer's designations **OR** As selected from full range of industry colors, **as directed**.
 3. Insulating Glass: Clear, sealed units that comply with Division 08 Section "Glazing", in manufacturer's standard overall thickness.
 - a. Exterior Lite: **1/4-inch (6-mm)** clear **OR** tinted, **as directed**, heat-strengthened **OR** fully tempered, **as directed**, glass.
 - b. Interior Lite:
 - 1) Laminated glass; 2 plies of **1/8-inch (3-mm)** clear heat-strengthened glass with **0.030-inch (0.762-mm)** clear polyvinyl butyral interlayer.
 - 2) **1/4-inch (6-mm)** clear **OR** tinted, **as directed**, heat-strengthened **OR** fully tempered **OR** wire, **as directed**, glass.
 - c. Interspace Content: Air **OR** Argon, **as directed**.
 - d. Low-Emissivity Coating: Manufacturer's standard.
 4. Polycarbonate-Insulating-Panel Glazing: Manufacturer's standard polycarbonate sheet with cellular cross section that provides isolated airspaces and that is coextruded with a UV-protective layer.
 - a. Thickness: As indicated **OR** Not less than thickness required to exceed performance requirements, **as directed**.
 - b. Color: As indicated by manufacturer's designations **OR** As selected from full range of industry colors, **as directed**.
 5. Fiberglass-Sandwich-Panel Glazing: Manufacturer's standard with uniformly colored, translucent, fiberglass-reinforced-polymer face sheets permanently adhered to a grid core.
 - a. Thickness: As indicated **OR** Not less than thickness required to exceed performance requirements, **as directed**.
 - b. Color: As indicated by manufacturer's designations **OR** As selected from full range of industry colors, **as directed**.
 6. Glazing Gaskets: Manufacturer's standard **OR** EPDM, neoprene, partially vulcanized butyl tape, or liquid-applied elastomeric sealant, **as directed**.
- C. Installation Materials
1. Bituminous Coating: SSPC-Paint 12, solvent-type, bituminous mastic, nominally free of sulfur and containing no asbestos fibers, formulated for **15-mil (0.4-mm)** dry film thickness per coating.

2. Joint Sealants: As specified in Division 07 Section "Joint Sealants".
3. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
4. Roofing Cement: ASTM D 4586, asbestos free, designed for trowel application or other adhesive compatible with roofing system.

D. Unit Skylights

1. General: Provide factory-assembled unit skylights that include glazing, extruded-aluminum glazing retainers, gaskets, and inner frames and that are capable of withstanding performance requirements indicated.
2. Integral Curb: Extruded-aluminum **OR** Vinyl **OR** Reinforced-thermoset-fiberglass profile, **as directed**, self-flashing type.
 - a. Height: As indicated **OR 8 inches (200 mm) OR 9 inches (225 mm) OR 12 inches (300 mm), as directed.**
 - b. Construction: Single **OR** Double, **as directed**, wall.
 - c. Insulation: Manufacturer's standard rigid or semirigid type.
3. Prefabricated Curb: As specified in Division 07 Section "Roof Accessories".
4. Site-Built Curb: As indicated.
5. Unit Shape and Size: As indicated **OR** Square, **40-by-40-inch (1016-by-1016-mm)** inside curb **OR** Rectangular, **40-by-48-inch (1016-by-1220-mm)** inside curb **OR** Circular, **40-inch- (1016-mm-)** diameter inside curb, **as directed.**
6. Condensation Control: Fabricate unit skylights with integral internal gutters and non-clogging weeps to collect and drain condensation to the exterior.
7. Thermal Break: Fabricate unit skylights with thermal barrier separating exterior and interior metal framing.
8. Operable Unit Skylight System: Equip vent-type unit skylights with manufacturer's standard hinges, chain-driven operating hardware, and weather-sealing gaskets.
 - a. Manual Operator: Manufacturer's standard, rotary-crank extension device.
 - 1) Pole Operator: Manual, **60 inches (1524 mm)** long **OR** Manual, telescoping to **144 inches (3658 mm) OR** Rechargeable-motor power-driven type, telescoping to **144 inches (3658 mm), as directed.**
 - b. Motor Operator: Manufacturer's standard electronic control, including switch, transformer, low-voltage motor, cover, and mounting hardware.
 - 1) Provide motor of size and capacity recommended by unit skylight manufacturer to suit unit skylight indicated.
 - 2) Provide rain sensor that automatically closes venting unit when water is detected.
 - 3) Provide motor operator with portable remote-control device.
9. Security Grilles: **1/2-inch- (13-mm-)** diameter, hardened steel bars spaced not more than **5 inches (130 mm)** o.c. in 1 direction and **16 inches (400 mm)** o.c. in other direction **OR 5 inches (130 mm)** o.c. in both directions, **as directed.**
10. Protective Screens: Manufacturer's standard to protect interior glazing lite from breakage **OR** personnel from falls **OR** against windborne debris **OR** against hail, **as directed.**

E. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

F. Aluminum Finishes

1. Mill Finish: Manufacturer's standard.
2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.

- a. Color: As selected from full range of industry colors and color densities.
4. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
5. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
6. High-Performance Organic Finish: 3 **OR** 4, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

1. Coordinate installation of unit skylight with installation of substrates, vapor retarders, roof insulation, roofing membrane, and flashing as required to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight.
2. Comply with recommendations in AAMA 1607 and with manufacturer's written instructions for installing unit skylights.
3. Install unit skylights level, plumb, and true to line, without distortion.
4. Anchor unit skylights securely to supporting substrates.
5. Where metal surfaces of unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, apply bituminous coating on concealed metal surfaces, or provide other permanent separation recommended in writing by unit skylight manufacturer.
6. Set unit skylight flanges in thick bed of roofing cement to form a seal unless otherwise indicated.
7. Where cap flashing is indicated, install to produce waterproof overlap with roofing or roof flashing. Seal with thick bead of mastic sealant except where overlap is indicated to be left open for ventilation.

B. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. After completion of installation and nominal curing of sealant and glazing compounds but before installation of interior finishes, test for water leaks according to AAMA 501.2.
3. Perform test for total area of each unit skylight.
4. Work will be considered defective if it does not pass tests and inspections.
5. Additional testing and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

C. Cleaning

1. Clean exposed unit skylight surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes.
2. Remove excess sealants, glazing materials, dirt, and other substances.
3. Remove and replace glazing that has been broken, chipped, cracked, abraded, or damaged during construction period.
4. Protect unit skylight surfaces from contact with contaminating substances resulting from construction operations.

08 - Openings



5. Unit Skylight Operating System: Clean and lubricate joints and hardware. Adjust for proper operation.

END OF SECTION 08 45 23 00b

SECTION 08 45 23 00c - METAL-FRAMED SKYLIGHTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for metal-framed skylights. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes aluminum-framed skylights with the following characteristics:
 - a. Glazing is glass **OR** plastic, **as directed**.
 - b. Glazing is retained by field-installed pressure caps on four sides **OR** field-installed structural sealant at horizontal members (purlins) and pressure caps at rafters **OR** factory-installed structural sealant on four sides, **as directed**.

C. Performance Requirements

1. Provide metal-framed skylights, including anchorage, capable of withstanding, without failure, the effects of the following:
 - a. Structural loads.
 - b. Thermal movements.
 - c. Movements of supporting structure.
 - d. Dimensional tolerances of building frame and other adjacent construction.
2. Failure includes the following:
 - a. Deflection exceeding specified limits.
 - b. Water leakage.
 - c. Thermal stresses transferred to building structure.
 - d. Noise or vibration created by wind and thermal and structural movements.
 - e. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
3. Structural Loads:
 - a. Wind Loads: As indicated by structural design data on Drawings **OR as directed**.
 - b. Snow Loads: As indicated by structural design data on Drawings **OR as directed**.
 - c. Concentrated Live Loads: **250 lbf (1112 N)** applied to framing members at locations that will produce greatest stress or deflection.
 - d. Seismic Loads: As indicated by earthquake design data on Drawings **OR as directed**.
 - e. Load Combinations: Calculate according to requirements of applicable code indicated on Drawings **OR as directed**.
4. Deflection of Framing Members:
 - a. Deflection Normal to Glazing Plane:
 - 1) Spans Up to **20 Feet (6 m)**: Limited to 1/175 **OR** 1/180, **as directed**, of clear span or **1 inch (25.4 mm)**, whichever is smaller.
 - 2) Spans Exceeding **20 Feet (6 m)**: Limited to 1/240 of clear span.
 - 3) Glass Edge Deflection: Limit edge deflection of individual glass lites to **3/4 inch (19 mm)**.
 - b. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or **1/8 inch (3.2 mm)**, whichever is smaller **OR** amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than **1/8 inch (3.2 mm)**, **as directed**.

5. Lateral Bracing of Framing Members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.
6. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
7. Structural-Sealant Glazing:
 - a. Structural Sealant: Capable of withstanding tensile and shear stresses imposed by metal-framed skylight assemblies without failing adhesively or cohesively. Sealant fails cohesively before sealant releases from substrate when tested for adhesive compatibility with each substrate and joint condition required.
 - 1) Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - 2) Cohesive failure occurs when sealant breaks or tears within itself but does not separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.
 - b. Structural-Sealant Joints: Designed to produce tensile or shear stress in structural-sealant joints of less than 20 psi (138 kPa).
 - 1) Structural-sealant joints do not carry gravity loads of glazing.

D. Performance Testing

1. Provide metal-framed skylights that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified independent testing agency.
2. Structural-Performance Test: ASTM E 330.
 - a. Performance at Design Load: When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - b. Performance at Maximum Test Load: When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main supporting members exceeding 0.2 percent of span.
 - c. Test Durations: As required by design wind velocity but not less than 10 seconds.
3. Air-Infiltration Test: ASTM E 283.
 - a. Minimum Static-Air-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa) which is equivalent to a 25-mph (40-km/h) wind **OR** 6.24 lbf/sq. ft. (300 Pa) which is equivalent to a 50-mph (80-km/h) wind, **as directed**.
 - b. Maximum Air Leakage: 0.06 cfm/sq. ft. (0.30 L/s per sq. m).
4. Test for Water Penetration under Static Pressure: ASTM E 331.
 - a. Minimum Static-Air-Pressure Difference: 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
 - b. Water Leakage: None.
5. Test for Water Penetration under Dynamic Pressure: AAMA 501.1.
 - a. Dynamic Pressure: 20 percent of positive wind-load design pressure, but not less than 12 lbf/sq. ft. (574 Pa).
 - b. Water Leakage: None, as defined by AAMA 501.1 **OR** No uncontrolled water penetrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation, **as directed**. Water controlled by flashing and gutters that is drained to exterior and cannot damage adjacent materials or finishes is not considered water leakage.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:

- a. Product Data for Credit EQ 4.1: For sealants used inside of the weatherproofing system, including printed statement of VOC content.
 3. Shop Drawings: For metal-framed skylights. Include plans, elevations, sections, details, and attachments to other work.
 - a. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 4. Samples: For each exposed finish.
 5. Compatibility Test Reports: For structural-sealant-glazed skylights, preconstruction test reports from structural- and nonstructural-sealant manufacturer indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results for sealant performance and written recommendations for primers and substrate preparation needed for adhesion.
 6. Field quality-control test and inspection reports.
 7. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for metal-framed skylights.
 8. Structural-Sealant-Glazing, Quality-Control Program: Developed specifically for Project.
 9. Structural-Sealant-Glazing, Quality-Control Program Reports: Documenting quality-control procedures and verifying results for metal-framed skylights.
 10. Maintenance Data: For metal-framed skylights to include in maintenance manuals.
 11. Warranties: Special warranties specified in this Section.
- F. Quality Assurance
1. Installer Qualifications: Entity capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
 2. Compatibility Testing: For structural-sealant-glazed skylights, perform structural- and nonstructural-sealant manufacturer's standard preconstruction tests for compatibility and adhesion of sealants with each material that will come in contact with sealants and each condition required by metal-framed skylights.
 3. Welding: Qualify procedures and personnel according to AWS D1.2, "Structural Welding Code - Aluminum."
 4. Structural-Sealant Glazing: Comply with recommendations in ASTM C 1401, "Guide for Structural Sealant Glazing," for joint design and quality-control procedures.
 - a. Joint designs are reviewed and approved by structural-sealant manufacturer.
 5. Preinstallation Conference: Conduct conference at Project site.
- G. Warranty
1. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including, but not limited to, excessive deflection.
 - 2) Noise or vibration caused by thermal movements.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 4) Adhesive or cohesive sealant failures.
 - 5) Water leakage.
 - b. Warranty Period: Two **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
 2. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
 - a. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
 - b. Warranty Period: Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Framing Systems

1. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Bars, Rods, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Extruded Structural Pipe and Tubes: ASTM B 429.
2. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - a. Include snap-on aluminum trim that conceals fasteners.
3. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.
4. Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.
 - a. At pressure caps, use ASTM A 193/A 193M, 300 series stainless-steel screws.
 - b. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
 - c. Exposed Fasteners:
 - 1) Use exposed fasteners with countersunk Phillips screw heads.
 - d. Finish exposed portions to match framing system.
 - e. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended in writing by manufacturer.
5. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
6. Anchor Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, hot-dip zinc coating, ASTM A 153/A 153M, Class C **OR** mechanically deposited zinc coating, ASTM B 695, Class 50, **as directed**.
7. Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials **OR** Dead-soft, **0.018-inch- (0.457-mm-)** thick stainless steel, ASTM A 240/A 240M of type recommended in writing by manufacturer, **as directed**.
8. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than **0.030 inch (0.762 mm) OR 0.040 inch (1.016 mm) OR 0.060 inch (1.524 mm)**, **as directed**, thick.
9. Framing Gaskets: Manufacturer's standard.
10. Framing Sealants: As recommended in writing by manufacturer **OR** specified in Division 07 Section "Joint Sealants", **as directed**.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Glazing Systems

1. Glazing: As specified in Division 08 Section(s) "Glazing" OR "Plastic Glazing", **as directed**.
2. Spacers, Setting Blocks, and Gaskets: Manufacturer's standard elastomeric types **OR** As specified in Division 08 Section "Glazing", **as directed**.
3. Bond-Breaker Tape: Manufacturer's standard tetrafluoroethylene-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
4. Glazing Sealants: As recommended in writing by manufacturer **OR** specified in Division 07 Section "Joint Sealants", **as directed**.
 - a. Provide sealants for use inside of the weatherproofing system that have a VOC content as indicated when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Structural Sealant: ASTM C 1184, neutral-curing silicone formulation compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant, and approved by structural-sealant manufacturer for use in metal-framed skylights indicated.
 - 1) VOC Content: 100 g/L or less.
 - 2) Color: Black **OR** As selected from manufacturer's full range, **as directed**.

- c. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; neutral-curing silicone formulation compatible with structural sealant and other components with which it comes in contact; and recommended in writing by structural- and weatherseal-sealant and metal-framed skylight manufacturers for this use.
 - 1) VOC Content: 250 g/L or less.
 - 2) Color: Matching structural sealant.

- C. Accessory Materials
 1. Insulating Materials: Specified in Division 07 Section "Thermal Insulation".
 2. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for **30-mil (0.762-mm)** thickness per coat.

- D. Fabrication
 1. Fabricate aluminum components before finishing.
 2. Fabricate aluminum components that, when assembled, have the following characteristics:
 - a. Profiles that are sharp, straight, and free of defects or deformations.
 - b. Accurately fitted joints with ends coped or mitered.
 - c. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
 - d. Physical and thermal isolation of glazing from framing members.
 - e. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 3. Fabricate aluminum sill closures with weep holes and for installation as continuous component.
 4. Reinforce aluminum components as required to receive fastener threads.
 5. Weld aluminum components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
 6. Factory-Glazed Units:
 - a. Factory install glazing to comply with requirements in Division 08 Section(s) "Glazing" OR "Plastic Glazing", **as directed**.
 - b. Prepare surfaces that will contact structural sealant according to structural-sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 7. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

- E. Aluminum Finishes
 1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 3. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 4. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 5. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** Match sample **OR** As selected from full range of industry colors and color densities, **as directed**.
 6. High-Performance Organic Finish (2-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive

primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 OR AAMA 2605, **as directed**, and with coating and resin manufacturers' written instructions.

7. High-Performance Organic Finish (3-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard 3-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2605 and with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As selected from manufacturer's full range.

F. Source Quality Control

1. Structural-Sealant Glazing: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, material qualification procedures, sealant testing, and fabrication reviews and checks.

1.3 EXECUTION

A. Installation

1. General:
 - a. Comply with manufacturer's written instructions.
 - b. Do not install damaged components.
 - c. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
 - d. Rigidly secure nonmovement joints.
 - e. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
 - f. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - g. Seal joints watertight, unless otherwise indicated.
2. Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with bituminous paint or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
3. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.
4. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
5. Install components plumb and true in alignment with established lines and elevations.
6. Install glazing as specified in Division 08 Section(s) "Glazing" OR "Plastic Glazing", **as directed**.
 - a. Structural-Sealant Glazing:
 - 1) Prepare surfaces that will contact structural sealant according to structural-sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 2) Install weatherseal sealant according to Division 07 Section "Joint Sealants" and according to weatherseal-sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind weatherseal sealant as recommended in writing by weatherseal-sealant manufacturer.
7. Install insulation materials as specified in Division 07 Section "Thermal Insulation".
8. Erection Tolerances: Install metal-framed skylights to comply with the following maximum tolerances:

- a. Alignment: Limit offset from true alignment to **1/32 inch (0.8 mm)** where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than **3 inches (76 mm)**; otherwise, limit offset to **1/8 inch (3.2 mm)**.
 - b. Location and Plane: Limit variation from true location and plane to **1/8 inch in 12 feet (3.2 mm in 3.7 m)** but no greater than **1/2 inch (13 mm)** over total length.
- B. Field Quality Control
- a. Structural-Sealant Compatibility and Adhesion: Structural sealant shall be tested according to recommendations in ASTM C 1401.
 - 1) Destructive test method, Method A, Hand Pull Tab (Destructive) in ASTM C 1401, Appendix X2, shall be used.
 - a) A minimum of one **OR** two, **as directed**, area(s) on each skylight face shall be tested.
 - b) Repair installation areas damaged by testing.
 - b. Structural-Sealant Glazing Inspection: After installation of metal-framed skylights is complete, structural-sealant glazing shall be inspected and evaluated according to ASTM C 1401 recommendations for quality-control procedures.
 - c. Water Penetration under Static Pressure: Before installation of interior finishes has begun, areas shall be tested according to ASTM E 1105.
 - 1) Test Procedures: Test under uniform and cyclic static air pressure.
 - 2) Water Penetration: None.
 - d. Water-Spray Test: Before installation of interior finishes has begun, skylights shall be tested according to AAMA 501.2 and shall not evidence water penetration.
2. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
 3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 08 45 23 00c

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Task	Specification	Specification Description
08 52 11 00	08 01 52 61	Wood Windows
08 52 16 00	08 01 52 61	Wood Windows
08 52 66 00	08 01 52 61	Wood Windows

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SECTION 08 53 13 00 - VINYL WINDOWS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for fixed and operable vinyl framed windows. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fixed and operable vinyl-framed windows.

C. Definitions

1. Performance class designations according to AAMA/WDMA 101/I.S.2/NAFS:
 - a. AW: Architectural.
 - b. HC: Heavy Commercial.
 - c. C: Commercial.
 - d. LC: Light Commercial.
 - e. R: Residential.
2. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - a. Design pressure number in **pounds force per square foot (pascals)** used to determine the structural test pressure and water test pressure.
3. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
4. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.

D. Performance Requirements

1. General: Provide vinyl windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size indicated below:
 - a. Size required by AAMA/WDMA 101/I.S.2/NAFS for gateway performance **OR** optional performance grade, **as directed**.
 - b. Size indicated on Drawings **OR** in a schedule, **as directed**.
2. Structural Performance: Provide vinyl windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
 - a. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in **miles per hour (meters per second)** at **33 feet (10 m)** above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s), as directed**.
 - 2) Importance Factor.
 - 3) Exposure Category: **A OR B OR C OR D, as directed**.
3. Windborne-Debris Resistance: Provide glazed windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 or AAMA 506 and requirements of authorities having jurisdiction.

E. Submittals

1. Product Data: For each type of vinyl window indicated.

2. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, and installation details.
3. Samples: For each exposed finish.
4. Product Schedule: Use same designations indicated on Drawings.
5. Product test reports.
6. Maintenance data.
7. Warranty: Special warranty specified in this Section.

F. Quality Assurance

1. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.
2. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - a. Provide AAMA **OR** WDMA, **as directed**, -certified vinyl windows with an attached label.
3. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
4. Preinstallation Conference: Conduct conference at Project site.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure to meet performance requirements.
 - 2) Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - 3) Faulty operation of movable sash and hardware.
 - 4) Deterioration of vinyl, other materials, and finishes beyond normal weathering.
 - 5) Failure of insulating glass.
 - b. Warranty Period:
 - 1) Window: Two **OR** Three **OR** 10, **as directed**, years from date of Final Completion.
 - 2) Glazing: Five **OR** 10, **as directed**, years from date of Final Completion.
 - 3) Vinyl Finish: Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Vinyl Extrusions: Rigid (unplasticized) hollow PVC extrusions, formulated and extruded for exterior applications, complying with AAMA/WDMA 101/I.S.2/NAFS and the following:
 - a. PVC Resins: 100 percent virgin resin.
 - b. PVC Formulation: High impact, low heat buildup, lead free, nonchalking, and color and UV stabilized.
 - c. Extrusion Wall Thickness: Not less than **0.060 inch (1.5 mm) OR 0.090 inch (2.3 mm) OR 0.125 inch (3.2 mm), as directed.**
 - d. Multichamber Extrusions: Profile designed with two chambers **OR** three chambers **OR** multichambers, **as directed**, between interior and exterior faces of the extrusions.
2. Vinyl Trim and Glazing Stops: Material and finish to match frame members.
3. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with vinyl window members, cladding, trim, hardware, anchors, and other components.
 - a. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.

4. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
5. Reinforcing Members: Aluminum, or nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
6. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and for complete concealment when vinyl window is closed.
 - a. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.
 - b. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
 - c. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.
7. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
 - a. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
8. Replaceable Weather Seals: Comply with AAMA 701/702.

B. Window

1. Window Type: Casement **OR** Double hung **OR** Fixed **OR** Horizontal sliding **OR** Projected awning **OR** Single hung **OR** Bay **OR** Bow **OR** Specialty product **OR** As indicated on Drawings **OR** As indicated on a schedule, **as directed**.
2. AAMA/WDMA Performance Requirements: Provide vinyl windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS unless more stringent performance requirements are indicated.
 - a. Performance Class and Grade: R15 **OR** R20 **OR** R25, **as directed**.
 - b. Performance Class and Grade: LC25 **OR** LC30 **OR** LC35, **as directed**.
 - c. Performance Class and Grade: C30 **OR** C35 **OR** C40, **as directed**.
 - d. Performance Class and Grade: HC40 **OR** HC45 **OR** HC50, **as directed**.
 - e. Performance Class and Grade: AW40 **OR** AW45 **OR** AW50, **as directed**.
 - f. Performance Class and Grade: As indicated.
 - g. Performance Class (if test performance method is selected for specifying windows and designating a performance class does not conflict with basic wind speed and performance testing indicated): R **OR** LC **OR** C **OR** HC **OR** AW, **as directed**.
3. Condensation-Resistance Factor (CRF): Provide vinyl windows tested for thermal performance according to AAMA 1503, showing a CRF of 45 **OR** 52 **OR** 65, **as directed**.
4. Thermal Transmittance: Provide vinyl windows with a whole-window, U-factor maximum indicated at 15-mph (24-km/h) exterior wind velocity and winter condition temperatures when tested according to AAMA 1503 **OR** ASTM E 1423 **OR** NFRC 100, **as directed**.
 - a. U-Factor: 0.35 Btu/sq. ft. x h x deg F (2.0 W/sq. m x K) **OR** 0.40 Btu/sq. ft. x h x deg F (2.3 W/sq. m x K) **OR** 0.43 Btu/sq. ft. x h x deg F (2.5 W/sq. m x K) **OR** 0.60 Btu/sq. ft. x h x deg F (3.4 W/sq. m x K), **as directed**, or less.
5. Solar Heat-Gain Coefficient (SHGC): Provide vinyl windows with a whole-window SHGC maximum of 0.40 **OR** 0.50 **OR** 0.55, **as directed**, determined according to NFRC 200 procedures.
6. Sound Transmission Class (STC): Provide glazed windows rated for not less than 26 **OR** 30 **OR** 35, **as directed**, STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
7. AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
 - a. Maximum Rate: 0.3 cfm/sq. ft. (5 cu. m/h x sq. m) of area at an inward test pressure of 1.57 lbf/sq. ft. (75 Pa) which is equivalent to 25-mph (40-km/h) wind speed and is typically used to test R, C, and LC performance classes.

- b. Maximum Rate: **0.3 cfm/sq. ft. (5 cu. m/h x sq. m)** of area at an inward test pressure of **6.24 lbf/sq. ft. (300 Pa)** which is equivalent to a 50-mph (80-km/h) wind speed and is typically used to test HC and AW performance classes.
 8. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
 - a. Test Pressure: 15 percent of positive design pressure, but not less than **2.86 lbf/sq. ft. (140 Pa)** or more than **15 lbf/sq. ft. (720 Pa)**.
 - b. Test Pressure: 20 percent of positive design pressure, but not more than **15 lbf/sq. ft. (720 Pa)**.
 9. Forced-Entry Resistance: Comply with Performance Grade 10 **OR** 20 **OR** 30 **OR** 40, **as directed**, requirements when tested according to ASTM F 588.
 10. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.
 11. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.
- C. Glazing
1. Glass: Clear, insulating-glass units **OR** Clear, insulating-glass units, with low-E coating pyrolytic on second surface or sputtered on second or third surface, **OR** Clear, insulating-glass units, argon gas filled, with low-E coating pyrolytic on second surface or sputtered on second or third surface, **as directed**, complying with Division 08 Section "Glazing".
 2. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal **OR** Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance **OR** Manufacturer's standard factory-glazing system as indicated in Division 08 Section "Glazing", **as directed**.
- D. Hardware
1. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with vinyl; designed to smoothly operate, tightly close, and securely lock vinyl windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide solid bronze **OR** extruded, cast, or wrought aluminum **OR** die-cast zinc with special coating finish **OR** nonmagnetic stainless steel, **as directed**.
 2. Counterbalancing Mechanism: Comply with AAMA 902.
 - a. Sash-Balance Type: Concealed, tape-spring **OR** spiral-tube **OR** spring-loaded, block-and-tackle, **as directed**, type, of size and capacity to hold sash stationary at any open position.
 3. Sill Cap/Track: Extruded-aluminum track with natural anodized finish **OR** Rigid PVC or other weather-resistant plastic track with manufacturer's standard integral color, **as directed**, of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
 4. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide custodial locks, **as directed**.
 5. Roller Assemblies: Low-friction design.
 6. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.
 7. Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A.
 - a. Operation Function: All ventilators move simultaneously and securely close at both jambs without using additional manually controlled locking devices.
 8. Four- or Six-Bar Friction Hinges: Comply with AAMA 904.
 - a. Locking mechanism and handles for manual operation.
 - b. Friction Shoes: Provide friction shoes of nylon or other nonabrasive, nonstaining, noncorrosive, durable material.

9. Limit Devices: Provide concealed friction adjustor, adjustable stay bar **OR** concealed support arms with adjustable, limited, hold-open, **as directed**, limit devices designed to restrict sash or ventilator opening.
 - a. Safety Devices: Limit clear opening to **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, for ventilation; with custodial key release.
 10. Pole Operators: Tubular-shaped anodized aluminum; with rubber-capped lower end and standard push-pull hook at top to match hardware design; of sufficient length to operate window without reaching more than **60 inches (1500 mm)** above floor; 1 pole operator and pole hanger per room that has operable windows more than **72 inches (1800 mm)** above floor.
- E. Insect Screens
1. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on inside **OR** outside, **as directed**, of window and provide for each operable exterior sash or ventilator.
 - a. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 **OR** Architectural C-24 **OR** Monumental M-32, **as directed**, class.
 2. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, adjustable rollers, **as directed**, and removable PVC spline/anchor concealing edge of frame.
 - a. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
 - b. Finish: Anodized aluminum **OR** Baked-on organic coating, **as directed**, in manufacturer's standard color.
 - c. Finish: Anodized aluminum **OR** Baked-on organic coating, **as directed**, in color selected from manufacturer's full range.
 - d. Finish: Manufacturer's standard.
 3. Glass-Fiber Mesh Fabric: **18-by-14 (1.1-by-1.4-mm)** or **18-by-16 (1.0-by-1.1-mm) OR 20-by-20 (0.85-by-0.85-mm)** or **20-by-30 (0.85-by-0.42-mm)**, **as directed**, mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration, in the following color. Comply with ASTM D 3656.
 - a. Mesh Color: Charcoal gray **OR** Silver gray **OR** Aquamarine, **as directed**.
 4. Aluminum Wire Fabric: **18-by-16 (1.1-by-1.3-mm)** mesh of **0.011-inch- (0.28-mm-)** diameter, coated aluminum wire.
 - a. Wire-Fabric Finish: Natural bright **OR** Charcoal gray **OR** Black, **as directed**.
 5. Wickets: Provide sliding **OR** hinged, **as directed**, wickets, framed and trimmed for a tight fit and for durability during handling.
- F. Accessories
1. Dividers (False Muntins): Provide dividers in designs indicated for each sash lite, one per sash, removable from the exposed surface of interior lite of the sash **OR** two per sash, removable from the exposed surfaces of interior and exterior lites of the sash **OR** one permanently located between glazing lites in the airspace, **as directed**.
 - a. Material: Extruded, rigid PVC **OR** Aluminum, **as directed**.
 - b. Design: Rectangular **OR** Diamond, **as directed**.
 - c. Color: White **OR** Beige, **as directed**.
- G. Fabrication
1. Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
 - a. Welded Frame and Sash/Ventilator Corners: Miter-cut and fusion **OR** chemically, **as directed**, welded.
 - b. Mechanically Fastened Frame and Sash/Ventilator Corners: Double-butt coped and fastened with concealed screws, **as directed**.

2. Fabricate vinyl windows that are reglazable without dismantling sash or ventilator framing.
3. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.
 - a. Double-Hung Windows: Provide weather stripping only at horizontal rails of operable sash.
4. Mullions: Provide mullions and cover plates as shown, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units. Provide manufacturer's standard finish to match window units.
5. Subframes: Provide subframes with anchors for window units as shown, of profile and dimensions indicated but not less than **0.062-inch- (1.6-mm-)** thick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Provide manufacturer's standard finish to match window units. Provide subframes capable of withstanding design loads of window units.
6. Factory-Glazed Fabrication: Except for light sizes in excess of **100 united inches (2500 mm width plus length)**, glaze vinyl windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS.
7. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 08 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
8. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant steel reinforcement complying with requirements for reinforcing members, or do both.
9. Bow **OR** Bay, **as directed**, Windows: Provide vinyl windows in configuration indicated. Provide window frames, fixed and operating sash, operating hardware, and other trim and components necessary for a complete, secure, and weathertight installation, including the following:
 - a. Angled mullion posts with interior and exterior trim.
 - b. Angled interior and exterior extension and trim.
 - c. Clear pine head and seat boards.
 - d. Top and bottom plywood platforms.
 - e. Exterior head and sill casings and trim.
 - f. Support brackets.
10. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

H. Vinyl Finishes

1. Integral Finish and Color: Uniform, solid, homogeneous white **OR** beige, **as directed**, interior and exterior.
2. Organic Pigmented Finish: Manufacturer's standard finish, interior and exterior, complying with AAMA 613 **OR** AAMA 615, **as directed**, and paint manufacturer's written specifications for cleaning and painting.
 - a. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

1. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
2. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
3. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

4. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- B. Adjusting, Cleaning, And Protection
1. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
 2. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 3. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
 4. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
 5. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 08 53 13 00

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Task	Specification	Specification Description
08 53 66 00	08 53 13 00	Vinyl Windows

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SECTION 08 56 19 00 - SECURITY WINDOWS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for security windows. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Vision security windows.
 - b. Fixed, transaction security windows.
 - c. Sliding, transaction security windows.

C. Performance Requirements

1. Ballistics-Resistance Performance: Provide units identical to those tested for compliance with requirements indicated, and as follows:
 - a. Listed and labeled as bullet resisting according to UL 752.
 - b. Tested for ballistics resistance according to UL 752 **OR** ASTM F 1233 **OR** HPW-TP-0500.03 **OR** NIJ STD-0108.01, **as directed**, by a testing agency acceptable to authorities having jurisdiction.
 - c. Certified as complying with SD-STD-01.01, by the U.S. State Department, for ballistics resistance when tested by a qualified testing agency.
2. Forced-Entry-Resistance Performance: Provide units identical to those tested for compliance with requirements indicated, and as follows:
 - a. Tested for forced-entry resistance according to HPW-TP-0500.03 **OR** ASTM F 1233, **as directed**, by a testing agency acceptable to authorities having jurisdiction.
 - b. For Federal Government Work: Certified as complying with SD-STD-01.01, by the U.S. State Department, for forced-entry resistance when tested by a qualified testing agency.
3. Windborne-Debris-Impact-Resistance-Test Performance: Provide automatic entrances that pass large missile-impact and cyclic-pressure tests of ASTM E 1996 according to the IBC.
4. Structural Performance: Security windows shall withstand the effects of wind loads determined as follows, with no permanent deformation or breakage within window assembly when tested according to ASTM E 330:
 - a. Basic Wind Speed: As indicated in **miles per hour (meters per second)** at **33 feet (10 m)** above grade. Determine wind loads and resulting design pressures applicable to Project according to SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 6.4.2, "Analytic Procedure," based on mean roof heights above grade as indicated on Drawings.
5. Air Infiltration for Operable Windows: Not more than **0.370 cfm/ft. (0.573 L/s per m)** **OR** **0.500 cfm/ft. (0.774 L/s per m)**, **as directed**, of operable sash joint at an inward test pressure of **1.56 lbf/sq. ft. (75 Pa)** when tested according to ASTM E 283.
6. Air Infiltration for Fixed Windows: Not more than **0.010 cfm/ft. (0.015 L/s per m)** **OR** **0.060 cfm/ft. (0.093 L/s per m)**, **as directed**, of crack length at an inward test pressure of **1.56 lbf/sq. ft. (75 Pa)** when tested according to ASTM E 283.
7. Water Penetration: No water penetration as defined in test method at an inward test pressure of **1.56 lbf/sq. ft. (75 Pa)** **OR** **2.86 lbf/sq. ft. (137 Pa)** **OR** **6.24 lbf/sq. ft. (300 Pa)**, **as directed**, when tested according to ASTM E 331.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings.

3. Samples: For each type of exposed finish required.
4. Welding certificates.
5. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of security window and accessory indicated as ballistics **OR** forced-entry, **as directed**, resistant.
6. Configuration Disclosure Drawing: For each type of forced-entry-resistant security window, complying with ASTM F 1233.
7. Warranty: Sample of special warranty.

E. Quality Assurance

1. Testing Agency Qualifications: Qualified according to ASTM E 699 and experienced in ballistics- and forced-entry-resistance testing.
2. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - d. AWS D1.6, "Structural Welding Code - Stainless Steel."
3. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Pack security windows in wood crates for shipment. Crate glazing separate from frames unless factory glazed.
2. Label security window packaging with location in Project **OR** drawing designation, **as directed**.
3. Store crated security windows on raised blocks to prevent moisture damage.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace security windows that fail in materials or workmanship within three years from date of Final Completion.

1.2 PRODUCTS**A. Materials**

1. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**. Provide alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than **22,000-psi (150-MPa)** ultimate tensile strength and not less than **0.125 inch (3.2 mm)** thick at any location for main frame and sash members.
2. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
3. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
4. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B.
5. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with **G60 (Z180)** zinc (galvanized) or **A60 (ZF180)** zinc-iron-alloy (galvannealed) coating designation.
6. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 240/A 240M or ASTM A 666, austenitic stainless steel, Type 304 **OR** Type 316, **as directed**, stretcher-leveled standard of flatness.
7. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
8. Cast-in-Place Anchors in Concrete: Fabricated from corrosion-resistant materials capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified testing agency.
 - a. Threaded or wedge type; galvanized ferrous castings, either ASTM A 27/A 27M cast steel or ASTM A 47/A 47M malleable iron. Provide bolts, washers, and shims as required; hot-dip galvanized per ASTM A 153/A 153M or ASTM F 2329.

9. Embedded Plate Anchors: Fabricated from steel shapes and plates, minimum **3/16 inch (4.8 mm)** thick; with minimum **1/2-inch- (12.7-mm-)** diameter, headed studs welded to back of plate.
 10. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 11. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for **30-mil (0.76-mm)** thickness per coat.
 12. Sealants: For sealants required within fabricated security windows, provide type recommended by manufacturer for joint size and movement. Sealant shall remain permanently elastic, nonshrinking, and nonmigrating.
- B. Window Components**
1. Glazing: Comply with requirements in Division 08 Section "Security Glazing" for performance indicated.
 - a. Comply with requirements of UL listing for ballistics-resistance level.
 2. Compression-Type Glazing Strips and Weather Stripping: Unless otherwise indicated, provide compressible stripping for glazing and weather stripping, such as molded EPDM or neoprene gaskets complying with ASTM D 2000, Designations 2BC415 to 3BC620; molded PVC gaskets complying with ASTM D 2287; or molded, expanded EPDM or neoprene gaskets complying with ASTM C 509, Grade 4.
 3. Miscellaneous Glazing Materials: Provide material, size, and shape complying with requirements of glass manufacturers, and with a proven record of compatibility with surfaces contacted in installation.
 - a. Cleaners, Primers, and Sealers: Type recommended by sealant or gasket manufacturer.
 - b. Setting Blocks: Elastomeric material with a Type A Shore durometer hardness of 85, plus or minus 5.
 - c. Spacers: Elastomeric blocks or continuous extrusions with a Type A Shore durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - d. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
 4. Anchors, Clips, and Window Accessories: Stainless steel; hot-dip, zinc-coated steel or iron, complying with ASTM B 633; provide sufficient strength to withstand design pressure indicated.
- C. Vision Security Windows**
1. Vision Security Windows: Provide fixed vision security windows with framing on four sides and no operable sash or ventilator.
 2. Ballistics Resistance:
 - a. Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8, **as directed**, when tested according to UL 752.
 - b. HG1 **OR** HG2 **OR** HG3 **OR** HG4 **OR** SMG **OR** R1 **OR** R2 **OR** R3 **OR** R4-AP **OR** SH1 **OR** SH2, **as directed**, when tested according to ASTM F 1233.
 - c. A **OR** B **OR** C **OR** D **OR** E, **as directed**, when tested according to HPW-TP-0500.03.
 - d. S **OR** R **OR** AP **OR** SH, **as directed**, when tested according to SD-STD-01.01.
 - e. Level I **OR** Level IIA **OR** Level II **OR** Level IIIA **OR** Level III **OR** Level IV, **as directed**, when tested according to NIJ STD-0108.01.
 3. Forced-Entry Resistance:
 - a. Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, when tested according to HPW-TP-0500.03.
 - b. Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, when tested according to ASTM F 1233.
 - c. Five **OR** 15 **OR** 60, **as directed**, -minute protection level when tested according to SD-STD-01.01.
 4. Framing: Fabricate perimeter framing, mullions, and glazing stops from metal sheet as follows:
 - a. Material:
 - 1) Cold-rolled steel sheet, factory primed for field-painted finish **OR** with baked-enamel finish, **as directed**.

- 2) Galvanized-steel sheet, factory primed for field-painted finish.
 - 3) Stainless-steel sheet with No. 4 finish.
 - 4) Aluminum-clad steel sheet with Class I, clear anodized **OR** Class II, clear anodized **OR** Class I, color anodized **OR** Class II, color anodized **OR** baked-enamel, **as directed**, finish.
 - 5) Material: Extruded aluminum with Class I, clear anodized **OR** Class II, clear anodized **OR** Class I, color anodized **OR** Class II, color anodized **OR** baked-enamel, **as directed**, finish.
- b. Profile: Manufacturer's standard **OR** Narrow, **as directed**, with minimum face dimension indicated.
 - c. Minimum Face Dimension: **2 inches (50 mm)** **OR** **1-1/4 inches (32 mm)** **OR** As indicated on Drawings, **as directed**.
 - d. Framing Depth:
 - 1) Manufacturer's standard.
 - 2) Adjustable for varying wall thicknesses by use of a two-piece, split frame that is attached to wall by clamping action induced by tightening screws.
 - 3) As indicated on Drawings.
 - e. Framing Orientation: Vertical **OR** Incline subframe 5 degrees to vertical, with top of frame slanted away from protected side of window, **as directed**.
- D. Fixed, Transaction Security Windows
1. Fixed, Transaction Security Windows: Provide fixed, framed transaction windows with operable sash or ventilator capable of allowing transfer of currency and documents.
 2. Configuration: One fixed-glazed panel **OR** Multiple fixed-glazed panels **OR** As indicated on Drawings, **as directed**.
 3. Ballistics Resistance:
 - a. Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8, **as directed**, when tested according to UL 752.
 - b. HG1 **OR** HG2 **OR** HG3 **OR** HG4 **OR** SMG **OR** R1 **OR** R2 **OR** R3 **OR** R4-AP **OR** SH1 **OR** SH2, **as directed**, when tested according to ASTM F 1233.
 - c. A **OR** B **OR** C **OR** D **OR** E, **as directed**, when tested according to HPW-TP-0500.03.
 - d. S **OR** R **OR** AP **OR** SH, **as directed**, when tested according to SD-STD-01.01.
 - e. Level I **OR** Level IIA **OR** Level II **OR** Level IIIA **OR** Level III **OR** Level IV, **as directed**, when tested according to NIJ STD-0108.01.
 4. Forced-Entry Resistance:
 - a. Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, when tested according to HPW-TP-0500.03.
 - b. Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, when tested according to ASTM F 1233.
 - c. Five **OR** 15 **OR** 60, **as directed**, -minute protection level when tested according to SD-STD-01.01.
 5. Framing: Fabricate perimeter framing, mullions, and glazing stops from metal sheet as follows:
 - a. Material:
 - 1) Cold-rolled steel sheet, factory primed for field-painted finish **OR** with baked-enamel finish, **as directed**.
 - 2) Stainless-steel sheet with No. 4 finish.
 - 3) Aluminum-clad steel sheet with Class I, clear anodized **OR** Class II, clear anodized **OR** Class I, color anodized **OR** Class II, color anodized **OR** baked-enamel, **as directed**, finish.
 - 4) Extruded aluminum with Class I, clear anodized **OR** Class II, clear anodized **OR** Class I, color anodized **OR** Class II, color anodized **OR** baked-enamel, **as directed**, finish.
 - b. Profile: Manufacturer's standard **OR** Narrow, **as directed**, with minimum face dimension indicated.

- c. Minimum Face Dimension: **2 inches (50 mm) OR 1-1/4 inches (32 mm) OR** As indicated on Drawings, **as directed**.
 - d. Framing Depth:
 - 1) Manufacturer's standard.
 - 2) Adjustable for varying wall thicknesses by use of a two-piece, split frame that is attached to wall by clamping action induced by tightening screws.
 - 3) As indicated on Drawings.
 - e. Provide thermally improved construction for aluminum framing.
 - 6. Head and Jamb Framing: Designed for sealant glazing **OR** gasket glazing **OR** voice communication by speech at normal volume, **as directed**.
 - 7. Channel-Frame Sill: Formed from stainless steel and designed for sealant glazing.
 - a. Transaction Counter: Stainless steel, **12 inches (305 mm) OR 18 inches (457 mm)**, **as directed**, deep by width of security window, with integral deal tray centered in opening **OR** as indicated on Drawings, **as directed**.
 - b. Transaction Counter: Stainless steel, **21 inches (533 mm)** deep by width of security window, with operable deal tray centered in opening **OR** as indicated on Drawings, **as directed**.
 - 8. Voice-Communication-Type Sill: Formed from stainless steel and designed to allow passage of speech at normal speaking volume without distortion.
 - a. Sill Depth: **12 inches (305 mm)** deep **OR 18 inches (457 mm)** deep with **6-inch (152-mm)** deep projection on nonsecure side **OR 21 inches (533 mm)** deep with **6-inch (152-mm)** deep projection on both sides, **as directed**.
 - b. Transaction Counter: Stainless steel, **12 inches (305 mm) OR 18 inches (457 mm)**, **as directed**, deep by width of security window, with integral deal tray centered in opening **OR** as indicated on Drawings, **as directed**.
 - c. Integral Transaction-Drawer Sill: Formed from stainless steel **OR** framing to match head and jamb framing, **as directed**; with transaction drawer integrated into framing and contained in a stainless-steel housing that forms a transaction counter on secure side **OR** nonsecure side **OR** both sides, **as directed**, of opening. Drawer front shall be flush with housing when drawer is closed.
- E. Sliding, Transaction Security Windows
- 1. Sliding, Transaction Security Windows: Provide horizontal-sliding, transaction security windows.
 - 2. Configuration: One fixed-glazed panel and one horizontal-sliding glazed panel **OR** Two glazed panels that slide horizontally and meet at center of security window **OR** As indicated on Drawings, **as directed**.
 - 3. Ballistics Resistance:
 - a. Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8, **as directed**, when tested according to UL 752.
 - b. HG1 **OR** HG2 **OR** HG3 **OR** HG4 **OR** SMG **OR** R1 **OR** R2 **OR** R3 **OR** R4-AP **OR** SH1 **OR** SH2, **as directed**, when tested according to ASTM F 1233.
 - c. A **OR** B **OR** C **OR** D **OR** E, **as directed**, when tested according to HPW-TP-0500.03.
 - d. S **OR** R **OR** AP **OR** SH, **as directed**, when tested according to SD-STD-01.01.
 - e. Level I **OR** Level IIA **OR** Level II **OR** Level IIIA **OR** Level III **OR** Level IV, **as directed**, when tested according to NIJ STD-0108.01.
 - 4. Forced-Entry Resistance:
 - a. Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, when tested according to HPW-TP-0500.03.
 - b. Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, when tested according to ASTM F 1233.
 - c. Five **OR** 15 **OR** 60, **as directed**,-minute protection level when tested according to SD-STD-01.01.
 - 5. Framing: Fabricate perimeter framing, mullions, and glazing stops from metal sheet as follows:
 - a. Material:
 - 1) Cold-rolled steel sheet, factory primed for field-painted finish **OR** with baked-enamel finish, **as directed**.

- 2) Material: Stainless-steel sheet with No. 4 finish.
- 3) Material: Aluminum-clad steel sheet with Class I, clear anodized **OR** Class II, clear anodized **OR** Class I, color anodized **OR** Class II, color anodized **OR** baked-enamel, **as directed**, finish.
- 4) Material: Extruded aluminum with Class I, clear anodized **OR** Class II, clear anodized **OR** Class I, color anodized **OR** Class II, color anodized **OR** baked-enamel, **as directed**, finish.
- b. Profile: Manufacturer's standard **OR** Narrow, **as directed**, with minimum face dimension indicated.
- c. Minimum Face Dimension: **2 inches (50 mm) OR 1-1/4 inches (32 mm) OR** As indicated on Drawings, **as directed**.
- d. Framing Depth:
 - 1) Manufacturer's standard.
 - 2) Adjustable for varying wall thicknesses by use of a two-piece, split frame that is attached to wall by clamping action induced by tightening screws.
 - 3) As indicated on Drawings.
- e. Provide thermally improved construction for aluminum framing.
6. Head and Jamb Framing: Designed for sealant **OR** gasket, **as directed**, glazing.
7. Glazing Meeting Edges: Polished glazing.
8. Sill: Stainless-steel channel frame designed for sealant **OR** gasket, **as directed**, glazing.
 - a. Shelf: Stainless steel, **12 inches (305 mm) OR 18 inches (457 mm)**, **as directed**, deep by width of security window, with integral deal tray.
9. Sliding Window Hardware: Provide roller track designed for overhead support of two- or four-wheel carriage supporting horizontal-sliding glazed panel. Provide manufacturer's standard pull and lock with two keys for each horizontal-sliding glazed panel.
 - a. Provide weather stripping for exterior horizontal-sliding, transaction security windows.

F. Accessories

1. Recessed Deal Trays: Formed from stainless steel with sliding stainless-steel cover, **as directed**; fabricated in curved shape with exposed flanges for recessed installation into horizontal surface.
 - a. Clear Opening Size: **12 inches wide by 8 inches deep by 1-1/2 inches high (305 mm wide by 203 mm deep by 38 mm high) OR 12 inches wide by 11 inches deep by 1-1/2 inches high (305 mm wide by 279 mm deep by 38 mm high) OR 16 inches wide by 11 inches deep by 1-1/2 inches high (406 mm wide by 279 mm deep by 38 mm high)**, **as directed**.
2. Recessed, Nonricochet Deal Trays: Formed from stainless steel; fabricated with recessed bullet trap to ricochet bullets away from secure side, with exposed flanges for recessed installation into horizontal surface, and with sliding stainless-steel cover, **as directed**.
 - a. Clear Opening Size: **10 inches wide by 7 inches deep by 1-1/2 inches high (254 mm wide by 178 mm deep by 38 mm high) OR 12 inches wide by 8 inches deep by 1-1/2 inches high (305 mm wide by 203 mm deep by 38 mm high) OR 12 inches wide by 11 inches deep by 1-1/2 inches high (305 mm wide by 279 mm deep by 38 mm high) OR 16 inches wide by 11 inches deep by 1-1/2 inches high (406 mm wide by 279 mm deep by 38 mm high)**, **as directed**.
 - b. Bullet Trap Location: Secure side **OR** Both sides, **as directed**.
 - c. Ballistics Resistance: UL Level 1 **OR** UL Level 3 **OR** Same as security window, **as directed**.
 - d. Listed and labeled as bullet resisting according to UL 752.
3. Rotating Deal Trays: Formed from stainless steel, with rotating recessed deal tray on each side of secure opening and with handle that rotates deal trays 180 degrees.
 - a. Mounting: Drop in **OR** Countertop, **as directed**.
 - b. Ballistics Resistance: UL Level 1 **OR** UL Level 3 **OR** Same as security window, **as directed**.
 - c. Listed and labeled as bullet resisting according to UL 752.

4. Transaction Drawers: Formed from stainless steel **OR** steel **OR** bullet-resistant armoring, **as directed**; with ball-bearing, telescoping sliding mechanism; with cover on secure side of top of drawer that automatically closes when drawer is extended to nonsecure side.
 - a. Inside Dimensions: **15-3/8 inches wide by 8-1/2 inches deep by 4-3/8 inches high (390 mm wide by 216 mm deep by 111 mm high) OR 13 inches wide by 22 inches deep by 6-1/2 inches high (330 mm wide by 559 mm deep by 165 mm high), as directed.**
 - b. Operation:
 - 1) Manual.
 - 2) Electric, with sliding handle for emergency manual operation during lack of power. Provide individual switches for power and drawer movement on secure side and call button on nonsecure side.
 - c. Ballistics Resistance: UL Level 1 **OR** UL Level 3 **OR** Same as security window, **as directed.**
 - d. Listed and labeled as bullet resisting according to UL 752.
5. Speaking Apertures: Fabricate from stainless steel **OR** security glazing, **as directed**, designed to allow passage of speech at normal speaking volume without distortion.
 - a. Shape: Circular **OR** Square, **as directed.**
 - b. Ballistics Resistance: UL Level 1 **OR** UL Level 3 **OR** Same as security window, **as directed.**
 - c. Listed and labeled as bullet resisting according to UL 752.

G. Fabrication

1. General: Fabricate security windows to provide a complete system for assembly of components and anchorage of window units.
 - a. Provide units that are reglazable from the secure side without dismantling the nonsecure side of framing.
 - b. Prepare security windows for glazing unless preglazing at the factory is indicated.
2. Provide weep holes and internal water passages for exterior security windows to conduct infiltrating water to the exterior.
3. Framing: Miter or cope corners the full depth of framing; weld and dress smooth.
 - a. Fabricate framing with manufacturer's standard, internal opaque armoring in thicknesses required for security windows to comply with ballistics-resistance performance indicated.
4. Glazing Stops: Finish glazing stops to match security window framing.
 - a. Secure-Side (Exterior) Glazing Stops: Welded or integral to framing.
 - b. Nonsecure-Side (Interior) Glazing Stops: Removable, coordinated with glazing indicated.
5. Welding: Weld components to comply with referenced AWS standard. To greatest extent possible, weld before finishing and in concealed locations to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
6. Metal Protection: Separate dissimilar metals to protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
7. Factory-cut openings in glazing for speaking apertures.
8. Preglazed Fabrication: Preglaze window units at factory, where required for applications indicated. Comply with requirements in Division 08 Section "Security Glazing".
9. Weather Stripping: Factory applied.

H. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black, **as directed.**
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

- a. Color and Gloss: As selected from manufacturer's full range.

I. Metallic-Coated Steel Sheet Finishes

1. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and apply galvanizing repair paint, complying with SSPC-Paint 20, to comply with ASTM A 780.
2. Factory Prime Finish: Apply an air-dried primer, complying with SSPC-Paint 5, immediately after cleaning and pretreating.
3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
 - a. Color and Gloss: As selected from manufacturer's full range.

J. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.

1.3 EXECUTION

A. Installation

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing security windows to in-place construction. Include threaded fasteners for concrete and masonry inserts, security fasteners, and other connectors.
 - a. Install an attached or integral flange to secure side of security windows extending over rough-in opening gap so that gap has same forced-entry-resistance and ballistics-resistance performance as security window.
2. Voice-Communication-Type Framing: Attach removable glass spacers to jambs and head of glazing, located not more than **6 inches (152 mm)** from each corner and spaced not more than **12 inches (305 mm)** o.c.
3. Glazed Framing: Provide sealant **OR** gasket, **as directed**, glazed framing. Comply with installation requirements in Division 08 Section "Security Glazing".
4. Removable Glazing Stops and Trim: Fasten components with security fasteners.
5. Fasteners: Install security windows using fasteners recommended by manufacturer with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel fasteners in stainless-steel materials, **as directed**.
6. Sealants: Comply with requirements in Division 07 Section "Joint Sealants" for installing sealants, fillers, and gaskets.
 - a. Set continuous sill members and flashing in a full sealant bed to provide weathertight construction unless otherwise indicated.
 - b. Seal frame perimeter with sealant to provide weathertight construction unless otherwise indicated.
7. Metal Protection: Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended in writing by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

B. Adjusting

1. Adjust horizontal-sliding, transaction security windows to provide a tight fit at contact points for smooth operation and a secure enclosure.
 2. Adjust transaction drawers to provide a tight fit at contact points and weather stripping for smooth operation and weathertight and secure enclosure.
 3. Remove and replace defective work, including security windows that are warped, bowed, or otherwise unacceptable.
- C. Cleaning And Protection
1. Clean surfaces promptly after installation of security windows. Take care to avoid damaging the finish. Remove excess glazing and sealant compounds, dirt, and other substances.
 - a. Lubricate sliding security window hardware.
 - b. Lubricate transaction drawer hardware.
 2. Clean glass of preglazed security windows promptly after installation. Comply with requirements in Division 08 Section "Security Glazing" for cleaning and maintenance.
 3. Provide temporary protection to ensure that security windows are without damage at time of Final Completion.

END OF SECTION 08 56 19 00

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Task	Specification	Specification Description
08 56 56 00	08 11 63 13a	Security Window Screens and Doors
08 56 56 00	08 34 53 00a	Security Grilles
08 56 59 00	01 22 16 00	No Specification Required

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SECTION 08 62 00 00 - ROOF WINDOWS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for roof windows. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fixed (nonoperable) roof windows for exterior locations with aluminum-clad, copper-clad and fiberglass-clad exterior exposed surfaces and wood interior exposed surfaces.
 - b. Venting (with operable sash) roof windows for exterior locations with aluminum-clad, copper-clad and fiberglass-clad exterior exposed surfaces and wood interior exposed surfaces.

C. Performance Requirements

1. Structural Performance: Provide roof windows capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Wind Loads: Compliance is based on testing units representative of those indicated for Project that pass AAMA/WDMA/CSA 101/I.S.2/A440, Uniform Load Structural Test.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s), as directed.**
 - 2) Importance Factor.
 - 3) Exposure Category: **B OR C OR D, as directed.**
 - b. Deflection Limits: Design glass framing system to limit lateral deflections of glass edges to less than 1/175 of glass-edge length or **3/4 inch (19 mm)**, whichever is less, at design pressure based on testing performed according to AAMA/WDMA/CSA 101/I.S.2/A440, Uniform Load Deflection Test, or structural computations.
 - c. Snow Loads.
2. Windborne-Debris Resistance: Provide glazed roof windows capable of resisting impact from windborne debris, based on the pass/fail criteria as determined from testing glazed roof windows identical to those specified, according to ASTM E 1886 and testing information in ASTM E 1996 **OR AAMA 506, as directed**, and requirements of authorities having jurisdiction.

D. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions.
 - a. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
2. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
 - a. Mullion details, including reinforcement and stiffeners.
 - b. Joinery details.
 - c. Expansion provisions.
 - d. Flashing and drainage details.
 - e. Weather-stripping details.
 - f. Glazing details.
 - g. Accessories.
 - h. Window cleaning provisions.
 - i. Window System Operators: Show locations, mounting, and details for installing operator components and controls.

- j. Window System Operators: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - k. Wiring Diagrams: Power, signal, and control wiring.
 - 3. Samples: For roof windows and components required, prepared on Samples of size indicated below.
 - a. Main Framing Member: **12-inch- (300-mm-)** long section with weather stripping, **as directed**, glazing bead and factory-applied color finish.
 - b. Hardware: Full-size units with factory-applied finish.
 - 4. Delegated-Design Submittal: For roof windows indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation and used to determine the following:
 - a. Structural test pressures and design pressures from loads indicated.
 - b. Deflection limitations of glass framing systems.
 - 5. Qualification Data: For qualified Installer, manufacturer and professional engineer.
 - 6. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency, for each class, grade, and size of roof window.
 - 7. Maintenance Data: For weather stripping, operable sash, operating hardware, and finishes to include in maintenance manuals.
 - 8. Warranties: Sample of special warranties.
 - E. Quality Assurance
 - 1. Manufacturer Qualifications: A manufacturer capable of fabricating roof windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
 - 2. Installer Qualifications: An installer acceptable to roof window manufacturer for installation of units required for this Project.
 - a. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility including preparation of data for roof windows, including Shop Drawings and Designated Design Submittal, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - 3. Fenestration Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440, "Standard/Specification for Windows, Doors, and Unit Skylights," for minimum standards of performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
 - a. Provide WDMA-certified units with an attached label.
 - 4. Glazing Publication: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
 - F. Delivery, Storage, And Handling
 - 1. Protect roof windows during transit, storage, and handling to prevent damage, soiling, and deterioration. Store off ground and covered in a clean, dry, well-ventilated, protected space. Comply with manufacturer's written instructions.
 - G. Warranty
 - 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace roof windows that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure to meet performance requirements.
 - 2) Structural failures including excessive deflection.
 - 3) Water leakage or air infiltration.
 - 4) Faulty operation of movable panels and hardware.
 - 5) Deterioration of wood, metals, vinyl, other materials, and finishes beyond normal weathering.

- 6) Deterioration of insulating glass and laminated glass, **as directed**, as defined in Division 08 Section "Glazing".
- b. Warranty Period:
 - 1) Roof Window: Five **OR** 10, **as directed**, years from date of Final Completion.
 - 2) Glazing: 10 **OR** 20, **as directed**, years from date of Final Completion.
 - 3) Exterior Finish: Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

- 1. Wood: Clear fir or pine or another suitable fine-grained lumber; kiln-dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than **1/32 inch (0.8 mm)** deep by **2 inches (51 mm)** wide; water-repellent preservative treated.
 - a. Finish: Unfinished **OR** Manufacturer's standard transparent finish **OR** Manufacturer's standard prime-painted finish complying with WDMA T.M. 11 **OR** Manufacturer's standard opaque finish complying with WDMA T.M. 12, **as directed**.
- 2. Aluminum: Manufacturer's standard formed sheet or extruded aluminum. Provide aluminum alloy and temper recommended by roof window manufacturer for strength, corrosion resistance, and application of required finish.
 - a. Baked-Enamel Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1) Color and Gloss: White **OR** Bronze **OR** Brown **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 620 **OR** AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1) Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- 3. Copper: ASTM B 370; Temper H00, cold rolled unless Temper 060, soft is required for forming; not less than **16 oz./sq. ft. (0.55 mm thick)**.
 - a. Finish: Manufacturer's standard **OR** As selected from manufacturer's full range, **as directed**.
- 4. Reinforced Thermoset Fiberglass: AAMA 305 with manufacturer's standard finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- 5. Trim and Glazing Stops: Material and finish to match wood frame members.
- 6. Fasteners: Aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive for SC 3 severe service conditions and compatible with roof window members, cladding, trim, hardware, anchors, and other components.
 - a. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- 7. Anchors, Clips, Mounting Brackets, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 456 or ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- 8. Mullions: Provide mullions and mullion casing and cover plates as shown, matching roof window units, complete with anchors for support to structure and installation of roof window units. Allow for erection tolerances and provide for movement of roof window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of roof window units.

9. Reinforcing Members: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with ASTM B 456 or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
10. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and completely concealed when roof window is closed.
 - a. Weather-Stripping Material: Closed-cell elastomeric, preformed gaskets complying with ASTM C 509.
OR
Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.
OR
Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA/CSA 101/I.S.2/A440.
11. Flashing: Manufacturer's standard flashing system for application indicated.
 - a. Material: Aluminum **OR** Copper **OR** Flexible EPDM flashing, **as directed**.
 - b. Rigid aluminum **OR** copper, **as directed**, nailing flange formed into frame.
 - c. Auxiliary Water Diverter: Provide at roof window head as back flashing.

B. Roof Window

1. AAMA/WDMA/CSA Performance Requirements: Provide roof windows of performance indicated that comply with AAMA/WDMA/CSA 101/I.S.2/A440 unless more stringent performance requirements are indicated.
 - a. Performance Class and Grade: R15 **OR** 20 **OR** 25, **as directed**.
 - b. Performance Class and Grade: C30 **OR** 35 **OR** 40, **as directed**.
 - c. Performance Class and Grade: As indicated.
2. Thermal Transmittance: Provide roof windows with a whole fenestration product U-factor maximum indicated, when tested according to AAMA 1503 **OR** determined according to ASTM E 1423 **OR** determined according to NFRC 100, **as directed**.
 - a. U-Factor: 0.35 **OR** 0.40 **OR** 0.65, **as directed**, Btu/sq. ft. x h x deg F (W/sq. m x K).
 - b. U-Factor: 0.60 Btu/sq. ft. x h x deg F (W/sq. m x K) (this is the maximum U-factor allowed by the IECC 2006 for skylights in all but climate zones 1 to 3).
3. Solar Heat-Gain Coefficient (SHGC): Provide roof windows with a whole-window SHGC maximum of 0.40 **OR** 0.50 **OR** 0.55, **as directed**, determined according to NFRC 200.
4. Air-Leakage Resistance: Maximum rate not more than indicated when tested according to AAMA/WDMA/CSA 101/I.S.2/A440, Air Leakage Resistance Test.
 - a. Maximum Rate: 0.3 cfm/sq. ft. (1.5 L/s x sq. m) of area at an inward test pressure of 1.6 lbf/sq. ft. (75 Pa) (equivalent to 25-mph (40-km/h) wind speed and typically used to test R and C performance classes).
5. Water-Penetration Resistance: No water leakage as defined in AAMA/WDMA/CSA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA/CSA 101/I.S.2/A440, Water Penetration Resistance Test.
 - a. Test Pressure: 15 percent of positive design pressure, but not less than 2.9 lbf/sq. ft. (140 Pa) or more than 12 lbf/sq. ft. (580 Pa).
6. Forced-Entry Resistance: Comply with Performance Grade 10 (lowest recognized by ASTM F 588 and is mandatory if AAMA/WDMA/CSA 101/I.S.2/A440 is the method selected for specifying roof window performance) requirements when tested according to ASTM F 588.
7. Operating Force and Auxiliary (Durability) Tests: According to and complying with AAMA/WDMA/CSA 101/I.S.2/A440.

C. Glazing

1. Glass and Glazing System: Comply with Division 08 Section "Glazing" for glass, insulating-glass units, laminated glass, and glazing requirements applicable to glazed roof windows.

D. Hardware

1. Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for fixed skylights.

2. General: Provide manufacturer's standard hardware, fabricated from a corrosion-resistant material compatible with wood and aluminum cladding **OR** and copper cladding, **as directed**, complying with AAMA 907; designed to smoothly operate, tightly close, and securely lock sliding wood-framed roof windows; and sized to accommodate sash weight and dimensions. Do not use aluminum in frictional contact with other metals.
 - a. Hardware Finish: Manufacturer's standard **OR** Match cladding appearance, **as directed**.
 3. Gear-Type Rotary Operators: Comply with AAMA 901 when tested according to ASTM E 405, Method A.
 4. Pole Operator: Manufacturer's standard manual **OR** motorized, **as directed**, pole for operating venting units that are more than **72 inches (1800 mm)** above floor.
 5. Motor Operator: Manufacturer's standard electric motor and remote control for operating venting units that are more than **72 inches (1800 mm)** above floor.
 - a. Provide rain sensor that automatically closes venting unit when water is detected.
OR
Provide motor operator with wireless remote-control device.
 6. Roof Window Operation:
 - a. Operator and Control: Gear-type rotary operator with plastic or metal cable that uncoils and stiffens to open sash; with locking mechanism.
 - 1) Operation: Crank handle **OR** Pole, **as directed**, for manual operation.
 - 2) Operation: Electric.**OR**
 Operator and Control: Gear-type rotary operator with arm(s) that scissors or swings to open sash; with locking mechanism.
 - 1) Operation: Crank handle **OR** Pole, **as directed**, for manual operation.
 - 2) Operation: Electric.**OR**
 Operator and Control: Spring-assisted, counter-balanced operator that allows sash to remain open in any position; with lever-handle-operated latches and lock for manual operation.
 - b. Hinge: Continuous.
OR
Hinges: Pivot **OR** Manufacturer's standard, **as directed**; two per operable sash.
- E. Accessories
1. Insect Screens: Manufacturer's standard removable screen; aluminum or vinyl frame with mitered or coped joints and with ASTM D 3656 mesh of plastic-coated glass-fiber threads. Provide frame in manufacturer's standard finish and mesh in manufacturer's standard color.
 2. Shades: Manufacturer's standard of type indicated and in color and pattern selected from manufacturer's full range.
 - a. Type: Pleated **OR** Venetian blind **OR** Roll up, **as directed**.
 - b. Pole Operation: Provide manual **OR** motorized, **as directed**, pole for operating shades that are more than **72 inches (1800 mm)** above floor.
OR
Motorized Operation: Provide manufacturer's standard electric motor and remote control for operating shades with wireless remote-control device, **as directed**.
- F. Fabrication
1. Fabricate roof windows in sizes indicated. Include a complete system for assembling components and anchoring and flashing windows.
 2. Fabricate roof windows that are reglazable without dismantling sash framing.
 3. Weather Stripping: Provide full-perimeter weather stripping for each operable sash.
 4. Provide condensation gutter or other means to hold condensed moisture or drain it to exterior.
 5. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

6. Factory-Glazed Fabrication: Glaze roof windows in the factory. Comply with requirements in Division 08 Section "Glazing" and with AAMA/WDMA/CSA 101/I.S.2/A440.

1.3 EXECUTION

A. Examination

1. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, slope of roof construction, and operational clearances. Examine roof decks, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight roof window installation.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Comply with manufacturer's written installation instructions for installing roof windows, hardware, **as directed**, motor operators, **as directed**, accessories, and other components.
2. Install roof windows square, true, and without distortion, warp, or rack of frames and sash. Securely anchor windows to structural support without impeding thermal movement and in proper relation to adjacent construction.
3. Install flashing to provide a watertight and weathertight seal.
4. Separate aluminum, copper, and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials according to recommendations in ASTM E 2112.

C. Adjusting, Cleaning, And Protection

1. Lubricate hardware and moving parts.
2. Adjust operating sash, operators, **as directed**, screens, and accessories for a tight fit at contact points and for smooth operation and weathertight closure.
3. Adjust hardware for proper alignment, smooth operation, and proper latching without unnecessary force or excessive clearance.
4. Adjust shades to hang true to line without rack. Provide unencumbered operation.
5. Clean frame surfaces immediately after installing roof windows. Comply with manufacturer's written instructions for final cleaning and maintenance. Avoid damaging protective coatings and finishes.
6. Inspect drainage holes for blockage. Clean and free holes of any obstructions to allow drainage.
7. Clean glass immediately after installing roof windows. Comply with manufacturer's written instructions for final cleaning and maintenance. Remove nonpermanent labels and clean surfaces.
8. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
9. Protect roof window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances contact roof window surfaces, remove contaminants immediately according to manufacturer's written instructions.
10. Refinish or replace roof windows that have damaged finishes.
11. Replace damaged components.

END OF SECTION 08 62 00 00

Task	Specification	Specification Description
08 62 23 00	08 62 00 00	Roof Windows
08 63 13 00	08 62 00 00	Roof Windows
08 66 00 00	08 45 23 00b	Unit Skylights

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SECTION 08 71 11 00 - DETENTION DOOR HARDWARE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for detention door hardware. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Detention door hardware for the following:
 - 1) Swinging detention doors.
 - 2) Sliding detention doors.
 - b. Detention cylinders for doors specified in other Sections.

C. Performance Requirements

1. Swinging Detention Door Assemblies: Provide detention door hardware as part of a detention door assembly that complies with security grade indicated, when tested according to ASTM F 1450, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
 - a. Bullet Resistance: Comply with Level 3 rating when tested according to UL 752; where indicated.
 - 1) Listed and labeled as bullet resisting by a testing agency acceptable to authorities having jurisdiction.
 - b. Tool-Attack Resistance: Comply with small-tool-attack-resistance rating when tested according to UL 1034 and UL 437.
2. Detention Door Hardware Functional Performance: Provide detention door hardware with features, functions, and internal equipment required to perform control and monitoring functions indicated in Division 28 Section "Plc Electronic Detention Monitoring And Control Systems".

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For each type of detention door hardware.
 - a. Wiring Diagrams: For power, signal, and control wiring; differentiate between manufacturer-installed and field-installed wiring for electrified and pneumatic, **as directed**, detention door hardware.
 - b. Compressed-Air System Diagrams: For compressed-air piping for door control systems; differentiate between manufacturer-installed and field-installed piping for pneumatic detention door hardware.
 - c. Detail interface between electrified detention door hardware and perimeter security, detention monitoring and control, fire-alarm, and building control, **as directed**, system.
 - d. Detail interface between pneumatic detention door hardware and perimeter security, detention monitoring and control, fire-alarm, and building control, **as directed**, system.
3. Other Action Submittals:
 - a. Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with detention doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1) Integrate detention door hardware indicated in "Detention Door Hardware Sets" Article into the Door Hardware Schedule, and indicate complete designations of every item required for each door and opening.

- b. Keying Schedule: Comply with requirements specified in Division 08 Section "Door Hardware". Coordinate detention keying with other door hardware in the final Keying Schedule.
 - 1) Indicate each lock and type of key using the following prefixes: "P" for paracentric, "M" for mogul, "HS" for high security, and "C" for commercial.
 - c. Operation and Maintenance Data: For electrified and pneumatic, **as applicable**, detention door hardware to include in emergency, operation, and maintenance manuals.
4. Warranties: Sample of special warranties.

E. Quality Assurance

- 1. Installer Qualifications: An employer of workers trained and approved by manufacturer and an authorized representative of detention door hardware manufacturer for installation and maintenance of units required for this Project.
- 2. Supplier Qualifications: Detention door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and the Owner about detention door hardware and keying.
 - a. Detention Door Hardware Supplier Qualifications: An experienced detention door hardware supplier who has completed projects with electrified and pneumatic, **as directed**, detention door hardware similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance, and who is acceptable to manufacturer of primary materials.
 - 1) Engineering Responsibility: Prepare data for electrified and pneumatic, **as directed**, detention door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - b. Scheduling Responsibility: Preparation of door hardware and keying schedules.
- 3. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant **OR** one who meets the requirements necessary for certification, **as directed**, and who is experienced in providing consulting services for detention door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
 - a. Detention Door Hardware Consultant Qualifications: Experienced in providing consulting services for electrified and pneumatic, **as directed**, detention door hardware installations.
- 4. Source Limitations for Detention Door Hardware: Obtain each type of detention door hardware from single source from single manufacturer.
 - a. Provide electrified and pneumatic, **as directed**, detention door hardware from same manufacturer as mechanical detention door hardware unless otherwise indicated.
- 5. Regulatory Requirements: Comply with provisions of the following:
 - a. Where indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1, **as directed**, as follows:
 - 1) Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.
 - 2) Security Door Closers: Comply with the following maximum opening-force requirements indicated:
 - a) Interior Hinged Doors: **5 lbf (22 N)** applied perpendicular to door.
 - b) Sliding Doors: **5 lbf (22 N)** applied parallel to door at latch.
 - c) Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 - b. NFPA 101: Comply with the following for means-of-egress doors:
 - 1) Latches and Locks: Not more than **15 lbf (67 N)** to release the latch.
 - 2) Security Door Closers: Not more than **30 lbf (133 N)** to set door in motion and not more than **15 lbf (67 N)** to open door to minimum required width.

- 3) Sliding Detention Door Devices: Not more than **50 lbf (222 N)** to slide door to its fully open position with a perpendicular force of **50 lbf (222 N)** against door.
 - c. Electrified and Pneumatic, **as directed**, Door Hardware: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 6. Fire-Rated Detention Door Assemblies: Provide detention door hardware for assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure **OR** as close to neutral pressure as possible, **as directed**, according to NFPA 252 **OR** UBC Standard 7-2 **OR** UL 10B **OR** UL 10C, **as directed**.
 7. Keying Conference: Conduct conference at Project site Incorporate keying conference decisions into the final Keying Schedule after reviewing detention door hardware keying system including, but not limited to, the following:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key-control system including key exclusivity and duplication control.
 - d. Address for delivery of keys.
 8. Preinstallation Conference: Conduct conference at Project site.
- F. Delivery, Storage, And Handling
1. Inventory detention door hardware on receipt and provide secure lockup for detention door hardware delivered to Project site.
 2. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
 3. Deliver keys to the Owner by registered mail or overnight package service.
- G. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of detention door hardware that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including excessive deflection, cracking, or breakage.
 - 2) Faulty operation of operators and detention door hardware.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal weathering or detention use.
 2. Warranty Period: Three years from date of Final Completion.
 3. Warranty Period for Continuous-Pin Detention Hinges: 10 years from date of Final Completion.
 4. Warranty Period for Security Door Closers: 10 years from date of Final Completion.
- H. Maintenance Service
1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for the Owner's continued adjustment, maintenance, and removal and replacement of detention door hardware.
 2. Initial Maintenance Service: Beginning at Final Completion, provide three **OR** six **OR** nine **OR** 12, **as directed**, months' full maintenance by skilled employees of detention door hardware Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper detention door hardware operation. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.

1.2 PRODUCTS

A. Security Fasteners

1. General: Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive-system type, head style, material, and protective coating as required for assembly, installation, and strength, and as follows:
 - a. Drive-System Types: Pinned Torx-Plus **OR** Pinned Torx, **as directed**.
 - b. Fastener Strength: **120,000 psi (827 MPa)**.
 - c. Socket Button Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - d. Socket Flat Countersunk Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - e. Socket Head Cap Fasteners:
 - 1) Heat-treated alloy steel, **ASTM A 574 (ASTM A 574M)**.
 - 2) Stainless steel, **ASTM F 837 (ASTM F 837M)**, Group 1 CW.
 - f. Protective Coatings for Heat-Treated Alloy Steel:
 - 1) Zinc and clear trivalent chromium where indicated.
 - 2) Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide unless otherwise indicated.

B. Detention Hinges, General

1. Standard for Electric Detention Hinges: UL 634.
2. Quantity: Provide the following unless otherwise indicated:
 - a. Two Detention Hinges: For detention doors with heights up to **60 inches (1524 mm)**.
 - b. Three Detention Hinges: For detention doors with heights **61 to 90 inches (1549 to 2286 mm)**.
 - c. Four Detention Hinges: For detention doors with heights **91 to 120 inches (2311 to 3048 mm)**.
 - d. For detention doors with heights more than **120 inches (3048 mm)**, provide four detention hinges, plus one detention hinge for every **30 inches (762 mm)** of detention door height greater than **120 inches (3048 mm)**.
3. Size: Provide the following, unless otherwise indicated, with detention hinge widths sized for **2-inch (51-mm)** detention door thickness and clearances required:
 - a. Doors up to **42 Inches (1067 mm)** Wide: Minimum **4-1/2 inches (114 mm)** wide by **0.180 inches (4.6 mm)** thick or **5 inches (127 mm)** wide by **0.190 inches (4.8 mm)** thick.
 - b. Doors Greater Than **42 Inches (1067 mm)** Wide: Minimum **6 inches (152 mm)** wide by **0.203 inches (5.2 mm)** thick.
4. Detention Doors with Security Closers: Unless otherwise indicated, provide antifriction-bearing detention hinges.
5. Detention Hinge Base Metal: Unless otherwise indicated, provide the following:
 - a. Exterior Detention Hinges: Stainless steel, with stainless-steel pin.
 - b. Interior Detention Hinges: Steel, with steel pin **OR** Stainless steel, with stainless-steel pin, **as directed**.
 - c. Detention Hinges for Fire-Rated Assemblies: Steel, with steel pin **OR** Stainless steel, with stainless-steel pin, **as directed**.
6. Electrified Functions for Detention Hinges: Comply with the following:
 - a. Electrical Contact: Exposed electrical contacts for transfer of power.
 - b. Power Transfer: Concealed PTFE-jacketed wires, secured at each leaf and continuous through detention hinge knuckle.
 - c. Monitoring: Concealed electrical monitoring switch.
7. Fastening: Comply with the following:
 - a. Welding: Where indicated, weld hinges to detention doors and frames with continuous fillet weld around three sides of hinge perimeter.
 - b. Security Fasteners: Provide socket flat countersunk head machine screws; finish screw heads to match surface of detention hinges. Install into drilled and tapped holes.

C. Detention Hinges

1. Utility-Door Detention Hinges DH-1: Heavy weight, plain bearing; fabricated from cast iron or steel; **3/8-inch- (9.5-mm-)** diameter, case-hardened, fully welded, **as directed**, steel hinge pin; full surface.
 - a. Leaves: Drilled for countersunk security fasteners **OR Solid, as directed**.
 - b. Size: Minimum **3 by 4 inches by 0.200 inch (75 by 100 by 5 mm)**.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed**, according to ASTM F 1758.
 - d. Finish: BHMA 600.
2. Food-Pass Detention Hinges DH-2: Heavy weight, plain bearing; fabricated from cast iron or steel; **3/8-inch- (9.5-mm-)** diameter, case-hardened, fully welded, **as directed**, steel hinge pin; with applied stop preventing door from opening more than 90 degrees and supporting door in horizontal position as a shelf; full surface.
 - a. Leaves: Drilled for countersunk security fasteners **OR Solid, as directed**.
 - b. Size: Minimum **3 by 4 inches by 0.200 inch (75 by 100 by 5 mm)**.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed**, according to ASTM F 1758.
 - d. Finish: BHMA 600.
3. Full-Surface Detention Hinges DH-3: Extra heavy weight; two heavy-duty thrust bearings with hardened-steel ball bearings; fabricated from steel plate; **3/4-inch- (19-mm-)** diameter, case-hardened, fully welded, steel hinge pin.
 - a. Leaves: Drilled for countersunk security fasteners **OR Solid, as directed**.
 - b. Size: Minimum **5 by 5-1/4 inches by 1/2 inch (127 by 133 by 13 mm)**.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed**, according to ASTM F 1758.
 - d. Finish: BHMA 600.
4. Half-Surface Detention Hinges DH-4: Extra heavy weight; two heavy-duty thrust bearings with hardened-steel ball bearings; fabricated from steel plate; **3/4-inch- (19-mm-)** diameter, case-hardened, fully welded, steel hinge pin.
 - a. Leaves: Drilled for countersunk security fasteners **OR Solid, as directed**.
 - b. Size: Minimum **5 by 5-1/4 inches by 1/2 inch (127 by 133 by 13 mm)**.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed**, according to ASTM F 1758.
 - d. Finish: BHMA 600.
5. Gap-Mounted Detention Hinges DH-5: Extra heavy weight; two heavy-duty thrust bearings with hardened-steel ball bearings; fabricated from steel plate; **3/4-inch- (19-mm-)** diameter, case-hardened, fully welded, steel hinge pin.
 - a. Leaves: Drilled for countersunk security fasteners **OR Solid, as directed**.
 - b. Size: Minimum **5 by 6 inches by 1/2 inch (127 by 152 by 13 mm)**.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed**, according to ASTM F 1758.
 - d. Finish: BHMA 600.
6. Continuous-Pin Detention Hinges DH-6: Minimum **0.109-inch- (2.78-mm-)** thick, stainless-steel hinge leaves with minimum overall width of **4 inches (100 mm)**; with **1/4-inch- (6-mm-)** diameter continuous pin; fabricated to full height of detention door and frame. Finish components after milling and drilling are complete. Fabricate continuous-pin detention hinges to template screw locations.
 - a. Security Grade: **1 OR 2 OR 3 OR 4, as directed**, according to ASTM F 1758.

D. Detention Locks And Latches, General

1. Swinging Detention Door Lock and Latch Performance: Provide detention door locks and latches that comply with security grade indicated, when tested according to ASTM F 1577, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
2. Detention Lock Functions: Provide function numbers and descriptions indicated in detention door hardware sets complying with ASTM F 1577.
3. Detention Lock Construction: Fabricate detention lock case and cover plate from steel plate. Fabricate bolts from solid sections; laminated construction unacceptable.
4. Detention Lock Throw: Comply with testing requirements for length of bolts to comply with labeled fire door requirements, and as follows:
 - a. Latchbolts for Detention Food Pass **OR Security Access Doors, as directed**: Minimum **5/8-inch (16-mm)** latchbolt throw.

- b. Latchbolts: Minimum **3/4-inch (19-mm)** latchbolt throw.
- c. Deadbolts: Minimum **1-inch (25-mm)** bolt throw.
- 5. Detention Lock Trim:
 - a. Levers: Solid stainless steel.
 - b. Knobs: Stainless steel **OR** Brass, **as directed**.
 - c. Escutcheons for Paracentric Locks: **0.125-inch- (3.18-mm-)** thick, **3-inch- (75-mm-)** diameter stainless steel with BHMA 626 **OR** brass with BHMA 606, **as directed**, finish. Attach with security fasteners.
 - 1) Style: Single wing **OR** Double wing **OR** Single or double wing as required by lock function **OR** As indicated, **as directed**.
 - 2) Provide escutcheons unless otherwise **OR** where, **as directed**, indicated.
 - d. Cylinder Shields for Paracentric Locks: **0.125-inch- (3.18-mm-)** thick, **3-inch- (75-mm-)** diameter stainless steel with BHMA 626 **OR** brass with BHMA 606, **as directed**, finish and swinging cover to protect keyhole. Attach with security fasteners.
 - 1) Style: Single wing **OR** Double wing **OR** Single or double wing as required by lock function **OR** As indicated, **as directed**.
 - 2) Provide cylinder shields unless otherwise **OR** where, **as directed**, indicated.
- 6. Pneumatic Detention Locks and Latches: Operate when supplied with air between **40 psig (275 kPa)** minimum and **100 psig (690 kPa)** maximum. Factory install quick-connect air fitting and factory-wired plug connector with **6-inch (150-mm)** wire pigtail.
 - a. Provide security ring for installation of pneumatic detention lock in hollow-metal detention frame, welded to frame or access cover unless otherwise **OR** where, **as directed**, indicated.

E. Mechanical Detention Locks And Latches

- 1. General: Provide mechanical detention lock mountings as follows:
 - a. Hollow-Metal Detention Doors: Mount detention lock to back of **0.179-inch (4.56-mm)** nominal-thickness steel **OR** **0.183-inch (4.65-mm)** nominal-thickness galvanized-steel, **as directed**, cover plate for installation in lock pocket fabricated into detention door. Attach cover plate to hollow-metal detention door with security fasteners.
 - b. Bar-Grille Detention Doors: Mount detention lock to back of galvanized, **as directed**, steel enclosure welded to flat horizontal bars of bar-grille detention door; cover with **0.179-inch (4.56-mm)** nominal-thickness steel **OR** **0.183-inch (4.65-mm)** nominal-thickness galvanized-steel, **as directed**, plate. Attach plate with security fasteners.
 - c. Steel-Plate Detention Doors: Mount detention lock to inside surface of **0.179-inch (4.56-mm)** nominal-thickness steel **OR** **0.134-inch (3.42-mm)** nominal-thickness steel **OR** **0.183-inch (4.65-mm)** nominal-thickness galvanized-steel **OR** **0.138-inch (3.50-mm)** nominal-thickness galvanized-steel, **as directed**, enclosure with integrally formed mounting flanges. Attach enclosure to steel-plate detention door with security fasteners **OR** rivets, **as directed**.
- 2. Utility-Door Mechanical Deadlocks, Paracentric ML-1: For use on small swinging doors, such as access panels, plumbing space doors, electric panel doors, and hatches that are infrequently used.
 - a. Function: Lockbolt retracted and extended by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**.
 - b. Lockbolt: **1-1/2 inches high by 3/4 inch (38 mm high by 19 mm)** thick; **5/8-inch (16-mm)** throw.
 - c. Security Grade: **1 OR 2 OR 3 OR 4**, **as directed**.
- 3. Utility-Door Mechanical Deadlocks, Mogul ML-2: For use on small swinging doors, such as access panels, plumbing space doors, electric panel doors, and hatches that are infrequently used.
 - a. Function: Lockbolt retracted and extended by mogul cylinder; keyed one side **OR** two sides, **as directed**.
 - b. Lockbolt: **1-1/2 inches high by 3/4 inch (38 mm high by 19 mm)** thick; **5/8-inch (16-mm)** throw.

- c. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
4. Mechanical Snaplatches, Paracentric ML-3: For use on small swinging doors, such as food-pass doors, observation panels, gun locker doors, and other small doors where snaplocking is needed and deadlocking is not required.
 - a. Function: Automatic snaplatch when door is closed; latchbolt retracted by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**.
 - b. Latchbolt: 1 inch high by 7/16 inch (25 mm high by 11 mm) thick; 5/16-inch (8-mm) throw.
 - c. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
5. Mechanical Snaplatches, Mogul ML-4: For use on small swinging doors, such as food-pass doors, observation panels, gun locker doors, and other small doors where snaplocking is needed and deadlocking is not required
 - a. Function: Automatic snaplatch when door is closed; latchbolt retracted by mogul cylinder; keyed one side **OR** two sides, **as directed**.
 - b. Latchbolt: 1 inch high by 7/16 inch (25 mm high by 11 mm) thick; 5/16-inch (8-mm) throw.
 - c. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
6. Mechanical Concealed Snaplatches ML-5: For use on small swinging doors, such as observation panels, wickets, covers, and other small doors.
 - a. Function: Automatic snaplatch when door is closed; latchbolt retracted by five-tumbler paracentric cylinder; keyed one side. When closed, latch is concealed within lock case.
 - b. Latchbolt: 1 inch high by 7/16 inch (25 mm high by 11 mm) thick; 7/16-inch (11-mm) throw.
 - c. Provide angled strike.
 - d. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
7. Sliding Door Mechanical Deadlatches ML-6: For use on sliding doors, such as entrance, safety vestibule, and corridor doors.
 - a. Function: Hookbolt snaplatches and automatically deadlocks through action of plunger pin when door is closed (slam locking); hookbolt raised by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**.
 - b. Hookbolt: 1/2-inch- (13-mm-) thick, case-hardened steel; 5/8-inch (16-mm) lift.
 - c. Provide case-hardened-steel deadlock plunger pin.
 - d. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
8. Sliding Door Mechanical Deadlocks ML-7: For use on sliding doors, such as entrance, safety vestibule, corridor, and inmate cell doors.
 - a. Function: Hookbolt raised and lowered by five **OR** six, **as directed**,-tumbler paracentric cylinder (no slam locking); keyed one side **OR** two sides, **as directed**.
 - b. Hookbolt: 1/2-inch- (13-mm-) thick, case-hardened steel; 5/8-inch (16-mm) lift.
 - c. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
9. Mechanical Snaplatches ML-8: For use on swinging doors, such as corridor, dining room, and recreational area doors.
 - a. Function: Automatic snaplatch when door is closed (slam locking); latchbolt retracted by half turn and extended by full turn in opposite direction of five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**.
 - 1) Knob operation retracts latchbolt unless deadlocked. Locate knobs on one side **OR** two sides, **as directed**.
 - b. Latchbolt: 2-inch-high by 3/4-inch- (50-mm-high by 19-mm-) thick steel, with two case-hardened-steel insert pins; 3/4-inch (19-mm) throw; 1/2-inch (13-mm) **OR** 1-1/4-inch (32-mm), **as directed**, bolt projection when retracted.
 - c. Listed and labeled for use on fire doors.
 - d. Security Grade: 1 **OR** 2 **OR** 3 **OR** 4, **as directed**.
10. Mechanical Deadlatches/Deadlocks ML-9: For use on swinging doors, such as day room, dining room, and recreational area doors.
 - a. Function: Automatic snaplatch and automatic deadlock through action of actuator when door is closed (slam locking); latchbolt retracted by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**.
 - b. Latchbolt: 2-inch-high by 3/4-inch- (50-mm-high by 19-mm-) thick steel, with two case-hardened-steel insert pins; 3/4-inch (19-mm) throw; 1/2-inch (13-mm) **OR** 1-1/4-inch (32-mm), **as directed**, bolt projection when retracted.

- c. Deadlock Actuator: **3/4-inch-high by 3/4-inch-** (19-mm-high by 19-mm-) thick steel; **1/2-inch** (13-mm) throw.
 - d. Listed and labeled for use on fire doors.
 - e. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
11. Mechanical Deadlocks ML-10: For use on swinging doors where slam locking is not required, such as holding cell, segregation cell, control room, armory, key cabinet, storage, utility, and hollow-metal access doors.
- a. Function: Deadlocked in both locked and unlocked position; latchbolt retracted and extended by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed.**
 - b. Latchbolt: **2-inch-high by 3/4-inch-** (50-mm-high by 19-mm-) thick steel, with two case-hardened-steel insert pins; **3/4-inch** (19-mm) throw; **1/2-inch** (13-mm) **OR** **1-1/4-inch** (32-mm), **as directed**, bolt projection when retracted.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
12. Cremona Bolt Mechanical Snaplatches ML-11: For use on swinging doors or active leaf of pairs of swinging doors where slam locking is needed.
- a. Function: Automatic snaplatch and deadlocking when door is closed (slam locking); latchbolt retracted and extended by five-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed.** Lever operation one side **OR** two sides, **as directed**, retracts head and foot rods, unless deadlocked, for three-point locking.
 - b. Latchbolt: **2-inch-high by 3/4-inch-** (50-mm-high by 19-mm-) thick steel, with two case-hardened-steel insert pins; **3/4-inch** (19-mm) throw.
 - c. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
13. Cremona Bolt Mechanical Deadlocks, Paracentric ML-12: For use on swinging doors or active leaf of pairs of swinging doors where doors may be subject to mass attack. Delete inactive leaf for single door.
- a. Function: Active leaf deadlocks when door is closed (no slam locking); active-leaf deadbolt retracted and extended by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed.** Active-leaf lever operation one side **OR** two sides, **as directed**, retracts active-leaf head and foot bolts unless deadlocked.
 - 1) Inactive Leaf: Head and foot bolts deadlocked by five **OR** six, **as directed**,-tumbler, inactive-leaf paracentric cylinder. Inactive-leaf lever operation one side **OR** two sides, **as directed**, retracts inactive-leaf head and foot bolts unless deadlocked.
 - b. Deadbolt: **2-inch-high by 3/4-inch-** (50-mm-high by 19-mm-) thick steel, with two case-hardened-steel insert pins; **3/4-inch** (19-mm) throw.
 - c. Head and Foot Bolts: **7/8-inch** (22-mm) diameter; **3/4-inch** (19-mm) throw.
 - d. Provide foot bolt receptacle(s).
 - e. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
14. Mechanical Head and Foot Bolts ML-14: For use on the inactive leaf of pairs of swinging doors.
- a. Function: Bolt retracted and extended by spanner-type key **OR** five-tumbler paracentric cylinder, **as directed**; enclosed in iron or steel case with steel cover (not applicable for hollow-metal doors).
 - b. Latchbolt: **1-inch-** (25-mm-) diameter steel; **3/4-inch** (19-mm) throw.
 - c. Footbolt Receptacle: Spring-loaded mechanism; brass.
 - d. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
- F. Electromechanical Detention Locks And Latches
1. General: Provide electromechanical detention locks and latches with factory-wired plug connector with **6-inch** (152-mm) wire pigtail.
 - a. Provide security ring for installation of electromechanical detention lock in hollow-metal detention frame, welded to frame or access cover, unless otherwise **OR** where, **as directed**, indicated.
 - b. Equip direct-current solenoid-operated detention locks and latches with diode transient voltage protection at each locking device.

2. Solenoid-Operated Deadlatches, Paracentric EL-1: For use on swinging doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.
 - a. Function: Remote switch activates electric solenoid that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**; if latchbolt is retracted by key, it remains retracted until relocked by key.
 - 1) Latchback: Latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is activated; latchbolt extends when power is discontinued, **as directed**.
 - 2) If power fails, latchbolt automatically deadlocks (fail secure).
 - b. Latchbolt: **2-inch-high by 3/4-inch- (50-mm-high by 19-mm-)** thick hardened steel; **3/4-inch (19-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide roller-type deadlock actuator.
 - e. Voltage: 120-V ac.
 - f. Listed and labeled for use on fire doors.
 - g. Security Grade: **1 OR 2 OR 3 OR 4, as directed**.
3. Motor-Operated Deadlatches, Paracentric EL-2: For use on swinging doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.
 - a. Function: Remote switch activates electric motor that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**; if latchbolt is retracted by key, it remains retracted until relocked by key.
 - 1) Latchback: Latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is activated; latchbolt extends when power is discontinued, **as directed**.
 - 2) If power fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: **2-inch-high by 3/4-inch- (50-mm-high by 19-mm-)** thick hardened steel; **3/4-inch (19-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide roller-type deadlock actuator.
 - e. Voltage: 120-V ac **OR** 24-V dc, **as directed**.
 - f. Listed and labeled for use on fire doors.
 - g. Security Grade: **1 OR 2 OR 3 OR 4, as directed**.
4. Sliding Door Motor-Operated Deadlatches EL-3: For use on sliding doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.
 - a. Function: Remote switch activates electric motor that raises hookbolt; spring-loaded actuator pin pushes door open **1 to 3 inches (25 to 75 mm)**; automatic latching and deadlocking when door is closed (slam locking). Hookbolt can be mechanically raised by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed**; if hookbolt is raised by key, it remains raised until relocked by key.
 - 1) Latchback: Hookbolt remains raised until door is opened **2 inches (50 mm)**, then lowers **OR** as long as control switch is in open position; hookbolt lowers when control switch is moved to locked position, **as directed**.
 - 2) If power fails, hookbolt automatically deadlocks (fail-secure).
 - b. Hookbolt: **1-3/4- by 1/2-inch- (44- by 13-mm-)** thick, case-hardened steel; **3/4-inch (19-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide case-hardened-steel deadlock actuator.
 - e. Voltage: 120-V ac.
 - f. Security Grade: **1 OR 2 OR 3 OR 4, as directed**.
5. Solenoid-Operated Deadlatches, Mogul EL-4: For use on swinging doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.

- a. Function: Remote switch activates electric solenoid that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by mogul cylinder; keyed one side **OR** two sides, **as directed**.
 - 1) Latchback: Latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is activated; latchbolt extends when power is discontinued, **as directed**.
 - 2) Local Electric Key (LEK): Inmate key operates lock electrically when enabled; staff key always operates lock manually and electrically; where indicated.
 - 3) Key Holdback: If latchbolt is retracted by key, it remains retracted until relocked by key (listing for use on fire doors is not available).
 - 4) Knob operation retracts latchbolt; always active.
 - 5) If power fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: **1-1/2-inch-high by 3/4-inch- (38-mm-high by 19-mm-)** thick hardened steel; **1-inch (25-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide roller-type deadlock actuator.
 - e. Voltage: 120-V ac.
 - f. Listed and labeled for use on fire doors.
 - g. Security Grade: **1 OR 2 OR 3 OR 4, as directed**.
6. Motor-Operated Deadlatches, Mogul EL-5: for use on swinging doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.
- a. Function: Remote switch activates electric motor that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by mogul cylinder; keyed one side **OR** two sides, **as directed**.
 - 1) Latchback: Latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is in open position; latchbolt extends when control switch is moved to locked position, **as directed**.
 - 2) Local Electric Key (LEK): Inmate key operates lock electrically when enabled; staff key always operates lock manually and electrically; where indicated.
 - 3) Key Holdback: If latchbolt is retracted by key, it remains retracted until relocked by key (listing for use on fire doors is not available).
 - 4) Knob operation retracts latchbolt; always active.
 - 5) If power fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: **1-1/2-inch-high by 3/4-inch- (38-mm-high by 19-mm-)** thick hardened steel; **1-inch (25-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide roller-type deadlock actuator.
 - e. Voltage: 120-V ac **OR** 24-V dc, **as directed**.
 - f. Listed and labeled for use on fire doors.
 - g. Security Grade: **1 OR 2 OR 3 OR 4, as directed**.
7. Solenoid-Operated Deadlatches, Commercial EL-6: For use on swinging doors, hung in standard 2-inch (50-mm) hollow-metal frames, that are to be unlocked from remote locations.
- a. Function: Remote switch activates electric solenoid that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by high-security, **as directed**, commercial cylinder; keyed one side **OR** two sides, **as directed**.
 - 1) Latchback: Latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is activated; latchbolt extends when power is discontinued, **as directed**.
 - 2) Local Electric Key (LEK): Inmate key operates lock electrically when enabled; staff key always operates lock manually and electrically; where indicated.
 - 3) If power fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: **1-1/2-inch-high by 5/8-inch- (38-mm-high by 16-mm-)** thick hardened steel; **3/4-inch (19-mm)** throw.
 - c. Provide internal deadlock indicator switch.

- d. Deadlock Actuator: Stainless steel.
 - e. Strike: Stainless steel.
 - f. Voltage: 24-V dc.
 - g. Listed and labeled for use on fire doors.
 - h. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
8. Motor-Operated Deadlatches, Commercial EL-7: For use on swinging doors, hung in standard 2-inch (50-mm) hollow-metal frames, that are to be unlocked from remote locations.
- a. Function: Remote switch activates electric motor that retracts latchbolt; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by high-security, **as directed**, commercial cylinder; keyed one side **OR** two sides, **as directed.**
 - 1) Latchback: Latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is in open position; latchbolt extends when control switch is moved to locked position, **as directed.**
 - 2) Local Electric Key (LEK): Inmate key operates lock electrically when enabled; staff key always operates lock manually and electrically; where indicated.
 - 3) If power fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: **1-1/2-inch-high by 5/8-inch- (38-mm-high by 16-mm-)** thick hardened steel; **3/4-inch (19-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Deadlock Actuator: Stainless steel.
 - e. Strike: Stainless steel.
 - f. Voltage: 24-V dc.
 - g. Listed and labeled for use on fire doors.
 - h. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
9. Solenoid-Operated Gate Locks, Paracentric EL-8: For use on swinging and sliding gates that are to be unlocked from remote locations.
- a. Function: Remote switch activates electric solenoid that raises an internal bolt; automatic deadlocking when gate is closed. Bolt can be mechanically retracted by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed.**
 - 1) Latchback: Bolt remains raised until gate is closed.
 - 2) If power fails, latchbolt automatically deadlocks (fail-secure).
 - b. Bolt: **5/8-inch- (16-mm-)** diameter stainless steel; **1-inch (25-mm)** throw.
 - c. Provide internal deadlock indicator switch.
 - d. Voltage: 120-V ac.
 - e. Finish: Galvanized.
 - f. Mounting: Mount lock to gate post; mount locking tongue to gate frame.
 - g. Security Grade: **1 OR 2 OR 3 OR 4, as directed.**
- G. Pneumatic Detention Locks And Latches
- 1. General: Provide pneumatic detention locks and latches that operate when supplied with air between **40 psig (275 kPa)** minimum and **100 psig (690 kPa)** maximum.
 - 2. Factory install quick-connect air fitting and factory-wired plug connector with **6-inch (150-mm)** wire pigtail.
 - a. Provide security ring for installation of pneumatic detention lock in hollow-metal detention frame, welded to frame or access cover, unless otherwise **OR** where, **as directed**, indicated.
 - 3. Pneumatic Deadlatches, Paracentric PL-1: For use on swinging doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.
 - a. Function: Remote switch activates pneumatic cylinder that retracts latchbolt; latchbolt remains retracted until door is opened **2 inches (50 mm)**, then releases **OR** as long as control switch is activated, **as directed**; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by five **OR** six, **as directed**,-tumbler paracentric cylinder; keyed one side **OR** two sides, **as directed.**
 - 1) If power fails or compressed-air system fails, latchbolt automatically deadlocks (fail-secure).

- b. Latchbolt: 2-inch-high by 3/4-inch- (50-mm-high by 19-mm-) thick hardened steel; 3/4-inch (19-mm) throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide roller-type deadlock actuator.
 - e. Voltage: 24-V dc.
 - f. Security Grade: 1 **OR 2 OR 3 OR 4, as directed**.
4. Pneumatic Deadlatches, Mogul PL-2: For use on swinging doors, such as entrance, sally port, corridor, and inmate cell doors, that are to be unlocked from remote locations.
- a. Function: Remote switch activates pneumatic cylinder that retracts latchbolt; latchbolt remains retracted until door is opened 2 inches (50 mm), then releases **OR** as long as control switch is activated, **as directed**; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by mogul cylinder; keyed one side **OR** two sides, **as directed**.
 - 1) Local Electric Key (LEK): Inmate key operates lock electrically when enabled; staff key always operates lock manually and electrically; where indicated.
 - 2) Knob on opposite side of cylinder retracts latchbolt.
 - 3) If power fails or compressed-air system fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: 1-1/2-inch-high by 3/4-inch- (38-mm-high by 19-mm-) thick hardened steel; 1-inch (25-mm) throw.
 - c. Provide internal deadlock indicator switch.
 - d. Provide roller-type deadlock actuator.
 - e. Voltage: 24-V dc.
 - f. Listed and labeled for use on fire doors.
 - g. Security Grade: 1 **OR 2 OR 3 OR 4, as directed**.
5. Pneumatic Deadlatches, Commercial PL-3: For use on swinging doors, hung in standard 2-inch (50-mm) hollow-metal frames, that are to be unlocked from remote locations.
- a. Function: Remote switch activates pneumatic cylinder that retracts latchbolt; latchbolt remains retracted until door is opened 2 inches (50 mm), then releases **OR** as long as control switch is activated, **as directed**; automatic latching and deadlocking when door is closed (slam locking). Latchbolt can be mechanically retracted by high-security, **as directed**, commercial cylinder; keyed one side **OR** two sides, **as directed**.
 - 1) Local Electric Key (LEK): Inmate key operates lock electrically when enabled; staff key always operates lock manually and electrically; where indicated.
 - 2) If power fails or compressed-air system fails, latchbolt automatically deadlocks (fail-secure).
 - b. Latchbolt: 1-1/2-inch-high by 5/8-inch- (38-mm-high by 16-mm-) thick hardened steel; 3/4-inch (19-mm) throw.
 - c. Faceplate: Stainless steel.
 - d. Provide internal deadlock indicator switch.
 - e. Provide roller-type deadlock actuator.
 - f. Voltage: 24-V dc.
 - g. Listed and labeled for use on fire doors.
 - h. Security Grade: 1 **OR 2 OR 3 OR 4, as directed**.

H. Cylinders And Keying

- 1. General: Subject to compliance with requirements, provide cylinders and keying for paracentric and mogul cylinders by the same manufacturer as for detention locks and latches.
- 2. Commercial (Builders' Hardware) Cylinders: As specified in Division 08 Section "Door Hardware".
- 3. Paracentric Cylinders: Manufacturer's standard lever-tumbler type, constructed from one-piece spring-tempered brass; with tumblers activated by phosphor bronze springs; five tumblers per lock unless otherwise indicated.

4. Mogul Cylinders: Manufacturer's standard pin-tumbler type, minimum **2-inch (50-mm)** diameter; body constructed from brass or bronze, stainless steel, or nickel silver; with stainless-steel tumblers and engaging cylinder balls; complying with the following:
 - a. Number of Pins: Five **OR** Six **OR** Seven, **as directed**.
 - b. Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.
 - 1) High-Security Grade: Listed and labeled as complying with pick- and drill-resistant testing requirements in UL 437 (Suffix A); where indicated.
 - c. Finish: BHMA 606 **OR** BHMA 626, **as directed**.
 5. Keying System: Unless otherwise indicated, provide a factory-registered keying system complying with the following requirements:
 - a. Paracentric cylinders operated by change keys only.
 - b. No Master Key System: Mogul cylinders operated by change keys only.
OR
Master Key System: Mogul cylinders operated by a change key and a master key.
OR
Grand Master Key System: Mogul cylinders operated by a change key, a master key, and a grand master key.
OR
Great-Grand Master Key System: Mogul cylinders operated by a change key, a master key, a grand master key, and a great-grand master key.
 - c. Existing System: Master key or grand master key mogul-cylinder locks to the Owner's existing system.
 - d. Existing System: Re-key the Owner's existing master key system for mogul-cylinder locks into new keying system.
 6. Keys: Provide cast silicon-bronze copper alloy keys complying with the following:
 - a. Stamping: Permanently inscribe each key with a visual key-control number and include the following notation:
 - 1) Notation: "DO NOT DUPLICATE" **OR** Information to be furnished by the Owner, **as directed**.
 - b. Quantity: In addition to one extra blank key for each lock, provide the following:
 - 1) Cylinder Change Keys: Three.
OR
Master Key(s): One.
OR
Grand Master Key(s): One.
OR
Great-Grand Master Key(s): One.
- I. Switches
1. General: Provide switches configured with type of contacts required for functions indicated, including multiple circuiting where required by functional performance of Division 28 Section "Plc Electronic Detention Monitoring And Control Systems".
 2. Concealed, Magnetic Door Position Switches: Consisting of actuating magnet mortised into detention door and switch mortised into frame; with stainless-steel faceplates; 24-V dc, factory wired with plug connector. Wire in series with lock monitors. Attach with security fasteners.
 3. Concealed, Mechanical Door Position Switches: Consisting of metal track mortised into head of detention door connected by steel actuator arm to steel actuator mortised into frame; switch fully concealed when door is in closed position; with stainless-steel faceplate; 120-V ac; factory wired with plug connector. Action of door mechanically activates switch. Wire in series with lock monitors. Attach with security fasteners.
 4. Surface-Mounted Door Position Switches: Switch enclosed in **0.134-inch (3.42-mm)** nominal-thickness steel enclosure, factory primed for painting; 120-V ac; factory wired with plug connector. Wire in series with lock monitors. Attach with security fasteners.
 - a. Galvanize enclosure for exterior locations and where indicated.

5. Strike Indicator Switches: Designed to be mortised behind strike and to indicate whether door is locked or unlocked; enclosed in metal strike box. Wire in series with door position switches. Attach with security fasteners.
 - a. Voltage: 120-V dc **OR** 240-V ac **OR** As indicated, **as directed**.
 - b. Locations: At doors with mechanical detention lock **OR** Where indicated, **as directed**.
 - c. Manufacturer: Same as detention lock.
 6. Inmate Door Control Switches, as directed: Momentary **OR** Maintained-contact, **as directed**, push-button switch with metal faceplate. Attach with security fasteners.
 - a. Material and Finish: Brass with BHMA 606 **OR** Brass with BHMA 626 **OR** Stainless steel with BHMA 630, **as directed**, finish.
 - b. Operation: When activated from remote location, switch allows inmate operation of electric cell door lock.
 7. Push-Button, Inmate Door Control Switches, as directed: Momentary **OR** Maintained-contact, **as directed**, push-button switch for installation without faceplate. Attach with security fasteners.
 - a. Material and Finish: Brass with BHMA 606 **OR** Brass with BHMA 626 **OR** Stainless steel with BHMA 630, **as directed**, finish.
 - b. Operation: When activated from remote location, switch allows inmate operation of electric cell door lock.
- J. Detention Operating Trim
1. Standard: BHMA A156.6, Grade 1.
 2. Surface-Mounted Door Pulls (not typically used inside cells): **8-3/4-inch (222-mm)** overall length and **2-1/4-inch (57-mm)** projection; attach to door with two security fasteners.
 - a. Material: Cast bronze with BHMA 606 **OR** BHMA 626, **as directed**, finish.
 - b. Material: Cast stainless steel with BHMA 630 finish.
 3. Round, Surface-Mounted Door Pulls (not typically used inside cells): **7-inch (178-mm)** overall length by **1-inch- (25-mm-)** diameter solid bar, with **2-1/4-inch (57-mm)** projection; attach to door with two security through fasteners.
 - a. Material: Cast or extruded bronze with BHMA 606 **OR** BHMA 626, **as directed**, finish.
 - b. Material: Cast stainless steel with BHMA 630 finish.
 4. Flush Door Pulls: **5 inches high by 4 inches wide by 1 inch deep (127 mm high by 102 mm wide by 25 mm deep)**, with **1/8-inch- (3-mm-)** thick faceplate; attach to door with four security fasteners.
 - a. Material: Formed, wrought, or cast brass/bronze with BHMA 606 **OR** BHMA 626, **as directed**, finish.
 - b. Material: Formed or cast stainless steel with BHMA 630 finish.
 5. Knob Pulls: **2-inch (50-mm)** diameter; fabricated from solid brass with BHMA 606 **OR** BHMA 626, **as directed**, finish. Attach with security fasteners.
 6. Lever-Handle Guides: Guide track and escutcheon, **as directed**, that provides selective stopping of lever handle by use of an adjustable stop; fabricated from steel with BHMA 633 **OR** stainless steel with BHMA 630, **as directed**, finish. Attach with security fasteners.
- K. Security Door Closers
1. Standard: BHMA A156.4, Grade 1.
 - a. Certified Products: Provide security door closers listed in BHMA's "Directory of Certified Products."
 2. Surface-Mounted Security Door Closers:
 - a. Arms: Minimum **3/8-inch- (9.5-mm-)** thick by **1-1/8-inch- (29-mm-)** wide, rectangular steel main arm; **5/16-inch- (8-mm-)** thick by **1-inch- (25-mm-)** wide, rectangular steel secondary arm; full rack-and-pinion type; fabricated with orbital-riveted, pinned, or welded elbow and arm shoe/soffit plate joints designed to prevent disassembly with ordinary hand tools.
 - b. Cover: Heavy-duty metal, attached with four security fasteners.
 - c. Mounting: Attach security door closer with security fasteners.
 3. Concealed Security Door Closers:

- a. Construction: Forged-steel arm; security roller; with track concealed in head of detention door, designed to eject foreign objects during opening and closing; fabricated with joints designed to prevent disassembly with ordinary hand tools. Closer arm and track fully concealed when door is closed.
 - b. Cover Plates: Heavy-duty metal, attached with security fasteners.
 - c. Provide door position switch integral to closer.
4. Unit Size: Unless otherwise indicated, comply with manufacturer's written recommendations for size of security door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- L. Detention Door Stops
1. Detention Floor Stops: **1-1/2-inch-high by 2-inch- (38-mm-high by 50-mm-)** diameter rubber bumper mounted on steel lag bolt; BHMA A156.16; install in floor with nonshrink grout; for detention doors unless wall or other type stops are indicated. Do not mount floor stops where they will impede traffic.
 2. Silencers for Detention Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum **1/2-inch (13-mm)** diameter; fabricated for drilled-in application to detention door frame. Attach with security fasteners.
- M. Sliding Detention Door Device Assemblies
1. Performance Requirements: Provide sliding detention door device assemblies, including locking device, receiver, overhead door hanger, bottom door guide, lock column, and enclosure, as a complete assembly, complying with Grade 1 **OR** Grade 2, **as directed**, according to ASTM F 1643, as determined by testing manufacturers' standard units representing those indicated for Project.
 2. Assembly Construction: As follows:
 - a. Enclosure: Fabricated from **0.179-inch (4.56-mm)** nominal-thickness steel plate, with **0.134-inch (3.42-mm)** nominal-thickness steel removable **OR** hinged, **as directed**, cover. Baffle openings in enclosure. Provide closures for ends of housings.
 - 1) Provide sloping-top housings. Flat-top housings may be provided for operators mounted to ceiling, **as directed**.
 - b. Lock Column: Vertical tube enclosure fabricated from **0.134-inch (3.42-mm)** nominal-thickness steel, providing mechanical locking control of detention sliding door at door location; operated by paracentric key. Doors shall be capable of being locked at top and bottom, at rear of door, in both open and closed positions, with no components projecting into door opening.
 - c. Receiver: Fabricated from **0.134-inch (3.42-mm)** nominal-thickness steel plate.
 - d. Hanger Assembly: Extend steel carrier full width of door and door travel required for clear door opening. Provide antifriction ball-bearing steel rollers with hardened members and grease shield.
 - e. Finish: Factory prime painted.
 3. Mechanical-Locking, Manual-Door-Movement, Sliding Door Device Assemblies SDA-1: Doors are manually opened and closed and mechanically locked by means of jamb-mounted mechanical detention lock specified elsewhere in this Section.
 4. Electromechanical-Locking, Manual-Door-Movement, Sliding Door Device Assemblies SDA-2: Operated from remote-control panel that activates electric motors to unlock sliding doors. Doors spring open a small distance after unlocking and are manually opened and closed. Locks automatically deadlock when doors are moved to fully open or fully closed position. Provide factory-wired cable harness with plug connectors for each motor unit.
 - a. Single-Door Function: In an emergency or if power fails, individual doors can be unlocked using a manual-release tool and manually moved; doors relock in either fully open or fully closed position.
 - b. Multiple-Door Function: Each door can be individually unlocked locally or from a remote panel, or unlocked from a remote panel with other doors as a group. In an emergency or if power fails, door group can be manually operated from mechanical-release cabinet at end

- of cell line **OR** pilaster release adjacent to receiving jamb of each door operated by paracentric key, **as directed**; doors shall not relock in any position.
- c. Electric Key Switch: Operated by paracentric **OR** mogul, **as directed**, key and providing electric control of detention sliding door operation at door location; where indicated.
5. Electromechanical-Locking, Electromechanical-Door-Movement, Sliding Door Device Assemblies SDA-3: Operated from remote-control panel that activates electric motors to unlock sliding doors and motorized rack-and-pinion drive mechanisms to open and close doors. Doors lock in open position and deadlock when closed. Provide factory-wired cable harness with plug connectors for each motor unit.

NOTE: Paragraph above describes Southern Folger's "Southern Steel Model 3150LX" and "Southern Steel Model 3165LX." Only the 3150LX system offers multiple door functions, such as for cell doors; the 3165LX system is for individual doors, such as for vestibules, day rooms, and corridors.

 - 1) Single-Door Function: In an emergency or if power fails, individual doors can be unlocked using a manual-release tool and manually moved; doors relock in either fully open or fully closed position.
 - 2) Multiple-Door Function: Each door can be individually unlocked locally or from a remote panel, or unlocked from a remote panel with other doors as a group. In an emergency or if power fails, door group can be manually operated from mechanical-release cabinet at end of cell line **OR** pilaster release adjacent to receiving jamb of each door operated by paracentric key, **as directed**; doors shall not relock in any position.
 - b. Electric Key Switch: Operated by paracentric **OR** mogul, **as directed**, key and providing electric control of detention sliding door operation at door location; where indicated.
6. Electromechanical-Locking, Pneumatic-Door-Movement, Sliding Door Device Assemblies SDA-4 (for individual doors, such as for vestibules, day rooms, and corridors): Operated from remote-control panel that activates electric motors to unlock sliding doors and pneumatic system to open and close doors. Doors lock in open position and deadlock when closed. Factory install quick-connect air fitting and factory-wired cable harness with plug connectors for each motor unit; 24-V dc.
 - a. Single-Door Function: In an emergency or if pneumatic systems or electric power fails, individual doors can be unlocked using a manual-release tool and manually moved; doors relock in either fully open or fully closed position.
 - 1) Lock Control at Door: Mechanical key release adjacent to receiving jamb of each door, contained in pilaster and operated by paracentric key; where indicated.
 7. Pneumatic-Locking, Manual-Door-Movement, Sliding Door Device Assemblies SDA-5: Operated from remote-control panel that activates pneumatic cylinders to unlock doors. Doors spring open a small distance after unlocking and are manually opened and closed. Locks automatically deadlock when doors are moved to fully open or fully closed position. Factory install quick-connect air fitting and factory-wired cable harness with plug connectors for each motor unit.
 - a. Single-Door Function: In an emergency or if pneumatic systems or electric power fails, individual doors can be unlocked using a manual-release tool and manually moved; doors relock in either fully open or fully closed position.
 - 1) Lock Control at Door: Mechanical key release adjacent to receiving jamb of each door, contained in pilaster and operated by paracentric key; where indicated.
 - b. Multiple-Door Function: Each door can be individually unlocked locally or from a remote panel, or unlocked from a remote panel with other doors as a group. In an emergency or if pneumatic systems or electric power fails, door group can be operated from remotely located auxiliary pneumatic-release system **OR** pilaster release adjacent to receiving jamb of each door operated by paracentric key, **as directed**; doors shall not relock in any position.
 - c. Electric Key Switch: Operated by paracentric **OR** mogul, **as directed**, key and providing electric control of detention sliding door operation at door location; where indicated.
 8. Pneumatic-Locking, Pneumatic-Door-Movement, Sliding Door Device Assemblies SDA-6 (Paragraph below describes Southern Folger's "Southern Steel Model 8050L" and "Southern

Steel Model 8065L." Only the 8050L system offers multiple door functions, such as for cell doors; the 8065L system is for individual doors, such as for vestibules, day rooms, and corridors.); Operated from remote-control panel that activates pneumatic cylinder to unlock sliding doors and open and close doors. Doors lock in open position and deadlock when closed. Factory install quick-connect air fitting and factory-wired cable harness with plug connectors for each motor unit; 24-V dc.

- a. Single-Door Function: In an emergency or if pneumatic systems or electric power fails, individual doors can be unlocked using a manual-release tool and manually moved; doors relock in either fully open or fully closed position.
- b. Multiple-Door Function: Each door can be individually unlocked locally or from a remote panel, or unlocked from a remote panel with other doors as a group. In an emergency or if pneumatic systems or electric power fails, door group can be operated from remotely located auxiliary pneumatic-release system **OR** pilaster release adjacent to receiving jamb of each door operated by paracentric key, **as directed**; doors shall not relock in any position.
- c. Electric Key Switch: Operated by paracentric **OR** mogul, **as directed**, key and providing electric control of detention sliding door operation at door location; where indicated.
- d. Provide security ring for installation of pneumatic detention lock in hollow-metal detention frame, welded to frame or access cover, unless otherwise **OR** where, **as directed**, indicated.

N. Fabrication

1. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated labels and as otherwise approved.
2. Base Metals: Produce detention door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified detention door hardware units and BHMA A156.18 finishes. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
3. Fasteners: Provide flat-head security fasteners with finished heads to match surface of detention door hardware unless otherwise indicated.
 - a. Security Fasteners: Fabricate detention door hardware using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials. Provide stainless-steel security fasteners in stainless-steel materials, **as directed**.
 - b. Concealed Fasteners: For detention door hardware units that are exposed when detention door is closed except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching detention door hardware. Where through bolts are used on hollow-metal detention door and frame construction, provide sleeves for each through bolt.
 - c. Steel Machine Screws (for fire-rated detention door assemblies. NFPA 80 requires locks, latches, and surface-mounted top and bottom bolts to be secured with machine screws or through bolts.): For the following fire-rated applications:
 - 1) Mortise detention hinges to detention doors.
 - 2) Strike plates to detention frames.
 - 3) Security door closers to detention doors and frames.
 - d. Steel Through Bolts (for fire-rated detention door assemblies. NFPA 80 requires locks, latches, and surface-mounted top and bottom bolts to be secured with machine screws or through bolts.): For the following fire-rated applications unless door blocking is provided:
 - 1) Surface detention hinges to detention doors.
 - 2) Security door closers to detention doors and frames.
 - e. Spacers or Sex Bolts: For through bolting of hollow-metal detention doors.
 - f. Fasteners for Wood Detention Doors: Comply with DHI WDHS.2.

- O. Finishes
 - 1. Standard: Comply with BHMA A156.18.
 - 2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - 3. BHMA Designations: Comply with base material and finish requirements indicated by the following:
 - a. BHMA 600: Primed for painting, over steel base metal.
 - b. BHMA 606: Satin brass, clear coated, over brass base metal.
 - c. BHMA 626: Satin chromium plated over nickel, over brass or bronze base metal.
 - d. BHMA 630: Stainless steel, satin, over stainless-steel base metal.
 - e. BHMA 652: Satin chromium plated over nickel, over steel base metal.

1.3 EXECUTION

- A. Preparation
 - 1. Steel Detention Doors and Frames: Comply with ANSI/DHI A115 Series.
 - a. Surface-Applied Detention Door Hardware: Drill and tap detention doors and frames according to ANSI/SDI A250.6.
 - 2. Wood Detention Doors: Comply with DHI A115-W Series.
- B. Installation
 - 1. Mounting Heights: Mount detention door hardware units at heights indicated in the following applicable publications unless specifically indicated or required to comply with governing regulations:
 - a. Steel Detention Doors and Frames: DHI's "Recommended Locations for Builders' Hardware for Custom Steel Doors and Frames."
 - b. Wood Detention Doors: DHI WDHS.3.
 - 2. Install each detention door hardware item to comply with Shop Drawings and manufacturer's written instructions. Where cutting and fitting are required to install detention door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - a. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - b. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 - 3. Install interconnecting wiring and connectors between detention door hardware devices. Terminate device wiring for detention door hardware installed in swinging doors at a plug-type connector located in lock pocket or door frame junction box and for sliding doors at a junction box in door frame.
 - 4. Security Fasteners: Install detention door hardware using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials.
- C. Field Quality Control
 - 1. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
 - 2. Perform the following field tests and inspections and prepare test reports:
 - a. After installing electrified and pneumatic, **as directed**, detention door hardware and after electrical circuitry has been energized and compressed-air system is functional, **as directed**, test detention door hardware for compliance with requirements.
 - 1) Test: Operate lock of each door and group of doors in normal remote, normal local, and emergency operating modes. Verify that remote controls operate correct door locks and in correct sequence.

- b. Verify that lock bolts engage strikes with required bolt projection.
- c. Verify that detention door hardware is installed, connected, and adjusted according to the Contract Documents.
- d. Verify that electrical wiring installation complies with manufacturer's submittal and written installation requirements.
3. Remove and replace detention work if inspections indicate that work does not comply with specified requirements. Remove malfunctioning units, replace with new units, and retest as specified above.
4. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
5. Prepare field quality-control certification endorsed by Detention Specialist, **as directed**, that states installed products and their installation comply with requirements in the Contract Documents.

D. Adjusting

1. Adjust and check each operating item of detention door hardware and each detention door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust detention door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - a. Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 - b. Security Door Closers: Adjust sweep period so that, from an open position of 90 degrees, detention door will take at least five seconds to move to a position of 12 degrees.

E. Cleaning And Protection

1. Clean adjacent surfaces soiled by detention door hardware installation.
2. Clean operating items as necessary to restore proper function and finish.
3. Provide final protection and maintain conditions that ensure that detention door hardware is without damage or deterioration at time of Final Completion.

1.4 Detention Door Hardware Sets

- Note 1: Hanging devices below include detention hinges and sliding detention door device assemblies. Indicate whether detention hinges are attached to detention doors and frames by security fasteners or by welding.
- Note 2: Securing devices (inactive leaf) below include door position switches and strike indicator switches.
- Note 3: Securing devices (active leaf) below include detention locksets and latchsets, cylinders, door position switches, strike indicator switches, and inmate door control switches.
- Note 4: Operating trim below includes detention door pulls, flush pulls, knob pulls, and lever-handle guides.
- Note 5: Closing devices below include security door closers.
- Note 6: Stops below include detention floor stops and door silencers if not specified with steel detention doors and frames.
- Note 7: Miscellaneous items that could be inserted at end of detention door hardware sets include key-control cabinets, software if not included in Division 08 Section "Door Hardware", and detention door hardware not otherwise listed.

- A. General:** Provide detention door hardware for each detention door to comply with requirements in this Section and detention door hardware sets indicated in a door and frame schedule **OR** and detention door hardware sets indicated below, as directed by the Owner . Provide **[Description] [Manufacturer] [Finish]** as directed by the Owner .

1. Hanging Devices
2. Securing Devices (inactive leaf)
3. Securing Devices (active leaf)

08 - Openings



-
4. Operating Trim
 5. Closing Devices
 6. Stops
 7. Number of Hinges, as specified
 8. Insert additional requirements and sequence of operation in schedule above for electrified and pneumatic detention door hardware if required.

END OF SECTION 08 71 11 00

Task	Specification	Specification Description
08 71 11 00	01 22 16 00	No Specification Required
08 71 11 00	06 01 40 91	Door Hardware

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SECTION 08 71 13 00 - AUTOMATIC DOOR OPERATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for automatic door operators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Power door operators for swinging doors.
 - b. Low-energy door operators for swinging doors.
 - c. Power-assist door operators for swinging doors.

C. Definitions

1. Double Egress Doors: A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion between them.
2. Double Swing Doors: A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single swing door.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For automatic door operators. Include plans, elevations, sections, details, and attachments to other work.
3. Samples: For each exposed product and for each color and texture specified.
4. Product certificates
5. Field quality-control reports.
6. Maintenance data.
7. Warranty: Sample of special warranty.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project and who employs a certified inspector, **as directed**.
2. Certified Inspector Qualifications: Certified by the AAADM.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
4. Exit-Door Requirements: Comply with requirements of authorities having jurisdiction for doors with automatic door operators serving as a component of a required means of egress.
5. Preinstallation Conference: Conduct conference at Project site.

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within two years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with standards indicated below:

- a. Sheet: **ASTM B 209 (ASTM B 209M)**.
 - b. Extrusions: **ASTM B 221 (ASTM B 221M)**.
 2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, stretcher-leveled standard of flatness, in manufacturer's standard thickness.
 3. Brass Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000 (cartridge brass, 70 percent copper), in manufacturer's standard thickness.
 4. Bronze Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal, 60 percent copper) or Alloy UNS No. C23000 (red brass, 85 percent copper), in manufacturer's standard thickness.
 5. Expanded Aluminum Mesh: Manufacturer's standard expanded **OR** expanded and flattened, **as directed**, aluminum sheet in accordance with the geometry of ASTM F 1267.
 6. Polycarbonate: Manufacturer's standard monolithic polycarbonate sheet manufactured by extrusion process, with an average impact strength of **12 to 16 ft-lbf/in. (640 to 854 J/m)** of width when tested according to ASTM D 256, Method A.
 7. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
- B. Automatic Door Operators, General
1. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated; and complying with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
 - a. Emergency Breakaway: Where indicated for center-pivoted doors, provide emergency breakaway feature for reverse swing of doors. Equip system to discontinue power to automatic door operator when door is in emergency breakaway position, and to return to closed position after breakaway and automatically reset.
 - b. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
 - c. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in fully closed position when subjected to wind load as directed by the Owner .
 2. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.
 3. Electrohydraulic Operating System: Self-contained low-pressure unit; with separate cylinders for power and checking, connections for power and activation- and safety-device wiring, manual operation including spring closing when power is off.
 4. Pneumatic Operating System: Pneumatic operator, air opened and spring closed, checking in both cycles, with doors manually operable when power is off.
 - a. Power Unit: Manufacturer's standard remote compressor unit, complete with tank, compressor, motor, regulator, safety valve, pressure cutoff switch, and automatic air-line filter drain.
OR
Power Unit: As specified in Division 22 Section(s) "General-service Compressed-air Piping" AND "General-service Packaged Air Compressors And Receivers".
 5. Hinges: See Division 08 Section "Door Hardware" for type of hinge for each door that door operator shall accommodate.
 6. Housing for Overhead Concealed Operators: Fabricated from minimum **0.125-inch- (3.2-mm-)** thick, extruded or formed aluminum and extending full width of door opening including door jambs to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.
 7. Cover for Surface-Mounted Operators: Fabricated from **0.125-inch- (3.2-mm-)** thick extruded or formed aluminum; manufacturer's standard width; **OR** continuous over full width of operator-controlled door opening; **OR** continuous over full width of door opening including door jambs, **as**

- directed**; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.
8. Brackets and Reinforcements: Manufacturer's standard, fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.
 9. Fire-Door Package: Consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.
- C. Power Door Operators
1. Standard: BHMA A156.10.
 2. Performance Requirements:
 - a. Opening Force:
 - 1) Power-Operated Doors: Not more than **50 lbf (222 N)** required to manually set door in motion if power fails; not more than **15 lbf (67 N)** required to open door to minimum required width.
OR
Power-Operated Swinging Doors: Not more than **30 lbf (133 N)** required to manually open door if power fails.
 - 2) Breakaway Device for Power-Operated Doors: Not more than **50 lbf (222 N)** required for a door to open.
 - b. Entrapment Protection: Not more than **40 lbf (178 N)** required to prevent stopped door in the last 10 degrees of opening from moving in the direction of opening; not more than **30 lbf (133 N)** required to prevent stopped door from moving in direction of closing.
 3. Configuration: Operator to control single swinging door **OR** pair of swinging doors, **as directed**.
 - a. Traffic Pattern: One way **OR** Two way **OR** Double swing **OR** Double egress, **as directed**.
 - b. Operator Mounting: Surface **OR** Overhead concealed, **as directed**.
 4. Operation: Power opening and power-assisted, **as directed**, spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.10.
 5. Operating System: Electromechanical **OR** Electrohydraulic **OR** Pneumatic, **as directed**.
 6. Microprocessor Control Unit: Solid-state controls.
 7. Features:
 - a. Adjustable opening **OR** closing **OR** opening and closing, **as directed**, speed.
 - b. Adjustable opening **OR** closing, **as directed**, force.
 - c. Adjustable backcheck.
 - d. Adjustable hold-open time from zero to 30 seconds.
 - e. Adjustable time delay.
 - f. Adjustable acceleration.
 - g. Adjustable limit switch.
 - h. Obstruction recycle.
 - i. On-off/hold-open switch to control electric power to operator; key operated, **as directed**.
 8. Exposed Finish: Finish exposed components with Class I, clear anodic finish **OR** Class II, clear anodic finish **OR** Class I, color anodic finish **OR** Class II, color anodic finish **OR** baked-enamel or powder coat **OR** metal cladding **OR** finish matching door and frame **OR** finish matching door hardware, **as directed**.
 - a. Color: As selected from full range of industry colors and color densities.
 - b. Metal Cladding: No. 4 directional-satin-finish stainless steel **OR** No. 8 mirrorlike reflective, nondirectional-polish-finish stainless steel **OR** Satin brass **OR** Polished brass **OR** Satin bronze **OR** Polished bronze, **as directed**.
- D. Low-Energy Door Operators
1. Standard: BHMA A156.19.
 2. Performance Requirements:
 - a. Opening Force if Power Fails: Not more than **15 lbf (67 N)** required to release a latch if provided, not more than **30 lbf (133 N)** required to manually set door in motion, and not more than **15 lbf (67 N)** required to fully open door.

- b. Entrapment Protection: Not more than **15 lbf (67 N)** required to prevent stopped door from closing or opening.
 - 3. Configuration: Operator to control single swinging door **OR** pair of swinging doors, **as directed**.
 - a. Traffic Pattern: One way **OR** Two way **OR** Double swing **OR** Double egress, **as directed**.
 - b. Operator Mounting: Surface **OR** Overhead concealed, **as directed**.
 - 4. Operation: Power opening and power-assisted, **as directed**, spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.
 - 5. Operating System: Electromechanical **OR** Electrohydraulic **OR** Pneumatic, **as directed**.
 - 6. Microprocessor Control Unit: Solid-state controls.
 - 7. Features:
 - a. Adjustable opening **OR** closing **OR** opening and closing, **as directed**, speed.
 - b. Adjustable opening **OR** closing, **as directed**, force.
 - c. Adjustable backcheck.
 - d. Adjustable hold-open time from zero to 30 seconds.
 - e. Adjustable time delay.
 - f. Adjustable acceleration.
 - g. Obstruction recycle.
 - h. On-off/hold-open switch to control electric power to operator; key operated, **as directed**.
 - 8. Exposed Finish: Finish exposed components with Class I, clear anodic finish **OR** Class II, clear anodic finish **OR** Class I, color anodic finish **OR** Class II, color anodic finish **OR** baked-enamel or powder coat **OR** metal cladding **OR** finish matching door and frame **OR** finish matching door hardware, **as directed**.
 - a. Color: As selected from full range of industry colors and color densities.
 - b. Metal Cladding: No. 4 directional-satin-finish stainless steel **OR** No. 8 mirrorlike reflective, nondirectional-polish-finish stainless steel **OR** Satin brass **OR** Polished brass **OR** Satin bronze **OR** Polished bronze, **as directed**.
- E. Power-Assist Door Operators
- 1. Standard: BHMA A156.19.
 - 2. Performance Requirements:
 - a. Opening Force:
 - 1) If Power Fails: Not more than **15 lbf (67 N)** required to release a latch if provided, not more than **30 lbf (133 N)** required to manually set door in motion, and not more than **15 lbf (67 N)** required to fully open door.
 - 2) Accessible Interior Doors: Not more than **5 lbf (22 N)** to fully open door.
 - b. Entrapment Protection: Not more than **15 lbf (67 N)** required to prevent stopped door from closing or opening.
 - 3. Configuration: Operator to control single swinging door **OR** pair of swinging doors, **as directed**.
 - a. Traffic Pattern: One way **OR** Two way **OR** Double swing **OR** Double egress, **as directed**.
 - b. Operator Mounting: Surface **OR** Overhead concealed, **as directed**.
 - 4. Operation: Power-assisted opening that reduces force to open door and power-assisted, **as directed**, spring closing. Pushing or pulling on door activates the operator. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.
 - 5. Operating System: Electromechanical **OR** Electrohydraulic **OR** Pneumatic, **as directed**.
 - 6. Microprocessor Control Unit: Solid-state controls.
 - 7. Features:
 - a. Adjustable opening **OR** closing **OR** opening and closing, **as directed**, speed.
 - b. Adjustable opening **OR** closing, **as directed**, force.
 - c. Adjustable backcheck.
 - d. Adjustable latch speed.
 - e. Adjustable hold-open time from zero to 30 seconds.

- f. Adjustable time delay.
- g. Adjustable acceleration.
- h. Obstruction recycle.
- i. On-off/hold-open switch to control electric power to operator; key operated, **as directed**.
- 8. Exposed Finish: Finish exposed components with Class I, clear anodic finish **OR** Class II, clear anodic finish **OR** Class I, color anodic finish **OR** Class II, color anodic finish **OR** baked-enamel or powder coat **OR** metal cladding **OR** finish matching door and frame **OR** finish matching door hardware, **as directed**.
 - a. Color: As selected from full range of industry colors and color densities.
 - b. Metal Cladding: No. 4 directional-satin-finish stainless steel **OR** No. 8 mirrorlike reflective, nondirectional-polish-finish stainless steel **OR** Satin brass **OR** Polished brass **OR** Satin bronze **OR** Polished bronze, **as directed**.
- F. Activation And Safety Devices
 - 1. General: Provide activation and safety devices in accordance with BHMA standards, for condition of exposure and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
 - 2. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10.
 - a. Provide capability for switching between bidirectional and unidirectional detection.
 - b. For one-way traffic, sensor on egress side shall not be active when doors are fully closed.
 - 3. Presence Sensors: Self-contained, infrared-scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.
 - 4. Combination Motion/Presence Sensors: Self-contained units consisting of both motion and presence sensors in a single housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.
 - a. Motion Sensor: K-band-frequency, microwave-scanner units.
 - 1) Provide capability for switching between bidirectional and unidirectional detection.
 - 2) For one-way traffic, sensor on egress side shall not be active when doors are fully closed.
 - b. Presence Sensor: Infrared-scanner units that remain active at all times.
 - 5. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.
 - 6. Control Mats: **1/2-inch- (13-mm-)** thick, synthetic-rubber or flexible-plastic mat in safety-ribbed surface pattern, with extruded-aluminum frame; with pressure switches for low-voltage control wiring; and complying with performance requirements in BHMA A156.10.
 - a. Frame: Recessed to fit flush with floor, with concealed anchors **OR** Surface mounted, with tapered safety edge, **as directed**.
 - b. Size: As indicated, but not smaller than required by BHMA A156.10 including Appendix A.
 - c. Color: As selected from full range of industry colors and color densities.
 - 7. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message, **as directed**.
 - a. Configuration: Round **OR** Square, **as directed**, push plate with **4-by-4-inch (100-by-100-mm)** junction box.
 - 1) Mounting: Recess mounted, semiflush in wall **OR** Surface mounted on wall **OR** As indicated on Drawings, **as directed**.
 - b. Configuration: Rectangular push plate with **2-by-4-inch (50-by-100-mm)** junction box.
 - 1) Mounting: Recess mounted, semiflush in wall **OR** Recess mounted in door jamb **OR** Surface mounted on wall **OR** Surface mounted on post **OR** Surface mounted on guide rail **OR** As indicated on Drawings, **as directed**.
 - c. Push-Plate Material: Stainless steel **OR** Plastic, **as directed**, as selected from manufacturer's full range.
 - d. Message: Plain face with no message **OR** "Push to Open" **OR** International symbol of accessibility **OR** International symbol of accessibility and "Push to Open", **as directed**.

8. Push-Button Switch: Momentary-contact door control switch with one red-button actuator; enclosed in nominal **2-by-4-inch (50-by-100-mm)** **OR** **4-by-4-inch (100-by-100-mm)**, **as directed**, junction box.
 - a. Provide faceplate engraved with "Press to Open" text and international symbol of accessibility, **as directed**, in contrasting color.
 - b. Provide blue plastic cover engraved with "Press Button to Open" in white text and international symbol of accessibility.
 - c. Mounting: Surface mounted on wall **OR** Surface mounted on post **OR** Surface mounted on guide rail **OR** Recess mounted in wall **OR** As indicated on Drawings, **as directed**.
 - d. Faceplate Material: Stainless steel **OR** Painted metal, **as directed**, as selected from manufacturer's full range.
9. Key Switch: Recess-mounted, door control switch with key-controlled actuator; enclosed in **2-by-4-inch (50-by-100-mm)** junction box. Provide faceplate engraved with text indicating switch functions.
 - a. Faceplate Material: Stainless steel **OR** Painted metal, **as directed**, as selected from manufacturer's full range.
 - b. Functions: On-off, momentary contact **OR** On-off, maintained contact **OR** Two-way automatic, hold open, one-way exit, and off **OR** Two-way automatic, hold open, one-way exit, off, full open, and partial open, **as directed**.
 - c. Mounting: Recess mounted, semiflush in wall **OR** Recess mounted in door jamb **OR** Surface mounted on wall **OR** Surface mounted on post **OR** As indicated on Drawings, **as directed**.
10. Wireless or Remote Radio-Control Switch: Manufacturer's standard radio-control system consisting of header-mounted receiver and wall-mounted **OR** hand-held, battery-operated, **as directed**, transmitter switch.
 - a. Wall-Mounted Transmitter Switch: One red-button, momentary-contact actuator enclosed in **4-by-4-inch (100-by-100-mm)** junction box. Provide blue plastic cover engraved with "Press Button to Open" in white text and international symbol of accessibility.
11. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

G. Fabrication

1. Factory fabricate automatic door operators to comply with indicated standards.
2. Fabricate exterior components to drain water passing joints and condensation and moisture occurring or migrating within operator enclosure to the exterior.
3. Form aluminum shapes before finishing.
4. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.
5. Provide metal cladding, completely cladding visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

H. Accessories

1. Signage: As required by cited BHMA standard for the type of operator.
 - a. Application Process: Decals **OR** Silk-screened **OR** Door manufacturer's standard process, **as directed**.
 - b. Provide sign materials with instructions for field application when operators are installed.
2. Guide Rails: Anodized aluminum **OR** Baked-enamel or powder-coated aluminum **OR** Stainless steel, **as directed**, fabricated from bars **OR** tubing, **as directed**, minimum **30 inches (762 mm)** high, and finished to match doors unless otherwise indicated; positioned and projecting from face of door jamb for distance as indicated, but not less than that required by BHMA A156.10 for type of door and direction of travel; with filler panel.
 - a. Filler Panel: Expanded aluminum mesh **OR** Polycarbonate plastic, **as directed**.

- 1) Orient expanded aluminum mesh with long dimension of diamonds parallel to top rail **OR** perpendicular to top rail **OR** horizontal **OR** vertical, **as directed**.
 - 2) Color: As selected from manufacturer's full range.
 - b. Provide intermediate guide rail suitable for supporting photoelectric beams.
 - c. Mounting: Jamb and floor **OR** Floor, freestanding, **as directed**.
- OR**
Guide Rails: See Division 05 Section(s) "Metal Fabrications" OR "Pipe And Tube Railings" OR "Decorative Metal", **as directed**.

I. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
4. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

J. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, application, and baking.

1.3 EXECUTION

A. Installation

1. General: Install complete automatic door operators according to manufacturer's written instructions, including activation and safety devices, control wiring, and remote power units if any; connection to the building's power supply; and signage.
 - a. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
 - b. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.
 - c. Power Door Operator Installation Standard: BHMA A156.10.
 - d. Low-Energy Door Operator Installation Standard: BHMA A156.19.
2. Power Connection: See Division 26 for connection to electrical power distribution system and see Division 22 for connection to compressed-air distribution piping, **as directed**.
3. Activation and Safety Devices: Install devices and wiring according to manufacturer's written instructions and cited BHMA standard for type of operator and direction of pedestrian travel. Connect activation- and safety-device wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
4. Access-Control System: Connect operators to access-control system as specified in Division 28 Section "Access Control".
5. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.
6. Guide Rails: Install according to BHMA A156.10 including Appendix A and manufacturer's written instructions unless otherwise indicated.

B. Field Quality Control

1. Inspection: Engage Installer's certified inspector to test and inspect automatic door operators and prepare test and inspection reports.

08 - Openings



- a. Certified inspector shall test and inspect each automatic door operator to determine compliance of installed systems with applicable BHMA standards.
- b. Inspection Report: Certified inspector shall submit report in writing to the Owner and Contractor within 24 hours after inspection.
2. Work will be considered defective if it does not pass tests and inspections.

C. Adjusting

1. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
 - a. Adjust operators on exterior doors for weathertight closure.
2. After completing installation of exposed, factory-finished automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.
3. Readjust automatic door operators after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).
4. Occupancy Adjustment: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

END OF SECTION 08 71 13 00

Task	Specification	Specification Description
08 72 33 00	08 14 00 00	Wood Doors
08 72 33 00	08 14 16 00	Flush Wood Doors
08 72 33 00	06 01 40 91	Door Hardware
08 72 43 00	06 01 40 91	Door Hardware
08 75 13 00	06 01 40 91	Door Hardware
08 75 13 00	08 71 13 00	Automatic Door Operators
08 78 00 00	08 71 11 00	Detention Door Hardware
08 81 23 13	07 42 13 19	Glazing
08 81 23 23	07 42 13 19	Glazing

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SECTION 08 83 13 00 - MIRRORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for mirrors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes the following types of silvered flat glass mirrors:
 - a. Annealed monolithic glass mirrors.
 - b. Film-backed, Laminated and Tempered glass mirrors qualifying as safety glazing.

C. Submittals

1. Product Data: For each type of product indicated.
 - a. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
2. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
3. Samples: For each type of the following products:
 - a. Mirrors: **12 inches (300 mm)** square, including edge treatment on two adjoining edges.
 - b. Mirror Clips: Full size.
 - c. Mirror Trim: **12 inches (300 mm)** long.
4. Qualification Data: For qualified Installer.
5. Product Certificates: For each type of mirror and mirror mastic, from manufacturer.
6. Preconstruction Test Reports: From mirror manufacturer indicating that mirror mastic was tested for compatibility and adhesion with mirror backing paint **OR** film, **as directed**, and substrates on which mirrors are installed.
7. Maintenance Data: For mirrors to include in maintenance manuals.
8. Warranty: Sample of special warranty.

D. Quality Assurance

1. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
2. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
3. Source Limitations for Mirror Accessories: Obtain mirror glazing accessories from single source.
4. Glazing Publications: Comply with the following published recommendations:
 - a. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
 - b. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
5. Safety Glazing Products: For film-backed, laminated and tempered mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
6. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing paint **OR** film, **as directed**, and substrates on which mirrors are installed.

E. Delivery, Storage, And Handling

1. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
2. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

F. Project Conditions

1. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
 - a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Silvered Flat Glass Mirrors

1. Glass Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process, **as directed**.
2. Clear Glass: Mirror Select **OR** Glazing, **as directed**, Quality; ultraclear (low-iron) float glass with a minimum 91 percent visible light transmission, **as directed**.
 - a. Nominal Thickness: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
3. Tinted Glass: Mirror Glazing Quality.
 - a. Nominal Thickness: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Tint Color: Blue **OR** Black **OR** Bronze **OR** Gold **OR** Gray **OR** Green **OR** Peach **OR** Pink, **as directed**.
4. Tempered Clear **OR** Tinted, **as directed**, Glass: Mirror Glazing Quality, for blemish requirements; and comply with ASTM C 1048 for Kind FT, Condition A, tempered float glass before silver coating is applied.
 - a. Nominal Thickness: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - b. Tint Color: Blue **OR** Black **OR** Bronze **OR** Gold **OR** Gray **OR** Green **OR** Peach **OR** Pink, **as directed**.
5. Laminated Mirrors: ASTM C 1172, Kind LM.
 - a. Clear Glass for Outer Lite: Mirror Select **OR** Glazing, **as directed**, Quality; ultraclear (low-iron) float glass with a minimum 91 percent visible light transmission, **as directed**.
 - b. Tinted Glass for Outer Lite: Mirror Glazing Quality.
 - 1) Tint Color: Blue **OR** Black **OR** Bronze **OR** Gold **OR** Gray **OR** Green **OR** Peach **OR** Pink, **as directed**.
 - c. Nominal Thickness for Outer Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
 - d. Glass for Inner Lite: Annealed float glass; ASTM C 1036, Type I (transparent flat glass), Quality-Q3; Class 1 (clear).
OR
Glass for Inner Lite: Heat-treated float glass; ASTM C 1048 Type I; Quality-Q3; Class I (clear) Kind HS, Condition A.
OR

Glass for Inner Lite: Tempered float glass; ASTM C 1048 Type I; Quality-Q3; Class I (clear), Kind FT, Condition A.

- e. Nominal Thickness for Inner Lite: 3.0 mm **OR** 4.0 mm **OR** 5.0 mm **OR** 6.0 mm **OR** As indicated, **as directed**.
- f. Interlayer: Mirror manufacturer's standard **0.030-inch- (0.76-mm-)** thick, clear polyvinyl-butylal interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, silver coating.

B. Miscellaneous Materials

1. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
2. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
3. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.
4. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.

C. Mirror Hardware

1. Top and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - a. Bottom Trim: J-channels formed with front leg and back leg not less than **3/8 and 7/8 inch (9.5 and 22 mm)** in height, respectively, and a thickness of not less than **0.04 inch (1.0 mm) OR 0.05 inch (1.3 mm), as directed**.
 - b. Top Trim: J-channels formed with front leg and back leg not less than **5/8 and 1 inch (16 and 25 mm)** in height, respectively, and a thickness of not less than **0.04 inch (1.0 mm) OR 0.062 inch (1.57 mm), as directed**.
 - c. Finish: Clear **OR** Gold, **as directed**, bright anodized.
2. Top Channel/Cleat and Bottom Aluminum J-Channels: Aluminum extrusions with a return deep enough to produce a glazing channel to accommodate mirrors of thickness indicated and in lengths required to cover bottom and top edges of each mirror in a single piece.
 - a. Bottom Trim: J-channels formed with front leg and back leg not less than **5/16 and 3/4 inch (7.9 and 19 mm)** in height, respectively.
 - b. Top Trim: Formed with front leg with a height of **5/16 inch (7.9 mm)** and back leg designed to fit into the pocket created by wall-mounted aluminum cleat.
 - c. Finish: Clear **OR** Gold, **as directed**, bright anodized.
3. Mirror Bottom Clips: As indicated.
4. Mirror Top Clips: As indicated.
5. Plated Steel Hardware: Formed-steel shapes with plated finish indicated.
 - a. Profile: As indicated.
 - b. Finish: Selected from manufacturer's standards.
6. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
7. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

D. Fabrication

1. Mirror Sizes: To suit Project conditions, and before tempering, **as directed**, cut mirrors to final sizes and shapes.
2. Cutouts: Fabricate cutouts before tempering, **as directed**, for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.

3. Mirror Edge Treatment: Flat polished **OR** Rounded polished **OR** Flat high-polished **OR** Rounded high-polished **OR** Beveled polished edge of width shown, **as directed**.
 - a. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
 - b. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.
4. Film-Backed Safety Mirrors: Apply film backing with adhesive coating over mirror backing paint as recommended in writing by film-backing manufacturer to produce a surface free of bubbles, blisters, and other imperfections.

1.3 EXECUTION

A. Examination

1. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
2. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
3. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

B. Preparation

1. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

C. Installation

1. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
2. Provide a minimum air space of **1/8 inch (3 mm)** between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
3. Wall-Mounted Mirrors: Install mirrors with mirror hardware **OR** mastic and mirror hardware, **as directed**. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
 - a. Top and Bottom Aluminum J-Channels: Provide setting blocks **1/8 inch (3 mm)** thick by **4 inches (100 mm)** long at quarter points. To prevent trapping water, provide, between setting blocks, two slotted weeps not less than **1/4 inch (6.4 mm)** wide by **3/8 inch (9.5 mm)** long at bottom channel.
 - b. Top Channel/Cleat and Bottom Aluminum J-Channels: Fasten J-channel directly to wall and attach top trim to continuous cleat fastened directly to wall.
 - c. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips where indicated **OR** so they are symmetrically placed and evenly spaced, **as directed**.
 - d. Install mastic as follows:
 - 1) Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
 - 2) Apply mastic to comply with mastic manufacturer's written instructions for coverage and to allow air circulation between back of mirrors and face of mounting surface.
 - 3) After mastic is applied, align mirrors and press into place while maintaining a minimum air space of **1/8 inch (3 mm)** between back of mirrors and mounting surface.

D. Cleaning And Protection

1. Protect mirrors from breakage and contaminating substances resulting from construction operations.
2. Do not permit edges of mirrors to be exposed to standing water.
3. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
4. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Final Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 83 13 00

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Task	Specification	Specification Description
08 83 13 00	07 42 13 19	Glazing

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SECTION 08 84 00 00 - PLASTIC GLAZING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for plastic glazing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Monolithic acrylic glazing.
 - b. Monolithic polycarbonate glazing.
 - c. Multiwalled structured polycarbonate glazing.

C. Performance Requirements

1. Provide plastic glazing sheets and glazing materials capable of withstanding normal temperature changes, wind, and impact loads without failure, including loss or breakage of plastic sheets attributable to the following: failure of sealants or gaskets to remain watertight and airtight, deterioration of plastic sheet and glazing materials, or other defects in materials and installation.
2. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on plastic glazing and glazing framing members.
 - a. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

D. Preconstruction Testing

1. Preconstruction Adhesion and Compatibility Testing: Test each plastic glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - a. Testing will not be required if data are submitted based on previous testing of current sealant products and plastic glazing matching those submitted.
 - b. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glazing, tape sealants, gaskets, and glazing channel substrates.
 - c. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - d. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - e. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For glazing sealants used inside the weatherproofing system, including printed statement of VOC content.
3. Plastic Glazing Samples: For each color and finish of plastic glazing indicated, **12 inches (300 mm)** square and of same thickness indicated for final Work.
4. Glazing Accessory Samples: For gaskets and sealants, in **12-inch (300-mm)** lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system, **as directed**.
5. Plastic Glazing Schedule: List plastic glazing types and thicknesses for each size opening and location. Use same designations indicated on Drawings. Indicate coordinated dimensions of

plastic glazing and construction that receives plastic glazing, including clearances and glazing channel dimensions.

6. Qualification Data: For installers, plastic glazing testing agency and sealant testing agency.
7. Product Certificates: For plastic glazing and glazing products, from manufacturer.
8. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for plastic glazing, glazing sealants and glazing gaskets.
 - a. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
9. Preconstruction adhesion and compatibility test report.
10. Research/Evaluation Reports: For plastic glazing.
11. Maintenance Data: For plastic glazing to include in maintenance manuals.
12. Warranty: Sample of special warranty.

F. Quality Assurance

1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Source Limitations: Obtain plastic glazing from single source from single manufacturer. Obtain sealants and gaskets from single source from single manufacturer for each product and installation method.
3. Glazing Publication: Comply with published recommendations of plastic glazing manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glazing terms not otherwise defined in this Section or in other referenced standards.
4. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.
5. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of a certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of plastic glazing, thickness, and safety glazing standard with which glass complies.

G. Delivery, Storage, And Handling

1. Protect plastic glazing materials according to manufacturer's written instructions. Prevent damage to plastic glazing and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
2. Maintain protective coverings on plastic glazing to avoid exposures to abrasive substances, excessive heat, and other sources of possible deterioration.

H. Project Conditions

1. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - a. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

I. Coordination

1. Coordinate dimensions of plastic glazing with dimensions of construction that receives plastic glazing to ensure that glazing channels provide adequate face and edge clearance, bite, and allowance for expansion.

J. Warranty

1. Manufacturer's Special Warranty for Abrasion- and UV-Resistant, Monolithic **OR** Multiwalled Structured, **as directed**, Polycarbonate: Manufacturer's standard form, made out to the Owner and signed by polycarbonate manufacturer, in which manufacturer agrees to replace polycarbonate products that break or develop defects from normal use that are attributable to manufacturing process and not to practices for maintaining and cleaning plastic glazing contrary

to manufacturer's written instructions. Defects include coating delamination, haze, excessive yellowing, and loss of light transmission beyond the limits stated in plastic glazing manufacturer's standard form.

- a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Plastic Glazing, General

1. Sizes: Fabricate plastic glazing to sizes required for openings indicated. Allow for thermal expansion and contraction of plastic glazing without restraint and without withdrawal of edges from frames, with edge clearances and tolerances complying with plastic glazing manufacturer's written instructions.
2. Fire-Test-Response Characteristics of Plastic Glazing: As determined by testing plastic glazing by a qualified testing agency acceptable to authorities having jurisdiction.
 - a. Self-ignition temperature of **650 deg F (343 deg C)** or higher when tested according to ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
 - b. Smoke-developed index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested according to ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
 - c. Burning extent of **1 inch (25 mm)** or less when tested according to ASTM D 635 at a nominal thickness of **0.060 inch (1.52 mm)** or thickness indicated for the Work, where Class CC1 is indicated.
 - d. Burning rate of **2.5 in./min. (1.06 mm/s)** or less when tested according to ASTM D 635 at a nominal thickness of **0.060 inch (1.52 mm)** or thickness indicated for the Work, where Class CC2 is indicated.
 - e. Flame-spread index not less than that indicated when tested according to ASTM E 84.
3. Windborne-Debris-Impact Resistance: Provide exterior plastic glazing that passes basic **OR** enhanced, **as directed**, -protection testing requirements in ASTM E 1996 for Wind Zone 1 **OR** Wind Zone 2 **OR** Wind Zone 3 **OR** Wind Zone 4, **as directed**, when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than plastic glazing indicated for use on Project and shall be installed in same manner as indicated for use on Project.
 - a. Large-Missile Test: For plastic glazing located within **30 feet (9.1 m)** of grade.
 - b. Small-Missile Test: For plastic glazing located more than **30 feet (9.1 m)** above grade.
OR
Large-Missile Test: For all plastic glazing, regardless of height above grade.

B. Monolithic Acrylic Glazing

1. Plastic Glazing: Transparent acrylic sheet; ASTM D 4802, Category A-1 (cell cast) **OR** Category A-2 (continuously cast) **OR** Category B-1 (continuously manufactured), **as directed**, Finish 1 (smooth or polished), Type UVF (UV filtering).
 - a. Nominal Thickness: **0.093 inch (2.5 mm) OR 0.118 inch (3 mm) OR 0.177 inch (4.5 mm) OR 0.236 inch (6 mm), as directed.**
 - b. Color: Colorless **OR** As selected from manufacturer's full range, **as directed.**
 - c. Combustibility Class: CC2.
 - d. Provide safety glazing labeling.
2. Plastic Glazing: Coated, transparent acrylic sheet; ASTM D 4802, Category A-1 (cell cast) **OR** Category B-1 (continuously manufactured), **as directed**, Finish 3 (abrasion-resistant coating) with coating on one side **OR** both sides, **as directed**, Type UVF (UV filtering).
 - a. Nominal Thickness: **0.093 inch (2.5 mm) OR 0.118 inch (3 mm) OR 0.177 inch (4.5 mm) OR 0.236 inch (6 mm), as directed.**
 - b. Color: Colorless **OR** As selected from manufacturer's full range, **as directed.**
 - c. Combustibility Class: CC2.
 - d. Provide safety glazing labeling.

3. Plastic Glazing: Translucent acrylic sheet; ASTM D 4802, Category A-1 (cell cast) **OR** Category B-1 (continuously manufactured), **as directed**, Finish 1 (smooth or polished), Type UVF (UV filtering).
 - a. Nominal Thickness: **0.093 inch (2.5 mm) OR 0.118 inch (3 mm) OR 0.177 inch (4.5 mm) OR 0.236 inch (6 mm), as directed.**
 - b. Color: White, with visible light transmittance of not more than 50 percent for **0.117-inch-(2.9-mm-)** thick sheet, measured according to ASTM D 1003 **OR** As selected from manufacturer's full range, **as directed.**
 - c. Combustibility Class: CC2.
 - d. Provide safety glazing labeling.
 4. Plastic Glazing: Patterned acrylic sheet; ASTM D 4802, Category A-1 (cell cast), Finish 2 (patterned), Type UVF (UV filtering).
 - a. Nominal Thickness: **0.093 inch (2.5 mm) OR 0.118 inch (3 mm) OR 0.177 inch (4.5 mm) OR 0.236 inch (6 mm), as directed.**
 - b. Pattern: Matte finish **OR** As selected from manufacturer's full range, **as directed.**
 - c. Color: Transparent colorless **OR** Translucent white **OR** As selected from manufacturer's full range, **as directed.**
 - d. Combustibility Class: CC2.
 - e. Provide safety glazing labeling.
- C. Monolithic Polycarbonate Glazing
1. Plastic Glazing: Polycarbonate sheet; ASTM C 1349, Appendix X1, Type I (standard, UV stabilized), with a polished finish.
 - a. Nominal Thickness: **0.093 inch (2.5 mm) OR 0.118 inch (3 mm) OR 0.177 inch (4.5 mm) OR 0.236 inch (6 mm), as directed.**
 - b. Color: Transparent colorless **OR** As selected from manufacturer's full range, **as directed.**
 - c. Combustibility Class: CC1.
 - d. Flame-Spread Index: 25 **OR** 75 **OR** 200, **as directed**, or less.
 - e. Provide safety glazing labeling.
 2. Plastic Glazing: Coated polycarbonate sheet; ASTM C 1349, Appendix X1, Type II (coated mar-resistant, UV stabilized), with coating on both sides.
 - a. Nominal Thickness: **0.093 inch (2.5 mm) OR 0.118 inch (3 mm) OR 0.177 inch (4.5 mm) OR 0.236 inch (6 mm), as directed.**
 - b. Color: Transparent colorless **OR** As selected from manufacturer's full range, **as directed.**
 - c. Combustibility Class: CC1.
 - d. Flame-Spread Index: 25 **OR** 75 **OR** 200, **as directed**, or less.
 - e. Provide safety glazing labeling.
- D. Multiwalled Structured Polycarbonate Glazing
1. Multiwalled Structured Polycarbonate Sheet: Manufacturer's standard polycarbonate extruded shape with smooth, flat exterior surfaces and internal ribbing.
 - a. Nominal Thickness: **5/16 inch (8 mm) OR 3/8 inch (10 mm) OR 5/8 inch (16 mm) OR 3/4 inch (20 mm) OR 1 inch (25 mm), as directed.**
 - b. Color: Transparent colorless **OR** As selected from manufacturer's full range, **as directed.**
 - c. Combustibility Class: CC1 **OR** CC2, **as directed.**
 - d. Flame-Spread Index: 25 **OR** 75 **OR** 200, **as directed**, or less.
- E. Glazing Gaskets
1. Dense Compression Gaskets: Molded or extruded gaskets, EPDM, ASTM C 864 or silicone, ASTM C 1115; and of profile and hardness required to maintain watertight seal.
 2. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned EPDM or silicone gaskets complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal.
- F. Glazing Sealants

1. General:
 - a. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including plastic glazing products and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - b. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - c. VOC Content: For sealants used inside the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - d. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
2. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
OR
 Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
OR
 Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
OR
 Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

G. Glazing Tapes

1. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - a. AAMA 804.3 tape, where indicated.
 - b. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - c. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
2. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

H. Miscellaneous Glazing Materials

1. Compatibility: Provide products of material, size, and shape complying with requirements of manufacturers of plastic glazing and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
2. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
3. Setting Blocks: EPDM or silicone as required for compatibility with glazing sealant and plastic glazing, and of hardness recommended by plastic glazing manufacturer for application indicated.
4. Compressible Filler Rods: Closed cell of waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with **5- to 10-psi (35- to 70-kPa)** compression strength for 25 percent deflection.

1.3 EXECUTION

A. Examination

1. Examine plastic glazing framing, with glazing Installer present, for compliance with the following:

- a. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - b. Minimum required face or edge clearances.
 - c. Effective sealing between joints of plastic glazing framing members.
 2. Proceed with glazing only after unsatisfactory conditions have been corrected.
- B. Preparation
1. Clean glazing channels and other framing members immediately before glazing. Remove coatings not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.
- C. Glazing, General
1. Comply with combined written instructions of manufacturers of plastic glazing materials, sealants, gaskets, and other glazing materials unless more stringent requirements are indicated, including those in referenced glazing publication.
 2. Glazing channel dimensions indicated on Drawings are designed to provide the necessary bite on plastic glazing, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust plastic glazing lites during installation to ensure that bite is equal on all sides.
 3. Sand or scrape cut edges of plastic glazing to provide smooth edges, free of chips and hairline cracks.
 4. Remove burrs and other projections from glazing channel surfaces.
 5. Protect plastic glazing surfaces from abrasion and other damage during handling and installation, according to the following requirements:
 - a. Retain plastic glazing manufacturer's protective covering or protect by other methods according to plastic glazing manufacturer's written instructions.
 - b. Remove covering at border of each piece before glazing; remove remainder of covering immediately after installation where plastic glazing will be exposed to sunlight or where other conditions make later removal difficult.
 - c. Remove damaged plastic glazing sheets from Project site and legally dispose of off-site. Damaged plastic glazing sheets are those containing imperfections that, when installed, result in weakened glazing and impaired performance and appearance.
 6. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
 7. Install elastomeric setting blocks in sill channels, sized and located to comply with referenced glazing publication, unless otherwise instructed by plastic glazing manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
 8. Provide edge blocking to comply with referenced glazing publication unless otherwise instructed by plastic glazing manufacturer.
 9. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
 10. Square cut wedge-shaped gaskets at corners and install gaskets as recommended in writing by gasket manufacturer to prevent corners from pulling away; seal corner and butt joints with sealant recommended by gasket manufacturer.
- D. Tape Glazing
1. Install tapes continuously, but not in one continuous length. Do not stretch tapes to make them fit opening.
 2. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
 3. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant recommended by tape manufacturer.
 4. Do not remove release paper from tape until immediately before each lite is installed.
 5. Apply heel bead of glazing sealant.

6. Center plastic glazing lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 7. Apply cap bead of glazing sealant over exposed edge of tape.
- E. Gasket Glazing (Dry)
1. Fabricate compression gaskets in lengths recommended in writing by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 2. Insert soft compression gasket between plastic glazing and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 3. Center plastic glazing lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in plastic glazing. Seal gasket joints with sealant recommended by gasket manufacturer.
 4. Install gaskets so they protrude past face of glazing stops.
- F. Sealant Glazing (Wet)
1. Install continuous spacers between plastic glazing lites and glazing stops to maintain plastic glazing face clearances and to prevent sealant from extruding into glazing channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
 2. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to plastic glazing and channel surfaces.
 3. Tool exposed surfaces of sealants to provide a substantial wash away from plastic glazing.
- G. Protecting And Cleaning
1. Protect plastic glazing from contact with contaminating substances from construction operations. If, despite such protection, contaminating substances do come into contact with plastic glazing, remove immediately and wash plastic glazing according to plastic glazing manufacturer's written instructions.
 2. Remove and replace plastic glazing that is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents, and vandalism.
 3. Wash plastic glazing on both faces before date scheduled for inspections intended to establish date of Final Completion in each area of Project. Wash plastic glazing according to plastic glazing manufacturer's written instructions.

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Task	Specification	Specification Description
08 85 00 00	08 44 13 00	Glazed Aluminum Curtain Walls
08 85 00 00	08 44 13 00a	Structural-Sealant-Glazed Curtain Walls
08 85 00 00	08 44 13 00b	Sloped Glazing Assemblies
08 87 13 00	07 42 13 19	Glazing

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SECTION 08 87 23 16 - FRAGMENT RETENTION FILM FOR GLASS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of fragment retention film for glass. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each type of product indicated.
3. Test Reports: Certified test reports including analysis and interpretation of test results. Each report shall identify the manufacturer, the specific product name, the film thickness, the adhesive type and thickness, and the glass type and thickness. Test reports shall clearly identify the methods used and shall include the results recorded.
4. Certificates: On applications where the film will contact the glazing beads or gaskets, a certificate from the Contractor stating that the glazing compounds and gaskets are compatible with the fragment retention film and adhesive.

C. Delivery, Storage, And Handling

1. Deliver, store, and handle in accordance with the manufacturer's recommendations. Glass, including glass in windows or doors, that has the film factory applied shall be stored in a dry location free of dust, water, and other contaminants. Glass with factory applied film shall be delivered, stored, and handled so that the film is not damaged, scratched, or abraded and shall be stored in a manner which permits easy access for inspection and handling. Each roll of film shall have a tamperproof label containing full details of the roll and the batch number.

D. Warranty

1. Provide a 5 year warranty for fragment retention film material. The warranty shall provide for replacement of film if cracking, crazing, peeling, or inadequate adhesion occurs.

1.2 PRODUCTS

- #### A. Standard Products:
- Fragment retention film shall be the standard product of a manufacturer regularly engaged in the manufacture of such products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening.

- #### B. Fragment Retention Film:
- Fragment retention film shall be polyester, polyethylene terephthalate, or a composite. Fragment retention film shall be optically clear and free of waves, distortions, impurities, and adhesive lines. The film may be a single layer or laminated. Lamination of the film shall only occur at the factory of the fragment retention film manufacturer. The film shall include an abrasion resistant coating on the surface that does not receive the film adhesive. Fragment retention film shall be a minimum thickness of **0.004 inch (0.10 mm)**, as required to meet Project requirements, and shall be clear **OR** tinted, **OR** reflective, **as directed**. The film shall be supplied with an optically clear weatherable pressure sensitive adhesive. The adhesive shall contain ultraviolet inhibitors to protect the film for its required life and shall limit ultraviolet transmission to not more than 8 percent of the radiation between 300 and 380 nanometers. The adhesive shall not be water activated.

1. Impact Performance: Test fragment retention film for impact in accordance with ANSI Z97.1 or 16 CFR 1201.

2. Tensile Strength: The fragment retention film samples tested shall exhibit a minimum tensile strength at break of **25,000 psi (172.4 MPa)** when tested in accordance with ASTM D882, Method A.
3. Peel Strength: The fragment retention film shall exhibit a minimum peel strength of **5.3 pounds/inch (930 N/m)** for **0.004 inch (0.10 mm)** thick film when tested in accordance with ASTM D3330, Method A.
4. Surface Abrasion: The fragment retention film shall exhibit a change in haze not to exceed 3.2 percent following 100 turns, using 500-gram weights on a CS 10F abrasive wheel when tested in accordance with ASTM D1044.
5. Flame Spread and Smoke Density: The fragment retention film shall exhibit a flame spread index not exceeding 25 and a smoke density index not exceeding 100 when tested in accordance with ASTM E84.

1.3 EXECUTION

- A. Surface Preparation: The glass surface to which the fragment retention film is to be applied shall be cleaned of paint, foreign compounds, smears, and spatters. After the initial cleaning, the surface to receive the film shall be further cleaned in accordance with the film manufacturer's instructions.
- B. Application: Provide fragment retention film on window and door glass where indicated. After surface preparation, apply the fragment retention film in accordance with the manufacturer's recommendations and instructions. Apply film to the interior (room) side of the glass for both single and double glazed sheets, unless otherwise indicated. Multiple applications of film to achieve specified thicknesses will not be allowed. The film shall not be applied if there are visible dust particles in the air, if there is frost on the glazing, or if any room condition such as temperature and humidity do not meet the manufacturer's instructions. After film application, maintain room conditions as required by the manufacturer's instructions to allow for proper curing of the adhesive.
 1. Application to New Glass Before Glazing: Apply fragment retention film so that it extends edge to edge of the glass sheet. Set the film reinforced glass into the frame with glazing compounds or gaskets as specified in Division 08 Section "Glazing". When contact between the glazing compounds and/or gaskets and the film occurs, the Contractor shall ensure compatibility. The Contractor shall be responsible for delivery of the fragment retention film to the appropriate location for application. Coordinate fragment retention film application and curing with the glass supplier and window or door manufacturer prior to glazing installation.
 2. Application to Existing Glass Involving Dismantlement: Remove the existing glazing compound, gaskets, and/or stops as required to expose the existing glass pane. If necessary, remove the glass so that the film can be applied. Apply the film so that it extends edge to edge of the glass sheet. Install existing gaskets and/or stops and replace any removed glazing compounds with new glazing compounds. Scrap removed glazing compounds. Glazing compounds shall be in accordance with GANA Sealant Manual. Glazing methods shall be in accordance with GANA Glazing Manual. When contact between the glazing compounds and/or gaskets and the film occurs, the Contractor shall ensure compatibility. Replace and reinstall any damaged or broken glazing and gaskets in kind.
 3. Application to Existing Glass Without Dismantlement: Apply fragment retention film so that it extends to within **1/16-inch (1.6 mm)**, with a maximum of **1/8 inch (3 mm)**, of the edge of the visible glass area.
 4. Application to Existing Glass and Frame Without Dismantlement: Apply fragment retention film past the edge of the visible glass and extend onto the frame. Amount of film overlap, edge connection to the frame, and adhesive for adhering film to frame shall be as recommended by the film manufacturer. When contact between the glazing compounds and/or gaskets and the film occurs, the Contractor shall ensure compatibility.
 5. Splicing: Splices or seams in fragment retention film shall be permitted only when a sheet of glass has a dimension exceeding **58 inches (1.475 m)** in both directions. All seams shall be

applied with a minimum overlap of **1/4 inch (6 mm)** unless submitted test reports indicate impact performance is not diminished when seam is applied with a different overlap or a gap.

- C. Cleaning: Clean the fragment retention film in accordance with the manufacturer's instructions.

END OF SECTION 08 87 23 16

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SECTION 08 88 53 00 - SECURITY GLAZING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material for security glazing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes glazing for the following products and applications and of the following types:
 - a. Products and applications specified in other Sections where glazing requirements are specified by reference to this Section:
 - 1) Steel detention and Steel doors.
 - 2) Glazed entrances.
 - 3) Storefront framing.
 - 4) Interior borrowed lites.
 - 5) Glazed curtain walls.
 - 6) Sloped glazing.
 - 7) Security, Detention, Aluminum and Steel windows.
 - b. Security Glazing Types:
 - 1) Monolithic polycarbonate.
 - 2) Laminated glass.
 - 3) Laminated polycarbonate.
 - 4) Glass-clad polycarbonate.
 - 5) Laminated glass and polycarbonate.
 - 6) Insulating security glazing.
 - 7) Air-gap security glazing.

C. Definitions

1. Glazing Manufacturers: Firms that produce primary glass, monolithic plastic glazing, or fabricated security glazing, as defined in referenced glazing publications.
2. Interspace: Space between lites of air-gap security glazing or insulating security glazing.

D. Performance Requirements

1. General:
 - a. Installed security glazing shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing; or other defects in construction.
 - b. Installed security glazing shall withstand security-related loads and forces without damage to the glazing beyond that allowed by referenced standards.
2. Delegated Design: Design security glazing, including comprehensive engineering analysis by a qualified professional engineer.
 - a. Design Procedure for Glass: Design according to ASTM E 1300 **OR** ICC's 2003 International Building Code, **as directed**.
 - b. Design Wind Pressures: As indicated on Drawings.
OR
Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - 1) Basic Wind Speed: **85 mph (38 m/s) OR 90 mph (40 m/s) OR 100 mph (44 m/s) OR 110 mph (49 m/s), as directed.**
 - 2) Importance Factor.

- 3) Exposure Category: **B OR C OR D, as directed.**
 - c. Design Snow Loads: As indicated on Drawings **OR as directed.**
 - d. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
 - e. Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass to resist each of the following combinations of loads:
 - 1) Outward design wind pressure minus the weight of the glass. Base design on glass type factors for short-duration load.
 - 2) Inward design wind pressure plus the weight of the glass plus half of the design snow load. Base design on glass type factors for short-duration load.
 - 3) Half of the inward design wind pressure plus the weight of the glass plus the design snow load. Base design on glass type factors for long-duration load.
 - f. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 - g. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or **1 inch (25 mm)**, whichever is less.
3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glazing framing members and glazing components.
- a. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
- E. Preconstruction Testing
1. Preconstruction Adhesion and Compatibility Testing: Test each security glazing type, tape sealant, gasket, glazing accessory, and glazing-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - a. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - b. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to security glazing, tape sealants, gaskets, and glazing channel substrates.
 - c. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - d. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - e. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.
- F. Submittals
1. Product Data: For each type of product indicated.
 2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For glazing sealants used inside of the weatherproofing system, including printed statement of VOC content.
 3. Security Glazing Samples: For each type of security glazing; **12 inches (300 mm)** square.
 4. Glazing Accessory Samples: For gaskets, sealants and colored spacers, in **12-inch (300-mm)** lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system, **as directed.**
 5. Security Glazing Schedule: List security glazing types and thicknesses for each size opening and location. Use same designations indicated on Drawings. Indicate coordinated dimensions of security glazing and construction that receives security glazing, including clearances and glazing channel dimensions.
 6. Delegated-Design Submittal: For security glazing indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 7. Qualification Data: For installers, manufacturers of insulating security glazing with sputter-coated, low-e coatings, glazing testing agency and sealant testing agency.

8. Product Certificates: For each type of product indicated, from manufacturer.
9. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of security glazing, glazing sealant and glazing gasket.
 - a. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
10. Preconstruction adhesion and compatibility test reports.
11. Warranties: Sample of special warranties.

G. Quality Assurance

1. Manufacturer Qualifications for Insulating Security Glazing Units with Sputter-Coated, Low-E Coatings: A qualified insulating glazing manufacturer who is approved and certified, **as directed**, by coated-glass manufacturer.
2. Installer Qualifications: A qualified installer who employs glazing installers for this Project who are certified under the National Glass Association Glazier Certification Program.
3. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
4. Source Limitations for Security Glazing: Obtain security glazing from single source from single manufacturer using the same type of lites, plies, interlayers, and spacers for each security glazing type indicated.
 - a. Source Limitations for Tinted Glass: Obtain tinted glass from single source from single primary glass manufacturer for each tint color indicated.
5. Source Limitations for Glazing Sealants and Gaskets: Obtain from single source from single manufacturer for each product and installation method.
6. Glazing Publications: Comply with published recommendations of security glazing and glazing material manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 - a. GANA Publications: GANA's "Laminated Glazing Reference Manual" and GANA's "Glazing Manual."
 - b. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 - c. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 - d. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
7. Plastic Glazing Labeling: Identify plastic sheets with appropriate markings of applicable testing and inspecting agency, indicating compliance with required fire-test-response characteristics.
8. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC **OR** another certification agency acceptable to authorities having jurisdiction **OR** manufacturer, **as directed**. Label shall indicate manufacturer's name, type of glazing, thickness, and safety glazing standard with which glazing complies.
9. Insulating Glazing Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
10. Preinstallation Conference: Conduct conference at Project site.

H. Delivery, Storage, And Handling

1. Protect security glazing and glazing materials according to manufacturer's written instructions. Prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.
2. Comply with insulating security glazing and with air-gap security glazing manufacturers' written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

I. Project Conditions

1. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

- a. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below **40 deg F (4.4 deg C)**.

J. Coordination

- 1. Coordinate dimensions, including thickness, of security glazing with dimensions of construction that receives security glazing.

K. Warranty

- 1. Manufacturer's Special Warranty for Coated Glass: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated glass that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
 - a. Warranty Period: 10 years from date of Final Completion.
- 2. Manufacturer's Special Warranty on Laminated Glass: Manufacturer's standard form in which laminated-glass manufacturer agrees to replace laminated glass that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - a. Warranty Period: Five **OR 10, as directed**, years from date of Final Completion.
- 3. Manufacturer's Special Warranty for Polycarbonate Sheet: Manufacturer's standard form in which glazing manufacturer agrees to replace polycarbonate sheet that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to maintaining and cleaning polycarbonate sheet contrary to manufacturer's written instructions. Defects include yellowing and loss of light transmission.
 - a. Warranty Period: 10 years from date of Final Completion.
- 4. Manufacturer's Special Warranty for Laminated Polycarbonate: Manufacturer's standard form in which laminated polycarbonate manufacturer agrees to replace laminated polycarbonate that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to maintaining and cleaning laminated polycarbonate contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced standard, yellowing, and loss of light transmission.
 - a. Warranty Period: Five **OR 10, as directed**, years from date of Final Completion.
- 5. Manufacturer's Special Warranty for Glass-Clad Polycarbonate: Manufacturer's standard form in which glass-clad polycarbonate manufacturer agrees to replace glass-clad polycarbonate that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning glass-clad polycarbonate contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced glass-clad polycarbonate standard, yellowing, and loss of light transmission.
 - a. Warranty Period: Five **OR 10, as directed**, years from date of Final Completion.
- 6. Manufacturer's Special Warranty for Laminated Glass and Polycarbonate: Manufacturer's standard form in which laminated-glass-and-polycarbonate manufacturer agrees to replace laminated glass and polycarbonate that deteriorates within specified warranty period. Deterioration is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass and polycarbonate contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced glass-clad polycarbonate standard, yellowing, and loss of light transmission.
 - a. Warranty Period: Five **OR 10, as directed**, years from date of Final Completion.

7. Manufacturer's Special Warranty on Insulating Security Glazing: Manufacturer's standard form in which insulating security glazing manufacturer agrees to replace insulating security glazing that deteriorates within specified warranty period. Deterioration is defined as defects in individual lites developed from normal use or failure of hermetic seal under normal use. Deterioration does not include defects in individual lites or failure of hermetic seal that is attributed to glass breakage or to maintaining and cleaning insulating security glazing contrary to manufacturer's written instructions.
 - a. Defects in coated glass lites include peeling, cracking, and other indications of deterioration in coating.
 - b. Defects in laminated-glass lites include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 - c. Defects in glass-clad polycarbonate lites include edge separation, delamination materially obstructing vision through glazing, blemishes exceeding those allowed by referenced glass-clad polycarbonate standard, yellowing, and loss of light transmission.
 - d. Evidence of hermetic seal failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glazing.
 - e. Warranty Period: Five **OR** 10, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Security Glazing, General

1. Thickness: Where thickness is indicated, it is a minimum. Provide security glazing in thicknesses as needed to comply with requirements indicated.
2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
3. Fire-Test-Response Characteristics of Plastic Sheets: As determined by testing plastic sheets identical to those used in security glazing products by a qualified testing agency acceptable to authorities having jurisdiction.
 - a. Self-ignition temperature of **650 deg F (343 deg C)** or more when tested per ASTM D 1929 on plastic sheets in thicknesses indicated for the Work.
 - b. Smoke-developed index of 450 or less when tested according to ASTM E 84, or smoke density of 75 or less when tested per ASTM D 2843 on plastic sheets in thicknesses indicated for the Work.
 - c. Burning extent of **1 inch (25 mm) OR** rate of **2.5 in./min. (1.06 mm/s)**, **as directed**, or less when tested per ASTM D 635 at a nominal thickness of **0.060 inch (1.52 mm)** or thickness indicated for the Work.
4. Windborne-Debris-Impact Resistance: Provide exterior security glazing that passes basic **OR** enhanced, **as directed**, -protection testing requirements in ASTM E 1996 for Wind Zone 1 **OR** Wind Zone 2 **OR** Wind Zone 3 **OR** Wind Zone 4, **as directed**, when tested according to ASTM E 1886. Test specimens shall be no smaller in width and length than security glazing indicated for use on the Project and shall be installed in same manner as indicated for use on the Project.
 - a. Large-Missile Test: For security glazing located within **30 feet (9.1 m)** of grade.
 - b. Small-Missile Test: For security glazing located more than **30 feet (9.1 m)** above grade.

OR

Large-Missile Test: For all security glazing, regardless of height above grade.
5. Thermal and Optical Performance Properties: Provide security glazing with performance properties specified, as indicated in manufacturer's published test data, based on products of construction indicated and on procedures indicated below:
 - a. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as **Btu/sq. ft. x h x deg F (W/sq. m x K)**.
 - b. Solar-Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - c. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

B. Glass Products

1. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
2. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
 - a. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 - b. For heat-strengthened float glass, comply with requirements for Kind HS.
 - c. For fully tempered float glass, comply with requirements for Kind FT.
 - d. For uncoated glass, comply with requirements for Condition A.
 - e. For coated vision glass, comply with requirements for Condition C (other coated glass).
3. Chemically Strengthened Glass: Annealed float glass chemically strengthened to comply with ASTM C 1422, Surface Compression Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5, **as directed**, and Case Depth Level A **OR** Level B **OR** Level C **OR** Level D **OR** Level E **OR** Level F, **as directed**.
4. Reflective-Coated Vision Glass: ASTM C 1376, Kind CV (coated vision glass), coated by pyrolytic process **OR** vacuum deposition (sputter-coating) process, **as directed**, and complying with other requirements specified.

C. Laminated Glass

1. Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation.
 - a. Construction: Laminate glass with polyvinyl butyral interlayer or cast-in-place and cured-transparent-resin interlayer to comply with interlayer manufacturer's written recommendations.
 - b. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - c. Interlayer Color: Clear unless otherwise indicated.
2. Windborne-Debris-Impact-Resistant Laminated Glass: ASTM C 1172, and complying with testing requirements in 16 CFR 1201 for Category II materials, with "Windborne-Debris-Impact Resistance" Paragraph, and with other requirements specified.
 - a. Construction: Laminate glass with one of the following to comply with interlayer manufacturer's written recommendations:
 - 1) Polyvinyl butyral interlayer.
 - 2) Polyvinyl butyral interlayers reinforced with polyethylene terephthalate film.
 - 3) Ionoplast interlayer.
 - 4) Cast-in-place and cured-transparent-resin interlayer.
 - 5) Cast-in-place and cured-transparent-resin interlayer reinforced with polyethylene terephthalate film.
 - b. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - c. Interlayer Color: Clear unless otherwise indicated.

D. Polycarbonate Security Glazing

1. Polycarbonate Sheet: ASTM C 1349, Appendix X1, Type II, coated, mar-resistant, UV-stabilized polycarbonate with coating on exposed surfaces and Type I, standard, UV-stabilized polycarbonate where no surfaces are exposed.
2. Laminated Polycarbonate: Polycarbonate sheets laminated with clear urethane interlayer that complies with ASTM C 1349, Appendix X2, and has a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation. Provide laminated units that comply with requirements of ASTM C 1349 for maximum allowable laminating process blemishes and haze.
3. Glass-Clad Polycarbonate: ASTM C 1349, and other requirements specified.

- a. Provide glass-clad polycarbonate that complies with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified.
4. Laminated Glass and Polycarbonate: ASTM C 1349, and other requirements specified.
 - a. Provide laminated glass and polycarbonate that complies with testing requirements in 16 CFR 1201 for Category II materials, and with other requirements specified.
- E. Spall-Resistant Film
 1. Spall-Resistant Film: Composite of clear polyvinyl butyral film and clear abrasion-resistant polyester film.
 2. Laminating Process: Laminate spall-resistant film to glazing assemblies in factory to produce laminated lites free of foreign substances, air, and glass pockets.
- F. Insulating Security Glazing
 1. Insulating Security Glazing: Factory-assembled units consisting of sealed lites separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.
 - a. Sealing System: Dual seal, with manufacturer's standard **OR** polyisobutylene and polysulfide **OR** polyisobutylene and silicone **OR** polyisobutylene and hot-melt butyl **OR** polyisobutylene and polyurethane, **as directed**, primary and secondary.
 - b. Spacer: Manufacturer's standard spacer material and construction **OR** Aluminum with mill or clear anodic finish **OR** Aluminum with black, color anodic finish **OR** Aluminum with bronze, color anodic finish **OR** Aluminum with powdered metal paint finish in color selected **OR** Galvanized steel **OR** Stainless steel **OR** Polypropylene-covered stainless steel in color selected **OR** Thermally broken aluminum **OR** Nonmetallic laminate **OR** Nonmetallic tube, **as directed**.
 - c. Desiccant: Molecular sieve or silica gel, or blend of both.
- G. Air-Gap Security Glazing
 1. Air-Gap Security Glazing: Factory-assembled units consisting of sealed lites separated by a dehydrated interspace and complying with other requirements specified.
 - a. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - b. Spacer Specifications: Manufacturer's standard rigid, **as directed**, spacer material and construction.
- H. Glazing Gaskets
 1. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
 - a. Neoprene complying with ASTM C 864.
 - b. EPDM complying with ASTM C 864.
 - c. Silicone complying with ASTM C 1115.
 - d. Thermoplastic polyolefin rubber complying with ASTM C 1115.
 2. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
 - a. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.
- I. Glazing Sealants
 1. General:
 - a. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including security glazing, seals of insulating security glazing and air-gap security glazing, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

- b. Suitability: Comply with sealant and security glazing manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - c. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
 - d. Colors of Exposed Glazing Sealants: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- 2. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
 - 3. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 4. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
 - 5. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
- J. Glazing Tapes
- 1. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and security glazing manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
 - a. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - b. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
 - 2. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - a. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - b. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- K. Miscellaneous Glazing Materials
- 1. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of security glazing and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
 - 2. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
 - 3. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
 - 4. Spacers: Elastomeric blocks or continuous extrusions of hardness required by security glazing manufacturer to maintain security glazing lites in place for installation indicated.
 - 5. Edge Blocks: Elastomeric material of hardness needed to limit security glazing lateral movement (side walking).
 - 6. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- L. Fabrication Of Security Glazing
- 1. Fabricate security glazing in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- M. Laminated-Glass Security Glazing Types
- 1. Security Glazing: Clear laminated glass **OR** Tinted laminated glass **OR** Clear reflective-coated laminated glass **OR** Tinted reflective-coated laminated glass, **as directed**.

- a. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
- b. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.
- c. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
 - 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
- d. Number of Plies: Two **OR** Three, **as directed**.
- e. Overall Unit Thickness: as directed by the Owner.
- f. Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
- g. Core Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
- h. Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
- i. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.3 mm), **as directed**.
- j. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray **as directed**.
- k. Tinted Glass Location: Outer ply.
- l. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
- m. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
- n. Overall Visible Light Transmittance: as directed by the Owner.
- o. Outdoor Visible Reflectance: as directed by the Owner. Winter Nighttime U-Factor: as directed by the Owner.
- p. Summer Daytime U-Factor: as directed by the Owner.
- q. Solar Heat-Gain Coefficient: as directed by the Owner.
- r. Provide safety glazing labeling.
- 2. Security Glazing: Tinted reflective-coated, **as directed**, laminated glass with clear glass and tinted interlayer.
 - a. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - b. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.

- c. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
 - 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
 - d. Number of Plies: Two **OR** Three, **as directed**.
 - e. Overall Unit Thickness: as directed by the Owner.
 - f. Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
 - g. Core Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
 - h. Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
 - i. Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.3 mm), **as directed**.
 - j. Interlayer Color: Clear **OR** Blue-green **OR** Bronze light **OR** Gray, **as directed**.
 - k. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
 - l. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
 - m. Overall Visible Light Transmittance: as directed by the Owner.
 - n. Outdoor Visible Reflectance: as directed by the Owner. Winter Nighttime U-Factor: as directed by the Owner.
 - o. Summer Daytime U-Factor: as directed by the Owner.
 - p. Solar Heat-Gain Coefficient: as directed by the Owner. Provide safety glazing labeling.
- N. Monolithic Polycarbonate Security Glazing Types
- 1. Security Glazing: Monolithic polycarbonate with mar-resistant coating on both surfaces.
 - a. Detention Security Grade: Grade 4 per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
OR
Thickness: 3/8 inch (9.25 mm) **OR** 1/2 inch (12.7 mm), **as directed**.
- O. Laminated-Polycarbonate Security Glazing Types
- 1. Security Glazing: Laminated polycarbonate.
 - a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
 - b. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - c. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
 - 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
 - d. Number of Plies: Two **OR** Three **OR** Four, **as directed**.
 - e. Overall Unit Thickness: as directed by the Owner.

- f. Outer and Inner Plies: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
 - g. Core Ply **OR** Core Plies, **as directed**: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
 - h. Interlayer Thicknesses: **0.025 inch (0.635 mm)**.
- P. Glass-Clad Polycarbonate Security Glazing Types
1. Security Glazing: Clear symmetrical glass-clad polycarbonate **OR** Tinted symmetrical glass-clad polycarbonate **OR** Clear reflective-coated symmetrical glass-clad polycarbonate **OR** Tinted reflective-coated symmetrical glass-clad polycarbonate, **as directed**.
 - a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
 - b. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - c. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.
 - d. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
 - 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
 - e. Overall Unit Thickness: as directed by the Owner. Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
 - f. Single Core: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
OR
Multiple Core:
 - 1) Outer Core Ply: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
 - 2) Single Inner Core Ply **OR** Double Inner Core Plies, **as directed**: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
 - g. Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
 - h. Interlayer Thickness: **0.025 inch (0.635 mm) OR 0.050 inch (0.127 mm), as directed**.
 - i. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - j. Tinted Glass Location: Outer ply.
 - k. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
 - l. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
 - m. Overall Visible Light Transmittance: as directed by the Owner.
 - n. Outdoor Visible Reflectance: as directed by the Owner.
 - o. Winter Nighttime U-Factor: as directed by the Owner.
 - p. Summer Daytime U-Factor: as directed by the Owner.

- q. Solar Heat-Gain Coefficient: as directed by the Owner.
- r. Provide safety glazing labeling.

Q. Laminated-Glass-And-Polycarbonate Security Glazing Types

1. Security Glazing: Nonsymmetrical clear **OR** tinted **OR** reflective-coated, **as directed**, laminated glass and polycarbonate with glass plies on the attack or threat side and polycarbonate plies on the witness side.
 - a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
 - b. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - c. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **a directed**, per UL 752.
 - d. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
 - 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
 - e. Overall Unit Thickness: as directed by the Owner.
 - f. Makeup:
 - 1) Outer Glass Ply: 3-mm heat-strengthened float glass.
 - 2) Interlayer Thickness: 0.025 inch (0.635 mm) **OR** 0.050 inch (0.127 mm), **as directed**.
 - 3) First Inner Glass Ply: 12-mm, **as directed**, float glass.
 - 4) Interlayer Thickness: 0.025 inch (0.635 mm) **OR** 0.050 inch (0.127 mm), **as directed**.
 - 5) Second Inner Glass Ply: 10-mm, **as directed**, float glass.
 - 6) Interlayer Thickness: 0.025 inch (0.635 mm) **OR** 0.050 inch (0.127 mm), **as directed**.
 - 7) Inner Polycarbonate Ply: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, Type I (standard, UV-stabilized) polycarbonate.
 - 8) Interlayer Thickness: 0.025 inch (0.635 mm) **OR** 0.050 inch (0.127 mm), **as directed**.
 - 9) Outer Polycarbonate Ply: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, Type II (coated, mar-resistant, UV-stabilized) polycarbonate.
 - g. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - h. Tinted Glass Location: Outer glass ply.
 - i. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
 - j. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
 - k. Overall Visible Light Transmittance: as directed by the Owner.
 - l. Outdoor Visible Reflectance: as directed by the Owner.

- m. Winter Nighttime U-Factor: as directed by the Owner.
- n. Summer Daytime U-Factor: as directed by the Owner.
- o. Solar Heat-Gain Coefficient: as directed by the Owner.
- p. Provide safety glazing labeling.

R. Insulating Security Glazing Types

1. Security Glazing: Clear insulating security glazing **OR** Tinted insulating security glazing **OR** Reflective-coated, clear insulating security glazing **OR** Reflective-coated, tinted insulating security glazing, **as directed**. Outdoor lite is monolithic glass and indoor lite is glass-clad polycarbonate.
 - a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
 - b. Overall Unit Thickness: as directed by the Owner.
 - c. Outdoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass, **as directed**.
 - d. Indoor Lite: Glass-clad polycarbonate.
 - 1) Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened **OR** fully tempered, **as directed**, float glass.
 - 2) Single Core: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
OR
Multiple Core:
 - a) Outer Core Ply: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - b) Single Inner Core Ply **OR** Double Inner Core Plies, **as directed**: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - 3) Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened **OR** fully tempered, **as directed**, float glass.
 - e. Interspace Content: Air **OR** Argon, **as directed**.
 - f. Interspace Dimension: as directed by the Owner.
 - g. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - h. Tinted Glass Location: Outdoor lite.
 - i. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
 - j. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
 - k. Overall Visible Light Transmittance: as directed by the Owner.
 - l. Outdoor Visible Reflectance: as directed by the Owner.
 - m. Winter Nighttime U-Factor: as directed by the Owner.
 - n. Summer Daytime U-Factor: as directed by the Owner.
 - o. Solar Heat-Gain Coefficient: as directed by the Owner.
 - p. Provide safety glazing labeling.
2. Security Glazing: Low-e-coated, clear insulating security glazing **OR** Low-e-coated, tinted insulating security glazing, **as directed**. Outdoor lite is monolithic glass and indoor lite is glass-clad polycarbonate.
 - a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
 - b. Overall Unit Thickness: as directed by the Owner.
 - c. Outdoor Lite: Float glass **OR** Heat-strengthened float glass **OR** Fully tempered float glass, **as directed**.
 - d. Indoor Lite: Glass-clad polycarbonate.
 - 1) Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened **OR** fully tempered, **as directed**, float glass.
 - 2) Single Core: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
OR

- Multiple Core:
- a) Outer Core Ply: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
 - b) Single Inner Core Ply **OR** Double Inner Core Plies, **as directed: 0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
- 3) Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened **OR** fully tempered, **as directed**, float glass.
- e. Interspace Content: Air **OR** Argon, **as directed**.
 - f. Interspace Dimension: as directed by the Owner.
 - g. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - h. Tinted Glass Location: Outer lite.
 - i. Low-E Coating: Pyrolytic on second surface **OR** Pyrolytic on third surface **OR** Sputtered on second surface **OR** Sputtered on third surface, **as directed**.
 - j. Overall Visible Light Transmittance: as directed by the Owner.
 - k. Winter Nighttime U-Factor: as directed by the Owner.
 - l. Summer Daytime U-Factor: as directed by the Owner.
 - m. Solar Heat-Gain Coefficient: as directed by the Owner..
 - n. Provide safety glazing labeling.
3. Security Glazing: Clear insulating security glazing **OR** Tinted insulating security glazing **OR** Reflective-coated, clear insulating security glazing **OR** Reflective-coated, tinted insulating security glazing, **as directed**. Outdoor lite is laminated glass and indoor lite is glass-clad polycarbonate with spall-resistant film on inside face.
 - a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed**.
 - b. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - c. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.
 - d. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
 - 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
 - e. Overall Unit Thickness: as directed by the Owner.
 - f. Outdoor Lite: Laminated glass with two plies of heat-strengthened float glass **OR** three plies of heat-strengthened float glass **OR** two outer plies of heat-strengthened float glass and two inner plies of annealed float glass, **as directed**.
 - 1) Outer Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 2) Core Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 3) Inner Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.

- 4) Interlayer Thickness: **0.030 inch (0.76 mm) OR 0.060 inch (1.52 mm) OR 0.090 inch (2.3 mm), as directed.**
- g. Indoor Lite: Glass-clad polycarbonate faced with a **0.037-inch- (0.94-mm-)** thick, spall-resistant polyester film laminated to indoor face.
- 1) Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
- 2) Single Core: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
OR
Multiple Core:
- a) Outer Core Ply: **0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
- b) Single Inner Core Ply **OR** Double Inner Core Plies, **as directed: 0.118-inch (4.57-mm) OR 0.177-inch (2.97-mm) OR 0.236-inch (5.99-mm), as directed**, polycarbonate.
- 3) Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
- h. Interspace Content: Air **OR** Argon, **as directed.**
- i. Interspace Dimension: as directed by the Owner.
- j. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed.**
- k. Tinted Glass Location: Outer **OR** Inner, **as directed**, ply of outdoor lite.
- l. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed.**
- m. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
- n. Overall Visible Light Transmittance: as directed by the Owner.
- o. Outdoor Visible Reflectance: as directed by the Owner.
- p. Winter Nighttime U-Factor: as directed by the Owner.
- q. Summer Daytime U-Factor: as directed by the Owner.
- r. Solar Heat-Gain Coefficient: as directed by the Owner.
- s. Provide safety glazing labeling.
4. Security Glazing: Low-e-coated, clear insulating security glazing **OR** Low-e-coated, tinted insulating security glazing, **as directed.** Outdoor lite is laminated glass and indoor lite is glass-clad polycarbonate with spall-resistant film on inside face.
- a. Detention Security Grade: Grade 1 **OR** Grade 2 **OR** Grade 3 **OR** Grade 4, **as directed**, per ASTM F 1915 cold-temperature impact test **OR** warm-temperature impact test **OR** torch and small blunt impactor test, **as directed.**
- b. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
- c. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.
- d. Blast Resistance:
- 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
- 2) Peak Pressure: as directed by the Owner.
- 3) Positive Phase Impulse: as directed by the Owner.

- e. Overall Unit Thickness: as directed by the Owner.
 - f. Outdoor Lite: Laminated glass with two plies of heat-strengthened float glass **OR** three plies of heat-strengthened float glass **OR** two outer plies of heat-strengthened float glass and two inner plies of annealed float glass, **as directed**.
 - 1) Outer Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 2) Core Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 3) Inner Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 4) Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.3 mm), **as directed**.
 - g. Indoor Lite: Glass-clad polycarbonate faced with a 0.037-inch- (0.94-mm-) thick, spall-resistant polyester film laminated to indoor face.
 - 1) Outer Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
 - 2) Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
 - 3) Single Core: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
OR
Multiple Core:
 - a) Outer Core Ply: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - b) Single Inner Core Ply **OR** Double Inner Core Plies, **as directed**: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - 4) Inner Ply: 3-mm **OR** 5-mm **OR** 6-mm, **as directed**, heat-strengthened **OR** chemically strengthened, **as directed**, float glass.
 - h. Interspace Content: Air **OR** Argon, **as directed**.
 - i. Interspace Dimension: as directed by the Owner.
 - j. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - k. Tinted Glass Location: Outer lite.
 - l. Low-E Coating: Pyrolytic on second surface **OR** Pyrolytic on third surface **OR** Sputtered on second surface **OR** Sputtered on third surface, **as directed**.
 - m. Overall Visible Light Transmittance: as directed by the Owner.
 - n. Winter Nighttime U-Factor: as directed by the Owner.
 - o. Summer Daytime U-Factor: as directed by the Owner.
 - p. Solar Heat-Gain Coefficient: as directed by the Owner. Provide safety glazing labeling.
- S. Air-Gap Security Glazing Types
1. Security Glazing: Clear air-gap security glazing **OR** Tinted air-gap security glazing **OR** Clear reflective-coated air-gap security glazing **OR** Tinted reflective-coated air-gap security glazing, **as directed**. Outdoor lite is laminated glass and indoor lite is laminated polycarbonate.
 - a. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - b. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.
 - c. Blast Resistance:

- 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR
Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
- 2) Peak Pressure: as directed by the Owner.
- 3) Positive Phase Impulse: as directed by the Owner.
- d. Overall Unit Thickness: as directed by the Owner.
- e. Outdoor Lite: Laminated glass with two **OR** three, **as directed**, plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
 - 1) Outer Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 2) Core Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 3) Inner Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 4) Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.3 mm), **as directed**.
- f. Indoor Lite: Laminated polycarbonate with two **OR** three **OR** four, **as directed**, polycarbonate plies.
 - 1) Overall Unit Thickness: as directed by the Owner.
 - 2) Outer and Inner Plies: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - 3) Core Ply **OR** Core Plies, **as directed**: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - 4) Interlayer Thicknesses: 0.025 inch (0.635 mm).
- g. Air-Gap Dimension: as directed by the Owner.
- h. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
- i. Tinted Glass Location: Outer **OR** Inner, **as directed**, ply of outdoor lite.
- j. Coating Color: Gold **OR** Pewter **OR** Silver, **as directed**.
- k. Coating Location: Second **OR** Third **OR** Fifth, **as directed**, surface.
- l. Overall Visible Light Transmittance: as directed by the Owner..
- m. Outdoor Visible Reflectance: as directed by the Owner.
- n. Winter Nighttime U-Factor: as directed by the Owner.
- o. Summer Daytime U-Factor: as directed by the Owner.
- p. Solar Heat-Gain Coefficient: as directed by the Owner.
- q. Provide safety glazing labeling.
2. Security Glazing: Low-e-coated, clear air-gap security glazing **OR** Low-e-coated, tinted air-gap security glazing, **as directed**. Outdoor lite is laminated glass and indoor lite is laminated polycarbonate.
 - a. Forced-Entry Resistance: Class I **OR** Class II **OR** Class III **OR** Class IV **OR** Class V, **as directed**, per ASTM F 1233.
OR
Forced-Entry Resistance: Level I **OR** Level II **OR** Level III **OR** Level IV **OR** Level V, **as directed**, per HPW-TP-0500.03.
 - b. Ballistic Resistance: Class/Level HG1 **OR** Class/Level HG2 **OR** Class/Level HG3 **OR** Class/Level HG4 **OR** Class/Level SMG **OR** Class/Level R1 **OR** Class/Level R2 **OR** Class/Level R3 **OR** Class/Level R4-AP **OR** Class/Level SH1 **OR** Class/Level SH2, **as directed**, per ASTM F 1233.
OR
Ballistic Resistance: Level 1 **OR** Level 2 **OR** Level 3 **OR** Level 4 **OR** Level 5 **OR** Level 6 **OR** Level 7 **OR** Level 8 **OR** Level 1-SG **OR** Level 2-SG **OR** Level 3-SG **OR** Level 4-SG **OR** Level 5-SG **OR** Level 6-SG **OR** Level 7-SG **OR** Level 8-SG, **as directed**, per UL 752.
 - c. Blast Resistance:
 - 1) Hazard Rating: No hazard **OR** Minimal hazard **OR** Very low hazard **OR** Low hazard **OR** High hazard, **as directed**, per ASTM F 1642.
OR

- Performance Condition: 1 **OR** 2 **OR** 3a **OR** 3b **OR** 4 **OR** 5, **as directed**, per GSA-TS01.
- 2) Peak Pressure: as directed by the Owner.
 - 3) Positive Phase Impulse: as directed by the Owner.
- d. Overall Unit Thickness: as directed by the Owner.
 - e. Outdoor Lite: Laminated glass with two **OR** three, **as directed**, plies of float glass **OR** heat-strengthened float glass **OR** fully tempered float glass **OR** chemically strengthened float glass, **as directed**.
 - 1) Outer Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 2) Core Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 3) Inner Ply Thickness: 3 mm **OR** 5 mm **OR** 6 mm, **as directed**.
 - 4) Interlayer Thickness: 0.030 inch (0.76 mm) **OR** 0.060 inch (1.52 mm) **OR** 0.090 inch (2.3 mm), **as directed**.
 - f. Indoor Lite: Laminated polycarbonate with two **OR** three **OR** four, **as directed**, polycarbonate plies.
 - 1) Overall Unit Thickness: as directed by the Owner.
 - 2) Outer and Inner Plies: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - 3) Core Ply **OR** Core Plies, **as directed**: 0.118-inch (4.57-mm) **OR** 0.177-inch (2.97-mm) **OR** 0.236-inch (5.99-mm), **as directed**, polycarbonate.
 - 4) Interlayer Thicknesses: 0.025 inch (0.635 mm).
 - g. Air-Gap Dimension: as directed by the Owner.
 - h. Glass Tint Color: Blue **OR** Blue-green **OR** Bronze **OR** Green **OR** Gray, **as directed**.
 - i. Tinted Glass Location: Outer **OR** Inner, **as directed**, ply of outdoor lite.
 - j. Low-E Coating: Pyrolytic on second surface **OR** Pyrolytic on third surface **OR** Sputtered on second surface **OR** Sputtered on third surface, **as directed**.
 - k. Overall Visible Light Transmittance: as directed by the Owner.
 - l. Winter Nighttime U-Factor: as directed by the Owner.
 - m. Summer Daytime U-Factor: as directed by the Owner.
 - n. Solar Heat-Gain Coefficient: as directed by the Owner.
 - o. Provide safety glazing labeling.

1.3 EXECUTION

A. Examination

1. Examine framing for security glazing, with Installer present, for compliance with the following:
 - a. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - b. Presence and functioning of weep system.
 - c. Minimum required face or edge clearances.
 - d. Effective sealing between joints of framing members.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Clean glazing channels and other framing members receiving security glazing immediately before glazing. Remove coatings not firmly bonded to substrates.

C. Glazing, General

1. Comply with combined written instructions of manufacturers of security glazing, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
2. Protect edges of security glazing from damage during handling and installation. Remove damaged security glazing from Project site and legally dispose of off Project site. Damaged

- security glazing includes units with edge or face damage or other imperfections that, when installed, could weaken security glazing, impair performance, or impair appearance.
3. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
 4. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications unless otherwise required by glazing unit manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
 5. Do not exceed edge pressures stipulated by security glazing manufacturers for installing lites.
 6. Provide spacers for security glazing lites where the length plus width is larger than **50 inches (1270 mm)**.
 - a. Locate spacers directly opposite each other on both inside and outside faces of security glazing. Install correct size and spacing to preserve required face clearances unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with performance requirements.
 - b. Provide **1/8-inch (3-mm)** minimum bite of spacers on glazing lites and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
 7. Provide edge blocking where indicated or needed to prevent security glazing from moving sideways in glazing channel, as recommended in writing by security glazing manufacturer and according to requirements in referenced glazing publications.
 8. Set security glazing in each series with uniform pattern, draw, bow, and similar characteristics.
 9. Set coated security glazing with proper orientation so that coatings face exterior or interior as specified.
 10. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
 11. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- D. Tape Glazing
1. Position tapes on fixed stops so that, when compressed by security glazing, their exposed edges are flush with or protrude slightly above sightline of stops.
 2. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
 3. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
 4. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 5. Do not remove release paper from tape until just before each glazing unit is installed.
 6. Apply heel bead of elastomeric sealant.
 7. Center security glazing in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 8. Apply cap bead of elastomeric sealant over exposed edge of tape.
- E. Gasket Glazing (Dry)
1. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
 2. Insert soft compression gasket securely in place between glazing unit and frame or fixed stop, with joints miter cut and bonded together at corners.
 3. Installation with Drive-in Wedge Gaskets: Center security glazing in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal

without developing bending stresses in security glazing. Seal gasket joints with sealant recommended by gasket manufacturer.

4. Installation with Pressure-Glazing Stops: Center security glazing in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in security glazing. Seal gasket joints with sealant recommended by gasket manufacturer.
5. Install gaskets so they protrude past face of glazing stops.

F. Sealant Glazing (Wet)

1. Install continuous spacers, or spacers combined with cylindrical sealant backing, between security glazing and glazing stops to maintain face clearances and to prevent sealant from extruding into glazing channel and blocking weep systems. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
2. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to security glazing and channel surfaces.
3. Tool exposed surfaces of sealants to provide a substantial wash away from security glazing.

G. Protection And Cleaning

1. Protect exterior security glazing from damage immediately after installation by attaching crossed streamers to framing held away from glazing unit. Do not apply markers to security glazing surfaces. Remove nonpermanent labels, and clean surfaces.
2. Protect security glazing from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with security glazing, remove substances immediately as recommended in writing by security glazing manufacturer.
3. Examine security glazing surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by security glazing manufacturer.
4. Remove and replace security glazing that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, or vandalism during construction period.
5. Wash security glazing on exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Final Completion. Wash security glazing as recommended in writing by security glazing manufacturer.

END OF SECTION 08 88 53 00

Task	Specification	Specification Description
08 88 53 00	07 42 13 19	Glazing

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SECTION 08 90 00 00 - LOUVERS AND VENTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for louvers and vents. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fixed, extruded-aluminum and formed-metal louvers.
 - b. Adjustable, extruded-aluminum and formed-metal louvers.
 - c. Adjustable, extruded-aluminum and formed-metal insulated louvers.
 - d. Fixed, formed-metal acoustical louvers.
 - e. Wall vents (brick vents).

C. Definitions

1. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
2. Horizontal Louver: Louver with horizontal blades; i.e., the axes of the blades are horizontal.
3. Vertical Louver: Louver with vertical blades; i.e., the axes of the blades are vertical.
4. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
5. Storm-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

D. Performance Requirements

1. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.
2. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver blade rattle or flutter, or permanent damage to fasteners and anchors.
 - a. Wind Loads:
 - 1) Determine loads based on pressures as indicated on Drawings.
OR
Determine loads based on a uniform pressure of **20 lbf/sq. ft. (957 Pa) OR 30 lbf/sq. ft. (1436 Pa), as directed**, acting inward or outward.
3. Seismic Performance: Louvers, including attachments to other construction, shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. Design earthquake spectral response acceleration, short period (Sds) for Project is **as directed**.
 - b. Component Importance Factor is 1.5 **OR** 1.0, **as directed**.
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
5. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.

6. Acoustic Performance: Provide acoustical louvers complying with ratings specified, as demonstrated by testing manufacturer's stock units identical to those specified, except for length and width for airborne sound-transmission loss according to ASTM E 90 **OR** outdoor-indoor sound-transmission loss according to ASTM E 966, **as directed**.

E. Submittals

1. Product Data: For each type of product indicated.
 - a. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
2. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
3. Samples: For each type of metal finish required.
4. Delegated-Design Submittal: For louvers indicated to comply with structural and seismic performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Product Test Reports: Based on tests performed according to AMCA 500-L.

F. Quality Assurance

1. Welding: Qualify procedures and personnel according to the following:
 - a. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."
2. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.
3. UL and NEMA Compliance: Provide motors and related components for motor-operated louvers that are listed and labeled by UL and comply with applicable NEMA standards.

1.2 PRODUCTS

A. Materials

1. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5, T-52, or T6.
2. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
3. Aluminum Castings: ASTM B 26/B 26M, Alloy 319.
4. Galvanized-Steel Sheet: ASTM A 653/A 653M, **G60 (Z180) OR G90 (Z275)**, **as directed**, zinc coating, mill phosphatized.
5. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, No. 2B finish **OR** No. 2D finish **OR** No. 4 finish, with grain running parallel to length of blades and frame members **OR** No. 4 finish, with grain running perpendicular to length of blades and frame members **OR** No. 4 finish, with grain running perpendicular to length of blades and parallel to length of frame members **OR** No. 6 finish, **as directed**.
6. Fasteners: Use types and sizes to suit unit installation conditions.
 - a. Use Phillips flat-head **OR** hex-head or Phillips pan-head **OR** tamper-resistant, **as directed**, screws for exposed fasteners unless otherwise indicated.
 - b. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - c. For fastening galvanized steel, use hot-dip-galvanized steel or 300 series stainless-steel fasteners.
 - d. For fastening stainless steel, use 300 series stainless-steel fasteners.
 - e. For color-finished louvers, use fasteners with heads that match color of louvers.
7. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed, for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
8. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

B. Fabrication, General

1. Assemble louvers in factory to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
2. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - a. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated **OR** where indicated, **as directed**.
 - b. Horizontal Mullions: Provide horizontal mullions at joints unless continuous vertical assemblies are indicated **OR** where indicated, **as directed**.
3. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, **as directed**, to produce uniform appearance.
4. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - a. Frame Type: Channel **OR** Exterior flange **OR** Interior flange, **as directed**, unless otherwise indicated.
5. Include supports, anchorages, and accessories required for complete assembly.
6. Provide vertical mullions of type and at spacings indicated, but not more than recommended by manufacturer, or **72 inches (1830 mm)** o.c., whichever is less.
 - a. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
 - b. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
 - c. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
 - d. Exterior Corners: Prefabricated corner units with mitered and welded blades **OR** blades with concealed close-fitting splices, **as directed**, and with fully recessed **OR** semirecessed, **as directed**, mullions at corners.
7. Provide subsills made of same material as louvers **OR** extended sills, **as directed**, for recessed louvers.
8. Join frame members to each other and to fixed louver blades with fillet welds concealed from view **OR** welds, threaded fasteners, or both, as standard with louver manufacturer, **as directed**, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

C. Fixed, Extruded-Aluminum Louvers

1. Horizontal Storm-Resistant Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 5 inches (125 mm) OR 7 inches (175 mm) OR 8 inches (200 mm) OR 9 inches (225 mm)**, **as directed**.
 - b. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) OR 0.060 inch (1.52 mm)** for blades and **0.080 inch (2.03 mm)** for frames, **as directed**.
 - c. Louver Performance Ratings:
 - 1) Free Area: Not less than **5.0 sq. ft. (0.46 sq. m) OR 6.0 sq. ft. (0.56 sq. m) OR 7.0 sq. ft. (0.65 sq. m)**, **as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **600-fpm (3.0-m/s) OR 700-fpm (3.6-m/s) OR 800-fpm (4.1-m/s)**, **as directed**, free-area exhaust **OR** intake, **as directed**, velocity.

- 3) Wind-Driven Rain Performance: Not less than 99 **OR** 95 **OR** 80, **as directed**, percent effectiveness when subjected to a rainfall rate of **3 inches (75 mm)** per hour and a wind speed of **29 mph (13 m/s) OR 8 inches (200 mm)** per hour and a wind speed of **50 mph (22.4 m/s), as directed**, at a core-area intake velocity of **300 fpm (1.5 m/s) OR 400 fpm (2.0 m/s) OR 500 fpm (2.5 m/s), as directed**.
- d. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
2. Vertical Storm-Resistant Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm) OR 8 inches (200 mm) OR 9 inches (225 mm) OR 12 inches (300 mm), as directed**.
 - b. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) OR 0.060 inch (1.52 mm)** for blades and **0.080 inch (2.03 mm)** for frames, **as directed**.
 - c. Louver Performance Ratings:
 - 1) Free Area: Not less than **5.0 sq. ft. (0.46 sq. m) OR 6.0 sq. ft. (0.56 sq. m) OR 7.0 sq. ft. (0.65 sq. m) as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **600-fpm (3.0-m/s) OR 700-fpm (3.6-m/s) OR 800-fpm (4.1-m/s), as directed**, free-area exhaust **OR** intake, **as directed**, velocity.
 - 3) Wind-Driven Rain Performance: Not less than 99 percent effectiveness when subjected to a rainfall rate of **3 inches (75 mm)** per hour and a wind speed of **29 mph (13 m/s) OR 8 inches (200 mm)** per hour and a wind speed of **50 mph (22.4 m/s), as directed**, at a core-area intake velocity of **300 fpm (1.5 m/s) OR 400 fpm (2.0 m/s) OR 500 fpm (2.5 m/s), as directed**.
 - d. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
3. Horizontal, Drainable-Blade Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm), as directed**.
 - b. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) OR 0.060 inch (1.52 mm)** for blades and **0.080 inch (2.03 mm)** for frames, **as directed**.
 - c. Mullion Type: Exposed.
 - d. Louver Performance Ratings:
 - 1) Free Area: Not less than **7.0 sq. ft. (0.65 sq. m) OR 7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m) OR 8.5 sq. ft. (0.79 sq. m), as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **900 fpm (4.6 m/s) OR 950 fpm (4.8 m/s) OR 1000 fpm (5.1 m/s) OR 1050 fpm (5.3 m/s) OR 1100 fpm (5.6 m/s), as directed**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **700-fpm (3.6-m/s) OR 750-fpm (3.8-m/s) OR 800-fpm (4.1-m/s) OR 850-fpm (4.3-m/s), as directed**, free-area exhaust **OR** intake, **as directed**, velocity.
 - 4) Air Performance: Not more than **0.15-inch wg (37-Pa)** static pressure drop at **900-fpm (4.6-m/s) OR 950-fpm (4.8-m/s) OR 1000-fpm (5.1-m/s), as directed**, free-area exhaust **OR** intake, **as directed**, velocity.
 - e. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
4. Horizontal, Continuous-Line, Drainable-Blade Louver: Drainable-blade louver with blade gutters (drains) in rear two-thirds of blades only and with semirecessed mullions capable of collecting and draining water from blades.
 - a. Louver Depth: **6 inches (150 mm)**.
 - b. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm)**.
 - c. Louver Performance Ratings:
 - 1) Free Area: Not less than **7.8 sq. ft. (0.72 sq. m)** for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **850 fpm (4.3 m/s)**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **800-fpm (4.1-m/s)** free-area exhaust **OR** intake, **as directed**, velocity.
5. Horizontal, Sightproof, Drainable-Blade Louver:

- a. Louver Depth: **5 inches (125 mm)**.
 - b. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) OR 0.060 inch (1.52 mm)** for blades and **0.080 inch (2.03 mm)** for frames, **as directed**.
 - c. Mullion Type: Exposed.
 - d. Louver Performance Ratings:
 - 1) Free Area: Not less than **8.3 sq. ft. (0.77 sq. m)** for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **750 fpm (3.8 m/s) OR 950 fpm (4.8 m/s)**, **as directed**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **550-fpm (2.8-m/s)** free-area exhaust **OR** intake, **as directed**, velocity.
6. Horizontal, Nondrainable-Blade Louver:
- a. Louver Depth: **2 inches (50 mm) OR 4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**.
 - b. Blade Profile: Plain blade without **OR** Blade with, **as directed**, center baffle.
 - c. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) OR 0.060 inch (1.52 mm)** for blades and **0.080 inch (2.03 mm)** for frames, **as directed**.
 - d. Mullion Type: Exposed **OR** Semirecessed **OR** Fully recessed, **as directed**.
 - e. Louver Performance Ratings:
 - 1) Free Area: Not less than **7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m) OR 8.5 sq. ft. (0.79 sq. m)**, **as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **700 fpm (3.6 m/s) OR 750 fpm (3.8 m/s) OR 800 fpm (4.1 m/s) OR 850 fpm (4.3 m/s) OR 900 fpm (4.6 m/s) OR 950 fpm (4.8 m/s)**, **as directed**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **650-fpm (3.3-m/s) OR 700-fpm (3.6-m/s) OR 750-fpm (3.8-m/s)**, **as directed**, free-area exhaust **OR** intake, **as directed**, velocity.
7. Vertical, Sightproof, Louver:
- a. Louver Depth: **4 inches (100 mm)**.
 - b. Blade Profile: Chevron **OR** Y **OR** Labyrinth, **as directed**, -shaped blade.
 - c. Frame and Blade Nominal Thickness: Not less than **0.080 inch (2.03 mm) OR 0.060 inch (1.52 mm)** for blades and **0.080 inch (2.03 mm)** for frames, **as directed**.
 - d. Blade Spacing: **2 inches (50 mm) OR 4 inches (100 mm)**, **as directed**, o.c.
 - e. Mullion Type: Exposed **OR** Semirecessed **OR** Fully recessed, **as directed**.
- D. Fixed, Formed-Metal Louvers
1. Horizontal, Drainable-Blade Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**.
 - b. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than **0.052 inch (1.32 mm)** for frames and **0.040 inch (1.02 mm)** for blades **OR 0.052 inch (1.32 mm) OR 0.064 inch (1.63 mm)**, **as directed**.
 - c. Frame and Blade Material and Nominal Thickness: Stainless-steel sheet, not less than **0.050 inch (1.27 mm) OR 0.062 inch (1.59 mm)**, **as directed**.
 - d. Mullion Type: Exposed.
 - e. Louver Performance Ratings:
 - 1) Free Area: Not less than **7.0 sq. ft. (0.65 sq. m) OR 7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m) OR 8.5 sq. ft. (0.79 sq. m)**, **as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **800 fpm (4.1 m/s) OR 850 fpm (4.3 m/s) OR 900 fpm (4.6 m/s) OR 950 fpm (4.8 m/s) OR 1000 fpm (5.1 m/s)**, **as directed**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **700-fpm (3.6-m/s) OR 750-fpm (3.8-m/s) OR 800-fpm (4.1-m/s) OR 850-fpm (4.3-m/s)**, **as directed**, free-area exhaust **OR** intake, **as directed**, velocity.

- 4) Air Performance: Not more than **0.15-inch wg (37-Pa)** static pressure drop at **900-fpm (4.6-m/s) OR 950-fpm (4.8-m/s) OR 1000-fpm (5.1-m/s)**, **as directed**, free-area velocity.
- f. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
2. Horizontal, Nondrainable-Blade Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**.
 - b. Blade Profile: Plain blade without **OR** Blade with, **as directed**, center baffle.
 - c. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than **0.052 inch (1.32 mm)** for frames and **0.040 inch (1.02 mm)** for blades **OR 0.052 inch (1.32 mm) OR 0.064 inch (1.63 mm)**, **as directed**.
 - d. Frame and Blade Material and Nominal Thickness: Stainless-steel sheet, not less than **0.050 inch (1.27 mm) OR 0.062 inch (1.59 mm)**, **as directed**.
 - e. Mullion Type: Exposed **OR** Semirecessed **OR** Fully recessed, **as directed**.
 - f. Louver Performance Ratings:
 - 1) Free Area: Not less than **6.5 sq. ft. (0.60 sq. m) OR 7.0 sq. ft. (0.65 sq. m) OR 7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m)**, **as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **550 fpm (2.8 m/s) OR 600 fpm (3.0 m/s) OR 650 fpm (3.3 m/s) OR 700 fpm (3.6 m/s)**, **as directed**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **550-fpm (2.8-m/s) OR 600-fpm (3.0-m/s) OR 650-fpm (3.3-m/s) OR 700-fpm (3.6-m/s)**, **as directed**, free-area exhaust **OR** intake, **as directed**, velocity.
- E. Adjustable, Extruded-Aluminum Louvers
 1. Louver Construction and Operation: Provide adjustable louvers with extruded-aluminum frames and blades not less than **0.080-inch (2.03-mm)** nominal thickness, and with operating mechanisms to suit louver sizes.
 - a. Hand operation with push bars.
 - b. Crank operation with removable-crank operator in sill or jamb.
 - c. Chain operation with tension spring, wall clip, pull chain, and **160 deg F (71 deg C)** fusible link.
 - d. Motor operation with 2-position, spring-return application (with power on, motor opens louver; with power off, spring closes louver); 110-V, 60-Hz motor and limit switch **OR** 2-direction, 110-V, 60-Hz motor and limit switches, **as directed**; equipped with frame-mounted switch **OR** remote-mounted switch with indicator light **OR** terminals for controlling devices, **as directed**.
 - e. Pneumatic piston operation for use with **80- to 100-psi (550- to 690-kPa)** compressed air for 2-position **OR** modulating, **as directed**, operation; power open, power close with spring-return fail-safe, **as directed**.
 2. Dual-Blade, Drainable-Blade, Adjustable Louver: Fixed drainable blades and adjustable plain blades combined in single frame.
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, overall.
 - b. Louver Performance Ratings:
 - 1) Free Area: Not less than **6.0 sq. ft. (0.56 sq. m) OR 6.5 sq. ft. (0.60 sq. m) OR 7.0 sq. ft. (0.65 sq. m) OR 7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m)**, **as directed**, for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **750 fpm (3.8 m/s) OR 800 fpm (4.1 m/s) OR 850 fpm (4.3 m/s) OR 900 fpm (4.6 m/s) OR 950 fpm (4.8 m/s) OR 1000 fpm (5.1 m/s)**, **as directed**.
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **750-fpm (3.8-m/s) OR 800-fpm (4.1-m/s) OR 850-fpm (4.3-m/s) OR 900-fpm (4.6-m/s)**, **as directed**, free-area exhaust **OR** intake, **as directed**, velocity.
 - 4) Air Leakage: Not more than **1.5 cfm/sq. ft. (7.6 L/s per sq. m)** of louver gross area at a differential static pressure of **0.15-inch wg (37 Pa)** with adjustable louver blades closed.

- c. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
3. Single-Blade, Adjustable Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm), as directed.**
 - b. Blade Type: Drainable **OR** Plain, **as directed.**
 - c. Accessories: Equip louvers as follows:
 - 1) Vinyl blade-edge gaskets for each louver blade.
 - 2) Stainless-steel jamb seals **OR** vinyl blade-end gaskets, **as directed.**
 - d. Louver Performance Ratings:
 - 1) Free Area: Not less than **6.5 sq. ft. (0.60 sq. m) OR 7.0 sq. ft. (0.65 sq. m) OR 7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m), as directed,** for **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **500 fpm (2.5 m/s) OR 600 fpm (3.0 m/s) OR 700 fpm (3.6 m/s) OR 800 fpm (4.1 m/s) OR 900 fpm (4.6 m/s) OR 1000 fpm (5.1 m/s), as directed.**
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **500-fpm (2.5-m/s) OR 600-fpm (3.0-m/s) OR 700-fpm (3.6-m/s) OR 800-fpm (4.1-m/s) OR 900-fpm (4.6-m/s), as directed,** free-area exhaust **OR** intake, **as directed,** velocity.
 - 4) Air Leakage: Not more than **3.5 cfm/sq. ft. (17.8 L/s per sq. m)** of louver gross area at a differential static pressure of **0.15-inch wg (37 Pa)** with adjustable louver blades closed.
 - e. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
- F. Adjustable, Formed-Metal Louvers
 1. Louver Operation: Provide adjustable louvers with operating mechanisms to suit louver sizes.
 - a. Hand operation with push bars.
 - b. Crank operation with removable-crank operator in sill or jamb.
 - c. Chain operation with tension spring, wall clip, pull chain, and **160 deg F (71 deg C)** fusible link.
 - d. Motor operation with 2-position, spring-return application (with power on, motor opens louver; with power off, spring closes louver); 110-V, 60-Hz motor and limit switch **OR** 2-direction, 110-V, 60-Hz motor and limit switches, **as directed;** equipped with frame-mounted switch **OR** remote-mounted switch with indicator light **OR** terminals for controlling devices, **as directed.**
 - e. Pneumatic piston operation for use with **80- to 100-psi (550- to 690-kPa)** compressed air for 2-position **OR** modulating, **as directed,** operation; power open, power close with spring-return fail-safe, **as directed.**
 2. Dual-Blade, Drainable-Blade, Adjustable Louver: Fixed drainable blades and adjustable plain blades combined in single frame.
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm), as directed,** overall.
 - b. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than **0.052 inch (1.32 mm)** for frames and **0.040 inch (1.02 mm)** for blades **OR 0.052 inch (1.32 mm) OR 0.064 inch (1.63 mm), as directed.**
 - c. Frame and Blade Material and Nominal Thickness: Stainless-steel sheet, not less than **0.050 inch (1.27 mm) OR 0.062 inch (1.59 mm), as directed.**
 - d. Louver Performance Ratings:
 - 1) Air Leakage: Not more than **1.5 cfm/sq. ft. (7.6 L/s per sq. m)** of louver gross area at a differential static pressure of **0.15-inch wg (37 Pa)** with adjustable louver blades closed.
 - e. AMCA Seal: Mark units with AMCA Certified Ratings Seal.
 3. Single-Blade, Adjustable Louver:
 - a. Louver Depth: **4 inches (100 mm) OR 6 inches (150 mm), as directed.**
 - b. Blade Type: Drainable **OR** Plain, **as directed.**
 - c. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than **0.052 inch (1.32 mm)** for frames and **0.040 inch (1.02 mm)** for blades **OR 0.052 inch (1.32 mm) OR 0.064 inch (1.63 mm), as directed.**

- d. Frame and Blade Material and Nominal Thickness: Stainless-steel sheet, not less than **0.050 inch (1.27 mm) OR 0.062 inch (1.59 mm), as directed.**
- e. Accessories: Equip louvers as follows:
 - 1) Vinyl blade-edge gaskets for each louver blade.
 - 2) Stainless-steel jamb seals **OR** vinyl blade-end gaskets, **as directed.**
- f. Louver Performance Ratings:
 - 1) Free Area: Not less than **6.5 sq. ft. (0.60 sq. m) OR 7.0 sq. ft. (0.65 sq. m) OR 7.5 sq. ft. (0.70 sq. m) OR 8.0 sq. ft. (0.74 sq. m), as directed,** for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - 2) Point of Beginning Water Penetration: Not less than **500 fpm (2.5 m/s) OR 600 fpm (3.0 m/s) OR 700 fpm (3.6 m/s) OR 800 fpm (4.1 m/s) OR 900 fpm (4.6 m/s) OR 1000 fpm (5.1 m/s), as directed.**
 - 3) Air Performance: Not more than **0.10-inch wg (25-Pa)** static pressure drop at **500-fpm (2.5-m/s) OR 600-fpm (3.0-m/s) OR 700-fpm (3.6-m/s) OR 800-fpm (4.1-m/s) OR 900-fpm (4.6-m/s), as directed,** free-area exhaust **OR** intake, **as directed,** velocity.
 - 4) Air Leakage: Not more than **3.5 cfm/sq. ft. (17.8 L/s per sq. m)** of louver gross area at a differential static pressure of **0.15-inch wg (37 Pa)** with adjustable louver blades closed.
- g. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

G. Adjustable, Insulated Louvers

- 1. Louver Operation: Provide adjustable louvers with operating mechanisms to suit louver sizes.
 - a. Hand operation with push bars.
 - b. Crank operation with removable-crank operator in sill or jamb.
 - c. Chain operation with tension spring, wall clip, pull chain, and **160 deg F (71 deg C)** fusible link.
 - d. Motor operation with 2-position, spring-return application (with power on, motor opens louver; with power off, spring closes louver); 110-V, 60-Hz motor and limit switch **OR** 2-direction, 110-V, 60-Hz motor and limit switches, **as directed;** equipped with frame-mounted switch **OR** remote-mounted switch with indicator light **OR** terminals for controlling devices, **as directed.**
 - e. Pneumatic piston operation for use with **80- to 100-psi (550- to 690-kPa)** compressed air for 2-position **OR** modulating, **as directed,** operation; power open, power close with spring-return fail-safe, **as directed.**
- 2. Adjustable, Insulated, Extruded-Aluminum Louver: Single-blade, adjustable louver with gasketed, insulated blades. Frames and blade frames have urethane thermal break. Frames are extruded aluminum, not less than **0.080-inch (2.03-mm)** nominal thickness. Blade facings are aluminum sheet, not less than **0.032-inch (0.81-mm)** nominal thickness.
 - a. Louver Depth: **6 inches (150 mm) OR 9 inches (225 mm), as directed.**
 - b. Insulation: Extruded-polystyrene foam, **2 inches (50 mm)** thick **OR** Foamed-in-place polyurethane, **as directed.**
- 3. Adjustable, Insulated, Formed-Metal Louver: Single-blade, adjustable louver with gasketed, insulated blades.
 - a. Louver Depth: **6 inches (150 mm) OR 8 inches (200 mm), as directed.**
 - b. Frame Material and Nominal Thickness: Galvanized-steel sheet, not less than **0.052 inch (1.32 mm) OR 0.064 inch (1.63 mm), as directed.**
 - c. Frame Material and Nominal Thickness: Stainless-steel sheet, not less than **0.050 inch (1.27 mm) OR 0.062 inch (1.59 mm), as directed.**
 - d. Blade Material and Nominal Thickness: Galvanized-steel sheet, not less than **0.028 inch (0.71 mm) OR 0.040 inch (1.02 mm) OR 0.052 inch (1.32 mm) OR 0.064 inch (1.63 mm), as directed.**
 - e. Blade Material and Nominal Thickness: Stainless-steel sheet, not less than **0.025 inch (0.64 mm) OR 0.038 inch (0.95 mm) OR 0.050 inch (1.27 mm) OR 0.062 inch (1.59 mm), as directed.**

- f. Insulation: Extruded-polystyrene foam, **1 inch (25 mm)** thick **OR** Rigid, glass-fiber-board insulation, **1 inch (25 mm)** thick **OR** Foamed-in-place polyurethane, **1/2 inch (13 mm)** thick, **as directed**.

H. Fixed, Acoustical Louvers

1. Fixed, Formed-Metal Acoustical Louver: Louver with formed-metal blades filled on interior with mineral-fiber, rigid-board, acoustical insulation retained by perforated metal sheet of same material and finish as blade.
 - a. Louver Depth: **6 inches (150 mm)** **OR** **8 inches (200 mm)** **OR** **12 inches (300 mm)**, **as directed**.
 - b. Frame Material: Extruded-aluminum or aluminum sheet, not less than **0.080-inch (2.03-mm)** nominal thickness.
 - c. Frame Material: Galvanized-steel sheet, not less than **0.052-inch (1.32-mm)** **OR** **0.064-inch (1.63-mm)**, **as directed**, nominal thickness.
 - d. Blade Material: Aluminum sheet, not less than **0.063-inch (1.60-mm)** **OR** **0.080-inch (2.03-mm)**, **as directed**, nominal thickness.
 - e. Blade Material: Galvanized-steel sheet, not less than **0.034-inch (0.86-mm)** **OR** **0.040-inch (1.02-mm)** **OR** **0.052-inch (1.32-mm)**, **as directed**, nominal thickness.
 - f. Blade Shape: Straight **OR** Airfoil **OR** Chevron, **as directed**.
 - g. Blade Angle: 45 degrees unless otherwise indicated.
 - h. Blade Spacing: **6 inches (150 mm)** o.c. for **6-inch- (150-mm-)** deep louvers.
 - i. Blade Spacing: **6 inches (150 mm)** **OR** **8 inches (200 mm)**, **as directed**, o.c. for **8-inch- (200-mm-)** deep louvers.
 - j. Blade Spacing: **9 inches (225 mm)** **OR** **12 inches (300 mm)**, **as directed**, o.c. for **12-inch- (300-mm-)** deep louvers.
 - k. Free Area: Not less than **4 sq. ft. (0.37 sq. m)** for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 - l. Airborne Sound-Transmission Loss: STC 10 per ASTM E 413, determined by testing per ASTM E 90.
 - m. Outdoor-Indoor Sound-Transmission Loss: OITC 10 per ASTM E 1332, determined by testing per ASTM E 966.

I. Louver Screens

1. General: Provide screen at each exterior louver **OR** louvers indicated, **as directed**.
 - a. Screen Location for Fixed Louvers: Interior face.
 - b. Screen Location for Adjustable Louvers: Interior **OR** Exterior, **as directed**, face unless otherwise indicated.
 - c. Screening Type: Bird screening **OR** Bird screening except where insect screening is indicated **OR** Insect screening, **as directed**.
2. Secure screen frames to louver frames with stainless-steel machine screws **OR** machine screws with heads finished to match louver, **as directed**, spaced a maximum of **6 inches (150 mm)** from each corner and at **12 inches (300 mm)** o.c.
3. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - a. Metal: Same kind and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips, **as directed**.
 - b. Finish: Same finish as louver frames to which louver screens are attached **OR** Mill finish unless otherwise indicated, **as directed**.
 - c. Type: Rewirable frames with a driven spline or insert **OR** Non-rewirable, U-shaped frames, **as directed**.
4. Louver Screening for Aluminum Louvers:
 - a. Bird Screening: Aluminum, **1/2-inch- (13-mm-)** square mesh, **0.063-inch (1.60-mm)** wire.
 - b. Bird Screening: Stainless steel, **1/2-inch- (13-mm-)** square mesh, **0.047-inch (1.19-mm)** wire.
 - c. Bird Screening: Flattened, expanded aluminum, **3/4 by 0.050 inch (19 by 1.27 mm)** thick.
 - d. Insect Screening: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh, **0.012-inch (0.30-mm)** wire.

- e. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.
- 5. Louver Screening for Galvanized-Steel Louvers:
 - a. Bird Screening: Galvanized steel, 1/2-inch- (13-mm-) square mesh, 0.041-inch (1.04-mm) wire.
 - b. Bird Screening: Stainless steel, 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
 - c. Insect Screening: Galvanized steel, 18-by-14 (1.4-by-1.8-mm) mesh, 0.011-inch (0.28-mm) wire.
 - d. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.
- 6. Louver Screening for Stainless-Steel Louvers:
 - a. Bird Screening: Stainless steel, 1/2-inch- (13-mm-) square mesh, 0.047-inch (1.19-mm) wire.
 - b. Insect Screening: Stainless steel, 18-by-18 (1.4-by-1.4-mm) mesh, 0.009-inch (0.23-mm) wire.
- J. Blank-Off Panels
 - 1. Uninsulated, Blank-Off Panels: Metal sheet attached to back of louver.
 - a. Aluminum sheet for aluminum louvers, not less than 0.050-inch (1.27-mm) nominal thickness.
 - b. Galvanized-steel sheet for galvanized-steel louvers, not less than 0.040-inch (1.02-mm) **OR** 0.052-inch (1.32-mm), **as directed**, nominal thickness.
 - c. Stainless-steel sheet for stainless-steel louvers, not less than 0.038-inch (0.95-mm) **OR** 0.050-inch (1.27-mm), **as directed**, nominal thickness, with grain running in same direction as grain of louver blades.
 - d. Panel Finish: Same finish applied to louvers **OR** Same type of finish applied to louvers, but black color, **as directed**.
 - e. Attach blank-off panels with clips **OR** sheet metal screws, **as directed**.
 - 2. Insulated, Blank-Off Panels: Laminated panels consisting of insulating core surfaced on back and front with metal sheets and attached to back of louver.
 - a. Thickness: 1 inch (25 mm) **OR** 2 inches (50 mm), **as directed**.
 - b. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch (0.81-mm) nominal thickness.
 - c. Metal Facing Sheets: Galvanized-steel sheet, not less than 0.028-inch (0.71-mm) nominal thickness.
 - d. Metal Facing Sheets: Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness.
 - e. Insulating Core: Rigid, glass-fiber-board insulation **OR** extruded-polystyrene foam, **as directed**.
 - f. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch (2.03-mm) nominal thickness **OR** channel frames, **as directed**, with corners mitered and with same finish as panels.
 - g. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 - h. Panel Finish: Same finish applied to louvers **OR** Same type of finish applied to louvers, but black color, **as directed**.
 - i. Attach blank-off panels with clips **OR** sheet metal screws, **as directed**.
- K. Wall Vents (Brick Vents)
 - 1. Extruded-Aluminum Wall Vents:
 - a. Extruded-aluminum louvers and frames, not less than 0.125-inch (3.18-mm) nominal thickness, assembled by welding; with 18-by-14- (1.4-by-1.8-mm-) mesh, aluminum insect screening on inside face; incorporating weep holes, continuous drip at sill, and integral waterstop on inside edge of sill; of load-bearing design and construction.

- b. Dampers: Aluminum blades and frames mounted on inside of wall vents; operated from exterior with Allen wrench in socket-head cap screw. Fabricate operating mechanism from Type 304 stainless-steel components.
 - c. Finish: Mill finish.
 - 2. Cast-Aluminum Wall Vents:
 - a. One-piece, cast-aluminum louvers and frames; with **18-by-14- (1.4-by-1.8-mm-)** mesh, aluminum insect screening on inside face; incorporating integral waterstop on inside edge of sill; of load-bearing design and construction.
 - b. Dampers: Aluminum blades and frames mounted on inside of wall vents; operated from exterior with Allen wrench in socket-head cap screw. Fabricate operating mechanism from Type 304 stainless-steel components.
 - c. Finish: Mill finish.
- L. Finishes, General
 - 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- M. Aluminum Finishes
 - 1. Finish louvers after assembly.
 - 2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
 - 3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: As selected from full range of industry colors and color densities.
 - 4. Conversion-Coated Finish: AA-C12C42 (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating).
 - 5. Conversion-Coated and Factory-Primed Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below).
 - a. Organic Coating: Air-dried primer of not less than **2-mil (0.05-mm)** dry film thickness.
 - 6. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 7. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 8. High-Performance Organic Finish: 3 **OR** 4, **as directed**, -coat fluoropolymer finish complying with AAMA 2605 and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- N. Galvanized-Steel Sheet Finishes
 - 1. Finish louvers after assembly.
 - 2. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A 780.
 - 3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish consisting of prime coat and thermosetting

topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.

a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

O. Stainless-Steel Sheet Finishes

1. Repair sheet finish by grinding and polishing irregularities, weld spatter, scratches, and forming marks to match surrounding finish.

1.3 EXECUTION

A. Installation

1. Locate and place louvers and vents level, plumb, and at indicated alignment with adjacent work.
2. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
3. Form closely fitted joints with exposed connections accurately located and secured.
4. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
5. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
6. Protect unpainted galvanized and nonferrous-metal surfaces that will be in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
7. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Division 07 Section "Joint Sealants" for sealants applied during louver installation.

B. Adjusting And Cleaning

1. Test operation of adjustable louvers and adjust as needed to produce fully functioning units that comply with requirements.
2. Clean exposed surfaces of louvers and vents that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
3. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
4. Restore louvers and vents damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by the Owner, remove damaged units and replace with new units.
 - a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 08 90 00 00

Task	Specification	Specification Description
08 91 16 00	08 90 00 00	Louvers And Vents
08 95 13 00	01 22 16 00	No Specification Required
08 95 16 00	01 22 16 00	No Specification Required
08 95 16 00	05 50 00 00	Metal Fabrications
08 95 16 00	05 73 23 00	Miscellaneous Ornamental Metals

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Task	Specification	Specification Description
09 01 30 91	09 30 13 00	Ceramic Tile
09 01 60 91	01 22 16 00	No Specification Required
09 01 60 91	07 91 23 00	Joint Sealants
09 01 60 91	09 66 13 00	Portland Cement Terrazzo Flooring
09 01 60 91	09 68 13 00	Carpet Tile
09 01 60 91	09 68 16 00	Carpet
09 01 90 52	03 01 30 71	Concrete Rehabilitation
09 05 71 00	09 30 13 00	Ceramic Tile

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SECTION 09 22 13 13 - GYPSUM PLASTER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gypsum plaster. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Gypsum plasterwork on expanded-metal lath, unit masonry and monolithic concrete.
 - b. Solid-plaster partitions.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For sealants, including printed statement of VOC content.
3. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

D. Quality Assurance

1. Fire-Resistance Ratings: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Sound Transmission Characteristics: Where indicated, provide gypsum plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.

E. Delivery, Storage, And Handling

1. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

F. Project Conditions

1. Comply with ASTM C 842 requirements or gypsum plaster manufacturer's written recommendations, whichever are more stringent.
2. Room Temperatures: Maintain temperatures at not less than **55 deg F (13 deg C)** or greater than **80 deg F (27 deg C)** for at least seven days before application of gypsum plaster, continuously during application, and for seven days after plaster has set or until plaster has dried.
3. Avoid conditions that result in gypsum plaster drying out too quickly.
 - a. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - b. Maintain relative humidity levels for prevailing ambient temperature that produce normal drying conditions.
 - c. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

1.2 PRODUCTS

- A. Steel Framing For Solid-Plaster Partitions
1. Components, General: Comply with ASTM C 841. For steel sheet components not included in ASTM C 841, comply with ASTM C 645 requirements for metal unless otherwise indicated.
 2. Channel Studs: Cold-rolled channels, **3/4 inch (19.1 mm) OR 1-1/2 inches (38.1 mm), as directed**, deep.
 3. Runners: L-runners with perforated or plain legs to suit lath attachment requirements, in **0.033-inch (0.84-mm)** base-metal thickness where attached to overhead support and in **0.043-inch (1.1-mm)** base-metal thickness where attached to floor.
- B. Expanded-Metal Lath
1. Expanded-Metal Lath: ASTM C 847, cold-rolled carbon-steel sheet, ASTM A 653/A 653M, **G60 (Z180)**, hot-dip galvanized zinc coated.
 - a. Recycled Content: Provide steel products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 - b. Paper Backing: Kraft paper factory bonded to back of lath.
 - c. Diamond-Mesh Lath: Flat **OR** Self-furring, **as directed, 2.5 lb/sq. yd. (1.4 kg/sq. m) OR 3.4 lb/sq. yd. (1.8 kg/sq. m), as directed.**
 - d. Flat Rib Lath: Rib depth of not more than **1/8 inch (3.1 mm), 2.75 lb/sq. yd. (1.5 kg/sq. m) OR 3.4 lb/sq. yd. (1.8 kg/sq. m), as directed.**
 - e. **3/8-Inch (9.5-mm) Rib Lath: 3.4 lb/sq. yd. (1.8 kg/sq. m) OR 4 lb/sq. yd. (2.2 kg/sq. m), as directed.**
- C. Accessories
1. General: Comply with ASTM C 841 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
 2. Metal Accessories:
 - a. Cornerite: Fabricated from expanded-metal lath with ASTM A 653/A 653M, **G60 (Z180)**, hot-dip galvanized zinc coating.
 - b. Striplath: Fabricated from expanded-metal lath with ASTM A 653/A 653M, **G60 (Z180)**, hot-dip galvanized zinc coating.
 - c. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
 - 1) Small nose cornerbead with expanded flanges; use unless otherwise indicated.
 - 2) Small nose cornerbead with perforated flanges; use on curved corners.
 - 3) Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing unit masonry corners.
 - 4) Bull nose cornerbead, radius **3/4 inch (19.1 mm)** minimum, with expanded flanges; use at locations indicated on Drawings.
 - d. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
 - e. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - f. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
 - g. Two-Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from **1/4 to 5/8 inch (6 to 16 mm)** wide; with perforated flanges.
 3. Plastic Accessories: Fabricated from high-impact PVC.
 - a. Cornerbeads: With perforated flanges.
 - 1) Small nose cornerbead; use unless otherwise indicated.
 - 2) Bull nose cornerbead, radius **3/4 inch (19.1 mm)** minimum; use at locations indicated on Drawings.

- b. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
 - 1) Square-edge style; use unless otherwise indicated.
 - 2) Bull-nose style, radius **3/4 inch (19.1 mm)** minimum; use at locations indicated on Drawings.
 - c. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - d. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged **1/2-inch- (13-mm-) OR 1-inch- (25.4-mm-) OR 1-1/2-inch- (38.1-mm-)**, **as directed**, wide reveal; with perforated concealed flanges.
4. Aluminum Trim: Extruded accessories of profiles and dimensions indicated on Drawings.
- a. Aluminum: Alloy and temper with not less than the strength and durability properties of **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5.
 - b. Finish: Mill **OR** Chemical-conversion coating, ASTM D 1730, Type B, compatible with field-applied finish coatings specified, **as directed**.
- D. Miscellaneous Materials
1. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
 2. Bonding Compound: ASTM C 631.
 3. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
 4. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 841.
 5. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than **0.0475-inch (1.21-mm)** diameter, unless otherwise indicated.
 6. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - a. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of rated assembly.
 - b. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
 7. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants."
 - a. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Base-Coat Plaster Materials
1. Base-Coat Plasters, General: ASTM C 28/C 28M.
 2. Lightweight Gypsum Ready-Mixed Plaster: With mill-mixed perlite aggregate.
 3. Gypsum Neat Plaster: For use with job-mixed aggregates.
 4. Gypsum Wood-Fibered Plaster:
 5. High-Strength Gypsum Neat Plaster: With a minimum, average, dry compressive strength of **2800 psi (19 MPa)** per ASTM C 472 for a mix of **100 lb (45 kg)** of plaster and **2 cu. ft. (0.06 cu. m)** of sand.
 6. Aggregates for Base-Coat Plasters: ASTM C 35, sand and perlite.
- F. Finish-Coat Plaster Materials
1. Gypsum Gaging Plaster: ASTM C 28/C 28M.
 2. Gypsum Ready-Mixed Finish Plaster: Manufacturer's standard, mill-mixed, gaged, interior finish.
 3. High-Strength Gypsum Gaging Plaster: ASTM C 28/C 28M, with a minimum, average, dry compressive strength of **5000 psi (34 MPa)** per ASTM C 472 for a neat mix.
 4. Gypsum Keene's Cement: ASTM C 61/C 61M.
 5. Lime: ASTM C 206, Type S, special finishing hydrated lime.

6. Lime: ASTM C 206, Type N, normal finishing hydrated lime.
7. Aggregates for Float Finishes: ASTM C 35, sand **OR** perlite, **as directed**; graded per ASTM C 842.

G. Plaster Mixes

1. Mixing: Comply with ASTM C 842 and manufacturer's written instructions for applications indicated.

1.3 EXECUTION

A. Examination

1. Examine nonstructural and structural metal framing, substrates, and hollow-metal frames, for compliance with requirements and other conditions affecting performance of the Work.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

C. Installation, General

1. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
2. STC-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
 - a. Seal construction at perimeters, behind control and expansion joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations.
 - b. Comply with ASTM C 919 and manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
3. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
4. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.

D. Installing Steel Framing For Solid-Plaster Partitions

1. Install according to ASTM C 841.
2. Framing for Solid-Plaster Partitions: Provide channel stud to support expanded-metal lath construction.
 - a. Space channel studs at **16 inches (406 mm) OR 24 inches (610 mm)**, **as directed**, o.c. unless otherwise indicated.
3. Framing for Studless Solid-Plaster Partition: Provide top and bottom L-track runners to support expanded-metal lath.

E. Installing Expanded-Metal Lath

1. Expanded-Metal Lath: Install according to ASTM C 841.
 - a. Partition Framing and Vertical Furring: Install flat diamond-mesh **OR** flat rib, **as directed**, lath.
 - b. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh **OR** flat rib, **as directed**, lath.
 - c. Curved-Ceiling Framing: Install flat diamond-mesh lath.
 - d. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.
 - e. Solid-Plaster Partitions: Where supported by channel studs, install flat rib **OR** flat diamond-mesh, **as directed**, lath.

- f. Studless Solid-Plaster Partitions: Install **3/8-inch (9.5-mm)** rib lath.

F. Installing Accessories

1. General: Install according to ASTM C 841.
2. Cornerbeads: Install at external corners.
3. Casing Beads: Install at terminations of plasterwork, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or frames act as casing beads.
4. Control Joints: Install control joints at locations indicated on Drawings **OR** with spacing between joints in either direction not exceeding the following and in specific locations approved by Architect for visual effect, **as directed**:
 - a. Partitions: **30 feet (9 m)**.
 - b. Ceilings: **50 feet (15 m) OR 30 feet (9 m), as directed.**

G. Plaster Application

1. General: Comply with ASTM C 842.
 - a. Do not deviate more than plus or minus **1/8 inch in 10 feet (3.1 mm in 3 m)** from a true plane in finished plaster surfaces, as measured by a **10-foot (3-m)** straightedge placed on surface.
 - b. Grout hollow-metal frames, bases, and similar work occurring in plastered areas, with base-coat plaster material, before lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least **6 inches (152 mm)** at each jamb anchor.
 - c. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 - d. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
2. Bonding Compound: Apply on unit masonry and concrete plaster bases.
3. Base Coats:
 - a. Base Coats over Expanded-Metal Lath: High-strength gypsum **OR** Gypsum neat, **as directed**, plaster with job-mixed sand for scratch and brown coats.
 - b. Base Coats over Expanded-Metal Lath:
 - 1) Scratch Coat: Gypsum wood-fibered plaster; neat or with job-mixed sand.
 - 2) Brown Coat: Gypsum wood-fibered plaster with job-mixed sand **OR** neat plaster with job-mixed sand **OR** lightweight ready-mixed plaster **OR** neat plaster with job-mixed perlite, **as directed**.
 - c. Base Coats over Unit Masonry: Gypsum wood-fibered plaster with job-mixed sand **OR** neat plaster with job-mixed sand **OR** lightweight ready-mixed plaster, **as directed**.
 - d. Base-Coat Mix over Monolithic Concrete: Gypsum neat plaster with job-mixed sand.
4. Finish Coats:
 - a. Finish-Coat Mix for Smooth-Troweled Finishes: Gypsum gaging plaster **OR** Gypsum ready-mixed finish plaster **OR** High-strength gypsum gaging plaster **OR** Gypsum Keene's cement, **as directed**.
 - b. Finish-Coat Mix for Float Finishes: Gypsum gaging plaster **OR** Gypsum Keene's cement, **as directed**.
 - c. Finish-Coat Mix for Sprayed Finishes: Gypsum ready-mixed finish plaster.
 - d. Finish-Coat Mix for Textured Finishes: Gypsum ready-mixed finish plaster.
5. Plaster Finishes:
 - a. Provide troweled finish unless otherwise indicated **OR** where indicated, **as directed**.
 - b. Provide float finish unless otherwise indicated **OR** where indicated, **as directed**.
 - c. Provide sprayed finish unless otherwise indicated **OR** where indicated, **as directed**.
 - 1) Sprayed Finish: Match sample.
 - d. Provide textured finish where indicated.
 - 1) Textured Finish: Match sample.
6. Concealed Plaster:

09 - Finishes



- a. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
- b. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
- c. Where plaster application will be used as a base for adhesive application of tile and similar finishes, finish coat may be omitted.

H. Plaster Repairs

1. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

I. Cleaning And Protection

1. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09 22 13 13

SECTION 09 22 13 13a - PORTLAND CEMENT PLASTER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for portland cement plaster. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Interior portland cement plasterwork on metal lath, unit masonry and monolithic concrete.
 - b. Exterior portland cement plasterwork (stucco) on metal lath, unit masonry and monolithic concrete.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For sealants, including printed statement of VOC content.
3. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.
4. Samples: For each type of factory-prepared, colored or textured finish coat indicated; **12 by 12 inches (305 by 305 mm)**, and prepared on rigid backing.

D. Quality Assurance

1. Fire-Resistance Ratings: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
2. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

F. Project Conditions

1. Comply with ASTM C 926 requirements.
2. Interior Plasterwork: Maintain room temperatures at greater than **40 deg F (4.4 deg C)** for at least 48 hours before plaster application, and continuously during and after application.
 - a. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - b. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.
3. Exterior Plasterwork:

- a. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - b. Apply plaster when ambient temperature is greater than **40 deg F (4.4 deg C)**.
 - c. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.
4. Factory-Prepared Finishes: Comply with manufacturer's written recommendations for environmental conditions for applying finishes.

1.2 PRODUCTS

A. Metal Lath

1. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, **G60 (Z180)**, hot-dip galvanized zinc coating.
 - a. Recycled Content: Provide steel products with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 - b. Diamond-Mesh Lath: Flat **OR** Self-furring, **as directed**, **2.5 lb/sq. yd. (1.4 kg/sq. m) OR 3.4 lb/sq. yd. (1.8 kg/sq. m), as directed**.
 - c. Flat Rib Lath: Rib depth of not more than **1/8 inch (3.1 mm)**, **2.75 lb/sq. yd. (1.5 kg/sq. m) OR 3.4 lb/sq. yd. (1.8 kg/sq. m), as directed**.
 - d. **3/8-Inch (9.5-mm) Rib Lath: 3.4 lb/sq. yd. (1.8 kg/sq. m) OR 4 lb/sq. yd. (2.2 kg/sq. m), as directed**.
2. Wire-Fabric Lath:
 - a. Welded-Wire Lath: ASTM C 933; self-furring, **1.4 lb/sq. yd. (0.8 kg/sq. m) OR 1.95 lb/sq. yd. (1.1 kg/sq. m), as directed**.
 - b. Woven-Wire Lath: ASTM C 1032; self-furring, with stiffener wire backing, **1.1 lb/sq. yd. (0.6 kg/sq. m) OR 1.4 lb/sq. yd. (0.8 kg/sq. m), as directed**.
3. Paper Backing: FS UU-B-790, Type I, Grade D, Style 2 vapor-permeable paper **OR** Grade B, Style 1a vapor-retardant paper, **as directed**.
 - a. Provide paper-backed lath unless otherwise indicated **OR** at exterior locations **OR** in locations indicated on Drawings, **as directed**.

B. Accessories

1. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
2. Metal Accessories:
 - a. Foundation Weep Screed: Fabricated from hot-dip galvanized-steel sheet, ASTM A 653/A 653M, **G60 (Z180)** zinc coating.
 - b. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, **G60 (Z180)**, hot-dip galvanized zinc coating.
 - c. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, **G60 (Z180)**, hot-dip galvanized zinc coating.
 - d. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
 - 1) Small nose cornerbead with expanded flanges; use unless otherwise indicated.
 - 2) Small nose cornerbead with perforated flanges; use on curved corners.
 - 3) Small nose cornerbead with expanded flanges reinforced by perforated stiffening rib; use on columns and for finishing masonry corners.
 - 4) Bull nose cornerbead, radius **3/4 inch (19.1 mm)** minimum, with expanded flanges; use at locations indicated on Drawings.
 - e. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.

- f. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - g. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.
 - h. Two-Piece Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from **1/4 to 5/8 inch (6.34 to 16 mm)** wide; with perforated flanges.
3. Plastic Accessories: Fabricated from high-impact PVC.
- a. Cornerbeads: With perforated flanges.
 - 1) Small nose cornerbead; use unless otherwise indicated.
 - 2) Bull nose cornerbead, radius **3/4 inch (19.1 mm)** minimum; use at locations indicated on Drawings.
 - b. Casing Beads: With perforated flanges in depth required to suit plaster bases indicated and flange length required to suit applications indicated.
 - 1) Square-edge style; use unless otherwise indicated.
 - 2) Bull-nose style, radius **3/4 inch (19.1 mm)** minimum; use at locations indicated on Drawings.
 - c. Control Joints: One-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
 - d. Expansion Joints: Two-piece type, formed to produce slip-joint and square-edged **1/2-inch- (13-mm-) OR 1-inch- (25-mm-) OR 1-1/2-inch- (38-mm-), as directed**, wide reveal; with perforated concealed flanges.
- C. Miscellaneous Materials
1. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
 2. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, **1/2 inch (13 mm)** long, free of contaminants, manufactured for use in portland cement plaster.
 3. Bonding Compound: ASTM C 932.
 4. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
 5. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
 6. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than **0.0475-inch (1.21-mm)** diameter, unless otherwise indicated.
 7. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - a. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - b. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
 8. Acoustical Sealant: As specified in Division 7 Section "Joint Sealants".
 - a. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Plaster Materials
1. Portland Cement: ASTM C 150, Type I **OR** Type II, **as directed**.
 - a. Color for Finish Coats: White **OR** Gray, **as directed**.
 2. Masonry Cement: ASTM C 91, Type N.
 - a. Color for Finish Coats: White **OR** Gray, **as directed**.
 3. Plastic Cement: ASTM C 1328.
 4. Colorants for Job-Mixed Finish Coats: Colorfast mineral pigments that produce finish plaster color to match sample.

5. Lime: ASTM C 206, Type S; or ASTM C 207, Type S.
6. Sand Aggregate: ASTM C 897.
 - a. Color for Job-Mixed Finish Coats: White **OR** In color matching sample, **as directed**.
7. Perlite Aggregate: ASTM C 35.
8. Exposed Aggregates for Finish Coats: For marblecrete finish, clean, sound, crushed marble matching color and size gradation of sample.
9. Ready-Mixed Finish-Coat Plaster: Mill-mixed portland cement, aggregates, coloring agents, and proprietary ingredients.
 - a. Color: As selected from manufacturer's full range.
10. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.
 - a. Color: As selected from manufacturer's full range.

E. Plaster Mixes

1. General: Comply with ASTM C 926 for applications indicated.
 - a. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed **1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m)** of cementitious materials.
2. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
 - a. Portland Cement Mixes:
 - 1) Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 **OR** 3/4 to 1-1/2, **as directed**, parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2) Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 **OR** 3/4 to 1-1/2, **as directed**, parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
 - b. Masonry Cement Mixes:
 - 1) Scratch Coat: 1 part masonry cement and 2-1/2 to 4 parts aggregate.
 - 2) Brown Coat: 1 part masonry cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
 - c. Portland and Masonry Cement Mixes:
 - 1) Scratch Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2) Brown Coat: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
 - d. Plastic Cement Mixes:
 - 1) Scratch Coat: 1 part plastic cement and 2-1/2 to 4 parts aggregate.
 - 2) Brown Coat: 1 part plastic cement and 3 to 5 parts aggregate, but not less than volume of aggregate used in scratch coat.
 - e. Portland and Plastic Cement Mixes:
 - 1) Scratch Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - 2) Brown Coat: For cementitious material, mix 1 part plastic cement and 1 part portland cement. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.
3. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:
 - a. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 0 to 3/4 part lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Portland and Masonry Cement Mix: For cementitious material, mix 1 part portland cement and 1 part masonry cement. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - c. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.

4. Base-Coat Mixes: Single base coats for two-coat plasterwork as follows:
 - a. Portland Cement Mix: For cementitious material, mix 1 part portland cement and 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Masonry Cement Mix: Use 1 part masonry cement and 2-1/2 to 4 parts aggregate.
 - c. Plastic Cement Mix: Use 1 part plastic cement and 2-1/2 to 4 parts aggregate.
5. Job-Mixed Finish-Coat Mixes:
 - a. Portland Cement Mix: For cementitious materials, mix 1 part portland cement and 3/4 to 1-1/2 **OR** 1-1/2 to 2, **as directed**, parts lime. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
 - b. Masonry Cement Mix: 1 part masonry cement and 1-1/2 to 3 parts aggregate.
 - c. Portland and Masonry Cement Mix: For cementitious materials, mix 1 part portland cement and 1 part masonry cement. Use 1-1/2 to 3 parts aggregate per part of cementitious material.
 - d. Plastic Cement Mix: 1 part plastic cement and 1-1/2 to 3 parts aggregate.
6. Factory-Prepared Finish-Coat Mixes: For ready-mixed finish-coat plasters or acrylic-based finish coatings, comply with manufacturer's written instructions.

1.3 EXECUTION

- A. Examination
 1. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Preparation
 1. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
 2. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.
- C. Installation, General
 1. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.
 2. Sound Attenuation Blankets: Where required, install blankets before installing lath unless blankets are readily installed after lath has been installed on one side.
 3. Acoustical Sealant: Where required, seal joints between edges of plasterwork and abutting construction with acoustical sealant.
- D. Installing Metal Lath
 1. Expanded-Metal Lath: Install according to ASTM C 1063.
 - a. Partition Framing and Vertical Furring: Install flat diamond-mesh **OR** flat rib **OR** welded-wire **OR** woven-wire, **as directed**, lath.
 - b. Flat-Ceiling and Horizontal Framing: Install flat diamond-mesh **OR** flat rib **OR** 3/8-inch (9.5-mm) rib lath **OR** welded-wire **OR** woven-wire, **as directed**, lath.
 - c. Curved-Ceiling Framing: Install flat diamond-mesh **OR** welded-wire **OR** flat woven-wire, **as directed**, lath.
 - d. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh **OR** welded-wire **OR** woven-wire, **as directed**, lath.
- E. Installing Accessories
 1. Install according to ASTM C 1063 and at locations indicated on Drawings.
 2. Reinforcement for External Corners:
 - a. Install lath-type, external-corner reinforcement at exterior locations.
 - b. Install cornerbead at interior and exterior, **as directed**, locations.

3. Control Joints: Install control joints at locations indicated on Drawings **OR** in specific locations approved for visual effect as follows, **as directed**:
 - a. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - 1) Vertical Surfaces: **144 sq. ft. (13.4 sq. m)**.
 - 2) Horizontal and other Nonvertical Surfaces: **100 sq. ft. (9.3 sq. m)**.
 - b. At distances between control joints of not greater than **18 feet (5.5 m)** o.c.
 - c. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - d. Where control joints occur in surface of construction directly behind plaster.
 - e. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

F. Plaster Application

1. General: Comply with ASTM C 926.
 - a. Do not deviate more than plus or minus **1/4 inch in 10 feet (6.4 mm in 3 m)** from a true plane in finished plaster surfaces, as measured by a **10-foot (3-m)** straightedge placed on surface.
 - b. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 - c. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
2. Bonding Compound: Apply on unit masonry and concrete plaster bases.
3. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry or on concrete; **3/4-inch (19-mm)** thickness.
 - a. Portland cement mixes.
 - b. Masonry cement mixes.
 - c. Portland and masonry cement mixes.
 - d. Plastic cement mixes.
 - e. Portland and plastic cement mixes.
4. Ceilings; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork; **1/2 inch (13 mm)** thick **OR 3/4 inch (19 mm)** thick on concrete, **as directed**.
 - a. Portland cement mixes.
 - b. Masonry cement mixes.
 - c. Portland and masonry cement mixes.
 - d. Plastic cement mixes.
 - e. Portland and plastic cement mixes.
5. Walls; Base-Coat Mix: Scratch coat for two-coat plasterwork, **3/8 inch (10 mm)** thick on concrete masonry **OR 1/4 inch (6 mm)** thick on concrete, **as directed**.
 - a. Portland cement mixes.
 - b. Masonry cement mixes.
 - c. Portland and masonry cement mixes.
 - d. Plastic cement mixes.
 - e. Portland and plastic cement mixes.
6. Ceilings; Base-Coat Mix: Scratch coat for two-coat plasterwork, **1/4 inch (6 mm)** thick on concrete.
 - a. Portland cement mixes.
 - b. Masonry cement mixes.
 - c. Portland and masonry cement mixes.
 - d. Plastic cement mixes.
 - e. Portland and plastic cement mixes.
7. Plaster Finish Coats: Apply to provide float **OR** dash **OR** scraped trowel-textured **OR** skip trowel-textured **OR** brocade (knock-down dash) **OR** trowel sweep **OR** combed **OR** sacked (California mission) **OR** English **OR** marblecrete, **as directed**, finish to match sample.

8. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.
 9. Concealed Exterior Plasterwork: Where plaster application will be used as a base for adhered finishes, omit finish coat.
 10. Concealed Interior Plasterwork:
 - a. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
 - b. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
 - c. Where plaster application will be used as a base for adhesive application of tile and similar finishes, omit finish coat.
- G. Plaster Repairs
1. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.
- H. Protection
1. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 09 22 13 13a

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SECTION 09 22 13 13b - GYPSUM VENEER PLASTER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gypsum veneer plastering. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Gypsum veneer plaster and gypsum base for veneer plaster.
 - b. Gypsum veneer plaster over cementitious backer units.
 - c. Gypsum veneer plaster over masonry surfaces.
 - d. Gypsum veneer plaster over monolithic concrete surfaces.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show locations, fabrication, and installation of control joints, and reveals and trim; include plans, elevations, sections, details of components, and attachments to other work.
3. Samples: For the following products:
 - a. Trim Accessories: Full-size Sample in **12-inch (300-mm)** length for each trim accessory.
 - b. Textured Finishes: Manufacturer's standard size for each textured finish and on rigid backing.
4. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
 - b. Product Data for Credit MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.

D. Quality Assurance

1. Source Limitations: Obtain gypsum veneer plaster products, including gypsum base for veneer plaster, **OR** cementitious base units, **as directed**, joint reinforcing tape, and embedding material, from a single manufacturer.
2. Fire-Resistance-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by a testing and inspecting agency.
3. STC-Rated Assemblies: Provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

E. Delivery, Storage, And Handling

1. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
2. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
3. Stack panels flat on leveled supports off floor or slab to prevent sagging.

F. Project Conditions

1. Environmental Limitations: Comply with ASTM C 843 requirements or gypsum veneer plaster manufacturer's written recommendations, whichever are more stringent.

2. Room Temperatures: Maintain not less than **55 deg F (13 deg C)** or more than **80 deg F (27 deg C)** for 7 days before application of gypsum base and gypsum veneer plaster, continuously during application, and after application until veneer plaster is dry.
3. Avoid conditions that result in gypsum veneer plaster drying too rapidly.
 - a. Distribute heat evenly; prevent concentrated or uneven heat on veneer plaster.
 - b. Maintain relative humidity levels, for prevailing ambient temperature, that produce normal drying conditions.
 - c. Ventilate building spaces in a manner that prevents drafts of air from contacting surfaces during veneer plaster application until it is dry.
4. Do not install panels that are wet, moisture damaged, or mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

1.2 PRODUCTS

A. Gypsum Veneer Plaster Materials

1. One-Component Gypsum Veneer Plaster: ASTM C 587, formulated for application directly over substrate without use of separate base-coat material.
2. High-Strength, One-Component Gypsum Veneer Plaster: ASTM C 587, ready-mixed, smooth, finish-coat veneer plaster containing mill-mixed, fine silica sand; with a compressive strength of **3000 psi (20 MPa)** when tested according to ASTM C 472; and formulated for application directly over substrate without use of separate base-coat material.
3. Two-Component Gypsum Veneer Plaster: ASTM C 587, with separate formulations; one for base-coat and one for finish-coat application over substrates.
4. High-Strength, Two-Component Gypsum Veneer Plaster: ASTM C 587, ready-mixed, base-coat plaster and smooth finish-coat veneer plaster containing mill-mixed, fine silica sand; with a compressive strength of **3000 psi (20 MPa)** when tested according to ASTM C 472.
5. Radiant-Heat, Two-Component Gypsum Veneer Plaster: ASTM C 587, and approved in writing by gypsum veneer plaster manufacturer for application with embedded electric heating cables.
 - a. Provide ready-mixed **OR** job-aggregated, **as directed**, components, as standard for manufacturer, to comply with manufacturer's written recommendations.
 - b. Aggregate: For job-aggregated base coat and texture finish coat, provide white silica sand passing a **No. 30 (0.6-mm)** sieve.

B. Panel Products

1. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
2. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
3. Gypsum Base for Veneer Plaster: ASTM C 588/C 588M.
 - a. Regular Type: In thickness indicated **OR 1/2 inch (13 mm)** thick, unless otherwise indicated, **as directed**.
 - b. Type X: In thickness indicated **OR 5/8 inch (16 mm)** thick, **as directed**.
 - c. Foil-Backed, Regular-Type Core: In thickness indicated **OR 1/2 inch (13 mm)** thick, unless otherwise indicated, **as directed**.
 - d. Type C: In thickness indicated **OR 5/8 inch (16 mm)** thick **OR 1/2 inch (13 mm)** thick, **as directed**.
 - e. Abuse-Resistant Base: With specially reinforced core for greater resistance to surface indentation, **5/8-inch (16-mm)** thick, Type X core **OR 1/2-inch (13-mm)** thick, regular-type core, **as directed**.

- f. High-Impact Base: With Type X core, plastic film laminated to back side for greater resistance to through-penetration (impact resistance), and in thickness indicated **OR 5/8 inch (16 mm) thick, as directed.**
 - 1) Plastic-Film Thickness: **0.010 inch (0.254 mm) OR 0.020 inch (0.508 mm) OR 0.030 inch (0.762 mm) OR 0.081 inch (2.057 mm), as directed.**
 - g. Moisture- and Mold-Resistant Base: With moisture- and mold-resistant core, glass-mat facing on both sides of panel, and in thickness indicated **OR 5/8-inch (16-mm) thick, Type X core OR 1/2-inch (13-mm) thick, regular-type core, as directed.**
 - 1) Mold Resistance: ASTM D 3273; no mold growth after four weeks' exposure.
 4. Backing Panels for Multilayer Applications: ASTM C 588/C 588M gypsum base or ASTM C 36/C 36M gypsum board, as recommended by gypsum veneer plaster manufacturer, for application method and thicknesses indicated.
 - a. Core: Matching face layer, unless otherwise indicated.
 - b. Thickness: Matching face layer, unless otherwise indicated.
 5. Cementitious Backer Units: ANSI A118.9, in thickness indicated **OR 1/2 inch (13 mm) thick, as directed.**
- C. Trim Accessories
1. Standard Trim: ASTM C 1047, provided or approved by manufacturer for use in gypsum veneer plaster applications indicated.
 - a. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet **OR** Galvanized or aluminum-coated steel sheet or rolled zinc **OR** Plastic **OR** Paper-faced galvanized steel sheet, **as directed.**
 - b. Shapes:
 - 1) Cornerbead.
 - 2) Bullnose bead.
 - 3) LC-Bead: J-shaped; exposed long flange receives joint compound.
 - 4) L-Bead: L-shaped; exposed long flange receives joint compound.
 - 5) U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - 6) Curved-Edge Cornerbead: With notched or flexible flanges.
 - 7) Control joints.
 2. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
 - a. Aluminum: Alloy and temper with not less than the strength and durability properties of **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5.
 - b. Finish: Manufacturer's standard Architectural Class II, Clear Anodic Finish AA-M12C22A31, complying with AAMA 611 **OR** chemical conversion coat finish **OR** prime paint finish, **as directed.**
- D. Joint Reinforcing Materials
1. General: Comply with joint strength requirements in ASTM C 587 and with gypsum veneer plaster manufacturer's written recommendations for each application indicated.
 2. Joint Tape:
 - a. Gypsum Base for Veneer Plaster: As recommended by gypsum veneer plaster manufacturer for applications indicated **OR** Paper **OR** Open-mesh, glass fiber, **as directed.**
 - b. Cementitious Backer Units: As recommended by cementitious backer unit manufacturer.
 3. Embedding Material for Joint Tape:
 - a. Gypsum Base for Veneer Plaster: As recommended by gypsum veneer plaster manufacturer for use with joint-tape material and gypsum veneer plaster applications indicated.
 - b. Cementitious Backer Units: As recommended by cementitious backer unit manufacturer for applications indicated.
- E. Auxiliary Materials
1. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.

2. Bonding Agent: ASTM C 631, polyvinyl acetate.
3. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum base face-layer panels to backing-layer panels in multilayer construction.
 - a. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - a. Use screws complying with ASTM C 954 for fastening panels to steel members from **0.033 to 0.112 inch (0.84 to 2.84 mm)** thick.
5. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
6. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - a. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - b. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
7. Acoustical Sealant: As specified in Division 07 Section "Thermal Insulation".
 - a. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. Patching Mortar: Dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a **No. 16 (1.18-mm)** sieve, using only enough water for handling and placing.

F. Gypsum Veneer Plaster Mixes

1. Mechanically mix gypsum veneer plaster materials to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.

1.3 EXECUTION

A. Preparation

1. Monolithic Concrete Substrates: Prepare according to gypsum veneer plaster manufacturer's written recommendations and as follows:
 - a. Clean surfaces to remove dust, loose particles, grease, oil, incompatible curing compounds, form-release agents, and other foreign matter and deposits that could impair bond with gypsum veneer plaster.
 - b. Remove ridges and protrusions greater than **1/8 inch (3 mm)** and fill depressions greater than **1/4 inch (6 mm)** with patching mortar. Allow to set and dry.
 - c. Apply bonding agent on dry and cured concrete substrates.
2. Masonry Substrates: Prepare according to gypsum veneer plaster manufacturer's written recommendations and as follows:
 - a. Clean surfaces to remove dirt, grease, oil, and other foreign matter and deposits that could impair bond with gypsum veneer plaster.
 - b. Apply bonding agent on dry masonry substrates.

B. Installing Panels, General

1. Gypsum Base for Veneer Plaster: Apply according to ASTM C 844 unless manufacturer's written recommendations are more stringent.
 - a. Do not allow gypsum base to degrade from exposure to sunlight as evidenced by fading of paper facing.
 - b. Erection Tolerance: No more than **1/16-inch (1.6-mm)** offsets between planes of gypsum base panels, and **1/8 inch in 8 feet (3 mm in 2.4 m)** noncumulative, for level, plumb, warp, and bow.

2. Install sound attenuation blankets before installing gypsum base for veneer plaster unless blankets are readily installed after panels have been installed on one side.
3. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
4. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch (1.6 mm)** of open space between panels. Do not force into place.
5. Locate edge and end joints over supports except in ceiling applications where intermediate supports or back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints, other than control joints, at corners of framed openings.
6. Attach panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
7. Attach panels to framing provided at openings and cutouts.
8. Form control joints with space between edges of adjoining panels.
9. Cover both sides of steel stud partition framing with panels in concealed spaces, including above ceilings, except in internally braced chases.
 - a. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than **8 sq. ft. (0.74 sq. m)** in area.
 - b. Fit panels around ducts, pipes, and conduits.
 - c. Where partitions intersect open concrete coffers, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut panels to fit profile formed by coffers, joists, and other structural members; allow **1/4- to 3/8-inch-** (6.4- to 9.5-mm-) wide joints; seal joints with acoustical sealant.
10. Wood Framing: Install panels over wood framing, with "floating" internal corner construction. Do not attach panels across the flat grain of wide-dimension lumber, including floor joists and headers. "Float" panels over these members or provide control joints to counteract wood shrinkage.
11. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
12. Fastener Spacing: Comply with ASTM C 844, manufacturer's written recommendations, and fire-resistance-rating requirements.
 - a. Space screws a maximum of **12 inches (305 mm)** o.c. along framing members for wall or ceiling application.
 - b. Space fasteners in cementitious backer units a maximum of **8 inches (200 mm)** o.c. along framing members for wall applications and **6 inches (150 mm)** o.c. along framing members for ceiling applications.

C. Installing Panels

1. Install gypsum base panels for veneer plaster in the following locations:
 - a. Regular Type: As indicated on Drawings **OR** Vertical surfaces, unless otherwise indicated, **as directed.**
 - b. Ceiling Type: As indicated on Drawings **OR** Ceiling surfaces, **as directed.**
 - c. Type X: As indicated on Drawings **OR** Where required for fire-resistance-rated assembly **OR** Vertical surfaces, unless otherwise indicated, **as directed.**
 - d. Type C: As indicated on Drawings **OR** Where required for specific fire-resistance-rated assembly indicated, **as directed.**
 - e. Foil-Backed, Regular-Type Core: As indicated on Drawings **OR as directed.**
 - f. Abuse-Resistant Base: As indicated on Drawings **OR as directed.**
 - g. High-Impact Base: As indicated on Drawings **OR as directed.**
 - h. Moisture- and Mold-Resistant Base: As indicated on Drawings **OR as directed.**
2. Single-Layer Application:

- a. On ceilings, apply gypsum base panels before wall panels, to the greatest extent possible and at right angles to framing, unless otherwise indicated.
 - b. On walls, apply gypsum base panels vertically and parallel **OR** horizontally and perpendicular, **as directed**, to framing, unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - 1) Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 2) At stairwells and other walls higher than **30 feet (9.0 m)**, install gypsum base panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 - c. On Z-furring, apply gypsum base panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
3. Multilayer Application on Ceilings: Apply backing panels for ceilings before applying backing panels for partitions; apply gypsum-base face layers in same sequence. Apply backing panels at right angles to framing members and offset gypsum-base face-layer joints a minimum of **16 inches (400 mm)** from parallel backing panel joints, unless otherwise required by fire-resistance-rated assembly.
 4. Multilayer Application on Partitions: Apply backing panels indicated and gypsum-base face layers vertically (parallel to framing) with joints of backing panels located over stud or furring members and gypsum-base face-layer joints offset at least one stud or furring member from backing-panel joints, unless otherwise required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 - a. Z-Furring: Apply backing panels vertically (parallel to framing) and gypsum-base face layer either vertically or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of backing panels over furring members.
 5. Single-Layer Fastening Methods: Apply gypsum base panels to supports with steel drill screws.
 6. Multilayer Fastening Methods: Fasten backing panels and gypsum-base face layers separately to supports with screws **OR** with screws; fasten gypsum-base face layers with adhesive and supplementary fasteners, **as directed**.
 7. Curved Partitions: Comply with gypsum base manufacturer's written installation recommendations.
 8. Cementitious Backer Units: Install according to ANSI A108.11.
 - a. Where cementitious backer units abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.
- D. Installing Trim Accessories
1. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
 2. Control Joints: Install at locations indicated on Drawings **OR** according to ASTM C 844 and in specific locations approved by the Owner, **as directed**.
 3. Trim: Install in the following locations:
 - a. Cornerbead: Use at outside corners, unless otherwise indicated.
 - b. Bullnose Bead: Use at outside corners **OR** where indicated, **as directed**.
 - c. LC-Bead: Use at exposed panel edges.
 - d. L-Bead: Use where indicated.
 - e. U-Bead: Use at exposed panel edges **OR** where indicated, **as directed**.
 - f. Curved-Edge Cornerbead: Use at curved openings.
 4. Aluminum Trim:
 - a. Install aluminum trim according to manufacturer's written recommendations.
 - b. Apply and embed joint tape over flanges of aluminum trim accessories if recommended by trim manufacturer.
- E. Installing Joint Reinforcement

1. Gypsum Base for Veneer Plaster: Reinforce interior angles and flat joints with joint tape and embedding material to comply with ASTM C 843 and with gypsum veneer plaster manufacturer's written recommendations.
 2. Abuse-Resistant Base: Reinforce joints between abuse-resistant panels with joint tape and embedding material according to panel manufacturer's written recommendations.
 3. Impact-Resistant Base: Reinforce joints between impact-resistant panels with joint tape and embedding material according to panel manufacturer's written recommendations.
 4. Moisture- and Mold-Resistant Base: Reinforce joints between moisture- and mold-resistant panels with joint tape and embedding material according to panel manufacturer's written recommendations.
 5. Cementitious Backer Units: Reinforce joints between cementitious backer units with joint tape and embedding material according to unit manufacturer's written recommendations.
- F. Gypsum Veneer Plastering
1. Bonding Agent: Apply bonding agent on dry monolithic concrete **OR** masonry **OR** abuse-resistant base panels **OR** cementitious backer units, **as directed**, according to gypsum veneer plaster manufacturer's written recommendations.
 2. Gypsum Veneer Plaster Application: Comply with ASTM C 843 and with veneer plaster manufacturer's written recommendations.
 - a. One-Component Gypsum Veneer Plaster: Trowel apply base coat over substrate to uniform thickness of **1/16 to 3/32 inch (1.6 to 2.4 mm)**. Fill all voids and imperfections. Allow plaster to set, then scratch and immediately double back with gypsum veneer plaster to uniform total thickness of **3/16 inch (4.8 mm)**.
 - b. Two-Component Gypsum Veneer Plaster:
 - 1) Base Coat: Trowel apply base coat over substrate to uniform thickness of **1/16 to 3/32 inch (1.6 to 2.4 mm)**. Fill all voids and imperfections.
 - 2) Finish Coat: Trowel apply finish-coat plaster over base-coat plaster to uniform thickness of **1/16 to 3/32 inch (1.6 to 2.4 mm)**.
 - c. Where gypsum veneer plaster abuts only metal door frames, windows, and other units, groove finish coat to eliminate spalling.
 - d. Do not apply veneer plaster to gypsum base if paper facing has degraded from exposure to sunlight. Before applying veneer plaster, use remedial methods to restore bonding capability to degraded paper facing according to manufacturer's written recommendations and as approved by the Owner.
 3. Radiant-Heat, Two-Component Gypsum Veneer Plaster Ceilings: Comply with ASTM C 843 and with radiant-heat veneer plaster manufacturer's written recommendations.
 - a. Base Coat: Apply plaster base coat to sufficiently cover electric heating cables. Trowel plaster parallel in direction of cables to uniform thickness of **3/16 inch (4.8 mm)**. Completely cover cables.
 - b. Finish Coat: After base coat has developed sufficient bond, apply finish coat. Trowel plaster to uniform thickness of **1/16 to 3/32 inch (1.6 to 2.4 mm)**.
 4. Concealed Surfaces: Do not omit gypsum veneer plaster behind cabinets, furniture, furnishings, and similar removable items. Omit veneer plaster in the following areas where it will be concealed from view in the completed Work unless otherwise indicated or required to maintain fire-resistance and STC ratings:
 - a. Above suspended ceilings.
 - b. Behind wood paneling.
 5. Gypsum Veneer Plaster Finish: Smooth-troweled finish, unless otherwise indicated **OR** Textured finish matching the Owner's sample, **as directed**.
- G. Protection
1. Protect installed gypsum veneer plaster from damage from weather, condensation, construction, and other causes during remainder of the construction period.
 2. Remove and replace gypsum veneer plaster and gypsum base panels that are wet, moisture damaged, or mold damaged.

09 - Finishes



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- a. Indications that gypsum base panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - b. Indications that gypsum base panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 22 13 13b

Task	Specification	Specification Description
09 22 13 23	09 22 13 13	Gypsum Plaster
09 22 13 23	09 22 13 13a	Portland Cement Plaster
09 22 13 23	09 22 13 13b	Gypsum Veneer Plaster

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SECTION 09 22 16 13 - NON-LOAD-BEARING STEEL FRAMING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for non-load bearing steel framing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes non-load-bearing steel framing members for the following applications:
 - a. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).
 - b. Interior suspension systems (e.g., supports for ceilings, suspended soffits, etc.).

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.

D. Quality Assurance

1. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
2. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

1.2 PRODUCTS

A. Non-Load-Bearing Steel Framing, General

1. Recycled Content of Steel Products: Provide products with average recycled content of steel products such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - a. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - b. Protective Coating: ASTM A 653/A 653M, **G40 (Z120) OR** ASTM A 653/A 653M, **G60 (Z180) OR** Coating with equivalent corrosion resistance of ASTM A 653/A 653M, **G40 (Z120), as directed**, hot-dip galvanized, unless otherwise indicated.

B. Suspension System Components

1. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.0625-inch- (1.59-mm-)** diameter wire, or double strand of **0.0475-inch- (1.21-mm-)** diameter wire.
2. Hanger Attachments to Concrete:
 - a. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.

- 1) Type: Cast-in-place anchor, designed for attachment to concrete forms **OR** Postinstalled, chemical anchor **OR** Postinstalled, expansion anchor, **as directed**.
 - b. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.
 3. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.162-inch (4.12-mm)** diameter.
 4. Flat Hangers: Steel sheet, in size indicated on Drawings **OR 1 by 3/16 inch (25.4 by 4.76 mm)** by length indicated, **as directed**.
 5. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of **0.0538 inch (1.37 mm)** and minimum **1/2-inch- (12.7-mm-)** wide flanges.
 - a. Depth: As indicated on Drawings **OR 2-1/2 inches (64 mm) OR 2 inches (51 mm) OR 1-1/2 inches (38 mm), as directed**.
 6. Furring Channels (Furring Members):
 - a. Cold-Rolled Channels: **0.0538-inch (1.37-mm)** bare-steel thickness, with minimum **1/2-inch- (12.7-mm-)** wide flanges, **3/4 inch (19.1 mm)** deep.
 - b. Steel Studs: ASTM C 645.
 - 1) Minimum Base-Metal Thickness: As indicated on Drawings **OR 0.0179 inch (0.45 mm) OR 0.0312 inch (0.79 mm), as directed**.
 - 2) Depth: As indicated on Drawings **OR 1-5/8 inches (41.3 mm) OR 2-1/2 inches (63.5 mm) OR 3-5/8 inches (92.1 mm), as directed**.
 - c. Hat-Shaped, Rigid Furring Channels: ASTM C 645, **7/8 inch (22.2 mm)** deep.
 - 1) Minimum Base Metal Thickness: As indicated on Drawings **OR 0.0179 inch (0.45 mm) OR 0.0312 inch (0.79 mm), as directed**.
 - d. Resilient Furring Channels: **1/2-inch- (12.7-mm-)** deep members designed to reduce sound transmission.
 - 1) Configuration: Asymmetrical **OR** Hat shaped, **as directed**.
 7. Grid Suspension System for Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.
- C. Steel Framing For Framed Assemblies
1. Steel Studs and Runners: ASTM C 645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings **OR 0.0179 inch (0.45 mm) OR 0.027 inch (0.7 mm) OR 0.0312 inch (0.79 mm), as directed**.
 - b. Depth: As indicated on Drawings **OR 3-5/8 inches (92.1 mm) OR 6 inches (152.4 mm) OR 4 inches (101.6 mm) OR 2-1/2 inches (63.5 mm) OR 1-5/8 inches (41.3 mm), as directed**.
 2. Slip-Type Head Joints: Where indicated, provide one of the following:
 - a. Single Long-Leg Runner System: ASTM C 645 top runner with **2-inch- (50.8-mm-)** deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within **12 inches (305 mm)** of the top of studs to provide lateral bracing.
 - b. Double-Runner System: ASTM C 645 top runners, inside runner with **2-inch- (50.8-mm-)** deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - c. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 3. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
 4. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings **OR 0.0179 inch (0.45 mm) OR 0.027 inch (0.7 mm) OR 0.0312 inch (0.79 mm), as directed**.

5. Cold-Rolled Channel Bridging: **0.0538-inch (1.37-mm)** bare-steel thickness, with minimum **1/2-inch- (12.7-mm-)** wide flanges.
 - a. Depth: As indicated on Drawings **OR 1-1/2 inches (38.1 mm), as directed.**
 - b. Clip Angle: Not less than **1-1/2 by 1-1/2 inches (38.1 by 38.1 mm), 0.068-inch- (1.73-mm-)** thick, galvanized steel.
6. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
 - a. Minimum Base Metal Thickness: As indicated on Drawings **OR 0.0179 inch (0.45 mm) OR 0.0312 inch (0.79 mm), as directed.**
 - b. Depth: As indicated on Drawings **OR 7/8 inch (22.2 mm) OR 1-1/2 inches (38.1 mm), as directed.**
7. Resilient Furring Channels: **1/2-inch- (12.7-mm-)** deep, steel sheet members designed to reduce sound transmission.
 - a. Configuration: Asymmetrical **OR Hat shaped, as directed.**
8. Cold-Rolled Furring Channels: **0.0538-inch (1.37-mm)** bare-steel thickness, with minimum **1/2-inch- (12.7-mm-)** wide flanges.
 - a. Depth: As indicated on Drawings **OR 3/4 inch (19.1 mm), as directed.**
 - b. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum bare-steel thickness of **0.0312 inch (0.79 mm).**
 - c. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, **0.0625-inch- (1.59-mm-)** diameter wire, or double strand of **0.0475-inch- (1.21-mm-)** diameter wire.
9. Z-Shaped Furring: With slotted or nonslotted web, face flange of **1-1/4 inches (31.8 mm)**, wall attachment flange of **7/8 inch (22.2 mm)**, minimum bare-metal thickness of **0.0179 inch (0.45 mm)**, and depth required to fit insulation thickness indicated.

D. Auxiliary Materials

1. General: Provide auxiliary materials that comply with referenced installation standards.
 - a. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
2. Isolation Strip at Exterior Walls: Provide one of the following:
 - a. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
 - b. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, **1/8 inch (3.2 mm)** thick, in width to suit steel stud size.

1.3 EXECUTION

A. Preparation

1. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - a. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
2. Coordination with Sprayed Fire-Resistive Materials:
 - a. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than **24 inches (600 mm) o.c.**
 - b. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

B. Installation, General

1. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.

- a. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
 - b. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
 - c. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
 - d. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
2. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
 3. Install bracing at terminations in assemblies.
 4. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- C. Installing Suspension Systems
1. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
 2. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
 3. Suspend hangers from building structure as follows:
 - a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - 1) Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - 1) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - c. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - d. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 - e. Do not attach hangers to steel roof deck.
 - f. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - g. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - h. Do not connect or suspend steel framing from ducts, pipes, or conduit.
 4. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
 5. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
 6. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
 7. Installation Tolerances: Install suspension systems that are level to within **1/8 inch in 12 feet (3 mm in 3.6 m)** measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
- D. Installing Framed Assemblies
1. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

2. Install studs so flanges within framing system point in same direction.
 - a. Space studs as follows:
 - 1) Single-Layer Application: **16 inches (406 mm) OR 24 inches (610 mm) OR 400 mm OR 600 mm, as directed**, o.c., unless otherwise indicated.
 - 2) Multilayer Application: **16 inches (406 mm) OR 24 inches (610 mm) OR 400 mm OR 600 mm, as directed**, o.c., unless otherwise indicated.
 - 3) Tile backing panels: **16 inches (406 mm) OR 400 mm, as directed**, o.c., unless otherwise indicated.
3. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - a. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - b. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - 1) Install two studs at each jamb, unless otherwise indicated.
 - 2) Install cripple studs at head adjacent to each jamb stud, with a minimum **1/2-inch (12.7-mm)** clearance from jamb stud to allow for installation of control joint in finished assembly.
 - 3) Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - c. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - d. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - 1) Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - e. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
 - f. Curved Partitions:
 - 1) Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - 2) Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of not less than 2 studs at ends of arcs, place studs **6 inches (150 mm)** o.c.
4. Direct Furring:
 - a. Screw to wood framing.
 - b. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (610 mm)** o.c.
5. Z-Furring Members:
 - a. Erect insulation (specified in Division 7 Section "Building Insulation") vertically and hold in place with Z-furring members spaced **24 inches (610 mm) OR 600 mm, as directed**, o.c.
 - b. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced **24 inches (600 mm)** o.c.
 - c. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than **12 inches (300 mm)** from corner and cut insulation to fit.
6. Installation Tolerance: Install each framing member so fastening surfaces vary not more than **1/8 inch (3 mm)** from the plane formed by faces of adjacent framing.

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Task	Specification	Specification Description
09 22 36 13	09 22 13 13	Gypsum Plaster
09 22 36 13	09 22 13 13a	Portland Cement Plaster
09 22 36 13	09 22 13 13b	Gypsum Veneer Plaster

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SECTION 09 22 36 23 - LATH AND PLASTER RENOVATION

GENERAL

Description Of Work

1. This specification covers the furnishing and installation of materials for lath and plaster renovation. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

Quality Assurance

2. Regulatory Requirements:
 - a. Plaster Partitions: Listed and labeled for fire-protective ratings as indicated or scheduled.
 - b. Plaster Floor/Ceilings and Roof/Ceiling Assemblies: Listed and labeled for fire-protective ratings as indicated or scheduled.
 - c. Fire Rated Assemblies: Comply with UL 05, FM P8016, or GA 600 for required fire-rated assembly.

Submittals

3. Product Data: Submit in accordance with Detailed Scope of Work. Include each type of plaster material, metal lath, and lathing accessories to be installed.

Delivery, Storage, And Handling

4. General:
 - a. Plastering Materials: Deliver in original unopened containers and store off ground and under cover.
 - b. Metal Lath and Accessories: Protect from rusting during storage.
 - c. Rusted or Water Damaged Materials: Subject to rejection before or after installation.

Project Conditions

5. Environmental Requirements: Comply with Detailed Scope of Work.
 - a. Cold-Weather Protection: Do not apply plaster if ambient temperature is less than 4 degrees C (40 degrees F) or more than 26 degrees C (80 degrees F). Maintain this temperature range in all areas 7 days prior to application, during application, and for 7 days after plaster is set.
 - b. Hot-Weather Protection: Protect plaster against uneven or excessive evaporation during dry, hot weather and from strong blasts of dry air, either natural or artificial.
 - c. Ventilation: Ventilate building spaces as required to remove water in excess of that required for hydration of plaster. Begin ventilation immediately after plaster is applied and continue until it sets.
6. Existing Conditions: See Division 1 Section "Summary of Work". Do not interfere with use of occupied buildings or portions of buildings. Maintain free and safe passage to and from occupied areas.
7. Protection: Protect grounds, plantings, buildings, and any other facilities or property from damage caused by construction operations.

Scheduling And Sequencing

8. Scheduling and Completion: Comply with Detailed Scope of Work.
 - a. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

PRODUCTS

Materials

9. Materials for Patching, Extending, and Matching:
 - a. Provide same products or types of construction as existing structure, as needed to patch, extend, or match existing work.
 - 1) Generally, Contract Documents will not define products or standards of workmanship present in existing construction. Determine products by inspection and any necessary testing, and workmanship by use of existing as sample of comparison.
 - 2) Patching, extending, and matching of existing work and systems shall result in complete, finished system.
 - b. Presence of product, finish, or type of construction, requires that patching, extending, or matching shall be performed as necessary to make work complete and consistent.
10. Partition Metals: ASTM C 645, galvanized steel:
 - a. Interior Steel Studs: Minimum 0.46 mm (25 gage), provide sizes and gages to match existing, or as indicated.
 - 1) Provide minimum of 0.84 mm (20 gage) studs both sides of hollow metal frames.
 - b. Steel Stud Runners: Match studs. Provide long leg runners for slip joint at structure above to allow for deflection.
 - c. Furring Channels: Hat-shaped furring channels, minimum 0.46 mm (25 gage).
 - d. Sheet Metal Reinforcement (Alternate to Wood Blocking): 1.52 mm (16 gage) minimum.
11. Suspended Ceiling Metals:
 - a. Main Runners (Primary Members): ASTM C 754 cold-rolled steel channels with rust-inhibitive finish.
 - 1) 50 mm (2 inches) deep, 88 kg per 100 m (590 pounds per 1,000 LF).
 - 2) 38 mm (1-1/2 inch) deep, 70 kg per 100 m (475 pounds per 1,000 LF).
 - 3) 19 mm (3/4 inch) deep, 45 kg per 100 m (300 pounds per 1,000 LF).
 - b. Cross Furring (Furring Channels): Hat-shaped galvanized steel furring channels, minimum 0.46 mm (25 gage).
 - c. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
 - 1) Hanger Wire: Minimum 4.1 mm (8 gage).
 - 2) Tie Wire: 6 mm (16 gage).
12. Lath:
 - a. Metal Lath: ASTM C 847, galvanized expanded metal.
 - 1) Weight: In compliance with ASTM C 841 for conditions and spacing of supports.
 - b. Gypsum Lath: ASTM C 37, plain. Provide Type X at fire-rated assemblies.
 - 1) Thickness: As indicated or specified and in compliance with ASTM C 841 for conditions and spacing of supports.
13. Fasteners:
 - a. Screws: ASTM C 1002, corrosion-resistant. Provide types as recommended by manufacturer for each application.
 - 1) To Metal Framing: Minimum 25 mm (1 inch), Type S.
 - 2) To Wood Framing: Minimum 32 mm (1-1/4 inch), Type W bugle head.
14. Accessories: ASTM C 841, galvanized steel.
 - a. Comer Beads: Small nose with expanded flanges, unless otherwise indicated.
 - b. Casing Beads: Square-edged style. with short or expanded flanges to suit kinds of plaster bases indicated.
 - c. Control Joints: Prefabricated folded pair of non-perforated screeds in M-shaped configuration, with expanded or perforated flanges.
 - 1) Provide removable protective tape on plaster face of control joints.
 - d. Cornerite: Galvanized expanded metal lath in accordance with ASTM C 841.
15. Gypsum Plaster Materials: ASTM C 28.
 - a. Base Coat Plasters: One of following:
 - 1) Gypsum ready-mixed plaster with mill-mixed perlite aggregate.
 - 2) Gypsum wood-fibered plaster, ASTM C 28, Type N.
 - b. Finish Coat Plasters: One of following:

- 1) Gypsum ready-mixed finished plaster, manufacturers standard mill-mixed gauged interior finish.
 - 2) Gypsum Gauging Plaster: ASTM C 28, Type G.
 - c. Quicklime: ASTM C 5.
 - d. Sand: ASTM C 35.
 - e. Finishing Hydrated Limes: ASTM C 206, Type S, special hydrated lime for finishing purposes.
 - f. Bonding Compound for Gypsum Plaster: ASTM C 631.
 - g. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or substances that may be deleterious to plaster or metals in contact with plaster.
16. Sound-Isolation Materials:
- a. Sound Insulation: ASTM C 665, Type I (unfaced) mineral-fiber blankets, 12 to 16 kg per cu m (0.75 to 1 PCF), thickness as indicated or scheduled, or required by fire-rated assembly.
 - b. Acoustical Sealant:
 - 1) Concealed: ASTM C 919 nondrying, non-hardening, non-skinning, non-bleeding, and non-staining.
 - 2) Exposed: ASTM C 919 non-oxidizing and skinning, permanently elastic, and paintable.
 - c. Ductwork Penetrations Packing: Low-density fiberglass.
17. Gypsum Plaster Mixes: As recommended by manufacturer:
- a. Scratch Coat:
 - 1) Over Metal Lath: Gypsum wood-fibered plaster, neat or with job-mixed sand.
 - 2) Over Gypsum Lath: Gypsum neat plaster with job-mixed sand.
 - 3) Over Unit Masonry: Gypsum wood-fibered plaster, neat or with job-mixed sand.
 - b. Brown Coat:
 - 1) Over Metal Lath: Gypsum wood-fibered plaster, with job-mixed sand.
 - 2) Over Gypsum Lath: Gypsum neat plaster with job-mixed sand.
 - 3) Over Unit Masonry: Gypsum wood-fibered plaster with job-mixed sand.
 - c. Finish Coat: Proportion materials for finish coats to comply with ASTM C 842 for each type of finish coat and texture indicated.
 - 1) Gypsum Gauging Plaster 1 part plaster and 2 parts lime.
 - a) Over lightweight aggregate base coats, add 15 L (1/2 cubic foot) of perlite fines or 23 kg (50 pounds) of No. 1 white silica sand per 45 kg (100 pounds) of plaster.
 - 2) Gypsum Ready-mixed Finish Plaster Neat.
 - d. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

EXECUTION

Examination

18. Units, Spaces, and Areas to be renovated: Comply with Detailed Scope of Work.
 - a. Verify that surfaces to receive rough carpentry are prepared to required grades and dimensions.

Preparation

19. Dust Protection: Comply with Detailed Scope of Work.
20. Building Occupation: Carry out demolition and renovation work to cause as little inconvenience to occupants as possible. See Detailed Scope of Work.
21. Protection: Comply with Detailed Scope of Work.
 - a. Protection: Provide drapes and drop cloths necessary to protect walls, floors, ductwork and piping, electrical work, etc. during plastering operations.
22. Selective Demolition: Comply with Detailed Scope of Work.

23. Surface Preparation: Clean projections, dust, loose particles, grease, bond breakers, and foreign matter from surfaces to receive plaster.
 - a. Do not apply plaster directly to surfaces (1) of masonry or concrete that have been coated with bituminous compound or other waterproofing agents, or (2) that have been painted or previously plastered.
 - b. Before plaster work is started, wet masonry and concrete surfaces thoroughly with fine fog spray of clean water to produce uniformly moist surface.
 - c. Do not apply plaster to surfaces containing frost.

Laying-Out Work

24. Discrepancies: Verify dimensions and elevations indicated in layout of existing work.
 - a. Prior to commencing work, carefully compare and check Drawings (if any) for discrepancies in locations or elevations of work to be executed.
 - b. Refer discrepancies among Drawings (if any), Specifications, and existing conditions to the Owner for adjustment before work affected is performed.
 - 1) Failure to make such notification shall place responsibility on Contractor to carry out work in satisfactory, workmanlike manner.
25. Contractor: Responsible for location and elevation of construction contemplated by Construction Documents.

Performance

26. Patching: Patch and extend existing work using skilled mechanics who are capable of matching existing quality of workmanship.
 - a. Quality of Patched or Extended Work: Not less than specified for new work. If similar new work is not specified, equal to existing work.
27. Damaged Surfaces: Comply with Detailed Scope of Work.
28. Transitions from Existing to New Work: Comply with Detailed Scope of Work.
29. Isolation: Where lathing and metal support system abuts building structure horizontally and where partition/wall work abuts overhead structure, isolate work from structural movement sufficiently to prevent transfer of loads to work from building structure. Install slip or cushion-type joints to absorb deflections but maintain lateral support.
 - a. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

Installation Of Suspended Steel Framing

30. General: Construct ceilings of lath and plaster on suspended steel framing system in accordance with manufacturer's recommendations and Reference Standards.
31. Hanger Installation: Attach hangers to structure above ceiling to comply with NAAMM ML/SFA 920.
32. Ceiling Suspension System Components: Install In sizes and at spacings indicated but not in smaller sizes or greater spacings than those required by ASTM C 841 and NAAMM ML/SFA 920.
 - a. Wire Hangers: Space and install wire hangers in accordance with ASTM C 841 and within 150 mm (6 inches) of channel ends, unless closer spacing indicated or required for fire-resistance rated assembly.
 - b. Main Runners (Primary Members): Space and install channels in accordance with ASTM C 841, unless closer spacing indicated or required for fire-resistance rated assembly.
 - c. Cross Furring (Furring Channels): Space and install furring channels in accordance with ASTM C 841, unless closer spacing indicated or required for fire-resistance rated assembly.
33. Framing Around Openings: Frame channels and lath on suspended soffits and ceilings and at furring to receive electric lights, etc. as indicated or as necessary to complete work. Furnish and install in furring, plaster rings or access panels furnished under other sections.

Installation Of Steel Stud Partitions

34. General: Install steel stud partition support systems in accordance with manufacturer's recommendations and Reference Standards.
35. Steel Stud Systems: Comply with ASTM C 754.
 - a. To Receive Metal Lath: Space studs in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - b. To Receive Gypsum Lath: Space studs in accordance with ASTM C 841.
36. Extend partition support systems to finish ceilings and attach to ceiling suspension members, unless otherwise indicated.

Metal Furring

37. General: Install in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - a. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, bath accessories, furnishings, and similar work to comply with manufacturer's recommendations.
38. Metal Furring to Receive Gypsum Lath: Space furring channels in accordance with ASTM C 841.
39. Metal Furring Systems:
 - a. To Receive Metal Lath: Space furring in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - b. To Receive Gypsum Lath: Space furring in accordance with ASTM C 841.
40. Isolation: Where lathing and metal support system abuts building structure horizontally and where partition/wall work abuts overhead structure, isolate work from structural movement sufficiently to prevent transfer of loads to work from building structure. Install slip or cushion-type joints to absorb deflections but maintain lateral support.
 - a. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

Installation Of Suspended Steel Framing

41. General: Construct ceilings of lath and plaster on suspended steel framing system in accordance with manufacturer's recommendations and Reference Standards.
42. Hanger Installation: Attach hangers to structure above ceiling to comply with NAAMM ML/SFA 920.
43. Ceiling Suspension System Components: Install In sizes and at spacings indicated but not in smaller sizes or greater spacings than those required by ASTM C 841 and NAAMM ML/SFA 920.
 - a. Wire Hangers: Space and install wire hangers in accordance with ASTM C 841 and within 150 mm (6 inches) of channel ends, unless closer spacing indicated or required for fire-resistance rated assembly.
 - b. Main Runners (Primary Members): Space and install channels in accordance with ASTM C 841, unless closer spacing indicated or required for fire-resistance rated assembly.
 - c. Cross Furring (Furring Channels): Space and install furring channels in accordance with ASTM C 841, unless closer spacing indicated or required for fire-resistance rated assembly.
44. Framing Around Openings: Frame channels and lath on suspended soffits and ceilings and at furring to receive electric lights, etc. as indicated or as necessary to complete work. Furnish and install in furring, plaster rings or access panels furnished under other sections.

Installation Of Steel Stud Partitions

45. General: Install steel stud partition support systems in accordance with manufacturer's recommendations and Reference Standards.
46. Steel Stud Systems: Comply with ASTM C 754.
 - a. To Receive Metal Lath: Space studs in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - b. To Receive Gypsum Lath: Space studs in accordance with ASTM C 841.
47. Extend partition support systems to finish ceilings and attach to ceiling suspension members, unless otherwise indicated.

Metal Furring

48. General: Install in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - a. Install supplementary framing, blocking, and bracing at terminations in work and for support of fixtures, equipment services, heavy trim, grab bars, bath accessories, furnishings, and similar work to comply with manufacturer's recommendations.
49. Metal Furring to Receive Gypsum Lath: Space furring channels in accordance with ASTM C 841.
50. Metal Furring Systems:
 - a. To Receive Metal Lath: Space furring in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - b. To Receive Gypsum Lath: Space furring in accordance with ASTM C 841.

Lathing

51. Metal Lathing: Install in accordance with ASTM C 841 and NAAMM ML/SFA 920.
 - a. At Metal Framing: Attach metal lath to furring channels with long dimension of sheet at right angles to furring channels with gage wire ties spaced not over 150 mm (6 inches) apart.
 - b. At Wood Framing: Nail metal lath to wood framing with long dimension of sheet at right angles to framing member.
 - c. Place ties where sides of sheets laps at supports and at side laps of sheets between supports. Lap metal lath not less than 13 mm (1/2 inch) at sides of sheets and 25 mm (1 inch) at ends of sheets.
 - d. Suspended and Furred Ceilings: Use 1.8 kg/sq m (3.4 pounds/SY) minimum weight diamond mesh lath.
 - e. Ceramic Tile Setting Beds: Use 1.8 kg/sq m (3.4 pounds/SY) minimum weight diamond mesh lath.
52. Gypsum Lath: Install in accordance with ASTM C 841.
 - a. Wood Framing and Furring: Install lath as follows:
 - 1) With screws to comply with lath manufacturer's directions.
 - 2) With nails.
 - 3) Provide floating angle construction.
 - b. Suspended and Furred Ceilings: Install lath to furring members with clips.
 - c. Vertical Metal Framing and Furring: Install lath as follows:
 - 1) With screws.
 - 2) With clips, supplemented by screws where required by lath manufacturer.
 - 3) Where sound-rated partitions are indicated, attach lath with resilient clips.

Installation Of Accessories

53. Accessories: Install as required to repair area of work to match existing. Install in accordance with ASTM C 841. Miter or cope accessories at comers; Install with tight joints and in alignment. Attach accessories securely to plaster bases to hold accessories in place and alignment during plastering.
54. Interior Corners: Apply cornerite.
55. Corner Beads: Install corner beads tightly secured to lath at exposed exterior corners.
56. Casing Beads: Install at terminations of plaster work, except where plaster passes behind and is concealed by other work and where metal screeds, bases, or metal frames act as casing beads.
57. Control Joints: Install at locations indicated or, if not indicated, at spacings and locations required by Reference Standards. Coordinate specific locations with the Owner.
58. Access Panels: Provide access panels as required for maintenance of concealed plumbing work in coordination with Division 15 Section "Plumbing." Tiled Areas: Coordinate with Division 9 Section "Ceramic Tile."
59. Sound-Rated Plaster Work: Where sound-rated plaster work is indicated by STC ratings or other notation:
 - a. Acoustical Sealant: Seal work at perimeters, control joints, openings, and penetrations with continuous bead of acoustical sealant. Comply with ASTM C 919 and plastering manufacturer's recommendations for location of sealant beads.

- b. Sound Insulation: Install insulation blankets within stud cavities of sound-rated partition assemblies where indicated.

Plastering

- 60. Plastering: Comply with ASTM C 842 in thickness to match existing.
 - a. Preparation: Remove loose, fractured, or separated plaster to face of substrate. repairing lath at substrate to ensure repair area bounded by solid and sound existing plaster construction.
 - 1) Prepare monolithic surfaces for bonded base coats and use bonding compound to comply with Reference Standards for conditioning of monolithic surfaces.
 - b. Grout hollow metal frames, bases, and similar work with base-mat plaster material, and prior to lathing where necessary. Except where full grouting is indicated or required for fire-resistance rating, grout at least 150 mm (6 inches) at each jamb anchor dip.
 - c. Plaster flush with metal frames and other built-in metal items or accessories that act as plaster ground, unless otherwise indicated. Where plaster is not terminated at metal by casing beads, cut base coat free from metal before plaster sets and groove finish coat at junctures with metal.
- 61. Preparation: Check metal grounds, corner beads, screeds, and other accessories carefully for alignment before starting plaster application. Check expansion and control joints and supporting metal structures to ensure that expansion and control joints can move unrestrained.
- 62. Plaster: Apply in accordance with ASTM C 842 in thickness to match existing:
 - a. Use three-coat work over following plaster bases:
 - 1) Metal lath.
 - 2) Gypsum lath attached to ceiling supports by clips.
 - 3) Gypsum lath attached to ceiling supports spaced over 400 mm (16 inches) OC.
 - 4) Gypsum lath, 9.5 mm (3/8 inch) thick, with separate vapor retarder behind.
 - b. Use two-coat work over following bases.
 - 1) Gypsum lath except for installations requiring three-coat work.
 - 2) Unit masonry.
 - 3) Concrete, cast-in-place or precast when surface condition complies with ASTM C 842 for plaster bonded to solid base.
 - c. First Coat: Apply first coat of plaster with such force to secure good key.
 - d. Finish Coats: Apply troweled finish coats unless otherwise indicated.
- 63. Workmanship: Perform work true to line, straight, and plumb.
 - a. Finished Surfaces: Free from waves, dents, bumps, cracks, pits, checks, streaks, catfaces, blisters, or other defects. Cutout and properly replace defective areas.
 - b. Execute work to avoid any irregularity occurring at point or place where one section is joined to another.
 - c. Arises and Angles: True and sharp.
- 64. Tolerances: Plaster surface plane within plus/minus 3 mm in 3 000 mm (1/8 inch in 10 feet).

Integrating Existing Work

- 65. Protection: Comply with Detailed Scope of Work.

Adjustments

- 66. Partition Removal: Comply with Detailed Scope of Work.

Dust Control

- 67. Dust: Comply with Detailed Scope of Work.

Patching And Cleaning

- 68. Cutting and Patching: Do necessary cutting, patching, and repairing and pointing up of plastering after other work is in place to restore defective areas. Repair or replace work to eliminate blisters, buckles, excessive crazing and check-cracking, dry outs, efflorescence, sweat-outs, and similar defects and where bond to substrate has failed.
 - a. Sand smooth-troweled finishes lightly to remove trowel marks and arises.

09 - Finishes



-
69. Cleaning: As rapidly as plastering is completed in each space, clean up rubbish, utensils, and surplus material, sweep floor and leave in neat condition for work of others.
- a. When general plastering is concluded, remove plastering rubbish, equipment, and surplus materials from premises.
 - b. Clean surfaces splattered with plaster.

END OF SECTION 09 22 36 23

Task	Specification	Specification Description
09 22 36 23	09 22 13 13	Gypsum Plaster
09 22 36 23	09 22 13 13a	Portland Cement Plaster
09 22 36 23	09 22 13 13b	Gypsum Veneer Plaster
09 22 36 33	09 22 36 23	Lath and Plaster Renovation
09 22 36 33	09 22 13 13	Gypsum Plaster
09 22 36 33	09 22 13 13a	Portland Cement Plaster
09 22 36 33	09 22 13 13b	Gypsum Veneer Plaster

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SECTION 09 23 13 00 - GYPSUM BOARD RENOVATION

GENERAL

Description Of Work

1. This specification covers the furnishing and installation of materials for gypsum board renovation. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

Submittals

2. Quality Assurance/Control Submittals
 - a. Certificates: Manufacturer's written certification that gypsum products meet or exceed specified requirements.

Quality Assurance

3. Regulatory Requirements:
 - a. Gypsum Board Partitions: Listed and labeled for fire-protective ratings as indicated or scheduled.
 - b. Gypsum Board Floor/Ceilings and Roof/Ceiling Assemblies: Listed and labeled for fire protective ratings as indicated or scheduled.
 - c. Fire-Rated Assemblies: Comply with UL 05, FM P8016, or GA 600 for required fire-rated assembly.

Delivery, Storage, And Handling

4. Storage and Protection: Store wallboard off ground to protect it from weather and damage due to moisture damage.
 - a. Wallboard: Dry, free of warpage, and have bundling tape intact immediately prior to use.

Project Conditions

5. Environmental Requirements: Comply with Detailed Scope of Work.
 - a. During gypsum-panel application and finishing, maintain indoor temperatures within range of 13 degrees C (55 degrees F) to 21 degrees C (70 degrees F). Provide adequate ventilation to carry off excess moisture.
6. Existing Conditions: See Division 1 Section "Summary of Work". Do not interfere with use of occupied buildings or portions of buildings. Maintain free and safe passage to and from occupied areas.
7. Protection: Protect grounds, plantings, buildings and any other facilities or property from damage caused by construction operations.

Scheduling And Sequencing

8. Scheduling and Completion: Comply with Detailed Scope of Work.

PRODUCTS

Materials

9. Materials for Patching, Extending, and Matching:

- a. Provide same products or types of construction as in existing structure, as needed to patch, extend, or match existing work.
 - 1) Generally, Contract Documents will not define products present in existing construction. Determine products by Inspection and any necessary testing.
 - 2) Patching, extending, and matching of existing work and systems shall result in a complete, finished system.
- b. Presence of product, finish, or type of construction requires that patching, extending, or matching be performed as necessary to make work complete and consistent.

Metals

10. Partition Metals: ASTM C 645, galvanized steel:
 - a. Interior Steel Studs: Minimum 0.46 mm (25 gage), provide sizes and gages to match existing or as indicated.
 - 1) Provide minimum of 0.84 mm (20 gage) studs both sides of hollow metal frames.
 - b. Steel Stud Runners: Match studs. Provide long leg runners for slip joint at structure above to allow for deflection.
 - c. Furring Channels: Hat-shaped furring channels, minimum 0.46 mm (25 gage).
 - d. Resilient Furring Channels: Manufacturer's standard product designed to reduce sound transmission by resilient attachment of gypsum board, 13 mm (1/2 inch) deep.
 - e. Sheet-Metal Reinforcement (Alternate to Wood Blocking): 1.52 mm (16 gage) minimum.
11. Suspended Coiling Metals:
 - a. Runner Channels: ASTM C 754 cold-rolled steel channels with rust-inhibitive finish.
 - 1) 50 mm (2 Inches) deep, 88 kg per 100 m (590 pounds per 1,000 LF).
 - 2) 38 mm (1-1/2 inch) deep, 70 kg per 100 m (475 pounds per 1,000 LF).
 - 3) 19 mm (3/4 Inch) deep, 45 kg per 100 m (300 pounds per 1,000 LF).
 - b. Furring Channels: Hat-shaped galvanized-steel furring channels, minimum 0.46 mm (25 gage).
 - c. Steel Studs: Galvanized steel as specified above, minimum 0.46 mm (25 gage).
 - d. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
 - 1) Hanger Wire: Minimum 4.1 mm (8 gage).
 - 2) Tie Wire: 6 mm (16 gage).

Gypsum Board And Related Materials

12. Gypsum Board: GA216 and ASTM C 36
 - a. Size: 12.7 mm and 15.9 mm (1/2 inch and 5/8 inch) thick to match existing, as indicated or scheduled. Provide boards 1 200 mm (48 inches) wide by length required to minimize cross joints.
 - b. Regular Tapered-edge gypsum panels.
 - 1) Provide Type X gypsum panels at fire-rated assemblies.
 - c. Water-Resistant: ASTM C 630, paintable, tapered-edge gypsum panels.
 - 1) Provide Type X water-resistant gypsum panels at fire-rated assemblies.
13. Cementitious Backer Units (CBU): ANSI A118.9, nailable/screwable backer board composed of stable portland cement, aggregates, and reinforcements with ability to remain unaffected by prolonged exposure to moisture, 12.7 mm (1/2 inch) thick.
14. Fasteners:
 - a. Screws: ASTM C 1002, drywall screws, corrosion resistant. Provide types as recommended by manufacturer for each application.
 - 1) Wallboard to Metal Framing: Minimum 25 mm (1 inch), Type S.
 - 2) Wall board to Wood Framing: Minimum 32 mm (1-1/4 inch) Type W bugle head.

- 3) Wall board to Wallboard: Type G.
- b. Nails: ASTM C 514.
- 15. Accessories: GA 216 and ASTM C 1047, galvanized steel.
 - a. Comer Bead: GA 216 Type CB-114 x 114.
 - b. Metal Trim (Casing Beads): GA 216 Type L, in depth to match gypsum-board thickness.
 - c. Control Joint: V-shaped control joint.
 - d. Adhesive: ASTM C 557 multi-purpose adhesive.
- 16. Finishing Materials: ASTM C 475.
 - a. Joint Tape: Provide type as recommended by panel manufacturer.
 - b. Joint Treatment: Joint compound, adhesive, water, and fasteners.
- 17. Sound-Isolation Materials:
 - a. Sound Insulation: ASTM C 665, Type I (unfaced) mineral fiber blankets, 3.7 to 4.9 kg per sq m (3/4 to 1 PCF), thickness as indicated, scheduled, or required by fire-rated assembly.
 - b. Acoustical Sealant:
 - 1) Concealed: ASTM C 919 nondrying, non-hardening, and non-skinning; non-bleeding; and non-staining.
 - 2) Exposed: ASTM C 919 non-oxidizing and skinning; permanently elastic; and paintable.
 - c. Ductwork Penetrations Packing: Low-density fiberglass.

EXECUTION

Examination

- 18. Units, Spaces, and Areas to be Renovated: Comply with Detailed Scope of Work.
 - a. Existing Conditions: Before beginning installation, examine substrates and framing to receive gypsum board for defects or conditions adversely affecting quality and execution of installation.

Preparation

- 19. Dust Protection: Comply with Detailed Scope of Work.
- 20. Building Occupation: Carry out demolition and renovation work to cause as little inconvenience to occupants as possible. See Detailed Scope of Work.
- 21. Protection: Comply with Detailed Scope of Work.
 - a. Protection: Provide drapes and drop cloths necessary to protect walls, floors, ductwork and piping, electrical work, etc. during drywall finishing operations.
- 22. Selective Demolition: Comply with Detailed Scope of Work.

Laying Out Work

- 23. Discrepancies: Verify dimensions and elevations indicated in layout of existing work.
 - a. Prior to commencing work, carefully compare and check Drawings (if any) for discrepancies in locations or elevations of work to be executed.
 - b. Refer discrepancies among Drawings (if any), Specifications, and existing conditions to the Owner or adjustment before work affected is performed.
 - 1) Failure to make such notification shall place responsibility on Contractor to carry out work in satisfactory, workmanlike manner.
 - c. Contractor: Responsible for location and elevation of construction indicated by Construction Documents.

Performance

24. Patching: Patch and extend existing work using skilled mechanics capable of matching existing quality of workmanship.
 - a. Quality of Patched or Extended Work: Not less than specified for new work. If similar new work is not specified, equal to existing work.
25. Damaged Surfaces: Comply with Detailed Scope of Work.
26. Transitions from Existing to New Work: Comply with Detailed Scope of Work.

Erection Of Drywall Stud Partitions

27. Reference Standard: Erect steel framing in accordance with ASTM C 754.
28. Layouts: Align partition studs accurately according to partition layout.
29. Anchoring: Anchor runner channels to concrete slabs with concrete stub nails or power-driven anchors at 600 mm (24 inches) OC. Anchor runner channels to coiling grid, where applicable, with stove bolts. Where studs extend above ceiling system, install headers where required to receive runners.
30. Studs: Position studs vertically in runners. Where studs are located adjacent to openings or partition intersections and comers. anchor studs to runners with manufacturer's metal lock fastener or with 13 mm (1/2 inch) Type S pan-head screws.
 - a. Space studs at 400 mm (16 Inches) and 600 mm (24 inches) OC as indicated or scheduled.
 - 1) Cementitious Backer Units (CBU): Space studs at maximum of 400 mm (16 inches) OC.
 - 2) Limiting Heights: Comply with ASTM C 754 for transverse load of 240 Pa (5 lb-force/SF) without exceeding either allowable stress or deflection of L/240. Comers and Intersections: Locate studs no more than 50 mm (2 inches) from abutting partitions, comers, etc.
 - b. Openings: Locate studs not more than 50 mm (2 inches) from opening frames. Anchor studs to frame anchor clips by bolt or screw attachment. Install headers over openings as recommended by the manufacturer.
 - 1) Solid-Core Wood Doors and Hollow Metal Doors: Provide two full-height studs at jambs fastened together back to back.
 - 2) Fire-Rated Openings: Comply with GA 219.
31. Bracing: Provide diagonal bracing at head of studs that terminate above the ceiling level. Bracing shall consist of metal studs bent to V-shape and extending at 45 degrees from partition head to structure above. Locate bracing 1 200 mm (48 inches) maximum OC.
32. Wood Blocking or Metal Reinforcement:
 - a. Wood Blocking: See Division 6 Section "Rough Carpentry."
 - b. Install metal reinforcement of size required for support of toilet and bath accessories, hardware, cabinets, shelving, counters, and other wall-mounted items.
 - c. Set true to line, level, or plumb well-secured in stud wall and flush with back of drywall or other wall finish.
 - d. Coordinate exact locations with other sections.

Miscellaneous Framing And Furring

33. General: Provide necessary framing and furring for special framing at recesses, offsets, specialty Items, and at wall-mounted casework, shelving, and equipment.
34. Furring Channels: Install furring channels over back-up material. Position channels vertically at 600 mm (24 inches) OC. Use power-activated fasteners or stub nails at 600 mm (24 Inches) OC along alternating flanges. Shim channels level as required.
 - a. Cementitious Backer Units (CBU): Space furring at maximum of 400 mm (16 inches) OC.

35. Resilient Furring Channels: Screw-attach In accordance with manufacturer's recommendations.
 - a. Spacing: 600 mm (24 inches) OC for framing at 16 inches OC and 400 mm (16 inches) OC for framing at 24 Inches OC.

Ceiling Grillage Erection

36. Reference Standard: Erect steel framing In accordance with ASTM C 754.
37. Hangers: Install wire hangers spaced not over 1 200 mm (48 inches) OC in direction of 38 mm (1-1/2 inch) main runner channels and within 150 mm (6 inches) of ends of main runners or interruptions of ceiling continuity. Hang from structure above.
38. Runners: Place main runners not over 1 200 mm (48 inches) OC. Provide, position, and level hangers with hangers saddle-tied along runners. Space furring channels at 600 mm (24 inches) OC at right angles to runner channels and secure with furring channel clips.
39. Reinforcement: At light troffers or other openings, reinforce grillage with 19 mm (3/4 inch) cold-rolled channels wired atop and parallel to main runner channels.
 - a. Provide lateral seismic bracing as required by code.
40. Special Shapes: Provide necessary framing and suspension for off sets, verticals, etc.

Insulation

41. Sound Insulation: Place sound Insulation blankets in partitions tight within spaces, around cut openings. behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
 - a. Ductwork Penetrations: Provide one-inch wide clearance around ductwork and pack with fiberglass ready for joint sealers.

Installation Of Gypsum Drywall

42. Reference Standards: Apply and finish gypsum board in accordance with GA 216 and ASTM C 840.
43. Partition Gypsum Board Layout: Apply gypsum wallboard panels vertically with abutting ends and edges occurring over stud flanges or furring.
 - a. Joints on Opposite Sides of Partitions: Stagger; joints shall not occur over same stud.
 - b. Two Layer Construction: Stagger Joints between layers.
44. Ceiling Gypsum Board: Apply gypsum board of maximum practical length with long dimensions at right angles to furring channels. End and edge joints shall occur over furring channels with end joints staggered. Properly support gypsum board around cutouts and openings.
45. Fasteners: Apply board to studs or furring with drywall screws spaced 300 mm (12 inches) OC in field of board and 200 mm (8 inches) OC staggered along abutting edges.
46. Water-Resistant: Apply gypsum wallboard manufacturer's recommended sealant to raw cut edges and screw heads.
47. Cementitious Backer Units (CBU): Install in accordance with ANSI A108.11 and manufacturer's recommendations.
48. Accessories:
 - a. Comer Bead: Apply as recommended by manufacturer at exposed outer corners.
 - b. Trim (Casing Beads): Apply as recommended by manufacturer, where gypsum board abuts other materials, and as indicated.
 - c. Control Joints: Comply with GA 216.
 - 1) Walls: Install at not more than 9 m (30 feet) OC.
 - 2) Ceilings: Install at not more than 15 m (50 feet) OC and where framing changes direction.
 - 3) Coordinate locations with the Owner.
49. Access Panels: Securely install access panels furnished under other sections. Set plumb and square to align with finish surface.

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50. Acoustical Sealant: Seal perimeter and penetrations on both sides of sound-rated partitions and partitions with sound-attenuation blankets with minimum of single 6 mm (1/4 inch) bead of sealant
- a. Locations:
 - 1) Seal around gypsum-board perimeter in angle formed by gypsum-board panels and abutting dissimilar materials.
 - 2) Seal intersections of gypsum board with dissimilar materials.
 - 3) Seal pipe, conduit, ductwork, penetrations, etc.
 - 4) Seal around cutouts for lights, cabinets, pipes, ductwork, electrical boxes, etc.
 - 5) Seal gypsum board panel terminations in door and window frames.
 - 6) Seal control-joint locations before installing control Joints to panels.
 - b. Installation: Comply with ASTM C 919 and requirements of indicated sound-rated assembly. Provide number and positions of beads to comply with sound rating of assembly.
51. Tolerances: Gypsum-board surface plane within plus or minus 3 mm in 3 000 mm (1/8 inch in 10 feet).
52. Finishing: Finish in accordance with GA 214.
- a. Concealed Locations (Not Exposed to View in Rooms): Level 1
 - b. Beneath Tile: Level 2.
 - c. Other Finished Areas: Level 4. Finish joints, trim, and fastener dimples. Sand smooth.
 - d. Cementitious Backer Units (CBU): Treat joints in accordance with ANSI A108.11 and manufacturer's recommendations.

END OF SECTION 09 23 13 00

Task	Specification	Specification Description
09 23 13 00	09 22 36 23	Lath and Plaster Renovation
09 23 13 00	09 22 13 13	Gypsum Plaster
09 23 13 00	09 22 13 13a	Portland Cement Plaster
09 23 13 00	09 22 13 13b	Gypsum Veneer Plaster
09 24 13 00	09 22 13 13	Gypsum Plaster
09 24 13 00	09 22 13 13b	Gypsum Veneer Plaster
09 24 33 00	01 22 16 00	No Specification Required
09 28 13 00	09 22 13 13b	Gypsum Veneer Plaster
09 28 13 00	01 95 99 92h	Gypsum Board
09 28 13 00	09 29 82 00	Gypsum Board Shaft-Wall Assemblies
09 28 13 00	09 30 13 00	Ceramic Tile
09 29 10 00	01 22 16 00	No Specification Required
09 29 10 00	09 23 13 00	Gypsum Board Renovation
09 29 10 00	01 95 99 92h	Gypsum Board
09 29 10 00	09 29 82 00	Gypsum Board Shaft-Wall Assemblies

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SECTION 09 29 82 00 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gypsum board shaft-wall assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes gypsum board shaft-wall assemblies for the following:
 - a. Shaft-wall enclosures.
 - b. Chase enclosures.
 - c. Stair enclosures.
 - d. Horizontal enclosures.

C. Submittals

1. Product Data: For each gypsum board shaft-wall assembly indicated.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
 - b. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.

D. Quality Assurance

1. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.
2. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
2. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
3. Stack panels flat on leveled supports off floor or slab to prevent sagging.

F. Project Conditions

1. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
2. Do not install interior products until installation areas are enclosed and conditioned.
3. Do not install panels that are wet, moisture damaged, or mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

- A. Gypsum Board Shaft-Wall Assemblies, General
1. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - a. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 - b. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.
- B. Panel Products
1. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
 2. Gypsum Liner Panels: Comply with ASTM C 442/C 442M.
 - a. Type X: Manufacturer's proprietary liner panels with moisture-resistant paper faces.
 - 1) Core: 1 inch (25.4 mm) thick.
 - 2) Long Edges: Double bevel.
 - b. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels with moisture- and mold-resistant core and surfaces; comply with ASTM D 3273.
 - 1) Core: 1 inch (25.4 mm) thick.
 - 2) Long Edges: Double bevel.
 3. Gypsum Base for Gypsum Veneer Plaster: As specified in Division 09 Section "Gypsum Veneer Plastering".
 4. Gypsum Board: As specified in Division 09 Section "Gypsum Board".
 5. Water-Resistant Gypsum Backing Board: As specified in Division 09 Section "Gypsum Board".
 6. Cementitious Backer Units: As specified in Division 09 Section "Tiling".
- C. Non-Load-Bearing Steel Framing
1. Framing Members: Comply with ASTM C 754 for conditions indicated.
 2. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - a. Recycled Content: Provide steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 - b. Protective Coating: ASTM A 653/A 653M, G40 (Z120) OR ASTM A 653/A 653M, G60 (Z180) OR Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120), as directed, hot-dip galvanized, unless otherwise indicated.
- D. Auxiliary Materials
1. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.
 2. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section(s) "Gypsum Veneer Plastering" OR "Gypsum Board", as directed, that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
 3. Gypsum Base Joint-Reinforcing Materials: As specified in Division 09 Section "Gypsum Veneer Plastering".
 4. Gypsum Veneer Plaster: As specified in Division 09 Section "Gypsum Veneer Plastering".
 5. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board".
 6. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum face-layer panels and gypsum-base face-layer panels to backing-layer panels in multilayer construction.
 - a. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - a. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
8. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - a. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
 - b. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
9. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - a. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - b. Recycled Content: Provide blankets with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 25 percent by weight.
10. Acoustical Sealant: As specified in Division 07 Section "Thermal Insulation".
 - a. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Gypsum Board Shaft-Wall Assemblies

1. Basis-of-Design Product: As indicated on Drawings by design designation of a qualified testing agency.
2. Fire-Resistance Rating: As indicated **OR** 1 hour **OR** 2 hours **OR** 3 hours **OR** 4 hours, **as directed**.
3. STC Rating: As indicated **OR** 51, minimum, **as directed**.
4. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
 - a. Depth: As indicated **OR** 2-1/2 inches (64 mm) **OR** 4 inches (102 mm) **OR** 6 inches (152 mm), **as directed**.
 - b. Minimum Base-Metal Thickness: As indicated **OR** 0.0179 inch (0.45 mm) **OR** 0.0220 inch (0.55 mm) **OR** 0.0329 inch (0.84 mm), **as directed**.
5. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches (51 mm) long and in depth matching studs.
 - a. Minimum Base-Metal Thickness: As indicated **OR** Matching steel studs **OR** 0.0179 inch (0.45 mm) **OR** 0.0220 inch (0.55 mm) **OR** 0.0329 inch (0.84 mm), **as directed**.
6. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
7. Jamb Struts: Manufacturer's standard J-profile strut with long-leg length of 3 inches (76 mm), in depth matching studs, and not less than 0.0329 inch (0.84 mm) thick.
8. Room-Side Finish: As indicated **OR** Gypsum board **OR** Gypsum veneer plaster **OR** Cementitious backer units, **as directed**.
9. Shaft-Side Finish: As indicated **OR** As indicated by fire-resistance-rated assembly design designation, **as directed**.
10. Insulation: Sound attenuation blankets.

2.2 EXECUTION

A. Preparation

1. Sprayed Fire-Resistive Materials: Coordinate with gypsum board shaft-wall assemblies so both elements of Work remain complete and undamaged. Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft-wall assemblies to comply with requirements specified in Division 07 Section "Applied Fireproofing".
 - a. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runner tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than **24 inches (610 mm)** o.c.
2. After sprayed fire-resistive materials are applied, remove only to extent necessary for installation of gypsum board shaft-wall assemblies and without reducing the fire-resistive material thickness below that which is required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

B. Installation

1. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - a. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
 - b. Division 09 Section(s) "Gypsum Veneer Plastering" OR "Gypsum Board", **as directed**, for applying and finishing panels.
 - c. Division 09 Section "Tiling" for cementitious backer units.
2. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.
3. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 - a. At elevator hoistway entrance door frames, provide jamb struts on each side of door frame.
 - b. Where handrails directly attach to gypsum board shaft-wall assemblies, provide galvanized steel reinforcing strip with **0.0312-inch (0.79-mm)** minimum thickness of base (uncoated) metal, accurately positioned and secured behind at least 1 gypsum base for veneer plaster **OR** gypsum board **OR** cementitious backer unit, **as directed**, face-layer panel.
4. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.
5. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
6. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
7. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
8. Control Joints: Install control joints at locations indicated on Drawings **OR** according to ASTM C 840 and in specific locations approved by the Owner, **as directed**, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.
9. Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with manufacturer's written instructions, whichever are more stringent.
10. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within **4 inches (102 mm)** of the shaft face of structural beams, floor edges, and similar projections into shaft, install **1/2- or 5/8-inch- (13- or 16-mm-)** thick, gypsum board cants covering tops of projections. No recesses allowed (at steel beams especially).

- a. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at **24 inches (610 mm)** o.c. with screws fastened to shaft-wall framing.
 - b. Where steel framing is required to support gypsum board cants, install framing at **24 inches (610 mm)** o.c. and extend studs from the projection to shaft-wall framing.
11. Installation Tolerance: Install each framing member so fastening surfaces vary not more than **1/8 inch (3mm)** from the plane formed by faces of adjacent framing.

C. Protection

1. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
2. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - a. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - b. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 82 00

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Task	Specification	Specification Description
09 29 82 00	01 95 99 92h	Gypsum Board

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SECTION 09 30 13 00 - CERAMIC TILE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for ceramic tile. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Ceramic tile.
 - b. Porcelain tile.
 - c. Stone thresholds.
 - d. Waterproof membrane.
 - e. Crack isolation membrane.
 - f. Tile backing panels.
 - g. Metal edge strips.

C. Definitions

1. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
2. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
3. Module Size: Actual tile size plus joint width indicated.
4. Face Size: Actual tile size, excluding spacer lugs.

D. Performance Requirements

1. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
 - a. Level Surfaces: Minimum 0.6.
 - b. Step Treads: Minimum 0.6.
 - c. Ramp Surfaces: Minimum 0.8.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
4. Samples:
 - a. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.

OR

Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least **12 inches**

(300 mm) square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.

- b. Full-size units of each type of trim and accessory for each color and finish required.
 - c. Stone thresholds in 6-inch (150-mm) lengths.
 - d. Metal edge strips in 6-inch (150-mm) lengths.
5. Qualification Data: For qualified Installer.
 6. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
 7. Product Certificates: For each type of product, signed by product manufacturer. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
 8. Material Test Reports: For each tile-setting and -grouting product, special purpose tile and certified porcelain tile.

F. Quality Assurance

1. Source Limitations for Tile: Obtain tile of each type and color or finish **OR** tile of each type **OR** tile of each color or finish **OR** tile, **as directed**, from one source or producer.
 - a. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
2. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
3. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - a. Stone thresholds.
 - b. Waterproof membrane.
 - c. Crack isolation membrane.
 - d. Joint sealants.
 - e. Cementitious backer units.
 - f. Metal edge strips.
4. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
2. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
3. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
4. Store liquid materials in unopened containers and protected from freezing.
5. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

H. Project Conditions

1. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.2 PRODUCTS

A. Products, General

1. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - a. Provide tile complying with Standard grade requirements unless otherwise indicated.

2. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 1.2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
3. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
4. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - a. Where tile is indicated for installation in swimming pools, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
5. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

B. Tile Products

1. Tile Type: Factory-mounted unglazed **OR** glazed, **as directed**, ceramic mosaic tile.
 - a. Composition: Porcelain **OR** Impervious natural clay or porcelain **OR** Vitreous or impervious natural clay or porcelain, **as directed**.
 - b. Module Size: **1 by 1 inch (25.4 by 25.4 mm) OR 1 by 2 inches (25.4 by 50.8 mm) OR 2 by 2 inches (50.8 by 50.8 mm), as directed.**
 - c. Thickness: **1/4 inch (6.35 mm).**
 - d. Face: Plain **OR** Pattern of design indicated, **as directed**, with cushion edges.
 - e. Surface (for unglazed tile): Smooth, without **OR** Slip-resistant, with, **as directed**, abrasive admixture.
 - f. Finish (for glazed tile): Bright, opaque **OR** Bright, clear **OR** Mat, opaque **OR** Mat, clear **OR** Semimat, opaque **OR** Semimat, clear **OR** Vellum, opaque **OR** Vellum, clear **OR** Crystalline, **as directed**, glaze.
 - g. Tile Color and Pattern: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - h. Grout Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - i. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile, **as directed**. Provide shapes as follows, selected from manufacturer's standard shapes:
 - 1) Base Cove: Cove, module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm), as directed.**
 - 2) Base Cap for Portland Cement Mortar Installations: Bead (bullnose), module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm), as directed.**
 - 3) Base Cap for Thin-Set Mortar Installations: Surface bullnose, module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm) OR 2 by 2 inches (50.8 by 50.8 mm), as directed.**
 - 4) Wainscot Cap for Portland Cement Mortar Installations: Bead (bullnose), module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm), as directed.**
 - 5) Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm) OR 2 by 2 inches (50.8 by 50.8 mm), as directed.**
 - 6) Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - 7) External Corners for Portland Cement Mortar Installations: Bead (bullnose), module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm), as directed.**
 - 8) External Corners for Thin-Set Mortar Installations: Surface bullnose, module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm) OR 2 by 2 inches (50.8 by 50.8 mm), as directed.**

- 9) Internal Corners: Cove, module size **1 by 1 inch (25.4 by 25.4 mm) OR 2 by 1 inch (50.8 by 25.4 mm), as directed.**
OR
 Internal Corners: Field-buttet square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.
- 10) Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from **1/2 to 1/4 inch (12.7 to 6.35 mm)** across nominal **4-inch (100-mm)** dimension.
2. Tile Type: Unglazed **OR** Glazed, **as directed**, square-edged quarry tile.
- Face Size: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm) OR 6 by 3 inches (152 by 76 mm) OR 6 by 6 inches (152 by 152 mm) OR 8 by 3-7/8 inches (203 by 98 mm) OR 8 by 8 inches (203 by 203 mm), as directed.**
 - Thickness: **3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm) OR 3/4 inch (19 mm), as directed.**
 - Wearing Surface (for unglazed tile): Nonabrasive, smooth **OR** Abrasive aggregate embedded in surface, **as directed.**
 - Finish (for glazed tile): Bright, opaque **OR** Bright, clear **OR** Mat, opaque **OR** Mat, clear **OR** Semimat, opaque **OR** Semimat, clear **OR** Vellum, opaque **OR** Vellum, clear **OR** Crystalline, **as directed**, glaze.
 - Tile Color and Pattern: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - Grout Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - For furan-grouted quarry tile, precoat with temporary protective coating.
 - Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile, **as directed.** Provide shapes as follows, selected from manufacturer's standard shapes:
 - Base: Coved with surface bullnose top edge, **as directed**, face size **6 by 6 inches (152 by 152 mm) OR 8 by 3-7/8 inches (203 by 98 mm), as directed.**
 - Wainscot Cap: Surface bullnose, face size **6 by 6 inches (152 by 152 mm) OR 8 by 3-7/8 inches (203 by 98 mm), as directed.**
 - Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
3. Tile Type: Unglazed **OR** Glazed, **as directed**, paver tile.
- Composition: Porcelain **OR** Impervious natural clay or porcelain **OR** Vitreous or impervious natural clay or porcelain **OR** Natural clay or porcelain, **as directed.**
 - Face Size: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm) OR 6 by 6 inches (152 by 152 mm) OR 7-3/4 by 3-7/8 inches (197 by 98 mm) OR 7-7/8 by 7-7/8 inches (200 by 200 mm) OR 11-13/16 by 11-13/16 inches (300 by 300 mm) OR 165 by 333 mm OR 200 by 250 mm OR 250 by 250 mm OR 165 by 333 mm OR 333 by 333 mm OR 400 by 400 mm, as directed.**
 - Thickness: **1/4 inch (6.35 mm) OR 3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm), as directed.**
 - Face: Plain with square or cushion edges **OR** Plain with square edges **OR** Plain with cushion edges **OR** Pattern of design indicated, with square or cushion edges **OR** As indicated, **as directed.**
 - Finish (for glazed tile): Bright, opaque **OR** Bright, clear **OR** Mat, opaque **OR** Mat, clear **OR** Semimat, opaque **OR** Semimat, clear **OR** Vellum, opaque **OR** Vellum, clear **OR** Crystalline, **as directed**, glaze.
 - Tile Color and Pattern: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - Grout Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
4. Tile Type: Glazed wall tile **OR** Decorative thin wall tile, **as directed.**

- a. Module Size: **4-1/4 by 4-1/4 inches (108 by 108 mm) OR 6 by 4-1/4 inches (152 by 108 mm) OR 6 by 6 inches (152 by 152 mm) OR 200 by 200 mm OR 250 by 250 mm OR 200 by 300 mm, as directed.**
 - b. Thickness: **5/16 inch (8 mm).**
 - c. Face: Plain with modified square edges or cushion edges **OR** Plain with modified square edges **OR** Plain with cushion edges **OR** Pattern of design indicated, with manufacturer's standard edges, **as directed.**
 - d. Finish: Bright, opaque **OR** Bright, clear **OR** Mat, opaque **OR** Mat, clear **OR** Semimat, opaque **OR** Semimat, clear **OR** Vellum, opaque **OR** Vellum, clear **OR** Crystalline, **as directed, glaze.**
 - e. Tile Color and Pattern: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - f. Grout Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - g. Mounting: Factory, back mounted.
 - h. Mounting: PregROUTED sheets of tiles factory assembled and grouted with manufacturer's standard white silicone rubber.
 - i. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile, **as directed.** Provide shapes as follows, selected from manufacturer's standard shapes:
 - 1) Base for Portland Cement Mortar Installations: Coved, module size **4-1/4 by 4-1/4 inches (108 by 108 mm) OR 6 by 6 inches (152 by 152 mm) OR 6 by 3-3/4 inches (152 by 95 mm), as directed.**
 - 2) Base for Thin-Set Mortar Installations: Straight, module size **4-1/4 by 4-1/4 inches (108 by 108 mm) OR 6 by 6 inches (152 by 152 mm) OR 6 by 2 inches (152 by 51 mm), as directed.**
 - 3) Wainscot Cap for Portland Cement Mortar Installations: Bullnose cap, module size **4-1/4 by 4-1/4 inches (108 by 108 mm) OR 6 by 6 inches (152 by 152 mm) OR 6 by 2 inches (152 by 51 mm), as directed.**
 - 4) Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size **4-1/4 by 4-1/4 inches (108 by 108 mm) OR 6 by 6 inches (152 by 152 mm) OR 6 by 2 inches (152 by 51 mm), as directed.**
 - 5) Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - 6) External Corners for Portland Cement Mortar Installations: Bullnose shape with radius of at least **3/4 inch (19 mm)** unless otherwise indicated.
 - 7) External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
 - 8) Internal Corners: Field-buttet square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.
5. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as adjoining wall tile.
- a. One soap holder with grab handle, **as directed,** for each shower and tub indicated.
 - b. One paper holder at each water closet.
 - c. Color and Finish: Match adjoining glazed wall tile **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range **OR** White, bright glaze, **as directed.**
- C. Thresholds
1. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - a. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to **1/16 inch (1.5 mm)** above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to **1/2 inch (12.7 mm)** or less above adjacent floor surface.
 2. Granite Thresholds: ASTM C 615, with polished **OR** honed, **as directed,** finish.

- a. Description: Uniform, fine **OR** medium, **as directed**, -grained, white **OR** gray **OR** black, **as directed**, stone without veining.
OR
Description: Match sample.
 3. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 10 **OR** 12, **as directed**, per ASTM C 1353 or ASTM C 241 and with honed finish.
 - a. Description: Uniform, fine- to medium-grained white stone with gray veining.
OR
Description: Match sample.
 4. Slate Thresholds: ASTM C 629, Classification I Exterior **OR** II Interior, **as directed**, with fine, even grain and honed finish.
 - a. Description: Uniform, black **OR** blue-black **OR** gray **OR** blue-gray **OR** green, **as directed**, stone and unfading.
OR
Description: Match sample.
- D. Tile Backing Panels
1. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.
 - a. Thickness: **1/4 inch (6.4 mm) OR 1/2 inch (12.7 mm) OR 5/8 inch (15.9 mm) OR** As indicated, **as directed**.
 2. Fiber-Cement Underlayment: ASTM C 1288, in maximum lengths available to minimize end-to-end butt joints.
 - a. Thickness: **1/4 inch (6.4 mm) OR 1/2 inch (12.7 mm) OR** As indicated, **as directed**.
- E. Waterproof Membrane
1. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
 2. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; **0.030-inch (0.76-mm)** nominal thickness.
 3. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; **0.040-inch (1.01-mm)** nominal thickness.
 4. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; **0.008-inch (0.203-mm)** nominal thickness.
 5. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcement facing; **0.040-inch (1.01-mm)** nominal thickness.
 6. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 7. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 8. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.
 9. Urethane Waterproofing and Tile-Setting Adhesive: One-part, liquid-applied urethane, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process.
- F. Crack Isolation Membrane
1. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for standard **OR** high, **as directed**, performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
 2. Chlorinated Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; **0.030-inch (0.76-mm)** nominal thickness.
 3. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; **0.040-inch (1.01-mm)** nominal thickness.

4. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; **0.008-inch (0.203-mm)** nominal thickness.
5. Corrugated Polyethylene: Corrugated polyethylene with dovetail-shaped corrugations and with anchoring webbing on the underside; **3/16-inch (4-mm)** nominal thickness.
6. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, modified-bituminous sheet with fabric reinforcement facing; **0.040-inch (1.01-mm)** nominal thickness.
7. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.
8. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
9. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.
10. Urethane Crack Isolation Membrane and Tile-Setting Adhesive: One-part, liquid-applied urethane, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process.

G. Setting Materials

1. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
 - a. Cleavage Membrane: Asphalt felt, ASTM D 226, Type I (No. 15); or polyethylene sheeting, ASTM D 4397, **4.0 mils (0.1 mm)** thick.
 - b. Reinforcing Wire Fabric: Galvanized, welded wire fabric, **2 by 2 inches (50.8 by 50.8 mm)** by **0.062-inch (1.57-mm)** diameter; comply with ASTM A 1064 and ASTM A 82 except for minimum wire size.
 - c. Expanded Metal Lath: Diamond-mesh lath complying with ASTM C 847.
 - 1) Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
 - 2) Base Metal and Finish for Exterior Applications: Zinc-coated (galvanized) steel sheet.
 - 3) Configuration over Studs and Furring: Flat.
 - 4) Configuration over Solid Surfaces: Self furring.
 - 5) Weight: **2.5 lb/sq. yd. (1.4 kg/sq. m) OR 3.4 lb/sq. yd. (1.8 kg/sq. m), as directed.**
 - d. Latex Additive: Manufacturer's standard, acrylic resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
2. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.
 - a. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.1.
3. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 - a. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
OR
Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
 - b. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.
4. Medium-Bed, Latex-Portland Cement Mortar: Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of **5/8 inch (16 mm)**.
 - a. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
OR
Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
5. EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar (Thin Set): ANSI A118.11.
 - a. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.

- half-hard brass **OR** white zinc alloy **OR** nickel silver **OR** stainless-steel, ASTM A 666, 300 Series, **as directed**, exposed-edge material.
3. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - a. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of **120 to 140 deg F (49 to 60 deg C)** per ASTM D 87.
 - b. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
 4. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
 5. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
- K. Mixing Mortars And Grout
1. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
 2. Add materials, water, and additives in accurate proportions.
 3. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

1.3 EXECUTION

- A. Examination
1. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - a. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - b. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - 1) Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - 2) Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - c. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - d. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Preparation
1. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
 2. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped **1/4 inch per foot (1:50)** toward drains.
 3. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from

other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

4. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

C. Tile Installation

1. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - a. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - 1) Exterior tile floors.
 - 2) Tile floors in wet areas.
 - 3) Tile swimming pool decks.
 - 4) Tile floors in laundries.
 - 5) Tile floors composed of tiles **8 by 8 inches (200 by 200 mm)** or larger.
 - 6) Tile floors composed of rib-backed tiles.
2. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
3. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
4. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
5. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - a. Ceramic Mosaic Tile: **1/16 inch (1.6 mm)**.
 - b. Porcelain Tile: **1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm), as directed.**
 - c. Quarry Tile: **1/4 inch (6.35 mm) OR 3/8 inch (9.5 mm), as directed.**
 - d. Paver Tile: **1/4 inch (6.35 mm) OR 3/8 inch (9.5 mm), as directed.**
 - e. Glazed Wall Tile: **1/16 inch (1.6 mm)**.
 - f. Decorative Thin Wall Tile: **1/16 inch (1.6 mm)**.
6. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
7. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - a. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - b. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants".
8. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - a. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

- b. Do not extend cleavage membrane, waterproofing or crack isolation membrane under thresholds set in dry-set portland cement or latex-portland cement mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing or crack isolation membrane with elastomeric sealant.
 9. Metal Edge Strips: Install at locations indicated **OR** where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile **OR** where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated, **as directed**.
 10. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- D. Tile Backing Panel Installation
1. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.
- E. Waterproofing Installation
1. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
 2. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.
- F. Crack Isolation Membrane Installation
1. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
 2. Do not install tile or setting materials over crack isolation membrane until membrane has cured.
- G. Cleaning And Protecting
1. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - a. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - b. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - c. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
 2. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
 3. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
 4. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.
- H. Exterior Tile Installation Schedule
1. Exterior Floor Installations:
 - a. Tile Installation F101: Cement mortar bed (thickset) bonded to concrete **OR** over waterproof membrane on concrete **OR** over waterproof membrane on concrete where indicated and bonded to concrete where membrane is not indicated, **as directed**; TCA F101 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.

- 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
- 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- b. Tile Installation F102: Thin-set mortar on concrete **OR** over waterproof membrane on concrete **OR** over waterproof membrane on concrete where indicated and on concrete where membrane is not indicated, **as directed**; TCA F102.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
2. Exterior Wall Installations, Masonry or Concrete:
 - a. Tile Installation W201: Cement mortar bed (thickset) on metal lath over waterproof membrane; TCA W201 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - b. Tile Installation W202: Thin-set mortar; TCA W202.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- I. Interior Tile Installation Schedule
 1. Interior Floor Installations, Concrete Subfloor:
 - a. Tile Installation F111: Cement mortar bed (thickset) with cleavage membrane; TCA F111 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - b. Tile Installation F112: Cement mortar bed (thickset) bonded to concrete; TCA F112 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - c. Tile Installation F113: Thin-set mortar; TCA F113.
 - 1) Tile Type: as directed by the Owner.

- 2) Thin-Set Mortar: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - d. Tile Installation F114: Cement mortar bed (thickset) with cleavage membrane; epoxy **OR** furan, **as directed**, grout; TCA F114 and ANSI A108.1B.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Water-cleanable epoxy **OR** Chemical-resistant furan, **as directed**, grout.
 - e. Tile Installation F115: Thin-set mortar; epoxy **OR** furan, **as directed**, grout; TCA F115.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Water-cleanable epoxy **OR** Chemical-resistant furan, **as directed**, grout.
 - f. Tile Installation F116: Organic adhesive **OR** Water-cleanable, tile-setting epoxy, **as directed**; TCA F116.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - g. Tile Installation F121: Cement mortar bed (thickset) on waterproof membrane; TCA F121 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - h. Tile Installation F122: Thin-set mortar on waterproof membrane; TCA F122.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Polymer-modified sanded **OR** unsanded, **as directed**, grout.
 - i. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - j. Tile Installation F131: Water-cleanable, tile-setting epoxy; epoxy grout; TCA F131.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Water-cleanable epoxy grout.
 - k. Tile Installation F132: Water-cleanable, tile-setting epoxy on cured cement mortar bed bonded to concrete subfloor **OR** installed over cleavage membrane, **as directed**; epoxy grout; TCA F132.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Water-cleanable epoxy grout.
 - l. Tile Installation F133: Chemical-resistant furan mortar **OR** Water-cleanable, tile-setting epoxy, **as directed**; furan grout. TCA F133 except use water-cleanable, tile-setting epoxy instead of chemical-resistant furan mortar for setting tile.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Chemical-resistant furan grout.
2. Interior Floor Installations, Wood Subfloor:

- a. Tile Installation F121: Cement mortar bed (thickset) on waterproof membrane; TCA F121 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - b. Tile Installation F141: Cement mortar bed (thickset) with cleavage membrane; TCA F141 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - c. Tile Installation F142: Organic adhesive; TCA F142.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - d. Tile Installation F143: Water-cleanable, tile-setting epoxy; epoxy grout; TCA F143.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Water-cleanable epoxy grout.
 - e. Tile Installation F144: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA F144.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - f. Tile Installation F150/160: Thin-set mortar on exterior-glue plywood; TCA F150 or TCA F160.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: EGP latex-portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
3. Interior Radiant Heat Floor Installations, Concrete Subfloor:
- a. Tile Installation RH110: Thin-set mortar on crack isolation membrane; hydronic piping installed in concrete; TCA RH110.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - b. Tile Installation RH115: Thin-set mortar; electric radiant system encapsulated in thin-set mortar; TCA RH115.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.

- 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- c. Tile Installation RH116: Thin-set mortar on crack isolation membrane; electric radiant system encapsulated in cementitious self-leveling underlayment; TCA RH116.
 - 1) Tile Type: as directed by the Owner.
 - 2) Cementitious Self-Leveling Underlayment: Specified in Division 03 Section "Hydraulic Cement Underlayment".
 - 3) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
4. Interior Radiant Heat Floor Installations, Wood Subfloor:
 - a. Tile Installation RH130: Thin-set mortar on exterior-glue plywood; electric radiant system encapsulated in thin-set mortar; TCA RH130.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: EGP latex-portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - b. Tile Installation RH135: Thin-set mortar on cementitious backer units or fiber cement underlayment; electric radiant system encapsulated in thin-set mortar; TCA RH135.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - c. Tile Installation RH140: Thin-set mortar on crack isolation membrane; electric radiant system encapsulated in cementitious self-leveling underlayment; TCA RH140.
 - 1) Tile Type: as directed by the Owner.
 - 2) Cementitious Self-Leveling Underlayment: Specified in Division 03 Section "Hydraulic Cement Underlayment".
 - 3) Thin-Set Mortar: Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
5. Interior Wall Installations, Masonry or Concrete:
 - a. Tile Installation W202: Thin-set mortar; TCA W202.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex- **OR** Medium-bed, latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - b. Tile Installation W211: Cement mortar bed (thickset) bonded to substrate; TCA W211 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.

- 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- c. Tile Installation W221: Cement mortar bed (thickset) on metal lath over waterproof membrane, **as directed**; TCA W221 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- d. Tile Installation W222: One-coat cement mortar bed (thickset) on metal lath over waterproof membrane, **as directed**; TCA W222 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- e. Tile Installation W223: Organic adhesive; TCA W223.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
6. Interior Wall Installations, Wood Studs or Furring:
 - a. Tile Installation W221: Cement mortar bed (thickset) over waterproof membrane, **as directed**, on solid backing; TCA W221 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - b. Tile Installation W222: One-coat cement mortar bed (thickset) over waterproof membrane, **as directed**, on solid backing; TCA W222 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - c. Tile Installation W223: Organic adhesive on solid backing; TCA W223.
 - 1) Tile Type: as directed by the Owner.

- 2) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- d. Tile Installation W231: Cement mortar bed (thickset); TCA W231 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- e. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- f. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment over cleavage membrane, **as directed**; TCA W244.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- g. Tile Installation W245: Thin-set mortar **OR** Organic adhesive, **as directed**, on coated glass-mat, water-resistant gypsum backer board; TCA W245.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
7. Interior Wall Installations, Metal Studs or Furring:
 - a. Tile Installation W221: Cement mortar bed (thickset) over waterproof membrane, **as directed**, on solid backing; TCA W221 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
 - b. Tile Installation W222: One-coat cement mortar bed (thickset) over waterproof membrane, **as directed**, on solid backing; TCA W222 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.

- c. Tile Installation W223: Organic adhesive on solid backing; TCA W223.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- d. Tile Installation W241: Cement mortar bed (thickset); TCA W241 and ANSI A108.1B.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- e. Tile Installation W242: Organic adhesive on gypsum board; TCA W242.
 - 1) Tile Type: as directed by the Owner.
 - 2) Grout: Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- f. Tile Installation W243: Thin-set mortar on gypsum board; TCA W243.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- g. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment over cleavage membrane, **as directed**; TCA W244.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- h. Tile Installation W245: Thin-set mortar **OR** Organic adhesive, **as directed**, on coated glass-mat, water-resistant gypsum backer board; TCA W245.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- 8. Bathtub Wall Installations, Wood **OR** Metal, **as directed**, Studs or Furring:
 - a. Tile Installation B413: Thin-set mortar **OR** Organic adhesive, **as directed**, on water-resistant gypsum board; TCA B413.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- 9. Bathtub/Shower Wall Installations, Wood **OR** Metal, **as directed**, Studs or Furring:
 - a. Tile Installation B411: Cement mortar bed (thickset); TCA B411 and ANSI A108.1A.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - b. Tile Installation B412: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA B412.
 - 1) Tile Type: as directed by the Owner.

- 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
- 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
- c. Tile Installation B419: Thin-set mortar **OR** Organic adhesive, **as directed**, on coated glass-mat, water-resistant backer board; TCA B419.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded **OR** Water-cleanable epoxy, **as directed**, grout.
10. Shower Receptor and Wall Installations, Concrete or Masonry:
 - a. Tile Installation B414: Cement mortar bed (thickset); TCA B414 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - b. Tile Installation B421: Thin-set mortar on waterproof membrane; TCA B421.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex-portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - c. Tile Installation B422: Thin-set mortar on waterproof membrane with integrated bonding flange for bonded membranes; TCA B422.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
11. Shower Receptor and Wall Installations, Wood **OR** Metal, **as directed**, Studs or Furring:
 - a. Tile Installation B414: Cement mortar bed (thickset); TCA B414 and ANSI A108.1A **OR** ANSI A108.1B **OR** ANSI A108.1C, **as directed**.
 - 1) Tile Type: as directed by the Owner.
 - 2) Bond Coat Mortar for Wet-Set Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Thin-Set Mortar for Cured-Bed Method: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 4) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - b. Tile Installation B415: Thin-set mortar on cementitious backer units or fiber cement underlayment; TCA B415.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
 - c. Tile Installation B420: Thin-set mortar on coated glass-mat, water-resistant backer board; TCA B420.
 - 1) Tile Type: as directed by the Owner.

- 2) Thin-Set Mortar: Dry-set **OR** Latex-, **as directed**, portland cement mortar.
- 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- d. Tile Installation B421: Thin-set mortar on waterproof membrane over cementitious backer units or fiber cement underlayment; TCA B421.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex-portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.
- e. Tile Installation B422: Thin-set mortar on waterproof membrane over cementitious backer units or fiber cement underlayment with integrated bonding flange for bonded membranes; TCA B422.
 - 1) Tile Type: as directed by the Owner.
 - 2) Thin-Set Mortar: Latex-portland cement mortar.
 - 3) Grout: Sand-portland cement **OR** Standard sanded cement **OR** Standard unsanded cement **OR** Polymer-modified sanded **OR** Polymer-modified unsanded, **as directed**, grout.

END OF SECTION 09 30 13 00

Task	Specification	Specification Description
09 30 16 00	09 30 13 00	Ceramic Tile
09 34 00 00	09 30 13 00	Ceramic Tile
09 39 00 00	01 22 16 00	No Specification Required
09 39 00 00	09 30 13 00	Ceramic Tile

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SECTION 09 51 13 00 - ACOUSTICAL PANEL CEILINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for acoustical panel ceilings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes acoustical panels and exposed suspension systems for ceilings.
2. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

C. Definitions

1. AC: Articulation Class.
2. CAC: Ceiling Attenuation Class.
3. LR: Light Reflectance coefficient.
4. NRC: Noise Reduction Coefficient.

D. Submittals

1. Product Data: For each type of product indicated.
2. Coordination Drawings: Drawn to scale and coordinating acoustical panel ceiling installation with hanger attachment to building structure and ceiling mounted items:
3. Samples: For each exposed finish.
4. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For sealants, including printed statement of VOC content.
5. Product test reports.
6. Research/evaluation reports.
7. Maintenance data.

E. Quality Assurance

1. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
2. Fire-Test-Response Characteristics
 - a. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1) Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - 2) Identify materials with appropriate markings of applicable testing and inspecting agency.
 - b. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A **OR B OR C, as directed**, materials as determined by testing identical products per ASTM E 84:
 - 1) Smoke-Developed Index: 450 or less.

3. Seismic Standard: Provide acoustical panel ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 - b. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
 - c. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."
 - d. IBC Standard for Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings.
 - e. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
 4. Preinstallation Conference: Conduct conference at Project site.
- F. Delivery, Storage, And Handling
1. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
 2. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.
 3. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.2 PRODUCTS

- A. Acoustical Panels, General
1. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - a. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface per ASTM E 795.
 2. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.
 - a. Where appearance characteristics of acoustical panels are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by the Owner from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
 3. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical panels treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
 4. Antimicrobial Fungicide Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
- B. Acoustical Panels For Acoustical Panel Ceiling
1. Classification: Provide fire-resistance-rated, **as directed**, panels complying with ASTM E 1264 for type, form, and pattern as follows:

- a. Type and Form: Type III, mineral base with painted finish; Form 1, nodular **OR** 2, water felted **OR** 4, cast or molded, **as directed**.
 - b. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 1, nodular; with glass-fiber cloth **OR** washable vinyl-film, **as directed**, overlay.
 - c. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, water felted; with vinyl overlay on face **OR** vinyl overlay on face and back **OR** vinyl overlay on face, back, and sealed edges **OR** fiberglass-fabric overlay on face, **as directed**.
 - d. Type and Form: Type XII, glass-fiber base with membrane-faced overlay; Form 1, plastic **OR** 2, cloth **OR** 3, other, **as directed**.
 - e. Type and Form: Type XX, other types; described as high-density, ceramic- and mineral-base panels with scrubbable finish, resistant to heat, moisture, and corrosive fumes.
 - f. Pattern: C (perforated, small holes) **OR** CD (perforated, small holes and fissured) **OR** CE (perforated, small holes and lightly textured) **OR** D (fissured) **OR** E (lightly textured) **OR** F (heavily textured) **OR** G (smooth) **OR** GH (smooth and printed) **OR** I (embossed) **OR** J (embossed-in-register) **OR** K (surface scored) **OR** Z (other patterns as described) **OR** As indicated by manufacturer's designation, **as directed**.
2. Color: White **OR** As selected from manufacturer's full range **OR** Match sample **OR** As indicated by manufacturer's designation **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 3. LR: Not less than 0.65 **OR** 0.70 **OR** 0.75 **OR** 0.80 **OR** 0.85 **OR** 0.90, **as directed**.
 4. NRC: Not less than 0.10 **OR** 0.35 **OR** 0.40 **OR** 0.50 **OR** 0.55 **OR** 0.60 **OR** 0.65 **OR** 0.70 **OR** 0.75 **OR** 0.80 **OR** 0.85 **OR** 0.90 **OR** 0.95 **OR** 1.00, **as directed**.
 5. CAC: Not less than 20 **OR** 25 **OR** 30 **OR** 35 **OR** 40, **as directed**.
 6. AC: Not less than 170 **OR** 180 **OR** 190 **OR** 200 **OR** 210, **as directed**.
 7. Edge/Joint Detail: Square **OR** Reveal sized to fit flange of exposed suspension system members **OR** Flush reveal sized to fit flange of exposed suspension system members **OR** Beveled, kerfed and rabbeted long edges and square, butt-on short edges, **as directed**.
 8. Thickness: 5/8 inch (15 mm) **OR** 3/4 inch (19 mm) **OR** 7/8 inch (22 mm) **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 9. Thickness (For glass-fiber-based panels): 1/8 inch (3 mm) **OR** 9/16 inch (15 mm) **OR** 5/8 inch (15 mm) **OR** 7/16 inch (22 mm) **OR** 3/4 inch (19 mm) **OR** 1 inch (25 mm) **OR** 1-1/2 inches (38 mm) **OR** 2 inches (51 mm) **OR** 3 inches (76 mm) **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 10. Modular Size: 24 by 24 inches (610 by 610 mm) **OR** 24 by 48 inches (610 by 1220 mm) **OR** 600 by 600 mm **OR** 600 by 1200 mm **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 11. Antimicrobial Treatment: Broad spectrum fungicide and bactericide **OR** Fungicide, **as directed**, based.
- C. Metal Suspension Systems, General
1. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 2. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
 3. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 - a. High-Humidity Finish: Comply with ASTM C 635 requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.
 4. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - a. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per

ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

- 1) Type: Cast-in-place **OR** Postinstalled expansion **OR** Postinstalled bonded, **as directed**, anchors.
 - 2) Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - 3) Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchor.
 - 4) Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
- b. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
5. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
- a. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
OR
Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
OR
Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - b. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than **0.106-inch- (2.69-mm-)** **OR** **0.135-inch- (3.5-mm-)**, **as directed**, diameter wire.
6. Hanger Rods **OR** Flat Hangers, **as directed**: Mild steel, zinc coated or protected with rust-inhibitive paint.
7. Angle Hangers: Angles with legs not less than **7/8 inch (22 mm)** wide; formed with **0.04-inch- (1-mm-)** thick, galvanized steel sheet complying with ASTM A 653/A 653M, **G90 (Z275)** coating designation; with bolted connections and **5/16-inch- (8-mm-)** diameter bolts.
8. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
9. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
10. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical panels in-place.
11. Hold-Down Clips: Where indicated, provide manufacturer's standard hold-down clips spaced **24 inches (610 mm)** o.c. on all cross tees.
12. Impact Clips: Where indicated, provide manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.
13. Clean-Room Gasket System: Where indicated, provide manufacturer's standard system, including manufacturer's standard **OR** closed-cell PVC **OR** neoprene **OR** antimicrobial, **as directed**, gasket and related adhesives, tapes, seals, and retention clips, designed to seal out foreign material from and maintain positive pressure in clean room.
- D. Metal Suspension System For Acoustical Panel Ceiling
1. Wide-Face, Capped, Double-Web, Fire-Rated, **as directed**, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than **G30 (Z90)** coating designation, with prefinished **15/16-inch- (24-mm-)** wide metal caps on flanges.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. End Condition of Cross Runners: Override (stepped) **OR** Butt-edge, **as directed**, type.
 - c. Face Design: Flat, flush.
 - d. Cap Material: Steel **OR** Aluminum, **as directed**, cold-rolled sheet.
 - e. Cap Finish: Painted white **OR** Painted in color as selected from manufacturer's full range **OR** Painted to match color indicated by manufacturer's designation **OR** Painted to match

- color of acoustical unit **OR** Plated with metallic finish, as selected from manufacturer's full range **OR** Plated with metallic finish indicated by manufacturer's designation **OR** Natural finish for aluminum, **as directed**.
2. Narrow-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than **G30 (Z90)** coating designation, with prefinished **9/16-inch- (15-mm-)** wide metal caps on flanges.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. End Condition of Cross Runners: Override (stepped) **OR** Butt-edge, **as directed**, type.
 - c. Face Design: Flat, flush **OR** Flanges formed with an integral center reveal, **as directed**.
 - d. Cap Material: Steel **OR** Aluminum, **as directed**, cold-rolled sheet.
 - e. Cap Finish: Painted white **OR** Painted in color as selected from manufacturer's full range **OR** Painted to match color indicated by manufacturer's designation **OR** Painted to match color of acoustical unit **OR** Plated with metallic finish, as selected from manufacturer's full range **OR** Plated with metallic finish indicated by manufacturer's designation **OR** Natural finish for aluminum, **as directed**.
 3. Narrow-Face, Steel-Capped, Double-Web, Fire-Rated Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than **G30 (Z90)** coating designation, with prefinished, cold-rolled, **9/16-inch- (15-mm-)** wide metal caps on flanges.
 - a. Structural Classification: Intermediate-duty system.
 - b. Face Design: Flat, flush.
 - c. Cap Finish: Painted white **OR** Painted in color as selected from manufacturer's full range **OR** Painted to match color indicated by manufacturer's designation **OR** Painted to match color of acoustical unit **OR** Plated with metallic finish, as selected from manufacturer's full range **OR** Plated with metallic finish indicated by manufacturer's designation **OR** Natural finish for aluminum, **as directed**.
 4. Narrow-Face, Uncapped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized, to produce structural members with **9/16-inch- (15-mm-)** wide faces.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. Face Design: With **1/8-inch- (3.2-mm-)** wide, slotted, box-shaped flange **OR** With **1/4-inch- (6.35-mm-)** wide, slotted, box-shaped flange **OR** Flanges formed in stepped design with a center protrusion projecting **19/64 inch (7.54 mm)** below flange surfaces supporting panel faces and forming **3/16-inch- (4.76-mm-)** wide reveals between edges of protrusion and those of panels, **as directed**.
 - c. Face Finish: Painted white **OR** in color as selected from manufacturer's full range **OR** to match color indicated by manufacturer's designation **OR** to match color of acoustical unit, **as directed**.
 - d. Reveal Finish: Painted to match flange color **OR** white **OR** black **OR** in color other than flange color as selected from manufacturer's full range of contrasting reveal colors, **as directed**.
 5. Wide-Face, Capped, Double-Web, Fire-Rated, **as directed**, Hot-Dip Galvanized, **G60 (Z180)**, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, **G60 (Z180)** coating designation, with prefinished, cold-rolled, **15/16-inch- (24-mm-)** wide, aluminum caps on flanges.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. Face Design: Flat, flush.
 - c. Face Finish: Painted white **OR** Painted to match color indicated by manufacturer's designation **OR** Painted to match color of acoustical unit **OR** Natural finish, **as directed**.
 6. Wide-Face, Single-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet electrolytically zinc coated, with prefinished flanges of width indicated.
 - a. Structural Classification: Heavy-duty system.
 - b. Face Finish: Painted white **OR** black, **as directed**.

7. Wide-Face, Capped, Double-Web, Stainless-Steel Suspension System: Main and cross runners roll formed from Type 304 or 316, stainless-steel sheet, with prefinished **15/16-inch- (24-mm-)** wide, stainless-steel caps on flanges.
 - a. Structural Classification: Intermediate-duty system.
 - b. Face Design: Flat, flush.
 8. Narrow-Face, Single-Web, Extruded-Aluminum Suspension System: Main and cross runners formed from extruded aluminum to produce structural members with **9/16-inch- (15-mm-)** wide faces.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. Face Design: Screw-slot profile.
 - c. Face Finish: Painted white **OR** Satin anodized per AA-M12C22A31 and AAMA 611, **as directed**.
 - d. Reveal Finish: Match face finish **OR** Painted white **OR** Painted black, **as directed**.
 9. Extra-Wide-Face, Double-Web **OR** Single-Web, **as directed**, Metal Suspension System: Main and cross runners formed from extruded aluminum **OR** aluminum-capped steel **OR** steel-capped steel, **as directed**, to produce structural members with **1-1/2-inch- (50-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, wide flanges.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. Face Design: Flat, flush.
 - c. Face Finish: Painted white **OR** Satin anodized per AA-M12C22A31 and AAMA 611, **as directed**.
 - d. Gasket System: Clean-room type.
- E. Metal Edge Moldings And Trim
1. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - a. Provide manufacturer's standard edge moldings that fit acoustical panel edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - b. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 - c. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
 2. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
 - a. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of aluminum extrusions complying with **ASTM B 221 (ASTM B 221M)** for Alloy and Temper 6063-T5.
 - b. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
 - c. Conversion-Coated Finish: AA-M12C42 (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating).
 - d. Conversion-Coated and Factory-Primed Finish: AA-M12C42R1x (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating; organic coating as follows):
 - 1) Manufacturer's standard, factory-applied prime-coat finish ready for field painting.
 - e. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

- f. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1) Organic Coating: Thermosetting, primer/topcoat system with a minimum dry film thickness of 0.8 to 1.2 mils (0.02 to 0.03 mm).

F. Acoustical Sealant

- 1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- 2. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

1.3 EXECUTION

A. Preparation

- 1. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

B. Installation

- 1. General: Install acoustical panel ceilings to comply with ASTM C 636 **OR** IBC Standard, **as directed**, and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - a. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- 2. Suspend ceiling hangers from building's structural members and as follows:
 - a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - b. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - c. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - d. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - e. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 - f. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - g. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.

- h. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - i. Do not attach hangers to steel deck tabs.
 - j. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - k. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than **8 inches (200 mm)** from ends of each member.
 - l. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
3. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
 4. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
 - a. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - b. Screw attach moldings to substrate at intervals not more than **16 inches (400 mm)** o.c. and not more than **3 inches (75 mm)** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet (3.2 mm in 3.6 m)**. Miter corners accurately and connect securely.
 - c. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 5. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
 6. Install acoustical panels with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
 - a. Arrange directionally patterned acoustical panels as follows:
 - 1) As indicated on reflected ceiling plans.
OR
Install panels with pattern running in one direction parallel to long **OR** short, **as directed**, axis of space.
OR
Install panels in a basket-weave pattern.
 - b. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension system runners and moldings.
 - c. For reveal-edged panels on suspension system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 - d. For reveal-edged panels on suspension system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension system surfaces and panel faces flush with bottom face of runners.
 - e. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 - f. Install hold-down clips in areas indicated, in areas required by authorities having jurisdiction, and for fire-resistance ratings; space as recommended by panel manufacturer's written instructions, unless otherwise indicated.
 - g. Install clean-room gasket system in areas indicated, sealing each panel and fixture as recommended by panel manufacturer's written instructions.
 - h. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.
- C. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

2. Tests and Inspections: Testing and inspecting of completed installations of acoustical panel ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.
 - a. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no panels have been installed.
 - 1) Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for **200 lbf (890 N)** of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for **440 lbf (1957 N)** of tension.
 - 2) When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
3. Remove and replace acoustical panel ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

D. Cleaning

1. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

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SECTION 09 51 23 00 - ACOUSTICAL TILE CEILINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for acoustical tile ceilings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes acoustical tiles for ceilings and the following:
 - a. Concealed suspension systems.
 - b. Direct attachment of tiles to substrates with adhesive.
 - c. Direct attachment of tiles to substrates with staples.
2. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

C. Definitions

1. AC: Articulation Class.
2. CAC: Ceiling Attenuation Class.
3. LR: Light-Reflectance coefficient.
4. NRC: Noise Reduction Coefficient.

D. Submittals

1. Product Data: For each type of product indicated.
2. Coordination Drawings: Drawn to scale and coordinating acoustical tile ceiling installation with hanger attachment to building structure and ceiling mounted items. Show size and location of initial access modules.
3. Samples: For each exposed finish.
4. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
5. Field quality-control test reports.
6. Product test reports.
7. Research/evaluation reports.
8. Maintenance data.

E. Quality Assurance

1. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
2. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:
 - a. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1) Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

- 2) Identify materials with appropriate markings of applicable testing and inspecting agency.
- b. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class A **OR B OR C**, **as directed**, materials as determined by testing identical products per ASTM E 84:
 - 1) Smoke-Developed Index: 450 or less.
3. Seismic Standard: Provide acoustical tile ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 - b. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."
 - c. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."
 - d. IBC Standard for Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings.
 - e. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
4. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
2. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.
3. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.2 PRODUCTS

A. Acoustical Tiles, General

1. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances, unless otherwise indicated.
 - a. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is **15-3/4 inches (400 mm)** away from test surface per ASTM E 795.
2. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
 - a. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by the Owner from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.
3. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.
4. Antimicrobial Fungicide Treatment: Provide acoustical tiles with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide

added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

- B. Acoustical Tiles For Acoustical Tile Ceiling
1. Classification: Provide fire-resistance-rated, **as directed**, tiles complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type III, mineral base with painted finish; Form 1, nodular **OR** 2, water felted **OR** 4, cast or molded, **as directed**.
 - b. Pattern: C (perforated, small holes) **OR** CD (perforated, small holes and fissured) **OR** CE (perforated, small holes and lightly textured) **OR** D (fissured) **OR** E (lightly textured) **OR** F (heavily textured) **OR** G (smooth) **OR** I (embossed) **OR** J (embossed-in-register) **OR** As indicated by manufacturer's designation, **as directed**.
 2. Color: White **OR** As selected from manufacturer's full range **OR** Match sample **OR** As indicated by manufacturer's designation **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 3. LR: Not less than 0.65 **OR** 0.70 **OR** 0.75 **OR** 0.80, **as directed**.
 4. NRC: Not less than 0.50 **OR** 0.55 **OR** 0.60 **OR** 0.65 **OR** 0.70, **as directed**.
 5. CAC: Not less than 20 **OR** 25 **OR** 30 **OR** 35 **OR** 40, **as directed**.
 6. AC: Not less than 170 **OR** 180 **OR** 190 **OR** 200 **OR** 210, **as directed**.
 7. Edge/Joint Detail: Square, kerfed and rabbeted, or tongue and grooved, or butt **OR** Beveled, kerfed and rabbeted, or tongue and grooved, or butt **OR** Beveled, kerfed and rabbeted long edges and square, butt on short edges, **as directed**.
 8. Thickness: **5/8 inch (15 mm)** **OR** **3/4 inch (19 mm)** **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 9. Modular Size: **12 by 12 inches (305 by 305 mm)** **OR** 300 by 300 mm **OR** As indicated on Drawings **OR** As indicated in a schedule, **as directed**.
 10. Antimicrobial Treatment: Broad spectrum fungicide and bactericide **OR** Fungicide, **as directed**, based.
- C. Metal Suspension Systems, General
1. Recycled Content: Provide products made from steel sheet with average recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
 2. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
 3. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
 4. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - a. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - 1) Type: Cast-in-place **OR** Postinstalled expansion **OR** Postinstalled bonded, **as directed**, anchors.
 - 2) Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.
 - 3) Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchors.
 - b. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without

failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

5. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - a. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - b. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than **0.106-inch- (2.69-mm-)** **OR** **0.135-inch- (3.5-mm-)**, **as directed**, diameter wire.
 6. Hanger Rods **OR** Flat Hangers, **as directed**: Mild steel, zinc coated or protected with rust-inhibitive paint.
 7. Angle Hangers: Angles with legs not less than **7/8 inch (22 mm)** wide; formed with **0.04-inch- (1-mm-)** thick, galvanized steel sheet complying with ASTM A 653/A 653M, **G90 (Z275)** coating designation; with bolted connections and **5/16-inch- (8-mm-)** diameter bolts.
 8. Seismic Struts: Manufacturer's standard compression struts designed to accommodate lateral forces.
 9. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.
- D. Metal Suspension System For Acoustical Tile Ceiling
1. Direct-Hung, Double-Web, Fire-Rated, **as directed**, Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, **G30 (Z90)** coating designation.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. Access: Upward **OR** Downward, **as directed**, and end pivoted, **OR** side pivoted, **as directed**, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.
 2. Indirect-Hung, Fire-Rated, **as directed**, Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, **G30 (Z90)** coating designation.
 - a. Structural Classification: Intermediate-duty **OR** Heavy-duty, **as directed**, system.
 - b. Carrying Channels: Cold-rolled steel, **0.059850-inch- (1.52-mm-)** minimum base (uncoated) metal thickness, not less than **3/16-inch- (4.7-mm-)** wide flanges by **1-1/2-inch- (38-mm-)** deep steel channels, **475 lb/1000 feet (0.707 kg/m)**, with rust-inhibitive paint finish **OR** hot-dip galvanized according to ASTM A 653/A 653M, **G60 (Z180)** coating designation, **as directed**.
 - c. Access: Where access is indicated, provide special cross runners or split splines to allow for removal of acoustical units in indicated access areas. Identify access tile with manufacturer's standard unobtrusive markers for each access unit.
- E. Metal Edge Moldings And Trim
1. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - a. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - b. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
 2. Extruded-Aluminum Edge Moldings and Trim: Where indicated, provide manufacturer's extruded-aluminum edge moldings and trim of profile indicated or referenced by manufacturer's designations, including splice plates, corner pieces, and attachment and other clips, complying with seismic design requirements and the following:
 - a. Aluminum Alloy: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability

properties of aluminum extrusions complying with **ASTM B 221 (ASTM B 221M)** for Alloy and Temper 6063-T5.

- b. Finish designations prefixed by AA comply with system established by the Aluminum Association for designating aluminum finishes.
- c. Conversion-Coated Finish: AA-M12C42 (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating).
- d. Conversion-Coated and Factory-Primed Finish: AA-M12C42R1x (Chemical Finish: cleaned with inhibited chemicals; acid-chromate-fluoride-phosphate conversion coating; organic coating as follows):
 - 1) Manufacturer's standard factory-applied prime-coat finish ready for field painting.
- e. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
- f. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; organic coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - 1) Organic Coating: Thermosetting, enamel primer/topcoat system with a minimum dry film thickness of **0.8 to 1.2 mils (0.02 to 0.03 mm)**.

F. Acoustical Sealant

- 1. Acoustical Sealant for Exposed and Concealed Joints: Manufacturer's standard nonsag, paintable, nonstaining latex sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), complying with ASTM C 834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
- 2. Acoustical Sealant for Concealed Joints: Manufacturer's standard nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing interior concealed joints to reduce airborne sound transmission.

G. Miscellaneous Materials

- 1. Tile Adhesive: Type recommended by tile manufacturer, bearing UL label for Class 0-25 flame spread.
 - a. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2. Staples: **5/16-inch- (8-mm-)** long, divergent-point staples.

1.3 EXECUTION

A. Preparation

- 1. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.
- 2. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

B. Installation, Suspended Acoustical Tile Ceilings

- 1. General: Install acoustical tile ceilings to comply with ASTM C 636 **OR** IBC Standard, **as directed**, and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
 - a. Fire-Rated Assembly: Install fire-rated ceiling systems according to tested fire-rated design.
- 2. Suspend ceiling hangers from building's structural members and as follows:

- a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - b. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
OR
Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - c. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - d. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
OR
Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - e. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - f. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - g. Do not attach hangers to steel deck tabs.
 - h. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - i. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than **8 inches (200 mm)** from ends of each member.
 - j. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
3. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
 4. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
 - a. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - b. Screw attach moldings to substrate at intervals not more than **16 inches (400 mm)** o.c. and not more than **3 inches (75 mm)** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet (3.2 mm in 3.6 m)**. Miter corners accurately and connect securely.
 - c. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 5. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
 6. Arrange directionally patterned acoustical tiles as follows:
 - a. As indicated on reflected ceiling plans.
OR
Install tiles with pattern running in one direction parallel to long **OR** short, **as directed**, axis of space.
OR

- Install tiles in a basket-weave pattern.
7. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
 - a. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
 - b. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced **12 inches (305 mm)** o.c.
 - c. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.
- C. Installation, Directly Attached Acoustical Tile Ceilings
1. Adhesive Installation: Install acoustical tile by bonding to substrate, using amount of adhesive and procedure recommended in writing by tile manufacturer and as follows:
 - a. Remove loose dust from backs of tiles by brushing and prime them with a thin coat of adhesive.
 - b. Install splines in joints between tiles; maintain level of bottom surface of tiles to a tolerance of **1/8 inch in 12 feet (3 mm in 3.6 m)** and not exceeding **1/4 inch (6.35 mm)** cumulatively.
 - c. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
 2. Stapled Installation: Fasten acoustical tile to substrate using a minimum of two staples per tile that are installed in flanges of tile and as follows:
 - a. Form double-lapped joint between tiles by securely pressing tile tongues into corresponding tile grooves.
 - b. Maintain level of bottom surface of tiles to a tolerance of **1/8 inch in 12 feet (3 mm in 3.6 m)** and not exceeding **1/4 inch (6.35 mm)** cumulatively. Shim tile or correct substrate as required to maintain tolerance.
 - c. Maintain tight butt joints, aligned in both directions and coordinated with ceiling fixtures.
 3. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical units.
 4. Arrange directionally patterned acoustical tiles as follows:
 - a. As indicated on reflected ceiling plans.
OR
 Install tiles with pattern running in one direction parallel to long axis of space.
OR
 Install tiles with pattern running in one direction parallel to short axis of space.
OR
 Install tiles in a basket-weave pattern.
- D. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
 2. Tests and Inspections: Testing and inspecting of completed installations of acoustical tile ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.
 - a. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no tiles have been installed.
 - 1) Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for **200 lbf (890 N)** of tension; it will also select one of every 2 postinstalled anchors used to attach bracing wires to concrete and will test them for **440 lbf (1957 N)** of tension.
 - 2) When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

09 - Finishes



3. Remove and replace acoustical tile ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

E. Cleaning

1. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 23 00

Task	Specification	Specification Description
09 53 23 00	09 51 13 00	Acoustical Panel Ceilings

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SECTION 09 54 23 00 - ACOUSTICAL METAL PAN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical metal pans and associated suspension system for interior ceilings.

B. Related Requirements:

1. Section 095113 "Acoustical Panel Ceilings" for ceilings consisting of mineral-base and glass-fiber-base acoustical panels and exposed suspension systems.
2. Section 095123 "Acoustical Tile Ceilings" for ceilings consisting of mineral-base acoustical tiles used with concealed suspension systems, stapling, or adhesive bonding.
3. Section 095423 "Linear Metal Ceilings."
4. Section 095436 "Suspended Decorative Grids."
5. Section 095753 "Security Ceiling Assemblies" for downward-locking panel and plank ceilings for use in security or detention facilities.

- C. Products furnished, but not installed, under this Section include anchors, clips, and other ceiling attachment devices to be cast in concrete.**

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference:** Conduct conference at **[Project site]** <Insert location>.

1.3 ACTION SUBMITTALS

- A. Product Data:** For each type of product. Include procedure for cutting metal pans.

B. Sustainable Design Submittals:

1. [<Double click to insert sustainable design text for recycled content.>](#)
2. [<Double click to insert sustainable design text for adhesives and sealants.>](#)
3. [<Double click to insert sustainable design text for ceilings.>](#)
4. [<Double click to insert sustainable design text for insulation.>](#)
5. [<Double click to insert sustainable design text for regional materials.>](#)
6. [<Double click to insert sustainable design text for EPDs and HPDs.>](#)

- C. Samples:** For each exposed product and for each color and texture specified, **6 inches (150 mm)** in size.

- D. Samples for Initial Selection:** For units with factory-applied finishes.

- E. Samples for Verification:** For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:

1. Metal Pans: Set of **[full-size]** **[6-inch- (150-mm-) square]** Samples of each type, finish, color, pattern, and texture. Show pan edge profile.

2. Exposed Suspension-System Members, Moldings, and Trim: Set of **6-inch-** (150-mm-) long Samples of each type, finish, and color.
3. Sound Absorber: Sample of each type matching size of Sample metal pan.

F. Delegated Design Submittals: For design of [**seismic restraints and**] attachment devices.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which suspension systems will be attached.
3. Size and location of access modules for acoustical panels.
4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Access panels.
 - f. **<Insert item>**.

5. Perimeter moldings.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical metal pan ceiling, for tests performed by [**manufacturer and witnessed by a qualified testing agency**] [**a qualified testing agency**].

D. Evaluation Reports: For each acoustical metal pan ceiling suspension system[**and anchor and fastener type**].

E. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Metal Pans[**with Sound Absorber**]: Full-size units equal to [**2**] **<Insert number>** percent of quantity installed.
2. Suspension-System Components: Quantity of each grid, exposed molding, and trim equal to [**2**] **<Insert number>** percent of quantity installed.
3. Hold-Down Clips: [**Equal to 2 percent of quantity installed**] **<Insert number>**.

1.7 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical ceiling area as indicated on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical metal pans, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they are protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Handle acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design [seismic restraints and]attachment devices.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E1264 for [Class A] [Class B] [Class C] materials.
 - 2. Smoke-Developed Index: [50] [450] <Insert value> or less.

2.2 ACOUSTICAL METAL PANS, GENERAL

- A. Source Limitations: Obtain each type of acoustical metal ceiling pan and supporting suspension system from single source from single manufacturer.
- B. <Double click to insert sustainable design text for recycled content.>
- C. <Double click to insert sustainable design text for recycled content of aluminum.>
- D. <Double click to insert sustainable design text for recycled content of insulation.>
- E. <Double click to insert sustainable design text for insulation.>
- F. <Double click to insert sustainable design text for regional materials.>

- G. Acoustical Panel Standard: Provide manufacturer's standard pans of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is **15-3/4 inches (400 mm)** away from test surface according to ASTM E795.
- H. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.
1. Aluminum Sheet: Rolled aluminum sheet, complying with **ASTM B209 (ASTM B209M)**; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 2. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C635/C635M.
 - a. Painted Finishes: Electrolytic zinc-coated steel complying with ASTM A879/A879M, **13Z (40G)** coating, surface treatment as recommended by finish manufacturer for type of use and finish indicated.
 - b. Chemical/Mechanical Finishes: Uncoated steel sheet complying with ASTM A1008/A1008M with luster or bright finish as required by finisher for applying electroplating or other metallic-finishing processes.
 3. Stainless Steel Sheet: Complying with ASTM A240/A240M or ASTM A666, **[Type 304] [Type 430] <Insert type>**.
- I. Sound-Absorbent Fabric Layer: Provide fabric layer, sized to fit concealed surface of pan, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84.
1. Bond fabric layer to panels in the factory with manufacturer's standard nonflammable adhesive.
- J. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84, and to comply with the following requirements:
1. Plastic Sheet-Wrapped, Mineral-Fiber Insulation: Pads consisting of nonrigid, PVC plastic sheet encapsulating unfaced mineral-fiber insulation complying with ASTM C553, Type I, Type II, or Type III, and as follows:
 - a. Mineral-Fiber Type and Thickness: Glass fiber; **[1 inch (25 mm)] [1-1/2 inches (38 mm)] [3 inches (76 mm)] <Insert dimension>**.
 - b. Mineral-Fiber Density: **[3/4 lb/cu. ft. (12 kg/cu. m)] [1 lb/cu. ft. (16 kg/cu. m)] [1-1/2 lb/cu. ft. (24 kg/cu. m)] <Insert value>**.
 - c. Plastic Sheet Thickness and Color: Not less than **0.003 inch (0.076 mm)**; **[clear] [flat black] [white]**.
 2. Unwrapped, Glass-Fiber Insulation: Black coated, unfaced, complying with ASTM C553, Type I, Type II, or Type III; treated to be nondusting; **[1 inch (25 mm)] [1-1/2 inches (38 mm)] <Insert dimension>** thick.
 3. Spacer Grids: Provide manufacturer's standard **[aluminum] [galvanized-steel]** grid units that provide an air cushion between metal pans and insulation pads and that act to improve sound absorption.

- K. Sound Attenuation Panels: Provide manufacturer's standard [aluminum] [galvanized-steel] unperforated metal backing unit that acts as a sound attenuation pan to reduce sound travel through ceiling plenum into adjoining rooms.
 - 1. Sound-Absorbent Pads: Provide secondary sound-absorbent pads, [same as specified for primary sound-absorbent pads] <Insert requirements>, for placement over sound attenuation pan to reduce plenum sound.
- L. Adhesive: Manufacturer's standard nonflammable adhesive for sound-absorbent [fabric] [and] [pads].
 - 1. <Double click to insert sustainable design text for VOC content of adhesive.>
 - 2. <Double click to insert sustainable design text for low emitting adhesives.>

2.3 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING <Insert drawing designation>

- A. <Double click here to find, evaluate, and insert list of manufacturers and products.>
- B. Classification: Units complying with ASTM E1264 for [Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing] [Type XX, other types described as perforated aluminum facing (pan) units with sound-absorbent fabric backing] [Type XX, other types described as unperforated aluminum facing (pan) units] <Insert Type XX description>.
 - 1. Pattern A: (Perforated, regularly spaced large holes), arranged in [diagonal] [parallel] alignment to pan edge with uniform perforations of dimension, holes per square foot or inch, and percent open area as [indicated by product designation] [selected from manufacturer's full range].
 - 2. Pattern B: (Perforated, small holes) regularly spaced, with uniform perforations of dimension, holes per square foot or inch, and percent open area as [specified by product designation] [selected from manufacturer's full range].
 - 3. Pattern: <Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, percent open area, and border requirements>.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 - 1. Lay-in Pans: Formed to set in exposed suspension grid.
 - 2. Clip-in Pans: Designed to clip in and be securely retained in exposed suspension grid by formed edges or accessory clips provided by manufacturer.
 - 3. Snap-in Pans: Designed with dimples or continuous beads on flanges for snap-in, secure engagement with concealed suspension system.
 - 4. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
 - 5. <Insert type and description>.
- D. Pan Thickness: Not less than [0.019 inch (0.5 mm)] [0.025 inch (0.6 mm)] [0.032 inch (0.8 mm)] [0.040 inch (1.0 mm)] <Insert dimension>.
- E. Pan Edge Detail: [Square] [Beveled] [Reveal] [Manufacturer's standard edge detail].
- F. Pan Joint Detail: [Butt] [Wide reveal, not less than 15/16 inch (24 mm) wide] [Narrow reveal, not greater than 9/16 inch (15 mm) wide] [Flush narrow reveal, not greater than 9/16 inch (15 mm) wide] <Insert description>.
- G. Pan Size: [12 by 12 inches (305 by 305 mm)] [12 by 24 inches (305 by 610 mm)] [12 by 36 inches (305 by 915 mm)] [24 by 24 inches (610 by 610 mm)] [24 by 48 inches (610 by 1220 mm)] [24 by 60

inches (610 by 1525 mm)] [30 by 30 inches (760 by 760 mm)] [30 by 60 inches (760 by 1525 mm)] [As indicated on Drawings] <Insert dimensions>.

- H. Scoring: Score pans at intervals to appear as [**12-by-12-inch (305-by-305-mm)**] <Insert dimensions> ceiling units.
- I. Pan Face Finish: [Mill] [Lacquered mill] [Clear anodized] [Clear mirror anodized] [Painted white] [Painted to match color indicated by product designation] [Painted to match Architect's sample] [Painted in color selected from manufacturer's full range] [Bright-reflective metallic finish selected from manufacturer's full range] <Insert finish>.
- J. Light Reflectance Coefficient: Not less than [**0.70**] [**0.75**] <Insert number>.
- K. NRC: Not less than [**0.60**] [**0.65**] [**0.70**] [**0.75**] [**0.80**] [**0.85**] [**0.90**] [**0.95**] <Insert number>.
- L. Ceiling Attenuation Class: Not less than [**35**] [**40**] [**45**] <Insert number>.

2.4 STEEL PANS FOR ACOUSTICAL METAL PAN CEILING <Insert drawing designation>

- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Classification: Units complying with ASTM E1264 for [Type V, perforated steel facing (pan) with mineral- or glass-fiber-base backing] [Type XX, other types described as perforated steel facing (pan) units with sound-absorbent fabric backing] [Type XX, other types described as unperforated steel facing (pan) units] <Insert Type XX description>.
 1. Pattern A: (Perforated, regularly spaced large holes), arranged in [**diagonal**] [**parallel**] alignment to pan edge with uniform perforations of dimension, holes per square foot or inch, and percent open area as [**indicated by product designation**] [**selected from manufacturer's full range**].
 2. Pattern B: (Perforated, small holes) regularly spaced, with uniform perforations of dimension, holes per square foot or inch, and percent open area as [**specified by product designation**] [**selected from manufacturer's full range**].
 3. Pattern: <Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, and percent open area>.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 1. Lay-in Pans: Formed to set in exposed suspension grid.
 2. Clip-in Pans: Designed to clip in and be securely retained in exposed suspension grid by formed edges or accessory clips provided by manufacturer.
 3. Snap-in Pans: Designed with dimples or continuous beads on flanges for snap-in, secure engagement with concealed suspension system.
 4. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
 5. <Insert type and description>.
- D. Pan Thickness: Not less than [**0.010 inch (0.25 mm)**] [**0.019 inch (0.5 mm)**] [**0.025 inch (0.6 mm)**] [**0.030 inch (0.75 mm)**] [**0.036 inch (0.9 mm)**] <Insert dimension>.
- E. Pan Edge Detail: [Square] [Beveled] [Reveal] [Manufacturer's standard edge detail].

- F. Pan Joint Detail: [Butt] [Wide reveal, not less than **15/16 inch (24 mm)** wide] [Narrow reveal, not greater than **9/16 inch (15 mm)** wide] [Flush narrow reveal, not greater than **9/16 inch (15 mm)** wide] <Insert description>.
- G. Pan Size: [**12 by 12 inches (305 by 305 mm)**] [**12 by 24 inches (305 by 610 mm)**] [**12 by 36 inches (305 by 915 mm)**] [**24 by 24 inches (610 by 610 mm)**] [**24 by 48 inches (610 by 1220 mm)**] [**24 by 60 inches (610 by 1525 mm)**] [**30 by 30 inches (760 by 760 mm)**] [**30 by 60 inches (760 by 1525 mm)**] [As indicated on Drawings] <Insert dimensions>.
- H. Scoring: Score pans at intervals to appear as [**12-by-12-inch (305-by-305-mm)**] <Insert dimensions> ceiling units.
- I. Pan Face Finish: [Painted white] [Painted to match color indicated by product designation] [Painted to match Architect's sample] [Painted in color selected from manufacturer's full range] [Plated with metallic finish, as selected from manufacturer's full range] [Bright-reflective metallic finish selected from manufacturer's full range] <Insert finish>.
- J. Light Reflectance Coefficient: Not less than [**0.70**] [**0.75**] <Insert number>.
- K. NRC: Not less than [**0.60**] [**0.65**] [**0.70**] [**0.75**] [**0.80**] [**0.85**] [**0.90**] [**0.95**] <Insert number>.
- L. Ceiling Attenuation Class: Not less than [**35**] [**40**] [**45**] <Insert number>.
- 2.5 STAINLESS STEEL PANS FOR ACOUSTICAL METAL PAN CEILING <Insert drawing designation>
- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
- B. Classification: Units complying with ASTM E1264 for [Type VI, perforated stainless steel facing (pan) with mineral- or glass-fiber-base backing] [Type XX, other types described as perforated stainless steel facing (pan) units with sound-absorbent fabric backing] [Type XX, other types described as unperforated stainless steel facing (pan) units] <Insert Type XX description>.
1. Pattern A: (Perforated, regularly spaced large holes), arranged in parallel alignment to pan edge with uniform perforations of **0.109-inch (2.8-mm)** diameter, 1800 holes/sq. ft. or inch, and 11.8 percent open area.
 2. Pattern: <Insert pattern designation for perforated pans and any requirements for perforation alignment, hole shape and size, holes per square foot or inch, and percent open area>.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
1. Lay-in Pans: Formed to set in exposed suspension grid.
 2. Clip-in Pans: Designed to clip in and be securely retained in exposed suspension grid by formed edges or accessory clips provided by manufacturer.
 3. Snap-in Pans: Designed with dimples or continuous beads on flanges for snap-in, secure engagement with concealed suspension system.
 4. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
 5. <Insert type and description>.
- D. Pan Thickness: Not less than [**0.019 inch (0.5 mm)**] [**0.025 inch (0.6 mm)**] [**0.030 inch (0.76 mm)**] <Insert dimension>.
- E. Pan Edge Detail: [Square] [Beveled] [Reveal] [Manufacturer's standard edge detail].

- F. Pan Joint Detail: [Butt] [Wide reveal, not less than **15/16 inch (24 mm) wide**] [Narrow reveal, not greater than **9/16 inch (15 mm) wide**] [Flush narrow reveal, not greater than **9/16 inch (15 mm) wide**] <Insert description>.
- G. Pan Size: [**12 by 12 inches (305 by 305 mm)**] [**12 by 24 inches (305 by 610 mm)**] [**12 by 36 inches (305 by 915 mm)**] [**24 by 24 inches (610 by 610 mm)**] [**24 by 48 inches (610 by 1220 mm)**] [**30 by 30 inches (760 by 760 mm)**] [As indicated on Drawings] <Insert dimensions>.
- H. Scoring: Score pans at intervals to appear as [**12-by-12-inch (305-by-305-mm)**] <Insert dimensions> ceiling units.
- I. Pan Face Finish: [Directional Satin Finish: **ASTM A480/A480M No. 4**] [Dull Satin Finish: **ASTM A480/A480M No. 6**] [Mirrorlike Reflective, Nondirectional Polish: **ASTM A480/A480M No. 8**] <Insert finish>.
- J. NRC: Not less than [**0.60**] [**0.65**] [**0.70**] [**0.75**] [**0.80**] [**0.85**] [**0.90**] [**0.95**] <Insert number>.
- K. Ceiling Attenuation Class: Not less than [**35**] [**40**] [**45**] <Insert number>.

2.6 METAL SUSPENSION SYSTEMS, GENERAL

- A. [<Double click to insert sustainable design text for recycled content.>](#)
- B. [<Double click to insert sustainable design text for regional materials.>](#)
- C. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635/C635M requirements.
- D. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
- E. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements.
- F. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488/E488M conducted by a qualified testing agency.
- G. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated and with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
- H. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 2. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
 3. Nickel-Copper-Alloy Wire: ASTM B164, nickel copper alloy for UNS No. N04400 alloy.

4. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C635/C635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than **[0.106-inch- (2.69-mm-)] [0.135-inch- (3.5-mm-)]** <Insert dimension> diameter wire.
 - I. **[Hanger Rods] [Flat Hangers]**: Mild steel, zinc coated or protected with rust-inhibitive paint.
 - J. Angle Hangers: Angles with legs not less than **7/8 inch (22 mm)** wide; formed with **0.04-inch- (1.0-mm-)** thick, galvanized-steel sheet complying with ASTM A653/A653M, **G90 (Z275)** coating designation; with bolted connections and **5/16-inch- (8-mm-)** diameter bolts.
 - K. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.
 - L. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
 - M. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical metal pans in place.
 - N. Hold-Down Clips: Manufacturer's standard hold-down clips spaced to secure acoustical metal pans in place **[to molding and trim at perimeter] [at each pan] <Insert requirements>**.
 - O. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or as required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units unless otherwise indicated.
 1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.
- 2.7 METAL SUSPENSION SYSTEM FOR ACOUSTICAL, STANDARD-GRID METAL PAN CEILING <Insert drawing designation>
- A. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)
 - B. Suspension System: For **[clip-in] [lay-in] [torsion-spring-hinged]** <Insert type> pans.
 1. Wide-Face, Capped, Double-Web, Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized according to ASTM A653/A653M, **G30 (Z90)** coating designation, with prefinished, cold-rolled, **15/16-inch- (24-mm-)** wide, sheet metal caps on flanges.
 - a. Structural Classification: **[Intermediate] [Heavy]**-duty system.
 - b. End Condition of Cross Runners: **[Override (stepped)] [or] [butt-edge]** type.
 - c. Face Design: Flat, flush.
 - d. Cap Material: **[Steel] [or] [aluminum]** cold-rolled sheet.
 - e. Cap Finish: **[Painted white] [Painted in color as selected from manufacturer's full range] [Painted to match color indicated by manufacturer's designation] [Painted to match color of metal pan] [Plated with metallic finish, as selected from manufacturer's full range] [Plated with metallic finish indicated by manufacturer's designation] [Natural finish for aluminum].**
 2. Narrow-Face, Capped, Double-Web, Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized according

to ASTM A653/653M, **G30 (Z90)** coating designation, with prefinished, cold-rolled, **9/16-inch- (15-mm-)** wide, sheet metal caps on flanges.

- a. Structural Classification: **[Intermediate] [Heavy]**-duty system.
- b. End Condition of Cross Runners: **[Override (stepped)] [or] [butt-edge]** type.
- c. Face Design: **[Flat, flush] [Flanges formed with an integral center reveal]**.
- d. Cap Material: **[Steel] [or] [aluminum]** cold-rolled sheet.
- e. Cap Finish: **[Painted white] [Painted in color as selected from manufacturer's full range] [Painted to match color indicated by manufacturer's designation] [Painted to match color of metal pan] [Plated with metallic finish, as selected from manufacturer's full range] [Plated with metallic finish indicated by manufacturer's designation] [Natural finish for aluminum]**.

3. Narrow-Face, Uncapped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized, to produce structural members with **9/16-inch- (15-mm-)** wide faces.

- a. Structural Classification: **[Intermediate] [Heavy]**-duty system.
- b. Face Design: With **[1/8-inch- (3.2-mm-)] [1/4-inch- (6.35-mm-)]** wide, slotted, box-shaped flange.
- c. Face Finish: Painted **[white] [in color as selected from manufacturer's full range] [to match color indicated by manufacturer's designation] [to match color of metal pan]**.

4. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A653/A653M, **G60 (Z180)** coating designation, with prefinished, cold-rolled, **15/16-inch- (24-mm-)** wide, aluminum caps on flanges.

- a. Structural Classification: **[Intermediate] [Heavy]**-duty system.
- b. Face Design: Flat, flush.
- c. Face Finish: **[Painted white] [Painted to match color indicated by manufacturer's designation] [Painted to match color of acoustical unit] [Natural finish]**.

5. Wide-Face, Capped, Double-Web, Stainless Steel Suspension System: Main and cross runners roll formed from and capped with Type 304 or Type 316 stainless steel sheet, with prefinished, cold-rolled, **15/16-inch- (24-mm-)** wide, stainless steel caps on flanges.

- a. Structural Classification: Intermediate-duty system.
- b. Face Design: Flat, flush.
- c. Finish: **[Directional Satin Finish: ASTM A480/A480M No. 4] [Dull Satin Finish: ASTM A480/A480M No. 6] [Mirrorlike Reflective, Nondirectional Polish: ASTM A480/A480M No. 8] <Insert finish>**.

6. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.

2.8 METAL SUSPENSION SYSTEM FOR ACOUSTICAL SNAP-IN METAL PAN CEILING <Insert drawing designation>

- A. Manufacturers: Subject to compliance with requirements, provide products by snap-in metal pan ceiling manufacturer.

B. Indirect-Hung, Snap-[Tee] [Bar] System: Designed to support metal pans that snap into main runners, consisting of main runners connected to carrying channels that are attached by hangers to building structure, and complying with the following requirements:

1. Main Runners: Formed from the following metal:

- a. Aluminum Sheet: Alloy and temper recommended by aluminum producer and finisher for type of use indicated and manufacturer's standard finish, complying with **ASTM B209 (ASTM B209M)**.
- b. Electrolytic Zinc-Coated Steel Sheet: ASTM A879/A879M, with not less than **[08Z (24G)]** <Insert coating designation> zinc coating.
- c. Hot-Dip Galvanized Steel: ASTM A653/A653M, with not less than **[G60 (Z180)]** <Insert coating designation> zinc coating.
- d. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 302 or Type 304, stretcher leveled, with cold-rolled mill finish.
- e. Metal Sheet: Metal as standard with ceiling system manufacturer, with factory-applied protective finish complying with ASTM C635/C635M.

2. Carrying Channels:

- a. Same member and metal as indicated for main runners.
- b. Cold-rolled steel, not less than **0.060-inch (1.5-mm)** nominal thickness of base (uncoated) metal and **7/16-inch- (11-mm-)** wide flanges, **[protected with rust-inhibitive paint] [hot-dip galvanized according to ASTM A653/A653M, G60 (Z180) coating designation]**, and as follows:
 - 1) Depth and Weight: **[1-1/2 inches and 475 lb/1000 feet (38 mm and 215 kg/305 m)] [2 inches and 590 lb/1000 feet (51 mm and 268 kg/305 m)]**.

C. Direct-Hung, Snap-[Tee] [Bar] System: Designed to support metal pans that snap into main runners, consisting of main runners supported by hangers attached directly to building structure, and complying with the following requirements:

1. Hangers: Angles or channels, as standard with ceiling system manufacturer, formed from same metal as main runners.
2. Main Runners: Rolled aluminum sheet; alloy and temper recommended by aluminum producer and finisher for type of use indicated and manufacturer's standard finish, complying with **ASTM B209 (ASTM B209M)**.

D. Access Panels: For access at locations indicated, provide acoustical snap-in metal pan ceiling units, accessible by **[key or tool] [two access knobs; place one access knob at each end of panel near corners]**.

1. Access Key or Tool: Provide manufacturer's standard key or tool for opening access panels; **[one] [two] <Insert number>**.

2.9 ACOUSTICAL SEALANT

A. Acoustical Sealant for Exposed and Concealed Joints:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

B. Acoustical Sealant for Concealed Joints:

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- C. Acoustical Sealant: Manufacturer's standard sealant complying with ASTM C834 and effective in reducing airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - 1. Exposed and Concealed Joints: Nonsag, paintable, nonstaining latex sealant.
 - 2. Concealed Joints: Nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant.
 - 3. [<Double click to insert sustainable design text for sealants.>](#)
 - 4. [<Double click to insert sustainable design text for sealants.>](#)

2.10 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. High-Humidity Finish: Comply with ASTM C635/C635M requirements for "Coating Classification for Severe Environment Performance" where high-humidity finishes are indicated.

2.11 ALUMINUM FINISHES

- A. Mill Finish: AA-M10C10 (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned).
- B. Lacquered Mill Finish: AA-M10C10R1x (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned; Organic Coating: as specified below).
 - 1. Organic Coating: Manufacturer's standard clear organic coating.
- C. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
- D. Clear Mirror Anodic Finish: AA-M21C12A212, 0.005 mm or thicker.
- E. Color-Coated Finish: Manufacturer's standard[**powder-coat**] baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
- F. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

2.12 METALLIC-COATED STEEL SHEET FINISHES

- A. Color-Coated Finish: Manufacturer's standard[**powder-coat**] baked paint complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

2.13 STEEL SHEET FINISHES

- A. Electroplated Finish: Electroplating process complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, and minimum thickness to produce a coating uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unplated areas, and other visible defects.
- B. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

2.14 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
 - 2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and coordination drawings.

3.3 INSTALLATION

- A. General: Install acoustical metal pan ceiling assemblies to comply with ASTM C636/C636M[, **seismic design requirements,**] and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.

2. Splay hangers only where required[**and, if permitted with fire-resistance-rated ceilings,**] to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members[**or carrying channels**] and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that do not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to ceiling suspension members[**or carrying channels**] and to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that does not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than **8 inches (200 mm)** from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members[**or carrying channels**] and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical metal pans.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 2. Screw attach moldings to substrate at intervals not more than **16 inches (400 mm)** o.c. and not more than **3 inches (75 mm)** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet (3.2 mm in 3.6 m)**. Miter corners accurately and connect securely.
 3. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet. Cut and treat edges to comply with manufacturer's written instructions.
- G. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with manufacturer's installation tolerances.

1. For lay-in, square-edge pans, install pans with edges fully hidden from view by flanges of suspension-system runners and moldings.
 2. For lay-in, reveal-edge pans on suspension-system runners, install pans with bottom of reveal in firm contact with top surface of runner flanges.
 3. For lay-in, reveal-edge pans on suspension-system members with box-shaped flanges, install pans with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 4. For **[clip-in] [torsion-spring-hinged]** pans, position pans according to manufacturer's written instructions.
 5. For snap-in pans, fit adjoining units to form flush, tight joints.
 6. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 7. Fit adjoining units to form flush, tight joints.
 8. Install directionally patterned or textured metal pans in directions indicated.
 9. Install sound-absorbent fabric layers in, and bond to, perforated metal pans.
 10. Install sound-absorbent pads in perforated metal pans[**over metal spacer grids**].
- H. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas. Lay second sound-absorbent pads on sound attenuation panels.
- I. Install hold-down clips where indicated.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: **[Owner will engage] [Engage]** a qualified special inspector to perform the following special inspections:
1. Seismic design compliance.
- B. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.
- C. Perform the following tests and inspections of completed installations of acoustical metal panel ceiling hangers, anchors, and fasteners in successive stages. Do not proceed with installations of acoustical metal panel ceiling hangers for the next area until test results for previously completed installations show compliance with requirements.
1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed.
 - a. Within each test area, testing agency selects one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and tests them for **200 lbf (890 N)** of tension; it also selects one of every two postinstalled anchors used to attach bracing wires to concrete and tests them for **440 lbf (1957 N)** of tension.
 - b. When tested fasteners and anchors do not comply with requirements, testing agency tests those fasteners and anchors not previously tested until 20 pass consecutively and then resumes initial testing frequency.
- D. Acoustical metal panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical metal pan ceilings, including trim and edge moldings, after removing strippable, temporary protective covering, if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 09 54 23 00

SECTION 09 54 23 00a - LINEAR METAL CEILINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for linear metal ceilings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes strip linear metal pans and suspension systems for ceilings.

C. Definitions

1. LR: Light Reflectance coefficient.
2. NRC: Noise Reduction Coefficient.

D. Performance Requirements

1. Structural Performance: Exterior linear metal ceilings shall withstand exterior exposure and the effects of gravity loads and the following loads and stresses without showing permanent deformation of ceiling system components including pans and suspension system; noise or metal fatigue caused by vibration, deflection, and displacement of ceiling units; or permanent damage to fasteners and anchors.
 - a. Wind Load: Uniform pressure of **20 lbf/sq. ft. (960 Pa) OR of 30 lbf/sq. ft. (1436 Pa) OR** as indicated on Drawings, **as directed**, acting inward or outward.
2. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, **as directed**, material surfaces.

E. Submittals

1. Product Data: For each type of product indicated.
2. Performance Data: For installed products indicated to comply with design loads and other criteria, include structural analysis and other analytical data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Samples: For each exposed finish.
4. Coordination Drawings: Drawn to scale and coordinating and showing the following:
 - a. Linear pattern.
 - b. Joint pattern.
 - c. Ceiling suspension members.
 - d. Method of attaching hangers to building structure.
 - e. Ceiling-mounted items.
 - f. Ceiling perimeter and penetrations through ceiling; trim and moldings.
5. Product test reports.
6. Evaluation reports.
7. Maintenance data.

F. Quality Assurance

1. Acoustical Testing Agency Qualifications: An independent testing laboratory or an NVLAP-accredited laboratory.
2. Surface-Burning Characteristics: Complying with ASTM E 1264 for Class A materials, as determined by testing identical products according to ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.

3. Seismic Standard: Comply with the following:
 - a. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 - b. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Panel Ceilings - Seismic Zones 0-2."
 - c. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies - Seismic Zones 3 & 4."
 - d. IBC Standard for Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings.
 - e. SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

G. Delivery, Storage, And Handling

1. Deliver linear metal pans, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
2. Handle linear metal pans, suspension system components, and accessories carefully to avoid damaging units and finishes in any way.

1.2 PRODUCTS

A. Linear Metal Ceiling Pans

1. Acoustical Metal Pan Standard: Provide manufacturer's standard linear metal pans of configuration indicated that comply with ASTM E 1264.
 - a. Mounting Method for Measuring NRC: Type E-400.
2. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.
 - a. Aluminum Sheet: Roll-formed aluminum sheet, complying with **ASTM B 209 (ASTM B 209M)**; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
 - b. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled; with protective coating complying with ASTM C 635.
 - c. Steel Sheet: Commercial-quality, cold-rolled, carbon-steel sheet; stretcher leveled and ASTM A 591/A 591M, **40Z (12G)** coating for painted finish **OR** ASTM A 1008/A 1008M for electroplating, **as directed**; with protective coating complying with ASTM C 635 and recommended by finisher for finish indicated.
 - d. Stainless-Steel Sheet: Complying with ASTM A 240/A 240M, Type 304 **OR** Type 430, **as directed**.
3. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated to snap on and be securely retained on carriers without separate fasteners, and finished to comply with requirements indicated.
4. Pan Splices: Construction same as pans, in lengths **8 to 12 inches (200 to 300 mm)**; with manufacturer's standard finish.
5. End Caps: Metal matching pans **OR** Plastic **OR** Manufacturer's standard material, **as directed**; fabricated to fit and conceal exposed ends of pans.
6. Filler Strips: Metal matching pans **OR** Plastic **OR** Manufacturer's standard material, **as directed**; fabricated to uninterruptedly close voids between pans.
7. Moldings and Trim: Provide manufacturer's standard moldings and trim for exposed members, and as indicated or required, for edges and penetrations of ceiling, around fixtures, at changes in ceiling height, and for other conditions; of same metal and finish as linear metal ceiling pans.

8. Sound-Absorbent Fabric Layer: Provide fabric layer, sized to fit concealed surface of pan, and consisting of black, nonwoven, nonflammable, sound-absorbent material with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84.
 - a. Bond fabric layer to pan in the factory with manufacturer's standard nonflammable adhesive.
 9. Sound-Absorbent Pads: Provide width and length to completely fill between carriers, joined at center of panel, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing per ASTM E 84, and to comply with the following requirements:
 - a. Plastic Sheet-Wrapped Mineral-Fiber Insulation: Pads consisting of nonrigid, PVC plastic sheet encapsulating unfaced mineral-fiber insulation complying with ASTM C 553, Type I, II, or III, and as follows:
 - 1) Mineral-Fiber Type and Thickness: Glass fiber; **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 3 inches (76 mm), as directed.**
 - 2) Mineral-Fiber Density: **3/4 lb/cu. ft. (12 kg/cu. m) OR 1 lb/cu. ft. (16 kg/cu. m) OR 1-1/2 lb/cu. ft. (24 kg/cu. m), as directed.**
 - 3) Plastic Sheet Thickness and Color: Not less than **0.003 inch (0.076 mm)**; clear **OR** flat black **OR** white, **as directed.**
 - b. Unwrapped, Glass-Fiber Insulation: Black-coated, unfaced, glass-fiber insulation complying with ASTM C 553, Type I, II, or III, not less than **1-lb/cu. ft. (16-kg/cu. m)** density, treated to be nondusting, and as follows:
 - 1) Thickness: **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed.**
- B. Metal Suspension Systems**
1. Metal Suspension Systems Standard: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635 requirements.
 2. Suspension Systems: Provide systems complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, fixture adapters, and other suspension components required to support ceiling units and other ceiling-supported construction.
 3. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.
 - a. Cast-in-Place and Postinstalled Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.
 - 1) Type: Cast-in-place **OR** Postinstalled expansion **OR** Postinstalled bonded, **as directed**, anchors.
 - 2) Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC service condition (mild).
 - 3) Corrosion Protection: Stainless-steel components complying with ASTM F 593 and ASTM F 594, Group 1 Alloy 304 or 316 for bolts; Alloy 304 or 316 for anchors.
 - 4) Corrosion Protection: Components fabricated from nickel-copper-alloy rods complying with ASTM B 164 for UNS No. N04400 alloy.
 - b. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
 4. Wire Hangers, Braces, and Ties: Provide wire complying with the following requirements:
 - a. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - b. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - c. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.

- d. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C 635, Table 1, Direct Hung will be less than yield stress of wire, but provide not less than **0.106-inch- (2.69-mm-)** **OR 0.135-inch- (3.5-mm-)**, **as directed**, diameter wire.
 5. Hanger Rods **OR** Flat Hangers, **as directed**: Mild steel, zinc coated or protected with rust-inhibitive paint.
 6. Angle Hangers: Angles with legs not less than **7/8 inch (22 mm)** wide; formed from **0.04-inch- (1.0-mm-)** thick, galvanized-steel sheet complying with ASTM A 653/A 653M, **G90 (Z275)** coating designation; with bolted connections and **5/16-inch- (8-mm-)** diameter bolts.
 7. Carriers: Factory finished with matte-black baked finish, **as directed**.
 - a. Main Carriers: Aluminum, not less than **0.240-inch (6.0-mm)** rolled sheet, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, complying with **ASTM B 209 (ASTM B 209M)**.
 - b. Main Carriers: Steel, not less than **0.0209-inch (0.53-mm)** nominal thickness, cold-rolled sheet, with factory-applied protective coating, complying with ASTM C 635.
 - 1) Electrolytic Zinc-Coated Steel: ASTM A 591/A 591M, not less than **80Z (24G)**, **as directed**, zinc coating.
 - 2) Hot-Dip Galvanized Steel: ASTM A 653/A 653M, not less than **G60 (Z180)**, **as directed**, zinc coating.
 - c. Adaptable Carriers: Manufacturer's standard carriers for direct attachment to existing suspended tees.
 - d. Flexible Radial Carriers: Manufacturer's standard radial carriers.
 - e. Expansion Carriers: Manufacturer's standard carriers allowing for irregularities or other unusual space conditions.
 8. Carrier Splices: Same metal, profile, and finish as indicated for carriers.
 9. Stabilizer Channels, Tees, and Bars: Manufacturer's standard components for stabilizing main carriers at regular intervals and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.
 10. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
 11. Exterior Bracing Channels and Angles: Cold-rolled steel, hot-dip galvanized to comply with ASTM A 653/A 653M, **G60 (Z180)** coating designation; size and profile as required to withstand wind load.
 12. Hold-Down Clips: Manufacturer's standard hold-down clips spaced as standard with manufacturer.
 13. Edge Moldings and Trim: Provide exposed members as indicated or required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of penetrations through ceiling, to conceal ends of pans and carriers, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching linear metal pans or extruded plastic unless otherwise indicated.
 - a. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.
- C. Aluminum Pans And Suspension System For Linear Metal Ceiling
1. Aluminum Pans and Suspension System:
 2. Classification: Units complying with ASTM E 1264 for Type XIII, aluminum strips with mineral- or glass-fiber-base backing; Form 1, perforated **OR** Type XIII, aluminum strips with mineral- or glass-fiber-base backing; Form 2, unperforated **OR** Type XX, other types described as perforated aluminum strips with sound-absorbent fabric backing, **as directed**.
 3. Pan Thickness: Not less than **0.018 inch (0.46 mm)** **OR 0.022 inch (0.56 mm)** **OR 0.024 inch (0.6 mm)** **OR 0.025 inch (0.65 mm)** **OR 0.027 inch (0.7 mm)** **OR 0.032 inch (0.8 mm)** **OR 0.040 inch (1.0 mm)**, **as directed**.
 4. Pan Edge Detail: Beveled **OR** Square **OR** Round **OR** Manufacturer's standard edge detail, **as directed**.

5. Linear Module Width and Pan Face Width: 2-inch (51-mm) module width and 1-1/4-inch (32-mm) face width OR 4-inch (102-mm) module width and 3-1/4-inch (83-mm) face width OR 6-inch (152-mm) module width and 5-1/4-inch (133-mm) face width OR 8-inch (203-mm) module width and 7-1/4-inch (184-mm) face width OR 100-mm module width and 80-mm face width OR 200-mm module width and 180-mm face width OR 300-mm module width and 280-mm face width OR As indicated on Drawings, **as directed**.
6. Pan Depth: 5/8 inch (16 mm) deep OR 3/4 inch (19 mm) deep OR Not less than 1 to 1-1/2 inches (25 to 38 mm) deep OR 15 mm deep OR As indicated, **as directed**.
7. Pan Face Finish: Mill OR Lacquered mill OR Clear anodized OR Clear mirror-anodized OR Painted white OR Painted to match color indicated by product designation OR Painted to match sample OR Painted in color selected from manufacturer's full range OR High-performance organic coating in color selected from manufacturer's full range OR Bright-reflective finish selected from manufacturer's full range, **as directed**.
8. End Cap, Finish of Exposed Portions: Matte black OR To match pan OR Manufacturer's standard finish, **as directed**.
9. Filler Strip Design: Recessed OR Flush OR An integral extension of pan profile OR Expansion, for use with expansion carriers OR Slotted, for air diffusion, **as directed**.
10. Filler Strip, Finish of Exposed Portions: Matte black OR To match pan, **as directed**.
11. LR: Not less than 0.70 OR 0.75, **as directed**.
12. NRC: Not less than 0.65 OR 0.75 OR 0.95, **as directed**.
13. Suspension-System Main-Carrier Material: Aluminum OR Electrolytic zinc-coated steel OR Hot-dip galvanized steel OR Manufacturer's standard material and protective finish, **as directed**.

D. Steel Pans And Suspension System For Linear Metal Ceiling

1. Steel Pans and Suspension System:
2. Classification: Units complying with ASTM E 1264 for Type XIII, steel strips with mineral- or glass-fiber-base backing; Form 1, perforated OR Type XIII, steel strips with mineral- or glass-fiber-base backing; Form 2, unperforated OR Type XX, other types described as perforated steel strips with sound-absorbent fabric backing, **as directed**.
3. Pan Thickness: Not less than 0.015 inch (0.4 mm) OR 0.020 inch (0.5 mm) OR 0.024 inch (0.6 mm) OR 0.030 inch (0.75 mm), **as directed**.
4. Pan Edge Detail: Beveled OR Square OR Round OR Manufacturer's standard edge detail, **as directed**.
5. Linear Module Width and Pan Face Width: 2-inch (51-mm) module width and 1-1/4-inch (32-mm) face width OR 4-inch (102-mm) module width and 3-1/4-inch (83-mm) face width OR 6-inch (152-mm) module width and 5-1/4-inch (133-mm) face width OR 8-inch (203-mm) module width and 7-1/4-inch (184-mm) face width OR As indicated on Drawings, **as directed**.
6. Pan Depth: 5/8 inch (16 mm) deep OR 3/4 inch (19 mm) deep OR Not less than 1 to 1-1/2 inches (25 to 38 mm) deep OR 15 mm deep OR As indicated, **as directed**.
7. Pan Face Finish: Painted white OR Painted to match color indicated by product designation OR Painted to match sample OR Painted in color selected from manufacturer's full range OR Electroplated finish selected from manufacturer's full range, **as directed**.
8. End Cap, Finish of Exposed Portions: Matte black OR To match pan OR Manufacturer's standard finish, **as directed**.
9. Filler Strip Design: Recessed OR Flush OR An integral extension of pan profile OR Expansion, for use with expansion carriers OR Slotted, for air diffusion, **as directed**.
10. Filler Strip, Finish of Exposed Portions: Matte black OR To match pan, **as directed**.
11. LR: Not less than 0.70 OR 0.75, **as directed**.
12. NRC: Not less than 0.65 OR 0.75 OR 0.95, **as directed**.
13. Suspension-System Main-Carrier Material: Aluminum OR Electrolytic zinc-coated steel OR Hot-dip galvanized steel OR Manufacturer's standard material and protective finish, **as directed**.

E. Stainless-Steel Pans And Suspension System For Linear Metal Ceiling

1. Stainless-Steel Pans and Suspension System:
2. Classification: Units complying with ASTM E 1264 for Type XIII, stainless-steel strips with mineral- or glass-fiber-base backing; Form 1, perforated OR Type XIII, stainless-steel strips with

mineral- or glass-fiber-base backing; Form 2, unperforated **OR** Type XX, other types described as perforated stainless-steel strips with sound-absorbent fabric backing, **as directed**.

3. Pan Thickness: Not less than **0.016 inch (0.396 mm)** **OR** **0.019 inch (0.475 mm)**, **as directed**.
4. Pan Edge Detail: Manufacturer's standard edge detail, **as directed**.
5. Linear Module Width and Pan Face Width: **2-inch (51-mm)** module width and **1-1/4-inch (32-mm)** face width **OR** **4-inch (102-mm)** module width and **3-1/4-inch (83-mm)** face width **OR** **6-inch (152-mm)** module width and **5-1/4-inch (133-mm)** face width **OR** **8-inch (203-mm)** module width and **7-1/4-inch (184-mm)** face width **OR** As indicated on Drawings, **as directed**.
6. Pan Depth: **5/8 inch (16 mm)** deep **OR** As indicated, **as directed**.
7. Pan Face Finish: Brushed, directional polish **OR** Satin, directional polish **OR** Mirrorlike reflective, nondirectional polish, **as directed**.
8. End Cap, Finish of Exposed Portions: Matte black **OR** To match pan **OR** Manufacturer's standard finish, **as directed**.
9. Filler Strip Design: Recessed **OR** Flush **OR** An integral extension of pan profile **OR** Expansion, for use with expansion carriers **OR** Slotted, for air diffusion, **as directed**.
10. Filler Strip, Finish of Exposed Portions: Matte black **OR** To match pan, **as directed**.
11. NRC: Not less than 0.65 **OR** 0.75 **OR** 0.95, **as directed**.
12. Suspension-System Main-Carrier Material: Aluminum **OR** Electrolytic zinc-coated steel **OR** Hot-dip galvanized steel **OR** Manufacturer's standard material and protective finish, **as directed**.

F. Accessories

1. Access Panels: For access at locations indicated, provide door hinge assembly, retainer clip, and retainer bar, assembled with ceiling panels and carrier sections into access doors of required size, permitting upward or downward opening.

G. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

H. Aluminum Finishes

1. Mill Finish: AA-M10C10.
2. Lacquered Mill Finish: AA-M10C10R1x with manufacturer's standard clear, organic coating.
3. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
4. Clear Mirror Anodic Finish: AA-M21C12A212, 0.005 mm or thicker.
5. Color-Coated Finish: Manufacturer's standard powder-coat baked paint finish complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.
6. High-Performance Organic Finish: 2-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
7. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

I. Galvanized-Steel Sheet Finishes

1. Color-Coated Finish: Manufacturer's standard powder-coat baked paint finish complying with coating manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film thickness.

J. Steel Sheet Finishes

1. Electroplated Finish: Electroplating process complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, and minimum thickness to produce a coating uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unplated areas, and other visible defects.
2. Bright-Reflective Finish: Manufacturer's standard chemical/mechanical bright-reflective metallic finish complying with finish manufacturer's written instructions for surface preparation, pretreatment, process, protective coating, and minimum thickness to produce a finish uniform in appearance and free of blisters, pits, roughness, nodules, burning, cracks, unfinished areas, and other visible defects.

K. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1.3 EXECUTION

A. Installation

1. Comply with ASTM C 636 **OR** IBC Standard, **as directed**, and seismic requirement indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
2. Suspend ceiling hangers from building's structural members and as follows:
 - a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - b. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - c. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 - d. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate to which hangers are attached and for type of hanger involved.
 - e. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 - f. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 - g. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 - h. Do not attach hangers to steel deck tabs.
 - i. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 - j. Space hangers not more than **48 inches (1200 mm)** o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than **8 inches (200 mm)** from ends of each member.

- k. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
 - 3. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers but without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
 - 4. Install edge moldings and trim of type indicated at perimeter of linear metal ceiling area and where necessary to conceal edges and ends of linear metal pans.
 - a. Screw attach moldings to substrate at intervals not more than **16 inches (400 mm)** o.c. and not more than **3 inches (75 mm)** from ends, leveling with ceiling suspension system to a tolerance of **1/8 inch in 12 feet (3.2 mm in 3.6 m)**. Miter corners accurately and connect securely.
 - b. Do not use exposed fasteners, including pop rivets, on moldings and trim.
 - 5. Install suspension system carriers so they are aligned and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
 - 6. Cut linear metal pans for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet.
 - 7. Install linear metal pans in coordination with suspension system and exposed moldings and trim.
 - a. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 - b. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders and around construction penetrating ceiling.
 - c. Install pans with butt joints using internal pan splices.
 - 1) Joint Configuration: Aligned **OR** Aligned, every other panel length **OR** Staggered a minimum of **12 inches (300 mm)** **OR** Random **OR** As indicated, **as directed**.
 - d. Install directionally textured metal pans in directions indicated.
 - e. Where metal pan ends are visible, install end caps unless trim is indicated.
 - f. Install filler strips where indicated.
 - g. Install sound-absorbent fabric layers in perforated metal pans.
 - h. Install sound-absorbent pads at right angle to perforated metal pans so pads do not hang unsupported.
 - 8. Install hold-down clips where indicated.
- B. Cleaning
- 1. Clean exposed surfaces of linear metal ceilings, including trim and edge moldings after removing strippable, temporary protective covering if any. Comply with manufacturer's written instructions for stripping of temporary protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION 09 54 23 00a

SECTION 09 64 00 00 - WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Field-finished wood flooring.
2. Factory-finished wood flooring.
3. Sound control underlayment.

B. Related Requirements:

1. Section 096466 "Wood Athletic Flooring" for wood resilient systems used in sports-activity areas.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. as directed by the Owner

C. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.

D. Samples: For each exposed product and for each color and texture specified, approximately [**12 inches (300 mm) long**] or as directed by the Owner and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.

1. Include Samples of accessories involving color and finish selection.

F. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately [**12 inches (300 mm) long**] or as directed by the Owner and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.3 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wood Flooring: Equal to [**1**] percent or as directed by the Owner installed for each type, color, and finish of wood flooring indicated.

1.4 QUALITY ASSURANCE

- A. as directed by the Owner

1.5 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood flooring materials in unopened cartons or bundles.
- B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.
- C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.7 FIELD CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F (18 and 24 deg C) and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hardwood Flooring: Comply with NWFA A500 for species, grade, and cut.
 - 1. Certification: Provide flooring that carries NWFA grade stamp on each bundle or piece.
- B. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.
 - 1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.
- C. Softwood Flooring: Comply with WCLIB No. 17 grading rules for species, grade, and cut.

2.2 FIELD-FINISHED WOOD FLOORING

- A. Solid-Wood Flooring, Field-Finished: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.
 - 1. Grade and Species: [Clear red oak] [Select red oak] [No. 1 Common red oak] [No. 2 Common red oak] [MFMA-RL First Grade hard maple] [MFMA-RL Second and Better Grade hard maple] [Grade C & BTR - Flooring Douglas fir] [Grade D - Flooring Douglas fir] or as directed by the Owner.
 - 2. Cut: [Plain sawn] [Quarter/rift sawn] [Edge grain] [Vertical grain] or as directed by the Owner.
 - 3. Thickness: [25/32 inch (20 mm)] [3/4 inch (19 mm)] or as directed by the Owner.
 - 4. Face Width: [2-1/4 inches (57 mm)] [3-1/8 inches (79 mm)] [5-1/8 inches (130 mm)] or as directed by the Owner.
 - 5. Lengths: [Manufacturer's standard] [Random-length strips complying with applicable grading rules] [Lengths required to form pattern indicated] or as directed by the Owner.
 - 6. Simulated Wood Pegs: Contrasting wood pegs at ends of flooring pieces.
- B. Solid-Wood Parquet Flooring, Field-Finished: Kiln dried to 6 to 9 percent maximum moisture content.
 - 1. Species: [Red oak] [White oak] [Ash] [Maple] [Black cherry] or as directed by the Owner.
 - 2. Grade: as directed by the Owner.
 - 3. Thickness: [5/16 inch (8 mm)] [11/16 inch (17 mm)] [1/4 inch (6 mm)] or as directed by the Owner.
 - 4. Pattern: as directed by the Owner.
 - 5. Size: as directed by the Owner.
- C. Engineered-Wood Flooring, Field-Finished: HPVA EF[, complying with requirements for composite wood products].
 - 1. Species: [Red oak] [White oak] [Ash] [Beech] [Maple] [Black cherry] or as directed by the Owner.
 - 2. Grade: as directed by the Owner.
 - 3. Thickness: [1/2 inch (13 mm)] [3/8 inch (10 mm)] or as directed by the Owner.
 - 4. Construction: [Five] [Three] ply.
 - 5. Face Width: [2-1/4 inches (57 mm)] [3 inches (76 mm)] or as directed by the Owner.
 - 6. Length: Manufacturer's standard.

- D. Urethane Finish System: Complete **[solvent-based, oil-modified]** **[water-based]** system of compatible components that is recommended by finish manufacturer for application indicated.
1. Stain: Penetrating and nonfading type.
 - a. Color: **[Match sample]** **[As selected by Architect from manufacturer's full range]** or as directed by the Owner.
 2. Floor Sealer: Pliable, penetrating type.
 3. Finish Coats: Formulated for multicoat application on wood flooring.
- E. Wood Filler: Compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved Samples, provide pigmented filler.

2.3 FACTORY-FINISHED WOOD FLOORING

- A. Solid-Wood Flooring, Factory-Finished: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.
1. Species: **[Red oak]** **[White oak]** **[Ash]** **[Birch]** **[Maple]** **[Black cherry]** **[Hickory]** **[Walnut]** or as directed by the Owner.
 2. Grade: as directed by the Owner.
 3. Cut: **[Plain sawn]** **[Quarter/rift sawn]** **[Edge grain]** **[Vertical grain]** or as directed by the Owner.
 4. Thickness: **[3/4 inch (19 mm)]** **[25/32 inch (20 mm)]** or as directed by the Owner.
 5. Face Width: **[2-1/4 inches (57 mm)]** **[3-1/8 inches (79 mm)]** **[5-1/8 inches (130 mm)]** or as directed by the Owner.
 6. Lengths: **[Random-length strips complying with applicable grading rules]** **[Lengths required to form pattern indicated]** or as directed by the Owner.
 7. Edge Style: **[Square]** **[Beveled (eased)]** or as directed by the Owner.
 8. Finish: UV urethane.
 - a. Color: **[As selected by Architect from manufacturer's full range]** or as directed by the Owner.
- B. Solid-Wood Parquet Flooring, Factory-Finished: Kiln dried to 6 to 9 percent maximum moisture content.
1. Species: **[Red oak]** or as directed by the Owner.
 2. Grade: as directed by the Owner.
 3. Thickness: **[5/16 inch (8 mm)]** **[11/16 inch (17 mm)]** **[1/4 inch (6 mm)]** or as directed by the Owner.
 4. Edge Style: as directed by the Owner.
 5. Pattern: as directed by the Owner.
 6. Size: as directed by the Owner.
 7. Finish: **[UV urethane]** **[Acrylic impregnated]**.
 - a. Color: **[As selected by Architect from manufacturer's full range]** or as directed by the Owner.
- C. Engineered-Wood Flooring, Factory-Finished: HPVA EF, **complying with requirements for composite wood products**.

1. Species: **[Red oak]** **[White oak]** **[Ash]** **[Beech]** **[Birch]** **[Maple]** **[Black cherry]** **[Hickory]** **[Walnut]** or as directed by the Owner.
2. Grade: as directed by the Owner.
3. Thickness: **[1/2 inch (13 mm)]** **[3/8 inch (10 mm)]** or as directed by the Owner.
4. Construction: **[Five]** **[Three]** ply.
5. Face Width: **[2-1/4 inches (57 mm)]** **[3 inches (76 mm)]** or as directed by the Owner.
6. Length: Manufacturer's standard.
7. Edge Style: **[Square]** **[Beveled (eased)]** or as directed by the Owner.
8. Finish: **[UV urethane]** **[Acrylic impregnated]**.

- a. Color: **[As selected by Architect in manufacturer's full range]** or as directed by the Owner.

D. Engineered-Wood Parquet Flooring, Factory-Finished: HPVA EF[, complying with requirements for composite wood products].

1. Species: **[Red oak]** **[Ash]** **[Beech]** **[Maple]** **[Walnut]** or as directed by the Owner.
2. Grade: or as directed by the Owner.
3. Thickness: **[3/8 inch (10 mm)]** **[1/2 inch (13 mm)]** or as directed by the Owner.
4. Construction: **[Five]** **[Three]** ply.
5. Edge Style: as directed by the Owner.
6. Pattern: as directed by the Owner.
7. Size: as directed by the Owner.
8. Finish: UV urethane.

- a. Color: **[As selected by Architect from manufacturer's full range]** or as directed by the Owner.

2.4 SOUND CONTROL UNDERLAYMENT

A. Sound Control Underlayment: Sound reducing underlayment consisting of impact-absorbing materials. Minimum Impact Insulation Class (IIC) of [50] [55] or as directed by the Owner when tested according to ASTM E492.

1. Material: **[Recycled rubber]** **[Polyurethane foam]** **[Wood fiber]** **[Wood fiber complying with requirements for composite wood products]** or as directed by the Owner.
2. Thickness: **[3/4 inch (19 mm)]** **[1/2 inch (13 mm)]** **[3/8 inch (10 mm)]** **[1/4 inch (6 mm)]** **[5/32 inch (4 mm)]** or as directed by the Owner.

2.5 ACCESSORY MATERIALS

A. Wood Sleepers and Subfloor: [As specified in Section 061000 "Rough Carpentry" and Section 061600 "Sheathing."] or as directed by the Owner.

B. Wood Underlayment: [As specified in Section 061600 "Sheathing."] or as directed by the Owner.

C. Vapor Retarder: ASTM D4397, polyethylene sheet not less than [6.0 mils (0.15 mm)] [8.0 mils (0.2 mm)] thick.

D. Asphalt-Saturated Felt: ASTM D4869/D4869M, Type II.

- E. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
 - 1. as directed by the Owner.
- F. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by wood flooring manufacturer.
- G. Fasteners: As recommended by manufacturer, but not less than that recommended in [NWFA's "Installation Guidelines."] or as directed by the Owner.
- H. Thresholds and Saddles: To match wood flooring. Tapered on each side.
- I. Reducer Strips: To match wood flooring. [2 inches (51 mm)] wide or as directed by the Owner, tapered, and in thickness required to match height of flooring.
- J. Cork Expansion Strip: Composition cork strip.
- K. Feature Strips: [2-inch- (51-mm-) wide, square-edged walnut strips] or as directed by the Owner, furnished in lengths as long as practical and in thickness to match wood flooring.
- L. Metal Feature Strips: [1/8-by-1/8-inch (3-by-3-mm) solid-brass strips] or as directed by the Owner, designed for inlaying into routed reveal in wood flooring surface.
- M. Wood Air Vents and Grilles: To match wood flooring and in sizes and design indicated on Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Concrete Slabs: Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - 1. Moisture Testing: Perform tests so that each test area does not exceed [200 sq. ft. (18.6 sq. m)] [1000 sq. ft. (304.8 sq. m)] or as directed by the Owner, and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of [3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)] [4.5 lb of water/1000 sq. ft. (2.04 kg of water/92.9 sq. m)] or as directed by the Owner in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum [80] [75] percent or as directed by the Owner relative humidity level measurement.
 - c. Perform additional moisture tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

3.2 PREPARATION

A. Concrete Slabs:

1. Grind high spots and fill low spots to produce a maximum **1/8-inch (3-mm)** deviation in any direction when checked with a **10-foot (3-m)** straight edge.
2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
3. Remove coatings, including curing compounds, and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

- B. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in **[NWFA's "Installation Guidelines."]** or as directed by the Owner.

- B. Wood Sleepers and Subfloor: **[Install according to requirements in Section 061000 "Rough Carpentry" and Section 061600 "Sheathing."]** or as directed by the Owner.

- C. Wood Underlayment: **[Install according to requirements in Section 061600 "Sheathing."]** or as directed by the Owner.

- D. Provide expansion space at walls and other obstructions and terminations of flooring **[as indicated on Drawings] [of not less than 3/4 inch (19 mm)]** or as directed by the Owner.

- E. Vapor Retarder: Comply with the following for vapor retarder installation:

1. Wood Flooring Nailed to Wood Subfloor: Install flooring over a layer of asphalt-saturated felt.
2. Wood Flooring Nailed to Sleepers over Concrete: Install flooring over a layer of polyethylene sheet with edges overlapped over sleepers and turned up behind baseboards.
3. Wood Flooring Installed Directly on Concrete: Install a layer of polyethylene sheet according to flooring manufacturer's written instructions.

- F. Sound Control Underlayment: Install over vapor retarder according to manufacturer's written instructions.

- G. Solid-Wood Flooring: Blind nail or staple flooring to substrate.

1. Plank Flooring: For flooring of face width more than **3 inches (76 mm)**:
 - a. Hardwood: Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.
 - b. Softwood: Install no fewer than two countersunk nails at each end of each piece, spaced not more than **16 inches (406 mm)** along length of each piece, in addition to blind nailing. Fill holes with matching wood filler.

- H. Solid-Wood Parquet Flooring: Set in adhesive in pattern indicated on Drawings.

- I. Engineered-Wood Flooring: **[Set in adhesive] [Nail or staple] [Install floating floor]**.

3.4 FIELD FINISHING

- A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that are noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.
 - 1. Comply with applicable recommendations in [NWFA's "Installation Guidelines."] or as directed by the Owner.
- B. Fill [open-grained hardwood] or as directed by the Owner.
- C. Fill and repair wood flooring defects.
- D. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and [three] finish coats or as directed by the Owner.
 - 1. Apply stains to achieve an even color distribution matching approved Samples.
 - 2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.
- E. Cover wood flooring before finishing.
- F. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.5 PROTECTION

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
 - 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 09 64 00 00

Task	Specification	Specification Description
09 64 13 00	09 64 00 00	Wood Flooring
09 64 23 00	09 64 00 00	Wood Flooring
09 64 23 00	09 64 66 00	Wood Sports-Floor Assemblies
09 64 29 00	09 64 00 00	Wood Flooring
09 64 29 00	09 64 66 00	Wood Sports-Floor Assemblies

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SECTION 09 64 66 00 - WOOD SPORTS-FLOOR ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wood sports-floor assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes wood sports-floor assemblies.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show installation details including location and layout of each type of floor assembly and accessory. Include the following:
 - a. Expansion provisions and trim details.
 - b. Layout, colors, widths, and dimensions of game lines and markers.
 - c. Locations of floor inserts for athletic equipment installed through flooring assembly.
3. Samples: For each exposed finish.
4. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For wood sports-floor assembly installation adhesives, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.2: For field-applied finishes and game-line and marker paints, including printed statement of VOC content.
 - c. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood flooring complies with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
5. Maintenance data.

D. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
2. Installer Responsibilities: Include installation and field finishing of sports-floor assembly components and accessories, and application of game lines and markers.
3. Forest Certification: Provide wood components produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
4. Maple Flooring: Comply with MFMA grading rules for species, grade, and cut.
 - a. Certification: Provide flooring that carries MFMA mark on each bundle or piece.

E. Delivery, Storage, And Handling

1. Deliver assembly materials in unopened cartons or bundles.
2. Protect wood from exposure to moisture. Do not deliver wood components until after concrete, masonry, plaster, ceramic tile, and similar wet work is complete and dry.
3. Store wood components in a dry, warm, well-ventilated, weathertight location and in a horizontal position.

F. Field Conditions

1. Conditioning period begins not less than seven days before sports-floor assembly installation, is continuous through installation, and continues not less than seven days after sports-floor installation.

- a. Environmental Conditioning: Maintain an ambient temperature between **65 and 75 deg F (18 and 24 deg C)** and relative humidity planned for building occupants, but not less than 35 percent or more than 50 percent, in spaces to receive sports-floor assemblies during the conditioning period.
- b. Wood Conditioning: Move wood components into spaces where they will be installed, no later than beginning of the conditioning period.
 - 1) Do not install sports-floor assemblies until wood components adjust to relative humidity of, and are at same temperature as, spaces where they are to be installed.
 - 2) Open sealed packages to allow wood components to acclimatize immediately on moving wood components into spaces in which they will be installed.
- c. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- d. Install sports-floor assemblies after other finishing operations, including painting, have been completed.

1.2 PRODUCTS

A. Description

1. System Type: Floating **OR** Fixed **OR** Anchored resilient **OR** Portable, as directed.
2. Overall System Height: **2-1/8 inches (54 mm) OR 2-1/4 inches (57 mm) OR 2-1/2 inches (64 mm), as directed.**

B. Performance

1. Provide wood athletic flooring systems tested by a qualified testing agency according to DIN V 18032-2 and shown to meet the following requirements:
 - a. Shock Absorption: Minimum 53 percent.
 - b. Vertical Deflection: Minimum **0.09 inch (2.3 mm)**.
 - c. Area of Deflection: Maximum 15 percent.
 - d. Ball Bounce: Minimum **90** percent.
 - e. Surface Friction: Not less than 0.5 or more than 0.7.
 - f. Rolling Loads: No damage when subjected to **337 lbf (1500 N)** applied through a single wheel.

C. Flooring Material

1. Random-Length Strip Flooring: Northern hard maple (*Acer saccharum*), kiln dried, random length, tongue and groove, and end matched.
 - a. Grade: MFMA-RL First **OR** Second and Better **OR** Third and Better, **as directed**.
 - 1) Exception: For areas under stacked portion of telescoping bleachers that are normally concealed from view, provide Third and Better Grade.
 - b. Cut: Edge **OR** Flat, **as directed**.
 - c. Thickness: **25/32 inch (20 mm) OR 33/32 inch (26 mm), as directed.**
 - d. Face Width: **2-1/4 inches (57 mm) OR 1-1/2 inches (38 mm), as directed.**
2. Finger-Jointed Strip Flooring: Northern hard maple (*Acer saccharum*), kiln dried, random length, tongue and groove, and end matched.
 - a. Grade: MFMA-RL First **OR** Second and Better **OR** Third and Better, **as directed**.
 - 1) Exception: For areas under stacked portion of telescoping bleachers that are normally concealed from view, provide Third and Better Grade.
 - b. Cut: Edge **OR** Flat, **as directed**.
 - c. Thickness: **25/32 inch (20 mm) OR 33/32 inch (26 mm), as directed.**
 - d. Face Width: **2-1/4 inches (57 mm) OR 1-1/2 inches (38 mm), as directed.**
3. Parquet Flooring: Northern hard maple (*Acer saccharum*), kiln dried, edge grain, and square edge.
 - a. Grade: MFMA-PQ Second and Better **OR** Third and Better, **as directed**.

- b. Thickness: Not less than **5/16 inch (8 mm) OR 3/8 inch (10 mm) OR 7/16 inch (11 mm) OR 1/2 inch (13 mm) OR 11/16 inch (17 mm), as directed.**
 - c. Picket Dimensions:
 - 1) Width: **7/8 inch (22 mm) or 1-1/8 inches (29 mm) OR 7/8 inch (22 mm) OR 1-1/8 inches (29 mm), as directed.**
 - 2) Length: **6 inches (152 mm) OR 9 inches (229 mm), as directed.**
- D. Subfloor Materials
1. Board Underlayment: Nominal **1-by-6-inch (25-by-150-mm)** graded boards; of SPIB No. 2 Southern pine, WCLIB Construction grade (any species), or WWPA No. 3 (any species), dried to 15 percent moisture content.
 2. Plywood Underlayment: APA rated, C-D Plugged, exterior glue, tongue and groove, **15/32 inch (12 mm) OR 23/32 inch (18 mm), as directed, thick.**
 3. Wood Sleepers: Standard grade; **48 inches (1200 mm)** long; kiln-dried Eastern hemlock, fir, pine, or spruce.
 - a. Size: Nominal **2 by 3 inches (50 by 75 mm) OR 2 by 4 inches (50 by 100 mm), as directed.**
 - b. Sleeper Anchors: Manufacturer's standard, but not less than steel drive pins recommended by anchor manufacturer to achieve minimum **900-lbf (4000-N)** pullout strength.
 - c. Sleeper Shims: In size and type recommended in writing by flooring manufacturer for application indicated.
 - d. Asphalt Primer: ASTM D 41.
 - e. Asphalt Mastic: ASTM D 312, Type I, cold-applied dead-level asphalt or Type III, hot-applied steep asphalt, as recommended in writing by manufacturer.
 4. Channels: Manufacturer's standard as indicated by product designation above.
 - a. Channel Anchors: Manufacturer's standard but not less than modified steel drive pins recommended by anchor manufacturer to achieve minimum **900-lbf (4000-N)** pullout strength.
 - b. Clips: Manufacturer's standard as indicated by product designation above.
 5. Resilient Pads: With air voids for resiliency and installed at manufacturer's standard spacing for product designation indicated above.
 - a. Material: PVC **OR Rubber OR Neoprene, as directed.**
 - b. Thickness: **3/8 inch (10 mm) OR 7/16 inch (11 mm) OR 5/8 inch (16 mm) OR 3/4 inch (19 mm), as directed.**
 6. Resilient Underlayment: Flexible, multicellular, closed-cell, expanded polyethylene-foam sheet; **1/2 inch (13 mm)** thick; nominal **2-lb/cu. ft. (32-kg/cu. m)** density, **as directed.**
- E. Finishes
1. Floor-Finish System: System of compatible components recommended in writing by flooring manufacturer, and MFMA approved.
 - a. Floor-Sealer Formulation: Pliable, penetrating type. MFMA Group 1, Sealers.
 - b. Finish-Coat Formulation: Formulated for gloss finish indicated and multicoat application.
 - 1) Type: MFMA Group 3, Gymnasium-Type Surface Finishes **OR MFMA Group 5, Water-Based Finishes, as directed.**
 - c. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.
 - d. VOC Content: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Floor Sealers and Finish Coats: VOC content of not more than 350 g/L.
 - 2) Game-Line and Marker Paint: VOC content of not more than 150 g/L.
 - e. VOC Emissions: Provide products that comply with the maximum allowable concentrations of VOCs when tested according to California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Accessories

1. Vapor Retarder: ASTM D 4397, polyethylene sheet not less than **6 mils (0.15 mm)** thick.
2. Resilient Wall Base: Molded, vented, rubber or vinyl cove base; **4 by 3 by 48 inches (100 by 75 by 1200 mm)**; with premolded outside corners.
 - a. Color: Black **OR** Brown, **as directed**.
3. Wood Wall Base: Nominal **1-by-3-inch (25-by-75-mm)** wood base **OR** Built-up wood base as indicated on Drawings, **as directed**, matching species, grade, and cut of wood flooring.
4. Thresholds: As specified in Division 08 Section "Door Hardware".
5. Fasteners: Type and size recommended by manufacturer, but not less than those recommended by MFMA for application indicated.
6. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by sports-floor manufacturer.
7. Adhesives: Manufacturer's standard for application indicated.
 - a. Concrete Primers: Manufacturer's standard for application indicated.
 - b. Use adhesive and primer, if any, that have a VOC content of 100 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. Floor-Finish System: System of compatible components recommended in writing by flooring manufacturer and MFMA approved.
 - a. Type: MFMA Group 3, Gymnasium Type (Surface) Finishes; urethane-oil type **OR** Group 5, Water Based Finishes; polyurethane, **as directed**.
 - b. Floor-Sealer Formulation: Pliable, penetrating type.
 - c. Finish-Coat Formulation: Formulated for gloss finish and multicoat application.
 - d. Game-Line and Marker Paint: Industrial enamel compatible with finish coats and recommended in writing by manufacturers of finish coats, and paint for this use.
 - e. VOC content: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Floor Sealers and Finish Coats: VOC content of not more than 350 g/L.
 - 2) Game-Line and Marker Paint: VOC content of not more than 150 g/L.

1.3 EXECUTION

A. Preparation

1. Grind high spots and fill low spots on concrete substrates to produce a maximum **1/8-inch (3-mm)** deviation in any direction when checked with a **10-foot (3-m)** straight edge.
 - a. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
2. Remove coatings including curing compounds and other substances on substrates that are incompatible with installation adhesives and that contain soap, wax, oil, or silicone; use mechanical methods recommended by manufacturer. Do not use solvents.
3. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. General: Comply with sports-floor assembly manufacturer's written instructions, but not less than written recommendations of MFMA applicable to flooring type indicated.
2. Pattern: Lay flooring parallel with long dimension of space to be floored, unless otherwise indicated.
3. Expansion Spaces: Provide as indicated, but not less than that required by manufacturer's written instructions and MFMA's written recommendations at walls and other obstructions, and at interruptions and terminations of flooring.
 - a. Cover expansion spaces with base molding, trim, and saddles, as indicated on Drawings.
4. Vapor Retarder: Install with joints lapped a minimum of **6 inches (150 mm)** and sealed.

5. Underlayment: Install perpendicular to direction of flooring, staggering end joints in adjacent rows.
 6. Sleepers:
 - a. Install perpendicular to direction of flooring, staggering end joints a minimum of **24 inches (610 mm)**.
 - b. Space at spacing recommended by manufacturer for system components indicated **OR 12 inches (305 mm) o.c. OR 9 inches (229 mm) o.c. OR 8 inches (203 mm) o.c., as directed.**
 - c. Shim and level sleepers and install anchors at spacing recommended by manufacturer, but not less than **30 inches (760 mm) o.c.**
 - d. Anchor predrilled sleepers through resilient pads.
 7. Channels: Anchor channels to substrate according to manufacturer's written instructions.
 - a. Install wood strip flooring across channels.
 - b. Insert steel clip at each intersection of a flooring strip with a channel.
 8. Strip Flooring: Mechanically fasten perpendicular to supports.
 9. Parquet Flooring: Adhere to substrates according to manufacturer's written instructions.
 10. Installation Tolerances: **1/8 inch in 10 feet (3 mm in 3 m)** of variance from level.
- C. Sanding And Finishing
1. Follow applicable recommendations in MFMA's "Industry Recommendations for Sanding, Sealing, Court Lining, Finishing, and Resurfacing of Maple Gym Floors."
 2. Allow installed flooring to acclimate to ambient conditions for at least 10 days before sanding.
 3. Machine sand with coarse, medium, and fine grades of sandpaper to achieve a level, smooth, uniform surface without ridges or cups. Remove sanding dust by tack or vacuum.
 4. Finish: Apply seal and finish coats of finish system according to finish manufacturer's written instructions. Provide not less than four coats total and not less than two finish coats.
 - a. Water-Based Finishes: Use finishing methods recommended by finish manufacturer to reduce grain raise and sidebonding effect.
 - b. Game Lines and Markers: Apply game-line and marker paint between final seal coat and first finish coat according to paint manufacturer's written instructions.
 - 1) Mask flooring at game lines and markers, and apply paint to produce lines and markers with sharp edges.
 - 2) Where game lines cross, break minor game line at intersection; do not overlap lines.
 - 3) Apply game lines and markers in widths and colors according to requirements indicated on Drawings.
 - 4) Apply finish coats after game-line and marker paint is fully cured.
- D. Protection
1. Protect sports floors during remainder of construction period to allow finish to cure and to ensure that flooring and finish are without damage or deterioration at time of Final Completion.
 - a. Do not cover sports floors after finishing until finish reaches full cure, and not before seven days after applying last finish coat.
 - b. Do not move heavy and sharp objects directly over sports floors. Protect fully cured floor finishes and surfaces with plywood or hardboard panels to prevent damage from storing or moving objects over sports floors.

END OF SECTION 09 64 66 00

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Task	Specification	Specification Description
09 64 66 00	09 64 00 00	Wood Flooring

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SECTION 09 65 13 13 - RESILIENT WALL BASE AND ACCESSORIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for resilient wall base and accessories. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Resilient base.
 - b. Resilient stair accessories.
 - c. Resilient molding accessories.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
3. Samples: For each type of product indicated, in manufacturer's standard-size Samples but not less than **12 inches (300 mm)** long, of each resilient product color, texture, and pattern required.

D. Quality Assurance

1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

E. Delivery, Storage, And Handling

1. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**.

F. Project Conditions

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **95 deg F (35 deg C)**, in spaces to receive resilient products during the following time periods:
 - a. 48 hours before installation.
 - b. During installation.
 - c. 48 hours after installation.
2. Until Final Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
3. Install resilient products after other finishing operations, including painting, have been completed.

1.2 PRODUCTS

A. Resilient Base

1. Resilient Base Standard: ASTM F 1861.
 - a. Material Requirement: Type TV (vinyl, thermoplastic) **OR** Type TS (rubber, vulcanized thermoset) **OR** Type TP (rubber, thermoplastic), **as directed**.
 - b. Manufacturing Method: Group I (solid, homogeneous) **OR** Group II (layered), **as directed**.

- c. Style: Cove (base with toe) **OR** Straight (flat or toeless) **OR** Butt to (fit-to-floor), **as directed**.
 2. Minimum Thickness: **0.125 inch (3.2 mm) OR 0.080 inch (2.0 mm), as directed.**
 3. Height: **2-1/2 inches (64 mm) OR 4 inches (102 mm) OR 6 inches (152 mm) OR** As indicated on Drawings, **as directed.**
 4. Lengths: Cut lengths, **48 inches (1219 mm) long OR** Coils in manufacturer's standard length, **as directed.**
 5. Outside Corners: Job formed **OR** Preformed, **as directed.**
 6. Inside Corners: Job formed **OR** Preformed, **as directed.**
 7. Finish: Satin **OR** Matte **OR** Low luster **OR** As selected from manufacturer's full range, **as directed.**
 8. Colors and Patterns: As selected from full range of industry colors.
- B. Resilient Stair Accessories
1. Resilient Stair Treads Standard: ASTM F 2169.
 - a. Material Requirement: Type TV (vinyl, thermoplastic) **OR** Type TS (rubber, vulcanized thermoset) **OR** Type TP (rubber, thermoplastic), **as directed.**
 - b. Surface Design:
 - 1) Class 1, Smooth (flat).
 - 2) Class 2, Pattern: Raised-disc design **OR** Raised-square design **OR** Raised-chevron design **OR** Raised-diamond design **OR** Raised-rib design **OR** Raised-rib design with abrasive strips, **as directed.**
 - c. Manufacturing Method: Group 1, tread with embedded abrasive strips **OR** Group 2, tread with contrasting color for the visually impaired, **as directed.**
 2. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees **OR** Square **OR** Round, **as directed.**
 3. Nosing Height: **1-1/2 inches (38 mm) OR 2 inches (51 mm) OR 2-3/16 inches (56 mm), as directed.**
 4. Thickness: **1/4 inch (6 mm)** and tapered to back edge.
 5. Size: Lengths and depths to fit each stair tread in one piece **OR** one piece or, for treads exceeding maximum lengths manufactured, in equal-length units, **as directed.**
 6. Risers: Smooth, flat, coved-toe, **7 inches (178 mm)** high by length matching treads **OR** toeless, height and length to cover risers, **as directed;** produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
 - a. Thickness: **0.125 inch (3.2 mm) OR 0.080 inch (2.0 mm), as directed.**
 7. Stringers: Of same thickness as risers, height and length after cutting to fit risers and treads and to cover stair stringers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
 8. Colors and Patterns: As selected from full range of industry colors.
- C. Resilient Molding Accessory
1. Description: Cap for cove carpet **OR** Cap for cove resilient floor covering **OR** Carpet bar for tackless installations **OR** Carpet edge for glue-down applications **OR** Nosing for carpet **OR** Nosing for resilient floor covering **OR** Reducer strip for resilient floor covering **OR** Joiner for tile and carpet **OR** Transition strips, **as directed.**
 2. Material: Vinyl **OR** Rubber, **as directed.**
 3. Profile and Dimensions: As indicated.
 4. Colors and Patterns: As selected from full range of industry colors.
- D. Installation Materials
1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
 2. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

- a. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) Cove Base Adhesives: Not more than 50 g/L.
 - 2) Rubber Floor Adhesives: Not more than 60 g/L.
3. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.
4. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edges of tiles, and in maximum available lengths to minimize running joints.
5. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

1.3 EXECUTION

A. Preparation

1. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
2. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.
 - a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
 - d. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - 1) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
 - 2) Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
3. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
4. Do not install resilient products until they are same temperature as the space where they are to be installed.
 - a. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
5. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

B. Resilient Base Installation

1. Comply with manufacturer's written instructions for installing resilient base.
2. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
3. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
4. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
5. Do not stretch resilient base during installation.
6. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
7. Preformed Corners: Install preformed corners before installing straight pieces.
8. Job-Formed Corners:
 - a. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.

b. Inside Corners: Use straight pieces of maximum lengths possible.

C. Resilient Accessory Installation

1. Comply with manufacturer's written instructions for installing resilient accessories.
2. Resilient Stair Accessories:
 - a. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - b. Tightly adhere to substrates throughout length of each piece.
 - c. For treads installed as separate, equal-length units, install to produce a flush joint between units.
3. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet **OR** resilient floor covering, **as directed**, that would otherwise be exposed.

D. Cleaning And Protection

1. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
2. Perform the following operations immediately after completing resilient product installation:
 - a. Remove adhesive and other blemishes from exposed surfaces.
 - b. Sweep and vacuum surfaces thoroughly.
 - c. Damp-mop surfaces to remove marks and soil.
3. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
4. Floor Polish: Remove soil, visible adhesive, and surface blemishes from resilient stair treads before applying liquid floor polish.
 - a. Apply one **OR** two **OR** three, **as directed**, coat(s).
5. Cover resilient products until Final Completion.

END OF SECTION 09 65 13 13

Task	Specification	Specification Description
09 65 13 13	01 95 09 00	Cork Flooring
09 65 13 23	01 95 09 00	Cork Flooring

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SECTION 09 65 13 33 - LINOLEUM FLOOR COVERINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for linoleum floor coverings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Linoleum floor tile **OR** sheet flooring, **as directed**.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 6.0: For linoleum flooring, including printed statement of costs for each rapidly renewable material.
 - b. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
3. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
4. Samples for Verification: In manufacturer's standard size, but not less than **6-by-9-inch (152-by-230-mm)** sections of each color and pattern of floor covering required.
 - a. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than **9 inches (230 mm)** long, of each color required.
5. Heat-Welded Seam Samples: For each floor covering product and welding bead color and pattern combination required; with seam running lengthwise and in center of **6-by-9-inch (152-by-230-mm)** Sample applied to rigid backing and prepared by Installer for this Project.
6. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

E. Delivery, Storage, And Handling

1. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **65 deg F (18 deg C)** or more than **90 deg F (32 deg C)**.
 - a. Floor Tile: Store on flat surfaces.
 - b. Sheet Flooring: Store rolls upright.

F. Project Conditions

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **95 deg F (35 deg C)**, in spaces to receive floor coverings during the following time periods:
 - a. 72 hours before installation.
 - b. During installation.
 - c. 72 hours after installation.
2. Until Final Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
3. Close spaces to traffic during floor covering installation.

4. Close spaces to traffic for 72 hours after floor covering installation.
5. Install floor coverings after other finishing operations, including painting, have been completed.

1.2 PRODUCTS

A. Linoleum Floor Covering

1. Floor Tile: ASTM F 2195, Type I, linoleum floor tile with fibrous backing **OR** Type II, linoleum floor tile with special backing **OR** Type III, linoleum floor tile without backing, **as directed**.
 - a. Nominal Floor Tile Size: Manufacturer's standard **OR 12 by 12 inches (300 by 300 mm) OR 18 by 18 inches (460 by 460 mm) OR 20 by 20 inches (500 by 500 mm) OR 24 by 24 inches (600 by 600 mm), as directed.**
2. Sheet Flooring: ASTM F 2034, Type I, linoleum sheet with backing **OR** Type III, linoleum sheet with special backing, **as directed**.
 - a. Roll Size: In manufacturer's standard length by not less than **78 inches (1980 mm)** wide.
3. Seaming Method: Standard **OR** Heat welded, **as directed**.
4. Thickness: **0.08 inch (2.0 mm) OR 0.10 inch (2.5 mm) OR 0.13 inch (3.2 mm) OR 0.16 inch (4.0 mm) OR 0.18 inch (4.5 mm), as directed.**
5. Colors and Patterns: As selected from full range of industry colors.

B. Installation Materials

1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
2. Adhesives: Water-resistant type recommended by manufacturer to suit products and substrate conditions indicated.
 - a. Use adhesives that have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Heat-Welding Bead: Solid-strand product of linoleum floor covering manufacturer.
 - a. As selected from manufacturer's full range to contrast with linoleum floor covering **OR** Match linoleum floor covering, **as directed**.
4. Integral-Flash-Cove-Base Accessories:
 - a. Cove Strip: **1-inch (25.4-mm)** radius provided or approved by manufacturer.
 - b. Cove-Base Cap Strip: Square metal, vinyl, or rubber cap provided or approved by manufacturer.
5. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

1.3 EXECUTION

A. Preparation

1. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
2. Concrete Substrates: Prepare according to ASTM F 710.
 - a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - b. Remove substrate coatings and other substances that are incompatible with floor covering adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - d. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - 1) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.

- 2) Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have maximum 75 percent relative humidity level measurement.
 3. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
 4. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - a. Move floor coverings and installation materials into spaces where they will be installed at least 72 hours in advance of installation.
 5. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.
- B. Installation, General**
1. Comply with manufacturer's written instructions for installing floor coverings.
 2. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings.
 3. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
 4. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on subfloor. Use chalk or other nonpermanent marking device.
 5. Install floor coverings on covers for telephone and electrical ducts and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of floor covering installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
 6. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 7. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
- C. Linoleum Floor Tile Installation**
1. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - a. Lay floor tiles square with room axis **OR** at a 45-degree angle with room axis **OR** in pattern indicated, **as directed**.
 2. Match floor tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
 - a. Lay floor tiles with grain running in one direction **OR** with grain direction alternating in adjacent floor tiles (basket-weave pattern) **OR** in pattern of colors and sizes indicated, **as directed**.
- D. Linoleum Sheet Flooring Installation**
1. Unroll sheet floorings and allow them to stabilize before cutting and fitting.
 2. Lay out sheet floorings as follows:
 - a. Maintain uniformity of floor covering direction.
 - b. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least **6 inches (152 mm)** away from parallel joints in floor covering substrates.
 - c. Match edges of floor coverings for color shading at seams.
 - d. Avoid cross seams.
 - e. Eliminate deformations that result from hanging method used during drying process (stove bar marks).

3. Integral-Flash-Cove Base: Cove linoleum floor covering **6 inches (152 mm)** **OR** dimension indicated, **as directed**, up vertical surfaces. Support floor covering at horizontal and vertical junction with cove strip. Butt at top against cap strip.

E. Cleaning And Protection

1. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
2. Perform the following operations immediately after completing floor covering installation:
 - a. Remove adhesive and other blemishes from exposed surfaces.
 - b. Sweep and vacuum surfaces thoroughly.
 - c. Damp-mop surfaces to remove marks and soil.
3. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
4. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor coverings before applying liquid floor polish.
 - a. Apply two **OR** three, **as directed**, coat(s).
5. After allowing drying room film (yellow film caused by linseed oil oxidation) to disappear, cover floor coverings until Final Completion.

END OF SECTION 09 65 13 33

Task	Specification	Specification Description
09 65 13 33	01 22 16 00	No Specification Required
09 65 13 33	01 95 09 00	Cork Flooring
09 65 13 33	09 65 13 13	Resilient Wall Base And Accessories
09 65 13 33	09 65 16 23	Resilient Sheet Flooring
09 65 13 33	09 65 19 19	Resilient Floor Tile
09 65 13 36	01 95 09 00	Cork Flooring
09 65 13 36	09 65 13 13	Resilient Wall Base And Accessories

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SECTION 09 65 16 23 - RESILIENT SHEET FLOORING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for resilient sheet floor flooring. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Vinyl sheet floor covering, with and without backing.
 - b. Rubber sheet floor covering, with and without backing.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives and chemical-bonding compounds, including printed statement of VOC content.
3. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - a. Show details of special patterns.
4. Samples: In manufacturer's standard size, but not less than **6-by-9-inch (150-by-230-mm)** sections of each different color and pattern of floor covering required.
 - a. For heat-welding bead, manufacturer's standard-size Samples, but not less than **9 inches (230 mm)** long, of each color required.
5. Seam Samples: For seamless-installation technique indicated and for each floor covering product, color, and pattern required; with seam running lengthwise and in center of **6-by-9-inch (150-by-230-mm)** Sample applied to a rigid backing and prepared by Installer for this Project.
6. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

E. Delivery, Storage, And Handling

1. Store floor coverings and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**. Store rolls upright.

F. Project Conditions

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **85 deg F (29 deg C)**, in spaces to receive floor coverings during the following time periods:
 - a. 48 hours before installation.
 - b. During installation.
 - c. 48 hours after installation.
2. Until Final Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
3. Close spaces to traffic during floor covering installation.
4. Close spaces to traffic for 48 hours after floor covering installation.
5. Install floor coverings after other finishing operations, including painting, have been completed.

1.2 PRODUCTS

A. Vinyl Sheet Floor Covering

1. Unbacked Vinyl Sheet Floor Covering: ASTM F 1913, **0.080 inch (2.0 mm)** thick.
2. Vinyl Sheet Floor Covering with Backing: ASTM F 1303.
 - a. Type (Binder Content): Type I, minimum binder content of 90 percent **OR** Type II, minimum binder content of 34 percent, **as directed**.
 - b. Wear-Layer Thickness: Grade 1.
 - c. Overall Thickness: As standard with manufacturer.
 - d. Interlayer Material: Foamed plastic **OR** None, **as directed**.
 - e. Backing Class: Class A (fibrous) **OR** Class B (nonfoamed plastic) **OR** Class C (foamed plastic), **as directed**.
3. Wearing Surface: Smooth **OR** Embossed **OR** Smooth with embedded abrasives **OR** Embossed with embedded abrasives, **as directed**.
4. Sheet Width: As standard with manufacturer **OR** **4.9 feet (1.5 m)** **OR** **6 feet (1.8 m)** **OR** **6.5 feet (1.98 m)** **OR** **6.6 feet (2.0 m)** **OR** **9 feet (2.7 m)** **OR** **12 feet (3.6 m)**, **as directed**.
5. Seaming Method: Heat welded **OR** Chemically bonded **OR** Standard, **as directed**.
6. Colors and Patterns: As selected from full range of industry colors.

B. Rubber Sheet Floor Covering

1. Unbacked Rubber Sheet Floor Covering: ASTM F 1859.
 - a. Type: Type I (homogeneous rubber sheet) **OR** Type II (layered rubber sheet), **as directed**.
 - b. Thickness: As standard with manufacturer.
2. Rubber Sheet Floor Covering with Backing: ASTM F 1860.
 - a. Type: Type I, homogeneous rubber sheet with backing **OR** Type II, layered rubber sheet with backing, **as directed**.
 - b. Wear-Layer Thickness: As standard with manufacturer.
 - c. Overall Thickness: As standard with manufacturer.
 - d. Interlayer Material: As standard with manufacturer **OR** None, **as directed**.
 - e. Backing Type: Fibrous) **OR** Foamed rubber, **as directed**.
3. Hardness: Not less than required by ASTM F 1859 **OR** Not less than required by ASTM F 1860 **OR** Manufacturer's standard hardness, measured using Shore, Type A durometer per ASTM D 2240, **as directed**.
4. Wearing Surface: Smooth **OR** Textured **OR** Molded pattern, **as directed**.
 - a. Molded-Pattern Figure: Raised discs **OR** Raised squares, **as directed**.
5. Sheet Width: As standard with manufacturer **OR** **4.9 feet (1.5 m)** **OR** **6 feet (1.8 m)** **OR** **6.5 feet (1.98 m)** **OR** **6.6 feet (2.0 m)** **OR** **9 feet (2.7 m)** **OR** **12 feet (3.6 m)**, **as directed**.
6. Seaming Method: Heat welded **OR** Chemically bonded **OR** Standard, **as directed**.
7. Colors and Patterns: As selected from full range of industry colors.

C. Installation Materials

1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
2. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
 - a. Use adhesives that have a VOC content of not more than 50 g/L **OR** 60 g/L, **as directed**, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Seamless-Installation Accessories:
 - a. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - 1) Color: As selected from manufacturer's full range to contrast with floor covering **OR** Match floor covering, **as directed**.
 - b. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.

- 1) VOC Content: Not more than 510 g/L. when calculated according to 40 CFR 59, Subpart D (EPA method 24).
4. Integral-Flash-Cove-Base Accessories:
 - a. Cove Strip: **1-inch (25-mm)** radius provided or approved by manufacturer.
 - b. Cap Strip: Square metal, vinyl, or rubber cap **OR** Tapered vinyl cap, **as directed**, provided or approved by manufacturer.
 - c. Corners: Metal inside and outside corners and end stops provided or approved by manufacturer.
5. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

1.3 EXECUTION

A. Preparation

1. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
2. Concrete Substrates: Prepare according to ASTM F 710.
 - a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - d. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - 1) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
 - 2) Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
3. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
4. Do not install floor coverings until they are same temperature as space where they are to be installed.
 - a. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
5. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

B. Floor Covering Installation

1. Comply with manufacturer's written instructions for installing floor coverings.
2. Unroll floor coverings and allow them to stabilize before cutting and fitting.
3. Lay out floor coverings as follows:
 - a. Maintain uniformity of floor covering direction.
 - b. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least **6 inches (152 mm)** away from parallel joints in floor covering substrates.
 - c. Match edges of floor coverings for color shading at seams.
 - d. Avoid cross seams.
4. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
5. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
6. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.

7. Install floor coverings on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of floor coverings installed on covers and adjoining floor covering. Tightly adhere floor covering edges to substrates that abut covers and to cover perimeters.
8. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
9. Seamless Installation:
 - a. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
 - b. Chemically-Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly-fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.
10. Integral-Flash-Cove Base: Cove floor coverings **6 inches (152 mm) OR** dimension indicated, **as directed**, up vertical surfaces. Support floor coverings at horizontal and vertical junction by cove strip. Butt at top against cap strip.
 - a. Install metal corners at inside and outside corners.

C. Cleaning And Protection

1. Comply with manufacturer's written instructions for cleaning and protection of floor coverings.
2. Perform the following operations immediately after completing floor covering installation:
 - a. Remove adhesive and other blemishes from floor covering surfaces.
 - b. Sweep and vacuum floor coverings thoroughly.
 - c. Damp-mop floor coverings to remove marks and soil.
3. Protect floor coverings from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
4. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
 - a. Apply one **OR** two **OR** three, **as directed**, coat(s).
5. Cover floor coverings until Final Completion.

END OF SECTION 09 65 16 23

Task	Specification	Specification Description
09 65 16 23	01 95 09 00	Cork Flooring

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SECTION 09 65 19 19 - RESILIENT FLOOR TILE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for resilient floor tile. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Solid vinyl floor tile.
 - b. Rubber floor tile.
 - c. Vinyl composition floor tile.
 - d. Resilient terrazzo floor tile.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For adhesives, sealants and chemical-bonding compounds, including printed statement of VOC content.
3. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - a. Show details of special patterns.
4. Samples: Full-size units of each color and pattern of floor tile required.
5. Seam Samples: For seamless-installation technique indicated and for each flooring product, color, and pattern required; with seam running lengthwise and in center of **6-by-9-inch (150-by-230-mm)** Sample applied to a rigid backing and prepared by Installer for this Project.
6. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - a. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
2. Preconstruction Testing: Use manufacturer's standard test methods to determine whether materials will obtain optimum adhesion with installed flooring material.

E. Delivery, Storage, And Handling

1. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than **50 deg F (10 deg C)** or more than **90 deg F (32 deg C)**. Store floor tiles on flat surfaces.

F. Project Conditions

1. Maintain ambient temperatures within range recommended by manufacturer, but not less than **70 deg F (21 deg C)** or more than **95 deg F (35 deg C)**, in spaces to receive floor tile during the following time periods:
 - a. 48 hours before installation.
 - b. During installation.
 - c. 48 hours after installation.
2. Until Final Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than **55 deg F (13 deg C)** or more than **95 deg F (35 deg C)**.
3. Close spaces to traffic during floor tile installation.
4. Close spaces to traffic for 48 hours after floor tile installation.

5. Install floor tile after other finishing operations, including painting, have been completed.

1.2 PRODUCTS

A. Solid Vinyl Floor Tile

1. Tile Standard: ASTM F 1700.
 - a. Class: As indicated by product designations **OR** Class I, monolithic vinyl tile **OR** Class II, surface-decorated vinyl tile **OR** Class III, printed film vinyl tile, **as directed**.
 - b. Type: Type A, smooth surface **OR** Type B, embossed surface, **as directed**.
2. Thickness: **0.080 inch (2.0 mm) OR 0.100 inch (2.5 mm) OR 0.120 inch (3.0 mm) OR 0.125 inch (3.2 mm), as directed.**
3. Size: **12 by 12 inches (305 by 305 mm) OR 18 by 18 inches (457 by 457 mm) OR 24 by 24 inches (610 by 610 mm) OR 36 by 36 inches (914 by 914 mm) OR 3 by 36 inches (76 by 914 mm), as directed.**
4. Seaming Method: Heat welded **OR** Chemically bonded **OR** Standard, **as directed**.
5. Colors and Patterns: As selected from full range of industry colors.

B. Rubber Floor Tile

1. Tile Standard: ASTM F 1344, Class I-A, homogeneous rubber tile, solid color **OR** Class I-B, homogeneous rubber tile, through mottled **OR** Class II-A, laminated rubber tile, solid-color wear layer **OR** Class II-B, laminated rubber tile, mottled wear layer, **as directed**.
2. Hardness: Not less than 85 as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240 **OR** Manufacturer's standard hardness, **as directed**.
3. Wearing Surface: Smooth **OR** Textured **OR** Molded pattern, **as directed**.
 - a. Molded-Pattern Figure: Raised discs **OR** Raised squares, **as directed**.
4. Thickness: **0.125 inch (3.2 mm).**
5. Size: **12 by 12 inches (305 by 305 mm) OR 24 by 24 inches (610 by 610 mm), as directed.**
6. Seaming Method: Heat welded **OR** Chemically bonded **OR** Standard, **as directed**.
7. Colors and Patterns: As selected from full range of industry colors.

C. Vinyl Composition Floor Tile

1. Tile Standard: ASTM F 1066, Class 1, solid-color tile **OR** Class 2, through-pattern tile **OR** Class 3, surface-pattern tile, **as directed**.
2. Wearing Surface: Smooth **OR** Embossed, **as directed**.
3. Thickness: **0.125 inch (3.2 mm).**
4. Size: **12 by 12 inches (305 by 305 mm).**
5. Colors and Patterns: As selected from full range of industry colors.

D. Resilient Terrazzo Floor Tile

1. Resilient Terrazzo Floor Tile: Marble or granite chips embedded in flexible, thermoset-polyester-resin matrix; electrically nonconductive and chemical, oil, and corrosion resistive, with smooth wearing surface and manufacturer's standard factory-applied, protective urethane coating.
2. Thickness: **1/8 inch (3.0 mm) OR 3/16 inch (4.8 mm), as directed.**
3. Size: **12 by 12 inches (305 by 305 mm).**
4. Performance Characteristics:
 - a. Compressive Strength: **2900 to 5000 psi (20 to 34.5 MPa)**, ASTM C 109/C 109M or ASTM D 695.
 - b. Abrasion Resistance: Maximum 0.0196 cubic centimeters volume loss, ASTM F 510, Taber abrader, S-39 wheels, at 500 cycles with 1000-gram load.
 - c. Static Load Limit: **0.0007-inch (0.0177-mm)** maximum indentation, ASTM F 970 at **125 lb (57 kg)**.
 - d. Resin Matrix Hardness: Not less than 78, as measured using Shore, Type D durometer per ASTM D 2240.
5. Colors and Patterns: As selected from full range of industry colors.

E. Installation Materials

1. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
2. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.
 - a. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1) VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
 - 2) Rubber Floor Adhesives: Not more than 60 g/L.
3. Seamless-Installation Accessories:
 - a. Heat-Welding Bead: Manufacturer's solid-strand product for heat welding seams.
 - 1) Color: As selected from manufacturer's full range to contrast with floor tile **OR** Match floor tile, **as directed**.
 - b. Chemical-Bonding Compound: Manufacturer's product for chemically bonding seams.
 - 1) Use chemical-bonding compound that has a VOC content of 350 **OR** 510, **as directed**, g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.
5. Joint Sealant for Resilient Terrazzo Floor Tile: Silicone sealant of type and grade as recommended in writing by manufacturer to suit resilient terrazzo floor tile.
 - a. Use sealant that has a VOC content of not more than 250 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Joint-Sealant Color: White **OR** As selected from manufacturer's full range to match floor tile **OR** Match floor tile, **as directed**.
6. Sealers and Finish Coats for Resilient Terrazzo Floor Tile: Premium-type products as recommended by manufacturer for resilient terrazzo floor tile.

1.3 EXECUTION

A. Preparation

1. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
2. Concrete Substrates: Prepare according to ASTM F 710.
 - a. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - b. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - c. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - d. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - 1) Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
 - 2) Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
3. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.
4. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
5. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - a. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

6. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

B. Floor Tile Installation

1. Comply with manufacturer's written instructions for installing floor tile.
2. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - a. Lay tiles square with room axis **OR** at a 45-degree angle with room axis **OR** in pattern indicated, **as directed**.
3. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - a. Lay tiles with grain running in one direction **OR** with grain direction alternating in adjacent tiles (basket-weave pattern) **OR** in pattern of colors and sizes indicated, **as directed**.
4. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
5. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
6. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
7. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
8. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
9. Seamless Installation:
 - a. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.
 - b. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.

C. Cleaning And Protection

1. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
2. Perform the following operations immediately after completing floor tile installation:
 - a. Remove adhesive and other blemishes from exposed surfaces.
 - b. Sweep and vacuum surfaces thoroughly.
 - c. Damp-mop surfaces to remove marks and soil.
3. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
4. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - a. Apply one **OR** two **OR** three, **as directed**, coat(s).
5. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.
6. Sealers and Finish Coats: Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products.
 - a. Sealer: Apply two base coats of liquid sealer.
 - b. Finish: Apply two **OR** three, **as directed**, coats of liquid floor finish.

7. Cover floor tile until Final Completion.

END OF SECTION 09 65 19 19

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Task	Specification	Specification Description
09 65 19 19	01 95 09 00	Cork Flooring
09 65 19 23	01 95 09 00	Cork Flooring
09 65 19 23	09 65 19 19	Resilient Floor Tile
09 65 19 33	01 95 09 00	Cork Flooring
09 65 19 33	09 65 19 19	Resilient Floor Tile
09 65 19 43	01 95 09 00	Cork Flooring
09 65 19 43	09 65 19 19	Resilient Floor Tile
09 65 23 00	01 95 09 00	Cork Flooring
09 65 23 00	09 65 16 23	Resilient Sheet Flooring
09 65 43 00	01 95 09 00	Cork Flooring
09 65 43 00	09 65 16 23	Resilient Sheet Flooring

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SECTION 09 65 66 00 - INTERLOCKING RESILIENT FLOORING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for interlocking resilient flooring. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Performance Requirements

1. Static Coefficient of Friction: Provide products with the following values as determined by testing identical products per ASTM C 2047 for level surfaces:
 - a. Minimum of 0.65.
2. Americans with Disabilities Act (ADA): Whether indicated or not, the products specified herein must comply with Americans with Disabilities Act Guidelines (ADAG).
3. Performance Characteristics: Provide tiles that meet the following:
 - a. Abrasion Resistance: Less than 0.4 grams (0.9%) at 1000 cycles using a 500 gram H-18 wheel (ASTM D-3389)
 - b. Shore A Hardness of 83 (+/- 5) per ASTM D-2240.
 - c. Meets Standard Specification for Solid Vinyl Tile ASTM F-1700, 1996 (except as to size, thickness and squareness, which standards are specific to a 12" x 12" VCT Tile)
 - d. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm., per ASTM E 648
 - e. Smoke Generated by Solid Materials, ASTM 662, NFPA 258: NFPA 0-450, passes
 - f. Solvent/Stain Resistance: Comply with ASTM F-925-96.

C. Submittals

1. Product Data: Provide product data for each type of product indicated.
2. Shop Drawings: Provide shop drawings indicating installation details including border tiles, floor patterns made by varying colors of tiles, layout, colors, widths, and dimensions of game lines, and locations of athletic equipment floor inserts.
3. Samples: Submit samples for each type, color, and pattern of flooring indicated, 6-inch- (150-mm-) square samples of same thickness and material indicated for the Work.
4. Maintenance Data: Submit maintenance data for each type of flooring indicated to include in maintenance manuals specified in Division 1.
5. Tile Test reports: Indicated and interpret test results for compliance of special-purpose tile with specified requirements.

D. Quality Assurance

1. Product Characteristics: Flooring tiles shall be made from a minimum of 70 percent recycled materials.
2. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.
3. Fire- Test-Response Characteristics: Provide products with a Class I critical radiant flux classification , as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

E. Delivery, Storage, And Handling

1. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.
2. Store materials to prevent deterioration. Store tiles on flat surfaces.
3. Move products into spaces where they will be installed at least 48 hours before installation, unless a longer conditioning period is recommended in writing by the tile manufacturer. Do not

install products until they are at the same temperature as the space where they are to be installed.

F. Project Conditions

1. Install products after other finishing operations, including painting, are completed.
2. Provide as follows:
 - a. Maintain a temperature of not less than **70 degree F (21 degree C)** or more than **95 degree F (35 degree C)** in installation spaces for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post-installation period, maintain a temperature of not less than **55 degree F (13 degree C)** or more than **95 degree F (35 degree C)**.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of interlocking resilient flooring installation as follows:
 - a. Against wear for a period of 10 years from date of Final Completion.
 - b. Manufacturing defects for a period of 1 year from date of Final Completion.

1.2 PRODUCTS

A. Specialty Vinyl Floor Tile

1. Product: Subject to compliance with requirements, provide the following or approved equivalent:
 - a. "FreeStyle" as manufactured by SelecTech, Inc., Taunton, MA, (877-738-4537).
2. Material: Recycled composite fiber reinforced vinyl.
3. Style: Solid surface.
4. Installation Method: Free lay without adhesive, interlocking.
5. Size: 18.5 inches (470 mm) square (nominal).
6. Thickness: 0.375 inch (9.5 mm).
7. Weight: Not less than 5.5 pounds (2.27 kg) per tile.
8. Color and Pattern as selected by the the Owner.
9. Fire Rating: Class I.
10. Static Load Resistance: 750 psi with maximum 0.006 indentation, per ASTM F 970.

B. Specialty Resilient Flooring

1. Product: Subject to compliance with requirements, provide the following or approved equivalent:
 - a. "SelecTile Industrial" as manufactured by SelecTech, Inc., Taunton, MA, (877-738-4537).
2. Material: Recycled composite fiber reinforced vinyl
 - a. Black - 100%.
 - b. Gray & colors - 10%.
3. Style: Smooth **OR** Coin **OR** Diamond, **as directed**, surface.
4. Installation Method: Free lay without adhesive, unless directed otherwise, interlocking.
5. Size: 23.75 inches (603 mm) square (nominal).
6. Thickness: 0.22 inch (5.59 mm).
7. Weight: Not less than 6.0 pounds (2.72 kg) per tile.
8. Color and Pattern as selected by the the Owner.
9. Fire Rating: Class I.
10. Static Load Resistance: 1,000 psi with maximum 0.006 indentation, per ASTM F 970.
11. Transition Strip: Interlocking, 24" x 2" (61 cm x 5.1 cm), color as selected.
12. Corner Piece: Interlocking, 2" x 2" (5.1 cm x 5.1 cm), color as selected

C. Accessories

1. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.

2. Barrier Coating: Provide "Nu-Flor #500" as manufactured by W.F. Taylor or an approved equivalent by the flooring manufacturer.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions where installation of products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for flooring installation and comply with requirements.
2. Concrete Substrates: Verify that concrete slabs comply with ASTM F 710 and the following:
 - a. Slab substrates are dry and cured.
 - b. Substrates are free of cracks, ridges, depressions, scale, and foreign deposits
3. Wood Subfloor Substrates: Verify the following:
 - a. Underlayment over subfloor complies with requirements specified in Division 6 Section "Rough Carpentry."
 - b. Underlayment surface is free of irregularities that may show through surface, or stain floor covering.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.
2. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.
3. Scrape existing adhesives off the existing floor substrate and seal with barrier coating.

C. Flooring Installation, General

1. Mix tiles from several boxes to avoid adverse color variations in the final installation. Open several boxes at one time to ensure that color variations do not occur in one area.
2. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
3. Extend floor coverings into toe spaces, door reveals, closets, and similar openings, unless otherwise indicated.
4. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on finish flooring. Use nonpermanent, non-staining marking device.
5. Whether indicated or not, provide a minimum of a 1/4 inch (6.35 mm) gap for FreeStyle or 3/8 inch (9.53 mm) for SelecTile around the perimeter of the flooring tiles to allow for expansion and contraction.

D. Tile Installation

1. Installation shall be in accordance with manufacturer's printed instructions.
2. Lay out tiles from center marks established with principal walls.
 - a. Ignoring minor wall offsets, lay out so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths narrower than one-third of a tile at perimeter.
 - b. Lay tiles as follows room axis, unless otherwise indicated.
 - 1) Square with the room axis.
 - 2) At a 45 degree angle.
 - 3) As indicated.
3. Match tiles for color and pattern by selecting them from cartons of the same batch and mixing tiles as recommended in writing by manufacturer.
 - a. Lay tiles in the following pattern:
 - 1) Basket-weave pattern with grain direction alternating in adjacent tiles
 - 2) Pattern of colors and sizes indicated on Drawings.

E. Cleaning And Protecting

1. Perform the following operations immediately after installing flooring products:
 - a. Sweep and vacuum floor thoroughly.
 - b. Do not wash floor until after waiting period recommended in writing by flooring manufacturer.
 - c. Damp mop floor to remove marks and soil using method and cleaner recommended in writing by flooring manufacturer.
 - d. Seal floor with an acrylic floor finish using method and sealer recommended in writing by flooring manufacturer.
2. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
 - a. Do not move heavy or sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

END OF SECTION 09 65 66 00

Task	Specification	Specification Description
09 65 66 00	09 65 19 19	Resilient Floor Tile

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SECTION 09 66 13 00 - PORTLAND CEMENT TERRAZZO FLOORING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for portland cement terrazzo flooring. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Poured-in-place portland cement terrazzo flooring and base.
 - b. Poured-in-place rustic terrazzo flooring.
 - c. Precast terrazzo units.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For marble chips, aggregates, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement that indicates cost for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
3. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work.
4. Samples: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected
5. Qualification data.
6. Material certificates.
7. Maintenance data.

D. Quality Assurance

1. Installer Qualifications: An installer who is a contractor member of NTMA.
2. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
2. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

F. Project Conditions

1. Environmental Limitations: Maintain temperature above **50 deg F (10 deg C)** for 48 hours before and during terrazzo installation.
2. Weather Limitations: Proceed with rustic terrazzo installation only when forecasted weather conditions permit work to be performed according to NTMA's written recommendations and temperatures remain above **45 deg F (7.2 deg C)**.
3. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.

4. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.
 - a. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.

1.2 PRODUCTS

A. Portland Cement Terrazzo

1. Portland Cement Terrazzo Type: Sand cushion **OR** Structural **OR** Bonded **OR** Monolithic **OR** Installed over metal deck, **as directed**.
2. Materials:
 - a. Portland Cement: ASTM C 150, Type 1.
 - 1) Color for Exposed Matrix: As required by mix indicated **OR** White **OR** Gray, **as directed**.
 - b. Water: Potable.
 - c. Sand: ASTM C 33.
 - d. Marble Chips **OR** Aggregates, **as directed**: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.
 - 1) Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131 and ASTM C 535, **as directed**.
 - 2) 24-Hour Absorption Rate: Less than 0.75 percent.
 - 3) Dust Content: Less than 1.0 percent by weight.
 - e. Matrix Pigments: Pure mineral or synthetic pigments, alkali resistant, durable under exposure to sunlight, and compatible with terrazzo matrix.
 - f. Bonding Agent: Neat portland cement or epoxy or acrylic bonding agents formulated for use with topping indicated.
 - g. Underbed Reinforcement: Galvanized welded-wire reinforcement, **2 by 2 inches (51 by 51 mm)** by **0.062-inch- (1.57-mm-)** diameter wire, complying with ASTM A 1064 and ASTM A 82, except for minimum wire size.
 - h. Isolation Membrane: Polyethylene sheeting, ASTM D 2103, Type 13300, **4 mils (0.1 mm)** thick; or unperforated asphalt felt, ASTM D 226, Type I (No. 15).
3. Mixes:
 - a. Underbed (for structural portland cement terrazzo or portland cement terrazzo installed over metal deck): Structural-concrete underbed as specified in Division 03 Section "Cast-in-place Concrete".
 - b. Underbed (for sand-cushion or bonded portland cement terrazzo): Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated for component proportions and mixing.
 - c. Portland Cement Terrazzo (below for NTMA-formulated design mixes): Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated for matrix and marble-chip proportions and mixing.
 - 1) Formulated Mix Color and Pattern: As selected from NTMA standard-terrazzo plates **OR** As selected from NTMA Venetian-terrazzo plates, **as directed**.
 - d. Portland Cement Terrazzo (for custom design mixes): Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated for matrix and marble-chip **OR** aggregate, **as directed**, proportions and mixing.
 - 1) Custom Mix Color and Pattern: Match sample **OR** Match existing, **as directed**.

B. Rustic Terrazzo

1. Rustic Terrazzo Type: Structural **OR** Bonded **OR** Monolithic **OR** Unbonded, **as directed**.
2. Materials:
 - a. Portland Cement: ASTM C 150, Type 1.
 - 1) Color for Exposed Matrix: As required by mix indicated.
 - b. Water: Potable.

- c. Sand: ASTM C 33.
 - d. Marble Chips **OR** Aggregates, **as directed**: As required for mix indicated, sizes complying with NTMA gradation standards, 0.25 percent maximum 24-hour absorption rate, and containing no deleterious or foreign matter.
 - e. Matrix Pigments: Pure mineral or synthetic pigments, alkali resistant, durable under exposure to sunlight and weather, and compatible with matrix binder.
 - f. Air-Entraining Agent (for underbed of structural, bonded, or unbonded rustic terrazzo): Complying with NTMA's written recommendations and recommended by supplier for intended use.
 - g. Underbed Bonding Agent (for bonded rustic terrazzo): Neat portland cement.
 - h. Topping Bonding Agent (for monolithic rustic terrazzo): Neat portland cement, or epoxy or acrylic bonding agents formulated for use with topping indicated.
 - i. Isolation Membrane (for unbonded rustic terrazzo): Polyethylene sheeting, ASTM D 2103, Type 13300, **4 mils (0.1 mm)** thick.
3. Mixes:
- a. Underbed (for structural or unbonded rustic terrazzo): Structural-concrete underbed as specified in Division 03 Section "Cast-in-place Concrete".
 - b. Underbed (for bonded rustic terrazzo): Comply with NTMA's "Terrazzo Specifications and Design Guide" for component proportions and mixing.
 - 1) Exterior Applications: Provide air-entraining agent.
 - c. Rustic Terrazzo (for NTMA-formulated design mixes): Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated for matrix and marble-chip proportions and mixing.
 - 1) Formulated Mix Color and Pattern: As selected from NTMA rustic-terrazzo plates.
 - d. Rustic Terrazzo (for custom design mixes): Comply with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated for matrix and marble-chip **OR** aggregate, **as directed**, proportions and mixing.
 - 1) Custom Mix Color and Pattern: Match sample **OR** Match existing, **as directed**.
- C. Strip Materials
- 1. Standard Divider Strips: One-piece, flat-type strips for grouting into sawed joints prepared in concrete slab or underbed.
 - a. Material: As indicated **OR** White-zinc alloy **OR** Brass, **as directed**.
 - b. Depth: As indicated **OR 3/4 inch (19 mm) OR 1-1/4 inches (32 mm) OR 2 inches (51 mm), as directed**.
 - c. Width: As indicated **OR 0.05 inch (1.27 mm) OR 1/8 inch (3.2 mm) OR 1/4 inch (6.4 mm), as directed**.
 - 2. Heavy-Top Divider Strips: One-piece, flat-type strips for grouting into sawed joints prepared in concrete slab or underbed.
 - a. Base-Section Material: As indicated **OR** White-zinc alloy **OR** Galvanized steel, **as directed**.
 - b. Top-Section Material: As indicated **OR** White-zinc alloy **OR** Brass **OR** Plastic, in color selected from manufacturer's full range, **as directed**.
 - c. Depth: As indicated **OR 3/4 inch (19 mm) OR 1-1/4 inches (32 mm) OR 2 inches (51 mm), as directed**.
 - d. Top-Section Width: As indicated **OR 1/8 inch (3.2 mm) OR 1/4 inch (6.4 mm) OR 1/2 inch (12.7 mm), as directed**.
 - 3. Heavy-Top Angle Divider Strips: One-piece, L-type angle strips with anchoring device and in depth required for topping thickness indicated.
 - a. Material: As indicated **OR** White-zinc alloy **OR** Brass **OR** Plastic, in color selected from manufacturer's full range, **as directed**.
 - b. Top-Section Width: As indicated **OR 1/8 inch (3.2 mm) OR 1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm), as directed**.
 - 4. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated.

5. Expansion-Joint Strips (for structural portland cement terrazzo or for any type of rustic terrazzo): Brass **OR** Plastic strips in color selected from manufacturer's full range, **as directed**, with removable zip-strip top for installing sealant; in width indicated **OR** minimum **1/2 inch (12.7 mm)** wide, **as directed**.
 6. Accessory Strips: Match divider strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
 - a. Base-bead strips for exposed top edge of terrazzo base.
 - b. Edge-bead strips for exposed edges of terrazzo.
 - c. Nosings for terrazzo stair treads and landings.
 7. Abrasive Strips (for terrazzo stair treads and landings): Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
 - a. Width: **1/2 inch (12.7 mm)**.
 - b. Depth: As required by terrazzo thickness.
 - c. Length: **4 inches (100 mm)** less than stair width **OR** As indicated, **as directed**.
 - d. Color: As selected from manufacturer's full range.
- D. Miscellaneous Accessories
1. Strip Adhesive: Adhesive recommended by manufacturer for this use.
 - a. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Anchoring Devices:
 - a. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
 - b. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
 3. Isolation and Expansion-Joint Material: Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, and nonoutgassing in unruptured state; butyl rubber; rubber; or cork; in width indicated **OR** minimum **1/2 inch (12.7 mm)** wide, **as directed**.
 4. Portland Cement Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by cleaner manufacturer for use on terrazzo type indicated.
 5. Rustic Terrazzo Cleaner: Solution of muriatic acid and water for use on terrazzo type indicated.
 6. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral with pH factor between 7 and 10; does not affect color or physical properties of terrazzo; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
 - a. Rustic Terrazzo: Use solvent acrylic-type sealer.
- E. Precast Terrazzo
1. Precast Terrazzo Base Units: Minimum **3/4-inch- (19-mm-)** thick, reinforced portland cement terrazzo units cast in maximum lengths possible, but not less than **36 inches (900 mm)**.
 - a. Type: As indicated **OR** Coved with minimum **3/4-inch (19-mm)** radius **OR** Straight **OR** Splayed, **as directed**.
 - b. Top Edge: Straight, unfinished if top edge is concealed **OR** Beveled with polished top surface **OR** Radius edge with polished top surface, **as directed**.
 - c. Metal Toe Strip (for coved-toe bases): Zinc **OR** Brass, **as directed**.
 - d. Outside Corner Units: With finished returned edges at outside corner.
 - e. Color, Pattern, and Finish: As selected from manufacturer's full range **OR** Match sample **OR** Match adjacent poured-in-place terrazzo flooring, **as directed**.
 2. Precast Terrazzo Units for Stair Treads, Thresholds, Sills, Benches and Planters: Comply with NTMA's written recommendations for fabricating precast terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer.
 - a. Stair Treads: Three-line **OR** Two-line **OR** One-line **OR** Abrasive nosing strip and two-line, **as directed**, abrasive inserts at nosings.

- b. Color, Pattern, and Finish: As selected from manufacturer's full range **OR** Match sample **OR** Match adjacent poured-in-place terrazzo flooring, **as directed**.
- 3. Precast Terrazzo Finishing (for custom precast terrazzo components):
 - a. Finish exposed-to-view edges or reveals to match face finish.
 - b. Ease exposed edges to **1/8-inch (3-mm)** radius.

1.3 EXECUTION

A. Preparation

- 1. Clean substrates to produce clean, dry, and neutral substrate for terrazzo application.
 - a. Remove substances, including oil, grease, and curing compounds, that might impair bond of terrazzo system.
 - b. Roughen concrete substrates before installing terrazzo system according to NTMA's written recommendations.
- 2. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.
 - a. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

B. Installation, General

- 1. Comply with NTMA's written recommendations for terrazzo and accessory installation.
- 2. Installation Tolerance: Limit variation in terrazzo surface from level to **1/4 inch in 10 feet (6 mm in 3 m)**; noncumulative.
- 3. Structural Portland Cement **OR** Structural Rustic **OR** Bonded Rustic **OR** Monolithic Rustic **OR** Unbonded Rustic, **as directed**, Terrazzo: Install isolation and expansion material where terrazzo and underbed abut **OR** terrazzo abuts, **as directed**, adjacent construction and directly above substrate expansion joints.
- 4. Underbed (for structural portland cement terrazzo or portland cement terrazzo installed over metal deck, or for structural or unbonded rustic terrazzo): Install structural-concrete underbed according to requirements specified in Division 03 Section "Cast-in-place Concrete".
- 5. Underbed (for sand-cushion or bonded portland cement terrazzo or for bonded rustic terrazzo):
 - a. Comply with NTMA's "Terrazzo Specifications and Design Guide" for underbed installation.
 - b. For sand-cushion portland cement terrazzo only:
 - 1) Cover entire surface to receive terrazzo with dusting of sand.
 - 2) Install isolation membrane over sand, overlapping ends and edges a minimum of **3 inches (75 mm)**.
 - 3) Install welded wire reinforcement, overlapping at edges and ends at least two squares. Stop mesh a minimum of **1 inch (25 mm)** short of expansion joints.
 - c. Place underbed and screed to elevation indicated below finished floor elevation.
- 6. Strip Materials:
 - a. Divider and Control-Joint Strips:
 - 1) Locate divider strips over each edge of steel beams and girders **OR** centered over steel beams and joists **OR** directly over control joints, breaks, and saw cuts in concrete slabs **OR** in locations indicated, **as directed**.
 - 2) Install control-joint strips back to back and directly above concrete-slab control joints **OR** in locations indicated, **as directed**.
 - 3) Install control-joint strips with **1/4-inch (6.4-mm)** gap between strips, and install sealant in gap.
 - 4) Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
 - b. Expansion-Joint Strips (for structural portland cement terrazzo or for any type of rustic terrazzo): Form expansion joints using divider strips and install directly above concrete-slab expansion joints.

- c. Accessory Strips: Install accessory strips as required to provide a complete installation.
 - d. Abrasive Strips: Install with surface of abrasive strip positioned **1/16 inch (1.6 mm) OR 1/32 inch (0.8 mm), as directed**, higher than terrazzo surface.
7. Repair: Cut out and replace terrazzo areas that evidence lack of bond with substrate or underbed, including areas that emit a "hollow" sound if tapped. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by the Owner.
- C. Portland Cement Terrazzo Installation
- 1. Pour in place, cure, and finish portland cement terrazzo according to NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
 - 2. Terrazzo Topping Thickness: As indicated.
 - 3. Finishing:
 - a. Seed additional marble chips **OR** aggregates, **as directed**, in matrix to uniformly distribute granular material on surface.
 - b. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
 - c. Fine Grinding: Grind with stones 120 grit or finer until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure.
- D. Rustic Terrazzo Installation
- 1. Pour in place, cure, and finish rustic terrazzo according to NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
 - 2. Terrazzo Topping Thickness: As indicated.
 - 3. Finishing:
 - a. Seed additional marble chips **OR** aggregates, **as directed**, in matrix to uniformly distribute granular material on surface.
- E. Precast Terrazzo Installation
- 1. Install precast terrazzo units using method recommended by NTMA and manufacturer unless otherwise indicated.
 - 2. Installation Tolerance: Set units with alignment level and true to dimensions, varying **1/8 inch (3.2 mm)** maximum in length, height, or width; noncumulative.
 - 3. Do not install units that are chipped, cracked, discolored, or improperly finished.
 - 4. Seal joints between units with cement grout matching precast terrazzo matrix **OR** joint sealant, **as directed**.
- F. Cleaning And Protection
- 1. Portland Cement Terrazzo and Precast Terrazzo Cleaning:
 - a. Remove grinding dust from installation and adjacent areas.
 - b. Wash surfaces with cleaner immediately after grouting precast terrazzo units and final cleaning of terrazzo flooring.
 - c. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow to dry thoroughly.
 - 2. Rustic Terrazzo Cleaning: Clean surfaces with 1:10 solution of muriatic acid in water. Legally contain and dispose of runoff from cleaning operations. Rinse surfaces with water and allow to dry thoroughly.
 - 3. Sealing:
 - a. Seal surfaces according to NTMA's written recommendations.
 - b. Apply sealer according to sealer manufacturer's written instructions.
 - 4. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Final Completion.

END OF SECTION 09 66 13 00

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Task	Specification	Specification Description
09 66 13 13	09 66 13 00	Portland Cement Terrazzo Flooring
09 66 13 16	09 66 13 00	Portland Cement Terrazzo Flooring
09 66 13 19	09 66 13 00	Portland Cement Terrazzo Flooring
09 66 16 13	09 66 13 00	Portland Cement Terrazzo Flooring

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SECTION 09 66 33 13 - RESINOUS MATRIX TERRAZZO FLOORING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for resinous matrix terrazzo flooring. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Thin-set epoxy-resin terrazzo flooring and base.
 - b. Precast terrazzo units.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For marble chips, aggregates, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement that indicates cost for each product having recycled content.
 - b. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
3. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work.
4. Samples: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected.
5. Installer certificates.
6. Qualification data.
7. Material certificates.
8. Maintenance data.

D. Quality Assurance

1. Installer Qualifications: A qualified installer who is acceptable to terrazzo manufacturer to install manufacturer's products.
 - a. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
 - b. Engage an installer who is a contractor member of NTMA.
2. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
2. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

F. Project Conditions

1. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.

2. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
3. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
4. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
5. Control and collect dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.
 - a. Provide dustproof partitions and temporary enclosures to limit dust migration and to isolate areas from noise.

1.2 PRODUCTS

A. Epoxy-Resin Terrazzo

1. Materials:
 - a. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate crack preparation and reflective crack reduction.
 - 1) Reinforcement: Fiberglass scrim.
 - b. Primer: Manufacturer's product recommended for substrate and use indicated.
 - c. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.
 - 1) Physical Properties without Marble Chips **OR** Aggregates, **as directed**:
 - a) Hardness: 60 to 85 per ASTM D 2240, Shore D.
 - b) Minimum Tensile Strength: **3000 psi (20.7 MPa)** per ASTM D 638 for a **2-inch (51-mm)** specimen made using a "C" die per ASTM D 412.
 - c) Minimum Compressive Strength: **10,000 psi (6.9 MPa)** per ASTM D 695, Specimen B cylinder.
 - d) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.
 - i. Distilled water.
 - ii. Mineral water.
 - iii. Isopropanol.
 - iv. Ethanol.
 - v. 0.025 percent detergent solution.
 - vi. 1.0 percent soap solution.
 - vii. 10 percent sodium hydroxide.
 - viii. 10 percent hydrochloric acid.
 - ix. 30 percent sulfuric acid.
 - x. 5 percent acetic acid.
 - 2) Physical Properties with Marble Chips **OR** Aggregates, **as directed**: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide," comply with the following:
 - a) Flammability: Self-extinguishing, maximum extent of burning **0.25 inch (6.35 mm)** per ASTM D 635.
 - b) Thermal Coefficient of Linear Expansion: **0.0025 inch/inch per deg F (0.0025 mm/mm per 0.5556 deg C)** for temperature range of **minus 12 to plus 140 deg F (minus 24 to plus 60 deg C)** per ASTM D 696.
 - d. Marble Chips **OR** Aggregates, **as directed**: Complying with NTMA gradation standards for mix indicated and containing no deleterious or foreign matter.
 - 1) Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
 - 2) 24-Hour Absorption Rate: Less than 0.75 percent.
 - 3) Dust Content: Less than 1.0 percent by weight.
 - e. Finishing Grout: Resin based.

2. Terrazzo (for NTMA-formulated design mixes): Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and marble-chip proportions and mixing.
 - a. Formulated Mix Color and Pattern: As selected by the Owner from manufacturer's full range **OR** As selected from NTMA standard-terrazzo plates **OR** As selected from NTMA thin-set terrazzo plates, **as directed**.
 3. Terrazzo (for custom design mixes): Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and marble-chip **OR** aggregate, **as directed**, proportions and mixing.
 - a. Custom Mix Color and Pattern: Match sample **OR** Match existing, **as directed**.
- B. Strip Materials**
1. Thin-Set Divider Strips: L-type angle or T-type, **1/4 inch (6.4 mm)** deep.
 - a. Material: White-zinc alloy **OR** Brass **OR** Aluminum **OR** Plastic, in color selected from manufacturer's full range, **as directed**.
 - b. Top Width: **1/8 inch (3.2 mm) OR 1/4 inch (6.4 mm)**, **as directed**.
 2. Heavy-Top Divider Strips: L-type angle in depth required for topping thickness indicated.
 - a. Bottom-Section Material: Galvanized steel **OR** Matching top-section material, **as directed**.
 - b. Top-Section Material: White-zinc alloy **OR** Brass **OR** Aluminum **OR** Plastic, in color selected from manufacturer's full range, **as directed**.
 - c. Top-Section Width: **1/8 inch (3.2 mm) OR 1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR 1/2 inch (12.7 mm)**, **as directed**.
 3. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material, thickness, and color of divider strips and in depth required for topping thickness indicated.
 4. Accessory Strips: Match divider strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
 - a. Base-bead strips for exposed top edge of terrazzo base.
 - b. Edge-bead strips for exposed edges of terrazzo.
 - c. Nosings for terrazzo stair treads and landings.
 5. Abrasive Strips (for terrazzo stair treads and landings): Silicon carbide or aluminum oxide, or combination of both, in epoxy-resin binder and set in channel.
 - a. Width: **1/2 inch (12.7 mm)**.
 - b. Depth: As required by terrazzo thickness.
 - c. Length: **4 inches (100 mm)** less than stair width **OR** As indicated, **as directed**.
 - d. Color: As selected from manufacturer's full range.
- C. Miscellaneous Accessories**
1. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use and acceptable to terrazzo manufacturer.
 - a. Use adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Anchoring Devices:
 - a. Strips: Provide mechanical anchoring devices for strip materials as required for secure attachment to substrate.
 - b. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
 3. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
 4. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
 5. Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
 6. Sealer: Slip- and stain-resistant penetrating-type sealer that is chemically neutral with pH factor between 7 and 10; does not affect color or physical properties of terrazzo; is recommended by

sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated **OR Acrylic OR Urethane OR Chemical-resistant epoxy, as directed.**

- D. Precast Terrazzo
1. Precast Terrazzo Units: Precast epoxy-resin terrazzo base, stair tread, threshold, bench, and planter units.
 2. Precast Terrazzo Base Units: **1/4 inch (6.4 mm)** thick; cast in maximum lengths possible, but not less than **36 inches (900 mm)**; with rounded, finished top edge.
 - a. Type: Coved with minimum **3/4-inch (19-mm)** radius **OR Straight OR Splayed OR As indicated, as directed.**
 - b. Height: **6 inches (152 mm) OR 4 inches (101 mm) OR As indicated, as directed.**
 - c. Outside Corner Units: With finished returned edges at outside corner.
 - d. Color, Pattern, and Finish: As selected from manufacturer's full range **OR Match sample OR Match adjacent poured-in-place terrazzo flooring, as directed.**
 3. Precast Terrazzo Stair Treads: **1/2 inch (12.7 mm)** thick with rounded nosing edge.
 - a. Abrasive Strips: Three-line **OR Two-line OR One-line OR Abrasive nosing strip and two-line, as directed,** abrasive inserts at nosings.
 - b. Color, Pattern, and Finish: As selected from manufacturer's full range **OR Match sample OR Match adjacent poured-in-place terrazzo flooring, as directed.**
 4. Precast Terrazzo Finishing (for custom precast terrazzo components):
 - a. Finish exposed-to-view edges or reveals to match face finish.
 - b. Ease exposed edges to **1/8-inch (3-mm)** radius.

1.3 EXECUTION

- A. Preparation
1. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
 2. Concrete Slabs:
 - a. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
 - 1) Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
 - 2) Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
 - 3) Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.
 - b. Verify that concrete substrates are visibly dry and free of moisture.
 - c. Moisture Testing:
 - 1) Test for moisture by anhydrous calcium chloride method according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of **3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m)** in 24 hours.
 - 2) Test for moisture by relative humidity probe and digital meter method according to ASTM F 2170. Proceed with installation only after substrates have a maximum relative-humidity-measurement reading of 70 to 75 percent in 24 hours.
 - 3) Test for moisture content by method recommended in writing by terrazzo manufacturer. Proceed with installation only after substrates pass testing.
 3. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.
 - a. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

4. Installation of terrazzo indicates acceptance of surfaces and conditions.
- B. Epoxy-Resin Terrazzo Installation
1. General:
 - a. Comply with NTMA's written recommendations for terrazzo and accessory installation.
 - b. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."
 - c. Installation Tolerance: Limit variation in terrazzo surface from level to **1/4 inch in 10 feet (6 mm in 3 m)**; noncumulative.
 - d. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
 - e. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
 2. Thickness: **1/4 inch (6.4 mm) OR 3/8 inch (9.5 mm) OR** As indicated, **as directed**, nominal.
 3. Flexible Reinforcing Membrane:
 - a. Prepare and prefill substrate cracks with membrane material.
 - b. Install membrane to produce full substrate coverage in areas to receive terrazzo.
 - c. Reinforce membrane with fiberglass scrim.
 - d. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
 4. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
 5. Strip Materials:
 - a. Divider and Control-Joint Strips:
 - 1) Locate divider strips in locations indicated.
 - 2) Install control-joint strips back to back directly above concrete-slab control joints **OR** in locations indicated, **as directed**.
 - 3) Install control-joint strips with **1/4-inch (6.4-mm)** gap between strips, and install sealant in gap.
 - 4) Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
 - b. Accessory Strips: Install accessory strips as required to provide a complete installation **OR** in locations indicated, **as directed**.
 - c. Abrasive Strips: Install with surface of abrasive strip positioned **1/16 inch (1.6 mm) OR 1/32 inch (0.8 mm), as directed**, higher than terrazzo surface.
 6. Fine Grinding: Grind with stones 120 grit or finer until all grout is removed from surface. Repeat rough grinding, grout coat, and fine grinding if large voids exist after initial fine grinding. Produce surface with a minimum of 70 percent aggregate exposure.
 7. Repair: Remove and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by the Owner.
- C. Precast Terrazzo Installation
1. Install precast terrazzo units using method recommended NTMA and manufacturer unless otherwise indicated.
 2. Installation Tolerance: Set units with alignment level and true to dimensions, varying **1/8-inch (3.2-mm)** maximum in length, height, or width; noncumulative.
 3. Do not install units that are chipped, cracked, discolored, or not properly finished.
 4. Seal joints between units with joint compound matching precast terrazzo matrix **OR** joint sealant, **as directed**.
- D. Cleaning And Protection
1. Cleaning:
 - a. Remove grinding dust from installation and adjacent areas.

09 - Finishes



- b. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow to dry thoroughly.
 2. Sealing:
 - a. Seal surfaces according to NTMA's written recommendations.
 - b. Apply sealer according to sealer manufacturer's written instructions.
 3. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Final Completion.

END OF SECTION 09 66 33 13

Task	Specification	Specification Description
09 66 33 16	09 66 33 13	Resinous Matrix Terrazzo Flooring
09 66 33 19	09 66 33 13	Resinous Matrix Terrazzo Flooring

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SECTION 09 68 13 00 - CARPET TILE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for carpet tile. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes modular, fusion-bonded **OR** tufted, **as directed**, carpet tile.

C. Submittals

1. Product Data: For each product indicated.
2. Shop Drawings: Show the following:
 - a. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - b. Existing flooring materials to be removed.
 - c. Existing flooring materials to remain.
 - d. Carpet tile type, color, and dye lot.
 - e. Type of subfloor.
 - f. Type of installation.
 - g. Pattern of installation.
 - h. Pattern type, location, and direction.
 - i. Pile direction.
 - j. Type, color, and location of insets and borders.
 - k. Type, color, and location of edge, transition, and other accessory strips.
 - l. Transition details to other flooring materials.
3. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - a. Carpet Tile: Full-size Sample.
 - b. Exposed Edge, Transition, and other Accessory Stripping: **12-inch- (300-mm-)** long Samples.
4. LEED Submittal:
 - a. Product Data for Credit EQ 4.3:
 - 1) For carpet tile, documentation indicating compliance with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.
 - 2) For installation adhesive, including printed statement of VOC content.
5. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
6. Maintenance data.

D. Quality Assurance

1. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
2. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Comply with CRI 104, Section 5, "Storage and Handling."

F. Project Conditions

1. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
2. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
3. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
4. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

G. Warranty

1. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - a. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - b. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
 - c. Warranty Period: 10 years from date of Final Completion.

1.2 PRODUCTS

A. Carpet Tile

1. Fiber Content: 100 percent nylon 6, 6 **OR** 100 percent nylon 6 **OR** 100 percent polypropylene **OR** 100 percent wool **OR** 80 percent wool; 20 percent nylon 6, 6 **OR** 80 percent wool; 20 percent nylon 6, 6 **as directed**.
2. Fiber Type: **Insert proprietary fiber type** as directed by the Owner
3. Pile Characteristic: Level-loop **OR** Cut **OR** Cut-and-loop, **as directed**, pile.
4. Yarn Twist: **Insert twist in TPI (TPCM)** as directed by the Owner.
5. Yarn Count: **Insert yarn count** as directed by the Owner.
6. Density: **Insert oz./cu. yd. (g/cu. cm)** as directed by the Owner.
7. Pile Thickness: **Insert inches (mm)** as directed by the Owner for finished carpet tile per ASTM D 6859.
8. Stitches: **Insert stitches per inch (mm)** as directed by the Owner.
9. Gage: **Insert gage in ends per inch (mm)** as directed by the Owner.
10. Surface Pile Weight: **Insert oz./sq. yd. (g/sq. m)** as directed by the Owner.
11. Total Weight: **Insert oz./sq. yd. (g/sq. m)** as directed by the Owner for finished carpet tile.
12. Primary Backing/Backcoating: Manufacturer's standard composite materials **OR** PVC **OR** Fiberglass-reinforced PVC **OR** Fiberglass-reinforced amorphous resin **OR** Reinforced polyurethane composite cushion **OR** Reinforced polyurethane composite **OR** Reinforced thermoplastic copolymer, **as directed**.
13. Secondary Backing: Manufacturer's standard material.
14. Backing System: **Insert proprietary name** as directed by the Owner
15. Size: **18 by 18 inches (457 by 457 mm) OR 24 by 24 inches (610 by 610 mm) OR 18 by 36 inches (457 by 914 mm) OR 36 by 36 inches (914 by 914 mm)**, **as directed**.
16. Applied Soil-Resistance Treatment: Manufacturer's standard material.
17. Antimicrobial Treatment: Manufacturer's standard material.
18. Performance Characteristics: As follows:
 - a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm **OR** 0.22 W/sq. cm, **as directed**.
 - b. Dry Breaking Strength: Not less than **100 lbf (445 N)** per ASTM D 2646.

- c. Tuft Bind: Not less than **3 lbf (13 N) OR 5 lbf (22 N) OR 6.2 lbf (28 N) OR 8 lbf (36 N) OR 10 lbf (45 N)**, as directed, per ASTM D 1335.
- d. Delamination: Not less than **3.5 lbf/in. (15 N/mm) OR 4 lbf/in. (18 N/mm)**, as directed, per ASTM D 3936.
- e. Dimensional Tolerance: Within **1/32 inch (0.8 mm)** of specified size dimensions, as determined by physical measurement.
- f. Dimensional Stability: 0.2 percent or less per ISO 2551 (Aachen Test).
- g. Resistance to Insects: Comply with AATCC 24.
- h. Noise Reduction Coefficient (NRC): **Insert NRC** as directed by the Owner per ASTM C 423.
- i. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
- j. Colorfastness to Light: Not less than 4 after 40 **OR 60**, as directed, AFU (AATCC fading units) per AATCC 16, Option E.
- k. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.
- l. Electrostatic Propensity: Less than 3.5 **OR 2**, as directed, kV per AATCC 134.
- m. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

B. Installation Accessories

1. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
2. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - a. VOC Limits: Provide adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).

1.3 EXECUTION

A. Preparation

1. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions **1/8 inch (3 mm)** wide or wider and protrusions more than **1/32 inch (0.8 mm)**, unless more stringent requirements are required by manufacturer's written instructions.
3. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.
4. Clean metal substrates of grease, oil, soil and rust, and prime if directed by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.
5. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

B. Installation

1. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
2. Installation Method: As recommended in writing by carpet tile manufacturer **OR** Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive **OR** Partial glue down; install periodic tiles with releasable, pressure-sensitive adhesive **OR** Free lay; install carpet tiles without adhesive, as directed.
3. Maintain dye lot integrity. Do not mix dye lots in same area.

4. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
 5. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
 6. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
 7. Install pattern parallel to walls and borders.
 8. Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.
- C. Cleaning And Protection
1. Perform the following operations immediately after installing carpet tile:
 - a. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 - b. Remove yarns that protrude from carpet tile surface.
 - c. Vacuum carpet tile using commercial machine with face-beater element.
 2. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations."
 3. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13 00

SECTION 09 68 16 00 - CARPET

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for carpet. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Tufted carpet.
 - b. Woven carpet.
 - c. Carpet cushion.

C. Submittals

1. Product Data: For each product indicated.
2. Shop Drawings: Show the following:
 - a. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
 - b. Existing flooring materials to be removed.
 - c. Existing flooring materials to remain.
 - d. Carpet type, color, and dye lot.
 - e. Locations where dye lot changes occur.
 - f. Seam locations, types, and methods.
 - g. Type of subfloor.
 - h. Type of installation.
 - i. Pattern type, repeat size, location, direction, and starting point.
 - j. Pile direction.
 - k. Type, color, and location of insets and borders.
 - l. Type, color, and location of edge, transition, and other accessory strips.
 - m. Transition details to other flooring materials.
 - n. Type of carpet cushion.
3. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
 - a. Carpet: **12-inch- (300-mm-)** square Sample.
 - b. Exposed Edge, Transition, and other Accessory Stripping: **12-inch- (300-mm-)** long Samples.
 - c. Carpet Cushion: **6-inch- (150-mm-)** square Sample.
 - d. Carpet Seam: **6-inch (150-mm)** Sample.
 - e. Mitered Carpet Border Seam: **12-inch- (300-mm-)** square Sample. Show carpet pattern alignment.
4. LEED Submittals:
 - a. Product Data for Credit EQ 4.3:
 - 1) For carpet, documentation indicating compliance with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.
 - 2) For carpet cushion, documentation indicating compliance with testing and product requirements of Carpet and Rug Institute's "Green Label" program.
 - 3) For installation adhesive, including printed statement of VOC content.
5. Product Schedule: For carpet and carpet cushion. Use same designations indicated on Drawings.
6. Maintenance data.

- D. Quality Assurance
 - 1. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
 - 2. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 1.2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Preinstallation Conference: Conduct conference at Project site.
- E. Delivery, Storage, And Handling
 - 1. Comply with CRI 104, Section 5, "Storage and Handling."
- F. Project Conditions
 - 1. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
 - 2. Environmental Limitations: Do not install carpet and carpet cushion until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 3. Do not install carpet and carpet cushion over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
 - 4. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.
- G. Warranty
 - 1. Special Warranty for Carpet: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - a. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - b. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, excess static discharge, and delamination.
 - c. Warranty Period: 10 years from date of Final Completion.
 - 2. Special Warranty for Carpet Cushion: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet cushion installation that fail in materials or workmanship within specified warranty period.
 - a. Warranty includes consequent removal and replacement of carpet and accessories.
 - b. Warranty does not include deterioration or failure of carpet cushion due to unusual traffic, failure of substrate, vandalism, or abuse.
 - c. Failure includes, but is not limited to, permanent indentation or compression.
 - d. Warranty Period: 10 years from date of Final Completion.

1.2 PRODUCTS

- A. Tufted Carpet
 - 1. Fiber Content: 100 percent nylon 6, 6 **OR** 100 percent nylon 6 **OR** 100 percent polypropylene, **as directed**.
 - 2. Pile Characteristic: Level-loop **OR** Cut **OR** Cut-and-loop **OR** Multilevel-loop **OR** Level tip shear **OR** Random shear **OR** Frieze **OR** Sculptured, **as directed**, pile.
 - 3. Yarn Twist: as directed by the Owner.
 - 4. Yarn Count: as directed by the Owner.
 - 5. Density: as directed by the Owner.
 - 6. Pile Thickness: finished carpet per ASTM D 6859.
 - 7. Stitches: as directed by the Owner.
 - 8. Gage: as directed by the Owner.
 - 9. Face Weight: as directed by the Owner.

10. Total Weight: for finished carpet.
11. Primary Backing: Manufacturer's standard material **OR** Woven polypropylene **OR** Nonwoven, polypropylene or polyester, **as directed**.
12. Secondary Backing: Manufacturer's standard material **OR** Woven polypropylene **OR** Nonwoven, polypropylene or polyester **OR** Woven jute **OR** Fiberglass, **as directed**.
13. Backcoating: Manufacturer's standard material **OR** SBR latex **OR** PVC **OR** Thermoplastic copolymer, **as directed**.
14. Width: **12 feet (3.7 m) OR 6 feet (1.8 m) OR 13.5 feet (4.1 m) OR 15 feet (4.6 m)**, **as directed**.
15. Applied Soil-Resistance Treatment: Manufacturer's standard material.
16. Antimicrobial Treatment: Manufacturer's standard material.
17. Performance Characteristics: As follows:
 - a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm **OR** 0.22 W/sq. cm, **as directed**.
 - b. Dry Breaking Strength: Not less than **100 lbf (445 N)** per ASTM D 2646.
 - c. Tuft Bind: Not less than **3 lbf (13 N) OR 5 lbf (22 N) OR 6.2 lbf (28 N) OR 8 lbf (36 N) OR 10 lbf (45 N)**, **as directed**, per ASTM D 1335.
 - d. Delamination: Not less than **2.5 lbf/in. (12 N/mm) OR 3.5 lbf/in. (15 N/mm) OR 4 lbf/in. (18 N/mm)**, **as directed**, per ASTM D 3936.
 - e. Resistance to Insects: Comply with AATCC 24.
 - f. Noise Reduction Coefficient (NRC): per ASTM C 423.
 - g. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.
 - h. Colorfastness to Light: Not less than 4 after 40 **OR** 60, **as directed**, AFU (AATCC fading units) per AATCC 16, Option E.
 - i. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC 174.
 - j. Electrostatic Propensity: Less than 3.5 **OR** 2, **as directed**, kV per AATCC 134.
 - k. Environmental Requirements: Provide carpet that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

B. Woven Carpet

1. Fiber Content: 100 percent wool **OR** 80 percent wool; 20 percent nylon 6, 6 **OR** 80 percent wool; 20 percent nylon 6, **as directed**.
2. Face Construction: Axminster **OR** Wilton **OR** Velvet, **as directed**.
3. Pile Characteristic: Level-loop **OR** Cut **OR** Cut-and-loop, **as directed**, pile.
4. Yarn Twist: as directed by the Owner.
5. Yarn Count: as directed by the Owner.
6. Density: as directed by the Owner.
7. Pile Thickness: for finished carpet per ASTM D 6859.
8. Rows: as directed by the Owner.
9. Pitch: as directed by the Owner.
10. Face Weight: as directed by the Owner.
11. Total Weight: as directed by the Owner., for finished carpet.
12. Backing: Manufacturers standard **OR** As follows, **as directed**:
 - a. Chain Warp: as directed by the Owner.
 - b. Stuffer Warp: as directed by the Owner.
 - c. Shot or Fill Weft: as directed by the Owner.
 - d. Backcoating: as directed by the Owner.
13. Applied Soil-Resistance Treatment: Manufacturer's standard material.
14. Performance Characteristics: As follows:
 - a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm **OR** 0.22 W/sq. cm, **as directed**.
 - b. Dry Breaking Strength: Not less than **100 lbf (445 N)** per ASTM D 2646.
 - c. Resistance to Insects: Comply with AATCC 24.
 - d. Noise Reduction Coefficient (NRC): per ASTM C 423.
 - e. Colorfastness to Crocking: Not less than 4, wet and dry, per AATCC 165.

- f. Colorfastness to Light: Not less than 4 after 40 **OR** 60, **as directed**, AFU (AATCC fading units) per AATCC 16, Option E.
- g. Electrostatic Propensity: Less than 3.5 **OR** 2, **as directed**, kV per AATCC 134.
- h. Environmental Requirements: Provide carpet that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

C. Carpet Cushion

1. Traffic Classification: CCC Class I, moderate **OR** II, heavy **OR** III, extra-heavy, **as directed**, traffic.
2. Fiber Cushion: Rubberized hair, mothproofed and sterilized **OR** Rubberized jute, mothproofed and sterilized **OR** Synthetic **OR** Resinated, recycled textile, **as directed**.
 - a. Weight: as directed by the Owner.
 - b. Thickness: as directed by the Owner.plus 5 percent maximum.
 - c. Density: as directed by the Owner.
3. Rubber Cushion: Flat **OR** Rippled waffle **OR** Textured flat **OR** Reinforced, **as directed**.
 - a. Weight: as directed by the Owner.
 - b. Thickness: as directed by the Owner.plus 5 percent maximum.
 - c. Compression Resistance: at 25 **OR** 65, **as directed**, percent per ASTM D 3676.
 - d. Density: as directed by the Owner.
4. Polyurethane-Foam Cushion: Grafted prime **OR** Densified **OR** Bonded **OR** Mechanically frothed, **as directed**.
 - a. Compression Force Deflection at 65 Percent: per ASTM D 3574.
 - b. Thickness: as directed by the Owner.
 - c. Density: as directed by the Owner.
5. Performance Characteristics: As follows:
 - a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm **OR** 0.22 W/sq. cm, **as directed**.
 - b. Noise Reduction Coefficient (NRC): per ASTM C 423.
 - c. Environmental Requirements: Provide carpet cushion that complies with testing and product requirements of Carpet and Rug Institute's "Green Label" program.

D. Installation Accessories

1. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet **OR** carpet cushion, **as directed**, manufacturer.
2. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer **OR** carpet and carpet cushion manufacturers, **as directed**.
 - a. VOC Limits: Provide adhesives with VOC content not more than 50g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).
3. Tackless Carpet Stripping: Water-resistant plywood, in strips as required to match cushion thickness and that comply with CRI 104, Section 12.2.
4. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
5. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

1.3 EXECUTION

A. Preparation

1. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

2. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions **1/8 inch (3 mm)** wide or wider, and protrusions more than **1/32 inch (0.8 mm)**, unless more stringent requirements are required by manufacturer's written instructions.
3. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet **OR** carpet cushion, **as directed**, manufacturer.
4. Broom and vacuum clean substrates to be covered immediately before installing carpet.

B. Installation

1. Comply with CRI 104 and carpet manufacturer's **OR** carpet and carpet cushion manufacturers', **as directed**, written installation instructions for the following:
 - a. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
 - b. Double-Glue-Down Installation: Comply with CRI 104, Section 10, "Double Glue-Down Installation."
 - c. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 11, "Attached-Cushion Installations."
 - d. Preapplied Adhesive Installation: Comply with CRI 104, Section 11.4, "Pre-Applied Adhesive Systems (Peel and Stick)."
 - e. Hook-and-Loop Installation: Comply with CRI 104, Section 11.5, "Hook and Loop Technology."
 - f. Stretch-in Installation: Comply with CRI 104, Section 12, "Stretch-in Installation."
 - g. Stair Installation: Comply with CRI 104, Section 13, "Carpet on Stairs" for stretch-in **OR** glue-down, **as directed**, installation.
2. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
 - a. Bevel adjoining border edges at seams with hand shears **OR** Level adjoining border edges, **as directed**.
3. Do not bridge building expansion joints with carpet.
4. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
5. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
6. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
7. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.
8. Comply with carpet cushion manufacturer's written recommendations. Install carpet cushion seams at 90-degree angle with carpet seams.

C. Cleaning And Protecting

1. Perform the following operations immediately after installing carpet:
 - a. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - b. Remove yarns that protrude from carpet surface.
 - c. Vacuum carpet using commercial machine with face-beater element.
2. Protect installed carpet to comply with CRI 104, Section 16, "Protection of Indoor Installations."
3. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet cushion manufacturer **OR** and carpet adhesive manufacturer **OR** and carpet cushion and adhesive manufacturers, **as directed**.

09 - Finishes



END OF SECTION 09 68 16 00

Task	Specification	Specification Description
09 68 16 00	09 68 13 00	Carpet Tile

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SECTION 09 69 13 00 - ACCESS FLOORING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for access flooring. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Access flooring panels and understructure.
 - b. Floor panel coverings.

C. Definition

1. ESD: Electrostatic discharge. The transfer of electric charge between bodies at different potentials.

D. System Description

1. Access Flooring System: Assemblies composed of modular floor panels on pedestals with or without stringers.

E. Performance Requirements

1. Structural Performance: Provide access flooring systems capable of withstanding the following loads and stresses within limits and under conditions indicated, as determined by testing manufacturer's current standard products according to referenced procedures in CISCA A/F, "Recommended Test Procedures for Access Floors":
 - a. Concentrated Loads: Provide floor panels, including those with cutouts, capable of withstanding a concentrated design load of **1000 lbf (4448 N) OR 1250 lbf (5560 N) OR 1500 lbf (6672 N) OR 2000 lbf (8896 N), as directed**, with a top-surface deflection under load and a permanent set not to exceed, respectively, **0.10 and 0.010 inch (2.54 and 0.25 mm) OR 0.080 inch and 0.010 inch (2.03 and 0.25 mm), as directed**, according to CISCA A/F, Section I, "Concentrated Loads."
OR
Concentrated Loads: Provide floor panels, including those with cutouts, capable of withstanding a concentrated design load of **1000 lbf (4448 N) OR 1250 lbf (5560 N) OR 1500 lbf (6672 N) OR 2000 lbf (8896 N), as directed**, with a bottom-surface deflection under load and a permanent set not to exceed, respectively, **0.10 and 0.010 inch (2.54 and 0.25 mm) OR 0.13 inch and 0.010 inch (3.30 and 0.25 mm), as directed**, measured below each applied-load location at horizontal surface of nearest composite beam according to CISCA A/F, Section I, "Concentrated Loads."
 - b. Ultimate Loads: Provide access flooring systems capable of withstanding a minimum ultimate concentrated load of **2000 lbf (8896 N) OR 2500 lbf (11 121 N) OR 2600 lbf (11 565 N) OR 3000 lbf (13 345 N) OR 4000 lbf (17 793 N), as directed**, without failing, according to CISCA A/F, Section II, "Ultimate Loading."
 - c. Rolling Loads: Provide access flooring systems capable of withstanding rolling loads of the following magnitude, with a combination of local and overall deformation not to exceed **0.040 inch (1.02 mm)** after exposure to rolling load over CISCA A/F Path A or B, whichever path produces the greatest top-surface deformation, according to CISCA A/F, Section III, "Rolling Loads."
 - 1) CISCA A/F Wheel 1 Rolling Load: **600 lbf (2669 N) OR 800 lbf (3559 N) OR 1000 lbf (4448 N) OR 1200 lbf (5338 N), as directed.**

- 2) CISCA A/F Wheel 2 Rolling Load: **500 lbf (2224 N) OR 600 lbf (2669 N) OR 800 lbf (3559 N) OR 1000 lbf (4448 N), as directed.**
 - d. Stringer Load Testing: Provide stringers, without panels in place, capable of withstanding a concentrated load of **75 lbf (334 N) OR 225 lbf (1001 N) OR 450 lbf (2002 N) OR 850 lbf (3781 N), as directed**, at center of span with a permanent set not to exceed **0.010 inch (0.25 mm)**, as determined per CISCA A/F, Section IV, "Stringer Load Testing."
 - e. Pedestal Axial Load Test: Provide pedestal assemblies, without panels or other supports in place, capable of withstanding a **5000 lbf (22 240 N) OR 6000 lbf (26 690 N), as directed**, axial load per pedestal, according to CISCA A/F, Section V, "Pedestal Axial Load Test."
 - f. Pedestal Overturning Moment Test: Provide pedestal assemblies, without panels or other supports in place, capable of withstanding an overturning moment per pedestal of **1000 lbf x inches (113 N x meters)**, according to CISCA A/F, Section VI, "Pedestal Overturning Moment Test."
2. Floor Panel Impact-Load Performance: Provide access flooring system capable of withstanding an impact load of **75 lb (34.0 kg) OR 100 lb (45.5 kg) OR 125 lb (56.7 kg) OR 150 lb (68.0 kg) OR 175 lbs (79.4 kg), as directed**, when dropped from **36 inches (914 mm)** onto a **1-sq. in. (6.5-sq. cm)** area located anywhere on panel, without failing. Failure is defined as collapse of access flooring system.
 3. Seismic Performance: Provide access flooring system capable of withstanding the effects of seismic motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
 4. ESD-Control Properties: Provide floor coverings with ESD-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
 - a. Static-Dissipative Floor Covering Properties:
 - 1) Electrical Resistance: Test per ASTM F 150 with 100-V applied voltage **OR ESD STM 7.1, as directed.**
 - a) Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
 - b) Average no less than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
 - 2) Static Generation: Less than 300 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
 - 3) Static Decay: 5000 to 0 V in less than 0.25 seconds when tested per FED-STD-101C/4046.1.
 - b. Static-Conductive Floor Covering Properties:
 - 1) Electrical Resistance: Test per ASTM F 150 with 500-V applied voltage **OR ESD STM 7.1 OR NFPA 99, Annex 2 OR UL 779, as directed.**
 - a) Average greater than 25,000 ohms and less than 1 megohm when test specimens and installed floor coverings are tested surface to surface (point to point).
 - b) Average no less than 25,000 ohms with no single measurement less than 10,000 ohms when installed floor coverings are tested surface to ground.
 - 2) Static Generation: Less than 100 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.
 - 3) Static Decay: 5000 to 0 V in less than 0.03 **OR 0.01, as directed**, seconds when tested per FED-STD-101C/4046.1.
 - c. Antistatic Floor Covering Properties:
 - 1) Electrical Resistance: Test per ESD STM 7.1.
 - a) Average greater than 25,000 ohms and less than 1,000 megohm when test specimens and installed floor coverings are tested surface to surface (point to point).
 - 2) Static Generation: Less than 100 V when tested per AATCC-134 at 20 percent relative humidity with conductive footwear.

- d. Panel-to-Understructure Resistance: Not more than 10 ohms as measured without floor coverings.

F. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include layout of access flooring system and relationship to adjoining Work based on field-verified dimensions.
3. Shop Drawings: Include layout, details, sections, and relationship to adjoining Work.
4. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For pedestal installation adhesive, including printed statement of VOC content.
 - b. Product Data for Credit EQ 4.3: For carpet and installation adhesive, documentation indicating compliance with specified requirements.
 - c. Product Data for Credit EQ 4.4: For particleboard used in steel-encapsulated, wood core panels, documentation indicating that particleboard contains no urea formaldehyde.
5. Product test reports.

G. Quality Assurance

1. Regulatory Requirements: Fabricate and install access flooring to comply with NFPA 75 requirements for raised flooring.
2. Preinstallation Conference: Conduct conference at Project site.

1.2 PRODUCTS

A. Floor Panels And Understructure

1. Floor Panels, General: Provide modular panels complying with the following requirements that one person, using a portable lifting device, can interchange with other field panels without disturbing adjacent panels or understructure:
 - a. Nominal Panel Size: **24 by 24 inches (610 by 610 mm) OR 600 by 600 mm, as directed.**
 - b. Fabrication Tolerances: Fabricate panels to the following tolerances with squareness tolerances expressed as the difference between diagonal measurements from corner to corner:
 - 1) Size and Squareness: Plus or minus **0.015 inch (0.38 mm)** of required size, with a squareness tolerance of plus or minus **0.015 inch (0.38 mm)**, unless tolerances are otherwise indicated for a specific panel type.
 - 2) Flatness: Plus or minus **0.020 inch (0.50 mm)**, measured on a diagonal on top of panel.
 - c. Panel Attachment to Understructure: By gravity.
 - d. Panel Attachment to Understructure: By bolting to pedestal head. Provide panels with holes drilled in corners to align precisely with threaded holes in pedestal heads and to accept countersunk screws with heads flush with top of panel.
 - 1) Provide fasteners held captive to panels.
2. Steel-Encapsulated, Wood-Core Panels: Fabricated with **1-inch- (25-mm-)** thick, particleboard core, made without urea formaldehyde laminated to top and bottom steel face sheets, with metal surfaces protected against corrosion by manufacturer's standard factory-applied finish, and with a flame-spread index of 25 or less per ASTM E 84. Provide core edges enclosed with upturned, die-formed edge of bottom sheet or with perimeter steel channel welded to top sheet and welded or bonded to bottom sheet.
3. Formed-Steel Panels: Fabricated with die-cut flat top sheet and die-formed and stiffened steel bottom pan formed from cold-rolled steel sheet and joined together by resistance welding, with metal surfaces protected against corrosion by manufacturer's standard factory-applied finish to produce units of the following type:
 - a. Solid Panels: Flat, solid top surface.

- b. Perforated Panels: Perforated top surface with holes **OR** slots, **as directed**, of number, spacing, and size standard with manufacturer to produce a nominal open area of 25 percent. Provide mechanical dampers with each panel unit, **as directed**.
 - 1) Quantity: As directed.
 - 2) Finish: Manufacturer's standard **OR** To match solid panels, **as directed**.
- c. Grates: Grating ribs arranged in manufacturer's standard pattern to produce a nominal open area of 56 percent. Provide mechanical dampers with each panel unit, **as directed**.
 - 1) Quantity: As directed.
 - 2) Finish: Manufacturer's standard **OR** To match solid panels, **as directed**.
4. Cementitious-Filled, Formed-Steel Panels: Fabricated with die-cut flat top sheet and die-formed and stiffened bottom pan formed from cold-rolled steel sheet joined together by resistance welding to form an enclosed assembly, with metal surfaces protected against corrosion by manufacturer's standard factory-applied finish. Fully grout internal spaces of completed units with manufacturer's standard cementitious fill.
5. Die-Cast Aluminum Panels: Fabricated from manufacturer's standard aluminum alloy but not less than the strength and corrosion resistance of Alloy UNS No. A03830 or UNS No. A03840 per ASTM B 85, to produce units of the following type and with the following finish:
 - a. Solid Panels: Flat, solid surface on top and symmetrical crossing ribs on bottom; edge machined after casting to specified tolerances.
 - b. Perforated Panels: Perforated top surface with holes **OR** slots, **as directed**, of number, spacing, and size standard with manufacturer to produce a nominal open area of 25 percent. Provide mechanical dampers with each panel unit, **as directed**.
 - 1) Quantity: As directed.
 - 2) Finish: Manufacturer's standard **OR** To match solid panels, **as directed**.
 - c. Grates: Grating ribs arranged in manufacturer's standard pattern to produce a nominal open area of 56 percent. Provide mechanical dampers with each panel unit, **as directed**.
 - 1) Quantity: As directed.
 - 2) Finish: Manufacturer's standard **OR** To match solid panels, **as directed**.
 - d. Epoxy Finish: Epoxy **OR** Conductive epoxy, **as directed**, powder coating with a minimum average thickness of **2.5 mils (0.064 mm)** and in color selected from manufacturer's full range.
 - e. Plated Finish: Nickel-chrome electrodeposited plating, **0.000005-inch (0.000127-mm)** chrome over **0.0008-inch (0.02-mm)** nickel, without copper or brass strike, to produce complete coverage over significant surfaces with a matte metallic appearance.
6. Concrete-Filled, Steel Pan Panels: Fabricated with bottom pan die-formed from electrolytic-zinc-coated steel sheet and filled with lightweight concrete that is reinforced and bonded to pan by shear ties.
7. Pedestals: Assembly consisting of base, column with provisions for height adjustment, and head (cap); made of steel **OR** aluminum, **as directed**.
 - a. Provide pedestals designed for use in seismic applications.
 - b. Base: Square or circular base with not less than **16 sq. in. (103 sq. cm)** of bearing area.
 - c. Column: Of height required to bring finished floor to elevations indicated. Weld to base plate.
 - d. Provide vibration-proof leveling mechanism for making and holding fine adjustments in height over a range of not less than **2 inches (51 mm)** and for locking at a selected height, so deliberate action is required to change height setting and vibratory displacement is prevented.
 - e. Head: Designed to support understructure system indicated.
 - 1) Provide sound-deadening pads or gaskets at contact points between heads and panels.
 - 2) Provide head with four holes aligned with holes in floor panels for bolting of panels to pedestals.
8. Stringer Systems: Modular steel **OR** aluminum, **as directed**, stringer systems made to interlock with pedestal heads and form a grid pattern placing stringers under each edge of each floor panel

and a pedestal under each corner of each floor panel. Protect steel components with manufacturer's standard galvanized or corrosion-resistant paint finish.

- a. Bolted Stringers: System of main and cross stringers connected to pedestals with threaded fasteners accessible from above.
- b. Snap-on Stringers: System of stringers attached to pedestals with nonbolted interlocking connections to provide a stable understructure and to prevent accidental disengagement.
- c. Provide continuous gasket at contact surfaces between panel and stringers to deaden sound, to seal off underfloor cavity from above, and to maintain panel alignment and position.
- d. Provide stringers that support each edge of each panel where required to meet design-load criteria.

B. Floor Panel Coverings

1. Provide bare panels without factory-applied floor coverings on traffic surfaces.
2. General: Provide factory-applied floor coverings of type indicated that are laminated by access flooring manufacturer to tops of floor panels including perforated panels, **as directed**.
3. Colors, Textures, and Patterns: As selected from manufacturer's full range.
4. Standard Plastic Laminate: NEMA LD 3, High-Wear type, Grade HWH **OR** HDS, **as directed**; fabricated in one piece to cover each panel face within perimeter plastic **OR** with integral trim serving as, **as directed**, edging.
5. Static-Conductive Plastic Laminate: NEMA LD 3, High-Wear type, Grade CHWH **OR** CHDS, **as directed**, fabricated in one piece to cover each panel face within perimeter plastic edging or with integral trim serving as edging.
6. Solid Vinyl Tile: Static-Conductive **OR** Static-Dissipative, **as directed**, ASTM F 1700, Class I (Monolithic Vinyl Tile), Type A (Smooth Surface), fabricated in one piece to cover panel face within plastic edging.
7. Low-Emissivity, Solid Vinyl Tile: Static-Conductive **OR** Static-Dissipative, **as directed**, ASTM F 1700, Class I (Monolithic Vinyl Tile), Type A (Smooth Surface), with minimum 50 percent reduction in outgassing **OR** total mass loss of 1 percent and minimum 98 percent reduction in collected volatile condensable materials, **as directed**, compared to products with dioctyl phthalate as determined by testing per ASTM E 595.
8. Standard Commercial Carpet: Die cut and adhesively bonded to top surface of panel.
 - a. Provide factory-applied carpet with the following characteristics:
 - 1) Style: Passport.
 - 2) Fiber Type: 100% BCF nylon.
 - 3) Pile Characteristics: Level loop.
 - 4) Pile Thickness: **0.130 inch (3.30 mm)**.
 - 5) Stitches: **10.0/inch (10.0/2.54 cm)**.
 - 6) Surface Pile Weight: **26 oz./sq. yd. (881 g/sq. m)**.
 - 7) Total Weight: **56 oz./sq. yd. (1899 g/sq. m)**.
 - 8) Backing: Woven polypropylene.
 - 9) Critical Radiant Flux Rating: Minimum of 0.45 W/sq. cm per ASTM E 648.
 - b. Environmental Requirements: Provide carpet that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program. Bond carpet to panels with adhesives with VOC content not more than 50g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24).
9. Antistatic Carpet: Antistatic modular carpet tile bonded with conductive adhesive to **OR** with buttons that engage into positioning holes in, **as directed**, top surface of panel.
 - a. Provide carpet with the following characteristics:
 - 1) Style: Classic **OR** Contempo, **as directed**.
 - 2) Fiber Type: Solutia LXI nylon **OR** Performa SD Type 6 nylon, **as directed**
 - 3) Pile Characteristics: Textured loop **OR** Textured graphic loop, **as directed**.
 - 4) Pile Thickness: **0.125 and 0.188 inch (3.18 and 4.78 mm)**.
 - 5) Stitches: **11.0/inch (11.0/2.54 cm) OR 10.0/inch (10.0/ 2.54 cm), as directed**.
 - 6) Surface Pile Weight: **24 oz./sq. yd. (814 g/sq. m)**.
 - 7) Total Weight: **148 oz./sq. yd. (5018 g/sq. m)**.

- 8) Backing: Static-dissipative, unitary PVC backing with conductive additive.
- 9) Critical Radiant Flux Rating: Minimum of 0.45 W/sq. cm per ASTM E 648.
- b. Environmental Requirements: Provide carpet that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program. Bond carpet to panels with adhesives with VOC content not more than 50g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24), **as directed**.
10. Edging: Manufacturer's standard applied **OR** integral, **as directed**, edge trim. Provide size and profile of applied edge trim that fits floor coverings selected.
11. Resilient Wall Base: ASTM F 1861, Type TS (rubber, vulcanized thermoset) **OR** TV (vinyl, thermoplastic), **as directed**, Group 1 (solid), Style B (cove), **0.080 inch (2.03 mm) OR 0.125 inch (3.18 mm), as directed**, thick and **2-1/2 inches (63.5 mm) OR 4 inches (102 mm) OR 6 inches (152 mm), as directed**, high, with matching end stops and factory-made corner units, **as directed**.

C. Accessories

1. Adhesives: Manufacturer's standard adhesive for bonding pedestal bases to subfloor.
 - a. Provide adhesive with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Post-Installed Anchors: For anchoring pedestal bases to subfloor, provide 2 **OR** 4, **as directed**, post-installed expansion anchors **OR** threaded concrete screws, **as directed**, made from carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (5 microns) for Class SC 1 service condition (mild), with the capability to sustain, without failure, a load equal to 1.5 times the loads imposed by pedestal overturning moment on fasteners, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
3. Cutouts: Provide cutouts in floor panels for cable penetrations and service outlets. Provide reinforcement or additional support, if needed, to make panels with cutouts comply with standard performance requirements.
 - a. Number, Size, Shape, and Location: As directed.
 - b. Trim edge of cutouts with manufacturer's standard plastic molding.
 - c. Fit cutouts with manufacturer's standard grommets in sizes indicated or, if size of cutouts exceeds maximum grommet size available, trim edge of cutouts with manufacturer's standard plastic molding having tapered top flange. Furnish removable covers for grommets, **as directed**.
 - d. Provide foam-rubber pads for sealing annular space formed in cutouts by cables.
4. Service Outlets: Standard UL-listed and -labeled assemblies, for recessed mounting flush with top of floor panels, for power, communication, and signal services, and complying with the following requirements:
 - a. Structural Performance: Cover capable of supporting a **1000-lbf (4448-N)** concentrated load.
 - b. Cover and Box Type: Hinged polycarbonate cover with opening for passage of cables when cover is closed and including frame and steel box or formed-steel plate for mounting electrical receptacles.
OR
Cover and Box Type: Grommet with twist-close cover and including steel junction box for electrical receptacle with provision for telephone Amphenol connectors and signal cables.
 - c. Location: In center of panel quadrant, unless otherwise indicated.
 - d. Receptacles and Wiring: Electrical receptacles and wiring for service outlets are specified in Division 22.
OR
Receptacles and Wiring: Equip each service outlet with power receptacles to comply with the following requirements:
 - 1) Type of Receptacle: Heavy-duty duplex, 2-pole, 3-wire grounding, 20 A, 125 V, NEMA WD 6, Configuration 5-20R, unless otherwise indicated.
 - 2) Number of Receptacles for Outlet: One **OR** Two **OR** Four, **as directed**.

- 3) Wiring Method: Factory wired for hard wiring in field with armored cable, containing 3 insulated No. 12 AWG solid-copper conductors, terminated with a **6-inch- (152-mm-)** long pigtail.
OR
Wiring Method: Power-in connectors, built into outlet housing, of type to fit power-in and power-out connectors of branch-circuit cables supplied with building electrical system.
5. Diffusers: Manufacturer's standard round diffusers, **4 inches (102 mm) OR 8 inches (203 mm), as directed**, in diameter, formed from aluminum **OR** polycarbonate plastic, **as directed**, to produce a removable 1-piece unit complete with diffuser, manually adjustable flow regulator, dirt and dust receptacle, trim ring, and underfloor compression mounting ring; precisely fitted in factory-prepared openings of standard field panels, and complying with the following requirements:
 - a. Air-Distribution Characteristics: **100 cfm (47 L/s) at 0.096-inch (24-Pa)** static pressure and a maximum noise criterion rating of 15, **as directed**.
 - b. Structural Performance: Capable of supporting a **600-lbf (2669-N)** concentrated load, **as directed**.
 - c. Fire-Test-Response Characteristics: Classified 94V-0 per UL 94.
6. Floor Grilles: Standard load-bearing grilles formed from aluminum **OR** polycarbonate plastic, **as directed**, to produce removable one-piece unit precisely fitted in factory-prepared openings of standard field panels, with adjustable/removable **OR** without, **as directed**, dampers and complying with the following requirements:
 - a. Air-Distribution Characteristics: **468 cfm at 0.10-inch wg (221 L/s at 25-Pa)** static pressure.
 - b. Structural Performance: Capable of supporting a **1000-lbf (4448-N)** concentrated load.
 - c. Fire-Test-Response Characteristics: Classified 94V-0 per UL 94.
7. Cavity Dividers: Provide manufacturer's standard metal dividers located where indicated to divide underfloor cavities.
8. Vertical Closures (Fasciae): Where underfloor cavity is not enclosed by abutting walls or other construction, provide metal-closure plates with manufacturer's standard finish.
9. Ramps: Manufacturer's standard ramp construction of width and slope indicated but not steeper than 1:12, with raised-disc or textured rubber or vinyl floor coverings, and of same materials, performance, and construction requirements as access flooring.
10. Steps: Provide steps of size and arrangement indicated with floor coverings to match access flooring. Apply nonslip aluminum nosings to treads, unless otherwise indicated.
11. Railings: Standard extruded-aluminum railings, at ramps and open-sided perimeter of access flooring where indicated. Include handrail, intermediate rails, posts, brackets, end caps, wall returns, wall and floor flanges, plates, and anchorages where required.
 - a. Provide railings that comply with structural performance requirements specified in Division 05 Section(s) "Pipe And Tube Railings" OR "Decorative Metal", **as directed**.
12. Panel Lifting Device: Manufacturer's standard portable lifting device of type required for specified panels. Provide one lifting devices per room of each type required.
13. Perimeter Support: Where indicated, provide manufacturer's standard method for supporting panel edge and forming transition between access flooring and adjoining floor coverings at same level as access flooring.

1.3 EXECUTION

A. Preparation

1. Lay out floor panel installation to keep the number of cut panels at floor perimeter to a minimum. Avoid using panels cut to less than **6 inches (152 mm)**.
2. Locate each pedestal, complete any necessary subfloor preparation, and vacuum clean subfloor to remove dust, dirt, and construction debris before beginning installation.

B. Installation

1. Install access flooring system and accessories under supervision of access flooring manufacturer's authorized representative to produce a rigid, firm installation that complies with performance requirements and is free of instability, rocking, rattles, and squeaks.
 2. Set pedestals in adhesive as recommended in writing by access flooring manufacturer to provide full bearing of pedestal base on subfloor.
 3. Attach pedestals to subfloor by post-installed mechanical anchors.
 4. Adjust pedestals to permit top of installed panels to be set flat, level, and to proper height.
 5. Secure stringers to pedestal heads according to access flooring manufacturer's written instructions.
 6. Install flooring panels securely in place, properly seated with panel edges flush. Do not force panels into place.
 - a. Carpeted Panels: Install panels with carpet pile in same direction.
 7. Scribe perimeter panels to provide a close fit with adjoining construction with no voids greater than **1/8 inch (3 mm)** where panels abut vertical surfaces.
 - a. To prevent dusting, seal cut edges of steel-encapsulated, wood-core panels with sealer recommended in writing by panel manufacturer.
 8. Cut and trim access flooring and perform other dirt-or-debris-producing activities at a remote location or as required to prevent contamination of subfloor under access flooring already installed.
 9. Ground flooring system as recommended by manufacturer and as needed to comply with performance requirements for electrical resistance of floor coverings.
 10. Scribe and install underfloor-cavity dividers to closely fit against subfloor surfaces, and seal with mastic.
 11. Scribe vertical closures to closely fit against subfloor and adjacent finished-floor surfaces. Set in mastic and seal to maintain plenum effect within underfloor cavity.
 12. Clean dust, dirt, and construction debris caused by floor installation, and vacuum subfloor area, as installation of floor panels proceeds.
 13. Seal underfloor air cavities at construction seams, penetrations, and perimeter to control air leakage as recommended in writing by manufacturer.
 14. Install access flooring without change in elevation between adjacent panels and within the following tolerances:
 - a. Plus or minus **1/16 inch (1.5 mm) OR 1/8 inch (3 mm)**, **as directed**, in any **10-foot (3-m)** distance.
 - b. Plus or minus **1/8 inch (3 mm) OR 1/4 inch (6.5 mm)**, **as directed**, from a level plane over entire access flooring area.
- C. Adjusting, Cleaning, And Protection
1. Prohibit traffic on access flooring for 24 hours and removal of floor panels for 72 hours after installation to allow pedestal adhesive to set.
 2. After completing installation, vacuum clean access flooring and cover with continuous sheets of reinforced paper or plastic. Maintain protective covering until time of Final Completion.
 3. Replace access flooring panels that are stained, scratched, or otherwise damaged or that do not comply with specified requirements.

END OF SECTION 09 69 13 00

Task	Specification	Specification Description
09 69 53 00	09 69 13 00	Access Flooring

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SECTION 09 72 13 00 - WALL COVERINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wall coverings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Vinyl wall covering.
 - b. Woven glass-fiber wall covering.
 - c. Textile wall covering.
 - d. Heavy-duty synthetic textile wall covering.
 - e. Wood-veneer wall covering.
 - f. Wallpaper.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood-veneer wall coverings comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - b. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
 - c. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content and chemical components.
3. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, veneer matching, seams and termination points.
4. Samples: Full width by **36-inch- (914-mm-)** long section of wall covering from same print run or dye lot to be used for the Work, with specified treatments, paint, applied. Show complete pattern repeat. Mark top and face of fabric.
5. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for wall covering.
6. Maintenance Data: For wall coverings to include in maintenance manuals.

D. Quality Assurance

1. Forest Certification: Fabricate products with wood veneer produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
2. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Surface-Burning Characteristics: As follows, per ASTM E 84:
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.
 - b. Fire-Growth Contribution: Textile wall coverings complying with acceptance criteria of IBC Standard 803.
 - c. Fire-Growth Contribution: Textile wall coverings tested according to NFPA 265 **OR** NFPA 286, **as directed**, and complying with test protocol and criteria in the IBC Standard 803.

E. Project Conditions

1. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - a. Wood-Veneer Wall Coverings: Condition spaces for not less than 48 hours before installation.
2. Lighting: Do not install wall covering until a permanent level of lighting is provided on the surfaces to receive wall covering.
3. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

1.2 PRODUCTS**A. Wall Coverings**

1. General: Provide rolls of each type of wall covering from same print run or dye lot.

B. Vinyl Wall Covering

1. Vinyl Wall-Covering Standards: Provide products **OR** mildew-resistant products, **as directed**, complying with the following:
 - a. FS CCC-W-408D and CFFA-W-101-D for Type I, Light-Duty **OR** Type II, Medium-Duty **OR** Type III, Heavy-Duty, **as directed**, products.
 - b. ASTM F 793 for peelable **OR** strippable, **as directed**, wall coverings that qualify as Category I, Decorative Only **OR** Category II, Decorative with Medium Serviceability **OR** Category III, Decorative with High Serviceability **OR** Category IV, Type I, Commercial Serviceability **OR** Category V, Type II, Commercial Serviceability **OR** Category VI, Type III, Commercial Serviceability, **as directed**, products.
2. Width: **27 inches (686 mm) OR 54 inches (1372 mm)**, **as directed**.
3. Backing: Scrim **OR** Osnaburg **OR** Drill **OR** Nonwoven, **as directed**, fabric.
 - a. Fiber Content: Cotton **OR** Polyester **OR** Polycotton **OR** Polyester cellulose, **as directed**.
4. Repeat: Random.
5. Colors, Textures, and Patterns: As selected from manufacturer's full range.

C. Woven Glass-Fiber Wall Covering

1. Width: **39 inches (991 m)**.
2. Colors, Textures, and Patterns: As selected from manufacturer's full range.

D. Textile Wall Covering

1. Wall-Covering Standard: Provide mildew-resistant **OR** peelable **OR** strippable, **as directed**, wall coverings that comply with ASTM F 793 for Category I, Decorative Only **OR** Category II, Decorative with Medium Serviceability **OR** Category III, Decorative with High Serviceability **OR** Category IV, Type I, Commercial Serviceability **OR** Category V, Type II, Commercial Serviceability **OR** Category VI, Type III, Commercial Serviceability, **as directed**, products.
2. Test Responses:
 - a. Colorfastness to Wet and Dry Crocking: Passes AATCC 8, Grade 3, minimum.
 - b. Colorfastness to Light: Passes AATCC 16, Option 1 or 3, Grade 4, minimum, at 40 hours.
3. Repeat: Random.
4. Applied Backing Material: Acrylic **OR** Paper, **as directed**.
5. Colors, Textures, and Patterns: As selected from manufacturer's full range.

E. Heavy-Duty Synthetic Textile Wall Covering

1. Wall-Covering Standard: Provide wall coverings **OR** mildew-resistant wall coverings, **as directed**, that comply with ASTM F 793 for Category IV, Type I, Commercial Serviceability **OR**

- Category V, Type II, Commercial Serviceability **OR** Category VI, Type III, Commercial Serviceability, **as directed**, products.
- 2. Test Responses:
 - a. Colorfastness to Wet and Dry Crocking: Passes AATCC 8, Class 3, minimum.
 - b. Colorfastness to Light: Passes AATCC 16A or AATCC 16E, Class 4, minimum, at 40 hours.
- 3. Width: **54 inches (1372 mm) OR 60 inches (1524 mm), as directed.**
- 4. Colors, Textures, and Patterns: As selected from manufacturer's full range.

F. Wood-Veneer Wall Covering

- 1. Sheet Size: **24 by 96 inches (610 by 2440 mm) OR 48 by 96 inches (1220 by 2440 mm) OR 48 by 120 inches (1220 by 3050 mm), as directed.**
- 2. Veneer Construction: Single ply veneer **OR** Two veneer plies assembled perpendicular to one another, **as directed.**
- 3. Wood Species: Red oak **OR** Maple **OR** Cherry, **as directed.**
- 4. Veneer Match: Book **OR** Slip, **as directed.**
- 5. Sheet Match: Running **OR** Balance **OR** Center **OR** Sequence, as indicated **OR** Blueprint, as indicated, **as directed.**
- 6. Applied Backing Material: Fabric.
- 7. Finish: Factory **OR** Field, **as directed**, applied using wall-covering manufacturer's standard stain and polyurethane system.
 - a. Colors: As selected from manufacturer's full range.

G. Wallpaper

- 1. Wall-Covering Standard: Provide mildew-resistant **OR** peelable **OR** strippable, **as directed**, wallpaper that complies with ASTM F 793 for Category I, Decorative Only **OR** Category II, Decorative with Medium Serviceability **OR** Category III, Decorative with High Serviceability, **as directed**, products.
- 2. Width: **20-1/2 inches (520.7 mm) OR 28 inches (711.2 mm), as directed.**
- 3. Repeat: Random.
- 4. Colors, Textures, and Patterns: As selected from manufacturer's full range.

H. Accessories

- 1. Adhesive: Mildew-resistant, nonstaining, strippable, **as directed**, adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering manufacturer and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2. Primer/Sealer: Mildew resistant, complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by wall-covering manufacturer for intended substrate.
- 3. Wall Liner: Nonwoven, synthetic underlayment and adhesive as recommended by wall-covering manufacturer.
- 4. Seam Tape: As recommended in writing by wall-covering manufacturer.
- 5. Metal Primer: Interior ferrous metal primer complying with Division 09 Section "Interior Painting".

1.3 EXECUTION

A. Preparation

- 1. Comply with manufacturer's written instructions for surface preparation.
- 2. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- 3. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
 - a. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.

- b. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - c. Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - d. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
 - e. Painted Surfaces: Treat areas susceptible to pigment bleeding.
4. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.
 5. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
 6. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.
 7. Install wall liner, with no gaps or overlaps, where required by wall-covering manufacturer. Form smooth wrinkle-free surface for finished installation. Do not begin wall-covering installation until wall liner has dried.
- B. Installation
1. General: Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated except where more stringent requirements apply.
 2. Cut wall-covering strips in roll number sequence. Change roll numbers at partition breaks and corners.
 3. Install strips in same order as cut from roll.
 4. Install reversing every other strip.
 5. Install wall covering with no gaps or overlaps, no lifted or curling edges, and no visible shrinkage.
 6. Match pattern **72 inches (1830 mm)** above the finish floor.
 7. Install seams vertical and plumb at least **6 inches (150 mm)** from outside corners and **3 inches (75 mm) OR 6 inches (150 mm)**, **as directed**, from inside corners unless a change of pattern or color exists at corner. No horizontal seams are permitted.
 8. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
 9. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without any overlay or spacing between strips.
- C. Field Finishing Of Wood-Veneer Wall Coverings
1. Apply wall-covering manufacturer's standard stain and polyurethane system according to coating manufacturer's written instructions to produce finish that is consistent in color and gloss and matches approved Samples.
 2. Apply no fewer than two **OR** three, **as directed**, finish coats.
- D. Cleaning
1. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
 2. Use cleaning methods recommended in writing by wall-covering manufacturer.
 3. Replace strips that cannot be cleaned.
 4. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09 72 13 00

Task	Specification	Specification Description
09 72 16 13	09 72 13 00	Wall Coverings
09 72 23 00	09 72 13 00	Wall Coverings
09 73 00 00	09 68 16 00	Carpet
09 81 16 00	09 84 13 00	Acoustical Wall Panels

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SECTION 09 84 13 00 - ACOUSTICAL WALL PANELS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for acoustical wall panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes spline-mounted **OR** back-mounted, **as directed**, acoustical wall panels.

C. Definitions

1. NRC: Noise reduction coefficient.

D. Submittals

1. Product Data: For each type of panel edge, core material, and mounting indicated.
2. Shop Drawings: For acoustical wall panels. Include mounting devices and details.
3. Coordination Drawings: Show intersections with adjacent work.
4. Samples: For each fabric and sample panels.
5. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For installation adhesive, including printed statement of VOC content.
6. Product certificates **OR** test reports, **as directed**.
7. Maintenance data.
8. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Fire-Test-Response Characteristics: Provide acoustical wall panels with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 **OR** IBC Chapter 8, **as directed**, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 **OR** NFPA 286, **as directed**.
3. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Comply with fabric and acoustical wall panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
2. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.
3. Protect panel edges from crushing and impact.

G. Project Conditions

1. Environmental Limitations: Do not install acoustical wall panels until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
2. Lighting: Do not install acoustical wall panels until a permanent level of lighting **OR** a lighting level of not less than 50 fc (538 lux), **as directed**, is provided on surfaces to receive acoustical wall panels.

3. Air-Quality Limitations: Protect acoustical wall panels from exposure to airborne odors, such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
4. Field Measurements: Verify locations of acoustical wall panels by field measurements before fabrication and indicate measurements on Shop Drawings.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of acoustical wall panels that fail in performance, materials, or workmanship within two years from date of Final Completion.
 - a. Failure in performance includes, but is not limited to, acoustical performance.
 - b. Failures in materials include, but are not limited to, fabric sagging, distorting, or releasing from panel edge; or warping of core.

1.2 PRODUCTS

A. Core Materials

1. Glass-Fiber Board: ASTM C 612, Type IA or Types IA and IB; density as specified, unfaced, dimensionally stable, molded rigid board, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
2. Mineral-Fiber Board: Maximum flame-spread and smoke-developed indexes of 15 and 5, respectively.
3. Cementitious-Fiber Board Core: Density of not less than 20 lb/cu. ft. (320 kg/cu. m).
4. Tackable, Impact-Resistant, High-Density Face Layer: 1/8-inch- (3.2-mm-) thick layer of compressed molded glass-fiber board with a minimum nominal density of 16 to 18 lb/cu. ft. (256 to 288 kg/cu. m) laminated to face of core.
5. Impact-Resistant, Acoustically Transparent, Copolymer Face-Sheet Layer for High-Abuse Applications: 1/16- to 1/8-inch- (1.6- to 3.2-mm-) thick layer of perforated, noncombustible, copolymer sheet laminated to face of core.
6. Wood: Clear, vertical grain, straight, kiln-dried hardwood of manufacturer's standard species, AWPAC20, Interior Type A, fire-retardant treated, low-hygroscopic-type formulation. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Kiln-dry material after treatment to 5 to 10 percent moisture content.

B. Spline-Mounted Acoustical Wall Panels With Perforated Mineral-Fiber Board Core Or Cementitious-Fiber Board Core

1. Panel Construction: Manufacturer's standard panel construction consisting of facing material laminated to front face of a perforated, water-felted, mineral-fiber board **OR** cementitious-fiber board, **as directed**, core; with long edges kerfed and rabbeted to receive splines.
 - a. Mineral-Fiber Board: Not less than 13-lb/cu. ft. (208-kg/cu. m) **OR** 20-lb/cu. ft. (320-kg/cu. m), **as directed**, nominal density; with perforated surface.
2. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations **OR** matching samples **OR** as selected from manufacturer's full range **OR** as indicated on Drawings, **as directed**.
 - a. Fiber Content: 100 percent woven polyester **OR** nonwoven polyester **OR** polyolefin **OR** acoustically transparent vinyl, **as directed**.
 - b. Width: 54 inches (1371 mm) **OR** 66 inches (1676 mm), **as directed**.
 - c. Applied Treatments: Stain resistance.
3. Nominal Overall Panel Thickness: 3/4 inch (19 mm) **OR** 1 inch (25 mm), **as directed**.
4. NRC: For Type A mounting per ASTM E 795, NRC 0.50 to NRC 0.90 **OR** NRC 0.60 to NRC 0.70 **OR** NRC 0.65 to NRC 0.75, **as directed**.
5. Panel Width: 24 inches (610 mm) **OR** 30 inches (762 mm) **OR** 48 inches (1220 mm) **OR** 600 mm **OR** As indicated on Drawings, **as directed**.
6. Panel Height: Fabricated from units 96 inches (2438 mm) **OR** 108 inches (2743 mm) **OR** 120 inches (3048 mm), **as directed**, in height; mounting height **as directed**.

7. Panel Edge: Core self-edge.
 8. Panel Short Edge Detail: Square.
- C. Spline-Mounted Acoustical Wall Panels With Glass-Fiber Board Core
1. Panel Construction: Manufacturer's standard panel construction consisting of facing material laminated to front face of a dimensionally stable, rigid glass-fiber board core with a nominal density of **6 to 7 lb/cu. ft. (96 to 112 kg/cu. m)**; with long edges kerfed and rabbeted to receive splines.
 2. Core-Face Layer: Tackable, impact-resistant, high-density board **OR** Impact-resistant, acoustically transparent, copolymer face-sheet, **as directed**.
 3. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations **OR** matching samples **OR** as selected from manufacturer's full range **OR** as indicated on Drawings, **as directed**.
 - a. Fiber Content: 100 percent woven polyester **OR** nonwoven polyester **OR** polyolefin **OR** acoustically transparent vinyl, **as directed**.
 - b. Width: **54 inches (1371 mm) OR 66 inches (1676 mm)**, **as directed**.
 - c. Applied Treatments: Stain resistance.
 4. Nominal Overall Panel Thickness: **3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (51 mm)**, **as directed**.
 5. NRC: For Type A mounting per ASTM E 795, not less than NRC 0.20 **OR** NRC 0.80 **OR** NRC 0.95, **as directed**.
 6. Panel Width: Manufacturer's standard **OR 24 inches (610 mm) OR 30 inches (762 mm) OR 48 inches (1220 mm) OR 600 mm OR 1200 mm OR** As indicated on Drawings, **as directed**.
 7. Panel Height: Fabricated from units **96 inches (2438 mm) OR 108 inches (2743 mm) OR 120 inches (3048 mm)**, **as directed**, in height; mounting height **as directed**.
 8. Panel Edge: Manufacturer's standard short edge.
 9. Panel Short Edge Detail: Square.
- D. Back-Mounted Acoustical Wall Panels With Perforated Mineral-Fiber Board Core
1. Panel Construction: Manufacturer's standard panel construction consisting of facing material laminated to front face of a perforated, water-felted, mineral-fiber board core of not less than **13-lb/cu. ft. (208-kg/cu. m) OR 20-lb/cu. ft. (320-kg/cu. m)**, **as directed**, nominal density; with perforated surface.
 2. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations **OR** matching samples **OR** as selected from manufacturer's full range **OR** as indicated on Drawings, **as directed**.
 - a. Fiber Content: 100 percent woven polyester **OR** nonwoven polyester **OR** polyolefin **OR** acoustically transparent vinyl, **as directed**.
 - b. Width: **54 inches (1371 mm) OR 66 inches (1676 mm)**, **as directed**.
 - c. Applied Treatments: Stain resistance.
 3. Nominal Core Thickness and Overall System NRC: **1/2 inch (13 mm)** and not less than NRC 0.35 **OR 3/4 inch (19 mm)** and not less than NRC 0.45, **as directed**, for Type A mounting.
 4. Panel Width: **24 inches (610 mm) OR 30 inches (762 mm) OR 48 inches (1220 mm) OR 600 mm OR** As indicated on Drawings, **as directed**.
 5. Panel Height: Fabricated from units **96 inches (2438 mm) OR 108 inches (2743 mm) OR 120 inches (3048 mm)**, **as directed**, in height; mounting height **as directed**.
 6. Panel Edge: Core self-edge.
 7. Panel Short Edge Detail: Square.
- E. Back-Mounted, Edge-Reinforced Acoustical Wall Panels With Glass-Fiber Board Core
1. Panel Construction: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back border of dimensionally stable, rigid glass-fiber **OR** rock-fiber/slag-fiber, **as directed**, board core; with edges chemically hardened or impact resistant and resilient to reinforce panel perimeter against warpage and damage.
 2. Nominal Core Density: **4 to 7 lb/cu. ft. (64 to 112 kg/cu. m) OR 6 to 7 lb/cu. ft. (96 to 112 kg/cu. m)**, **as directed**.

3. Core-Face Layer: Tackable, impact-resistant, high-density board **OR** Impact-resistant, acoustically transparent, copolymer face-sheet, **as directed**.
 4. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations **OR** matching samples **OR** as selected from manufacturer's full range **OR** as indicated on Drawings, **as directed**.
 - a. Fiber Content: 100 percent woven polyester **OR** nonwoven polyester **OR** polyolefin **OR** acoustically transparent vinyl, **as directed**.
 - b. Width: **54 inches (1371 mm)** **OR** **66 inches (1676 mm)**, **as directed**.
 - c. Applied Treatments: Stain resistance.
 5. Nominal Core Thickness and Overall System NRC: **3/4 inch (19 mm)** and not less than NRC 0.65 **OR** **1 inch (25 mm)** and not less than NRC 0.80 **OR** **1-1/2 inches (38 mm)** and not less than NRC 0.85 **OR** **2 inches (51 mm)** and not less than NRC 0.90 **OR** **2 inches (51 mm)** and not less than NRC 1.00, **as directed**, for Type A mounting per ASTM E 795.
 6. Panel Width: Manufacturer's standard **OR** **24 inches (610 mm)** **OR** **30 inches (762 mm)** **OR** **48 inches (1220 mm)** **OR** 600 mm **OR** 1200 mm **OR** As indicated on Drawings, **as directed**.
 7. Panel Height: Fabricated height as indicated on Drawings **OR as directed**; mounting height as indicated on Drawings **OR as directed**.
 8. Panel Edge Detail: Square **OR** Bullnosed (radiused) **OR** Chamfered (beveled) **OR** Mitered **OR** Custom as indicated on Drawings, **as directed**.
 9. Corner Detail: Square **OR** Round, radius as indicated **OR** Off-square, dimensions as indicated, **as directed**, to form continuous profile to match edge detail.
- F. Back-Mounted, Edge-Framed Acoustical Wall Panels With Glass-Fiber Board Core
1. Panel Construction: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed, dimensionally stable, rigid glass-fiber board core and bonded or attached to edges and back of frame.
 2. Nominal Core Density: **4 to 7 lb/cu. ft. (64 to 112 kg/cu. m)** **OR** **6 to 7 lb/cu. ft. (96 to 112 kg/cu. m)**, **as directed**.
 3. Core-Face Layer: Tackable, impact-resistant, high-density board **OR** Impact-resistant, acoustically transparent, copolymer face-sheet, **as directed**.
 4. Facing Material: Fabric from same dye lot; color and pattern as indicated by manufacturer's designations **OR** matching samples **OR** as selected from manufacturer's full range **OR** as indicated on Drawings, **as directed**.
 - a. Fiber Content: 100 percent woven polyester **OR** nonwoven polyester **OR** polyolefin **OR** acoustically transparent vinyl, **as directed**.
 - b. Width: **54 inches (1371 mm)** **OR** **66 inches (1676 mm)**, **as directed**.
 - c. Applied Treatments: Stain resistance.
 5. Nominal Core Thickness and Overall System NRC: **1 inch (25 mm)** and not less than NRC 0.80 **OR** **1-1/2 inches (38 mm)** and not less than NRC 0.85 **OR** **2 inches (51 mm)** and not less than NRC 0.90, **as directed**, for Type A mounting per ASTM E 795.
 6. Panel Width: Manufacturer's standard **OR** **24 inches (610 mm)** **OR** **30 inches (762 mm)** **OR** **48 inches (1220 mm)** **OR** 600 mm **OR** 1200 mm **OR** As indicated on Drawings, **as directed**.
 7. Panel Height: Fabricated height as indicated on Drawings **OR as directed**; mounting height as indicated on Drawings **OR as directed**.
 8. Panel Edge and Frame: Extruded-aluminum or zinc-coated, rolled-steel shape **OR** Extruded PVC **OR** Hardwood, rabbeted, and splined with glued joints and machined corners, **as directed**.
 - a. Panel Edge Detail: Square.
- G. Fabrication
1. Sound-Absorption Performance: Provide acoustical wall panels with minimum NRCs indicated, as determined by testing per ASTM C 423 for mounting type specified.
 2. Acoustical Wall Panels: Panel construction consisting of facing material adhered to face, **as directed**, edges and back border of dimensionally stable core; with rigid edges to reinforce panel perimeter against warpage and damage.
 - a. Glass-Fiber Board: Resin harden areas of core for attachment of mounting devices.

3. Fabric Facing: Stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other foreign matter. Applied with visible surfaces fully covered.
 - a. Where square corners are indicated, tailor corners. Heat seal vinyl fabric seams at corners.
 - b. Where radius or other nonsquare corners are indicated, attach facing material so there are no seams or gathering of material.
 - c. Where fabrics with directional or repeating patterns or directional weave are indicated, mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.
4. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, sags.
5. Dimensional Tolerances of Finished Units: Plus or minus **1/16 inch (1.6 mm)** for the following:
 - a. Thickness.
 - b. Edge straightness.
 - c. Overall length and width.
 - d. Squareness from corner to corner.
 - e. Chords, radii, and diameters.
6. Spline-Mounting Accessories: Manufacturer's standard concealed, extruded-aluminum or plastic connecting splines designed and fabricated for screw attachment to walls, with other moldings and trim for interior and exterior corners, leveling and base support with factory-applied finish on exposed items.
 - a. Finish Color: White **OR** Black **OR** Match color of facing material **OR** Match sample, **as directed**.
7. Back-Mounting Devices: Concealed on backside of panel, recommended to support weight of panel, with base-support bracket system where recommended by manufacturer for additional support of panels, and as follows:
 - a. Adhesive. Use only adhesives that have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Hook-and-loop tape.
 - c. Impaling clips.
 - d. Magnetic strip or devices.
 - e. Metal "Z" Clips: Two-part panel clips, with one part of each clip mechanically attached to back of panel and the other part to wall substrate, designed to allow for panel removal.
 - f. As recommended by manufacturer.
8. Owner-Furnished Fabric: Provide fabric acceptable to acoustical wall panel manufacturer for application indicated. Notify the Owner of fabric unacceptability.

1.3 EXECUTION

A. Installation

1. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
 - a. Cut units to be at least 50 percent of unit width, with facing material extended over cut edge to match uncut edge. Scribe acoustical wall panels to fit adjacent work. Butt joints tightly.
2. Comply with acoustical wall panel manufacturer's written instructions for installation of panels using type of concealed mounting accessories indicated or, if not indicated, as recommended by manufacturer. Anchor panels securely to supporting substrate.
3. Match and level fabric pattern and grain among adjacent panels.
4. Installation Tolerances: As follows:
 - a. Variation from Level and Plumb: Plus or minus **1/16 inch (1.6 mm)**.
 - b. Variation of Panel Joints from Hairline: Not more than **1/16 inch (1.6 mm) OR 1/32 inch (0.79 mm)**, **as directed**, wide.

09 - Finishes



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- B. Cleaning
 - 1. Clip loose threads; remove pills and extraneous materials.
 - 2. Clean panels with fabric facing, on completion of installation, to remove dust and other foreign materials according to manufacturer's written instructions.

 - C. Protection
 - 1. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, to ensure that acoustical wall panels are without damage or deterioration at time of Final Completion.
 - 2. Replace acoustical wall panels that cannot be cleaned and repaired, in a manner approved by the Owner, before time of Final Completion.

END OF SECTION 09 84 13 00

Task	Specification	Specification Description
09 84 13 00	09 23 13 00	Gypsum Board Renovation
09 84 13 00	01 95 99 92h	Gypsum Board
09 84 13 00	09 29 82 00	Gypsum Board Shaft-Wall Assemblies

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SECTION 09 91 13 00 - EXTERIOR PAINTING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for exterior painting. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - a. Concrete.
 - b. Clay masonry.
 - c. Concrete masonry units (CMU).
 - d. Steel.
 - e. Galvanized metal.
 - f. Aluminum (not anodized or otherwise coated).
 - g. Wood.
 - h. Plastic trim fabrications.
 - i. Exterior portland cement (stucco).
 - j. Exterior gypsum board.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each finish and for each color and texture required.
3. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 1.2, with the proposed product highlighted.

D. Quality Assurance

1. MPI Standards:
 - a. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - b. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated. For renovation projects, comply with requirements of "MPI Maintenance Repainting Manual" for products and paint systems indicated.
2. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - a. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - 1) Vertical and Horizontal Surfaces: Provide samples of at least **100 sq. ft. (9 sq. m)**.
 - 2) Other Items: Architect will designate items or areas required.
 - b. Final approval of color selections will be based on mockups.
 - 1) If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - c. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - d. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- E. Delivery, Storage, And Handling
 - 1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - b. Remove rags and waste from storage areas daily.
- F. Project Conditions
 - 1. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between **50 and 95 deg F (10 and 35 deg C)**.
 - 2. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than **5 deg F (3 deg C)** above the dew point; or to damp or wet surfaces.

1.2 PRODUCTS

- A. Paint, General
 - 1. Material Compatibility:
 - a. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - b. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
 - 2. Colors: As selected from manufacturer's full range.
- B. Block Fillers
 - 1. Interior/Exterior Latex Block Filler: MPI #4.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
- C. Primers/Sealers
 - 1. Alkali-Resistant Primer: MPI #3.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 2. Bonding Primer (Water Based): MPI #17.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 3. Bonding Primer (Solvent Based): MPI #69.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 4. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint system indicated.
- D. Metal Primers
 - 1. Alkyd Anticorrosive Metal Primer: MPI #79.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 - 2. Quick-Drying Alkyd Metal Primer: MPI #76.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 3. Cementitious Galvanized-Metal Primer: MPI #26.
 - a. VOC Content: E Range of E1.
 - 4. Waterborne Galvanized-Metal Primer: MPI #134.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 - 5. Quick-Drying Primer for Aluminum: MPI #95.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- E. Wood Primers
 - 1. Exterior Latex Wood Primer: MPI #6.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 2. Exterior Alkyd Wood Primer: MPI #5.

- a. VOC Content: E Range of E2 **OR** E3, **as directed**.
 3. Exterior Oil Wood Primer: MPI #7.
 - a. VOC Content: E Range of E2.
- F. Exterior Latex Paints
1. Exterior Latex (Flat): MPI #10 (Gloss Level 1).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 2. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 3. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- G. Exterior Alkyd Paints
1. Exterior Alkyd Enamel (Flat): MPI #8 (Gloss Level 1).
 - a. VOC Content: E Range of E1.
 2. Exterior Alkyd Enamel (Semigloss): MPI #94 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 3. Exterior Alkyd Enamel (Gloss): MPI #9 (Gloss Level 6).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
- H. Quick-Drying Enamels
1. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 2. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- I. Textured And High-Build Coatings
1. Latex Stucco and Masonry Textured Coating: MPI #42.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
 2. High-Build Latex (Exterior): MPI #40.
 - a. VOC Content: E Range of E1 **OR** E3, **as directed**.
- J. Aluminum Paint
1. Aluminum Paint: MPI #1.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- K. Floor Coatings
1. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 2. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 3. Interior/Exterior Latex Floor and Porch Paint (Low Gloss): MPI #60 (maximum Gloss Level 3).
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 3.
 4. Exterior/Interior Alkyd Floor Enamel (Gloss): MPI #27 (Gloss Level 6).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 - b. Additives: Manufacturer's standard additive to increase skid resistance of painted surface.
- 1.3 EXECUTION
- A. Examination
1. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
 2. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

- a. Concrete: 12 percent.
 - b. Masonry (Clay and CMU): 12 percent.
 - c. Wood: 15 percent.
 - d. Plaster: 12 percent.
 - e. Gypsum Board: 12 percent.
 3. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
 4. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - a. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.
- B. Preparation And Application
1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
 2. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - a. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
 3. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 4. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
 5. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- C. Exterior Painting Schedule
1. Paint systems herein are based on "MPI Architectural Painting Specification Manual" (hereafter, "MPI Manual"). For renovation projects, consult "MPI Maintenance Repainting Manual" and revise paint systems accordingly.
 2. For a Premium Grade system, "MPI Manual" requires intermediate coat; if Custom Grade system is required or if so directed, delete intermediate coat, **unless directed otherwise** or as otherwise required by manufacturer's recommendations.
 3. Concrete Substrates, Nontraffic Surfaces:
 - a. Latex System: MPI EXT 3.1A.
 - 1) Prime Coat: Exterior latex matching topcoat.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Aggregate/Latex System: MPI EXT 3.1 B.
 - 1) Prime Coat: Latex stucco and masonry textured coating.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Latex Over Alkali-Resistant Primer System: MPI EXT 3.1K.
 - 1) Prime Coat: Alkali-resistant primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. High-Build Latex System: MPI EXT 3.1L, applied to form dry film thickness of not less than **10 mils (0.25 mm)**.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: High-build latex (exterior).
 - e. Latex Aggregate System: MPI EXT 3.1N.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.

- 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
- 3) Topcoat: Latex stucco and masonry textured coating.
4. Concrete Substrates, Traffic Surfaces:
 - a. Latex Floor Paint System: MPI EXT 3.2A.
 - 1) Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
 - 2) Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
 - 3) Topcoat: Interior/exterior latex floor and porch paint (low gloss).
 - b. Alkyd Floor Enamel System: MPI EXT 3.2D.
 - 1) Prime Coat: Exterior/interior alkyd floor enamel (gloss).
 - 2) Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
 - 3) Topcoat: Exterior/interior alkyd floor enamel (gloss).
 - c. Clear Sealer System: MPI EXT 3.2G.
 - 1) Prime Coat: Interior/exterior clear concrete floor sealer (solvent based).
 - 2) Intermediate Coat: Interior/exterior clear concrete floor sealer (solvent based).
 - 3) Topcoat: Interior/exterior clear concrete floor sealer (solvent based).
 - d. Water-Based Clear Sealer System: MPI EXT 3.2H.
 - 1) Prime Coat: Interior/exterior clear concrete floor sealer (water based).
 - 2) Intermediate Coat: Interior/exterior clear concrete floor sealer (water based).
 - 3) Topcoat: Interior/exterior clear concrete floor sealer (water based).
5. Clay-Masonry Substrates:
 - a. Latex System: MPI EXT 4.1A.
 - 1) Prime Coat: Exterior latex matching topcoat.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. High-Build Latex System: MPI EXT 4.1H, applied to form dry film thickness of not less than **10 mils (0.25 mm)**.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: High-build latex (exterior).
 - c. Latex Aggregate System: MPI EXT 4.1B.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: Latex stucco and masonry textured coating.
6. CMU Substrates:
 - a. Latex System: MPI EXT 4.2A.
 - 1) Prime Coat: Interior/exterior latex block filler.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkali-Resistant Primer System: MPI EXT 4.2L.
 - 1) Prime Coat: Alkali-resistant primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. High-Build Latex System: MPI EXT 4.2K, applied to form dry film thickness of not less than **10 mils (0.25 mm)**.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: High-build latex (exterior).
 - d. Latex Aggregate System: MPI EXT 4.2B.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: Latex stucco and masonry textured coating.
7. Steel Substrates:
 - a. Quick-Drying Enamel System: MPI EXT 5.1A.
 - 1) Prime Coat: Quick-drying alkyd metal primer.
 - 2) Intermediate Coat: Quick-drying enamel matching topcoat.
 - 3) Topcoat: Quick-drying enamel (semigloss) **OR** (high gloss), **as directed**.

- b. Alkyd System: MPI EXT 5.1D.
 - 1) Prime Coat: Alkyd anticorrosive metal primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
- c. Aluminum Paint System: MPI EXT 5.1K.
 - 1) Prime Coat: Alkyd anticorrosive metal primer.
 - 2) Intermediate Coat: Aluminum paint.
 - 3) Topcoat: Aluminum paint.
- 8. Galvanized-Metal Substrates: Galvanized-metal substrates should not be chromate passivated (commercially known as "bonderized") if primer is field applied. If galvanized metal is chromate passivated, consult manufacturers for appropriate surface preparation and primers.
 - a. Latex System: MPI EXT 5.3A.
 - 1) Prime Coat: Cementitious galvanized-metal primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Water-Based Primer System: MPI EXT 5.3H. "MPI Manual" recommends latex over water-based primer system for low-contact/traffic areas.
 - 1) Prime Coat: Waterborne galvanized-metal primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI EXT 5.3B.
 - 1) Prime Coat: Cementitious galvanized-metal primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
- 9. Aluminum Substrates:
 - a. Latex System: MPI EXT 5.4H.
 - 1) Prime Coat: Quick-drying primer for aluminum.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd System: MPI EXT 5.4F.
 - 1) Prime Coat: Quick-drying primer for aluminum.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
- 10. Glue-Laminated Beam and Column Substrates:
 - a. Latex System: MPI EXT 6.1L.
 - 1) Prime Coat: Exterior latex wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI EXT 6.1A.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI EXT 6.1B.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
- 11. Dressed Lumber Substrates: Including architectural woodwork **OR** doors, **as directed**.
 - a. Latex System: MPI EXT 6.3L.
 - 1) Prime Coat: Exterior latex wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**. Flat paint is not recommended for use on doors.
 - b. Latex Over Alkyd Primer System: MPI EXT 6.3A.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.

- 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**. Flat paint is not recommended for use on doors.
- c. Alkyd System: MPI EXT 6.3B.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**. Flat paint is not recommended for use on doors.
12. Wood Panel Substrates: Including plywood siding **OR** fascias **OR** soffits, **as directed**.
 - a. Latex System: MPI EXT 6.4K.
 - 1) Prime Coat: Exterior latex wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI EXT 6.4G.
 - 1) Prime Coat: Exterior alkyd wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI EXT 6.4B.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
13. Wood Shingle and Shake Substrates (Excluding Roofs):
 - a. Latex System: MPI EXT 6.6E.
 - 1) Prime Coat: Exterior latex wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI EXT 6.6A.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI EXT 6.6B.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
14. Dimension Lumber Substrates, Nontraffic Surfaces: Including board siding **OR** fencing **OR** undersides of decking, **as directed**.
 - a. Latex System: MPI EXT 6.2M.
 - 1) Prime Coat: Exterior latex wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI EXT 6.2A.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI EXT 6.2C.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
15. Dimension Lumber Substrates, Traffic Surfaces: Including lumber decking **OR** stairs, **as directed**.
 - a. Latex System: MPI EXT 6.5E.
 - 1) Prime Coat: Exterior latex wood primer.
 - 2) Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
 - 3) Topcoat: Interior/exterior latex floor and porch (low gloss).
 - a) With additive to increase skid resistance of painted surface.
 - b. Latex Over Alkyd Primer System: MPI EXT 6.5A.
 - 1) Prime Coat: Exterior alkyd wood primer.

- 2) Intermediate Coat: Interior/exterior latex floor and porch (low gloss).
- 3) Topcoat: Interior/exterior latex floor and porch (low gloss).
 - a) With additive to increase skid resistance of painted surface.
- c. Alkyd Floor Enamel System: MPI EXT 6.5B.
 - 1) Prime Coat: Exterior/interior alkyd floor enamel (gloss).
 - 2) Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
 - 3) Topcoat: Exterior/interior alkyd floor enamel (gloss).
 - a) With additive to increase skid resistance of painted surface.
- 16. Plastic Trim Fabrication Substrates:
 - a. Latex System: MPI EXT 6.8A.
 - 1) Prime Coat: Bonding primer (water based) **OR** (solvent based), **as directed**.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd System: MPI EXT 6.8B.
 - 1) Prime Coat: Bonding primer (water based) **OR** (solvent based), **as directed**.
 - 2) Intermediate Coat: Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
- 17. Stucco Substrates:
 - a. Latex System: MPI EXT 9.1A.
 - 1) Prime Coat: Exterior latex matching topcoat.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkali-Resistant Primer System: MPI EXT 9.1J.
 - 1) Prime Coat: Alkali-resistant primer.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. High-Build Latex System: MPI EXT 9.1H, applied to form dry film thickness of not less than **10 mils (0.25 mm)**.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: High-build latex (exterior).
- 18. Exterior Gypsum Board Substrates:
 - a. Latex System: MPI EXT 9.2A.
 - 1) Prime Coat: Exterior latex matching topcoat.
 - 2) Intermediate Coat: Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.

END OF SECTION 09 91 13 00

SECTION 09 91 13 00a - WOOD STAINS AND TRANSPARENT FINISHES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wood stains and transparent finishes. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes surface preparation and the application of wood finishes on the following substrates:
 - a. Exterior Substrates:
 - 1) Exposed glue-laminated beams and columns.
 - 2) Exposed dimension lumber (rough carpentry).
 - 3) Dressed lumber (finish carpentry).
 - 4) Exposed wood panel products.
 - 5) Wood decks and stairs.
 - 6) Wood shingles and shakes (excluding roofs).
 - b. Interior Substrates:
 - 1) Exposed glue-laminated beams and columns.
 - 2) Exposed dimension lumber (rough carpentry).
 - 3) Dressed lumber (finish carpentry).
 - 4) Exposed wood panel products.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.2: For interior primers, stains, and transparent finishes, including printed statement of VOC content.
3. Samples: For each finish and for each color and texture required.
4. Product List: Printout of MPI's current "MPI Approved Products List" for each product category specified in Part 1.2, with the product proposed for use highlighted.

D. Quality Assurance

1. MPI Standards:
 - a. Products: Complying with MPI standards indicated and listed in its "MPI Approved Products List."
 - b. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and finish systems indicated.

E. Delivery, Storage, And Handling

1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - b. Remove rags and waste from storage areas daily.

F. Project Conditions

1. Apply finishes only when temperature of surfaces to be finished and ambient air temperatures are between **50 and 95 deg F (10 and 35 deg C)**.
2. Do not apply exterior finishes in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than **5 deg F (3 deg C)** above the dew point; or to damp or wet surfaces.

1.2 PRODUCTS

A. Materials, General

1. Material Compatibility:
 - a. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - b. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.
2. VOC Content of Field-Applied Interior Primers, Stains, and Transparent Finishes: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to primers, stains, and transparent finishes that are applied in a fabrication or finishing shop:
 - a. Flat Primers: VOC content of not more than 50 g/L.
 - b. Nonflat Primers: VOC content of not more than 150 g/L.
 - c. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
 - d. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - e. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 - f. Floor Coatings: VOC not more than 100 g/L.
 - g. Shellacs, Clear: VOC not more than 730 g/L.
 - h. Stains: VOC not more than 250 g/L.
3. Stain Colors: As selected from manufacturer's full range **OR** Match samples **OR** As indicated in a color schedule, **as directed**.

B. Wood Fillers

1. Wood Filler Paste: MPI #91.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.

C. Primers And Sealers

1. Exterior Alkyd Wood Primer: MPI #5.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
2. Exterior Latex Wood Primer: MPI #6.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
3. Exterior Oil Wood Primer: MPI #7.
 - a. VOC Content: E Range of E2.
4. Wood Preservative: MPI #37.
 - a. VOC Content: E Range of E1 **OR** E3, **as directed**.
5. Alkyd Sanding Sealer: MPI #102.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
6. Lacquer Sanding Sealer: MPI #84.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
7. Shellac: MPI #88.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.

D. Stains

1. Exterior Semitransparent Stain (Solvent Based): MPI #13.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
2. Exterior Solid-Color Stain (Solvent Based): MPI #14.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
3. Exterior, Solid-Color Latex Stain: MPI #16.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
4. Stain for Wood Decks: MPI #33.
 - a. VOC Content: E Range of E1 **OR** E3, **as directed**.
5. Interior Wood Stain (Semitransparent): MPI #90.

- a. VOC Content: E Range of E1 **OR** E2, **as directed**.

E. Varnishes

1. Exterior Marine Spar Varnish (Gloss): MPI #28, Gloss Level 7.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
2. Exterior Varnish (Gloss): MPI #29, Gloss Level 6.
 - a. VOC Content: E Range of E1.
3. Exterior Varnish (Semigloss): MPI #30, Gloss Level 5.
 - a. VOC Content: E Range of E1.
4. Interior Varnish (Flat): MPI #73, Gloss Level 1, alkyd type.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
5. Interior Varnish (Semigloss): MPI #74, Gloss Level 5, alkyd type.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
6. Interior Varnish (Gloss): MPI #75, Gloss Level 6, alkyd type.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.

F. Polyurethane Finishes

1. Two-Component Aliphatic Polyurethane (Clear): MPI #78.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
2. Interior, Oil-Modified, Clear Urethane (Satin): MPI #57, Gloss Level 4.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
3. Interior, Oil-Modified, Clear Urethane (Gloss): MPI #56, Gloss Level 6.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
4. Moisture-Cured Clear Polyurethane (Flat): MPI #71, Gloss Level 1.
 - a. VOC Content: E Range of E2.
5. Moisture-Cured Clear Polyurethane (Gloss): MPI #31.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.

G. Waterborne Acrylic Finishes

1. Waterborne Clear Acrylic (Satin): MPI #128, Gloss Level 4.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
2. Waterborne Clear Acrylic (Semigloss): MPI #129, Gloss Level 5.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
3. Waterborne Clear Acrylic (Gloss): MPI #130, Gloss Level 6.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.

H. Lacquers

1. Lacquer (Clear Flat): MPI #87, Gloss Level 1.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
2. Lacquer (Clear Satin): MPI #85, Gloss Level 4.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
3. Lacquer (Clear Gloss): MPI #86, Gloss Level 6.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.

I. Oil Finish

1. Danish Oil: MPI #92.
 - a. VOC Content: E Range of E3.

1.3 EXECUTION

A. Preparation

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
 2. Remove plates, machined surfaces, and similar items already in place that are not to be finished. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and finishing.
 - a. After completing finishing operations, reinstall items that were removed; use workers skilled in the trades involved. Remove surface-applied protection if any.
 3. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - a. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - b. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
 - c. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.
 4. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
- B. Application
1. Apply finishes according to manufacturer's written instructions.
 - a. Use applicators and techniques suited for finish and substrate indicated.
 - b. Finish surfaces behind movable equipment and furniture same as similar exposed surfaces.
 2. Apply finishes to produce surface films without cloudiness, holidays, lap marks, brush marks, runs, ropiness, or other surface imperfections.
- C. Field Quality Control
1. The following procedure may be requested at any time and as often as the Owner deems necessary during the period when finishes are being applied:
 - a. Engage the services of a qualified testing agency to sample finish materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance with product requirements.
 - c. the Owner may direct Contractor to stop applying finishes if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and refinish surfaces finished with rejected materials. Contractor will be required to remove rejected materials from previously finished surfaces if, on refinishing with complying materials, the two finishes are incompatible.
- D. Cleaning And Protection
1. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 2. After completing finish application, clean spattered surfaces. Remove spattered materials by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
 3. Protect work of other trades against damage from finish application. Correct damage by cleaning, repairing, replacing, and refinishing, as approved by the Owner, and leave in an undamaged condition.
 4. At completion of construction activities of other trades, touch up and restore damaged or defaced finished wood surfaces.
- E. Exterior Wood-Finish-System Schedule
1. Exposed Glue-Laminated Beam and Column Substrates:
 - a. Solid-Color, Solvent-Based Stain System: MPI EXT 6.1C.

- 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
- 2) Two Stain Coats: Exterior solid-color stain (solvent based).
- b. Varnish Over Semitransparent Stain System: MPI EXT 6.1D.
 - 1) Stain Coat: Exterior semitransparent stain (solvent based).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Exterior marine spar varnish (gloss) **OR** varnish (gloss) **OR** varnish (semigloss), **as directed**.
- c. Varnish System: MPI EXT 6.1K.
 - 1) Four (for a Premium Grade system) **OR** Three, **as directed**, Finish Coats: Exterior marine spar varnish (gloss) **OR** varnish (gloss) **OR** varnish (semigloss), **as directed**.
- d. Clear, Two-Component Polyurethane Over Stain System: MPI EXT 6.1E.
 - 1) Stain Coat: Exterior semitransparent stain (solvent based).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Two-component aliphatic polyurethane (clear).
- e. Clear, Two-Component Polyurethane System: MPI EXT 6.1H.
 - 1) Three Finish Coats: Two-component aliphatic polyurethane (clear).
2. Exposed Rough Carpentry Substrates:
 - a. Solid-Color Latex Stain System: MPI EXT 6.2B.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior, solid-color latex stain.
 - b. Solid-Color, Solvent-Based Stain System: MPI EXT 6.2D.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - c. Two Stain Coats (for a Premium Grade system) One Stain Coat, **as directed**: Exterior solid-color stain (solvent based).
 - d. Semitransparent Stain System: MPI EXT 6.2L.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
 - e. Varnish Over Semitransparent Stain System: MPI EXT 6.2E.
 - 1) Stain Coat: Exterior semitransparent stain (solvent based).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Exterior marine spar varnish (gloss) **OR** varnish (gloss) **OR** varnish (semigloss), **as directed**.
 - f. Varnish System: MPI EXT 6.2K.
 - 1) Four (for a Premium Grade system) **OR** Three, **as directed**, Finish Coats: Exterior varnish (marine spar, high gloss) **OR** (gloss) **OR** (semigloss), **as directed**.
 - g. Clear, Two-Component Polyurethane System: MPI EXT 6.2H.
 - 1) Three Finish Coats: Two-component aliphatic polyurethane (clear).
3. Finish Carpentry Substrates:
 - a. Solid-Color Latex Stain System: MPI EXT 6.3K.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior, solid-color latex stain.
 - b. Solid-Color, Solvent-Based Stain System: MPI EXT 6.3C.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior solid-color stain (solvent based).
 - c. Semitransparent Stain System: MPI EXT 6.3D.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
 - d. Varnish Over Semitransparent Stain System: MPI EXT 6.3E.
 - 1) Stain Coat: Exterior semitransparent stain (solvent based).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Exterior varnish (marine spar, high gloss) **OR** (gloss) **OR** (semigloss), **as directed**.
 - e. Varnish System: MPI EXT 6.3F.
 - 1) Four (for a Premium Grade system) **OR** Three, **as directed**, Finish Coats: Exterior varnish (marine spar, high gloss) **OR** (gloss) **OR** (semigloss), **as directed**.
 - f. Clear, Two-Component Polyurethane System: MPI EXT 6.3G.
 - 1) Three Finish Coats: Two-component aliphatic polyurethane (clear).

- F. Exposed Wood Panel-Product Substrates:
- a. Solid-Color Latex Stain System: MPI EXT 6.4A.
 - 1) Prime Coat: Exterior alkyd **OR** latex **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior, solid-color latex stain.
 - b. Solid-Color, Solvent-Based Stain System: MPI EXT 6.4C.
 - 1) Prime Coat (for a Premium Grade system): Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats: Exterior solid-color stain (solvent based).
 - c. Semitransparent Stain System: MPI EXT 6.4D.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
 - d. Varnish Over Semitransparent Stain System: MPI EXT 6.4J.
 - 1) Stain Coat: Exterior semitransparent stain (solvent based).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Exterior varnish (marine spar, high gloss) **OR** (gloss) **OR** (semigloss), **as directed**.
 - e. Varnish System: MPI EXT 6.4H.
 - 1) Four (for a Premium Grade system) **OR** Three, **as directed**, Finish Coats: Exterior varnish (marine spar, high gloss) **OR** (gloss) **OR** (semigloss), **as directed**.
2. Wood Deck and Stair Substrates:
- a. MPI EXT 6.5D.
 - 1) Preservative Coat: Wood preservative.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Stain for wood decks.
 - b. MPI EXT 6.5F.
 - 1) Two Stain Coats: Stain for wood decks.
3. Wood Shingle and Shake Substrates (Excluding Roofs):
- a. Solid-Color Latex Stain System: MPI EXT 6.6D.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior, solid-color latex stain.
 - b. Solid-Color, Solvent-Based Stain System: MPI EXT 6.6C.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior solid-color stain (solvent based).
 - c. Semitransparent Stain System: MPI EXT 6.6F.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
- G. Interior Wood-Finish-System Schedule
1. Exposed Glue-Laminated Beam and Column Substrates:
 - a. Alkyd Varnish Over Stain System: MPI INT 6.1K.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Varnish Over Stain and Sealer System: MPI INT 6.1P.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Seal Coat: Alkyd sanding sealer.
 - 3) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd Varnish Over Sealer System: MPI INT 6.1C.
 - 1) Seal Coat: Alkyd sanding sealer.
 - 2) Two Finish Coats: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Polyurethane Varnish Over Stain System: MPI INT 6.1J.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.

- e. Polyurethane Varnish System: MPI INT 6.1D.
 - 1) One Factory-Applied Finish Coat: Matching field-applied finish coats.
 - 2) Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
- f. Moisture-Cured Clear Polyurethane Over Stain System: MPI INT 6.1S.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Moisture-cured clear polyurethane (flat) **OR** (gloss), **as directed**.
- g. Waterborne Clear Acrylic Over Stain System: MPI INT 6.1R.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Waterborne clear acrylic (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- h. Waterborne Clear Acrylic System: MPI INT 6.F.
 - 1) Three Finish Coats: Waterborne clear acrylic (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- i. Solid-Color Latex Stain System: MPI INT 6.1T.
 - 1) Prime Coat: Exterior alkyd **OR** oil, **as directed**, wood primer.
 - 2) Two Stain Coats (for a Premium Grade system) **OR** One Stain Coat, **as directed**: Exterior, solid-color latex stain.
- j. Solid-Color, Solvent-Based Stain System: MPI INT 6.1H.
 - 1) Two Stain Coats: Exterior solid-color stain (solvent based).
- k. Semitransparent Stain System: MPI INT 6.1G.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
- 2. Exposed Rough Carpentry Substrates:
 - a. Alkyd Varnish Over Stain and Sealer System: MPI INT 6.2K.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Seal Coat: Alkyd sanding sealer.
 - 3) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Varnish Over Sealer System: MPI INT 6.2P.
 - 1) Seal Coat: Alkyd sanding sealer.
 - 2) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Polyurethane Varnish Over Stain System: MPI INT 6.2J.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
 - d. Polyurethane Varnish System: MPI INT 6.2H.
 - 1) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
 - e. Moisture-Cured Clear Polyurethane Over Stain System: MPI INT 6.2N.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Moisture-cured clear polyurethane (flat) **OR** (gloss), **as directed**.
 - f. Waterborne Clear Acrylic Over Stain System: MPI INT 6.2M.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Waterborne clear acrylic (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- 3. Finish Carpentry Substrates:
 - a. Alkyd Varnish Over Stain and Sealer System: MPI INT 6.3D.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Seal Coat: Alkyd sanding sealer **OR** Shellac, **as directed**.
 - 3) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Varnish Over Sealer System: MPI INT 6.3J.
 - 1) Seal Coat: Alkyd sanding sealer **OR** Shellac, **as directed**.

- 2) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (semigloss) **OR** (gloss), **as directed**.
- c. Polyurethane Varnish Over Stain System: MPI INT 6.3E.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
- d. Polyurethane Varnish System: MPI INT 6.3K.
 - 1) One Factory-Applied Finish Coat: Matching field-applied finish coats.
 - 2) Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
- e. Moisture-Cured Clear Polyurethane Over Stain System: MPI INT 6.3Y.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Moisture-cured clear polyurethane (flat) **OR** (gloss), **as directed**.
- f. Moisture-Cured Clear Polyurethane System: MPI INT 6.3X.
 - 1) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Moisture-cured clear polyurethane (flat) **OR** (gloss), **as directed**.
- g. Clear, Two-Component Polyurethane System: MPI INT 6.3Z.
 - 1) Three (for a Premium Grade system) Two, **as directed**, Finish Coats: Two-component aliphatic polyurethane (clear).
- h. Waterborne Clear Acrylic Over Stain System: MPI INT 6.3W.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Waterborne clear acrylic (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- i. Waterborne Clear Acrylic System: MPI INT 6.3Q.
 - 1) Three Finish Coats: Waterborne clear acrylic (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- j. Lacquer Over Stain and Sealer System: MPI INT 6.3F.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Seal Coat: Lacquer sanding sealer.
 - 3) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Lacquer (clear flat **OR** satin **OR** gloss, **as directed**).
- k. Lacquer Over Sealer System: MPI INT 6.3H.
 - 1) Seal Coat: Lacquer sanding sealer.
 - 2) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Lacquer (clear flat **OR** satin **OR** gloss, **as directed**).
- l. Semitransparent Stain System: MPI INT 6.3C.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
- m. Danish Oil System: MPI INT 6.3M.
 - 1) Two Finish Coats: Danish oil.
- 4. Exposed Wood Panel-Product Substrates:
 - a. Alkyd Varnish Over Sealer and Stain System: MPI INT 6.4D.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Seal Coat: Alkyd sanding sealer **OR** Shellac, **as directed**.
 - 3) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Varnish Over Sealer System: MPI INT 6.4G.
 - 1) Seal Coat: Alkyd sanding sealer **OR** Shellac, **as directed**.
 - 2) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Interior varnish (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Polyurethane Varnish Over Stain System: MPI INT 6.4E.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
 - d. Polyurethane Varnish System: MPI INT 6.4.J.

- 1) One Factory-Applied Finish Coat: Matching field-applied finish coats.
- 2) Two Field-Applied Finish Coats: Interior, oil-modified, clear urethane (satin) **OR** (gloss), **as directed**.
- e. Moisture-Cured Clear Polyurethane Over Stain System: MPI INT 6.4V.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) Two, **as directed**, Finish Coats: Moisture-cured clear polyurethane (flat) **OR** (gloss), **as directed**.
- f. Waterborne Clear Acrylic Over Stain System: MPI INT 6.4U.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Three (for a Premium Grade system) **OR** Two, **as directed**, Finish Coats: Waterborne clear acrylic (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- g. Lacquer Over Stain and Sealer System: MPI INT 6.4F.
 - 1) Stain Coat: Interior wood stain (semitransparent).
 - 2) Seal Coat: Lacquer sanding sealer.
 - 3) Two Finish Coats (for a Premium Grade system) **OR** One Finish Coat, **as directed**: Lacquer (clear flat **OR** satin **OR** gloss, **as directed**).
- h. Lacquer Over Sealer System: MPI INT 6.4Y.
 - 1) Seal Coat: Lacquer sanding sealer.
 - 2) Three (for a Premium Grade system) Two, **as directed**, Finish Coats: Lacquer (clear flat **OR** satin **OR** gloss, **as directed**).
- i. Semitransparent Stain System: MPI INT 6.4C.
 - 1) Two Stain Coats: Exterior semitransparent stain (solvent based).
- j. Danish Oil System: MPI INT 6.4K.
 - 1) Two Finish Coats: Danish oil.

END OF SECTION 09 91 13 00a

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SECTION 09 91 13 00b - HIGH-TEMPERATURE-RESISTANT COATINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for high-temperature-resistant coatings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes surface preparation and application of high-temperature-resistant coating systems on steel substrates subject to high temperatures.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each coating and for each color and texture required.
3. LEED Submittal:
 - a. Product Data for Credit EQ 4.2: For coatings, including printed statement of VOC content and chemical components.

D. Quality Assurance

1. Master Painters Institute (MPI) Standards:
 - a. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List" **OR** "MPI Maintenance Repainting Manual," **as directed**.
 - b. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" **OR** "MPI Maintenance Repainting Manual," **as directed**, for products and coating systems indicated.

E. Delivery, Storage, And Handling

1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - b. Remove rags and waste from storage areas daily.

F. Project Conditions

1. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between **50 and 104 deg F (10 and 40 deg C)**.
2. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than **5 deg F (3 deg C)** above the dew point; or to damp or wet surfaces.

1.2 PRODUCTS

A. High-Temperature-Resistant Coatings

1. VOC Content of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) :
 - a. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - b. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - c. Anticorrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC content of not more than 250 g/L.
 - d. Flat Interior Topcoat Paints: VOC content of not more than 50 g/L.
 - e. Nonflat Interior Topcoat Paints: VOC content of not more than 150 g/L.

- f. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
- g. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
- h. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
- 2. Chemical Components of Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).
 - b. Restricted Components: Paints and coatings shall not contain any of the following:
 - 1) Acrolein.
 - 2) Acrylonitrile.
 - 3) Antimony.
 - 4) Benzene.
 - 5) Butyl benzyl phthalate.
 - 6) Cadmium.
 - 7) Di (2-ethylhexyl) phthalate.
 - 8) Di-n-butyl phthalate.
 - 9) Di-n-octyl phthalate.
 - 10) 1,2-dichlorobenzene.
 - 11) Diethyl phthalate.
 - 12) Dimethyl phthalate.
 - 13) Ethylbenzene.
 - 14) Formaldehyde.
 - 15) Hexavalent chromium.
 - 16) Isophorone.
 - 17) Lead.
 - 18) Mercury.
 - 19) Methyl ethyl ketone.
 - 20) Methyl isobutyl ketone.
 - 21) Methylene chloride.
 - 22) Naphthalene.
 - 23) Toluene (methylbenzene).
 - 24) 1,1,1-trichloroethane.
 - 25) Vinyl chloride.
- 3. Colors: As selected from manufacturer's full range **OR** Match samples, **as directed**.
- 4. Primer: Undercoating recommended in writing for use in coating system by manufacturer of high-temperature-resistant coating under conditions indicated.
- 5. Heat-Resistant Enamel (Gloss): MPI #21.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
- 6. Inorganic Zinc Primer: MPI #19.
 - a. VOC Content: Minimum E Range of 0 **OR** E1 **OR** E2 **OR** E3, **as directed**.
- 7. Aluminum Heat-Resistant Enamel: MPI #2.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
- 8. High-Heat-Resistant Coating: MPI #22.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.

1.3 EXECUTION

A. Preparation

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" **OR** "MPI Maintenance Repainting Manual," **as directed**, applicable to substrates indicated.
 2. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - a. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
 3. Clean steel substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
 - a. Remove incompatible primers as required to produce coating systems indicated.
- B. Application**
1. Apply high-temperature-resistant coating systems according to manufacturer's written instructions.
 - a. Use applicators and techniques suited for coating and substrate indicated.
 - b. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - c. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- C. Field Quality Control**
1. Contractor shall invoke the following procedure at any time and as often as necessary during the period when coatings are being applied:
 - a. Engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance with specified requirements.
 - c. the Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.
- D. Cleaning And Protection**
1. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 2. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
 3. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by the Owner, and leave in an undamaged condition.
 4. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.
- E. High-Temperature-Resistant Coating Schedule**
1. Heat-Resistant Enamel (Gloss) Coating System (System below corresponds with MPI EXT 5.2A and MPI INT 5.2A coating systems) {suitable for use on surfaces that reach a maximum temperature of 400 deg F (205 deg C)}:
 - a. Surface Preparation: Clean using methods recommended in writing by finish-coat manufacturer, but not less than blast cleaning according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning **OR** SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," **as directed**.
 - b. Prime Coat: Primer.

- c. Finish Coat(s): Heat-resistant enamel (gloss), MPI #21, in number of coats recommended in writing by manufacturer for conditions indicated.
 2. Inorganic Zinc Primer Coating System (System below corresponds with MPI EXT 5.2C and MPI INT 5.2C coating systems) {suitable for use on surfaces that reach a maximum temperature of 750 deg F (400 deg C)}:
 - a. Surface Preparation: Clean using methods recommended in writing by finish-coat manufacturer, but not less than blast cleaning according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning **OR** SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," **as directed**.
 - b. Prime Coat: Primer.
 - c. Finish Coat(s): Inorganic zinc primer, MPI #19, in number of coats recommended in writing by manufacturer for conditions indicated.
 3. Aluminum Heat-Resistant Enamel Coating System (System below corresponds with MPI EXT 5.2B and MPI INT 5.2B coating systems) {suitable for use on surfaces that reach a maximum temperature of 800 deg F (427 deg C)}:
 - a. Surface Preparation: Clean using methods recommended in writing by finish-coat manufacturer, but not less than blast cleaning according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning **OR** SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," **as directed**.
 - b. Prime Coat: Primer.
 - c. Finish Coat(s): Aluminum heat-resistant enamel, MPI #2, in number of coats recommended in writing by manufacturer for conditions indicated.
 4. High-Heat-Resistant Coating System (System below corresponds with MPI EXT 5.2D and MPI INT 5.2D coating systems) {suitable for use on surfaces that reach a maximum temperature of 1100 deg F (593 deg C)}:
 - a. Surface Preparation: Clean using methods recommended in writing by finish-coat manufacturer, but not less than blast cleaning according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning **OR** SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning," **as directed**.
 - b. Prime Coat: Primer.
 - c. Finish Coat(s): High-heat-resistant coating, MPI #22, in number of coats recommended in writing by manufacturer for conditions indicated.

END OF SECTION 09 91 13 00b

Task	Specification	Specification Description
09 91 13 00	01 22 16 00	No Specification Required

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SECTION 09 91 23 00 - INTERIOR PAINTING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for interior painting. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes surface preparation and the application of paint systems on the following interior substrates:
 - a. Concrete.
 - b. Clay masonry.
 - c. Concrete masonry units (CMU).
 - d. Steel.
 - e. Galvanized metal.
 - f. Aluminum (not anodized or otherwise coated).
 - g. Wood.
 - h. Gypsum board.
 - i. Plaster.
 - j. Spray-textured ceilings.
 - k. Cotton or canvas insulation covering.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each finish and for each color and texture required.
3. Product List: Printout of current "MPI Approved Products List" for each product category specified in Part 1.2, with the proposed product highlighted.
4. LEED Submittal:
 - a. Product Data for Credit EQ 4.2: For paints, including printed statement of VOC content and chemical components.

D. Quality Assurance

1. MPI Standards:
 - a. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - b. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.
2. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - a. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
 - 1) Vertical and Horizontal Surfaces: Provide samples of at least **100 sq. ft. (9 sq. m)**.
 - 2) Other Items: Architect will designate items or areas required.
 - b. Final approval of color selections will be based on mockups.
 - 1) If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 - c. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

- d. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Delivery, Storage, And Handling

1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - b. Remove rags and waste from storage areas daily.

F. Project Conditions

1. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between **50 and 95 deg F (10 and 35 deg C)**.
2. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than **5 deg F (3 deg C)** above the dew point; or to damp or wet surfaces.

1.2 PRODUCTS

A. Paint, General

1. Material Compatibility:
 - a. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - b. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
2. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - a. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - b. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - c. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - d. Floor Coatings: VOC not more than 100 g/L.
 - e. Shellacs, Clear: VOC not more than 730 g/L.
 - f. Shellacs, Pigmented: VOC not more than 550 g/L.
 - g. Flat Topcoat Paints: VOC content of not more than 50 g/L.
 - h. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 - i. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - j. Floor Coatings: VOC not more than 100 g/L.
 - k. Shellacs, Clear: VOC not more than 730 g/L.
 - l. Shellacs, Pigmented: VOC not more than 550 g/L.
 - m. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
 - n. Dry-Fog Coatings: VOC content of not more than 400 g/L.
 - o. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
 - p. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
3. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - b. Restricted Components: Paints and coatings shall not contain any of the following:

- 1) Acrolein.
 - 2) Acrylonitrile.
 - 3) Antimony.
 - 4) Benzene.
 - 5) Butyl benzyl phthalate.
 - 6) Cadmium.
 - 7) Di (2-ethylhexyl) phthalate.
 - 8) Di-n-butyl phthalate.
 - 9) Di-n-octyl phthalate.
 - 10) 1,2-dichlorobenzene.
 - 11) Diethyl phthalate.
 - 12) Dimethyl phthalate.
 - 13) Ethylbenzene.
 - 14) Formaldehyde.
 - 15) Hexavalent chromium.
 - 16) Isophorone.
 - 17) Lead.
 - 18) Mercury.
 - 19) Methyl ethyl ketone.
 - 20) Methyl isobutyl ketone.
 - 21) Methylene chloride.
 - 22) Naphthalene.
 - 23) Toluene (methylbenzene).
 - 24) 1,1,1-trichloroethane.
 - 25) Vinyl chloride.
4. Colors: As selected from manufacturer's full range **OR** Match samples **OR** As indicated in a color schedule, **as directed**.
- B. Block Fillers**
1. Interior/Exterior Latex Block Filler: MPI #4.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
- C. Primers/Sealers**
1. Interior Latex Primer/Sealer: MPI #50.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 2. Interior Alkyd Primer/Sealer: MPI #45.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 3. Wood-Knot Sealer: Sealer recommended in writing by topcoat manufacturer for use in paint systems indicated.
- D. Metal Primers**
1. Alkyd Anticorrosive Metal Primer: MPI #79.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 2. Quick-Drying Alkyd Metal Primer: MPI #76.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 3. Rust-Inhibitive Primer (Water Based): MPI #107.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 4. Cementitious Galvanized-Metal Primer: MPI #26.
 - a. VOC Content: E Range of E1.
 5. Waterborne Galvanized-Metal Primer: MPI #134.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 6. Vinyl Wash Primer: MPI #80.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.

7. Quick-Drying Primer for Aluminum: MPI #95.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.

E. Wood Primers

1. Interior Latex-Based Wood Primer: MPI #39.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.

F. Latex Paints

1. Interior Latex (Flat): MPI #53 (Gloss Level 1).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 0.5 **OR** EPR 1.5 **OR** EPR 2.5, **as directed**.
2. Interior Latex (Low Sheen): MPI #44 (Gloss Level 2).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
3. Interior Latex (Eggshell): MPI #52 (Gloss Level 3).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
4. Interior Latex (Satin): MPI #43 (Gloss Level 4).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1.5 **OR** EPR 2 **OR** EPR 2.5 **OR** EPR 3.5, **as directed**.
5. Interior Latex (Semigloss): MPI #54 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 2 **OR** EPR 3 **OR** EPR 4, **as directed**.
6. Interior Latex (Gloss): MPI #114 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 2 **OR** EPR 3 **OR** EPR 4, **as directed**.
7. Institutional Low-Odor/VOC Latex (Flat): MPI #143 (Gloss Level 1).
 - a. VOC Content: E Range of E3.
 - b. Environmental Performance Rating: EPR 4 **OR** EPR 5.5, **as directed**.
8. Institutional Low-Odor/VOC Latex (Low Sheen): MPI #144 (Gloss Level 2).
 - a. VOC Content: E Range of E3.
 - b. Environmental Performance Rating: EPR 4.5.
9. Institutional Low-Odor/VOC Latex (Eggshell): MPI #145 (Gloss Level 3).
 - a. VOC Content: E Range of E3.
 - b. Environmental Performance Rating: EPR 4.5.
10. Institutional Low-Odor/VOC Latex (Semigloss): MPI #147 (Gloss Level 5).
 - a. VOC Content: E Range of E3.
 - b. Environmental Performance Rating: EPR 3 **OR** EPR 5.5, **as directed**.
11. High-Performance Architectural Latex (Low Sheen): MPI #138 (Gloss Level 2).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 4 **OR** EPR 5 **OR** EPR 6, **as directed**.
12. High-Performance Architectural Latex (Eggshell): MPI #139 (Gloss Level 3).
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 5 **OR** EPR 6, **as directed**.
13. High-Performance Architectural Latex (Satin): MPI #140 (Gloss Level 4).
 - a. VOC Content: E Range of E1 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 4.5 **OR** EPR 6.5, **as directed**.
14. High-Performance Architectural Latex (Semigloss): MPI #141 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 5 **OR** EPR 6 **OR** EPR 7, **as directed**.
15. Exterior Latex (Flat): MPI #10 (Gloss Level 1).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
16. Exterior Latex (Semigloss): MPI #11 (Gloss Level 5).

- a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- 17. Exterior Latex (Gloss): MPI #119 (Gloss Level 6, except minimum gloss of 65 units at 60 deg).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- G. Alkyd Paints
 - 1. Interior Alkyd (Flat): MPI #49 (Gloss Level 1).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 2. Interior Alkyd (Eggshell): MPI #51 (Gloss Level 3).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 - 3. Interior Alkyd (Semigloss): MPI #47 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 - 4. Interior Alkyd (Gloss): MPI #48 (Gloss Level 6).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
- H. Quick-Drying Enamels
 - 1. Quick-Drying Enamel (Semigloss): MPI #81 (Gloss Level 5).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 2. Quick-Drying Enamel (High Gloss): MPI #96 (Gloss Level 7).
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- I. Textured Coating
 - 1. Latex Stucco and Masonry Textured Coating: MPI #42.
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
- J. Dry Fog/Fall Coatings
 - 1. Latex Dry Fog/Fall: MPI #118.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 - 2. Waterborne Dry Fall: MPI #133.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 1 **OR** EPR 2 **OR** EPR 3, **as directed**.
 - 3. Interior Alkyd Dry Fog/Fall: MPI #55.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- K. Aluminum Paint
 - 1. Aluminum Paint: MPI #1.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
- L. Floor Coatings
 - 1. Interior Concrete Floor Stain: MPI #58.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 2.
 - 2. Interior/Exterior Clear Concrete Floor Sealer (Water Based): MPI #99.
 - a. VOC Content: E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - 3. Interior/Exterior Clear Concrete Floor Sealer (Solvent Based): MPI #104.
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 - 4. Interior/Exterior Latex Floor and Porch Paint (Low Gloss): MPI #60 (maximum Gloss Level 3).
 - a. VOC Content: E Range of E2 **OR** E3, **as directed**.
 - b. Environmental Performance Rating: EPR 3.
 - 5. Exterior/Interior Alkyd Floor Enamel (Gloss): MPI #27 (Gloss Level 6).
 - a. VOC Content: E Range of E1 **OR** E2, **as directed**.
 - b. Additives: Manufacturer's standard additive to increase skid resistance of painted surface.

1.3 EXECUTION**A. Preparation**

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
2. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - a. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - b. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
3. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - a. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
4. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
5. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
6. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
7. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
8. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
9. Aluminum Substrates: Remove surface oxidation.
10. Wood Substrates:
 - a. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - b. Sand surfaces that will be exposed to view, and dust off.
 - c. Prime edges, ends, faces, undersides, and backsides of wood.
 - d. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
11. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
12. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
13. Spray-Textured Ceiling Substrates: Do not begin paint application until surfaces are dry.
14. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

B. Application

1. Apply paints according to manufacturer's written instructions.
 - a. Use applicators and techniques suited for paint and substrate indicated.
 - b. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - c. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
2. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

3. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
 4. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
 5. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - a. Mechanical Work:
 - 1) Uninsulated metal piping.
 - 2) Uninsulated plastic piping.
 - 3) Pipe hangers and supports.
 - 4) Tanks that do not have factory-applied final finishes.
 - 5) Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - 6) Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - 7) Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - b. Electrical Work:
 - 1) Switchgear.
 - 2) Panelboards.
 - 3) Electrical equipment that is indicated to have a factory-primed finish for field painting.
- C. Field Quality Control
1. Testing of Paint Materials: The following procedure may be requested at any time and as often as the Owner deems necessary during the period when paints are being applied:
 - a. Engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance with product requirements.
 - c. the Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.
- D. Cleaning And Protection
1. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
 2. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
 3. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by the Owner, and leave in an undamaged condition.
 4. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- E. Interior Painting Schedule
1. Concrete Substrates, Nontraffic Surfaces:
 - a. Latex System: MPI INT 3.1E.
 - 1) Prime Coat: Interior latex matching topcoat.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Sealer System: MPI INT 3.1A.

- 1) Prime Coat: Interior latex primer/sealer.
- 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
- 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- c. Latex Over Latex Aggregate System: MPI INT 3.1B.
 - 1) Prime Coat: Latex stucco and masonry textured coating.
 - 2) Intermediate Coat (for MPI Premium Grade system): Exterior latex matching topcoat.
 - 3) Topcoat: Exterior latex (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
- d. Alkyd System: MPI INT 3.1D.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
- e. Institutional Low-Odor/VOC Latex System: MPI INT 3.1M.
 - 1) Prime Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
- f. High-Performance Architectural Latex System: MPI INT 3.1C.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
2. Concrete Substrates, Traffic Surfaces:
 - a. Latex Floor Enamel System: MPI INT 3.2A.
 - 1) Prime Coat: Interior/exterior latex floor and porch paint (low gloss).
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior/exterior latex floor and porch paint (low gloss).
 - 3) Topcoat: Interior/exterior latex floor and porch paint (low gloss).
 - b. Alkyd Floor Enamel System: MPI INT 3.2B.
 - 1) Prime Coat: Exterior/interior alkyd floor enamel (gloss).
 - 2) Intermediate Coat (for MPI Premium Grade system): Exterior/interior alkyd floor enamel (gloss).
 - 3) Topcoat: Exterior/interior alkyd floor enamel (gloss).
 - c. Concrete Stain System: MPI INT 3.2E.
 - 1) First Coat (for MPI Premium Grade system): Interior concrete floor stain.
 - 2) Topcoat: Interior concrete floor stain.
 - d. Clear Sealer System: MPI INT 3.2F.
 - 1) First Coat: Interior/exterior clear concrete floor sealer (solvent based).
 - 2) Topcoat: Interior/exterior clear concrete floor sealer (solvent based).
 - e. Water-Based Clear Sealer System: MPI INT 3.2G.
 - 1) First Coat: Interior/exterior clear concrete floor sealer (water based).
 - 2) Topcoat: Interior/exterior clear concrete floor sealer (water based).
3. Clay-Masonry Substrates:
 - a. Latex System: MPI INT 4.1A.
 - 1) Prime Coat: Interior latex matching topcoat.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd System: MPI INT 4.1D.
 - 1) Prime Coat: Interior latex primer/sealer.

- 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
- 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
- c. Latex Aggregate System: MPI INT 4.1B.
 - 1) Prime Coat: As recommended in writing by topcoat manufacturer.
 - 2) Intermediate Coat: As recommended in writing by topcoat manufacturer.
 - 3) Topcoat: Latex stucco and masonry textured coating.
- d. Institutional Low-Odor/VOC Latex System: MPI INT 4.1M.
 - 1) Prime Coat: Institutional low-odor/VOC interior latex matching topcoat.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
- e. High-Performance Architectural Latex System: MPI INT 4.1L.
 - 1) Prime Coat: High-performance architectural latex matching topcoat.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
4. CMU Substrates:
 - a. Latex System: MPI INT 4.2A.
 - 1) Prime Coat: Interior/exterior latex block filler.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd System: MPI INT 4.2C.
 - 1) Prime Coat: Interior/exterior latex block filler.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd Over Latex Sealer System: MPI INT 4.2N.
 - 1) Prime Coat: Interior/exterior latex block filler.
 - 2) Sealer Coat: Interior latex primer/sealer.
 - 3) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 4) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 4.2E.
 - 1) Prime Coat: Interior/exterior latex block filler.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - e. High-Performance Architectural Latex System: MPI INT 4.2D.
 - 1) Prime Coat: Interior/exterior latex block filler.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
5. Steel Substrates:
 - a. Quick-Drying Enamel System: MPI INT 5.1A.
 - 1) Prime Coat: Quick-drying alkyd metal primer.
 - 2) Intermediate Coat: Quick-drying enamel matching topcoat.
 - 3) Topcoat: Quick-drying enamel (semigloss) **OR** (high gloss), **as directed**.
 - b. Water-Based Dry-Fall System: MPI INT 5.1C.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Topcoat: Latex dry fog/fall **OR** Waterborne dry fall, **as directed**.

- c. Alkyd Dry-Fall System: MPI INT 5.1D.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Topcoat: Interior alkyd dry fog/fall.
- d. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- e. Alkyd System: MPI INT 5.1E.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
- f. Aluminum Paint System: MPI INT 5.1M.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Aluminum paint.
 - 3) Topcoat: Aluminum paint.
- g. Institutional Low-Odor/VOC Latex System: MPI INT 5.1S.
 - 1) Prime Coat: Rust-inhibitive primer (water based).
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
- h. High-Performance Architectural Latex System: MPI INT 5.1R.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
- 6. Galvanized-Metal Substrates:
 - a. Water-Based Dry-Fall System: MPI INT 5.3H.
 - 1) Prime Coat: Waterborne dry fall.
 - 2) Topcoat: Waterborne dry fall.
 - b. Alkyd Dry-Fall System: MPI INT 5.3F.
 - 1) Prime Coat: Cementitious galvanized-metal primer.
 - 2) Topcoat: Interior alkyd dry fog/fall.
 - c. Latex System: MPI INT 5.3A.
 - 1) Prime Coat: Cementitious galvanized-metal primer.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Latex Over Waterborne Primer System: MPI INT 5.3J.
 - 1) Prime Coat: Waterborne galvanized-metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - e. Alkyd System: MPI INT 5.3C.
 - 1) Prime Coat: Cementitious galvanized-metal primer.
 - 2) Intermediate Coat: Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - f. Aluminum Paint System: MPI INT 5.3G.
 - 1) Prime Coat: Cementitious galvanized-metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Aluminum paint.
 - 3) Topcoat: Aluminum paint.
 - g. Institutional Low-Odor/VOC Latex System: MPI INT 5.3N.

- 1) Prime Coat: Waterborne galvanized-metal primer.
- 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
- 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
- h. High-Performance Architectural Latex System: MPI INT 5.3M.
 - 1) Prime Coat: Waterborne galvanized-metal primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
7. Aluminum (Not Anodized or Otherwise Coated) Substrates:
 - a. Latex System: MPI INT 5.4H.
 - 1) Prime Coat: Quick-drying primer for aluminum.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Over Vinyl Wash Primer System: MPI INT 5.4A.
 - 1) Prime Coat: Vinyl wash primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd Over Quick-Drying Primer System: MPI INT 5.4J.
 - 1) Prime Coat: Quick-drying primer for aluminum.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Aluminum Paint System: MPI INT 5.4D.
 - 1) Prime Coat: Vinyl wash primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Aluminum paint.
 - 3) Topcoat: Aluminum paint.
 - e. Institutional Low-Odor/VOC Latex System: MPI INT 5.4G.
 - 1) Prime Coat: Quick-drying primer for aluminum.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - f. High-Performance Architectural Latex System: MPI INT 5.4F.
 - 1) Prime Coat: Quick-drying primer for aluminum.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
8. Glue-Laminated Beam and Column Substrates:
 - a. Latex System: MPI INT 6.1M.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI INT 6.1A.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI INT 6.1B.
 - 1) Prime Coat: Interior alkyd primer/sealer.

- 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 6.1Q.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - e. High-Performance Architectural Latex System: MPI INT 6.1N.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
9. Dressed Lumber Substrates: Including architectural woodwork and doors.
- a. Latex System: MPI INT 6.3T.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI INT 6.3U.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI INT 6.3B.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 6.3V.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - e. High-Performance Architectural Latex System: MPI INT 6.3A.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
10. Wood Panel Substrates: Including painted plywood, medium-density fiberboard, and hardboard.
- a. Latex System: MPI INT 6.4R.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI INT 6.4A.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI INT 6.4B.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 6.4T.

- 1) Prime Coat: Interior latex-based wood primer.
- 2) Intermediate Coat : Institutional low-odor/VOC interior latex matching topcoat.
- 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
- e. High-Performance Architectural Latex System: MPI INT 6.4S.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
11. Dimension Lumber Substrates, Nontraffic Surfaces: Including exposed joists and exposed beams.
 - a. Latex System: MPI INT 6.2D.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI INT 6.2A.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat : Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd System: MPI INT 6.2C.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 6.2L.
 - 1) Prime Coat: Interior latex-based wood primer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - e. High-Performance Architectural Latex System: MPI INT 6.2B.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
12. Wood Substrates, Traffic Surfaces:
 - a. Latex Floor Paint System: MPI INT 6.5G.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat: Interior/exterior latex floor and porch paint (low gloss).
 - 3) Topcoat: Interior/exterior latex floor and porch paint (low gloss).
 - b. Alkyd Floor Enamel System: MPI INT 6.5A.
 - 1) Prime Coat: Exterior/interior alkyd floor enamel (gloss).
 - 2) Intermediate Coat: Exterior/interior alkyd floor enamel (gloss).
 - 3) Topcoat: Exterior/interior alkyd floor enamel (gloss).
13. Gypsum Board Substrates:
 - a. Latex System: MPI INT 9.2A.
 - 1) Prime Coat: Interior latex primer/sealer (for MPI Premium Grade system) **OR** matching topcoat, **as directed**.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Over Latex Primer System: MPI INT 9.2C.
 - 1) Prime Coat: Interior latex primer/sealer.

- 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - d. High-Performance Architectural Latex System: MPI INT 9.2B.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
14. Plaster Substrates:
- a. Latex System: MPI INT 9.2A.
 - 1) Prime Coat: Interior latex primer/sealer (for MPI Premium Grade system) **OR** matching topcoat, **as directed**.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Latex Over Alkyd Primer System: MPI INT 9.2K.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Alkyd Over Latex Primer System: MPI INT 9.2C.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 9.2M.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.
 - e. High-Performance Architectural Latex System: MPI INT 9.2B.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
15. Spray-Textured Ceiling Substrates:
- a. Latex (Flat) System: MPI INT 9.1A, spray applied.
 - 1) Prime Coat: Interior latex primer/sealer **OR** (flat), **as directed**.
 - 2) Topcoat: Interior latex (flat).
 - b. Latex System: MPI INT 9.1E, spray applied.
 - 1) Prime Coat: Interior latex matching topcoat.
 - 2) Intermediate Coat: Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss), **as directed**.
 - c. Latex Over Alkyd Primer System: MPI INT 9.1B.
 - 1) Prime Coat: Interior alkyd primer/sealer.

- 2) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
- d. Alkyd (Flat) System: MPI INT 9.1C.
 - 1) Prime Coat: Interior alkyd (flat).
 - 2) Topcoat: Interior alkyd (flat).
- e. Alkyd System: MPI INT 9.1D.
 - 1) Prime Coat: Interior alkyd primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
- 16. Cotton or Canvas Insulation-Covering Substrates: Including pipe and duct coverings.
 - a. Latex System: MPI INT 10.1A.
 - 1) Prime Coat: Interior latex primer/sealer (for MPI Premium Grade system) **OR** matching topcoat, **as directed**.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - b. Alkyd Over Latex Primer System: MPI INT 10.1B.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - c. Aluminum Paint System: MPI INT 10.1C.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Aluminum paint.
 - 3) Topcoat: Aluminum paint.
 - d. Institutional Low-Odor/VOC Latex System: MPI INT 10.1D.
 - 1) Prime Coat: Interior latex primer/sealer.
 - 2) Intermediate Coat (for MPI Premium Grade system): Institutional low-odor/VOC interior latex matching topcoat.
 - 3) Topcoat: Institutional low-odor/VOC interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (semigloss), **as directed**.

END OF SECTION 09 91 23 00

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SECTION 09 91 23 00a - MULTICOLORED INTERIOR COATINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for multicolored interior coatings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes surface preparation and field application of multicolor interior coating systems applied on the following substrates:
 - a. Vertical concrete.
 - b. Cementitious composition board.
 - c. Clay masonry units.
 - d. Concrete masonry units (CMU).
 - e. Wood.
 - f. Fiberglass moldings and trim.
 - g. Plastic moldings and trim.
 - h. Plaster, Gypsum veneer plaster, and Gypsum board.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each finish-coat product and for each color and texture required.
3. LEED Submittal:
 - a. Product Data for Credit EQ 4.2: For coatings, including printed statement of VOC content and chemical components.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Provide coatings with flame-spread and smoked-developed indexes of 25 or less and 450 or less, respectively, as determined by testing identical products per ASTM E 84 by testing and inspecting agency acceptable to authorities having jurisdiction.
2. Master Painters Institute (MPI) Standards: Comply with recommendations in "MPI Architectural Painting Specification Manual" **OR** "MPI Maintenance Repainting Manual," **as directed**, applicable to products and coating systems indicated.
3. Mockups: Apply mockup of each coating system indicated to verify preliminary selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - a. Architect will select one surface to represent surfaces and conditions for application of each coating system and type of substrate.
 - 1) Wall Surfaces: Provide samples of at least **100 sq. ft. (9 sq. m)**.
 - 2) Other Items: Architect will designate items or areas required.
 - b. Apply mockup after permanent lighting and other environmental services have been activated.
 - c. Final approval of color and pattern selections will be based on mockup.
 - 1) If preliminary color and pattern selections are not approved, apply additional mockups of colors and patterns selected by Architect at no added cost to Owner.
 - d. Repair Mockup: After approval of color and pattern selections, apply representative repairs to **100 sq. in. (65 sq. cm)** of mockup to establish quality standards for coating system repairs.
 - e. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

- f. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Delivery, Storage, And Handling

- 1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - b. Remove rags and waste from storage areas daily.

1.2 PRODUCTS

A. Multicolor Coating Systems, General

- 1. Material Compatibility: Provide materials for use within each coating system that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- 2. VOC Content of Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - b. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - c. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - d. Shellacs, Clear: VOC not more than 730 g/L.
 - e. Shellacs, Pigmented: VOC not more than 550 g/L.
 - f. Flat Topcoat Paints: VOC content of not more than 50 g/L.
 - g. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 - h. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - i. Shellacs, Clear: VOC not more than 730 g/L.
 - j. Shellacs, Pigmented: VOC not more than 550 g/L.
 - k. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
- 3. Chemical Components of Interior Paints and Coatings: Provide topcoat paints that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).
 - b. Restricted Components: Paints and coatings shall not contain any of the following:
 - 1) Acrolein.
 - 2) Acrylonitrile.
 - 3) Antimony.
 - 4) Benzene.
 - 5) Butyl benzyl phthalate.
 - 6) Cadmium.
 - 7) Di (2-ethylhexyl) phthalate.
 - 8) Di-n-butyl phthalate.
 - 9) Di-n-octyl phthalate.
 - 10) 1,2-dichlorobenzene.
 - 11) Diethyl phthalate.
 - 12) Dimethyl phthalate.
 - 13) Ethylbenzene.
 - 14) Formaldehyde.
 - 15) Hexavalent chromium.
 - 16) Isophorone.
 - 17) Lead.
 - 18) Mercury.
 - 19) Methyl ethyl ketone.

- 20) Methyl isobutyl ketone.
 - 21) Methylene chloride.
 - 22) Naphthalene.
 - 23) Toluene (methylbenzene).
 - 24) 1,1,1-trichloroethane.
 - 25) Vinyl chloride.
4. Colors and Patterns: Match samples **OR** As selected from manufacturer's full range **OR** As indicated in color schedule, **as directed**.
- B. Fillers And Primers**
1. General: Undercoatings recommended in writing for use in coating systems by manufacturer of multicolor interior coating on substrates and under conditions indicated.
 2. Latex Block Filler: Waterborne, high-solids, emulsion-type, pigmented coating product recommended in writing for use in coating system indicated by manufacturer of multicolor interior coating, with bridging and filling properties, and formulated for filling surfaces of CMU for subsequent applications of finish coatings.
 - a. VOC Content: Minimum E Range of E2 **OR** E3, **as directed**, according to requirements for MPI #4.
 3. Wood Filler Paste: Solvent-based, high-solids, clear paste product recommended in writing for use in coating system indicated by manufacturer of multicolor interior coating, for use on open-grained or damaged woods and that fills hardwood pores with minimal surface residues and without showing cracking or shrinkage. When dry, sanding filler produces a smooth surface without clogging or gumming sandpaper.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**, according to requirements for MPI #91.
 4. Wood-Knot Sealer: White shellac or other sealer recommended in writing for this purpose by manufacturer of multicolor interior coating.
 5. Primer/Sealer for Multicolor Systems: Acrylic or acrylic/polyvinyl acetate (PVA) co-polymer emulsion-type, pigmented primer/sealer product recommended in writing for use in coating system indicated by manufacturer of multicolor interior coating.
 - a. VOC Content: Minimum E Range of E2 **OR** E3, **as directed**, according to requirements for MPI #125.
 6. Interior Alkyd Primer/Sealer: Solvent-based, pigmented primer/sealer.
 - a. VOC Content: Minimum E Range of E1 **OR** E2, **as directed**, according to requirements for MPI #45.
 7. Water-Based Bonding Primer: Water-based, emulsion-type, pigmented primer product recommended in writing for use in coating system indicated by manufacturer of multicolor interior coating, and formulated to promote adhesion of subsequent coatings.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**, according to requirements for MPI #17.
 8. Solvent-Based Bonding Primer: Solvent-based, pigmented product recommended in writing for use in coating system indicated by manufacturer of multicolor interior coating, and formulated to promote adhesion of subsequent coatings to substrate.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**, according to requirements for MPI #69.
- C. Multicolor Coatings**
1. Multicolor Coatings: Complying with MPI #112 and listed in "MPI Approved Products List."
 - a. VOC Content: Minimum E Range of E1 **OR** E3, **as directed**.
 2. Clear Topcoat: Product of multicolor coating manufacturer complying with MPI #121 and listed in "MPI Approved Products List."
 - a. VOC Content: Minimum E Range of E1 **OR** E2, **as directed**.

1.3 EXECUTION**A. Preparation**

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
2. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - a. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
3. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible primers, paints, and encapsulants.
4. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
5. Clay Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
6. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
7. Wood Substrates:
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of knot sealer before applying primer.
 - b. Sand surfaces that will be exposed to view and dust off.
 - c. Prime edges, ends, faces, undersides, and back sides of wood.
 - d. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

B. Application

1. Apply coatings according to manufacturer's written instructions using applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Apply coating systems to produce uniformly textured, colored, and patterned finished-surface films without substrates, undercoats, marks, or stains showing through. Produce sharp, even glass lines and color breaks.

C. Cleaning And Protection

1. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
2. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
3. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by the Owner, and leave in an undamaged condition.
4. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

D. Multicolor Interior Coating Schedule

1. Vertical Concrete Substrates: System below corresponds to MPI INT 3.1H
 - a. Prime Coat: Primer/sealer for multicolor systems.

- b. Multicolor Base Coat: Multicolor coating, MPI #112.
- c. Multicolor Pattern Coat: Multicolor coating, MPI #112.
- d. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 2. Cementitious Composition Board Substrates: System below corresponds to MPI INT 3.3F
 - a. Prime Coat: Primer/sealer for multicolor systems.
 - b. Multicolor Base Coat: Multicolor coating, MPI #112.
 - c. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - d. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 3. Clay Masonry Units Substrates: System below corresponds to MPI INT 4.1H
 - a. Prime Coat: Primer/sealer for multicolor systems tinted to match multicolor basecoat.
 - b. Multicolor Base Coat: Multicolor coating, MPI #112.
 - c. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - d. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 4. CMU Substrates: System below corresponds to MPI INT 4.2H
 - a. Block Filler: Latex block filler.
 - b. Prime Coat: Primer/sealer for multicolor systems.
 - c. Multicolor Base Coat: Multicolor coating, MPI #112.
 - d. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - e. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 5. Wood Substrates: System below corresponds to MPI INT 6.2E, MPI INT 6.3N, and MPI INT 6.4L
 - a. Fill Coat: Wood filler paste (Fill coat is optional component and is for use on open-grained woods where a smooth, glasslike finish is desired).
 - b. Prime Coat: Interior alkyd primer/sealer tinted to match multicolor base coat {for dressed lumber (finished carpentry)}.
 - c. Multicolor Base Coat: Multicolor coating, MPI #112.
 - d. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - e. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 6. Fiberglass Molding and Trim Substrates: System below corresponds to MPI INT 6.7G
 - a. Prime Coat: Water-based **OR** Solvent-based, **as directed**, bonding primer.
 - b. Multicolor Base Coat: Multicolor coating, MPI #112.
 - c. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - d. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 7. Plastic Molding and Trim Substrates: System below corresponds to MPI INT 6.8D
 - a. Prime Coat: Solvent-based bonding primer.
 - b. Multicolor Base Coat: Multicolor coating, MPI #112.
 - c. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - d. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.
- 8. Plaster **OR** Gypsum Veneer Plaster **OR** Gypsum Board, **as directed**, Substrates: System below corresponds to MPI INT 9.2G
 - a. Prime Coat: Primer/sealer for multicolor systems.
 - b. Multicolor Base Coat: Multicolor coating, MPI #112.
 - c. Multicolor Pattern Coat: Multicolor coating, MPI #112.
 - d. Topcoat (for a Premium Grade system): Clear topcoat, MPI #121.

END OF SECTION 09 91 23 00a

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Task	Specification	Specification Description
09 91 23 00	09 91 13 00	Exterior Painting
09 91 33 00	09 91 13 00a	Wood Stains and Transparent Finishes
09 91 33 00	09 91 13 00b	High-Temperature-Resistant Coatings

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SECTION 09 93 23 13 - FLOOR TREATMENT REFINISHING WOOD FLOORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for refinishing wood floors. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

C. Quality Assurance

1. Build mockup of typical flooring area as shown on Drawings including base and shoe moldings.
 - a. To set quality standards for sanding and application of field finishes, prepare finish mockup of floor area as shown on Drawings.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - c. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.2 PRODUCTS

- A. Cleaning Compound: A liquid chemical cleaner containing non-ionic and anionic type detergents, non-reactive to wood flooring. Compound shall have no free metal alkalies, no artificial coloring and no fatty acids. Compound shall be UL listed as "slip-resistant."
- B. Varnish Remover: Non-flammable paint and varnish remover.
- C. Stain: Penetrating type non-fading wood stain.
- D. Wood Filler: Paste type wood filler, pigmented if necessary to match sample, complying with Fed. Spec. TT-F-336.
- E. Floor Sealer: Penetrating type, pliable, wood-hardening finish/sealer.
- F. Floor Varnish: Alkyd resin varnish, specially compounded for floor finish, Fed. Spec. TT-V-109.
- G. Urethane Finish: Specially compounded for wood floor finish, moisture curing type, for multiple-coat application.
- H. Floor Wax: Liquid, solvent-type, slip-resistant, CID A-A-1550, Type II.

1.3 EXECUTION

A. Preparation:

1. Cleaning: Scrub thoroughly with cleaning compound and warm water. Rinse with clean water, mop dry, and buff with polishing machine.
2. Varnish Removal: Apply paint and varnish remover as required.

3. Sanding: Traverse floors two times with an electric-powered sanding machine. A rotary disc sander may be used for the final cut, but first cut shall be made with a drum-type machine. The first cut may be made crosswise of the grain or at a 45-degree angle. Make second cut in direction of grain. Use No. 1/2 sandpaper for first traverse and No. 0 for second traverse. Use an electric edger or hand sander for sanding areas near walls, in corners, and small closets.

B. Installation:

1. Apply Wood Paste Filler, followed by wiping cross-grain to work into pores and cracks.
2. Apply Stain if needed to match selected finish.
3. Apply Sealer (2 coats) complying with Fed. Spec. TT-S-176. Use Class I for white oak and red oak floors and Class II for beech, birch, and hard maple floors.
4. Apply Floor Varnish, (3 coats) buffing after each coat. First coat may be thinned as a sealer.
5. Apply Urethane Finish. Apply as many coats as needed to build a dry film thickness of 1.0 mil.
6. When Floors are Dry, apply two coats of wax complying with Fed. Spec. P-W-155; concentration 12 percent. Spread the wax at the rate of 1,500 square feet per gallon and polish the floors with a weighted floor brush or an electric polisher.
7. Protection: Upon completion of work, cover all traffic areas immediately with nonstaining kraft paper or polyethylene, taped along edges, and maintain floor protection until acceptance.

END OF SECTION 09 93 23 13

Task	Specification	Specification Description
09 93 23 13	09 91 13 00a	Wood Stains and Transparent Finishes
09 93 23 53	09 93 23 13	Floor Treatment Refinishing Wood Floors
09 93 23 53	09 91 13 00a	Wood Stains and Transparent Finishes

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SECTION 09 96 00 00 - HIGH-PERFORMANCE COATINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for high performance coatings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes surface preparation and application of high-performance coating systems on the following substrates:
 - a. Exterior Substrates:
 - 1) Concrete, vertical and horizontal surfaces.
 - 2) Clay masonry.
 - 3) Concrete masonry units (CMU).
 - 4) Steel.
 - 5) Galvanized metal.
 - 6) Aluminum (not anodized or otherwise coated).
 - 7) Wood.
 - b. Interior Substrates:
 - 1) Concrete, vertical and horizontal surfaces.
 - 2) Clay masonry.
 - 3) Concrete masonry units (CMU).
 - 4) Steel.
 - 5) Galvanized metal.
 - 6) Aluminum (not anodized or otherwise coated).
 - 7) Wood.
 - 8) Gypsum board.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each type of finish-coat product indicated.
3. Product List: For each product indicated. Cross-reference products to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules.
4. LEED Submittals:
 - a. Product Data for Credit EQ 4.2: For coatings, including printed statement of VOC content and chemical components.

D. Quality Assurance

1. Master Painters Institute (MPI) Standards:
 - a. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - b. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" **OR** "MPI Maintenance Repainting Manual," **as directed**, for products and coating systems indicated.
2. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - a. Architect will select one surface to represent surfaces and conditions for application of each coating system specified in Part 3.
 - 1) Wall and Ceiling Surfaces: Provide samples of at least **100 sq. ft. (9 sq. m)**.
 - 2) Other Items: Architect will designate items or areas required.

- b. Final approval of color selections will be based on mockups.
 - 1) If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
- c. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
- d. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

E. Delivery, Storage, And Handling

- 1. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than **45 deg F (7 deg C)**.
 - a. Maintain containers in clean condition, free of foreign materials and residue.
 - b. Remove rags and waste from storage areas daily.

F. Project Conditions

- 1. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between **50 and 95 deg F (10 and 35 deg C)**.
- 2. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than **5 deg F (3 deg C)** above the dew point; or to damp or wet surfaces.

1.2 PRODUCTS

A. High-Performance Coatings, General

- 1. Material Compatibility:
 - a. Provide materials for use within each coating system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - b. Provide products of same manufacturer for each coat in a coating system.
- 2. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - b. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - c. Anticorrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC content of not more than 250 g/L.
 - d. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - e. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 - f. Floor Coatings: VOC not more than 100 g/L.
 - g. Shellacs, Clear: VOC not more than 730 g/L.
 - h. Shellacs, Pigmented: VOC not more than 550 g/L.
 - i. Stains: VOC content of not more than 250 g/L.
 - j. Flat Interior Topcoat Paints: VOC content of not more than 50 g/L.
 - k. Nonflat Interior Topcoat Paints: VOC content of not more than 150 g/L.
 - l. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - m. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
 - n. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
 - o. Floor Coatings: VOC not more than 100 g/L.
 - p. Shellacs, Clear: VOC not more than 730 g/L.
 - q. Shellacs, Pigmented: VOC not more than 550 g/L.
 - r. Stains: VOC not more than 250 g/L.
 - s. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
 - t. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.

- u. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
 - 3. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).
 - b. Restricted Components: Paints and coatings shall not contain any of the following:
 - 1) Acrolein.
 - 2) Acrylonitrile.
 - 3) Antimony.
 - 4) Benzene.
 - 5) Butyl benzyl phthalate.
 - 6) Cadmium.
 - 7) Di (2-ethylhexyl) phthalate.
 - 8) Di-n-butyl phthalate.
 - 9) Di-n-octyl phthalate.
 - 10) 1,2-dichlorobenzene.
 - 11) Diethyl phthalate.
 - 12) Dimethyl phthalate.
 - 13) Ethylbenzene.
 - 14) Formaldehyde.
 - 15) Hexavalent chromium.
 - 16) Isophorone.
 - 17) Lead.
 - 18) Mercury.
 - 19) Methyl ethyl ketone.
 - 20) Methyl isobutyl ketone.
 - 21) Methylene chloride.
 - 22) Naphthalene.
 - 23) Toluene (methylbenzene).
 - 24) 1,1,1-trichloroethane.
 - 25) Vinyl chloride.
 - 4. Colors: As selected from manufacturer's full range **OR** Match samples **OR** As indicated in color schedule, **as directed**.
- B. Block Fillers
- 1. Interior/Exterior Latex Block Filler: MPI#4.
 - a. VOC Content: Minimum E Range of E2 **OR** E3, **as directed**.
 - 2. Epoxy Block Filler: MPI #116.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
- C. Interior Primers/Sealers
- 1. Interior Latex Primer/Sealer: MPI #50.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E2 **OR** E3, **as directed**.
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 2 **OR** 3, **as directed**.
 - 2. Interior Alkyd Primer/Sealer: MPI #45.
 - a. VOC Content: Minimum E Range of E1 **OR** E2, **as directed**.
 - 3. Interior Latex-Based Wood Primer: MPI #39.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.

- b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 1 **OR 2 OR 3, as directed.**
 - 4. Wood-Knot Sealer: White shellac or other sealer recommended in writing by manufacturer for this purpose.
- D. Metal Primers
 - 1. Inorganic Zinc Primer: MPI #19.
 - a. VOC Content: Minimum E Range of 0 **OR E1 OR E2 OR E3, as directed.**
 - 2. Epoxy Zinc Primer: MPI #20.
 - a. VOC Content: Minimum E Range of E1 **OR E2 OR E3, as directed.**
 - 3. Rust-Inhibitive Primer (Water Based): MPI #107.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR E2 OR E3, as directed.**
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 1 **OR 2 OR 3, as directed.**
 - 4. Cold-Curing Epoxy Primer: MPI #101.
 - a. VOC Content: Minimum E Range of E1 **OR E3, as directed.**
 - 5. Alkyd Anticorrosive Metal Primer: MPI #79.
 - a. VOC Content: Minimum E Range of E1 **OR E2, as directed.**
 - 6. Quick-Dry Alkyd Metal Primer: MPI #76.
 - a. VOC Content: Minimum E Range of E1 **OR E2 OR E3, as directed.**
 - 7. Cementitious Galvanized-Metal Primer: MPI #26.
 - a. VOC Content: Minimum E Range of E1 **OR E2 OR E3, as directed.**
 - 8. Waterborne Galvanized-Metal Primer: MPI #134.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR E2 OR E3, as directed.**
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 1 **OR 2 OR 3, as directed.**
 - 9. Quick-Drying Primer for Aluminum: MPI #95.
 - a. VOC Content: Minimum E Range of E1 **OR E2 OR E3, as directed.**
 - 10. Vinyl Wash Primer: MPI #80.
 - a. VOC Content: Minimum E Range of E2 **OR E3, as directed.**
- E. Water-Based, Light-Industrial Coatings
 - 1. Gloss, Water-Based, Light-Industrial Coating: MPI #110-G6.
 - a. Environmental Characteristics:
 - 1) VOC Content: Minimum E Range of E2.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 2.
 - 2. Semigloss, Water-Based, Light-Industrial Coating: MPI #110-G5.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E2 **OR E3, as directed.**
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 2 **OR 3, as directed.**
 - 3. Eggshell, Water-Based, Light-Industrial Coating: MPI #110-G3.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E2 **OR E3, as directed.**
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 2 **OR 3, as directed.**

F. Epoxy Coatings

1. Epoxy, Cold-Cured, Gloss: MPI #77.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
2. Water-Based Epoxy (Interior and Exterior): MPI #115.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
3. High-Build Epoxy Marine Coating, Low Gloss: MPI #108.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
4. Epoxy Deck Coating: MPI #82.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
5. Water-Based Epoxy Floor Paint: MPI #93.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 1 **OR** 2 **OR** 3, **as directed**.

G. Polyurethane Coatings

1. Polyurethane, Two-Component, Pigmented, Gloss: MPI #72.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
2. Two-Component, Aliphatic Polyurethane, Clear: MPI #78.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
3. Polyurethane, Moisture Cured, Clear, Gloss: MPI #31.
 - a. VOC Content: Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
4. Polyurethane, Moisture Cured, Clear, Flat: MPI #71.
 - a. VOC Content: Minimum E Range of E2.

H. Interior High-Performance Architectural Latex Coatings

1. High-Performance Architectural Latex, Velvet Finish: MPI #138, Gloss Level 2.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 4 **OR** 5 **OR** 6, **as directed**.
2. High-Performance Architectural Latex, Eggshell Finish: MPI #139, Gloss Level 3.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E2 **OR** E3, **as directed**.
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 5 **OR** 6, **as directed**.
3. High-Performance Architectural Latex, Satin Finish: MPI #140, Gloss Level 4.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR** E3, **as directed**.
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 4.5 **OR** 6.5, **as directed**.
4. High-Performance Architectural Latex, Semigloss Finish: MPI #141, Gloss Level 5.
 - a. Environmental Characteristics:
 - 1) VOC Content:
 - a) Minimum E Range of E1 **OR** E2 **OR** E3, **as directed**.
 - b) Meets or exceeds LEED requirements for VOC content.
 - 2) Environmental Performance Rating (EPR): Minimum EPR 5 **OR** 6 **OR** 7, **as directed**.

I. Wood Stains

1. Exterior Semitransparent Stain (Solvent Based): MPI #13.
 - a. VOC Content: Minimum E Range of E1 **OR** E2, **as directed**.
2. Interior Wood Stain, Semitransparent (Solvent Based): MPI #90.
 - a. VOC Content: Minimum E Range of E1 **OR** E2, **as directed**.

1.3 EXECUTION

A. Preparation

1. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
2. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
 - a. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
3. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, and incompatible paints and encapsulants.
 - a. Remove incompatible primers and reprime substrate with compatible primers as required to produce coating systems indicated.
4. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - a. Clean surfaces with pressurized water. Use pressure range of **1500 to 4000 psi (10 350 to 27 580 kPa)** at **6 to 12 inches (150 to 300 mm)** **OR 4000 to 10,000 psi (27 580 to 68 950 kPa)**, **as directed**.
OR
Abrasive blast clean surfaces to comply with SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
5. Clay Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - a. Clean surfaces with pressurized water. Use pressure range of **100 to 600 psi (690 to 4140 kPa)** **OR 1500 to 4000 psi (10 350 to 27 580 kPa)**, **as directed**, at **6 to 12 inches (150 to 300 mm)**.
6. CMU Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
7. Steel Substrates (for field applied primers): Remove rust and loose mill scale.
 - a. Clean using methods recommended in writing by coating manufacturer.

Blast clean according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning **OR** SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning **OR** SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning," **as directed**.
8. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied coatings.
9. Aluminum Substrates: Remove surface oxidation.
10. Wood Substrates:
 - a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of knot sealer before applying primer.
 - b. Sand surfaces that will be exposed to view and dust off.
 - c. Prime edges, ends, faces, undersides, and back sides of wood.
 - d. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

B. Application

1. Apply high-performance coatings according to manufacturer's written instructions.
 - a. Use applicators and techniques suited for coating and substrate indicated.
 - b. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
 - c. Coat back sides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
2. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
3. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.
4. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

C. Field Quality Control

1. The following procedure may be requested at any time and as often as the Owner deems necessary during the period when coatings are being applied:
 - a. Engage the services of a qualified testing agency to sample coating material being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - b. Testing agency will perform tests for compliance with specified requirements.
 - c. the Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with specified requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

D. Cleaning And Protection

1. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
2. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
3. Protect work of other trades against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by the Owner, and leave in an undamaged condition.
4. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

E. Exterior High-Performance Coating Schedule

1. Coating systems in this Article are based on "MPI Architectural Painting Specification Manual." For renovation projects, consult "MPI Maintenance Repainting Manual" and revise coating systems accordingly.
2. Concrete Substrates, Vertical Surfaces:
 - a. Water-Based, Light-Industrial Coating System (System below corresponds to MPI EXT 3.1C):
 - 1) Prime Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - b. Epoxy Coating System (System below corresponds to MPI EXT 3.1D):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.

- 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
- 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
- c. Water-Based Epoxy Coating System (System below corresponds to MPI EXT 3.1E):
 - 1) Prime Coat: Water-based epoxy (interior and exterior), MPI #115.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
3. Concrete Substrates, Horizontal Surfaces (System below corresponds to MPI EXT 3.2C):
 - a. Epoxy Slip-Resistant Deck Coating System:
 - 1) Topcoat: Epoxy deck coating, MPI #82.
4. Clay-Masonry Substrates (System below corresponds to MPI EXT 4.1C):
 - a. Water-Based, Light-Industrial Coating System:
 - 1) Prime Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - b. Epoxy Coating System (System below corresponds to MPI EXT 4.1D) (MPI recommends this system for smooth brick.):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat : Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - c. Water-Based Epoxy Coating System (System below corresponds to MPI EXT 4.1E) (MPI recommends this system for smooth brick.):
 - 1) Prime Coat: Water-based epoxy (interior and exterior), MPI #115.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
 - d. Polyurethane, Pigmented, Over Epoxy Coating System (System below corresponds to MPI EXT 4.1J):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
5. CMU Substrates:
 - a. Water-Based, Light-Industrial Coating System (System below corresponds to MPI EXT 4.2C):
 - 1) Prime Coat: Interior/exterior latex block filler, MPI #4.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - b. Epoxy Coating System (System below corresponds to MPI EXT 4.2E):
 - 1) Block Filler: Epoxy block filler, MPI #116.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - c. Water-Based Epoxy Coating System (System below corresponds to MPI EXT 4.2F):
 - 1) Block Filler: Epoxy block filler, MPI #116.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.

- d. Polyurethane, Pigmented, Over High-Build Epoxy Coating System (System below corresponds to MPI EXT 4.2G):
 - 1) Block Filler: Epoxy block filler, MPI #116.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
- 6. Steel Substrates:
 - a. Water-Based, Light-Industrial Coating System (System below corresponds to MPI EXT 5.1B, MPI EXT 5.1C, MPI EXT 5.1M and MPI EXT 5.1N, depending on primer selected):
 - 1) Prime Coat: Inorganic zinc primer, MPI #19 **OR** Alkyd anticorrosive metal primer, MPI #79 **OR** Rust-inhibitive primer, (water based), MPI #107 **OR** Cold-curing epoxy primer, MPI #101, **as directed**, primer.
 - 2) Intermediate Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat (intermediate coat is required for coating systems except MPI Custom Grade system using inorganic zinc primer).
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - b. High-Build Epoxy Coating System (System below corresponds to MPI EXT 5.1F):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - c. Water-Based Epoxy Coating System (System below corresponds to MPI EXT 5.1E):
 - 1) Prime Coat: Rust-inhibitive primer, (water based), MPI #107.
 - 2) Intermediate Coat: Water-based epoxy (interior and exterior), MPI #115.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
 - d. Polyurethane, Pigmented, Over Epoxy Coating System (System below corresponds to MPI EXT 5.1H):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat (for Premium Grade system): Polyurethane, two-component, pigmented, gloss, MPI #72.
 - e. Polyurethane, Pigmented, Over Epoxy Coating System (System below corresponds to MPI EXT 5.1P)
 - 1) Prime Coat: Epoxy zinc primer, MPI#20.
 - 2) Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - f. Polyurethane, Pigmented, Over High-Build Epoxy Coating System (System below corresponds to MPI EXT 5.1G):
 - 1) Prime Coat: Epoxy zinc primer, MPI#20.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat (for Premium Grade system): Polyurethane, two-component, pigmented, gloss, MPI #72.
 - g. Polyurethane, Pigmented, Over High-Build Epoxy Coating System (System below corresponds to MPI EXT 5.1J):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - h. Polyurethane, Pigmented, Over High-Build Epoxy Coating System (System below corresponds to MPI EXT 5.1L):
 - 1) Prime Coat: Inorganic zinc primer, MPI #19.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.

- 4) Second Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
7. Galvanized-Metal Substrates:
 - a. Water-Based, Light-Industrial Coating System (System below corresponds to MPI EXT 5.3G and MPI EXT 5.3J, depending on primer selected):
 - 1) Prime Coat: Cementitious galvanized-metal primer, MPI #26 **OR** Waterborne galvanized-metal primer, MPI #134, **as directed**.
 - 2) Intermediate Coat (for Premium Grade system): Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - b. Epoxy Coating System (System below corresponds to MPI EXT 5.3C) (MPI recommends this system for high-contact and -traffic areas.):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat (for Premium Grade system): Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - c. Polyurethane, Pigmented Coating System (System below corresponds to MPI EXT 5.3D) (MPI recommends these systems for high-contact and -traffic areas.):
 - 1) Prime Coat: Vinyl wash primer, MPI #80.
 - 2) Intermediate Coat: Not required **OR** Cold-curing epoxy primer, MPI #101, **as directed**.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - d. Polyurethane, Pigmented Coating System (System below corresponds to MPI EXT 5.3L):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: Not required **OR** Polyurethane, two-component, pigmented, gloss, MPI #72, **as directed**.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
8. Aluminum (Not Anodized or Otherwise Coated) Substrates:
 - a. Water-Based, Light-Industrial Coating System (System below corresponds to MPI EXT 5.4G):
 - 1) Prime Coat: Quick-drying primer for aluminum, MPI #95.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - b. Epoxy Coating System (System below corresponds to MPI EXT 5.4E):
 - 1) Prime Coat: Vinyl wash primer, MPI #80.
 - 2) Intermediate Coat (for Premium Grade system): Epoxy, cold-cured, gloss, MPI #77.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - c. Polyurethane, Pigmented Coating System (System below corresponds to MPI EXT 5.4B) (MPI recommends these systems for high-contact and -traffic areas.):
 - 1) Prime Coat: Vinyl wash primer, MPI #80.
 - 2) Intermediate Coat: Cold-curing epoxy primer, MPI #101.
 - 3) First Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 4) Second Topcoat (for Premium Grade system): Polyurethane, two-component, pigmented, gloss, MPI #72.
9. Wood Substrates:
 - a. Pigmented Polyurethane Coating System (System below corresponds to MPI EXT 6.1J, MPI EXT 6.2J, and MPI EXT 6.3H):
 - 1) Prime Coat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 2) Intermediate Coat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.

- b. Polyurethane, Clear, Two-Component Coating System (System below corresponds to MPI EXT 6.1E for use on glue-laminated beams and columns):
 - 1) Stain Coat: Exterior semitransparent stain (solvent based), MPI #13.
 - 2) Intermediate Coat: Two-component, aliphatic polyurethane, clear, MPI #78.
 - 3) First Topcoat: Two-component, aliphatic polyurethane, clear, MPI #78.
 - 4) Second Topcoat (for Premium Grade systems): Two-component, aliphatic polyurethane, clear, MPI #78.

- F. Interior High-Performance Coating Schedule
 - 1. Coating systems in this Article are based on "MPI Architectural Painting Specification Manual." For renovation projects, consult "MPI Maintenance Repainting Manual" and revise coating systems accordingly.
 - 2. Concrete Substrates, Vertical Surfaces (System below corresponds to MPI INT 3.1C):
 - a. High-Performance Architectural Latex Coating System:
 - 1) Prime Coat: Interior latex primer/sealer, MPI #50.
 - 2) Intermediate Coat: Not required **OR** High-performance architectural latex matching topcoat, **as directed**.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 3.1L):
 - 1) Prime Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - c. Epoxy Coating System (System below corresponds to MPI INT 3.1F.) (MPI recommends this system for smooth concrete.):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - d. Water-Based Epoxy Coating System (System below corresponds to MPI INT 3.1G) (MPI recommends this system for smooth concrete.):
 - 1) Prime Coat: Water-based epoxy (interior and exterior), MPI #115.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
 - 3. Concrete Substrates, Horizontal Surfaces.
 - a. Epoxy Coating System (System below corresponds to MPI INT 3.2C):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - b. Water-Based Epoxy Floor Paint Coating System (System below corresponds to MPI INT 3.2L).
 - 1) Prime Coat: Water-based epoxy floor paint, MPI #93.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy floor paint, MPI #93, **as directed**.
 - 3) Topcoat: Water-based epoxy floor paint, MPI #93.
 - c. Polyurethane, Pigmented Coating System (System below corresponds to MPI INT 3.2D):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat: Not required **OR** Polyurethane, two-component, pigmented, gloss, MPI #72, **as directed**.

- 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
- d. Polyurethane, Clear, Two-Component Coating System (System below corresponds to MPI INT 3.2K):
 - 1) Prime Coat: Two-component, aliphatic polyurethane, clear, MPI #78.
 - 2) Intermediate Coat: Not required **OR** Two-component, aliphatic polyurethane, clear, MPI #78, **as directed**.
 - 3) Topcoat: Two-component, aliphatic polyurethane, clear, MPI #78.
4. Clay-Masonry Substrates:
 - a. High-Performance Architectural Latex Coating System (System below corresponds to MPI INT 4.1L):
 - 1) Prime Coat: High-performance architectural latex matching topcoat.
 - 2) Intermediate Coat: Not required **OR** High-performance architectural latex matching topcoat, **as directed**.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 4.1C):
 - 1) Prime Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - c. Epoxy Coating System (System below corresponds to MPI INT 4.1F) (MPI recommends this system for smooth brick.):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - d. Water-Based Epoxy Coating System (System below corresponds to MPI INT 4.1G) (MPI recommends this system for smooth brick.):
 - 1) Prime Coat: Water-based epoxy (interior and exterior), MPI #115.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
 - e. Polyurethane, Clear, Two-Component Coating System (System below corresponds to MPI INT 4.1K):
 - 1) Prime Coat: Two-component, aliphatic polyurethane, clear, MPI #78.
 - 2) Intermediate Coat: Not required **OR** Two-component, aliphatic polyurethane, clear, MPI #78, **as directed**.
 - 3) Topcoat: Two-component, aliphatic polyurethane, clear, MPI #78.
5. CMU Substrates:
 - a. High-Performance Architectural Latex Coating System (System below corresponds to MPI INT 4.2D):
 - 1) Prime Coat: Interior/exterior latex block filler, MPI #4.
 - 2) Intermediate Coat: Not required **OR** High-performance architectural latex matching topcoat, **as directed**.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 4.2K):
 - 1) Prime Coat: Interior/exterior latex block filler, MPI #4.

- 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
- 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
- c. Epoxy Coating System (System below corresponds to MPI INT 4.2F and MPI INT 4.2G, depending on primer selected) (MPI recommends these systems for dry environments.):
 - 1) Prime Coat: Interior/exterior latex block filler, MPI #4 **OR** Epoxy block filler, MPI #116, **as directed**.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
- d. Water-Based Epoxy Coating System (System below corresponds to MPI INT 4.2J) (MPI recommends this system for wet environments.):
 - 1) Prime Coat: Interior/exterior latex block filler, MPI #4.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
6. Steel Substrates:
 - a. High-Performance Architectural Latex Coating System (System below corresponds to MPI INT 5.1R):
 - 1) Prime Coat: Alkyd anticorrosive metal primer, MPI #79 **OR** Quick-dry alkyd metal primer, MPI #76, **as directed**.
 - 2) Intermediate Coat: Not required **OR** High-performance architectural latex matching topcoat, **as directed**.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 5.1B and MPI INT 5.1N, depending on primer selected.):
 - 1) Prime Coat: Rust-inhibitive primer (water based), MPI #107 **OR** Cold-curing epoxy primer, MPI #101, **as directed**.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - c. High-Build Epoxy Coating System - Premium Grade (System below corresponds to MPI INT 5.1P):
 - 1) Prime Coat: Epoxy zinc primer, MPI#20.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - d. High-Build Epoxy Coating System – Custom Grade (System below corresponds to MPI INT 5.1P):
 - 1) Prime Coat: Epoxy zinc primer, MPI#20.
 - 2) Topcoat: High-build epoxy marine coating, low gloss, MPI #108.
 - e. Epoxy Coating System (System below corresponds to MPI INT 5.1L):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - f. Water-Based Epoxy Coating System (System below corresponds to MPI INT 5.1K):
 - 1) Prime Coat: Rust-inhibitive primer (water based), MPI #107.
 - 2) Intermediate Coat: Water-based epoxy (interior and exterior), MPI #115.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.
 - g. Polyurethane, Pigmented Coating System (System below corresponds to MPI INT 5.1F):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.

- 2) Intermediate Coat: Not required **OR** Polyurethane, two-component, pigmented, gloss, MPI #72, **as directed**.
- 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
- h. Polyurethane, Pigmented Coating System (System below corresponds to MPI INT 5.1H):
 - 1) Prime Coat: Inorganic zinc primer, MPI #19.
 - 2) Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
- i. Polyurethane, Pigmented Coating System (System below corresponds to MPI INT 5.1J):
 - 1) Prime Coat: Epoxy zinc primer, MPI#20.
 - 2) Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
- j. Polyurethane, Pigmented, Over High-Build Epoxy Coating System (System below corresponds to MPI INT 5.1G):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: High-build epoxy marine coating, low gloss, MPI #108.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
7. Galvanized-Metal Substrates:
 - a. High-Performance Architectural Latex Coating System (System below corresponds to MPI INT 5.3M):
 - 1) Prime Coat: Waterborne galvanized-metal primer, MPI #134.
 - 2) Intermediate Coat: Not required **OR** High-performance architectural latex matching topcoat, **as directed**.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 5.3B and MPI INT 5.3K, depending on primer selected.):
 - 1) Prime Coat: Cementitious galvanized-metal primer, MPI #26 **OR** Waterborne galvanized-metal primer, MPI #134, **as directed**.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - c. Epoxy Coating System (System below corresponds to MPI INT 5.3D):
 - 1) Prime Coat: Cold-curing epoxy primer, MPI #101.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
8. Aluminum (Not Anodized or Otherwise Coated) Substrates (System below corresponds to MPI INT 5.4F):
 - a. High-Performance Architectural Latex Coating System:
 - 1) Prime Coat: Quick-drying primer for aluminum, MPI #95.
 - 2) Intermediate Coat: Not required **OR** High-performance architectural latex, matching topcoat, **as directed**.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 5.4E):
 - 1) Prime Coat: Quick-drying primer for aluminum, MPI #95.
 - 2) Intermediate Coat: Not required **OR** Water-based, light-industrial coating, MPI #110, gloss matching topcoat, **as directed**.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - c. Epoxy Coating System (System below corresponds to MPI INT 5.4B):

- 1) Prime Coat: Vinyl wash primer, MPI #80.
- 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
- 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
- d. Polyurethane, Pigmented Coating System (System below corresponds to MPI INT 5.4C):
 - 1) Prime Coat: Vinyl wash primer, MPI #80.
 - 2) Intermediate Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
9. Wood Substrates:
 - a. High-Performance Architectural Latex Coating System (System below corresponds to MPI INT 6.1N, MPI INT 6.3A, and MPI INT 6.4S):
 - 1) Prime Coat: Interior latex-based wood primer, MPI #39.
 - 2) Intermediate Coat: High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
 - b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 6.3P and MPI INT 6.4N):
 - 1) Prime Coat: Interior alkyd primer/sealer, MPI #45.
 - 2) Intermediate Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
 - c. Epoxy Coating System (System below corresponds to MPI INT 6.1L and MPI INT 6.3L):
 - 1) Prime Coat: Epoxy, cold-cured, gloss, MPI #77.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
 - d. Pigmented Polyurethane Coating System (System below corresponds to MPI INT 6.1E):
 - 1) Prime Coat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 2) Intermediate Coat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - 3) Topcoat: Polyurethane, two-component, pigmented, gloss, MPI #72.
 - e. Polyurethane, Clear, Moisture-Cured Coating System (System below corresponds to MPI INT 6.1S, MPI INT 6.2N, MPI INT 6.3Y, and MPI INT 6.4V):
 - 1) Stain Coat: Interior wood stain, semitransparent (solvent based), MPI #90.
 - 2) Intermediate Coat: Polyurethane, moisture cured, clear, flat, MPI #71 **OR** Polyurethane, moisture cured, clear, gloss, MPI #31, **as directed**.
 - 3) First Topcoat: Polyurethane, moisture cured, clear, flat, MPI #71 **OR** Polyurethane, moisture cured, clear, gloss, MPI #31, **as directed**.
 - 4) Second Topcoat: Not required **OR** Polyurethane, moisture cured, clear, flat, MPI #71 **OR** Polyurethane, moisture cured, clear, gloss, MPI #31, **as directed**.
 - f. Polyurethane, Clear, Moisture-Cured Coating System (System below corresponds to MPI INT 6.3X):
 - 1) Intermediate Coat: Polyurethane, moisture cured, clear, flat, MPI #71 **OR** Polyurethane, moisture cured, clear, gloss, MPI #31, **as directed**.
 - 2) First Topcoat: Polyurethane, moisture cured, clear, flat, MPI #71 **OR** Polyurethane, moisture cured, clear, gloss, MPI #31, **as directed**.
 - 3) Second Topcoat: Not required **OR** Polyurethane, moisture cured, clear, flat, MPI #71 **OR** Polyurethane, moisture cured, clear, gloss, MPI #31, **as directed**.
 - g. Polyurethane, Clear, Two-Component Coating System (System below corresponds to MPI INT 6.3Z):
 - 1) Stain Coat: Exterior semitransparent stain (solvent based), MPI #13.
 - 2) Intermediate Coat: Not required **OR** Two-component, aliphatic polyurethane, clear, MPI #78, **as directed**.
 - 3) Topcoat: Two-component, aliphatic polyurethane, clear, MPI #78.
10. Gypsum Board Substrates:

- a. High-Performance Architectural Latex Coating System (System below corresponds to MPI INT 9.2B):
 - 1) Prime Coat: Interior latex primer/sealer, MPI #50.
 - 2) Intermediate Coat: High-performance architectural latex matching topcoat.
 - 3) Topcoat: High-performance architectural latex, velvet finish, MPI #138, Gloss Level 2 **OR** eggshell finish, MPI #139, Gloss Level 3 **OR** satin finish, MPI #140, Gloss Level 4 **OR** semigloss finish, MPI #141, Gloss Level 5, **as directed**.
- b. Water-Based, Light-Industrial Coating System (System below corresponds to MPI INT 9.2L):
 - 1) Prime Coat: Interior latex primer/sealer, MPI #50.
 - 2) Intermediate Coat: Water-based, light-industrial coating, MPI #110, gloss matching topcoat.
 - 3) Topcoat: Water-based, light-industrial coating, MPI #110-G6, gloss **OR** 5, semigloss **OR** 3, eggshell, **as directed**.
- c. Epoxy Coating System (System below corresponds to MPI INT 9.2E):
 - 1) Prime Coat: Interior latex primer/sealer, MPI #50.
 - 2) Intermediate Coat: Not required **OR** Epoxy, cold-cured, gloss, MPI #77, **as directed**.
 - 3) Topcoat: Epoxy, cold-cured, gloss, MPI #77.
- d. Water-Based Epoxy Coating System (System below corresponds to MPI INT 9.2F):
 - 1) Prime Coat: Interior latex primer/sealer, MPI #50.
 - 2) Intermediate Coat: Not required **OR** Water-based epoxy (interior and exterior), MPI #115, **as directed**.
 - 3) Topcoat: Water-based epoxy (interior and exterior), MPI #115.

END OF SECTION 09 96 00 00

Task	Specification	Specification Description
09 96 53 00	09 91 13 00	Exterior Painting
09 97 35 00	09 91 23 00	Interior Painting

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Task	Specification	Specification Description
10 01 50 11	10 51 13 00	Metal Lockers

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SECTION 10 11 13 13 - VISUAL DISPLAY SURFACES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for visual display surfaces. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Chalkboards.
 - b. Markerboards.
 - c. Tackboards.
 - d. Visual display rails.
 - e. Visual display wall panels.
 - f. Support systems for visual display boards.
 - g. Sliding visual display units.
 - h. Visual display conference units.
 - i. Visual display wall coverings.
 - j. Electronic markerboards.

C. Definitions

1. Tackboard: Framed or unframed, tackable, visual display board assembly.
2. Visual Display Board Assembly: Visual display surface that is factory fabricated into composite panel form, either with or without a perimeter frame; includes chalkboards, markerboards, and tackboards.
3. Visual Display Surface: Surfaces that are used to convey information visually, including surfaces of chalkboards, markerboards, tackboards, and surfacing materials that are not fabricated into composite panel form but are applied directly to walls.

D. Submittals

1. Product Data: For each type of product indicated.
 - a. Include rated capacities, operating characteristics, electrical characteristics and individual panel weights for sliding visual display units.
 - b. Include computer system requirements for electronic markerboards.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that the product contains no urea formaldehyde.
 - b. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content and chemical components.
3. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.
 - a. Show locations of panel joints.
 - b. Show locations of special-purpose graphics for visual display surfaces.
 - c. Include sections of typical trim members.
 - d. Wiring Diagrams: For power, signal, and control wiring.
4. Samples: For each exposed product and for each color and texture specified.
5. Qualification Data: For qualified Installer.
6. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for surface-burning characteristics of fabrics.
7. Operation and Maintenance Data: For visual display surfaces and power-operated units to include in maintenance manuals.

8. Warranties: Sample of special warranties.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of motor-operated, sliding visual display units required for this Project.
2. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Deliver factory-built visual display surfaces, including factory-applied trim where indicated, completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to the Owner. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.
2. Store visual display surfaces vertically with packing materials between each unit.

G. Project Conditions

1. Environmental Limitations: Do not deliver or install visual display surfaces until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Field Measurements: Verify actual dimensions of construction contiguous with visual display surfaces by field measurements before fabrication.
 - a. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

H. Warranty

1. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Surfaces lose original writing and erasing qualities.
 - 2) Surfaces exhibit crazing, cracking, or flaking.
 - b. Warranty Period: 50 years from date of Final Completion **OR** Life of the building, **as directed**.
2. Special Warranty for Electronic Markerboards: Manufacturer's standard form in which manufacturer agrees to repair or replace electronic markerboards that fail in materials or workmanship within two years from date of Final Completion.

1.2 PRODUCTS

A. Materials, General

1. Porcelain-Enamel Face Sheet: ASTM A 424, enameling-grade steel, uncoated thickness indicated; with exposed face and edges coated with primer, **1.7-to-2.5-mil- (0.043-to-0.064-mm-)** thick ground coat, and color cover coat; and with concealed face coated with primer and **1.7-to-2.5-mil- (0.043-to-0.064-mm-)** thick ground coat.
 - a. Matte-Finish Cover Coat: Low reflective; chalk wipes clean with dry cloth or standard eraser. Minimum **2.0-to-2.5-mil- (0.051-to-0.064-mm-)** thick cover coat. Cover and ground

- coats shall be fused to steel at manufacturer's standard firing temperatures but not less than 1250 deg F (677 deg C).
- b. Gloss-Finish Cover Coat: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser. Minimum 3.0-to-4.0-mil- (0.076-to-0.102-mm-) thick cover coat. Cover and ground coats shall be fused to steel at manufacturer's standard firing temperatures but not less than 1475 deg F (802 deg C).
2. Porcelain-Enamel Face Sheet: Porcelain-enamel-clad, ASTM A 463/A 463M, Type 1, stretcher-leveled aluminized steel, with 0.024-inch (0.60-mm) uncoated thickness; with porcelain-enamel coating fused to steel at approximately 1000 deg F (538 deg C).
 - a. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
 - b. Gloss Finish: Low gloss; dry-erase markers wipe clean with dry cloth or standard eraser. Suitable for use as projection screen.
 3. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
 - a. Matte Finish: Low reflective; chalk wipes clean with dry cloth or standard eraser.
 - b. Gloss Finish: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser.
 4. Melamine: Thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 5. High-Pressure Plastic Laminate: NEMA LD 3.
 6. Natural Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish with surface-burning characteristics indicated.
 7. Plastic-Impregnated Cork Sheet: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout with surface-burning characteristics indicated.
 8. Vinyl Fabric: Mildew resistant, washable, complying with FS CCC-W-408D, Type II, burlap weave; weighing not less than 13 oz./sq. yd. (440 g/sq. m); with surface-burning characteristics indicated.
 9. Polyester Fabric: Nondirectional weave, 100 percent polyester; weighing not less than 15 oz./sq. yd. (508 g/sq. m); with surface-burning characteristics indicated.
 10. Hardboard: ANSI A135.4, tempered.
 11. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde.
 12. Fiberboard: ASTM C 208.
 13. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6063.
- B. Chalkboard Assemblies
1. Porcelain-Enamel Chalkboards: Balanced, high-pressure, factory-laminated chalkboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch- (0.53-mm-) thick, OR 0.013-inch- (0.33-mm-) thick, as directed, porcelain-enamel face sheet with matte finish.
 - a. Hardboard Core: 1/4 inch (6 mm) thick; with 0.005-inch- (0.127-mm-) thick, aluminum foil OR 0.015-inch- (0.38-mm-) thick, aluminum sheet OR 0.0129-inch- (0.35-mm-) thick, galvanized-steel sheet, as directed, backing.
 - b. Particleboard Core: 3/8 inch (9.5 mm) thick; with 0.005-inch- (0.127-mm-) thick, aluminum foil OR 0.015-inch- (0.38-mm-) thick, aluminum sheet OR 0.0129-inch- (0.35-mm-) thick, galvanized-steel sheet, as directed, backing.
 - c. Fiberboard Core: 3/8 inch (9.5 mm) OR 1/2 inch (13 mm), as directed, thick; with 0.001-inch- (0.025-mm-) thick, aluminum foil OR 0.015-inch- (0.38-mm-) thick, aluminum sheet OR 0.0129-inch- (0.35-mm-) thick, galvanized-steel sheet, as directed, backing.
 - d. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
 - e. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.
 2. High-Pressure-Laminate Chalkboards: Balanced, high-pressure, factory-laminated chalkboard assembly of two-ply construction consisting of fiberboard core material and high-pressure-laminate writing surface.

3. Melamine Chalkboards: Fabricated from 1/4-inch- (6-mm-) thick, sealed and primed hardboard panels permanently bonded with melamine writing surface.
4. Painted-Finish Chalkboards: Fabricated from two plies of 1/4-inch- (6-mm-) thick, treated, tempered hardboard panels permanently surfaced with manufacturer's standard, heat-cured organic coating formulated for chalk-receptive matte finish.
5. Natural-Slate Chalkboards: Select grade, resurfaced, natural slate; free from ribbons and other natural marks that impair their functional use and durability as a writing surface.
 - a. Writing surface shall be free of tooling marks, pits, chipping, scratches, and surface spalls in excess of those that can be easily corrected; and shall be free of surface-applied stain, dye, or other artificial coloring.
 - b. Thickness: Not less than 1/4 inch (6 mm) or more than 3/8 inch (9.5 mm) thick with maximum deviation of 1/16 inch (1.6 mm) when an average thickness of at least 1/4 inch (6 mm) is maintained.

C. Markerboard Assemblies

1. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and 0.021-inch- (0.53-mm-) thick, OR 0.013-inch- (0.33-mm-) thick, as directed, porcelain-enamel face sheet with high-gloss OR low-gloss, as directed, finish.
 - a. Hardboard Core: 1/4 inch (6 mm) thick; with 0.005-inch- (0.127-mm-) thick, aluminum foil OR 0.015-inch- (0.38-mm-) thick, aluminum sheet OR 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet, as directed, backing.
 - b. Particleboard Core: 3/8 inch (9.5 mm) OR 1/2 inch (13 mm), as directed, thick; with 0.005-inch- (0.127-mm-) thick, aluminum foil OR 0.015-inch- (0.38-mm-) thick, aluminum sheet OR 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet, as directed, backing.
 - c. Fiberboard Core: 3/8 inch (9.5 mm) OR 1/2 inch (13 mm), as directed, thick; with 0.001-inch- (0.025-mm-) thick, aluminum foil OR 0.015-inch- (0.38-mm-) thick, aluminum sheet OR 0.013-inch- (0.35-mm-) thick, galvanized-steel sheet, as directed, backing.
 - d. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
 - e. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.
2. Melamine Markerboards: Fabricated from 1/4-inch- (6-mm-) thick, sealed and primed hardboard panels permanently bonded with melamine or another high-pressure-laminate writing surface.
3. High-Pressure-Laminate Markerboard Assembly: Balanced, high-pressure, factory-laminated chalkboard assembly of three-ply construction consisting of backing sheet, fiberboard core material, and high-pressure-laminate writing surface.

D. Tackboard Assemblies

1. Natural-Cork Tackboard:
 - a. 1/16-inch- (1.6-mm-) thick, natural cork sheet factory laminated to 3/8-inch- (9.5-mm-) OR 7/16-inch- (11-mm-), as directed, thick fiberboard backing.
 - b. 1/8-inch- (3-mm-) thick, natural cork sheet factory laminated to 3/8-inch- (9.5-mm-) thick fiberboard backing.
 - c. 1/4-inch- (6-mm-) thick, natural cork sheet factory laminated to 1/4-inch- (6-mm-) thick hardboard OR particleboard, as directed, backing.
2. Plastic-Impregnated-Cork Tackboard:
 - a. 1/8-inch- (3-mm-) thick, plastic-impregnated cork sheet factory laminated to 3/8-inch- (9.5-mm-) thick fiberboard backing.
 - b. 1/4-inch- (6-mm-) thick, plastic-impregnated cork sheet factory laminated to 1/4-inch- (6-mm-) thick hardboard OR particleboard, as directed, backing.
3. Vinyl-Fabric-Faced Tackboard:
 - a. Vinyl fabric factory laminated to 3/8-inch- (9.5-mm-) OR 7/16-inch- (11-mm-) OR 1/2-inch- (13-mm-), as directed, thick fiberboard backing.
 - b. 1/16-inch- (1.6-mm-) thick, vinyl-fabric-faced cork sheet factory laminated to 3/8-inch- (9.5-mm-) thick fiberboard backing.

- c. **1/8-inch- (3-mm-)** thick, vinyl-fabric-faced cork sheet factory laminated to **3/8-inch- (9.5-mm-)** thick fiberboard backing.
 - d. **1/4-inch- (6-mm-)** thick, vinyl-fabric-faced cork sheet factory laminated to **1/4-inch- (6-mm-)** thick hardboard **OR** particleboard, **as directed**, backing.
 - 4. Polyester-Fabric-Faced Tackboard:
 - a. Polyester fabric factory laminated to **3/8-inch- (9.5-mm-)** **OR** **1/2-inch- (13-mm-)**, **as directed**, thick fiberboard backing.
 - b. **1/16-inch- (1.6-mm-)** thick, polyester-fabric-faced cork sheet factory laminated to **3/8-inch- (9.5-mm-)** thick fiberboard backing.
 - c. **1/8-inch- (3-mm-)** thick, polyester-fabric-faced cork sheet factory laminated to **3/8-inch- (9.5-mm-)** thick fiberboard backing.
 - d. **1/4-inch- (6-mm-)** thick, polyester-fabric-faced cork sheet factory laminated to **1/4-inch- (6-mm-)** thick hardboard **OR** particleboard, **as directed**, backing.
- E. Visual Display Rails
 - 1. General: Manufacturer's standard, aluminum-framed, tackable cork **OR** fabric, **as directed**, visual display surface fabricated into narrow rail shape and designed for displaying material.
- F. Visual Display Wall Panels
 - 1. Marker Wall Sheets: Fabricated from **0.021-inch (0.53-mm)** uncoated thickness, porcelain-enamel face sheets; for direct application to wall surface.
 - 2. Marker Wall Panels: Fabricated from markerboard assembly indicated.
 - 3. Tack Wall Panels: With tackable surface.
 - a. Fabricated from tackboard assembly indicated.
 - b. Natural Cork: **1/8-inch- (3-mm-)** **OR** **1/4-inch- (6-mm-)**, **as directed**, thick, natural cork sheet for direct application to wall surface.
 - c. Plastic-Impregnated Cork: **1/8-inch- (3-mm-)** **OR** **1/4-inch- (6-mm-)**, **as directed**, thick, plastic-impregnated cork sheet for direct application to wall surface.
 - d. Vinyl Fabric-Faced Cork: **1/4-inch- (6-mm-)** thick, vinyl-fabric-faced cork sheet for direct application to wall surface.
 - e. Polyester-Fabric-Faced Cork: **1/4-inch- (6-mm-)** thick, polyester-fabric-faced cork sheet for direct application to wall surface.
 - 4. Joint Accessories: Manufacturer's standard, exposed trim **OR** concealed aluminum or steel spline, **as directed**, at butt joints.
 - 5. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific tack wall panels and substrate application, as recommended in writing by visual display surface manufacturer, and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 6. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by visual display surface manufacturer for intended substrate.
- G. Rail Support System For Visual Display Boards
 - 1. Support Rails: Horizontal, wall-mounted, extruded-aluminum rails designed to receive hanger clip and to support visual display boards; capable of gripping and suspending paper directly from rail.
 - a. Finish: Clear anodic **OR** Color anodic **OR** Baked enamel **OR** Powder coat, **as directed**.
 - b. Color and Gloss: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - 2. Hanger Clips: Extruded aluminum with finish to match rails; designed to support independent visual display boards by engaging support rail and top trim of board.
 - 3. Visual Display Panels: Fabricated from not less than **3/8-inch- (9.5-mm-)** thick, kraft-paper honeycomb core; designed to be rigid and to resist warpage, and with aluminum trim designed to engage hanger clips.
- H. Modular Support System For Visual Display Boards

1. Standards: **72-inch- (1829-mm-)** long, extruded-aluminum slotted standards designed for supporting visual display boards on panel clips. Standards shall be punched at not less than **4 inches (100 mm)** o.c.
 - a. Finish: Clear anodic **OR** Color anodic **OR** Baked enamel **OR** Powder coat, **as directed**.
 - b. Color and Gloss: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 2. Panel Clips: Extruded aluminum or steel with finish to match standards.
- I. Sliding Visual Display Units
1. Horizontal-Sliding Visual Display Units: Factory-fabricated units consisting of extruded-aluminum tubular frame, fixed-rear visual display panel, aluminum-framed horizontal-sliding panels, and extruded-aluminum fascia that conceals overhead sliding track; designed for recessed mounting. Provide panels that operate smoothly without vibration or chatter.
 - a. Two-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide two sliding panels, each equal to not less than one-half of overall length of unit.
 - b. Three-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide three sliding panels, each equal to not less than one-third **OR** one-half, **as directed**, of overall length of unit.
 - c. Four-Track Units: Fabricate unit with fixed rear panel centered in and covering not less than one-half of rear surface, and fixed front panel on each side of unit equal to not less than one-quarter of overall length of unit. Provide four sliding panels, each equal to not less than one-quarter of overall length of unit.
 - 1) Swinging Doors: Fabricated from same construction as sliding panels and supported on full-height continuous hinges. Provide visual display surface on both sides of each door.
 - d. Sliding Panels: Fabricated from not less than **3/8-inch- (9.5-mm-)** thick, kraft-paper honeycomb core; designed to be rigid and to resist warpage.
 - 1) Fabricate sliding panels with **0.021-inch (0.53-mm)** uncoated thickness, porcelain-enamel face sheets.
 - e. Hardware: Manufacturer's standard, extruded-aluminum overhead track and channel-shaped bottom guides; with two nylon ball-bearing carriers and two nylon rollers for each sliding panel.
 2. Vertical-Sliding Visual Display Units: Factory-fabricated units consisting of extruded-aluminum tubular frame, fixed-rear visual display panel, and aluminum-framed vertical-sliding panels; designed for recessed mounting. Provide panels that operate smoothly without vibration or chatter.
 - a. Type: Tubular frame on four sides **OR** top and two sides, with sides extending to floor; with kick panel to conceal sliding panels, **as directed**. Unit shall be designed to support panels independent of wall.
 - b. Two-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide two sliding panels, each equal to not less than one-half of overall height of unit.
 - c. Three-Track Units: Fabricate unit with fixed rear panel covering entire rear surface. Provide three sliding panels, each equal to not less than one-half of overall height of unit.
 - d. Four-Track Units: Fabricate unit with fixed rear panel centered in and covering not less than one-half of rear surface. Provide four sliding panels, each equal to not less than one-half of overall height of unit.
 - e. Sliding Panels: Fabricated from not less than **3/8-inch- (9.5-mm-)** thick, kraft-paper honeycomb core; designed to be rigid and to resist warpage.
 - 1) Fabricate sliding panels with **0.021-inch (0.53-mm)** uncoated thickness, porcelain-enamel face sheets.
 - f. Hardware: Manufacturer's standard, neoprene ball-bearing end rollers, four on each side of each sliding panel. Counterbalance each sliding panel with lead counterweights supported by steel aircraft cable over ball-bearing sheaves; with removable cover plate for

access to counterweights. Provide rubber bumpers at top and bottom for each sliding panel.

- g. Motorized Operation: Provide not less than one motor with gearhead reducers for each sliding panel, mounted above visual display unit and connected to sliding panels with steel aircraft cable. Provide removable cover plate for access to motor. Equip motors with limit switches to automatically stop motor at each end of travel.
 - 1) Electric Motors: UL approved or recognized, totally enclosed, complying with NEMA MG 1, with thermal-overload protection; 1/15 hp, single phase, 110 **OR** 220, **as directed**, V, 60 Hz.
 - 2) Control Station: Three-position, maintained-contact **OR** momentary-contact, **as directed**, switch-operated control station with open, close, and off functions; with NEMA ICS 6, Type 1 enclosure. Provide one control station for each sliding panel unit, unless directed otherwise.
 - 3) Key Switch: Provide supplementary key switch for each control station. Furnish two keys for each control station, keyed alike.

J. Visual Display Conference Units

- 1. Visual Display Conference Units: Factory-fabricated units consisting of hinged-door wood cabinet with perimeter face frame, sides, and back; not less than **3-inch (75-mm)** interior depth and designed for surface wall mounting. Fabricate inside of cabinet and cabinet doors with fixed visual display surfaces.
 - a. Wood Cabinets: Fabricated from solid wood with integral, solid-wood markertray. Fabricate hinged door panels with solid wood frame and wood-veneer exterior surface.
 - b. Plastic-Laminate Cabinets: Cabinet and hinged door panels fabricated from manufacturer's standard, high-pressure, plastic-laminate-finished panels; with integral markertray.
 - c. Hardware: Manufacturer's standard, full-height continuous hinges, wire door pulls, and door bumpers.
 - d. Projection Screens: Manufacturer's standard, pull-down, matte, white projection screen, not less than **8 inches (200 mm)** smaller in each direction than overall cabinet size, and mounted above rear visual display surface.
 - e. Fluorescent Light: Manufacturer's standard, not less than **24 inches (610 mm)** long, and mounted above rear visual display surface.

K. Visual Display Wall Coverings

- 1. Visual Display Wall Covering: Intended for use with dry-erase markers and as a projection surface, **as directed**, and consisting of low-gloss **OR** moderate-gloss **OR** high-gloss, **as directed**, plastic film bonded to fabric backing; not less than **0.012-mil (0.0003-mm)** **OR** **0.020-mil (0.0005-mm)**, **as directed**, total thickness.
- 2. Surface Graphics: **2-inch- (50-mm-)** square grid.
 - a. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
- 3. Magnetic Visual Display Wall Covering: Intended for use with dry-erase markers and magnetic aids and consisting of moderate-gloss plastic film bonded to ferrous-powdered fabric backing; not less than **0.025-mil (0.0006-mm)** total thickness.
 - a. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
- 4. Adhesive: Mildew-resistant, nonstaining, strippable, **as directed**, adhesive, for use with specific wall covering and substrate application, as recommended in writing by wall covering manufacturer, and with a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 5. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Division 09 Section "Interior Painting" and recommended in writing by wall covering manufacturer for intended substrate.

L. Electronic Markerboards

1. General: Provide manufacturer's standard electronic markerboard that consists of touch-sensitive writing surface connected to microcomputer via RS-232 serial cable and that electronically records writing with standard dry-erase markers. Equip unit with cables, software, pens, erasers, mounting hardware, and accessories required for a complete installation.
2. Software: Capable of real-time recording, saving, and printing of everything that is written and drawn on electronic markerboard; with Windows **OR** Macintosh, **as directed**, operating system.
 - a. File Export Formats: BMP, WMF, HTML, and vector-based formats.
 - b. Compatibility: Compatible with Microsoft NetMeeting or other T.120-compliant software.
 - c. Features: Capable of the following:
 - 1) Saving directly from screen.
 - 2) Erasing portions of screen.
 - 3) Printing directly from screen.
 - 4) Saving individual screens as separate pages.
 - 5) Showing onscreen toolbar **OR** keyboard, **as directed**.
 - 6) Recognizing not less than four pen colors.
 - 7) Recognizing finger touch control for presentations.
 - 8) Connecting multiple electronic markerboards to a single computer.
 - 9) Showing online help and tutorial.
3. Overall Size: Approximately **48 inches high by 60 inches wide (1219 mm high by 1524 mm wide)**.
4. Mounting: Wall mounted **OR** Supported by rail support system, **as directed**.

M. Chalkboard, Markerboard, And Tackboard Accessories

1. Aluminum Frames and Trim: Fabricated from not less than **0.062-inch- (1.57-mm-)** thick, extruded aluminum; standard size and shape **OR** slim size and standard shape **OR** of size and shape indicated on Drawings, **as directed**.
 - a. Field-Applied Trim: Manufacturer's standard, snap-on trim with no visible screws or exposed joints **OR** slip-on trim **OR** screw-on trim with Phillips flat-head screws, **as directed**.
 - b. Factory-Applied Trim: Manufacturer's standard.
2. Factory-Applied Wood Trim: Red oak **OR** Walnut **OR** Manufacturer's standard species, **as directed**, not less than **1/2 inch (13 mm)** thick; standard size and shape **OR** of size and shape indicated on Drawings, **as directed**.
3. Field-Applied Wood Trim: Comply with requirements specified in Division 06 Section(s) "Finish Carpentry" **OR** "Interior Architectural Woodwork" **as directed**.
4. Chalktray: Manufacturer's standard, continuous.
 - a. Box Type: Extruded aluminum with slanted front, grooved tray, and cast-aluminum end closures.
 - b. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.
5. Map Rail: Provide the following accessories:
 - a. Display Rail: Continuous and integral with map rail; fabricated from cork approximately **1 to 2 inches (25 to 50 mm)** wide.
 - b. End Stops: Located at each end of map rail.
 - c. Map Hooks: Two map hooks for every **48 inches (1219 mm)** **OR** 1200 mm, **as directed**, of map rail or fraction thereof.
 - d. Map Hooks and Clips: Two map hooks with flexible metal clips for every **48 inches (1219 mm)** **OR** 1200 mm, **as directed**, of map rail or fraction thereof.
 - e. Flag Holder: One for each room.
 - f. Paper Holder: Extruded aluminum; designed to hold paper by clamping action.
6. Special-Purpose Graphics: Fuse or paint the following graphics into surface of porcelain-enamel visual display unit:
 - a. Semivisible writing guidelines.
 - b. Penmanship lines.
 - c. Music staff lines.
 - d. Grid, **1 inch (25 mm)** square.
 - e. Graph coordinates, rectangular.

- f. Horizontal lines, **2 inches (50 mm)** o.c.
- g. Polar coordinates.
- h. USA map.
- i. World map.
- j. Soccer field.
- k. Football field.
- l. Basketball court.

N. Fabrication

1. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
2. Natural-Slate Chalkboards: Surface slate panels to a natural plane. Grind and hone to smooth, uniform finish equivalent to that obtained by minimum 180 grit and maximum 220 grit.
 - a. Cut joints straight and true. Space joints symmetrically. Fit and match panels before shipment to provide continuous, uniform writing surface.
 - b. Length: Furnish panels approximately equal in length with permissible variation not more than **3 inches (75 mm)** in either direction of equal spacing. Allow **1/4-inch (6-mm)** clearance at trim in length and width for fitting. Provide lengths of panels in each space as follows:
 - 1) Up to **5 feet (1.5 m)**; one panel.
 - 2) More than **5 feet (1.5 m)** but less than **9 feet (2.7 m)**; two panels.
 - 3) More than **9 feet (2.7 m)** but less than **13.5 feet (4.1 m)**; three panels.
 - 4) More than **13.5 feet (4.1 m)** but less than **18 feet (5.5 m)**; four panels.
 - 5) More than **18 feet (5.5 m)** but less than **22.5 feet (6.9 m)**; five panels.
 - 6) More than **22.5 feet (6.9 m)** but less than **27 feet (8.2 m)**; six panels.
3. Visual Display Boards: Factory **OR** Field, **as directed**, assemble visual display boards unless otherwise indicated.
 - a. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display boards at manufacturer's factory before shipment.
4. Factory-Assembled Visual Display Units: Coordinate factory-assembled units with trim and accessories indicated. Join parts with a neat, precision fit.
 - a. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to the Owner **OR** as indicated on approved Shop Drawings, **as directed**.
 - b. Provide manufacturer's standard vertical-joint spline **OR** H-trim, **as directed**, system between abutting sections of chalkboards **OR** markerboards, **as directed**.
 - c. Provide manufacturer's standard mullion trim at joints between chalkboards **OR** markerboards **OR** tackboards, **as directed**, of combination units.
 - d. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by the Owner from manufacturer's standard structural support accessories to suit conditions indicated.
5. Modular Visual Display Boards: Fabricated with integral panel clips attached to core material.
6. Aluminum Frames and Trim: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
 - a. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

O. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

P. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A32/A34, Class II, 0.010 mm or thicker.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1.3 EXECUTION

A. Examination

1. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
2. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motor-operated, sliding visual display units.
3. Examine walls and partitions for proper preparation and backing for visual display surfaces.
4. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Comply with manufacturer's written instructions for surface preparation.
2. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.
3. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display surfaces and wall surfaces.
 - a. Prime wall surfaces indicated to receive direct-applied, visual display tack wall panels **OR** visual display wall coverings, **as directed**, and as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - b. Prepare surfaces to receive visual display wall coverings and test for moisture according to requirements specified in Division 09 Section "Wall Coverings".
OR
Prepare substrates indicated to receive visual display wall covering as required by manufacturer's written instructions to achieve a smooth, dry, clean, structurally sound surface that is uniform in color.
 - 1) Moisture Content: Maximum of 4 percent when tested with an electronic moisture meter.
 - 2) Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - 3) Metals: If not factory primed, clean and apply metal as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - 4) Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall covering manufacturer.
 - 5) Painted Surfaces: Treat areas susceptible to pigment bleeding.
4. Prepare recesses for sliding visual display units as required by type and size of unit.

C. Installation, General

1. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
 - a. Mounting Height for Grades K through 3: **24 inches (610 mm)** above finished floor to top of chalktray.
 - b. Mounting Height for Grades 4 through 6: **28 inches (711 mm)** above finished floor to top of chalktray.
 - c. Mounting Height for Grades 7 and Higher: **36 inches (914 mm)** above finished floor to top of chalktray.

OR

 - a. Mounting heights of **24 inches (610 mm)** above finished floor to top of chalktray for kindergarten.
 - b. Mounting heights of **26 inches (660 mm)** above finished floor to top of chalktray for Grades 1 through 3.
 - c. Mounting heights of **30 inches (762 mm)** above finished floor to top of chalktray for Grades 4 through 6.
 - d. Mounting heights of **34 inches (864 mm)** above finished floor to top of chalktray for Grades 7 through 9.
 - e. Mounting heights of **37 inches (940 mm)** above finished floor to top of chalktray for Grades 10 and higher,
as directed

- D. Installation Of Field-Fabricated Visual Display Boards And Assemblies
 1. Field-Assembled Visual Display Units: Coordinate field-assembled units with grounds, trim, and accessories indicated. Join parts with a neat, precision fit.
 - a. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to the Owner **OR** as indicated on approved Shop Drawings, **as directed**.
 - b. Provide manufacturer's standard vertical-joint spline **OR** H-trim, **as directed**, system between abutting sections of chalkboards **OR** markerboards, **as directed**.
 - c. Provide manufacturer's standard mullion trim at joints between chalkboards **OR** markerboards **OR** tackboards, **as directed**, of combination units.
 - d. Where size of visual display boards or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by the Owner from manufacturer's standard structural support accessories to suit conditions indicated.
 2. Natural-Slate Chalkboards: Align and level joints between adjoining panels and apply manufacturer's recommended joint-filler compound. Hone and finish joints to continuous even plane.

- E. Installation Of Factory-Fabricated Visual Display Boards And Assemblies
 1. Visual Display Boards:
 - a. Attach visual display boards to wall surfaces with egg-size adhesive gobs at **16 inches (400 mm)** o.c., horizontally and vertically.
OR
Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than **16 inches (400 mm)** o.c. Secure both top and bottom of boards to walls.
 - b. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than **24 inches (610 mm)** o.c.
 - 1) Attach chalktrays to boards with fasteners at not more than **12 inches (300 mm)** o.c.
 - c. Field-Applied Wood Trim: Install trim according to requirements in Division 06 Section(s) "Finish Carpentry" OR "Interior Architectural Woodwork", **as directed**.

- F. Installation Of Visual Display Rails
1. Display Rails: Install rails in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners at not more than **16 inches (400 mm)** o.c.
 - a. Mounting Height: **48 inches (1219 mm)** **OR** **60 inches (1524 mm)**, **as directed**, above finished floor to top of rail.
- G. Installation Of Visual Display Wall Panels
1. Marker Wall Sheets: Attach wall sheets to wall surface with thin layer of adhesive over entire wall surface. Butt join adjacent panels and cover joint with matching joint strip installed with double-stick tape, **as directed**.
 2. Marker Wall Panels: Attach panels to wall surface with egg-size adhesive gobs at **16 inches (400 mm)** o.c., horizontally and vertically.
 - a. Join adjacent wall panels with concealed steel splines for smooth alignment.
OR
Join adjacent wall panels with exposed, H-shaped aluminum trim painted to match wall panel.
 3. Tack Wall Panels: Attach panels to wall surface with egg-size adhesive gobs at **16 inches (400 mm)** o.c. horizontally and vertically.
 - a. Install wrapped-edge wall panels with butt joints between adjacent wall panels.
 - b. Join adjacent wall panels with exposed, H-shaped aluminum trim covered with same fabric as wall panels.
- H. Installation Of Rail **OR** Modular, **as directed**, Support System
1. Rail Support System: Install horizontal support rail in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners at **12 inches (300 mm)** o.c.
 - a. Mounting Height: **72 inches (1829 mm)** above finished floor to top of rail.
 - b. Hang visual display units on rail support system.
 2. Modular Support System: Install adjustable standards in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Install standards at **48 inches (1219 mm)** o.c., vertically aligned and plumb, and attached to wall surface with fasteners at **12 inches (300 mm)** o.c.
 - a. Mounting Height: **12 inches (300 mm)** above finished floor to bottom of standard.
 - b. Install single-slotted standard at each end of each run of standards and double-slotted standards at intermediate locations.
 - c. Provide locking screw at top corner of visual display board at each standard.
 - d. Hang visual display units on modular support system.
- I. Installation Of Factory-Fabricated Visual Display Units
1. Sliding Visual Display Units: Install units in recessed locations and at mounting heights indicated. Attach to wall framing with fasteners at not more than **16 inches (400 mm)** o.c.
 - a. Adjust panels to operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
 2. Visual Display Conference Units: Install units in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners through back of cabinet **OR** concealed brackets screwed to wall **OR** concealed wood cleats screwed to wall, **as directed**.
 - a. Mounting Height: **72 inches (1829 mm)** above finished floor to top of cabinet.
- J. Installation Of Visual Display Wall Covering
1. General: Comply with visual display wall covering manufacturers' written installation instructions.
 2. Install seams horizontal and level, with lowest seam **24 inches (610 mm)** above finished floor. Railroad fabric (reverse roll direction) to ensure color matching.

3. Double cut seams, with no gaps or overlaps. Remove air bubbles, wrinkles, blisters, and other defects.
 4. After installation, clean visual display wall covering according to manufacturer's written instructions. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- K. Installation Of Visual Electronic Markerboards
1. Electronic Markerboards: Install units in locations and at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall **OR** cubicle, **as directed**, surface with manufacturer's standard mounting hardware.
 - a. Mounting Height: **72 inches (1829 mm)** above finished floor to top of markerboard.
- L. Cleaning And Protection
1. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
 2. Touch up factory-applied finishes to restore damaged or soiled areas.
 3. Cover and protect visual display surfaces after installation and cleaning.
- M. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain motor-operated, sliding visual display units.

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Task	Specification	Specification Description
10 11 13 33	10 11 13 13	Visual Display Surfaces
10 11 16 13	10 11 13 13	Visual Display Surfaces
10 11 16 33	10 11 13 13	Visual Display Surfaces
10 11 23 13	10 11 13 13	Visual Display Surfaces
10 13 11 00	10 11 13 13	Visual Display Surfaces

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SECTION 10 14 00 00 - SIGNAGE

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for signage. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Plaques.
 - b. Dimensional illuminated and non-illuminated characters.
 - c. Panel signs.
 - d. Illuminated panel signs.
 - e. Photoluminescent markings and signs.

C. Definitions

1. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication and installation details for signs.
 - a. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - b. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
 - c. Wiring Diagrams: Power, signal, and control wiring.
3. Samples: For each sign type and for each color and texture required.

E. Quality Assurance

1. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Provide exit signs in accordance with NFPA 101, Building Code, and Fire Code.
4. Comply with National Fire Protection Association (NFPA) 101 - Life Safety Code.
5. Comply with Underwriters Laboratories, Inc. (UL) - 924 - Standard for Emergency Lighting and Power Equipment.

F. Field Quality Control

1. With room light fixtures illuminated, measure amount of illumination on face of each exit sign using handheld light meter.
2. Ensure that each location has minimum of 5 foot-candles of illumination.

G. Warranty

1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
2. Aluminum Sheet and Plate: **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
3. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
4. Brass Castings: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).
5. Brass, Yellow, Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000.
6. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
7. Bronze Plate: ASTM B 36/B 36M.
8. Copper Sheet: ASTM B 152/B 152M.
9. Steel:
 - a. Galvanized Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating, either commercial or forming steel.
 - b. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, Type B, exposed **OR** Electrolytic zinc-coated, ASTM A 591/A 591M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed, **as directed**.
 - c. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304 **OR** 316, **as directed**, stretcher-leveled standard of flatness.
 - d. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, **42,000-psi (290-MPa)** minimum yield strength.
 - e. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
10. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of **15,000 psi (103 MPa)** when tested according to ASTM D 638 and with a minimum flexural strength of **30,000 psi (207 MPa)** when tested according to ASTM D 790.
11. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
12. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
 - a. Impact Resistance: **16 ft-lbf/in. (854 J/m)** per ASTM D 256, Method A.
 - b. Tensile Strength: **9000 lbf/sq. in. (62 MPa)** per ASTM D 638.
 - c. Flexural Modulus of Elasticity: **340,000 lbf/sq. in. (2345 MPa)** per ASTM D 790.
 - d. Heat Deflection: **265 deg F (129 deg C)** at **264 lbf/sq. in. (1.82 MPa)** per ASTM D 648.
 - e. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
13. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of **3 mils (0.076 mm)** with pressure-sensitive adhesive backing, suitable for exterior applications.

B. Plaques

1. Cast Plaques: Provide castings free of pits, scale, sand holes, and other defects, as follows:
 - a. Plaque Material: Aluminum **OR** Bronze, **as directed**.
 - b. Background Texture: Manufacturer's standard pebble **OR** leatherette **OR** matte **OR** stipple, **as directed**, texture.
 - c. Border Style: Square, polished **OR** Plain bevel **OR** Projected bevel **OR** Raised flat band **OR** Double-raised line border, **as directed**.
 - d. Mounting: Rosettes and fasteners matching plaque finish **OR** Concealed studs, **as directed**, noncorroding, **as directed**, for substrates encountered.
2. Etched Plaques: Provide metal sheet or plate for etching, as follows:
 - a. Plaque Material: Aluminum **OR** Brass **OR** Bronze, **as directed**.

- b. Custom Paint Colors: Match Pantone, **as directed**, color matching system.
- c. Color(s): As indicated **OR** As selected from manufacturer's full range, **as directed**.
- d. Edge Style: Square, polished **OR** Plain bevel, **as directed**.
- e. Mounting: Concealed studs **OR** Exposed fasteners, **as directed**, noncorroding, **as directed**, for substrates encountered.
- f. Thickness: **0.125 inch (3.18 mm) OR 0.250 inch (6.35 mm)**, **as directed**, thick.

C. Dimensional Characters

1. Cast Characters: Produce characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated. Comply with the following requirements.
 - a. Character Material: Aluminum **OR** Brass **OR** Bronze, **as directed**.
 - b. Thickness: As indicated.
 - c. Color(s): As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - d. Mounting: Rosettes and fasteners matching character finish **OR** Concealed studs, **as directed**, noncorroding, **as directed**, for substrates encountered.
2. Aluminum Extrusions: Comply with the following requirements:
 - a. Finish: Anodized **OR** Painted, **as directed**.
 - b. Thickness: As indicated.
 - c. Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - d. Color(s): As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - e. Mounting: Concealed studs, noncorroding, **as directed**, for substrates encountered.
3. Fabricated Channel Characters: Form exposed faces and sides of characters to produce surfaces free from warp and distortion. Include internal bracing for stability and attachment of mounting accessories. Comply with the following requirements:
 - a. Illuminated Backlighted **OR** Frontlighted, **as directed**, Channel Characters: Manufacturer's standard fluorescent tube **OR** fiber-optic **OR** LED **OR** neon tube, **as directed**, lighting including transformers, insulators, and other components. Make provisions for servicing and concealing connections to building electrical system.
 - b. Aluminum Sheet: Not less than **0.090 inch (2.29 mm)** thick.
 - 1) Finish: Anodized **OR** Painted, **as directed**.
 - 2) Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - 3) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - c. Bronze Sheet: Not less than **0.032 inch (0.81 mm)** thick.
 - d. Brass Sheet: Not less than **0.032 inch (0.81 mm)** thick.
 - e. Copper Sheet: Not less than **0.032 inch (0.81 mm) OR 0.048 inch (1.22 mm)**, **as directed**, thick.
 - f. Steel Sheet: Painted, not less than **0.050 inch (1.27 mm)** thick for face and **0.031 inch (0.78 mm)** thick for returns.
 - 1) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - g. Stainless-Steel Sheet: Not less than **0.050 inch (1.27 mm)** thick for face and **0.031 inch (0.78 mm)** thick for returns.
 - 1) Finish: No. 4 **OR** No. 8, **as directed**.
 - h. Provide manufacturer's hardware for projection mounting of backlighted, **as directed**, channel characters at distance from wall surface indicated.
 - i. Provide translucent acrylic face sheet of thickness indicated. Attach characters to sheet metal back channels. Provide required to illuminate sign faces evenly.
 - 1) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - j. Provide open-front, sheet metal channel characters.
4. Molded Plastic Characters: Thermoformed **OR** Injection molded, **as directed**, and as follows:
 - a. Illuminated Characters: Manufacturer's standard fluorescent tube **OR** fiber-optic **OR** LED **OR** neon tube, **as directed**, lighting including transformers, insulators, and other components. Make provisions for servicing and concealing connections to building electrical system.

- b. Integral Color **OR** Painted Finish, **as directed**: As indicated **OR** As selected from manufacturer's full range, **as directed**.
- 5. Cutout Characters: Provide characters with square-cut, smooth, eased, **as directed**, edges. Comply with the following requirements:
 - a. Acrylic: **0.25 inch (6.35 mm) OR 0.50 inch (12.7 mm)**, **as directed**, thick.
 - 1) Metal face laminated to acrylic base with painted edges, **as directed**.
 - a) Brass Face: Satin **OR** Polished, **as directed**, finish.
 - b) Stainless-Steel Face: No. 4 **OR** No. 8, **as directed**, finish.
 - c) Metal Thickness: **0.030 inch (0.76 mm)**.
 - 2) Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - 3) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - b. Aluminum Sheet: **0.125 inch (3.18 mm) OR 0.25 inch (6.35 mm)**, **as directed**, thick.
 - 1) Finish: Anodized **OR** Painted, **as directed**.
 - 2) Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - 3) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - c. Brass Sheet, Yellow: **0.125 inch (3.18 mm) OR 0.25 inch (6.35 mm)**, **as directed**, thick.
 - d. Bronze Sheet: **0.125 inch (3.18 mm) OR 0.25 inch (6.35 mm)**, **as directed**, thick.
 - e. Vinyl: Pressure sensitive, **3.5 mils (0.09 mm)** thick.
 - 1) Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - 2) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - f. Mounting: Adhesive **OR** Flush **OR** Projected **OR** Back bar **OR** Bracket, **as directed**, with concealed noncorroding studs, **as directed**, for substrates encountered.

D. panel signs

- 1. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus **1/16 inch (1.5 mm)** measured diagonally from corner to corner, complying with the following requirements:
 - a. Aluminum Sheet: **0.050 inch (1.27 mm) OR 0.080 inch (2.03 mm)**, **as directed**, thick.
 - b. Laminated, Aluminum-Faced Sheet: **0.020-inch- (0.51-mm-)** thick aluminum sheet laminated to each side of **0.197-inch- (5.0-mm-)** **OR** **0.394-inch- (10.0-mm-)**, **as directed**, thick, corrugated **OR** phenolic **OR** acrylic, **as directed**, backing with painted edges, **as directed**.
 - c. Laminated, Polycarbonate-Faced Sheet: **0.060-inch- (1.52-mm-)** thick, polycarbonate face sheet laminated to each side of **0.197-inch- (5.0-mm)** **OR** **0.394-inch- (10.0-mm-)**, **as directed**, thick phenolic backing.
 - d. Acrylic Sheet: **0.060 inch (1.52 mm) OR 0.080 inch (2.03 mm)**, **as directed**, thick.
 - e. PVC Sheet: **0.060-inch- (1.52-mm-)** **OR** **0.080-inch- (2.03-mm-)**, **as directed**, thick, extruded, high-impact PVC plastic in color to match face color **OR** with painted finish, **as directed**.
 - f. High-Pressure Decorative Laminate: **0.048 inch (1.21 mm)** thick.
 - g. Phenolic-Backed Photopolymer Sheet: Provide light-sensitive, water-wash photopolymer face layer bonded to a phenolic base layer to produce a composite sheet with overall, face layer, and base-layer thicknesses, respectively, of **0.120, 0.040, and 0.080 inch (3.0, 1.0, and 2.03 mm) OR 0.160, 0.040, and 0.120 inch (4.06, 1.0, and 3.04 mm)**, **as directed**.
 - h. Laminated Sheet: High-pressure engraved stock with contrasting color, **as directed**, face laminated to acrylic core in finishes and color combinations indicated **OR** as selected from manufacturer's full range, **as directed**.
 - i. Laminated, Etched Photopolymer: Raised graphics with Braille, **as directed**, **1/32 inch (0.8 mm)** above surface with contrasting colors in finishes and color combinations indicated **OR** as selected from manufacturer's full range, **as directed**, and laminated to acrylic back.
 - j. Laminated, Sandblasted Polymer: Raised graphics with Braille, **as directed**, **1/32 inch (0.8 mm)** above surface with contrasting colors in finishes and color combinations indicated **OR** as selected from manufacturer's full range, **as directed**, and laminated to acrylic back.
 - k. Edge Condition: Square cut **OR** Beveled **OR** Bullnose, **as directed**.
 - l. Corner Condition: Square **OR** Rounded to radius indicated, **as directed**.

- m. Mounting: Framed **OR** Unframed **OR** As indicated, **as directed**.
 - 1) Wall **OR** Ceiling **OR** Projection, **as directed**, mounted with concealed anchors **OR** magnetic tape **OR** two-face tape, **as directed**.
 - 2) Manufacturer's standard anchors for substrates encountered.
- n. Custom Paint Colors: Match Pantone, **as directed**, color matching system.
- o. Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
- p. Tactile Characters: Characters and Grade 2 Braille raised **1/32 inch (0.8 mm)** above surface with contrasting colors.
- 2. Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus **1/16 inch (1.5 mm)** measured diagonally from corner to corner, complying with the following requirements:
 - a. Aluminum Sheet: **0.050 inch (1.27 mm) OR 0.080 inch (2.03 mm)**, **as directed**, thick.
 - b. Laminated, Aluminum-Faced Sheet: **0.020-inch- (0.51-mm-)** thick aluminum sheet laminated to each side of **0.197-inch- (5.0-mm-)** **OR 0.394-inch- (10.0-mm-)**, **as directed**, thick, corrugated **OR** phenolic **OR** acrylic, **as directed**, backing with painted edges, **as directed**.
 - c. Acrylic Sheet: **0.060 inch (1.52 mm) OR 0.080 inch (2.03 mm)**, **as directed**, thick.
 - d. Fiberglass Sheet: **0.090-inch- (2.29-mm-)** **OR 0.125-inch- (3.18-mm-)**, **as directed**, thick sheet.
 - e. Edge Condition: Square cut **OR** Beveled **OR** Bullnose, **as directed**.
 - f. Corner Condition: Square **OR** Rounded to radius indicated, **as directed**.
 - g. Mounting: Framed **OR** Unframed **OR** As indicated, **as directed**.
 - 1) Wall **OR** Soffit **OR** Projection, **as directed**, mounted.
 - 2) Manufacturer's standard noncorroding, **as directed**, anchors for substrates encountered.
 - h. Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - i. Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
- 3. Laminated Interior **OR** Exterior, **as directed**, Signs: Solid phenolic panel core with graphic image covered with thermosetting resin face layer.
 - a. Surface Finish: Mat **OR** Beaded **OR** Gloss **OR** UV resistant, outdoor, **as directed**.
 - b. Edge Condition: Square cut **OR** Beveled **OR** Bullnose, **as directed**.
 - c. Corner Condition: Square **OR** Rounded to radius indicated, **as directed**.
 - d. Thickness: **1/8 inch (3 mm) OR 1/4 inch (6 mm)**, **as directed**.
- 4. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign **OR** matching sample, **as directed**.
- 5. Panel Sign Frames:
 - a. PVC Frames: Extruded, high-impact PVC plastic.
 - 1) Color: As indicated **OR** As selected from manufacturer's full range **OR** Match face color, **as directed**.
 - 2) Depth: As indicated.
 - 3) Profile: Square **OR** Beveled **OR** Rounded, **as directed**.
 - 4) Corner Condition: Square **OR** Rounded to radius indicated, **as directed**.
 - 5) Mounting: As indicated.
 - a) Wall **OR** Ceiling **OR** Projection, **as directed**, mounted with concealed anchors **OR** magnetic tape **OR** two-face tape, **as directed**.
 - b) Manufacturer's standard noncorroding, **as directed**, anchors for substrates encountered.
 - b. Extruded-Aluminum Frames: Mitered with concealed anchors and welded, **as directed**.
 - 1) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Depth: As indicated.
 - 3) Profile: Square **OR** Beveled **OR** Rounded, **as directed**.
 - 4) Corner Condition: Square **OR** Rounded to radius indicated, **as directed**.
 - 5) Mounting: As indicated.
 - a) Wall **OR** Ceiling **OR** Projection, **as directed**, mounted with concealed anchors **OR** magnetic tape **OR** two-face tape, **as directed**.

- b) Manufacturer's standard noncorroding, **as directed**, anchors for substrates encountered.
 - c. Metal Frames:
 - 1) Bronze Plate: Not less than **0.032 inch (0.81 mm)** thick.
 - 2) Brass Plate: Not less than **0.032 inch (0.81 mm)** thick.
 - 3) Steel Sheet: Painted, not less than **0.050 inch (1.27 mm)** thick for face and **0.031 inch (0.78 mm)** thick for returns.
 - a) Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - 4) Stainless-Steel Sheet: Not less than **0.050 inch (1.27 mm)** thick for face and **0.031 inch (0.78 mm)** thick for returns.
 - 5) Depth: As indicated.
 - 6) Corner Condition: Square **OR** Rounded to radius indicated, **as directed**.
 - 7) Mounting: As indicated.
 - a) Wall **OR** Ceiling **OR** Projection, **as directed**, mounted with concealed anchors **OR** magnetic tape **OR** two-face tape, **as directed**.
 - b) Manufacturer's standard noncorroding, **as directed**, anchors for substrates encountered.
- 6. Changeable Message Inserts: Fabricate signs to allow insertion of changeable messages in the form of slide-in inserts **OR** transparent covers with paper inserts printed by the Owner **OR** changeable panel inserts for use in fixed frames, **as directed**.
 - a. Furnish insert material and software for creating text and symbols for PC-Windows **OR** Macintosh, **as directed**, computers for the Owner production of paper inserts.
 - b. Furnish insert material cut-to-size for changeable message insert.
- 7. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - a. Panel Material: Opaque acrylic sheet **OR** Photopolymer **OR** Clear acrylic sheet with opaque color coating, subsurface applied, **as directed**.
 - b. Raised-Copy Thickness: Not less than **1/32 inch (0.8 mm)**.
- 8. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
 - a. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
 - b. Engraved Metal: Fill engraved copy with enamel.
 - c. Engraved Opaque Acrylic Sheet: Fill engraved copy with enamel.
 - d. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with enamel. Apply opaque background color coating to back face of acrylic sheet.
- 9. Subsurface Copy: Apply minimum **4-mil- (0.10-mm-)** thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.
- 10. Subsurface Engraved Acrylic Sheet: Reverse-engrave back face of clear acrylic sheet. Fill resulting copy with enamel. Apply opaque background color coating over enamel-filled copy.
- 11. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of **3 mils (0.076 mm)** with pressure-sensitive adhesive backing. Apply copy to exposed face of panel sign **OR** glass **OR** doors **OR** wall surfaces, **as directed**.
 - a. Panel Material: Opaque acrylic sheet **OR** Clear acrylic sheet with opaque color coating, subsurface applied, **as directed**.
- 12. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant for three **OR** five, **as directed**, years for application intended.
 - a. Custom Paint Colors: Match Pantone, **as directed**, color matching system.
 - b. Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.

- E. Photoluminescent Markings and Signs
1. All photoluminescent exit path markings, signs and materials shall be approved by Authorities having jurisdiction and meet minimum performance requirements.
 2. Photoluminescent Signs: Self-contained, single **OR** double, **as directed**, face, as follows:
 - a. Manufacturer's standard aluminum **OR** plastic, **as directed**, frame with translucent lettering and transparent polycarbonate face.
 - b. Exit sign, UL 924.
 - c. Mounting: As indicated.
 - 1) Wall **OR** Ceiling **OR** Projection, **as directed**, mounted with concealed anchors.
 - d. Face Color: Red **OR** Green **OR** Black, **as directed**.
 - e. Frame Color: As indicated **OR** As selected from manufacturer's full range, **as directed**.
 - f. Service Life: 10 **OR** 15 **OR** 20, **as directed**, years.
 - g. New Buildings.
 - 1) All new buildings of three or more stories in height shall be provided with approved photoluminescent exit path markings in all enclosed exit stairwells.
 - h. Existing buildings.
 - 1) All Group E, I, R-1 and R-2 occupancies in buildings of three or more stories in height shall be provided with approved photoluminescent exit path markings in all enclosed exit stairwells.
 - i. All other occupancies in buildings four or more stories in height shall be provided with approved photoluminescent exit path markings in all enclosed exit stairwells.
 - j. Exception: Exit path markings in existence at the time of the adoption and or at the time of this ordinance may continue to exist as installed as long as they are in proper working order.
- F. Accessories
1. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.
 2. Fasteners: Stainless or corrosion-resistant; type best suited to application.
- G. Fabrication
1. General: Provide manufacturer's standard signs of configurations indicated.
 - a. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - b. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - c. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - d. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.
- H. Finishes, General
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 3. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

- I. Aluminum Finishes
 - 1. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) **OR** polished (buffed) **OR** nonspecular as fabricated, **as directed**, mechanical finish, complying with AAMA 611.
 - 2. Color Anodic Finish: Manufacturer's standard Class 1 integrally colored or electrolytically deposited color anodic coating, 0.018 mm or thicker, in light bronze **OR** medium bronze **OR** dark bronze **OR** gold **OR** black, **as directed**, applied over a satin (directionally textured) **OR** polished (buffed) **OR** nonspecular as fabricated, **as directed**, mechanical finish, complying with AAMA 611.
 - 3. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 - a. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**, medium gloss.
- J. Steel Finishes
 - 1. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - 2. Factory Priming for Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
 - a. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.
 - 3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
- K. Stainless-Steel Finishes
 - 1. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 - 2. Directional Satin Finish: No. 4 finish.
 - 3. Mirrorlike Reflective, Nondirectional Polish: No. 8 finish.
 - 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- L. Copper-Alloy Finishes
 - 1. Sheet or Plate Finish: Medium satin (directionally textured) **OR** Smooth specular (mirrorlike), buffed, **as directed**, finish.
 - a. Raised Finish: Satin **OR** Polished **OR** Painted, **as directed**.
 - b. Recessed Finish: Etched, painted, **as directed**.
 - 2. Cast-Bronze **OR** Cast-Brass, **as directed**, Character Finishes: Manufacturer's standard satin finish, **as directed**, with exposed surfaces free from porosity, burrs, and rough spots; with returns finished with fine-grain air blast.
 - 3. Cast-Bronze Plaque Finishes: Exposed surfaces free of porosity, burrs, and rough spots; with returns finished with fine-grain air blast.
 - a. Raised Areas: Hand-tool and buff borders and raised copy to produce manufacturer's standard satin **OR** polished, **as directed**, finish.
 - b. Background Finish: Painted **OR** Dark oxidized **OR** Green patina, **as directed**.
 - 4. Clear Protective Coating: Coat exposed surfaces of copper alloys with manufacturer's standard, clear organic coating specially designed for coating copper-alloy products.

M. Acrylic Sheet Finishes

1. Colored Coatings for Acrylic Sheet: For copy and background and frame colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for three **OR** five, **as directed**, years for application intended.

1.3 EXECUTION

A. Installation

1. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - a. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - b. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within **3 inches (75 mm)** of sign without encountering protruding objects or standing within swing of door.
2. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - a. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - b. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
 - c. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
 - d. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 - e. Shim Plate Mounting: Provide **1/8-inch- (3-mm-)** thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 - f. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - g. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
3. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.
4. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
 - a. Flush Mounting: Mount characters with backs in contact with wall surface.
 - b. Projected Mounting: Mount characters at projection distance from wall surface indicated.
5. Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.
 - a. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.
 - b. Face Mounting: Mount plaques using exposed fasteners with rosettes attached through face of plaque into wall surface.
6. Photoluminescent Marking and Signs
 - a. Approved stair markings shall be provided for all enclosed stairways in buildings three or more stories above grade or three or more levels below grade and in any exit pathways leading from the stairways with the exception of ground floor lobbies leading to the exterior of the building in the following manner:
 - b. Horizontal Leading Edge of each stair step shall be marked by Option 1 or Option 2.

- 1) Option 1: A minimum one inch and a maximum of two inches (25 mm) shaped contrasting marker of photoluminescent material on both side edges of the step. These markers shall be placed a minimum of 0inch to a maximum of 1/2inch (13 mm) from the leading edge of the step parallel to the nose of the step or landing.
 - 2) Option 2: A minimum one inch and a maximum of two inches (25mm) "zig-zag" pattern contrasting marker of photoluminescent material on both sides of the step. This shall be a continuous pattern along the walls of the stair step. (See Option 1 & 2 attachments)
- c. Stair Landings shall also be marked with a contrasting photoluminescent pathway marker located around the perimeter wall and across the face or floor in front of non-exit doors, on or within four inches (102 mm) of the floor. The dimensions, distances and locations shall be consistent and uniform throughout the same exit. Any spaces intervening between portions of the stairwell shall be marked as directed by the Owner. (See attachments)
- d. Photoluminescent Directional Signs shall be placed in the following locations:
- 1) Stairwell or exit: directional arrow visible upon opening the door into the stairwell or exit indicating the direction of travel.
 - 2) Transfer levels: A directional arrow on the wall. Exception: Markings shall be as directed by the Owner if walls are not available.
 - 3) Wherever egress direction is not clear, (turns along horizontal extensions; at transitions from vertical to horizontal direction; at "T" intersections; etc.) a directional arrow or outlined path (or both as determined by the Owner) shall be installed.
- e. Door frames (top and sides) of all stair entry, intermediate and final exit doors of the enclosed stairway shall be marked with a solid and continuous contrasting one inch minimum and a two inch maximum (25 mm) stripe of photoluminescent material.
- f. An approved photoluminescent "exit" sign shall be mounted on all stair entry, intermediate and final exit doors or adjacent to the door (on the latch side) within 18 inch (455 mm) of the floor. The sign shall state "EXIT", "FINAL EXIT", "EXIT THROUGH LOBBY", or "EXIT TO STREET". These signs shall be required to be UL 924 listed if they are to be viewed at a distance of 50 feet or more.
- g. Handrails shall be marked with a minimum one inch and a maximum of two inches (25 mm) solid and continuous stripe of photoluminescent material either on the handrail or on the wall adjacent to handrail.
- h. Obstacles at or below six feet six inches (1981 mm) in height and projecting more than four inches (102 mm) into the egress path shall be outlined with markings no less than one inch (25 mm) in width and not more than a two inches maximum comprised of a pattern of alternating equal bands of photoluminescent material and black, with the alternating bands no more than two inches in width and angled at 45 degrees. Examples of such obstacles include standpipes, hose cabinets, wall projections, and restricted height areas.
- i. Exit pathways shall be marked with a minimum one inch and a maximum of two inches (25 mm) solid and continuous stripe of photoluminescent pathway marking material on or within four inches of the floor along each side of the pathway. Pathways more than 50 feet in length shall have directional arrows along the wall at intervals not exceeding 50 feet.
- j. Minimum Lighting Requirements:
- 1) All installed photoluminescent materials shall be exposed to a minimum of two foot candles of fluorescent light illumination at all times while the building is occupied or if incandescent lighting is used, the photoluminescent material chosen must be capable of meeting the minimum brightness rating required by this standard with the lighting provided.
 - 2) Motion sensor activated lighting is prohibited in the stairwells addressed by this standard.
 - 3) Timers on stairwell lighting, if used, shall be set to turn on the lights not less than one hour before the building is occupied each day.
- k. Maintenance Requirements:
- 1) Owners shall maintain the required photoluminescent signs and markings in good repair. Every 12 months owners shall perform a visual inspection of the signs and

markings with the normal lighting turned on. Signs and/or markings that are missing, damaged, loose or that show signs of wear shall be noted and properly repaired or replaced.

B. Cleaning And Protection

1. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by the Owner.

END OF SECTION 10 14 00 00

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SECTION 10 14 19 00 - VITRIFIED BRICK PAVEMENT REPLACEMENT

1.1 GENERAL

A. General

1. Limits of Brick Pavement Replacement shall be as per the detail entitled "Payment Limits for Surface Restoration" shown in the plans, plus one foot on each side. Alternate individual bricks may have to be removed in order to maintain staggered joint pattern along the edge of the undisturbed brick pavement.

1.2 PRODUCT

A. Preparation

1. Base shall be provided and shaped to match level, kind and thickness (4" min.) of adjoining base. The base material shall be compacted to meet the density standards. 4" 2500 PSI concrete base may be used for irregular patches and where compaction is otherwise impractical. Concrete shall be properly placed, consolidated and cured. One inch of sand, or good grade dirt, free from clay, loam or other foreign matter shall be used for cushion to hold the bricks in place. The sand shall be shaped to a true surface parallel to required finished pavement surface.

B. Materials

1. Existing bricks shall be cleaned, stored, and secured by the Contractor.

1.3 EXECUTION

A. Reinstallation of Bricks

1. The bricks shall be installed in rows, better face upward, sorted by size with joints staggered, then rolled daily with a static tandem wheel roller. Additional bricks, if required, will be supplied by the Owner. City Personnel shall inspect work daily. After inspection, the bricks shall be sprayed with a solution of lime and water, using 26 lbs. of lime to 55 gallons of water. Asphalt steep 7330 or equal shall be used for joint filler. The steep shall be heated until fluid and poured over bricks and removed when cool with square pointed shovels dipped in lime water. Removed asphalt may be reused. If adjoining bricks are grouted, new filler shall be grout (8:1, builders sand: cement).

B. Acceptance

1. Upon completion of the work, and before acceptance and final payment, the Contractor shall remove all false work, equipment, rubbish, surplus, and discarded materials. The Contractor shall restore in an acceptable manner all property, both public and private, damaged during the prosecution of the work. The Contractor shall leave the roadway in a neat and presentable condition each day.

END OF SECTION 10 14 19 00

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Task	Specification	Specification Description
10 14 19 00	01 22 16 00	No Specification Required
10 14 19 00	10 14 00 00	Signage
10 14 23 00	10 14 19 00	Vitrified Brick Pavement Replacement
10 14 23 11	10 14 19 00	Vitrified Brick Pavement Replacement
10 14 23 11	10 14 00 00	Signage
10 14 53 00	10 14 19 00	Vitrified Brick Pavement Replacement

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SECTION 10 14 53 11 - TRAFFIC SIGNS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of traffic signs. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCT

A. Sign Foundations:

1. Replacement Foundation Footing Concrete shall be a mixture of cement complying with ASTM C 150 and aggregate complying with ASTM C 33. Compressive strength shall be 2,800 psi at 28 days.
2. Sulfur Mortar shall comply with ASTM C 287.
3. Reinforcing Steel shall comply with ASTM A 615.

B. Sign Supports shall be of the "break-away" type. Supports shall be strong enough to resist applicable wind forces without damage, but shall be designed to experience a brittle rupture type failure or a "quick separation" type joint.

1. Sign Support, Aluminum:

- a. Replacement Castings shall be Alloy A356.0-T6 in compliance with ASTM B 108.
- b. Replacement Structural Members shall comply with ASTM B 308.
- c. Replacement Bars, Rods, Shapes, and Tubes shall comply with ASTM B 221, alloy 6061-T6.
- d. Replacement Bolts, Nuts, and Screws shall match items being replaced and shall be alloy 2024-T4 with anodic coating complying with ASTM B 580, or 6061-T6 in compliance with ASTM B 211. Bolt heads shall be hexagon. Bolt threads shall be Class 2, 2A, or 2B in compliance with ANSI B18.2.1. Nuts shall be hexagon shaped in compliance with ANSI B18.2.2.
- e. Replacement washers shall be furnished from sheet metal complying with ASTM B 209, alloy Alclad 2024-T3 or T4.

2. Sign Support, Steel:

- a. Replacement Structural Members shall comply with ASTM A 36.
- b. Replacement Bars shall comply with ASTM A 108.
- c. Replacement Pipe shall comply with ASTM A 53 standard weight.
- d. Replacement Fasteners shall comply with ASTM A 307 and ASTM A 325.
- e. Replacement Anchor Bolts for anchoring base plates to concrete bases and nuts and washers shall be galvanized in compliance with ASTM A 153.

3. Sign Support, Wood:

- a. Replacement Wood Sign Post shall be of the species listed in AASHTO M168, dressed four sides and having a pyramidal top cut before being treated.
- b. Replacement Sign Post shall be pressure treated with creosote or creosote-tar solution complying with AWPB LP-55.

C. Sign Face:

1. Replacement Plywood Sign Face shall be grade HDOAB G-1 EXTERIOR, in compliance with DOC PS 1. Material shall be cut to size in compliance with ANSI D6.1E.
2. Replacement Galvanizing Steel Sign Face shall comply with USDOT FHA MUTCD.

D. Reflective Sheeting shall be enclosed lens unless otherwise directed by the Owner.

1. Enclosed Lens Reflective Sheeting shall comply with Fed. Spec. L-S-300.
 2. Reflective Sheeting shall comply with FP-79 minimum reflective intensity. Measurements shall comply with Fed. Spec. L-S-300.
 3. Color shall be matched visually and within the limits shown on the Color Tolerance Charts issued by the Federal Highway Administration. The diffuse day color of the reflective sheeting shall be determined in compliance with ASTM E 97.
 4. Film:
 - a. General: Reflective sheeting shall be sufficiently flexible to be easily cut to shape and permit application over, and conformance to, moderate shallow embossing characteristic of certain sign borders and symbols.
 - b. Surface: Sheeting surface shall be smooth and flat, shall facilitate cleaning and wet performance, and shall exhibit 85 degrees glossmeter rating of not less than 40, as specified in ASTM D 523. The sheeting surface shall withstand cleaning with gasoline, VM&P Naphtha, mineral spirits, turpentine, methanol, and xylol.
- E. Demountable Sign Face Materials:
1. Acrylic Plastic Reflectors: Replacement demountable sign letters, digits, arrows, borders, and alphabet accessories shall be reflectorized and shall consist of acrylic plastic reflectors supported by embossed aluminum frames. They shall comply with the Standard Alphabet for Highway Signs, of the Federal Highway Administration, Series E.
 2. Design and Fabrication: The letters shall be modified as necessary to accommodate the required reflectors. All items except border strips shall be fabricated from 0.040-inch minimum sheet aluminum. Border strips shall be of 0.032-inch minimum sheet aluminum. Mounting holes shall be provided within the frames to permit the use of screws, rivets or other acceptable fasteners. The size and spacing of the reflector holes shall provide maximum night legibility and visibility of the finished cutout figure.
 3. General Requirements: The reflectors shall be of acrylic plastic meeting the requirements of Fed. Spec. L-P-380, Type I, Class 3. The reflectors shall be yellow or colorless. The lens shall consist of a smooth front surface, free from projections or indentations other than for identification, and a rear surface bearing a prismatic configuration that will effect total internal reflection of light.
 4. Reflective Sheeting:
 - a. Demountable Sign Letters, Digits, Arrows, Borders, and Alphabet Accessories, when so specified, shall be reflectorized with reflective sheeting supported by flat aluminum backing and shall comply with the Standard Alphabet Highway Signs of the Federal Highway Administration.
 - b. Design and Fabrication: Letter design shall be Series E, modified for legibility. All items except border strips shall be fabricated from 0.040-inch sheet aluminum, 6061-T6 alloy, with mounting holes to permit use of screws, rivets, or other acceptable fasteners.
- F. Highway Delineators, Enclosed Lens Type: Replacement reflectors shall be of acrylic plastic and a minimum of 3 inches in diameter. They shall be mounted in a heavy-duty housing with a back plate. The reflector shall consist of a clear and transparent plastic lens, which shall be colorless, and a plastic back of the same material, fused to the lens under heat and pressure around the entire perimeter to form a homogeneous unit, permanently sealed against dust, water, and water vapor. The acrylic plastic shall comply with Fed. Spec. L-P-380, Type I, Class 3.
- G. Highway Delineators, High Intensity Type:
1. Replacement Reflectorized Delineators shall consist of a reflective sheeting compound of glass spheres, embedded in a weatherproof, synthetic, noncellulose material. The overall size of the plastic reflectors shall be 4 inches by 5 inches, with a reflective area of at least 17.5 square inches.
 2. Delineators shall be silver-white when viewed with reflected light.
- H. Highway Delineators Including Posts and Attachments:

1. Reflective Sheeting: Replacement reflective sheeting for delineators shall match delineators being replaced.
 2. Delineator Posts and Accessories shall be of steel or aluminum. They shall have the necessary holes for attachment of the delineator housing. The assembly shall be furnished with the necessary bolts, nuts, and washers for attaching to the posts.
 3. Insulating Materials: Neoprene, for separation of aluminum and steel parts, shall contain at least 60 percent, by volume, of pure neoprene. Other material may be used, subject to the approval of the Owner as to pliability and ability to withstand wear caused by stretching or distortion.
 4. Reflector Units for guardrail installation shall match existing reflector being replaced in size and color.
 5. Highway Delineators shall be supplemented with directional guidance signs as directed by the Owner. Signs shall be the chevron alignment type and shall comply with ANSI D6.1E, Type W 1-8.
- I. Painting Panels for Nonreflectorized Background:
1. Replacement Metal Panels for sign categories not required to be reflectorized shall have a nonreflectorized background composed of one spray coat of primer and two finish coats of baked enamel.
 2. Finish Coats shall be baked alkyd resin enamels meeting Fed. Spec. TT-E-529, Class B, of a composition that affects the finished background surface. When thoroughly dry, the colors shall match those described in the current Highway Blue Color Tolerance Chart, PR Color No. 3, or in Highway Green Color Tolerance Chart, PR Color No. 4, of the Federal Highway Administration.
 3. Wood Signs shall have two coats of oil paint complying with Fed. Spec. TT-P-52. Message paint shall be a single coat of oil paint. All colors shall comply with ANSI D6.1E.
- J. Sign Wash Detergent shall comply with ASTM D 3399.
- K. Street, Wayside, Utility Location, And Parking Lot Signs; Decals
1. Blanks: aluminum of type, size, and shape indicated.
 2. Reflective sheeting: Type 1 sheeting having Level A reflective intensity.
 3. Silk screen lettering paint and transparent process colors: as directed by the Owner.
 4. Posts
 - a. Drive type: as directed by the Owner.
 - b. Pipe type: Two-inch inside diameter.
 5. Hardware: as directed by the Owner.
 6. Fabrication
 - a. Dimensions, colors, and reflectorizing: As indicated, and in accordance with MUTCD.
 - b. Size, style, and spacing of letters, numerals, symbols, and borders: As indicated, and the Owner; as supplemented by DOT/FHA's publication entitled Standard Highway Signs as specified in MUTCD 1978.
 - c. Workmanship: as directed by the Owner.
- 1.3 EXECUTION
- A. Footings for Signs, Posts, and Supports:
1. Backfill Material shall be at or near optimum moisture and neither dry nor saturated. It shall be tamped thoroughly in place.
 2. Concrete Footings may be cast in place or precast. Hand mixing of concrete will be permitted where the quantity does not exceed one-half cubic yard.
- B. Erection of Signs and Sign Supports: Sign posts shall be erected vertically. Posts erected in sleeves shall be anchored with sulphur mortar. Mortar shall comply with ASTM C 287. Sign faces shall be positioned to be generally perpendicular to the line-of-sight for the observer. Reflectorized signs shall

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be inspected at night. If specular reflection is apparent on any sign, its position shall be adjusted by the Contractor to eliminate the condition.

- C. Delineators and Hazard Markers: Delineator posts shall be driven to a depth of 30 inches.
- D. Removal of Existing Signs and Posts:
 - 1. Damaged, Obsolete, or Change of Purpose Signs and Posts shall be removed and delivered to a storage area designated by the Owner. Post hole shall be backfilled, tamped, and made level with the adjacent surface. Disturbed paving, sidewalks, and grassed areas shall be replaced with matching material of same quality and quantity as existing.
 - 2. Signs and Posts to be Replaced shall be removed and replaced by new signs and posts in identical locations. Backfill around post shall be thoroughly compacted to hold posts securely in a vertical position.
- E. Installation: Install in accordance with manufacturer's recommendations and as directed by the Owner. Unless otherwise indicated, install not more than one sign on each post.

END OF SECTION 10 14 53 11

SECTION 10 21 13 13 - TOILET COMPARTMENTS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for toilet compartments. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Steel toilet compartments configured as toilet enclosures, entrance screens, and urinal screens.
 - b. Stainless-steel toilet compartments configured as toilet enclosures, entrance screens, and urinal screens.
 - c. Plastic-laminate-faced toilet compartments configured as toilet enclosures, entrance screens, and urinal screens.
 - d. Phenolic-core toilet compartments configured as toilet enclosures, entrance screens, and urinal screens.
 - e. Solid-polymer toilet compartments configured as toilet enclosures, entrance screens, and urinal screens.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.4: For particleboard, documentation indicating that product contains no urea formaldehyde.
3. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.
4. Samples for each exposed product and for each color and texture specified.
5. Product certificates.
6. Maintenance data.

D. Quality Assurance

1. Comply with requirements in GSA's CID-A-A-60003, "Partitions, Toilets, Complete", **as directed**.
2. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 **OR** 75 **OR** 200, **as directed**, or less.
 - b. Smoke-Developed Index: 450 or less.
3. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

1.2 PRODUCTS

A. Materials

1. Aluminum Castings: ASTM B 26/B 26M.
2. Aluminum Extrusions: **ASTM B 221** (ASTM B 221M).
3. Brass Castings: ASTM B 584.
4. Brass Extrusions: ASTM B 455.
5. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
 - a. Electrolytically Zinc Coated: ASTM A 879/A 879M, **01Z** (03G).
 - b. Hot-Dip Galvanized: ASTM A 653/A 653M, either hot-dip galvanized or galvanized.
6. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
7. Stainless-Steel Castings: ASTM A 743/A 743M.
8. Zamac: ASTM B 86, commercial zinc-alloy die castings.
9. Particleboard: ANSI A208.1, Grade M-2 with **45-lb** (20.4-kg) density, made with binder containing no urea formaldehyde.
10. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, **0.048-inch** (1.2-mm) nominal thickness.

B. Steel Units

1. Toilet-Enclosure Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
2. Entrance-Screen Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
3. Urinal-Screen Style: Wall hung, flat panel **OR** Wall hung with integral flanges **OR** Wall hung, wedge shaped **OR** Floor anchored **OR** Overhead braced **OR** Post to ceiling, **as directed**.
4. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Provide with no-sightline system, **as directed**. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - a. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch** (25 mm) for doors and panels and **1-1/4 inches** (32 mm) for pilasters.
 - b. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
 - c. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
5. Urinal-Screen Construction:
 - a. Flat-Panel Urinal Screen: Matching panel construction.
 - b. Integral-Flange, Wall-Hung Urinal Screen: Similar to panel construction, with integral full-height flanges for wall attachment, and maximum **1-1/4 inches** (32 mm) thick.
 - c. Wedge-Shaped, Wall-Hung Urinal Screen: Similar to panels, V-shaped, fabricated for concealed wall attachment, and maximum **6 inches** (152 mm) wide at wall and minimum **1 inch** (25 mm) wide at protruding end.
6. Facing Sheets and Closures: Electrolytically coated steel **OR** Hot-dip galvanized-steel **OR** Electrolytically coated or hot-dip galvanized-steel, **as directed**, sheet with nominal base-metal (uncoated) thicknesses as follows:
 - a. Pilasters, Braced at Both Ends (for overhead-braced and floor-and-ceiling-anchored mounting styles): Manufacturer's standard thickness, but not less than **0.036 inch** (0.91 mm).
 - b. Pilasters, Unbraced at One End (for floor-anchored and ceiling-hung mounting styles): Manufacturer's standard thickness, but not less than **0.048 inch** (1.21 mm).
 - c. Panels: Manufacturer's standard thickness, but not less than **0.030 inch** (0.76 mm) **OR** **0.036 inch** (0.91 mm), **as directed**.
 - d. Doors: Manufacturer's standard thickness, but not less than **0.030 inch** (0.76 mm).
 - e. Flat-Panel Urinal Screens: Thickness matching the panels.

- f. Integral-Flange, Wall-Hung Urinal Screens (for government-style metal screens): Manufacturer's standard thickness, but not less than **0.030 inch (0.76 mm)**.
 - g. Wedge-Shaped, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than **0.036 inch (0.91 mm)**.
 7. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
 8. Urinal-Screen Post (for floor-anchored, overhead-braced, and post-to-ceiling urinal screens): Manufacturer's standard post design of material matching the thickness and construction of pilasters **OR 1-3/4-inch- (44-mm-)** square, aluminum tube with satin finish, **as directed**; with shoe and sleeve (cap), **as directed**, matching that on the pilaster.
 9. Brackets (Fittings):
 - a. Stirrup Type: Ear or U-brackets; chrome-plated zamac **OR** clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - b. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel **OR** aluminum, **as directed**.
 10. Steel-Sheet Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on finish, including thermosetting, electrostatically applied, and powder coatings. Comply with coating manufacturer's written instructions for applying and baking. Apply one color **OR** two colors, **as directed**, in each room.
 - a. Color: As selected from manufacturer's full range.
- C. Stainless-Steel Units
1. Toilet-Enclosure Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 2. Entrance-Screen Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 3. Urinal-Screen Style: Wall hung flat panel **OR** Wall hung with integral flanges **OR** Wall hung, wedge shaped **OR** Floor anchored **OR** Overhead braced **OR** Post to ceiling, **as directed**.
 4. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Provide with no-sightline system, **as directed**. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - a. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch (25 mm)** for doors and panels and **1-1/4 inches (32 mm)** for pilasters.
 - b. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
 - c. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
 5. Urinal-Screen Construction:
 - a. Flat-Panel Urinal Screen: Matching panel construction.
 - b. Integral-Flange, Wall-Hung Urinal Screen (for government-style metal screens): Similar to panel construction, with integral full-height flanges for wall attachment, and maximum **1-1/4 inches (32 mm)** thick.
 - c. Wedge-Shaped, Wall-Hung Urinal Screen: Similar to panels, V-shaped, fabricated for concealed wall attachment, and maximum **6 inches (152 mm)** wide at wall and minimum **1 inch (25 mm)** wide at protruding end.
 6. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
 - a. Pilasters, Braced at Both Ends (for overhead-braced and floor-and-ceiling-anchored mounting styles): Manufacturer's standard thickness, but not less than **0.038 inch (0.95 mm)**.
 - b. Pilasters, Unbraced at One End (for floor-anchored and ceiling-hung mounting styles): Manufacturer's standard thickness, but not less than **0.050 inch (1.27 mm)**.
 - c. Panels: Manufacturer's standard thickness, but not less than **0.031 inch (0.79 mm) OR 0.038 inch (0.95 mm)**, **as directed**.

- d. Doors: Manufacturer's standard thickness, but not less than **0.031 inch (0.79 mm)**.
 - e. Flat-Panel Urinal Screens: Thickness matching the panels.
 - f. Integral-Flange, Wall-Hung Urinal Screens (for government-style metal screens: Manufacturer's standard thickness, but not less than **0.031 inch (0.79 mm)**).
 - g. Wedge-Shaped, Wall-Hung Urinal Screens: Manufacturer's standard thickness, but not less than **0.038 inch (0.95 mm)**.
 - 7. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
 - 8. Urinal-Screen Post (for floor-anchored, overhead-braced, and post-to-ceiling urinal screens): Manufacturer's standard post design of material matching the thickness and construction of pilasters **OR 1-3/4-inch- (44-mm-)** square, aluminum tube with satin finish, **as directed**; with shoe and sleeve (cap) matching that on the pilaster.
 - 9. Brackets (Fittings):
 - a. Stirrup Type: Ear or U-brackets; chrome-plated zamac **OR** clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - b. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel **OR** aluminum, **as directed**.
 - 10. Stainless-Steel Finish: No. 4 bright, directional polish **OR** Manufacturer's standard textured finish, **as directed**, on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.
- D. Plastic-Laminate-Faced Units
- 1. Toilet-Enclosure Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 - 2. Entrance-Screen Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 - 3. Urinal-Screen Style: Wall hung **OR** Floor anchored **OR** Overhead braced **OR** Post to ceiling, **as directed**.
 - 4. Door, Panel, Screen, and Pilaster Construction: One-piece, plastic-laminate facing sheets pressure laminated to core material without splices or joints in facings or cores; with laminate **OR** stainless-steel edge trim **0.050 inch (1.27 mm)** thick, **as directed**, applied to edges before faces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture. Provide with no-sightline system, **as directed**.
 - a. Core Material: Particleboard.
 - b. Doors and Panels: Finished to not less than **7/8 inch (22 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - c. Pilasters: Provide construction to comply with one of the following, **as directed**:
 - 1) Finished to not less than **1-1/4 inches (32 mm)** thick and with internal, nominal **0.134-inch- (3.42-mm-)** thick, steel-sheet reinforcement, **as directed**.
 - 2) Finished to **1-1/4 inches (32 mm)** thick and with manufacturer's standard steel-sheet core laminated to both sides of honeycomb of resin-impregnated kraft paper in lieu of particleboard core.
 - 3) Finished to not less than **1 inch (25 mm)** thick and with internal, nominal **0.120-inch- (3.04-mm-)** thick, steel-sheet reinforcement.
 - 5. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
 - 6. Urinal-Screen Post (for floor-anchored, overhead-braced, and post-to-ceiling urinal screens): Manufacturer's standard post design of material matching the thickness and construction of pilasters **OR 1-3/4-inch- (44-mm-)** square, aluminum tube with satin finish **OR 1-1/4-inch- (32-mm-)** square, stainless-steel tube **0.050 inch (1.27 mm)** thick with satin finish, **as directed**; with shoe and sleeve (cap) matching that on the pilaster.
 - 7. Brackets (Fittings):
 - a. Stirrup Type: Ear or U-brackets, chrome-plated zamac **OR** clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.

- b. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel **OR** aluminum, **as directed**.
 - 8. Plastic-Laminate Finish: One color and pattern **OR** Two colors and patterns, **as directed**, in each room.
 - a. Color and Pattern: As selected from manufacturer's full range.
- E. Phenolic-Core Units
 - 1. Toilet-Enclosure Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 - 2. Entrance-Screen Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 - 3. Urinal-Screen Style: Wall hung **OR** Floor anchored **OR** Overhead braced **OR** Post to ceiling, **as directed**.
 - 4. Door, Panel, Screen, and Pilaster Construction: Solid phenolic-core panel material with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated), and with eased and polished edges and no-sightline system, **as directed**. Provide minimum **3/4-inch- (19-mm-)** thick doors and pilasters and minimum **1/2-inch- (13-mm-)** thick panels.
 - 5. Pilaster Shoes and Sleeves (Caps): Fabricated from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
 - 6. Urinal-Screen Post (for floor-anchored, overhead-braced, and post-to-ceiling urinal screens): Manufacturer's standard post design of monolithic phenolic urinal screen cut out at bottom to form a post **OR** material matching the thickness and construction of pilasters **OR 1-3/4-inch- (44-mm-)** square, aluminum tube with satin finish, **as directed**; with shoe and sleeve (cap) matching that on the pilaster.
 - 7. Brackets (Fittings):
 - a. Stirrup Type: Ear or U-brackets, chrome-plated zamac **OR** clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - b. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel **OR** aluminum, **as directed**.
 - 8. Phenolic-Panel Finish:
 - a. Facing Sheet Finish: One color and pattern **OR** Two colors and patterns, **as directed**, in each room.
 - b. Color and Pattern: As selected from manufacturer's full range, with manufacturer's standard dark color core **OR** through-color core matching face sheet, **as directed**.
- F. Solid-Polymer Units
 - 1. Toilet-Enclosure Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 - 2. Entrance-Screen Style: Overhead braced **OR** Floor anchored **OR** Ceiling hung **OR** Floor and ceiling anchored, **as directed**.
 - 3. Urinal-Screen Style: Wall hung **OR** Floor anchored **OR** Overhead braced **OR** Post to ceiling, **as directed**.
 - 4. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) **OR** polypropylene (PP), **as directed**, panel material, not less than **1 inch (25 mm)** thick, seamless, with eased edges, no-sightline system, **as directed**, and with homogenous color and pattern throughout thickness of material.
 - a. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - b. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum **OR** stainless-steel, **as directed**, strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 - c. Color and Pattern: One color and pattern **OR** Two colors and patterns, **as directed**, in each room as indicated by manufacturer's designations **OR** as selected from manufacturer's full range, **as directed**.
 - 5. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer **OR** stainless steel, **as directed**.

- a. Polymer Color and Pattern: Matching pilaster **OR** Contrasting with pilaster, as indicated by manufacturer's designations **OR** Contrasting with pilaster, as selected from manufacturer's full range, **as directed**.
 6. Urinal-Screen Post (for floor-anchored, overhead-braced, and post-to-ceiling urinal screens): Manufacturer's standard post design of material matching the thickness and construction of pilasters **OR** 1-3/4-inch- (44-mm-) square, aluminum tube with satin finish, **as directed**; with shoe and sleeve (cap) matching that on the pilaster.
 7. Brackets (Fittings):
 - a. Stirrup Type: Ear or U-brackets, chrome-plated zamac **OR** clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - b. Full-Height (Continuous) Type: Manufacturer's standard design; polymer or extruded aluminum **OR** polymer **OR** extruded aluminum **OR** stainless steel, **as directed**.
 - 1) Polymer Color and Pattern: Matching panel **OR** Contrasting with panel, as indicated by manufacturer's designations **OR** Contrasting with panel, as selected from manufacturer's full range, **as directed**.
 8. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.
- G. Accessories
1. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
 - a. Material: Chrome-plated zamac **OR** Clear-anodized aluminum **OR** Stainless steel **OR** Chrome-plated brass, **as directed**.
 - b. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees **OR** continuous, cam type that swings to a closed or partially open position **OR** continuous, spring-loaded type **OR** integral hinge for solid-polymer doors, **as directed**.
 - c. Latch and Keeper: Manufacturer's standard recessed **OR** surface-mounted, **as directed**, latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 - d. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 - e. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors and entrance-screen doors, **as directed**.
 - f. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
 2. Overhead Bracing (for overhead-braced units): Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
 3. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.
- H. Fabrication
1. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
 2. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
 3. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished

- ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.
4. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
 5. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms, **as directed**, of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
 6. Door Size and Swings: Unless otherwise indicated, provide **24-inch- (610-mm-)** wide, in-swinging doors for standard toilet compartments and **36-inch- (914-mm-)** wide, out-swinging doors with a minimum **32-inch- (813-mm-)** wide, clear opening for compartments designated as accessible.

1.3 EXECUTION

A. Installation

1. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - a. Maximum Clearances:
 - 1) Pilasters and Panels: **1/2 inch (13 mm)**.
 - 2) Panels and Walls: **1 inch (25 mm)**.
 - b. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached **OR** three brackets attached at midpoint and, **as directed**, near top and bottom of panel.
 - 1) Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - 2) Align brackets at pilasters with brackets at walls.
2. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than **1-3/4 inches (44 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
3. Floor-Anchored Units: Set pilasters with anchors penetrating not less than **2 inches (51 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
4. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.
5. Floor-and-Ceiling-Anchored Units: Secure pilasters to supporting construction and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position.
6. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

B. Adjusting

1. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors and doors in entrance screens to return doors to fully closed position.

END OF SECTION 10 21 13 13

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Task	Specification	Specification Description
10 21 13 13	01 22 16 00	No Specification Required
10 21 13 14	01 22 16 00	No Specification Required
10 21 13 14	10 21 13 13	Toilet Compartments
10 21 13 16	01 22 16 00	No Specification Required
10 21 13 16	10 21 13 13	Toilet Compartments

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SECTION 10 21 13 19 - SOLID SURFACE MATERIAL TOILET COMPARTMENTS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for solid surface material toilet compartments. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
2. Samples:
 - a. Panel: 1'-0" by 1'-0" panel showing construction with two sides and two edges, including one finished corner condition.
 - b. Hardware: Actual hardware item
3. Manufacturer's installation and maintenance instructions.

C. Warranty

1. Special Warranty: Solid surface material compartment manufacturer's three year warranty against defects in fabricated products. Provide for product replacement only; labor not included. Damage caused by physical or chemical abuse is not warranted.

1.2 PRODUCTS

A. Manufactured Units

1. Product standard of quality: E.I. DuPont de Nemours and Company, Inc.; Privacy Partitions.

B. Types:

1. Floor supported, overhead braced compartments.
2. Wall hung urinal screens.

C. Materials:

1. Partitions, panels, headrails, and doors:
 - a. Material: E.I. DuPont de Nemours and Company, Inc.; Corian, or approved equivalent.
 - b. Characteristics:
 - 1) Material type: Homogeneous filled methyl methacrylate sheet, not coated.
 - 2) Meet ANSI Z124.3 and 6, Type Six.
 - 3) Thickness: 1/2".
 - a) Partition panels and doors: 1/2".
 - b) Urinal screen panels: 1/2".
 - c. Colors: Selected from manufacturer's color selection.
 - d. Finish: Matte.
2. Pilasters, hardware, and fittings: Note requirements in FABRICATION Article for hardware concealment.
 - a. Pilaster material: Same material as panels; 1" thickness.
 - b. Acceptable hardware manufacturer: Jack Knob Hardware, or approved equivalent.
 - c. Hinges:
 - 1) ANSI Type 304 stainless steel; surface mounted; self closing pivot hinge type, two per door; matt finish.
 - 2) Type: Adjustable to return door by gravity to preset position when not latched.
 - d. Wall brackets:

- 1) Material: ASTM B209-90, extruded aluminum alloy 6463-T5, mill finish, full length continuous wall brackets; extrusion weighing not less than 1.685 lbs. per LF.
- 2) Predrill by manufacturer; holes spaced 6" along full bracket length; tamper resistant bolt attachment.
- e. Pilaster hanger:
 - 1) Manufacturer's standard galvanized anchorage device for attachment of pilaster to structural support and for leveling compartment.
 - 2) Hanger consists of threaded rods, saddle, lock washers, and leveling nuts.
 - 3) Design pilaster hangers to transmit loads to above-ceiling support system, not finished ceiling.
- f. Pilaster base:
 - 1) Type: Manufacturer's standard galvanized anchorage devices for attachment of pilaster to supporting floor and for leveling of compartment. Base consists of threaded rods, saddle, lock washers, leveling nuts, and minimum of two brass or lead expansion shields per base.
 - 2) Anchor penetration: Penetrate floor at least 1" for overhead braced compartments.
- g. Latch and keeper: AISI Type 304 Type stainless steel; 360 deg. pivot on latch; ADA compatible; surface mounted.
- h. Door stop/bumper: AISI Type 304 Type stainless steel; surface mounted.
- i. Door pull: Same material as panels; meet ADA requirements on handicap stalls.
- j. Coat hook; one per unit: Same material as panels; surface mounted.
- k. Grab bar mounting plate: Same material as panels; recessed back; complete with "T" nuts and screws; one per each mounting location to divider panel.
- l. Headrail for overhead braced units: ASTM B209-90, 6063-T6 extruded aluminum, satin anodized finish.

D. Accessories:

1. Exposed fasteners: Stainless steel or chrome plated brass with theft resistant one-way heads,
2. Unexposed fasteners: Galvanized steel, hot-dip coated following fabrication.
3. Inserts for door hardware, hinges, latches, and coat hooks: Threaded steel.
4. Adhesives: Type recommended by panel material manufacturer for joints.
5. Silicone sealant: Specified in Joints Sealants Section.

E. Fabrication

1. Shop assembly:
 - a. Fabricate components in accord with manufacturers standards, without face or edge seams in solid plastic material; bevel exposed edges.
 - b. Factory install metal inserts into components for screw fastened hardware; fasteners secured directly into core are prohibited.
 - c. Pre-notch and predrill panels for hardware at factory. Exposed hardware in completed installation includes only the following items or portion of items:
 - 1) Door hinge barrel.
 - 2) Door latch and keeper.
 - 3) Door striker.
 - d. Cover hardware with 1/2" solid surfacing material strips, except as indicated above.
 - e. Secure templates and factory cut panels for installation of accessories furnished under other Sections.
 - f. Doors: Inswing and outswing type indicated.
 - g. Exposed surfaces free from marks and blemishes; completely hide through material joints.
2. Tolerances; variation in size: $\pm 1/8"$

1.3 EXECUTION

A. Installation

1. General:
 - a. Erect solid surface material compartment system plumb; attach to supporting structure indicated on reviewed shop drawings.
 - b. Attach solid surface material compartment system to back-up construction; use fasteners indicated on reviewed shop drawings.
 - c. Secure solid surface material panels to walls with continuous mounting flanges.
 - d. Locate wall brackets aligning holes for fasteners with masonry or tile joints.
 - e. Floor supported, overhead braced compartments:
 - 1) Attach pilasters to supporting floor with pilaster base indicated on reviewed shop drawings.
 - 2) Level and plumb compartments. Tighten pilaster base fasteners.
 - 3) Secure pilaster shoes in position against finished floor.
 - 4) Secure headrail to panels with minimum of two fasteners per face. Provide cover plates for exposed ends.
 - 5) Set door tops parallel with headrail when doors are in closed position.
 - f. Wall hung screens:
 - 1) Attach screens to wall construction with brackets and fasteners, indicated on reviewed shop drawings.
 - 2) Position and level units. Tighten fasteners in place.
- B. Application
 1. Tolerances:
 - a. Between panel and pilaster: 1/2", except where concealed fasteners are used.
 - b. Between door edge and pilaster: 1/4"
 - c. Between panel and wall: 1".
 2. Conceal evidence of drilling, cutting, and fitting to room finishes.
- C. Adjustment And Cleaning
 1. Adjustment:
 - a. Lubricate and adjust hardware. Tighten fasteners.
 - b. Set hinges on in-swing doors to hold doors open approximately 15 deg. from closed position when unlatched.
 - c. Set hinges on out-swing doors to return to closed position.
 2. Cleaning:
 - a. Remove protective coverings from compartments and hardware.
 - b. Clean exposed surfaces of compartments and hardware using materials and methods recommended by solid surface material compartment system manufacturer.

END OF SECTION 10 21 13 19

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Task	Specification	Specification Description
10 21 13 19	10 21 13 13	Toilet Compartments
10 21 13 43	01 22 16 00	No Specification Required
10 21 13 43	10 21 13 13	Toilet Compartments

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SECTION 10 21 16 17 - SHOWER AND DRESSING COMPARTMENTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for shower and dressing compartments. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Shower compartments fabricated from steel, stainless steel, solid phenolic, or solid polymer.
 - b. Dressing compartments fabricated from steel, stainless steel, solid phenolic, solid polymer, or plastic laminate.
 - c. Shower receptors.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Product Data for Credit EQ 4.4: For particleboard, documentation indicating that product contains no urea formaldehyde.
3. Shop Drawings: For shower and dressing compartments. Include plans, elevations, sections, details, and attachments to other work.
 - a. Show locations of cutouts for compartment-mounted accessories.
 - b. Show locations of reinforcements for compartment-mounted grab bars.
 - c. Show locations of centerlines of drains.
 - d. Show ceiling grid and overhead support or bracing locations.
4. Samples: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - a. Each type of material, color, and finish required for compartments, prepared on **6-inch- (152-mm-)** square Samples of same thickness and material indicated for the Work.
 - b. Each type of hardware and accessory.
 - c. Curtain Fabric: **12-inch- (305-mm-)** square swatch or larger as required to show complete pattern repeat, from dye lot used for the Work, with specified treatments applied. Mark top and face of material.
5. Product Certificates: For each type of shower and dressing compartment, from manufacturer.
6. Maintenance Data: For shower and dressing compartments to include in maintenance manuals.

D. Quality Assurance

1. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: **25 OR 75 OR 200, as directed**, or less.
 - b. Smoke-Developed Index: 450 or less.
2. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1 for shower and dressing compartments designated as accessible.

E. Project Conditions

1. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with shower and dressing compartments by field measurements before fabrication.

1.2 PRODUCTS

A. Materials

1. Aluminum Castings: ASTM B 26/B 26M.
2. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**.
3. Brass Castings: ASTM B 584.
4. Brass Extrusions: ASTM B 455.
5. Steel Sheet: ASTM A 653/A 653M, either hot-dip galvanized or galvanized; mill phosphatized and selected for smoothness.
6. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.
7. Stainless-Steel Castings: ASTM A 743/A 743M.
8. Particleboard: ANSI A208.1, Grade M-2 with **45-lb (20.4-kg)** density, made with binder containing no urea formaldehyde.
9. Plastic Laminate: NEMA LD 3, general-purpose HGS grade, **0.048-inch (1.2-mm)** nominal thickness.

B. Steel Compartments

1. Configuration: Shower compartment **OR** Shower and dressing compartments **OR** Shower compartment with two dressing compartments **OR** As shown on Drawings, **as directed**.
2. Enclosure Style: Overhead braced **OR** Floor and ceiling anchored, **as directed**.
3. Panel and Pilaster Construction: Seamless metal facing sheets, pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures and with corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - a. Core Material: Manufacturer's standard, sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch (25 mm)** for panels and **1-1/4 inches (32 mm)** for pilasters.
 - b. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on compartments.
 - c. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to compartments.
4. Door Construction: Match panels; **1-inch (25-mm)** finished thickness.
5. Facing Sheets and Closures: Hot-dip galvanized-steel sheet with nominal base-metal (uncoated) thicknesses as follows:
 - a. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than **0.036 inch (0.91 mm)**.
 - b. Panels: Manufacturer's standard thickness, but not less than **0.030 inch (0.76 mm) OR 0.036 inch (0.91 mm), as directed**.
 - c. Doors: Manufacturer's standard thickness, but not less than **0.030 inch (0.76 mm)**.
6. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
7. Brackets (Fittings):
 - a. Full-Height (Continuous) Type: Manufacturer's standard design; clear-anodized aluminum.
 - b. Stirrup Type: Ear or U-brackets; clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - c. Dressing-Compartment Brackets: Match toilet-compartment brackets specified in Division 10 Section "Toilet Compartments".
8. Steel-Sheet Finish: Immediately after cleaning and pretreating, apply manufacturer's standard baked-on finish, including thermosetting, electrostatically applied, and powder coatings. Comply

with coating manufacturer's written instructions for applying and baking. Apply one color **OR** two colors, **as directed**, in each room.

- a. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range **OR** Match steel toilet compartments specified in Division 10 Section "Toilet Compartments", **as directed**.

C. Stainless-Steel Compartments

1. Configuration: Shower compartment **OR** Shower and dressing compartments **OR** Shower compartment with two dressing compartments **OR** As shown on Drawings, **as directed**.
2. Enclosure Style: Overhead braced **OR** Floor and ceiling anchored, **as directed**.
3. Panel and Pilaster Construction: Seamless metal facing sheets, pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures and with corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - a. Core Material: Manufacturer's standard, sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch (25 mm)** for panels and **1-1/4 inches (32 mm)** for pilasters.
 - b. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on compartments.
 - c. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to compartments.
4. Door Construction: Match panels; **1-inch (25-mm)** finished thickness.
5. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
 - a. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than **0.038 inch (0.95 mm)**.
 - b. Panels: Manufacturer's standard thickness, but not less than **0.031 inch (0.79 mm) OR 0.038 inch (0.95 mm), as directed**.
6. Doors: Manufacturer's standard thickness, but not less than **0.031 inch (0.79 mm)**.
7. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
8. Brackets (Fittings):
 - a. Full-Height (Continuous) Type: Manufacturer's standard design; clear-anodized aluminum.
 - b. Stirrup Type: Ear or U-brackets; clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - c. Dressing-Compartment Brackets: Match toilet-compartment brackets specified in Division 10 Section "Toilet Compartments".
9. Stainless-Steel Finish: No. 4, bright, directional polish **OR** Manufacturer's standard textured finish **OR** Match stainless-steel toilet-compartment finish, specified in Division 10 Section "Toilet Compartments", **as directed**, on exposed faces. Protect exposed surfaces from damage by applying strippable, temporary protective covering before shipment.

D. Phenolic-Core Compartments

1. Configuration: Shower compartment **OR** Shower and dressing compartments **OR** Shower compartment with two dressing compartments **OR** As shown on Drawings, **as directed**.
2. Enclosure Style: Overhead braced **OR** Floor and ceiling anchored, **as directed**.
3. Panel and Pilaster Construction: Solid phenolic material consisting of solid phenolic-core panel with melamine facing on both sides fused to substrate during panel manufacture (not separately laminated) and with eased and polished edges. Provide minimum **3/4-inch- (19-mm-)** thick pilasters and minimum **1/2-inch- (13-mm-)** thick panels.
4. Door Construction: Match panels; **3/4-inch (19-mm)** minimum thickness.
5. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
6. Brackets (Fittings):
 - a. Full-Height (Continuous) Type: Manufacturer's standard design; clear-anodized aluminum.

- b. Stirrup Type: Ear or U-brackets; clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
- c. Dressing-Compartment Brackets: Match toilet-compartment brackets specified in Division 10 Section "Toilet Compartments".
- 7. Phenolic-Core-Panel Finish:
 - a. Facing Sheet Finish: One color and pattern **OR** Two colors and patterns, **as directed**, in each room.
 - b. Color and Pattern: As indicated by manufacturer's designations, **OR** As selected from manufacturer's full range, **OR** Match phenolic-core toilet compartments specified in Division 10 Section "Toilet Compartments", **as directed**, with manufacturer's standard dark-color core **OR** through-color core matching face sheet, **as directed**.
- E. Solid-Polymer Compartments
 - 1. Configuration: Shower compartment **OR** Shower and dressing compartments **OR** Shower compartment with two dressing compartments **OR** As shown on Drawings, **as directed**.
 - 2. Enclosure Style: Overhead braced **OR** Floor and ceiling anchored, **as directed**.
 - 3. Panel and Pilaster Construction: Solid HDPE panel material, not less than **1 inch (25 mm)** thick, seamless, with eased edges and with homogenous color and pattern throughout thickness of material.
 - a. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - b. Heat-Sink Strip: Manufacturer's standard, continuous, clear-anodized extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-polymer components to prevent burning.
 - c. Color and Pattern: One color and pattern **OR** Two colors and patterns, **as directed**, in each room; as indicated by manufacturer's designations **OR** as selected from manufacturer's full range **OR** match solid-polymer toilet compartments specified in Division 10 Section "Toilet Compartments", **as directed**.
 - 4. Door Construction: Match panels.
 - 5. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; polymer or stainless steel.
 - a. Polymer Color and Pattern: Match pilaster **OR** Contrast with pilaster, as indicated by manufacturer's designations **OR** Contrast with pilaster, as selected from manufacturer's full range **OR** Match solid-polymer toilet compartments specified in Division 10 Section "Toilet Compartments", **as directed**.
 - 6. Brackets (Fittings):
 - a. Full-Height (Continuous) Type: Manufacturer's standard design; polymer or clear-anodized extruded aluminum **OR** polymer **OR** clear-anodized extruded aluminum, **as directed**.
 - 1) Polymer Color and Pattern: Match panel **OR** Contrast with panel, as indicated by manufacturer's designations **OR** Contrast with panel, as selected from manufacturer's full range **OR** Match solid-polymer toilet compartments specified in Division 10 Section "Toilet Compartments", **as directed**.
 - b. Stirrup Type: Ear or U-brackets; clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - c. Dressing-Compartment Brackets: Match toilet-compartment brackets specified in Division 10 Section "Toilet Compartments".
- F. Plastic-Laminate-Faced Dressing Compartments
 - 1. Configuration: Dressing compartment attached to steel **OR** stainless-steel **OR** phenolic-core **OR** solid-polymer, **as directed**, shower compartment as shown on Drawings.
 - 2. Enclosure Style: Overhead braced **OR** Floor and ceiling anchored, **as directed**.
 - 3. Panel and Pilaster Construction: One-piece, plastic-laminate facing sheets pressure laminated to core material without splices or joints in facings or cores; with laminate **OR** stainless-steel edge trim **0.050 inch (1.27 mm)** thick, **as directed**, applied to edges before faces to seal edges and prevent laminate from being pried loose. Seal exposed core material at cutouts to protect core from moisture.
 - a. Core Material: Particleboard.

- b. Panels: Finished to not less than **1 inch (25 mm)** thick.
 - c. Pilasters: Comply with one of the following:
 - 1) Finished to not less than **1-1/4 inches (32 mm)** thick and with internal, nominal **0.134-inch- (3.42-mm-)** thick, steel-sheet reinforcement.
OR
Finished to not less than **1 inch (25 mm)** thick and with internal, nominal **0.120-inch- (3.04-mm-)** thick, steel-sheet reinforcement.
 - 4. Door Construction: Match panels.
 - 5. Pilaster Shoes and Sleeves (Caps): Formed from stainless-steel sheet, not less than **0.031-inch (0.79-mm)** nominal thickness and **3 inches (76 mm)** high, finished to match hardware.
 - 6. Brackets (Fittings):
 - a. Full-Height (Continuous) Type: Manufacturer's standard design; clear-anodized aluminum.
 - b. Stirrup Type: Ear or U-brackets; clear-anodized aluminum **OR** stainless steel **OR** chrome-plated brass, **as directed**.
 - 7. Plastic-Laminate Finish: One color and pattern **OR** Two colors and patterns, **as directed**, in each room.
 - a. Color and Pattern: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range **OR** Match toilet compartments specified in Division 10 Section "Toilet Compartments", **as directed**.
- G. Shower Receptors
- 1. General: Manufacturer's standard, prefabricated, terrazzo receptor complete with integral drain.
 - a. Curb: Not less than **2 inches (51 mm)** and not more than **9 inches (229 mm)** deep when measured from the top of the curb to the top of the drain; with curb threshold not less than **1 inch (25 mm)** below the sides and back of the receptor; and with a ramped entrance surface for accessible compartments, **as directed**.
 - b. Floor: Finished, sloping uniformly toward the drain and not less than 1/4 unit vertical in 12 units horizontal and not more than **1/2 inch (13 mm)**.
 - c. Drain Strainer: Manufacturer's standard, removable brass strainer **OR** chrome strainer **OR** stainless-steel strainer **OR** plastic strainer, matching the receptor, **as directed**.
 - d. Drain Gasket: Manufacturer's standard gasket sized to fit waste pipe.
 - e. Waterstop: Manufacturer's standard, continuous galvanized-steel flange or rabbeted groove to receive panels and create a waterstop when panels are in place.
 - 2. Finish: Manufacturer's standard finish on exposed surfaces, matching the enclosure panels **OR** contrasting with the enclosure panels, as indicated by manufacturer's designations **OR** contrasting with the enclosure panels, as selected from manufacturer's full range, **as directed**, and with slip-resistant floor surface texture.
- H. Accessories
- 1. Door Hardware and Accessories: Manufacturer's standard design, heavy-duty, operating hardware and accessories.
 - a. Material: Clear-anodized aluminum **OR** Stainless steel **OR** Chrome-plated brass, **as directed**.
 - b. Hinges: Manufacturer's standard, paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees **OR** continuous, cam type that swings to a closed or partially open position **OR** continuous, spring-loaded type **OR** integral hinge for solid-polymer doors, **as directed**.
 - c. Latch and Keeper: Manufacturer's standard, recessed **OR** surface-mounted, **as directed**, latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at each compartment, accessible or not **OR** at compartments designated as accessible, **as directed**.
 - d. Clothing Hooks: Manufacturer's standard clothing hooks in each dressing compartment; include one combination hook and rubber-tipped bumper at in-swinging doors, sized to prevent door from hitting wall panel or compartment-mounted accessories, **as directed**.

- e. Door Bumper: Manufacturer's standard, rubber-tipped bumper at out-swinging doors.
 - f. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
2. Overhead Bracing: Manufacturer's standard, continuous, extruded-aluminum head rail or cap with antigrip profile; in manufacturer's standard finish.
 3. Head Rail with Hooks: Manufacturer's standard, continuous, extruded-aluminum head rail or cap with curtain hooks running in concealed track; with antigrip profile; in manufacturer's standard finish.
OR
Curtain Rod with Hooks: Manufacturer's standard, **1-inch- (25-mm-)** diameter, stainless-steel curtain rod with matching hooks.
 4. Curtain: Flame-resistant, polyester-reinforced vinyl fabric **OR** manufacturer's standard fabric, **as directed**, that is stain resistant, self-sanitizing, antistatic, and antimicrobial; launderable to a temperature of not less than **90 deg F (32 deg C)**.
 - a. Flame Resistance: Passes NFPA 701 tests when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - b. Labeling: Identify fabrics with appropriate markings of applicable testing and inspecting agency.
 - c. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than **6 inches (152 mm)** o.c.; machined into top hem.
 - d. Length: Where curtain extends to a floor surface, size so that bottom hem clears finished floor by not more than **1 inch (25 mm)** and not less than **1/2 inch (13 mm)** above floor surface. Where curtains extend to a shower-receptor curb, size so that bottom hem hangs above curb line and clears curb line by not more than **1/2 inch (13 mm)**.
 - e. Color and Pattern: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 5. Soap Holder: Surface-mounted **OR** Recessed, **as directed**, seamless stainless-steel soap dish.
 6. Seats: Manufacturer's standard, panel-mounted, wall-mounted or floor-mounted benches.
 - a. Material: Wood **OR** Solid phenolic **OR** Molded plastic **OR** Stainless steel, **as directed**.
 - b. Operation: Fixed **OR** Folding, **as directed**.
 - c. Finish: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range **OR** Match enclosure panels, **as directed**.
 7. Anchorages and Fasteners: Manufacturer's standard, exposed fasteners of stainless steel, chrome-plated steel, or solid brass, finished to match the items they are securing; with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.
- I. Fabrication
1. Overhead-Braced Compartments: Provide manufacturer's standard, corrosion-resistant supports, leveling method, and anchors at pilasters and walls to suit floor and wall conditions. Provide shoes at pilasters to conceal supports and leveling method.
 2. Floor-and-Ceiling-Anchored Compartments: Provide manufacturer's standard, corrosion-resistant anchoring assemblies at pilasters and walls with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.
 3. Door Sizes and Swings: Unless otherwise indicated, provide **24-inch- (610-mm-)** wide, in-swinging doors for standard shower and dressing compartments, and **36-inch- (914-mm-)** wide, out-swinging doors with a minimum **32-inch- (813-mm-)** wide, clear opening for compartments designated as accessible.

1.3 EXECUTION

A. Installation

1. General: Comply with manufacturer's written installation instructions. Install compartments rigid, straight, level, and plumb. Secure compartments in position with manufacturer's recommended anchoring devices.
 - a. Maximum Clearances for Dressing Compartment:
 - 1) Pilasters and Panels: **1/2 inch (13 mm)**.
 - 2) Panels and Walls: **1 inch (25 mm)**.
 - b. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than two brackets attached **OR** three brackets attached at midpoint and, **as directed**, near top and bottom of panel.
 - 1) Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - 2) Align brackets at pilasters with brackets at walls.
 2. Overhead-Braced Compartments: Secure pilasters to floor, and level, plumb, and tighten. Set pilasters with anchors penetrating not less than **1-3/4 inches (44 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position, **as directed**.
 3. Floor-and-Ceiling-Anchored Compartments: Secure pilasters to supporting construction, and level, plumb, and tighten. Hang doors and adjust so doors are level and aligned with panels when doors are in closed position, **as directed**.
 4. Curtains: Install curtains to specified length and verify that they hang vertically without stress points or diagonal folds.
 5. Shower Receptors: Install prefabricated shower receptors with drain gasket compression fit to outside diameter of waste pipe.
- B. Adjusting
1. Curtain Adjustment: After hanging curtains, test and adjust each track or rod to produce unencumbered, smooth operation. Steam and dress down curtains as required to produce crease- and wrinkle-free installation. Remove and replace curtains that are stained or soiled or that have stress points or diagonal folds.
 2. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 21 16 17

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SECTION 10 21 16 17a - CUBICLE CURTAINS AND TRACKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cubicle curtains and tracks. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Curtain tracks and curtain carriers.
 - b. IV tracks and hangers.
 - c. Cubicle, dressing area, tub, and shower curtains.

C. Definition

1. IV: Intravenous.

D. Performance Requirements

1. Curtains: Provide curtain fabrics with the following characteristics:
 - a. Fabrics are launderable to a temperature of not less than **160 deg F (71 deg C) OR 90 deg F (32 deg C), as directed.**
 - b. Fabrics are flame resistant and are identical to those that have passed NFPA 701 when tested by a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1) Identify fabrics with appropriate markings of applicable testing and inspecting agency.

E. Submittals

1. Product Data: Include durability, laundry temperature limits, fade resistance, and fire-test-response characteristics for each type of curtain fabric indicated.
 - a. Include data on each type of applied curtain treatment.
2. Shop Drawings: Show layout and types of cubicles, sizes of curtains, number of carriers, anchorage details, and conditions requiring accessories. Indicate dimensions taken from field measurements.
 - a. Include details on blocking above ceiling and in walls.
3. Samples: For each type of product required.
4. Curtain and Track Schedule: Use same designations indicated on Drawings.
5. Operation and Maintenance Data.

1.2 PRODUCTS

A. Curtain Tracks

1. Extruded-Aluminum Track: Not less than **1-1/4 inches wide by 3/4 inch high (32 mm wide by 19 mm high) OR 5/8 inch wide by 1/2 inch high (16 mm wide by 13 mm high), as directed;** with minimum wall thickness of **0.050 inch (1.27 mm) OR 0.058 inch (1.47 mm) OR 0.062 inch (1.57 mm), as directed.**
 - a. Curved Track: Factory-fabricated, **12-inch- (305-mm-) OR 14-inch- (356-mm-) OR 18-inch- (457-mm-), as directed,** radius bends.
 - b. Finish: Clear anodized **OR** Satin anodized **OR** Baked enamel, acrylic, or epoxy, **as directed.**
2. PVC Track: Not less than **1-1/4 inches wide by 15/16 inch high (32 mm wide by 24 mm high).**
 - a. Curved Track: Factory-fabricated, **12-inch- (305-mm-)** radius bends.

3. Track Accessories: Fabricate splices, end caps, connectors, end stops, coupling and joining sleeves, wall flanges, brackets, ceiling clips, and other accessories from same material and with same finish as track.
 - a. Suspended Track Support: Not less than **5/8-inch- (16-mm-)** square **OR 7/8-inch- (22.2-mm-)** OD, **as directed**, tube.
 - b. End Stop: Nonremovable **OR** Removable with carrier hook, **as directed**.
 - c. Switch Unit: Shuttle and coupling device for rerouting and securing cubicle curtain, with pull chain for switching track.
 - d. Hinged Loading Unit: Detachable hinge and lock unit factory assembled on **60-inch (1524-mm)** section of manufacturer's extruded-aluminum track. Provide 1 operating wand for every 10 cubicles.
 4. Curtain Carriers: Two nylon rollers and nylon axle with chrome-plated steel **OR** nylon **OR** aluminum, **as directed**, hook.
 5. Curtain Carriers: One-piece nylon glide with chrome-plated steel **OR** nylon, **as directed**, hook.
 6. Breakaway Curtain Carriers: One-piece nylon **OR** Velcro, **as directed**, breakaway curtain carriers designed to allow curtains to detach from tracks with a pulling force of no more than **5 lbf (22.2 N)**.
 7. Exposed Fasteners: Stainless steel.
 8. Concealed Fasteners: Hot-dip galvanized **OR** Stainless steel, **as directed**.
- B. IV Support Systems
1. Extruded-Aluminum IV Track: Not less than **1-1/4 inches wide by 3/4 inch high (32 mm wide by 19 mm high)**; with minimum wall thickness of **0.058 inch (1.47 mm) OR 0.062 inch (1.57 mm)**, **as directed**.
 - a. Curved Track: Factory fabricated **12-inch- (305-mm-) OR 14-inch- (356-mm-) OR 18-inch- (457-mm-)**, **as directed**, radius bends.
 - b. Finish: Clear anodized **OR** Satin anodized **OR** Baked enamel, acrylic, or epoxy, **as directed**.
 2. IV Carriers: Four nylon rollers and nylon **OR** steel or stainless-steel, **as directed**, axles, with ball bearings, **as directed**, with hanger loop fabricated from **1/4-inch- (6-mm-)** diameter stainless steel.
 3. Stationary IV Hangers: **24-inch (610-mm) OR 30-inch (762-mm) OR 36-inch (914-mm) OR 42-inch (1067-mm) OR 48-inch (1219-mm)**, **as directed**, overall height with stainless-steel shaft; with 4 **OR** 8, **as directed**, folding **OR** nonfolding, **as directed**, **1/4-inch (6-mm)** stainless-steel arms with loops, a stainless-steel bottom loop, and a stainless-steel top loop to attach to carrier.
 - a. Top Loop: Coated for nonconductivity **OR** Uncoated, **as directed**.
 4. Telescoping IV Hangers: **28-inch (711-mm) OR 39-inch (991-mm) OR 45-inch (1143-mm) OR 51-inch (1295-mm) OR 57-inch (1448-mm)**, **as directed**, overall height with a **3/4-inch (19-mm)** stainless-steel main shaft and a **3/8-inch (9.5-mm)** stainless-steel inner shaft, minimum vertical adjustment of **16 inches (406 mm)**; with 4 **OR** 8, **as directed**, folding **OR** nonfolding, **as directed**, **1/4-inch (6-mm)** stainless-steel arms with loops and a stainless-steel top loop to attach to carrier.
 - a. Top Loop: Coated for nonconductivity **OR** Uncoated, **as directed**.
 - b. Adjustment Control: Push button **OR** Release ring, **as directed**.
- C. Curtains
1. Cubicle Curtain and Dressing Area Fabric: Curtain manufacturer's standard, 100 percent polyester, inherently and permanently flame resistant, stain resistant, and antimicrobial.
 - a. Pattern: as directed by the Owner .
 - b. Color: As selected from manufacturer's full range.
 2. Shower and Tub Curtain Fabric: Curtain manufacturer's standard. Polyester-reinforced vinyl fabric; flame resistant, stain resistant, and antimicrobial.
 - a. Pattern: as directed by the Owner .
 - b. Color: As selected from manufacturer's full range.
 3. Curtain Grommets: Two-piece, rolled-edge, rustproof, nickel-plated brass; spaced not more than **6 inches (152 mm)** o.c.; machined into top hem.

4. Mesh Top: No. 50 **OR** 40 **OR** 42, **as directed**, nylon mesh.
5. Beaded-Chain Curtain Drop: **6 inches (152 mm) OR 9 inches (229 mm) OR 12 inches (305 mm) OR 15 inches (381 mm) OR 18 inches (457 mm)**, **as directed**, long; nickel-plated steel, with aluminum hook.
6. PVC-Strip Curtain Drop: **16 inches (406 mm) OR 18 inches (457 mm)**, **as directed**, long, with chrome-plated steel hook.
 - a. Curtain Movers: In-line hinged nylon spacers that connect to the top of PVC-strip curtain drops to provide tangle-free operation.
7. Curtain Tieback: Nickel-plated brass chain; one at each curtain termination.

D. Curtain Fabrication

1. Fabricate curtains to comply with the following requirements:
 - a. Width: Equal to track length from which curtain is hung plus 10 percent added fullness, but not less than **12 inches (305 mm)** added fullness.
 - b. Length: Equal to floor-to-ceiling height minus depth of track and carrier at top, and minus distance above the finished floor at bottom as follows:

OR

Length: Equal to floor-to-ceiling height, with **20-inch (508-mm)** mesh top, and minus distance above the finished floor at bottom as follows:

OR

Length: Equal to floor-to-ceiling height minus **18 inches (457 mm)** from finished ceiling at top, and minus distance above the finished floor at bottom as follows:

 - 1) Cubicle Curtains: **12 inches (305 mm) OR 15 inches (381 mm)**, **as directed**.
 - 2) Dressing Area Curtains: **4 inches (102 mm) OR 6 inches (152 mm)**, **as directed**.
 - 3) Tub Curtains: **6 inches (152 mm)**.
 - 4) Shower Curtains: **1/2 inch (13 mm)**.
 - c. Top Hem: Not less than **1 inch (25.4 mm)** and not more than **1-1/2 inches (38 mm)** wide, triple thickness, reinforced with integral web, and double lock stitched.
 - d. Mesh Top: Top hem not less than **1 inch (25.4 mm)** and not more than **1-1/2 inches (38 mm)** wide, triple thickness, reinforced with integral web, and double lock stitched. Double lock stitch bottom of mesh directly to **1/2-inch (13-mm)** triple thickness, top hem of curtain fabric.
 - e. Bottom Hem: Not less than **1 inch (25.4 mm)** and not more than **1-1/2 inches (38 mm)** wide, double thickness and single **OR** double thickness and double **OR** triple thickness, reinforced, and double, **as directed**, lock stitched.
 - f. Side Hems: Not less than **1/2 inch (13 mm)** and not more than **1-1/4 inches (32 mm)** wide, with double **OR** triple, **as directed**, turned edges, and single lock stitched.
2. Vertical Seams: Not less than **1/2 inch (13 mm)** wide, double turned and double stitched.

1.3 EXECUTION

A. Installation

1. General: Install tracks level and plumb, according to manufacturer's written instructions.
2. Up to **16 feet (4.9 m) OR 20 feet (6.0 m)**, **as directed**, in length, provide track fabricated from 1 continuous length.
 - a. Curtain Track Mounting: Surface **OR** Suspended **OR** Recessed **OR** As indicated on Drawings, **as directed**.
 - b. IV Track Mounting: Surface.
3. Surface Track Mounting: Fasten surface-mounted tracks at intervals of not less than **24 inches (610 mm)**. Fasten support at each splice and tangent point of each corner. Center fasteners in track to ensure unencumbered carrier operation. Attach track to ceiling as follows:
 - a. Mechanically fasten directly to bottom of concrete deck with post-installed anchors.
 - b. Mechanically fasten directly to finished ceiling with toggle bolts.
 - c. Mechanically fasten to furring through suspended ceiling with screw and tube spacer.
 - d. Mechanically fasten to suspended ceiling grid with screws.

10 - Specialties



- e. Attach track to suspended ceiling grid with manufacturer's proprietary clip.
 4. Suspended Track Mounting: Install track with suspended supports at intervals of not more than **48 inches (1219 mm)**. Fasten support at each splice and tangent point of each corner. Secure ends of track to wall with flanged fittings or brackets.
 5. Track Accessories: Install splices, end caps, connectors, end stops, coupling and joining sleeves, and other accessories as required for a secure and operational installation.
 - a. Provide one locking switch unit for each pair of beds.
 - b. Provide one hinged loading unit for each bed **OR** pair of beds with locking switch unit, **as directed**.
 6. IV Hangers: Unless otherwise indicated, install one IV hook on each IV track and hang one IV hanger.
 7. Curtain Carriers: Provide curtain carriers adequate for **6-inch (152-mm)** spacing along full length of curtain plus an additional carrier.
 8. Curtains: Hang curtains on each curtain track. Secure with curtain tieback, **as directed**.
- B. Protection
1. Protect installed recessed track openings with nonresidue adhesive tape to prevent construction debris from impeding carrier operation. Remove tape prior to Final Completion.

END OF SECTION 10 21 16 17a

Task	Specification	Specification Description
10 21 16 17	10 21 13 13	Toilet Compartments

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SECTION 10 22 13 00 - WIRE MESH PARTITIONS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for wire mesh partitions. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Standard-duty wire mesh partitions.
 - b. Heavy-duty wire mesh partitions.
 - c. Wire mesh ceilings.
 - d. Wire mesh storage lockers.
 - e. Wire mesh stairway partitions.
 - f. Wire mesh equipment barriers.

C. Definitions

1. As defined in ASTM E 2016:
 - a. Intermediate Crimp: Wires pass over one and under the next adjacent wire in both directions, with wires crimped before weaving and with extra crimps between the intersections.
 - b. Lock Crimp: Deep crimps at points of the intersection that lock wires securely in place.

D. Performance Requirements

1. Delegated Design: Design wire mesh units, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Wire mesh units shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
3. Samples: For each exposed product and for each color and texture specified.
4. Delegated-Design Submittal: For wire mesh units indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Maintenance data.

F. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
2. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Deliver wire mesh items with cardboard protectors on perimeters of panels and doors and with posts wrapped **OR** palletted **OR** crated, **as directed**, to provide protection during transit and Project-site storage. Use vented plastic.
2. Inventory wire mesh partition door hardware on receipt and provide secure lockup for wire mesh partition door hardware delivered to Project site.
 - a. Tag each item or package separately with identification and include basic installation instructions with each item or package.
3. Deliver keys to the Owner by registered mail or overnight package service.

1.2 PRODUCTS

A. Materials

1. Steel Wire: **ASTM A 510 (ASTM A 510M)**.
2. Steel Plates, Channels, Angles, and Bars: ASTM A 36/A 36M.
3. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
4. Steel Pipe: ASTM A 53/A 53M, Schedule 40 unless another weight is indicated or required by structural loads.
5. Square Steel Tubing: ASTM A 500, cold-formed structural-steel tubing.
6. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with **G60 (Z180)** zinc (galvanized) or **A60 (ZF180)** zinc-iron-alloy (galvannealed) coating designation.
7. Panel-to-Panel Fasteners: Manufacturer's standard steel bolts, nuts, and washers.
8. Postinstalled Expansion Anchors: With capability to sustain, without failure, load imposed within factors of safety indicated, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - a. Carbon Steel: Zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition (mild).
 - b. Stainless Steel: **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Alloy Group 1 or 4)**, for bolts and nuts; ASTM A 276 or ASTM A 666, Type 304 or 316, for anchors.
 - c. For Postinstalled Anchors in Concrete: Capability to sustain, without failure, a load equal to four times the loads imposed.
 - d. For Postinstalled Anchors in Grouted Masonry Units: Capability to sustain, without failure, a load equal to six times the loads imposed.
9. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated and fabricated from corrosion-resistant materials; with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by wire mesh construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.
10. Seismic Bracing: Angles with legs not less than **1-1/4 inch (32 mm)** wide, formed from **0.04-inch- (1-mm-)** thick, metallic-coated steel sheet; with bolted connections and **1/4-inch- (6-mm-)** diameter bolts.
11. Shop Primers: Provide primers that comply with Division 07..
12. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer, complying with MPI#79.
 - a. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
13. Zinc-Rich Primer: Compatible with topcoat, complying with SSPC-Paint 20 or SSPC-Paint 29.
14. Galvanizing Repair Paint: High-zinc-dust-content paint for regalanizing welds in steel, complying with SSPC-Paint 20.

B. Standard-Duty Wire Mesh Partitions

1. Mesh: **0.135-inch- (3.5-mm-)** diameter, intermediate-crimp steel wire woven into **1-1/2-inch (38-mm)** diamond mesh.

2. Vertical Panel Framing: 1-1/4-by-5/8-by-0.097-inch (32-by-16-by-2.5-mm) cold-rolled, C-shaped steel channels with 1/4-inch- (6-mm-) diameter bolt holes spaced not more than 18 inches (450 mm) o.c. along center of framing.
3. Horizontal and Vertical Panel Framing: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels.
4. Horizontal Panel Stiffeners: 2 cold-rolled steel channels, not less than 1 by 3/8 by 1/8 inch (25 by 9.5 by 3 mm), bolted or riveted toe to toe through mesh or 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels with wire woven through.
5. Top Capping Bars: 2-1/4-by-1-inch (57-by-25-mm) cold-rolled steel channels.
6. Posts for 90-Degree Corners: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm) steel angles with 1/4-inch- (6-mm-) diameter bolt holes aligning with bolt holes in vertical framing; with floor anchor clips.
7. Posts for Other-Than-90-Degree Corners: Manufacturer's standard steel pipe or tubing with 1/4-inch- (6-mm-) diameter bolt holes aligning with bolt holes in vertical framing.
 - a. Partitions up to 12 Feet (3.7 m) High: 1-1/4-inch (32-mm) OD.
 - b. Partitions up to 20 Feet (6.1 m) High: 2-1/2-inch (65-mm) OD.
8. Adjustable Corner Posts: 2, manufacturer's standard steel pipe or tubing posts connected by steel hinges at 36 inches (900 mm) o.c. attached to posts; with 1/4-inch- (6-mm-) diameter bolt holes aligning with bolt holes in vertical framing.
9. Line Posts: 3-inch-by-4.1-lb (76-mm-by-1.9-kg) or 3-1/2-by-1-1/4-by-0.127-inch (89-by-32-by-3.2-mm) steel channels; with 5-by-18-by-1/4-inch (125-by-450-by-6-mm) steel base plates punched for attachment to floor.
10. Three- and Four-Way Intersection Posts: 1-1/4-by-1-1/4-inch (32-by-32-mm) tubular steel, with 1/4-inch- (6-mm-) diameter bolt holes aligned for bolting to adjacent panels.
11. Floor Shoes: Steel, cast iron, or cast aluminum, not less than 2 inches (50 mm) high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
12. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm) steel channels or C-channels, banded with 1-1/4-by-1/8-inch (32-by-3-mm) flat steel bar cover plates on 3 OR 4, **as directed**, sides, and with 1/8-inch- (3-mm-) thick angle strike bar and cover on strike jamb.
 - a. Hinges: Full-surface type, 3-by-3-inch (76-by-76-mm) steel, 1-1/2 pairs per door; bolted, riveted, or welded to door and jamb framing.
 - b. Padlock Lug: Mortised into door framing and enclosed with steel cover.
 - c. Cylinder Lock: Mortise type with manufacturer's standard cylinder OR cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob OR knob OR lever, **as directed**, inside.
 - d. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.
13. Swinging Dutch Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm) steel channels or C-channels, banded with 1-1/4-by-1/8-inch (32-by-3-mm) flat steel bar cover plates on 3 OR 4, **as directed**, sides, and with 1/8-inch- (3-mm-) thick angle strike bar and cover on strike jamb.
 - a. Hinges: Full-surface type, 3-by-3-inch (76-by-76-mm) steel, 1 pair per section of door (top and bottom); bolted, riveted, or welded to door and jamb framing.
 - b. Cylinder Lock: Mortise type with manufacturer's standard cylinder OR cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob OR knob OR lever, **as directed**, inside; mounted in lower section of door.
 - c. Bolt: Mounted in, securing upper section of door.
 - d. Shelf: Fabricated from 0.097-inch- (2.5-mm-) thick, cold-rolled steel sheet, 12 inches (300 mm) deep by full width of door; with corners rounded and edges finished smooth; mounted on top of lower section of door and braced with manufacturer's standard brackets.
14. Sliding Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm) steel channels or C-channels, banded with 1-1/2-by-1/8-inch (38-by-3-mm) flat steel bar cover plates on 4 sides.
 - a. Hardware: Two, four-wheel roller-bearing carriers, box track, and bottom guide channel for each door.
 - b. Padlock Lug: Mortised into door framing and enclosed with steel cover.

- c. Cylinder Lock: Mortise type with manufacturer's standard cylinder **OR** cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob **OR** knob **OR** lever, **as directed**, inside.
 - 15. Vertically Sliding Service Windows: Fabricated from same mesh and framing as panels and equipped with spring catch **OR** slide bolts, **as directed**, on each jamb that locks window in open and closed positions. Include opening frame in partition fabricated from **1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm)** steel channels or C-channels.
 - a. Size: **24 inches wide by 18 inches high (600 mm wide by 450 mm high)** **as directed** As indicated, **as directed**.
 - b. Shelf: Fabricated from **0.097-inch- (2.5-mm-)** thick, cold-rolled steel sheet; with corners rounded and edges finished smooth; braced with manufacturer's standard brackets.
 - 1) Size: **24 inches wide by 12 inches deep (600 mm wide by 300 mm deep)** **OR** As indicated, **as directed**.
 - 16. Swinging Service Windows: Fabricated from same mesh and framing as panels and equipped with spring catch on strike jamb that locks window in closed position. Include opening frame in partition fabricated from **1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm)** steel channels or C-channels.
 - a. Size: **24 inches wide by 18 inches high (600 mm wide by 450 mm high)** **OR** As indicated, **as directed**.
 - b. Shelf: Fabricated from **0.097-inch- (2.5-mm-)** thick, cold-rolled steel sheet; with corners rounded and edges finished smooth; braced with manufacturer's standard brackets.
 - 1) Size: **24 inches wide by 12 inches deep (600 mm wide by 300 mm deep)** **OR** As indicated, **as directed**.
 - 17. Accessories:
 - a. Sheet Metal Base: Not less than **0.060-inch- (1.5-mm-)** thick, cold-rolled steel sheet.
 - b. Adjustable Filler Panels: Not less than **0.060-inch- (1.5-mm-)** thick, cold-rolled steel sheet; capable of filling openings from **2 to 12 inches (50 to 300 mm)**.
 - c. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to **1 inch (25 mm)** of adjustment, **as directed**.
 - 18. Finish for Uncoated Ferrous Steel: Hot-dip galvanized **OR** Hot-dip galvanized and shop primed for field painting **OR** Shop primed for field painting **OR** Shop coat **OR** Baked-enamel finish **OR** Powder-coated finish, **as directed**, unless otherwise indicated.
 - a. Color: As selected from manufacturer's full range.
- C. Heavy-Duty Wire Mesh Partitions
- 1. Mesh: **0.192-inch- (4.8-mm-)** diameter, intermediate-crimp steel wire woven into **2-inch (50-mm)** diamond mesh.
 - 2. Vertical and Horizontal Panel Framing: **1-1/2-by-3/4-by-0.097-inch (38-by-19-by-2.5-mm)** cold-rolled, C-shaped steel channels; with **3/8-inch- (9.5-mm-)** diameter bolt holes spaced not more than **18 inches (450 mm)** o.c. along center of framing.
 - 3. Vertical and Horizontal Panel Framing: **1-1/2-by-3/4-by-1/4-inch (38-by-19-by-6-mm)** cold-rolled steel channels; with **3/8-inch- (9.5-mm-)** diameter bolt holes spaced not more than **18 inches (450 mm)** o.c. along center of framing. Provide vertical panel stiffeners in shapes and sizes as recommended by manufacturers.
 - 4. Horizontal Panel Stiffeners: 2 cold-rolled steel channels, not less than **1 by 1/2 by 1/8 inch (25 by 13 by 3 mm)**, bolted or riveted toe to toe through mesh or **1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm)** cold-rolled steel channels with wire woven through.
 - 5. Top Capping Bars: **3-inch-by-4.1-lb (76-mm-by-1.9-kg)** hot-rolled steel channels.
 - 6. Posts for 90-Degree Corners: **2-by-2-by-1/8-inch (50-by-50-by-3-mm)** steel angles with **3/8-inch- (9.5-mm-)** diameter bolt holes aligning with bolt holes in vertical framing; with floor anchor clips.
 - 7. Posts for Other-Than-90-Degree Corners: Manufacturer's standard steel **2-inch- (50-mm)** OD pipe or tubing with **3/8-inch- (9.5-mm-)** diameter bolt holes aligning with bolt holes in vertical framing.

8. Adjustable Corner Posts: 2, manufacturer's standard steel pipe or tubing posts connected by steel hinges at **36 inches (900 mm)** o.c. attached to posts; with **1/4-inch- (6-mm-)** diameter bolt holes aligning with bolt holes in vertical framing.
9. Line Posts: **3-inch-by-4.1-lb (76-mm-by-1.9-kg)** or **3-1/2-by-1-1/4-by-0.1265-inch (89-by-32-by-3.2-mm)** steel channels; with **5-by-18-by-1/4-inch (125-by-450-by-6-mm)** steel base plates punched for attachment to floor.
10. Three- and Four-Way Intersection Posts: **2-by-2-inch (50-by-50-mm)** tubular steel, with **3/8-inch- (9.5-mm-)** diameter bolt holes aligned for bolting to adjacent panels.
11. Floor Shoes: Steel, cast iron, or cast aluminum, not less than **2 inches (50 mm)** high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
12. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from **1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm)** steel channels or C-channels, banded with **1-1/2-by-1/8-inch (38-by-3-mm)** flat steel bar cover plates on 4 sides, and with **1/8-inch- (3-mm-)** thick angle strike bar and cover on strike jamb.
 - a. Hinges: Full-surface type, **3-1/2-by-3-1/2-inch (89-by-89-mm)** steel, 1-1/2 pairs per door; bolted, riveted, or welded to door and jamb framing.
 - b. Padlock Lug: Mortised into door framing and enclosed with steel cover.
 - c. Cylinder Lock: Mortise type with manufacturer's standard cylinder **OR** cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob **OR** knob **OR** lever, **as directed**, inside.
 - d. Inactive Leaf Hardware: Cane bolt at bottom and chain bolt at top.
13. Swinging Dutch Doors: Fabricated from same mesh as partitions, with framing fabricated from **1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm)** steel channels or C-channels, banded with **1-1/2-by-1/8-inch (38-by-3-mm)** flat steel bar cover plates on 3 **OR** 4, **as directed**, sides, and with **1/8-inch- (3-mm-)** thick angle strike bar and cover on strike jamb.
 - a. Hinges: Full-surface type, **3-1/2-by-3-1/2-inch (89-by-89-mm)** steel, 1 pair per section of door (top and bottom); bolted, riveted, or welded to door and jamb framing.
 - b. Cylinder Lock: Mortise type with manufacturer's standard cylinder **OR** cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob **OR** knob **OR** lever, **as directed**, inside.
 - c. Bolt: Mounted in, securing upper section of door.
 - d. Shelf: Fabricated from **0.097-inch- (2.5-mm-)** thick, cold-rolled steel sheet, **12 inches (300 mm)** deep by full width of door; with corners rounded and edges finished smooth; mounted on top of lower section of door and braced with manufacturer's standard brackets.
14. Sliding Doors: Fabricated from same mesh as partitions, with framing fabricated from **1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm)** steel channels or C-channels, banded with **1-1/2-by-1/8-inch (38-by-3-mm)** flat steel bar cover plates on 4 sides.
 - a. Hardware: Two, four-wheel roller-bearing carriers, box track, and bottom guide channel for each door.
 - b. Padlock Lug: Mortised into door framing and enclosed with steel cover.
 - c. Cylinder Lock: Mortise type with manufacturer's standard cylinder **OR** cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob **OR** knob **OR** lever, **as directed**, inside.
15. Vertically Sliding Service Windows: Fabricated from same mesh and framing as panels and equipped with spring catch **OR** slide bolts, **as directed**, on each jamb that locks window in open and closed positions. Include opening frame in partition fabricated from **1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm)** steel channels or C-channels.
 - a. Size: **24 inches wide by 18 inches high (600 mm wide by 450 mm high)** **OR** As indicated, **as directed**.
 - b. Shelf: Fabricated from **0.097-inch- (2.5-mm-)** thick, cold-rolled steel sheet; with corners rounded and edges finished smooth; braced with manufacturer's standard brackets.
 - 1) Size: **24 inches wide by 12 inches deep (600 mm wide by 300 mm deep)** **OR** As indicated, **as directed**.
16. Swinging Service Windows: Fabricated from same mesh and framing as panels and equipped with spring catch on strike jamb that locks window in closed position. Include opening frame in

partition fabricated from 1-1/4-by-1/2-by-1/8-inch (32-by-13-by-3-mm) steel channels or C-channels.

- a. Size: 24 inches wide by 18 inches high (600 mm wide by 450 mm high) **OR** As indicated, **as directed**.
- b. Shelf: Fabricated from 0.097-inch- (2.5-mm-) thick, cold-rolled steel sheet; with corners rounded and edges finished smooth; braced with manufacturer's standard brackets.
 - 1) Size: 24 inches wide by 12 inches deep (600 mm wide by 300 mm deep) **OR** As indicated, **as directed**.

17. Accessories:

- a. Sheet Metal Base: Not less than 0.060-inch- (1.5-mm-) thick, cold-rolled steel sheet.
- b. Adjustable Filler Panels: Not less than 0.0598-inch- (1.5-mm-) thick, cold-rolled steel sheet; capable of filling openings from 2 to 12 inches (50 to 300 mm).
- c. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to 1 inch (25 mm) of adjustment, **as directed**.

18. Finish for Uncoated Ferrous Steel: Hot-dip galvanized **OR** Hot-dip galvanized and shop primed for field painting **OR** Shop primed for field painting **OR** Shop coat **OR** Baked-enamel finish **OR** Powder-coated finish, **as directed**, unless otherwise indicated.

- a. Color: As selected from manufacturer's full range.

D. Wire Mesh Ceilings

1. Mesh, Framing, and Stiffeners: Fabricated from same mesh and framing as wire mesh partition panels.
2. Perimeter Partition Supports: 1-1/2-by-1-1/2-by-1/8-inch (38-by-38-by-3-mm) steel angle, with 1/4-inch- (6-mm-) diameter bolt holes aligned for bolting to top of wire mesh partitions and to sides of wire mesh ceiling panels.
3. Wall Supports: 1-1/2-by-1-1/2-by-1/8-inch (38-by-38-by-3-mm) steel angle punched for attachment to wall and wire mesh ceiling panels.
4. Intermediate Supports: Steel I-beam, as recommended by manufacturer.
5. Intermediate Support Posts: 2-by-2-by-1/8-inch (50-by-50-by-3-mm) steel pipe or tubing.
6. Finishes: Match adjacent wire mesh partitions.

E. Wire Mesh Storage Lockers

1. Unit Sizes:
 - a. Width: 36 inches (914 mm) **OR** 48 inches (1219 mm), **as directed**.
 - b. Depth: 36 inches (914 mm) **OR** 48 inches (1219 mm) **OR** 60 inches (1524 mm), **as directed**.
 - c. Height: 90 inches (2286 mm).
2. Mesh: 0.135-inch- (3.5-mm-) diameter, intermediate-crimp steel wire woven into 1-1/2-inch (38-mm) diamond **OR** 1-by-2-inch (25-by-50-mm) rectangular, **as directed**, mesh.
3. Wall Panels: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm) steel angle framing on top, bottom, and back sides, and 3-by-1/8-inch (76-by-3-mm) cold-rolled steel flat bar framing on front side; with wire mesh welded to framing.
 - a. Horizontal Panel Stiffeners: 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm) steel angles or 3/4-by-1/4-inch (19-by-6-mm) hot-rolled steel flat bars.
4. Backs: 0.027-inch- (0.7-mm-) thick, metallic-coated steel sheet.
5. Tops: Fabricated from same mesh and framing as doors **OR** 0.027-inch- (0.7-mm-) thick, metallic-coated steel sheet, **as directed**.
6. Horizontal Dividers/Shelves: 0.043-inch- (1.1-mm-) thick, metallic-coated, **as directed**, steel sheet; with flanged edges and reinforced across width with 3/4-by-1/4-inch (19-by-6-mm) steel stiffeners, **as directed**.
7. Doors: Fabricated from same mesh as wall panels, with framing fabricated from 1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm) steel angles on 4 sides; with wire mesh welded to framing. Include door strike and padlock hasp.
 - a. Horizontal Stiffeners for Single-Tier Doors: 3/4-by-1/4-inch (19-by-6-mm) steel flat bars.

- b. Hinges: Full-surface type, 2-1/2-by-2-1/2-inch (64-by-64-mm) steel, 1-1/2 pairs per single-tier door and 1 pair per double-tier door; bolted, riveted, or welded to door and jamb framing.
 - 8. Finish for Uncoated Ferrous Steel: Hot-dip galvanized **OR** Hot-dip galvanized and shop primed for field painting **OR** Shop primed for field painting **OR** Shop coat **OR** Baked-enamel finish **OR** Powder-coated finish, **as directed**, unless otherwise indicated.
 - a. Color: As selected from manufacturer's full range.
- F. Wire Mesh Stairway Partitions
1. Standard-Duty Stairway Partitions:
 - a. Diamond Mesh: 0.135-inch- (3.5-mm-) diameter, intermediate-crimp steel wire woven into 1-1/2-inch (38-mm) diamond pattern and securely clinched to frames.
 - b. Square Mesh: 0.135-inch- (3.5-mm-) diameter, intermediate **OR** lock, **as directed**,-crimp steel wire woven into 1-1/2-inch (38-mm) square pattern, inserted through frame holes and welded into frame. Vertical wires are plumb, and horizontal wires are perpendicular to vertical wires.
 - c. Rectangular Mesh: 0.135-inch- (3.5-mm-) diameter, intermediate **OR** lock, **as directed**, -crimp steel wire woven into 2-by-1-inch (50-by-25-mm) rectangular pattern, inserted through frame holes and welded into frame. Vertical wires are plumb, and horizontal wires are perpendicular to vertical wires.
 - d. Vertical Panel Framing: 1-1/4-by-5/8-by-0.0966-inch (32-by-16-by-2.5-mm) cold-rolled, C-shaped steel channels; with 1/4-inch- (6-mm-) diameter bolt holes spaced not more than 18 inches (450 mm) o.c. along center of framing.
 - e. Horizontal Panel Framing: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels.
 - f. Horizontal Panel Stiffeners: 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels with wire woven through, or two 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels bolted or riveted toe to toe through mesh.
 2. Heavy-Duty Stairway Partitions:
 - a. Diamond Mesh: 0.192-inch- (4.9-mm-) diameter, intermediate-crimp steel wire woven into 2-inch (50-mm) diamond pattern and securely clinched to frames.
 - b. Square Mesh: 0.192-inch- (4.9-mm-) diameter, intermediate **OR** lock, **as directed**, -crimp steel wire woven into 2-inch (50-mm) square pattern, inserted through frame holes and welded into frame. Vertical wires are plumb, and horizontal wires are perpendicular to vertical wires.
 - c. Rectangular Mesh: 0.192-inch- (4.9-mm-) diameter, intermediate **OR** lock, **as directed**, -crimp steel wire woven into 2-by-1-inch (50-by-25-mm) rectangular pattern, inserted through frame holes and welded into frame. Vertical wires are plumb, and horizontal wires are perpendicular to vertical wires.
 - d. Vertical and Horizontal Panel Framing: 1-1/2-by-3/4-by-0.0966-inch (38-by-19-by-2.5-mm) cold-rolled, C-shaped steel channels; with 3/8-inch- (9.5-mm-) diameter bolt holes spaced not more than 18 inches (450 mm) o.c. along center of framing.
 - e. Horizontal Panel Stiffeners: 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm) cold-rolled steel channels with wire woven through, or two 1-by-1/2-by-1/8-inch (25-by-13-by-3-mm) cold-rolled steel channels bolted or riveted toe to toe through mesh.
 3. Swinging Doors: Fabricated from same mesh as partitions, with framing fabricated from 1-1/2-by-3/4-by-1/8-inch (38-by-19-by-3-mm) steel channels, banded with 1-1/2-by-1/8-inch (38-by-3-mm) flat steel bar cover plates on 3 **OR** 4, **as directed**, sides, and with 1/8-inch- (3-mm-) thick angle strike bar and cover on strike jamb.
 - a. Hinges: Full-surface spring type, 3-1/2-by-3-1/2-inch (89-by-89-mm) steel, 1-1/2 pairs per door; bolted, riveted, or welded to door and jamb framing.
 - b. Exit Device: As specified in Division 08 Section "Door Hardware".
 - c. Tamper Shield: Fabricated from 0.097-inch- (2.5-mm-) thick, cold-rolled steel sheet; 15 inches (381 mm) high by width of door.
 4. Door Jamb Framing: 2-by-2-by-1/8-inch (50-by-50-by-3-mm) steel pipe or tubing.

5. Floor Shoes: Steel, cast iron, or cast aluminum, not less than **2 inches (50 mm)** high; sized to suit vertical framing, drilled for attachment to floor, and with set screws for leveling adjustment.
 6. Wall Clips: Manufacturer's standard, cold-rolled steel sheet; allowing up to **1 inch (25 mm)** of adjustment, **as directed**.
 7. Finish for Uncoated Ferrous Steel: Hot-dip galvanized **OR** Hot-dip galvanized and shop primed for field painting **OR** Shop primed for field painting **OR** Shop coat **OR** Baked-enamel finish **OR** Powder-coated finish, **as directed**, unless otherwise indicated.
 - a. Color: As selected from manufacturer's full range.
- G. Wire Mesh Equipment Barriers
1. Mesh: **0.135-inch- (3.5-mm-)** diameter, intermediate-crimp steel wire woven into **1-1/2-inch (38-mm)** diamond **OR** **1-by-2-inch (25-by-50-mm)** rectangular, **as directed**, mesh.
 2. Panels: **1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm)** steel angle framing on 4 sides, with wire mesh welded to framing.
 - a. Horizontal Panel Stiffeners: **1-1/4-by-1-1/4-by-1/8-inch (32-by-32-by-3-mm)** steel angles or **3/4-by-1/4-inch (19-by-6-mm)** hot-rolled steel flat bars.
 - b. Height: **48 inches (1220 mm)** **OR** **60 inches (1525 mm)**, **as directed**.
 3. Line and Corner Posts: **2-by-2-by-0.068-inch (50-by-50-by-1.7-mm)** steel tubing with steel base plates welded to bottoms, drilled for attachment to floor, and with steel caps welded to tops.
 - a. Height: Panel height plus **12-inch- (300-mm-)**, **as directed**, high, sweep space.
 4. Swinging Gates: Fabricated from same mesh as panels, with gate framing fabricated from **1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-4.7-mm)** steel angles on 4 sides, and with wire mesh welded to framing.
 - a. Hinges: Full-surface spring, **as directed**, type, **3-1/2-by-3-1/2-inch (89-by-89-mm)** steel, 1 pair per door; bolted, riveted, or welded to door and jamb framing.
 - b. Padlock Lug: Mortised into door framing and enclosed with steel cover.
 - c. Cylinder Lock: Mortise type with manufacturer's standard cylinder **OR** cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob **OR** knob **OR** lever, **as directed**, inside.
 5. Sliding Gates: Fabricated from same mesh as panels, with framing fabricated from **1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-4.7-mm)** steel angles on 4 sides, and with wire mesh welded to framing.
 - a. Hardware: Two, four-wheel roller-bearing carriers, box track, and bottom guide channel for each door.
 - b. Padlock Lug: Mortised into door framing and enclosed with steel cover.
 - c. Cylinder Lock: Mortise type with manufacturer's standard cylinder **OR** cylinder specified in Division 08 Section "Door Hardware", **as directed**; operated by key outside and recessed turn knob **OR** knob **OR** lever, **as directed**, inside.
 6. Finish for Uncoated Ferrous Steel: Hot-dip galvanized **OR** Hot-dip galvanized and shop primed for field painting **OR** Shop primed for field painting **OR** Shop coat **OR** Baked-enamel finish **OR** Powder-coated finish, **as directed**, unless otherwise indicated.
 - a. Color: As selected from manufacturer's full range.
- H. Fabrication
1. General: Fabricate wire mesh items from components of sizes not less than those indicated. Use larger-sized components as recommended by wire mesh item manufacturer. As required for complete installation, provide bolts, hardware, and accessories with manufacturer's standard finishes.
 - a. Fabricate wire mesh items to be readily disassembled.
 - b. Welding: Weld corner joints of framing and grind smooth, leaving no evidence of joint **OR** finish sand **OR** remove spatter **OR** leave as applied, **as directed**.
 2. Standard- and Heavy-Duty Wire Mesh Partitions: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 - a. Mesh: Securely clinch mesh to framing.

- b. Framing: Fabricate framing with mortise and tenon corner construction.
 - 1) Provide horizontal stiffeners as indicated or, if not indicated, as required by panel height and as recommended by wire mesh partition manufacturer. Weld horizontal stiffeners to vertical framing.
 - 2) Fabricate three- and four-way intersections using intersection posts **OR** manufacturer's standard connecting clips and fasteners, **as directed**.
 - 3) Fabricate partition and door framing with slotted holes for connecting adjacent panels.
- c. Fabricate wire mesh partitions with **3 inches (76 mm)** of clear space between finished floor and bottom horizontal framing.
- d. Fabricate wire mesh partitions with bottom horizontal framing flush with finished floor.
- e. Doors: Align bottom of door with bottom of adjacent panels.
 - 1) For doors that do not extend full height of partition, provide transom over door, fabricated from same mesh and framing as partition panels.
- f. Hardware Preparation: Mortise, reinforce, drill, and tap doors and framing as required to install hardware.
3. Wire Mesh Ceilings: Fabricate wire mesh partitions with cutouts for pipes, ducts, beams, and other items indicated. Finish edges of cutouts to provide a neat, protective edge.
 - a. Mesh: Securely clinch mesh to framing.
 - b. Framing: Fabricate framing with mortise and tenon corner construction.
 - 1) Provide stiffeners as indicated or, if not indicated, as required by panel span and as recommended by wire mesh ceiling manufacturer. Weld stiffeners to framing.
4. Wire Mesh Stairway Partitions: Provide door jamb framing on each side of doors. Attach tamper shields centered behind exit devices.
5. Wire Mesh Storage Lockers: Fabricate initial storage locker with front and two sides. Fabricate additional storage lockers similarly, so each unit is independent **OR** as add-on units, designed to share one side with initial storage locker, **as directed**.
 - a. Fabricate wall panel and door framing with slotted holes for connecting adjacent panels.
 - b. Prehang doors in factory.
- I. General Finish Requirements
 1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- J. Steel And Iron Finishes
 1. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - a. ASTM A 123/A 123M, for galvanizing steel and iron components.
 - b. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
 - c. Preparation for Shop Priming: After galvanizing, thoroughly clean wire mesh components of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.
 2. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
 - a. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
 3. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.

4. Shop Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard one-coat, shop-coat finish suitable for use intended. Comply with paint manufacturer's written instructions for applying and curing.
 - a. Color and Gloss: As selected from manufacturer's full range.
5. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish, suitable for use indicated, consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat.
 - a. Color and Gloss: As selected from manufacturer's full range.

1.3 EXECUTION

A. Wire Mesh Partitions Erection

1. Anchor wire mesh partitions to floor with **3/8-inch- (9.5-mm-)** diameter, postinstalled expansion anchors at **12 inches (305 mm)** o.c. through anchor clips located at each post and corner. Shim anchor clips as required to achieve level and plumb installation.
2. Anchor wire mesh partitions to floor with **3/8-inch- (9.5-mm-)** diameter, postinstalled expansion anchors at **12 inches (305 mm)** o.c. through floor shoes located at each post and corner. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.
3. Anchor wire mesh partitions to walls at **12 inches (305 mm)** o.c. through back corner panel framing and as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - e. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
4. Secure top capping bars to top framing channels with **1/4-inch- (6-mm-)** diameter "U" bolts spaced not more than **28 inches (700 mm)** o.c.
5. Provide line posts at locations indicated or, if not indicated, as follows:
 - a. On each side of sliding door openings.
 - b. For partitions that are **7 to 9 feet (2.1 to 2.7 m)** high, spaced at **15 to 20 feet (4.6 to 6.1 m)** o.c.
 - c. For partitions that are **10 to 12 feet (3.0 to 3.7 m)** high, located between every other panel.
 - d. For partitions that are more than **12 feet (3.7 m)** high, located between each panel.
6. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.
7. Where standard-width wire mesh partition panels do not fill entire length of run, provide adjustable filler panels to fill openings.
8. Install doors complete with door hardware.
9. Install service windows complete with window hardware.
10. Weld or bolt sheet metal bases to wire mesh partitions and doors **OR** where indicated, **as directed**.
11. Bolt accessories to wire mesh partition framing.

B. Wire Mesh Ceilings Erection

1. Anchor wall support angle to walls at **12 inches (305 mm)** o.c. and as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

- b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - e. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
2. Attach wire mesh ceiling panels to wall support angles with bolts at **12 inches (305 mm)** o.c.
 3. Attach wire mesh ceiling panels to wire mesh partitions with slotted angles bolted to sides of ceiling panels and to top of partitions at **12 inches (305 mm)** o.c.
 4. Attach wire mesh ceiling panels to intermediate supports as recommended by manufacturer.
 5. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.
- C. Wire Mesh Storage Lockers Erection
1. Anchor wire mesh storage lockers to floor with **3/8-inch- (9.5-mm-)** diameter, expansion anchors at **12 inches (305 mm)** o.c. through bottom panel framing. Shim panel framing as required to achieve level and plumb installation.
 2. Anchor wire mesh storage lockers to walls at **12 inches (305 mm)** o.c. through back corner panel framing and as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed gypsum board assemblies, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - e. For steel-framed gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.
 3. Attach adjacent wire mesh storage lockers to each other through side panel framing.
 4. Install horizontal dividers/shelving in double-tier storage lockers.
 5. Install doors complete with door hardware.
- D. Wire Mesh Stairway Partitions Erection
1. Anchor wire mesh stairway partitions to floor with **3/8-inch- (9.5-mm-)** diameter, postinstalled expansion anchors at **12 inches (305 mm)** o.c. through floor shoes located at each post. Adjust wire mesh partition posts in floor shoes to achieve level and plumb installation.
 2. Anchor angle clips supporting wire mesh stairway partitions at stairs and intermediate landings with **3/8-inch- (9.5-mm-)** diameter, postinstalled expansion anchors at **12 inches (305 mm)** o.c. Weld stairway partition framing to angle clips.
 3. Provide seismic supports and bracing as indicated or, if not indicated, as recommended by manufacturer and as required for stability, extending and fastening members to supporting structure.
 4. Install doors complete with door hardware.
- E. Wire Mesh Equipment Barriers Erection
1. Anchor wire mesh equipment barriers to floor with **3/8-inch- (9.5-mm-)** diameter, expansion anchors through post bases. Shim post bases as required to achieve level and plumb installation.
 2. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if indicated on Shop Drawings.
 3. Install gates complete with gate hardware.

10 - Specialties



F. Adjusting And Cleaning

1. Adjust doors **OR** gates **OR** service windows, **as directed**, to operate smoothly and easily, without binding or warping. Adjust hardware to function smoothly. Confirm that latches and locks engage accurately and securely without forcing or binding.
2. Remove and replace defective work including doors and framing that are warped, bowed, or otherwise unacceptable.
3. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
4. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 10 22 13 00

SECTION 10 22 19 13 - DEMOUNTABLE PARTITIONS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for demountable partitions. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Demountable site-assembled partitions.
 - b. Demountable unitized-panel partitions.

C. Performance Requirements

1. Structural Performance: Provide demountable partitions capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - a. Load-Bearing Capacity of Panel System: Not less than **300-lb (136-kg concentrated) OR 2.3-lb/linear inch (0.041-kg/linear mm)** distributed, **as directed**, proof load when tested according to BIFMA X 5.6, Section 6, Table 1.
 - b. Transverse-Load Capacity of Panel System: Lateral deflection of not more than 1/120 **OR 1/240, as directed**, of the overall span when tested under a uniformly distributed load of **5 lb/sq. ft. (24.4 kg/sq. m)** according to ASTM E 72.
 - c. Seismic Performance: Provide demountable partitions capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For demountable partitions. Include plans, elevations, sections, details, and attachments to other work.
3. Samples: For each type of exposed finish required.
4. Product Test Reports.
5. Maintenance Data.

E. Quality Assurance

1. Sound Transmission Characteristics: Where STC ratings are indicated, provide partitions with STC rating that was determined by testing an identical system according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
2. Fire-Test-Response Characteristics: Provide demountable partitions complying with the following requirements:
 - a. Where indicated, provide demountable partitions identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or a testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1) Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - b. Surface-Burning Characteristics: Provide demountable partitions per ASTM E 84:
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 450 or less.
3. Fire-Rated Door and Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated.
 - a. Test Pressure:

- 1) Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
OR
Test according to NFPA 252 or UL 10C. After 5 minutes into the test, neutral pressure level in furnace shall be established at **40 inches (1016 mm)** or less above the sill.
- b. As scheduled on Drawings.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Demountable Site-Assembled Partitions

1. Face Panels: Manufacturer's standard **OR** Gypsum board, ASTM C 36/C 36M **OR** Wood composite **OR** Fiber composite **OR** Steel-sheet-faced gypsum board, ASTM C 36/C 36M **OR** Stainless-steel-sheet-faced gypsum board, ASTM C 36/C 36M, **as directed**.
 - a. Thickness: Manufacturer's standard **OR 1/2 inch (13 mm) OR 5/8 inch (16 mm) OR 3/4 inch (19 mm), as directed**.
 - b. Width: Manufacturer's standard **OR 24 inches (610 mm) OR 30 inches (762 mm) OR** As indicated, **as directed**.
 - c. Finish: Unfinished **OR** Manufacturer's standard prime-coat finish ready for field painting **OR** Vinyl wall covering complying with CFFA-W-101-A **OR** Fabric **OR** Factory-applied paint finish **OR** Powder-coat finish **OR** No. 4 satin, **as directed**.
 - d. Colors, Textures, and Patterns: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
2. Accessory Panels: Manufacturer's standard fabric-covered tackable panels **OR** porcelain-enamel chalkboard and markerboard panels, **as directed**.
3. Framing: Studs, top and bottom track, **2-1/2 inches (64 mm) OR 4 inches (102 mm) OR** manufacturer's standard, **as directed**, deep.
 - a. Steel: Metallic-coated, **0.0359-inch (0.912-mm)** base metal thickness.
 - b. Aluminum.
 - c. Fiberglass.
4. Panel Joint Closure: Manufacturer's standard **OR** Vinyl **OR** Aluminum **OR** Steel, **as directed**.
5. Trim: Continuous, factory-finished, snap-on type; adjustable for variations in floor level **OR** floor and ceiling levels, **as directed**.
 - a. Outside Corner Trim: Square **OR** Radiused, **as directed**.
 - b. Base: Snap-on vinyl **OR** metal, **as directed**.
 - c. Base Trim Profile: Recessed **OR** Projected **OR** Flush, **as directed**.
 - d. Ceiling Trim Profile: Recessed **OR** Projected, **as directed**.
 - e. Cornice Trim: Continuous over tops of partial-height units for maximum stability.
 - f. Exposed-Metal Trim Finish: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - g. Trim Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
6. Doors: As specified in Division 12.
7. Door Frames: Manufacturer's standard steel **OR** aluminum, **as directed**, reversible, **as directed**, factory mortised to receive hardware, **as directed**, for **1-3/4-inch (45-mm)** doors.
 - a. Frame Finishes: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - b. Frame Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.

8. Fire-Protection Rating of Rated Door Assemblies: Labeled 20 **OR** 45, **as directed**, minutes.
 9. Hardware: As specified in Division 08 Section "Door Hardware".
 10. Glazing Frames: Manufacturer's standard **OR** Match door frames, **as directed**, for glazing thickness indicated.
 - a. Frame Finishes: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - b. Frame Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 11. Glazing: Fully tempered clear float glass **OR** Laminated clear float glass **OR** Glass type indicated, **as directed**, complying with Division 08 Section "Glazing".
 12. Acoustical Rating: STC 35, unless directed otherwise.
 13. Fire-Resistance Rating of Partition Assemblies: 1 hour.
 14. Seals: Manufacturer's standard **OR** Open cell, **2 lb/cu. ft. (32 kg/cu. m)**, **as directed**.
- B. Demountable Unitized-Panel Partitions**
1. Panels: Manufacturer's standard **OR** Gypsum board, ASTM C 36/C 36M **OR** Wood composite **OR** Fiber composite **OR** Steel-sheet-faced gypsum board, ASTM C 36/C 36M **OR** Stainless-steel-sheet-faced gypsum board, ASTM C 36/C 36M, **as directed**.
 - a. Type: Unfinished **OR** Factory finished **OR** Metal faced, **as directed**.
 - b. Thickness: Manufacturer's standard **OR** 1-3/4 inches (45 mm) **OR** 2-1/4 inches (57 mm), **as directed**.
 - c. Width: Manufacturer's standard **OR** 24 inches (610 mm) **OR** 30 inches (762 mm) **OR** As indicated, **as directed**.
 - d. Finish: Vinyl wall covering complying with CFFA-W-101-A **OR** Fabric **OR** Factory-applied paint finish **OR** Powder-coat finish **OR** Stainless steel, **as directed**.
 - e. Colors, Textures, and Patterns: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 2. Accessory Panels: Manufacturer's standard fabric-covered tackable panels **OR** porcelain-enamel chalkboard and markerboard panels, **as directed**.
 3. Framing: Manufacturer's standard **OR** Steel **OR** Aluminum, **as directed**.
 - a. Frame Finishes: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - b. Frame Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 4. Panel Joint Closure: Manufacturer's standard **OR** Flush **OR** Vinyl **OR** Aluminum **OR** Steel, **as directed**.
 5. Trim: Continuous, factory-finished, snap-on type; adjustable for variations in floor level **OR** floor and ceiling levels, **as directed**.
 - a. Base Trim Profile: Recessed **OR** Projected **OR** Flush, **as directed**.
 - b. Ceiling Trim Profile: Recessed **OR** Projected, **as directed**.
 - c. Cornice Trim: Continuous over tops of partial-height units for maximum stability.
 - d. Exposed-Metal Trim Finish: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - e. Colors: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
 6. Doors: Manufacturer's standard solid-core wood **OR** steel **OR** glazed, **as directed**, 1-3/4 inches (45 mm) thick.
 - a. Door Finishes: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - b. Door Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.

7. Door Frames: Manufacturer's standard steel **OR** aluminum, **as directed**, reversible, **as directed**, factory mortised to receive hardware, **as directed**, for **1-3/4-inch (45-mm)** doors.
 - a. Frame Finishes: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - b. Frame Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
8. Hardware: As specified in Division 08 Section "Door Hardware".
9. Glazing Frames: Manufacturer's standard **OR** Match door frames, **as directed**, for glazing thickness indicated.
 - a. Frame Finishes: Factory-applied paint finish **OR** Clear-anodized aluminum; AAMA 611, AA-M12C22A31, Class II **OR** Color-anodized aluminum; AAMA 611, AA-M12C22A32/A34, Class II **OR** Manufacturer's standard prime-coat finish ready for field painting, **as directed**.
 - b. Frame Color: As indicated by manufacturer's designations **OR** Match samples **OR** As selected from manufacturer's full range, **as directed**.
10. Glazing: Fully tempered clear float glass **OR** Laminated clear float glass **OR** Glass type indicated, **as directed**, complying with Division 08 Section "Glazing".
11. Acoustical Rating: STC 35, unless directed otherwise.
12. Seals: Manufacturer's standard **OR** Open cell, **2 lb/cu. ft. (32 kg/cu. m)**, **as directed**.

C. Fabrication

1. Demountable Site-Assembled Panels: Fabricate each panel from one sheet **OR** two sheets, **as directed**, of gypsum board.
 - a. Transom Panels: Fabricate in material and finish to match wall panels, unless otherwise indicated.
2. Demountable Unitized Panels: Factory-assembled, flush, hollow unit construction; with faces smooth and free of buckles, oil canning, and seams; and insulated with solidly packed, inorganic, mineral filler. Fabricate panels for installation with concealed fastening devices and pressure-fit components that will not damage ceiling or floor coverings. Fabricate panels with continuous light-and-sound seals at floor, ceiling, and other locations where panels abut fixed construction.
 - a. Factory glaze panels to the greatest extent possible.
3. Components: Fabricate components for installation with concealed fastening devices and pressure-fit members that will not damage ceiling or floor coverings. Fabricate for installation with continuous seals at floor, ceiling, and other locations where partition assemblies abut fixed construction and for installation of sound attenuation insulation in partition cavities.

D. Finishes, General

1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Installation

1. Install demountable partition systems rigid, level, plumb, and aligned. Install seals to prevent light and sound transmission at connections to floors, ceilings, fixed walls, and abutting surfaces.
 - a. Installation Tolerance: Install each demountable partition so surfaces vary not more than **1/8 inch (3 mm)** from the plane formed by the faces of adjacent partitions.
2. Do not alter ceiling suspension system **OR** Make alterations to ceiling suspension system required by partition installation or to gain access to electrical or communication systems without

- affecting the structural integrity of ceiling suspension system. Make alterations so they are not noticeable after panel installation, **as directed**.
3. Install door-and-frame and glazing-and-glazing-frame assemblies securely anchored to partitions and with doors aligned and fitted. Install and adjust door hardware for proper operation.
 - a. Install fire-rated door frames according to NFPA 80.

END OF SECTION 10 22 19 13

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Task	Specification	Specification Description
10 22 19 43	10 22 19 13	Demountable Partitions
10 22 19 53	10 22 19 13	Demountable Partitions
10 22 23 23	10 22 19 13	Demountable Partitions

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SECTION 10 22 43 00 - OPERABLE PANEL PARTITIONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for operable panel partitions. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Manually operated, acoustical panel partitions.
 - b. Electrically operated, acoustical panel partitions.
 - c. Manually operated, fire-rated panel partitions.
 - d. Manually operated, glass panel partitions.

C. Definitions

1. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."
2. Glass and Glazing Definitions: See Division 08 Section "Glazing".
3. NIC: Noise Isolation Class.
4. NRC: Noise Reduction Coefficient.
5. STC: Sound Transmission Class.

D. Performance Requirements

1. Delegated Design: Design operable panel partitions, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the panels will remain in place without separation of any parts from the system when subjected to the seismic forces specified."
3. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - a. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
 - b. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.
 - c. Acoustical Performance Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for 10 dB less than STC value indicated.
4. Fire Resistance: Provide fire-rated operable panel partition assemblies including pass doors with fire-resistance ratings indicated.
 - a. Pass Doors: Provide doors in fire-rated operable panel partition assemblies with fire-resistance ratings indicated. Pass doors shall meet positive-pressure requirements.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:

- a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that operable panel partitions comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- b. Product Data for Credit EQ 4.4: For each composite wood product used in operable panel partitions, documentation indicating that product contains no urea formaldehyde.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. For installed products indicated to comply with design loads, include structural analysis data for attachments, signed and sealed by the qualified professional engineer responsible for their preparation.
 - b. Indicate storage and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
 - c. Wiring Diagrams: For power, signal, and control wiring.
4. Samples: For each type of exposed material, finish, covering, or facing indicated.
5. Delegated-Design Submittal: For operable panel partitions indicated to comply with performance requirements, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Design Calculations: Calculate requirements for seismic restraints.
6. Coordination Drawings: Reflected ceiling plans, drawn to scale, and coordinated with each other, based on input from installers of the items involved:
7. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.
8. Seismic Qualification Certificates: For operable panel partitions, accessories, and components, from manufacturer.
9. Product Certificates.
10. Product Test Reports.
11. Field quality-control reports.
12. Operation and Maintenance Data.
13. Warranty: Sample of special warranty.

F. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
2. Installer Qualifications: An employer of workers trained and approved by manufacturer.
3. Forest Certification: Fabricate products with wood, wood veneers, and wood-based panel products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
4. Fire-Test-Response Characteristics: Provide panels with finishes meeting one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - 1) Flame-Spread Index: 25 or less **OR** 26 to 75 **OR** 76 to 200, **as directed**.
 - 2) Smoke-Developed Index: 450 or less.
 - b. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 **OR** NFPA 286, **as directed**.
5. Fire-Rated Door Assemblies: Comply with NFPA 80, based on testing according to UL 10B.
 - a. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
7. Preinstallation Conference: Conduct conference at Project site.

G. Delivery, Storage, And Handling

1. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within two years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Steel Frame: Steel sheet, manufacturer's standard **OR 0.0508-inch (1.3-mm) OR 0.0641-inch (1.6-mm) OR 0.0747-inch (1.9-mm), as directed**, nominal minimum thickness for uncoated steel.
2. Steel Face/Liner Sheets: Tension-leveled steel sheet, manufacturer's standard **OR** minimum **0.0299-inch (0.75-mm) OR 0.0359-inch (0.9-mm) OR 0.0478-inch (1.2-mm) OR 0.0598-inch (1.5-mm) OR 0.0747-inch (1.9-mm), as directed**, nominal minimum thickness for uncoated steel.
3. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; **ASTM B 221 (ASTM B 221M)** for extrusions; manufacturer's standard strengths and thicknesses for type of use.
 - a. Frame Reinforcement: Manufacturer's standard steel or aluminum.
4. Wood Frame: Clear, vertical-grain, straight, kiln-dried, wood **OR** fire-retardant-treated wood, **as directed**; of manufacturer's standard species **OR** one of the following species, **as directed**:
 - a. Cherry.
 - b. Hemlock.
 - c. Maple.
 - d. Meranti.
 - e. Poplar.
 - f. Red oak.
5. Gypsum Board: ASTM C 36/C 36M.
6. Cement Board: ASTM C 1288.
7. Plywood: DOC PS 1.
8. Particleboard: ANSI A208.1, made with binder containing no urea formaldehyde.
9. Medium-Density Fiberboard: ANSI A208.2, made with binder containing no urea formaldehyde.

B. Operable Acoustical Panels

1. Operable Acoustical Panels: Operable acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
2. Panel Operation: Manually operated, individual **OR** Manually operated, paired **OR** Manually operated, continuously hinged **OR** Electrically operated, continuously hinged, **as directed**, panels.
3. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
4. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - a. Panel Width: Standard widths **OR** Equal widths **OR** As indicated, **as directed**.
5. STC: Not less than 38 **OR** 41 **OR** 45 **OR** 47 **OR** 50 **OR** 52 **OR** 54, **as directed**.
6. NRC: Not less than 0.50 **OR** 0.60 **OR** 0.65 **OR** 0.90, **as directed**.
7. Panel Weight: **8 lb/sq. ft. (40 kg/sq. m) OR 10 lb/sq. ft. (50 kg/sq. m) OR 12 lb/sq. ft. (59 kg/sq. m), as directed**, maximum.
8. Panel Thickness: Not less than **3 inches (75 mm) OR 3-1/2 inches (89 mm) OR 4 inches (102 mm), as directed**.

9. Panel Closure: Manufacturer's standard.
 - a. Initial Closure: Flexible, resilient PVC, bulb-shaped acoustical seal **OR** Fixed jamb **OR** As indicated, **as directed**.
 - b. Final Closure: Constant-force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal **OR** Hinged jamb closure **OR** Hinged communicating panel **OR** Fixed jamb **OR** Angle jamb **OR** Flexible, resilient PVC, bulb-shaped acoustical seal, **as directed**.
 10. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
 - a. Hinges: Manufacturer's standard **OR** Concealed (invisible), **as directed**.
 - b. Exit Device: Manufacturer's standard.
- C. Operable Fire-Rated Panels
1. Operable Fire-Rated Panels: Operable fire-rated acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
 2. Panel Operation: Manually operated, individual **OR** Manually operated, paired, **as directed**, panels.
 3. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
 4. Dimensions: Fabricate operable fire-rated panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - a. Panel Width: Standard widths **OR** Equal widths **OR** As indicated, **as directed**.
 5. Fire Rating: 1 hour **OR** 2 hours, **as directed**.
 6. STC: Not less than 38 **OR** 41 **OR** 45 **OR** 47 **OR** 50 **OR** 52 **OR** 54, **as directed**.
 7. NRC: Not less than 0.50 **OR** 0.60 **OR** 0.65 **OR** 0.90, **as directed**.
 8. Panel Weight: 8 lb/sq. ft. (40 kg/sq. m) **OR** 10 lb/sq. ft. (50 kg/sq. m) **OR** 12 lb/sq. ft. (59 kg/sq. m), **as directed**, maximum.
 9. Panel Thickness: Not less than 3 inches (75 mm) **OR** 3-1/2 inches (89 mm) **OR** 4 inches (102 mm), **as directed**.
 10. Panel Closure: Manufacturer's standard fire-rated closure.
 - a. Initial Closure: Flexible, resilient PVC, bulb-shaped acoustical seal **OR** Fixed jamb **OR** As indicated, **as directed**.
 - b. Final Closure: Fire-rated, constant-force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal **OR** hinged jamb closure **OR** hinged communicating panel **OR** fixed jamb **OR** angle jamb **OR** flexible, resilient PVC, bulb-shaped acoustical seal, **as directed**.
 11. Hardware: Manufacturer's standard as required to operate fire-rated operable panel partition and accessories; with decorative, protective finish.
 - a. Hinges: Manufacturer's standard **OR** Concealed (invisible), **as directed**.
 - b. Exit Device: Manufacturer's standard.
- D. Operable Glass Panels
1. Operable Glass Panels: Operable frameless aluminum **OR** aluminum-framed **OR** wood-framed, **as directed**, glass panel partition system with acoustical properties, **as directed**, including panels, seals, **as directed**, suspension system, operators, and accessories.
 2. Panel Operation: Manually operated, individual **OR** Manually operated, paired **OR** Manually operated, continuously hinged, **as directed**, panels.
 3. Panel Construction: Manufacturer's standard glazed panels, reinforced as required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

- a. Factory-Glazed Fabrication: Glaze operable glass panels in the factory where practical and possible for applications indicated. Comply with manufacturer's written requirements and with requirements in Division 08 Section "Glazing".
4. Glass and Glazing:
 - a. Safety Glass: Provide glass products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.
 - b. Glass: Manufacturer's standard **OR** Custom, **as directed**, glass and glass assemblies as indicated and complying with the following:
 - 1) Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Type I (transparent flat glass), Class 1 (clear) **OR** Class 2 (tinted), **as directed**, Quality-Q3.
 - 2) Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.
 - 3) Laminated Glass: ASTM C 1172, with clear **OR** colored **OR** patterned **OR** graphic, **as directed**, interlayer.
 - a) Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), Class 1 (clear) **OR** Class 2 (tinted), **as directed**, Quality-Q3.
 - b) Patterned Glass: ASTM C 1036, Type II (patterned and wired flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.
 - 4) Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass as indicated, separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units.
 - a) Spacer Specifications: Manufacturer's standard spacer material and construction.
 - b) Spacer Specifications: Manufacturer's standard spacer construction and material as follows: Aluminum with mill or clear anodic finish **OR** Aluminum with black, color anodic finish **OR** Aluminum with bronze, color anodic finish **OR** Aluminum with powdered-metal paint finish in color selected **OR** Galvanized steel **OR** Stainless steel, **as directed**.
 - 5) Glass Thickness: Manufacturer's standard thickness for indicated requirements **OR** As indicated **OR 1/4 inch (6 mm) OR 3/8 inch (10 mm) OR 1 inch (25 mm) OR 2-1/4 inches (57 mm), as directed**.
 - 6) Glass Vertical Edge: Polished **OR** Manufacturer's standard, permanently adhered edge trim, **as directed**.
 - c. Glazing System: Manufacturer's standard factory-glazing system **OR** Manufacturer's standard factory-glazing system that produces acoustical seal **OR** Manufacturer's standard factory-glazing system as indicated, **as directed**.
5. Dimensions: Fabricate operable glass panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
 - a. Panel Width: Standard widths **OR** Equal widths **OR** As indicated, **as directed**.
6. STC: Not less than 36 **OR** 41 **OR** 46 **OR** 48, **as directed**.
7. Panel Weight: 8 lb/sq. ft. (40 kg/sq. m) **OR** 20 lb/sq. ft. (98 kg/sq. m), **as directed**, maximum.
8. Panel Frame Thickness: Maximum 1-7/8 inches (48 mm) **OR** 2-1/4 inches (57 mm) **OR** 3-3/4 inches (96 mm), **as directed**.
9. Panel Closure: Manufacturer's standard.
10. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
11. Finishes:
 - a. Exposed Metal: Match sample **OR** As selected from manufacturer's full range, **as directed**, as follows:
 - 1) Aluminum: Clear anodized **OR** Light bronze anodized **OR** Medium bronze anodized **OR** Dark bronze anodized **OR** Black anodized **OR** Baked powder coating, **as directed**.

- 2) Metal-Clad Aluminum: Satin stainless steel **OR** Polished stainless steel **OR** Satin brass **OR** Polished brass **OR** Satin bronze **OR** Polished bronze, **as directed**.
- b. Wood Finish: Match sample **OR** As selected from manufacturer's full range, **as directed**, as follows:
 - 1) Type: Transparent finish **OR** Transparent finish over stain, **as directed**, over wood variety indicated.

E. Seals

- 1. General: Provide types of seals indicated that produce operable panel partitions complying with acoustical and fire-resistive performance requirements, **as directed**, and the following:
 - a. Manufacturer's standard seals.
 - b. Seals made from materials and in profiles that minimize sound leakage.
 - c. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
- 2. Vertical Seals: Deep-nesting, interlocking steel, **as directed**, astragals mounted on each edge of panel, with continuous PVC acoustical seal.
- 3. Horizontal Top Seals:
 - a. Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track.
OR
PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.
OR
Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track or PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.
- 4. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.
 - a. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 4 inches (102 mm) OR 6 inches (152 mm)**, **as directed**, between retracted seal and floor finish.
OR
Mechanically Operated for Fire-Rated Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 4 inches (102 mm)**, **as directed**, between retracted seal and floor finish.
OR
Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, between retracted seal and floor finish.

F. Finish Facing

- 1. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
 - a. Apply facings **OR** one-piece, seamless facings, **as directed**, free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, and **OR** with invisible seams complying with Shop Drawings for location, and, **as directed**, with no gaps or overlaps. Horizontal butted edges **OR** seams, **as directed**, are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.

- b. Where facings with directional or repeating patterns or directional weave **OR** directional, repeating, or matching grain, **as directed**, are indicated, mark facing top and attach facing in same direction.
 - c. Match facing pattern **72 inches (1830 mm)** above finished floor.
 - d. Color/Pattern: Match samples **OR** As selected from manufacturer's full range, **as directed**.
 2. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.
 - a. Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts.
 3. Carpet Wall Covering: Manufacturer's standard nonwoven, needle-punched carpet with fibers fused to backing, from same dye lot, treated to resist stains.
 4. Fabric Wall Covering: Manufacturer's standard fabric **OR** 100 percent polyolefin woven fabric, **as directed**, from same dye lot, treated to resist stains.
 5. High-Pressure Decorative Laminate: NEMA LD 3, Horizontal grade.
 6. Wood Veneer: Laminated to noncombustible **OR** fire-retardant-treated wood, **as directed**, core with moisture-resistant adhesive, of wood species indicated.
 - a. Wood Finish: Match sample **OR** As selected from manufacturer's full range, **as directed**, as follows:
 - 1) Type: Transparent finish **OR** Transparent finish over stain, **as directed**, over wood variety indicated.
 7. Paint: Manufacturer's standard factory-painted finish.
 - a. Color: As indicated **OR** As selected, **as directed**.
 8. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing, finished as follows:
 - a. Steel, Painted: Finished with manufacturer's standard neutral color **OR** Matching sample **OR** As selected from manufacturer's full range, **as directed**.
 - b. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper required to comply with performance requirements; and with manufacturer's standard mill **OR** clear anodic **OR** color anodic, **as directed**, finish.
 9. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.
- G. Suspension Systems
1. Suspension Tracks: Steel or aluminum mounted directly to overhead structural support, **OR** with adjustable steel hanger rods for overhead support, **as directed**, designed for type of operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than **0.10 inch (2.54 mm)** between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
 - a. Panel Guide: Aluminum; finished with factory-applied, decorative, protective finish.
 - b. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish **OR** primed for field finish, **as directed**.
 2. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.
 - a. Multidirectional Carriers: Capable of negotiating 90-degree L, T, and X intersections without track switches.
 3. Track Intersections, Switches, and Accessories: As required for type of operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.
 - a. Curve-and-Diverter Switches: Allowing radius turns to divert panels to an auxiliary track.
 - b. L Intersections: Allowing panels to change 90 degrees in direction of travel.
 - c. T Intersections: Allowing panels to pass through or change 90 degrees to another direction of travel.

- d. X Intersections: Allowing panels to pass through or change travel direction full circle in 90-degree increments, and allowing 1 partition to cross track of another.
 - e. Multidirectional Switches: Adjustable switch configuring track into L, T, or X intersections and allowing panels to be moved in all pass-through, 90-degree change, and cross-over travel direction combinations.
 - f. Center carrier stop.
 4. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.
 5. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.
- H. Electric Operators
1. General: Provide factory-assembled electric operation system of size and capacity recommended and provided by operable panel partition manufacturer for partition specified; with electric motor and factory-prewired motor controls, speed reducer, chain drive, remote-control stations, control devices, and accessories required for proper operation. Include wiring from motor control to motor. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
 2. Comply with NFPA 70.
 3. Control Equipment: Complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.
 4. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:
 - a. Voltage: 120 V **OR** 208-220 V **OR** NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected, **as directed**.
 - b. Horsepower: 1/4 **OR** 1/3 **OR** 3/4 **OR** Manufacturer's standard, **as directed**.
 - c. Efficiency: Standard **OR** Premium, **as directed**.
 - d. Enclosure: Open dripproof **OR** Totally enclosed **OR** Manufacturer's standard, **as directed**.
 - e. Duty: Continuous duty at ambient temperature of **105 deg F (40 deg C)** and at altitude of **3300 feet (1005 m)** above sea level.
 - f. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - g. Phase: Single **OR** Polyphase, **as directed**.
 5. Remote-Control Stations: Two single-key-operated, constant-pressure control stations located remotely from each other on opposite sides and opposite ends of partition run. Wire in series to require simultaneous activation of both key stations to operate partition. Each three-position control station labeled "Open," "Close," and "Off **OR** Stop, **as directed**." Provide two keys per station.
 6. Obstruction-Detection Devices: Provide each motorized operable panel partition with automatic safety sensor indicated, that causes operator to immediately shut off motor **OR** stop and reverse direction, **as directed**.
 - a. Sensor Edge: Contact-pressure-sensitive safety edge along partition's leading edge.
 - b. Sensor Mat: Electrically operated, contact-weight-sensitive safety mat in storage pocket area.
 - c. Infrared Sensor System: Designed to detect an obstruction in partition's path and sound an audible alarm, without obstruction contacting partition.
 7. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop operable panel partition at fully extended and fully stacked positions.
 8. Emergency Release Mechanism: Quick disconnect-release of electric-motor drive system, permitting manual operation in event of operating failure.
- I. Accessories
1. Pass Doors: Fabricated to comply with recommendations in ICC/ANSI A117.1 **OR** the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines, **as directed**. Swinging door built into and matching panel materials, **OR** construction, **OR**

acoustical qualities, **OR** fire rating, **as directed**, finish, and thickness, complete with frames and operating hardware. Hinges finished to match other exposed hardware.

- a. Single Pass Door: **36 by 80 inches (914 by 2032 mm) OR 36 by 84 inches (914 by 2134 mm), as directed**, with the following:
 - b. Double Pass Door: **72 by 80 inches (1829 by 2032 mm) OR 72 by 84 inches (1829 by 2134 mm), as directed**, with the following:
 - 1) Door Seals: Mechanically operated floor seal on panels containing pass doors **OR** Sweep floor seals, **as directed**.
 - 2) Panic **OR** Fire, **as directed**, exit device.
 - 3) Concealed door closer.
 - 4) Door Viewer: Installed with view in direction of swing.
 - 5) Exit Sign: Recessed, self-illuminated.
 - 6) Latchset: Passage set.
 - 7) Lock: Key-operated lock cylinder, keyed to master key system, **as directed**, operable from both sides of door. Include two keys per lock.

OR

 Lock: Deadlock to receive cylinder, operable from both sides of door. Refer to Division 12 for lock cylinder and keying requirements.
2. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware and acoustical seals at soffit, floor, and jambs, **as directed**. Hinges in finish to match other exposed hardware.
- a. Manufacturer's standard method to secure storage pocket door in closed position.

OR

 Rim Lock: Key-operated lock cylinder, keyed to master key system, **as directed**, to secure storage pocket door in closed position. Include two keys per lock.

OR

 Rim Lock: Deadlock to receive cylinder, to secure storage pocket door in closed position. Refer to Division 12 for lock cylinder and keying requirements.
3. Electric Interlock: Provide each motorized operable panel partition with electric interlocks at locations indicated, to prevent operation of operable panel partition under the following conditions:
 - a. On storage pocket door, to prevent operation if door is not in fully open position.
 - b. On partitions at location of convergence by another partition, to prevent operation if merging partitions are in place.
4. Windows: Manufacturer's standard **OR** As indicated, **as directed**.
5. Work Surfaces: Quantities, placement, and size indicated.
 - a. Surface: Porcelain steel marker/projection surface **OR** Self-healing, tackable, vinyl-coated fabric wall covering, complying with CFFA-W-101-D, Type II, and indicated fire-test-response characteristics; laminated to natural cork tackboard, **as directed**.
 - b. Surface Color: Matching sample **OR** As selected from manufacturer's full range, **as directed**.
 - c. Size: Full width and height of panel **OR** Full width of panel by **48 inches (1219 mm) OR 48 by 48 inches (1219 by 1219 mm) OR** As indicated on Drawings, **as directed**.
 - d. Trim: Aluminum slip-on or snap-on trim with no visible screws or exposed joints and with corners mitered to a neat, hairline joint.
6. Chalk Tray and Eraser Pocket, **as directed**: Manufacturer's standard.
 - a. Aluminum with mill **OR** clear anodic **OR** color anodic, **as directed**, finish.
7. Chair Rails: Recessed **OR** Surface mounted, **as directed**, in locations indicated on Drawings.
8. Vertical Edge Trim: Manufacturer's standard transparent **OR** thin aluminum astragal, **as directed**, trim to protect vertical edges of glass in frameless panels.

1.3 EXECUTION

A. Installation

10 - Specialties



1. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.
2. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed.
3. Install panels from marked packages in numbered sequence indicated on Shop Drawings.
4. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.
5. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

B. Adjusting

1. Adjust operable panel partitions to operate smoothly, without warping or binding. Lubricate hardware, electric operator, **as directed**, and other moving parts.
2. Adjust pass doors and storage pocket doors, **as directed**, to operate smoothly and easily, without binding or warping. Check and readjust operating hardware. Confirm that latches and locks engage accurately and securely without forcing or binding.

C. Field Quality Control

1. This paragraph is applicable if sound control is critical. Installer shall conduct a light-leakage test at completion of installation, and prior to NIC testing, to correct alignment of vertical joints and top and bottom seals.
2. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids; adjust partitions for acceptable fit.
3. NIC Testing: Engage a qualified testing agency to perform tests and inspections.
4. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.
5. Testing Extent: Testing agency shall randomly select one operable panel partition installation(s) for testing.
6. Repair or replace operable panel partitions that do not comply with requirements.
7. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of repaired, replaced, or additional work with specified requirements.
8. Prepare test and inspection reports.

D. Cleaning

1. Clean soiled surfaces of operable panel partitions to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.

END OF SECTION 10 22 43 00

Task	Specification	Specification Description
10 26 13 00	05 50 00 00	Metal Fabrications
10 26 13 00	10 26 23 13	Impact-Resistant Wall Protection

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SECTION 10 26 23 13 - IMPACT-RESISTANT WALL PROTECTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for impact-resistant wall protection. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Wall guards.
 - b. Impact-resistant handrails.
 - c. Bed locators.
 - d. Corner guards.
 - e. Impact-resistant wall coverings.
 - f. Door protection systems.

C. Performance Requirements

1. Structural Performance: Provide handrails capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - a. Uniform load of **50 lbf/ft. (0.73 kN/m)** applied in any direction.
 - b. Concentrated load of **200 lbf (0.89 kN)** applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.

D. Submittals

1. Product Data: Include construction details, material descriptions, impact strength, fire-test-response characteristics, dimensions of individual components and profiles, and finishes for each impact-resistant wall protection unit.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood rails comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
 - b. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content.
 - c. Product Data for Credit EQ 4.4: For particleboard, documentation indicating that products contain no urea formaldehyde.
3. Shop Drawings: For each impact-resistant wall protection unit showing locations and extent. Include sections, details, and attachments to other work.
 - a. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Samples: For each type of exposed finish required, prepared on Samples of size indicated below. Include Samples of accent strips to verify color selected.
 - a. Wall and Corner Guards: **12 inches (300 mm)** long. Include examples of joinery, corners, end caps, top caps, and field splices.
 - b. Handrails: **12 inches (300 mm)** long. Include examples of joinery, corners, and field splices.
 - c. Impact-Resistant Wall Covering: **6 by 6 inches (150 by 150 mm)** square.
 - d. Door-Surface Protection: **6 by 6 inches (150 by 150 mm)** square.
 - e. Door-Edge and -Frame Protectors: **12 inches (300 mm)** long.
 - f. Door-Knob and -Lever Protectors: Full-size unit of each type.

5. Qualification Data: For qualified Installer and testing agency.
 6. Material Certificates: For each impact-resistant plastic material, from manufacturer.
 7. Material Test Reports: For each impact-resistant plastic material.
 8. Maintenance Data: For each impact-resistant wall protection unit to include in maintenance manuals.
 - a. Include recommended methods and frequency of maintenance for maintaining optimum condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to plastic finishes and performance.
 9. Warranty: Sample of special warranty.
- E. Quality Assurance
1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 2. Source Limitations: Obtain impact-resistant wall protection units from single source from single manufacturer.
 3. Product Options: Drawings indicate size, profiles, and dimensional requirements of impact-resistant wall protection units and are based on the specific system indicated.
 - a. Do not modify intended aesthetic effects, as judged solely by the Owner, except with the Owner's approval. If modifications are proposed, submit comprehensive explanatory data to the Owner for review.
 4. Forest Certification: Fabricate wood rails from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
 5. Surface-Burning Characteristics: Provide impact-resistant, plastic wall protection units with surface-burning characteristics as determined by testing identical products per ASTM E 84, NFPA 255, or UL 723 by UL or another qualified testing agency.
 6. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
 7. Preinstallation Conference: Conduct conference at Project site.
- F. Delivery, Storage, And Handling
1. Store impact-resistant wall protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 - a. Maintain room temperature within storage area at not less than 70 deg F (21 deg C) during the period plastic materials are stored.
 - b. Keep plastic sheet material out of direct sunlight.
 - c. Store plastic wall protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F (21 deg C).
 - 1) Store corner-guard covers in a vertical position.
 - 2) Store wall-guard, bed-locator and handrail covers in a horizontal position.
- G. Project Conditions
1. Environmental Limitations: Do not deliver or install impact-resistant wall protection units until building is enclosed and weatherproof, wet work is complete and dry, and HVAC system is operating and maintaining temperature at 70 deg F (21 deg C) for not less than 72 hours before beginning installation and for the remainder of the construction period.
- H. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of impact-resistant wall protection units that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures.

- 2) Deterioration of plastic and other materials beyond normal use.
- b. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. PVC Plastic: ASTM D 1784, Class 1, textured, chemical- and stain-resistant, high-impact-resistant PVC or acrylic-modified vinyl plastic with integral color throughout; extruded and sheet material, thickness as indicated.
 - a. Impact Resistance: Minimum **25.4 ft-lbf/in. (1356 J/m)** of notch when tested according to ASTM D 256, Test Method A.
 - b. Chemical and Stain Resistance: Tested according to ASTM D 543 **OR** ASTM D 1308.
 - c. Self-extinguishing when tested according to ASTM D 635.
 - d. Flame-Spread Index: 25 or less.
 - e. Smoke-Developed Index: 450 or less.
2. Polycarbonate Plastic Sheet: ASTM D 6098, S-PC01, Class 1 or 2, abrasion resistant; with a minimum impact-resistance rating of **15 ft-lbf/in. (800 J/m)** of notch when tested according to ASTM D 256, Test Method A.
3. Aluminum Extrusions: Alloy and temper recommended by manufacturer for type of use and finish indicated, but with not less than strength and durability properties specified in **ASTM B 221 (ASTM B 221M)** for Alloy 6063-T5.
4. Stainless-Steel Sheet: ASTM A 240/A 240M.
5. Brass: ASTM B 249/B 249M for extruded shapes and ASTM B 36/B 36 M for sheet.
6. Solid Wood: Clear hardwood lumber of species indicated, free of appearance defects, and selected for compatible grain and color.
7. Particleboard: ANSI A208.1, Grade M-2; made with binder containing no urea formaldehyde.
8. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
9. Adhesive: As recommended by impact-resistant plastic wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Wall Guards

1. Crash Rail: Heavy-duty assembly consisting of continuous snap-on plastic cover installed over concealed retainer system; designed to withstand impacts.
 - a. Cover: Extruded rigid plastic, minimum **0.100-inch (2.5-mm)** wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Flat **OR** Convex, **as directed**.
 - a) Dimensions: Nominal **6 inches high by 1 inch deep (150 mm high by 25 mm deep) OR 8 inches high by 1 inch deep (200 mm high by 25 mm deep), as directed**.
 - b) Surface: Uniform **OR** Uniform with coextruded accent inlay strip in contrasting color **OR** Grooved, **as directed**.
 - i. Accent Inlay Strip: Nominal 2 inches (50 mm) high by length of rail.
 - 2) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Continuous Retainer: Minimum **0.080-inch- (2.0-mm-)** thick, one-piece, extruded aluminum.

OR

 Retainer Clips: Manufacturer's standard impact-absorbing clips designed for heavy-duty performance.
 - c. Bumper: Continuous rubber or vinyl bumper cushion(s).

- d. End Caps and Corners: Prefabricated, injection-molded plastic; matching color **OR** contrasting with color, **as directed**, cover; field adjustable for close alignment with snap-on cover.
 - e. Accessories: Concealed splices and mounting hardware.
 - f. Mounting: Surface mounted directly to wall **OR** Reveal mounted on bumper cushion(s) **OR** Extended mounting on injection-molded plastic mounting brackets, **as directed**.
2. Bumper Rail: Assembly consisting of continuous snap-on plastic cover installed over concealed, continuous retainer; designed to withstand impacts.
- a. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm)** wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Half round profile, nominal **1 inch high by 1 inch deep (25 mm high by 25 mm deep)** **OR** Rounded bullnose profile, nominal **4 inches high by 2 inches deep (100 mm high by 50 mm deep)** **OR** Angled profile with rounded-bullnose front edge, nominal **4 inches high by 2 inches deep (100 mm high by 50 mm deep)** **OR** Flat profile, nominal **4 inches high by 1 inch deep (100 mm high by 25 mm deep)**, **as directed**.
 - 2) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Continuous Retainer: Minimum **0.080-inch- (2.0-mm-)** thick, one-piece, extruded aluminum.
 - OR**
 - Retainer Clips: Manufacturer's standard impact-absorbing clips.
 - c. Bumper: Continuous rubber or vinyl bumper cushion(s).
 - d. End Caps and Corners: Prefabricated, injection-molded plastic; matching color **OR** contrasting with color, **as directed**, cover; field adjustable for close alignment with snap-on cover.
 - e. Accessories: Concealed splices and mounting hardware.
 - f. Mounting: Surface mounted directly to wall **OR** Reveal mounted on bumper cushions **OR** Extended mounting on injection-molded plastic mounting brackets, **as directed**.
3. Rub Rail: Assembly consisting of continuous snap-on cover installed over concealed, continuous retainer.
- a. Cover: Extruded rigid plastic **OR** flexible PVC, **as directed**, minimum **0.078-inch (2.0-mm)** wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Half-round profile, nominal **1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)** **OR** Rounded bullnose profile, nominal **2 inches high by 1 inch deep (50 mm high by 25 mm deep)**, **as directed**.
 - 2) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Retainer: Minimum **0.0625-inch- (1.6-mm-)** thick, one-piece, extruded aluminum.
 - c. End Caps and Corners: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
 - d. Accessories: Concealed splices and mounting hardware.
 - e. Mounting: Surface mounted directly to wall **OR** Reveal mounted on bumper cushions, **as directed**.
4. Wood Chair Rail with Bumper: Assembly consisting of continuous sculpted, solid-wood rail, with continuous bumper insert installed in continuous recessed retainer.
- a. Wood Rail: **3-1/2 inches high by 7/8 inch deep (89 mm high by 22 mm deep)** **OR** **5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)** **OR** Size and profile indicated on Drawings, **as directed**.
 - 1) Wood Species: Red oak **OR** Maple **OR** Ash **OR** Beech, **as directed**.
 - 2) Finish: Clear **OR** Stained, **as directed**.
 - 3) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

- a. Cover: Minimum **0.078-inch- (2.0-mm-)** OR **0.100-inch- (2.5-mm-)**, as directed, thick, extruded rigid plastic; as follows: OR in dimensions and profiles indicated on Drawings, as directed.
- 1) Single Handrail: Cylindrical tube profile cover with continuous retainer; with mounting brackets supporting bottom of rail.
 - a) Tube Diameter: as directed by the Owner.
 - 2) Bumper Rail: Cover with flat OR sculpted with contoured thumb recess on, as directed, front side; with **1-1/2-inch- (38-mm-)** diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.
 - a) Bumper-Rail Dimensions: Nominal **5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)** OR **5-1/2 inches high by 2 inches deep (140 mm high by 50 mm deep)**, as directed.
 - b) Bumper Surface: Smooth OR Smooth with coextruded accent inlay strip in contrasting color OR Grooved, as directed.
 - c) Accent Inlay Strip: Nominal **2 inches (50 mm)** high by length of rail.
 - 3) Double Handrail with Bumper-Rail Profile: Two tubes mounted above and below nominal, flat-faced bumper rail; each tube with **1-1/2-inch- (38-mm-)** diameter gripping surface and finger recess on back side; supported by concealed, continuous retainer and extended mounting brackets.
 - a) Bumper-Rail Dimensions: Nominal **4 inches high by 1-1/2 inches deep (100 mm high by 38 mm deep)**.
 - b) Bumper Surface: Smooth OR Smooth with coextruded accent inlay strip in contrasting color OR Grooved, as directed.
 - c) Accent Inlay Strip: Nominal **2 inches (50 mm)** high by length of rail.
 - 4) Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
- b. Retainer: Minimum **0.080-inch- (2.0-mm-)** thick, one-piece, extruded aluminum.
- c. Mounting Bracket: Extended mounting on injection-molded plastic OR anodized-aluminum, as directed, mounting brackets.
- d. End Caps and Corners: Prefabricated, injection-molded plastic; matching color OR contrasting with color, as directed, cover; field adjustable for close alignment with snap-on cover.
- e. Accessories: Concealed splices, cushions, and mounting hardware.
2. Combination Wood-Plastic Bumper Handrail: Assembly consisting of solid-wood handrail mounted above plastic bumper rail, both mounted on continuous retainer; with reveal between handrail and bumper serving as thumb recess on front side; with **1-1/2-inch- (38-mm-)** diameter gripping surface and finger recess on back side.
- a. Wood Handrail: **1-1/2 inches (38 mm)** in diameter; with matching end caps and corners.
 - 1) Wood Species: Red oak OR Maple OR Ash OR Beech, as directed.
 - 2) Finish: Clear OR Stained, as directed.
 - 3) Color: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - b. Bumper: Extruded rigid plastic, minimum **0.078-inch- (2.0-mm-)** OR **0.100-inch- (2.5-mm-)**, as directed, wall thickness; as follows: OR in dimensions and profiles indicated on Drawings, as directed.
 - 1) Profile: Flat OR Convex, as directed, profile, nominal **4 inches high by 1 inch deep (100 mm high by 25 mm deep)**.
 - 2) Accent Inlay Strip: Nominal **2 inches (50 mm)** high by length of rail.
 - 3) Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - 4) End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.
 - c. Retainer: Minimum **0.0625-inch- (1.6-mm-)** thick, one-piece, extruded aluminum.
 - d. Reveal: Extruded rigid plastic or vinyl over aluminum retainer.

- 1) Color: Brass **OR** Chrome **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- e. Accessories: Concealed splices, cushion(s), and mounting hardware.
- 3. Wood Handrail with Bumper: Assembly consisting of continuous sculpted, solid-wood handrail, with bumper insert installed in continuous retainer recessed into the face of the wood.
 - a. Wood Handrail: As indicated on Drawings with **1-1/2-inch- (38-mm-)** diameter gripping surface.
 - 1) End Caps, Returns, Corners, and Mounting Brackets: Solid wood that matches rail.
 - 2) Wood Species: Red oak **OR** Maple **OR** Ash **OR** Beech **OR** Bamboo, **as directed**.
 - 3) Finish: Clear **OR** Stained, **as directed**.
 - 4) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Bumper: Extruded rigid plastic **OR** flexible vinyl, **as directed**, minimum **0.078-inch (2.0-mm)** wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Half-round profile, nominal **2 inches high by 1 inch deep (50 mm high by 25 mm deep)** **OR** Small rounded profile, nominal **1-1/8 inches high by 1-1/8 inches deep (30 mm high by 30 mm deep)**, **as directed**.
 - 2) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 3) End Caps and Corners: Prefabricated, injection-molded plastic; color matching bumper; field adjustable for close alignment with snap-on bumper.
 - c. Retainer: Minimum **0.0625-inch- (1.6-mm-)** thick, one-piece, extruded aluminum.
 - 1) Finish: Mill **OR** Brass colored, **as directed**.
 - d. Accessories: Concealed splices and mounting hardware.
- 4. Solid-Wood Handrail: Assembly consisting of continuous sculpted, solid-wood handrail.
 - a. Handrail: **5-1/2 inches high by 1-1/2 inches deep (140 mm high by 38 mm deep)** **OR** As indicated on Drawings, **as directed**, with **1-1/2-inch- (38-mm-)** diameter gripping surface.
 - 1) End Caps, Returns, Corners, and Mounting Brackets: Solid wood that matches rail.
 - 2) Wood Species: Red oak **OR** Maple **OR** Ash **OR** Beech, **as directed**.
 - 3) Finish: Clear **OR** Stained, **as directed**.
 - 4) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

D. Bed Locators

- 1. Bed Locators: Assembly consisting of continuous snap-on plastic cover installed over continuous retainer; with two bed-locator end caps and mounting hardware; cover designed to spring back when hit.
 - a. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm)** wall thickness.
 - 1) Profile: Large rounded angled **OR** bullnose, **as directed**, profile, nominal **4 inches high by 2 inches deep (100 mm high by 50 mm deep)**.
 - 2) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Retainer: Minimum **0.080-inch- (2.0-mm-)** thick, one-piece, extruded aluminum.
 - c. Bed-Locator End Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
 - d. Mounting Type: Surface mounted on **1/2-inch- (13-mm-)** thick cushion spacers **OR** Extended mounting on injection-molded plastic mounting brackets **OR** Extended mounting on aluminum mounting brackets, **as directed**.

E. Corner Guards

- 1. Surface-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.

- a. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm) OR 0.100-inch (2.5-mm)**, **as directed**, wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Nominal **2-inch- (50-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR 3-inch- (75-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR 3-inch- (75-mm-)** long leg and **1-1/4-inch (32-mm)** corner radius, **as directed**.
 - 2) Height: **4 feet (1.2 m) OR 8 feet (2.4 m)**, **as directed**.
 - 3) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Retainer: Minimum **0.060-inch- (1.5-mm-)** thick, one-piece, extruded aluminum **OR** One-piece extruded plastic, **as directed**.
OR
Retainer Clips: Manufacturer's standard impact-absorbing clips.
 - c. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
2. Flush-Mounted, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface, installed over continuous retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.
 - a. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm) OR 0.100-inch (2.5-mm)**, **as directed**, wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Nominal **2-inch- (50-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR 3-inch- (75-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR 3-inch- (75-mm-)** long leg and **1-1/4-inch (32-mm)** corner radius, **as directed**.
 - 2) Height: **4 feet (1.2 m) OR 8 feet (2.4 m)**, **as directed**.
 - 3) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Retainer: Minimum **0.060-inch- (1.5-mm-)** thick, one-piece, extruded aluminum.
OR
Retainer Clips: Manufacturer's standard impact-absorbing clips.
 - c. Aluminum Cove Base: Nominal **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, high.
 3. Fire-Rated, Resilient, Plastic Corner Guards: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface, installed over continuous retainer and intumescent fire barrier; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition; full wall height.
 - a. Fire Rating: 1 hour **OR** 2 hours **OR** Same rating as wall in which corner guard is installed, **as directed**; UL listed and labeled according to UL 2079.
 - b. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm) OR 0.100-inch (2.5-mm)**, **as directed**, wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Leg: Nominal **2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**.
 - 2) Corner Radius: **1/4 inch (6 mm) OR 1-1/4 inches (32 mm)**, **as directed**.
 - 3) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - c. Retainer: Minimum **0.070-inch- (1.8-mm-)** thick, one-piece, extruded aluminum.
 - d. Aluminum Cove Base: Nominal **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, high.
 4. Surface-Mounted, Opaque-Plastic Corner Guards: Fabricated from PVC plastic, acrylic-modified vinyl sheet or opaque polycarbonate sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
 - a. Wing Size: Nominal **3/4 by 3/4 inch (20 by 20 mm) OR 1-1/8 by 1-1/8 inches (30 by 30 mm) OR 2-1/2 by 2-1/2 inches (65 by 65 mm)**, **as directed**.
 - b. Mounting: Countersunk screws through factory-drilled mounting holes **OR** Adhesive **OR** Double-faced adhesive foam tape, **as directed**.

- c. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- 5. Surface-Mounted, Transparent-Plastic Corner Guards: Fabricated from clear polycarbonate plastic sheet; with formed edges; fabricated with 90- or 135-degree turn to match wall condition.
 - a. Wing Size: Nominal **3/4 by 3/4 inch (20 by 20 mm)** **OR** **1-1/8 by 1-1/8 inches (30 by 30 mm)** **OR** **2-1/2 by 2-1/2 inches (65 by 65 mm)**, **as directed**.
 - b. Thickness: Minimum **0.050 inch (1.3 mm)** **OR** **0.075 inch (1.9 mm)** **OR** **0.100 inch (2.5 mm)**, **as directed**.
 - c. Mounting: Countersunk screws through factory-drilled mounting holes **OR** Corner clips, **as directed**.
- 6. Surface-Mounted, Metal Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90- or 135-degree turn to match wall condition.
 - a. Material: Stainless steel, Type 304 **OR** Type 430, **as directed**.
 - 1) Thickness: Minimum **0.0500 inch (1.3 mm)** **OR** **0.0625 inch (1.6 mm)** **OR** **0.0781 inch (2.0 mm)**, **as directed**.
 - 2) Finish: Directional satin, No. 4 **OR** Bright annealed, **as directed**.
 - OR**
Material: Extruded aluminum, minimum **0.0625 inch (1.6 mm)** thick, with clear anodic finish.
 - OR**
Material: Brass sheet, minimum **0.0500 inch (1.3 mm)** thick, with buffed, smooth specular **OR** fine satin, **as directed**, finish.
 - b. Wing Size: Nominal **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **2-1/2 by 2-1/2 inches (65 by 65 mm)** **OR** **3-1/2 by 3-1/2 inches (90 by 90 mm)**, **as directed**.
 - c. Corner Radius: **1/8 inch (3 mm)** **OR** **3/4 inch (19 mm)**, **as directed**.
 - d. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes **OR** Oval head, countersunk screws through factory-drilled mounting holes **OR** Double-faced, adhesive foam tape **OR** Adhesive, **as directed**.
- F. End-Wall Guards
 - 1. Surface-Mounted, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover installed over continuous retainer **OR** continuous retainer at each corner, with end of wall covered by semirigid, impact-resistant sheet wall covering, **as directed**; including mounting hardware.
 - a. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm)** **OR** **0.100-inch (2.5-mm)**, **as directed**, wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Nominal **2-inch- (50-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR** **3-inch- (75-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR** **3-inch- (75-mm-)** long leg and **1-1/4-inch (32-mm)** corner radius, **as directed**.
 - 2) Height: **4 feet (1.2 m)** **OR** **8 feet (2.4 m)**, **as directed**.
 - 3) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **a directed**.
 - b. Retainer: Minimum **0.060-inch- (1.5-mm-)** thick, one-piece, extruded aluminum.
 - c. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.
 - 2. Flush-Mounted, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer **OR** continuous retainer at each corner, with end of wall covered by semirigid, impact-resistant sheet wall covering, **as directed**; including mounting hardware.
 - a. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm)** **OR** **0.100-inch (2.5-mm)**, **as directed**, wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed**.
 - 1) Profile: Nominal **2-inch- (50-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR** **3-inch- (75-mm-)** long leg and **1/4-inch (6-mm)** corner radius **OR** **3-inch- (75-mm-)** long leg and **1-1/4-inch (32-mm)** corner radius, **as directed**.

- 2) Height: **4 feet (1.2 m) OR 8 feet (2.4 m), as directed.**
- 3) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
- b. Retainer: Minimum **0.060-inch- (1.5-mm-)** thick, one-piece, extruded aluminum.
- c. Aluminum Cove Base: Nominal **4 inches (100 mm) OR 6 inches (150 mm), as directed,** high.
- 3. Fire-Rated, Resilient, Plastic End-Wall Guard: Assembly consisting of snap-on plastic cover that is flush with adjacent wall surface and that covers entire end of wall, installed over continuous retainer and intumescent fire barrier; including mounting hardware; full wall height.
 - a. Fire Rating: 1 hour **OR** 2 hours **OR** Same rating as wall in which end guard is installed, **as directed**; UL listed and labeled according to UL 2079.
 - b. Cover: Extruded rigid plastic, minimum **0.078-inch (2.0-mm) OR 0.100-inch (2.5-mm), as directed,** wall thickness; as follows: **OR** in dimensions and profiles indicated on Drawings, **as directed.**
 - 1) Leg: Nominal **2 inches (50 mm) OR 3 inches (75 mm), as directed.**
 - 2) Corner Radius: **1/4 inch (6 mm) OR 1-1/4 inches (32 mm), as directed.**
 - 3) Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - c. Retainer: Minimum **0.070-inch- (1.8-mm-)** thick, one-piece, extruded aluminum.
 - d. Aluminum Cove Base: Nominal **4 inches (100 mm) OR 6 inches (150 mm), as directed,** high.
- 4. Surface-Mounted, Metal, End-Wall Guards: Fabricated from one-piece, formed or extruded metal that covers entire end of wall; with formed edges.
 - a. Material: Stainless steel, Type 304 **OR** Type 430 **as directed.**
 - 1) Thickness: Minimum **0.0500 inch (1.3 mm) OR 0.0625 inch (1.6 mm) OR 0.0781 inch (2.0 mm), as directed.**
 - 2) Finish: Directional satin, No. 4 **OR** Bright annealed, **as directed.**
 - OR**
 - Material: Extruded aluminum, minimum **0.0625 inch (1.6 mm)** thick, with clear anodic finish.
 - OR**
 - Material: Brass sheet, minimum **0.0500 inch (1.3 mm)** thick, with buffed, smooth specular **OR** fine satin, **as directed,** finish.
 - b. Wing Size: Nominal **1-1/2 by 1-1/2 inches (38 by 38 mm) OR 2-1/2 by 2-1/2 inches (65 by 65 mm) OR 3-1/2 by 3-1/2 inches (90 by 90 mm), as directed.**
 - c. Corner Radius: **1/8 inch (3 mm) OR 3/4 inch (19 mm), as directed.**
 - d. Mounting: Flat-head, countersunk screws through factory-drilled mounting holes **OR** Oval head, countersunk screws through factory-drilled mounting holes **OR** Double-faced, adhesive foam tape **OR** Adhesive, **as directed.**
- G. Impact-Resistant Wall Coverings
 - 1. Impact-Resistant Sheet Wall Covering: Fabricated from plastic sheet wall-covering material.
 - a. Size: **48 by 96 inches (1219 by 2438 mm)** for sheet **OR 48 by 120 inches (1219 by 3048 mm)** for roll **OR** As indicated, **as directed.**
 - b. Sheet Thickness: **0.022 inch (0.56 mm) OR 0.028 inch (0.7 mm) OR 0.040 inch (1.0 mm) OR 0.060 inch (1.5 mm) OR 0.080 inch (2.0 mm) OR 0.093 inch (2.4 mm) OR 0.125 inch (3.0 mm), as directed.**
 - c. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed.**
 - d. Height: Full wall **OR** Wainscot **OR** As indicated, **as directed.**
 - e. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.
 - f. Mounting: Adhesive.
 - 2. Prelaminated, Impact-Resistant Wall Panels: Rigid wall panels consisting of impact-resistant plastic sheet wall covering material factory laminated to high-impact-resistant core, with moisture-resistant vapor barrier factory laminated to reverse side of panel for stability.

- a. Composition: **0.028-inch- (0.70-mm-)** thick plastic sheet laminated to **3/8-inch- (9.5-mm-)** thick, particleboard core **OR 0.04-inch- (1.02-mm-)** thick plastic sheet laminated to **3/8-inch- (9.5-mm-)** thick, particleboard core, **as directed**.
 - b. Sheet Size: **48 by 96 inches (1219 by 2438 mm) OR 48 by 108 inches (1219 by 2743 mm) OR 48 by 120 inches (1219 by 3048 mm) OR** As indicated, **as directed**.
 - c. Height: Full wall **OR** Wainscot **OR** As indicated, **as directed**.
 - d. Sheet Edge: Square **OR** Beveled, **as directed**.
 - e. Trim and Joint Moldings: Extruded rigid plastic that matches sheet wall covering color.
 - f. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - g. Mounting: Adhesive.
- H. Door Protection Systems
- 1. General: Comply with BHMA A156.6.
 - a. For fire-rated doors, provide door protection systems that are UL listed and labeled.
 - 2. Protection Plates: Fabricated from extruded rigid plastic, of thickness indicated.
 - 3. Full-Height Door-Surface Protection: Minimum **0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm) OR 0.080-inch (2.0-mm)**, **as directed**, wall thickness; with 90-degree bend for door-edge protection.
 - a. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - b. Mounting: Adhesive **OR** Countersunk screws through factory-drilled mounting holes **OR** Double-faced adhesive foam tape, **as directed**.
 - 4. Armor Plates: Minimum **0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm) OR 0.080-inch (2.0-mm)**, **as directed**, wall thickness; beveled four sides.
 - a. Size: **32 inches (813 mm) OR 36 inches (914 mm) OR 40 inches (1016 mm) OR 42 inches (1067 mm)**, **as directed**, high by door width, with allowance for frame stops.
 - b. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - c. Mounting: Adhesive **OR** Countersunk screws through factory-drilled mounting holes **OR** Double-faced adhesive foam tape, **as directed**.
 - 5. Kick Plates: Minimum **0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm) OR 0.080-inch (2.0-mm)**, **as directed** wall thickness; beveled four sides.
 - a. Size: **8 inches (203 mm) OR 10 inches (254 mm) OR 12 inches (305 mm)**, **as directed**, high by door width, with allowance for frame stops.
 - b. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - c. Mounting: Adhesive **OR** Countersunk screws through factory-drilled mounting holes **OR** Double-faced adhesive foam tape, **as directed**.
 - 6. Mop Plates: Minimum **0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm) OR 0.080-inch (2.0-mm)**, **as directed**, wall thickness; beveled four sides.
 - a. Size: **4 inches (102 mm) OR 6 inches (152 mm)**, **as directed**, high by **1 inch (25 mm)** less than door width.
 - b. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - c. Mounting: Adhesive **OR** Countersunk screws through factory-drilled mounting holes **OR** Double-faced adhesive foam tape, **as directed**.
 - 7. Stretcher Plates: Minimum **0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm) OR 0.080-inch (2.0-mm)**, **as directed**, wall thickness; beveled four sides.
 - a. Size: **6 inches (152 mm) OR 8 inches (203 mm)**, **as directed**, high by door width, with allowance for frame stops.
 - b. Color and Texture: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - c. Mounting: Adhesive **OR** Countersunk screws through factory-drilled mounting holes **OR** Double-faced adhesive foam tape, **as directed**.
 - 8. Push Plates: Minimum **0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm) OR 0.080-inch (2.0-mm)**, **as directed**, wall thickness; beveled four sides.

- a. Size: 12 inches high by 4 inches wide (305 mm high by 102 mm wide) OR 16 inches high by 4 inches wide (406 mm high by 102 mm wide), as directed.
 - b. Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - c. Mounting: Adhesive OR Countersunk screws through factory-drilled mounting holes OR Double-faced adhesive foam tape, as directed.
9. Door-Edge Protection: Fabricated from extruded rigid plastic, minimum 0.040-inch (1.0-mm) OR 0.060-inch (1.5-mm), as directed, wall thickness; formed to fit over door edge without mortising.
- a. Shape: L OR U, as directed.
 - b. Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - c. Mounting: Adhesive OR Countersunk screws through factory-drilled mounting holes OR Double-faced adhesive foam tape, as directed.
10. Door-Frame Protector: Fabricated from extruded rigid plastic, minimum 0.040-inch (1.0-mm) OR 0.050-inch (1.3-mm) OR 0.060-inch (1.5-mm), as directed, wall thickness; formed to fit entire door-frame profile.
- a. Height: 36 inches (914 mm) OR 48 inches (1219 mm), as directed.
 - b. Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - c. Mounting: Adhesive OR Countersunk screws through factory-drilled mounting holes OR Double-faced adhesive foam tape, as directed.
11. Door-Frame Protector: Assembly consisting of snap-on plastic cover installed over continuous retainer; formed to fit door frame on opposite side of door swing.
- a. Cover: Extruded rigid plastic, minimum 0.080-inch (2.0-mm) wall thickness; in dimensions and profiles indicated.
 - 1) Height: 36 inches (914 mm) OR 48 inches (1219 mm), as directed.
 - 2) Corner Radius: 1/4 inch (6 mm) OR 1-1/4 inches (32 mm), as directed.
 - 3) Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - b. Retainer: Minimum 0.080-inch- (2.0-mm-) thick, one-piece, extruded aluminum.
12. Door-Knob OR Door-Lever, as directed, Protector: Fabricated from injection-molded plastic, minimum 0.060-inch (1.5-mm) wall thickness.
- a. Color and Texture: As indicated by manufacturer's designations OR As selected from manufacturer's full range, as directed.
 - b. Mounting: Countersunk screws through factory-drilled mounting holes.
- I. Fabrication
1. Fabricate impact-resistant wall protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.
 2. Preform curved semirigid, impact-resistant sheet wall covering in factory for radius and sheet thickness as follows:
 - a. Sheet Thickness of 0.040 Inch (1.0 mm): 24-inch (610-mm) radius.
 - b. Sheet Thickness of 0.060 Inch (1.5 mm): 36-inch (914-mm) radius.
 3. Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
 4. Fabricate components with tight seams and joints with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.
 5. Miter corners and ends of wood handrails for returns.
- J. Metal Finishes
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - a. Remove tool and die marks and stretch lines, or blend into finish.
 - b. Grind and polish surfaces to produce uniform finish, free of cross scratches.

- c. Run grain of directional finishes with long dimension of each piece.
 - d. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
2. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.3 EXECUTION

A. Examination

1. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances, fire rating, and other conditions affecting performance of work.
2. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - a. For impact-resistant wall protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Complete finishing operations, including painting, before installing impact-resistant wall protection system components.
2. Before installation, clean substrate to remove dust, debris, and loose particles.

C. Installation

1. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 - a. Install impact-resistant wall protection units in locations and at mounting heights indicated on Drawings or, if not indicated, at heights indicated on Drawings **OR** as directed.
 - b. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
 - 1) Provide anchoring devices to withstand imposed loads.
 - 2) Where splices occur in horizontal runs of more than **20 feet (6.1 m)**, splice aluminum retainers and plastic covers at different locations along the run, but no closer than **12 inches (305 mm)**.
 - 3) Adjust end and top caps as required to ensure tight seams.
2. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

D. Cleaning

1. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
2. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

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SECTION 10 28 13 13 - TOILET AND BATH ACCESSORIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for toilet and bath accessories. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Public-use washroom accessories.
 - b. Public-use shower room accessories.
 - c. Private-use bathroom accessories.
 - d. Healthcare accessories.
 - e. Warm-air dryers.
 - f. Childcare accessories.
 - g. Underlavatory guards.
 - h. Custodial accessories.

C. Submittals

1. Product Data: For each type of product indicated.
2. Product Schedule:
 - a. Identify locations using room designations indicated on Drawings.
 - b. Identify products using designations indicated on Drawings.

D. Warranty

1. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within 15 years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Stainless Steel: ASTM A 666, Type 304, **0.0312-inch (0.8-mm)** minimum nominal thickness, unless otherwise indicated.
2. Brass: ASTM B 19 flat products; **ASTM B 16 (ASTM B 16M)**, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
3. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), **0.0359-inch (0.9-mm)** minimum nominal thickness.
4. Galvanized Steel Sheet: ASTM A 653/A 653M, with **G60 (Z180)** hot-dip zinc coating.
5. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
6. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
7. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
8. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
9. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

B. Public-Use Washroom Accessories

1. Toilet Tissue (Roll) Dispenser:

- a. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset **OR** Single-roll dispenser **OR** Double-roll dispenser **OR** Double-roll dispenser with shelf, **as directed**.
 - b. Mounting: Recessed **OR** Partition mounted serving two adjacent toilet compartments **OR** Surface mounted, **as directed**.
 - c. Operation: Noncontrol delivery with standard spindle **OR** Noncontrol delivery with theft-resistant spindle **OR** Spindleless with tension-spring controlled delivery **OR** Spindleless with tension-spring controlled delivery and self-locking device extending through core that prevents core removal until roll is empty **OR** Eccentric-shaped, molded-plastic spindle revolves one-half revolution per dispensing operation for controlled delivery; core cannot be removed until roll is empty, **as directed**.
 - d. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) **OR** 5-inch- (127-mm-), **as directed**, diameter tissue rolls.
 - e. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** Chrome-plated zinc alloy (zamac) or steel **OR** Satin-finish aluminum bracket with plastic spindle **OR** ABS plastic, gray, **as directed**.
2. Combination Toilet Tissue Dispenser:
- a. Description: Combination unit with double-roll toilet tissue dispenser and the following:
 - 1) Removable sanitary-napkin waste receptacle with self-closing disposal-opening cover.
 - 2) Seat-cover dispenser with minimum capacity of 500 **OR** 1000, **as directed**, single or half-fold seat covers.
 - b. Mounting: Recessed **OR** Surface mounted **OR** Partition mounted, dual access with two tissue rolls per compartment **OR** Partition mounted, dual access with two tissue rolls per compartment and with one side that mounts flush with partition of accessible compartment, **as directed**.
 - c. Toilet Tissue Dispenser Capacity: 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
 - d. Toilet Tissue Dispenser Operation: Noncontrol delivery with theft-resistant spindles.
 - e. Material and Finish: Stainless steel, No. 4 finish (satin).
 - f. Lockset: Tumbler type.
3. Toilet Tissue (Folded) Dispenser:
- a. Description: Folded-tissue dispenser with cover hinged at bottom.
 - b. Mounting: Surface mounted.
 - c. Minimum Capacity: 1250 single-fold tissues.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin).
 - e. Lockset: Tumbler type.
 - f. Refill Indicators: Pierced slots at front.
4. Toilet Tissue (Jumbo-Roll) Dispenser:
- a. Description: One-roll unit **OR** Two-roll unit with sliding panel to expose other roll, **as directed**.
 - b. Mounting: Surface mounted.
 - c. Capacity: 9- or 10-inch- (228- or 254-mm-) diameter rolls.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** ABS plastic, gray, **as directed**.
 - e. Lockset: Tumbler type.
 - f. Refill Indicator: Pierced slots at front.
5. Paper Towel (Folded) Dispenser:
- a. Mounting: Recessed **OR** Semirecessed **OR** Deck mounted, recessed **OR** Surface mounted, **as directed**.
 - b. Minimum Capacity: 400 C-fold or 525 multifold towels **OR** 600 C-fold or 800 multifold towels **OR** 400 single-fold towels, **as directed**.
 - c. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** ABS plastic, gray, **as directed**.
 - d. Lockset: Tumbler type.
 - e. Refill Indicators: Pierced slots at sides or front.
6. Paper Towel (Roll) Dispenser:

- a. Description: Lever-actuated mechanism permits controlled delivery of paper rolls in preset lengths per stroke.
 - b. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
 - c. Minimum Capacity: **8-inch (203-mm)** wide, **800-foot (244-m)** long roll.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** ABS plastic, gray, **as directed**.
 - e. Lockset: Tumbler type.
7. Waste Receptacle:
- a. Mounting: Open top, recessed **OR** Self-closing disposal-opening cover, recessed **OR** Semirecessed **OR** Surface mounted **OR** Wall mounted for corner installation **OR** Freestanding **OR** Undercounter, **as directed**.
 - b. Minimum Capacity: Capacity in **gal. (L)** **as directed**.
 - c. Material and Finish: Stainless steel, No. 4 finish (satin).
 - d. Liner: Reusable vinyl liner.
 - e. Lockset: Tumbler type for waste-receptacle.
8. Combination Towel (Folded) Dispenser/Waste Receptacle:
- a. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
 - b. Mounting: Surface mounted **OR** Surface mounted with stainless-steel collar **OR** Recessed **OR** Recessed with projecting receptacle **OR** Semirecessed, **as directed**.
 - 1) Designed for nominal **4-inch (100-mm)** **OR** **6-inch (150-mm)**, **as directed**, wall depth.
 - c. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
 - d. Minimum Waste-Receptacle Capacity: **4 gal. (15 L)** **OR** **12 gal. (45.4 L)**, **as directed**.
 - e. Material and Finish: Stainless steel, No. 4 finish (satin).
 - f. Liner: Reusable, vinyl waste-receptacle liner.
 - g. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.
9. Combination Towel (Roll) Dispenser/Waste Receptacle:
- a. Description: Combination unit for dispensing preset length of roll paper towels, with removable waste receptacle.
 - b. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
 - c. Minimum Towel-Dispenser Capacity: **8-inch (203-mm)** wide, **800-foot (244-m)** long roll.
 - d. Minimum Waste Receptacle Capacity: **8 gal. (30 L)** **OR** **12 gal. (45.4 L)** **OR** **15 gal. (56.8 L)**, **as directed**.
 - e. Material and Finish: Stainless steel, No. 4 finish (satin).
 - f. Liner: Reusable, vinyl waste-receptacle liner.
 - g. Lockset: Tumbler type for towel dispenser compartment and waste receptacle.
10. Multipurpose Soap/Towel Dispenser Unit:
- a. Description: Combination unit for dispensing soap in liquid or lotion **OR** lather, **as directed**, form and folded towels.
 - b. Mounting: Recessed, designed for nominal **4-inch (100-mm)** wall depth **OR** Surface mounted with stainless-steel collar, **as directed**.
 - c. Minimum Soap-Dispenser Capacity: **80 oz. (2.36 L)**.
 - d. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold **OR** 1000 single-fold, **as directed**, towels.
 - e. Material and Finish: Stainless steel, No. 4 finish (satin) for unit body and soap valve.
 - f. Lockset: Tumbler type.
11. Liquid-Soap Dispenser:
- a. Description: Designed for dispensing soap in liquid or lotion **OR** lather, **as directed**, form.
 - b. Mounting: Deck mounted on vanity **OR** Deck mounted on lavatory **OR** Horizontally oriented, recessed **OR** Horizontally oriented, surface mounted **OR** Vertically oriented, surface mounted, **as directed**.
 - c. Capacity: Capacity in **oz. (mL)**, **as directed**.
 - d. Materials: Valve and reservoir materials and finishes, **as directed**.
 - e. Lockset: Tumbler type.
 - f. Refill Indicator: Window type.
12. Grab Bar:

- a. Mounting: Flanges with concealed **OR** exposed, **as directed**, fasteners.
 - b. Material: Stainless steel, **0.05 inch (1.3 mm)** thick.
 - 1) Finish: Smooth, No. 4, satin finish **OR** Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area, **as directed**.
 - c. Outside Diameter: **1-1/4 inches (32 mm) OR [1-1/2 inches (38 mm), as directed**.
 - d. Configuration and Length: As indicated on Drawings **OR** Straight, **36 inches (914 mm)** long, **as directed**.
13. Vendor:
- a. Type: Sanitary napkin **OR** Sanitary napkin and tampon **OR** Condom, **as directed**.
 - b. Mounting: Fully recessed, designed for **4-inch (100-mm)** wall depth, **OR** Semirecessed, **OR** Surface mounted, **as directed**.
 - c. Capacity: **As directed**.
 - d. Operation: No coin (free) **OR** Single coin (25 cents) **OR** Two coin (50 cents), **as directed**.
 - e. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
 - f. Lockset: Tumbler type with separate lock and key for coin box.
14. Sanitary-Napkin Disposal Unit:
- a. Mounting: Recessed **OR** Partition mounted, dual access **OR** Surface mounted, **as directed**.
 - b. Door or Cover: Self-closing disposal-opening cover and hinged face panel with tumbler lockset.
 - c. Receptacle: Removable.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** ABS plastic, gray, **as directed**.
15. Seat-Cover Dispenser:
- a. Mounting: Surface mounted **OR** Recessed **OR** Partition mounted, dual access, **as directed**.
 - b. Minimum Capacity: 250 **OR** 500, **as directed**, seat covers.
 - c. Exposed Material and Finish: Stainless steel, No. 4 finish (satin) **OR** ABS plastic, gray, **as directed**.
 - d. Lockset: Tumbler type.
16. Fold-Down Purse Shelf:
- a. Description: Hinged unit with spring-loaded shelf that automatically returns to vertical position.
 - b. Nominal Size: **15 inches (381 mm)** long by **5-1/2 inches (140 mm)** wide.
 - c. Material and Finish: Chrome-plated cast-zinc alloy (zamac) with stippled finish on tray or stainless steel, No. 4 finish (satin) **OR** Chrome-plated cast-zinc alloy (zamac) with stippled finish on tray and bright chrome finish on edges **OR** Stainless steel, No. 4 finish (satin), **as directed**.
17. Mirror Unit:
- a. Frame: Stainless-steel angle, **0.05 inch (1.3 mm)** thick **OR** Stainless-steel channel **OR** Stainless steel, fixed tilt **OR** Stainless steel, adjustable tilt, **as directed**.
 - 1) Corners: Manufacturer's standard **OR** Mitered and mechanically interlocked **OR** Welded and ground smooth, **as directed**.
 - b. Integral Shelf: **5 inches (127 mm)** deep.
 - c. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - 1) One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 2) Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
 - d. Size: As indicated on Drawings **OR as directed**.
18. Facial Tissue Dispenser:
- a. Mounting: Wall mounted, recessed **OR** Surface mounted, **as directed**.
 - b. Nominal Depth: **2-1/4 inches (57 mm) OR 4 inches (102 mm), as directed**.
 - c. Capacity: 150 double-ply tissues.
 - d. Material and Finish:

- 1) Dispenser Face: Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
- 2) Cabinet: Steel with corrosion-resistant finish.

C. Public-Use Shower Room Accessories

1. Shower Curtain Rod:
 - a. Description: **1-inch (25.4-mm)** OD; fabricated from nominal **0.0375-inch- (0.95-mm-)** thick stainless steel **OR** **1-1/4-inch (32-mm)** OD; fabricated from nominal **0.05-inch- (1.3-mm-)** thick stainless steel, **as directed**.
 - b. Mounting Flanges: Stainless-steel flanges designed for exposed fasteners.
 - c. Finish: No. 4 (satin).
2. Shower Curtain:
 - a. Size: Minimum **6 inches (152 mm)** **OR** **12 inches (305 mm)**, **as directed**, wider than opening by **72 inches (1828 mm)** high.
 - b. Material: Vinyl, minimum **0.006-inch- (0.15-mm-)** thick, opaque, matte, **OR** Duck, minimum **8 oz. (227 g)**, white, 100 percent cotton, **OR** Nylon-reinforced vinyl, minimum **10-oz. (284-g)** or **0.008-inch- (0.2-mm-)** thick vinyl, with integral antibacterial agent, **as directed**.
 - c. Color: White **OR** Green **OR** As selected from manufacturer's full range, **as directed**.
 - d. Grommets: Corrosion resistant at minimum **6 inches (152 mm)** o.c. through top hem.
 - e. Shower Curtain Hooks: Chrome-plated or stainless-steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.
3. Folding Shower Seat:
 - a. Configuration: L-shaped seat, designed for wheelchair access **OR** Rectangular seat **OR** Triangular, corner-type seat **OR** Stainless-steel seat designed to fold into recessed-mounted, stainless-steel wall box, **as directed**.
 - b. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected **OR** White vinyl padded seat **OR** Stainless steel, No. 4 finish (satin); **0.05-inch (1.3-mm)** minimum nominal thickness; with single-piece, pan-type construction and edge seams welded and ground smooth, **as directed**.
 - c. Mounting Mechanism: Stainless steel, No. 4 finish (satin).
 - d. Dimensions: **As directed**.
4. Soap Dish:
 - a. Description: With **OR** Without, **as directed**, washcloth bar.
 - b. Mounting: Recessed **OR** Surface mounted, **as directed**.
 - c. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** Ceramic at Cermaic Tile Bathtub surround (See Ceramic Tile Section) **OR** Metal at Porcelain Steel Bathtub Surround (Fastenings: Plated expansion toggle or molly bolts, lead anchors or as required by existing wall conditions), **as directed**.

D. Private-Use Bathroom Accessories

1. Toilet Tissue Dispenser:
 - a. Description: Single-roll dispenser **OR** Double-roll dispenser **OR** Single-roll dispenser with hood **OR** Double-roll dispenser with hood, **as directed**.
 - b. Mounting: Recessed **OR** Surface mounted, **as directed**.
 - c. Capacity: Designed for **4-1/2- or 5-inch- (114- or 127-mm-)** diameter tissue rolls.
 - d. Material and Finish: Solid brass, polished **OR** Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Polished chrome-plated zinc alloy (zamac) **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
2. Shower Curtain Rod:
 - a. Outside Diameter: **1 inch (25.4 mm)** **OR** **1-1/4 inch (32 mm)**, **as directed**.
 - b. Mounting: Flanges with exposed **OR** concealed, **as directed**, fasteners.
 - c. Rod Material and Finish: Solid brass, polished **OR** Polished chrome-plated brass **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.

- d. Flange Material and Finish: Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Polished chrome-plated zinc alloy (zamac) **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
- e. Accessories: Integral chrome-plated brass glide hooks.
- 3. Soap Dish:
 - a. Description: **As directed**.
 - b. Mounting: Recessed **OR** Surface mounted, **as directed**.
 - c. Material and Finish: Solid brass, polished **OR** Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Polished chrome-plated zinc alloy (zamac) **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished) **OR** Ceramic at Cermaic Tile Bathtub surround (See Ceramic Tile Section) **OR** Metal at Porcelain Steel Bathtub Surround (Fastenings: Plated expansion toggle or molly bolts, lead anchors or as required by existing wall conditions), **as directed**.
- 4. Medicine Cabinet:
 - a. Mounting: Recessed, for nominal 4-inch (100-mm) wall depth **OR** Surface mounted, **as directed**.
 - b. Size: 18 by 24 inches (460 by 610 mm).
 - c. Door: Framed mirror door concealing storage cabinet equipped with continuous hinge and spring-buffered, rod-type stop and magnetic door catch.
 - d. Shelves: Three, adjustable.
 - e. Material and Finish:
 - 1) Cabinet: Stainless steel, No. 4 finish (satin) **OR** Steel with corrosion resistant finish, **as directed**.
 - 2) Mirror Frame: **As directed**.
 - 3) Door: **As directed**.
 - 4) Hinge: **As directed**.
 - 5) Shelves: **As directed**.
- 5. Facial Tissue Dispenser:
 - a. Mounting: Wall mounted, recessed **OR** Surface mounted, **as directed**.
 - b. Depth: 2-5/8 inches (67 mm) **OR** 4 inches (102 mm), **as directed**.
 - c. Material and Finish:
 - 1) Dispenser Face: Polished chrome-plated brass **OR** Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated steel **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
 - 2) Cabinet: Steel with corrosion-resistant finish.
- 6. Robe Hook:
 - a. Description: Double-prong **OR** Single-prong, **as directed**, unit.
 - b. Material and Finish: Solid brass, polished **OR** Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Polished chrome-plated zinc alloy (zamac) **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
- 7. Toothbrush and Tumbler Holder:
 - a. Description: **As directed**.
 - b. Material and Finish: Solid brass, polished **OR** Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Polished chrome-plated zinc alloy (zamac) **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
- 8. Towel Bar:
 - a. Description: 3/4-inch- (19-mm-) square tube with rectangular end brackets **OR** 3/4-inch- (19-mm-) round tube with circular end brackets, **as directed**.
 - b. Mounting: Flanges with concealed **OR** exposed, **as directed**, fasteners.
 - c. Length: 18 inches (457 mm), **OR** 24 inches (610 mm), **OR** 30 inches (762 mm), **as directed**.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished) **OR** Polished aluminum, **as directed**.
- 9. Towel Pin:

- a. Description: Projecting minimum of **3 inches (75 mm) OR 5 inches (127 mm)**, as directed, from wall surface.
 - b. Material and Finish: Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
10. Towel Ring:
- a. Description: Pin projecting approximately **2-1/2 inches (63 mm)** from wall with square **OR** circular **OR** oval **OR** trapezoidal, **as directed**, ring.
 - b. Pin Material and Finish: Solid brass, polished **OR** Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated brass **OR** Polished chrome-plated zinc alloy (zamac) **OR** Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished), **as directed**.
 - c. Ring Material and Finish: Matching pin **OR** Clear plastic, **as directed**.
11. Towel Shelf:
- a. Description: Surface-mounted, guest-towel shelf with four **3/8-inch- (9-mm-)** diameter **OR** **5/16-inch- (8-mm-)** square, **as directed**, stainless steel tubes mounted in support arms.
 - 1) Towel Bar: **1/4-inch (6-mm-)** diameter **OR** **5/16-inch- (8-mm-)** square, **as directed**, stainless-steel towel bar below shelf.
 - b. Length: **18 inches (457 mm) OR 24 inches (610 mm)**, **as directed**.
 - c. Material and Finish: Polished brass-plated stainless steel tubes mounted in zinc alloy (zamac) support arms **OR** Polished chrome-plated stainless steel tubes mounted in zinc alloy (zamac) support arms **OR** Stainless steel, No. 7 finish (polished), **as directed**.
12. Towel Rack:
- a. Description: Surface-mounted, guest-towel unit with approximately **1/4-inch- (6-mm-)** diameter wire rings welded to upright wire bracket.
 - b. Capacity: **2 OR 3 OR 4**, **as directed**, sets of bath towels, hand towels, and washcloths.
 - c. Nominal Height: **11 inches (279 mm) OR 17 inches (432 mm) OR 21 inches (533 mm)**, **as directed**.
 - d. Material and Finish: Polished brass-plated zinc alloy (zamac) **OR** Polished chrome-plated zinc alloy (zamac), **as directed**.
13. Retractable Clothesline:
- a. Description: Surface-mounted rectangular **OR** circular, **as directed**, housing with minimum **72-inch- (1829-mm-)** long, retractable, spring-actuated, synthetic clothesline and remote retention bracket.
 - b. Material and Finish Chrome-plated brass **OR** Stainless steel, No. 7 finish (polished), **as directed**.
14. Bottle Opener:
- a. Description: Surface-mounted unit with standard **OR** vandal-resistant, **as directed**, fasteners.
 - b. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** Stainless steel, No. 7 finish (polished) **OR** Chrome-plated steel, **as directed**.
- E. Healthcare Accessories
- 1. Specimen Pass-Through Cabinet:
 - a. Description: With self-closing doors on both sides, lock that prevents doors from both being opened at the same time, and removable stainless-steel tray.
 - b. Nominal Wall Opening: **12 by 11-1/4 inches (305 by 285 mm)**, width times height.
 - c. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 2. Specimen Pass-Through Box:
 - a. Description: With minimum **12-inch (305-mm)** diameter turntable removable cylinder that revolves on stainless-steel self-lubricating ball bearing plates, and with mechanism to prevent over rotation of cylinder.
 - b. Nominal Wall Opening: **13-1/4 by 14 inches (335 by 355 mm)**, width times height.
 - c. Material and Finish: Stainless steel, No. 4 finish (satin).
 - d. Lockset: Tumbler type.
 - 3. Bedpan and Urinal Cabinet:

- a. Description: For storing one conventional size bedpan and one urinal bottle; with door that produces **1/2-inch (13-mm)** opening at top and bottom of cabinet to allow air circulation.
 - b. Mounting: Recessed.
 - c. Nominal Wall Opening: **13-1/2 by 26-1/2 by 5 inches (340 by 670 by 130 mm)**, width times height times depth.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin).
4. Bedpan and Urinal Rack:
- a. Description: For storing one conventional size bedpan and one urinal bottle.
 - b. Mounting: Surface mounted.
 - c. Size: **12 by 27 inches (300 by 685 mm)**, width times height.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin).

F. Warm-Air Dryers

- 1. Warm-Air Dryer:
 - a. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
 - b. Operation: Touch-button **OR** Electronic-sensor, **as directed**, activated with timed power cut-off switch.
 - 1) Operation Time: 30 to 40, **OR** 80, **as directed**, seconds.
 - c. Cover Material and Finish: Steel, with white enamel finish **OR** Cast iron, with enamel finish in color selected **OR** Chrome-plated steel **OR** Stainless steel, No. 4 finish (satin) **OR** Molded plastic, gray **OR** Molded plastic, white, **as directed**.
 - d. Electrical Requirements: 115 V, 13 A, 1500 W **OR** 115 V, 15 A, 1725 W **OR** 115 V, 20 A, 2300 W **OR** 208-240 V, 9-10 A, 1900-2300 W, **as directed**.

G. Childcare Accessories

- 1. Diaper-Changing Station:
 - a. Description: Horizontal **OR** Vertical, **as directed**, unit that opens by folding down from stored position and with child-protection strap.
 - 1) Engineered to support a minimum of **250-lb (113-kg)** static load when opened.
 - b. Mounting: Surface mounted, with unit projecting not more than **4 inches (100 mm)** from wall when closed **OR** Semirecessed, with unit projecting not more than **1 inch (25 mm)** from wall when closed, **as directed**.
 - c. Operation: By pneumatic shock-absorbing mechanism.
 - d. Material and Finish: High-density polyethylene in manufacturer's standard color **OR** High-density polyethylene with plastic laminate insert in color selected **OR** Stainless steel, No. 4 finish (satin), with replaceable insulated polystyrene tray liner and rounded plastic corners **OR** Stainless steel, No. 4 finish (satin), exterior shell with rounded plastic corners; high-density polyethylene interior in manufacturer's standard color, **as directed**.
 - e. Liner Dispenser: Built in.
- 2. Diaper-Pack Vendor:
 - a. Mounting: Surface mounted **OR** Recessed, **as directed**.
 - b. Minimum Capacity: 100 diaper packs.
 - c. Coin Operation: Coin slot preset for 1 U.S. dollar, adjustable up in 25-cent increments.
 - d. Material and Finish: Stainless steel, No. 4 finish (satin).
- 3. Child-Protection Seat:
 - a. Description: Unit that opens by folding down from stored position and with child-protection strap.
 - 1) Engineered to support a minimum of **80-lb (36-kg)**, **OR** **150-lb (68-kg)**, **as directed**, static load when opened.
 - b. Mounting: Surface mounted, with unit projecting not more than **4-1/2 inches (114 mm)**, **OR** **6 inches (152 mm)**, **as directed**, from wall when closed.
 - c. Material and Finish: High-density polyethylene in manufacturer's standard color.

H. Underlavatory Guards

- 1. Material and Finish: Antimicrobial, molded-plastic, white.

I. Custodial Accessories

1. Utility Shelf:

- a. Description: With exposed edges turned down not less than **1/2 inch (12.7 mm)** and supported by two triangular brackets welded to shelf underside.
- b. Size: **16 inches (406 mm)** long by **6 inches (152 mm)** deep.
- c. Material and Finish: Not less than nominal **0.05-inch- (1.3-mm-)** thick stainless steel, No. 4 finish (satin).

2. Mop and Broom Holder:

- a. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
- b. Length: **36 inches (914 mm)**.
- c. Hooks: Three.
- d. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
- e. Material and Finish: Stainless steel, No. 4 finish (satin).
 - 1) Shelf: Not less than nominal **0.05-inch- (1.3-mm-)** thick stainless steel.
 - 2) Rod: Approximately **1/4-inch- (6-mm-)** diameter stainless steel.

3. Paper Towel (Folded) Dispenser:

- a. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
- b. Minimum Capacity: 400 C-fold or 525 multifold towels **OR** 600 C-fold or 800 multifold towels **OR** 400 single-fold towels, **as directed**.
- c. Material and Finish: Stainless steel, No. 4 finish (satin) **OR** ABS plastic, gray, **as directed**.
- d. Lockset: Tumbler type.
- e. Refill Indicators: Pierced slots at sides or front.

4. Paper Towel (Roll) Dispenser:

- a. Description: Lever-actuated mechanism permits controlled delivery of paper rolls in preset lengths per stroke.
- b. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
- c. Minimum Capacity: **8-inch (203-mm)** wide, **800-foot (244-m)** long roll.
- d. Material and Finish: Stainless steel, No. 4 finish (satin), **OR** ABS plastic, gray, **as directed**.
- e. Lockset: Tumbler type.

5. Liquid-Soap Dispenser:

- a. Description: Designed for dispensing soap in liquid or lotion **OR** lather, **as directed**, form.
- b. Mounting: Deck mounted on vanity **OR** Deck mounted on lavatory **OR** Horizontally oriented, recessed **OR** Horizontally oriented, surface mounted **OR** Vertically oriented, surface mounted, **as directed**.
- c. Capacity: Capacity in **oz. (mL)**, **as directed**.
- d. Materials: Valve and reservoir materials and finishes, **as directed**.
- e. Lockset: Tumbler type.
- f. Refill Indicator: Window type.

J. Fabrication

1. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

1.3 EXECUTION

A. Installation

- a. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- b. Grab Bars: Install to withstand a downward load of at least **250 lbf (1112 N)**, when tested according to method in ASTM F 446.

END OF SECTION 10 28 13 13

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SECTION 10 28 13 13a - DETENTION TOILET ACCESSORIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for detention toilet accessories. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Safety hooks.
 - b. Shelves.
 - c. Combination shelves with safety hooks.
 - d. Miscellaneous toilet accessories.
 - e. Stainless-steel mirrors.
 - f. Grab bars.
 - g. Shower seats.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.1: For security sealants, including printed statement of VOC content.
3. Samples: For each type of detention toilet accessory indicated.
4. Product Schedule: Indicate types, quantities, sizes, and installation locations by room.
5. Coordination Drawings: Drawings showing location of each built-in anchor supporting detention toilet accessories, including anchors to be installed as work of other Sections, drawn to scale and coordinating anchorage with detention toilet accessories.
6. Welding certificates.
7. Maintenance data.
8. Warranties: Sample of special warranties.
9. Other Informational Submittals:
 - a. Examination reports documenting inspection of substrates, areas, and conditions.
 - b. Anchor inspection reports documenting inspections of built-in and cast-in anchors.
 - c. Field quality-control certification signed by Contractor and Detention Specialist.

D. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."
2. Preinstallation Conference: Conduct conference at Project site.
3. Coordination Meetings: Conduct coordination meetings at Project site to comply with requirements in Division 01 Section "Special Project Procedures For Detention Facilities".

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace detention toilet accessories that fail in materials or workmanship within two years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B.
2. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, CS (Commercial Steel), Type B; with **G60 (Z180)** zinc (galvanized) coating designation.
3. Stainless-Steel Sheet: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304; Type 430 for mirrors.
4. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
5. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
6. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, a load equal to 4 times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
 - a. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153/A 153M.
7. Embedded Plate Anchors: Fabricated from steel shapes and plates, minimum **3/16 inch (4.8 mm)** thick; with minimum **1/2-inch- (12.7-mm-)** diameter headed studs welded to back of plate.
8. Proprietary Built-in Masonry Anchors: Fabricated from **0.134-inch (3.41-mm)** nominal-thickness steel sheet **OR 1/4-inch (6.3-mm)** nominal-thickness steel plate **OR 1/2-inch (12.7-mm)** nominal-thickness steel plate, **as directed**, into **6-inch- (152-mm-)** **OR 8-inch- (203-mm-)**, **as directed**, deep blocks matching size of concrete masonry units; with weld nuts attached on inside to receive field-bolted attachments, **as directed**.
 - a. Finish: Factory primed for field painting for anchors with field-welded attachments **OR** Polyester powder coat for anchors with bolted attachments **OR** Epoxy paint for anchors with bolted attachments, **as directed**.
9. Welding Rods and Bare Electrodes: Select according to AWS specifications.

B. Security Sealants

1. Manufacturer's standard, high-modulus, nonsag, two-part, pick-proof, epoxy sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing nonmoving interior joints in security applications.

C. Security Fasteners

1. Fasteners that are operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific type of fastener.
2. Provide drive-system type, head style, material, and protective coating as required for assembly, installation, and strength, and as follows:
 - a. Drive-System Types: Pinned Torx-Plus **OR** Pinned Torx, **as directed**.
 - b. Fastener Strength: **120,000 psi (827 MPa)**.
 - c. Socket Button Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - d. Socket Flat Countersunk Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - e. Socket Head Cap Fasteners:
 - 1) Heat-treated alloy steel, **ASTM A 574 (ASTM A 574M)**.
 - 2) Stainless steel, **ASTM F 837 (ASTM F 837M)**, Group 1 CW.
 - f. Protective Coatings for Heat-Treated Alloy Steel:
 - 1) Zinc and clear trivalent chromium, where indicated.
 - 2) Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide unless otherwise indicated.

D. Detention Safety Hooks

1. Individual, Curved, Detention Safety Hook: **0.188-inch (4.77-m)** nominal-thickness, stainless-steel curved hook held by **0.141-inch- (3.58-mm-)** **OR** **0.109-inch- (2.77-mm-)**, **as directed**, thick, stainless-steel bracket punched with not less than 2 holes for fastening with security fastener. Provide friction washer assembly, adjustable with a nonremovable security screw that maintains pressure on hook and allows hook to pivot when load exceeds preset limit. Provide No. 4 finish.
2. Individual, Straight, Detention Safety Hook: **3/8-inch- (9.5-mm-)** **OR** **1/4-inch- (6.3-mm-)**, **as directed**, diameter, stainless-steel straight hook held by **0.109-inch- (2.77-mm-)** **OR** **0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel mounting plate approximately **4 inches (102 mm)** square. Provide pivoting assembly that maintains pressure on hook and snaps down when load exceeds **8 lbf (35.6 N)**. Provide No. 4 finish.
 - a. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
3. Multiple, Curved, Safety Hook Strip: Minimum **5-1/2-inch- (140-mm-)** high backplate by length indicated, formed from **0.125-inch- (3.18-mm-)** **OR** **0.109-inch- (2.77-mm-)** **OR** **0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel sheet. Provide **0.188-inch- (4.77-mm-)** thick, stainless-steel hooks attached to backplate; with each hook having a friction washer assembly, adjustable with a nonremovable security screw that maintains pressure on hook and allows hook to pivot when load exceeds preset limit. Provide No. 4 finish.
 - a. Configuration: **16 inches (406 mm)** long with 2 hooks **OR** **18 inches (457 mm)** long with 4 hooks **OR** **21 inches (533 mm)** long with 4 hooks **OR** **24 inches (610 mm)** long with 3 hooks **OR** **32 inches (813 mm)** long with 4 hooks, **as directed**.
 - b. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
4. Multiple, Straight, Safety Hook Strip: Minimum **5-1/2-inch- (140-mm-)** high backplate by length indicated, formed from **0.141-inch- (3.58-mm-)** **OR** **0.109-inch- (2.77-mm-)** **OR** **0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel sheet. Provide **3/8-inch- (9.5-mm-)** **OR** **1/4-inch- (6.3-mm-)**, **as directed**, diameter, stainless-steel straight hooks attached to backplate. Provide pivoting assembly that maintains pressure on hook and snaps down when load exceeds **8 lbf (35.6 N)**. Provide No. 4 finish.
 - a. Configuration: **16 inches (406 mm)** long with 2 hooks **OR** **18 inches (457 mm)** long with 4 hooks **OR** **24 inches (610 mm)** long with 3 hooks **OR** **32 inches (813 mm)** long with 4 hooks, **as directed**.
 - b. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.

E. Detention Shelves

1. Surface-Mounted, Steel Detention Shelf: Minimum **6 inches high by 8 inches (152 mm high by 203 mm)** deep by **16 inches (406 mm)** **OR** **24 inches (610 mm)** **OR** **32 inches (813 mm)**, **as directed**, long; formed from **0.138-inch (3.50-mm)** **OR** **0.108-inch (2.74-mm)**, **as directed**, nominal-thickness, metallic-coated steel sheet; with welded side gussets and minimum **1-inch (25.4-mm)** flanged front edge; with back punched for fastening to wall with security fasteners. Provide factory priming for field-painted **OR** baked-enamel, **as directed**, finish.
2. Surface-Mounted, Stainless-Steel Detention Shelf: Minimum **5-1/2 inches high by 8 inches (140 mm high by 203 mm)** deep by **18 inches (457 mm)** **OR** **24 inches (610 mm)**, **as directed**, long; formed from **0.078-inch- (1.98-mm-)** thick, stainless-steel sheet; with welded side gussets and hemmed front edge. Provide No. 4 finish.
 - a. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
3. Recessed Detention Shelf: Minimum inside dimensions of **16 inches (406 mm)** wide by **5 inches high by 4 inches (127 mm high by 102 mm)** deep; formed from **0.062-inch- (1.57-mm-)** thick, stainless-steel sheet; with **1-inch- (25.4-mm-)** wide flanged front edge. Secure to wall with rear-mounting steel strap and adjustment bolts. Provide No. 4 finish.

F. Combination Detention Shelves With Safety Hooks

1. Steel Detention Shelf with Multiple, Curved Safety Hooks: Minimum **6 inches high by 8 inches (152 mm high by 203 mm)** deep by length indicated, formed from **0.138-inch (3.50-mm) OR 0.108-inch (2.74-mm)**, **as directed**, nominal-thickness, metallic-coated steel sheet, with welded side gussets and hemmed or flanged front edge. Provide **0.138-inch (3.50-mm)** nominal-thickness, zinc-plated-steel curved hooks held by **0.1265-inch- (3.21-mm-)** thick steel brackets welded to backplate, with each hook having a friction washer assembly, adjustable with a nonremovable security screw that maintains pressure on hook and allows hook to pivot when load exceeds preset limit. Provide factory priming for field-painted **OR** baked-enamel, **as directed**, finish.
 - a. Configuration: **16 inches (406 mm)** long with 2 hooks **OR 24 inches (610 mm)** long with 3 hooks **OR 32 inches (813 mm)** long with 4 hooks, **as directed**.
 - b. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
 2. Stainless-Steel Detention Shelf with Multiple, Curved Safety Hooks: Minimum **5-1/2 inches high by 8 inches (140 mm high by 203 mm)** deep by length indicated; formed from **0.078-inch- (1.98-mm-)** thick, stainless-steel sheet; with welded side gussets and hemmed or flanged front edge. Provide **0.141-inch (3.58-mm)** stainless-steel curved hooks held by **0.141-inch- (3.58-mm-)** thick stainless-steel brackets welded to backplate, with each hook having a friction washer assembly, adjustable with a nonremovable security screw that maintains pressure on hook and allows hook to pivot when load exceeds preset limit. Provide No. 4 finish.
 - a. Configuration: **16 inches (406 mm)** long with 2 hooks **OR 18 inches (457 mm)** long with 4 hooks **OR 24 inches (610 mm)** long with 3 hooks **OR 32 inches (813 mm)** long with 4 hooks, **as directed**.
 - b. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
 3. Stainless-Steel Detention Shelf with Multiple, Straight Safety Hooks: Minimum **5-1/2 inches high by 8 inches (140 mm high by 203 mm)** deep by length indicated; formed from **0.078-inch- (1.98-mm-)** thick, stainless-steel sheet; with welded side gussets and hemmed or flanged front edge. Provide **3/8-inch- (9.5-mm-) OR 1/4-inch- (6.3-mm-)**, **as directed**, diameter, stainless-steel straight hooks held by **0.109-inch- (2.77-mm-) OR 0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel mounting plate. Provide pivoting assembly that maintains pressure on hook and snaps down when load exceeds **8 lbf (35.6 N)**. Provide No. 4 finish.
 - a. Configuration: **16 inches (406 mm)** long with 2 hooks **OR 18 inches (457 mm)** long with 4 hooks **OR 24 inches (610 mm)** long with 3 hooks **OR 32 inches (813 mm)** long with 4 hooks, **as directed**.
 - b. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
- G. Miscellaneous Detention Toilet Accessories
1. Recessed, Detention Toilet Tissue Dispenser: Minimum **5-inch diameter by 4-1/2 inches (127-mm diameter by 114 mm)** deep; formed from **0.062-inch- (1.57-mm-)** thick, stainless-steel sheet. Secure to wall with rear-mounting steel strap and adjustment bolts. Provide No. 4 finish.
 - a. Face: **1-inch (25.4-mm)** lip around entire face **OR 7-inch- (178-mm-)** square face flange, **as directed**.
 2. Recessed, Detention Soap Dish: Minimum inside dimensions of **5-3/4 inches wide by 4-1/2 inches high by 2-1/2 inches (146 mm wide by 114 mm high by 64 mm)** deep with **3/4-inch (19-mm)** lip around entire face; formed from **0.062-inch- (1.57-mm-) OR 0.050-inch- (1.27-mm-)**, **as directed**, thick, stainless-steel sheet. Secure to wall with rear-mounting steel strap and adjustment bolts. Provide No. 4 finish.
- H. Detention Mirrors
1. Small, Framed Detention Mirror: Approximately **9-1/2 inches wide by 11 inches (241 mm wide by 279 mm)** high; formed from **0.038-inch- (0.95-mm-)** thick, stainless-steel sheet with fiberboard backing; enclosed in a frame formed from **0.064-inch (1.63-mm)** nominal-thickness, zinc-plated

- steel sheet; with round corners. Fabricate frame with welded and ground corners or from one piece of metal. Provide No. 8 **OR** 4, **as directed**, finish for mirror, chrome plating for frame.
- a. Mounting: Front mounting with security fasteners to **0.168-inch (4.27-mm)** nominal-thickness, metallic-coated steel mounting plate **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
2. Small, Integrally Framed Detention Mirror: Approximately **9-1/2 inches wide by 11 inches (241 mm wide by 279 mm)** high; with mirror and integral frame formed from a single sheet of **0.038-inch- (0.95-mm-) OR 0.062-inch- (1.57-mm-)**, **as directed**, thick stainless steel; with round corners. Provide No. 8 **OR** 4, **as directed**, finish for mirror, chrome plating for frame.
 - a. Mounting: Front mounting with security fasteners to **0.168-inch (4.27-mm)** nominal-thickness, metallic-coated steel mounting plate **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
 3. Large, Framed Detention Mirror with Square Corners: Minimum **11 inches wide by 16 inches (279 mm wide by 406 mm)** high; formed from **0.038-inch- (0.95-mm-) OR 0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel sheet with fiberboard backing and No. 8 **OR** No. 4, **as directed**, finish; enclosed in a metal frame.
 - a. Frame: Formed from **0.064-inch (1.63-mm)** nominal-thickness, chrome-plated steel **OR 0.062-inch- (1.57-mm-)** thick, stainless-steel **OR 0.078-inch- (1.98-mm-)** thick, stainless-steel, **as directed**, sheet. Fabricate frame with welded and ground corners or from one piece of metal.
 - b. Mounting: Front mounting with security fasteners to **0.168-inch (4.27-mm)** nominal-thickness, metallic-coated steel mounting plate **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
 4. Large, Framed Detention Mirror with Round Corners: Minimum **11 inches wide by 16 inches (279 mm wide by 406 mm)** high, formed from a single sheet of **0.038-inch- (0.95-mm-) OR 0.078-inch- (1.98-mm-)**, **as directed**, thick stainless steel with No. 8 **OR** No. 4, **as directed**, finish; enclosed in a metal frame.
 - a. Frame: Formed from **0.064-inch (1.63-mm)** nominal-thickness, chrome-plated steel **OR 0.078-inch- (1.98-mm-)** thick, stainless-steel, **as directed**, sheet. Fabricate frame with welded and ground corners or from one piece of metal.
 - b. Mounting: Front mounting with security fasteners to **0.168-inch (4.27-mm)** nominal-thickness, metallic-coated steel mounting plate **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
 5. Large, Integrally Framed Detention Mirror with Round Corners: Minimum **11 inches wide by 16 inches (279 mm wide by 406 mm)** high; with mirror and integral frame formed from **0.038-inch- (0.95-mm-) OR 0.062-inch- (1.57-mm-) OR 0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel sheet; with round corners. Provide No. 8 **OR** 4, **as directed**, finish for mirror, chrome plating for frame.
 - a. Mounting: Front mounting with security fasteners to **0.168-inch (4.27-mm)** nominal-thickness, metallic-coated steel mounting plate **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
- I. Detention Grab Bars
 1. Grab Bars: **1-1/2 inches (38.1 mm)** in diameter; formed from **0.038-inch- (0.95-mm-)** thick, stainless-steel tubing, with **3-inch- (76.2-mm-)** diameter flanges formed from **0.125-inch- (3.18-mm-)** thick, stainless steel. Closure plates formed from **0.125-inch- (3.18-mm-)** thick, stainless steel. All-welded construction. Provide No. 4 finish.
 - a. Length: As indicated on Drawings **OR 36 inches (914 mm)** long, **as directed**.
 - b. Mounting: Front mounting with security fasteners **OR** Chase mounting with welded anchor nuts on backplate, **as directed**.
 - J. Detention Shower Seats
 1. Shower Seats: Double-pan retractable, recessed shower seat with recessed handle. Approximately **16-inch by 16-inch (406-mm by 406-mm)** overall size formed from **0.062-inch- (1.57-mm-) OR 0.078-inch- (1.98-mm-)**, **as directed**, thick, stainless-steel sheet. Seat pivots on

solid **0.375-inch- (9.5-mm-)** diameter stainless-steel rod and self-latches when closed. Minimum **750 lb. (340 kg)** loading capacity. Provide No. 4 finish.

K. Fabrication

1. Coordinate dimensions and attachment methods of detention toilet accessories with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
2. Shear and punch metals cleanly and accurately. Remove burrs.
3. Form edges and corners to be free of sharp edges and rough areas. Fold back exposed edges of unsupported sheet metal to form a **1/2-inch- (12.7-mm-)** wide hem on the concealed side, or ease edges to a radius of approximately **1/32 inch (0.8 mm)** and support with concealed stiffeners.
4. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
5. Weld corners and seams continuously to comply with referenced AWS standard and the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - e. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
6. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure detention toilet accessories rigidly in place and to support expected loads. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.
7. Cut, reinforce, drill, and tap detention toilet accessories to receive hardware, security fasteners, and similar items.
8. Form exposed work true to line and level with accurate angles and surfaces. Grind off and ease edges unless otherwise indicated.
9. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed security fasteners of type indicated or, if not indicated, flat-head (countersunk) security fasteners. Locate joints where least conspicuous.

L. Finishes

1. Finish detention toilet accessories after assembly.
2. Steel Finishes:
 - a. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - b. Factory Priming for Field-Painted Finish: Apply manufacturer's standard prime coat immediately after surface preparation and pretreatment.
 - c. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **1.2 mils (0.03 mm)**.
 - 1) Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - d. Chromium Plating: ASTM B 456, Service Condition Number SC 2 (moderate service), nickel plus chromium electrodeposited on base metal.
3. Stainless-Steel Finishes: Remove tool and die marks and stretch lines or blend into finish.

- a. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1.3 EXECUTION

A. Installation

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing detention toilet accessories to in-place construction. Include threaded fasteners for concrete and masonry inserts, security fasteners, and other connectors.
2. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry or similar construction.
3. Apply security sealant around perimeter in a continuous ribbon on back of detention toilet accessories before installation.
4. Security Fasteners: Install detention toilet accessories using security fasteners with head style appropriate for installation requirements, strength, and finish of adjacent materials. Provide stainless-steel security fasteners in stainless-steel materials, **as directed**.

B. Field Quality Control

1. Inspect installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
2. Remove and replace detention work where inspections indicate that work does not comply with specified requirements.
3. Perform additional inspections to determine compliance of replaced or additional work. Prepare inspection reports.
4. Prepare field quality-control certification that states installed products and their installation comply with requirements in the Contract Documents.

C. Adjusting And Cleaning

1. Remove temporary labels and protective coatings.
2. Adjust safety hooks to release with application of **8-lbf (35.6-N)** load.
3. Painting: Immediately after erection, clean bolted connections and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
4. Touchup Painting: Cleaning and touchup painting of bolted connections and abraded areas of shop paint are specified in Division 07..

END OF SECTION 10 28 13 13a

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Task	Specification	Specification Description
10 28 13 13	01 22 16 00	No Specification Required
10 28 13 63	10 28 13 13	Toilet And Bath Accessories
10 28 13 63	10 28 13 13a	Detention Toilet Accessories

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SECTION 10 28 16 13 - BATH ACCESSORIES

DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for bath accessories. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

GENERAL

Definitions

1. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by the Owner.

Submittals

2. Product Data.
3. Shop Drawings.
4. Quality Assurance/Control Submittals:
 - a. Certificates: Submit manufacturer's written self certification that bath accessories meet or exceed specified requirements.

Quality Assurance

5. Regulatory Requirements: Comply with following:
 - a. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
6. Mock-ups: Install one complete mock-up of bath accessories in each typical bathroom installation. Comply with Detailed Scope of Work for bathroom renovation mock-up requirements.
 - a. Locations: As directed.
 - b. Approved Mock-ups: Standard for rest of work.
 - c. Approved Mock-ups: May remain part of completed project.

Scheduling

7. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

PRODUCTS

Bath Accessories

8. Ceramic Soap Dishes at Ceramic Tile Bathtub Surround: See Division 9 Section "Ceramic Tile."
9. Metal Soap Dishes at Porcelain Steel Bathtub Surround:
 - a. Recessed: FS WW-P-541/8B, Type VI, Class 2, heavy duty satin stainless steel.
 - b. Fastenings: Plated expansion toggle or molly bolts, lead anchors or as required by existing wall conditions.

10. Safety Grab Bars: Type 304 stainless steel, minimum 32 mm (1-1/4 inch) OD, maximum 38 mm (1-1/2 inch) OD, 1.2 mm (18 gage) wall thickness in accordance with Uniform Federal Accessibility Standards (UFAS).
 - a. Grab Bar Posts: Stainless steel.
 - b. Post Flanges: Diameter of not less than 68 mm (2-11/16 inches) with center line of screw holes located minimum 13 mm (1/2 inch) from edges of flange.
11. Shower Curtains and Rods: By Bobrick Washroom Equipment, McKinney/Parker, or Leigh Products, or approved equal:
 - a. Rods: Type 304 stainless steel, satin finish, adjustable length type to fit bathtub length, minimum 25 mm (1 inch) OD, minimum 1.0 mm (20 gage) wall thickness, similar to Bobrick No. B-6107 or McKinney/Parker No. 267.
 - b. Flanges: Chrome plated cast brass or stainless steel.
 - c. Shower Curtains: FS L-C-780a, Style I, opaque, matte white vinyl 0.2 mm (0.008 inch) thick, 1 829 mm (72 inches) by 1 829 mm (72 inches) high.
 - 1) Curtains: Germ proof, bacteria proof, and mildew resistant.
 - 2) Curtains: Similar to Bobrick No. 204-2 or McKinney/Parker No. 268SC.
 - d. Curtain Hooks: Stainless steel, Type 304 or nickel plated brass wire, similar to Bobrick No. 204-1 or McKinney/Parker No. 269SH. Provide 12 hooks per curtain.
12. Other Bathroom Accessories: FS WW-P-541/8B, Type 304 stainless steel, satin finish, by Bobrick Washroom Equipment, McKinney/Parker, or Leigh Products, or approved equal:
 - a. Surface Mounted:
 - 1) Medicine Cabinets: Type III, Class 2, Style S, swinging door, minimum 381 mm (15 inches) wide by 610 mm (24 inches) high. Provide complete with magnetic catch, three adjustable shelves, and full length mirror.
 - 2) Towel Bars: Type IV, Class 1, square bar, 610 mm (24 inches) long.
 - 3) Toilet Paper Holders: Type I, Class 1, Mounting S, Style A.
 - 4) Tumbler and Toothbrush Holders: Type VI, Class 4.
 - 5) Lavatory Soap Dishes: Type VI, Class 1.
 - 6) Robe hooks.
 - b. Recessed:
 - 1) Medicine Cabinets: Type III, Class 2, Style R, enamel painted steel, swinging door, minimum 381 mm (15 inches) wide by 610 mm (24 inches) high. Provide complete with magnetic catch, three adjustable shelves, and full length mirror.
 - 2) Toilet Paper Holders: Type I, Class 1, Style K.
 - 3) Lavatory Soap Dishes: Type VI, Class 2.
13. Window Curtains and Rods: Provide over bathroom window openings.
 - a. Rods: Solid steel with brass finish, minimum 10 mm (3/8 inch) diameter.
 - b. Rod Brackets: Two brass-finished brackets with open tops and brass finish.
 - c. Window Curtains: FS L-C-780a, Style II, opaque, matte white vinyl 0.2 mm (0.008 inch) thick.
 - 1) Curtains : Germ proof, bacteria proof, and mildew resistant.
 - 2) Size: To fit bathroom windows.
14. Joint Sealant: Mildew resistant one-component silicone; FS TT-S-001543A, Class A; ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, and A.
 - a. Color: As selected from manufacturer's standard line.

EXECUTION

Examination

15. Site Verification of Conditions:
 - 1) Field Measurements: Verify field measurements.
 - 2) Existing Conditions: Ensure proper openings and blocking have been installed.

Installation

16. General: Install accessories rigidly and securely to blocking in walls using methods and materials recommended by manufacturer.
 - a. Locations and Mounting Heights: As indicated or directed.
 - b. Comply with Regulatory Requirements.
17. Bath Accessories: Securely install flanges for bath accessories and window curtain rods in accordance with manufacturer s recommendations and approved Shop Drawing.
 - a. Safety Grab Bars: Install 100 mm (4 inch) by 100 mm (4 inch) perforated 1.2 mm (18 gage) galvanized steel plates at each post, flush to wall, by using toggle bolts, molly bolts, or anchors as required by conditions.
 - 1) After installation of wall finish, secure each grab bar flange to perforated plates through wall finish with three - 6 mm (1/4 inch) chrome plated machine screws, screwed into threaded sleeves or tee nuts welded to plates.
 - b. Shower Curtains and Rods: Mount flanges to existing wall with approved expansion type inserts and chrome plated or stainless steel wood screws.
18. Bath Accessories at Bathroom with Porcelain Steel Surround:
 - a. Metal Soap Dishes: Mount to new porcelain enamel panels and anchored securely to existing walls using approved mechanical fastenings.
 - 1) Waterproof with joint sealant between surround panel and dishes.
 - b. China Soap Dishes: Anchor securely, using approved mechanical fastening.
 - c. Safety Grab Bars: After installation of wall panels, secure each grab bar flange to perforated plates through panels with three - 6 mm (1/4 inch) chrome plated machine screws, screwed into threaded sleeves or tee nuts welded to plates.

Cleaning

19. Cleaning: Comply with requirements of Detailed Scope of Work.

END OF SECTION 10 28 16 13

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Task	Specification	Specification Description
10 28 16 13	10 28 13 13	Toilet And Bath Accessories
10 28 16 13	10 28 13 13a	Detention Toilet Accessories
10 28 19 16	22 40 00 00	Plumbing Fixtures
10 28 19 19	22 40 00 00	Plumbing Fixtures

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SECTION 10 44 13 00 - FIRE PROTECTION CABINETS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for fire extinguisher cabinets. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fire protection cabinets for the following:
 - 1) Portable fire extinguishers.
 - 2) Fire hose valves.
 - 3) Fire hoses and racks.

C. Submittals

1. Product Data: For each type of product indicated.
2. Show location of knockouts for hose valves.
3. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
4. Samples: For each type of fire protection cabinet indicated.
5. Maintenance Data.

D. Quality Assurance

1. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Coordination

1. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
2. Coordinate size of fire protection cabinets to ensure that type and capacity of fire hoses, hose valves, and hose racks indicated are accommodated.
3. Coordinate sizes and locations of fire protection cabinets with wall depths.

F. Sequencing

1. Apply decals **OR** vinyl lettering, **as directed**, on field-painted, fire protection cabinets after painting is complete.

1.2 PRODUCTS

A. Materials

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
2. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - a. Sheet: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Shapes: **ASTM B 221 (ASTM B 221M)**.
3. Stainless-Steel Sheet: ASTM A 666, Type 304.
4. Copper-Alloy Brass Sheet: ASTM B 36/B 36M, alloy UNS No. C26000 (cartridge brass, 70 percent copper).

5. Copper-Alloy Bronze Sheet: ASTM B 36/B 36M, alloy UNS No. C28000 (muntz metal, 60 percent copper).
6. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3, 3 **OR** 6, **as directed**, mm thick.
7. Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear) **OR** Class 2 (tinted, heat absorbing, and light reducing), bronze tint, **as directed**.
8. Break Glass: Clear annealed float glass, ASTM C 1036, Type I, Class 1, Quality q3, 1.5 mm thick, single strength.
9. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.
10. Wire Glass: ASTM C 1036, Type II, Class 1, Form 1, Quality q8, Mesh m1 (diamond), 6 mm thick.
11. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 1.5 **OR** 3 **OR** 6, **as directed**, mm thick, with Finish 1 (smooth or polished) **OR** Finish 2 (patterned, textured), **as directed**.
12. Acrylic Bubble: One piece.

B. Fire Protection Cabinet

1. Cabinet Type: Suitable for fire extinguisher **OR** extinguisher and hose valve **OR** hose, rack, valve, and extinguisher **OR** hose, rack, and valve **OR** hose valve, **as directed**.
2. Cabinet Construction: Nonrated **OR** 1-hour fire rated **OR** 2-hour fire rated, **as directed**.
 - a. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick, fire-barrier material. Provide factory-drilled mounting holes.
3. Cabinet Material: Steel **OR** Aluminum **OR** Stainless-steel, **as directed**, sheet.
 - a. Shelf: Same metal and finish as cabinet.
4. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
 - a. Trimless with Concealed Flange: Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as plaster stop **OR** drywall bead, **as directed**.
 - b. Trimless with Hidden Flange: Flange of same metal and finish as box overlaps surrounding wall finish and is concealed from view by an overlapping door.
 - c. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
5. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
 - a. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.
 - b. Rolled-Edge Trim: 2-1/2-inch (64-mm) **OR** 4-inch (102-mm) **OR** 4-1/2-inch (114-mm), **as directed**, backbend depth.
6. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall with no trim. Provide where walls are of insufficient depth for semirecessed cabinet installation.
7. Cabinet Trim Material: Steel sheet **OR** Aluminum sheet **OR** Extruded-aluminum shapes **OR** Stainless-steel sheet **OR** Copper-alloy brass sheet **OR** Copper-alloy bronze sheet **OR** Same material and finish as door, **as directed**.
8. Door Material: Steel sheet **OR** Aluminum sheet **OR** Extruded-aluminum shapes **OR** Stainless-steel sheet **OR** Copper-alloy brass sheet **OR** Copper-alloy bronze sheet, **as directed**.
9. Door Style: Fully glazed, frameless, backless, acrylic panel **OR** Fully glazed panel with frame **OR** Full bubble, frameless **OR** Full bubble with frame **OR** Full bubble with frameless, rotating turntable **OR** Horizontal duo panel with frame **OR** Vertical duo panel with frame **OR** Center glass panel with frame **OR** Solid opaque panel with frame **OR** Flush opaque panel, frameless, with no exposed hinges, **as directed**.

10. Door Glazing: Clear float glass **OR** Tempered float glass (clear) **OR** Tempered float glass (bronze tint) **OR** Break glass **OR** Tempered break glass **OR** Wire glass **OR** Mirror glass **OR** Acrylic sheet **OR** Break acrylic bubble **OR** Molded acrylic bubble, **as directed**.
 - a. Acrylic Sheet Color: Clear **OR** Bronze, **as directed**, transparent acrylic sheet.
 - b. Acrylic Sheet Color: Clear transparent acrylic sheet painted white **OR** red **OR** black, **as directed**, on unexposed side.
 - c. Acrylic Bubble Color: Clear **OR** Bronze **OR** Red, **as directed**, transparent.
 11. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - a. Provide projecting lever handle with cam-action latch **OR** projecting door pull and friction latch **OR** recessed door pull and friction latch **OR** manufacturer's standard, **as directed**.
 - b. Provide continuous hinge, of same material and finish as trim, **OR** concealed hinge **OR** pivot hinge **OR** manufacturer's standard hinge, **as directed**, permitting door to open 180 degrees.
 12. Accessories:
 - a. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - b. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
 - c. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
 - d. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle **OR** Cylinder lock, keyed alike to other cabinets, **as directed**.
 - e. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed.
 - 1) Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER."
 - a) Location: Applied to cabinet door **OR** cabinet glazing **OR** location indicated on Drawings, **as directed**.
 - b) Application Process: Silk-screened **OR** Engraved **OR** Etched **OR** Decals **OR** Pressure-sensitive vinyl letters, **as directed**.
 - c) Lettering Color: Red **OR** Black **OR** White, **as directed**.
 - d) Orientation: Vertical **OR** Horizontal **OR** As indicated on Drawings, **as directed**.
 - f. Alarm: Manufacturer's standard alarm that actuates when fire protection cabinet door is opened and that is powered by batteries **OR** low voltage, complete with transformer, **as directed**.
 13. Finishes:
 - a. Manufacturer's standard baked-enamel paint for the following:
 - 1) Exterior of cabinet door **OR** trim, **OR** door, and trim, **as directed**, except for those surfaces indicated to receive another finish.
 - 2) Interior of cabinet and door, **as directed**.
 - b. Aluminum: Clear anodic **OR** Color anodic **OR** Baked enamel or powder coat, **as directed**.
 - c. Steel: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
 - d. Stainless Steel: No. 2B **OR** No. 4 **OR** No. 6 **OR** No. 7 **OR** No. 8, **as directed**.
 - e. Copper Alloy, Brass: Buffed **OR** Hand rubbed **OR** Hand rubbed, lacquered **OR** Medium satin **OR** Fine matte **OR** Statuary conversion **OR** Patina conversion, **as directed**.
 - f. Copper Alloy, Bronze: Buffed **OR** Hand rubbed **OR** Hand rubbed, lacquered **OR** Medium satin **OR** Fine matte **OR** Statuary conversion **OR** Patina conversion, **as directed**.
- C. Security Fire Protection Cabinet
1. Cabinet Type: Suitable for fire extinguisher **OR** extinguisher and hose valve **OR** hose, rack, valve, and extinguisher **OR** hose, rack, and valve **OR** hose valve, **as directed**.
 2. Cabinet Construction: Nonrated **OR** 1-hour fire rated **OR** 2-hour fire rated, **as directed**.

- a. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls lined with minimum **5/8-inch- (16-mm-)** thick, fire-barrier material.
3. Cabinet Material: **0.0677-inch- (1.7-mm-)** thick steel **OR** **0.0966-inch- (2.5-mm-)** thick steel **OR** **0.0781-inch- (2.0-mm-)** thick, stainless-steel, **as directed**, sheet.
 - a. Shelf: Same metal and finish as cabinet.
4. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim indicated.
 - a. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
5. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.
 - a. Square-Edge Trim: **1-1/4- to 1-1/2-inch (32- to 38-mm)** backbend depth.
 - b. Rolled-Edge Trim: **2-1/2-inch (64-mm)** backbend depth.
6. Surface-Mounted Cabinet: Cabinet box fully exposed and mounted directly on wall; with no trim. Provide where walls are of insufficient depth for semirecessed cabinet installation.
7. Cabinet Trim Material: Steel sheet **OR** Stainless-steel sheet **OR** Same material and finish as door, **as directed**.
8. Door Material: **0.0966-inch- (2.5-mm-)** thick steel **OR** **0.0781-inch- (2.0-mm-)** thick, stainless-steel **OR** **0.1094-inch- (2.8-mm-)** thick, stainless-steel, **as directed**, sheet.
9. Door Style: Solid opaque panel with frame.
10. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated, and as follows:
 - a. Recessed door pull.
 - b. Continuous Hinge: Same material and finish as trim, permitting door to open 180 degrees.
 - c. Mechanical Deadlock: Lockbolt retracted and extended by five-tumbler paracentric **OR** mogul, **as directed**, cylinder; keyed one side.
 - 1) Lockbolt: **1-1/2 inches high by 3/4 inch (38 mm high by 19 mm)** thick; **5/8-inch (16-mm)** throw.
 - d. Mechanical Deadlock: As specified in Division 08 Section "Detention Door Hardware".
 - e. Mechanical Snaplatch: Automatic snaplatch when closed; latchbolt retracted by five-tumbler paracentric **OR** mogul, **as directed**, cylinder; keyed one side.
 - 1) Lockbolt: **1 inch high by 7/16 inch (25 mm high by 11 mm)** thick; **5/16-inch (8-mm)** throw.
 - f. Mechanical Snaplatch: As specified in Division 08 Section "Detention Door Hardware".
11. Accessories:
 - a. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to security fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 - b. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed.
 - 1) Identify fire extinguisher in security fire protection cabinet with the words "FIRE EXTINGUISHER."
 - a) Location: Applied to cabinet door **OR** location indicated on Drawings, **as directed**.
 - b) Application Process: Silk-screened **OR** Engraved **OR** Etched **OR** Decals **OR** Pressure-sensitive vinyl letters, **as directed**.
 - c) Lettering Color: Red **OR** Black **OR** White, **as directed**.
 - d) Orientation: Vertical **OR** Horizontal **OR** As indicated on Drawings, **as directed**.
 - c. Keys to Door Locks: Three per lock.
12. Finishes:
 - a. Manufacturer's standard baked-enamel paint for the following:

- 1) Exterior of cabinet door **OR** trim, **OR** door, and trim, **as directed**, except for those surfaces indicated to receive another finish.
- 2) Interior of cabinet and door, **as directed**.
- b. Steel: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
- c. Stainless Steel: No. 4 finish.

D. Fabrication

1. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - a. Weld joints and grind smooth.
 - b. Provide factory-drilled mounting holes.
 - c. Prepare doors and frames to receive locks.
 - d. Install door locks at factory.
2. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - a. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum **1/2 inch (13 mm)** thick.
 - b. Fabricate door frames of one-piece construction with edges flanged.
 - c. Miter and weld perimeter door frames.
3. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

E. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
3. Finish fire protection cabinets after assembly.
4. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

F. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black, **as directed**.
 - b. Color: As selected from full range of industry colors and color densities, **as directed**.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

G. Steel Finishes

1. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" **OR** SSPC-SP 8, "Pickling", **as directed**. After cleaning, apply a conversion coating suited to the organic coating to be applied over it, **as directed**.
2. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.

- a. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

H. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
 - d. Dull Satin Finish: No. 6.
 - e. Reflective, Directional Polish: No. 7.
 - f. Mirrorlike Reflective, Nondirectional Polish: No. 8.
3. Bright, Cold-Rolled, Unpolished Finish: No. 2B.

I. Copper-Alloy Finishes

1. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in 2 coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
2. Hand-Rubbed Finish, Lacquered: M31-M34-O6x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in 2 coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
3. Statuary Conversion Coating over Satin Finish: M31-C55 (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide).
 - a. Color: Match sample.
4. Patina Conversion Coating: CDA-M36-C12-C52 (Mechanical Finish: directionally textured, uniform; Chemical Finish: nonetched cleaned, degreased; Chemical Finish: conversion coating, ammonium sulfate).
 - a. Color: Match sample.

1.3 EXECUTION

A. Preparation

1. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

B. Installation

1. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below: or, if not indicated, at heights acceptable to authorities having jurisdiction.
 - a. Fire Protection Cabinets: **54 inches (1372 mm)** above finished floor to top of cabinet.
2. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - a. Unless otherwise indicated, provide recessed fire protection cabinets. If wall thickness is not adequate for recessed cabinets, provide semirecessed fire protection cabinets.
 - b. Provide inside latch and lock for break-glass panels.
 - c. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
 - d. Fire-Rated, Hose and Valve **OR** Hose-Valve, **as directed**, Cabinets:
 - 1) Install cabinet with not more than **1/16-inch (1.6-mm)** tolerance between pipe OD and knockout OD. Center pipe within knockout.

- 2) Seal through penetrations with firestopping sealant as specified in Division 07 Section "Penetration Firestopping".
 3. Identification: Apply decals **OR** vinyl lettering, **as directed**, at locations indicated.
- C. Adjusting And Cleaning
1. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
 2. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
 3. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
 4. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
 5. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13 00

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SECTION 10 44 16 13 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes portable, [**hand-carried**] [**wheeled**] fire extinguishers[**and mounting brackets for fire extinguishers**].
- B. Owner-Furnished Material: [**Hand-carried**] [**Wheeled**] fire extinguishers.
- C. Related Requirements:
 - 1. Section 104413 "Fire Protection Cabinets."
 - 2. Section 233813 "Commercial-Kitchen Hoods" for fire-extinguishing systems provided as part of commercial-kitchen exhaust hoods.

1.2 ALLOWANCES

- A. Fire Extinguishers are part of allowance as directed by the Owner .

1.3 UNIT PRICES

- A. Work of this Section is affected by unit price as directed by the Owner .

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at site location as directed by the Owner .
 - 1. Review methods and procedures related to fire extinguishers including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher[**and mounting brackets**].
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.[**Use same designations indicated on Drawings.**]

1.6 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.8 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: **[Six]** years as directed by the Owner from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each **[fire-protection cabinet] [and] [mounting bracket]** indicated.
 - 1. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 - 2. Valves: **[Manufacturer's standard] [Nickel-plated, polished-brass body]**.
 - 3. Handles and Levers: **[Manufacturer's standard] [Stainless steel]**.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B[, and **bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging]**.
- B. Stored-Pressure Water Type **Drawing designation** as directed by the Owner : UL-rated 2-A, **2.5-gal. (9.5-L)** nominal capacity, with water in stainless steel container; with pressure-indicating gage.

- C. Stored-Pressure Antifreeze Water Type **Drawing designation** as directed by the Owner : UL-rated 2-A, **2.5-gal. (9.5-L)** nominal capacity, with water and approved antifreeze solution mixed for temperatures as low as **minus 40 deg F (minus 40 deg C)** in stainless steel container; with pressure-indicating gage.
- D. Stored-Pressure Water-Mist Type **Drawing designation** as directed by the Owner : UL-rated 2-A:C, **2.5-gal. (9.5-L)** nominal capacity, with water in enameled-steel container; with pressure-indicating gage.
- E. Pressurized, AFFF-Foam Type **Drawing designation** as directed by the Owner : UL-rated **[2-A:10-B, 1.6-gal. (6-L)] [3-A:20-B, 2.5-gal. (9.5-L)]** nominal capacity, with AFFF foam in stainless steel container; with pressure-indicating gage.
- F. Pressurized, FFFP-Foam Type **Drawing designation** as directed by the Owner : UL-rated 3-A:20-B, **2.5-gal. (9.5-L)** nominal capacity, with FFFP foam in stainless steel container; with pressure-indicating gage.
- G. Wet-Chemical Type **Drawing designation** as directed by the Owner : UL-rated 2-A:1-B:C:K, **[1.6-gal. (6-L)] [2.5-gal. (9.5-L)]** nominal capacity, with potassium [**acetate**] [**citrate**] [**carbonate**]-based chemical in stainless steel container; with pressure-indicating gage.
- H. Regular Dry-Chemical Type **Drawing designation** as directed by the Owner : UL-rated nominal capacity or as directed by the Owner, with sodium bicarbonate-based dry chemical in manufacturer's standard enameled container.
- I. Regular Dry-Chemical Type in Steel Container **Drawing designation** as directed by the Owner : UL-rated **[2-B:C, 1-lb (0.4-kg)] [10-B:C, 2.5-lb (1.1-kg)] [10-B:C, 5-lb (2.3-kg)] [40-B:C, 5.5-lb (2.5-kg)] [40-B:C, 6-lb (2.7-kg)] [60-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)]** nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container.
- J. Regular Dry-Chemical Type in Aluminum Container **Drawing designation** as directed by the Owner : UL-rated **[2-B:C, 1-lb (0.4-kg)] [10-B:C, 2.5-lb (1.1-kg)] [10-B:C, 5-lb (2.3-kg)] [40-B:C, 5.5-lb (2.5-kg)] [60-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)]** nominal capacity, with sodium bicarbonate-based dry chemical in enameled-aluminum container.
- K. Regular Dry-Chemical Type in Brass Container **Drawing designation** as directed by the Owner : UL-rated **[40-B:C, 6-lb (2.7-kg)] [60-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)]** nominal capacity, with sodium bicarbonate-based dry chemical in chrome-plated-brass container.
- L. Multipurpose Dry-Chemical Type **Drawing designation** as directed by the Owner : UL-rated nominal capacity or as directed by the Owner, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.
- M. Multipurpose Dry-Chemical Type in Steel Container **Drawing designation** as directed by the Owner : UL-rated **[1-A:10-B:C, 2.5-lb (1.1-kg)] [2-A:10-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 6-lb (2.7-kg)] [4-A:60-B:C, 10-lb (4.5-kg)] [10-A:120-B:C, 20-lb (9.1-kg)]** nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
- N. Multipurpose Dry-Chemical Type in Aluminum Container **Drawing designation** as directed by the Owner : UL-rated **[1-A:10-B:C, 2.5-lb (1.1-kg)] [2-A:10-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 6-lb (2.7-kg)] [4-A:60-B:C, 10-lb (4.5-kg)] [10-A:120-B:C, 20-lb (9.1-kg)]** nominal capacity, with monoammonium phosphate-based dry chemical in enameled-aluminum container.
- O. Multipurpose Dry-Chemical Type in Brass Container **Drawing designation** as directed by the Owner : UL-rated **[2-A:10-B:C, 5-lb (2.3-kg)] [3-A:40-B:C, 6-lb (2.7-kg)] [4-A:60-B:C, 10-lb (4.5-kg)] [4-A:80-B:C, 10-lb (4.5-kg)] [10-A:120-B:C, 20-lb (9.1-kg)]** nominal capacity, with monoammonium phosphate-based dry chemical in chrome-plated-brass container.

- P. Purple-K Dry-Chemical Type in Aluminum Container **Drawing designation** as directed by the Owner : UL-rated [10-B:C, 2.5-lb (1.1-kg)] [30-B:C, 5-lb (2.3-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with potassium bicarbonate-based dry chemical in enameled-aluminum container.
- Q. Purple-K Dry-Chemical Type in Brass Container **Drawing designation** as directed by the Owner : UL-rated [80-B:C, 10-lb (4.5-kg)] [120-B:C, 20-lb (9.1-kg)] nominal capacity, with potassium bicarbonate-based dry chemical in chrome-plated-brass container.
- R. Carbon Dioxide Type **Drawing designation** as directed by the Owner : UL-rated [5-B:C, 5-lb (2.3-kg)] [10-B:C, 10-lb (4.5-kg)] [10-B:C, 15-lb (6.8-kg)] [10-B:C, 20-lb (9.1-kg)] nominal capacity, with carbon dioxide in [manufacturer's standard enameled-metal] [enameled-steel] [enameled-aluminum] container.
- S. Dry-Powder Type **Drawing designation** as directed by the Owner : [FM approved,]UL-rated Class D, 30-lb (13.6-kg) nominal capacity, with [sodium chloride] [copper]-based powder in enameled-steel container; with pressure-indicating gage.
- T. Halon Type **Drawing designation** as directed by the Owner : [5-B:C, 2.5-lb (1.1-kg)] [10-B:C, 5-lb (2.3-kg)] nominal capacity, in enameled-steel container; with pressure-indicating gage.
1. UL-rated.
- U. Clean-Agent Type in Aluminum Container **Drawing designation** as directed by the Owner : UL-rated [1-B:C, 1.4-lb (0.6-kg)] [2-B:C, 2.5-lb (1.1-kg)] [5-B:C, 5-lb (2.3-kg)] nominal capacity, with HCFC Blend B agent and inert material in enameled-aluminum container; with pressure-indicating gage.
- V. Clean-Agent Type in Brass Container **Drawing designation** as directed by the Owner : UL-rated [1-A:10-B:C, 11-lb (5-kg)] [2-A:10-B:C, 15.5-lb (7-kg)] nominal capacity, with HCFC Blend B agent and inert material in chrome-plated-brass container; with pressure-indicating gage.
- W. Clean-Agent Type in Steel Container **Drawing designation** as directed by the Owner : UL-rated [5-B:C, 4.75-lb (2.2-kg)] [1-A:10-B:C, 10-lb (4.5-kg)] [2-A:10-B:C, 14-lb (6.4-kg)] nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.
- 2.3 MOUNTING BRACKETS **Drawing designation** as directed by the Owner :
- A. Mounting Brackets: Manufacturer's standard [galvanized] steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or [red] [black] baked-enamel finish.
1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: [Vertical] [Horizontal].

- 2.4 WHEELED FIRE EXTINGUISHERS **Drawing designation** as directed by the Owner :
- A. Wheeled Fire Extinguishers: Type, size, and capacity for locations indicated, complete with carriage.
 - B. Source Limitations: Obtain wheeled fire extinguishers and fire extinguishers from single source from single manufacturer.
 1. Carriage: Fabricated from enameled-steel pipe, complete with hanger assembly, long-range nozzle, hose, and **[semipneumatic solid-rubber tires] [wide-rim wheels]**.
 - a. Hose: **[15 feet (4.6 m)] [50 feet (15.2 m)] [100 feet (30.5 m)]**.
 - C. Pressurized, FFFP-Foam Type: UL-rated 20-A:160-B, **33-gal. (125-L)** nominal capacity, with FFFP foam in stainless steel container.
 - D. Regular Dry-Chemical Type: UL-rated **[160-B:C, 50-lb (23-kg)] [240-B:C, 150-lb (68-kg)] [160-B:C, 250-lb (113-kg)]** nominal capacity, with sodium bicarbonate-based dry chemical in **[regulated] [stored] [direct]**-pressure, enameled-steel container.
 - E. Multipurpose Dry-Chemical Type: UL-rated **[20-A:160-B:C, 30-lb (13.6-kg)] [30-A:160-B:C, 50-lb (23-kg)] [40-A:240-B:C, 125-lb (57-kg)] [40-A:160-B:C, 250-lb (113-kg)]** nominal capacity, with monoammonium phosphate-based dry chemical in **[regulated] [stored] [direct]**-pressure, enameled-**[steel] [aluminum] [steel or -aluminum]** container.
 - F. Purple-K Dry-Chemical Type: UL-rated **[160-B:C, 50-lb (23-kg)] [320-B:C, 125-lb (57-kg)] [160-B:C, 250-lb (113-kg)]** nominal capacity, with potassium bicarbonate-based dry chemical in **[regulated] [stored] [direct]**-pressure, enameled-steel container.
 - G. Carbon Dioxide Type: UL-rated **[20-B:C, 50-lb (23-kg)] [20-B:C, 100-lb (45-kg)]** nominal capacity, with carbon dioxide in **[manufacturer's standard enameled-metal] [enameled-steel] [enameled-aluminum]** container.
 - H. Dry-Powder Type: **[FM approved,]**UL-rated Class D, **[sodium chloride-based powder, 150-lb (68-kg)] [copper-based powder, 250-lb (113-kg)]** nominal capacity, in regulated-pressure, enameled-steel container; with pressure-indicating gage.
 - I. Clean-Agent Type: UL-rated **[4-A:40-B:C, 65-lb (29-kg)] [10-A:80-B:C, 150-lb (68-kg)]** nominal capacity, with HCFC Blend B agent and inert material in stored-pressure, enameled-steel container; with pressure-indicating gage.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

10 - Specialties



3.2 INSTALLATION

- A. General: Install fire extinguishers[**and mounting brackets**] in locations indicated and in compliance with requirements of authorities having jurisdiction.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.
 - 1. Mounting Height: Top of fire extinguisher to be at **[42 inches (1067 mm)]** or as directed by the Owner above finished floor.

END OF SECTION 10 44 16 13

Task	Specification	Specification Description
10 44 16 13	01 22 16 00	No Specification Required
10 44 16 13	10 44 13 00	Fire Protection Cabinets

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SECTION 10 51 13 00 - METAL LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Knocked-down corridor lockers.
2. Welded corridor lockers.
3. Knocked-down athletic lockers.
4. Welded athletic lockers.
5. Knocked-down, open-front athletic lockers.
6. Welded, open-front athletic lockers.
7. Locks.
8. Locker benches.

B. Related Requirements:

1. Section 105113.13 "Coin-Operated Metal Lockers" for coin-operated lockers used in public facilities for temporary storage of personal belongings.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference:** Conduct conference at site location as directed by the Owner .

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker[**and bench**].

B. Sustainable Design Submittals:

1. as directed by the Owner .

C. Shop Drawings: For metal lockers.

1. Include plans, elevations, sections, and attachment details.
2. Show locker trim and accessories.
3. Include locker identification system and numbering sequence.

D. Samples: For each color specified, in manufacturer's standard size.

E. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available.

F. Samples for Verification: For the following products, in manufacturer's standard size:

1. Lockers and equipment.

10 - Specialties



2. Locker benches.

G. Product Schedule: For lockers.[**Use same designations indicated on Drawings.**]

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. The following metal locker hardware items equal to **[10]** percent or as directed by the Owner of amount installed for each type and finish installed, but no fewer than **[five]** units or as directed by the Owner :

- a. Locks.
- b. Blank identification plates.
- c. Hooks.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

B. Deliver **[master and control keys]** **[combination control charts]** to Owner by registered mail or overnight package service[.], **addressed as follows:**

1. **Name and address of the Owner representative** as directed by the Owner .

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.9 COORDINATION

A. Coordinate sizes and locations of **[concrete]** **[concrete masonry]** **[wood]** bases for metal lockers.

- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Warranty Period for Knocked-Down Metal Lockers: **[Two]** years or as directed by the Owner from date of Substantial Completion.
 - 4. Warranty Period for Welded Metal Lockers: **[Lifetime] [10 years]** or as directed by the Owner from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers[, **locker benches,**] and accessories from single source from single locker manufacturer.
 - 1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers[**and locker benches**] indicated to be accessible, comply with applicable provisions in **[the USDOJ's "2010 ADA Standards for Accessible Design"] [the ABA standards of the Federal agency having jurisdiction] [and] [ICC A117.1]** or as directed by the Owner

2.3 KNOCKED-DOWN CORRIDOR LOCKERS

- A. Doors: One piece; fabricated from **[0.060-inch (1.52-mm)] [0.075-inch (1.90-mm)]** nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
 - 1. Doors less than **12 inches (305 mm)** wide may be fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
 - 2. Doors for box lockers less than **15 inches (381 mm)** wide may be fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
 - 3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than **15 inches (381 mm)** wide; welded to inner face of doors.
 - 4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet; welded to inner face of doors.

5. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
 6. Door Style: [**Unperforated panel.**] [**Vented panel as follows:**]
 - a. Louvered Vents: No fewer than [**six louver openings at top and bottom for single-tier**] [**three louver openings at top and bottom for double-tier**] [**two louver openings at top and bottom, or three louver openings at top or bottom, for triple-tier**] lockers or as directed by the Owner .
 - b. Security Vents: Manufacturer's standard, stamped horizontal or vertical.
 - c. Perforated Vents: [**Manufacturer's standard shape and configuration**] or as directed by the Owner .
 - d. Concealed Vents: Slotted perforations in top and bottom horizontal door return flanges.
- B. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Intermediate Dividers: **0.024-inch (0.61-mm)** nominal thickness, with single bend at sides.
 2. Backs and Sides: **0.024-inch (0.61-mm)** nominal thickness, with full-height, double-flanged connections.
 3. Shelves: **0.024-inch (0.61-mm)** nominal thickness, with double bend at front and single bend at sides and back.
- C. Frames: Channel formed; fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
 2. Frame Vents: Fabricate face frames with vents.
- D. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees[; **self-closing**].
1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum **2 inches (51 mm)** high. Provide no fewer than three hinges for each door more than **42 inches (1067 mm)** high.
 2. Continuous Hinges: Manufacturer's standard, steel, full height.
 3. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- E. Projecting Door Handle and Latch: Finger-lift latch control designed for use with either built-in combination locks or padlocks; positive automatic latching, chromium plated; pry and vandal resistant.
1. Latch Hooks: Equip doors **48 inches (1219 mm)** and higher with three latch hooks and doors less than **48 inches (1219 mm)** high with two latch hooks; fabricated from **0.105-inch (2.66-mm)** nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 2. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- F. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors **48 inches (1219 mm)** and higher with three latch hooks and doors less than **48 inches (1219 mm)** high with two latch hooks; fabricated from **0.105-inch (2.66-mm)** nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.

2. Single-Point Latching: Nonmoving latch hook **[designed to engage bolt of built-in combination or cylinder lock] [with steel padlock loop that projects through recessed cup and is finished to match metal locker body]**.
 - a. Latch Hook: Equip each door with one latch hook, fabricated from **0.105-inch (2.66-mm)** nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.

- G. Door Handle and Latch for **[Box] [16-Person]** Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

- H. Locks: **[Combination padlocks] [Built-in combination locks] [Cylinder locks] [Built-in, card-operated locks] [Digital keypad locks] [Built-in, coin-operated locks]**.

- I. Identification Plates: Manufacturer's standard, etched, embossed, or stamped **[aluminum] [plastic]** plates, with numbers and letters at least **3/8 inch (9 mm)** high.

- J. Hooks: Manufacturer's standard ball-pointed hooks, aluminum or steel; zinc plated.

- K. Coat Rods: **[1-inch- (25-mm-) diameter steel tube or rod, chrome finished] [1-inch- (25-mm-) diameter steel tube or rod, nickel plated] [3/4-inch- (19-mm-) diameter steel tube or rod, chrome finished] [3/4-inch- (19-mm-) diameter steel tube or rod, nickel plated] [Manufacturer's standard]**.

- L. Legs: **[6 inches (152 mm)]** high or as directed by the Owner; formed by extending vertical frame members, or fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; welded to bottom of locker.
 1. Closed Front and End Bases: Fabricated from **0.036-inch (0.91-mm)** nominal-thickness steel sheet.

- M. Continuous Zee Base: Fabricated from **[0.060-inch (1.52-mm)] [0.075-inch (1.90-mm)] [manufacturer's standard thickness, but not less than 0.060-inch (1.52-mm)]** nominal-thickness steel sheet.
 1. Height: **[4 inches (102 mm)]** or as directed by the Owner .

- N. Continuous Sloping Tops: Fabricated from **[0.036-inch (0.91-mm)] [0.048-inch (1.21-mm)] [manufacturer's standard thickness, but not less than 0.036-inch (0.91-mm)]** nominal-thickness steel sheet.
 1. Closures: **[Vertical] [Hipped]**-end type.
 2. Sloping-top corner fillers, mitered.

- O. Individual Sloping Tops: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet.

- P. Recess Trim: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- Q. Filler Panels: Fabricated from [**0.036-inch (0.91-mm)**] [**0.048-inch (1.21-mm)**] [**manufacturer's standard thickness, but not less than 0.036-inch (0.91-mm)**] nominal-thickness steel sheet.
- R. Boxed End Panels: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- S. Finished End Panels: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- T. Center Dividers: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet.
- U. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - 2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with **A60 (ZF180)** zinc-iron, alloy (galvannealed) coating designation.
- V. Finish: Baked enamel or powder coat.
 - 1. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer's full range**] or as directed by the Owner .

2.4 WELDED CORRIDOR LOCKERS

- A. Doors: One piece; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
 - 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than **15 inches (381 mm)** wide; welded to inner face of doors.
 - 2. Door Style: [**Unperforated panel.**] [**Vented panel as follows:**]
 - a. Louvered Vents: No fewer than [**six louver openings at top and bottom for single-tier**] [**three louver openings at top and bottom for double-tier**] [**two louver openings at top and bottom, or three louver openings at top or bottom, for triple-tier**] lockers or as directed by the Owner .
 - b. Security Vents: Manufacturer's standard, stamped horizontal or vertical.
 - c. Perforated Vents: [**Manufacturer's standard shape and configuration**] or as directed by the Owner .
- B. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 - 1. Tops, Bottoms, and Sides: **0.060-inch (1.52-mm)** nominal thickness.
 - 2. Backs: **0.048-inch (1.21-mm)** nominal thickness.
 - 3. Shelves: **0.060-inch (1.52-mm)** nominal thickness, with double bend at front and single bend at sides and back.

- C. Frames: Channel formed; fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
- D. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees; **self-closing**.
1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum **2 inches (51 mm)** high. Provide no fewer than three hinges for each door more than **42 inches (1067 mm)** high.
 2. Continuous Hinges: Manufacturer's standard, steel, full height.
 3. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- E. Projecting Door Handle and Latch: Finger-lift latch control designed for use with either built-in combination locks or padlocks; positive automatic latching, chromium plated; pry and vandal resistant.
1. Latch Hooks: Equip doors **48 inches (1219 mm)** and higher with three latch hooks and doors less than **48 inches (1219 mm)** high with two latch hooks; fabricated from **0.105-inch (2.66-mm)** nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 2. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- F. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors **48 inches (1219 mm)** and higher with three latch hooks and doors less than **48 inches (1219 mm)** high with two latch hooks; fabricated from **0.120-inch (3.04-mm)** nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
 2. Single-Point Latching: Nonmoving latch hook [**designed to engage bolt of built-in combination or cylinder lock**] [**with steel padlock loop that projects through recessed cup and is finished to match metal locker body**].
 - a. Latch Hook: Equip each door with one latch hook, fabricated from **0.120-inch (3.04-mm)** nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.
- G. Door Handle and Latch for [**Box**] [**16-Person**] Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
- H. Locks: [**Combination padlocks**] [**Built-in combination locks**] [**Cylinder locks**] [**Built-in, card-operated locks**] [**Digital keypad locks**] [**Built-in, coin-operated locks**].

10 - Specialties



- I. Identification Plates: Manufacturer's standard, etched, embossed, or stamped [aluminum] [plastic] plates, with numbers and letters at least **3/8 inch (9 mm)** high.
- J. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- K. Coat Rods: [**1-inch- (25-mm-)** diameter steel, chrome finished] [**1-inch- (25-mm-)** diameter steel, nickel plated] [**3/4-inch- (19-mm-)** diameter steel, chrome finished] [**3/4-inch- (19-mm-)** diameter steel, nickel plated] [Manufacturer's standard].
- L. Legs: [**6 inches (152 mm)**] high or as directed by the Owner; formed by extending vertical frame members, or fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; welded to bottom of locker.
 - 1. Closed Front and End Bases: Fabricated from **0.036-inch (0.91-mm)** nominal-thickness steel sheet.
- M. Continuous Zee Base: Fabricated from, [**0.060-inch (1.52-mm)**] [**0.075-inch (1.90-mm)**] [manufacturer's standard thickness, but not less than **0.060-inch (1.52-mm)**] nominal-thickness steel sheet.
 - 1. Height: [**4 inches (102 mm)**] or as directed by the Owner .
- N. Continuous Sloping Tops: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 - 1. Closures: [**Vertical**] [**Hipped**]-end type.
- O. Recess Trim: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- P. Filler Panels: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- Q. Boxed End Panels: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- R. Finished End Panels: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- S. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - 2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with **A60 (ZF180)** zinc-iron, alloy (galvannealed) coating designation.
- T. Finish: Baked enamel or powder coat.
 - 1. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] [**Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer's full range**] or as directed by the Owner .

2.5 KNOCKED-DOWN ATHLETIC LOCKERS

- A. Perforated Doors: One piece; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at [**vertical edges and with right-angle single bend at horizontal edges**] [**and**] [**latch point (bottom) and right-angle single bend at remaining edges for box lockers**].
 - 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than **15 inches (381 mm)** wide; welded to inner face of doors.
- B. Expanded-Metal Doors: Fabricated from **0.090-inch (2.28-mm)** nominal-thickness expanded metal; welded to **0.105-inch (2.66-mm)** nominal-thickness steel angle frame; with **0.090-inch (2.28-mm)** nominal-thickness, steel sheet lock panel backed by **0.060-inch (1.52-mm)** nominal-thickness, steel sheet retainer welded to door frame.
- C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 - 1. Tops and Bottoms: **0.060-inch (1.52-mm)** nominal thickness, with single bend at edges.
 - 2. Backs: **0.048-inch (1.21-mm)** nominal thickness.
 - 3. Shelves: **0.060-inch (1.52-mm)** nominal thickness, with double bend at front and single bend at sides and back.
- D. Unperforated Sides: Fabricated from [**0.048-inch (1.21-mm)**] [**0.060-inch (1.52-mm)**] nominal-thickness steel sheet.
- E. Perforated Sides: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet with manufacturer's standard diamond perforations.
- F. Expanded-Metal Sides: Fabricated from **0.090-inch (2.28-mm)** nominal-thickness expanded metal; welded to **0.105-inch (2.66-mm)** nominal-thickness steel angles or **0.060-inch (1.52-mm)** nominal-thickness steel channel frames.
- G. Frames: Channel formed; fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet or **0.097-inch (2.45-mm)** nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
 - 1. Cross Frames for [**Double-Tier**] [**Triple-Tier**] Lockers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
- H. Reinforced Bottoms: Structural channels, formed from [**0.060-inch (1.52-mm)**] [**0.075-inch (1.90-mm)**] nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- I. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees; **self-closing**.
 - 1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum **2 inches (51 mm)** high. Provide no fewer than three hinges for each door more than **42 inches (1067 mm)** high.
 - 2. Continuous Hinges: Manufacturer's standard, steel; side or top mounted as required by locker configuration.
 - 3. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- J. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.

1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors **48 inches (1219 mm)** and higher with three latch hooks and doors less than **48 inches (1219 mm)** high with two latch hooks; fabricated from **0.120-inch (3.04-mm)** nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
2. Single-Point Latching: Nonmoving latch hook **[designed to engage bolt of built-in combination or cylinder lock] [with steel padlock loop that projects through recessed cup and is finished to match metal locker body]**.
 - a. Latch Hook: Equip each door with one latch hook, fabricated from **0.120-inch (3.04-mm)** nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.
- K. Projecting Turn-Handle and Latch: Steel handle welded to manufacturer's standard, three-point, cremone-type latching mechanism consisting of steel rods or bars that engage locker frame at top and bottom of door, and center latch that engages strike jamb; with steel padlock loop.
- L. Door Handle and Latch for Box Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
- M. Locks: **[Combination padlocks] [Built-in combination locks] [Cylinder locks] [Built-in, card-operated locks] [Digital keypad locks] [Built-in, coin-operated locks]**.
- N. Identification Plates: Manufacturer's standard, etched, embossed, or stamped **[aluminum] [plastic]** plates, with numbers and letters at least **3/8 inch (9 mm)** high.
- O. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- P. Coat Rods: **[1-inch- (25-mm-) diameter steel, chrome finished] [1-inch- (25-mm-) diameter steel, nickel plated] [3/4-inch- (19-mm-) diameter steel, chrome finished] [3/4-inch- (19-mm-) diameter steel, nickel plated] [Manufacturer's standard]**.
- Q. Legs: **[6 inches (152 mm)]** high or as directed by the Owner; formed by extending vertical frame members, or fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; welded to bottom of locker.
 1. Closed Front and End Bases: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- R. Continuous Zee Base: **4 inches (102 mm)** high; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet.
- S. Continuous Sloping Tops: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 1. Closures: **[Vertical] [Hipped]**-end type.
- T. Recess Trim: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.

- U. Filler Panels: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- V. Boxed End Panels: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- W. Finished End Panels: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- X. Materials:
 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with **A60 (ZF180)** zinc-iron, alloy (galvannealed) coating designation.
 3. Expanded Metal: ASTM F1267, Type II (flattened), Class I (uncoated), **3/4-inch (19-mm)** steel mesh, with at least 70 percent open area.
- Y. Finish: Baked enamel or powder coat.
 1. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] [Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer's full range]** or as directed by the Owner .

2.6 WELDED ATHLETIC LOCKERS

- A. Perforated Doors: One piece; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at **[vertical edges and with right-angle single bend at horizontal edges] [and] [latch point (bottom) and right-angle single bend at remaining edges for box lockers]**.
 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than **15 inches (381 mm)** wide; welded to inner face of doors.
- B. Expanded-Metal Doors: Fabricated from **0.090-inch (2.28-mm)** nominal-thickness expanded metal; welded to **0.105-inch (2.66-mm)** nominal-thickness steel angle frame; with **0.090-inch (2.28-mm)** nominal-thickness, steel sheet lock panel backed by **0.060-inch (1.52-mm)** nominal-thickness, steel sheet retainer welded to door frame.
- C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 1. Tops and Bottoms: **0.060-inch (1.52-mm)** nominal thickness, with single bend at edges.
 2. Backs: **0.048-inch (1.21-mm)** nominal thickness.
 3. Shelves: **0.060-inch (1.52-mm)** nominal thickness, with double bend at front and single bend at sides and back.
- D. Unperforated Sides: Fabricated from **[0.048-inch (1.21-mm)] [0.060-inch (1.52-mm)]** nominal-thickness steel sheet.
- E. Perforated Sides: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet with manufacturer's standard diamond perforations.

- F. Expanded-Metal Sides: Fabricated from **0.090-inch (2.28-mm)** nominal-thickness expanded metal; welded to **0.105-inch (2.66-mm)** nominal-thickness steel angles or **0.060-inch (1.52-mm)** nominal-thickness steel channel frames.
- G. Frames: Channel formed; fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet or **0.097-inch (2.45-mm)** nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames for [**Double-Tier**] [**Triple-Tier**] Lockers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
- H. Reinforced Bottoms: Structural channels, formed from [**0.060-inch (1.52-mm)**] [**0.075-inch (1.90-mm)**] nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- I. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees; **self-closing**.
1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum **2 inches (51 mm)** high. Provide no fewer than three hinges for each door more than **42 inches (1067 mm)** high.
 2. Continuous Hinges: Manufacturer's standard, steel; side or top mounted as required by locker configuration.
 3. Hinges: Manufacturer's standard, steel, continuous or knuckle type.
- J. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors **48 inches (1219 mm)** and higher with three latch hooks and doors less than **48 inches (1219 mm)** high with two latch hooks; fabricated from **0.120-inch (3.04-mm)** nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
 2. Single-Point Latching: Nonmoving latch hook [**designed to engage bolt of built-in combination or cylinder lock**] [**with steel padlock loop that projects through recessed cup and is finished to match metal locker body**].
 - a. Latch Hook: Equip each door with one latch hook, fabricated from **0.120-inch (3.04-mm)** nominal-thickness steel sheet; welded midway up full-height door strike; with resilient silencer.
- K. Projecting Turn-Handle and Latch: Steel handle welded to manufacturer's standard, three-point, cremone-type latching mechanism consisting of steel rods or bars that engage locker frame at top and bottom of door, and center latch that engages strike jamb; with steel padlock loop.
- L. Door Handle and Latch for Box Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.

- M. Locks: **[Combination padlocks] [Built-in combination locks] [Cylinder locks] [Built-in, card-operated locks] [Digital keypad locks] [Built-in, coin-operated locks]**.
- N. Identification Plates: Manufacturer's standard, etched, embossed, or stamped **[aluminum] [plastic]** plates, with numbers and letters at least **3/8 inch (9 mm)** high.
- O. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- P. Coat Rods: **[1-inch- (25-mm-) diameter steel, chrome finished] [1-inch- (25-mm-) diameter steel, nickel plated] [3/4-inch- (19-mm-) diameter steel, chrome finished] [3/4-inch- (19-mm-) diameter steel, nickel plated] [Manufacturer's standard]**.
- Q. Legs: **[6 inches (152 mm)]** high or as directed by the Owner; formed by extending vertical frame members, or fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; welded to bottom of locker.
1. Closed Front and End Bases: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- R. Continuous Zee Base: **4 inches (102 mm)** high; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet.
- S. Continuous Sloping Tops: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
1. Closures: **[Vertical] [Hipped]**-end type.
- T. Recess Trim: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- U. Filler Panels: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- V. Boxed End Panels: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- W. Finished End Panels: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- X. Materials:
1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with **A60 (ZF180)** zinc-iron, alloy (galvannealed) coating designation.
 3. Expanded Metal: ASTM F1267, Type II (flattened), Class I (uncoated), **3/4-inch (19-mm)** steel mesh, with at least 70 percent open area.
- Y. Finish: Baked enamel or powder coat.
1. Color: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range] [Two colors, with door one color and frame and body another color; as selected by Architect from manufacturer's full range]** or as directed by the Owner .

2.7 KNOCKED-DOWN, OPEN-FRONT ATHLETIC LOCKERS

- A. Locker Arrangement: Open front, with **[seat/shelf]** **[seat/footlocker]** **[upper shelf]** **[upper shelf with security box]** **[and]** **[full-width security compartment]** **[configuration as indicated on Drawings]**.
- B. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops and Bottoms: **0.060-inch (1.52-mm)** nominal thickness, with single bend at edges.
 2. Backs: **0.048-inch (1.21-mm)** nominal thickness.
 3. Shelves: **0.060-inch (1.52-mm)** nominal thickness, with double bend at front and single bend at sides and back.
- C. Unperforated Sides: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- D. Perforated Sides: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet with manufacturer's standard diamond perforations. Perforations shall not occur **[above upper shelf]** **[at security compartment]** **[or]** **[at seat/footlocker]**.
- E. Expanded-Metal Sides: Fabricated from **0.090-inch (2.28-mm)** nominal-thickness expanded metal; welded to **0.105-inch (2.66-mm)** nominal-thickness steel angles or **0.060-inch (1.52-mm)** nominal-thickness steel channel frames.
- F. Frames: Channel formed; fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet or **0.105-inch (2.66-mm)** nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames.
- G. Reinforced Bottoms: Structural channels, formed from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- H. Seats/Shelves: Full width of metal locker; channel formed; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; with stiffeners for reinforcement.
- I. Seats/Footlockers: Enclosure full width of bottom of metal locker; fabricated from cold-rolled steel sheet.
1. Seat/Lid: **0.075-inch (1.90-mm)** nominal-thickness steel sheet; channel formed and reinforced with stiffeners; with manufacturer's standard, steel continuous hinge that is completely concealed and tamper resistant when seat/lid is closed; with padlock hasp.
 2. Front Panel: **0.075-inch (1.90-mm)** nominal-thickness steel sheet; channel formed at top edge; with minilouvers for ventilation; recessed for padlock loop.
 3. Sides: **[Integral part of unperforated]** **[Unperforated bottom portions of perforated]** **[0.060-inch (1.52-mm) nominal-thickness steel sheet inside expanded-metal]** sides.
- J. Security Boxes: Nonperforated, consisting of partition extending from upper shelf to top of metal locker, fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet; with channel-formed, **0.060-inch (1.52-mm)** nominal-thickness, steel sheet door frame, and door fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet with right-angle single bend at edges; with manufacturer's standard, steel continuous hinge that is completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Single-Point Latching: Stainless steel strike plate with integral pull; with steel, nonmoving latch hook **[designed to engage bolt of lock]** **[with steel padlock loop that projects through door and is finished to match metal locker body]**.
 2. Locks: **[Combination padlocks]** **[Built-in combination locks]** or as directed by the Owner .

- K. Security Compartments: Nonperforated, running full width of metal locker, with door fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet.
1. Locks: [**Combination padlocks**] [**Built-in combination locks**] or as directed by the Owner .
- L. Identification Plates: Manufacturer's standard, etched, embossed, or stamped [**aluminum**] [**plastic**] plates, with numbers and letters at least **3/8 inch (9 mm)** high.
- M. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- N. Coat Rods: [**1-inch- (25-mm-) diameter steel, chrome finished**] [**1-inch- (25-mm-) diameter steel, nickel plated**] [**3/4-inch- (19-mm-) diameter steel, chrome finished**] [**3/4-inch- (19-mm-) diameter steel, nickel plated**] [**Manufacturer's standard**].
- O. Continuous Sloping Tops: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
1. Closures: [**Vertical**] [**Hipped**]-end type.
- P. Recess Trim: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- Q. Filler Panels: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- R. Boxed End Panels: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- S. Finished End Panels: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- T. Materials:
1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with **A60 (ZF180)** zinc-iron, alloy (galvannealed) coating designation.
 3. Expanded Metal: ASTM F1267, Type II (flattened), Class I (uncoated), **3/4-inch (19-mm)** steel mesh, with at least 70 percent open area.
- U. Finish: Baked enamel or powder coat.
1. Color: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**] or as directed by the Owner .
- 2.8 WELDED, OPEN-FRONT ATHLETIC LOCKERS
- A. Locker Arrangement: Open front, with [**seat/shelf**] [**seat/footlocker**] [**upper shelf**] [**upper shelf with security box**] [**and**] [**full-width security compartment**] [**configuration as indicated on Drawings**].
- B. Material: [**Cold-rolled**] [**Metallic-coated**] steel sheet.
- C. Body: Assembled by [**welding**] [**or**] [**riveting or bolting**] body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops and Bottoms: **0.060-inch (1.52-mm)** nominal thickness, with single bend at edges.

2. Backs: **0.048-inch (1.21-mm)** nominal thickness.
 3. Shelves: **0.060-inch (1.52-mm)** nominal thickness, with double bend at front and single bend at sides and back.
- D. Unperforated Sides: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- E. Perforated Sides: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet with manufacturer's standard diamond perforations. Perforations shall not occur [**above upper shelf**] [**at security compartment**] [**or**] [**at seat/footlocker**].
- F. Expanded-Metal Sides: Fabricated from **0.090-inch (2.28-mm)** nominal-thickness expanded metal; welded to **0.105-inch (2.66-mm)** nominal-thickness steel angles or **0.060-inch (1.52-mm)** nominal-thickness steel channel frames.
- G. Frames: Channel formed; fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet or **0.105-inch (2.66-mm)** nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames.
- H. Reinforced Bottoms: Structural channels, formed from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- I. Seats/Shelves: Full width of metal locker; channel formed; fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet; with stiffeners for reinforcement.
- J. Seats/Footlockers: Enclosure full width of bottom of metal locker; fabricated from cold-rolled steel sheet.
1. Seat/Lid: **0.075-inch (1.90-mm)** nominal-thickness steel sheet; channel formed and reinforced with stiffeners; with manufacturer's standard, steel continuous hinge that is completely concealed and tamper resistant when seat/lid is closed; with padlock hasp.
 2. Front Panel: **0.075-inch (1.90-mm)** nominal-thickness steel sheet; channel formed at top edge; with minilouvers for ventilation; recessed for padlock loop.
 3. Sides: [**Integral part of unperforated**] [**Unperforated bottom portions of perforated**] [**0.060-inch (1.52-mm) nominal-thickness steel sheet inside expanded-metal**] sides.
- K. Security Boxes: Nonperforated, consisting of partition extending from upper shelf to top of metal locker, fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet; with channel-formed, **0.060-inch (1.52-mm)** nominal-thickness, steel sheet door frame, and door fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet with right-angle single bend at edges; with manufacturer's standard, steel continuous hinge that is completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Single-Point Latching: Stainless steel strike plate with integral pull; with steel, nonmoving latch hook [**designed to engage bolt of lock**] [**with steel padlock loop that projects through door and is finished to match metal locker body**].
 2. Locks: [**Combination padlocks**] [**Built-in combination locks**] or as directed by the Owner .
- L. Security Compartments: Nonperforated, running full width of metal locker, with door fabricated from **0.075-inch (1.90-mm)** nominal-thickness steel sheet.
1. Locks: [**Combination padlocks**] [**Built-in combination locks**] or as directed by the Owner .
- M. Identification Plates: Manufacturer's standard, etched, embossed, or stamped [**aluminum**] [**plastic**] plates, with numbers and letters at least **3/8 inch (9 mm)** high.
- N. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.

- O. Coat Rods: **[1-inch- (25-mm-) diameter steel, chrome finished]** **[1-inch- (25-mm-) diameter steel, nickel plated]** **[3/4-inch- (19-mm-) diameter steel, chrome finished]** **[3/4-inch- (19-mm-) diameter steel, nickel plated]** **[Manufacturer's standard]**.
- P. Continuous Sloping Tops: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 - 1. Closures: **[Vertical]** **[Hipped]**-end type.
- Q. Recess Trim: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- R. Filler Panels: Fabricated from **0.048-inch (1.21-mm)** nominal-thickness steel sheet.
- S. Boxed End Panels: Fabricated from **0.060-inch (1.52-mm)** nominal-thickness steel sheet.
- T. Finished End Panels: Fabricated from **0.024-inch (0.61-mm)** nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- U. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - 2. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with **A60 (ZF180)** zinc-iron, alloy (galvannealed) coating designation.
 - 3. Expanded Metal: ASTM F1267, Type II (flattened), Class I (uncoated), **3/4-inch (19-mm)** steel mesh, with at least 70 percent open area.
- V. Finish: Baked enamel or powder coat.
 - 1. Color: **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** or as directed by the Owner .

2.9 LOCKS

- A. Combination Padlock: **[Key-controlled, three-number dialing combination locks; capable of five combination changes]** **[Provided by Owner]**.
- B. Built-in Combination Lock: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.
 - 1. Bolt Operation: **[Manually locking deadbolt]** **[or]** **[automatically locking spring bolt]**.
- C. Cylinder Lock: Built-in, flush, cam lock with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and **[two]** master keys or as directed by the Owner .
 - 1. Key Type: **[Flat]** **[Grooved]**, **with minimum 2- by 2.68-inch (51- by 68.3-mm) key head for accessible lockers]**.
 - 2. Bolt Operation: **[Manually locking deadbolt]** **[or]** **[automatically locking spring bolt]**.
- D. Built-in, Card-Operated Lock: Self-contained units mounted on interior of door with replaceable lock cylinders keyed separately and master keyed. Mount instruction decals on both door faces. Furnish one change card key for each lock and one master card key.

1. Bolt Operation: **[Manually locking deadbolt]** [or] **[automatically locking spring bolt]**.
- E. Digital Keypad Lock: Battery-powered electronic keypad with reprogrammable manager and owner codes that override access. Three consecutive incorrect code entries shall disable lock for three minutes.
1. Designed for permanently assigned access via entry of user's four-digit code.
 2. Designed for shared or temporary access by multiple users, with user-defined code to lock and unlock. Provide LED indicator to show when lock is in use.
- F. Built-in, Coin-Operated Lock: Self-contained units mounted on interior of door with replaceable lock cylinders keyed separately and master keyed. Mount instruction decals on both door faces. Furnish one change key for each lock and one master key.
1. Bolt Operation: **[Manually locking deadbolt]** [or] **[automatically locking spring bolt]**.
 2. Lock Type: Fee **[return/deposit]** [collect/pay].
 3. Fee Type: **[Token]** **[Coin, one quarter]** **[Coin, two quarters]**.
 4. Coin Box: Manufacturer's standard housing or stainless steel cash box with stainless steel flanged cover set into base of lock channel frame. Furnish with removable cylinder and key, and master code changer key.
- 2.10 LOCKER BENCHES
- A. Provide bench units with overall assembly height of **[17-1/2 inches (445 mm)]** or as directed by the Owner .
- B. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.
1. Size: Minimum **9-1/2 inches wide by 1-1/4 inches thick (241 mm wide by 32 mm thick)****[except provide 20- to 24-inch- (508- to 610-mm-) wide tops where accessible benches are indicated]**.
 2. Laminated clear hardwood with one coat of clear sealer on all surfaces and one coat of clear lacquer on top and sides.
 3. Plastic laminate over particleboard core, with two steel tubes running full length of top and positioned to receive pedestal fasteners.
 - a. Color: **[Match metal lockers]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]**.
 4. Extruded aluminum with clear anodic finish.
- C. Fixed-Bench Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:
1. Tubular Steel:
 - a. **1-1/2-inch- (38-mm-)** diameter steel tubing: threaded on both ends, with standard pipe flange at top and bell-shaped cast-iron base; with baked-enamel or powder-coat finish; anchored with exposed fasteners.
 - 1) Color: **[Match metal lockers]** **[As indicated by manufacturer's designations]** **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]**.

- b. **1-1/4-inch- (32-mm-)** diameter steel tubing: with **0.1265-inch- (3.2-mm-)** thick steel flanges welded at top and base; with **[baked-enamel] [zinc-plated]** finish; anchored with exposed fasteners.
 - 1) Color: **[Match metal lockers] [As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range]**.
- D. Movable-Bench Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top, complete with fasteners, and as follows:
- 1. Aluminum: **1/8-inch-thick by 3-inch-wide (3-mm-thick by 76-mm-wide)** channel or **1/4-inch-thick by 3-inch-wide (6-mm-thick by 76-mm-wide)** bar stock, shaped into **[trapezoidal] [inverted-T]** form; with nonskid pads at bottom.
 - a. Finish: **[Clear] [Black] [Gold]** anodic finish.
 - 2. Stainless Steel: **1/8-inch-thick by 3-inch-wide (3-mm-thick by 76-mm-wide)** channel or **1/4-inch-thick by 3-inch-wide (6-mm-thick by 76-mm-wide)** bar stock, shaped into trapezoidal form; with nonskid pads at bottom.
 - a. Finish: **[Manufacturer's standard] [No. 4B]**.
- E. Materials:
- 1. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.
 - 2. Plastic Laminate: NEMA LD 3, Grade HGP.
 - 3. Extruded Aluminum: **ASTM B221 (ASTM B221M)**, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
 - 4. Steel Tube: ASTM A500/A500M, cold rolled.
 - 5. Particleboard: ANSI A208.1, Grade M-2.

2.11 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
 - 1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
 - 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
 - 3. Triple-Tier Units: One double-prong ceiling hook.
 - 4. Coat Rods: **[As indicated on Drawings] [For each compartment of each locker] [In lieu of ceiling hook for metal lockers 24 inches (610 mm) high or more] [In lieu of ceiling hook for metal lockers 18 inches (457 mm) deep or more]**.
 - 5. Open-Front Athletic Lockers: Two single-prong wall hooks bolted to locker back and coat rod.

- D. Knocked-Down Construction: Fabricate metal lockers by **[assembling at Project site]** **[preassembling at plant prior to shipping]**, using manufacturer's nuts, bolts, screws, or rivets.
- E. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.
- F. Accessible Lockers: Fabricate as follows:
1. Locate bottom shelf no lower than **15 inches (381 mm)** above the floor.
 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than **48 inches (1219 mm)** above the floor.
- G. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.
- H. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
1. Sloping-top corner fillers, mitered.
- I. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.
- J. Recess Trim: Fabricated with minimum **2-1/2-inch (64-mm)** face width and in lengths as long as practical; finished to match lockers.
- K. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- L. Boxed End Panels: Fabricated with **1-inch- (25-mm-)** wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
1. Provide one-piece panels for double-row (back-to-back) locker ends.
- M. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
1. Provide one-piece panels for double-row (back-to-back) locker ends.
- N. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.
- 2.12 ACCESSORIES
- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, **[and elsewhere as indicated,]** for corrosion resistance.
 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than **36 inches (910 mm)** o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top [**and bottom of lockers**] [**of lockers and to floor**].
 - 3. Anchor back-to-back metal lockers to floor.
- B. Knocked-Down Lockers: Assemble with manufacturer's standard fasteners, with no exposed fasteners on door faces or face frames.
- C. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- D. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.
- E. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach recess trim to recessed metal lockers with concealed clips.
 - 2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
 - 4. Attach boxed end panels using concealed fasteners to conceal exposed ends of nonrecessed metal lockers.
 - 5. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.
- F. Fixed Benches: Provide no fewer than two pedestals for each bench, uniformly spaced not more than **72 inches (1830 mm)** apart. Securely fasten tops of pedestals to undersides of bench tops, and anchor bases to floor.

10 - Specialties



- G. Movable Benches: Place benches in locations indicated on Drawings.

3.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. [**Verify that integral locking devices operate properly.**]

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13 00

SECTION 10 51 13 00a - WIRE BASKET LOCKERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wire basket lockers. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Submitted shop drawings showing individual locker construction and overall dimensions, including complete installation instructions.

C. Product Handling

1. Store locker components flat until assembly. Protect all finishes from soiling and damage during handling.

D. Warranty

1. Manufacturer shall warranty lockers for a period of 10 years against rust and other types of corrosion, or breakage of any of the baskets and shelves under normal use.

1.2 PRODUCTS

A. Materials

1. Wire Basket Racks:
 - a. Shelving: Shelving units shall consist of minimum 13 ga. steel angle posts punched for bolting shelves.
 - b. Sway Braces: Minimum 12 ga. steel for back and sides of unit.
 - c. Shelves: Minimum 20 ga. formed steel, with down turned flanges at the back to act as backstop and to prevent removal from rear.
 - d. Dividers: Minimum 20 ga., 3-inches in height, with an attaching flange formed at right angles. Dividers shall be bolted to shelves.
 - e. Padlock Attachment: Provide minimum 14 ga. padlock staple attachment at the front edge of each shelf located to match the locking loop formed in the basket rim.
 - f. Casters (Option): 3-inch dia., swivel-type mobility casters bolted to each corner post.
 - g. Number Plates: Aluminum number plates with 3/8" high black letters. Rivet plates to shelf face at each basket opening.
2. Baskets:
 - a. Baskets shall be 12" x 13" x 8" **OR** 9" x 13" x 8", **as directed**, all wire or wire mesh or perforated steel front type. Provide number plates specified above on the front of each basket.
 - b. Pilfer Guards (Option): Provide sheet steel pilfer guard designed for field attachment to the top of the basket to cover the first 3" of depth.
3. Finish:
 - a. Baskets and pilfer guards: electroplating with bright zinc chromate.
 - b. Basket rack posts, shelves, and braces: In color selected from manufacturer's standard colors.

B. Fabrication

1. Locker components shall be fabricated square and rigid with a finish free of scratches and chips. All sides, tops, bottoms, and shelves shall be coated on both sides with a protective masking.

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1.3 EXECUTION

A. Installation

1. Install lockers at the location shown in accordance with the manufacturer's instructions for plumb, level, rigid, and flush installations.
2. Anchor the units to wall studs through the locker back and to the floor using #8 pan head wood screws. Furring must be installed between lockers and wall of installations.

END OF SECTION 10 51 13 00a

Task	Specification	Specification Description
10 51 13 00	01 22 16 00	No Specification Required

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SECTION 10 51 26 00 - SOLID PLASTIC LOCKERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for solid plastic lockers. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Submitted shop drawings showing individual locker construction and overall dimensions, including complete installation instructions.

C. Product Handling

1. Store locker components flat until assembly. Protect all finishes from soiling and damage during handling.

D. Warranty

1. Manufacturer shall warranty lockers for a period of 10 years against rust and other types of corrosion, delamination, or breakage of any of the plastic panels, doors, and shelves under normal use.

1.2 PRODUCTS

- #### **A. Materials:** Sides, tops, bottoms, rears, doors, and shelves shall be made from high impact, high density polyethylene (HDPE) formed under high pressure into solid plastic components 3/8" thick with homogeneous color throughout. All panels, doors, and shelves will match in color.

1. Material testing: All solid plastic components shall resist deterioration and discoloration when subjected to any of the following:
 - Acetic Acid 80%
 - Acetone
 - Ammonia Liquid
 - Ammonium Phosphate
 - Bleach 12%
 - Borax
 - Brine
 - Caustic Soda
 - Chlorine Water
 - Citric Acid
 - Copper Chloride
 - Core Oils
 - Hydrochloric Acid 40%
 - Hydrogen Peroxide 30%
 - Isopropyl Alcohol
 - Lactic Acid 25%
 - Lime Sulfur
 - Nicotine
 - Potassium Bromide
 - Soaps
 - Sodium Bicarbonate
 - Trisodium Phosphate
 - Urea and Urine

Vinegar

(Testing in accordance with corrosion testing procedure established by the United States Plastic Corporation)

2. Continuous latch, capable of accepting various locking mechanisms, shall be securely fastened to the entire length of the door, providing a continuous security latch.
3. Door hinge shall be made from plastic with no steel or metal parts. Door hinge shall be continuous and integrated into the full length of the door and main locker body.
4. Coat hooks shall be made from chrome plated steel and attached with tempered screws.
5. All components shall have a smooth "orange peel" finish. All components shall be of the same color and selected from the manufacturer's full color line.

B. Fabrication

1. Locker components shall be fabricated square and rigid with a finish free of scratches and chips. All sides, tops, bottoms, backs, doors, and shelves shall be coated on both sides with a protective masking.
2. Solid plastic locker components shall snap together for easy assembly and shall provide a solid and secure construction. Adjacent lockers shall share a common side panel. Locker units shall be manufactured for assembly in a group of no more than five adjacent lockers.

1.3 EXECUTION

A. Installation

1. Install lockers at the location shown in accordance with the manufacturer's instructions for plumb, level, rigid, and flush installations.
2. Anchor the units to wall studs through the locker back and to the floor using #8 pan head wood screws. Furring must be installed between lockers and wall of installations.
3. Lockers can be either floor-mounted or installed on a 4" high base. Hardware and instructions for either method shall be provided by the manufacturer.
4. Number plates shall be available for field or factory mounting.

END OF SECTION 10 51 26 00

Task	Specification	Specification Description
10 51 53 00	01 22 16 00	No Specification Required

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SECTION 10 55 23 26 - POSTAL SPECIALTIES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for postal specialties. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. USPS-approved horizontal mail receptacles.
 - b. Private-delivery horizontal mail receptacles.
 - c. Private postal-facility horizontal mail receptacles.
 - d. Vertical mail receptacles.
 - e. USPS-approved cluster box units (CBUs).
 - f. Neighborhood delivery and collection box units (NDCBUs).
 - g. USPS-approved parcel lockers.
 - h. USPS-approved collection boxes.
 - i. Private collection boxes.
 - j. Data distribution boxes.
 - k. Mail chutes.
 - l. Accessories:
 - 1) Directory for mail receptacles.
 - 2) Key keeper.
 - 3) Key cabinet.
 - 4) Mail-sorting collection unit.
 - 5) Letter drops.
 - 6) Package depository.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For postal specialties. Include plans, elevations, sections, details, identification sequence for compartments, and attachments to other work.
3. Samples: For each exposed product and for each color and texture specified.
4. Product certificates, including written approval by Postmaster General, as applicable.
5. Maintenance data.
6. Other Informational Submittals: Final USPS local postmaster approval for installed postal specialties to be served by USPS.

D. Quality Assurance

1. Source Limitations for Each Type of Postal Specialty: For USPS-approved products, use only those included on current lists of USPS manufacturers and models.
2. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver lock keys to the Owner by registered mail or overnight package service with a record of each corresponding lock and key number.
2. Deliver combination-lock combinations to the Owner by registered mail or overnight package service with a record of each corresponding lock and combination.

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Manufacturer's standard alloy and temper for type of use and finish indicated, and as follows:
 - a. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Shapes: **ASTM B 221 (ASTM B 221M)**.
2. Steel Sheet: Cold rolled, ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, exposed matte finish where exposed.
3. Metallic-Coated Steel Sheet: Galvanized-steel sheet, ASTM A 653/A 653M, **G60 (Z180)** coating designation, extra smooth where exposed; or electrolytic zinc-coated steel sheet, ASTM A 879/A 879M, Coating Designation **08Z (24G)**.
4. Stainless-Steel Sheet: ASTM A 666, Type 304.
5. Brass Sheet: ASTM B 36/B 36M, manufacturer's standard copper alloy.
6. Zinc Sheet or Plate: ASTM B 69, manufacturer's standard sheet or plate and zinc alloy.
7. Die-Cast Aluminum: ASTM B 85, manufacturer's standard aluminum alloy.
8. Die-Cast Brass: ASTM B 176, manufacturer's standard copper alloy.
9. Die-Cast Zinc: ASTM B 86, manufacturer's standard zinc alloy.
10. Steel Anchor Bolts, Nuts, and Washers: ASTM F 1554, Grade 36 or 55, hot-dip galvanized.
11. Stainless-Steel Anchor Bolts, Nuts, and Washers: ASTM A 193/A 193M, Grade B8M, Type 316.
12. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

B. USPS-Approved Horizontal Mail Receptacles

1. Front-Loading, USPS-Approved Horizontal Mail Receptacles: Consisting of multiple compartments with fixed, solid compartment backs, enclosed within recessed wall box. Provide access to compartments for distributing incoming mail from front of unit by unlocking master lock and swinging side-hinged master door to provide accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door. Comply with USPS-STD-4C **OR** USPS-STD-4B+, **as directed**.
 - a. Mail Delivery: USPS **OR** Private, **as directed**.
 - b. Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - 1) Type I: A group of mail receptacles in single-column configuration with single master door, three – eight mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep (76 mm high by 305 mm wide by 381 mm deep)**, one outgoing mail collection compartment prepared for master-door lock, and one parcel compartment **15 inches high by 12 inches wide by 15 inches deep (381 mm high by 305 mm wide by 381 mm deep)**.
 - 2) Type II: A group of mail receptacles in double-column configuration with double master door, three - sixteen mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep (76 mm high by 305 mm wide by 381 mm deep)**, one outgoing mail collection compartment prepared for master-door lock, and one **OR** two, **as directed**, parcel compartment(s): **15 inches high by 12 inches wide by 15 inches deep (381 mm high by 305 mm wide by 381 mm deep)** and **18 inches high by 12 inches wide by 15 inches deep (457 mm high by 305 mm wide by 381 mm deep)**.
 - 3) Type III: A group of mail receptacles in double-column configuration with single master door, three - sixteen mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep (76 mm high by 305 mm wide by 381 mm deep)**, one outgoing mail collection compartment prepared for master-door lock, and one **OR** two, **as directed**, parcel compartment(s): **15 inches high by 12 inches wide by 15**

- inches deep (381 mm high by 305 mm wide by 381 mm deep) and 18 inches high by 12 inches wide by 15 inches deep (457 mm high by 305 mm wide by 381 mm deep).
- 4) Type VI (No Parcel Compartment): A group of mail receptacles in single-column configuration with single master door, three – ninemail compartments not less than 3 inches high by 12 inches wide by 15 inches deep (76 mm high by 305 mm wide by 381 mm deep), and one outgoing mail collection compartment prepared for master-door lock.
 - 5) Type VIII (No Parcel Compartment): A group of mail receptacles in double-column configuration with double master door, three – nineteen mail compartments not less than 3 inches high by 12 inches wide by 15 inches deep (76 mm high by 305 mm wide by 381 mm deep), and one outgoing mail collection compartment prepared for master-door lock.
- c. Compartments: Number and size as follows: **OR** Number as indicated on Drawings, of the following sizes: **OR** Number and size as indicated on Drawings, **as directed**.
- 1) Type A: Provide compartments with inside dimensions not less than 5 inches high by 6 inches wide by 15 inches deep (127 mm high by 152 mm wide by 381 mm deep).
 - 2) Type B: Provide compartments with inside dimensions not less than 5 inches high by 12-1/2 inches wide by 15 inches deep (127 mm high by 318 mm wide by 381 mm deep).
 - 3) Type C: Provide compartments with inside dimensions not less than 10-1/2 inches high by 6 inches wide by 15 inches deep (267 mm high by 152 mm wide by 381 mm deep).
 - 4) Type D: Provide compartments with inside dimensions not less than 10-1/2 inches high by 12-1/2 inches wide by 15 inches deep (267 mm high by 318 mm wide by 381 mm deep).
 - 5) Type E: Provide compartments with inside dimensions not less than 16 inches high by 12-1/2 inches wide by 15 inches deep (406 mm high by 318 mm wide by 381 mm deep).
- d. Front-Loading Master Door: Fabricated from extruded aluminum and braced and framed to hold compartment doors; prepared to receive master-door lock.
- 1) Master-Door Lock: Door prepared to receive lock provided by local postmaster, for units served by USPS.
OR
Master-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
- e. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock and tenant identification as required by cited standard. Provide mail slot in the compartment with master-door lock, **as directed**.
- 1) Compartment-Door Locks (for units served by USPS): Comply with USPS-L-1172C, PSIN O910, for locks and keys, or equivalent as approved by USPS; with three keys for each compartment door. Key each compartment differently.
 - 2) Compartment-Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
 - 3) Compartment-Door Locks: Removable core locks, furnished by the Owner and installed as Work of this Section.
 - 4) Compartment-Door Locks: Spring-latch-type lock designed to accommodate cylinders keyed to building keying system; with two **OR** three, **as directed**, keys for each compartment door. Provide cylinders specified in Division 08 Section "Door Hardware".
 - 5) Compartment-Door Locks: Three-digit, single-dial, combination locks with spring latch and automatic throw off. Set each compartment with different combination.
- f. Frames: Fabricated from extruded aluminum or aluminum sheet; ganged and nested units, with cardholder and blank cards for tenant's identification within each compartment.

- g. Snap-on Trim: Fabricated from same material and finish as compartment doors.
- h. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
- i. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Brass **OR** Dark bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Silver **OR** Black **OR** Medium bronze **OR** Dark bronze **OR** Gold **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
- 2. Rear-Loading, USPS-Approved Horizontal Mail Receptacles: Consisting of multiple compartments enclosed within recessed wall box. Provide access to compartments for distributing incoming mail from rear of unit with accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door. Comply with USPS-STD-4C **OR** USPS-STD-4B+, **as directed**.
 - a. Mail Delivery: USPS **OR** Private, **as directed**.
 - b. Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - 1) Type IV: A group of mail receptacles in single-column configuration with a rear-access cover, three - eight mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep** (76 mm high by 305 mm wide by 381 mm deep), one outgoing mail collection compartment, and one parcel compartment **15 inches high by 12 inches wide by 15 inches deep** (381 mm high by 305 mm wide by 381 mm deep).
 - 2) Type V: A group of mail receptacles in double-column configuration with a rear-access cover, three - sixteen mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep** (76 mm high by **OR** 305 mm wide by 381 mm deep), one outgoing mail collection compartment, and one **OR** two, **as directed**, parcel compartment(s) **15 inches high by 12 inches wide by 15 inches deep** (381 mm high by 305 mm wide by 381 mm deep) and **18 inches high by 12 inches wide by 15 inches deep** (457 mm high by 305 mm wide by 381 mm deep).
 - 3) Type VII (No Parcel Compartment): A group of mail receptacles in single-column configuration with a rear-access cover, three - nine mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep** (76 mm high by 305 mm wide by 381 mm deep), and one outgoing mail collection compartment.
 - 4) Type IX (No Parcel Compartment): A group of mail receptacles in double-column configuration with a rear-access cover, three - nineteen mail compartments not less than **3 inches high by 12 inches wide by 15 inches deep** (76 mm high by 305 mm wide by 381 mm deep), and one outgoing mail collection compartment.
 - c. Compartments: Number and size as follows: **OR** Number as indicated on Drawings, of the following sizes: **OR** Number and size as indicated on Drawings, **as directed**.
 - 1) Type A: Provide compartments with inside dimensions not less than **5 inches high by 6 inches wide by 15 inches deep** (127 mm high by 152 mm wide by 381 mm deep).
 - 2) Type B: Provide compartments with inside dimensions not less than **5 inches high by 12-1/2 inches wide by 15 inches deep** (127 mm high by 318 mm wide by 381 mm deep).
 - 3) Type C: Provide compartments with inside dimensions not less than **10-1/2 inches high by 6 inches wide by 15 inches deep** (267 mm high by 152 mm wide by 381 mm deep).
 - 4) Type D: Provide compartments with inside dimensions not less than **10-1/2 inches high by 12-1/2 inches wide by 15 inches deep** (267 mm high by 318 mm wide by 381 mm deep).
 - 5) Type E: Provide compartments with inside dimensions not less than **16 inches high by 12-1/2 inches wide by 15 inches deep** (406 mm high by 318 mm wide by 381 mm deep).

- d. Rear-Loading Cover: Not required **OR** Lift-off rear cover fabricated from extruded aluminum or aluminum sheet, finished to match front of unit, **as directed**.
OR
 Rear-Loading Door: Side hinged, fabricated from extruded aluminum or aluminum sheet, finished to match front of unit; with full-length, stainless-steel piano hinge on one side and positive-latching **OR** locking, **as directed**, mechanism on the other.
 - 1) Rear-Door Lock (for units served by USPS if lock is required): Door prepared to receive lock provided by local postmaster.
OR
 Rear-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
- e. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock and tenant identification as required by cited standard. Provide one compartment with outgoing mail slot, **as directed**.
 - 1) Compartment-Door Locks (for units served by USPS): Comply with USPS-L-1172C, PSIN O910, for locks and keys, or equivalent as approved by USPS; with three keys for each compartment door. Key each compartment differently.
 - 2) Compartment-Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
 - 3) Compartment-Door Locks: Removable core locks, furnished by the Owner and installed as Work of this Section.
 - 4) Compartment-Door Locks: Spring-latch-type lock designed to accommodate cylinders keyed to building keying system; with two **OR** three, **as directed**, keys for each compartment door. Provide cylinders specified in Division 08 Section "Door Hardware".
 - 5) Compartment-Door Locks: Three-digit, single-dial, combination locks with spring latch and automatic throw off. Set each compartment with different combination.
- f. Frames: Fabricated from extruded aluminum or aluminum sheet; ganged and nested units, with cardholder and blank cards for tenant's identification behind each compartment.
- g. Snap-on Trim: Fabricated from same material and finish as compartment doors.
- h. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
- i. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Brass **OR** Dark bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Silver **OR** Black **OR** Medium bronze **OR** Dark bronze **OR** Gold **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.

C. Private-Delivery Horizontal Mail Receptacles

- 1. Front-Loading, Private-Delivery Horizontal Mail Receptacles: Consisting of multiple compartments with fixed, solid compartment backs, enclosed within recessed wall box. Provide access to compartments for distributing incoming mail from front of unit by unlocking master lock and swinging side-hinged master door to provide accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door.
 - a. Front-Loading Master Door: Fabricated from extruded aluminum and braced and framed to hold compartment doors; with master-door lock and concealed, full-length, stainless-steel piano hinge on one side. Fabricate master door to remain open while mail is deposited.
 - 1) Master-Door Lock: Manufacturer's standard five-pin tumbler, cylinder lock; with two **OR** three, **as directed**, keys.
OR

- Master-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
- b. Compartments and Doors: Manufacturer's standard compartments with extruded aluminum doors. Equip each with lock, tenant identification, and concealed, full-length, flush hinge on one side. Provide one compartment prepared for master-door lock and with outgoing mail slot, **as directed**.
- 1) Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - a) Size 1: Provide compartments with inside dimensions not less than **3 inches high by 6 inches wide by 15 inches deep** (76 mm high by 152 mm wide by 381 mm deep).
 - b) Size 2: Provide compartments with inside dimensions not less than **5 inches high by 3-1/2 inches wide by 15 inches deep** (127 mm high by 89 mm wide by 381 mm deep).
 - c) Size 3: Provide compartments with inside dimensions not less than **5 inches high by 7-1/2 inches wide by 15 inches deep** (127 mm high by 191 mm wide by 381 mm deep).
 - d) Size 4: Provide compartments with inside dimensions not less than **10-1/2 inches high by 3-1/2 inches wide by 15 inches deep** (267 mm high by 89 mm wide by 381 mm deep).
 - e) Size 5: Provide compartments with inside dimensions not less than **10-1/2 inches high by 7-1/2 inches wide by 15 inches deep** (267 mm high by 191 mm wide by 381 mm deep).
 - 2) Tenant Identification: **2-inch-wide by 5/8-inch-** (51-mm-wide by 16-mm-) high, clear-plastic cardholder set in recessed slot in face of compartment door. Provide cardboard strip and self-adhesive numbers.

OR

Tenant Identification: Laminated, black plastic tabs, engraved with identification and adhesively applied to face of compartment door.

OR

Tenant Identification: Identification engraved into face of compartment door.
- c. Compartments and Doors: Manufacturer's standard compartments with ornamental doors fabricated from solid, die-cast brass **OR** zinc, **as directed**. Equip each with glass window, **as directed**, lock, nameplate, and two hinges.
- 1) Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - a) Size 1: Provide compartments **15 inches** (381 mm) deep with doors **5 inches high by 3-1/2 inches wide** (127 mm high by 89 mm wide).
 - b) Size 2: Provide compartments **15 inches** (381 mm) deep with doors **6 inches high by 5-1/2 inches wide** (152 mm high by 140 mm wide).
 - c) Size 3: Provide compartments **15 inches** (381 mm) deep with doors **6 inches high by 11 inches wide** (152 mm high by 279 mm wide).
 - 2) Compartment-Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
 - 3) Compartment-Door Locks: Removable core locks, furnished by the Owner and installed as Work of this Section.
 - 4) Compartment-Door Locks: Spring-latch-type lock designed to accommodate cylinders keyed to building keying system; with two **OR** three, **as directed**, keys for each compartment door. Provide cylinders specified in Division 08 Section "Door Hardware".
 - 5) Compartment-Door Locks: Three-digit, single-dial, combination locks with spring latch and automatic throw off. Set each compartment with different combination.

- d. Frames: Fabricated from extruded aluminum or aluminum sheet **OR** brass sheet **OR** zinc sheet or plate, **as directed**; ganged and nested units, with cardholder and blank cards for tenant's identification behind each compartment.
 - e. Snap-on Trim: Fabricated from same material and finish as compartment doors.
 - f. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - g. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Gold **OR** Medium bronze **OR** Silver **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
 - h. Brass Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Brushed satin, lacquered, **as directed**.
 - i. Zinc Finish: Manufacturer's standard powder-coated finish, tan, **as directed**.
2. Rear-Loading, Private-Delivery Horizontal Mail Receptacles: Consisting of multiple compartments enclosed within recessed wall box. Provide access to compartments for distributing incoming mail from rear of unit with accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door.
- a. Rear-Loading Cover: Not required **OR** Lift-off rear cover fabricated from extruded aluminum or aluminum sheet, finished to match front of unit, **as directed**.
OR
 Rear-Loading Door: Side hinged, fabricated from extruded aluminum or aluminum sheet, finished to match front of unit; with full-length, stainless-steel piano hinge on one side and positive-latching **OR** locking, **as directed**, mechanism on the other. Fabricate rear-loading door to open not less than 90 degrees and to remain open while mail is deposited.
 - 1) Rear-Door Lock: Manufacturer's standard five-pin tumbler, cylinder lock; with two **OR** three, **as directed**, keys.
OR
 Rear-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 - b. Compartments and Doors: Manufacturer's standard compartments with doors fabricated from extruded aluminum. Equip each with lock, tenant identification, and concealed, full-length, flush hinge on one side. Provide one compartment prepared for master-door lock and with outgoing mail slot, **as directed**.
 - 1) Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - a) Size 1: Provide with inside dimensions not less than **3 inches high by 6 inches wide by 15 inches deep** (76 mm high by 152 mm wide by 381 mm deep).
 - b) Size 2: Provide compartments with inside dimensions not less than **5 inches high by 3-1/2 inches wide by 15 inches deep** (127 mm high by 89 mm wide by 381 mm deep).
 - c) Size 3: Provide compartments with inside dimensions not less than **5 inches high by 7-1/2 inches wide by 15 inches deep** (127 mm high by 191 mm wide by 381 mm deep).
 - d) Size 4: Provide compartments with inside dimensions not less than **10-1/2 inches high by 3-1/2 inches wide by 15 inches deep** (267 mm high by 89 mm wide by 381 mm deep).
 - e) Size 5: Provide compartments with inside dimensions not less than **10-1/2 inches high by 7-1/2 inches wide by 15 inches deep** (267 mm high by 191 mm wide by 381 mm deep).
 - 2) Tenant Identification: **2-inch-wide by 5/8-inch-** (51-mm-wide by 16-mm-) high, clear-plastic cardholder set in recessed slot in face of compartment door. Provide cardboard strip and self-adhesive numbers.
OR

Tenant Identification: Laminated, black plastic tabs, engraved with identification and adhesively applied to face of compartment door.

OR

Tenant Identification: Identification engraved into face of compartment door.

- c. Compartments and Doors: Manufacturer's standard compartments with ornamental doors fabricated from solid, die-cast brass **OR** zinc, **as directed**. Equip each with glass window, **as directed**, lock, nameplate, and two hinges.
- 1) Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - a) Size 1: Provide compartments **15 inches (381 mm)** deep with doors **5 inches high by 3-1/2 inches wide (127 mm high by 89 mm wide)**.
 - b) Size 2: Provide compartments **15 inches (381 mm)** deep with doors **6 inches high by 5-1/2 inches wide (152 mm high by 140 mm wide)**.
 - c) Size 3: Provide compartments **15 inches (381 mm)** deep with doors **6 inches high by 11 inches wide (152 mm high by 279 mm wide)**.
 - d. Compartment-Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
 - e. Compartment-Door Locks: Removable core locks, furnished by the Owner and installed as Work of this Section.
 - f. Compartment-Door Locks: Spring-latch-type lock designed to accommodate cylinders keyed to building keying system; with two **OR** three, **as directed**, keys for each compartment door. Provide cylinders specified in Division 08 Section "Door Hardware".
 - g. Compartment-Door Locks: Three-digit, single-dial, combination locks with spring latch and automatic throw off. Set each compartment with different combination.
 - h. Frames: Fabricated from extruded aluminum or aluminum sheet **OR** brass sheet **OR** zinc sheet or plate, **as directed**; ganged and nested units, with cardholder and blank cards for tenant's identification behind each compartment.
 - i. Snap-on Trim: Fabricated from same material and finish as compartment doors.
 - j. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - k. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Gold **OR** Medium bronze **OR** Silver **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
 - l. Brass Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Brushed satin, lacquered, **as directed**.
 - m. Zinc Finish: Manufacturer's standard powder-coated finish, tan, **as directed**.
- D. Private Postal-Facility Horizontal Mail Receptacles
1. Standard, Rear-Loading Horizontal Mail Receptacles: Consisting of multiple compartments with open backs, enclosed within recessed, modular wall box, with approximate overall module dimensions of **30 inches high by 23-1/2 inches wide by 15-1/2 inches deep (762 mm high by 596 mm wide by 394 mm deep)**; for installation between studs spaced **24 inches (610 mm)** o.c. Provide access to compartments for distributing incoming mail from rear of unit with accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door.
 - a. Compartments: Provide 10 **OR** 20 **OR** 30, **as directed**, equal-sized compartments within each module.

OR

 Compartments: Provide number and size, and number of modules as indicated on Drawings.
 - b. Compartment Doors: Fabricated from extruded or die-cast aluminum. Equip each with lock, tenant identification, and concealed, full-length, flush hinge on one side.

- 1) Tenant Identification: Identification engraved into face of compartment door **OR** self-adhesive placards, **as directed**.
 - 2) Compartment-Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
 - c. Frames: Fabricated from aluminum or cold-rolled steel sheet; ganged and nested units, with cardholder and blank cards for tenant's identification behind each compartment.
 - d. Trim: Fabricated from same material as compartment doors.
 - e. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - f. Exposed Aluminum Finish: Finish surfaces exposed to view with silver powder coat on doors, black on trim **OR** gold powder coat on doors and trim **OR** silver powder coat on doors and trim, **as directed**.
2. Rack-Ladder, Rear-Loading Horizontal Mail Receptacles: Consisting of multiple compartments with open backs, enclosed within recessed, modular wall box, with approximate overall module dimensions of **12 inches high by 23-1/2 inches wide by 15-1/2 inches deep (305 mm high by 596 mm wide by 394 mm deep)**; for installation between rack ladders. Provide access to compartments for distributing incoming mail from rear of unit with accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door.
- a. Compartments: Provide one within each module and number of modules as indicated on Drawings.
OR
Compartments: Provide two **OR** four **OR** eight **OR** 12, **as directed**, equal-sized compartments within each module and number of modules as indicated on Drawings.
OR
Compartments: Provide number and size, and number of modules as indicated on Drawings.
 - b. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock, tenant identification, and concealed, full-length, flush hinge on one side.
 - 1) Tenant Identification: Identification engraved into face of compartment door **OR** self-adhesive placards, **as directed**.
 - 2) Compartment-Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
 - c. Frames: Fabricated from aluminum or cold-rolled steel sheet; ganged and nested units, with cardholder and blank cards for tenant's identification behind each compartment.
 - d. Trim: Fabricated from same material as compartment doors.
 - e. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - f. Rack Ladders: Aluminum or steel with manufacturer's standard finish.
 - 1) Height of Rack Ladders: Two **OR** Three **OR** Four **OR** Five **OR** Six, **as directed**, modules high.
 - 2) Provide two rack ladders for first column of modules and one ladder for each additional, adjacent column of modules.
 - g. Exposed Aluminum Finish: Finish surfaces exposed to view with silver powder coat on doors, black on trim.
- E. Vertical Mail Receptacles
1. USPS-Approved Vertical Mail Receptacles: Consisting of three to seven compartments enclosed within wall box; with inside dimensions of each compartment not less than **15 inches high by 5 inches wide by 6 inches deep (381 mm high by 127 mm wide by 152 mm deep)**. Provide access to compartments for distributing incoming mail from front of unit by unlocking master lock and tilting inner compartments forward as a group. Provide access to each compartment for removing mail by swinging compartment door. Comply with USPS-STD-4B+.

- a. Mounting: Recessed **OR** Semirecessed with mounting frame **OR** Surface mounted with mounting frame **OR** As indicated on Drawings, **as directed**.
 - b. Mail Delivery: USPS **OR** Private, **as directed**.
 - c. Compartments: Provide three - seven.
OR
Compartments: Provide number as indicated on Drawings.
 - d. Compartment Doors and Frames: Fabricated from striated, extruded aluminum. Equip each compartment door with lock, slot in face of door to receive tenant identification, and concealed, full-length, flush hinge on one side. Provide one double-wide compartment with outgoing mail slot, **as directed**.
 - 1) Tenant Identification: Cardboard name and number tab **OR** Laminated, black plastic tabs, engraved with identification, **as directed**.
 - 2) Compartment-Door Locks (for units served by USPS): Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
OR
Compartment-Door Locks: Removable core locks, furnished by the Owner and installed as Work of this Section.
OR
Compartment-Door Locks: Spring-latch-type lock designed to accommodate cylinders keyed to building keying system; with two **OR** three, **as directed**, keys for each compartment door. Provide cylinders specified in Division 08 Section "Door Hardware".
 - e. Frames: Fabricated from aluminum or cold-rolled steel sheet; ganged and nested units, with cardholder and blank cards for tenant's identification within each compartment.
 - f. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - g. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Gold **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Aluminum **OR** Black **OR** Brass **OR** Dark bronze **OR** Gold **OR** Green **OR** Ivory **OR** Medium bronze **OR** Silver **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
- F. USPS-Approved Cluster Box Units (CBUs)
- 1. General: Consisting of multiple compartments enclosed within freestanding, pedestal-mounted enclosure. Provide access to compartments for distributing incoming mail from front of unit by unlocking master lock and swinging pair of side-hinged master doors to provide accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door. Comply with USPS-B-1118F.
 - 2. Compartment Enclosure: Fabricated from aluminum sheet with aluminum mounting pedestal and weather-protection hood, with the following number and size of compartments:
 - a. Type I: Provide eight compartments 12 inches wide by 3 inches high by 15 inches deep (305 mm wide by 76 mm high by 381 mm deep), one outgoing mail compartment 12 inches wide by 3 inches high by 15 inches deep (305 mm wide by 76 mm high by 381 mm deep), one parcel compartment 12 inches wide by 10 inches high by 15 inches deep (305 mm wide by 254 mm high by 381 mm deep), and another parcel compartment 12 inches wide by 13-1/2 inches high by 15 inches deep (305 mm wide by 343 mm high by 381 mm deep).
 - b. Type II: Provide 12 compartments 12 inches wide by 3 inches high by 15 inches deep (305 mm wide by 76 mm high by 381 mm deep), one outgoing mail compartment 12 inches wide by 3 inches high by 15 inches deep (305 mm wide by 76 mm high by 381 mm deep), and one parcel compartment 12 inches wide by 10 inches high by 15 inches deep (305 mm wide by 254 mm high by 381 mm deep).

- c. Type III: Provide 16 compartments 12 inches wide by 3 inches high by 15 inches deep (305 mm wide by 76 mm high by 381 mm deep), one outgoing mail compartment 12 inches wide by 3 inches high by 15 inches deep (305 mm wide by 76 mm high by 381 mm deep), one parcel compartment 12 inches wide by 10 inches high by 15 inches deep (305 mm wide by 254 mm high by 381 mm deep), and another parcel compartment 12 inches wide by 13-1/2 inches high by 15 inches deep (305 mm wide by 343 mm high by 381 mm deep).
 - d. Type IV: Provide 13 compartments 12 inches wide by 4-3/4 inches high by 15 inches deep (305 mm wide by 121 mm high by 381 mm deep), one outgoing mail compartment 12 inches wide by 4-3/4 inches high by 15 inches deep (305 mm wide by 121 mm high by 381 mm deep), and one parcel compartment 12 inches wide by 10 inches high by 15 inches deep (305 mm wide by 254 mm high by 381 mm deep).
3. Compartment Doors and Frames: Fabricated from one-piece extruded aluminum or aluminum sheet. Equip each compartment door with lock, tenant identification, and concealed, full-length, flush hinge on one side. Provide outgoing mail slot with weather protection flap.
 - a. Tenant Identification: Number engraved into face **OR** applied into recess, **as directed**, of compartment door.
 - b. Compartment-Door Locks: Comply with USPS-L-1172C, PSIN O910, for locks and keys, or equivalent as approved by USPS; with three keys for each compartment door. Key each compartment differently.
 - c. Parcel-Locker-Door Locks: Two-key security system in which control key provides access to parcel-locker key, which opens compartment and is retained once opened.
 4. Pedestal: Aluminum, with same finish as compartment enclosure and attached with theft-resistant fasteners.
 5. Exposed Aluminum Finish: Finish surfaces exposed to view with powder-coated finish in postal gray (light gray) **OR** color as selected from manufacturer's full range of colors, **as directed**.
- G. Neighborhood Delivery And Collection Box Units (NDCBUs)
1. General: Consisting of multiple compartments, with inside dimensions of each compartment not less than 5 inches high by 6 inches wide by 15 inches deep (127 mm high by 152 mm wide by 381 mm deep), enclosed within freestanding, pedestal-mounted enclosure. Provide access to compartments for distributing incoming mail from rear of unit by side-hinged rear door with accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door.
 2. Compartment Enclosure: Fabricated from aluminum sheet with integral weather protection hood, with eight equal-sized compartments (Type I) **OR** 12 equal-sized compartments (Type II) **OR** 16 equal-sized compartments (Type III) **OR** compartments of number and size as indicated on Drawings, **as directed**.
 3. Compartment Doors and Frames: Fabricated from one-piece extruded aluminum or aluminum sheet. Equip each compartment door with lock, tenant identification, and concealed, full-length, flush hinge on one side. Provide top left compartment with outgoing mail slot, **as directed**.
 - a. Tenant Identification: Number engraved into face of compartment door.
 - b. Compartment-Door Locks: Dustproof, five-pin tumbler, cylinder cam locks capable of at least 1000 key changes; with three, **as directed**, keys for each compartment door. Key each compartment differently.
 4. Rear-Loading Door: Fabricated from aluminum sheet, with full-length, stainless-steel piano hinge on one side and three-point latching mechanism on the other. Fabricate rear-loading door to open not less than 90 degrees and to remain open while mail is deposited.
 - a. Rear-Door Lock: Door prepared to receive lock furnished by local postmaster.
OR
Rear-Door Lock: Cylinder lock with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 5. Pedestal: Same material and finish as compartment enclosure and attached with theft-resistant fasteners **OR** As indicated on Drawings, **as directed**.
 6. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - a. Anodic Finish: Clear, **as directed**.

- b. Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Gold **OR** Medium bronze **OR** Color as selected from manufacturer's full range, **as directed**.

H. USPS-Approved Parcel Lockers

1. Front-Loading, USPS-Approved Indoor Parcel Lockers: Consisting of single or multiple compartments enclosed within a larger enclosure of type indicated below. Provide access to compartments for distributing incoming parcels from front of unit. Provide access to each compartment for removing parcels by swinging compartment door. Comply with USPS-STD-4C **OR** USPS-STD-4B+ or USPS-B-1116A construction, adapted for larger-sized, interior, parcel compartments, **as directed**.
 - a. Enclosure Type: Recessed **OR** Freestanding, **as directed**.
 - b. Mail Delivery: USPS **OR** Private, **as directed**.
 - c. Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - 1) Type X, Parcel Only (No Master Door): Single parcel receptacle 15 inches high by 12 inches wide by 15 inches deep (381 mm high by 305 mm wide by 381 mm deep) **OR** 18 inches high by 12 inches wide by 15 inches deep (457 mm high by 305 mm wide by 381 mm deep), **as directed**.
 - 2) Type X, Parcel Only (No Master Door): A group of parcel receptacles in single-column configuration without a master door; one **OR** two, **as directed**, compartment(s) 18 inches high by 12 inches wide by 15 inches deep (457 mm high by 305 mm wide by 381 mm deep) and one compartment 15 inches high by 12 inches wide by 15 inches deep (381 mm high by 305 mm wide by 381 mm deep).
 - 3) Type XI, Parcel Only: A group of parcel receptacles in single-column configuration with single master door prepared for master-door lock; one **OR** two, **as directed**, compartment(s) 15 inches high by 12 inches wide by 15 inches deep (381 mm high by 305 mm wide by 381 mm deep) and one **OR** two, **as directed**, compartment(s) 18 inches high by 12 inches wide by 15 inches deep (457 mm high by 305 mm wide by 381 mm deep).
 - d. Compartments: Fabricated from aluminum sheet with number and size as follows: **OR** as indicated on Drawings, **as directed**.
 - 1) Type I: Provide one box with two compartments, one on top of the other, each compartment with inside dimensions of 12 inches wide by 14 inches high by 15 inches deep (305 mm wide by 356 mm high by 381 mm deep).
 - 2) Type II: Provide one box with four compartments, side by side, two on top and two on bottom, each compartment with inside dimensions of 12 inches wide by 14 inches high by 15 inches deep (305 mm wide by 356 mm high by 381 mm deep).
 - e. Front-Loading Master Door: Fabricated to hold compartment doors; prepared to receive master-door lock provided by local postmaster.
 - f. Compartment Doors and Frames: Fabricated from same material and finish as adjacent mail receptacles **OR** extruded aluminum **OR** aluminum sheet **OR** metallic-coated steel sheet **OR** aluminum or metallic-coated steel sheet, **as directed**. Equip each compartment door with lock, identification, and concealed, full-length, spring-loaded, flush hinge on right side.
 - 1) Compartment Identification: Black, sequential numbers engraved into **OR** stamped onto, **as directed**, recess in face of compartment door.
 - 2) Compartment-Door Locks (for USPS delivery): Dual lock security system in which master lock provides access to customer lock (USPS-L-1172C, PSIN O910) and parcel-locker key opens compartment and is retained once opened.
 - 3) Compartment-Door Locks (for private delivery): Two-key security system in which control key provides access to parcel-locker key, which opens compartment and is retained once opened.
 - g. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Brass **OR** Dark bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

- 2) Baked-Enamel or Powder-Coated Finish: Silver **OR** Black **OR** Medium bronze **OR** Dark bronze **OR** Gold **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
- h. Metallic-Coated Steel Finish: Finish surfaces exposed to view with baked-enamel or powder-coated finish; color as indicated by manufacturer's designations **OR** color as selected from manufacturer's full range, **as directed**.
2. Rear-Loading, USPS-Approved Indoor Parcel Lockers: Consisting of single or multiple compartments enclosed within recessed wall box. Provide access to compartments for distributing incoming parcels from rear of unit with accessibility to entire group of compartments. Provide access to each compartment for removing parcels by swinging compartment door. Comply with USPS-STD-4C **OR** USPS-STD-4B+ or USPS-B-1116A construction, adapted for larger-sized, interior, parcel compartments, **as directed**.
 - a. Mail Delivery: USPS **OR** Private, **as directed**.
 - b. Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - 1) Type XII, Parcel Only: A group of parcel receptacles in single-column configuration with a rear-access cover; one **OR** two, **as directed** compartment(s) 15 inches high by 12 inches wide by 15 inches deep (381 mm high by 305 mm wide by 381 mm deep) and one **OR** two, **as directed**, compartment(s) 18 inches high by 12 inches wide by 15 inches deep (457 mm high by 305 mm wide by 381 mm deep).
 - c. Compartments: Fabricated enclosure with number and size as follows: **OR** as indicated on Drawings, **as directed**.
 - 1) Type I: Provide one box with two compartments, one on top of the other, each compartment with inside dimensions of 12 inches wide by 14 inches high by 15 inches deep (305 mm wide by 356 mm high by 381 mm deep).
 - 2) Type II: Provide one box with four compartments, side by side, two on top and two on bottom, each compartment with inside dimensions of 12 inches wide by 14 inches high by 15 inches deep (305 mm wide by 356 mm high by 381 mm deep).
 - d. Rear-Loading Cover: Not required **OR** Lift-off rear cover fabricated from extruded aluminum or aluminum sheet, finished to match front of unit, **as directed**.
OR
Rear-Loading Door: Side hinged, fabricated from extruded aluminum or aluminum sheet, finished to match front of unit; with full-length, stainless-steel piano hinge on one side and positive-latching **OR** locking, **as directed**, mechanism on the other.
 - 1) Rear-Door Lock: Door prepared to receive lock provided by local postmaster.
OR
Rear-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 - e. Compartment Doors and Frames: Fabricated from same material and finish as adjacent mail receptacles **OR** extruded aluminum **OR** aluminum sheet **OR** metallic-coated steel sheet **OR** aluminum or metallic-coated steel sheet, **as directed**. Equip each compartment door with lock, identification, and concealed, full-length, spring-loaded, flush hinge on one side.
 - 1) Compartment Identification: Black, sequential numbers engraved into **OR** stamped onto, **as directed**, recess in face of compartment door.
 - 2) Compartment-Door Locks (for USPS delivery): Dual-lock security system in which master lock provides access to customer lock (USPS-L-1172C, PSIN O910) and parcel-locker key opens compartment and is retained once opened.
 - 3) Compartment-Door Locks (for private delivery): Two-key security system in which control key provides access to parcel-locker key, which opens compartment and is retained once opened.
 - f. Exposed Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Brass **OR** Dark bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

- 2) Baked-Enamel or Powder-Coated Finish: Silver **OR** Black **OR** Medium bronze **OR** Dark bronze **OR** Gold **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
- g. Metallic-Coated Steel Finish: Finish surfaces exposed to view with baked-enamel or powder-coated finish; color as indicated by manufacturer's designations **OR** color as selected from manufacturer's full range, **as directed**.
3. USPS-Approved Outdoor Parcel Lockers (OPLs), Pedestal Mounted: Consisting of multiple compartments enclosed within freestanding, pedestal-mounted enclosure. Provide access to compartments for distributing incoming mail from front of unit by unlocking master lock and swinging pair of side-hinged master doors to provide accessibility to entire group of compartments. Provide access to each compartment for removing mail by swinging compartment door. Comply with USPS-B-1116A.
 - a. Compartment Enclosure: Fabricated from aluminum sheet with aluminum mounting pedestal and weather-protection hood, with the following number and size of compartments:
 - 1) Type I: Provide one box with two compartments, one on top of the other, each compartment with inside dimensions of **12 inches wide by 14 inches high by 15 inches deep (305 mm wide by 356 mm high by 381 mm deep)**.
 - 2) Type II: Provide one box with four compartments, side by side, two on top and two on bottom, each compartment with inside dimensions of **12 inches wide by 14 inches high by 15 inches deep (305 mm wide by 356 mm high by 381 mm deep)**.
 - b. Compartment Doors and Frames: Fabricated from one-piece extruded aluminum or aluminum sheet. Equip each compartment door with lock, tenant identification, and concealed, full-length, flush hinge on one side. Provide outgoing mail slot with weather protection flap.
 - 1) Locker Identification: Number engraved into face **OR** applied into recess, **as directed**, of compartment door.
 - 2) Door Locks: Two-key security system in which control key provides access to parcel-locker key, which opens compartment and is retained once opened.
 - c. Pedestal: Aluminum, with same finish as compartment enclosure and attached with theft-resistant fasteners.
 - d. Exposed Aluminum Finish: Finish surfaces exposed to view with powder-coated finish in postal gray (light gray) **OR** color as selected from manufacturer's full range of colors, **as directed**.
- I. USPS-Approved Collection Boxes
 1. USPS-Approved, Front-Loading Collection **OR** Receiving, **as directed**, Boxes: Consisting of single compartment with fire-resistant cushion bottom, enclosed within wall box, with mail slot **OR** hopper door, **as directed**, to receive mail. Provide access to compartment for collecting mail from front of unit. Comply with USPS Publication 16.
 - a. Mail Collection: USPS **OR** Private, **as directed**.
 - b. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
 - c. Type: Collection box **OR** Receiving box for mail chutes, **as directed**.
 - d. Height: Sized to match height of four **OR** five **OR** six **OR** seven, **as directed**, horizontal mail receptacles.
OR
Height: As indicated on Drawings, **as directed**.
 - e. Compartment Door and Frame: Fabricated from **1/4-inch- (6-mm-)** **OR** minimum **1/8-inch- (3-mm-)**, **as directed**, thick aluminum, with opening not less than **12 by 20 inches (305 by 508 mm)** and not more than **18 by 30 inches (457 by 762 mm)**. Equip door with lock and concealed, full-length, flush hinge on one side.
 - 1) Door Lock (for units served by USPS): Door prepared to receive lock provided by local postmaster.
OR

- Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
- 2) Identification: Engrave face of compartment door with **1-inch- (25-mm-)** high letters as follows: "U.S. MAIL LETTER BOX" on two lines at top or bottom of unit.
 - 3) Door Style: Set door within face frame **OR** Extend door full width and height of unit, with no exposed frame, **as directed**.
- f. Mail Slot: Fabricated from **1/4-inch- (6-mm-)** thick aluminum, with **11-inch-wide by 1-1/4-inch- (279-mm-wide by 32-mm-)** high opening, protected by inside hood and hinge flap, and with inside baffle to prevent removal of mail from box.
- OR**
- Hopper Door: Fabricated from **1/4-inch- (6-mm-)** thick aluminum, with opening that allows a bundle measuring **6-1/2 inches wide by 11-1/2 inches long by 4 inches high (165 mm wide by 292 mm long by 102 mm high)** to be deposited, and with inside baffle to prevent removal of mail from box. Equip door with door pull and concealed, full-length bottom hinge.
- 1) Identification: Engrave face of hopper door with **1-inch- (25-mm-)** high letters as follows: "LETTERS AND LETTER MAIL TIED IN BUNDLES."
 - 2) Door Style: Set door within face frame **OR** Extend door full width and height of unit, with no exposed frame, **as directed**.
- g. Exposed Materials: Fabricated from stainless-steel-clad **OR** brass-clad, **as directed**, extruded or sheet aluminum.
- h. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
- i. Schedule-Card Holder: Provide recessed or surface-mounted holder for pick-up schedule card in center of bottom front portion of unit. Fabricate of same material and finish as front of unit.
- j. Mailbag Hooks: Provide two aluminum or stainless-steel hooks at exterior front edge of bottom of surface-mounted units, spaced **15 to 17-1/2 inches (381 to 445 mm)** apart, for supporting mailbags.
- k. Mailbag Rack: Provide internal rack system for supporting mailbags within unit.
2. USPS-Approved, Rear-Loading Collection Boxes: Consisting of single compartment with fire-resistant cushion bottom, enclosed within recessed wall box, with mail slot **OR** hopper door, **as directed**, to receive mail. Provide access to compartment for collecting mail from rear of unit. Comply with USPS Publication 16.
- a. Mail Collection: USPS **OR** Private, **as directed**.
 - b. Height: Sized to match height of four **OR** five **OR** six **OR** seven, **as directed**, horizontal mail receptacles.
- OR**
- Height: As indicated on Drawings, **as directed**.
- c. Compartment Frame and Front Panel: Fabricated from **1/4-inch- (6-mm-)** **OR** minimum **1/8-inch- (3-mm-)**, **as directed**, thick aluminum.
 - 1) Identification: Engrave face of front panel with **1-inch- (25-mm-)** high letters as follows: "U.S. MAIL LETTER BOX" on two lines at top or bottom of unit.
 - d. Mail Slot: Fabricated from **1/4-inch- (6-mm-)** thick metal plate, with **11-inch-wide by 1-1/4-inch- (279-mm-wide by 32-mm-)** high opening, protected by inside hood and hinge flap, and with inside baffle to prevent removal of mail from box.
- OR**
- Hopper Door: Fabricated from **1/4-inch- (6-mm-)** thick metal plate, with opening that allows a bundle measuring **6-1/2 inches wide by 11-1/2 inches long by 4 inches high (165 mm wide by 292 mm long by 102 mm high)** to be deposited, and with inside baffle to prevent removal of mail from box. Equip door with door pull and concealed, full-length bottom hinge.
- 1) Identification: Engrave face of hopper door with **1-inch- (25-mm-)** high letters as follows: "LETTERS AND LETTER MAIL TIED IN BUNDLES."
 - 2) Door Style: Set door within face frame **OR** Extend door full width and height of unit, with no exposed frame, **as directed**.

- e. Rear-Loading Enclosure: Lift-off rear cover fabricated from same material and finish as front of unit.
OR
 Rear-Loading Door: Side hinged, with opening not less than **12 by 20 inches (305 by 508 mm)** and not more than **18 by 30 inches (457 by 762 mm)**, fabricated from same material and finish as front of unit; with full-length, stainless-steel piano hinge on one side and positive-latching mechanism on the other. Fabricate rear-loading door to remain open while mail is collected.
 - 1) Rear-Door Lock (for units served by USPS): Door prepared to receive lock provided by local postmaster.
OR
 Rear-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
- f. Exposed Materials: Fabricated from extruded or sheet aluminum.
- g. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
- h. Schedule-Card Holder: Provide recessed or surface-mounted holder for pick-up schedule card in center of bottom front portion of unit. Fabricate of same material and finish as front of unit.
- i. Mailbag Hooks: Provide two aluminum or stainless-steel hooks at exterior front edge of bottom of surface-mounted units, spaced **15 to 17-1/2 inches (381 to 445 mm)** apart, for supporting mailbags.
- j. Mailbag Rack: Provide internal rack system for supporting mailbags within unit.
- 3. Finish surfaces exposed to view as follows:
 - a. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Black **OR** Gold **OR** Dark bronze **OR** Light bronze **OR** Medium bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Gold **OR** Dark bronze **OR** Medium bronze **OR** Silver **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
 - b. Brass Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Brushed satin, lacquered, **as directed**.
 - c. Stainless-Steel Finish: No. 4.
- J. Private Collection Boxes
 - 1. Private, Horizontal, Front-Loading Collection Boxes: Consisting of single compartment of same depth as horizontal mail receptacles, enclosed within wall box, with slot in top of front to receive mail. Provide access to compartment for collecting mail from front of unit.
 - a. Height: Sized to match height of four **OR** five **OR** six **OR** seven, **as directed**, horizontal mail receptacles.
 - b. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
 - c. Compartment Door and Frame: Fabricated from extruded aluminum or aluminum sheet that is full height of unit including **OR** in portion of unit below, **as directed**, mail slot, and equipped with lock and concealed, continuous side hinge.
 - 1) Door Lock (for units served by USPS): Door prepared to receive lock provided by local postmaster.
OR
 Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 - 2) Identification: Engrave face of compartment door with **1-inch- (25-mm-)** high letters as follows: "LETTERS" **OR** "OUTGOING MAIL" **OR** "OFFICE," **as directed**.
 - d. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear, **as directed**.

- 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Gold **OR** Medium bronze **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
2. Private, Horizontal, Rear-Loading Collection Boxes: Consisting of single compartment of same depth as horizontal mail receptacles, enclosed within recessed wall box, with slot in top of front to receive mail. Provide access to compartment for collecting mail from rear of unit.
 - a. Height: Sized to match height of four **OR** five **OR** six **OR** seven, **as directed**, horizontal mail receptacles.
 - b. Rear-Loading Cover: Not required **OR** Lift-off rear cover fabricated from extruded aluminum or aluminum sheet, finished to match front of unit, **as directed**.
OR
Rear-Loading Door: Side hinged, fabricated from extruded aluminum or aluminum sheet, finished to match front of unit; with continuous hinge on one side and positive-latching **OR** locking, **as directed**, mechanism on the other.
 - 1) Rear-Door Lock (for units served by USPS if lock is required): Door prepared to receive lock provided by local postmaster.
OR
Rear-Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 - c. Exposed Materials: Fabricated from extruded or sheet aluminum.
 - d. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - e. Identification: Engrave front of unit below mail slot with **1-inch- (25-mm-)** high letters as follows: "LETTERS" **OR** "OUTGOING MAIL" **OR** "OFFICE," **as directed**.
 - f. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Gold **OR** Medium bronze **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
3. Vertical Collection Boxes: Consisting of single compartment enclosed within wall box, with slot in top of front to receive mail. Provide access to compartment for collecting incoming mail from front of unit.
 - a. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted, **as directed**.
 - b. Size: Same height as adjacent vertical mail receptacles **OR** **8-3/4 inches wide by 19 inches high by 6-1/2 inches deep (222 mm wide by 483 mm high by 165 mm deep)** **OR** **15 inches wide by 19 inches high by 6-1/2 inches deep (381 mm wide by 483 mm high by 165 mm deep)**, **as directed**.
 - c. Compartment Door and Frame: Fabricated from aluminum, with opening for mail. Equip door with lock and concealed, full-length, flush hinge on one side. Set door within face frame.
 - 1) Door Lock (for units served by USPS): Door prepared to receive lock provided by local postmaster.
OR
Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 - 2) Identification: Engrave face of compartment door with **1-inch- (25-mm-)** high letters as follows: "LETTERS" **OR** "OUTGOING MAIL" **OR** "OFFICE," **as directed**.
 - d. Exposed Materials: Fabricated from extruded or sheet aluminum.
 - e. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - f. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Aluminum **OR** Black **OR** Brass **OR** Dark bronze **OR** Gold **OR** Green **OR** Ivory **OR** Medium bronze **OR** Silver **OR** Color as

indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.

4. Private, Pedestal-Mounted Collection Boxes: Consisting of single compartment enclosed within freestanding, pedestal-mounted enclosure, with slot in top of front of unit to receive mail. Provide access to compartment for collecting mail from front or rear of unit through door equipped with concealed, continuous side hinge and lock.
 - a. Compartment Enclosure: Fabricated from extruded aluminum or aluminum sheet with integral weather-protection hood.
 - b. Pedestal: Same material and finish as parcel locker and attached with theft-resistant fasteners **OR** As indicated on Drawings, **as directed**.
 - c. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Blue **OR** Gray **OR** White **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
5. Private, Curbside Collection Boxes: Consisting of single compartment enclosed within curved-top, freestanding enclosure with four legs and casters, **as directed**. Fabricate enclosure from welded and riveted steel. Provide hopper door with door pull in top of unit to receive packages, with opening size not less than 4-1/2 inches high by 15-1/2 inches wide (114 mm high by 394 mm wide). Provide access to compartment for collecting packages from bottom of front of unit through door equipped with concealed, continuous bottom hinge and lock.
 - a. Door Lock: Five-pin tumbler cylinder **OR** Hasp for padlock, **as directed**.
 - b. Snorkel: Provide rear-mounted, drive-by attachment with opening not less than 12 inches wide by 3 inches high (305 mm wide by 76 mm high).
 - c. Steel Finish: Baked-enamel or powder-coated finish; gray **OR** white **OR** color as indicated by manufacturer's designations **OR** color as selected from manufacturer's full range, **as directed**.

K. Data Distribution Boxes

1. Data Distribution Boxes: Consisting of multiple compartments enclosed within enclosure.
 - a. Enclosure Configuration: Freestanding **OR** Recessed in wall **OR** Recessed in wall and installed between rack ladders, **as directed**.
 - b. Compartment Access: Provide access to compartments as follows:
 - 1) For Distributing Incoming Mail from Front of Unit: Mail slot in each compartment door.
 - 2) For Distributing Incoming Mail from Rear of Unit: Open backs with aluminum cover finished to match front of unit, **as directed**.
 - 3) For Removing Mail: Unlocking and swinging compartment door.
 - c. Compartments: Number and size as follows: **OR** As indicated on Drawings, of the following sizes: **OR** As indicated on Drawings, **as directed**.
 - 1) Size 1: Provide compartments with inside dimensions not less than 5 inches high by 12-1/2 inches wide by 15 inches deep (127 mm high by 318 mm wide by 381 mm deep).
 - d. Compartment Doors: Equip each with lock and concealed, continuous hinge.
 - 1) Door Locks: Five-pin tumbler, cylinder cam **OR** spring-latch-type, **as directed**, locks capable of at least 1000 key changes; with two **OR** three, **as directed**, keys for each compartment door. Key each compartment differently.
OR
Door Locks: Three-digit, single-dial, combination locks with spring latch and automatic throw off. Set each compartment with different combination.
 - e. Concealed Components and Mounting Frames: Aluminum or steel sheet with manufacturer's standard finish.
 - f. Exposed Materials: Fabricated from steel sheet or aluminum with powder-coat finish.
 - g. Rack Ladders: Aluminum or steel with manufacturer's standard finish.

- h. Powder-Coated Finish: Silver **OR** Silver with black trim **OR** Silver with slate trim **OR** Sandalwood with sand trim **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.

L. Mail Chutes

1. General: Factory assembled and fabricated with tight joints, overlaps in direction of mail flow, and free of ledges. Provide transition sections so all sections of chutes are connected and overlap at least **2 inches (51 mm)**. Fabricate mail chutes so joint sections comply with same dimensions with no reduction in chute size. Provide removable panels for access to concealed portions of chutes that exceed **5 feet (1.5 m)** in length. Comply with USPS Publication 16, **as directed**.
 - a. Mail Collection: USPS **OR** Private, **as directed**.
 - b. Inside Dimensions: **8 inches wide by 2 inches deep (203 mm wide by 51 mm deep)** (for chutes served by USPS) **OR 14 inches wide by 3 inches deep (356 mm wide by 76 mm deep)** **OR 14 inches wide by 7 inches deep (356 mm wide by 178 mm deep)**, **as directed**.
 - c. Mounting: Recessed **OR** Semirecessed **OR** Surface mounted **OR** As detailed, **as directed**.
2. Exposed Front Panels: Continuous, one-piece frames and covers fabricated from **0.125-inch-(3.2-mm-)** thick, stainless-steel-clad **OR** brass-clad, **as directed**, extruded aluminum, and retaining removable transparent material as follows, for not less than 3/4 of length of front of chute on each floor:
 - a. Transparent Material: Manufacturer's standard glazing, complying with USPS Publication 16.
3. Concealed Front Panels: Consisting of continuous, one-piece frames retaining **0.0269-inch-(0.7-mm-)** thick, metallic-coated steel sheet panels. Extend concealed front panels from top of ceiling fascia to bottom of floor collar above.
4. Sides and Backs: Continuous, one-piece, **0.125-inch-(3.2-mm-)** thick aluminum sheet extending from floor to ceiling on each floor and extending **54 inches (1372 mm)** above finish flooring at top story.
5. Floor and Ceiling Fasciae and Lock Band: Manufacturer's standard, matching material and finish of front frames and covers. Provide lock band with locking device and keyed lock that prevents key removal if locking device is not secured.
6. Mail Slots: Same material and finish as chute; not less than **4-3/4 inches wide by 1/2 inch high (121 mm wide by 13 mm high)** with device designed to guide mail into inside opening of same size located **2-1/2 inches (64 mm)** below mail slot. Provide mail slots on each floor.
 - a. For chutes served by USPS, inscribe the words "U.S. MAIL" on face of mail slots.
7. Finish surfaces exposed to view as follows:
 - a. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Black **OR** Dark bronze **OR** Medium bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
 - b. Brass Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Brushed satin, lacquered, **as directed**.
 - c. Stainless-Steel Finish: No. 4.

M. Accessories

1. Directory for Mail Receptacles: Surface-mounted, front-opening unit, with clear glass or plastic window.
 - a. Framed, Top-Mount Unit for Horizontal Mail Receptacles: Fabricate directory as framed, horizontal unit with modular sections having a 24-name capacity (3 modules) **OR** 32-name capacity (4 modules) **OR** 40-name capacity (5 modules), **as directed**; of same material, size, **as directed**, and finish as adjacent mail receptacles; mounted above mail receptacles as indicated on Drawings, **as directed**.

- b. Framed, Side-Mount Unit for Horizontal Mail Receptacles: Fabricate directory as framed, horizontal unit with 50-name capacity, **28 inches (711 mm) OR 60-name capacity, 33-3/8 inches (848 mm) OR 70-name capacity, 38-3/4 inches (984 mm), as directed** high; of same material and finish as adjacent mail receptacles; mounted along side of mail receptacles as indicated on Drawings, **as directed**.
- c. Framed, Side-Mount Unit for Vertical Mail Receptacles: Fabricate directory as framed, vertical unit with modular sections having a 40-name capacity (1 module) **OR 80-name capacity (2 modules) OR 120-name capacity (3 modules) OR 160-name capacity (4 modules) OR 200-name capacity (5 modules), as directed**; of same size, material, and finish as adjacent vertical mail compartment doors unless otherwise indicated.
- d. Insert Units for Vertical Mail Receptacles: Fabricate directory as modular inserts having a 40-name capacity (1 module) **OR 80-name capacity (2 modules) OR 120-name capacity (3 modules) OR 160-name capacity (4 modules) OR 200-name capacity (5 modules), as directed**; of same size, material, and finish as adjacent vertical mail compartment doors unless otherwise indicated.
- e. Provide name strips made of **1/4-inch- (6-mm-) high label tape.**
- 2. Key Keeper: Consisting of single compartment with door; interior compartment size not less than **4-3/4 inches wide by 2-1/4 inches high by 1-1/2 inches deep (121 mm wide by 57 mm high by 38 mm deep), as directed.** USPS approved, **as directed**.
 - a. Mounting: Recessed **OR** Surface mounted, **as directed**.
 - b. Style: Compartment door set within face frame **OR** extending full width and height of unit, with no exposed frame, **as directed**.
 - c. Type of Operation: Loose key in box **OR** Retractor reel with minimum **20-inch- (508-mm-) long chain OR Push button, 24-V switch in box, as directed**.
 - d. Mail Delivery: USPS **OR** Private, **as directed**.
 - e. Door Lock (for units served by USPS): Door prepared to receive lock furnished by local postmaster.
OR
Door Lock: Five-pin tumbler, cylinder cam lock capable of at least 1000 key changes; with two **OR** three, **as directed**, keys.
OR
Door Lock: Cylinder lock keyed to building keying system; with two **OR** three, **as directed**, keys. Provide cylinders specified in Division 08 Section "Door Hardware".
 - f. Exposed Material and Finish: Exposed surfaces fabricated from same material and finish as adjacent mail receptacles.
 - g. Exposed Material and Finish: Steel, aluminum **OR** brass, **as directed**, powder-coated finish.
 - h. Exposed Material and Finish: Stainless steel, brushed finish.
 - i. Exposed Material and Finish: Aluminum, as follows:
 - 1) Anodic Finish: Clear **OR** Brass **OR** Dark bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Medium bronze **OR** Gold **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
- 3. Key Cabinet: Wall-mounted, metallic-coated, **as directed**, steel cabinet with pivoting, key-holding panels and side-hinged door equipped with five-pin tumbler, cylinder door lock and concealed, full-length flush hinge. Finish cabinet, panels, and door with baked-enamel or powder-coated finish. Provide key control system consisting of key-holding hooks, labels, two sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers.
 - a. Capacity: Keys for 150 percent of the number of, **as directed**, mail-receptacle locks.
 - b. Cross-Index System: Consisting of index cards for recording key information. Include three receipt forms for each key-holding hook.
 - c. Baked-Enamel or Powder-Coated Finish: Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.

4. Mail-Sorting Collection Unit: Consisting of **1/4-inch- (6-mm-)** thick, metal face plate and through-the-wall hopper door(s) allowing receipt and separation of mail.
 - a. Hopper Doors: One **OR** Two **OR** Three, **as directed**, door(s), with door pull for each and with opening size not less than dimensions approved by the Owner.
 - 1) Engrave doors with **1-inch- (25-mm-)** high letters as follows: "STAMPED MAIL" **OR** "METERED MAIL," **as directed**.
 - 2) Identification: Engrave unit at top with **2-inch- (51-mm-)** high letters as follows: "U.S. MAIL" **OR** "UNITED STATES MAIL," **as directed**.
 - b. Exposed Material and Finish: Exposed surfaces fabricated from same material and finish as adjacent mail receptacles.
 - c. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** Black **OR** Dark bronze **OR** Light bronze **OR** Medium bronze **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Black **OR** Dark bronze **OR** Gold **OR** Medium bronze **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
 - d. Brass Finish: Buffed finish, lacquered **OR** Hand-rubbed finish, lacquered **OR** Brushed satin, lacquered, **as directed**.
 - e. Stainless-Steel Finish: No. 4.
5. Letter Drops (Through Wall): Consisting of **11-inch-wide by 3-1/2-inch- (279-mm-wide by 89-mm-)** high, top-hinged, spring-loaded flap that pivots inward, held in place by **1-inch- (25-mm-)** wide face frame. Fabricated from **1/4-inch- (6-mm-)** thick aluminum or steel, with exposed surfaces finished to match adjacent mail receptacles.
 - a. Sleeve: Provide metallic-coated, **as directed**, steel wall sleeve for full depth of wall.
 - b. Finished Frame: Provide finished face frame on back side of wall opening.
 - c. Identification: Engrave face of swinging flap with **1-inch- (25-mm-)** high letters as follows: "U.S. MAIL" **OR** "LETTERS" **OR** "OUTGOING MAIL," **as directed**
 - d. Exposed Material and Finish: Exposed surfaces fabricated from same material and finish as adjacent mail receptacles, **as directed**.
6. Package Depository (Through Wall): Consisting of **1/4-inch- (6-mm-)** thick, aluminum or steel face plate and through-the-wall hopper door with hinged baffle, **as directed**, allowing receipt of packages; fabricated from **1/4-inch- (6-mm-)** thick aluminum or steel.
 - a. Hopper Door: Equipped with door pull and concealed, full-length bottom hinge; with opening size not less than **15 inches wide by 6-1/2 inches high (381 mm wide by 165 mm high)** **OR** as indicated on Drawings, **as directed**.
 - b. Sleeve: Provide metallic-coated, **as directed**, steel wall sleeve for full depth of wall.
 - c. Slowdown: Provide steel slowdown ramp on back side of wall opening.
 - d. Identification: Engrave face of hopper door with **1-inch- (25-mm-)** high letters as follows: "BOOK DEPOSITORY," **as directed**
 - e. Finish: Exposed surfaces finished same as mail receptacles.
 - f. Aluminum Finish: Finish surfaces exposed to view as follows:
 - 1) Anodic Finish: Clear **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 - 2) Baked-Enamel or Powder-Coated Finish: Dark bronze **OR** Gold **OR** Color as indicated by manufacturer's designations **OR** Color as selected from manufacturer's full range, **as directed**.
 - g. Steel Finish: Finish surfaces exposed to view with baked-enamel or powder-coated finish; color as indicated by manufacturer's designations **OR** color as selected from manufacturer's full range, **as directed**.

N. Fabrication

1. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

2. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.
3. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.
4. Drill or punch holes required for fasteners and remove burrs. Use security fasteners where fasteners are exposed. If used, seal external rivets before finishing.
5. Weld in concealed locations to greatest extent possible without distorting or discoloring exposed surfaces. Remove weld spatter and welding oxides from exposed surfaces.
6. Fabricate tubular and channel frame assemblies with manufacturer's standard welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support loads.
7. Fabricate rack ladders to support indicated number of units to form a column of units.
8. Where dissimilar metals will contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

O. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

P. Copper-Alloy Finishes

1. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic coating as specified below).
2. Hand-Rubbed Finish, Lacquered: M31-M34-O6x (Mechanical Finish: directionally textured, fine satin; Mechanical Finish: directionally textured, hand rubbed; Coating: clear organic coating as specified below).
3. Brushed Satin Finish, Lacquered: M32-O6x (Mechanical Finish: directionally textured, medium satin; Coating: clear organic coating as specified below).
4. Clear Organic Coating: Clear, waterborne, air-drying, acrylic lacquer specially developed for coating copper-alloy products, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**. It consists of a solution of methyl methacrylate copolymer with benzotriazole to prevent breakdown of the film in UV light, and is called "Incralac."

1.3 EXECUTION

A. Installation

1. General: Install postal specialties level and plumb, according to manufacturer's written instructions and roughing-in drawings.
 - a. Where dissimilar metals will be in permanent contact with each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturer for this purpose.
 - b. Where aluminum will contact grout, concrete, masonry, or wood, protect against corrosion by painting contact surfaces with bituminous coating.
 - c. Final acceptance of postal specialties served by USPS depends on compliance with USPS requirements.
2. Horizontal Mail Receptacles: Install horizontal mail receptacles with center of tenant-door lock cylinders and bottom of compartments at the maximum and minimum heights above finished floor established by USPS and manufacturer's written instructions.

- a. Install removable-core and keyed-in door lock cylinders as required for each type of cylinder lock.
 - b. Install and align two rack ladders for the first column of mail receptacles and one rack ladder for each additional adjacent column of mail receptacles.
 3. Vertical Mail Receptacles: Install vertical mail receptacles with center of master lock cylinder not more than **48 inches (1219 mm)** and not less than **30 inches (762 mm)** above finished floor.
 4. Pedestal-Mounted Postal Specialties: Anchor units with **1/2-inch- (13-mm-)** diameter, galvanized **OR** stainless, **as directed**, -steel anchor bolts with hooked ends, for CBUs, NDCBUs, and some models of parcel lockers and collection boxes.
 5. Collection Boxes: Install collection boxes with centerline of mail slots **OR** handle of hopper doors, **as directed**, not more than **48 inches (1219 mm)** above finished floor.
 6. Receiving Boxes: Install receiving boxes with bottom of unloading door not less than **30 inches (762 mm)** above finished floor.
 - a. Install receiving boxes with exterior of box bottom not more than **20 inches (508 mm)** above finished floor.
 7. Freestanding Data Distribution Boxes: Locate freestanding data distribution boxes at locations indicated or, if not indicated, as directed.
 8. Rack-Ladder Data Distribution Boxes: Install and align two rack ladders for the first column of data distribution boxes and one rack ladder for each additional adjacent column of data distribution boxes.
 9. Mail Chutes: Mount chutes with bottom ends extending **1 inch (25 mm)** into receiving boxes. Attach chutes with straps, collars, and sleeves. Do not penetrate chute with fasteners.
 - a. Comply with USPS Publication 16 for installation.
 - b. Install chutes with centerline of mail slots not more than **48 inches (1219 mm)** above finished floor.
 10. Key Keeper: Install horizontally **OR** vertically **OR** as indicated on Drawings, **as directed**.
- B. Field Quality Control
1. Arrange for USPS personnel to examine and test postal specialties served by USPS after they have been installed according to USPS regulations.
 2. Obtain written final approval of postal specialties to be served by USPS. Obtain this approval from USPS postmaster that authorizes mail collection for the served installation.
- C. Adjusting, Cleaning, And Protection
1. Remove temporary protective coverings and strippable films, if any, as postal specialties are installed unless otherwise indicated in manufacturer's written installation instructions.
 2. Adjust doors, hardware, and moving parts to function smoothly, and lubricate as recommended by manufacturer. Verify that integral locking devices operate properly.
 3. Touch up marred finishes or replace postal specialties that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by postal specialty manufacturer.
 4. Replace postal specialties that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
 5. On completion of postal specialty installation, clean interior and exterior surfaces as recommended by manufacturer.

END OF SECTION 10 55 23 26

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Task	Specification	Specification Description
10 55 26 00	10 55 23 26	Postal Specialties
10 56 13 13	01 22 16 00	No Specification Required
10 56 16 00	06 10 00 00a	Miscellaneous Carpentry

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SECTION 10 73 13 13 - AWNINGS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for awnings. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Fixed awnings.
 - b. Retractable awnings, manually operated and motorized.

C. Definitions

1. **Awning:** An architectural projection that provides weather protection, identity, or decoration and is wholly supported by the building to which it is attached. An awning is comprised of a lightweight, rigid skeleton structure over which a rigid covering is attached.
2. **Retractable Awning:** A cover with a frame that retracts against a building or other structure to which it is entirely supported.

D. Performance Requirements

1. **General:** Design, fabricate, and install awnings to withstand loads from gravity, wind, snow, ponding, drift, seismic, and structural movement, including thermally induced movement; and to resist, without failure, other conditions of in-service use, including exposure to weather.
2. **Structural Performance:** Provide awnings capable of withstanding the effects of gravity loads and loads and stresses within limits and under conditions required for the location of the Work.
3. **Seismic Performance:** Provide awnings capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
4. **Thermal Movements:** Provide awnings that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, tearing of fabric, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - a. **Temperature Change (Range):** 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Submittals

1. **Product Data:** Include styles, material descriptions, construction details, fabrication details, dimensions of individual components and profiles, hardware, fittings, mounting accessories, features, finishes, and operating instructions for awnings.
 - a. **Motorized Awning Operators:** Include operating instructions.
 - b. **Motors:** Show nameplate data, ratings, characteristics, and mounting arrangements.
2. **Shop Drawings:** Show location and extent of awnings. Include elevations, sections, and details not shown in Product Data. Show materials, fabrication, dimensions, mounting heights, connections, anchorages, installation details, attachments to other work, operational clearances, and relationship to adjoining work. Show colors and graphic layout and content.
3. **Samples:** For each of the following products and for the full range of color, texture, and pattern variations required, prepared on Samples of size indicated below. If finishes involve normal color and texture variations, include sample sets showing the full range of variations expected.
 - a. **Awning Fabric:** 12-inch- (300-mm-) square section of fabric from dye lot to be used for the Work, with specified treatments applied. Mark face of fabric.

- b. Graphics: Not less than **12-inch- (300-mm-)** square section showing graphics application method.
 - c. Seam, Edge, and Corner Condition: Not less than **12-inch- (300-mm-)** long section showing seam, edge, and corner treatment.
 - d. Valance: Full-size unit, not less than **12 inches (300 mm)** long.
 - e. Frame Finish: Not less than **6-inch (150-mm)** lengths.
 - f. Frame Corner and Three **OR** Four, **as directed**, -Way Truss Intersection: Not less than **12-inch (300-mm)** sections showing finished joint construction and fabric and valance attachment to awning frame.
 - g. Exposed Hardware Finishes: Manufacturer's standard-size unit, not less than **3 inches (76 mm)** square.
 - h. Accessories: Manufacturer's full-size unit.
4. Welding certificates.
 5. Maintenance Data: For awnings to include in maintenance manuals.

F. Quality Assurance

1. Welding: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code--Steel."
 - b. AWS D1.2, "Structural Welding Code--Aluminum."
2. Regulatory Requirements: Provide awnings complying with or exceeding requirements of authorities having jurisdiction>.
3. Fire-Test-Response Characteristics: Provide awning fabrics with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - a. Flame-Resistance Ratings: Passes NFPA 701 **OR** California Code of Regulations, Title 19, **as directed**.
 - b. Permanently attach label to each awning fabric indicating whether fabric is inherently and permanently flame resistant, or treated with flame-retardant chemicals, and whether it will require retreatment after designated time period or cleaning.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

G. Warranty: Manufacturer's standard form in which manufacturer and fabricator agree to repair or replace components of awnings that fail in materials or workmanship within specified warranty period.

1. Awning Warranty Period: Five years from date of Final Completion.
2. Fabric Warranty Period: Three **OR** Five **OR** Eight **OR** 12, **as directed**, years from date of Final Completion.
3. Thread Warranty Period: Five **OR** Eight, **as directed**, years from date of Final Completion.
4. Graphics Warranty Period: Outdoor durability not less than five **OR** three, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Source Limitations: Obtain awnings from single source from single manufacturer.

B. Awning Fabrics

1. Fabric Fiber Content: Vinyl-laminated or -coated polyester mesh **OR** Vinyl-laminated or -coated polyester **OR** Acrylic-coated polyester **OR** Resin-coated polyester **OR** Vinyl-coated polyester/cotton blend **OR** Acrylic-coated polyester/cotton blend **OR** Resin-coated polyester/cotton blend **OR** Solution-dyed acrylic **OR** Solution-dyed modacrylic, **as directed**.
2. Style:

- a. Bottom Hem: Straight **OR** Scalloped, evenly spaced pattern **OR** As indicated by manufacturer's designation **OR** As indicated in an awning schedule, **as directed**.
 - b. Trim: As indicated by manufacturer's designation for style and color **OR** As indicated in a window treatment schedule, **as directed**.
 - c. Fringe: As indicated by manufacturer's designation for style and color **OR** As indicated in an awning schedule, **as directed**.
 - d. Color: Match samples **OR** As selected from manufacturer's full range **OR** As indicated in an awning schedule, **as directed**.
 - e. Applied Treatment: Stain resistant **OR** Mildew resistant **OR** Polymer, flame resistant **OR** Water repellent **OR** Lamination, **as directed**.
 - f. Performance Characteristics: As follows:
 - 1) Mildew Resistance: Showing no growth when tested per ASTM G 21.
 - 2) Shrinkage: Not greater than 0.1 **OR** 0.5 **OR** 1, **as directed**, percent per ASTM D 1204.
 - 3) Stretch Factor: Not less than 0.4 **OR** 1 **OR** 4, **as directed**, percent per ASTM D 4851.
3. Graphic Application: Hand painting **OR** Silk-screen printing **OR** Heat color transfer **OR** Vinyl film with pressure-sensitive adhesive backing **OR** PVDF film with pressure-sensitive adhesive backing **OR** PVF film with pressure-sensitive adhesive backing **OR** Radio-frequency, heat-sealed vinyl film **OR** Eradication **OR** Cut-out lettering, **as directed**.
- a. Text Message: As indicated on Drawings **OR** As indicated in an awning schedule, **as directed**.
 - 1) Text Font: Arial, **unless directed otherwise**.
 - 2) Character Size: Minimum 1-inch- (25.4-mm-) **OR** 1-foot- (0.3048-m-), **as directed**, high characters.
 - b. Vinyl Film: Calendered-vinyl film, not less than 3 mils (0.076 mm) thick, with pressure-sensitive adhesive backing **OR** Cast-vinyl film, not less than 2 mils (0.051 mm) thick, with pressure-sensitive adhesive backing **OR** Cast-vinyl reflective film, not less than 2 mils (0.051 mm) thick, with pressure-sensitive adhesive backing, **as directed**.
4. Inset Fabric: Heat-sealed **OR** Sewn-in, **as directed**, process, and as follows:
- a. Colors: Match samples **OR** As selected from manufacturer's full range **OR** As indicated in an awning schedule, **as directed**.
 - b. Applied Treatment: Stain resistant **OR** Mildew resistant **OR** Polymer, flame resistant **OR** Water repellent, **as directed**.
- C. Thread: 100 percent expanded PTFE **OR** 100 percent bonded polyester, **as directed**, UV-light, mildew, and rot resistant.
- D. Awning Frames
- 1. Steel Frames:
 - a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - b. Cold-Formed Steel Tubing: ASTM A 500, grade as required by structural loads.
 - c. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless another weight is indicated or required by structural loads.
 - d. Steel Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513 or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500.
 - e. Steel Finish: Manufacturer's standard galvanized and corrosion-resistant mill **OR** Manufacturer's standard decorative **OR** Baked-enamel **OR** Powder-coat, **as directed**, finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
 - 2. Aluminum Frames: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated and with not less than the strength and durability properties of alloy and temper required by structural loads.
 - a. Aluminum Plate and Sheet: **ASTM B 209 (ASTM B 209M)**.
 - b. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**.

- c. Extruded Structural Pipe and Round Tubing: ASTM B 429, standard weight (Schedule 40) unless another weight is indicated or required by structural loads.
 - d. Drawn Seamless Tubing: **ASTM B 210 (ASTM B 210M)**.
 - e. Aluminum Finish: Mill **OR** Manufacturer's standard decorative **OR** Baked-enamel **OR** Powder-coat, **as directed**, finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
3. Anchors, Fasteners, Fittings, Hardware, and Installation Accessories: Complying with performance requirements indicated and suitable for exposure conditions, supporting structure, anchoring substrates, and installation methods indicated. Corrosion-resistant or noncorrodible units; weather-resistant, tamperproof, vandal- and theft-resistant, compatible, nonstaining materials. Provide as required for awning assembly, mounting, and secure attachment. Number as needed to comply with performance requirements and to maximize appearance; evenly spaced. Where exposed to view, with finish and color as selected by Architect from manufacturer's full range.
- a. Wood Screws: ASME B18.6.1.
 - b. Lag Bolts: **ASME B18.2.1. (ASME B18.2.3.8M)**.
 - c. Bolts: Steel bolts complying with **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**; with **ASTM A 563 (ASTM A 563M)** hex nuts and, where indicated, flat washers.
 - d. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1) Material: Stainless steel with bolts and nuts complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4)**.
 - e. Adhesive-Bonded Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 1512 conducted by a qualified independent testing and inspecting agency.
 - 1) Material: Stainless steel with bolts and nuts complying with **ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4)**.
 - f. Grommets: Zinc-coated brass, No. 2 **OR** Stainless steel, No. 2, **as directed**.
 - 1) Grommet Spacing: **6-inch (150-mm)** o.c.
 - g. Lacing: 100 percent polyester, braided No. 4.
4. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
5. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Awning Fabrication
1. Fabrics: Reinforce wear points and hardware attachment points with nonwoven **OR** mesh **OR** polypropylene mesh, **as directed**, webbing.
 - a. Fabric Edges and Seams:
 - 1) Fold and stitch selvedge, and cut fabric edges.
 - 2) Hot cut and sealed.
 - 3) Radio-frequency welded.
 - 4) Adhesively bonded.
 - 5) Manufacturer's standard hemming and seaming methods.
 2. Decorative Trims: Borders **OR** Braid and bindings **OR** Cords **OR** Fringe **OR** Patterned edge; scalloped **OR** Patterned edge; V-shaped **OR** Streamers **OR** Tassels **OR** Welting, **as directed**.

- a. Colors: As indicated by manufacturer's designations **OR** Match samples **OR** Matching or coordinating with awning fabric color **OR** As selected from manufacturer's full range **OR** As indicated in an awning schedule, **as directed**.
3. Frames: Preassemble awning frames in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
 - a. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - b. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
 - c. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Fabricate slip-fit connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 - d. Weld corners and connections continuously. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed corners and connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - e. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications in place and to properly transfer loads.
4. Colors of Metal and Plastic Components Exposed to View: As indicated by manufacturer's designations **OR** Match samples **OR** Matching or coordinating with awning fabric color **OR** As selected from manufacturer's full range **OR** As indicated in an awning schedule, **as directed**.

F. Retractable Awning Operators

1. Manual Operation: With gear and crank operator.
 - a. Manual Operation Assist Mechanism: Manufacturer's standard spring assist for operating heavy awnings.
 - b. Crank Handle: One **OR** Two, **as directed**, detachable.
 - c. Awning Coupler System: Designed for simultaneously operating two **OR** three, **as directed**, awnings with a single crank. Provide system for each group of awnings **OR** where indicated on Drawings **OR** where indicated in an awning schedule, **as directed**.
 - d. Operating Function: Stop and hold awning at any position in ascending or descending travel **OR** Stop and hold awning at either fully open or fully closed positions only, **as directed**.
2. Motorized Operation: Provide factory-assembled motorized retractable awning operation systems designed for retracing awnings of type, size, weight, construction, use, and operation frequency indicated. Provide operation systems of size and capacity and with features, characteristics, and accessories suitable for Project conditions and recommended by awning manufacturer, complete with electric motors and factory-prewired motor controls, remote-control stations, remote-control devices, power disconnect switches, enclosures protecting controls and all operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
3. Comply with NFPA 70.
4. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
5. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection and internal limit switches; sized by awning manufacturer to start and operate size and weight of awning considering service factor or considering Project's service conditions without exceeding nameplate ratings.
 - a. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - b. Motor Characteristics: Single phase, 24 **OR** 110 **OR** 220, **as directed**, V, 60 Hz.
 - c. Coordinate wiring requirements and electrical characteristics of motors with building electrical system.
 - d. Motor Mounting: Within manufacturer's standard roller enclosure.

6. Remote Controls: Electric controls with NEMA ICS 6, Type 1 **OR** 4, **as directed**, enclosure for surface **OR** recessed or flush, **as directed**, mounting. Provide the following devices for remote-control activation of awnings:
 - a. Control Stations:
 - 1) Keyed, maintained **OR** momentary, **as directed**, -contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.
OR
Maintained **OR** Momentary, **as directed**, -contact, three-position, toggle **OR** rocker, **as directed**, -style, wall switch-operated control station with open, close, and center off functions.
 - 2) Color: Ivory **OR** White **OR** As indicated in an awning schedule, **as directed**.
 - b. Group Control Stations: Maintained **OR** Momentary, **as directed**, -contact, three-position, rocker-style, wall switch-operated control station with open, close, and center-off functions for single-switch group control.
 - 1) Color: Ivory **OR** White **OR** As indicated in an awning schedule, **as directed**.
 - c. Individual/Group Control Stations: Maintained **OR** Momentary, **as directed**, -contact, three-position, rocker-style, wall switch-operated control station with open, close, and center-off functions for individual and group control.
 - 1) Color: Ivory **OR** White **OR** As indicated in an awning schedule, **as directed**.
 - d. Sun Sensor Controls: Programmable system activated by LEDs detecting daylight intensity and responding by automatically adjusting awnings.
 - e. Radio Controls: Digital system consisting of code-compatible universal coaxial receiver, one per awning **OR** where indicated on Drawings, **as directed**, and two portable single-channel transmitters for operating a single motor with a single button to open and close awning.
 - f. Radio Controls: Digital system consisting of code-compatible universal coaxial receiver, one per awning **OR** where indicated on Drawings **OR** where indicated in an awning schedule, **as directed**, and two portable multiple-channel transmitters for operating two **OR** four **OR** up to 12, **as directed**, awnings individually, each with a single button to open and close awnings.
 - g. Timer Controls: Clock timer, 24-hour **OR** seven-day, **as directed**, programmable for regular events.
 - h. Microprocessor Controls: Electronic programmable means for setting, changing, and adjusting control features. Provide unit isolated from voltage spikes and surges.
7. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop awning at fully raised and fully lowered positions.
8. Operating Function: Stop and hold awning at any position **OR** Stop and hold awning at three predetermined positions including open, closed, and one user-programmed position, **as directed**.
9. Operating Features: Include the following:
 - a. Group switching with integrated switch control; single face plate for multiple switch cut-outs.
 - b. Capable of accepting input from building automation control system.
 - c. Override switch.
 - d. Backup gear and crank operator for manual operation during power failures with detachable handle, 6 feet (1.8 m) long **OR** manufacturer's standard length **OR** length required to make operation convenient from ground level **OR** length as indicated on Drawings, **as directed**.
10. Awning Hood: Sheet metal enclosure sized to fit awning roller and operating hardware inside and designed for UV-light, dust, weather, and vandal protection. Finish and color to match awning framing **OR** as indicated on Drawings **OR** as indicated in an awning schedule, **as directed**.

1.3 EXECUTION

A. Installation, General

1. General: Install awnings and motor controls at locations and in position indicated, securely connected to supports, free of rack, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and fabricator's written instructions.
2. Install awnings after other finishing operations, including joint sealing and painting, have been completed.
3. Attach fabric to frames as recommended by fabricator, by stapling into slotted track in frame **OR** using lacing method as required to conceal ends of lacing **OR** using fabric hem pockets, **as directed**, to ensure tight, wrinkle-free fit of fabric to frame.
4. Slip fit frame connections accurately together to form hairline joints and tighten to secure.
5. Weld frame connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - a. Field Welding: Comply with the following requirements:
 - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2) Obtain fusion without undercut or overlap.
 - 3) Remove welding flux immediately.
 - 4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
6. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing awnings to structural support and for properly transferring load to in-place construction.
7. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
8. Coordinate awning installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed exterior wall and roof assemblies.
9. Connections: Connect motorized operators to building electrical system.

B. Adjusting

1. Adjust awnings to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Cleaning And Protection

1. Clean awning surfaces after installation, according to manufacturer's written instructions.
2. Touchup Painting: Immediately after erection, clean field welds, connections, and abraded areas. Paint uncoated and abraded areas with same or compatible material as used for shop-applied finish painting.
 - a. Apply by brush or spray to provide a minimum **2.0-mil (0.05-mm)** dry film thickness.
3. Galvanized Surfaces: Clean field welds, connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
4. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that awnings are without damage or deterioration at time of Final Completion.
5. Replace damaged awnings that cannot be repaired, in a manner approved, before time of Final Completion.

END OF SECTION 10 73 13 13

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10 73 13 23	10 73 13 13	Awnings

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SECTION 10 73 26 13 - EXTRUDED ALUMINUM WALKWAY COVER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of mesh or netting for extruded aluminum walkway cover. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: Submit manufacturer's product information, specifications and installation instructions for building components and accessories.
2. Shop Drawings: Submit complete shop drawings including all necessary plan dimensions, elevations and details. Contractor shall verify all dimensions and provide elevations at each column, finish floor, and related soffit prior to manufacturer for fabrication.
3. Certification: Submit design calculations signed by a Registered Professional Engineer, licensed in the project state. Design calculations shall state that the walkway cover system design complies with the wind requirements of ASCE 7-95, the stability criteria of applicable building code, and all other governing criteria.

C. Quality Assurance

1. Walkway cover shall be wholly produced by a recognized manufacturer with at least 5 years experience in the design and fabrication of extruded aluminum walkway cover systems. Components shall be assembled in shop to the greatest extent possible to minimize field assembly. Walkway system shall be installed by manufacturer. Walkway system, including material and workmanship, shall be warranted from defects for a period of one year from Final Completion of installation.

1.2 PRODUCTS

A. Design

1. Walkway cover shall be all welded extruded aluminum system complete with internal drainage. Non-welded systems are not acceptable. Roll formed deck is not acceptable. Expansion joints shall be included to accommodate temperature changes of 120 degrees F. Expansion joints shall have no metal to metal contact.

B. Materials

1. Aluminum Members: Extruded aluminum 6063 alloy, heat treated to T-6 temper.
2. Fasteners: Aluminum, 18-8 stainless steel or 300 series stainless steel.
3. Protective coating: Aluminum columns embedded in concrete shall be protected with clear acrylic coating.
4. Grout: 2000 psi compressive strength, 1 part Portland cement to 3 parts masonry sand. Add water to grout mixture to produce pouring consistency.
5. Gaskets: Dry seal santoprene or neoprene, pressure type.

C. Components

1. Columns: Radius-cornered tubular extrusion of size indicated with cutout and internal diverter for drainage where indicated. Circular downspout openings in columns are not acceptable.
2. Beams: Open-top tubular extrusion of size and shape indicated, top edges thickened for strength and designed to receive deck members in self-flashing manner. Structural ties shall be installed in tops of beams.

3. Deck: Extruded self-flashing sections interlocking into a composite unit. Closures at deck ends shall be welded plates.
4. Fascia: Manufacturer's standard shape. Size as directed.
5. Flashing: Minimum 0.040-inch thick aluminum.

D. Fabrication

1. Internal Drainage: Water flow shall be directed from deck to beams to columns, as indicated by the shop drawings, for discharge out "weepholes" at ground level. Should underground drainage be required, proper coordination of trades shall be by Contractor.
2. Bent Construction: Beams and columns shall be factory welded with neatly mitered corners into rigid, one-piece units. All welds shall be smooth and uniform using an inert gas shielded arc. Suitable edge preparation shall be provided to assure 100 percent penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. When size of bent does not permit shipment as a welded unit, rigid mechanical joints may be utilized.
3. Deck Construction: Extruded self-flashing deck sections shall interlock into a composite unit, spanning double-bays. Interlocking joints shall be positively fastened at 8-inches on centers, creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings shall have minimum shear strength of 350 pounds each. Deck shall be assembled with sufficient camber to offset dead load deflection.

E. Finish

1. Clear anodized 204-R1, per AA-M10C22A21 (AAMA 607.1) **OR** bronze, amber or black anodizing per AA-M10C22A42 (AAMA 606.1), **as directed**, color to be selected,
OR
Painted finish shall be baked acrylic enamel (AAMA 603.8) over chromate conversion pretreatment or wash-etch primer **OR** polyester powder coating **OR** high-performance fluoropolymer coating (AAMA 605.2), **as directed**, on deck and fascia.

F. Light Fixture

1. Surface mounted to roof deck as shown on the drawings. Construction shall be of a welded weatherproof, extruded housing, high impact FR grade white acrylic diffuser tethered to housing by wire cables, including 1/2-inch conduit coupling and "Weldnuts" for attachment to roof deck. Finish shall match the extruded roof deck. Ballast shall be class P of voltage required, 0 degree F start. Sockets shall receive dual lamps. Fixtures shall occur at each bay of deck. All penetrations will be covered with a bed of silicone caulking. Caulking shall be applied to a clean and dry surface.

G. Accessories

1. Provide all accessories, fasteners, flashings and other items as necessary for a complete installation.

1.3 EXECUTION

A. Erection

1. Concrete Footings: Provide manufacturer's standard column sleeves (styrofoam block-outs).
2. Surface Mount: Bents shall be anchored to top of existing walks. In canopy runs where lengths exceed 100 ft., the next proceeding bent shall be set into a concrete footing.

B. Installation

1. Walkway cover shall be erected true to line, level, and plumb. Aluminum columns embedded in concrete shall be protected with clear acrylic. Downspout columns shall be filled with grout to the discharge level to prevent standing water. Non-draining columns shall have weep holes installed at top of concrete to remove condensation.

- C. Cleaning
 - 1. All walkway cover components shall be cleaned promptly after installation.

- D. Protection
 - 1. Extreme care shall be taken to protect materials during and after installation.

END OF SECTION 10 73 26 13

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Task	Specification	Specification Description
10 73 26 13	01 22 16 00	No Specification Required

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SECTION 10 75 16 00 - FLAGPOLES

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for flagpoles. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes ground-mounted, wall-mounted, and roof-mounted flagpoles made from aluminum, copper alloy (bronze), fiberglass, stainless steel, and steel.

C. Performance Requirements

1. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
 - a. Seismic Loads: **Seismic criteria** as directed by the Owner according to SEI/ASCE 7.
 - b. Wind Loads: **Wind speed and exposure factor** as directed by the Owner according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles" **OR** SEI/ASCE 7, **as directed**.
 - c. Base flagpole design on polyester **OR** nylon or cotton, **as directed**, flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

D. Submittals

1. Product Data: For each type of product indicated.
2. Delegated-Design Submittal: For flagpole assemblies indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Include loads, point reactions, and locations for attachment of flagpoles to building's structure.
3. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

E. Delivery, Storage, And Handling

1. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

1.2 PRODUCTS

A. Flagpoles

1. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
 - a. Fabricate shop and field joints without using fasteners, screw collars, or lead caulking.
 - b. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
OR
Provide self-aligning, snug-fitting joints.
2. Exposed Height: **20 feet (6 m) OR 25 feet (7.5 m) OR 30 feet (9 m) OR 35 feet (11 m) OR 40 feet (12 m) OR 45 feet (13.5 m) OR 50 feet (15 m) OR 60 feet (18 m) OR 70 feet (21 m) OR 80 feet (24 m), as directed.**

3. Aluminum Flagpoles: Provide cone **OR** entasis, **as directed**, tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of **3/16 inch (4.8 mm)**.
4. Copper-Alloy (Bronze) Flagpoles: Provide cone **OR** entasis, **as directed**, tapered flagpoles fabricated from seamless pipe or tube complying with ASTM B 43 or **ASTM B 135 (ASTM B 135M)**, Alloy UNS C23000 (red brass, 85 percent copper).
5. Fiberglass Flagpoles: Provide cone **OR** entasis, **as directed**, tapered flagpoles fabricated from polyester resin reinforced with woven glass-fiber roving with 75 percent of glass fibers parallel to length of flagpole.
6. Stainless-Steel Flagpoles: Provide cone **OR** entasis, **as directed**, tapered flagpoles fabricated from pipe, tube, or plate complying with ASTM A 312/A 312M, ASTM A 269, or ASTM A 666, Alloy UNS S30400 **OR** Alloy UNS S31603, **as directed**.
7. Steel Flagpoles: Provide cone-tapered **OR** stepped-sectional, **as directed**, flagpoles fabricated from standard-weight, seamless steel pipe complying with ASTM A 53/A 53M, Type S, Grade B or steel tube complying with ASTM A 513.
8. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, not less than **0.064-inch- (1.6-mm-)** nominal wall thickness. Provide with **3/16-inch (4.8-mm)** steel bottom plate and support plate; **3/4-inch- (19-mm-)** diameter, steel ground spike; and steel centering wedges welded together. Galvanize steel after assembly. Provide loose hardwood wedges at top of foundation tube for plumbing pole.
 - a. Provide flashing collar of same material and finish as flagpole.
 - b. Provide steel ground protectors extending **12 inches (300 mm)** aboveground and **6 inches (150 mm)** belowground for steel flagpoles where flashing collars are not provided.
9. Sleeve for Fiberglass **OR** Aluminum, **as directed**, Flagpole: Fiberglass or PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.
 - a. Provide flashing collar of same material and finish as flagpole.
10. Cast-Metal Shoe Base: For anchor-bolt mounting; provide with anchor bolts.
 - a. Provide units made from aluminum **OR** steel, **as directed**, with same finish and color as flagpoles.
 - b. Provide ground spike at grade-mounted flagpoles for metal flagpoles or fiberglass flagpoles with metal halyards.
 - c. Provide connector to building's lightning protection system conductor at roof-mounted flagpoles for metal flagpoles or fiberglass flagpoles with metal halyards.
11. Hinged Baseplate: Cast-metal tilting hinged base and anchored plate joined by permanently secured pivot rod for aluminum and fiberglass flagpoles 30 to 40 feet (9 to 12 m) or less in height. Provide with stainless-steel screws for securing tilting base to anchored plate when not tilted; provide with anchor bolts.
 - a. Finish base to match flagpole.
 - b. Provide aluminum base or aluminum flashing collar finished to match flagpole.
 - c. Provide ground spike at grade-mounted flagpoles for metal flagpoles or fiberglass flagpoles with metal halyards.
 - d. Provide connector to building's lightning protection system conductor at roof-mounted metal flagpoles for metal flagpoles or fiberglass flagpoles with metal halyards.
12. Pivoting Tilt Base: Steel baseplate with channel or rectangular tube uprights, pivot bolt, and locking device for tilting flagpole. Provide tilting flagpole with steel counterweight box and weights, or provide with internal counterweight. Provide base with anchor bolts.
 - a. Finish base to match flagpole.
 - b. Provide ground spike at grade-mounted flagpoles.

OR

Provide connector to building's lightning protection system conductor at roof-mounted metal flagpoles.
13. Vertical Wall Mount: Cast-aluminum **OR** Cast-copper-alloy (bronze), **as directed**, mounting bracket complete with escutcheon, **as directed**, mounting plate and through-wall anchorage.
 - a. Provide units with same finish as flagpole for copper-alloy (bronze) or aluminum units.

- b. Provide units with gold anodic **OR** bronze powder-coated **OR** black powder-coated, **as directed**, finish for aluminum units.
 14. Outrigger Wall Mount: Aluminum **OR** Copper-alloy (bronze), **as directed**, mounting bracket complete with escutcheon, **as directed**, mounting plate and through-wall anchorage.
 - a. Provide units with same finish as flagpole for copper-alloy (bronze) or aluminum units.
 - b. Provide units with gold anodic **OR** bronze powder-coated **OR** black powder-coated, **as directed**, finish for aluminum units.
 15. Braced Roof Mount: Roof-mounted flagpole socket and either rod or tubular braces with turnbuckles and mounting bases. Provide as a complete assembly with anchor bolts and connector for lightning protection system.
 - a. Provide braces, turnbuckles, and connectors made from same metal and with same finish as flagpoles.
- B. Fittings
 1. Finial Ball: Manufacturer's standard flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
 - a. **0.063-inch (1.6-mm)** spun aluminum, finished to match flagpole **OR** with gold anodic finish, **as directed**.
 - b. **20-oz. (0.70-mm)** copper with 23-karat gold leaf finish.
 - c. Spun stainless steel, finished to match flagpole.
 - d. Spun copper alloy, finished to match flagpole.
 2. Finial Eagle: Manufacturer's standard, sized as indicated **OR** as standard with manufacturer for flagpole size indicated, **as directed**.
 - a. Cast aluminum, finished to match flagpole **OR** with gold anodic finish, **as directed**.
OR
20-oz. (0.70-mm) copper with 23-karat gold leaf finish.
 3. Internal Halyard, Winch System: Manually operated winch with control stop device and removable handle, stainless-steel cable halyard, and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
 - a. Halyard Flag Snaps: Provide two chromium-plated bronze **OR** stainless-steel **OR** bronze **OR** nylon, **as directed**, swivel snap hooks per halyard.
 - 1) Provide with neoprene or vinyl covers.
 - b. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.
 4. Internal Halyard, Cam Cleat System (for flagpoles 40 feet (12 m) or less in height): **5/16-inch- (8-mm-)** diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Provide flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
 - a. Halyard Flag Snaps: Provide two chromium-plated bronze **OR** stainless-steel **OR** bronze **OR** nylon, **as directed**, swivel snap hooks per halyard.
 - 1) Provide with neoprene or vinyl covers.
 - b. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.
 5. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous **5/16-inch- (8-mm-)** diameter, braided polypropylene halyard and **9-inch (228-mm)** cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.
 - a. Provide one halyard and one cleat **OR** two halyards and two cleats, **as directed**, at each flagpole.
 - b. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.
 - c. Provide halyard covers consisting of a **2-inch (50-mm)** channel, **60 inches (1500 mm)** long, finished to match flagpole.
 - d. Halyard Flag Snaps: Provide two chromium-plated bronze **OR** stainless-steel **OR** bronze **OR** nylon, **as directed**, swivel snap hooks per halyard.

- 1) Provide with neoprene or vinyl covers.
- e. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.

C. Miscellaneous Materials

1. Nonshrink, Nonmetallic Grout (for baseplate-mounted flagpoles): Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
2. Drainage Material (for ground-set flagpoles with foundations): Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
3. Sand (for ground-set, foundation-tube-mounted flagpoles): ASTM C 33, fine aggregate.
4. Elastomeric Joint Sealant (for ground-set, foundation-tube-mounted flagpoles): Multicomponent nonsag urethane **OR** Single-component nonsag urethane **OR** Single-component neutral- and basic-curing silicone **OR** Single-component neutral-curing silicone, **as directed**, joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
5. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

D. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

E. Aluminum Finishes

1. Natural Satin Finish: AA-M32, fine, directional, medium satin polish; buff complying with AA-M20; seal aluminum surfaces with clear, hard-coat wax.
2. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
3. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black, **as directed**.
 - b. Color: Match sample **OR** As selected from full range of industry colors and color densities, **as directed**.
4. Gold Anodic Finish: AAMA 611, AA-M32C22A43 Class I, 0.018 mm or thicker; gold color.
5. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
6. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 **OR** AAMA 2605, **as directed**, and containing not less than 50 **OR** 70, **as directed**, percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.

F. Steel Finishes

1. Flagpole Interior Finish: Apply one coat of bituminous paint on interior of flagpole or otherwise treat to prevent corrosion.
2. Galvanized Finish: Hot-dip galvanize after fabrication to comply with ASTM A 123/A 123M.
3. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" **OR** SSPC-SP 8, "Pickling," **as**

- directed.** After cleaning, apply a conversion coating suited to the organic coating to be applied over it, **as directed.**
4. Polyurethane Enamel Finish: Immediately after cleaning, apply manufacturer's standard primer and two-coat, high-gloss, high-build polyurethane-enamel finish.
 - a. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
 5. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
- G. Stainless-Steel Finishes
1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
 - c. Directional Satin Finish: No. 4.
- H. Copper-Alloy Finishes
1. Buffed Finish, Lacquered: M21-O6x (Mechanical Finish: buffed, smooth specular; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 2. Medium Satin Finish, Lacquered: M32-O6x (Mechanical Finish: medium satin; Coating: clear organic, air drying, as specified below).
 - a. Clear, Organic Coating: Lacquer specified for copper alloys, applied by air spray in two coats per manufacturer's written instructions, with interim drying, to a total thickness of **1 mil (0.025 mm)**.
 3. Statuary Conversion Coating over Satin Finish: M31-C55 (Mechanical Finish: directionally textured, fine satin; Chemical Finish: conversion coating, sulfide).
 - a. Color: Match sample.
- I. Fiberglass Finishes
1. Fiberglass: UV-light stable, hard, high-gloss gel coat or high-gloss, high-build polyurethane or polyester coating.
 - a. Color: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**

1.3 EXECUTION

A. Preparation

1. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
2. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
3. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
4. Place concrete, as specified in Division 03 Section "Cast-in-place Concrete". Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.

5. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

B. Flagpole Installation

1. General: Install flagpoles where shown and according to Shop Drawings and manufacturer's written instructions.
2. Ground Set: Place foundation tube, sleeve, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube **OR** sleeve, **as directed**, and allow concrete to cure. Install flagpole, plumb, in foundation tube **OR** sleeve, **as directed**.
 - a. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a **2-inch (50-mm)** layer of elastomeric joint sealant and cover with flashing collar.
3. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.
4. Mounting Brackets and Bases: Anchor brackets and bases securely through to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION 10 75 16 00

Task	Specification	Specification Description
10 75 23 00	10 75 16 00	Flagpoles

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SECTION 10 81 13 00 - ORIENTED FLEXIBLE NETTING BIRD BARRIER

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of oriented flexible netting bird barrier. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

A. Material

1. Polyethylene twine netting attached to pre-installed cable system and steel installation hardware.
2. Netting shall be high density polyethylene knitted into sheets with mesh sizes of 3/4" **OR** 1-1/8" **OR 2", as directed.** Polyethylene shall be UV treated, color stable, and flame-retardant.
3. Color shall be selected from manufacturer's standard colors.
4. Installation hardware shall include corner and intermediate attachments, perimeter cable, turnbuckles, ferrules or clamps and net rings.

1.3 EXECUTION

A. Installation

1. Comply with manufacturer's printed instructions.

END OF SECTION 10 81 13 00

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SECTION 10 86 00 00 - DETENTION FURNITURE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for detention furniture. Product shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Gun lockers.
 - b. Security key cabinets.
 - c. Detention bunks.
 - d. Detention mattresses.
 - e. Detention desks.
 - f. Detention tables.
 - g. Detention seating.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For security sealants, including printed statement of VOC content.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
4. Samples: For factory-applied color finishes.
5. Samples for Verification:
 - a. Furniture: Full-size units. Approved Samples may become part of the completed Work.
 - b. Detention Mattresses: Not less than **6 inches (152 mm)** square by full depth, including core and cover fabric.
6. Welding certificates.
7. Product certificates.
8. Maintenance data.
9. Other Informational Submittals:
 - a. Field quality-control reports documenting inspections of installed products.
 - b. Field quality-control certification signed by Contractor and Detention Specialist, **as directed**.

D. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - c. AWS D1.6, "Structural Welding Code - Stainless Steel."
2. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage And Handling

1. Detention Mattresses: Deliver wrapped to provide protection during transit and Project-site storage. Protect from contact with moisture.

1.2 PRODUCTS

A. Materials

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 2. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS (Commercial Steel), Type B; suitable for exposed applications.
 3. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS (Commercial Steel), Type B; free of scale, pitting, or surface defects; pickled and oiled.
 4. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666 or ASTM A 240/A 240M, austenitic stainless steel, Type 304.
 5. Steel Tubing: ASTM A 513, Type B unless otherwise indicated; thickness indicated or required by structural loads.
 6. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless another weight is indicated or required by structural loads.
 7. Concealed Bolts: ASTM A 307, Grade A unless otherwise indicated.
 8. Cast-in-Place Anchors in Concrete: Fabricated from corrosion-resistant materials capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency; of type indicated below.
 - a. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed; hot-dip galvanized per ASTM A 153/A 153M or ASTM F 2329.
 9. Embedded Plate Anchors: Fabricated from steel shapes and plates, minimum **3/16 inch (4.8 mm)** thick; with minimum **1/2-inch- (12.7-mm-)** diameter headed studs welded to back of plate.
 10. Proprietary Built-in Masonry Anchors: Fabricated from **0.134-inch (3.42-mm)** nominal-thickness steel sheet **OR 1/4-inch (6-mm)** nominal-thickness steel plate **OR 1/2-inch (12.7-mm)** nominal-thickness steel plate, **as directed**, into **6-inch- (152-mm-)** **OR 8-inch- (203-mm-)**, **as directed**, deep blocks matching size of concrete masonry units; with weld nuts attached on inside to receive field-bolted attachments, **as directed**.
 - a. Finish: Factory primed for field painting for anchors with field-welded attachments **OR** Polyester powder coat for anchors with bolted attachments **OR** Epoxy paint for anchors with bolted attachments, **as directed**.
 11. Welding Rods and Bare Electrodes: Select according to AWS specifications.
- B. Security Sealants
1. Manufacturer's standard, high-modulus, nonsag, two-part, pick-proof, epoxy sealant, with a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), recommended for sealing nonmoving interior joints in security applications.
- C. Security Fasteners
1. Fasteners operable only by tools produced by fastener manufacturer or other licensed fabricator for use on specific type of fastener.
 2. Provide drive-system type, head style, material, and protective coating as required for assembly, installation, and strength, and as follows:
 - a. Drive-System Type: Pinned Torx-Plus **OR** Pinned Torx, **as directed**.
 - b. Fastener Strength: **120,000 psi (827 MPa)**.
 - c. Socket Button Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - d. Socket Flat Countersunk Head Fasteners:
 - 1) Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - 2) Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
 - e. Socket Head Cap Fasteners:
 - 1) Heat-treated alloy steel, **ASTM A 574 (ASTM A 574M)**.
 - 2) Stainless steel, **ASTM F 837 (ASTM F 837M)**, Group 1 CW.
 - f. Protective Coatings for Heat-Treated Alloy Steel:
 - 1) Zinc and clear trivalent chromium where indicated.
 - 2) Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide unless otherwise indicated.

D. Gun Lockers

1. Pistol Lockers:
 - a. Cabinet: Minimum **20 inches (508 mm)** wide by **15 inches (381 mm)** high by **10 inches (254 mm)** deep; formed from **0.134-inch (3.42-mm) OR 0.075-inch (1.90-mm)**, **as directed**, nominal-thickness steel sheet. Line each compartment with mothproofed felt or nonabsorbing, closed-cell padding.
 - 1) Compartments: Six.
 - b. Doors: Formed from same material as cabinet, supported by heavy-duty continuous bottom hinge.
 - c. Locks: Snap **OR** Cylinder, **as directed**, type, keyed differently and master keyed, **as directed**; provide one lock for each compartment.
 - d. Mounting: Surface **OR** Recessed, with mounting flange formed from same material as body, **as directed**.
 - e. Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
2. Tilt-Out, Pistol Locker:
 - a. Cabinet: Minimum **39 inches (991 mm)** wide by **15 inches (381 mm)** high by **6 inches (152 mm)** deep; formed from **0.134-inch (3.42-mm) OR 0.075-inch (1.90-mm)**, **as directed**, nominal-thickness steel sheet. Line each compartment with mothproofed felt or nonabsorbing, closed-cell padding.
 - 1) Compartments: Six.
 - b. Doors: Formed from same material as cabinet, supported by heavy-duty continuous bottom hinge, with attached tilt-out compartment with formed metal sides.
 - c. Locks: Snap **OR** Cylinder, **as directed**, type, keyed differently and master keyed, **as directed**; provide one lock for each compartment.
 - d. Mounting: Surface **OR** Recessed, with mounting flange formed from same material as body, **as directed**.
 - e. Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.

E. Security Key Cabinets

1. Cabinet: Minimum **16 inches (406 mm)** wide by **24 inches (610 mm)** high by **6-1/2 inches (165 mm)** deep; formed from **0.134-inch (3.42-mm)** nominal-thickness steel sheet. Provide **0.060-inch (1.52-mm)** nominal-thickness, steel sheet interior panels, supported on pivots, for mounting 150 **OR** 300, **as directed**, paracentric or mogul keys.
2. Doors: Formed from same material as cabinet, supported by heavy-duty continuous side hinge welded to cabinet and door; with tumbler deadlock.
3. Cross-Index System: Set up by key control manufacturer; include labels, two sets of key tags with self-locking key holders, key-gathering envelopes, temporary and permanent markers, and the following:
 - a. Card Index: Furnish four sets of index cards for recording key information. Include three receipt forms for each key-holding hook.
 - b. Computer Software: Furnish cross-index software for recording and reporting key-holder listings, tracking keys and lock and key history, and printing receipts for transactions. Include instruction manual.
4. Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.

F. Detention Bunks

1. Freestanding Single Bunks:
 - a. Bunk Pan: Formed from **0.134-inch (3.42-mm) OR 0.105-inch (2.66-mm)**, **as directed** nominal-thickness steel sheet, perforated with at least six holes, **as directed**.
 - 1) Size: Minimum **27 inches (689 mm)** wide by **76 inches (1930 mm)** long with bunk pan **14 inches (356 mm)** above floor.
 - 2) Turn up edges of back and sides and turn down edge of front **OR** back, sides, and front, **as directed**, with minimum **2-inch (51-mm)** flanges.
 - b. Drawer: Minimum **21 inches (533 mm)** wide by **24 inches (610 mm)** deep by **5 inches (127 mm)** high, with full-width integral pull formed from steel sheet **OR** solid-steel bar pull, **as directed**; formed from **0.134-inch (3.42-mm)** nominal-thickness steel sheet.

- c. Legs and Frames: Formed from 2-by-2-by-3/16-inch (51-by-51-by-4.8-mm) steel angle welded at connections to each other and to bunk pan; provide four legs for each bunk.
- d. Mounting Plates: Formed from 1/4-inch- (6-mm-) thick steel plate punched with one hole for floor anchorage; provide one mounting plate for each leg.
- e. Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
- 2. Freestanding Double Bunks:
 - a. Bunk Pan: Formed from 0.134-inch (3.42-mm) **OR** 0.105-inch (2.66-mm), **as directed**, nominal-thickness steel sheet, each pan perforated with at least six holes, **as directed**.
 - 1) Size: Minimum 27 inches (689 mm) wide by 76 inches (1930 mm) long with lower bunk pan 14 inches (356 mm) above floor and upper bunk pan at least 49 inches (1245 mm) above floor.
 - 2) Upper and Lower Bunks: Turn up edges of back and sides and turn down edge of front **OR** back, sides, and front, **as directed**, with minimum 2-inch (51-mm) flanges.
 - 3) Upper Bunk: Turn up edges of back and sides and turn down edge of front **OR** back, sides, and front, **as directed**, with minimum 2-inch (51-mm) flanges.
 - 4) Lower Bunk: Turn up edges of back and sides and turn down edge of front, with minimum 2-inch (51-mm) flanges.
 - b. Drawers: Two; minimum 21 inches (533 mm) wide by 24 inches (610 mm) deep by 5 inches (127 mm) high, with full-width integral pull formed from steel sheet **OR** solid-steel bar pull, **as directed**; formed from 0.134-inch (3.42-mm) nominal-thickness steel sheet.
 - c. Legs and Frames: Formed from 2-by-2-by-3/16-inch (51-by-51-by-4.8-mm) steel angle welded at connections to each other and to bunk pan; provide four legs for each bunk.
 - d. Mounting Plates: Formed from 1/4-inch- (6-mm-) thick steel plate punched with one hole for floor anchorage; provide one mounting plate for each leg.
 - e. Assembly: Factory assembled **OR** Knocked down for field assembly, **as directed**.
 - f. Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
- 3. Wall-Mounted Bunks:
 - a. Bunk Pan: Formed from 0.134-inch (3.42-mm) **OR** 0.105-inch (2.66-mm), **as directed**, nominal-thickness steel sheet, perforated with at least six holes, **as directed**.
 - 1) Size: Minimum 27 inches (689 mm) wide by 76 inches (1930 mm) long with bunk pan 2 inches (51 mm) from wall.
 - 2) Turn up edges of back and sides and turn down edge of front **OR** back, sides, and front, **as directed**, with minimum 2-inch (51-mm) flanges.
 - b. Drawer: Minimum 21 inches (533 mm) wide by 24 inches (610 mm) deep by 5 inches (127 mm) high, with full-width integral pull formed from steel sheet **OR** solid-steel bar pull, **as directed**; formed from 0.134-inch (3.42-mm) nominal-thickness steel sheet.
 - c. Combination End Panel/Mounting Plate: Formed from 3/16-inch- (0.048-mm-) thick steel sheet welded at connections to bunk pan, with 2-inch (51-mm) flange for wall mounting; provide two end panel/mounting plates for each bunk.
 - d. Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.

G. Detention Mattresses

- 1. General: Comply with 16 CFR 1632 and California Technical Bulletin 121 as determined by testing identical products by a testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
- 2. Core: Fire-resistive solid foam **OR** Fire-resistive densified polyester **OR** Cotton, with 10 percent boric acid treatment, tufted to nylon netting to retain shape, **as directed**.
- 3. Cover Fabric: Vinyl bonded to nylon scrim; with a minimum total weight of 10 oz./sq. yd. (339 g/sq. m). Fabricate cover of four-corner box construction with seams facing inside of detention mattress except end closing seam located at foot of mattress; sew with nylon thread in a double-lock stitch.
- 4. Thickness: 4 inches (102 mm) **OR** 6 inches (152 mm), **as directed**.

H. Detention Desks

1. Single-Seat, Floor-Mounted Desks:
 - a. Desk Top: Formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.105-inch (2.66-mm) nominal-thickness steel OR 0.141-inch- (3.57-mm-) thick, stainless-steel OR 0.062-inch- (1.59-mm-) thick, stainless-steel, **as directed**, sheet, with minimum 1-1/2-inch (38-mm) flanged edges.
 - b. Pedestal: Provide two storage shelves with sides and shelves formed from 0.134-inch (3.42-mm) nominal-thickness steel.
 - c. Legs: Formed from 1-1/2-inch-square by 3/16-inch- (38-mm-square by 4.8-mm-) thick steel tubing welded to desk top and mounting plate for an overall desk height of not less than 30 inches (762 mm).
 - d. Seat: 12-inch (305-mm) diameter, formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.075-inch (1.90-mm) nominal-thickness steel OR 0.141-inch- (3.57-mm-) thick, stainless-steel OR 0.062-inch- (1.59-mm-) thick, stainless-steel, **as directed**, sheet; reinforced with 0.134-inch (3.42-mm) nominal-thickness steel sheet, with minimum 1-1/2-inch (38-mm) flanged edges.
 - e. Swivel Seat Support: Formed from 1-by-2-by-0.075-inch (25-by-51-by-1.90-mm) nominal-thickness steel tubing, 2-inch-OD-by-0.075-inch (51-mm-OD-by-1.90-mm) nominal-thickness steel tubing, or 3/8-inch- (9.5-mm-) thick, steel plate bar; with 1/2-inch (12.7-mm) pivot pin welded to legs.
 - f. Towel Bar: Formed from 1/4-by-1-1/2-inch (6-by-38-mm) steel OR stainless-steel, **as directed**, plate, mounted on one side of desk.
 - g. Mounting Plates: Formed from 1/4-inch- (6-mm-) thick steel plate punched with one hole for floor anchorage; provide one mounting plate for each leg.
 - h. Steel Finish: Factory primed for field painting OR Baked enamel or powder coat, **as directed**.
 - i. Stainless-Steel Finish: No. 3.
 - 1) Size: Minimum 36 inches (914 mm) wide by 15-1/2 inches (381 mm) deep.
 2. Wall-Mounted Desk and Seat:
 - a. Desk: Formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.141-inch- (3.57-mm-) thick, stainless-steel, **as directed**, sheet, with minimum 1-1/2-inch (38-mm) flanged edges.
 - 1) Size: Minimum 12 inches (305 mm) wide by 18 inches (457 mm) deep OR 18 inches (457 mm) wide by 18 inches (457 mm) deep OR 24 inches (610 mm) wide by 18 inches (457 mm) deep OR 30 inches (762 mm) wide by 20 inches (508 mm) deep, **as directed**.
 - b. Seat: Minimum 12 inches (305 mm) wide by 16 inches (406 mm) OR 18 inches (457 mm), **as directed**, deep; formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.141-inch- (3.57-mm-) thick, stainless-steel, **as directed**, sheet, with minimum 1-1/2-inch (38-mm) flanged edges.
 - c. Steel Finish: Factory primed for field painting OR Baked enamel or powder coat, **as directed**.
 - d. Stainless-Steel Finish: No. 3.
- I. Detention Tables
1. Pedestal-Style Table:
 - a. Tabletop: Formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.105-inch (2.66-mm) nominal-thickness steel OR 0.109-inch- (2.78-mm-) thick, stainless-steel OR 0.078-inch- (1.98-mm-) thick, stainless-steel OR 0.062-inch- (1.59-mm-) thick, stainless-steel, **as directed**, sheet; reinforced with steel shapes or steel plate, with minimum 1-1/2-inch (38-mm) flanged edges.
 - 1) Size: Minimum 30 inches (762 mm) OR 40 inches (1016 mm), **as directed**, wide by length required for capacity by 30 inches (762 mm) OR 35 inches (889 mm), **as directed**, high.
 - 2) Game Top: Engrave, or otherwise integrally incorporate, checkerboard into tabletop.

- b. Seats: 12-inch (305-mm) diameter, formed from 0.105-inch (2.66-mm) nominal-thickness steel OR 0.075-inch (1.90-mm) nominal-thickness steel OR 0.078-inch- (1.98-mm-) thick, stainless-steel OR 0.062-inch- (1.59-mm-) thick, stainless-steel, **as directed**, sheet; reinforced with 0.134-inch (3.42-mm) nominal-thickness steel plate, with minimum 1-1/2-inch (38-mm) flanged edges.
 - c. Pedestal Supports: Formed from 3-inch-square by 3/16-inch- (76-mm-square by 4.8-mm-) OR 4-inch-square by 0.134-inch- (102-mm-square by 3.42-mm-), **as directed**, thick steel tubing welded to top and base plate. Provide two pedestals for tables with capacity of more than four persons.
 - d. Seat Framing: Formed from 3-inch-square by 0.134-inch- (76-mm-square by 3.42-mm-) OR 3-by-2-by-3/16-inch- (76-by-51-by-4.8-mm-), **as directed**, thick steel tubing welded to pedestal supports.
 - e. Base Plate: Minimum 16-inch- (406-mm-) square, 1/4-inch- (6-mm-) thick steel plate punched with four holes for floor anchorage.
 - f. Capacity: Four persons OR Six persons OR Eight persons OR As indicated on Drawings, **as directed**.
 - g. Steel Finish: Factory primed for field painting OR Baked enamel or powder coat, **as directed**.
 - h. Stainless-Steel Finish: No. 3.
2. Bench-Style Table:
- a. Tabletop: Formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.105-inch (2.66-mm) nominal-thickness steel OR 0.109-inch- (2.78-mm-) thick, stainless-steel, **as directed**, sheet; reinforced with steel channel frame or steel plate, with minimum 1-1/2-inch (38-mm) flanged edges.
 - 1) Size: Minimum 24 inches (610 mm) wide by length required for capacity by 30 inches (762 mm) OR 35 inches (889 mm), **as directed**, high.
 - b. Benches: 12 inches (305 mm) deep by length of tabletop, formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.105-inch (2.66-mm) nominal-thickness steel OR 0.109-inch- (2.78-mm-) thick, stainless-steel OR 0.062-inch- (1.59-mm-) thick, stainless-steel, **as directed**, sheet, with minimum 1-1/2-inch (38-mm) flanged edges.
 - c. Vertical Supports: Formed from 8-inch (203-mm) hot-rolled steel channels or 0.164-inch- (4.18-mm-) thick, formed-steel channels; braced and welded, with steel base plates punched for floor anchorage. Provide three supports for tables with capacity of more than four persons.
 - d. Bench Supports: Formed from 2-by-2-1/2-by-1/4-inch- (51-by-64-by-6-mm-) thick steel angle or 2-inch-square by 1/4-inch- (51-mm-square by 6-mm-) thick steel tubing; welded to vertical supports.
 - e. Floor Anchor: Formed from steel angle punched for floor anchorage.
 - f. Capacity: Four persons OR Six persons OR Eight persons OR As indicated on Drawings, **as directed**.
 - g. Steel Finish: Factory primed for field painting OR Baked enamel or powder coat, **as directed**.
 - h. Stainless-Steel Finish: No. 3.
- J. Detention Seating
- 1. Floor-Mounted Stool:
 - a. Seats: Minimum 12-inch (305-mm) diameter, formed from 0.134-inch (3.42-mm) nominal-thickness steel OR 0.075-inch (1.90-mm) nominal-thickness steel OR 0.125-inch- (3.18-mm-) thick, stainless-steel OR 0.062-inch- (1.59-mm-) thick, stainless-steel, **as directed**, sheet; reinforced with 0.134-inch- (3.42-mm-) thick steel sheet cut to interior dimension of seat, with minimum 1-1/2-inch (38-mm) flanged edges.
 - b. Seat Support: Formed from steel pipe or 2-inch-OD-by-0.075-inch- (51-mm-OD-by-1.90-mm-) thick steel tubing welded to seat reinforcement and base plate for an overall stool height of not less than 18 inches (457 mm).

- c. Base Plate: Minimum **6-by-1/4-inch- (152-by-6-mm-)** thick, square **OR** round, **as directed**, steel punched with four holes for floor anchorage.
- d. Steel Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
- e. Stainless-Steel Finish: No. 3.
- 2. Wall-Mounted Stool:
 - a. Seat: Minimum **12-inch (305-mm)** diameter, formed from **0.134-inch (3.42-mm)** nominal-thickness steel **OR 0.075-inch (1.90-mm)** nominal-thickness steel **OR 0.125-inch- (3.18-mm-)** thick, stainless-steel **OR 0.078-inch- (1.98-mm-)** thick, stainless-steel, **as directed**, sheet; reinforced with **0.134-inch- (3.42-mm-)** thick steel sheet cut to interior dimension of seat, with minimum **1-1/2-inch (38-mm)** flanged edges.
 - b. Seat Support: Formed from **1-by-2-by-0.075-inch- (25-by-51-by-1.90-mm-)** thick steel tubing, **2-inch-OD-by-0.075-inch- (51-mm-OD-by-1.90-mm-)** thick steel tubing or **3/8-inch- (9.5-mm-)** thick, steel plate bar; welded to seat reinforcement and wall bracket.
 - c. Swivel Wall Bracket: Minimum **1/2-inch (12.7-mm)** pivot pin, with **3/8-inch- (9.5-mm-)** thick steel plate for welding to embedded steel plate **OR** for welding to steel wall **OR** punched with four holes for wall anchorage, **as directed**.
 - d. Steel Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
 - e. Stainless-Steel Finish: No. 3.
- 3. Floor-Mounted Bench:
 - a. Bench Top: Formed from **0.134-inch (3.42-mm)** nominal-thickness steel **OR 0.105-inch (2.66-mm)** nominal-thickness steel **OR 0.141-inch- (3.57-mm-)** thick, stainless-steel **OR 0.109-inch- (2.78-mm-)** thick, stainless-steel, **as directed**, sheet, with minimum **1-1/2-inch (38-mm)** flanged edges.
 - 1) Size: Minimum **12 inches (305 mm)** deep by **48 inches (1219 mm) OR 60 inches (1524 mm) OR 72 inches (1829 mm) OR 96 inches (2438 mm)**, **as directed**, long.
 - b. Supports: Formed from **0.164-inch- (4.18-mm-)** thick, formed-steel channels **2-1/2-inch-OD-by-0.0677-inch- (64-mm-OD-by-1.7-mm-)** thick steel tubing; welded to bench and base plate for an overall bench height of not less than **18 inches (457 mm)**. Provide three supports for benches with length of more than **72 inches (1829 mm)**.
 - c. Base Plates: Minimum **8-inch-square by 1/4-inch- (203-mm-square by 6-mm-)** thick steel plate punched with four holes for floor anchorage.
 - d. Capacity: Four persons **OR** Six persons **OR** Eight persons **OR** As indicated on Drawings, **as directed**.
 - e. Steel Finish: Factory primed for field painting **OR** Baked enamel or powder coat, **as directed**.
 - f. Stainless-Steel Finish: No. 3.

K. Fabrication

- 1. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- 2. Coordinate dimensions and attachment methods of detention furniture with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
- 3. Shear and punch metals cleanly and accurately. Remove burrs.
- 4. Form and grind edges and corners to be free of sharp edges or rough areas.
 - a. Fabricate detention furniture with no more than **1/32-inch (0.8-mm)** gap between component materials. Weld edges that cannot be crimped to meet tolerance so as to provide a seamless joint with no place for concealment of contraband.
- 5. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- 6. Weld corners and seams continuously to comply with referenced AWS standard and the following:

- a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Finish exposed welds and surfaces smooth and blended at exposed connections so that no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - e. Weld before finishing components to greatest extent possible. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
7. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure detention furniture rigidly in place and to support expected loads. Build in straps, plates, and brackets as needed to support and anchor fabricated items to adjoining construction. Reinforce formed-metal units as needed to attach and support other construction.
 8. Cut, reinforce, drill, and tap detention furniture as indicated to receive hardware, security fasteners, and similar items.
 9. Form exposed work true to line and level with accurate angles, surfaces, and straight sharp edges.
 10. Form exposed connections with hairline joints, flush and smooth using concealed fasteners where possible. Use exposed security fasteners of type indicated or, if not indicated, flat-head (countersunk) security fasteners. Locate joints where least conspicuous.
 11. Attach drawer slides **OR** shelves, **as directed**, to furniture by welding **OR** with security fasteners, **as directed**.

L. Steel Finishes

1. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
2. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
3. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.

M. Stainless-Steel Finishes

1. General: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
2. Intermediate Polish Finish: No. 3 unless otherwise indicated.
3. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1.3 EXECUTION

A. Installation

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing detention furniture to in-place construction. Include threaded fasteners for concrete and masonry inserts, security fasteners, and other connectors.
2. Cutting, Fitting, and Placement: Obtain manufacturer's written approval for cutting, drilling, and fitting required for installing detention furniture. Set detention furniture accurately in location,

- alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
3. Provide temporary bracing or anchors in formwork for items that are to be built into concrete or masonry or similar construction.
 4. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 5. Field Welding: Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Finish exposed welds and surfaces smooth and blended at exposed connections so that no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - e. Fillet Welds: Minimum size of **1/8 inch by 1-1/2 inches (3 mm by 38 mm)** long, spaced not greater than **12 inches (305 mm)** o.c. Fill spaces between welds with security sealant **OR** auto body filler, **as directed**, where weld is exposed.
OR
Fillet Welds: Continuous.
 6. Adjust doors and latches of detention gun lockers and key cabinets to operate easily without binding. Verify that integral locking devices operate properly.
 7. Assemble detention furniture requiring field assembly with security fasteners with no exposed fasteners on exposed faces and frames.
 8. Anchor furniture with security fasteners **OR** by welding **OR** as indicated on Drawings, **as directed**, to floors and walls at intervals required by expected loads, but not more than **12 inches (305 mm)** o.c.
 - a. Install anchors through backup reinforcing plates where necessary to avoid metal distortion.
 - b. Use security fasteners with head styles appropriate for installation requirements, strength, and finish of adjacent materials, except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in painted materials.
 - c. Weld nuts onto cast-in-place anchors after installation so as to be nonremovable.
 9. Apply security sealant **OR** auto body filler, **as directed**, at all exposed gaps between detention furniture and adjacent construction greater than **1/16 inch (1.6 mm)**.
 10. Install one detention mattress for each detention bunk.
- B. Field Quality Control
1. Detention Specialist shall inspect **OR** Inspect, **as directed**, installed products to verify compliance with requirements. Prepare inspection reports and indicate compliance with and deviations from the Contract Documents.
 2. Prepare field quality-control certification endorsed by Detention Specialist, **as directed**, that states installed products and their installation comply with requirements in the Contract Documents.
- C. Cleaning And Protection
1. Touchup Painting: Immediately after erection, clean bolted connections and abraded areas of shop paint, and paint exposed areas with same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

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Task	Specification	Specification Description
10 86 00 00	10 28 13 13a	Detention Toilet Accessories

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SECTION 11 12 16 00 - PARKING CONTROL EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for parking control equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Automatic barrier gates.
 - b. Vehicle detectors.
 - c. Traffic controllers.
 - d. Entry terminal ticket dispensers.
 - e. Exit terminals.
 - f. Pay stations.
 - g. Fee computers.
 - h. Parking facility management software.
 - i. Access control units.

C. System Description

1. Parking Control System: Intended to be used for the following types of parking management:
 - a. Transient Parking: Hourly rated parking, with fee paid while entering **OR** exiting, **as directed**.
 - b. Monthly Parking: Monthly rated parking, with fee paid by the month and access gained by access control card.
 - c. Flat-Rate Parking: Unlimited-duration parking, with free gate entry and fixed-fee amount paid while exiting.
 - d. Special-Event Parking: Duration-of-event parking, with fee paid while entering with gates up or down.
 - e. Limited Date(s) and Time(s) Parking: Limited-duration parking, with predetermined fee access control card.
 - f. Merchant Validated Parking: Fee set, reduced, or waived by merchant validation, with free gate entry and fee paid while exiting.
 - g. Valet Parking: Assisted parking, with fee paid while entering or exiting.
 - h. Hotel Guest Parking: Unlimited access for duration of stay, with access gained by access control card.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For parking control equipment. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Field quality-control reports.
4. Operation and Maintenance Data: For parking control equipment to include in emergency, operation, and maintenance manuals.
5. Software and Firmware Operational Documentation:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - c. Device address list.

d. Printout of software application and graphic screens.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Preinstallation Conference: Conduct conference at Project site.

F. Software Service Agreement

1. Technical Support: Beginning with Final Completion, provide software support for two, **as directed**, years.
2. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two, **as directed**, years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30, **as directed**, days' notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - a. Sheet: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Shapes: **ASTM B 221 (ASTM B 221M)**.
2. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
3. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, commercial quality, with **G60 (Z180)** coating designation; mill phosphatized.
4. Stainless-Steel Sheet: ASTM A 666, Type 304.
5. Anchorages: Anchor bolts, hot-dip galvanized according to ASTM A 153/A 153M and ASTM F 2329.

B. Automatic Barrier Gates

1. General: Provide UL-approved parking control device consisting of operator and controller housed in a weathertight, tamper-resistant cabinet enclosure with gate arm. Device shall be activated by a signal from access or revenue control device. Fabricate unit with gate-arm height in down position of not more than **35 inches (889 mm)** above pavement to prevent even small vehicles from passing under gate arm.
2. Standard: Provide barrier gates and gate operators that are listed and labeled according to UL 325 by a qualified testing agency. Provide barrier gates that comply with ASTM F 2200, **as directed**.
3. Controller: Factory-sealed, solid-state, plug-in type, with galvanized-steel box for wiring connections.
 - a. Type: Noncommunicating.
 - 1) Capable of logic for one- and two-way lanes.
 - 2) Separate momentary contacts for transient patrons, monthly patrons, vehicle entries, and vehicle exits.
 - b. Type: Communicating.
 - 1) Real-time communication of lane counts, status messages, and execute commands.
 - 2) Monitor illegal entries and exits, tailgates, tickets, monthlies, and backouts.
 - 3) Status messages for gate up too long, backouts, ticket in chute, and gate-arm rebound.

- 4) Communication commands for resetting loops, turning "Full" signs on/off, raising and lowering gate arm, and disabling ticket dispensers **OR** card readers, **as directed**.
- c. Features: Equip unit with the following:
 - 1) Able to store successive inputs and sequentially processing each one.
 - 2) Automatic instant-reversing obstacle detector mechanism that stops downward motion of gate arm if arm contacts or nears an object and that immediately returns arm to upward position. Include a 0- to 60-second, variable-time reset device.
 - 3) On-off power supply switch.
 - 4) Automatic-manual switch.
 - 5) Differential counter.
 - 6) Directional arming logic.
 - 7) RS-422 communication port.
 - 8) Broken gate-arm monitoring.
 - 9) Programmable automatic, **as directed**, timer.
 - 10) Internal resettable **OR** non-resettable, **as directed**, counters.
 - 11) Thermal-overload protection with manual reset.
 - 12) Plug-in connectors for two **OR** three, **as directed**, vehicle loop detectors.
 - 13) Thermostatically controlled heater with on/off/auto switch.
 - 14) Diagnostic mode for on-site testing, with LEDs for inputs and outputs, **as directed**.
 - 15) Automatic and continuous testing of inputs and outputs.
 - 16) Switch to test motor and limit switches.
 - 17) Emergency manual disconnect.
 - 18) Battery backup.
 - 19) Single, 115-V ac grounded power receptacle.
 - 20) Reversible arm capability for right- or left-handed operation.
4. Cabinets: Fabricated from metal sheet with seams welded and ground smooth; approximately **15 inches square by 40 inches tall (381 mm square by 1016 mm tall)**. Provide single, gasketed access door for each cabinet with flush-mounted locks. Furnish two keys for each lock, all locks keyed alike, **as directed**. Fabricate cabinet with internal reinforcing and four mounting holes accessible only from inside cabinet.
 - a. Material: Not less than **0.097-inch- (2.5-mm-)** thick, galvanized-, **as directed**, steel sheet or **0.125-inch- (3.2-mm-)** thick aluminum sheet.
 - 1) Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.
 - b. Material: Not less than **0.109-inch- (2.8-mm-)** thick, stainless-steel sheet.
 - 1) Finish cabinet exterior with No. 4 finish.
OR
Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.
5. Straight Gate Arm: **1-by-4-inch nominal- (19-by-89-mm actual-)** size pine or redwood **OR 0.097-inch- (2.5-mm-)** thick steel **OR** Fiberglass, PVC, or polycarbonate **OR** Aluminum, **as directed**, with painted finish and black diagonal stripes on traffic-side face. Provide mounting flange with breakaway feature to ensure clean break if arm is struck by vehicle.
 - a. Length: **10 feet (3.0 m) OR 12 feet (3.7 m) OR** As indicated on Drawings, **as directed**.
6. Folding Gate Arm: Two pieces of **1-by-4-inch nominal- (19-by-89-mm actual-)** size pine or redwood joined together with metal side brackets; with painted finish and black diagonal stripes on traffic-side face. Provide mounting flange with breakaway feature to ensure clean break if arm is struck by vehicle.
 - a. Length: **10 feet (3.0 m) OR 12 feet (3.7 m) OR** As indicated on Drawings, **as directed**.
7. Straight Gate Arm with Counterbalance: **1-by-6-inch nominal- (19-by-140-mm actual-)** size pine or redwood with steel counterweights; with painted finish and black diagonal stripes on traffic-side face. Provide mounting flange with breakaway feature to ensure clean break if arm is struck by vehicle.
 - a. Length: **16 feet (4.9 m) OR** As indicated on Drawings, **as directed**.
8. Wishbone-Style Gate Arm: **1-by-4-inch nominal- (19-by-89-mm actual-)** size pine or redwood **OR 0.097-inch- (2.5-mm-)** thick steel, **as directed**, formed into wishbone configuration, with steel

counterweights; with painted finish and black diagonal stripes on traffic-side face. Provide mounting flange with breakaway feature to ensure clean break if arm is struck by vehicle.

- a. Length: **14 feet (4.3 m) OR** As indicated on Drawings, **as directed**.
9. Operator: 1/3 **OR** 1/2, **as directed**, hp; 60-Hz, single-phase, instant-reversing, continuous-duty motor for operating gate arm. Transmit power to gate-arm drive shaft through speed reducer to harmonic-acting crank and connecting rod. Fabricate crank, rod, and drive shaft of galvanized solid bar steel. Provide an operable cam for adjusting arm travel.
 - a. Opening Time: Three **OR** Six, **as directed**, seconds.
 - b. Inherently adjustable torque limiting clutch for safety.
10. Accessories:
 - a. Audible alarm that activates as part of a safety device system.
 - b. Additional obstruction detector; noncontact infrared **OR** photoelectric **OR** radio-frequency barrier, **as directed**.
 - c. Barrier-arm warning safety signs on both sides of unit limiting traffic to vehicular traffic.
 - d. Low-voltage yellow **OR** red, **as directed**, warning lights that illuminate when gate is in down position.
 - e. Low-voltage light on cabinet top that flashes or changes from red to green when barrier gate is operating.
 - f. Manually operated crank for emergency operation.
 - g. Local authorities' emergency access as directed by the Owner.
 - h. Gate-arm tip support with electromagnetic lock, **as directed**.

C. Vehicle Detectors

1. Vehicle Loop Detector System: Provide self-tuning electronic presence detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit signal activating gate-arm operator. Include automatic closing timer with adjustable time delay before closing, timer cut-off switch, **as directed**, and vehicle loop detector designed to open and close gate arm **OR** hold gate arm open until traffic clears, **as directed**. Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, as recommended in writing by detection system manufacturer for function indicated.
 - a. Field-Assembled Loop: Wire, in size indicated for field assembly, and sealant; style for pave-over **OR** saw-cut, **as directed**, installation.
 - b. Factory-Formed Loop: Wire, preformed in size indicated; style for pave-over **OR** saw-cut, **as directed**, installation.
 - c. System Performance: Capable of the following:
 - 1) Recognize two vehicles within **6 inches (152 mm)** of each other on standard-sized loop.
 - 2) Recognize vehicle direction by detecting vehicle moving from one loop to another.
 - 3) Generate reverse count if vehicle backs up after generating directional count in forward direction.
 - 4) Continuous diagnostic monitoring for intermittently operating and failed loops.
 - 5) Crosstalk test between adjacent loops.
2. Active Infrared Vehicle Detector: Provide retroreflective **OR** emitter/receiver, **as directed**,-type presence detector with adjustable detection zone pattern and sensitivity, designed to detect the presence or transit of vehicle in gate-arm pathway by interrupting infrared beam in zone pattern and to emit signal activating gate-arm operator. Include automatic closing timer with adjustable time delay before closing, timer cut-off switch, **as directed**, and vehicle presence detector designed to open and close gate arm **OR** hold gate arm open until traffic clears, **as directed**.

D. Traffic Controllers

1. Penetrating Type: Provide directional enforcement system consisting of multiple raised teeth that allow vehicular traffic in one direction and that puncture tires of vehicular traffic in the other direction. Fabricate system from steel plate contained in welded steel frame.

- a. Mounting: Surface **OR** Recessed, **as directed**.
 - b. Operation: Manual, with each tooth controlled by torsion spring **OR** Electromechanical **OR** Hydraulic, **as directed**.
 - c. Latch Down: Allow disarming for two-way traffic flow. Provide one, **as directed**, tool(s) for latch-down operation.
 - d. Illuminated Warning Signs: Single **OR** Double, **as directed**, -faced warning signs consisting of fluorescent lamps with cold-start ballasts contained in welded steel bodies with baked-enamel finish and fiberglass sign faces. Provide base sleeves and posts for post mounting, **as directed**.
 - 1) Sign Copy: "Wrong Way, Stop, Severe Tire Damage" **OR** "Warning, Do Not Back Up, Tire Damage," **as directed**.
2. Nonpenetrating Type: Provide directional enforcement system consisting of spring-activated steel curb that allows traffic in only one direction. Fabricate system from steel plate contained in welded steel frame.
 - a. Mounting: Surface **OR** Recessed, **as directed**.
 - b. Operation: Manual **OR** Electromechanical **OR** Hydraulic, **as directed**.
- E. Entry Terminal Ticket Dispensers
1. General: Provide entry terminal ticket dispensers, consisting of ticket-printing and issuing mechanisms, ticket magazines, thermal printers, and controllers housed in cabinet enclosures.
 - a. Features: Include the following:
 - 1) Time and date display.
 - 2) Time Indicator: 24-hour cycle with A.M. and P.M. **OR** military-time, **as directed**, clock mechanism.
 - 3) Voice annunciation.
 - 4) Tickets: Standard paper **OR** Magnetic-stripe **OR** Barcode, **as directed**, type.
 - 5) Removable ticket tray with capacity of 5000, **as directed**, fan-folded tickets.
 - 6) Operation: Standalone **OR** Online communication to remote computer, **as directed**.
 - 7) Battery backup for clock and RAM memory.
 - 8) RS-422 communication port.
 - 9) Thermostatically controlled heater with on/off/auto switch.
 - 10) Access **OR** Credit, **as directed**, card acceptance with activation slot and "Insert Ticket/Card" message.
 - 11) License plate recognition.
 - 12) Multiple ticket option for valet parking.
 - 13) Intercom.
 2. System Performance: Activation by button with "Push for Ticket" message **OR** vehicle detector **OR** card reader, **as directed**. On activation, unit automatically records entry time and date on ticket, sounds buzzer, **as directed**, and dispenses ticket.
 - a. Automatic ticket validation.
 - b. Program ticket numbering.
 - c. Low-ticket alarm.
 - d. Out-of-ticket alarm.
 - e. Ticket jam detection.
 - f. Print test ticket.
 3. Cabinets: Fabricated from metal sheet with seams welded and ground smooth, approximately **15 inches square by 40 inches tall (381 mm square by 1016 mm tall)**; consisting of base and top components. Provide single, gasketed access door for each base component with flush-mounted locks. Furnish two keys for each lock, all locks keyed alike, **as directed**. Fabricate cabinet with internal reinforcing and four mounting holes accessible only from inside cabinet. Fabricate top component so it can be unlocked and opened for ticket loading and maintenance. Include flush-mounted lock in rear of top, keyed the same as base component lock.
 - a. Material: Not less than **0.097-inch- (2.5-mm-)** thick, galvanized-, **as directed**, steel sheet or **0.125-inch- (3.2-mm-)** thick aluminum sheet.
 - 1) Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.

b. Material: Not less than **0.109-inch- (2.8-mm-)** thick, stainless-steel sheet.

1) Finish cabinet exterior with No. 4 finish.

OR

Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.

4. Ticket-Dispensing Mechanisms: Removable assembly, with self-sharpening ticket cutter or ticket burster and plug-in controller.

F. Exit Terminals

1. General: Provide exit terminals consisting of ticket collectors, magnetic-stripe ticket readers, LCD, **as directed**, displays, thermal printers, and controllers housed in cabinet enclosures. Provide "Please Insert Ticket" sign on side of cabinet visible to driver.

a. Features: Include the following:

1) Operation: Standalone **OR** Online communication to remote computer, **as directed**.

2) Battery backup for clock and RAM memory.

3) Thermostatically controlled heater with on/off/auto switch.

4) RS-422 communication port.

5) Access **OR** Credit, **as directed**, card acceptance with activation slot and "Insert Ticket/Card" message.

6) Intercom.

2. System Performance: Capable of the following:

a. Activated by vehicle detector **OR** card reader, **as directed**.

b. Print receipts on demand.

c. Voice annunciation.

d. Program facility code.

e. Program grace period.

f. Program display.

g. Program timer for closing barrier gate.

h. Reports for events and exception events.

i. Built-in service diagnostics.

3. Operation: Inserting exit ticket into exit ticket reader results in the following actions:

a. Valid Exit Ticket: Exit ticket reader captures ticket and automatically sends signal to raise barrier gate.

b. Invalid Exit Ticket: Exit ticket reader rejects ticket and displays "Pay Cashier First" message.

c. Exit Ticket with Elapsed Grace Time: Exit ticket reader rejects ticket and displays "Return to Cashier" message.

4. Cabinets: Fabricated from metal sheet with seams welded and ground smooth; approximately **15 inches square by 40 inches tall (381 mm square by 1016 mm tall)**. Provide single, gasketed access door for each cabinet with flush-mounted locks. Furnish two keys for each lock, all locks keyed alike, **as directed**. Fabricate cabinet with internal reinforcing and four mounting holes accessible only from inside cabinet.

a. Material: Not less than **0.097-inch- (2.5-mm-)** thick, galvanized-, **as directed**, steel sheet or **0.125-inch- (3.2-mm-)** thick aluminum sheet.

1) Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.

b. Material: Not less than **0.109-inch- (2.8-mm-)** thick, stainless-steel sheet.

1) Finish cabinet exterior with No. 4 finish.

OR

Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.

G. Pay Stations

1. General: Provide self-contained cashiering central **OR** entry **OR** exit, **as directed**, pay stations designed for self-service operation; consisting of magnetic-stripe ticket dispensers and, **as**

directed, readers/validators, LCD, **as directed**, displays, fee computers, controllers, **as directed**, and thermal printers housed in a combined enclosure.

- a. Features: Include the following:
 - 1) Operation: Standalone **OR** Online communication to remote computer, **as directed**.
 - 2) Battery backup for clock and RAM memory.
 - 3) Thermostatically controlled heater with on/off/auto switch.
 - 4) Access card acceptance.
 - 5) Intercom.
 2. System Performance: Capable of the following:
 - a. Compute multiple parking fees based on entry times on ticket from ticket dispenser.
 - b. Compute multiple taxes by percent and fixed amount.
 - c. Program lost ticket function.
 - d. Display fee.
 - e. Accept payment by cash credit card **OR** debit card **OR** merchant ticket, **as directed**.
 - f. Compute change.
 - g. Print receipts on demand.
 - h. Print validation on ticket.
 - i. Voice annunciation.
 - j. Print audit trail.
 - k. Program six, **as directed**, fee structures.
 - l. Program time.
 - m. Program merchant validations.
 - n. Test mode to verify accuracy of fee structure program.
 - o. Built-in service diagnostics.
 - p. Print cash audit, revenue, operational, and statistical reports on demand.
 - q. Duress alarm output for emergencies.
 - r. Battery backup.
 3. Cabinets: Fabricated from cold-rolled steel sheet with seams welded and ground smooth, approximately **36 inches wide by 18 inches deep by 60 inches tall (914 mm wide by 457 mm deep by 1524 mm tall)**. Provide single, gasketed access door with flush-mounted locks. Furnish two keys for each lock, all locks keyed alike, **as directed**. Fabricate cabinet with internal reinforcing and four mounting holes accessible only from inside cabinet.
 - a. Finish cabinet, interior and exterior, with manufacturer's standard white **OR** yellow, **as directed**, baked-enamel finish over primer.
- H. Fee Computers
1. Fee Computer System: Provide modular PC-based, **as directed**, system consisting of fee computer terminal, cash drawer, **OR** two cash drawers, **as directed**, standard ticket reader, **OR** magnetic-stripe ticket reader, **OR** barcode ticket reader, **as directed**, and detachable printer. Register permanent record of each transaction in computer's memory.
 - a. Features: Provide the following:
 - 1) Battery backup for clock and RAM memory.
 - 2) RS-422 communication port.
 - 3) Keyed **OR** Keyless-membrane, **as directed**, keypad.
 2. System Performance: Capable of the following:
 - a. Compute multiple parking fees based on entry times on ticket from ticket dispenser.
 - b. Compute multiple taxes by percent and fixed amount.
 - c. Program lost ticket function.
 - d. Display fee on remote fee display device.
 - e. Accept payment by cash check **OR** credit card **OR** debit card **OR** merchant ticket, **as directed**.
 - f. Control independent cash drawer.
 - g. Compute change.
 - h. Print receipts.
 - i. Print validation on ticket.
 - j. Print audit trail.

- k. Interface to automatic barrier gate.
 - l. Program six, **as directed**, fee structures.
 - m. Program time.
 - n. Program keys.
 - o. Program special events validations.
 - p. Program automatic activation for limited date(s) and time(s) validations.
 - q. Program merchant validations.
 - r. Program valet parking.
 - s. Program hotel guest parking.
 - t. Three levels of security, including cashier, supervisor, and master.
 - u. Recall last transaction.
 - v. Test mode to verify accuracy of fee structure program.
 - w. Built-in service diagnostics.
 - x. View cash audit, revenue, operational, and statistical reports on screen or print on demand.
 - y. Duress alarm output for emergencies.
 - z. Battery backup.
3. Cash Drawer: Fabricated with a removable tray and drawer, with five compartments for paper currency and five compartments for coins.
4. Remote Fee Display: Single-faced signs designed for use with fee computer, consisting of **1-inch- (25-mm-)** tall, LCD or LED displays contained in welded steel bodies with baked-enamel finish.
- a. Messages: Amount due, "Thank You," "Closed," and time in A.M./P.M. format.
 - b. Mounting: Front of cashier's booth **OR 42-inch- (1067-mm-)** high pedestal, **as directed**.
- I. Miscellaneous Parking Control Equipment
1. Lot "Full" Signs: Single-faced signs consisting of illumination source contained in welded steel bodies with extended hood and baked-enamel finish. Sign copy shall be **4 inches (102 mm)**, **as directed**, tall.
- a. Type: Flashing **OR** Nonflashing, **as directed**.
 - b. Operation: Manual by push button **OR** Automatic by barrier gate controller, **as directed**.
 - c. Illumination: Traffic signal lamps and colored **OR** Neon tube and clear, **as directed**, fiberglass sign face.
 - d. Mounting: Top of barrier gate cabinet **OR 42-inch- (1067-mm-)** high pedestal, **as directed**.
- J. Parking Facility Management Software
1. General: Manufacturer's standard software that is compatible with security access control system and that provides automatic facility monitoring, supervision, and remote control of parking control equipment from one or more locations.
- a. System Performance: Capable of the following:
 - 1) Collect data for revenue and activity reporting.
 - 2) Collect data for access and space control.
 - 3) Track tickets.
 - 4) Program parking control equipment.
- K. Access Control Units
1. General: Provide access control unit that activates barrier gates.
- a. Unit Housing: Fabricate from welded cold-rolled steel or aluminum sheet **OR** plastic, **as directed**, with weatherproof front access panel equipped with flush-mounted lock and two keys. Provide face-lighted unit fully visible at night.
 - 1) Steel Finish: Manufacturer's standard baked-enamel coating system.
2. Card Reader Controlled Unit: Functions only when authorized card is presented.
- a. System: Magnetically coded, single-code system activated by coded card **OR** Programmable, multiple-code capability permitting validating or voiding of individual cards, **as directed**.
 - 1) Permit four different access time periods.

- b. Reader: Swipe type for magnetic-stripe **OR** barcode **OR** Wiegand, **as directed**, cards.
OR
Reader: Insertion type for magnetic-stripe **OR** barcode **OR** Wiegand, **as directed**, cards.
OR
Reader: Proximity type for proximity cards.
 - c. Operation: Standalone **OR** Online communication to remote parking control system computer **OR** Online communication to remote security access control system computer, **as directed**.
 - d. Features: Timed antipassback **OR** Limited-time usage **OR** Capable of monitoring and auditing barrier gate activity **OR** LCD display **OR** Programmable by PDA (personal digital assistant) by infrared interface, **as directed**.
 - e. Mounting: With pedestal **OR** Wall **OR** In enclosed cabinet **OR** As indicated on Drawings, **as directed**.
 - f. Cards: Provide number as directed by the Owner..
 - 1) Imprint cards: as directed by the Owner.
 - 3. Digital Keypad Controlled Unit: Functions only when authorized code is entered on keyed **OR** keyless-membrane, **as directed**, keypad.
 - a. System: Multiple-code capability of not less than five **OR** 100 **OR** 500, **as directed**, possible individual codes.
OR
System: Programmable, multiple-code capability permitting validating or voiding of not less than 100 **OR** 2500 **OR** 10,000, **as directed**, possible individual codes, consisting of one to six, **as directed**, digits, and permitting four different access time periods, **as directed**.
 - b. Operation: Standalone **OR** Online communication to remote parking control system computer **OR** Online communication to remote security access control system computer, **as directed**.
 - c. Features: Timed antipassback **OR** Limited-time usage **OR** Capable of monitoring and auditing barrier gate activity, **as directed**.
 - d. Mounting: With pedestal **OR** Wall **OR** As indicated on Drawings, **as directed**.
 - 4. Radio-Controlled System: Digital access control system consisting of code-compatible universal coaxial receiver, one per barrier gate, **OR**, where indicated on Drawings, **as directed**, remote antenna with coaxial cable and mounting brackets, and one permanently mounted **OR** four portable, **as directed**, transmitter(s) per receiver designed to operate barrier gates. Provide programmable transmitter with multiple-code capability permitting validating or voiding of not less than 1000 **OR** 10,000, **as directed**, codes per channel configured for the following functions:
 - a. Transmitters: Single-button operated, with open **OR** open and close, **as directed**, functions.
OR
Transmitters: Triple-button operated, with open, close, and stop functions.
 - 1) Provide transmitters featuring two **OR** three **OR** four, **as directed**, independent channel settings controlling separate receivers for operating more than one barrier gate from each transmitter.
- L. Aluminum Finishes
- 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
- M. Steel Finishes
- 1. Galvanizing: Hot-dip galvanize items as indicated to comply with the following:
 - a. ASTM A 123/A 123M for iron and steel parking control equipment.
 - b. ASTM A 153/A 153M and ASTM F 2329 for iron and steel hardware for parking control equipment.

2. Galvanized-Steel and Steel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - a. Color and Gloss: As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.

N. Stainless-Steel Finishes

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

1.3 EXECUTION

A. Preparation

1. Excavation for Traffic Controllers: Saw cut existing pavement for recessed traffic controllers and hand-excavate recesses to dimensions and depths and at locations as required by traffic controller manufacturer's written instructions and as indicated on Drawings.

B. Installation

1. General: Install parking control equipment as required for a complete and integrated installation.
 - a. Rough-in electrical connections according to requirements specified in Division 22..
2. Automatic Barrier Gates: Anchor cabinets to concrete bases with anchor bolts or expansion anchors and mount barrier gate arms.
 - a. Install barrier gates according to UL 325.
3. Vehicle Loop Detectors: Cut grooves in pavement and bury **OR** Bury, **as directed**, and seal wire loop at locations indicated on Drawings according to manufacturer's written instructions. Connect to parking control equipment operated by detector.
4. Traffic Controllers: Anchor controllers to recessed concrete bases **OR** driveway surfaces, **as directed**, with anchor bolts or expansion anchors.
5. Entry Terminal Ticket Dispensers, Pay Stations and Exit Terminals: Attach cabinets to concrete bases with anchor bolts or expansion anchors.
 - a. Connect equipment to remote computer.
 - b. Load ticket dispenser with supply of tickets.
6. Fee Computers: Install computers at locations indicated, including connecting to peripheral equipment and remote computers, **as directed**.
7. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
8. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".

C. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
3. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
4. Tests and Inspections:
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

- b. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 5. Parking control equipment will be considered defective if it does not pass tests and inspections.
 - 6. Prepare test and inspection reports.
- D. Adjusting
- 1. Adjust parking control equipment to function smoothly and lubricate as recommended by manufacturer.
 - 2. Confirm that locks engage accurately and securely without forcing or binding.
 - 3. After completing installation of exposed, factory-finished parking control equipment, inspect exposed finishes and repair damaged finishes.
- E. Protection
- 1. Remove barrier gate arms during the construction period to prevent damage, and install them immediately before Final Completion.

END OF SECTION 11 12 16 00

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Task	Specification	Specification Description
11 12 16 00	13 34 23 16	Prefabricated Control Booths
11 12 23 00	11 12 16 00	Parking Control Equipment
11 12 23 00	13 34 23 16	Prefabricated Control Booths
11 12 26 13	11 12 16 00	Parking Control Equipment
11 12 26 13	13 34 23 16	Prefabricated Control Booths

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SECTION 11 13 13 00 - LOADING DOCK EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for loading dock equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Dock levelers.
 - b. Truck levelers.
 - c. Truck restraints.
 - d. Light-communication systems.
 - e. Dock bumpers.
 - f. Dock lifts (scissors lifts).
 - g. Dock seals.
 - h. Dock shelters.
 - i. Transparent-strip door curtains.

C. Definitions

1. Operating Range: Maximum amount of travel above and below the loading dock level.
2. Working Range: Recommended amount of travel above and below the loading dock level for which loading and unloading operations can take place.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For loading dock equipment. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For each type of dock-seal and -shelter fabric indicated.
4. Qualification Data: For qualified Installer.
5. Welding certificates.
6. Product Test Reports.
7. Operation and Maintenance Data.
8. Warranty: Sample of special warranty.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store and handle dock seals and shelters in a manner to avoid significant or permanent damage to fabric or frame.

- a. Comply with manufacturer's written instructions for minimum and maximum temperature requirements for storage.

G. Project Conditions

1. Field Measurements: Verify actual dimensions of construction contiguous with loading dock equipment, including recessed pit dimensions, slopes of driveways, and heights of loading docks, by field measurements before fabrication.

H. Warranty

1. Special Warranty for Dock Levelers: Manufacturer's standard form in which manufacturer agrees to repair or replace dock-leveler components that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including cracked or broken structural support members, load-bearing welds, and front and rear hinges.
 - 2) Faulty operation of operators, control system, or hardware.
 - 3) Deck plate failures including cracked plate or permanent deformation in excess of **1/4 inch (6 mm)** between deck supports.
 - 4) Hydraulic system failures including failure of hydraulic seals and cylinders.
 - b. Warranty Period for Structural Assembly: 10 years from date of Final Completion.
 - c. Warranty Period for Hydraulic System: Five years from date of Final Completion.
 - d. Warranty shall be for unlimited usage of leveler for the specified rated capacity over the term of the warranty.

1.2 PRODUCTS

A. Materials

1. Steel Plates, Shapes, and Bars: ASTM 36/A 36M.
2. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**.
3. Steel Tubing: ASTM A 500, cold formed.
4. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
5. Wood: DOC PS 20 dimension lumber, select structural grade, kiln dried.
6. Pressure-Treated Wood: DOC PS 20 dimension lumber, select structural grade, kiln dried, and pressure treated with waterborne preservatives to comply with AWPA C2.

B. Recessed Dock Levelers

1. General: Recessed, hinged-lip-type dock levelers designed for permanent installation in concrete pits preformed in the edge of loading platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.
2. Standard: Comply with MH 30.1, except for structural testing to establish rated capacity, **as directed**.
3. Rated Capacity: Capable of supporting total gross load without permanent deflection or distortion.
4. Platform: Not less than **3/16-inch- (5-mm-) OR 1/4-inch- (6-mm-) OR 3/8-inch- (9.5-mm-), as directed**, thick, nonskid steel plate.
 - a. Platform Size: As indicated on Drawings, **as directed**.
 - b. Frame: Manufacturer's standard **OR** Clean-pit type, designed to support leveler at sides of pit, with no side-to-side supports at front of pit floor, **as directed**.
 - c. Toe Guards: Equip open sides of dock leveler over range indicated with metal toe guards.
 - 1) Toe-Guard Range: Entire upper operating **OR** working, **as directed**, range.
5. Hinged Lip: Not less than **1/2-inch- (13-mm-) OR 5/8-inch- (16-mm-) OR 3/4-inch- (19-mm-) OR 1-inch- (25-mm-), as directed**, thick, nonskid steel plate.

- a. Hinge: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, **as directed**, with gussets on lip and ramp for support.
- b. Safety Barrier Lip: Designed to protect material-handling equipment from an accidental fall from loading platform edge of the dock leveler when the leveler is not in use.
6. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 - a. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - 1) Above Adjoining Platform: **12 inches (305 mm) OR 18 inches (457 mm) OR** As indicated on Drawings, **as directed**.
 - 2) Below Adjoining Platform: **12 inches (305 mm) OR 14 inches (356 mm) OR** As indicated on Drawings, **as directed**.
 - b. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 - c. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to **4 inches (102 mm)** over width of ramp.
 - d. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
 - 1) Length of Lip Extension: **16 inches (406 mm) OR 18 inches (457 mm) OR 20 inches (508 mm) OR** As indicated on Drawings, **as directed**.
 - e. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs.
 - f. Interlock: Leveler will not operate while overhead door is in closed position **OR** leveler night lock is engaged **OR** truck restraint is not engaged **OR** inflatable dock seal is not inflated **OR** inflatable dock shelter is not inflated, **as directed**.
7. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with an upward-biased-spring counterbalancing mechanism controlled by a hold-down device. Ramp raises to top limit of operating range by operating recessed control handle in ramp to disengage hold-down device. Ramp lowers below platform level with lip retracted by operating auxiliary, recessed control handle to release support legs.
 - a. Free-Fall Protection: Manufacturer's standard protection system to limit free fall of loaded ramps with front edge supported by truck bed.
8. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock bumpers. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than **3 inches (76 mm)**.
 - a. Remote-Control Station: Weatherproof single **OR** Single, **as directed**, -button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 4 **OR** Type 12, **as directed**, box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
 - b. Remote-Control Station with Emergency Stop: Weatherproof multibutton **OR** Multibutton, **as directed**, control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, Type 4 **OR** Type 12, **as directed**, box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button.

- 1) Dual-Panel Control Station: Remote-control station for operating side-by-side dock levelers.
- 2) Master Panel: Control panel with integral fused disconnecting means for operating dock leveler, dock door, and truck restraints.
- c. Independent Lip Operation: Electric-powered hydraulic raising and hydraulic lowering of lip, controlled independent of raising and lowering of ramp.
9. Electric Operating System: Electric control from a remote-control station; motorized operation. Electric activation for raising of ramp and automatic extending of lip. Equip leveler with a packaged unit including a unitized electric motor and shaft assembly of proper size, type, and operation for capacity of leveler indicated. Include means for lowering ramp below platform level with lip retracted behind dock bumpers.
 - a. Remote-Control Station: Weatherproof single **OR** Single, **as directed**, -button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 4 **OR** Type 12, **as directed**, box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
 - b. Remote-Control Station with Emergency Stop: Weatherproof multibutton **OR** Multibutton, **as directed**, control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, Type 4 **OR** Type 12, **as directed**, box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button.
10. Air-Bag Operating System: Electric control from a remote-control station; pneumatic operation. High-volume, low-pressure lifting of ramp. Equip leveler with a packaged unit including a PVC-coated, reinforced polyester lifting bag and two-stage, single-speed electric fan of proper size, type, and operation for capacity of leveler indicated. Include dock-leveler supports controlled by release chain for lowering ramp below platform level without extending lip.
 - a. Remote-Control Station: Weatherproof single **OR** Single, **as directed**, -button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 4, **as directed**, box. Ramp raises by depressing and holding button; ramp lowers at a controlled rate by releasing button.
11. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
 - a. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
 - b. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.
12. Integral Molded-Rubber Dock Bumpers: Fabricated from **4-inch- (102-mm-) OR 6-inch- (152-mm-), as directed**, thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
13. Integral Laminated-Tread Dock Bumper: Fabricated from **4-1/2-inch- (114-mm-) OR 6-inch- (152-mm-), as directed**, thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
14. Accessories:
 - a. Curb Angles: **3-by-3-by-1/4-inch (76-by-76-by-6-mm)** galvanized-steel curb angles for edge of recessed leveler pit, with **1/2-inch- (13-mm-)** diameter by **6-inch- (152-mm-)** long concrete anchors welded to angle at **6 inches (152 mm)** o.c.

- b. Self-Forming Pan: Manufacturer's standard prefabricated, self-forming steel form system for poured-in-place construction of concrete pit.
 - c. Night Locks: Manufacturer's standard means to prevent extending lip and lowering ramp when overhead doors are locked.
 - d. Side and rear weatherseals.
 - e. Foam insulation under dock-leveler platform.
 - f. Abrasive skid-resistant **OR** Smooth, **as directed**, surface.
15. Finish: Paint **OR** Hot-dip galvanize, **as directed**, dock levelers after assembly and testing, **as directed**.
- a. Toe Guards: Paint yellow **OR** orange, **as directed**, to comply with ANSI Z535.1.

C. Edge-Of-Dock Levelers

- 1. General: Surface-mounted, hinged-lip-type, edge-of-dock levelers designed for permanent installation on face of loading dock platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.
- 2. Standard: Comply with MH 30.1, except for structural testing to establish rated capacity, **as directed**.
- 3. Rated Capacity: Capable of supporting total gross load without permanent deflection or distortion.
- 4. Platform Ramp Width: **66 inches (1676 mm) OR 72 inches (1829 mm) OR 78 inches (1981 mm) OR 84 inches (2134 mm) OR** As indicated on Drawings, **as directed**.
- 5. Hinged Lip: Not less than **3/8-inch- (9.5-mm-) OR 7/16-inch- (11-mm-) OR 1/2-inch- (13-mm-), as directed**, thick, nonskid steel tread plate.
 - a. Hinge: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, **as directed**, with gussets on lip and ramp for support.
- 6. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 - a. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - 1) Above Adjoining Platform: **5 inches (127 mm) OR 6 inches (152 mm) OR** As indicated on Drawings, **as directed**.
 - 2) Below Adjoining Platform: **5 inches (127 mm) OR** As indicated on Drawings, **as directed**.
 - b. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 - c. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to **3 inches (76 mm)** over width of ramp.
 - d. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
 - 1) Length of Lip Extension: **15 inches (381 mm) OR 17 inches (432 mm) OR** As indicated on Drawings, **as directed**.
 - e. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs. Leveler shall be capable of retracting to stored position while truck is at loading dock.
- 7. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with a torsion-spring counterbalancing mechanism controlled by a hold-down device.
 - a. Lever Handle: Self-storing lever handle for raising unloaded ramp with minimal lifting force by pulling lever back to extend lip and pushing lever forward to lower ramp and lip.
 - b. Removable Lifting Handle: For raising unloaded ramp by lifting action.
- 8. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with

- a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than **3 inches (76 mm)**.
- a. Remote-Control Station: Weatherproof single **OR** Single, **as directed**, -button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12, **as directed**, box. Ramp and lip raise to vertical position and extend to truck bed by depressing and holding button.
9. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- and formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
- a. Cross-Traffic Support: Manufacturer's standard method of supporting ramp at platform level in stored position with lip retracted. Provide a means to release supports to allow ramp to descend below platform level.
 - b. Maintenance Strut: Integral strut to positively support ramp in up position during maintenance of dock leveler.
10. Integral Molded-Rubber Dock Bumpers: Fabricated from **4-inch- (102-mm-) OR 6-inch- (152-mm-), as directed**, thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
11. Integral Laminated-Tread Dock Bumper: Fabricated from **4-1/2-inch- (114-mm-) OR 6-inch- (152-mm-), as directed**, thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
12. Accessories:
- a. Self-forming pan.
 - b. Cast-in-place design.
 - c. Run-off guards.
 - d. Ramp approach plate.
13. Dock-Leveler Finish: Painted in manufacturer's standard color.
- D. Top-Of-Dock Levelers
1. General: Surface-mounted, hinged-lip-type, top-of-dock levelers designed for permanent installation on top edge of loading dock platform without concrete pit; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.
 2. Standard: Comply with MH 30.1, except for structural testing to establish rated capacity, **as directed**.
 3. Rated Capacity: Capable of supporting total gross load without permanent deflection or distortion.
 4. Platform Width: **72 inches (1829 mm) OR** As indicated on Drawings, **as directed**.
 5. Hinged Lip: Not less than **3/8-inch- (9.5-mm-) OR 7/16-inch- (11-mm-), as directed**, thick, nonskid steel plate.
 - a. Hinge: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, **as directed**, with gussets on lip and ramp for support.
 6. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 - a. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with a minimum working range of **10 inches (250 mm), as directed**, above and **4 inches (102 mm), as directed**, below adjoining platform level.

- b. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 - c. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
 - 1) Length of Lip Extension: **15 inches (381 mm) OR** As indicated on Drawings, **as directed**.
 - d. Automatic Ramp Return: Automatic return of unloaded ramp, from raised or lowered positions to stored position, level with platform, as truck departs. Leveler shall be capable of retracting to stored position while truck is at loading dock.
7. Mechanical Operating System: Manual control; counterbalance and spring operation. Spring-operated raising and walk-down lowering of unloaded ramp. Equip leveler with a torsion-spring counterbalancing mechanism controlled by a hold-down device.
 - a. Removable Lifting Hook: For raising unloaded ramp by lifting action and pushing forward to lower ramp and lip.
 8. Hydraulic Operating System: Electric control from a remote-control station, fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated.
 - a. Remote-Control Station: Weatherproof single **OR** Single, **as directed**, -button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12, **as directed**, box. Ramp and lip raise to vertical position and extend to truck bed by depressing and holding button.
 9. Construction: Fabricate dock-leveler frame, platform supports, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
 10. Integral Molded-Rubber Dock Bumpers: Fabricated from **4-inch- (102-mm-) OR 6-inch- (152-mm-)**, **as directed**, thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
 11. Integral Laminated-Tread Dock Bumper: Fabricated from **4-1/2-inch- (114-mm-) OR 6-inch- (152-mm-)**, **as directed**, thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
 12. Dock-Leveler Finish: Painted in manufacturer's standard color.
- E. Vertical-Storing Dock Levelers
1. General: Recessed, hinged-lip-type, vertical-storing dock levelers designed for permanent installation in shallow concrete pits preformed in the edge of loading platform; of type, function, operation, capacity, size, and construction indicated; and complete with controls, safety devices, and accessories required.
 2. Standard: Comply with MH 30.1, except for structural testing to establish rated capacity, **as directed**.
 3. Rated Capacity: Capable of supporting total gross load without permanent deflection or distortion.
 4. Platform: Not less than **3/16-inch- (5-mm-) OR 1/4-inch- (6-mm-)**, **as directed**, thick, nonskid steel plate.
 - a. Platform Size: As indicated on Drawings, **as directed**.
 5. Hinged Lip: Not less than **1/2-inch- (13-mm-) OR 5/8-inch- (16-mm-)**, **as directed**, thick, nonskid steel plate.

- a. Hinge: Full width, piano-type hinge with heavy-wall hinge tube and greased fittings, **as directed**, with gussets on lip and ramp for support.
6. Function: Dock levelers shall compensate for differences in height between truck bed and loading platform.
 - a. Vertical Travel: Operating range above platform level of sufficient height to enable lip to extend and clear truck bed before contact with the following minimum working range:
 - 1) Above Adjoining Platform: **6 inches (152 mm) OR 10 inches (250 mm) OR 12 inches (305 mm) OR As indicated on Drawings, as directed.**
 - 2) Below Adjoining Platform: **6 inches (152 mm) OR As indicated on Drawings, as directed.**
 - b. Automatic Vertical Compensation: Floating travel of ramp with lip extended and resting on truck bed shall compensate automatically for upward or downward movement of truck bed during loading and unloading.
 - c. Automatic Lateral Compensation: Tilting of ramp with lip extended and resting on truck bed shall compensate automatically for canted truck beds of up to **4 inches (102 mm)** over width of ramp.
 - d. Lip Operation: Manufacturer's standard mechanism that automatically extends and supports hinged lip on ramp edge with lip resting on truck bed over dock leveler's working range, allows lip to yield under impact of incoming truck, and automatically retracts lip when truck departs.
 - 1) Length of Lip Extension: **16 inches (406 mm) OR 18 inches (457 mm) OR 20 inches (508 mm) OR As indicated on Drawings, as directed.**
7. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Electric-powered hydraulic raising and hydraulic lowering of ramp. Equip leveler with a packaged unit including a unitized, totally enclosed, nonventilated electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity of leveler indicated. Provide a hydraulic velocity fuse connected to main hydraulic cylinder to limit loaded ramp's free fall to not more than **3 inches (76 mm)**. Provide mechanical lock that prevents leveler from lowering without hydraulic pressure.
 - a. Remote-Control Station: Weatherproof single **OR Single, as directed**, -button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12, **as directed**, box. Ramp lowers at a controlled rate.
 - b. Remote-Control Station with Emergency Stop: Weatherproof multibutton **OR Multibutton, as directed**, control station with an UP button of the constant-pressure type and an emergency STOP button of the momentary-contact type, enclosed in NEMA ICS 6, Type 12, **as directed**, box. Ramp raises by depressing and holding UP button; ramp lowers at a controlled rate by releasing UP button. All ramp movement stops, regardless of position of ramp or lip, by depressing STOP button. Normal operation resumes by engaging a manual reset button or by pulling out STOP button.
 - 1) Master Panel: Control panel with integral fused disconnecting means for operating dock leveler, dock door, and truck restraints.
 - c. Independent Lip Operation: Electric-powered hydraulic raising and lowering of lip, controlled independent of raising and lowering of ramp.
8. Construction: Fabricate dock-leveler frame, platform supports, run-off guards, **as directed**, and lip supports from structural- or formed-steel shapes. Weld platform and hinged lip to supports. Fabricate entire assembly to withstand deformation during both operating and stored phases of service. Chamfer lip edge to minimize obstructing wheels of material-handling vehicles.
9. Integral Molded-Rubber Dock Bumpers: Fabricated from **4-inch- (102-mm-) OR 6-inch- (152-mm-), as directed**, thick, heavy molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240. Provide two dock bumpers for each recessed dock leveler, attached to face of loading dock with expansion bolts.
10. Integral Laminated-Tread Dock Bumper: Fabricated from **4-1/2-inch- (114-mm-) OR 6-inch- (152-mm-), as directed**, thick, multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting

- rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
11. Accessories:
 - a. Interlock: Leveler will not operate while overhead door is in closed position **OR** truck restraint is not engaged, **as directed**.
 - b. Curb Angles: **3-by-3-by-1/4-inch (76-by-76-by-6-mm)** galvanized-steel curb angles for edge of recessed leveler pit, with **1/2-inch- (13-mm-)** diameter by **6-inch- (152-mm-)** long concrete anchors welded to angle at **6 inches (152 mm)** o.c.
 12. Finish: Paint **OR** Hot-dip galvanize, **as directed**, dock levelers after assembly and testing, **as directed**.
- F. Truck Levelers
1. General: Two-cylinder, hydraulic ramp designed to raise and lower end of truck at loading dock. Equip leveler with a packaged unit including a unitized electric motor, pump, manifold reservoir, and valve assembly of proper size, type, and operation for capacity indicated. Provide manufacturer's standard means for limiting loaded ramp's free fall.
 2. Rated Capacity: Capable of supporting total gross load without permanent deflection or distortion.
 3. Travel Speed: Leveler raises and lowers at **3 fpm (0.015 m/s)**, measured at traveling end.
 4. Surface-Mounted Units: Designed for mounting on surface of concrete driveway.
 5. Shallow-Pit-Mounted Units: Designed for mounting in sloping shallow pit; capable of **18 inches (457 mm)** of vertical travel above and below level of driveway.
 6. Full-Pit-Mounted Units: Designed for installation in a fully recessed pit, with top of platform in stored position flush with driveway.
 - a. Provide removable plate for access to pit for service.
 7. Hydraulic Operating System: Electric control from a remote-control station; fully hydraulic operation. Self-contained, electric-powered hydraulic raising and hydraulic lowering of lift.
 - a. Remote-Control Station: Weatherproof, multibutton control station of the constant-pressure type with UP and DOWN push buttons. Controller shall consist of magnetic motor starter with three-pole adjustable overloads and 24-V control transformer with 4-A, fused secondary prewired to terminal strips and enclosed in NEMA ICS 6, Type 12, **as directed**, box.
 - 1) Upper-Travel-Limit Switch: Equip unit with manufacturer's standard, adjustable, upper-travel-limit switch.
 8. Construction: Fabricate truck leveler from structural- and formed-steel shapes; fabricate platform from nonskid steel plate. Construct platform with notch at loading-dock end to provide clearance for truck restraint.
 - a. Cylinders: Equip truck leveler with not less than two heavy-duty, high-pressure, hydraulic, ram-type cylinders. Rams shall be manufacturer's standard, either direct-displacement plunger or rod-and-piston type with positive internal stops. Cylinder rods shall be chrome plated and polished.
 9. Truck-Leveler Finish: Manufacturer's standard finish.
- G. Truck Restraints
1. General: Manufacturer's standard device designed to engage truck's rear-impact guard and hold truck at loading dock. Restraint shall consist of an iron or steel restraining arm that raises until contacting rear-impact guard. Arm shall move vertically, automatically adjusting to varying height of truck due to loading and unloading operations.
 2. Standard: Comply with MH 30.3.
 3. Rated Capacity: Capable of supporting total gross load of **capacity as directed by the Owner** without permanent deflection or distortion.
 4. Operating Range: Capable of restraining rear-impact guards within a range from:
 - a. Vertical: **12 inches (305 mm) OR 30 inches (762 mm) OR** As indicated on Drawings, **as directed**, above driveway.

- b. Horizontal: **12 inches (305 mm)** **OR** As indicated on Drawings, **as directed**, in front of dock bumpers.
 5. Power Operating System: Manufacturer's standard electromechanical or hydraulic unit.
 - a. Remote-Control Station: Single-button station of the constant-pressure type, enclosed in NEMA ICS 6, Type 12, **as directed**, box. Restraint is engaged by depressing and holding button; restraint is released by releasing button.
 - b. Interlock: Leveler will not operate while truck restraint is not engaged.
 6. Mechanical Operating System: Restraint operates by use of a lifting rod or hook to raise engagement device.
 7. Rear-Impact-Guard Sensor: Detects presence of rear-impact guard and automatically returns to stored position if rear-impact guard is not engaged, **as directed**.
 8. Caution Signs: Exterior, surface mounted; designed to inform both dock attendant and truck driver; with sign copy as follows.
 - a. Sign Copy in Forward and Reverse Text: Manufacturer's standard text permitting truck movement with green light, **as directed**.
 - b. Interior Sign Copy: Manufacturer's standard text permitting truck movement with green light, **as directed**.
 9. Light-Communication System: Red and green illuminated signal-light sets, with lens approximately **4 inches (102 mm)** in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel located at interior of dock that includes illuminated lights indicating **OR** indicates, **as directed**, status of exterior signal lights. Provide signal-light set and control panel at each location indicated for light-communication system. Enclose exterior signal-light sets in steel or plastic housing with sunshade.
 - a. Manual Operation: System is activated by push button or switch located on interior **OR** truck-restraint, **as directed**, control panel.
 - b. Automatic Operation: System is activated automatically by limit switch **OR** photoelectric sensor **OR** magnetic switch, **as directed**, mounted on overhead door track. Provide on-off switch located on light-communication system **OR** truck-restraint, **as directed**, control panel.
 - c. Automatic Operation: System is activated automatically when device engages rear-impact guard. Provide on-off switch located on truck-restraint control panel.
 - d. Mounting: Wall **OR** Driveway **OR** Pit, **as directed**.
 10. Alarm: Audible **OR** Visual **OR** Audible and visual, **as directed**, system indicating that rear-impact guard is not engaged, with manual reset.
 11. Accessories: Interlock to dock leveler **OR** Key switch, **as directed**.
 12. Truck-Restraint Finish: Painted **OR** Hot-dip galvanized, **as directed**.
- H. Light-Communication Systems
1. General: Provide communication system consisting of signal-light sets, caution signs, alarms, and controls for each location indicated.
 2. Caution Signs: Surface mounted; designed to inform both dock attendant and truck driver; with sign copy as follows:
 - a. Exterior Sign Copy in Forward and Reverse Text: Manufacturer's standard text permitting truck movement with green light, **as directed**.
 - b. Interior Sign Copy: Manufacturer's standard text permitting truck movement with green light, **as directed**.
 3. Signal-Light Sets: Red and green illuminated signal-light sets, with lens approximately **4 inches (102 mm)** in diameter, designed to indicate status to both dock attendant and truck driver. Equip system with steel control panel that includes illuminated lights indicating **OR** indicates, **as directed**, status of exterior signal lights; located at interior of dock. Provide signal-light set and control panel at each location indicated for light-communication system. Enclose signal lights in steel or plastic housing, with exterior signal-light sets equipped with sunshade.
 - a. Manual Operation: Lights are activated by push button or switch located on interior signal-light enclosure **OR** control panel, **as directed**.

- b. Automatic Operation: Lights are activated automatically by limit switch **OR** photoelectric sensor **OR** magnetic switch, **as directed**, mounted on overhead door track. Provide on-off switch located on control panel.
- I. Dock Bumpers
1. Laminated-Tread Dock Bumper: Fabricated from multiple, uniformly thick plies cut from fabric-reinforced rubber tires. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles.
 - a. Thickness: **4-1/2 inches (114 mm) OR 6 inches (152 mm) OR** As indicated on Drawings, **as directed**.
 - b. Horizontal Style: **6 inches (152 mm) OR 10 inches (250 mm) OR 12 inches (305 mm), as directed**, high by length indicated on Drawings, **as directed**.
 - c. Vertical Style: **8 inches (203 mm)** wide by **20 inches (508 mm)** high **OR 24 inches (610 mm)** high **OR 36 inches (914 mm)** high **OR** height indicated on Drawings, as directed.
 2. Molded-Rubber Bumpers: Fabricated from molded-rubber compound reinforced with nylon, rayon, or polyester cord; with Type A Shore durometer hardness of 80, plus or minus 5, when tested according to ASTM D 2240; of size and configuration indicated. Fabricate units with not less than two predrilled anchor holes.
 - a. Configuration: T shape **OR** Inverted-L shape **OR** Square **OR** Rectangular **OR** As indicated on Drawings, **as directed**.
 - b. Thickness: **2 inches (50 mm) OR 3 inches (76 mm) OR 4 inches (102 mm) OR 6 inches (152 mm) OR** As indicated on Drawings, **as directed**.
 3. Extruded-Rubber Bumpers: Fabricated from ASTM D 2000, extruded synthetic rubber with Type A Shore durometer hardness of 75, plus or minus 5, when tested according to ASTM D 2240; of size and configuration indicated. Furnish units with predrilled anchor holes and concealed, flat, steel mounting bar.
 - a. Configuration: Flat or ribbed, with **2-inch (50-mm)** nominal thickness and **9-inch (229-mm)** height **OR 4-1/2-inch- (114-mm-)** wide base and **4-inch (102-mm)** depth with half-oval shape that compresses and returns to original shape **OR** As indicated on Drawings, **as directed**.
 4. Steel-Face, Laminated-Tread Bumpers: Fabricated from multiple, uniformly thick plies cut from fabric-reinforced rubber tires and with **3/8-inch (9.5-mm)** steel face plate of same size as rubber surface. Laminate plies under pressure on not less than two **3/4-inch- (19-mm-)** diameter, steel supporting rods that are welded at one end to **1/4-inch- (6-mm-)** thick, structural-steel end angle and secured with a nut and angle at the other end. Fabricate angles with predrilled anchor holes and sized to provide not less than **1 inch (25 mm)** of tread plies extending beyond the face of closure angles. Weld face plate to two steel support brackets, which shall extend back to and engage **3/4-inch- (19-mm-)** diameter support rods in elongated holes, allowing steel face to float on impact.
 - a. Thickness: **4-1/2 inches (114 mm) OR 6 inches (152 mm) OR** As indicated on Drawings, **as directed**.
 - b. Horizontal Style: **6 inches (152 mm) OR 10 inches (250 mm) OR 12 inches (305 mm), as directed**, high by length indicated, **as directed**.
 - c. Vertical Style: **8 inches (203 mm)** wide by **20 inches (508 mm)** high **OR 24 inches (610 mm)** high **OR 36 inches (914 mm)** high **OR** height indicated, **as directed**.
 5. Anchorage Devices: Hot-dip galvanized-steel anchor bolts, nuts, washers, bolts, sleeves, cast-in-place plates, and other anchorage devices as required to fasten bumpers securely in place and to suit installation type indicated.
- J. Dock Lifts
1. General: Built-in, scissors-type, single-leg, hydraulic dock lift of capacity, size, and construction indicated; complete with controls, safety devices, and accessories required.
 2. Standard: MH 29.1.

3. Rated Capacity: Lifting capacity of not less than 8000 lb (3629 kg) with 6500-lb (2948-kg) OR indicated on Drawings, **as directed**, axle load at ends and 5000-lb (2268-kg) OR indicated on Drawings, **as directed**, axle load at sides.
4. Platform: Nonskid, safety-tread OR Smooth-surface, **as directed**, heavy steel deck plate.
 - a. Platform Size: As indicated on Drawings, **as directed**.
 - b. Platform Guarding: Bevel toe guards OR Toe sensor OR Indicator bar OR Skirts OR Enclosure, **as directed**, to comply with requirements in MH 29.1.
 - c. Removable OR Fixed, **as directed**, Handrails: Equip lift with handrails on two sides of platform with a single, removable chain across each end. Provide handrails not less than 39 inches (991 mm) high with midrail and 4-inch- (102-mm-) high kick plate at bottom. Mount rail sockets flush with platform surface, **as directed**.
5. Bridge: Nonskid, safety-tread steel OR High-tensile aluminum, **as directed**, plate.
 - a. Hinged Bridge: Hinged, throw-over bridge bolted to full-length, heavy-duty, piano-type hinge welded to toe guard at end of platform. Provide bridge complete with heavy-duty lifting chains. Chamfer edge of bridge to minimize obstructing wheels of material-handling vehicles.
 - b. Size: 18 inches (457 mm) long by 60 inches (1524 mm) wide OR 18 inches (457 mm) long by 72 inches (1829 mm) wide OR As indicated on Drawings, **as directed**.
 - c. Locations: Ends OR Sides OR As indicated on Drawings, **as directed**.
6. Function: Dock lifts shall compensate for differences in height between truck bed and loading platform.
 - a. Vertical Travel: Maximum of 60 inches (1524 mm), **as directed**, from a lowered height of 12 inches (305 mm), **as directed**, for a total raised height of 72 inches (1829 mm), **as directed**.
 - b. Travel Speed: Nominal raising speed of 8 fpm (0.04 m/s) OR 10 fpm (0.05 m/s) OR 12 fpm (0.06 m/s), **as directed**.
 - c. Vertical Travel and Travel Speed: As indicated on Drawings, **as directed**.
 - d. Hinged Throw-Over Bridges Operation: Manual OR Manual-assist bridge winch OR Automatic powered, **as directed**.
7. Hydraulic Operating System: Self-contained, electric, hydraulic power unit for raising and lowering lift; of size, type, and operation needed for capacity of lift indicated; controlled from a remotely located push-button station.
 - a. Power Unit: Consisting of continuous-duty motor, high-pressure gear pump, valve manifold, oil-line filters, and oil reservoir.
 - 1) Equip manifold with relief valve, check valve, pressure-compensated flow-control valve, and solenoid valve and with provisions for lowering lift manually if power fails.
 - 2) Equip reservoir, valve manifold, and pressure line with oil-line filters.
 - b. Cylinders: Equip lift with not less than two heavy-duty, high-pressure, hydraulic, ram-type cylinders. Rams shall be manufacturer's standard, either direct-displacement plunger or rod-and-piston type with positive internal stops. Cylinder rods shall be chrome plated and polished.
 - 1) Rate of Descent Protection: Pressure-compensated flow control or hydraulic velocity fuse to limit down speed for each cylinder.
 - c. Remote-Control Station: Multibutton control station of the constant-pressure type with UP and DOWN push buttons. Controller shall consist of magnetic motor starter with three-pole adjustable overloads and 24-V control transformer with 4-A, fused secondary prewired to terminal strips and enclosed in NEMA ICS 6, Type 12, **as directed**, box.
 - 1) Upper-Travel-Limit Switch: Equip unit with manufacturer's standard, adjustable, upper-travel-limit switch.
8. Construction: Fabricate lift from structural-steel shapes rigidly welded and reinforced for maximum strength, safety, and stability. Design assembly to withstand deformation during both operating and stored phases of service. Provide mounting brackets and removable lifting eyes for ease of installation.
 - a. Scissors Mechanism: Fabricate leg members from heavy, steel-formed tube or plate members to provide maximum strength and rigidity.

- b. Scissors Configuration: Single leg **OR** Multiple width **OR** Multiple length, **as directed**.
 - c. Bearings: Pivot points with permanently lubricated antifriction bushings or sealed ball-bearings for minimum maintenance.
 - d. Maintenance Leg: Removable, safety maintenance leg or hinged, safety maintenance bars.
 - e. Mounting: Surface **OR** Pit, **as directed**.
 - 9. Dock Lift Finish: Painted **OR** Hot-dip galvanized, **as directed**.
 - a. Toe Guards: Paint yellow **OR** orange, **as directed**, to comply with ANSI Z535.1.
- K. Foam-Pad Dock Seals
- 1. General: Dock seals consisting of fabric-covered foam pads designed to compress **4 to 5 inches (102 to 127 mm)** under pressure of truck body to form an airtight seal at jambs and head of loading dock openings; of type, size, and construction indicated.
 - 2. Door Opening Size: As indicated on Drawings, **as directed**.
 - 3. Stationary Head Pad: **8 inches (203 mm) OR 12 inches (305 mm) OR 18 inches (457 mm) OR 24 inches (610 mm)**, **as directed**, high and same depth as jamb pads; beveled, **as directed**; sized for opening width.
 - 4. Adjustable Head Pad: **18 inches (457 mm) OR 24 inches (610 mm) OR 30 inches (762 mm)**, **as directed**, high and same depth as jamb pads; sized for opening width; with manufacturer's standard hardware and tension spring or counterweight mechanism for adjusting height of pad.
 - 5. Jamb Pads: Square **OR** Beveled; tapered to reduce opening width, **as directed**.
 - a. Nominal Size: **12 inches (305 mm) OR** As indicated on Drawings, **as directed**, wide and sized for opening height.
 - 6. Construction: Consisting of single- or double-ply, coated, fabric-covered, urethane-foam core with supporting frame. Fabricate jamb and head pads of same depth and sized for opening width.
 - a. Pressure-Treated, **as directed**, Wood Support Frame: Factory painted; with steel mounting hardware.
 - b. Steel Support Frame: Steel channel frame of manufacturer's standard weight, shape, and finish; with steel mounting hardware.
 - c. Tapered Side Panels: Taper side panels to angle required to accommodate sloped loading dock approach grades and make sealing edge of dock shelter parallel to back edge of truck. Taper for declined **OR** inclined, **as directed**, approach.
 - d. Cover Fabric: Vinyl-coated nylon or polyester with minimum total weight of **22 oz./sq. yd. (746 g/sq. m) OR 40 oz./sq. yd. (1356 g/sq. m)**, **as directed**.
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - e. Cover Fabric: Neoprene-coated nylon with minimum total weight of **16 oz./sq. yd. (543 g/sq. m) OR 40 oz./sq. yd. (1356 g/sq. m) OR 45 oz./sq. yd. (1526 g/sq. m)**, **as directed**.
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - f. Cover Fabric: Hypalon-coated nylon with minimum total weight of **16 oz./sq. yd. (543 g/sq. m) OR 40 oz./sq. yd. (1356 g/sq. m)**, **as directed**.
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - g. Cover Fabric: Manufacturer's proprietary cover fabric complying with the following minimum requirements:
 - 1) Tearing strength of not less than **300 by 300 lbf (1334 by 1334 N)** when tested according to ASTM D 2261.
 - 2) Abrasion resistance of not less than 6000 cycles when tested according to FED-STD-191A-5306.
 - 3) Tensile strength of not less than **1200 by 1200 lbf (5338 by 5338 N)** when tested according to FED-STD-191A-5100.1.

- 4) Cold resistance to **minus 40 deg F (minus 40 deg C)** when tested according to FED-STD-191A-5874.
 - 5) Color: **Black OR Green OR Blue OR Brown OR Tan OR As indicated by manufacturer's designations OR Match sample OR As selected from manufacturer's full range, as directed.**
 - h. Guide Strips: **4-inch- (102-mm-)** wide, coated, nylon guide strips on jamb pads.
 - i. Pleated Protectors: On face of jamb pads of overlapping layers of coated fabric attached to base fabric; **4-inch (102-mm) OR 8-inch (203-mm) OR 16-inch (406-mm)**, **as directed**, wear exposure.
- L. Inflatable Dock Seals
1. General: Inflatable dock seals consisting of one-piece jamb, sill, **as directed**, and header seals designed to inflate by motor/blower and compress against truck bodies to form airtight seals at loading dock openings; of type, size, and construction indicated.
 2. Door Opening Size: As indicated on Drawings, **as directed.**
 3. Head Members: **One OR Two, as directed.**
 4. Jamb Members: **One OR Two, as directed.**
 5. Construction: Fabricate header seal full width over jamb seals. Mount seals on pressure-treated wood frame with hot-dip galvanized-steel mounting hardware. Inflate seals by use of 1/2-hp motor/blower with on-off switch, mounted above header seal in galvanized-steel hood. Provide bottom of header and jamb seals with grommets to allow for release of moisture and excess air.
 - a. Fabric: Neoprene-coated nylon with minimum total weight of **14 oz./sq. yd. (475 g/sq. m)**.
 - 1) Color: **Black OR Gray OR Blue OR Brown OR As indicated by manufacturer's designations OR Match sample OR As selected from manufacturer's full range, as directed.**
 - b. Fabric: Manufacturer's proprietary fabric complying with the following minimum requirements:
 - 1) Tearing strength of not less than **110 by 85 lbf (489 by 378 N)** when tested according to ASTM D 2261.
 - 2) Abrasion resistance of not less than 490 cycles when tested according to FED-STD-191A-5306.
 - 3) Tensile strength of not less than **500 by 440 lbf (2224 by 1957 N)** when tested according to FED-STD-191A-5100.1.
 - 4) Cold resistance to **minus 40 deg F (minus 40 deg C)** when tested according to FED-STD-191A-5874.
 - 5) Color: **Black OR Gray OR Blue OR Brown OR As indicated by manufacturer's designations OR Match sample OR As selected from manufacturer's full range, as directed.**
- M. Frame-Type Dock Shelters
1. General: Dock shelters designed to form a seal with sides and top of truck body while leaving entire width and height of truck's rear opening unobstructed; of type, size, and construction indicated.
 2. Door Opening Size: As indicated on Drawings, **as directed.**
 3. Rigid-Frame Type: Fabricated from translucent, fabric-covered **OR** fiberglass, **as directed**, side and top panels attached to fixed supporting framework. Provide head and side curtains with built-in flexible stays, wind straps between head curtain and side frame, pleated protectors on head curtain, and a yellow aim patch on side curtains. Slope head frame from center for drainage. Provide replaceable, fabric-covered, tapered, foam-bottom pads and protective steel bumpers of size and type required for application shown.
 4. Flexible-Frame Type: Fabricated from fabric-covered side and top panels attached to retractable supporting framework with independent spring-tension extension arms. Provide head and side curtains with built-in flexible stays, pleated protectors on head curtain, and a yellow aim patch on side curtains. Provide replaceable, fabric-covered, tapered, foam-bottom pads of size and type required for application shown.

5. Head-Pad Height: **12 inches (305 mm) OR 18 inches (457 mm) OR 24 inches (610 mm) OR 30 inches (762 mm), as directed.**
6. Construction: Fabricate framework, pads, bumpers, fabric for curtains and panels, and other components to sizes and shapes indicated or required to fit door opening sizes shown and allow for not less than **18 inches (457 mm)** of truck-body penetration when truck is docked.
 - a. Wood Framework: Factory painted, mechanically fastened together using nails and lag bolts or metal connectors to form a rigid assembly.
 - b. Steel Framework: Zinc-plated steel tubing of size and thickness standard with manufacturer, with joints welded.
 - c. Top and Side Panels: White, translucent fiberglass, **0.045 inch (1.1 mm)** thick, weighing **6 oz./sq. ft. (1831 g/sq. m).**
 - d. Top and Side Panels: White, translucent vinyl, weighing **14 oz./sq. ft. (4272 g/sq. m).**
 - e. Tapered Side Panels: Taper side panels to angle required to accommodate sloped loading dock approach grades and make sealing edge of dock shelter parallel to back edge of truck. Taper for declined **OR** inclined, **as directed**, approach.
 - f. Cover Fabric: Vinyl-coated nylon with minimum total weight of **22 oz./sq. yd. (746 g/sq. m) OR 40 oz./sq. yd. (1356 g/sq. m), as directed.**
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
 - g. Cover Fabric: Polyurethane-coated nylon with minimum total weight of **25 oz./sq. yd. (848 g/sq. m).**
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
 - h. Cover Fabric: Neoprene-coated nylon with minimum total weight of **16 oz./sq. yd. (543 g/sq. m) OR 40 oz./sq. yd. (1356 g/sq. m) OR 45 oz./sq. yd. (1526 g/sq. m), as directed.**
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
 - i. Cover Fabric: Hypalon-coated nylon with minimum total weight of **16 oz./sq. yd. (543 g/sq. m) OR 40 oz./sq. yd. (1356 g/sq. m), as directed.**
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
 - j. Cover Fabric: Manufacturer's proprietary cover fabric complying with the following minimum requirements:
 - 1) Tearing strength of not less than **300 by 300 lbf (1334 by 1334 N)** when tested according to ASTM D 2261.
 - 2) Abrasion resistance of not less than 6000 cycles when tested according to FED-STD-191A-5306.
 - 3) Tensile strength of not less than **1200 by 1200 lbf (5338 by 5338 N)** when tested according to FED-STD-191A-5100.1.
 - 4) Cold resistance to **minus 40 deg F (minus 40 deg C)** when tested according to FED-STD-191A-5874.
 - 5) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** Tan **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed.**
 - k. Pleated Protectors: Overlapping layers of same fabric as cover.
7. Accessories:
 - a. Buffer flaps.
 - b. Bottom filler curtain.
 - c. Bottom seal pads.

N. Inflatable Dock Shelters

1. General: Inflatable dock shelters designed to inflate by motor/blower and compress against truck bodies to form airtight seals at loading dock openings; of type, size, and construction indicated.
 2. Door Opening Size: As indicated on Drawings, **as directed**.
 3. Rigid Canopy: Consisting of rigid canopy, fabric-covered header curtain, and one-piece inflatable header and jamb seals. Fabricate canopy from white, translucent plastic attached to rigid support framework.
 4. Rigid Canopy and Sides: Consisting of rigid canopy and sides, fabric-covered header curtain, and one-piece, inflatable header and jamb seals. Fabricate canopy and sides from white, translucent plastic attached to rigid support framework.
 5. Construction: Fabricate header seal full width over jamb seals. Mount seals on pressure-treated wood frame with hot-dip galvanized-steel mounting hardware. Provide header curtain with built-in flexible stays and two yellow aim patches. Slope canopy frame from center for drainage. Provide two protective steel bumpers of size and type required for application shown. Inflate seals by use of a 1/2-hp motor/blower with on-off switch, mounted under canopy frame. Provide bottom of header and jamb seals with grommets to allow for release of moisture and excess air.
 - a. Shape and Size: Fabricate framework, fabric for curtains, and other components to sizes and shapes indicated or required to fit door opening sizes shown and allow for not less than **12 inches (305 mm)** of truck-body penetration when truck is docked.
 - b. Wood Framework: Fasten members together mechanically using nails and lag bolts or metal connectors to form a rigid assembly.
 - c. Steel Framework: Zinc-plated steel tubing of size and thickness standard with manufacturer, with joints welded.
 - d. Fabric: Polyurethane **OR** Vinyl, **as directed**, -coated nylon with minimum total weight of **14 oz./sq. yd. (475 g/sq. m)**.
 - 1) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
 - e. Fabric: Manufacturer's proprietary fabric complying with the following minimum requirements:
 - 1) Tearing strength of not less than **110 by 85 lbf (489 by 378 N)** when tested according to ASTM D 2261.
 - 2) Abrasion resistance of not less than 490 cycles when tested according to FED-STD-191A-5306.
 - 3) Tensile strength of not less than **500 by 440 lbf (2224 by 1957 N)** when tested according to FED-STD-191A-5100.1.
 - 4) Cold resistance to **minus 40 deg F (minus 40 deg C)** when tested according to FED-STD-191A-5874.
 - 5) Color: Black **OR** Green **OR** Blue **OR** Brown **OR** As indicated by manufacturer's designations **OR** Match sample **OR** As selected from manufacturer's full range, **as directed**.
- O. Transparent-Strip Door Curtains
1. General: Door curtains consisting of overlapping strips suspended from top of opening to form a sealed door curtain. Provide strips of length required to suit opening height and with sufficient number in unit to close opening width with overlap indicated.
 2. Strip Material: Curved, clear, transparent, extruded PVC. Fabricate strips for manufacturer's standard method of attachment to overhead mounting system indicated.
 - a. Standard Grade: Designed to withstand temperature range of **0 to plus 150 deg F (minus 18 to plus 66 deg C)**.
 - b. Low-Temperature Grade: USDA accepted, designed to withstand temperature range of **minus 30 to plus 150 deg F (minus 34 to plus 66 deg C)**.
 - c. Strip Width and Thickness:
 - 1) **6 inches (152 mm)** wide and **0.060 inch (1.5 mm)** thick.
OR
8 inches (203 mm) wide and **0.080 inch (2 mm)** thick.

OR

12 inches (305 mm) wide and 0.120 inch (3 mm) thick.

OR

16 inches (406 mm) wide and 0.160 inch (4 mm) thick.

- d. Overlap: None **OR** One-third **OR** One-half **OR** Two-thirds **OR** Three-quarters **OR** Full, **as directed**.
 - 3. Header Mounting: Consisting of an angle bolted or welded to opening lintel; equip angle with permanently attached mounting pins and a steel-angle or -plate retaining strip attached to angle with wing nuts.
 - 4. Wall Surface Mounting:
 - a. Consisting of a steel plate bolted to side of lintel; equip plate with permanently attached, threaded, mounting pins and steel-angle or -plate retaining strip attached to plate with wing nuts.
 - OR**
 - Consisting of steel pipe attached to side of lintel by manufacturer's standard, winged-U-type suspension brackets.
 - OR**
 - Consisting of a rigid, vinyl wall-mounting unit bolted to side of lintel above opening; equip unit with a similarly formed, rigid, vinyl retainer attached to unit with wing nuts.
- P. General Finish Requirements
- 1. Finish loading dock equipment after assembly and testing.
- Q. Steel Finishes
- 1. Galvanizing: Hot-dip galvanize components as indicated to comply with the following:
 - a. ASTM A 123/A 123M for iron and steel loading dock equipment.
 - b. ASTM A 153/A 153M or ASTM F 2329 for iron and steel hardware for loading dock equipment.
 - 2. Galvanized-Steel and Steel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat in manufacturer's standard color.

1.3 EXECUTION

A. Preparation

- 1. Coordinate size and location of loading dock equipment indicated to be attached to or recessed into concrete or masonry, and furnish anchoring devices with templates, diagrams, and instructions for their installation.
- 2. Set curb angles in concrete edges of dock-leveler recessed pits with tops flush with loading platform. Fit exposed connections together to form hairline joints.
- 3. Set curb angles in concrete edges of truck-leveler recessed pits with tops flush with driveway. Fit exposed connections together to form hairline joints.
- 4. Place self-forming pan system for recessed dock **OR** edge-of-dock, **as directed**, levelers in proper relation to loading platform before pouring concrete.
- 5. Clean recessed pits of debris.

B. Installation

- 1. General: Install loading dock equipment, including motors, pumps, control stations, wiring, safety devices, light-communication systems, and accessories as required for a complete installation.
 - a. Rough-in electrical connections according to requirements specified in Division 22.
- 2. Recessed Dock Levelers: Attach dock levelers securely to loading dock platform, flush with adjacent loading dock surfaces and square to recessed pit.
- 3. Edge **OR** Top, **as directed**,-of-Dock Levelers: Attach dock levelers to loading dock platform in a manner that complies with requirements indicated for arrangement and position relative to top of platform.

- a. Weld anchor holes in contact with continuous embedded loading dock edge channel. Weld or bolt bumper blocks to face of loading dock.
 4. Truck Levelers: Attach truck levelers securely to driveway construction with expansion anchors and bolts.
 5. Truck Restraints: Attach truck restraints in a manner that complies with requirements for arrangement and height required for device to engage vehicle rear-impact guard. Interconnect control panel and signals with dock leveler, **as directed**.
 - a. Wall-Mounted Units: Weld truck restraints to steel curb angle **OR** edge channel **OR** mounting plate, **as directed**, embedded in loading dock edge.
 - b. Wall-Mounted Units: Anchor truck restraints to face of loading dock with expansion anchors and bolts.
 - c. Driveway-Mounted Units: Anchor truck restraints to driveway with expansion anchors and bolts.
 - d. Pit-Mounted Units: Anchor truck restraints to concrete pit with expansion anchors and bolts.
 6. Dock Bumpers: Attach dock bumpers to face of loading dock in a manner that complies with requirements indicated for spacing, arrangement, and position relative to top of platform and anchorage.
 - a. Welded Attachment: Plug-weld anchor holes in contact with steel inserts and fillet weld at other locations.
 - b. Bolted Attachment: Attach dock bumpers to preset anchor bolts embedded in concrete or to cast-in-place inserts or threaded studs welded to embedded-steel plates or angles. If preset anchor bolts, cast-in-place inserts, or threaded studs welded to embedded-steel plates or angles are not provided, attach dock bumpers by drilling and anchoring with expansion anchors and bolts.
 - c. Screw Attachment: Attach dock bumpers to wood construction with lag bolts as indicated.
 7. Dock Lifts: Attach dock lifts securely to loading platform **OR** floor of recessed pit **OR** surface of driveway, **as directed**.
 8. Dock Seals: Attach dock-seal support frames securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure compression of dock seals when trucks are positioned against dock bumpers.
 9. Dock Shelters: Attach dock shelters securely to building structure in proper relation to openings, dock bumpers, and dock levelers to ensure an effective seal of dock-shelter curtains with sides and top of truck body when trucks are positioned against dock bumpers.
 10. Transparent-Strip Door Curtains: Attach door-curtain mounting system to lintel with screw anchors or toggle bolts. Mount curtain strips to achieve overlap indicated.
- C. Adjusting
1. Adjust loading dock equipment to function smoothly and safely, and lubricate as recommended by manufacturer.
 2. Test dock levelers and lifts for vertical travel within operating range indicated.
 3. After completing installation of exposed, factory-finished loading dock equipment, inspect exposed finishes and repair damaged finishes.

END OF SECTION 11 13 13 00

Task	Specification	Specification Description
11 13 16 13	11 13 13 00	Loading Dock Equipment
11 13 16 23	11 13 13 00	Loading Dock Equipment
11 13 19 13	11 13 13 00	Loading Dock Equipment
11 13 19 26	11 13 13 00	Loading Dock Equipment
11 13 19 33	11 13 13 00	Loading Dock Equipment
11 13 23 23	11 13 13 00	Loading Dock Equipment
11 13 26 00	11 13 13 00	Loading Dock Equipment
11 14 13 16	11 14 13 19	Turnstiles

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SECTION 11 14 13 19 - TURNSTILES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of turnstiles. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Drawings showing individual turnstile construction, overall dimensions for installation, and installation details including trim and accessories.
2. Materials List showing major components, materials and material thicknesses.
3. Product Sample: Manufacturer shall demonstrate field up-gradability of the rotary gates from mechanical control to electronic control.

- #### **C. Product Handling:** Store turnstiles in a dry well ventilated place in the original crating and protective wrappings and protect all finished from damage during handling.

1.2 PRODUCTS

A. Security Turnstiles

1. Type B Rotary Gate

- a. Mechanism: All steel and machined cast iron with two ratchets each 1-1/4" thick hardened steel. Two locking pawls 1-1/4" thick hardened steel. Automatic control with free turning one direction **OR** free turning both directions, **as directed**.
- b. Arms: Hot dip galvanized steel tubing, wall thickness of 0.105" and 1.31" o.d.. Arm ends spun closed under heat and pressure, for a smooth safe finish. Heel guards on bottom arms of rotor "U" shaped sheet steel channels surrounding the lower arms and extending to the flooring.
- c. Rotor and Barrier Vertical Members: 1/4" thick steel angles, hot dip galvanized. Arms pinned into rotor with malleable iron clamps. Non-welded construction.
- d. Vertical Passage Members: Tubing with 1/8" wall thickness and 1" o.d., hot dip galvanized.
- e. Bottom Bearing: Machined grey iron casting 1-1/2" thick, 12" diameter.
- f. Height: As required to meet project requirements.

2. Type AA Rotary Gate

- a. Mechanism: All steel and machined cast iron. Two control ratchets each 1-1/4" thick hardened steel. Two locking pawls each 1-1/4" thick hardened steel. Automatic control with free turning one direction **OR** free turning both directions, **as directed**.
- b. Arms: Square steel tubing, walls 0.097" thick, ends spun closed, bottom arms with heel guards.
- c. Rotor and Barrier Columns: Five angles of 1/4" thick steel, sixty-three malleable cast iron clamps, non-welded construction.
- d. Vertical Cage Members: 3 "U" channels 0.097" wall thickness, passage sheet 4' high by 5'2" length of 0.048" thick steel, 7 reinforcing bands of 0.38" thick steel.
- e. Bottom Bearing: Machined grey iron casting 1-1/2" thick, 12" diameter.
- f. Ceiling: Full round steel sheet 0.052" thick with 1" x 1" circular reinforcing angle at edge.
- g. Height: As required to meet project requirements.

3. Type SA Rotary Gate

- a. Mechanism: All steel and machine cast iron. Two control ratchets each 1-1/4" thick hardened steel. Two locking pawls each 1-1/4" thick hardened steel. Time delay and power

- relays with 10 amp contact ratings and ten million operation life. One-way operation **OR** two-way, **as directed**, agent operated.
- b. Arms: ANSI 304 stainless steel (brushed finish); 4" reinforcing plugs at rotor end, spun closed ends, walls 0.065" thick.
 - c. Rotor: One piece solid aluminum extrusion weighing 140 lbs., three wing cross section, anodized.
 - d. Vertical Columns: One barrier support column of 3" by 3" solid aluminum, three passageway support columns of 2" by 2" aluminum tubing with 1/8" wall thickness.
 - e. Passageway Sheeting: ANSI 304 stainless steel (brushed finish) 0.065" thick **OR** 1/4" thick curved polycarbonate sheet, **as directed**, rising from 4" above floor level to 4" below mechanism housing.
 - f. Ceiling: Full ceiling 6 ft. diameter, 5" deep.
 - g. Height: As required to meet project requirements.
4. Type Dual Rotary Gate
- a. Mechanism: All steel and machine cast iron. Two control ratchets each 1.25" thick hardened steel. Two locking pawls each 1-1/4" thick hardened steel. Time delay and power relays with 10 amp contact ratings and ten million operation life. One-way operation **OR** two-way, **as directed**, agent operated.
 - b. Arms: ANSI 304 stainless steel (brushed finish); 4" reinforcing plugs at rotor end, spun closed ends, walls 0.065" thick. Press fit 3.5" into rotor sockets.
 - c. Rotors: One piece solid aluminum extrusions weighing 140 lbs. each, three wing cross section, clear anodized.
 - d. Barriers: Two columns of 2" by 2" solid aluminum, 21 arms 54" in length bent 1" o.d. ANSI 302 Tubing with 0.080" wall thickness, force fit and pin secured.
 - e. Passageway Columns: Four columns of 2" by 2" clear anodized aluminum tubing with 1/8" wall thickness.
 - f. Passageway Sheeting: ANSI 304 stainless steel (brushed finish) 0.065" thick **OR** 1/4" thick curved polycarbonate sheet, **as directed**, rising from 4" above floor level to 4" below mechanism housing.
 - g. Ceiling: Full ceiling 8' by 4'6", 5" deep.
 - h. Height: As required to meet project requirements.
5. 24" Diameter Manual Turnstiles
- a. Cover: Deep drawn ANSI #304 stainless steel (brushed finish), 0.078" thick, corners with 1-3/8" radii.
 - b. Frame: ANSI #304 stainless steel (brushed finish) **OR** painted mild steel, **as directed**. Welded double wall (cavity) construction. Each wall 0.078" thick. 2" blending outer wall radii, 1/4" thick stainless steel base plate.
 - c. Mechanical Mechanism: Ratchet of 1" x 6-1/2" machined cast iron. Use aided by springs of 0.175" diameter spring steel. Motion stabilized by large rotary shock absorber and cast iron two-lobe cam. Self centered by 1/2" steel compression shoe.
 - 1) Unlocking Controls: One continuous-duty rated 24VDC solenoid with 620% of required strength. Solenoid shall operate for 45 milliseconds per passage. All unlocking elements shall be mechanical. No time relays or transformers.
 - 2) Mechanism shall be field upgradable from mechanical counting to electronic counting both local and remote, without cutting, filing or other structural modifications. Mechanism shall be field upgradable from mechanical unlocking control to electronic unlocking control, both single passage and escrow control, without cutting, filing or other structural modifications.
 - d. Arms: ANSI #304 stainless steel tubing (brushed finish), 0.049" thick walls, spun closed ends. Arms shall be press fit into grey cast iron hub and held to main shaft with drill rod taper pin.
 - e. Hub: Grey cast iron, taper pin mounting.
 - f. Portable: 0.063" thick machined cast iron floor tread, force fit ANSI #304 stainless steel railing (brushed finish), with 0.0112" wall thickness hand-grip loops, 3-1/2" diameter solid rubber wheels recessed into cabinet.

1.3 EXECUTION:

- A. Installation: Install turnstiles in accordance with manufacturer's instructions.

END OF SECTION 11 14 13 19

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SECTION 11 21 63 00 - FOOD SERVICE EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for food service equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fabricated equipment.
 - b. Food waste machines.
 - c. Cooking equipment.
 - d. Self-contained refrigeration equipment.
 - e. Walk-in refrigeration equipment.
 - f. Powered food-preparation equipment.
 - g. Warewashing equipment.
 - h. Serving equipment.
 - i. Utility distribution systems.
2. Owner-Furnished Equipment: Where indicated, the Owner will furnish equipment for installation by Contractor.

C. Submittals

1. Product Data: For each type of product indicated. Include the following:
 - a. Manufacturer's model number.
 - b. Accessories and components that will be included for Project.
 - c. Clearance requirements for access and maintenance.
 - d. Utility service connections for water, drainage, power, and fuel; include roughing-in dimensions.
2. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.
3. Samples: For each factory-applied color finish required, in manufacturer's standard sizes.
4. Coordination Drawings: For foodservice facilities.
 - a. Indicate locations of foodservice equipment and connections to utilities.
 - b. Key equipment using same designations as indicated on Drawings.
 - c. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.
 - d. Include details of seismic bracing for equipment.
5. Operation and Maintenance Data: For foodservice equipment to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Product Schedule: For each foodservice equipment item, include the following:
 - 1) Designation indicated on Drawings.
 - 2) Manufacturer's name and model number.
 - 3) List of factory-authorized service agencies including addresses and telephone numbers.
6. Warranty: Samples of special warranty.

D. Quality Assurance

1. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.
2. BISSC Standards: Provide bakery equipment that complies with BISSC/Z50.2.

- a. Provide BISSC-certified equipment, with certification verified by a third-party agency, **as directed**.
 3. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.
 4. Steam Equipment: Provide steam-generating and direct-steam heating equipment that is fabricated and labeled to comply with ASME Boiler and Pressure Vessel Code.
 5. Regulatory Requirements: Install equipment to comply with the following:
 - a. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
 - b. NFPA 54, "National Fuel Gas Code."
 - c. NFPA 70, "National Electrical Code."
 - d. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."
 6. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.
 7. Preinstallation Conference: Conduct conference at Project site.
- E. Project Conditions
1. Field Measurements: Verify actual dimensions of construction contiguous with foodservice equipment by field measurements before fabrication. Indicate measurements on Coordination Drawings.
- F. Coordination
1. Coordinate foodservice equipment layout and installation with other work, including layout and installation of lighting fixtures, HVAC equipment, and fire-suppression system components.
 2. Coordinate locations and requirements of utility service connections.
 3. Coordinate sizes, locations, and requirements of the following:
 - a. Overhead equipment supports.
 - b. Equipment bases.
 - c. Floor depressions.
 - d. Insulated floors.
 - e. Floor areas with positive slopes to drains.
 - f. Floor sinks and drains serving foodservice equipment.
 - g. Roof curbs, equipment supports, and penetrations.
- G. Warranty
1. Refrigeration Compressor Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.
 - a. Failure includes, but is not limited to, inability to maintain set temperature.
 - b. Warranty Period: Five years from date of Final Completion.
- 1.2 PRODUCTS
- A. Fabricated Equipment
1. Stainless-Steel Sinks:
 - a. Description: One **OR** Two **OR** Three **OR** Four, **as directed**,-compartment sink(s). Fabricate units of welded stainless steel, sound deadened.
 - 1) Bowls: Stainless steel, Type 304, **0.078 inch (1.98 mm) OR 0.062 inch (1.59 mm), as directed**, thick.
 - 2) Integral Drainboards: Stainless steel, Type 304, **0.078 inch (1.98 mm) OR 0.062 inch (1.59 mm), as directed**, thick.
 - 3) Body: Stainless steel, Type 304, **0.078 inch (1.98 mm) OR Type 304, 0.062 inch (1.59 mm) OR Type 430, 0.062 inch (1.59 mm), as directed**, thick.

- a) Back Splash: Manufacturer's standard height **OR 13 inches (330 mm) OR 18 inches (457 mm), as directed.**
 - b) Side Splash: Manufacturer's standard height **OR 13 inches (330 mm) OR 18 inches (457 mm), as directed.**
 - 4) Legs and Feet: Stainless-steel tubing legs with adjustable bullet feet.
 - 5) Accessories:
 - a) Faucets and Spouts: as directed by the Owner.
 - b) Prerinse Faucet: as directed by the Owner.
 - c) Vacuum breaker.
 - d) Lever waste with **OR** without, **as directed**, overflow.
 - e) Basket strainer.
 - f) Continuous waste.
 - g) Scrap trough.
 - h) Control bracket for food waste disposer controls.
 - i) Scrap block and hole.
 - j) Stainless-steel pot rack.
 - b. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, type as indicated.
 - c. Fabrication: Prepare sink for installation of the following equipment items:
 - 1) Water heater.
 - 2) Food waste disposer; weld disposer cone or collar into sink.
 - 3) Undercounter dishwasher.
 - d. Stainless-Steel Finish: Directional satin finish, No. 4.
2. Stainless-Steel Tables:
 - a. Description: Flat-countertop **OR** Prep **OR** Equipment-stand **OR** Mixer-stand **OR** Dish, **as directed**, table.
 - 1) Tops: Stainless steel, Type 304, **0.078 inch (1.98 mm) OR** Type 304, **0.062 inch (1.59 mm) OR** Type 430, **0.062 inch (1.59 mm), as directed**, thick, reinforced and sound deadened.
 - a) Back Splash: Manufacturer's standard height **OR 1-1/2 inches (38 mm) OR 5 inches (127 mm), as directed.**
 - b) Edge: Bullnose on four sides **OR** Bullnose on front edge, straight on sides and back **OR** Marine edge, **as directed.**
 - 2) Welded **OR** Adjustable, **as directed**, Undershelf: Stainless steel, Type 304, **0.050 inch (1.27 mm) thick OR** Metallic-coated steel, **0.052-inch (1.32-mm)** nominal thickness, **as directed.**
 - 3) Crossbracing: Stainless-steel **OR** Metallic-coated steel, **as directed**, tubing, bolted **OR** welded, **as directed**, to legs.
 - 4) Cabinet:
 - a) Body: Stainless steel, Type 430, **0.050 inch (1.27 mm) thick.**
 - b) Doors: Sliding **OR** Hinged, **as directed**, stainless steel, Type 304, **0.038 inch (0.95 mm) thick.**
 - c) Drawers: Stainless-steel drawer and faceplate **OR** Galvanized-steel drawer and stainless-steel faceplate **OR** Stainless-steel front and liner **OR** Stainless-steel front and galvanized-steel liner, **as directed.**
 - 5) Sink: Stainless steel, Type 304, **0.078 inch (1.98 mm) thick**, welded into tabletop and including the following:
 - a) Faucet and Spout: as directed by the Owner.
 - b) Vacuum breaker.
 - c) Leverwaste with **OR** without, **as directed**, overflow.
 - d) Basket strainer.
 - e) Tail piece.
 - 6) Legs: Stainless-steel **OR** Metallic-coated steel, **as directed**, tubing.
 - 7) Feet: Stainless-steel adjustable bullets **OR** Plastic adjustable bullets **OR** Stainless-steel, flanged, adjustable bullets **OR** Casters, **as directed.**
 - 8) Accessories:
 - a) Control panel.

- b) Control bracket for food waste disposer controls.
 - c) Aluminum pan rack slides, six **OR** three, **as directed**, slides each.
 - d) Urn trough.
 - e) Spice bins.
 - b. Materials:
 - 1) Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, type as indicated.
 - 2) Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum **G90 (Z275)** coating.
 - c. Fabrication: Prepare table for installation of the following equipment items:
 - 1) Food waste disposer; weld disposer cone or collar into sink.
 - 2) Heat lamp.
 - d. Stainless-Steel Finish: Directional satin finish, No. 4.
- 3. Stainless-Steel Shelf Units:
 - a. Description: Table mounted, single deck **OR** Table mounted, double deck **OR** Wall mounted, **as directed**. Fabricate units of stainless steel, Type 304, **0.062 inch (1.59 mm)** **OR** Type 304, **0.050 inch (1.27 mm)** **OR** Type 430, **0.050 inch (1.27 mm)**, **as directed**, thick.
 - b. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, type as indicated.
 - c. Stainless-Steel Finish: Directional satin finish, No. 4.
- 4. Pot Racks:
 - a. Description: Wall mounted **OR** Ceiling hung **OR** Corner, **as directed**. Fabricate units of stainless steel **OR** painted, cold-rolled steel, **as directed**.
 - 1) Bars: Double **OR** Single, **as directed**.
 - 2) Hooks: 18 per unit.
 - b. Materials:
 - 1) Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, Type 304.
 - 2) Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
 - c. Finishes:
 - 1) Stainless Steel: Directional satin finish, No. 4.
 - 2) Cold-Rolled Steel: Powder-coat painted finish.
- 5. Stainless-Steel Hand Sinks:
 - a. Description: Lavatory sink. Fabricate units of stainless steel, Type 304, **0.050 inch (1.27 mm)** **OR** **0.038 inch (0.95 mm)**, **as directed**, thick.
 - 1) Operation: Electronic **OR** Knee valve **OR** Foot pedal **OR** Wrist handle **OR** Handle, **as directed**.
 - 2) Faucet and Spout: as directed by the Owner.
 - 3) Accessories:
 - a) Chrome-plated tail piece and P trap, **NPS 1-1/2 (DN 40)**, with **0.045-inch (1.1-mm)** minimum wall thickness.
 - b) Strainer basket with metal post.
 - c) Liquid soap dispenser, splash **OR** deck, **as directed**, mounted.
 - d) Liquid soap and towel dispenser.
 - e) Towel dispenser.
 - f) Tubular wall supports.
 - g) Skirt assembly for support.
 - h) Side splashes.
 - b. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, type as indicated.
 - c. Stainless-Steel Finish: Directional satin finish, No. 4.
- 6. Floor Troughs **OR** Water Receptacles, **as directed**:
 - a. Description: **4-inch (102-mm)** **OR** **2-inch (50-mm)**, **as directed**, nominal depth excluding tailpiece.
 - 1) Body: Stainless steel, Type 304, **0.078 inch (1.98 mm)** thick.
 - 2) Grate: Stainless-steel bar, Type 304 **OR** Fiberglass, **as directed**.

- 3) Waste Connection: **NPS 3 (DN 80)**.
 - b. Materials:
 - 1) Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, type as indicated.
 - 2) Stainless-Steel Bars: ASTM A 276, austenitic stainless steel, type as indicated.
 - c. Stainless-Steel Finish: Directional satin finish, No. 4.
- B. Food Waste Machines
1. Food Waste Disposer Units:
 - a. Description: **3 OR 5 OR 7, as directed**, hp, with dual-direction shredding elements, and the following:
 - 1) Stainless-steel **OR** Corrosion-resistant, **as directed**, housing.
 - 2) Flow control.
 - 3) Solenoid valve.
 - 4) Vacuum breaker.
 - 5) Fixed nozzle.
 - 6) Control Panel:
 - a) Autoreversing and internal timed water flush.
 - b) Stainless-steel mounting bracket.
 - 7) Prerinse: Backsplash mounted with hot- and cold-water mixing valve and with stainless-steel **OR** corrosion-resistant, **as directed**, exposed metal parts and the following:
 - a) Wall support bracket.
 - b) Flexible, **3/8-inch (10-mm)** metal-encased hose with a minimum length of **29 inches (737 mm)** and supported by spiral spring.
 - c) Spray-head assembly with lockable lever handle.
 - 8) Accessories:
 - a) Collar adaptor for sink **OR** trough, **as directed**.
 - b) Cone with adaptor ring.
 - i. Size: **12 inches (305 mm) OR 15 inches (381 mm) OR 18 inches (457 mm)**, **as directed**.
 - c) Cone cover in size that matches cone.
 - d) Silver accumulator.
 - 9) Electrical Service: Equip unit for connection to service indicated on Drawings.
 2. Food Waste Pulper and Water Extractor Systems:
 - a. Description: Stainless-steel pulper unit, extractor unit, and control panel with water-level control and push-button start.
 - 1) Capacity: Not less than **600 lb (272 kg) OR 700 lb (318 kg) OR 900 lb (408 kg)**, **as directed**, of waste per hour.
 - 2) Accessories:
 - a) Feed trough connection.
 - b) Feed tray.
 - c) Feed hood assembly.
 - d) Under-dish-table lid.
 - e) Remote Water Extractor:
 - i. Dam, to prevent siphoning of water from pulper tank.
 - ii. Remote piping system, overhead **OR** below floor, **as directed**.
 - 3) Electrical Service: Equip unit for connection to service indicated on Drawings.
 3. Food Waste Grinder and Water Extractor Systems:
 - a. Description: Stainless-steel construction; with off and on controls on unit, food waste hopper, silver saver, internal disposer, removable water extraction auger with internal water sprays, and discharge chute.
 - 1) Capacity: Not less than **600 lb (272 kg) OR 700 lb (318 kg)**, **as directed**, of waste per hour.
 - 2) Accessories:
 - a) Reel rinse unit with spray valve.

- b) Recirculation water pump.
 - c) Trough mount.
 - 3) Electrical Service: Equip unit for connection to service indicated on Drawings.
 - 4. Undercounter Food Waste Grinder and Water Extractors:
 - a. Description: Stainless-steel, undercounter, cleanable assembly including the following:
 - 1) Capacity: Not less than **600 lb (272 kg) OR 700 lb (318 kg), as directed**, of waste per hour.
 - 2) Separate water-extractor and disposer units.
 - a) Disposer: Corrosion-resistant housing, dual-direction shredding elements.
 - 3) Piping between disposer and water extractor.
 - 4) Vacuum breaker.
 - 5) Solenoid valve.
 - 6) Flow control.
 - 7) Time-delayed relay.
 - 8) Control Panel:
 - a) Autoreversing and internal timed water flush.
 - b) Stainless-steel mounting bracket.
 - 9) Prerinse: Backsplash mounted with hot- and cold-water mixing valve and with stainless-steel **OR** corrosion-resistant, **as directed**, exposed metal parts and the following:
 - a) Wall support bracket.
 - b) Flexible, **3/8-inch (10-mm)** metal-encased hose with a minimum length of **29 inches (737 mm)** and supported by spiral spring.
 - c) Spray-head assembly with lockable lever handle.
 - 10) Accessories:
 - a) Cone with adaptor ring.
 - i. Size: **12 inches (305 mm) OR 15 inches (381 mm) OR 18 inches (457 mm), as directed.**
 - b) Cone cover in size that matches cone.
 - c) Silver sorter.
 - d) Trough collar connection.
 - 11) Electrical Service: Equip unit for connection to service indicated on Drawings.
- C. Cooking Equipment
 - 1. Ranges:
 - a. Description:
 - 1) Top Configuration:
 - a) Open-Burner Unit:
 - i. Standard Burners: Four **OR** Six **OR** Eight **OR** Four, step-up type, **as directed.**
 - ii. Wok **OR** Saute, **as directed**, Head: as directed by the Owner.
 - b) Griddle: Flat **OR** Raised, **as directed.**
 - c) Radiant Broiler: as directed by the Owner.
 - 2) Base Configuration:
 - a) Standard Oven(s): One **OR** Two, **as directed.**
 - b) Convection Oven(s): One **OR** Two, **as directed.**
 - c) Storage Base: One.
 - 3) Accessories:
 - a) High **OR** Double-deck, **as directed**, back shelf.
 - b) Stainless-steel sides.
 - c) Stainless-steel back.
 - d) Legs for curb base.
 - e) Toe Base: **4 inches (102 mm)** high.
 - f) Casters: as directed by the Owner.
 - g) Oven Rack(s): One for each oven.

- 4) Electrical Service: Equip unit for connection to service indicated on Drawings.
- 5) Gas Service: Natural **OR** Liquefied propane, **as directed**, gas.
2. Deep Fat Fryers:
 - a. Description: Electric fryer, solid-state controls **OR** Electric, programmable computer controls **OR** Gas fryer, **as directed**.
 - 1) Oil Capacity: **40 lb (18 kg) OR 85 lb (39 kg), as directed**.
 - 2) Accessories:
 - a) Stainless-steel sides.
 - b) Stainless-steel fry tank.
 - c) Stainless-steel fry tank cover.
 - d) Casters: as directed by the Owner.
 - e) Automatic basket lifts.
 - f) Single Fry Baskets: as directed by the Owner.
 - g) Twin Fry Baskets: as directed by the Owner.
 - h) Triple Fry Baskets: as directed by the Owner.
 - i) Quick gas-service disconnect and flexible hose.
 - 3) Electrical Service: Equip unit for connection to service indicated on Drawings.
 - 4) Gas Service: Natural **OR** Liquefied propane, **as directed**, gas.
3. Steam Jacketed Kettles:
 - a. Description: Stainless steel, Type 304.
 - 1) Type: Stationary **OR** Tilting, **as directed**.
 - 2) Steam Source: Electrically heated, self-contained **OR** Direct, **as directed**.
 - a) Maximum **OR** Operating, **as directed**, Steam Pressure: **50 psig (345 kPa) OR 25 psig (172 kPa), as directed**.
 - 3) Capacity: **10 quarts (9.5 L) OR 20 gal. (76 L), as directed**.
 - 4) Accessories:
 - a) Basket insert.
 - b) Lift-off cover.
 - c) Single **OR** Double, **as directed**, -pantry water filler.
 - d) Tangent Drawoff: **2 inches (50 mm) OR 3 inches (76 mm), as directed**.
 - e) Disc Strainer: **1/8 inch (3 mm), perforated OR solid, as directed**.
 - f) Interior Finish: Manufacturer's standard **OR** Stainless steel, Type 316, **as directed**.
 - g) Cold-water jacket cooling.
 - h) Steam trap assemblies.
 - i) Kettle brush kit.
 - 5) Electrical Service: Equip unit for connection to service indicated on Drawings.
 - b. Stainless-Steel Sheet: ASTM A 240/A 240M, austenitic stainless steel, type as indicated.
 - c. Stainless-Steel Finish: Directional satin finish, No. 4.
4. Ovens:
 - a. Description: Electric convection **OR** Gas convection **OR** Rotisserie, **as directed**.
 - 1) Single deck **OR** Double deck **OR** Single deck with open stand, **as directed**.
 - 2) Accessories:
 - a) Oven Rack(s): One per oven chamber.
 - b) Stainless-steel drip pan.
 - c) Down-draft flue diverter.
 - d) Stacking kit.
 - 3) Electrical Service: Equip unit for connection to service indicated on Drawings.
 - 4) Gas Service: Natural **OR** Liquefied propane, **as directed**, gas.
5. Microwave Ovens:
 - a. Description: 1200-W cooking power.
 - 1) Electrical Service: Equip unit with plug and cord for 120-V service.
6. Coffee Urns:
 - a. Description: Single **OR** Twin **OR** Triple, **as directed**, urn.
 - 1) Capacity: **3 gal. (11 L) OR 6 gal. (23 L) OR 10 gal. (38 L), as directed**, per liner.
 - 2) Type: Electric **OR** Gas **OR** Steam, **as directed**, heated.

- 3) Agitator: Automatic **OR** Push button, **as directed**.
- 4) Spray Arm: With **OR** Without, **as directed**, bypass.
- 5) Timer: Digital **OR** Electromechanical, **as directed**.
- 6) Accessories:
 - a) Fill/Dispense: as directed by the Owner.
 - b) Multiple Faucet: as directed by the Owner.
 - c) Filtering: Permanent, stainless-steel, woven-wire cloth **OR** Disposable filter paper, **as directed**.
 - d) Finish: Manufacturer's standard **OR** Brass body and trim **OR** Copper body and brass trim, **as directed**.
- b. Electrical Service: Equip unit for connection to service indicated on Drawings.
- c. Gas Service: Natural **OR** Liquefied propane, **as directed**, gas.
- d. Operating Steam Pressure: As indicated on Drawings **OR** As directed.

D. Self-Contained Refrigeration Equipment**1. Refrigerators **OR** Freezers, **as directed**:**

- a. Description: Reach-in **OR** Roll-in **OR** Pass-through, **as directed**, type.
 - 1) Exterior Finish: Stainless steel.
 - 2) Interior Finish: Stainless steel **OR** Manufacturer's standard, **as directed**.
 - 3) Doors: Full length **OR** Half length **OR** In configuration shown on Drawings, **as directed**.
 - 4) Accessories:
 - a) Casters.
 - b) Stainless-steel back with rear louvers.
 - c) Re-hinging feature for doors.
 - d) Hinged glass doors and fluorescent fixtures.
 - e) Tray Slides: For sheet pans.
 - f) Chrome-Plated **OR** Stainless-Steel, **as directed**, Shelves: Quantity, as directed by the Owner.
 - g) Loading Rack: as directed by the Owner.
 - h) Transfer Carriage: as directed by the Owner.
 - 5) Electrical Service: Equip unit with plug and cord for service indicated on Drawings.

2. Undercounter Refrigerators **OR Freezers, **as directed**:**

- a. Description: Compact unit with rear-mounted, self-contained refrigeration system.
 - 1) Accessories:
 - a) Stainless-steel top with backsplash.
 - b) Stainless-steel back panel.
 - c) Casters: **6 inches (152 mm) OR 4 inches (102 mm) OR 3-1/2 inches (89 mm), as directed**, high.
 - d) Utility Base: **6 inches (152 mm)** high.
 - e) Shelves: Description and quantity, as directed by the Owner.
 - f) Stacking kit.
 - 2) Electrical Service: Equip unit with plug and cord for service indicated on Drawings.

3. Merchandiser Refrigeration Units:

- a. Description: Curved-glass, self-contained refrigerator **OR** Sliding-glass, self-contained refrigerator **OR** Sliding-glass, self-contained freezer, **as directed**.
 - 1) Exterior Finish: Manufacturer's standard **OR** Stainless steel, **as directed**.
 - 2) Interior Finish: Manufacturer's standard **OR** Stainless steel **OR** White, **as directed**.
 - 3) Accessories:
 - a) Door locks.
 - b) Fluorescent Light Fixtures: Quantity, as directed by the Owner.
 - c) Base: as directed by the Owner.
 - d) Casters: as directed by the Owner.
 - e) Legs: as directed by the Owner.
 - f) Chrome-Plated Shelves: Quantity, as directed by the Owner.

- 4) Electrical Service: Equip unit with plug and cord for service indicated on Drawings.
4. Ice-Making Machine:
 - a. Description: Undercounter **OR** Freestanding, **as directed**, units.
 - 1) Production: Ice cubes **OR** cubes, dice **OR** cubes, half dice **OR** flakes **OR** chiplets (compacted flake ice), **as directed**.
 - 2) Capacity: as directed by The Owner per 24-hour period.
 - 3) Accessories:
 - a) Storage Bin: as directed by the Owner..
 - i. Stainless-steel stand and legs.
 - b) Water filter.
 - 4) Electrical Service: Equip unit for connection to service indicated on Drawings.
- E. Walk-In Refrigeration Equipment
 1. Walk-in Refrigeration Units:
 - a. Description: Cooler **OR** Freezer **OR** Two-compartment unit, with cooler and freezer compartments, **as directed**.
 - 1) Wall and Ceiling Panels: Interlocking insulating panels.
 - 2) Floors: Insulated floor panels **OR** Field installed; provide manufacturer's standard insulated floor screed, **as directed**.
 - 3) Doors:
 - a) Hinges: Two per door **OR** Self-closing and spring loaded; three per door, **As directed**.
 - b) Latch: Edge-mounted, positive-type latch with cylinder lock.
 - c) Include an accessible safety-release handle that opens door from inside when door is locked per building code.
 - 4) Door Accessories:
 - a) Vision port: Install per building code. The bottom of the glass not higher than 43" AFF.
 - b) Pressure relief port.
 - c) Threshold: Stainless steel, factory installed per building code.
 - d) Anticondensate heater at freezer doors.
 - 5) Vaporproof Lighting Fixtures: Incandescent fixture with 100-W lamp.
 - a) Control: Neon pilot light and toggle switch located on exterior of door panel.
 - b) Quantity: One per compartment, located on door panel.
 - 6) Refrigeration System: Self-contained, mounted on unit **OR** Remote system with preassembled condensing unit and evaporator assemblies.
 - a) Exterior Condensing Units: Include winter control, crankcase heater, and enclosed weatherproof housing.
 - b) Operating Temperature: as directed by the Owner.
 - 7) Temperature Monitoring System: Electronic monitoring and remote audible alarm system that warns when temperatures register **10 deg F (6 deg C)** above or below set temperature.
 - 8) Closure Panels and Trim: Include closure panels and trim.
 - 9) Electrical Service: Equip unit for connection to service indicated on Drawings.
 - b. Finishes:
 - 1) Exposed Exterior Finish: Stucco-patterned aluminum **OR** Smooth, mill-finished aluminum **OR** White-painted aluminum, **as directed**.
 - 2) Unexposed Exterior Finish: Stucco-patterned, metallic-coated steel.
 - 3) Interior Finish: Stucco-patterned aluminum **OR** Smooth, mill-finished aluminum **OR** White-painted aluminum, **as directed**.
 - 4) Closure Panels and Trim: Matched to exposed exterior finish of panels.
- F. Powered Food-Preparation Equipment
 1. Mixers **OR** Slicers **OR** Meat Saws **OR** Peelers, **as directed**:
 - a. Description: as directed by the Owner.
 - b. Accessories: as directed by the Owner.

c. Electrical Service: Equip unit with plug and cord for service indicated on Drawings.

G. Warewashing Equipment

1. Warewashing Machines:

- a. Description: Dishwashing, single tank **OR** Dishwashing, double tank **OR** Dishwashing, rackless conveyor **OR** Dishwashing, with circular conveyor table **OR** Pot and pan washing, two racks **OR OR** Pot and pan washing, one rack, **as directed**.
- 1) Capacity: as directed by the Owner.
 - 2) Accessories: as directed by the Owner.
 - 3) Electrical Service: Equip unit for connection to service indicated on Drawings.

H. Serving Equipment

1. Modular Counters:

- a. Description: Hot food **OR** Refrigerated salad **OR** Ice-cooled salad **OR** Sliding-glass door refrigerated **OR** Frost-top **OR** Sandwich **OR** Pizza **OR** Refrigerated-chest **OR** Dual-temperature **OR** Tray-starter **OR** Storage **OR** Cashier, **as directed**, module.
- 1) Cabinet Face Panels: Manufacturer's standard.
 - 2) Accessories:
 - a) Tray slide.
 - b) Work shelf.
 - c) Casters.
 - d) Electrical receptacle.
 - e) Cam-action latch locks with trigger release to mate with adjoining modular counters.
 - f) Tempered-glass, food-protector shield.
 - 3) Electrical Service: Equip unit for connection to service indicated on Drawings.
 - 4) Color: As selected from manufacturer's full range.
 - 5) Install serving counters, tray slides, heights and reach depths per building code.

I. Utility Distribution Systems

1. Utility Distribution Systems:

- a. Description: Overhead **OR** Counter **OR** Island **OR** Tray-slide **OR** Steam **OR** Wall-mounted, **as directed**, system.
- b. Accessories: as directed by the Owner.

J. Miscellaneous Materials

1. Installation Accessories, General: NSF certified for end-use application indicated.
2. Elastomeric Joint Sealant: ASTM C 920; silicone **OR** urethane, **as directed**. Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.
 - a. Public Health and Safety Requirements:
 - 1) Sealant is certified for compliance with NSF standards for end-use application indicated.
 - 2) Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.
 - b. Cylindrical Sealant Backing: ASTM C 1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

K. Finishes

1. Stainless-Steel Finishes:

- a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.

- 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
2. Powder-Coat Finishes: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

1.3 EXECUTION

A. Installation

1. Install foodservice equipment level and plumb, according to manufacturer's written instructions.
 - a. Connect equipment to utilities.
 - b. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.
2. Complete equipment assembly where field assembly is required.
 - a. Provide closed butt and contact joints that do not require a filler.
 - b. Grind field welds on stainless-steel equipment until smooth and polish to match adjacent finish.
3. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.
4. Install cabinets and similar equipment on bases in a bed of sealant.
5. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.
6. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

B. Cleaning And Protecting

1. After completing installation of equipment, repair damaged finishes.
2. Clean and adjust equipment as required to produce ready-for-use condition.
3. Protect equipment from damage during remainder of the construction period.

C. Demonstration

1. Train the Owner's maintenance personnel to adjust, operate, and maintain foodservice equipment.

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SECTION 11 30 13 13 - RESIDENTIAL APPLIANCES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for residential appliances. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes:
 - a. Cooking appliances.
 - b. Kitchen exhaust ventilation.
 - c. Refrigeration appliances.
 - d. Cleaning appliances
 - e. Trash compactors.

C. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, dimensions, furnished accessories, and finishes for each appliance.
2. LEED Submittal:
 - a. Product Data for Credit EA 1.4 or LEED for Homes Credit EA9: For appliances, documentation indicating that products are ENERGY STAR rated.
3. Samples: For each exposed finish.
4. Product Schedule: For appliances; use same designations indicated on Drawings.
5. Qualification Data: For qualified Installer or manufacturer.
6. Product Certificates: For each type of appliance, from manufacturer.
7. Field quality-control reports.
8. Operation and Maintenance Data: For each residential appliance to include in operation and maintenance manuals.
9. Warranties: Special warranties specified in this Section.

D. Quality Assurance

1. Manufacturer Qualifications: Maintains a service center capable of providing training, parts, and emergency maintenance repairs.
2. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.
3. Source Limitations: Obtain residential appliances from single source and each type of residential appliance from single manufacturer.
4. High-Altitude and Propane Conversion: Provide gas-operated appliances with manufacturer's conversion kit installed by a qualified service agency according to manufacturer's written instructions for Project location and type of fuel.
5. Regulatory Requirements: Comply with the following:
 - a. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - b. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.
6. Accessibility: Where residential appliances are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1," **as directed**.
7. Preinstallation Conference: Conduct conference at Project site.

E. Warranty

1. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Two **OR** Five years, **as directed**, from date of Final Completion.
2. Electric Cooktop **OR** Range: Full warranty including parts and labor **OR** Limited warranty including parts and labor for first year and parts thereafter for on-site service on surface-burner elements, **as directed**.
 - a. Warranty Period: Two **OR** Five years, **as directed**, from date of Final Completion.
3. Microwave Oven: Full warranty including parts and labor **OR** Limited warranty including parts and labor for first year and parts thereafter for on-site service on the magnetron tube, **as directed**.
 - a. Warranty Period: Two **OR** Five years, **as directed**, from date of Final Completion.
4. Refrigerator/Freezer **OR** Freezer **OR** Ice maker, Sealed System: Full warranty including parts and labor **OR** Limited warranty including parts and labor for first year and parts thereafter for on-site service on the product, **as directed**.
 - a. Warranty Period for Sealed Refrigeration System: Two **OR** Five years, **as directed**, from date of Final Completion.
 - b. Warranty Period for Other Components: Two years from date of Final Completion.
5. Dishwasher: Full warranty including parts and labor **OR** Limited warranty including parts and labor for first year and parts thereafter for on-site service on the product, **as directed**.
 - a. Warranty Period for Deterioration of Tub and Metal Door Liner: Three **OR** Five **OR** 10 years, **as directed**, from date of Final Completion.
 - b. Warranty Period for Other Components: Two years from date of Final Completion.
6. Clothes Washer: Full warranty including parts and labor **OR** Limited warranty including parts and labor for first year and parts thereafter for on-site service on the product, **as directed**.
 - a. Warranty Period: Two **OR** Three years, **as directed**, from date of Final Completion.

1.2 PRODUCTS

A. Cooktops:

1. Electric Cooktop:
 - a. Width: **12 inches (305 mm) OR 30 inches (762 mm) OR 36 inches (914 mm)**, **as directed**.
 - b. Electric Burner Elements: Two **OR** Four **OR** Six, **as directed**.
 - c. Coil Type: Manufacturer's standard **OR** Two 1200 W and two 2200 W **OR** One 1200 W, one 2200-W dual element, and two 2200 W, **as directed**.
 - d. Radiant Type: Two 1500 W and two 2000 W **OR** One 1200-W element, dual 1500-W/1500-W bridge element, and one 1200-W/2500-W expandable element **as directed**.
 - e. Induction Type: Manufacturer's standard **OR** Two 1200 W and two 1800 W **OR** One 1200 W, one 1800 W, one 2700 W, and one 3300 W, **as directed**.
 - f. Controls: Digital panel controls, located on front **OR** on left side **OR** on right side **OR** remotely, where indicated, **as directed**.
 - g. Downdraft Ventilation: Manufacturer's standard **OR** **550 cfm (260 L/s)** **as directed**, built-in downdraft ventilation, with remote blower and exterior weatherproof wall cap.
 - h. Other Features: Grill **OR** deep fryer **OR** wok burner and wok ring, **as directed**.
 - i. Electric Power Supply: 240 V, 60 Hz, 1 phase, 30 A, **as directed**.
 - j. Top Material: Manufacturer's standard **OR** Ceramic glass **OR** Porcelain-enamel steel **OR** Stainless steel, **as directed**.
 - 1) Color/Finish: White **OR** Black, **as directed**.
2. Gas Cooktop
 - a. Width: **12 inches (300 mm) OR 30 inches (760 mm) OR 36 inches (915 mm)**, **as directed**.
 - b. Gas Burners: Two **OR** Four **OR** Six, **as directed**.
 - 1) Power Ratings: Manufacturer's standard **OR** One **5000 Btu/h (1500 W)**, two **9100 Btu/h (2700 W)**, and one **12,000 Btu/h (3500 W)**, **as directed**.
 - 2) Grates: Individual **OR** Continuous, **as directed**.

- c. Controls: Digital panel **OR** Manual-dial controls, located on front **OR** left side **OR** right side, **as directed**.
- d. Downdraft Ventilation: Manufacturer's standard **OR** 550 cfm (260 L/s), **as directed**, with remote, **as directed**, blower and exterior weatherproof wall cap.
- e. Other Features: Sealed burners **OR** Auto-reigniting **OR** Grill **OR** deep fryer **OR** wok burner and wok ring, **as directed**.
- f. Electric Power Supply: 120 V, 60 Hz, 1 phase, 30 A, **as directed**.
- g. Top Materials: Porcelain-enamel steel **OR** Ceramic glass **OR** glass **OR** Stainless steel **OR** Manufacturer's standard, **as directed**.
 - 1) Color/Finish: White **OR** Black, **as directed**.

B. Range:

- 1. Electric Range: Freestanding **OR** Slide-in **OR** Drop-in range, **as directed**, with one **OR** two oven(s), **as directed** and complying with AHAM ER-1.
 - a. Width: 30 inch (762 mm) **OR** 36 inch (914 mm), **as directed**.
 - b. Electric Burner Elements: Four **OR** Six, **as directed**.
 - 1) Coil Type: Manufacturer's standard **OR** Two 1200 W and two 2200 W **OR** One 1200 W, one 2200-W dual element, and two 2200 W, **as directed**.
 - 2) Radiant Type: Two 1500 W and two 2000 W **OR** One 1200-W element, dual 1500-W/1500-W bridge element, and one 1200-W/2500-W expandable element, **as directed**.
 - 3) Induction Type: Manufacturer's standard **OR** Two 1200 W and two 1800 W **OR** One 1200 W, one 1800 W, one 2700 W, and one 3300 W, **as directed**.
 - 4) Controls: Digital panel controls, located on front **OR** left side **OR** right side **OR** splash panel at rear of rangetop, **as directed**.
 - c. Oven Features:
 - 1) Capacity: 3.3 cu. ft. (0.09 cu. m).
 - 2) Operation: Baking **OR** convection **as directed**, and self-cleaning.
 - 3) Broiler: Located in top of oven **OR** separate roll-out drawer on bottom **as directed**.
 - 4) Oven Door(s): Counterbalanced, removable, with observation window and full-width handle.
 - 5) Electric Power Rating:
 - a) Oven(s): Manufacturer's standard **OR** 2400 W **as directed**.
 - b) Broiler: Manufacturer's standard **OR** 3500 W **as directed**.
 - 6) Controls: Digital panel controls and timer display, located on front **OR** left side **OR** right side **OR** splash panel at rear of rangetop, **as directed**.
 - d. Anti-Tip Device: Manufacturer's standard.
 - e. Electric Power Supply: 240 V, 60 Hz, 1 phase, 30 A.
 - f. Material Porcelain-enamel **OR** Stainless, **as directed**, with manufacturer's standard, **as directed**, cooktop.
 - a) Color/Finish: White **OR** Black, **as directed**.
- 2. Gas Range: Freestanding **OR** Slide-in range with one **OR** two ovens, **as directed**.
 - a. Width: 30 inch (762 mm) **OR** 36 inch (914 mm), **as directed**.
 - b. Gas Burners: Four **OR** Six, **as directed**.
 - 1) Power Ratings: Manufacturer's standard **OR** One 5000 Btu/h (1500 W), **as directed**, two 9100 Btu/h (2700 W), and one 12,000 Btu/h (3500 W).
 - 2) Controls: Digital panel **OR** Manual-dial controls, **as directed** located on front **OR** left side **OR** right side **OR** splash panel at rear of rangetop, **as directed**.
 - 3) Grates: Individual **OR** Continuous, **as directed**.
 - 4) Other Feature(s): Sealed burners **OR** auto-re-igniting burners, **as directed**, and grill.
 - c. Oven Features:
 - 1) Capacity: 3.3 cu. ft. (0.09 cu. m).
 - 2) Operation: Baking **OR** convection **as directed**, and self-cleaning.
 - 3) Broiler: Located in top of oven **OR** separate roll-out drawer on bottom **as directed**.

- 4) Oven Door(s): Counterbalanced, removable, with observation window and full-width handle.
 - 5) Electric Power Rating:
 - a) Oven(s): Manufacturer's standard **OR 9100 Btu/h (2700 W) as directed.**
 - b) Broiler: Manufacturer's standard **OR 14,500 Btu/h (4200 W) as directed.**
 - 6) Controls: Digital panel controls and timer display, located on front **OR** left side **OR** right side **OR** splash panel at rear of rangetop, **as directed.**
 - d. Anti-Tip Device: Manufacturer's standard.
 - e. Electric Power Supply: 240 V, 60 Hz, 1 phase, 15 A.
 - f. Material Porcelain-enamel **OR** Stainless, **as directed**, with manufacturer's standard, **as directed**, cooktop.
 - a) Color/Finish: White **OR** Black, **as directed.**
3. Dual Fuel Range Freestanding **OR** Slide-in range, **as directed**, with gas burners and one **OR** two electric ovens, **as directed.**
- a. Width: **30 inch (762 mm) OR 36 inch (914 mm), as directed.**
 - b. Gas Burners: Four **OR** Six, **as directed.**
 - 1) Power Ratings: Manufacturer's standard **OR** One **5000 Btu/h (1500 W), as directed**, two **9100 Btu/h (2700 W)**, and one **12,000 Btu/h (3500 W)**
 - 2) Controls: Digital panel **OR** Manual-dial controls, **as directed** located on front **OR** left side **OR** right side **OR** splash panel at rear of rangetop, **as directed.**
 - 3) Grates: Individual **OR** Continuous, **as directed.**
 - 4) Other Feature(s): Sealed burners **OR** auto-re-igniting burners, **as directed**, and grill.
 - c. Oven Features:
 - 1) Capacity: **3.3 cu. ft. (0.09 cu. m).**
 - 2) Operation: Baking **OR** convection **as directed**, and self-cleaning.
 - 3) Broiler: Located in top of oven **OR** separate roll-out drawer on bottom **as directed.**
 - 4) Oven Door(s): Counterbalanced, removable, with observation window and full-width handle.
 - 5) Electric Power Rating:
 - a) Oven(s): Manufacturer's standard **OR 2400 W as directed.**
 - b) Broiler: Manufacturer's standard **OR 3500 W as directed.**
 - 6) Controls: Digital panel controls and timer display, located on front **OR** left side **OR** right side **OR** splash panel at rear of rangetop, **as directed.**
 - d. Anti-Tip Device: Manufacturer's standard.
 - e. Electric Power Supply: 240 V, 60 Hz, 1 phase, 30 A.
 - f. Material Porcelain-enamel **OR** Stainless, **as directed**, with manufacturer's standard, **as directed**, cooktop.
 - 1) Color/Finish: White **OR** Black, **as directed.**
- C. Wall Oven:
- 1. Electric Wall Oven(s): One **OR** Two-oven unit, **as directed.**
 - a. Mounting: Built-in wall **OR** undercounter .
 - b. Capacity: **3.3 cu. ft. (0.09 cu. m).**
 - c. Operation: Baking **OR** convection and self-cleaning, **as directed.**
 - d. Broiler: Located in top of oven **OR** separate roll-out drawer on bottom, **as directed.**
 - e. Oven Door(s): Counterbalanced, removable, with observation window and full-width handle.
 - f. Electric Power Rating:
 - 1) Oven(s): Manufacturer's standard **OR 2400 W, as directed.**
 - 2) Broiler: Manufacturer's standard **OR 3500 W, as directed.**
 - g. Electric Power Supply: 240 V, 60 Hz, 1 phase, 30 A
 - h. Controls: Digital panel **OR** Manual-dial controls and timer display, **as directed.**

- 4) Built-in water filtration system.
 - 5) Dual refrigeration systems.
 - 6) Separate touch-pad temperature controls for each compartment.
 - e. Refrigerator Features:
 - 1) Interior light in refrigeration compartment.
 - 2) Compartment Storage: Wine racks **OR** vegetable crisper **OR** meat compartment, **as directed**.
 - 3) Door Storage: Glazed door without storage **OR** Modular compartments **OR** Gallon (3.8 L-) milk-container storage, **as directed**.
 - 4) Temperature-controlled meat/deli bin.
 - f. Freezer Features: One **OR** Two freezer compartment(s) with door(s) **OR** configured as pull-out drawer(s), **as directed**.
 - 1) Automatic **OR** Manual defrost, **as directed**.
 - 2) Interior light in freezer compartment.
 - 3) Automatic icemaker and storage bin.
 - g. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
 - h. Front Panel(s): Manufacturer's standard **OR** Wood panel(s) to match kitchen cabinets **OR** Porcelain enamel **OR** Stainless steel **OR** Wood-panel insert(s) specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert(s) specified in Division 12 Section "Residential Casework" to match kitchen cabinets **OR** Reversible panel(s) with choice of colors, **as directed**.
 - 1) Panel Color: White **OR** Black, **as directed**.
 - i. Appliance Color/Finish: White **OR** Black **OR** Stainless steel, **as directed**.
- G. Freezers
1. Freezer One **OR** Two freezer compartment(s) with door(s) **OR** configured as pull-out drawer(s), **as directed** and complying with AHAM HRF-1.
 - a. Type: Freestanding **OR** Built in **OR** Undercounter.
 - b. Dimensions:
 - 1) Width: 27 inches (686 mm) **OR** 30 inches (762 mm) **OR** 36 inches (914 mm), **as directed**.
 - 2) Depth: 24 inches (610 mm) **OR** 27 inches (686 mm), **as directed**.
 - 3) Height: 34-1/2 inches (876 mm) **OR** 70 inches (1778 mm) **OR** 73 inches (1854 mm) **OR** 84 inches (2134 mm), **as directed**.
 - c. Storage Capacity:
 - 1) Volume: 5.13 cu. ft. (0.15 cu. m) **OR** 15.0 cu. ft. (0.42 cu. m), **as directed**.
 - 2) Shelf Area: Three adjustable wire **OR** glass shelves, **as directed**, 26 sq. ft. (2.42 sq. m).
 - d. Features:
 - 1) Door Configuration: Framed **OR** Overlay, **as directed**.
 - 2) Automatic **OR** Manual defrost, **as directed**.
 - 3) Interior light in compartment.
 - 4) Automatic icemaker and storage bin.
 - 5) Temperature touch-pad controls for each compartment.
 - 6) Defrost drain.
 - 7) Lock with key.
 - e. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
 - f. Front Panel(s): Manufacturer's standard **OR** Wood panel(s) to match kitchen cabinets **OR** Porcelain enamel **OR** Stainless steel **OR** Wood-panel insert(s) specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert(s) specified in Division 12 Section "Residential Casework" to match kitchen cabinets, **as directed**.
 - 1) Panel Color: White **OR** Black, **as directed**.
 - g. Appliance Color/Finish: White **OR** Black **OR** Stainless steel, **as directed**.

H. Icemakers

1. Icemaker:
 - a. Type: Undercounter.
 - b. Dimensions:
 - 1) Width: **14-3/4 inches (375 mm) OR 15-1/4 inches (387 mm), as directed.**
 - 2) Depth: **24 inches (610 mm) OR 25-1/4 inches (641 mm), as directed.**
 - 3) Height: **33-5/8 inches (386 mm) OR 34-1/2 inches (876 mm), as directed.**
 - c. Ice Capacity:
 - 1) Production: **30 lb (13.6 kg) OR 50 lb (22.7 kg) per day, as directed.**
 - 2) Storage: **25 lb (11.3 kg) OR 35 lb (15.9 kg), as directed.**
 - d. Features:
 - 1) Door Configuration: Framed **OR** Overlay, **as directed.**
 - 2) Automatic defrost.
 - 3) Automatic shutoff.
 - 4) Defrost drain with pump.
 - e. Front Panel: Manufacturer's standard **OR** Wood panel to match kitchen cabinets **OR** Porcelain enamel **OR** Stainless steel **OR** Wood-panel insert specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert specified in Division 12 Section "Residential Casework" to match kitchen cabinets, **as directed.**
 - a) Panel Color: White **OR** Black, **as directed.**
 - f. Appliance Color/Finish: White **OR** Black **OR** Stainless steel, **as directed.**

I. Dishwashers

1. Dishwasher Complying with AHAM DW-1 and ASSE 1006.
 - a. Type: Built-in undercounter **OR** Built-in under sink **OR** Portable, **as directed.**
 - b. Dimensions:
 - 1) Width: **18 inches (457 mm) OR 24 inches (610 mm), as directed.**
 - 2) Depth: **23 inches (584 mm) OR 25-3/4 inches (654 mm), as directed.**
 - 3) Height: **34-1/2 inches (876 mm), as directed.**
 - c. Capacity:
 - 1) International Place Settings of China: Eight **OR** 12 **OR** 14, **as directed.**
 - 2) Water Consumption for Full Load: **3.2 gal. (12 L) per cycle.**
 - d. Sound Level: Maximum 42 **OR** 48 dB, **as directed.**
 - e. Tub and Door Liner: Manufacturer's standard **OR** Porcelain-enameled steel **OR** Stainless steel **OR** Porcelain-enameled steel tub and molded-plastic door liner, **as directed** with sealed detergent and automatic rinsing-aid dispensers.
 - f. Rack System: Nylon **OR** PVC-coated sliding dish racks, **as directed**, with removable cutlery basket **OR** top cutlery tray **as directed.**
 - g. Controls: Touch-pad **OR** Rotary-dial controls, **as directed**, with four wash cycles and hot-air and heat-off drying cycle options.
 - h. Features:
 - 1) Features in first three subparagraphs below are standard with most models.
 - 2) Waste food disposer.
 - 3) Self-cleaning food-filter system.
 - 4) Hot-water booster heater for **140 deg F (60 deg C) OR 160 deg F (71 deg C)** wash water with incoming water at **100 deg F (38 deg C).**
 - 5) Lock-out feature.
 - 6) Half-load option.
 - 7) Delay-wash option.
 - 8) Digital display panel.
 - 9) Water softener.
 - 10) Soil-sensing water use control system.

- i. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
 - j. Front Panel: Manufacturer's standard **OR** Wood panel to match kitchen cabinets **OR** Porcelain enamel **OR** Stainless steel **OR** Wood-panel insert specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert specified in Division 12 Section "Residential Casework" to match kitchen cabinets **OR** Reversible panel with choice of colors, **as directed**.
 - 1) Panel Color: White **OR** Black, **as directed**.
 - k. Appliance Color/Finish: White **OR** Black **OR** Stainless steel, **as directed** .
- J. Clothes Washers And Dryers
- 1. Clothes Washer Complying with ASSE 1007:
 - a. Type: Freestanding **OR** Stacking **OR** Undercounter, top **OR** front-loading unit.
 - b. Dimensions:
 - 1) Width: **23-1/2 inches (597 mm) OR 27 inches (686 mm) OR 30 inches (762 mm), as directed.**
 - 2) Depth: **24 inches (610 mm) OR 29 inches (737 mm) OR 31 inches (787 mm), as directed.**
 - 3) Height: **34-1/2 inches (876 mm) OR 38 inches (965 mm) OR 45 inches (1143 mm), as directed.**
 - c. Drum: Manufacturer's standard **OR** Perforated porcelain-enameled steel **OR** Perforated stainless steel, **as directed**.
 - 1) Capacity: **2.7 cu. ft. (0.08 cu. m) OR 3.2 cu. ft. (0.09 cu. m) OR 3.8 cu. ft. (0.11 cu. m).**
 - d. Controls: Touch-pad **OR** Rotary-dial controls, **as directed**, for water-fill levels, wash/rinse water temperatures, and variable-speed and fabric selectors.
 - 1) Wash Cycles: Four **OR** Six **OR** 10 wash cycles, **as directed**, including regular, delicate, and permanent press.
 - 2) Wash Temperatures: Three settings.
 - 3) Speed Combinations: Two **OR** Four **OR** Five, **as directed**.
 - e. Electrical Power: 120 V, 60 Hz, 1 phase.
 - f. Motor: Manufacturer's standard with built-in overload protector.
 - g. Features:
 - 1) Agitator: Center spindle **OR** Impeller (without spindle), **as directed**.
 - 2) Self-cleaning lint filter.
 - 3) Unbalanced-load compensator.
 - 4) Inlet Hoses: Minimum length **60 inches (1525 mm).**
 - 5) Drain Hoses: Minimum length **48 inches (1220 mm).**
 - 6) Self-leveling legs.
 - 7) Automatic dispenser for bleach **OR** fabric softener **OR** and **OR** detergent, **as directed**.
 - 8) Spin-cycle safety switch.
 - 9) End-of-cycle signal.
 - 10) Extra-rinse option.
 - 11) Delay-wash option.
 - 12) Electronic temperature control.
 - 13) Water levels automatically set.
 - 14) Pedestal: **8-inch- (203-mm-) high OR 15-inch- (381-mm-) high OR** Manufacturer's standard height laundry pedestal , **as directed**, with storage drawer, matching appliance finish.
 - h. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
 - i. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
 - j. Appliance Finish: Porcelain enamel on top and lid; baked enamel on front and sides **OR** Stainless steel, **as directed**.

- 1) Color: White **OR** Almond, **as directed**.
 - k. Front-Panel Finish: Manufacturer's standard **OR** Wood panel to match kitchen cabinets **OR** Porcelain enamel **OR** Stainless steel **OR** Wood-panel insert specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert specified in Division 12 Section "Residential Casework" to match kitchen cabinets, **as directed**.
 - 1) Panel Color: White **OR** Black, **as directed**.
 - 2. Clothes Dryer Complying with AHAM HLD-1:
 - a. Type: Freestanding **OR** Stacking **OR** Undercounter, **as directed**, frontloading, gas **OR** electric **OR** electric, ventless unit, **as directed**..
 - b. Dimensions:
 - 1) Width: 23-1/2 inches (597 mm) **OR** 27 inches (686 mm), **as directed**.
 - 2) Depth: 24 inches (610 mm) **OR** 31 inches (787 mm), **as directed**.
 - 3) Height: 34-1/2 inches (876 mm) **OR** 36 inches (914 mm), **as directed**.
 - c. Drum: Manufacturer's standard **OR** Perforated porcelain-enameled steel **OR** Perforated stainless steel, **as directed**.
 - 1) Capacity: 5.7 cu. ft. (0.16 cu. m) **OR** 7.0 cu. ft. (0.20 cu. m), **as directed**.
 - d. Controls: Touch-pad **OR** Rotary-dial controls for drying cycle, **as directed**, temperatures, and fabric selectors.
 - e. Electric-Dryer Power: 240 V, 60 Hz, 1 phase, 30 A.
 - f. Gas-Dryer Power: 120 V, 60 Hz, 1 phase, 15 A electric; 22,000-Btu/h (6400-W) gas.
 - g. Features:
 - 1) Features in first five subparagraphs below are standard with most manufacturers.
 - 2) Removable lint filter.
 - 3) Electronic temperature and moisture level sensor control.
 - 4) End-of-cycle signal.
 - 5) Interior drum light.
 - 6) Self-leveling legs.
 - 7) Antibacterial cycle.
 - 8) Auxiliary drying rack.
 - 9) Built-in electrical power fuse.
 - 10) Stacking kit to stack dryer over washer.
 - 11) Pedestal: 8-inch- (203-mm-) high **OR** 15-inch- (381-mm-) high **OR** Manufacturer's standard height laundry pedestal, **as directed**, with storage drawer, matching appliance finish.
 - h. Appliance Finish: Porcelain enamel on top and lid; baked enamel on front and sides **OR** Stainless steel, **as directed**.
 - 1) Color: White **OR** Almond, **as directed**.
 - i. Front-Panel Finish: Manufacturer's standard **OR** Wood panel to match kitchen cabinets **OR** Porcelain enamel **OR** Stainless steel **OR** Wood-panel insert specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert specified in Division 12 Section "Residential Casework" to match kitchen cabinets.
 - 1) Panel Color: White **OR** Black, **as directed**.
- K. Clothes Washer/Dryer Combinations
 - 1. Clothes Washer/Dryer Combination Complying with ASSE 1007.
 - a. Type: Freestanding washer/dryer unit with dual-drum design and electric dryer **OR** dual-drum design and gas dryer **OR** all-in-one, single-drum design, **as directed**; washer is top **OR** front loading, **as directed**.
 - b. Dimensions:
 - 1) Width: 23-1/2 inches (597 mm) **OR** 27 inches (686 mm), **as directed**.
 - 2) Depth: 25 inches (635 mm) **OR** 32 inches (813 mm), **as directed**.
 - 3) Height: 34-1/2 inches (876 mm) **OR** 71-1/2 inches (1816 mm), **as directed**.
 - c. Washer and Dryer Drums: Manufacturer's standard **OR** Perforated porcelain-enameled steel **OR** Perforated stainless steel, **as directed**.

- 1) Washer-Drum Capacity: **1.5 cu. ft. (0.04 cu. m) OR 2.0 cu. ft. (0.06 cu. m) OR 2.6 cu. ft. (0.07 cu. m), as directed.**
- 2) Dryer-Drum Capacity: **2.0 cu. ft. (0.06 cu. m) OR 3.4 cu. ft. (0.10 cu. m) OR 5.9 cu. ft. (0.17 cu. m), as directed.**
- d. Washer/Dryer Drum: Manufacturer's standard **OR** Perforated stainless steel, **as directed.**
 - 1) Drum Capacity: **2.3 cu. ft. (0.07 cu. m).**
2. Washer Controls: Touch-pad **OR** Rotary-dial controls for water-fill levels, **as directed**, wash/rinse water temperatures and variable-speed and fabric selectors.
3. Dryer Controls: Touch-pad **OR** Rotary-dial controls for drying cycle, **as directed**, temperatures and fabric selectors.
 - a. Wash Cycles: Three wash cycles including regular, delicate, and permanent press.
 - b. Wash Temperatures: Three settings.
 - c. Speed Combinations: Two.
4. Electric Washer/Dryer Power: 240 V, 60 Hz, 1 phase, 30 A **OR** 120 V, 60 Hz, 1 phase, 15 A, **as directed.**
5. Gas Washer/Dryer Power: 120 V, 60 Hz, 1 phase, 15 A electric; **22,000-Btu/h (6400-W)** gas.
6. Motor: Manufacturer's standard with built-in overload protector.
7. Washing Features:
 - a. Self-cleaning lint filter.
 - b. Unbalanced-load compensator.
 - c. Inlet Hoses: Minimum length **60 inches (1525 mm).**
 - d. Drain Hoses: Minimum length **48 inches (1220 mm).**
 - e. Self-leveling legs.
 - f. Automatic dispenser for bleach, fabric softener and **OR** detergent.
 - g. Spin-cycle safety switch.
8. Drying Features:
 - a. Removable lint filter.
 - b. Electronic temperature and moisture level sensor control.
 - c. End-of-cycle signal.
 - d. Interior drum light.
9. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.
10. Water-Efficient Clothes Washer: Provide clothes washer with modified energy factor greater than or equal to 2.0 and water factor less than 5.5.
11. Appliance Finish: Porcelain enamel on top and lid; baked enamel on front and sides **OR** Stainless steel, **as directed.**
 - 1) Color: White **OR** Almond, **as directed.**

L. Trash Compactors

- a. Type: Built in **OR** Convertible, **as directed.**
- b. Width: **15 inches (381 mm) OR 18 inches (457 mm), as directed.**
- c. Capacity: **1.4 cu. ft. (0.04 cu. m) OR 1.7 cu. ft. (0.05 cu. m), as directed.**
- d. Features:
 - 1) Key-operated starting switch.
 - 2) Rear wheels.
 - 3) Removable bag carrier.
 - 4) Retainer for disposable bags.
 - 5) Odor-control mechanism.
 - 6) Foot-operated drawer operator.
- e. Front Panel: Manufacturer's standard **OR** Wood panel to match kitchen cabinets **OR** Enameled steel **OR** Stainless steel **OR** Wood-panel insert specified in Division 06 Section "Interior Architectural Woodwork" to match kitchen cabinets **OR** Wood-panel insert specified in Division 12 Section "Residential Casework" to match kitchen cabinets, **as directed.**
 - a) Panel Color: White **OR** Black, **as directed.**

M. General Finish Requirements

1. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.3 EXECUTION

A. Examine

1. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.
2. Examine roughing-in for piping systems to verify actual locations of piping connections before appliance installation.
3. Examine walls, ceilings, and roofs for suitable conditions where overhead exhaust hoods **OR** downdraft exhaust and microwave ovens with vented exhaust fans will be installed.
4. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation, General

1. General: Comply with manufacturer's written instructions.
2. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.
3. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.
4. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions
5. Utilities: Refer to Division 21 AND Division 26 for plumbing and electrical requirements.

C. Field Quality Control

1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.
 - b. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After installation, start units to confirm proper operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.
3. An appliance will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports.

END OF SECTION 11 30 13 13

SECTION 11 30 13 13a - REFRIGERATORS

1.1 GENERAL

A. Summary

1. Section Includes:
 - a. Remove existing refrigerators.
 - b. Refrigerators supply and deliver only or supply and install as scheduled.
2. Related Requirements: Comply with requirements of following sections:
 - a. Contractor Use of Premises and Work Sequence
 - b. Section "Alteration Project Procedures."
3. Related Sections:
 - a. Kitchen Renovation Requirements; "Summary of Work"
 - b. Reference Standards: Section "References."

B. References

1. Reference Standards: See Section "References." Comply with following:
 - a. Association of Home Appliance Manufacturers (AHAM) HRF-1 - Standard for Household Refrigerators and Household Freezers, 1988.
 - 1) ASTM B 117 - Salt Spray (Fog) Testing.
 - b. ANSI/UL 250 - Household Refrigerators and Freezers, 1991.
 - c. Certification:
 - 1) ANSI Z34.2 - Certification, Self-Certification by Producer or Supplier, 1987.

C. Definitions

1. Configurations:
 - a. SD: Single Door.
 - b. TF: Top Freezer.
 - c. BF: Bottom Freezer.
 - d. SS: Side-by-Side.
2. Defrost System:
 - a. M: Manual Defrost: Defrost system in which defrosting action for refrigerated surfaces is initiated manually.
 - b. P: Partial Automatic: Defrost system in which defrosting action for refrigerated surfaces in refrigerator compartment is initiated and terminated automatically and defrosting action for refrigerated surfaces in freezer is initiated manually.
 - c. A: Automatic Defrost: Defrost system in which defrosting action for all refrigerated surfaces is initiated and terminated automatically.
3. Efficiency Standards:
 - a. Refrigerator: Cabinet designed for refrigerated storage of food at temperatures above 0 degrees C (32 degrees F) and may include compartment for freezing and storage of food at temperatures below 0 degrees C (32 degrees F), but does not provide separate low temperature compartment designed for freezing and storage of food at temperatures below minus 13 degrees C (8 degrees F).
 - b. Refrigerator-freezer: Cabinet with two or more compartments with at least one compartment designed for refrigerated storage of food at temperatures above 0 degrees C (32 degrees F) and with at least one compartment designed for freezing and storage of food at temperatures below minus 13 degrees C (8 degrees F).
 - c. AV: Adjusted Volume:
 - 1) Refrigerator: [1.44 x freezer volume (cubic feet)] + refrigerator volume (cubic feet).
 - 2) Refrigerator-freezer: [1.63 x freezer volume (cubic feet)] + refrigerator volume (cubic feet).
4. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by PHA/IHA.

D. System Description

1. Performance Requirements: Comply with following:
 - a. Refrigerators: Capable of producing average cabinet air temperature in general food storage compartment of 2.2 degrees C (36 degrees F) in ambient of 21.1 degrees C (70 degrees F), and 3.3 degrees C (38 degrees F) in ambient of 43.3 degrees C (110 degrees F).
 - 1) Performance Test Procedures: As specified in AHAM HRF-1.
 - b. Plastic Compartment and Door Liners: Not show any cracks or crazing when tested under Environment Cracking Resistance Test specified in AHAM HRF-1.
 - 1) Single-Piece Liners Testing: As specified in AHAM HRF-1, paragraph 10.6.
2. Efficiency Standards: Provide refrigerators which do not exceed following annual energy consumption in kWh:
 - a. Refrigerators and Refrigerator-freezers with Manual Defrost: 13.5 AV plus 299.
 - b. Refrigerator-freezers with Partial Automatic Defrost: 10.4 AV plus 398.
 - c. Refrigerator-freezers with Automatic Defrost with Top Mounted Freezer without Through-the-door Ice Service: 16.0 AV plus 355.
 - d. Refrigerator-freezers with Automatic Defrost with Side Mounted Freezer without Through-the-door Ice Service: 11.8 AV plus 501.
 - e. Refrigerator-freezers with Automatic Defrost with Bottom Mounted Freezer without Through-the-door Ice Service: 16.5 AV plus 367.

E. Submittal

1. Product Data: Submit to Contracting Officer.
2. Samples:
 - a. Production Sample: When requested, provide sample refrigerator to Contracting Officer for examination as to compliance with specifications.
 - b. Color Samples: Submit samples of manufacturer s standard colors to Contracting Officer for selection.
3. Quality Assurance/Control Submittals: Submit following to Contracting Officer:
 - a. Certificates: Manufacturer's written self certification that refrigerators meet or exceed specified requirements.
 - b. Manufacturer's installation instructions.
4. Closeout Submittals: Submit following to Contracting Officer:
 - a. Operation and Maintenance: Provide use and care information with each refrigerator. Include parts manual with diagrams and part numbers.
 - b. Special warranty.

F. Quality Assurance

1. Qualifications: Manufacturer: Stock and sell parts for refrigerators supplied for five years from time of delivery.
2. Regulatory Requirements: Comply with following:
 - a. EPA regulations regarding refrigerant.
 - b. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4151-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (42 USC §§ 12101, et seq.) and implementing regulations (28 CFR Part 35).
3. Appliances shall meet or exceed requirements established by the Energy Star program and bear the Energy Star logo. Visit www.energystar.gov for a listing of products that qualify. Energy Star® is a voluntary partnership that includes the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities, and retailers, helps

promote efficient products by labeling them with the Energy Star logo and educating consumers about the benefits of energy efficiency.

- G. Delivery, Storage, And Handling
 - 1. Packing, Shipping, Handling, and Unloading: In accordance with standard commercial practices.
 - 2. Acceptance at Site: Inspect refrigerators upon delivery. Replace damaged or defective appliances before installation.

- H. Scheduling
 - 1. Scheduling and Completion: Comply with requirements of Division 1.

- I. Warranty
 - 1. Special Warranties: Provide following written special warranties:
 - a. Plastic parts of cabinet for period of two years.
 - b. Sealed refrigerator cooling system for five years.
 - 1) Provide new or reconditioned cooling system units or components, replacing units and/or parts which become defective (excluding damage due to visible abuse) during five year period.
 - c. Entire refrigerator for one year.
 - 2. Special Warranty Periods: If refrigerator becomes inoperative, as defined in following paragraph, repair or replace and install any part (except enamel, porcelain or lacquer) necessary to make refrigerator operative within five working days of notification.
 - a. Inoperative Refrigerator: When interior cabinet temperature rises above 10.0 degrees C (50 degrees F) and remains at such temperature for six or more consecutive hours after usual normal adjustments have been made or other mechanical and electrical trouble affecting normal operations has been corrected.
 - 3. Special Warranties: Include labor, material and equipment to provide replacements and make repairs to refrigerators at no additional cost to PHA/IHA.
 - a. Defective Units and/or Parts: Become property of Contractor.
 - b. Submit name and address of local agent who will furnish service and replacement parts in connection with warranties to PHA/IHA.
 - 1) Charges by local service agent to PHA/IHA for services covered under special warranties not allowed.

1.2 PRODUCT

- A. Refrigerators - General Requirements
 - 1. Refrigerators: Household type, self-contained with electric-motor-driven condensing units and comply with Performance Requirements and Energy Standard Requirements.
 - 2. Types, Sizes and Grades: As specified and scheduled.
 - 3. Total Storage Volumes, Shelf Areas and Dimensions: In accordance with descriptions and computed in accordance with AHAM HRF-1.

- B. Refrigerators Cabinets
 - 1. Outer Shells (including Doors): Carbon-steel sheet finished in baked synthetic enamel.
 - a. Colors: As scheduled from manufacturer s standard colors.
 - 2. Exterior Doors: Provide with reversible hinges for right or left hand swing except on side-by-side (SS) configuration.
 - a. Construction of Freezer or Evaporator Door and Hinging: Door may be operated without breaking, cracking, or distorting when freezer or evaporator is free from or has maximum thickness of 6 mm (1/4 inch) of frost on outer surface of evaporator adjacent to door.
 - b. Exterior Doors: Equipped with magnetic gasket.
 - c. Doors: Contain shelves.
 - 3. Interior Liners of (including General and Low-Temperature) Storage Compartments and Doors: Porcelain enamel on carbon-steel or molded plastic.

- a. Carbon-Steel Sheet Inner Liners: Porcelain enamel or baked synthetic enamel finish.
 - b. Color of Plastic Inner Liners: White or pastel.
 - c. Plastic Liners in Conjunction with Foamed-In-Place Polyurethane Employing Fluorinated Hydrocarbons: Isolate liner material from polyurethane foam or fabricate of acrylonitrile butadiene styrene (ABS) or High Impact Polystyrene (HIPS).
 - d. Breaker Strips: ABS plastic, polypropylene, or HIPS when insulation is foamed-in-place polyurethane with fluorinated hydrocarbons.
 4. Drawers and Trays:
 - a. Vegetable Drawers or Crisper Trays: Provide one or more trays occupying full width of food compartment and readily removable.
 - b. Drawers or Trays: Constructed of steel finished with porcelain enamel, anodized aluminum, or durable plastic; durable glass; or non-corrosive metal.
 - c. Ice Cube Trays: Provide minimum of two standard size ice cube trays.
 - d. Defrosting or Chiller Tray: Made of material suitable for intended service and of adequate size to receive drip from cooling unit during defrosting.
 5. Hardware Components: Sturdy construction and made of material that are durable and structurally correct for application.
 - a. Hardware Attachment Devices (screws, bolts and nuts): Of material and finish consistent with material of components and parts which they are used.
 - b. Hardware Finish: Remain intact after being subjected to salt spray test for period of 25 hours in accordance with ASTM B 117.
 - 1) Center Section of Door Handle: Vinyl covered steel is acceptable.
 - c. Food Compartment Door Hinges: May be same finish as specified for outer panel of food compartment door.
 - d. Hardware: Securely attached in substantial manner and to extent that removal may not be accomplished without use of tools.
 6. Manual Defrost and Partial Defrost Refrigerators: Provide clear and legible caution similar to following: Do not use implements to defrost or to remove ice trays or other material from freezer section.
 - a. Location: Print or impress on freezer door or on name plate securely fastened in another prominent position easily read by user.
- C. Refrigerators Components
1. Electrical Components and Parts: Locate and mount controls, lamp socket, relay, switches, thermostat, wiring harness, cables and leads and their accessories in manner that their replacement may be readily accomplished.
 - a. Electrical Assemblies and Harness: Design and manufacture so that replacement of complete assembly or harness is not necessary when any component part of assembly becomes defective or inoperative.
 - b. Individual Components and Parts of Assemblies and Harness: Obtainable for relatively simple replacement purposes.
 2. Temperature Control: Equip refrigerators with off position and contact points or setting positions for wide range of degrees of temperature, which may be selected by readily accessible knob, properly marked with settings available, mounted on temperature control shaft.
 - a. Relay: Quality and rating which under normal operating conditions shall function properly for at least one year period and which is consistent with requirements specified and its companion components and parts in electrical circuit.
 3. Motor: For 115 volt, plus or minus 10 percent, 60 HZ, single phase, alternating current operation and capable of starting in ambient temperature of 37.8 degrees C (100 degrees F) on voltages between 90 percent and 100 percent of rated voltage.
 - a. Thermal Overload Protection: Automatic re-set type to prevent excess temperature rise of motor windings.
 - b. Three-Wire Cord with Three-Prong Attachment Plug: Provide grounding of refrigerator and extend five feet to nine feet beyond point at which it is attached to back of cabinet.

- c. Motor: Type, speed, load and horsepower ratings consistent with other requirements specified.
- 4. Refrigeration Unit: Compressor, motor and housing of hermetically sealed type with reciprocating or rotary-type compressor.
 - a. Compressor: Equipped with means of unloading, such as automatic unloader or capillary tube.
 - b. Sealed Refrigerating System: Serviceable by complete unit replacement or replacement of component parts such as motor compressor assembly, evaporator, condenser and heat exchanger.
 - c. Hermetic Compressor Unit: Quiet in operation, free from excessive vibration and entirely automatic in operation.
- D. Workmanship
 - 1. Welding and Brazing: Complete; uniform and properly fused; with no holes, slag inclusions, scale, or flux deposits; and not cracked, fractured or undercut.
 - 2. Soldering: Complete, clean, adherent and without pin-holes.
 - 3. Fasteners: Not be broken, fractured, stripped, or loose.
 - a. Structural Parts Subject to Vibration: Provide lock washers or self-locking washers.

1.3 EXECUTION

- A. Examination
 - 1. Site Verification of Conditions:
 - a. Utilities: Verify that required utilities are available, in proper locations, and ready for use.
- B. Preparation
 - 1. Existing Refrigerators: Remove existing refrigerators and debris from site.
- C. Installation
 - 1. General: Install refrigerators in accordance with manufacturer's recommendations.
 - a. Make adjustments to feet of refrigerators for a level installation.
 - b. Install in manner to ensure proper ventilation space is present.
- D. Cleaning
 - 1. Cleaning: Comply with requirements of Section 01120.
- E. Schedules
 - 1. Provide refrigerators as selected in following schedule:
 - _____ Remove existing refrigerators.
 - _____ Supply and Deliver Only to _____.
 - _____ Unloading and handling included.
 - _____ Supply and Install.

SELECTION SIZE

COLOR TYPE

_____ 0.28 cu m (10.0 CU FT) Minimum	_____ SD/M/S: Small, Single Door, Manual Defrost.
_____ 0.37 cu m (13.0 CU FT) Minimum	_____ SD/M/L: Large, Single Door, Manual Defrost.
_____ 0.28 - 0.34 cu m (10.0 - 11.9) CU FT	_____ TF/P/S: Small, Top Freezer, Partial Automatic Defrost.
_____ 0.34 - 0.39 cu m (12.0 - 13.9 CU FT)	_____ TF/P/M: Medium, Top Freezer, Partial Automatic Defrost.

11 - Equipment



_____ 0.40 cu m (14.0 CU FT) Minimum	_____ TF/P/L: Large, Top Freezer, Partial Automatic Defrost.
_____ 0.28 - 0.34 cu m (10.0 - 11.9 CU FT)	_____ TF/A/S: Small, Top Freezer, Automatic Defrost.
_____ 0.34 - 0.39 cu m (12.0 - 13.9 CU FT)	_____ TF/A/M: Medium, Top Freezer, Automatic Defrost.
_____ 0.40 - 0.45 cu m (14.0 - 15.9 CU FT)	_____ TF/A/ML: Medium/Large, Top Freezer, Automatic Defrost.
_____ 0.45 - 0.51 cu m (16.0 - 17.9 CU FT)	_____ TF/A/L: Large, Top Freezer, Automatic Defrost.
_____ 0.51 cu m (18.0 CU FT) Minimum	_____ TF/A/EL: Extra Large, Top Freezer, Automatic Defrost.
_____ 0.45 cu m (16.0 CU FT) Minimum	_____ BF/A for Accessible Units: Bottom Freezer, Automatic Defrost in accordance with UFAS requirements.
_____ 0.45 cu m (16.0 CU FT) Minimum	_____ SS/A for Accessible Units: Side-by-Side, Automatic Defrost in accordance with UFAS requirements.

END OF SECTION 11 30 13 13a

SECTION 11 30 13 13b - GAS RANGES

GENERAL

Summary

1. Section Includes:
 - a. Remove existing ranges.
 - b. Gas ranges, supply and deliver only or supply and install as scheduled.
2. Related Requirements: Comply with requirements of following sections:
 - a. Contractor Use of Premises and Work Sequence; "Summary of Work"
 - b. Section "Alteration Project Procedures."
3. Related Sections:
 - a. Kitchen Renovation Requirements: Section "Summary of Work"
 - b. Reference Standards: Section "References."
 - c. Electric Ranges: Section "Electric Ranges."
 - d. Gas Line Relocation: Section "Plumbing."

References

4. Reference Standards: See Section "References." Comply with following:
 - a. American National Standard Institute (ANSI) Z21.1 - Household Cooking Gas Appliances, 1990, including addenda Z21.1a, 1991.
 - 1) ANSI Z21.20 - Automatic Gas Ignition Systems and Components, 1989, including addenda Z21.20a, 1991, and Z21.20b, 1992.
 - b. Certification:
 - 1) ANSI Z34.1 - Certification, Third-Party Certification Program, 1987.
 - 2) ANSI Z34.2 - Certification, Self-Certification by Producer or Supplier, 1987.

Definitions

5. Types:
 - a. Type A: Economy or Builder's Model
 - b. Type C: Quality Model with hinged top.
6. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by PHA/IHA.

Submittals

7. Product Data: Submit to the Owner.
8. Samples:
 - a. Production Sample: When requested, provide sample gas range to the Owner for examination as to compliance with specifications.
 - b. Color Samples: Submit samples of manufacturer's standard colors to the Owner for selection.
9. Quality Assurance/Control Submittals: Submit following to the Owner:
 - a. Certificates: Manufacturer's written certification that ranges have been tested and comply with ANSI Z21.1 for operation with natural or LP gas.
 - 1) Certification by American Gas Association (AGA) Laboratories, or Third Party Certifier in accordance with ANSI Z34.1.
 - 2) Acceptable Evidence of Meeting Applicable Requirements of Standard: Photostatic copy of American Gas Association (AGA) Laboratories Appliance Certificate or listing including igniter device in American Gas Association (AGA) Laboratories Directory of Certified Appliances and Accessories.
 - b. Manufacturer's installation instructions.
10. Closeout Submittals: Submit following to the Owner:

11 - Equipment



- a. Operation and Maintenance: Provide use and care information with each gas range. Include parts manual with diagrams and part numbers.
- b. Special warranty.

Quality Assurance

11. Qualifications: Manufacturer: Stock and sell parts for ranges supplied for five years from time of delivery.
12. Regulatory Requirements: Comply with and following:
 - a. Gas Connections: Comply with applicable codes and regulations.
 - b. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4151-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (42 USC §§ 12101, et seq.) and implementing regulations (28 CFR Part 35).
13. Appliances shall meet or exceed requirements established by the Energy Star program and bear the Energy Star logo. Visit www.energystar.gov for a listing of products that qualify. Energy Star® is a voluntary partnership that includes the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities, and retailers, helps promote efficient products by labeling them with the Energy Star logo and educating consumers about the benefits of energy efficiency.

Delivery, Storage, And Handling

14. Packing, Shipping, Handling, and Unloading: In accordance with standard commercial practices.
15. Acceptance at Site: Inspect gas ranges upon delivery. Replace damaged or defective appliances before installation.

Scheduling

16. Scheduling and Completion: Comply with requirements of Division 1.

Warranty

17. Special Warranties: Provide following written special warranties:
 - a. Entire gas range for one year.
18. Special Warranties: Include labor, material and equipment to provide replacements and make repairs to gas ranges at no additional cost to PHA/IHA.
 - a. Defective Units and/or Parts: Become property of Contractor.
 - b. Submit name and address of local agent who will furnish service and replacement parts in connection with warranties to PHA/IHA.
 - 1) Charges by local service agent to PHA/IHA for services covered under special warranties not allowed.

PRODUCTS

Gas Ranges - General Requirements

19. Ranges: ANSI Z21.1, current standard models of manufacturer except for additional requirements specified.
 - a. Ranges: Floor mounted, free standing flush-to-wall, domestic gas ranges with open cooking top, oven and broiler below.
 - b. Ranges of Same Size: Identical, including parts and assemblies.
20. Gas Valves: Provide with either:
 - a. Convertible orifice set for gas specified on purchase order .

- b. Fixed orifice hood for use with gas specified on order.
- 21. Convertible Gas Pressure Regulators: Provide with each range.

Type A Ranges (Economy Or Builder S Model)

- 22. Burners: Provide cooking top with four burners.
 - a. Each Burner: Rated at no less than 2 650 W (9000 BTU/H) for natural gas and 2 350 W (8000 BTU/H) for LP.
- 23. Manual Gas Valves: Limited displacement type complying with ANSI Z21.1.
- 24. Grates: Provide each top burner with porcelain enameled cast iron or steel grate.
- 25. Ignition: One of following:
 - a. Automatic Ignition: Equip burners with means for automatic ignition of gas. Failure of oven burner pilot shall activate means for shutting off gas to oven burner.
 - b. 2. Intermittent Ignition: Equip burners with means for automatic electric ignition of gas complying with applicable requirements of ANSI Z21.20. Electric Ignition System: May be either spark, coil, glow bar, or combination of these.
- 26. Oven Thermostat Control: Provide oven thermostat control for controlling oven temperatures down to "hold warm temperature", approximately 77 degrees C (170 degrees F).
- 27. F. Insulation: Glass fiber blanket type, installed in manner to prevent sagging, and of sufficient thermal efficiency to meet surface and handle temperature tests specified in ANSI Z21.1.
- 28. Oven and Broiler Sections: Porcelain enamel-coated steel.
 - a. Broiling Section: Either drop door type, pull-out-type, or swing-door type with 3-position smokeless broiler pan and grill sliding on stationary runners.
 - b. Provide stops so that oven racks cannot be completely pulled out by accident.
- 29. Oven Vents: Provide ovens with vent designed to deflect moisture and fumes away from wall behind range.
- 30. Oven Doors: Drop-shelf type, counter-balanced and provided with device to hold door fully closed.
 - a. Hinges: Permit ready removal and replacement of hinge brackets and parts subject to wear.
 - b. Provide oven doors with means for adjusting misaligned door.
- 31. Burner Bowls (Aeration Bowls): Corrosion-resisting steel, plated steel, or steel coated with porcelain enamel.
 - a. Bowls: May be separate bowls or integral part of top.
- 32. Exterior Surfaces: Porcelain enamel, except body sides and front panels (including oven door) may be finished in synthetic baked-on enamel capable of withstanding 121 degrees C (250 degrees F).
 - a. Trim: In accordance with manufacturer's standard practice.
 - b. Backguard, Manifold Shield, Aeration Bowls, and Burners: May be porcelain enamel.
 - c. Range Body Back Panel, Legs, and/or Base: Porcelain enamel, baked-on enamel, galvanized, or aluminized steel.
 - d. Colors: As scheduled from manufacturer s standard colors.
- 33. Backguards: Equip each range with back guards not less than 100 mm (4 inches) higher than top cooking surface and extending full width of range top.
- 34. Equipment and Accessories: Provide accessories such as oven and broiler racks normally supplied with manufacturer's standard production for type range scheduled.
- 35. Name Plate: Permanent record of manufacturer's name and address, range model and serial number, and manufacturer's normal hourly W (BTU/H) input rating for oven, broiler and top burners.
 - a. Securely fasten nameplate to main part of each range in accessible place.

Type C Ranges (Quality Model)

- 36. General Requirements: Comply with requirements for Type A Ranges except as modified by following requirements.
- 37. B. Range Top: Hinged at back or lift off for easy cleaning and access to burners, valves, and pilots.

11 - Equipment



- a. Hinge Top: May have supporting rod to hold top in raised position or be removable. Design supporting rod, when in raised position, to prevent accidental closing of range top. Counterbalanced top is also acceptable.
- 38. Cooking Top Burners/Low Setting: Equip each range with burners with low settings not in excess of 400 W (1400 BTU/H).
- 39. Leg levelers: Equip each range with at least two leg levelers.
- 40. Manifold Shield: Provide recessed or slanted manifold shield to minimize burning of burner knobs from heat from open oven doors.
- 41. Oven Door: Provide 610 mm (24 inch), 760 mm (30 inch) and 910 mm (36 inch) ranges with removable oven door.

EXECUTION

Examination

- 42. Site Verification of Conditions:
 - a. Utilities: Verify that required utilities are available, in proper locations, and ready for use.

Preparation

- 43. Existing Ranges: Remove existing ranges and debris from site.

Installation

- 44. General: Install gas ranges in accordance with manufacturer's recommendations.
 - a. Make connection to gas line in accordance with applicable codes.
 - b. Make adjustments to feet of ranges for a level installation.

Cleaning

- 45. Cleaning: Comply with requirements of Division 1.

Schedules

- 46. Provide gas ranges as selected in following schedule:
 - _____ Remove existing ranges.
 - _____ Supply and Deliver Only to _____.
 - _____ Unloading and handling included.
 - _____ Supply and Install.

<u>SELECTION</u>	<u>NUMBER OF</u>	<u>SIZE</u>	<u>COLOR</u>	<u>TYPE BURNERS</u>
_____	4 Burner	510 mm (20 Inch)	_____	Type A Economy or Builders Model.
_____	4 Burner	610 mm (24 Inch)	_____	Type A Economy or Builders Model.
_____	4 Burner	760 mm (30 Inch)	_____	Type A Economy or Builders Model.
_____	4 Burner	910 mm (36 Inch)	_____	Type A Economy or Builders Model.
_____	4 Burner	510 mm (20 Inch)	_____	Type C Quality Model.
_____	4 Burner	610 mm (24 Inch)	_____	Type C Quality Model.
_____	4 Burner	760 mm (30 Inch)	_____	Type C Quality Model.
_____	4 Burner	910 mm (36 Inch)	_____	Type C Quality Model.

END OF SECTION 11 30 13 13b

SECTION 11 30 13 13c - ELECTRIC RANGES

GENERAL

Summary

1. Section Includes:
 - a. Remove existing ranges.
 - b. Electric ranges, supply and deliver only or supply and install as scheduled.
2. Related Requirements: Comply with requirements of following sections:
 - a. Contractor Use of Premises and Work Sequence: Section "Summary of Work."
 - b. Section "Alteration Project Procedures."
3. Related Sections:
 - a. Kitchen Renovation Requirements: Section "Summary of Work."
 - b. Reference Standards: Section "References."
 - c. Gas Ranges: Section "Gas Ranges."
 - d. Electrical Renovation: Section "Electrical Renovation."

References

4. Reference Standards: See Section "References." Comply with following:
 - a. Association of Home Appliance Manufacturers (AHAM) ER-1 - American National Standard Household Electric Ranges, 1992.
 - b. Federal Specification (FS): WR-101F dated March 13, 1970, and Interim Amendment 2 dated December 31, 1970.
 - c. Underwriter's Laboratories (UL): ANSI/UL 858 - Household Electric Ranges, 1986.
 - d. Certification:
 - 1) ANSI Z34.1 - Certification, Third-Party Certification Program, 1987.
 - 2) ANSI Z34.2 - Certification, Self-Certification by Producer or Supplier, 1987.

Definitions

5. Standard Ranges: Four Surface Cooking Units: Three - 150 mm (6 inch) and one - 200 mm (8 inch) with oven and broiler below.
 - a. Type, Style, and Sizes as defined in FS W-R-101F:
 - 1) Type I: Freestanding range.
 - 2) Type II: Build-in (slide-in) range.
 - 3) Style 1: Single oven.
 - 4) Style 2: Double oven 1 020 mm (40 inches) wide.
 - 5) Size 1: 1 020 mm (40 inches) wide.
 - 6) Size 2: 910 mm (36 inches) wide.
 - 7) Size 3: 760 mm (30 inches) wide.
 - 8) Size 4: 610 mm (24 inches) wide.
 - 9) Size 5: 510 mm (20 inches) wide.
6. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by PHA/IHA.

Submittals

7. Product Data: Submit to the Owner.
8. Samples:
 - a. Production Sample: When requested, provide sample electric range to the Owner for examination as to compliance with specifications.
 - b. Color Samples: Submit samples of manufacturer s standard colors to the Owner for selection.
9. Quality Assurance/Control Submittals: Submit following to the Owner:
 - a. Certificates: Manufacturer's written certification that electric ranges meet or exceed specified requirements including UL requirements and requirements of FS WR-101F.

11 - Equipment



- b. Manufacturer's installation instructions.
- 10. Closeout Submittals: Submit following to the Owner:
 - a. Operation and Maintenance Instructions: Provide use and care information with each range. Include parts manual with diagrams and part numbers.
 - b. Special warranty.

Quality Assurance

- 11. Qualifications: Manufacturer: Stock and sell parts for ranges supplied for five years from time of delivery.
- 12. Regulatory Requirements: Comply with following:
 - a. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4151-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (42 USC §§ 12101, et seq.) and implementing regulations (28 CFR Part 35).
- 13. Appliances shall meet or exceed requirements established by the Energy Star program and bear the Energy Star logo. Visit www.energystar.gov for a listing of products that qualify. Energy Star® is a voluntary partnership that includes the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities, and retailers, helps promote efficient products by labeling them with the Energy Star logo and educating consumers about the benefits of energy efficiency.

Delivery, Storage, And Handling

- 14. Packing, Shipping, Handling, and Unloading: In accordance with standard commercial practices.
- 15. Acceptance at Site: Inspect electric ranges upon delivery. Replace damaged or defective appliances before installation.

Scheduling

- 16. Scheduling and Completion: Comply with requirements of Division 1.

Warranty

- 17. Special Warranties: Provide following written special warranties:
 - a. Entire electric range for one year.
- 18. Special Warranties: Include labor, material and equipment to provide replacements and make repairs to electric ranges at no additional cost to PHA/IHA.
 - a. Defective Units and/or Parts: Become property of Contractor.
 - b. Submit name and address of local agent who will furnish service and replacement parts in connection with warranties to PHA/IHA.
 - 1) Charges by local service agent to PHA/IHA for services covered under special warranties not allowed.

PRODUCTS

Electric Ranges

- 19. Ranges: AHAM ER-1, ANSI/UL 858, and FS WR-101F, current standard models of manufacturer except for additional requirements specified.
 - a. Ranges: Floor mounted, free standing flush-to-wall, domestic electric ranges with open cooking top, oven and broiler below.
 - b. Ranges of Same Classification: Identical, including parts and assemblies.

- c. Ranges: UL listed and bear UL label.
- 20. Operating Service: 115/230 volts or 120/208 volts, 3-wire, single-phase, 60-HZ.
 - a. Type of Service: As scheduled.
- 21. Ranges:
 - a. Each Range: Equipped with at least two leg levelers.
 - b. Oven Door: Equip 610 mm (24 inch), 760 mm (30 inch), and 910 mm (36 inch) ranges with removable oven door.
 - c. Ranges without Storage Drawer: May be equipped with only one oven rack.

Ranges For Elderly Housing

- 22. Ranges for Elderly Housing: Same as above, Type I or II, Style 1, Sizes 4 and 5, standard electric ranges but, as minimum, include following additional items:
 - a. Location of Controls for Ranges and Cook-Tops: Not require reaching across burners.
 - b. Burner Indicator Lights: Provide light for each top burner and oven unit that will clearly indicate when burner is on.
 - 1) Indicator Light: Integral part of, or adjacent to, each control switch or adjacent to each top burner unit.
 - c. Oven Interior Light: Provide light in each oven that will clearly illuminate interior when oven door is open.

EXECUTION

Examination

- 23. Site Verification of Conditions:
 - a. Utilities: Verify that required utilities are available, in proper locations, and ready for use.

Preparation

- 24. Existing Ranges: Remove existing ranges and debris from site.

Installation

- 25. General: Install electric ranges in accordance with manufacturer's recommendations.
 - a. Make adjustments to feet of ranges for a level installation.
 - b. Electrical Renovation: See Section 16095.

Cleaning

- 26. Cleaning: Comply with requirements of Division 1.

Schedules

- 27. Provide electric ranges as selected in following schedule:

- ___ Remove existing ranges.
- ___ Supply and Deliver Only to _____.
- ___ Unloading and handling included.
- ___ Supply and Install.

<u>SELECTION</u>	<u>NUMBER</u>	<u>ELECTRIC</u>	<u>COLOR</u>	<u>TYPE AND SIZE</u>
	<u>BURNERS</u>	<u>SERVICE</u>		
___	4 Burner	___	___	Type I, Style I, Size 1, 1 020 mm (40 inches wide).
___	4 Burner	___	___	Type I, Style I, Size 2, 910 mm (36 inches) wide.
___	4 Burner	___	___	Type I, Style I, Size 3, 760 mm (30 inches) wide.
___	4 Burner	___	___	Type I, Style I, Size 4, 610 mm (24 inches) wide.
___	4 Burner	___	___	Type I, Style I, Size 5, 510 mm (20 inches) wide.

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_____	4 Burner	_____	_____	Type I or II, Style I, Size 5, 510 mm (20 inches) wide with specified elderly housing requirements.
_____	4 Burner	_____	_____	Type I or II, Style I, Size 4, 610 mm (24 inches) wide with specified elderly housing requirements.

END OF SECTION 11 30 13 13c

SECTION 11 30 13 13d - RANGE HOODS

GENERAL

Summary

1. Section Includes:
 - a. Remove existing range hoods.
 - b. Range hoods, supply and deliver only or supply and install as scheduled.
2. Related Requirements: Comply with requirements of following sections:
 - a. Contractor Use of Premises and Work Sequence: Section "Summary of Work."
 - b. Section "Alteration Project Procedures."
3. Related Sections:
 - a. Kitchen Renovation Requirements: Section "Summary of Work."
 - b. Reference Standards: Section "References."
 - c. Gas Ranges: Section "Gas Ranges."
 - d. Electric Ranges: Section "Electric Ranges."
 - e. Residential Cabinets: Section "Residential Cabinets."
 - f. Electrical Hook-up: Section "Electrical Renovation."

References

4. Reference Standards: See Section "References." Comply with following:
 - a. National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code (NEC).
 - b. Certification:
 - 1) ANSI Z34.1 - Certification, Third-Party Certification Program, 1987.
 - 2) ANSI Z34.2 - Certification, Self-Certification by Producer or Supplier, 1987.

Definitions

5. Supply and Delivery Only: Include supply and delivery to site(s) FOB destination freight prepaid. Unless otherwise specified or scheduled, unloading and handling at site is by PHA/IHA.

Submittals

6. Product Data: Submit to the Owner.
7. Samples: Submit to the Owner.
Production Sample: When requested, provide sample range hood to the Owner for examination as to compliance with specifications.
 - a. Color Samples: Samples of manufacturer's standard colors for selection.
8. Quality Assurance/Control Submittals: Submit following to the Owner:
 - a. Certificates: Manufacturer's written certification that range hoods meet or exceed specified requirements including UL requirements.
 - b. Manufacturer's installation instructions.
 - c. Appliances shall meet or exceed requirements established by the Energy Star program and bear the Energy Star logo. Visit www.energystar.gov for a listing of products that qualify. Energy Star® is a voluntary partnership that includes the U.S. Department of Energy, the U.S. Environmental Protection Agency, product manufacturers, local utilities, and retailers, helps promote efficient products by labeling them with the Energy Star logo and educating consumers about the benefits of energy efficiency.
 - d. Closeout Submittals: Submit following to the Owner:
 - 1) Operation and Maintenance Instructions: Provide use and care information with each range hood. Include parts manual with diagrams and part numbers.
 - e. Special warranty.

Quality Assurance

11 - Equipment



9. Qualifications: Manufacturer: Stock and sell parts for range hoods supplied for five years from time of delivery.
10. Regulatory Requirements: Comply with following:
 - a. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4151-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (42 USC §§ 12101, et seq.) and implementing regulations (28 CFR Part 35).

Delivery, Storage, And Handling

11. Packing, Shipping, Handling, and Unloading: In accordance with standard commercial practices.
12. Acceptance at Site: Inspect range hoods upon delivery. Replace damaged or defective appliances before installation.

Scheduling

13. Scheduling and Completion: Comply with requirements of Division 1.

Warranty

14. Special Warranties: Provide following written special warranties:
 - a. Entire range hood for one year.
15. Special Warranties: Include labor, material and equipment to provide replacements and make repairs to range hoods at no additional cost to PHA/IHA.

PRODUCTS

Range Hoods

16. Range Hoods: Ductless type with fan.
 - a. Size: 610 mm (24 inches) or 760 mm (30 inches) wide as scheduled, by 150 mm (6 inches) high by 445 mm (17.5 inches) deep.
 - b. Hoods: UL listed and bear UL label.
 - c. Fan: 120 V, 60 HZ, two speed, 2.0 A fan.
 - d. Light: Enclosed 75 watt.
 - e. Filter: Washable filter.
 - f. Color: As selected from manufacturer s standard colors.
17. Range Hood Shell: Same as range hoods above without fan and without light.
 - a. Size: 610 mm (24 inches) or 760 mm (30 inches) wide as scheduled, by 150 mm (6 inches) high by 445 mm (17.5 inches) deep.
 - b. Color: As selected from manufacturer standard colors.

EXECUTION

Examination

18. Site Verification of Conditions:
 - a. Utilities: Verify that required utilities are available, in proper locations, and ready for use.
 - b. Cabinets: Verify that adjacent residential cabinets and range hood are coordinated.

Preparation

19. Existing Range Hoods: Remove existing range hoods and debris from site.

Installation

- 20. General: Install range hoods in accordance with manufacturer's recommendations.
 - a. Electrical Hook-up: See electrical specifications.

Cleaning

- 21. Cleaning: Comply with requirements of Division 1.

Schedules

- 22. Provide range hoods as selected in following schedule:
 - _____ Remove existing range hoods.
 - _____ Supply and Deliver Only to _____.
 - _____ Unloading and handling included.
 - _____ Supply and Install.
 - _____ Range Hood (with fan, filter, and light).
 - _____ 760 mm (30 inches) wide.
 - _____ 610 mm (24 inches) wide.
 - _____ Range Hood Shell.
 - _____ 760 mm (30 inches) wide.
 - _____ 610 mm (24 inches) wide.

END OF SECTION11 30 13 13d

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Task	Specification	Specification Description
11 30 13 23	11 30 13 13	Residential Appliances
11 30 33 00	01 22 16 00	No Specification Required

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SECTION 11 32 13 00 - UNIT KITCHENS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for unit kitchens. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes factory-fabricated and -assembled unit kitchens with metal, laminate-clad and wood cabinets, countertops, fixtures, appliances, and accessories.

C. Submittals

1. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, finishes, furnished specialties, and accessories. Include rated capacities, operating characteristics, and utility requirements of appliances.
2. LEED Submittals:
 - a. Product Data for Credit EQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.
 - b. Certificates for Credit MR 7: Chain-of-custody certificates certifying that cabinets and countertops comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating costs for each certified wood product.
 - c. Product Data for Credit EA 1.4: For appliances, documentation indicating that products are ENERGY STAR rated.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
4. Samples: For each type of exposed finish required, prepared on Samples of size indicated below:
 - a. Metal finish for cabinets and countertops, **8 by 10 inches (200 by 250 mm)**.
 - b. Wood finish for cabinets, **8 by 10 inches (200 by 250 mm)**.
 - c. Plastic laminate for cabinets and countertops, **8 by 10 inches (200 by 250 mm)**.
 - d. Solid surfacing for countertops, **6 inches (150 mm) square**.
 - e. One full-size unit of each type of exposed hardware.
5. Product Certificates: For each type of unit kitchen, from manufacturer.
6. Manufacturer Certificate: Signed by manufacturer certifying that units comply with requirements.
7. Maintenance Data: For unit kitchen appliances to include in maintenance manuals.
8. Warranty: Sample of special warranty.

D. Quality Assurance

1. Manufacturer Qualifications: A qualified manufacturer that fabricates unit kitchens and their components.
2. Source Limitations: Obtain unit kitchens from single source from single manufacturer.
3. Regulatory Requirements: Where unit kitchens are indicated to comply with accessibility requirements, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines, ICC/ANSI A117.1 and HUD's "Fair Housing Accessibility Guidelines".
4. Forest Certification: Provide cabinets and countertops made from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
5. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

- a. Built-in Refrigerators: Listed and labeled for recessed installation. Mount label to be visible after installation of unit; include electrical rating, type of refrigerant, and minimum installation clearances.
- b. Refrigerated Unit Kitchens and Wet Bars: Listed and labeled for entire unit as a single integrated system. Mount label to be visible after installation of unit; include electrical rating, type of refrigerant, and minimum installation clearances.
6. Wood and Laminate-Clad Cabinet Fabrication Standard:
 - a. KCMA A161.1. Provide cabinets with KCMA's "Certified Cabinet" seal affixed to a semiexposed location of each unit and showing compliance with standard.
 - b. AWI 400B, Custom grade.
 - c. Either fabrication standard above.
7. Appliance Standards:
 - a. Refrigerators and Freezers: UL 250 or AHAM ER-1.
 - b. Electric Ranges: UL 858 or AHAM HRF-1.
 - c. Microwave Ovens: UL 923.
 - d. Gas-Burning Appliances: ANSI Z21 Series, and certified by CSA International, UL, or another testing and inspecting agency acceptable to authorities having jurisdiction.
8. ENERGY STAR Rating: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

E. Delivery, Storage, And Handling

1. Deliver factory-assembled units, individually factory packaged and protected. Label with manufacturer's name, product name, and model number.

F. Project Conditions

1. Environmental Limitations: Do not deliver or install unit kitchens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Field Measurements: Verify actual dimensions of construction contiguous with unit kitchens by field measurements before fabrication.

G. Coordination

1. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that unit kitchens can be supported and installed as indicated.
2. Coordinate wiring requirements and current characteristics of unit kitchens with building electrical system. See Division 22.
3. Coordinate layout and installation of plumbing, mechanical, and electrical services for unit kitchens.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace hermetically sealed refrigerator compressor system of unit kitchens that fail within specified warranty period.
 - a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

2. Porcelain-Enamel-Finished Steel Sheet: ASTM A 424, enameling-grade steel, uncoated thickness indicated; with exposed face and edges coated with primer, ground coat, and color cover coat; and concealed face coated with primer and ground coat; acid resistant.
3. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
4. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea-formaldehyde resin.
5. Particleboard: ANSI A208.1, Grade M-2 **OR** Grade M-2-Exterior Glue **OR** Grade M-2, made with binder containing no urea-formaldehyde resin, **as directed**.
6. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, Type I, made with adhesive containing no urea formaldehyde.
7. Solid Wood: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, and kiln dried to 7 percent moisture content.
8. High-Pressure Decorative Laminate: NEMA LD 3.
9. Solid-Surfacing Material: Homogenous solid sheets fabricated from reacted monomers and resins, mineral fillers, and pigments; in thickness indicated; complying with ISSFA-2.
10. Adhesives: Do not use adhesives that contain urea formaldehyde.

B. Metal Cabinets

1. Steel Base Cabinets: Fabricate frames and sides from **0.036-inch (0.91-mm) OR 0.030-inch (0.76-mm), as directed**, nominal-thickness, cold-rolled steel sheet; welded and reinforced with internal gussets and bracing; with baked-enamel finish.
 - a. Door and Drawer Fronts: **0.036-inch (0.91-mm) OR 0.030-inch (0.76-mm), as directed**, nominal-thickness, cold-rolled steel sheet, textured or smooth; welded, reinforced, and sound-deadened; with baked-enamel finish.
OR
Door and Drawer Fronts: **0.038-inch- (0.95-mm-)** thick, stainless-steel sheet; welded, reinforced, and sound deadened.
2. Stainless-Steel Base Cabinets: Fabricate frames and sides from **0.038-inch- (0.95-mm-)** thick, stainless-steel sheet; welded and reinforced with internal gussets and bracing.
 - a. Door and Drawer Fronts: **0.038-inch- (0.95-mm-)** thick, stainless-steel sheet; welded, reinforced, and sound deadened.
3. Undercounter Storage Cabinet: Same material and finish as base cabinets, with adjustable shelf and drawer or with two drawers.
4. Wall Cabinets: Same material and finish as base cabinets, with flush double bottoms and adjustable shelves.
 - a. Wall Shields: Fabricated from textured, cold-rolled steel sheet with baked-enamel finish, color to match cabinets **OR** textured, cold-rolled steel sheet with baked-enamel finish, color to match countertop **OR** stainless-steel sheet, **as directed**. Provide wall shields for back wall and side walls, **as directed**, between countertop splash and wall cabinets.
5. Shelves: Manufacturer's standard rolled-front shelves, fixed **OR** adjustable, **as directed**, of same material and finish as cabinets.
6. Wire Pulls: Brushed-chrome **OR** Polished-chrome **OR** Brushed-brass **OR** Polished-brass, **as directed**, finish.

C. Laminate-Clad Cabinets

1. Framed-Style Base Cabinets:
 - a. Face Frames: **3/4-inch- (19-mm-)** thick plywood or solid wood.
 - b. Back Panels: **3/8-inch- (10-mm-)** thick particleboard with melamine bonded to inside surface.
 - c. Top, Bottom, and End Panels: **3/8-inch- (10-mm-)** thick particleboard with melamine bonded to both sides.
 - d. Door and Drawer Fronts: **3/4-inch- (19-mm-)** thick, medium-density fiberboard with **16-mil- (0.4-mm-)** thick vinyl film (Thermofoil) bonded to exposed surfaces and melamine bonded to inside surfaces.
OR

- Door and Drawer Fronts: **5/8-inch- (16-mm-)** thick particleboard with melamine bonded to both sides.
- e. Drawers: Four sided, with **1/2-inch- (13-mm-)** thick particleboard fronts, backs, and sides, and **1/4-inch- (6-mm-)** thick particleboard bottom.
- f. Shelves: **5/8-inch- (16-mm-)** thick particleboard with melamine bonded to both sides and PVC edges.
- 2. Frameless-Style Base Cabinets:
 - a. Back Panels: **1/4-inch- (6-mm-)** thick plywood or particleboard with melamine bonded to inside surface.
 - b. Top and Bottom Panels: **3/4-inch- (19-mm-)** thick particleboard with melamine bonded to both sides.
 - c. End Panels: **5/8-inch- (16-mm-)** thick particleboard with melamine bonded to both sides.
 - d. Door and Drawer Fronts: **3/4-inch- (19-mm-)** thick plywood with Grade HGS high-pressure decorative laminate bonded to front and edges, and Grade CLS high-pressure decorative laminate bonded to inside surface.

OR

Door and Drawer Fronts: **5/8-inch- (16-mm-)** thick particleboard with melamine bonded to both sides.

OR

Door and Drawer Fronts: **5/8-inch- (16-mm-)** thick particleboard with melamine bonded to both sides. Provide continuous bevel edge at tops and bottoms of doors and bottom of drawer fronts in wood-grain laminate **OR** solid wood, **as directed**.

- e. Drawers: Four sided, with **1/2-inch- (13-mm-)** thick particleboard fronts, backs, and sides, and **1/4-inch- (6-mm-)** thick particleboard bottom.
- f. Shelves: **3/4-inch- (19-mm-)** thick particleboard with melamine bonded to both sides and PVC edges.
- 3. Wall Cabinets: Same material and finish as base cabinets, with adjustable shelves.
 - a. Wall Shields: Fabricated from high-pressure decorative laminate of grade and color to match cabinets **OR** high-pressure decorative laminate of grade and color to match countertop **OR** stainless-steel sheet, **as directed**. Provide wall shields for back wall and side walls, **as directed**, between countertop splash and wall cabinets.
- 4. Scribe Strips for Recessed Cabinets: Same material, finish, and color as cabinet.
- 5. Wire Pulls: Brushed-chrome **OR** Polished-chrome **OR** Brushed-brass **OR** Polished-brass, **as directed**, finish.

D. Wood Cabinets

- 1. Base Cabinets: Birch **OR** Maple **OR** Oak **OR** Cherry **OR** Ash, **as directed**.
 - a. Face Frames: **3/4-inch- (19-mm-)** thick, hardwood-veneer plywood or solid wood.
 - b. Back Panels: **3/8-inch- (10-mm-)** thick particleboard with melamine bonded to inside surface.
 - c. Top, Bottom, and End Panels: **3/8-inch- (10-mm-)** thick particleboard with melamine bonded to both sides.
 - d. Shelves: **5/8-inch- (16-mm-)** thick particleboard with melamine bonded to both sides and PVC edges.
 - e. Door and Drawer Fronts: **5/8-inch- (16-mm-)** thick, hardwood-veneer plywood with matching hardwood edges.

OR

Door and Drawer Fronts: **3/4-inch- (19-mm-)** thick, solid wood stiles and rails, with solid wood center panels.
- 2. Wall Cabinets: Same material and finish as base cabinets, with adjustable shelves.
 - a. Wall Shields: Fabricated from high-pressure decorative laminate of grade and color to match countertop **OR** stainless-steel sheet, **as directed**. Provide wall shields for back wall and side walls, **as directed**, between countertop splash and wall cabinets.
- 3. Scribe Strips for Recessed Cabinets: Same material, finish, and color as cabinet.

4. Wire Pulls: Brushed-chrome **OR** Polished-chrome **OR** Brushed-brass **OR** Polished-brass, **as directed**, finish.
- E. Countertops
1. Countertop and Integral Sink: Seamless, one-piece countertop and sink with integral embossed drainboard and backsplash and side splashes, **as directed**.
 - a. Stainless Steel: **0.038-inch- (0.95-mm-)** thick sheet bonded to **3/4-inch (19-mm)** plywood.
 - b. Porcelain-Enamel-Finished Steel: **0.0677 inch (1.7 mm)** thick.
 - c. Solid-Surfacing Material: Minimum **1/2 inch (13 mm)** thick.
 2. Countertop **OR** Countertop for Drop-in Sink, **as directed**: Seamless, one-piece countertop with integral backsplash and side splashes, **as directed**.
 - a. Stainless Steel: **0.038-inch- (0.95-mm-)** thick sheet bonded to **3/4-inch (19-mm)** plywood.
 - b. High-Pressure Decorative Laminate: Grade HGS, bonded to **3/4-inch (19-mm)** plywood.
OR
High-Pressure Decorative Laminate: Grade HGP, post formed, bonded to **3/4-inch (19-mm)** particleboard with Grade BKL unfinished backing sheet bonded to reverse side.
 3. Countertop **OR** Countertop for Undercounter-Mounted Sink, **as directed**: Seamless, one-piece countertop with integral backsplash and side splashes, **as directed**; fabricated from **1/2-inch- (13-mm-)** thick, solid-surfacing material.
- F. Fixtures
1. Stainless-Steel Drop-in Sinks: **0.050 inch (1.27 mm) OR 0.038 inch (0.95 mm)**, **as directed**, thick; seamless; single compartment.
 2. Porcelain-Enamel-Finished Steel Drop-in Sinks: **0.043 inch (1.09 mm)** thick; seamless; single compartment.
 3. Undercounter-Mounted Sinks: Solid-surfacing material; seamless; single compartment.
 4. Supplies: **NPS 3/8 (DN 12) OR NPS 1/2 (DN 15)**, **as directed**, chrome-plated copper with stops.
 5. Sink Faucet: Single-lever control; polished chrome-plated mixing **OR** European-style, pull-out spray, **as directed**, faucet with limited-swing spout and aerator.
OR
Sink Faucet: Separate hot and cold controls with wrist-blade handles, **as directed**; polished chrome-plated mixing faucet with limited-swing spout **OR** gooseneck spout, **as directed**, and aerator.
 6. Sink Outlet with Disposer: **3-1/2-inch- (89-mm-)** diameter outlet.
 7. Sink Outlet without Disposer: **3-1/2-inch- (89-mm-)** diameter outlet with stainless-steel cup strainer and **1-1/2-inch- (38-mm-)** diameter tailpiece.
 8. Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated cast-brass trap, tubular brass waste to wall, and wall escutcheon.
 9. Bar Sink Outlet: **2-inch- (51-mm-)** diameter outlet with stainless-steel grid strainer.
 10. Disposers: Continuous-feed, household, food-waste disposers. Include 115-V ac, 1725-rpm, 1/2-hp motor with overload protection and reset button; three-conductor, grounded power cord; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; **NPS 1-1/2 (DN 40)** outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper.
 11. Hot-Water Dispensers: Household type with instant on-off control; insulated, corrosion-resistant-metal storage tank that is open to atmosphere; electric, 115-V ac, heating element; three-conductor, grounded power cord; chrome-plated faucet or spout; removable strainer; thermostat control for water temperature up to **190 deg F (88 deg C)**; thermal-overload protection; and minimum **1/2-gal. (1.9-L)** tank capacity dispensing approximately **60 cups (240 mL)** of water per hour.
- G. Appliances
1. Built-in Refrigerators: Fabricated with one-piece seamless steel or ABS plastic inner liner; refrigerator compartment with slide-out or removable shelves and meat tray; adjustable automatic temperature control; door with magnetic gaskets and storage shelves; interior light; closed

- compartment for **25-lb (11-kg)** minimum storage of prefrozen food and two ice cube trays; 115-V ac.
- a. Minimum Capacity: **3.2 cu. ft. (0.091 cu. m) OR 5.5 cu. ft. (0.156 cu. m) OR 6.0 cu. ft. (0.169 cu. m), as directed.**
 - b. Defrost System: Automatic defrost timer **OR** Push button or manual, **as directed.**
 - c. Compressor: Cushion-mounted, self-oiling, and hermetically sealed compressor; fan or gravity cooled.
 - d. Finish Panel: Manufacturer's standard door trim kit with filler panel or integral finish panel; match material and finish of base cabinets.
2. Freestanding, Upright Refrigerator-Freezers: Two-door combination unit with one-piece seamless steel or ABS plastic inner liner; automatic defrost; closed freezer compartment with two adjustable shelves and two ice cube trays, **as directed**; full-width vegetable crisper; dairy compartment; interior light; adjustable automatic temperature control; door with magnetic gaskets and storage shelves; 115-V ac, with three-conductor, grounded power cord.
 - a. Minimum Capacity: **12-cu. ft. (0.340-cu. m)** refrigerator capacity with **100-lb (45-kg)** freezer capacity **OR 14-cu. ft. (0.396-cu. m)** refrigerator capacity with **125-lb (57-kg)** freezer capacity, **as directed.**
 - b. Icemaker: Built-in automatic unit, **as directed.**
 - c. Finish Panel: Manufacturer's standard door trim kit with filler panel or integral finish panel; match material and finish of base cabinets.
 3. Automatic Icemakers: Built-in undercounter unit; capable of producing **22 lb (10 kg)** of ice per day; with **12-lb (5.4-kg) OR 35 lb (15.9 kg)** of ice per day; with **26-lb (11.8-kg) OR 50 lb (22.6 kg)** of ice per day; with **35-lb (15.9-kg), as directed**, storage bin; 115-V ac, with three-conductor, grounded power cord; with plumbed water supply.
 4. Electric Cooktops: Porcelain-enamel-finished steel; coil-element burners with removable rings and reflector bowls, infinitely adjustable heating controls, and individual signal lights; with wiring terminated at factory-installed junction box.
 - a. Cooktop Burner: One element rated at 900 W; 115 **OR** 1250 W; 208/240, **as directed**, -V ac.
OR
Cooktop Burners: One element rated at 550 W and one element rated at 950 W; 115-V ac.
OR
Cooktop Burners: Two elements, each rated at 1250 W; 115 **OR** 208/240, **as directed**, -V ac.
OR
Cooktop Burners: Two elements rated at 1250 W and one element rated at 2100 W; 208/240-V ac.
 5. Built-in Electric Ovens: Porcelain-enamel-finished steel exterior surfaces; coil-element burners with removable rings and reflector bowls, infinitely adjustable heating controls, and individual signal lights. Oven interior fabricated from one-piece porcelain-enamel-finished steel with rounded corners, with "Bake" and "Broil" oven elements, automatic heat control, signal light, and removable wire oven rack; textured baked-enamel- or porcelain-enamel-finished steel oven door; 208/240-V ac, with wiring terminated at factory-installed junction box.
 - a. Cooktop Burners: Three elements, each rated at 1250 W.
 - b. Oven Elements: 1500 W bake; 2000 W broil **OR** Manufacturer's standard, **as directed.**
 6. Freestanding Electric Ranges: Porcelain-enamel-finished steel exterior surfaces; coil-element burners with removable rings and reflector bowls, infinitely adjustable heating controls, and individual signal lights; anti-tip anchors. Oven interior fabricated from one-piece porcelain-enamel-finished steel with rounded corners, with "Bake" and "Broil" oven elements, automatic heat control, signal light, two removable wire oven racks, and porcelain-on-steel broiler pan; textured baked-enamel- or porcelain-enamel-finished steel oven door; 208/240-V ac, with wiring terminated at factory-installed junction box.
 - a. Cooktop Burners: Three elements, each rated at 1250 W, and one element rated at 2100 W.
 - b. Oven Elements: Manufacturer's standard.

7. Gas Cooktops: Porcelain-enamel-finished steel; surface burners with removable cast-iron grates, lift-out burner bowls, and 115-V ac electronic ignition; with wiring terminated at factory-installed junction box, and burner control panel mounted at front of unit.
 - a. Cooktop Burners: Two elements, each rated at **8000 Btu/h (8440 kJ)** **OR** **10,000 Btu/h (10 550 kJ)**, **as directed**, for natural gas.
8. Built-in Gas Ovens: Stainless-steel **OR** Porcelain-enamel-finished steel, **as directed**, exterior surfaces; surface burners with removable cast-iron grates, lift-out burner bowls, and 115-V ac electronic ignition; with wiring terminated at factory-installed junction box. Oven interior fabricated from porcelain-enamel-finished steel with rounded corners; removable wire oven rack, automatic heat control, and combination surface burner and oven control panel mounted above oven door at front of unit.
 - a. Cooktop Burners: Three elements, each rated at **5000 Btu/h (5275 kJ)** for natural gas.
OR
Cooktop Burners: Four elements, each rated at **9000 Btu/h (9495 kJ)** for natural gas.
 - b. Oven Burner: Rated at **9000 Btu/h (9495 kJ)** **OR** **18,000 Btu/h (18 990 kJ)**, **as directed**, for natural gas.
9. Freestanding Gas Ranges: Porcelain-enamel-finished steel exterior surfaces; surface burners with removable grates, lift-out burner bowls, and 115-V ac electronic ignition; with three-conductor, grounded power cord; anti-tip anchors. Oven interior fabricated from porcelain-enamel-finished steel with rounded corners; two removable wire oven racks, porcelain-on-steel broiler pan, automatic heat control, and combination surface burner and oven control panel mounted above oven door at front of unit.
 - a. Cooktop Burners: Four elements, each rated at **9000 Btu/h (9495 kJ)** for natural gas.
 - b. Oven Burner: Rated at **18,000 Btu/h (18 990 kJ)** for natural gas.
10. Freestanding Microwave Ovens: **0.7-cu. ft. (0.020-cu. m)** capacity with 600 W **OR** **0.8-cu. ft. (0.023-cu. m)** capacity with 700 W, **as directed**, cooking power; electronic touch controls, variable power control, digital clock timer, interior light, turntable, and tempered glass door; 115-V ac, with three-conductor, grounded power cord.
11. Built-in Microwave Ovens with Exhaust Hood: Undercabinet mounted, minimum **1.0-cu. ft. (0.028-cu. m)** capacity with 800-W cooking power; electronic touch controls, variable power control, digital clock timer, interior light, turntable, tempered glass door, and exhaust hood with integral light and two-speed fan control; 115-V ac, with three-conductor, grounded power cord.
 - a. Exhaust Hood: Recirculating, nonventing type, with replaceable charcoal filter.
OR
Exhaust Hood: Ventilating type, with permanent washable filter. Provide exhaust duct and wall **OR** roof, **as directed**, cap and shutter. See Division 23 Section "Metal Ducts".
12. Built-in Microwave/Convection Ovens with Exhaust Hood: Undercabinet mounted, minimum **1.0-cu. ft. (0.028-cu. m)** capacity with 800-W cooking power; electronic touch controls, variable power control, digital clock timer, interior light, turntable, convection rack, tempered glass door, and exhaust hood with integral light and two-speed fan control; 115-V ac, with three-conductor, grounded power cord.
 - a. Exhaust Hood: Recirculating, nonventing type, with replaceable charcoal filter.
 - b. Exhaust Hood: Ventilating type, with permanent washable filter. Provide exhaust duct and wall **OR** roof, **as directed**, cap and shutter. See Division 23 Section "Metal Ducts".
13. Ventilating Exhaust Hoods: Undercabinet mounted, **24 inches (610 mm)** wide, stainless **OR** baked-enamel, **as directed**, steel; two-speed fan control, permanent washable filter, and built-in lighting; 115-V ac, with wiring terminated at factory-installed junction box.
 - a. Provide exhaust duct and wall **OR** roof, **as directed**, cap and shutter. See Division 23 Section "Metal Ducts".
14. Recirculating, Nonventing Exhaust Hoods: Undercabinet mounted, **24 inches (610 mm)** wide, stainless **OR** baked-enamel, **as directed**, steel; two-speed fan control, replaceable charcoal filter, and built-in lighting; 115-V ac, with wiring terminated at factory-installed junction box.
15. Dishwashers: Built-in undercounter unit, **18 inches (457 mm)** wide **OR** **24 inches (610 mm)** wide **OR** width as indicated, **as directed**; multiple wash cycles, coated roll-out racks, detergent dispenser, and insulated cavity walls and door; 115-V ac, with wiring terminated at factory-installed junction box.

16. Automatic Coffeemakers: Stainless steel, with capacity for three pots of coffee; automatic brewing, nonstick warmer plates, and lighted on-off switch; 115-V ac, with three-conductor, grounded power cord; designed for permanent installation in countertop, with plumbed water supply. Provide glass coffee decanters in number to match capacity.

H. Accessories

1. Locks: Brass-cylinder type; furnish two keys per lock. Provide where indicated **OR** on base cabinet doors **OR** on refrigerator, **as directed**.
2. Fluorescent Light Fixtures: Surface mounted to underside of overhead cabinet; with 15-W lamp, on-off switch, grounded convenience receptacle, and translucent plastic lens.
3. Cutlery Drawers: Concealed drawer in undercounter storage compartment with pull-out divided tray.
4. Cutting Boards: Pull-out hardwood board.
5. Heat Shields: Minimum **12 inches high by 24 inches (305 mm high by 610 mm)** wide, **0.025-inch- (0.64-mm-)** thick stainless steel over **1/4-inch- (6-mm-)** thick board insulation.

I. Fabrication

1. General: Factory fabricate and assemble unit kitchens, with base cabinets, sink **OR** refrigerator, **as directed**, and countertop shipping as a one-piece assembly. Securely fasten components, fixtures, and appliances together.
 - a. Provide manufacturer's standard hardware including concealed, adjustable plated-steel hinges; steel drawer slides with nylon rollers; and catches and rubber bumpers on doors and drawers. Unless otherwise indicated, provide chromium-plated metal or satin-finished stainless steel for exposed hardware.
2. Accessible Units: Fabricate unit kitchens to comply with accessibility regulations as follows:
 - a. Standard, Accessible Countertops: Fabricate unit kitchens with one-piece countertop located at height of **34 inches (864 mm)** above floor.
OR
Adjustable, Accessible Countertops: Fabricate unit kitchens with two-piece countertop that allows countertop over sink, including backsplash, side splashes, and sink assembly, to be adjusted between **29 and 36 inches (735 and 915 mm)** above finished floor.
 - b. Removable, Accessible Cabinets: Fabricate cabinet under sink to allow removal for future accessibility conversion. Fabricate cabinet to allow access to plumbing and electrical connections after conversion.
 - c. Knee and Toe Clearance: Provide minimum **30-inch- (760-mm-)** wide open space beneath countertop with a minimum clear height of **27 inches (685 mm)** above floor for first **8 inches (205 mm)** of depth, then reduce clearance at a rate of **1 inch (25 mm)** in depth for each **6 inches (150 mm)** in height, to a minimum clear height of **9 inches (230 mm)** above floor at a depth of **11 inches (280 mm)**.
 - d. Pipe Enclosure Panels: Provide manufacturer's standard panels to enclose plumbing under countertop, of same material and finish as cabinets. Install panel to prevent exposure of sharp or abrasive surfaces under countertop.
 - e. Operable Parts: Locate operable parts no higher than **48 inches (1219 mm)** and no lower than **15 inches (380 mm)** above floor. Provide operable parts that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than **5 lbf (22.2 N)**.
 - f. Range or Cooktop: Provide top surface **34 inches (865 mm)** above floor, with controls that do not require reaching across burners. Provide knee and toe clearance beneath range or cooktop; insulate underside of cooktop to prevent burns, shocks, or abrasions.
 - g. Refrigerator/Freezer: Provide 50 percent of freezer space no higher than **54 inches (1370 mm)** off floor.
 - h. Oven: Provide work surface adjacent to one side of bottom-hinged doors. Locate controls on front panel.

J. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

K. Finishes

1. Stainless-Steel Finishes: Remove tool and die marks and stretch lines, or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 - a. Bright, Directional Polish: No. 4 finish.
2. Wood Finishes: Factory finished with manufacturer's standard stain, sealer, and clear finish coat. Defer only final touchup until after installation.

1.3 EXECUTION

A. Examination

1. Examine walls and floors, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
2. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
3. Examine walls and partitions for proper backing for unit kitchens.
4. Examine roughing-in for electrical power plumbing and mechanical system(s) to verify actual locations of connections before installation of unit kitchens.
5. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. General: Install level, plumb, and true; shim as required, using concealed shims. Provide fasteners, clips, backing materials, brackets, anchors, fillers, scribes, trim, and accessories necessary for complete installation.
 - a. Anchor unit kitchens at ends and at intervals recommended by manufacturer, but not more than **36 inches (910 mm)** o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent material distortion; use concealed fasteners.
 - b. Freestanding Ranges: Install anti-tip anchors at locations recommended by manufacturer.
2. Comply with requirements specified in Division 14 AND Division 21 for connecting unit kitchens to plumbing and mechanical system(s).
3. Comply with requirements specified in Division 22 for connecting unit kitchens to electrical power system.

C. Adjusting And Cleaning

1. Test, adjust, and verify operation of each appliance, plumbing fixture, and component of unit kitchens. Repair or replace items found to be defective or operating below rated capacity.
2. Verify that operating parts work freely and fit neatly and that clearances are adequate to properly and freely operate appliances.
3. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that locking devices operate properly.
4. After completing unit kitchen installation, remove protective coverings if any.
5. Repair or replace damaged parts, dents, buckles, abrasions, and other defects affecting appearance or serviceability. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 11 32 13 00

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Task	Specification	Specification Description
11 41 13 00	11 21 63 00	Food Service Equipment
11 41 31 00	11 21 63 00	Food Service Equipment

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SECTION 11 41 33 00 - RESIDENTIAL CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. **[Kitchen] [and] [vanity]** cabinets.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking for anchoring casework.
2. Section 092216 "Non-Structural Metal Framing" for reinforcements in metal-framed partitions for anchoring casework.
3. Section 123623.13 "Plastic-Laminate-Clad Countertops."
4. Section 123640 "Stone Countertops."
5. Section 123661.13 "Cultured Marble Countertops."
6. Section 123661.16 "Solid Surfacing Countertops."
7. Section 123661.19 "Quartz Agglomerate Countertops."

1.2 DEFINITIONS

- A. Concealed Surfaces of Casework:** Surfaces not usually visible after installation, including sleepers, web frames, dust panels, bottoms of drawers, and ends of casework installed directly against and completely concealed by walls or other casework, and tops of wall cabinets and utility cabinets.
- B. Exposed Surfaces of Casework:** Surfaces visible when doors and drawers are closed, including visible surfaces in open cabinets or behind glass doors.
- C. Semiexposed Surfaces of Casework:** Surfaces behind opaque doors or drawer fronts, including interior faces of doors, interiors and sides of drawers, and bottoms of wall cabinets.

1.3 COORDINATION

- A. Coordinate layout and installation of blocking and reinforcement in partitions for support of casework.**

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components, and profiles and finishes for casework.
2. Include rated capacities, operating characteristics, profiles, and finishes for hardware.

B. Sustainable Design Submittals:

1. as directed by the Owner .

- C. Shop Drawings: For residential casework.
 - 1. Include plans, elevations, details, and attachments to other work.
 - 2. Show materials, finishes, filler panels, and hardware.
 - 3. Indicate manufacturer's catalog numbers for casework.
- D. Samples: For casework and hardware finishes.
- E. Samples for Initial Selection: For casework and hardware finishes.
- F. Samples for Verification: For the following:
 - 1. Casework Finishes: **8-by-10-inch (200-by-250-mm)** Samples for each type of casework finish.
 - 2. Hardware: One full-size Sample of each type of exposed hardware in each finish required.
 - 3. Base Cabinet: One full-size, [**16-inch- (406-mm-)**] wide or as directed by the Owner , finished base cabinet complete with hardware, doors, and drawers but without countertop.
 - 4. Wall Cabinet: One full-size, [**12-inch- (304-mm-)**] wide or as directed by the Owner , finished wall cabinet complete with hardware, doors, and adjustable shelves.
 - 5. Full-Size Samples: Maintain at Project site during construction in an undisturbed condition as a standard for judging the completed Work. Unless otherwise indicated, approved sample units may become part of the completed Work if in undisturbed condition at time of Substantial Completion. Notify Architect of their exact locations.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For casework.

1.6 QUALITY ASSURANCE

- A. as directed by the Owner .

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install casework until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.
- B. Established Dimensions: Where casework is indicated to fit to other construction, establish dimensions for areas where casework is to fit. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Provide fillers and scribes to allow for trimming and fitting.
- C. Field Measurements: Where casework is indicated to fit to existing construction, verify dimensions of existing construction by field measurements before fabrication and indicate measurements on Shop Drawings. Provide fillers and scribes to allow for trimming and fitting.
- D. Locate concealed framing, blocking, and reinforcements that support casework by field measurements before enclosing them, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 CABINETS

- A. Quality Standard: Provide cabinets that comply with KCMA A161.1.
1. KCMA Certification: Provide cabinets with KCMA's "Certified Cabinet" seal affixed in a semiexposed location of each unit and showing compliance with KCMA A161.1.
- B. Door and Drawer Face Style: **[Flush overlay; faces cover cabinet fronts] [Reveal overlay; faces partially cover cabinet fronts] [Lipped overlay; faces rabbeted and partially inset within cabinet fronts, lips of rabbets overlap cabinet fronts] [Flush inset; faces set within and flush with cabinet fronts].**
1. Door and Drawer Fronts:
 - a. Solid-wood stiles and rails, **5/8 inch (16 mm)** thick, with **3/4-inch- (19-mm-)** thick, solid-wood center panels.
 - b. Solid-wood stiles and rails, **3/4 inch (19 mm)** thick, with **1/4-inch- (6.4-mm-)** thick, veneer-faced plywood center panels.
 - c. **1/2-inch- (13-mm-)** thick, veneer-faced plywood.
 - d. **1/2-inch- (13-mm-)** thick, plastic-laminate-faced particleboard[, **with continuous solid-wood pulls on one edge**][, **with PVC edgebanding**].
 - e. **1/2-inch- (13-mm-)** thick, thermoset decorative panels[, **with continuous solid-wood pulls on one edge**].
 - f. **1/2-inch- (13-mm-)** thick, thermoformed-vinyl-faced panels with vinyl overlay on **[faces and edges and with thermoset decorative panel backs] [faces, backs, and edges]**.
- C. Cabinet Style: **[Face frame] [Frameless]**.
1. Face Frames:
 - a. **3/4-by-1-5/8-inch (19-by-41-mm)** solid wood[**with glued mortise and tenon or doweled joints**].
 - b. **5/8-inch- (16-mm-)** thick particleboard with plastic laminate on exposed and semiexposed surfaces.
 - c. **5/8-inch- (16-mm-)** thick, thermoset decorative panel material.
 - d. **1/2-inch- (13-mm-)** thick, thermoformed-vinyl-faced panels with vinyl overlay on exposed and semiexposed surfaces.
- D. Exposed Cabinet End Finish: **[Wood veneer] [Plastic laminate] [Thermoset decorative panels] [Thermoformed-vinyl-faced panels]**.
- E. Cabinet End Construction: **[5/8-inch- (16-mm-) thick particleboard or 1/2-inch- (13-mm-) thick plywood] [1/2-inch- (13-mm-) thick particleboard or 3/8-inch- (9.5-mm-) thick plywood]**.
- F. Cabinet Tops and Bottoms: **[5/8-inch- (16-mm-) thick particleboard or 1/2-inch- (13-mm-) thick plywood] [1/2-inch- (13-mm-) thick particleboard or 3/8-inch- (9.5-mm-) thick plywood]**.
1. Fully support in rabbets in and secure to end panels[, **front frame,**] and back rail.
- G. Back, Top, and Bottom Rails: **3/4-by-2-1/2-inch (19-by-63-mm)** solid wood, interlocking with end panels and rabbeted to receive top and bottom panels. Back rails secured under pressure with glue and with mechanical fasteners.

- H. Wall-Hung-Unit Back Panels: **3/16-inch- (4.8-mm-)** thick plywood fastened to rear edge of end panels and to top and bottom rails.
- I. Base-Unit Back Panels: [**3/16-inch- (4.8-mm-)** thick plywood] [**1/8-inch- (3.2-mm-)** thick hardboard] fastened to rear edge of end panels and to top and bottom rails.
- J. Front Frame Drawer Rails: **3/4-by-1-1/4-inch (19-by-32-mm)** solid wood mortised and fastened into face frame.
- K. Drawers: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
 - 1. Join subfronts, backs, and sides with [**glued rabbeted joints supplemented by mechanical fasteners**] [or] [**glued dovetail joints**].
 - 2. Subfronts, Backs, and Sides: [**3/4-inch- (19-mm-)** thick solid wood] [**1/2-inch- (13-mm-)** thick solid wood] [**1/2-inch- (13-mm-)** thick solid wood or **3/8-inch- (9.5-mm-)** thick plywood].
 - 3. Bottoms: [**1/4-inch- (6.4-mm-)** thick plywood] [**3/16-inch- (4.8-mm-)** thick plywood] [**1/4-inch- (6.4-mm-)** thick hardboard].
- L. Shelves: [**3/4-inch- (19-mm-)** thick particleboard or **5/8-inch- (16-mm-)** thick plywood] [**5/8-inch- (16-mm-)** thick particleboard or **1/2-inch- (13-mm-)** thick plywood].
- M. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms and stretchers of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops, bottoms, and backs into end panels.
- N. Factory Finishing: Finish cabinets at factory.

2.2 CABINET MATERIALS

- A. Hardwood Lumber: Kiln dried to 7 percent moisture content.
- B. Softwood Lumber: Kiln dried to 10 percent moisture content.
- C. Hardwood Plywood: HPVA HP-1.
- D. Particleboard: ANSI A208.1, Grade M-2.
- E. MDF: Medium-density fiberboard, ANSI A208.2, Grade MD.
- F. Hardboard: ANSI A135.4, Class 1 tempered.
- G. Exposed Materials:
 - 1. Exposed Wood Species: [**Oak**] [**Maple**] [**Alder**] [**Birch**] [**Hickory**] [**Cherry**] [**Manufacturer's standard domestic hardwood species**] or as directed by the Owner .
 - a. Select materials for compatible color and grain. Do not use two adjacent exposed surfaces that are noticeably dissimilar in color, grain, figure, or natural character markings.
 - b. Staining and Finish: [**As indicated by manufacturer's designations**] [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**].
 - 2. Solid Wood: Clear hardwood lumber of species indicated, free of defects.

3. Plywood: Hardwood plywood with face veneer of species indicated, with Grade A faces and Grade C backs of same species as faces.
 - a. Edge band exposed edges with **[a minimum of 1/8-inch- (3-mm-) thick, solid-wood] [veneer]** edging of same species as face veneer.
 4. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD 3, **[Grade VGS] [Grade HGL]** and edgebanded.
 - a. Colors, Textures, and Patterns: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
 - b. Plastic-Laminate Edgebanding: Of same grade, pattern, color, and texture of plastic laminate as for faces.
 - c. PVC Edgebanding: Rigid PVC extrusions, through color with satin finish, **[3 mm thick at doors and drawer fronts, and 1 mm thick elsewhere] [1 mm thick]**.
 - 1) Color: **[As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
 5. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper.
 - a. Provide material finished on both sides for doors and drawer fronts.
 - b. Provide **[PVC or polyester edgebanding] [PVC edge molding]** on components with exposed or semiexposed edges.
 - c. Colors: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
 6. Thermoformed-Vinyl-Faced Panels: MDF, milled to required shapes, with a thermoformed vinyl overlay applied in a vacuum or membrane press.
 - a. Color: **[White] [As indicated by manufacturer's designation] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
- H. Semiexposed Materials: Unless otherwise indicated, provide the following:
1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects. Same species as exposed surfaces **[or stained to be compatible with exposed surfaces]**.
 2. Plywood: Hardwood plywood with Grade C faces and not less than Grade 3 backs of same species as faces. Face veneers of same species as exposed surfaces **[or stained to be compatible with exposed surfaces]**.
 3. Plastic Laminate: Particleboard faced with high-pressure decorative laminate complying with NEMA LD 3, **[Grade VGS] [Grade CLS]**.
 - a. For backs of doors and drawer fronts faced with plastic laminate, provide same grade, pattern, color, and texture of plastic laminate as for faces.
 - b. For face frames faced with plastic laminate, provide plastic-laminate edges of same grade, pattern, color, and texture of plastic laminate as for faces.
 - c. For shelves faced with plastic laminate, provide **[plastic-laminate edges of same grade, pattern, color, and texture of plastic laminate as for faces] [PVC edge molding, 1 mm thick]**.

- d. Colors, Textures, and Patterns: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
- 4. Thermoset Decorative Panels: Particleboard or MDF finished with thermally fused, melamine-impregnated decorative paper.
 - a. Provide material finished on both sides for shelves, dividers, drawer bodies, and other components with two semiexposed surfaces.
 - b. Provide **[PVC or polyester edgebanding] [PVC edge molding]** on components with semiexposed edges.
 - c. Colors: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
- 5. Vinyl-Faced Particleboard: MDF with **[embossed, wood-grain-patterned]** vinyl film adhesively bonded to particleboard.
 - a. Provide vinyl film on both sides of shelves, dividers, drawer bodies, and other components with two semiexposed surfaces and on semiexposed edges.
 - b. Colors, Textures, and Patterns: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from cabinet manufacturer's full range]** or as directed by the Owner .
- I. Concealed Materials: Solid wood or plywood, of any hardwood or softwood species, with no defects affecting strength or utility; particleboard; MDF; or hardboard.

2.3 CABINET HARDWARE

- A. General: Manufacturer's standard units complying with BHMA A156.9, of type, size, style, material, and finish **[as indicated by manufacturer's designations] [matching Architect's sample] [as selected by Architect from manufacturer's full range]** or as directed by the Owner .
- B. Pulls: **[Surface-mounted decorative pulls] [Back-mounted decorative pulls] [Back-mounted decorative pulls with backing plates] [Wire pulls] [Back-mounted knobs] [Surface-mounted porcelain knobs]** or as directed by the Owner .
- C. Hinges: **[Decorative full-surface hinges] [Concealed butt hinges] [Semiconcealed (wraparound) butt hinges for overlay doors] [Pivot (knife) hinges] [Concealed European-style, self-closing hinges]** or as directed by the Owner .
- D. Drawer Guides: Epoxy-coated-metal, self-closing drawer guides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; and complying with BHMA A156.9, Type B05011 or Type B05091.
- E. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.
 - 1. Doors: Provide one bumper at top and bottom of closing edge of each swinging door.
 - 2. Drawers: Provide one bumper on back side of drawer front at each corner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances, location of framing and reinforcements, and other conditions affecting performance of casework.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install casework with no variations in adjoining surfaces; use concealed shims. Where casework abuts other finished work, scribe and cut for accurate fit. Provide filler strips, scribe strips, and moldings in finish to match casework.
- B. Install casework without distortion so doors and drawers fit the openings, are aligned, and are uniformly spaced. Complete installation of hardware and accessories as indicated.
- C. Install casework level and plumb to a tolerance of **1/8 inch in 8 feet (3 mm in 2.4 m)**.
- D. Fasten casework to adjacent units and to backing.
 - 1. Fasten wall cabinets through back, near top and bottom, and at ends not more than **16 inches (400 mm) o.c.**
 - a. Fasteners: [**No. 10 wafer-head screws sized for not less than 1-1/2-inch (38-mm) penetration into wood framing, blocking, or hanging strips**] [**No. 10 wafer-head sheet metal screws through the metal backing or metal framing behind the wall finish**] [**Toggle bolts through the metal backing or metal framing behind the wall finish**].

3.3 ADJUSTING AND CLEANING

- A. Adjust hardware so doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.
- B. Clean casework on exposed and semiexposed surfaces. Touch up as required to restore damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 11 41 33 00

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Task	Specification	Specification Description
11 41 33 00	11 21 63 00	Food Service Equipment
11 42 13 00	11 21 63 00	Food Service Equipment
11 42 16 00	11 21 63 00	Food Service Equipment
11 44 13 00	11 21 63 00	Food Service Equipment
11 44 16 00	11 21 63 00	Food Service Equipment
11 44 19 00	11 21 63 00	Food Service Equipment
11 46 13 00	11 21 63 00	Food Service Equipment
11 46 16 00	11 21 63 00	Food Service Equipment
11 46 19 00	11 21 63 00	Food Service Equipment
11 46 83 00	11 21 63 00	Food Service Equipment
11 48 13 00	11 21 63 00	Food Service Equipment
11 48 16 00	11 21 63 00	Food Service Equipment

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SECTION 11 52 13 13 - PROJECTION SCREENS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for projection screens. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Manually operated projection screens.
 - b. Electrically operated projection screens and controls.
 - c. Rigid rear-projection screens.

C. Definitions

1. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.
2. Gain of Rear-Projection Screens: Ratio of light refracted by screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94, except that for measuring luminance of test screen, projection lamp shall be placed behind screen same distance as it was placed in front of magnesium carbonate surface for measuring luminance of reference standard.
3. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:
 - a. For manually operated projection screens:
 - 1) Drop lengths.
 - 2) Anchorage details.
 - 3) Accessories.
 - b. For electrically operated projection screens and controls:
 - 1) Location of screen centerline relative to ends of screen case.
 - 2) Location of wiring connections for electrically operated units.
 - 3) Location of seams in viewing surfaces.
 - 4) Drop lengths.
 - 5) Anchorage details, including connection to supporting structure for suspended units.
 - 6) Details of juncture of exposed surfaces with adjacent finishes.
 - 7) Accessories.
 - 8) Wiring diagrams.
 - c. For rigid rear-projection screens:
 - 1) Frame details.
 - 2) Anchorage details.
 - 3) Details of juncture of exposed surfaces with adjacent finishes.
 - 4) Accessories.
3. Maintenance Data: For projection screens to include in maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Delivery, Storage, And Handling

1. Environmental Limitations: Do not deliver or install projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Store rear-projection screens in manufacturer's protective packaging and according to manufacturer's written instructions.

1.2 PRODUCTS

A. Manually Operated Projection Screens

1. General: Manufacturer's standard spring-roller-operated units, consisting of case, screen, mounting accessories, and other components necessary for a complete installation.
 - a. Screen Mounting: Top edge securely anchored to a **3-inch- (75-mm-)** diameter, rigid steel roller; bottom edge formed into a pocket holding a tubular metal slat, with ends of slat protected by plastic caps, and with a saddle and pull attached to slat by screws.
 - b. Tab Tensioning: Provide units that have a durable low-stretch cord, such as braided polyester, on each side of screen connected to edge of screen by tabs to pull screen flat horizontally. In lieu of tab tensioning, screens may be constructed from vinyl-coated screen cloth that contains horizontal stiffening monofilaments to resist edge curling, **as directed**.
2. Bracket-Mounted or Ceiling-Suspended, Metal-Encased, Manually Operated Screens: Units designed and fabricated for suspending from wall brackets or ceiling, fabricated from formed-steel sheet not less than **0.027 inch (0.7 mm)** thick or from aluminum extrusions; with vinyl covering or baked-enamel finish and matching end caps. Provide mounting brackets unless otherwise indicated.
3. Surface-Mounted, Metal-Encased, Manually Operated Screens: Units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet not less than **0.027 inch (0.7 mm)** thick or from aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish. Provide units with matching end caps and concealed mounting.
4. Surface-Mounted, Wood-Finished, Manually Operated Screens: Units designed and fabricated for surface mounting on wall or ceiling; with flat back design, hardwood finish, and concealed mounting brackets.
 - a. Hardwood: Oak **OR** Walnut **OR** Cherry **OR** As selected from manufacturer's full range of species, **as directed**.
 - b. Finish: As selected from manufacturer's full range.

B. Electrically Operated Projection Screens

1. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL or another testing and inspecting agency acceptable to authorities having jurisdiction, **as directed**.
 - a. Controls: Remote, key-operated, **as directed**, three-position control switch installed in recessed device box with flush cover plate matching other electrical device cover plates in room where switch is installed.
 - 1) Provide two **OR** three, **as directed**, control switches for each screen.
 - 2) Provide number of control switches indicated for each screen.
 - 3) Provide power supply for low-voltage systems if required.
 - 4) Provide locking cover plates for switches.
 - 5) Provide key-operated, power-supply switch.

- 6) Provide infrared **OR** radio-frequency, **as directed**, remote control consisting of battery-powered transmitter and receiver.
- 7) Provide video interface control for connecting to projector. Projector provides signal to raise or lower screen.
- b. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
- c. End-Mounted Motor: Instant-reversing, gear-drive motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Locate motor in its own compartment on right end of screen unless otherwise indicated **OR** on left end of screen unless otherwise indicated **OR** on end of screen indicated, **as directed**.
- d. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a **3/8-inch- (9.5-mm-)** diameter metal rod with ends of rod protected by plastic caps.
 - 1) Roller for end-mounted motor supported by self-aligning bearings in brackets.
 - 2) Roller for motor in roller supported by vibration- and noise-absorbing supports.
- e. Tab Tensioning: Provide units that have a durable low-stretch cord, such as braided polyester, on each side of screen connected to edge of screen by tabs to pull screen flat horizontally. In lieu of tab tensioning, screens may be constructed from vinyl-coated screen cloth that contains horizontal stiffening monofilaments to resist edge curling.
2. Surface-Mounted, Metal-Encased, Electrically Operated Screens: Motor-in-roller **OR** End-mounted motor, **as directed**, units designed and fabricated for surface mounting on wall or ceiling, fabricated from formed-steel sheet not less than **0.027 inch (0.7 mm)** thick or from aluminum extrusions; with flat back design and vinyl covering or baked-enamel finish. Provide with matching end caps and concealed mounting.
3. Surface-Mounted, Wood-Finished, Electrically Operated Screens: Motor in roller units designed and fabricated for surface mounting on wall or ceiling; with flat back design, hardwood finish, and concealed mounting brackets.
 - a. Hardwood: Oak **OR** Walnut **OR** Cherry **OR** As selected from manufacturer's full range of species, **as directed**.
 - b. Finish: As selected from manufacturer's full range.
4. Suspended, Electrically Operated Screens without Ceiling Closure: Motor-in-roller **OR** End-mounted motor, **as directed**, units designed and fabricated for suspended mounting, with bottom of case entirely or partially open under screen compartment.
 - a. Provide metal or metal-lined motor enclosure on units with end-mounted motor.
 - b. Provide metal or metal-lined wiring compartment on units with motor in roller.
 - c. Screen Case: Made from metal **OR** metal and fire-retardant materials **OR** metal, wood, wood products, and fire-retardant materials, **as directed**.
 - d. Provide screen case with trim flange to receive ceiling finish **OR** constructed to be installed with underside flush with ceiling **OR** constructed to be installed with ceiling finish applied to underside, **as directed**.
 - e. Finish on Exposed Surfaces: Prime painted **OR** Vinyl covering or baked enamel, **as directed**.
5. Suspended, Electrically Operated Screens with Automatic Ceiling Closure: Motor-in-roller **OR** End-mounted motor, **as directed**, units designed and fabricated for suspended mounting; with bottom of case composed of two panels, fully enclosing screen, motor, and wiring; one panel hinged and designed to open and close automatically when screen is lowered and fully raised, the other removable or openable for access to interior of case.
 - a. Provide metal or metal-lined motor enclosure on units with end-mounted motor.
 - b. Provide metal or metal-lined wiring compartment on units with motor in roller.
 - c. Screen Case: Made from metal **OR** metal and fire-retardant materials **OR** metal, wood, wood products, and fire-retardant materials, **as directed**.

- d. Provide screen case with trim flange to receive ceiling finish **OR** constructed to be installed with underside flush with ceiling **OR** constructed to be installed with ceiling finish applied to underside, **as directed**.
- e. Finish on Exposed Surfaces: Prime painted **OR** Vinyl covering or baked enamel, **as directed**.

C. Front-Projection Screen Material

- 1. Matte-White Viewing Surface: Peak gain not less than 0.9, and gain not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
- 2. Matte-Gray Viewing Surface: Peak gain not less than 0.8, and half-gain angle of not less than 50 degrees from the axis of the screen surface.
- 3. Glass-Beaded Viewing Surface: Peak gain not less than 2.0, and half-gain angle of at least 15 degrees from the axis of the screen surface.
- 4. Matte Reflective Viewing Surface: Peak gain not less than 1.3, and half-gain angle of at least 40 degrees from the axis of the screen surface.
- 5. Wide-Angle Reflective Viewing Surface: Peak gain not less than 1.5, and half-gain angle of at least 35 degrees from the axis of the screen surface.
- 6. Multipurpose Reflective Viewing Surface: Peak gain not less than 1.8, and half-gain angle of at least 25 degrees from the axis of the screen surface.
- 7. High-Gain Reflective Viewing Surface: Peak gain not less than 2.5, and half-gain angle of at least 20 degrees from the axis of the screen surface.
- 8. Material: Vinyl-coated, glass-fiber fabric or vinyl sheet.
- 9. Mildew-Resistance Rating: 0 or 1 when tested according to ASTM G 21.
- 10. Flame Resistance: Passes NFPA 701.
- 11. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.
- 12. Seams: Where length of screen indicated exceeds maximum length produced without seams in material specified, provide screen with horizontal seam placed as follows:
 - a. At top **OR** bottom, **as directed**, of screen at juncture between extra drop length and viewing surface.
 - b. In location indicated.
- 13. Seamless Construction: Provide screens, in sizes indicated, without seams.
- 14. Edge Treatment: Black **OR** Without black, **as directed**, masking borders.
- 15. Size of Viewing Surface: **50 by 50 inches (1270 by 1270 mm) OR 60 by 60 inches (1524 by 1524 mm) OR 70 by 70 inches (1778 by 1778 mm) OR 84 by 84 inches (2133 by 2133 mm) OR 48 by 65 inches (1219 by 1651 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 58 by 79 inches (1473 by 2006 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.**
- 16. Provide extra drop length of dimensions and at locations indicated.
 - a. Color: Same as viewing surface **OR** Black, **as directed**.

D. Flexible Rear-Projection Screen Material

- 1. Wide-Angle Screens: Peak gain not less than 1.0, and half-gain angle of at least 35 degrees from the axis of the screen surface.
- 2. Moderate-Gain Screens: Peak gain not less than 1.3, and half-gain angle of at least 30 degrees from the axis of the screen surface.
- 3. High-Gain Screens: Peak gain not less than 1.8, and half-gain angle of at least 15 degrees from the axis of the screen surface.
- 4. Material: Coated vinyl sheet.
- 5. Mildew-Resistance Rating: 0 or 1 when tested according to ASTM G 21.
- 6. Flame Resistance: Passes NFPA 701.
- 7. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.
- 8. Seamless Construction: Provide screens, in sizes indicated, without seams.
- 9. Size of Viewing Surface: **50 by 50 inches (1270 by 1270 mm) OR 60 by 60 inches (1524 by 1524 mm) OR 70 by 70 inches (1778 by 1778 mm) OR 84 by 84 inches (2133 by 2133 mm) OR 48 by 65 inches (1219 by 1651 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 58 by 79 inches (1473 by 2006 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.**

10. Provide extra drop length of dimensions and at locations indicated.
 - a. Color: Same as viewing surface **OR** Black, **as directed**.

- E. Optically Coated Rigid Rear-Projection Screens
 1. Screen Substrate: Optically clear substrate complying with the following requirements:
 - a. Clear float glass complying with ASTM C 1036 for Type I (transparent glass, flat), Class 1 (clear), and Quality q3 (glazing select), 6.0 mm thick **OR** 10.0 mm thick **OR** 12.0 mm thick **OR** thickness as indicated, **as directed**.
 - b. Colorless, transparent, cast-acrylic sheet with a luminous transmittance of 92 percent per ASTM D 1003 and complying with ASTM D 4802, Category A-1 (cell cast), Finish 1 (smooth or polished), **1/4 inch (6.4 mm) thick OR 3/8 inch (9.5 mm) thick OR 1/2 inch (12.7 mm) thick OR** thickness as indicated, **as directed**.
 - c. Fresnel lens cast from colorless, transparent, acrylic with a luminous transmittance of 92 percent per ASTM D 1003 and complying with ASTM D 4802, Category A-1 (cell cast), Finish 1 (smooth or polished) on one side and Finish 2 (patterned) on other side, **1/4 inch (6.4 mm) thick OR 3/8 inch (9.5 mm) thick OR 1/2 inch (12.7 mm) thick OR** thickness as indicated, **as directed**.
 2. Optical Coating: Durable, washable coating bonded to one side of substrate.
 3. Wide-Angle Screens: Peak gain not less than 1.0, and half-gain angle of at least 35 degrees from the axis of the screen surface.
 4. Moderate-Gain Screens: Peak gain not less than 1.3, and half-gain angle of at least 30 degrees from the axis of the screen surface.
 5. General-Purpose Screens: Peak gain of not less than 1.8, and half-gain angle of at least 28 degrees from the axis of the screen surface.
 6. High-Gain Screens: Peak gain not less than 2.0, and half-gain angle of at least 20 degrees from the axis of the screen surface.
 7. Optical Tint: High-contrast dark gray **OR** Medium neutral gray **OR** Neutral white **OR** Manufacturer's standard, **as directed**.
 8. Protective Coating: Provide formulation designed by screen manufacturer as a permanent topcoat over optical coatings to protect against normal abrasion before, during, and after installation.
 9. Writing-Surface Coating: Provide screen manufacturer's protective coating, designed as a writing surface for dry-erase markers, on front of screen.
 10. Size of Viewing Surface: **40 by 54 inches (1016 by 1371 mm) OR 43 by 57 inches (1092 by 1447 mm) OR 50 by 67 inches (1270 by 1701 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 60 by 80 inches (1524 by 2032 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.**

- F. High-Performance Rigid Rear-Projection Screens
 1. High-Performance Screens, General: Acrylic screen with Fresnel lens on rear surface and linear lenses on front surface.
 - a. Screen Substrate: Optically clear acrylic with a luminous transmittance of 92 percent per ASTM D 1003 and complying with ASTM D 4802, Category A-1 (cell cast), Finish 2 (patterned), **1/4 inch (6.4 mm) thick OR 3/8 inch (9.5 mm) thick OR 1/2 inch (12.7 mm) thick OR** thickness as indicated, **as directed**.
 2. Performance:
 - a. Peak gain not less than 3.0 **OR** 4.0, **as directed**, and horizontal half-gain angle of at least 50 degrees from the axis of the screen surface.
 - b. Peak gain of 3.5 **OR** 4.0, **as directed**, and horizontal half-gain angle of at least 30 degrees from the axis of the screen surface.
 - c. Performance: Peak gain of 5.0, and horizontal half-gain angle of at least 25 degrees from the axis of the screen surface.
 - d. Performance: Peak gain not less than 1.5 **OR** 3.0, **as directed**, and horizontal half-gain angle of at least 20 degrees from the axis of the screen surface.
 3. Size of Viewing Surface: **40 by 54 inches (1016 by 1371 mm) OR 43 by 57 inches (1092 by 1447 mm) OR 50 by 67 inches (1270 by 1701 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 60 by 80 inches (1524 by 2032 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.**

G. Rigid Rear-Projection Screen Accessories

1. Factory Frames: Screen manufacturer's standard frames of profile indicated, fabricated to sizes required to fit screens from aluminum extrusions complying with **ASTM B 221 (ASTM B 221M)** for 6063-T5 alloy and temper.
 - a. Class II, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 - b. Class II, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
 - 1) Color: Black **OR** Dark bronze **OR** Either black or dark bronze, as standard with manufacturer, **as directed**.
2. Glazing Accessories for Factory Frames: Provide gaskets and setting blocks with proven record of compatibility with screen and frame surfaces, of sizes and shapes to accommodate thickness of screen indicated and to fit glazing channel provided.
3. Glazing Accessories for Field-Framed Screens: Provide materials compatible with screen and frame surfaces while complying with applicable requirements in Division 08 Section "Glazing".

1.3 EXECUTION

A. Front-Projection Screen Installation

1. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.
2. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
 - a. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.
 - 1) Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
 - b. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.
 - c. Test manually operated units to verify that screen-operating components are in optimum functioning condition.

B. Rigid Rear-Projection Screen Installation

1. Install rear-projection screens at locations indicated to comply with screen manufacturer's written instructions. Handle screens carefully during installation using procedures and tools recommended by screen manufacturer; do not abrade screen surfaces.
2. Install optically coated rear-projection screens with optical coating toward projector **OR** audience, **as directed**.
3. Install high-performance, rear-projection screens with orientation as indicated in manufacturer's written instructions.
4. Install factory-framed, rear-projection screens in prepared wall openings. Securely anchor frames to surrounding construction so frames are plumb and level and screen surfaces are flat.
5. Install rear-projection screens with glass substrates, in frames specified in other Sections, to comply with applicable requirements in Division 08 Section "Glazing" and with screen manufacturer's written instructions. Set projection screen with surfaces flat and edges plumb and level.

6. Install rear-projection screens with plastic substrates, in frames specified in other Sections, to comply with screen manufacturer's written instructions. Clamp units only at top edge and allow for expansion and contraction of plastic glazing material by providing frame with adequate bite and edge clearances.
- C. Protecting And Cleaning Rigid Rear-Projection Screens
1. Provide temporary covering of rear-projection screens until time of Final Completion. Use type of covering approved by screen manufacturer that will effectively protect screen from abrasion, breakage, or other damage.
 2. Clean rear-projection screens on both faces immediately before date scheduled for inspection intended to establish date of Final Completion. Use methods and cleaning materials recommended by screen manufacturer, taking care not to scratch or damage optical coatings or screen substrates.
- D. Projection Screen Schedule
1. Manually Operated, Front-Projection Screen Type: Surface mounted, metal encased **OR** Surface mounted, wood finished, **as directed**.
 - a. Screen Surface: Matte white **OR** Matte gray **OR** Glass beaded **OR** Matte reflective **OR** Wide-angle reflective **OR** Multipurpose reflective **OR** High-gain reflective, **as directed**.
 - b. Viewing Surface Size: **50 by 50 inches (1270 by 1270 mm)** **OR** **60 by 60 inches (1524 by 1524 mm)** **OR** **70 by 70 inches (1778 by 1778 mm)** **OR** **84 by 84 inches (2133 by 2133 mm)** **OR** **48 by 65 inches (1219 by 1651 mm)** **OR** **54 by 72 inches (1371 by 1828 mm)** **OR** **58 by 79 inches (1473 by 2006 mm)** **OR** **72 by 96 inches (1828 by 2438 mm)**, **as directed**.
 - c. Extra Drop Length: As needed at top of screen for bottom of screen to be **36 inches (900 mm)** above floor and **36 inches (900 mm)** at bottom of screen, **as directed**.
 2. Electrically Operated, Front-Projection Screen Type: Surface mounted, metal encased **OR** Surface mounted, wood finished **OR** Suspended, without ceiling closure **OR** Suspended, with automatic ceiling closure, **as directed**.
 - a. Motor Configuration: Motor in roller **OR** End-mounted motor on right end of screen **OR** End-mounted motor on left end of screen **OR** End-mounted motor on end of screen indicated, **as directed**.
 - b. Screen Surface: Matte white **OR** Matte gray **OR** Glass beaded **OR** Matte reflective **OR** Wide-angle reflective **OR** Multipurpose reflective **OR** High-gain reflective, **as directed**.
 - c. Viewing Surface Size: **50 by 50 inches (1270 by 1270 mm)** **OR** **60 by 60 inches (1524 by 1524 mm)** **OR** **70 by 70 inches (1778 by 1778 mm)** **OR** **84 by 84 inches (2133 by 2133 mm)** **OR** **48 by 65 inches (1219 by 1651 mm)** **OR** **54 by 72 inches (1371 by 1828 mm)** **OR** **58 by 79 inches (1473 by 2006 mm)** **OR** **72 by 96 inches (1828 by 2438 mm)**, **as directed**.
 - d. Extra Drop Length: As needed at top of screen for bottom of screen to be **36 inches (900 mm)** above floor and **36 inches (900 mm)** at bottom of screen, **as directed**.
 3. Manually Operated, Rear-Projection Screen Type: Surface mounted, metal encased **OR** Surface mounted, wood finished, **as directed**.
 - a. Screen Type: Wide angle **OR** Moderate gain **OR** High gain, **as directed**.
 - b. Viewing Surface Size: **50 by 50 inches (1270 by 1270 mm)** **OR** **60 by 60 inches (1524 by 1524 mm)** **OR** **70 by 70 inches (1778 by 1778 mm)** **OR** **84 by 84 inches (2133 by 2133 mm)** **OR** **48 by 65 inches (1219 by 1651 mm)** **OR** **54 by 72 inches (1371 by 1828 mm)** **OR** **58 by 79 inches (1473 by 2006 mm)** **OR** **72 by 96 inches (1828 by 2438 mm)**, **as directed**.
 - c. Extra Drop Length: As needed at top of screen for bottom of screen to be **36 inches (900 mm)** above floor and **36 inches (900 mm)** at bottom of screen, **as directed**.
 4. Electrically Operated, Rear-Projection Screen Type: Surface mounted, metal encased **OR** Surface mounted, wood finished **OR** Suspended, without ceiling closure **OR** Suspended, with automatic ceiling closure, **as directed**.
 - a. Motor Configuration: Motor in roller **OR** End-mounted motor on right end of screen **OR** End-mounted motor on left end of screen **OR** End-mounted motor on end of screen indicated, **as directed**.
 - b. Screen Type: Wide angle **OR** Moderate gain **OR** High gain, **as directed**.

- c. Viewing Surface Size: 50 by 50 inches (1270 by 1270 mm) OR 60 by 60 inches (1524 by 1524 mm) OR 70 by 70 inches (1778 by 1778 mm) OR 84 by 84 inches (2133 by 2133 mm) OR 48 by 65 inches (1219 by 1651 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 58 by 79 inches (1473 by 2006 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.
- d. Extra Drop Length: As needed at top of screen for bottom of screen to be 36 inches (900 mm) above floor and 36 inches (900 mm) at bottom of screen, as directed.
- 5. Rigid Rear-Projection Screen Type: Optically coated screen.
 - a. Screen Substrate: Glass OR Acrylic, as directed.
 - b. Screen Type: Wide angle OR Moderate gain OR General purpose OR High gain, as directed.
 - c. Optical Tint: High-contrast dark gray OR Medium neutral gray OR Neutral white, as directed.
 - d. Size of Viewing Surface: 40 by 54 inches (1016 by 1371 mm) OR 43 by 57 inches (1092 by 1447 mm) OR 50 by 67 inches (1270 by 1701 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 60 by 80 inches (1524 by 2032 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.
 - e. Additional Features: Protective coating OR Writing surface coating OR Factory frame, as directed.
- 6. Rigid Rear-Projection Screen Type: High-performance screen.
 - a. Gain: Not less than 1.5 OR 3 OR 3.5 OR 4 OR 5, as directed.
 - b. Horizontal Half-Gain Angle: At least 20 OR 25 OR 30 OR 50, as directed, degrees from screen axis.
 - c. Size of Viewing Surface: 40 by 54 inches (1016 by 1371 mm) OR 43 by 57 inches (1092 by 1447 mm) OR 50 by 67 inches (1270 by 1701 mm) OR 54 by 72 inches (1371 by 1828 mm) OR 60 by 80 inches (1524 by 2032 mm) OR 72 by 96 inches (1828 by 2438 mm), as directed.
 - d. Additional Features: Factory frame.

END OF SECTION 11 52 13 13

Task	Specification	Specification Description
11 52 13 13	01 22 16 00	No Specification Required
11 52 16 26	01 22 16 00	No Specification Required
11 52 19 00	11 52 13 13	Projection Screens

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SECTION 11 68 13 00 - PLAYGROUND EQUIPMENT AND STRUCTURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for playground equipment and structures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Freestanding playground equipment and structures.
 - b. Composite playground equipment and structures.

C. Definitions

1. Fall Height: According to ASTM F 1487, "the vertical distance between a designated play surface and the protective surfacing beneath it."
2. HDPE: High-density polyethylene.
3. IPEMA: International Play Equipment Manufacturers Association.
4. LLDPE: Linear low-density polyethylene.
5. MDPE: Medium-density polyethylene.
6. Use Zone: According to ASTM F 1487, "the area beneath and immediately adjacent to a play structure that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment."

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication and installation details for playground equipment and structures.
3. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Extent of surface systems and use zones for equipment.
 - b. Critical heights for playground surface, or fall heights for equipment.
4. Samples: For each type of exposed finish.
5. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - 1) Include statement indicating costs for each product having recycled content.
 - b. Certificates for Credit MR 7: Chain-of-custody certificates certifying that products specified to be made from certified wood comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
6. Product Certificates: For each type of playground equipment, signed by product manufacturer.
7. Material Certificates: For the following items, signed by manufacturers:
 - a. Shop finishes.
 - b. Wood Preservative Treatment: Include certification by treating plant that states type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - c. Recycled plastic.
8. Field quality-control test reports.

9. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for playground equipment.
10. Maintenance Data: For playground equipment and finishes to include in maintenance manuals.
11. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
2. Manufacturer Qualifications: A firm whose playground equipment components have been certified by IPEMA's third-party product certification service.
3. Forest Certification: Fabricate designated playground equipment with wood components produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
4. Safety Standards: Provide playground equipment complying with or exceeding requirements in the following:
 - a. ASTM F 1487.
 - b. CPSC No. 325.
5. Preinstallation Conference: Conduct conference at Project site.

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground equipment that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures.
 - 2) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - b. Warranty Period: Two **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - a. Extruded Bars, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - b. Cast Aluminum: ASTM B 179.
 - c. Flat Sheet: **ASTM B 209 (ASTM B 209M)**.
2. Steel: Comply with the following:
 - a. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M, hot-dip galvanized.
 - b. Steel Pipe: ASTM A 53/A 53M or ASTM A 135/A 135M standard-weight, hot-dip galvanized.
 - c. Steel Tubing: ASTM A 513, cold formed, hot-dip galvanized.
 - d. Steel Sheet: ASTM A 1011/A 1011M, hot-dip galvanized not less than **G60 (Z180)** coating designation.
 - e. Perforated Metal: Steel sheet not less than **0.075-inch (1.9-mm) OR 0.090-inch (2.3-mm) OR 0.120-inch (3.0-mm)** uncoated thickness; hot-dip galvanized; manufacturer's standard perforation pattern.
 - f. Expanded Metal: Manufacturer's standard carbon-steel sheets complying with ASTM F 1267, Type II (expanded and flattened); deburred after expansion.
 - g. Woven Wire Mesh: Manufacturer's standard, with wire complying with **ASTM A 510 (ASTM A 510M)**.
3. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666; Type 304, finished on exposed faces with No. 2B finish.
4. Wood: Surfaced smooth on all sides and all edges rounded, Douglas fir, preservative treated after fabrication **OR** Pine, preservative treated after fabrication **OR** [Western red cedar, as directed.

5. Softwood Plywood: DOC PS 1, Exterior; smooth surfaced with rounded edges; preservative treated after fabrication.
6. Opaque Plastic: Color impregnated, UV stabilized, and mold resistant.
 - a. Polyethylene: Fabricated from virgin **OR** 96 percent recycled, purified, fractional-melt plastic resin; rotationally molded HDPE, LLDPE, or MDPE with not less than **1/4-inch (6-mm)** wall thickness.
7. Transparent Plastic: Abrasion-resistant, UV-stabilized monolithic polycarbonate sheet; clear, colorless; not less than **3/16 inch (5 mm)** thick.
8. Chain and Fittings: ASTM A 467/A 467M, Class CS, 4/0 or 5/0, welded-straight-link coil chain; hot-dip galvanized **OR** zinc plated **OR** PVC coated, **as directed**. With commercial-quality, hot-dip galvanized **OR** zinc-plated, **as directed**, steel connectors and swing or ring hangers.
9. Castings and Hangers: Malleable iron, ASTM A 47/A 47M, Grade 32510, hot-dip galvanized.
10. Post Caps: Cast aluminum **OR** color-impregnated, UV-stabilized, mold-resistant polyethylene or polypropylene, **as directed**; color to match posts.
11. Platform Clamps and Hangers: Cast aluminum **OR** zinc-plated steel, not less than **0.105-inch-(2.7-mm-)** nominal thickness, **as directed**.
12. Hardware: Manufacturer's standard; commercial-quality; corrosion-resistant; hot-dip galvanized steel and iron, stainless steel, or aluminum; of a secure and vandal-resistant design.
13. Fasteners: Manufacturer's standard; corrosion-resistant; hot-dip galvanized or plated steel and iron, or stainless steel; permanently capped, and theft resistant.

B. Wood-Preservative-Treated Materials

1. Preservative Treatment: Pressure-treat wood according to AWPA C2 (lumber) and AWPA C9 (plywood).
 - a. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 - b. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.

C. Playground Equipment Fabrication

1. General: Provide sizes, strengths, thicknesses, wall thickness, and weights of components as indicated but not less than required to comply with structural performance and other requirements in ASTM F 1487. Factory drill components for field assembly. Unnecessary holes in components, not required for field assembly, are not permitted. Provide complete play structure, including supporting members and connections, means of access and egress, designated play surfaces, barriers, guardrails, handrails, handholds, and other components indicated or required to comply with referenced standards for equipment indicated.
 - a. Composite Play Structure: Provide complete play structure, designed to be modular, linked, and expandable, forming one integral unit for more than one play activity.
2. Metal Frame: Fabricate main-frame upright support posts from metal pipe or tubing with cross-section profile and dimensions as indicated. Unless otherwise indicated, provide each pipe or tubing main-frame member with manufacturer's standard drainable bottom plate or support flange. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.
3. Wood Frame: Fabricate main-frame upright support posts from wood species and with profile and dimensions as indicated. Fabricate secondary frame members, bracing, and connections from wood, steel, or aluminum.
4. Composite Frame: Fabricate main-frame upright support posts from metal and plastic with profile and dimensions as indicated. Fabricate secondary frame members, bracing, and connections from either steel or aluminum.
5. Play Surfaces: Provide manufacturer's standard elevated drainable decks, platforms, landings, walkways, ramps, and similar transitional play surfaces, designed to withstand loads; fabricated from perforated or expanded metal **OR** molded plastic **OR** plastic panel or plank **OR** recycled

polyethylene panel or plank **OR** wood plank, **as directed**, made into floor units with slip-slip-resistant foot surfaces. Fabricate units in manufacturer's standard modular sizes and shapes to form assembled play surfaces indicated.

- a. Elevated Play Surfaces: Provide protective devices, completely surrounding play surface except for access openings, if play-surface heights above protective surfacing exceed requirements in ASTM F 1487 **OR** CPSC No. 325, **as directed**.
 - b. Stepped Play Surfaces: Provide protective infill between stepped platforms.
6. Protective Barriers: Fabricated such that openings within the barrier and between the barrier and the play surface preclude passage of the torso probe according to ASTM F 1487 **OR** CPSC No. 325, **as directed**. Provide barriers designed to minimize the possibility of climbing, free of hand- and footholds, and configured to completely surround the protected area except for access openings. Extend barriers above the protected elevated surface for use by age group indicated. Fabricate from the following:
 - a. Welded metal pipe or tubing with vertical bars.
 - b. Steel sheet with openings for vision and ventilation.
 - c. Metal-pipe or -tubing frame with wire mesh infill panels.
 - d. Opaque **OR** Transparent as directed, solid plastic panels with openings.
 - e. Vertical wood balusters with metal pipe or tubing or wood frame.
 - f. Wood panels with openings for vision and ventilation.
 7. Guardrails: Provide guardrails configured to completely surround the protected area except for access openings. Fabricate from welded metal pipe or tubing **OR** metal pipe or tubing, and wood, as directed. Extend guardrails to comply with requirements for use by age group indicated.
 8. Handrails: Welded metal pipe or tubing, OD between **0.095 to 1.55 inches (24.1 to 39.4 mm) OR 0.125 inch (3.2 mm)**.
 - a. Provide handrails at heights to comply with requirements for use by age group indicated according to ASTM F 1487 **OR** CPSC No. 325.
 9. Roofs and Canopies: Manufacturer's standard, designed to be positioned overhead and to discourage and minimize climbing by users.
 - a. Fabricated from metal **OR** metal-pipe or -tubing-framed, welded wire **OR** opaque plastic **OR** clear polycarbonate plastic **OR** recycled polyethylene **OR** wood, as directed.
 10. Signs: Manufacturer's standard sign panels, fabricated from opaque plastic with graphics molded in **OR** wood with painted graphics, as directed, attached to upright support posts.
 - a. Text: As directed.
 - b. Colors: As directed.
- D. Freestanding Playground Equipment And Structures
1. Swings, Single **OR** Multiple, **as directed**, Axis:
 - a. Frame: Galvanized steel **OR** Aluminum pipe or tubing connected frame sections.
 - 1) Leg Upright(s): Not less than **1-7/8-inch (48-mm) OR 2-3/8-inch (60-mm) OR 3-1/2-inch (89-mm) OR 4-1/2-inch (114-mm) OR 5-inch (127-mm), as directed**
 - 2) Overhead Beam: Match leg upright **OR** Not less than **2-3/8-inch (60-mm) OR** Not less than **3-1/2-inch (89-mm), as directed**.
 - 3) Color: As selected from manufacturer's full range].
 - b. Frame: Wood connected frame sections with leg upright(s) and overhead beam not less than **4 inches (100 mm) square OR 6 inches (152 mm) square OR 6 inches (152 mm) round, as directed**, for legs.
 - c. Overhead Beam Height: **96 inches (2440 mm) OR 10 feet (3 m) OR** Height as indicated on Drawings, **as directed**, from pivot point above protective surfacing.
 - d. Chain: Standard link **OR** Short link not permitting finger penetration **OR** Manufacturer's standard, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - e. Swing Connector: S-hook **OR** Double clevis and bolt link, **as directed**.
 - f. Swing Hanger: Galvanized stamped steel clamp and ductile-iron pivot **OR** heavy-duty ductile iron **OR** manufacturer's standard, **as directed**.

- g. Swing Seats: Enclosed, full-bucket infant/tot **OR** Half-bucket **OR** U-shaped flexible belt **OR** Rigid rectangular **OR** Rigid disk **OR** Tire seat made from rubber **OR** plastic, as directed.
- h. Swing Seats: EPDM rubber **OR** Injection molded plastic, **as directed**, enclosed infant seat **OR** flexible seat **OR** tire, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
- i. Age Appropriateness: Two through five years **OR** 5 through 12 years, **as directed**.
- 2. Slides: Fabricated from stainless steel **OR** opaque plastic **OR** aluminum, **as directed**.
 - a. Configuration: Straight-aligned **OR** Quarter-turn **OR** Half-turn **OR** Three-quarter-turn **OR** Full-turn spiral **OR** S-shaped **OR** Squiggle-shaped descending chute(s), **as directed**.
 - b. Access: Stair or step ladder with handrails **OR** Vertical ladder **OR** Vertical ladder with side handrails, **as directed**.
 - c. Sit-Down Entrance: With protective barriers **OR** opaque plastic panel barriers **OR** canopy or hood enclosure, **as directed** and overhead handhold and side handholds.
 - d. Frame: Manufacturer's standard galvanized-steel pipe or tubing **OR** aluminum pipe or tubing **OR** wood, **as directed**.
 - e. Sliding Surface: Inclined **OR** Wavy **OR** Washboard rollers, **as directed**.
 - f. Sliding Surface Construction: Flat, continuous stainless-steel sheet with integral, full-length side rails **OR** U-shaped, continuous stainless-steel sheet with integral, full-length side rails **OR** [One-piece plastic with integral, full-length side rails **OR** Plastic tube, ID not less than **24 inches (610 mm)** **OR** [Plastic tube, ID not less than **30 inches (760 mm)**, **as directed**.
 - g. Colors: As selected from manufacturer's full range.
 - h. Age Appropriateness: Two through five years **OR** 5 through 12 years, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - i. Tube, round, not less than **24-inch (610-mm)** **OR** **30-inch (760-mm)**, **as directed**, diameter.
- 3. Merry-Go-Rounds: Rotating platform **OR** seating, **as directed**, around a vertical axis.
 - a. Rotating Mechanism: Permanently sealed and lubricated ball bearings with hydraulic-speed **OR** mechanical-speed, **as directed**, limiting device.
 - b. Platform: Round, dish-shaped **OR** flat **OR** flat, dimpled, **as directed**, steel sheet, not less than **0.1196-inch- (3.038-mm-)** nominal thickness, with slip-resistant footing.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - c. Handholds and Handrails: Metal pipe or tubing.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - d. Capacity: Single user **OR** Two users **OR** Five users, **as directed**.
- 4. Tunnels (Crawl Tubes): Fabricated from stainless steel **OR** opaque plastic, **as directed**.
 - a. Shape: Straight **OR** Curved, quarter turn, **as directed**.
 - b. Tube, round, not less than **24-inch (610-mm)** **OR** **30-inch (760-mm)**, **as directed**, diameter.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
- 5. Climbers: Fabricated from steel with galvanized **OR** PVC-plastisol, **as directed**, finish.
 - a. Horizontal ladder with hand rings, **as directed**.
 - b. Vertical fence.
 - c. Chain or cable ladder **OR** walks, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
- 6. Spring Rocking-Rider **OR** Seesaw, **as directed**:
 - a. Seat: Cast aluminum **OR** Molded HDPE or other plastic **OR** Wood, **as directed**; with handholds **OR** handholds and footrests, **as directed**.
 - 1) Seat Style: as directed by the Owner.
 - 2) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - b. Base: One **OR** Two, **as directed**, coil spring(s) with steel base plate.

- c. Capacity: Single user **OR** Two users, **as directed**.
- E. Composite Playground Equipment And Structures
- 1. Composite Structure: Fabricated from steel **OR** wood **OR** opaque plastic, **as directed**.
 - a. Frame: Galvanized steel pipe or tubing frame sections connected with bolts **OR** clamps, **as directed**.
 - 1) Pipe or Tubing: Not less than **4-inch (102-mm)** **OR** **5-inch (127-mm)**, **as directed**, OD legs.
 - 2) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - b. Frame: Wood frame sections connected with bolts.
 - 1) Wood not less than **4 inches (102 mm)** square **OR** **6 inches (152 mm)** round, **as directed**, for legs.
 - c. Horizontal Ladder Beam Height: **60 inches (1524 mm)** **OR** **84 inches (2130 mm)** **OR** Height as indicated on Drawings, **as directed**, above protective surfacing.
 - 1) Steel overhead beam, **2-3/8-inch (60-mm)** OD.
 - 2) Wood overhead beam, **6 inches (152 mm)** square.
 - d. Platforms: Perforated metal **OR** Wood **OR** Manufacturer's standard, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - e. Roofs: Perforated metal **OR** Wood **OR** Manufacturer's standard, **as directed**.
 - 1) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - f. Equipment: Include the following play event components:
 - 1) Slide.
 - 2) Crawl tube with spy holes, **as directed**.
 - 3) Horizontal ladder.
 - 4) Log roll.
 - 5) Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - g. Accessories: as directed by the Owner.
 - h. Arrangement: As indicated **OR** Manufacturer's standard, **as directed**.
 - i. Capacity: 10 **OR** 20, **as directed**, users.
 - j. Age Appropriateness: 2 through 5 years **OR** 5 through 12 years, **as directed**.
- F. Cast-In-Place Concrete
- 1. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-place Concrete" **OR** ACI 301, **as directed**, to produce normal-weight, air-entrained, **as directed**, concrete with a minimum 28-day compressive strength of **3000 psi (20.7 MPa)**, **3-inch (75-mm)** slump, and **1-inch- (25-mm-)** maximum-size aggregate.
 - 2. Concrete Materials and Properties: Dry-packaged concrete mix complying with ASTM C 387 and mixed at site with potable water, according to manufacturer's written instructions, to produce normal-weight concrete with a minimum 28-day compressive strength of **3000 psi (20.7 MPa)**, **3-inch (75-mm)** slump, and **1-inch- (25-mm-)** maximum-size aggregate.
- G. Aluminum Finishes
- 1. Baked-Enamel Finish: Prepare, treat, and coat metal to comply with paint manufacturer's written instructions and as follows:
 - a. Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness not less than **1.5 mils (0.04 mm)** **OR** **3 to 5 mils (0.076 to 0.127 mm)**, **as directed**, medium gloss.
 - 2. PVC Finish: Manufacturer's standard, UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added, complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness of **80 mils (2 mm)** **OR** **100 mils (2.5 mm)**, **as directed**.

3. Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.

H. Iron And Steel Finishes

1. Galvanizing: Hot-dip galvanize products made from rolled-, pressed-, and forged-steel shapes, castings, plates, bars, and strips indicated to be galvanized to comply with ASTM A 123/A 123M.
 - a. Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153/A 153M.
 - b. Galvanized Steel Sheet: Commercial steel sheet, hot-dip galvanized, complying with ASTM A 653/A 653M for not less than **G60 (Z180)** coating designation; mill phosphatized.
2. Powder-Coat Finish: Prepare, treat, and coat ferrous metal to comply with resin manufacturer's written instructions and as follows:
 - a. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than **1.5 mils (0.04 mm)**.
3. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.
4. PVC Finish: Manufacturer's standard, UV-stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added, complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness of **80 mils (2 mm) OR 100 mils (2.5 mm), as directed**.
5. Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.

I. Stainless-Steel Finishes

1. Remove tool and die marks and stretch lines or blend into finish.
2. Bright, Cold-Rolled, Unpolished Finish: No. 2B finish on exposed faces.

1.3 EXECUTION

A. Installation, General

1. General: Comply with manufacturer's written installation instructions, unless more stringent requirements are indicated. Anchor playground equipment securely, positioned at locations and elevations indicated.
 - a. Maximum Equipment Height: Coordinate installed heights of equipment and components with finished elevations of protective surfacing. Set equipment so fall heights and elevation requirements for age group use and accessibility are within required limits. Verify that playground equipment elevations comply with requirements for each type and component of equipment.
2. Post and Footing Excavation: Excavate holes for posts and footings as indicated in firm, undisturbed or compacted subgrade soil.
3. Post Set on Subgrade: Level bearing surfaces with drainage fill to required elevation.
4. Post Set with Concrete Footing: Comply with ACI 301 for measuring, batching, mixing, transporting, forming, and placing concrete.
 - a. Set equipment posts in **OR** on, **as directed**, concrete footing. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at the correct angle, alignment, height, and spacing.
 - 1) Place concrete around posts and vibrate or tamp for consolidation. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
 - b. Embedded Items: Use setting drawings and manufacturer's written instructions to ensure correct installation of anchorages for equipment.
 - c. Concrete Footings: Smooth top, and shape to shed water.

11 - Equipment



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- B. Field Quality Control
1. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 2. Arrange for playground equipment manufacturer's technical personnel to inspect playground and playground equipment and components during installation and, **as directed**, at final completion and to certify compliance with the following:
 - a. ASTM F 1487.
 - b. CPSC No. 325.
 3. Notify the Owner 48 hours in advance of date and time of final inspection.

END OF SECTION 11 68 13 00

SECTION 11 68 13 00a - RECREATIONAL FACILITIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of recreational facilities. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings and/or Catalogue Cuts shall be submitted for approval prior to any installation.

1.2 PRODUCTS

A. Materials shall be resistant to corrosion and degradation by ultraviolet rays. Hardware and fittings shall be at least as corrosion-resistant as the materials fastened.

1. Steel Plates, Pipe, Tubing, Sheets, Wire Ropes, Chains, and Miscellaneous Shapes shall be stainless steel or galvanized steel, even if painted or coated with vinyl or other protective finish. All open pipe and tube ends shall have rain caps.
2. Wood shall be all-heart cedar, cypress, or redwood or shall be treated with a non-toxic preservative. Wood shall not be used where it will be in direct contact with the ground, unless approved by the Owner.
3. Fiberglass shall be smooth fiberglass-reinforced polyester with gelcoat coating and shall meet the following minimum physical properties: **22,000 psi (1,550 kg/sq cm)** flexural strength, **15,000 psi (1,055 kg/sq cm)** tensile strength, and **20,000 psi (1,410 kg sq cm)** compressive strength.
4. Aluminum shall be anodized.
5. Foundations shall be **3,200 psi (225 kg/sq cm)** compressive strength concrete, enforced as required. Provide embedded anchorage items as required,

B. Playground Equipment, including see-saws, slides, swings, whirlers, and monkey bars, shall be prefabricated and designed to withstand the anticipated structural loads.

1. Exposed Surfaces shall be smooth (except where required to be nonslip) seamless, and nonsplintering.
2. Steps, Platforms, and Other Flat Surfaces Subject to Foot Traffic shall be non-slip, but not abrasive and shall be formed to exclude or drain away water.
3. Fastening shall be flush, concealed, or otherwise formed or located to prevent injury to children playing on the equipment.
4. Slides shall have stainless steel sliding surfaces.

C. Bike Racks shall be mounted, and sections (if rack is sectional) shall be attached with tamper-proof fasteners.

D. Fiberglass Shelters shall be reinforced with steel, aluminum, or wood framework as required. Shelter roof shall be sloped to drain. Fiberglass edges shall be returned so that they are not exposed, Shelters shall be prefabricated and designed to withstand the anticipated live, dead, and wind loads.

1.3 EXECUTION

- #### **A. Recreational facilities shall be installed plumb, aligned, and securely anchored to the ground. Adjust equipment with moving parts until operation is smooth and easy.**

11 - Equipment



END OF SECTION 11 68 13 00a

SECTION 11 68 16 00 - BUS STOP/SMOKING SHELTERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of bus stop/smoking shelters. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.
2. The work includes wall frame, roof and glazing panels, all required accessories and hardware for installation. Shelters shall be architect designed and structurally engineered. Shelters shall be designed to be stable with all windows, roof, fascia and ground fastening removed. Shelters shall be vandal-resistant, maintenance-free and completely weatherproof. Shelters shall be prefabricated in 4 or 5 preglazed caulked and gasketed wall and roof sections and shipped knocked-down for ease of handling and fast on-site installation.

- B. Standards:** All aluminum shall conform to the standards of the Aluminum Association. Shelter construction shall conform to the standards of ASCE. Shelters shall be designed to withstand minimum dead loads of **40 psf (195 kg/sq m)** and minimum windload of **75 mph (34 m/sec)**.

1.2 PRODUCTS

- A. Construction:** Shelters shall be constructed of modular interchangeable components. All structural framing members and mullions shall be 1-piece seamless extruded aluminum tubes of 6061-T6 or 6063-T6 alloy. **SNAP TOGETHER OR 2-PIECE TUBES WILL NOT BE ACCEPTED.** Window frames, facias and roof "hold downs" shall be multi-function extrusions of 6063-T52 or -T6 alloy. Window frames and Facias shall permit use of various interchangeable glazing and roofing materials. Framing member connections shall be concealed utilizing 2-1/4" x 2-1/4" x 1/4" or 2-1/4" x 1-1/4" x 1/4" thick aluminum "U" channels with integral weep system and tapered edges. Main structural joints shall be fastened with (2) Hi-Strength 1/4" Stainless Steel Bolts with washers, lock washers and nuts and 1/4" structural aluminum drive rivets. **SELF TAPPING CONNECTORS WILL NOT BE ACCEPTED.** Shelter base connections shall be adjustable to varying mounting conditions with a choice of internal or external flange details. Finish of external flanges shall match shelter finish. All joints shall be neat and clean and all edges free of burrs.
- B. Framing Members:** All main structural framing, both vertical and horizontal, shall be the same size, a minimum of 2-1/2" x 2-1/2" x 0.125" thick. Mullions shall be 1-1/2" x 2-1/2" x 0.125" thick rectangular aluminum tubes.
- C. Window Framing:** Window frames shall be "F" shaped extruded sections with integral alignment lip with beveled edge, and screw boss or corner key slot. All corners shall be mitered and fastened internally with concealed stainless steel screws. Each window frame unit, with window, shall be "independent" of the structural frame. Tamperproof 3/16" shallow head aluminum rivets (finished to match shelter) shall be used to fasten window frames to structural frame. Window frames shall permit glazing to be engaged up to 3/4" to prevent "pop out."
- D. Finishes:** All aluminum framing shall have a #215R1 clear anodized finish, unless directed otherwise. All fascia members shall have a #313 Dark Bronze Duranodic Finish, unless directed otherwise. All finishes to conform to the standards of the Aluminum Company of America.
- E. Glazing:** Glazing shall be 1/4" clear vandal-resistant acrylic sheet **OR** 1/4" clear or bronze tinted acrylic **OR** polycarbonate **OR** mar-resistant polycarbonate **OR** tempered glass, **as directed.** All glazing shall be gasketed with continuous extruded PVC dry set splines.

11 - Equipment



- F. Roof: Roof shall be white prefinished aluminum V-Beam roofing, unless directed otherwise.
- G. Roof Facia: Facia shall be 4.6" high, clear anodized #215R1 finish, unless directed otherwise.
- H. Options: Manufacturer's standard products, as required to meet project requirements.
 - 1. Wind break front entrance panel.
 - 2. Aluminum bench.
 - 3. Ceiling mounted light fixture with unbreakable polycarbonate diffuser and photoelectric cell.
 - 4. Electric radiant heater with vandal resistant electric heating element.
 - 5. Integrated map/schedule display board with tamper-proof fasteners and clear polycarbonate **OR** mar-resistant polycarbonate, **as directed**, cover.

1.3 EXECUTION

- A. Installation: In accordance with manufacturer's instructions.

END OF SECTION 11 68 16 00

SECTION 11 68 23 13 - PLAYING FIELDS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for repair and maintenance of playing fields. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product/material indicated.
2. Shop drawings shall be submitted for approval.

1.2 PRODUCTS

- #### **A. Fills required to bring the subgrade of playing surfaces up to required elevation shall be placed in horizontal layers of not more than 8 in. (200 mm) in loose thickness. The top layer of all fills and excavated areas under the playing surfaces shall be compacted to 95 percent maximum density in accordance with ASTM D 698.**

- #### **B. Sand-Clay Playing Surfaces shall consist of a stone foundation course, a clay foundation course, a wearing course and, where equipped, a drainage filter course, constructed on the prepared subgrade.**

1. Stone Foundation Course: A layer at least 3 in. (75 mm) thick of 3/4- to 1-1/2 in. (19 to 38 mm) crushed stone shall be spread over the subgrade or over the drainage filter course constructed thereon and shall be given preliminary compaction by rolling, followed by a filler consisting of 1/4- to 1/2-in. (6 to 13 mm) crushed stone to fill voids in the underlying stone. The stone foundation course shall be compacted to a minimum of 95 percent maximum density in accordance with ASTM D 698.
2. Clay Foundation Course: Selected inorganic fat clay (CH) shall be evenly spread on the stone foundation course to produce a compacted layer not less than 3 in. (75 mm) thick. The clay layer shall be compacted to a minimum of 90 percent of CE 55 maximum density in accordance with ASTM D 698.
3. Wearing Course: The approved inorganic clay-silt mixture of approximately 50 percent each of clay and silt shall be screened through a 1/4-in. (6 mm) mesh screen. The wearing course shall be mixed in proportions of 1 part sand to 2 parts clay-silt by volume. The wearing course shall be compacted to at least 95 percent maximum density in accordance with ASTM D 698 and shall range from 1 to 1-1/2 in. (25 to 38 mm) in thickness.
4. Drainage Filter Course: The drainage filter course shall consist of a well-graded aggregate course encased in a geotextile material and laid in such a manner to allow water to freely drain from the playing surfaces. The geotextile material shall be a woven or non-woven filter material with a minimum permeability of 0.008 in./sec (0.02 cm/sec). The material shall be resistant to mildew, ratting, insects, rodents, and chemicals normally encountered in a subsurface drainage system.

- #### **C. Bituminous Concrete Playing Surfaces shall consist of a base course, prime coat, bituminous leveling course, tack coat, surface course, color coating and, where required, a drainage filter course, all constructed on a prepared subgrade. The stabilized-aggregate base course shall be compacted at optimum moisture to at least 95 percent maximum density in accordance with ASTM D 698. Marshall stability shall not be less than 500 pounds (190 kg) and the flow shall not be greater than 20/100 in. (12.7 mm). The bituminous mixture shall be compacted until the voids in the total mix are reduced to less than 4.0 percent by volume.**

11 - Equipment



1. Thickness of Courses: Base course shall be 4 in. (400 mm) thick after compaction. Leveling course shall be 1-1/2 in. (38 mm) thick after compaction unless directed otherwise. Surface course shall be 1 in. (100 mm) thick after Compaction.
2. Color Coating and Marking Paint: After curing of the bituminous surface course, the entire playing surface shall be covered with a color coat as required.

D. Portland Cement Concrete Playing Surfaces:

1. Aggregate: The nominal aggregate size shall be 1-1/2 in. (38 mm) to No. 4 sieve size and shall conform to ASTM C 33.
2. Portland Cement: The cement shall conform to ASTM C 150, Type IA or IIA; or ASTM C 595, Type IP-A.
3. Thickness: Horizontal Portland cement concrete playing surfaces shall consist of concrete slabs 4 inches thick.

E. Maintenance of Sand-Clay Surfaces: Prior to final acceptance, the Contractor shall make one application of 3/4 lb/sq yd (0.4 kg/sq m) of calcium chloride to the sand-clay surface of the entire playing area.

F. Portable Outdoor Bleachers:

1. Bleachers shall be designed to support a uniformly distributed live load of 100 lb/sq ft (490 kg/sq m) of gross horizontal projection and a horizontal wind load of 30 lbs/sq ft (150 kg/sq ft) of gross vertical projection. All seat and foot plank members shall be designed to support not less than 120 lb/lin ft (150 kg/m).
2. Wood Seating and Walk Boards shall be preservative-treated and painted.

G. Steel Basketball Poles: Minimum diameter 3-1/2 in. (88 mm); galvanized pipe.

H. Running Track: Gravel and cinders over stone base; compaction to 95 percent of maximum density in accordance with ASTM D 698. One hundred percent by weight of the gravel and cinders shall pass the 3/4-in. (19 mm) screen, and 90 percent of the gravel and cinders shall be retained on the No. 4 screen.

1.3 EXECUTION (Not Used)

END OF SECTION 11 68 23 13

Task	Specification	Specification Description
11 97 26 00	10 86 00 00	Detention Furniture
11 98 12 00	08 34 53 00	Detention Doors And Frames
11 98 12 00	08 71 11 00	Detention Door Hardware
11 98 12 00	10 86 00 00	Detention Furniture

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SECTION 12 01 60 00 - FIXED AUDIENCE SEATING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fixed audience seating. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes fixed audience seating with the following:
 - a. Standard, Beam, and Pedestal mounting.
 - b. Upholstered chairs, Molded-plastic chairs and Molded-plastic chairs with upholstered inserts.
 - c. Self-rising seat mechanism.
 - d. Power and data service to individual seats.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Certificates for Credit MR 7: Chain-of-custody certificates certifying that wood and wood-based materials comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
 - 1) Include statement indicating costs for each certified wood product.
 - b. Product Data for Credit EQ 4.4: For each composite wood product, documentation indicating that product contains no urea formaldehyde.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Seating Layout: Show seating layout, aisle widths, row-lettering and chair-numbering scheme, chair widths, and chair spacing in each row.
 - b. Accessories: Show accessories, including locations of left- and right-hand tablet arms, electrical devices, accessibility provisions, and attachments to other work.
 - c. Wiring Diagrams: For power, signal, and control wiring.
4. Samples: For each seating component and for each color and texture required.
5. Product Certificates: For each type of flame-retardant treatment of fabric, from manufacturer.
6. Maintenance Data.
7. Warranty: Sample of special warranty.

D. Quality Assurance

1. Source Limitations: Obtain fabric of a single dye lot for each color and pattern of fabric required.
2. Forest Certification: Fabricate products with wood components produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
3. Fire-Test-Response Characteristics of Upholstered Chairs:
 - a. Fabric: Class 1 according to DOC CS 191 and 16 CFR 1610.61, tested according to California Technical Bulletin 117.
 - b. Padding: Comply with California Technical Bulletin 117.
 - c. Full-Scale Fire Test: Comply with California Technical Bulletin 133.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. Preinstallation Conference: Conduct conference at Project site.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fixed audience seating that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including standards, beams, and pedestals.
 - 2) Faulty operation of self-rising seat mechanism.
 - 3) Faulty operation of electrical components.
 - 4) Wear and deterioration of fabric and stitching beyond normal use.
 - 5) Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 - b. Warranty Periods: As follows, from date of Final Completion.
 - 1) Structural: Five years **OR** 10 years **OR** Lifetime, **as directed**.
 - 2) Operating Mechanisms: Three years **OR** Five years **OR** Lifetime, **as directed**.
 - 3) Electrical Components: Three **OR** Five, **as directed**, years.
 - 4) Plastic, Wood, and Paint Components: Two **OR** Three **OR** Five, **as directed**, years.

1.2 PRODUCTS

A. Materials And Finishes

1. Steel: ASTM A 36/A 36M plates, shapes, and bars; ASTM A 513 mechanical tubing; ASTM A 1008/A 1008M cold-rolled sheet; and ASTM A 1011 hot-rolled sheet and strip.
2. Cast Iron: ASTM A 48/A 48M, **Class 25 (Class 175)**, gray iron castings free of blow holes and hot checks with parting lines ground smooth.
3. Cast Aluminum: ASTM B 85 aluminum-alloy die castings.
4. Metal Finish: Finish exposed metal parts with manufacturer's standard polyurethane **OR** baked-on **OR** minimum **1.5-mil- (0.04-mm-)** thick, polyester baked-on powder **OR** minimum **1.5-mil- (0.04-mm-)** thick, epoxy baked-on powder, **as directed**, coating.
 - a. Color: As selected from manufacturer's full range.
5. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
6. Concealed Plywood: HPVA HP-1 hardwood plywood, made with adhesive containing no urea formaldehyde, or DOC PS 1 softwood plywood, as standard with manufacturer.
7. Exposed Plywood: HPVA HP-1, Face Grade A, hardwood veneer core with color-matched hardwood-veneer faces, made with adhesive containing no urea formaldehyde.
8. Hardwood Lumber and Veneer Faces: American black walnut **OR** Red oak **OR** Teak **OR** Birch **OR** Cherry **OR** Maple, **as directed**, selected to be free of visible defects.
 - a. Stain and Finish: As selected from manufacturer's full range.
9. Plastic Laminate: NEMA LD 3, Grade VGS for vertical surfaces and Grade HGS for horizontal surfaces.
 - a. Color and Pattern: As selected from manufacturer's full range.
10. Fabric: Manufacturer's standard 100 percent nylon **OR** 100 percent polyolefin, **as directed**, with flame-retardant treatment.
 - a. Weight: **12 oz./linear yd. (0.37 kg/linear m) OR 16 oz./linear yd. (0.50 kg/linear m) OR 18 oz./linear yd. (0.56 kg/linear m) OR 20 oz./linear yd. (0.62 kg/linear m)**, **as directed**.
 - b. Color and Pattern: As selected from manufacturer's full range.
11. Upholstery Padding: Flexible, cellular, molded or slab polyurethane foam.
12. Molded Plastic: High-density polyethylene or polypropylene, blow or injection molded, with smooth or textured surface that is mar and dent resistant.
 - a. Provide with UV inhibitors to retard fading where exposed to sunlight.
 - b. Color and Texture: As selected from manufacturer's full range.

B. Fixed Audience Seating

1. Chair Mounting Standards: Floor **OR** Riser, **as directed**, attached of the following material:

- a. Steel: One-piece heavy-tube or reinforced sheet with welded mounting plate and welded connections for seat pivots, backs, armrests, and end panels.
- b. Cast Iron **OR** Aluminum, **as directed**: One-piece castings with integral mounting points and attachment anchoring points for seat pivots, backs, and armrests.
- c. Molded Plastic: One-piece, solid injection-molded plastic with integral reinforcing ribs and attachment anchoring points for seat pivots, backs, and armrests.
2. Chair Mounting Beam: Steel horizontal beam mounted on floor-attached **OR** riser-attached, **as directed**, steel support pedestals spaced at intervals of 2 to 2-1/2 chair widths.
3. Chair Mounting Pedestal: Floor-attached pedestal, manufacturer's standard jury base with swivel **OR** diffuser pedestal, **as directed**.
4. End Panels:
 - a. Material: Steel **OR** Cast iron with design **OR** Cast aluminum with design **OR** Plastic laminate **OR** Hardwood-veneer plywood **OR** Solid hardwood **OR** Fabric upholstered **OR** Molded plastic, **as directed**.
 - 1) Cast-Metal Design: As selected from manufacturer's full range.
 - b. Decorative Insert: Plastic laminate **OR** Hardwood-veneer plywood **OR** Solid hardwood **OR** Fabric upholstered **OR** Molded plastic **OR** Customized medallion, **as directed**.
 - c. Style: Rectangular **OR** Oval **OR** Teardrop **OR** Tapered **OR** Panel to floor (pew), **as directed**, with square **OR** rounded, **as directed**, corners.
5. Fabric Upholstered Chairs:
 - a. Backs:
 - 1) Padding Thickness: 1-1/4 inches (32 mm) **OR** 2 inches (51 mm) **OR** 3 inches (76 mm), **as directed**.
 - 2) Rear Panel: Steel **OR** Molded plastic **OR** Fabric upholstered with 1/4-inch (6-mm) padding **OR** Plastic laminate **OR** Hardwood-veneer plywood, **as directed**.
 - 3) Top Corners: Square **OR** Rounded, **as directed**.
 - 4) Upholstery Options: Tufting **OR** Decorative stitching, **as directed**.
 - b. Seats: Two part **OR** One part with slip-on upholstered padding **OR** One part, fully upholstered, **as directed**, and as follows:
 - 1) Padding Thickness: Minimum 1-1/2 inches (38 mm) **OR** 3 inches (76 mm) **OR** 4 inches (102 mm), **as directed**, at front and rear edge.
 - 2) Seat Underside: Steel sheet seat pan **OR** Perforated steel sheet seat pan with acoustical insulation **OR** Hardwood-veneer-faced, formed plywood shell **OR** Molded-plastic shell **OR** Fabric upholstered with padding, **as directed**.
6. Plastic Chairs: One-piece **OR** Two-piece, **as directed**, molded plastic and as follows:
 - a. Back: Smooth surface **OR** Textured surface **OR** Formed slats **OR** Smooth surface with upholstered inserts, **as directed**, with square **OR** rounded, **as directed**, top corners.
 - b. Seat: Smooth surface **OR** Textured surface **OR** With simulated slats **OR** Smooth surface with upholstered inserts, **as directed**.
 - c. Upholstered Inserts: Padding and fabric covering over 1/8-inch (3-mm) plywood or fiberboard backing board, recessed 3/16 inch (5 mm) into seat and back, centered, and attached with hidden, vandal-resistant fasteners.
7. Chair Width: Vary chair widths to accommodate sightlines and row lengths **OR** Single width chair in each row, **as directed**, with minimum chair width of 18 inches (457 mm) **OR** 19 inches (483 mm) **OR** 20 inches (508 mm) **OR** 22 inches (559 mm) **OR** 23 inches (584 mm) **OR** 24 inches (610 mm), **as directed**, from center to center of armrests.
8. Back Height: Standard-style **OR** High-style **OR** Planetarium-style, **as directed**, backs, 31 inches (787 mm) **OR** 32-1/2 inches (826 mm) **OR** 35 inches (889 mm) **OR** 38 inches (965 mm) **OR** 40 inches (1016 mm) **OR** 44 inches (1117 mm), **as directed**, high.
9. Back Pitch: Fixed **OR** Variable, hinged (rocker), **as directed**.
10. Chair Seat Hinges: Self-lubricating, compensating type with noiseless self-rising seat mechanism passing ASTM F 851 and with positive internal stops cushioned with rubber or neoprene.
11. Chair Back Hinges: Self-lubricating type with noiseless mechanism that raises back to vertical position when chair is unoccupied.
12. Self-Rising Seat Mechanism: Spring-actuated, three-quarter fold **OR** Spring-actuated, full fold **OR** Gravity-actuated, full fold, **as directed**.

13. Armrests: Plastic **OR** Hardwood **OR** Upholstered **OR** Plastic laminate on medium-density fiberboard **OR** Integral scrolled cast iron, **as directed**, with rounded edges, concealed mounting, and integral cup holder, **as directed**.
14. Aisle Lighting Fixtures: Manufacturer's standard round **OR** rectangular louvered **OR** concealed in armrest, **as directed**, fixtures.
 - a. Bulb: LED **OR** Incandescent, **as directed**.
 - b. Power: 24 **OR** 120, **as directed**, V.
 - c. For low-voltage lighting, provide manufacturer's voltage-reduction device housed in safety enclosure equipped with fuses, terminal blocks, and safety disconnect.
15. Power and Data Service Package: Manufacturer's standard service **OR** Service, **as directed**, to individual seats including terminal devices and wiring with **18 inches (457 mm)** of extra length and as follows.
 - a. Power Receptacles: 120 V with wiring and receptacle as specified in Division 22.
 - b. Data Ports: Data port terminal with wiring and receptacle jack as specified in Division 23.
 - c. Location: Manufacturer's standard location **OR** On raceway beneath the seating **OR** In the armrest **OR** Beneath the armrest on front or side of the standard **OR** In back panel of seat in front, **as directed**.
16. Row-Letter and Chair-Number and Donor Plates: Manufacturer's standard.
 - a. Material: Aluminum **OR** Bronze **OR** Stainless steel, **as directed**, with black embossed characters.
 - b. Attachment: Manufacturer's standard method **OR** Adhesive **OR** Minimum of two mechanical fasteners, **as directed**.
17. Tablet Arms: Manufacturer's standard-size **OR** Manufacturer's oversize, **as directed**, fixed **OR** foldaway, **as directed**, tablet arm with plastic-laminate writing surface over medium-density fiberboard or plywood core and with rounded, matching PVC edges.
 - a. Mounting: Right-hand mounted unless otherwise indicated.
 - b. Fold-Away Mechanism: Cast-iron or steel hinge and swivel mechanism that gives positive support in open position and semiautomatic return to stored position below arm block and parallel to chair.
18. Accessible Seating:
 - a. Provide removable **OR** rollaway **OR** swing-away, **as directed**, chairs where wheelchair spaces are indicated.
 - b. Provide chairs without **OR** with retractable **OR** with foldup, **as directed**, arm on aisle side in locations indicated, but not less than 5 percent of aisle seats. Identify these seats with a sign or marker.

C. Fabrication

1. Floor Attachments: Fabricate to conform to floor slope, if any, so that standards and pedestals are plumb and chairs are maintained at same angular relationship to vertical throughout Project.
2. For beam-mounted chairs in curved patterns, curve the beam to the various radii required for the rows.
3. Upholstery: Fabricate fabric-covered cushions with molded padding beneath fabric and with fabric covering free of welts, creases, stretch lines, and wrinkles. For each upholstered component, install pile and pattern run in a consistent direction.
4. Upholstered Chairs: Fabricate as follows:
 - a. Two-Part Upholstered Back: In length required to protect seat in raised position, with padded cushion glued to a curved steel, plywood, or molded-plastic support panel covered with easily replaceable fabric, and with curved rear shell that fully encloses upholstery edges.
 - b. Two-Part Seats: Upper part, an upholstered cushion with molded padding over no fewer than five serpentine springs attached to reinforced steel frame, with weight-distributing and abrasion-resistant sheeting separating padding from springs, and removable for reupholstering without removing seat from chair. Lower part, steel pan reinforced at stress points and completely enclosing hinges and self-rising mechanism.**OR**

- Two-Part Seats: Upper part, an upholstered cushion with formed padding over a five-ply plywood panel with fabric cover conforming to shape of cushion to conceal inner seat structure and hinge mechanism. Lower part, molded-plastic shell.
- c. One-Part Seats: Double-wall plastic shells fitted with a padded upholstered cushion and covered with easily replaceable fabric **OR** padded and fully upholstered, **as directed**.
 5. Two-Piece, Molded-Plastic Chairs: Fabricate contoured seat and back separately with double-wall, blow-molded plastic. Fabricate back in length required to protect seat in raised position. Reinforce plastic with steel plates at attachment points.
 6. One-Piece, Molded-Plastic Chairs: Provide contoured plastic shell with smoothly rolled edges and reinforcing ribs on underside of shell. Fabricate for attachment of chair to support with self-threading, corrosion-resistant screws.

1.3 EXECUTION

A. Installation

1. Install seating in locations indicated and fastened securely to substrates according to manufacturer's written installation instructions.
 - a. Use installation methods and fasteners that produce fixed audience seating assemblies with individual chairs capable of supporting an evenly distributed **600-lb (272-kg)** static load without failure or other conditions that might impair the chair's usefulness.
 - b. Install standards and pedestals plumb.
2. Install seating with chair end standards aligned from first to last row and with backs and seats varied in width **OR** spacing **OR** width and spacing, **as directed**, to optimize sightlines.
3. Install riser-mounted attachments to maintain uniform chair heights above floor.
4. Install chairs in curved rows at a smooth radius.
5. Install seating so moving components operate smoothly and quietly.
6. Install wiring conductors and cables concealed in components of seating and accessible for servicing.

B. Field Quality Control

1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 - b. Tests for Power Receptacles: As specified in Division 22.
 - c. Tests for Data Ports: As specified in Division 23.
2. Prepare test and inspection reports.

C. Adjusting

1. Adjust chair backs so that they are aligned with each other in straight **OR** uniformly curved, **as directed**, rows.
2. Adjust self-rising seat mechanisms so seats in each row are aligned when in upright position.
3. Verify that all components and devices are operating properly.
4. Verify that seating returns to correct at-rest position.
5. Repair minor abrasions and imperfections in finishes with coating that matches factory-applied finish.
6. Replace upholstery fabric damaged during installation.

END OF SECTION 12 01 60 00

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Task	Specification	Specification Description
12 01 60 00	01 22 16 00	No Specification Required

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SECTION 12 21 13 13 - HORIZONTAL LOUVER BLINDS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for horizontal louver blinds. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Horizontal louver blinds with aluminum, wood and polymer slats.
 - b. Motorized blind operators.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication and installation details for horizontal louver blinds and motorized blind operators.
 - a. Wiring Diagrams: Power, system, and control wiring.
3. Samples: For each exposed finish.
4. Product certificates **OR** test reports, **as directed**.
5. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Provide horizontal louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - a. Flame-Resistance Ratings: Passes NFPA 701.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Product Standard: Provide horizontal louver blinds complying with WCSC A 100.1.

E. Delivery, Storage, And Handling

1. Deliver horizontal louver blinds in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.2 PRODUCTS

A. Horizontal Louver Blinds, Aluminum Slats

1. Slats: Aluminum; alloy and temper recommended by producer for type of use and finish indicated; with crowned profile and radiused corners.
 - a. Width: **2 inches (51 mm) OR 1 inch (25 mm) OR 1/2 to 5/8 inch (13 to 16 mm), as directed.**
 - b. Finish: One color **OR** One color each side **OR** As indicated, **as directed.**
 - 1) Ionized Coating: Antistatic, dust-repellent, baked polyester finish.
 - 2) Reflective Coating: Manufacturer's special coating enhancing the reflection of solar energy on the outside-facing slat surface.
 - c. Perforated Slats: Openness factor of 6 to 7 percent.

2. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and end plugs.
 3. Bottom Rail: Formed-steel or extruded-aluminum tube, with plastic or metal capped ends.
 4. Maximum Light-Blocking Blinds: Designed for eliminating all visible light gaps if slats are tilted closed and with minimal-sized rout holes for ladders hidden and placed near back edge for maximum slat overlap; with headrail and bottom rail extended and formed for light-tight joints between rail and adjacent slats or construction.
 - a. Finish: Match color, texture, pattern, and gloss of slats **OR** Color, texture, pattern, and gloss differing from slats as indicated by manufacturer's designations **OR** Color, texture, pattern, and gloss differing from slats, matching samples **OR** Color texture, pattern, and gloss differing from slats as selected from manufacturer's full range, **as directed**.
 5. Ladders: Evenly spaced to prevent long-term slat sag.
 - a. For Blinds with Nominal Slat Width **1 Inch (25 mm)** or Less: Braided string.
 - b. For Blinds with Nominal Slat Width **1 Inch (25 mm)** **OR 2 Inches (51 mm)**, **as directed**, or More: Braided string **OR** Manufacturer's standard-width reinforced vinyl tapes **OR** Manufacturer's standard-width cloth tapes, **as directed**.
 - 1) Tape Color, Texture, and Pattern: Color, texture, and pattern as indicated by manufacturer's designations **OR** Color, texture, and pattern matching samples **OR** Color, texture, and pattern as selected from manufacturer's full range, **as directed**.
 6. Lift-and-Tilt Control: Motorized operator.
 7. Lift Cords: Manufacturer's standard.
 8. Tilt Control: Enclosed worm-gear mechanism, slip clutch or detachable wand preventing overrotation, and linkage rod.
 9. Lift Operation: Manual.
 10. Valance: Two slats **OR** PVC strip **OR** Manufacturer's standard, **as directed**.
 11. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
 12. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard.
 13. Side Channels and Perimeter Light Gap Seals: Manufacturer's standard.
 14. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.
- B. Horizontal Louver Blinds, Wood Slats
1. Slats: Hardwood, North American **OR** basswood **OR** poplar **OR** ramin, **as directed**, species, flame-retardant treated; with flat profile and radiused corners and beaded edges **OR** and double beaded edges, **as directed**.
 - a. Width: **1 inch (25 mm)** **OR 1-3/8 inch (35 mm)** **OR 2 inches (51 mm)** **OR 2-3/8-inch (60-mm)**, **as directed**.
 - b. Finish: Manufacturer's standard colors as indicated, for striped blind with pattern as indicated on Drawings.
 2. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.
 3. Bottom Rail: Hardwood matching slats.
 - a. Finish Color Characteristics: Match color, texture, pattern, and gloss of slats **OR** Match color, texture, pattern, and gloss of valance **OR** Color, texture, pattern, and gloss differing from slats as indicated by manufacturer's designations **OR** Color, texture, pattern, and gloss differing from slats, matching samples **OR** Color texture, pattern, and gloss differing from slats as selected from manufacturer's full range, **as directed**.
 4. Maximum Light-Blocking Blinds: Designed for eliminating all visible light gaps if slats are tilted closed and with minimal-sized rout holes for ladders hidden and placed near back edge for maximum slat overlap; with headrail and bottom rail extended and formed for light-tight joints between rail and adjacent slats or construction.
 5. Ladders: Braided string **OR** Manufacturer's standard-width cloth tapes, **as directed**. Evenly spaced to prevent long-term louver sag.

- a. Tape Color, Texture, and Pattern: Color, texture, and pattern as indicated by manufacturer's designations **OR** Color, texture, and pattern matching samples **OR** Color, texture, and pattern as selected from manufacturer's full range, **as directed**.
 6. Tilt Control: Enclosed worm gear mechanism, slip clutch or detachable wand preventing overrotation, and linkage rod.
 7. Lift Operation: Manual.
 8. Lift Operation: Motorized operator.
 9. Valance: Manufacturer's standard.
 10. Cornice: as directed by the Owner.
 11. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
 12. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard, as indicated.
 13. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.
- C. Horizontal Louver Blinds, Polymer Slats
1. Slats: Lead-free, UV-stabilized, integrally colored, opaque, permanently flexible, extruded PVC **OR** polymer/wood alloy, **as directed**, that will not crack or yellow; antistatic, dust-repellent treated; with crowned **OR** manufacturer's standard, **as directed**, profile.
 - a. Width: **2 inches (51 mm) OR 2-1/2 inches (64 mm), as directed**.
 - 1) Spacing: Manufacturer's standard.
 - b. Finish: Wood-tone **OR** Painted, **as directed**, color as indicated.
 - c. Finish: Two colors **OR** textures **OR** patterns, **as directed**, as indicated, one per side of slat.
 2. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends.
 3. Bottom Rail: Manufacturer's standard **OR** Formed-steel or extruded-aluminum tube, with plastic or metal capped ends **OR** Hardwood matching slats and trapezoid-shaped bottom angled for minimizing light gaps, **as directed**.
 4. Ladders: Braided string **OR** Manufacturer's standard-width cloth tapes, **as directed**. Evenly spaced to prevent long-term slat sag.
 - a. Tape Color, Texture, and Pattern: Color, texture, and pattern as selected from manufacturer's full range.
 5. Tilt Control: Enclosed worm-gear mechanism and linkage rod.
 6. Lift Operation: Manual.
 7. Lift Operation: Motorized operator.
 8. Valance: Manufacturer's standard.
 9. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
 10. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard, as indicated.
 11. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.
- D. Horizontal Louver Blind Fabrication
1. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - a. Lift-and-Tilt Mechanisms: With permanently lubricated moving parts.
 2. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows:
 - a. Blind Units Installed between (inside) Jamb: Width equal to **1/4 inch (6 mm)** per side or **1/2 inch (13 mm)** total, plus or minus **1/8 inch (3.1 mm)**, less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to **1/4 inch (6 mm)**, plus or minus **1/8 inch (3.1 mm)**, less than head-to-sill dimension of opening in which each blind is installed.
 - b. Blind Units Installed outside Jamb: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
 3. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.

4. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
5. Color-Coated Finish:
 - a. Metal: For components exposed to view, apply manufacturer's standard baked finish.
 - b. Wood: Apply manufacturer's standard opaque **OR** transparent, **as directed**, factory-applied finish.
6. Component Color: Provide rails, cords, ladders, and exposed-to-view metal, wood, and plastic matching or coordinating with slat color, unless otherwise indicated.

E. Motorized Horizontal Louver Blind Operators

1. General: Provide factory-assembled blind operation systems designed for blind type, size, weight, construction, use, and operation frequency indicated, with lift **OR** tilt **OR** lift-and-tilt, **as directed**, functions. Provide operation systems of size and capacity and with features, characteristics, and accessories suitable for Project conditions and recommended by blind manufacturer, complete with electric motors and factory-prewired motor controls, remote-control stations, remote-control devices, power disconnect switches, enclosures protecting controls and all operating parts, headrail, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
2. Comply with NFPA 70.
3. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
4. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection and internal limit switches; sized by blind manufacturer to start and operate size and weight of blind considering service factor or Project's service conditions without exceeding nameplate ratings.
 - a. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - b. Motor Characteristics: Single phase, 24 **OR** 110 **OR** 220, **as directed**, V, 60 Hz.
 - c. Motor Mounting: Within manufacturer's standard headrail enclosure.
5. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure for surface **OR** recessed or flush **OR** within headrail, **as directed**, mounting. Provide the following devices for remote-control activation of blinds:
 - a. Control Stations: Keyed, maintained **OR** momentary, **as directed**,-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.
 - b. Control Stations: Maintained **OR** Momentary, **as directed**,-contact, three-position, toggle **OR** rocker, **as directed**,-style, wall-switch-operated control station with open, close, and center off functions.
 - 1) Color: Ivory **OR** White **OR** As indicated, **as directed**.
6. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop blind at fully raised and fully lowered positions.
7. Operating Features: as directed by the Owner.
8. Accessories:
 - a. Solar Power Unit: For use with control system indicated.

1.3 EXECUTION

A. Installation

1. Install horizontal louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior slat edges in any position are not closer than **1 inch (25 mm) OR 2 inches (51 mm)**, **as directed**, to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware if any.

2. Flush Mounted: Install horizontal louver blinds with slat edges flush with finish face of opening if slats are tilted open.
3. Jamb Mounted: Install headrail flush with face of opening jamb and head.
4. Head Mounted: Install headrail on face of opening head.
5. Recessed: Install headrail concealed within blind pocket.
6. Connections: Connect motorized operators to building electrical system.
7. Adjust horizontal louver blinds to operate smoothly, easily, safely, and free of binding or malfunction throughout entire operational range.
8. Clean horizontal louver blind surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 12 21 13 13

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Task	Specification	Specification Description
12 21 13 13	12 21 16 13	Vertical Louver Blinds
12 21 13 33	12 21 13 13	Horizontal Louver Blinds
12 21 13 33	12 21 16 13	Vertical Louver Blinds

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SECTION 12 21 16 13 - VERTICAL LOUVER BLINDS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for vertical louver blinds. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Vertical louver blinds, aluminum vanes, PVC vanes, PVC vanes with fabric vane insert and fabric vanes.
 - b. Motorized blind operators.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show fabrication and installation details for vertical louver blinds and motorized operators.
 - a. Wiring Diagrams: Power, system, and control wiring.
3. Samples: For each exposed finish.
4. Product certificates **OR** test reports, **as directed**.
5. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Provide vertical louver blinds with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - a. Flame-Resistance Ratings: Passes NFPA 701.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Product Standard: Provide vertical louver blinds complying with WCSC A 100.1.

E. Delivery, Storage, And Handling

1. Deliver vertical louver blinds in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.2 PRODUCTS

A. Vertical Louver Blinds, Aluminum Vanes

1. Rail System: Headrail **OR** Dual system with headrail and bottom rail, **as directed**.
 - a. Rails: Extruded aluminum **OR** Formed steel **OR** Manufacturer's standard, **as directed**; long edges returned or rolled; channel-shaped, enclosing operating mechanisms.
 - 1) Color: Custom color **OR** As selected from manufacturer's standard color range, **as directed**.
 - 2) Anodized aluminum, clear **OR** color, **as directed**, anodized.

2. Vanes: Aluminum, alloy, and temper recommended by producer for type of use and finish indicated; with crowned profile and not less than **3/8-inch (9.5-mm)** overlap when vanes are rotated fully closed.
 - a. Nominal Vane Width: **3-1/2 inches (89 mm)** wide.
 - b. Vane Finish: One color as indicated, **OR** Two colors as indicated, one per side of slat, **as directed**.
3. Vane Directional Control: Manual **OR** Motorized operator, **as directed**.
4. Traversing Control: Manual **OR** Motorized operator, **as directed**.
5. Draw and Stack Position: One way, controls and stack left **OR** One way, controls and stack right **OR** One way, controls left and stack opposite **OR** One way, controls right and stack opposite **OR** Center split, controls left **OR** Center split, controls right **OR** Center stack, controls left **OR** Center stack, controls right **OR** Off center, controls left **OR** Off center, controls right **OR** As indicated on Drawings **OR** As indicated in a window treatment schedule, **as directed**.
6. Cord-Tensioner Mounting: Wall **OR** Floor **OR** Sill **OR** Baseboard **OR** As indicated, **as directed**.
7. Valance: One **OR** Two-tiered, **as directed**, vane insert; with dust cover.
 - a. Finish Color Characteristics: Match color, texture, pattern, and gloss of vanes **OR** Color, texture, pattern, and gloss differing from vanes as indicated by manufacturer's designations **OR** Color, texture, pattern, and gloss differing from vanes matching samples **OR** Color texture, pattern, and gloss differing from vanes as selected from manufacturer's full range, **as directed**.
8. Louver Bottom: Connecting or spacing chains.
9. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
10. Stack Release: Permitting stacked vanes to be moved away from stacking position for total access to glazed opening.
11. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.

B. Vertical Louver Blinds, PVC Vanes

1. Rail System: Headrail **OR** Dual system with headrail and bottom rail, **as directed**.
 - a. Rails: Extruded aluminum **OR** Formed steel **OR** Manufacturer's standard, **as directed**; long edges returned or rolled; channel-shaped, enclosing operating mechanisms.
 - 1) Color: Custom color **OR** As selected from manufacturer's standard color range, **as directed**.
 - 2) Anodized aluminum, clear **OR** color, **as directed**, anodized.
2. Vanes: Lead-free, UV-stabilized, integrally colored, opaque, permanently flexible, extruded PVC that will not crack or yellow; with flat **OR** crowned **OR** ribbed, **as directed**, profile and not less than **3/8-inch (9.5-mm)** overlap when vanes are rotated fully closed.
 - a. Nominal Vane Width: **2 inches (51 mm)** **OR** **3-1/2 inches (89 mm)** **OR** **4 inches (100 mm)** **OR** **5 inches (125 mm)**, **as directed**.
 - b. Perforated Vanes: Openness factor of 3 **OR** 6 **OR** 8 **OR** 10 **OR** 12, **as directed**, percent.
3. Vane Directional Control: Manual, **OR** Motorized operator, **as directed**.
4. Traversing Control: Manual **OR** Motorized operator, **as directed**.
5. Draw and Stack Position: One way, controls and stack left **OR** One way, controls and stack right **OR** One way, controls left and stack opposite **OR** One way, controls right and stack opposite **OR** Center split, controls left **OR** Center split, controls right **OR** Center stack, controls left **OR** Center stack, controls right **OR** Off center, controls left **OR** Off center, controls right **OR** As indicated on Drawings **OR** As indicated, **as directed**.
6. Cord-Tensioner Mounting: Wall **OR** Floor **OR** Sill **OR** Baseboard **OR** As indicated, **as directed**.
7. Valance: One **OR** Two-tiered, **as directed**, vane insert; with dust cover.
 - a. Finish Color Characteristics: Match color, texture, pattern, and gloss of vanes **OR** Color, texture, pattern, and gloss differing from vanes as indicated by manufacturer's designations **OR** Color, texture, pattern, and gloss differing from vanes matching samples **OR** Color texture, pattern, and gloss differing from vanes as selected from manufacturer's full range, **as directed**.
8. Louver Bottom: Connecting or spacing chains.

9. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
 10. Stack Release: Permitting stacked vanes to be moved away from stacking position for total access to glazed opening.
 11. Colors, Textures, Patterns, and Gloss: As selected from manufacturer's full range.
- C. Vertical Louver Blinds, PVC Vanes With Fabric Vane Inserts
1. Rail System: Headrail **OR** Dual system with headrail and bottom rail, **as directed**.
 - a. Rails: Extruded aluminum **OR** Formed steel **OR** Manufacturer's standard, **as directed**; long edges returned or rolled; channel-shaped, enclosing operating mechanisms.
 - 1) Color: Custom color **OR** As selected from manufacturer's standard color range, **as directed**.
 - 2) Anodized aluminum, clear **OR** color, **as directed**, anodized.
 2. Vanes: Lead-free, UV-stabilized, permanently flexible, extruded PVC that will not crack or yellow; with not less than **3/8-inch (9.5-mm)** overlap when vanes are rotated fully closed. Provide integrally colored, opaque vane with clear grooves for holding fabric insert.
 - a. Nominal Vane Width: **3-1/2 inches (89 mm)**.
 - b. Fabric Insert: Manufacturer's standard; stain and fade resistant.
 3. Vane Directional Control: Manual **OR** Motorized operator, **as directed**.
 4. Traversing Control: Manual **OR** Motorized operator, **as directed**.
 5. Draw and Stack Position: One way, controls and stack left **OR** One way, controls and stack right **OR** One way, controls left and stack opposite **OR** One way, controls right and stack opposite **OR** Center split, controls left **OR** Center split, controls right **OR** Center stack, controls left **OR** Center stack, controls right **OR** Off center, controls left **OR** Off center, controls right **OR** As indicated, **as directed**.
 6. Cord-Tensioner Mounting: Wall **OR** Floor **OR** Sill **OR** Baseboard **OR** As indicated on Drawings, **as directed**.
 7. Valance: One **OR** Two-tiered, **as directed**, vane insert; with dust cover. Fabric vane insert matching vanes.
 8. Louver Bottom: Connecting or spacing chains.
 9. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
 10. Stack Release: Permitting stacked vanes to be moved away from stacking position for total access to glazed opening.
 11. Fabric Colors, Textures, and Patterns: As selected from manufacturer's full range.
- D. Vertical Louver Blinds, Fabric Vanes
1. Rail System: Headrail **OR** Dual system with headrail and bottom rail, **as directed**.
 - a. Rails: Extruded aluminum **OR** Formed steel **OR** Manufacturer's standard, **as directed**; long edges returned or rolled; channel-shaped, enclosing operating mechanisms.
 - 1) Color: Custom color **OR** As selected from manufacturer's standard color range, **as directed**.
 - 2) Anodized aluminum, clear **OR** color, **as directed** anodized.
 2. Vanes: Manufacturer's standard **OR** PVC-coated fiberglass mesh **OR** PVC-coated polyester mesh, **as directed**, freehanging fabric with hemmed, nonraveling edges; stain and fade resistant; with not less than **3/8-inch (9.5-mm)** overlap when vanes are rotated fully closed.
 - a. Nominal Vane Width: **2 inches (51 mm) OR 3-1/2 inches (89 mm) OR 5 inches (125 mm)**, **as directed**.
 3. Vane Directional Control: Manual.
 4. Vane Directional Control: Motorized operator.
 5. Traversing Control: Manual.
 6. Traversing Control: Motorized operator.
 7. Draw and Stack Position: One way, controls and stack left **OR** One way, controls and stack right **OR** One way, controls left and stack opposite **OR** One way, controls right and stack opposite **OR** Center split, controls left **OR** Center split, controls right **OR** Center stack, controls left **OR** Center

stack, controls right **OR** Off center, controls left **OR** Off center, controls right **OR** As indicated, **as directed**.

8. Cord-Tensioner Mounting: Wall **OR** Floor **OR** Sill **OR** Baseboard **OR** As indicated, **as directed**.
9. Valance: One **OR** Two-tiered, **as directed**, vane insert; with dust cover. Fabric vane insert matching vanes.
10. Louver Bottom: Connecting or spacing chains **OR** Weights, **as directed**.
11. Mounting: Wall mounting **OR** Ceiling mounting **OR** End mounting **OR** Wall extension brackets **OR** As indicated, **as directed**.
12. Stack Release: Permitting stacked vanes to be moved away from stacking position for total access to glazed opening.
13. Fabric Colors, Textures, and Patterns: As selected from manufacturer's full range.

E. Vertical Louver Blind Fabrication

1. Product Description: Vertical louver blind consisting of equally spaced, synchronized vanes and rail system with self-aligning carrier mechanisms, carriers, traverse and vane directional mechanisms and controls, and installation hardware.
2. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - a. Louver Directional and Traversing Control Mechanisms: With permanently lubricated moving parts.
3. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows:
 - a. Blind Units Installed between (inside) Jamb: Width equal to **1/4 inch (6 mm)** per side or **1/2 inch (13 mm)** total less than jamb-to-jamb dimension of opening in which each blind is installed. Length equal to **1/4 inch (6 mm)**, plus or minus **1/8 inch (3.1 mm)**, less than head-to-sill dimension of opening in which each blind is installed.
 - b. Blind Units Installed outside Jamb: Width and length as indicated, with terminations between blinds of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
4. Installation Brackets: Designed for easy removal and reinstallation of blind, for supporting headrail, valance, and operating hardware, and for hardware position and blind mounting method indicated.
5. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to blind hardware and adjoining construction; type designed for securing to supporting substrate; and supporting blinds and accessories under conditions of normal use.
6. Color-Coated Finish: For metal components exposed to view, unless anodized or plated finish is indicated. Apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
7. Component Color: Provide cords and exposed-to-view metal and plastic matching or coordinating with vane color, unless otherwise indicated.

F. Motorized Vertical Louver Blind Operators

1. General: Provide factory-assembled blind operation systems designed for blind type, size, weight, construction, use, and operation frequency indicated, with traverse **OR** rotation **OR** traverse and rotation, **as directed** functions. Provide operation systems of size and capacity and with features, characteristics, and accessories suitable for Project conditions and recommended by blind manufacturer, complete with electric motors and factory-prewired motor controls, remote-control stations, remote-control devices, power disconnect switches, enclosures protecting controls and all operating parts, headrail, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with the building electrical system.
2. Comply with NFPA 70.
3. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
4. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection and internal limit switches; sized by blind

- manufacturer to start and operate size and weight of blind considering service factor or Project's service conditions without exceeding nameplate ratings.
- a. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - b. Motor Characteristics: Single phase, 24 **OR** 110 **OR** 220, **as directed**, V, 60 Hz.
 - c. Motor Mounting: On top of **OR** Behind, **as directed**, track, left **OR** right, **as directed**, side of headrail.
 - d. Motor Mounting: As indicated.
5. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure for surface **OR** recessed or flush **OR** within headrail, **as directed**, mounting. Provide the following devices for remote-control activation of blinds:
- a. Control Stations: Keyed, maintained **OR** momentary, **as directed**,-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.
 - b. Control Stations: Maintained **OR** Momentary, **as directed**,-contact, three-position, toggle **OR** rocker, **as directed**,-style, wall-switch-operated control station with open, close, and center off functions.
 - 1) Color: Ivory **OR** White **OR** As indicated, **as directed**.
6. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop blind at fully traversed, rotated closed and fully retracted, rotated open positions.
7. Operating Features: as directed by the Owner .
8. Accessories:
- a. Solar Power Unit: For use with control system indicated.

1.3 EXECUTION

A. Installation

1. Install vertical louver blinds level and plumb and aligned with adjacent units according to manufacturer's written instructions, and located so exterior vane edges in any position are not closer than **2 inches (51 mm)** to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances between adjacent blinds and for operating glazed opening's operation hardware, if any.
2. Flush Mounted: Install vertical louver blinds with vane edges flush with finish face of opening when vanes are tilted open.
3. Jamb Mounted: Install headrail flush with face of opening jamb and head.
4. Head Mounted: Install headrail on face of opening head.
5. Recessed: Install headrail concealed within blind pocket.
6. Connections: Connect motorized operators to building electrical system.
7. Adjust vertical louver blinds to operate smoothly, easily, safely and free of binding or malfunction throughout entire operational range.
8. Clean vertical louver blind surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 12 21 16 13

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Task	Specification	Specification Description
12 21 16 13	12 21 13 13	Horizontal Louver Blinds
12 21 16 33	12 21 13 13	Horizontal Louver Blinds
12 21 16 33	12 21 16 13	Vertical Louver Blinds

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SECTION 12 22 13 00 - DRAPERIES AND TRACKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for draperies and tracks. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes draperies and drapery tracks.

C. Submittals

1. Product Data: For the following:
 - a. Tracks: Include maximum weights of draperies that can be supported.
 - 1) Motorized Tracks: Indicate motor weights, motor-mounting requirements, and electrical requirements.
 - b. Fabrics and textile treatments.
2. Shop Drawings: For tracks. Show installation and anchorage details, locations of components and controls, and field measurements.
 - a. Draperies: Show sizes, locations, and details of installation.
3. Coordination Drawings: For track installation; reflected ceiling plans drawn to scale and coordinating track installation with openings and ceiling-mounted items.
4. Samples: For each drapery and for each fabric color and texture required.
5. Product Schedule: Use same designations indicated on Drawings.
6. Product Certificates: For each fabric treated with flame retardant, signed by fabric supplier.
7. Maintenance data.

D. Quality Assurance

1. Installer Qualifications: For draperies and tracks, fabricator of draperies.
2. Source Limitations: For draperies, obtain each color and pattern of fabric and trim from one dye lot.
3. Fire-Test-Response Characteristics: For fabrics treated with fire retardants, provide products that pass NFPA 701 as determined by testing of fabrics that were treated using treatment-application method intended for use for this Project by a testing and inspecting agency acceptable to authorities having jurisdiction.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
5. Corded Window Covering Product Standard: Provide drapery tracks operated by pull cords complying with ANSI A100.1.

1.2 PRODUCTS

A. Drapery Tracks

1. Manually Operated Track:
 - a. Construction: Extruded aluminum, slotted for mounting at interval of not more than **24 inches (610 mm)** o.c., and bendable to radii indicated.
 - 1) Lengths and Configurations: As directed.
 - 2) Support Capability: Weight of drapery indicated **OR 30 lb (14 kg) OR 45 lb (20 kg) OR 60 lb (27 kg) OR 80 lb (36 kg) OR 140 lb (64 kg) OR 210 lb (95 kg), as directed,** mounted on track length indicated.

- 3) Finish: Manufacturer's standard **OR** White baked enamel **OR** Clear anodic coating, **as directed**.
 - b. Mounting Brackets: Aluminum, of type suitable for fastening track to surface indicated and designed to support weight of track assembly and drapery plus force applied to operate track.
 - 1) Mounting Surface: As indicated on Drawings **OR** Wall **OR** Ceiling **OR** Drapery pocket, **as directed**.
 - c. Installation Fasteners: Sized to support track assembly and drapery, and fabricated from metal compatible with track, brackets, and supporting construction. Provide two fasteners to fasten each bracket to supporting construction.
 - d. Operation: Baton **OR** Cord **OR** Cord tension pulley, **as directed**.
 - 1) Pulley Mounting Location: Wall **OR** Baseboard **OR** Floor, **as directed**.
 - 2) Draw: One way, stack as indicated on Drawings **OR** One way, stack left **OR** One way, stack right **OR** Two way, center opening, **as directed**.
 - 3) Operating Hardware Location: On stack side **OR** Left **OR** Right **OR** As indicated on Drawings, **as directed**.
 - e. Carriers: Rollers **OR** Rollers with hooks **OR** Rollers with snaps **OR** Coordinate with drapery headings indicated, **as directed**.
 - 1) Master Carriers: Butt **OR** Overlap, **as directed**.
 - f. Accessories: as directed by the Owner .
2. Motorized Track:
- a. Construction: Extruded aluminum, slotted for mounting at interval of not more than **24 inches (610 mm)** o.c., and bendable to radii indicated.
 - 1) Lengths and Configurations: As directed.
 - 2) Support Capability: Weight of drapery indicated **OR 30 lb (14 kg) OR 45 lb (20 kg) OR 60 lb (27 kg) OR 80 lb (36 kg) OR 140 lb (64 kg) OR 210 lb (95 kg)**, **as directed**, mounted on track length indicated.
 - 3) Finish: Manufacturer's standard **OR** White baked enamel **OR** Clear anodic coating, **as directed**.
 - b. Mounting Brackets: Suitable for fastening track to surface indicated and designed to support weight of track assembly and drapery plus force applied to operate track.
 - 1) Mounting Surface: As indicated on Drawings **OR** Wall **OR** Ceiling **OR** Drapery pocket, **as directed**.
 - c. Installation Fasteners: Sized to support track assembly and drapery, and fabricated from metal compatible with track, brackets, and supporting construction. Provide two fasteners to fasten each bracket to supporting construction.
 - d. Motor Operation: Low-voltage motor with built-in low-voltage interface for direct access to control systems, with thermal-overload switch; sized for weight of drapery and track length indicated; and equipped with stops to prevent overdrawing.
 - 1) Control: Wall switch **OR** Remote, infrared **OR** Remote, radio controlled **OR** Digital timer, **as directed**.
 - 2) Draw: One way, stack as indicated on Drawings **OR** One way, stack left **OR** One way, stack right **OR** Two way, center opening, **as directed**.
 - 3) Electrical Requirements: 115 V/60 Hz/120 W/1.10 A **OR** 115 V/60 Hz/140 W/1.20 A **OR** 110 V/60 Hz/150 W/1.0 A **OR** 110 V/60 Hz/550 W/5.0 A, **as directed**.
 - 4) Travel Speed: **6 inches (152 mm) OR 8 inches (203 mm) OR 12 inches (305 mm)**, **as directed**, per second.
 - e. Carriers: Rollers **OR** Rollers with hooks **OR** Rollers with snaps **OR** Coordinate with drapery headings indicated, **as directed**.
 - 1) Master Carriers: Butt **OR** Overlap, **as directed**.
 - f. Accessories: as directed by the Owner .

B. Draperies

- 1. Drapery:
 - a. Heading:

- 1) Pinch (French) Pleats: 100 **OR** 150 **OR** 200, **as directed**, percent fullness.
- 2) Stack Pleats: 60 **OR** 80 **OR** 100 **OR** 120, **as directed**, percent fullness.
- 3) Roll Pleats: 60 **OR** 80 **OR** 100 **OR** 120, **as directed**, percent fullness.
- 4) Accordion Pleats: 40 **OR** 80 **OR** 100 **OR** 120, **as directed**, percent fullness.
- 5) Pleat Spacing: as directed by the Owner .
- 6) Heading Accessories:
 - a) Nonwoven buckram.
 - b) Woven snap tape, **7/8 inch (22 mm)** wide, with nickel-plated snaps at **4 inches (102 mm)** o.c.
 - c) Hooks.
- b. Drapery Fabric:
 - 1) Manufacturer, Designation, Pattern, Color, and Fiber Content: **As directed**.
 - 2) Orientation: Run right (up the bolt).
 - 3) Width and Pattern Repeat Distance: **As directed**.
 - 4) Textile Treatments: Stain repellent **OR** Flame retardant, polymer type **OR** Stain repellent; and flame retardant, polymer type, **as directed**.
- c. Lining Fabric:
 - 1) Lining Type: Blackout; light tight **OR** Water resistant, **as directed**.
 - 2) Manufacturer, Manufacturer's Designation, Color, Fiber Content, and Width: **As directed**.
 - 3) Textile Treatments: Stain repellent **OR** Flame retardant, polymer type **OR** Stain repellent; and flame retardant, polymer type, **as directed**.
- d. Interlining: Acoustical.
 - 1) Manufacturer: **As directed**.
- e. Textile Trim and Tiebacks: **As directed**.
- f. Hem Weights: **1-inch- (25-mm-)** square lead weights **OR** Tape type (string weights), **as directed**.

C. Drapery Fabrication

1. Fabricate draperies in heading styles and fullnesses indicated. Fabricate headings to stand erect. If less than a full width of fabric is required to produce panel of specified fullness, use equal widths of not less than one-half width of fabric located at ends of panel.
 - a. One-Way-Stacking Draperies: Add **5 inches (127 mm)** to overall width for returns.
 - b. Center-Opening Draperies: Add **10 inches (254 mm)** to overall width for overlap.
2. Seams: Sew vertical seams with twin-needle sewing machine with selvage trimmed and overlapped. Join widths so that patterns match and vertical seams lay flat and straight without puckering. Horizontal seams are not acceptable.
3. Side Hems: Double-turned, **1-1/2-inch- (38-mm-)** wide hems consisting of three layers of fabric, and blindstitched so that stitches are not visible on face of drapery.
4. Bottom Hems: Double-turned, **4-inch- (102-mm-)** wide hems consisting of three layers of fabric, and weighted and blindstitched so that weights and stitches are not visible on face of drapery.
 - a. Sew in square lead weights at each seam and at panel corners.
5. Interlinings: Extend from top of drapery to within **1/2 inch (13 mm)** of lining's bottom hem and to leading edge of side hems to produce full-shadowed appearance.
6. Linings: Equal to widths of drapery fabric and joined to drapery fabric at top by inside invisible seam, and hand stitched at side hems and shadowed with **1-1/2-inch (38-mm)** return of face fabric.
 - a. Bottom Hem: Hem separately from **OR** Blind stitch to, **as directed**, drapery fabric.

1.3 EXECUTION

A. Drapery Track Installation

1. Install track systems according to manufacturer's written instructions, level and plumb, and at height and location in relation to adjoining openings as indicated on Drawings.

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2. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by track manufacturer.

B. Drapery Installation

1. Where draperies abut overhead construction, hang draperies so that clearance between headings and overhead construction is **1/4 inch (6.4 mm)**.
2. Where draperies extend to floor, install so that bottom hems clear finished floor by not more than **1 inch (25 mm)** and not less than **1/2 inch (13 mm)**.
3. Where draperies extend to windowsill, install so that bottom hems hang above sill line and clear sill line by not more than **1/2 inch (13 mm)**.

C. Adjusting

1. After hanging draperies, test and adjust each track to produce unencumbered, smooth operation.
2. Steam and dress down draperies as required to produce crease- and wrinkle-free installation.
3. Remove and replace draperies that are stained or soiled.

END OF SECTION 12 22 13 00

Task	Specification	Specification Description
12 22 16 00	12 22 13 00	Draperies and Tracks

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SECTION 12 24 13 00 - ROLLER SHADES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for roller shades. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes roller shades and motorized shade operators.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, details of installation, operational clearances, wiring diagrams, and relationship to adjoining Work.
 - a. Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings.
3. Samples: For each exposed finish and for each color and texture required.
4. Window Treatment Schedule: Use same designations indicated on Drawings.
5. Maintenance data.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Provide products passing flame-resistance testing according to NFPA 701 by a testing agency acceptable to authorities having jurisdiction.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Comply with WCMA A 100.1.

E. Delivery, Storage, And Handling

1. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, lead-free designation, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.2 PRODUCTS

A. Roller Shades

1. Shade Band Material: PVC-coated fiberglass **OR** PVC-coated polyester **OR** PVC-coated fiberglass and polyester blends **OR** Fiberglass and acrylic blend **OR** Metallized film **OR** Mirror film **OR** Tinted film **OR** Owner-furnished material, **as directed**.
 - a. Colors: Match samples **OR** As selected from manufacturer's full range **OR** As indicated in a window treatment schedule, **as directed**.
 - b. Material Solar-Optical Properties: **As directed**.
 - c. Material Openness Factor: **As directed** percent.
 - d. Material UV Blockage: **As directed** percent.
2. Rollers: Electrogalvanized or epoxy primed steel or extruded-aluminum tube of diameter and wall thickness required to support and fit internal components of operating system and the weight and width of shade band material without sagging; designed to be easily removable from support brackets. Provide capacity for one **OR** two, **as directed**, roller shade band(s) per roller.

3. Direction of Roll: Regular, from back of roller **OR** Reverse, from front of roller **OR** Regular, from back of roller, and reverse, from front of roller, as indicated on Drawings for double-roller shades, **as directed**.
 4. Mounting Brackets: Galvanized or zinc-plated steel **OR** Fascia end caps, fabricated from steel finished to match fascia or headbox, **as directed**.
 5. Fascia: L-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; continuous panel concealing front and bottom of shade roller, brackets, and operating hardware and operators; removable design for access.
 6. Top/Back Cover: L-shaped; material and finish to match fascia; combining with fascia and end caps to form a six-sided headbox enclosure sized to fit shade roller and operating hardware inside.
 7. Pocket-Style Headbox: U-shaped, formed-steel sheet or extruded aluminum; long edges returned or rolled; with a bottom cover consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing shade roller, brackets, and operating hardware and operators within.
 8. Pocket with Ceiling Slot Opening: Six-sided box units for recessed installation; fabricated from formed-steel sheet, extruded aluminum, or wood; with a bottom consisting of slot opening of minimum dimension to allow lowering and raising of shade and a removable or an openable, continuous metal access panel concealing rollers, brackets, and operating hardware and operators within.
 - a. Corner Section: Factory formed and welded.
 9. Bottom Bar: Steel or extruded aluminum, with plastic or metal capped ends. Provide exposed-to-view, external **OR** concealed, by pocket of shade material, internal, **as directed**, -type.
 10. Audiovisual Light-Blocking Shades: Designed for eliminating all visible light gaps when shades are fully closed; fabricated from blackout shade band material with fascia **OR** headbox **OR** pocket, **as directed**, and bottom bar extended and formed for light-tight joints among shade components and between shade components and adjacent construction.
 11. Skylight Shades: Manufacturer's complete system for operable skylight shades, including operator, operating hardware, and accessories for smooth operation, designed for installation in horizontal position **OR** inclined position, slope as indicated on Drawings, **as directed**.
 12. Valance: As indicated by manufacturer's designation for style and color **OR** Style matching hem; as indicated by manufacturer's designation color **OR** As indicated in a window treatment schedule, **as directed**.
 13. Mounting: Inside **OR** Outside **OR** Ceiling **OR** Recessed in ceiling pocket **OR** Wall extension brackets **OR** Bottom-up brackets **OR** As indicated on Drawings, **as directed**.
 14. Shade Operation: Manual; with spring roller **OR** continuous-loop bead-chain, clutch, and cord tensioner and bracket **OR** gear and crank **OR** cordless system, **as directed**, lift operator.
 15. Hold-Down Brackets and Hooks or Pins and Side Channels: Manufacturer's standard for fixing shade in place, keeping shade band material taut, and reducing light gaps when shades are closed.
 16. Shade Operation: Manual; with spring roller **OR** continuous-loop bead-chain, clutch, and cord tensioner and bracket **OR** gear and crank **OR** cordless system, **as directed**, lift operator.
- B. Roller Shade Fabrication
1. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at **74 deg F (23 deg C)**:
 - a. Shade Units Installed between (Inside) Jambs: Edge of shade not more than **1/4 inch (6 mm)** from face of jamb. Length equal to head to sill dimension of opening in which each shade is installed.
 - b. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
 2. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting fascia, headbox, roller, and operating hardware and for hardware position and shade mounting method indicated.

3. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.

C. Motorized Roller Shade Operators

1. General: Provide factory-assembled motorized shade operation systems designed for lifting shades of type, size, weight, construction, use, and operation frequency indicated. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with the building electrical system.
2. Comply with NFPA 70.
3. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.
4. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection, brake, permanently lubricated bearings, and limit switches; sized by shade manufacturer to start and operate size and weight of shade considering service factor or considering Project's service conditions without exceeding nameplate ratings.
 - a. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - b. Motor Characteristics: Single phase, 24 **OR** 110 **OR** 220, **as directed**, V, 60 Hz.
 - c. Motor Mounting: Within manufacturer's standard roller enclosure.
5. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure surface **OR** recessed or flush, **as directed**, mounting. Keyed switch **OR** Toggle-style, wall switch Rocker-style, wall switch **OR** Rocker-style, group-control wall switch **OR** Rocker-style, individual/group-control wall switch **OR** Sun sensor **OR** Radio **OR** Infrared **OR** Timer **OR** Microprocessor, **as directed**.
6. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop shade at fully raised and fully lowered positions.

1.3 EXECUTION

A. Roller Shade Installation

1. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so shade band is not closer than **2 inches (50 mm)** to interior face of glass. Allow clearances for window operation hardware.
2. Connections: Connect motorized operators to building electrical system.
3. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
4. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 12 24 13 00

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SECTION 12 24 13 00a - PLEATED SHADES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for pleated shades. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following types of horizontal-fold shades and accessories:
 - a. Z-pleated shades.
 - b. Cellular shades.
 - c. Motorized shade operators.

C. Definitions

1. Cellular Shades: Pleated shades with more than one horizontally folded fabric layer forming accordion-folded fabric with enclosed air spaces or cells. Cellular shades may consist of two fabric layers forming a continuous accordion fold of enclosed air spaces or cells for a linear row of cells, one cell wide; three fabric layers forming two interconnected accordion folds of enclosed air spaces or cells for two honeycombed rows of cells, nominally two cells wide; or four fabric layers forming three interconnected accordion folds of enclosed air spaces or cells for three honeycombed rows of cells, nominally three cells wide.
2. Pleated Shades: Permanently creased, horizontally folded shades. Alternatively, pleated shades are synonymous with Z-pleated shades according to the industry. Z-pleated shades consist of one fabric layer forming Z-folded pleats.

D. Submittals

1. Product Data: For each type of product indicated.
 - a. Motorized Shade Operators: Include operating instructions.
 - b. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
2. Shop Drawings: Show location and extent of pleated shades. Include elevations, sections, details, and dimensions not shown in Product Data. Show installation details, mountings, attachments to other work, operational clearances, and relationship to adjoining work.
 - a. Motorized Shade Operators: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - b. Wiring Diagrams: Power, system, and control wiring.
3. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Suspended ceiling components.
 - b. Structural members to which equipment **OR** suspension systems, **as directed**, will be attached.
 - c. Sizes and locations of initial access modules for acoustical tile.
 - d. Items penetrating finished ceiling, including the following:
 - 1) Lighting fixtures.
 - 2) Air outlets and inlets.
 - 3) Speakers.
 - 4) Sprinklers.
 - 5) Access panels.
 - e. Perimeter moldings.
4. Samples: For the following products:

- a. Shade Fabrics: Not less than **3 inches (76 mm)** square, with specified treatments applied. Mark face of material.
 - b. Valance: Full-size unit, not less than **12 inches (300 mm)** long.
5. Maintenance Data.

E. Quality Assurance

1. Fire-Test-Response Characteristics: Provide pleated shades with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency:
 - a. Flame-Resistance Ratings: Passes NFPA 701.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Product Standard: Provide pleated shades complying with WCMA A 100.1.

F. Delivery, Storage, And Handling

1. Deliver shades in factory packages, marked with manufacturer and product name, fire-test-response characteristics, **OR** lead-free designation, **as directed**, and location of installation using same designations indicated on Drawings and in a window treatment schedule.

1.2 PRODUCTS

A. Z-Pleated Shades

1. Z-Pleated Shade Construction: One-fabric thickness, with uniform pleat spacing maintained at all positions.
 - a. Nominal Pleat Width: **1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (76 mm) OR 4 inches (100 mm), as directed.**
2. Shade Fabric: Manufacturer's standard **OR** 100 percent nonwoven polyester with antistatic treatment **OR** PVC-coated polyester mesh **OR** 100 percent spun-woven polyester, **as directed**; stain and fade resistant, width as wide as required for seamless shade.
 - a. Fabric Width: **36 inches (910 mm) OR 48 inches (1220 mm) OR 60 inches (1520 mm) OR 72 inches (1830 mm) OR 84 inches (2130 mm) OR 96 inches (2440 mm) OR** As indicated on Drawings **OR** As indicated in a window treatment schedule, **as directed.**
 - b. Pattern: as directed by the Owner.
 - c. Style: as directed by the Owner.
 - d. Colors: Match samples **OR** As selected from manufacturer's full range **OR** As indicated in a window treatment schedule, **as directed.**
 - e. **Material Solar-Optical Properties: as directed by the Owner.**
 - f. Material Openness Factor: percent as directed by the Owner..
 - g. Material UV Blockage: percent as directed by the Owner..
3. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends; capacity for one **OR** two, **as directed**, shade(s) per headrail, unless otherwise indicated on Drawings **OR** in a window treatment schedule, **as directed.**
4. Bottom Rail: Formed-steel or extruded-aluminum tube, sealed with plastic or metal capped ends.
5. Valance: Clear plastic with fabric insert matching fabric shade.
6. R-Value: Not less than **2.22 deg F x h x sq. ft./Btu (0.39 K x sq. m/W) OR 4.8 deg F x h x sq. ft./Btu (0.85 K x sq. m/W), as directed.**
7. Mounting: Wall **OR** Ceiling **OR** End **OR** Wall extension brackets **OR** As indicated on Drawings, **as directed**, mounting permitting easy removal and replacement without damaging shade or adjacent surfaces and finishes; with spacers and shims required for shade placement and alignment indicated.

8. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard, as indicated.
9. Side Channels and Perimeter Seals: Manufacturer's standard for eliminating light gaps when shades are closed.
10. Shade Operation: Manual.
 - a. Lift Control: System including lift cord, crash-proof cord lock, and cord joiner ball **OR** System including continuous-cord loop, clutch, and cord tensioner and bracket **OR** Cordless system, **as directed**, designed to hold shade in place unless force is applied to move shade.
 - b. Length of Lift Cord **OR** Cord Loop, **as directed**: Manufacturer's standard length **OR** Full length of shade **OR** Length required to make operation convenient from floor level **OR** As indicated on Drawings, **as directed**.
 - c. Position of Lift Cord **OR** Cord Loop, **as directed**: As indicated on Drawings **OR** in a window treatment schedule, **as directed**.
 - d. Position of Lift Cord **OR** Cord Loop, **as directed**: Left side **OR** Right side **OR** Left end **OR** Right end, **as directed**, of headrail, unless otherwise indicated on Drawings **OR** in a window treatment schedule, **as directed**.
 - e. Cord Tensioner Mounting: Wall **OR** Floor **OR** Sill **OR** Baseboard **OR** As indicated on Drawings, **as directed**.
11. Shade Operation: Motorized operator.

B. Cellular Shades

1. Cellular Shade Construction: Two-fabric thicknesses and one row of cells, one cell wide.
 - a. Nominal Cell Width: **3/8 to 7/16 inch (10 to 11 mm) OR 1/2 inch (13 mm) OR 9/16 inch (14.2 mm) OR 3/4 inch (19 mm), as directed.**
2. Cellular Shade Construction: Three-fabric thicknesses and two honeycombed cells, nominally two cells wide.
 - a. Nominal Cell Width: **3/8 inch (10 mm).**
3. Cellular Shade Construction: Four-fabric thicknesses and three honeycombed cells, nominally three cells wide.
 - a. Nominal Cell Width: **3/8 inch (10 mm).**
4. Shade Fabric: Manufacturer's standard **OR** 100 percent nonwoven polyester with antistatic treatment **OR** 100 percent spun-woven polyester, **as directed**; stain and fade resistant, width as wide as required for seamless shade.
 - a. Fabric Width: **36 inches (910 mm) OR 48 inches (1220 mm) OR 60 inches (1520 mm) OR 72 inches (1830 mm) OR 84 inches (2130 mm) OR 96 inches (2440 mm) OR** As indicated on Drawings **OR** As indicated in a window treatment schedule, **as directed**.
 - b. Pattern: as directed by the Owner.
 - c. Style: as directed by the Owner.
 - d. Colors: Match samples **OR** As selected from manufacturer's full range **OR** As indicated in a window treatment schedule, **as directed**.
5. Headrail: Formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends; capacity for one **OR** two, **as directed**, shade(s) per headrail, unless otherwise indicated on Drawings **OR** in a window treatment schedule, **as directed**.
6. Bottom Rail: Formed-steel or extruded-aluminum tube, sealed with plastic or metal capped ends.
7. Valance: Clear plastic with fabric insert matching fabric shade.
8. R-Value: Not less than **2.22 deg F x h x sq. ft./Btu (0.39 K x sq. m/W) OR 4.8 deg F x h x sq. ft./Btu (0.85 K x sq. m/W), as directed.**
9. Mounting: Wall **OR** Ceiling **OR** End **OR** Wall extension brackets **OR** As indicated on Drawings, **as directed**, mounting permitting easy removal and replacement without damaging shade or adjacent surfaces and finishes; with spacers and shims required for shade placement and alignment indicated.
10. Hold-Down Brackets and Hooks or Pins: Manufacturer's standard, as indicated.
11. Side Channels and Perimeter Seals: Manufacturer's standard for eliminating light gaps when shades are closed.
12. Shade Operation: Manual.

- a. Lift Control: System including lift cord, crash-proof cord lock, and cord joiner ball **OR** System including continuous-cord loop, clutch, and cord tensioner and bracket **OR** Cordless system, **as directed**, designed to hold shade in place unless force is applied to move shade.
 - b. Length of Lift Cord **OR** Cord Loop, **as directed**: Manufacturer's standard length **OR** Full length of shade **OR** Length required to make operation convenient from floor level **OR** As indicated on Drawings, **as directed**.
 - c. Position of Lift Cord **OR** Cord Loop, **as directed**: As indicated on Drawings **OR** in a window treatment schedule, **as directed**.
 - d. Position of Lift Cord **OR** Cord Loop, **as directed**: Left side **OR** Right side **OR** Left end **OR** Right end, **as directed**, of headrail, unless otherwise indicated on Drawings **OR** in a window treatment schedule, **as directed**.
 - e. Cord Tensioner Mounting: Wall **OR** Floor **OR** Sill **OR** Baseboard **OR** As indicated on Drawings, **as directed**.
13. Shade Operation: Motorized operator.

C. Pleated Shade Fabrication

1. Product Description: Pleated shades each consisting of fabric, rails, ladders, lifting mechanism, self-leveling device, and installation hardware.
2. Concealed Components: Noncorrodible or corrosion-resistant-coated materials.
 - a. Lifting Mechanism: With permanently lubricated moving parts.
3. Unit Sizes: Obtain units fabricated in sizes to fill window and other openings as follows, measured at **74 deg F (23 deg C)**:
 - a. Shade Units Installed between (Inside) Jambs: Edge of shade not more than **1/4 inch (6 mm)** from face of jamb. Length equal to head-to-sill dimension of opening in which each shade is installed.
 - b. Shade Units Installed Outside Jambs: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
4. Installation Brackets: Designed for easy removal and reinstallation of shade, for supporting headrail, valance, **as directed**, and operating hardware and for hardware position and shade mounting method indicated.
5. Installation Fasteners: No fewer than two fasteners per bracket, fabricated from metal noncorrosive to shade hardware and adjoining construction; type designed for securing to supporting substrate; and supporting shades and accessories under conditions of normal use.
6. Color-Coated Finish: For metal components exposed to view, apply manufacturer's standard baked finish complying with manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
7. Component Color: Provide rails and cords, **as directed**, and exposed-to-view ladders, **as directed**, metal and plastic matching or coordinating with fabric color, unless otherwise indicated.

D. Motorized Pleated Shade Operators

1. General: Provide factory-assembled shade operation systems designed for lifting shades of type, size, weight, construction, use, and operation frequency indicated. Provide operation systems of size and capacity and with features, characteristics, and accessories suitable for Project conditions and recommended by shade manufacturer, complete with electric motors and factory-prewired motor controls, remote-control stations, remote-control devices, power disconnect switches, enclosures protecting controls and all operating parts, headrail, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with the building electrical system.
2. Comply with NFPA 70.
3. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6 with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc, **as directed**.

4. Electric Motors: UL-approved or -recognized, totally enclosed, insulated motor, complying with NEMA MG 1, with thermal-overload protection, brake, permanently lubricated bearings, and internal limit switches; sized by shade manufacturer to start and operate size and weight of shade considering service factor or considering Project's service conditions without exceeding nameplate ratings.
 - a. Service Factor: According to NEMA MG 1, unless otherwise indicated.
 - b. Motor Characteristics: Single phase, 24 **OR** 110 **OR** 220, **as directed**, V, 60 Hz.
 - c. Motor Mounting: Within manufacturer's standard headrail enclosure.
5. Remote Controls: Electric controls with NEMA ICS 6, Type 1 enclosure for surface **OR** recessed or flush **OR** within headrail, **as directed**, mounting. Provide the following devices for remote-control activation of shades:
 - a. Control Stations: Keyed, maintained **OR** momentary, **as directed**,-contact, three-position, switch-operated control station with open, close, and off functions. Provide two keys per station.
 - b. Control Stations: Maintained **OR** Momentary, **as directed**,-contact, three-position, toggle **OR** rocker, **as directed**,-style, wall switch-operated control station with open, close, and center off functions.
 - 1) Color: Ivory **OR** White **OR** As indicated in a window treatment schedule, **as directed**.
 - c. Group Control Stations: Maintained **OR** Momentary, **as directed**,-contact, three-position, rocker-style, wall switch-operated control station with open, close, and center off functions for single-switch group control.
 - 1) Color: Ivory **OR** White **OR** As indicated in a window treatment schedule, **as directed**.
 - d. Individual/Group Control Stations: Maintained **OR** Momentary, **as directed**,-contact, three-position, rocker-style, wall switch-operated control station with open, close, and center-off functions for individual and group control.
 - 1) Color: Ivory **OR** White **OR** As indicated in a window treatment schedule, **as directed**.
 - e. Sun Sensor Controls: Programmable system activated by LEDs detecting daylight intensity and responding by automatically adjusting shades.
 - f. Radio Controls: Digital system consisting of code-compatible universal coaxial receiver, one per shade **OR** one per headrail **OR** where indicated on Drawings, **as directed**, and two, **as directed**, portable, multiple-channel transmitters for operating two **OR** four **OR** up to 12, **as directed**, shades individually, each with a single button to open and close shades.
 - g. Infrared Controls: System consisting of concealed receiver complete with external eye and connecting modular cable, and two, **as directed**, portable, multiple-channel transmitters with separate buttons to open and close up to 12, **as directed**, individual shades or groups of shades, to open and close all shades simultaneously, and to stop.
 - h. Timer Controls: Clock timer, 24-hour **OR** seven-day, **as directed**, programmable for regular events.
 - i. Microprocessor Controls: Electronic programmable means for setting, changing, and adjusting control features. Provide unit isolated from voltage spikes and surges.
6. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop shade at fully raised and fully lowered positions.
7. Operating Features: Include the following:
 - a. Group switching with integrated switch control; one face plate for multiple switch cut-outs.
 - b. Capable of interface with audiovisual **OR** multiroom, **as directed**, control system.
 - c. Capable of accepting input from building automation control system.
 - d. Override switch.
8. Accessories: Include the following:
 - a. Solar Power Unit: For use with control system indicated.
9. Headrail: Manufacturer's standard formed steel or extruded aluminum; long edges returned or rolled; fully enclosing operating mechanisms on three sides and ends; capacity for one **OR** two,

as directed, shade(s) per headrail, unless otherwise indicated on Drawings **OR** in a window treatment schedule, **as directed**.

- a. Color: Match shade **OR** As indicated by manufacturer's designations **OR** As selected from manufacturer's full range **OR** As indicated in a window treatment schedule, **as directed**.

1.3 EXECUTION

A. Pleated Shade Installation

1. Install shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions, and located so pleat edges are not closer than **2 inches (50 mm)** to interior face of glass. Install intermediate support as required to prevent deflection in headrail. Allow clearances for window operation hardware.
2. Flush Mounted: Install shades with pleat edges flush with finish face of opening if shade is in fully lowered position.
3. Jamb Mounted: Install headrail flush with face of opening jamb and head.
4. Head Mounted: Install headrail on face of opening head.
5. Recessed: Install headrail concealed within shade pocket.
6. Connections: Connect motorized operators to building electrical system.

B. Adjusting

1. Adjust and balance pleated shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Cleaning And Protection

1. Clean pleated shade surfaces after installation, according to manufacturer's written instructions.
2. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that pleated shades are without damage or deterioration at time of Final Completion.
3. Replace damaged pleated shades that cannot be repaired, in a manner approved, before time of Final Completion.

END OF SECTION 12 24 13 00a

Task	Specification	Specification Description
12 24 13 00	12 21 13 13	Horizontal Louver Blinds
12 24 13 00	12 21 16 13	Vertical Louver Blinds

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SECTION 12 31 16 00 - KITCHEN CASEWORK, STAINLESS STEEL CABINETS

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for kitchen casework, stainless steel cabinets. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Quality Assurance

1. Comply with all provisions of specifications for the design, quality testing. Manufacturing and installation of metal kitchen cabinets and specified equipment.
2. All kitchen cabinetry and equipment herein specified and shown on the drawings shall meet the standards, quality of materials, construction, workmanship and finish of Innovative Laboratory Systems Co., 1336 Industrial Rd., Omaha Nebraska, (402) 333-0679. Equal manufacturers acceptable.
3. All metal cabinetry and equipment herein shall be the product of one manufacturer and be the one on which this specification is based or approved of substitutes must be obtained in writing from the Owner ten days prior to the bid due date. All manufacturers other than the specified product shall provide evidence of having a minimum of five years experience in the manufacturing and installation of stainless steel kitchen cabinetry.
4. The manufacturer shall, from one year to date of installation, warrant parts or products manufactured and finished against manufacturing defects in material and any such parts which under normal use prove defective within one year form date of installation, shall be repaired or replaced without charge to the Owner.
5. Wood shall not be used in any portion of the casework construction whether exposed or hidden from view.

C. Submittals

1. Shop Drawings
 - a. Identify location of metal cabinetry and related items.
 - b. Detail cabinets, shelving, countertops, etc, in related and dimensional position, with sections. Locations for roughing-in of plumbing, including sinks, faucets, strainers, cocks, etc. shall be included
2. Certificates: All bidders shall provide to the Owner independent test results from a nationally recognized testing laboratory on the finishes required for this project with the bid.

1.2 PRODUCTS

A. Material

1. All metal cabinetry shall be fabricated to Type 304 stainless steel free of scales buckles or other defects.
2. Minimum metal gauge: All minimum thickness of metal referred to herein shall be U.S. standard gauge.
 - a. 20 Gauge: Inner door panels, inner and outer drawer panels, drawer body, and shelves.
 - b. 18 Gauge: Outer door panels, sides, backs, bottoms, and tops.
 - c. 16 Gauge: Top rails, cross rails, drawer slides.
 - d. 14 Gauge: Leveling and corner gussets.

B. Fabrications

1. Cabinet Grade: Premium and complying with the following.
 - a. Align sides, top rails, bottoms and vertical stiles, at intersections, without overlap.

- b. Rounded edges.
 - c. Full welded seams.
 - d. Grind exposed welds flush and smooth.
2. Cases: The sides of cabinets shall be formed to make a rabbeted stile 1-1/8" wide. Top of case stiles shall be closed by a mitered 45-degree bend from tip of case side. Stiles shall be closed by welded channel, which contains front shelf adjustment louvers. All case members including intermediate cross rails shall be welded for maximum strength. Use of sheet metal screws to hold intermediate cross rails in place is not acceptable. Sides of all cabinets shall be free from any holes to prevent dust and bacteria from entering the cabinet. Pre-punched holes in the side of any cabinet will not be allowed. All drawer cabinets and cupboard cabinets shall have full backs and bottoms welded into place. Any cabinet without any backs or bottoms will be rejected. All interior bottoms of base and tall cabinets shall be turned down to provide a clean, flush interior free from dust catching ledges and preventing bacterial accumulation. Bottoms of all wall units shall be flushed; recessed bottoms are not acceptable.
3. Doors
 - a. Doors shall be double panel reinforced construction 5/8" thick and sound deadened with vertical steel battens. Door fronts and liners shall be welded together for added strength. Door fronts and cases shall be slotted to receive hinges. Hinge wings must be concealed when doors open. Wrap around type hinges are not acceptable. All doors shall have soft rubber bumpers for quiet closing. Rubber bumpers must be securely locked in place. Rubber Bumpers attached by adhesives are not acceptable. All corners of doors shall be welded and ground smooth.
 - b. Sliding doors shall be double panel reinforced construction 5/8" thick and operate on nylon rollers suspended from stainless steel track at top of unit and center guide at bottom. Sliding doors shall have recessed door pulls.
4. Drawers
 - a. Drawers front shall be double panel reinforced construction with 5/8" thick fronts and sound deadened with vertical steel battens. Drawers shall be all welded construction. All drawers shall have soft rubber bumpers for quiet closing. Rubber bumpers must be securely locked in place. Rubber bumpers attached by adhesives are not acceptable. All edges of drawer fronts shall be closed.
 - b. Drawer bodies shall be formed from a single sheet of steel including the bottom, two sides, back and inner front. Interior bottoms of drawers shall be fully covered on four sides for ease in cleaning. The top front of the inner drawer shall be offset to interlock with the outer drawer front.
 - c. Flanges on the top of drawer body shall be fully formed channel and bent at a 6-degree angle for maximum strength. Flanges shall be formed to leave the inside of the drawer free form sharp edges. Drawer slide shall be welded to drawer body and be part of a "Z" shaped member in a wrap around design to support drawer body. Drawer slides shall have a 15/16" nylon tired ball bearing roller. Drawer slide shall be roller type, positive in action permitting drawer to be fully opened; yet preventing drawer from accidental removal. Case slides shall be a formed piece of galvanized steel with 15/16" nylon tired ball bearing roller at front of slide. All ball bearing rollers for drawer slide and case slide shall be pre-lubricated to guarantee a smooth, quiet operation. All drawers shall rise upward when opened to prevent engaging of drawers and doors below. Drawers shall have self-closing design during the last 5" of travel.
5. Shelves: Shelves shall be formed from a single sheet of stainless steel with 7/8" face turned back and up at a 30-degree angle and edge of flange shall make firm contact with underside of shelf for sound deadening. All shelves in cabinets shall be adjustable on 1-1/2" center and supported by stainless steel clips placed in embossed louvers. All shelves shall be solid.
6. Hardware: Door catch shall be positive type latch located at upper inside edge of door. Stainless steel strike bracket shall be installed inside of door with accessible removable screws. Bolt shall be nylon self-closing type tested for 300,000 opening and closing cycles. Complete bolt housing shall be recessed behind cross rail. Roller catches and/or friction catches are not acceptable.

7. Hinges: Hinges shall be institutional type, 2-1/2" long, with a metal thickness of least 0.090", containing 5-knuckles, and centered 3" above bottom and below top of door. Doors 45" high and over shall have an additional hinge in center. Hinges shall be stainless steel with smooth rounded joints for easy cleaning. When door is closed, only the joint shall be exposed. Both hinge wings shall be encased, one within the door, the other within the case. Hinges shall be attached to the door and the case by screws. Hinges welded to door and/or case are not acceptable.
8. Door and Drawer Pull: Door and drawer pull shall be stainless steel with a brushed satin finish. Shoulder screws shall be used so that when handles are mounted they do not cause the door to buckle or cave. Sliding doors shall have recessed door pulls.
9. Base Cabinet Legs: All base cabinets and sink units shall be furnished with integral stainless steel legs with adjustable levelers. Bottom of base cabinets shall be approximately 6" above the floor.
10. Locking Mechanism: All cabinet doors shall be provided with stainless steel angle hasps, with half-inch diameter holes for pad locking, as shown on the drawings. The left door of each door pair shall have a sliding flush bolt on the inside face, as shown on the drawings, to prevent the pair of doors from swinging open when pad locked.

C. Steel Cabinet Finish

1. Test Procedure: Chemical spot tests shall be made by applying 10 to 15 drops (approximately 0.5 cubic cm) of each reagent listed in Table 1 to the surface to be tested. Each reagent spot shall be open to the atmosphere. Ambient temperature is 68-72 degrees F (20-22 degrees C). After one hour, chemicals shall be flushed away with cold water and the surface, washed with detergent and warm water at 150 degrees F (65 degrees C). Surface shall be examined under 100-foot candles of illumination.

D. Kitchen Cabinets Performance Requirements

1. Base Cabinets.
 - a. Cabinets Load Test: A 48" wide standing height combination cupboard and drawer cabinet shall be freestanding with installed counter top. Cabinet shall sit 1" off the floor on all four leveling screws and be capable of supporting a uniform distributed load of 2,000 lbs. Door and drawer operation shall not be affected by the load.
 - b. Leveling device for floor mounted cabinets shall be capable of supporting a load of 500 lbs. Without failure and capable of adjustment after load is removed.
 - c. Cabinet Door Test: An open door shall withstand a load of 200 lbs. applied directly at the outer edge. Door shall be moved through a 180 degree arc and weight removed. Operation of the door after test shall be normal without distortion that will adversely affect operation for the door catch.
 - d. Life Cycle Test.
 - 1) Door hinge shall operate for 300,000 opening and closing cycles without a failure.
 - 2) Positive door catch shall operate for 300,000 opening and closing cycles without failure.
 - 3) Drawer shall be tested and operated with a load of 100 lbs. for a minimum of 150,000 opening and closing cycles. After test, drawers shall operate freely without evidence of dragging or scraping.
2. Wall Cabinets
 - a. A 48" wide, 30" high, 12 3/4" deep hinged wall case shall support a load of 1lbs. on cabinet bottom and 100 lbs. on each adjustable shelf for a total of 300 lbs. Cabinet shall not show any significant permanent deflection of cabinet, cabinet bottom or shelves. Doors shall operate smoothly when cabinet is fully loaded.
 - b. An adjustable shelf shall support a uniformly distributed load of 100 lbs. When load is removed, shelf should show no significant permanent distortion.
 - c. Performance of hinge and catch shall be the same as used on base cabinets.

E. Working Surfaces

1. Stainless Steel: Sink and counter tops shall be fabricated of 16 gauge, Type 304, 18-8 solid stainless steel formed down and back making a 1 1/2" high face on all exposed edges.

Drainboards and cabinet tops shall be rigidly reinforced the full length of the top. Drainboards shall be two-way pitched to the bowl to provide drainage without channeling or grooving. Drainboards, flanges and splashes shall be integral, being formed from one sheet of metal. Raised edge surrounding unit shall be seamless die formed at front and ends of unit. Sink bowls shall be fabricated of 16 gauge, Type 304, 18-8 solid stainless steel seamless electrically welded to drainboard. All joints shall be electrically welded, ground and polished to a satin finish. Entire units shall be thoroughly sound deadened on under surface with sprayed or trowelled undercoating. Wood shall not be used. All tops shall have stainless steel runners to facilitate fastening to cabinets.

1.3 EXECUTION

A. Insulations

1. Install cabinets, shelves, counter tops and other equipment level and square. Install sink units to provide positive drainage of bottom surface of the sinks.
2. Wall cabinets shall be hung from the metal stud framing system wherever possible. If the wall cabinets must be hung from the wall surfacing at any location, proper anchors shall be used. Install wall cabinets level and aligned.
3. Install base cabinets firmly on ground. Level all the surfaces by adjusting the leg levelers. Attached countertops to inslatted base cabinets with stainless steel screws as required. Caulk with silicone all around counter tops where it interfaces with the existing walls. Install the flat back panels to the wall surfaces by the most appropriate method and caulk as required.
4. All work, including installation of new casework, flooring, ceiling, ductwork, etc., as well as the demolition of the existing casework, flooring, etc. shall be completed within three (3) consecutive days of work start. Hours of work shall be between 7:30 a.m. 9:00 p.m. All work, including work noted on Punch List, shall be completed by 9:00 p.m. of the third work day after work starts.

B. Temporary Work Station

1. During the period of demolition and new casework installation (3 days maximum) the contractor shall provide a temporary cabinet assembly for use by the Owner. The temporary assembly shall have a 6-foot section of cabinets with countertop, sink and faucet. The faucet shall be temporary connected to an apparatus hose bib for providing cold water to the sink. The sink shall be temporarily connected to a sewer line or floor drain if possible for the discharge or to another approved system of temporary discharge by means of a suitable container. For the latter method, the Contractor shall be responsible for periodically disposing of the waste container's contents. The temporary cabinet assembly shall be located reasonably close to the existing kitchens and/or dining areas being remodeled. the Owner shall approve the location of the temporary cabinets.

C. Inspection

1. Inspect installed work of other trades and installation conditions for acceptability. Inform the Owner of discrepancies that will jeopardize a complete and proper installation
2. Cleaning: Touching up marred and/or abraded finished surfaces, clean components to post construction accepted levels, remove crating and packing material, broom sweep premises.

END OF SECTION 12 31 16 00

SECTION 12 31 16 00a - STONE COUNTERTOPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for stone countertops. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes stone countertops.

C. Submittals

1. Product Data: For each variety of stone and manufactured products.
2. Shop Drawings: Include plans, sections, details, and attachments to other work.
3. Samples: For each stone type indicated.
4. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, documentation including printed statement of VOC content.
5. Sealant Compatibility Test Report: From sealant manufacturer, complying with requirements in Division 07 Section "Joint Sealants" and indicating that sealants will not stain or damage stone.
6. Maintenance Data: For stone countertops to include in maintenance manuals. Include Product Data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

D. Quality Assurance

1. Installer Qualifications: Fabricator of products.
2. Source Limitations for Stone: Obtain each variety of stone from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.
 - a. Make stone slabs available for the Owner to examine for appearance characteristics. the Owner will select aesthetically acceptable slabs.

E. Delivery, Storage, And Handling

1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
2. Store stone on wood A-frames or pallets with nonstaining separators and nonstaining, waterproof covers. Ventilate under covers to prevent condensation.

F. Project Conditions

1. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication.

1.2 PRODUCTS

A. Granite

1. Granite: Comply with ASTM C 615.
2. Cut stone from contiguous, matched slabs in which natural markings occur, **as directed**.
3. Finish: Polished **OR** Honed **OR** Thermal **OR** As indicated **OR** Match the Owner's sample, **as directed**.

B. Marble

1. Marble: Comply with ASTM C 503.

- a. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241 or ASTM C 1353.
 2. Cut stone from contiguous, matched slabs in which natural markings occur, **as directed**.
 3. Finish: Polished **OR** Honed **OR** As indicated **OR** Match the Owner's sample, **as directed**.
- C. Serpentine
1. Serpentine: Comply with ASTM C 1526, Classification I Exterior **OR** II Interior, **as directed**.
 - a. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241 or ASTM C 1353.
 2. Cut stone from contiguous, matched slabs in which natural markings occur, **as directed**.
 3. Finish: Polished **OR** Honed **OR** As indicated **OR** Match the Owner's sample, **as directed**.
- D. Slate
1. Slate: Comply with ASTM C 629, Classification I Exterior **OR** II Interior, **as directed**, with a fine, even grain and unfading color, from clear, sound stock.
 - a. Stone Abrasion Resistance: Minimum value of 8, based on testing according to ASTM C 241 or ASTM C 1353.
 2. Finish: Honed **OR** Sand rubbed **OR** Natural cleft **OR** As indicated **OR** Match the Owner's sample, **as directed**.
- E. Adhesives, Grout, Sealants, And Stone Accessories
1. General: Use only adhesives formulated for stone and ceramic tile and recommended by their manufacturer for the application indicated.
 2. Water-Cleanable Epoxy Adhesive: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Water-Cleanable Epoxy Grout: ANSI A118.3, chemical-resistant, water-cleanable, tile-setting and -grouting epoxy.
 4. Stone Adhesive: 2-part epoxy or polyester adhesive, formulated specifically for bonding stone to stone, with an initial set time of not more than 2 hours at **70 deg F (21 deg C)**, and with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - a. Color: Clear **OR** Match stone, **as directed**.
 5. Sealant for Countertops: Manufacturer's standard sealant of characteristics indicated below that comply with applicable requirements in Division 07 Section "Joint Sealants" and will not stain the stone it is applied to.
 - a. Single-component, neutral-curing **OR** acid-curing, **as directed**, silicone sealant.
 - b. Color: Clear **OR** As selected by the Owner from manufacturer's full range, **as directed**.
 - c. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 6. Stone Joint Splines: Stainless-steel or brass washers approximately **1 inch (25 mm)** in diameter and of thickness to fit snugly in saw-cut kerf in edge of stone units.
 7. Stone Cleaner: Cleaner specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer and, if a sealer is specified, by sealer manufacturer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.
 8. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.
- F. Stone Fabrication, General
1. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that could impair structural integrity or function.
 - a. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by the Owner.
 2. Grade and mark stone for final locations to produce assembled countertop units with an overall uniform appearance.

3. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated, including details on Drawings and Shop Drawings.
 - a. For granite, comply with recommendations in NBGQA's "Specifications for Architectural Granite."
 - b. For marble and serpentine, comply with recommendations in MIA's "Dimension Stone-- Design Manual."
 - c. Clean sawed backs of stones to remove rust stains and iron particles.
 - d. Dress joints straight and at right angle to face, unless otherwise indicated.
 - e. Cut and drill sinkages and holes in stone for anchors, supports, and attachments.
 - f. Provide openings, reveals, and similar features as needed to accommodate adjacent work.
 - g. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units. Form corners of molded edges as indicated with outside corners slightly eased, unless otherwise indicated.
 - h. Finish exposed faces of stone to comply with requirements indicated for finish of each type of stone required and to match approved Samples and mockups. Provide matching finish on exposed edges of countertops, splashes, and cutouts.
4. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

G. Stone Countertops

1. General: Comply with recommendations in MIA's "Dimension Stone - Design Manual."
2. Nominal Thickness: Provide thickness indicated, but not less than **3/4 inch (20 mm) OR 7/8 inch (22 mm) OR 1-1/4 inches (32 mm)**, **as directed**. Gage backs to provide units of identical thickness.
3. Edge Detail: Straight, slightly eased at top **OR 3/8-inch (10-mm) bevel OR 3/4-inch (20-mm) full bullnose OR 1-1/4-inch (20-mm) full bullnose OR 3/8-inch (10-mm) radius with 2-inch (50-mm) apron OR 1-1/2-inch (40-mm) laminated bullnose OR As indicated, as directed**.
4. Splashes: Provide **3/4-inch- (20-mm-)** thick backsplashes **OR end splashes OR backsplashes and end splashes, as directed**, unless otherwise indicated.
5. Joints: Fabricate countertops without joints.
OR
Fabricate countertops in sections for joining in field, with joints at locations indicated and as follows:
 - a. Bonded Joints: **1/32 inch (0.8 mm)** or less in width.
 - b. Grouted Joints: **1/16 inch (1.5 mm)** in width.
 - c. Sealant-Filled Joints: **1/16 inch (1.5 mm)** in width.
 - d. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints where indicated. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
6. Cutouts and Holes:
 - a. Undercounter Fixtures: Make cutouts for undercounter fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - 1) Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting **3/16 inch (5 mm)** into fixture opening.
 - 2) Provide vertical edges, rounded to **3/8-inch (10-mm)** radius at juncture of cutout edges with top surface of countertop, slightly eased at bottom, and projecting **3/16 inch (5 mm)** into fixture opening.
 - 3) Provide **3/4-inch (20-mm)** full bullnose edges projecting **3/8 inch (10 mm)** into fixture opening.
 - b. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - c. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

1.3 EXECUTION

A. Preparation

1. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring stone countertops. Furnish installers of other work with Drawings or templates showing locations of these items.
2. Clean dirty or stained stone surfaces by removing soil, stains, and foreign materials before setting. Clean stone by thoroughly scrubbing with fiber brushes and then drenching with clear water. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives. Allow stone to dry before installing.

B. Construction Tolerances

1. Variation from Plumb: For vertical lines and surfaces, do not exceed **1/16 inch in 48 inches (1.5 mm in 1200 mm)**.
2. Variation from Level: Do not exceed **1/8 inch in 96 inches (3 mm in 2400 mm)**, **1/4 inch (6 mm)** maximum.
3. Variation in Joint Width: Do not vary joint thickness more than 1/4 of nominal joint width.
4. Variation in Plane at Joints (Lipping): Do not exceed **1/64-inch (0.4-mm)** difference between planes of adjacent units.
5. Variation in Line of Edge at Joints (Lipping): Do not exceed **1/64-inch (0.4-mm)** difference between edges of adjacent units, where edge line continues across joint.

C. Installation Of Countertops

1. General: Install countertops over plywood subtops with full spread of water-cleanable epoxy adhesive.
OR
Install countertops by adhering to supports with water-cleanable epoxy adhesive.
2. Do not cut stone in field, unless otherwise indicated. If stone countertops or splashes require additional fabrication not specified to be performed at Project site, return to fabrication shop for adjustment.
OR
Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight, true, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
3. Set stone to comply with requirements indicated on Drawings and Shop Drawings. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned according to established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.
4. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
5. If joints are allowed, space joints with **1/16-inch (1.5-mm)** gap for filling with grout **OR** sealant, **as directed**. Use temporary shims to ensure uniform spacing.
 - a. Install metal splines in kerfs in stone edges at joints where indicated. Fill kerfs with stone adhesive **OR** setting adhesive **OR** sealant, **as directed**, before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - b. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
6. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
7. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive and to countertops with stone adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
OR

Install backsplash and end splash by adhering to countertops with stone adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Leave **1/16-inch (1.5-mm)** gap between splash and wall for filling with sealant. Use temporary shims to ensure uniform spacing.

OR

Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive. Leave **1/16-inch (1.5-mm)** gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.

8. If grouted joints are acceptable, grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.
9. Apply sealant to joints and gaps specified for filling with sealant; comply with Division 07 Section "Joint Sealants". Remove temporary shims before applying sealant.

D. Adjusting And Cleaning

1. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
2. Remove and replace stone countertops of the following description:
 - a. Broken, chipped, stained, or otherwise damaged stone. Stone may be repaired if methods and results are approved by the Owner.
 - b. Defective countertops.
 - c. Defective joints, including misaligned joints.
 - d. Interior stone countertops and joints not matching approved Samples and mockups.
 - e. Interior stone countertops not complying with other requirements indicated.
3. Replace in a manner that results in stone countertops matching approved Samples and mockups, complying with other requirements, and showing no evidence of replacement.
4. Clean stone countertops not less than six days after completion of sealant installation **OR** installation, **as directed**, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage stone.
5. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 12 31 16 00a

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Task	Specification	Specification Description
12 31 16 00	01 22 16 00	No Specification Required
12 31 16 00	01 95 06 00b	Interior Architectural Woodwork
12 36 23 13	01 95 06 00b	Interior Architectural Woodwork

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SECTION 12 36 61 16 - SOLID POLYMER FABRICATIONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cast, mineral filled, nonporous, solid polymer material used for countertops, vanity tops, sinks, bowls, window sills, tub and shower walls, and other applications where a hard, durable, stain resistant surface is desired. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Fabrications; indicate joints, shapes, dimensions, accessories and installation details.
2. Product Data: Solid polymer fabrications; panel adhesive; joint adhesive; sealant; heat reflective tape.
3. Samples: Solid polymer fabrications; where colors and patterns are not indicated, submit at least 3 different samples of manufacturer's standard colors and patterns for selection.
4. Test Reports: Tensile strength; hardness; flammability; thermal expansion; boiling water resistance; high temperature resistance; liquid absorption; mold and mildew growth; bacteria growth; impact resistance; sanitation.
5. Operation and Maintenance Data: Solid polymer fabrications; provide manuals indicating manufacturer's care and maintenance data, including repair and cleaning instructions. Provide maintenance kit(s) for selected finish(es).

- C. Quality Assurance: Do not change source of supply for materials after work has started if the appearance of finished work would be affected. Variation in component size and location of openings to be plus or minus **1/8 inch (3 mm)**.

- D. Delivery: Do not deliver until areas are ready for installation. Deliver components and materials to the site undamaged in containers, clearly marked and labeled with manufacturer's name. Store in dry, weathertight enclosure. Protect materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining after installation until completion of the project.

- E. Warranty: Provide the solid surface material manufacturer's 10 year warranty, from date of acceptance of the work.

1.2 PRODUCTS

- A. Solid Polymer Fabrications: Provide fabrication of cast, solid polymer material composed of acrylic polymer, mineral fillers and pigments. Material shall not be coated or laminated to substrates. Polymer thickness to be as indicated but not less than **1/4 inch (6 mm)**. Superficial damage to a depth of **0.010 inch (0.25 mm)** shall be repairable by sanding or polishing.

1. Performance Requirements

- a. Tensile strength, ASTM D 638: **5800 psi (40 Mpa)** minimum
- b. Hardness, ASTM D 2583: Barcol Impressor 55 minimum
- c. Flammability, ASTM E 84: Class I/A, flame spread 25 maximum; smoke developed 30 maximum
- d. Thermal Expansion, ASTM D 696: **0.00002 in/in/F (0.000036 mm/mm/K)** maximum
- e. Boiling water resistance, NEMA LD 3: No effect
- f. High temperature resistance, NEMA LD 3: No effect
- g. Liquid absorption, ASTM D 570 (24 hours): 0.10 percent maximum

- h. Mold and mildew growth, ASTM G 21: No growth, no effect
 - i. Bacteria growth, ASTM G 22: No growth, no effect
 - j. Sanitation, NSF 51: "Food Contact" approval for food area applications
 - k. Impact resistance, NEMA LD 3 (1/2 lb. (0.227 kg) ball drop): 1/4 inch (6 mm) material, 36 inch (914 mm) drop, no failure OR 1/2 inch (13 mm) material, 120 inch (3048 mm) drop, no failure, **as directed**.
2. Joint Adhesive: Two part acrylic joint adhesive as recommended by the solid polymer manufacturer to form inconspicuous, non-porous joints by chemical bond.
 3. Panel Adhesive: Neoprene based panel adhesive as recommended by the solid polymer manufacturer, UL listed.
 4. Sealant: Mildew resistant, FDA compliant and UL listed, silicone sealant as recommended by the solid polymer manufacturer.
 5. Heat Reflective Tape: Heat reflective tape as recommended by the solid polymer manufacturer for use with cutouts for heat sources.
 6. Mounting Hardware: Provide mounting hardware including sink/bowl clips, inserts and fasteners for attachment of undermount sinks and lavatories.

B. Fabrications: Fabrication requirements.

1. Factory fabricate components to the greatest extent possible to the sizes and shapes indicated, in accordance with approved shop drawings. Where indicated, factory fabricate side and back splashes with 1/2 inch (13 mm) cove at intersections.
2. Form joints between components using manufacturer's standard acrylic joint adhesive. Joints shall be inconspicuous, non-porous, and reinforced with strips of solid polymer material in accordance with the manufacturer's printed instructions.
3. Provide factory cutouts for plumbing and accessories as indicated. Reinforce heated or cooled cutouts in accordance with approved shop drawings and the manufacturer's printed instructions. Support all cutouts in accordance with approved shop drawings and the manufacturer's printed instructions.
4. Cut and finish component edges with clean returns. Round edges of cutouts to 1/8 inch (3 mm) radius. Round corners of cutouts with 1/2 inch (13 mm) minimum radius. Use router to form all cutouts. Provide thick edges where indicated using strips of solid polymer material and manufacturer's acrylic joint adhesive. All joints to be inconspicuous and non-porous. All exposed surfaces to have uniform finish and gloss.

1.3 EXECUTION

A. Installation: Deliver fabrications to the locations indicated. Assemble and install complete with accessories and hardware.

1. Assembly Requirements
 - a. Install components plumb and level and scribed to adjacent finishes in accordance with approved shop drawings and data.
 - b. Fasten and support fabrications to walls, brackets, and partitions as indicated. Fasteners shall be appropriate for use with adjoining construction.
 - c. Form field joints using manufacturer's recommended acrylic adhesive. Joints shall be inconspicuous and non-porous. Keep components and hands clean when forming joints. Seal flexible joints using manufacturer's recommended sealant.
 - d. Provide integral backsplashes and sidesplashes as indicated. Attach splashes with silicone or joint adhesive as indicated.
 - e. Keep components and hands clean during installation. Remove excessive adhesive and sealants. Clean finished surfaces of all dirt and stains.
2. Protection: Provide protective coverings to prevent physical damage or staining following installation.

END OF SECTION 12 36 61 16

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Task	Specification	Specification Description
12 36 61 16	01 95 06 00b	Interior Architectural Woodwork
12 36 61 16	12 31 16 00a	Stone Countertops
12 36 61 19	01 95 06 00b	Interior Architectural Woodwork
12 36 61 19	12 36 61 16	Solid Polymer Fabrications
12 36 61 19	12 31 16 00a	Stone Countertops

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SECTION 12 48 13 13 - FLOOR MATS AND FRAMES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for floor mats and frames. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Roll-up mats in recessed and surface-mounted frames.
 - b. Entrance mats in recessed and surface-mounted frames.
 - c. Entrance tiles in recessed and surface-mounted frames.

C. Submittals

1. Product Data: For each type of floor mat and frame.
2. Shop Drawings: Show the following:
 - a. Items penetrating floor mats and frames, including the following:
 - 1) Door control devices.
 - b. Divisions between mat sections.
 - c. Perimeter floor moldings.
 - d. Custom Graphics: Scale drawing indicating colors.
3. Samples: For each floor mat, tread rail, and frame member.
4. Maintenance Data.

D. Quality Assurance

1. Accessibility Requirements: Provide installed floor mats that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" **OR** Sections 302 and 303 in ICC A117.1, **as directed**.

1.2 PRODUCTS

A. Roll-Up Mats

1. Roll-up, Vinyl-Rail Hinged Mats: Vinyl-acrylic tread rails **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, wide by **3/8 inch (9.5 mm)** thick, with slotted or perforated vinyl **OR** aluminum, **as directed**, hinges.
 - a. Tread Inserts: Textured-surface, resilient vinyl **OR** Ribbed-design-surface, resilient vinyl **OR** Mineral abrasive particles bonded to or embedded in vinyl **OR** Aluminum-oxide or silicon-carbide grit in epoxy matrix **OR** 1/4-inch- (6-mm-) high, **28-oz./sq. yd. (950-g/sq. m)** weight, level-cut, nylon-pile, fusion-bonded carpet, **as directed**.
 - b. Colors, Textures, and Patterns of Inserts: As selected from manufacturer's full range.
 - c. Rail Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
 - d. Mat Size: As indicated **OR as directed**.
2. Roll-up, Aluminum-Rail Hinged Mats: Extruded-aluminum tread rails **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, wide by **3/8 inch (9.5 mm)** thick, sitting on continuous vinyl cushions.
 - a. Tread Inserts: Plain serrated aluminum treads **OR** Textured-surface, resilient vinyl **OR** Ribbed-design-surface, resilient vinyl **OR** Mineral abrasive particles bonded to or embedded in vinyl **OR** Aluminum-oxide or silicon-carbide grit in epoxy matrix **OR** 1/4-inch-

- (6-mm-) high, 28-oz./sq. yd. (950-g/sq. m) weight, level-cut, nylon-pile, fusion-bonded carpet, **as directed**.
- b. Colors, Textures, and Patterns of Inserts: As selected from manufacturer's full range.
- c. Rail Color: Mill-finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
- d. Hinges: Plastic **OR** Aluminum, **as directed**.
- e. Mat Size: As indicated **OR as directed**.
- 3. Surface-Mounted Frames:
 - a. Tapered Frames: Tapered flexible vinyl edge-frame **OR** aluminum frame, **as directed**, members, not less than 1-1/2 inches (38 mm) wide, attached to mat at all 4 edges, with welded mitered corners.
 - b. Color: Mill finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
- 4. Recessed Frames:
 - a. Extruded Aluminum: **ASTM B 221 (ASTM B 221M)**, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - b. Color: Mill finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
 - c. Architectural Bronze: ASTM B 455, Alloy UNS No. C38500.
- 5. Structural Performance (if floor mats must withstand heavy wheeled-cart loads): Provide roll-up mats and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:
 - a. Uniform floor load of 300 lbf/sq. ft. (14.36 kN/sq. m) **OR as directed**.
 - b. Wheel load of 350 lb (159 kg) per wheel **OR as directed**.

B. Entrance Mats

- 1. Resilient Link Mats: 3/8-inch- (9.5-mm-) **OR** 7/16-inch- (11-mm-), **as directed**, thick, reversible vinyl **OR** rubber **OR** rubber-tire, **as directed**, link mats with galvanized spring-steel **OR** stainless-steel, **as directed**, wire link rods, vulcanized edge-nosing trim, steel-reinforced end trim, and links consisting of rectangular units or continuous strips in a heel-proof, solid-weave pattern with no openings between links **OR** heel-proof, close-weave pattern with openings between links not exceeding 1/8 inch (3 mm) wide by 1 inch (25.4 mm) long **OR** open-weave pattern with openings between links about 1/2 inch (13 mm) wide by 1 inch (25.4 mm) long, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 - b. Mat Size: As indicated **OR as directed**.
- 2. Rubber **OR** Vinyl, **as directed**, Mats: 1/4-inch- (6-mm-) **OR** 3/8-inch- (9.5-mm-) **OR** 7/16-inch- (11-mm-) **OR** 1/2-inch- (13-mm-), **as directed**, thick mats; with square edges for recessed installations **OR** beveled edges for surface applications, **as directed**, and with solid sheet (no perforations) style **OR** perforated style, 1/4-inch (6-mm) diameter on standard spacing **OR** perforated style, 3/16 by 3/4 inch (5 by 19 mm) on standard spacing, **as directed**, standard pyramid design **OR** standard wide-wale corrugated **OR** hi-rib, narrow-wale corrugated, **as directed**, top profile, and low-rib, narrow-wale corrugated **OR** standard knob-base **OR** flat-base, **as directed**, bottom surface.
 - a. Color: As selected from manufacturer's full range.
 - b. Mat Size: As indicated, **OR as directed**.
- 3. Cocoa Mats: Constructed from cocoa fiber yarn permanently bonded to PVC backing for dimensional stability and resistance to shedding; 5/8- to 3/4-inch (16- to 19-mm) overall thickness; 1.5-lb/sq. ft (7.3-kg/sq. m) **OR** 1-inch (25.4-mm) overall thickness; 2.0-lb/sq. ft (10-kg/sq. m) **OR** 1-1/4-inch (32-mm) overall thickness; 2.5-lb/sq. ft (12-kg/sq. m), **as directed**, weight.
 - a. Color: As selected from manufacturer's full range.
 - b. Mat Size: As indicated, **as directed**.
- 4. Rubber-Tire Mats: Units of edge-grain-laminated and chenille-buffed, rubber-tire wall cuts; bonded to sheet rubber or other durable flexible backing sheet to form 3/8- to 7/16-inch- (9.5- to

- 11-mm-) thick, 12-inch- (300-mm-) square tile **OR** wide, continuous linear strip up to 25 feet (7.6 m) long, **as directed**.
- a. Mat Size: As indicated **OR as directed**.
5. Carpet-Type Mats: Nylon **OR** Polypropylene **OR** Olefin **OR** Polyester, **as directed**, carpet bonded to 1/8- to 1/4-inch- (3- to 6-mm-) thick, flexible vinyl backing to form mats 3/8 or 7/16 inch (9.5 or 11 mm) thick with nonraveling edges.
 - a. Colors, Textures, and Patterns: As selected from manufacturer's full range.
 - b. Mat Size: As indicated **OR as directed**.
 6. Loop Filament Mats: 3M's "Nomad" loop filament vinyl material 3/8 inch (9.5 mm) **OR** 1/2 inch (13 mm), **as directed**, thick, with solid vinyl sheet **OR** foam sheet, **as directed**, backing and with built-in chemical agents to reduce fungus and mildew.
 - a. Color: As selected from manufacturer's full range.
 - b. Mat Size: As indicated **OR as directed**.
 7. Nuway Mats: Nylon-reinforced, 1/2-inch- (13-mm-) wide by 7/16-inch- (11-mm-) **OR** 11/16-inch- (17.4-mm-), **as directed**, thick, vulcanized laminated rubber strips alternating with 9/16-inch- (14-mm-) wide, profile shapes assembled on 0.1055-inch- (2.7-mm-) diameter, galvanized steel wire, 1-1/2 inches (38 mm) o.c. Fibered surface buffed on rubber strips for interior **OR** unbuffed on rubber strips for exterior, **as directed**, installations.
 - a. Semiopen construction incorporating a 1/8-inch- (3-mm-) thick, PVC spacer on each wire between each profile shape and rubber strip to allow dirt, grit, and water to drop through.
 - b. Profile Shape Finish: Extruded-aluminum, mill finish **OR** Solid architectural-quality brass **OR** High-impact, solid PVC in color selected, **as directed**.
 - c. Color: As selected from manufacturer's full range.
 - d. Mat Size: As indicated **OR as directed**.
 8. Surface-Mounted Frames:
 - a. Tapered Frames: Tapered flexible vinyl edge-frame **OR** aluminum frame, **as directed**, members, not less than 2 inches (50 mm) **OR** 1-1/2 inches (38 mm), **as directed**, wide, attached to mat at all 4 edges, **as directed**, with welded mitered corners.
 - b. Color: Mill finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
 9. Recessed Frames:
 - a. Extruded Aluminum: ASTM B 221 (ASTM B 221M), Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - b. Color: Mill-finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
 - c. Architectural Bronze: ASTM B 455, Alloy UNS No. C38500.
 10. Graphics: Custom inlaid or woven-in graphic design **OR** logo **OR** emblem **OR** characters, **as directed**, as indicated.
- C. Entrance Tiles
1. Rubber-Tire Tiles: Units of edge-grain-laminated and chenille-buffed, rubber-tire wall cuts; bonded to sheet rubber or other durable flexible backing sheet to form 3/8- to 7/16-inch- (9.5- to 11-mm-) thick, square tile **OR** continuous linear strip, **as directed**.
 - a. Colors, Textures, and Patterns: As selected from manufacturer's full range.
 - b. Tile Size: 12 inches (300 mm) **OR** As indicated, **as directed**.
 2. Rubber **OR** Vinyl, **as directed**, Tiles: 5/8-inch- (16-mm-) **OR** 7/16-inch- (11-mm-), **as directed**, thick, solid **OR** open-grid, **as directed**, rubber **OR** vinyl, **as directed**, compound molded tiles with concealed interlocking joint tabs **OR** 1/4-inch- (6-mm-) deep, serpentine-grooved top face and knob-base back face on solid tile, **as directed**.
 - a. Colors, Textures, and Patterns: As selected from manufacturer's full range.
 - b. Tile Size: As indicated **OR as directed**.
 3. Carpet-Type Tiles: Nylon **OR** Polypropylene **OR** Olefin **OR** Polyester, **as directed**, carpet bonded to 1/8- to 1/4-inch- (3- to 6-mm-) thick, flexible vinyl backing to form mats 3/8 or 7/16 inch (9.5 or 11 mm) thick with nonraveling edges.
 - a. Colors, Textures, and Patterns: As selected from manufacturer's full range.
 - b. Tile Size: As indicated **OR as directed**.

4. Surface-Mounted Frames:
 - a. Tapered Frames: Tapered flexible vinyl edge-frame **OR** aluminum frame, **as directed**, members, not less than **2 inches (50 mm) OR 1-1/2 inches (38 mm)**, **as directed**, wide, attached to mat at all 4 edges, **as directed**, with welded mitered corners.
 - b. Color: Mill finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
 5. Recessed Frames: Manufacturer's standard extrusion.
 - a. Extruded Aluminum: **ASTM B 221 (ASTM B 221M)**, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52.
 - b. Color: Mill-finish **OR** Clear **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
- D. Concrete Fill And Grout Materials
1. Provide concrete grout and fill equivalent in strength to cast-in-place concrete slabs for recessed mats and frames. Use aggregate no larger than one-third fill thickness.
- E. Fabrication
1. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
 2. Surface-Mounted Frames: As indicated for permanent surface-mounted installation, complete with corner connectors, splice plates or connecting pins, and postinstalled expansion anchors.
 3. Recessed Frames: As indicated, for permanent recessed installation, complete with corner pins or reinforcement and anchorage devices.
 - a. Fabricate edge-frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.
 4. Coat surfaces of aluminum frames that will contact cementitious material with manufacturer's standard protective coating.
- F. Aluminum Finishes
1. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 3. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 4. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 5. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
 6. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
- G. Copper-Alloy (Bronze) Finishes

1. Finish designations prefixed by CDA comply with the system established by the Copper Development Association for designating copper-alloy finishes, as defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
 - a. Remove tool and die marks and stretch lines or blend into finish.
 - b. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
2. CDA Mechanical Finish Designation: M11, specular, as fabricated **OR** M32, directionally textured, medium satin, **as directed**.

1.3 EXECUTION

A. Installation

1. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate top of mat surfaces with bottom of doors that swing across mats to provide clearance between door and mat.
 - a. For installation in terrazzo flooring areas, provide allowance for grinding and polishing of terrazzo without grinding surface of recessed frames. Coordinate with other trades as required.
 - b. Install necessary shims, spacers, and anchorages for proper location and secure attachment of frames.
 - c. Install grout and fill around frames and, if required to set mat tops at proper elevations, in recesses under mats. Finish grout and fill smooth and level.
2. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.
 - a. Anchor fixed surface-type frame members to floor with devices spaced as recommended by manufacturer.

B. Protection

1. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Final Completion.

END OF SECTION 12 48 13 13

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SECTION 12 48 13 13a - FOOT GRILLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for foot grilles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the Work.

B. Summary

1. This Section includes recessed foot grilles and frames.

C. Performance Requirements

1. Structural Performance: Provide foot grilles and frames capable of withstanding the following loads and stresses:
 - a. Uniform floor load of **300 lbf/sq. ft. (14.36 kN/sq. m) OR as directed.**
 - b. Wheel load of **350 lb (159 kg) OR as directed**, per wheel.

D. Submittals

1. Product Data: For each type of foot grille and frame.
2. Shop Drawings: Show the following:
 - a. Items penetrating foot grilles and frames, including the following:
 - 1) Door control devices.
 - b. Divisions between grille sections.
 - c. Perimeter floor moldings.
3. Samples: For each type of product involving color selection.
 - a. Foot Grille: **12-inch- (300-mm-)** square assembled sections.
 - b. Frame Members: **12-inch- (300-mm-)** long Sample of each type and color.
4. Maintenance data.

E. Quality Assurance

1. Accessibility Requirements: Provide installed foot grilles that comply with Section 4.5 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)" **OR** Sections 302 and 303 in ICC A117.1., **as directed**

1.2 PRODUCTS

A. Materials

1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with **A60 (ZF180)** zinc-iron-alloy (galvannealed) coating or with **G60 (Z180)** mill-phosphatized zinc coating; stretcher-leveled standard of flatness; with minimum thickness indicated representing specified thickness according to ASTM A 924/A 924M.
2. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
3. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15.
4. Extruded Aluminum: **ASTM B 221 (ASTM B 221M)**, Alloy 6061-T6 or Alloy 6063-T5, T6, or T52 as standard with manufacturer. Coat surface of frame in contact with cementitious materials with manufacturer's standard protective coating.
5. Extruded Architectural Bronze: ASTM B 455, Alloy No. C38500.
6. Stainless-Steel Angles: ASTM A 276 or ASTM A 479/A 479M, corrosion resistant, Type 304.

B. Foot Grilles

1. General: Provide manufacturer's standard foot-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and with support legs (if any) and other components needed to produce a complete installation.
2. Aluminum **OR** Bronze, **as directed**, Foot Grilles: Provide manufacturer's standard foot grilles with extruded members, top-surfaced tread rails, and as follows:
 - a. Tread Rails: Extruded-aluminum **OR** Extruded-bronze, **as directed**, tread rails with extruded-aluminum frame, **as directed**.
 - b. Tread Rail Spacing: 1-1/2 inches (38 mm) o.c. with 1/8- to 3/16-inch- (3- to 4.8-mm-) **OR** 2 inches (50 mm) o.c. with 1/4-inch- (6-mm-), **as directed**, wide openings between treads.
 - c. Aluminum Finish: Mill **OR** Anodized, **as directed**.
 - 1) Colors: Clear natural aluminum **OR** Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.
 - d. Top Surface: Serrated aluminum **OR** Serrated bronze **OR** Serrated vinyl cap with UV stabilizer and antifungal additive **OR** Textured-surface, resilient vinyl insert **OR** Aluminum-oxide or silicon-carbide grit in epoxy matrix **OR** Abrasive particles bonded to or imbedded in vinyl insert **OR** Fusion-bonded, level-cut-pile nylon carpet insert; 1/4 inch (6 mm) high, 28 oz./sq. yd. (950 g/sq. m), **as directed**.
 - 1) Colors: As selected from manufacturer's full range, **as directed**.
 - e. Grille Size: As indicated **OR as directed**.
3. Stainless-Steel Foot Grille: Type 304.
 - a. Surface Treads: 0.071-by-0.177-inch (1.8-by-4.49-mm) wire with 0.125-inch- (3.17-mm-) **OR** 0.090-by-0.172-inch (2.2-by-4.37-mm) wire with 0.145-inch- (3.68-mm-) **OR** 0.093-by-0.156-inch (2.36-by-3.96-mm) wire with 0.125-inch- (3.17-mm-), **as directed**, wide openings between wires.
 - b. Support Rods: Spaced 1 inch (25 mm) o.c., welded to each wire.
 - c. Mat Grating: 5/8 inch (16 mm) deep.
 - d. Pit Grating: 1-1/8 inches (28.5 mm) deep.
 - e. Stainless-Steel Finish: Mill **OR** No. 4, **as directed**, finish.
 - f. Grille Size: As indicated **OR as directed**.
4. PVC Foot Grille: 1/8-by-1-1/2-by-1-inch (3-by-38-by-25-mm) ribbed top, PVC tread bars joined with 3/8-inch (10-mm) stainless-steel rods with 1-1/16-inch- (27-mm-) long nylon spacers at 12 inches (300 mm) o.c. Provide PVC frame with nylon anchors.
 - a. Colors: As selected from manufacturer's full range.
 - b. Grille Size: As indicated **OR as directed**.
5. Lockdown: Manufacturer's standard **OR** Hidden **OR** In view, **as directed**.

C. Frames

1. Provide manufacturer's standard frames of size and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Unless otherwise indicated, fabricate frame of same material and finish as grilles.

D. Support System

1. Level Bed Applications: Provide manufacturer's standard, vinyl cushion support system.
2. Drainage Pit Applications: Provide manufacturer's special deep-pit frame and support extrusion system with intermediate support beams, sized and spaced as recommended by manufacturer for indicated spans and equipped with vinyl support cushions.

E. Drain Pans

1. Provide manufacturer's standard, 0.060-inch- (1.52-mm-) thick, **as directed**, metallic-coated steel **OR** aluminum **OR** stainless-steel, **as directed**, sheet drain pan with NPS 2 (DN 50) drain outlet for each floor grille unit. Coat bottom of pan with protective coating recommended by manufacturer.

F. Fabrication

1. Shop fabricate foot grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.
2. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

G. Finishes, General

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

H. Aluminum Finishes

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
2. Mill Finish: AA-M10 (Mechanical Finish: as fabricated); grind and buff as required to remove scratches, welding, or abrasions produced in fabrication process.
3. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
4. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
5. Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker).
6. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

I. Stainless-Steel Finishes

1. Mill finish.
2. Directional Satin Finish: No. 4.
 - a. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

J. Copper-Alloy (Bronze) Finishes

1. Finish designations for copper alloys comply with the system established for designating copper-alloy finish systems defined in NAAMM's "Metal Finishes Manual for Architectural and Metal Products."
 - a. Remove tool and die marks and stretch lines or blend into finish.
 - b. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
2. Mechanical Finish Designation: M11, specular, as fabricated **OR** M32, directionally textured, medium satin, **as directed**.

1.3 EXECUTION

A. Installation

1. Install recessed foot grilles and frames and drain pans to comply with manufacturer's written instructions at locations indicated and with top of foot grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set foot-grille tops

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at height for most effective cleaning action. Coordinate top of foot-grille surfaces with doors that swing across grilles to provide clearance under door.

B. Protection

1. After completing frame installations, provide temporary filler of plywood or fiberboard in foot-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Final Completion.

END OF SECTION 12 48 13 13a

Task	Specification	Specification Description
12 48 13 16	12 48 13 13	Floor Mats And Frames
12 48 13 16	12 48 13 13a	Foot Grilles
12 61 13 00	12 01 60 00	Fixed Audience Seating
12 61 16 00	12 01 60 00	Fixed Audience Seating
12 61 19 00	12 01 60 00	Fixed Audience Seating

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SECTION 12 62 23 00 - PORTABLE BLEACHERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of portable bleachers. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

C. Warranty

1. Contractor shall warranty any and all materials or workmanship covered by these specifications for a period of one (1) year. Defects shall be corrected by the Contractor at once without charge to the Owner.

1.2 PRODUCTS

A. Design:

1. The design shall be in accordance with the generally accepted standards as published by The American Institute of Steel Construction and The Aluminum Association.
2. Design Loads:
 - a. A uniformly distributed live load of not less than 100 psf of gross horizontal projection of the bleachers.
 - b. Bleachers shall be designed to withstand, with or without live loads, the horizontal and uplift pressures due to the wind. Wind pressures shall be derived from ANSI/ASCE 7-93, Minimum Design Loads in Buildings and Other Structures.
 - c. A horizontal swaying force applied to the seats, in a direction parallel to the length of the seats, of 24 lbs./ft.
 - d. A horizontal swaying force applied to the seats, in a direction perpendicular to the length of the seats, of 10 lb./ft.
 - e. All seat and footboard members shall be designed for live loads of not less than 120 lb. per lineal foot.
 - f. Guardrails shall be capable of sustaining a vertical load of 100 plf and a horizontal thrust of 50 plf. Acting outwardly at the top of the rail.
 - g. Under these loads, stresses shall not exceed those allowed in the "Specifications for Structural Steel Buildings, June 1, 1989" as adopted by the American Institute of Steel Construction.
3. Shop Connections: Welded and capable of carrying stress put upon them as per AWS standards.
4. Supporting Members (Framework):
 - a. Main supporting members are to be of a welded angle frame design.
 - b. Spaced at 6'-0" centers (maximum).
 - c. Constructed of a minimum 2 x 2 x 3/16" angle.
 - d. Every frame shall be laterally supported with cross-bracing to the adjacent frame.
5. Dimensions:
 - a. Length of Unit: 15" **OR** 21" **OR** 27," **as directed**.
 - b. Number of rows: 2 **OR** 3 **OR** 4 **OR** 5 **OR** 10, **as directed**.
 - c. Seat Height: 17 inches.
 - d. Typical Stands: 8" Rise with a 24" row depth.
6. Deck Arrangements:

- a. Seats: Nominal 2 x 10, anodized aluminum.
 - b. Footboards: Nominal 2 x 10 mill finish aluminum. (Optional 2 @ 2 x 10 mill finish aluminum on 2, 3, 4, 5 row units; Standard on 10 row units).
 - c. Riser: Optional on 2,3,4 & 5 row units, Standard on 10 row units
 - d. Vertical aisles with handrails as required by code.
7. Guardrails:
- a. Furnished on sides of any bleacher that is 5 rows high or higher per code. (Optional on 2, 3, & 4 row units).
 - b. All pipes shall be 1 5/8" O.D. anodized aluminum pipe with end plugs and elbows at corners. Secured to angle rail posts with galvanized fasteners.
 - c. Rails not less than 42" vertically above the center of the seatboard surface shall be provided at the back and sides of the bleacher.
 - d. Included on all sides of the bleacher shall be 2" x 9 gauge galvanized chain link fencing fastened in place with aluminum ties and galvanized tension bars and aluminum rail clamps.
8. Mudsills: 2 x 4 pressure treated wood shall be provided on all frames.
9. Transporting Options:
- a. Galvanized steel angle tow bar
 - b. Pneumatic wheels with axles
10. Tip-N-Roll Package: Optional on 2, 3, & 4 row units up to 21'-0" long.
- a. Non-marking rubber grommets shall be provided on all frames.
 - b. Caster wheels shall be 4" diameter, swivel mounted, non-marking soft rubber.

B. Materials

1. Steel: ASTM A572 (Hot-Dipped Galvanized), ASTM A586 (Weathering Steel).
2. Aluminum: Extruded alloy 6063-T6.
3. Accessories:
 - a. High Strength Bolts and Nuts - ASTM A325 steel.
 - b. Ordinary Bolts and Nuts - ASTM A307.
 - c. Hold-Down Clip Assemblies - Aluminum alloy 6063-T6.
 - d. End Caps - Channel aluminum alloy 6063-T6.

C. Finishes

1. Steel: Galvanized Steel and Weathering Steel.
2. Aluminum:
 - a. Anodized: Seat planks, backrest, stanchions and also risers if requested clear anodized 204R1, AA-M10C22A31, Class II.
 - b. Mill Finish: Footboards and riser boards (6063-T6).
 - c. Paint: Electrostatically applied, baked-on siliconized acrylic or siliconized polyester enamel.

1.3 EXECUTION

A. Installation

1. Install bleacher unit in accordance with manufacturer's installation procedures.

END OF SECTION 12 62 23 00

Task	Specification	Specification Description
12 62 23 00	01 22 16 00	No Specification Required

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SECTION 13 34 16 13 - GRANDSTANDS AND BLEACHERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of grandstands and bleachers. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Shop Drawings submitted shall be Designed and Detailed under the direct supervision of a licensed, in house, Professional Engineer. The Professional Engineer shall be present during the time the design and detailing is completed unless all details are included on the approval drawings bearing his/her seal.

C. Warranty

1. Contractor shall warranty any and all materials or workmanship covered by these specifications for a period of one (1) year. Defects shall be corrected by the Contractor at once without charge to the Owner.

1.2 PRODUCTS

A. Design:

1. The design shall be in accordance with the generally accepted standards as published by The American Institute of Steel Construction and The Aluminum Association.
2. Design Loads:
 - a. A uniformly distributed live load of not less than 100 psf of gross horizontal projection of the grandstand.
 - b. Grandstands and bleachers shall be designed to withstand, with or without live loads, the horizontal and uplift pressures due to the wind. Wind pressures shall be derived from ANSI/ASCE 7-93, Minimum Design Loads in Buildings and Other Structures.
 - c. A horizontal swaying force applied to the seats, in a direction parallel to the length of the seats, of 24 lbs./ft.
 - d. A horizontal swaying force applied to the seats, in a direction perpendicular to the length of the seats, of 10 lb./ft.
 - e. All seat and footboard members shall be designed for live loads of not less than 120 lb. per lineal foot.
 - f. Guardrails shall be capable of sustaining a vertical load of 100 plf and a horizontal thrust of 50 plf. Acting outwardly at the top of the rail.
 - g. Under these loads, stresses shall not exceed those allowed in the "Specifications for Structural Steel Buildings, June 1, 1989" as adopted by the American Institute of Steel Construction.
3. Shop Connections: Welded and capable of carrying stress put upon them as per AWS standards.
4. Steel Members for Grandstands:
 - a. Stringers: Wide flange beams spaced at 6'-0" on center.
 - b. Columns: Wide flange beams spaced at 18'-0" on center longitudinally and transversely they will be spaced according to the size of the stand with a maximum of 24'-0" on center.
 - c. Cross Beams: Horizontal cross beams shall be wide flange beams and run "continuously" for the length of the stand.

- d. Cross-Bracing: Front to back bracing shall be structural steel angle, bolted at ends and centers. Rod bracing shall be used for side to side bracing. On columns requiring 2 or more sets of cross-bracing, the connecting strut shall run continuously for the entire length of the stand.
5. Supporting Members (Framework) for Bleachers:
 - a. Main supporting members are to be of a welded angle frame design.
 - b. Spaced at 6'-0" centers (maximum).
 - c. Constructed of a minimum 2 x 2 x 3/16" angle.
 - d. Every frame shall be laterally supported with cross-bracing to the adjacent frame.
6. Dimensions:
 - a. Length of Unit: As required to meet Project requirements.
 - b. Number of rows: As required to meet Project requirements.
 - c. Net seating capacity: As required to meet Project requirements.
 - d. Bleacher seats: As required to meet Project requirements.
 - e. Wheelchair spaces: As required to meet Project requirements, A.D.A. or Local Codes
 - f. Front Walkways: 66 inches clear width
 - g. Seat Height:
 - 1) Grandstands: 17 to 18 inches.
 - 2) Bleachers: 17 inches.
 - h. Walkway Elevation:
 - 1) Grandstands: 42 to 49 inches.
 - 2) Bleachers: 30 to 42 inches.
 - i. Aisle Width: 48" minimum clear width, unless directed otherwise.
7. Typical Stands:
 - a. Grandstands:
 - 1) 8" Rise or 10" Rise with a 24" **OR** 28", **as directed**, row spacing.
 - 2) 12" Rise with 30" row spacing (Min. required for backrest).
 - b. Bleachers: Standard 8: Rise with a 24" row depth
8. Deck Arrangements:
 - a. Walkways: Six 2 x 12 planks.
 - b. Seats: Standard 2 x 10, unless directed otherwise.
 - c. Aisle Steps: Standard 2 x 12 plank **OR** 2 x 12 plank with 1" contrasting nosing to delineate the leading edge, **as directed**.
 - d. Footboard and Riser plank arrangement: Semi-closed (SC), Fully Closed Deck Plank Arrangement (CD), and Interlocked Deck (IL).
9. Guardrails:
 - a. Furnished on sides of the bleacher including stairs, ramps, portals and landings.
 - b. All pipes shall be 1 5/8" O.D. anodized aluminum pipe with end plugs and elbows at corners. Secured to angle rail posts with galvanized fasteners.
 - c. Rails not less than 42" vertically above the center of the seatboard surface shall be provided at the back and sides of the bleacher.
 - d. Rails are not to be less than 42" above the elevated front footrests.
 - e. Included on all sides of the bleacher shall be 2" x 9 gauge galvanized chain link fencing fastened in place with aluminum ties and galvanized tension bars and aluminum rail clamps.
10. Stairs: Per applicable codes and/or drawings.
 - a. 2 x 12 aluminum plank with a maximum rise of 7".
 - b. Stairs shall have a multi-pipe rail system that conforms to the 4" ball rule. Top rail shall be 42" above the leading edge of the treads.
11. Mudills: 2 x 4 pressure treated wood shall be provided on all frames.
12. Handicap Provisions:
 - a. Wheelchair pockets inset into the front rows of seating shall be provided to comply with local codes and ADA for wheelchair accessibility.
 - b. Handicapped seating will be enclosed on all three sides with no exposed vertical rise allowed.

- c. Front platform shall be accessible from a ramp with a maximum gradient of 1:12.
 - d. Ramp width shall be minimum 5'-0" for two-way traffic.
 - e. Ramp shall have a 3-pipe rail system consisting of 1 5/8" O.D. anodized aluminum pipe with 2 x 9 gauge galvanized fence. Top rail will be 42" above the ramp surface.
 - f. A handrail 36" above the ramp surface shall be provided.
13. Pressbox
- a. Grandstands: Pressbox Support Structure will be independently supported but connected to the rear of the grandstand.
 - b. Bleachers: Pressbox Support Structure will be independently supported on its own poured concrete piers and connected to bleacher by means of stairs off bleacher aisle.
 - c. Support Structure to be 8'-0" wide and in increments of 6'-0" in length.
 - d. Pressbox specifications as required to meet Project requirements.

B. Materials

- 1. Steel: ASTM A572 (Hot-Dipped Galvanized), ASTM A586 (Weathering Steel).
- 2. Aluminum: Extruded alloy 6063-T6.
- 3. Ready-Mixed Concrete shall comply with ASTM C94 with compressive strength of **3,000 pounds per square inch (210.9 kgs per square cm)** at 28 days and shall be protected from freezing for seven days after placement.
- 4. Reinforcement for Concrete shall comply with ASTM A184, A1064, or A615 as indicated.
- 5. Accessories:
 - a. High Strength Bolts and Nuts - ASTM A325 steel.
 - b. Ordinary Bolts and Nuts - ASTM A307.
 - c. Hold-Down Clip Assemblies - Aluminum alloy 6063-T6.
 - d. End Caps - Channel aluminum alloy 6063-T6.

C. Finishes

- 1. Steel: Galvanized Steel and Weathering Steel.
- 2. Aluminum:
 - a. Anodized: Seat planks, backrest, stanchions and also risers if requested clear anodized 204R1, AA-M10C22A31, Class II.
 - b. Mill Finish: Footboards and riser boards (6063-T6).
 - c. Paint: Electrostatically applied, baked-on siliconized acrylic or siliconized polyester enamel.

1.3 EXECUTION

A. Installation

- 1. All work will be performed by factory-trained technicians experienced in bleacher seating installation.
- 2. Complete installation as per approved shop drawings and manufacturers instructions.
- 3. Bleachers shall be sufficiently anchored to the ground to withstand the wind loads for their particular areas.
- 4. After installation, unit shall be inspected for proper alignment and function.

B. Foundations/Piers

- 1. Piers for the pressbox shall be designed to provide sufficient bearing area to support the total live and dead loads of the pressbox without exceeding the allowable soil bearing pressure.
- 2. Footings for the grandstand shall be designed to provide sufficient bearing area to support the total live and dead loads of the grandstand without exceeding the allowable soil bearing pressure.
- 3. Design and depth of footings shall be determined from the Owner supplied geotechnical report indicating local soil conditions.
- 4. Hot-Dipped galvanized anchor bolts shall be used, secured in the concrete footings.
- 5. Concrete shall attain a working strength of 3,000 psi.

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END OF SECTION 13 34 16 13

SECTION 13 34 16 13a - FIXED WOOD BLEACHERS (EXTERIOR)

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of fixed wood bleachers (exterior). Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Hardware, Brackets, Fasteners, and Connectors

1. Zinc-coated or hot-dipped galvanized steel or aluminum. Nails, brads, staples, and spikes shall comply with ASTM F 547.

B. Lumber and Timber Members

1. Repair or replacement bleacher components shall be of the species and grades complying with National Design Specification for Wood Construction and its Fastenings (National Forest Products Association). Sizes shall comply with American Lumber Standards Committee PS20. Lumber materials shall bear a mark of recognized inspection agency identifying the species, grade, and compliance with the applicable standard. Wood preservatives shall be pressure-applied and shall comply with ASTM D 1760. Creosote or arsenate treatments shall not be used.
 - a. Seatboard Lumber shall be kiln-dried Dense No. 1 Douglas fir or Dense No. 1 Southern yellow pine boards.
 - b. Footboard Lumber shall be kiln-dried Dense No. 1 Douglas fir or Dense No. 1 Southern yellow pine boards.
 - c. Support Member and Timber shall be Dense No. 1 Douglas fir or Dense No. 1 Southern yellow pine timbers or boards.

C. Ready-Mixed Concrete

1. Comply with ASTM C 94 with compressive strength of **3,000 pounds per square inch (210.9 kgs per square cm)** at 28 days and shall be protected from freezing for seven days after placement.

D. Reinforcement for Concrete

1. Comply with ASTM A 184, A 1064, or A 615 as indicated.

1.3 EXECUTION

- A. Repair or replace bleacher components using methods complying with the approved practices as referenced in American Institute of Timber Construction Timber Construction Manual.

END OF SECTION 13 34 16 13a

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SECTION 13 34 16 13b - DEMOUNTABLE BLEACHERS (EXTERIOR)

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of demountable bleachers (exterior). Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Hardware and Accessories

1. Zinc-coated or hot-dipped galvanized steel or aluminum.

B. Lumber

1. Seat-board and foot-board repair or replacement lumber shall be species and grades complying with National Forest Products Association National Design Specification for Wood Construction and Its Fastenings. Sizes shall comply with American Lumber Standards Committee PS20. Lumber materials shall bear the mark of a recognized inspection agency identifying the species, grade, and compliance with the applicable standard. Wood preservatives shall be pressure-applied and shall comply with ASTM D 1760. Creosote or arsenate treatments shall not be used.
 - a. Seat-board Lumber shall be kiln-dried Dense No. 1 Douglas fir or Dense No. 1 Southern yellow pine boards.
 - b. Foot-board Lumber shall be kiln-dried Dense No. 1 Douglas fir or Dense No. 1 Southern yellow pine boards.

C. Steel Structural Members

1. Comply with ASTM A36.

D. Aluminum Structural Members

1. Comply with ASTM B308.

1.3 EXECUTION

- A. Repair or replace bleacher components using methods complying with the approved practices as referenced in American Institute of Timber Construction Timber Construction Manual.

END OF SECTION 13 34 16 13b

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SECTION 13 34 23 13 - METAL BUILDING SYSTEMS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural-steel framing.
2. Metal roof panels.
3. Metal wall panels.
4. Foamed-insulation-core metal wall panels.
5. Metal soffit panels.
6. Thermal insulation.
7. Personnel doors and frames.
8. Horizontal sliding doors.
9. Windows.
10. Translucent panels.
11. Accessories.

B. Related Requirements:

1. Section 077253 "Snow Guards" for prefabricated devices designed to hold snow on the roof surface.
2. Section 083323 "Overhead Coiling Doors" for coiling vehicular doors in metal building systems.
3. Section 083613 "Sectional Doors" for sectional vehicular doors in metal building systems.

1.2 DEFINITIONS

- A. Terminology Standard:** See MBMA's "Metal Building Systems Manual" for definitions of terms for metal building system construction not otherwise defined in this Section or in standards referenced by this Section.

1.3 COORDINATION

- A.** Coordinate sizes and locations of concrete foundations and casting of anchor-rod inserts into foundation walls and footings. Anchor rod installation, concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."
- B.** Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference:** Conduct conference at site location as directed by the Owner .

1. Review methods and procedures related to metal building systems including, but not limited to, the following:

- a. Condition of foundations and other preparatory work performed by other trades.
 - b. Structural load limitations.
 - c. Construction schedule. Verify availability of materials and erector's personnel, equipment, and facilities needed to make progress and avoid delays.
 - d. Required tests, inspections, and certifications.
 - e. Unfavorable weather and forecasted weather conditions and impact on construction schedule.
2. Review methods and procedures related to metal roof panel assemblies including, but not limited to, the following:
- a. Compliance with requirements for purlin and rafter conditions, including flatness and attachment to structural members.
 - b. Structural limitations of purlins and rafters during and after roofing.
 - c. Flashings, special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect metal roof panels.
 - d. Temporary protection requirements for metal roof panel assembly during and after installation.
 - e. Roof observation and repair after metal roof panel installation.
3. Review methods and procedures related to metal wall panel assemblies including, but not limited to, the following:
- a. Compliance with requirements for support conditions, including alignment between and attachment to structural members.
 - b. Structural limitations of girts and columns during and after wall panel installation.
 - c. Flashings, special siding details, wall penetrations, openings, and condition of other construction that will affect metal wall panels.
 - d. Temporary protection requirements for metal wall panel assembly during and after installation.
 - e. Wall observation and repair after metal wall panel installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of metal building system component.
1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for the following:
 - a. Metal roof panels.
 - b. Metal wall panels.
 - c. Foamed-insulation-core metal panels.
 - d. Metal soffit panels.
 - e. Thermal insulation and vapor-retarder facings.
 - f. Personnel doors and frames.
 - g. Windows.
 - h. Translucent roof panels.
 - i. Roof ventilators.
 - j. Louvers.
- B. Sustainable Design Submittals:
1. as directed by the Owner .

- C. Shop Drawings: Indicate components by others. Include full building plan, elevations, sections, details and the following:
1. Anchor-Rod Plans: Submit anchor-rod plans and templates before foundation work begins. Include location, diameter, and minimum required projection of anchor rods required to attach metal building to foundation. Indicate column reactions at each location.
 2. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 - a. Show provisions for attaching [**mezzanines**] [**roof curbs**] [**service walkways**] [**platforms**] [**and**] [**pipe racks**].
 3. Metal [**Roof**] [**and**] [**Wall**] Panel Layout Drawings: Show layouts of panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, clip spacing, trim, flashings, closures, and special details. Distinguish between factory- and field-assembled work; show locations of exposed fasteners.
 - a. Show roof-mounted items including roof hatches, equipment supports, pipe supports and penetrations, lighting fixtures, and items mounted on roof curbs.
 - b. Show wall-mounted items including personnel doors, vehicular doors, windows, louvers, and lighting fixtures.
 - c. Show translucent panels.
 4. Accessory Drawings: Include details of the following items, at a scale of not less than [**1-1/2 inches per 12 inches (1:8)**] or as directed by the Owner :
 - a. Flashing and trim.
 - b. Gutters.
 - c. Downspouts.
 - d. Service walkways.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For the following products:
1. Panels: Nominal **12 inches (300 mm)** long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
 2. Flashing and Trim: Nominal **12 inches (300 mm)** long. Include fasteners and other exposed accessories.
 3. Vapor-Retarder Facings: Nominal **6-inch- (150-mm-)** square Samples.
 4. Windows: Full-size, nominal **12-inch- (300-mm-)** long frame Samples showing typical profile.
 5. Accessories: Nominal **12-inch- (300-mm-)** long Samples for each type of accessory.
- F. Door Schedule: For doors and frames. Use same designations indicated on Drawings. Include details of reinforcement.
1. Door Hardware Schedule: Include details of fabrication and assembly of door hardware. Organize schedule into door hardware sets indicating complete designations of every item required for each door or opening.
 2. Keying Schedule: Detail Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.
- G. Delegated Design Submittals: For metal building systems.

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1. Include analysis data indicating compliance with performance requirements and design data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [erector] [manufacturer] [land surveyor].
- B. Welding certificates.
- C. Letter of Design Certification: Signed and sealed by a qualified professional engineer. Include the following:
 1. Name and location of Project.
 2. Order number.
 3. Name of manufacturer.
 4. Name of Contractor.
 5. Building dimensions including width, length, height, and roof slope.
 6. Indicate compliance with AISC standards for hot-rolled steel and AISI standards for cold-rolled steel, including edition dates of each standard.
 7. Governing building code and year of edition.
 8. Design Loads: Include dead load, roof live load, collateral loads, roof snow load, deflection, wind loads/speeds and exposure, seismic design category or effective peak velocity-related acceleration/peak acceleration, and auxiliary loads (cranes).
 9. Load Combinations: Indicate that loads were applied acting simultaneously with concentrated loads, according to governing building code.
 10. Building-Use Category: Indicate category of building use and its effect on load importance factors.
- D. Erector Certificates: For qualified erector, from manufacturer.
- E. Material Test Reports: For each of the following products:
 1. Structural steel including chemical and physical properties.
 2. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 4. Shop primers.
 5. Nonshrink grout.
- F. Source quality-control reports.
- G. Field quality-control reports.
- H. Surveys: Show final elevations and locations of major members. Indicate discrepancies between actual installation and the Contract Documents. Have surveyor who performed surveys certify their accuracy.
- I. Sample Warranties: For special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panel finishes[**and door hardware**] to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer.
 - 1. Accreditation: Manufacturer's facility accredited according to IAS AC472, "Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems."
 - 2. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
- D. Land Surveyor Qualifications: A professional land surveyor who practices in jurisdiction where Project is located and who is experienced in providing surveying services of the kind indicated.
- E. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Build mockups for typical wall metal panel including accessories.
 - a. Size: **[48 inches (1200 mm) long by 48 inches (1200 mm)]** or as directed by the Owner .
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Protect foam-plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic insulation materials to Project site before installation time.
 - 3. Complete installation and concealment of foam-plastic materials as rapidly as possible in each area of construction.

13 - Special Construction



1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with panel installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty on Metal Panel Finishes: Manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: **[25] [20] [10]** years or as directed by the Owner from date of Substantial Completion.
- B. Special Weathertightness Warranty for Standing-Seam Metal Roof Panels: Manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that leak or otherwise fail to remain weathertight within specified warranty period.
 - 1. Warranty Period: **[20]** years or as directed by the Owner from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal building system components, including primary and secondary framing and metal panel assemblies, from single source from single manufacturer.

2.2 SYSTEM DESCRIPTION

- A. Provide a complete, integrated set of mutually dependent components and assemblies that form a metal building system capable of withstanding structural and other loads, thermally induced movement, and exposure to weather without failure or infiltration of water into building interior.
- B. Primary-Frame Type:
 - 1. Rigid Clear Span: Solid-member, structural-framing system without interior columns.
 - 2. Rigid Modular: Solid-member, structural-framing system with interior columns.
 - 3. Truss-Frame Clear Span: Truss-member, structural-framing system without interior columns.
 - 4. Truss-Frame Modular: Truss-member, structural-framing system with interior columns.
 - 5. Lean-to: Solid- or truss-member, structural-framing system, designed to be partially supported by another structure.
- C. End-Wall Framing:

1. Manufacturer's standard, for buildings not required to be expandable, consisting of [**primary frame, capable of supporting one-half of a bay design load, and end-wall columns**] [**load-bearing end-wall and corner columns and rafters**].
 2. Engineer end walls to be expandable. Provide primary frame, capable of supporting full-bay design loads, and end-wall columns.
- D. Secondary-Frame Type: Manufacturer's standard purlins and joists and [**flush-framed**] [**partially inset-framed**] [**exterior-framed (bypass)**] girts.
- E. Eave Height: [**16 feet (4.9 m)**] [**20 feet (6.1 m)**] [**24 feet (7.3 m)**] [**28 feet (8.5 m)**] [**Manufacturer's standard height, as indicated by nominal height on Drawings**] or as directed by the Owner .
- F. Bay Spacing: [**20 feet (6.1 m)**] [**25 feet (7.6 m)**] [**30 feet (9.1 m)**] [**As determined by manufacturer**] [**As indicated on Drawings**] or as directed by the Owner .
- G. Roof Slope: [**1/4 inch per 12 inches (1:48)**] [**1/2 inch per 12 inches (1:24)**] [**1 inch per 12 inches (1:12)**] [**4 inches per 12 inches (1:3)**] [**Manufacturer's standard for frame type required**] or as directed by the Owner .
- H. Roof System: Manufacturer's standard [**standing-seam, vertical-rib,**] [**standing-seam, trapezoidal-rib,**] [**lap-seam, tapered-rib**] metal roof panels.
1. Liner Panels: Tapered rib.
- I. Exterior Wall System: Manufacturer's standard [**exposed-fastener, tapered-rib,**] [**exposed-fastener, reverse-rib,**] [**concealed-fastener, flush-profile,**] [**foamed-insulation-core**] metal wall panels.
1. Liner Panels: [**Tapered rib**] [**Flush profile**].

2.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal building system.
- B. Structural Performance: Metal building systems to withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to procedures in MBMA's "Metal Building Systems Manual."
1. Design Loads: [**As indicated on Drawings**] or **applicable code requirement** as directed by the Owner .
 2. Deflection and Drift Limits:
 - a. Design metal building system assemblies to withstand serviceability design loads without exceeding deflections and drift limits recommended in AISC Steel Design Guide No. 3 "Serviceability Design Considerations for Steel Buildings."
 - b. No greater than the following:
 - 1) Purlins and Rafters: Vertical deflection of [**1/150**] [**1/240**] [**1/360**] or as directed by the Owner of the span.
 - 2) Girts: Horizontal deflection of [**1/120**] [**1/180**] [**1/240**] or as directed by the Owner of the span.
 - 3) Metal Roof Panels: Vertical deflection of [**1/150**] [**1/240**] [**1/360**] or as directed by the Owner of the span.
 - 4) Metal Wall Panels: Horizontal deflection of [**1/180**] [**1/240**] or as directed by the Owner of the span.

- 5) Design secondary-framing system to accommodate deflection of primary framing and construction tolerances, and to maintain clearances at openings.
 - 6) Lateral Drift: Maximum of [1/60] [1/100] [1/200] [1/400] or as directed by the Owner of the building height.
- C. Seismic Performance: Metal building system to withstand the effects of earthquake motions determined according to [ASCE/SEI 7] or as directed by the Owner .
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change: [120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces] or as directed by the Owner .
- E. Fire-Resistance Ratings: Where assemblies are indicated to have a fire-resistance rating, provide metal panel assemblies identical to those of assemblies tested for fire resistance per ASTM E119 or ASTM E108 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Indicate design designations from UL's "Fire Resistance Directory," FM Global's "Approval Guide," or from the listings of another qualified testing agency.
- F. Fire Propagation Characteristics: Exterior wall assemblies containing foam plastics pass NFPA 285 fire test.
- G. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- H. Structural Performance for Metal Roof[and Wall] Panels: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
- I. Air Infiltration for Metal Roof Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E1680[or ASTM E283] at the following test-pressure difference:
1. Test-Pressure Difference: [1.57 lbf/sq. ft. (75 Pa)] [6.24 lbf/sq. ft. (300 Pa)].
- J. Air Infiltration for Metal Wall Panels: Air leakage of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) when tested according to ASTM E283 at the following test-pressure difference:
1. Test-Pressure Difference: [1.57 lbf/sq. ft. (75 Pa)] [6.24 lbf/sq. ft. (300 Pa)].
- K. Water Penetration for Metal Roof Panels: No water penetration when tested according to ASTM E1646[or ASTM E331] at the following test-pressure difference:
1. Test-Pressure Difference: [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)].

- L. Water Penetration for Metal Wall Panels: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: [2.86 lbf/sq. ft. (137 Pa)] [6.24 lbf/sq. ft. (300 Pa)].
- M. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
 - 1. Uplift Rating: [UL 30] [UL 60] [UL 90].
- N. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global's "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 - 1. Fire/Windstorm Classification: Class 1A-[60] [75] [90] [105] [120] or as directed by the Owner .
 - 2. Hail Resistance: [MH] [SH].
- O. Energy Star Listing: Roof panels that are listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for [low] [steep]-slope roof products.
- P. Energy Performance: Provide roof panels according to one of the following when tested according to CRRC-1:
 - 1. Three-year, aged, solar reflectance of not less than [0.55] or as directed by the Owner and emissivity of not less than [0.75] or as directed by the Owner .
 - 2. Three-year, aged, Solar Reflectance Index of not less than [64] or as directed by the Owner when calculated according to ASTM E1980.
- Q. Thermal Performance for Opaque Elements: Provide the following maximum U-factors and minimum R-values when tested according to ASTM C1363 or ASTM C518:
 - 1. Roof:
 - a. U-Factor: **Value** as directed by the Owner .
 - b. R-Value: **Value** as directed by the Owner
 - 2. Walls:
 - a. U-Factor: **Value** as directed by the Owner .
 - b. R-Value: **Value** as directed by the Owner .

2.4 STRUCTURAL-STEEL FRAMING

- A. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings."
- B. Bolted Connections: Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- D. Primary Framing: Manufacturer's standard primary-framing system, designed to withstand required loads and specified requirements. Primary framing includes transverse and lean-to frames; rafters, rake, and canopy beams; sidewall, intermediate, end-wall, and corner columns; and wind bracing.

1. General: Provide frames with attachment plates, bearing plates, and splice members. Factory drill for field-bolted assembly. Provide frame span and spacing indicated.
 - a. Slight variations in span and spacing may be acceptable if necessary to comply with manufacturer's standard, as approved by Architect.
 2. Rigid Clear-Span Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 3. Rigid Modular Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
 4. Truss-Frame, Clear-Span Frames: Rafter frames fabricated from joist girders, and I-shaped column sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Interior columns are not permitted.
 5. Truss-Frame Modular Frames: Rafter frames fabricated from joist girders, and I-shaped column sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
 6. Long-Bay Frames: I-shaped frame sections fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide interior columns fabricated from round steel pipes or tubes, or shop-welded, built-up steel plates.
 7. Frame Configuration: **[Single gable] [One-directional, sloped] [Lean-to, with high side connected to and supported by another structure] [Multiple gable] [Load-bearing wall] [Multistory].**
 8. Exterior Column: **[Uniform depth] [Tapered].**
 9. Rafter: **[Uniform depth] [Tapered].**
- E. End-Wall Framing: Manufacturer's standard primary end-wall framing fabricated for field-bolted assembly to comply with the following:
1. End-Wall and Corner Columns: I-shaped sections fabricated from structural-steel shapes; shop-welded, built-up steel plates; or C-shaped, cold-formed, structural-steel sheet.
 2. End-Wall Rafters: C-shaped, cold-formed, structural-steel sheet; or I-shaped sections fabricated from shop-welded, built-up steel plates or structural-steel shapes.
- F. Secondary Framing: Manufacturer's standard secondary framing, including purlins, girts, eave struts, flange bracing, base members, gable angles, clips, headers, jambs, and other miscellaneous structural members. Unless otherwise indicated, fabricate framing from either cold-formed, structural-steel sheet or roll-formed, metallic-coated steel sheet, prepainted with coil coating, to comply with the following:
1. Purlins:
 - a. C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; minimum **2-1/2-inch- (64-mm-)** wide flanges.
 - b. Steel joists of depths indicated on Drawings.
 - 1) Depth: **[As indicated on Drawings] [As needed to comply with system performance requirements]** or as directed by the Owner .
 2. Girts: C- or Z-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes. Form ends of Z-sections with stiffening lips angled 40 to 50 degrees from flange, with minimum **2-1/2-inch- (64-mm-)** wide flanges.
 - a. Depth: **[As indicated on Drawings] [As required to comply with system performance requirements]** or as directed by the Owner .

3. Eave Struts: Unequal-flange, C-shaped sections; fabricated from built-up steel plates, steel sheet, or structural-steel shapes; to provide adequate backup for metal panels.
 4. Flange Bracing: Minimum **2-by-2-by-1/8-inch (51-by-51-by-3-mm)** structural-steel angles or **1-inch- (25-mm-)** diameter, cold-formed structural tubing to stiffen primary-frame flanges.
 5. Sag Bracing: Minimum **1-by-1-by-1/8-inch (25-by-25-by-3-mm)** structural-steel angles.
 6. Base or Sill Angles: Manufacturer's standard base angle, minimum **3-by-2-inch (76-by-51-mm)**, fabricated from zinc-coated (galvanized) steel sheet.
 7. Purlin and Girt Clips: Manufacturer's standard clips fabricated from steel sheet. Provide galvanized clips where clips are connected to galvanized framing members.
 8. Framing for Openings: Channel shapes; fabricated from cold-formed, structural-steel sheet or structural-steel shapes. Frame head and jamb of door openings and head, jamb, and sill of other openings.
 9. Miscellaneous Structural Members: Manufacturer's standard sections fabricated from cold-formed, structural-steel sheet; built-up steel plates; or zinc-coated (galvanized) steel sheet; designed to withstand required loads.
- G. Canopy Framing: Manufacturer's standard structural-framing system, designed to withstand required loads; fabricated from shop-welded, built-up steel plates or structural-steel shapes. Provide frames with attachment plates and splice members, factory drilled for field-bolted assembly.
1. Type: [**Straight-beam, eave type**] [**Purlin-extension type**] [**Tapered-beam, below-eave type**] [**As indicated**].
- H. Bracing: Provide adjustable wind bracing [**using any method**] as follows:
1. Rods: ASTM A36/A36M; ASTM A572/A572M, Grade **50 (345)**; or ASTM A529/A529M, Grade **50 (345)**; minimum **1/2-inch- (13-mm-)** diameter steel; threaded full length or threaded a minimum of **6 inches (152 mm)** at each end.
 2. Cable: ASTM A475, minimum **1/4-inch- (6-mm-)** diameter, extra-high-strength grade, Class B, zinc-coated, seven-strand steel; with threaded end anchors.
 3. Angles: Fabricated from structural-steel shapes to match primary framing, of size required to withstand design loads.
 4. Rigid Portal Frames: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 5. Fixed-Base Columns: Fabricated from shop-welded, built-up steel plates or structural-steel shapes to match primary framing; of size required to withstand design loads.
 6. Diaphragm Action of Metal Panels: Design metal building to resist wind forces through diaphragm action of metal panels.
- I. Anchor Rods: Headed anchor rods as indicated in Anchor Rod Plan for attachment of metal building to foundation.
- J. Materials:
1. W-Shapes: ASTM A992/A992M; ASTM A572/A572M, Grade **50 or 55 (345 or 380)**; or ASTM A529/A529M, Grade **50 or 55 (345 or 380)**.
 2. Channels, Angles, M-Shapes, and S-Shapes: ASTM A36/A36M; ASTM A572/A572M, Grade **50 or 55 (345 or 380)**; or ASTM A529/A529M, Grade **50 or 55 (345 or 380)**.
 3. Plate and Bar: ASTM A36/A36M; ASTM A572/A572M, Grade **50 or 55 (345 or 380)**; or ASTM A529/A529M, Grade **50 or 55 (345 or 380)**.
 4. Steel Pipe: ASTM A53/A53M, Type E or S, Grade B.
 5. Cold-Formed Hollow Structural Sections: ASTM A500, Grade B or C, structural tubing.
 6. Structural-Steel Sheet: Hot-rolled, ASTM A1011/A1011M, Structural Steel (SS), Grades **30 through 55 (205 through 380)**, or High-Strength Low-Alloy Steel (HSLAS) or High-Strength Low-Alloy Steel with Improved Formability (HSLAS-F), Grades **45 through 70 (310 through 480)**; or

- cold-rolled, ASTM A1008/A1008M, Structural Steel (SS), Grades 25 through 80 (170 through 550), or HSLAS, Grades 45 through 70 (310 through 480).
7. Metallic-Coated Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80 (230 through 550), or HSLAS or HSLAS-F, Grades 50 through 80 (340 through 550); with G60 (Z180) coating designation; mill phosphatized.
 8. Metallic-Coated Steel Sheet Prepainted with Coil Coating: Steel sheet, metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, SS, Grades 33 through 80 (230 through 550), or HSLAS or HSLAS-F, Grades 50 through 80 (340 through 550); with G90 (Z275) coating designation.
 - b. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792/A792M, SS, Grade 50 or 80 (340 or 550); with Class AZ50 (AZM150) coating.
 9. Joist Girders: Manufactured according to "Standard Specifications for Joist Girders," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated on Drawings and required for primary framing.
 10. Steel Joists: Manufactured according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders"; with steel-angle, top- and bottom-chord members, and end- and top-chord arrangements as indicated on Drawings and required for secondary framing.
 11. Non-High-Strength Bolts, Nuts, and Washers: ASTM A307, Grade A, carbon-steel, hex-head bolts; ASTM A563 (ASTM A563M) carbon-steel hex nuts; and ASTM F844 plain (flat) steel washers.
 - a. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].
 12. High-Strength Bolts, Nuts, and Washers, Grade A325 (Grade A325M): ASTM F3125/F3125M, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - a. Finish: [Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50].
 13. High-Strength Bolts, Nuts, and Washers, Grade A490 (Grade A490M): ASTM F3125/F3125M, Type 1, heavy-hex steel structural bolts [or Grade F2280 tension-control, bolt-nut-washer assemblies with splined ends]; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 14. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, [heavy-hex] [round] head assemblies consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, (ASTM A563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1 hardened carbon-steel washers.
 - a. Finish: [Plain] [Mechanically deposited zinc coating, ASTM B695, Class 50] [Mechanically deposited zinc coating, ASTM B695, Class 50, baked-epoxy coated].
 15. Unheaded Anchor Rods: [ASTM F1554, Grade 36] [ASTM A572/A572M, Grade 50 (345)] [ASTM A36/A36M] [ASTM A307, Grade A].
 - a. Configuration: Straight.
 - b. Nuts: ASTM A563 (ASTM A563M) [heavy-]hex carbon steel.
 - c. Plate Washers: ASTM A36/A36M carbon steel.

- d. Washers: **ASTM F436 (ASTM F436M)** hardened carbon steel.
 - e. Finish: **[Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50]**.
16. Headed Anchor Rods: **[ASTM F1554, Grade 36] [ASTM A307, Grade A]**.
- a. Configuration: Straight.
 - b. Nuts: **ASTM A563 (ASTM A563M) [heavy-]**hex carbon steel.
 - c. Plate Washers: ASTM A36/A36M carbon steel.
 - d. Washers: **ASTM F436 (ASTM F436M)** hardened carbon steel.
 - e. Finish: **[Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50]**.
17. Threaded Rods: **[ASTM A193/A193M] [ASTM A572/A572M, Grade 50 (345)] [ASTM A36/A36M] [ASTM A307, Grade A]**.
- a. Nuts: **ASTM A563 (ASTM A563M) [heavy-]**hex carbon steel.
 - b. Washers: **[ASTM F436 (ASTM F436M) hardened] [ASTM A36/A36M]** carbon steel.
 - c. Finish: **[Plain] [Hot-dip zinc coating, ASTM F2329, Class C] [Mechanically deposited zinc coating, ASTM B695, Class 50]**.
- K. Finish: Factory primed. Apply specified primer immediately after cleaning and pretreating.
- 1. Clean and prepare in accordance with SSPC-SP2.
 - 2. Coat with manufacturer's standard primer. Apply primer to primary and secondary framing to a minimum dry film thickness of **1 mil (0.025 mm)**.
 - a. Prime secondary framing formed from uncoated steel sheet to a minimum dry film thickness of **0.5 mil (0.013 mm)** on each side.

2.5 METAL ROOF PANELS

- A. Standing-Seam, Vertical-Rib, Metal Roof Panels **drawing designation** as directed by the Owner : Formed with vertical ribs at panel edges and **[intermediate stiffening ribs symmetrically spaced] [flat pan]** between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.
- 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **[0.018-inch (0.46-mm)] [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)]** nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: **[Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester]**.
 - b. Color: **[As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range]** or as directed by the Owner .
 - 2. Clips: **[One-piece fixed] [Two-piece floating]** to accommodate thermal movement.
 - 3. Joint Type: **[Panels snapped together] [Mechanically seamed]**.
 - 4. Panel Coverage: **[16 inches (406 mm)]** or as directed by the Owner .
 - 5. Panel Height: **[2 inches (51 mm)]** or as directed by the Owner .
- B. Standing-Seam, Trapezoidal-Rib, Metal Roof Panels **drawing designation or** as directed by the Owner : Formed with raised trapezoidal ribs at panel edges and **[intermediate stiffening ribs symmetrically spaced] [flat pan]** between ribs; designed for sequential installation by mechanically attaching panels to

supports using concealed clips located under one side of panels and engaging opposite edge of adjacent panels.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.018-inch (0.46-mm)] [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester].
 - b. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] or as directed by the Owner .
 2. Clips: [One-piece fixed] [Two-piece floating] to accommodate thermal movement.
 3. Joint Type: [Panels snapped together] [Mechanically seamed].
 4. Panel Coverage: [24 inches (610 mm)] or as directed by the Owner .
 5. Panel Height: [3 inches (76 mm)] or as directed by the Owner .
 6. Uplift Rating: [UL 30] [UL 60] [UL 90].
- C. Exposed Fastener, Tapered-Rib, Metal Roof Panels **drawing designation** as directed by the Owner : Formed with raised, trapezoidal major ribs and [intermediate stiffening ribs symmetrically spaced] [flat pan] between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.018-inch (0.46-mm)] [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester].
 - b. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] or as directed by the Owner .
 2. Major-Rib Spacing: [6 inches (152 mm)] [12 inches (305 mm)] or as directed by the Owner o.c.
 3. Panel Coverage: [36 inches (914 mm)] or as directed by the Owner .
 4. Panel Height: [0.75 inch (19 mm)] [1.125 inches (29 mm)] [1.188 inches (30 mm)] [1.25 inches (32 mm)] [1.5 inches (38 mm)] or as directed by the Owner .
- D. Exposed-Fastener, Tapered-Rib, Metal Liner Panels **drawing designation** as directed by the Owner : Formed with raised, trapezoidal major ribs and [intermediate stiffening ribs symmetrically spaced] [flat pan] between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.018-inch (0.46-mm)] [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester].
 - b. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] or as directed by the Owner .
 2. Major-Rib Spacing: [6 inches (152 mm)] [12 inches (305 mm)] or as directed by the Owner o.c.
 3. Panel Coverage: [36 inches (914 mm)] or as directed by the Owner .
 4. Panel Height: [1.25 inches (32 mm)] [1.5 inches (38 mm)] or as directed by the Owner .

E. Finishes:

1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a minimum dry film thickness of **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.

2.6 METAL WALL PANELS

- A. Exposed-Fastener, Tapered-Rib, Metal Wall Panels **drawing designation** as directed by the Owner : Formed with raised, trapezoidal major ribs and [**intermediate stiffening ribs symmetrically spaced**] [**flat pan**] between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [**0.018-inch (0.46-mm)**] [**0.024-inch (0.61-mm)**] [**0.030-inch (0.76-mm)**] nominal uncoated steel thickness. Preprimed by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Siliconized polyester**].
 - b. Color: [**As indicated by manufacturer's designations**] [**As selected by Architect from manufacturer's full range**] or as directed by the Owner .
 2. Major-Rib Spacing: [**6 inches (152 mm)**] [**12 inches (305 mm)**] or as directed by the Owner o.c.
 3. Panel Coverage: [**36 inches (914 mm)**] or as directed by the Owner .
 4. Panel Height: [**0.75 inch (19 mm)**] [**1.125 inches (29 mm)**] [**1.188 inches (30 mm)**] [**1.25 inches (32 mm)**] [**1.5 inches (38 mm)**] or as directed by the Owner .
- B. Exposed-Fastener, Reverse-Rib, Metal Wall Panels **drawing designation** as directed by the Owner : Formed with recessed, trapezoidal major valleys and [**intermediate stiffening valleys symmetrically spaced**] [**flat pan**] between major valleys; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
 1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [**0.018-inch (0.46-mm)**] [**0.024-inch (0.61-mm)**] [**0.030-inch (0.76-mm)**] nominal uncoated steel thickness. Preprimed by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [**Fluoropolymer**] [**Siliconized polyester**].
 - b. Color: [**As indicated by manufacturer's designations**] [**As selected by Architect from manufacturer's full range**] or as directed by the Owner .
 2. Major-Rib Spacing: [**12 inches (305 mm)**] or as directed by the Owner o.c.

3. Panel Coverage: [36 inches (914 mm)] or as directed by the Owner .
 4. Panel Height: [1.125 inches (29 mm)] [1.188 inches (30 mm)] [1.25 inches (32 mm)] [1.5 inches (38 mm)] or as directed by the Owner .
- C. Concealed-Fastener, Flush-Profile, Metal Wall Panels **drawing designation** as directed by the Owner : Formed with vertical panel edges and [a single wide recess, centered between panel edges] [flush surface]; with flush joint between panels; with 1-inch- (25-mm-) wide flange for attaching interior finish; designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners[and factory-applied sealant] in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [Fluoropolymer] [Siliconized polyester].
 - b. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] or as directed by the Owner .
 2. Panel Coverage: [16 inches (406 mm)] or as directed by the Owner .
 3. Panel Height: [3 inches (76 mm)] or as directed by the Owner .
- D. Tapered-Rib, Metal Liner Panels **drawing designation** as directed by the Owner : Formed with raised, trapezoidal major ribs and [intermediate stiffening ribs symmetrically spaced] [flat pan] between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.018-inch (0.46-mm)] [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [Siliconized polyester] [Acrylic enamel].
 - b. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] or as directed by the Owner .
 2. Major-Rib Spacing: [6 inches (152 mm)] [12 inches (305 mm)] or as directed by the Owner o.c.
 3. Panel Coverage: [36 inches (914 mm)] or as directed by the Owner .
 4. Panel Height: [1.25 inches (32 mm)] [1.5 inches (38 mm)] or as directed by the Owner .
- E. Flush-Profile, Metal Liner Panels **drawing designation** as directed by the Owner : [Solid] [Perforated] panels formed with vertical panel edges and [intermediate stiffening ribs symmetrically spaced] [flat pan] between panel edges; with flush joint between panels; designed for interior side of metal wall panel assemblies and installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners[and factory-applied sealant] in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: [Siliconized polyester] [Polyester] [Acrylic enamel].
 - b. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] or as directed by the Owner .

2. Sound Absorption: NRC not less than [0.65] [0.85] [1.00] or as directed by the Owner when tested according to ASTM C423.
3. Panel Coverage: [12 inches (305 mm)] or as directed by the Owner .
4. Panel Height: [1.5 inches (38 mm)] or as directed by the Owner .

F. Finishes:

1. Exposed Coil-Coated Finish:
 - a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a minimum dry film thickness of 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.7 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels **drawing designation** as directed by the Owner : Formed with tongue-and-groove panel edges; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
 1. Panel Thermal-Resistance Value (R-Value): as directed by the Owner .
 2. Facing Material: Fabricate panel with exterior and interior facings of same material and thickness. Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [0.018-inch (0.46-mm)] [0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Surface: [Smooth, flat] [Striated] [Shallow ribs] [Shallow V grooves].
 - b. Exterior Finish: [Two-coat fluoropolymer] [Three-coat fluoropolymer] [Siliconized polyester].
 - c. Color: [As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range] as directed by the Owner .
 3. Panel Coverage: [36 inches (914 mm)] [42 inches (1067 mm)] nominal or as directed by the Owner .
 4. Panel Thickness: [2 inches (51 mm)] [2.5 inches (64 mm)] [3 inches (76 mm)] [4 inches (102 mm)] [5 inches (127 mm)] [6 inches (152 mm)] or as directed by the Owner .
 5. Insulation Core: Modified polyisocyanurate or polyurethane foam using a non-CFC blowing agent, foamed-in-place or board type, with maximum flame-spread and smoke-developed indexes of 25 and 450, respectively.
 - a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.
 - b. Density: 2.0 to 2.6 lb/cu. ft. (32 to 42 kg/cu. m) when tested according to ASTM D1622.
 - c. Compressive Strength: Minimum 20 psi (140 kPa) when tested according to ASTM D1621.

d. Shear Strength: **26 psi (179 kPa)** when tested according to ASTM C273/C273M.

6. Fire-Test-Response Characteristics: Class A according to ASTM E108.

7. Surface-Burning Characteristics: Flame-spread index of 25 or less and a smoke-developed index of 450 or less, per ASTM E84.

B. Finishes:

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

b. Three-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

c. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with a minimum dry film thickness of **0.2 mil (0.005 mm)** for primer and **0.8 mil (0.02 mm)** for topcoat.

2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.

2.8 METAL SOFFIT PANELS

A. General: Provide factory-formed metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners[**and factory-applied sealant**] in side laps. Include accessories required for weathertight installation.

B. Metal Soffit Panels: Match profile and material of metal [**roof**] [**wall**] panels.

1. Finish: [**Match finish and color of metal roof panels**] [**Match finish and color of metal wall panels**] [**As indicated on Drawings**].

C. Exposed-Fastener, Tapered-Rib-Profile, Metal Soffit Panels **drawing designation** as directed by the Owner : Formed with raised, trapezoidal major ribs and [**intermediate stiffening ribs symmetrically spaced**] [**flat pan**] between major ribs; designed to be installed by lapping side edges of adjacent panels and mechanically attaching panels to supports using exposed fasteners in side laps.

1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [**0.018-inch (0.46-mm)**] [**0.024-inch (0.61-mm)**] [**0.030-inch (0.76-mm)**] nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.

a. Exterior Finish: [**Two-coat fluoropolymer**] [**Three-coat fluoropolymer**] [**Siliconized polyester**].

b. Color: [**As indicated by manufacturer's designations**] [**As selected by Architect from manufacturer's full range**] or as directed by the Owner .

2. Major-Rib Spacing: [**6 inches (152 mm)**] [**12 inches (305 mm)**] or as directed by the Owner o.c.

3. Panel Coverage: [**36 inches (914 mm)**] or as directed by the Owner .

4. Panel Height: **[0.75 inch (19 mm)] [1.125 inches (29 mm)] [1.188 inches (30 mm)] [1.25 inches (32 mm)] [1.5 inches (38 mm)]** or as directed by the Owner .
- D. Concealed-Fastener, Flush-Profile, Metal Soffit Panels **drawing designation** as directed by the Owner : Formed with vertical panel edges and **[a single wide recess, centered between panel edges] [flush surface]**; with flush joint between panels; with **1-inch- (25-mm-)** wide flange for attaching interior finish; designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners**[and factory-applied sealant]** in side laps.
1. Material: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **[0.024-inch (0.61-mm)] [0.030-inch (0.76-mm)]** nominal uncoated steel thickness. Prepainted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Exterior Finish: **[Fluoropolymer] [Siliconized polyester]**.
 - b. Color: **[As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range]** or as directed by the Owner .
 2. Panel Coverage: **[12 inches (305 mm)] [16 inches (406 mm)]** or as directed by the Owner .
 3. Panel Height: **[1 inch (25 mm)] [1.5 inches (38 mm)]** or as directed by the Owner .

2.9 THERMAL INSULATION

- A. Faced Metal Building Insulation: ASTM C991, Type II, glass-fiber-blanket insulation; **0.5-lb/cu. ft. (8-kg/cu. m)** density; **2-inch- (51-mm-)** wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
- B. Unfaced Metal Building Insulation: ASTM C991, Type I, or NAIMA 202, glass-fiber-blanket insulation; **0.5-lb/cu. ft. (8-kg/cu. m)** density; **2-inch- (51-mm-)** wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less.
- C. Mineral-Fiber-Blanket Insulation: ASTM C665, type indicated below; consisting of fibers manufactured from glass, slag wool, or rock wool.
 1. Nonreflective Faced: Type II (blankets with nonreflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 2. Reflective Faced: Type III (blankets with reflective membrane covering), Category 1 (membrane is a vapor retarder), Class A (membrane-faced surface with a flame-spread index of 25 or less).
 3. Unfaced: Type I (blankets without membrane covering), passing ASTM E136 for combustion characteristics.
- D. Faced, Polyisocyanurate Board Insulation: ASTM C1289, Type I (foil facing), Class 2, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests performed on unfaced core. Provide units tested for interior exposure without an approved thermal barrier.
- E. Retainer Strips: For securing insulation between supports, **0.025-inch (0.64-mm)** nominal-thickness, formed, metallic-coated steel or PVC retainer clips colored to match insulation facing.
- F. Vapor-Retarder Facing: ASTM C1136, with permeance not greater than **0.02 perm (1.15 ng/Pa x s x sq. m)** when tested according to ASTM E96/E96M, Desiccant Method.
 1. Composition:

- a. White metallized-polypropylene film facing, fiberglass scrim reinforcement, and kraft-paper backing.
 - b. Aluminum foil facing, elastomeric barrier coating, fiberglass scrim reinforcement, and kraft-paper backing.
 - c. White **[polypropylene] [vinyl]** film facing, fiberglass scrim reinforcement, and metallized-polyester film backing.
 - d. White polypropylene film facing and fiberglass-polyester-blend fabric backing.
- G. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

2.10 PERSONNEL DOORS AND FRAMES

A. Swinging Personnel Doors and Frames:

1. As specified in Section 081113 "Hollow Metal Doors and Frames."
2. Metal building system manufacturer's standard doors and frames; prepared and reinforced at strike and at hinges to receive factory- and field-applied hardware according to BHMA A156 Series.
 - a. Steel Doors: **1-3/4 inches (44.5 mm)** thick; fabricated from metallic-coated steel face sheets, **0.036-inch (0.91-mm)** nominal uncoated steel thickness, of **[seamed] [seamless]**, hollow-metal construction; with **0.060-inch (1.52-mm)** nominal uncoated steel thickness, inverted metallic-coated steel channels welded to face sheets at top and bottom of door.
 - 1) Design: **[Flush panel] [As indicated on Drawings]** as directed by the Owner .
 - 2) Core:
 - a) Kraft honeycomb with U-factor rating of at least **0.47 Btu/sq. ft. x h x deg F (2.67 W/sq. m x K)**.
 - b) Polystyrene foam with U-factor rating of at least **0.16 Btu/sq. ft. x h x deg F (0.91 W/sq. m x K)**.
 - c) Polyurethane foam with U-factor rating of at least **0.07 Btu/sq. ft. x h x deg F (0.40 W/sq. m x K)**.
 - 3) Glazing Frames: Steel frames to receive field-installed glass.
 - 4) Glazing: As specified in Section 088000 "Glazing."
 - b. Steel Frames: Fabricate **2-inch- (51-mm-)** wide face frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.060-inch (1.52-mm)** nominal uncoated steel thickness.
 - 1) Type: **[Knocked down for field assembly] [Factory welded]**.
 - c. Fabricate concealed stiffeners, reinforcement, edge channels, and moldings from either cold- or hot-rolled steel sheet.
 - d. Hardware:
 - 1) Provide hardware for each door leaf, as follows:
 - a) Hinges: BHMA A156.1. Three **[plain] [antifriction]**-bearing, standard-weight, full-mortise, stainless steel or bronze, template-type hinges; **4-1/2 by 4-1/2 inches (114 by 114 mm)**, with nonremovable pin.

- b) Lockset: BHMA A156.2. **[Key-in-lever cylindrical] [Mortise, with lever handle]** type.
 - c) Exit Device: BHMA A156.3. Touch- or push-bar type.
 - d) Threshold: BHMA A156.21. Extruded aluminum.
 - e) Silencers: Pneumatic rubber; three silencers on strike jambs of single door frames and two silencers on heads of double door frames.
 - f) Closer: BHMA A156.4. Surface-applied, standard-duty hydraulic type.
 - g) Weather Stripping: Vinyl applied to head and jambs, with vinyl sweep at sill.
- 2) Provide each pair of double doors with the following hardware in addition to that specified for each leaf:
- a) Astragal: Removable type.
 - b) Surface Bolts: Top and bottom of inactive door.
- e. Anchors and Accessories: Manufacturer's standard units, galvanized according to ASTM A123/A123M.
 - f. Fabrication: Fabricate doors and frames to be rigid; neat in appearance; and free from defects, warp, or buckle. Provide continuous welds on exposed joints; grind, dress, and make welds smooth, flush, and invisible.

B. Materials:

- 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- 2. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, CS, Type B; free of scale, pitting, or surface defects; pickled and oiled.
- 3. Metallic-Coated Steel Sheet: ASTM A653/A653M, CS, Type B; with **G60 (Z180)** zinc (galvanized) or **A60 (ZF180)** zinc-iron-alloy (galvannealed) coating designation.

C. Finishes for Personnel Doors and Frames:

- 1. Prime Finish: Factory-apply manufacturer's standard primer immediately after cleaning and pretreating.
 - a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
- 2. Factory-Applied Paint Finish: Manufacturer's standard, complying with SDI A250.3 for performance and acceptance criteria.
 - a. Color and Gloss: **[As indicated by manufacturer's designations] [Match Architect's sample] [As selected by Architect from manufacturer's full range]** or as directed by the Owner .

2.11 HORIZONTAL SLIDING DOORS

- A. Horizontal-Sliding Doors:** Manufacturer's standard horizontal-sliding door assembly including structural frame, door panels, brackets, guides, tracks, hardware, and installation accessories.
- 1. Door Frames: Channels and zeeks; metallic-coated steel sheet or structural-steel shapes, **0.060-inch (1.52-mm)** nominal uncoated steel thickness.
 - 2. Door Panels: Same material and finish as metal wall panels.

3. Hardware: Manufacturer's standard metallic-coated steel track, bottom guides, lock angles for side closure, and brackets. Support each door leaf by two four-wheel trolleys. Provide metallic-coated steel handle for each leaf, and slide bolt or padlock hasp. Flash top of track with metallic-coated steel sheet hood.

2.12 WINDOWS

A. Aluminum Windows:

1. As specified in Section 085113 "Aluminum Windows."
2. Metal building system manufacturer's standard, with self-flashing mounting fins, and as follows:
 - a. Type, Performance Class, and Performance Grade: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 and as follows:
 - 1) Horizontal-Sliding Units: **[HS-LC25]** **[HS-CW30]** or as directed by the Owner .
 - 2) Single-Hung Units: **[H-LC25]** **[H-CW30]** or as directed by the Owner .
 - 3) Fixed Units: **[FW-LC25]** **[FW-CW30]** **[FW-AW40]** or as directed by the Owner .
 - b. Aluminum Extrusions: **ASTM B221 (ASTM B221M)**, alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than **0.064-inch (1.63-mm)** thickness at any location for main frame and sash members.
 - 1) Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
 - c. Mullions: Between adjacent windows, fabricated of extruded aluminum matching finish of window units.
 - d. Fasteners, Anchors, and Clips: Nonmagnetic stainless steel, aluminum, or other noncorrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners are not be exposed, except for attaching hardware.
 - 1) Reinforcement: Where fasteners screw-anchor into aluminum less than **0.128 inch (3.26 mm)** thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, spline grommet nuts.
 - e. Hardware: Manufacturer's standard; of aluminum, stainless steel, die-cast steel, malleable iron, or bronze; including the following:
 - 1) Cam-action sweep sash lock and keeper at meeting rails.
 - 2) Spring-loaded, snap-type lock at jambs.
 - 3) Pole-operated, cam-action locking device on meeting rail where rail is more than **72 inches (1830 mm)** above floor.
 - 4) Lift handles for single-hung units.
 - 5) Nylon sash rollers for horizontal-sliding units.
 - 6) Steel or bronze operating arms.
 - f. Sliding-Type Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric; complying with AAMA 701/702.

- g. Insect Screens: Provide removable insect screen on each operable exterior sash, with screen frame finished to match window unit, and as follows:
- 1) Aluminum Wire Fabric: **18-by-18 (1.1-by-1.1-mm)**, **18-by-16 (1.1-by-1.3-mm)**, or **18-by-14 (1.1-by-1.5-mm)** mesh of **0.013-inch- (0.3-mm-)** diameter, coated aluminum wire; complying with FS RR-W-365, Type VII.
 - 2) Glass-Fiber Mesh Fabric: **18-by-16 (1.1-by-1.3-mm)** or **18-by-14 (1.1-by-1.5-mm)** mesh of PVC-coated, glass-fiber threads, woven and fused to form a fabric mesh; complying with ASTM D3656.
 - 3) Fabric: Manufacturer's standard aluminum wire fabric or glass-fiber mesh fabric.

B. Glazing: Comply with requirements specified in Section 088000 "Glazing."

1. Float Glass: ASTM C1036, Type I, Quality-Q3, Class I (clear), 3 mm thick.
2. Heat-Treated Float Glass: ASTM C1048, Type I, Quality-Q3, Class I (clear), Condition A, 3 mm thick.
3. Tinted Float Glass: ASTM C1036, Type I, Quality-Q3, Class 2, 3 mm thick.
 - a. Tint Color: **[Blue] [Blue-green] [Bronze] [Green] [Gray] [Manufacturer's standard color]** or as directed by the Owner .
4. Patterned Glass: ASTM C1036, Type II, Quality-Q6, Class 1 (clear), Form 3, Pattern P3 (random), 3 mm thick.
5. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of 2.5-mm-thick clear float glass separated by a dehydrated interspace, qualified according to ASTM E2190.
6. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201.
 - a. Provide safety glazing labeling.
7. Glazing Stops: Screw-applied or snap-on glazing stops coordinated with Section 088000 "Glazing" and with glazing system indicated. Match material and finish of window frames.
8. Factory-Glazed Fabrication: Glaze window units in the factory to greatest extent possible and practical for applications indicated. Comply with requirements in Section 088000 "Glazing."

C. Finish:

1. Mill finish.
2. Baked-Enamel Finish, Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of **0.7 mil (0.02 mm)**, medium gloss.
 - a. Color: **[As indicated by manufacturer's designations] [As selected by Architect from manufacturer's full range]** or as directed by the Owner .

2.13 TRANSLUCENT PANELS

A. Uninsulated Translucent Panels: Glass-fiber-reinforced polyester, translucent plastic; complying with ASTM D3841, **[Type CC2 (general purpose)] [Type CC1 (limited flammability)]**, Grade 1 (weather resistant); smooth finish on both sides. Match profile of adjacent metal panels.

1. Roof Panel Weight: Not less than **8 oz./sq. ft. (2441 g/sq. m)**.
2. Wall Panel Weight: Not less than **6 oz./sq. ft. (1831 g/sq. m)**.
3. Light Transmittance: Not less than **[55]** percent or as directed by the Owner according to ASTM D1494.

4. Metal Edge: Fabricate full length of each side of panel with metal edge for seaming into standing-seam roof panel joint.
5. Color: **[White]** or as directed by the Owner .

B. Insulated Translucent Panels: Fabricate insulating units of two sheets of glass-fiber-reinforced polyester, translucent plastic separated by an air space; complying with ASTM D3841, Type CC1 (limited flammability), Grade 1 (weather resistant); smooth finish on both sides. Match profile of adjacent metal panels.

1. Exterior Panel Weight: Not less than **[8 oz./sq. ft. (2441 g/sq. m)] [6 oz./sq. ft. (1831 g/sq. m)]**.
2. Interior Panel Weight: Not less than **[8 oz./sq. ft. (2441 g/sq. m)] [6 oz./sq. ft. (1831 g/sq. m)] [4 oz./sq. ft. (1221 g/sq. m)]**.
3. Light Transmittance: Not less than **[42]** percent or as directed by the Owner according to ASTM D1494.
4. Metal Edge: Fabricate full length of each side of panel with metal edge for seaming into standing-seam roof panel joint.
5. Color: **[White]** or as directed by the Owner .

C. Mastic for Translucent Panels: Nonstaining, saturated vinyl polymer as recommended by translucent panel manufacturer for sealing laps.

D. Performance:

1. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: **[25]** or less or as directed by the Owner .
 - b. Smoke-Developed Index: **[450]** or less or as directed by the Owner .

2.14 ACCESSORIES

A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.

1. Form exposed sheet metal accessories that are without excessive oil-canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

B. Roof Panel Accessories: Provide components required for a complete metal roof panel assembly including copings, fasciae, corner units, ridge closures, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal roof panels unless otherwise indicated.

1. Closures: Provide closures at eaves and ridges, fabricated of same material as metal roof panels.
2. Clips: Manufacturer's standard, formed from **[steel] [stainless steel]** sheet, designed to withstand negative-load requirements.
3. Cleats: Manufacturer's standard, mechanically seamed cleats formed from **[steel] [stainless steel sheet or nylon-coated aluminum]** sheet.
4. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
5. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum **1-inch- (25-mm-)** thick, flexible closure strips; cut or

- premolded to match metal roof panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
6. Thermal Spacer Blocks: Where metal panels attach directly to purlins, provide thermal spacer blocks of thickness required to provide **1-inch (25-mm)** standoff; fabricated from extruded polystyrene.
- C. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including copings, fasciae, mullions, sills, corner units, clips, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels unless otherwise indicated.
1. Closures: Provide closures at eaves and rakes, fabricated of same material as metal wall panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum **1-inch- (25-mm-)** thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- D. Flashing and Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.018-inch (0.46-mm)** nominal uncoated steel thickness, prepainted with coil coating; finished to match adjacent metal panels.
1. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
 2. Opening Trim: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, [**0.018-inch (0.46-mm)**] [**0.030-inch (0.76-mm)**] nominal uncoated steel thickness, prepainted with coil coating. Trim head and jamb of door openings, and head, jamb, and sill of other openings.
- E. Gutters: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.018-inch (0.46-mm)** nominal uncoated steel thickness, prepainted with coil coating; finished to match roof fascia and rake trim. Match profile of gable trim, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum **96-inch- (2438-mm-)** long sections, sized according to SMACNA's "Architectural Sheet Metal Manual."
1. Gutter Supports: Fabricated from same material and finish as gutters.
 2. Strainers: Bronze, copper, or aluminum wire ball type at outlets.
- F. Downspouts: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.018-inch (0.46-mm)** nominal uncoated steel thickness, prepainted with coil coating; finished to match metal wall panels. Fabricate in minimum **10-foot- (3-m-)** long sections, complete with formed elbows and offsets.
1. Mounting Straps: Fabricated from same material and finish as gutters.
- G. Service Walkways: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.048-inch (1.21-mm)** nominal uncoated steel thickness, steel plank grating; with slip-resistant pattern; [**18-inch (457-mm)**] [**24-inch (610-mm)**] [**36-inch (914-mm)**] overall width. Support walkways on framing system anchored to metal roof panels without penetrating panels; with predrilled holes and clamps or hooks for anchoring.
- H. Roof Ventilators: Gravity type, complete with hardware, flashing, closures, and fittings.
1. Circular-Revolving Type: Minimum [**20-inch- (508-mm-)**] diameter or as directed by the Owner throat opening; zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.024-inch (0.61-mm)** nominal uncoated steel thickness, with coil coating; finished to match metal roof panels; with matching base and rain cap.

- a. Type: **[Directional]** **[Stationary]** revolving.
 - b. Bird Screening: Galvanized steel, **1/2-inch- (13-mm-)** square mesh, **0.041-inch (1.04-mm)** wire; or aluminum, **1/2-inch- (13-mm-)** square mesh, **0.063-inch (1.6-mm)** wire.
 - c. Dampers: Spring-loaded, butterfly type; pull-chain operation; with pull chain of length required to reach within **36 inches (914 mm)** of floor.
 - d. Reinforce and brace units, with joints properly formed and edges beaded to be watertight under normal positive-pressure conditions.
 - e. Mount ventilators on square-to-round bases for ridge or on-slope mounting, designed to match roof pitch and roll formed to match metal roof panel profile.
2. Continuous or Sectional-Ridge Type: Factory-engineered and -fabricated, continuous unit; Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.018-inch (0.46-mm)** nominal uncoated steel thickness, prepainted with coil coating; finished to match metal roof panels. Fabricated in minimum **10-foot- (3-m-)** long sections. Provide throat size and total length indicated, complete with side baffles, ventilator assembly, end caps, splice plates, and reinforcing diaphragms.
 - a. Bird Screening: Galvanized steel, **1/2-inch- (13-mm-)** square mesh, **0.041-inch (1.04-mm)** wire; or aluminum, **1/2-inch- (13-mm-)** square mesh, **0.063-inch (1.6-mm)** wire.
 - b. Dampers: Manually operated, spring-loaded, vertically rising type; chain and worm gear operator; with pull chain of length required to reach within **36 inches (914 mm)** of floor.
 - c. Throat Size: **[9 inches (229 mm)] [or] [12 inches (305 mm)]**, **[as standard with manufacturer, and as required to comply with ventilation requirements]**.
- I. Louvers: Size and design indicated; self-framing and self-flashing. Fabricate welded frames from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.048-inch (1.21-mm)** nominal uncoated steel thickness; finished to match metal wall panels. Form blades from zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.036-inch (0.91-mm)** nominal uncoated steel thickness; folded or beaded at edges, set at an angle that excludes driving rains, and secured to frames by riveting or welding. Fabricate louvers with equal blade spacing to produce uniform appearance.
 1. Blades:
 - a. Fixed.
 - b. Adjustable type, with weather-stripped edges, and manually operated by hand crank or pull chain.
 2. Free Area: Not less than **[7.0 sq. ft. (0.65 sq. m)]** or as directed by the Owner for **48-inch- (1220-mm-)** wide by **48-inch- (1220-mm-)** high louver.
 3. Bird Screening: Galvanized steel, **1/2-inch- (13-mm-)** square mesh, **0.041-inch (1.04-mm)** wire; with rewirable frames, removable and secured with clips; fabricated of same kind and form of metal and with same finish as louvers.
 - a. Mounting: **[Interior]** **[Exterior]** face of louvers.
 4. Vertical Mullions: Provide mullions at spacings recommended by manufacturer, or **72 inches (1830 mm)** o.c., whichever is less.
- J. Roof Curbs: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.048-inch (1.21-mm)** nominal uncoated steel thickness prepainted with coil coating; finished to match metal roof panels; with welded top box and bottom skirt, and integral full-length cricket; capable of withstanding loads of size and height indicated.
 1. Curb Subframing: Zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet, **0.060-inch (1.52-mm)** nominal uncoated steel thickness, angle-, C-, or Z-shaped metallic-coated steel sheet.

2. Insulation: **1-inch- (25-mm-)** thick, rigid type.
- K. Pipe Flashing: Premolded, EPDM pipe collar with flexible aluminum ring bonded to base.
- L. Materials:
1. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide fasteners with heads matching color of materials being fastened by means of plastic caps or factory-applied coating.
 2. Fasteners for Metal Roof Panels:
 - a. Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws, with a stainless steel cap or zinc-aluminum-alloy head and EPDM sealing washer.
 - b. Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless steel or zinc-alloy-steel hex washer head, with EPDM washer under heads of fasteners bearing on weather side of metal panels.
 3. Fasteners for Metal Wall Panels:
 - a. Self-drilling or self-tapping, zinc-plated, hex-head carbon-steel screws[, **with EPDM sealing washers bearing on weather side of metal panels**].
 - b. Self-drilling, Type 410 stainless steel or self-tapping, Type 304 stainless steel or zinc-alloy-steel hex washer head[, **with EPDM sealing washers bearing on weather side of metal panels**].
 4. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
 5. Blind Fasteners: High-strength aluminum or stainless steel rivets.
 6. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for **15-mil (0.4-mm)** dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
 7. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.
 8. Metal Panel Sealants:
 - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene-compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape of manufacturer's standard size.
 - b. Joint Sealant: ASTM C920; one part elastomeric polyurethane or polysulfide; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended by metal building system manufacturer.

2.15 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
1. Mark each piece and part of the assembly to correspond with previously prepared erection drawings, diagrams, and instruction manuals.
 2. Fabricate structural framing to produce clean, smooth cuts and bends. Punch holes of proper size, shape, and location. Members to be free of cracks, tears, and ruptures.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.

- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 - 1. Make shop connections by welding or by using high-strength bolts.
 - 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
 - 3. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 - 4. Weld clips to frames for attaching secondary framing if applicable, or punch for bolts.
 - 5. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime primary framing with specified primer after fabrication.

- D. Secondary Framing: Shop fabricate framing components to indicated size and section by roll forming or break forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
 - 1. Make shop connections by welding or by using non-high-strength bolts.
 - 2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

- E. Metal Panels: Fabricate and finish metal panels at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.
 - 1. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of metal panel.

2.16 SOURCE QUALITY CONTROL

- A. Special Inspection: Owner will engage a qualified special inspector to perform source quality control inspections and to submit reports.
 - 1. Accredited Manufacturers: Special inspections will not be required if fabrication is performed by an IAS AC472-accredited manufacturer approved by authorities having jurisdiction to perform such Work without special inspection.
 - a. After fabrication, submit copy of certificate of compliance to authorities having jurisdiction, certifying that Work was performed according to Contract requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with erector present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Before erection proceeds, survey elevations and locations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments to receive structural framing, with erector present, for compliance with requirements and metal building system manufacturer's tolerances.

1. Engage land surveyor to perform surveying.

C. Proceed with erection only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition.

B. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION OF STRUCTURAL FRAMING

A. Erect metal building system according to manufacturer's written instructions and drawings.

B. Do not field cut, drill, or alter structural members without written approval from metal building system manufacturer's professional engineer.

C. Set structural framing accurately in locations and to elevations indicated, according to AISC specifications referenced in this Section. Maintain structural stability of frame during erection.

D. Base and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.

2. Tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.

3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

E. Align and adjust structural framing before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with framing. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. Make allowances for difference between temperature at time of erection and mean temperature when structure will be completed and in service.

F. Primary Framing and End Walls: Erect framing level, plumb, rigid, secure, and true to line. Level baseplates to a true even plane with full bearing to supporting structures, set with double-nutted anchor bolts. Use grout to obtain uniform bearing and to maintain a level base-line elevation. Moist-cure grout for not less than seven days after placement.

1. Make field connections using high-strength bolts installed according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt type and joint type specified.

a. Joint Type: Snug tightened or pretensioned as required by manufacturer.

- G. Secondary Framing: Erect framing level, plumb, rigid, secure, and true to line. Field bolt secondary framing to clips attached to primary framing.
1. Provide rake or gable purlins with tight-fitting closure channels and fasciae.
 2. Locate and space wall girts to suit openings such as doors and windows.
 3. Provide supplemental framing at entire perimeter of openings, including doors, windows, louvers, ventilators, and other penetrations of roof and walls.
- H. Steel Joists[**and Joist Girders**]: Install joists[, **girders**,] and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Standard Specifications and Load Tables for Steel Joists and Joist Girders," joist manufacturer's written instructions, and requirements in this Section.
1. Before installation, splice joists delivered to Project site in more than one piece.
 2. Space, adjust, and align joists accurately in location before permanently fastening.
 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 4. Joint Installation:
 - a. Bolt joists to supporting steel framework using carbon-steel bolts unless otherwise indicated.
 - b. Bolt joists to supporting steel framework using high-strength structural bolts unless otherwise indicated. Comply with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for high-strength structural bolt installation and tightening requirements.
 - c. Weld joist seats to supporting steel framework.
 5. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
- I. Bracing: Install bracing in roof and sidewalls where indicated on erection drawings.
1. Tighten rod and cable bracing to avoid sag.
 2. Locate interior end-bay bracing only where indicated.
- J. Framing for Openings: Provide shapes of proper design and size to reinforce openings and to carry loads and vibrations imposed, including equipment furnished under mechanical and electrical work. Securely attach to structural framing.
- K. Erection Tolerances: Maintain erection tolerances of structural framing within AISC 303.

3.4 METAL PANEL INSTALLATION, GENERAL

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. On-Site Fabrication: Subject to compliance with requirements of this Section, metal panels may be fabricated on-site using UL-certified, portable roll-forming equipment if panels are of same profile and warranted by manufacturer to be equal to factory-formed panels. Fabricate according to equipment manufacturer's written instructions and to comply with details shown.
- C. Examination: Examine primary and secondary framing to verify that structural-panel support members and anchorages have been installed within alignment tolerances required by manufacturer.

1. Examine roughing-in for components and systems penetrating metal panels, to verify actual locations of penetrations relative to seams before metal panel installation.
- D. General: Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Field cut metal panels as required for doors, windows, and other openings. Cut openings as small as possible, neatly to size required, and without damage to adjacent metal panel finishes.
 - a. Field cutting of metal panels by torch is not permitted unless approved in writing by manufacturer.
 2. Install metal panels perpendicular to structural supports unless otherwise indicated.
 3. Flash and seal metal panels with weather closures at perimeter of openings and similar elements. Fasten with self-tapping screws.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Locate metal panel splices over structural supports with end laps in alignment.
 6. Lap metal flashing over metal panels to allow moisture to run over and off the material.
- E. Lap-Seam Metal Panels: Install screw fasteners using power tools with controlled torque adjusted to compress EPDM washers tightly without damage to washers, screw threads, or metal panels. Install screws in predrilled holes.
1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply metal panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
- F. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal roof panel manufacturer.
- G. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal panel assemblies. Provide types of gaskets, fillers, and sealants indicated; or, if not indicated, provide types recommended by metal panel manufacturer.
1. Seal metal panel end laps with double beads of tape or sealant the full width of panel. Seal side joints where recommended by metal panel manufacturer.
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."
- 3.5 METAL ROOF PANEL INSTALLATION
- A. General: Provide metal roof panels of full length from eave to ridge unless otherwise indicated or restricted by shipping limitations.
1. Install ridge[**and hip**] caps as metal roof panel work proceeds.
 2. Flash and seal metal roof panels with weather closures at eaves and rakes. Fasten with self-tapping screws.
- B. Standing-Seam Metal Roof Panels: Fasten metal roof panels to supports with concealed clips at each standing-seam joint, at location and spacing and with fasteners recommended by manufacturer.
1. Install clips to supports with self-drilling or self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.

3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved motorized seamer tool so that clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Rigidly fasten eave end of metal roof panels and allow ridge end free movement for thermal expansion and contraction. Predrill panels for fasteners.
 6. Provide metal closures at **[peaks]** **[rake edges]** **[rake walls]** **[and]** each side of ridge **[and hip]** caps.
- C. Lap-Seam Metal Roof Panels: Fasten metal roof panels to supports with exposed fasteners at each lapped joint, at location and spacing recommended by manufacturer.
1. Provide metal-backed sealing washers under heads of exposed fasteners bearing on weather side of metal roof panels.
 2. Provide sealant tape at lapped joints of metal roof panels and between panels and protruding equipment, vents, and accessories.
 3. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps and on side laps of nesting-type metal panels, on side laps of ribbed or fluted metal panels, and elsewhere as needed to make metal panels weatherproof to driving rains.
 4. At metal panel splices, nest panels with minimum **6-inch (152-mm)** end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
- D. Metal Fascia Panels: Align bottom of metal panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws. Flash and seal metal panels with weather closures where fasciae meet soffits, along lower panel edges, and at perimeter of all openings.
- E. Metal Roof Panel Installation Tolerances: Shim and align metal roof panels within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)** on slope and location lines and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.
- ### 3.6 METAL WALL PANEL INSTALLATION
- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts, extending full height of building, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Unless otherwise indicated, begin metal panel installation at corners with center of rib lined up with line of framing.
 2. Shim or otherwise plumb substrates receiving metal wall panels.
 3. When two rows of metal panels are required, lap panels **4 inches (102 mm)** minimum.
 4. When building height requires two rows of metal panels at gable ends, align lap of gable panels over metal wall panels at eave height.
 5. Rigidly fasten base end of metal wall panels and allow eave end free movement for thermal expansion and contraction. Predrill panels.
 6. Flash and seal metal wall panels with weather closures at eaves and rakes, and at perimeter of all openings. Fasten with self-tapping screws.
 7. Install screw fasteners in predrilled holes.
 8. Install flashing and trim as metal wall panel work proceeds.
 9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated on Drawings; if not indicated, as necessary for waterproofing.
 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-drilling or self-tapping screws.
 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.

- B. Metal Wall Panels: Install metal wall panels on exterior side of girts. Attach metal wall panels to supports with fasteners as recommended by manufacturer.
- C. Insulated Metal Wall Panels: Install insulated metal wall panels on exterior side of girts. Attach panels to supports at each panel joint using concealed clip and fasteners at maximum **42 inches (1067 mm)** o.c., spaced not more than manufacturer's recommendation. Fully engage tongue and groove of adjacent insulated metal wall panels.
 - 1. Install clips to supports with self-tapping fasteners.
 - 2. Apply continuous ribbon of sealant to panel joint on concealed side of insulated metal wall panels as vapor seal; apply sealant to panel joint on exposed side of panels as weather seal.
- D. Installation Tolerances: Shim and align metal wall panels within installed tolerance of **1/4 inch in 20 feet (6 mm in 6 m)**, noncumulative; level, plumb, and on location lines; and within **1/8-inch (3-mm)** offset of adjoining faces and of alignment of matching profiles.

3.7 TRANSLUCENT PANEL INSTALLATION

- A. Translucent Panels: Attach translucent panels to structural framing with fasteners according to manufacturer's written instructions. Install panels perpendicular to supports unless otherwise indicated. Anchor translucent panels securely in place, with provisions for thermal and structural movement.
 - 1. Provide end laps of not less than **6 inches (152 mm)** and side laps of not less than **1-1/2-inch (38-mm)** corrugations for metal roof panels.
 - 2. Provide end laps of not less than **4 inches (102 mm)** and side laps of not less than **1-1/2-inch (38-mm)** corrugations for metal wall panels.
 - 3. Align horizontal laps with adjacent metal panels.
 - 4. Seal intermediate end laps and side laps of translucent panels with translucent mastic.

3.8 METAL SOFFIT PANEL INSTALLATION

- A. Provide metal soffit panels the full width of soffits. Install panels perpendicular to support framing.
- B. Flash and seal metal soffit panels with weather closures where panels meet walls and at perimeter of all openings.

3.9 THERMAL INSULATION INSTALLATION

- A. General: Install insulation concurrently with metal panel installation, in thickness indicated to cover entire surface, according to manufacturer's written instructions.
 - 1. Set vapor-retarder-faced units with vapor retarder toward warm side of construction unless otherwise indicated. Do not obstruct ventilation spaces except for firestopping.
 - 2. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to the surrounding construction to ensure airtight installation.
 - 3. Install factory-laminated, vapor-retarder-faced blankets straight and true in one-piece lengths, with both sets of facing tabs sealed, to provide a complete vapor retarder.
 - 4. Install blankets straight and true in one-piece lengths. Install vapor retarder over insulation, with both sets of facing tabs sealed, to provide a complete vapor retarder.
- B. Blanket Roof Insulation: Comply with the following installation method:

1. Over-Framing Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal roof panels fastened to secondary framing.
 2. Between-Purlin Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Hold in place with bands and crossbands below insulation.
 3. Over-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Install layer of filler insulation over first layer to fill space formed by metal roof panel standoffs. Hold in place by panels fastened to standoffs.
 - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
 4. Two-Layers-between-Purlin-with-Spacer-Block Installation: Extend insulation and vapor retarder between purlins. Carry vapor-retarder-facing tabs up and over purlin, overlapping adjoining facing of next insulation course and maintaining continuity of retarder. Install layer of filler insulation over first layer to fill space between purlins formed by thermal spacer blocks. Hold in place with bands and crossbands below insulation.
 - a. Thermal Spacer Blocks: Where metal roof panels attach directly to purlins, install thermal spacer blocks.
 5. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
- C. Blanket Wall Insulation: Extend insulation and vapor retarder over and perpendicular to top flange of secondary framing. Hold in place by metal wall panels fastened to secondary framing.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
 2. Sound-Absorption Insulation: Where sound-absorption requirement is indicated for metal liner panels, cover insulation with polyethylene film and provide inserts of wire mesh to form acoustical spacer grid.
- D. Board Wall Insulation: Extend board insulation in thickness indicated to cover entire wall. Hold in place by metal wall panels fastened to secondary framing. Comply with manufacturers' written instructions.
1. Retainer Strips: Install retainer strips at each longitudinal insulation joint, straight and taut, nesting with secondary framing to hold insulation in place.
- ### 3.10 DOOR AND FRAME INSTALLATION
- A. General: Install doors and frames plumb, rigid, properly aligned, and securely fastened in place according to manufacturers' written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each door frame with elastomeric sealant used for metal wall panels.
- B. Personnel Doors and Frames: Install doors and frames according to NAAMM-HMMA 840. Fit non-fire-rated doors accurately in their respective frames, with the following clearances:
1. Between Doors and Frames at Jambs and Head: **1/8 inch (3 mm)**.
 2. Between Edges of Pairs of Doors: **1/8 inch (3 mm)**.
 3. At Door Sills with Threshold: **3/8 inch (9.5 mm)**.
 4. At Door Sills without Threshold: **3/4 inch (19.1 mm)**.
 5. At fire-rated openings, install frames according to, and doors with clearances specified in, NFPA 80.

- C. Sliding Service Doors: Bolt support angles to opening head members through factory-punched holes. Bolt door tracks to support angles at maximum **24 inches (610 mm)** o.c. Set doors and operating equipment with necessary hardware, jamb and head mold stops, continuous hood flashing, anchors, inserts, hangers, and equipment supports.
- D. Field Glazing: Comply with installation requirements in Section 088000 "Glazing."
- E. Door Hardware:
 - 1. Install surface-mounted items after finishes have been completed at heights indicated in DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 - 2. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 3. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
 - 4. Set thresholds for exterior doors in full bed of sealant complying with requirements for concealed mastics specified in Section 079200 "Joint Sealants."

3.11 WINDOW INSTALLATION

- A. General: Install windows plumb, rigid, properly aligned, without warp or rack of frames or sash, and securely fasten in place according to manufacturer's written instructions. Coordinate installation with wall flashings and other components. Seal perimeter of each window frame with elastomeric sealant used for metal wall panels.
 - 1. Separate dissimilar materials from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in AAMA/WDMA/CSA 101/I.S.2/A440.
- B. Set sill members in bed of sealant or with gaskets, for weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Mount screens directly to frames with tapped screw clips.

3.12 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete metal roof panel assembly, including trim, copings, ridge closures, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Install components for a complete metal wall panel assembly, including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 3. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

1. Install exposed flashing and trim that is without excessive oil-canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof and weather-resistant performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of **10 feet (3 m)** with no joints allowed within **24 inches (600 mm)** of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than **1 inch (25 mm)** deep, filled with mastic sealant (concealed within joints).
- C. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than **36 inches (914 mm)** o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- D. Downspouts: Join sections with **1-1/2-inch (38-mm)** telescoping joints. Provide fasteners designed to hold downspouts securely **1 inch (25 mm)** away from walls; locate fasteners at top and bottom and at approximately **60 inches (1524 mm)** o.c. in between.
1. Provide elbows at base of downspouts to direct water away from building.
 2. Tie downspouts to underground drainage system indicated.
- E. Circular Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Mount ventilators on flat level base. Install preformed filler strips at base to seal ventilator to metal roof panels.
- F. Continuous Roof Ventilators: Set ventilators complete with necessary hardware, anchors, dampers, weather guards, rain caps, and equipment supports. Join sections with splice plates and end-cap skirt assemblies where required to achieve indicated length. Install preformed filler strips at base to seal ventilator to metal roof panels.
- G. Louvers: Locate and place louver units level, plumb, and at indicated alignment with adjacent work.
1. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
 2. Provide perimeter reveals and openings of uniform width for sealants and joint fillers.
 3. Protect galvanized- and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of corrosion-resistant paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
 4. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.
- H. Roof Curbs: Install curbs at locations indicated on Drawings. Install flashing around bases where they meet metal roof panels.
- I. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to panel as recommended by manufacturer.
- 3.13 FIELD QUALITY CONTROL
- A. Special Inspections: Owner will engage a qualified special inspector to perform field quality control special inspections and to submit reports.

- B. Product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.14 ADJUSTING

- A. Doors: After completing installation, test and adjust doors to operate easily, free of warp, twist, or distortion.
- B. Door Hardware: Adjust and check each operating item of door hardware and each door to ensure proper operation and function of every unit. Replace units that cannot be adjusted to operate as intended.
- C. Windows: Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and at weather stripping to ensure smooth operation and weathertight closure. Lubricate hardware and moving parts.
- D. **[Roof Ventilators] [and] [Adjustable Louvers]**: After completing installation, including work by other trades, lubricate, test, and adjust units to operate easily, free of warp, twist, or distortion as needed to provide fully functioning units.
 - 1. Adjust louver blades to be weathertight when in closed position.

3.15 CLEANING AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- C. Touchup Painting:
 - 1. After erection, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted structural framing[, **bearing plates,**] and accessories.
 - a. Clean and prepare surfaces by SSPC-SP 2, "Hand Tool Cleaning," or by SSPC-SP 3, "Power Tool Cleaning."
 - b. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
 - 2. Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Metal Panels: Remove temporary protective coverings and strippable films, if any, as metal panels are installed. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
 - 1. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Doors and Frames: Immediately after installation, sand rusted or damaged areas of prime coat until smooth and apply touchup of compatible air-drying primer.

13 - Special Construction



1. Immediately before final inspection, remove protective wrappings from doors and frames.
- F. Windows: Clean metal surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances. Clean factory-glazed glass immediately after installing windows.
- G. Louvers: Clean exposed surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate until final cleaning.
 1. Restore louvers damaged during installation and construction period so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - a. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 13 34 23 13

SECTION 13 34 23 16 - PREFABRICATED CONTROL BOOTHS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for prefabricated control booths. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes prefabricated steel and aluminum control booths.

C. Definition

1. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

D. Performance Requirements

1. Structural Performance: Control booths shall withstand the effects of gravity loads and the loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
3. Samples: For control booths with factory-applied color finishes.
4. Delegated-Design Submittal: For control booths indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Welding certificates.
6. Maintenance data.
7. Warranty: Sample of special warranty.

F. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - c. AWS D1.3, "Structural Welding Code - Sheet Steel."
2. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Safety Glazing Products: Category II materials complying with testing requirements in 16 CFR 1201.
5. Preinstallation Conference: Conduct conference at Project site.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace wall panels that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - a. Sheet: **ASTM B 209 (ASTM B 209M)**.
 - b. Extruded Shapes: **ASTM B 221 (ASTM B 221M)**.
 - c. Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T4 or Alloy 6061-T6.
2. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, commercial quality, **G90 (Z275)** coating designation; mill phosphatized.
3. Galvanized, Rolled Steel Tread Plate: ASTM A 786/A 786M, rolled from steel plate complying with ASTM A 572/A 572M, Grade **55 (380)**; hot-dip galvanized according to ASTM A 123/A 123M.
4. Steel Structural Tubing: ASTM A 500, Grade B.
5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
6. Steel Mechanical Tubing: ASTM A 513, welded steel mechanical tubing.
7. Zinc-Coated (Galvanized) Steel: Hot-dip galvanized according to ASTM A 123/A 123M.
8. Stainless-Steel Sheet: ASTM A 666, Type 304.
9. Plastic Laminate: NEMA LD 3, HGS or HGL grade.
10. Plywood: DOC PS 1, Exterior grade.
11. Particleboard: ANSI A208.1, Grade M-2.
12. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q3.
13. Clear Tempered Float Glass: ASTM C 1048, Kind FT, Condition A, Type I, Class 1, and Quality q3.
14. Insulating Glass: Units complying with ASTM E 774 for Class CBA and consisting of two lites of 2.5-mm-thick clear float glass and dehydrated air space, with a total overall unit thickness of **7/16 inch (11 mm)** and with manufacturer's standard dual seal.
15. Ballistics-Resistant Glazing: Comply with requirements specified in Division 08 Section "Security Glazing".
16. Anchorages: Anchor bolts; hot-dip galvanized according to ASTM A 153/A 153M or ASTM F 2329 **OR** stainless steel, **as directed**.

B. Prefabricated Control Booths, General

1. General: Provide a complete, integrated set of mutually dependent components that form a completely assembled, prefabricated control booth, ready for installation on Project site.
 - a. Building Style: Standard square corners **OR** Radius corners **OR** Round corners **OR** Butt-glazed corners **OR** Wraparound type, with single rounded building end **OR** Wraparound type, with both building ends rounded **OR** As indicated on Drawings, **as directed**.
 - b. Doors: Sliding door on one side **OR** Sliding doors on both sides **OR** Swinging door on back **OR** As indicated on Drawings, **as directed**.
2. Windows: Extruded-aluminum sash frames glazed with 6-mm-thick, clear tempered glass **OR** clear insulating glass **OR** ballistics-resistant glazing, UL 752 Level **as directed**.
 - a. Frame Finish: Mill **OR** Clear anodic, **as directed**.
 - b. Provide insect screens for each operable window.
 - c. Provide galvanized-steel security screens for each window.
 - d. Corner Shape: Square **OR** Round, **as directed**.
3. Horizontal Sliding Windows: Extruded-aluminum sash frames glazed with 3-mm-thick, clear tempered float glass. Equip windows with cam locks, weather stripping, and stainless-steel **OR** nylon, **as directed**, ball-bearing rollers.
 - a. Frame Finish: Mill **OR** Clear anodic, **as directed**.
 - b. Provide insect screens for each operable window.
 - c. Corner Shape: Square **OR** Round, **as directed**.
4. Work Counters: Full width of control booth, reinforced; with **16-inch- (406-mm-)** wide storage **OR** cash, **as directed**, drawer below each counter, and an access opening for electrical cords at each rear corner of counter.

- a. Material: **0.078-inch- (1.98-mm-)** thick, stainless-steel sheet **OR 0.079-inch (2.01-mm)** nominal-thickness, galvanized-steel sheet **OR 1/2-inch- (13-mm-)** thick particleboard with plastic-laminate finish, **as directed**.
 - b. Depth: **22 inches (559 mm) OR 20 inches (508 mm) OR 18 inches (457 mm)**, **as directed**.
 5. Electrical Power Service: 125-A, 120/240-V ac, single-phase, three-wire load center, with no fewer than four open circuits **OR** service with 8-16 circuit-breaker panel, **as directed**; located under one end of work counter. Run copper wiring in **1/2-inch (13-mm)** EMT conduit.
 - a. Provide one 120-V ground-fault circuit interrupter (GFCI) power receptacle(s).
 6. Lighting Fixtures: One **OR Two, as directed**, ceiling-mounted fluorescent lighting fixture(s), **48 inches (1219 mm)** long, with acrylic lens and two 40-W lamps in each fixture. Provide single-pole switch mounted adjacent to door to control lighting fixture.
 7. Heating Unit: Wall-mounted **OR** Roof-mounted, **as directed**, thermostatically controlled, 110-V, 1500-W electric heater with fan-forced operation and with capacity of not less than **5000 Btu/h (1465 W)**. Enclose in enameled-steel cabinet and mount under work counter.
 8. Cooling Unit: Wall-mounted **OR** Roof-mounted, **as directed**, thermostatically controlled air conditioner with cooling capacity of not less than **13,500 Btu/h (3956 W)**. Enclose in enameled-steel cabinet.
 9. Accessories: Provide the following for each control booth:
 - a. Through-wall transaction drawers and speaking apertures complying with requirements specified in Division 08 Section "Security Windows".
 - b. Antifatigue mats.
 - c. Exterior stainless-steel counter.
 - d. Floor-mounted **OR** Wall-mounted, **as directed**, safe.
 - e. Signage: as directed by the Owner .
 - f. Ventilation fan.
 - g. Intercom.
 - h. Traffic control lights.
- C. Prefabricated Steel Control Booths
1. Structural Framework: Fabricated from **2-by-2-by-0.075-inch (50-by-50-by-1.90-mm)** steel structural or mechanical tubing. Connect framework by welding.
 2. Base/Floor Assembly: **4-inch- (102-mm-) OR 3-inch- (76-mm-)**, **as directed**, high assembly consisting of perimeter frame welded to structural framework of booth. Fabricate frame from **2-by-4-inch (51-by-102-mm)** galvanized-steel structural tubing; **0.108-inch (2.74-mm)** nominal-thickness, C-shaped, galvanized-steel sheet channels; or galvanized structural-steel angles. Include anchor clips fabricated from **1/4-inch- (6-mm-)** thick galvanized-steel plate, predrilled and welded to exterior of integral floor frame.
 - a. Finished Floor: **0.108-inch (2.74-mm)** nominal-thickness, galvanized, rolled steel tread plate.
 - b. Subfloor and Finished Floor: Assembly consisting of **0.079-inch (2.01-mm)** nominal-thickness, galvanized-steel sheet underside with rigid insulation core; covered by **0.125-inch- (3.18-mm-)** thick, aluminum rolled tread plate; with overall assembly thickness of **2 inches (51 mm)**.
OR
Subfloor and Finished Floor: Assembly consisting of one **OR two, as directed**, layer(s) of **3/4-inch- (19-mm-)** thick plywood or oriented strand board with **0.125-inch- (3.18-mm-)** thick, aluminum rolled tread plate **OR** vinyl composition flooring **OR** carpeting, **as directed**.
- OR**
Base/Floor Assembly: No perimeter frame, with finished floor fabricated from **0.108-inch (2.74-mm)** nominal-thickness, galvanized, rolled steel tread plate.
- OR**
Base/Floor Assembly: No perimeter frame, with surface of supporting concrete base as finished floor.
3. Wall Panel Assembly: Assembly consisting of exterior face panel fabricated from **0.079-inch (2.01-mm)** nominal-thickness, galvanized-steel sheet; and interior face panel fabricated from **0.064-inch (1.63-mm) OR 0.052-inch (1.32-mm)**, **as directed**, nominal-thickness, galvanized-

steel sheet; with **2-inch- (51-mm-)** OR **3-inch- (76-mm-)**, **as directed**, thick, rigid fiberglass or polystyrene board insulation in cavity between exterior and interior face panels.

a. Thermal Resistance Value (R-Value): R-7.

4. Flat Roof/Ceiling Assembly: Consisting of exterior roof panels, interior ceiling panels, and insulation between exterior and interior panels; sloped to drain at booth perimeter.

a. Exterior Roof Panel: Fabricated from **0.079-inch (2.01-mm)** OR **0.064-inch (1.63-mm)**, **as directed**, nominal-thickness, galvanized-steel sheet; with painted finish OR EPDM membrane, **as directed**, continuously welded seams, and full-perimeter gutter.

b. Interior Ceiling Panel: Fabricated from **0.079-inch (2.01-mm)** nominal-thickness, galvanized-steel sheet; with fiberglass insulation in cavity between ceiling and roof.

1) Thermal Resistance Value (R-Value): R-17.

c. Insulated Exterior/Interior Panel: Fabricated from **0.028-inch (0.71-mm)** nominal-thickness, galvanized-steel OR **0.032-inch- (0.81-mm-)** thick, aluminum, **as directed**, sheet faces and expanded-foam insulation core.

1) Thermal Resistance Value (R-Value): R-17.

d. Canopy Fascia: Fabricated from **0.079-inch (2.01-mm)** nominal-thickness, galvanized-steel sheet, of manufacturer's standard design OR custom design indicated on Drawings, **as directed**.

1) Height: **6 inches (152 mm)** OR **8 inches (203 mm)**, **as directed**.

2) Overhang: **3 inches (76 mm)** beyond OR Flush with, **as directed**, face of walls below.

e. Downspouts: Integral, extending **3 inches (76 mm)** beyond booth walls.

f. Roof scuppers.

g. Rooftop finial.

5. Sliding Door: Top suspended from aluminum track with ball-bearing rollers; **1-3/4 inches (44 mm)** thick; tubular-frame design fabricated from clear-anodized aluminum OR galvanized steel, **as directed**; with top half of door glazed. Equip door with deadlock, lock support, guide hardware, and full weather stripping.

a. Glazing: Fixed OR Horizontal sliding, **as directed**, unit with 6-mm-thick, clear tempered float glass.

b. Deadlock: Mortised, laminated-hook bolt type with removable cylinder capable of being master keyed.

6. Swinging Door: **1-3/4 inches (44 mm)** thick; tubular-frame design fabricated from clear-anodized aluminum OR galvanized steel, **as directed**; with top half of door glazed. Equip door with deadlock, three butt hinges, closer, and full weather stripping.

a. Glazing: Fixed OR Horizontal sliding, **as directed**, unit with 6-mm-thick, clear tempered float glass.

b. Deadlock: Mortised, with lever handle and removable cylinder capable of being master keyed.

7. Finish: Finish exposed metal surfaces, including structural framework, walls, canopy, and ceiling with rust-inhibitive primer and one finish coat of industrial air-dry acrylic OR polyurethane, **as directed**, enamel.

a. Color: As selected from manufacturer's full range.

D. Prefabricated Aluminum Control Booths

1. Structural Framework: Fabricated from **2-by-2-by-0.125-inch (51-by-51-by-3.18-mm)** aluminum tubing, channel, angle, or tee extrusions; with clear OR color, **as directed**, anodic finish. Connect framework with exposed, **as directed**, mechanical fasteners.

2. Base/Floor Assembly: **4-inch- (102-mm-)** high assembly consisting of perimeter frame welded to structural framework of booth. Fabricate frame from **2-by-4-by-0.125-inch (51-by-102-by-3.18-mm)** aluminum tubing or aluminum angles. Include anchor clips fabricated from **1/4-inch- (6-mm-)** thick aluminum, predrilled and welded to exterior of integral floor frame.

a. Subfloor and Finished Floor: Assembly consisting of **0.032-inch- (0.81-mm-)** thick, aluminum sheet underside, plywood and rigid insulation core; covered by **0.125-inch-**

(3.18-mm-) thick, aluminum rolled tread plate; with overall assembly thickness of **2 inches (51 mm)**.

OR

Subfloor and Finished Floor: Assembly consisting of one **OR** two, **as directed**, layer(s) of **3/4-inch- (19-mm-)** thick plywood or oriented strand board with **0.125-inch- (3.18-mm-)** thick, aluminum rolled tread plate **OR** vinyl composition flooring **OR** carpeting, **as directed**.

OR

Base/Floor Assembly: No perimeter frame, with surface of supporting concrete base as finished floor.

3. Wall Panel Assembly: Assembly consisting of exterior face panel fabricated from **0.032-inch- (0.81-mm-)** **OR** **0.063-inch- (1.60-mm-)**, **as directed**, thick aluminum sheet, and interior face panel fabricated from **0.032-inch- (0.81-mm-)** **OR** **0.050-inch- (1.27-mm-)**, **as directed**, thick aluminum sheet; with **2-inch- (51-mm-)** thick, polystyrene or polyisocyanurate board insulation in cavity between exterior and interior face panels.
 - a. Thermal Resistance Value (R-Value): R-7.
4. Flat Roof/Ceiling Assembly: Consisting of exterior roof panels, interior ceiling panels, and insulation between exterior and interior panels; sloped to drain at booth perimeter.
 - a. Exterior Roof Panel: Fabricated from **0.032-inch- (0.81-mm-)** thick aluminum sheet with protective plastic sheet finish and full-perimeter gutter.
 - b. Interior Ceiling Panel: Fabricated from **0.125-inch- (3.18-mm-)** thick hardboard; with polyisocyanurate board insulation in cavity between ceiling and roof.
 - 1) Thermal Resistance Value (R-Value): R-19.
 - c. Insulated Exterior/Interior Panel: Fabricated from **0.032-inch- (0.81-mm-)** thick, aluminum **OR** **0.021-inch (0.53-mm)** nominal-thickness, galvanized-steel, **as directed**, sheet faces and expanded-foam insulation core.
 - 1) Thermal Resistance Value (R-Value): R-19.
 - d. Canopy Fascia: Fabricated from **0.063-inch- (1.60-mm-)** thick aluminum sheet, of manufacturer's standard design **OR** custom design indicated on Drawings, **as directed**.
 - 1) Height: **6 inches (152 mm) OR 8 inches (203 mm)**, **as directed**.
 - 2) Overhang: **3 inches (76 mm)** beyond **OR** Flush with, **as directed**, face of walls below.
 - e. Downspouts: Integral, extending **3 inches (76 mm)** beyond booth walls.
 - f. Roof scuppers.
 - g. Rooftop finial.
5. Sliding Door: Top suspended from aluminum track with ball-bearing rollers; **1-3/4 inches (44 mm)** thick; tubular-frame design fabricated from aluminum matching exterior and interior wall panels; with top half of door glazed and with extruded-aluminum door frame. Equip door with deadlock, lock support, guide hardware, and full weather stripping.
 - a. Glazing: Fixed **OR** Horizontal sliding, **as directed**, unit with 6-mm-thick, clear tempered float glass.
 - b. Deadlock: Mortised, laminated-hook bolt type with removable cylinder capable of being master keyed.
6. Swinging Door: **1-3/4 inches (44 mm)** thick; tubular-frame design fabricated from aluminum matching exterior and interior wall panels; with top half of door glazed and with extruded-aluminum door frame. Equip door with deadlock, three butt hinges, closer, and full weather stripping.
 - a. Glazing: Fixed **OR** Horizontal sliding, **as directed**, unit with 6-mm-thick, clear tempered float glass.
 - b. Deadlock: Mortised, with lever handle and removable cylinder capable of being master keyed.
7. Finish: Finish exposed metal surfaces, including structural framework, walls, canopy, and ceiling with clear anodizing **OR** color anodizing **OR** baked enamel or powder coat, **as directed**.
 - a. Color: As selected from manufacturer's full range.

E. Fabrication

1. Fabricate control booths completely in factory.

2. Preglaze windows and doors at factory.
3. Prewire control booths at factory, ready for connection to service at Project site.
4. Fabricate control booths with forklift pockets in base of booth **OR** removable lifting eye centered in roof, **as directed**.
5. Accessible Control Booths: Where indicated to be accessible, fabricate control booths as follows:
 - a. Provide service windows located no higher than **34 inches (865 mm)** above exterior grade.
 - b. Provide door opening with minimum **32-inch (813-mm)** clear width.
 - c. Provide minimum **60-inch (1525-mm)** clear turning spacing within the booth.
 - d. Provide minimum **27-inch (685-mm)** clearance beneath interior work surfaces. Locate work surfaces **28 inches (710 mm)** minimum and **34 inches (865 mm)** maximum above the floor.
 - e. Locate controls and operable parts no lower than **15 inches (381 mm)** and no higher than **48 inches (1219 mm)** above the floor where reach is unobstructed. Where side reach is obstructed, locate controls and operable parts no lower than **15 inches (381 mm)** and no higher than **46 inches (1219 mm)** above the floor.

F. General Finish Requirements

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
2. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

G. Finishes

1. Steel and Galvanized-Steel Factory Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat.
 - a. Color and Gloss: As selected from manufacturer's full range.

H. Aluminum Finishes

1. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.
2. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - a. Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from full range of industry colors and color densities, **as directed**.
3. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected from manufacturer's full range.

1.3 EXECUTION

A. Installation

1. Install control booths according to manufacturer's written instructions.
2. Accessible Control Booths: Install with interior floor surface at same elevation as adjacent paved surfaces.
3. Set control booths plumb and aligned. Level baseplates true to plane with full bearing on concrete bases.
4. Fasten control booths securely to cast-in anchor bolts **OR** concrete bases with expansion anchors, **as directed**.
5. Connect electrical power service to power distribution system according to requirements specified in Division 22.

B. Adjusting

1. Adjust doors, operable windows, and hardware to operate smoothly, easily, properly, and without binding. Confirm that locks engage accurately and securely without forcing or binding.
2. Lubricate hardware and other moving parts.
3. After completing installation, inspect exposed finishes and repair damaged finishes.

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Task	Specification	Specification Description
13 34 23 16	11 12 16 00	Parking Control Equipment

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SECTION 14 01 30 71 - ELECTRIC TRACTION ELEVATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electric traction elevators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes electric traction passenger and service elevators.

C. Definitions

1. Definitions in ASME A17.1 apply to work of this Section.
2. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
3. Service Elevator: A passenger elevator that is also used to carry freight.

D. Submittals

1. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
 - a. Car enclosures and hoistway entrances.
 - b. Operation, control, and signal systems.
2. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel, **as directed**. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
3. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; **3-inch (75-mm)** square Samples of sheet materials; and **4-inch (100-mm)** lengths of running trim members.
4. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
5. Qualification Data: For Installer.
6. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
7. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
8. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Source Limitations: Obtain elevators, including hydraulic passenger elevators specified in another Division 14 Section, through one source from a single manufacturer.
 - a. Provide major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.
3. Legal Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.

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- a. Effective peak velocity acceleration (A_v) for Project's location is less than 0.10 (seismic risk zones 0 and 1) **OR** greater than or equal to 0.10, but less than 0.20 (seismic risk zone 2) **OR** greater than or equal to 0.20 (seismic risk zones 3 and 4), **as directed**.
 - b. Provide earthquake equipment required by ASME A17.1.
 - c. Design earthquake spectral response acceleration, short period (Sds) for Project is determined by Project's location and site classification.
 - d. Project's seismic design category is A **OR** B **OR** C **OR** D, **as directed**.
 - e. Elevator importance factor is 1.5 **OR** 1.0, **as directed**.
 - f. Accessibility Requirements: Americans with Disabilities Act (including the ADA Standards issued by the U.S. Department of Justice and the U.S. Department of Transportation and the United States Access Board's Guide to the ADA Standards, specifically Chapter 4.
4. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 **OR** IBC Standard 3002.4 **OR** UL 10B, **as directed**.

F. Delivery, Storage, And Handling

1. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.
2. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

G. Coordination

1. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to electric traction elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; machine beams, **as directed**; and electrical service, electrical outlets, lights, and switches in pits and machine rooms **OR** hoistways, **as directed**.

H. Warranty

1. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.
 - a. Warranty Period: One year from date of Final Completion.

1.2 PRODUCTS

A. Systems And Components

1. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.
2. Elevator Machines: Provide variable-voltage, variable-frequency, ac-type hoisting machines **OR** At manufacturer's option, provide either variable-voltage, variable-frequency, ac-type or variable-voltage, dc-type hoisting machines, **as directed**. Provide solid-state power converters.
 - a. Provide regenerative **OR** nonregenerative, **as directed**, system.
 - b. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
 - c. Provide means for absorbing regenerated power when elevator system is operating on standby power.
 - d. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.

3. Fluid for Oil Buffers: If oil buffers are used, use only fire-resistant hydraulic fluid containing antioxidant, anticorrosive, antifoaming, and metal-passivating additives.
4. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.
5. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Division 5 Section "Metal Fabrications" for materials and fabrication.
6. Car Frame and Platform: Welded steel units.
7. Guides: Provide roller guides **OR** polymer-coated, nonlubricated sliding guides, **as directed**, at top and bottom of car and counterweight frames.

B. Operation Systems

1. General: Provide manufacturer's standard microprocessor operation system for each elevator **OR** for each group of elevators, **as directed**, as required to provide type of operation system indicated.
2. Group Automatic Operation with Demand-Based Dispatching: Provide reprogrammable, **as directed**, group automatic system that assigns cars to hall calls based on a dispatching program designed to minimize passenger waiting time. System automatically adjusts to changes in demand for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.
3. Destination-Based Group Automatic Operation: Provide reprogrammable group automatic system that assigns elevators leaving the main lobby in the up direction to a selected group of floors and directs passengers to an elevator serving their destination floor. System dispatches cars in a regulated sequence for optimum system efficiency; dispatch is based on origin and destination of calls. System automatically adjusts to changes in demand for different traffic conditions including heavy incoming, heavy two-way, heavy outgoing, and light off-hours as variations of normal two-way traffic.
4. Auxiliary **OR** Single-Car Auxiliary, **as directed**, Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
 - a. Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby **OR** fire command station, **as directed**. Manual operation causes automatic operation to cease.
 - b. Standby Powered Lowering: On activation of standby power, if car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to the next floor below, opens its doors, and shuts down.
 - c. Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to the next floor below, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
 - d. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
 - e. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight, **as directed**, can be adjusted.
5. Group Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators and elevator groups where indicated:
 - a. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. One car is returned at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular

- operation, by switches in control panel located at main lobby **OR** fire command station, **as directed**. Manual operation causes automatic operation to cease.
- b. Standby Power Operation: On activation of standby power, cars are returned, one at a time, to a designated floor and parked with doors open. If a car cannot be returned, it is removed from the system. When all cars have been returned or removed from the system, one car can be put in service on standby power by a selector switch in control panel located at main lobby **OR** fire command station, **as directed**.
 - c. Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered one at a time to the next floor below, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
 - d. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
 - e. Nuisance Call Cancel: When car calls exceed a preset number while the car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight, **as directed**, can be adjusted.
 - f. Emergency Hospital **OR** Priority, **as directed**, Service: Service is initiated by a keyswitch **OR** card reader **OR** remote switch, **as directed**, at designated floors. One elevator is removed from group operation and directed to the floor where service was initiated. On arriving at the floor, elevator opens its doors and parks and a lighted sign directs passengers to exit elevator, **as directed**. Car is placed in operation by selecting a floor and pressing door close button or by operating keyswitch to put car in independent service. After responding to floor selected or being removed from independent service, car is returned to group operation. If car is not placed in operation within a preset time after being called, it is returned to group operation.
 - g. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
 - h. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car will respond only to car calls, not to hall calls.
 - i. Distributed Parking: When cars are not required for response to calls, they are parked with doors closed, distributed in predetermined zones throughout the building. One zone shall include the main floor and adjacent floors; remaining floors shall be divided into approximately equal zones.
6. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
- a. Card-Reader Operation: System uses card readers at car control stations **OR** hall push-button stations, **as directed**, to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space as indicated for card reader in car **OR** Provide stripe-swipe card reader integral with each car control station, **as directed**.
 - 1) Security access system equipment is specified in Division 28 Section "Access Control".
OR
Security access system equipment is not in the Contract.
 - b. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car control stations **OR** hall push-button stations, **as directed**. Key is removable only in deactivated position **OR** in either position, **as directed**.
 - c. Keypad Operation: Allows each landing to be restricted or unrestricted. When a restricted landing button is pressed, a "Restricted Floor" lamp lights and remains lit until landing access code has been entered into a keypad or predetermined time period has elapsed.

Car calls for restricted landings do not register until landing access code is entered into keypad within predetermined time period after landing button is pressed.

- 1) Access codes are programmed at each car operating panel using a security keyswitch. Keypad operation can be activated and deactivated by security keyswitch at main landing.
 - d. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car **OR** all cars in a group, **as directed**, to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.
- C. Door Reopening Devices
1. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
 2. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.
- D. Finish Materials
1. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
 2. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
 3. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.
 4. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 - a. Textured Stainless-Steel Sheet: Product with coined **OR** embossed, **as directed**, texture rolled into exposed surface.
 - 1) Metal surface is satin polished **OR** satin relieved **OR** titanium nitride colored **OR** oxide colored **OR** satin polished and titanium nitride colored **OR** satin relieved and titanium nitride colored **OR** satin polished and oxide colored **OR** satin relieved and oxide colored **OR** color coated and satin relieved **OR** color coated and bright relieved, **as directed**, after rolling.
 5. Stainless-Steel Bars: ASTM A 276, Type 304.
 6. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
 7. Bronze Plate and Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal).
 8. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
 9. Bronze Tubing: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C23000 (red brass, 85 percent copper).
 10. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063.
 11. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500 or No. C77600.
 12. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications **OR** Type HGL for flat applications, **as directed**, Type HGP for postformed applications and Type BKV for panel backing.
- E. Car Enclosures
1. General: Provide enameled-steel car enclosures to receive removable **OR** steel-framed car enclosures with nonremovable, **as directed**, wall panels, with car **OR** removable car, **as directed**, roof, access doors, power door operators, and ventilation.
 - a. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
 - b. Provide finished car including materials and finishes specified below.
 2. Materials and Finishes: Provide manufacturer's standards, but not less than the following:
 - a. Subfloor: Underlayment grade, exterior plywood, **5/8-inch (16-mm)** nominal thickness.
 - b. Floor Finish: Specified in a Division 9 Section **OR** Elevator manufacturer's standard level-loop nylon carpet; color as selected from manufacturer's full range, **as directed**.

- c. Enameled-Steel Wall Panels: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - d. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - e. Bronze Wall Panels: Flush, hollow-metal construction; fabricated from bronze sheet.
 - f. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to **1/2-inch (13-mm)** fire-retardant-treated particleboard **OR** manufacturer's standard honeycomb core, **as directed**, with plastic-laminate panel backing and, **as directed**, manufacturer's standard protective edge trim. Panels have a flame-spread index of 25 **OR** 75, **as directed**, or less, when tested according to ASTM E 84. Plastic-laminate color, texture, and pattern as selected from plastic-laminate **OR** elevator, **as directed**, manufacturer's full range.
 - g. Fabricate car with recesses and cutouts for signal equipment.
 - h. Fabricate car door frame integrally with front wall of car.
 - i. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - j. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet **OR** by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning, **as directed**.
 - k. Bronze Doors: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - l. Plastic-Laminate Doors: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim matching return panels, **as directed**. Plastic-laminate color, texture, and pattern as selected from plastic-laminate **OR** elevator, **as directed**, manufacturer's full range.
 - m. Sight Guards: Provide sight guards on car doors.
 - n. Sills: Extruded metal, with grooved surface, **1/4 inch (6.4 mm)** thick.
 - o. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
 - p. Metal **OR** Metallic-Finish, Plastic-Laminate, **as directed**, Ceiling: Flush panels, with incandescent downlights in the center of **OR** four low-voltage downlights in, **as directed**, each panel. Align ceiling panel joints with joints between wall panels, **as directed**.
 - q. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.
- F. Hoistway Entrances
- 1. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
 - a. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
 - 2. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:
 - a. Enameled-Steel Frames: Formed from cold-rolled or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - b. Steel Subframes: Formed from cold-rolled or hot-rolled steel sheet with factory-applied enamel finish or corrosion-inhibiting primer. Fabricate to receive applied finish as indicated.
 - c. Stainless-Steel Frames: Formed from stainless-steel sheet.
 - d. Bronze Frames: Formed from cold-rolled or hot-rolled steel sheet, with enamel finish, and with formed-bronze sheet laminated to steel frames using adhesive that fully bonds metal to metal without telegraphing or oil-canning.

- e. Enameled-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
- f. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from stainless-steel sheet **OR** by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning, **as directed**.
- g. Bronze Doors and Transoms: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
- h. Plastic-Laminate Doors and Transoms: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim matching door frames, **as directed**. Plastic-laminate color, texture, and pattern as selected from plastic-laminate **OR** elevator, **as directed**, manufacturer's full range.
- i. Sight Guards: Provide sight guards on doors matching door edges.
- j. Sills: Extruded metal, with grooved surface, **1/4 inch (6.4 mm)** thick.
- k. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

G. Signal Equipment

- 1. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers **OR** LEDs, **as directed**.
OR
General: Provide signal equipment designed for destination-based system. Fabricate lighted elements with long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers **OR** LEDs, **as directed**.
- 2. Car Control Stations: Provide manufacturer's standard recessed **OR** semirecessed, **as directed**, car control stations. Mount in return panel adjacent to car door, unless otherwise indicated.
OR
Swing-Return Car Control Stations: Provide car control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.
 - a. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
 - b. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- 3. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- 4. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet **OR** telephone jack, **as directed**, in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" **OR** "Zoned (dc Loop) Fire-alarm System".
- 5. Car Position Indicator: Provide illuminated, **as directed**, digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
 - a. Include travel direction arrows if not provided in car control station.

6. Hall Push-Button Stations: Provide one hall push-button station at each landing for each single elevator or group of elevators, but not less than one station for each four elevators in a group, **as directed**.
OR
Hall Push-Button Stations: Provide hall push-button stations at each landing as indicated.
 - a. Provide manufacturer's standard wall-mounted units.
OR
Provide units with flat faceplate for mounting with body of unit recessed in wall.
 - b. Equip units with buttons for calling elevator and for indicating desired direction of travel.
OR
Equip units with buttons **OR** touch screen, **as directed**, for calling elevator and for indicating direction of travel or destination as required by system. Provide a signaling system to verify floor selection, where destination registration is required, and to direct passengers to appropriate car.
 - 1) Provide a means for passengers to indicate that they have disabilities so control system can allow extra room in assigned car.
 - 2) Provide for connecting units that require destination registration to building security access system so a card reader can be used to register calls.
 - c. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" **OR** "Zoned (dc Loop) Fire-alarm System".
7. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide one of the following:
 - a. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
 - b. Units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
 - c. Units mounted in both jambs of entrance frame for each elevator, **as directed**.
 - d. Units mounted in both car door jambs; may be used only for single elevators or for two-car groups, **as directed**.
8. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - a. At manufacturer's option, audible signals may be placed on car **OR** each car, **as directed**.
9. Hall Position Indicators: Provide illuminated, **as directed**, digital-display-type position indicators, located above each, **as directed**, hoistway entrance at ground floor. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 - a. Integrate ground-floor hall lanterns with hall position indicators.
10. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.
OR
Fire Command Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.
11. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

H. Elevators

1. Elevator Description:

- a. Group Number: **A different number for each group of elevators that share a group operation system** as directed by the Owner .
- b. Elevator Number(s): **Elevator number(s) as shown on Drawings** as directed by the Owner .
- c. Service Elevator Number(s): **Elevator number(s) as shown on Drawings** as directed by the Owner .
- d. Type: Geared **OR** Gearless, **as directed**, traction.
- e. Machine Location: Machine room above hoistway **OR** Hoistway; no machine room is provided, **as directed**.
- f. Rated Load: **2000 lb (908 kg) OR 2100 lb (953 kg) OR 2500 lb (1135 kg) OR 3000 lb (1362 kg) OR 3500 lb (1589 kg) OR 4000 lb (1816 kg) OR 4500 lb (2043 kg) OR 5000 lb (2270 kg), as directed.**
- g. Freight Loading Class for Service Elevator(s): Class A.
- h. Rated Speed: **200 fpm (1.0 m/s) OR 350 fpm (1.8 m/s) OR 400 fpm (2.0 m/s) OR 450 fpm (2.3 m/s) OR 500 fpm (2.5 m/s) OR 700 fpm (3.6 m/s) OR 800 fpm (4.1 m/s) OR 1000 fpm (5.1 m/s) OR 1200 fpm (6.1 m/s) OR 1400 fpm (7.1 m/s), as directed.**
- i. Operation System: Selective collective automatic operation **OR** Group automatic operation **OR** Group automatic operation with demand-based dispatching **OR** Destination-based group automatic operation, **as directed**.
- j. Auxiliary Operations:
 - 1) Standby power operation.
 - 2) Standby powered lowering.
 - 3) Battery-powered lowering.
 - 4) Earthquake Emergency Operation: Comply with requirements in ASME A17.1.
 - 5) Automatic dispatching of loaded car.
 - 6) Nuisance call cancel.
 - 7) Emergency hospital **OR** Priority, **as directed**, service at designated floors **OR** all floors, **as directed**.
 - 8) Independent service for service elevator **OR** all cars in group, **as directed**.
 - 9) Loaded-car bypass.
 - 10) Distributed parking.
- k. Security Features: Card-reader operation **OR** Keyswitch operation **OR** Keypad operation **OR** Car-to-lobby feature, **as directed**.
- l. Dual Car Control Stations: Provide two car control stations in each elevator, **as directed**; equip only one with required keyswitches if any.
- m. Car Enclosures:
 - 1) Inside Width: **64 inches (1626 mm) OR 68 inches (1727 mm) OR 80 inches (2032 mm) OR 92 inches (2337 mm), as directed**, from side wall to side wall.
 - 2) Inside Depth: **51 inches (1295 mm) OR 53 inches (1346 mm) OR 57 inches (1448 mm) OR 65 inches (1651 mm) OR 87-1/2 inches (2222 mm) OR 90 inches (2286 mm) OR 93 inches (2362 mm) OR 93-1/2 inches (2375 mm) OR 96 inches (2438 mm) OR 101 inches (2565 mm) OR 102 inches (2591 mm), as directed**, from back wall to front wall (return panels).
 - 3) Inside Height: **88 inches (2235 mm) OR 92 inches (2337 mm) OR 94 inches (2388 mm) OR 100 inches (2540 mm) OR 104 inches (2642 mm) OR 108 inches (2743 mm) OR 112 inches (2845 mm), as directed**, to underside of ceiling.
 - 4) Front Walls (Return Panels): Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
 - 5) Car Fixtures: Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
 - 6) Side and Rear Wall Panels: Enameled steel **OR** Plastic laminate **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel, **as directed**.
 - 7) Reveals: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.

- 8) Door Faces (Interior): Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Plastic laminate, **as directed**.
 - 9) Door Sills: Aluminum, mill finish **OR** Bronze, polished **OR** Nickel silver, polished, **as directed**.
 - 10) Ceiling: Luminous ceiling **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Reflective metallic-finish, plastic-laminate, stainless steel **OR** Reflective metallic-finish, plastic-laminate, bronze, **as directed**.
 - 11) Handrails: 1-1/2 inches (38 mm) round **OR** 1/2 by 2 inches (13 by 50 mm) rectangular, **as directed**, mirror-polished stainless steel, No. 8 finish **OR** satin stainless steel, No. 4 finish **OR** mirror-polished bronze, lacquered **OR** satin bronze, lacquered, **as directed**, at sides **OR** rear **OR** sides and rear, **as directed**, of car.
 - 12) Floor: Manufacturer's standard carpet.
OR
 Floor prepared to receive carpet (specified in Division 09 Section "Sheet Carpeting").
OR
 Floor prepared to receive resilient tile (specified in Division 09 Section "Resilient Tile Flooring").
OR
 Floor prepared to receive sheet vinyl (specified in Division 09 Section "Resilient Sheet Flooring").
OR
 Floor recessed and prepared to receive dimension stone tile (specified in Division 09 Section "Stone Tiling") **OR** ceramic tile (specified in Division 09 Section "Tiling"), **as directed**.
 - 13) Floor Thickness, Including Setting Materials: as directed by the Owner above plywood subfloor.
- n. Hoistway Entrances: As follows:
- 1) Width: 36 inches (914 mm) **OR** 42 inches (1067 mm) **OR** 48 inches (1219 mm) **OR** 54 inches (1372 mm), **as directed**.
 - 2) Height: 84 inches (2134 mm) **OR** 96 inches (2438 mm), **as directed**.
 - 3) Type: Single-speed side sliding **OR** Two-speed side sliding **OR** Single-speed center opening **OR** Two-speed center opening, **as directed**.
 - 4) Fire-Protection Rating: 1 hour **OR** 1-1/2 hours, **as directed**, with 30-minute temperature rise of 450 deg F (250 deg C), **as directed**.
 - 5) Frames at First Floor **OR** at Basement Floors, **as directed**: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
 - 6) Frames at Other Floors: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
 - 7) Doors and Transoms at First Floor **OR** at Basement Floors, **as directed**: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Plastic laminate, **as directed**.
 - 8) Doors and Transoms at Other Floors: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Plastic laminate, **as directed**.
 - 9) Sills at First Floor **OR** at Basement Floors, **as directed**: Aluminum, mill finish **OR** Bronze, polished **OR** Nickel silver, polished, **as directed**.
 - 10) Sills at Other Floors: Aluminum, mill finish **OR** Bronze, polished **OR** Nickel silver, polished, **as directed**.

- o. Hall Fixtures at First Floor **OR** at Basement Floors, **as directed**: Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Recessed type with no exposed-metal surfaces, **as directed**.
- p. Hall Fixtures at Other Floors: Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Recessed type with no exposed-metal surfaces, **as directed**.
- q. Additional Requirements:
 - 1) Provide inspection certificate in each car, mounted under acrylic cover with frame made from polished stainless steel, No. 8 finish **OR** satin stainless steel, No. 4 finish **OR** polished bronze, lacquered **OR** satin bronze, lacquered, **as directed**.
 - 2) Provide blanket hooks in all cars, **as directed**, and one **OR** two, **as directed**, complete set(s) of full-height protective blankets.

1.3 EXECUTION

A. Examination

1. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
 - a. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.
 - b. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Comply with manufacturer's written instructions.
2. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
3. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.
4. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
5. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
6. Leveling Tolerance: **1/8 inch (3 mm)**, up or down, regardless of load and direction of travel.
7. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
8. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - a. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - b. Place hall lanterns either above or beside each hoistway entrance.
 - c. Mount hall lanterns at a minimum of **72 inches (1829 mm)** above finished floor.

C. Field Quality Control

1. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
2. Operating Test: Load elevator **OR** each elevator **OR** one elevator of each type, capacity, speed, and travel distance, **as directed**, to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record

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temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.

3. Advise Owner and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

D. Protection

1. Temporary Use: Limit temporary use for construction purposes to one elevator **as directed**. Comply with the following requirements for each, **as directed**, elevator used for construction purposes:
 - a. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - b. Provide strippable protective film on entrance and car doors and frames.
 - c. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - d. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - e. Do not load elevators beyond their rated weight capacity.
 - f. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - g. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

E. Demonstration

1. Train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
2. Check operation of each elevator with Owner's personnel present and before date of Final Completion. Determine that operation systems and devices are functioning properly.
3. Check operation of each elevator with Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 01 30 71

SECTION 14 01 30 71a - HYDRAULIC ELEVATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hydraulic elevators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes hydraulic passenger and service elevators.

C. Definitions

1. Definitions in ASME A17.1 apply to work of this Section.
2. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
3. Service Elevator: A passenger elevator that is also used to carry freight.

D. Submittals

1. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
 - a. Car enclosures and hoistway entrances.
 - b. Operation, control, and signal systems.
2. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station and standby power operation control panel, **as directed**. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
3. Samples: For exposed finishes of cars, hoistway doors and frames, and signal equipment; **3-inch (75-mm)** square Samples of sheet materials; and **4-inch (100-mm)** lengths of running trim members.
4. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
5. Qualification Data: For Installer.
6. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
7. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
8. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Source Limitations: Obtain elevators, including electric traction passenger elevators specified in another Division 14 Section, through one source from a single manufacturer.
 - a. Provide major elevator components, including pump-and-tank units, plunger-cylinder assemblies, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.

3. Legal Requirements: Comply with ASME A17.1 and elevator design requirements for earthquake loads in ASCE 7.
 - a. Effective peak velocity acceleration (A_v) for Project's location is less than 0.10 (seismic risk zones 0 and 1) **OR** greater than or equal to 0.10, but less than 0.20 (seismic risk zone 2) **OR** greater than or equal to 0.20 (seismic risk zones 3 and 4), **as directed**.
 - b. Design earthquake spectral response acceleration, short period (S_d s) for Project is determined by Project's location and site classification.
 - c. Project's seismic design category is A **OR** B **OR** C **OR** D, **as directed**.
 - d. Elevator importance factor is 1.5 **OR** 1.0, **as directed**.
 - e. Accessibility Requirements: Comply with to U.S. Department of Justice ADA, U.S. Department of Transportation ADA, U.S. Access Board's Guides ADA Standards Chapter 4.
4. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 **OR** IBC Standard 3002 **OR** UL 10B, **as directed**.

F. Delivery, Storage, And Handling

1. Deliver, store, and handle materials, components and equipment in manufacturer's protective packaging.
2. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

G. Coordination

1. Coordinate installation of sleeves, block outs, and items that are embedded in concrete or masonry for elevator equipment. Furnish templates and installation instructions and deliver to Project site in time for installation.
2. Furnish well casing and coordinate delivery with related excavation work.
3. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
4. Coordinate locations and dimensions of other work relating to hydraulic elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and machine rooms.

H. Warranty

1. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.
 - a. Warranty Period: One year from date of Final Completion.

1.2 PRODUCTS

A. Systems And Components

1. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.
2. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations. Provide the following, **as directed**:
 - a. Pump, with fan-cooled squirrel-cage induction motor, mounted on oil tank with vibration isolation mounts. Enclose pump in prime-painted steel enclosure lined with 1-inch- (25-mm-) thick, glass-fiber insulation board.
 - b. Submersible pump, with submersible squirrel-cage induction motor, suspended inside oil tank from vibration isolation mounts.
 - c. Provide motor with wye-delta **OR** solid-state, **as directed**, starting.
 - d. Provide variable-voltage variable-frequency motor control.

3. Hydraulic Silencers: Provide hydraulic silencer containing pulsation-absorbing material in a blowout-proof housing at pump unit.
4. Piping: Provide size, type, and weight piping recommended by manufacturer, and provide flexible connectors to minimize sound and vibration transmissions from power unit.
 - a. Provide dielectric couplings at cylinder units.
 - b. Casing for Underground Piping: PVC pipe complying with ASTM D 1785, joined with PVC fittings complying with ASTM D 2466 and solvent cement complying with ASTM D 2564.
5. Hydraulic Fluid: Elevator manufacturer's standard fire-resistant, **as directed**, fluid with additives as needed to prevent oxidation of fluid, corrosion of cylinder and other components, and other adverse effects.

OR

Hydraulic Fluid: Nontoxic, readily biodegradable, fire-resistant, **as directed**, fluid made from vegetable oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Hydraulic fluid is approved by elevator manufacturer for use with elevator equipment.

6. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.
7. Protective Cylinder Casing: PVC or HDPE pipe casing complying with ASME A17.1, of sufficient size to provide not less than **1-inch (25-mm)** clearance from cylinder and extending above pit floor. Provide means to monitor casing effectiveness to comply with ASME A17.1.
8. Corrosion Protective Filler: A nontoxic, petroleum-based gel formulated for filling the space between hydraulic cylinder and protective casing. Filler is electrically nonconductive, displaces or absorbs water, and gels or solidifies at temperatures below **60 deg F (16 deg C)**.
9. Car Frame and Platform: Welded steel units.
10. Guides: Provide either roller guides or sliding guides at top and bottom of car and counterweight frames. If sliding guides are used, provide guide-rail lubricators or polymer-coated, nonlubricated guides.

B. Operation Systems

1. General: Provide manufacturer's standard microprocessor operation system for each elevator **OR** for each group of elevators, **as directed**, as required to provide type of operation system indicated.
2. Auxiliary **OR** Single-Car Auxiliary, **as directed**, Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
 - a. Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby **OR** fire command station, **as directed**. Manual operation causes automatic operation to cease.

OR

Standby-Powered Lowering: On activation of standby power, if car is at a floor it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to a preselected floor, opens its doors, and shuts down. If car is below the preselected floor, it is lowered to the next lower floor, opens its doors, and shuts down.

OR

Standby-Powered Lowering: On activation of standby power, car is lowered to the lowest floor, opens its doors, and shuts down.

OR

Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to a preselected floor, opens its doors, and shuts down. If car is below the preselected floor, it is lowered to the next lower floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.

OR

- Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
- b. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
 - c. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight, **as directed**, can be adjusted.
3. Group Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators and elevator groups where indicated:
- a. Standby Power Operation: On activation of standby power, cars are returned to a designated floor and parked with doors open. Only one car is moved upward at a time, with priority given to loaded cars. If a car cannot be returned after two attempts, it is removed from the system. When all cars have been returned or removed from the system, one car is automatically placed in service. If car selected for service cannot operate within 60 seconds, the system removes car from service and places another car in service. Cars can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby **OR** fire command station, **as directed**. Manual operation causes automatic operation to cease.
OR
Standby Power Operation: On activation of standby power, cars are returned to lowest floor and parked with doors open. If a car cannot be returned, it is removed from the system. One car is selected for service on standby power by a switch located at main lobby **OR** fire command station, **as directed**.
OR
Standby-Powered Lowering: On activation of standby power, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered to a preselected floor, open their doors, and shut down. Cars that are below the preselected floor are lowered to the next lower floor, open their doors, and shut down.
OR
Standby-Powered Lowering: On activation of standby power, cars are lowered to the lowest floor, open their doors, and shut down.
OR
Battery-Powered Lowering: If power fails, cars that are at a floor remain at that floor, open their doors, and shut down. Cars that are between floors are lowered to a preselected floor, open their doors, and shut down. Cars that are below the preselected floor are lowered to the next lower floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
OR
Battery-Powered Lowering: When power fails, cars are lowered to the lowest floor, open their doors, and shut down. System includes rechargeable battery and automatic recharging system.
 - b. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors will begin closing.
 - c. Nuisance Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight, **as directed**, can be adjusted.
 - d. Emergency Hospital **OR** Priority, **as directed**, Service: Service is initiated by a keyswitch **OR** card reader **OR** remote switch, **as directed**, at designated floors. One elevator is removed from group operation and directed to the floor where service was initiated. On arriving at the floor, elevator opens its doors and parks and a lighted sign directs passengers to exit elevator, **as directed**. Car is placed in operation by selecting a floor and pressing door close button or by operating keyswitch to put car in independent service. After responding to floor selected or being removed from independent service, car is

- returned to group operation. If car is not placed in operation within a preset time after being called, it is returned to group operation.
- e. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
 - f. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car will respond only to car calls, not to hall calls.
4. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
- a. Card-Reader Operation: System uses card readers at car control stations **OR** hall push-button stations, **as directed**, to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space as indicated for card reader in car **OR** Provide stripe-swipe card reader integral with each car control station, **as directed**.
 - 1) Security access system equipment is specified in Division 28 Section "Access Control".
OR
Security access system equipment is not in the Contract.
 - b. Keyswitch Operation: Push buttons are activated and deactivated by security keyswitches at car control stations **OR** hall push-button stations, **as directed**. Key is removable only in deactivated position **OR** in either position, **as directed**.
 - c. Keypad Operation: Allows each landing to be restricted or unrestricted. When a restricted landing button is pressed, a "Restricted Floor" lamp lights and remains lit until landing access code has been entered into a keypad or predetermined time period has elapsed. Car calls for restricted landings do not register until landing access code is entered into keypad within predetermined time period after landing button is pressed.
 - 1) Access codes are programmed at each car operating panel using a security keyswitch. Keypad operation can be activated and deactivated by security keyswitch at main landing.
 - d. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car **OR** all cars in a group, **as directed**, to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.
- C. Door Reopening Devices
1. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
 2. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.
- D. Finish Materials
1. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
 2. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
 3. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.
 4. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
 - a. Textured Stainless-Steel Sheet: Product with coined **OR** embossed, **as directed**, texture rolled into exposed surface.
 - 1) Metal surface is satin polished **OR** satin relieved **OR** titanium nitride colored **OR** oxide colored **OR** satin polished and titanium nitride colored **OR** satin relieved and

titanium nitride colored **OR** satin polished and oxide colored **OR** satin relieved and oxide colored **OR** color coated and satin relieved **OR** color coated and bright relieved, **as directed**, after rolling.

5. Stainless-Steel Bars: ASTM A 276, Type 304.
6. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
7. Bronze Plate and Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal).
8. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze).
9. Bronze Tubing: **ASTM B 135 (ASTM B 135M)**, Alloy UNS No. C23000 (red brass, 85 percent copper).
10. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063.
11. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500 or No. C77600.
12. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications **OR** Type HGL for flat applications, **as directed**, Type HGP for postformed applications and Type BKV for panel backing.

E. Car Enclosures

1. General: Provide enameled-steel car enclosures to receive removable **OR** steel-framed car enclosures with nonremovable, **as directed**, wall panels, with car **OR** removable car, **as directed**, roof, access doors, power door operators, and ventilation.
 - a. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
 - b. Provide finished car including materials and finishes specified below.
2. Materials and Finishes: Provide manufacturer's standards, but not less than the following:
 - a. Subfloor: Underlayment grade, exterior plywood, **5/8-inch (16-mm)** nominal thickness.
 - b. Floor Finish: Specified in a Division 07 **OR** Elevator manufacturer's standard level-loop nylon carpet; color as selected from manufacturer's full range, **as directed**.
 - c. Enameled-Steel Wall Panels: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - d. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
 - e. Bronze Wall Panels: Flush, hollow-metal construction; fabricated from bronze sheet.
 - f. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to **1/2-inch (13-mm)** fire-retardant-treated particleboard **OR** manufacturer's standard honeycomb core, **as directed**, with plastic-laminate panel backing and, **as directed**, manufacturer's standard protective edge trim. Panels have a flame-spread index of 25 **OR** 75, **as directed**, or less, when tested according to ASTM E 84. Plastic-laminate color, texture, and pattern as selected from plastic-laminate **OR** elevator, **as directed**, manufacturer's full range.
 - g. Fabricate car with recesses and cutouts for signal equipment.
 - h. Fabricate car door frame integrally with front wall of car.
 - i. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - j. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet **OR** by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning, **as directed**.
 - k. Bronze Doors: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - l. Plastic-Laminate Doors: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim matching return panels, **as directed**. Plastic-laminate color, texture, and pattern as selected from plastic-laminate **OR** elevator, **as directed**, manufacturer's full range.

- m. Sight Guards: Provide sight guards on car doors.
 - n. Sills: Extruded metal, with grooved surface, **1/4 inch (6.4 mm)** thick.
 - o. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
 - p. Metal **OR** Metallic-Finish, Plastic-Laminate, **as directed**, Ceiling: Flush panels, with incandescent downlights in the center of **OR** four low-voltage downlights in, **as directed**, each panel. Align ceiling panel joints with joints between wall panels, **as directed**.
 - q. Handrails: Manufacturer's standard handrails, of shape, metal, and finish indicated.
- F. Hoistway Entrances
- 1. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
 - a. Where gypsum board wall construction is indicated, provide self-supporting frames with reinforced head sections.
 - 2. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:
 - a. Enameled-Steel Frames: Formed from cold-rolled or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - b. Steel Subframes: Formed from cold-rolled or hot-rolled steel sheet with factory-applied enamel finish or corrosion-inhibiting primer. Fabricate to receive applied finish as indicated.
 - c. Stainless-Steel Frames: Formed from stainless-steel sheet.
 - d. Bronze Frames: Formed from cold-rolled or hot-rolled steel sheet, with enamel finish, and with formed-bronze sheet laminated to steel frames using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - e. Enameled-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected from manufacturer's full range.
 - f. Stainless-Steel Doors and Transoms: Flush, hollow-metal construction; fabricated from stainless-steel sheet **OR** by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning, **as directed**.
 - g. Bronze Doors and Transoms: Flush, hollow-metal construction; fabricated by laminating bronze sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
 - h. Plastic-Laminate Doors and Transoms: Flush, hollow-metal construction; fabricated by laminating plastic laminate to exposed faces of enameled cold-rolled steel doors and covering edges with protective edge trim matching door frames, **as directed**. Plastic-laminate color, texture, and pattern as selected from plastic-laminate **OR** elevator, **as directed**, manufacturer's full range.
 - i. Sight Guards: Provide sight guards on doors matching door edges.
 - j. Sills: Extruded metal, with grooved surface, **1/4 inch (6.4 mm)** thick.
 - k. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- G. Signal Equipment
- 1. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life incandescent lamps and acrylic or other permanent, nonyellowing translucent plastic diffusers **OR** LEDs, **as directed**.
 - 2. Car Control Stations: Provide manufacturer's standard recessed **OR** semirecessed, **as directed**, car control stations. Mount in return panel adjacent to car door, unless otherwise indicated.

OR

Swing-Return Car Control Stations: Provide car control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.

- a. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
- b. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
3. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
4. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet **OR** telephone jack, **as directed**, in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" **OR** "Zoned (dc Loop) Fire-alarm System"
5. Car Position Indicator: Provide illuminated, **as directed**, digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
 - a. Include travel direction arrows if not provided in car control station.
6. Hall Push-Button Stations: Provide one hall push-button station at each landing for each single elevator or group of elevators, but not less than one station for each four elevators in a group, **as directed**.
OR
Hall Push-Button Stations: Provide hall push-button stations at each landing as indicated.
 - a. Provide manufacturer's standard wall-mounted units.
 - b. Provide units with flat faceplate for mounting with body of unit recessed in wall.
 - c. Equip units with buttons for calling elevator and for indicating desired direction of travel.
 - d. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" **OR** "Zoned (dc Loop) Fire-alarm System".
7. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide one of the following, **as directed**:
 - a. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
 - b. Units with flat faceplate for mounting with body of unit recessed in wall and with illuminated elements projecting from faceplate for ease of angular viewing.
 - c. Units mounted in both jambs of entrance frame for each elevator, **as directed**.
 - d. Units mounted in both car door jambs; may be used only for single elevators or for two-car groups, **as directed**.
8. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
 - a. At manufacturer's option, audible signals may be placed on car **OR** each car, **as directed**.
9. Hall Position Indicators: Provide illuminated, **as directed**, digital-display-type position indicators, located above each, **as directed**, hoistway entrance at ground floor. Provide units with flat faceplate for mounting and with body of unit recessed in wall.
 - a. Integrate ground-floor hall lanterns with hall position indicators.
10. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open, **as directed**.
OR
Fire Command Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal

that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switch(es), as required by ASME A17.1, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

11. Corridor Call Station Pictograph Signs: Provide signs matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station, unless otherwise indicated.

H. Elevators

1. Elevator Description:

- a. Group Number: Insert a different number for each group of elevators that share a group operation system, as directed by the Owner.
- b. Elevator Number(s): Insert elevator number(s) as shown on Drawings, as directed by the Owner.
- c. Service Elevator Number(s): Insert elevator number(s) as shown on Drawings, as directed by the Owner.
- d. Type: Under-the-car single cylinder.
OR
 Type: Holeless, beside-the-car, single-acting, single **OR** dual, **as directed**, cylinder.
OR
 Type: Holeless, beside-the-car, telescoping, single **OR** dual, **as directed**, cylinder.
OR
 Type: Holeless, beside-the-car, roped hydraulic, single **OR** dual, **as directed**, cylinder.
- e. Rated Load: **2000 lb (908 kg) OR 2100 lb (953 kg) OR 2500 lb (1135 kg) OR 3000 lb (1362 kg) OR 3500 lb (1589 kg) OR 4000 lb (1816 kg) OR 4500 lb (2043 kg) OR 5000 lb (2270 kg), as directed.**
- f. Freight Loading Class for Service Elevators: Class A.
- g. Rated Speed: **75 or 80 fpm (0.38 or 0.41 m/s) OR 100 fpm (0.51 m/s) OR 125 fpm (0.64 m/s) OR 150 fpm (0.76 m/s) OR 175 fpm (0.89 m/s) OR 200 fpm (1.0 m/s), as directed.**
- h. Operation System: Single automatic **OR** Selective collective automatic **OR** Group automatic, **as directed**, operation.
- i. Auxiliary Operations:
 - 1) Standby power operation.
 - 2) Standby-powered lowering.
 - 3) Battery-powered lowering.
 - 4) Automatic dispatching of loaded car.
 - 5) Nuisance call cancel.
 - 6) Emergency hospital **OR** Priority, **as directed**, service at designated floors **OR** all floors, **as directed**.
 - 7) Independent service for service elevator **OR** all cars in group, **as directed**.
 - 8) Loaded-car bypass.
- j. Security Features: Card-reader operation **OR** Keyswitch operation **OR** Keypad operation **OR** Car-to-lobby feature, **as directed**.
- k. Dual Car Control Stations: Provide two car control stations in each elevator, **as directed**; equip only one with required keyswitches, if any.
- l. Car Enclosures:
 - 1) Inside Width: **64 inches (1626 mm) OR 68 inches (1727 mm) OR 80 inches (2032 mm) OR 92 inches (2337 mm), as directed**, from side wall to side wall.
 - 2) Inside Depth: **51 inches (1295 mm) OR 53 inches (1346 mm) OR 57 inches (1448 mm) OR 65 inches (1651 mm) OR 87-1/2 inches (2222 mm) OR 90 inches (2286 mm) OR 93 inches (2362 mm) OR 93-1/2 inches (2375 mm) OR 96 inches (2438 mm) OR 101 inches (2565 mm) OR 102 inches (2591 mm), as directed**, from back wall to front wall (return panels).

- 3) Inside Height: **88 inches (2235 mm) OR 92 inches (2337 mm) OR 94 inches (2388 mm) OR 100 inches (2540 mm) OR 104 inches (2642 mm) OR 108 inches (2743 mm) OR 112 inches (2845 mm)**, **as directed**, to underside of ceiling.
 - 4) Front Walls (Return Panels): Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**, with integral car door frames.
 - 5) Car Fixtures: Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
 - 6) Side and Rear Wall Panels: Enameled steel **OR** Plastic laminate **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel, **as directed**.
 - 7) Reveals: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
 - 8) Door Faces (Interior): Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Plastic laminate, **as directed**.
 - 9) Door Sills: Aluminum, mill finish **OR** Bronze, polished **OR** Nickel silver, polished, **as directed**.
 - 10) Ceiling: Luminous ceiling **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Reflective metallic-finish, plastic-laminate, stainless steel **OR** Reflective metallic-finish, plastic-laminate, bronze, **as directed**.
 - 11) Handrails: **1-1/2 inches (38 mm) round OR 1/2 by 2 inches (13 by 50 mm) rectangular, as directed**, mirror-polished stainless steel, No. 8 finish **OR** satin stainless steel, No. 4 finish **OR** mirror-polished bronze, lacquered **OR** satin bronze, lacquered, **as directed**, at sides **OR** sides and rear, **as directed**, of car.
 - 12) Floor: Manufacturer's standard carpet.
OR
 Floor prepared to receive carpet (specified in Division 09 Section "Sheet Carpeting").
OR
 Floor prepared to receive resilient tile (specified in Division 09 Section "Resilient Tile Flooring").
OR
 Floor prepared to receive sheet vinyl (specified in Division 09 Section "Resilient Sheet Flooring").
OR
 Floor recessed and prepared to receive dimension stone tile (specified in Division 09 Section "Stone Tiling") **OR** ceramic tile (specified in Division 09 Section "Tiling"), **as directed**.
OR
 Floor Thickness, Including Setting Materials: Thickness above plywood subfloor, shall be as directed by the Owner.
- m. Hoistway Entrances:
- 1) Width: **36 inches (914 mm) OR 42 inches (1067 mm) OR 48 inches (1219 mm) OR 54 inches (1372 mm)**, **as directed**.
 - 2) Height: **84 inches (2134 mm) OR 96 inches (2438 mm)**, **as directed**.
 - 3) Type: Single-speed side sliding **OR** Two-speed side sliding **OR** Single-speed center opening **OR** Two-speed center opening, **as directed**.
 - 4) Fire-Protection Rating: 1 hour **OR** 1-1/2 hours, **as directed**, with 30-minute temperature rise of **450 deg F (250 deg C)**, **as directed**.
 - 5) Frames at First Floor **OR** at Basement Floors, **as directed**: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.

- 6) Frames at Other Floors: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered, **as directed**.
- 7) Doors and Transoms at First Floor **OR** at Basement Floors, **as directed**: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Plastic laminate, **as directed**.
- 8) Doors and Transoms at Other Floors: Enameled steel **OR** Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Textured stainless steel **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Plastic laminate, **as directed**.
- 9) Sills at First Floor **OR** at Basement Floors, **as directed**: Aluminum, mill finish **OR** Bronze, polished **OR** Nickel silver, polished, **as directed**.
- 10) Sills at Other Floors: Aluminum, mill finish **OR** Bronze, polished **OR** Nickel silver, polished, **as directed**.
- n. Hall Fixtures at First Floor **OR** at Basement Floors, **as directed**: Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Recessed type with no exposed-metal surfaces, **as directed**.
- o. Hall Fixtures at Other Floors: Polished stainless steel, No. 8 finish **OR** Satin stainless steel, No. 4 finish **OR** Polished bronze, lacquered **OR** Satin bronze, lacquered **OR** Recessed type with no exposed-metal surfaces, **as directed**.
- p. Additional Requirements:
 - 1) Provide inspection certificate in each car, mounted under acrylic cover with frame made from polished stainless steel, No. 8 finish **OR** satin stainless steel, No. 4 finish **OR** polished bronze, lacquered **OR** satin bronze, lacquered, **as directed**.
 - 2) Provide blanket hooks in all cars, **as directed**, and one **OR** two, **as directed**, complete set(s) of full-height protective blankets.

1.3 EXECUTION

A. Examination

- 1. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Verify critical dimensions and examine supporting structure and other conditions under which elevator work is to be installed.
 - a. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.
 - b. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

- 1. Excavation for Cylinder: Drill well hole in each, **as directed**, elevator pit to accommodate installation of cylinder; comply with applicable requirements in Division 31 Section "Earth Moving".
- 2. Provide waterproof well casing as necessary to retain walls of well hole.
- 3. Install cylinder in protective casing within well hole. Before installing protective casing, remove water and debris from well hole and provide permanent waterproof seal at bottom of well casing, **as directed**.
 - a. Fill void space between protective casing and cylinder with corrosion protective filler.
 - b. Align cylinders and fill space around protective casing with fine sand.
- 4. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor. Seal between well **OR** protective, **as directed**, casing and pit floor with **4 inches (100 mm)** of nonshrink, nonmetallic grout.
- 5. Install cylinder plumb and accurately centered for elevator car position and travel. Anchor securely in place, supported at pit floor and braced at intervals as needed to maintain alignment. Anchor cylinder guides at spacing needed to maintain alignment and avoid overstressing guides.

14 - Conveying Equipment

6. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
7. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts designed to effectively prevent transmission of vibrations to structure and thereby eliminate sources of structure-borne noise from elevator system.
8. Install piping above the floor, where possible. Where not possible, install underground piping in Schedule 40 PVC pipe casing assembled with solvent-cemented fittings.
OR
Install piping above the floor, where possible. Where not possible, cover underground piping with permanent protective wrapping before backfilling.
9. Lubricate operating parts of systems as recommended by manufacturers.
10. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay installation of sills and frames until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
11. Leveling Tolerance: **1/4 inch (6 mm)**, up or down, regardless of load and direction of travel.
12. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
13. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
 - a. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - b. Place hall lanterns either above or beside each hoistway entrance.
 - c. Mount hall lanterns at a minimum of **72 inches (1829 mm)** above finished floor.

C. Field Quality Control

1. Acceptance Testing: On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
2. Advise Owner and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

D. Protection

1. Temporary Use: Limit temporary use for construction purposes to one elevator, **as directed**. Comply with the following requirements for each, **as directed**, elevator used for construction purposes:
 - a. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - b. Provide strippable protective film on entrance and car doors and frames.
 - c. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - d. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - e. Do not load elevators beyond their rated weight capacity.
 - f. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - g. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

E. Demonstration

1. Train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).

2. Check operation of each, **as directed**, elevator with Owner's personnel present and before date of Final Completion. Determine that operation systems and devices are functioning properly.
3. Check operation of each, **as directed**, elevator with Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 01 30 71a

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Task	Specification	Specification Description
14 01 30 71	14 31 00 00	Escalators
14 24 13 00	14 01 30 71a	Hydraulic Elevators

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SECTION 14 31 00 00 - ESCALATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for escalators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes high-traffic, interior and exterior escalators.

C. Definitions

1. High-Traffic Escalators: Escalators designed specifically for use where high-traffic volumes produce dense occupancy resulting in structural, machinery, and brake loads much higher than normal.
2. Defective Escalator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

D. Performance Requirements

1. Rated Speed: 90 fpm (0.46 m/s) or 100 fpm (0.5 m/s).
2. Braking Performance: Provide brakes that stop escalator in up-running mode at a rate no greater than 3 ft./s² (0.91 m/s²).
OR
Braking Performance: Provide brakes that produce a stopping force on escalator in up-running mode that is one-third that used in down-running mode.
3. Step/Skirt Performance Index: Not more than 0.15.
4. Structural and Mechanical Performance for High-Traffic Escalators: For the purpose of structural design, driving machine and power transmission calculations, and brake calculations, design high-traffic escalators for loads not less than 2 times the design loads required by ASME A17.1.
5. Structural Performance of Balustrades, Deck Barricades, and Handrails: Provide components and assemblies capable of withstanding the effects of loads indicated in ASCE 7 for handrail assemblies and guardrail systems.

E. Submittals

1. Product Data: Include capacities, sizes, performances, safety features, finishes, and similar information.
2. Shop Drawings: Show plans, elevations, sections, and details indicating coordination with building structure and relationships with other construction. Indicate variations from specified requirements, maximum loads imposed on building structure at points of support, and power requirements. Indicate access and ventilation for escalator machine space.
3. Samples: For exposed finishes, 3-inch- (75-mm-) square Samples of sheet materials, and 4-inch (100-mm) lengths of running trim members.
4. Manufacturer Certificates: Signed by manufacturer certifying that escalator layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for escalator system being provided.
5. Qualification Data: For Installer.
6. Operation and Maintenance Data: For escalators to include in emergency, operation, and maintenance manuals.
7. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted escalator use.

8. Warranty: Special warranty specified in this Section.

F. Quality Assurance

1. Installer Qualifications: Escalator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Source Limitations: Obtain escalators and moving walks, specified in another Division 14 Section, through one source from a single manufacturer.
3. Regulatory Requirements: Comply with ASME A17.1.

G. Delivery, Storage, And Handling

1. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.
2. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's recommendations to prevent damage, deterioration, or soiling.

H. Coordination

1. Coordinate installation of sleeves, block outs, escalator equipment with integral anchors, and other items that are embedded in concrete or masonry for escalator equipment. Furnish templates, sleeves, escalator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
2. Coordinate sequence of escalator installation with other work to avoid delaying the Work.
3. Coordinate locations and dimensions of other work relating to escalators including sumps and floor drains in pits, electrical service, and electrical outlets, lights, and switches in pits.

I. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective escalator work within specified warranty period.
 - a. Warranty Period: One year from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Stainless Steel: ASTM A 240/A 240M, Type 304 **OR** 316 **OR** 304, except use Type 316 for exterior escalators, **as directed**.
 - a. Satin Finish: No. 4 directional satin.
 - b. Polished Finish: No. 8 mirror polish.
 - c. Gold-Colored Satin Finish: No. 4 directional satin with gold-colored oxide or titanium nitride finish.
 - d. Gold-Colored Mirror Finish: No. 8 mirror polish with gold-colored oxide or titanium nitride finish.
2. Satin Bronze Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal), fine satin finish, lacquered.
3. Satin Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze), fine satin finish, lacquered.
4. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
5. Clear Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 1 (clear), Quality q3 (glazing, select), Kind FT (fully tempered), **[10.0] [12.0]** mm thick.
6. Tinted Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 2 (tinted), Quality q3 (glazing, select), Kind FT (fully tempered), **[10.0] [12.0]** mm thick.
 - a. Color: Bronze **OR** Gray **OR** Green, **as directed**.

B. Components

1. General: Provide preengineered escalators complying with requirements. Unless otherwise indicated, provide standard components as indicated in manufacturers' publications and as required for a complete escalator.
2. General: Provide high-traffic escalators complying with requirements. Unless otherwise indicated, provide heavy-duty components as indicated in manufacturers' publications and as required for a complete escalator.
 - a. Provide escalators with two **OR** three **OR** four, **as directed**, flat steps at top and bottom landings.
 - b. Fabricate exposed metalwork, including deck covers, balustrade panels, and trim to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use; increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as necessary. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
3. Opaque Balustrades: Manufacturer's standard profile or arrangement of moving handrails on fully paneled guide rail with interior balustrade panels, deck covers, skirts, trim, and accessories. Prepare for exterior finish below the deck covers, specified in another Section.
4. Transparent Balustrades: Manufacturer's standard profile or arrangement of moving handrails on guide rail that is supported by tempered glass panels, with deck covers, skirts, trim, and accessories. Prepare for exterior finish below the deck covers, specified in another Section.
5. Guards at Ceiling Intersection: Clear plastic.
6. Handrails: Smooth, jointless, reinforced neoprene.
 - a. Color: Black **OR** As selected from manufacturer's full range, **as directed**.
7. Deck Covers and Trim: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
8. Antislip Devices: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
9. Balustrade Interior Panels: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
10. Balustrade Exterior Panels and Escalator Soffits: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
11. Skirt Panels, if Applicable: Satin stainless steel **OR** Polished stainless steel **OR** Satin stainless steel with exposed surface coated with clear PTFE **OR** Steel panels with exposed surface coated with PTFE **OR** Manufacturer's standard low-friction material, **as directed**.
12. Steps: One-piece, die-cast aluminum with demarcation grooves at front and rear of tread surface.
 - a. Finish: Powder-coated, gray **OR** black, **as directed**.
 - b. Step Demarcation: Yellow inserts at sides and back of step treads.
 - c. Nosing Demarcation: **2-inch- (50-mm-)** wide yellow stripe at nosings of step treads.
13. Combs: Integrally colored structural plastic **OR** Cast aluminum **OR** Cast aluminum with powder-coated finish, **as directed**.
 - a. Comb Color: Yellow.
14. Floor Plates: Cast or extruded aluminum with grooved or patterned surface and mill finish.
15. Abrasive-Surface Floor Plates: Cast or extruded aluminum **OR** Stainless steel, **as directed**, with grooved or patterned surface and with abrasive material embedded in or metallurgically bonded to floor-plate surface and having a coefficient of friction of 0.6 or higher when tested according to ASTM C 1028.
16. Operational Control: Provide escalators designed and equipped to run equally in either direction. Provide key-operated switches for directional control and key-operated starter switches located on exterior deck above newel base at both upper and lower landings of escalators.

C. Features

1. Fault Indicator: Provide escalators with a microprocessor unit that monitors safety devices, motor temperature, and escalator speed and records in nonvolatile memory date, time, and device identification if a safety device is activated or escalator malfunctions.

- a. Provide built-in or plug-in unit to display recorded information.
2. Reduced-Current Starting: Provide escalator motors with wye-delta or solid-state starting.
3. Energy-Saving Feature: Provide escalator motors and controls designed for motors to run on partial windings (at reduced power) when not under full load.
4. Provide motors complying with NEMA MG 1, Insulation Class B.
5. Brake-Saving Feature: Provide stopping mechanism that allows escalator to coast to a stop before applying brakes, unless stopping is initiated by a safety device.
6. Equip step drive mechanism with automatic step-chain lubricators.
7. Oil Drip Pan: Provide metal pan under full width and length of escalator to collect and hold oil and grease drippings from lubricated components. Design and fabricate drip pan to sustain a load of **250 lbf (1.1 kN)** on a **1.0-sq. ft. (0.9-sq. m)** area at any location without permanent deflection.
8. Direction Indicator Lights: Provide red and green indicator lights at least **2 inches (50 mm)** in diameter in right-hand **OR** both, **as directed**, balustrade newels at both upper and lower landings. Green light indicates entrance end, and red light indicates exit end. When escalator is stopped, red lights are illuminated at both ends.
9. Combplate Lights: Provide recessed light fixtures with flush lenses mounted in skirt panels at each side of combplates designed to illuminate steps at combplate.
10. Overspeed Governor: Provide units with overspeed governor that is activated if speed of steps exceeds rated speed by more than 20 percent.
11. Upper-Landing, Step Upthrust Device: Activated if a step is displaced against upthrust track at upper curve in passenger-carrying line of track system.
12. Comb-Step Impact Device: Activated if a horizontal force in direction of travel is applied exceeding **112 lbf (500 N)** at either side or exceeding **225 lbf (1000 N)** at center of front edge of combplate, or a resultant force in upward direction is applied exceeding **150 lbf (688 N)** at center of front edge of combplate.

D. Exterior Escalators

1. Fabricate exposed components from stainless steel **OR** bronze, **as directed**, unless otherwise indicated.
2. Hot-dip galvanize escalator trusses and other structural components to comply with ASTM A 123/A 123M. Use only stainless-steel or zinc-plated fasteners for assembly of escalator components.
3. Fabricate oil drip pan from galvanized steel sheet. Provide drain and oil/water separator in oil drip pan.
4. Provide drains, weeps, and drips to prevent water accumulation on horizontal surfaces and to direct water away from electrical equipment and moving parts.
5. Provide enclosures complying with NEMA 250, Type 4 for electrical connections, switches, and equipment.
6. Provide totally enclosed motors complying with NEMA MG 1, Insulation Class B.
7. Equip step drive mechanism with automatic step-chain lubricators.
8. Provide electric heaters with integral thermostats in escalator truss space to maintain temperature above **40 deg F (4.4 deg C)**.
9. Equip combplates with 400-W electric heaters to prevent ice and snow accumulation.

1.3 EXECUTION

A. Examination

1. Examine escalator areas, with Installer present, for compliance with requirements, installation tolerances, and other conditions affecting performance. Examine supporting structure, machine spaces, and pits; verify critical dimensions; and examine conditions under which escalators are to be installed.
 - a. Proceed with installation only after unsatisfactory conditions have been corrected.

- b. For the record, prepare written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.

B. Installation

1. Comply with manufacturer's written instructions.
2. Set escalators true to line and level, properly supported, and anchored to building structure. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.
3. Adjust installed components for smooth, efficient operation, complying with required tolerances and free of hazardous conditions. Lubricate operating parts, including bearings, tracks, chains, guides, and hardware. Test operating devices, equipment, signals, controls, and safety devices. Install oil drip pans and verify that no oil drips outside of pans.
4. Repair damaged finishes so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

C. Field Quality Control

1. Acceptance Testing: On completion of escalator installation and before permitting use of escalators, perform acceptance tests as required and recommended by ASME A17.1 and by authorities having jurisdiction.
 - a. For escalators specified to comply with requirements more stringent than those of ASME A17.1, perform tests for compliance with specified requirements. Test optional safety devices.
2. Advise the Owner and authorities having jurisdiction in advance of dates and times tests are to be performed.

D. Demonstration

1. Train the Owner's maintenance personnel to operate, adjust, and maintain escalators.
2. Check operation of escalators with the Owner's personnel present and before date of Final Completion. Determine that operation systems and devices are functioning properly.
3. Check operation of escalators with the Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 31 00 00

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SECTION 14 32 00 00 - MOVING WALKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for moving walks. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes interior and exterior moving walks.

C. Definition

1. Defective Moving Walk Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; the need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.

D. Performance Requirements

1. Rated Speed: **90 fpm (0.45 m/s) OR 100 fpm (0.5 m/s) OR 120 fpm (0.6 m/s) OR 130 fpm (0.66 m/s) OR 150 fpm (0.76 m/s), as directed.**
2. Structural Performance of Balustrades, Deck Barricades, and Handrails: Provide components and assemblies capable of withstanding the effects of loads indicated in ASCE 7 for handrail assemblies and guardrail systems.

E. Submittals

1. Product Data: Include capacities, sizes, performances, safety features, finishes, and similar information.
2. Shop Drawings: Show plans, elevations, sections, and details indicating coordination with building structure and relationships with other construction. Indicate variations from specified requirements, maximum loads imposed on building structure at points of support, and power requirements. Indicate access and ventilation for moving walk machine space.
3. Samples: For exposed finishes, **3-inch- (75-mm-)** square Samples of sheet materials, and **4-inch (100-mm)** lengths of running trim members.
4. Manufacturer Certificates: Signed by manufacturer certifying that moving walk layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for moving walks being provided.
5. Operation and Maintenance Data: For moving walks to include in emergency, operation, and maintenance manuals.
6. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of moving walks.

F. Quality Assurance

1. Regulatory Requirements: Comply with ASME A17.1.

G. Delivery, Storage, And Handling

1. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.
2. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's recommendations to prevent damage, deterioration, or soiling.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective moving walk work within one year from date of Final Completion.

I. Maintenance Service

1. Initial Maintenance Service: Beginning at Final Completion, provide one years' full maintenance service by skilled employees of moving walk Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper moving walk operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.

1.2 PRODUCTS

A. General

1. Provide preengineered pallet- or belt-type moving walks complying with requirements.

B. Materials

1. Stainless Steel: ASTM A 240/A 240M, Type 304 **OR** 316 **OR** 304, except use Type 316 for exterior moving walks, **as directed**.
 - a. Satin Finish: No. 4 directional satin.
 - b. Polished Finish: No. 8 mirror polish.
 - c. Gold-Colored Satin Finish: No. 4 directional satin with gold-colored oxide or titanium nitride finish.
 - d. Gold-Colored Mirror Finish: No. 8 mirror polish with gold-colored oxide or titanium nitride finish.
2. Satin Bronze Sheet: ASTM B 36/B 36M, Alloy UNS No. C28000 (muntz metal), fine satin finish, lacquered.
3. Satin Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (architectural bronze), fine satin finish, lacquered.
4. Steel Sheet: Cold-rolled steel sheet, ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
5. Clear Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 1 (clear), Quality q3 (glazing, select), Kind FT (fully tempered), 10.0 **OR** 12.0, **as directed**, mm thick.
6. Tinted Tempered Glass: ASTM C 1048, Condition A (uncoated surfaces), Type 1 (transparent glass, flat), Class 2 (tinted), Quality q3 (glazing, select), Kind FT (fully tempered), 10.0 **OR** 12.0, **as directed**, mm thick.
 - a. Color: Bronze **OR** Gray **OR** Green, **as directed**.

C. Components

1. General: Unless otherwise indicated, provide standard components as indicated in manufacturers' publications and as required for a complete moving walk.
 - a. Fabricate exposed metalwork, including deck covers, balustrade panels, and trim to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use; increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as necessary. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
2. Opaque Balustrades: Manufacturer's standard profile or arrangement of moving handrails on fully paneled guide rail with interior balustrade panels, deck covers, skirts, trim, and accessories. Prepare for exterior finish below the deck covers, specified in another Section.
3. Transparent Balustrades: Manufacturer's standard profile or arrangement of moving handrails on guide rail that is supported by clear **OR** tinted, **as directed**, tempered glass panels, with deck covers, skirts, trim, and accessories. Prepare for exterior finish below the deck covers, specified in another Section.
4. Handrails: Smooth, jointless, reinforced neoprene.

- a. Color: Black **OR** As selected from manufacturer's full range, **as directed**.
5. Deck Covers and Trim: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
6. Balustrade Interior Panels: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
7. Balustrade Exterior Panels: Satin stainless steel **OR** Polished stainless steel **OR** Gold-colored satin stainless steel **OR** Gold-colored polished stainless steel **OR** Satin bronze, **as directed**.
8. Skirt Panels, if Applicable: Polished stainless steel **OR** Satin stainless steel with exposed surface coated with clear PTFE **OR** Steel panels with exposed surface coated with PTFE, **as directed**.
 - a. Clearance between skirt panels or overhanging balustrade panels and treadway shall not exceed **1/16 inch (1.6 mm)**.
9. Combs: Integrally colored structural plastic **OR** Cast aluminum **OR** Cast aluminum with powder-coated finish, **as directed**.
 - a. Comb Color: Yellow **OR** Black **OR** Gray **OR** Red, **as directed**.
10. Floor Plates: Cast or extruded aluminum **OR** Stainless steel, **as directed**, with grooved or patterned surface and mill finish.
11. Abrasive-Surface Floor Plates: Cast or extruded aluminum **OR** Stainless steel, **as directed**, with grooved or patterned surface and with abrasive material embedded in or metallurgically bonded to floor-plate surface and having a coefficient of friction of 0.6 or higher when tested according to ASTM C 1028.
12. Operational Control: Provide moving walks designed and equipped to run equally in either direction. Provide key-operated switches for directional control and key-operated starter switches located on exterior deck above newel base at both ends of moving walks.

D. Features

1. Fault Indicator: Provide moving walks with a microprocessor unit that monitors safety devices, motor temperature, and moving walk speed and records in nonvolatile memory date, time, and device identification if a safety device is activated or moving walk malfunctions.
 - a. Provide built-in or plug-in unit to display recorded information.
2. Reduced-Current Starting: Provide moving walk motors with wye-delta or solid-state starting.
3. Energy-Saving Feature: Provide moving walk motors and controls designed for motors to run on partial windings (at reduced power) when not under full load.
4. Brake-Saving Feature: Provide stopping mechanism that allows moving walks to coast to a stop before applying brakes, unless stopping is initiated by a safety device.
5. Equip pallet drive mechanism with automatic pallet drive-chain lubricators.
6. Oil Drip Pan: Provide metal pan under full width and length of moving walks to collect and hold oil and grease drippings from lubricated components. Design and fabricate drip pan to sustain a load of **250 lbf (1.1 kN)** on a **1.0-sq. ft. (0.09-sq. m)** area at any location without permanent deflection.
7. Direction Indicator Lights: Provide red and green indicator lights at least **2 inches (50 mm)** in diameter in right-hand **OR** both, **as directed**, balustrade newels at both landings. Green light indicates entrance end, and red light indicates exit end. When moving walk is stopped, red lights are illuminated at both ends.
8. Combplate Lights: Provide recessed light fixtures with flush lenses mounted in interior balustrade panels at each side of combplates designed to illuminate treadway at combplate.
9. Comb-Step Impact Device: Activated if a horizontal force in direction of travel is applied exceeding **112 lbf (500 N)** at either side or exceeding **225 lbf (1000 N)** at center of front edge of combplate, or a resultant force in upward direction is applied exceeding **150 lbf (688 N)** at center of front edge of combplate.

E. Exterior Moving Walks

1. Fabricate exposed components from stainless steel **OR** bronze, **as directed**, unless otherwise indicated.
2. Hot-dip galvanize moving walk trusses and other structural components to comply with ASTM A 123/A 123M. Use only stainless-steel or zinc-plated fasteners for assembly of moving walk components.

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3. Fabricate oil drip pan from galvanized steel sheet. Provide drain and oil/water separator in oil drip pan.
4. Provide drains, weeps, and drips to prevent water accumulation on horizontal surfaces and to direct water away from electrical equipment and moving parts.
5. Provide enclosures complying with NEMA 250, Type 4 for electrical connections, switches, and equipment.
6. Provide totally enclosed fan-cooled motors complying with NEMA MG 1, Insulation Class B.
7. Equip pallet drive mechanism with automatic pallet drive-chain lubricators.
8. Provide electric heaters with integral thermostats in moving walk truss space to maintain temperature above 40 deg F (4.4 deg C).
9. Equip combplates with 400-W electric heaters to prevent ice and snow accumulation.

1.3 EXECUTION

A. Installation

1. Comply with manufacturer's written instructions.
2. Set moving walks true to line and level, or to indicated slope, properly supported, and anchored to building structure. Use established benchmarks, lines, and levels to ensure dimensional coordination of the Work.
3. Adjust installed components for smooth, efficient operation, complying with required tolerances and free of hazardous conditions. Lubricate operating parts, including bearings, tracks, chains, guides, and hardware. Test operating devices, equipment, signals, controls, and safety devices. Install oil drip pans and verify that no oil drips outside of pans.
4. Repair damaged finishes so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

B. Field Quality Control

1. Acceptance Testing: On completion of moving walk installation and before permitting use of moving walks, perform acceptance tests as required and recommended by ASME A17.1 and by authorities having jurisdiction.
2. Advise the Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed.

C. Demonstration

1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to operate, adjust, and maintain moving walks.

END OF SECTION 14 32 00 00

SECTION 14 41 19 00 - WHEELCHAIR LIFTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wheelchair lifts. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Vertical and Private-residence, vertical platform lifts.
 - b. Inclined and Private-residence, inclined platform lifts.
 - c. Inclined and Private-residence, inclined stairway chairlifts.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For each lift. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For each type of exposed finish required.
4. Manufacturer Certificates: Signed by lift manufacturer certifying that runway, ramp or pit, and dimensions as shown on Drawings and that electrical service as shown and specified are adequate for lift being provided.
5. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted use of lifts.
6. Operation and Maintenance Data: For each type of lift to include in operation and maintenance manuals.
7. Warranty: Sample of special warranty.
8. Continuing maintenance proposal.

D. Quality Assurance

1. Legal Requirements: In addition to requirements of authorities having jurisdiction, comply with Americans with Disabilities Act (including the ADA Standards issued by the U.S. Department of Justice and the U.S. Department of Transportation and the United States Access Board's Guide to the ADA Standards, specifically Chapter 4. "Elevators and Platform Lifts" (available on-line at <https://www.access-board.gov>), **as directed**.
2. Fire-Rated, Runway-Enclosure Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 **OR** IBC Standard **OR** UL 10B, **as directed**.
 - a. Temperature-Rise Limit: Provide doors that have a maximum transmitted temperature end point of not more than **450 deg F (250 deg C)** above ambient after 30 minutes of standard fire-test exposure.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lifts that fail in materials or workmanship within two **OR** Four **OR** Five, **as directed**, years from date of Final Completion.

F. Maintenance Service

1. Initial Maintenance Service: Beginning at Final Completion, provide 12 months' full maintenance by skilled employees of lift Installer. Include quarterly preventive maintenance and repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper lift operation at rated speed and capacity. Provide parts and supplies the same as those used in the manufacture and installation of original equipment.
2. Continuing Maintenance Proposal: From Installer to the Owner, in the form of a standard yearly **OR** two-year **OR** five-year, **as directed**, maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.2 PRODUCTS

A. Materials

1. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Steel Tubing: ASTM A 500.
3. Steel Pipe: ASTM A 53/A 53M; standard weight (Schedule 40) unless otherwise indicated or required by structural loads.
4. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel (CS), Type B, exposed, matte finish.
5. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel (CS), Type B, pickled.
6. Galvanized-Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** zinc coating,
7. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
 - a. ASTM A 123/A 123M, for galvanizing steel and iron products.
 - b. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
8. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required:
 - a. Extruded Aluminum: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T6.
 - b. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 5005-H15.
9. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
10. Stainless-Steel Tubing: ASTM A 554, Grade MT-304.
11. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.
12. Stainless-Steel Floor Plate: ASTM A 793.
13. Wood and Wood Panel Products: Comply with requirements in Division 06 Section "Interior Architectural Woodwork".
14. Wood and Wood Panel Products:
 - a. Wood: Clear, vertical-grain, straight, kiln-dried wood, AWPA C20-02, Interior Type A, fire-retardant treated, **as directed**; of manufacturer's standard species.
 - b. Wood Panels: Provide wood panels consisting of wood veneer and wood panel as follows:
 - 1) Wood Veneer: Laminated to core with moisture-resistant adhesive.
 - 2) Plywood: DOC PS 1.
 - 3) Particleboard: ANSI A208.1, made with binder containing no urea formaldehyde, **as directed**.
 - 4) Medium-Density Fiberboard: ANSI A208.2, made with binder containing no urea formaldehyde, **as directed**.
 - c. Fire-Retardant-Treated Wood Panels: Provide wood panels consisting of wood veneer and AWPA C27-02 fire-retardant-treated wood panels. Panels shall have flame-spread index of 75 **OR** 25, **as directed**, or less and smoke-developed index of 450 or less per ASTM E 84.
 - 1) Wood Veneer: Laminated to core with moisture-resistant adhesive.
 - 2) Plywood: DOC PS 1.
 - 3) Particleboard: ANSI A208.1, made with binder containing no urea formaldehyde, **as directed**.

- 4) Medium-Density Fiberboard: ANSI A208.2, made with binder containing no urea formaldehyde, **as directed**.
 15. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light-stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and manufacturer's standard finish.
 16. Glass:
 - a. Comply with requirements in Division 08 Section "Glazing".
OR
As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**, and complying with ASME A18.1.
 - 1) Safety Glazing Products: Comply with testing requirements in 16 CFR 1201, Category II.
 - 2) Safety Glass Marking: Glass permanently marked with certification label of SGCC or another certification agency or manufacturer acceptable to authorities having jurisdiction.
 17. Acrylic Glazing: ASTM D 4802, Category A-1 (cell-cast) or Category A-2 (continuous cast), Finish 1 (smooth or polished), clear or tinted as indicated.
 18. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing structural members, guide rails, machines, and other lift components where installation of devices is specified in another Section.
 19. Expansion Anchors: Anchor-bolt-and-sleeve assembly of material indicated below with capability to sustain a load equal to 10 times the load imposed as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
 - a. Material:
 - 1) Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
OR
Group 1, Alloy 304 or Alloy 316, stainless-steel bolts and nuts complying with **ASTM F 593 (ASTM F 738M)** and **ASTM F 594 (ASTM F 836M)**.
 20. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.
- B. Vertical Platform Lifts
1. Private-Residence, **as directed**, Vertical Platform Lifts: Manufacturer's standard preengineered lift systems as indicated.
 2. Platform Size: **34 by 54 inches (864 by 1372 mm)** **OR** **35 by 48 inches (889 by 1220 mm)** **OR** **35 by 51 inches (889 by 1295 mm)** **OR** **36 by 56 inches (914 by 1422 mm)** **OR** **36 by 60 inches (914 by 1524 mm)**, **as directed**.
 3. Door Operation and Clear Opening Width: Low-energy, power-operated doors that remain open for 20 seconds minimum; end door with minimum **32-inch (815-mm)** and side door with minimum **42-inch (1065-mm)** clear opening width.
 4. Rated Speed: **8 fpm (0.04 m/s)** **OR** **10 fpm (0.05 m/s)** **OR** **12 fpm (0.06 m/s)** **OR** **15 fpm (0.08 m/s)** **OR** **20 fpm (0.10 m/s)** **OR** **22 fpm (0.11 m/s)** **OR** **30 fpm (0.15 m/s)**, **as directed**.
 5. Power Supply: 208 V, 60 Hz, 3 phase **OR** 240 V, 60 Hz, 1 phase **OR** 120 V, 60 Hz, 1 phase, **as directed**.
 6. Emergency Operation: Provide emergency manual operation and emergency battery power system **OR** connection to indicated standby (emergency) power, **as directed**, to raise or lower units in case of malfunction or power loss.
 7. Attendant Operation: Provide attendant operation at location shown.
 8. Self-Supporting Units: Support vertical loads of units only at base, with lateral support only at landing levels.
 9. Partial, **as directed**, Runway Enclosure: Manufacturer's standard weather-resistant, **as directed**, enclosure assembly.
 - a. Runway Enclosure: One of the following, **as directed**.
 - 1) Rectangular steel-tube frame with flush steel-sheet panels.
 - 2) Rectangular hot-dip-galvanized steel-tube frame with flush galvanized-steel-sheet panels.

- 3) Extruded-aluminum frame with flush galvanized-steel-sheet panels.
 - 4) Extruded-aluminum frame with flush aluminum-sheet panels; with hot-dip-galvanized steel-tube frame for structural framing that cannot be aluminum.
 - 5) Rectangular steel-tube frame with wood panels and trim.
 - 6) Rectangular wood frame with wood panels and trim.
 - 7) Rectangular steel-tube frame with fiberglass panels.
 - b. Glazed Runway Enclosure: Rectangular structure of glazed extruded-aluminum framing with a tinted, acrylic dome roof.
 - 1) Glazing:
 - a) Bronze-tinted acrylic glazing, 6.0 mm thick.
OR
Bronze-tinted, float glass **OR** tempered safety **OR** laminated safety, **as directed**, glass, 6.0 mm thick, where indicated.
 - c. Runway-Enclosure Doors: One of the following, **as directed**:
 - 1) Rectangular steel-tube frames with flush steel-sheet panels.
 - 2) Rectangular steel-tube frames glazed with 6.0-mm-thick, clear acrylic glazing and with **12-inch- (300-mm-)** high, steel kick panels.
 - 3) Wide-stile aluminum entrance doors glazed with bronze-tinted tempered safety glass, 6.0 mm thick.
 - 4) Enclosure doors matching appearance of adjacent glass-supported railings, complying with Division 05 Section "Decorative Metal Railings".
 - d. Fire-Rated Runway-Enclosure Door: Provide fire-rated runway-enclosure door where shown **OR** at upper landing **OR** at lower landing, **as directed**.
 - 1) Fire-Protection Rating: 1-1/2 hours.
 - 2) Equip door with wired glass vision panel, delay-action door closer, dead latch, dummy trim door handle, and electric strike.
10. Platform: One of the following, **as directed**:
- a. Galvanized-steel sheet with black rubber flooring.
 - b. Stainless-steel floor plate with checkered texture.
 - c. Aluminum floor plate with nonskid surface texture.
11. Platform Low-Profile Carriage: Fabricate platform floor assembly to total thickness not exceeding **1-1/2 inches (38 mm)**.
12. Platform Enclosure and Door: One of the following, **as directed**:
- a. Rectangular steel-tube frame with flush steel-sheet panels.
 - b. Rectangular hot-dip-galvanized steel-tube frame with flush galvanized-steel-sheet panels.
 - c. Extruded-aluminum frame with flush galvanized-steel-sheet panels.
 - d. Extruded-aluminum frame with flush aluminum-sheet panels; with hot-dip-galvanized steel-tube frame for structural framing that cannot be aluminum.
 - e. Rectangular steel-tube frame with wood panels and trim.
 - f. Rectangular steel-tube frame with fiberglass panels.
 - g. Enclosure walls and doors matching appearance of adjacent glass-supported railings, complying with Division 05 Section "Decorative Metal Railings".
13. Platform Top: Provide a non-load-bearing top, matching construction of enclosure walls. Permanently mark top to indicate that it cannot sustain a load.
14. Fixed Ramp: Provide fixed ramp matching platform to provide transition from floor to lift platform at bottom landing.
15. Retractable Ramp: Provide ramp matching platform to provide transition from lower floor to lift platform. Ramp lowers to floor automatically when lifts reach lower landing and door opens. Ramp rises automatically when lift control is activated for lift to leave lower landing.
 - a. Ramp Size: End ramps a minimum of **32 inches (815 mm)** and side ramps a minimum of **42 inches (1065 mm)** wide; length as required for slope.
 - b. Ramp Slope: As indicated **OR** Maximum 1:12, **as directed**.
 - c. Ramp Finish: Finish ramps to match lift platform **OR** Ramp finish is specified elsewhere as indicated, **as directed**.
16. Accessories: Provide units with the following accessories:

- a. Fold-down seat with armrests and safety belt.
 - b. Forced Ventilation System: Minimum 1 air change per minute, continuously operating **OR** thermostatically controlled to activate at **90 deg F (32.22 deg C)** , **as directed**, and with auxiliary power source to operate ventilation for 1 hour in case of power failure.
 - c. Lighting system within lift enclosures as indicated on Drawings **OR** selected from manufacturer's available products, **as directed**.
- C. Inclined Platform Lifts
1. Private-Residence, **as directed**, Inclined Platform Lifts: Manufacturer's standard preengineered lift systems as indicated.
 2. Platform Size: **29 by 33 inches (737 by 838 mm) OR 28 by 35 inches (711 by 889 mm) OR 30 by 35 inches (760 by 889 mm) OR 30 by 36 inches (760 by 914 mm) OR 31 by 39 inches (787 by 991 mm) OR 30 by 41 inches (760 by 1041 mm) OR 30 by 42 inches (760 by 1067 mm) OR 31 by 43 inches (787 by 1092 mm) OR 30 by 48 inches (760 by 1220 mm)**, **as directed**.
 3. Door Operation and Clear Opening Width: Low-energy, power-operated doors that remain open for 20 seconds minimum; end door with minimum **32-inch (815-mm)** and side door with minimum **42-inch (1065-mm)** clear opening width.
 4. Rated Speed: **20 fpm (0.10 m/s) OR 22 fpm (0.11 m/s) OR 25 fpm (0.13 m/s) OR 30 fpm (0.15 m/s)**, **as directed**.
 5. Minimum Headroom Clearance during Travel: Minimum of **80 inches (2032 mm)** above any point on platform floor.
 6. Power Supply: 208 V, 60 Hz, 3 phase **OR** 240 V, 60 Hz, 1 phase **OR** 120 V, 60 Hz, 1 phase, **as directed**.
 7. Emergency Operation: Provide emergency manual operation and emergency battery power system **OR** connection to indicated standby (emergency) power, **as directed**, to raise or lower units in case of malfunction or power loss.
 8. Attendant Operation: Provide attendant operation at location shown.
 9. Platform: One of the following, **as directed**:
 - a. Galvanized-steel sheet with black rubber flooring.
 - b. Stainless-steel floor plate with checkered texture.
 - c. Aluminum floor plate with nonskid surface texture.
 10. Automatic Folding Platforms: When not in use, platforms automatically fold up against wall to minimize projection into stairway.
 11. Manual Folding Platforms: When not in use, platforms can be folded up against wall to minimize projection into stairway.
 12. Platform Guarding: Guard platform with passenger restraining arms **OR** enclosure, **as directed**.
 - a. Passenger Restraining Arms: Steel **OR** Galvanized-steel **OR** Stainless-steel, **as directed**, tubing, manually **OR** power, **as directed**, operated.
 - b. Platform Enclosure (Side Walls and Self-Closing Door): One of the following, **as directed**:
 - 1) Rectangular steel-tube frame with flush steel-sheet panels.
 - 2) Enclosure walls and doors matching appearance of adjacent glass-supported railings, complying with Division 05 Section "Decorative Metal Railings".
 13. Platform Guarding: Guard platform with automatically **OR** manually, **as directed**, actuated, retractable metal guard on lower access end of platform.
 14. Fixed Ramp: Provide fixed ramp matching platform to provide transition from floor to lift platform at bottom landing.
 15. Retractable Ramp: Provide ramp matching platform to provide transition from floor to lift platform. Ramp lowers to floor automatically when lifts reach landing and enclosure door opens. Ramp rises automatically when lift control is activated for lift to leave landing.
 - a. Ramp Size: End ramps a minimum of **32 inches (815 mm)** and side ramps a minimum of **42 inches (1065 mm)** wide; length as required for slope.
 - b. Ramp Slope: As indicated **OR** Maximum 1:12, **as directed**.
 - c. Ramp Finish: Finish ramps to match lift platform **OR** Ramp finish is specified elsewhere as indicated, **as directed**.

16. Supporting Structure: Provide framing to support vertical loads from floor or stair treads and only lateral loads from walls. Fabricate framing from steel **OR** stainless-steel, **as directed**, rectangular tubing, plates, shapes, and bars.
 17. Guide Rails: Fabricate from steel **OR** stainless-steel, **as directed**, tubing.
 18. Accessories: Provide units with the following accessories:
 - a. Fold-down seat with armrests and safety belt.
 - b. Caution sign as required by ASME A18.1.
- D. Inclined Stairway Chairlifts
1. Private-Residence, **as directed**, Inclined Stairway Chairlifts: Manufacturer's standard preengineered lift systems as indicated.
 2. Systems and Machinery: Manufacturer's standard preengineered lift systems as indicated in published product literature and as follows:
 - a. Rated Capacity: Minimum **250 lb (113 kg) OR 400 lb (181 kg), as directed**.
 - b. Rated Speed: **18 fpm (0.09 m/s) OR 20 fpm (0.10 m/s) OR 22 fpm (0.11 m/s) OR 25 fpm (0.13 m/s), as directed**.
 3. Power Supply: 120 V, 60 Hz, 1 phase.
 4. Battery Operation: Provide battery-operated drive with automatic charging system.
 5. Manual Lowering: Provide means to manually lower units in case of malfunction or power loss.
 6. Folding Units: Provide units that can be folded up against wall when not in use, to minimize projection into stairway.
 7. Supporting Structure: Provide brackets to support vertical loads from floor or stair treads and to support lateral loads from walls. Fabricate brackets from steel plates, shapes, or bars.
 8. Accessories: Provide units with the following accessories:
 - a. Tubular-steel, manually operated safety arms designed to restrain and provide grab bar for occupant.
 - b. Retractable seat belt.
 - c. Seat with back and two handgrips or arms.
- E. General Finish Requirements
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
 3. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- F. Finishes
1. Steel and Galvanized-Steel Factory Finish:
 - a. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard 2-coat, baked-on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat.
 - b. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard, thermosetting polyester or acrylic urethane powder coating with a cured film thickness not less than **1.5 mils (0.04 mm)**.
 - c. Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
 2. Stainless-Steel Finishes:
 - a. Floor Plate Finish: Mill **OR** Abrasive blasted, **as directed**.
 - b. Grab Rail Finish: As selected from manufacturer's full range **OR** Directional satin finish No. 4, **as directed**.
 3. Aluminum Finishes:
 - a. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm **OR** AA-M12C22A31, Class II, 0.010 mm, **as directed**, or thicker.

- b. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm **OR** AA-M12C22A32/A34, Class II, 0.010 mm, **as directed**, or thicker.
 - 1) Color: As selected from full range of industry colors and color densities.
- c. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard, thermosetting polyester or acrylic urethane powder coating with a cured film thickness not less than **1.5 mils (0.04 mm)**.
 - 1) Color and Gloss: As selected from manufacturer's full range.
- 4. Wood Finish:
 - a. As specified in Division 09 Section "Staining And Transparent Finishing".
OR
As selected from manufacturer's full range, as follows:
 - 1) Type: Transparent finish **OR** Transparent finish over stain, **as directed**, over wood variety indicated.
- 5. Fiberglass Color and Gloss: As selected from manufacturer's full range.

1.3 EXECUTION

A. Installation

- 1. Wiring Method: Conceal conductors and cables within housings of units or building construction. Do not install conduit exposed to view in finished spaces. Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.
- 2. Coordinate runway doors with platform travel and positioning, for accurate alignment and minimum clearance between platforms, runway doors, sills, and door frames.
- 3. Position sills accurately and fill space under sills solidly with nonshrink, nonmetallic grout.
- 4. Coordinate platform doors with platform travel and positioning.
- 5. Adjust stops for accurate stopping and leveling at each landing, within required tolerances.
 - a. Leveling Tolerance: **1/4 inch (6 mm)** up or down, regardless of load and direction of travel.
- 6. Adjust retractable ramps to meet maximum allowable slope and change-in-elevation requirements, and to lie fully against landing surfaces.
- 7. Lubricate operating parts of lift, including drive mechanism, guide rails, hinges, safety devices, and hardware.
- 8. Test safety devices and verify smoothness of required protective enclosures and fascias

B. Field Quality Control

- 1. Acceptance Testing: On completion of lift installation and before permitting use of lifts, perform acceptance tests as required and recommended by ASME A18.1 and authorities having jurisdiction.
- 2. Operating Test: In addition to above testing, load lifts to rated capacity and operate continuously for 30 minutes between lowest and highest landings served. Readjust stops, signal equipment, and other devices for accurate stopping and operation of system.
- 3. Advise the Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on lifts.

C. Demonstration

- 1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain lifts. Include a review of emergency systems and emergency procedures to be followed at time of operational failure and other building emergencies.

END OF SECTION 14 41 19 00

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Task	Specification	Specification Description
14 42 13 00	14 41 19 00	Wheelchair Lifts
14 42 16 00	14 41 19 00	Wheelchair Lifts

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SECTION 21 05 13 00 - COMMON MOTOR REQUIREMENTS FOR FIRE SUPPRESSION EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on alternating-current power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.2 COORDINATION

- A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - 1. Motor controllers.
 - 2. Torque, speed, and horsepower requirements of the load.
 - 3. Ratings and characteristics of supply circuit and required control sequence.
 - 4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

- A. Comply with requirements in this Section except when stricter requirements are specified in equipment schedules or Sections.
- B. Comply with NEMA MG 1 unless otherwise indicated.
- C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

- A. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of 3300 ft. (1000 m) above sea level.
- B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

- A. Description: NEMA MG 1, Design B, medium induction motor.
- B. Efficiency: Premium efficient, as defined in NEMA MG 1.

- C. Service Factor: 1.15.
- D. Multispeed Motors: Variable torque.
 - 1. For motors with 2:1 speed ratio, consequent pole, single winding.
 - 2. For motors with other than 2:1 speed ratio, separate winding for each speed.
- E. Multispeed Motors, Multiple Winding: Separate winding for each speed.
- F. Rotor: Random-wound, squirrel cage.
- G. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
- H. Temperature Rise: Match insulation rating.
- I. Insulation: **[Class F]** or as directed by the Owner .
- J. Code Letter Designation:
 - 1. Motors **[15]** HP or as directed by the Owner and Larger: NEMA starting Code F or Code G.
 - 2. Motors Smaller Than **[15]** HP or as directed by the Owner : Manufacturer's standard starting characteristic.
- K. Enclosure Material: Cast iron for motor frame sizes **[324T]** and larger or as directed by the Owner ; rolled steel for motor frame sizes smaller than **[324T]** or as directed by the Owner .

2.4 ADDITIONAL REQUIREMENTS FOR POLYPHASE MOTORS

- A. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- B. Motors Used with Variable-Frequency Controllers:**[Ratings, characteristics, and features coordinated with and approved by controller manufacturer.]**
 - 1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width-modulated inverters.
 - 2. Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - 3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - 4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

2.5 SINGLE-PHASE MOTORS

- A. Motors larger than 1/20 hp must be one of the following, to suit starting torque and requirements of specific motor application:
 - 1. Permanent-split capacitor.
 - 2. Split phase.
 - 3. Capacitor start, inductor run.
 - 4. Capacitor start, capacitor run.

- B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- D. Motors 1/20 HP and Smaller: Shaded-pole type.
- E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device will automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 21 05 13 00

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Task	Specification	Specification Description
21 05 19 00	01 22 16 00	No Specification Required
21 05 19 00	22 05 19 00	Meters and Gages for Plumbing Piping
21 05 19 00	23 05 19 00	Meters and Gages for HVAC Piping
21 05 19 00	33 14 00 00	Water Distribution

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SECTION 21 05 48 13 - VIBRATION AND SEISMIC CONTROLS FOR FIRE-SUPPRESSION PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Elastomeric isolation pads.
2. Elastomeric isolation mounts.
3. Restrained elastomeric isolation mounts.
4. Elastomeric hangers.
5. Snubbers.
6. Restraints - rigid type.
7. Restraints - cable type.
8. Restraint accessories.
9. Post-installed concrete anchors.
10. Concrete inserts.

B. Related Requirements:

1. Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment" for devices for plumbing equipment and systems.
2. Section 230548 "Vibration and Seismic Controls for HVAC" for devices for HVAC equipment and systems.

1.2 DEFINITIONS

- A. Designated Seismic System: A fire-suppression component that requires design in accordance with ASCE/SEI 7, Ch. 13 and for which the Component Importance Factor is greater than 1.0.
- B. IBC: International Building Code.
- C. OSHPD: Office of Statewide Health Planning and Development (for the State of California).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Include load rating for each wind-load-restraint fitting and assembly.
3. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of vibration isolation device and seismic-[**and wind-load-**]restraint component.
4. Annotate types and sizes of seismic restraints and accessories, complete with listing markings or report numbers and load rating in tension and compression as evaluated by **[ICC-ES product listing] [UL product listing] [FM Approvals] [an evaluation service member of ICC-ES] [OSHPD] [an agency acceptable to authorities having jurisdiction]**.
5. Annotate to indicate application of each product submitted and compliance with requirements.

6. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.

B. Shop Drawings:

1. Detail fabrication and assembly of equipment bases.
2. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.

C. Delegated Design Submittal:

1. For each seismic-restraint **[and]** **[wind-load protection]** device, including **[seismic-restrained mounting,]** **[pipe-riser resilient support,]** **[snubber,]** **[seismic restraint,]** **[seismic-restraint accessory,]** **[and]** **[concrete anchor and insert]** that is required by this Section or is indicated on Drawings, submit the following:
 - a. Seismic-**[and Wind-Load-]**Restraint Selection: Select seismic **[and wind-load]** restraints complying with performance requirements, design criteria, and analysis data.
 - b. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, and seismic loads. Include certification by professional engineer that riser system was examined for excessive stress and that none exists.
 - c. Post-Installed Concrete Anchors and Inserts: Include calculations showing anticipated seismic **[and wind]** loads. Include certification that device is approved by an NRTL for seismic reinforcement use.
 - d. Seismic Design Calculations: Submit all input data and loading calculations prepared under "Seismic Design Calculations" Paragraph in "Performance Requirements" Article.
 - e. Wind-Load Design Calculations: Submit all static and dynamic loading calculations prepared under "Wind-Load Design Calculations" in "Performance Requirements" Article.
 - f. Qualified Professional Engineer: All designated-design submittals for seismic **[and wind-load-restraint]** calculations are to be signed and sealed by qualified professional engineer responsible for their preparation.
2. Seismic-**[and Wind-Load-]**Restraint Detail Drawing:
 - a. Design Analysis: To support selection and arrangement of seismic **[and wind]** restraints. Include calculations of combined tensile and shear loads.
 - b. Details: Indicate fabrication and arrangement. Detail attachments of restraints to restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - c. Coordinate seismic restraint details with wind-load restraint details required for equipment mounted outdoors. Comply also with requirements in other Sections for equipment mounted outdoors.
3. Product Listing, Preapproval, and Evaluation Documentation: By **[an evaluation service member of ICC-ES]** **[UL]** **[FM Approvals]** **[OSHPD]** **[an agency acceptable to authorities having jurisdiction]**, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
4. All delegated design submittals for seismic-**[and wind-load-]**restraint detail Drawings are to be signed and sealed by qualified professional engineer responsible for their preparation.

- D. Riser Supports: Include riser diagrams and calculations showing anticipated expansion and contraction at each support point, initial and final loads on building structure, and seismic loads. Include certification that riser system was examined for excessive stress and that none exists.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Show coordination of seismic bracing for fire-suppression piping and equipment with other systems and equipment in the vicinity, including other supports and restraints, if any.
- B. Qualification Data: For **[professional engineer]** **[and]** **[testing agency]**.
- C. Welding certificates.
- D. Field quality-control reports.
- E. Seismic Qualification Data: Provide special certification for designated seismic systems as indicated in **[ASCE/SEI 7-05,]** **[ASCE/SEI 7-10,]** **[ASCE/SEI 7-16,]** Paragraph 13.2.2, "Special Certification Requirements for Designated Seismic Systems" for all Designated Seismic Systems identified as such on Drawings or in the Specifications.
 - 1. Provide equipment manufacturer's written certification for each designated active fire-suppression system seismic device and system, stating that it will remain operable following the design earthquake. Certification must be based on requirements of ASCE/SEI 7 and **AHRI 1270 (AHRI 1271)**, including shake table testing per ICC-ES AC156 or a similar nationally recognized testing standard procedure acceptable to authorities having jurisdiction **[or]** **[experience data as permitted by]** **[ASCE/SEI 7-05]** **[ASCE/SEI 7-10]** **[ASCE/SEI 7-16]**.
 - 2. Provide equipment manufacturer's written certification that components with hazardous contents maintain containment following the design earthquake by methods required in **[ASCE/SEI 7-05]** **[ASCE/SEI 7-10]** **[ASCE/SEI 7-16]**.
 - 3. Submit evidence demonstrating compliance with these requirements for approval to authorities having jurisdiction after review and acceptance by a licensed professional engineer.
 - 4. The following fire-suppression systems and components are Designated Seismic Systems and require written special certification of seismic qualification by manufacturer:
 - a. as directed by the Owner .
- F. Wind-Load Performance Certification: Provide special certification for fire-suppression system components subject to high-wind exposure and impact damage and designated on Drawings or in the Specifications to require wind-load performance certification.
 - 1. Provide equipment manufacturer's written certification for each designated fire-suppression system device, stating that it will remain in place and operable following the design wind event and comply with all requirements of authorities having jurisdiction.
 - 2. Certification must be based on ICC-ES or similar nationally recognized testing standard procedures acceptable to authorities having jurisdiction.
 - 3. The following fire-suppression system systems and components require special certification for high wind performance. Written special certification of resistance to the effects of high wind load and impact damage must be provided by manufacturer.
 - a. as directed by the Owner .

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7 and that is acceptable to authorities having jurisdiction.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Seismic-[**and Wind-Load**]-Restraint Device Load Ratings: Devices to be tested and rated in accordance with applicable code requirements and authorities having jurisdiction. Devices to be listed by a nationally recognized third party that requires periodic follow-up inspections and has a listing directory available to the public. Provide third-party listing by one or more of the following: **[ICC-ES product listing] [UL product listing] [FM Approvals] [an evaluation service member of ICC-ES] [an agency acceptable to authorities having jurisdiction]**.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic[**and wind-load**] control system.
 - 1. Seismic Performance: Equipment must be designed and secured to withstand the effects of earthquake motions determined in accordance with NFPA 13 and **[ASCE/SEI 7-05] [ASCE/SEI 7-10] [ASCE/SEI 7-16]** or as directed by the Owner .
 - 2. Wind-Load Performance: Equipment must be designed and secured to withstand the effects of high wind events determined in accordance with **[ASCE/SEI 7-05] [ASCE/SEI 7-10] [ASCE/SEI 7-16]** or as directed by the Owner .
- B. Seismic Design Calculations:
 - 1. Perform calculations to obtain force information necessary to properly select seismic-restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to applicable code authorities and as presented in **[NFPA 13] [and] [ASCE/SEI 7-05] [ASCE/SEI 7-10 including supplement No. 1] [ASCE/SEI 7-16] ASCE/SEI 7 edition or other seismic calculation method required by authorities having jurisdiction as directed by the Owner .** Where "ASCE/SEI 7" is used throughout this Section, it is to be understood that the edition referred to in this subparagraph is the edition intended as reference throughout the Section Text.
 - a. Data indicated below to be determined by Delegated Design Contractor must be obtained by Contractor and must be included in individual component submittal packages.
 - b. Coordinate seismic design calculations with wind-load calculations for equipment mounted outdoors. Comply with requirements in other Sections in addition to those in this Section for equipment mounted outdoors.
 - c. Building Occupancy Category: **[I] [II] [III] [IV]**.
 - d. Building Risk Category: **[I] [II] [III] [IV]**.
 - e. Building Site Classification: **[A] [B] [C] [D] [E] [F]**.

2. Calculation Factors, ASCE/SEI 7-16, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-16 unless otherwise noted.
 - a. Horizontal Seismic Design Force F_p : Value is to be calculated by Delegated Design Contractor using Equation 13.3-1. Factors below must be obtained for this calculation:
 - 1) S_{DS} = Spectral Acceleration: **Value as directed by the Owner** . Value applies to all components on Project.
 - 2) a_p = Component Amplification Factor: See Drawing Schedule for each component.
 - 3) I_p = Component Importance Factor: See Drawing Schedule for each component.
 - 4) W_p = Component Operating Weight: For each component. Obtain by Delegated Design Contractor from each component submittal.
 - 5) R_p = Component Response Modification Factor: See Drawing Schedule for each component.
 - 6) z = Height in Structure of Point of Attachment of Component for Base: Determine from Project Drawings for each component by Delegated Design Contractor. For items at or below the base, "z" is to be taken as zero.
 - 7) h = Average Roof Height of Structure for Base: Determine from Project Drawings by Delegated Design Contractor.
 - b. Vertical Seismic Design Force: Calculated by Delegated Design Contractor using method explained in ASCE/SEI 7-16, Paragraph 13.3.1.2.
 - c. Seismic Relative Displacement D_{pi} : Calculated by Delegated Design Contractor using methods explained in ASCE/SEI 7-16, Paragraph 13.3.2. Factors below must be obtained for this calculation:
 - 1) D_p = Relative Seismic Displacement that Each Component Must Be Designed to Accommodate: Calculated by Delegated Design Contractor in accordance with ASCE/SEI 7-16, Paragraph 13.3.2.
 - 2) I_e = Structure Importance Factor: **Value as directed by the Owner** . Value applies to all components on Project.
 - 3) δ_{xA} = Deflection at Building Level x of Structure A: See Drawing Schedule for each component.
 - 4) δ_{yA} = Deflection at Building Level y of Structure A: See Drawing Schedule for each component.
 - 5) δ_{yB} = Deflection at Building Level y of Structure B: See Drawing Schedule for each component.
 - 6) h_x = Height of Level x to which Upper Connection Point Is Attached: Determine for each component by Delegated Design Contractor from Project Drawings and manufacturer's data.
 - 7) h_y = Height of Level y to which Upper Connection Point Is Attached: Determine for each component by Delegated Design Contractor from Project Drawings and manufacturer's data.
 - 8) Δ_{aA} = Allowable Story Drift for Structure A: See Drawing Schedules for each component.
 - 9) Δ_{aB} = Allowable Story Drift for Structure B: See Drawing Schedules for each component.
 - 10) h_{sx} = Story Height Used in the Definition of the Allowable Drift Δ_a : See Drawings Schedules for each component.
 - d. Component Fundamental Period T_p : Calculated by Delegated Design Contractor using methods explained in ASCE/SEI 7-16, Paragraph 13.3.3. Factors below must be obtained for this calculation:

- 1) W_p = Component Operating Weight: Determined by contractor from Project Drawings and manufacturer's data.
 - 2) g = Gravitational Acceleration: [32.17 fps² (9.81 m/s²)] or as directed by the Owner .
 - 3) K_p = Combined Stiffness of Component, Supports, and Attachments: Determined by delegated design seismic engineer. **Value** as directed by the Owner .
3. Calculation Factors, ASCE/SEI 7-10, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-10 unless otherwise noted.
- a. Horizontal Seismic Design Force F_p : Calculated by Delegated Design Contractor by ASCE/SEI 7-10, Equation 13.3-1. Factors below must be obtained for this calculation:
 - 1) S_{DS} = Spectral Acceleration: **Value as directed by the Owner** . Value applies to all components on Project.
 - 2) a_p = Component Amplification Factor: See Drawing Schedule for each component.
 - 3) I_p = Component Importance Factor: See Drawing Schedule for each component.
 - 4) W_p = Component Operating Weight: For each component. Obtain by Delegated Design Contractor from equipment submittal.
 - 5) R_p = Component Response Modification Factor: See Drawing Schedule for each component.
 - 6) z = Height in Structure of Point of Attachment of Component for Base: Determined from Project Drawings for each component by Contractor. For items at or below the base, "z" is to be taken as zero.
 - 7) h = Average Roof Height of Structure for Base: Determine from Project Drawings by Delegated Design Contractor.
 - b. Vertical Seismic Design Force: Calculate by Delegated Design Contractor using method explained in ASCE/SEI 7-10, Paragraph 13.3.1.
 - c. Seismic Relative Displacement D_p : Calculate by Delegated Design Contractor using methods explained in ASCE/SEI 7-10, Paragraph 13.3.2. Factors below must be obtained for this calculation:
 - 1) D_p = Relative Seismic Displacement that Each Component Must Be Designed to Accommodate: Calculate by Delegated Design Contractor in accordance with ASCE/SEI 7-10, Paragraph 13.3.2.
 - 2) I_e = Structure Importance Factor: **Value as directed by the Owner** . Value applies to all components on Project.
 - 3) δ_{xA} = Deflection at Building Level x of Structure A: See Drawing Schedule for each component.
 - 4) δ_{yA} = Deflection at Building Level y of Structure A: See Drawing Schedule for each component.
 - 5) δ_{yB} = Deflection at Building Level y of Structure B: See Drawing Schedule for each component.
 - 6) h_x = Height of Level x to which Upper Connection Point Is Attached: Determine for each component by Delegated Design Contractor from Project Drawings and manufacturer's data.
 - 7) h_y = Height of Level y to which Upper Connection Point Is Attached: Determine for each component by Delegated Design Contractor from Project Drawings and manufacturer's data.
 - 8) Δ_{aA} = Allowable Story Drift for Structure A: See Drawing Schedule for each component.

- 9) Δ_{aB} = Allowable Story Drift for Structure B: See Drawing Schedule for each component.
 - 10) h_{sx} = Story Height Used in the Definition of the Allowable Drift Δ_a : See Drawing Schedule for each component.
4. Calculation Factors, ASCE/SEI 7-05, Ch. 13 - Seismic Design Requirements for Nonstructural Components: All section, paragraph, equation, and table numbers refer to ASCE/SEI 7-05 unless otherwise noted.
- a. Horizontal Seismic Design Force F_p : Calculated by Delegated Design Contractor by ASCE/SEI 7-05, Equation 13.3-1. Factors below must be obtained for this calculation:
 - 1) S_{DS} = Spectral Acceleration: **Value as directed by the Owner** . Value applies to all components on Project.
 - 2) a_p = Component Amplification Factor: See Drawing Schedule for each component.
 - 3) I_p = Component Importance Factor: See Drawing Schedule for each component.
 - 4) W_p = Component Operating Weight: Obtain by Delegated Design Contractor for each component from component submittal.
 - 5) R_p = Component Response Modification Factor: See Drawing Schedule for each component.
 - 6) z = Height in Structure of Point of Attachment of Component for Base: Determine by Delegated Design Contractor for each component from Project Drawings. For items at or below the base, "z" is to be taken as zero.
 - 7) h = Average Roof Height of Structure for Base: Determine by Delegated Design Contractor from Project Drawings.
 - b. Vertical Seismic Design Force: Calculated by Delegated Design Contractor using method explained in ASCE/SEI 7-05, Paragraph 13.3.1.
 - c. Seismic Relative Displacement D_p : Calculated by Delegated Design Contractor using methods explained in ASCE/SEI 7-05, Paragraph 13.3.2. Factors below must be obtained for this calculation:
 - 1) δ_{xA} = Deflection at Building Level x of Structure A: See Drawing Schedule for each component.
 - 2) δ_{yA} = Deflection at Building Level y of Structure A: See Drawing Schedule for each component.
 - 3) δ_{yB} = Deflection at Building Level y of Structure B: See Drawing Schedule for each component.
 - 4) h_x = Height of Level x to which Upper Connection Point Is Attached: Determine for each component by Delegated Design Contractor from Project Drawings and manufacturer's data.
 - 5) h_y = Height of Level y to which Upper Connection Point Is Attached: Determine for each component by Delegated Design Contractor from Project Drawings and manufacturer's data.
 - 6) Δ_{aA} = Allowable Story Drift for Structure A: See Drawing Schedule for each component.
 - 7) Δ_{aB} = Allowable Story Drift for Structure B: See Drawing Schedule for each component.
 - 8) h_{sx} = Story Height Used in the Definition of the Allowable Drift Δ_a : See Drawing Schedule for each component.
- C. Wind-Load Design Calculations:

1. Perform calculations to obtain force information necessary to properly select wind-load-restraint devices, fasteners, and anchorage. Perform calculations using methods acceptable to applicable code authorities and as presented in **[ASCE/SEI 7-05] [ASCE/SEI 7-10] [ASCE/SEI 7-16] ASCE/SEI 7 edition or other wind-load calculation method required by authorities having jurisdiction** as directed by the Owner . Where "ASCE/SEI 7" is used throughout this Section, it is to be understood that the edition referred to in this subparagraph is intended as referenced throughout the Section Text unless otherwise noted.
 - a. Factors indicated below that are specific to individual pieces of equipment must be obtained by Contractor and must be included in individual component submittal packages.
 - b. Coordinate design wind-load calculations with seismic load calculations for equipment requiring both seismic and wind-load reinforcement. Comply with requirements in other Sections in addition to those in this Section for equipment mounted outdoors.
2. Design wind pressure "p" for external sidewall-mounted equipment is to be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-16, Ch. 30. Perform calculations in accordance with one of the following, as appropriate:
 - a. PART 1: Low-Rise Buildings.
 - b. PART 2: Low-Rise Buildings (Simplified).
 - c. PART 3: Buildings with "h" less than **60 feet (18.3 m)**.
 - d. PART 4: Buildings with "h" greater than **60 feet (18.3 m)** and less than **160 feet (48.8 m)**.
 - e. PART 5: Open Buildings.
3. Design wind pressure "p" for rooftop equipment is to be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-16, Ch 30, PART 6: Building Appurtenances and Rooftop Structures and Equipment.
 - a. Risk Category: **[I] [II] [III] [IV] [V]**.
 - b. h = Mean Roof Height: as directed by the Owner .
 - c. V = Basic Wind Speed: as directed by the Owner .
 - d. K_d = Wind Directionality Factor: as directed by the Owner .
 - e. Exposure Category: **[B] [C] [D]**.
 - f. K_{zt} = Topographic Factor: as directed by the Owner .
 - g. K_e = Ground Elevation Factor: as directed by the Owner .
 - h. K_z = Velocity Pressure Exposure Coefficient (Evaluated at Height z): as directed by the Owner .
 - i. K_h = Velocity Pressure Exposure Coefficient (Evaluated at Height h): as directed by the Owner .
 - j. q_z = Velocity Pressure: Value calculated by delegated wind-load design Contractor using methods detailed in ASCE/SEI 7-16 Section 26.10.1 or other source approved by authorities having jurisdiction.
 - k. q_h = Velocity Pressure: Value calculated by delegated wind-load design Contractor using methods detailed in ASCE/SEI 7-16 Section 26.10.1 or other source approved by authorities having jurisdiction.
 - l. G = Gust-Effect Factor: **[0.85]** as directed by the Owner .
 - m. Enclosure Classification: as directed by the Owner .
 - n. GC_{pi} = Internal Pressure Coefficient: as directed by the Owner .
4. Design wind pressure "p" for external sidewall-mounted equipment is to be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-10, Ch. 30. Perform calculations in accordance with the following, as appropriate:
 - a. PART 1: Low-Rise Buildings.

- b. PART 2: Low-Rise Buildings (Simplified).
 - c. PART 3: Buildings with "h" greater than **60 feet (18.3 m)**.
 - d. PART 4: Buildings with "h" less than **160 feet (48.8 m)**.
 - e. PART 5: Open Buildings.
5. Design wind pressure "p" for rooftop equipment is to be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-10, Ch. 30, PART 6: Building Appurtenances and Rooftop Structures and Equipment.
- a. Risk Category: **[I] [II] [III] [IV] [V]**.
 - b. h = Mean Roof Height: as directed by the Owner .
 - c. V = Basic Wind Speed: as directed by the Owner .
 - d. K_d = Wind Directionality Factor: as directed by the Owner .
 - e. Exposure Category: **[B] [C] [D]**.
 - f. K_{zt} = Topographic Factor: as directed by the Owner .
 - g. K_z = Velocity Pressure Exposure Coefficient (Evaluated at Height z): as directed by the Owner .
 - h. K_h = Velocity Pressure Exposure Coefficient (Evaluated at Height h): as directed by the Owner .
 - i. q_z = Velocity Pressure at Height z: Value calculated by delegated wind-load design Contractor using methods detailed in ASCE/SEI 7-10 Section 26.10.1 or other source approved by authorities having jurisdiction.
 - j. q_h = Velocity Pressure at Height h: Value calculated by delegated wind-load design Contractor using methods detailed in ASCE/SEI 7-10 Section 26.10.1 or other source approved by authorities having jurisdiction.
 - k. G = Gust-Effect Factor: **[0.85]** as directed by the Owner .
 - l. Enclosure Classification: as directed by the Owner .
 - m. GC_{pi} = Internal Pressure Coefficient: as directed by the Owner .
6. Design wind force "F" for rooftop equipment and external sidewall-mounted equipment such as louvers is to be calculated by Delegated Design Contractor using methods in ASCE/SEI 7-05, Ch. 6.
- a. I = Importance Factor: as directed by the Owner .
 - b. h = Mean Roof Height: as directed by the Owner .
 - c. V = Basic Wind Speed: as directed by the Owner .
 - d. K_d = Wind Directionality Factor: as directed by the Owner .
 - e. Exposure Category: **[B] [C] [D]**.
 - f. K_{zt} = Topographic Factor: as directed by the Owner .
 - g. K_z = Velocity Pressure Exposure Coefficient (Evaluated at Height z): as directed by the Owner .
 - h. K_h = Velocity Pressure Exposure Coefficient (Evaluated at Height h): as directed by the Owner .
 - i. q_z = Velocity Pressure at Height z: Value calculated by delegated wind-load design Contractor using methods detailed in ASCE/SEI 7-05 Section 6.5.10 or other source approved by authorities having jurisdiction.
 - j. q_h = Velocity Pressure at Roof Height h: Value calculated by delegated wind-load design Contractor using methods detailed in ASCE/SEI 7-05 Section 6.5.10 or other source approved by authorities having jurisdiction.
 - k. G = Gust-Effect Factor: **[0.85]** as directed by the Owner .
 - l. GC_{pi} = Internal Pressure Coefficient: as directed by the Owner .
 - m. GC_p = External Pressure Coefficient: as directed by the Owner .
 - n. C_f = Force Coefficient: Value determined by delegated wind-load design Contractor from ASCE/SEI 7-05, Figures 6-21 through 6-23 or other source approved by authorities having jurisdiction.

- o. A_r = Projected Area Normal to the Wind: Except where C_r is specified for the actual surface area, value determined by delegated wind-load design Contractor from equipment submittal or manufacturer.
- D. Consequential Damage: Provide additional seismic and wind-load restraints for suspended fire-suppression system components or anchorage of floor-, roof-, or wall-mounted fire-suppression system components as indicated in [ASCE/SEI 7-05] [ASCE/SEI 7-10] [ASCE/SEI 7-16] so that failure of a non-essential or essential fire-suppression system component will not cause the failure of any other essential architectural, mechanical, or electrical building component.
- E. Fire/Smoke Resistance: Seismic-[and wind-load]-restraint devices that are not constructed of ferrous metals must have a maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by an NRTL in accordance with ASTM E84 or UL 723, and be so labeled.
- F. Component Supports:
 - 1. Load ratings, features, and applications of all reinforcement components must be based on testing standards of a nationally recognized testing agency.
 - 2. All component support attachments must comply with force and displacement resistance requirements of [ASCE/SEI 7-05 Section 13.6] [ASCE/SEI 7-10 Section 13.6] [ASCE/SEI 7-16 Section 13.6].

2.2 ELASTOMERIC ISOLATION PADS

- A. Elastomeric Isolation Pads: **Drawing designation** as directed by the Owner .
 - 1. Fabrication: Single or multiple layers of sufficient durometer stiffness for uniform loading over pad area.
 - 2. Size: Factory or field cut to match requirements of supported equipment.
 - 3. Pad Material: Oil and water resistant with elastomeric properties. Neoprene rubber, silicone rubber, or other elastomeric material.
 - 4. Surface Pattern: Smooth, ribbed, or waffle pattern.
 - 5. Infused nonwoven cotton or synthetic fibers.
 - 6. Load-bearing metal plates adhered to pads.
 - 7. Sandwich-Core Material: [**Resilient**] [**and**] [**elastomeric**] or as directed by the Owner .
 - a. Surface Pattern: Smooth, ribbed, or waffle pattern.
 - b. Infused nonwoven cotton or synthetic fibers.

2.3 ELASTOMERIC ISOLATION MOUNTS

- A. Double-Deflection, Elastomeric Isolation Mounts: **Drawing designation** as directed by the Owner .
 - 1. Mounting Plates:
 - a. Top Plate: Encapsulated steel load transfer top plates, factory drilled and threaded[**with threaded studs or bolts**].
 - b. Baseplate: Encapsulated steel bottom plates with holes provided for anchoring to support structure.

2. Elastomeric Material: Molded, oil- and water-resistant neoprene rubber, silicone rubber, or other elastomeric material.

2.4 RESTRAINED ELASTOMERIC ISOLATION MOUNTS

- A. Restrained Elastomeric Isolation Mounts: **Drawing designation** as directed by the Owner .

1. Description: All-directional isolator with seismic restraints containing two separate and opposing elastomeric elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - a. Housing: Cast-ductile iron or welded steel.
 - b. Elastomeric Material: Molded, oil-resistant rubber, neoprene, or other elastomeric material.

2.5 ELASTOMERIC HANGERS

- A. Elastomeric Mount in a Steel Frame with Upper and Lower Steel Hanger Rods: **Drawing designation** as directed by the Owner .

1. Frame: Steel, fabricated with a connection for an upper threaded hanger rod and an opening on the underside to allow for a maximum of 30 degrees of angular lower hanger-rod misalignment without binding or reducing isolation efficiency.
2. Damping Element: Molded, oil-resistant rubber, neoprene, or other elastomeric material with a projecting bushing for the underside opening preventing steel-to-steel contact.

2.6 SNUBBERS

- A. Description: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.

1. Post-Installed Concrete Anchor Bolts: Secure to concrete surface with post-installed concrete anchors. Anchors to be seismically prequalified in accordance with ACI 355.2 testing and designated in accordance with **[ACI 318-08 Appendix D for 2009 IBC] [ACI 318-11 Appendix D for 2012 IBC] [ACI 318-14 Ch. 17 for 2015 or 2018 IBC]**.
2. Preset Concrete Inserts: Seismically prequalified in accordance with ICC-ES AC446 testing.
3. Anchors in Masonry: Design in accordance with TMS 402.
4. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
5. Resilient Cushion: Maximum **1/4-inch (6-mm)** air gap, and minimum **1/4 inch (6 mm)** thick.

2.7 RESTRAINTS - RIGID TYPE

- A. Description: Shop- or field-fabricated bracing assembly made of AISI S110-07-S1 slotted steel channels, ANSI/ASTM A53/A53M steel pipe as per NFPA 13, or other rigid steel brace member. Includes accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; rated in tension, compression, and torsion forces.

2.8 RESTRAINTS - CABLE TYPE

- A. Seismic-Restraint Cables: **[ASTM A1023/A12023M galvanized or ASTM A603 galvanized-steel] [ASTM A492 stainless steel]** cables. End connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for seismic restraining cable service; with fittings attached by means of poured socket, swaged socket or mechanical (Flemish eye) loop.
- B. Restraint cable assembly with cable fittings must comply with ASCE/SEI 19. All cable fittings and complete cable assembly must maintain the minimum cable breaking force. U-shaped cable clips and wedge-type end fittings do not comply and are unacceptable.

2.9 RESTRAINT ACCESSORIES

- A. Hanger-Rod Stiffener: **[Steel tube or steel slotted-support-system sleeve with internally bolted connections] [Reinforcing steel angle clamped]** to hanger rod. Non-metallic stiffeners are unacceptable.
- B. Hinged and Swivel Brace Attachments: Multifunctional steel connectors for attaching hangers to **[rigid restraints] [and] [restraint cables]**.
- C. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
- D. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
- E. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.

2.10 POST-INSTALLED CONCRETE ANCHORS

- A. Mechanical Anchor Bolts:
 - 1. Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength for anchor and as tested according to ASTM E488/E488M.
- B. Adhesive Anchor Bolts:
 - 1. Drilled-in and capsule anchor system containing PVC or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E488/E488M.
- C. Provide post-installed concrete anchors that have been prequalified for use in seismic applications. Post-installed concrete anchors must comply with all requirements of **[ASCE/SEI 7-05, Ch. 13] [ASCE/SEI 7-10, Ch. 13] [ASCE/SEI 7-16, Ch. 13]**.
 - 1. Prequalify post-installed anchors in concrete in accordance with ACI 355.2 or other approved qualification testing procedures.

2. Prequalify post-installed anchors in masonry in accordance with approved qualification procedures.
 - D. Expansion-type anchor bolts are not permitted for equipment in excess of **10 hp (7.46 kW)** that is not vibration isolated.
 1. Undercut expansion anchors are permitted.
- 2.11 CONCRETE INSERTS
- A. Provide preset concrete inserts that are seismically prequalified in accordance with ICC-ES AC466 testing.
 - B. Comply with ANSI/MSS SP-58.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and equipment to receive vibration isolation [, **wind control,**] and seismic control devices for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

- A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by [**an evaluation service member of ICC-ES**] [**OSHPD**] [**an agency acceptable to authorities having jurisdiction**].
- B. Hanger-Rod Stiffeners: Install where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
- C. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength is adequate to carry calculated static[, **wind load,**] and seismic loads within specified loading limits.

3.3 INSTALLATION OF VIBRATION CONTROL[, **WIND-LOAD-RESTRAINT,] AND SEISMIC-RESTRAINT DEVICES**

- A. Provide vibration-control devices for systems and equipment where indicated in Equipment Schedules or Fire-Suppression Vibration Isolation, Seismic, and Wind-Load-Restraint Schedule, where indicated on Drawings, or where the Specifications indicate they are to be installed on specific equipment and systems.

- B. Provide seismic-restraint [**and wind-load-restraint**] devices for systems and equipment where indicated in Equipment Schedules or Vibration Isolation, Seismic, and Wind-Load-Restraint Schedules, where indicated on Drawings, where the Specifications indicate they are to be installed on specific equipment and systems, and where required by applicable codes.
- C. Coordinate location of embedded connection hardware with supported equipment attachment and mounting points and with requirements for concrete reinforcement and formwork specified in Section 033000 "Cast-in-Place Concrete."
- D. Installation of vibration isolators[, **wind-load restraints,**] and seismic restraints must not cause any stresses, misalignment, or change of position of equipment or piping.
- E. Comply with installation requirements of NFPA 13 for installation of all seismic-restraint devices.
- F. Comply with requirements in Section 077200 "Roof Accessories" for installation of equipment supports and roof penetrations.
- G. Equipment Restraints:
 - 1. Install snubbers on fire-suppression equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
 - 2. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds **0.125 inch (3.2 mm)**.
 - 3. Install seismic-restraint devices using methods approved by [**an evaluation service member of ICC-ES**] [**OSHPD**] [**an agency acceptable to authorities having jurisdiction**] that provides required submittals for component.
- H. Piping Restraints:
 - 1. Comply with all requirements in NFPA 13.
 - 2. Design piping sway bracing in accordance with NFPA 13.
 - a. Maximum spacing of all sway bracing to be no greater than indicated in NFPA 13.
 - b. Design loading of all sway bracing not to exceed values indicated in NFPA 13.
- I. Install seismic-[**and wind-load-**]restraint devices using methods approved by [**an evaluation service member of ICC-ES**] [**OSHPD**] [**an agency acceptable to authorities having jurisdiction**] that provides required submittals for component.
- J. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
- K. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
- L. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
- M. Post-Installed Concrete Anchors:
 - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the

- structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 3. Mechanical-Type Anchor Bolts: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors to be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 4. Adhesive-Type Anchor Bolts: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 5. Set anchors to manufacturer's recommended torque, using a torque wrench.
 6. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.

3.4 ACCOMMODATION OF DIFFERENTIAL SEISMIC MOTION

- A. Install flexible connections in piping where they cross structural seismic joints and other points where differential movement may occur, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Section 211200 "Fire-Suppression Standpipes," Section 211313 "Wet-Pipe Sprinkler Systems," and Section 211316 "Dry-Pipe Sprinkler Systems" for piping flexible connections.

3.5 ADJUSTING

- A. Adjust isolators after system is at operating weight.
- B. Adjust limit stops on restrained-spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: **[Owner will engage] [Engage]** a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Tests and Inspections:
 1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 4. Test at no fewer than **[four]** or as directed by the Owner of each type and size of installed anchors and fasteners selected by Architect.
 5. Test to 90 percent of rated proof load of device.
 6. Measure isolator restraint clearance.

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7. Measure isolator deflection.
 8. Verify snubber minimum clearances.
- D. Remove and replace malfunctioning units and retest as specified above.
- E. Units will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.

END OF SECTION 21 05 48 13

SECTION 21 07 00 00 - FIRE-SUPPRESSION SYSTEMS INSULATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fire-suppression systems insulation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Insulation Materials:
 - 1) Calcium silicate.
 - 2) Cellular glass.
 - 3) Flexible elastomeric.
 - 4) Mineral fiber.
 - 5) Phenolic.
 - 6) Polyisocyanurate.
 - 7) Polyolefin.
 - 8) Polystyrene.
 - b. Insulating cements.
 - c. Adhesives.
 - d. Mastics.
 - e. Lagging adhesives.
 - f. Sealants.
 - g. Factory-applied jackets.
 - h. Field-applied fabric-reinforcing mesh.
 - i. Field-applied cloths.
 - j. Field-applied jackets.
 - k. Tapes.
 - l. Securements.
 - m. Corner angles.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings:
 - a. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - b. Detail attachment and covering of heat tracing inside insulation.
 - c. Detail insulation application at pipe expansion joints for each type of insulation.
 - d. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - e. Detail removable insulation at piping specialties and equipment connections.
 - f. Detail application of field-applied jackets.
 - g. Detail application at linkages of control devices.
 - h. Detail field application for fire-suppression water storage tanks.
4. Field quality-control reports.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - a. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - b. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

E. Delivery, Storage, And Handling

1. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.2 PRODUCTS

A. Insulation Materials

1. Comply with requirements in Part 1.3 schedule articles for where insulating materials shall be applied.
2. Products shall not contain asbestos, lead, mercury, or mercury compounds.
3. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
4. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
5. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
6. Calcium Silicate:
 - a. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 - b. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
7. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - a. Block Insulation: ASTM C 552, Type I.
 - b. Special-Shaped Insulation: ASTM C 552, Type III.
 - c. Board Insulation: ASTM C 552, Type IV.
 - d. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - e. Preformed Pipe Insulation with Factory-Applied ASJ **OR** ASJ-SSL, **as directed**: Comply with ASTM C 552, Type II, Class 2.
 - f. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
8. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
9. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
10. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For equipment applications, provide insulation without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied FSK jacket, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
11. Mineral-Fiber, Preformed Pipe Insulation:
 - a. Type I, **850 deg F (454 deg C)** Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, without factory-applied

- jacket **OR** with factory-applied ASJ **OR** with factory-applied ASJ-SSL, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
- b. Type II, **1200 deg F (649 deg C)** Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied ASJ-SSL, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
12. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ **OR** FSK jacket, **as directed**, complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is **2.5 lb/cu. ft. (40 kg/cu. m)** or more. Thermal conductivity (k-value) at **100 deg F (55 deg C)** is **0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K)** or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 13. Phenolic:
 - a. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
 - b. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
 - c. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
 - d. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - 1) Preformed Pipe Insulation: None **OR** ASJ, **as directed**.
 - 2) Board for Equipment Applications: None **OR** ASJ, **as directed**.
 14. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.
 - a. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed **0.19 Btu x in./h x sq. ft. x deg F (0.027 W/m x K)** at **75 deg F (24 deg C)** after 180 days of aging.
 - b. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less for thickness up to **1-1/2 inches (38 mm)** as tested by ASTM E 84.
 - c. Fabricate shapes according to ASTM C 450 and ASTM C 585.
 - d. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - 1) Pipe Applications: None **OR** ASJ **OR** ASJ-SSL **OR** PVDC **OR** PVDC-SSL, **as directed**.
 - 2) Equipment Applications: None **OR** ASJ **OR** ASJ-SSL **OR** PVDC **OR** PVDC-SSL, **as directed**.
 15. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
 16. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed **0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K)** after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.
- B. Insulating Cements
1. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
 2. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
 3. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- C. Adhesives
1. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
 2. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of **50 to 800 deg F (10 to 427 deg C)**.
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of **minus 75 to plus 300 deg F (minus 59 to plus 149 deg C)**.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of **minus 20 to plus 140 deg F (29 to plus 60 deg C)**.
7. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A, for bonding insulation jacket lap seams and joints.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. PVC Jacket Adhesive: Compatible with PVC jacket.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Mastics

1. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 - a. For indoor applications, use mastics that have a VOC content of **Value g/L** as directed by the Owner when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM E 96, Procedure B, **0.013 perm (0.009 metric perm)** at **43-mil (1.09-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C)**.
 - c. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - d. Color: White.
3. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **0.05 perm (0.033 metric perm)** at **30-mil (0.8-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C)**.
 - c. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - d. Color: White.
4. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **3 perms (2 metric perms)** at **0.0625-inch (1.6-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 20 to plus 200 deg F (Minus 29 to plus 93 deg C)**.
 - c. Solids Content: 63 percent by volume and 73 percent by weight.
 - d. Color: White.

E. Lagging Adhesives

1. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
 - a. For indoor applications, use lagging adhesives that have a VOC content of **Value g/L** as directed by the Owner when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment and pipe insulation.
 - c. Service Temperature Range: **Minus 50 to plus 180 deg F (Minus 46 to plus 82 deg C)**.

- d. Color: White.

F. Sealants

1. Joint Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Permanently flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).**
 - d. Color: White or gray.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. FSK and Metal Jacket Flashing Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).**
 - d. Color: Aluminum.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).**
 - d. Color: White.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

G. Factory-Applied Jackets

1. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - a. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - b. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - c. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 - d. PVDC Jacket for Indoor Applications: **4-mil- (0.10-mm-)** thick, white PVDC biaxially oriented barrier film with a permeance at **0.02 perms (0.013 metric perms)** when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 - e. PVDC Jacket for Outdoor Applications: **6-mil- (0.15-mm-)** thick, white PVDC biaxially oriented barrier film with a permeance at **0.01 perms (0.007 metric perms)** when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 - f. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

H. Field-Applied Fabric-Reinforcing Mesh

1. Woven Glass-Fiber Fabric for Pipe Insulation: Approximately **2 oz./sq. yd. (68 g/sq. m)** with a thread count of **10 strands by 10 strands/sq. inch (4 strands by 4 strands/sq. mm)** for covering pipe and pipe fittings.
2. Woven Glass-Fiber Fabric for Equipment Insulation: Approximately **6 oz./sq. yd. (203 g/sq. m)** with a thread count of **5 strands by 5 strands/sq. inch (2 strands by 2 strands/sq. mm)** for covering equipment.
3. Woven Polyester Fabric: Approximately **1 oz./sq. yd. (34 g/sq. m)** with a thread count of **10 strands by 10 strands/sq. inch (4 strands by 4 strands/sq. mm)**, in a Leno weave.

I. Field-Applied Cloths

1. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of **8 oz./sq. yd. (271 g/sq. m)**.

J. Field-Applied Jackets

1. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
2. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - a. Adhesive: As recommended by jacket material manufacturer.
 - b. Color: White **OR** Color-code jackets based on system. Color as selected by the Owner, **as directed**.
 - c. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - 1) Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 - d. Factory-fabricated tank heads and tank side panels.
3. Metal Jacket:
 - a. Aluminum Jacket: Comply with **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 - 1) Sheet and roll stock ready for shop or field sizing **OR** Factory cut and rolled to size, **as directed**.
 - 2) Finish and thickness are indicated in field-applied jacket schedules.
 - 3) Moisture Barrier for Indoor Applications: **1-mil- (0.025-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 4) Moisture Barrier for Outdoor Applications: **3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 5) Factory-Fabricated Fitting Covers:
 - a) Same material, finish, and thickness as jacket.
 - b) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c) Tee covers.
 - d) Flange and union covers.
 - e) End caps.
 - f) Beveled collars.
 - g) Valve covers.
 - h) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
 - b. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - 1) Sheet and roll stock ready for shop or field sizing **OR** Factory cut and rolled to size, **as directed**.
 - 2) Material, finish, and thickness are indicated in field-applied jacket schedules.
 - 3) Moisture Barrier for Indoor Applications: **1-mil- (0.025-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 4) Moisture Barrier for Outdoor Applications: **3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 5) Factory-Fabricated Fitting Covers:
 - a) Same material, finish, and thickness as jacket.
 - b) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c) Tee covers.
 - d) Flange and union covers.
 - e) End caps.
 - f) Beveled collars.
 - g) Valve covers.

- h) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

K. Tapes

1. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - a. Width: **3 inches (75 mm)**.
 - b. Thickness: **11.5 mils (0.29 mm)**.
 - c. Adhesion: **90 ounces force/inch (1.0 N/mm)** in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: **40 lbf/inch (7.2 N/mm)** in width.
 - f. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
2. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - a. Width: **3 inches (75 mm)**.
 - b. Thickness: **6.5 mils (0.16 mm)**.
 - c. Adhesion: **90 ounces force/inch (1.0 N/mm)** in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: **40 lbf/inch (7.2 N/mm)** in width.
 - f. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
3. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 - a. Width: **2 inches (50 mm)**.
 - b. Thickness: **6 mils (0.15 mm)**.
 - c. Adhesion: **64 ounces force/inch (0.7 N/mm)** in width.
 - d. Elongation: 500 percent.
 - e. Tensile Strength: **18 lbf/inch (3.3 N/mm)** in width.
4. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 - a. Width: **2 inches (50 mm)**.
 - b. Thickness: **3.7 mils (0.093 mm)**.
 - c. Adhesion: **100 ounces force/inch (1.1 N/mm)** in width.
 - d. Elongation: 5 percent.
 - e. Tensile Strength: **34 lbf/inch (6.2 N/mm)** in width.
5. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - a. Width: **3 inches (75 mm)**.
 - b. Film Thickness: **4 mils (0.10 mm)**.
 - c. Adhesive Thickness: **1.5 mils (0.04 mm)**.
 - d. Elongation at Break: 145 percent.
 - e. Tensile Strength: **55 lbf/inch (10.1 N/mm)** in width.
6. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - a. Width: **3 inches (75 mm)**.
 - b. Film Thickness: **6 mils (0.15 mm)**.
 - c. Adhesive Thickness: **1.5 mils (0.04 mm)**.
 - d. Elongation at Break: 145 percent.
 - e. Tensile Strength: **55 lbf/inch (10.1 N/mm)** in width.

L. Securements

1. Bands:
 - a. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 **OR** Type 316, **as directed**; **0.015 inch (0.38 mm)** thick, **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, wide with wing seal **OR** closed seal, **as directed**.
 - b. Aluminum: **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105, or 5005; Temper H-14, **0.020 inch (0.51 mm)** thick, **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, wide with wing seal **OR** closed seal, **as directed**.
 - c. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.

2. Insulation Pins and Hangers:
 - a. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Perforated, galvanized carbon-steel sheet, **0.030 inch (0.76 mm)** thick by **2 inches (50 mm)** square.
 - 2) Spindle: Copper- or zinc-coated, low carbon steel **OR** Aluminum **OR** Stainless steel, **as directed**, fully annealed, **0.106-inch- (2.6-mm-)** diameter shank, length to suit depth of insulation indicated.
 - 3) Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 - b. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Galvanized carbon-steel sheet, **0.030 inch (0.76 mm)** thick by **2 inches (50 mm)** square.
 - 2) Spindle: Copper- or zinc-coated, low carbon steel **OR** Aluminum **OR** Stainless steel, **as directed**, fully annealed, **0.106-inch- (2.6-mm-)** diameter shank, length to suit depth of insulation indicated.
 - 3) Adhesive-backed base with a peel-off protective cover.
 - c. Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch- (0.41-mm-)** thick, galvanized-steel **OR** aluminum **OR** stainless-steel, **as directed**, sheet, with beveled edge sized as required to hold insulation securely in place but not less than **1-1/2 inches (38 mm)** in diameter.
 - 1) Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
3. Staples: Outward-clinching insulation staples, nominal **3/4-inch- (19-mm-)** wide, stainless steel or Monel.
4. Wire: **0.080-inch (2.0-mm)** nickel-copper alloy **OR** **0.062-inch (1.6-mm)** soft-annealed, stainless steel **OR** **0.062-inch (1.6-mm)** soft-annealed, galvanized steel, **as directed**.

1.3 EXECUTION

A. Preparation

1. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
OR
Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - a. Stainless Steel: Coat 300 series stainless steel with an epoxy primer **5 mils (0.127 mm)** thick and an epoxy finish **5 mils (0.127 mm)** thick if operating in a temperature range between **140 and 300 deg F (60 and 149 deg C)**. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - b. Carbon Steel: Coat carbon steel operating at a service temperature between **32 and 300 deg F (0 and 149 deg C)** with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
3. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

B. General Installation Requirements

1. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
2. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
3. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
4. Install insulation with longitudinal seams at top and bottom of horizontal runs.
5. Install multiple layers of insulation with longitudinal and end seams staggered.
6. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
7. Keep insulation materials dry during application and finishing.
8. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
9. Install insulation with least number of joints practical.
10. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - a. Install insulation continuously through hangers and around anchor attachments.
 - b. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - c. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - d. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
11. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
12. Install insulation with factory-applied jackets as follows:
 - a. Draw jacket tight and smooth.
 - b. Cover circumferential joints with **3-inch- (75-mm-)** wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced **4 inches (100 mm)** o.c.
 - c. Overlap jacket longitudinal seams at least **1-1/2 inches (38 mm)**. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at **2 inches (50 mm) OR 4 inches (100 mm), as directed**, o.c.
 - 1) For below ambient services, apply vapor-barrier mastic over staples.
 - d. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - e. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
13. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
14. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
15. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least **4 inches (100 mm)** beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
16. For above ambient services, do not install insulation to the following:
 - a. Vibration-control devices.
 - b. Testing agency labels and stamps.
 - c. Nameplates and data plates.
 - d. Manholes.
 - e. Handholes.
 - f. Cleanouts.

C. Penetrations

1. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - a. Seal penetrations with flashing sealant.
 - b. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - c. Extend jacket of outdoor insulation outside roof flashing at least **2 inches (50 mm)** below top of roof flashing.
 - d. Seal jacket to roof flashing with flashing sealant.
2. Insulation Installation at Below-Grade Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
3. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - a. Seal penetrations with flashing sealant.
 - b. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - c. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least **2 inches (50 mm)**.
 - d. Seal jacket to wall flashing with flashing sealant.
4. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
5. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - a. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
6. Insulation Installation at Floor Penetrations:
 - a. Pipe: Install insulation continuously through floor penetrations.
 - b. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping".

D. Equipment, Tank, And Vessel Insulation Installation

1. Secure insulation with adhesive and anchor pins and speed washers.
 - a. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 **OR** 50, **as directed**, percent coverage of tank and vessel surfaces.
 - b. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
 - c. Protect exposed corners with secured corner angles.
 - d. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
 - 1) Do not weld anchor pins to ASME-labeled pressure vessels.
 - 2) Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
 - 3) On tanks and vessels, maximum anchor-pin spacing is **3 inches (75 mm)** from insulation end joints, and **16 inches (400 mm)** o.c. in both directions.
 - 4) Do not overcompress insulation during installation.
 - 5) Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
 - 6) Impale insulation over anchor pins and attach speed washers.
 - 7) Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

- e. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
 - f. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately **6 inches (150 mm)** from each end. Install wire or cable between two circumferential girdles **12 inches (300 mm)** o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of **48 inches (1200 mm)** o.c. Use this network for securing insulation with tie wire or bands.
 - g. Stagger joints between insulation layers at least **3 inches (75 mm)**.
 - h. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.
 - i. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
 - j. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.
2. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.
 - a. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
 - b. Seal longitudinal seams and end joints.
- E. General Pipe Insulation Installation
1. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
 2. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - a. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - b. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - c. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - d. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - e. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 - f. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - g. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for

- above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
- h. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - i. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
3. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
 4. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - a. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - b. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 - c. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 - d. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least **2 inches (50 mm)** over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - e. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.
- F. Calcium Silicate Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation materials.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 - c. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least **1 inch (25 mm)**. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 - d. Finish flange insulation same as pipe insulation.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.

- b. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
 - c. Finish fittings insulation same as pipe insulation.
 - 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - b. Install insulation to flanges as specified for flange insulation application.
 - c. Finish valve and specialty insulation same as pipe insulation.

- G. Cellular-Glass Insulation Installation
 - 1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and applicable insulation joint sealant.
 - c. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 - 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
 - d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least **1 inch (25 mm)**, and seal joints with flashing sealant.
 - 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.
 - 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of cellular-glass insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.

- H. Flexible Elastomeric Insulation Installation
 - 1. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 - 2. Insulation Installation on Pipe Flanges:
 - a. Install pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 - 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install mitered sections of pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - b. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
 - d. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

- I. Mineral-Fiber Insulation Installation
 1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and applicable insulation joint sealant.
 - c. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 - d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least **1 inch (25 mm)**, and seal joints with flashing sealant.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 - c. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - d. Install insulation to flanges as specified for flange insulation application.

- J. Phenolic Insulation Installation
 1. General Installation Requirements:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation materials.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with **0.062-inch (1.6-mm)** wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 2. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

- b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and applicable insulation joint sealant.
 - c. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets with vapor retarders on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
3. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 4. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation.
 5. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- K. Polyisocyanurate Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3 and 9 o'clock positions on the pipe.
 - b. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs but secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
 - c. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed **1-1/2-inch (38-mm)** thickness.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as pipe insulation.
 3. Insulation Installation on Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of polyisocyanurate insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- L. Polyolefin Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Flanges:
 - a. Install pipe insulation to outer diameter of pipe flange.

- b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install mitered sections of polyolefin pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install cut sections of polyolefin pipe and sheet insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
 - d. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

M. Polystyrene Insulation Installation

1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3 and 9 o'clock positions on the pipe.
 - b. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs but secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
 - c. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed **1-1/2-inch (38-mm)** thickness.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness as pipe insulation.
3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation.
4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed section of polystyrene insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.

N. Field-Applied Jacket Installation

1. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - a. Draw jacket smooth and tight to surface with **2-inch (50-mm)** overlap at seams and joints.
 - b. Embed glass cloth between two **0.062-inch- (1.6-mm-)** thick coats of lagging adhesive.
 - c. Completely encapsulate insulation with coating, leaving no exposed insulation.
2. Where FSK jackets are indicated, install as follows:
 - a. Draw jacket material smooth and tight.
 - b. Install lap or joint strips with same material as jacket.

- c. Secure jacket to insulation with manufacturer's recommended adhesive.
 - d. Install jacket with **1-1/2-inch (38-mm)** laps at longitudinal seams and **3-inch- (75-mm-)** wide joint strips at end joints.
 - e. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
3. Where PVC jackets are indicated, install with **1-inch (25-mm)** overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.
 - a. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
 4. Where metal jackets are indicated, install with **2-inch (50-mm)** overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands **12 inches (300 mm)** o.c. and at end joints.
 5. Where PVDC jackets are indicated, install as follows:
 - a. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
 - b. Wrap factory-presizes jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of **2 inches (50 mm)** over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
 - c. Continuous jacket can be spiral wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
 - d. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of **33-1/2 inches (850 mm)** or less. The **33-1/2-inch- (850-mm-)** circumference limit allows for **2-inch- (50-mm-)** overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
 - e. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.
- O. Finishes
1. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 07.
 - a. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - 1) Finish Coat Material: Interior, flat, latex-emulsion size.
 2. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
 3. Color: Final color as selected by the Owner. Vary first and second coats to allow visual inspection of the completed Work.
 4. Do not field paint aluminum or stainless-steel jackets.
- P. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Inspect field-insulated equipment, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
 - b. Inspect pipe, fittings, strainers, and valves, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of

inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

3. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

Q. Equipment Insulation Schedule

1. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
2. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
3. Fire-suppression water storage tank insulation shall be one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m)** OR **3-lb/cu. ft. (48-kg/cu. m)** OR **6-lb/cu. ft. (96-kg/cu. m)**, as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.

R. Piping Insulation Schedule, General

1. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
2. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - a. Indoor fire-suppression piping.
 - b. Underground piping.

S. Indoor Piping Insulation Schedule

1. Indoor Engine Coolant Piping for Remote Radiator of Engine-Driven Fire Pump:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **2 inches (50 mm)** thick.
 - 2) Cellular Glass: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **2 inches (50 mm)** thick.
2. Indoor Engine Exhaust Piping and Silencer, All Pipe Sizes: Calcium silicate, **4 inches (100 mm)** thick.

T. Outdoor, Aboveground Piping Insulation Schedule

1. Outdoor Engine Coolant Piping for Remote Radiator of Engine-Driven Fire Pump:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **2 inches (50 mm)** thick.
 - 2) Cellular Glass: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **2 inches (50 mm)** thick.
2. Outdoor Engine Exhaust Piping and Silencer, All Pipe Sizes: Calcium silicate, **4 inches (100 mm)** thick.
3. Outdoor Fire-Suppression Piping Filled with Water:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **2 inches (50 mm)** thick.
 - 7) Polystyrene: **2 inches (50 mm)** thick.

U. Indoor, Field-Applied Jacket Schedule

1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
2. If more than one material is listed, selection from materials listed is Contractor's option.
3. Piping, Concealed:
 - a. None.
 - b. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm) **OR** 0.040 inch (1.0 mm), **as directed**, thick.
 - c. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm), **as directed**, thick.
 - d. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.010 inch (0.25 mm) **OR** 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm), **as directed**, thick.
4. Piping, Exposed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed**: 20 mils (0.5 mm) **OR** 30 mils (0.8 mm), **as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm) **OR** 0.040 inch (1.0 mm), **as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm), **as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.010 inch (0.25 mm) **OR** 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm), **as directed**, thick.

V. Outdoor, Field-Applied Jacket Schedule

1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
2. If more than one material is listed, selection from materials listed is Contractor's option.
3. Equipment, Concealed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed**: 20 mils (0.5 mm) **OR** 30 mils (0.8 mm), **as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm) **OR** 0.040 inch (1.0 mm), **as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm), **as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.010 inch (0.25 mm) **OR** 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm), **as directed**, thick.
4. Equipment, Exposed, up to 48 Inches (1200 mm) in Diameter or with Flat Surfaces up to 72 Inches (1800 mm):
 - a. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm) **OR** 0.040 inch (1.0 mm), **as directed**, thick.
 - b. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: 0.010 inch (0.25 mm) **OR** 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm), **as directed**, thick.

5. Equipment, Exposed, Larger Than **48 Inches (1200 mm)** in Diameter or with Flat Surfaces Larger Than **72 Inches (1800 mm)**:
 - a. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Stucco Embossed, **as directed**, with **1-1/4-Inch- (32-mm-)** Deep Corrugations **OR** **2-1/2-Inch- (65-mm-)** Deep Corrugations **OR** **4-by-1-Inch (100-by-25-mm)** Box Ribs, **as directed**: **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.0 mm)**, **as directed**, thick.
 - b. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth **OR** Stucco Embossed, **as directed**, with **1-1/4-Inch- (32-mm-)** Deep Corrugations **OR** **2-1/2-Inch- (65-mm-)** Deep Corrugations **OR** **4-by-1-Inch (100-by-25-mm)** Box Ribs, **as directed**: **0.020 inch (0.51 mm)** **OR** **0.024 inch (0.61 mm)**, **as directed**, thick.
6. Outdoor Exposed Piping:
 - a. PVC: **20 mils (0.5 mm)** **OR** **30 mils (0.8 mm)** **OR** **40 mils (1.0 mm)**, **as directed**, thick.
 - b. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: **0.016 inch (0.41 mm)** **OR** **0.020 inch (0.51 mm)** **OR** **0.024 inch (0.61 mm)** **OR** **0.032 inch (0.81 mm)** **OR** **0.040 inch (1.0 mm)**, **as directed**, thick.
 - c. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed** with Z-Shaped Locking Seam, **as directed**: **0.010 inch (0.25 mm)** **OR** **0.016 inch (0.41 mm)** **OR** **0.020 inch (0.51 mm)** **OR** **0.024 inch (0.61 mm)**, **as directed**, thick.

END OF SECTION 21 07 00 00

SECTION 21 11 19 00 - FIRE-SUPPRESSION STANDPIPES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fire-suppression standpipes. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pipes, fittings, and specialties.
 - b. Fire-protection valves.
 - c. Hose connections.
 - d. Hose stations.
 - e. Monitors.
 - f. Fire-department connections.
 - g. Alarm devices.
 - h. Manual control stations.
 - i. Control panels.
 - j. Pressure gages.

C. Definitions

1. High-Pressure Standpipe Piping: Fire-suppression standpipe piping designed to operate at working pressure higher than standard **175 psig (1200 kPa)**, but not higher than **250 psig (1725 kPa) OR 300 psig (2070 kPa)**, as directed.
2. Standard-Pressure Standpipe Piping: Fire-suppression standpipe piping designed to operate at working pressure **175 psig (1200 kPa)** maximum.

D. System Descriptions

1. Automatic Wet-Type, Class I Standpipe System: Includes **NPS 2-1/2 (DN 65)** hose connections. Has open water-supply valve with pressure maintained and is capable of supplying water demand.
2. Automatic Wet-Type, Class II Standpipe System: Includes **NPS 1-1/2 (DN 40)** hose stations. Has open water-supply valve with pressure maintained and is capable of supplying water demand.
3. Automatic Wet-Type, Class III Standpipe System: Includes **NPS 1-1/2 (DN 40)** hose stations and **NPS 2-1/2 (DN 65)** hose connections. Has open water-supply valve with pressure maintained and is capable of supplying water demand.
4. Automatic Dry-Type, Class I Standpipe System: Includes **NPS 2-1/2 (DN 65)** hose connections. Has open water-supply valve and dry-pipe valve with standpipes containing compressed air. Opening fire-hose valve releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into standpipes.
5. Automatic Dry-Type, Class II Standpipe System: Includes **NPS 1-1/2 (DN 40)** hose stations. Has open water-supply valve and dry-pipe valve with standpipes containing compressed air. Opening fire-hose valve releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into standpipes.
6. Automatic Dry-Type, Class III Standpipe System: Includes **NPS 1-1/2 (DN 40)** hose stations and **NPS 2-1/2 (DN 65)** hose connections. Has open water-supply valve and dry-pipe valve with standpipes containing compressed air. Opening fire-hose valve releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into standpipes.
7. Semiautomatic Dry-Type, Class I Standpipe System: Includes **NPS 2-1/2 (DN 65)** hose connections. Has open water-supply valve and deluge valve with standpipes containing air.

Actuation of detection device permits water pressure to open deluge valve. Water then flows into standpipes.

8. Semiautomatic Dry-Type, Class II Standpipe System: Includes **NPS 1-1/2 (DN 40)** hose stations. Has open water-supply valve and deluge valve with standpipes containing air. Actuation of detection device permits water pressure to open deluge valve. Water then flows into standpipes.
9. Semiautomatic Dry-Type, Class III Standpipe System: Includes **NPS 1-1/2 (DN 40)** hose stations and **NPS 2-1/2 (DN 65)** hose connections. Has open water-supply valve and deluge valve with standpipes containing air. Actuation of detection device permits water pressure to open deluge valve. Water then flows into standpipes.
10. Manual Wet-Type, Class I Standpipe System: Includes **NPS 2-1/2 (DN 65)** hose connections. Has small water supply to maintain water in standpipes. Piping is wet, but water must be pumped into standpipes to satisfy demand.
11. Manual Dry-Type, Class I Standpipe System: Includes **NPS 2-1/2 (DN 65)** hose connections. Does not have permanent water supply. Piping is dry. Water must be pumped into standpipes to satisfy demand.

E. Performance Requirements

1. Standard-Pressure, Fire-Suppression Standpipe System Component: Listed for **175-psig (1200-kPa)** minimum working pressure.
2. High-Pressure, Fire-Suppression Standpipe System Component: Listed for **250-psig (1725-kPa)** minimum **OR 300-psig (2070-kPa), as directed**, working pressure.
3. Delegated Design: Design fire-suppression standpipes, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
4. Fire-suppression standpipe design shall be approved by authorities having jurisdiction.
 - a. Minimum residual pressure at each hose-connection outlet is as follows:
 - 1) **NPS 1-1/2 (DN 40)** Hose Connections: **65 psig (450 kPa)**.
 - 2) **NPS 2-1/2 (DN 65)** Hose Connections: **100 psig (690 kPa)**.
 - b. Maximum residual pressure at required flow at each hose-connection outlet is as follows unless otherwise indicated:
 - 1) **NPS 1-1/2 (DN 40)** Hose Connections: **100 psig (690 kPa)**.
 - 2) **NPS 2-1/2 (DN 65)** Hose Connections: **175 psig (1200 kPa)**.
5. Seismic Performance: Fire-suppression standpipes shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

F. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For fire-suppression standpipes. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
3. Delegated-Design Submittal: For standpipe systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Qualification Data: For qualified Installer and professional engineer.
5. Approved Standpipe Drawings: Working plans, prepared according to NFPA 14, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
6. Welding certificates.
7. Fire-hydrant flow test report.
8. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 14. Include "Contractor's Material and Test Certificate for Aboveground Piping" and "Contractor's Material and Test Certificate for Underground Piping."
9. Field quality-control reports.
10. Operation and Maintenance Data: For fire-suppression standpipes specialties to include in emergency, operation, and maintenance manuals.

G. Quality Assurance

1. **Installer Qualifications:**
 - a. Installer's responsibilities include designing, fabricating, and installing fire-suppression standpipes and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - 1) **Engineering Responsibility:** Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
2. **Welding Qualifications:** Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
3. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. **NFPA Standards:** Fire-suppression standpipe equipment, specialties, accessories, installation, and testing shall comply with NFPA 14, "Installation of Standpipe and Hose Systems."

H. Project Conditions

1. **Interruption of Existing Fire-Suppression Standpipe Service:** Do not interrupt fire-suppression standpipe service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary fire-suppression standpipe service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of fire-suppression standpipe service.
 - b. Do not proceed with interruption of fire-suppression standpipe service without the Owner's written permission.

1.2 PRODUCTS

A. Piping Materials

1. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. Steel Pipe And Fittings

1. **Standard Weight, Galvanized- and Black-Steel Pipe:** ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
2. **Schedule 30, Galvanized- and Black-Steel Pipe:** ASTM A 135; ASTM A 795/A 795M, Type E; or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
3. **Thinwall Galvanized- and Black-Steel Pipe:** ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
4. **Schedule 10, Black-Steel Pipe:** ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in **NPS 5 (DN 125)** and smaller; and NFPA 13-specified wall thickness in **NPS 6 to NPS 10 (DN 150 to DN 250)**, plain end.
5. **Nonstandard OD, Thinwall Black-Steel Pipe:** ASTM A 135 or ASTM A 795/A 795M, thinwall, with plain ends and wall thickness less than Schedule 10.
6. **Hybrid Black-Steel Pipe:** ASTM A 135 or ASTM A 795/A 795M, lightwall, with wall thickness less than Schedule 10 and greater than Schedule 5.
7. **Standard-Weight, Galvanized- and Black-Steel Pipe Nipples:** ASTM A 733, made of ASTM A 53/A 53M, seamless steel pipe with threaded ends.
8. **Galvanized and Uncoated, Steel Couplings:** ASTM A 865, threaded.
9. **Galvanized and Uncoated, Gray-Iron Threaded Fittings:** ASME B16.4, Class 125, standard pattern.
10. **Malleable- or Ductile-Iron Unions:** UL 860.
11. **Cast-Iron Flanges:** ASME B16.1, Class 125.
12. **Steel Flanges and Flanged Fittings:** ASME B16.5, Class 150.
13. **Steel Welding Fittings:** ASTM A 234/A 234M and ASME B16.9.

14. Grooved-Joint, Steel-Pipe Appurtenances:
 - a. Pressure Rating: **175 psig (1200 kPa) OR 250 psig (1725 kPa) OR 300 psig (2070 kPa), as directed**, minimum.
 - b. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - c. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
- C. Copper Tube And Fittings
 1. Hard Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)** and **ASTM B 88, Type M (ASTM B 88M, Type C)** water tube, drawn temper.
 2. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
 3. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings.
 4. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 5. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 6. Grooved-Joint, Copper-Tube Appurtenances:
 - a. Grooved-End, Copper Fittings: **ASTM B 75 (ASTM B 75M)**, copper tube or ASTM B 584, bronze castings.
 - b. Grooved-End-Tube Couplings: To fit copper tube dimensions, with design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gasket suitable for hot and cold water, and bolts and nuts.
- D. Piping Joining Materials
 1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick or ASME B16.21, nonmetallic and asbestos free.
 - a. Class 125, Cast-Iron Flanges and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
 - b. Class 250, Cast-Iron Flanges and Class 300, Steel Raised-Face Flanges: Ring-type gaskets.
 2. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
 3. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
 4. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- E. Listed Fire-Protection Valves
 1. General Requirements:
 - a. Valves shall be UL listed or FM approved.
 - b. Minimum Pressure Rating for Standard-Pressure Piping: **175 psig (1200 kPa)**.
 - c. Minimum Pressure Rating for High-Pressure Piping: **250 psig (1725 kPa) OR 300 psig (2070 kPa), as directed**.
 2. Ball Valves:
 - a. Standard: UL 1091 except with ball instead of disc.
 - b. Valves **NPS 1-1/2 (DN 40)** and Smaller: Bronze body with threaded ends.
 - c. Valves **NPS 2 and NPS 2-1/2 (DN 50 and DN 65)**: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - d. Valves **NPS 3 (DN 80)**: Ductile-iron body with grooved ends.
 3. Bronze Butterfly Valves:
 - a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Bronze.
 - d. End Connections: Threaded.

4. Iron Butterfly Valves:
 - a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Cast or ductile iron.
 - d. Style: Lug or wafer.

OR
End Connections: Grooved.
 5. Check Valves:
 - a. Standard: UL 312.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Type: Swing check.
 - d. Body Material: Cast iron.
 - e. End Connections: Flanged or grooved.
 6. Bronze OS&Y Gate Valves:
 - a. Standard: UL 262.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Bronze.
 - d. End Connections: Threaded.
 7. Iron OS&Y Gate Valves:
 - a. Standard: UL 262.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Cast or ductile iron.
 - d. End Connections: Flanged or grooved.
 8. Indicating-Type Butterfly Valves:
 - a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - c. Valves **NPS 2 (DN 50)** and Smaller:
 - 1) Valve Type: Ball or butterfly.
 - 2) Body Material: Bronze.
 - 3) End Connections: Threaded.
 - d. Valves **NPS 2-1/2 (DN 65)** and Larger:
 - 1) Valve Type: Butterfly.
 - 2) Body Material: Cast or ductile iron.
 - 3) End Connections: Flanged, grooved, or wafer.
 - e. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch **OR** electrical, 115-V ac, prewired, two-circuit, supervisory switch **OR** visual, as directed, indicating device.
 9. NRS Gate Valves:
 - a. Standard: UL 262.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Cast iron with indicator post flange.
 - d. Stem: Nonrising.
 - e. End Connections: Flanged or grooved.
 10. Indicator Posts:
 - a. Standard: UL 789.
 - b. Type: Horizontal for wall mounting.
 - c. Body Material: Cast iron with extension rod and locking device.
 - d. Operation: Wrench **OR** Hand wheel, as directed.
- F. Trim And Drain Valves
1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 2. Angle Valves.
 3. Ball Valves.

4. Globe Valves.
5. Plug Valves.

G. Specialty Valves

1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating:
 - 1) Standard-Pressure Piping Specialty Valves: 175 psig (1200 kPa) minimum.
 - 2) High-Pressure Piping Specialty Valves: 250 psig (1725 kPa) minimum **OR** 300 psig (2070 kPa), **as directed**.
 - c. Body Material: Cast or ductile iron.
 - d. Size: Same as connected piping.
 - e. End Connections: Flanged or grooved.
2. Alarm Valves:
 - a. Standard: UL 193.
 - b. Design: For horizontal or vertical installation.
 - c. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, **as directed**, and fill-line attachment with strainer.
 - d. Drip Cup Assembly (if retarding chamber is required): Pipe drain without valves and separate from main drain piping.
 - e. Drip Cup Assembly (if retarding chamber is not required): Pipe drain with check valve to main drain piping.
3. Dry-Pipe Valves:
 - a. Standard: UL 260.
 - b. Design: Differential-pressure type.
 - c. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - d. Air-Pressure Maintenance Device:
 - 1) Standard: UL 260.
 - 2) Type: Automatic device to maintain minimum air pressure in piping.
 - 3) Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range, and 175-psig (1200-kPa) **OR** 300-psig (2070-kPa), **as directed**, outlet pressure.
 - e. Air Compressor:
 - 1) Standard: UL's "Fire Protection Equipment Directory" listing.
 - 2) Motor Horsepower: Fractional.
 - 3) Power: 120-V ac, 60 Hz, single phase.
4. Deluge Valves:
 - a. Standard: UL 260.
 - b. Design: Hydraulically operated, differential-pressure type.
 - c. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, fill-line attachment with strainer, and push-rod chamber supply connection.
 - d. Wet, Pilot-Line Trim Set: Include gage to read push-rod chamber pressure, globe valve for manual operation of deluge valve, and connection for actuation device.
 - e. Dry, Pilot-Line Trim Set: Include dry, pilot-line actuator; air- and water-pressure gages; low-air-pressure warning switch; air relief valve; and actuation device. Dry, pilot-line actuator includes cast-iron, operated, diaphragm-type valve with resilient facing plate, resilient diaphragm, and replaceable bronze seat. Valve includes threaded water and air inlets and water outlet. Loss of air pressure on dry, pilot-line side allows pilot-line actuator to open and causes deluge valve to open immediately.
 - f. Air-Pressure Maintenance Device:

- 1) Standard: UL 260.
- 2) Type: Automatic device to maintain minimum air pressure in piping.
- 3) Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator, or switch to maintain pressure, strainer, pressure ratings with **14- to 60-psig (95- to 410-kPa)** adjustable range, and **175-psig (1200-kPa) OR 300-psig (2070-kPa)**, **as directed**, outlet pressure.
- g. Air Compressor:
 - 1) Standard: UL's "Fire Protection Equipment Directory" listing.
 - 2) Motor Horsepower: Fractional.
 - 3) Power: 120-V ac, 60 Hz, single phase.
5. Pressure-Reducing Valves:
 - a. UL 668 hose valve, with integral UL 1468 reducing device.
 - b. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - c. Material: Brass or bronze.
 - d. Inlet: Female pipe threads.
 - e. Outlet: Threaded with or without adapter having male hose threads.
 - f. Pattern: Angle or gate.
 - g. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
6. Automatic (Ball Drip) Drain Valves:
 - a. Standard: UL 1726.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - c. Type: Automatic draining, ball check.
 - d. Size: **NPS 3/4 (DN 20)**.
 - e. End Connections: Threaded.
- H. Hose Connections
 1. Adjustable-Valve Hose Connections:
 - a. Standard: UL 668 hose valve, with integral UL 1468 reducing or restricting pressure-control device, for connecting fire hose.
 - b. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - c. Material: Brass or bronze.
 - d. Size: **NPS 1-1/2 or NPS 2-1/2 (DN 40 or DN 65)**, as indicated.
 - e. Inlet: Female pipe threads.
 - f. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 1963 and matching local fire-department threads.
 - g. Pattern: Angle or gate.
 - h. Pressure-Control Device Type: Pressure reducing **OR** restricting, **as directed**.
 - i. Design Outlet Pressure Setting: as directed by the Owner.
 - j. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 2. Nonadjustable-Valve Hose Connections:
 - a. Standard: UL 668 hose valve for connecting fire hose.
 - b. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - c. Material: Brass or bronze.
 - d. Size: **NPS 1-1/2 or NPS 2-1/2 (DN 40 or DN 65)**, as indicated.
 - e. Inlet: Female pipe threads.
 - f. Outlet: Male hose threads with lugged cap, gasket, and chain. Include hose valve threads according to NFPA 1963 and matching local fire-department threads.
 - g. Pattern: Angle or gate.
 - h. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
- I. **NPS 1-1/2 (DN 40)** Rack-Type Hose Stations
 1. Hose Rack:
 - a. Standard: UL 47.

- b. Material: Brass or bronze with polished chrome-plated **OR** Steel with red-enamel, **as directed**, finish.
 - c. Type: Hose-rack assembly. Include hose valve, hose rack, water-retention device, hose pins, and hose.
 - d. Operation: Semiautomatic.
 - e. Sized to hold fire hose.
2. Hose Valve:
- a. Standard: UL 668 **NPS 1-1/2 (DN 40)**, for connecting fire hose.
 - b. Type: Adjustable **OR** Nonadjustable, **as directed**.
 - c. Pressure-Control Device: Not required **OR** Pressure reducing **OR** Pressure restricting, **as directed**.
 - d. Design Outlet Pressure Setting: Not applicable **OR as directed**.
 - e. Hose Valve and Trim Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - f. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - g. Pattern: Angle.
 - h. Material: Brass or bronze.
 - i. Pressure-Control Device: UL 1468 integral or for field installation if indicated.
 - j. Size: **NPS 1-1/2 (DN 40)**.
 - k. Inlet: Female pipe threads.
 - l. Outlet: Male hose threads according to NFPA 1963 and matching local fire-department threads.
3. Hose:
- a. Standards: NFPA 1961 and UL 219 lined fire hose with swivel inlet, coupling, gaskets, and nozzle.
 - b. Size: **NPS 1-1/2 (DN 40)**.
 - c. Length: **50 feet (15 m) OR 75 feet (23 m) OR 100 feet (30 m)**, **as directed**.
 - d. Jacket: Combination of natural and synthetic threads **OR** Natural thread **OR** Synthetic thread, **as directed**.
 - e. Lining: Combination of rubber and plastic compounds **OR** Rubber compound **OR** Plastic compound, **as directed**.
 - f. Cover: Rubber, plastic, or combination of rubber and plastic compounds.
 - g. Nozzle: UL 401.
 - 1) Material: Brass **OR** Polished brass **OR** Rough chrome-plated brass **OR** Polished chrome-plated brass **OR** Polycarbonate plastic, **as directed**.
 - 2) Type: Plain, for nonadjustable water stream **OR** Spray, adjustable from shutoff to fog spray or straight stream **OR** Spray, adjustable from shutoff to full fog; for use on electrical fires, **as directed**.
- J. **NPS 1-1/2 BY NPS 2-1/2 (DN 40 BY DN 65)** Rack-Type Hose Stations
- 1. Hose Rack:
 - a. Standard: UL 47.
 - b. Material: Brass or bronze with polished chrome-plated **OR** Steel with red-enamel, **as directed**, finish.
 - c. Type: Hose-rack assembly. Include hose valve, reducer adapter, hose rack, water-retention device, hose pins, and hose.
 - d. Operation: Semiautomatic.
 - e. Sized to hold fire hose.
 - 2. Hose Valve:
 - a. Standard: UL 668, **NPS 2-1/2 (DN 65)**, for connecting fire hose.
 - b. Type: Adjustable **OR** Nonadjustable, **as directed**.
 - c. Pressure-Control Device: Not required **OR** Pressure reducing **OR** Pressure restricting, **as directed**.
 - d. Design Outlet Pressure Setting: Not applicable **OR as directed**.

- e. Hose Valve and Trim Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - f. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - g. Pattern: Angle.
 - h. Material: Brass or bronze.
 - i. Pressure-Control Device: UL 1468, integral or for field installation if indicated.
 - j. Size: **NPS 2-1/2 (DN 65)**.
 - k. Inlet: Female pipe threads.
 - l. Outlet: Male hose threads according to NFPA 1963 and matching local fire-department threads.
 - m. Reducer Adapter: **NPS 2-1/2 by NPS 1-1/2 (DN 65 by DN 40)**.
3. Hose:
- a. Standards: NFPA 1961 and UL 219, lined fire hose with swivel inlet, coupling, gaskets, and nozzle.
 - b. Size: **NPS 1-1/2 (DN 40)**.
 - c. Length: **50 feet (15 m) OR 75 feet (23 m) OR 100 feet (30 m)**, **as directed**.
 - d. Jacket: Combination of natural and synthetic threads **OR** Natural thread **OR** Synthetic thread, **as directed**.
 - e. Lining: Combination of rubber and plastic compounds **OR** Rubber compound **OR** Plastic compound, **as directed**.
 - f. Cover: Rubber, plastic, or combination of rubber and plastic compounds.
 - g. Nozzle: UL 401 spray nozzle unless plain nozzle is indicated.
 - 1) Material: Brass **OR** Polished brass **OR** Rough chrome-plated brass **OR** Polished chrome-plated brass **OR** Polycarbonate plastic, **as directed**.
 - 2) Type: Plain, for nonadjustable water stream **OR** Spray, adjustable from shutoff to fog spray or straight stream **OR** Spray, adjustable from shutoff to full fog; for use on electrical fires, **as directed**.
- K. **NPS 1-1/2 (DN 40)** Reel-Type Hose Stations
- 1. Hose Reel:
 - a. Standard: UL 47.
 - b. Hose Reel and Bracket Material: Steel.
 - c. Type: Hose-reel assembly. Include hose valve, wall bracket, hose reel, water-retention device, hose pins, and hose.
 - d. Operation: Semiautomatic.
 - e. Sized to hold fire hose.
 - f. Finish: Red enamel.
 - 2. Hose Valve:
 - a. Standard: UL 668, **NPS 1-1/2 (DN 40)**, for connecting fire hose.
 - b. Type: Adjustable **OR** Nonadjustable, **as directed**.
 - c. Pressure-Control Device: Not required **OR** Pressure reducing **OR** Pressure restricting, **as directed**.
 - d. Design Outlet Pressure Setting: Not applicable **OR as directed**.
 - e. Hose Valve and Trim Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - f. Pressure Rating: **300 psig (2070 kPa)** minimum.
 - g. Pattern: Angle.
 - h. Material: Brass or bronze.
 - i. Pressure-Control Device: UL 1468, integral or for field installation if indicated.
 - j. Size: **NPS 1-1/2 (DN 40)**.
 - k. Inlet: Female pipe threads.
 - l. Outlet: Male hose threads according to NFPA 1963 and matching local fire-department threads.
 - 3. Hose:
 - a. Standards: NFPA 1961 and UL 219 lined fire hose with swivel inlet, coupling, gaskets, and nozzle.

- b. Size: **NPS 1-1/2 (DN 40)**.
- c. Length: **50 feet (15 m) OR 75 feet (23 m) OR 100 feet (30 m), as directed.**
- d. Jacket: Combination of natural and synthetic threads **OR** Natural thread **OR** Synthetic thread, **as directed.**
- e. Lining: Combination of rubber and plastic compounds **OR** Rubber compound **OR** Plastic compound, **as directed.**
- f. Cover: Rubber, plastic, or combination of rubber and plastic compounds.
- g. Nozzle: UL 401.
 - 1) Material: Brass **OR** Polished brass **OR** Rough chrome-plated brass **OR** Polished chrome-plated brass **OR** Polycarbonate plastic, **as directed.**
 - 2) Type: Spray, adjustable from shutoff to fog spray or straight stream **OR** full fog; for use on electrical fires, **as directed.**

L. Monitors

- 1. Type: Stationary.
- 2. Nozzle: UL 401, **NPS 2-1/2 (DN 65)**, brass, adjustable from fog spray to straight stream to shutoff.
- 3. Horizontal Rotation: 360 degrees with locking device.
- 4. Vertical Rotation: 80-degree elevation and 60-degree depression with locking device.
- 5. Waterway: Double **OR** Single, **as directed**, brass or stainless-steel tube.
- 6. Waterway Size: **NPS 2-1/2 (DN 65)** minimum.
- 7. Water Stream Flow: **500 gpm (31.5 L/s) OR 750 gpm (47.3 L/s) OR 1000 gpm (63 L/s), as directed.**
- 8. Operation: Lever **OR** Wheel, **as directed.**
- 9. Base Inlet Size: **NPS 2-1/2 (DN 65) OR NPS 3 (DN 80) OR NPS 4 (DN 100), as directed.**
- 10. Finish: Red-painted body with brass trim.

M. Fire-Department Connections

- 1. Exposed-Type, Fire-Department Connection:
 - a. Standard: UL 405.
 - b. Type: Exposed, projecting, for wall mounting.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Round, brass, wall type.
 - h. Outlet: Back, with pipe threads.
 - i. Number of Inlets: Two **OR** Three, **as directed.**
 - j. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "STANDPIPE", **as directed.**
 - k. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed.**
 - l. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150), as directed.**
- 2. Flush-Type, Fire-Department Connection:
 - a. Standard: UL 405.
 - b. Type: Flush, for wall mounting.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Rectangular, brass, wall type.

- h. Outlet: With pipe threads.
 - i. Body Style: Horizontal **OR** Square **OR** Vertical, **as directed**.
 - j. Number of Inlets: Two **OR** Three **OR** Four **OR** Six, **as directed**.
 - k. Outlet Location: Back **OR** Bottom **OR** Left side **OR** Right side **OR** Top, **as directed**.
 - l. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "STANDPIPE", **as directed**.
 - m. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - n. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150) OR NPS 8 (DN 200), as directed.**
3. Yard-Type, Fire-Department Connection:
- a. Standard: UL 405.
 - b. Type: Exposed, freestanding.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa), as directed.**
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Round, brass, floor type.
 - h. Outlet: Bottom, with pipe threads.
 - i. Number of Inlets: Two **OR** Three **OR** Four, **as directed**.
 - j. Sleeve: Brass **OR** Not required, **as directed**.
 - k. Sleeve Height: **18 inches (460 mm).**
 - l. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "STANDPIPE", **as directed**.
 - m. Finish, Including Sleeve: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - n. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150), as directed.**
- N. Alarm Devices
- 1. Alarm-device types shall match piping and equipment connections.
 - 2. Water-Motor-Operated Alarm:
 - a. Standard: UL 753.
 - b. Type: Mechanically operated, with Pelton wheel.
 - c. Alarm Gong: Cast aluminum with red-enamel factory finish.
 - d. Size: **10-inch (250-mm)** diameter.
 - e. Components: Shaft length, bearings, and sleeve to suit wall construction.
 - f. Inlet: **NPS 3/4 (DN 20).**
 - g. Outlet: **NPS 1 (DN 25)** drain connection.
 - 3. Electrically Operated Alarm Bell:
 - a. Standard: UL 464.
 - b. Type: Vibrating, metal alarm bell.
 - c. Size: **6-inch (150-mm)** minimum **OR 8-inch (200-mm)** minimum **OR 10-inch (250-mm), as directed**, diameter.
 - d. Finish: Red-enamel factory finish, suitable for outdoor use.
 - 4. Water-Flow Indicators:
 - a. Standard: UL 346.
 - b. Water-Flow Detector: Electrically supervised.
 - c. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
 - d. Type: Paddle operated.
 - e. Pressure Rating: **250 psig (1725 kPa).**
 - f. Design Installation: Horizontal or vertical.

5. Pressure Switches:
 - a. Standard: UL 346.
 - b. Type: Electrically supervised water-flow switch with retard feature.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design Operation: Rising pressure signals water flow.
 6. Valve Supervisory Switches:
 - a. Standard: UL 346.
 - b. Type: Electrically supervised.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design: Signals that controlled valve is in other than fully open position.
 7. Indicator-Post Supervisory Switches:
 - a. Standard: UL 346.
 - b. Type: Electrically supervised.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design: Signals that controlled indicator-post valve is in other than fully open position.
- O. Manual Control Stations
1. Description: UL listed or FM approved, hydraulic operation, with union, **NPS 1/2 (DN 15)** pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- P. Control Panels
1. Description: Single-area, two-area, or single-area cross-zoned control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire-alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
 - a. Panels: UL listed and FM approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - b. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

OR

Manual Control Stations: Hydraulic operation, with union, **NPS 1/2 (DN 15)** pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- Q. Pressure Gages
1. Standard: UL 393.
 2. Dial Size: **3-1/2- to 4-1/2-inch (90- to 115-mm)** diameter.
 3. Pressure Gage Range: **0 to 250 psig (0 to 1725 kPa)** minimum **OR 0 to 300 psig (0 to 2070 kPa), as directed.**
 4. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
 5. Air System Piping Gage: Include retard feature, **as directed**, and "AIR" or "AIR/WATER" label on dial face.
- R. Escutcheons
1. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
 2. One-Piece, Cast-Brass Escutcheons: Polished chrome-plated or rough-brass finish with set-screws.
 3. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with chrome-plated finish.

4. One-Piece, Stamped-Steel Escutcheons: Chrome-plated finish with set-screw or spring clips.
5. Split-Casting, Cast-Brass Escutcheons: Polished chrome-plated or rough-brass finish with concealed hinge and set-screw.
6. Split-Plate, Stamped-Steel Escutcheons: Chrome-plated finish with concealed **OR** exposed-rivet, **as directed**, hinge, set-screw or spring clips.
7. One-Piece Floor Plates: Cast-iron flange with holes for fasteners, **as directed**.
8. Split-Casting Floor Plates: Cast brass with concealed hinge.

S. Sleeves

1. Cast-Iron Wall-Pipe Sleeves: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
2. Galvanized-Steel-Sheet Sleeves: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
3. Molded-PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
4. Molded-PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
5. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
6. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard weight, zinc coated, plain ends.
7. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set-screws.

T. Sleeve Seals

1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Carbon steel **OR** Plastic **OR** Stainless steel, **as directed**.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements.

U. Grout

1. Standard: ASTM C 1107, Grade B, posthardening and volume adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink, and recommended for interior and exterior applications.
3. Design Mix: **5000-psi (34-MPa)**, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Preparation

1. Perform fire-hydrant flow test according to NFPA 14 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
2. Report test results promptly and in writing.

B. Service-Entrance Piping

1. Connect fire-suppression standpipe piping to water-service piping at service entrance into building. Comply with requirements for exterior piping in Division 21 Section "Facility Fire-suppression Water-service Piping".
2. Install shutoff valve, backflow preventer, **as directed**, pressure gage, drain, and other accessories at connection to fire-suppression water-service piping. Comply with requirements for backflow preventers in Division 21 Section "Facility Fire-suppression Water-service Piping", **as directed**.
3. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

- C. Water-Supply Connections
1. Connect fire-suppression standpipe piping to building's interior water-distribution piping. Comply with requirements for interior piping in Division 22 Section "Domestic Water Piping".
 2. Install shutoff valve, backflow preventer, **as directed**, pressure gage, drain, and other accessories at connection to water-distribution piping. Comply with requirements for backflow preventers in Division 22 Section "Domestic Water Piping Specialties", **as directed**.
OR
Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.
- D. Piping Installation
1. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - a. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with the Owner before deviating from approved working plans.
 2. Piping Standard: Comply with requirements in NFPA 14 for installation of fire-suppression standpipe piping.
 3. Install seismic restraints on piping. Comply with requirements in NFPA 13 for seismic-restraint device materials and installation.
 4. Install listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
 5. Install drain valves on standpipes. Extend drain piping to outside of building.
 6. Install automatic (ball drip) drain valves to drain piping between fire-department connections and check valves. Drain to floor drain or outside building.
 7. Install alarm devices in piping systems.
 8. Install hangers and supports for standpipe system piping according to NFPA 14. Comply with requirements in NFPA 13 for hanger materials.
 9. Install pressure gages on riser or feed main and at top of each standpipe. Include pressure gages with connection not less than **NPS 1/4 (DN 8)** and with soft-metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
 10. Drain dry-type standpipe system piping.
 11. Pressurize and check dry-type standpipe system piping and air-pressure maintenance devices **OR** air compressors, **as directed**.
 12. Fill wet-type standpipe system piping with water.
 13. Install electric heating cables and pipe insulation on wet-type, fire-suppression standpipe piping in areas subject to freezing. Comply with requirements for heating cables in Division 21 Section "Heat Tracing For Fire-suppression Piping" and for piping insulation in Division 21 Section "Fire-suppression Systems Insulation".
 14. Connect compressed-air supply to dry-pipe sprinkler piping.
OR
Connect air compressor to the following piping and wiring:
 - a. Pressure gages and controls.
 - b. Electrical power system.
 - c. Fire-alarm devices, including low-pressure alarm.
- E. Joint Construction
1. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
 2. Install unions adjacent to each valve in pipes **NPS 2 (DN 50)** and smaller.
 3. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having **NPS 2-1/2 (DN 65)** and larger end connections.
 4. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

5. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
 6. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
 7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 8. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
 9. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
 10. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - a. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
 11. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
 12. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
 13. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- F. Valve And Specialties Installation
1. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 14 and authorities having jurisdiction.
 2. Install listed fire-protection shutoff valves supervised-open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
 3. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
 4. Specialty Valves:
 - a. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - b. Alarm Valves: Install bypass check valve and retarding chamber drain-line connection.
 - c. Dry-Pipe and Deluge Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - 1) Install air compressor and compressed-air supply piping.
OR
Air-Pressure Maintenance Device: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with **14- to 60-psig (95- to 410-kPa)** adjustable range; and **175-psig (1200-kPa)** maximum inlet pressure.
 - 2) Install compressed-air supply piping from building's compressed-air piping system.
- G. Hose-Connection Installation
1. Install hose connections adjacent to standpipes.
 2. Install freestanding hose connections for access and minimum passage restriction.
 3. Install **NPS 1-1/2 (DN 40)** hose-connection valves with flow-restricting device.

4. Install **NPS 2-1/2 (DN 65)** hose connections with quick-disconnect **NPS 2-1/2** by **NPS 1-1/2 (DN 65 by DN 40)** reducer adapter and flow-restricting device.
 5. Install wall-mounted-type hose connections in cabinets. Include pipe escutcheons, with finish matching valves, inside cabinet where water-supply piping penetrates cabinet. Install valves at angle required for connection of fire hose. Comply with requirements for cabinets in Division 10 Section "Fire Extinguisher Cabinets".
- H. Hose-Station Installation
1. Install freestanding hose stations for access and minimum passage restriction.
 2. Install **NPS 1-1/2 (DN 40)** hose-station valves with flow-restricting device unless otherwise indicated.
 3. Install **NPS 2-1/2 (DN 65)** hose connections with quick-disconnect **NPS 2-1/2** by **NPS 1-1/2 (DN 65 by DN 40)** reducer adapter and flow-restricting device unless otherwise indicated.
 4. Install freestanding hose stations with support or bracket attached to standpipe.
 5. Install wall-mounted, rack hose stations in cabinets. Include pipe escutcheons, with finish matching valves, inside cabinet where water-supply piping penetrates cabinet. Install valves at angle required for connection of fire hose. Comply with requirements for cabinets in Division 10 Section "Fire Extinguisher Cabinets".
 6. Install hose-reel hose stations on wall with bracket.
- I. Monitor Installation
1. Install monitors on standpipe piping.
- J. Fire-Department Connection Installation
1. Install wall-type, fire-department connections.
 2. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Division 03 Section "Cast-in-place Concrete".
 - a. Install two **OR** three, **as directed**, protective pipe bollards around **OR** on sides of, **as directed**, each fire-department connection. Comply with requirements for bollards in Division 05 Section "Metal Fabrications".
 3. Install automatic (ball drip) drain valve at each check valve for fire-department connection.
- K. Escutcheon Installation
1. Install escutcheons for penetrations of walls, ceilings, and floors.
 2. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set-screw **OR** stamped steel with set-screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set-screw **OR** One piece or split plate, stamped steel with set-screw **OR** Split plate, stamped steel with set-screw, **as directed**.
 - d. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set-screw **OR** stamped steel with spring clips **OR** stamped steel with set-screw or spring clips, **as directed**.
 - e. Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set-screw **OR** stamped steel with spring clips **OR** stamped steel with set-screw or spring clips, **as directed**.
 - f. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
 3. Escutcheons for Existing Piping:
 - a. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.

- b. Insulated Piping: Split plate, stamped steel with concealed or exposed-rivet hinge and spring clips.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set-screw, **as directed**.
 - e. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set-screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set-screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set-screw or spring clips, **as directed**.
 - f. Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set-screw or spring clips, **as directed**.
 - g. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.
- L. Sleeve Installation
- 1. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
 - 2. Sleeves are not required for core-drilled holes.
 - 3. Permanent sleeves are not required for holes formed by removable PE sleeves.
 - 4. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
 - 5. Install sleeves in new partitions, slabs, and walls as they are built.
 - 6. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants".
 - 7. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants".
 - 8. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals.
 - 9. Seal space outside of sleeves in concrete slabs and walls with grout.
 - 10. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
 - 11. Install sleeve materials according to the following applications:
 - a. Sleeves for Piping Passing through Concrete Floor Slabs: Molded PE **OR** Molded PVC **OR** Galvanized-steel pipe, **as directed**.
 - b. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Galvanized-steel pipe **OR** Stack sleeve fittings, **as directed**.
 - 1) Extend sleeves **2 inches (50 mm)** above finished floor level.
 - 2) For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements for flashing in Division 07 Section "Sheet Metal Flashing And Trim".
 - c. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - 1) PVC-pipe **OR** Galvanized-steel-pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel-sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Exception: Sleeves are not required for water-supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - d. Sleeves for Piping Passing through Concrete Roof Slabs: Molded PE **OR** Molded PVC **OR** Galvanized-steel pipe, **as directed**.
 - e. Sleeves for Piping Passing through Exterior Concrete Walls:
 - 1) Galvanized-steel-pipe sleeves for pipes smaller than **NPS 6 (DN 150)**.

- 2) Cast-iron wall pipe sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Install sleeves that are large enough to provide **1-inch (25-mm)** annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
 - f. Sleeves for Piping Passing through Interior Concrete Walls:
 - 1) PVC-pipe **OR** Galvanized-steel-pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel-sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
 12. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestop materials and installations in Division 07 Section "Penetration Firestopping".
- M. Sleeve Seal Installation
1. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
 2. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- N. Identification
1. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 14.
 2. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
- O. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - c. Flush, test, and inspect standpipe systems according to NFPA 14, "System Acceptance" Chapter.
 - d. Energize circuits to electrical equipment and devices.
 - e. Start and run air compressors.
 - f. Coordinate with fire-alarm tests. Operate as required.
 - g. Coordinate with fire-pump tests. Operate as required.
 - h. Verify that equipment hose threads are same as local fire-department equipment.
 3. Fire-suppression standpipe system will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- P. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain specialty valves.
- Q. Piping Schedule
1. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded **OR** grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved, **as directed**, joints.
 2. Standard-pressure, wet-type, fire-suppression standpipe piping, **NPS 4 (DN 100)** and smaller, shall be one of the following:
 - a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight **OR** Schedule 30 or thinwall, **as directed**, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

- c. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, **OR** nonstandard OD, thinwall or hybrid, **as directed**, black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - g. Thinwall **OR** Schedule 10, **as directed**, **OR** nonstandard OD, thinwall or hybrid, **as directed**, black-steel pipe with plain ends; welding fittings; and welded joints.
 - h. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - i. **Type L (Type B) OR Type M (Type B), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
3. Standard-pressure, wet-type, fire-suppression standpipe piping, **NPS 5 to NPS 8 (DN 125 to DN 200)**, shall be one of the following:
- a. Standard-weight **OR** Schedule 30, **as directed**, or thinwall, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - g. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
 - h. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - i. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
4. Standard-pressure, wet-type, fire-suppression standpipe piping, **NPS 10 and NPS 12 (DN 250 and DN 300)**, shall be one of the following:
- a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, **OR** nonstandard OD, thinwall or hybrid, **as directed**, black-steel pipe with plain ends; welding fittings; and welded joints.

5. High-pressure, wet-type, fire-suppression standpipe piping, **NPS 4 (DN 100)** and smaller, shall be one of the following:
 - a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with cut-grooved **OR** roll-grooved, **as directed**, ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, **OR** nonstandard OD, thinwall or hybrid, **as directed**, black-steel pipe with plain ends; welding fittings; and welded joints.
6. High-pressure, wet-type, fire-suppression standpipe piping, **NPS 5 (DN 125)** and larger, shall be one of the following:
 - a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, **OR** nonstandard OD, thinwall or hybrid, **as directed**, black-steel pipe with plain ends; welding fittings; and welded joints.
7. Standard-pressure, dry-type, fire-suppression standpipe piping, **NPS 4 (DN 100)** and smaller, shall be one of the following:
 - a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - c. **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - d. **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
8. Standard-pressure, dry-type, fire-suppression standpipe piping, **NPS 5 and NPS 6 (DN 125 and DN 150)**, shall be one of the following:
 - a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - c. **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - d. **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

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Task	Specification	Specification Description
21 12 13 00	21 11 19 00	Fire-Suppression Standpipes
21 12 23 00	21 11 19 00	Fire-Suppression Standpipes
21 12 29 00	01 22 16 00	No Specification Required
21 12 29 00	21 11 19 00	Fire-Suppression Standpipes

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SECTION 21 13 13 00 - WET-PIPE FIRE-SUPPRESSION SPRINKLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for wet-pipe fire-suppression sprinklers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pipes, fittings, and specialties.
 - b. Fire-protection valves.
 - c. Fire-department connections.
 - d. Sprinklers.
 - e. Excess-pressure pumps.
 - f. Alarm devices.
 - g. Manual control stations.
 - h. Control panels.
 - i. Pressure gages.

C. Definitions

1. High-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure higher than standard **175 psig (1200 kPa)**, but not higher than **250 psig (1725 kPa) OR 300 psig (2070 kPa), as directed**.
2. Standard-Pressure Sprinkler Piping: Wet-pipe sprinkler system piping designed to operate at working pressure of **175 psig (1200 kPa)** maximum.

D. System Descriptions

1. Wet-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing water and that is connected to water supply through alarm valve. Water discharges immediately from sprinklers when they are opened. Sprinklers open when heat melts fusible link or destroys frangible device. Hose connections are included if indicated.
2. Deluge Sprinkler System: Open sprinklers are attached to piping connected to water supply through deluge valve. Fire-detection system, in same area as sprinklers, opens valve. Water flows into piping system and discharges from attached sprinklers when valve opens.

E. Performance Requirements

1. Standard-Pressure Piping System Component: Listed for **175-psig (1200-kPa)** minimum working pressure.
2. High-Pressure Piping System Component: Listed for **250-psig (1725-kPa)** minimum **OR 300-psig (2070-kPa), as directed**, working pressure.
3. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
4. Sprinkler system design shall be approved by authorities having jurisdiction.
 - a. Margin of Safety for Available Water Flow and Pressure: **10 OR 20, as directed**, percent, including losses through water-service piping, valves, and backflow preventers.
 - b. Sprinkler Occupancy Hazard Classifications:
 - 1) Automobile Parking Areas: Ordinary Hazard, Group 1.
 - 2) Building Service Areas: Ordinary Hazard, Group 1.
 - 3) Churches: Light Hazard.
 - 4) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
 - 5) Dry Cleaners: Ordinary Hazard, Group 2.

- 6) General Storage Areas: Ordinary Hazard, Group 1.
 - 7) Laundries: Ordinary Hazard, Group 1.
 - 8) Libraries except Stack Areas: Light Hazard.
 - 9) Library Stack Areas: Ordinary Hazard, Group 2.
 - 10) Machine Shops: Ordinary Hazard, Group 2.
 - 11) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
 - 12) Office and Public Areas: Light Hazard.
 - 13) Plastics Processing Areas: Extra Hazard, Group 2.
 - 14) Printing Plants: Extra Hazard, Group 1.
 - 15) Repair Garages: Ordinary Hazard, Group 2.
 - 16) Residential Living Areas: Light Hazard.
 - 17) Restaurant Service Areas: Ordinary Hazard, Group 1.
 - 18) Solvent Cleaning Areas: Extra Hazard, Group 2.
 - 19) Upholstering Plants: Extra Hazard, Group 1.
 - c. Minimum Density for Automatic-Sprinkler Piping Design:
 - 1) Residential (Dwelling) Occupancy: 0.05 gpm over 400-sq. ft. (2.04 mm/min. over 37.2-sq. m) area.
 - 2) Light-Hazard Occupancy: 0.10 gpm over 1500-sq. ft. (4.1 mm/min. over 139-sq. m) area.
 - 3) Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm over 1500-sq. ft. (6.1 mm/min. over 139-sq. m) area.
 - 4) Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm over 1500-sq. ft. (8.1 mm/min. over 139-sq. m) area.
 - 5) Extra-Hazard, Group 1 Occupancy: 0.30 gpm over 2500-sq. ft. (12.2 mm/min. over 232-sq. m) area.
 - 6) Extra-Hazard, Group 2 Occupancy: 0.40 gpm over 2500-sq. ft. (16.3 mm/min. over 232-sq. m) area.
 - 7) Special Occupancy Hazard: As determined by authorities having jurisdiction.
 - d. Minimum Density for Deluge-Sprinkler Piping Design:
 - 1) Ordinary-Hazard, Group 1 Occupancy: 0.15 gpm (6.1 mm/min.) over entire area.
 - 2) Ordinary-Hazard, Group 2 Occupancy: 0.20 gpm (8.1 mm/min.) over entire area.
 - 3) Extra-Hazard, Group 1 Occupancy: 0.30 gpm (12.2 mm/min.) over entire area.
 - 4) Extra-Hazard, Group 2 Occupancy: 0.40 gpm (16.3 mm/min.) over entire area.
 - 5) Special Occupancy Hazard: As determined by authorities having jurisdiction.
 - e. Maximum Protection Area per Sprinkler: Per UL listing.
OR
Maximum Protection Area per Sprinkler:
 - 1) Residential Areas: 400 sq. ft. (37 sq. m).
 - 2) Office Spaces: 120 sq. ft. (11.1 sq. m) **OR** 225 sq. ft. (20.9 sq. m), as directed.
 - 3) Storage Areas: 130 sq. ft. (12.1 sq. m).
 - 4) Mechanical Equipment Rooms: 130 sq. ft. (12.1 sq. m).
 - 5) Electrical Equipment Rooms: 130 sq. ft. (12.1 sq. m).
 - 6) Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
 - f. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - 1) Light-Hazard Occupancies: 100 gpm (6.3 L/s) for 30 minutes.
 - 2) Ordinary-Hazard Occupancies: 250 gpm (15.75 L/s) for 60 to 90 minutes.
 - 3) Extra-Hazard Occupancies: 500 gpm (31.5 L/s) for 90 to 120 minutes.
5. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.
- F. Submittals
1. Product Data: For each type of product indicated.
 2. LEED Submittal:

- a. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content and chemical components.
3. Shop Drawings: For wet-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
4. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Qualification Data: For qualified Installer and professional engineer, **as directed**.
6. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
7. Welding certificates.
8. Fire-hydrant flow test report.
9. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
10. Field quality-control reports.
11. Operation and maintenance data.

G. Quality Assurance

1. Installer Qualifications:
 - a. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - 1) Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
2. Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - a. NFPA 13, "Installation of Sprinkler Systems."
 - b. NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."
 - c. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

H. Project Conditions

1. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of sprinkler service.
 - b. Do not proceed with interruption of sprinkler service without the Owner's written permission.

1.2 PRODUCTS

A. Piping Materials

1. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.

B. Steel Pipe And Fittings

1. Standard Weight, Galvanized- and Black-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.

2. Schedule 30, Galvanized- and Black-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E; or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
 3. Thinwall Galvanized- and Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
 4. Schedule 10, Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, Schedule 10 in **NPS 5 (DN 125)** and smaller; and NFPA 13-specified wall thickness in **NPS 6 to NPS 10 (DN 150 to DN 250)**, plain end.
 5. Nonstandard OD, Thinwall Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, thinwall, with plain ends and wall thickness less than Schedule 10.
 6. Hybrid Black-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, lightwall, with wall thickness less than Schedule 10 and greater than Schedule 5.
 7. Schedule 5 Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, lightwall, with plain ends.
 8. Galvanized- and Black-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
 9. Galvanized and Uncoated, Steel Couplings: ASTM A 865, threaded.
 10. Galvanized and Uncoated, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
 11. Malleable- or Ductile-Iron Unions: UL 860.
 12. Cast-Iron Flanges: ASME 16.1, Class 125.
 13. Steel Flanges and Flanged Fittings: ASME B16.5, Class 150.
 14. Steel Welding Fittings: ASTM A 234/A 234M and ASME B16.9.
 15. Grooved-Joint, Steel-Pipe Appurtenances:
 - a. Pressure Rating: **175 psig (1200 kPa) OR 250 psig (1725 kPa) OR 300 psig (2070 kPa)**, as directed, minimum.
 - b. Galvanized and Uncoated, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - c. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
 16. Steel Pressure-Seal Fittings: UL 213, FM-approved, **175-psig (1200-kPa)** pressure rating with steel housing, rubber O-rings, and pipe stop; for use with fitting manufacturers' pressure-seal tools.
- C. Copper Tube And Fittings
1. Hard Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)** and **ASTM B 88, Type M (ASTM B 88M, Type C)** water tube, drawn temper.
 2. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
 3. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings.
 4. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 5. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 6. Copper Pressure-Seal Fittings:
 - a. Standard: UL 213.
 - b. **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
 - c. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Cast-bronze fitting with EPDM-rubber O-ring seal in each end.
 7. Grooved-Joint, Copper-Tube Appurtenances:
 - a. Grooved-End, Copper Fittings: **ASTM B 75 (ASTM B 75M)**, copper tube or ASTM B 584, bronze castings.

- a. Standard: UL 1091 except with ball instead of disc.
 - b. Valves **NPS 1-1/2 (DN 40)** and Smaller: Bronze body with threaded ends.
 - c. Valves **NPS 2 and NPS 2-1/2 (DN 50 and DN 65)**: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - d. Valves **NPS 3 (DN 80)**: Ductile-iron body with grooved ends.
3. Bronze Butterfly Valves:
- a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Bronze.
 - d. End Connections: Threaded.
4. Iron Butterfly Valves:
- a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Cast or ductile iron.
 - d. Style: Lug or wafer.
- OR**
End Connections: Grooved.
5. Check Valves:
- a. Standard: UL 312.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Type: Swing check.
 - d. Body Material: Cast iron.
 - e. End Connections: Flanged or grooved.
6. Bronze OS&Y Gate Valves:
- a. Standard: UL 262.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Bronze.
 - d. End Connections: Threaded.
7. Iron OS&Y Gate Valves:
- a. Standard: UL 262.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Cast or ductile iron.
 - d. End Connections: Flanged or grooved.
8. Indicating-Type Butterfly Valves:
- a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - c. Valves **NPS 2 (DN 50)** and Smaller:
 - 1) Valve Type: Ball or butterfly.
 - 2) Body Material: Bronze.
 - 3) End Connections: Threaded.
 - d. Valves **NPS 2-1/2 (DN 65)** and Larger:
 - 1) Valve Type: Butterfly.
 - 2) Body Material: Cast or ductile iron.
 - 3) End Connections: Flanged, grooved, or wafer.
 - e. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch **OR** electrical, 115-V ac, prewired, two-circuit, supervisory switch **OR** visual, as directed, indicating device.
9. NRS Gate Valves:
- a. Standard: UL 262.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Cast iron with indicator post flange.
 - d. Stem: Nonrising.
 - e. End Connections: Flanged or grooved.
10. Indicator Posts:
- a. Standard: UL 789.

- b. Type: Horizontal for wall mounting.
 - c. Body Material: Cast iron with extension rod and locking device.
 - d. Operation: Wrench **OR** Hand wheel, **as directed**.
- H. Trim And Drain Valves
- 1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - 2. Angle Valves.
 - 3. Ball Valves.
 - 4. Globe Valves.
 - 5. Plug Valves.
- I. Specialty Valves
- 1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating:
 - 1) Standard-Pressure Piping Specialty Valves: **175 psig (1200 kPa)** minimum.
 - 2) High-Pressure Piping Specialty Valves: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa), as directed**.
 - c. Body Material: Cast or ductile iron.
 - d. Size: Same as connected piping.
 - e. End Connections: Flanged or grooved.
 - 2. Alarm Valves:
 - a. Standard: UL 193.
 - b. Design: For horizontal or vertical installation.
 - c. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, retarding chamber, **as directed**, and fill-line attachment with strainer.
 - d. Drip Cup Assembly: Pipe drain without valves and separate from main drain piping.
OR
Drip Cup Assembly: Pipe drain with check valve to main drain piping.
 - 3. Deluge Valves:
 - a. Standard: UL 260.
 - b. Design: Hydraulically operated, differential-pressure type.
 - c. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, fill-line attachment with strainer, and push-rod chamber supply connection.
 - d. Wet, Pilot-Line Trim Set: Include gage to read push-rod chamber pressure, globe valve for manual operation of deluge valve, and connection for actuation device.
 - 4. Automatic (Ball Drip) Drain Valves:
 - a. Standard: UL 1726.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - c. Type: Automatic draining, ball check.
 - d. Size: **NPS 3/4 (DN 20)**.
 - e. End Connections: Threaded.
- J. Fire-Department Connections
- 1. Exposed-Type, Fire-Department Connection:
 - a. Standard: UL 405.
 - b. Type: Exposed, projecting, for wall mounting.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - d. Body Material: Corrosion-resistant metal.

- e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Round, brass, wall type.
 - h. Outlet: Back, with pipe threads.
 - i. Number of Inlets: Two **OR** Three, **as directed**.
 - j. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "AUTO SPKR", **as directed**.
 - k. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - l. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150)**, **as directed**.
2. Flush-Type, Fire-Department Connection:
- a. Standard: UL 405.
 - b. Type: Flush, for wall mounting.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Rectangular, brass, wall type.
 - h. Outlet: With pipe threads.
 - i. Body Style: Horizontal **OR** Square **OR** Vertical, **as directed**.
 - j. Number of Inlets: Two **OR** Three **OR** Four **OR** Six, **as directed**.
 - k. Outlet Location: Back **OR** Bottom **OR** Left side **OR** Right side **OR** Top, **as directed**.
 - l. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "AUTO SPKR", **as directed**.
 - m. Finish: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - n. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150) OR NPS 8 (DN 200)**, **as directed**.
3. Yard-Type, Fire-Department Connection:
- a. Standard: UL 405.
 - b. Type: Exposed, freestanding.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum **OR** **300 psig (2070 kPa)**, **as directed**.
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Round, brass, floor type.
 - h. Outlet: Bottom, with pipe threads.
 - i. Number of Inlets: Two **OR** Three **OR** Four, **as directed**.
 - j. Sleeve: Brass **OR** Not required, **as directed**.
 - k. Sleeve Height: **18 inches (460 mm)**.
 - l. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "AUTO SPKR", **as directed**.
 - m. Finish, Including Sleeve: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - n. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150)**, **as directed**.
- K. Sprinkler Specialty Pipe Fittings
- 1. Branch Outlet Fittings:
 - a. Standard: UL 213.

- b. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
- c. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
- d. Type: Mechanical-T and -cross fittings.
- e. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
- f. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
- g. Branch Outlets: Grooved, plain-end pipe, or threaded.
- 2. Flow Detection and Test Assemblies:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 - d. Size: Same as connected piping.
 - e. Inlet and Outlet: Threaded.
- 3. Branch Line Testers:
 - a. Standard: UL 199.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Brass.
 - d. Size: Same as connected piping.
 - e. Inlet: Threaded.
 - f. Drain Outlet: Threaded and capped.
 - g. Branch Outlet: Threaded, for sprinkler.
- 4. Sprinkler Inspector's Test Fittings:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Cast- or ductile-iron housing with sight glass.
 - d. Size: Same as connected piping.
 - e. Inlet and Outlet: Threaded.
- 5. Adjustable Drop Nipples:
 - a. Standard: UL 1474.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - c. Body Material: Steel pipe with EPDM-rubber O-ring seals.
 - d. Size: Same as connected piping.
 - e. Length: Adjustable.
 - f. Inlet and Outlet: Threaded.
- 6. Flexible, Sprinkler Hose Fittings:
 - a. Standard: UL 1474.
 - b. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - d. Size: Same as connected piping, for sprinkler.
- L. Sprinklers
 - 1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating for Residential Sprinklers: **175 psig (1200 kPa)** maximum.
 - c. Pressure Rating for Automatic Sprinklers: **175 psig (1200 kPa)** minimum.
 - d. Pressure Rating for High-Pressure Automatic Sprinklers: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - 2. Automatic Sprinklers with Heat-Responsive Element:
 - a. Early-Suppression, Fast-Response Applications: UL 1767.
 - b. Nonresidential Applications: UL 199.
 - c. Residential Applications: UL 1626.

- d. Characteristics: Nominal **1/2-inch (12.7-mm)** orifice with Discharge Coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
 3. Open Sprinklers with Heat-Responsive Element Removed: UL 199.
 - a. Characteristics:
 - 1) Nominal **1/2-inch (12.7-mm)** Orifice: With Discharge Coefficient K between 5.3 and 5.8.
 - 2) Nominal **17/32-inch (13.5-mm)** Orifice: With Discharge Coefficient K between 7.4 and 8.2.
 4. Sprinkler Finishes:
 - a. Chrome plated.
 - b. Bronze.
 - c. Painted.
 5. Special Coatings:
 - a. Wax.
 - b. Lead.
 - c. Corrosion-resistant paint.
 6. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - a. Ceiling Mounting: Chrome-plated steel, one piece, flat **OR** Chrome-plated steel, two piece, with **1-inch (25-mm)** vertical adjustment **OR** Plastic, white finish, one piece, flat, **as directed**.
 - b. Sidewall Mounting: Chrome-plated steel **OR** Plastic, white finish, **as directed**, one piece, flat.
 7. Sprinkler Guards:
 - a. Standard: UL 199.
 - b. Type: Wire cage with fastening device for attaching to sprinkler.
- M. Excess-Pressure Pumps
1. Pump: Factory-fabricated, positive-displacement, gear type.
 - a. Pump and Motor: Directly connected.
 - b. Motor: Comply with requirements in Division 21 Section "Common Work Results For Fire Suppression".
 2. Miscellaneous Components: Wet-pipe kit of switches, fittings, valves, mounting brackets, and connections for power, hydraulic piping, and wiring from alarm devices.
 3. Motor Control: Differential-pressure switch.
 4. Lights: To indicate sprinkler system's operating condition.
 - a. White Light: Pressure is normal.
 - b. Red Light: Pressure is low.
 5. Capacity: **2.0 gpm at 75-psig (0.13 L/s at 520-kPa)** differential pressure and 1/3 hp **OR 1.85 gpm at 100-psig (0.12 L/s at 690-kPa)** differential pressure and 1/2 hp **OR 3.5 gpm at 100-psig (0.22 L/s at 690-kPa)** differential pressure and 1/2 hp, **as directed**.
- N. Alarm Devices
1. Alarm-device types shall match piping and equipment connections.
 2. Water-Motor-Operated Alarm:
 - a. Standard: UL 753.
 - b. Type: Mechanically operated, with Pelton wheel.
 - c. Alarm Gong: Cast aluminum with red-enamel factory finish.
 - d. Size: **10-inch (250-mm)** diameter.
 - e. Components: Shaft length, bearings, and sleeve to suit wall construction.
 - f. Inlet: **NPS 3/4 (DN 20)**.
 - g. Outlet: **NPS 1 (DN 25)** drain connection.
 3. Electrically Operated Alarm Bell:

- a. Standard: UL 464.
 - b. Type: Vibrating, metal alarm bell.
 - c. Size: **6-inch (150-mm)** minimum-diameter **OR 8-inch (200-mm)** minimum-diameter **OR 10-inch (250-mm)** diameter, **as directed**.
 - d. Finish: Red-enamel factory finish, suitable for outdoor use.
4. Water-Flow Indicators:
- a. Standard: UL 346.
 - b. Water-Flow Detector: Electrically supervised.
 - c. Components: Two single-pole, double-throw circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
 - d. Type: Paddle operated.
 - e. Pressure Rating: **250 psig (1725 kPa)**.
 - f. Design Installation: Horizontal or vertical.
5. Pressure Switches:
- a. Standard: UL 346.
 - b. Type: Electrically supervised water-flow switch with retard feature.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design Operation: Rising pressure signals water flow.
6. Valve Supervisory Switches:
- a. Standard: UL 346.
 - b. Type: Electrically supervised.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design: Signals that controlled valve is in other than fully open position.
7. Indicator-Post Supervisory Switches:
- a. Standard: UL 346.
 - b. Type: Electrically supervised.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design: Signals that controlled indicator-post valve is in other than fully open position.
- O. Manual Control Stations
- 1. Description: UL listed or FM approved, hydraulic operation, with union, **NPS 1/2 (DN 15)** pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- P. Control Panels
- 1. Description: Single-area, two-area, or single-area cross-zoned control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire-alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
 - a. Panels: UL listed and FM approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - b. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.

OR

 Manual Control Stations: Hydraulic operation, with union, **NPS 1/2 (DN 15)** pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- Q. Pressure Gages

1. Standard: UL 393.
2. Dial Size: 3-1/2- to 4-1/2-inch (90- to 115-mm) diameter.
3. Pressure Gage Range: 0 to 250 psig (0 to 1725 kPa) minimum **OR** 0 to 300 psig (0 to 2070 kPa), **as directed**.
4. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
5. Air System Piping Gage: Include retard feature, **directed**, and "AIR" or "AIR/WATER" label on dial face.

R. Escutcheons

1. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
2. One-Piece, Cast-Brass Escutcheons: Polished chrome-plated **OR** rough-brass, **as directed**, finish with set-screws.
3. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with chrome-plated finish.
4. One-Piece, Stamped-Steel Escutcheons: Chrome-plated finish with set-screw **OR** spring clips, **as directed**.
5. Split-Casting, Cast-Brass Escutcheons: Polished chrome-plated **OR** rough-brass, **as directed**, finish with concealed hinge and set-screw.
6. Split-Plate, Stamped-Steel Escutcheons: Chrome-plated finish with concealed **OR** exposed-rivet, **as directed**, hinge, set-screw **OR** spring clips, **as directed**.
7. One-Piece Floor Plates: Cast-iron flange with holes for fasteners, **as directed**.
8. Split-Casting Floor Plates: Cast brass with concealed hinge.

S. Sleeves

1. Cast-Iron Wall Pipe Sleeves: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
2. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
3. Molded-PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
4. Molded-PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
5. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
6. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard weight, zinc coated, plain ends.
7. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set-screws.

T. Sleeve Seals

1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Carbon steel **OR** Plastic **OR** Stainless steel, **as directed**.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements.

U. Grout

1. Standard: ASTM C 1107, Grade B, posthardening and volume adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink, and recommended for interior and exterior applications.
3. Design Mix: 5000-psi (34-MPa), 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Preparation

1. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
2. Report test results promptly and in writing.

B. Service-Entrance Piping

1. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements for exterior piping in Division 21 Section "Facility Fire-suppression Water-service Piping".
2. Install shutoff valve, backflow preventer, **as directed**, pressure gage, drain, and other accessories indicated at connection to water-service piping. Comply with requirements for backflow preventers in Division 21 Section "Facility Fire-suppression Water-service Piping", **as directed**.
OR
Install shutoff valve, check valve, pressure gage, and drain at connection to water service.

C. Water-Supply Connections

1. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements for interior piping in Division 22 Section "Domestic Water Piping".
2. Install shutoff valve, backflow preventer, **as directed**, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements for backflow preventers in Division 22 Section "Domestic Water Piping Specialties", **as directed**.
OR
Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.

D. Piping Installation

1. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - a. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with the Owner before deviating from approved working plans.
2. Piping Standard: Comply with requirements for installation of sprinkler piping in NFPA 13.
3. Install seismic restraints on piping. Comply with requirements for seismic-restraint device materials and installation in NFPA 13.
4. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
5. Install unions adjacent to each valve in pipes **NPS 2 (DN 50)** and smaller.
6. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having **NPS 2-1/2 (DN 65)** and larger end connections.
7. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
8. Install sprinkler piping with drains for complete system drainage.
9. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
10. Install automatic (ball drip) drain valve at each check valve for fire-department connection, to drain piping between fire-department connection and check valve. Install drain piping to and spill over floor drain or to outside building.
11. Install alarm devices in piping systems.
12. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements for hanger materials in NFPA 13.
13. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than **NPS 1/4 (DN 8)** and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.

14. Pressurize and check preaction sprinkler system piping and air-pressure maintenance devices **OR** air compressors, **as directed**.
15. Fill sprinkler system piping with water.
16. Install electric heating cables and pipe insulation on sprinkler piping in areas subject to freezing. Comply with requirements for heating cables in Division 21 Section "Heat Tracing For Fire-suppression Piping" and for piping insulation in Division 21 Section "Fire-suppression Systems Insulation".

E. Joint Construction

1. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
2. Install unions adjacent to each valve in pipes **NPS 2 (DN 50)** and smaller.
3. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having **NPS 2-1/2 (DN 65)** and larger end connections.
4. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
5. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
6. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
8. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
9. Steel-Piping, Pressure-Sealed Joints: Join lightwall steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
10. Welded Joints: Construct joints according to AWS D10.12M/D10.12, using qualified processes and welding operators according to "Quality Assurance" Article.
 - a. Shop weld pipe joints where welded piping is indicated. Do not use welded joints for galvanized-steel pipe.
11. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
12. Steel-Piping, Roll-Grooved Joints: Roll rounded-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
13. Steel-Piping, Pressure-Sealed Joints: Join Schedule 5 steel pipe and steel pressure-seal fittings with tools recommended by fitting manufacturer.
14. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
15. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
16. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.
17. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
18. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

19. Plastic-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
 - b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

- F. Installation Of Cover System For Sprinkler Piping
 1. Install cover system, brackets, and cover components for sprinkler piping according to manufacturer's "Installation Manual" and with NFPA 13 or NFPA 13R for supports.

- G. Valve And Specialties Installation
 1. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
 2. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
 3. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
 4. Specialty Valves:
 - a. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - b. Alarm Valves: Include bypass check valve and retarding chamber drain-line connection.
 - c. Deluge Valves: Install in vertical position, in proper direction of flow, and in main supply to deluge system. Install trim sets for drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.

- H. Excess-Pressure Pump Installation
 1. Assemble components and mount on wood backing. Comply with requirements in Division 06 Section "Rough Carpentry" for wood backing material and installation.
 2. Install excess-pressure pumps, controls, devices, and supports for sprinkler piping application.
 - a. Mounting: Install on wall, where indicated **OR** attached to water-supply pipe, **as directed**.

- I. Sprinkler Installation
 1. Install sprinklers in suspended ceilings in center of narrow dimension of, **as directed**, acoustical ceiling panels.
 2. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
 3. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.

- J. Fire-Department Connection Installation
 1. Install wall-type, fire-department connections.
 2. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Division 03 Section "Cast-in-place Concrete".
 - a. Install two **OR** three, **as directed**, protective pipe bollards around **OR** on sides of, **as directed**, each fire-department connection. Comply with requirements for bollards in Division 05 Section "Metal Fabrications".
 3. Install automatic (ball drip) drain valve at each check valve for fire-department connection.

- K. Escutcheon Installation
 1. Install escutcheons for penetrations of walls, ceilings, and floors.
 2. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set-screw **OR** stamped steel with set-screw or spring clips **OR** stamped steel with spring clips, **as directed**.

- c. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set-screw **OR** One piece or split plate, stamped steel with set-screw **OR** Split plate, stamped steel with set-screw, **as directed**.
 - d. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set-screw **OR** stamped steel with spring clips **OR** stamped steel with set-screw or spring clips, **as directed**.
 - e. Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set-screw **OR** stamped steel with spring clips **OR** stamped steel with set-screw or spring clips, **as directed**.
 - f. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
3. Escutcheons for Existing Piping:
- a. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - b. Insulated Piping: Split plate, stamped steel with concealed or exposed-rivet hinge and spring clips.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set-screw, **as directed**.
 - e. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set-screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set-screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set-screw or spring clips, **as directed**.
 - f. Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set-screw or spring clips, **as directed**.
 - g. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.
- L. Sleeve Installation
- 1. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
 - 2. Sleeves are not required for core-drilled holes.
 - 3. Permanent sleeves are not required for holes formed by removable PE sleeves.
 - 4. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
 - 5. Install sleeves in new partitions, slabs, and walls as they are built.
 - 6. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants".
 - 7. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants".
 - 8. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals.
 - 9. Seal space outside of sleeves in concrete slabs and walls with grout.
 - 10. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
 - 11. Install sleeve materials according to the following applications:
 - a. Sleeves for Piping Passing through Concrete Floor Slabs: Molded PE **OR** Molded PVC **OR** Galvanized-steel pipe, **as directed**.
 - b. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Galvanized-steel pipe **OR** Stack sleeve fittings, **as directed**.

- 1) Extend sleeves **2 inches (50 mm)** above finished floor level.
 - 2) For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements for flashing in Division 07 Section "Sheet Metal Flashing And Trim".
 - c. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - 1) PVC-pipe **OR** Galvanized-steel-pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel-sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Exception: Sleeves are not required for water-supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - d. Sleeves for Piping Passing through Concrete Roof Slabs: Molded PE **OR** Molded PVC **OR** Galvanized-steel pipe, **as directed**.
 - e. Sleeves for Piping Passing through Exterior Concrete Walls:
 - 1) Galvanized-steel-pipe sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Cast-iron wall-pipe sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Install sleeves that are large enough to provide **1-inch (25-mm)** annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
 - f. Sleeves for Piping Passing through Interior Concrete Walls:
 - 1) PVC-pipe **OR** Galvanized-steel-pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel-sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
 12. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestop materials and installations in Division 07 Section "Penetration Firestopping".
- M. Sleeve Seal Installation
1. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
 2. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- N. Identification
1. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
 2. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
- O. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - c. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - d. Energize circuits to electrical equipment and devices.
 - e. Start and run excess-pressure pumps.
 - f. Coordinate with fire-alarm tests. Operate as required.
 - g. Coordinate with fire-pump tests. Operate as required.
 - h. Verify that equipment hose threads are same as local fire-department equipment.
 3. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.

- P. Cleaning
1. Clean dirt and debris from sprinklers.
 2. Remove and replace sprinklers with paint other than factory finish.
- Q. Piping Schedule
1. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded **OR** grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved, **as directed**, joints.
 2. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
 3. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.
 4. CPVC pipe; Schedule 40 **OR** Schedule 80, **as directed**, CPVC fittings; and solvent-cemented joints may be used for light-hazard and residential occupancies.
 5. Standard-pressure, wet-pipe sprinkler system, **NPS 2 (DN 50)** and smaller, shall be one of the following:
 - a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with plain ends; galvanized, plain-end-pipe fittings; and twist-locked joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - f. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - g. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - h. Thinwall **OR** Schedule 10, **as directed**, nonstandard OD, thinwall or hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - i. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with plain ends; uncoated, plain-end-pipe fittings; and twist-locked joints.
 - j. Thinwall **OR** Schedule 10, **as directed**, nonstandard OD, thinwall or hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
 - k. Schedule 5 steel pipe; steel pressure-seal fittings; and pressure-sealed joints.
 - l. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - m. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.
 - n. **NPS 2 (DN 50), Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
 6. Standard-pressure, wet-pipe sprinkler system, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**, shall be one of the following:
 - a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.

- d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, nonstandard OD, thinwall or hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - g. Thinwall **OR** Schedule 10, **as directed**, nonstandard OD, thinwall or hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
 - h. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - i. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.
 - j. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
7. Standard-pressure, wet-pipe sprinkler system, **NPS 5 (DN 125)** and larger, shall be one of the following:
- a. Standard-weight or Schedule 30, black-steel pipe with threaded ends; uncoated, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with cut- or roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - e. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - f. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with roll-grooved ends; uncoated, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - g. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
 - h. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - i. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
8. High-pressure, wet-pipe sprinkler system, **NPS 4 (DN 100)** and smaller, shall be one of the following:
- a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - c. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
 - d. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with plain ends; welding fittings; and welded joints.
9. High-pressure, wet-pipe sprinkler system, **NPS 5 (DN 125)** and larger, shall be one of the following:
- a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.

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- b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
- c. Standard-weight or Schedule 30, black-steel pipe with plain ends; steel welding fittings; and welded joints.
- d. Thinwall **OR** Schedule 10, **as directed**, or hybrid black-steel pipe with plain ends; welding fittings; and welded joints.

R. Sprinkler Schedule

- 1. Use sprinkler types in subparagraphs below for the following applications:
 - a. Rooms without Ceilings: Upright sprinklers.
 - b. Rooms with Suspended Ceilings: Pendent sprinklers **OR** Recessed sprinklers **OR** Flush sprinklers **OR** Concealed sprinklers, **as directed**.
 - c. Wall Mounting: Sidewall sprinklers.
 - d. Spaces Subject to Freezing: Upright sprinklers **OR** Pendent, dry sprinklers **OR** Sidewall, dry sprinklers, **as directed**.
 - e. Deluge-Sprinkler Systems: Upright and pendent, open sprinklers.
 - f. Special Applications: Extended-coverage, flow-control, and quick-response sprinklers where indicated.
- 2. Provide sprinkler types in subparagraphs below with finishes indicated.
 - a. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - b. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - c. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
 - d. Residential Sprinklers: Dull chrome.
 - e. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 21 13 13 00

SECTION 21 13 16 00 - DRY-PIPE FIRE-SUPPRESSION SPRINKLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for dry-pipe fire-suppression sprinklers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pipes, fittings, and specialties.
 - b. Fire-protection valves.
 - c. Fire-department connections.
 - d. Sprinkler specialty pipe fittings.
 - e. Sprinklers.
 - f. Alarm devices.
 - g. Manual control stations.
 - h. Control panels.
 - i. Pressure gages.

C. Definitions

1. Standard-Pressure Sprinkler Piping: Dry-pipe sprinkler system piping designed to operate at working pressure **175 psig (1200 kPa)** maximum.

D. System Descriptions

1. Dry-Pipe Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Opening of sprinklers releases compressed air and permits water pressure to open dry-pipe valve. Water then flows into piping and discharges from sprinklers that are open.
2. Combined Dry-Pipe and Preaction Sprinkler System: Automatic sprinklers are attached to piping containing compressed air. Fire-detection system in same area as sprinklers actuates tripping devices that open dry-pipe valve without loss of air pressure and actuates fire alarm. Water discharges from sprinklers that have opened.
3. Single-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of fire-detection system in same area as sprinklers opens deluge valve, permitting water to flow into piping and to discharge from sprinklers that have opened.
4. Double-Interlock Preaction Sprinkler System: Automatic sprinklers are attached to piping containing low-pressure air. Actuation of a fire-detection system in the same area as sprinklers opens the deluge valve permitting water to flow into the sprinkler piping; a closed solenoid valve in the sprinkler piping is opened by another fire-detection device; then water will discharge from sprinklers that have opened.

E. Performance Requirements

1. Standard-Pressure Piping System Component: Listed for **175-psig (1200-kPa)** minimum working pressure.
2. Delegated Design: Design sprinkler system(s), including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Sprinkler system design shall be approved by authorities having jurisdiction.
 - a. Margin of Safety for Available Water Flow and Pressure: **10 OR 20, as directed**, percent, including losses through water-service piping, valves, and backflow preventers.
 - b. Sprinkler Occupancy Hazard Classifications:
 - 1) Automobile Parking Areas: Ordinary Hazard, Group 1.

- 2) Building Service Areas: Ordinary Hazard, Group 1.
- 3) Churches: Light Hazard.
- 4) Electrical Equipment Rooms: Ordinary Hazard, Group 1.
- 5) Dry Cleaners: Ordinary Hazard, Group 2.
- 6) General Storage Areas: Ordinary Hazard, Group 1.
- 7) Laundries: Ordinary Hazard, Group 1.
- 8) Libraries Except Stack Areas: Light Hazard.
- 9) Library Stack Areas: Ordinary Hazard, Group 2.
- 10) Machine Shops: Ordinary Hazard, Group 2.
- 11) Mechanical Equipment Rooms: Ordinary Hazard, Group 1.
- 12) Office and Public Areas: Light Hazard.
- 13) Plastics Processing Areas: Extra Hazard, Group 2.
- 14) Printing Plants: Extra Hazard, Group 1.
- 15) Repair Garages: Ordinary Hazard, Group 2.
- 16) Restaurant Service Areas: Ordinary Hazard, Group 1.
- 17) Solvent Cleaning Areas: Extra Hazard, Group 2.
- 18) Upholstering Plants: Extra Hazard, Group 1.
- c. Minimum Density for Automatic-Sprinkler Piping Design:
 - 1) Light-Hazard Occupancy: **0.10 gpm over 1500-sq. ft.** (4.1 mm/min. over 139-sq. m) area.
 - 2) Ordinary-Hazard, Group 1 Occupancy: **0.15 gpm over 1500-sq. ft.** (6.1 mm/min. over 139-sq. m) area.
 - 3) Ordinary-Hazard, Group 2 Occupancy: **0.20 gpm over 1500-sq. ft.** (8.1 mm/min. over 139-sq. m) area.
 - 4) Extra-Hazard, Group 1 Occupancy: **0.30 gpm over 2500-sq. ft.** (12.2 mm/min. over 232-sq. m) area.
 - 5) Extra-Hazard, Group 2 Occupancy: **0.40 gpm over 2500-sq. ft.** (16.3 mm/min. over 232-sq. m) area.
 - 6) Special Occupancy Hazard: As determined by authorities having jurisdiction.
- d. Maximum Protection Area per Sprinkler: Per UL listing.
OR
Maximum Protection Area per Sprinkler:
 - 1) Office Spaces: **120 sq. ft. (11.1 sq. m) OR 225 sq. ft. (20.9 sq. m), as directed.**
 - 2) Storage Areas: **130 sq. ft. (12.1 sq. m).**
 - 3) Mechanical Equipment Rooms: **130 sq. ft. (12.1 sq. m).**
 - 4) Electrical Equipment Rooms: **130 sq. ft. (12.1 sq. m).**
 - 5) Other Areas: According to NFPA 13 recommendations unless otherwise indicated.
- e. Total Combined Hose-Stream Demand Requirement: According to NFPA 13 unless otherwise indicated:
 - 1) Light-Hazard Occupancies: **100 gpm (6.3 L/s)** for 30 minutes.
 - 2) Ordinary-Hazard Occupancies: **250 gpm (15.75 L/s)** for 60 to 90 minutes.
 - 3) Extra-Hazard Occupancies: **500 gpm (31.5 L/s)** for 90 to 120 minutes.
4. Seismic Performance: Sprinkler piping shall withstand the effects of earthquake motions determined according to NFPA 13 and ASCE/SEI 7.

F. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For dry-pipe sprinkler systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
3. Delegated-Design Submittal: For sprinkler systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Qualification Data: For qualified Installer and professional engineer, **as directed.**

5. Approved Sprinkler Piping Drawings: Working plans, prepared according to NFPA 13, that have been approved by authorities having jurisdiction, including hydraulic calculations if applicable.
6. Fire-hydrant flow test report.
7. Field Test Reports and Certificates: Indicate and interpret test results for compliance with performance requirements and as described in NFPA 13. Include "Contractor's Material and Test Certificate for Aboveground Piping."
8. Field quality-control reports.
9. Operation and maintenance data.

G. Quality Assurance

1. Installer Qualifications:
 - a. Installer's responsibilities include designing, fabricating, and installing sprinkler systems and providing professional engineering services needed to assume engineering responsibility. Base calculations on results of fire-hydrant flow test.
 - 1) Engineering Responsibility: Preparation of working plans, calculations, and field test reports by a qualified professional engineer.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. NFPA Standards: Sprinkler system equipment, specialties, accessories, installation, and testing shall comply with the following:
 - a. NFPA 13, "Installation of Sprinkler Systems."
 - b. NFPA 13R, "Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."
 - c. NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances."

H. Project Conditions

1. Interruption of Existing Sprinkler Service: Do not interrupt sprinkler service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sprinkler service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of sprinkler service.
 - b. Do not proceed with interruption of sprinkler service without the Owner's written permission.

1.2 PRODUCTS

A. Piping Materials

1. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, and fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Steel Pipe And Fittings

1. Standard Weight, Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B. Pipe ends may be factory or field formed to match joining method.
2. Schedule 30, Galvanized-Steel Pipe: ASTM A 135; ASTM A 795/A 795M, Type E; or ASME B36.10M, wrought steel; with wall thickness not less than Schedule 30 and not more than Schedule 40. Pipe ends may be factory or field formed to match joining method.
3. Thinwall Galvanized-Steel Pipe: ASTM A 135 or ASTM A 795/A 795M, threadable, with wall thickness less than Schedule 30 and equal to or greater than Schedule 10. Pipe ends may be factory or field formed to match joining method.
4. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, standard-weight, seamless steel pipe with threaded ends.
5. Galvanized, Steel Couplings: ASTM A 865, threaded.
6. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
7. Malleable- or Ductile-Iron Unions: UL 860.
8. Cast-Iron Flanges: ASME B16.1, Class 125.

9. Plain-End-Pipe Fittings: UL 213, ductile-iron body with retainer lugs that require one-quarter turn or screwed retainer pin to secure pipe in fitting.
 10. Grooved-Joint, Steel-Pipe Appurtenances:
 - a. Pressure Rating: **175 psig (1200 kPa) OR 250 psig (1725 kPa) OR 300 psig (2070 kPa), as directed**, minimum.
 - b. Galvanized, Grooved-End Fittings for Steel Piping: ASTM A 47/A 47M, malleable-iron casting or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - c. Grooved-End-Pipe Couplings for Steel Piping: AWWA C606 and UL 213, rigid pattern, unless otherwise indicated, for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gasket, and bolts and nuts.
- C. Copper Tube And Fittings
1. Hard Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)** and **ASTM B 88, Type M (ASTM B 88M, Type C)** water tube, drawn temper.
 2. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.
 3. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, pressure fittings.
 4. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 5. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 6. Copper Pressure-Seal Fittings:
 - a. Standard: UL 213.
 - b. **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
 - c. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Cast-bronze fitting with EPDM-rubber O-ring seal in each end.
 7. Grooved-Joint, Copper-Tube Appurtenances:
 - a. Grooved-End, Copper Fittings: **ASTM B 75 (ASTM B 75M)**, copper tube or ASTM B 584, bronze castings.
 - b. Grooved-End-Tube Couplings: To fit copper tube, with dimensions and design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gasket suitable for hot and cold water, and bolts and nuts.
 8. Copper-Tube, Extruded-Tee Connections:
 - a. Description: Tee formed in copper tube according to ASTM F 2014.
- D. Piping Joining Materials
1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick or ASME B16.21, nonmetallic and asbestos free.
 - a. Class 125, Cast-Iron and Class 150, Bronze Flat-Face Flanges: Full-face gaskets.
 - b. Class 250, Cast-Iron and Class 300, Raised-Face Flanges: Ring-type gaskets.
 2. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
 3. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
- E. Listed Fire-Protection Valves
1. General Requirements:
 - a. Valves shall be UL listed or FM approved.
 - b. Minimum Pressure Rating for Standard-Pressure Piping: **175 psig (1200 kPa)**.
 2. Ball Valves:
 - a. Standard: UL 1091 except with ball instead of disc.
 - b. Valves **NPS 1-1/2 (DN 40)** and Smaller: Bronze body with threaded ends.
 - c. Valves **NPS 2 and NPS 2-1/2 (DN 50 and DN 65)**: Bronze body with threaded ends or ductile-iron body with grooved ends.
 - d. Valves **NPS 3 (DN 80)**: Ductile-iron body with grooved ends.
- F. Bronze Butterfly Valves:

- a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Bronze.
 - d. End Connections: Threaded.
- G. Iron Butterfly Valves:
- a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Cast or ductile iron.
 - d. Style: Lug or wafer.
OR
End Connections: Grooved.
- H. Check Valves:
- a. Standard: UL 312
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa), as directed.**
 - c. Type: Swing check.
 - d. Body Material: Cast iron.
 - e. End Connections: Flanged or grooved.
2. Bronze OS&Y Gate Valves:
- a. Standard: UL 262.
 - b. Pressure Rating: **175 psig (1200 kPa)**.
 - c. Body Material: Bronze.
 - d. End Connections: Threaded.
3. Iron OS&Y Gate Valves:
- a. Standard: UL 262.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa), as directed.**
 - c. Body Material: Cast or ductile iron.
 - d. End Connections: Flanged or grooved.
4. Indicating-Type Butterfly Valves:
- a. Standard: UL 1091.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - c. Valves **NPS 2 (DN 50)** and Smaller:
 - 1) Valve Type: Ball or butterfly.
 - 2) Body Material: Bronze.
 - 3) End Connections: Threaded.
 - d. Valves **NPS 2-1/2 (DN 65)** and Larger:
 - 1) Valve Type: Butterfly.
 - 2) Body Material: Cast or ductile iron.
 - 3) End Connections: Flanged, grooved, or wafer.
 - e. Valve Operation: Integral electrical, 115-V ac, prewired, single-circuit, supervisory switch **OR** electrical, 115-V ac, prewired, two-circuit, supervisory switch **OR** visual, **as directed**, indicating device.
5. NRS Gate Valves:
- a. Standard: UL 262.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa), as directed.**
 - c. Body Material: Cast iron with indicator post flange.
 - d. Stem: Nonrising.
 - e. End Connections: Flanged or grooved.
6. Indicator Posts:
- a. Standard: UL 789.
 - b. Type: Horizontal for wall mounting.
 - c. Body Material: Cast iron with extension rod and locking device.
 - d. Operation: Wrench **OR** Hand wheel, **as directed.**
- I. Trim And Drain Valves

1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 2. Angle Valves.
 3. Ball Valves.
 4. Globe Valves.
 5. Plug Valves.
- J. Specialty Valves
1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating:
 - 1) Standard-Pressure Piping Specialty Valves: **175 psig (1200 kPa)** minimum.
 - 2) High-Pressure Piping Specialty Valves: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa), as directed.**
 - c. Body Material: Cast or ductile iron.
 - d. Size: Same as connected piping.
 - e. End Connections: Flanged or grooved.
 2. Dry-Pipe Valves:
 - a. Standard: UL 260
 - b. Design: Differential-pressure type.
 - c. Include UL 1486, quick-opening devices, trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - d. Air-Pressure Maintenance Device:
 - 1) Standard: UL 260.
 - 2) Type: Automatic device to maintain minimum air pressure in piping.
 - 3) Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure, strainer, pressure ratings with **14- to 60-psig (95- to 410-kPa)** adjustable range, and **175-psig (1200-kPa) OR 300-psig (2070-kPa), as directed**, outlet pressure.
 - e. Air Compressor:
 - 1) Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2) Motor Horsepower: Fractional.
 - 3) Power: 120-V ac, 60 Hz, single phase.
 3. Deluge Valves:
 - a. Standard: UL 260.
 - b. Design: Hydraulically operated, differential-pressure type.
 - c. Include trim sets for bypass, drain, electrical sprinkler alarm switch, pressure gages, drip cup assembly piped without valves and separate from main drain line, fill-line attachment with strainer, and push-rod chamber supply connection.
 - d. Dry, Pilot-Line Trim Set: Include dry, pilot-line actuator; air- and water-pressure gages; low-air-pressure warning switch; air relief valve; and actuation device. Dry, pilot-line actuator includes cast-iron, operated, diaphragm-type valve with resilient facing plate, resilient diaphragm, and replaceable bronze seat. Valve includes threaded water and air inlets and water outlet. Loss of air pressure on dry, pilot-line side allows pilot-line actuator to open and causes deluge valve to open immediately.
 - e. Air-Pressure Maintenance Device:
 - 1) Standard: UL 260.
 - 2) Type: Automatic device to maintain minimum air pressure in piping.
 - 3) Include shutoff valves to permit servicing without shutting down sprinkler piping, bypass valve for quick filling, pressure regulator or switch to maintain pressure,

- strainer, pressure ratings with 14- to 60-psig (95- to 410-kPa) adjustable range, and 175-psig (1200-kPa) OR 300-psig (2070-kPa), as directed, outlet pressure.
- f. Air Compressor:
 - 1) Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - 2) Motor Horsepower: Fractional.
 - 3) Power: 120-V ac, 60 Hz, single phase.
 4. Automatic (Ball Drip) Drain Valves:
 - a. Standard: UL 1726.
 - b. Pressure Rating: 175 psig (1200 kPa) minimum.
 - c. Type: Automatic draining, ball check.
 - d. Size: NPS 3/4 (DN 20).
 - e. End Connections: Threaded.
- K. Fire-Department Connections
1. Exposed-Type, Fire-Department Connection:
 - a. Standard: UL 405.
 - b. Type: Exposed, projecting, for wall mounting.
 - c. Pressure Rating: 175 psig (1200 kPa) minimum.
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Round, brass, wall type.
 - h. Outlet: Back, with pipe threads.
 - i. Number of Inlets: Two OR Three, as directed.
 - j. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" OR "AUTO SPKR", as directed.
 - k. Finish: Polished chrome plated OR Rough brass or bronze OR Rough chrome plated, as directed.
 - l. Outlet Size: NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150), as directed.
 2. Flush-Type, Fire-Department Connection:
 - a. Standard: UL 405.
 - b. Type: Flush, for wall mounting.
 - c. Pressure Rating: 175 psig (1200 kPa) minimum.
 - d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Rectangular, brass, wall type.
 - h. Outlet: With pipe threads.
 - i. Body Style: Horizontal OR Square OR Vertical, as directed.
 - j. Number of Inlets: Two OR Three OR Four OR Six, as directed.
 - k. Outlet Location: Back OR Bottom OR Left side OR Right side OR Top, as directed.
 - l. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" OR "AUTO SPKR", as directed.
 - m. Finish: Polished chrome plated OR Rough brass or bronze OR Rough chrome plated, as directed.
 - n. Outlet Size: NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150) OR NPS 8 (DN 200), as directed.
 3. Yard-Type, Fire-Department Connection:
 - a. Standard: UL 405.
 - b. Type: Exposed, freestanding.
 - c. Pressure Rating: 175 psig (1200 kPa) minimum OR 300 psig (2070 kPa), as directed.

- d. Body Material: Corrosion-resistant metal.
 - e. Inlets: Brass with threads according to NFPA 1963 and matching local fire-department sizes and threads. Include extension pipe nipples, brass lugged swivel connections, and check devices or clappers.
 - f. Caps: Brass, lugged type, with gasket and chain.
 - g. Escutcheon Plate: Round, brass, floor type.
 - h. Outlet: Bottom, with pipe threads.
 - i. Number of Inlets: Two **OR** Three **OR** Four, **as directed**.
 - j. Sleeve: Brass **OR** Not required, **as directed**.
 - k. Sleeve Height: **18 inches (460 mm)**.
 - l. Escutcheon Plate Marking: Similar to "AUTO SPKR & STANDPIPE" **OR** "AUTO SPKR", **as directed**.
 - m. Finish, Including Sleeve: Polished chrome plated **OR** Rough brass or bronze **OR** Rough chrome plated, **as directed**.
 - n. Outlet Size: **NPS 4 (DN 100) OR NPS 5 (DN 125) OR NPS 6 (DN 150), as directed**.
- L. Sprinkler Specialty Pipe Fittings
- 1. General Requirements for Dry-Pipe-System Fittings: UL listed for dry-pipe service.
 - 2. Branch Outlet Fittings:
 - a. Standard: UL 213.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, **as directed**.
 - c. Body Material: Ductile-iron housing with EPDM seals and bolts and nuts.
 - d. Type: Mechanical-T and -cross fittings.
 - e. Configurations: Snap-on and strapless, ductile-iron housing with branch outlets.
 - f. Size: Of dimension to fit onto sprinkler main and with outlet connections as required to match connected branch piping.
 - g. Branch Outlets: Grooved, plain-end pipe, or threaded.
 - 3. Flow Detection and Test Assemblies:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, **as directed**.
 - c. Body Material: Cast- or ductile-iron housing with orifice, sight glass, and integral test valve.
 - d. Size: Same as connected piping.
 - e. Inlet and Outlet: Threaded.
 - 4. Branch Line Testers:
 - a. Standard: UL 199.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum.
 - c. Body Material: Brass.
 - d. Size: Same as connected piping.
 - e. Inlet: Threaded.
 - f. Drain Outlet: Threaded and capped.
 - g. Branch Outlet: Threaded, for sprinkler.
 - 5. Sprinkler Inspector's Test Fittings:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, **as directed**.
 - c. Body Material: Cast- or ductile-iron housing with sight glass.
 - d. Size: Same as connected piping.
 - e. Inlet and Outlet: Threaded.
 - 6. Adjustable Drop Nipples:
 - a. Standard: UL 1474.
 - b. Pressure Rating: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, **as directed**.
 - c. Body Material: Steel pipe with EPDM O-ring seals.
 - d. Size: Same as connected piping.
 - e. Length: Adjustable.

- f. Inlet and Outlet: Threaded.
 - 7. Flexible, Sprinkler Hose Fittings:
 - a. Standard: UL 1474.
 - b. Type: Flexible hose for connection to sprinkler, and with bracket for connection to ceiling grid.
 - c. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 - d. Size: Same as connected piping, for sprinkler.
- M. Sprinklers
1. General Requirements:
 - a. Standard: UL's "Fire Protection Equipment Directory" listing or "Approval Guide," published by FM Global, listing.
 - b. Pressure Rating for Residential Sprinklers: **175 psig (1200 kPa)** maximum.
 - c. Pressure Rating for Automatic Sprinklers: **175 psig (1200 kPa)** minimum.
 - d. Pressure Rating for High-Pressure Automatic Sprinklers: **250 psig (1725 kPa)** minimum **OR 300 psig (2070 kPa)**, as directed.
 2. Automatic Sprinklers with Heat-Responsive Element:
 - a. Nonresidential Applications: UL 199.
 - b. Residential Applications: UL 1626.
 - c. Characteristics: Nominal **1/2-inch (12.7-mm)** orifice with discharge coefficient K of 5.6, and for "Ordinary" temperature classification rating unless otherwise indicated or required by application.
 3. Sprinkler Finishes:
 - a. Chrome plated.
 - b. Bronze.
 - c. Painted.
 4. Special Coatings:
 - a. Wax.
 - b. Lead.
 - c. Corrosion-resistant paint.
 5. Sprinkler Escutcheons: Materials, types, and finishes for the following sprinkler mounting applications. Escutcheons for concealed, flush, and recessed-type sprinklers are specified with sprinklers.
 - a. Ceiling Mounting: Chrome-plated steel, one piece, flat **OR** Chrome-plated steel, two piece, with **1-inch (25-mm)** vertical adjustment **OR** Plastic, white finish, one piece, flat, **as directed**.
 - b. Sidewall Mounting: Chrome-plated steel **OR** Plastic, white finish, **as directed**, one piece, flat.
 6. Sprinkler Guards:
 - a. Standard: UL 199.
 - b. Type: Wire cage with fastening device for attaching to sprinkler.
- N. Alarm Devices
1. Alarm-device types shall match piping and equipment connections.
 2. Water-Motor-Operated Alarm:
 - a. Standard: UL 753.
 - b. Type: Mechanically operated, with Pelton wheel.
 - c. Alarm Gong: Cast aluminum with red-enamel factory finish.
 - d. Size: **10-inch (250-mm)** diameter.
 - e. Components: Shaft length, bearings, and sleeve to suit wall construction.
 - f. Inlet: **NPS 3/4 (DN 20)**.
 - g. Outlet: **NPS 1 (DN 25)** drain connection.
 3. Electrically Operated Alarm Bell:
 - a. Standard: UL 464.
 - b. Type: Vibrating, metal alarm bell.

- c. Size: **6-inch (150-mm)** minimum **OR 8-inch (200-mm)** minimum **OR 10-inch (250-mm)**, **as directed**, diameter.
 - d. Finish: Red-enamel factory finish, suitable for outdoor use.
 4. Pressure Switches:
 - a. Standard: UL 346.
 - b. Type: Electrically supervised water-flow switch with retard feature.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design Operation: Rising pressure signals water flow.
 5. Valve Supervisory Switches:
 - a. Standard: UL 346.
 - b. Type: Electrically supervised.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design: Signals that controlled valve is in other than fully open position.
 6. Indicator-Post Supervisory Switches:
 - a. Standard: UL 346.
 - b. Type: Electrically supervised.
 - c. Components: Single-pole, double-throw switch with normally closed contacts.
 - d. Design: Signals that controlled indicator-post valve is in other than fully open position.
- O. Manual Control Stations
 1. Description: UL listed or FM Global approved, hydraulic operation, with union, **NPS 1/2 (DN 15)** pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- P. Control Panels
 1. Description: Single-area, two-area, or single-area cross-zoned type control panel as indicated, including NEMA ICS 6, Type 1 enclosure, detector, alarm, and solenoid-valve circuitry for operation of deluge valves. Panels contain power supply; battery charger; standby batteries; field-wiring terminal strip; electrically supervised solenoid valves and polarized fire-alarm bell; lamp test facility; single-pole, double-throw auxiliary alarm contacts; and rectifier.
 2. Panels: UL listed and FM Global approved when used with thermal detectors and Class A detector circuit wiring. Electrical characteristics are 120-V ac, 60 Hz, with 24-V dc rechargeable batteries.
 - a. Manual Control Stations: Electric operation, metal enclosure, labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
OR
Manual Control Stations: Hydraulic operation, with union, **NPS 1/2 (DN 15)** pipe nipple, and bronze ball valve. Include metal enclosure labeled "MANUAL CONTROL STATION" with operating instructions and cover held closed by breakable strut to prevent accidental opening.
- Q. Pressure Gages
 1. Standard: UL 393.
 2. Dial Size: **3-1/2- to 4-1/2-inch (90- to 115-mm)** diameter.
 3. Pressure Gage Range: **0 to 250 psig (0 to 1725 kPa)** minimum **OR 0 to 300 psig (0 to 2070 kPa)**, **as directed**.
 4. Water System Piping Gage: Include "WATER" or "AIR/WATER" label on dial face.
 5. Air System Piping Gage: Include retard feature, **as directed**, and "AIR" or "AIR/WATER" label on dial face.
- R. Escutcheons
 1. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.

2. One-Piece, Cast-Brass Escutcheons: Polished chrome-plated or rough-brass finish with set-screws.
3. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with chrome-plated finish.
4. One-Piece, Stamped-Steel Escutcheons: Chrome-plated finish with set-screw or spring clips.
5. Split-Casting, Cast-Brass Escutcheons: Polished chrome-plated or rough-brass finish with concealed hinge and set-screw.
6. Split-Plate, Stamped-Steel Escutcheons: Chrome-plated finish with concealed **OR** exposed-rivet, **as directed**, hinge, set-screw or spring clips.
7. One-Piece Floor Plates: Cast-iron flange with holes for fasteners, **as directed**.
8. Split-Casting Floor Plates: Cast brass with concealed hinge.

S. Sleeves

1. Cast-Iron Wall Pipe Sleeves: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
2. Galvanized-Steel-Sheet Sleeves: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
3. Molded-PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
4. Molded-PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
5. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
6. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, standard weight, zinc coated, plain ends.
7. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set-screws.

T. Sleeve Seals

1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM-rubber or NBR interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Carbon steel **OR** Plastic **OR** Stainless steel, **as directed**.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements.

U. Grout

1. Standard: ASTM C 1107, Grade B, posthardening and volume adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink, and recommended for interior and exterior applications.
3. Design Mix: **5000-psi (34-MPa)**, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Preparation

1. Perform fire-hydrant flow test according to NFPA 13 and NFPA 291. Use results for system design calculations required in "Quality Assurance" Article.
2. Report test results promptly and in writing.

B. Service-Entrance Piping

1. Connect sprinkler piping to water-service piping for service entrance to building. Comply with requirements in Division 21 Section "Facility Fire-suppression Water-service Piping" for exterior piping.

2. Install shutoff valve, backflow preventer, **as directed**, pressure gage, drain, and other accessories indicated at connection to water-service piping. Comply with requirements in Division 21 Section "Facility Fire-suppression Water-service Piping" for backflow preventers, **as directed**.
 3. Install shutoff valve, check valve, pressure gage, and drain at connection to water service.
- C. Water-Supply Connections
1. Connect sprinkler piping to building's interior water-distribution piping. Comply with requirements in Division 22 Section "Domestic Water Piping" for interior piping.
 2. Install shutoff valve, backflow preventer, **as directed**, pressure gage, drain, and other accessories indicated at connection to water-distribution piping. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for backflow preventers, **as directed**.
 3. Install shutoff valve, check valve, pressure gage, and drain at connection to water supply.
- D. Piping Installation
1. Locations and Arrangements: Drawing plans, schematics, and diagrams indicate general location and arrangement of piping. Install piping as indicated, as far as practical.
 - a. Deviations from approved working plans for piping require written approval from authorities having jurisdiction. File written approval with the Owner before deviating from approved working plans.
 2. Piping Standard: Comply with requirements in NFPA 13 for installation of sprinkler piping.
 3. Install seismic restraints on piping. Comply with requirements in NFPA 13 for seismic-restraint device materials and installation.
 4. Use listed fittings to make changes in direction, branch takeoffs from mains, and reductions in pipe sizes.
 5. Install unions adjacent to each valve in pipes **NPS 2 (DN 50)** and smaller.
 6. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having **NPS 2-1/2 (DN 65)** and larger end connections.
 7. Install "Inspector's Test Connections" in sprinkler system piping, complete with shutoff valve, and sized and located according to NFPA 13.
 8. Install sprinkler piping with drains for complete system drainage.
 9. Install sprinkler control valves, test assemblies, and drain risers adjacent to standpipes when sprinkler piping is connected to standpipes.
 10. Install automatic (ball drip) drain valves to drain piping between fire-department connections and check valves. Drain to floor drain or to outside building.
 11. Connect compressed-air supply to dry-pipe sprinkler piping.

OR

Connect air compressor to the following piping and wiring:
 - a. Pressure gages and controls.
 - b. Electrical power system.
 - c. Fire-alarm devices, including low-pressure alarm.
 12. Install alarm devices in piping systems.
 13. Install hangers and supports for sprinkler system piping according to NFPA 13. Comply with requirements in NFPA 13 for hanger materials.
 14. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each standpipe. Include pressure gages with connection not less than **NPS 1/4 (DN 8)** and with soft metal seated globe valve, arranged for draining pipe between gage and valve. Install gages to permit removal, and install where they will not be subject to freezing.
 15. Drain dry-pipe sprinkler piping.
 16. Pressurize and check dry-pipe sprinkler system piping and air-pressure maintenance devices **OR** air compressors, **as directed**.
- E. Joint Construction

1. Install couplings, flanges, flanged fittings, unions, nipples, and transition and special fittings that have finish and pressure ratings same as or higher than system's pressure rating for aboveground applications unless otherwise indicated.
 2. Install unions adjacent to each valve in pipes **NPS 2 (DN 50)** and smaller.
 3. Install flanges, flange adapters, or couplings for grooved-end piping on valves, apparatus, and equipment having **NPS 2-1/2 (DN 65)** and larger end connections.
 4. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 5. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
 6. Flanged Joints: Select appropriate gasket material in size, type, and thickness suitable for water service. Join flanges with gasket and bolts according to ASME B31.9.
 7. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 8. Twist-Locked Joints: Insert plain end of steel pipe into plain-end-pipe fitting. Rotate retainer lugs one-quarter turn or tighten retainer pin.
 9. Steel-Piping, Cut-Grooved Joints: Cut square-edge groove in end of pipe according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe joints.
 10. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Brazed Joints" Chapter.
 11. Copper-Tubing Grooved Joints: Roll rounded-edge groove in end of tube according to AWWA C606. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
 12. Copper-Tubing, Pressure-Sealed Joints: Join copper tube and copper pressure-seal fittings with tools recommended by fitting manufacturer.
 13. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
 14. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- F. Valve And Specialties Installation
1. Install listed fire-protection valves, trim and drain valves, specialty valves and trim, controls, and specialties according to NFPA 13 and authorities having jurisdiction.
 2. Install listed fire-protection shutoff valves supervised open, located to control sources of water supply except from fire-department connections. Install permanent identification signs indicating portion of system controlled by each valve.
 3. Install check valve in each water-supply connection. Install backflow preventers instead of check valves in potable-water-supply sources.
 4. Specialty Valves:
 - a. General Requirements: Install in vertical position for proper direction of flow, in main supply to system.
 - b. Dry-Pipe and Deluge Valves: Install trim sets for air supply, drain, priming level, alarm connections, ball drip valves, pressure gages, priming chamber attachment, and fill-line attachment.
 - 1) Install air compressor and compressed-air supply piping.
 - 2) Air-Pressure Maintenance Device: Install shutoff valves to permit servicing without shutting down sprinkler system; bypass valve for quick system filling; pressure regulator or switch to maintain system pressure; strainer; pressure ratings with **14- to 60-psig (95- to 410-kPa)** adjustable range; and **175-psig (1200-kPa)** maximum inlet pressure.
 - 3) Install compressed-air supply piping from building's compressed-air piping system.

- G. Sprinkler Installation
1. Install sprinklers in suspended ceilings in center of narrow dimension of, **as directed**, acoustical ceiling panels.
 2. Install dry-type sprinklers with water supply from heated space. Do not install pendent or sidewall, wet-type sprinklers in areas subject to freezing.
 3. Install sprinklers into flexible, sprinkler hose fittings and install hose into bracket on ceiling grid.
- H. Fire-Department Connection Installation
1. Install wall-type, fire-department connections.
 2. Install yard-type, fire-department connections in concrete slab support. Comply with requirements for concrete in Division 03 Section "Cast-in-place Concrete".
 - a. Install two **OR** three, **as directed**, protective pipe bollards around **OR** on sides of, **as directed**, each fire-department connection. Comply with requirements for bollards in Division 05 Section "Metal Fabrications".
 3. Install automatic (ball drip) drain valve at each check valve for fire-department connection.
- I. Escutcheon Installation
1. Install escutcheons for penetrations of walls, ceilings, and floors.
 2. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set-screw **OR** stamped steel with set-screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set-screw **OR** One piece or split plate, stamped steel with set-screw **OR** Split plate, stamped steel with set-screw, **as directed**.
 - d. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set-screw **OR** stamped steel with spring clips **OR** stamped steel with set-screw or spring clips, **as directed**.
 - e. Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set-screw **OR** stamped steel with spring clips **OR** stamped steel with set-screw or spring clips, **as directed**.
 - f. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
 3. Escutcheons for Existing Piping:
 - a. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - b. Insulated Piping: Split plate, stamped steel with concealed or exposed-rivet hinge and spring clips.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set-screw, **as directed**.
 - e. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set-screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set-screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set-screw or spring clips, **as directed**.
 - f. Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set-screw or spring clips, **as directed**.
 - g. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

J. Sleeve Installation

1. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
2. Sleeves are not required for core-drilled holes.
3. Permanent sleeves are not required for holes formed by removable PE sleeves.
4. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
5. Install sleeves in new partitions, slabs, and walls as they are built.
6. For interior wall penetrations, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants".
7. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements for joint sealants in Division 07 Section "Joint Sealants".
8. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals.
9. Seal space outside of sleeves in concrete slabs and walls with grout.
10. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe unless otherwise indicated.
11. Install sleeve materials according to the following applications:
 - a. Sleeves for Piping Passing through Concrete Floor Slabs: Molded PE **OR** Molded PVC **OR** Galvanized-steel pipe, **as directed**.
 - b. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Galvanized-steel pipe **OR** Stack sleeve fittings, **as directed**.
 - 1) Extend sleeves **2 inches (50 mm)** above finished floor level.
 - 2) For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements for flashing in Division 07 Section "Sheet Metal Flashing And Trim".
 - c. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - 1) PVC-pipe **OR** Galvanized-steel-pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel-sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Exception: Sleeves are not required for water-supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - d. Sleeves for Piping Passing through Concrete Roof Slabs: Molded PE **OR** Molded PVC **OR** Galvanized-steel pipe, **as directed**.
 - e. Sleeves for Piping Passing through Exterior Concrete Walls:
 - 1) Galvanized-steel-pipe sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Cast-iron wall pipe sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Install sleeves that are large enough to provide **1-inch (25-mm)** annular clear space between sleeve and pipe when sleeve seals are used.
 - f. Sleeves for Piping Passing through Interior Concrete Walls:
 - 1) PVC-pipe **OR** Galvanized-steel pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel-sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
12. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

K. Sleeve Seal Installation

1. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
2. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe

and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- L. Identification
 - 1. Install labeling and pipe markers on equipment and piping according to requirements in NFPA 13.
 - 2. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".

- M. Field Quality Control
 - 1. Perform tests and inspections.
 - 2. Tests and Inspections:
 - a. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - c. Flush, test, and inspect sprinkler systems according to NFPA 13, "Systems Acceptance" Chapter.
 - d. Energize circuits to electrical equipment and devices.
 - e. Start and run air compressors.
 - f. Coordinate with fire-alarm tests. Operate as required.
 - g. Coordinate with fire-pump tests. Operate as required.
 - h. Verify that equipment hose threads are same as local fire-department equipment.
 - 3. Sprinkler piping system will be considered defective if it does not pass tests and inspections.
 - 4. Prepare test and inspection reports.

- N. Cleaning
 - 1. Clean dirt and debris from sprinklers.
 - 2. Remove and replace sprinklers with paint other than factory finish.

- O. Demonstration
 - 1. Train the Owner's maintenance personnel to adjust, operate, and maintain specialty valves.

- P. Piping Schedule
 - 1. Piping between Fire-Department Connections and Check Valves: Galvanized, standard-weight steel pipe with threaded ends; cast-iron threaded fittings; and threaded **OR** grooved ends; grooved-end fittings; grooved-end-pipe couplings; and grooved, **as directed**, joints.
 - 2. Sprinkler specialty fittings may be used, downstream of control valves, instead of specified fittings.
 - 3. Copper-tube, extruded-tee connections may be used for tee branches in copper tubing instead of specified copper fittings. Branch-connection joints must be brazed.
 - 4. Standard-pressure, dry-pipe sprinkler system, **NPS 2 (DN 50)** and smaller, shall be one of the following:
 - a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight **OR** Schedule 30 **OR** thinwall, **as directed**, galvanized-steel pipe with plain ends; plain-end-pipe fittings; and twist-locked joints.
 - c. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - d. **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with plain ends; cast-or wrought-copper solder-joint fittings; and brazed joints.
 - e. **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.
 - f. **NPS 2 (DN 50)**, **Type L (Type B) OR Type M (Type C)**, **as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.

5. Standard-pressure, dry-pipe sprinkler system, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**, shall be one of the following:
 - a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - c. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - d. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; copper pressure-seal fittings; and pressure-sealed joints.
 - e. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
 6. Standard-pressure, dry-pipe sprinkler system, **NPS 5 and NPS 6 (DN 125 and DN 150)**, shall be one of the following:
 - a. Standard-weight or Schedule 30, galvanized-steel pipe with threaded ends; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Standard-weight or Schedule 30, galvanized-steel pipe with cut-grooved ends; galvanized, grooved-end fittings for steel piping; grooved-end-pipe couplings for steel piping; and grooved joints.
 - c. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with plain ends; cast- or wrought-copper solder-joint fittings; and brazed joints.
 - d. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube with roll-grooved ends; copper, grooved-end fittings; grooved-end-tube couplings; and grooved joints.
- Q. Sprinkler Schedule
1. Use sprinkler types in subparagraphs below for the following applications:
 - a. Rooms without Ceilings: Upright sprinklers.
 - b. Rooms with Suspended Ceilings: Dry pendent sprinklers **OR** Dry recessed sprinklers **OR** Dry flush sprinklers **OR** Dry concealed sprinklers, **as directed**.
 - c. Wall Mounting: Dry sidewall sprinklers.
 - d. Spaces Subject to Freezing: Upright sprinklers **OR** Dry pendent sprinklers **OR** Dry sidewall sprinklers, **as directed**.
 - e. Special Applications: Extended-coverage and quick-response sprinklers where indicated.
 2. Provide sprinkler types in subparagraphs below with finishes indicated.
 - a. Concealed Sprinklers: Rough brass, with factory-painted white cover plate.
 - b. Flush Sprinklers: Bright chrome, with painted white escutcheon.
 - c. Recessed Sprinklers: Bright chrome, with bright chrome escutcheon.
 - d. Upright, Pendent, and Sidewall Sprinklers: Chrome plated in finished spaces exposed to view; rough bronze in unfinished spaces not exposed to view; wax coated where exposed to acids, chemicals, or other corrosive fumes.

END OF SECTION 21 13 16 00

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SECTION 21 13 39 00 - FOAM FIRE EXTINGUISHING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for foam fire extinguishing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fixed, low-expansion, AFFF fire-extinguishing systems and the following:
 - a. Concentrate piping and piping specialties.
 - b. Proportioning tanks and proportioning devices.
 - c. Foam concentrate.
 - d. Discharge devices.
 - e. Monitoring and alarm devices.

C. Definitions

1. AFFF: Aqueous film-forming foam.
2. AR-AFFF: Alcohol-resistant aqueous film-forming foam.
3. ATS: Acceptance Testing Specifications.

D. System Description

1. Description: Engineered, fixed, wet-pipe **OR** dry-pipe, **OR** preaction, **OR** deluge, **as directed**, automatically actuated, low-expansion, AFFF **OR** AR-AFFF, **as directed**, fire-extinguishing system for flammable-liquid fires. System includes diaphragm proportioning tanks and devices as described in NFPA 16.

E. Performance Requirements

1. Standard Piping System Component Working Pressure: Listed for at least **175 psig (1200 kPa)**.
2. Minimum design parameters to be used with the approval of authorities having jurisdiction are as follows:
 - a. Solution: 3 percent foam-water solution.
 - b. Sprinkler Spacing: Maximum of **100 sq. ft. (9.5 sq. m)** per sprinkler, and maximum **12-foot (3.7-m)** spacing.
 - c. Design Density: Minimum **0.16 gpm/sq. ft. (0.108 L/s per sq. m)**.
 - d. Foam Supply: Minimum 10-minute discharge time.
 - e. Water Supply: Minimum 60 minutes.
 - f. Remote Area: Minimum **5000-sq. ft. (476-sq. m)** design area for closed-sprinkler systems. Open-sprinkler systems shall discharge over the entire system area.
 - g. Sprinkler Temperature Rating: Maximum **250 to 300 deg F (121 to 149 deg C)** at a roof or ceiling, and **135 to 170 deg F (57 to 77 deg C)** for intermediate sprinklers.
3. Seismic Performance: Fire-suppression piping shall be capable of withstanding the effects of earthquake motions determined according to NFPA 13.

F. Submittals

1. Product Data: For the following:
 - a. Piping and equipment seismic restraints.
 - b. Valves.
 - c. Proportioning tanks and proportioning devices.
 - d. Foam concentrate.
 - e. Discharge devices. Include flow characteristics.
 - f. Monitoring and alarm devices. Include electrical data.

2. Shop Drawings: Signed and sealed by a qualified professional engineer. Include the following for each hazard area, drawn to scale:
 - a. Include plans, elevations, sections, details, and attachments to other work. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: Power, signal, and control wiring.
 - c. Design Calculations: For amount of foam concentrate required for each hazard area.
 - d. Plans: Show the following:
 - 1) Foam-solution proportioning tanks and devices, piping, discharge devices, monitoring and alarm devices, and accessories.
 - 2) Method of attaching hangers to building structure.
 - 3) Fire alarm panel.
 - 4) Equipment and furnishings.
3. Permit-Approved Drawings: Working plans, prepared according to NFPA 16, that have been approved by authorities having jurisdiction. Include design calculations.
4. Welding certificates.
5. Field quality-control test reports.
6. Operation and Maintenance Data: For foam fire extinguishing to include in emergency, operation, and maintenance manuals.

G. Quality Assurance

1. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. FMG Compliance: Provide components that are FMG approved and that are listed in FMG's "Fire Protection Approval Guide."
4. UL Compliance: Provide equipment listed in UL's "Fire Protection Equipment Directory."

1.2 PRODUCTS

A. Pipe And Fittings

1. Steel Pipe: ASTM A 53/A 53M, ASTM A 135, ASTM A 106, or ASTM A 795, Type E or S, Grade A or B, Schedule 40, with factory- or field-formed threaded ends.
 - a. Cast-Iron Threaded Flanges: ASME B16.1.
 - b. Malleable-Iron Threaded Fittings: ASME B16.3.
 - c. Gray-Iron Threaded Fittings: ASME B16.4.
 - d. Butt-Weld Fittings: ASTM A 234/A 234M, Grade WPB, Schedule 40, carbon-steel butt-weld fittings.
 - e. Steel Threaded Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, seamless steel pipe. Include ends matching joining method.
 - f. Steel Threaded Couplings: ASTM A 865.
2. Stainless Steel: ASTM A 312/A 312M, Schedule 40, with factory-formed threaded or beveled ends; ASTM A 376/A 376M for seamless pipe; or ASTM A 213/A 213M, ASTM A 249/A 249M, and ASTM A 269 for seamless and welded tubing.
 - a. Class 150 Threaded Fittings: ASME B16.3 and MSS SP 114.
 - b. Butt-Weld Fittings: ASTM A 403/A 403M.
 - c. Flanges, Forged Fittings and Flanges, and Socket-Weld Fittings: ASTM A 182/A 182M.
 - d. Bar Stock and Compression Fittings: ASTM A 276 and ASTM A 479/A 479M.
3. Red Brass Pipe: ASTM B 43, Schedule 40, with factory- or field-formed threaded ends.
 - a. Threaded Flanges and Fittings: ASTM B 584.
4. Refer to Division 21 Section "Common Work Results For Fire Suppression" for basic joining materials.

- B. Valves
 - 1. Ball Valves: Bronze body with threaded or flanged ends. Comply with UL 1091, except with stainless-steel ball instead of disc.
- C. Specialties
 - 1. Concentrate Storage Tank: Buna-N, bladder-type proportioning tank complying with UL 162 and ASME Boiler and Pressure Vessel Code: Section VIII. Include bladder, internal piping, fill and drain, pipe assembly, glass sight gage, piping, and valves. Concentrate to be contained in the bladder.
 - a. Orientation: Horizontal design with saddle **OR** Vertical design with skirt, **as directed**, support.
 - 2. Proportioning Controller: Venturi type complying with UL 162 and of capacity to match design at minimum and maximum flow.
 - 3. Concentrate Control Valve: Water-operated ball or deluge valve designed to open with flow through the proportioning controller.
 - 4. Concentrate Strainers: Bronze body and stainless-steel mesh strainer with minimum **0.125-inch (3.2-mm)** perforations to remove solids that would block system components.
 - 5. Provide devices that comply with NFPA 16, are compatible with the foam concentrate, and are designed to be drained and cleaned.
- D. Foam Concentrate
 - 1. Description: AFFF **OR** AR-AFFF, **as directed**, liquid concentrate, complying with NFPA 11 and UL 162, for making foam-water fire-extinguishing foam solution.
- E. Pressure Gages
 - 1. Description: Comply with UL 393, with **3-1/2-inch- (90-mm-)** minimum diameter dial, **0- to 300-psig (0- to 2070-kPa)** dial range, and caption "WATER" or "CONCENTRATE" on dial face.
- F. Discharge Devices
 - 1. General: Discharge devices shall be listed and approved by UL and FMG.
 - 2. Sprinklers: Closed **OR** Open, **as directed**, air-aspirating **OR** non-air-aspirating, **as directed**, type complying with UL 162 and suitable for discharging foam.
 - 3. Spray Nozzles: Foam-water spray nozzles including foam generator and distributing deflector complying with UL 162 and designed to distribute foam or water in the absence of foam solution in a special pattern peculiar to a particular head.
- G. Monitoring Devices
 - 1. Valve Supervisory Switches: UL 753, electrical, single pole, double throw, with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
- H. Alarm Devices
 - 1. Description: UL listed or FMG approved, low voltage, and surface mounting. Alarm and monitoring devices are specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" OR "Zoned (dc Loop) Fire-alarm System".

1.3 EXECUTION

- A. Concentrate Storage Tank Installation
 - 1. Install proportioning tanks on concrete bases. Concrete bases are specified in Division 21 Section "Common Work Results For Fire Suppression".
 - 2. Install tanks level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 - 3. Install seismic restraints for tanks. Anchor tanks to substrate.

- B. Piping Applications
 - 1. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
 - 2. AFFF-Concentrate Piping: Steel pipe, malleable- or cast-iron threaded fittings, and threaded joints.
 - 3. AFFF-Concentrate Piping: Steel pipe with welded fittings and joints.
 - 4. AR-AFFF-Concentrate Piping: Brass **OR** Stainless-steel, **as directed**, pipe, threaded fittings, and joints.
 - 5. AR-AFFF-Concentrate Piping: Stainless-steel pipe with welded fittings and joints.
 - 6. Foam-solution piping is specified in Division 21 Section "Wet-pipe Sprinkler Systems".
- C. Piping Installation
 - 1. Install piping and other components level and plumb.
 - 2. Refer to Division 21 Section "Common Work Results For Fire Suppression" for basic pipe installation and joint construction.
 - 3. Install proportioning tanks anchored to substrate.
 - 4. Install pipe and fittings, valves, and discharge devices according to requirements listed in NFPA 16, "Installation of Deluge Foam-Water Sprinkler and Foam-Water Spray Systems."
 - a. Support piping using supports and methods according to NFPA 13.
 - b. Install seismic restraints for proportioning tanks and piping systems.
 - c. Install monitoring and alarm devices according to NFPA 16 and NFPA 72.
- D. Connections
 - 1. Piping installation requirements are specified in Division 21 Section "Wet-pipe Sprinkler Systems". Drawings indicate general arrangement of piping, fittings, and specialties.
 - 2. Provide concentrate control, maintenance service, and drain valves with piping to permit maintenance of the foam concentrate with continuous sprinkler system service.
 - 3. Install proportioning controller in fire-suppression piping to provide coverage to area indicated on Drawings.
 - 4. Install piping adjacent to equipment to allow service and maintenance.
 - 5. Connect electrical devices to building's fire alarm system. Electrical power, wiring, and devices are specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" OR "Zoned (dc Loop) Fire-alarm System".
- E. Labeling
 - 1. Install labeling on piping, equipment, and panels according to Division 22 Section "Identification For Plumbing Piping And Equipment".
- F. Charging System
 - 1. Fill proportioning tanks with foam concentrate after field quality-control testing is complete and satisfactory results have been achieved.
- G. Field Quality Control
 - 1. Inspection: Engage the services of a qualified professional engineer to inspect installed fire-extinguishing systems, prepare installation report, and certify that installation complies with the Contract Documents, calculations, and requirements of authorities having jurisdiction.
 - 2. Comply with operating instructions and procedures in NFPA 16, "Acceptance Tests" Chapter. Include the following tests and inspections to demonstrate compliance with requirements:
 - a. Check mechanical items.
 - b. Inspect equipment and fire-extinguishing foam concentrate, and check mountings for adequate anchoring to substrate.
 - c. Check electrical systems.
 - d. Flush piping.
 - e. Perform acceptance test.
 - f. Perform pressure test.

- g. Perform operating test.
 - h. Perform discharge test.
 - i. Correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be satisfactorily corrected or does not perform as specified and indicated, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
 - 1) Report test results promptly and in writing and authorities having jurisdiction.
3. Perform the following field tests and inspections and prepare test reports:
- a. After installing foam fire-extinguishing piping system and after electrical circuitry has been energized, test for compliance with requirements.
 - b. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, "Inspection and Test Procedures" and "System Function Tests." Certify compliance with test parameters.
 - c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Operational Test: After electrical circuitry has been energized, start systems to confirm proper unit operation.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
4. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 21 13 39 00

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SECTION 21 22 16 00 - CLEAN-AGENT EXTINGUISHING SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for clean-agent extinguishing systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes clean-agent extinguishing systems and the following:
 - a. Piping and piping specialties.
 - b. Extinguishing-agent containers.
 - c. Extinguishing agent.
 - d. Detection and alarm devices.
 - e. Control and alarm panels.
 - f. Accessories.
 - g. Connection devices for and wiring between system components.
 - h. Connection devices for power and integration into building's fire alarm system.

C. Definitions

1. ATS: Acceptance Testing Specifications.
2. EPO: Emergency Power Off.

D. System Description

1. Clean-agent fire-extinguishing system shall be an engineered system for total flooding of the hazard area including the room cavity below the ceiling and below the raised floor. Provide separate zones above and below the raised floor. If smoke is detected below the raised floor, agent shall be discharged in the underfloor zone only. If smoke is detected above the raised floor, agent shall be discharged in zones above and below the floor.

E. Performance Requirements

1. Design clean-agent extinguishing system and obtain approval from authorities having jurisdiction. Design system for Class A, B, or C fires as appropriate for areas being protected and include safety factor. Use clean agent indicated and in concentration suitable for normally occupied areas.
2. Performance Requirements: Discharge HFC 227ea within 10 seconds and maintain 7.1 percent concentration by volume at **70 deg F (21 deg C)** for 10-minute holding time in hazard areas.
 - a. HFC 227ea concentration in hazard areas greater than 9.0 percent immediately after discharge or less than 5.8 percent throughout holding time will not be accepted without written authorization from the Owner and authorities having jurisdiction.
 - b. System Capabilities: Minimum **620-psig (4278-kPa)** calculated working pressure and **360-psig (2484-kPa)** initial charging pressure.
3. Performance Requirements: Discharge IG-541 within 60 seconds and maintain 38 percent concentration by volume at **70 deg F (21 deg C)** for 10-minute holding time in hazard areas.
 - a. IG-541 concentration in hazard areas greater than 40 percent immediately after discharge or less than 32 percent throughout holding time will not be accepted without written authorization from the Owner and authorities having jurisdiction.
 - b. System Capabilities: Minimum **2175-psig (15-MPa)** calculated working pressure upstream from orifice union, minimum **1000-psig (6895-kPa)** calculated working pressure downstream from orifice union, and **2175-psig (15-MPa)** initial charging pressure.

4. Cross-Zoned Detection: Devices located in two separate zones. Sound alarm on activating single-detection device, and discharge extinguishing agent on actuating single-detection device in other zone.
OR
Verified Detection: Devices located in single zone. Sound alarm on activating single-detection device, and discharge extinguishing agent on actuating second-detection device.
 5. System Operating Sequence: As follows:
 - a. Actuating First Detector: Visual indication on annunciator panel, energize audible alarm and visual alarms (slow pulse), shut down air-conditioning and ventilating systems serving protected area, close doors in protected area, and send signal to fire alarm system.
 - b. Actuating Second Detector: Visual indication on annunciator panel, energize audible and visual alarms (fast pulse), shut down power to protected equipment, start time delay for extinguishing-agent discharge for 30 seconds, and discharge extinguishing agent. On agent discharge, release preaction valve to allow water to fill sprinkler system.
 - c. Extinguishing-agent discharge will operate audible alarms and strobe lights inside and outside the protected area.
 6. System Operating Sequence: System shall be cross-zoned, air-sampling detectors and photoelectric detectors reporting to a fully programmable microprocessor-based control panel programmed to operate as follows:
 - a. If one photoelectric detector and air-sampling detector reaches the third detection level (Fire 1), agent discharge will be initiated as described for the third detection level (Fire 1) below.
 - b. Air-Sampling System:
 - 1) First Detection Level (Alert): Mild audible and visual indication on annunciator panel. Strobe lights flash slowly in the protected area.
 - 2) Second Detection Level (Action): Strong audible and visual indication on annunciator panel. Strobe lights flash rapidly in the protected area.
 - 3) Third Detection Level (Fire 1): Strong audible and visual indication on annunciator panel. Energize horn(s), bell(s), and strobe light(s) in the protected area and outside entry doors. Shut down air-conditioning and ventilating systems serving the protected area, and close doors in the protected area. Send signal to fire alarm system, initiate 30-second time delay for extinguishing-agent discharge, and discharge extinguishing agent. At agent discharge, terminate power to equipment in the protected area, and release preaction valve to allow water flow to sprinkler system.
 - 4) Fourth Detection Level (Fire 2): Same as Fire 1.
 7. Manual stations shall immediately discharge extinguishing agent when activated.
 8. Operating abort switches will delay extinguishing-agent discharge while being activated, and switches must be reset to prevent agent discharge. Release of hand pressure on the switch will cause agent discharge if the time delay has expired.
 9. EPO: Will terminate power to protected equipment immediately on actuation.
 10. Low-Agent Pressure Switch: Initiate trouble alarm if sensing less than set pressure.
 11. Power Transfer Switch: Transfer from normal to stand-by power source.
 12. Seismic Performance: Fire-suppression piping and containers shall be capable of withstanding the effects of earthquake motions determined according to ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
- F. Submittals
1. Product Data: For each product indicated.
 2. LEED Submittal:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that clean agents comply.
 3. Shop Drawings: Signed and sealed by a qualified professional engineer. Include design calculations.

4. Permit Approved Drawings: Working plans, prepared according to NFPA 2001, that have been approved by authorities having jurisdiction. Include design calculations.
5. Field quality-control test reports.
6. Maintenance Data: For components to include in maintenance manuals.

G. Quality Assurance

1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of clean-agent extinguishing systems that are similar to those indicated for this Project in material, design, and extent.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Piping Materials

1. Refer to Part 1.3 piping applications Article retained for applications of pipe, tube, fitting, and joining materials.
2. Piping, Valves, and Discharge Nozzles: Comply with types and standards listed in NFPA 2001, Section "Distribution," for charging pressure of system.

B. Pipe And Fittings

1. Steel Pipe: ASTM A 53/A 53M, Type S, Grade B or ASTM A 106, Grade B; Schedule 40, or Schedule 80, seamless steel pipe.
 - a. Threaded Fittings:
 - 1) Malleable-Iron Fittings: ASME B16.3, Class 300.
 - 2) Flanges and Flanged Fittings: ASME B16.5, Class 300, unless Class 600 is indicated.
 - b. Forged-Steel Welding Fittings: ASME B16.11, Class 3000, socket pattern.
 - c. Grooved-End Fittings: FMG approved and NRTL listed, ASTM A 47/A 47M malleable iron or ASTM A 536 ductile iron, with dimensions matching steel pipe and ends factory grooved according to AWWA C606.
Plain-End, Hard Copper Tube: **ASTM B 88, Type K OR L, as directed, (ASTM B 88M, Type A OR B, as directed),** water tube, drawn temper.
 - d. Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper alloy, pressure.
 - e. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 300.
2. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness, unless thickness or specific material is indicated.
3. Flange Bolts and Nuts: ASME B18.2.1, carbon steel.
4. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing.
5. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
6. Steel, Keyed Couplings: UL 213, AWWA C606, approved or listed for clean-agent service, and matching steel-pipe dimensions. Include ASTM A 536, ductile-iron housing, rubber gasket, and steel bolts and nuts.

C. Valves

1. General: Brass; suitable for intended operation.
2. Container Valves: With rupture disc or solenoid and manual-release lever, capable of immediate and total agent discharge and suitable for intended flow capacity.

3. Valves in Sections of Closed Piping and Manifolds: Fabricate to prevent entrapment of liquid, or install valve and separate pressure relief device.
 4. Valves in Manifolds: Check valve; installed to prevent loss of extinguishing agent when container is removed from manifold.
- D. Extinguishing-Agent Containers
1. Description: Steel tanks complying with ASME Boiler and Pressure Vessel Code: Section VIII, for unfired pressure vessels. Include minimum working-pressure rating that matches system charging pressure, valve, pressure switch, and pressure gage.
 - a. Finish: Red **OR** Manufacturer's standard color, **as directed**, enamel or epoxy paint.
 - b. Manifold: Fabricate with valves, pressure switches, and connections for multiple storage containers, as indicated.
OR
Manifold: Fabricate with valves, pressure switches, selector switch, and connections for main- and reserve-supply banks of multiple storage containers.
 - c. Storage-Tank Brackets: Factory- or field-fabricated retaining brackets consisting of steel straps and channels; suitable for container support, maintenance, and tank refilling or replacement.
- E. Fire-Extinguishing Clean Agent
1. Clean Agent: HFC 227ea, heptafluoropropane.
OR
Clean Agent: IG-541, mixture of nitrogen, argon, and carbon dioxide inert gases.
- F. Discharge Nozzles
1. Equipment manufacturer's standard one-piece brass or aluminum alloy of type, discharge pattern, and capacity required for application.
- G. Manifold And Orifice Unions
1. Description: NRTL-listed device with minimum **2175-psig (15-MPa)** pressure rating, to control flow and reduce pressure of IG-541 gas in piping.
 - a. **NPS 2 (DN 50)** and Smaller: Piping assembly with orifice, sized for system design requirements.
 - b. **NPS 2-1/2 (DN 65)** and Larger: Piping assembly with nipple, sized for system design requirements.
- H. Control Panels
1. Description: FMG approved or NRTL listed, including equipment and features required for testing, supervising, and operating fire-extinguishing system.
 2. Power Requirements: 120/240-V ac; with electrical contacts for connection to system components and fire alarm system, and transformer or rectifier as needed to produce power at voltage required for accessories and alarm devices.
 3. Enclosure: NEMA ICS 6, Type 1, enameled-steel cabinet.
 - a. Mounting: Recessed flush with surface **OR** Surface, **as directed**.
 4. Supervised Circuits: Separate circuits for each independent hazard area.
 - a. Detection circuits equal to the required number of zones, or addressable devices assigned to the required number of zones.
 - b. Manual pull-station circuit.
 - c. Alarm circuit.
 - d. Release circuit.
 - e. Abort circuit.
 - f. EPO circuit.
 5. Provide the following control-panel features:
 - a. Electrical contacts for shutting down fans, activating dampers, and operating system electrical devices.

- b. Automatic switchover to standby power at loss of primary power.
 - c. Storage container, low-pressure indicator.
 - d. Service disconnect to interrupt system operation for maintenance with visual status indication on the annunciator panel.
6. Annunciator Panel: Graphic type showing protected, hazard-area plans and locations of detectors, abort, EPO, and manual stations. Include lamps to indicate device-initiating alarm, electrical contacts for connection to control panel, and stainless-steel or aluminum enclosure.
 7. Standby Power: Lead-acid or nickel-cadmium batteries with capacity to operate system for 72 hours and alarm for minimum of 15 minutes. Include automatic battery charger, with varying charging rate between trickle and high depending on battery voltage, that is capable of maintaining batteries fully charged. Include manual voltage control, dc voltmeter, dc ammeter, electrical contacts for connection to control panel, and suitable enclosure.
- I. Detection Devices
1. Description: Comply with NFPA 2001 and NFPA 72, and include the following types:
 - a. Ionization Detectors: Comply with UL 268, dual-chamber type, having sampling and referencing chambers, with smoke-sensing element.
 - b. Photoelectric Detectors: Comply with UL 268, consisting of LED light source and silicon photodiode receiving element.
 - c. Remote Air-Sampling Detector System: Includes air-sampling pipe network, a laser-based photoelectric detector, a sample transport fan, and a control unit.
 - 1) Comply with UL 268 and NRTL listed, operating at 24-V dc, nominal.
 - 2) Pipe Network: CPVC tubing connects control unit with calibrated sampling holes.
 - 3) Smoke Detector: Particle-counting type with continuous laser beam. Sensitivity adjustable to a minimum of four preset values.
 - 4) Sample Transport Fan: Centrifugal type, creating a minimum static pressure of **0.05-inch wg (12.5 Pa)** at all sampling ports.
 - 5) Control Unit: Multizone unit as indicated on Drawings. Provides same system power supply, supervision, and alarm features as specified for the control panel plus separate trouble indication for airflow and detector problems.
 - 6) Signals to the Central Fire Alarm Control Panel: Any type of local system trouble is reported to the central fire alarm control panel as a composite "trouble" signal. Alarms on each system zone are individually reported to the central fire alarm control panel as separately identified zones.
- J. Manual Stations
1. General Description: Surface **OR** Semirecessed, **as directed**, FMG approved or NRTL listed, with clear plastic hinged cover, 120-V ac or low voltage compatible with controls. Include contacts for connection to control panel.
 2. Manual Release: "MANUAL RELEASE" caption, and red finish. Unit can manually discharge extinguishing agent with operating device that remains engaged until unlocked.
 3. Abort Switch: "ABORT" caption, momentary contact, with green finish.
 4. EPO Switch: "EPO" caption, with yellow finish.
- K. Switches
1. Description: FMG approved or NRTL listed, where available, 120-V ac or low voltage compatible with controls. Include contacts for connection to control panel.
 - a. Low-Agent Pressure Switches: Pneumatic operation.
 - b. Power Transfer Switches: Key-operation selector, for transfer of release circuit signal from main supply to reserve supply.
 - c. Door Closers: Magnetic retaining and release device or electrical interlock to cause the door operator to drive the door closed.
- L. Alarm Devices
1. Description: FMG approved or NRTL listed, low voltage, and surface mounting, unless otherwise indicated.

2. Bells: Minimum **6-inch (150-mm)** diameter.
3. Horns: 90 to 94 dBA.
4. Strobe Lights: Translucent lens, with "FIRE" or similar caption.

M. Electrical Power And Wiring

1. Electrical power, wiring, and devices are specified in Division 22.

1.3 EXECUTION

A. Piping Applications

1. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
2. Fittings Working Pressure: **620 psig (4278 kPa)** minimum.
3. Flanged Joints: Class 300 minimum.
4. **NPS 2 (DN 50)** and Smaller: **ASTM B 88, Type K OR L, as directed, (ASTM B 88M, Type A OR B, as directed,)** copper tube; copper, solder-joint fittings; and brazed joints.
OR
NPS 2 (DN 50) and Smaller: Schedule 40, steel pipe; malleable-iron threaded fittings; and threaded joints.
5. **NPS 2-1/2 and NPS 3 (DN 65 and DN 80): ASTM B 88, Type K OR L, as directed, (ASTM B 88M, Type A OR B, as directed,)** copper tube; copper, solder-joint fittings; and brazed joints.
OR
NPS 2-1/2 and NPS 3 (DN 65 and DN 80): Schedule 40, steel pipe; forged-steel welding fittings; and welded joints.
OR
NPS 2-1/2 and NPS 3 (DN 65 and DN 80): Schedule 40, steel pipe; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
6. **NPS 4 (DN 100)** and Larger: Schedule 40, steel pipe; steel, grooved-end fittings; steel, keyed couplings; and grooved joints.
OR
NPS 4 (DN 100) and Larger: Schedule 40, steel pipe; forged-steel welding fittings; and welded joints.

B. Piping Applications

1. Piping between Storage Containers and Orifice Union:
 - a. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
 - b. Fittings Working Pressure: **2175 psig (15 MPa)** minimum.
 - c. Flanged Joints: Class 600 minimum.
 - d. All Sizes: Schedule 80, steel pipe; forged-steel welding fittings; and welded joints.
2. Piping Downstream from Orifice Union:
 - a. Flanged pipe and fittings and flanged joints may be used to connect to specialties and accessories and where required for maintenance.
 - b. Fittings Working Pressure: **1000 psig (6900 kPa)** minimum.
 - c. Flanged Joints: Class 300 minimum.
 - d. All Sizes: Schedule 40 **OR** 80, **as directed**, steel pipe; forged-steel welding fittings; and welded joints.

C. Clean-Agent Extinguishing Piping Installation

1. Install clean-agent extinguishing piping and other components level and plumb and according to manufacturers' written instructions.
2. Refer to Division 21 Section "Common Work Results For Fire Suppression" for basic pipe installation and joint construction.

3. Grooved Piping Joints: Groove pipe ends according to AWWA C606 dimensions. Assemble grooved-end steel pipe and steel, grooved-end fittings with steel, keyed couplings and lubricant according to manufacturer's written instructions.
 4. Install extinguishing-agent containers anchored to substrate.
 5. Install pipe and fittings, valves, and discharge nozzles according to requirements listed in NFPA 2001, Section "Distribution," and in ASME B31.1.
 - a. Install valves designed to prevent entrapment of liquid or install pressure relief devices in valved sections of piping systems.
 - b. Support piping using supports and methods according to NFPA 13.
 - c. Install seismic restraints for extinguishing-agent containers and piping systems.
 - d. Install control panels, detection system components, alarms, and accessories, complying with requirements of NFPA 2001, Section "Detection, Actuation, and Control Systems," as required for supervised system application.
- D. Connections
1. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to extinguishing-agent containers to allow service and maintenance.
 3. Connect electrical devices to control panel and to building's fire alarm system. Electrical power, wiring, and devices are specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" OR "Zoned (dc Loop) Fire-alarm System".
- E. Labeling
1. Install labeling on piping, extinguishing-agent containers, other equipment, and panels according to NFPA 2001.
 2. Install signs at entry doors for protected areas to warn occupants that they are entering a room protected with a clean-agent fire extinguishing system.
 3. Install signs at entry doors to advise persons outside the room the meaning of the horn(s), bell(s), and strobe light(s) outside the protected space.
- F. Field Quality Control
1. Comply with operating instructions and procedures of NFPA 2001, Section "Approval of Installations." Include the following tests and inspections to demonstrate compliance with requirements:
 - a. Check mechanical items.
 - b. Inspect extinguishing-agent containers and extinguishing agent, and check mountings for adequate anchoring to substrate.
 - c. Check electrical systems.
 - d. Check enclosure integrity. Comply with NFPA 2001, Section "Enclosure Inspection," and Appendix C, "Enclosure Integrity Procedure."
 - e. Perform functional pre-discharge test.
 - f. Perform system functional operational test including, EPO, abort, and manual release.
 - g. Check remote monitoring operations.
 - h. Check control-panel primary power source.
 - i. Perform "puff" test on piping system, using nitrogen.
 2. Perform field-acceptance tests of each clean-agent extinguishing system when installation is complete. Perform system testing only after hazard-area enclosure construction has been completed and openings sealed. Comply with operating instructions and procedures of NFPA 2001, Section "Approval of Installations." Include the following to demonstrate compliance with requirements:
 - a. Perform functional pre-discharge test.
 - b. Perform system functional operational test.
 - c. Check remote monitoring operations.
 - d. Check control-panel primary power source.
 - e. Perform "puff" test on piping system, using nitrogen.

3. Correct malfunctioning equipment, then retest to demonstrate compliance. Replace equipment that cannot be corrected or does not perform as specified and indicated, then retest to demonstrate compliance. Repeat procedure until satisfactory results are obtained.
 - a. Report test results promptly and in writing to the Owner and authorities having jurisdiction.
 4. Perform the following field tests and inspections and prepare test reports:
 - a. After installing clean-agent extinguishing piping system and after electrical circuitry has been energized, test for compliance with requirements.
 - b. Perform each electrical test and visual and mechanical inspection stated in NETA ATS, Sections "Inspection and Test Procedures" and "System Function Tests." Certify compliance with test parameters.
 - c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Remove malfunctioning units, replace with new units, and retest.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 5. Remove and replace malfunctioning units and retest as specified above.
- G. Cleaning
1. Each pipe section shall be cleaned internally after preparation and before assembly by means of swabbing, using a suitable nonflammable cleaner. Pipe network shall be free of particulate matter and oil residue before installing nozzles or discharge devices.
- H. System Filling
1. Preparation:
 - a. Verify that piping system installation is completed and cleaned.
 - b. Check for complete enclosure integrity.
 - c. Check operation of ventilation and exhaust systems.
 2. Filling Procedures:
 - a. Fill extinguishing-agent containers with extinguishing agent and pressurize to indicated charging pressure.
 - b. Install filled extinguishing-agent containers.
 - c. Energize circuits.
 - d. Adjust operating controls.
- I. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain clean-agent extinguishing systems.

END OF SECTION 21 22 16 00

Task	Specification	Specification Description
21 22 16 00	01 22 16 00	No Specification Required

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SECTION 21 24 00 00 - FIBERGLASS REINFORCED POLYESTER (FRP) FLUSH DOORS

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for fiberglass reinforced polyester (FRP) flush doors and aluminum frames. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Performance Requirements

1. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.
2. Air Infiltration: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 283 at pressure differential of 6.24 psf. Door shall not exceed 0.90 cfm per linear foot of perimeter crack.
3. Water Resistance: For a single door 3'-0" x 7'-0", test specimen shall be tested in accordance with ASTM E 331 at pressure differential of 7.50 psf. Door shall not have water leakage.
4. Hurricane Test Standards, Single Door with Single-Point Latching:
 - a. Uniform Static Load, ASTM E 330: Plus or minus 75 pounds per square foot.
 - b. Forced Entry Test, 300 Pound Load Applied, SFBC 3603.2 (b)(5): Passed.
 - c. Cyclic Load Test, SFBC PA 203: Plus or minus 53 pounds per square foot.
 - d. Large Missile Impact Test, SFBC PA 201: Passed.
5. Swinging Door Cycle Test, Doors and Frames, ANSI A250.4: Minimum of 20,000,000 cycles.
6. Swinging Security Door Assembly, Doors and Frames, ASTM F 476: Grade 40.
7. Salt Spray, Exterior Doors and Frames, ASTM B 117: Minimum of 500 hours.
8. Sound Transmission, Exterior Doors, STC, ASTM E 90: Minimum of 25.
9. Thermal Transmission, Exterior Doors, U-Value, AAMA 1503-98: Maximum of 0.29 BTU/hr x sf x degrees F. Minimum of 55 CRF value.
10. Surface Burning Characteristics, FRP Doors and Panels, ASTM E 84:
 - a. Flame Spread: Maximum of 200, Class C.
 - b. Smoke Developed: Maximum of 450, Class C.
11. Surface Burning Characteristics, Class A Option On Interior Faces of FRP Exterior Panels and Both Faces of FRP Interior Panels, ASTM E 84:
 - a. Flame Spread: Maximum of 25.
 - b. Smoke Developed: Maximum of 450.
12. Impact Strength, FRP Doors and Panels, Nominal Value, ASTM D 256: 15.0 foot-pounds per inch of notch.
13. Tensile Strength, FRP Doors and Panels, Nominal Value, ASTM D 638: 14,000 psi.
14. Flexural Strength, FRP Doors and Panels, Nominal Value, ASTM D 790: 21,000 psi.
15. Water Absorption, FRP Doors and Panels, Nominal Value, ASTM D 570: 0.20 percent after 24 hours.
16. Indentation Hardness, FRP Doors and Panels, Nominal Value, ASTM D 2583: 55.
17. Abrasion Resistance, Face Sheet, Taber Abrasion Test, 25 Cycles at 1,000 Gram Weight with CS-17 Wheel: Maximum of 0.029 average weight loss percentage.
18. Stain Resistance, ASTM D 1308: Face sheet unaffected after exposure to red cabbage, tea, and tomato acid. Stain removed easily with mild abrasive or FRP cleaner when exposed to Sharpie ink pen and white spray paint.
19. Chemical Resistance, ASTM D 543. Excellent rating.
 - a. Acetic acid, 5 percent solution.
 - b. Chlorine bleach, 10 percent solution.
 - c. Sodium hypochlorite, 4 to 6 percent solution.
 - d. Citric acid, 10 percent solution.
 - e. Sodium carbonate, 20 percent solution.

- f. Turpentine.
- 20. Compressive Strength, Foam Core, Nominal Value, ASTM D 1621: 84.2 psi.
- 21. Compressive Modulus, Foam Core, Nominal Value, ASTM D 1621: 448 psi.
- 22. Tensile Adhesion, Foam Core, Nominal Value, ASTM D 1623: 48 psi.
- 23. Thermal and Humid Aging, Nominal Value, 158 Degrees F and 100 Percent Humidity for 14 Days, ASTM D 2126: Minus 4.89 percent volume change.

C. Submittals

- 1. Product Data: Submit manufacturer's product data, including description of materials, components, fabrication, finishes, and installation.
- 2. Shop Drawings: Submit manufacturer's shop drawings, including elevations, sections, and details, indicating dimensions, tolerances, materials, fabrication, doors, panels, framing, hardware schedule, and finish.
- 3. Samples:
 - a. Door: Submit manufacturer's sample of door showing face sheets, core, framing, and finish.
 - b. Color: Submit manufacturer's samples of standard colors of doors and frames.
- 4. Test Reports: Submit certified test reports from qualified independent testing agency indicating doors comply with specified performance requirements.
- 5. Manufacturer's Project References: Submit list of successfully completed projects including project name and location, name of architect, and type and quantity of doors manufactured.
- 6. Maintenance Manual: Submit manufacturer's maintenance and cleaning instructions for doors, including maintenance and operating instructions for hardware.
- 7. Warranty: Submit manufacturer's standard warranty.

D. Quality Assurance

- 1. Manufacturer's Qualifications:
 - a. Continuously engaged in manufacturing of doors of similar type to that specified, with a minimum of 25 years successful experience.
 - b. Door and frame components from same manufacturer.
 - c. Evidence of a compliant documented quality management system.

E. Delivery, Storage, And Handling

- 1. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying opening door mark and manufacturer.
- 2. Storage: Store materials in clean, dry area indoors in accordance with manufacturer's instructions.
- 3. Handling: Protect materials and finish from damage during handling and installation.

F. Warranty

- 1. Warrant doors, frames, and factory hardware against failure in materials and workmanship, including excessive deflection, faulty operation, defects in hardware installation, and deterioration of finish or construction in excess of normal weathering.
- 2. Warranty Period: Ten years starting on date of shipment.

1.2 PRODUCTS

A. Manufacturer: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- 1. Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.

B. FRP Flush Doors

- 1. Model: SL-17 Flush Doors with SpecLite3 fiberglass reinforced polyester (FRP) face sheets.
- 2. Door Opening Size: As indicated on the Drawings **OR as directed**.

3. Construction:
 - a. Door Thickness: 1-3/4 inches.
 - b. Stiles and Rails: Aluminum Alloy 6063-T5, minimum of 2-5/16-inch depth.
 - c. Corners: Mitered.
 - d. Provide joinery of 3/8-inch diameter full-width tie rods through extruded splines top and bottom as standard tubular shaped stiles and rails reinforced to accept hardware as specified.
 - e. Securing Internal Door Extrusions: 3/16-inch angle blocks and locking hex nuts for joinery. Welds, glue, or other methods are not acceptable.
 - f. Furnish extruded stiles and rails with integral reglets to accept face sheets. Lock face sheets into place to permit flush appearance.
 - g. Rail caps or other face sheet capture methods are not acceptable.
 - h. Extrude top and bottom rail legs for interlocking continuous weather bar.
 - i. Meeting Stiles: Pile brush weatherseals. Extrude meeting stile to include integral pocket to accept pile brush weatherseals.
 - j. Bottom of Door: Install bottom weather bar with nylon brush weatherstripping into extruded interlocking edge of bottom rail.
 4. Face Sheet:
 - a. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout. Abuse-resistant engineered surface.
 - b. Texture: Pebble.
 - c. Color: **As directed**.
 5. Core:
 - a. Material: Poured-in-place polyurethane foam.
 - b. Density: Minimum of 5 pounds per cubic foot.
 - c. R-Value: Minimum of 9.
 6. Cutouts:
 - a. Manufacture doors with cutouts for required vision lites, louvers, and panels.
 - b. Factory install vision lites, louvers, and panels.
 7. Hardware:
 - a. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
 - b. Factory install hardware.
- C. Materials
1. Aluminum Members:
 - a. Extrusions: ASTM B 221.
 - b. Sheet and Plate: ASTM B 209.
 - c. Alloy and Temper: As required by manufacturer for strength, corrosion resistance, application of required finish, and control of color.
 2. Components: Door and frame components from same manufacturer.
 3. Fasteners:
 - a. Material: Aluminum, 18-8 stainless steel, or other noncorrosive metal.
 - b. Compatibility: Compatible with items to be fastened.
 - c. Exposed Fasteners: Screws with finish matching items to be fastened.
- D. Fabrication
1. Sizes and Profiles: Required sizes for door and frame units, and profile requirements shall be as indicated on the Drawings.
 2. Coordination of Fabrication: Field measure before fabrication and show recorded measurements on shop drawings.
 3. Assembly:
 - a. Complete cutting, fitting, forming, drilling, and grinding of metal before assembly.
 - b. Remove burrs from cut edges.
 4. Welding: Welding of doors or frames is not acceptable.
 5. Fit:

- a. Maintain continuity of line and accurate relation of planes and angles.
- b. Secure attachments and support at mechanical joints with hairline fit at contacting members.

E. Architectural Panels

1. FRP Panels:
 - a. Model: SL-37 Architectural Panels with SpecLite3 FRP face sheets.
 - b. Size: As indicated on the Drawings **OR as directed**.
 - c. Thickness: 1/4 inch **OR** 1 inch **OR** As indicated on the Drawings **OR as directed**.
2. Face Sheets:
 - a. Material: SpecLite3 FRP, 0.120-inch thickness, finish color throughout. Abuse-resistant engineered surface.
 - b. Texture: Pebble.
 - c. Color: **As directed**.
3. Insulated SpecLite3 FRP Panels:
 - a. Insulated Panels: Two 0.120-inch minimum thickness sheets.
 - b. Core: Foamed polyurethane core of a minimum of 5 pounds per cubic foot density.
 - c. Form components to function as single unit.
 - d. U-Value: Minimum of 0.23 for 1-inch panels.
4. Class A Flame Spread and Smoke Developed Rating, **as directed**:
 - a. Class A flame spread and smoke developed rating on interior faces of exterior panels and both faces of interior panels.
 - b. Flame Spread, ASTM E 84: Maximum of 25.
 - c. Smoke Developed, ASTM E 84: Maximum of 450.

F. Aluminum Door Framing Systems

1. Tubular Framing:
 - a. Size and Type: As indicated on the Drawings.
 - b. Materials: Aluminum Alloy 6063-T5, 1/8-inch minimum wall thickness.
 - c. Applied Door Stops: 0.625-inch high, with screws and weatherstripping. Door stop shall incorporate pressure gasketing for weathering seal. Counterpunch fastener holes in door stop to preserve full metal thickness under fastener head.
 - d. Frame Members: Box type with 4 enclosed sides. Open-back framing is not acceptable.
 - e. Caulking: Caulk joints before assembling frame members.
 - f. Joints:
 - 1) Secure joints with fasteners.
 - 2) Provide hairline butt joint appearance.
 - g. Field Fabrication: Field fabrication of framing using stick material is not acceptable.
 - h. Applied Stops: For side, transom, and borrowed lites and panels. Applied stops shall incorporate pressure gasketing for weathering seal. Reinforce with solid bar stock fill for frame hardware attachments.
 - i. Hardware:
 - 1) Premachine and reinforce frame members for hardware in accordance with manufacturer's standards and hardware schedule.
 - 2) Factory install hardware.
 - j. Anchors:
 - 1) Anchors appropriate for wall conditions to anchor framing to wall materials.
 - 2) Door Jamb and Header Mounting Holes: Maximum of 24-inch centers.
 - 3) Secure head and sill members of transom, side lites, and similar conditions.
 - k. Side Lites:
 - 1) Factory preassemble side lites to greatest extent possible.
 - 2) Mark frame assemblies according to location.
2. Insert Framing System:
 - a. Model: SL-1030 Series, SL-1031 **OR** SL-1032 **OR** SL-1034, **as directed**.
 - b. Insert frame as indicated on the Drawings, using integral stop fitted with weatherstripping.

- c. Corner joints of miter design, secure with furnished aluminum clips, and screw into place.
 - d. Hardware:
 - 1) Premachine and reinforce insert frame members for hardware in accordance with manufacturer's standards and hardware schedule.
 - 2) Factory install hardware.
 - e. Anchors:
 - 1) Anchors of suitable type to fasten insert framing to existing frame materials.
 - 2) Minimum of 5 anchors on jambs up to 7'-4" height, 3 anchors on headers, and 1 additional anchor for each additional foot of frame.
 - 3. Frame Capping:
 - a. Model: SL-70.
 - b. Capping: With insert frame as indicated on the Drawings, **OR as directed**.
 - c. Finish: Match framing.
- G. Hardware
- 1. Premachine doors in accordance with templates from specified hardware manufacturers and hardware schedule.
 - 2. Factory install hardware.
 - 3. Hardware Schedule: As specified in Division 08 Section "Door Hardware" **OR** As indicated on the Drawings, **OR as directed**.
 - a. Hinges shall be continuous type.
 - 4. Finish: As specified in Division 08 Section "Door Hardware" **OR** As indicated on the Drawings, **OR as directed**.
- H. Vision Lites
- 1. Factory Glazing: 1/4-inch glass **OR** 1-inch glass insulating units, **as directed**.
 - 2. Lites in Exterior Doors: Allow for thermal expansion.
 - 3. Rectangular Lites:
 - a. Size: 12 inches by 12 inches **OR** Half lite **OR** Full lite **OR** Narrow lite **OR** Double lite **OR** As indicated on the Drawings **OR as directed**.
 - b. Factory glazed with screw-applied aluminum stops anodized to match perimeter door rails.
 - 4. Security Grate: SL-SG349.
 - a. Frame Perimeter: 1-inch by 1-inch by 1/8-inch steel angle.
 - b. Expanded Metal: 1/4-inch diameter, round hole perforated, 14-gauge steel sheet.
 - c. Finish: Factory painted to match door finish.
 - 5. Vandal Screen: SL-SG350.
 - a. Frame Perimeter: Aluminum. Finish to match vision lite.
 - b. Expanded Metal: 1/4-inch diameter, round hole perforated, 16-gauge stainless steel sheet. Powder coat black finish.
- I. Louvers
- 1. Type: Aluminum, inverted Y-type, fixed blade, 12 inches minimum from bottom of door.
 - 2. Size: As indicated on the Drawings **OR** as directed.
 - 3. Installation: Factory installed into standard vision lite kit. Exterior side of louver shall be free of fasteners.
 - 4. Insect screen.
- J. Aluminum Finishes
- 1. Anodized Finish: Class I finish, 0.7 mils thick.
 - a. Clear 215 R1, AA-M10C12C22A41, Class I, 0.7 mils thick.
 - b. Champagne, AA-M10C12C22A44, Class I, 0.7 mils thick.
 - c. Light Bronze, AA-M10C12C22A44, Class I, 0.7 mils thick.
 - d. Medium Bronze, AA-M10C12C22A44, Class I, 0.7 mils thick.
 - e. Dark Bronze, AA-M10C12C22A44, Class I, 0.7 mils thick.
 - f. Black, AA-M10C12C22A44, Class I, 0.7 mils thick.
 - 2. Painted: as directed by the Owner.

1.3 EXECUTION

A. Preparation

1. Ensure openings to receive frames are plumb, level, square, and in tolerance.

B. Installation

1. Install doors in accordance with manufacturer's instructions.
2. Install doors plumb, level, square, true to line, and without warp or rack.
3. Anchor frames securely in place.
4. Separate aluminum from other metal surfaces with bituminous coatings or other means approved by the Owner.
5. Set thresholds in bed of mastic and backseal.
6. Install exterior doors to be weathertight in closed position.
7. Repair minor damages to finish in accordance with manufacturer's instructions and as approved by the Owner.
8. Remove and replace damaged components that cannot be successfully repaired as determined by the Owner.

C. Field Quality Control

1. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for installation of doors.

D. Adjusting

1. Adjust doors, hinges, and locksets for smooth operation without binding.

E. Cleaning

1. Clean doors promptly after installation in accordance with manufacturer's instructions.
2. Do not use harsh cleaning materials or methods that would damage finish.

F. Protection

1. Protect installed doors to ensure that, except for normal weathering, doors will be without damage or deterioration at time of Final Completion.

END OF SECTION 21 24 00 00

Task	Specification	Specification Description
21 24 16 00	21 24 00 00	Fiberglass Reinforced Polyester (FRP) Flush Doors
21 30 00 00	21 31 13 00	Electric-Drive, Centrifugal Fire Pumps
21 30 00 00	21 31 16 00	Diesel-Drive, Centrifugal Fire Pumps

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SECTION 21 31 13 00 - ELECTRIC-DRIVE, CENTRIFUGAL FIRE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electric-drive, centrifugal fire pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. End-suction, In-line, and Split-case fire pumps.
 - b. Fire-pump accessories and specialties.
 - c. Flowmeter systems.

C. Performance Requirements

1. Seismic Performance: Fire pumps shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Pump Equipment, Accessory, and Specialty Pressure Rating: **175 psig (1200 kPa)** minimum unless higher pressure rating is indicated.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For fire pumps, motor drivers, and fire-pump accessories and specialties. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Seismic Qualification Certificates: For fire pumps, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Product Certificates: For each fire pump, from manufacturer.
5. Source quality-control reports.
6. Field quality-control reports.
7. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. NFPA Compliance: Comply with NFPA 20, "Installation of Stationary Pumps for Fire Protection."

1.2 PRODUCTS

A. General Requirements For Centrifugal Fire Pumps

1. Description: Factory-assembled and -tested fire-pump and driver unit.
2. Base: Fabricated and attached to fire-pump and driver unit with reinforcement to resist movement of pump during seismic events when base is anchored to building substrate.
3. Finish: Red paint applied to factory-assembled and -tested unit before shipping.

B. End-Suction Fire Pumps

1. Pump:
 - a. Standard: UL 448, for end-suction pumps for fire service.
 - b. Casing: Radially split case, cast iron with ASME B16.1 pipe-flange connections.
 - c. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - d. Wear Rings: Replaceable bronze.
 - e. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - f. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
3. Driver:
 - a. Standard: UL 1004A.
 - b. Type: Electric motor; NEMA MG 1, polyphase Design B.

C. In-Line Fire Pumps

1. Pump:
 - a. Standard: UL 448, for in-line pumps for fire service.
 - b. Casing: Radially split case, cast iron with ASME B16.1 pipe-flange connections.
 - c. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - d. Wear Rings: Replaceable bronze.
 - e. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - f. Mounting: Pump and driver shaft is vertical, with motor above pump and pump on base.
2. Coupling: None or rigid.
3. Driver:
 - a. Standard: UL 1004A.
 - b. Type: Electric motor; NEMA MG 1, polyphase Design B.

D. Horizontally Mounted, Single-Stage, Split-Case Fire Pumps

1. Pump:
 - a. Standard: UL 448, for split-case pumps for fire service.
 - b. Casing: Axially split case, cast iron with ASME B16.1 pipe-flange connections.
 - c. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - d. Wear Rings: Replaceable bronze.
 - e. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - f. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
3. Driver:
 - a. Standard: UL 1004A.
 - b. Type: Electric motor; NEMA MG 1, polyphase Design B.

- E. Horizontally Mounted, Multistage, Split-Case Fire Pumps
1. Pump:
 - a. Standard: UL 448, for split-case pumps for fire service.
 - b. Number of Stages: Two.
 - c. Casing: Axially split case, cast iron with ASME B16.1 pipe-flange connections.
 - d. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - e. Wear Rings: Replaceable bronze.
 - f. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - g. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
 2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
 3. Driver:
 - a. Standard: UL 1004A.
 - b. Type: Electric motor; NEMA MG 1, polyphase Design B.
- F. Vertically Mounted, Single-Stage, Split-Case Fire Pumps
1. Pump:
 - a. Standard: UL 448, for split-case pumps for fire service.
 - b. Casing: Axially split case, cast iron with ASME B16.1 pipe-flange connections.
 - c. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - d. Wear Rings: Replaceable bronze.
 - e. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - f. Mounting: Pump and driver shafts are vertical, with motor above pump and pump on base.
 2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
 3. Driver:
 - a. Standard: UL 1004A.
 - b. Type: Electric motor; NEMA MG 1, polyphase Design B.
- G. Fire-Pump Accessories And Specialties
1. Automatic Air-Release Valves: Comply with NFPA 20 for installation in fire-pump casing.
 2. Circulation Relief Valves: UL 1478, brass, spring loaded; for installation in pump discharge piping.
 3. Relief Valves:
 - a. Description: UL 1478, bronze or cast iron, spring loaded; for installation in fire-suppression water-supply piping.
 4. Inlet Fitting: Eccentric tapered reducer at pump suction inlet.
 5. Outlet Fitting: Concentric tapered reducer at pump discharge outlet.
 6. Discharge Cone: Closed **OR** Open, **as directed**, type.
 7. Hose Valve Manifold Assembly:
 - a. Standard: Comply with requirements in NFPA 20.
 - b. Header Pipe: ASTM A 53/A 53M, Schedule 40, galvanized steel with ends threaded according to ASME B1.20.1.
 - c. Header Pipe Fittings: ASME B16.4, galvanized cast-iron threaded fittings.
 - d. Automatic Drain Valve: UL 1726.
 - e. Manifold:
 - 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Flush type, brass or ductile iron, with number of outlets required by NFPA 20.

- 3) Nipples: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with ends threaded according to ASME B1.20.1.
 - 4) Adapters and Caps with Chain: Brass or bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 5) Escutcheon Plate: Brass or bronze; rectangular.
 - 6) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 7) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, chrome plated, **as directed**.
 - 8) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
- OR**
Manifold:
- 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Exposed type, brass, with number of outlets required by NFPA 20.
 - 3) Escutcheon Plate: Brass or bronze; round.
 - 4) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads. Include caps and chains.
 - 5) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, chrome plated, **as directed**.
 - 6) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."

H. Flowmeter Systems

1. Description: UL-listed or FM-Approved, fire-pump flowmeter system with capability to indicate flow to not less than 175 percent of fire-pump rated capacity.
 2. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 250 psig (1725 kPa)**, **as directed**.
 3. Sensor: Annubar probe, orifice plate, or venturi unless otherwise indicated. Sensor size shall match pipe, tubing, flowmeter, and fittings.
 4. Permanently Mounted Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter. Include bracket or device for wall mounting.
 - a. Tubing Package: **NPS 1/8 or NPS 1/4 (DN 6 or DN 10)** soft copper **OR** plastic, **as directed**, tubing with copper or brass fittings and valves.
- OR**
Portable Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter and with two **12-foot- (3.7-m-)** long hoses in carrying case.

I. Grout

1. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink and recommended for interior and exterior applications.
3. Design Mix: **5000-psi (34-MPa)**, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

J. Source Quality Control

1. Testing: Test and inspect fire pumps according to UL 448 requirements for "Operation Test" and "Manufacturing and Production Tests."
 - a. Verification of Performance: Rate fire pumps according to UL 448.
2. Fire pumps will be considered defective if they do not pass tests and inspections.
3. Prepare test and inspection reports.

1.3 EXECUTION

A. Installation

1. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.
 2. Equipment Mounting: Install fire pumps on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install fire-pump suction and discharge piping equal to or larger than sizes required by NFPA 20.
 4. Support piping and pumps separately so weight of piping does not rest on pumps.
 5. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
 6. Install pressure gages on fire-pump suction and discharge flange pressure-gage tappings. Comply with requirements for pressure gages specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
 7. Install piping hangers and supports, anchors, valves, gages, and equipment supports according to NFPA 20.
 8. Install flowmeters and sensors. Install flowmeter-system components and make connections according to NFPA 20 and manufacturer's written instructions.
 9. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.
 10. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- B. Alignment**
1. Align end-suction and split-case pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
 2. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
 3. Align piping connections.
 4. Align pump and driver shafts for angular and parallel alignment according to HI 1.4 and to tolerances specified by manufacturer.
- C. Connections**
1. Comply with requirements for piping and valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to pumps and equipment to allow service and maintenance.
 3. Connect relief-valve discharge to drainage piping or point of discharge.
 4. Connect flowmeter-system meters, sensors, and valves to tubing.
 5. Connect fire pumps to their controllers.
- D. Identification**
1. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.
- E. Field Quality Control**
1. Test each fire pump with its controller as a unit. Comply with requirements for electric-motor-driver fire-pump controllers specified in Division 21 Section(s) "Electric-drive, Centrifugal Fire Pumps" OR "Diesel-drive, Centrifugal Fire Pumps" OR "Electric-drive, Vertical-turbine Fire Pumps" OR "Diesel-drive, Vertical-turbine Fire Pumps".

21 - Fire Suppression



2. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 3. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 4. Tests and Inspections:
 - a. After installing components, assemblies, and equipment including controller, test for compliance with requirements.
 - b. Test according to NFPA 20 for acceptance and performance testing.
 - c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 5. Components, assemblies, and equipment will be considered defective if they do not pass tests and inspections.
 6. Prepare test and inspection reports.
 7. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Hoses are for tests only and do not convey to the Owner.
- F. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain fire pumps.

END OF SECTION 21 31 13 00

Task	Specification	Specification Description
21 31 13 00	21 34 13 00	Pressure-Maintenance Pumps
21 31 13 00	26 29 33 13	Controllers for Fire-Pump Drivers

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SECTION 21 31 16 00 - DIESEL-DRIVE, CENTRIFUGAL FIRE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for diesel-drive, centrifugal fire pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. End-suction and Split-case fire pumps.
 - b. Fire-pump accessories and specialties.
 - c. Flowmeter systems.

C. Performance Requirements

1. Seismic Performance: Fire pumps shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Pump Equipment, Accessory, and Specialty Pressure Rating: **175 psig (1200 kPa)** minimum unless higher pressure rating is indicated.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.
2. Shop Drawings: For fire pumps, engine drivers, and fire-pump accessories and specialties. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Seismic Qualification Certificates: For fire pumps, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Product Certificates: For each fire pump, from manufacturer.
5. Source quality-control reports.
6. Field quality-control reports.
7. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. NFPA Compliance: Comply with NFPA 20, "Installation of Stationary Pumps for Fire Protection."

1.2 PRODUCTS

- A. General Requirements For Centrifugal Fire Pumps
1. Description: Factory-assembled and -tested fire-pump and driver unit.
 2. Base: Fabricated and attached to fire-pump and driver unit with reinforcement to resist movement of pump during seismic events when base is anchored to building substrate.
 3. Finish: Red paint applied to factory-assembled and -tested unit before shipping.
- B. End-Suction Fire Pumps
1. Pump:
 - a. Standard: UL 448, for end-suction pumps for fire service.
 - b. Casing: Radially split case, cast iron with ASME B16.1 pipe-flange connections.
 - c. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - d. Wear Rings: Replaceable bronze.
 - e. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - f. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
 2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
 3. Driver:
 - a. Standard: UL 1247.
 - b. Type: Diesel engine.
 - c. Emergency Manual Operator: Factory wired for starting and operating standby engine in case of malfunction in main controller or wiring.
 - d. Engine Cooling System: Factory-installed radiator.
 - 1) Coolant: Type recommended by driver manufacturer.

OR

Engine Cooling System: Factory-installed water piping, valves, strainer, pressure regulator, heat exchanger, coolant pump, bypass piping, and fittings.

 - 1) Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)**, copper water tube; ASME B16.22, wrought-copper, solder-joint pressure fittings; AWS A5.8/A5.8M, BCuP Series brazing filler metal; and brazed joints.
 - e. Engine-Jacket Water Heater: Factory-installed electric elements.
 - f. Dual Batteries: Lead-acid-storage type with 100 percent standby reserve capacity.
 - g. Fuel System: Comply with NFPA 20.
 - 1) Fuel Storage Tank: Size indicated but not less than required by NFPA 20. Include floor legs, direct-reading level gage, and secondary containment tank with capacity at least equal to fuel storage tank.
 - h. Exhaust System: ASTM A 53/A 53M, Type E or S, Schedule 40, black steel pipe; ASME B16.9, weld-type pipe fittings; ASME B16.5, steel flanges; and ASME B16.21, nonmetallic gaskets. Fabricate double-wall, ventilated thimble from steel pipe.
 - 1) Exhaust Connector: Flexible type.
 - 2) Exhaust Silencer: Industrial **OR** Residential, **as directed**, type.
- C. Single-Stage, Split-Case Fire Pumps
1. Pump:
 - a. Standard: UL 448, for split-case pumps for fire service.
 - b. Casing: Axially split case, cast iron with ASME B16.1 pipe-flange connections.
 - c. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - d. Wear Rings: Replaceable bronze.
 - e. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - f. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.

2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
 3. Driver:
 - a. Standard: UL 1247.
 - b. Type: Diesel engine.
 - c. Emergency Manual Operator: Factory wired for starting and operating standby engine in case of malfunction in main controller or wiring.
 - d. Engine Cooling System: Factory-installed radiator.
 - 1) Coolant: Type recommended by driver manufacturer.

OR

 Engine Cooling System: Factory-installed water piping, valves, strainer, pressure regulator, heat exchanger, coolant pump, bypass piping, and fittings.
 - 1) Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)**, copper water tube; ASME B16.22, wrought-copper, solder-joint pressure fittings; AWS A5.8/A5.8M, BCuP Series brazing filler metal; and brazed joints.
 - e. Engine-Jacket Water Heater: Factory-installed electric elements.
 - f. Dual Batteries: Lead-acid-storage type with 100 percent standby reserve capacity.
 - g. Fuel System: Comply with NFPA 20.
 - 1) Fuel Storage Tank: Size indicated but not less than required by NFPA 20. Include floor legs, direct-reading level gage, and secondary containment tank with capacity at least equal to fuel storage tank.
 - h. Exhaust System: ASTM A 53/A 53M, Type E or S, Schedule 40, black steel pipe; ASME B16.9, weld-type pipe fittings; ASME B16.5, steel flanges; and ASME B16.21, nonmetallic gaskets. Fabricate double-wall, ventilated thimble from steel pipe.
 - 1) Exhaust Connector: Flexible type.
 - 2) Exhaust Silencer: Industrial **OR** Residential, **as directed**, type.
- D. Multistage, Split-Case Fire Pumps
1. Pump:
 - a. Standard: UL 448, for split-case pumps for fire service.
 - b. Number Stages: Two.
 - c. Casing: Axially split case, cast iron with ASME B16.1 pipe-flange connections.
 - d. Impeller: Cast bronze, statically and dynamically balanced, and keyed to shaft.
 - e. Wear Rings: Replaceable bronze.
 - f. Shaft and Sleeve: Steel shaft with bronze sleeve.
 - 1) Shaft Bearings: Grease-lubricated ball bearings in cast-iron housing.
 - 2) Seals: Stuffing box with minimum of four rings of graphite-impregnated braided yarn and bronze packing gland.
 - g. Mounting: Pump and driver shafts are horizontal, with pump and driver on same base.
 2. Coupling: Flexible and capable of absorbing torsional vibration and shaft misalignment. Include metal coupling guard.
 3. Driver:
 - a. Standard: UL 1247.
 - b. Type: Diesel engine.
 - c. Emergency Manual Operator: Factory wired for starting and operating standby engine in case of malfunction in main controller or wiring.
 - d. Engine Cooling System: Factory-installed radiator.
 - 1) Coolant: Type recommended by driver manufacturer.

OR

 Engine Cooling System: Factory-installed water piping, valves, strainer, pressure regulator, heat exchanger, coolant pump, bypass piping, and fittings.
 - 1) Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)**, copper water tube; ASME B16.22, wrought-copper, solder-joint pressure fittings; AWS A5.8/A5.8M, BCuP Series brazing filler metal; and brazed joints.
 - e. Engine-Jacket Water Heater: Factory-installed electric elements.
 - f. Dual Batteries: Lead-acid-storage type with 100 percent standby reserve capacity.

- g. Fuel System: Comply with NFPA 20.
 - 1) Fuel Storage Tank: Size indicated but not less than required by NFPA 20. Include floor legs, direct-reading level gage, and secondary containment tank with capacity at least equal to fuel storage tank.
 - h. Exhaust System: ASTM A 53/A 53M, Type E or S, Schedule 40, black steel pipe; ASME B16.9, weld-type pipe fittings; ASME B16.5, steel flanges; and ASME B16.21, nonmetallic gaskets. Fabricate double-wall, ventilated thimble from steel pipe.
 - 1) Exhaust Connector: Flexible type.
 - 2) Exhaust Silencer: Industrial **OR** Residential, **as directed**, type.
- E. Fire-Pump Accessories And Specialties
- 1. Automatic Air-Release Valves: Comply with NFPA 20 for installation in fire-pump casing.
 - 2. Circulation Relief Valves: UL 1478, brass, spring loaded; for installation in pump discharge piping.
 - 3. Relief Valves:
 - a. Description: UL 1478, bronze or cast iron, spring loaded; for installation in fire-suppression water-supply piping.
 - 4. Inlet Fitting: Eccentric tapered reducer at pump suction inlet.
 - 5. Outlet Fitting: Concentric tapered reducer at pump discharge outlet.
 - 6. Discharge Cone: Closed **OR** Open, **as directed**, type.
 - 7. Hose Valve Manifold Assembly:
 - a. Standard: Comply with requirements in NFPA 20.
 - b. Header Pipe: ASTM A 53/A 53M, Schedule 40, galvanized steel with ends threaded according to ASME B1.20.1.
 - c. Header Pipe Fittings: ASME B16.4, galvanized cast-iron threaded fittings.
 - d. Automatic Drain Valve: UL 1726.
 - e. Manifold:
 - 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Flush type, brass or ductile iron, with number of outlets required by NFPA 20.
 - 3) Nipples: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with ends threaded according to ASME B1.20.1.
 - 4) Adapters and Caps with Chain: Brass or bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 5) Escutcheon Plate: Brass or bronze; rectangular.
 - 6) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 7) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, **as directed**, chrome plated, **as directed**.
 - 8) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
- OR**
- Manifold:
- 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Exposed type, brass, with number of outlets required by NFPA 20.
 - 3) Escutcheon Plate: Brass or bronze; round.
 - 4) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads. Include caps and chains.
 - 5) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, **as directed**, chrome plated, **as directed**.
 - 6) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
- F. Flowmeter Systems
- 1. Description: UL-listed or FM-Approved, fire-pump flowmeter system with capability to indicate flow to not less than 175 percent of fire-pump rated capacity.

2. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 250 psig (1725 kPa)**, **as directed**.
3. Sensor: Annubar probe, orifice plate, or venturi unless otherwise indicated. Sensor size shall match pipe, tubing, flowmeter, and fittings.
4. Permanently Mounted Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter. Include bracket or device for wall mounting.
 - a. Tubing Package: **NPS 1/8 or NPS 1/4 (DN 6 or DN 10)** soft copper **OR** plastic, **as directed**, tubing with copper or brass fittings and valves.

OR

 Portable Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter and with two **12-foot- (3.7-m-)** long hoses in carrying case.

G. Grout

1. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink and recommended for interior and exterior applications.
3. Design Mix: **5000-psi (34-MPa)**, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

H. Source Quality Control

1. Testing: Test and inspect fire pumps according to UL 448 requirements for "Operation Test" and "Manufacturing and Production Tests."
 - a. Verification of Performance: Rate fire pumps according to UL 448.
2. Fire pumps will be considered defective if they do not pass tests and inspections.
3. Prepare test and inspection reports.

1.3 EXECUTION

A. Installation

1. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.
2. Equipment Mounting: Install fire pumps on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install fire-pump suction and discharge piping equal to or larger than sizes required by NFPA 20.
4. Support piping and pumps separately so weight of piping does not rest on pumps.
5. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
6. Install pressure gages on fire-pump suction and discharge flange pressure-gage tappings. Comply with requirements for pressure gages specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
7. Install piping hangers and supports, anchors, valves, gages, and equipment supports according to NFPA 20.
8. Install fuel system according to NFPA 20.
9. Install water supply and drain piping for diesel-engine heat exchangers. Extend drain piping from heat exchangers to point of disposal.
10. Install exhaust-system piping for diesel engines. Extend to point of termination outside structure. Install pipe and fittings with welded joints; install components having flanged connections with gasketed joints.

11. Install condensate-drain piping for diesel-engine exhaust system. Extend drain piping from low points of exhaust system to condensate traps and to point of disposal.
 12. Install flowmeters and sensors. Install flowmeter-system components and make connections according to NFPA 20 and manufacturer's written instructions.
 13. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.
 14. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- B. Alignment
1. Align end-suction and split-case pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
 2. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
 3. Align piping connections.
 4. Align pump and driver shafts for angular and parallel alignment according to HI 1.4 and to tolerances specified by manufacturer.
- C. Connections
1. Comply with requirements for piping and valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to pumps and equipment to allow service and maintenance.
 3. Connect relief-valve discharge to drainage piping or point of discharge.
 4. Connect flowmeter-system meters, sensors, and valves to tubing.
 5. Connect fire pumps to their controllers.
- D. Identification
1. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.
- E. Field Quality Control
1. Test each fire pump with its controller as a unit. Comply with requirements for diesel-engine-driver fire-pump controllers specified in Division 21 Section(s) "Electric-drive, Centrifugal Fire Pumps" OR "Diesel-drive, Centrifugal Fire Pumps" OR "Electric-drive, Vertical-turbine Fire Pumps" OR "Diesel-drive, Vertical-turbine Fire Pumps".
 2. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 3. Tests and Inspections:
 - a. After installing components, assemblies, and equipment including controller, test for compliance with requirements.
 - b. Test according to NFPA 20 for acceptance and performance testing.
 - c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 4. Components, assemblies, and equipment will be considered defective if they do not pass tests and inspections.
 5. Prepare test and inspection reports.

6. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Hoses are for tests only and do not convey to the Owner.

- F. Startup Service
 1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

- G. Demonstration
 1. Train the Owner's maintenance personnel to adjust, operate, and maintain fire pumps.

END OF SECTION 21 31 16 00

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Task	Specification	Specification Description
21 31 16 00	21 34 13 00	Pressure-Maintenance Pumps
21 31 16 00	26 29 33 13	Controllers for Fire-Pump Drivers

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SECTION 21 34 13 00 - PRESSURE-MAINTENANCE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for pressure-maintenance pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Multistage, pressure-maintenance pumps.
 - b. Regenerative-turbine, pressure-maintenance pumps.
 - c. Submersible, pressure-maintenance pumps.
 - d. Vertical-turbine, pressure-maintenance pumps.

C. Performance Requirements

1. Pump Equipment, Accessory, and Specialty Pressure Rating: **175 psig (1200 kPa)** minimum unless higher pressure rating is indicated.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.
2. Shop Drawings: For pumps, accessories, and specialties. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Field quality-control reports.
4. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.2 PRODUCTS

A. Multistage, Pressure-Maintenance Pumps

1. Description: Factory-assembled and -tested, multistage, barrel-type vertical pump as defined in HI 2.1-2.2 and HI 2.3; designed for surface installation with pump and motor direct coupled and mounted vertically.
2. Pump Construction:
 - a. Barrel: Stainless steel.
 - b. Suction and Discharge Chamber: Cast iron with flanged inlet and outlet.
 - c. Pump Head/Motor Mount: Cast iron.
 - d. Impellers: Stainless steel, balanced, and keyed to shaft.
 - e. Pump Shaft: Stainless steel.
 - f. Seal: Mechanical type with carbon rotating face and silicon-carbide stationary seat.
 - g. Intermediate Chamber Bearings: Aluminum-oxide ceramic or bronze.
 - h. Chamber-Base Bearing: Tungsten carbide.
 - i. O-Rings: EPDM or NBR.

3. Motor: Single speed with permanently lubricated ball bearings and rigidly mounted to pump head. Comply with requirements in Division 15 Section "Common Motor Requirements for Fire Suppression Equipment."
 - a. Power Cord: Factory-connected to motor for field connection to controller and at least **10 feet (3 m)** long.
 4. Nameplate: Permanently attached to pump and indicating capacity and characteristics.
- B. Regenerative-Turbine, Pressure-Maintenance Pumps
1. Description: Factory-assembled and -tested, close-coupled, single-stage, regenerative-turbine centrifugal pump as defined in HI 1.1-1.2 and HI 1.3; with pump and motor mounted horizontally.
 2. Pump Construction:
 - a. Casing: Radially split, cast iron, with threaded inlet and outlet.
 - b. Impeller: Bronze, balanced, and keyed to shaft.
 - c. Pump Shaft: Stainless steel **OR** steel, **as directed**, with deflector.
 - d. Shaft Sleeve: Bronze.
 - e. Seal: Mechanical type with spring-loaded rotating head.
 3. Motor: Single speed with permanently lubricated ball bearings. Comply with requirements in Division 15 Section "Common Motor Requirements for Fire Suppression Equipment."
 - a. Power Cord: Factory-connected to motor for field connection to controller and at least **10 feet (3 m)** long.
 4. Nameplate: Permanently attached to pump and indicating capacity and characteristics.
- C. Submersible, Pressure-Maintenance Pumps
1. Description: Factory-assembled and -tested, vertical, multistage, submersible pump as defined in HI 2.1-2.2 and HI 2.3; with pump motor mounted below pump.
 2. Pump Construction:
 - a. Pump Head or Elbow: Cast iron, for surface discharge, with flanged or threaded connections.
 - b. Pump Shaft: Stainless steel.
 - c. Bearings: Bronze.
 - d. Bowl Section: Multiple cast-iron bowls with closed-type bronze or stainless-steel impellers.
 - e. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel fittings, in sections **10 feet (3 m)** or less, with strainer of cast or fabricated bronze or stainless steel between pump and bowl section.
 3. Motor: Single speed with permanently lubricated ball bearings and capable of continuous operation under water. Comply with requirements in Division 15 Section "Common Motor Requirements for Fire Suppression Equipment."
 - a. Power Cord: Capable of continuous under-water operation, factory-connected to motor for field connection to controller, and at least **10 feet (3 m)** long.
 4. Base: Cast iron or steel with hole for electrical cable.
 5. Nameplate: Permanently attached to pump and indicating capacity and characteristics.
- D. Vertical-Turbine, Pressure-Maintenance Pumps
1. Description: Factory-assembled and -tested, vertical, multistage, open-line-shaft turbine pump as defined in HI 2.1-2.2 and HI 2.3; with pump motor mounted above pump head.
 2. Pump Construction:
 - a. Pump Head: Cast iron, for surface discharge, with flange except connections may be threaded in sizes in which flanges are not available.
 - b. Pump Head Seal: Stuffing box and stuffing.
 - c. For static water levels of 50 feet (15 m) or less and for water-lubricated bearings.
 - 1) Line Shaft: Stainless steel or steel, with corrosion-resistant shaft sleeves.
 - 2) Line Shaft Bearings: Rubber sleeve, water lubricated.
 - d. For static water levels between 50 and 200 feet (15 and 61 m) and for oil-lubricated bearings.
 - 1) Line Shaft: Steel.

- 2) Line Shaft Bearings: Corrosion resistant, oil lubricated.
 - e. Impeller Shaft: Monel metal or stainless steel.
 - f. Bowl Section: Multiple cast-iron bowls with closed-type bronze or stainless-steel impellers.
 - g. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel fittings, in sections **10 feet (3 m)** or less, with strainer of cast or fabricated bronze or stainless steel at bottom.
 3. Motor: Single speed with permanently lubricated ball bearings. Comply with requirements in Division 15 Section "Common Motor Requirements for Fire Suppression Equipment."
 - a. Power Cord: Factory-connected to motor for field connection to controller and at least **10 feet (3 m)** long.
 4. Base: Cast iron or steel with hole for electrical cable.
 5. Nameplate: Permanently attached to pump and indicating capacity and characteristics.
- E. Motors
1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 15 Section "Common Motor Requirements for Fire Suppression Equipment."
 - a. Motor Sizes: Minimum size as indicated; if not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 16 Sections.

1.3 EXECUTION

- A. Equipment Installation
1. NFPA Standard: Comply with NFPA 20 for installation of pressure-maintenance pumps.
 2. Base-Mounted Pump Mounting: Install pumps on concrete bases. Comply with requirements for concrete bases specified in Division 3 Section "Cast-in-Place Concrete."
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - e. Attach pumps to equipment base using anchor bolts.
 3. Install multistage and regenerative-turbine, pressure-maintenance pumps according to HI 1.4.
 4. Install submersible and vertical-turbine, pressure-maintenance pumps according to HI 2.4.
- B. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Pressure-maintenance pumps will be considered defective if they do not pass tests and inspections.
 4. Prepare test and inspection reports.
- C. Adjusting
1. Lubricate pumps as recommended by manufacturer.

21 - Fire Suppression



-
2. Set field-adjustable pressure-switch ranges as indicated.

END OF SECTION 21 34 13 00

Task	Specification	Specification Description
21 34 13 00	26 29 33 13	Controllers for Fire-Pump Drivers

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Task	Specification	Specification Description
22 01 40 81	22 40 00 00	Plumbing Fixtures
22 01 40 81	22 45 00 00	Emergency Plumbing Fixtures

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SECTION 22 05 13 00 - COMMON MOTOR REQUIREMENTS FOR PLUMBING EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common motor requirements for plumbing equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

C. Coordination

1. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - a. Motor controllers.
 - b. Torque, speed, and horsepower requirements of the load.
 - c. Ratings and characteristics of supply circuit and required control sequence.
 - d. Ambient and environmental conditions of installation location.

1.2 PRODUCTS

A. General Motor Requirements

1. Comply with requirements in this Section except when stricter requirements are specified in plumbing equipment schedules or Sections.
2. Comply with NEMA MG 1 unless otherwise indicated.
3. Comply with IEEE 841 for severe-duty motors.

B. Motor Characteristics

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of **3300 feet (1000 m)** above sea level.
2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. Polyphase Motors

1. Description: NEMA MG 1, Design B, medium induction motor.
2. Efficiency: Energy efficient, as defined in NEMA MG 1.
3. Service Factor: 1.15.
4. Multispeed Motors: Variable torque.
 - a. For motors with 2:1 speed ratio, consequent pole, single winding.
 - b. For motors with other than 2:1 speed ratio, separate winding for each speed.
5. Multispeed Motors: Separate winding for each speed.
6. Rotor: Random-wound, squirrel cage.
7. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
8. Temperature Rise: Match insulation rating.
9. Insulation: Class F.
10. Code Letter Designation:
 - a. Motors 15 HP and Larger: NEMA starting Code F or Code G.

- b. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- 11. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

D. Polyphase Motors With Additional Requirements

- 1. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- 2. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - a. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - b. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - c. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - d. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- 3. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

E. Single-Phase Motors

- 1. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - a. Permanent-split capacitor.
 - b. Split phase.
 - c. Capacitor start, inductor run.
 - d. Capacitor start, capacitor run.
- 2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- 3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- 4. Motors 1/20 HP and Smaller: Shaded-pole type.
- 5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

1.3 EXECUTION (Not Applicable)

END OF SECTION 22 05 13 00

SECTION 22 05 19 00 - METERS AND GAGES FOR PLUMBING PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for meters and gages for plumbing piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Bimetallic-actuated thermometers.
 - b. Filled-system thermometers.
 - c. Liquid-in-glass thermometers.
 - d. Light-activated thermometers.
 - e. Thermowells.
 - f. Dial-type pressure gages.
 - g. Gage attachments.
 - h. Test plugs.
 - i. Test-plug kits.
 - j. Sight flow indicators.

C. Submittals

1. Product Data: For each type of product indicated.
2. Product Certificates: For each type of meter and gage, from manufacturer.
3. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

1.2 PRODUCTS

A. Bimetallic-Actuated Thermometers

1. Standard: ASME B40.200.
2. Case: Liquid-filled and sealed type(s); stainless steel with **3-inch (76-mm) OR 5-inch (127-mm), as directed**, nominal diameter.
3. Dial: Nonreflective aluminum with permanently etched scale markings and scales in **deg F (deg C) OR deg F and deg C, as directed**.
4. Connector Type(s): Union joint, adjustable angle **OR** rigid, back **OR** rigid, bottom, **as directed**, with unified-inch screw threads.
5. Connector Size: **1/2 inch (13 mm)**, with ASME B1.1 screw threads.
6. Stem: **0.25 or 0.375 inch (6.4 or 9.4 mm)** in diameter; stainless steel.
7. Window: Plain glass or plastic.
8. Ring: Stainless steel.
9. Element: Bimetal coil.
10. Pointer: Dark-colored metal.
11. Accuracy: Plus or minus **1 OR 1.5, as directed**, percent of scale range.

B. Filled-System Thermometers

1. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, cast aluminum or drawn steel; **4-1/2-inch (114-mm) OR 5-inch (127-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Element: Bourdon tube or other type of pressure element.

- d. Movement: Mechanical, dampening type, **as directed**, with link to pressure element and connection to pointer.
- e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
- f. Pointer: Dark-colored metal.
- g. Window: Glass or plastic.
- h. Ring: Metal **OR** Stainless steel, **as directed.**
- i. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device **OR** rigid, back **OR** rigid, bottom, **as directed**; with ASME B1.1 screw threads.
- j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
- k. Accuracy: Plus or minus 1 percent of scale range.
- 2. Direct-Mounted, Plastic-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, plastic; **4-1/2-inch (114-mm) OR 5-inch (127-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, with link to pressure element and connection to pointer.
 - e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Pointer: Dark-colored metal.
 - g. Window: Glass or plastic.
 - h. Ring: Metal or plastic.
 - i. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device **OR** rigid, back **OR** rigid, bottom, **as directed**; with ASME B1.1 screw threads.
 - j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - k. Accuracy: Plus or minus 1 percent of scale range.
- 3. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, cast aluminum or drawn steel; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, with link to pressure element and connection to pointer.
 - e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Pointer: Dark-colored metal.
 - g. Window: Glass or plastic.
 - h. Ring: Metal **OR** Stainless steel, **as directed.**
 - i. Connector Type(s): Union joint, back **OR** bottom, **as directed**; with ASME B1.1 screw threads.
 - j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - k. Accuracy: Plus or minus 1 percent of scale range.
- 4. Remote-Mounted, Plastic-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, plastic; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Element: Bourdon tube or other type of pressure element.

- d. Movement: Mechanical, with link to pressure element and connection to pointer.
- e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
- f. Pointer: Dark-colored metal.
- g. Window: Glass or plastic.
- h. Ring: Metal or plastic.
- i. Connector Type(s): Union joint, threaded, back **OR** bottom, **as directed**; with ASME B1.1 screw threads.
- j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
- k. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

C. Liquid-In-Glass Thermometers

- 1. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Cast aluminum; **6-inch (152-mm)** nominal size.
 - c. Case Form: Back angle **OR** Straight, **as directed**, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red organic liquid.
 - e. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum or brass and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - h. Connector: **3/4 inch (19 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
- 2. Plastic-Case, Compact-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Plastic; **6-inch (152-mm)** nominal size.
 - c. Case Form: Back angle **OR** Straight, **as directed**, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red organic liquid.
 - e. Tube Background: Nonreflective with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum or brass and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - h. Connector: **3/4 inch (19 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
- 3. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Cast aluminum; **7-inch (178-mm) OR 9-inch (229-mm)**, **as directed**, nominal size unless otherwise indicated.
 - c. Case Form: Adjustable angle **OR** Back angle **OR** Straight, **as directed**, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red organic liquid.
 - e. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - h. Connector: **1-1/4 inches (32 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

4. Plastic-Case, Industrial-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Plastic; **7-inch (178-mm) OR 9-inch (229-mm)**, as directed, nominal size unless otherwise indicated.
 - c. Case Form: Adjustable angle **OR** Back angle **OR** Straight, as directed, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red organic liquid.
 - e. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR** deg F and deg C, as directed.
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum **OR** Brass **OR** Stainless steel **OR** Aluminum, brass, or stainless steel, as directed, and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - h. Connector: **1-1/4 inches (32 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

- D. Light-Activated Thermometers
 1. Direct-Mounted, Light-Activated Thermometers:
 - a. Case: Plastic **OR** Metal, as directed; **7-inch (178-mm) OR 9-inch (229-mm)**, as directed, nominal size unless otherwise indicated.
 - b. Scale(s): **Deg F (Deg C) OR** Deg F and deg C, as directed.
 - c. Case Form: Adjustable angle.
 - d. Connector: **1-1/4 inches (32 mm)**, with ASME B1.1 screw threads.
 - e. Stem: Aluminum and of length to suit installation.
 - 1) Design for Thermowell Installation: Bare stem.
 - f. Display: Digital.
 - g. Accuracy: Plus or minus **2 deg F (1 deg C)**.
 2. Remote-Mounted, Light-Activated Thermometers:
 - a. Case: Plastic, for wall mounting.
 - b. Scale(s): **Deg F (Deg C) OR** Deg F and deg C, as directed.
 - c. Sensor: Bulb and thermister wire.
 - 1) Design for Thermowell Installation: Bare stem.
 - d. Display: Digital.
 - e. Accuracy: Plus or minus **2 deg F (1 deg C)**.

- E. Thermowells
 1. Thermowells:
 - a. Standard: ASME B40.200.
 - b. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
 - c. Material for Use with Copper Tubing: CNR or CUNI.
 - d. Material for Use with Steel Piping: CRES **OR** CSA, as directed.
 - e. Type: Stepped shank unless straight or tapered shank is indicated.
 - f. External Threads: **NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,)** ASME B1.20.1 pipe threads.
 - g. Internal Threads: **1/2, 3/4, and 1 inch (13, 19, and 25 mm)**, with ASME B1.1 screw threads.
 - h. Bore: Diameter required to match thermometer bulb or stem.
 - i. Insertion Length: Length required to match thermometer bulb or stem.
 - j. Lagging Extension: Include on thermowells for insulated piping and tubing.
 - k. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.
 2. Heat-Transfer Medium: Mixture of graphite and glycerin.

- F. Pressure Gages

1. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Liquid-filled **OR** Sealed **OR** Open-front, pressure relief **OR** Solid-front, pressure relief, **as directed**, type(s); cast aluminum or drawn steel; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with **NPS 1/4 (DN 8) OR NPS 1/4 or NPS 1/2 (DN 8 or DN 15) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi (kPa) OR psi and kPa, as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Ring: Metal **OR** Brass **OR** Stainless steel, **as directed**.
 - j. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
2. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Sealed type; plastic; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with **NPS 1/4 (DN 8) OR NPS 1/4 or NPS 1/2 (DN 8 or DN 15) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi (kPa) OR psi and kPa, as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
3. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Liquid-filled **OR** Sealed, **as directed**, type; cast aluminum or drawn steel **OR** metal, **as directed**; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with **NPS 1/4 (DN 8) OR NPS 1/4 or NPS 1/2 (DN 8 or DN 15) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi (kPa) OR psi and kPa, as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Ring: Metal **OR** Stainless steel, **as directed**.
 - j. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
4. Remote-Mounted, Plastic-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Sealed type; plastic; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.

- c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with **NPS 1/4 (DN 8) OR NPS 1/4 or NPS 1/2 (DN 8 or DN 15) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi (kPa) OR psi and kPa, as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
- G. Gage Attachments
1. Snubbers: ASME B40.100, brass; with **NPS 1/4 (DN 8) OR NPS 1/4 or NPS 1/2 (DN 8 or DN 15) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and piston **OR** porous-metal, **as directed**, -type surge-dampening device. Include extension for use on insulated piping.
 2. Valves: Brass ball **OR** Brass or stainless-steel needle, **as directed**, with **NPS 1/4 (DN 8) OR NPS 1/4 or NPS 1/2 (DN 8 or DN 15) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads.
- H. Test Plugs
1. Description: Test-station fitting made for insertion into piping tee fitting.
 2. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
 3. Thread Size: **NPS 1/4 (DN 8) or NPS 1/2 (DN 15)**, ASME B1.20.1 pipe thread.
 4. Minimum Pressure and Temperature Rating: **500 psig at 200 deg F (3450 kPa at 93 deg C)**.
 5. Core Inserts: Chlorosulfonated polyethylene synthetic and EPDM self-sealing rubber.
- I. Test-Plug Kits
1. Furnish one test-plug kit(s) containing one **OR** two, **as directed**, thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.
 2. Low-Range Thermometer: Small, bimetallic insertion type with **1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F (minus 4 to plus 52 deg C)**.
 3. High-Range Thermometer: Small, bimetallic insertion type with **1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F (minus 18 to plus 104 deg C)**.
 4. Pressure Gage: Small, Bourdon-tube insertion type with **2- to 3-inch- (51- to 76-mm-) diameter dial and probe. Dial range shall be at least 0 to 200 psig (0 to 1380 kPa)**.
 5. Carrying Case: Metal or plastic, with formed instrument padding.
- J. Sight Flow Indicators
1. Description: Piping inline-installation device for visual verification of flow.
 2. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.
 3. Minimum Pressure Rating: **125 psig (860 kPa) OR 150 psig (1034 kPa), as directed**.
 4. Minimum Temperature Rating: **200 deg F (93 deg C)**.
 5. End Connections for **NPS 2 (DN 50) and Smaller: Threaded**.
 6. End Connections for **NPS 2-1/2 (DN 65) and Larger: Flanged**.

1.3 EXECUTION

A. Installation

1. Install thermowells with socket extending a minimum of **2 inches (51 mm)** into fluid **OR** one-third of pipe diameter **OR** to center of pipe, **as directed**, and in vertical position in piping tees.
2. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.
3. Install thermowells with extension on insulated piping.
4. Fill thermowells with heat-transfer medium.
5. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
6. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.
7. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
8. Install remote-mounted pressure gages on panel.
9. Install valve and snubber in piping for each pressure gage for fluids.
10. Install test plugs in piping tees.
11. Install thermometers in the following locations:
 - a. Inlet and outlet of each water heater.
 - b. Inlets and outlets of each domestic water heat exchanger.
 - c. Inlet and outlet of each domestic hot-water storage tank.
 - d. Inlet and outlet of each remote domestic water chiller.
12. Install pressure gages in the following locations:
 - a. Building water service entrance into building.
 - b. Inlet and outlet of each pressure-reducing valve.
 - c. Suction and discharge of each domestic water pump.

B. Connections

1. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

C. Adjusting

1. Adjust faces of meters and gages to proper angle for best visibility.

D. Thermometer Schedule

1. Thermometers at inlet and outlet of each domestic water heater shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct **OR** Remote, **as directed**, -mounted, metal **OR** plastic, **as directed**, -case, vapor-actuated type.
 - c. Compact **OR** Industrial, **as directed**, -style, liquid-in-glass type.
 - d. Direct **OR** Remote, **as directed**, -mounted, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
2. Thermometers at inlets and outlets of each domestic water heat exchanger shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct **OR** Remote, **as directed**, -mounted, metal **OR** plastic, **as directed**, -case, vapor-actuated type.
 - c. Compact **OR** Industrial, **as directed**, -style, liquid-in-glass type.
 - d. Direct **OR** Remote, **as directed**, -mounted, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
3. Thermometers at inlet and outlet of each domestic hot-water storage tank shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.

- b. Direct **OR** Remote, **as directed**, -mounted, metal **OR** plastic, **as directed**, -case, vapor-actuated type.
 - c. Compact **OR** Industrial, **as directed**, -style, liquid-in-glass type.
 - d. Direct **OR** Remote, **as directed**, -mounted, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
4. Thermometers at inlet and outlet of each remote domestic water chiller shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct **OR** Remote, **as directed**, -mounted, metal **OR** plastic, **as directed**, -case, vapor-actuated type.
 - c. Compact **OR** Industrial, **as directed**, -style, liquid-in-glass type.
 - d. Direct **OR** Remote, **as directed**, -mounted, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
 5. Thermometer stems shall be of length to match thermowell insertion length.
- E. Thermometer Scale-Range Schedule
1. Scale Range for Domestic Cold-Water Piping: **0 to 100 deg F (Minus 20 to plus 50 deg C) OR 0 to 100 deg F and minus 20 to plus 50 deg C, as directed.**
 2. Scale Range for Domestic Cold-Water Piping: **0 to 150 deg F (Minus 20 to plus 70 deg C) OR 0 to 150 deg F and minus 20 to plus 70 deg C, as directed.**
 3. Scale Range for Domestic Cold-Water Piping: **30 to 240 deg F (0 to plus 115 deg C) OR 30 to 240 deg F and 0 to plus 115 deg C, as directed.**
 4. Scale Range for Domestic Hot-Water Piping: **0 to 250 deg F (0 to 150 deg C) OR 0 to 250 deg F and 0 to 150 deg C, as directed.**
 5. Scale Range for Domestic Hot-Water Piping: **20 to 240 deg F (0 to 150 deg C) OR 20 to 240 deg F and 0 to 150 deg C, as directed.**
 6. Scale Range for Domestic Hot-Water Piping: **30 to 240 deg F (0 to plus 115 deg C) OR 30 to 240 deg F and 0 to plus 115 deg C, as directed.**
 7. Scale Range for Domestic Cooled-Water Piping: **0 to 100 deg F (Minus 20 to plus 50 deg C) OR 0 to 100 deg F and minus 20 to plus 50 deg C, as directed.**
 8. Scale Range for Domestic Cooled-Water Piping: **0 to 150 deg F (Minus 20 to plus 70 deg C) OR 0 to 150 deg F and minus 20 to plus 70 deg C, as directed.**
- F. Pressure-Gage Schedule
1. Pressure gages at discharge of each water service into building shall be one of the following:
 - a. Liquid-filled **OR** Sealed **OR** Open-front, pressure-relief **OR** Solid-front, pressure-relief, **as directed**, direct **OR** remote, **as directed**, -mounted, metal case.
 - b. Sealed, direct **OR** remote, **as directed**, -mounted, plastic case.
 - c. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
 2. Pressure gages at inlet and outlet of each water pressure-reducing valve shall be one of the following:
 - a. Liquid-filled **OR** Sealed **OR** Open-front, pressure-relief **OR** Solid-front, pressure-relief, **as directed**, direct **OR** remote, **as directed**, -mounted, metal case.
 - b. Sealed, direct **OR** remote, **as directed**, -mounted, plastic case.
 - c. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
 3. Pressure gages at suction and discharge of each domestic water pump shall be one of the following:
 - a. Liquid-filled **OR** Sealed **OR** Open-front, pressure-relief **OR** Solid-front, pressure-relief, **as directed**, direct **OR** remote, **as directed**, -mounted, metal case.
 - b. Sealed, direct **OR** remote, **as directed**, -mounted, plastic case.

- c. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
- G. Pressure-Gage Scale-Range Schedule
- 1. Scale Range for Water Service Piping: **0 to 100 psi (0 to 600 kPa) OR** 0 to 100 psi and 0 to 600 kPa, **as directed**.
 - 2. Scale Range for Water Service Piping: **0 to 160 psi (0 to 1100 kPa) OR** 0 to 160 psi and 0 to 1100 kPa, **as directed**.
 - 3. Scale Range for Water Service Piping: **0 to 200 psi (0 to 1400 kPa) OR** 0 to 200 psi and 0 to 1400 kPa, **as directed**.
 - 4. Scale Range for Domestic Water Piping: **0 to 100 psi (0 to 600 kPa) OR** 0 to 100 psi and 0 to 600 kPa, **as directed**.
 - 5. Scale Range for Domestic Water Piping: **0 to 160 psi (0 to 1100 kPa) OR** 0 to 160 psi and 0 to 1100 kPa, **as directed**.
 - 6. Scale Range for Domestic Water Piping: **0 to 200 psi (0 to 1400 kPa) OR** 0 to 200 psi and 0 to 1400 kPa, **as directed**.
 - 7. Scale Range for Domestic Water Piping: **0 to 300 psi (0 to 2500 kPa) OR** 0 to 300 psi and 0 to 2500 kPa, **as directed**.

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SECTION 22 05 23 00 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for architecturally exposed structural steel framing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes architecturally exposed structural-steel framing.

C. Definitions

1. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
2. Category 1 AESS: AESS that is within **96 inches (2400 mm)** vertically and **36 inches (900 mm)** horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.
3. Category 2 AESS: AESS that is within **20 feet (6 m)** vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
4. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

D. Submittals

1. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS, **as directed**.
 - a. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
 - b. Include embedment drawings.
 - c. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds, **as directed**.
 - d. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections. Indicate orientation of bolt heads, **as directed**.
 - e. Indicate exposed surfaces and edges and surface preparation being used.
 - f. Indicate special tolerances and erection requirements.
2. Samples: Submit samples of AESS to set quality standards for exposed welds for Category 1 AESS, **as directed**.
 - a. Two steel plates, **3/8 by 8 by 4 inches (9.5 by 200 by 100 mm)**, with long edges joined by a groove weld and with weld ground smooth, **as directed**.
 - b. Steel plate, **3/8 by 8 by 8 inches (9.5 by 200 by 200 mm)**, with one end of a short length of rectangular steel tube, **4 by 6 by 3/8 inches (100 by 150 by 9.5 mm)**, welded to plate with a continuous fillet weld and with weld ground smooth and blended, **as directed**.
 - c. Round steel tube or pipe, minimum **8 inches (200 mm)** in diameter, with end of another round steel tube or pipe, approximately **4 inches (100 mm)** in diameter, welded to its side at a 45-degree angle with a continuous fillet weld and with weld ground smooth and blended, **as directed**.
3. Qualification Data: For qualified Installer **OR** fabricator, **as directed**.

- E. Quality Assurance
1. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE **OR** CSE, **as directed**.
 2. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
 3. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 **OR** P2 **OR** P3, **as directed**, or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
 4. Preinstallation Conference: Conduct conference at Project site.
- F. Delivery, Storage, And Handling
1. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 - a. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- G. Project Conditions
1. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.
- H. Coordination
1. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

1.2 PRODUCTS

- A. Bolts, Connectors, And Anchors
1. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
 - a. Finish: Plain **OR** Mechanically deposited zinc coating, **as directed**.
 2. Corrosion-Resisting (Weathering Steel), Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 3, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
- B. Primer
1. Primer: Comply with Division 07 **OR** Division 09 Section(s) "High-performance Coatings" **OR** Division 07 **AND** Division 09 Section(s) "High-performance Coatings", **as directed**.
OR
Primer: SSPC-Paint 25, Type I **OR** Type II, **as directed**, zinc oxide, alkyd, linseed oil primer.
OR
Primer: SSPC-Paint 25 BCS, Type I **OR** Type II, **as directed**, zinc oxide, alkyd, linseed oil primer.
OR
Primer: SSPC-Paint 23, latex primer.
OR
Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
 2. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
 3. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 **OR** ASTM A 780, **as directed**.

4. Shop Primer for Galvanized Steel: Cementitious galvanized metal primer complying with MPI#26 **OR** Vinyl wash primer complying with MPI#80 **OR** Water-based galvanized metal primer complying with MPI#134, **as directed**.

C. Fabrication

1. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.
2. In addition to special care used to handle and fabricate AESS, comply with the following:
 - a. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - b. Grind sheared, punched, and flame-cut edges of Category 1 AESS to remove burrs and provide smooth surfaces and edges.
 - c. Fabricate Category 1 AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - d. Fabricate Category 1 and Category 2 AESS with exposed surfaces free of seams to maximum extent possible.
 - e. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - f. Fabricate with piece marks fully hidden in the completed structure or made with media that permits full removal after erection.
 - g. Fabricate Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - h. Fabricate Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
 - i. Seal-weld open ends of hollow structural sections with **3/8-inch (9.5-mm)** closure plates for Category 1 AESS.
3. Curved Members: Fabricate indicated members to curved shape by rolling to final shape in fabrication shop.
 - a. Distortion of webs, stems, outstanding flanges, and legs of angles shall not be visible from a distance of **20 feet (6 m)** under any lighting conditions.
 - b. Tolerances for walls of hollow steel sections after rolling shall be approximately **1/2 inch (13 mm)**.
4. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of **1/8 inch (3.2 mm)** with a tolerance of **1/32 inch (0.8 mm)** for Category 1 AESS.
5. Bolt Holes: Cut, drill, mechanically thermal cut, **as directed**, or punch standard bolt holes perpendicular to metal surfaces.
6. Cleaning Corrosion-Resisting Structural Steel: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - a. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning, **unless directed otherwise**.
 - b. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - c. Weld threaded nuts to framing and other specialty items indicated to receive other work.

D. Shop Connections

1. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - a. Joint Type: Snug tightened **OR** Pretensioned **OR** Slip critical, **as directed**.
2. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M, **as directed**, for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
 - a. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.

- b. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
- c. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where Category 1 AESS is exposed to weather.
- d. Provide continuous welds of uniform size and profile where Category 1 AESS is welded.
- e. Grind butt and groove welds flush to adjacent surfaces within tolerance of **plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm)** for Category 1 and Category 2 AESS.
OR
Make butt and groove welds flush to adjacent surfaces within tolerance of **plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm)** for Category 1 and Category 2 AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
- f. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
- g. At locations where welding on the far side of an exposed connection of Category 1 and Category 2 AESS occurs, grind distortions and marking of the steel to a smooth profile aligned with adjacent material.
- h. Make fillet welds for Category 1 and Category 2 AESS oversize and grind to uniform profile with smooth face and transition.
OR
Make fillet welds for Category 1 and Category 2 AESS of uniform size and profile with exposed face smooth and slightly concave. Do not grind unless directed to correct unacceptable work.

E. Galvanizing

- 1. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - a. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - b. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
 - c. Galvanize lintels and shelf angles attached to structural-steel frame and located in exterior walls.

F. Shop Priming

- 1. Shop prime steel surfaces except the following:
 - a. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of **2 inches (50 mm)**.
 - b. Surfaces to be field welded.
 - c. Surfaces to be high-strength bolted with slip-critical connections.
 - d. Surfaces to receive sprayed fire-resistive materials.
 - e. Galvanized surfaces.
- 2. Surface Preparation for Nongalvanized Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - a. SSPC-SP 2, "Hand Tool Cleaning."
 - b. SSPC-SP 3, "Power Tool Cleaning."
 - c. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
 - d. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
 - e. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
 - f. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - g. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 - h. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
 - i. SSPC-SP 8, "Pickling."

3. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.
4. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of **1.5 mils (0.038 mm)**. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.
 - b. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

1.3 EXECUTION

A. Examination

1. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - a. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
2. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - a. If possible, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
 - b. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

C. Erection

1. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
 - a. Erect Category 1 AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
 - b. Erect Category 2 and Category 3 AESS to the tolerances specified in AISC 303 for steel that is not designated AESS.
2. Do not use thermal cutting during erection unless approved by the Owner. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

D. Field Connections

1. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
 - a. Joint Type: Snug tightened **OR** Pretensioned **OR** Slip critical, **as directed**.
 - b. Orient bolt heads as indicated on Drawings **OR** in same direction for each connection and to maximum extent possible in same direction for similar connections, **as directed**.
2. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.
 - a. Remove backing bars or runoff tabs; back-gouge and grind steel smooth for Category 1 and Category 2 AESS.
 - b. Remove erection bolts in Category 1 and Category 2 AESS, fill holes, and grind smooth.
 - c. Fill weld access holes in Category 1 and Category 2 AESS and grind smooth.

E. Field Quality Control

22 - Plumbing



1. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect AESS as specified in Division 5 Section "Structural Steel." The testing agency will not be responsible for enforcing requirements relating to aesthetic effect.
2. the Owner will observe AESS in place to determine acceptability relating to aesthetic effect.

F. Repairs And Protection

1. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.
2. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
3. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

OR

Touchup Painting: Cleaning and touchup painting are specified in Division 9 painting Sections.

END OF SECTION 22 05 23 00

SECTION 22 05 23 00a - GENERAL-DUTY VALVES FOR PLUMBING PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of general-duty valves for plumbing piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Bronze angle valves.
 - b. Brass ball valves.
 - c. Bronze ball valves.
 - d. Iron ball valves.
 - e. Iron, single-flange butterfly valves.
 - f. Iron, grooved-end butterfly valves.
 - g. Bronze lift check valves.
 - h. Bronze swing check valves.
 - i. Iron swing check valves.
 - j. Iron swing check valves with closure control.
 - k. Iron, grooved-end swing check valves.
 - l. Iron, center-guided check valves.
 - m. Iron, plate-type check valves.
 - n. Bronze gate valves.
 - o. Iron gate valves.
 - p. Bronze globe valves.
 - q. Iron globe valves.
 - r. Lubricated plug valves.
 - s. Chainwheels.

C. Definitions

1. CWP: Cold working pressure.
2. EPDM: Ethylene propylene copolymer rubber.
3. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
4. NRS: Nonrising stem.
5. OS&Y: Outside screw and yoke.
6. RS: Rising stem.
7. SWP: Steam working pressure.

D. Submittals

1. Product Data: For each type of valve indicated.

E. Quality Assurance

1. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
2. ASME Compliance:
 - a. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - b. ASME B31.1 for power piping valves.
 - c. ASME B31.9 for building services piping valves.
3. NSF Compliance: NSF 61 for valve materials for potable-water service.

F. Delivery, Storage, And Handling

1. Prepare valves for shipping as follows:
 - a. Protect internal parts against rust and corrosion.
 - b. Protect threads, flange faces, grooves, and weld ends.
 - c. Set angle, gate, and globe valves closed to prevent rattling.
 - d. Set ball and plug valves open to minimize exposure of functional surfaces.
 - e. Set butterfly valves closed or slightly open.
 - f. Block check valves in either closed or open position.
2. Use the following precautions during storage:
 - a. Maintain valve end protection.
 - b. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
3. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.2 PRODUCTS

A. General Requirements For Valves

1. Refer to valve schedule articles for applications of valves.
2. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
3. Valve Sizes: Same as upstream piping unless otherwise indicated.
4. Valve Actuator Types:
 - a. Gear Actuator: For quarter-turn valves **NPS 8 (DN 200)** and larger.
 - b. Handwheel: For valves other than quarter-turn types.
 - c. Handlever: For quarter-turn valves **NPS 6 (DN 150)** and smaller except plug valves, **as directed**.
 - d. Wrench: For plug valves with square heads. Furnish the Owner with 1 wrench for every 5 **OR 10, as directed**, plug valves, for each size square plug-valve head.
 - e. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
5. Valves in Insulated Piping: With **2-inch (50-mm)** stem extensions and the following features:
 - a. Gate Valves: With rising stem.
 - b. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - c. Butterfly Valves: With extended neck.
6. Valve-End Connections:
 - a. Flanged: With flanges according to ASME B16.1 for iron valves.
 - b. Grooved: With grooves according to AWWA C606.
 - c. Solder Joint: With sockets according to ASME B16.18.
 - d. Threaded: With threads according to ASME B1.20.1.
7. Valve Bypass and Drain Connections: MSS SP-45.

B. Bronze Angle Valves

1. Class 125, Bronze Angle Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded.
 - 5) Stem and Disc: Bronze.
 - 6) Packing: Asbestos free.
 - 7) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
2. Class 125, Bronze Angle Valves with Nonmetallic Disc:

- a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
 3. Class 150, Bronze Angle Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem and Disc: Bronze.
 - 6) Packing: Asbestos free.
 - 7) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
 4. Class 150, Bronze Angle Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
- C. Brass Ball Valves
1. One-Piece, Reduced-Port, Brass Ball Valves with Brass Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Design: One piece.
 - 4) Body Material: Forged brass.
 - 5) Ends: Threaded.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Brass.
 - 8) Ball: Chrome-plated brass.
 - 9) Port: Reduced.
 2. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: **150 psig (1035 kPa)**.
 - 3) CWP Rating: **600 psig (4140 kPa)**.
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
 3. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.

- 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Full.
4. Two-Piece, Regular-Port, Brass Ball Valves with Brass Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Regular.
5. Two-Piece, Regular-Port, Brass Ball Valves with Stainless-Steel Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Brass or bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Regular.
6. Three-Piece, Full-Port, Brass Ball Valves with Brass Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
7. Three-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.

- 9) Ball: Stainless steel, vented.
- 10) Port: Full.

D. Bronze Ball Valves

1. One-Piece, Reduced-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) CWP Rating: 400 psig (2760 kPa).
 - 3) Body Design: One piece.
 - 4) Body Material: Bronze.
 - 5) Ends: Threaded.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Bronze.
 - 8) Ball: Chrome-plated brass.
 - 9) Port: Reduced.
2. One-Piece, Reduced-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) CWP Rating: 600 psig (4140 kPa).
 - 3) Body Design: One piece.
 - 4) Body Material: Bronze.
 - 5) Ends: Threaded.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Stainless steel.
 - 8) Ball: Stainless steel, vented.
 - 9) Port: Reduced.
3. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Bronze.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
4. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Full.
5. Two-Piece, Regular-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.

- 5) Body Material: Bronze.
- 6) Ends: Threaded.
- 7) Seats: PTFE or TFE.
- 8) Stem: Bronze.
- 9) Ball: Chrome-plated brass.
- 10) Port: Regular.
- 6. Two-Piece, Regular-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Regular.
- 7. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Bronze.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
- 8. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Full.

E. Iron Ball Valves

- 1. Class 125, Iron Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-72.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Split body.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Ends: Flanged.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Stainless steel.
 - 8) Ball: Stainless steel.
 - 9) Port: Full.

F. Iron, Single-Flange Butterfly Valves

1. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Aluminum bronze.
2. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Aluminum-Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Aluminum bronze.
3. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Ductile-Iron Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Nickel-plated or -coated, **as directed**, ductile iron.
4. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Ductile-Iron Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Nickel-plated or -coated, **as directed**, ductile iron.
5. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Stainless steel.
6. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Stainless-Steel Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).

- 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
- 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
- 5) Seat: NBR.
- 6) Stem: One- or two-piece stainless steel.
- 7) Disc: Stainless steel.

G. Iron, Grooved-End Butterfly Valves

1. 175 CWP, Iron, Grooved-End Butterfly Valves:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 175 psig (1200 kPa).
 - 3) Body Material: Coated, ductile iron.
 - 4) Stem: Two-piece stainless steel.
 - 5) Disc: Coated, ductile iron.
 - 6) Seal: EPDM.
2. 300 CWP, Iron, Grooved-End Butterfly Valves:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) NPS 8 (DN 200) and Smaller CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 10 (DN 250) and Larger CWP Rating: 200 psig (1380 kPa).
 - 4) Body Material: Coated, ductile iron.
 - 5) Stem: Two-piece stainless steel.
 - 6) Disc: Coated, ductile iron.
 - 7) Seal: EPDM.

H. Bronze Lift Check Valves

1. Class 125, Lift Check Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Vertical flow.
 - 4) Body Material: ASTM B 61 or ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: Bronze.
2. Class 125, Lift Check Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Vertical flow.
 - 4) Body Material: ASTM B 61 or ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: NBR, PTFE, or TFE.

I. Bronze Swing Check Valves

1. Class 125, Bronze Swing Check Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 3.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: Bronze.
2. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:
 - a. Description:

- 1) Standard: MSS SP-80, Type 4.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: PTFE or TFE.
3. Class 150, Bronze Swing Check Valves with Bronze Disc:
- a. Description:
 - 1) Standard: MSS SP-80, Type 3.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: Bronze.
4. Class 150, Bronze Swing Check Valves with Nonmetallic Disc:
- a. Description:
 - 1) Standard: MSS SP-80, Type 4.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: PTFE or TFE.
- J. Iron Swing Check Valves
1. Class 125, Iron Swing Check Valves with Metal Seats:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Design: Clear or full waterway.
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Gasket: Asbestos free.
 2. Class 125, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Design: Clear or full waterway.
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Composition.
 - 7) Seat Ring: Bronze.
 - 8) Disc Holder: Bronze.
 - 9) Disc: PTFE or TFE.
 - 10) Gasket: Asbestos free.
 3. Class 250, Iron Swing Check Valves with Metal Seats:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Design: Clear or full waterway.
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Gasket: Asbestos free.
- K. Iron Swing Check Valves With Closure Control

1. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Clear or full waterway.
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Gasket: Asbestos free.
 - 8) Closure Control: Factory-installed, exterior lever and spring.
 2. Class 125, Iron Swing Check Valves with Lever- and Weight-Closure Control:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Clear or full waterway.
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Gasket: Asbestos free.
 - 8) Closure Control: Factory-installed, exterior lever and weight.
- L. Iron, Grooved-End Swing Check Valves
1. 300 CWP, Iron, Grooved-End Swing Check Valves:
 - a. Description:
 - 1) CWP Rating: 300 psig (2070 kPa).
 - 2) Body Material: ASTM A 536, ductile iron.
 - 3) Seal: EPDM.
 - 4) Disc: Spring-operated, ductile iron or stainless steel.
- M. Iron, Center-Guided Check Valves
1. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Compact wafer.
 - 5) Seat: Bronze.
 2. Class 125, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: Bronze.
 3. Class 150, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Compact wafer.
 - 5) Seat: Bronze.
 4. Class 150, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.

- 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: Bronze.
5. Class 250, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Compact wafer, spring loaded.
 - 5) Seat: Bronze.
 6. Class 250, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: Bronze.
 7. Class 300, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Compact wafer, spring loaded.
 - 5) Seat: Bronze.
 8. Class 300, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: Bronze.
 9. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Compact wafer.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
 10. Class 125, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 11. Class 150, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Compact wafer.

- 5) Seat: EPDM **OR** NBR, **as directed**.
 - 12. Class 150, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 - 13. Class 250, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 400 psig (2760 kPa).
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Compact wafer, spring loaded.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
 - 14. Class 250, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 400 psig (2760 kPa).
 - 3) Body Material: ASTM A 126, gray iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 - 15. Class 300, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 500 psig (3450 kPa).
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Compact wafer, spring loaded.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
 - 16. Class 300, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) CWP Rating: 500 psig (3450 kPa).
 - 3) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 4) Style: Globe, spring loaded.
 - 5) Ends: Flanged.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
- N. Iron, Plate-Type Check Valves
- 1. Class 125, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Seat: Bronze.
 - 2. Class 150, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Seat: Bronze.

3. Class 250, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Seat: Bronze.
4. Class 300, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Seat: Bronze.
5. Class 125, Iron, Single-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plate.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
6. Class 125, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
7. Class 150, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
8. Class 250, Iron, Wafer, Single-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plate.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
9. Class 250, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Seat: EPDM **OR** NBR, **as directed**.
10. Class 300, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Design: Wafer, spring-loaded plates.
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Seat: EPDM **OR** NBR, **as directed**.

O. Bronze Gate Valves

1. Class 125, NRS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
2. Class 125, RS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
3. Class 150, NRS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
4. Class 150, RS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.

P. Iron Gate Valves

1. Class 125, NRS, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Disc: Solid wedge.
 - 7) Packing and Gasket: Asbestos free.
2. Class 125, OS&Y, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.

- 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Disc: Solid wedge.
 - 7) Packing and Gasket: Asbestos free.
3. Class 250, NRS, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Disc: Solid wedge.
 - 7) Packing and Gasket: Asbestos free.
 4. Class 250, OS&Y, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) CWP Rating: **500 psig (3450 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Disc: Solid wedge.
 - 7) Packing and Gasket: Asbestos free.

Q. Bronze Globe Valves

1. Class 125, Bronze Globe Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem and Disc: Bronze.
 - 6) Packing: Asbestos free.
 - 7) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
2. Class 125, Bronze Globe Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
3. Class 150, Bronze Globe Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **300 psig (2070 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.

R. Iron Globe Valves

1. Class 125, Iron Globe Valves:
 - a. Description:
 - 1) Standard: MSS SP-85, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Packing and Gasket: Asbestos free.
2. Class 250, Iron Globe Valves:
 - a. Description:
 - 1) Standard: MSS SP-85, Type I.
 - 2) CWP Rating: 500 psig (3450 kPa).
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Packing and Gasket: Asbestos free.

S. Lubricated Plug Valves

1. Class 125, Regular-Gland, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.
2. Class 125, Regular-Gland, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.
3. Class 125, Cylindrical, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.
4. Class 125, Cylindrical, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.
5. Class 250, Regular-Gland, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) CWP Rating: 400 psig (2760 kPa).

- 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
- 4) Pattern: Regular or short **OR** Venturi, **as directed**.
- 5) Plug: Cast iron or bronze with sealant groove.
6. Class 250, Regular-Gland, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.
7. Class 250, Cylindrical, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.
8. Class 250, Cylindrical, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) CWP Rating: **400 psig (2760 kPa)**.
 - 3) Body Material: ASTM A 48/A 48M or ASTM A 126, Grade 40 cast iron with lubrication-sealing system.
 - 4) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 5) Plug: Cast iron or bronze with sealant groove.

T. Chainwheels

1. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
 - a. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
 - b. Attachment: For connection to ball **OR** butterfly **OR** plug, **as directed**, valve stems.
 - c. Sprocket Rim with Chain Guides: Ductile iron **OR** Cast iron **OR** Aluminum **OR** Bronze, **as directed**, of type and size required for valve. Include zinc coating, **as directed**.
 - d. Chain: Hot-dip, galvanized steel **OR** Brass **OR** Stainless steel, **as directed**, of size required to fit sprocket rim.

1.3 EXECUTION

A. Valve Installation

1. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
2. Locate valves for easy access and provide separate support where necessary.
3. Install valves in horizontal piping with stem at or above center of pipe.
4. Install valves in position to allow full stem movement.
5. Install chainwheels on operators for ball **OR** butterfly **OR** gate **OR** globe **OR** plug, **as directed**, valves **NPS 4 (DN 100)** and larger and more than **96 inches (2400 mm)** above floor. Extend chains to **60 inches (1520 mm)** above finished floor.
6. Install check valves for proper direction of flow and as follows:
 - a. Swing Check Valves: In horizontal position with hinge pin level.
 - b. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
 - c. Lift Check Valves: With stem upright and plumb.

- B. Adjusting
1. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.
- C. General Requirements For Valve Applications
1. If valve applications are not indicated, use the following:
 - a. Shutoff Service: Ball **OR** butterfly **OR** gate **OR** plug, **as directed**, valves.
 - b. Butterfly Valve Dead-End Service: Single-flange (lug) type.
 - c. Throttling Service: Globe **OR** angle **OR** ball **OR** butterfly, **as directed**, valves.
 - d. Pump-Discharge Check Valves:
 - 1) **NPS 2 (DN 50)** and Smaller: Bronze swing check valves with bronze **OR** nonmetallic, **as directed**, disc.
 - 2) **NPS 2-1/2 (DN 65)** and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal **OR** resilient, **as directed**, -seat check valves.
 - 3) **NPS 2-1/2 (DN 65)** and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.
 2. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
 3. Select valves, except wafer types, with the following end connections:
 - a. For Copper Tubing, **NPS 2 (DN 50)** and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. For Copper Tubing, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - c. For Copper Tubing, **NPS 5 (DN 125)** and Larger: Flanged ends.
 - d. For Steel Piping, **NPS 2 (DN 50)** and Smaller: Threaded ends.
 - e. For Steel Piping, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
 - f. For Steel Piping, **NPS 5 (DN 125)** and Larger: Flanged ends.
 - g. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.
- D. Low-Pressure, Compressed-Air Valve Schedule (**150 psig (1035 kPa)** Or Less)
1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - b. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - c. Bronze Lift Check Valves: Class 125, bronze **OR** nonmetallic, **as directed**, disc.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
 - a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron, Single-Flange Butterfly Valves: 200 CWP, NBR seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - c. Iron, Grooved-End Butterfly Valves: 175 **OR** 300, **as directed**, CWP.
 - d. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - e. Iron, Grooved-End Swing Check Valves: 300 CWP.
 - f. Iron, Center-Guided Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**, compact-wafer **OR** globe, **as directed**, metal **OR** resilient, **as directed**, seat.
 - g. Iron, Plate-Type Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**; single **OR** dual, **as directed**, plate; metal **OR** resilient, **as directed**, seat.

- h. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
- E. High-Pressure, Compressed-Air Valve Schedule (150 to 200 psig (1035 to 1380 kPa))
- 1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - b. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - c. Bronze Lift Check Valves: Class 125, bronze **OR** nonmetallic, **as directed**, disc.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
 - a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron, Single-Flange Butterfly Valves: 200 CWP, NBR seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - c. Iron, Grooved-End Butterfly Valves: 175 **OR** 300, **as directed**, CWP.
 - d. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - e. Iron, Grooved-End Swing Check Valves: 300 CWP.
 - f. Iron, Center-Guided Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**, compact-wafer **OR** globe, **as directed**, metal **OR** resilient, **as directed**, seat.
 - g. Iron, Plate-Type Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**; single **OR** dual, **as directed**, plate; metal **OR** resilient, **as directed**, seat.
 - h. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
- F. Domestic, Hot- And Cold-Water Valve Schedule
- 1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - b. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - c. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - f. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
 - a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves: Class 150.
 - c. Iron, Single-Flange Butterfly Valves: 200 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - d. Iron, Grooved-End Butterfly Valves: 175 **OR** 300, **as directed**, CWP.
 - e. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - f. Iron Swing Check Valves with Closure Control: Class 125, lever and spring **OR** weight, **as directed**.
 - g. Iron, Grooved-End Swing Check Valves: 300 CWP.
 - h. Iron, Center-Guided Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**, compact-wafer **OR** globe, **as directed**, metal **OR** resilient, **as directed**, seat.

- i. Iron, Plate-Type Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**; single **OR** dual, **as directed**, plate; metal **OR** resilient, **as directed**, seat.
- j. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
- k. Iron Globe Valves: Class 125 **OR** Class 250, **as directed**.

G. Sanitary-Waste And Storm-Drainage Valve Schedule

- 1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - b. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic **OR** stainless-steel, **as directed**, disc.
 - c. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - f. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
- 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
 - a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves: Class 150.
 - c. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - d. Iron Swing Check Valves with Closure Control: Class 125, lever and spring **OR** weight, **as directed**.
 - e. Iron, Grooved-End Swing Check Valves: 300 CWP.
 - f. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - g. Iron Globe Valves: Class 125 **OR** Class 250, **as directed**.
 - h. Lubricated Plug Valves: Class 125 **OR** Class 250, **as directed**, regular gland **OR** cylindrical, **as directed**, threaded **OR** flanged, **as directed**.

END OF SECTION 22 05 23 00a

SECTION 22 05 23 00b - PIPED UTILITIES BASIC MATERIALS AND METHODS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for piped utilities - basic materials and methods. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Piping joining materials.
 - b. Transition fittings.
 - c. Dielectric fittings.
 - d. Sleeves.
 - e. Identification devices.
 - f. Grout.
 - g. Flowable fill.
 - h. Piped utility demolition.
 - i. Piping system common requirements.
 - j. Equipment installation common requirements.
 - k. Painting.
 - l. Concrete bases.
 - m. Metal supports and anchorages.

C. Definitions

1. Exposed Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions.
2. Concealed Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.
3. ABS: Acrylonitrile-butadiene-styrene plastic.
4. CPVC: Chlorinated polyvinyl chloride plastic.
5. PE: Polyethylene plastic.
6. PVC: Polyvinyl chloride plastic.

D. Submittals

1. Product Data: For the following:
 - a. Dielectric fittings.
 - b. Identification devices.
2. Welding certificates.

E. Quality Assurance

1. Steel Support Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Steel Piping Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - a. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
3. Comply with ASME A13.1 for lettering size, length of color field, colors, and viewing angles of identification devices.

- F. Delivery, Storage, And Handling
 - 1. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
 - 2. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.2 PRODUCTS

A. Piping Joining Materials

- 1. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos free, **1/8-inch (3.2-mm)** maximum thickness, unless otherwise indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 - b. AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.
- 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
- 3. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- 4. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- 5. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BA_g1, silver alloy for refrigerant piping, unless otherwise indicated.
- 6. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
- 7. Solvent Cements for Joining Plastic Piping:
 - a. ABS Piping: ASTM D 2235.
 - b. CPVC Piping: ASTM F 493.
 - c. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - d. PVC to ABS Piping Transition: ASTM D 3138.
- 8. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.

B. Transition Fittings

- 1. Transition Fittings, General: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
- 2. Transition Couplings **NPS 1-1/2 (DN 40)** and Smaller:
 - a. Underground Piping: Manufactured piping coupling or specified piping system fitting.
 - b. Aboveground Piping: Specified piping system fitting.
- 3. AWWA Transition Couplings **NPS 2 (DN 50)** and Larger:
 - a. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
- 4. Plastic-to-Metal Transition Fittings:
 - a. Description: CPVC and PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-joint or threaded end.
- 5. Plastic-to-Metal Transition Unions:
 - a. Description: MSS SP-107, CPVC and PVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.
- 6. Flexible Transition Couplings for Underground Nonpressure Drainage Piping:
 - a. Description: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

- C. Dielectric Fittings
1. Dielectric Fittings, General: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
 2. Dielectric Unions:
 - a. Description: Factory fabricated, union, **NPS 2 (DN 50)** and smaller.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum **OR 250 psig (1725 kPa)**, **as directed**, at **180 deg F (82 deg C)**.
 - 2) End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
 3. Dielectric Flanges:
 - a. Description: Factory-fabricated, bolted, companion-flange assembly, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)** and larger.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum **OR 175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, **as directed**.
 - 2) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
 4. Dielectric-Flange Kits:
 - a. Description: Nonconducting materials for field assembly of companion flanges, **NPS 2-1/2 (DN 65)** and larger.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum.
 - 2) Gasket: Neoprene or phenolic.
 - 3) Bolt Sleeves: Phenolic or polyethylene.
 - 4) Washers: Phenolic with steel backing washers.
 5. Dielectric Couplings:
 - a. Description: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining, **NPS 3 (DN 80)** and smaller.
 - 1) Pressure Rating: **300 psig (2070 kPa)** at **225 deg F (107 deg C)**.
 - 2) End Connections: Threaded.
 6. Dielectric Nipples:
 - a. Description: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining.
 - 1) Pressure Rating: **300 psig (2070 kPa)** at **225 deg F (107 deg C)**.
 - 2) End Connections: Threaded or grooved.
- D. Sleeves
1. Mechanical sleeve seals for pipe penetrations are specified in Division 22 Section "Common Work Results For Plumbing".
 2. Galvanized-Steel Sheet Sleeves: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 3. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized, plain ends.
 4. Cast-Iron Sleeves: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 5. Molded PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
 6. PVC Pipe Sleeves: ASTM D 1785, Schedule 40.
 7. Molded PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
- E. Identification Devices
1. Equipment Nameplates: Metal permanently fastened to equipment with data engraved or stamped.
 - a. Data: Manufacturer, product name, model number, serial number, capacity, operating and power characteristics, labels of tested compliances, and essential data.
 - b. Location: Accessible and visible.
 2. Stencils: Standard stencils prepared with letter sizes complying with recommendations in ASME A13.1. Minimum letter height is **1-1/4 inches (30 mm)** for ducts, and **3/4 inch (20 mm)** for access door signs and similar operational instructions.
 - a. Material: Fiberboard **OR** Brass, **as directed**.

- b. Stencil Paint: Exterior, oil-based, alkyd-gloss black enamel, unless otherwise indicated. Paint may be in pressurized spray-can form.
- c. Identification Paint: Exterior, oil-based, alkyd enamel in colors according to ASME A13.1, unless otherwise indicated.
3. Snap-on Plastic Pipe Markers: Manufacturer's standard preprinted, semirigid, snap-on type. Include color-coding according to ASME A13.1, unless otherwise indicated.
4. Pressure-Sensitive Pipe Markers: Manufacturer's standard preprinted, color-coded, pressure-sensitive-vinyl type with permanent adhesive.
5. Pipes with OD, Including Insulation, Less Than **6 Inches (150 mm)**: Full-band pipe markers, extending 360 degrees around pipe at each location.
6. Pipes with OD, Including Insulation, **6 Inches (150 mm)** and Larger: Either full-band or strip-type pipe markers, at least three times letter height and of length required for label.
7. Lettering: Manufacturer's standard preprinted captions as selected by the Owner.
8. Lettering: Use piping system terms indicated and abbreviate only as necessary for each application length.
 - a. Arrows: Either integrally with piping system service lettering to accommodate both directions of flow, or as separate unit on each pipe marker to indicate direction of flow.
9. Plastic Tape: Manufacturer's standard color-coded, pressure-sensitive, self-adhesive vinyl tape, at least **3 mils (0.08 mm)** thick.
 - a. Width: **1-1/2 inches (40 mm)** on pipes with OD, including insulation, less than **6 inches (150 mm)**; **2-1/2 inches (65 mm)** for larger pipes.
 - b. Color: Comply with ASME A13.1, unless otherwise indicated.
10. Valve Tags: Stamped or engraved with **1/4-inch (6.4-mm)** letters for piping system abbreviation and **1/2-inch (13-mm)** sequenced numbers. Include **5/32-inch (4-mm)** hole for fastener.
 - a. Material: **0.032-inch- (0.8-mm-)** thick, polished brass **OR** aluminum, **as directed**.
 - b. Material: **0.0375-inch- (1-mm-)** thick stainless steel.
 - c. Material: **3/32-inch- (2.4-mm-)** thick plastic laminate with 2 black surfaces and a white inner layer.
 - d. Material: Valve manufacturer's standard solid plastic.
 - e. Size: **1-1/2 inches (40 mm)** in diameter, unless otherwise indicated.
 - f. Shape: As indicated for each piping system.
11. Valve Tag Fasteners: Brass, wire-link or beaded chain; or brass S-hooks.
12. Engraved Plastic-Laminate Signs: ASTM D 709, Type I, cellulose, paper-base, phenolic-resin-laminate engraving stock; Grade ES-2, black surface, black phenolic core, with white melamine subcore, unless otherwise indicated. Fabricate in sizes required for message. Provide holes for mechanical fastening.
 - a. Engraving: Engraver's standard letter style, of sizes and with terms to match equipment identification.
 - b. Thickness: **1/16 inch (1.6 mm)**, for units up to **20 sq. in. (130 sq. cm)** or **8 inches (200 mm)** in length, and **1/8 inch (3 mm)** for larger units.
 - c. Fasteners: Self-tapping, stainless-steel screws or contact-type permanent adhesive.
13. Plastic Equipment Markers: Manufacturer's standard laminated plastic, in the following color codes:
 - a. Green: Cooling equipment and components.
 - b. Yellow: Heating equipment and components.
 - c. Brown: Energy reclamation equipment and components.
 - d. Blue: Equipment and components that do not meet criteria above.
 - e. Hazardous Equipment: Use colors and designs recommended by ASME A13.1.
 - f. Terminology: Match schedules as closely as possible. Include the following:
 - 1) Name and plan number.
 - 2) Equipment service.
 - 3) Design capacity.
 - 4) Other design parameters such as pressure drop, entering and leaving conditions, and speed.

- g. Size: **2-1/2 by 4 inches (65 by 100 mm)** for control devices, dampers, and valves; **4-1/2 by 6 inches (115 by 150 mm)** for equipment.
- 14. Plasticized Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with mat finish suitable for writing.
 - a. Size: **3-1/4 by 5-5/8 inches (83 by 143 mm)**.
 - b. Fasteners: Brass grommets and wire.
 - c. Nomenclature: Large-size primary caption such as DANGER, CAUTION, or DO NOT OPERATE.
- 15. Lettering and Graphics: Coordinate names, abbreviations, and other designations used in piped utility identification with corresponding designations indicated. Use numbers, letters, and terms indicated for proper identification, operation, and maintenance of piped utility systems and equipment.
 - a. Multiple Systems: Identify individual system number and service if multiple systems of same name are indicated.

F. Grout

- 1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

G. Flowable Fill

- 1. Description: Low-strength-concrete, flowable-slurry mix.
 - a. Cement: ASTM C 150, Type I, portland.
 - b. Density: **115- to 145-lb/cu. ft. (1840- to 2325-kg/cu. m)**.
 - c. Aggregates: ASTM C 33, natural sand, fine and crushed gravel or stone, coarse
OR
Aggregates: ASTM C 33, natural sand, fine with admixture, ASTM C 618, fly-ash mineral.
 - d. Water: Comply with ASTM C 94/C 94M.
 - e. Strength: **100 to 200 psig (690 to 1380 kPa)** at 28 days.

1.3 EXECUTION

A. Piped Utility Demolition

- 1. Refer to Division 01 Section(s) "Cutting And Patching" AND Division 02 Section(s) "Selective Structure Demolition" for general demolition requirements and procedures.
- 2. Disconnect, demolish, and remove piped utility systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping. Fill abandoned piping with flowable fill, and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to the Owner.
- 3. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace with new products of equal capacity and quality.

B. Dielectric Fitting Applications

- 1. Dry Piping Systems: Connect piping of dissimilar metals with the following:
 - a. **NPS 2 (DN 50)** and Smaller: Dielectric unions.
 - b. **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Dielectric flanges or dielectric flange kits.

2. Wet Piping Systems: Connect piping of dissimilar metals with the following:
 - a. **NPS 2 (DN 50)** and Smaller: Dielectric couplings **OR** dielectric nipples, **as directed**.
 - b. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Dielectric nipples.
 - c. **NPS 2-1/2 to NPS 8 (DN 65 to DN 200)**: Dielectric nipples or dielectric flange kits.
 - d. **NPS 10 and NPS 12 (DN 250 and DN 300)**: Dielectric flange kits.

C. Piping Installation

1. Install piping according to the following requirements and Division 33 specifying piping systems.
2. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on the Coordination Drawings.
3. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
4. Install piping to permit valve servicing.
5. Install piping at indicated slopes.
6. Install piping free of sags and bends.
7. Install fittings for changes in direction and branch connections.
8. Select system components with pressure rating equal to or greater than system operating pressure.
9. Sleeves are not required for core-drilled holes, unless directed otherwise.
10. Permanent sleeves are not required for holes formed by removable PE sleeves, unless directed otherwise.
11. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
 - a. Cut sleeves to length for mounting flush with both surfaces.
 - 1) Exception: Extend sleeves installed in floors of equipment areas or other wet areas **2 inches (50 mm)** above finished floor level.
 - b. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 - 1) **PVC OR Steel, as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - 2) **Steel Sheet Sleeves**: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum-board partitions.
12. Verify final equipment locations for roughing-in.
13. Refer to equipment specifications in other Sections for roughing-in requirements.

D. Piping Joint Construction

1. Join pipe and fittings according to the following requirements and Division 33 specifying piping systems.
2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
4. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
5. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1.1 "Quality Assurance" Article.
6. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
7. Grooved Joints: Assemble joints with grooved-end pipe coupling with coupling housing, gasket, lubricant, and bolts according to coupling and fitting manufacturer's written instructions.

8. Soldered Joints: Apply ASTM B 813 water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
 9. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 10. Pressure-Sealed Joints: Assemble joints for plain-end copper tube and mechanical pressure seal fitting with proprietary crimping tool to according to fitting manufacturer's written instructions.
 11. Plastic Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. ABS Piping: Join according to ASTM D 2235 and ASTM D 2661 appendixes.
 - c. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - d. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - e. PVC Nonpressure Piping: Join according to ASTM D 2855.
 - f. PVC to ABS Nonpressure Transition Fittings: Join according to ASTM D 3138 Appendix.
 12. Plastic Pressure Piping Gasketed Joints: Join according to ASTM D 3139.
 13. Plastic Nonpressure Piping Gasketed Joints: Join according to ASTM D 3212.
 14. Plastic Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - a. Plain-End PE Pipe and Fittings: Use butt fusion.
 - b. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
 15. Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
- E. Piping Connections
1. Make connections according to the following, unless otherwise indicated:
 - a. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment.
 - b. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment.
 - c. Install dielectric fittings at connections of dissimilar metal pipes.
- F. Equipment Installation
1. Install equipment level and plumb, unless otherwise indicated.
 2. Install equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference with other installations. Extend grease fittings to an accessible location.
 3. Install equipment to allow right of way to piping systems installed at required slope.
- G. Painting
1. Painting of piped utility systems, equipment, and components is specified in Division 09.
 2. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.
- H. Identification
1. Piping Systems: Install pipe markers on each system. Include arrows showing normal direction of flow.
 - a. Stenciled Markers: According to ASME A13.1.
 - b. Plastic markers, with application systems. Install on insulation segment if required for hot noninsulated piping.
 - c. Locate pipe markers on exposed piping according to the following:
 - 1) Near each valve and control device.

- 2) Near each branch, excluding short takeoffs for equipment and terminal units. Mark each pipe at branch if flow pattern is not obvious.
 - 3) Near locations where pipes pass through walls or floors or enter inaccessible enclosures.
 - 4) At manholes and similar access points that permit view of concealed piping.
 - 5) Near major equipment items and other points of origination and termination.
2. Equipment: Install engraved plastic-laminate sign or equipment marker on or near each major item of equipment.
 - a. Lettering Size: Minimum **1/4 inch (6.4 mm)** high for name of unit if viewing distance is less than **24 inches (610 mm)**, **1/2 inch (13 mm)** high for distances up to **72 inches (1800 mm)**, and proportionately larger lettering for greater distances. Provide secondary lettering two-thirds to three-fourths of size of principal lettering.
 - b. Text of Signs: Provide name of identified unit. Include text to distinguish among multiple units, inform user of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 3. Adjusting: Relocate identifying devices that become visually blocked by work of this or other Divisions.

I. Concrete Bases

1. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of base.
 - c. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - f. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - g. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".

J. Erection Of Metal Supports And Anchorages

1. Refer to Division 05 Section "Metal Fabrications" for structural steel.
2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor piped utility materials and equipment.
3. Field Welding: Comply with AWS D1.1/D1.1M.

K. Grouting

1. Mix and install grout for equipment base bearing surfaces, pump and other equipment base plates, and anchors.
2. Clean surfaces that will come into contact with grout.
3. Provide forms as required for placement of grout.
4. Avoid air entrapment during placement of grout.
5. Place grout, completely filling equipment bases.
6. Place grout on concrete bases and provide smooth bearing surface for equipment.
7. Place grout around anchors.
8. Cure placed grout.

END OF SECTION 22 05 23 00b

Task	Specification	Specification Description
22 05 23 00	23 05 23 00	General-Duty Valves for HVAC Piping
22 05 23 00	33 14 00 00	Water Distribution

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SECTION 22 05 48 13 - VIBRATION AND SEISMIC CONTROLS FOR PLUMBING PIPING AND EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of vibration and seismic controls for plumbing piping and equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Isolation pads.
 - b. Isolation mounts.
 - c. Restrained elastomeric isolation mounts.
 - d. Freestanding and Restrained spring isolators.
 - e. Housed spring mounts.
 - f. Elastomeric hangers.
 - g. Spring hangers.
 - h. Spring hangers with vertical-limit stops.
 - i. Pipe riser resilient supports.
 - j. Resilient pipe guides.
 - k. Seismic snubbers.
 - l. Restraining braces and cables.
 - m. Steel and Inertia, vibration isolation equipment bases.

C. Definitions

1. IBC: International Building Code.
2. ICC-ES: ICC-Evaluation Service.
3. OSHPD: Office of Statewide Health Planning and Development for the State of California.

D. Performance Requirements

1. Seismic-Restraint Loading:
 - a. Site Class as Defined in the IBC: **A OR B OR C OR D OR E OR F, as directed.**
 - b. Assigned Seismic Use Group or Building Category as Defined in the IBC: **I OR II OR III, as directed.**
 - 1) Component Importance Factor: **1.0 OR 1.5, as directed.**
 - 2) Component Response Modification Factor: **1.5 OR 2.5 OR 3.5 OR 5.0, as directed.**
 - 3) Component Amplification Factor: **1.0 OR 2.5, as directed.**
 - c. Design Spectral Response Acceleration at Short Periods (0.2 Second): Percentage as directed.
 - d. Design Spectral Response Acceleration at 1-Second Period: Percentage as directed.

E. Submittals

1. Product Data: For each product indicated.
2. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Welding certificates.
4. Qualification Data: For professional engineer.
5. Field quality-control test reports.

F. Quality Assurance

1. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
2. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproved by ICC-ES, or preapproved by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

1.2 PRODUCTS

A. Vibration Isolators

1. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - a. Resilient Material: Oil- and water-resistant neoprene **OR** rubber **OR** hermetically sealed compressed fiberglass, **as directed**.
2. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
 - a. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - b. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
3. Restrained Mounts: All-directional mountings with seismic restraint.
 - a. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - b. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
4. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - a. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - b. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - c. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - d. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - e. Baseplates: Factory drilled for bolting to structure and bonded to **1/4-inch- (6-mm-)** thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to **500 psig (3447 kPa)**.
 - f. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
5. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
 - a. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to **1/4-inch- (6-mm-)** thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.

- b. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 - c. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - d. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - e. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - f. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.
 - a. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
 - b. Base: Factory drilled for bolting to structure.
 - c. Snubbers: Vertically adjustable to allow a maximum of **1/4-inch (6-mm)** travel up or down before contacting a resilient collar.
 7. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.
 8. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
 - a. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 - g. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
 9. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
 - a. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - g. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 - h. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
 10. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of **1/2-inch- (13-mm-)** thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of **500 psig (3.45 MPa)** and for equal resistance in all directions.
 11. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of **1/2-inch- (13-mm-)** thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion

and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.

B. Vibration Isolation Equipment Bases

1. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
 - a. Design Requirements: Lowest possible mounting height with not less than **1-inch (25-mm)** clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - 1) Include supports for suction and discharge elbows for pumps.
 - b. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - c. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
2. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.
 - a. Design Requirements: Lowest possible mounting height with not less than **1-inch (25-mm)** clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - 1) Include supports for suction and discharge elbows for pumps.
 - b. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - c. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
 - d. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.

C. Seismic-Restraint Devices

1. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
2. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
 - a. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 - b. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 - c. Maximum **1/4-inch (6-mm)** air gap, and minimum **1/4-inch- (6-mm-)** thick resilient cushion.
3. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
4. Restraint Cables: ASTM A 603 galvanized-steel **OR** ASTM A 492 stainless-steel, **as directed**, cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
5. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections **OR** Reinforcing steel angle clamped, **as directed**, to hanger rod.
6. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.

7. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
8. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
9. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
10. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

D. Factory Finishes

1. Finish:
 - a. Manufacturer's standard prime-coat finish ready for field painting.
OR
Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1) Powder coating on springs and housings.
 - 2) All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3) Baked enamel or powder coat for metal components on isolators for interior use.
 - 4) Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

1.3 EXECUTION

A. Applications

1. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
2. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
3. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

B. Vibration-Control And Seismic-Restraint Device Installation

1. Equipment Restraints:
 - a. Install seismic snubbers on plumbing equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
 - b. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds **0.125 inches (3.2 mm)**.
 - c. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**, providing required submittals for component.
2. Piping Restraints:
 - a. Comply with requirements in MSS SP-127.
 - b. Space lateral supports a maximum of **40 feet (12 m)** o.c., and longitudinal supports a maximum of **80 feet (24 m)** o.c.

Vibration And Seismic Controls For Plumbing Piping And Equipment

- c. Brace a change of direction longer than **12 feet (3.7 m)**.
 3. Install cables so they do not bend across edges of adjacent equipment or building structure.
 4. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**, providing required submittals for component.
 5. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
 6. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
 7. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
 8. Drilled-in Anchors:
 - a. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - b. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - c. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - d. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - e. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - f. Install zinc-coated steel anchors for interior and stainless steel anchors for exterior applications.
- C. Accommodation Of Differential Seismic Motion
1. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 22 Section "Domestic Water Piping" for piping flexible connections.
- D. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - b. Schedule test with the Owner before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 - c. Obtain approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - d. Test at least four of each type and size of installed anchors and fasteners selected.
 - e. Test to 90 percent of rated proof load of device.
 - f. Measure isolator restraint clearance.
 - g. Measure isolator deflection.
 - h. Verify snubber minimum clearances.
 - i. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

- j. Air-Mounting System Operational Test: Test the compressed-air leveling system.
 - k. Test and adjust air-mounting system controls and safeties.
 - l. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
3. Remove and replace malfunctioning units and retest as specified above.
 4. Prepare test and inspection reports.
- E. Adjusting
1. Adjust isolators after piping system is at operating weight.
 2. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
 3. Adjust active height of spring isolators.
 4. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 22 05 48 13

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SECTION 22 05 53 00 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for identification for plumbing piping and equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Equipment labels.
 - b. Warning signs and labels.
 - c. Pipe labels.
 - d. Stencils.
 - e. Valve tags.
 - f. Warning tags.

C. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Equipment Labels

1. Metal Labels for Equipment:
 - a. Material and Thickness: Brass, **0.032-inch (0.8-mm)** OR Stainless steel, **0.025-inch (0.64-mm)** OR Aluminum, **0.032-inch (0.8-mm)** OR anodized aluminum, **0.032-inch (0.8-mm)**, **as directed**, minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - b. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2 by 3/4 inch (64 by 19 mm)**.
 - c. Minimum Letter Size: **1/4 inch (6.4 mm)** for name of units if viewing distance is less than **24 inches (600 mm)**, **1/2 inch (13 mm)** for viewing distances up to **72 inches (1830 mm)**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - d. Fasteners: Stainless-steel rivets OR self-tapping screws, **as directed**.
 - e. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
2. Plastic Labels for Equipment:
 - a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm)** OR **1/8 inch (3.2 mm)**, **as directed**, thick, and having predrilled holes for attachment hardware.
 - b. Letter Color: Black OR Blue OR Red OR White OR Yellow, **as directed**.
 - c. Background Color: Black OR Blue OR Red OR White OR Yellow, **as directed**.
 - d. Maximum Temperature: Able to withstand temperatures up to **160 deg F (71 deg C)**.
 - e. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2 by 3/4 inch (64 by 19 mm)**.
 - f. Minimum Letter Size: **1/4 inch (6.4 mm)** for name of units if viewing distance is less than **24 inches (600 mm)**, **1/2 inch (13 mm)** for viewing distances up to **72 inches (1830 mm)**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - g. Fasteners: Stainless-steel rivets OR self-tapping screws, **as directed**.
 - h. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

3. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
 4. Equipment Label Schedule: For each item of equipment to be labeled, on **8-1/2-by-11-inch (A4)** bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.
- B. Warning Signs And Labels
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm) OR 1/8 inch (3.2 mm)**, **as directed**, thick, and having predrilled holes for attachment hardware.
 2. Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 3. Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 4. Maximum Temperature: Able to withstand temperatures up to **160 deg F (71 deg C)**.
 5. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2 by 3/4 inch (64 by 19 mm)**.
 6. Minimum Letter Size: **1/4 inch (6.4 mm)** for name of units if viewing distance is less than **24 inches (600 mm)**, **1/2 inch (13 mm)** for viewing distances up to **72 inches (1830 mm)**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets **OR** self-tapping screws, **as directed**.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
 9. Label Content: Include caution and warning information, plus emergency notification instructions.
- C. Pipe Labels
1. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
 2. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover **OR** cover full, **as directed**, circumference of pipe and to attach to pipe without fasteners or adhesive.
 3. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
 4. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - a. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - b. Lettering Size: At least **1-1/2 inches (38 mm)** high.
- D. Stencils
1. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; and minimum letter height of **3/4 inch (19 mm)** for access panel and door labels, equipment labels, and similar operational instructions.
 - a. Stencil Material: Aluminum **OR** Brass **OR** Fiberboard, **as directed**.
 - b. Stencil Paint: Exterior, gloss, alkyd enamel **OR** acrylic enamel, **as directed**, black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - c. Identification Paint: Exterior, alkyd enamel **OR** acrylic enamel, **as directed**, in colors according to ASME A13.1 unless otherwise indicated.
- E. Valve Tags
1. Valve Tags: Stamped or engraved with **1/4-inch (6.4-mm)** letters for piping system abbreviation and **1/2-inch (13-mm)** numbers.
 - a. Tag Material: Brass, **0.032-inch (0.8-mm) OR** Stainless steel, **0.025-inch (0.64-mm) OR** Aluminum, **0.032-inch (0.8-mm) OR** anodized aluminum, **0.032-inch (0.8-mm)**, **as directed**, minimum thickness, and having predrilled or stamped holes for attachment hardware.

- b. Fasteners: Brass wire-link chain **OR** beaded chain **OR** S-hook, **as directed**.
- 2. Valve Schedules: For each piping system, on **8-1/2-by-11-inch (A4)** bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - a. Valve-tag schedule shall be included in operation and maintenance data.

F. Warning Tags

- 1. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - a. Size: **3 by 5-1/4 inches (75 by 133 mm)** minimum **OR** Approximately **4 by 7 inches (100 by 178 mm)**, **as directed**.
 - b. Fasteners: Brass grommet and wire **OR** Reinforced grommet and wire or string, **as directed**.
 - c. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - d. Color: Yellow background with black lettering.

1.3 EXECUTION

A. Preparation

- 1. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

B. Equipment Label Installation

- 1. Install or permanently fasten labels on each major item of mechanical equipment.
- 2. Locate equipment labels where accessible and visible.

C. Pipe Label Installation

- 1. Piping Color-Coding: Painting of piping is specified in Division 09 Section(s) "Interior Painting" **OR** "High-performance Coatings", **as directed**.
- 2. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles **OR** complying with ASME A13.1, **as directed**, on each piping system.
 - a. Identification Paint: Use for contrasting background.
 - b. Stencil Paint: Use for pipe marking.
- 3. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - a. Near each valve and control device.
 - b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - c. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum intervals of **50 feet (15 m)** along each run. Reduce intervals to **25 feet (7.6 m)** in areas of congested piping and equipment.
 - g. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
- 4. Pipe Label Color Schedule:
 - a. Low-Pressure, Compressed-Air Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - b. Medium-Pressure, Compressed-Air Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.

- 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - c. Domestic Water Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - d. Sanitary Waste and Storm Drainage Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
- D. Valve-Tag Installation
- 1. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
 - 2. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - a. Valve-Tag Size and Shape:
 - 1) Cold Water: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 2) Hot Water: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 3) Low-Pressure Compressed Air: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 4) High-Pressure Compressed Air: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - b. Valve-Tag Color:
 - 1) Cold Water: Natural **OR** Green, **as directed**.
 - 2) Hot Water: Natural **OR** Green, **as directed**.
 - 3) Low-Pressure Compressed Air: Natural **OR** Green, **as directed**.
 - 4) High-Pressure Compressed Air: Natural **OR** Green, **as directed**.
 - c. Letter Color:
 - 1) Cold Water: Black **OR** White, **as directed**.
 - 2) Hot Water: Black **OR** White, **as directed**.
 - 3) Low-Pressure Compressed Air: Black **OR** White, **as directed**.
 - 4) High-Pressure Compressed Air: Black **OR** White, **as directed**.
- E. Warning-Tag Installation
- 1. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 22 05 53 00

SECTION 22 05 76 00 - STORM DRAINAGE PIPING SPECIALTIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for storm drainage piping specialties. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Roof drains.
 - b. Miscellaneous storm drainage piping specialties.
 - c. Cleanouts.
 - d. Backwater valves.
 - e. Trench drains.
 - f. Channel drainage systems.
 - g. Through-penetration firestop assemblies.
 - h. Flashing materials.

C. Submittals

1. Product Data: For each type of product indicated.

D. Quality Assurance

1. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

1.2 PRODUCTS

A. Metal Roof Drains

1. Cast-Iron, Large-Sump, General-Purpose Roof Drains:
 - a. Standard: ASME A112.6.4, for general-purpose roof drains.
 - b. Body Material: Cast iron.
 - c. Dimension of Body: Nominal **14-inch (357-mm)** diameter.
 - d. Combination Flashing Ring and Gravel Stop: Not required **OR** Required, **as directed**.
 - e. Flow-Control Weirs: Not required **OR** Required, **as directed**.
 - f. Outlet: Bottom **OR** Side, **as directed**.
 - g. Extension Collars: Not required **OR** Required, **as directed**.
 - h. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - i. Expansion Joint: Not required **OR** Required, **as directed**.
 - j. Sump Receiver Plate: Not required **OR** Required, **as directed**.
 - k. Dome Material: Aluminum **OR** Cast iron **OR** PE **OR** Stainless steel, **as directed**.
 - l. Perforated Gravel Guard: Stainless steel **OR** Not required, **as directed**.
 - m. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
 - n. Water Dam: Not required **OR** **2 inches (51 mm)** high, **as directed**.
2. Cast-Iron, Medium-Sump, General-Purpose Roof Drains:
 - a. Standard: ASME A112.6.4, for general-purpose roof drains.
 - b. Body Material: Cast iron.
 - c. Dimension of Body: **8- to 12-inch (203- to 305-mm)** diameter.
 - d. Combination Flashing Ring and Gravel Stop: Not required **OR** Required, **as directed**.
 - e. Flow-Control Weirs: Not required **OR** Required, **as directed**.
 - f. Outlet: Bottom **OR** Side, **as directed**.
 - g. Extension Collars: Not required **OR** Required, **as directed**.

- h. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - i. Expansion Joint: Not required **OR** Required, **as directed**.
 - j. Sump Receiver Plate: Not required **OR** Required, **as directed**.
 - k. Dome Material: Aluminum **OR** Cast iron **OR** Copper **OR** PE **OR** Stainless steel, **as directed**.
 - l. Wire Mesh: Stainless steel or brass over dome **OR** Not required, **as directed**.
 - m. Perforated Gravel Guard: Stainless steel **OR** Not required, **as directed**.
 - n. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
 - o. Water Dam: Not required **OR 2 inches (51 mm)** high, **as directed**.
3. Copper, Medium-Sump, General-Purpose Roof Drains:
- a. Standard: ASME A112.6.4, for general-purpose roof drains.
 - b. Body Material: Copper.
 - c. Dimension of Body: **8- to 12-inch (203- to 305-mm)** diameter.
 - d. Combination Flashing Ring and Gravel Stop: Not required **OR** Required, **as directed**.
 - e. Flow-Control Weirs: Not required **OR** Required, **as directed**.
 - f. Outlet: Bottom **OR** Side, **as directed**.
 - g. Extension Collars: Not required **OR** Required, **as directed**.
 - h. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - i. Expansion Joint: Not required **OR** Required, **as directed**.
 - j. Sump Receiver Plate: Not required **OR** Required, **as directed**.
 - k. Dome Material: Aluminum **OR** Cast iron **OR** Copper **OR** PE **OR** Stainless steel, **as directed**.
 - l. Wire Mesh: Stainless steel or brass over dome **OR** Not required, **as directed**.
 - m. Perforated Gravel Guard: Stainless steel **OR** Not required, **as directed**.
 - n. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
 - o. Water Dam: Not required **OR 2 inches (51 mm)** high, **as directed**.
4. Cast-Iron, Small-Sump, General-Purpose Roof Drains:
- a. Standard: ASME A112.6.4, for general-purpose roof drains.
 - b. Body Material: Cast iron.
 - c. Dimension of Body: Nominal **8-inch (203-mm)** diameter.
 - d. Combination Flashing Ring and Gravel Stop: Not required **OR** Required, **as directed**.
 - e. Outlet: Bottom **OR** Side, **as directed**.
 - f. Extension Collars: Not required **OR** Required, **as directed**.
 - g. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - h. Expansion Joint: Not required **OR** Required, **as directed**.
 - i. Sump Receiver Plate: Not required **OR** Required, **as directed**.
 - j. Dome Material: Cast iron.
 - k. Wire Mesh: Stainless steel or brass over dome **OR** Not required, **as directed**.
 - l. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
5. Copper, Small-Sump, General-Purpose Roof Drains:
- a. Standard: ASME A112.6.4, for general-purpose roof drains.
 - b. Body Material: Copper.
 - c. Dimension of Body: Nominal **8-inch (203-mm)** diameter.
 - d. Combination Flashing Ring and Gravel Stop: Not required **OR** Required, **as directed**.
 - e. Outlet: Bottom **OR** Side, **as directed**.
 - f. Extension Collars: Not required **OR** Required, **as directed**.
 - g. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - h. Expansion Joint: Not required **OR** Required, **as directed**.
 - i. Sump Receiver Plate: Not required **OR** Required, **as directed**.
 - j. Dome Material: Cast iron.
 - k. Wire Mesh: Stainless steel or brass over dome **OR** Not required, **as directed**.
 - l. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
6. Metal, Cornice and Gutter Roof Drains:
- a. Standard: ASME A112.6.4, for cornice and gutter roof drains.
 - b. Body Material: Metal.

- c. Dimension of Body: Nominal **6-inch (152-mm)** diameter.
 - d. Outlet: Bottom **OR** Side **OR** 45-degree angle, **as directed**.
 - e. Dome Material: Bronze.
 - f. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
7. Metal, Parapet Roof Drains:
- a. Standard: ASME A112.6.4, for parapet roof drains.
 - b. Body Material: Cast iron.
 - c. Outlet: Back **OR** Angle, **as directed**.
 - d. Grate Material: Bronze **OR** Cast iron **OR** Nickel-bronze alloy, **as directed**.
 - e. Vandal-Proof Grate: Not required **OR** Required, **as directed**.
8. Metal, Large-Sump, Promenade Roof Drains:
- a. Standard: ASME A112.6.4, for promenade roof drains.
 - b. Body Material: Cast iron.
 - c. Dimension of Body: Nominal **14-inch (357-mm)** diameter.
 - d. Dimension of Frame and Grate: Nominal **14 inches (357 mm)** square.
 - e. Outlet: Bottom.
 - f. Grate Material: Bronze **OR** Cast iron **OR** Nickel-bronze alloy, **as directed**.
 - g. Vandal-Proof Grate: Not required **OR** Required, **as directed**.
 - h. Extension Collars: Not required **OR** Required, **as directed**.
 - i. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - j. Expansion Joint: Not required **OR** Required, **as directed**.
 - k. Sump Receiver Plate: Not required **OR** Required, **as directed**.
9. Metal, Medium-Sump, Promenade Roof Drains:
- a. Standard: ASME A112.6.4, for promenade roof drains.
 - b. Body Material: Cast iron.
 - c. Dimension of Body: **11- to 12-inch (280- to 305-mm)** diameter.
 - d. Dimension of Frame and Grate: Nominal **12 inches (305 mm)** square.
 - e. Outlet: Bottom.
 - f. Grate Material: Bronze **OR** Cast iron **OR** Nickel-bronze alloy, **as directed**.
 - g. Vandal-Proof Grate: Not required **OR** Required, **as directed**.
 - h. Extension Collars: Not required **OR** Required, **as directed**.
 - i. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - j. Expansion Joint: Not required **OR** Required, **as directed**.
 - k. Sump Receiver Plate: Not required **OR** Required, **as directed**.
10. Metal, Small-Sump, Promenade Roof Drains:
- a. Standard: ASME A112.6.4, for promenade roof drains.
 - b. Body Material: Cast iron.
 - c. Dimension of Body: Nominal **8-inch (203-mm)** diameter.
 - d. Dimension of Frame and Grate: Nominal **8 inches (203 mm)** square.
 - e. Outlet: Bottom.
 - f. Grate Material: Bronze **OR** Cast iron **OR** Nickel-bronze alloy, **as directed**.
 - g. Vandal-Proof Grate: Not required **OR** Required, **as directed**.
 - h. Extension Collars: Not required **OR** Required, **as directed**.
 - i. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - j. Expansion Joint: Not required **OR** Required, **as directed**.
 - k. Sump Receiver Plate: Not required **OR** Required, **as directed**.
11. Metal, Medium-Sump, Deck Roof Drains:
- a. Standard: ASME A112.6.4, for deck roof drains; ASME A112.6.3, for floor drains.
 - b. Body Material: Metal.
 - c. Flange: Anchor **OR** Anchor with weep holes **OR** Not required, **as directed**.
 - d. Clamping Device: Not required **OR** Required, **as directed**.
 - e. Integral Backwater Valve: Not required **OR** Required, **as directed**.
 - f. Outlet: Bottom **OR** End **OR** Side, **as directed**.
 - g. Grate Material: Cast iron.
 - h. Grate Finish: Painted **OR** Not required, **as directed**.

- i. Overall Dimension of Frame and Grate: Nominal **14 inches (357 mm)** round **OR** square, **as directed**.
 - j. Top-Loading Classification: Extra-Heavy Duty **OR** Heavy Duty, **as directed**.
 - k. Vandal-Proof Frame and Grate: Not required **OR** Required, **as directed**.
12. Metal, Small-Sump, Deck Roof Drains:
- a. Standard: ASME A112.6.4, for deck roof drains; ASME A112.6.3, for floor drains.
 - b. Body Material: Metal.
 - c. Flange: Anchor **OR** Anchor with weep holes **OR** Not required, **as directed**.
 - d. Clamping Device: Not required **OR** Required, **as directed**.
 - e. Integral Backwater Valve: Not required **OR** Required, **as directed**.
 - f. Outlet: Bottom **OR** End **OR** Side, **as directed**.
 - g. Grate Material: Cast iron.
 - h. Grate Finish: Painted **OR** Not required, **as directed**.
 - i. Overall Dimension of Frame and Grate: Nominal **8 inches (203 mm)** round **OR** square, **as directed**.
 - j. Top-Loading Classification: Extra-Heavy Duty **OR** Heavy Duty **OR** Light Duty **OR** Medium Duty, **as directed**.
 - k. Vandal-Proof Frame and Grate: Not required **OR** Required, **as directed**.
- B. Plastic Roof Drains
- 1. Plastic Roof Drains:
 - a. Standard: ASME A112.6.4, for plastic roof drains.
 - b. Body Material: ABS or PVC.
 - c. Sump Diameter: as directed by the Owner
 - d. Combination Flashing Ring and Gravel Stop: Not required **OR** Required, **as directed**.
 - e. Outlet: Bottom.
 - f. Extension Collars: Not required **OR** Required, **as directed**.
 - g. Underdeck Clamp: Not required **OR** Required, **as directed**.
 - h. Expansion Joint: Not required **OR** Required, **as directed**.
 - i. Sump Receiver Plate: Not required **OR** Required, **as directed**.
 - j. Dome Material: Aluminum **OR** Cast iron **OR** PE **OR** Stainless steel, **as directed**.
 - k. Vandal-Proof Dome: Not required **OR** Required, **as directed**.
- C. Miscellaneous Storm Drainage Piping Specialties
- 1. Downspout Adaptors:
 - a. Description: Manufactured, gray-iron casting, for attaching to horizontal-outlet, parapet roof drain and to exterior, sheet metal downspout.
 - b. Size: Inlet size to match parapet drain outlet.
 - 2. Downspout Boots:
 - a. Description: Manufactured, ASTM A 48/A 48M, gray-iron casting, with strap or ears for attaching to building; **NPS 4 (DN 100)** outlet; and shop-applied bituminous coating.
 - b. Size: Inlet size to match downspout and **NPS 4 (DN 100)** outlet.
 - 3. Conductor Nozzles:
 - a. Description: Bronze body with threaded inlet and bronze wall flange with mounting holes.
 - b. Size: Same as connected conductor.
- D. Cleanouts
- 1. Floor Cleanouts:
 - a. Standard: ASME A112.36.2M, for adjustable housing **OR** cast-iron soil pipe with cast-iron ferrule **OR** heavy-duty, adjustable housing **OR** threaded, adjustable housing, **as directed**, cleanouts.
 - b. Size: Same as connected branch.
 - c. Type: Adjustable housing **OR** Cast-iron soil pipe with cast-iron ferrule **OR** Heavy-duty, adjustable housing **OR** Threaded, adjustable housing, **as directed**.
 - d. Body or Ferrule Material: Cast iron **OR** Stainless steel, **as directed**.

- e. Clamping Device: Not required **OR** Required, **as directed**.
 - f. Outlet Connection: Inside callk **OR** Spigot **OR** Threaded, **as directed**.
 - g. Closure: Brass plug with straight threads and gasket **OR** Brass plug with tapered threads **OR** Cast-iron plug **OR** Plastic plug, **as directed**.
 - h. Adjustable Housing Material: Cast iron **OR** Plastic, **as directed**, with threads **OR** set-screws or other device, **as directed**.
 - i. Frame and Cover Material and Finish: Nickel-bronze, copper alloy **OR** Painted cast iron **OR** Polished bronze **OR** Rough bronze **OR** Stainless steel, **as directed**.
 - j. Frame and Cover Shape: Round **OR** Square, **as directed**.
 - k. Top-Loading Classification: Extra-Heavy Duty **OR** Heavy Duty **OR** Light Duty **OR** Medium Duty, **as directed**.
 - l. Riser: ASTM A 74, Extra-Heavy **OR** Service, **as directed**, class, cast-iron drainage pipe fitting and riser to cleanout.
2. Test Tees:
- a. Standard: ASME A112.36.2M and ASTM A 74, ASTM A 888, or CISPI 301, for cleanout test tees.
 - b. Size: Same as connected drainage piping.
 - c. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch or hubless, cast-iron soil-pipe test tee as required to match connected piping.
 - d. Closure Plug: Countersunk or raised head, brass.
 - e. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
3. Wall Cleanouts:
- a. Standard: ASME A112.36.2M, for cleanouts. Include wall access.
 - b. Size: Same as connected drainage piping.
 - c. Body Material: Hub-and-spigot, cast-iron soil-pipe T-branch **OR** Hubless, cast-iron soil-pipe test tee, **as directed**, as required to match connected piping.
 - d. Closure: Countersunk **OR** Countersunk or raised-head **OR** Raised-head, **as directed**, drilled-and-threaded **OR** brass **OR** cast-iron, **as directed**, plug.
 - e. Closure Plug Size: Same as or not more than one size smaller than cleanout size.
 - f. Wall Access: Round, deep, chrome-plated bronze **OR** flat, chrome-plated brass or stainless-steel, **as directed**, cover plate with screw.
 - g. Wall Access: Round **OR** Square, **as directed**, nickel-bronze, copper-alloy, or stainless-steel wall-installation frame and cover.
4. Plastic Floor Cleanouts:
- a. Size: Same as connected branch.
 - b. Body Material: PVC.
 - c. Closure Plug: PVC.
 - d. Riser: Drainage pipe fitting and riser to cleanout of same material as drainage piping.
- E. Backwater Valves
1. Cast-Iron, Horizontal Backwater Valves:
- a. Standard: ASME A112.14.1, for backwater valves.
 - b. Size: Same as connected piping.
 - c. Body Material: Cast iron.
 - d. Cover: Cast iron with bolted or threaded access check valve.
 - e. End Connections: Hub and spigot or hubless.
 - f. Check Valve: Removable, bronze, swing check, factory assembled or field modified to hang closed **OR** open for airflow unless subject to backflow condition, **as directed**.
 - g. Extension: ASTM A 74, Service class; full-size, cast-iron soil-pipe extension to field-installed cleanout at floor; replaces backwater valve cover.
2. Cast-Iron, Drain-Outlet Backwater Valves:
- a. Size: Same as floor drain outlet.
 - b. Body Material: Cast iron or bronze made for vertical installation in bottom outlet of floor drain.
 - c. Check Valve: Removable ball float.
 - d. Inlet: Threaded.

- e. Outlet: Threaded or spigot.
- 3. Plastic, Horizontal Backwater Valves:
 - a. Standard: ASME A112.14.1, for backwater valves.
 - b. Size: Same as connected piping.
 - c. Body Material: ABS **OR** PVC, **as directed**.
 - d. Cover: Same material as body with threaded access to check valve.
 - e. Check Valve: Removable swing check.
 - f. End Connections: Socket type.

F. Trench Drains

- 1. Trench Drains:
 - a. Standard: ASME A112.6.3, for trench drains.
 - b. Body Material: Cast iron.
 - c. Flange: Anchor **OR** Anchor with weep holes **OR** Not required, **as directed**.
 - d. Clamping Device: Not required **OR** Required, **as directed**.
 - e. Outlet: Bottom **OR** End **OR** Side, **as directed**.
 - f. Grate Material: Ductile iron or gray iron **OR** stainless steel, **as directed**.
 - g. Grate Finish: Painted **OR** Not required, **as directed**.
 - h. Dimensions of Frame and Grate: as directed by the Owner .
 - i. Top-Loading Classification: Extra-Heavy Duty **OR** Heavy Duty **OR** Light Duty **OR** Medium Duty, **as directed**.

G. Channel Drainage Systems

- 1. Narrow, Sloped-Invert, Polymer-Concrete, Channel Drainage Systems:
 - a. Type: Modular system of channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.
 - 1) Channel Sections: Narrow, interlocking-joint, sloped-invert, polymer-concrete modular units with end caps. Include rounded bottom, with built-in invert slope of 0.6 percent and with outlets in number, sizes, and locations indicated. Include extension sections necessary for required depth.
 - a) Dimensions: **4-inch (102-mm)** inside width. Include number of units required to form total lengths indicated.
 - b) Frame: Galvanized steel or gray iron for grates **OR** Not required, **as directed**.
 - 2) Grates: Manufacturer's designation "heavy duty" **OR** "medium duty", **as directed**, with slots or perforations, and of width and thickness that fit recesses in channel sections.
 - a) Material: Ductile iron **OR** Fiberglass **OR** Galvanized steel **OR** Gray iron **OR** Stainless steel, **as directed**.
 - b) Locking Mechanism: Manufacturer's standard device for securing grates to channel sections **OR** Not required, **as directed**.
 - 3) Covers: Solid ductile or gray iron, of width and thickness that fit recesses in channel sections, and of lengths indicated.
 - 4) Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
 - 5) Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.
- 2. Narrow, Level-Invert, Polymer-Concrete, Channel Drainage Systems:
 - a. Type: Modular system of channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.
 - 1) Channel Sections: Narrow, interlocking-joint, precast, polymer-concrete modular units with end caps. Include rounded bottom, with level invert and with **NPS 4 (DN 100)** outlets in number and locations indicated.
 - a) Dimensions: **5-inch (127-mm)** inside width and **9-3/4-inch (248-mm)** depth. Include number of units required to form total lengths indicated.

- b) Frame: Galvanized steel or gray iron for grates **OR** Not required, **as directed**.
 - 2) Grates: Manufacturer's designation "heavy duty" **OR** "medium duty", **as directed**, with slots or perforations, and of width and thickness that fit recesses in channel sections.
 - a) Material: Ductile iron **OR** Fiberglass **OR** Galvanized steel **OR** Gray iron **OR** Stainless steel, **as directed**.
 - b) Locking Mechanism: Manufacturer's standard device for securing grates to channel sections **OR** Not required, **as directed**.
 - 3) Covers: Solid ductile or gray iron, of width and thickness that fit recesses in channel sections, and of lengths indicated.
 - 4) Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
 - 5) Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.
 - 3. Wide, Level-Invert, Polymer-Concrete, Channel Drainage Systems:
 - a. Type: Modular system of channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling.
 - 1) Channel Sections: Wide, interlocking-joint, precast, polymer-concrete modular units with end caps. Include flat or rounded bottom, with level invert and with outlets in number, sizes, and locations indicated.
 - a) Dimensions: **8-inch (203-mm)** inside width and **13-3/4-inch (350-mm)** depth. Include number of units required to form total lengths indicated.
 - b) Frame: Galvanized steel or gray iron for grates **OR** Not required, **as directed**.
 - 2) Grates: Manufacturer's designation "heavy duty" **OR** "medium duty", **as directed**, with slots or perforations, and of width and thickness that fit recesses in channel sections.
 - a) Material: Ductile iron **OR** Fiberglass **OR** Galvanized steel **OR** Gray iron **OR** Stainless steel, **as directed**.
 - b) Locking Mechanism: Manufacturer's standard device for securing grates to channel sections **OR** Not required, **as directed**.
 - 3) Covers: Solid ductile or gray iron, of width and thickness that fit recesses in channel sections, and of lengths indicated.
 - 4) Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
 - 5) Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.
- H. Through-Penetration Firestop Assemblies
 - 1. Through-Penetration Firestop Assemblies:
 - a. Standard: ASTM E 814, for through-penetration firestop assemblies.
 - b. Certification and Listing: Intertek Testing Service NA for through-penetration firestop assemblies.
 - c. Size: Same as connected pipe.
 - d. Sleeve: Molded PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
 - e. Stack Fitting: ASTM A 48/A 48M, gray-iron, hubless-pattern, wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
 - f. Special Coating: Corrosion resistant on interior of fittings.
- I. Flashing Materials
 - 1. Copper Sheet: ASTM B 152/B 152M, **12 oz./sq. ft. (3.7 kg/sq. m or 0.41-mm thickness)**.

2. Zinc-Coated Steel Sheet: ASTM A 653/A 653M, with 0.20 percent copper content and **0.04-inch (1.01-mm)** minimum thickness unless otherwise indicated. Include **G90 (Z275)** hot-dip galvanized, mill-phosphatized finish for painting if indicated.
3. Elastic Membrane Sheet: ASTM D 4068, flexible, chlorinated polyethylene, **40-mil (1.01-mm)** minimum thickness.
4. Fasteners: Metal compatible with material and substrate being fastened.
5. Metal Accessories: Sheet metal strips, clamps, anchoring devices, and similar accessory units required for installation; matching or compatible with material being installed.
6. Solder: ASTM B 32, lead-free alloy.

1.3 EXECUTION

A. Installation

1. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions. Roofing materials are specified in Division 7 Sections.
 - a. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 - b. Install expansion joints, if indicated, in roof drain outlets.
 - c. Position roof drains for easy access and maintenance.
2. Install downspout adapters on outlet of back-outlet parapet roof drains and connect to sheet metal downspouts.
3. Install downspout boots at grade with top **6 inches (152 mm) OR 12 inches (305 mm) OR 18 inches (457 mm)**, **as directed**, above grade. Secure to building wall.
4. Install conductor nozzles at exposed bottom of conductors where they spill onto grade.
5. Install cleanouts in aboveground piping and building drain piping according to the following instructions unless otherwise indicated:
 - a. Use cleanouts the same size as drainage piping up to **NPS 4 (DN 100)**. Use **NPS 4 (DN 100)** for larger drainage piping unless larger cleanout is indicated.
 - b. Locate cleanouts at each change in direction of piping greater than 45 degrees.
 - c. Locate cleanouts at minimum intervals of **50 feet (15 m)** for piping **NPS 4 (DN 100)** and smaller and **100 feet (30 m)** for larger piping.
 - d. Locate cleanouts at base of each vertical soil and waste stack.
6. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.
7. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.
8. Install horizontal backwater valves in floor with cover flush with floor.
9. Install drain-outlet backwater valves in outlet of drains.
10. Install test tees in vertical conductors and near floor.
11. Install wall cleanouts in vertical conductors. Install access door in wall if indicated.
12. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface unless otherwise indicated.
13. Assemble channel drainage system components according to manufacturer's written instructions. Install on support devices so that top will be flush with adjacent surface.
14. Install through-penetration firestop assemblies in plastic conductors at concrete floor penetrations.
15. Install sleeve flashing device with each conductor passing through floors with waterproof membrane.

B. Connections

1. Comply with requirements for piping specified in Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.

C. Flashing Installation

1. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required. Join flashing according to the following if required:
 - a. Lead Sheets: Burn joints of 6.0-lb/sq. ft. (30-kg/sq. m) lead sheets, 0.0938-inch (2.4-mm) thickness or thicker. Solder joints of 4.0-lb/sq. ft. (20-kg/sq. m) lead sheets, 0.0625-inch (1.6-mm) thickness or thinner.
 - b. Copper Sheets: Solder joints of copper sheets.
 2. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded in floors and roofs with waterproof membrane.
 - a. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches (250 mm) and with skirt or flange extending at least 8 inches (200 mm) around pipe.
 - b. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
 - c. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.
 3. Set flashing on floors and roofs in solid coating of bituminous cement.
 4. Secure flashing into sleeve and specialty clamping ring or device.
 5. Fabricate and install flashing and pans, sumps, and other drainage shapes.
- D. Protection
1. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.
 2. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 05 76 00

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Task	Specification	Specification Description
22 05 76 00	33 31 11 00	Sanitary Sewerage

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SECTION 22 07 19 00 - PLUMBING INSULATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for plumbing insulation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Insulation Materials:
 - 1) Calcium silicate.
 - 2) Cellular glass.
 - 3) Flexible elastomeric.
 - 4) Mineral fiber.
 - 5) Phenolic.
 - 6) Polyisocyanurate.
 - 7) Polyolefin.
 - 8) Polystyrene.
 - b. Insulating cements.
 - c. Adhesives.
 - d. Mastics.
 - e. Lagging adhesives.
 - f. Sealants.
 - g. Factory-applied jackets.
 - h. Field-applied fabric-reinforcing mesh.
 - i. Field-applied cloths.
 - j. Field-applied jackets.
 - k. Tapes.
 - l. Securements.
 - m. Corner angles.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings:
 - a. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - b. Detail attachment and covering of heat tracing inside insulation.
 - c. Detail insulation application at pipe expansion joints for each type of insulation.
 - d. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - e. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - f. Detail application of field-applied jackets.
 - g. Detail application at linkages of control devices.
 - h. Detail field application for each equipment type.
4. Field quality-control reports.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - a. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - b. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.
- E. Delivery, Storage, And Handling
 1. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.2 PRODUCTS

A. Insulation Materials

1. Comply with requirements in Part 1.3 schedule articles for where insulating materials shall be applied.
2. Products shall not contain asbestos, lead, mercury, or mercury compounds.
3. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
4. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
5. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
6. Calcium Silicate:
 - a. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 - b. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 - c. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
7. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - a. Block Insulation: ASTM C 552, Type I.
 - b. Special-Shaped Insulation: ASTM C 552, Type III.
 - c. Board Insulation: ASTM C 552, Type IV.
 - d. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - e. Preformed Pipe Insulation with Factory-Applied ASJ **OR** ASJ-SSL, **as directed**: Comply with ASTM C 552, Type II, Class 2.
 - f. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
8. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
9. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
10. High-Temperature, Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type V, without factory-applied jacket.
11. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For equipment applications, provide insulation

- without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied FSK jacket, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
12. High-Temperature, Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type III, without factory-applied jacket.
 13. Mineral-Fiber, Preformed Pipe Insulation:
 - a. Type I, **850 deg F (454 deg C)** Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied ASJ-SSL, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 14. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ **OR** FSK jacket, **as directed**, complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is **2.5 lb/cu. ft. (40 kg/cu. m)** or more. Thermal conductivity (k-value) at **100 deg F (55 deg C)** is **0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K)** or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 15. Phenolic:
 - a. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
 - b. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
 - c. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
 - d. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - 1) Preformed Pipe Insulation: None **OR** ASJ, **as directed**.
 - 2) Board for Equipment Applications: None **OR** ASJ, **as directed**.
 16. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.
 - a. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed **0.19 Btu x in./h x sq. ft. x deg F (0.027 W/m x K)** at **75 deg F (24 deg C)** after 180 days of aging.
 - b. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less for thickness up to **1-1/2 inches (38 mm)** as tested by ASTM E 84.
 - c. Fabricate shapes according to ASTM C 450 and ASTM C 585.
 - d. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - 1) Pipe Applications: None **OR** ASJ **OR** ASJ-SSL **OR** PVDC **OR** PVDC-SSL, **as directed**.
 - 2) Equipment Applications: None **OR** ASJ **OR** ASJ-SSL **OR** PVDC **OR** PVDC-SSL, **as directed**.
 17. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
 18. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed **0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K)** after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.
- B. Insulating Cements
1. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
 2. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
 3. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.
- C. Adhesives
1. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
 2. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of **50 to 800 deg F (10 to 427 deg C)**.

- a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of **minus 75 to plus 300 deg F (minus 59 to plus 149 deg C)**.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of **minus 20 to plus 140 deg F (29 to plus 60 deg C)**.
7. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. PVC Jacket Adhesive: Compatible with PVC jacket.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Mastics

1. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 - a. For indoor applications, use mastics that have a VOC content of **Value g/L** as directed by the Owner when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM E 96, Procedure B, **0.013 perm (0.009 metric perm)** at **43-mil (1.09-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C)**.
 - c. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - d. Color: White.
3. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **0.05 perm (0.03 metric perm)** at **35-mil (0.9-mm)** dry film thickness.
 - b. Service Temperature Range: **0 to 180 deg F (Minus 18 to plus 82 deg C)**.
 - c. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 - d. Color: White.
4. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **0.05 perm (0.033 metric perm)** at **30-mil (0.8-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C)**.
 - c. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - d. Color: White.
5. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **3 perms (2 metric perms)** at **0.0625-inch (1.6-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 20 to plus 200 deg F (Minus 29 to plus 93 deg C)**.
 - c. Solids Content: 63 percent by volume and 73 percent by weight.
 - d. Color: White.

E. Lagging Adhesives

1. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.
 - a. For indoor applications, use lagging adhesives that have a VOC content of **Value g/L** as directed by the Owner when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over equipment and pipe insulation.
 - c. Service Temperature Range: **Minus 50 to plus 180 deg F (Minus 46 to plus 82 deg C)**.
 - d. Color: White.

- F. Sealants
 1. Joint Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Permanently flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C)**.
 - d. Color: White or gray.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. FSK and Metal Jacket Flashing Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C)**.
 - d. Color: Aluminum.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C)**.
 - d. Color: White.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

- G. Factory-Applied Jackets
 1. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - a. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - b. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - c. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 - d. PVDC Jacket for Indoor Applications: **4-mil- (0.10-mm-)** thick, white PVDC biaxially oriented barrier film with a permeance at **0.02 perms (0.013 metric perms)** when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 - e. PVDC Jacket for Outdoor Applications: **6-mil- (0.15-mm-)** thick, white PVDC biaxially oriented barrier film with a permeance at **0.01 perms (0.007 metric perms)** when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 - f. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

- H. Field-Applied Fabric-Reinforcing Mesh

1. Woven Glass-Fiber Fabric for Pipe Insulation: Approximately **2 oz./sq. yd. (68 g/sq. m)** with a thread count of **10 strands by 10 strands/sq. inch (4 strands by 4 strands/sq. mm)** for covering pipe and pipe fittings.
 2. Woven Glass-Fiber Fabric for Equipment Insulation: Approximately **6 oz./sq. yd. (203 g/sq. m)** with a thread count of **5 strands by 5 strands/sq. inch (2 strands by 2 strands/sq. mm)** for covering equipment.
 3. Woven Polyester Fabric: Approximately **1 oz./sq. yd. (34 g/sq. m)** with a thread count of **10 strands by 10 strands/sq. inch (4 strands by 4 strands/sq. mm)**, in a Leno weave, for equipment and pipe.
- I. Field-Applied Cloths
1. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and prescribed a minimum of **8 oz./sq. yd. (271 g/sq. m)**.
- J. Field-Applied Jackets
1. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
 2. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - a. Adhesive: As recommended by jacket material manufacturer.
 - b. Color: White **OR** Color-code jackets based on system. Color as selected by the Owner, **as directed**.
 - c. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - 1) Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 - d. Factory-fabricated tank heads and tank side panels.
 3. Metal Jacket:
 - a. Aluminum Jacket: Comply with **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 - 1) Sheet and roll stock ready for shop or field sizing **OR** Factory cut and rolled to size, **as directed**.
 - 2) Finish and thickness are indicated in field-applied jacket schedules.
 - 3) Moisture Barrier for Indoor Applications: **1-mil- (0.025-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 4) Moisture Barrier for Outdoor Applications: **3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 5) Factory-Fabricated Fitting Covers:
 - a) Same material, finish, and thickness as jacket.
 - b) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c) Tee covers.
 - d) Flange and union covers.
 - e) End caps.
 - f) Beveled collars.
 - g) Valve covers.
 - h) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
 - b. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - 1) Sheet and roll stock ready for shop or field sizing **OR** Factory cut and rolled to size, **as directed**.
 - 2) Material, finish, and thickness are indicated in field-applied jacket schedules.
 - 3) Moisture Barrier for Indoor Applications: **1-mil- (0.025-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.

- 4) Moisture Barrier for Outdoor Applications: **3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
- 5) Factory-Fabricated Fitting Covers:
 - a) Same material, finish, and thickness as jacket.
 - b) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c) Tee covers.
 - d) Flange and union covers.
 - e) End caps.
 - f) Beveled collars.
 - g) Valve covers.
 - h) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
4. Underground Direct-Buried Jacket: **125-mil- (3.2-mm-)** thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

K. Tapes

1. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - a. Width: **3 inches (75 mm)**.
 - b. Thickness: **11.5 mils (0.29 mm)**.
 - c. Adhesion: **90 ounces force/inch (1.0 N/mm)** in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: **40 lbf/inch (7.2 N/mm)** in width.
 - f. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
2. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - a. Width: **3 inches (75 mm)**.
 - b. Thickness: **6.5 mils (0.16 mm)**.
 - c. Adhesion: **90 ounces force/inch (1.0 N/mm)** in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: **40 lbf/inch (7.2 N/mm)** in width.
 - f. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
3. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 - a. Width: **2 inches (50 mm)**.
 - b. Thickness: **6 mils (0.15 mm)**.
 - c. Adhesion: **64 ounces force/inch (0.7 N/mm)** in width.
 - d. Elongation: 500 percent.
 - e. Tensile Strength: **18 lbf/inch (3.3 N/mm)** in width.
4. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 - a. Width: **2 inches (50 mm)**.
 - b. Thickness: **3.7 mils (0.093 mm)**.
 - c. Adhesion: **100 ounces force/inch (1.1 N/mm)** in width.
 - d. Elongation: 5 percent.
 - e. Tensile Strength: **34 lbf/inch (6.2 N/mm)** in width.
5. PVDC Tape: White vapor-retarder PVDC tape with acrylic adhesive.
 - a. Width: **3 inches (75 mm)**.
 - b. Film Thickness: **4 mils (0.10 mm) OR 6 mils (0.15 mm), as directed**.
 - c. Adhesive Thickness: **1.5 mils (0.04 mm)**.
 - d. Elongation at Break: 145 percent.
 - e. Tensile Strength: **55 lbf/inch (10.1 N/mm)** in width.

L. Securements

1. Bands:

- a. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 **OR** Type 316, **as directed**; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) **OR** 3/4 inch (19 mm), **as directed**, wide with wing seal **OR** closed seal, **as directed**.
 - b. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) **OR** 3/4 inch (19 mm), **as directed**, wide with wing seal **OR** closed seal, **as directed**.
 - c. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
2. Insulation Pins and Hangers:
- a. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- (2.6-mm-) **OR** 0.135-inch- (3.5-mm-), **as directed**, diameter shank, length to suit depth of insulation indicated.
 - b. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.106-inch- (2.6-mm-) **OR** 0.135-inch- (3.5-mm-), **as directed**, diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch (38-mm) galvanized carbon-steel washer.
 - c. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Perforated, galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
 - 2) Spindle: Copper- or zinc-coated, low carbon steel **OR** Aluminum **OR** Stainless steel, **as directed**, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
 - 3) Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 - d. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Perforated, nylon sheet, 0.030 inch (0.76 mm) thick by 1-1/2 inches (38 mm) in diameter.
 - 2) Spindle: Nylon, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated, up to 2-1/2 inches (63 mm).
 - 3) Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 - e. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Galvanized carbon-steel sheet, 0.030 inch (0.76 mm) thick by 2 inches (50 mm) square.
 - 2) Spindle: Copper- or zinc-coated, low carbon steel **OR** Aluminum **OR** Stainless steel, **as directed**, fully annealed, 0.106-inch- (2.6-mm-) diameter shank, length to suit depth of insulation indicated.
 - 3) Adhesive-backed base with a peel-off protective cover.
 - f. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- (0.41-mm-) thick, galvanized-steel **OR** aluminum **OR** stainless-steel, **as directed**, sheet, with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches (38 mm) in diameter.
 - 1) Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.

- g. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch (0.41-mm-)** thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than **1-1/2 inches (38 mm)** in diameter.
3. Staples: Outward-clinching insulation staples, nominal **3/4-inch- (19-mm-)** wide, stainless steel or Monel.
4. Wire: **0.080-inch (2.0-mm)** nickel-copper alloy **OR 0.062-inch (1.6-mm)** soft-annealed, stainless steel **OR 0.062-inch (1.6-mm)** soft-annealed, galvanized steel, **as directed**.

M. Corner Angles

1. PVC Corner Angles: **30 mils (0.8 mm)** thick, minimum **1 by 1 inch (25 by 25 mm)**, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.
2. Aluminum Corner Angles: **0.040 inch (1.0 mm)** thick, minimum **1 by 1 inch (25 by 25 mm)**, aluminum according to **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105 or 5005; Temper H-14.
3. Stainless-Steel Corner Angles: **0.024 inch (0.61 mm)** thick, minimum **1 by 1 inch (25 by 25 mm)**, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 **OR** Type 316, **as directed**.

1.3 EXECUTION

A. Preparation

1. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
OR
Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - a. Stainless Steel: Coat 300 series stainless steel with an epoxy primer **5 mils (0.127 mm)** thick and an epoxy finish **5 mils (0.127 mm)** thick if operating in a temperature range between **140 and 300 deg F (60 and 149 deg C)**. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - b. Carbon Steel: Coat carbon steel operating at a service temperature between **32 and 300 deg F (0 and 149 deg C)** with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
3. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

B. General Installation Requirements

1. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment and piping including fittings, valves, and specialties.
2. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment and pipe system as specified in insulation system schedules.
3. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
4. Install insulation with longitudinal seams at top and bottom of horizontal runs.
5. Install multiple layers of insulation with longitudinal and end seams staggered.
6. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
7. Keep insulation materials dry during application and finishing.
8. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
9. Install insulation with least number of joints practical.

10. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - a. Install insulation continuously through hangers and around anchor attachments.
 - b. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - c. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
 - d. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
11. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
12. Install insulation with factory-applied jackets as follows:
 - a. Draw jacket tight and smooth.
 - b. Cover circumferential joints with **3-inch- (75-mm-)** wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced **4 inches (100 mm)** o.c.
 - c. Overlap jacket longitudinal seams at least **1-1/2 inches (38 mm)**. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at **2 inches (50 mm) OR 4 inches (100 mm), as directed**, o.c.
 - 1) For below ambient services, apply vapor-barrier mastic over staples.
 - d. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - e. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.
13. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
14. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
15. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least **4 inches (100 mm)** beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
16. For above ambient services, do not install insulation to the following:
 - a. Vibration-control devices.
 - b. Testing agency labels and stamps.
 - c. Nameplates and data plates.
 - d. Manholes.
 - e. Handholes.
 - f. Cleanouts.

C. Penetrations

1. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - a. Seal penetrations with flashing sealant.
 - b. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - c. Extend jacket of outdoor insulation outside roof flashing at least **2 inches (50 mm)** below top of roof flashing.
 - d. Seal jacket to roof flashing with flashing sealant.
2. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

3. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - a. Seal penetrations with flashing sealant.
 - b. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - c. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least **2 inches (50 mm)**.
 - d. Seal jacket to wall flashing with flashing sealant.
 4. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
 5. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.
 - a. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
 6. Insulation Installation at Floor Penetrations:
 - a. Pipe: Install insulation continuously through floor penetrations.
 - b. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping".
- D. Equipment, Tank, And Vessel Insulation Installation
1. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.
 - a. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 **OR** 50, **as directed**, percent coverage of tank and vessel surfaces.
 - b. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
 - c. Protect exposed corners with secured corner angles.
 - d. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
 - 1) Do not weld anchor pins to ASME-labeled pressure vessels.
 - 2) Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
 - 3) On tanks and vessels, maximum anchor-pin spacing is **3 inches (75 mm)** from insulation end joints, and **16 inches (400 mm)** o.c. in both directions.
 - 4) Do not overcompress insulation during installation.
 - 5) Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
 - 6) Impale insulation over anchor pins and attach speed washers.
 - 7) Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 - e. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
 - f. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately **6 inches (150 mm)** from each end. Install wire or cable between two circumferential girdles **12 inches (300 mm)** o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of **48 inches (1200 mm)** o.c. Use this network for securing insulation with tie wire or bands.
 - g. Stagger joints between insulation layers at least **3 inches (75 mm)**.

- above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
- h. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
 - i. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
3. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
 4. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - a. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - b. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 - c. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 - d. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least **2 inches (50 mm)** over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - e. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.
- F. Calcium Silicate Insulation Installation
1. Insulation Installation on Domestic Water Boiler Breechings:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation material.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 - c. On exposed applications without metal jacket, finish insulation surface with a skim coat of mineral-fiber, hydraulic-setting cement. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth. Overlap edges at least **1 inch (25 mm)**. Apply finish coat of lagging adhesive over glass cloth. Thin finish coat to achieve smooth, uniform finish.
 2. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation materials.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 - c. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least **1 inch (25 mm)**. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.
 3. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.

- b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 - d. Finish flange insulation same as pipe insulation.
 4. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - b. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
 - c. Finish fittings insulation same as pipe insulation.
 5. Insulation Installation on Valves and Pipe Specialties:
 - a. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - b. Install insulation to flanges as specified for flange insulation application.
 - c. Finish valve and specialty insulation same as pipe insulation.
- G. Cellular-Glass Insulation Installation
 1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - c. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
 - d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least **1 inch (25 mm)**, and seal joints with flashing sealant.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - b. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of cellular-glass insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- H. Flexible Elastomeric Insulation Installation
 1. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Flanges:
 - a. Install pipe insulation to outer diameter of pipe flange.

- b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install mitered sections of pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - b. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
 - d. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- I. Mineral-Fiber Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - c. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 - d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least **1 inch (25 mm)**, and seal joints with flashing sealant.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 - c. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - d. Install insulation to flanges as specified for flange insulation application.

- J. Phenolic Insulation Installation
1. General Installation Requirements:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation materials.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with **0.062-inch (1.6-mm)** wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 2. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - c. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets with vapor retarders on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 3. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 4. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 5. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- K. Polyisocyanurate Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3 and 9 o'clock positions on the pipe.
 - b. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs but secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
 - c. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed **1-1/2-inch (38-mm)** thickness.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as pipe insulation.
 3. Insulation Installation on Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 4. Insulation Installation on Valves and Pipe Specialties:

- a. Install preformed sections of polyisocyanurate insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- L. Polyolefin Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Flanges:
 - a. Install pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install mitered sections of polyolefin pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install cut sections of polyolefin pipe and sheet insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
 - d. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- M. Polystyrene Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3 and 9 o'clock positions on the pipe.
 - b. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs but secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
 - c. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed **1-1/2-inch (38-mm)** thickness.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness as pipe insulation.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed section of polystyrene insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

- c. Install insulation to flanges as specified for flange insulation application.

N. Field-Applied Jacket Installation

1. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - a. Draw jacket smooth and tight to surface with **2-inch (50-mm)** overlap at seams and joints.
 - b. Embed glass cloth between two **0.062-inch- (1.6-mm-)** thick coats of lagging adhesive.
 - c. Completely encapsulate insulation with coating, leaving no exposed insulation.
2. Where FSK jackets are indicated, install as follows:
 - a. Draw jacket material smooth and tight.
 - b. Install lap or joint strips with same material as jacket.
 - c. Secure jacket to insulation with manufacturer's recommended adhesive.
 - d. Install jacket with **1-1/2-inch (38-mm)** laps at longitudinal seams and **3-inch- (75-mm-)** wide joint strips at end joints.
 - e. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
3. Where PVC jackets are indicated, install with **1-inch (25-mm)** overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 - a. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
4. Where metal jackets are indicated, install with **2-inch (50-mm)** overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands **12 inches (300 mm)** o.c. and at end joints.
5. Where PVDC jackets are indicated, install as follows:
 - a. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
 - b. Wrap factory-presize jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presize jacket with an approximate overlap at butt joint of **2 inches (50 mm)** over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
 - c. Continuous jacket can be spiral wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
 - d. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of **33-1/2 inches (850 mm)** or less. The **33-1/2-inch- (850-mm-)** circumference limit allows for **2-inch- (50-mm-)** overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
 - e. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.

O. Finishes

1. Equipment and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 07.
 - a. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - 1) Finish Coat Material: Interior, flat, latex-emulsion size.
2. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

3. Color: Final color as selected by the Owner. Vary first and second coats to allow visual inspection of the completed Work.
4. Do not field paint aluminum or stainless-steel jackets.

P. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Inspect field-insulated equipment, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
 - b. Inspect pipe, fittings, strainers, and valves, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.
3. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

Q. Domestic Water Boiler Breeching Insulation Schedule

1. Round, exposed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
2. Round, concealed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
3. Rectangular, exposed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
4. Rectangular, concealed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.

R. Equipment Insulation Schedule

1. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
2. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
3. Heat-exchanger (water-to-water for domestic water heating service) insulation shall be one of the following:
 - a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.

- c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
4. Steam-to-hot-water converter insulation shall be one of the following:
 - a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
5. Domestic water pump insulation shall be one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1 inch (25 mm)** thick.
 - d. Polyisocyanurate: **1 inch (25 mm)** thick.
6. Domestic chilled-water (potable) pump insulation shall be one of the following:
 - a. Cellular Glass: **3 inches (75 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1 inch (25 mm)** thick.
 - d. Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
7. Domestic hot-water pump insulation shall be one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1 inch (25 mm)** thick.
 - d. Polyisocyanurate: **1 inch (25 mm)** thick.
8. Domestic water, domestic chilled-water (potable), and domestic hot-water hydropneumatic tank insulation shall be one of the following:
 - a. Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
9. Domestic hot-water storage tank insulation shall be one of the following, of thickness to provide an R-value of 12.5:
 - a. Cellular glass.
 - b. Mineral-Fiber Board: **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Mineral-fiber pipe and tank.
 - d. Phenolic.
10. Domestic water storage tank insulation shall be one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
11. Domestic chilled-water (potable) storage tank insulation shall be one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.

- b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
12. Piping system filter-housing insulation shall be one of the following:
- a. Cellular Glass: **3 inches (75 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
- S. Piping Insulation Schedule, General
- 1. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
 - 2. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - a. Drainage piping located in crawl spaces.
 - b. Underground piping.
 - c. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- T. Indoor Piping Insulation Schedule
- 1. Domestic Cold Water:
 - a. **NPS 1 (DN 25)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1/2 inch (13 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.
 - 6) Polyolefin: **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - b. **NPS 1-1/4 (DN 32)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch (25 mm)** thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.
 - 6) Polyolefin: **1 inch (25 mm)** thick.
 - 2. Domestic Hot and Recirculated Hot Water:
 - a. **NPS 1-1/4 (DN 32)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1/2 inch (13 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.
 - 6) Polyolefin: **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - b. **NPS 1-1/2 (DN 40)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch (25 mm)** thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.

- 6) Polyolefin: 1 inch (25 mm) thick.
3. Domestic Chilled Water (Potable):
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: 1-1/2 inches (38 mm) thick.
 - 2) Flexible Elastomeric: 1 inch (25 mm) thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
 - 4) Phenolic: 1 inch (25 mm) thick.
 - 5) Polyisocyanurate: 1 inch (25 mm) thick.
 - 6) Polyolefin: 1 inch (25 mm) thick.
4. Stormwater and Overflow:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: 1-1/2 inches (38 mm) thick.
 - 2) Flexible Elastomeric: 1 inch (25 mm) thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
 - 4) Phenolic: 1 inch (25 mm) thick.
 - 5) Polyisocyanurate: 1 inch (25 mm) thick.
 - 6) Polyolefin: 1 inch (25 mm) thick.
5. Roof Drain and Overflow Drain Bodies:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: 1-1/2 inches (38 mm) thick.
 - 2) Flexible Elastomeric: 1 inch (25 mm) thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
 - 4) Phenolic: 1 inch (25 mm) thick.
 - 5) Polyisocyanurate: 1 inch (25 mm) thick.
 - 6) Polyolefin: 1 inch (25 mm) thick.
6. Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Flexible Elastomeric: 1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm), as directed, thick.
 - 2) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) OR 1 inch (25 mm) thick.
 - 3) Polyolefin: 1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm) thick.
7. Sanitary Waste Piping Where Heat Tracing Is Installed:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: 2 inches (50 mm) thick.
 - 2) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inches (38 mm) thick.
 - 3) Phenolic: 1-1/2 inches (38 mm) thick.
 - 4) Polyisocyanurate: 1-1/2 inches (38 mm) thick.
8. Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: 1-1/2 inches (38 mm) thick.
 - 2) Flexible Elastomeric: 3/4 inch (19 mm) OR 1 inch (25 mm), as directed, thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) OR 1 inch (25 mm), as directed, thick.
 - 4) Phenolic: 1 inch (25 mm) thick.
 - 5) Polyisocyanurate: 1 inch (25 mm) thick.
 - 6) Polyolefin: 3/4 inch (19 mm) OR 1 inch (25 mm), as directed, thick.
9. Floor Drains, Traps, and Sanitary Drain Piping within 10 Feet (3 m) of Drain Receiving Condensate and Equipment Drain Water below 60 Deg F (16 Deg C):
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: 1-1/2 inches (38 mm) thick.
 - 2) Flexible Elastomeric: 3/4 inch (19 mm) OR 1 inch (25 mm), as directed, thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) OR 1 inch (25 mm), as directed, thick.

- 4) Phenolic: **1 inch (25 mm)** thick.
- 5) Polyisocyanurate: **1 inch (25 mm)** thick.
- 6) Polyolefin: **3/4 inch (19 mm) OR 1 inch (25 mm), as directed**, thick.
- 10. Hot Service Drains:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1 inch (25 mm)** thick.
- 11. Hot Service Vents:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1 inch (25 mm)** thick.
- U. Outdoor, Aboveground Piping Insulation Schedule
 - 1. Domestic Water Piping:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **2 inches (50 mm)** thick.
 - 7) Polystyrene: **2 inches (50 mm)** thick.
 - 2. Domestic Hot and Recirculated Hot Water:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **2 inches (50 mm)** thick.
 - 3. Sanitary Waste Piping Where Heat Tracing Is Installed:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 3) Phenolic: **2 inches (50 mm)** thick.
 - 4) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 4. Hot Service Drains:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch (25 mm)** thick.
 - 5. Hot Service Vents:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type II: **1 inch (25 mm)** thick.
- V. Outdoor, Underground Piping Insulation Schedule
 - 1. Loose-fill insulation, for belowground piping, is specified in Division 28.
 - 2. Sanitary Waste Piping, All Sizes, Where Heat Tracing Is Installed: Cellular glass, **2 inches (50 mm)** thick.
 - 3. Chilled Water, All Sizes: Cellular glass, **2 inches (50 mm)** thick.
- W. Indoor, Field-Applied Jacket Schedule

1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
2. If more than one material is listed, selection from materials listed is Contractor's option.
3. Equipment, Concealed:
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - d. Painted Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.
 - e. Stainless Steel, Type 304 OR Type 316, as directed, Smooth 2B Finish OR Corrugated OR Stucco Embossed, as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
4. Equipment, Exposed, up to 48 Inches (1200 mm) in Diameter or with Flat Surfaces up to 72 Inches (1800 mm):
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - d. Painted Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.
 - e. Stainless Steel, Type 304 OR Type 316, as directed, Smooth 2B Finish OR Corrugated OR Stucco Embossed, as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
5. Equipment, Exposed, Larger Than 48 Inches (1200 mm) in Diameter or with Flat Surfaces Larger Than 72 Inches (1800 mm):
 - a. None.
 - b. Aluminum OR Painted Aluminum, as directed, Smooth OR Stucco Embossed, as directed, with 1-1/4-Inch- (32-mm-) Deep Corrugations OR 2-1/2-Inch- (65-mm-) Deep Corrugations OR 4-by-1-Inch (100-by-25-mm) Box Ribs, as directed: 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - c. Stainless Steel, Type 304 OR Type 316, as directed, Smooth OR Stucco Embossed, as directed, with 1-1/4-Inch- (32-mm-) Deep Corrugations OR 2-1/2-Inch- (65-mm-) Deep Corrugations OR 4-by-1-Inch (100-by-25-mm) Box Ribs, as directed: 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
6. Piping, Concealed:
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - d. Painted Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.
 - e. Stainless Steel, Type 304 OR Type 316, as directed, Smooth 2B Finish OR Corrugated OR Stucco Embossed, as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
7. Piping, Exposed:

- a. None.
 - b. PVC OR PVC, Color-Coded by System, **as directed**: 20 mils (0.5 mm) OR 30 mils (0.8 mm), **as directed**, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), **as directed**, thick.
 - d. Aluminum OR Painted Aluminum, **as directed**, Smooth OR Corrugated OR Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), **as directed**, thick.
 - e. Stainless Steel, Type 304 OR Type 316, **as directed**, Smooth 2B Finish OR Corrugated OR Stucco Embossed, **as directed**: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), **as directed**, thick.
- X. Outdoor, Field-Applied Jacket Schedule
1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
 2. If more than one material is listed, selection from materials listed is Contractor's option.
 3. Equipment, Concealed:
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, **as directed**: 20 mils (0.5 mm) OR 30 mils (0.8 mm), **as directed**, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), **as directed**, thick.
 - d. Aluminum OR Painted Aluminum, **as directed**, Smooth OR Corrugated OR Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), **as directed**, thick.
 - e. Stainless Steel, Type 304 OR Type 316, **as directed**, Smooth 2B Finish OR Corrugated OR Stucco Embossed, **as directed**: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), **as directed**, thick.
 4. Equipment, Exposed, up to 48 Inches (1200 mm) in Diameter or with Flat Surfaces up to 72 Inches (1800 mm):
 - a. Aluminum OR Painted Aluminum, **as directed**, Smooth OR Corrugated OR Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), **as directed**, thick.
 - b. Stainless Steel, Type 304 OR Type 316, **as directed**, Smooth 2B Finish OR Corrugated OR Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), **as directed**, thick.
 5. Equipment, Exposed, Larger Than 48 Inches (1200 mm) in Diameter or with Flat Surfaces Larger Than 72 Inches (1800 mm):
 - a. Aluminum OR Painted Aluminum, **as directed**, Smooth OR Stucco Embossed, **as directed** with 1-1/4-Inch- (32-mm-) Deep Corrugations OR 2-1/2-Inch- (65-mm-) Deep Corrugations OR 4-by-1-Inch (100-by-25-mm) Box Ribs, **as directed**: 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), **as directed**, thick.
 - b. Stainless Steel, Type 304 OR Type 316, **as directed**, Smooth OR Stucco Embossed, **as directed**, with 1-1/4-Inch- (32-mm-) Deep Corrugations OR 2-1/2-Inch- (65-mm-) Deep Corrugations OR 4-by-1-Inch (100-by-25-mm) Box Ribs, **as directed**: 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), **as directed**, thick.
 6. Piping, Concealed:
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, **as directed**: 20 mils (0.5 mm) OR 30 mils (0.8 mm), **as directed**, thick.

- c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm) **OR** 0.040 inch (1.0 mm), **as directed**, thick.
 - d. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm), **as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: 0.010 inch (0.25 mm) **OR** 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm), **as directed**, thick.
7. Piping, Exposed:
- a. PVC: 20 mils (0.5 mm) **OR** 30 mils (0.8 mm) **OR** 40 mils (1.0 mm), **as directed**, thick.
 - b. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm) **OR** 0.032 inch (0.81 mm) **OR** 0.040 inch (1.0 mm), **as directed**, thick.
 - c. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: 0.010 inch (0.25 mm) **OR** 0.016 inch (0.41 mm) **OR** 0.020 inch (0.51 mm) **OR** 0.024 inch (0.61 mm), **as directed**, thick.
- Y. Underground, Field-Installed Insulation Jacket
- 1. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 22 07 19 00

Task	Specification	Specification Description
22 07 19 00	21 07 00 00	Fire-Suppression Systems Insulation

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SECTION 22 11 16 00 - DOMESTIC WATER PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for domestic water piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
 - b. Encasement for piping.
 - c. Specialty valves.
 - d. Flexible connectors.
 - e. Water meters furnished by utility company for installation by Contractor.
OR
Water meters.
 - f. Escutcheons.
 - g. Sleeves and sleeve seals.
 - h. Wall penetration systems.

C. Performance Requirements

1. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
3. Field quality-control reports.

E. Quality Assurance

1. Piping materials shall bear label, stamp, or other markings of specified testing agency.
2. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping, **as directed**.
3. Comply with NSF 61 for potable domestic water piping and components.

F. Project Conditions

1. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of water service.
 - b. Do not proceed with interruption of water service without the Owner's written permission.

1.2 PRODUCTS

A. Piping Materials

1. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

B. Copper Tube And Fittings

1. Hard Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)** water tube, drawn temper.
 - a. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.
 - b. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - c. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.
 - d. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
 - e. Copper Pressure-Seal-Joint Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.
 - f. Copper Push-on-Joint Fittings:
 - 1) Description: Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22; with stainless-steel teeth and EPDM-rubber O-ring seal in each end instead of solder-joint ends.
 - g. Copper-Tube Extruded-Tee Connections:
 - 1) Description: Tee formed in copper tube according to ASTM F 2014.
 - h. Grooved-Joint Copper-Tube Appurtenances:
 - 1) Copper Grooved-End Fittings: **ASTM B 75 (ASTM B 75M)** copper tube or ASTM B 584 bronze castings.
 - 2) Grooved-End-Tube Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.
2. Soft Copper Tube: **ASTM B 88, Type K (ASTM B 88M, Type A)** and **ASTM B 88, Type L (ASTM B 88M, Type B)** water tube, annealed temper.
 - a. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.
 - b. Copper Pressure-Seal-Joint Fittings:
 - 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
 - 2) **NPS 3 and NPS 4 (DN 80 and DN 100)**: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.

C. Ductile-Iron Pipe And Fittings

1. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - a. Standard-Pattern, Mechanical-Joint Fittings: AWWA C110, ductile or gray iron.
 - b. Compact-Pattern, Mechanical-Joint Fittings: AWWA C153, ductile iron.
 - 1) Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
2. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - a. Standard-Pattern, Push-on-Joint Fittings: AWWA C110, ductile or gray iron.
 - 1) Gaskets: AWWA C111, rubber.
 - b. Compact-Pattern, Push-on-Joint Fittings: AWWA C153, ductile iron.
 - 1) Gaskets: AWWA C111, rubber.
3. Plain-End, Ductile-Iron Pipe: AWWA C151.
 - a. Grooved-Joint, Ductile-Iron-Pipe Appurtenances:
 - 1) Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.

- 2) Grooved-End, Ductile-Iron-Pipe Couplings: AWWA C606 for ductile-iron-pipe dimensions. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.
- D. Galvanized-Steel Pipe And Fittings
1. Galvanized-Steel Pipe: ASTM A 53/A 53M, Type E, Grade B, Standard Weight. Include ends matching joining method.
 - a. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless steel pipe with threaded ends.
 - b. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
 - c. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
 - d. Flanges: ASME B16.1, Class 125, cast iron.
 - e. Grooved-Joint, Galvanized-Steel-Pipe Appurtenances:
 - 1) Galvanized, Grooved-End Fittings for Galvanized-Steel Piping: ASTM A 47/A 47M, malleable-iron casting; ASTM A 106/A 106M, steel pipe; or ASTM A 536, ductile-iron casting; with dimensions matching steel pipe.
 - 2) Grooved-End-Pipe Couplings for Galvanized-Steel Piping: AWWA C606 for steel-pipe dimensions. Include ferrous housing sections, EPDM-rubber gaskets suitable for hot and cold water, and bolts and nuts.
- E. CPVC Piping
1. CPVC Pipe: ASTM F 441/F 441M, Schedule 40 and Schedule 80.
 - a. CPVC Socket Fittings: ASTM F 438 for Schedule 40 and ASTM F 439 for Schedule 80.
 - b. CPVC Threaded Fittings: ASTM F 437, Schedule 80.
 2. CPVC Piping System: ASTM D 2846/D 2846M, SDR 11, pipe and socket fittings.
 3. CPVC Tubing System: ASTM D 2846/D 2846M, SDR 11, tube and socket fittings.
- F. PEX Tube And Fittings
1. PEX Distribution System: ASTM F 877, SDR 9 tubing.
 - a. Fittings for PEX Tube: ASTM F 1807, metal-insert type with copper or stainless-steel crimp rings and matching PEX tube dimensions.
 - b. Manifold: Multiple-outlet, plastic or corrosion-resistant-metal assembly complying with ASTM F 877; with plastic or corrosion-resistant-metal valve for each outlet.
- G. PVC Pipe And Fittings
1. PVC Pipe: ASTM D 1785, Schedule 40 and Schedule 80.
 - a. PVC Socket Fittings: ASTM D 2466 for Schedule 40 and ASTM D 2467 for Schedule 80.
 - b. PVC Schedule 80 Threaded Fittings: ASTM D 2464.
- H. Piping Joining Materials
1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free, unless otherwise indicated; full-face or ring type unless otherwise indicated.
 2. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
 3. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 4. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
 5. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.
 - a. Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 6. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

- a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 7. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.
- I. Encasement For Piping
1. Standard: ASTM A 674 or AWWA C105.
 2. Form: Sheet **OR** Tube, **as directed**.
 3. Material: LLDPE film of **0.008-inch (0.20-mm)** **OR** LLDPE film of **0.008-inch (0.20-mm)** minimum thickness or high-density, cross-laminated PE film of **0.004-inch (0.10-mm)** **OR** High-density, cross-laminated PE film of **0.004-inch (0.10-mm)**, **as directed**, minimum thickness.
 4. Color: Black **OR** Natural, **as directed**.
- J. Specialty Valves
1. Comply with requirements in Division 22 Section "General-duty Valves For Plumbing Piping" for general-duty metal valves.
 2. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves, drain valves, backflow preventers, and vacuum breakers.
 3. CPVC Union Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-122.
 - 2) Pressure Rating: **125 psig (860 kPa)** **OR** **150 psig (1035 kPa)**, **as directed**, at **73 deg F (23 deg C)**.
 - 3) Body Material: CPVC.
 - 4) Body Design: Union type.
 - 5) End Connections for Valves **NPS 2 (DN 50)** and Smaller: Detachable, socket **OR** threaded, **as directed**.
 - 6) End Connections for Valves **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Detachable, socket **OR** threaded **OR** flanged, **as directed**.
 - 7) Ball: CPVC; full port.
 - 8) Seals: PTFE or EPDM-rubber O-rings.
 - 9) Handle: Tee shaped.
 4. PVC Union Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-122.
 - 2) Pressure Rating: **125 psig (860 kPa)** **OR** **150 psig (1035 kPa)**, **as directed**, at **73 deg F (23 deg C)**.
 - 3) Body Material: PVC.
 - 4) Body Design: Union type.
 - 5) End Connections for Valves **NPS 2 (DN 50)** and Smaller: Detachable, socket **OR** threaded, **as directed**.
 - 6) End Connections for Valves **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Detachable, socket **OR** threaded **OR** flanged, **as directed**.
 - 7) Ball: PVC; full port.
 - 8) Seals: PTFE or EPDM-rubber O-rings.
 - 9) Handle: Tee shaped.
 5. CPVC Non-Union Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-122.
 - 2) Pressure Rating: **125 psig (860 kPa)** **OR** **150 psig (1035 kPa)**, **as directed**, at **73 deg F (23 deg C)**.
 - 3) Body Material: CPVC.
 - 4) Body Design: Non-union type.

- 5) End Connections: Socket or threaded.
 - 6) Ball: CPVC; full or reduced port.
 - 7) Seals: PTFE or EPDM-rubber O-rings.
 - 8) Handle: Tee shaped.
6. PVC Non-Union Ball Valves:
- a. Description:
 - 1) Standard: MSS SP-122.
 - 2) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed, at 73 deg F (23 deg C).**
 - 3) Body Material: PVC.
 - 4) Body Design: Non-union type.
 - 5) End Connections: Socket or threaded.
 - 6) Ball: PVC; full or reduced port.
 - 7) Seals: PTFE or EPDM-rubber O-rings.
 - 8) Handle: Tee shaped.
7. CPVC Butterfly Valves:
- a. Description:
 - 1) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed, at 73 deg F (23 deg C).**
 - 2) Body Material: CPVC.
 - 3) Body Design: Lug or wafer type.
 - 4) Seat: EPDM rubber.
 - 5) Seals: PTFE or EPDM-rubber O-rings.
 - 6) Disc: CPVC.
 - 7) Stem: Stainless steel.
 - 8) Handle: Lever.
8. PVC Butterfly Valves:
- a. Description:
 - 1) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed, at 73 deg F (23 deg C).**
 - 2) Body Material: PVC.
 - 3) Body Design: Lug or wafer type.
 - 4) Seat: EPDM rubber.
 - 5) Seals: PTFE or EPDM-rubber O-rings.
 - 6) Disc: PVC.
 - 7) Stem: Stainless steel.
 - 8) Handle: Lever.
9. CPVC Ball Check Valves:
- a. Description:
 - 1) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed, at 73 deg F (23 deg C).**
 - 2) Body Material: CPVC.
 - 3) Body Design: Union-type ball check.
 - 4) End Connections for Valves **NPS 2 (DN 50)** and Smaller: Detachable, socket **OR** threaded, **as directed.**
 - 5) End Connections for Valves **NPS 2-1/2 to NPS 4 (DN 65 to DN 100):** Detachable, socket **OR** threaded **OR** flanged, **as directed.**
 - 6) Ball: CPVC.
 - 7) Seals: EPDM- or FKM-rubber O-rings.
10. PVC Ball Check Valves:
- a. Description:
 - 1) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed, at 73 deg F (23 deg C).**
 - 2) Body Material: PVC.
 - 3) Body Design: Union-type ball check.

- 4) End Connections for Valves **NPS 2 (DN 50)** and Smaller: Detachable, socket **OR** threaded, **as directed**.
 - 5) End Connections for Valves **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Detachable, socket **OR** threaded **OR** flanged, **as directed**.
 - 6) Ball: PVC.
 - 7) Seals: EPDM- or FKM-rubber O-rings.
11. CPVC Gate Valves:
- a. Description:
 - 1) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, at **73 deg F (23 deg C)**.
 - 2) Body Material: CPVC.
 - 3) Body Design: Nonrising stem.
 - 4) End Connections for Valves **NPS 2 (DN 50)** and Smaller: Socket **OR** Threaded, **as directed**.
 - 5) End Connections for Valves **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Socket **OR** Threaded **OR** Flanged, **as directed**.
 - 6) Gate and Stem: Plastic.
 - 7) Seals: EPDM rubber.
 - 8) Handle: Wheel.
12. PVC Gate Valves:
- a. Description:
 - 1) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, at **73 deg F (23 deg C)**.
 - 2) Body Material: PVC.
 - 3) Body Design: Nonrising stem.
 - 4) End Connections for Valves **NPS 2 (DN 50)** and Smaller: Socket **OR** Threaded, **as directed**.
 - 5) End Connections for Valves **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Socket **OR** Threaded **OR** Flanged, **as directed**.
 - 6) Gate and Stem: Plastic.
 - 7) Seals: EPDM rubber.
 - 8) Handle: Wheel.
- K. Transition Fittings
1. General Requirements:
 - a. Same size as pipes to be joined.
 - b. Pressure rating at least equal to pipes to be joined.
 - c. End connections compatible with pipes to be joined.
 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 3. Sleeve-Type Transition Coupling: AWWA C219.
 4. Plastic-to-Metal Transition Fittings:
 - a. Description: CPVC **OR** PVC, **as directed**, one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket threaded, **as directed**, end.
 5. Plastic-to-Metal Transition Unions:
 - a. Description: CPVC **OR** PVC, **as directed**, four-part union. Include brass or stainless-steel, **as directed**, threaded end, solvent-cement-joint or threaded, **as directed**, plastic end, rubber O-ring, and union nut.
- L. Dielectric Fittings
1. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
 2. Dielectric Unions:

- a. Description:
 - 1) Pressure Rating: **150 psig (1035 kPa) OR 250 psig (1725 kPa), as directed**, at **180 deg F (82 deg C)**.
 - 2) End Connections: Solder-joint copper alloy and threaded ferrous.
 3. Dielectric Flanges:
 - a. Description:
 - 1) Factory-fabricated, bolted, companion-flange assembly.
 - 2) Pressure Rating: **150 psig (1035 kPa) OR 175 psig (1200 kPa) minimum OR 300 psig (2070 kPa), as directed**.
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
 4. Dielectric-Flange Kits:
 - a. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Gasket: Neoprene or phenolic.
 - 4) Bolt Sleeves: Phenolic or polyethylene.
 - 5) Washers: Phenolic with steel backing washers.
 5. Dielectric Couplings:
 - a. Description:
 - 1) Galvanized-steel coupling.
 - 2) Pressure Rating: **300 psig (2070 kPa) at 225 deg F (107 deg C)**.
 - 3) End Connections: Female threaded.
 - 4) Lining: Inert and noncorrosive, thermoplastic.
 6. Dielectric Nipples:
 - a. Description:
 - 1) Electroplated steel nipple complying with ASTM F 1545.
 - 2) Pressure Rating: **300 psig (2070 kPa) at 225 deg F (107 deg C)**.
 - 3) End Connections: Male threaded or grooved.
 - 4) Lining: Inert and noncorrosive, propylene.
- M. Flexible Connectors
1. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - a. Working-Pressure Rating: Minimum **200 psig (1380 kPa) OR 250 psig (1725 kPa), as directed**.
 - b. End Connections **NPS 2 (DN 50)** and Smaller: Threaded copper pipe or plain-end copper tube.
 - c. End Connections **NPS 2-1/2 (DN 65)** and Larger: Flanged copper alloy.
 2. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
 - a. Working-Pressure Rating: Minimum **200 psig (1380 kPa) OR 250 psig (1725 kPa), as directed**.
 - b. End Connections **NPS 2 (DN 50)** and Smaller: Threaded steel-pipe nipple.
 - c. End Connections **NPS 2-1/2 (DN 65)** and Larger: Flanged steel nipple.
- N. Water Meters
1. Displacement-Type Water Meters:
 - a. Description:
 - 1) Standard: AWWA C700.
 - 2) Pressure Rating: **150-psig (1035-kPa)** working pressure.
 - 3) Body Design: Nutating disc; totalization meter.
 - 4) Registration: In **gallons (liters)** or **cubic feet (cubic meters)** as required by utility.
 - 5) Case: Bronze.
 - 6) End Connections: Threaded.
 2. Turbine-Type Water Meters:

- a. Description:
 - 1) Standard: AWWA C701.
 - 2) Pressure Rating: 150-psig (1035-kPa) working pressure.
 - 3) Body Design: Turbine; totalization meter.
 - 4) Registration: In gallons (liters) or cubic feet (cubic meters) as required by utility company.
 - 5) Case: Bronze.
 - 6) End Connections for Meters NPS 2 (DN 50) and Smaller: Threaded.
 - 7) End Connections for Meters NPS 2-1/2 (DN 65) and Larger: Flanged.
 3. Compound-Type Water Meters:
 - a. Description:
 - 1) Standard: AWWA C702.
 - 2) Pressure Rating: 150-psig (1035-kPa) working pressure.
 - 3) Body Design: With integral mainline and bypass meters; totalization meter.
 - 4) Registration: In gallons (liters) or cubic feet (cubic meters) as required by utility company.
 - 5) Case: Bronze.
 - 6) Pipe Connections: Flanged.
 4. Fire-Service-Type Water Meters:
 - a. Description:
 - 1) Standard: AWWA C703 and UL listing.
 - 2) Pressure Rating: 175-psig (1200-kPa) working pressure.
 - 3) Body Design:
 - a) Proportional, Detector-Type Water Meters: With meter on bypass.
 - i. Bypass Meter: AWWA C701, turbine **OR** AWWA C702, compound, **as directed**, type with bronze case; size not less than one-half nominal size of main-line meter.
 - b) Turbine-Type Water Meters: With strainer, and with meter on bypass.
 - i. Strainer: Full size, matching water meter.
 - ii. Bypass Meter: AWWA C701, turbine type with bronze case; not less than NPS 2 (DN 50).
 - 4) Registration: In gallons (liters) or cubic feet (cubic meters) as required by utility company.
 - 5) Case: Bronze.
 - 6) Pipe Connections for Meters NPS 2 (DN 50) and Smaller: Threaded.
 - 7) Pipe Connections for Meters NPS 2-1/2 (DN 65) and Larger: Flanged.
 5. Remote Registration System: Direct-reading type complying with AWWA C706; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
OR
Remote Registration System: Encoder type complying with AWWA C707; modified with signal transmitting assembly, low-voltage connecting wiring, and remote register assembly as required by utility company.
- O. Escutcheons
1. General: Manufactured ceiling, floor, and wall escutcheons and floor plates.
 2. One Piece, Cast Brass: Polished, chrome-plated **OR** rough-brass, **as directed**, finish with setscrews.
 3. One Piece, Deep Pattern: Deep-drawn, box-shaped brass with chrome-plated finish.
 4. One Piece, Stamped Steel: Chrome-plated finish with setscrew **OR** spring clips, **as directed**.
 5. Split Casting, Cast Brass: Polished, chrome-plated **OR** rough-brass, **as directed**, finish with concealed hinge and setscrew.
 6. Split Plate, Stamped Steel: Chrome-plated finish with concealed **OR** exposed-rivet, **as directed**, hinge, setscrew **OR** spring clips, **as directed**.
 7. One-Piece Floor Plates: Cast-iron flange with holes for fasteners, **as directed**.

8. Split-Casting Floor Plates: Cast brass with concealed hinge.

P. Sleeves

1. Cast-Iron Wall Pipes: Fabricated of cast iron, and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
2. Galvanized-Steel-Sheet Sleeves: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
3. Molded-PE Sleeves: Reusable, PE, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.
4. Molded-PVC Sleeves: Permanent, with nailing flange for attaching to wooden forms.
5. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
6. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, with plain ends.
7. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with setscrews.

Q. Sleeve Seals

1. Description: Modular sealing element unit, designed for field assembly, used to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM-rubber **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Carbon steel **OR** Plastic **OR** Stainless steel, **as directed**.
 - c. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements.

R. Wall Penetration Systems

1. Description: Wall-sleeve assembly, consisting of housing and gland, gaskets, and pipe sleeve.
 - a. Carrier-Pipe Deflection: Up to 5 percent without leakage.
 - b. Housing: Ductile-iron casting with hub, waterstop, anchor ring, and locking devices. Include gland, bolts, and nuts.
 - c. Housing-to-Sleeve Gasket: EPDM rubber **OR** NBR, **as directed**.
 - d. Housing-to-Carrier-Pipe Gasket: AWWA C111, EPDM rubber **OR** NBR, **as directed**.
 - e. Pipe Sleeve: AWWA C151, ductile-iron pipe **OR** ASTM A 53/A 53M, Schedule 40, zinc-coated steel pipe, **as directed**.

S. Grout

1. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink; recommended for interior and exterior applications.
3. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Earthwork

1. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

B. Piping Installation

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

3. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.
4. Install underground copper tube and ductile-iron pipe in PE encasement according to ASTM A 674 or AWWA C105.
5. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters And Gages For Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.
6. Install shutoff valve immediately upstream of each dielectric fitting.
7. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.
8. Install domestic water piping level with 0.25 percent slope downward toward drain **OR** without pitch, **as directed**, and plumb.
9. Rough-in domestic water piping for water-meter installation according to utility company's requirements.
10. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment" for seismic-restraint devices.
11. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.
12. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
13. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.
14. Install piping adjacent to equipment and specialties to allow service and maintenance.
15. Install piping to permit valve servicing.
16. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.
17. Install piping free of sags and bends.
18. Install fittings for changes in direction and branch connections.
19. Install PEX piping with loop at each change of direction of more than 90 degrees.
20. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.
21. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters And Gages For Plumbing Piping" for pressure gages.
22. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.
23. Install thermometers on inlet **OR** inlet and outlet, **as directed**, piping from each water heater. Comply with requirements in Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.

C. Joint Construction

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.
3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
4. Brazed Joints: Join copper tube and fittings according to CDA's "Copper Tube Handbook," "Braze Joints" Chapter.

5. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."
 6. Pressure-Sealed Joints: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.
 7. Copper-Tubing, Push-on Joints: Clean end of tube. Measure insertion depth with manufacturer's depth gage. Join copper tube and push-on-joint fittings by inserting tube to measured depth.
 8. Extruded-Tee Connections: Form tee in copper tube according to ASTM F 2014. Use tool designed for copper tube; drill pilot hole, form collar for outlet, dimple tube to form seating stop, and braze branch tube into collar.
 9. Copper-Tubing Grooved Joints: Roll groove end of tube. Assemble coupling with housing, gasket, lubricant, and bolts. Join copper tube and grooved-end fittings according to AWWA C606 for roll-grooved joints.
 10. Ductile-Iron-Piping Grooved Joints: Cut groove end of pipe. Assemble coupling with housing, gasket, lubricant, and bolts. Join ductile-iron pipe and grooved-end fittings according to AWWA C606 for ductile-iron-pipe, cut-grooved joints.
 11. Steel-Piping Grooved Joints: Cut **OR** Roll, **as directed**, groove end of pipe. Assemble coupling with housing, gasket, lubricant, and bolts. Join steel pipe and grooved-end fittings according to AWWA C606 for steel-pipe grooved joints.
 12. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.
 13. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.
 - b. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - c. PVC Piping: Join according to ASTM D 2855.
 14. PEX Piping Joints: Join according to ASTM F 1807.
 15. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.
- D. Valve Installation
1. General-Duty Valves: Comply with requirements in Division 22 Section "General-duty Valves For Plumbing Piping" for valve installations.
 2. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping **NPS 2 (DN 50)** and smaller. Use butterfly or gate valves for piping **NPS 2-1/2 (DN 65)** and larger.
 3. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties".
 - a. Hose-End Drain Valves: At low points in water mains, risers, and branches.
 - b. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.
 4. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping **NPS 2 (DN 50)** and smaller and butterfly valves for piping **NPS 2-1/2 (DN 65)** and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.
 5. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.
- E. Transition Fitting Installation
1. Install transition couplings at joints of dissimilar piping.
 2. Transition Fittings in Underground Domestic Water Piping:

- a. **NPS 1-1/2 (DN 40)** and Smaller: Fitting-type coupling.
 - b. **NPS 2 (DN 50)** and Larger: Sleeve-type coupling.
 3. Transition Fittings in Aboveground Domestic Water Piping **NPS 2 (DN 50)** and Smaller: Plastic-to-metal transition fittings **OR** unions, **as directed**.
- F. Dielectric Fitting Installation
1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 2. Dielectric Fittings for **NPS 2 (DN 50)** and Smaller: Use dielectric couplings **OR** nipples **OR** unions, **as directed**.
 3. Dielectric Fittings for **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Use dielectric flanges **OR** flange kits **OR** nipples, **as directed**.
 4. Dielectric Fittings for **NPS 5 (DN 125)** and Larger: Use dielectric flange kits.
- G. Flexible Connector Installation
1. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump, **as directed**.
 2. Install bronze-hose flexible connectors in copper domestic water tubing.
 3. Install stainless-steel-hose flexible connectors in steel domestic water piping.
- H. Water Meter Installation
1. Rough-in domestic water piping for water meter installation, and install water meters, **as directed**, according to utility company's requirements.
 2. Water meters will be furnished and installed by utility company.
OR
Install water meters according to AWWA M6 and utility company's requirements.
 3. Install displacement-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.
OR
Install turbine-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.
OR
Install compound-type water meters with shutoff valves on water-meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.
OR
Install fire-service water meters with shutoff valves on water-meter inlet and outlet and on full-size valved bypass around meter. Support meter, valves, and piping on brick or concrete piers.
 4. Install remote registration system according to standards of utility company and of authorities having jurisdiction.
- I. Hanger And Support Installation
1. Comply with requirements in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment" for seismic-restraint devices.
 2. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for pipe hanger and support products and installation.
 - a. Vertical Piping: MSS Type 8 or 42, clamps.
 - b. Individual, Straight, Horizontal Piping Runs:
 - 1) **100 Feet (30 m)** and Less: MSS Type 1, adjustable, steel clevis hangers.
 - 2) Longer Than **100 Feet (30 m)**: MSS Type 43, adjustable roller hangers.
 - 3) Longer Than **100 Feet (30 m)** If Indicated: MSS Type 49, spring cushion rolls.
 - c. Multiple, Straight, Horizontal Piping Runs **100 Feet (30 m)** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - d. Base of Vertical Piping: MSS Type 52, spring hangers.
 3. Support vertical piping and tubing at base and at each floor.

4. Rod diameter may be reduced one size for double-rod hangers, to a minimum of **3/8 inch (10 mm)**.
 5. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.**
 - b. **NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.**
 - c. **NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.**
 - d. **NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.**
 - e. **NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.**
 - f. **NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.**
 - g. **NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.**
 6. Install supports for vertical copper tubing every **10 feet (3 m)**.
 7. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1-1/4 (DN 32) and Smaller: 84 inches (2100 mm) with 3/8-inch (10-mm) rod.**
 - b. **NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.**
 - c. **NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.**
 - d. **NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.**
 - e. **NPS 3 and NPS 3-1/2 (DN 80 and DN 90): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.**
 - f. **NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.7 m) with 5/8-inch (16-mm) rod.**
 - g. **NPS 6 (DN 150): 12 feet (3.7 m) with 3/4-inch (19-mm) rod.**
 - h. **NPS 8 to NPS 12 (DN 200 to DN 300): 12 feet (3.7 m) with 7/8-inch (22-mm) rod.**
 8. Install supports for vertical steel piping every **15 feet (4.5 m)**.
 9. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1 (DN 25) and Smaller: 36 inches (900 mm) with 3/8-inch (10-mm) rod.**
 - b. **NPS 1-1/4 to NPS 2 (DN 32 to DN 50): 48 inches (1200 mm) with 3/8-inch (10-mm) rod.**
 - c. **NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.**
 - d. **NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.**
 - e. **NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.**
 - f. **NPS 8 (DN 200): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.**
 10. Install supports for vertical CPVC piping every **60 inches (1500 mm)** for **NPS 1 (DN 25)** and smaller, and every **72 inches (1800 mm)** for **NPS 1-1/4 (DN 32)** and larger.
 11. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1 (DN 25) and Smaller: 32 inches (815 mm) with 3/8-inch (10-mm) rod.**
 12. Install hangers for vertical PEX piping every **48 inches (1200 mm)**.
 13. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 2 (DN 50) and Smaller: 48 inches (1200 mm) with 3/8-inch (10-mm) rod.**
 - b. **NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90): 48 inches (1200 mm) with 1/2-inch (13-mm) rod.**
 - c. **NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1200 mm) with 5/8-inch (16-mm) rod.**
 - d. **NPS 6 (DN 150): 48 inches (1200 mm) with 3/4-inch (19-mm) rod.**
 - e. **NPS 8 (DN 200): 48 inches (1200 mm) with 7/8-inch (22-mm) rod.**
 14. Install supports for vertical PVC piping every **48 inches (1200 mm)**.
 15. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.
- J. Connections
1. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to equipment and machines to allow service and maintenance.

3. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.
4. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:
 - a. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
 - b. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
 - c. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 Section(s) "Plumbing Fixtures" OR "Healthcare Plumbing Fixtures" OR "Emergency Plumbing Fixtures" OR "Security Plumbing Fixtures", **as directed**, for connection sizes.
 - d. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for **NPS 2-1/2 (DN 65)** and larger.

K. Escutcheon Installation

1. Install escutcheons for penetrations of walls, ceilings, and floors.
2. Escutcheons for New Piping:
 - a. Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - b. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set screw **OR** stamped steel with set screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - c. Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set screw **OR** One piece or split plate, stamped steel with set screw **OR** Split plate, stamped steel with set screw, **as directed**.
 - d. Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - e. Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - f. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
3. Escutcheons for Existing Piping:
 - a. Chrome-Plated Piping: Split casting, cast brass with chrome-plated finish.
 - b. Insulated Piping: Split plate, stamped steel with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - d. Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set screw, **as directed**.
 - e. Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set screw or spring clips, **as directed**.
 - f. Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set screw or spring clips, **as directed**.
 - g. Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.

L. Sleeve Installation

1. General Requirements: Install sleeves for pipes and tubes passing through penetrations in floors, partitions, roofs, and walls.
2. Sleeves are not required for core-drilled holes.
3. Permanent sleeves are not required for holes formed by removable PE sleeves.
4. Cut sleeves to length for mounting flush with both surfaces unless otherwise indicated.
5. Install sleeves in new partitions, slabs, and walls as they are built.
6. For interior wall penetrations, seal annular space between sleeve and pipe or pipe insulation using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
7. For exterior wall penetrations above grade, seal annular space between sleeve and pipe using joint sealants appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants" for joint sealants.
8. For exterior wall penetrations below grade, seal annular space between sleeve and pipe using sleeve seals **OR** wall penetration systems, **as directed**, specified in this Section.
9. Seal space outside of sleeves in concrete slabs and walls with grout.
10. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation unless otherwise indicated.
11. Install sleeve materials according to the following applications:
 - a. Sleeves for Piping Passing through Concrete Floor Slabs: Molded PE **OR** Molded PVC **OR** Steel pipe, **as directed**.
 - b. Sleeves for Piping Passing through Concrete Floor Slabs of Mechanical Equipment Areas or Other Wet Areas: Steel pipe **OR** Stack sleeve fittings, **as directed**.
 - 1) Extend sleeves **2 inches (50 mm)** above finished floor level.
 - 2) For pipes penetrating floors with membrane waterproofing, extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - c. Sleeves for Piping Passing through Gypsum-Board Partitions:
 - 1) PVC pipe **OR** Steel pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Exception: Sleeves are not required for water supply tubes and waste pipes for individual plumbing fixtures if escutcheons will cover openings.
 - d. Sleeves for Piping Passing through Concrete Roof Slabs: Molded PE **OR** Molded PVC **OR** Steel pipe, **as directed**.
 - e. Sleeves for Piping Passing through Exterior Concrete Walls:
 - 1) Steel pipe sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Cast-iron wall pipe sleeves for pipes **NPS 6 (DN 150)** and larger.
 - 3) Install sleeves that are large enough to provide **1-inch (25-mm)** annular clear space between sleeve and pipe or pipe insulation when sleeve seals are used.
 - 4) Do not use sleeves when wall penetration systems are used.
 - f. Sleeves for Piping Passing through Interior Concrete Walls:
 - 1) PVC pipe **OR** Steel pipe, **as directed**, sleeves for pipes smaller than **NPS 6 (DN 150)**.
 - 2) Galvanized-steel sheet sleeves for pipes **NPS 6 (DN 150)** and larger.
12. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestop materials and installations.

M. Sleeve Seal Installation

1. Install sleeve seals in sleeves in exterior concrete walls at water-service piping entries into building.
2. Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seal components and install in annular space between pipe

and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

- N. Wall Penetration System Installation
1. Install wall penetration systems in new, exterior concrete walls.
 2. Assemble wall penetration system components with sleeve pipe. Install so that end of sleeve pipe and face of housing are flush with wall. Adjust locking devices to secure sleeve pipe in housing.
- O. Identification
1. Identify system components. Comply with requirements in Division 22 Section "Identification For Plumbing Piping And Equipment" for identification materials and installation.
 2. Label pressure piping with system operating pressure.
- P. Field Quality Control
1. Perform tests and inspections.
 2. Piping Inspections:
 - a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
 - b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:
 - 1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
 - 2) Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.
 - c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
 - d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.
 3. Piping Tests:
 - a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
 - b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
 - c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
 - d. Cap and subject piping to static water pressure of **50 psig (345 kPa)** above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
 - e. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.
 - f. Prepare reports for tests and for corrective action required.
 4. Domestic water piping will be considered defective if it does not pass tests and inspections.
 5. Prepare test and inspection reports.
- Q. Adjusting
1. Perform the following adjustments before operation:
 - a. Close drain valves, hydrants, and hose bibbs.
 - b. Open shutoff valves to fully open position.
 - c. Open throttling valves to proper setting.
 - d. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

- 1) Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
- 2) Adjust calibrated balancing valves to flows indicated.
- e. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
- f. Remove and clean strainer screens. Close drain valves and replace drain plugs.
- g. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
- h. Check plumbing specialties and verify proper settings, adjustments, and operation.

R. Cleaning

1. Clean and disinfect potable and non-potable, **as directed**, domestic water piping as follows:
 - a. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - b. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
 - 1) Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - 2) Fill and isolate system according to either of the following:
 - a) Fill system or part thereof with water/chlorine solution with at least **50 ppm (50 mg/L)** of chlorine. Isolate with valves and allow to stand for 24 hours.
 - b) Fill system or part thereof with water/chlorine solution with at least **200 ppm (200 mg/L)** of chlorine. Isolate and allow to stand for three hours.
 - 3) Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
 - 4) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
2. Clean non-potable domestic water piping as follows:
 - a. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - b. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:
 - 1) Flush piping system with clean, potable water until dirty water does not appear at outlets.
 - 2) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.
3. Prepare and submit reports of purging and disinfecting activities.
4. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

S. Piping Schedule

1. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
2. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.
3. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.
4. Under-building-slab, domestic water, building service piping, **NPS 3 (DN 80)** and smaller, shall be one of the following:
 - a. Soft copper tube, **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**; wrought-copper solder-joint fittings; and brazed **OR** copper pressure-seal fittings; and pressure-sealed, **as directed**, joints.
 - b. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
5. Under-building-slab, domestic water, building-service piping, **NPS 4 to NPS 8 (DN 100 to DN 200)** and larger, shall be one of the following:

- a. Soft copper tube, **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**; wrought-copper solder-joint fittings; and brazed joints.
 - b. Mechanical-joint, ductile-iron pipe; standard-pattern **OR** compact-pattern, **as directed**, mechanical-joint fittings; and mechanical joints.
 - c. Push-on-joint, ductile-iron pipe; standard-pattern **OR** compact-pattern, **as directed**, push-on-joint fittings; and gasketed joints.
 - d. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.
 - e. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
6. Under-building slab, combined domestic water, building-service, and fire-service-main piping, **NPS 6 to NPS 12 (DN 150 to DN 300)**, shall be one of the following:
- a. Mechanical-joint, ductile-iron pipe; standard-pattern **OR** compact-pattern, **as directed**, mechanical-joint fittings; and mechanical joints.
 - b. Push-on-joint, ductile-iron pipe; standard-pattern **OR** compact-pattern, **as directed**, push-on-joint fittings; and gasketed joints.
 - c. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.
7. Under-building-slab, domestic water piping, **NPS 2 (DN 50)** and smaller, shall be one of the following:
- a. Hard **OR** Soft, **as directed**, copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B)**; wrought-copper solder-joint fittings; and brazed **OR** copper pressure-seal-joint fittings; and pressure-sealed, **as directed**, joints.
 - b. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
8. Aboveground domestic water piping, **NPS 2 (DN 50)** and smaller, shall be one of the following:
- a. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B), as directed**; cast-copper **OR** wrought-copper, **as directed**, solder-joint fittings; and brazed **OR** soldered, **as directed**, joints.
 - c. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B, as directed**; copper pressure-seal-joint fittings; and pressure-sealed joints.
 - d. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B) OR, as directed**; copper push-on-joint fittings; and push-on joints.
 - e. CPVC, Schedule 40 pipe; CPVC, Schedule 40 **OR** Schedule 80 pipe; CPVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
 - f. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
 - g. CPVC Tubing System: CPVC tube; CPVC socket fittings; and solvent-cemented joints. **NPS 1-1/2 (DN 40)** and **NPS 2 (DN 50)** CPVC pipe with CPVC socket fittings may be used instead of tubing.
 - h. PEX Tube, **NPS 1 (DN 25)** and smaller; fittings for PEX tube; and crimped joints.
 - i. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
9. Aboveground domestic water piping, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**, shall be one of the following:
- a. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B), as directed**; cast-copper **OR** wrought-copper, **as directed**, solder-joint fittings; and brazed **OR** soldered, **as directed**, joints.
 - b. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B), as directed**; copper pressure-seal-joint fittings; and pressure-sealed joints.
 - c. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B, as directed**; grooved-joint copper-tube appurtenances; and grooved joints.

- d. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - e. Galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.
 - f. CPVC, Schedule 40 pipe; CPVC, Schedule 40 **OR** Schedule 80 pipe; CPVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
 - g. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
 - h. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
10. Aboveground domestic water piping, **NPS 5 to NPS 8 (DN 125 to DN 200)**, shall be one of the following:
- a. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B)**, **as directed**; cast-copper **OR** wrought-copper, **as directed**, solder-joint fittings; and brazed **OR** soldered, **as directed**, joints.
 - b. Hard copper tube, **ASTM B 88, Type L (ASTM B 88M, Type B)**, **as directed**; grooved-joint copper-tube appurtenances; and grooved joints.
 - c. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - d. Galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.
 - e. CPVC, Schedule 40 pipe; CPVC, Schedule 40 **OR** Schedule 80 pipe; CPVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
 - f. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.
 - g. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
11. Aboveground, combined domestic-water-service and fire-service-main piping, **NPS 6 to NPS 12 (DN 150 to DN300)**, shall be one of the following:
- a. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.
 - b. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - c. Galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.
- T. Valve Schedule
1. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - a. Shutoff Duty: Use ball or gate valves for piping **NPS 2 (DN 50)** and smaller. Use butterfly, ball, or gate valves with flanged ends for piping **NPS 2-1/2 (DN 65)** and larger.
 - b. Throttling Duty: Use ball or globe valves for piping **NPS 2 (DN 50)** and smaller. Use butterfly or ball valves with flanged ends for piping **NPS 2-1/2 (DN 65)** and larger.
 - c. Hot-Water Circulation Piping, Balancing Duty: Calibrated **OR** Memory-stop, **as directed**, balancing valves.
 - d. Drain Duty: Hose-end drain valves.
 2. Use check valves to maintain correct direction of domestic water flow to and from equipment.
 3. Iron grooved-end valves may be used with grooved-end piping.
 4. CPVC and PVC valves matching piping materials may be used.

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SECTION 22 11 16 00a - GENERAL-SERVICE COMPRESSED-AIR PIPING

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for general-service compressed-air piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes piping and related specialties for general-service compressed-air systems operating at **200 psig (1380 kPa)** or less.

C. Definitions

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. CR: Chlorosulfonated polyethylene synthetic rubber.
3. EPDM: Ethylene-propylene-diene terpolymer rubber.
4. HDPE: High-density polyethylene plastic.
5. NBR: Acrylonitrile-butadiene rubber.
6. PE: Polyethylene plastic.
7. PVC: Polyvinyl chloride plastic.
8. High-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures between **150 and 200 psig (1035 and 1380 kPa)**.
9. Low-Pressure Compressed-Air Piping: System of compressed-air piping and specialties operating at pressures of **150 psig (1035 kPa)** or less.

D. Performance Requirements

1. Seismic Performance: Compressed-air piping and support and installation shall withstand effects of seismic events determined according to SEI/ASCE 7, "Minimum Design Loads for Buildings and Other Structures."

E. Submittals

1. Product Data: For the following:
 - a. Plastic pipes, fittings, and valves.
 - b. Dielectric fittings.
 - c. Flexible pipe connectors.
 - d. Safety valves.
 - e. Pressure regulators. Include rated capacities and operating characteristics.
 - f. Automatic drain valves.
 - g. Filters. Include rated capacities and operating characteristics.
 - h. Lubricators. Include rated capacities and operating characteristics.
 - i. Quick couplings.
 - j. Hose assemblies.
2. Brazing **OR** Welding, **as directed**, certificates.
3. Field quality-control test reports.
4. Operation and maintenance data.

F. Quality Assurance

1. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications," or to AWS B2.2, "Standard for Brazing Procedure and Performance Qualification."
2. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.

3. ASME Compliance:
 - a. Comply with ASME B31.1, "Power Piping," for high-pressure compressed-air piping.
 - b. Comply with ASME B31.9, "Building Services Piping," for low-pressure compressed-air piping.

G. Project Conditions

1. Interruption of Existing Compressed-Air Service: Do not interrupt compressed-air service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary compressed-air service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of compressed-air service.
 - b. Do not proceed with interruption of compressed-air service without the Owner's written permission.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. Schedule 40, Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B, black or hot-dip zinc coated with ends threaded according to ASME B1.20.1.
 - a. Steel Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106, Schedule 40, galvanized seamless steel pipe. Include ends matching joining method.
 - b. Malleable-Iron Fittings: ASME B16.3, Class 150 or 300, threaded.
 - c. Malleable-Iron Unions: ASME B16.39, Class 150 or 300, threaded.
 - d. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel, threaded.
 - e. Wrought-Steel Butt-Welding Fittings: ASME B16.9, Schedule 40.
 - f. Steel Flanges: ASME B16.5, Class 150 or 300, carbon steel.
 - g. Grooved-End Fittings and Couplings:
 - 1) Grooved-End Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron casting; with grooves according to AWWA C606 and dimensions matching steel pipe.
 - 2) Couplings: AWWA C606 or UL 213, for steel-pipe dimensions and rated for **300-psig (2070-kPa)** minimum working pressure. Include ferrous housing sections, gasket suitable for compressed air, and bolts and nuts. Provide EDPM gaskets for oil-free compressed air. Provide NBR gaskets if compressed air contains oil or oil vapor.
2. Schedule 5, Steel Pipe: ASTM A 135, carbon steel with plain ends and zinc-plated finish.
 - a. Pressure-Seal Fittings: Listed and labeled by a qualified testing agency and FMG-approved, carbon-steel, pressure-seal housing with O-ring end seals suitable for compressed-air piping and rated for **300-psig (2070-kPa)** minimum working pressure. Provide EDPM seals for oil-free compressed air. Provide NBR seals if compressed air contains oil or oil vapor.
3. Copper Tube: **ASTM B 88, Type K or L (ASTM B 88M, Type A or B)** and **ASTM B 88, Type M (ASTM B 88M, Type C)** seamless, drawn-temper, water tube.
 - a. Wrought-Copper Fittings: ASME B16.22, solder-joint pressure type or MSS SP-73, wrought copper with dimensions for brazed joints.
 - b. Cast-Copper-Alloy Flanges: ASME B16.24, Class 150 or 300.
 - c. Copper Unions: ASME B16.22 or MSS SP-123.
 - d. Press-Type Fittings, **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - e. Press-Type Fittings, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
 - f. Extruded-Tee Outlets: Procedure for making branch outlets in copper tube according to ASTM F 2014.

- g. Grooved-End Fittings and Couplings:
 - 1) Grooved-End Fittings: **ASTM B 75 (ASTM B 75M)**, copper tube or ASTM B 584, bronze castings.
 - 2) Couplings: Copper-tube dimensions and design similar to AWWA C606. Include ferrous housing sections, gasket suitable for compressed air, and bolts and nuts. Provide EDPM gasket for oil-free compressed air. Provide NBR gasket if compressed air contains oil or oil vapor.
 4. Transition Couplings for Metal Piping: Metal coupling or other manufactured fitting same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
 5. PVC Pipe: ASTM D 1785, Schedule 40.
 - a. PVC Fittings: ASTM D 2466, Schedule 40, socket type.
 6. Blue ABS Piping System: Made of ASTM D 3965, ABS-resin modified to provide shatter-resistant pipe for compressed-air service. Pipe and fittings are light blue and sizes are in millimeters.
 - a. Transition Fittings, 20 to 63 mm: Composite union with ABS socket end, CR O-ring, and malleable-iron union nut and threaded end; with construction similar to MSS SP-107, transition union.
 - b. Transition Fittings, 90 to 110 mm: Flange assembly with ABS flange, CR gasket, and metal flange of material matching piping to be connected.
 - c. Valves, 20 to 63 mm: ABS union ball valve with socket ends.
 - d. Valves, 90 to 110 mm: ABS butterfly valve with lever handle.
 7. Green ABS Piping System: Made of ASTM D 3965, ABS-resin modified to provide shatter-resistant pipe for compressed-air service. Pipe and fittings are dark green with SDR of 9.0 and same OD as ASTM A 53/A 53M, steel pipe.
 - a. Transition Fittings, **NPS 1/2 to NPS 2 (DN 15 to DN 50)**: Composite union with ABS socket end, CR O-ring, ABS union nut, and brass solder-joint end; with construction similar to MSS SP-107, transition union.
 - b. Transition Fittings, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: ABS flange, CR gasket, and metal flange of material matching piping to be connected.
 - c. Valves, **NPS 1/2 to NPS 2 (DN 15 to DN 50)**: Union ball valve with socket ends.
 - d. Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Union ball valve with flanged ends. Include safety exhaust feature in Part 3 "Valve Applications" Article if required.
 8. HDPE Piping System: Made of ASTM D 1248, HDPE resin to provide shatter-resistant pipe for compressed-air service. Pipe and fittings are dark blue with pipe dimensions about the same OD as ASTM D 3035, PE pipe.
 - a. Transition Fittings, **NPS 1/2 to NPS 2 (DN 15 to DN 50)**: HDPE adapter with one socket end and one end with threaded brass insert.
 - b. Transition Fittings, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: HDPE flange, CR gasket, and metal flange of material matching piping to be connected.
 - c. Valves, **NPS 1/2 to NPS 3 (DN 15 to DN 80)**: HDPE union ball valve with socket ends.
- B. Joining Materials**
1. Pipe-Flange Gasket Materials: Suitable for compressed-air piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
 3. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
 4. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 5. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated.
 6. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 7. Solvent Cements for Joining Plastic Piping:

- a. ABS Piping: ASTM D 2235.
 - b. PVC Piping: ASTM D 2564. Include primer complying with ASTM F 656.
- C. Valves
1. Metal Ball, Butterfly, Check, Gate, and Globe Valves: Comply with requirements in Division 22 Section "General-duty Valves For Plumbing Piping".
- D. Dielectric Fittings
1. General Requirements for Dielectric Fittings: Combination fitting of copper alloy and ferrous materials with insulating material; suitable for system fluid, pressure, and temperature. Include threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
 2. Dielectric Unions: Factory-fabricated union assembly, for 250-psig (1725-kPa) minimum working pressure at 180 deg F (82 deg C).
 3. Dielectric Flanges: Factory-fabricated companion-flange assembly, for 150- or 300-psig (1035- or 2070-kPa) minimum working pressure as required to suit system pressures.
 4. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - a. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig (1035- or 2070-kPa) minimum working pressure where required to suit system pressures.
- E. Flexible Pipe Connectors
1. Bronze-Hose Flexible Pipe Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.
 - a. Working-Pressure Rating: 200 psig (1380 kPa) OR 250 psig (1725 kPa), as directed, minimum.
 - b. End Connections, NPS 2 (DN 50) and Smaller: Threaded copper pipe or plain-end copper tube.
 - c. End Connections, NPS 2-1/2 (DN 65) and Larger: Flanged copper alloy.
 2. Stainless-Steel-Hose Flexible Pipe Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.
 - a. Working-Pressure Rating: 200 psig (1380 kPa) OR 250 psig (1725 kPa), as directed, minimum.
 - b. End Connections, NPS 2 (DN 50) and Smaller: Threaded steel pipe nipple.
 - c. End Connections, NPS 2-1/2 (DN 65) and Larger: Flanged steel nipple.
- F. Sleeves
1. Galvanized-Steel Sheet: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.
 2. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.
- G. Escutcheons
1. General Requirements: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
 2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 3. One-Piece, Cast-Brass Escutcheons: With set screw.
 - a. Finish: Polished chrome-plated OR Rough brass, as directed.
 4. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated OR Rough brass, as directed.
 5. One-Piece, Stamped-Steel Escutcheons: With set screw OR spring clips, as directed, and chrome-plated finish.

6. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
7. One-Piece, Floor-Plate Escutcheons: Cast iron.
8. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

H. Specialties

1. Safety Valves: ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," construction; National Board certified, labeled, and factory sealed; constructed of bronze body with poppet-type safety valve for compressed-air service.
 - a. Pressure Settings: Higher than discharge pressure and same or lower than receiver pressure rating.
2. Air-Main Pressure Regulators: Bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for **250-psig (1725-kPa)** inlet pressure, unless otherwise indicated.
 - a. Type: Pilot operated.
3. Air-Line Pressure Regulators: Diaphragm **OR** Pilot, **as directed**, operated, bronze body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for **200-psig (1380-kPa)** minimum inlet pressure, unless otherwise indicated.
OR
Air-Line Pressure Regulators: Diaphragm operated, aluminum alloy or plastic body, direct acting, spring-loaded manual pressure-setting adjustment, and rated for **200-psig (1380-kPa)** minimum inlet pressure, unless otherwise indicated.
4. Automatic Drain Valves: Stainless-steel body and internal parts, rated for **200-psig (1380-kPa)** minimum working pressure, capable of automatic discharge of collected condensate. Include mounting bracket if wall mounting is indicated, **as directed**.
5. Coalescing Filters: Coalescing type with activated carbon capable of removing water and oil aerosols; with color-change dye to indicate when carbon is saturated and warning light to indicate when selected maximum pressure drop has been exceeded. Include mounting bracket if wall mounting is indicated, **as directed**.
6. Mechanical Filters: Two-stage, mechanical-separation-type, air-line filters. Equip with deflector plates, resin-impregnated-ribbon-type filters with edge filtration, and drain cock. Include mounting bracket if wall mounting is indicated, **as directed**.
7. Air-Line Lubricators: With drip chamber and sight dome for observing oil drop entering air stream; with oil-feed adjustment screw and quick-release collar for easy bowl removal. Include mounting bracket if wall mounting is indicated, **as directed**.
 - a. Provide with automatic feed device for supplying oil to lubricator.

I. Quick Couplings

1. General Requirements for Quick Couplings: Assembly with locking-mechanism feature for quick connection and disconnection of compressed-air hose.
2. Automatic-Shutoff Quick Couplings: Straight-through brass body with O-ring or gasket seal and stainless-steel or nickel-plated-steel operating parts.
 - a. Socket End: With one-way valve and threaded inlet for connection to piping or threaded hose fitting.
 - b. Plug End: Flow-sensor-bleeder, check-valve **OR** Straight-through, **as directed**, type with barbed outlet for attaching hose.
3. Valveless Quick Couplings: Straight-through brass body with stainless-steel or nickel-plated-steel operating parts.
 - a. Socket End: With O-ring or gasket seal, without valve, and with barbed inlet for attaching hose.
 - b. Plug End: With barbed outlet for attaching hose.

J. Hose Assemblies

1. Description: Compatible hose, clamps, couplings, and splicers suitable for compressed-air service, of nominal diameter indicated, and rated for **300-psig (2070-kPa)** minimum working pressure, unless otherwise indicated.

- a. Hose: Reinforced single **OR** double, **as directed**,-wire-braid, CR-covered hose for compressed-air service.
- b. Hose Clamps: Stainless-steel clamps or bands.
- c. Hose Couplings: Two-piece, straight-through, threaded brass or stainless-steel O-ring or gasket-seal swivel coupling with barbed ends for connecting two sections of hose.
- d. Hose Splicers: One-piece, straight-through brass or stainless-steel fitting with barbed ends for connecting two sections of hose.

K. Grout

1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Piping Applications

1. Compressed-Air Piping between Air Compressors and Receivers: Use one of the following piping materials for each size range:
 - a. **NPS 2 (DN 50)** and Smaller: Schedule 40, black **OR** galvanized, **as directed**,-steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - b. **NPS 2 (DN 50)** and Smaller: Schedule 5, galvanized-steel pipe; pressure-seal fittings; and pressure-sealed joints.
 - c. **NPS 2 (DN 50)** and Smaller: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.
 - d. **NPS 2 (DN 50)** and Smaller: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed joints.
 - e. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Schedule 40, black **OR** galvanized, **as directed**,-steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - f. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Schedule 40, black **OR** galvanized, **as directed**,-steel pipe; grooved-end fittings; couplings; and grooved joints.
 - g. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.
 - h. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed joints.
 - i. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **Type K or L (Type A or B)**, copper tube; grooved-end copper fittings; couplings; and grooved joints.
 - j. **NPS 5 (DN 125)** and Larger: Schedule 40, black **OR** galvanized, **as directed**,-steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - k. **NPS 5 (DN 125)** and Larger: Schedule 40, black **OR** galvanized, **as directed**,-steel pipe; grooved-end fittings; couplings; and grooved joints.
 - l. **NPS 5 (DN 125)** and Larger: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.
 - m. **NPS 5 (DN 125)** and Larger: Grooved-end, **Type K or L (ASTM B 88M Type A or B)**, copper tube; grooved-end copper fittings; couplings; and grooved joints.
2. Low-Pressure Compressed-Air Distribution Piping: Use one of the following piping materials for each size range:
 - a. **NPS 2 (DN 50)** and Smaller: Schedule 40, black **OR** galvanized, **as directed**,-steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - b. **NPS 2 (DN 50)** and Smaller: Schedule 5, galvanized-steel pipe; pressure-seal fittings; and pressure-sealed joints.
 - c. **NPS 2 (DN 50)** and Smaller: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.

- d. **NPS 2 (DN 50)** and Smaller: **Type K or L (Type A or B)**, copper tube; press-type fittings; and pressure-sealed joints.
 - e. **NPS 2 (DN 50)** and Smaller: 63-mm and smaller, blue ABS pipe and fittings; transition fittings; valves; and solvent-cemented joints.
 - f. **NPS 2 (DN 50)** and Smaller: Green ABS pipe and fittings, transition fittings, and valves; and solvent-cemented joints.
 - g. **NPS 2 (DN 50)** and Smaller: HDPE pipe, fittings, and valves; and heat-fusion joints.
 - h. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - i. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; grooved-end fittings; couplings; and grooved joints.
 - j. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - k. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **Type K or L (Type A or B)**, copper tube; grooved-end copper fittings; couplings; and grooved joints.
 - l. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **Type K or L (Type A or B)**, copper tube; press-type fittings; and pressure-sealed joints.
 - m. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: 90- and 110-mm, blue ABS pipe and fittings; transition fittings; and solvent-cemented joints. Include butterfly valves and flanged joints.
 - n. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **NPS 3 and NPS 4 (DN 80 and DN 100)**, green ABS pipe and fittings; transition fittings; and solvent-cemented joints. Include ball valves and flanged joints.
 - o. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **NPS 3 and NPS 4 (DN 80 and DN 100)**, HDPE pipe and fittings; valves; and heat-fusion joints.
 - p. **NPS 5 and NPS 6 (DN 125 and DN 150)**: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - q. **NPS 5 (DN 125)** and Larger: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; grooved-end fittings; couplings; and grooved joints.
 - r. **NPS 5 to NPS 8 (DN 125 to DN 200)**: **Type K or L (Type A or B)**, copper tube; grooved-end copper fittings; couplings; and grooved joints.
3. High-Pressure Compressed-Air Distribution Piping: Use one of the following piping materials for each size range:
- a. **NPS 2 (DN 50)** and Smaller: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - b. **NPS 2 (DN 50)** and Smaller: Schedule 5, galvanized-steel pipe; pressure-seal fittings; and pressure-sealed joints.
 - c. **NPS 2 (DN 50)** and Smaller: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.
 - d. **NPS 2 (DN 50)** and Smaller: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - e. **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; threaded, malleable-iron fittings; and threaded joints.
 - f. **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; grooved-end fittings; couplings; and grooved joints.
 - g. **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.
 - h. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed **OR** soldered, **as directed**, joints.
 - i. **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: **Type K or L (Type A or B)**, copper tube; wrought-copper fittings; and brazed joints.
 - j. **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: **Type K or L (Type A or B)**, copper tube; grooved-end copper fittings; couplings; and grooved joints.
 - k. **NPS 8 (DN 200)** and Larger: Schedule 40, black **OR** galvanized, **as directed**, -steel pipe; grooved-end fittings; couplings; and grooved joints.
 - l. **NPS 8 (DN 200)** and Larger: Schedule 40, black-steel pipe; wrought-steel fittings; and welded joints.

- m. **NPS 8 (DN 200): Type K or L (Type A or B)**, copper tube; grooved-end copper fittings; couplings; and grooved joints.
- 4. Drain Piping: Use one of the following piping materials:
 - a. **NPS 2 (DN 50) and Smaller: Type M (Type C)** copper tube; wrought-copper fittings; and brazed or soldered joints.
 - b. **NPS 2 (DN 50) and Smaller:** PVC pipe and fittings; and solvent-cemented joints.
- B. Valve Applications
 - 1. General-Duty Valves: Comply with requirements in Division 22 Section "General-duty Valves For Plumbing Piping" for metal general-duty valves. Use metal valves, unless otherwise indicated.
 - a. Metal General-Duty Valves: Use valve types specified in "Valve Applications" Article in Division 22 Section "General-duty Valves For Plumbing Piping" according to the following:
 - 1) Low-Pressure Compressed Air: Valve types specified for low-pressure compressed air.
 - 2) High-Pressure Compressed Air: Valve types specified for medium-pressure compressed air.
 - 3) Equipment Isolation **NPS 2 (DN 50) and Smaller:** Safety-exhaust, copper-alloy ball valve with exhaust vent and pressure rating at least as great as piping system operating pressure.
 - 4) Grooved-end valves may be used with grooved-end piping and grooved joints.
 - b. Plastic General-Duty Valves: Provide valves, made by piping manufacturer, that are compatible with piping. Do not use plastic valves between air compressors and receivers.
 - 1) Blue ABS Piping System: Ball and butterfly valves.
 - 2) Green ABS Piping System: Ball valves.
 - 3) HDPE Piping System: Ball valves.
- C. Piping Installation
 - 1. Drawing plans, schematics, and diagrams indicate general location and arrangement of compressed-air piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, air-compressor sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
 - 2. Install piping concealed from view and protected from physical contact by building occupants, unless otherwise indicated and except in equipment rooms and service areas.
 - 3. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited, unless otherwise indicated.
 - 4. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal and to coordinate with other services occupying that space.
 - 5. Install piping adjacent to equipment and machines to allow service and maintenance.
 - 6. Install air and drain piping with 1 percent slope downward in direction of flow.
 - 7. Install nipples, flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating, unless otherwise indicated.
 - 8. Equipment and Specialty Flanged Connections:
 - a. Use steel companion flange with gasket for connection to steel pipe.
 - b. Use cast-copper-alloy companion flange with gasket and brazed **OR** soldered, **as directed**, joint for connection to copper tube. Do not use soldered joints for connection to air compressors or to equipment or machines producing shock or vibration.
 - 9. Flanged joints may be used instead of specified joint for any piping or tubing system.
 - 10. Extended-tee outlets with brazed branch connection may be used for copper tubing, within extruded-tee connection diameter to run tube diameter ratio for tube type, according to Extruded Tee Connections Sizes and Wall Thickness for Copper Tube (Inches) Table in ASTM F 2014.
 - 11. Install eccentric reducers where compressed-air piping is reduced in direction of flow, with bottoms of both pipes and reducer fitting flush.
 - 12. Install branch connections to compressed-air mains from top of main. Provide drain leg and drain trap at end of each main and branch and at low points.

13. Install thermometer and pressure gage on discharge piping from each air compressor and on each receiver. Comply with requirements in Division 22 Section "Meters And Gages For Plumbing Piping".
14. Install piping to permit valve servicing.
15. Install piping free of sags and bends.
16. Install fittings for changes in direction and branch connections.
17. Install seismic restraints on piping. Seismic-restraint devices are specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".

D. Joint Construction

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
4. Welded Joints for Steel Piping: Join according to AWS D10.12/D10.12M.
5. Brazed Joints for Copper Tubing: Join according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
6. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Join according to ASTM B 828 or CDA's "Copper Tube Handbook."
7. Extruded-Tee Outlets for Copper Tubing: Form branches according to ASTM F 2014, with tools recommended by procedure manufacturer, and using operators qualified according to Part 1 "Quality Assurance" Article.
8. Flanged Joints: Use asbestos-free, nonmetallic gasket suitable for compressed air. Join flanges with gasket and bolts according to ASME B31.9 for bolting procedure.
9. Grooved Joints: Assemble couplings with housing, gasket, lubricant, and bolts. Join according to AWWA C606 for grooved joints. Do not apply lubricant to prelubricated gaskets.
10. Heat-Fusion Joints for PE Piping: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657 for socket-fusion joints.
11. Pressure-Sealed Joints: Join with tools recommended by fitting manufacturer, using operators qualified according to Part 1 "Quality Assurance" Article.
12. Solvent-Cemented Joints for ABS Piping: Clean and dry joining surfaces. Join according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. Join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2235 Appendix.
13. Solvent-Cemented Joints for PVC Piping: Clean and dry joining surfaces. Join according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. Apply primer and join according to ASME B31.9 for solvent-cemented joints and to ASTM D 2672.
14. Dissimilar Metal Piping Material Joints: Use dielectric fittings.

E. Valve Installation

1. General-Duty Valves: Comply with requirements in Division 22 Section "General-duty Valves For Plumbing Piping".
2. Install shutoff valves and unions or flanged joints at compressed-air piping to air compressors.
3. Install shutoff valve at inlet to each automatic drain valve, filter, lubricator, and pressure regulator.
4. Install check valves to maintain correct direction of compressed-air flow to and from compressed-air piping specialties and equipment.

- F. Dielectric Fitting Installation
1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
 2. **NPS 2 (DN 50)** and Smaller: Use dielectric unions.
 3. **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Use dielectric flanges.
 4. **NPS 5 (DN 125)** and Larger: Use dielectric flange kits.
- G. Flexible Pipe Connector Installation
1. Install flexible pipe connectors in discharge piping and in inlet air piping from remote air-inlet filter, **as directed**, of each air compressor.
 2. Install bronze-hose flexible pipe connectors in copper compressed-air tubing.
 3. Install stainless-steel-hose flexible pipe connectors in steel compressed-air piping.
- H. Specialty Installation
1. Install safety valves on receivers in quantity and size to relieve at least the capacity of connected air compressors.
 2. Install air-main pressure regulators in compressed-air piping at or near air compressors.
 3. Install air-line pressure regulators in branch piping to equipment and tools, **as directed**.
 4. Install automatic drain valves on aftercoolers, receivers, and dryers. Discharge condensate onto nearest floor drain.
 5. Install coalescing filters in compressed-air piping at or near air compressors and upstream from mechanical filters. Mount on wall at locations indicated, **as directed**.
 6. Install mechanical filters in compressed-air piping at or near air compressors and downstream from coalescing filters. Mount on wall at locations indicated, **as directed**.
 7. Install air-line lubricators in branch piping to machine tools. Mount on wall at locations indicated, **as directed**.
 8. Install quick couplings at piping terminals for hose connections.
 9. Install hose assemblies at hose connections.
- I. Connections
1. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment and machine.
 2. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment and machine.
- J. Sleeve Installation
1. Sleeves are not required for core-drilled holes.
 2. Permanent sleeves are not required for holes formed by removable PE sleeves.
 3. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs using galvanized-steel pipe **OR** galvanized-steel sheet **OR** stack sleeve fittings **OR** PVC pipe, **as directed**.
OR
Install sleeves for pipes passing through concrete and masonry walls, gypsum board partitions, and concrete floor and roof slabs.
 - a. Wall Penetrations: Cut sleeves to length for mounting flush with both surfaces.
 - b. Floor Penetrations: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
 4. Install sleeves in new walls and slabs as new walls and slabs are constructed.
 5. Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a. PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - b. Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum board partitions.
 - c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to

2 inches (50 mm) above finished floor level. Comply with requirements in Division 07 Section "Sheet Metal Flashing And Trim" for flashing.

- 1) Seal space outside of sleeve fittings with grout.
 6. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
- K. Escutcheon Installation
1. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One piece, deep pattern.
 - 2) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** stamped steel with set screw **OR** stamped steel with set screw or spring clips **OR** stamped steel with spring clips, **as directed**.
 - 3) Bare Piping at Ceiling Penetrations in Finished Spaces: One piece, cast brass with polished chrome-plated finish **OR** One piece or split-casting, cast brass with polished chrome-plated finish **OR** Split casting, cast brass with polished chrome-plated finish **OR** One piece, stamped steel with set screw **OR** One piece or split plate, stamped steel with set screw **OR** Split plate, stamped steel with set screw, **as directed**.
 - 4) Bare Piping in Unfinished Service Spaces: One piece, cast brass with polished chrome-plated finish **OR** cast brass with rough-brass finish **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - 5) Bare Piping in Equipment Rooms: One piece, cast brass **OR** stamped steel with set screw **OR** stamped steel with spring clips **OR** stamped steel with set screw or spring clips, **as directed**.
 - 6) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece floor plate.
 - b. Existing Piping:
 - 1) Chrome-Plated Piping: Split-casting, cast brass with chrome-plated finish.
 - 2) Insulated Piping: Split-plate, stamped steel with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - 3) Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and spring clips, **as directed**.
 - 4) Bare Piping at Ceiling Penetrations in Finished Spaces: Split casting, cast brass with chrome-plated finish **OR** plate, stamped steel with concealed hinge and set screw, **as directed**.
 - 5) Bare Piping in Unfinished Service Spaces: Split casting, cast brass with polished chrome-plated finish **OR** casting, cast brass with rough-brass finish **OR** plate, stamped steel with concealed hinge and set screw or spring clips **OR** plate, stamped steel with concealed or exposed-rivet hinge and set screw or spring clips **OR** plate, stamped steel with exposed-rivet hinge and set screw or spring clips, **as directed**.
 - 6) Bare Piping in Equipment Rooms: Split casting, cast brass **OR** plate, stamped steel with set screw or spring clips, **as directed**.
 - 7) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting floor plate.
- L. Hanger And Support Installation
1. Comply with requirements in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment" for seismic-restraint devices.
 2. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for pipe hanger and support devices.
 3. Vertical Piping: MSS Type 8 or 42, clamps.
 4. Individual, Straight, Horizontal Piping Runs:
 - a. 100 Feet (30 m) or Less: MSS Type 1, adjustable, steel clevis hangers.

- b. Longer Than **100 Feet (30 m)**: MSS Type 43, adjustable roller hangers.
5. Multiple, Straight, Horizontal Piping Runs **100 Feet (30 m)** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 6. Base of Vertical Piping: MSS Type 52, spring hangers.
 7. Support horizontal piping within **12 inches (300 mm)** of each fitting and coupling.
 8. Rod diameter may be reduced 1 size for double-rod hangers, with **3/8-inch (10-mm)** minimum rods.
 9. Install hangers for Schedule 40, steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1/4 to NPS 1/2 (DN 8 to DN 15)**: **96 inches (2400 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 3/4 to NPS 1-1/4 (DN 20 to DN 32)**: **84 inches (2100 mm)** with **3/8-inch (10-mm)** rod.
 - c. **NPS 1-1/2 (DN 40)**: **12 feet (3.7 m)** with **3/8-inch (10-mm)** rod.
 - d. **NPS 2 (DN 50)**: **13 feet (4 m)** with **3/8-inch (10-mm)** rod.
 - e. **NPS 2-1/2 (DN 65)**: **14 feet (4.3 m)** with **1/2-inch (13-mm)** rod.
 - f. **NPS 3 (DN 80)**: **15 feet (4.6 m)** with **1/2-inch (13-mm)** rod.
 - g. **NPS 3-1/2 (DN 90)**: **16 feet (4.9 m)** with **1/2-inch (13-mm)** rod.
 - h. **NPS 4 (DN 100)**: **17 feet (5.2 m)** with **5/8-inch (16-mm)** rod.
 - i. **NPS 5 (DN 125)**: **19 feet (5.8 m)** with **5/8-inch (16-mm)** rod.
 - j. **NPS 6 (DN 150)**: **21 feet (6.4 m)** with **3/4-inch (19-mm)** rod.
 - k. **NPS 8 (DN 200)**: **24 feet (7.3 m)** with **3/4-inch (19-mm)** rod.
 - l. **NPS 10 (DN 250)**: **26 feet (7.9 m)** with **7/8-inch (22-mm)** rod.
 - m. **NPS 12 (DN 300)**: **30 feet (9.1 m)** with **7/8-inch (22-mm)** rod.
 10. Install supports for vertical, Schedule 40, steel piping every **15 feet (4.6 m)**.
 11. Install hangers for Schedule 5, steel piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1/2 (DN 15)**: **72 inches (1800 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 3/4 (DN 20)**: **84 inches (2100 mm)** with **3/8-inch (10-mm)** rod.
 - c. **NPS 1 (DN 25)**: **96 inches (2400 mm)** with **3/8-inch (10-mm)** rod.
 - d. **NPS 1-1/4 (DN 32)**: **108 inches (2700 mm)** with **3/8-inch (10-mm)** rod.
 - e. **NPS 1-1/2 (DN 40)**: **10 feet (3 m)** with **3/8-inch (10-mm)** rod.
 - f. **NPS 2 (DN 50)**: **11 feet (3.4 m)** with **3/8-inch (10-mm)** rod.
 12. Install supports for vertical, Schedule 5, steel piping every **10 feet (3 m)**.
 13. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 1/4 (DN 8)**: **60 inches (1500 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 3/8 and NPS 1/2 (DN 10 and DN 15)**: **72 inches (1800 mm)** with **3/8-inch (10-mm)** rod.
 - c. **NPS 3/4 (DN 20)**: **84 inches (2100 mm)** with **3/8-inch (10-mm)** rod.
 - d. **NPS 1 (DN 25)**: **96 inches (2400 mm)** with **3/8-inch (10-mm)** rod.
 - e. **NPS 1-1/4 (DN 32)**: **108 inches (2700 mm)** with **3/8-inch (10-mm)** rod.
 - f. **NPS 1-1/2 (DN 40)**: **10 feet (3 m)** with **3/8-inch (10-mm)** rod.
 - g. **NPS 2 (DN 50)**: **11 feet (3.4 m)** with **3/8-inch (10-mm)** rod.
 - h. **NPS 2-1/2 (DN 65)**: **13 feet (4 m)** with **1/2-inch (13-mm)** rod.
 - i. **NPS 3 (DN 80)**: **14 feet (4.3 m)** with **1/2-inch (13-mm)** rod.
 - j. **NPS 3-1/2 (DN 90)**: **15 feet (4.6 m)** with **1/2-inch (13-mm)** rod.
 - k. **NPS 4 (DN 100)**: **16 feet (4.9 m)** with **1/2-inch (13-mm)** rod.
 - l. **NPS 5 (DN 125)**: **18 feet (5.5 m)** with **1/2-inch (13-mm)** rod.
 - m. **NPS 6 (DN 150)**: **20 feet (6 m)** with **5/8-inch (16-mm)** rod.
 - n. **NPS 8 (DN 200)**: **23 feet (7 m)** with **3/4-inch (19-mm)** rod.
 14. Install supports for vertical copper tubing every **10 feet (3 m)**.
 15. Install vinyl-coated hangers for ABS piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. All Sizes: Install continuous support for piping with compressed air at normal operating temperature above **100 deg F (38 deg C)**.
 - b. **NPS 3/8 and NPS 1/2 (DN 10 and DN 15)**: **30 inches (760 mm)** with **3/8-inch (10-mm)** rod.

- c. **NPS 3/4 (DN 20): 38 inches (975 mm) with 3/8-inch (10-mm) rod.**
 - d. **NPS 1 (DN 25): 40 inches (1015 mm) with 3/8-inch (10-mm) rod.**
 - e. **NPS 1-1/4 (DN 32): 45 inches (1140 mm) with 3/8-inch (10-mm) rod.**
 - f. **NPS 1-1/2 (DN 40): 52 inches (1330 mm) with 3/8-inch (10-mm) rod.**
 - g. **NPS 2 (DN 50): 58 inches (1470 mm) with 3/8-inch (10-mm) rod.**
 - h. **NPS 3 (DN 80): 68 inches (1730 mm) with 1/2-inch (13-mm) rod.**
 - i. **NPS 4 (DN 100): 76 inches (1900 mm) with 1/2-inch (13-mm) rod.**
16. Install supports for vertical ABS piping every **48 inches (1220 mm)**.
 17. Install vinyl-coated hangers for HDPE piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. All Sizes: Install continuous support for piping with compressed air at normal operating temperature above **100 deg F (38 deg C)**.
 - b. **NPS 1/2 (DN 15): 30 inches (760 mm) with 3/8-inch (10-mm) rod.**
 - c. **NPS 3/4 (DN 20): 35 inches (890 mm) with 3/8-inch (10-mm) rod.**
 - d. **NPS 1 (DN 25): 40 inches (1015 mm) with 3/8-inch (10-mm) rod.**
 - e. **NPS 1-1/4 (DN 32): 43 inches (1090 mm) with 3/8-inch (10-mm) rod.**
 - f. **NPS 1-1/2 (DN 40): 49 inches (1245 mm) with 3/8-inch (10-mm) rod.**
 - g. **NPS 2 (DN 50): 55 inches (1400 mm) with 3/8-inch (10-mm) rod.**
 - h. **NPS 3 and NPS 4 (DN 80 and DN 100): 96 inches (2440 mm) with 1/2-inch (13-mm) rod.**
 18. Install supports for vertical HDPE piping every **48 inches (1220 mm)**.
- M. Labeling And Identification
1. Install identifying labels and devices for general-service compressed-air piping, valves, and specialties. Comply with requirements in Division 22 Section "Identification For Plumbing Piping And Equipment".
- N. Field Quality Control
1. Perform field tests and inspections.
 2. Tests and Inspections:
 - a. Piping Leak Tests for Metal Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen to pressure of **50 psig (345 kPa)** above system operating pressure, but not less than **150 psig (1035 kPa)**. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - b. Piping Leak Tests for ABS Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen, at temperature of **110 deg F (43 deg C)** or less, to pressure of **40 psig (275 kPa)** above system operating pressure, but not less than **80 psig (550 kPa) OR 100 psig (690 kPa), as directed**, or more than **120 psig (825 kPa)**. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - c. Piping Leak Tests for HDPE Compressed-Air Piping: Test new and modified parts of existing piping. Cap and fill general-service compressed-air piping with oil-free dry air or gaseous nitrogen, at temperature of **100 deg F (38 deg C)** or less, to pressure of **40 psig (275 kPa)** above system operating pressure, but not less than **100 psig (690 kPa) OR 125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, or more than **180 psig (1240 kPa)**. Isolate test source and let stand for four hours to equalize temperature. Refill system, if required, to test pressure; hold for two hours with no drop in pressure.
 - d. Repair leaks and retest until no leaks exist.
 - e. Inspect filters, lubricators, and pressure regulators for proper operation.
 3. Prepare test reports.

END OF SECTION 22 11 16 00a

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SECTION 22 11 16 00b - STEAM AND CONDENSATE PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for steam and condensate piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following for LP and HP steam and condensate piping:
 - a. Pipe and fittings.
 - b. Strainers.
 - c. Flash tanks.
 - d. Safety valves.
 - e. Pressure-reducing valves.
 - f. Steam traps.
 - g. Thermostatic air vents and vacuum breakers.
 - h. Steam and condensate meters.

C. Definitions

1. HP Systems: High-pressure piping operating at more than **15 psig (104 kPa)** as required by ASME B31.1.
2. LP Systems: Low-pressure piping operating at **15 psig (104 kPa)** or less as required by ASME B31.9.
3. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
4. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

D. Performance Requirements

1. Components and installation shall be capable of withstanding the following minimum working pressures and temperatures:
 - a. HP Steam Piping: **<Insert psig (kPa)>**
 - b. LP Steam Piping: **<Insert psig (kPa)>**
 - c. Condensate Piping: **<Insert psig (kPa)>** at **250 deg F (121 deg C)**.
 - d. Makeup-Water Piping: **80 psig (552 kPa)** at **150 deg F (66 deg C)**.
 - e. Blowdown-Drain Piping: Equal to pressure of the piping system to which it is attached.
 - f. Air-Vent and Vacuum-Breaker Piping: Equal to pressure of the piping system to which it is attached.
 - g. Safety-Valve-Inlet and -Outlet Piping: Equal to pressure of the piping system to which it is attached.

E. Submittals

1. Product Data: For each type of the following:
 - a. RTRP and RTRF with adhesive.
 - b. Pressure-reducing and safety valve.
 - c. Steam trap.
 - d. Air vent and vacuum breaker.
 - e. Flash tank.
 - f. Meter.
2. Shop Drawings: Detail, **1/4 inch equals 1 foot (1:50)** scale, flash tank assemblies and fabrication of pipe anchors, hangers, pipe, multiple pipes, alignment guides, and expansion joints and loops and their attachment to the building structure. Detail locations of anchors, alignment guides, and expansion joints and loops.

3. Welding certificates.
4. Field quality-control test reports.
5. Operation and Maintenance Data: For valves, safety valves, pressure-reducing valves, steam traps, air vents, vacuum breakers, and meters to include in emergency, operation, and maintenance manuals.

F. Quality Assurance

1. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code - Steel."
2. Pipe Welding: Qualify processes and operators according to the following:
 - a. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
3. ASME Compliance: Comply with ASME B31.1, "Power Piping" **AND/OR** ASME B31.9, "Building Services Piping", **as directed**, for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp flash tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1.2 PRODUCTS

A. Copper Tube And Fittings

1. Drawn-Temper Copper Tubing: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M, Type C), as directed.**
2. Annealed-Temper Copper Tubing: **ASTM B 88, Type K (ASTM B 88M, Type A).**
3. Wrought-Copper Fittings and Unions: ASME B16.22.

B. Steel Pipe And Fittings

1. Steel Pipe: ASTM A 53/A 53M, black steel, plain ends, Type, Grade, and Schedule as indicated in Part 3 piping applications articles.
2. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125, 150, and 300 as indicated in Part 3 piping applications articles.
3. Malleable-Iron Threaded Fittings: ASME B16.3; Classes 150 and 300 as indicated in Part 3 piping applications articles.
4. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 3 piping applications articles.
5. Cast-Iron Threaded Flanges and Flanged Fittings: ASME B16.1, Classes 125 and 250 as indicated in Part 3 piping applications articles; raised ground face, and bolt holes spot faced.
6. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
7. Wrought-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Butt welding.
 - c. Facings: Raised face.
8. Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M, black steel of same Type, Grade, and Schedule as pipe in which installed.
9. Stainless-Steel Bellows, Flexible Connectors:
 - a. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforced, protective jacket.
 - b. End Connections: Threaded or flanged to match equipment connected.
 - c. Performance: Capable of **3/4-inch (20-mm)** misalignment.
 - d. CWP Rating: **150-psig (1035-kPa).**
 - e. Maximum Operating Temperature: **250 deg F (121 deg C).**

C. Fiberglass Pipe And Fittings

1. RTRP: ASTM D 2996 filament-wound pipe with tapered bell and spigot ends for adhesive joints.
 2. RTRF: Compression or spray-up/contact molded fittings of same material, pressure class, and joining method as pipe.
 3. Flanges: ASTM D 4024 full-face gaskets suitable for the service, minimum **1/8 inch (3.2 mm)** thick, 60-70 durometer. ASTM A 307, Grade B, hex head bolts with washers.
 4. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- D. Joining Materials
1. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
 3. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 4. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
 5. Welding Filler Metals: Comply with **AWS D10.12 (AWS D10.12M)** for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 6. Welding Materials: Comply with Section II, Part C, of ASME Boiler and Pressure Vessel Code for welding materials appropriate for wall thickness and for chemical analysis of pipe being welded.
- E. Dielectric Fittings
1. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
 2. Insulating Material: Suitable for system fluid, pressure, and temperature.
 3. Dielectric Unions:
 - a. Factory-fabricated union assembly, for **250-psig (1725-kPa)** minimum working pressure at **180 deg F (82 deg C)**.
 4. Dielectric Flanges:
 - a. Factory-fabricated companion-flange assembly, for **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure as required to suit system pressures.
 5. Dielectric-Flange Kits:
 - a. Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - b. Separate companion flanges and steel bolts and nuts shall have **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure as required to suit system pressures.
- F. Valves
1. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Division 23 Section "General-duty Valves For Hvac Piping".
 2. Stop-Check Valves:
 - a. Body and Bonnet: Malleable iron.
 - b. End Connections: Flanged.
 - c. Disc: Cylindrical with removable liner and machined seat.
 - d. Stem: Brass alloy.
 - e. Operator: Outside screw and yoke with cast-iron handwheel.
 - f. Packing: Polytetrafluoroethylene-impregnated packing with two-piece packing gland assembly.
 - g. Pressure Class: 250.
- G. Strainers
1. Y-Pattern Strainers:

- a. Body: ASTM A 126, Class B cast iron, with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for strainers **NPS 2 (DN 50)** and smaller; flanged ends for strainers **NPS 2-1/2 (DN 65)** and larger.
 - c. Strainer Screen: Stainless-steel, 20 mesh strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. Tapped blowoff plug.
 - e. CWP Rating: **250-psig (1725-kPa)** working steam pressure.
2. Basket Strainers:
- a. Body: ASTM A 126, Class B cast iron, with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for strainers **NPS 2 (DN 50)** and smaller; flanged ends for strainers **NPS 2-1/2 (DN 65)** and larger.
 - c. Strainer Screen: Stainless-steel, 20 mesh strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: **250-psig (1725-kPa)** working steam pressure.
- H. Flash Tanks
1. Shop or factory fabricated of welded steel according to ASME Boiler and Pressure Vessel Code, for **150-psig (1035-kPa)** rating; and bearing ASME label. Fabricate with tappings for low-pressure steam and condensate outlets, high-pressure condensate inlet, air vent, safety valve, and legs.
- I. Safety Valves
1. Bronze **OR** Brass, **as directed**, Safety Valves:
 - a. Disc Material: Forged copper alloy.
 - b. End Connections: Threaded inlet and outlet.
 - c. Spring: Fully enclosed steel spring with adjustable pressure range and positive shutoff, factory set and sealed.
 - d. Pressure Class: 250.
 - e. Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
 - f. Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code.
 2. Cast-Iron Safety Valves:
 - a. Disc Material: Forged copper alloy with bronze nozzle.
 - b. End Connections: Raised-face flanged inlet and threaded or flanged outlet connections.
 - c. Spring: Fully enclosed cadmium-plated steel spring with adjustable pressure range and positive shutoff, factory set and sealed.
 - d. Pressure Class: 250.
 - e. Drip-Pan Elbow: Cast iron and having threaded inlet, outlet, and drain, with threads complying with ASME B1.20.1.
 - f. Exhaust Head: Cast iron and having threaded inlet and drain, with threads complying with ASME B1.20.1.
 - g. Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code.
- J. Pressure-Reducing Valves
1. Size, Capacity, and Pressure Rating: Factory set for inlet and outlet pressures indicated.
 2. Description: Pilot-actuated, diaphragm type, with adjustable pressure range and positive shutoff.
 3. Body: Cast iron.
 4. End Connections: Threaded connections for valves **NPS 2 (DN 50)** and smaller and flanged connections for valves **NPS 2-1/2 (DN 65)** and larger.
 5. Trim: Hardened stainless steel.
 6. Head and Seat: Replaceable, main head stem guide fitted with flushing and pressure-arresting device cover over pilot diaphragm.
 7. Gaskets: Non-asbestos materials.

K. Steam Traps

1. Thermostatic Traps:
 - a. Body: Bronze angle-pattern body with integral union tailpiece and screw-in cap.
 - b. Trap Type: Balanced-pressure.
 - c. Bellows: Stainless steel or monel.
 - d. Head and Seat: Replaceable, hardened stainless steel.
 - e. Pressure Class: 125.
2. Thermodynamic Traps:
 - a. Body: Stainless steel with screw-in cap.
 - b. End Connections: Threaded.
 - c. Disc and Seat: Stainless steel.
 - d. Maximum Operating Pressure: **600 psig (4140 kPa)**.
3. Float and Thermostatic Traps:
 - a. Body and Bolted Cap: ASTM A 126, cast iron.
 - b. End Connections: Threaded.
 - c. Float Mechanism: Replaceable, stainless steel.
 - d. Head and Seat: Hardened stainless steel.
 - e. Trap Type: Balanced pressure.
 - f. Thermostatic Bellows: Stainless steel or monel.
 - g. Thermostatic air vent capable of withstanding **45 deg F (25 deg C)** of superheat and resisting water hammer without sustaining damage.
 - h. Vacuum Breaker: Thermostatic with phosphor bronze bellows, and stainless steel cage, valve, and seat.
 - i. Maximum Operating Pressure: **125 psig (860 kPa)**.
4. Inverted Bucket Traps:
 - a. Body and Cap: Cast iron.
 - b. End Connections: Threaded.
 - c. Head and Seat: Stainless steel.
 - d. Valve Retainer, Lever, and Guide Pin Assembly: Stainless steel.
 - e. Bucket: Brass or stainless steel.
 - f. Strainer: Integral stainless-steel inlet strainer within the trap body.
 - g. Air Vent: Stainless-steel thermostatic vent.
 - h. Pressure Rating: **250 psig (1725 kPa)**.

L. Thermostatic Air Vents And Vacuum Breakers

1. Thermostatic Air Vents:
 - a. Body: Cast iron, bronze or stainless steel.
 - b. End Connections: Threaded.
 - c. Float, Valve, and Seat: Stainless steel.
 - d. Thermostatic Element: Phosphor bronze bellows in a stainless-steel cage.
 - e. Pressure Rating: **125 psig (861 kPa) OR 300 psig (2068 kPa), as directed.**
 - f. Maximum Temperature Rating: **350 deg F (177 deg C)**.
2. Vacuum Breakers:
 - a. Body: Cast iron, bronze, or stainless steel.
 - b. End Connections: Threaded.
 - c. Sealing Ball, Retainer, Spring, and Screen: Stainless steel.
 - d. O-ring Seal: EPR.
 - e. Pressure Rating: **125 psig (861 kPa) OR 300 psig (2068 kPa), as directed.**
 - f. Maximum Temperature Rating: **350 deg F (177 deg C)**.

M. Steam Meters

1. Meters shall have a microprocessor to display totalizer flow, flow rate, temperature, pressure, time, and date; alarms for high and low flow rate and temperature.
 - a. Computer shall have 4 to 20-mA or 2 to 10 volt output for temperature, pressure, and contact closure for flow increments.
 - b. Independent timers to store four peak flow rates and total flow.

- c. Interface compatible with central workstation described in Division 23 Section "Instrumentation And Control For Hvac".
 - d. Microprocessor Enclosure: NEMA 250, Type 4.
2. Sensor:
- a. Venturi, of stainless-steel **OR** carbon-steel, **as directed**, construction, for insertion in pipeline between flanges. At least 10:1 turndown with plus or minus 1 percent accuracy over full-flow range.
 - b. Vortex type with stainless-steel wetted parts and wafer **OR** flange, **as directed**, connections; and with a piezoelectric sensor removable and serviceable without shutting down the process. At least 10:1 turndown with plus or minus 1 percent accuracy over full-flow range.
 - c. Spring-loaded, variable-area flowmeter type; density compensated with stainless-steel wetted parts and wafer **OR** flange, **as directed**, connections. At least 10:1 turndown with plus or minus 2 percent accuracy over full-flow range.

N. Condensate Meters

1. Body: Cast iron, bronze, or brass.
2. Turbine: Copper, brass, or stainless steel.
3. Connections: Threaded for **NPS 2 (DN 50)** and smaller and flanged for **NPS 2-1/2 (DN 65)**.
4. Totalizer: Meters shall have a microprocessor to display flow, flow rate, time, and date; alarms for high and low flow rate, pressure, and temperature.
 - a. Computer shall have 4- to 20-mA or 2- to 10-volt output for temperature, pressure, and contact closure for flow increments.
 - b. Independent timers to store four peak flow rates and total flow.
 - c. Interface compatible with central workstation specified in Division 23 Section "Instrumentation And Control For Hvac".
 - d. Microprocessor Enclosure: NEMA 250, Type 4.
5. Pressure Rating: Atmospheric.
6. Maximum Temperature Rating: **250 deg F (121 deg C)**.

1.3 EXECUTION

A. LP Steam Piping Applications

1. LP Steam Piping, **NPS 2 (DN 50)** and Smaller: Schedule 40 **OR** 80, **as directed**, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
2. LP Steam Piping, **NPS 2-1/2 through NPS 12 (DN 65 through DN 300)**: Schedule 40 **OR** 80, **as directed**, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
3. LP Steam Piping, **NPS 14 through NPS 18 (DN 350 through DN 450)**: Schedule 30, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
4. LP Steam Piping, **NPS 20 (DN 500)** and Larger: Schedule 20, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
5. Condensate piping above grade, **NPS 2 (DN 50)** and smaller, shall be either of the following, **as directed**:
 - a. Schedule 80, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
6. Condensate piping above grade, **NPS 2-1/2 (DN 65)** and larger, shall be either of the following, **as directed**:
 - a. Schedule 80, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
7. Condensate piping below grade, **NPS 2 (DN 50)** and smaller, shall be either of the following, **as directed**:

- a. Schedule 80, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
8. Condensate piping below grade, **NPS 2-1/2 (DN 65)** and larger, shall be either of the following, **as directed**:
- a. Schedule 80, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
- B. HP Steam Piping Applications
1. HP Steam Piping, **NPS 2 (DN 50)** and Smaller: Schedule 40 **OR** 80, **as directed**, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
 2. HP Steam Piping, **NPS 2-1/2 through NPS 12 (DN 65 through DN 300)**: Schedule 40 **OR** 80, **as directed**, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 3. HP Steam Piping, **NPS 14 through NPS 18 (DN 350 through DN 450)**: Schedule 30, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 4. HP Steam Piping, **NPS 20 (DN 500)** and Larger: Schedule 20, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 5. Condensate piping above grade, **NPS 2 (DN 50)** and smaller, shall be either of the following, **as directed**:
 - a. Schedule 80, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
 6. Condensate piping above grade, **NPS 2-1/2 (DN 65)** and larger, shall be either of the following, **as directed**:
 - a. Schedule 80, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
 7. Condensate piping below grade, **NPS 2 (DN 50)** and smaller, shall be either of the following, **as directed**:
 - a. Schedule 80, Type S, Grade B, steel pipe; Class 125 cast-iron fittings; and threaded joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
 8. Condensate piping below grade, **NPS 2-1/2 (DN 65)** and larger, shall be either of the following, **as directed**:
 - a. Schedule 80, Type E, Grade B, steel pipe; Class 150 wrought-steel fittings, flanges, and flange fittings; and welded and flanged joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
- C. Ancillary Piping Applications
1. Makeup-water piping installed above grade shall be either of the following, **as directed**:
 - a. Drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings, and solvent welded joints.
 2. Makeup-Water Piping Installed below Grade and within Slabs: Annealed-temper copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.
 3. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.
 4. Air-Vent Piping:
 - a. Inlet: Same as service where installed.
 - b. Outlet: Type **K (A)** annealed-temper copper tubing with soldered or flared joints.
 5. Vacuum-Breaker Piping: Outlet, same as service where installed.
 6. Safety-Valve-Inlet and -Outlet Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed.
- D. Valve Applications

1. Install shutoff duty valves at branch connections to steam supply mains, at steam supply connections to equipment, and at the outlet of steam traps.
2. Install safety valves on pressure-reducing stations and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install safety-valve discharge piping, without valves, to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.

E. Piping Installation

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Use indicated piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
3. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
4. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
5. Install piping to permit valve servicing.
6. Install piping free of sags and bends.
7. Install fittings for changes in direction and branch connections.
8. Install piping to allow application of insulation.
9. Select system components with pressure rating equal to or greater than system operating pressure.
10. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
11. Install drains, consisting of a tee fitting, **NPS 3/4 (DN 20)** full port-ball valve, and short **NPS 3/4 (DN 20)** threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
12. Install steam supply piping at a minimum uniform grade of 0.2 percent downward in direction of steam flow.
13. Install condensate return piping at a minimum uniform grade of 0.4 percent downward in direction of condensate flow.
14. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
15. Install branch connections to mains using mechanically formed, **as directed**, tee fittings in main pipe, with the branch connected to top of main pipe.
16. Install valves according to Division 23 Section "General-duty Valves For Hvac Piping".
17. Install unions in piping, **NPS 2 (DN 50)** and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.
18. Install flanges in piping, **NPS 2-1/2 (DN 65)** and larger, at final connections of equipment and elsewhere as indicated.
19. Install strainers on supply side of control valves, pressure-reducing valves, traps, and elsewhere as indicated. Install **NPS 3/4 (DN 20)** nipple and full port ball valve in blowdown connection of strainers **NPS 2 (DN 50)** and larger. Match size of strainer blowoff connection for strainers smaller than **NPS 2 (DN 50)**.
20. Install expansion loops, expansion joints, anchors, and pipe alignment guides as specified in Division 23 Section "Expansion Fittings And Loops For Hvac Piping".
21. Identify piping as specified in Division 23 Section "Identification For Hvac Piping And Equipment".
22. Install drip legs at low points and natural drainage points such as ends of mains, bottoms of risers, and ahead of pressure regulators, and control valves.
 - a. On straight runs with no natural drainage points, install drip legs at intervals not exceeding **300 feet (90 m)**.
 - b. Size drip legs same size as main. In steam mains **NPS 6 (DN 150)** and larger, drip leg size can be reduced, but to no less than **NPS 4 (DN 100)**.
23. Flash Tank:

- a. Pitch condensate piping down toward flash tank.
 - b. If more than one condensate pipe discharges into flash tank, install a check valve in each line.
 - c. Install thermostatic air vent at tank top.
 - d. Install safety valve at tank top.
 - e. Install full-port ball valve, and swing check valve on condensate outlet.
 - f. Install inverted bucket or float and thermostatic trap at low-pressure condensate outlet, sized for three times the calculated heat load.
 - g. Install pressure gage on low-pressure steam outlet according to Division 23 Section "Meters And Gages For Hvac Piping".
- F. Steam-Trap Installation
1. Install steam traps in accessible locations as close as possible to connected equipment.
 2. Install full-port ball valve, strainer, and union upstream from trap; install union, check valve, and full-port ball valve downstream from trap unless otherwise indicated.
- G. Pressure-Reducing Valve Installation
1. Install pressure-reducing valves in accessible location for maintenance and inspection.
 2. Install bypass piping around pressure-reducing valves, with globe valve equal in size to area of pressure-reducing valve seat ring, unless otherwise indicated.
 3. Install gate valves on both sides of pressure-reducing valves.
 4. Install unions or flanges on both sides of pressure-reducing valves having threaded- or flanged-end connections respectively.
 5. Install pressure gages on low-pressure side of pressure-reducing valves after the bypass connection according to Division 23 Section "Meters And Gages For Hvac Piping".
 6. Install strainers upstream for pressure-reducing valve.
 7. Install safety valve downstream from pressure-reducing valve station.
- H. Steam Or Condensate Meter Installation
1. Install meters with lengths of straight pipe upstream and downstream according to steam meter manufacturer's instructions.
 2. Provide data acquisition wiring. Refer to Division 23 Section "Instrumentation And Control For Hvac".
- I. Safety Valve Installation
1. Install safety valves according to ASME B31.1, "Power Piping" **OR** ASME B31.9, "Building Services Piping," **as directed**
 2. Pipe safety-valve discharge without valves to atmosphere outside the building.
 3. Install drip-pan elbow fitting adjacent to safety valve and pipe drain connection to nearest floor drain.
 4. Install exhaust head with drain to waste, on vents equal to or larger than **NPS 2-1/2 (DN 65)**.
- J. Hangers And Supports
1. Install hangers and supports according to Division 23 Section "Hangers And Supports For Hvac Piping And Equipment". Comply with requirements below for maximum spacing.
 2. Seismic restraints are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 3. Install the following pipe attachments:
 - a. Adjustable steel clevis hangers for individual horizontal piping less than **20 feet (6 m)** long.
 - b. Adjustable roller hangers and spring hangers for individual horizontal piping **20 feet (6 m)** or longer.
 - c. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping **20 feet (6 m)** or longer, supported on a trapeze.
 - d. Spring hangers to support vertical runs.
 4. Install hangers with the following maximum spacing and minimum rod sizes:
 - a. **NPS 3/4 (DN 20)**: Maximum span, **9 feet (2.7 m)**; minimum rod size, **1/4 inch (6.4 mm)**.

- b. **NPS 1 (DN 25):** Maximum span, **9 feet (2.7 m)**; minimum rod size, **1/4 inch (6.4 mm)**.
 - c. **NPS 1-1/2 (DN 40):** Maximum span, **12 feet (3.7 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 2 (DN 50):** Maximum span, **13 feet (4 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - e. **NPS 2-1/2 (DN 65):** Maximum span, **14 feet (4.3 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - f. **NPS 3 (DN 80):** Maximum span, **15 feet (4.6 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - g. **NPS 4 (DN 100):** Maximum span, **17 feet (5.2 m)**; minimum rod size, **1/2 inch (13 mm)**.
 - h. **NPS 6 (DN 150):** Maximum span, **21 feet (6.4 m)**; minimum rod size, **1/2 inch (13 mm)**.
 - i. **NPS 8 (DN 200):** Maximum span, **24 feet (7.3 m)**; minimum rod size, **5/8 inch (16 mm)**.
 - j. **NPS 10 (DN 250):** Maximum span, **26 feet (8 m)**; minimum rod size, **3/4 inch (19 mm)**.
 - k. **NPS 12 (DN 300):** Maximum span, **30 feet (9.1 m)**; minimum rod size, **7/8 inch (22 mm)**.
 - l. **NPS 14 (DN 350):** Maximum span, **32 feet (9.8 m)**; minimum rod size, **1 inch (25 mm)**.
 - m. **NPS 16 (DN 400):** Maximum span, **35 feet (10.7 m)**; minimum rod size, **1 inch (25 mm)**.
 - n. **NPS 18 (DN 450):** Maximum span, **37 feet (11.3 m)**; minimum rod size, **1-1/4 inches (32 mm)**.
 - o. **NPS 20 (DN 500):** Maximum span, **39 feet (11.9 m)**; minimum rod size, **1-1/4 inches (32 mm)**.
5. Install hangers for drawn-temper copper piping with the following maximum spacing and minimum rod sizes:
 - a. **NPS 1/2 (DN 15):** Maximum span, **4 feet (1.2 m)**; minimum rod size, **1/4 inch (6.4 mm)**.
 - b. **NPS 3/4 (DN 20):** Maximum span, **5 feet (1.5 m)**; minimum rod size, **1/4 inch (6.4 mm)**.
 - c. **NPS 1 (DN 25):** Maximum span, **6 feet (1.8 m)**; minimum rod size, **1/4 inch (6.4 mm)**.
 - d. **NPS 1-1/2 (DN 40):** Maximum span, **8 feet (2.4 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - e. **NPS 2 (DN 50):** Maximum span, **8 feet (2.4 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - f. **NPS 2-1/2 (DN 65):** Maximum span, **9 feet (2.7 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - g. **NPS 3 (DN 80):** Maximum span, **10 feet (3 m)**; minimum rod size, **3/8 inch (10 mm)**.
 6. Support vertical runs at roof, at each floor, and at **10-foot (3-m)** intervals between floors.
 7. Fiberglass Piping Hanger Spacing: Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
- K. Pipe Joint Construction
1. Join pipe and fittings according to the following requirements and Division 21 specifying piping systems.
 2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 4. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube ends. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
 5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 6. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 7. Welded Joints: Construct joints according to **AWS D10.12 (AWS D10.12M)**, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.
 8. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
 9. Fiberglass Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
- L. Terminal Equipment Connections

1. Size for supply and return piping connections shall be the same as or larger than equipment connections.
2. Install traps and control valves in accessible locations close to connected equipment.
3. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
4. Install vacuum breakers downstream from control valve, close to coil inlet connection.
5. Install a drip leg at coil outlet.

M. Field Quality Control

1. Prepare steam and condensate piping according to ASME B31.1, "Power Piping" **AND/OR** ASME B31.9, "Building Services Piping," **as directed**, and as follows:
 - a. Leave joints, including welds, uninsulated and exposed for examination during test.
 - b. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - c. Flush system with clean water. Clean strainers.
 - d. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
2. Perform the following tests on steam and condensate piping:
 - a. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - b. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength.
 - c. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
3. Prepare written report of testing.

END OF SECTION 22 11 16 00b

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SECTION 22 11 16 00c - REFRIGERANT PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for refrigerant piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes refrigerant piping used for air-conditioning applications.

C. Performance Requirements

1. Line Test Pressure for Refrigerant R-134a:
 - a. Suction Lines for Air-Conditioning Applications: **115 psig (793 kPa)**.
 - b. Suction Lines for Heat-Pump Applications: **225 psig (1551 kPa)**.
 - c. Hot-Gas and Liquid Lines: **225 psig (1551 kPa)**.
2. Line Test Pressure for Refrigerant R-407C:
 - a. Suction Lines for Air-Conditioning Applications: **230 psig (1586 kPa)**.
 - b. Suction Lines for Heat-Pump Applications: **380 psig (2620 kPa)**.
 - c. Hot-Gas and Liquid Lines: **380 psig (2620 kPa)**.
3. Line Test Pressure for Refrigerant R-410A:
 - a. Suction Lines for Air-Conditioning Applications: **300 psig (2068 kPa)**.
 - b. Suction Lines for Heat-Pump Applications: **535 psig (3689 kPa)**.
 - c. Hot-Gas and Liquid Lines: **535 psig (3689 kPa)**.

D. Submittals

1. Product Data: For each type of valve and refrigerant piping specialty indicated. Include pressure drop, based on manufacturer's test data, for the following:
 - a. Thermostatic expansion valves.
 - b. Solenoid valves.
 - c. Hot-gas bypass valves.
 - d. Filter dryers.
 - e. Strainers.
 - f. Pressure-regulating valves.
2. Shop Drawings: Show layout of refrigerant piping and specialties, including pipe, tube, and fitting sizes, flow capacities, valve arrangements and locations, slopes of horizontal runs, oil traps, double risers, wall and floor penetrations, and equipment connection details. Show interface and spatial relationships between piping and equipment.
 - a. Shop Drawing Scale: **1/4 inch equals 1 foot (1:50)**.
 - b. Refrigerant piping indicated on Drawings is schematic only. Size piping and design actual piping layout, including oil traps, double risers, specialties, and pipe and tube sizes to accommodate, as a minimum, equipment provided, elevation difference between compressor and evaporator, and length of piping to ensure proper operation and compliance with warranties of connected equipment.
3. Welding certificates.
4. Field quality-control test reports.
5. Operation and Maintenance Data: For refrigerant valves and piping specialties to include in maintenance manuals.

E. Quality Assurance

1. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

2. Comply with ASHRAE 15, "Safety Code for Refrigeration Systems."
3. Comply with ASME B31.5, "Refrigeration Piping and Heat Transfer Components."

F. Product Storage And Handling

1. Store piping in a clean and protected area with end caps in place to ensure that piping interior and exterior are clean when installed.

1.2 PRODUCTS

A. Copper Tube And Fittings

1. Copper Tube: **ASTM B 88, Type K or L (ASTM B 88M, Type A or B) OR ASTM B 280, Type ACR, as directed.**
2. Wrought-Copper Fittings: ASME B16.22.
3. Wrought-Copper Unions: ASME B16.22.
4. Solder Filler Metals: ASTM B 32. Use 95-5 tin antimony or alloy HB solder to join copper socket fittings on copper pipe.
5. Brazing Filler Metals: AWS A5.8.
6. Flexible Connectors:
 - a. Body: Tin-bronze bellows with woven, flexible, tinned-bronze-wire-reinforced protective jacket.
 - b. End Connections: Socket ends.
 - c. Offset Performance: Capable of minimum **3/4-inch (20-mm)** misalignment in minimum **7-inch- (180-mm-)** long assembly.
 - d. Pressure Rating: Factory test at minimum **500 psig (3450 kPa)**.
 - e. Maximum Operating Temperature: **250 deg F (121 deg C)**.

B. Steel Pipe And Fittings

1. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; Type, Grade, and wall thickness as selected in Part 3 piping applications articles.
2. Wrought-Steel Fittings: ASTM A 234/A 234M, for welded joints.
3. Steel Flanges and Flanged Fittings: ASME B16.5, steel, including bolts, nuts, and gaskets, bevel-welded end connection, and raised face.
4. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
5. Flanged Unions:
 - a. Body: Forged-steel flanges for **NPS 1 to NPS 1-1/2 (DN 25 to DN 40)** and ductile iron for **NPS 2 to NPS 3 (DN 50 to DN 80)**. Apply rust-resistant finish at factory.
 - b. Gasket: Fiber asbestos free.
 - c. Fasteners: Four plated-steel bolts, with silicon bronze nuts. Apply rust-resistant finish at factory.
 - d. End Connections: Brass tailpiece adapters for solder-end connections to copper tubing.
 - e. Offset Performance: Capable of minimum **3/4-inch (20-mm)** misalignment in minimum **7-inch- (180-mm-)** long assembly.
 - f. Pressure Rating: Factory test at minimum **400 psig (2760 kPa)**.
 - g. Maximum Operating Temperature: **330 deg F (165 deg C)**.
6. Flexible Connectors:
 - a. Body: Stainless-steel bellows with woven, flexible, stainless-steel-wire-reinforced protective jacket
 - b. End Connections:
 - 1) **NPS 2 (DN 50)** and Smaller: With threaded-end connections.
 - 2) **NPS 2-1/2 (DN 65)** and Larger: With flanged-end connections.
 - c. Offset Performance: Capable of minimum **3/4-inch (20-mm)** misalignment in minimum **7-inch- (180-mm-)** long assembly.
 - d. Pressure Rating: Factory test at minimum **500 psig (3450 kPa)**.

- e. Maximum Operating Temperature: **250 deg F (121 deg C)**.

C. Valves And Specialties

1. Diaphragm Packless Valves:
 - a. Body and Bonnet: Forged brass or cast bronze; globe design with straight-through or angle pattern.
 - b. Diaphragm: Phosphor bronze and stainless steel with stainless-steel spring.
 - c. Operator: Rising stem and hand wheel.
 - d. Seat: Nylon.
 - e. End Connections: Socket, union, or flanged.
 - f. Working Pressure Rating: **500 psig (3450 kPa)**.
 - g. Maximum Operating Temperature: **275 deg F (135 deg C)**.
2. Packed-Angle Valves:
 - a. Body and Bonnet: Forged brass or cast bronze.
 - b. Packing: Molded stem, back seating, and replaceable under pressure.
 - c. Operator: Rising stem.
 - d. Seat: Nonrotating, self-aligning polytetrafluoroethylene.
 - e. Seal Cap: Forged-brass or valox hex cap.
 - f. End Connections: Socket, union, threaded, or flanged.
 - g. Working Pressure Rating: **500 psig (3450 kPa)**.
 - h. Maximum Operating Temperature: **275 deg F (135 deg C)**.
3. Check Valves:
 - a. Body: Ductile iron, forged brass, or cast bronze; globe pattern.
 - b. Bonnet: Bolted ductile iron, forged brass, or cast bronze; or brass hex plug.
 - c. Piston: Removable polytetrafluoroethylene seat.
 - d. Closing Spring: Stainless steel.
 - e. Manual Opening Stem: Seal cap, plated-steel stem, and graphite seal.
 - f. End Connections: Socket, union, threaded, or flanged.
 - g. Maximum Opening Pressure: **0.50 psig (3.4 kPa)**.
 - h. Working Pressure Rating: **500 psig (3450 kPa)**.
 - i. Maximum Operating Temperature: **275 deg F (135 deg C)**.
4. Service Valves:
 - a. Body: Forged brass with brass cap including key end to remove core.
 - b. Core: Removable ball-type check valve with stainless-steel spring.
 - c. Seat: Polytetrafluoroethylene.
 - d. End Connections: Copper spring.
 - e. Working Pressure Rating: **500 psig (3450 kPa)**.
5. Solenoid Valves: Comply with ARI 760 and UL 429; listed and labeled by an NRTL.
 - a. Body and Bonnet: Plated steel.
 - b. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 - c. Seat: Polytetrafluoroethylene.
 - d. End Connections: Threaded.
 - e. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with **1/2-inch (16-GRC)** conduit adapter, and 24 **OR** 115 **OR** 208, **as directed**, -V ac coil.
 - f. Working Pressure Rating: **400 psig (2760 kPa)**.
 - g. Maximum Operating Temperature: **240 deg F (116 deg C)**.
 - h. Manual operator.
6. Safety Relief Valves: Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - a. Body and Bonnet: Ductile iron and steel, with neoprene O-ring seal.
 - b. Piston, Closing Spring, and Seat Insert: Stainless steel.
 - c. Seat Disc: Polytetrafluoroethylene.
 - d. End Connections: Threaded.
 - e. Working Pressure Rating: **400 psig (2760 kPa)**.
 - f. Maximum Operating Temperature: **240 deg F (116 deg C)**.
7. Thermostatic Expansion Valves: Comply with ARI 750.

- a. Body, Bonnet, and Seal Cap: Forged brass or steel.
 - b. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 - c. Packing and Gaskets: Non-asbestos.
 - d. Capillary and Bulb: Copper tubing filled with refrigerant charge.
 - e. Suction Temperature: 40 deg F (4.4 deg C).
 - f. Superheat: Adjustable **OR** Nonadjustable, **as directed**.
 - g. Reverse-flow option (for heat-pump applications).
 - h. End Connections: Socket, flare, or threaded union.
 - i. Working Pressure Rating: 700 psig (4820 kPa) **OR** 450 psig (3100 kPa), **as directed**.
8. Hot-Gas Bypass Valves: Comply with UL 429; listed and labeled by an NRTL.
- a. Body, Bonnet, and Seal Cap: Ductile iron or steel.
 - b. Diaphragm, Piston, Closing Spring, and Seat Insert: Stainless steel.
 - c. Packing and Gaskets: Non-asbestos.
 - d. Solenoid Tube, Plunger, Closing Spring, and Seat Orifice: Stainless steel.
 - e. Seat: Polytetrafluoroethylene.
 - f. Equalizer: Internal **OR** External, **as directed**.
 - g. Electrical: Molded, watertight coil in NEMA 250 enclosure of type required by location with 1/2-inch (16-GRC) conduit adapter, and 24 **OR** 115 **OR** 208, **as directed**,-V ac coil.
 - h. End Connections: Socket.
 - i. Set Pressure: as directed by the Owner.
 - j. Throttling Range: Maximum 5 psig (34 kPa).
 - k. Working Pressure Rating: 500 psig (3450 kPa).
 - l. Maximum Operating Temperature: 240 deg F (116 deg C).
9. Straight-Type Strainers:
- a. Body: Welded steel with corrosion-resistant coating.
 - b. Screen: 100-mesh stainless steel.
 - c. End Connections: Socket or flare.
 - d. Working Pressure Rating: 500 psig (3450 kPa).
 - e. Maximum Operating Temperature: 275 deg F (135 deg C).
10. Angle-Type Strainers:
- a. Body: Forged brass or cast bronze.
 - b. Drain Plug: Brass hex plug.
 - c. Screen: 100-mesh monel.
 - d. End Connections: Socket or flare.
 - e. Working Pressure Rating: 500 psig (3450 kPa).
 - f. Maximum Operating Temperature: 275 deg F (135 deg C).
11. Moisture/Liquid Indicators:
- a. Body: Forged brass.
 - b. Window: Replaceable, clear, fused glass window with indicating element protected by filter screen.
 - c. Indicator: Color coded to show moisture content in ppm.
 - d. Minimum Moisture Indicator Sensitivity: Indicate moisture above 60 ppm.
 - e. End Connections: Socket or flare.
 - f. Working Pressure Rating: 500 psig (3450 kPa).
 - g. Maximum Operating Temperature: 240 deg F (116 deg C).
12. Replaceable-Core Filter Dryers: Comply with ARI 730.
- a. Body and Cover: Painted-steel shell with ductile-iron cover, stainless-steel screws, and neoprene gaskets.
 - b. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 - c. Desiccant Media: Activated alumina **OR** charcoal, **as directed**.
 - d. Designed for reverse flow (for heat-pump applications).
 - e. End Connections: Socket.
 - f. Access Ports: NPS 1/4 (DN 8) connections at entering and leaving sides for pressure differential measurement.
 - g. Maximum Pressure Loss: 2 psig (14 kPa).

- h. Rated Flow: as directed by the Owner.
 - i. Working Pressure Rating: **500 psig (3450 kPa)**.
 - j. Maximum Operating Temperature: **240 deg F (116 deg C)**.
 - 13. Permanent Filter Dryers: Comply with ARI 730.
 - a. Body and Cover: Painted-steel shell.
 - b. Filter Media: 10 micron, pleated with integral end rings; stainless-steel support.
 - c. Desiccant Media: Activated alumina **OR** charcoal, **as directed**.
 - d. Designed for reverse flow (for heat-pump applications).
 - e. End Connections: Socket.
 - f. Access Ports: **NPS 1/4 (DN 8)** connections at entering and leaving sides for pressure differential measurement.
 - g. Maximum Pressure Loss: **2 psig (14 kPa)**.
 - h. Rated Flow: as directed by the Owner.
 - i. Working Pressure Rating: **500 psig (3450 kPa)**.
 - j. Maximum Operating Temperature: **240 deg F (116 deg C)**.
 - 14. Mufflers:
 - a. Body: Welded steel with corrosion-resistant coating.
 - b. End Connections: Socket or flare.
 - c. Working Pressure Rating: **500 psig (3450 kPa)**.
 - d. Maximum Operating Temperature: **275 deg F (135 deg C)**.
 - 15. Receivers: Comply with ARI 495.
 - a. Comply with ASME Boiler and Pressure Vessel Code; listed and labeled by an NRTL.
 - b. Comply with UL 207; listed and labeled by an NRTL.
 - c. Body: Welded steel with corrosion-resistant coating.
 - d. Tappings: Inlet, outlet, liquid level indicator, and safety relief valve.
 - e. End Connections: Socket or threaded.
 - f. Working Pressure Rating: **500 psig (3450 kPa)**.
 - g. Maximum Operating Temperature: **275 deg F (135 deg C)**.
 - 16. Liquid Accumulators: Comply with ARI 495.
 - a. Body: Welded steel with corrosion-resistant coating.
 - b. End Connections: Socket or threaded.
 - c. Working Pressure Rating: **500 psig (3450 kPa)**.
 - d. Maximum Operating Temperature: **275 deg F (135 deg C)**.
- D. Refrigerants
1. ASHRAE 34, R-134a: Tetrafluoroethane.
 2. ASHRAE 34, R-407C: Difluoromethane/Pentafluoroethane/1,1,1,2-Tetrafluoroethane.
 3. ASHRAE 34, R-410A: Pentafluoroethane/Difluoromethane.

1.3 EXECUTION

- A. Piping Applications For Refrigerant R-134a
1. Suction Lines **NPS 1-1/2 (DN 40)** and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
OR
Suction Lines **NPS 4 (DN 100)** and Smaller **OR NPS 2 to NPS 4 (DN 50 to DN 100)**, **as directed**, for Conventional Air-Conditioning Applications: Copper, Type ACR **OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
 2. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with soldered joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**:

a. **NPS 1-1/2 (DN 40)** and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

OR

NPS 1-1/2 (DN 40) and Smaller: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

b. **NPS 4 (DN 100)**: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

3. Safety-Relief-Valve Discharge Piping: Schedule 40, black-steel and wrought-steel fittings with welded joints.

OR

Safety-Relief-Valve Discharge Piping: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with soldered joints.

OR

Safety-Relief-Valve Discharge Piping:

a. **NPS 1-1/2 (DN 40)** and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

OR

NPS 1-1/2 (DN 40) and Smaller: Copper, Type ACR **OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

b. **NPS 4 (DN 100)**: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

B. Piping Applications For Refrigerant R-407c

1. Suction Lines **NPS 1-1/2 (DN 40)** and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings

OR

Suction Lines **NPS 4 (DN 100)** and Smaller **OR NPS 2 to NPS 4 (DN 50 to DN 100)**, **as directed**, for Conventional Air-Conditioning Applications: Copper, Type ACR **OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

2. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with soldered joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**:

a. **NPS 1 (DN 25)** and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

OR

NPS 1 (DN 25) and Smaller: Copper, Type ACR **OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

b. **NPS 1-1/4 to NPS 2 (DN 32 to DN 50)**: Copper, Type **K (A)**, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.

c. **NPS 4 (DN 100)**: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with soldered joints.

3. Safety-Relief-Valve Discharge Piping: Schedule 40, black-steel and wrought-steel fittings with welded joints.

OR

Safety-Relief-Valve Discharge Piping: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with soldered joints.

OR

Safety-Relief-Valve Discharge Piping:

- a. **NPS 1 (DN 25)** and Smaller: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered joints.

OR

NPS 1 (DN 25) and Smaller: Copper, Type ACR **OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.

- b. **NPS 1-1/4 to NPS 2 (DN 32 to DN 50)**: Copper, Type **K (A)**, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.
- c. **NPS 4 (DN 100)**: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with soldered joints.

C. Piping Applications For Refrigerant R-410a

- 1. Suction Lines **NPS 1-1/2 (DN 40)** and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR, annealed-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.

OR

Suction Lines **NPS 3-1/2 (DN 90)** and Smaller **OR NPS 2 to NPS 3-1/2 (DN 50 to DN 90)**, as directed, for Conventional Air-Conditioning Applications: Copper, Type ACR **OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.

OR

Suction Lines **NPS 4 (DN 100)** and Smaller for Conventional Air-Conditioning Applications: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with soldered joints.

- 2. Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, as directed: Copper, Type ACR **OR L (B)**, as directed, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, as directed Copper, Type **K (A)**, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, as directed: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, as directed: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

OR

Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, as directed:

- a. **NPS 5/8 (DN 18)** and Smaller: Copper, Type ACR **OR L (B)**, as directed, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.
- b. **NPS 3/4 to NPS 1 (DN 20 to DN 25)** and Smaller: Copper, Type **K (A)**, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, as directed, joints.
- c. **NPS 1-1/4 (DN 32)** and Smaller: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.
- d. **NPS 1-1/2 to NPS 2 (DN 40 to DN 50)**: Copper, Type ACR **OR K (A) OR L (B)**, as directed, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.

OR

- Hot-Gas and Liquid Lines, and Suction Lines for Heat-Pump Applications, **as directed**, NPS 2 to NPS 4 (DN 50 to DN 100): Schedule 40, black-steel and wrought-steel fittings with welded joints.
3. Safety-Relief-Valve Discharge Piping: Copper, Type ACR **OR L (B)**, **as directed**, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
OR
Safety-Relief-Valve Discharge Piping: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
OR
Safety-Relief-Valve Discharge Piping: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.
OR
Safety-Relief-Valve Discharge Piping: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.
OR
Safety-Relief-Valve Discharge Piping:
a. NPS 5/8 (DN 18) and Smaller: Copper, Type ACR **OR L (B)**, **as directed**, annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
b. NPS 3/4 to NPS 1 (DN 20 to DN 25) and Smaller: Copper, Type K (A), annealed- or drawn-temper tubing and wrought-copper fittings with brazed **OR** soldered, **as directed**, joints.
c. NPS 1-1/4 (DN 32) and Smaller: Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with 95-5 tin-antimony soldered joints.
d. NPS 1-1/2 to NPS 2 (DN 40 to DN 50): Copper, Type ACR **OR K (A) OR L (B)**, **as directed**, drawn-temper tubing and wrought-copper fittings with Alloy HB soldered joints.
OR
Safety-Relief-Valve Discharge Piping NPS 2 to NPS 4 (DN 50 to DN 100): Schedule 40, black-steel and wrought-steel fittings with welded joints.
- D. Valve And Specialty Applications
1. Install diaphragm packless **OR** packed-angle, **as directed**, valves in suction and discharge lines of compressor.
 2. Install service valves for gage taps at inlet and outlet of hot-gas bypass valves and strainers if they are not an integral part of valves and strainers.
 3. Install a check valve at the compressor discharge and a liquid accumulator at the compressor suction connection.
 4. Except as otherwise indicated, install diaphragm packless **OR** packed-angle, **as directed**, valves on inlet and outlet side of filter dryers.
 5. Install a full-sized, three-valve bypass around filter dryers.
 6. Install solenoid valves upstream from each expansion valve and hot-gas bypass valve. Install solenoid valves in horizontal lines with coil at top.
 7. Install thermostatic expansion valves as close as possible to distributors on evaporators.
 - a. Install valve so diaphragm case is warmer than bulb.
 - b. Secure bulb to clean, straight, horizontal section of suction line using two bulb straps. Do not mount bulb in a trap or at bottom of the line.
 - c. If external equalizer lines are required, make connection where it will reflect suction-line pressure at bulb location.
 8. Install safety relief valves where required by ASME Boiler and Pressure Vessel Code. Pipe safety-relief-valve discharge line to outside according to ASHRAE 15.
 9. Install moisture/liquid indicators in liquid line at the inlet of the thermostatic expansion valve or at the inlet of the evaporator coil capillary tube.
 10. Install strainers upstream from and adjacent to the following unless they are furnished as an integral assembly for device being protected:
 - a. Solenoid valves.
 - b. Thermostatic expansion valves.

- c. Hot-gas bypass valves.
 - d. Compressor.
 - 11. Install filter dryers in liquid line between compressor and thermostatic expansion valve, and in the suction line at the compressor, **as directed**.
 - 12. Install receivers sized to accommodate pump-down charge.
 - 13. Install flexible connectors at compressors.
- E. Piping Installation
1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.
 2. Install refrigerant piping according to ASHRAE 15.
 3. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
 4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 6. Install piping adjacent to machines to allow service and maintenance.
 7. Install piping free of sags and bends.
 8. Install fittings for changes in direction and branch connections.
 9. Select system components with pressure rating equal to or greater than system operating pressure.
 10. Refer to Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls" for solenoid valve controllers, control wiring, and sequence of operation.
 11. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.
 12. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection. Install access doors or panels as specified in Division 08 Section "Access Doors And Frames" if valves or equipment requiring maintenance is concealed behind finished surfaces.
 13. Install refrigerant piping in protective conduit where installed belowground.
 14. Install refrigerant piping in rigid or flexible conduit in locations where exposed to mechanical injury.
 15. Slope refrigerant piping as follows:
 - a. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
 - b. Install horizontal suction lines with a uniform slope downward to compressor.
 - c. Install traps and double risers to entrain oil in vertical runs.
 - d. Liquid lines may be installed level.
 16. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.
 17. Before installation of steel refrigerant piping, clean pipe and fittings using the following procedures:
 - a. Shot blast the interior of piping.
 - b. Remove coarse particles of dirt and dust by drawing a clean, lintless cloth through tubing by means of a wire or electrician's tape.
 - c. Draw a clean, lintless cloth saturated with trichloroethylene through the tube or pipe. Continue this procedure until cloth is not discolored by dirt.
 - d. Draw a clean, lintless cloth, saturated with compressor oil, squeezed dry, through the tube or pipe to remove remaining lint. Inspect tube or pipe visually for remaining dirt and lint.
 - e. Finally, draw a clean, dry, lintless cloth through the tube or pipe.

- f. Safety-relief-valve discharge piping is not required to be cleaned but is required to be open to allow unrestricted flow.
 18. Install pipe sleeves at penetrations in exterior walls and floor assemblies.
 19. Seal penetrations through fire and smoke barriers according to Division 07 Section "Penetration Firestopping".
 20. Install piping with adequate clearance between pipe and adjacent walls and hangers or between pipes for insulation installation.
 21. Install sleeves through floors, walls, or ceilings, sized to permit installation of full-thickness insulation.
 22. Seal pipe penetrations through exterior walls according to Division 07 Section "Joint Sealants" for materials and methods.
 23. Identify refrigerant piping and valves according to Division 23 Section "Identification For Hvac Piping And Equipment".
- F. Pipe Joint Construction
1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Fill pipe and fittings with an inert gas (nitrogen or carbon dioxide), during brazing or welding, to prevent scale formation.
 4. Soldered Joints: Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook."
 5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," Chapter "Pipe and Tube."
 - a. Use Type BcuP, copper-phosphorus alloy for joining copper socket fittings with copper pipe.
 - b. Use Type BA9, cadmium-free silver alloy for joining copper with bronze or steel.
 6. Threaded Joints: Thread steel pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry-seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 7. Steel pipe can be threaded, but threaded joints must be seal brazed or seal welded.
 8. Welded Joints: Construct joints according to AWS D10.12/D10.12M.
 9. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
- G. Hangers And Supports
1. Hanger, support, and anchor products are specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
 2. Install the following pipe attachments:
 - a. Adjustable steel clevis hangers for individual horizontal runs less than 20 feet (6 m) long.
 - b. Roller hangers and spring hangers for individual horizontal runs 20 feet (6 m) or longer.
 - c. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping 20 feet (6 m) or longer, supported on a trapeze.
 - d. Spring hangers to support vertical runs.
 - e. Copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
 3. Install hangers for copper tubing with the following maximum spacing and minimum rod sizes:
 - a. NPS 1/2 (DN 15): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 - b. NPS 5/8 (DN 18): Maximum span, 60 inches (1500 mm); minimum rod size, 1/4 inch (6.4 mm).
 - c. NPS 1 (DN 25): Maximum span, 72 inches (1800 mm); minimum rod size, 1/4 inch (6.4 mm).

- d. **NPS 1-1/4 (DN 32):** Maximum span, **96 inches (2400 mm)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - e. **NPS 1-1/2 (DN 40):** Maximum span, **96 inches (2400 mm)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - f. **NPS 2 (DN 50):** Maximum span, **96 inches (2400 mm)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - g. **NPS 2-1/2 (DN 65):** Maximum span, **108 inches (2700 mm)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - h. **NPS 3 (DN 80):** Maximum span, **10 feet (3 m)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - i. **NPS 4 (DN 100):** Maximum span, **12 feet (3.7 m)**; minimum rod size, **1/2 inch (13 mm)**.
 4. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - a. **NPS 2 (DN 50):** Maximum span, **10 feet (3 m)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - b. **NPS 2-1/2 (DN 65):** Maximum span, **11 feet (3.4 m)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - c. **NPS 3 (DN 80):** Maximum span, **12 feet (3.7 m)**; minimum rod size, **3/8 inch (9.5 mm)**.
 - d. **NPS 4 (DN 100):** Maximum span, **14 feet (4.3 m)**; minimum rod size, **1/2 inch (13 mm)**.
 5. Support multifloor vertical runs at least at each floor.
- H. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 2. Tests and Inspections:
 - a. Comply with ASME B31.5, Chapter VI.
 - b. Test refrigerant piping, specialties, and receivers. Isolate compressor, condenser, evaporator, and safety devices from test pressure if they are not rated above the test pressure.
 - c. Test high- and low-pressure side piping of each system separately at not less than the pressures indicated in Part 1 "Performance Requirements" Article.
 - 1) Fill system with nitrogen to the required test pressure.
 - 2) System shall maintain test pressure at the manifold gage throughout duration of test.
 - 3) Test joints and fittings with electronic leak detector or by brushing a small amount of soap and glycerin solution over joints.
 - 4) Remake leaking joints using new materials, and retest until satisfactory results are achieved.
- I. System Charging
1. Charge system using the following procedures:
 - a. Install core in filter dryers after leak test but before evacuation.
 - b. Evacuate entire refrigerant system with a vacuum pump to **500 micrometers (67 Pa)**. If vacuum holds for 12 hours, system is ready for charging.
 - c. Break vacuum with refrigerant gas, allowing pressure to build up to **2 psig (14 kPa)**.
 - d. Charge system with a new filter-dryer core in charging line.
- J. Adjusting
1. Adjust thermostatic expansion valve to obtain proper evaporator superheat.
 2. Adjust high- and low-pressure switch settings to avoid short cycling in response to fluctuating suction pressure.
 3. Adjust set-point temperature of air-conditioning or chilled-water controllers to the system design temperature.
 4. Perform the following adjustments before operating the refrigeration system, according to manufacturer's written instructions:
 - a. Open shutoff valves in condenser water circuit.
 - b. Verify that compressor oil level is correct.
 - c. Open compressor suction and discharge valves.
 - d. Open refrigerant valves except bypass valves that are used for other purposes.
 - e. Check open compressor-motor alignment and verify lubrication for motors and bearings.
 5. Replace core of replaceable filter dryer after system has been adjusted and after design flow rates and pressures are established.

22 - Plumbing



END OF SECTION 22 11 16 00c

Task	Specification	Specification Description
22 11 16 00	01 95 99 99a	Common Work Results for Fire Suppression
22 11 16 00	01 95 99 99b	Common Work Results for Plumbing
22 11 16 00	22 13 16 00	Sanitary Waste And Vent Piping
22 11 16 00	01 95 99 99c	Storm Drainage Piping
22 11 16 00	01 95 99 99d	Compressed-Air Piping For Laboratory And Healthcare Facilities
22 11 16 00	01 95 99 99e	Vacuum Piping For Laboratory And Healthcare Facilities
22 11 16 00	01 95 99 99f	Gas Piping For Laboratory And Healthcare Facilities
22 11 16 00	01 95 99 99g	Common Work Results for HVAC
22 11 16 00	23 21 13 23a	Hydronic Piping
22 11 19 00	01 22 16 00	No Specification Required
22 11 19 00	01 95 99 99a	Common Work Results for Fire Suppression
22 11 19 00	01 95 99 99b	Common Work Results for Plumbing
22 11 19 00	01 95 99 99g	Common Work Results for HVAC
22 11 19 00	22 11 16 00b	Steam And Condensate Piping
22 11 19 00	23 43 00 00	Electronic Air Cleaners
22 11 19 00	33 14 00 00	Water Distribution
22 11 19 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 22 11 23 13 - WATER DISTRIBUTION PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for domestic water pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. In-line, sealless centrifugal pumps.
 - b. Horizontally mounted, in-line, separately coupled centrifugal pumps.
 - c. Horizontally mounted, in-line, close-coupled centrifugal pumps.
 - d. Vertically mounted, in-line, close-coupled centrifugal pumps.

C. Definitions

1. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

D. Submittals

1. Product Data: For each type of product indicated. Include materials of construction, rated capacities, certified performance curves with operating points plotted on curves, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Operation and Maintenance Data: For domestic water pumps to include in operation and maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. UL Compliance: Comply with UL 778 for motor-operated water pumps.

F. Delivery, Storage, And Handling

1. Retain shipping flange protective covers and protective coatings during storage.
2. Protect bearings and couplings against damage.
3. Comply with pump manufacturer's written rigging instructions for handling.

G. Coordination

1. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.2 PRODUCTS

A. In-Line, Sealless Centrifugal Pumps

1. Description: Factory-assembled and -tested, in-line, close-coupled, canned-motor, sealless, overhung-impeller centrifugal pumps.
2. Pump Construction:
 - a. Pump and Motor Assembly: Hermetically sealed, replaceable-cartridge type with motor and impeller on common shaft and designed for installation with pump and motor shaft horizontal.
 - b. Casing: Bronze, with threaded or companion-flange connections.
 - c. Impeller: Plastic.
 - d. Motor: Single speed, unless otherwise indicated.

- B. Horizontally Mounted, In-Line, Separately Coupled Centrifugal Pumps
1. Description: Factory-assembled and -tested, in-line, single-stage, separately coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shafts mounted horizontal.
 2. Pump Construction:
 - a. Casing: Radially split with threaded companion-flange connections for pumps with **NPS 2 (DN 50)** pipe connections and flanged connections for pumps with **NPS 2-1/2 (DN 65)** pipe connections.
 - b. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
 - c. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve.
 - d. Coupling: Flexible.
 - e. Seal: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket.
 - f. Bearings: Oil-lubricated; bronze-journal or ball type.
 - g. Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
 3. Motor: Single speed, with grease-lubricated ball bearings; and resiliently **OR** rigidly, **as directed**, mounted to pump casing.
- C. Horizontally Mounted, In-Line, Close-Coupled Centrifugal Pumps
1. Description: Factory-assembled and -tested, in-line, single-stage, close-coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shaft mounted horizontal.
 2. Pump Construction:
 - a. Casing: Radially split with threaded companion-flange connections for pumps with **NPS 2 (DN 50)** pipe connections and flanged connections for pumps with **NPS 2-1/2 (DN 65)** pipe connections.
 - b. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
 - c. Shaft and Shaft Sleeve: Steel shaft with deflector, with copper-alloy shaft sleeve. Include water slinger on shaft between motor and seal.
 - d. Seal: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket.
 - e. Bearings: Oil-lubricated; bronze-journal or ball type.
 - f. Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
 3. Motor: Single speed, with grease-lubricated ball bearings; and resiliently or rigidly mounted to pump casing.
- D. Vertically Mounted, In-Line, Close-Coupled Centrifugal Pumps
1. Description: Factory-assembled and -tested, in-line, single-stage, close-coupled, overhung-impeller centrifugal pumps designed for installation with pump and motor shaft mounted vertical.
 2. Pump Construction:
 - a. Casing: Radially split, cast iron, with wear rings and threaded companion-flange connections for pumps with **NPS 2 (DN 50)** pipe connections and flanged connections for pumps with **NPS 2-1/2 (DN 65)** pipe connections. Include pump manufacturer's base attachment for mounting pump on concrete base, **as directed**.
 - b. Impeller: Statically and dynamically balanced, closed, and keyed to shaft.
 - c. Shaft and Shaft Sleeve: Stainless-steel or steel **OR** Stainless-steel, **as directed**, shaft, with copper-alloy shaft sleeve.
 - d. Seal: Mechanical, with carbon-steel rotating ring, stainless-steel spring, ceramic seat, and rubber bellows and gasket. Include water slinger on shaft between motor and seal.
 - e. Bearings: Oil-lubricated; bronze-journal or ball type.
 - f. Shaft Coupling: Flexible or rigid type if pump is provided with coupling.
 3. Motor: Single speed, with grease-lubricated ball bearings; and rigidly mounted to pump casing.
- E. Motors

1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 22 Section "Common Motor Requirements For Plumbing Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.

F. Controls

1. Pressure Switches: Electric, adjustable for control of water-supply pump.
 - a. Type: Water-immersion pressure sensor, for installation in piping.
 - b. Enclosure: NEMA 250, Type 4X.
 - c. Operation of Pump: On or off.
 - d. Transformer: Provide if required.
 - e. Power Requirement: 24 V, ac **OR** 120 V, ac, **as directed**.
 - f. Settings: Start pump at as directed by the Owner and stop pump at as directed by the Owner .
2. Thermostats: Electric; adjustable for control of hot-water circulation pump.
 - a. Type: Water-immersion temperature sensor, for installation in piping.
 - b. Range: **50 to 125 deg F (10 to 52 deg C) OR 65 to 200 deg F (18 to 93 deg C) OR 100 to 240 deg F (38 to 116 deg C), as directed.**
 - c. Enclosure: NEMA 250, Type 4X.
 - d. Operation of Pump: On or off.
 - e. Transformer: Provide if required.
 - f. Power Requirement: 24 V, ac **OR** 120 V, ac, **as directed**.
 - g. Settings: Start pump at **105 deg F (41 deg C) OR 110 deg F (43 deg C) OR 115 deg F (46 deg C), as directed**, and stop pump at **120 deg F (49 deg C) OR 125 deg F (52 deg C), as directed**.
3. Timers: Electric, for control of hot-water circulation pump.
 - a. Type: Programmable, seven-day clock with manual override on-off switch.
 - b. Enclosure: NEMA 250, Type 1 suitable for wall mounting.
 - c. Operation of Pump: On or off.
 - d. Transformer: Provide if required.
 - e. Power Requirement: 24 V, ac **OR** 120 V, ac, **as directed**.
 - f. Programmable Sequence of Operation: Up to two on-off cycles each day for seven days.
4. Time-Delay Relays: Electric, for control of hot-water circulation pump between water heater and connected hot-water storage tank.
 - a. Type: Adjustable time-delay relay.
 - b. Range: Up to five minutes.
 - c. Setting: Five minutes.
 - d. Enclosure: NEMA 250, Type 4X.
 - e. Operation of Pump: On or off.
 - f. Transformer: Provide if required.
 - g. Power Requirement: 24 V, ac **OR** 120 V, ac, **as directed**.
 - h. Programmable Sequence of Operation: Limit pump operation to periods of burner operation plus maximum five minutes after the burner stops.

1.3 EXECUTION

A. Examination

1. Examine roughing-in of domestic-water-piping system to verify actual locations of connections before pump installation.

B. Pump Installation

1. Comply with HI 1.4.

2. Install in-line, sealless centrifugal pumps with shaft horizontal unless otherwise indicated.
3. Install horizontally mounted, in-line, separately coupled and close-coupled centrifugal pumps with shaft(s) horizontal.
4. Install vertically mounted, in-line, close-coupled centrifugal pumps with shaft vertical.
5. Pump Mounting: Install vertically mounted, in-line, close-coupled centrifugal pumps with cast-iron base mounted on concrete base using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install continuous-thread hanger rods and spring hangers **OR** spring hangers with vertical-limit stop, **as directed**, of size required to support pump weight.
 - a. Comply with requirements for vibration isolation devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment". Fabricate brackets or supports as required.
 - b. Comply with requirements for hangers and supports specified in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment".
7. Install pressure switches in water supply piping.
8. Install thermostats in hot-water return piping.
9. Install timers on wall in engineer's office, **as directed**.
10. Install time-delay relays in piping between water heaters and hot-water storage tanks.

C. Connections

1. Comply with requirements for piping specified in Division 22 Section "Domestic Water Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to pumps to allow service and maintenance.
3. Connect domestic water piping to pumps. Install suction and discharge piping equal to or greater than size of pump nozzles.
 - a. Install flexible connectors adjacent to pumps in suction and discharge piping of the following pumps:
 - 1) Horizontally mounted, in-line, separately coupled centrifugal pumps.
 - 2) Horizontally mounted, in-line, close-coupled centrifugal pumps.
 - 3) Vertically mounted, in-line, close-coupled centrifugal pumps.
 - 4) Comply with requirements for flexible connectors specified in Division 22 Section "Domestic Water Piping".
 - b. Install shutoff valve and strainer on suction side of each pump, and check, shutoff, and throttling valves on discharge side of each pump. Install valves same size as connected piping. Comply with requirements for valves specified in Division 22 Section "General-duty Valves For Plumbing Piping" and comply with requirements for strainers specified in Division 22 Section "Domestic Water Piping Specialties".
 - c. Install pressure gage and snubber, **as directed**, at suction of each pump and pressure gage and snubber, **as directed**, at discharge of each pump. Install at integral pressure-gage tappings where provided or install pressure-gage connectors in suction and discharge piping around pumps. Comply with requirements for pressure gages and snubbers specified in Division 22 Section "Meters And Gages For Plumbing Piping".
4. Comply with Division 22 for electrical connections, and wiring methods.
5. Connect pressure switches, thermostats, time-delay relays, and timers to pumps that they control.
6. Interlock pump between water heater and hot-water storage tank with water heater burner and time-delay relay.

- D. Identification
 - 1. Comply with requirements for identification specified in Division 22 Section "Identification For Plumbing Piping And Equipment" for identification of pumps.

- E. Startup Service
 - 1. Engage a factory-authorized service representative to perform **OR** Perform, **as directed**, startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Check piping connections for tightness.
 - c. Clean strainers on suction piping.
 - d. Set pressure switches, thermostats, timers, and time-delay relays for automatic starting and stopping operation of pumps.
 - e. Perform the following startup checks for each pump before starting:
 - 1) Verify bearing lubrication.
 - 2) Verify that pump is free to rotate by hand and that pump for handling hot liquid is free to rotate with pump hot and cold. If pump is bound or drags, do not operate until cause of trouble is determined and corrected.
 - 3) Verify that pump is rotating in the correct direction.
 - f. Prime pump by opening suction valves and closing drains, and prepare pump for operation.
 - g. Start motor.
 - h. Open discharge valve slowly.
 - i. Adjust temperature settings on thermostats.
 - j. Adjust timer settings.

- F. Adjusting
 - 1. Adjust domestic water pumps to function smoothly, and lubricate as recommended by manufacturer.
 - 2. Adjust initial temperature set points.
 - 3. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

END OF SECTION 22 11 23 13

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SECTION 22 11 23 13a - PACKAGED BOOSTER PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for packaged booster pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Simplex, constant-speed booster pumps.
 - b. Multiplex, constant-speed booster pumps.
 - c. Simplex, variable-speed booster pumps.
 - d. Multiplex, variable-speed booster pumps.

C. Definitions

1. VFC: Variable-frequency controller(s).

D. Performance Requirements

1. Seismic Performance: Booster pumps shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the booster pump will remain in place without separation of any parts from the booster pump when subjected to the seismic forces specified and the booster pump will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, and dimensions of individual components and profiles **OR** Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories, **as directed**.
2. Shop Drawings: For booster pumps. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Seismic Qualification Certificates: For booster pumps, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Operation and Maintenance Data: For booster pumps to include in emergency, operation, and maintenance manuals.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASME Compliance: Comply with ASME B31.9 for piping.
3. UL Compliance for Packaged Pumping Systems:
 - a. UL 508, "Industrial Control Equipment."

- b. UL 508A, "Industrial Control Panels."
- c. UL 778, "Motor-Operated Water Pumps."
- d. UL 1995, "Heating and Cooling Equipment."
- 4. Booster pumps shall be listed and labeled as packaged pumping systems by testing agency acceptable to authorities having jurisdiction.

G. Delivery, Storage, And Handling

- 1. Retain protective coatings and flange's protective covers during storage.

H. Coordination

- 1. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.2 PRODUCTS

A. Simplex, Constant-Speed Booster Pumps

- 1. Description: Factory-assembled and -tested, fluid-handling system for domestic water, with pump, piping, valves, specialties, and controls, and mounted on base.
- 2. Pump:
 - a. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, close-coupled, single-stage, overhung-impeller, centrifugal pump.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **s directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve and deflector.
 - e. Seal: Mechanical.
 - f. Orientation: Mounted horizontally or vertically.
- 3. Motor: Single speed, with grease-lubricated or pre-greased, permanently shielded, ball-type bearings, and directly mounted to pump casing. Select motor that will not overload through full range of pump performance curve.
- 4. Piping: Copper tube and copper fittings **OR** Stainless-steel pipe and fittings **OR** Stainless-steel pipe and fitting headers and copper tube and copper fittings between headers and pump **OR** Galvanized-steel pipe and cast-iron fittings, **as directed**.
- 5. Valves:
 - a. Shutoff Valves **NPS 2 (DN 50)** and smaller: Gate valve or two-piece, full-port ball valve, in pump suction and discharge piping.
 - b. Shutoff Valves **NPS 2-1/2 (DN 65)** and Larger: Gate valve or lug-type butterfly valve, in pump suction and discharge piping.
 - c. Check Valve **NPS 2 (DN 50)** and smaller: Silent or swing type in pump discharge piping.
 - d. Check Valve **NPS 2-1/2 (DN 65)** and Larger: Silent type in pump discharge piping.
 - e. Control Valve: Adjustable, automatic, pilot-operated or direct-acting, pressure-reducing type in pump discharge piping.
 - f. Control Valve: Combination adjustable, automatic, pilot-operated or direct-acting pressure-reducing-and-check type in pump discharge piping.
 - g. Thermal-Relief Valve: Temperature-and-pressure relief type in pump discharge piping.
- 6. Dielectric Fittings: With insulating material isolating joined dissimilar metals.
- 7. Hydropneumatic Tank: Precharged, ASME-construction, **as directed**, diaphragm or bladder tank made of materials complying with NSF 61.
- 8. Control Panel: Factory installed and connected as an integral part of booster pump; automatic for single-pump, constant-speed operation, with load control and protection functions.
 - a. Control Logic: Electromechanical system with switches, relays **OR** Solid-state system with transducers, programmable microprocessor, **as directed**, and other devices in the controller.

- b. Motor Controller: NEMA ICS 2, general-purpose, Class A, full-voltage, combination-magnetic type with undervoltage release feature, motor-circuit-protector-type disconnect, and short-circuit protective device.
 - 1) Control Voltage: 24 **OR** 120, **as directed**, -V ac, with integral control-power transformer.
 - c. Motor Controller: NEMA ICS 2, solid-state, reduced-voltage type.
 - 1) Control Voltage: 24 **OR** 120, **as directed**, -V ac, with integral control-power transformer.
 - d. Enclosure: NEMA 250, Type 1 **OR** Type 3R **OR** Type 4 **OR** Type 12, **as directed**.
 - e. Motor Overload Protection: Overload relay in each phase.
 - f. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
 - g. Pump Operation: Current- or pressure- sensing method.
 - 1) Time Delay: Controls pump on-off operation; adjustable from 1 to 300 seconds.
 - h. Instrumentation: Suction and discharge pressure gages.
 - i. Light: Running light for pump.
 - j. Thermal-bleed cutoff.
 - k. Low-suction-pressure **OR** Water-storage-tank, low-level, **as directed**, cutout.
 - l. High-suction-pressure cutout.
 - m. Low-discharge-pressure cutout.
 - n. High-discharge-pressure cutout.
 - o. Building Automation System Interface: Provide auxiliary contacts for interface to BACnet **OR** LonWorks, **as directed**, building automation system. Building automation systems are specified in Division 23 Section "Instrumentation And Control For Hvac". Include the following:
 - 1) On-off status of pump.
 - 2) Alarm status.
9. Base: Structural steel.

B. Multiplex, Constant-Speed Booster Pumps

- 1. Description: Factory-assembled and -tested, fluid-handling system for domestic water, with pumps, piping, valves, specialties, and controls, and mounted on base.
- 2. Pumps:
 - a. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, close-coupled, single-stage, overhung-impeller, centrifugal pump.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve and deflector.
 - e. Seal: Mechanical.
 - f. Orientation: Mounted horizontally or vertically.

OR

Pumps:

 - a. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, frame-mounted, separately coupled, single-stage, overhung-impeller, centrifugal pump. Include back-pullout design, **as directed**.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Stainless-steel or steel, **as directed**, shaft, with copper-alloy shaft sleeve and deflector.
 - e. Seal: Mechanical.
 - f. Bearing: Grease-lubricated or pre-greased, permanently shielded ball type.
 - g. Coupling: Flexible, with metal guard.

OR

Pumps:

- a. Type: In line, single stage as defined in HI 1.1-1.2 and HI 1.3 for in-line, single-stage, close-coupled, overhung-impeller, centrifugal pump.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Stainless-steel or steel, **as directed**, shaft, with copper-alloy shaft sleeve.
 - e. Seal: Mechanical.
 - f. Bearing: Grease-lubricated or pre-greased, permanently shielded ball type.
- OR**
- Pumps:
- a. Type: Vertical, multistage as defined in HI 1.1-1.2 and HI 1.3 for in-line, multistage, separately coupled, overhung-impeller, centrifugal pump.
 - b. Casing: Cast-iron or steel base and stainless-steel chamber.
 - c. Impeller: Closed, stainless steel; statically and dynamically balanced and keyed to shaft.
 - d. Shaft: Stainless steel.
 - e. Seal: Mechanical.
 - f. Bearing: Water-lubricated sleeve type.
- OR**
- Pumps:
- a. Type: Vertical, can, as defined in HI 2.1-2.2 and HI 2.3 for in-line, barrel or can, lineshaft, vertical pump.
 - b. Impeller: Closed, stainless steel; statically and dynamically balanced and keyed to shaft.
 - c. Bowls: Epoxy-coated cast iron **OR** Cast iron, **as directed**.
 - d. Shaft: Stainless steel.
 - e. Seals: Mechanical and stuffing-box types.
 - f. Bearings: Water-lubricated bushing type.
3. Motors: Single speed, with grease-lubricated or pre-greased, permanently shielded, ball-type bearings. Select motors that will not overload through full range of pump performance curve.
 4. Piping: Copper tube and copper fittings **OR** Stainless-steel pipe and fittings **OR** Stainless-steel pipe and fitting headers and copper tube and copper fittings between headers and pump **OR** Galvanized-steel pipe and cast-iron fittings, **as directed**.
 5. Valves:
 - a. Shutoff Valves **NPS 2 (DN 50)** and smaller: Gate valve or two-piece, full-port ball valve, in each pump's suction and discharge piping.
 - b. Shutoff Valves **NPS 2-1/2 (DN 65)** and Larger: Gate valve or lug-type butterfly valve, in each pump's suction and discharge piping and in inlet and outlet headers, **as directed**.
 - c. Check Valves **NPS 2 (DN 50)** and smaller: Silent or swing type in each pump's discharge piping.
 - d. Check Valves **NPS 2-1/2 (DN 65)** and Larger: Silent type in each pump's discharge piping.
 - e. Control Valves: Adjustable, automatic, pilot-operated or direct-acting, pressure-reducing type in each pump's discharge piping.
 - f. Control Valves: Combination adjustable, automatic, pilot-operated or direct-acting pressure-reducing-and-check type in each pump's discharge piping.
 - g. Thermal-Relief Valve: Temperature-and-pressure relief type in pump's discharge header piping.
 6. Dielectric Fittings: With insulating material isolating joined dissimilar metals.
 7. Control Panel: Factory installed and connected as an integral part of booster pump; automatic for multiple-pump, constant-speed operation, with load control and protection functions.
 - a. Control Logic: Electromechanical system with switches, relays **OR** Solid-state system with transducers, programmable microprocessor, **as directed**, and other devices in the controller.
 - b. Motor Controller: NEMA ICS 2, general-purpose, Class A, full-voltage, combination-magnetic type with undervoltage release feature, motor-circuit-protector-type disconnect, and short-circuit protective device.

- 1) Control Voltage: 24 **OR** 120, **as directed**, -V ac, with integral control-power transformer.
 - c. Motor Controller: NEMA ICS 2, solid-state, reduced-voltage type.
 - 1) Control Voltage: 24 **OR** 120, **as directed**, -V ac, with integral control-power transformer.
 - d. Enclosure: NEMA 250, Type 1 **OR** Type 3R **OR** Type 4 **OR** Type 12, **as directed**.
 - e. Motor Overload Protection: Overload relay in each phase.
 - f. Starting Devices: Hand-off-automatic selector switch for each pump in cover of control panel, plus pilot device for automatic control.
 - 1) Duplex, Automatic, Alternating Starter: Switches lead pump to lag main pump and to two-pump operation.
 - 2) Triplex, Sequence (Lead-Lag-Lag) Starter: Switches lead pump to one lag main pump and to three-pump operation.
 - g. Pump Operation and Sequencing: Current- or pressure- sensing method.
 - 1) Time Delay: Controls pump on-off operation; adjustable from 1 to 300 seconds.
 - h. Instrumentation: Suction and discharge pressure gages.
 - i. Lights: Running light for each pump.
 - j. Alarm Signal Device: Sounds alarm when backup pumps are operating.
 - 1) Time Delay: Controls alarm operation; adjustable from 1 to 300 seconds, with automatic **OR** manual, **as directed**, reset.
 - k. Thermal-bleed cutoff.
 - l. Low-suction-pressure **OR** Water-storage-tank, low-level, **as directed**, cutout.
 - m. High-suction-pressure cutout.
 - n. Low-discharge-pressure cutout.
 - o. High-discharge-pressure cutout.
 - p. Building Automation System Interface: Provide auxiliary contacts for interface to BACnet **OR** LonWorks, **as directed**, building automation system. Building automation systems are specified in Division 23 Section "Instrumentation And Control For Hvac". Include the following:
 - 1) On-off status of each pump.
 - 2) Alarm status.
8. Base: Structural steel.
- C. Simplex, Variable-Speed Booster Pumps
1. Description: Factory-assembled and -tested, fluid-handling system for domestic water, with pump, piping, valves, specialties, and controls, and mounted on base.
 2. Pump:
 - a. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, close-coupled, single-stage, overhung-impeller, centrifugal pump.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve and deflector.
 - e. Seal: Mechanical.
 - f. Orientation: Mounted horizontally or vertically.
 3. Motor: Single speed, with grease-lubricated or pre-greased, permanently shielded, ball-type bearings, and directly mounted to pump casing. Select motor that will not overload through full range of pump performance curve.
 4. Piping: Copper tube and copper fittings **OR** Stainless-steel pipe and fittings **OR** Stainless-steel pipe and fitting headers and copper tube and copper fittings between headers and pump **OR** Galvanized-steel pipe and cast-iron fittings, **as directed**.
 5. Valves:
 - a. Shutoff Valves **NPS 2 (DN 50)** and Smaller: Gate valve or two-piece, full-port ball valve, in pump suction and discharge piping.
 - b. Shutoff Valves **NPS 2-1/2 (DN 65)** and Larger: Gate valve or lug-type butterfly valve, in pump suction and discharge piping.

- c. Check Valve **NPS 2 (DN 50)** and Smaller: Silent or swing type in pump discharge piping.
 - d. Check Valve **NPS 2-1/2 (DN 65)** and Larger: Silent type in pump discharge piping.
 - e. Thermal-Relief Valve: Temperature-and-pressure relief type in pump discharge piping.
 6. Dielectric Fittings: With insulating material isolating joined dissimilar metals.
 7. Hydropneumatic Tank: Precharged, ASME-construction, **as directed**, diaphragm or bladder tank made of materials complying with NSF 61.
 8. Control Panel: Factory installed and connected as an integral part of booster pump; automatic for single-pump, variable-speed operation, with load control and protection functions.
 - a. Control Logic: Solid-state system with transducers, programmable microprocessor, VFC, and other devices in the controller.
 - b. Motor Controller: NEMA ICS 2, variable-frequency, solid-state type.
 - 1) Control Voltage: 24 **OR** 120, **as directed**, -V ac, with integral control-power transformer.
 - c. Enclosure: NEMA 250, Type 1 **OR** Type 3R **OR** Type 4 **OR** Type 12, **as directed**.
 - d. Motor Overload Protection: Overload relay in each phase.
 - e. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
 - f. Pump Operation: Pressure-sensing method.
 - 1) Time Delay: Controls pump on-off operation; adjustable from 1 to 300 seconds.
 - g. VFC: Voltage-source, pulse-width, modulating-frequency converter; installed in control panel.
 - h. Manual Bypass: Magnetic contactor arranged to transfer to constant-speed operation upon VFC failure.
 - i. Instrumentation: Suction and discharge pressure gages.
 - j. Light: Running light for pump.
 - k. Thermal-bleed cutoff.
 - l. Low-suction-pressure **OR** Water-storage-tank, low-level, **as directed**, cutout.
 - m. High-suction-pressure cutout.
 - n. Low-discharge-pressure cutout.
 - o. High-discharge-pressure cutout.
 - p. Building Automation System Interface: Provide auxiliary contacts for interface to BACnet **OR** LonWorks, **as directed**, building automation system. Building automation systems are specified in Division 23 Section "Instrumentation And Control For Hvac". Include the following:
 - 1) On-off status of each pump.
 - 2) Alarm status.
 9. Base: Structural steel.
- D. Multiplex, Variable-Speed Booster Pumps
1. Description: Factory-assembled and -tested, fluid-handling system for domestic water, with pumps, piping, valves, specialties, and controls, and mounted on base.
 2. Pumps:
 - a. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, close-coupled, single-stage, overhung-impeller, centrifugal pump.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve and deflector.
 - e. Seal: Mechanical.
 - f. Orientation: Mounted horizontally or vertically.
 3. Pumps:
 - a. Type: End suction as defined in HI 1.1-1.2 and HI 1.3 for end-suction, frame-mounted, separately coupled, single-stage, overhung-impeller, centrifugal pump. Include back-pullout design, **as directed**.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.

- c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
- d. Shaft and Shaft Sleeve: Stainless-steel or steel, **as directed**, shaft, with copper-alloy shaft sleeve and deflector.
- e. Seal: Mechanical.
- f. Bearing: Grease-lubricated or pre-greased, permanently shielded ball type.
- g. Coupling: Flexible, with metal guard.
- 4. Pumps:
 - a. Type: In line, single stage as defined in HI 1.1-1.2 and HI 1.3 for in-line, single-stage, close-coupled, overhung-impeller, centrifugal pump.
 - b. Casing: Radially split; bronze **OR** cast iron **OR** stainless steel, **as directed**.
 - c. Impeller: Closed, ASTM B 584 cast bronze **OR** stainless steel, **as directed**; statically and dynamically balanced and keyed to shaft.
 - d. Shaft and Shaft Sleeve: Stainless-steel or steel, **as directed**, shaft, with copper-alloy shaft sleeve.
 - e. Seal: Mechanical.
 - f. Bearing: Grease-lubricated or pre-greased, permanently shielded ball type.
- 5. Pumps:
 - a. Type: Vertical, multistage as defined in HI 1.1-1.2 and HI 1.3 for in-line, multistage, separately coupled, overhung-impeller, centrifugal pump.
 - b. Casing: Cast-iron or steel base and stainless-steel chamber.
 - c. Impeller: Closed, stainless steel; statically and dynamically balanced and keyed to shaft.
 - d. Shaft: Stainless steel.
 - e. Seal: Mechanical.
 - f. Bearing: Water-lubricated sleeve type.
- 6. Pumps:
 - a. Type: Vertical, can, as defined in HI 2.1-2.2 and HI 2.3 for in-line, barrel or can, lineshaft, vertical pump.
 - b. Impeller: Closed, stainless steel; statically and dynamically balanced and keyed to shaft.
 - c. Bowls: Epoxy-coated cast iron **OR** Cast iron, **as directed**.
 - d. Shaft: Stainless steel.
 - e. Seals: Mechanical and stuffing-box types.
 - f. Bearings: Water-lubricated bushing type.
- 7. Motors: Single speed, with grease-lubricated or pre-greased, permanently shielded, ball-type bearings. Select motors that will not overload through full range of pump performance curve.
- 8. Piping: Copper tube and copper fittings **OR** Stainless-steel pipe and fittings **OR** Stainless-steel pipe and fitting headers and copper tube and copper fittings between headers and pump **OR** Galvanized-steel pipe and cast-iron fittings, **as directed**.
- 9. Valves:
 - a. Shutoff Valves **NPS 2 (DN 50)** and Smaller: Gate valve or two-piece, full-port ball valve, in each pump's suction and discharge piping.
 - b. Shutoff Valves **NPS 2-1/2 (DN 65)** and Larger: Gate valve or lug-type butterfly valve, in each pump's suction and discharge piping and in inlet and outlet headers, **as directed**.
 - c. Check Valves **NPS 2 (DN 50)** and Smaller: Silent or swing type in each pump's discharge piping.
 - d. Check Valves **NPS 2-1/2 (DN 65)** and Larger: Silent type in each pump's discharge piping.
 - e. Thermal-Relief Valve: Temperature-and-pressure relief type in pump's discharge header piping.
- 10. Dielectric Fittings: With insulating material isolating joined dissimilar metals.
- 11. Control Panel: Factory installed and connected as an integral part of booster pump; automatic for multiple-pump, variable-speed operation, with load control and protection functions.
 - a. Control Logic: Solid-state system with transducers, programmable microprocessor, VFC, and other devices in controller. Install VFC for pump motors larger than 25 hp in separate panel; same type as motor control panel enclosure.
 - b. Motor Controller: NEMA ICS 2, variable-frequency, solid-state type.

- 1) Control Voltage: 24 **OR** 120, **as directed**, -V ac, with integral control-power transformer.
 - c. Enclosure: NEMA 250, Type 1 **OR** Type 3R **OR** Type 4 **OR** Type 12, **as directed**.
 - d. Motor Overload Protection: Overload relay in each phase.
 - e. Starting Devices: Hand-off-automatic selector switch for each pump in cover of control panel, plus pilot device for automatic control.
 - 1) Duplex, Automatic, Alternating Starter: Switches lead pump to lag main pump and to two-pump operation.
 - 2) Triplex, Sequence (Lead-Lag-Lag) Starter: Switches lead pump to one lag main pump and to three-pump operation.
 - f. Pump Operation and Sequencing: Pressure-sensing method or flow-sensing method **OR** Pressure-sensing method for lead pump and flow-sensing method for lag pumps, **as directed**.
 - 1) Time Delay: Controls pump on-off operation; adjustable from 1 to 300 seconds.
 - g. VFC: Voltage-source, pulse-width, modulating-frequency converter for each **OR** lead, **as directed**, pump.
 - h. Manual Bypass: Magnetic contactor arranged to transfer to constant-speed operation upon VFC failure.
 - i. Instrumentation: Suction and discharge pressure gages.
 - j. Lights: Running light for each pump.
 - k. Alarm Signal Device: Sounds alarm when backup pumps are operating.
 - 1) Time Delay: Controls alarm operation; adjustable from 1 to 300 seconds, with automatic **OR** manual, **as directed**, reset.
 - l. Thermal-bleed cutoff.
 - m. Low-suction-pressure **OR** Water-storage-tank, low-level, **as directed**, cutout.
 - n. High-suction-pressure cutout.
 - o. Low-discharge-pressure cutout.
 - p. High-discharge-pressure cutout.
 - q. Building Automation System Interface: Provide auxiliary contacts for interface to BACnet **OR** LonWorks, **as directed**, building automation system. Building automation systems are specified in Division 23 Section "Instrumentation And Control For Hvac". Include the following:
 - 1) On-off status of each pump.
 - 2) Alarm status.
12. Base: Structural steel.

E. Motors

- 1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors.
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in NFPA 70.

1.3 EXECUTION

A. Examination

- 1. Examine roughing-in for booster pumps to verify actual locations of piping connections before booster-pump installation.

B. Installation

- 1. Equipment Mounting: Install booster pumps on concrete base using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete", **as directed**.

- a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed.**
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 2. Equipment Mounting: Install booster pumps using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed.** Comply with requirements for vibration isolation devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed.**
 3. Support connected domestic-water piping so weight of piping is not supported by booster pumps.
- C. Connections
1. Comply with requirements for piping specified in Division 22 Section "Domestic Water Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Connect domestic-water piping to booster pumps. Install suction and discharge pipe equal to or greater than size of system suction and discharge headers **OR** piping, **as directed.**
 - a. Install shutoff valves on piping connections to booster-pump suction and discharge headers **OR** piping, **as directed.** Install ball, butterfly, or gate valves same size as suction and discharge headers **OR** piping, **as directed.** Comply with requirements for general-duty valves specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 - b. Install union, flanged, or grooved-joint connections on suction and discharge headers **OR** piping, **as directed,** at connection to domestic-water piping. Comply with requirements for unions and flanges specified in Division 22 Section "Domestic Water Piping".
 - c. Install valved bypass, same size as and between piping, at connections to booster-pump suction and discharge headers **OR** piping, **as directed.** Comply with requirements for domestic-water piping specified in Division 22 Section "Domestic Water Piping".
 - d. Install flexible connectors, same size as piping, on piping connections to booster-pump suction and discharge headers **OR** piping, **as directed.** Comply with requirements for flexible connectors specified in Division 22 Section "Domestic Water Piping".
 - e. Install piping adjacent to booster pumps to allow service and maintenance.
- D. Identification
1. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification For Plumbing Piping And Equipment".
- E. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Perform visual and mechanical inspection.
 - b. Leak Test: After installation, charge booster pump and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start booster pumps to confirm proper motor rotation and booster-pump operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Pumps and controls will be considered defective if they do not pass tests and inspections.
 4. Prepare test and inspection reports.
- F. Startup Service
1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

22 - Plumbing



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- G. Adjusting
1. Adjust booster pumps to function smoothly, and lubricate as recommended by manufacturer.
 2. Adjust pressure set points.
 3. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting booster pump to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- H. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain booster pumps.

END OF SECTION 22 11 23 13a

Task	Specification	Specification Description
22 11 23 23	23 21 23 13	Hydronic Pumps
22 11 23 23	01 95 99 99h	Water Supply Wells
22 11 23 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
22 12 23 13	22 33 00 00	Electric, Domestic Water Heaters
22 12 23 13	22 34 00 00	Fuel-Fired, Domestic Water Heaters
22 12 23 26	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 22 13 16 00 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Hub-and-spigot, cast-iron soil pipe and fittings.
2. Hubless, cast-iron soil pipe and fittings.
3. Galvanized-steel pipe and fittings.
4. Stainless steel drainage pipe and fittings.
5. Ductile-iron pipe and fittings.
6. Copper tube and fittings.
7. ABS pipe and fittings.
8. PVC pipe and fittings.
9. Specialty pipe fittings.
10. Encasement for underground metal piping.

B. Related Requirements:

1. Section 221313 "Facility Sanitary Sewers" for sanitary sewerage piping and structures outside the building.
2. Section 221329 "Sanitary Sewerage Pumps" for effluent and sewage pumps.
3. Section 226600 "Chemical-Waste Systems for Laboratory and Healthcare Facilities" for chemical-waste and vent piping systems.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. as directed by the Owner .

C. Shop Drawings: For hubless, single-stack drainage system. Include plans, elevations, sections, and details.

1.3 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and elevations, or Building Information Model (BIM) drawn to scale, showing items described in this Section and coordinated with all building trades.

B. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

- C. Field quality-control reports.

1.4 FIELD CONDITIONS

- A. Interruption of Existing Sanitary Waste Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service in accordance with requirements indicated:
 1. Notify **[Architect] [Construction Manager] [Owner]** no fewer than **[two]** days or as directed by the Owner in advance of proposed interruption of sanitary waste service.
 2. Do not proceed with interruption of sanitary waste service without **[Architect's] [Construction Manager's] [Owner's]** written permission.

1.5 WARRANTY

- A. Listed manufacturers to provide labeling and warranty of their respective products.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Components and installation are capable of withstanding the following minimum working pressure unless otherwise indicated:
 1. Soil, Waste, and Vent Piping: **[10 ft. head of water (30 kPa head of water)]** or as directed by the Owner .
 2. Waste, Force-Main Piping: **[50 psig (345 kPa)] [100 psig (690 kPa)] [150 psig (1035 kPa)]** or as directed by the Owner .
- B. Seismic Performance: Soil, waste, and vent piping and support and installation to withstand the effects of earthquake motions determined in accordance with **[ASCE/SEI 7]** or as directed by the Owner . See Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment":
 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the unit will be fully operational after the seismic event**]."
 2. Component Importance Factor: **[1.5] [1.0]**.
- C. **Requirements for Component Amplification Factor and Component Response Modification Factor** as directed by the Owner .

2.2 PIPING MATERIALS

- A. Piping materials to bear label, stamp, or other markings of specified testing agency.
- B. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings:
 1. Marked with CISPI collective trademark.
 2. ASTM A74, **[service] [and] [extra-heavy]** cast iron.
- B. Gaskets: ASTM C564, rubber.
- C. Caulking Materials: ASTM B29, pure lead and oakum or hemp fiber.

2.4 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS

- A. Pipe and Fittings:
 1. Marked with CISPI collective trademark.
 2. ASTM A888 or CISPI 301.
- B. Single-Stack Aerator Fittings: ASME B16.45, hubless, cast-iron aerator and deaerator drainage fittings.
- C. CISPI, Hubless-Piping Couplings:
 1. Standards: ASTM C1277 and CISPI 310.
 2. Description: Stainless steel corrugated shield with stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.
- D. Heavy-Duty, Hubless-Piping Couplings:
 1. Standards: ASTM C1277 and ASTM C1540. or as directed by the Owner .
 2. Description: Stainless steel shield with stainless steel bands and tightening devices; and ASTM C564, rubber sleeve with integral, center pipe stop.

2.5 GALVANIZED-STEEL PIPE AND FITTINGS

- A. Galvanized-Steel Pipe: ASTM A53/A53M, Type E, standard-weight cast iron. Include square-cut-grooved or threaded ends matching joining method.
- B. **[Galvanized-]**Cast-Iron Drainage Fittings: ASME B16.12, threaded.
- C. Steel Pipe Pressure Fittings:
 1. **[Galvanized-]**Steel Pipe Nipples: ASTM A733, made of ASTM A53/A53M or ASTM A106/A106M, Schedule 40, seamless steel pipe. Include ends matching joining method.
 2. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface; and female threaded ends.
 3. **[Galvanized-]**Gray-Iron, Threaded Fittings: ASME B16.4, Class 125, standard pattern.
- D. Cast-Iron Flanges: ASME B16.1, Class 125.
 1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- E. Grooved-Joint, Galvanized-Steel-Pipe Appurtenances:

1. Galvanized, Grooved-End Fittings for Galvanized-Steel Piping: ASTM A536, ductile-iron castings; ASTM A47/A47M, malleable-iron castings; ASTM A234/A234M, forged steel fittings; or ASTM A106/A106M, steel pipes with dimensions matching ASTM A53/A53M, steel pipe, and complying with AWWA C606 for grooved ends.
2. Grooved Mechanical Couplings for Galvanized-Steel Piping: ASTM F1476, Type I. Include ferrous housing sections with continuous curved keys, EPDM-rubber gasket suitable for hot and cold water, and bolts and nuts.

2.6 STAINLESS STEEL DRAINAGE PIPE AND FITTINGS

- A. Description: Comply with requirements of ASME A112.3.1 drainage pattern.
- B. Material: **[Type 304 stainless steel] [Type 316L stainless steel] [Type 304 or 316L stainless steel]**.
- C. Pipe Construction: Seamless.
- D. Internal Sealing Rings: **[EPDM] [NBR]** or as directed by the Owner [, **marked or color-coded for the application**].
- E. Joints: Single or double, socket and spigot ends.

2.7 DUCTILE-IRON PIPE AND FITTINGS

- A. Ductile-Iron, Mechanical-Joint Piping:
 1. Ductile-Iron Pipe: AWWA C151/A21.51, with mechanical-joint bell and plain spigot ends unless grooved or flanged ends are indicated.
 2. Ductile-Iron Fittings: AWWA C110/A21.10, mechanical-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
 3. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- B. Ductile-Iron, Push-on-Joint Piping:
 1. Ductile-Iron Pipe: AWWA C151/A21.51, with push-on-joint bell and plain spigot ends unless grooved or flanged ends are indicated.
 2. Ductile-Iron Fittings: AWWA C110/A21.10, push-on-joint, ductile- or gray-iron standard pattern or AWWA C153/A21.53, ductile-iron compact pattern.
 3. Gaskets: AWWA C111/A21.11, rubber.
- C. Ductile-Iron, Grooved-Joint Piping: AWWA C151/A21.51, with round-cut-grooved ends in accordance with AWWA C606.
- D. Ductile-Iron, Grooved-End Pipe Appurtenances:
 1. Grooved-End, Ductile-Iron Fittings: ASTM A536, ductile-iron castings, with dimensions matching AWWA C110/A 21.10, ductile-iron pipe or AWWA C153/A 21.53, ductile-iron fittings, and complying with AWWA C606 for grooved ends.
 2. Grooved Mechanical Couplings for Ductile-Iron Pipe: ASTM F1476, Type I. Include ferrous housing sections with continuous curved keys, EPDM-rubber center-leg gasket suitable for hot and cold water, and bolts and nuts.

2.8 COPPER TUBE AND FITTINGS

- A. Copper Type DWV Tube: ASTM B306, drainage tube, drawn temper.
- B. Copper Drainage Fittings: ASME B16.23, cast copper or ASME B16.29, wrought copper, solder-joint fittings.
- C. Hard Copper Tube: **ASTM B88, Type L and Type M (ASTM B88M, Type B and Type C)**, water tube, drawn temper.
- D. Soft Copper Tube: **ASTM B88, Type L (ASTM B88M, Type B)**, water tube, annealed temper.
- E. Copper Pressure Fittings:
 - 1. Copper Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Copper Unions: MSS SP-123, copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- F. Copper Flanges: ASME B16.24, Class 150, cast copper with solder-joint end.
 - 1. Flange Gasket Materials: ASME B16.21, full-face, flat, nonmetallic, asbestos-free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- G. Solder: ASTM B32, lead free with ASTM B813, water-flushable flux.

2.9 ABS PIPE AND FITTINGS

- A. NSF Marking: Comply with NSF 14 for plastic piping components. Include "NSF-dwv" marking for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.
- B. Solid-Wall ABS Pipe: ASTM D2661, Schedule 40.
- C. Cellular-Core ABS Pipe: ASTM F628, Schedule 40.
- D. ABS Socket Fittings: ASTM D2661, made in accordance with ASTM D3311, drain, waste, and vent patterns.
- E. Solvent Cement: ASTM D2235.
 - 1. as directed by the Owner .

2.10 PVC PIPE AND FITTINGS

- A. Comply with NSF 14 for plastic piping components. Include "NSF-dwv" marking for plastic drain, waste, and vent piping and "NSF-sewer" marking for plastic sewer piping.
- B. Solid-Wall PVC Pipe: ASTM D2665 drain, waste, and vent.
- C. Cellular-Core PVC Pipe: ASTM F891, Schedule 40.

- D. PVC Socket Fittings: ASTM D2665, made in accordance with ASTM D3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.
- E. Adhesive Primer: ASTM F656.
 - 1. as directed by the Owner .
- F. Solvent Cement: ASTM D2564.
 - 1. as directed by the Owner .

2.11 SPECIALTY PIPE FITTINGS

- A. Transition Couplings:
 - 1. General Requirements: Fitting or device for joining piping with small differences in ODs or of different materials. Include end connections of same size as and compatible with pipes to be joined.
 - 2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
 - 3. Unshielded, Nonpressure Transition Couplings:
 - a. Standard: ASTM C1173.
 - b. Description: Elastomeric, sleeve-type, reducing or transition pattern. Include shear ring and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - c. End Connections: Same size as and compatible with pipes to be joined.
 - d. Sleeve Materials:
 - 1) For Cast-Iron Soil Pipes: ASTM C564, rubber.
 - 2) For Plastic Pipes: ASTM F477, elastomeric seal or ASTM D5926 PVC.
 - 3) For Dissimilar Pipes: ASTM D5926 PVC or other material compatible with pipe materials being joined.
 - 4. Shielded, Nonpressure Transition Couplings:
 - a. Standard: ASTM C1460.
 - b. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - c. End Connections: Same size as and compatible with pipes to be joined.
 - 5. Pressure Transition Couplings:
 - a. Standard: AWWA C219.
 - b. Description: Metal sleeve-type same size as, with pressure rating at least equal to, and ends compatible with, pipes to be joined.
 - c. Center-Sleeve Material: **[Manufacturer's standard] [Carbon steel] [Stainless steel] [Ductile iron] [Malleable iron]**.
 - d. Gasket Material: Natural or synthetic rubber.
 - e. Metal Component Finish: Corrosion-resistant coating or material.
- B. Dielectric Fittings:
 - 1. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
 - 2. Dielectric Unions:
 - a. Description:

- 1) Standard: ASSE 1079.
 - 2) Pressure Rating: [125 psig (860 kPa) minimum at 180 deg F (82 deg C)] [150 psig (1035 kPa)] [250 psig (1725 kPa)] or as directed by the Owner .
 - 3) End Connections: Solder-joint copper alloy and threaded ferrous.
3. Dielectric Flanges:
- a. Description:
 - 1) Standard: ASSE 1079.
 - 2) Factory-fabricated, bolted, companion-flange assembly.
 - 3) Pressure Rating: [125 psig (860 kPa) minimum at 180 deg F (82 deg C)] [150 psig (1035 kPa)] [175 psig (1200 kPa)] [300 psig (2070 kPa)] or as directed by the Owner .
 - 4) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
4. Dielectric-Flange Insulating Kits:
- a. Description:
 - 1) Nonconducting materials for field assembly of companion flanges.
 - 2) Pressure Rating: [150 psig (1035 kPa)] or as directed by the Owner .
 - 3) Gasket: Neoprene or phenolic.
 - 4) Bolt Sleeves: Phenolic or polyethylene.
 - 5) Washers: Phenolic with steel backing washers.
5. Dielectric Nipples:
- a. Description:
 - 1) Standard: IAPMO PS 66.
 - 2) Electroplated steel nipple.
 - 3) Pressure Rating: [300 psig (2070 kPa) at 225 deg F (107 deg C)] or as directed by the Owner .
 - 4) End Connections: Male threaded or grooved.
 - 5) Lining: Inert and noncorrosive, propylene.

2.12 ENCASEMENT FOR UNDERGROUND METAL PIPING

- A. Standard: ASTM A674 or AWWA C105/A 21.5.
- B. Material: [Linear low-density polyethylene film of 0.008-inch (0.20-mm)] [or] [high-density, cross-laminated polyethylene film of 0.004-inch (0.10-mm)] minimum thickness.
- C. Form: [Sheet] [or] [tube].
- D. Color: [Black] [or] [natural] or as directed by the Owner .

PART 3 - EXECUTION

3.1 EARTH MOVING

- A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems.
 - 1. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations.
 - 2. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
- C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
- D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
- E. Install piping to permit valve servicing.
- F. Install piping at indicated slopes.
- G. Install piping free of sags and bends.
- H. Install fittings for changes in direction and branch connections.
- I. Install piping to allow application of insulation.
- J. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in **[Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment"]** **[Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment"]**.
- K. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends.
 - 1. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical.
 - 2. Use long-turn, double Y-branch, and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe.
 - a. Straight tees, elbows, and crosses may be used on vent lines.
 - 3. Do not change direction of flow more than 90 degrees.
 - 4. Use proper size of standard increasers and reducers if pipes of different sizes are connected.
 - a. Reducing size of waste piping in direction of flow is prohibited.

- L. Lay buried building waste piping beginning at low point of each system.
 - 1. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream.
 - 2. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
 - 3. Maintain swab in piping and pull past each joint as completed.
- M. Install soil and waste and vent piping at the following minimum slopes unless otherwise indicated:
 - 1. Building Sanitary Waste: Two percent downward in direction of flow for piping **NPS 3 (DN 80)** and smaller; **[1] [2]** percent or as directed by the Owner downward in direction of flow for piping **NPS 4 (DN 100)** and larger.
 - 2. Horizontal Sanitary Waste Piping: **[Two]** percent or as directed by the Owner downward in direction of flow.
 - 3. Vent Piping: **[One]** percent or as directed by the Owner down toward vertical fixture vent or toward vent stack.
- N. Install cast-iron soil piping in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."
 - 1. Install encasement on underground piping in accordance with ASTM A674 or AWWA C105/A 21.5.
- O. Install steel piping in accordance with applicable plumbing code.
- P. Install stainless-steel piping in accordance with ASME A112.3.1 and applicable plumbing code.
- Q. Install aboveground copper tubing in accordance with CDA's "Copper Tube Handbook."
- R. Install aboveground ABS piping in accordance with ASTM D2661.
- S. Install aboveground PVC piping in accordance with ASTM D2665.
- T. Install underground **[ABS] [and] [PVC]** piping in accordance with ASTM D2321.
- U. Install engineered soil and waste and vent piping systems as follows:
 - 1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.
 - 2. Hubless, Single-Stack Drainage System: Comply with ASME B16.45 and hubless, single-stack aerator fitting manufacturer's written installation instructions.
 - 3. Reduced-Size Venting: Comply with standards of authorities having jurisdiction.
- V. Install underground, ductile-iron, force-main piping according to AWWA C600.
 - 1. Install buried piping inside building between wall and floor penetrations and connection to sanitary sewer piping outside building with restrained joints.
 - 2. Anchor pipe to wall or floor. Install thrust-block supports at vertical and horizontal offsets.
 - 3. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.
- W. Install underground, copper, force-main tubing in accordance with CDA's "Copper Tube Handbook."
 - 1. Install encasement on piping in accordance with ASTM A674 or AWWA C105/A 21.5.
- X. Install force mains at elevations indicated.

- Y. Plumbing Specialties:
1. Install backwater valves in sanitary waster gravity-flow piping.
 - a. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."
 2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary waste gravity-flow piping.
 - a. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping.
 - b. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."
 3. Install drains in sanitary waste gravity-flow piping.
 - a. Comply with requirements for drains specified in Section 221319 "Sanitary Waste Piping Specialties."
- Z. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.
- AA. Install sleeves for piping penetrations of walls, ceilings, and floors.
 1. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- BB. Install sleeve seals for piping penetrations of concrete walls and slabs.
 1. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."
- CC. Install escutcheons for piping penetrations of walls, ceilings, and floors.
 1. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

- A. Hub-and-Spigot, Cast-Iron Soil Piping Gasketed Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
- B. Hub-and-Spigot, Cast-Iron Soil Piping Caulked Joints: Join in accordance with CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead-and-oakum caulked joints.
- C. Hubless, Cast-Iron Soil Piping Coupled Joints:
 1. Join hubless, cast-iron soil piping in accordance with CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.
- D. Threaded Joints: Thread pipe with tapered pipe threads in accordance with ASME B1.20.1.

1. Cut threads full and clean using sharp dies.
 2. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.
 - c. Do not use pipe sections that have cracked or open welds.
 - E. Join stainless-steel pipe and fittings with gaskets in accordance with ASME A112.3.1.
 - F. Join copper tube and fittings with soldered joints in accordance with ASTM B828. Use ASTM B813, water-flushable, lead-free flux and ASTM B32, lead-free-alloy solder.
 - G. Grooved Joints: Cut groove ends of pipe in accordance with AWWA C606. Lubricate and install gasket over ends of pipes or pipe and fitting. Install coupling housing sections over gasket, with keys seated in piping grooves. Install and tighten housing bolts.
 - H. Flanged Joints: Align bolt holes. Select appropriate gasket material, size, type, and thickness. Install gasket concentrically positioned. Use suitable lubricants on bolt threads. Torque bolts in cross pattern.
 - I. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings in accordance with the following:
 1. Comply with ASTM F402 for safe-handling practice of cleaners, primers, and solvent cements.
 2. ABS Piping: Join in accordance with ASTM D2235 and ASTM D2661 appendixes.
 3. PVC Piping: Join in accordance with ASTM D2855 and ASTM D2665 appendixes.
 - J. Joint Restraints and Sway Bracing:
 1. Provide joint restraints and sway bracing for storm drainage piping joints to comply with the following conditions:
 - a. Provide axial restraint for pipe and fittings [**5 inches (125 mm)**] or as directed by the Owner and larger, upstream and downstream of all changes in direction, branches, and changes in diameter greater than two pipe sizes.
 - b. Provide rigid sway bracing for pipe and fittings [**4 inches (100 mm)**] or as directed by the Owner and larger, upstream and downstream of all changes in direction 45 degrees and greater.
 - c. Provide rigid sway bracing for pipe and fittings [**5 inches (125 mm)**] or as directed by the Owner and larger, upstream and downstream of all changes in direction and branch openings.
- 3.4 SPECIALTY PIPE FITTING INSTALLATION
- A. Transition Couplings:
 1. Install transition couplings at joints of piping with small differences in ODs.
 2. In Waste Drainage Piping: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
 3. In Aboveground Force Main Piping: Fitting-type transition couplings.
 4. In Underground Force Main Piping:
 - a. **NPS 1-1/2 (DN 40)** and Smaller: Fitting-type transition couplings.
 - b. **NPS 2 (DN 50)** and Larger: Pressure transition couplings.

B. Dielectric Fittings:

1. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.
2. Dielectric Fittings for **[NPS 2 (DN 50)]** or as directed by the Owner and Smaller: Use dielectric **[nipples] [unions]**.
3. Dielectric Fittings for **[NPS 2-1/2 to NPS 4 (DN 65 to DN 100)]** or as directed by the Owner . Use dielectric **[flanges] [flange kits] [nipples]**.
4. Dielectric Fittings for **[NPS 5 (DN 125)]** and Larger or as directed by the Owner : Use dielectric flange kits.

3.5 VALVE INSTALLATION

A. General valve installation requirements for general-duty valve installation are specified in the following Sections:

1. Section 220523.12 "Ball Valves for Plumbing Piping."
2. Section 220523.13 "Butterfly Valves for Plumbing Piping."
3. Section 220523.14 "Check Valves for Plumbing Piping."
4. Section 220523.15 "Gate Valves for Plumbing Piping."

B. Shutoff Valves:

1. Install shutoff valve on each sewage pump discharge.
2. Install **[gate] [full-port ball]** valve for piping **NPS 2 (DN 50)** and smaller.
3. Install **[gate]** valve or as directed by the Owner for piping **NPS 2-1/2 (DN 65)** and larger.

C. Check Valves: Install swing check valve, between pump and shutoff valve, on each sewage pump discharge.

D. Backwater Valves: Install backwater valves in piping subject to backflow.

1. Horizontal Piping: Horizontal backwater valves. **[Use normally closed type unless otherwise indicated.]**
2. Floor Drains: Drain outlet backwater valves unless drain has integral backwater valve.
3. Install backwater valves in accessible locations.
4. Comply with requirements for backwater valve specified in Section 221319 "Sanitary Waste Piping Specialties."

3.6 INSTALLATION OF HANGERS AND SUPPORTS

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in **[Section 220529 "Hangers and Supports for Plumbing Piping and Equipment"] [Section 220548.13 "Vibration Controls for Plumbing Piping and Equipment"]**.

1. Install **[carbon-steel]** pipe hangers or as directed by the Owner for horizontal piping in noncorrosive environments.
2. Install **[stainless steel] [fiberglass]** pipe hangers for horizontal piping in corrosive environments.
3. Install **[carbon-steel]** pipe support clamps or as directed by the Owner for vertical piping in noncorrosive environments.
4. Install stainless steel pipe support clamps for vertical piping in corrosive environments.

5. Vertical Piping: MSS Type 8 or Type 42 clamps.
 6. Install individual, straight, horizontal piping runs:
 - a. **100 Ft. (30 m)** and Less: MSS Type 1, adjustable, steel clevis hangers.
 - b. Longer Than **100 Ft. (30 m)**: MSS Type 43, adjustable roller hangers.
 - c. Longer Than **100 Ft. (30 m)** if Indicated: MSS Type 49, spring cushion rolls.
 7. Multiple, Straight, Horizontal Piping Runs **100 Ft. (30 m)** or Longer: MSS Type 44 pipe rolls. Support pipe rolls on trapeze.
 8. Base of Vertical Piping: MSS Type 52 spring hangers.
- C. Install hangers for **[cast-iron] [steel] [stainless steel] [and] [copper]** soil piping, with maximum horizontal spacing and minimum rod diameters, to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- D. Install hangers for **[ABS] [and] [PVC]** piping, with maximum horizontal spacing and minimum rod diameters, to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- E. Support horizontal piping and tubing within **12 inches (300 mm)** of each fitting[, **valve,**] and coupling.
- F. Support vertical runs of **[cast-iron] [steel] [stainless steel] [and] [copper]** soil piping to comply with MSS SP-58, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.
- G. Support vertical runs of **[ABS] [and] [PVC]** piping to comply with manufacturer's written instructions, locally enforced codes, and authorities having jurisdiction requirements, whichever are most stringent.

3.7 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect soil and waste piping to exterior sanitary sewerage piping. Use transition fitting to join dissimilar piping materials.
- C. Connect waste and vent piping to the following:
 1. Plumbing Fixtures: Connect waste piping in sizes indicated, but not smaller than required by plumbing code.
 2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
 3. Plumbing Specialties: Connect waste and vent piping in sizes indicated, but not smaller than required by plumbing code.
 4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
 5. Install horizontal backwater valves **[with cleanout cover flush with floor] [in pit with pit cover flush with floor]** or as directed by the Owner .
 6. Comply with requirements for **[backwater valves] [cleanouts] [and] [drains]** specified in Section 221319 "Sanitary Waste Piping Specialties."
 7. Equipment: Connect waste piping as indicated.
 - a. Provide shutoff valve if indicated and union for each connection.
 - b. Use flanges instead of unions for connections **NPS 2-1/2 (DN 65)** and larger.
- D. Connect force-main piping to the following:

1. Sanitary Sewer: To exterior force main.
2. Sewage Pump: To sewage pump discharge.

E. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.

F. Make connections in accordance with the following unless otherwise indicated:

1. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment.

3.8 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping.

B. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.9 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary waste and vent piping in accordance with procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired.
 - a. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
2. Leave uncovered and unconcealed new, altered, extended, or replaced waste and vent piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
3. Roughing-in Plumbing Test Procedure: Test waste and vent piping except outside leaders on completion of roughing-in.

- a. Close openings in piping system and fill with water to point of overflow, but not less than **10 ft. head of water (30 kPa head of water)**.
 - b. From 15 minutes before inspection starts to completion of inspection, water level must not drop.
 - c. Inspect joints for leaks.
4. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight.
- a. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of **1 inch wg (250 Pa)**.
 - b. Use U-tube or manometer inserted in trap of water closet to measure this pressure.
 - c. Air pressure must remain constant without introducing additional air throughout period of inspection.
 - d. Inspect plumbing fixture connections for gas and water leaks.
5. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
6. Prepare reports for tests and required corrective action.
- E. Test force-main piping in accordance with procedures of authorities having jurisdiction or, in absence of published procedures, as follows:
1. Leave uncovered and unconcealed new, altered, extended, or replaced force-main piping until it has been tested and approved.
 - a. Expose work that was covered or concealed before it was tested.
 2. Cap and subject piping to static-water pressure of **50 psig (345 kPa)** above operating pressure, without exceeding pressure rating of piping system materials.
 - a. Isolate test source and allow to stand for four hours.
 - b. Leaks and loss in test pressure constitute defects that must be repaired.
 3. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
 4. Prepare reports for tests and required corrective action.

3.10 CLEANING AND PROTECTION

- A. Clean interior of piping. Remove dirt and debris as work progresses.
- B. Protect sanitary waste and vent piping during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.
- C. Place plugs in ends of uncompleted piping at end of day and when work stops.
- D. Exposed **[ABS]** **[and]** **[PVC]** Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.
- E. Repair damage to adjacent materials caused by waste and vent piping installation.

3.11 PIPING SCHEDULE

- A. Flanges and unions may be used on aboveground pressure piping unless otherwise indicated.
- B. Aboveground, soil and waste piping [**NPS 4 (DN 100) and smaller**] or as directed by the Owner are to be [**any of**] the following:
1. Service cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Hubless, cast-iron soil pipe and fittings [**and hubless, single-stack aerator fittings**]; [**CISPI**] [**heavy-duty**] hubless-piping couplings; and coupled joints.
 3. Galvanized-steel pipe, drainage fittings, and threaded joints.
 4. Stainless steel pipe and fittings, sealing rings, and gasketed joints.
 5. Copper Type DWV tube, copper drainage fittings, and soldered joints.
 6. [**Solid-wall**] [**Cellular-core**] ABS pipe, ABS socket fittings, and solvent-cemented joints.
 7. [**Solid-wall**] [**Cellular-core**] PVC pipe, PVC socket fittings, and solvent-cemented joints.
 8. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
- C. Aboveground, soil and waste piping [**NPS 5 (DN 125) and larger**] or as directed by the Owner are to be [**any of**] the following:
1. Service cast iron, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Hubless, cast-iron soil pipe and fittings [**and hubless, single-stack aerator fittings**]; [**CISPI**] [**heavy-duty**] hubless-piping couplings; and coupled joints.
 3. Galvanized-steel pipe, drainage fittings, and threaded joints.
 4. Stainless steel pipe and fittings, sealing rings, and gasketed joints.
 5. [**Solid-wall**] [**Cellular-core**] PVC pipe, PVC socket fittings, and solvent-cemented joints.
 6. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
- D. Aboveground, vent piping [**NPS 4 (DN 100) and smaller**] or as directed by the Owner is to be [**any of**] the following:
1. Service cast iron, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] [**heavy-duty**] hubless-piping couplings; and coupled joints.
 3. Galvanized-steel pipe, drainage fittings, and threaded joints.
 4. Stainless steel pipe and fittings gaskets, and gasketed joints.
 5. Copper Type DWV tube, copper drainage fittings, and soldered joints.
 - a. Option for Vent Piping, **NPS 2-1/2 and NPS 3-1/2 (DN 65 and DN 90)**: Hard copper tube, **Type M (Type C)**; copper pressure fittings; and soldered joints.
 6. [**Solid-wall**] [**Cellular-core**] ABS pipe, ABS socket fittings, and solvent-cemented joints.
 7. [**Solid-wall**] [**Cellular-core**] PVC pipe, PVC socket fittings, and solvent-cemented joints.
 8. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
- E. Aboveground, vent piping [**NPS 5 (DN 125) and larger**] or as directed by the Owner is to be [**any of**] the following:
1. Service cast iron, cast-iron soil pipe and fittings; gaskets; and gasketed joints.
 2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] [**heavy-duty**] hubless-piping couplings; and coupled joints.
 3. Galvanized-steel pipe, drainage fittings, and threaded joints.
 4. [**Solid-wall**] [**Cellular-core**] PVC pipe, PVC socket fittings, and solvent-cemented joints.
 5. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.

- F. Underground, soil, waste, and vent piping [**NPS 4 (DN 100) and smaller**] or as directed by the Owner are to be [**any of**] the following:
1. [**Extra-heavy**] [**Service**] cast-iron soil piping; [**gaskets; and gasketed**] [**caulking materials; and caulked**] joints.
 2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] [**heavy-duty**] [**cast-iron**] hubless-piping couplings; and coupled joints.
 3. Stainless steel pipe and fittings, gaskets, and gasketed joints.
 4. [**Solid-wall**] [**Cellular-core**] ABS pipe, ABS socket fittings, and solvent-cemented joints.
 5. [**Solid-wall**] [**Cellular-core**] PVC pipe, PVC socket fittings, and solvent-cemented joints.
 6. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
- G. Underground, soil and waste piping [**NPS 5 (DN 125) and larger**] or as directed by the Owner are to be [**any of**] the following:
1. [**Extra-heavy**] [**Service**], cast-iron soil piping; [**gaskets; and gasketed**] [**caulking materials; and caulked**] joints.
 2. Hubless, cast-iron soil pipe and fittings; [**CISPI**] [**heavy-duty**] [**cast-iron**] hubless-piping couplings; coupled joints.
 3. [**Solid-wall**] [**Cellular-core**] PVC pipe, PVC socket fittings, and solvent-cemented joints.
 4. Dissimilar Pipe-Material Couplings: [**Unshielded**] [**Shielded**], nonpressure transition couplings.
- H. Aboveground sanitary-sewage force mains [**NPS 1-1/2 and NPS 2 (DN 40 and DN 50)**] or as directed by the Owner are to be [**any of**] the following:
1. Hard copper tube, **Type L (Type B)**; copper pressure fittings; and soldered joints.
 2. Galvanized-steel pipe, pressure fittings, and threaded joints.
- I. Aboveground sanitary-sewage force mains [**NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**] or as directed by the Owner are to be [**any of**] the following:
1. Hard copper tube, **Type L (Type B)**; copper pressure fittings; and soldered joints.
 2. Galvanized-steel pipe, pressure fittings, and threaded joints.
 3. Grooved-end, galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.
- J. Underground sanitary-sewage force mains [**NPS 4 (DN 100) and smaller**] or as directed by the Owner are to be [**any of**] the following:
1. [**Hard**] [**Soft**] copper tube, **Type L (Type B)**; [**wrought-**]copper pressure fittings; and soldered joints.
 2. Ductile-iron, mechanical-joint piping and mechanical joints.
 3. Ductile-iron, push-on-joint piping and push-on joints.
 4. Ductile-iron, grooved-joint piping and grooved joints.
 5. Fitting-type transition coupling for piping smaller than **NPS 1-1/2 (DN 40)** and pressure transition coupling for **NPS 1-1/2 (DN 40)** and larger if dissimilar pipe materials.
- K. Underground sanitary-sewage force mains [**NPS 5 (DN 125) and larger**] or as directed by the Owner are to be [**any of**] the following:
1. Hard copper tube, **Type L (Type B)**; [**wrought-**]copper pressure fittings; and soldered joints.
 2. Ductile-iron, mechanical-joint piping and mechanical joints.
 3. Ductile-iron, push-on-joint piping and push-on joints.
 4. Ductile-iron, grooved-joint piping and grooved joints.
 5. Pressure transition couplings if dissimilar pipe materials.

22 - Plumbing



END OF SECTION 22 13 16 00

Task	Specification	Specification Description
22 13 16 00	01 95 99 99a	Common Work Results for Fire Suppression
22 13 16 00	01 95 99 99b	Common Work Results for Plumbing
22 13 16 00	01 95 99 99c	Storm Drainage Piping
22 13 16 00	01 95 99 99g	Common Work Results for HVAC
22 13 16 00	01 95 99 99h	Water Supply Wells
22 13 16 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
22 13 16 00	33 31 11 00	Sanitary Sewerage
22 13 19 00	23 41 33 00	High-Efficiency Particulate Filtration
22 13 19 13	23 41 33 00	High-Efficiency Particulate Filtration

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SECTION 22 13 19 26 - INTERCEPTORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for interceptors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Grease interceptors.
 - b. Oil interceptors.
 - c. Sand interceptors.

C. Definitions

1. FRP: Fiberglass-reinforced plastic.
2. PP: Polypropylene plastic.

D. Submittals

1. Product Data: For each type of metal and plastic interceptor indicated. Include materials of fabrication, dimensions, rated capacities, retention capacities, operating characteristics, size and location of each pipe connection, furnished specialties, and accessories.
2. Shop Drawings: For each type and size of precast-concrete interceptor indicated.
 - a. Include materials of construction, dimensions, rated capacities, retention capacities, location and size of each pipe connection, furnished specialties, and accessories.
3. Coordination Drawings: Interceptors, drawn to scale, on which the following items are shown and coordinated with each other, based on input from Installers of the items involved:
 - a. Interceptors.
 - b. Piping connections. Include size, location, and elevation of each.
 - c. Interface with underground structures and utility services.

E. Project Conditions

1. Interruption of Existing Sewer Services: Do not interrupt services to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sewer services according to requirements indicated:
 - a. Notify the Owner no fewer than seven days in advance of proposed interruption of service.
 - b. Do not proceed with interruption of sewer services without the Owner's written permission.

1.2 PRODUCTS

A. Grease Interceptors

1. Grease Interceptors: Precast concrete complying with ASTM C 913.
 - a. Include rubber-gasketed joints, vent connections (if required), manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow, unless directed otherwise.
 - b. Structural Design Loads:
 - 1) Light-Traffic Load: Comply with ASTM C 890, A-8 (ASSHTO HS10-44).
 - 2) Medium-Traffic Load: Comply with ASTM C 890, A-12 (ASSHTO HS15-44).
 - 3) Heavy-Traffic Load: Comply with ASTM C 890, A-16 (ASSHTO HS20-44).
 - 4) Walkway Load: Comply with ASTM C 890, A-03.

- c. Resilient Pipe Connectors (if required): **ASTM C 923 (ASTM C 923M)**, cast or fitted into interceptor walls, for each pipe connection.
- d. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of interceptor to finished grade is less than **60 inches (1500 mm)**.
- e. Grade Rings (if required): Reinforced-concrete rings, **6- to 9-inch (150- to 225-mm)** total thickness, to match diameter of manhole frame and cover.
- f. Manhole Frames and Covers: Ferrous; **24-inch (610-mm)** ID by **7- to 9-inch (175- to 225-mm)** riser with **4-inch- (100-mm-)** minimum width flange and **26-inch- (660-mm-)** diameter cover.
 - 1) Ductile Iron: ASTM A 536, Grade 60-40-18, unless otherwise indicated.
 - 2) Gray Iron: ASTM A 48, Class 35, unless otherwise indicated.
 - 3) Include indented top design with lettering cast into cover, using wording equivalent to "INTERCEPTOR," or "GREASE INTERCEPTOR," or "SANITARY SEWER."

B. Oil Interceptors

- 1. Oil Interceptors: Precast concrete comply with ASTM C 913.
 - a. Include rubber-gasketed joints, vent connections, manholes, compartments or baffles, and piping or openings to retain grease and to permit wastewater flow.
 - b. Structural Design Loads:
 - 1) Light-Traffic Load: Comply with ASTM C 890, A-8 (ASSHTO HS10-44).
 - 2) Medium-Traffic Load: Comply with ASTM C 890, A-12 (ASSHTO HS15-44).
 - 3) Heavy-Traffic Load: Comply with ASTM C 890, A-16 (ASSHTO HS20-44).
 - 4) Walkway Load: Comply with ASTM C 890, A-03.
 - c. Resilient Pipe Connectors (if required): **ASTM C 923 (ASTM C 923M)**, cast or fitted into interceptor walls, for each pipe connection.
 - d. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of interceptor to finished grade is less than **60 inches (1500 mm)**.
 - e. Grade Rings (if required): Reinforced-concrete rings, **6- to 9-inch (150- to 225-mm)** total thickness, to match diameter of manhole frame and cover.
 - f. Manhole Frames and Covers: Ferrous; **24-inch (610-mm)** ID by **7- to 9-inch (175- to 225-mm)** riser with **4-inch- (100-mm-)** minimum width flange and **26-inch- (660-mm-)** diameter cover.
 - 1) Ductile Iron: ASTM A 536, Grade 60-40-18, unless otherwise indicated.
 - 2) Gray Iron: ASTM A 48, Class 35, unless otherwise indicated.
 - 3) Include indented top design with lettering cast into cover, using wording equivalent to "INTERCEPTOR," or "OIL INTERCEPTOR," or "SANITARY SEWER."
 - g. Waste-oil storage tank and piping are specified in Division 23 Section "Facility Fuel-oil Piping".
- 2. Oil Interceptors: Factory-fabricated, cast-iron or steel body; with removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.
 - a. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: Hub, hubless, or threaded, unless otherwise indicated.
 - b. Extension (if required): Cast-iron or steel shroud, full size of interceptor, extending from top of interceptor to grade.

- c. Cover: Cast iron or steel, with steel reinforcement to provide ASTM C 890, A-03, walkway load, **as directed**.
- d. Comply with requirements in Division 23 Section "Facility Fuel-oil Piping" for waste-oil storage tank and piping
3. Oil Interceptors: Plastic body; with removable sediment bucket or strainer, baffles, vents, and flow-control fitting on inlet.
 - a. Inlet, Outlet, Vent, and Waste-Oil Outlet Piping Connections: Hub, hubless, or threaded, unless otherwise indicated.
 - b. Extension (if required): Plastic shroud, full size of interceptor, extending from top of interceptor to grade.
 - c. Cover: Plastic with steel reinforcement to provide ASTM C 890, A-03, walkway load, **as directed**.
 - d. Waste-oil storage tank and piping are specified in Division 23 Section "Facility Fuel-oil Piping".
- C. Sand Interceptors
 1. Description: Factory-fabricated, cast-iron or steel body and inlet grate; with settlement chamber and removable basket or strainer.
 2. Outlet Piping Connection: Hub, hubless, or threaded, unless otherwise indicated.
 3. Grate: Cast iron or steel with reinforcement to provide ASTM C 890, A-03, walkway load, **as directed**.
- D. Precast-Concrete Manhole Risers
 1. Precast-Concrete Manhole Risers: **ASTM C 478 (ASTM C 478M) OR** ASTM C 913, **as directed**, with rubber-gasket joints.
 - a. Structural Design Loads:
 - 1) Light-Traffic Load: Comply with ASTM C 890, A-8 (ASSHTO HS10-44).
 - 2) Medium-Traffic Load: Comply with ASTM C 890, A-12 (ASSHTO HS15-44).
 - 3) Heavy-Traffic Load: Comply with ASTM C 890, A-16 (ASSHTO HS20-44).
 - 4) Walkway Load: Comply with ASTM C 890, A-03.
 - b. Length: From top of underground concrete structure to grade.
 - c. Riser Sections: **3-inch (75-mm)** minimum thickness and **36-inch (915-mm)** diameter.
 - d. Top Section: Eccentric cone, unless otherwise indicated. Include top of cone to match grade ring size.
 - e. Gaskets: **ASTM C 443 (ASTM C 443M)**, rubber.
 - f. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals.
 2. Grade Rings: Reinforced-concrete rings, **6- to 9-inch (150- to 225-mm)** total thickness, diameter matching manhole frame and cover, and height as required to adjust the manhole frame and cover to indicated elevation and slope.
 3. Manhole Frames and Covers (if required): Ferrous; **24-inch (610-mm)** ID by **7- to 9-inch (175- to 225-mm)** riser with **4-inch- (100-mm-)** minimum width flange and **26-inch- (660-mm-)** diameter cover.
 - a. Ductile Iron: ASTM A 536, Grade 60-40-18, unless otherwise indicated.
 - b. Gray Iron: ASTM A 48, Class 35, unless otherwise indicated.
 - c. Include indented top design with lettering cast into cover, using wording equivalent to the following:
 - 1) Grease Interceptors in Sanitary Sewerage System: "INTERCEPTOR" **OR** "GREASE INTERCEPTOR" **OR** "SANITARY SEWER", **as directed**.
 - 2) Oil Interceptors in Sanitary Sewerage System: "INTERCEPTOR" **OR** "OIL INTERCEPTOR" **OR** "SANITARY SEWER", **as directed**.

1.3 EXECUTION

A. Earthwork

1. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving".

B. Installation

1. Install precast-concrete interceptors according to ASTM C 891. Set level and plumb.
2. Install manhole risers from top of underground concrete interceptors to manholes and gratings at finished grade.
3. Set tops of manhole frames and covers flush with finished surface in pavements. Set tops **3 inches (75 mm)** above finish surface elsewhere, unless otherwise indicated.
4. Set tops of grating frames and grates flush with finished surface.
5. Set metal and plastic interceptors level and plumb.
6. Set tops of metal interceptor covers flush with finished surface in pavements. Set tops **3 inches (75 mm)** above finish surface elsewhere, unless otherwise indicated.
7. Install piping and oil storage tanks according to Division 23 Section "Facility Fuel-oil Piping".

C. Connections

1. Piping installation requirements are specified in other Division 22. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Make piping connections between interceptors and piping systems.

D. Identification

1. Identification materials and installation are specified in Division 31 Section "Earth Moving". Arrange for installation of green warning tapes directly over piping and at outside edges of underground interceptors.
 - a. Use warning tapes or detectable warning tape over ferrous piping.
 - b. Use detectable warning tape over nonferrous piping and over edges of underground structures.

END OF SECTION 22 13 19 26

Task	Specification	Specification Description
22 13 19 26	23 41 33 00	High-Efficiency Particulate Filtration
22 13 19 33	22 05 23 00a	General-Duty Valves for Plumbing Piping
22 13 19 33	23 05 23 00	General-Duty Valves for HVAC Piping
22 13 19 33	23 41 33 00	High-Efficiency Particulate Filtration
22 13 19 33	22 05 23 00b	Piped Utilities Basic Materials And Methods
22 13 19 33	33 31 11 00	Sanitary Sewerage
22 13 19 36	23 41 33 00	High-Efficiency Particulate Filtration
22 13 23 00	22 13 19 26	Interceptors

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SECTION 22 13 29 13 - PACKAGED SEWAGE PUMPING STATIONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for packaged sewage pumping stations. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes dry-well, packaged pumping stations with dry-well or vacuum-primed sewage pumps.
2. This Section includes wet-well, packaged pumping stations with submersible or submersible grinder or wet-well-mounting sewage pumps.

C. Performance Requirements

1. Pressure Rating of Sewage Pumps and Discharge Piping Components: At least equal to sewage pump discharge pressure, but not less than **125 psig (860 kPa)**.
2. Pressure Rating of Other Piping Components: At least equal to system operating pressure.

D. Submittals

1. Product Data: Include rated capacities; shipping, installed, and operating weights; furnished specialties; and accessories.
2. Shop Drawings: Show fabrication and installation details for each packaged pumping station. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Product Certificates: For sewage pumps, signed by product manufacturer.
4. Manufacturer Seismic Qualification Certification
5. Field quality-control test reports.
6. Maintenance Data: For packaged pumping stations to include in maintenance manuals.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Testing Agency Qualifications: Nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
4. Comply with HI 1.1-1.2, "Centrifugal Pumps for Nomenclature and Definitions"; HI 1.3, "Centrifugal Pumps for Design and Application"; and HI 1.4, "Centrifugal Pumps for Installation, Operation and Maintenance," for sewage and sump pumps.
5. Comply with UL 778, "Motor-Operated Water Pumps," for sewage and sump pumps.

F. Project Conditions

1. Interruption of Existing Sanitary Sewer Service: Do not interrupt sanitary sewer service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary sanitary sewer service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of sanitary sewer service.

- b. Do not proceed with interruption of sanitary sewer service without the Owner's written permission.

1.2 PRODUCTS

A. Dry-Well, Packaged Sewage Pumping Stations

1. Dry-Well, Packaged Sewage Pumping Stations with Dry-Well Sewage Pumps:

- a. Description: Factory fabricated, assembled, and tested with wet well for comminutor and collection of sanitary sewage and with dry equipment chamber for sewage pumps, controls, and accessories.
 - 1) Orientation: Shell underground with dry equipment chamber underground with top flush with grade **OR** partially recessed underground **OR** above grade **OR** underground with entrance tube to grade, **as directed**.
 - 2) Shell: Factory fabricated from structural-steel plate **OR** fiberglass, **as directed**.
 - 3) Entrance Tube: From dry compartment to entrance at grade, and of size required to replace largest piece of equipment, but not smaller than **36 inches (914 mm)** in diameter.
 - 4) Cathodic Protection: as directed by the Owner, exterior magnesium anode(s).
 - 5) Comminutor: Full size of sewage inlet pipe.
 - 6) Sewage Pumps: Two **OR** Three, **as directed**, dry-well-type, nonclog sewage pumps with controls and piping. Include ASTM A 48/A 48M, Class 25, nonclog, cast-iron impeller capable of passing solids of **3-inch (76-mm)** minimum diameter; mechanical or stuffing-box seals; and pedestal-mounted motor.

2. Dry-Well, Packaged Sewage Pumping Stations with Vacuum-Primed Sewage Pumps:

- a. Description: Factory fabricated, assembled, and tested with wet well for comminutor and collection of sanitary sewage and with dry equipment chamber for sewage pumps, vacuum pumps, controls, and accessories.
 - 1) Orientation: Shell underground with dry equipment chamber underground with top flush with grade **OR** partially recessed underground **OR** above grade **OR** underground with entrance tube to grade, **as directed**.
 - 2) Shell: Factory fabricated from structural-steel plate **OR** fiberglass, **as directed**.
 - 3) Entrance Tube: From dry compartment to entrance at grade, and of size required to replace largest piece of equipment, but not smaller than **36 inches (914 mm)** in diameter.
 - 4) Cathodic Protection: as directed by the Owner, exterior magnesium anode(s).
 - 5) Comminutor: Full size of sewage inlet pipe.
 - 6) Sewage Pumps: Two **OR** Three, **as directed**, dry-chamber-mounting, vacuum-primed, nonclog sewage pumps located in dry compartment above wet pit, with controls and piping. Include ASTM A 48/A 48M, Class 25, nonclog, cast-iron impeller capable of passing solids of **3-inch (76-mm)** minimum diameter; mechanical or stuffing-box seals; pedestal-mounted motor; and suction piping extending to bottom of wet pit.
 - 7) Vacuum Pumps: Duplex arrangement with controls, vacuum piping, and vent piping of size and capacity required for system. Include automatic alternator, with manual disconnect switch, to change sequence of lead-lag vacuum pumps at completion of each cycle.

B. Wet-Well, Packaged Sewage Pumping Stations

1. Wet-Well, Packaged Sewage Pumping Stations with Submersible Sewage Pumps:

- a. Description: Factory fabricated, assembled, and tested with wet well for comminutor, sewage pumps and collection of sanitary sewage and with sewage pumps and dry equipment chamber for controls and accessories.

- 1) Orientation: Shell underground with dry equipment chamber underground with top flush with grade **OR** partially recessed underground **OR** above grade **OR** underground with entrance tube to grade, **as directed**.
 - 2) Shell: Factory fabricated from structural-steel plate **OR** fiberglass, **as directed**.
 - 3) Entrance Tube: From dry compartment to entrance at grade, and of size required to replace largest piece of equipment, but not smaller than **36 inches (914 mm)** in diameter.
 - 4) Cathodic Protection: as directed by the Owner, exterior magnesium anode(s).
 - 5) Comminutor: Full size of sewage inlet pipe.
 - 6) Sewage Pumps: Two **OR** Three, **as directed**, submersible-type sewage pumps, with guide rail, quick-disconnect system, controls, and piping. Include ASTM A 48/A 48M, Class 25, nonclog, cast-iron impeller capable of passing solids of **3-inch (76-mm)** minimum diameter; and hermetically sealed motor with moisture-sensing probe, mechanical seals, and waterproof power cable.
2. Wet-Well, Packaged Sewage Pumping Stations with Submersible Grinder Sewage Pumps:
- a. Description: Factory fabricated, assembled, and tested with wet well for sewage pumps and collection of sanitary sewage and with dry equipment chamber for controls and accessories.
 - 1) Orientation: Shell underground with dry equipment chamber underground with top flush with grade **OR** partially recessed underground **OR** above grade **OR** underground with entrance tube to grade, **as directed**.
 - 2) Shell: Factory fabricated from structural-steel plate **OR** fiberglass, **as directed**.
 - 3) Entrance Tube: From dry compartment to entrance at grade, and of size required to replace largest piece of equipment, but not smaller than **36 inches (914 mm)** in diameter.
 - 4) Cathodic Protection: as directed by the Owner, exterior magnesium anode(s).
 - 5) Sewage Pumps: Two **OR** Three, **as directed**, submersible grinder-type sewage pumps, with guide rail, quick-disconnect system, controls, and piping. Include stainless-steel grinder impeller and hermetically sealed motor with moisture-sensing probe, mechanical seals, and waterproof power cable.
 - a) If Project has more than one wet-well, packaged sewage pumping station with submersible grinder sewage pumps,
3. Wet-Well, Packaged Sewage Pumping Stations with Wet-Well-Mounting Sewage Pumps:
- a. Description: Factory fabricated, assembled, and tested with wet well for comminutor, sewage pumps and collection of sanitary sewage and with suspended sewage pumps and dry equipment chamber for pump motors, controls, and accessories.
 - 1) Orientation: Shell underground with dry equipment chamber underground with top flush with grade **OR** partially recessed underground **OR** above grade **OR** underground with entrance tube to grade, **as directed**.
 - 2) Shell: Factory fabricated from structural-steel plate **OR** fiberglass, **as directed**.
 - 3) Entrance Tube: From dry compartment to entrance at grade, and of size required to replace largest piece of equipment, but not smaller than **36 inches (914 mm)** in diameter.
 - 4) Cathodic Protection: as directed by The Owner, exterior magnesium anode(s).
 - 5) Comminutor: Full size of sewage inlet pipe.
 - 6) Sewage Pumps: Two **OR** Three, **as directed**, wet-well-mounting-type, nonclog sewage pumps suspended from dry-compartment floor, with controls and piping. Include ASTM A 48/A 48M, Class 25, nonclog, cast-iron impeller capable of passing solids of **3-inch (76-mm)** minimum diameter; grease-lubricated bearings and stuffing-box seal; shaft coupling; and pedestal-mounted motor.
- C. Comminutors:
1. Description: Motor-operated, single- or twin-shaft, cutter- or grinder-design unit with controls; for pipeline installation.
 - a. Body: Stainless steel or ductile iron with flanged ends and access plate.

- b. Cutting Elements: Motor-driven rotor and stationary cutters or grinders of hardened stainless or heat-treated steel.
- c. Motor: Explosion proof, directly connected to body.
- d. Control Panel: NEMA 250, Type 12 enclosure for installation in dry equipment chamber.

D. Controls

1. Control Sequence of Operation: Cycle each sewage pump on and off automatically to maintain wet-well sewage level. Automatic control operates both pumps in parallel if wet-well level rises above starting point of low-level pump, until shutoff level is reached. Automatic alternator, with manual disconnect switch, changes sequence of lead-lag sewage pumps at completion of each pumping cycle.
2. Self-Purging, Air-Bubbler System: Senses variations of sewage level in wet well. Include duplex-arrangement oilless air compressors to furnish bubbler air; filters; air-storage reservoir; piping; airflow meter with needle valve adjustment for airflow regulation; sewage depth gage; air-bubbler piping to wet well; and pressure-sensing, dustproof mercury switches.
3. Electrode **OR** Float-Switch **OR** Pressure-Switch **OR** Ultrasonic, **as directed**, System: Senses variations of sewage level in wet well. Include high and low adjustments capable of operating on **6-inch (150-mm)** minimum differential of liquid level.
4. Motor Controllers: Magnetic, full voltage, nonreversing. Include undervoltage release, thermal-overload heaters in each phase, manual reset buttons, and hand-automatic selector switches. Include circuit breakers to provide branch-circuit protection for each controller.
5. 120-V accessory controls with 15-A, single-phase circuit breakers or fuses for each item.
6. Control Panel: Enclosure complying with UL 508A and with UL 508A, Supplement SB, **as directed**, with separate compartments and covers for controllers, circuit breakers, transformers, alternators, and single-phase controls. Include 20-A duplex receptacle in NEMA WD 1, Configuration 5-20R mounted on exterior of control panel.
 - a. Mounting: Inside, on dry-chamber wall **OR** Outside, on pedestal, at grade, **as directed**.
 - b. Enclosure: NEMA 250, Type 1 **OR** 4 **OR** 4X, **as directed**.
7. Install labels on panel face to identify switches and controls.
8. Wiring: Tin-copper wiring.
9. Connection for Portable Generator: Nonautomatic (manual) transfer switch with receptacle matching generator electrical power requirements. Nonautomatic transfer switches are specified in Division 26 Section "Transfer Switches" and receptacles are specified in Division 26 Section "Wiring Devices".

E. Accessories

1. Lighting: Minimum of 2, UL 1571, heavy-duty, cast-metal, wet-location-type fixtures with 100-W bulbs and guards in service area. Locate switches, with pilot lights, at chamber entrance.
2. Submersible Sump Pump:
 - a. Discharge Size: **NPS 1-1/4 (DN 32)** minimum.
 - b. Pump End Bell and Motor Shell: Cast iron.
 - c. Motor: 1/3 hp, 1750-rpm, hermetically sealed, capacitor-start, with built-in overload protection.
 - d. Impeller: ASTM B 584, cast bronze or ASTM B 36/B 36M, brass.
 - e. Shaft: Stainless steel.
 - f. Bearings: Grease-lubricated, factory-sealed ball bearings.
 - g. Seals: Mechanical.
 - h. Accessories: Inlet strainer.
 - i. Controls: Float switch.
3. Dehumidifier: Electric refrigeration system, adjustable humidistat, reverse-acting thermostat for low-temperature cutoff controls, and condensate pump with drain piping to sump.
 - a. Dehumidification system capacity adequate to remove at least **15 pints (7 L)** of water per day from service area air that is **80 deg F (27 deg C)** with a relative humidity of 60 percent.
4. Ventilation: Electrically powered ventilation system. Include centrifugal blower with **4-inch- (100-mm-)** round exhaust vent designed to keep out rain, insects, and other foreign matter; limit switch

- to start blower if entrance door or lid is opened; 0- to 15-minute timer; and separate manual switch.
- a. Ventilating system capacity to change air in dry equipment chamber every two minutes.
 5. Heater: Electric, 1.5 kW minimum, with fan and thermostat control.
 6. High-Water Audio Alarm: Horn for audio indication of station high-water level, energized by separate level-detecting device. Include alarm silencer switch and relay in station.
 7. Remote Alarm Circuit: Include contacts for connection to remote alarm panel.
- F. Motors
1. General requirements for motors are specified in Division 22 Section "Common Motor Requirements For Plumbing Equipment".
- G. Miscellaneous Materials
1. Structural Steel: ASTM A 6/A 6M, W or HP shapes, or ASTM A 36/A 36M, plates or beams.
 2. Grout: ASTM C 1107, Grade B, nonshrink cement grout.
 - a. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 3. Concrete: Concrete is specified in Division 03 Section "Cast-in-place Concrete".
- H. Packaged Sewage Pumping Station Fabrication
1. Fabricate shell from structural-steel plate with continuous welds to make watertight and gastight construction.
 - a. Walls: **1/4-inch (6.4-mm)** minimum thickness.
 - b. Top and Bottom Heads: **3/8-inch (9.5-mm)** minimum thickness. Weld reinforcing steel to top and bottom heads.
 - c. Entrance-Tube Walls: **1/4-inch (6.4-mm)** minimum thickness.
 - d. Weld steel access ladder and air vent to shell and entrance tube, **as directed**.
 - e. Apply three coats of epoxy resin to interior and exterior surfaces.
 - f. Include at least two **OR** four, **as directed**, exterior magnesium anode(s) for cathodic protection.
 2. Fabricate shell from fiberglass with structural-steel reinforcement.
 - a. Attach structural-steel reinforcement to top and bottom heads.
 - b. Fabricate shell with continuous joints to make watertight and gastight construction.
 - c. Attach air vent to pump chamber and entrance tube, **as directed**.
 - d. Ladder: Steel **OR** Fiberglass, **as directed**.
 3. Install sump, **18 inches (450 mm)** in diameter by **10 inches (254 mm)** deep in dry-chamber floor. Slope floor toward sump and fasten rubber mat to floor walkway with cement.
 4. Entrance tube may be furnished separately for field installation.
 5. Entrance Cover: Waterproof and corrosion resistant, with lock. Include way to open cover from inside tube if cover is locked.
 6. Air Vent: Duct fabricated from corrosion-resistant material, extended to above grade, outlet turned down, and with insect screen in outlet.
 7. Factory fabricate piping between unit components.
 - a. Use galvanized-steel pipe and cast-iron fittings or ductile-iron pipe and fittings.
 - b. Use fittings for changes in direction and branch connections.
 - c. Flanged and union joints may be used instead of joints specified.
 - d. Use dielectric fittings for connections between ferrous- and copper-alloy piping.
 8. Piping Connections: Unless otherwise indicated, make the following piping connections:
 - a. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment having **NPS 2 (DN 50)** or smaller threaded pipe connection.
 - b. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
 9. Valves: Ferrous alloy.
 - a. Sewage Pump Piping: Include gate valve on each pump inlet and gate and check valves on each discharge pipe.
 - b. Sump Pump Piping: Include ball or gate and check valves on discharge pipe.

- c. Compressed-Air Piping: Include ball and check valves on discharge pipe from each air compressor.
 - d. Vacuum Piping: Include ball and check valves on inlet pipe to each vacuum pump.
10. Wiring: Tin-coated copper.
- I. Source Quality Control
- 1. Test and inspect sewage and sump, **as directed**, pumps according to HI 1.6, "Centrifugal Pump Tests." Include test recordings that substantiate correct performance of pumps at design head, capacity, suction lift, speed, and horsepower.
 - 2. Test accessories and controls through complete cycle. Include test recordings that substantiate correct performance.

1.3 EXECUTION

A. Earthwork

- 1. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving".

B. Installation

- 1. Install packaged sewage pumping station components where indicated, according to specific equipment and piping arrangement indicated.
- 2. Shell Base Supports: Form from structural-steel beams, of number and lengths required to support bottom of shell and to anchor beams to concrete foundation.
 - a. Use elevator blocks attached to bottom of shell to slope station floor **1 inch in 10 feet (25.4 mm in 3 m)** down toward sump.
- 3. Grout under and around shell. Ensure that there are no voids between foundation slab and underslab of pumping station.
- 4. Fill voids between shell sidewalls, sleeves, and piping and make watertight seal with grout.
- 5. Connect anode conductors to grounding lugs on steel housing.
- 6. Join separate sections of housing by field welding.
- 7. Field weld entrance tube to housing.

C. Connections

- 1. Sanitary sewer piping installation requirements are specified in Division 22 Section "Facility Sanitary Sewers". Drawings indicate general arrangement of piping.
- 2. Install piping adjacent to machine to allow service and maintenance.
- 3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
- 4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

D. Identification

- 1. Install identifying labels permanently attached to equipment.
- 2. Install operating instruction signs permanently attached to equipment or on pumping station wall near equipment.
- 3. Arrange for installing green warning tape or detectable warning tape over outside edges of underground packaged sewage pumping stations. Tape materials and their installation are specified in Division 31 Section "Earth Moving".

E. Painting

- 1. Prepare and paint ferrous piping in wet wells, structural-steel supports, and anchor devices with coal-tar epoxy-polyamide paint according to SSPC-Paint 16.
- 2. Paint field-welded areas to match factory coating.

F. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform field tests and inspections and prepare test reports.
 2. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.. Report results in writing.
 3. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 4. Tests and Inspections:
 - a. After installing packaged sewage pumping stations and after electrical circuitry has been energized, test for compliance with requirements. Furnish water required for pump tests.
 - b. Leak Test: After installation, charge systems and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 5. Remove and replace packaged sewage pumping stations that do not pass tests and inspections and retest as specified above.
- G. Startup Service
1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Adjust pump, accessory, and control settings, and safety and alarm devices.
- H. Demonstration
1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain packaged sewage pumping stations.

END OF SECTION 22 13 29 13

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SECTION 22 13 29 13a - SEWAGE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for sewage pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Submersible effluent pumps.
 - b. Submersible sewage pumps.
 - c. Wet-pit-volute sewage pumps.
 - d. Sewage-pump, reverse-flow assemblies.
 - e. Sewage-pump basins and basin covers.
 - f. Progressing-cavity sewage pumps.
 - g. Packaged, submersible sewage-pump units.
 - h. Packaged wastewater-pump units.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. UL Compliance: Comply with UL 778 for motor-operated water pumps.

E. Delivery, Storage, And Handling

1. Retain shipping flange protective covers and protective coatings during storage.
2. Protect bearings and couplings against damage.
3. Comply with pump manufacturer's written rigging instructions for handling.

F. Coordination

1. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.2 PRODUCTS

A. Submersible Effluent Pumps

1. Submersible, Fixed-Position, Single-Seal Effluent Pumps:
 - a. Description: Factory-assembled and -tested effluent-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal effluent pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as**

- directed**, and stainless steel, **as directed**, closed or semiopen design for clear wastewater, and keyed and secured to shaft.
- e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seal: Mechanical.
 - g. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - h. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - i. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
2. Submersible, Fixed-Position, Double-Seal Effluent Pumps:
- a. Description: Factory-assembled and -tested effluent-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal effluent pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, closed or semiopen design for clear wastewater, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seals: Mechanical.
 - g. Moisture-Sensing Probe: Internal moisture sensor and moisture alarm.
 - h. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - i. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.

- 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
- 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
- 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
- j. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
- k. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
3. Submersible, Quick-Disconnect, Single-Seal Effluent Pumps:
 - a. Description: Factory-assembled and -tested effluent-pump unit with guide-rail supports.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal effluent pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail support.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, closed or semiopen design for clear wastewater, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seal: Mechanical.
 - g. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - h. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - i. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.

- 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
- j. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
- k. Guide-Rail Supports:
 - 1) Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
 - 2) Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
 - 3) Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
 - 4) Pump Yoke: Motor-mounted or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
 - 5) Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
 - 6) Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
 - 7) Lifting Cable: Stainless steel; attached to pump and cover at manhole.
4. Submersible, Quick-Disconnect, Double-Seal Effluent Pumps:
 - a. Description: Factory-assembled and -tested effluent-pump unit with guide-rail supports.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal effluent pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail support.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, closed or semiopen design for clear wastewater, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seals: Mechanical.
 - g. Moisture-Sensing Probe: Internal moisture sensor and moisture alarm.
 - h. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - i. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.

- 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - k. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
 - l. Guide-Rail Supports:
 - 1) Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
 - 2) Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
 - 3) Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
 - 4) Pump Yoke: Motor-mounted or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
 - 5) Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
 - 6) Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
 - 7) Lifting Cable: Stainless steel; attached to pump and cover at manhole.
- B. Submersible Sewage Pumps
- 1. Submersible, Fixed-Position, Single-Seal Sewage Pumps:
 - a. Description: Factory-assembled and -tested sewage-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seal: Mechanical.
 - g. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - h. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - i. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.

- 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
- 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
- 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
- j. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
2. Submersible, Fixed-Position, Double-Seal Sewage Pumps:
 - a. Description: Factory-assembled and -tested sewage-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seals: Mechanical.
 - g. Moisture-Sensing Probe: Internal moisture sensor and moisture alarm.
 - h. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - i. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - k. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.

- b) Alarm status.
3. Submersible, Quick-Disconnect, Single-Seal Sewage Pumps:
- a. Description: Factory-assembled and -tested sewage-pump unit with guide-rail supports.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail support.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seal: Mechanical.
 - g. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - h. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - i. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
 - k. Guide-Rail Supports:
 - 1) Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
 - 2) Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
 - 3) Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
 - 4) Pump Yoke: Motor-mounted or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
 - 5) Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
 - 6) Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
 - 7) Lifting Cable: Stainless steel; attached to pump and cover at manhole.

4. Submersible, Quick-Disconnect, Double-Seal Sewage Pumps:
 - a. Description: Factory-assembled and -tested sewage-pump unit with guide-rail supports.
 - b. Pump type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail support.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, and stainless steel, **as directed**, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seals: Mechanical.
 - g. Moisture-Sensing Probe: Internal moisture sensor and moisture alarm.
 - h. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - i. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - k. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
 - l. Guide-Rail Supports:
 - 1) Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
 - 2) Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
 - 3) Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
 - 4) Pump Yoke: Motor-mounted or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
 - 5) Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
 - 6) Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.

- 7) Lifting Cable: Stainless steel; attached to pump and cover at manhole.
5. Submersible, Quick-Disconnect, Grinder Sewage Pumps:
 - a. Description: Factory-assembled and -tested, grinder sewage-pump unit with guide-rail supports.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with open inlet, and discharge fittings for connection to guide-rail supports.
 - d. Impeller: Bronze or stainless steel; statically and dynamically balanced, with stainless-steel cutter, grinder, or slicer assembly; capable of handling solids; and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seal: Mechanical.
 - g. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - h. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - i. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
 - k. Guide-Rail Supports:
 - 1) Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
 - 2) Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
 - 3) Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
 - 4) Pump Yoke: Motor-mounted or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
 - 5) Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
 - 6) Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
 - 7) Lifting Cable: Stainless steel; attached to pump and cover at manhole.

6. Submersible, Quick-Disconnect, Progressing-Cavity, Grinder Sewage Pumps:
 - a. Description: Factory-assembled and -tested progressing-cavity, grinder sewage-pump unit with guide-rail supports.
 - b. Pump Type: Submersible, progressing-cavity, single-screw rotary, grinder sewage pump as defined in HI 3.1-3.5.
 - c. Pump Body: Cast iron.
 - d. Pump Bearings: Radial and thrust types.
 - e. Pump Shaft: Steel.
 - f. Rotor: Stainless steel.
 - g. Stator: Buna-N **OR** Natural rubber, **as directed**.
 - h. Seal: Packing gland and mechanical types.
 - i. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - j. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - k. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - l. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
 - m. Guide-Rail Supports:
 - 1) Standard: SWPA's "Submersible Sewage Pumping Systems (SWPA) Handbook."
 - 2) Guide Rails: Vertical pipes or structural members, made of galvanized steel or other corrosion-resistant metal, attached to baseplate and basin sidewall or cover.
 - 3) Baseplate: Corrosion-resistant metal plate, attached to basin floor, supporting guide rails and stationary elbow.
 - 4) Pump Yoke: Motor-mounted or casing-mounted yokes or other attachments for aligning pump during connection of flanges.
 - 5) Movable Elbow: Pump discharge-elbow fitting with flange, seal, and positioning device.
 - 6) Stationary Elbow: Fixed discharge-elbow fitting with flange that mates to movable-elbow flange and support attached to baseplate.
 - 7) Lifting Cable: Stainless steel; attached to pump and cover at manhole.

C. Wet-Pit-Volute Sewage Pumps

1. Description: Factory-assembled and -tested sewage-pump unit.

2. Pump Type: Wet-pit-volute, single-stage, separately-coupled, overhung-impeller, centrifugal sewage pump as defined in HI 1.1-1.2 and HI 1.3.
 3. Pump Casing: Cast iron, with open inlet and threaded or flanged connection for discharge piping.
 4. Pump Shaft: Stainless-steel **OR** steel, **as directed**.
 5. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, nonclog, open, or semiopen design for solids handling, and keyed and secured to shaft.
 6. Sleeve Bearings: Bronze. Include oil-lubricated, intermediate sleeve bearings at **48-inch (1200-mm)** maximum intervals if basin depth is more than **48 inches (1200 mm)**, and grease-lubricated, ball-type thrust bearings.
 7. Pump and Motor Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
 8. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.1, Class 125, cast-iron flanges and flanged fittings or ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 - a. Modify piping configuration to accommodate reverse-flow assembly.
 9. Support Plate: Cast iron or coated steel and strong enough to support pumps, motors, and controls. Refer to Part 1.2 "Sewage-Pump Basins and Basin Covers" Article for requirements.
 10. Shaft Seal: Stuffing box, with graphite-impregnated braided-yarn rings and bronze packing gland.
 11. Motor: Single-speed; grease-lubricated ball bearings and mounted on vertical, cast-iron pedestal.
 12. Controls (rod-and-float type):
 - a. Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - b. Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - d. Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - e. High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 13. Controls (float- and pressure-switch types):
 - a. Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - b. Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - d. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 14. Control-Interface Features:
 - a. Remote Alarm Contacts: For remote alarm interface.
 - b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - 1) On-off status of pump.
 - 2) Alarm status.
- D. Sewage-Pump, Reverse-Flow Assemblies
1. Description: Factory-fabricated, sewage pump reverse-flow assembly for factory or field assembly and installation in sewage pump basin. Include the following corrosion-resistant-metal components:
 - a. Inlet Fitting: One combination inlet-overflow strainer fitting.
 - b. Valves: Two shutoff valves and two check valves.
 - c. Strainers: Two strainer housings with reverse-flow, self-flushing strainers.
 - d. Pipe and Fittings: Size and configuration required to connect to sewage pumps and piping.
- E. Sewage-Pump Basins And Basin Covers

1. Basins: Factory-fabricated, watertight, cylindrical, basin sump with top flange and sidewall openings for pipe connections.
 - a. Material: Cast iron **OR** Fiberglass **OR** Polyethylene, **as directed**.
 - b. Reinforcement: Mounting plates for pumps, fittings, guide-rail supports if used, and accessories.
 - c. Anchor Flange: Same material as or compatible with basin sump, cast in or attached to sump, in location and of size required to anchor basin in concrete slab.
 2. Basin Covers: Fabricate metal cover with openings having gaskets, seals, and bushings; for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.
 - a. Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.
- F. Progressing-Cavity Sewage Pumps
1. Description: Factory-assembled and -tested progressing-cavity, single-screw rotary pump as defined in HI 3.1-3.5.
 2. Pump Body: Cast iron with feet for base or floor installation.
 3. Pump Bearings: Radial and thrust types.
 4. Pump Shaft: Steel.
 5. Rotor: Chrome-plated steel.
 6. Stator: Buna-N **OR** Natural rubber, **as directed**.
 7. Seals: Packing gland and mechanical types.
 8. Coupling: Flexible.
 9. Motor: Single-speed; grease-lubricated ball bearings.
- G. Packaged, Submersible Sewage-Pump Units
1. Packaged, Submersible, Grinder, Sewage-Pump Units:
 - a. Description: Factory-assembled and -tested, automatic-operation, basin-mounted, grinder, sewage-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron.
 - d. Impeller: Stainless-steel grinder, cutter, or slicer type with shredding ring.
 - e. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - f. Control (for simplex pump unit): Manufacturer's standard panel for one pump.
 - g. Controls (for duplex pump unit): Automatic, with mechanical- or mercury-float switches and alternator.
 - h. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 - i. Basin: Watertight plastic, **as directed**, and of size required for pumps, with inlet pipe connection and gastight cover with pump discharge and vent connections.
 2. Packaged, Submersible, Nonclog, Sewage-Pump Units:
 - a. Description: Factory-assembled and -tested, automatic-operation, basin-mounted, sewage-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron.
 - d. Impeller: Brass or cast iron; statically and dynamically balanced, non-clog design, and capable of handling **2-inch (50-mm)** diameter solids.
 - e. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.

- f. Control (for simplex pump units): Manufacturer's standard panel for one pump.
 - g. Controls (for duplex pump unit): Automatic, with mechanical- or mercury-float switches and alternator.
 - h. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 - i. Basin: Watertight plastic, **as directed**, and of size required for pumps, with inlet pipe connection and gastight cover with pump discharge and vent connections.
- H. Packaged Wastewater-Pump Units
- 1. Packaged, Wet-Pit-Volute, Wastewater-Pump Units:
 - a. Description: Factory-assembled and -tested, automatic-operation, basin-mounted, effluent-pump unit.
 - b. Pump Type: Wet-pit-volute, single-stage, separately-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Body and Impeller: Corrosion-resistant materials.
 - d. Motor: With built-in overload protection and mounted vertically on basin cover.
 - e. Power Cord: Three-conductor, waterproof cable of length required but not less than **72 inches (1830 mm)** and with grounding plug and cable-sealing assembly for connection at pump.
 - f. Control: Float switch.
 - g. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 - h. Basin: Watertight, aluminum, plastic, or coated steel with inlet pipe connection and gastight cover with vent and pump discharge connections.
 - 2. Packaged, Submersible Wastewater-Pump Units:
 - a. Description: Factory-assembled and -tested, automatic-operation, effluent-pump unit with basin.
 - b. Pump Type: Submersible, end-suction, single-stage, overhung-impeller, centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Body and Impeller: Corrosion-resistant materials.
 - d. Pump Seals: Mechanical.
 - e. Motor: Hermetically sealed, capacitor-start type, with built-in overload protection.
 - f. Power Cord: Three-conductor, waterproof cable of length required but not less than **72 inches (1830 mm)** and with grounding plug and cable-sealing assembly for connection at pump.
 - g. Control: Float switch.
 - h. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 - i. Basin: Watertight plastic with inlet pipe connection and gastight cover with vent and pump discharge connections.
- I. Motors
- 1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 22 Section "Common Motor Requirements For Plumbing Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
 - 2. Motors for submersible pumps shall be hermetically sealed.

1.3 EXECUTION

A. Earthwork

1. Excavation and filling are specified in Division 31 Section "Earth Moving".

B. Examination

1. Examine roughing-in for plumbing piping to verify actual locations of sanitary drainage and vent piping connections before sewage pump installation.

C. Installation

1. Pump Installation Standards:
 - a. Comply with HI 1.4 for installation of centrifugal pumps.
 - b. Comply with HI 3.1-3.5 for installation of progressing-cavity sewage pumps.
2. Equipment Mounting (for equipment supported on slabs-on-grade): Install progressing-cavity sewage pumps on concrete base using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Equipment Mounting: Install progressing-cavity sewage pumps using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
4. Equipment Mounting: Install progressing-cavity sewage pumps on vibration isolation equipment base. Comply with requirements specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
5. Wiring Method (for pumps with wall-mounted controls): Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
6. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

D. Connections

1. Comply with requirements for piping specified in Division 22 Section "Sanitary Waste And Vent Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to equipment to allow service and maintenance.

E. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Perform each visual and mechanical inspection.
 - b. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Pumps and controls will be considered defective if they do not pass tests and inspections.

4. Prepare test and inspection reports.
- F. Startup Service
 1. Engage a factory-authorized service representative to perform **OR** Perform, **as directed**, startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
- G. Adjusting
 1. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.
 2. Adjust control set points.
- H. Demonstration
 1. Train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

END OF SECTION 22 13 29 13a

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SECTION 22 13 29 13b - LIFT STATION

1.1 GENERAL

A. Description Of Work

1. This Specification covers the furnishing and installation of sewage lift stations. Work includes but is not limited to earthwork, installation of watertight precast concrete sump basin, basin access cover, submersible sewage pumps, pump guide rail system, pump control system, valves and piping and electrical connections as required. Specific sizes of basins, pumps, and piping shall be as follows or as directed by the Owner.

B. Submittals

1. Product Data: For each type of product indicated.
 - a. Pipe and fittings
 - b. Check valves
 - c. Gate valves
 - d. Submersible sewage grinder pumps
 - e. Pump motor
 - f. Flexible flanged coupling
2. Operation and Maintenance Data: Include pumps, alarms, and motors. Data for submersible sewage grinder pump station data shall include all information on all equipment, alarm panel and controls, pumps and pump performance curves, and station layout.

C. Delivery, Storage, and Handling of Materials

1. Delivery and Storage: Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials in enclosures or under protective covering. Store rubber gaskets not to be installed immediately under cover, out of direct sunlight. Do not store materials directly on the ground. Keep interior of pipes and fittings free of dirt and debris.
2. Handling: Handle pipe, fittings, valves, and other accessories in such manner as to ensure delivery to the trench in sound, undamaged condition. Avoid injury to coatings and linings on pipe and fittings; make satisfactory repairs if coatings or linings are damaged. Carry pipe to the trench; do not drag it.

1.2 PRODUCTS

A. Precast Concrete Sump Basin(s)

1. Precast Concrete Sump Basin shall be constructed in conformance with Division 26 Section "Underground Ducts And Raceways For Electrical Systems". Basin shall have an integral bottom base section.
2. Joint Sealant: Seal all joints with EZ Stik Butyl Gasket as manufactured by Concrete Products Supply Co., or approved equal. Install in accordance with manufacturer's recommendations.
3. Pipe Opening Seals.
4. Waterproofing: Waterproof interior of concrete sump with one coat of Koppers Coal Tar Bitumastic Black or approved equal. Repair all damaged coating before final backfill. Do not coat cover of basin.
5. Access Hatch - Aluminum Hinged Frame and Cover Model EC-3HD by Syracuse Castings, Cicero, NY (315) 699-2601, or approved equal. Frame and cover shall be heavy duty, rated for H-20 Loadings. Frame shall be angle style frame. Material shall be 6061-T6 aluminum for bars, angles and extrusions. 1/4" diamond plate shall be 5086 aluminum. Unit designed heavy duty, for H-20 wheel loads where not subject to high density traffic. Unit supplied with a heavy duty pneu-spring, for ease of operation when opening cover. Each hatch shall be equipped with a hold open arm. Door shall lock open in the 90 degree position. Hinges shall be of heavy duty design. Material shall be a brass alloy with a 65,000 psi tensile strength. Each hinge shall have

a Grade 316 Stainless Steel, 3/8" diameter hinge pin. Exterior of frame, which comes in contact with concrete shall have one coat black bituminous paint. Unit supplied with a recessed stainless steel slamlock. Angle frame must be completely encased in concrete. Both bearing plates must be fully supported by a bed of concrete.

6. The unit shall be supplied with aluminum safety grate. Safety Grate shall be made of 6061-T6 aluminum with a minimum ultimate strength of 38,000 psi and a minimum yield strength of 35,000 psi as per ASTM B221. Grate design shall use safety factors as defined in the "Specifications for Aluminum Structures", by the Aluminum Association, Inc., 5th edition, DEC. 1986 for "Bridge Type Structures."
 - a. Grating shall be designed to withstand a minimum live load of 300 pounds per square foot. Deflection shall not exceed 1/150th of the span.
 - b. Grate openings shall be 4" x 4", which will allow for visual inspection of the pit once the access hatch is open.
 - c. Each grate shall be provided with a stainless steel, safety check chain. Chain will prevent the grating from falling into the pit.
 - d. Welding shall be in accordance with ANSI/AWS D1.2 "Structural Welding Code for Aluminum."

B. Submersible Sewage Pump System

1. Submersible sewage effluent pumps shall be sized as directed by the Owner and specified herein. Pump shall be heavy duty cast iron with stainless steel fasteners. The impeller shall be semi-open, non-clog, engineered plastic capable of passing 3/4" solids. Pump motor shall be oil filled. Pumps shall be equal to SHEF Series as manufactured by Hydromatic or approved equal. Specific pump performance data shall conform to the following:

1/2 HP Pumps 230 volt/single phase/60 Hz/2" NPT/ 3450 rpm
40 gpm @ 42 ft. TDH
50 gpm @ 32 ft. TDH
60 gpm @ 18 ft. TDH

1 HP Pumps 230 volt/single phase/60 Hz/2" NPT/3450 rpm
20 gpm @ 80 ft. TDH
30 gpm @ 76 ft. TDH
40 gpm @ 71 ft. TDH
50 gpm @ 65 ft. TDH

C. Duplex Guide Rail System: Complete package system shall be as manufactured by Moran Manufacturing Inc., or approved equal, as follows.

1. The guide rail assembly shall be constructed of Type 304 stainless steel and shall consist of a minimum of two rails, a bottom base plate, a minimum of one cross brace every 18 inches between the rails and a wall brace, all welded together to provide the maximum structural integrity. The rails shall be round to provide a non-binding surface during installation and removal of the pump. The guide rail assembly shall be installed as a one piece unit and shall be bolted with stainless anchor bolts to the basin bottom and the basin wall a minimum of two places each.
2. The pump bracket assembly shall consist of a top bracket and a bottom bracket. The brackets shall be fabricated of 1/4" steel material and shall be painted with coal tar epoxy paint at such rate as to provide a minimum 10 mil thickness. The top bracket shall be attached to the discharge piping above the pump disconnect and shall be constructed in such a manner that pump cannot be removed from the guide rail assembly except when removing pump out the top of the sump basin. The bottom bracket shall be attached to the pump at the discharge connection and shall guide the pump along the guide rail assembly to ensure proper alignment of the pump.

3. A 3/16" min. (7 x 9) stainless steel lifting cable, 10 ft. longer than the sump depth, shall be furnished for lifting and lowering the pump in the sump basin. The stainless steel lifting cable shall be of the 18-8 type 302/304 stainless steel and shall have minimum nominal breaking strength of 15 times the weight of the pump. It shall be substantially attached to the top of the pump and shall have a formed loop at the other end.
4. The discharge piping shall include a cast iron ball check valve, with a natural rubber ball and clean out port with plug for easy access, a brass quick disconnect fitting, with an O-ring stem brass gate valve, per pump. All other piping shall be schedule 40 stainless steel.
5. The station shall have a gate valve extension handle per valve which will allow the gate valve to be operated from a maximum of 6" below the basin cover. The handle shall be constructed of a minimum of 3/8" dia. Type 304 stainless steel. The handle shall be held in place by being attached to the gate valve and by the guide rail wall brace.
6. All internal metal parts that are not brass, galvanized steel, or stainless steel shall be painted with coal-tar epoxy paint to resist corrosion, unless otherwise noted.
7. Mercury level control switches shall be provided for lead pump on, lag pump on and high level alarm, pumps off and low level alarm.
8. The mercury switch shall be encapsulated in polyurethane foam for corrosion and shock resistance. Level switches shall be weighted to hold position in the sump. The cord connecting the control shall be No. 16-2, rated for 13 amps, and shall be type C-SJO. To ensure optimum longevity, mercury contacts shall be of the mercury-to-mercury type and encapsulated in a glass tube and shall be rated for 20 amps at 115 VAC.
9. The manufacturer of the lift station shall furnish a limited warranty for 18 months from the date of shipment or 12 months from start-up (whichever occurs first), that all equipment shall be free from defects in design, materials and workmanship. The lift station manufacturer shall furnish replacement parts for any component proven defective whether of its or other manufacturer during the warranty period, excepting only those items which are normally consumed in service, such as (but not limited to) light bulbs, oil, grease, packing, etc.
10. Installation instructions shall be furnished with the station.

D. Control System

1. This system shall be controlled and protected by a packaged system as manufactured by Rombus, or approved equal. The control shall provide automatic start, stop and alternation of 2 pumps, and shall provide an audible alarm as well as visual indication of high level conditions.
2. The control panel shall be pre-wired in a NEMA 3R weatherproof enclosure, and all necessary components including the following: single phase lightning arrester for protection of the pumps, NEMA rated contractor and thermal magnetic circuit breaker for each pump, a main control/alarm circuit fused disconnect switch, separately fused control and alarm circuits, panel mounted duplex alternating relays, control relays, and terminal blocks for the connection on all external wiring. Provide a 20 amp/115v convenience outlet in each panel on its own GFCI circuit breaker. Multi-colored circuitry is to be used within the control panel to facilitate trouble shooting.
3. Mounted inside the enclosure shall be hand-off-auto switches and run pilot lights for each pump circuit; normal-off-test switch and alarm pilot light for high level alarm; float test toggle switches for each float to override floats to simulate operation; non-resettable elapsed time meters for each pump.
4. Mounted remotely from the Control Panel shall be a 4" 120V alarm bell and a flashing alarm light.

E. System Operation: As the level in the sump rises to the lead pump on level, the pump selected as lead by the alternator will come on line, and will pump the level down to the pump off level. The pump will then turn off, and the alternator will cycle, selecting the other pump as lead for the next cycle. If, with the lead pump running, the level in the tank continues to rise to the lag pump on level, the lag pump will come on line, alarms will sound, and will run with the lead pump until the pumps off level has been reached. The pumps will then be turned off, and the alternator will cycle. If level continues to drop to the low level alarm float, alarm circuits will be activated.

1. Placing the T-O-N switch into the off position will de-energize the alarm bell and flashing light, but the alarm pilot light will remain illuminated until the alarm condition has been cleared. When the

alarm pilot light is extinguished, the T-O-N switch may be reset to the normal position, and the alarm will stand ready for the next alarm.

1.3 EXECUTION

- A. The Contractor shall excavate the station site to the elevations as required to meet project requirements. Compact the subgrade and install crushed stone.
- B. Install lift station in accordance with manufacturer's recommendations. Perform additional exterior waterproofing as required to repair original coating and to achieve a watertight sump basin. The discharge piping shall be extended and connected to the sewage force mains. Backfill material shall be approved by the Owner. No backfill material shall have any dimension greater than 6". Backfill material within 15" of basin shall not have a dimension greater than 2".
- C. The Lift Station control panel shall be mounted to the building nearby and shall have sufficient cord supplied by the Lift Station manufacturer to avoid any splices. All necessary electrical connections between pumps, flow controls and control panel shall be made in accordance with manufacturer's recommendations. No splices shall be made in the basin. Lightning protection shall be provided in the panel.
- D. Install pump power conductors in rigid steel conduit between Lift Station and Control Panel.
- E. Upon completion, the Lift Station shall be tested to assure there is no leakage and that the pumps, controls and alarm are operating satisfactorily. The Lift Station manufacturer's representative shall be present during initial start up and testing. Three (3) Lift Station operation and maintenance manuals shall be provided.

END OF SECTION 22 13 29 13b

Task	Specification	Specification Description
22 13 29 16	22 13 29 13a	Sewage Pumps
22 13 29 33	01 22 16 00	No Specification Required

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SECTION 22 14 29 13 - SUMP PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for sump pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Submersible sump pumps.
 - b. Wet-pit-volute sump pumps.
 - c. Sump-pump basins and basin covers.
 - d. Packaged drainage-pump units.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Operation and Maintenance Data: For pumps and controls, to include in operation and maintenance manuals.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. UL Compliance: Comply with UL 778 for motor-operated water pumps.

E. Delivery, Storage, And Handling

1. Retain shipping flange protective covers and protective coatings during storage.
2. Protect bearings and couplings against damage.
3. Comply with pump manufacturer's written rigging instructions for handling.

1.2 PRODUCTS

A. Submersible Sump Pumps

1. Submersible, Fixed-Position, Single-Seal Sump Pumps:
 - a. Description: Factory-assembled and -tested sump-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, semiopen, **as directed**, design for clear wastewater handling, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seal: Mechanical.

- g. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - h. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - i. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
2. Submersible, Fixed-Position, Double-Seal Sump Pumps:
- a. Description: Factory-assembled and -tested sump-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Cast iron, with strainer inlet, legs that elevate pump to permit flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, semiopen, **as directed**, design for clear wastewater handling, and keyed and secured to shaft.
 - e. Pump and Motor Shaft: Stainless steel **OR** steel, **as directed**, with factory-sealed, grease-lubricated ball bearings.
 - f. Seals: Mechanical.
 - g. Moisture-Sensing Probe: Internal moisture sensor and moisture alarm.
 - h. Motor: Hermetically sealed, capacitor-start type; with built-in overload protection; lifting eye or lug; and three-conductor, waterproof power cable of length required and with grounding plug and cable-sealing assembly for connection at pump.
 - 1) Motor Housing Fluid: Air **OR** Oil, **as directed**.
 - i. Controls (rod-and-float type):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - 2) Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.

- 5) High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - j. Controls (float- and pressure-switch types):
 - 1) Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - 2) Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.
 - 3) Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - 4) High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 - k. Control-Interface Features:
 - 1) Remote Alarm Contacts: For remote alarm interface.
 - 2) Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - a) On-off status of pump.
 - b) Alarm status.
- B. Wet-Pit-Volute Sump Pumps
1. Description: Factory-assembled and -tested sump-pump unit.
 2. Pump Type: Wet-pit-volute, single-stage, separately-coupled, overhung-impeller, centrifugal sump pump as defined in HI 1.1-1.2 and HI 1.3.
 3. Pump Casing: Cast iron, with strainer inlet and threaded connection for **NPS 2 (DN 50)** and smaller and flanged connection for **NPS 2-1/2 (DN 65)** and larger discharge piping.
 4. Impeller: Statically and dynamically balanced, ASTM A 48/A 48M, Class No. 25 A cast iron **OR** ASTM A 532/A 532M, abrasion-resistant cast iron **OR** ASTM B 584, cast bronze, **as directed**, semiopen, **as directed**, design for clear wastewater handling, and keyed and secured to shaft.
 5. Sleeve Bearings: Bronze. Include oil-lubricated, intermediate sleeve bearings at **48-inch (1200-mm)** maximum intervals if basin depth is more than **48 inches (1200 mm)**, and grease-lubricated, ball-type thrust bearings.
 6. Pump and Motor Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
 7. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.1, Class 125, cast-iron flanges and flanged fittings or ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 8. Support Plate: Cast iron or coated steel and strong enough to support pumps, motors, and controls. Refer to Part 1.2 "Sump-Pump Basins and Basin Covers" Article for requirements.
 9. Shaft Seal: Stuffing box, with graphite-impregnated braided-yarn rings and bronze packing gland.
 10. Motor: Single-speed; grease-lubricated ball bearings and mounting on vertical, cast-iron pedestal.
 11. Controls (rod-and-float type):
 - a. Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**.
 - b. Switch Type: Pedestal-mounted float switch with float rods and rod buttons.
 - c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - d. Float Guides: Pipe or other restraint for floats and rods in basins of depth greater than **60 inches (1500 mm)**.
 - e. High-Water Alarm: Cover-mounted, compression-probe alarm, with electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
 12. Controls (float- and pressure-switch types):
 - a. Enclosure: NEMA 250, Type 1 **OR** Type 4X, **as directed**; pedestal-mounted **OR** wall-mounted, **as directed**.
 - b. Switch Type: Mechanical-float **OR** Mercury-float **OR** Pressure, **as directed**, type, in NEMA 250, Type 6 enclosures with mounting rod and electric cables.

- c. Automatic Alternator: Start pumps on successive cycles and start multiple pumps if one cannot handle load.
 - d. High-Water Alarm: Rod-mounted, NEMA 250, Type 6 enclosure with mechanical-float, mercury-float, or pressure switch matching control and electric bell; 120-V ac, with transformer and contacts for remote alarm bell.
13. Control-Interface Features:
- a. Remote Alarm Contacts: For remote alarm interface.
 - b. Building Automation System Interface: Auxiliary contacts in pump controls for interface to building automation system and capable of providing the following:
 - 1) On-off status of pump.
 - 2) Alarm status.
- C. Sump-Pump Basins And Basin Covers
- 1. Basins: Factory-fabricated, watertight, cylindrical, basin sump with top flange and sidewall openings for pipe connections.
 - a. Material: Cast iron **OR** Fiberglass **OR** Polyethylene, **as directed**.
 - b. Reinforcement: Mounting plates for pumps, fittings, and accessories.
 - c. Anchor Flange: Same material as or compatible with basin sump, cast in or attached to sump, in location and of size required to anchor basin in concrete slab.
 - 2. Basin Covers: Fabricate metal cover with openings having gaskets, seals, and bushings; for access to pumps, pump shafts, control rods, discharge piping, vent connections, and power cables.
 - a. Reinforcement: Steel or cast iron, capable of supporting foot traffic for basins installed in foot-traffic areas.
- D. Packaged Drainage-Pump Units
- 1. Packaged Pedestal Drainage-Pump Units:
 - a. Description: Factory-assembled and -tested, automatic-operation, freestanding, sump-pump unit.
 - b. Pump Type: Wet-pit-volute, single-stage, separately-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Pump Casing: Corrosion-resistant material, with strainer inlet, design that permits flow into impeller, and vertical discharge for piping connection.
 - d. Impeller: Aluminum, brass, or plastic.
 - e. Motor: With built-in overload protection and mounted vertically on sump pump column.
 - f. Power Cord: Three-conductor, waterproof cable of length required but not less than **72 inches (1830 mm)**, with grounding plug and cable-sealing assembly for connection at pump.
 - g. Control: Float switch.
 - 2. Packaged Submersible Drainage-Pump Units:
 - a. Description: Factory-assembled and -tested, automatic-operation, basin-mounted, sump-pump unit.
 - b. Pump Type: Submersible, end-suction, single-stage, close-coupled, overhung-impeller centrifugal pump as defined in HI 1.1-1.2 and HI 1.3.
 - c. Casing: Metal.
 - d. Impeller: Brass.
 - e. Pump Seal: Mechanical.
 - f. Motor: Hermetically sealed, capacitor-start type, with built-in overload protection.
 - g. Power Cord: Three-conductor, waterproof cable of length required but not less than **72 inches (1830 mm)**, with grounding plug and cable-sealing assembly for connection at pump.
 - h. Pump Discharge Piping: Factory or field fabricated, galvanized, ASTM A 53/A 53M, Schedule 40, steel pipe with ASME B16.4, Class 125, gray iron threaded fittings, **as directed**.
 - i. Control: Motor-mounted float switch.

j. Basin: Plastic.

E. Motors

1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 22 Section "Common Motor Requirements For Plumbing Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
2. Motors for submersible pumps shall be hermetically sealed.

1.3 EXECUTION

A. Earthwork

1. Excavation and filling are specified in Division 31 Section "Earth Moving".

B. Examination

1. Examine roughing-in for plumbing piping to verify actual locations of storm drainage piping connections before sump pump installation.

C. Installation

1. Pump Installation Standards: Comply with HI 1.4 for installation of sump pumps.

D. Connections

1. Comply with requirements for piping specified in Division 22 Section "Facility Storm Drainage Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to equipment to allow service and maintenance.

E. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Perform each visual and mechanical inspection.
 - b. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Pumps and controls will be considered defective if they do not pass tests and inspections.
4. Prepare test and inspection reports.

F. Startup Service

1. Engage a factory-authorized service representative to perform **OR** Perform, **as directed**, startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

G. Adjusting

1. Adjust pumps to function smoothly, and lubricate as recommended by manufacturer.
2. Adjust control set points.

H. Demonstration

1. Train Owner's maintenance personnel to adjust, operate, and maintain controls and pumps.

22 - Plumbing



END OF SECTION 22 14 29 13

Task	Specification	Specification Description
22 14 29 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
22 15 13 00	22 15 19 13	General-Service Packaged Air Compressors and Receivers
22 15 13 00	23 09 00 00	HVAC Instrumentation And Controls

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SECTION 22 15 19 13 - GENERAL-SERVICE PACKAGED AIR COMPRESSORS AND RECEIVERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for general-service packaged air compressors and receivers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Lubricated, reciprocating air compressors.
 - b. Oil-free, reciprocating air compressors.
 - c. Oilless, reciprocating air compressors.
 - d. Oil-free, rotary-screw air compressors.
 - e. Oil-flooded, rotary-screw air compressors.
 - f. Oil-free, rotary, sliding-vane air compressors.
 - g. Oil-sealed, rotary, sliding-vane air compressors.
 - h. Inlet-air filters.
 - i. Air-cooled, compressed-air aftercoolers.
 - j. Water-cooled, compressed-air aftercoolers.
 - k. Refrigerant compressed-air dryers.
 - l. Desiccant compressed-air dryers.
 - m. Computer interface cabinet.

C. Definitions

1. Actual Air: Air delivered from air compressors. Flow rate is delivered compressed air measured in **acfm** (actual L/s).
2. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
3. Standard Air: Free air at **68 deg F** (**20 deg C**) and 1 atmosphere (29.92 in. Hg) before compression or expansion and measured in **scfm** (standard L/s).

D. Performance Requirements

1. Delegated Design: Design compressed-air equipment mounting, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Seismic Performance: Compressed-air equipment shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated.
 - a. Wiring Diagrams: For power, signal, and control wiring.
2. Delegated-Design Submittal: For compressed-air equipment mounting indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of supports.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

3. Seismic Qualification Certificates: For compressed-air equipment, accessories, and components, from manufacturers.
4. Operation and Maintenance Data.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASME Compliance: Fabricate and label receivers to comply with ASME Boiler and Pressure Vessel Code.

1.2 PRODUCTS

A. General Requirements For Packaged Air Compressors And Receivers

1. General Description: Factory-assembled, -wired, -piped, and -tested; electric-motor-driven; air-cooled; continuous-duty air compressors and receivers that deliver air of quality equal to intake air.
2. Control Panels: Automatic control station with load control and protection functions. Comply with NEMA ICS 2 and UL 508.
 - a. Enclosure: NEMA ICS 6, Type 12 control panel unless otherwise indicated.
 - b. Motor Controllers: Full-voltage, combination magnetic type with undervoltage release feature and motor-circuit-protector-type disconnecting means and short-circuit protective device.
 - c. Control Voltage: 120-V ac or less, using integral control power transformer.
 - d. Motor Overload Protection: Overload relay in each phase.
 - e. Starting Devices: Hand-off-automatic selector switch in cover of control panel, plus pilot device for automatic control.
 - f. Automatic control switches to alternate lead-lag compressors for duplex **OR** sequence lead-lag compressors for multiplex, **as directed**, air compressors.
 - g. Instrumentation: Include discharge-air pressure gage, air-filter maintenance indicator, hour meter, compressor discharge-air and coolant temperature gages, and control transformer.
 - h. Alarm Signal Device: For connection to alarm system to indicate when backup air compressor is operating.
3. Receivers: Steel tank constructed according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - a. Pressure Rating: At least as high as highest discharge pressure of connected compressors, and bearing appropriate code symbols.
 - b. Interior Finish: Corrosion-resistant coating.
 - c. Accessories: Include safety valve, pressure gage, drain, and pressure-reducing valve.
4. Mounting Frame: Fabricate mounting and attachment to pressure vessel with reinforcement strong enough to resist packaged equipment movement during a seismic event when base is anchored to building structure.

B. Lubricated, Reciprocating Air Compressors

1. Compressor(s): Lubricated, reciprocating-piston type with lubricated compression chamber and crankcase.
 - a. Submerged gear-type oil pump.
 - b. Oil filter.
 - c. Combined high discharge-air temperature and low lubrication-oil pressure switch.
 - d. Belt guard totally enclosing pulleys and belts.

C. Oil-Free, Reciprocating Air Compressors

1. Compressor(s): Oil-free, reciprocating-piston type with nonlubricated compression chamber, lubricated crankcase, and of construction that prohibits oil from entering compression chamber.

- a. Submerged gear-type oil pump.
 - b. Oil filter.
 - c. Combined high discharge-air temperature and low lubrication-oil pressure switch.
 - d. Belt guard totally enclosing pulleys and belts.
- D. Oilless, Reciprocating Air Compressors
1. Compressor(s): Oilless (nonlubricated), reciprocating-piston type, with sealed oil-free bearings, that will deliver air of quality equal to intake air.
 - a. High discharge-air temperature switch.
 - b. Belt guard totally enclosing pulleys and belts.
- E. Oil-Free, Rotary-Screw Air Compressors
1. Compressor(s): Oil-free, rotary-screw type with nonlubricated helical screws and lubricated gear box, and of construction that prohibits oil from entering compression chamber.
 - a. Coupling: Nonlubricated, flexible type.
 - b. Cooling/Lubrication System: Unit-mounted, air-cooled exchanger package prepiped to unit; with air pressure circulation system with coolant stop valve, full-flow coolant filter, and thermal bypass valve.
 - c. Air Filter: Dry type, with maintenance indicator and cleanable replaceable filter element.
 - d. Air/Coolant Receiver and Separation System: **150-psig- (1035-kPa-)** rated steel tank with ASME safety valve, coolant-level gage, multistage air-coolant separator element, minimum pressure valve, blowdown valve, discharge check valve, coolant stop valve, full-flow coolant filter, and thermal bypass valve.
 - e. Capacity Control: Capacity modulation between zero and 100 percent air delivery, with operating pressures between **50 and 100 psig (345 and 690 kPa)**. Include necessary control to hold constant pressure. When air demand is zero, unload compressor by using pressure switch and blowdown valve.
- F. Oil-Flooded, Rotary-Screw Air Compressors
1. Compressor(s): Oil-flooded, rotary-screw type with lubricated helical screws and lubricated gear box.
 - a. Coupling: Nonlubricated, flexible type.
 - b. Cooling/Lubrication System: Unit-mounted, air-cooled exchanger package prepiped to unit; with air pressure circulation system with coolant stop valve, full-flow coolant filter, and thermal bypass valve.
 - c. Air Filter: Dry type, with maintenance indicator and cleanable replaceable filter element.
 - d. Air/Coolant Receiver and Separation System: **150-psig- (1035-kPa-)** rated steel tank with ASME safety valve, coolant-level gage, multistage air-coolant separator element, minimum pressure valve, blowdown valve, discharge check valve, coolant stop valve, full-flow coolant filter, and thermal bypass valve.
 - e. Capacity Control: Capacity modulation between zero and 100 percent air delivery, with operating pressures between **50 and 100 psig (345 and 690 kPa)**. Include necessary control to hold constant pressure. When air demand is zero, unload compressor by using pressure switch and blowdown valve.
- G. Oil-Free, Rotary, Sliding-Vane Air Compressors
1. Compressor(s): Oil-free, nonpulsating, rotary, sliding-vane type with nonlubricated sliding vanes.
 - a. Cleanable inlet screens.
 - b. Outlet silencers on discharge connections.
- H. Oil-Sealed, Rotary, Sliding-Vane Air Compressors
1. Compressor(s): Nonpulsating, rotary, sliding-vane type with oil-sealed sliding vanes.
 - a. Cleanable inlet screens.
 - b. Outlet silencers and oil-mist separators on discharge connections.
- I. Inlet-Air Filters

1. Description: Combination inlet-air filter-silencer, suitable for remote installation, for each air compressor.
 - a. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
 - b. Capacity: Match capacity of air compressor, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.
 2. Description: Combination inlet-air filter-silencer, suitable for remote installation, for multiple air compressors.
 - a. Construction: Weatherproof housing for replaceable, dry-type filter element, with silencer tubes or other method of sound reduction.
 - b. Capacity: Match total capacity of connected air compressors, with filter having collection efficiency of 99 percent retention of particles larger than 10 micrometers.
- J. Air-Cooled, Compressed-Air Aftercoolers
1. Description: Electric-motor-driven, fan-operation, finned-tube unit; rated at **250 psig (1725 kPa)** and leak tested at **350-psig (2415-kPa)** minimum air pressure; in capacities indicated. Size units to cool compressed air in compressor-rated capacities to **10 deg F (6 deg C)** above summertime maximum ambient temperature. Include moisture separator and automatic drain.
- K. Water-Cooled, Compressed-Air Aftercoolers
1. Description: Shell and tube unit, rated at **250 psig (1725 kPa)** and leak tested at **350-psig (2415-kPa)** minimum air pressure, in capacities indicated. Include moisture separator and automatic drain.
- L. Refrigerant Compressed-Air Dryers
1. Description: Noncycling, air-cooled, electric-motor-driven unit with steel enclosure and capability to deliver **35 deg F (2 deg C)**, **100-psig (690-kPa)** air at dew point. Include automatic ejection of condensate from airstream, step-down transformers, disconnect switches, inlet and outlet pressure gages, thermometers, automatic controls, and filters.
- M. Desiccant Compressed-Air Dryers
1. Description: Twin-tower unit with purge system, mufflers, and capability to deliver **plus 10 deg F (minus 12 deg C)**, **100-psig (690-kPa)** air at dew point. Include dew point controlled purge, step-down transformers, disconnect switches, inlet and outlet pressure gages, thermometers, automatic controls, and filters.
- N. Computer Interface Cabinet
1. Description:
 - a. Wall mounting.
 - b. Welded steel with white enamel finish.
 - c. Gasketed door.
 - d. Grounding device.
 - e. Factory-installed, signal circuit boards.
 - f. Power transformer.
 - g. Circuit breaker.
 - h. Wiring terminal board.
 - i. Internal wiring capable of interfacing 20 alarm signals.
- O. Motors
1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 22 Section "Common Motor Requirements For Plumbing Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

- b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.

1.3 EXECUTION

A. Equipment Installation

1. Equipment Mounting:

- a. Install air compressors, aftercoolers, and air dryers on concrete bases using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
 - 1) Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 - 2) Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - 3) For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 4) Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 5) Install anchor bolts to elevations required for proper attachment to supported equipment.
- b. Install air compressors, aftercoolers, and air dryers using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
 - 1) Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
- c. Install air compressors, aftercoolers, and air dryers on vibration isolation inertia bases. Comply with requirements specified in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
- d. Install air compressors, aftercoolers, and air dryers on concrete bases. Comply with requirements in Division 03 Section "Cast-in-place Concrete".
 - 1) Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - 2) For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3) Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4) Install anchor bolts to elevations required for proper attachment to supported equipment.
- e. Install water-cooled, compressed-air aftercoolers and desiccant compressed-air dryers on concrete bases. Comply with requirements in Division 03 Section "Cast-in-place Concrete".
 - 1) Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - 2) For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - 3) Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 4) Install anchor bolts to elevations required for proper attachment to supported equipment.
2. Install compressed-air equipment anchored to substrate.
3. Arrange equipment so controls and devices are accessible for servicing.

4. Maintain manufacturer's recommended clearances for service and maintenance.
 5. Install the following devices on compressed-air equipment:
 - a. Thermometer, Pressure Gage, and Safety Valve: Install on each compressed-air receiver.
 - b. Pressure Regulators: Install downstream from air compressors and dryers.
 - c. Automatic Drain Valves: Install on aftercoolers, receivers, and dryers. Discharge condensate over nearest floor drain.
- B. Connections
1. Comply with requirements for piping specified in Division 22 Section "General-service Compressed-air Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
- C. Identification
1. Identify general-service air compressors and components. Comply with requirements for identification specified in Division 22 Section "Identification For Plumbing Piping And Equipment".
- D. Startup Service
1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Check for lubricating oil in lubricated-type equipment.
 - c. Check belt drives for proper tension.
 - d. Verify that air-compressor inlet filters and piping are clear.
 - e. Check for equipment vibration-control supports and flexible pipe connectors and verify that equipment is properly attached to substrate.
 - f. Check safety valves for correct settings. Ensure that settings are higher than air-compressor discharge pressure but not higher than rating of system components.
 - g. Check for proper seismic restraints.
 - h. Drain receiver tanks.
 - i. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - j. Test and adjust controls and safeties.
- E. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain air compressors, aftercoolers, and air dryers.

END OF SECTION 22 15 19 13

Task	Specification	Specification Description
22 15 19 13	23 09 00 00	HVAC Instrumentation And Controls
22 15 19 19	22 15 19 13	General-Service Packaged Air Compressors and Receivers
22 15 19 19	23 09 00 00	HVAC Instrumentation And Controls

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SECTION 22 31 16 00 - WATER SOFTENERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for water softeners. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes household and commercial water softeners.
 - a. Chemicals.
 - b. Water testing kits.

C. Definitions

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. FRP: Fiberglass-reinforced plastic.
3. PE: Polyethylene plastic.
4. PVC: Polyvinyl chloride plastic.

D. Submittals

1. Product Data: For each type of water softener and water testing kit indicated.
2. Shop Drawings: Include plans, elevations, sections, details, and connections to piping systems.
 - a. Include wiring diagrams.
3. Manufacturer Seismic Qualification Certification
4. Field quality-control test reports.
5. Operation and Maintenance Data: For water softeners to include in emergency, operation, and maintenance manuals.
6. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance for Steel Tanks: Fabricate and label mineral tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, where indicated.
3. ASME Compliance for FRP Tanks: Fabricate and label mineral tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, where indicated.

F. Warranty

1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of water softener that fail in materials or workmanship within Five years from date of Final Completion.

1.2 PRODUCTS

A. Household Water Softeners

1. Description: Factory-assembled, fully-automatic, pressure-type water softener.
 - a. Configuration: Unit with one mineral tank and one brine tank or cabinet-style, combination mineral and brine tank unit with equivalent characteristics.
 - b. Mineral Tank: Steel or FRP, with coating or liner suitable for potable-water service and **125-psig (860-kPa)** minimum pressure rating.

- c. Comply with NSF 61, "Drinking Water System Components--Health Effects."
- d. Controls: For fully automatic operation.
- e. Brine Tank: Combination measuring and wet-salt storing system.
 - 1) Tank and Cover Material: FRP or molded PE.
 - 2) Brine Valve: Float operated and plastic fitted for automatic control of brine withdrawn and freshwater refill.
 - 3) Size: Large enough for at least two regenerations at full salting.
- f. Factory-Installed Accessories:
 - 1) Piping, valves, tubing, and drains.
 - 2) Sampling cock.
 - 3) Main-operating-valve position indicator.

B. Commercial Water Softeners

- 1. Description: Factory-assembled, pressure-type water softener.
 - a. Comply with NSF 61, "Drinking Water System Components--Health Effects."
 - b. Configuration: Single unit with one mineral tank **OR** Twin unit with two mineral tanks **OR** Triple unit with three mineral tanks, **as directed**, and one brine tank, factory mounted on skids, **unless directed otherwise**.
 - c. Mineral Tanks: FRP, pressure-vessel quality.
 - 1) Construction: Non-ASME code **OR** Fabricated and stamped to comply with ASME Boiler and Pressure Vessel Code: Section X, "Fiber-Reinforced Plastic Pressure Vessels," **as directed**.
 - 2) Pressure Rating: **100 psig (690 kPa) OR 125 psig (860 kPa), as directed**, minimum.
 - 3) Wetted Components: Suitable for water temperatures from **40 to at least 100 deg F (5 to at least 38 deg C) OR 40 to at least 120 deg F (5 to at least 49 deg C) OR 40 to at least 150 deg F (5 to at least 66 deg C), as directed**.
 - 4) Freeboard: 50 percent minimum for backwash expansion above normal resin bed level.
 - 5) Support Legs or Skirt: Constructed of structural steel, welded to tank before testing and labeling.
 - 6) Upper Distribution System: Single, point type, fabricated from galvanized-steel pipe and fittings.
 - 7) Lower Distribution System: Hub and radial-arm or header-lateral type; fabricated from nonmetallic pipe and fittings with individual, fine-slotted, nonclogging plastic strainers; arranged for even flow distribution through resin bed.
 - 8) Liner: PE, ABS, or other material suitable for potable water.
 - d. Mineral Tanks: Steel **OR** Stainless steel, **as directed**, electric welded; pressure-vessel quality.
 - 1) Fabricate supports and attachments to tank with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure.
 - 2) Construction: Non-ASME code **OR** Fabricated and stamped to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," **as directed**.
 - 3) Pressure Rating: **100 psig (690 kPa) OR 125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, minimum.
 - 4) Wetted Components: Suitable for water temperatures from **40 to at least 100 deg F (5 to at least 38 deg C) OR 40 to at least 120 deg F (5 to at least 49 deg C) OR 40 to at least 150 deg F (5 to at least 66 deg C), as directed**.
 - 5) Freeboard: 50 percent minimum for backwash expansion above normal resin bed level.
 - 6) Handholes: **4 inches (102 mm)** round or **4 by 6 inches (102 by 152 mm)** elliptical, in top head and lower sidewall of tanks **30 inches (762 mm)** and smaller in diameter.
 - 7) Manhole: **11 by 15 inches (280 by 380 mm)** in top head of tanks larger than **30 inches (762 mm)** in diameter.

- 8) Support Legs or Skirt: Constructed of structural steel, welded to tank before testing and labeling.
- 9) Finish: Hot-dip galvanized on exterior and interior of tank after fabrication, unless tank is stainless steel.
- 10) Finish: Exterior of tank spray painted with rust-resistant prime coat, 2- to 3-mil (0.051- to 0.076-mm) dry film thickness. Interior sandblasted and lined with epoxy-polyamide coating, 8- to 10-mil (0.203- to 0.254-mm) dry film thickness.
- 11) Upper Distribution System: Single, point type, fabricated from galvanized-steel pipe and fittings.
- 12) Lower Distribution System: Hub and radial-arm or header-lateral type; fabricated from PVC pipe and fittings with individual, fine-slotted, nonclogging PE strainers; arranged for even flow distribution through resin bed.
- 13) Liner: PE, ABS, or other material suitable for potable water.
- e. Controls: Automatic; factory mounted on unit and factory wired.
 - 1) Adjustable duration of various regeneration steps.
 - 2) Push-button start and complete manual operation.
 - 3) Electric time clock and switch for automatic operation, except for manual return to service.
 - 4) Sequence of Operation: Program multiport pilot-control valve to automatically pressure-actuate main operating valve through steps of regeneration.
 - 5) Pointer on pilot-control valve shall indicate cycle of operation.
 - 6) Means of manual operation of pilot-control valve if power fails.
- f. Controls: Fully automatic; factory mounted on unit and factory wired.
 - 1) Adjustable duration of various regeneration steps.
 - 2) Push-button start and complete manual operation.
 - 3) Electric time clock and switch for fully automatic operation, adjustable to initiate regeneration at any hour of day and any day of week or at fixed intervals.
 - 4) Sequence of Operation: Program multiport pilot-control valve to automatically pressure-actuate main operating valve through steps of regeneration and return to service.
 - 5) Pointer on pilot-control valve shall indicate cycle of operation.
 - 6) Means of manual operation of pilot-control valve if power fails.
 - 7) Main Operating Valves: Industrial, automatic, multiport, diaphragm type with the following features:
 - a) Slow opening and closing, nonslam operation.
 - b) Diaphragm guiding on full perimeter from fully open to fully closed.
 - c) Isolated dissimilar metals within valve.
 - d) Self-adjusting, internal, automatic brine injector that draws brine and rinses at constant rate independent of pressure.
 - e) Valve for single mineral-tank unit with internal automatic bypass of raw water during regeneration.
 - f) Sampling cocks for soft water.
 - g) Special tools are not required for service.
 - 8) Flow Control: Automatic, to control backwash and flush rates over wide variations in operating pressures, and that does not require field adjustments.
 - a) Meter Control: Equip each mineral tank with signal-register-head water meter that will produce electrical signal indicating need for regeneration on reaching hand-set total in gallons (liters). Design so signal will continue until reset.
 - b) Demand-Initiated Control:
 - i. Equip single mineral-tank units with automatic-reset-head water meter that electrically activates cycle controller to initiate regeneration at preset total in gallons (liters). Design so head automatically resets to preset total in gallons (liters) for next service run.
 - ii. Equip each mineral tank of twin mineral-tank units with automatic-reset-head water meters that electrically activate cycle controllers to initiate regeneration at preset total in gallons (liters). Design so heads

automatically reset to preset total in gallons (liters) for next service run. Include electrical lockout to prevent simultaneous regeneration of both tanks.

- iii. Equip each mineral tank of twin mineral-tank units with automatic-reset-head water meter in common outlet header that electrically activates cycle controller to automatically regenerate one mineral tank at preset total in gallons (liters) and divert flow to other tank. Set to repeat with other tank. Include electrical lockout to prevent simultaneous regeneration of both tanks.
 - iv. Equip each mineral tank of multiple mineral-tank units with automatic-reset-head water meters that electrically activate cycle controllers to automatically regenerate at preset total in gallons (liters). Design so heads automatically reset to preset total in gallons (liters) for next service run. Include electrical lockouts to prevent simultaneous regeneration of more than one tank.
 - v. Equip each mineral tank of multiple mineral-tank units with automatic-reset-head water meter in common outlet header that electrically activates cycle controller to automatically regenerate one mineral tank at preset total in gallons (liters) and divert flow to other tanks. Set to repeat with other tanks. Include electrical lockouts to prevent simultaneous regeneration of more than one tank.
- g. Brine Tank: Combination measuring and wet-salt storing system.
- 1) Tank and Cover Material: Fiberglass, 3/16 inch (4.8 mm) thick; or molded PE, 3/8 inch (9.5 mm) thick.
 - 2) Brine Valve: Float operated and plastic fitted for automatic control of brine withdrawn and freshwater refill.
 - 3) Size: Large enough for at least four regenerations at full salting.
- h. Factory-Installed Accessories:
- 1) Piping, valves, tubing, and drains.
 - 2) Sampling cocks.
 - 3) Main-operating-valve position indicators.
 - 4) Water meters.
2. Capacity and Characteristics:
- a. Service: Cold **OR** Hot, **as directed**, water.
 - b. Number of Mineral Tanks: One **OR** Two, **as directed**.

C. Chemicals

- 1. Mineral: High-capacity, sulfonated-polystyrene ion-exchange resin that is stable over entire pH range with good resistance to bead fracture from attrition or shock.
 - a. Exchange Capacity: 30,000 grains/cu. ft. (69 kg/cu. m) of calcium carbonate of resin when regenerated with 15 lb (6.8 kg) of salt.
- 2. Salt for Brine Tanks: High-purity sodium chloride; free of dirt and foreign material. Rock and granulated forms are not acceptable.
 - a. Form: Processed, food-grade salt pellets **OR** plain salt pellets **OR** crystallized solar salt from shallow ponds and milled into irregular particles **OR** plain, brine block salt, **as directed**.

D. Water Testing Sets

- 1. Description: Manufacturer's standard water-hardness testing apparatus and chemicals with testing procedure instructions. Include metal container suitable for wall mounting.

1.3 EXECUTION

A. Concrete Bases

1. Install concrete bases of dimensions indicated for commercial water softeners. Refer to Division 22 Section "Common Work Results For Plumbing".
- B. Water Softener Installation**
1. Install household water softeners on floor. Anchor water softener and brine tanks to substrate.
 2. Install commercial water softener equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor mineral and brine tanks and floor-mounting accessories to substrate.
 3. Install seismic restraints for tanks and floor-mounting accessories and anchor to building structure.
 4. Install brine lines and fittings furnished by equipment manufacturer but not specified to be factory installed.
 5. Prepare mineral-tank distribution system and underbed for minerals and place specified mineral into mineral tanks.
 6. Install water testing sets mounted on wall, unless otherwise indicated, and near water softeners.
- C. Connections**
1. Piping installation requirements are specified in other Division 14.. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to equipment to allow service and maintenance.
 3. Make piping connections between water-softener-unit headers and dissimilar-metal water piping with dielectric fittings. Dielectric fittings are specified in Division 22 Section "Common Work Results For Plumbing".
 4. Install shutoff valves on raw-water inlet and soft-water outlet piping of each mineral tank, and on inlet and outlet headers.
 - a. Metal general-duty valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 - b. Plastic valves are specified in Division 22 Section "Domestic Water Piping".
 - c. Exception: Water softeners with factory-installed shutoff valves at locations indicated.
 5. Install pressure gages on raw-water inlet and soft-water outlet piping of each mineral tank. Pressure gages are specified in Division 22 Section "Meters And Gages For Plumbing Piping".
 - a. Exception: Water softeners with factory-installed pressure gages at locations indicated.
 - b. Exception: Household water softeners.
 - c. Exception: Water softeners in hot-water service.
 6. Install valved bypass water piping around water softeners.
 - a. Metal general-duty valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 - b. Plastic valves are specified in Division 22 Section "Domestic Water Piping".
 - c. Water piping is specified in Division 22 Section "Domestic Water Piping".
 - d. Exception: Household water softeners.
 - e. Exception: Water softeners in hot-water service.
 7. Install drains as indirect wastes to spill into open drains or over floor drains.
 8. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 9. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- D. Field Quality Control**
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
 2. Perform the following field tests and inspections and prepare test reports:
 - a. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.

- b. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
- c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Remove and replace malfunctioning water softeners that do not pass tests and inspections and retest as specified above.

E. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
2. Add water to brine tanks and fill with salt.
 - a. Household Water Softeners: Processed food-grade salt pellets **OR** plain salt pellets **OR** crystallized solar salt, **as directed**.
 - b. Commercial Water Softeners: Plain salt pellets **OR** Crystallized solar salt **OR** Plain, brine block salt **OR** Food-grade salt pellets, **as directed**.
3. Sample water softener effluent after startup and at three consecutive seven-day intervals (total of four samples), and prepare certified test reports for required water performance characteristics. Comply with the following:
 - a. ASTM D 859, "Test Method for Silica in Water."
 - b. ASTM D 1067, "Test Methods for Acidity or Alkalinity of Water."
 - c. ASTM D 1068, "Test Methods for Iron in Water."
 - d. ASTM D 1126, "Test Method for Hardness in Water."
 - e. ASTM D 1129, "Terminology Relating to Water."
 - f. ASTM D 3370, "Practices for Sampling Water from Closed Conduits."

F. Demonstration

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial water softeners.

END OF SECTION 22 31 16 00

SECTION 22 33 00 00 - ELECTRIC, DOMESTIC WATER HEATERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electric, water heaters. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following electric water heaters:
 - a. Household, small-capacity electric water heaters.
 - b. Household, storage electric water heaters.
 - c. Household, collector-to-tank, solar-electric water heaters.
 - d. Household, collector-to-tank, heat-exchanger-coil, solar-electric water heaters.
 - e. Flow-control, instantaneous electric water heaters.
 - f. Thermostat-control, instantaneous electric water heaters.
 - g. Light-commercial electric water heaters.
 - h. Commercial electric booster heaters.
 - i. Commercial, storage electric water heaters.
 - j. Compression tanks.
 - k. Water heater accessories.

C. Submittals

1. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. LEED Submittal:
 - a. Product Data for Prerequisite EA 2: Documentation indicating that units comply with ASHRAE/IESNA 90.1, Section 7 - "Service Water Heating."
3. Shop Drawings: Diagram power, signal, and control wiring.
4. Manufacturer Seismic Qualification Certification: Submit certification that commercial water heaters, accessories, and components will withstand seismic forces defined in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment".
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
3. ASME Compliance: Where indicated, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
4. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9," for all components that will be in contact with potable water.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric water heaters that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including storage tank and supports.

- 2) Faulty operation of controls.
- 3) Deterioration of metals, metal finishes, and other materials beyond normal use.
- b. Warranty Period(s): From date of Final Completion:
 - 1) Household Electric Water Heaters:
 - a) Storage Tank: Five **OR** Six **OR** 10, **as directed**, years.
 - b) Controls and Other Components: Two **OR** Three, **as directed**, years.
 - 2) Instantaneous Electric Water Heaters: One **OR** Two **OR** Five, **as directed**, year(s).
 - 3) Light-Commercial Electric Water Heaters:
 - a) Storage Tank: Three **OR** Five, **as directed**, years.
 - b) Controls and Other Components: Two **OR** Three, **as directed**, years.
 - 4) Commercial Electric Water Heaters:
 - a) Storage Tank: Three **OR** Five, **as directed**, years.
 - b) Controls and Other Components: Three **OR** Five, **as directed**, years.
 - 5) Compression Tanks: One year.

1.2 PRODUCTS

A. Household Electric Water Heaters

- 1. Household, Small-Capacity Electric Water Heaters: Comply with UL 174.
 - a. Storage-Tank Construction: Corrosion-resistant metal or steel with corrosion-resistant coating, **as directed**.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: 150 psig (1035 kPa).
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Drain Valve: ASSE 1005, if tank has drain outlet. Provide hose-end drain valve in piping for water heaters without drain outlet. Hose-end drain valves are specified in Division 22 Section "Domestic Water Piping Specialties".
 - 2) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 3) Jacket: Steel with enameled finish.
 - 4) Heating Element: Electric, screw-in immersion type.
 - 5) Temperature Control: Adjustable thermostat.
 - 6) Safety Control: High-temperature-limit cutoff device or system.
 - 7) Power Supply Cord: 24 to 72 inches (610 to 1830 mm) with plug.
 - 8) Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
- 2. Household, Standard **OR** Tabletop, **as directed**, Storage Electric Water Heaters: Comply with UL 174.
 - a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: 150 psig (1035 kPa).
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - a) Standard: Cylindrical shape.

- b) Tabletop: Rectangular shape, with flat-top work surface and raised back.
 - 6) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 7) Heating Elements: Two; electric, screw-in immersion type with 12 kW or less total, and wired for nonsimultaneous operation, unless otherwise indicated.
 - 8) Temperature Control: Adjustable thermostat for each element.
 - 9) Safety Control: High-temperature-limit cutoff device or system.
 - 10) Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
- 3. Household, Collector-to-Tank, Solar-Electric Water Heaters: Comply with UL 174 with piping and electrical connections for UL 1279 solar collector system.
 - a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Sensor electrical connections and tank stud for sensor.
 - 2) Anode Rod: Replaceable magnesium.
 - 3) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 4) Drain Valve: ASSE 1005.
 - 5) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 6) Jacket: Steel with enameled finish.
 - 7) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 8) Heating Element: One; electric, screw-in immersion type with 6 kW or less.
 - 9) Temperature Control: Adjustable thermostat for each element.
 - 10) Safety Control: High-temperature-limit cutoff device or system.
 - 11) Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
- 4. Household, Collector-to-Tank, Heat-Exchanger-Coil, Solar-Electric Water Heaters: Comply with UL 174 with integral coil-type heat exchanger.
 - a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 7) Heat Exchanger: Corrosion-resistant-metal immersion coil.
 - 8) Heating Element: One; electric, screw-in immersion type with 6 kW or less.
 - 9) Temperature Control: Adjustable thermostat for each element.
 - 10) Safety Control: High-temperature-limit cutoff device or system.
 - 11) Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater

working-pressure rating. Select relief valve with sensing element that extends into storage tank.

B. Instantaneous Electric Water Heaters

1. Flow-Control, Instantaneous Electric Water Heaters: Comply with UL 499 for tankless electric (water heater) heating appliance.
 - a. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - 1) Connections: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Heating Element: Resistance heating system.
 - 4) Temperature Control: Flow-control fitting.
 - 5) Safety Control: High-temperature-limit cutoff device or system.
 - 6) Jacket: Aluminum or steel with enameled finish or plastic.
 - b. Support: Bracket for wall mounting.
2. Thermostat-Control, Instantaneous Electric Water Heaters: Comply with UL 499 for tankless electric (water heater) heating appliance.
 - a. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - 1) Connections: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Heating Element: Resistance heating system.
 - 4) Temperature Control: Thermostat.
 - 5) Safety Control: High-temperature-limit cutoff device or system.
 - 6) Jacket: Aluminum or steel with enameled finish or plastic.
 - b. Support: Bracket for wall mounting.

C. Light-Commercial Electric Water Heaters

1. Description: Comply with UL 174 for household, storage electric water heaters.
 - a. Storage-Tank Construction: Steel, vertical arrangement.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 7) Heating Elements: Two; electric, screw-in immersion type; wired for simultaneous operation, unless otherwise indicated.
 - 8) Temperature Control: Adjustable thermostat for each element.
 - 9) Safety Control: High-temperature-limit cutoff device or system.
 - 10) Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3 for combination temperature and pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
 - c. Special Requirements: NSF 5 construction with legs for off-floor installation.

D. Commercial Electric Water Heaters

1. Commercial Electric Booster Heaters: Comply with UL 1453 requirements for booster-type water heaters.

- a. Storage-Tank Construction: Corrosion-resistant metal **OR** Steel, **as directed**.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 3) Insulation: Comply with ASHRAE/IESNA 90.1.
 - 4) Jacket: Rectangular shaped, with stainless-steel front panel, unless otherwise indicated.
 - 5) Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
 - a) Option: Booster heaters with 9 kW or less total may have 2 or 3 elements.
 - b) Staging: Input not exceeding 18 kW per step.
 - 6) Temperature Control: Adjustable thermostat, to setting of at least **180 deg F (82 deg C)**.
 - 7) Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - 8) Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3, combination temperature and pressure relief valve. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
 - 9) Gages: Combination temperature and pressure type or separate thermometer and pressure gage.
 - c. Special Requirements: NSF 5 construction with brackets for undercounter **OR** legs for floor, **as directed**, installation.
2. Commercial, Storage Electric Water Heaters: Comply with UL 1453 requirements for storage-tank-type water heaters.
- a. Storage-Tank Construction: ASME-code **OR** Non-ASME-code, **as directed**, steel horizontal **OR** vertical, **as directed**, arrangement.
 - 1) Tappings: Factory fabricated of materials compatible with tank and piping connections. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 3) Insulation: Comply with ASHRAE/IESNA 90.1.
 - 4) Jacket: Steel with enameled finish.
 - 5) Heating Elements: Electric, screw-in or bolt-on immersion type arranged in multiples of three.
 - a) Staging: Input not exceeding 18 kW per step.
 - 6) Temperature Control: Adjustable thermostat.
 - 7) Safety Controls: High-temperature-limit and low-water cutoff devices or systems.
 - 8) Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Special Requirements: NSF 5 construction.

- d. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.

E. Compression Tanks

1. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
 - a. Construction:
 - 1) Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1, pipe thread.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Air-Charging Valve: Factory installed.

F. Water Heater Accessories

1. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.
2. Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include pressure setting less than water heater working-pressure rating.
3. Water Heater Stand and Drain-Pan Units: High-density-polyethylene-plastic, **18-inch- (457-mm-)** high, enclosed-base stand complying with IAPMO PS 103 and IAS No. 2. Include integral or separate drain pan with raised edge and **NPS 1 (DN 25)** drain outlet with ASME B1.20.1 pipe thread.
4. Water Heater Stands: Water heater manufacturer's factory-fabricated steel stand for floor mounting and capable of supporting water heater and water. Include dimension that will support bottom of water heater a minimum of **18 inches (457 mm)** above the floor.
5. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
6. Drain Pans: Corrosion-resistant metal with raised edge. Include dimensions not less than base of water heater and include drain outlet not less than **NPS 3/4 (DN 20)**.
7. Piping Manifold Kits: Water heater manufacturer's factory-fabricated inlet and outlet piping arrangement for multiple-unit installation. Include piping and valves for field assembly that are capable of isolating each water heater and of providing balanced flow through each water heater.
8. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
9. Water Regulators: ASSE 1003, water-pressure reducing valve. Set at **25-psig- (172.5-kPa-)** maximum outlet pressure, unless otherwise indicated.
10. Shock Absorbers: ASSE 1010 or PDI WH 201, Size A water hammer arrester.

G. Source Quality Control

1. Test and inspect water heater storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
2. Hydrostatically test commercial, **as directed**, water heater storage tanks before shipment to minimum of one and one-half times pressure rating.
3. Prepare test reports.

1.3 EXECUTION

A. Water Heater Installation

1. Install commercial water heaters on concrete bases.
 - a. Exception: Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.

- b. Concrete base construction requirements are specified in Division 22 Section "Common Work Results For Plumbing".
 2. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
 3. Install seismic restraints for light-commercial and commercial water heaters. Anchor to substrate.
 4. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
 5. Install combination temperature and pressure relief valves in water piping for water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
 6. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.
 7. Install thermometer on outlet piping of water heaters. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.
 8. Install thermometers on inlet and outlet piping of household, collector-to-tank, solar-electric water heaters. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.
 9. Install pressure gage(s) on inlet and outlet of commercial electric water- heater piping. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for pressure gages.
 10. Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve, thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet. Refer to Division 22 Section "General-duty Valves For Plumbing Piping" for general-duty valves and to Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.
 11. Install water regulator, with integral bypass relief valve, in booster-heater inlet piping and water hammer arrester in booster-heater outlet piping.
 12. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.
 13. Fill water heaters with water.
 14. Charge compression tanks with air.
- B. Connections
 1. Piping installation requirements are specified in other Division 14. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
 3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
 2. Perform the following field tests and inspections and prepare test reports:
 - a. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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3. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.

D. Demonstration

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain commercial and instantaneous electric water heaters.

END OF SECTION 22 33 00 00

Task	Specification	Specification Description
22 33 30 16	22 33 00 00	Electric, Domestic Water Heaters
22 33 30 16	22 34 00 00	Fuel-Fired, Domestic Water Heaters
22 33 33 00	22 33 00 00	Electric, Domestic Water Heaters

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SECTION 22 34 00 00 - FUEL-FIRED, DOMESTIC WATER HEATERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fuel-fired water heaters. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following fuel-fired water heaters:
 - a. Household, atmospheric, storage, gas water heaters.
 - b. Household, direct-vent, storage, gas water heaters.
 - c. Household, power-vent, storage, gas water heaters.
 - d. Instantaneous, tankless, gas water heaters.
 - e. Commercial, atmospheric, storage, gas water heaters.
 - f. Commercial, power-burner, storage, gas water heaters.
 - g. Commercial, power-vent, storage, gas water heaters.
 - h. Commercial, high-efficiency, gas water heaters.
 - i. Commercial, coil-type, finned-tube, gas water heaters.
 - j. Commercial, grid-type, finned-tube, gas water heaters.
 - k. Household, oil-fired water heaters.
 - l. Commercial, oil-fired water heaters.
 - m. Large-capacity, oil-fired water heaters.
 - n. Dual-fuel, gas and oil-fired water heaters.
 - o. Compression tanks.
 - p. Water heater accessories.

C. Definitions

1. LP Gas: Liquefied-petroleum fuel gas.

D. Submittals

1. Product Data: For each type and size of water heater indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. LEED Submittal:
 - a. Product Data for Prerequisite EA 2: Documentation indicating that units comply with ASHRAE/IESNA 90.1, Section 7 - "Service Water Heating."
3. Shop Drawings: Diagram power, signal, and control wiring.
4. Manufacturer Seismic Qualification Certification: Submit certification that commercial water heaters, accessories, and components will withstand seismic forces defined in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment". Include the following:
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
3. ASME Compliance:

- a. Where ASME-code construction is indicated, fabricate and label commercial water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- b. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.
- 4. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9" for all components that will be in contact with potable water.

F. Warranty

- 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired water heaters that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including storage tank and supports.
 - 2) Faulty operation of controls.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal use.
 - b. Warranty Period(s): From date of Final Completion:
 - 1) Household, Gas Water Heaters:
 - a) Storage Tank: Five **OR** Six **OR** 10, **as directed**, years.
 - b) Controls and Other Components: Two **OR** Three, **as directed**, years.
 - 2) Instantaneous, Gas Water Heaters:
 - a) Heat Exchanger: Five years.
 - b) Controls and Other Components: Three years.
 - 3) Commercial, Gas Water Heaters:
 - a) Storage Tank: Three **OR** Five, **as directed**, years.
 - b) Controls and Other Components: Three **OR** Five, **as directed**, years.
 - 4) Oil-Fired Water Heaters:
 - a) Storage Tank: Three **OR** Five, **as directed**, years.
 - b) Burner and Controls: One **OR** Two **OR** Three, **as directed**, year(s).
 - c) Other Components: Three **OR** Five, **as directed**, years.
 - 5) Dual-Fuel Water Heaters:
 - a) Storage Tank: Three **OR** Five, **as directed**, years.
 - b) Burner and Controls: One **OR** Two **OR** Three, **as directed**, year(s).
 - c) Other Components: Three **OR** Five, **as directed**, years.
 - 6) Compression Tanks: One year.

1.2 PRODUCTS

A. Household, Gas Water Heaters

- 1. Household, Atmospheric, Storage, Gas Water Heaters: Comply with ANSI Z21.10.1/CSA 4.1.
 - a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Burner: For use with atmospheric water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 7) Automatic Ignition: ANSI Z21.20, electric, automatic, gas-ignition system.

- 8) Temperature Control: Adjustable thermostat.
 - 9) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 10) Combination Temperature and Pressure Relief Valve: ANSI Z21.22/CSA 4.4. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
 - c. Draft Hood: Low-profile-type, draft diverter; complying with ANSI Z21.12.
 - d. Automatic Damper: ANSI Z21.66, electrically operated **OR** mechanically activated **OR** thermally activated, **as directed**, automatic-vent-damper device with size matching draft hood.
2. Household, Direct-Vent, Storage, Gas Water Heaters: Comply with ANSI Z21.10.1/CSA 4.1.
- a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Burner: For use with direct-vent water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 7) Automatic Ignition: ANSI Z21.20, electric, automatic, gas-ignition system.
 - 8) Temperature Control: Adjustable thermostat.
 - 9) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 10) Combination Temperature and Pressure Relief Valve: ANSI Z21.22/CSA 4.4. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
 - c. Direct-Vent System: Through-wall **OR** Through-roof, **as directed**, coaxial- or double-channel, vent assembly with water heater manufacturers' outside intake/exhaust screen.
3. Household, Power-Vent, Storage, Gas Water Heaters: Comply with ANSI Z21.10.1/CSA 4.1.
- a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Burner: For use with power-vent water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 7) Automatic Ignition: ANSI Z21.20, electric, automatic, gas-ignition system.
 - 8) Temperature Control: Adjustable thermostat.
 - 9) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 10) Combination Temperature and Pressure Relief Valve: ANSI Z21.22/CSA 4.4. Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
 - c. Power-Vent System: Exhaust fan, interlocked with burner.

B. Instantaneous, Gas Water Heaters

1. Description: Comply with ANSI Z21.10.3/CSA 4.3, except storage is not required.
 - a. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Heat Exchanger: Copper tubing.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Burner: For use with tankless water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 6) Automatic Ignition: Manufacturer's proprietary system for automatic, gas ignition.
 - 7) Temperature Control: Adjustable thermostat.
 - 8) Jacket: Metal with enameled finish or plastic.
 - b. Support: Bracket for wall mounting.

C. Commercial, Gas Water Heaters

1. Commercial, Atmospheric, Storage, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
 - a. Storage-Tank Construction: ASME-code **OR** Non-ASME-code, **as directed**, steel with **150-psig (1035-kPa)** working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - 5) Jacket: Steel with enameled finish.
 - 6) Burner: For use with atmospheric water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 7) Automatic Ignition: ANSI Z21.20, electric, automatic, gas-ignition system.
 - 8) Temperature Control: Adjustable thermostat.
 - 9) Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 - 10) Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Special Requirements: NSF 5 construction.
 - d. Draft Hood: Draft diverter; complying with ANSI Z21.12.
 - e. Automatic Damper: ANSI Z21.66, electrically operated **OR** mechanically activated **OR** thermally activated, **as directed**, automatic-vent-damper device with size matching draft hood.
 - f. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
2. Commercial, Power-Burner, Storage, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.

- a. Storage-Tank Construction: ASME-code **OR** Non-ASME-code, **as directed**, steel with **150-psig (1035-kPa)** working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - 5) Jacket: Steel with enameled finish.
 - 6) Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Burner: Comply with UL 795 for power-burner water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 1) Automatic Ignition: ANSI Z21.20, electric, automatic, gas-ignition system.
 - d. Temperature Control: Adjustable thermostat.
 - e. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 - f. Special Requirements: NSF 5 construction.
 - g. Draft Hood: Draft diverter; complying with ANSI Z21.12.
 - h. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
3. Commercial, Power-Vent, Storage, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
 - a. Storage-Tank Construction: ASME-code **OR** Non-ASME-code, **as directed**, steel with **150-psig (1035-kPa)** working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - 5) Jacket: Steel with enameled finish.

- 6) Burner: For use with power-vent water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 7) Automatic Ignition: ANSI Z21.20, electric, automatic, gas-ignition system.
 - 8) Temperature Control: Adjustable thermostat.
 - 9) Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 - 10) Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valve with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Special Requirements: NSF 5 construction.
 - d. Power-Vent System: Exhaust fan, interlocked with burner.
 - e. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
4. Commercial, High-Efficiency, Gas Water Heaters: Comply with ANSI Z21.10.3/CSA 4.3.
- a. Description: Manufacturer's proprietary design to provide at least 84 **OR** 85 **OR** 88 **OR** 95, **as directed**, percent combustion efficiency at optimum operating conditions. Following features and attributes may be modified or omitted if water heater otherwise complies with requirements for performance.
 - b. Storage-Tank Construction: ASME-code steel with 150-psig (1035-kPa) minimum working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - c. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - 5) Jacket: Steel with enameled finish.
 - 6) Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - d. Burner or Heat Exchanger: Comply with UL 795 or approved testing agency requirements for high-efficiency water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - e. Temperature Control: Adjustable thermostat.
 - f. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 - g. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
 - h. Draft Hood: Draft diverter; complying with ANSI Z21.12.
5. Commercial, Coil-Type, Finned-Tube, Gas Water Heaters: Comply with ANSI Z21.13 for hot-water boilers.
- a. Description: Packaged unit with boiler, storage tank, pump, piping, and controls.

- b. Boiler Construction: ASME code with **160-psig (1100-kPa)** working-pressure rating for hot-water-boiler-type water heater.
 - 1) Heat Exchanger: Helix or spiral, finned-copper-tube coils with bronze headers.
 - 2) Connections: Factory fabricated of materials compatible with boiler. Attach to boiler before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
- c. Boiler Appurtenances:
 - 1) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire boiler except connections and controls.
 - 2) Jacket: Steel with enameled finish.
 - 3) Burner: For use with coil-type, finned-tube water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 4) Temperature Control: Adjustable, storage tank temperature-control fitting and flow switch, interlocked with circulator and burner.
 - 5) Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - 6) Automatic Ignition: Intermittent electronic ignition complying with ANSI Z21.20.
- d. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
- e. Support: Steel base or skids.
- f. Draft Hood: Draft diverter; complying with ANSI Z21.12.
- g. Automatic Damper: ANSI Z21.66, electrically operated **OR** mechanically activated **OR** thermally activated, **as directed**, automatic-vent-damper device with size matching draft hood.
- h. Hot-Water Storage Tank: Connected with piping to circulating pump and water heater.
 - 1) Construction: According to ASME Boiler and Pressure Vessel Code: Section VIII, steel with **150-psig (1035-kPa)** **OR** **125-psig (860-kPa)**, **as directed**, working-pressure rating.
 - 2) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - 5) Jacket: Steel with enameled finish.
 - 6) Anode Rods: Factory installed, magnesium.
 - 7) Drain Valve: Corrosion-resistant metal complying with ASSE 1005, factory installed.
 - 8) Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
- i. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, **125-psig (860-kPa)** minimum working-pressure rating, and **225 deg F (107 deg C)** continuous-water-temperature rating.
- j. Piping: Copper tubing; copper, solder-joint fittings; and brazed or flanged joints.
- k. Mounting: Water heater, tank, and accessories factory mounted on skids.
- 6. Commercial, Grid-Type, Finned-Tube, Gas Water Heaters: Comply with ANSI Z21.13 for hot-water boilers.
 - a. Description: Packaged unit with boiler, storage tank, pump, piping, and controls.

- b. Boiler Construction: ASME code with **160-psig (1100-kPa)** working-pressure rating for hot-water-boiler-type water heater.
 - 1) Heat Exchanger: Horizontal, straight, finned-copper tubes with bronze headers.
 - 2) Connections: Factory fabricated of materials compatible with boiler. Attach to boiler before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
- c. Boiler Appurtenances:
 - 1) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire boiler except connections and controls.
 - 2) Jacket: Steel with enameled finish.
 - 3) Burner: For use with grid-type, finned-tube water heaters and for natural-gas **OR** LP-gas, **as directed**, fuel.
 - 4) Temperature Control: Adjustable, storage tank temperature-control fitting and flow switch, interlocked with circulator and burner.
 - 5) Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - 6) Automatic Ignition: Intermittent electronic ignition complying with ANSI Z21.20.
- d. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
- e. Support: Steel base or skids.
- f. Draft Hood: Draft diverter; complying with ANSI Z21.12.
- g. Automatic Damper: ANSI Z21.66, electrically operated **OR** mechanically activated **OR** thermally activated, **as directed**, automatic-vent-damper device with size matching draft hood.
- h. Hot-Water Storage Tank: Connected with piping to circulating pump and water heater.
 - 1) Construction: According to ASME Boiler and Pressure Vessel Code: Section VIII, steel with **150-psig (1035-kPa)** **OR** **125-psig (860-kPa)**, **as directed**, working-pressure rating.
 - 2) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1. Surround entire storage tank except connections and controls.
 - 5) Jacket: Steel with enameled finish.
 - 6) Anode Rods: Factory installed, magnesium.
 - 7) Drain Valve: Corrosion-resistant metal complying with ASSE 1005, factory installed.
 - 8) Combination Temperature and Pressure Relief Valves: ANSI Z21.22/CSA 4.4. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
- i. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, **125-psig (860-kPa)** minimum working-pressure rating, and **225 deg F (107 deg C)** continuous-water-temperature rating.
- j. Piping: Copper tubing; copper, solder-joint fittings; and brazed or flanged joints.
- k. Mounting: Water heater, tank, and accessories factory mounted on skids.

D. Oil-Fired Water Heaters

1. Household, Oil-Fired Water Heaters: Comply with UL 732 for storage water heaters.
 - a. Storage-Tank Construction: Steel.
 - 1) Tappings: ASME B1.20.1 pipe thread.
 - 2) Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Temperature Control: Adjustable thermostat.
 - 7) Heat Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
 - 8) Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Oil Burner: Comply with UL 296 for use with No. 2 fuel oil.
 - d. Draft Regulator: Barometric type or adjustable-damper device.
2. Commercial, Oil-Fired Water Heaters: Comply with UL 732 for storage water heaters.
 - a. Storage-Tank Construction: ASME-code **OR** Non-ASME-code, **as directed**, steel with **150-psig (1035-kPa)** minimum working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Temperature Control: Adjustable thermostat.
 - 7) Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Oil Burners: Comply with UL 296 for use with No. 2 fuel oil.
 - d. Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - e. Draft Regulator: Barometric type or adjustable-damper device.
 - f. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
3. Large-Capacity, Oil-Fired Water Heaters: Comply with UL 732 for storage water heaters except when capacity is greater than **120 gal. (454 L)**.
 - a. Storage-Tank Construction: ASME-code steel with **150-psig (1035-kPa)** minimum working-pressure rating.

- 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Temperature Control: Adjustable thermostat.
 - 7) Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - 8) Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
 - c. Oil Burner: Comply with UL 296 for use with No. 2 fuel oil.
 - d. Safety Controls: Automatic, high-temperature-limit and low-water cutoff devices or systems.
 - e. Draft Regulator: Barometric type or adjustable-damper device.
 - f. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.
- E. Dual-Fuel Water Heaters
1. Description: Comply with ANSI Z21.10.3/CSA 4.3 or UL 732 requirements appropriate for dual-fuel, gas and oil-fired water heaters.
 - a. Storage-Tank Construction: ASME-code steel with **150-psig (1035-kPa)** minimum working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - b. Factory-Installed, Storage-Tank Appurtenances:
 - 1) Anode Rod: Replaceable magnesium.
 - 2) Dip Tube: Provide unless cold-water inlet is near bottom of tank.
 - 3) Drain Valve: Corrosion-resistant metal complying with ASSE 1005.
 - 4) Insulation: Comply with ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.
 - 5) Jacket: Steel with enameled finish.
 - 6) Temperature Control: Adjustable thermostat.

- 7) Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.
- c. Dual-Fuel Burners: Combination gas-oil burner assembly, complying with appropriate requirements of UL 795; or comply with UL 296 for oil burners for No. 2 fuel oil and UL 795 for natural-gas **OR** LP-gas, **as directed**, fuel.
- d. Safety Control: Automatic, high-temperature-limit cutoff device or system.
- e. Vent Connection: According to standards of authorities having jurisdiction for dual-fuel water heaters.
- f. Building Automation System Interface: Normally closed dry contacts for enabling and disabling water heater.

F. Compression Tanks

1. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
 - a. Construction:
 - 1) Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Air-Charging Valve: Factory installed.

G. Water Heater Accessories

1. Gas Shutoff Valves: ANSI Z21.15/CGA 9.1, manually operated. Furnish for installation in piping.
2. Gas Pressure Regulators: ANSI Z21.18, appliance type. Include pressure rating, capacity, and pressure differential required between gas supply and water heater.
3. Gas Automatic Valves: ANSI Z21.21, appliance, electrically operated, on-off automatic valve.
4. Combination Temperature and Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than water heater working-pressure rating. Select each relief valve with sensing element that extends into storage tank.
 - a. Gas Water Heaters: ANSI Z21.22/CSA 4.4.
 - b. Oil-Fired Water Heaters: ASME rated and stamped and complying with ASME PTC 25.3.
5. Pressure Relief Valves: Include pressure setting less than working-pressure rating of water heater.
 - a. Gas Water Heaters: ANSI Z21.22/CSA 4.4.
 - b. Oil-Fired Water Heaters: ASME rated and stamped and complying with ASME PTC 25.3.
6. Water Heater Stand and Drain Pan Units: High-density-polyethylene-plastic, **18-inch- (457-mm-)** high, enclosed-base stand complying with IAPMO PS 103 and IAS No. 2. Include integral or separate drain pan with raised edge and **NPS 1 (DN 25)** drain outlet with ASME B1.20.1 pipe thread.
7. Water Heater Stands: Water heater manufacturer's factory-fabricated steel stand for floor mounting and capable of supporting water heater and water. Provide dimension that will support bottom of water heater a minimum of **18 inches (457 mm)** above the floor.
8. Water Heater Mounting Brackets: Water heater manufacturer's factory-fabricated steel bracket for wall mounting and capable of supporting water heater and water.
9. Drain Pans: Corrosion-resistant metal with raised edge. Provide dimensions not less than base of water heater and include drain outlet not less than **NPS 3/4 (DN 20)**.
10. Piping Manifold Kits: Water heater manufacturer's factory-fabricated inlet and outlet piping arrangement for multiple-unit installation. Include piping and valves for field assembly that is capable of isolating each water heater and of providing balanced flow through each water heater.
11. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2, **as directed**.

H. Source Quality Control

1. Test and inspect water heater storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
2. Hydrostatically test commercial water heater storage tanks before shipment to minimum of one and one-half times pressure rating.
3. Prepare test reports.

1.3 EXECUTION

A. Water Heater Installation

1. Install commercial water heaters on concrete bases.
 - a. Exception: Omit concrete bases for commercial water heaters if installation on stand, bracket, suspended platform, or direct on floor is indicated.
 - b. Concrete base construction requirements are specified in Division 22 Section "Common Work Results For Plumbing".
2. Install water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
3. Install seismic restraints for commercial water heaters. Anchor to substrate.
4. Install gas water heaters according to NFPA 54.
5. Install gas shutoff valves on gas supplies to gas water heaters without shutoff valves.
6. Install gas pressure regulators on gas supplies to gas water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
7. Install automatic gas valves on gas supplies to gas water heaters, if required for operation of safety control.
8. Install oil-fired water heaters according to NFPA 31.
9. Install combination temperature and pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater, relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
10. Install combination temperature and pressure relief valves in water piping for water heaters without storage. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
11. Install water heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for water heaters that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.
12. Install thermometer on outlet piping of water heaters. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.
13. Install pressure gage(s) on inlet and outlet piping of commercial, fuel-fired water heater piping. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for pressure gages.
14. Assemble and install inlet and outlet piping manifold kits for multiple water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each water heater. Include shutoff valve and thermometer in each water heater inlet and outlet, and throttling valve in each water heater outlet. Refer to Division 22 Section "General-duty Valves For Plumbing Piping" for general-duty valves and to Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.
15. Install piping-type heat traps on inlet and outlet piping of water heater storage tanks without integral or fitting-type heat traps.
16. Fill water heaters with water.
17. Charge compression tanks with air.

B. Connections

1. Piping installation requirements are specified in other Division 14. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to water heaters to allow service and maintenance. Arrange piping for easy removal of water heaters.
 3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
 2. Perform the following field tests and inspections and prepare test reports:
 - a. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Remove and replace water heaters that do not pass tests and inspections and retest as specified above.
- D. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain instantaneous and commercial water heaters.

END OF SECTION 22 34 00 00

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Task	Specification	Specification Description
22 34 36 13	22 33 00 00	Electric, Domestic Water Heaters
22 34 36 19	22 34 00 00	Fuel-Fired, Domestic Water Heaters
22 34 46 11	22 34 00 00	Fuel-Fired, Domestic Water Heaters

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SECTION 22 35 23 13 - DOMESTIC WATER HEAT EXCHANGERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for heat exchangers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following heat exchangers:
 - a. Heating-fluid-in-coil, instantaneous heat exchangers.
 - b. Domestic-water-in-coil, instantaneous heat exchangers.
 - c. Heating-fluid-in-U-tube-coil, instantaneous heat exchangers.
 - d. Circulating, compact heat exchangers.
 - e. Circulating, storage heat exchangers.
 - f. Noncirculating, compact heat exchangers.
 - g. Noncirculating, storage heat exchangers.
 - h. Brazed-plate heat exchangers.
 - i. Frame-and-plate heat exchangers.
 - j. Heat reclaimers.
 - k. Compression tanks.
 - l. Heat-exchanger accessories.

C. Submittals

1. Product Data: For each type and size of heat exchanger indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: Diagram power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification
4. Source quality-control test reports.
5. Field quality-control test reports.
6. Operation and Maintenance Data: For heat exchangers to include in emergency, operation, and maintenance manuals.
7. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: Where ASME-code construction is indicated, fabricate and label heat-exchanger storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
3. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9" for all components that will be in contact with water.

E. Warranty

1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of heat exchangers that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Structural failures including heat exchanger, storage tank, and supports.
 - 2) Faulty operation of controls.
 - 3) Deterioration of metals, metal finishes, and other materials beyond normal use.
 - b. Warranty Period(s): From date of Final Completion:

- 1) Instantaneous Heat Exchangers:
 - a) Tube Coil and Shell: One year.
 - b) Controls and Other Components: One year.
- 2) Circulating, Storage Heat Exchangers:
 - a) Storage Tank: Five years.
 - b) Tube Coil: Five years.
 - c) Controls and Other Components: Three years.
- 3) Noncirculating, Storage Heat Exchangers:
 - a) Storage Tank: Five years.
 - b) Tube Coil: Five years.
 - c) Controls and Other Components: Three years.
- 4) Plate Heat Exchangers:
 - a) Brazed-Plate Type: One year.
 - b) Plate-and-Frame Type: One year.
- 5) Heat Reclaimers: One year.
- 6) Compression Tanks: One year.

1.2 PRODUCTS

A. Instantaneous Heat Exchangers

1. Heating-Fluid-in-Coil, Instantaneous Heat Exchangers:
 - a. Description: Packaged assembly of tank, heat-exchanger coils, controls, and specialties for heating domestic water with heating hot water **OR** steam, **as directed**, in heat-exchanger coils.
 - b. Construction: ASME-code, negligible-capacity, copper-lined, carbon-steel shell with **150-psig (1035-kPa)** minimum working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with heat-exchanger shell. Attach tappings to shell before testing and labeling.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 2) Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire shell and nozzle except connections and controls.
 - 3) Heat-Exchanger Coils: Copper **OR** Copper nickel **OR** Stainless-steel, **as directed**, helix-wound coils for heating fluid with pressure rating equal to or greater than heating-fluid supply pressure.
 - 4) Temperature Control: Adjustable thermostat that operates control valve and that is capable of maintaining outlet-water temperature within **4 deg F (2 deg C)** of setting.
 - 5) Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - 6) Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.
 - c. Miscellaneous Components for Heating Hot-Water Unit: Control valve, valves, and piping. Include components fitted for pneumatic control.
 - d. Miscellaneous Components for Steam Unit: Strainers, steam-control valve, steam trap, valves, pressure gage, thermometer, and piping. Include components fitted for pneumatic control.
 - 1) Exception: Steam trap is not required if manufacturer's written instructions direct that it not be used.
 - e. Stand: Factory fabricated for floor mounting.

2. Domestic-Water-in-Coil, Instantaneous Heat Exchangers:
 - a. Description: Tankless, packaged assembly of heat-exchanger coils, controls, and specialties for heating domestic water in coils with steam in shell.
 - b. Construction: ASME code, with cast-iron or steel shell for steam.
 - 1) Cast-Iron Shell Pressure Rating: 75 psig (517 kPa).
 - 2) Steel Shell Pressure Rating: 150 psig (1035 kPa).
 - 3) Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire shell and nozzle except connections and controls.
 - c. Heat-Exchanger Coils: Spiral-wound, copper or copper-alloy **OR** stainless-steel, **as directed**, coils for domestic water.
 - d. Temperature Control: Adjustable thermostat that operates steam-control valve and that is capable of maintaining outlet-water temperature within 3 deg F (2 deg C) of setting.
 - e. Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - f. Miscellaneous Components: Strainers, steam-control valve, steam trap, valves, and piping.
 - g. Stand: Factory fabricated for floor mounting.
3. Heating-Fluid-in-U-Tube-Coil, Instantaneous Heat Exchangers:
 - a. Description: Tankless, packaged assembly of heat-exchanger coil, controls, and specialties for heating domestic water in shell with heating hot water **OR** steam, **as directed**, in coil.
 - b. Construction: ASME-code, negligible-capacity, copper-lined, carbon-steel or copper-alloy shell with 150-psig (1035-kPa) minimum working-pressure rating.
 - 1) Configuration: Horizontal **OR** Vertical, **as directed**.
 - 2) Shell Tappings: Factory fabricated of materials compatible with water heater shell. Attach tappings to shell before testing and labeling.
 - a) NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1.
 - b) NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 3) Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire shell and nozzle except connections and controls.
 - 4) Heat-Exchanger Coil: Copper, double-wall **OR** single-wall, **as directed**, U tubes for heating fluid.
 - a) Tube Pressure Rating: Equal to or greater than heating-fluid supply pressure.
 - c. Temperature Control: Adjustable thermostat that operates steam-control valve and that is capable of maintaining outlet-water temperature within 5 deg F (3 deg C) of setting.
 - d. Safety Control: Automatic, high-temperature-limit cutoff device or system.
 - e. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into shell.
 - f. Miscellaneous Components for Heating Hot-Water Unit: Control valve, valves, and piping. Include components fitted for pneumatic control.
 - g. Miscellaneous Components for Steam Unit: Strainers, steam-control valve, steam trap, valves, pressure gage, thermometer, and piping. Include components fitted for pneumatic control.
 - h. Stand: Factory fabricated for floor mounting.

B. Circulating, Storage Heat Exchangers

1. Circulating, Compact Heat Exchangers:
 - a. Description: Packaged, small-capacity, hot-water storage tank with heat-exchanger coil; circulator; controls; and specialties for heating domestic water with heating hot water **OR** steam, **as directed**, in coil.

- b. Flow Pattern: Standard-flow arrangement, with water from bottom of storage tank circulated across heat-exchanger coil and returned to tank. Include hot-water outlet located at top of tank and temperature sensor in tank.
 - c. Storage Tank Construction: ASME-code, vertical; copper-silicon or corrosion-resistant metal with **150-psig (1035-kPa)** working-pressure rating. Include nozzle and head for heat-exchanger tube coil.
 - 1) Configuration: Vertical.
 - 2) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing and labeling.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 3) Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire storage tank and nozzle except connections and controls.
 - d. Heat-Exchanger Coil: **NPS 3/4 (DN 20) OR NPS 1-1/4 (DN 32), as directed**, diameter, vented, double-wall, copper or copper-alloy, U tubes with tube sheet and supporting baffles.
 - 1) Heat-Exchanger Pressure Rating: Equal to or greater than heating-fluid supply pressure.
 - e. Temperature Control: Adjustable thermostat.
 - f. Safety Control: Automatic, high-temperature-limit cutoff device or system. Include automatic low-water cutoff device or system.
 - g. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.
 - h. Gages: Factory-mounted thermometer and pressure gage.
 - i. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, **125-psig (860-kPa)** minimum working-pressure rating, and **225 deg F (107 deg C)** continuous-water-temperature rating.
 - 1) Pump Control: Sensor for operating pump and control valve.
 - j. Miscellaneous Components for Heating Hot-Water Units: Control valve, valves, and piping.
 - k. Miscellaneous Components for Steam Units: Strainers, steam-control valve, steam trap, valves, and piping.
 - l. Support: Factory mounted on skids.
 - m. Energy Management System Interface: Normally closed dry contacts for enabling and disabling heat exchanger.
2. Circulating, Storage Heat Exchangers:
- a. Description: Packaged, large-capacity, hot-water storage tank with heat-exchanger coil, circulator, controls, and specialties for heating domestic water with heating hot water **OR steam, as directed**, in coil.
 - b. Flow Pattern: Standard-flow arrangement, with water from bottom of storage tank circulated across heat-exchanger coil and returned to tank. Include hot-water outlet located at top of tank and temperature sensor in tank.
 - c. Flow Pattern: Reverse-flow arrangement, with water from storage tank drawn across heat-exchanger coil and returned to bottom of tank. Include hot-water outlet and temperature sensor located in or at coil shell.
 - d. Storage Tank Construction: ASME-code steel with **125-psig (860-kPa) OR 150-psig (1035-kPa), as directed**, working-pressure rating. Include nozzle and head for heat-exchanger tube coil.

- 1) Configuration: Horizontal **OR** Vertical, **as directed**.
 - 2) Manhole: **11 by 15 inches (280 by 380 mm)** in end head of horizontal **OR** sidewall of vertical, **as directed**, storage tank shell.
 - 3) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing and labeling.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 4) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - 5) Anode Rods: Factory installed, magnesium.
 - 6) Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire storage tank and nozzle except connections and controls.
 - e. Heat-Exchanger Coil: **NPS 3/4 (DN 20) OR NPS 1-1/4 (DN 32)**, **as directed**, diameter, vented, double-wall, copper or copper-alloy, U tubes with tube sheet and supporting baffles.
 - 1) Heat-Exchanger Pressure Rating: Equal to or greater than heating-fluid supply pressure.
 - f. Temperature Control: Adjustable temperature aquastat, mounted in storage tank shell head, unless otherwise indicated.
 - g. Safety Control: Automatic, high-temperature-limit cutoff device or system. Include automatic low-water cutoff device or system.
 - h. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.
 - i. Gages: Factory-mounted thermometer and pressure gage.
 - j. Circulating Pump: UL 778, all-bronze, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3. Include mechanical seals, **125-psig (860-kPa)** minimum working-pressure rating, and **225 deg F (107 deg C)** continuous-water-temperature rating.
 - 1) Pump Control: Sensor for operating pump and control valve.
 - k. Support: Factory mounted on skids.
 - l. Energy Management System Interface: Normally closed dry contacts for enabling and disabling heat exchanger.
- C. Noncirculating, Storage Heat Exchangers
1. Compact Heat Exchangers:
 - a. Description: Hot-water storage tank with integral heat-exchanger coil, controls, and specialties for heating domestic water with heating hot water **OR** steam, **as directed**, in coil.
 - b. Storage Tank Shell Construction: Steel or stainless steel with **150-psig (1035-kPa)** working-pressure rating.
 - 1) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Insulation: Complying with ASHRAE/IESNA 90.1 or ASHRAE 90.2, and suitable for operating temperature. Surround entire tank except connections and controls.
 - 4) Jacket: Steel with enameled finish, unless otherwise indicated.
 - 5) Anode Rods for Steel Tanks: Factory installed, magnesium.

- c. Heat-Exchanger Coil: Copper or stainless-steel coil assembly, permanently installed inside storage tank, for heating fluid. Include working-pressure rating equal to or greater than heating-fluid supply pressure.
 - d. Temperature Control: Adjustable thermostat.
 - e. Relief Valve: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include relief valve with relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select relief valve with sensing element that extends into storage tank.
2. Storage Heat Exchangers:
- a. Description: Assembly of hot-water storage tank with separate heat-exchanger coil; controls; and specialties for heating domestic water with heating hot water **OR** steam, **as directed**, in coil.
 - b. Storage Tank Construction: ASME-code steel with **125-psig (860-kPa) OR 150-psig (1035-kPa), as directed**, working-pressure rating. Include nozzle and head for heat-exchanger tube coil.
 - 1) Configuration: Horizontal **OR** Vertical, **as directed**.
 - 2) Manhole: **11 by 15 inches (280 by 380 mm)** in end head of horizontal **OR** sidewall of vertical, **as directed**, storage tank shell.
 - 3) Tappings: Factory fabricated of materials compatible with tank. Attach tappings to tank before testing and labeling.
 - a) **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
 - 4) Lining: Cement **OR** Glass **OR** Nickel plate **OR** Phenolic coating **OR** Sheet copper, **as directed**, complying with NSF 61 barrier materials for potable-water tank linings, including extending lining into and through tank fittings and outlets.
 - 5) Anode Rods: Factory installed, magnesium.
 - 6) Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire storage tank and nozzle except connections and controls.
 - c. Heat-Exchanger Coil: **NPS 3/4 (DN 20) OR NPS 1-1/4 (DN 32), as directed**, diameter, vented, double-wall, copper or copper-alloy, U tubes with tube sheet and supporting baffles.
 - 1) Heat-Exchanger Pressure Rating: Equal to or greater than heating-fluid supply pressure.
 - d. Temperature Control: Adjustable temperature aquastat, mounted in storage tank shell head, unless otherwise indicated.
 - e. Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3, for combination temperature and pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select one relief valve with sensing element that extends into storage tank.
 - f. Support: Factory mounted on skids.
- D. Plate Heat Exchangers
- 1. Brazed-Plate Heat Exchangers:
 - a. Description: Assembly of heat-exchanger plates, permanently brazed together, for using heating hot water **OR** steam, **as directed**, to heat domestic water.
 - b. Working-Pressure Rating: **150 psig (1035 kPa) OR 200 psig (1380 kPa) OR 250 psig (1725 kPa) OR 400 psig (2760 kPa), as directed**, minimum.
 - c. Plate Construction: Single **OR** Vented, double, **as directed**, wall.
 - d. Plate Material: ASTM A 666, Type 316 stainless steel.
 - e. Connections: Stainless steel; threaded.

2. Frame-and-Plate Heat Exchangers:
 - a. Description: Assembly of nonfixed-position, heat-exchanger plates, with frame, for using heating hot water **OR** steam, **as directed**, to heat domestic water.
 - b. Working-Pressure Rating: **150 psig (1035 kPa) OR 200 psig (1380 kPa) OR 250 psig (1725 kPa) OR 400 psig (2760 kPa)**, **as directed**, minimum.
 - c. Frame:
 - 1) Carrying and Guide Bars: Carbon steel **OR** Stainless steel, **as directed**.
 - 2) Fixed, Frame Plate; Pressure Plate; Support Column; and Nuts and Bolts: Carbon steel.
 - d. Channel Plates:
 - 1) Type: Single **OR** Vented, double, **as directed**, wall.
 - 2) Material: ASTM A 666, Type 304 or 316 stainless steel.
 - 3) Gasket Material: Butyl or acrylonitrile-butadiene rubber, suitable for potable water.
 - e. Connections: Stainless steel suitable for potable water.
 - 1) **NPS 2 (DN 50)** and Smaller: Threaded.
 - 2) **NPS 2-1/2 (DN 65)** and Larger: Flanged.
 - f. Protective Shroud: Steel, covering channel plates.
 - g. Insulation: Complying with ASHRAE/IESNA 90.1, unless otherwise indicated, and suitable for operating temperature. Surround entire heat exchanger except connections.

E. Heat Reclaimers

1. Description: Waste-heat recovery device complying with and listed according to UL 207 for heat reclaimers. Device includes vertical drainage tube with helical, domestic water preheat coil around drainage tube.
 - a. Drainage Tube: ASTM B 306, Type DWV, center, copper drainage tube of size indicated.
 - b. Water Preheat Coil: **ASTM B 88, Type L (ASTM B 88M, Type B)**, copper water tube, of size indicated attached to drainage tube.
 - 1) Working-Pressure Rating: **150 psig (1035 kPa)** on potable-water supply tubing.
 - c. Capacity and Characteristics:
 - 1) **NPS 2 (DN 50)** Drainage Tube:
 - a) Domestic Water Preheat Coil: **NPS 3/8 (DN 10)**.
 - b) Unit Height: **20 inches (508 mm) OR 24 inches (610 mm) OR 30 inches (762 mm)**, **as directed**.
 - 2) **NPS 3 (DN 80)** Drainage Tube:
 - a) Domestic Water Preheat Coil: **NPS 1/2 (DN 15) OR NPS 3/4 (DN 20)**, **as directed**.
 - b) Unit Height: **30 inches (762 mm) OR 40 inches (1016 mm) OR 60 inches (1524 mm)**, **as directed**.
 - 3) **NPS 4 (DN 100)** Drainage Tube:
 - a) Domestic-Water Preheat Coil: **NPS 1/2 (DN 15) OR NPS 3/4 (DN 20)**, **as directed**.
 - b) Unit Height: **30 inches (762 mm) OR 40 inches (1016 mm) OR 60 inches (1524 mm)**, **as directed**.

F. Compression Tanks

1. Description: Steel, pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
 - a. Construction:
 - 1) Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
 - 2) Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
 - 3) Air-Charging Valve: Factory installed.
 - b. Capacity and Characteristics:
 - 1) Working-Pressure Rating: **100 psig (690 kPa) OR 150 psig (1035 kPa)**, **as directed**.

- 2) Capacity Acceptable: **2 gal. (7.6 L) OR 4 gal. (15.1 L) OR 7 gal. (26.5 L) OR 10 gal. (37.9 L)**, as directed, minimum.

G. Heat-Exchanger Accessories

1. Combination Temperature and Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include relieving capacity at least as great as heat input, and include pressure setting less than working-pressure rating of heat exchanger. Select relief valves with sensing element that extends into heat-exchanger storage tank.
2. Pressure Relief Valves: ASME rated and stamped and complying with ASME PTC 25.3. Include pressure setting less than working-pressure rating of heat exchanger.
3. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1 or ASHRAE 90.2.
4. Source Quality Control
5. Test and inspect heat-exchanger storage tanks, specified to be ASME-code construction, according to ASME Boiler and Pressure Vessel Code.
6. Hydrostatically test commercial heat-exchanger storage tanks before shipment to minimum of one and one-half times pressure rating.
7. Prepare test reports.

1.3 EXECUTION

A. Heat-Exchanger Installation

1. Install heat exchangers on concrete bases.
 - a. Concrete base construction requirements are specified in Division 22 Section "Common Work Results For Plumbing".
2. Install heat exchangers level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.
3. Anchor heat exchangers to substrate.
4. Install seismic restraints for heat exchangers. Anchor to substrate.
5. Install temperature and pressure relief valves in top portion of storage tank shells of heat exchangers with domestic water storage. Use relief valves with sensing elements that extend into shells. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
6. Install combination temperature and pressure relief valves in water piping for heat exchangers without storage. Extend relief-valve outlet, with drain piping same as water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.
7. Install heat-exchanger drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for heat exchangers that do not have tank drains. Refer to Division 22 Section "Domestic Water Piping Specialties" for hose-end drain valves.
8. Install thermometer on each heat-exchanger domestic-water inlet and outlet piping, and install thermometer on each heat-exchanger heating-fluid inlet and outlet piping. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for thermometers.
9. Install pressure gages on heat-exchanger heating-fluid piping. Refer to Division 22 Section "Meters And Gages For Plumbing Piping" for pressure gages.
10. Fill heat exchangers with water.
11. Charge compression tanks with air.

B. Connections

1. Piping installation requirements are specified in other Division 14. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to heat exchangers to allow service and maintenance. Arrange piping for easy removal of heat exchangers.

3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.
 2. Perform the following field tests and inspections and prepare test reports:
 - a. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, confirm proper operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Remove and replace heat exchangers that do not pass tests and inspections and retest as specified above.
- D. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain heat exchangers.

END OF SECTION 22 35 23 13

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Task	Specification	Specification Description
22 35 23 13	22 33 00 00	Electric, Domestic Water Heaters

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SECTION 22 40 00 00 - PLUMBING FIXTURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for plumbing fixtures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following conventional plumbing fixtures and related components:
 - a. Faucets for lavatories, bathtubs, bathtub/showers, showers, and sinks.
 - b. Laminar-flow faucet-spout outlets.
 - c. Flushometers.
 - d. Toilet seats.
 - e. Protective shielding guards.
 - f. Fixture supports.
 - g. Interceptors.
 - h. Shower receptors.
 - i. Dishwasher air-gap fittings.
 - j. Disposers.
 - k. Hot-water dispensers.
 - l. Water closets.
 - m. Urinals.
 - n. Bidets.
 - o. Lavatories.
 - p. Commercial sinks.
 - q. Shampoo bowls.
 - r. Wash fountains.
 - s. Bathtubs.
 - t. Individual showers.
 - u. Group showers.
 - v. Whirlpool bathtubs.
 - w. Kitchen sinks.
 - x. Service sinks.
 - y. Service basins.
 - z. Laundry trays.
 - aa. Sacristy sinks.

C. Definitions

1. ABS: Acrylonitrile-butadiene-styrene plastic.
2. Accessible Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
3. Cast Polymer: Cast-filled-polymer-plastic material. This material includes cultured-marble and solid-surface materials.
4. Cultured Marble: Cast-filled-polymer-plastic material with surface coating.
5. Fitting: Device that controls the flow of water into or out of the plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads and tub spouts, drains and tailpieces, and traps and waste pipes. Piping and general-duty valves are included where indicated.
6. FRP: Fiberglass-reinforced plastic.
7. PMMA: Polymethyl methacrylate (acrylic) plastic.
8. PVC: Polyvinyl chloride plastic.

9. Solid Surface: Nonporous, homogeneous, cast-polymer-plastic material with heat-, impact-, scratch-, and stain-resistance qualities.

D. Submittals

1. Product Data: For each type of plumbing fixture indicated.
2. LEED Submittal:
 - a. Product Data for Credit WE 2, 3.1, and 3.2: Documentation indicating flow and water consumption requirements.
3. Shop Drawings: Diagram power, signal, and control wiring.
4. Operation and maintenance data
5. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities" **OR** Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act", **as directed**; for plumbing fixtures for people with disabilities.
3. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
4. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
5. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.
6. Comply with the following applicable standards and other requirements specified for plumbing fixtures:
 - a. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - b. Plastic Bathtubs: ANSI Z124.1.
 - c. Plastic Lavatories: ANSI Z124.3.
 - d. Plastic Laundry Trays: ANSI Z124.6.
 - e. Plastic Mop-Service Basins: ANSI Z124.6.
 - f. Plastic Shower Enclosures: ANSI Z124.2.
 - g. Plastic Sinks: ANSI Z124.6.
 - h. Plastic Urinal Fixtures: ANSI Z124.9.
 - i. Plastic Whirlpool Bathtubs: ANSI Z124.1 and ASME A112.19.7M.
 - j. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.
 - k. Slip-Resistant Bathing Surfaces: ASTM F 462.
 - l. Solid-Surface-Material Lavatories and Sinks: ANSI/ICPA SS-1.
 - m. Stainless-Steel Commercial, Handwash Sinks: NSF 2 construction.
 - n. Stainless-Steel Residential Sinks: ASME A112.19.3.
 - o. Vitreous-China Fixtures: ASME A112.19.2M.
 - p. Water-Closet, Flush Valve, Tank Trim: ASME A112.19.5.
 - q. Water-Closet, Flushometer Tank Trim: ASSE 1037.
 - r. Whirlpool Bathtub Fittings: ASME A112.19.8M.
7. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - a. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.
 - b. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
 - c. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
 - d. Faucets: ASME A112.18.1.
 - e. Hose-Connection Vacuum Breakers: ASSE 1011.
 - f. Hose-Coupling Threads: ASME B1.20.7.
 - g. Integral, Atmospheric Vacuum Breakers: ASSE 1001.

- h. NSF Potable-Water Materials: NSF 61.
 - i. Pipe Threads: ASME B1.20.1.
 - j. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - k. Supply Fittings: ASME A112.18.1.
 - l. Brass Waste Fittings: ASME A112.18.2.
8. Comply with the following applicable standards and other requirements specified for bathtub, bathtub/shower, and shower faucets:
 - a. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
 - b. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
 - c. Deck-Mounted Bath/Shower Transfer Valves: ASME 18.7.
 - d. Faucets: ASME A112.18.1.
 - e. Hand-Held Showers: ASSE 1014.
 - f. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
 - g. Hose-Coupling Threads: ASME B1.20.7.
 - h. Manual-Control Antiscald Faucets: ASTM F 444.
 - i. Pipe Threads: ASME B1.20.1.
 - j. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
 - k. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - l. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
 9. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - a. Atmospheric Vacuum Breakers: ASSE 1001.
 - b. Brass and Copper Supplies: ASME A112.18.1.
 - c. Dishwasher Air-Gap Fittings: ASSE 1021.
 - d. Manual-Operation Flushometers: ASSE 1037.
 - e. Plastic Tubular Fittings: ASTM F 409.
 - f. Brass Waste Fittings: ASME A112.18.2.
 - g. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
 10. Comply with the following applicable standards and other requirements specified for miscellaneous components:
 - a. Disposers: ASSE 1008 and UL 430.
 - b. Dishwasher Air-Gap Fittings: ASSE 1021.
 - c. Flexible Water Connectors: ASME A112.18.6.
 - d. Floor Drains: ASME A112.6.3.
 - e. Grab Bars: ASTM F 446.
 - f. Hose-Coupling Threads: ASME B1.20.7.
 - g. Hot-Water Dispensers: ASSE 1023 and UL 499.
 - h. Off-Floor Fixture Supports: ASME A112.6.1M.
 - i. Pipe Threads: ASME B1.20.1.
 - j. Plastic Shower Receptors: ANSI Z124.2.
 - k. Plastic Toilet Seats: ANSI Z124.5.
 - l. Supply and Drain Protective Shielding Guards: ICC A117.1.
 - m. Whirlpool Bathtub Equipment: UL 1795.
- F. Warranty
1. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace components of whirlpools that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Commercial Applications: One **OR** Three, **as directed**, year(s) from date of Final Completion.
 - b. Warranty Period for Residential Applications of Shells: Five **OR** 20 **OR** 30, **as directed**, years from date of Final Completion.
 - c. Warranty Period for Residential Applications of Pumps and Blowers: Five **OR** 20, **as directed**, years from date of Final Completion.

- d. Warranty Period for Residential Applications of Electronic Controls: Five years from date of Final Completion.

1.2 PRODUCTS

A. Lavatory Faucets

1. Description: Single-control mixing **OR** Single-control nonmixing **OR** Two-handle mixing, **as directed**, valve. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Body Material: Commercial, solid brass **OR** General-duty, solid brass **OR** General-duty, solid brass or copper or brass underbody with brass cover plate **OR** General-duty, copper or brass underbody with brass cover plate **OR** Residential, nonmetallic underbody with brass cover plate **OR** Residential, nonmetallic underbody with nonmetallic cover plate, **as directed**.
 - b. Finish: Polished chrome plate **OR** Polished brass **OR** Nonmetallic, **as directed**.
 - c. Maximum Flow Rate: 0.5 gpm (1.5 L/min.) **OR** 2.2 gpm (8.3 L/min.) **OR** 2.5 gpm (9.5 L/min.), **as directed**.
OR
Maximum Flow: 0.25 gal. (0.95 L).
 - d. Centers: 3-3/8 inches (86 mm) **OR** 4 inches (102 mm) **OR** 6 inches (152 mm) **OR** 8 inches (203 mm) **OR** Single hole **OR** Adjustable, **as directed**.
 - e. Mounting: Deck, exposed **OR** Deck, concealed **OR** Back/wall, exposed **OR** Back/wall, concealed, **as directed**.
 - f. Valve Handle(s): Lever **OR** Knob **OR** Knob, nonmetallic **OR** Cross, four arm **OR** Wrist blade, 4 inches (102 mm) **OR** Elbow, 6 inches (152 mm) **OR** Push button **OR** Not applicable, **as directed**.
 - g. Inlet(s): NPS 3/8 (DN 10) tubing, plain end **OR** NPS 3/8 (DN 10) tubing, with NPS 1/2 (DN 15) male adaptor **OR** NPS 1/2 (DN 15) male shank **OR** NPS 1/2 (DN 15) female shank, **as directed**.
 - h. Spout: Rigid **OR** Swing **OR** Rigid, gooseneck **OR** Swivel, gooseneck, **as directed**, type.
 - i. Spout Outlet: Aerator **OR** Spray **OR** Laminar flow **OR** Plain end **OR** Spray, **0.5 gpm (1.5 L/min.)**, **as directed**.
 - j. Operation: Compression, manual **OR** Noncompression, manual **OR** Sensor **OR** Self-closing, metering, **as directed**.
 - k. Drain: Not required **OR** Pop up **OR** Stopper with chain **OR** Grid **OR** Lift and turn, **as directed**.
 - l. Tempering Device: Mechanical **OR** Thermostatic **OR** Pressure balance **OR** Not required, **as directed**.

B. Bathtub Faucets

1. Description: Single-control mixing **OR** Two-handle mixing **OR** Three-handle mixing **OR** Push-button, metering, nonmixing, **as directed**, valve. Include hot- and cold-water indicators and tub spout. Coordinate faucet inlets with supplies.
 - a. Body Material: Solid brass.
 - b. Finish: Polished chrome plate **OR** Polished brass, **as directed**.
 - c. Mounting: Deck **OR** Exposed, over rim **OR** Wall, **as directed**.
 - d. Valve Handle(s): Lever **OR** Knob **OR** Knob, nonmetallic **OR** Cross, four arm **OR** Not applicable, **as directed**.
 - e. Bathtub Spout: Chrome-plated brass with diverter, **as directed**.
 - f. Operation: Compression, manual **OR** Noncompression, manual **OR** Sensor, **as directed**.
 - g. Supply Connections: NPS 1/2 (DN 15) **OR** NPS 1/2 (DN 15), union **OR** Sweat, **as directed**.

C. Bathtub/Shower Faucets

1. Description: Single-handle pressure-balance **OR** thermostatic **OR** thermostatic/pressure-balance, **as directed**, valve for bathtub and for shower. Include hot- and cold-water indicators; check stops; tub spout; and shower head, arm, and flange. Coordinate faucet inlets with supplies; coordinate outlet with diverter valve.
 - a. Body Material: Solid brass with nonmetallic trim, **as directed**.
 - b. Finish: Polished chrome plate **OR** Polished brass, **as directed**.
 - c. Maximum Flow Rate: 2.5 gpm (9.5 L/min.), unless otherwise indicated.
 - d. Diverter Valve: Integral **OR** Not integral, **as directed**, with mixing valve.
 - e. Mounting: Wall.
 - f. Bathtub Spout: Chrome-plated brass with diverter, **as directed**.
 - g. Operation: Compression, manual **OR** Noncompression, manual **OR** Sensor, **as directed**.
 - h. Antiscald Device: Integral with mixing valve **OR** Separate unit, **as directed**.
 - i. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
 - j. Supply Connections: NPS 1/2 (DN 15) **OR** NPS 1/2 (DN 15), union **OR** Sweat, **as directed**.
 - k. Backflow Protection Device for Hand-Held Shower: Required **OR** Not required, **as directed**.
 - l. Shower Head Type: Ball joint **OR** Without ball joint **OR** Ball joint and head integral with mounting flange **OR** Integral with mounting flange **OR** Hand held, slide-bar mounted **OR** Hand held, hook mounted, **as directed**.
 - m. Shower Head Material: Metallic **OR** Nonmetallic **OR** Combined, metallic and nonmetallic, **as directed**, with chrome-plated finish.
 - n. Spray Pattern: Fixed **OR** Adjustable, **as directed**.
 - o. Integral Volume Control: Required **OR** Not required, **as directed**.
 - p. Shower-Arm Flow-Control Fitting: Not required **OR** 1.5 gpm (5.7 L/min.) **OR** 2.0 gpm (7.6 L/min.), **as directed**.

D. Shower Faucets

1. Description: Single-handle pressure-balance **OR** thermostatic **OR** thermostatic and pressure-balance, **as directed**, valve. Include hot- and cold-water indicators; check stops; and shower head, arm, and flange. Coordinate faucet inlets with supplies and outlet with diverter valve.
 - a. Body Material: Solid brass with nonmetallic trim, **as directed**.
 - b. Finish: Polished chrome plate **OR** Polished brass, **as directed**.
 - c. Maximum Flow Rate: 2.5 gpm (9.5 L/min.), unless otherwise indicated.
 - d. Diverter Valve: Not required **OR** Integral with mixing valve **OR** Not integral with mixing valve, **as directed**.
 - e. Mounting: Exposed **OR** Concealed, **as directed**.
 - f. Backflow Protection Device for Hand-Held Shower: Required **OR** Not required, **as directed**.
 - g. Operation: Compression, manual **OR** Noncompression, manual **OR** Sensor, **as directed**.
 - h. Antiscald Device: Integral with mixing valve **OR** Separate unit **OR** Not required, **as directed**.
 - i. Check Stops: Check-valve type, integral with or attached to body; on hot- and cold-water supply connections.
 - j. Supply Connections: NPS 1/2 (DN 15) **OR** NPS 1/2 (DN 15), union **OR** Sweat, **as directed**.
 - k. Shower Head Type: Ball joint **OR** Without ball joint **OR** Ball joint and head integral with mounting flange **OR** Integral with mounting flange **OR** Hand held, slide-bar mounted **OR** Hand held, hook mounted, **as directed**.
 - l. Shower Head Material: Metallic **OR** Nonmetallic **OR** Combined, metallic and nonmetallic, **as directed**, with chrome-plated finish.
 - m. Spray Pattern: Fixed **OR** Adjustable, **as directed**.
 - n. Integral Volume Control: Required **OR** Not required, **as directed**.
 - o. Shower-Arm Flow-Control Fitting: Not required **OR** 1.5 gpm (5.7 L/min.) **OR** 2.0 gpm (7.6 L/min.), **as directed**.

- p. Temperature Indicator: Not required **OR** Integral with faucet, **as directed**.

E. Sink Faucets

1. Description: Kitchen faucet with spray, three-hole fixture **OR** Kitchen faucet with spray, four-hole fixture **OR** Kitchen faucet without spray **OR** Laundry tray faucet **OR** Service sink faucet with stops in shanks, vacuum breaker, hose-thread outlet, and pail hook **OR** Bar sink faucet, **as directed**. Include hot- and cold-water indicators; coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Body Material: Commercial, solid brass **OR** General-duty, solid brass **OR** General-duty, solid brass or copper or brass underbody with brass cover plate **OR** General-duty, copper or brass underbody with brass cover plate **OR** Residential, nonmetallic underbody with brass cover plate **OR** Residential, nonmetallic underbody with nonmetallic cover plate, **as directed**.
 - b. Finish: Polished chrome plate **OR** Polished brass **OR** Nonmetallic **OR** Polished or rough brass **OR** Rough brass, **as directed**.
 - c. Maximum Flow Rate: 2.5 gpm (9.5 L/min.), unless otherwise indicated.
 - d. Mixing Valve: Single control **OR** Two-lever handle, **as directed**.
 - e. Backflow Protection Device for Hose Outlet: Required **OR** Not required, **as directed**.
 - f. Backflow Protection Device for Side Spray: Required **OR** Not required, **as directed**.
 - g. Centers: 3-3/8 inches (86 mm) **OR** 4 inches (102 mm) **OR** 6 inches (152 mm) **OR** 8 inches (203 mm) **OR** Single hole **OR** Adjustable, **as directed**.
 - h. Mounting: Deck **OR** Back/wall, **as directed**, exposed **OR** concealed, **as directed**.
 - i. Handle(s): Lever **OR** Knob **OR** Knob, nonmetallic **OR** Cross, four arm **OR** Wrist blade, 4 inches (102 mm) **OR** Elbow, 6 inches (152 mm) **OR** Not applicable, **as directed**.
 - j. Inlet(s): NPS 3/8 (DN 10) plain-end tubing **OR** NPS 3/8 (DN 10) tubing with NPS 1/2 (DN 15) male adapter **OR** NPS 1/2 (DN 15) male shank **OR** NPS 1/2 (DN 15) female shank, **as directed**.
 - k. Spout Type: Rigid, solid brass **OR** Rigid, solid brass with wall brace **OR** Swing, round tubular **OR** Swing, shaped tube **OR** Swing, solid brass **OR** Rigid gooseneck **OR** Swivel gooseneck, **as directed**.
 - l. Spout Outlet: Aerator **OR** Swivel aerator/spray **OR** Spray **OR** Laminar flow **OR** Hose thread **OR** Plain end, **as directed**.
 - m. Vacuum Breaker: Required **OR** Not required, **as directed**.
 - n. Operation: Compression, manual **OR** Noncompression, manual **OR** Sensor, **as directed**.
 - o. Drain: Not required **OR** Pop up **OR** Stopper with chain **OR** Grid **OR** Lift and turn, **as directed**.

F. Laminar-Flow Faucet-Spout Outlets

1. Description: Chrome-plated-brass faucet-spout outlet that produces non-aerating, laminar stream. Include male or female thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.

G. Flushometers

1. Description: Flushometer for urinal-type **OR** water-closet-type, **as directed**, fixture. Include brass body with corrosion-resistant internal components, non-hold-open feature, **as directed**, control stop with check valve, vacuum breaker, copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Diaphragm **OR** Piston, **as directed**, operation.
 - b. Style: Exposed **OR** Concealed, **as directed**.
 - c. Inlet Size: NPS 3/4 (DN 20) **OR** NPS 1 (DN 25), **as directed**.
 - d. Trip Mechanism: Oscillating, lever-handle actuator **OR** Mechanical, push-button actuator with stainless-steel access plate **OR** Hydraulic, push-button actuator **OR** Foot-pedal actuator **OR** Hard-wired, electric-sensor actuator **OR** Battery-operated sensor actuator, **as directed**.

- e. Consumption: 0.5 gal./flush (1.9 L/flush) **OR** 1.0 gal./flush (3.8 L/flush) **OR** 1.5 gal./flush (5.7 L/flush) **OR** 1.6 gal./flush (6.0 L/flush) **OR** 3.5 gal./flush (13.3 L/flush), **as directed**.
 - f. Tailpiece Size: NPS 3/4 (DN 20) **OR** NPS 1-1/4 (DN 32) **OR** NPS 1-1/2 (DN 40), **as directed**, and standard, **as directed**, length to top of bowl.
- H. Toilet Seats
- 1. Description: Toilet seat for water-closet-type fixture.
 - a. Material: Molded, solid plastic with antimicrobial agent, **as directed**.
 - b. Configuration: Closed **OR** Open, **as directed**, front with **OR** without, **as directed**, cover.
 - c. Size: Elongated **OR** Regular, **as directed**.
 - d. Hinge Type: CK, check **OR** SS, self-sustaining **OR** SC, self-sustaining, check **OR** SR, self-raising, **as directed**.
 - e. Class: Residential **OR** Standard commercial **OR** Heavy-duty commercial, **as directed**.
 - f. Color: White **OR** Black, **as directed**.
- I. Protective Shielding Guards
- 1. Protective Shielding Pipe Covers:
 - a. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply **OR** hot- and cold-water supplies, **as directed**, and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
 - 2. Protective Shielding Piping Enclosures:
 - a. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.
- J. Fixture Supports
- 1. Water-Closet Supports:
 - a. Description: Combination carrier designed for accessible **OR** standard, **as directed**, mounting height of wall-mounting, water-closet-type fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
 - 2. Urinal Supports:
 - a. Description: Type I, urinal carrier with fixture support plates and coupling with seal and fixture bolts and hardware matching fixture **OR** Type II, urinal carrier with hanger and bearing plates, **as directed**, for wall-mounting, urinal-type fixture. Include steel uprights with feet.
 - b. Accessible-Fixture Support: Include rectangular steel uprights.
 - 3. Lavatory Supports:
 - a. Description: Type I, lavatory carrier with exposed arms and tie rods **OR** Type II, lavatory carrier with concealed arms and tie rod **OR** Type III, lavatory carrier with hanger plate and tie rod, **as directed**, for wall-mounting, lavatory-type fixture. Include steel uprights with feet.
 - b. Accessible-Fixture Support: Include rectangular steel uprights.
 - 4. Sink Supports:
 - a. Description: Type I, sink carrier with exposed arms and tie rods **OR** Type II, sink carrier with hanger plate, bearing studs, and tie rod **OR** Type III, sink carrier with hanger plate and exposed arms, **as directed**, for sink-type fixture. Include steel uprights with feet.
- K. Interceptors
- 1. Hair Interceptors:
 - a. Description: Manufactured unit with removable screen or strainer and removable cover; designed to trap and retain hair.
 - 1) Material: Brass **OR** Stainless-steel, **as directed**, body.
 - 2) Pipe Connections: NPS 1-1/4 (DN 32) **OR** NPS 1-1/2 (DN 40), **as directed**.
 - 2. Sediment Interceptors:

- a. Description: Manufactured unit with removable screens or strainer and removable cover; designed to trap and retain waste material.
- 1) Material: Cast-iron or steel body with acid-resistant lining and coating **OR** Carbon-steel body with acid-resistant lining and coating **OR** Stainless-steel, **as directed**.
 - 2) Pipe Connections: **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50), as directed**.
- L. Shower Receptors
1. Description: Cast-polymer **OR** FRP **OR** PMMA **OR** Precast-terrazzo **OR** Solid-surface, **as directed**, base for built-up-type shower fixture.
 - 1) Type: Standard, residential **OR** Handicapped/wheelchair, **as directed**.
 - 2) Size: **32 by 32 inches (813 by 813 mm) OR 36 by 36 inches (914 by 914 mm) OR 32 by 42 inches (813 by 1067 mm) OR 48 by 60 inches (1219 by 1524 mm), as directed**.
 - 3) Color: White.
 - 4) Outlet: Cast-in-floor drain **OR** Drain, **as directed**, with **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50) OR NPS 3 (DN 80), as directed**, outlet.
- M. Dishwasher Air-Gap Fittings
1. Description: Fitting suitable for use with domestic dishwashers and for deck mounting; with plastic body, chrome-plated brass cover, **as directed**; and capacity of at least 5 gpm (0.32 L/s); and inlet pressure of at least 5 psig (35 kPa) at a temperature of at least 140 deg F (60 deg C). Include 5/8-inch- (16-mm-) ID inlet and 7/8-inch- (22-mm-) ID outlet hose connections.
 2. Hoses: Rubber and suitable for temperature of at least 140 deg F (60 deg C).
 - a. Inlet Hose: 5/8-inch (16-mm) ID and 48 inches (1219 mm) long.
 - b. Outlet Hose: 7/8-inch (22-mm) ID and 48 inches (1219 mm) long.
- N. Disposers
1. Description: Batch-feed **OR** Continuous-feed, **as directed**, household, food-waste disposer. Include reset button; wall switch; corrosion-resistant chamber with jam-resistant, cutlery- or stainless-steel grinder or shredder; **NPS 1-1/2 (DN 40)** outlet; quick-mounting, stainless-steel sink flange; antisplash guard; and combination cover/stopper.
 - a. Type: Batch-feed **OR** Continuous-feed, **as directed**, household.
 - b. Model: Not applicable **OR** Sound-insulated chamber **OR** Sound-insulated chamber and stainless-steel outer shell, **as directed**.
 - c. Motor: 115-V ac, 1725 rpm, 1/3 **OR** 1/2 **OR** 3/4 **OR** 1, **as directed**, hp with overload protection.
- O. Hot-Water Dispensers
1. Description: Gooseneck spout with lever-handle **OR** Spout with twist-knob or push-button, **as directed**, flow control, household-type dispenser with instant on-off control; insulated, corrosion-resistant-metal storage tank that is open to atmosphere; electric heating element; chrome-plated faucet or spout; removable strainer; thermostat control for water temperature up to 190 deg F (88 deg C); and thermal-overload protection.
 - a. Storage Tank Capacity: 0.5 gal. (1.5 L).
 - b. Heating Element: 750 W minimum, 115-V ac.
- P. Water Closets
1. Water Closets, Wall-Mounting, Back-Outlet Type:
 - a. Description Accessible, wall-mounting **OR** Wall-mounting, **as directed**, back-outlet, vitreous-china fixture designed for flushometer-tank **OR** gravity-type tank **OR** flushometer valve, **as directed**, operation.
 - 1) Style: Close coupled **OR** One piece, **as directed**.
 - a) Bowl Type: Elongated **OR** Round front, **as directed**, with siphon-jet design.
 - b) Design Consumption: **1.6 gal./flush (6 L/flush) OR 3.5 gal./flush (13.3 L/flush), as directed**.

- c) Tank: Gravity type with trim **OR** Flushometer-tank type with trim and pressurized tank, **as directed**. Include cover.
 - d) Trip Mechanism: Lever-handle **OR** Push-button, **as directed**, actuator.
 - e) Color: White.
 - 2) Supply: **NPS 1/2 (DN 15)** chrome-plated brass or copper with wheel-handle **OR** screwdriver **OR** loose-key, **as directed**, stop.
 - 3) Style: Flushometer valve.
 - a) Bowl Type: Elongated **OR** Round front, **as directed**, with siphon-jet **OR** blowout, **as directed**, design.
 - b) Design Consumption: **1.6 gal./flush (6 L/flush) OR 3.5 gal./flush (13.3 L/flush), as directed.**
 - c) Color: White.
 - 4) Fixture Support: Water-closet support <Insert designation> combination carrier.
- 2. Water Closets, Floor-Mounting, Floor-Outlet Type:
 - a. Description: Accessible, floor-mounting **OR** Floor-mounting, **as directed**, floor-outlet, vitreous-china fixture designed for gravity-type tank **OR** flushometer tank **OR** flushometer valve, **as directed**, operation.
 - 1) Style: Close coupled **OR** One piece, **as directed**.
 - a) Bowl Type: Elongated **OR** Round front, **as directed**, with siphon-jet design. Include bolt caps matching fixture.
 - b) Height: Standard **OR** Accessible **OR** Juvenile **OR** Child, **as directed**.
 - c) Design Consumption: **1 gal./flush (3.8 L/flush) OR 1.6 gal./flush (6 L/flush) OR 3.5 gal./flush (13.3 L/flush), as directed.**
 - d) Tank: Gravity type with trim **OR** Flushometer-tank type with trim and pressurized tank, **as directed**. Include cover.
 - e) Trip Mechanism: Lever-handle **OR** Push-button, **as directed**, actuator.
 - f) Color: White.
 - 2) Supply: **NPS 3/8 (DN 10) OR NPS 1/2 (DN 15), as directed**, chrome-plated brass or copper with wheel-handle **OR** screwdriver **OR** loose-key, **as directed**, stop.
 - 3) Style: Flushometer valve.
 - a) Bowl Type: Elongated **OR** Round front, **as directed**, with siphon-jet **OR** reverse-trap **OR** blowout **OR** siphon-vortex **OR** siphon-wash **OR** washdown, **as directed**, design. Include bolt caps matching fixture.
 - b) Height: Standard **OR** Accessible **OR** Juvenile **OR** Child, **as directed**.
 - c) Design Consumption: **1.6 gal./flush (6 L/flush) OR 3.5 gal./flush (13.3 L/flush), as directed.**
 - d) Color: White.
 - 3. Water Closets, Floor-Mounting, Back-Outlet Type:
 - a. Description Accessible, floor-mounting **OR** Floor-mounting, **as directed**, back-outlet, vitreous-china fixture designed for gravity-tank **OR** flushometer-tank **OR** flushometer-valve, **as directed**, operation.
 - 1) Style: Close coupled.
 - a) Bowl Type: Elongated with siphon-jet design. Include bolt caps matching fixture.
 - b) Height: Standard **OR** Accessible, **as directed**.
 - c) Design Consumption: **1.6 gal./flush (6 L/flush).**
 - d) Tank: Gravity type with trim. Include cover.
 - e) Trip Mechanism: Lever-handle actuator.
 - f) Color: White.
 - 2) Supply: **NPS 1/2 (DN 15)** chrome-plated brass or copper with wheel-handle **OR** screwdriver **OR** loose-key, **as directed**, stop.
 - 3) Style: Flushometer valve.
 - a) Bowl Type: Elongated with siphon-jet design. Include bolt caps matching fixture.
 - b) Height: Standard **OR** Accessible, **as directed**.

- c) Design Consumption: 1.6 gal./flush (6 L/flush) OR 3.5 gal./flush (13.3 L/flush), as directed.
- d) Color: White.
- 4) Wall Support: Manufactured waste fitting with seal and fixture bolts.

Q. Urinals

1. Urinals, Wall-Mounting, Back-Outlet Type:
 - a. Description: Accessible, wall-mounting OR Wall-mounting, as directed, back-outlet, vitreous-china fixture designed for flushometer valve operation.
 - 1) Type: Blowout OR Siphon jet OR Blowout with extended shields OR Siphon jet with extended shields OR Washout with extended shields, as directed.
 - 2) Strainer or Trapway: Integral cast strainer OR Separate removable strainer OR Open trapway, as directed, with integral trap.
 - 3) Design Consumption: 0.5 gal./flush (1.9 L/flush) OR 1 gal./flush (3.8 L/flush) OR 1.5 gal./flush (5.7 L/flush), as directed.
 - 4) Color: White.
 - 5) Supply Spud Size: NPS 3/4 (DN 20) OR NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed.
 - 6) Outlet Size: NPS 1-1/2 (DN 40) OR NPS 2 (DN 50) OR NPS 3 (DN 80), as directed.
 - 7) Fixture Support: Urinal chair carrier.
2. Urinals, Wall-Mounting, Bottom-Outlet Type:
 - a. Description: Accessible, wall-mounting OR Wall-mounting, as directed, bottom-outlet, vitreous-china fixture designed for flushometer valve operation.
 - 1) Type: Washout OR Washdown, as directed.
 - 2) Strainer or Trapway: Integral cast strainer OR Separate removable strainer OR Open trapway, as directed.
 - 3) Design Consumption: 0.5 gal./flush (1.9 L/flush) OR 1 gal./flush (3.8 L/flush), as directed.
 - 4) Color: White.
 - 5) Supply Spud Size: NPS 3/4 (DN 20).
 - 6) Outlet Size: NPS 1-1/2 (DN 40).
 - 7) Drain Piping: NPS 1-1/2 (DN 40) chrome-plated, cast-brass P-trap; 0.045-inch- (1.1-mm-) thick tubular brass waste to wall; and wall escutcheon.
 - 8) Flushing Device: Fixture manufacturer's standard matching fixture.
 - 9) Flushometer: As directed.
 - 10) Fixture Support: Urinal chair carrier.
3. Urinals, Stall-Type, Bottom-Outlet:
 - a. Description Stall-type, bottom-outlet, vitreous-china fixture designed for flushometer valve operation.
4. Urinals, Wall-Mounting, Bottom-Outlet, Trough-Type:
 - a. Description: Wall-mounting, bottom-outlet, trough-type, enameled, cast-iron fixture modified for flushometer valve operation.
 - 1) Style: Similar to wash sink with back and without pedestal.
 - 2) Size: 36 inches (915 mm) OR 48 inches (1219 mm) OR 60 inches (1525 mm) OR 72 inches (1830 mm), as directed.
 - 3) Color: White.
 - 4) Drain: Separate removable dome strainer.
 - 5) Design Consumption: Not applicable.
 - 6) Supply: NPS 1/2 (DN 15).
 - 7) Outlet Size: NPS 1-1/2 (DN 40).
 - 8) Drain Piping: NPS 1-1/2 (DN 40) chrome-plated, cast-brass P-trap; 0.045-inch- (1.1-mm-) thick tubular brass waste to wall; and wall escutcheon.
 - 9) Flushing Device: Fixture manufacturer's standard, with washdown pipe, matching fixture.

- 10) Fixture Support: Sink chair carrier.
5. Urinals, Wall-Mounting, Back-Outlet Dry Type:
 - a. Description Accessible, wall-mounting **OR** Wall-mounting, **as directed**, back-outlet dry, plastic **OR** vitreous-china, **as directed**, fixture designed for liquid-trap-seal operation.
 - 1) Type: Without water supply.
 - 2) Trap-Seal Method: Proprietary cartridge or trap system.
 - 3) Color: White.
 - 4) Outlet Size: **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50), as directed**. Include transition coupling, if required.
 - 5) Trap-Sealing Liquid: Proprietary.
 - 6) Fixture Support: Urinal chair carrier.
- R. Bidets
 1. Description: Floor-mounting, vitreous-china fixture with fittings.
 - a. Type: With spray **OR** flushing rim **OR** spray and flushing rim, **as directed**, and overflow. Include bolt caps matching fixture.
 - b. Faucet Hole Punching: One **OR** Two **OR** Three **OR** Four **OR** No, **as directed**, hole(s).
 - c. Color: White.
 - d. Faucet: Fixture manufacturer's standard, or two-valve supply, provided by fixture supplier, with vacuum breaker, diverter, submerged spray, **OR** over-rim filling, **as directed**, pop-up waste, and chrome-plated finish.
 - e. Supplies: NPS 3/8 (DN 10) **OR** NPS 1/2 (DN 15), **as directed**, chrome-plated copper with stops.
 - f. Drain Piping: NPS 1-1/4 (DN 32) chrome-plated, cast-brass P-trap; 0.032-inch- (0.8-mm-) **OR** 0.045-inch- (1.1-mm-), **as directed**, thick tubular brass waste to wall; and wall escutcheon.
- S. Lavatories
 1. Lavatories, Wall-Mounting Type:
 - a. Description: Accessible, wall-mounting **OR** Wall-mounting **OR** Wall-and-pedestal-mounting, **as directed**, enameled, cast-iron **OR** vitreous-china, **as directed**, fixture.
 - 1) Type: With back **OR** Ledge back **OR** Shelf back **OR** Slab **OR** Pedestal, **as directed**.
 - 2) Size: **18 by 15 inches (457 by 381 mm) OR 19 by 16 inches (483 by 406 mm) OR 20 by 18 inches (508 by 457 mm) OR 24 by 20 inches (610 by 508 mm), as directed**, rectangular.
 - 3) Faucet Hole Punching: One hole **OR** Three holes, **2-inch (51-mm) centers OR Three holes, 4-inch (102-mm) centers, as directed**.
 - 4) Faucet Hole Location: Top **OR** Front wall **OR** Inclined panel, **as directed**.
 - 5) Pedestal: Not required **OR** Required, **as directed**.
 - 6) Color: White.
 - 7) Faucet: Lavatory with pop-up waste **OR** for separate drain, **as directed**.
 - 8) Supplies: **NPS 3/8 (DN 10)** chrome-plated copper with stops.
 - 9) Drain: See faucet **OR** Grid **OR** Grid with offset waste, **as directed**.
 - a) Location: Not applicable **OR** Near back of bowl, **as directed**.
 - 10) Drain Piping: **NPS 1-1/4 (DN 32) OR NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), as directed**, chrome-plated, cast-brass P-trap; **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed, 0.032-inch- (0.8-mm-) OR 0.045-inch- (1.1-mm-), as directed**, thick tubular brass waste to wall; and wall escutcheon.

OR

 Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/4 (DN 32) OR NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), as directed**, P-trap; **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed**, tubular waste to wall; and wall escutcheon.
 - a) Exception: Omit P-trap if hair interceptor is required.
 - 11) Hair Interceptor: Not required.
 - 12) Protective Shielding Guard(s): **As directed**.

- 13) Fixture Support: Lavatory.
2. Lavatories, Counter-Mounting Type:
- a. Description: Accessible **OR** Counter-mounting **OR** Undercounter-mounting, **as directed**, enameled, cast-iron **OR** FRP **OR** PMMA **OR** porcelain-enameled, formed-steel **OR** solid-surface **OR** stainless-steel **OR** vitreous-china, **as directed** fixture.
- 1) Type: Flat rim with ledge **OR** Self-rimming, **as directed**.
 - 2) Rectangular Lavatory Size: **18 by 15 inches (457 by 381 mm) OR 19 by 16 inches (483 by 406 mm) OR 20 by 18 inches (508 by 457 mm) OR 24 by 20 inches (610 by 508 mm), as directed.**
 - 3) Oval Lavatory Size: **19 by 16 inches (483 by 406 mm) OR 20 by 17 inches (508 by 432 mm), as directed.**
 - 4) Round Lavatory Size: **18 inches (457 mm) OR 19 inches (483 mm), as directed**, in diameter.
 - 5) Faucet Hole Punching: One hole **OR** Three holes, **2-inch (51-mm) centers OR Three holes, 4-inch (102-mm) centers, as directed.**
 - 6) Faucet Hole Location: Top **OR** Front wall **OR** Inclined panel, **as directed**.
 - 7) Color: White.
 - 8) Faucet: Lavatory with pop-up waste **OR** for separate drain, **as directed**.
 - 9) Supplies: **NPS 3/8 (DN 10)** chrome-plated copper with stops.
 - 10) Drain: See faucet **OR** Grid **OR** Grid with offset waste, **as directed**.
 - a) Location: Not applicable **OR** Near back of bowl, **as directed**.
 - 11) Drain Piping: **NPS 1-1/4 (DN 32) OR NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), as directed**, chrome-plated, cast-brass P-trap; **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed, 0.032-inch- (0.8-mm-) OR 0.045-inch- (1.1-mm-), as directed**, thick tubular brass waste to wall; and wall escutcheon.

OR

 Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, NPS 1-1/4 (DN 32) **OR** NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), **as directed**, P-trap; NPS 1-1/4 (DN 32) **OR** NPS 1-1/2 (DN 40), **as directed**, tubular waste to wall; and wall escutcheon.
 - a) Exception: Omit P-trap if hair interceptor is required.
 - 12) Hair Interceptor: Not required.
 - 13) Protective Shielding Guard(s): **As directed**.
3. Lavatories, Countertop With Integral Bowl Type:
- a. Description: Countertop **OR** Accessible countertop, **as directed**, with integral bowl fixtures for mounting on base unit.
- 1) Backsplash: Integral with countertop **OR** Separate, same material as countertop **OR** Not required, **as directed**.
 - 2) Overall Rectangular Top Size: **25 by 17 inches (635 by 432 mm) OR 31 by 19 inches (787 by 483 mm) OR 49 by 22 inches (1245 by 559 mm) OR 73 by 22 inches (1854 by 559 mm), as directed**, with 1 **OR** 2 **OR** 3 **OR** 4, **as directed**, bowl(s).
 - a) Bowl Size: Oval **19 by 16 inches (483 by 406 mm) OR 20 by 17 inches (508 by 432 mm), as directed.**
 - 3) Faucet Hole Punching: One hole **OR** Three holes, **2-inch (51-mm) centers OR Three holes, 4-inch (102-mm) centers, as directed.**
 - 4) Faucet Hole Location: Countertop.
 - 5) Color: White.
 - 6) Faucet(s): Lavatory with pop-up waste **OR** with separate drain, **as directed**, for each bowl.
 - 7) Supplies: **NPS 3/8 (DN 10)** chrome-plated copper with stops.
 - 8) Drain(s): See faucets **OR** Grid **OR** Grid with offset waste, **as directed**.
 - a) Location: Not applicable **OR** Near back of bowl, **as directed**.
 - 9) Drain Piping: **NPS 1-1/4 (DN 32) OR NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), as directed**, chrome-plated, cast-brass P-trap; **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed, 0.032-inch- (0.8-mm-) OR 0.045-inch- (1.1-mm-), as directed**, thick tubular brass waste to wall; and wall escutcheon.

- OR**
 Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, NPS 1-1/4 (DN 32) **OR** NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), **as directed**, P-trap; NPS 1-1/4 (DN 32) **OR** NPS 1-1/2 (DN 40), **as directed**, tubular waste to wall; and wall escutcheon.
- 10) Hair Interceptor(s): **As directed** for bowls as indicated.
 - 11) Protective Shielding Guard(s): **As directed** for bowls as indicated.
4. Lavatories, For Wheelchair-Bound Persons:
- a. Description: Accessible, wall-mounting, vitreous-china fixture designed for people in wheelchairs.
 - 1) Type: Ledge back **OR** Shelf back **OR** Slab, **as directed**.
 - 2) Size: 20 by 26 inches (508 by 660 mm) minimum; rectangular.
 - 3) Faucet Hole Punching: One hole **OR** Three holes, 2-inch (51-mm) centers **OR** Three holes, 4-inch (102-mm) centers **OR** Three holes, 8-inch (203-mm) centers **OR** Three holes, 12-inch (305-mm) centers, **as directed**.
 - 4) Color: White.
 - 5) Faucet: Lavatory for separate drain.
 - 6) Supplies: NPS 3/8 (DN 10) chrome-plated copper with stops.
 - 7) Drain: Grid **OR** Grid with offset waste, **as directed**.
 - 8) Drain Piping: NPS 1-1/4 (DN 32) **OR** NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), **as directed**, chrome-plated, cast-brass P-trap; NPS 1-1/4 (DN 32) **OR** NPS 1-1/2 (DN 40), **as directed**, 0.045-inch- (1.1-mm-) thick tubular brass waste to wall; and wall escutcheon.

OR
 Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, NPS 1-1/4 (DN 32) **OR** NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), **as directed**, P-trap; NPS 1-1/4 (DN 32) **OR** NPS 1-1/2 (DN 40), **as directed**, tubular waste to wall; and wall escutcheon.
 - 9) Fixture Support: Lavatory.
- T. Commercial Sinks
1. Commercial Sinks, Counter-Mounting Type:
 - a. Description: One-compartment **OR** Two-compartment **OR** Three-compartment, **as directed**, counter-mounting, stainless-steel commercial sink with backsplash.
 - 1) Metal Thickness: 0.050 inch (1.3 mm).
 - 2) Compartment (for single-compartment sink):
 - a) Drain: Grid with NPS 1-1/2 (DN 40) tailpiece and twist drain **OR** Grid with NPS 2 (DN 50) tailpiece and twist drain **OR** NPS 1-1/2 (DN 40) tailpiece with stopper **OR** NPS 1-1/2 (DN 40) tailpiece with pop-up waste, **as directed**.
 - i. Location: Centered in compartment **OR** Near back of compartment **OR** Near left side of compartment **OR** Near right side of compartment, **as directed**.
 - 3) Each Compartment (for multiple-compartment sink):
 - a) Drains: Grid with NPS 1-1/2 (DN 40) tailpiece and twist drain **OR** Grid with NPS 2 (DN 50) tailpiece and twist drain **OR** NPS 1-1/2 (DN 40) tailpiece with stopper **OR** NPS 1-1/2 (DN 40) tailpiece with pop-up waste, **as directed**.
 - i. Location: Centered in compartment **OR** Near back of compartment, **as directed**.
 - 4) Faucet(s): Sink.
 - a) Number Required: One **OR** Two, **as directed**.
 - b) Mounting: Deck.
 - 5) Supplies: NPS 1/2 (DN 15) **OR** NPS 3/4 (DN 20), **as directed**, chrome-plated copper with stops or shutoff valves.
 - 6) Drain Piping: NPS 1-1/2 (DN 40) **OR** NPS 2 (DN 50), **as directed**, chrome-plated, cast-brass P-trap; 0.045-inch- (1.1-mm-) thick tubular brass **OR** copper pipe, **as directed**, waste to wall; continuous waste, **as directed**; and wall escutcheon(s).
 2. Commercial Sinks, Freestanding Type:

- a. Description: One-compartment **OR** Two-compartment **OR** Three-compartment, **as directed**, freestanding, stainless-steel commercial sink with backsplash.
- 1) Metal Thickness: **0.050 inch (1.3 mm) OR 0.063 inch (1.6 mm)**, **as directed**.
 - 2) Compartment (for single-compartment sink):
 - a) Drain: Grid with **NPS 1-1/2 (DN 40)** tailpiece and twist drain **OR** Grid with **NPS 2 (DN 50)** tailpiece and twist drain **OR NPS 1-1/2 (DN 40)** tailpiece with stopper **OR NPS 1-1/2 (DN 40)** tailpiece with pop-up waste, **as directed**.
 - i. Location: Centered in compartment **OR** Near back of compartment **OR** Near left side of compartment **OR** Near right side of compartment, **as directed**.
 - 3) Each Compartment (for multiple-compartment sink):
 - a) Drains: Grid with **NPS 1-1/2 (DN 40)** tailpiece and twist drain **OR** Grid with **NPS 2 (DN 50)** tailpiece and twist drain **OR NPS 1-1/2 (DN 40)** tailpiece with stopper **OR NPS 1-1/2 (DN 40)** tailpiece with pop-up waste, **as directed**.
 - i. Location: Centered in compartment **OR** Near back of compartment, **as directed**.
 - 4) Drainboard(s): Not required **OR** Both **OR** Left **OR** Right, **as directed**, side(s).
 - a) Dimensions Each: Not applicable.
 - 5) Supports: Adjustable-length, steel legs.
 - 6) Faucet(s): Sink.
 - a) Number Required: One **OR** Two, **as directed**.
 - b) Mounting: In backsplash.
 - 7) Supplies: **NPS 1/2 (DN 15) OR NPS 3/4 (DN 20)**, **as directed**, chrome-plated copper with stops or shutoff valves.
 - 8) Drain Piping: **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50)**, **as directed**, chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular brass **OR** copper pipe, **as directed**, waste to wall; continuous waste, **as directed**; and wall escutcheon(s).
3. Commercial Sinks, Handwash Type:
- a. Description: Wall-mounting, stainless-steel, commercial, handwash-sink fixture.
- 1) Type: Basin with radius corners, back for faucet, and support brackets.
 - 2) Size; Approximately **17 by 16 by 5 inches (432 by 406 by 127 mm)**.
 - 3) Faucet: Back-mounting, chrome-plated, solid-brass, gooseneck type with individual valves.
 - 4) Supplies: **NPS 1/2 (DN 15)** chrome-plated copper with stops.
 - 5) Drain: Grid.
 - 6) Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular brass waste to wall; and wall escutcheon.
 - 7) Fixture Support: Sink for wall-mounting installation.
- U. Shampoo Bowls
1. Description: Enameled, cast-iron **OR** PMMA, **as directed**, fixture shaped for head rest. Include vacuum breaker, faucet, hose and spray, drain, and mounting brackets.
 - a. Color: White.
 - b. Supplies: **NPS 3/8 (DN 10) OR NPS 1/2 (DN 15)**, **as directed**, chrome-plated copper with stops.
 - c. Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular brass waste to wall; and wall escutcheon.
OR
Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/2 (DN 40)** P-trap; tubular waste to wall; and wall escutcheon.
 - d. Hair Interceptor: **As directed**
 - e. Fixture Support for Counter Mounting: Brackets or forms.
OR
Fixture Support for Wall Mounting: Sink.

V. Wash Fountains

1. Wash Fountains, Freestanding Type:
 - a. Description: Accessible, Circular, freestanding-design, wash-up fixture.
 - 1) Arrangement: Wash-up stations facing central spray head.
 - 2) Receptor Material: Precast terrazzo **OR** Stainless steel **OR** Solid surface, **as directed**, on base.
 - 3) Receptor Color or Finish: Not applicable.
 - 4) Size: **36- to 39-inch (914- to 990-mm)** **OR** **54-inch (1370-mm)**, **as directed**, diameter.
 - 5) Number of Stations: Two **OR** Three **OR** Four **OR** Five **OR** Six **OR** Eight, **as directed**.
 - 6) Control: Collective **OR** Individual, **as directed**, push-button **OR** foot-pedal **OR** sensor, **as directed**, actuation with thermostatic valve and check stops or field-installed check valves.
 - 7) Liquid Soap Dispensers: Manual **OR** Sensor, **as directed**, for each station.
 - 8) Mounting: Floor.
 - 9) Supplies: **NPS 3/4 (DN 20)** **OR** **NPS 1 (DN 25)**, **as directed**, copper tubing with ball, gate, or globe valves from bottom **OR** top, **as directed**.
 - 10) Shroud: Not required **OR** Stainless steel of size to cover supplies and vent piping, **as directed**.
 - 11) Drain: Grid with **NPS 2 (DN 50)** tailpiece.
 - 12) Trap Fitting: Not required **OR** **NPS 2 (DN 50)** trap with waste and vent connections, **as directed**.
 - 13) Drain Piping: **NPS 1-1/2 (DN 40)**, **OR** **NPS 2 (DN 50)**, **as directed**, waste to floor.
 - 14) Vent Piping: Not required **OR** **NPS 1-1/2 (DN 40)** to ceiling, **as directed**.
2. Wash Fountains, Semicircular Or Corner Type:
 - a. Description: Accessible, Semicircular **OR** Corner, **as directed**, design, wash-up fixture.
 - 1) Arrangement: Wash-up stations facing central spray head.
 - 2) Receptor Material: Precast terrazzo **OR** Stainless steel **OR** Solid surface, **as directed**, on base.
 - 3) Receptor Color or Finish: Not applicable.
 - 4) Size: **36- to 39-inch (914- to 990-mm)** **OR** **54-inch (1370-mm)**, **as directed**, diameter.
 - 5) Number of Stations: Two **OR** Three **OR** Four, **as directed**.
 - 6) Control: Collective **OR** Individual, **as directed**, push-button **OR** foot-pedal **OR** sensor, **as directed**, actuation with thermostatic valve and check stops or field-installed check valves.
 - 7) Liquid Soap Dispensers: Manual **OR** Sensor, **as directed**, for each station.
 - 8) Mounting: Floor and flush-to-wall with wall bracket.
 - 9) Supplies: **NPS 1/2 (DN 15)** **OR** **NPS 3/4 (DN 20)**, **as directed**, copper tubing with ball, gate, or globe valves.
 - 10) Drain: Grid with **NPS 1-1/2 (DN 40)** **OR** **NPS 2 (DN 50)**, **as directed**, tailpiece.
 - 11) Drain Piping: **NPS 1-1/2 (DN 40)** **OR** **NPS 2 (DN 50)**, **as directed**, P-trap, waste to wall, and wall flange.
3. Wash Fountains, Wall-Mounting Type:
 - a. Description: Accessible, **as directed**, Flush-to-wall, **as directed**, linear design, wash-up fixture.
 - 1) Arrangement: Wash-up stations facing spray heads.
 - 2) Receptor Material: Precast terrazzo **OR** Stainless steel **OR** Solid surface, **as directed**, on base.
 - 3) Receptor Color or Finish: Not applicable.
 - 4) Number of Stations: One **OR** Two **OR** Three **OR** Four, **as directed**.
 - 5) Control: Collective **OR** Individual, **as directed**, push-button **OR** sensor, **as directed**, actuation with thermostatic valve and check stops or field-installed check valves.
 - 6) Liquid Soap Dispensers: Manual **OR** Sensor, **as directed**, for each station.

- 7) Mounting: Floor mounting with bracket for attaching to wall.
- 8) Faucet(s): Push-button **OR** Sensor-actuated, **as directed**, mixing valve with check stops.
- 9) Supplies: **NPS 1/2 (DN 15)** copper tubing with ball, gate, or globe valves.
- 10) Drain: Grid with **NPS 1-1/2 (DN 40)** tailpiece.
- 11) Drain Piping: **NPS 1-1/2 (DN 40)** P-trap, waste to wall, and wall flange.

W. Bathtubs

1. Description: Enameled, cast-iron **OR** FRP **OR** PMMA **OR** Porcelain-enameled, formed-steel, **as directed**, fixture.
 - a. Bathing Surface: Slip resistant.
 - b. Size: **48 by 30 inches (1220 by 765 mm)** **OR** **60 by 30 inches (1525 by 765 mm)** **OR** **66 by 30 inches (1680 by 765 mm)**, **as directed**, with front apron **OR** drop-in type, **as directed**.
 - c. Color: White.
 - d. Drain Location: Left **OR** Right, **as directed**, end.
 - e. Accessibility Options: Include grab bar and bench.
 - f. Faucet: Bathtub **OR** Bathtub/shower, **as directed**.
 - g. Supplies: **NPS 1/2 (DN 15)** copper tubing with ball, gate, or globe valves.
 - h. Drain: **NPS 1-1/2 (DN 40)**; chrome-plated exposed parts; brass pop-up waste and overflow.
 - i. Drain Piping: **NPS 1-1/2 (DN 40)** cast-brass P-trap and waste.
OR
Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/2 (DN 40)** P-trap and waste.

X. Individual Showers

1. Individual Showers, Enclosure Type:
 - a. Description: Accessible, **as directed**, FRP **OR** PMMA, **as directed**, shower enclosure with slip-resistant bathing surface and shower rod with curtain.
 - 1) Size: **36 by 34 inches (915 by 865 mm)** **OR** **42 by 36 inches (1065 by 915 mm)** **OR** **43 by 39 inches (1090 by 990 mm)** **OR** **48 by 34 inches (1220 by 865 mm)** **OR** **52 by 36 inches (1320 by 915 mm)** **OR** **60 by 36 inches (1525 by 915 mm)** **OR** **72 by 36 inches (1830 by 915 mm)**, **as directed**.
 - 2) Surround: One piece or sealed, multiple piece, **as directed**.
OR
Surround: One piece.
 - 3) Color: White.
 - 4) Drain Location: Left side **OR** Center **OR** Right side, **as directed**.
 - 5) Accessibility Options: Include grab bar and bench.
 - 6) Faucet: Shower.
 - 7) Drain: Grid, **NPS 2 (DN 50)**.
2. Individual Showers, Built-Up Type:
 - a. Description: Components for built-up shower.
 - 1) Receptor: Not required.
3. Individual Showers, Cabinet Type:
 - a. Description: Factory-fabricated, accessible, **as directed**, cabinet type with faucet and receptor.
 - 1) Size: **30 by 30 inches (760 by 760 mm)** **OR** **32 by 32 inches (815 by 815 mm)** **OR** **36 by 36 inches (915 by 915 mm)** **OR** **36 by 39 inches (915 by 990 mm)** **OR** **45 by 39 inches (1145 by 990 mm)**, **as directed**.
 - 2) Material: Steel **OR** Composite **OR** Plastic, **as directed**, front **OR** corner **OR** front and rear, **as directed**, access.
 - 3) Color: Not applicable.
 - 4) Accessibility Options: Grab bar and bench.
 - 5) Faucet: Shower.

- 6) Supplies: **NPS 1/2 (DN 15)** copper tubing with ball, gate, or globe valves, **as directed**.
- 7) Drain: Grid, **NPS 2 (DN 50)**.

Y. Group Showers

1. Group Showers, Column Type:

- a. Description: Stainless-steel column fixture with two **OR** three **OR** four **OR** five **OR** six, **as directed**, individual showers.
 - 1) Height to Shower Heads: **66 inches (1675 mm) OR 72 inches (1830 mm)**, **as directed**.
 - 2) Control: Thermostatic **OR** Pressure-balance, **as directed**, valve with individual hot-and cold-water mixing valve operation.
OR
Control: Thermostatic valve with individual tempered-water supply and push-button **OR** sensor, **as directed**, operation.
 - 3) Flow Control: **2 gpm (7.6 L/min.) OR 2.5 gpm (9.5 L/min.)**, **as directed**, for each shower head.
 - 4) Liquid Soap Dispenser: For each shower.
 - 5) Mounting: Floor flange.
 - 6) Supplies: **NPS 3/4 (DN 20) OR NPS 1 (DN 25)**, **as directed**, copper tubing with ball, gate, or globe valves from bottom **OR** top, **as directed**.
 - 7) Shroud: Not required **OR** Stainless steel of size to cover supplies and vent piping, **as directed**.
 - 8) Drain Fitting: **NPS 3 (DN 80) OR NPS 4 (DN 100)**, **as directed**, outlet with **NPS 2 (DN 50)** vent, integral with base of column.
 - 9) Vent Piping: Not required **OR NPS 2 (DN 50)** to ceiling, **as directed**.

2. Group Showers, Wall-Mounting Type:

- a. Description: Wall-mounting fixture with stainless-steel surface enclosure with two **OR** three, **as directed**, individual showers.
 - 1) Control: Thermostatic **OR** Pressure-balance, **as directed**, valve with individual hot-and cold-water mixing valve operation.
OR
Control: Thermostatic valve with individual tempered-water supply and push-button **OR** sensor, **as directed**, operation.
 - 2) Flow Control: **2 gpm (7.6 L/min.) OR 2.5 gpm (9.5 L/min.)**, **as directed**, for each shower head.
 - 3) Liquid Soap Dispenser: For each shower.
 - 4) Mounting: Wall bracket.
 - 5) Supplies: **NPS 3/4 (DN 20)** copper tubing with ball, gate, or globe valves.

3. Group Showers, Freestanding, Plastic Type:

- a. Description: Freestanding, plastic group-shower fixture.
 - 1) Number of Shower Stations: One **OR** Two **OR** Three **OR** Four, **as directed**, with individual self-closing control valve(s).
 - 2) Number of Foot Wash Stations: One **OR** Two, **as directed**, with individual self-closing control valve(s).
 - 3) Hose Bibb: Not **OR** One, **as directed**, required.
 - 4) Control-Valve Mounting Height: **50 inches (1270 mm) OR 48 inches (1219 mm)**, **as directed**.
 - 5) Material: Cast-filled-polymer plastic.
 - 6) Color: Gray.
 - 7) Internal Piping: Factory installed.
 - 8) Mounting: Base flange with bolt holes.

4. Group Showers, Freestanding, Steel Type:

- a. Description: Freestanding, steel group-shower fixture.
 - 1) Number of Shower Stations: One **OR** Two, **as directed**, with individual self-closing control valve(s).

- 2) Number of Foot Wash Stations: One **OR** Two, **as directed**, with individual self-closing control valve(s).
- 3) Material: Painted steel pipe.
- 4) Color: Blue.
- 5) Internal Piping: Factory installed.
- 6) Mounting: Base flange with bolt holes.

Z. Whirlpool Bathtubs

1. Whirlpool Bathtubs, Water-Circulation Hydromassage Type:

- a. Description: Packaged, enameled, cast-iron **OR** FRP **OR** PMMA **OR** porcelain-enameled, formed-steel, **as directed**, hydromassage bathtub with air-entrained-water jet nozzles and water circulation.
 - 1) Seating Capacity: One **OR** Two, **as directed**, person(s).
 - 2) Bathing Surface: Slip resistant.
 - 3) Size: **60 by 30 inches (1525 by 765 mm)** **OR** **66 by 30 inches (1680 by 765 mm)** **OR** **60 by 42 inches (1525 by 1065 mm)**, **as directed**.
 - 4) Base for Drop-in Unit: **<Insert description>** with access panel.
OR
Apron: Matching unit, covering exposed front and sides, and with access panel.
 - 5) Color: White.
 - 6) Drain Location: Left **OR** Right, **as directed**, end.
 - 7) Controls: For pump, timer, **as directed**, and water heater, **as directed**.
 - 8) Faucet: Fixture manufacturer's individual valves **OR** mixing valve, **as directed**, with over-rim tub filler.
 - 9) Supplies: **NPS 1/2 (DN 15)** copper tubing with ball, gate, or globe valves.
 - 10) Drain: **NPS 1-1/2 (DN 40)**; chrome-plated exposed parts; brass pop-up waste and overflow.
 - 11) Drain Piping: **NPS 1-1/2 (DN 40)** cast-brass P-trap and waste.
OR
Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/2 (DN 40)** P-trap and waste.
 - 12) Water-Circulating System: Electric circulating pump and plastic piping.
 - 13) Water Heater: Electric, inline, **as directed**.

2. Whirlpool Bathtubs, Airmassage Type:

- a. Description: Packaged, PMMA airmassage bathtub with air-injection nozzles.
 - 1) Seating Capacity: One **OR** Two, **as directed**, person(s).
 - 2) Bathing Surface: Slip resistant.
 - 3) Size: **60 by 30 inches (1525 by 765 mm)** **OR** **66 by 30 inches (1680 by 765 mm)** **OR** **60 by 42 inches (1525 by 1065 mm)**, **as directed**.
 - 4) Base for Drop-in Unit: **<Insert description>** with access panel.
OR
Apron: Matching unit, covering exposed front and sides, and with access panel.
 - 5) Color: White.
 - 6) Drain Location: Left **OR** Right, **as directed**, end.
 - 7) Controls: For blower, timer, **as directed**, and water heater, **as directed**.
 - 8) Faucet: Fixture manufacturer's individual valves **OR** mixing valve, **as directed**, with over-rim tub filler.
 - 9) Supplies: **NPS 1/2 (DN 15)** copper tubing with ball, gate, or globe valves.
 - 10) Drain: **NPS 1-1/2 (DN 40)**; chrome-plated exposed parts; brass pop-up waste and overflow.
 - 11) Drain Piping: **NPS 1-1/2 (DN 40)** cast-brass P-trap and waste.
OR
Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/2 (DN 40)** P-trap and waste.

- 12) Air-Injection System: Electric, blower **OR** combination blower/heater, **as directed**, and plastic piping.

AA. Kitchen Sinks

1. Kitchen Sinks:

- a. Description: One-bowl **OR** Two-bowl **OR** Three-bowl, **as directed**, residential, counter-mounting, enameled, cast-iron **OR** PMMA **OR** porcelain-enameled, formed-steel **OR** solid-surface **OR** stainless-steel, **as directed**, kitchen sink.
- 1) Metal Thickness: **0.038 inch (1.0 mm) OR 0.050 inch (1.3 mm)**, **as directed**.
 - 2) Bowl (single bowl):
 - a) Drain: **3-1/2-inch (89-mm)** crumb cup **OR** grid **OR** grid with offset waste **OR** outlet for disposer, **as directed**.
 - i. Location: Centered in bowl **OR** Near back of bowl, **as directed**.
 - 3) Left Bowl:
 - a) Drain: **3-1/2-inch (89-mm)** crumb cup **OR** grid **OR** grid with offset waste **OR** outlet for disposer, **as directed**.
 - i. Location: Centered in bowl **OR** Near back of bowl, **as directed**.
 - 4) Right Bowl:
 - a) Drain: **3-1/2-inch (89-mm)** crumb cup **OR** grid **OR** grid with offset waste **OR** outlet for disposer, **as directed**.
 - i. Location: Centered in bowl **OR** Near back of bowl, **as directed**.
 - 5) Center Bowl:
 - a) Drain: **1-1/2-inch (38-mm) OR 3-1/2-inch (89-mm)**, **as directed**, crumb cup **OR** grid **OR** grid with offset waste, **as directed**.
 - i. Location: Centered in bowl.
 - 6) Supplies: **NPS 1/2 (DN 15)** chrome-plated copper with stops.
 - 7) Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular brass waste to wall; continuous waste, **as directed**; and wall escutcheon(s).
OR
Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/2 (DN 40)** P-trap; tubular waste to wall; continuous waste, **as directed**; and wall escutcheon(s).
 - 8) Disposer: Not required.
 - 9) Dishwasher Air-Gap Fitting: Required **OR** Not required, **as directed**.
 - 10) Hot-Water Dispenser: Not required.

2. Bar Sinks:

- a. Description: Single-bowl, residential, counter-mounting, enameled, cast-iron **OR** PMMA **OR** stainless-steel **OR** porcelain-enameled, cast-iron **OR** solid-surface, **as directed**, bar sink.
- 1) Supplies: **NPS 3/8 (DN 10) OR NPS 1/2 (DN 15)**, **as directed**, chrome-plated copper with stops.
 - 2) Drain: **1-1/2-inch (38-mm) OR 3-1/2-inch (89-mm)**, **as directed**, crumb cup **OR** grid **OR** grid with offset waste, **as directed**.
 - 3) Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular brass waste to wall; and wall escutcheon.
OR
Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, **NPS 1-1/2 (DN 40)** P-trap; tubular waste to wall; and wall escutcheon.
 - 4) Protective Shielding Guard(s): **As directed**.

BB. Service Sinks

1. Service Sinks, Standard Type:

- a. Description: Trap-standard- and wall-mounting, enameled, cast-iron fixture with roll-rim **OR** vitreous-china fixture, **as directed**, with plain **OR** two faucet holes in, **as directed**, back and rim guard on front and sides.

- 1) Size (cast-iron fixture): **22 by 18 inches (560 by 460 mm) OR 24 by 20 inches (610 by 510 mm), as directed.**
 - 2) Size (vitreous-china fixture): **19 by 16 inches (480 by 405 mm) OR 22 by 20 inches (560 by 510 mm), as directed.**
 - 3) Color: White.
 - 4) Faucet: Sink type. Polished OR rough, as directed, chrome-plated, solid-brass faucet. Include integral stops in shanks, vacuum breaker, hose-thread outlet, and pail hook. Provide type with wall brace if faucet will be mounted above back.
 - 5) Drain: Grid with **NPS 2 (DN 50) OR NPS 3 (DN 80), as directed**, outlet.
 - 6) Trap Standard: **NPS 2 (DN 50) OR NPS 3 (DN 80), as directed**, enameled, cast iron with cleanout and floor flange.
 - 7) Fixture Support: Sink.
2. Service Sinks, Floor-Mounting Type:
- a. Description: Floor-mounting, enameled, cast-iron fixture with front apron, raised back, and coated, wire rim guard. (This type of service sink requires a drainage piping trap under the fixture. This trap is not part of fixture fittings)
 - 1) Size: **28 by 28 inches (710 by 710 mm).**
 - 2) Color: White.
 - 3) Faucet: Sink type. Polished OR rough, as directed, chrome-plated, solid-brass faucet with wall brace. Include integral stops in shanks, vacuum breaker, hose-thread outlet, and pail hook..
 - 4) Drain: Grid with **NPS 2 (DN 50) OR NPS 3 (DN 80), as directed**, outlet.

CC. Service Basins

1. Description: Flush-to-wall, floor-mounting, precast terrazzo **OR** cast-polymer, **as directed**, fixture with rim guard. (This type of fixture requires a drainage piping trap under the fixture. This trap is not part of fixture fittings.)
 - a. Shape: Square **OR** Rectangular **OR** Five sided **OR** Radial front, **as directed**.
 - b. Size: 24 by 24 inches (610 by 610 mm) **OR** 28 by 28 inches (710 by 710 mm) **OR** 24 by 36 inches (610 by 915 mm) **OR** 32 by 32 inches (815 by 815 mm) **OR** 36 by 36 inches (915 by 915 mm), **as directed**.
 - c. Height: 6 inches (150 mm) **OR** 10 inches (255 mm) **OR** 12 inches (305 mm) **OR** 12 inches (305 mm) with dropped front, **as directed**.
 - d. Tiling Flange: Not required **OR** On one side **OR** On two sides **OR** On three sides, **as directed**.
 - e. Rim Guard: On front **OR** all, **as directed**, top surfaces.
 - f. Color: Not applicable.
 - g. Faucet: Sink type. Polished OR rough, as directed, chrome-plated, solid-brass faucet with wall brace. Include integral stops in shanks, vacuum breaker, hose-thread outlet, and pail hook.
 - h. Drain: Grid with NPS 2 (DN 50) **OR** NPS 3 (DN 80), **as directed**, outlet.

DD. Laundry Trays

1. Description: Stand-mounting **OR** Counter-mounting, **as directed**, enameled, cast-iron **OR** plastic, **as directed**, laundry trays.
 - a. Size: 24 by 21 inches (610 by 535 mm) **OR** 25 by 22 inches (635 by 560 mm), **as directed**.
 - b. Color: Not applicable.
 - c. Faucet: Sink type, polished, chrome-plated, solid brass, for fixture-ledge **OR** wall **OR** counter, **as directed**, mounting.
 - d. Supplies: NPS 1/2 (DN 15) chrome-plated copper with stops **OR** copper tubing with ball, gate, or globe valves, **as directed**.
 - e. Drain: Grid with NPS 1-1/2 (DN 40) outlet.
 - f. Drain Piping: NPS 1-1/2 (DN 40) chrome-plated, cast-brass P-trap; 0.045-inch- (1.1-mm-) thick tubular brass waste to wall; and wall escutcheon.

OR

Drain Piping: Schedule 40 ABS **OR** PVC, **as directed**, NPS 1-1/2 (DN 40) P-trap; tubular waste to wall; and wall escutcheon.

- g. Stand: Not required **OR** Painted steel, **as directed**.

EE. Sacristy Sinks

1. Description: Two-bowl, counter-mounting, stainless-steel fixture.
 - a. Size: Approximately 22 by 42 inches (560 by 1070 mm).
 - b. Cover: Hinged with lock on left **OR** right, **as directed**, bowl.
 - c. Supplies: NPS 1/2 (DN 15) chrome-plated copper with stops.
 - d. Drains: One with stopper and one with grid.
 - e. Drain Piping: NPS 1-1/2 (DN 40) chrome-plated, tubular-brass waste. Include one trap, one direct waste without trap, separate waste piping, and wall flanges.

1.3 EXECUTION

A. Installation

1. Assemble plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.
2. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - a. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - b. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - c. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
3. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
4. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
5. Install wall-mounting fixtures with tubular waste piping attached to supports.
6. Install floor-mounting, back-outlet water closets attached to building floor substrate and wall bracket and onto waste fitting seals.
7. Install counter-mounting fixtures in and attached to casework.
8. Install fixtures level and plumb according to roughing-in drawings.
9. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - a. Exception: Use ball, gate, or globe valves if supply stops are not specified with fixture. Valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
10. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
11. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.
12. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
13. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.
14. Install toilet seats on water closets.
15. Install trap-seal liquid in dry urinals.
16. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
17. Install water-supply flow-control fittings with specified flow rates in fixture supplies at stop valves.
18. Install faucet flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
19. Install shower flow-control fittings with specified maximum flow rates in shower arms.
20. Install traps on fixture outlets.
 - a. Exception: Omit trap on fixtures with integral traps.

- b. Exception: Omit trap on indirect wastes, unless otherwise indicated.
21. Install disposer in outlet of each sink indicated to have disposer. Install switch where indicated or in wall adjacent to sink if location is not indicated.
 22. Install dishwasher air-gap fitting at each sink indicated to have air-gap fitting. Install in sink deck **OR** on countertop at sink, **as directed**. Connect inlet hose to dishwasher and outlet hose to disposer.
 23. Install hot-water dispensers in back top surface of sink or in countertop with spout over sink.
 24. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results For Plumbing".
 25. Set bathtubs, shower receptors, and service basins in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results For Plumbing".
 26. Seal joints between fixtures and walls, floors, and countertops using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants".
- B. Connections
1. Piping installation requirements are specified in other Division 14. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.
 3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Verify that installed plumbing fixtures are categories and types specified for locations where installed.
 2. Check that plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
 3. Inspect installed plumbing fixtures for damage. Replace damaged fixtures and components.
 4. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
 5. Install fresh batteries in sensor-operated mechanisms.
- D. Adjusting
1. Operate and adjust faucets and controls. Replace damaged and malfunctioning fixtures, fittings, and controls.
 2. Operate and adjust disposers, hot-water dispensers, and controls. Replace damaged and malfunctioning units and controls.
 3. Adjust water pressure at faucets and flushometer valves to produce proper flow and stream.
 4. Replace washers and seals of leaking and dripping faucets and stops.
 5. Install fresh batteries in sensor-operated mechanisms.
- E. Cleaning
1. Clean fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - a. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - b. Remove sediment and debris from drains.
 2. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

- F. Protection
1. Provide protective covering for installed fixtures and fittings.
 2. Do not allow use of plumbing fixtures for temporary facilities unless approved in writing by the Owner.

END OF SECTION 22 40 00 00

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Task	Specification	Specification Description
22 41 13 13	01 22 16 00	No Specification Required
22 41 16 16	22 45 00 00	Emergency Plumbing Fixtures

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SECTION 22 41 19 00 - PORCELAIN STEEL BATHTUB LINERS AND SURROUNDS

DESCRIPTION OF WORK

This specification covers the furnishing and installation of materials for porcelain steel bathtub liners and surrounds. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

GENERAL

System Description

1. Performance Requirements: Comply with following:
 - a. Porcelain Enameled Formed Steel Plumbing Fixtures: FS WWP 542b, Section 12, Porcelain Enameled Fixtures:
 - 1) Specular Gloss: Determined in accordance with ASTM C 346.
 - a) Cover Coat: 45 degree specular gloss.
 - 2) Acid Resistance: Determined in accordance with ASTM C 282.
 - a) Cover Coat: Rating of not less than Class A.
 - 3) Alkali Resistance: Determined in accordance with ASTM C 614.
 - a) Cover Coat: Weight Loss: Not exceed 20 mg/square inch.
 - 4) Abrasion Resistance: Determined in accordance with ASTM C 448.
 - a) Surface Abrasion Index of Cover Coat: 40 or higher.
 - 5) Warpage: Comply with US Dept. of Commerce Commercial Standard (CS) 77, Paragraph 7.1; and US Dept. of Commerce Product Standard (PS) 5, Paragraph 6.2.2.
 - 6) Rigidity: Comply with PS 5, Paragraph 6.6.2.

Submittals

2. Product Data:
 - a. Include porcelain enamel steel samples, backer board material, and joint sealant.
3. Shop Drawings
 - a. Indicate proposed method of panel securing method.
 - b. Templates: Furnish plumber with templates of all openings required in porcelain enamel wall system to accommodate new plumbing trim.
4. Design Drawings: If required, prepare and submit drawings for approval to applicable governmental agencies and obtain necessary permits and certificates for compliance when required.
5. Samples:
 - a. Three samples of steel proposed to be used for bathtub liner and for wall panels.
 - 1) Samples without porcelain enamel coating.
 - 2) Sample: Used to calibrate elcometer to determine amount of porcelain enamel coatings applied.
 - b. Three samples of each type of porcelain enamel finish on steel for acceptance.
 - c. the Owner will retain one set of approved samples.
 - d. Keep one set of approved samples at site throughout construction period.
6. Quality Assurance/Control Submittals:
 - a. Test Reports: Results of testing by accredited independent laboratory demonstrating compliance of porcelain enamel with Performance Requirements.
 - b. Certificates: Manufacturer's written certification that bathtub liners and surrounds meet or exceed specified requirements.

Quality Assurance

7. Materials: Been in general use and satisfactorily performed for minimum of five years. Provide list of locations where such materials have been used.
8. Certifications: Comply with ANSI Z34.2.
9. Regulatory Requirements: Comply with following:
 - a. Install bathtub liners and surrounds in accordance with applicable codes and regulations. Should any specified items or requirements conflict with such codes and regulations, consult with the Owner.
 - b. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4152-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CF1R Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (28 CFR Part 35).
10. Mock-ups: Install one complete mock-up of each typical bathtub liner and surround installation. Comply with Section _____ for bathroom renovation mock-up requirements.
 - a. Locations: As directed.
 - b. Approved Mock-ups: Standard for rest of work.
 - c. Approved Mock-ups: May remain part of completed project.
11. Pre-Installation Meetings: Hold meeting with associated plumbing items installer. Notify the Owner of time and location of meeting.

Project Conditions

12. Existing Conditions:
 - a. Existing Utilities: Protect any sewer, water, gas, electric or other pipelines or conduits uncovered during work from damage.
13. Field Measurements: Field measure each bathroom before start of fabrication.

Scheduling And Sequencing

14. Scheduling: Schedule bathtub liner and surround work in coordination with associated plumbing work installer.
15. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

PRODUCTS

Bathtub Liners And Aprons

16. Description: Prefabricated customized inserts to fit existing bathtubs and provide new, substantial units, capable of supporting bather and coordinated and integrated with bathtub/shower surround system.
 - a. Bathtub Liners and Aprons: Completely and uniformly enclose existing bathtubs, obscuring them from view.
 - b. New Tub Liners and Aprons: Integrate with existing bathtubs, wall conditions, floor conditions, and plumbing connections to provide complete installation subject to individual dimensional variations in bathtub.
17. Bathtub Liner and Apron Materials: Sheet steel coated with porcelain enamel.
 - a. Sheet Steel Thickness: No. 16 gage through 20 gage as specified below:

Gage	No. 16	No. 18	No. 20
Standard Thickness, mm (inch)	1.52 (0.0598)	1.21 (0.0478)	1.01 (0.0398)
Minimum Thickness, mm (inch)	1.37 (0.054)	1.09 (0.043)	0.84 (0.0329)

Bathtub/Shower Surrounds

18. Panel System: Prefabricated panels in solid sections and continuous to cover back and side walls of bathtub/shower, coordinated and integrated with bathtub liners and aprons.
 - a. Height of Bathtub/Shower Surround: 1 500 mm (60 inches) above bathtub ledge.
 - b. Contractor's Option: One, two, or three piece back wall system.
 - c. Where window is located over bathtub, install porcelain enamel on steel on full depth of returns at full length of window stool and at jambs; from window stool to top of surround.
 - 1) Sill and Jamb System: Not interfere with easy use of and access to window pulls, handles, screen retainers, etc.
 - d. Access Panels: Provide easily removable panel to provide access to tub and shower valves. Provide panels with shallow formed edge on all four sides to receive bead of joint sealant.
 - e. Method of Securing: Not visible.
19. Panels: Coated with porcelain enamel to provide bright, hard, impervious panels.
 - a. Panels: Retain their surface characteristics and resist wear as result of abrasion or scouring, and staining due to use of ordinary household abrasive cleaners in popular use.
 - b. Material: Special purpose enameling iron or steel or low metalloids for carbon content, especially manufactured and processed for porcelain enamel units for architectural purposes.
 - 1) Thickness: 18 through 22 gage steel.
 - c. Panel Edges: 90 degree flange formed as part of face panel and of same finish.
20. Wall Clips Supporting Panels: Minimum 20 gage, hot-dipped galvanized.
21. Fastening Devices: As required and in accordance with panel manufacturer's instructions and accepted good industry practices and as approved.
 - a. Provide expansion toggle bolts, molly bolts, nylon and other plastic anchors, lead anchors as required for existing wall conditions.

Porcelain Enamel Finish

22. Porcelain Enamel Coating: Hard, impervious and durable, glass-like coating produced by fusing carefully compounded mixture of mineral substances such as Cryolite, Feldspar, Quartz, Borax, Silica, Tin and Zirconium Oxide Clays at temperatures up to 980 degrees C (1800 degrees F) in accordance with ANSI A112.19.4M.
23. Porcelain Enamel: Apply to all areas of each component, including backs and flanges.
 - a. Initial Enamel Coating: Apply to all surfaces and apply additional separately fired coating of chemically resistant porcelain enamel as face coat.
 - b. Each coat of Porcelain Enamel: 0.10 to 0.15 mm (0.004 to 0.006 inch) when measured in accordance with ASTM D1186.
 - c. Two Coatings of Porcelain Enamel on Exposed Surfaces of Panels: Thickness of 0.20 to 0.05 mm (0.008 to 0.002 inch).
 - d. Final Porcelain Enamel Coat: Chemically resistant, complying with Performance Requirements in this Section.
 - e. Installed Liner and Surround: Uniform color.
 - 1) Color: White.

Accessories

24. Bracing Strips/Filler Material/Backer Board: Fire retardant perlite or molded polystyrene material providing zero capillarity water resistance, and permanent insulation properties.
 - a. Bracing Strips: Fire retardant molded polystyrene material.
 - b. Filler Material: Sound deadening and cushioning material.
 - c. Panel Backer Board: Minimum 12.7 mm (1/2 inch) thick.
25. Joint Sealant: Mildew resistant one-component silicone; FS TT-S-001543A, Class A; ASTM C 920, Type S, Grade NS, Class 25, Uses NT, G, and A.
 - a. Color: Match color of porcelain enamel.
26. Bath Accessories: See Division 10 Section "Bath Accessories."

Fabrication

27. Shop Assembly: Shop assemble panels to greatest extent possible.
 - a. Coordinate with bath accessories provided under Division 10 Section "Bath Accessories."

EXECUTION

Examination

28. Site Verification of Conditions:
 - a. Existing Conditions: Examine bathrooms before beginning installation.
 - b. Field Measurements: Verify field measurements are as indicated on Shop Drawings.
 - c. Do not proceed with installation until conditions are satisfactory.

Preparation

29. Protection: Comply with requirements of Detailed Scope of Work.
 - a. Protect or repair utilities damaged by operations under this Section.
 - b. Protect adjacent elements from damage and disfiguration.
 - c. Repair or replace damaged elements in accordance with Detailed Scope of Work.
30. Preparation: Prepare bathtubs and surround walls as required for proper installation in accordance with Detailed Scope of Work.

Installation

31. Interface With Other Work: Coordinate installation of bathtub liner and surround wall panel system with installation of bath accessories under Division 10 Section "Bath Accessories" and plumbing work under Division 15 Section "Plumbing."
32. Bathtub Liners and Aprons:
 - a. Installation: Accomplished without removing existing bathtub fixture.
 - b. Bracing Strips/Filler Material: Partially line clearance between base of existing bathtubs and tub liner with bracing strips.
 - c. Insert new bathtub liner over and into existing bathtub, simultaneously bottoming on and compressing filler material and resting on and being supported by intimate contact with existing bathtub seat and rim on all four sides, to eliminate any movement.
 - d. Apron: Install new apron to extension to new bathtub liner ledge or seat portion; by inserting non-corrosive locating pins and/or fasteners as required between floor and roll rim of new tub liner.
 - e. Customize bathtub liner Insert in accordance with variable field dimensions into variably sized ledges and seat: both in plant fabrication and field installation as required.
 - 1) a. Verify dimensions and conditions by visiting each bathroom for work indicated and specified.
33. Tub Surround Wall Panel System: Integrate wall panels with installation of new tub liners.
 - a. Panel System: Install as extension of bathtub in upward direction bearing configuration and function of bathtub and shower enclosure.
 - b. Install window sill and jamb system where window is located over bathtub in manner not to interfere with easy use of and access to window pulls, handles, screen retainers, etc.
 - c. Existing Walls: Remove obstructions, encountered for installation of porcelain enamel panels.
 - 1) Patch and repair damaged wall board surfaces that are exposed after panel installation in accordance with Detailed Scope of Work.
 - 2) Backer Board: Provide between wall panels and existing masonry walls.
 - d. Method of Securing Panels: Mechanical and not visible.
 - 1) Provide at least two wall clips on both top and bottom flanges of each panel.
 - 2) Exposed bolts, screw heads, grommets, battens, channel moldings. or any other fastening devices not allowed.
 - e. Access Panels: Seal perimeter with joint sealant for waterproof joint.

- f. Joint Sealing: Permanently seal perimeter edges between new panels and existing walls, joints between panels, joints at window sill and jamb system, and corner joint at juncture of back wall with side walls with joint sealant .
- 34. Joint Sealants: Apply in accordance with manufacturers recommendations.
 - a. Surfaces to be Sealed: Clean, dry and free of any foreign matter that would degrade adhesion.
 - b. Prime cleaned surfaces in accordance with sealant manufacturer's recommendations.
 - c. Protect surfaces adjacent to joints by masking tape before applying sealant. Remove tape upon finishing sealing work.

Cleaning

- 35. Cleaning: Comply with requirements of Detailed Scope of Work.
 - a. Clean bathtub liners and surrounds after installation is completed with materials compatible with porcelain enamel and having no detrimental effects on porcelain enamel.

END OF SECTION 22 41 19 00

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Task	Specification	Specification Description
22 41 19 00	22 45 00 00	Emergency Plumbing Fixtures
22 41 39 00	01 22 16 00	No Specification Required
22 41 39 00	22 40 00 00	Plumbing Fixtures
22 41 39 00	22 45 00 00	Emergency Plumbing Fixtures

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SECTION 22 42 13 13 - SECURITY PLUMBING FIXTURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for security plumbing fixtures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following security plumbing fixtures and related components:
 - a. Combination units.
 - b. Drinking fountains.
 - c. Lavatories.
 - d. Service sinks.
 - e. Shampoo bowls.
 - f. Showers.
 - g. Urinals.
 - h. Water closets.
 - i. Flushometer valves for vitreous-china water closets.
 - j. Fixture supports for front-mounting, stainless-steel fixtures and vitreous-china, wall-mounting fixtures.

C. Related Requirements:

1. Section 224213.13 "Commercial Water Closets."
2. Section 224213.16 "Commercial Urinals."
3. Section 224216.13 "Commercial Lavatories."
4. Section 224216.16 "Commercial Sinks."
5. Section 224223 "Commercial Showers."
6. Section 224233 "Wash Fountains."
7. Section 224300 "Healthcare Plumbing Fixtures."
8. Section 224500 "Emergency Plumbing Fixtures."
9. Section 224713 "Drinking Fountains."

D. Definitions

1. Accessible Fixture: Security plumbing fixture that can be approached and used by people with disabilities.
2. Back-Mounting-Type Fixture: Security plumbing fixture designed to mount on wall sleeve built into wall so installation and removal of fixture and piping and other components are only accessible from service space behind wall.
3. Front-Mounting-Type Fixture: Security plumbing fixture designed to mount on fixture support with installation and removal from fixture side of wall, and piping and other components are accessible from access panels in fixture or wall.

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit WE 2, 3.1, and 3.2: Documentation indicating flow and water consumption requirements.
3. Shop Drawings: Diagram power, signal, and control wiring.
4. Field quality-control test reports.
5. Operation and maintenance data.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act", **as directed**; about security plumbing fixtures for people with disabilities. Comply with requirements in "Energy Policy Act" about water flow and consumption rates for plumbing fixtures.
3. NSF Standard: Comply with NSF 61, "Drinking Water System Components - Health Effects," for fixture materials that will be in contact with potable water.
4. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

1.2 PRODUCTS

1.3 SOURCE LIMITATIONS

- A. Obtain each product type from single manufacturer.

1.4 PERFORMANCE REQUIREMENTS

- A. Comply with ASME A112.19.2/CSA B45.1 for vitreous-china plumbing fixtures.
- B. Comply with ASME A112.19.3/CSA B45.4 for stainless steel plumbing fixtures.
- C. Comply with ASSE 1037/ASME A112.1037/CSA B125.37 for flush valves.
- D. Comply with ASME A112.19.5/CSA B45.15 for flush valves and spuds for water closets.
- E. Comply with ASME A112.18.1/CSA B125.1 for plumbing supply fittings.
- F. Comply with ASME A112.18.2/CSA B125.2 for plumbing waste fittings.
- G. Comply with IAPMO Z124.5 for water-closet (toilet) seats.
- H. Comply with ASME A112.6.1M for plumbing fixture supports.
- I. Comply with ICC A117.1 for ADA-compliant, accessible plumbing fixtures and installation.
- J. Comply with ASTM A1045 for flexible PVC gaskets used in connection of vitreous-china water closets to sanitary drainage systems.
- K. Comply with ASME A112.4.3 for plastic fittings used in connection of vitreous-china water closets to sanitary drainage systems.
- L. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.
- M. Faucets and bubblers intended to convey or dispense water for human consumption are to comply with the U.S. Safe Drinking Water Act (SDWA), with requirements of the Authority Having Jurisdiction (AHJ),

and with NSF 61/NSF 372; or are certified in compliance with NSF 61/NSF 372 by an ANSI-accredited third-party certification body, that the weighted average lead content at wetted surfaces is less than or equal to 0.25 percent.

N. Combination Units

1. Security Combination Units:

a. Description: Back-mounting, cabinet, security plumbing fixture with integral water closet and lavatory; fabricated from **0.078-inch (2.0-mm) minimum OR 0.109-inch (2.8-mm), as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.

1) Water Closet: Comply with IAPMO PS 61 for water-closet component.

a) Bowl: Elongated, with back inlet, integral trap, blowout design with back **OR** siphon-jet design with back **OR** siphon-jet design with floor, **as directed**, outlet and contoured seat.

i. Seat Surface: SSINA No. 7 polished finish.

ii. Punching: Provide two holes for installation of separate toilet seat.

iii. Drain: NPS 4 (DN 100) **OR** NPS 3 (DN 80), **as directed**, horizontal with cleanout and slip joint **OR** vertical, **as directed**.

b) Toilet Seat: ANSI Z124.5, white, **OR** black, **as directed**, commercial, heavy-duty, elongated, open front with cover, **as directed**, with check **OR** self-sustaining **OR** self-sustaining, check, **as directed**, hinges.

c) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and **3.5-gal./flush (13.3-L/flush) OR 1.6-gal./flush (6.0-L/flush), as directed**, consumption. Refer to "Flushometer Valves" Article.

2) Lavatory: In top of cabinet.

a) Receptor: Oval **OR** Rectangular, **as directed**, bowl with integral soap depression.

b) Hot- and Cold-Water and Bubbler, **as directed**, Supply Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with push-button actuation and individual check stop.

c) Filler Spout: Backsplash **OR** Deck, **as directed**, mounted.

d) Drain: Integral punched grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2 **OR** concealed waste piping to spill into water-closet bowl, **as directed**.

e) Toothbrush Holders: One on each **OR** left **OR** right, **as directed**, side of backsplash.

f) Towel Hooks: One **OR** Two, **as directed**, on each **OR** left **OR** right, **as directed**, side of fixture.

g) Bubbler Location: On backsplash **OR** deck, **as directed**.

3) Cabinet Configuration: Rectangular apron **OR** Five-sided apron with two angled sides **OR** Four-sided apron with angled left side **OR** Four-sided apron with angled right side, **as directed**, made for above-floor **OR** on-floor, **as directed**, installation and with backsplash.

a) Water-Closet Bowl Location: Centered on front **OR** Left of center on front **OR** Right of center on front **OR** On angled left side **OR** On angled right side, **as directed**, of apron.

b) Toilet Paper Holder: Recessed, **0.063-inch (1.6-mm)** minimum thickness, stainless steel complying with ASTM A 666, Type 304 and located above water closet and centered in front **OR** in front **OR** right of center in front **OR** left of center in front **OR** in angled right side **OR** in angled left side **OR** in right side **OR** in left side, **as directed**, of apron.

4) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support entire fixture. Include steel bars or other design that will prevent escape if fixture is removed.

O. Drinking Fountains

1. Security Drinking Fountains, Back-Mounting:
 - a. Description: Back-mounting, accessible, **as directed**, security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Receptor: Bowl or depression in top and with backsplash.
 - 2) Bubbler Location: On backsplash **OR** deck, **as directed**.
 - 3) Bubbler Water-Supply Valve: Pneumatic type with push-button actuation.
 - 4) Drain: Integral punched grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.
2. Security Drinking Fountains, Front-Mounting:
 - a. Description: Front-mounting, accessible, **as directed**, security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Receptor: Bowl or depression in top and with backsplash.
 - 2) Bubbler Location: On backsplash **OR** deck, **as directed**.
 - 3) Bubbler Water-Supply Valve: Pneumatic type with push-button actuation.
 - 4) Drain: Integral punched grid with **NPS 1-1/4 (DN 32)** minimum tailpiece, trap, and waste, and complying with ASME A112.18.2.
 - 5) Access to Internal Components: Vandal-resistant access panels.
 - 6) Mounting Device: Wall bracket.
 - 7) Support: Chair carrier. Refer to "Fixture Supports" Article.

P. Lavatories

1. Security Lavatories, Back-Mounting:
 - a. Description: Back-mounting, accessible, **as directed**, security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Receptor: Oval **OR** Rectangular, **as directed**, bowl with integral soap depression and backsplash.
 - 2) Hot- and Cold-Water and Bubbler, **as directed**, Supply Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with push-button actuation and individual check stop.
 - 3) Filler Spout: Backsplash **OR** Deck, **as directed**, mounted.
 - 4) Drain: Integral punched grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - 5) Toothbrush Holders: One on each **OR** left **OR** right, **as directed**, side of backsplash.
 - 6) Towel Hooks: One **OR** Two, **as directed**, on each **OR** left **OR** right, **as directed**, side of fixture.
 - 7) Bubbler Location: On backsplash **OR** deck, **as directed**.
 - 8) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.
2. Security Lavatories, Front-Mounting:
 - a. Description: Front-mounting, accessible, **as directed**, security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304, stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Receptor: Oval **OR** Rectangular, **as directed**, bowl with integral soap depression and backsplash.

- 2) Hot- and Cold-Water and Bubbler, **as directed**, Supply Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with push-button actuation and individual check stop.
 - 3) Filler Spout: Backsplash **OR** Deck, **as directed**, mounted.
 - 4) Drain: Integral punched grid with **NPS 1-1/4 (DN 32)** minimum tailpiece, trap, and waste complying with ASME A112.18.2.
 - 5) Toothbrush Holders: One on each **OR** left **OR** right, **as directed**, side of backsplash.
 - 6) Towel Hooks: One **OR** Two, **as directed**, on each **OR** left **OR** right, **as directed**, side of fixture.
 - 7) Bubbler Location: On backsplash **OR** deck, **as directed**.
 - 8) Access to Internal Components: Vandal-resistant access panels.
 - 9) Mounting Device: Wall bracket.
 - 10) Support: Chair carrier. Refer to "Fixture Supports" Article.
3. Security Lavatories, Vitreous-China:
- a. Description: ASME A112.19.2M, vitreous-china security plumbing fixture made for institutional applications, with integral soap depression and **NPS 1-1/4 (DN 32)** waste outlet and with factory-installed, push-button, self-closing, chrome-plated brass faucets complying with ASME A112.18.1.
 - 1) Waste: **NPS 1-1/4 (DN 32)** minimum piping and trap complying with ASME A112.18.2.
 - 2) Mounting Device: Wall bracket.
 - 3) Support: Chair carrier. Refer to "Fixture Supports" Article.
- Q. Service Sinks
1. Security Service Sinks:
 - a. Description: Back-mounting security plumbing fixture made for above-floor **OR** on-floor, **as directed**, installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR** **0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Receptor: Rectangular bowl with high backsplash.
 - 2) Hot- and Cold-Water-Supply Valves: Pneumatic type with push-button actuation and individual check stop.
 - 3) Filler Spout: Backsplash mounted.
 - 4) Drain: Grid with **NPS 2 (DN 50)** waste and trap complying with ASME A112.18.2.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.
- R. Shampoo Bowls
1. Security Shampoo Bowls:
 - a. Description: Front-mounting security plumbing fixture made for above-floor **OR** counter-mounting, **as directed**, installation; fabricated from **0.078-inch (2.0-mm)** thickness, ASTM A 666, Type 304 stainless steel and corrosion-resistant metal internal piping and bracing.
 - 1) Receptor: Bowl with contoured neck rest.
 - 2) Finish: White **OR** Black, **as directed**, enamel.
 - 3) Exposed Surfaces without Enamel Finish: SSINA No. 4 polished finish.
 - 4) Faucet: Dial single-lever control with vacuum breaker, hose, and spray.
 - 5) Drain: Basket strainer with **NPS 1-1/2 (DN 40)** tailpiece, trap, and waste to wall complying with ASME A112.18.2.
 - 6) Access to Internal Components: Vandal-resistant access panels.
 - 7) Mounting Device: Wall bracket.
 - 8) Support: Chair carrier. Refer to "Fixture Supports" Article.
- S. Showers

1. Security Showers, Back-Mounting, Recessed:
 - a. Description: Back-mounting, accessible, **as directed**, recessed security plumbing fixture made with wall plate for flush installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Wall type with shower head and soap dish.
 - 2) Tempered-Water-Supply **OR** Hot- and Cold-Water-Supply, **as directed**, Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with individual check stop.
 - 3) Shower: Hose with vandal-resistant, hand-held **OR** Vandal-resistant, fixed-type **OR** Vandal-resistant, swivel-type, **as directed**, head.
 - 4) Soap Dish: Recessed, stainless steel.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.
2. Security Showers, Front-Mounting, Recessed:
 - a. Description: Front-mounting, accessible, **as directed**, recessed security plumbing fixture made with wall plate for flush installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Wall type with shower head and soap dish.
 - 2) Tempered-Water-Supply **OR** Hot- and Cold-Water-Supply, **as directed**, Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with individual check stop.
 - 3) Shower: Hose with vandal-resistant, hand-held **OR** Vandal-resistant, fixed-type **OR** Vandal-resistant, swivel-type, **as directed**, head.
 - 4) Soap Dish: Recessed, stainless steel.
 - 5) Access to Internal Components: Vandal-resistant access panels.
 - 6) Mounting Device: Wall-mounting frame.
3. Security Showers, Front-Mounting, Surface Installation:
 - a. Description: Front-mounting, accessible, **as directed**, security plumbing fixture made for surface installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Wall type with shower head and soap dish.
 - 2) Tempered-Water-Supply **OR** Hot- and Cold-Water-Supply, **as directed**, Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with individual check stops.
 - 3) Soap Dish: Recessed, stainless steel.
 - 4) Access to Internal Components: Vandal-resistant access panels.
 - 5) Mounting Device: Wall-mounting frame.
4. Security Showers, Back-Mounting, Accessible:
 - a. Description: Back-mounting, accessible, cabinet, security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Cabinet **42 or 44 by 36 inches (1065 or 1120 by 915 mm)** **OR 48 by 36 inches (1220 by 915 mm)**, **as directed**, with floor and top, **as directed**, with stainless-steel soap dish, towel hook, drain, seat, and grab bar.
 - 2) Tempered-Water-Supply **OR** Hot- and Cold-Water-Supply, **as directed**, Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with individual check stops.
 - 3) Shower: Hose with vandal-resistant, hand-held head.

- 4) Drain: **NPS 2 (DN 50)** strainer, waste to wall, and trap complying with ASME A112.18.2.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.
5. Security Showers, Back-Mounting:
- a. Description: Back-mounting, cabinet, security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Cabinet **30 by 30 inches (760 by 760 mm)** **OR 32 by 32 inches (815 by 815 mm)** **OR 36 by 36 inches (915 by 915 mm)**, **as directed**, with floor and top, **as directed**, and with stainless-steel soap dish, towel hook, and drain.
 - 2) Tempered-Water-Supply **OR** Hot- and Cold-Water-Supply, **as directed**, Valves: Pneumatic **OR** Mechanical-metering **OR** Electric-solenoid, **as directed**, type with individual check stops.
 - 3) Shower: Vandal-resistant, fixed **OR** Fixed **OR** Swivel, **as directed**, -type head.
 - 4) Drain: **NPS 2 (DN 50)** strainer, waste to wall, and trap complying with ASME A112.18.2.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.

T. Urinals

1. Security Urinals, Back-Mounting:
 - a. Description: Back-mounting security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Type and Configuration: Blowout **OR** Washout, **as directed**, type with back inlet and extended shields.
OR
Type and Configuration: Washout, trough type, and **36 inches (915 mm)** **OR 48 inches (1220 mm)**, **as directed**, wide.
 - 2) Drain: Strainer with **NPS 2 (DN 50)** tailpiece, trap under fixture, and drain piping.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and **3.5-gal./flush (13.3-L/flush)** **OR 1.5-gal./flush (5.7-L/flush)** **OR 1.0-gal./flush (3.78-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 4) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture.
2. Security Urinals, Front-Mounting:
 - a. Description: Front-mounting security plumbing fixture; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Type and Configuration: Blowout **OR** Washout, **as directed**, type with back **OR** top, **as directed**, inlet and extended shields.
OR
Type and Configuration: Washout, trough type, and **36 inches (915 mm)** **OR 48 inches (1220 mm)**, **as directed**, wide.
 - 2) Drain: Strainer with **NPS 2 (DN 50)** tailpiece, trap under fixture, and drain piping complying with ASME A112.18.2.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **3.5-gal./flush (13.3-L/flush)** **OR 1.5-gal./flush (5.7-L/flush)** **OR 1.0-gal./flush (3.78-L/flush)**, **as directed** consumption. Refer to "Flushometer Valves" Article.

- 4) Support: Chair carrier. Refer to "Fixture Supports" Article.
3. Security Urinals, Back-Mounting, Wall-And-Floor Installation:
 - a. Description: Back-mounting security plumbing fixture made for wall-and-floor installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Type and Configuration: Washout, stall type with back inlet.
 - 2) Drain: Strainer with **NPS 2 (DN 50)** outlet.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and **1.5-gal./flush (5.7-L/flush)** **OR 1.0-gal./flush (3.78-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
4. Security Urinals, Front-Mounting, Wall-And-Floor Installation:
 - a. Description: Front-mounting security plumbing fixture made for wall-and-floor installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Type and Configuration: Washout, stall type with back **OR top, as directed**, inlet.
 - 2) Drain: Strainer with **NPS 2 (DN 50)** outlet.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **1.5-gal./flush (5.7-L/flush)** **OR 1.0-gal./flush (3.78-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 4) Support: Chair carrier. Refer to "Fixture Supports" Article.

U. Water Closets

1. Security Water Closets, Back-Mounting, Above Floor Installation:
 - a. Description: IAPMO PS 61, back-mounting, accessible, **as directed**, security plumbing fixture made for above-floor installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Compact design, with bowl on wall flange.
 - 2) Bowl: Elongated, with back inlet, integral trap, blowout design with back outlet and contoured seat.
 - a) Seat Surface: SSINA No. 7 polished finish.
 - b) Punching: Provide two holes for installation of separate toilet seat.
 - c) Drain: **NPS 4 (DN 100)** **OR NPS 3 (DN 80)**, **as directed**, horizontal with cleanout and slip joint.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **3.5-gal./flush (13.3-L/flush)** **OR 1.6-gal./flush (6.0-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 4) Toilet Seat, **as directed**: ANSI Z124.5, white, **OR** black, **as directed**, commercial, heavy-duty, elongated, open front with cover, **as directed**, with check **OR** self-sustaining **OR** self-sustaining, check, **as directed**, hinges.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture. Include steel bars or other design that will prevent escape if fixture is removed.
2. Security Water Closets, Back-Mounting, Off Floor Installation:
 - a. Description: IAPMO PS 61, back-mounting, accessible, **as directed**, security plumbing fixture made for off-floor installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Standard design.

- 2) Bowl: Elongated, with back **OR** top, **as directed**, inlet, integral trap, blowout **OR** siphon-jet, **as directed**, design with back outlet and contoured seat.
 - a) Seat Surface: SSINA No. 7 polished finish.
 - b) Punching: Provide two holes for installation of separate toilet seat.
 - c) Drain: **NPS 4 (DN 100) OR NPS 3 (DN 80)**, **as directed**, horizontal with cleanout and slip joint.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **3.5-gal./flush (13.3-L/flush) OR 1.6-gal./flush (6.0-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 4) Toilet Seat, **as directed**: ANSI Z124.5, white, **OR** black, **as directed**, commercial, heavy-duty, elongated, open front with cover, **as directed**, with check **OR** self-sustaining **OR** self-sustaining, check, **as directed**, hinges.
 - 5) Wall Sleeve: Galvanized-steel frame of dimensions required to match and support fixture. Include steel bars or other design that will prevent escape if fixture is removed.
3. Security Water Closets, Front-Mounting, Off-Floor Installation:
- a. Description: IAPMO PS 61, front-mounting, accessible, **as directed**, security plumbing fixture made for off-floor installation; fabricated from **0.078-inch (2.0-mm) minimum OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Standard design.
 - 2) Bowl: Elongated, with back **OR** top, **as directed**, inlet, integral trap, blowout **OR** siphon-jet, **as directed**, design with back outlet and contoured seat.
 - a) Seat Surface: SSINA No. 7 polished finish.
 - b) Punching: Provide two holes for installation of separate toilet seat.
 - 3) Access to Internal Components: Vandal-resistant access panels.
 - 4) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **3.5-gal./flush (13.3-L/flush) OR 1.6-gal./flush (6.0-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 5) Toilet Seat, **as directed**: ANSI Z124.5, white, **OR** black, **as directed**, commercial, heavy-duty, elongated, open front with cover, **as directed**, with check **OR** self-sustaining **OR** self-sustaining, check, **as directed**, hinges.
 - 6) Support: Combination support and waste fitting assembly. Refer to "Fixture Supports" Article.
4. Security Water Closets, Back-Mounting, On-Floor Installation:
- a. Description: IAPMO PS 61, back-mounting security plumbing fixture made for on-floor installation; fabricated from **0.078-inch (2.0-mm) minimum OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4, polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Standard design.
 - 2) Bowl: Elongated, with back **OR** top, **as directed**, inlet, integral trap, blowout **OR** siphon-jet, **as directed**, design with back outlet and contoured seat.
 - a) Seat Surface: SSINA No. 7 polished finish.
 - b) Punching: Provide two holes for installation of separate toilet seat.
 - c) Drain: **NPS 4 (DN 100) OR NPS 3 (DN 80)**, **as directed**, horizontal with cleanout and slip joint.
 - 3) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **3.5-gal./flush (13.3-L/flush) OR 1.6-gal./flush (6.0-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.

- 4) Toilet Seat, **as directed**: ANSI Z124.5, white, **OR** black, **as directed**, commercial, heavy-duty, elongated, open front with cover, **as directed**, with check **OR** self-sustaining **OR** self-sustaining, check, **as directed**, hinges.
5. Security Water Closets, Front-Mounting, On-Floor Installation:
 - a. Description: IAPMO PS 61, front-mounting security plumbing fixture made for on-floor installation; fabricated from **0.078-inch (2.0-mm)** minimum **OR 0.109-inch (2.8-mm)**, **as directed**, thickness, ASTM A 666, Type 304 stainless steel. Include SSINA No. 4 polished finish on exposed surfaces, and corrosion-resistant metal for internal piping and bracing.
 - 1) Configuration: Standard design.
 - 2) Bowl: Elongated, with back **OR** top, **as directed**, inlet, integral trap, siphon-jet design with back **OR** floor, **as directed**, outlet and contoured seat.
 - a) Seat Surface: SSINA No. 7 polished finish.
 - b) Punching: Provide two holes for installation of separate toilet seat.
 - 3) Access to Internal Components: Vandal-resistant access panels.
 - 4) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button **OR** Exposed flushometer valve with oscillating lever-handle, **as directed**, mechanism, and **3.5-gal./flush (13.3-L/flush) OR 1.6-gal./flush (6.0-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 5) Toilet Seat, **as directed**: ANSI Z124.5, white, **OR** black, **as directed**, commercial, heavy-duty, elongated, open front with cover, **as directed**, with check **OR** self-sustaining **OR** self-sustaining, check, **as directed**, hinges.
 - 6) Support: Combination support and waste fitting assembly. Refer to "Fixture Supports" Article.
 6. Security Water Closets, Vitreous-China, Wall-Mounting, On-Floor Installation
 - a. Description: ASME A112.19.2M, vitreous-china, wall-mounting and on-floor installation, back-inlet, blowout **OR** siphon-jet, **as directed**, fixture with integral contoured seat and made for institutional applications.
 - 1) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and **3.5-gal./flush (13.3-L/flush) OR 1.6-gal./flush (6.0-L/flush)**, **as directed**, consumption. Refer to "Flushometer Valves" Article.
 - 2) Support: Combination support and waste fitting assembly. Refer to "Fixture Supports" Article.
 7. Security Water Closets, Vitreous-China, Wall-Mounting:
 - a. Description: ASME A112.19.2M, vitreous-china, accessible, **as directed**, wall-mounting, back-inlet, blowout fixture with integral contoured seat and made for institutional applications.
 - 1) Flushing Device: Concealed flushometer valve with stainless-steel access panel, push-button mechanism, and **3.5-gal./flush (13.3-L/flush)** consumption. Refer to "Flushometer Valves" Article.
 - 2) Support: Combination support and waste fitting assembly. Refer to "Fixture Supports" Article.
- V. Flushometer Valves
 1. Flushing Devices for Vitreous-China Water Closets:
 - a. Description: Flushometer valves, trim, and components complying with ASSE 1037. Include brass body, check-stop inlet, diaphragm operation, vacuum breaker, tailpiece, chrome-plated finish on exposed components, and non-hold-open feature on oscillating lever-handle trip mechanism. See fixture type for consumption.
- W. Fixture Supports
 1. Back-mounting fixtures are installed on wall sleeves. Front-mounting and wall-mounting fixtures are installed on supports specified herein.
 2. Off-Floor, Plumbing Fixture Supports:
 - a. Description: ASME A112.6.1M carriers with dimensions and trim matching fixture.
 - 1) Stainless-Steel, Front-Mounting Fixtures: With modifications.

- a) Drinking Fountains: Type I drinking fountain carrier.
- b) Lavatories: Type III lavatory carrier.
- c) Shampoo Bowls: Type II sink carrier.
- d) Urinals: Type I urinal carrier with inlet seal unless Type II is required.
- e) Water Closets: Combination support and waste fitting assembly.
- 2) Vitreous-China, Wall-Mounting Fixtures:
 - a) Lavatories: Type III lavatory carrier.
 - b) Water Closets: Combination support and waste fitting assembly.
- 3) Carriers: With vertical steel uprights with feet. Include tie rods, bearing plates, and mounting studs matching fixture to be supported.
- 4) Combination Support and Waste Fitting Assemblies: With feet and inlet seal.
- 5) Carriers for Accessible Fixtures: Include rectangular, vertical steel uprights instead of steel pipe uprights.

1.5 EXECUTION

A. Security Plumbing Fixture Installation

1. Install back-mounting-type, stainless-steel security plumbing fixtures as follows:
 - a. Install wall sleeve in wall.
 - b. Install fixture on wall sleeve; mount components on or attached to wall sleeve with access from accessible service space.
 - c. Extend supply piping from service space to fixture.
 - d. Install soil and waste piping from fixture and extend into service space.
 - e. Install fixture trap in service space instead of below fixture drain.
2. Install front-mounting-type, stainless-steel security plumbing fixtures as follows:
 - a. Install fixture support or mounting bracket.
 - b. Install fixture on support; mount components inside of or attached to fixture.
 - c. Extend supply piping from pipe space to fixture.
 - d. Install trap below fixture and extend soil and waste piping into pipe space.
3. Install vitreous-china security plumbing fixtures onto accessible service space as follows:
 - a. Install fixture support in service space.
 - 1) Use combination support and waste fitting assembly for water closet.
 - 2) Use chair carriers for lavatory.
 - b. Install fixture on support.
 - c. Install components in service space.
4. Install vitreous-china security plumbing fixtures onto accessible pipe space as follows:
 - a. Install fixture support in pipe space.
 - 1) Use combination support and waste fitting assembly for water closet.
 - 2) Use carrier support for lavatory.
 - b. Install fixture on support.
 - c. Install components in pipe space with access panels. See Division 08 Section "Access Doors And Frames" for access panels not in this Section.
5. Install security plumbing fixture outlets with gasket seals.
6. Install fixtures designated "accessible" according to ICC A117.1 for heights, dimensions, and clearances.
7. Install fixtures level and plumb.
8. Install shutoff valves in water-supply piping to fixtures. Use ball, gate, or globe valve if specific type valve is not indicated. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
9. Install dielectric fittings in water-supply piping to fixtures if piping and fixture connections are made of different metals. See Division 22 Section "Common Work Results For Plumbing" for dielectric fittings.
10. Install toilet seats on water closets and combination units if seats are indicated.

- B. Connections
 - 1. Piping installation requirements are specified in other Division 14. Drawings indicate general arrangement of piping, fittings, and specialties.
 - 2. Connect hot- and cold-water supply piping to security plumbing fixtures. Include supply stops, if specified, or ball valve on each supply. Ball valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 - 3. Connect soil and waste piping to security plumbing fixtures.
 - 4. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 - 5. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
 - 1. Perform the following field tests and inspections and prepare test reports:
 - a. Testing: After installing security plumbing fixtures and after electrical circuitry has been energized, test for compliance with requirements.
 - b. Remove and replace malfunctioning security plumbing fixtures. Retest as specified above after repairs or replacements are made.
- D. Adjusting
 - 1. Operate and adjust water-supply flushometers and flow-control valves on security plumbing fixtures.
- E. Cleaning
 - 1. Clean security plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - a. Remove faucet spouts and strainers, remove sediment and debris, and reinstall spouts and strainers.
 - b. Remove sediment and debris from drains.
 - 2. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.
- F. Protection
 - 1. Provide protective covering for installed security plumbing fixtures and fittings.
 - 2. Do not allow use of security plumbing fixtures for temporary facilities unless approved in writing by the Owner.

END OF SECTION 22 42 13 13

Task	Specification	Specification Description
22 42 13 13	22 40 00 00	Plumbing Fixtures
22 42 13 13	22 45 00 00	Emergency Plumbing Fixtures
22 42 13 16	22 42 13 13	Security Plumbing Fixtures
22 42 13 16	22 40 00 00	Plumbing Fixtures
22 42 13 16	22 45 00 00	Emergency Plumbing Fixtures
22 42 16 13	22 42 13 13	Security Plumbing Fixtures
22 42 16 13	22 40 00 00	Plumbing Fixtures
22 42 16 13	22 45 00 00	Emergency Plumbing Fixtures
22 42 16 16	22 42 13 13	Security Plumbing Fixtures
22 42 16 16	22 40 00 00	Plumbing Fixtures
22 42 16 16	22 45 00 00	Emergency Plumbing Fixtures
22 42 19 00	22 41 19 00	Porcelain Steel Bathtub Liners and Surrounds
22 42 19 00	22 40 00 00	Plumbing Fixtures
22 42 19 00	22 45 00 00	Emergency Plumbing Fixtures
22 42 23 00	22 40 00 00	Plumbing Fixtures
22 42 23 00	22 45 00 00	Emergency Plumbing Fixtures
22 42 33 00	22 40 00 00	Plumbing Fixtures
22 42 33 00	22 45 00 00	Emergency Plumbing Fixtures
22 42 39 00	01 22 16 00	No Specification Required
22 42 39 00	22 40 00 00	Plumbing Fixtures
22 42 39 00	22 45 00 00	Emergency Plumbing Fixtures
22 42 43 00	22 40 00 00	Plumbing Fixtures
22 42 43 00	22 45 00 00	Emergency Plumbing Fixtures
22 42 46 00	22 40 00 00	Plumbing Fixtures
22 42 46 00	22 45 00 00	Emergency Plumbing Fixtures

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SECTION 22 43 00 00 - MEDICAL PLUMBING FIXTURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for medical plumbing fixtures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following medical plumbing fixtures and related components:
 - a. Faucets for lavatories, showers, and sinks.
 - b. Laminar-flow, faucet-spout outlets.
 - c. Flushometers.
 - d. Toilet seats.
 - e. Protective shielding guards.
 - f. Fixture supports.
 - g. Bedpan washers.
 - h. Water closets.
 - i. Lavatories.
 - j. Individual showers.
 - k. Patients' combination toilets.
 - l. Clinical sinks.
 - m. Plaster sinks.
 - n. Surgeons' scrub sinks.
 - o. Surgeons' instrument sinks.
 - p. Bathing units.
 - q. Sitz baths.
 - r. Bedpan washing equipment.
 - s. Hydrotherapy whirlpools.
 - t. Outlet boxes.
 - u. Morgue equipment.

C. Definitions

1. Accessible Medical Plumbing Fixture: Plumbing fixture that can be approached, entered, and used by people with disabilities.
2. Fitting: Device that controls the flow of water into or out of the medical plumbing fixture. Fittings specified in this Section include supplies and stops, faucets and spouts, shower heads, drains and tailpieces, and traps and waste pipes.
3. FRP: Fiberglass-reinforced plastic.
4. PMMA: Polymethyl methacrylate (acrylic) plastic.

D. Submittals

1. Product Data: For each type of medical plumbing fixture indicated.
2. LEED Submittal:
 - a. Product Data for Credit WE 2, 3.1, and 3.2: Documentation indicating flow and water consumption requirements.
3. Shop Drawings: Diagram power, signal, and control wiring.
4. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act", **as directed**; for plumbing fixtures for people with disabilities.
3. Regulatory Requirements: Comply with requirements in Public Law 102-486, "Energy Policy Act," about water flow and consumption rates for plumbing fixtures.
4. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
5. Select combinations fixtures and trim, faucets, fittings, and other components that are compatible.
6. Comply with the following applicable standards and other requirements specified for medical plumbing fixtures:
 - a. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.
 - b. Plastic Bathtubs: ANSI Z124.1.
 - c. Plastic Shower Enclosures: ANSI Z124.2.
 - d. Slip-Resistant Bathing Surfaces: ASTM F 462.
 - e. Vitreous-China Fixtures: ASME A112.19.2M.
7. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:
 - a. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.
 - b. Diverter Valves for Faucets with Hose Spray: ASSE 1025.
 - c. Faucets: ASME A112.18.1.
 - d. Hose-Connection Vacuum Breakers: ASSE 1011.
 - e. Hose-Coupling Threads: ASME B1.20.7.
 - f. Integral, Atmospheric Vacuum Breakers: ASSE 1001.
 - g. NSF Materials: NSF 61.
 - h. Pipe Threads: ASME B1.20.1.
 - i. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - j. Supply Fittings: ASME A112.18.1.
 - k. Brass Waste Fittings: ASME A112.18.2.
8. Comply with the following applicable standards and other requirements specified for bathtub and shower faucets:
 - a. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.
 - b. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.
 - c. Faucets: ASME A112.18.1.
 - d. Hand-Held Showers: ASSE 1014.
 - e. High-Temperature-Limit Controls for Thermal-Shock-Preventing Devices: ASTM F 445.
 - f. Hose-Coupling Threads: ASME B1.20.7.
 - g. Manual-Control Antiscald Faucets: ASTM F 444.
 - h. Pipe Threads: ASME B1.20.1.
 - i. Pressure-Equalizing-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
 - j. Sensor-Actuated Faucets and Electrical Devices: UL 1951.
 - k. Thermostatic-Control Antiscald Faucets: ASTM F 444 and ASSE 1016.
9. Comply with the following applicable standards and other requirements specified for miscellaneous fittings:
 - a. Atmospheric Vacuum Breakers: ASSE 1001.
 - b. Brass and Copper Supplies: ASME A112.18.1.
 - c. Flexible Water Connectors: ASME A112.18.6.
 - d. Manual-Operation Flushometers: ASSE 1037.
 - e. Sensor-Operation Flushometers: ASSE 1037 and UL 1951.
 - f. Brass Waste Fittings: ASME A112.18.2.
10. Comply with the following applicable standards and other requirements specified for miscellaneous components:

- a. Grab Bars: ASTM F 446.
- b. Hose-Coupling Threads: ASME B1.20.7.
- c. Off-Floor Fixture Supports: ASME A112.6.1M.
- d. Pipe Threads: ASME B1.20.1.
- e. Plastic Toilet Seats: ANSI Z124.5.
- f. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.2 PRODUCTS

A. Lavatory Faucets

1. Description: Faucet for lavatory-type medical plumbing fixture. Coordinate faucet inlets with supplies, connectors, and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Maximum Flow Rate: **2.2 gpm (8.3 L/min.)**.
 - b. Body Material: Solid brass.
 - c. Finish: Polished chrome plate.
 - d. Type: Single-control mixing **OR** Single-valve nonmixing **OR** Two-handle mixing, **as directed**.
 - e. Tempering System: Not required **OR** Thermostatic **OR** Pressure balance, **as directed**.
 - f. Supply Centers: Single hole **OR 4 inches (102 mm) OR 6 inches (152 mm) OR 8 inches (203 mm) OR 12 inches (305 mm) OR** Adjustable, **as directed**.
 - g. Mounting: Deck, exposed **OR** Deck, concealed **OR** Back/wall, exposed **OR** Back/wall, concealed, **as directed**.
 - h. Handle(s): Single lever **OR** Cross, four arm **OR** Wrist blade, **4 inches (102 mm) OR Elbow, 6 inches (152 mm) OR** Not applicable, **as directed**.
 - i. Temperature Indicators: Color-coded for hot and cold water.
 - j. Inlet(s): **NPS 3/8 (DN 10)** tubing, plain end **OR NPS 3/8 (DN 10)** tubing, with **NPS 1/2 (DN 15)** male adaptor **OR NPS 1/2 (DN 15)** male shank **OR NPS 1/2 (DN 15)** female shank, **as directed**.
 - k. Spout: Rigid **OR** Swing **OR** Rigid gooseneck **OR** Swivel gooseneck, **as directed**, brass.
 - l. Spout Outlet: Aerator **OR** Spray **OR** Laminar flow **OR** Plain end **OR** Spray, **0.5 gpm (1.5 L/min.)**, **as directed**.
 - m. Operation: Compression, manual **OR** Noncompression, manual **OR** Automatic, hard-wired electric sensor, **as directed**.
 - n. Drain: Pop up **OR** See fixture, **as directed**.

B. Shower Faucets

1. Description: Faucet for shower-type medical plumbing fixtures. Include hot- and cold-water indicators; check stops; and shower head, arm, and flange. Coordinate faucet inlets with supplies.
 - a. Maximum Flow Rate: **2.5 gpm (9.5 L/min.)**, unless otherwise indicated.
 - b. Body Material: Solid brass.
 - c. Finish: Polished chrome plate.
 - d. Type: Thermostatic **OR** Pressure balance **OR** Thermostatic and pressure balance, **as directed**, with integral or field-installed check stops on hot- and cold-water supplies.
 - e. Mounting: Exposed **OR** Concealed, **as directed**.
 - f. Handle(s): Single lever **OR** Cross, four arm **OR** Not applicable, **as directed**.
 - g. Temperature Indicators: Color-coded for hot and cold water.
 - h. Diverter Valve: Not required **OR** Integral with mixing valve **OR** Not integral with mixing valve, **as directed**.
 - i. Backflow Protection Device for Hand-Held Shower: Required **OR** Not required, **as directed**.
 - j. Operation: Compression, manual **OR** Noncompression, manual **OR** Automatic, hard-wired electric sensor, **as directed**.
 - k. Antiscald Device: Integral with mixing valve **OR** Not required, **as directed**.

- l. Supply Connections: **NPS 1/2 (DN 15) OR NPS 1/2 (DN 15)**, union **OR** Sweat, **as directed**.
 - m. Shower Head Material: Brass with chrome-plated finish.
 - n. Head Type: Ball joint **OR** Without ball joint **OR** Hand held, slide-bar mounted **OR** Hand held, hook mounted, **as directed**.
 - o. Spray Pattern: Fixed **OR** Adjustable, **as directed**.
 - p. Integral Volume Control: Required **OR** Not required, **as directed**.
 - q. Shower-Arm, Flow-Control Fitting: Not required **OR** **1.5 gpm (5.7 L/min.) OR 2.0 gpm (7.6 L/min.)**, **as directed**.
- C. Sink Faucets
- 1. Description: Faucet for sink-type medical plumbing fixtures. Coordinate faucet inlets with supplies and fixture holes; coordinate outlet with spout and fixture receptor.
 - a. Maximum Flow Rate: **2.5 gpm (9.5 L/min.)**, unless otherwise indicated.
 - b. Body Material: Solid brass.
 - c. Finish: Polished chrome plate **OR** Rough chrome plate, **as directed**.
 - d. Type: Sink faucet **OR** Clinical-sink faucet with stops in shanks, vacuum breaker, hose-thread outlet, and pail hook, **as directed**.
 - e. Tempering Device: Thermostatic **OR** Pressure balance **OR** Not required, **as directed**.
 - f. Mixing Valve: Single control **OR** Two-lever handle, **as directed**.
 - g. Backflow Protection Device for Hose Outlet: Required **OR** Not required **OR** Not applicable, **as directed**.
 - h. Supply Centers: Single hole **OR** **4 inches (102 mm) OR 6 inches (152 mm) OR 8 inches (203 mm) OR** Adjustable, **as directed**.
 - i. Mounting: Deck, exposed **OR** Deck, concealed **OR** Back/wall, exposed **OR** Back/wall, concealed, **as directed**.
 - j. Handle(s): Lever **OR** Knob **OR** Cross, four arm **OR** Wrist blade, **4 inches (102 mm) OR** Elbow, **6 inches (152 mm) OR** Not applicable, **as directed**.
 - k. Temperature Indicators: Color-coded for hot water on left and cold water on right.
 - l. Inlet(s): **NPS 3/8 (DN 10)** plain-end tubing **OR** **NPS 3/8 (DN 10)** tubing with **NPS 1/2 (DN 15)** male adapter **OR** **NPS 1/2 (DN 15)** male shank **OR** **NPS 1/2 (DN 15)** female shank, **as directed**.
 - m. Spout: Rigid, solid **OR** Swing tubular **OR** Rigid, gooseneck, solid **OR** Swivel, gooseneck, solid, **as directed**, brass with wall brace, **as directed**.
 - n. Spout Outlet: Aerator **OR** Swivel aerator/spray **OR** Spray **OR** Laminar flow **OR** Hose thread **OR** Plain end, **as directed**.
 - o. Vacuum Breaker: Required **OR** Not required, **as directed**.
 - p. Operation: Compression, manual **OR** Noncompression, manual **OR** Automatic, hard-wired electric sensor, **as directed**.
- D. Laminar-Flow Faucet-Spout Outlets
- 1. Description: Chrome-plated-brass faucet-spout outlet that produces non-aerating laminar stream. Include male or female thread that mates with faucet outlet for attachment to faucets where indicated and flow-rate range that includes flow of faucet.
- E. Flushometers
- 1. Description: Flushometer for clinical-sink-type **OR** water-closet-type, **as directed**, medical plumbing fixture. Include brass body with corrosion-resistant internal components, non-hold-open feature, **as directed**, control stop with check valve, vacuum breaker, and copper or brass tubing, and polished chrome-plated finish on exposed parts.
 - a. Internal Design: Diaphragm operation.
 - b. Style: Exposed **OR** Concealed, **as directed**.
 - c. Inlet Size: **NPS 1 (DN 25)**.
 - d. Trip Mechanism: Oscillating, lever-handle actuator **OR** Mechanical, push-button actuator with stainless-steel access plate **OR** Hydraulic, push-button actuator **OR** Foot-pedal

- actuator **OR** Hard-wired, electric-sensor actuator **OR** Battery-operated sensor actuator, **as directed**.
- e. Consumption: **1.6 gal./flush (6.0 L/flush) OR 3.5 gal./flush (13.3 L/flush), as directed.**
 - f. Tailpiece Size: **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed**, and standard length to top of bowl.
 - g. Integral Bedpan Washer: Not required **OR** Factory fabricated, attached to tailpiece, and with spray head, **as directed**.
- F. Toilet Seats
1. Description: Plastic toilet seat for water-closet-type medical plumbing fixture.
 - a. Material: Molded, solid plastic with antimicrobial agent, **as directed**.
 - b. Configuration: Closed **OR** Open, **as directed**, front with **OR** without, **as directed**, cover.
 - c. Size: Elongated, unless otherwise indicated.
 - d. Class: Standard **OR** Heavy-duty, **as directed**, commercial.
 - e. Hinge Type: Stainless-steel CK, check **OR** SC, self-sustaining check, **as directed**.
 - f. Color: White **OR** Black, **as directed**.
- G. Protective Shielding Guards
1. Protective Shielding Pipe Covers:
 - a. Description: Manufactured plastic wraps for covering medical plumbing fixture hot-water supply **OR** hot- and cold-water supplies, **as directed**, and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.
 2. Protective Shielding Piping Enclosures:
 - a. Description: Manufactured plastic enclosure for covering medical plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.
- H. Fixture Supports
1. Water-Closet Supports:
 - a. Description: Combination carrier designed for accessible **OR** standard, **as directed**, mounting height of wall-mounting, water-closet-type medical plumbing fixture. Include single or double, vertical or horizontal, hub-and-spigot or hubless waste fitting as required for piping arrangement; faceplates; couplings with gaskets; feet; and fixture bolts and hardware matching fixture. Include additional extension coupling, faceplate, and feet for installation in wide pipe space.
 2. Lavatory Supports:
 - a. Description: Type I, lavatory carrier with exposed arms and tie rods **OR** Type II, lavatory carrier with concealed arms and tie rod **OR** Type III, lavatory carrier with hanger plate and tie rod, **as directed**, for wall-mounting, lavatory-type medical plumbing fixture. Include steel uprights with feet.
 - b. Accessible-Fixture Support: Include rectangular steel uprights.
 3. Sink Supports:
 - a. Description: Type I, sink carrier with exposed arms and tie rods **OR** Type II, sink carrier with hanger plate, bearing studs, and tie rod **OR** Type III, sink carrier with hanger plate and exposed arms, **as directed**, for sink-type medical plumbing fixture. Include steel uprights with feet.
 4. Bedpan Washers
 - a. Description: Wall-mounting, hand-held, hand-control **OR** single-pedal, foot-control **OR** double-pedal, hot- and cold-water control, **as directed**, medical plumbing fixture.
 - 1) Hose: **48-inch- (1220-mm-)** long rubber or vinyl hose with spray nozzle, wall bracket, and hook.
 - 2) Self-closing valve.
 - 3) Loose-key supply stop.
 - 4) Vacuum Breaker: Wall mounting, atmospheric.
 - 5) Finish: Polished, chrome-plated finish on metal parts exposed after installation.
- I. Water Closets

1. Wall-Mounting Water Closets:
 - a. Description: Accessible, wall-mounting **OR** Wall-mounting, **as directed**, back-outlet, vitreous-china medical plumbing fixture designed for bedpan washing and flushometer valve operation.
 - 1) Style: Flushometer valve.
 - a) Bowl Type: Elongated with siphon-jet design and bedpan lugs or slots.
 - b) Design Consumption: **1.6 gal./flush (6 L/flush)**.
 - c) Color: White.
2. Floor-Mounting Water Closets:
 - a. Description: Accessible, floor-mounting **OR** Floor-mounting, **as directed**, floor-outlet, vitreous-china medical plumbing fixture designed for bedpan washing and flushometer valve operation.
 - 1) Style: Flushometer valve.
 - a) Bowl Type: Elongated with siphon-jet design and bedpan lugs or slots. Include bolt caps matching fixture.
 - b) Height: Standard **OR** Accessible, **as directed**.
 - c) Design Consumption: **1.6 gal./flush (6 L/flush)**.
 - d) Color: White.

J. Lavatories

1. Wall-Mounting Lavatories:
 - a. Description: Accessible, wall-mounting **OR** Wall-mounting, **as directed**, vitreous-china medical plumbing fixture.
 - 1) Type: With back **OR** Ledge back **OR** Shelf back **OR** Slab, **as directed**.
 - 2) Size: **18 by 15 inches (457 by 381 mm) OR 19 by 16 inches (483 by 406 mm) OR 20 by 18 inches (508 by 457 mm) OR 24 by 20 inches (610 by 508 mm), as directed**, rectangular.
 - 3) Faucet Hole Punching: One hole **OR** Three holes, **2-inch (51-mm) centers OR Three holes, 4-inch (102-mm) centers, as directed**.
 - 4) Faucet Hole Location: Top **OR** Front wall **OR** Inclined panel, **as directed**.
 - 5) Color: White.
 - 6) Faucet: Lavatory with pop-up waste **OR** for separate drain, **as directed**.
 - 7) Supplies: **NPS 3/8 (DN 10)** chrome-plated copper tubes or flexible connectors, **as directed**, with stops.
 - 8) Drain: See faucet **OR** Grid **OR** Grid with offset, **as directed**.
 - a) Location: Not applicable.
 - 9) Drain Piping: **NPS 1-1/4 (DN 32) OR NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40), as directed**, chrome-plated, cast-brass P-trap; **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40), as directed, 0.032-inch- (0.8-mm-) OR 0.045-inch- (1.1-mm-), as directed**, thick tubular brass waste to wall; and wall escutcheon.
 - 10) Protective Shielding Guard(s): Designation, as directed by the Owner.
 - 11) Fixture Support: Lavatory.
2. Counter-Mounting Lavatories:
 - a. Description: Accessible, **as directed**, Counter-mounting **OR** Undercounter-mounting, **as directed**, vitreous-china, medical plumbing fixture.
 - 1) Type: Flat rim with ledge **OR** Self-rimming, **as directed**.
 - 2) Rectangular Lavatory Size: **18 by 15 inches (457 by 381 mm) OR 19 by 16 inches (483 by 406 mm) OR 20 by 18 inches (508 by 457 mm) OR 24 by 20 inches (610 by 508 mm), as directed**.
 - 3) Oval Lavatory Size: **19 by 16 inches (483 by 406 mm) OR 20 by 17 inches (508 by 432 mm), as directed**.
 - 4) Round Lavatory Size: **18 inches (457 mm) OR 19 inches (483 mm), as directed**, in diameter.
 - 5) Faucet Hole Punching: One hole **OR** Three holes, **2-inch (51-mm) centers OR Three holes, 4-inch (102-mm) centers, as directed**.

- 6) Faucet Hole Location: Top **OR** Front wall **OR** Inclined panel, **as directed**.
- 7) Color: White.
- 8) Faucet: Lavatory with pop-up waste **OR** for separate drain, **as directed**.
- 9) Supplies: **NPS 3/8 (DN 10)** chrome-plated copper tubes or flexible connectors, **as directed**, with stops.
- 10) Drain: See faucet **OR** Grid **OR** Grid with offset, **as directed**.
 - a) Location: Not applicable.
- 11) Drain Piping: **NPS 1-1/4 (DN 32)** **OR** **NPS 1-1/4 by NPS 1-1/2 (DN 32 by DN 40)**, **as directed**, chrome-plated, cast-brass P-trap; **NPS 1-1/4 (DN 32)** **OR** **NPS 1-1/2 (DN 40)**, **as directed**, **0.032-inch- (0.8-mm-)** **OR** **0.045-inch- (1.1-mm-)**, **as directed**, thick tubular brass waste to wall; and wall escutcheon.
- 12) Protective Shielding Guard(s): Designation, as directed by the Owner.

K. Individual Showers:

1. Description: Accessible, **as directed**, FRP **OR** PMMA, **as directed**, shower enclosure medical plumbing fixture with slip-resistant bathing surface complying with ASTM F 462. Comply with ADA requirements for use by people with disabilities.
 - a. Size: 36 by 34 inches (915 by 865 mm) **OR** 42 by 36 inches (1065 by 915 mm) **OR** 43 by 39 inches (1090 by 990 mm) **OR** 48 by 34 inches (1220 by 865 mm) **OR** 52 by 36 inches (1320 by 915 mm) **OR** 60 by 36 inches (1525 by 915 mm) **OR** 72 by 36 inches (1830 by 915 mm), **as directed**.
 - b. Surround: One piece.
 - c. Color: White.
 - d. Faucet: Shower.
 - e. Drain: Grid, NPS 2 (DN 50).
 - 1) Location: Left side **OR** Center **OR** Right side, **as directed**.
 - f. Accessories: If not furnished as integral components of specified fixture. Accessories are specified in Division 10 Section "Toilet, Bath, And Laundry Accessories".
 - 1) Grab bar(s).
 - 2) Normal-duty **OR** Heavy-duty, **as directed**, shower-curtain rod.
 - 3) Vinyl **OR** Duck **OR** Antibacterial, **as directed**, shower curtain.
 - 4) Shower-curtain hooks.
 - 5) Folding seat, **as directed**.

L. Patients' Combination Toilets

1. Swing-Away, Patients' Combination Toilets:
 - a. Description: Factory-fabricated, combination water closet and lavatory medical plumbing fixture.
 - 1) Cabinet: Fixed installation with storage space and toilet paper holder.
 - a) Material: Stainless steel **OR** Stainless steel, plastic laminate, or fiberglass, **as directed**, with laminated-wood or -plastic **OR** solid-plastic **OR** stainless-steel, **as directed**, top surface.
 - b) Color: Not applicable.
 - c) Mounting: Wall bracket.
 - 2) Water Closet: Swivel, floor-mounting, back-outlet **OR** floor-outlet, **as directed**, flushometer valve design.
 - a) Material: Stainless steel.
 - b) Orientation: Left **OR** Right, **as directed**, hand.
 - c) Color: Not applicable.
 - d) Toilet Seat: White, solid plastic.
 - e) Flushometer: Concealed flushometer valve with push-button trip mechanism, check stop, and vacuum breaker on tailpiece.
 - f) Fixture Support: Floor plate.
 - g) Seal: For outlet.
 - 3) Lavatory: Counter mounting.
 - a) Material: Stainless steel.

- b) Color: Not applicable.
 - c) Faucet: Gooseneck type with wrist-blade handles **OR** Swing-spout type with single lever, **as directed**.
 - d) Drain: Grid, **NPS 1-1/4 (DN 32)**.
 - e) Drain Piping: **NPS 1-1/4 (DN 32)** chrome-plated, cast-brass P-trap; tubular-brass waste to wall; and wall flange.
 - 4) Bedpan Washer: On flushometer valve tailpiece or separate attachment affixed to unit.
 - 2. Static, Patients' Combination Toilets:
 - a. Description: Factory-fabricated, combination water closet and lavatory fixture.
 - 1) Cabinet: Fixed installation; swing-away cabinet or retractable, water-closet cover design with storage space and toilet paper holder.
 - a) Material: Stainless steel **OR** Stainless steel, plastic laminate, or fiberglass, **as directed**, with laminated-wood or -plastic **OR** solid-plastic **OR** stainless-steel, **as directed**, top surface.
 - b) Color: Not applicable.
 - c) Mounting: Wall bracket.
 - 2) Water Closet: Floor-mounting, floor-outlet, flushometer valve design.
 - a) Material: Stainless steel or vitreous china.
 - b) Orientation: Left **OR** Right, **as directed**, hand.
 - c) Color: Not applicable.
 - d) Toilet Seat: White, solid plastic.
 - e) Flushometer: Concealed flushometer valve with push-button trip mechanism, check stop, and vacuum breaker on tailpiece.
 - f) Seal: For outlet.
 - 3) Lavatory: Counter mounting.
 - a) Material: Stainless steel.
 - b) Color: Not applicable.
 - c) Faucet: Gooseneck type with wrist-blade handles **OR** Swing-spout type with single lever, **as directed**.
 - d) Drain: Grid, **NPS 1-1/4 (DN 32)**.
 - e) Drain Piping: **NPS 1-1/4 (DN 32)** chrome-plated, cast-brass P-trap; tubular-brass waste to wall; and wall flange.
 - 4) Bedpan Washer: On flushometer valve tailpiece or separate attachment affixed to unit.
- M. Clinical Sinks
 - 1. Wall-Mounting Clinical Sinks:
 - a. Description: Wall-mounting, back-outlet, vitreous-china, flushing-rim, service-sink-type medical plumbing fixture.
 - 1) Size: Approximately **25 by 20 inches (635 by 510 mm)**.
 - 2) Color: White.
 - 3) Rim Guard: Stainless steel on front and also on sides if flat rim.
 - 4) Faucet: Sink, polished, chrome-plated, solid-brass, service-sink faucet type, including integral stops in shanks, vacuum breaker, hose-thread outlet, and pail hook.
 - 2. Floor-Mounting Clinical Sinks:
 - a. Description: Floor-mounting, bottom-outlet, vitreous-china, flushing-rim, service-sink-type medical plumbing fixture. Include bolt caps.
 - 1) Size: Approximately **27 by 20 inches (685 by 510 mm)**.
 - 2) Color: White.
 - 3) Rim Guards: Stainless steel on front and sides.
 - 4) Sink Base: **10-inch (25.4-mm)** -high, cast terrazzo if required.

- 5) Faucet: Sink, polished, chrome-plated, solid-brass, service-sink faucet type, including integral stops in shanks, vacuum breaker, hose-thread outlet, and pail hook.

N. Plaster Sinks:

1. Description: Wall-mounting, vitreous-china medical plumbing fixture.
 - a. Size: 24 by 22 inches (610 by 560 mm) **OR** 30 by 22 inches (760 by 560 mm), **as directed**, with back or ledge faucet holes.
 - b. Color: White.
 - c. Faucet Holes: One **OR** Two, **as directed**, in back or ledge.
 - d. Faucet: Sink.
 - e. Supplies: NPS 1/2 (DN 15) chrome-plated copper tubes or flexible connectors, **as directed**, with stops.
 - f. Drain: Grid, NPS 1-1/2 (DN 40) with NPS 1-1/2 (DN 40) to NPS 2 (DN 50) adaptor, **as directed**.
 - g. Drain Piping: NPS 1-1/2 (DN 40) **OR** NPS 2 (DN 50), **as directed**, chrome-plated brass; 0.045-inch- (1.1-mm-) thick waste to interceptor; interceptor to wall; and wall flange.
 - h. Plaster Interceptor:
 - 1) Description: Cast-iron or steel body and removable cover with acid-resistant-enameled interior lining and outside coating; removable, corrosion-resistant metal screens or strainer; and NPS 1-1/2 (DN 40) **OR** NPS 2 (DN 50), **as directed**, inlet and outlet.
2. Fixture Support: Sink with white-enameled-steel brackets.

O. Surgeons' Scrub Sinks

1. Stainless-Steel Surgeons' Scrub Sinks:
 - a. Description: Wall-mounting, sink-type medical plumbing fixture.
 - 1) Size: Approximately **31 by 20 inches (790 by 510 mm)** with back with 1 faucet hole.
 - 2) Faucet: Chrome-plated-brass, gooseneck type matching fixture.
 - 3) Operation: Foot-pedal **OR** Knee **OR** Automatic, hard-wired electric sensor, **as directed**, control.
 - 4) Supplies: **NPS 1/2 (DN 15)** chrome-plated copper tubes or flexible connectors, **as directed**, with stops.
 - 5) Drain: Grid, **NPS 1-1/2 (DN 40)**.
 - 6) Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular-brass waste to wall; and wall flange.
 - 7) Fixture Support: Sink.
2. Vitreous-China Surgeons' Scrub Sinks:
 - a. Description: Wall-mounting, sink-type medical plumbing fixture.
 - 1) Size: **28 by 22 inches (710 by 560 mm) OR 30 by 22 inches (760 by 560 mm)**, **as directed**, with back or ledge with 1 faucet hole.
 - 2) Color: White.
 - 3) Faucet: Chrome-plated-brass, gooseneck-type matching fixture.
 - 4) Operation: Foot-pedal **OR** Knee, **as directed**, control.
 - 5) Supplies: **NPS 1/2 (DN 15)** chrome-plated copper tubes or flexible connectors, **as directed**, with stops.
 - 6) Drain: Grid, **NPS 1-1/2 (DN 40)**.
 - 7) Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular-brass waste to wall; and wall flange.
 - 8) Fixture Support: Sink.

P. Surgeons' Instrument Sinks:

1. Description: Wall-mounting, stainless-steel, sink-type medical plumbing fixture. Include instrument tray on each side.
 - a. Size: 28 by 20 inches (710 by 510 mm) with 1 hole for deck-mounting faucet.

- b. Faucet: Chrome-plated-brass, gooseneck type matching fixture with knee **OR** foot-pedal, **as directed**, control for mixing hot- and cold-water supplies.
- c. Supplies: NPS 1/2 (DN 15) chrome-plated copper tubes or flexible connectors, **as directed**, with stops.
- d. Drain: Grid, NPS 1-1/2 (DN 40).
- e. Drain Piping: NPS 1-1/2 (DN 40) chrome-plated, cast-brass P-trap; 0.045-inch- (1.1-mm-) thick tubular-brass waste to wall; and wall flange.
- f. Fixture Support: Sink.

Q. Bathing Units

1. Institutional Bath Tubs:

- a. Description: Enameled, cast-iron, island medical plumbing fixture with separate wall-mounting faucet.
 - 1) Size: **66 by 30 by 18 inches (1680 by 765 by 455 mm)**.
 - 2) Base: Enameled, cast iron to raise rim of bathtub to **28 inches (710 mm)** above the floor.
 - 3) Faucet: Shower **OR** Sink, **as directed**, modified to include tub filler spout.
 - 4) Supplies: **NPS 1/2 (DN 15)** chrome-plated copper tubes or flexible connectors, **as directed**, with stops. Include atmospheric vacuum breaker.
 - 5) Drain: **NPS 1-1/2 (DN 40)**; chrome-plated exposed parts; brass pop-up waste and overflow.
 - 6) Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; **0.045-inch- (1.1-mm-)** thick tubular-brass waste to wall; and wall flange.

2. Bathing Units:

- a. Description: Plastic-tub, institutional side-entry bath **OR** whirlpool-bath, **as directed**, fixture with integral controls.
 - 1) Tub Size: **60 by 30 inches (1525 by 765 mm)**.
 - 2) Controls: Vacuum breakers on supplies, thermostatic mixing valve, tub fill spout, and hand-held shower head.
 - 3) Supplies: **NPS 3/4 (DN 20) OR NPS 1 (DN 25)**, **as directed**, copper tubing with ball, gate, or globe valves.
 - 4) Drain: **NPS 1-1/2 (DN 40)** and **NPS 2 (DN 50)**.
 - 5) Drain Piping: **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50)**, **as directed**, cast-brass P-trap, waste to wall, and wall flange. Include combined drain piping if two drains.

3. Bathing Units:

- a. Description: Plastic-tub, institutional side-entry **OR** transfer-lift-entry **OR** slide-on-entry, **as directed**, adjustable-height **OR** fixed-height, **as directed**, bath fixture with integral controls.
 - 1) Tub Size: **60 by 30 inches (1525 by 765 mm)**.
 - 2) Controls: Vacuum breakers on supplies, thermostatic mixing valve, tub fill spout, and hand-held shower head.
 - 3) Supplies: **NPS 3/4 (DN 20) OR NPS 1 (DN 25)**, **as directed**, copper tubing with ball, gate, or globe valves.
 - 4) Drain: **NPS 1-1/2 (DN 40)** and **NPS 2 (DN 50)**.
 - 5) Drain Piping: **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50)**, **as directed**, cast-brass P-trap, waste to wall, and wall flange. Include combined drain piping if two drains.
 - 6) Lift System: Not required.

4. Bathing Units:

- a. Description: Plastic-tub, institutional front-entry shower fixture with integral controls.
 - 1) Cabinet Size: **35 by 41 inches (889 by 1041 mm)**.
 - 2) Controls: Vacuum breakers on supplies, thermostatic mixing valve, tub fill spout, and hand-held shower head.
 - 3) Supplies: **NPS 3/4 (DN 20) OR NPS 1 (DN 25)**, **as directed**, copper tubing with ball, gate, or globe valves.
 - 4) Drain: **NPS 2 (DN 50)**.
 - 5) Drain Piping: **NPS 2 (DN 50)** cast-brass P-trap, waste to wall, and wall flange.

5. Residential Bath Tubs:
- a. Description: Plastic island or against-wall-installation, **as directed**, medical plumbing fixture with side door, seat, and separate wall-mounting faucet.
 - 1) Size 1
 - a) Size: Approximately **60 by 32 by 21 inches (1525 by 815 by 535 mm)**.
 - b) Seat: Integral.
 - c) Drain Location: Left **OR** Right, **as directed**, end.
 - 2) Size 2
 - a) Size: Approximately **60 by 42 by 24.5 inches (1525 by 1070 by 620 mm)**.
 - b) Seat: Integral bench **OR** None, **as directed**.
 - c) Drain Location: Right end.
 - 3) Material: PMMA.
 - 4) Skirt: Front only **OR** Full, on three sides, **as directed**.
 - 5) Door: Side opening with rubber sealing gasket.
 - 6) Faucet: Shower **OR** Sink, **as directed**, modified to include tub filler spout.
 - 7) Supplies: **NPS 1/2 (DN 15)** chrome-plated copper tubes or flexible connectors, **as directed**, with stops. Include atmospheric vacuum breaker.
 - 8) Drain: **NPS 1-1/2 (DN 40)**; chrome-plated exposed parts; brass pop-up waste and overflow.
 - 9) Drain Piping: **NPS 1-1/2 (DN 40)** cast-brass P-trap and **0.045-inch- (1.1-mm-)** thick, tubular-brass waste to wall.

R. Sitz Baths:

1. Description: Pedestal-mounting **OR** Wall-mounting, **as directed**, vitreous-china, perineal bath medical plumbing fixture.
 - a. Color: White.
 - b. Drain: **NPS 1-1/2 (DN 40)** with removable overflow attachment.
 - c. Drain Piping: **NPS 1-1/2 (DN 40)** chrome-plated, cast-brass P-trap; waste to wall; and wall flange.
 - d. Fixture Support: Sink.
 - e. Faucet:
 - 1) Description: Wall-mounting, single-lever-handle, thermostatic-mixing-valve faucet with concealed supplies and wall-mounting thermometer.
 - a) Material: Brass body and escutcheon.
 - b) Flow Rate: Modified to **1.5 gpm (5.7 L/min.)** maximum, unless otherwise indicated.
 - c) Finish: Polished chrome plate.
 - d) Temperature Indicators: Color-coded for hot and cold water.
 - f. Exposed Piping: Chrome-plated; brass pipe or copper tube.

S. Bedpan Washing Equipment

1. Bedpan Washers/Sanitizers:
 - a. Description: Recessed-mounting **OR** On-wall-mounting **OR** Pedestal-mounting, **as directed**, medical plumbing fixture for cleaning bedpans and urinals having cast-iron chamber and waste assembly with spray nozzles and enameled-steel **OR** stainless-steel, **as directed**, front panel and cover box.
 - 1) Controls: Electric, 120-V ac, automatic operation with timer, solenoid valves, and circuit breaker.
 - 2) Door Mechanism: Foot-pedal operation.
 - 3) Supplies: **NPS 1 (DN 25)** cold water and **NPS 3/8 (DN 10)** hot water **OR** steam, **as directed**.
 - 4) Drain: **NPS 3 (DN 80)** P-trap and soil pipe.
 - 5) Atmospheric Vent: **NPS 2 (DN 50)**.
 - 6) Mounting Hardware: Matching fixture mounting arrangement.
 - 7) Accessories:
 - a) Bedpan Rack(s): One **OR** Two, **as directed**.

- b) Urinal Rack(s): One **OR** Two, **as directed**.
 - c) Drain Tray(s): One **OR** Two, **as directed**.
 - 2. Bedpan Washers/Disinfectors:
 - a. Description: Freestanding-mounting **OR** On-wall-mounting **OR** Undercounter-mounting, **as directed**, medical plumbing fixture for cleaning bedpans and urinals; with steam generator, pump, and spray nozzle.
 - 1) Controls: Electric, automatic operation.
 - 2) Cabinet: Stainless steel.
 - 3) Wash Chamber: Stainless steel.
 - 4) Supplies: **NPS 1/2 (DN 15)** cold water and **NPS 1/2 (DN 15)** hot water.
 - 5) Drain: **NPS 4 (DN 100)** P-trap and soil pipe.
 - 6) Mounting Hardware: Matching fixture mounting arrangement.
- T. Hydrotherapy Whirlpools
 - 1. Podiatry Whirlpools:
 - a. Description: Stationary, stainless-steel tank for feet and ankles.
 - 1) Water Capacity: **15 gal. (57 L)**.
 - 2) Drain: Waste connection.
 - 3) Controls.
 - 4) Thermometer: Control panel or tank mounted.
 - 5) One electric turbine ejector.
 - 2. Upper-Extremity Whirlpools:
 - a. Description: Stationary, pedestal-mounted, stainless-steel tank for arms, hands, and elbows.
 - 1) Water Capacity: **25 gal. (95 L)**.
 - 2) Drain: Waste connection.
 - 3) One arm support.
 - 4) Controls.
 - 5) Thermometer: Control panel or tank mounted.
 - 6) One electric turbine ejector.
 - 3. High-Tank Body Whirlpools:
 - a. Description: Stationary, stainless-steel tank for legs, hip, and back.
 - 1) Water Capacity: **105 gal. (397 L)**.
 - 2) Drain: Waste connection.
 - 3) Controls.
 - 4) Thermometer: Control panel or tank mounted.
 - 5) One electric turbine ejector.
 - 4. Low-Tank Body Whirlpools:
 - a. Description: Stationary, extended-length stainless-steel tank for legs, hip, and lower back.
 - 1) Water Capacity: **105 gal. (397 L)**.
 - 2) Drain: Waste connection.
 - 3) Controls.
 - 4) Thermometer: Control panel or tank mounted.
 - 5) Head rest.
 - 6) One electric turbine ejector.
 - 5. Small, Hubbard Immersion Tanks:
 - a. Description: Stationary, butterfly-shaped tank, for full-body massage
 - 1) Tank Dimensions: **93 by 64 by 22 inches (2362 by 1626 by 560 mm)**.
 - 2) Overall Height: **34 to 38 inches (864 to 965 mm)**.
 - 3) Water Capacity: **268 gal. (1014 L)**.
 - 4) Material: Stainless steel.
 - 5) Supports: Legs or base.
 - 6) Controls.
 - 7) Thermometer: Control panel or tank rim mounted.
 - 8) Supply: Over-the-rim fill spout.

- 9) Drains: Two waste connections.
 - 10) Electric Turbine Ejectors: Two; one rail mounted on each side.
 - 11) Thermostatic, mixing-valve assembly.
 - 12) Hose and hand-held shower.
 - 13) Wash-out-hose assembly.
 - 14) Stretcher lift.
 - 15) Overhead electric, **as directed**, hoist.
6. Medium, Hubbard Immersion Tanks:
- a. Description: Stationary, butterfly-shaped tank, for full-body massage.
 - 1) Tank Dimensions: **100 by 73 by 24 inches** (2540 by 1854 by 610 mm).
 - 2) Overall Height: **34 to 38 inches** (864 to 965 mm).
 - 3) Water Capacity: **377 gal.** (1468 L).
 - 4) Material: Stainless steel.
 - 5) Supports: Legs or base.
 - 6) Controls.
 - 7) Thermometer: Control panel or tank rim mounted.
 - 8) Supply: Over-the-rim fill spout.
 - 9) Drain: One waste connection.
 - 10) Electric Turbine Ejector: One, panel mounted.
 - 11) Thermostatic, mixing-valve assembly.
 - 12) Hose and hand-held shower.
 - 13) Wash-out-hose assembly.
 - 14) Stretcher lift.
 - 15) Overhead electric, **as directed**, hoist.
7. Large, Hubbard Immersion Tanks:
- a. Description: Stationary, butterfly-shaped tank, for full-body massage.
 - 1) Tank Dimensions: **106 by 77 by 22 inches** (2692 by 1956 by 560 mm).
 - 2) Overall Height: **34 inches** (864 mm).
 - 3) Water Capacity: **425 gal.** (1609 L).
 - 4) Material: Stainless steel.
 - 5) Supports: Legs or base.
 - 6) Controls.
 - 7) Thermometer: Control panel or tank rim mounted.
 - 8) Supply: Over-the-rim fill spout.
 - 9) Drain(s): One or two waste connections.
 - 10) Electric Turbine Ejectors: Two; one rail mounted on each side.
 - 11) Thermostatic, mixing-valve assembly.
 - 12) Hose and hand-held shower.
 - 13) Wash-out-hose assembly.
 - 14) Stretcher lift.
 - 15) Overhead electric, **as directed**, hoist.
8. Full-Body Immersion Tanks:
- a. Description: Stationary, rectangular tank, for full-body massage
 - 1) Tank Dimensions: **90 by 32 by 19 inches** (2286 by 813 by 483 mm) **OR 95 by 41 by 22 inches** (2413 by 1041 by 560 mm), **as directed**.
 - 2) Overall Height: **32 or 34 inches** (813 or 860 mm).
 - 3) Water Capacity: **195 gal.** (738 L) **OR 260 gal.** (984 L), **as directed**.
 - 4) Material: Stainless steel.
 - 5) Supports: Legs or base.
 - 6) Controls.
 - 7) Thermometer: Control panel or tank rim mounted.
 - 8) Supply: Over-the-rim fill spout.
 - 9) Drain(s): One or two waste connections.
 - 10) Electric Turbine Ejector: One, tank mounted at end **OR** on rail **OR** on side, **as directed**.
 - 11) Thermostatic, mixing-valve assembly.

- 12) Hose and hand-held shower.
- 13) Wash-out-hose assembly.
- 14) Stretcher lift.
- 15) Overhead electric, **as directed**, hoist.

U. Outlet Boxes

1. Dialysis Equipment Outlet Boxes:

- a. Description: Recessed-mounting outlet box with water supply and drain connections.
 - 1) Box and Faceplate: Stainless steel.
 - 2) Supply Fitting(s): 1 **OR** 2, **as directed**, **NPS 1/2 (DN 15)** PVC ball valve(s) and adapter with male hose-thread outlet.
 - 3) Drain: **NPS 2 (DN 50)** standpipe, P-trap, and direct waste connection to drainage piping.
- b. Reinforcement: **2-by-4-inch (50-by-100-mm)** fire-retardant-treated-wood blocking between studs. Fire-retardant-treated wood blocking is specified in Division 06 Section "Rough Carpentry".

V. Morgue Equipment

1. Autopsy Tables:

- a. Description: Pedestal stainless-steel table with sink; designed for downdraft ventilation.
 - 1) Material: Stainless steel.
 - 2) Overall Size: Approximately **88 by 30 inches (2250 by 760 mm)** with deck faucet holes.
 - 3) Faucet: Deck mounted with wrist- or elbow-blade handles.
 - 4) Aspirator: Deck mounted.
 - 5) Removable body supports.
 - 6) Rinse Assembly: Deck-mounted faucet with hose.
 - 7) Disposer: Not required **OR** Required, **as directed**.
 - 8) Fixture Support: Sink.
 - 9) Receptacle: Duplex, hospital grade with ground-fault interruption.
 - 10) Supplies: Chrome-plated copper tubes or flexible connectors, **as directed**, with atmospheric vacuum breakers and stops.
 - 11) Drain: Chrome-plated, cast-brass P-trap and waste to wall.

2. Dissecting Sinks:

- a. Description: Wall-mounting sink with backsplash.
 - 1) Material: Stainless steel.
 - 2) Overall Size: **84 by 28 inches (2134 by 711 mm)** with back faucet holes.
 - 3) Sink Size: Approximately **30 inches (763 mm)** wide.
 - 4) Equipment drawer.
 - 5) Faucet: Back mounted with wrist- or elbow-blade handles.
 - 6) Aspirator: Back mounted.
 - 7) Rinse Assembly: One back-mounted faucet with hose.
 - 8) Disposer: Not required **OR** Required, **as directed**.
 - 9) Fixture Support: Sink.
 - 10) Supplies: Chrome-plated copper tubes or flexible connectors, **as directed**, with atmospheric vacuum breakers and stops.
 - 11) Drain: Chrome-plated, cast-brass P-trap and waste to wall.
 - 12) Back-mounted, hand-held-type eye wash.

1.3 EXECUTION

A. Installation

1. Assemble medical plumbing fixtures, trim, fittings, and other components according to manufacturers' written instructions.

2. Install off-floor supports, affixed to building substrate, for wall-mounting fixtures.
 - a. Use carrier supports with waste fitting and seal for back-outlet fixtures.
 - b. Use carrier supports without waste fitting for fixtures with tubular waste piping.
 - c. Use chair-type carrier supports with rectangular steel uprights for accessible fixtures.
 3. Install back-outlet, wall-mounting fixtures onto waste fitting seals and attach to supports.
 4. Install floor-mounting fixtures on closet flanges or other attachments to piping or building substrate.
 5. Install wall-mounting fixtures with tubular waste piping attached to supports.
 6. Install counter-mounting fixtures in and attached to casework.
 7. Install fixtures level and plumb according to roughing-in drawings.
 8. Install water-supply piping with stop on each supply to each fixture to be connected to domestic water piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.
 - a. Exception: Use ball, gate, or globe valve if stops are not specified with fixture. Valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 9. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.
 10. Install flushometer valves for accessible water closets with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
 11. Install toilet seats on water closets.
 12. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.
 13. Install shower flow-control fittings with specified maximum flow rates in shower arms.
 14. Install traps on fixture outlets.
 - a. Exception: Omit trap on fixtures with integral traps.
 15. Install escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings. Escutcheons are specified in Division 22 Section "Common Work Results For Plumbing".
 16. Set showers in leveling bed of cement grout. Grout is specified in Division 22 Section "Common Work Results For Plumbing".
 17. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants".
- B. Connections
1. Piping installation requirements are specified in other Division 14.. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Connect water supplies from domestic water piping to medical plumbing fixtures.
 3. Connect drain piping from medical plumbing fixtures to sanitary waste and vent piping.
 4. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 5. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Verify that installed medical plumbing fixtures are categories and types specified for locations where installed.
 2. Check that medical plumbing fixtures are complete with trim, faucets, fittings, and other specified components.
 3. Inspect installed medical plumbing fixtures for damage. Replace damaged fixtures and components.
 4. Test installed fixtures after water systems are pressurized for proper operation. Replace malfunctioning fixtures and components, then retest. Repeat procedure until units operate properly.
 5. Install fresh batteries in sensor-operated mechanisms.

22 - Plumbing



- D. Adjusting
 - 1. Operate and adjust faucets and controls. Replace damaged and malfunctioning medical plumbing fixtures, fittings, and controls.
 - 2. Adjust water pressure at faucets, shower valves, and flushometer valves to produce proper flow and stream.
 - 3. Replace washers and seals of leaking and dripping faucets and stops.

- E. Cleaning
 - 1. Clean medical plumbing fixtures, faucets, and other fittings with manufacturers' recommended cleaning methods and materials. Do the following:
 - a. Remove faucet spouts and strainers, remove sediment and debris, and reinstall strainers and spouts.
 - b. Remove sediment and debris from drains.
 - 2. After completing installation of exposed, factory-finished fixtures, faucets, and fittings, inspect exposed finishes and repair damaged finishes.

- F. Protection
 - 1. Provide protective covering for installed fixtures and fittings.
 - 2. Do not allow use of medical plumbing fixtures for temporary facilities unless approved in writing by the Owner.

END OF SECTION 22 43 00 00

Task	Specification	Specification Description
22 43 13 00	22 40 00 00	Plumbing Fixtures
22 43 13 00	22 45 00 00	Emergency Plumbing Fixtures
22 43 16 00	22 40 00 00	Plumbing Fixtures
22 43 16 00	22 45 00 00	Emergency Plumbing Fixtures
22 43 39 00	22 40 00 00	Plumbing Fixtures
22 43 39 00	22 43 00 00	Medical Plumbing Fixtures
22 43 39 00	22 45 00 00	Emergency Plumbing Fixtures
22 43 43 00	22 40 00 00	Plumbing Fixtures

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SECTION 22 45 00 00 - EMERGENCY PLUMBING FIXTURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for emergency plumbing fixtures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work

B. Summary

1. This Section includes the following emergency plumbing fixtures:
 - a. Emergency showers.
 - b. Eyewash equipment.
 - c. Self-contained eyewash equipment.
 - d. Personal eyewash equipment.
 - e. Eye/face wash equipment.
 - f. Hand-held drench hoses.
 - g. Combination units.
 - h. Water-tempering equipment.

C. Definitions

1. Accessible Fixture: Emergency plumbing fixture that can be approached, entered, and used by people with disabilities.
2. Plumbed Emergency Plumbing Fixture: Fixture with fixed, potable-water supply.
3. Self-Contained Emergency Plumbing Fixture: Fixture with flushing-fluid-solution supply.
4. Tepid: Moderately warm.

D. Submittals

1. Product Data: For each type of product indicated. Include flow rates and capacities, furnished specialties, and accessories.
2. Shop Drawings: Diagram power, signal, and control wiring.
3. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ANSI Standard: Comply with ANSI Z358.1, "Emergency Eyewash and Shower Equipment."
3. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for plumbing fixtures for people with disabilities.
4. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.

1.2 PRODUCTS

1.3 PERFORMANCE REQUIREMENTS

- A. Comply with ANSI/ISEA Z358.1 for emergency plumbing fixtures including third-party certification of fixtures.

- B. Comply with ASSE 1071 for temperature-actuated mixing valves for plumbed emergency fixtures.
- C. Comply with ASME A112.18.1/CSA B125.1 for water-supply fittings.
- D. Comply with ASME A112.18.2/CSA B125.2 for plumbing waste fittings.
- E. Comply with NSF 61 and NSF 372 for fixture materials that will be in contact with potable water.
- F. Comply with requirements in ICC A117.1 for plumbing fixtures for people with disabilities.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- H. Emergency Showers:
 - 1. Description: Plumbed, single-shower-head horizontal, wall-mounting **OR** vertical, ceiling-mounting **OR** freestanding, **as directed**, emergency shower.
 - a. Capacity: Deliver potable water at rate not less than **20 gpm (76 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1 (DN 25) OR NPS 1-1/4 (DN 32) OR** galvanized steel **OR** chrome-plated brass or stainless steel **OR** PVC, **as directed**, with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Pull rod **OR** chain, **as directed**.
 - d. Shower Head: **8-inch (200-mm)** minimum diameter, chrome-plated brass or stainless steel **OR** plastic, **as directed**.
 - 2. Description: Plumbed, multiple-spray emergency shower with eight **OR** 12 **OR** 16, **as directed**, small shower heads or nozzles.
 - a. Capacity: Deliver potable water at rate not less than **20 gpm (76 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1-1/4 (DN 32)** minimum galvanized **OR** chrome-plated brass or stainless, **as directed**, steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle **OR** Treadle, **as directed**.
 - 3. Description: Plumbed, freeze-protected, freestanding emergency shower.
 - a. Capacity: Deliver potable water at rate not less than **20 gpm (76 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1-1/4 (DN 32)** galvanized steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Pull rod **OR** chain, **as directed**.
 - d. Shower Head: **8-inch (200-mm)** minimum diameter, chrome-plated brass or stainless steel **OR** plastic, **as directed**.
 - e. Heating System: 120 **OR** 240, **as directed**,-V ac electric; and insulation with protective jacket.
- I. Eyewash Equipment
 - 1. Description: Plumbed, freestanding eyewash equipment.
 - a. Capacity: Deliver potable water at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle **OR** Push bar **OR** Treadle, **as directed**.
 - d. Receptor: Chrome-plated brass or stainless-steel **OR** Plastic, **as directed**, bowl.
 - e. Drain Piping: **NPS 1-1/4 (DN 32)** minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2 **OR** Omit drain piping **OR** Include galvanized-steel indirect connection to drainage system, **as directed**.
 - 2. Description: Plumbed, accessible, **as directed**, wall-mounting eyewash equipment with receptor and wall bracket.

- a. Capacity: Deliver potable water at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle.
 - d. Receptor: Chrome-plated brass or stainless-steel **OR Plastic, as directed**, bowl.
 - e. Drain Piping: **NPS 1-1/4 (DN 32)** minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2.
3. Description: Plumbed, accessible, **as directed**, wall-mounting eyewash equipment with wall bracket.
 - a. Capacity: Deliver potable water at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle **OR Movement sensor, as directed**.
 4. Description: Plumbed, adjacent-to-sink, swivel, counter-mounting eyewash equipment.
 - a. Capacity: Deliver potable water at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle.
- J. Self-Contained Eyewash Equipment:
1. Description: Portable, pressurized, self-contained eyewash equipment.
 - a. Capacity: Deliver flushing fluid at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Tank: **10 gal. (3.8 L)**, stainless steel, cylindrical, and suitable for on-floor installation.
 - c. Flushing Fluid: Medically acceptable solution manufactured and labeled according to applicable regulations.
 - d. Piping: Chrome-plated copper alloy or stainless steel with flow regulator and stay-open control valve.
 - e. Control-Valve Actuator: Paddle.
 - f. Spray Heads: Twin with covers.
 2. Description: Static, nonpressurized, self-contained eyewash equipment.
 - a. Capacity: Deliver flushing fluid at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Tank: **14 gal. (53 L)** minimum, plastic, and suitable for shelf mounting.
 - c. Flushing Fluid: Medically acceptable solution manufactured and labeled according to applicable regulations.
 - d. Actuator: Pull-down front panel.
 - e. Spray Heads: Protected, twin.
 3. Description: Freeze-protected, static, nonpressurized, self-contained eyewash equipment with heating system.
 - a. Capacity: Deliver flushing fluid at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - b. Tank: **14 gal. (53 L)** minimum **OR 20 gal. (76 L)** minimum, **as directed**, plastic, and suitable for shelf mounting.
 - c. Flushing Fluid: Medically acceptable solution manufactured and labeled according to applicable regulations.
 - d. Actuator: Pull-down front panel.
 - e. Spray Heads: Protected, twin.
 - f. Heating System: Electric, 120-V ac; and insulation with protective jacket.
- K. Personal Eyewash Equipment:
1. Description: Portable, pressurized, personal eyewash equipment with spray heads.
 - a. Capacity: Deliver flushing fluid at rate not less than **0.4 gpm (1.5 L/min.)**, **as directed**.

- b. Tank: **5 gal. (19 L)**, stainless steel, cylindrical, and with base suitable for on-floor installation.
 - c. Flushing Fluid: Medically acceptable solution manufactured and labeled according to applicable regulations.
 - d. Piping: Chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - e. Control-Valve Actuator: Paddle.
 - f. Spray Heads: Twin with covers.
2. Description: Portable, pressurized, personal eyewash equipment with spray heads and drench hose.
- a. Capacity: Deliver flushing fluid at rate not less than **0.4 gpm (1.5 L/min.)**, **as directed**.
 - b. Tank: **5 gal. (19 L)**, stainless steel, cylindrical, and with base suitable for on-floor installation.
 - c. Flushing Fluid: Medically acceptable solution manufactured and labeled according to applicable regulations.
 - d. Piping: Chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - e. Spray-Head, Control-Valve Actuator: Paddle.
 - f. Spray Heads: Twin with covers.
 - g. Drench Hose: Rubber or plastic.
 - 1) Control-Valve Actuator: Hand-held squeeze valve.
 - 2) Spray Head: Single with cover.
- L. Eye/Face Wash Equipment:
1. Description: Plumbed, freestanding, pedestal eye/face wash equipment.
 - a. Capacity: Deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle **OR** Push bar **OR** Treadle, **as directed**.
 - d. Receptor: Chrome-plated brass or stainless-steel **OR** Plastic, **as directed**, bowl.
 - e. Drain Piping: **NPS 1-1/4 (DN 32)** minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2. Include galvanized-steel indirect connection to drainage system.
 2. Description: Plumbed, accessible, **as directed**, wall-mounting eye/face wash equipment with receptor and wall bracket.
 - a. Capacity: Deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle.
 - d. Receptor: Chrome-plated brass or stainless-steel **OR** Plastic, **as directed**, bowl.
 - e. Drain Piping: **NPS 1-1/4 (DN 32)** minimum, chrome-plated brass, receptor drain, P-trap, waste to wall, and wall flange complying with ASME A112.18.2.
 3. Description: Plumbed, accessible, **as directed**, wall-mounting eye/face wash equipment without receptor and with wall bracket.
 - a. Capacity: Deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle.
 4. Description: Plumbed, adjacent-to-sink, swivel, counter-mounting eye/face wash equipment.
 - a. Capacity: Deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.

- b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle.
- M. Hand-Held Drench Hoses:
1. Description: Plumbed, wall-mounting, hand-held drench hose with wall bracket.
 - a. Capacity: Deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - b. Supply Piping: **NPS 1/2 (DN 15)** chrome-plated brass or stainless steel with flow regulator and stay-open control valve.
 - c. Control-Valve Actuator: Paddle.
 - d. Hose: Coiled **OR** Plain, **as directed**, rubber or plastic.
 - e. Spray Heads: Single **OR** Twin, **as directed**.
 2. Description: Plumbed, counter-mounting, hand-held drench hose.
 - a. Capacity: Deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - b. Supply Fitting: **NPS 1/2 (DN 15)** brass with flow regulator.
 - c. Hose: Rubber or plastic.
 - d. Control-Valve Actuator: Hand-held squeeze valve.
 - e. Spray Heads: Single **OR** Twin, **as directed**.
- N. Combination Units:
1. Description: Plumbed, accessible, **as directed**, freestanding, with emergency shower and eyewash **OR** eye/face wash **OR** drench hose, **as directed**, equipment.
 - a. Piping: Galvanized steel **OR** Chrome-plated brass or stainless steel **OR** PVC, **as directed**.
 - 1) Unit Supply: **NPS 1-1/4 (DN 32)** minimum **OR** **NPS 1-1/2 (DN 40)**, **as directed**, from top **OR** side, **as directed**.
 - 2) Unit Drain: Outlet at side near bottom.
 - 3) Shower Supply: **NPS 1 (DN 25)** with flow regulator and stay-open control valve.
 - 4) Eyewash **OR** Eye/Face Wash **OR** Drench Hose, **as directed**, Supply: **NPS 1/2 (DN 15)** with flow regulator and stay-open control valve.
 - b. Shower Capacity: Deliver potable water at rate not less than **20 gpm (76 L/min.)** for at least 15 minutes.
 - 1) Control-Valve Actuator: Pull rod **OR** Pull chain **OR** Treadle, **as directed**.
 - 2) Shower Head: **8-inch (200-mm)** minimum diameter, chrome-plated brass or stainless steel **OR** plastic, **as directed**.
 - c. Eyewash Equipment: With capacity to deliver potable water at rate not less than **0.4 gpm (1.5 L/min.)** for at least 15 minutes.
 - 1) Control-Valve Actuator: Paddle **OR** Push bar, **as directed**.
 - 2) Receptor: Chrome-plated brass or stainless-steel **OR** Plastic, **as directed**, bowl.
 - d. Eye/Face Wash Equipment: With capacity to deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - 1) Control-Valve Actuator: Paddle **OR** Push bar, **as directed**.
 - 2) Receptor: Chrome-plated brass or stainless-steel **OR** Plastic, **as directed**, bowl.
 - e. Hand-Held Drench Hose: With capacity to deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - 1) Hose: Rubber or plastic.
 - 2) Control-Valve Actuator: Hand-held squeeze valve.
 - 3) Spray Head(s): Single **OR** Twin, **as directed**.
 2. Description: Plumbed, accessible, **as directed**, freeze-protected, freestanding, with emergency shower and eye/face wash equipment.
 - a. Piping: Galvanized steel.
 - 1) Unit Supply: **NPS 1-1/4 (DN 32)** minimum **OR** **NPS 1-1/2 (DN 40)**, **as directed**, from top **OR** side **OR** bottom, **as directed**.
 - 2) Shower Supply: **NPS 1 (DN 25)** with flow regulator and stay-open control valve.

- 3) Eye/Face Wash Supply: **NPS 1/2 (DN 15)** with flow regulator and stay-open control valve.
 - b. Heating System: Electric, 120 **OR** 240, **as directed**, -V ac; and insulation with protective jacket.
 - c. Shower Capacity: Deliver potable water at rate not less than **20 gpm (76 L/min.)** for at least 15 minutes.
 - 1) Control-Valve Actuator: Pull rod **OR** Pull chain **OR** Treadle, **as directed**.
 - 2) Shower Head: **8-inch (200-mm)** minimum diameter, chrome-plated brass or stainless steel **OR** plastic, **as directed**.
 - d. Eye/Face Wash Equipment: With capacity to deliver potable water at rate not less than **3.0 gpm (11.4 L/min.)** for at least 15 minutes.
 - 1) Control-Valve Actuator: Paddle **OR** Push bar, **as directed**.
- O. Water-Tempering Equipment:
1. Description: Factory-fabricated, hot- and cold-water-tempering equipment with thermostatic mixing valve.
 - a. Thermostatic Mixing Valve: Designed to provide **85 deg F (29 deg C)** tepid, potable water at emergency plumbing fixtures, to maintain temperature at plus or minus **5 deg F (3 deg C)** throughout required 15-minute test period, and in case of unit failure to continue cold-water flow, with union connections, controls, metal piping, and corrosion-resistant enclosure.
 2. Description: Factory-fabricated, steam and cold-water, water-tempering equipment with thermostatic mixing valve.
 - a. Thermostatic Mixing Valve: Designed to provide **85 deg F (29 deg C)** tepid, potable water at emergency plumbing fixtures, to maintain temperature at plus or minus **5 deg F (3 deg C)** throughout required 15-minute test period, and in case of unit failure to continue cold-water flow, with union connections, steam controls, heat exchanger, high-temperature-limit and freeze-protection devices, metal piping, and corrosion-resistant enclosure.
 3. Description: Factory-fabricated, water-tempering equipment with electric heating.
 - a. Heating System: Electric, designed to provide **85 deg F (29 deg C)** tepid, potable water at emergency plumbing fixtures, to maintain temperature at plus or minus **5 deg F (3 deg C)** throughout required 15-minute test period, and in case of unit failure to continue cold-water flow, with union connections, controls, heating coils, high-temperature-limit device, metal piping, and corrosion-resistant enclosure.
 - 1) Electrical Characteristics: 208-V ac, 38 **OR** 220-V ac, 40 **OR** 277-V ac, 32, **as directed**, A, single phase, 60 Hz.

1.4 EXECUTION

A. Installation

1. Assemble emergency plumbing fixture piping, fittings, control valves, and other components.
2. Install fixtures level and plumb.
3. Fasten fixtures to substrate.
4. Install shutoff valves in water-supply piping to fixtures. Use ball, gate, or globe valve if specific type valve is not indicated. Install valves chained or locked in open position if permitted. Install valves in locations where they can easily be reached for operation. Valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
 - a. Exception: Omit shutoff valve on supply to group of plumbing fixtures that includes emergency plumbing fixture.
 - b. Exception: Omit shutoff valve on supply to emergency equipment if prohibited by authorities having jurisdiction.
5. Install shutoff valve and strainer in steam piping and shutoff valve in condensate return piping.

6. Install dielectric fitting in supply piping to fixture if piping and fixture connections are made of different metals. Dielectric fittings are specified in Division 22 Section "Common Work Results For Plumbing".
 7. Install thermometers in supply and outlet piping connections to water-tempering equipment. Thermometers are specified in Division 22 Section "Meters And Gages For Plumbing Piping".
 8. Install trap and waste to wall on drain outlet of fixture receptors that are indicated to be directly connected to drainage system.
 9. Install indirect waste piping to wall on drain outlet of fixture receptors that are indicated to be indirectly connected to drainage system. Drainage piping is specified in Division 22 Section "Sanitary Waste And Vent Piping".
 10. Install escutcheons on piping wall and ceiling penetrations in exposed, finished locations. Escutcheons are specified in Division 22 Section "Common Work Results For Plumbing".
 11. Fill self-contained fixtures with flushing fluid.
 12. Install equipment nameplates or equipment markers on fixtures and equipment signs on water-tempering equipment. Identification materials are specified in Division 22 Section "Identification For Plumbing Piping And Equipment".
 13. Piping installation requirements are specified in other Division 14. Drawings indicate general arrangement of piping, fittings, and specialties.
 14. Connect cold-water-supply piping to plumbed emergency plumbing fixtures not having water-tempering equipment.
 15. Connect hot- and cold-water-supply piping to hot- and cold-water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures.
 16. Connect cold-water and steam supply and condensate return piping to steam and cold-water-tempering equipment. Connect output from water-tempering equipment to emergency plumbing fixtures.
 17. Connect cold water and electrical power to electric heating water-tempering equipment.
 18. Directly connect emergency plumbing fixture receptors with trapped drain outlet to sanitary drainage and vent piping.
 19. Indirectly connect emergency plumbing fixture receptors without trapped drain outlet to sanitary or storm drainage piping.
 20. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 21. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- B. Field Quality Control
1. Electrical-Component Testing: After electrical circuitry has been energized, test for compliance with requirements.
 - a. Test and adjust controls and safeties.
 2. Repair or replace malfunctioning units. Retest as specified above after repairs or replacements are made.
- C. Adjusting
1. Adjust or replace fixture flow regulators for proper flow.
 2. Adjust equipment temperature settings.

END OF SECTION 22 45 00 00

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Task	Specification	Specification Description
22 45 13 00	22 40 00 00	Plumbing Fixtures
22 45 13 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 16 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 23 00	22 40 00 00	Plumbing Fixtures
22 45 23 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 26 00	22 40 00 00	Plumbing Fixtures
22 45 26 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 29 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 33 00	22 40 00 00	Plumbing Fixtures
22 45 33 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 36 00	22 45 00 00	Emergency Plumbing Fixtures
22 45 39 00	22 45 00 00	Emergency Plumbing Fixtures

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SECTION 22 47 13 00 - DRINKING FOUNTAINS AND WATER COOLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for drinking fountains and water coolers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Style F, freestanding drinking fountains.
 - b. Style W, wall-mounting drinking fountains.
 - c. Type PB, pressure with bubbler, Style F, freestanding water coolers.
 - d. Type PB, pressure with bubbler, Style W, wall-mounting water coolers.
 - e. Fixture supports.

C. Definitions

1. Accessible Drinking Fountain or Water Cooler: Fixture that can be approached and used by people with disabilities.
2. Cast Polymer: Dense, cast-filled-polymer plastic.
3. Drinking Fountain: Fixture with nozzle for delivering stream of water for drinking.
4. Fitting: Device that controls flow of water into or out of fixture.
5. Fixture: Drinking fountain or water cooler unless one is specifically indicated.
6. Remote Water Cooler: Electrically powered equipment for generating cooled drinking water.
7. Water Cooler: Electrically powered fixture for generating and delivering cooled drinking water.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Diagram power, signal, and control wiring.
3. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Regulatory Requirements: Comply with requirements in ICC A117.1, "Accessible and Usable Buildings and Facilities"; Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act"; for fixtures for people with disabilities.
3. NSF Standard: Comply with NSF 61, "Drinking Water System Components--Health Effects," for fixture materials that will be in contact with potable water.
4. ARI Standard: Comply with ARI's "Directory of Certified Drinking Water Coolers" for style classifications.
5. ARI Standard: Comply with ARI 1010, "Self-Contained, Mechanically Refrigerated Drinking-Water Coolers," for water coolers and with ARI's "Directory of Certified Drinking Water Coolers" for type and style classifications.
6. ASHRAE Standard: Comply with ASHRAE 34, "Designation and Safety Classification of Refrigerants" for water coolers. Provide HFC 134a (tetrafluoroethane) refrigerant unless otherwise indicated.

1.2 PRODUCTS

A. Drinking Fountains

1. Description: Accessible, Style F, freestanding drinking fountain.
 - a. Pedestal:
 - 1) Material: Concrete **OR** Painted cast iron or steel, **as directed**.
 - 2) Shape: Rectangular **OR** Round, **as directed**, with offset to receptor **OR** with side receptor(s), **as directed**.
 - b. Receptor(s):
 - 1) Number: One **OR** Two **OR** Three, **as directed**.
 - 2) Material: Bronze **OR** Chrome-plated brass or stainless steel, **as directed**.
 - 3) Shape: Rectangular **OR** Round **OR** Rounded front, **as directed**.
 - 4) Bubbler: One for each receptor, with adjustable stream regulator, located on deck.
 - c. Controls: Foot pedal **OR** Push bar **OR** Push button, **as directed**, with adjustable stream regulator.
 - d. Access to Internal Components: Panel in pedestal.
 - e. Supply: **NPS 3/8 (DN 10) OR NPS 1/2 (DN 15)**, **as directed**, with ball, gate, or globe valve.
 - f. Drain: Grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2 **OR** waste to drainage system, **as directed**.
2. Description: Accessible, Style F, antifreeze, freestanding drinking fountain designed to operate without draining into ground.
 - a. Pedestal: Rectangular, painted cast iron or steel.
 - b. Receptor: Rectangular, chrome-plated brass or stainless steel with bubbler.
 - c. Control: Foot pedal with control valve assembly.
 - d. Supply: **NPS 1/2 (DN 15)** with underground shutoff and flow-control valve assembly.
 - e. Drain: Grid with **NPS 1 (DN 25) OR NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40)**, **as directed**, minimum waste to drainage system.
 - f. Bury Depth, Grade to Valve Components: **36 inches (915 mm) OR 48 inches (1220 mm) OR 60 inches (1525 mm)**, **as directed**.
3. Description: Accessible, Style W, wall-mounting drinking fountain.
 - a. Material: Bronze **OR** Metal **OR** Cast polymer **OR** Stainless steel **OR** Vitreous china complying with ASME 112.19.2M for drinking fountains with backsplash, **as directed**.
 - b. Receptor Shape: Rectangular **OR** Round **OR** Rounded front, **as directed**.
 - c. Back Panel: Stainless-steel wall plate behind drinking fountain.
 - d. Bubblers: One **OR** Two **OR** Three, **as directed**, with adjustable stream regulator, located on deck.
 - e. Control: Push button **OR** Push bar, **as directed**.
 - f. Supply: **NPS 3/8 (DN 10)** with ball, gate, or globe valve.
 - g. Drain: Grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - h. Support: Type I, water cooler carrier. Refer to "Fixture Supports" Article.
4. Description: Accessible, Style WS, wall-mounting, semirecessed drinking fountain.
 - a. Material: Stainless steel **OR** Bronze **OR** Vitreous china complying with ASME A112.19.2M for semirecessed drinking fountains, **as directed**.
 - b. Receptor Shape: Concave with projecting bowl.
 - c. Bubbler: One, with adjustable stream regulator, located on deck.
 - d. Control: Push button **OR** Push bar, **as directed**.
 - e. Supply: **NPS 3/8 (DN 10)** with ball, gate, or globe valve.
 - f. Drain: Integral punched grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - g. Support: Mounting frame or brackets for attaching to substrate.
5. Description: Style RE, stainless-steel, recessed drinking fountain.
 - a. Receptor Shape: Concave with flush wall flange.
 - b. Bubbler: One, with adjustable stream regulator, located on deck.

- c. Control: Push button **OR** bar, **as directed**.
 - d. Supply: **NPS 3/8 (DN 10)** with ball, gate, or globe valve.
 - e. Drain: Grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - f. Support: Mounting frame or brackets for attaching to substrate.
- B. Water Coolers**
1. Description: ARI 1010, Type PB, pressure with bubbler, Style F, freestanding or Style FW, flush-to-wall water cooler.
 - a. Cabinet: All stainless steel **OR** Steel with powder-coat-finish **OR** Vinyl-covered steel with stainless-steel top, **as directed**.
 - b. Bubbler: One, with adjustable stream regulator, located on deck.
 - c. Control: Push button **OR** Foot pedal, **as directed**.
 - d. Supply: **NPS 3/8 (DN 10)** with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain: Grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - g. Cooling System: Electric, with precooler, hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 1) Capacity: **5 gph (0.0053 L/s) OR 8 gph (0.0084 L/s) OR 10 gph (0.0105 L/s) OR 14 gph (0.0147 L/s), as directed**, of **50 deg F (10 deg C)** cooled water from **80 deg F (27 deg C)** inlet water and **90 deg F (32 deg C)** ambient air temperature.
 - 2) Electrical Characteristics: **1/6 OR 1/5 OR 1/4, as directed**, hp; 120-V ac; single phase; 60 Hz.
 2. Description: ARI 1010, Type PBC, pressure with bubbler and compartment, Style F, freestanding water cooler.
 - a. Cabinet: All stainless steel **OR** Vinyl-covered steel with stainless-steel top, **as directed**, with refrigerated compartment in front panel.
 - b. Bubbler: One, with adjustable stream regulator, located on deck.
 - c. Control: Push button.
 - d. Supply: **NPS 3/8 (DN 10)** with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain: Grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.2.
 - g. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 1) Capacity: **3 gph (0.0032 L/s) of 50 deg F (10 deg C)** cooled water from **80 deg F (27 deg C)** inlet water and **90 deg F (32 deg C)** ambient air temperature.
 - 2) Electrical Characteristics: **1/8 hp; 120-V ac; single phase; 60 Hz.**
 3. Description: Accessible, ARI 1010, Type PB, pressure with bubbler, Style W, wall-mounting water cooler for adult **OR** child, **as directed**, -mounting height.
 - a. Cabinet: Single **OR** Bilevel with two attached cabinets **OR** Bilevel with two attached cabinets and with bilevel skirt kit, **as directed**, all stainless steel **OR** vinyl-covered steel with stainless-steel top, **as directed**.
 - b. Bubbler: One, with adjustable stream regulator, located on each cabinet deck.
 - c. Control: Push button **OR** Push bar, **as directed**.
 - d. Supply: **NPS 3/8 (DN 10)** with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain(s): Grid with **NPS 1-1/4 (DN 32)** minimum horizontal waste and trap complying with ASME A112.18.1.

- g. Cooling System: Electric, with hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
- 1) Capacity: 5 gph (0.0053 L/s) OR 8 gph (0.0084 L/s), as directed, of 50 deg F (10 deg C) cooled water from 80 deg F (27 deg C) inlet water and 90 deg F (32 deg C) ambient air temperature.
 - 2) Electrical Characteristics: 1/6 OR 1/5 OR 1/4 OR 1/3, as directed, hp; 120-V ac; single phase; 60 Hz.
- h. Support: Type I OR II, as directed, water cooler carrier. Refer to "Fixture Supports" Article.
4. Description: Accessible, ARI 1010, Type PB, pressure with bubbler, Style WS, semirecessed water cooler.
- a. Cabinet: All stainless steel OR Vinyl-covered steel with stainless-steel top, as directed.
 - b. Bubbler: One, with adjustable stream regulator, located on deck.
 - c. Control: Push button OR Push bar, as directed.
 - d. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.2.
 - g. Cooling System: Electric, with precooler, hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 1) Capacity: 8 gph (0.0084 L/s) OR 12 gph (0.0126 L/s), as directed, of 50 deg F (10 deg C) cooled water from 80 deg F (27 deg C) inlet water and 90 deg F (32 deg C) ambient air temperature.
 - 2) Electrical Characteristics: 1/6 OR 1/5, as directed, hp; 120-V ac; single phase; 60 Hz. - h. Support: Mounting frame or brackets for attaching to substrate.
5. Description: ARI 1010, Type PB, pressure with bubbler, Style RE, recessed water cooler.
- a. Cabinet: All stainless steel.
 - b. Bubbler: One, with adjustable stream regulator, located on deck.
 - c. Control: Push button OR bar, as directed.
 - d. Supply: NPS 3/8 (DN 10) with ball, gate, or globe valve.
 - e. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - f. Drain: Grid with NPS 1-1/4 (DN 32) minimum horizontal waste and trap complying with ASME A112.18.2.
 - g. Cooling System: Electric, with precooler, hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, refrigerant, corrosion-resistant-metal storage tank, and adjustable thermostat.
 - 1) Capacity: 8 gph (0.0084 L/s) OR 12 gph (0.0126 L/s), as directed, of 50 deg F (10 deg C) cooled water from 80 deg F (27 deg C) inlet water and 90 deg F (32 deg C) ambient air temperature.
 - 2) Electrical Characteristics: 1/6 OR 1/5, as directed, hp; 120-V ac; single phase; 60 Hz. - h. Ventilation Grille: Stainless steel, located above OR below, as directed, fountain.
 - i. Support: Mounting frame for attaching to substrate.
- C. Water Station Water Coolers
1. Description: Water-station configuration, freestanding, cabinet water cooler with top-mounting glass fillers.
 - a. Cabinet: All stainless steel OR Enameled-steel panels with stainless-steel top, as directed, 0.05 inch (1.3 mm) thick; and 32 inches (813 mm) OR 36 inches (915 mm), as directed, high.

- b. Receptors: Two **OR** Four, **as directed**, stainless-steel bowls, with grid drain and bottom outlet in top; with two facing front and two facing back.
 - c. Glass Fillers: Two **OR** Four, **as directed**, push-back type **OR** pedestal type, **as directed**, on top, over receptors.
 - d. Tray Slides: One on front and one on back, stainless steel.
 - e. Supply: **NPS 1/2 (DN 15)** with ball, gate, or globe valve, and connected to filter, chiller, and each glass filler.
 - f. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - g. Drain: Waste piping from each receptor connected to **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40)**, **as directed**, trap and waste to wall **OR** indirect waste to floor receptor, **as directed**, complying with ASME A112.18.2.
 - h. Cooling System: Electric, complying with ARI 1010, for Type R remote water coolers.
 - 1) Chassis: Galvanized or corrosion-resistant-coated steel.
 - 2) Chiller: Hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, and refrigerant.
 - 3) Storage Tank: **2 gal. (7.6 L) OR 4 gal. (15.1 L) OR 6 gal. (22.7 L) OR 14 gal. (53 L) OR 25 gal. (95 L)**, **as directed**, stainless steel.
 - 4) Controls: Adjustable thermostat.
 - 5) One-Hour Peak Capacity Rate: **8 gph (0.0084 L/s) OR 12 gph (0.0126 L/s) OR 18 gph (0.0189 L/s) OR 29 gph (0.0305 L/s) OR 50 gph (0.0526 L/s)**, **as directed**, of **50 deg F (10 deg C)** cooled water from **80 deg F (27 deg C)** inlet water and **90 deg F (32 deg C)** ambient air temperature.
 - 6) Electrical Characteristics: **1/5 OR 1/4 OR 1/3 OR 1/2 OR 3/4**, **as directed**, hp; **120 OR 240 OR 277 OR 480**, **as directed**,-V ac; single phase; 60 Hz.
2. Description: Water-station configuration, freestanding, cabinet water cooler with front-mounting glass fillers.
- a. Cabinet: All stainless steel **OR** Enameled-steel panels with stainless-steel top, **as directed**, **0.05 inch (1.3 mm)** thick; and **42 inches (1067 mm) OR 48 inches (1219 mm)**, **as directed**, high.
 - b. Receptors: One **OR** Two, **as directed**, stainless-steel tray(s), with antisplash design, drain, and bottom outlet, in vertical panel(s), with one facing front and one facing back.
 - c. Glass Fillers: Two **OR** Four, **as directed**, push-back type, on vertical panel(s), over receptor(s).
 - d. Shelves: One **OR** Two, **as directed**, stainless steel, on each side panel.
 - e. Supply: **NPS 1/2 (DN 15)** with ball, gate, or globe valve, and connected to filter, chiller, and each glass filler.
 - f. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
 - g. Drain: **NPS 1-1/4 (DN 32) OR NPS 1-1/2 (DN 40)**, **as directed**, trap and waste to wall **OR** indirect waste to floor receptor, **as directed**, complying with ASME A112.18.2.
 - h. Cooling System: Electric, complying with ARI 1010, for Type R remote water coolers.
 - 1) Chassis: Galvanized or corrosion-resistant-coated steel.
 - 2) Chiller: Hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, and refrigerant.
 - 3) Storage Tank: **6 gal. (22.7 L) OR 14 gal. (53 L) OR 25 gal. (95 L) OR 30 gal. (113.6 L) OR 40 gal. (151.4 L)**, **as directed**, stainless steel.
 - 4) Controls: Adjustable thermostat.
 - 5) One-Hour Peak Capacity Rate: **18 gph (0.0189 L/s) OR 29 gph (0.0305 L/s) OR 50 gph (0.0526 L/s) OR 65 gph (0.0684 L/s) OR 85 gph (0.0894 L/s)**, **as directed**, of **50 deg F (10 deg C)** cooled water from **80 deg F (27 deg C)** inlet water and **90 deg F (32 deg C)** ambient air temperature.
 - 6) Electrical Characteristics: **1/3 OR 1/2 OR 3/4 OR 1 OR 1-1/2**, **as directed**, hp; **120 OR 240 OR 277 OR 480**, **as directed**,-V ac; single phase; 60 Hz.

D. Remote Water Coolers

1. Description: ARI 1010, Style R, remote chiller equipment for installation separate from drinking fountains. Include filter, reverse-osmosis system and ultra-violet-disinfection equipment, **as directed**.
 - a. Cooling System: Electric.
 - 1) Chassis: Galvanized or corrosion-resistant-coated steel.
 - 2) Chiller: Hermetically sealed compressor, cooling coil, air-cooled condensing unit, corrosion-resistant tubing, and refrigerant.
 - 3) Storage Tank: **0.5 gal. (1.9 L) OR 4 gal. (15.1 L), as directed**, stainless steel.
 - 4) Controls: Adjustable thermostat.
 - 5) Capacity: **5 gph (0.0053 L/s) OR 8 gph (0.0084 L/s) OR 14 gph (0.0147 L/s), as directed**, of **50 deg F (10 deg C)** cooled water from **80 deg F (27 deg C)** inlet water and **90 deg F (32 deg C)** ambient air temperature.
 - 6) Electrical Characteristics: **1/5 OR 1/4 OR 1/3, as directed**, hp; **120 OR 240 OR 277 OR 480, as directed**,-V ac; single phase; 60 Hz.
 - b. Ventilation Grille: Stainless steel.
 - c. Filter: One or more water filters complying with NSF 42 and NSF 53 for cyst and lead reduction to below EPA standards; with capacity sized for unit peak flow rate.
- E. Fixture Supports
1. Description: ASME A112.6.1M, water cooler carriers. Include vertical, steel uprights with feet and tie rods and bearing plates with mounting studs matching fixture to be supported.
 - a. Type I: Hanger-type carrier with two vertical uprights.
 - b. Type II: Bilevel, hanger-type carrier with three vertical uprights.
 - c. Supports for Accessible Fixtures: Include rectangular, vertical, steel uprights instead of steel pipe uprights.

1.3 EXECUTION

A. Applications

1. Use carrier off-floor supports for wall-mounting fixtures, unless otherwise indicated.
2. Use mounting frames for recessed water coolers, unless otherwise indicated.
3. Set freestanding and pedestal drinking fountains on floor.
4. Set remote water coolers on floor, unless otherwise indicated.
5. Use chrome-plated brass or copper tube, fittings, and valves in locations exposed to view. Plain copper tube, fittings, and valves may be used in concealed locations.

B. Installation

1. Install off-floor supports affixed to building substrate and attach wall-mounting fixtures, unless otherwise indicated.
2. Install mounting frames affixed to building construction and attach recessed water coolers to mounting frames, unless otherwise indicated.
3. Install fixtures level and plumb. For fixtures indicated for children, install at height required by authorities having jurisdiction.
4. Install water-supply piping with shutoff valve on supply to each fixture to be connected to water distribution piping. Use ball, gate, or globe valve. Install valves in locations where they can be easily reached for operation. Valves are specified in Division 22 Section "General-duty Valves For Plumbing Piping".
5. Install trap and waste piping on drain outlet of each fixture to be connected to sanitary drainage system.
6. Install pipe escutcheons at wall penetrations in exposed, finished locations. Use deep-pattern escutcheons where required to conceal protruding pipe fittings. Escutcheons are specified in Division 22 Section "Common Work Results For Plumbing".

7. Seal joints between fixtures and walls and floors using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color. Sealants are specified in Division 07 Section "Joint Sealants".
- C. Connections
1. Connect fixtures with water supplies, traps, and risers, and with soil, waste, and vent piping. Use size fittings required to match fixtures.
 2. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 3. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- D. Field Quality Control
1. Water Cooler Testing: After electrical circuitry has been energized, test for compliance with requirements. Test and adjust controls and safeties.
 - a. Remove and replace malfunctioning units and retest as specified above.
 - b. Report test results in writing.
- E. Adjusting
1. Adjust fixture flow regulators for proper flow and stream height.
 2. Adjust water cooler temperature settings.

END OF SECTION 22 47 13 00

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Task	Specification	Specification Description
22 47 13 00	22 40 00 00	Plumbing Fixtures
22 47 16 00	01 22 16 00	No Specification Required
22 47 16 00	22 40 00 00	Plumbing Fixtures
22 47 16 00	22 45 00 00	Emergency Plumbing Fixtures
22 47 16 00	22 47 13 00	Drinking Fountains And Water Coolers
22 47 23 00	22 47 13 00	Drinking Fountains And Water Coolers
22 47 26 00	22 40 00 00	Plumbing Fixtures
22 51 13 00	01 22 16 00	No Specification Required
22 51 16 00	01 22 16 00	No Specification Required
22 51 19 00	01 22 16 00	No Specification Required
22 66 53 00	01 95 99 99a	Common Work Results for Fire Suppression
22 66 53 00	01 95 99 99b	Common Work Results for Plumbing
22 66 53 00	22 13 16 00	Sanitary Waste And Vent Piping
22 66 53 00	22 11 16 00a	General-Service Compressed-Air Piping
22 66 53 00	01 95 99 99g	Common Work Results for HVAC

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SECTION 22 66 83 16 - CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for chemical-waste systems for laboratory and healthcare facilities. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

C. Summary

1. Section Includes:
 - a. Single-wall piping.
 - b. Double-containment piping.
 - c. Field-fabrication containment piping.
 - d. Piping specialties.
 - e. Neutralization tanks.
 - f. Neutralization systems.
 - g. Manholes.
 - h. Leak-detection systems.

D. Definitions

1. CR: Chlorosulfonated polyethylene synthetic rubber.
2. FPM: Vinylidene fluoride-hexafluoro propylene copolymer rubber.

E. Performance Requirements

1. Single-Wall Piping Pressure Rating: 10 feet head of water (30 kPa).
2. Double-Containment Piping Pressure Rating:
 - a. Carrier Piping: 5-psig (34.5-kPa) air test pressure.
 - b. Containment Piping: 5-psig (34.5-kPa) air test pressure.
3. Field-Fabrication Containment-Piping Pressure Rating: 5-psig (34.5-kPa) air test pressure.
4. Delegated Design: Design seismic restraints for aboveground piping, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

F. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
3. Shop Drawings: For neutralization system and leak-detection system. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail neutralization-system assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Detail leak-detection-system assemblies and indicate required clearances, method of field assembly, components, and location and size of each field connection.
 - c. Wiring Diagrams: For power, signal, and control wiring.
4. Delegated-Design Submittal: For seismic restraints of aboveground piping, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
5. Profile Drawings for Outdoor Underground Piping: Show system piping in elevation. Draw profiles at horizontal scale of not less than 1 inch equals 50 feet (1:500) and vertical scale of not

less than **1 inch equals 5 feet (1:50)**. Indicate underground structures and pipes. Show types, sizes, materials, and elevations of other utilities crossing system piping.

6. Field quality-control test reports.
7. Operation and Maintenance Data: For chemical-waste specialties and neutralization tanks, neutralization systems, and leak-detection systems to include in emergency, operation, and maintenance manuals.

G. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. NFPA Compliance: Comply with NFPA 70, "National Electrical Code."

H. Delivery, Storage, And Handling

1. Deliver and store piping and specialties with sealing plugs in ends or with end protection.
2. Do not store plastic pipe or fittings in direct sunlight.
3. Protect pipe, fittings, and seals from dirt and damage.

I. Project Conditions

1. Interruption of Existing Chemical-Waste Service: Do not interrupt chemical-waste service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary chemical-waste service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of chemical-waste service.
 - b. Do not proceed with interruption of chemical-waste service without the Owner's written permission.

1.2 PRODUCTS

A. Single-Wall Pipe And Fittings

1. PE Drainage Pipe and Fittings: Made of ASTM D 4976, PE resin.
 - a. Pipe: ASTM F 1412, Schedule 40.
 - b. Fittings: ASTM F 1412, Schedule 40, socket-fusion, drainage pattern complying with ASTM D 3311.
2. PP Drainage Pipe and Fittings: ASTM F 1412, pipe extruded and drainage-pattern fittings molded, with Schedule 40 dimensions, from PP resin with fire-retardant additive complying with ASTM D 4101; with fusion **OR** fusion- and mechanical **OR** mechanical, **as directed**,-joint ends.
 - a. Exception: Pipe and fittings made from PP resin without fire-retardant additive may be used for underground installation.
3. PVC Drainage Pipe and Fittings: ASTM D 2665, pipe and drainage-pattern fittings.
4. PVDF Drainage Pipe and Fittings: ASTM F 1673, Schedule 40, pipe and drainage-pattern fittings. Include fittings with fusion **OR** fusion- and mechanical **OR** mechanical, **as directed**,-joint ends.
5. Fiberglass Pipe and Fittings, Centrifugally Cast: ASTM D 2997, Type II, Grade 1 **OR** Grade 2, **as directed**, Class A **OR** Class B **OR** Class C, **as directed**, RTRP pipe; with ASTM D 5685, Type 4, RTRF fittings matching pipe; and adhesive-bonding **OR** butt-and-wrap-joint, **as directed**, materials. Include wall thickness that will provide **160-psig (1105-kPa)** minimum, sustained water test pressure rating.
6. Fiberglass Pipe and Fittings, Filament Wound: ASTM D 2996, Type I, Grade 1 **OR** Grade 2, **as directed**, Class A **OR** Class B **OR** Class C **OR** Class E **OR** Class F, **as directed**, RTRP pipe; ASTM D 5685, Type 1, RTRF fittings matching pipe; and adhesive-bonding **OR** butt-and-wrap-joint, **as directed**, materials. Include wall thickness that will provide **160-psig (1105-kPa)** minimum, sustained water test pressure rating.

7. High-Silicon-Iron, Hub-and-Plain-End Pipe and Fittings: ASTM A 861, pipe and drainage-pattern fittings; acid-resistant packing; and lead calking materials.
 8. High-Silicon-Iron, Mechanical-Joint Pipe and Fittings: ASTM A 861, pipe and drainage-pattern fittings; and stainless-steel clamps with TFE inner sleeve and CR outer sleeve.
 9. Stainless-Steel Drainage Pipe and Fittings: ASME A112.3.1, ASTM A 666, Type 316L, stainless-steel pipe and drainage-pattern fittings; with socket and spigot ends for gasket joints; and having piping manufacturer's FPM lip-seal rubber gaskets shaped to fit socket groove, with plastic backup ring.
 10. Borosilicate Glass Pipe and Fittings: ASTM C 1053, pipe and drainage-pattern fittings; with manufacturer's standard couplings.
 - a. Covering: Factory-applied polystyrene for pipe installed underground.
 11. Adapters and Transition Fittings: Assemblies with combination of clamps, couplings, adapters, and gaskets; compatible with piping and system liquid; made for joining different piping materials.
- B. Double-Containment Pipe And Fittings**
1. Description: Factory-fabricated, double-wall pipe and fittings. Sizes indicate carrier-pipe size; with carrier (inner) pipe and fittings; annular-space, carrier-pipe supports; containment (outer) pipe and fittings; and joining materials and fasteners. Include manufacturer's standard piping materials according to the following:
 - a. PE, Double-Containment Drainage Pipe and Fittings: Made of ASTM D 4976, PE resin.
 - 1) Carrier and Containment Pipes: ASTM F 1412, Schedule 40.
 - 2) Fittings: ASTM F 1412, Schedule 40 drainage pattern complying with ASTM D 3311.
 - b. PP, Double-Containment Drainage Pipe and Fittings: Made of ASTM D 4101, PP resin.
 - 1) Carrier and Containment Pipes: ASTM F 1412, Schedule 40.
 - 2) Fittings: ASTM F 1412, Schedule 40 drainage pattern complying with ASTM D 3311.
 - c. PP/PVC, Double-Containment Drainage Pipe and Fittings:
 - 1) PP Carrier Pipe: ASTM F 1412, Schedule 40; made of ASTM D 4101, PP resin.
 - 2) PP Carrier-Pipe Fittings: ASTM F 1412, Schedule 40 drainage pattern complying with ASTM D 3311; made of ASTM D 4101, PP resin.
 - 3) PVC Containment Pipe: ASTM D 2665, PVC pipe.
 - 4) PVC Containment Pipe Fittings: ASTM D 2665, PVC drainage pattern.
 - d. PVDF, Double-Containment Drainage Pipe and Fittings: Made of ASTM D 3222, PVDF resin.
 - 1) Carrier and Containment Pipes: ASTM F 1673, Schedule 40.
 - 2) Fittings: ASTM F 1673, Schedule 40 drainage pattern complying with ASTM D 3311.
 - e. PVDF/PVC, Double-Containment Drainage Pipe and Fittings:
 - 1) PVDF Carrier Pipe: ASTM F 1673, Schedule 40; made of ASTM D 3222, PVDF resin.
 - 2) PVDF Carrier-Pipe Fittings: ASTM F 1673, Schedule 40 drainage pattern complying with ASTM D 3311; made of ASTM D 3222, PVDF resin.
 - 3) PVC Containment Pipe: ASTM D 2665, PVC pipe.
 - 4) PVC Containment Pipe Fittings: ASTM D 2665, PVC drainage pattern.
 2. Include design and fabrication of double-containment pipe and fitting assemblies with provision for field installation of cable leak-detection system in annular space between carrier and containment piping.
- C. Field-Fabrication Containment Piping**
1. Description: Containment split pipe and split fittings with carrier-pipe centralizers. Include manufacturer's fastening devices and materials.
 - a. Material: HDPE **OR** PP **OR** Yellow PVC **OR** Clear PVC, **as directed**, pipe and fittings.
 - b. Fastening System: FPM gaskets, clamps, and pins.

- c. Material: Clear PVC pipe and fittings with adhesive channels, for use with drainage-pattern carrier piping.
 - d. Fastening System: Adhesive.
- D. Joining Materials
- 1. Couplings: Assemblies with combination of clamps, gaskets, sleeves, and threaded or flanged parts; compatible with piping and system liquid; and made by piping manufacturer for joining system piping.
 - 2. Adapters and Transition Fittings: Assemblies with combination of clamps, couplings, adapters, gaskets, and threaded or flanged parts; compatible with piping and system liquid; and made for joining different piping materials.
 - 3. Flanges: Assemblies of companion flanges and gaskets complying with ASME B16.21 and compatible with system liquid, and bolts and nuts.
 - 4. Solvent Cement for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 5. Fiberglass-Pipe Adhesive: As furnished or recommended by pipe manufacturer.
 - a. Use fiberglass adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Piping Specialties
- 1. Plastic Dilution Traps:
 - a. Material: Corrosion-resistant PP, with removable base.
 - b. End Connections: Mechanical joint.
 - c. Dilution Tanks: **1-gal. (3.8-L)** capacity, with clear base unless colored base is indicated; with two **NPS 1-1/2 (DN 40)** top inlets and one **NPS 1-1/2 (DN 40)** side outlet.
 - d. Small Dilution Jars: **1-pint (0.5-L)** capacity, with clear base unless colored base is indicated; with **NPS 1-1/2 (DN 40)** top inlet and **NPS 1-1/2 (DN 40)** side outlet.
 - e. Large Dilution Jars: **1-quart (1-L)** capacity; with **NPS 1-1/2 (DN 40)** top inlet and **NPS 1-1/2 (DN 40)** side outlet.
 - 2. High-Silicon-Iron Dilution Traps:
 - a. Standard: ASTM A 861.
 - b. Size: **NPS 1-1/2 or NPS 2 (DN 40 or DN 50)** as required for fixture and waste.
 - c. End Connections: Mechanical.
 - 3. Glass, Drain-Line, Interceptor Traps:
 - a. Standard: ASTM C 1053.
 - b. Type: Drum trap.
 - c. Size: **NPS 1-1/2 (DN 40), NPS 2 by NPS 1-1/2 (DN 50 by DN 40), or NPS 2 (DN 50)**, as required to match connecting piping.
 - 4. Corrosion-Resistant Traps:
 - a. Type: P-trap or drum trap.
 - b. Size: **NPS 1-1/2 or NPS 2 (DN 40 or DN 50)**, as required to match connected piping.
 - c. High-Silicon Iron: ASTM A 861, with horizontal outlet and hub-and-plain or plain ends to match connecting piping.
 - d. PP: ASTM D 4101, with mechanical-joint pipe connections.
 - e. PVDF: ASTM D 3222, with mechanical-joint pipe connections.
 - f. Glass: ASTM C 1053, with coupling pipe connections.
 - 5. High-Silicon-Iron Floor Drains:
 - a. Standard: ASTM A 861.
 - b. Body: With integral flashing flange and weep holes; and with flashing ring and stainless-steel strip, sediment basin and funnel attachment, **as directed**.

- c. Top: **8-3/4-inch (222-mm)** diameter with grate.
 - d. Size: **NPS 2, NPS 3, NPS 4, or NPS 6 (DN 50, DN 80, DN 100, or DN 150)** outlet as indicated.
6. Stainless-Steel Floor Drains:
 - a. Standard: ASME A112.3.1, ASTM A 666, Type 316L.
 - b. Body: With **8.5-by-8.5-inch (215-by-215-mm)** **OR** **12.4-by-12.4-inch (315-by-315-mm)**, **as directed**, top with grate.
 - c. Outlet: Bottom, of size indicated.
 7. PP Floor Drains:
 - a. Body: With **7- to 9-inch (178- to 230-mm)** top diameter, with flashing flange and weep holes; and with flashing clamp, basket strainer, funnel attachment, and trap-primer connection, **as directed**.
 - b. Outlet: Bottom, to match connecting pipe, with **NPS 2, NPS 3, NPS 4, or NPS 6 (DN 50, DN 80, DN 100, or DN 150)** outlet as indicated.
 8. High-Silicon-Iron Cleanouts:
 - a. Standard: ASTM A 861, fitting with PTFE gasket and closure plug, of design appropriate for piping application.
 9. Stainless-Steel Cleanouts:
 - a. Standard: ASME A112.3.1, ASTM A 666, Type 316L, stainless steel.
 - b. Aboveground Piping: Cleanout tee of size matching piping.
 - c. Underground and Underslab Piping: Floor access cleanout of size matching piping.
 10. High-Silicon-Iron Backwater Valves:
 - a. Standard: ASTM A 861.
 - b. Body: Hub-and-plain end with swing-check valve; and with high-silicon-iron pipe extension of length to reach floor surface, and high-silicon-iron closure plug, **as directed**.
 11. Plastic Backwater Valves:
 - a. Description: Full-port **NPS 3 (DN 80)** check valve, PP or PVDF, matching or compatible with system piping and compatible with system liquid, with EPDM seals and flanged ends.
 - 1) Exception: PVC material for use with PVC piping systems.
 12. High-Silicon-Iron Sink Outlets:
 - a. Standard: ASTM A 861, high-silicon iron, **NPS 1-1/2 (DN 40)**, with clamping device and **4-, 6-, or 8-inch- (100-, 150-, or 200-mm-)** high overflow fitting, as indicated.
 13. PP Sink Outlets:
 - a. Description: **NPS 1-1/2 (DN 40)**, with clamping device, stopper, and **7-inch- (178-mm-)** high overflow fitting.
 14. Glass Sink Outlets:
 - a. Standard: ASTM C 1053, components for field assembly, **NPS 1-1/2 (DN 40)**; with sink assembly of outlet, strainer, gasket, and locknut; overflow fitting of length indicated; and tailpiece assembly of borosilicate glass and locknut.
- F. Neutralization Tanks
1. Plastic Neutralization Tanks:
 - a. Description: Corrosion-resistant plastic materials; with removable, gastight cover; interior, sidewall, dip-tube inlet; outlet; vent; and threaded or flanged, sidewall pipe connections.
 - 1) Material: HDPE **OR** ASTM D 4101, PP, **as directed**.
 - 2) Tank Capacity: as directed by the Owner.
 - 3) Dip Tube: On outlet pipe instead of inlet pipe.
 - 4) Extension: HDPE, PE, or PP.
 - 5) Traffic Cover: Light-duty **OR** Heavy-duty pedestrian or light-duty vehicular, steel plate over, **as directed**, plastic, bolted.
 - 6) Limestone: Chips or lumps, with more than 90 percent calcium carbonate content and **1- to 3-inch (25- to 75-mm)** diameter.
OR

Dolomitic Limestone: Chips or lumps, with more than 90 percent combined magnesium carbonate and calcium carbonate content and 1- to 3-inch (25- to 75-mm) diameter.

2. Ceramic Neutralization Tanks:
 - a. Description: Corrosion-resistant, cast-ceramic shell; with removable, reinforced-plastic, gastight cover; inlet; interior, sidewall, dip-tube outlet; vent; and bell, sidewall pipe connections.
 - 1) Extension: Ceramic, of size and length indicated, and with cast-iron manhole frame and cover.
OR
Extension: Steel with protective coating, 28-inch (710-mm) diameter, and cast-iron manhole frame and cover.
 - 2) Limestone: Chips or lumps, with more than 90 percent calcium carbonate content and 1- to 3-inch (25- to 75-mm) diameter.
OR
Dolomitic Limestone: Chips or lumps, with more than 90 percent combined magnesium carbonate and calcium carbonate content and 1- to 3-inch (25- to 75-mm) diameter.
3. Collection Tanks: Corrosion-resistant, cast-ceramic shell. Include removable, reinforced-plastic, gastight cover; inlet; vent; and bell, sidewall pipe connections.
 - a. Extension: Ceramic **OR** Steel with protective coating, **as directed**, 28-inch (710-mm) minimum diameter, and cast-iron manhole frame and cover.

G. Neutralization Systems

1. Plastic-Tank Neutralization Systems:
 - a. Description: Automatic system for neutralizing chemical waste.
 - 1) Controls: Factory-wired and -tested, 120-V ac, to operate probes, control valves, and metering pumps and to monitor pH of effluent; with wiring and electrical-power terminals.
 - 2) Panel: NEMA 250, Type 4X enclosure, unless otherwise indicated; with manufacturer's standard features, control devices, and indicators, but not less than the following:
 - a) Power light and on/off switch.
 - b) pH analyzer with meter and high- and low-pH indicators.
 - c) Low caustic- and acid-solution level indicators.
 - d) Alarm horn with silencer and reset switch.
 - e) Agitator running light with on/off switch.
 - f) Running lights with on/off switches for caustic- and acid-solution pumps.
 - 3) Strip chart recorder with capacity for 30-day record.
 - 4) Piping between Tanks: Same material as chemical-waste piping system unless otherwise indicated.
 - 5) Interceptor Tank: Same material as mixing tank; with removable, gastight cover; and sidewall inlet and outlet piping connections.
 - 6) Neutralization Tank: Same material as mixing tank; with removable, gastight cover; sidewall inlet and outlet piping connections; and vent connection in sidewall or top.
 - a) Limestone: Chips or lumps, with more than 90 percent calcium carbonate content and 1- to 3-inch (25- to 75-mm) diameter.
OR
Dolomitic Limestone: Chips or lumps, with more than 90 percent combined magnesium carbonate and calcium carbonate content and 1- to 3-inch (25- to 75-mm) diameter.
 - 7) Mixing Tank: With removable, gastight cover; sidewall inlet and outlet piping connections; vent connection in sidewall or top; neutralizing-solution piping connections; and openings in top for probe and agitator.

- a) Material: HDPE **OR** ASTM D 4101, PP, **as directed**.
 - b) pH Probe: Type and length suitable for mixing-tank size.
 - c) Agitator: Electric, with stainless-steel shaft and propeller.
 - 8) Caustic-Solution Storage Tank: PP.
 - a) Caustic Chemical: Sodium hydroxide solution.
 - 9) Acid Storage Tank: PP.
 - a) Acid Chemical: Sulfuric acid solution.
 - 10) Metering Pumps: Types suitable for neutralizing solutions.
 - 11) Sampling Tank: Same material as mixing tank; with removable, gastight cover; sidewall inlet and outlet piping connections; and opening in top for probe.
 - a) pH probe: Type and length suitable for sampling-tank size.
2. Ceramic-Tank Neutralization Systems:
- a. Description: Automatic system for neutralizing chemical waste.
 - 1) Controls: Factory-wired and -tested, 120-V ac, to operate probes, control valves, and metering pumps and to monitor pH of effluent; with wiring and electrical-power terminals.
 - 2) Panel: NEMA 250, Type 4X enclosure, unless otherwise indicated; with manufacturer's standard features, control devices, and indicators, including the following:
 - a) Power light and on/off switch.
 - b) pH analyzer with meter and high- and low-pH indicators.
 - c) Low caustic- and acid-solution level indicators.
 - d) Alarm horn with silencer and reset switch.
 - e) Agitator running light with on/off switch.
 - f) Running lights with on/off switches for caustic- and acid-solution pumps.
 - 3) Strip chart recorder with capacity for 30-day record.
 - 4) Piping between Tanks: Same material as chemical-waste piping system unless otherwise indicated.
 - 5) Interceptor Tank: Same material as mixing tank; with removable, gastight cover; and sidewall inlet and outlet piping connections.
 - 6) Neutralization Tank: Same material as mixing tank; with removable, gastight cover; sidewall inlet and outlet piping connections; and vent connection in sidewall or top.
 - a) Limestone: Chips or lumps, with more than 90 percent calcium carbonate content and **1- to 3-inch (25- to 75-mm)** diameter.
OR
Dolomitic Limestone: Chips or lumps, with more than 90 percent combined magnesium carbonate and calcium carbonate content and **1- to 3-inch (25- to 75-mm)** diameter.
 - 7) Mixing Tank: With removable, gastight cover; sidewall inlet and outlet piping connections; vent connection in sidewall or top; neutralizing-solution piping connections; and openings in top for probe and agitator.
 - a) Material: Clay, vitrified into ceramic unit.
 - b) pH Probe: Type and length suitable for mixing tank size.
 - c) Agitator: Electric, with stainless-steel shaft and propeller.
 - 8) Caustic-Solution Storage Tank: PP.
 - a) Caustic Chemical: Sodium hydroxide solution.
 - 9) Acid Storage Tank: PP.
 - a) Acid Chemical: Sulfuric acid solution.
 - 10) Metering Pumps: Types suitable for neutralizing solutions.
 - 11) Sampling Tank: Same material as mixing tank; with removable, gastight cover; sidewall inlet and outlet piping connections; and opening in top for probe.
 - a) pH probe: Type and length suitable for sampling-tank size.

H. Manholes

1. Description: ASTM F 1759, fabricated from PE components. Include bottom, sidewalls, and top sections; corrosion-resistant, manhole frame and cover; fusion or other watertight joints; and design to prohibit flotation.
 - a. Construction: Single wall **OR** Double wall with interstitial space, **as directed**.
 - b. Bottom: Channeled.
 - c. Connections: Inlets and outlet matching or suitable for piping.
 - d. Steps: Manufacturer's standard, fusion welded to sidewall. Omit steps for manholes less than **60 inches (1500 mm)** deep.
 - e. Top: Include **24-inch- (610-mm-)** nominal-diameter frame and cover.

- I. Leak-Detection Systems
 1. Leak-Detection Systems:
 - a. Description: Cable leak-detection system capable of detecting and annunciating fluid leaks; with controls, panel, wiring, cable sensors, probes if required, and piping.
 - 1) Annunciator Panel: Enclosure with visual and audible alarms and leak location indicator.
 - 2) Sensors: Electric cable, suitable for insertion into double-containment piping annular space, with capability of detecting fluid leaks and signaling locations of leaks.

- J. Sleeves
 1. Cast-Iron Wall Pipes: Cast or fabricated of cast iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
 2. Galvanized-Steel-Sheet Sleeves: **0.0239-inch (0.6-mm)** minimum thickness; round tube closed with welded longitudinal joint.
 3. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.
 4. Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc-coated, plain ends.
 5. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
 - a. Underdeck Clamp: Clamping ring with set screws.

- K. Sleeve Seals
 1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
 - b. Pressure Plates: Carbon steel **OR** Plastic **OR** Stainless steel, **as directed**.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements.

- L. Escutcheons
 1. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to closely fit around pipe and tube and OD that completely covers opening.
 2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
 3. One-Piece, Stamped-Steel Escutcheons: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 4. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 5. One-Piece, Floor-Plate Escutcheons: Cast iron.
 6. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

- M. Grout
 1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

- a. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
- b. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.
- c. Packaging: Premixed and factory packaged.

1.3 EXECUTION

A. Earthwork

1. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

B. Concrete Bases

1. Anchor neutralization tanks and neutralization system tanks to concrete bases.
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 19-inch (480-mm) centers around full perimeter of base.
 - b. For installed equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be imbedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - e. Construct concrete bases of dimensions indicated, but not less than 4 inches (100 mm) larger in both directions than supported unit.
 - f. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".
 - g. Comply with requirements in Division 31 for cast-in-place concrete materials and placement.

C. Piping Installation

1. Chemical-Waste Sewerage Outside the Building:
 - a. Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground chemical-waste sewerage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
 - b. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
 - c. Install manholes for changes in direction, unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
 - d. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
 - e. Tunneling: Install pipe under streets or other obstructions that cannot be disturbed by tunneling, jacking, or combination of both.
 - f. Install drainage piping pitched down in direction of flow, at minimum slope of 1 OR 2, as directed, percent, unless otherwise indicated.
 - g. Install drainage piping with 36-inch (915-mm) OR 48-inch (1220-mm) OR 60-inch (1524-mm) OR 72-inch (1830-mm), as directed, minimum cover.
 - h. Install PE drainage piping according to ASTM D 2321 and ASTM F 1668.
 - i. Install PVC drainage piping according to ASTM D 2321 and ASTM F 1668.
 - j. Install PVDF drainage piping according to ASTM D 2321 and ASTM F 1668.
 - k. Install fiberglass piping according to ASTM D 3839 and ASTM F 1668.
 - l. Install field-fabrication containment piping over new and existing carrier piping. Use containment piping manufacturer's fastening system.

- m. Clear interior of piping and structures of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.
- 2. Chemical-Waste Piping Inside the Building:
 - a. Install piping next to equipment, accessories, and specialties to allow service and maintenance.
 - b. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used unless otherwise indicated.
 - c. Flanges may be used on aboveground piping unless otherwise indicated.
 - d. Install underground fiberglass piping according to ASTM D 3839.
 - e. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
 - f. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - g. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - h. Install piping at indicated slopes.
 - i. Install piping free of sags and bends.
 - j. Install fittings for changes in direction and branch connections.
 - k. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:
 - 1) New Piping:
 - a) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - b) Insulated Piping: One-piece, stamped-steel type with spring clips.
 - c) Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - d) Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type **OR** Split-plate, stamped-steel type with concealed hinge **OR** One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge, **as directed**, and set screw.
 - e) Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - f) Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - g) Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
 - 2) Existing Piping:
 - a) Insulated Piping: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and spring clips.
 - b) Bare Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - c) Bare Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
 - d) Bare Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw or spring clips.
 - e) Bare Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.
 - f) Bare Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
 - l. Sleeves are not required for core-drilled holes.
 - m. Permanent sleeves are not required for holes formed by removable PE sleeves.
 - n. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

OR

Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

- 1) Cut sleeves to length for mounting flush with both surfaces.
 - a) Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas **2 inches (50 mm)** above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.
- 2) Install sleeves in new walls and slabs as new walls and slabs are constructed.
- 3) Install sleeves that are large enough to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:
 - a) PVC **OR** Steel, **as directed**, Pipe Sleeves: For pipes smaller than **NPS 6 (DN 150)**.
 - b) Steel Sheet Sleeves: For pipes **NPS 6 (DN 150)** and larger, penetrating gypsum board partitions.
 - c) Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to **2 inches (50 mm)** above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing And Trim" for flashing.
 - d) Seal space outside of sleeve fittings with grout.
- 4) Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
- o. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1) Install steel pipe for sleeves smaller than **6 inches (150 mm)** in diameter.
 - 2) Install cast-iron "wall pipes" for sleeves **6 inches (150 mm)** and larger in diameter.
 - 3) Sleeve-Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- p. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - 1) Sleeve-Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.
- r. Verify final equipment locations for roughing-in.

D. Piping Specialty Installation

1. Embed floor drains in **4-inch (100-mm)** minimum depth of concrete around bottom and sides. Comply with requirements in Division 03 Section "Cast-in-place Concrete" for concrete.
2. Fasten grates to drains if indicated.
3. Set floor drains with tops flush with pavement surface.
4. Install cleanouts and riser extension from sewer pipe to cleanout at grade. Use fittings of same material as sewer pipe at branches for cleanouts and riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in pipe.

- a. Set cleanout bodies in earth in cast-in-place concrete block, **18 by 18 by 12 inches (450 by 450 by 300 mm)** deep. Set with tops **1 inch (25 mm)** above surrounding grade. Set cleanout plugs in concrete pavement with tops flush with pavement surface. Comply with requirements in Division 03 Section "Cast-in-place Concrete" for formwork, reinforcement, and concrete requirements.
 5. Install backwater valves in horizontal position. Include riser to cleanout at grade.
- E. Joint Construction
1. Chemical-Waste Sewerage Outside the Building:
 - a. Plastic-Piping, Electrofusion Joints: Make polyolefin drainage-piping joints according to ASTM F 1290.
 - b. Make fiberglass-piping bonded joints according to ASTM D 3839.
 - c. Make fiberglass butt-and-wrap joints according to ASTM D 3839.
 - d. Join dissimilar pipe materials with adapters compatible with pipe materials being joined.
 - e. Join high-silicon-iron, hub-and-plain-end piping with calked joints using acid-resistant packing and lead.
 - f. Join high-silicon-iron, mechanical-joint piping with coupled joints using clamps and sleeves.
 - g. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.
 2. Chemical-Waste Piping Inside the Building:
 - a. Plastic-Piping Electrofusion Joints: Make polyolefin drainage-piping joints according to ASTM F 1290.
 - b. Fiberglass-Piping Joints: Make joints with piping manufacturer's bonded adhesive.
 - c. Dissimilar-Material Piping Joints: Make joints using adapters compatible with both system materials.
 - d. Join high-silicon-iron, hub-and-plain-end piping with calked joints using acid-resistant packing and lead.
 - e. Join high-silicon-iron, mechanical-joint piping with coupled joints using clamps and sleeves.
 - f. PVC Nonpressure Piping Joints: Join piping according to ASTM D 2665.
- F. Hanger And Support Installation
1. Pipe sizes in this article refer to aboveground, single-wall piping and carrier piping of containment piping, **as directed**.
 2. Comply with requirements in Division 22 Section "Vibration And Seismic Controls For Plumbing Piping And Equipment" for seismic-restraint devices.
 3. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for pipe hanger and support devices. Install the following:
 - a. Vertical Piping: MSS Type 8 or MSS Type 42, riser clamps.
 - b. Individual, Straight, Horizontal Piping Runs:
 - 1) **100 Feet (30 m)** and Less: MSS Type 1, adjustable, steel clevis hangers.
 - 2) Longer Than **100 Feet (30 m)**: MSS Type 43, adjustable roller hangers.
 - 3) Longer Than **100 Feet (30 m)**, if Indicated: MSS Type 49, spring cushion rolls.
 - c. Multiple, Straight, Horizontal Piping Runs **100 Feet (30 m)** or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
 - d. Base of Vertical Piping: MSS Type 52, spring hangers.
 4. Comply with requirements in Division 22 Section "Hangers And Supports For Plumbing Piping And Equipment" for installation of supports.
 5. Support horizontal piping and tubing within **12 inches (300 mm)** of each fitting and coupling.
 6. Support vertical piping and tubing at base and at each floor.
 7. Rod diameter may be reduced 1 size for double-rod hangers, to minimum of **3/8 inch (10 mm)**.
 8. Install vinyl-coated hangers for PP piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. **NPS 2 (DN 50): 33 inches (840 mm)** with **3/8-inch (10-mm)** rod.
 - b. **NPS 2-1/2 and NPS 3 (DN 65 and DN 80): 42 inches (1067 mm)** with **1/2-inch (13-mm)** rod.

- c. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1220 mm) with 5/8-inch (16-mm) rod.
- d. NPS 6 (DN 150): 48 inches (1220 mm) with 3/4-inch (19-mm) rod.
- e. NPS 8 (DN 200): 48 inches (1220 mm) with 7/8-inch (22-mm) rod.
9. Install supports for vertical PP piping every 72 inches (1830 mm).
10. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/4 (DN 32): 36 inches (910 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 42 inches (1067 mm) with 3/8-inch (10-mm) rod.
 - c. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): 42 inches (1067 mm) with 1/2-inch (13-mm) rod.
 - d. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1220 mm) with 5/8-inch (16-mm) rod.
 - e. NPS 6 (DN 150): 48 inches (1220 mm) with 3/4-inch (19-mm) rod.
 - f. NPS 8 to NPS 12 (DN 200 to DN 300): 48 inches (1220 mm) with 7/8-inch (22-mm) rod.
11. Install supports for vertical PVC piping every 48 inches (1220 mm).
12. Install vinyl-coated hangers for PVDF piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. All Sizes: Install continuous support for piping with liquid waste at temperatures above 140 deg F (60 deg C).
 - b. NPS 1/2 (DN 15) and Smaller: 30 inches (760 mm) with 3/8-inch (10-mm) rod.
 - c. NPS 3/4 to NPS 1-1/2 (DN 20 to DN 40): 36 inches (910 mm) with 3/8-inch (10-mm) rod.
 - d. NPS 2 (DN 50): 36 inches (910 mm) with 3/8-inch (10-mm) rod.
 - e. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): 42 inches (1067 mm) with 1/2-inch (13-mm) rod.
 - f. NPS 4 and NPS 5 (DN 100 and DN 125): 48 inches (1220 mm) with 5/8-inch (16-mm) rod.
 - g. NPS 6 (DN 150): 48 inches (1220 mm) with 3/4-inch (19-mm) rod.
13. Install supports for vertical PVDF piping NPS 1-1/2 (DN 40) every 48 inches (1220 mm) and NPS 2 (DN 50) and larger every 72 inches (1830 mm).
14. Install vinyl-coated hangers for fiberglass piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 2 (DN 50) and Smaller: 10 feet (3 m) with 3/8-inch (10-mm) rod.
 - b. NPS 2-1/2 and NPS 3 (DN 65 and DN 80): 10 feet (3 m) with 1/2-inch (13-mm) rod.
 - c. NPS 4 and NPS 5 (DN 100 and DN 125): 10 feet (3 m) with 5/8-inch (16-mm) rod.
 - d. NPS 6 (DN 150): 10 feet (3 m) with 3/4-inch (19-mm) rod.
 - e. NPS 8 to NPS 12 (DN 200 to DN 300): 12 feet (3.6 m) with 7/8-inch (22-mm) rod.
15. Install supports for vertical fiberglass piping every 12 feet (3.6 m).
16. Install hangers for stainless-steel drainage piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
 - b. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
 - c. NPS 3 (DN 80): 12 feet (3.6 m) with 1/2-inch (13-mm) rod.
 - d. NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.6 m) with 5/8-inch (16-mm) rod.
 - e. NPS 6 (DN 150): 12 feet (3.6 m) with 3/4-inch (19-mm) rod.
17. Install supports for vertical stainless-steel drainage piping every 15 feet (4.5 m).
18. Install hangers for high-silicon-iron piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 60 inches (1520 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 3 (DN 80): 60 inches (1520 mm) with 1/2-inch (13-mm) rod.
 - c. NPS 4 and NPS 5 (DN 100 and DN 125): 60 inches (1520 mm) with 5/8-inch (16-mm) rod.
 - d. NPS 6 (DN 150): 60 inches (1520 mm) with 3/4-inch (19-mm) rod.
 - e. NPS 8 to NPS 12 (DN 200 to DN 300): 60 inches (1520 mm) with 7/8-inch (22-mm) rod.
 - f. NPS 15 (DN 375): 60 inches (1520 mm) with 1-inch (25-mm) rod.
 - g. Spacing for horizontal pipe in 84-inch (2134-mm) lengths may be increased to 84 inches (2134 mm). Spacing for fittings is limited to 60 inches (1520 mm).

19. Install supports for vertical high-silicon-iron piping every 15 feet (4.5 m).
20. Install vinyl-coated hangers for glass piping with the following maximum horizontal spacing and minimum rod diameters:
 - a. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1830 mm) with 3/8-inch (10-mm) rod.
 - b. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2440 mm) with 3/8-inch (10-mm) rod.
 - c. NPS 3 (DN 80): 96 inches (2440 mm) with 1/2-inch (13-mm) rod.
 - d. NPS 4 and NPS 6 (DN 100 and DN 150): 96 inches (2440 mm) with 5/8-inch (16-mm) rod.
21. Install supports for vertical glass piping every 96 inches (2440 mm).
22. Support piping and tubing not listed above according to MSS SP-69.

G. Neutralization Tank Installation

1. Install exterior collection **OR** neutralization, **as directed**, tanks, complete with appurtenances indicated.
 - a. Set tops of tank covers flush with finished surface where covers occur in pavements. Set covers 3 inches (76 mm) above finished surface elsewhere unless otherwise indicated.
 - b. Include initial fill of limestone for neutralization tanks.
2. Install interior neutralization tanks on smooth and level concrete base **OR** floor surface, **as directed**. Include full initial charge of limestone.

H. Neutralization System Installation

1. Install neutralization systems on smooth and level concrete base **OR** floor surface, **as directed**. Include neutralizing solutions and full initial charge of limestone.

I. Manhole Installation

1. General: Install manholes, complete with appurtenances and accessories indicated. Comply with requirements in Division 22 Section "Facility Sanitary Sewers".
2. Set tops of manhole frames and covers flush with finished surface where manholes occur in pavements. Set tops 3 inches (76 mm) above finished surface elsewhere unless otherwise indicated.

J. Leak-Detection System Installation

1. Single-Pipe, Chemical-Waste Sewerage Piping: Install leak-detection system below piping.
2. Double-Containment Piping: Install leak-detection system in piping annular space.
3. Manholes: Install leak-detection system around bottom of exterior.
4. Install panel in location indicated.

K. Concrete Placement

1. Comply with requirements in Division 03 Section "Cast-in-place Concrete" for concrete supports.
2. Place cast-in-place concrete according to ACI 318/318R.

L. Connections

1. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Make connections to existing piping so finished Work complies as nearly as practical with requirements specified for new Work.
3. Use commercially manufactured wye fittings for sewerage piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting plus 6-inch (150-mm) overlap, with not less than 6 inches (150 mm) of concrete with 28-day compressive strength of 3000 psi (20.7 MPa).
4. Protect existing piping to prevent concrete or debris from entering while making connections. Remove debris or other extraneous material that may accumulate.
5. Install piping adjacent to equipment to allow service and maintenance.

- M. Labeling And Identification
1. Comply with requirements in Division 22 Section "Identification For Plumbing Piping And Equipment" for labeling of equipment and piping.
 - a. Use warning tape **OR** detectable warning tape, **as directed**, over ferrous piping.
 - b. Use detectable warning tape over nonferrous piping and over edges of underground structures.
- N. Field Quality Control
1. Inspect interior of sewerage piping to determine whether line displacement or other damage has occurred. Inspect after approximately **24 inches (610 mm)** of backfill is in place and again at completion of Project.
 - a. Defects requiring correction include the following:
 - 1) Alignment: Less than full diameter of inside of pipe is visible between inspection points.
 - 2) Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - 3) Crushed, broken, cracked, or otherwise damaged piping.
 - 4) Hydrostatic Tests for Drainage Piping:
 - a) Allowable leakage is a maximum of **50 gal./inch of nominal pipe size per mile (4.6 L/mm of nominal pipe size per kilometer)** of pipe, during 24-hour period.
 - b) Close openings in system and fill with water.
 - c) Purge air and refill with water.
 - d) Disconnect water supply.
 - e) Test and inspect joints for leaks.
 - 5) Air Tests for Drainage Piping: Comply with UNI-B-6.
 - b. Leaks and loss in test pressure constitute defects that must be repaired.
 - c. Submit separate reports for each test.
 2. Replace leaking sewerage piping using new materials, and repeat testing until leakage is within allowances specified.
 3. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 4. Tests and Inspections:
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect assembled neutralization systems and leak-detection systems and their installation, including piping and electrical connections, and to assist in testing.
 - b. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 5. Chemical-waste piping will be considered defective if it does not pass tests and inspections.
 6. Prepare test and inspection reports.
- O. Startup Service
1. Perform startup service for neutralization systems and leak-detection systems.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Neutralization Systems:
 - 1) Verify that neutralization system is installed and connected according to the Contract Documents.
 - 2) Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 22.
 - 3) Install neutralizing solutions and limestone.
 - 4) Energize circuits.
 - 5) Start and run systems through complete sequence of operations.

- 6) Adjust operating controls.
- c. Leak-Detection Systems:
 - 1) Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 22.
 - 2) Energize circuits.
 - 3) Adjust operating controls.
- P. Adjusting
 1. Adjust neutralization-system set points.
 2. Adjust leak-detection-system control and device settings.
- Q. Cleaning
 1. Use procedures prescribed by authorities having jurisdiction or, if not prescribed, use procedures described below:
 - a. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
 - b. Clean piping by flushing with potable water.
- R. Demonstration
 1. Train the Owner's maintenance personnel to adjust, operate, and maintain neutralization systems and leak-detection systems.
- S. Piping Schedule
 1. Transition and special fittings with pressure ratings at least equal to piping pressure rating may be used in applications below unless otherwise indicated.
 2. Single-Wall, Chemical-Waste Sewerage Piping: Use any of the following piping materials for each size range:
 - a. **NPS 2 to NPS 4 (DN 50 to DN 100)**: High-silicon-iron, hub-and-plain-end pipe and fittings and calked **OR** High-silicon-iron, mechanical-joint pipe and fittings and coupled, **as directed**, joints.
 - b. **NPS 2 to NPS 4 (DN 50 to DN 100)**: Stainless-steel drainage pipe and fittings and gasketed joints.
 - c. **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: PE drainage pipe and fittings and heat-fusion joints.
 - d. **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: PP drainage pipe and fittings and electrofusion joints.
 - e. **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: PVC drainage pipe and fittings and solvent-cemented joints.
 - f. **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: PVDF drainage pipe and fittings and electrofusion joints.
 - g. **NPS 2 to NPS 4 (DN 50 to DN 100)**: Centrifugally cast **OR** Filament-wound, **as directed**, fiberglass pipe and fittings and butt-and-wrap **OR** bonded, **as directed**, joints.
 - h. **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: Glass pipe and fittings and coupled joints.
 - i. **NPS 6 (DN 150)**: High-silicon-iron, hub-and-plain-end pipe and fittings and calked **OR** High-silicon-iron, mechanical-joint pipe and fittings and coupled, **as directed**, joints.
 - j. **NPS 6 (DN 150)**: Stainless-steel drainage pipe and fittings and gasketed joints.
 - k. **NPS 6 (DN 150)**: PE drainage pipe and fittings and heat-fusion joints.
 - l. **NPS 6 (DN 150)**: PP drainage pipe and fittings and electrofusion joints.
 - m. **NPS 6 (DN 150)**: PVC drainage pipe and fittings and solvent-cemented joints.
 - n. **NPS 6 (DN 150)**: PVDF drainage pipe and fittings and electrofusion joints.
 - o. **NPS 6 (DN 150)**: Centrifugally cast **OR** Filament-wound, **as directed**, fiberglass pipe and fittings and butt-and-wrap **OR** bonded, **as directed**, joints.
 - p. **NPS 6 (DN 150)**: Glass pipe and fittings and coupled joints.

- q. **NPS 8 to NPS 12 (DN 200 to DN 300):** High-silicon-iron, hub-and-plain-end pipe and fittings and calked joints.
 - r. **NPS 8 to NPS 12 (DN 200 to DN 300):** PP drainage pipe and fittings and electrofusion joints.
 - s. **NPS 8 to NPS 12 (DN 200 to DN 300):** PVC drainage pipe and fittings and solvent-cemented joints.
 - t. **NPS 8 to NPS 12 (DN 200 to DN 300):** PVDF drainage pipe and fittings and electrofusion joints.
 - u. **NPS 8 to NPS 12 (DN 200 to DN 300):** Centrifugally cast **OR** Filament-wound, **as directed**, fiberglass pipe and fittings and butt-and-wrap **OR** bonded, **as directed**, joints.
 - v. **NPS 15 (DN 375):** High-silicon-iron, hub-and-plain-end pipe and fittings and calked joints.
 - w. **NPS 15 (DN 375): NPS 16 (DN 400)** centrifugally cast **OR NPS 14 (DN 350)** filament-wound, **as directed**, fiberglass pipe and fittings and butt-and-wrap **OR** bonded, **as directed**, joints.
3. Underground, Double-Containment, Chemical-Waste Sewerage Piping: Use any of the following piping materials for each size range:
- a. **NPS 2 to NPS 12 (DN 50 to DN 300):** PE double-containment drainage pipe and fittings.
 - b. **NPS 2 to NPS 12 (DN 50 to DN 300):** PP double-containment drainage pipe and fittings.
 - c. **NPS 2 to NPS 12 (DN 50 to DN 300):** PP/PVC double-containment drainage pipe and fittings.
 - d. **NPS 2 to NPS 12 (DN 50 to DN 300):** PVDF double-containment drainage pipe and fittings.
 - e. **NPS 2 to NPS 12 (DN 50 to DN 300):** PVDF/PVC double-containment drainage pipe and fittings.
4. Aboveground Chemical-Waste Piping: Use any of the following piping materials for each size range:
- a. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** PP drainage piping and electrofusion **OR** mechanical, **as directed**, joints.
 - b. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** PVC drainage piping and solvent-cemented joints.
 - c. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** PVDF drainage piping and electrofusion **OR** mechanical, **as directed**, joints.
 - d. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150): NPS 2 to NPS 6 (DN 50 to DN 150)** high-silicon-iron piping with hub-and-plain ends and calked joints.
 - e. **NPS 1-1/2 to NPS 4 (DN 40 to DN 100):** High-silicon-iron piping with mechanical-joint ends, mechanical couplings, and coupled joints.
 - f. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150): NPS 2 to NPS 4 (DN 50 to DN 100)** stainless-steel drainage piping with socket-and-spigot ends and gasketed joints.
 - g. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** Borosilicate glass pipe and fittings, couplings, and coupled joints.
 - h. **NPS 8 to NPS 12 (DN 200 to DN 300):** PVC drainage pipe and fittings and solvent-cemented joints.
 - i. **NPS 8 to NPS 12 (DN 200 to DN 300):** High-silicon-iron piping with hub-and-plain ends and calked joints.
5. Under Slab-on-Grade, Indoor, Chemical-Waste Piping: Use any of the following piping materials for each size range:
- a. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** PP drainage piping and electrofusion joints.
 - b. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** PVC drainage piping and solvent-cemented joints.
 - c. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150):** PVDF drainage piping and electrofusion joints.
 - d. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150): NPS 2 to NPS 4 (DN 50 to DN 100)** high-silicon-iron piping with hub-and-plain ends and calked joints.
 - e. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150): NPS 2 to NPS 4 (DN 50 to DN 100)** stainless-steel drainage piping with socket-and-spigot ends and gasketed joints.

- f. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150)**: Borosilicate glass piping with covering, couplings, and coupled joints.
- g. **NPS 1-1/2 to NPS 6 (DN 40 to DN 150)**: PE **OR** PP **OR** PP/PVC **OR** PVDF **OR** PVDF/PVC, **as directed**, double-containment drainage piping and manufacturer's standard joints.
- h. **NPS 8 (DN 200)**: PVC drainage piping and solvent-cemented joints.
- i. **NPS 8 (DN 200)**: High-silicon-iron piping with hub-and-plain ends and calked joints.
- j. **NPS 8 (DN 200)**: PE **OR** PP **OR** PP/PVC **OR** PVDF **OR** PVDF/PVC, **as directed**, double-containment drainage piping and manufacturer's standard joints.
- k. **NPS 10 and NPS 12 (DN 250 and DN 300)**: PVC drainage piping and solvent-cemented joints.
- l. **NPS 10 to NPS 15 (DN 250 to DN 375)**: High-silicon-iron piping with hub-and-plain ends and calked joints.

END OF SECTION 22 66 83 16

SECTION 23 01 10 91 - SEQUENCE OF OPERATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for sequence of operation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes control sequences for HVAC systems, subsystems, and equipment.

C. Definitions

1. DDC: Direct digital control.
2. VAV: Variable air volume.

D. Heating Control Sequences

1. Heating-Water Supply Temperature Control:
 - a. Input Device: Thermostat **OR** Thermistor temperature sensor **OR** Resistance temperature sensor, **as directed**.
 - b. Output Device: Control valve.
 - c. Action: Modulate control valve to maintain heating-water supply temperature.
 - d. Display:
 - 1) Heating-water supply temperature.
 - 2) Heating-water supply temperature set point.
 - 3) Control-valve position.
2. Heating-Water Supply Temperature Reset:
 - a. Input Device: Electric, outdoor-air-reset controller **OR** Outdoor-air sensor, **as directed**.
 - b. Output Device: Unitary controller **OR** DDC system software, **as directed**.
 - c. Action: Reset heating-water supply temperature in straight-line relationship with outdoor-air temperature for the following conditions:
 - 1) **195 deg F (90 deg C)** heating water when outdoor-air temperature is **minus 30 deg F (minus 35 deg C)**.
 - 2) **130 deg F (54 deg C)** heating water when outdoor-air temperature is **75 deg F (24 deg C)**.
 - 3) **150 deg F (65 deg C)** minimum, heating-water temperature.
 - d. Display:
 - 1) Outdoor-air temperature.
 - 2) Heating-water supply temperature.
 - 3) Heating-water supply temperature set point.
3. Control Primary Circulating Pump(s):
 - a. Input Device: Thermostat **OR** DDC system, **as directed**.
 - b. Output Device: Starter **OR** DDC system command to starter, **as directed**, relay.
 - c. Action: Energize pump(s) at outdoor-air temperatures below **65 deg F (18 deg C)**.
 - d. Display:
 - 1) Outdoor-air temperature.
 - 2) Operating status of primary circulating pump(s).

E. Central Refrigeration Equipment Sequences

1. Start and Stop Condenser-Water Pump(s):
 - a. Enable: Allow pump to start when water is in cooling tower:
 - 1) Input Device: Water pressure transducer.

- 2) Output Device: Hard wired through motor starter; DDC system binary output, **as directed**.
 - 3) Action: Confirm water in cooling-tower sump.
 - b. Enable: When outdoor-air temperature conditions are met:
 - 1) Input Device: Space thermostat **OR** DDC system outdoor-air temperature, **as directed**.
 - 2) Output Device: Hard wired through motor starter; DDC system binary output, **as directed**.
 - 3) Action: Confirm outdoor-air temperature is above 50 deg F (10 deg C).
 - c. Enable: When demand conditions are met:
 - 1) Input Device: DDC system software demand.
 - 2) Action: Confirm cooling demand from ventilation system(s).
 - d. Initiate:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Energize pump(s).
 - e. Display:
 - 1) Low-level cooling-tower sump alarm.
 - 2) Outdoor-air temperature.
 - 3) Cooling (software) demand indication.
 - 4) Time and time schedule.
 - 5) Condenser-water pump(s) on-off status.
 - 6) Condenser-water pump(s) on-off indication.
2. Start and Stop Chilled-Water Pump(s):
 - a. Input Device: Flow switch in condenser-water circuit.
 - b. Output Device: Starter **OR** DDC system command to starter, **as directed**, relay.
 - c. Action: Energize pump(s).
 - d. Display:
 - 1) Chilled-water flow indication.
 - 2) Chilled-water pump(s) on-off status.
 - 3) Chilled-water pump(s) on-off indication.
3. Start and Stop Cooling-Tower Fans(s):
 - a. Input Device: Flow switch in condenser-water circuit.
 - b. Output Device: Starter **OR** DDC system command to starter, **as directed**, relay.
 - c. Action: Energize fan(s).
 - d. Display:
 - 1) Condenser-water flow indication.
 - 2) Cooling-tower fan(s) on-off indication.
4. Start and Stop Refrigeration Machine(s):
 - a. Input Device: Flow switch in condenser-water circuit. Flow switch in chilled-water circuit, **as directed**.
 - b. Output Device: Refrigeration **OR** DDC system command to refrigeration, **as directed**, machine terminal strip.
 - c. Action: Energize refrigeration machine(s) internal control circuit.
 - d. Display:
 - e. Condenser-water flow indication.
 - f. Chilled-water flow indication.
 - g. Refrigeration machine on-off indication.
 - h. Chilled-water supply and return temperature.
 - i. Chilled-water temperature control-point adjustment.
5. Start and Stop Chiller(s):
 - a. Input Device: Flow switches in condenser-water and chilled-water circuit.
 - b. Output Device: Chiller **OR** DDC system command to chiller, **as directed**, terminal strip.
 - c. Action: Energize chiller internal control circuit.

- d. Display:
 - 1) Condenser-water flow indication.
 - 2) Chilled-water flow indication.
 - 3) Chiller(s) on-off status.
 - 4) Chiller(s) on-off indication.
 - 5) Chilled-water supply and return temperature.
 - 6) Chilled-water temperature control-point adjustment.
6. Alternate Chiller(s):
 - a. Input Device: Electric alternator **OR** DDC system software, **as directed**.
 - b. Output Device: Chiller **OR** DDC system command to chiller, **as directed**, terminal strip.
 - c. Action: Operate chiller(s) on lead-lag, alternating each startup.
OR
Action: Adding and dropping chiller(s) as follows: **Sequence and parameters** as directed by the Owner .
 - d. Display: Chiller(s) on-off indication.
7. Alarm Chiller(s) Start Failure:
 - a. Input Device: Chiller control panel terminal strip contact **OR** software signal, **as directed**.
 - b. Output Device: Analog control panel **OR** DDC system alarm, **as directed**.
 - c. Action: Signal alarm.
 - d. Display: Chiller "failure-to-start" indication.
8. Chilled-Water Level:
 - a. Input Device: Expansion tank level switch **OR** liquid sensor, **as directed**.
 - b. Output Device: Electric relay signal to alarm panel **OR** DDC system alarm, **as directed**.
 - c. Action: Signal alarm.
 - d. Display: Expansion tank low-level alarm.
9. Chilled-Water Supply Temperature:
 - a. Input Device: Temperature sensor **OR** transmitter, **as directed**, in common chilled-water supply piping.
 - b. Output Device: Integral chiller controls **OR** DDC system signal to chiller control panel, **as directed**.
 - c. Action: Maintain constant leaving chilled-water temperature reset according to highest cooling demand, **as directed**.
 - 1) Display: Chilled-water supply temperature.
10. Condenser-Water Temperature:
 - a. Input Device: Temperature sensor **OR** transmitter, **as directed**, in cooling-tower sump.
 - b. Output Device: Bypass control valve **OR** Cooling-tower fan starter relay **OR** DDC system command to cooling-tower fan starter relay, **as directed**.
 - c. Action: Modulate control valve open to cooling tower and closed to bypass and cycle tower fan(s) on and off **OR** and to low speed and then to high speed, **as directed**, to maintain **65 deg F (18 deg C) OR 70 deg F (21 deg C)**, **as directed**, sump temperature. Close valve when unoccupied, **as directed**.
 - d. Display:
 - 1) Condenser-water sump (return) control-point temperature.
 - 2) Condenser-water sump (return) temperature.
 - 3) Control-valve position.
 - 4) Cooling-tower fan(s) on-off indication.
 - 5) Condenser-water supply temperature.
11. Cooling-Tower Sump Heater:
 - a. Input Device: Sump temperature sensor **OR** transmitter, **as directed**.
 - b. Output Device: Electric relay **OR** DDC system command to electric relay, as directed, and solenoid valve, **as directed**.
 - c. Action: Energize sump heater; drain sump on low temperature, **as directed**.
 - d. Display:
 - 1) Cooling-tower sump temperature.
 - 2) Cooling-tower sump heater on-off indication.
 - 3) Cooling-tower dump indication.

12. Operator Station Display: Indicate the following on operator workstation display terminal:
 - a. DDC system graphic.
 - b. DDC system status, on-off.
 - c. Low-level cooling-tower sump alarm.
 - d. Outdoor-air temperature.
 - e. Cooling (software) demand indication.
 - f. Time and time schedule.
 - g. Condenser-water pump(s) on-off status.
 - h. Condenser-water pump(s) on-off indication.
 - i. Condenser-water flow indication.
 - j. Chilled-water pump(s) on-off status.
 - k. Chilled-water pump(s) on-off indication.
 - l. Cooling-tower fan(s) on-off indication.
 - m. Chilled-water flow indication.
 - n. Refrigeration machine on-off indication.
 - o. Chilled-water supply temperature.
 - p. Chilled-water return temperature.
 - q. Chilled-water temperature control-point adjustment.
 - r. Chiller(s) on-off status.
 - s. Chiller(s) on-off indication.
 - t. Chiller "failure-to-start" indication.
 - u. Expansion tank low-level alarm.
 - v. Condenser-water sump (return) control-point temperature.
 - w. Condenser-water sump (return) temperature.
 - x. Condenser-water control-valve position.
 - y. Cooling-tower fan(s) on-off indication.
 - z. Condenser-water supply temperature.
 - aa. Cooling-tower sump temperature.
 - bb. Cooling-tower sump heater on-off indication.
 - cc. Cooling-tower dump indication.
 - dd. Chilled-water pressure drop through chiller.
 - ee. Entering condenser-water temperature.
 - ff. Leaving condenser-water temperature.
 - gg. Condenser-water pressure drop through chiller.
 - hh. Chiller condenser-water supply and return temperature.
 - ii. Chiller chilled-water supply and return temperature.
 - jj. System capacity in tons.

F. Air-Handling-Unit Control Sequences

1. Start and Stop Supply Fan(s):
 - a. Enable: Freeze Protection:
 - 1) Input Device: Duct-mounted averaging element thermostat, located before supply fan.
 - 2) Output Device: Hard wired through motor starter; analog alarm panel **OR** DDC system alarm, **as directed**.
 - 3) Action: Allow start if duct temperature is above **37 deg F (3 deg C)**; signal alarm if fan fails to start as commanded.
 - b. Enable: High-Temperature Protection:
 - 1) Input Device: Duct-mounted thermostat, located in return air.
 - 2) Output Device: Hard wired through motor starter; analog alarm panel **OR** DDC system alarm, **as directed**.
 - 3) Action: Allow start if duct temperature is below **300 deg F (150 deg C)**.
 - c. Enable: Smoke Control:
 - 1) Input Device: Duct-mounted smoke detector, located in return **OR** supply, **as directed**, air.

- 2) Output Device: Hard wired through motor starter; analog alarm panel **OR** DDC system alarm, **as directed**.
- 3) Action: Allow start if duct is free of products of combustion.
- d. Initiate: Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**, to motor starter.
 - 3) Action: Energize fan(s).
- e. Initiate: Unoccupied Time Schedule:
 - 1) Input Device: Room thermostat **OR** DDC system demand, **as directed**.
 - 2) Output Device: Room thermostat **OR** Binary output, **as directed**, to motor starter.
 - 3) Action: Energize fan(s).
- f. Unoccupied Ventilation:
 - 1) Input Device: Time clock and room thermostat **OR** DDC system time schedule and output, **as directed**.
 - 2) Output Device: Room thermostat **OR** DDC system binary output, **as directed**, to motor starter.
 - 3) Action: Cycle fan(s) during unoccupied periods.
- g. Display: Supply-fan on-off indication.
2. Supply Fan(s) Variable-Volume Control:
 - a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Enable control.
 - b. Volume Control (for fans equipped with variable inlet vanes):
 - 1) Input Device: Static-pressure transmitter **OR** Differential-pressure switch, **as directed**, sensing supply-duct static pressure referenced to conditioned-space static pressure.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator. Set inlet guide vanes to minimum **OR** closed, **as directed**, position when fan is stopped.
 - 3) Action: Maintain constant supply-duct static pressure.
 - c. Volume Control (for fans equipped with variable-speed drives):
 - 1) Input Device: Static-pressure transmitter **OR** Differential-pressure switch, **as directed**, sensing supply-duct static pressure referenced to conditioned-space static pressure.
 - 2) Output Device: Receiver controller **OR** DDC system analog output, **as directed**, to motor speed controller. Set variable-speed drive to minimum speed when fan is stopped.
 - 3) Action: Maintain constant supply-duct static pressure.
 - d. High Pressure:
 - 1) Input Device: Static-pressure transmitter sensing supply-duct static pressure referenced to static pressure outside the duct.
 - 2) Output Device: Receiver controller **OR** DDC system binary output, **as directed**, to alarm panel **OR** motor starter, **as directed**.
 - 3) Action: Stop fan and signal alarm when static pressure rises above excessive-static-pressure set point.
 - e. Display:
 - 1) Supply-fan-discharge static-pressure indication.
 - 2) Supply-fan-discharge static-pressure set point.
 - 3) Supply-fan airflow rate.
 - 4) Supply-fan inlet vane position **OR** speed, **as directed**.
3. Start and Stop Return Fan(s):
 - a. Initiate: Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**, to motor starter.

- 3) Action: Energize fans when supply fans are energized.
 - b. Initiate: Unoccupied Time Schedule:
 - 1) Input Device: Room thermostat **OR** DDC system demand, **as directed**.
 - 2) Output Device: Room thermostat **OR** Binary output, **as directed**, to motor starter.
 - 3) Action: Energize fans when supply fans are energized.
 - c. Unoccupied Ventilation:
 - 1) Input Device: Time clock and room thermostat **OR** DDC system time schedule and output, **as directed**.
 - 2) Output Device: Room thermostat **OR** DDC system binary output, **as directed**, to motor starter.
 - 3) Action: Cycle fan(s) during unoccupied periods.
 - d. Display: Return-fan on-off indication.
4. Return Fan(s) Variable-Volume Control:
- a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Enable control.
 - b. Volume Control (for fans equipped with variable inlet vanes):
 - 1) Input Device: Static-pressure transmitter **OR** Differential-pressure switch, **as directed**, sensing building static pressure referenced to outdoor static pressure.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator. Set inlet guide vanes to minimum **OR** closed, **as directed**, position when fan is stopped.
 - 3) Action: Maintain constant building static pressure.
 - c. Volume Control (for fans equipped with variable-speed drives):
 - 1) Input Device: Static-pressure transmitter **OR** Differential-pressure switch, **as directed**, sensing building static pressure referenced to outdoor static pressure.
 - 2) Output Device: Receiver controller **OR** DDC system analog output, **as directed**, to motor speed controller. Set variable-speed drive to minimum speed when fan is stopped.
 - 3) Action: Maintain constant building static pressure.
 - d. Display:
 - 1) Return-air static-pressure indication.
 - 2) Return-air static-pressure set point.
 - 3) Return-fan airflow rate.
 - 4) Return-fan inlet vane position **OR** speed, **as directed**.
 - 5) Building static-pressure indication.
 - 6) Building static-pressure set point.
5. Return Fan(s) Variable-Volume Control:
- a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Enable control.
 - b. Volume Control (for fans equipped with variable inlet vanes):
 - 1) Input Device: Static-pressure transmitter **OR** Differential-pressure switch, **as directed**, sensing building static pressure referenced to outdoor static pressure.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator. Set inlet guide vanes to minimum **OR** closed, **as directed**, position when fan is stopped.
 - 3) Action: Maintain constant building static pressure.
 - c. Volume Control (for fans equipped with variable-speed drives):
 - 1) Input Device: Static-pressure transmitter **OR** Differential-pressure switch, **as directed**, sensing building static pressure referenced to outdoor static pressure.

- 2) Output Device: Receiver controller **OR** DDC system analog output, **as directed**, to motor speed controller. Set variable-speed drive to minimum speed when fan is stopped.
- 3) Action: Maintain constant building static pressure.
- d. Display:
 - 1) Return-fan-discharge static-pressure indication.
 - 2) Return-fan-discharge static-pressure set point.
 - 3) Return-fan airflow rate.
 - 4) Return-fan inlet vane position **OR** speed, **as directed**.
6. Preheat Coil:
 - a. Freeze Protection:
 - 1) Input Device: Duct-mounted averaging element thermostat, located after preheat coil.
 - 2) Output Device: Hard wired through motor starter; analog alarm panel **OR** DDC system alarm, **as directed**.
 - 3) Action: Allow start if duct temperature is above **33 deg F (1 deg C)**.
 - b. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**, to motor starter.
 - 3) Action: Energize coil circulating pump(s).
 - c. Supply **OR** Discharge, **as directed**, -Air Temperature:
 - 1) Input Device: Time clock and duct-mounted thermostat **OR** DDC system time schedule and electronic temperature sensor, **as directed**.
 - 2) Output Device: Modulating control valve.
 - 3) Action: Maintain air temperature set point of **55 deg F (13 deg C)**.
 - d. Unoccupied Time Schedule:
 - 1) Input Device: Time clock and duct-mounted thermostat mounted in outdoor air **OR** DDC system time schedule and outdoor-air temperature, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**, to motor starter.
 - 3) Action: Energize coil circulating pump(s) when outdoor-air temperature falls below **35 deg F (2 deg C)**.
 - e. Display:
 - 1) Preheat-coil air-temperature indication.
 - 2) Preheat-coil air-temperature set point.
 - 3) Preheat-coil pump operation indication.
 - 4) Preheat-coil control-valve position.
7. Mixed-Air Control:
 - a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Pneumatic relay **OR** DDC system output, **as directed**.
 - 3) Action: Enable control.
 - b. Minimum Position:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator(s).
 - 3) Action: Open minimum outdoor-air dampers **OR** outdoor-air dampers to minimum position, **as directed**.
 - c. Heating Reset:
 - 1) Input Device: Room thermostat **OR** DDC system software, **as directed**.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator(s).
 - 3) Action: Close minimum outdoor-air dampers **OR** Set outdoor-air dampers to minimum position, **as directed**.
 - d. Supply **OR** Mixed, **as directed**, -Air Temperature:

- 1) Input Device: Duct-mounted thermostat **OR** Electronic temperature sensor, **as directed**.
- 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator(s).
- 3) Action: Modulate outdoor-, return-, and relief-air dampers to maintain air temperature set point of **55 deg F (13 deg C)**.
- e. Cooling Reset:
 - 1) Input Device: Outdoor- and return-air, duct-mounted thermostats **OR** electronic temperature sensors, **as directed**.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to damper actuator(s).
 - 3) Action: Set outdoor-air dampers to minimum position when outdoor-air temperature exceeds return-air temperature **OR** enthalpy exceeds return-air enthalpy, **as directed**.
- f. Unoccupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, to modulating damper actuator(s).
 - 3) Action: Position outdoor- and relief-air dampers closed and return-air dampers open.
- g. Display:
 - 1) Mixed-air-temperature indication.
 - 2) Mixed-air-temperature set point.
 - 3) Mixed-air damper position.
8. Humidifier:
 - a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**, and airflow switch
 - 2) Output Device: Pneumatic relay **OR** DDC system output, **as directed**.
 - 3) Action: Enable control.
 - b. Humidity:
 - 1) Input Device: Room humidistat **OR** Return-air, duct-mounted humidistat **OR** DDC system, **as directed**.
 - 2) Output Device: Receiver controller **OR** DDC system analog output **OR** DDC system analog output to digital-to-pneumatic transducer, **as directed**, enables humidifier **OR** modulates control valve to maintain humidity **OR** cycles pump to maintain humidity **OR** cycles pump and modulates control valve to maintain humidity, **as directed**, in straight-line relationship for the following conditions:
 - a) 20 percent when outdoor-air temperature is **minus 30 deg F (minus 35 deg C)**.
 - b) 40 percent when outdoor-air temperature is **75 deg F (24 deg C)**.
 - 3) Action: Modulate outdoor-, return-, and relief-air dampers to maintain air temperature set point of **55 deg F (13 deg C)**.
 - c. Display:
 - 1) Relative humidity indication.
 - 2) Relative humidity set point.
 - 3) Relative humidity control-valve position.
9. Filters: During occupied periods, when fan is running, differential air-pressure transmitters exist.
 - a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Electric relay **OR** DDC system output, **as directed**.
 - 3) Action: Enable control.
 - b. Differential Pressure:

- 1) Input Device: Differential-pressure switches **OR** Pressure transmitter, **as directed**.
- 2) Output Device: Analog alarm panel **OR** DDC system alarm, **as directed**.
- 3) Action: Signal alarm on low- and high-pressure conditions.
- c. Display:
 - 1) Filter air-pressure-drop indication.
 - 2) Filter low-air-pressure set point.
 - 3) Filter high-air-pressure set point.
10. Hydronic **OR** Steam, **as directed**, Heating Coil:
 - a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Enable control.
 - b. Supply **OR** Discharge, **as directed**, -Air Temperature:
 - 1) Input Device: Duct-mounted thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Normally open **OR** closed, **as directed**, modulating control valve.
 - 3) Action: Maintain supply-air temperature set point of **55 deg F (13 deg C)**.
 - c. Temperature Reset (for constant-temperature supply-air systems):
 - 1) Input Device: Duct-mounted thermostat **OR** Electronic temperature sensor, **as directed**, in return air.
 - 2) Output Device: Direct to receiver controller **OR** DDC system, **as directed**, in straight-line relationship for the following conditions:
 - a) **65 deg F (18 deg C)** when return-air temperature is **70 deg F (21 deg C)**.
 - b) **55 deg F (13 deg C)** when return-air temperature is **75 deg F (24 deg C)**.
 - 3) Action: Reset supply-air temperature set point of **55 deg F (13 deg C)**.
 - d. Temperature Reset (for multizone or dual-duct supply-air systems):
 - 1) Input Device: Load analyzer **OR** DDC system, **as directed**, with input from room thermostats **OR** temperature sensors, **as directed**.
 - 2) Output Device: Direct to receiver controller **OR** DDC system, **as directed**.
 - 3) Action: Reset supply-air temperature in response to greatest heating demand.
 - e. Unoccupied Time Schedule:
 - 1) Input Device: Time clock and room thermostat **OR** DDC system time schedule and output, **as directed**.
 - 2) Output Device: Room thermostat (cycling fan) **OR** DDC system binary output, **as directed**.
 - 3) Action: Enable normal control **OR** Return valve to normal position, **as directed**, when fan is cycled on.
 - f. Display:
 - 1) Fan-discharge air-temperature indication.
 - 2) Fan-discharge air-temperature set point.
 - 3) Heating-coil air-temperature indication.
 - 4) Heating-coil air-temperature set point.
 - 5) Heating-coil pump operation indication.
 - 6) Heating-coil control-valve position.
 - 7) Hot-deck air-temperature indication.
 - 8) Hot-deck air-temperature set point.
11. Hydronic Cooling Coil:
 - a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Enable control.
 - b. Supply **OR** Discharge, **as directed**, -Air Temperature:
 - 1) Input Device: Duct-mounted thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Normally open **OR** closed, **as directed**, modulating control valve.
 - 3) Action: Maintain supply-air temperature set point of **55 deg F (13 deg C)**.

- c. Temperature Reset (for constant-temperature systems):
 - 1) Input Device: Duct-mounted thermostat **OR** Electronic temperature sensor, **as directed**, in return air.
 - 2) Output Device: Direct to receiver controller **OR** DDC system, **as directed**, in straight-line relationship for the following conditions:
 - a) 65 deg F (18 deg C) when return-air temperature is 70 deg F (21 deg C).
 - b) 55 deg F (13 deg C) when return-air temperature is 75 deg F (24 deg C).
 - 3) Action: Reset supply-air temperature set point of 55 deg F (13 deg C).
 - d. Temperature Reset (for multizone or dual-duct supply-air systems):
 - 1) Input Device: Load analyzer **OR** DDC system, **as directed**, with input from room thermostats **OR** temperature sensors, **as directed**.
 - 2) Output Device: Direct to receiver controller **OR** DDC system, **as directed**.
 - 3) Action: Reset supply-air temperature in response to greatest heating demand.
 - e. Unoccupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Disable control.
 - f. Display:
 - 1) Fan-discharge air-temperature indication.
 - 2) Fan-discharge air-temperature set point.
 - 3) Cooling-coil air-temperature indication.
 - 4) Cooling-coil air-temperature set point.
 - 5) Cooling-coil control-valve position.
 - 6) Cold-deck air-temperature indication.
 - 7) Cold-deck air-temperature set point.
12. Multizone Damper Control:
- a. Occupied Time Schedule:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Enable control.
 - b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Damper actuator.
 - 3) Action: Maintain room temperature.
 - c. Display:
 - 1) Room temperature indication.
 - 2) Room temperature set point.
 - 3) Multizone damper position.
13. Coordination of Air-Handling Unit Sequences: Ensure that preheat, mixed-air, heating-coil, and cooling-coil controls have common inputs and do not overlap in function.
14. Operator Station Display: Indicate the following on operator workstation display terminal:
- a. DDC system graphic.
 - b. DDC system on-off indication.
 - c. DDC system occupied/unoccupied mode.
 - d. Outdoor-air-temperature indication.
 - e. Supply-fan on-off indication.
 - f. Supply-fan-discharge static-pressure indication.
 - g. Supply-fan-discharge static-pressure set point.
 - h. Supply-fan airflow rate.
 - i. Supply-fan inlet vane position **OR** speed, **as directed**.
 - j. Return-fan on-off indication.
 - k. Return-air static-pressure indication.
 - l. Return-air static-pressure set point.
 - m. Return-fan airflow rate.
 - n. Return-fan inlet vane position **OR** speed, **as directed**.

- o. Building static-pressure indication.
- p. Building static-pressure set point.
- q. Preheat-coil air-temperature indication.
- r. Preheat-coil air-temperature set point.
- s. Preheat-coil pump operation indication.
- t. Preheat-coil control-valve position.
- u. Mixed-air-temperature indication.
- v. Mixed-air-temperature set point.
- w. Mixed-air damper position.
- x. Relative humidity indication.
- y. Relative humidity set point.
- z. Relative humidity control-valve position.
- aa. Filter air-pressure-drop indication.
- bb. Filter low-air-pressure set point.
- cc. Filter high-air-pressure set point.
- dd. Fan-discharge air-temperature indication.
- ee. Fan-discharge air-temperature set point.
- ff. Heating-coil air-temperature indication.
- gg. Heating-coil air-temperature set point.
- hh. Heating-coil pump operation indication.
- ii. Heating-coil control-valve position.
- jj. Hot-deck air-temperature indication.
- kk. Hot-deck air-temperature set point.
- ll. Cooling-coil air-temperature indication.
- mm. Cooling-coil air-temperature set point.
- nn. Cooling-coil control-valve position.
- oo. Cold-deck air-temperature indication.
- pp. Cold-deck air-temperature set point.
- qq. Room temperature indication.
- rr. Room temperature set point.
- ss. Multizone damper position.

G. Terminal Unit Operating Sequence

1. Cabinet Unit Heater, Hydronic **OR** Steam, **as directed**:
 - a. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Room thermostat **OR** DDC system binary output, **as directed**.
 - 3) Action: Cycle fan to maintain temperature.
 - b. Low-Temperature Safety:
 - 1) Input Device: Line-voltage, on-off thermostat, pipe mounted.
 - 2) Output Device: Hard wired.
 - 3) Action: Stop fan when return heating-water **OR** condensate, **as directed**, temperature falls below **35 deg F (2 deg C)**.
 - c. Display:
 - 1) Room temperature indication.
 - 2) Room temperature set point.
2. Cabinet Unit Heater, Electric: Room thermostat cycles fan and sequences stages of heating.
3. Unit Heater, Hydronic **OR** Steam, **as directed**:
 - a. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Room thermostat **OR** DDC system binary output, **as directed**.
 - 3) Action: Cycle fan to maintain temperature.
 - b. Low-Temperature Safety:
 - 1) Input Device: Line-voltage, on-off thermostat, pipe mounted.
 - 2) Output Device: Hard wired.

- 3) Action: Stop fan when return heating-water **OR** condensate, **as directed**, temperature falls below **35 deg F (2 deg C)**.
 - c. Display:
 - 1) Room temperature indication.
 - 2) Room temperature set point.
 4. Unit Heater, Electric: Room thermostat cycles fan and sequences stages of heating.
 5. Combustion-Air Unit Heaters:
 - a. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control-valve operator.
 - 3) Action: Modulate valve to maintain temperature.
 - b. Display:
 - 1) Room temperature indication.
 - 2) Room temperature set point.
 - 3) Control-valve position.
 6. Radiant Heating Cable, Electric: Room thermostat cycles power.
 7. Radiant Heating Panel, Electric: Room thermostat cycles power.
 8. Radiant Heating Panel, Hydronic:
 - a. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control-valve operator.
 - 3) Action: Modulate valve to maintain temperature.
 - b. Display:
 - 1) Room temperature indication.
 - 2) Room temperature set point.
 - 3) Control-valve position.
 9. Two-Pipe, Single-Coil, Fan-Coil Unit:
 - a. Occupied Time Schedule:
 - 1) Input Device: Fan switch **OR** Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Start and stop fan and enable control.
 - b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**, in room **OR** return air, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control-valve operator.
 - 3) Action: Modulate valve to maintain temperature.
 - c. DDC System Changeover:
 - 1) Input Device: Thermostat **OR** Electronic temperature sensor, **as directed**, in supply-water **OR** on supply-water piping **OR** DDC system, **as directed**.
 - 2) Output Device: Hard-wired relay **OR** DDC system software, **as directed**.
 - 3) Action: Reverse control-valve action to switch from heating to cooling.
 - d. Display:
 - 1) DDC system graphic.
 - 2) DDC system on-off indication.
 - 3) DDC system occupied/unoccupied mode.
 - 4) Room temperature indication.
 - 5) Room temperature set point.
 - 6) Control-valve position.
 - 7) Supply-water temperature indication.
 10. Four-Pipe, Hydronic Fan-Coil Unit:
 - a. Occupied Time Schedule:
 - 1) Input Device: Fan switch **OR** Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.

- 3) Action: Start and stop fan, and enable control.
- b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control-valve operators.
 - 3) Action: Modulate multiport control valves to maintain temperature.
- c. Display:
 - 1) DDC system graphic.
 - 2) DDC system on-off indication.
 - 3) DDC system occupied/unoccupied mode.
 - 4) Room temperature indication.
 - 5) Room temperature set point.
 - 6) Control-valve position.
11. Unit Ventilator: Room thermostat modulates heating-and-cooling control valves; airstream thermostats modulate outdoor- and return-air dampers as follows:
 - a. Occupied Time Schedule:
 - 1) Input Device: Fan switch **OR** Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Time clock **OR** Binary output, **as directed**.
 - 3) Action: Start and stop fan, move outdoor- and return-air dampers to minimum **OR** maximum, **as directed**, outdoor-air position, and enable control.
 - b. Room Temperature - Valves:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control-valve operators.
 - 3) Action: Modulate heating-water supply control valve and chilled-water supply control valve in sequence to maintain temperature.
 - c. Room Temperature - Dampers:
 - 1) Input Device: Thermostat **OR** Electronic temperature sensor, **as directed**, in mixed air.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control damper actuators.
 - 3) Action: Modulate outdoor- and return-air dampers to maintain temperature.
 - d. Supply-Air Temperature Limit:
 - 1) Input Device: Thermostat **OR** Electronic temperature sensor, **as directed**, in discharge air.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, control-valve operators and control damper actuators.
 - 3) Action: Override room thermostat to control valves and dampers to prevent discharge air from dropping below a minimum set point.
 - e. Warm-up Cycle:
 - 1) Input Device: Time clock **OR** DDC system time schedule, **as directed**.
 - 2) Output Device: Hard-wired relay **OR** DDC system binary output, **as directed**.
 - 3) Action: Open heating-water supply control valve, close outdoor-air damper, and open return-air damper.
 - f. Display:
 - 1) DDC system graphic.
 - 2) DDC system on-off indication.
 - 3) DDC system occupied/unoccupied mode.
 - 4) Room temperature indication.
 - 5) Room temperature set point.
 - 6) Control-valve position.
 - 7) Damper position.
12. Heating Coils, Hydronic **OR** Steam, **as directed**:
 - a. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic **OR** Electric, **as directed**, control-valve operators.
 - 3) Action: Modulate **OR** Cycle, **as directed**, valve to maintain temperature.

- b. Display:
 - 1) Room temperature indication.
 - 2) Room temperature set point.
 - 3) Control-valve position.
- 13. Heating Coils, Electric: Room thermostat cycles coils **OR** sequences stages of heating, **as directed**.
- 14. Radiators and Convectors, Hydronic **OR** Steam, **as directed**:
 - a. Occupancy:
 - 1) Input Device: Occupancy sensor.
 - 2) Output Device: DDC system binary output.
 - 3) Action: Report occupancy and enable occupied temperature set point.
 - b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic **OR** Electric, **as directed**, control-valve operators.
 - 3) Action: Modulate **OR** Cycle, **as directed**, valve to maintain temperature.
 - a) Occupied Temperature: 75 deg F (24 deg C).
 - b) Unoccupied Temperature: 65 deg F (18 deg C).
 - c. Display:
 - 1) Room/area served.
 - 2) Room temperature indication.
 - 3) Room temperature set point.
 - 4) Room temperature set point, occupied.
 - 5) Room temperature set point, occupied standby.
 - 6) Room temperature set point, unoccupied.
 - 7) Control-valve position as percent open.
- 15. Radiators and Convectors, Electric: Room thermostat cycles coils **OR** sequences stages of heating, **as directed**.
- 16. Constant-Volume, Terminal Air Units, Hydronic **OR** Steam, **as directed**:
 - a. Occupancy:
 - 1) Input Device: Occupancy sensor.
 - 2) Output Device: DDC system binary output.
 - 3) Action: Report occupancy and enable occupied temperature set point.
 - a) Occupied Temperature: 75 deg F (24 deg C).
 - b) Unoccupied Temperature: 65 deg F (18 deg C).
 - b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic **OR** Electric, **as directed**, control-valve operators.
 - 3) Action: Modulate **OR** Cycle, **as directed**, valve to maintain temperature.
 - c. Display:
 - 1) Room/area served.
 - 2) Room occupied/unoccupied.
 - 3) Room temperature indication.
 - 4) Room temperature set point.
 - 5) Room temperature set point, occupied.
 - 6) Room temperature set point, unoccupied.
 - 7) Control-valve position as percent open.
- 17. VAV, Terminal Air Units with Hydronic **OR** Steam, **as directed**, Coils:
 - a. Occupancy:
 - 1) Input Device: Occupancy sensor.
 - 2) Output Device: DDC system binary output.
 - 3) Action: Report occupancy and enable occupied temperature set point.
 - a) Occupied Temperature: 75 deg F (24 deg C).
 - b) Unoccupied Temperature: 65 deg F (18 deg C).

- b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, damper actuators and control-valve operators.
 - 3) Action: Modulate damper and valve to maintain temperature.
 - a) Sequence damper from full open to minimum position, then valve from closed to fully open.
 - c. Display:
 - 1) Room/area served.
 - 2) Room occupied/unoccupied.
 - 3) Room temperature indication.
 - 4) Room temperature set point.
 - 5) Room temperature set point, occupied.
 - 6) Room temperature set point, unoccupied.
 - 7) Air-damper position as percent open.
 - 8) Control-valve position as percent open.
18. Dual-Duct, VAV, Terminal Air Units:
- a. Occupancy:
 - 1) Input Device: Occupancy sensor.
 - 2) Output Device: DDC system binary output.
 - 3) Action: Report occupancy and enable occupied temperature set point.
 - a) Occupied Temperature: **75 deg F (24 deg C)**.
 - b) Unoccupied Temperature: **65 deg F (18 deg C)**.
 - b. Room Temperature:
 - 1) Input Device: Room thermostat **OR** Electronic temperature sensor, **as directed**.
 - 2) Output Device: Pneumatic **OR** Electronic, **as directed**, damper actuators.
 - 3) Action: Modulate dampers to maintain temperature.
 - a) Sequence when space temperature is below set point: Close VAV damper to minimum position, open hot-deck dampers and close cold-deck dampers, then open VAV damper.
 - b) Sequence when space temperature is above set point: Close VAV damper to minimum position, close hot-deck dampers and open cold-deck dampers, then open VAV damper.
 - c. Display:
 - 1) Room/area served.
 - 2) Room occupied/unoccupied.
 - 3) Room temperature indication.
 - 4) Room temperature set point.
 - 5) Room temperature set point, occupied.
 - 6) Room temperature set point, unoccupied.
 - 7) VAV damper position as percent open.
 - 8) Hot-deck damper position as percent open.
 - 9) Cold-deck damper position as percent open.

H. Ventilation Sequences

- 1. Combustion-Air, Makeup Unit Control, Electric: Start fan when served appliance burner starts; room thermostat sequences stages of heating.
- 2. Combustion-Air, Makeup Unit Control, Hydronic **OR** Steam, **as directed**: Start fan when served appliance burner starts; room thermostat cycles **OR** modulates, **as directed**, control valve.
- 3. Gravity Roof Ventilator: Occupancy sensor **OR** Room thermostat, **as directed**, opens dampers.
- 4. Exhaust Fan: Occupancy sensor **OR** Interlock with light switch **OR** Room thermostat, **as directed**, cycles fan.
- 5. Kitchen Exhaust Fan: Occupancy sensor starts fan and energizes makeup air unit.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION (Not Applicable)

END OF SECTION 23 01 10 91

Task	Specification	Specification Description
23 01 10 91	23 05 93 00	Testing, Adjusting, And Balancing
23 01 20 91	23 05 93 00	Testing, Adjusting, And Balancing
23 01 20 91	23 01 10 91	Sequence Of Operation

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SECTION 23 01 30 51 - AIR DUCT CLEANING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for HVAC air-distribution system cleaning. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes cleaning HVAC air-distribution equipment, ducts, plenums, and system components.

C. Definitions

1. ASCS: Air systems cleaning specialist.
2. NADCA: National Air Duct Cleaners Association.

D. Submittals

1. Qualification Data: For an ASCS.
2. Strategies and procedures plan.
3. Cleanliness verification report.

E. Quality Assurance

1. ASCS Qualifications: A certified member of NADCA **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. Certification: Employ an ASCS certified by NADCA **OR** one who meets the requirements necessary for certification, **as directed**, on a full-time basis.
 - b. Supervisor Qualifications: Certified as an ASCS by NADCA **OR** one who meets the requirements necessary for certification, **as directed**.
2. UL Compliance: Comply with UL 181 and UL 181A for fibrous-glass ducts.
3. Cleaning Conference: Conduct conference at Project site.

1.2 PRODUCTS (Not Used)

1.3 EXECUTION

A. Examination

1. Examine HVAC air-distribution equipment, ducts, plenums, and system components to determine appropriate methods, tools, and equipment required for performance of the Work.
2. Perform "Project Evaluation and Recommendation" according to NADCA ACR 2006.
3. Prepare written report listing conditions detrimental to performance of the Work.
4. Proceed with work only after unsatisfactory conditions have been corrected.

B. Preparation

1. Prepare a written plan that includes strategies and step-by-step procedures. At a minimum, include the following:
 - a. Supervisor contact information.
 - b. Work schedule including location, times, and impact on occupied areas.
 - c. Methods and materials planned for each HVAC component type.
 - d. Required support from other trades.
 - e. Equipment and material storage requirements.

- f. Exhaust equipment setup locations.
2. Use the existing service openings, as required for proper cleaning, at various points of the HVAC system for physical and mechanical entry and for inspection.
3. Comply with NADCA ACR 2006, "Guidelines for Constructing Service Openings in HVAC Systems" Section.

C. Cleaning

1. Comply with NADCA ACR 2006.
2. Remove visible surface contaminants and deposits from within the HVAC system.
3. Systems and Components to Be Cleaned:
 - a. Air devices for supply and return air.
 - b. Air-terminal units.
 - c. Ductwork:
 - 1) Supply-air ducts, including turning vanes and reheat coils, to the air-handling unit.
 - 2) Return-air ducts to the air-handling unit.
 - 3) Exhaust-air ducts.
 - d. Air-Handling Units:
 - 1) Interior surfaces of the unit casing.
 - 2) Coil surfaces compartment.
 - 3) Condensate drain pans.
 - 4) Fans, fan blades, and fan housings.
 - e. Filters and filter housings.
4. Collect debris removed during cleaning. Ensure that debris is not dispersed outside the HVAC system during the cleaning process.
5. Particulate Collection:
 - a. For particulate collection equipment, include adequate filtration to contain debris removed. Locate equipment downwind and away from all air intakes and other points of entry into the building.
 - b. HEPA filtration with 99.97 percent collection efficiency for particles sized 0.3 micrometer or larger shall be used where the particulate collection equipment is exhausting inside the building.
6. Control odors and mist vapors during the cleaning and restoration process.
7. Mark the position of manual volume dampers and air-directional mechanical devices inside the system prior to cleaning. Restore them to their marked position on completion of cleaning.
8. System components shall be cleaned so that all HVAC system components are visibly clean. On completion, all components must be returned to those settings recorded just prior to cleaning operations.
9. Clean all air-distribution devices, registers, grilles, and diffusers.
10. Clean visible surface contamination deposits according to NADCA ACR 2006 and the following:
 - a. Clean air-handling units, airstream surfaces, components, condensate collectors, and drains.
 - b. Ensure that a suitable operative drainage system is in place prior to beginning wash-down procedures.
 - c. Clean evaporator coils, reheat coils, and other airstream components.
11. Duct Systems:
 - a. Create service openings in the HVAC system as necessary to accommodate cleaning.
 - b. Mechanically clean duct systems specified to remove all visible contaminants so that the systems are capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).
12. Debris removed from the HVAC system shall be disposed of according to applicable Federal, state, and local requirements.
13. Mechanical Cleaning Methodology:
 - a. Source-Removal Cleaning Methods: The HVAC system shall be cleaned using source-removal mechanical cleaning methods designed to extract contaminants from within the HVAC system and to safely remove these contaminants from the facility. No cleaning

method, or combination of methods, shall be used that could potentially damage components of the HVAC system or negatively alter the integrity of the system.

- 1) Use continuously operating vacuum-collection devices to keep each section being cleaned under negative pressure.
- 2) Cleaning methods that require mechanical agitation devices to dislodge debris that is adhered to interior surfaces of HVAC system components shall be equipped to safely remove these devices. Cleaning methods shall not damage the integrity of HVAC system components or damage porous surface materials such as duct and plenum liners.
- b. Cleaning Mineral-Fiber Insulation Components:
 - 1) Fibrous-glass thermal or acoustical insulation elements present in equipment or ductwork shall be thoroughly cleaned with HEPA vacuuming equipment while the HVAC system is under constant negative pressure and shall not be permitted to get wet according to NADCA ACR 2006.
 - 2) Cleaning methods used shall not cause damage to fibrous-glass components and will render the system capable of passing the HVAC System Cleanliness Tests (see NADCA ACR 2006).
 - 3) Fibrous materials that become wet shall be discarded and replaced.
14. Coil Cleaning:
 - a. Measure static-pressure differential across each coil.
 - b. See NADCA ACR 2006, "Coil Surface Cleaning" Section. Type 1, or Type 1 and Type 2, cleaning methods shall be used to render the coil visibly clean and capable of passing Coil Cleaning Verification (see applicable NADCA ACR 2006).
 - c. Coil drain pans shall be subject to NADCA ACR 2006, "Non-Porous Surfaces Cleaning Verification." Ensure that condensate drain pans are operational.
 - d. Electric-resistance coils shall be de-energized, locked out, and tagged before cleaning.
 - e. Cleaning methods shall not cause any appreciable damage to, cause displacement of, inhibit heat transfer, or cause erosion of the coil surface or fins, and shall comply with coil manufacturer's written recommendations when available.
 - f. Rinse thoroughly with clean water to remove any latent residues.
15. Antimicrobial Agents, Coatings, and Sanitizers:
 - a. Apply antimicrobial agents, coatings, and sanitizers if active fungal growth is reasonably suspected or where unacceptable levels of fungal contamination have been verified. Apply antimicrobial agents and coatings according to manufacturer's written recommendations and EPA registration listing after the removal of surface deposits and debris.
 - b. When used, antimicrobial treatments, coatings, and sanitizers shall be applied after the system is rendered clean.
 - c. Apply antimicrobial agents, coatings, and sanitizers directly onto surfaces of interior ductwork. Fogging is prohibited.
 - d. Sanitizing agent products shall be registered by the EPA as specifically intended for use in HVAC systems and ductwork.
- D. Cleanliness Verification
 1. Verify cleanliness according to NADCA ACR 2006, "Verification of HVAC System Cleanliness" Section.
 2. Verify HVAC system cleanliness after mechanical cleaning and before applying any treatment or introducing any treatment-related substance to the HVAC system, including biocidal agents, coatings, and sanitizers.
 3. Perform visual inspection for cleanliness. If no contaminants are evident through visual inspection, the HVAC system shall be considered clean. If visible contaminants are evident through visual inspection, those portions of the system where contaminants are visible shall be re-cleaned and subjected to re-inspection for cleanliness.
 4. Additional Verification:
 - a. Perform surface comparison testing or NADCA vacuum test.
 - b. Conduct NADCA vacuum gravimetric test analysis for nonporous surfaces.
 5. Verification of Coil Cleaning:

- a. Measure static-pressure differential across each coil.
 - b. Coil will be considered clean if cleaning restored the coil static-pressure differential within 10 percent of **inches wg (Pa)** as directed by the Owner the differential measured when the coil was first installed.
OR
Coil will be considered clean if the coil is free of foreign matter and chemical residue, based on a thorough visual inspection.
6. Prepare a written cleanliness verification report. At a minimum, include the following:
 - a. Written documentation of the success of the cleaning.
 - b. Site inspection reports, initialed by supervisor, including notation on areas of inspection, as verified through visual inspection.
 - c. Surface comparison test results if required.
 - d. Gravimetric analysis (nonporous surfaces only).
 - e. System areas found to be damaged.
 7. Photographic Documentation: Comply with requirements listed in Scope of Work.
- E. Restoration
1. Restore and repair HVAC air-distribution equipment, ducts, plenums, and components according to NADCA ACR 2006, "Restoration and Repair of Mechanical Systems" Section.
 2. Restore service openings capable of future reopening. Comply with requirements in Division 23 Section "Metal Ducts". Include location of service openings in Project closeout report.
 3. Replace fibrous-glass materials that cannot be restored by cleaning or resurfacing. Comply with requirements in Division 23 Section "Metal Ducts" & Division 23 Section "Nonmetal Ducts" .
 4. Replace damaged insulation according to Division 23 Section "Hvac Insulation".
 5. Ensure that closures do not hinder or alter airflow.
 6. New closure materials, including insulation, shall match opened materials and shall have removable closure panels fitted with gaskets and fasteners.
 7. Reseal fibrous-glass ducts. Comply with requirements in Division 23 Section "Nonmetal Ducts".

END OF SECTION 23 01 30 51

Task	Specification	Specification Description
23 01 30 51	23 05 93 00	Testing, Adjusting, And Balancing
23 01 30 51	23 01 10 91	Sequence Of Operation
23 01 30 61	23 31 13 13a	Metal Ducts

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SECTION 23 01 50 61 - CAST-IRON BOILERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cast-iron boilers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged cast-iron boilers, trim, and accessories for generating hot water or steam with the following configurations and burners:
 - a. Factory and Field assembled.
 - b. Atmospheric gas, Sealed-combustion, gas, Forced-draft, gas, Oil, and Combination gas and oil burner.

C. Submittals

1. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - a. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.
 - 1) Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 2) Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Include the following:
4. Source quality-control test reports.
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
3. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
4. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
5. I=B=R Compliance: Boilers shall be tested and rated according to HI's "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with I=B=R emblem on a nameplate affixed to boiler.
6. UL Compliance: Test boilers for compliance with UL 726, "Oil-Fired Boiler Assemblies **OR** UL 726, "Oil-Fired Boiler Assemblies," and UL 795, "Commercial-Industrial Gas Heating

Equipment **OR** UL 795, "Commercial-Industrial Gas Heating Equipment", **as directed**. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace controls and heat exchangers of boilers that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Controls: Two years from date of Final Completion.
 - b. Warranty Period for Heat Exchangers: Five **OR** 10 **OR** 20, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Units

1. Description: Factory fabricated and assembled **OR** field assembled, **as directed**.
 - a. Cast-iron sections shall be sealed pressure tight and held together with tie rods set on an insulated steel base, **as directed**; including insulated jacket and flue-gas vent connection.
OR
Ship cast-iron sections disassembled with all materials and equipment, including seals, tie rods, and insulated jacket and flue-gas vent connection for field assembly.
2. Cast-Iron Section Design:
 - a. Configuration: Wet base **OR** back **OR** leg, **as directed**.
 - b. Number of Passes: Single **OR** Multiple, **as directed**.
 - c. Sectional Joints: High-temperature sealant to seal flue-gas passages not in contact with heating medium, tapered cast-iron push nipples, **OR** O-ring gaskets, **OR** fiber roping, **as directed**, and held together with tie rods.
 - d. Drain and blowdown tappings.
 - e. Return injection tube to equalize water flow to all sections.
 - f. Crown inspection tappings with brass plugs.
 - g. Built-in air separator.
3. Combustion Chamber: Equipped with ceramic-fiber target wall **OR** refractory **OR** insulation, **as directed**, and flame observation ports, front and back.
4. Casing:
 - a. Jacket: Sheet metal **OR** Galvanized sheet metal, **as directed**, with snap-in or interlocking closures and baked-enamel **OR** powder-coated, **as directed**, protective finish.
 - b. Insulation: Minimum **1-inch- (25-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, thick, mineral-fiber insulation surrounding the heat exchanger.
 - c. Combustion Chamber Access: Refractory lined, hinged, front.
 - d. Access: For cleaning between cast-iron sections.
 - e. Draft Hood: Flue canopy and top **OR** rear, **as directed**, flue connection shall be constructed of aluminized **OR** stainless, **as directed**, steel containing adjustable outlet damper assembly.
 - f. Insulated base constructed of aluminized steel to permit boiler to be installed on combustible floor.
 - g. Mounting Frame: Steel rails to mount assembled boiler package on concrete base.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
 - h. Control Cabinet: Sheet metal casing shall cover all controls, gas train, and burner.
5. Draft Diverter: Steel assembly integral with boiler casing **OR** Separate galvanized-steel assembly, **as directed**.

B. Burner: For Atmospheric Gas Burners.

1. Burner Tubes and Orifices: Stainless steel **OR** Cast iron, **as directed**, for natural **OR** propane, **as directed**, gas.
 2. Gas Train: Control devices and full-modulation **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**. **OR**
Gas Train: Combination gas valve with manual shutoff, pressure regulator, and pilot adjustment.
 3. Pilot: Standing **OR** Intermittent-electric-spark, **as directed**, pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
- C. Burner: For Residential-Size Boilers With Sealed-Combustion Burners.
1. Burner Tubes and Orifices: Stainless steel **OR** Cast iron, **as directed**, for natural **OR** propane, **as directed**, gas.
 2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Gas Train: Combination gas valve with manual shutoff, pressure regulator, and pilot adjustment.
 4. Pilot: Standing **OR** Intermittent-electric-spark, **as directed**, pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
- D. Burner: For Forced-Draft Burners.
1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for natural **OR** propane, **as directed**, gas.
 2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Gas Train: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 4. Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 5. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - a. Maximum Oxides of Nitrogen Emissions: 20 **OR** 30, **as directed**, ppm.
- E. Burner: For Oil Burners.
1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil.
 2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Oil Supply: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - a. Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower, **as directed**, shall be capable of producing 300-psig (2070-kPa) discharge pressure and 15-inch Hg (50.7-kPa) vacuum.
 - b. Oil Piping Specialties:
 - 1) Suction-line, manual, gate valve.
 - 2) Removable-mesh oil strainer.
 - 3) 0- to 30-inch Hg (0- to 101.3-kPa) vacuum; 0- to 30-psig (0- to 207-kPa) vacuum-pressure gage.

- 4) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
 - 5) Nozzle-line, solenoid-safety-shutoff oil valve.
 4. Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid using cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
 5. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - a. Maximum Oxides of Nitrogen Emissions: 30 ppm.
- F. Burner: For Combination Gas And Oil Burners.
 1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil and natural **OR** propane, **as directed**, gas.
 2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Oil Supply: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - a. Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower, **as directed**, shall be capable of producing 300-psig (2070-kPa) discharge pressure and 15-inch Hg (50.7-kPa) vacuum.
 - b. Oil Piping Specialties:
 - 1) Suction-line, manual, gate valve.
 - 2) Removable-mesh oil strainer.
 - 3) 0- to 30-inch Hg (0- to 101.3-kPa) vacuum; 0- to 30-psig (0- to 207-kPa) vacuum-pressure gage.
 - 4) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
 - 5) Nozzle-line, solenoid-safety-shutoff oil valve.
 4. Gas Train: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 5. Gas Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 6. Oil Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid with cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
 7. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - a. Maximum Oxides of Nitrogen Emissions: 20 **OR** 30, **as directed**, ppm.
- G. Trim: For Hot-Water Boilers.
 1. Include devices sized to comply with ANSI B31.9, "Building Services Piping."
 2. Aquastat Controllers: Operating, firing rate, **as directed**, and high limit.
 3. Safety Relief Valve: ASME rated.
 4. Pressure and Temperature Gage: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
 5. Boiler Air Vent: Automatic **OR** Manual, **as directed**.
 6. Drain Valve: Minimum NPS 3/4 (DN 20) hose-end gate valve.
 7. Tankless Heater: Carbon-steel header with copper-tube heat exchanger, mounted in an upper port of cast-iron sections and sealed with fiber gasket.
 - a. Tappings NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - b. Tappings NPS 2-1/2 (DN 65) and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

- H. Trim: For Steam Boilers.
1. Include devices sized to comply with ANSI B31.9, "Building Services Piping."
 2. Pressure Controllers: Operating, firing rate, **as directed**, and high limit.
 3. Safety Relief Valve:
 - a. Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code.
 - b. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
 - 1) Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
 4. Pressure Gage: Minimum **3-1/2-inch (89-mm)** diameter. Gage shall have normal operating pressure about 50 percent of full range.
 5. Water Column: Minimum **12-inch (300-mm)** glass gage with shutoff cocks.
 6. Drain Valves: Minimum **NPS 3/4 (DN 20)** or nozzle size with hose-end connection.
 7. Blowdown Valves: Factory-installed bottom and surface, slow-acting blowdown valves same size as boiler nozzle.
 8. Stop Valves: Boiler inlets and outlets, except safety relief valves or preheater inlet and outlet, shall be equipped with stop valve in an accessible location as near as practical to boiler nozzle and same size as or larger than nozzle. Valves larger than **NPS 2 (DN 50)** shall have rising stem.
 9. Stop-Check Valves: Factory-installed, stop-check valve and stop valve at boiler outlet with free-blow drain valve factory installed between the two valves and visible when operating stop-check valve.
 10. Tankless Heater: Carbon-steel header with copper-tube heat exchanger, mounted in an upper port of cast-iron sections and sealed with fiber gasket.
 - a. Tappings **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - b. Tappings **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
- I. Controls
1. Refer to Division 23 Section "Instrumentation And Control For Hvac".
OR
Boiler operating controls shall include the following devices and features:
 - a. Control transformer.
 - b. Set-Point Adjust: Set points shall be adjustable.
 - c. Operating Pressure Control for Steam Boilers: Factory wired and mounted to cycle burner.
 - d. Low-Water Cutoff and Pump Control for Steam Boilers: Cycle feedwater pump(s) for makeup water control.
 - e. Sequence of Operation for Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.
OR
Sequence of Operation for Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At **0 deg F (minus 17 deg C)** outside-air temperature, set supply-water temperature at **200 deg F (93 deg C)**; at **60 deg F (15 deg C)** outside-air temperature, set supply-water temperature at **140 deg F (60 deg C)**.
 - f. Sequence of Operation for Steam Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain a constant steam pressure. Maintain pressure set point plus or minus 10 percent.
 - 1) Include automatic, alternating-firing sequence for multiple boilers.
 2. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - a. High Cutoff: Manual **OR** Automatic, **as directed**, reset stops burner if operating conditions rise above maximum boiler design temperature **OR** pressure, **as directed**.

- b. Low-Water Cutoff Switch: Electronic for hot-water boilers or Float and electronic for steam boilers probe shall prevent burner operation on low water. Cutoff switch shall be manual **OR** automatic, **as directed**, -reset type.
- c. Blocked Vent Safety Switch for Atmospheric Burners: Manual-reset switch factory mounted on draft diverter.
- d. Rollout Safety Switch for Atmospheric Burners: Factory mounted on boiler combustion chamber.
- e. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
- 3. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.
 - a. Hardwired Points:
 - 1) Monitoring: On/off status, common trouble alarm **OR** low water level alarm, **as directed**.
 - 2) Control: On/off operation, hot water supply temperature set-point adjustment **OR** steam pressure adjustment, **as directed**.
 - b. A communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building automation system.

J. Electrical Power

- 1. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22..
- 2. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 - a. House in NEMA 250, Type 1 enclosure.
 - b. Wiring shall be numbered and color-coded to match wiring diagram.
 - c. Install factory wiring outside of an enclosure in a metal raceway.
 - d. Field power interface shall be to wire lugs **OR** fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - e. Provide branch power circuit to each motor and to controls with disconnect switch or circuit breaker, **as directed**.
 - f. Provide each motor with overcurrent protection.

K. Source Quality Control

- 1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- 2. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- 3. Allow the Owner access to source quality-control testing of boilers. Notify the Owner 14 days in advance of testing.

1.3 EXECUTION

A. Boiler Installation

- 1. Install boilers level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac" and concrete materials and installation requirements are specified in Division 31..
- 2. Vibration Isolation: Elastomeric isolator pads **OR** mounts, **as directed**, with a minimum static deflection of **0.25 inch (6.35 mm)**. Vibration isolation devices and installation requirements are

specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

3. Install gas-fired boilers according to NFPA 54.
4. Install oil-fired boilers according to NFPA 31.
5. Assemble boiler sections in sequence and seal between each section if boiler is not delivered fully assembled.
6. Assemble and install boiler trim.
7. Install electrical devices furnished with boiler but not specified to be factory mounted.
8. Install control wiring to field-mounted electrical devices.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to boiler to allow service and maintenance.
3. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
4. Connect oil piping full size to burner inlet with shutoff valve and union.
5. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
6. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.
7. Install piping from safety relief valves to nearest floor drain, for hot-water boilers.
8. Install piping from safety valves to drip-pan elbow and to nearest floor drain, for steam boilers.
9. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
10. Connect breeching full size to boiler outlet. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for venting materials.
11. Install flue-gas recirculation duct from vent to burner. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for recirculation duct materials.
12. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
13. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Perform installation and startup checks according to manufacturer's written instructions.
 - b. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - c. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 1) Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.
 - 2) Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature **OR** steam pressure, **as directed**.
 - 3) Set field-adjustable switches and circuit-breaker trip ranges as indicated.
3. Remove and replace malfunctioning units and retest as specified above.
4. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

5. Performance Tests, **as directed**:
 - a. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - b. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
 - c. Perform field performance tests to determine capacity and efficiency of boilers.
 - 1) For dual-fuel boilers, perform tests for each fuel.
 - 2) Test for full capacity.
 - 3) Test for boiler efficiency at low fire 20, 40, 60, 80, 100, 80, 60, 40, and 20 percent of full capacity. Determine efficiency at each test point.
 - d. Repeat tests until results comply with requirements indicated.
 - e. Provide analysis equipment required to determine performance.
 - f. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
 - g. Notify the Owner in advance of test dates.
 - h. Document test results in a report and submit to the Owner.

D. Demonstration

1. Train the Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 23 01 50 61



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 01 50 61	01 22 16 00	No Specification Required
23 01 50 61	23 21 13 23a	Hydronic Piping

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SECTION 23 01 60 71 - CONDENSING UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for condensing units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes air-cooled and water-cooled condensing units.

C. Submittals

1. Product Data: For each condensing unit, include rated capacities, operating characteristics, furnished specialties, and accessories. Include equipment dimensions, weights and structural loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Shop Drawings: Signed and sealed by a qualified professional engineer.
 - a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints, **as directed**, and for designing vibration isolation bases.
 - b. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment.
 - c. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that condensing units, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Include the following:
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
4. Field quality-control test reports.
5. Operation and maintenance data.
6. Warranty: Special warranty specified in this Section.
7. LEED Submittal:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Code for Mechanical Refrigeration."
3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
4. ASME Compliance: Fabricate and label water-cooled condensing units to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Compressor failure.
 - 2) Condenser coil leak.

- b. Warranty Period: Four **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
- c. Warranty Period (Compressor Only): Five **OR** 10, **as directed**, years from date of Final Completion.
- d. Warranty Period (Condenser Coil Only): Five years from date of Final Completion.

1.2 PRODUCTS

A. Condensing Units, Air Cooled, **1 To 5 Tons (3.5 TO 17.6 kW)**

1. Description: Factory assembled and tested, consisting of compressor, condenser coil, fan, motors, refrigerant reservoir, and operating controls.
2. Compressor: Scroll, hermetically sealed, with rubber vibration isolators.
 - a. Motor: Single **OR** Two, **as directed**, speed, and includes thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - b. Two-Speed Compressor: Include manual-reset, high-pressure switch and automatic-reset, low-pressure switch.
 - c. Accumulator: Suction tube.
 - d. Refrigerant Charge: R-407C **OR** R-410A, **as directed**.
3. Condenser Coil: Seamless copper-tube, aluminum-fin coil; circuited for integral liquid subcooler, with removable drain pan and brass service valves with service ports.
4. Condenser Fan: Direct-drive, aluminum propeller fan; with permanently lubricated, totally enclosed fan motor with thermal-overload protection and ball bearings, **as directed**.
5. Accessories:
 - a. Coastal Filter: Mesh screen to protect condenser coil from salt damage.
 - b. Crankcase heater.
 - c. Cycle Protector: Automatic-reset timer to prevent rapid compressor cycling.
 - d. Electronic programmable thermostat **OR** Low-voltage thermostat and subbase, **as directed**, to control condensing unit and evaporator fan.
 - e. Evaporator Freeze Thermostat: Temperature-actuated switch that stops unit when evaporator reaches freezing temperature.
 - f. Filter-dryer.
 - g. High-Pressure Switch: Automatic-reset switch cycles compressor off on high refrigerant pressure.
 - h. Liquid-line solenoid.
 - i. Low Ambient Controller: Cycles condenser fan to permit operation down to **0 deg F (minus 18 deg C)** with time-delay relay to bypass low-pressure switch, **as directed**.
OR
Low Ambient Controller: Controls condenser fan speed to permit operation down to **minus 20 deg F (minus 29 deg C)** with time-delay relay to bypass low-pressure switch, **as directed**.
 - j. Low-Pressure Switch: Automatic-reset switch cycles compressor off on low refrigerant pressure.
 - k. PE mounting base to provide a permanent foundation.
 - l. Precharged and insulated suction and liquid tubing.
 - m. Sound Hood: Wraps around sound attenuation cover for compressor.
 - n. Thermostatic expansion valve.
 - o. Time-Delay Relay: Continues operation of evaporator fan after compressor shuts off.
6. Unit Casing: Galvanized steel, finished with baked enamel; with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Mount service valves, fittings, and gage ports on exterior of casing.

B. Condensing Units, Air Cooled, **6 To 120 Tons (21 TO 422 kW)**

1. Description: Factory assembled and tested, air cooled; consisting of casing, compressors, condenser coils, condenser fans and motors, and unit controls.

2. Compressor: Hermetic or semihermetic compressor designed for service with crankcase sight glass, crankcase heater, and backseating service access valves on suction and discharge ports.
 - a. Capacity Control: Cylinder unloading **OR** Hot-gas bypass, **as directed**.
 - b. Refrigerant Charge: R-407C **OR** R-410A **OR** HFC-134a, **as directed**.
 3. Condenser Coil: Seamless copper-tube, aluminum-fin coil, including subcooling circuit and backseating liquid-line service access valve. Factory pressure test coils, then dehydrate by drawing a vacuum and fill with a holding charge of nitrogen or refrigerant.
 4. Condenser Fans: Propeller-type vertical discharge; either directly or belt driven. Include the following:
 - a. Permanently lubricated ball-bearing motors.
 - b. Separate motor for each fan.
 - c. Dynamically and statically balanced fan assemblies.
 5. Operating and safety controls include the following:
 - a. Manual-reset, high-pressure cutout switches.
 - b. Automatic-reset, low-pressure cutout switches.
 - c. Low oil pressure cutout switch.
 - d. Compressor-winding thermostat cutout switch.
 - e. Three-leg, compressor-overload protection.
 - f. Control transformer.
 - g. Magnetic contactors for compressor and condenser fan motors.
 - h. Timer to prevent excessive compressor cycling.
 6. Accessories:
 - a. Electronic programmable thermostat **OR** Low-voltage thermostat and subbase, **as directed**, to control condensing unit and evaporator fan.
 - b. Low Ambient Controller: Cycles condenser fan to permit operation down to **0 deg F (minus 18 deg C)** with time-delay relay to bypass low-pressure switch, **as directed**.
OR
Low Ambient Controller: Controls condenser fan speed to permit operation down to **minus 20 deg F (minus 29 deg C)** with time-delay relay to bypass low-pressure switch, **as directed**.
 - c. Gage Panel: Package with refrigerant circuit suction and discharge gages.
 - d. Hot-gas bypass kit.
 - e. Part-winding-start timing relay, circuit breakers, and contactors.
 7. Unit Casings: Designed for outdoor installation with weather protection for components and controls and with removable panels for required access to compressors, controls, condenser fans, motors, and drives. Additional features include the following:
 - a. Steel, galvanized or zinc coated, for exposed casing surfaces; treated and finished with manufacturer's standard paint coating.
 - b. Perimeter base rail with forklift slots and lifting holes to facilitate rigging.
 - c. Gasketed control panel door.
 - d. Nonfused disconnect switch, factory mounted and wired, for single external electrical power connection.
 - e. Condenser coil hail guard **OR** grille, **as directed**, to protect coil from physical damage.
- C. Condensing Units, Water Cooled
1. Description: Factory assembled and tested, water cooled; consisting of compressors, water-cooled condensers, bases, and unit controls.
 2. Compressor: Hermetic or serviceable hermetic type; with oil pump, operating oil charge, and suction and discharge shutoff valves. Factory mounted on base using spring isolators. Include the following:
 - a. Thermally protected compressor motor.
 - b. Crankcase heater.
 - c. Capacity control using cylinder unloading, suction pressure controlled and discharge pressure operated, designed for unloaded start.
 - d. Refrigerant Charge: R-407C **OR** R-410A **OR** HFC-134a, **as directed**.

3. Condenser: Single-pass, tube-in-tube coaxial type; with seamless, integral-finned, copper tube and steel outer shell with water-regulating valve.
OR
Condenser: Multipass, shell-and-tube type; with replaceable, seamless, integral-finned copper tubes; positive-liquid subcooling circuit; pressure relief device; liquid-level test cock; purge connection; liquid-line shutoff valve; and angle valve for connection of water-regulating valve.
 - a. Unit Construction: ASME stamped, **as directed**, for refrigerant-side working pressure of **385 psig (2650 kPa)** and water-side working pressure of **250 psig (1720 kPa)**.
4. Accessories include the following:
 - a. Discharge-line muffler.
 - b. Gage panel containing gages for suction, discharge, and oil pressure.
 - c. Electric solenoid cylinder unloaders.
 - d. Pump-down relay package.
 - e. Crankcase cover plates with equalizer connections.
5. Controls: Factory-mounted and -wired panel with the following:
 - a. Timer to prevent short cycling.
 - b. High- and low-refrigerant-pressure safety controls.
 - c. Power- and control-circuit terminal blocks.
 - d. Compressor motor starter.
 - e. Control-circuit on-off switch.
 - f. Control-circuit fuse.

D. Motors

1. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.

E. Source Quality Control

1. Verification of Performance: Rate condensing units according to ARI 210/240, ARI 340/360, or ARI 365.
 - a. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
2. Test and inspect shell and tube condensers according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
3. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

1.3 EXECUTION

A. Installation

1. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
2. Install condensing units on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac" and concrete materials and installation requirements are specified in Division 31.
3. Concrete Bases:
 - a. Install dowel rods to connect concrete base to concrete slab. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around full perimeter of the base.
 - b. For equipment supported on structural slab, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

- d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - e. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 4. Install roof-mounting units on equipment supports specified in Division 07.
 5. Vibration Isolation: Mount condensing units on rubber pads with a minimum deflection of **1/4 inch (6.35 mm)**. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
OR
Vibration Isolation: Mount condensing units on restrained spring isolators with a minimum deflection specified by the Owner. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 6. Maintain manufacturer's recommended clearances for service and maintenance.
 7. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.
- B. Connections**
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
 3. Connect precharged refrigerant tubing to unit's quick-connect fittings. Install tubing so it does not interfere with access to unit. Install furnished accessories.
 4. Connect refrigerant piping to air-cooled condensing units; maintain required access to unit. Install furnished field-mounted accessories. Refrigerant piping and specialties are specified in Division 23 Section "Refrigerant Piping".
 5. Connect refrigerant and condenser-water piping to water-cooled condensing units. Maintain clear tube removal space. Refrigerant piping and specialties are specified in Division 23 Section "Refrigerant Piping" and condenser-water piping and specialties are specified in Division 22 Section(s) "Domestic Water Piping" OR Division 23 Section(s) "Hydronic Piping", **as directed**.
- C. Field Quality Control**
1. Perform the following field tests and inspections and prepare test reports:
 - a. Perform electrical test and visual and mechanical inspection.
 - b. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - e. Verify proper airflow over coils.
 2. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
 3. Remove and replace malfunctioning condensing units and retest as specified above.
- D. Startup Service**
1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Inspect for physical damage to unit casing.
 - b. Verify that access doors move freely and are weathertight.
 - c. Clean units and inspect for construction debris.
 - d. Verify that all bolts and screws are tight.
 - e. Adjust vibration isolation and flexible connections.
 - f. Verify that controls are connected and operational.
 2. Lubricate bearings on fans.
 3. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
 4. Adjust fan belts to proper alignment and tension.

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5. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
 6. Measure and record airflow over coils.
 7. Verify proper operation of condenser capacity control device.
 8. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
 9. After startup and performance test, lubricate bearings and adjust belt tension, **as directed**.
- E. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain condensing units.

END OF SECTION 23 01 60 71

SECTION 23 05 13 00 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common motor requirements for HVAC equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

C. Coordination

1. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:
 - a. Motor controllers.
 - b. Torque, speed, and horsepower requirements of the load.
 - c. Ratings and characteristics of supply circuit and required control sequence.
 - d. Ambient and environmental conditions of installation location.

1.2 PRODUCTS

A. General Motor Requirements

1. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.
2. Comply with NEMA MG 1 unless otherwise indicated.
3. Comply with IEEE 841 for severe-duty motors.

B. Motor Characteristics

1. Duty: Continuous duty at ambient temperature of 40 deg C and at altitude of **3300 feet (1000 m)** above sea level.
2. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

C. Polyphase Motors

1. Description: NEMA MG 1, Design B, medium induction motor.
2. Efficiency: Energy efficient, as defined in NEMA MG 1.
3. Service Factor: 1.15.
4. Multispeed Motors: Variable torque.
 - a. For motors with 2:1 speed ratio, consequent pole, single winding.
 - b. For motors with other than 2:1 speed ratio, separate winding for each speed.
5. Multispeed Motors: Separate winding for each speed.
6. Rotor: Random-wound, squirrel cage.
7. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.
8. Temperature Rise: Match insulation rating.
9. Insulation: Class F.
10. Code Letter Designation:
 - a. Motors 15 HP and Larger: NEMA starting Code F or Code G.

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- b. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.
- 11. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

D. Polyphase Motors With Additional Requirements

- 1. Motors Used with Reduced-Voltage and Multispeed Controllers: Match wiring connection requirements for controller with required motor leads. Provide terminals in motor terminal box, suited to control method.
- 2. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.
 - a. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
 - b. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
 - c. Inverter-Duty Motors: Class F temperature rise; Class H insulation.
 - d. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.
- 3. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

E. Single-Phase Motors

- 1. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:
 - a. Permanent-split capacitor.
 - b. Split phase.
 - c. Capacitor start, inductor run.
 - d. Capacitor start, capacitor run.
- 2. Multispeed Motors: Variable-torque, permanent-split-capacitor type.
- 3. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.
- 4. Motors 1/20 HP and Smaller: Shaded-pole type.
- 5. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

1.3 EXECUTION (Not Applicable)

END OF SECTION 23 05 13 00

SECTION 23 05 16 00 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for expansion fittings and loops for plumbing piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Flexible-hose packless expansion joints.
 - b. Metal-bellows packless expansion joints.
 - c. Rubber packless expansion joints.
 - d. Grooved-joint expansion joints.
 - e. Pipe loops and swing connections.
 - f. Alignment guides and anchors.

C. Performance Requirements

1. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.
2. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

D. Submittals

1. Product Data: For each type of product indicated.
2. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
 - b. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
 - c. Alignment Guide Details: Detail field assembly and attachment to building structure.
 - d. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.
3. Welding certificates.
4. Product Certificates: For each type of expansion joint, from manufacturer.
5. Maintenance Data: For expansion joints to include in maintenance manuals.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. ASME Boiler and Pressure Vessel Code: Section IX.

1.2 PRODUCTS

A. Packless Expansion Joints

1. Flexible-Hose Packless Expansion Joints:
 - a. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
 - b. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.

- c. Expansion Joints for Copper Tubing **NPS 2 (DN 50)** and Smaller: Copper-alloy fittings with solder-joint end connections.
 - 1) Bronze hoses and single-braid bronze sheaths with **450 psig at 70 deg F (3100 kPa at 21 deg C)** and **340 psig at 450 deg F (2340 kPa at 232 deg C)** ratings.
 - 2) Bronze hoses and double-braid bronze sheaths with **700 psig at 70 deg F (4830 kPa at 21 deg C)** and **500 psig at 450 deg F (3450 kPa at 232 deg C)** ratings.
- d. Expansion Joints for Copper Tubing **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Copper-alloy fittings with threaded end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **300 psig at 70 deg F (2070 kPa at 21 deg C)** and **225 psig at 450 deg F (1550 kPa at 232 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **420 psig at 70 deg F (2890 kPa at 21 deg C)** and **315 psig at 450 deg F (2170 kPa at 232 deg C)** ratings.
- e. Expansion Joints for Steel Piping **NPS 2 (DN 50)** and Smaller: Stainless-steel fittings with threaded end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **450 psig at 70 deg F (3100 kPa at 21 deg C)** and **325 psig at 600 deg F (2250 kPa at 315 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **700 psig at 70 deg F (4830 kPa at 21 deg C)** and **515 psig at 600 deg F (3550 kPa at 315 deg C)** ratings.
- f. Expansion Joints for Steel Piping **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: Stainless-steel fittings with flanged end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **200 psig at 70 deg F (1380 kPa at 21 deg C)** and **145 psig at 600 deg F (1000 kPa at 315 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **275 psig at 70 deg F (1900 kPa at 21 deg C)** and **200 psig at 600 deg F (1380 kPa at 315 deg C)** ratings.
- g. Expansion Joints for Steel Piping **NPS 8 to NPS 12 (DN 200 to DN 300)**: Stainless-steel fittings with flanged end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **125 psig at 70 deg F (860 kPa at 21 deg C)** and **90 psig at 600 deg F (625 kPa at 315 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **165 psig at 70 deg F (1130 kPa at 21 deg C)** and **120 psig at 600 deg F (830 kPa at 315 deg C)** ratings.
- 2. Metal-Bellows Packless Expansion Joints:
 - a. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
 - b. Type: Circular, corrugated bellows with external tie rods.
 - c. Minimum Pressure Rating: **150 psig (1035 kPa) OR 175 psig (1200 kPa), as directed**, unless otherwise indicated.
 - d. Configuration: Single joint **OR** Single joint with base and double joint with base, **as directed**, class(es) unless otherwise indicated.
 - e. Expansion Joints for Copper Tubing: Single **OR** Multi, **as directed**,-ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.
 - 1) End Connections for Copper Tubing **NPS 2 (DN 50)** and Smaller: Solder joint or threaded.
 - 2) End Connections for Copper Tubing **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Solder joint or threaded.
 - 3) End Connections for Copper Tubing **NPS 5 (DN 125)** and Larger: Flanged.
- 3. Rubber Packless Expansion Joints:

- a. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
 - b. Material: Fabric-reinforced rubber complying with FSA-NMEJ-703.
 - c. Arch Type: Single **OR** Multiple, **as directed**, arches with external control rods, **as directed**.
 - d. Spherical Type: Single **OR** Multiple, **as directed** spheres with external control rods, **as directed**.
 - e. Minimum Pressure Rating for **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: **150 psig (1035 kPa)** at **220 deg F (104 deg C)**.
 - f. Minimum Pressure Rating for **NPS 5 and NPS 6 (DN 125 and DN 150)**: **140 psig (966 kPa)** at **200 deg F (93 deg C)**.
 - g. Minimum Pressure Rating for **NPS 8 to NPS 12 (DN 200 to DN 300)**: **140 psig (966 kPa)** at **180 deg F (82 deg C)**.
 - h. Material for Fluids Containing Acids, Alkalies, or Chemicals: BR **OR** CSM **OR** EPDM, **as directed**.
 - i. Material for Fluids Containing Gas, Hydrocarbons, or Oil: Buna-N **OR** CR, **as directed**.
 - j. Material for Water: BR **OR** Buna-N **OR** CR **OR** CSM **OR** EPDM **OR** NR, **as directed**.
 - k. End Connections: Full-faced, integral steel flanges with steel retaining rings.
- B. Grooved-Joint Expansion Joints
1. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.
 2. Standard: AWWA C606, for grooved joints.
 3. Nipples: Galvanized, **as directed**, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.
 4. Couplings: Five **OR** Seven **OR** 10 **OR** 12, **as directed**, flexible type for steel-pipe dimensions. Include ferrous housing sections, Buna-N gasket suitable for diluted acid, alkaline fluids, and cold and hot water **OR** EPDM gasket suitable for cold and hot water, **as directed**, and bolts and nuts.
- C. Alignment Guides And Anchors
1. Alignment Guides:
 - a. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.
 2. Anchor Materials:
 - a. Steel Shapes and Plates: ASTM A 36/A 36M.
 - b. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
 - c. Washers: ASTM F 844, steel, plain, flat washers.
 - d. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - 1) Stud: Threaded, zinc-coated carbon steel.
 - 2) Expansion Plug: Zinc-coated steel.
 - 3) Washer and Nut: Zinc-coated steel.
 - e. Chemical Fasteners: Insert-type-stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - 1) Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - 2) Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud unless otherwise indicated.
 - 3) Washer and Nut: Zinc-coated steel.

1.3 EXECUTION

- A. Expansion-Joint Installation
 1. Install expansion joints of sizes matching sizes of piping in which they are installed.
 2. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
 3. Install rubber packless expansion joints according to FSA-NMEJ-702.
 4. Install grooved-joint expansion joints to grooved-end steel piping

- B. Pipe Loop And Swing Connection Installation
 1. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
 2. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.
 3. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.
 4. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.

- C. Alignment-Guide And Anchor Installation
 1. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
 2. Install one **OR** two, **as directed**, guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.
 3. Attach guides to pipe and secure guides to building structure.
 4. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
 5. Anchor Attachments:
 - a. Anchor Attachment to Black-Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - b. Anchor Attachment to Galvanized-Steel Pipe: Attach with pipe hangers. Use MSS SP-69, Type 42, riser clamp welded to anchor.
 - c. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.
 6. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.
 - a. Anchor Attachment to Steel Structural Members: Attach by welding.
 - b. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.
 7. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 23 05 16 00

SECTION 23 05 16 00a - EXPANSION FITTINGS AND LOOPS FOR HVAC PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for expansion fittings and loops for HVAC piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Flexible, ball-joint, packed expansion joints.
 - b. Slip-joint packed expansion joints.
 - c. Expansion-compensator packless expansion joints.
 - d. Flexible-hose packless expansion joints.
 - e. Metal-bellows packless expansion joints.
 - f. Rubber packless expansion joints.
 - g. Grooved-joint expansion joints.
 - h. Pipe loops and swing connections.
 - i. Alignment guides and anchors.

C. Performance Requirements

1. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.
2. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

D. Submittals

1. Product Data: For each type of product indicated.
2. Delegated-Design Submittal: For each anchor and alignment guide indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Design Calculations: Calculate requirements for thermal expansion of piping systems and for selecting and designing expansion joints, loops, and swing connections.
 - b. Anchor Details: Detail fabrication of each anchor indicated. Show dimensions and methods of assembly and attachment to building structure.
 - c. Alignment Guide Details: Detail field assembly and attachment to building structure.
 - d. Schedule: Indicate type, manufacturer's number, size, material, pressure rating, end connections, and location for each expansion joint.
3. Welding certificates.
4. Product Certificates: For each type of expansion joint, from manufacturer.
5. Maintenance Data: For expansion joints to include in maintenance manuals.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. ASME Boiler and Pressure Vessel Code: Section IX.

1.2 PRODUCTS

A. Packed Expansion Joints

1. Flexible, Ball-Joint, Packed Expansion Joints:

- a. Standards: ASME Boiler and Pressure Vessel Code: Section II, "Materials"; and ASME B31.9, "Building Services Piping," for materials and design of pressure-containing parts and bolting.
 - b. Material: Carbon-steel assembly with asbestos-free composition packing.
 - c. Design: For 360-degree rotation and angular deflection.
 - d. Minimum Pressure Rating: **250 psig at 400 deg F (1725 kPa at 204 deg C)**.
 - e. Angular Deflection for **NPS 6 (DN 150)** and Smaller: 30 degree minimum.
 - f. Angular Deflection for **NPS 8 (DN 200)** and Larger: 15 degree minimum.
 - g. End Connections for **NPS 2 (DN 50)** and Smaller: Threaded.
 - h. End Connections for **NPS 2-1/2 (DN 65)** and Larger: Flanged.
 2. Slip-Joint Packed Expansion Joints:
 - a. Standard: ASTM F 1007.
 - b. Material: Carbon steel with asbestos-free PTFE packing.
 - c. Design: With internal guide and injection device for repacking under pressure. Include drip connection if used for steam piping.
 - d. Configuration: Single joint **OR** Single joint with base and double joint with base, **as directed**, class(es) unless otherwise indicated.
 - e. End Connections: Flanged or weld ends to match piping system.
- B. Packless Expansion Joints
1. Metal, Expansion-Compensator Packless Expansion Joints:
 - a. Minimum Pressure Rating: **150 psig (1035 kPa) OR 175 psig (1200 kPa)**, **as directed**, unless otherwise indicated.
 - b. Configuration for Copper Tubing: Two-ply, phosphor-bronze bellows with copper pipe ends.
 - 1) End Connections for Copper Tubing **NPS 2 (DN 50)** and Smaller: Solder joint or threaded.
 - 2) End Connections for Copper Tubing **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Threaded.
 - c. Configuration for Steel Piping: Two-ply, stainless-steel bellows; steel-pipe end connections; and carbon-steel shroud.
 - 1) End Connections for Steel Pipe **NPS 2 (DN 50)** and Smaller: Threaded.
 - 2) End Connections for Steel Pipe **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Flanged **OR** Weld, **as directed**.
 2. Rubber, Expansion-Compensator Packless Expansion Joints:
 - a. Material: Twin reinforced-rubber spheres with external restraining cables.
 - b. Minimum Pressure Rating: **150 psig at 170 deg F (1035 kPa at 77 deg C)** unless otherwise indicated.
 - c. End Connections for **NPS 2 (DN 50)** and Smaller: Threaded.
 3. Flexible-Hose Packless Expansion Joints:
 - a. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.
 - b. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.
 - c. Expansion Joints for Copper Tubing **NPS 2 (DN 50)** and Smaller: Copper-alloy fittings with solder-joint end connections.
 - 1) Bronze hoses and single-braid bronze sheaths with **450 psig at 70 deg F (3100 kPa at 21 deg C)** and **340 psig at 450 deg F (2340 kPa at 232 deg C)** ratings.
 - 2) Bronze hoses and double-braid bronze sheaths with **700 psig at 70 deg F (4830 kPa at 21 deg C)** and **500 psig at 450 deg F (3450 kPa at 232 deg C)** ratings.
 - d. Expansion Joints for Copper Tubing **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Copper-alloy fittings with threaded end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **300 psig at 70 deg F (2070 kPa at 21 deg C)** and **225 psig at 450 deg F (1550 kPa at 232 deg C)** ratings.

- 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **420 psig at 70 deg F (2890 kPa at 21 deg C)** and **315 psig at 450 deg F (2170 kPa at 232 deg C)** ratings.
- e. Expansion Joints for Steel Piping **NPS 2 (DN 50)** and Smaller: Carbon-steel fittings with threaded end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **450 psig at 70 deg F (3100 kPa at 21 deg C)** and **325 psig at 600 deg F (2250 kPa at 315 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **700 psig at 70 deg F (4830 kPa at 21 deg C)** and **515 psig at 600 deg F (3550 kPa at 315 deg C)** ratings.
- f. Expansion Joints for Steel Piping **NPS 2-1/2 to NPS 6 (DN 65 to DN 150)**: Carbon-steel fittings with flanged **OR** weld, **as directed**, end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **200 psig at 70 deg F (1380 kPa at 21 deg C)** and **145 psig at 600 deg F (1000 kPa at 315 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **275 psig at 70 deg F (1900 kPa at 21 deg C)** and **200 psig at 600 deg F (1380 kPa at 315 deg C)** ratings.
- g. Expansion Joints for Steel Piping **NPS 8 to NPS 12 (DN 200 to DN 300)**: Carbon-steel fittings with flanged **OR** weld, **as directed**, end connections.
 - 1) Stainless-steel hoses and single-braid, stainless-steel sheaths with **125 psig at 70 deg F (860 kPa at 21 deg C)** and **90 psig at 600 deg F (625 kPa at 315 deg C)** ratings.
 - 2) Stainless-steel hoses and double-braid, stainless-steel sheaths with **165 psig at 70 deg F (1130 kPa at 21 deg C)** and **120 psig at 600 deg F (830 kPa at 315 deg C)** ratings.
- h. Expansion Joints for Steel Piping **NPS 14 (DN 350)** and Larger: Carbon-steel fittings with flanged **OR** weld, **as directed**, end connections.
 - 1) Stainless-steel hoses and double-braid, stainless-steel sheaths with **165 psig at 70 deg F (1130 kPa at 21 deg C)** and **120 psig at 600 deg F (830 kPa at 315 deg C)** ratings.
4. Metal-Bellows Packless Expansion Joints:
 - a. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
 - b. Type: Circular, corrugated bellows with external tie rods.
 - c. Minimum Pressure Rating: **150 psig (1035 kPa)** **OR** **175 psig (1200 kPa)**, **as directed**, unless otherwise indicated.
 - d. Configuration: Single joint **OR** Single joint with base and double joint with base, **as directed**, class(es) unless otherwise indicated.
 - e. Expansion Joints for Copper Tubing: Single **OR** Multi, **as directed**,-ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.
 - 1) End Connections for Copper Tubing **NPS 2 (DN 50)** and Smaller: Solder joint or threaded.
 - 2) End Connections for Copper Tubing **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Solder joint or threaded.
 - 3) End Connections for Copper Tubing **NPS 5 (DN 125)** and Larger: Flanged.
 - f. Expansion Joints for Steel Piping: Single **OR** Multi, **as directed**,-ply stainless-steel bellows, steel pipe ends, and carbon-steel shroud.
 - 1) End Connections for Steel Pipe **NPS 2 (DN 50)** and Smaller: Threaded.
 - 2) End Connections for Steel Pipe **NPS 2-1/2 (DN 65)** and Larger: Flanged **OR** Weld, **as directed**.
5. Rubber Packless Expansion Joints:
 - a. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
 - b. Material: Fabric-reinforced rubber complying with FSA-NMEJ-703.

- c. Arch Type: Single **OR** Multiple, **as directed**, arches with external control rods, **as directed**.
- d. Spherical Type: Single **OR** Multiple, **as directed**, spheres with external control rods, **as directed**.
- e. Minimum Pressure Rating for **NPS 1-1/2 to NPS 4 (DN 40 to DN 100)**: **150 psig (1035 kPa) at 220 deg F (104 deg C)**.
- f. Minimum Pressure Rating for **NPS 5 and NPS 6 (DN 125 and DN 150)**: **140 psig (966 kPa) at 200 deg F (93 deg C)**.
- g. Minimum Pressure Rating for **NPS 8 to NPS 12 (DN 200 to DN 300)**: **140 psig (966 kPa) at 180 deg F (82 deg C)**.
- h. Material for Fluids Containing Acids, Alkalies, or Chemicals: BR **OR** CSM **OR** EPDM, **as directed**.
- i. Material for Fluids Containing Gas, Hydrocarbons, or Oil: Buna-N **OR** CR, **as directed**.
- j. Material for Water: BR **OR** Buna-N **OR** CR **OR** CSM **OR** EPDM **OR** NR, **as directed**.
- k. End Connections: Full-faced, integral steel flanges with steel retaining rings.

C. Grooved-Joint Expansion Joints

1. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.
2. Standard: AWWA C606, for grooved joints.
3. Nipples: Galvanized, **as directed**, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.
4. Couplings: Five **OR** Seven **OR** 10 **OR** 12, **as directed**, flexible type for steel-pipe dimensions. Include ferrous housing sections, Buna-N gasket suitable for diluted acid, alkaline fluids, and cold and hot water **OR** EPDM gasket suitable for cold and hot water, **as directed**, and bolts and nuts.

D. Alignment Guides And Anchors

1. Alignment Guides:
 - a. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.
2. Anchor Materials:
 - a. Steel Shapes and Plates: ASTM A 36/A 36M.
 - b. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
 - c. Washers: ASTM F 844, steel, plain, flat washers.
 - d. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - 1) Stud: Threaded, zinc-coated carbon steel.
 - 2) Expansion Plug: Zinc-coated steel.
 - 3) Washer and Nut: Zinc-coated steel.
 - e. Chemical Fasteners: Insert-type-stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.
 - 1) Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
 - 2) Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud unless otherwise indicated.
 - 3) Washer and Nut: Zinc-coated steel.

1.3 EXECUTION

A. Expansion-Joint Installation

1. Install expansion joints of sizes matching sizes of piping in which they are installed.

2. Install packed-type expansion joints with packing suitable for fluid service.
 3. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
 4. Install rubber packless expansion joints according to FSA-NMEJ-702.
 5. Install grooved-joint expansion joints to grooved-end steel piping
- B. Pipe Loop And Swing Connection Installation
1. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.
 2. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.
 3. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.
 4. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.
- C. Alignment-Guide And Anchor Installation
1. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.
 2. Install one **OR** two, **as directed**, guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.
 3. Attach guides to pipe and secure guides to building structure.
 4. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.
 5. Anchor Attachments:
 - a. Anchor Attachment to Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
 - b. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.
 6. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.
 - a. Anchor Attachment to Steel Structural Members: Attach by welding.
 - b. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.
 7. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 23 05 16 00a

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Task	Specification	Specification Description
23 05 17 00	01 95 99 99a	Common Work Results for Fire Suppression
23 05 17 00	01 95 99 99b	Common Work Results for Plumbing
23 05 17 00	01 95 99 99g	Common Work Results for HVAC
23 05 17 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 05 19 00 - METERS AND GAGES FOR HVAC PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for meters and gages for HVAC piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Bimetallic-actuated thermometers.
 - b. Filled-system thermometers.
 - c. Liquid-in-glass thermometers.
 - d. Light-activated thermometers.
 - e. Thermowells.
 - f. Dial-type pressure gages.
 - g. Gage attachments.
 - h. Test plugs.
 - i. Test-plug kits.
 - j. Sight flow indicators.
 - k. Orifice flowmeters.
 - l. Pitot-tube flowmeters.
 - m. Turbine flowmeters.
 - n. Venturi flowmeters.
 - o. Vortex-shedding flowmeters.
 - p. Impeller-turbine, thermal-energy meters.
 - q. Ultrasonic, thermal-energy meters.

C. Submittals

1. Product Data: For each type of product indicated.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Product Certificates: For each type of meter and gage, from manufacturer.
4. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

1.2 PRODUCTS

A. Bimetallic-Actuated Thermometers

1. Standard: ASME B40.200.
2. Case: Liquid-filled and sealed type(s); stainless steel with 3-inch (76-mm) OR 5-inch (127-mm), as directed, nominal diameter.
3. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F (deg C) OR deg F and deg C, as directed.
4. Connector Type(s): Union joint, adjustable angle OR rigid, back OR rigid, bottom, as directed, with unified-inch screw threads.
5. Connector Size: 1/2 inch (13 mm), with ASME B1.1 screw threads.
6. Stem: 0.25 or 0.375 inch (6.4 or 9.4 mm) in diameter; stainless steel.
7. Window: Plain glass or plastic.
8. Ring: Stainless steel.
9. Element: Bimetal coil.
10. Pointer: Dark-colored metal.

11. Accuracy: Plus or minus 1 **OR** 1.5, **as directed**, percent of scale range.

B. Filled-System Thermometers

1. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, cast aluminum or drawn steel; **4-1/2-inch (114-mm) OR 5-inch (127-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, dampening type, **as directed**, with link to pressure element and connection to pointer.
 - e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed**.
 - f. Pointer: Dark-colored metal.
 - g. Window: Glass or plastic.
 - h. Ring: Metal **OR** Stainless steel.
 - i. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device **OR** rigid, back **OR** rigid, bottom, **as directed**; with ASME B1.1 screw threads.
 - j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - k. Accuracy: Plus or minus 1 percent of scale range.
2. Direct-Mounted, Plastic-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, plastic; **4-1/2-inch (114-mm) OR 5-inch (127-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, with link to pressure element and connection to pointer.
 - e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed**.
 - f. Pointer: Dark-colored metal.
 - g. Window: Glass or plastic.
 - h. Ring: Metal or plastic.
 - i. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device **OR** rigid, back **OR** rigid, bottom, **as directed**; with ASME B1.1 screw threads.
 - j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - k. Accuracy: Plus or minus 1 percent of scale range.
3. Remote-Mounted, Metal-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, cast aluminum or drawn steel; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, with link to pressure element and connection to pointer.
 - e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed**.
 - f. Pointer: Dark-colored metal.
 - g. Window: Glass or plastic.
 - h. Ring: Metal **OR** Stainless steel, **as directed**.

- i. Connector Type(s): Union joint, back **OR** bottom, **as directed**; with ASME B1.1 screw threads.
- j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
- k. Accuracy: Plus or minus 1 percent of scale range.
- 4. Remote-Mounted, Plastic-Case, Vapor-Actuated Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Sealed type, plastic; **4-1/2-inch (114-mm) OR 6-inch (152-mm)**, **as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, with link to pressure element and connection to pointer.
 - e. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Pointer: Dark-colored metal.
 - g. Window: Glass or plastic.
 - h. Ring: Metal or plastic.
 - i. Connector Type(s): Union joint, threaded, back **OR** bottom, **as directed**; with ASME B1.1 screw threads.
 - j. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - k. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
- C. Liquid-In-Glass Thermometers
 - 1. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Cast aluminum; **6-inch (152-mm)** nominal size.
 - c. Case Form: Back angle **OR** Straight, **as directed**, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red, **as directed**, organic liquid.
 - e. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum or brass and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - h. Connector: **3/4 inch (19 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
 - 2. Plastic-Case, Compact-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Plastic; **6-inch (152-mm)** nominal size.
 - c. Case Form: Back angle **OR** Straight, **as directed**, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red, **as directed**, organic liquid.
 - e. Tube Background: Nonreflective with permanently etched scale markings graduated in **deg F (deg C) OR deg F and deg C, as directed.**
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum or brass and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - h. Connector: **3/4 inch (19 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

3. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Cast aluminum; **7-inch (178-mm) OR 9-inch (229-mm)**, as directed, nominal size unless otherwise indicated.
 - c. Case Form: Adjustable angle **OR** Back angle **OR** Straight, as directed, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red, as directed, organic liquid.
 - e. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR** deg F and deg C, as directed.
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - h. Connector: **1-1/4 inches (32 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
 4. Plastic-Case, Industrial-Style, Liquid-in-Glass Thermometers:
 - a. Standard: ASME B40.200.
 - b. Case: Plastic; **7-inch (178-mm) OR 9-inch (229-mm)**, as directed, nominal size unless otherwise indicated.
 - c. Case Form: Adjustable angle **OR** Back angle **OR** Straight, as directed, unless otherwise indicated.
 - d. Tube: Glass with magnifying lens and blue or red, as directed, organic liquid.
 - e. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in **deg F (deg C) OR** deg F and deg C, as directed.
 - f. Window: Glass or plastic.
 - g. Stem: Aluminum **OR** Brass **OR** Stainless steel, as directed, and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - h. Connector: **1-1/4 inches (32 mm)**, with ASME B1.1 screw threads.
 - i. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.
- D. Light-Activated Thermometers
1. Direct-Mounted, Light-Activated Thermometers:
 - a. Case: Plastic **OR** Metal, as directed; **7-inch (178-mm) OR 9-inch (229-mm)**, as directed, nominal size unless otherwise indicated.
 - b. Scale(s): **Deg F (Deg C) OR** Deg F and deg C, as directed.
 - c. Case Form: Adjustable angle.
 - d. Connector: **1-1/4 inches (32 mm)**, with ASME B1.1 screw threads.
 - e. Stem: Aluminum and of length to suit installation.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - f. Display: Digital.
 - g. Accuracy: Plus or minus **2 deg F (1 deg C)**.
 2. Remote-Mounted, Light-Activated Thermometers:
 - a. Case: Plastic, for wall mounting.
 - b. Scale(s): **Deg F (Deg C) OR** Deg F and deg C, as directed.
 - c. Sensor: Bulb and thermister wire.
 - 1) Design for Air-Duct Installation: With ventilated shroud.
 - 2) Design for Thermowell Installation: Bare stem.
 - d. Display: Digital.
 - e. Accuracy: Plus or minus **2 deg F (1 deg C)**.

- E. Duct-Thermometer Mounting Brackets
1. Description: Flanged bracket with screw holes, for attachment to air duct and made to hold thermometer stem.
- F. Thermowells
1. Thermowells:
 - a. Standard: ASME B40.200.
 - b. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
 - c. Material for Use with Copper Tubing: CNR **OR** CUNI, **as directed**.
 - d. Material for Use with Steel Piping: CRES **OR** CSA, **as directed**.
 - e. Type: Stepped shank unless straight or tapered shank is indicated.
 - f. External Threads: **NPS 1/2, NPS 3/4, or NPS 1, (DN 15, DN 20, or NPS 25,)** ASME B1.20.1 pipe threads.
 - g. Internal Threads: **1/2, 3/4, and 1 inch (13, 19, and 25 mm),** with ASME B1.1 screw threads.
 - h. Bore: Diameter required to match thermometer bulb or stem.
 - i. Insertion Length: Length required to match thermometer bulb or stem.
 - j. Lagging Extension: Include on thermowells for insulated piping and tubing.
 - k. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.
 2. Heat-Transfer Medium: Mixture of graphite and glycerin.
- G. Pressure Gages
1. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:
 - 1) Standard: ASME B40.100.
 - 2) Case: Liquid-filled **OR** Sealed **OR** Open-front, pressure relief **OR** Solid-front, pressure relief, **as directed**, type(s); cast aluminum or drawn steel; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - 3) Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - 4) Pressure Connection: Brass, with **NPS 1/4 (DN 8) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - 5) Movement: Mechanical, with link to pressure element and connection to pointer.
 - 6) Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi (kPa) OR psi and kPa, as directed**.
 - 7) Pointer: Dark-colored metal.
 - 8) Window: Glass or plastic.
 - 9) Ring: Metal **OR** Brass **OR** Stainless steel, **as directed**.
 - 10) Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
 2. Direct-Mounted, Plastic-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Sealed type; plastic; **4-1/2-inch (114-mm) OR 6-inch (152-mm), as directed**, nominal diameter.
 - c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with **NPS 1/4 (DN 8) OR NPS 1/2 (DN 15), as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in **psi (kPa) OR psi and kPa, as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.

3. Remote-Mounted, Metal-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Liquid-filled **OR** Sealed, **as directed**, type; cast aluminum or drawn steel **OR** metal, **as directed**; 4-1/2-inch (114-mm) **OR** 6-inch (152-mm), **as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with NPS 1/4 (DN 8) **OR** NPS 1/2 (DN 15), **as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa) **OR** psi and kPa, **as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Ring: Metal **OR** Stainless steel, **as directed**.
 - j. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
 4. Remote-Mounted, Plastic-Case, Dial-Type Pressure Gages:
 - a. Standard: ASME B40.100.
 - b. Case: Sealed type; plastic; 4-1/2-inch (114-mm) **OR** 6-inch (152-mm), **as directed**, nominal diameter with back **OR** front, **as directed**, flange and holes for panel mounting.
 - c. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
 - d. Pressure Connection: Brass, with NPS 1/4 (DN 8) **OR** NPS 1/2 (DN 15), **as directed**, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
 - e. Movement: Mechanical, with link to pressure element and connection to pointer.
 - f. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi (kPa) **OR** psi and kPa, **as directed**.
 - g. Pointer: Dark-colored metal.
 - h. Window: Glass or plastic.
 - i. Accuracy: Grade A, plus or minus 1 percent of middle half of **OR** Grade B, plus or minus 2 percent of middle half of **OR** Grade C, plus or minus 3 percent of middle half of **OR** Grade D, plus or minus 5 percent of whole, **as directed**, scale range.
- H. Gage Attachments
1. Snubbers: ASME B40.100, brass; with NPS 1/4 (DN 8) **OR** NPS 1/2 (DN 15), **as directed**, ASME B1.20.1 pipe threads and piston-type **OR** porous-metal-type, **as directed**, surge-dampening device. Include extension for use on insulated piping.
 2. Siphons: Loop-shaped section of brass **OR** stainless-steel **OR** steel, **as directed**, pipe with NPS 1/4 (DN 8) **OR** NPS 1/2 (DN 15), **as directed**, pipe threads.
 3. Valves: Brass ball **OR** Brass or stainless-steel needle, **as directed**, with NPS 1/4 (DN 8) **OR** NPS 1/2 (DN 15), **as directed**, ASME B1.20.1 pipe threads.
- I. Test Plugs
1. Description: Test-station fitting made for insertion into piping tee fitting.
 2. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.
 3. Thread Size: NPS 1/4 (DN 8) **OR** NPS 1/2 (DN 15), **as directed**, ASME B1.20.1 pipe thread.
 4. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F (3450 kPa at 93 deg C).
 5. Core Inserts: Chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber.
- J. Test-Plug Kits
1. Furnish one test-plug kit(s) containing one **OR** two, **as directed**, thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.

2. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F (minus 4 to plus 52 deg C).
 3. High-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- (25- to 51-mm-) diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F (minus 18 to plus 104 deg C).
 4. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch- (51- to 76-mm-) diameter dial and probe. Dial range shall be at least 0 to 200 psig (0 to 1380 kPa).
 5. Carrying Case: Metal or plastic, with formed instrument padding.
- K. Sight Flow Indicators
1. Description: Piping inline-installation device for visual verification of flow.
 2. Construction: Bronze or stainless-steel body, with sight glass and ball, flapper, or paddle wheel indicator, and threaded or flanged ends.
 3. Minimum Pressure Rating: 125 psig (860 kPa) OR 150 psig (1034 kPa), as directed.
 4. Minimum Temperature Rating: 200 deg F (93 deg C).
 5. End Connections for NPS 2 (DN 50) and Smaller: Threaded.
 6. End Connections for NPS 2-1/2 (DN 65) and Larger: Flanged.
- L. Flowmeters
1. Orifice Flowmeters:
 - a. Description: Flowmeter with sensor, hoses or tubing, fittings, valves, indicator, and conversion chart.
 - b. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
 - c. Sensor: Wafer-orifice-type, calibrated, flow-measuring element; for installation between pipe flanges.
 - 1) Design: Differential-pressure-type measurement for gas OR oil OR steam OR water, as directed.
 - 2) Construction: Cast-iron body, brass valves with integral check valves and caps, and calibrated nameplate.
 - 3) Minimum Pressure Rating: 300 psig (2070 kPa).
 - 4) Minimum Temperature Rating: 250 deg F (121 deg C).
 - d. Permanent Indicators: Meter suitable for wall or bracket mounting, calibrated for connected sensor and having 6-inch- (152-mm-) diameter, or equivalent, dial with fittings and copper tubing for connecting to sensor.
 - 1) Scale: Gallons per minute (Liters per second).
 - 2) Accuracy: Plus or minus 1 percent between 20 and 80 percent of scale range.
 - e. Portable Indicators: Hand-held, differential-pressure type, calibrated for connected sensor and having two 12-foot (3.7-m) hoses, with carrying case.
 - 1) Scale: Gallons per minute (Liters per second).
 - 2) Accuracy: Plus or minus 2 percent between 20 and 80 percent of scale range.
 - f. Display: Shows rate of flow, with register to indicate total volume in gallons (liters).
 - g. Conversion Chart: Flow rate data compatible with sensor and indicator.
 - h. Operating Instructions: Include complete instructions with each flowmeter.
 2. Pitot-Tube Flowmeters:
 - a. Description: Flowmeter with sensor and indicator.
 - b. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
 - c. Sensor: Insertion type; for inserting probe into piping and measuring flow directly in gallons per minute (liters per second).
 - 1) Design: Differential-pressure-type measurement for oil OR water, as directed.
 - 2) Construction: Stainless-steel probe of length to span inside of pipe, with integral transmitter and direct-reading scale.
 - 3) Minimum Pressure Rating: 150 psig (1035 kPa).
 - 4) Minimum Temperature Rating: 250 deg F (121 deg C).

- d. Indicator: Hand-held meter; either an integral part of sensor or a separate meter.
 - e. Integral Transformer: For low-voltage power connection.
 - f. Accuracy: Plus or minus 3 percent.
 - g. Display: Shows rate of flow, with register to indicate total volume in **gallons (liters)**.
 - h. Operating Instructions: Include complete instructions with each flowmeter.
3. Turbine Flowmeters:
- a. Description: Flowmeter with sensor and indicator.
 - b. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
 - c. Sensor: Impeller turbine; for inserting into pipe fitting or for installing in piping and measuring flow directly in **gallons per minute (liters per second)**.
 - 1) Design: Device or pipe fitting with inline turbine and integral direct-reading scale for gas **OR** oil **OR** steam **OR** water, **as directed**.
 - 2) Construction: Bronze or stainless-steel body, with plastic turbine or impeller.
 - 3) Minimum Pressure Rating: **150 psig (1035 kPa)**.
 - 4) Minimum Temperature Rating: **180 deg F (82 deg C)**.
 - d. Indicator: Hand-held meter; either an integral part of sensor or a separate meter.
 - e. Accuracy: Plus or minus 1-1/2 percent.
 - f. Display: Shows rate of flow, with register to indicate total volume in **gallons (liters)**.
 - g. Operating Instructions: Include complete instructions with each flowmeter.
4. Venturi Flowmeters:
- a. Description: Flowmeter with calibrated flow-measuring element, hoses or tubing, fittings, valves, indicator, and conversion chart.
 - b. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
 - c. Sensor: Venturi-type, calibrated, flow-measuring element; for installation in piping.
 - 1) Design: Differential-pressure-type measurement for gas **OR** oil **OR** steam **OR** water, **as directed**.
 - 2) Construction: Bronze, brass, or factory-primed steel, with brass fittings and attached tag with flow conversion data.
 - 3) Minimum Pressure Rating: **250 psig (1725 kPa)**.
 - 4) Minimum Temperature Rating: **250 deg F (121 deg C)**.
 - 5) End Connections for **NPS 2 (DN 50)** and Smaller: Threaded.
 - 6) End Connections for **NPS 2-1/2 (DN 65)** and Larger: Flanged or welded.
 - 7) Flow Range: Flow-measuring element and flowmeter shall cover operating range of equipment or system served.
 - d. Permanent Indicators: Meter suitable for wall or bracket mounting, calibrated for connected flowmeter element, and having **6-inch- (152-mm-)** diameter, or equivalent, dial with fittings and copper tubing for connecting to flowmeter element.
 - 1) Scale: **Gallons per minute (Liters per second)**.
 - 2) Accuracy: Plus or minus 1 percent between 20 and 80 percent of scale range.
 - e. Portable Indicators: Hand-held, differential-pressure type, calibrated for connected flowmeter element and having two **12-foot (3.7-m)** hoses, with carrying case.
 - 1) Scale: **Gallons per minute (Liters per second)**.
 - 2) Accuracy: Plus or minus 2 percent between 20 and 80 percent of scale range.
 - f. Display: Shows rate of flow, with register to indicate total volume in **gallons (liters)**.
 - g. Conversion Chart: Flow rate data compatible with sensor.
 - h. Operating Instructions: Include complete instructions with each flowmeter.
5. Vortex-Shedding Flowmeters:
- a. Description: Flowmeter with sensor and indicator.
 - b. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.
 - c. Sensor: Inline type; for installing between pipe flanges and measuring flow directly in **gallons per minute (liters per second)**.

- 1) Design: Flow obstruction device, vortex-measurement type for gas **OR** steam **OR** liquids, **as directed**.
- 2) Construction: Stainless-steel body, with integral transmitter and direct-reading scale.
- 3) Minimum Pressure Rating: **1000 psig (6900 kPa)**.
- 4) Minimum Temperature Rating: **500 deg F (260 deg C)**.
- 5) Integral Transformer: For low-voltage power operation.
- d. Indicator: Hand-held meter; either an integral part of sensor or a separate meter.
- e. Accuracy: Plus or minus 0.25 percent for liquids and 0.75 percent for gases.
- f. Display: Shows rate of flow, with register to indicate total volume in **gallons (liters)**.
- g. Operating Instructions: Include complete instructions with each flowmeter.

M. Thermal-Energy Meters

1. Impeller-Turbine, Thermal-Energy Meters:

- a. Description: System with strainer, **as directed**, flow sensor, temperature sensors, transmitter, indicator, and connecting wiring.
- b. Flow Sensor: Impeller turbine with corrosion-resistant-metal body and transmitter; for installing in piping.
 - 1) Design: Total thermal-energy measurement.
 - 2) Minimum Pressure Rating: **150 psig (1035 kPa)**.
 - 3) Minimum Temperature Range: **40 to 250 deg F (5 to 121 deg C)**.
- c. Temperature Sensors: Insertion-type transducer.
- d. Indicator: Solid-state, integrating-type meter with integral battery pack, **as directed**; for wall mounting.
 - 1) Data Output: Six-digit electromechanical counter with readout in kilowatts per hour or **British thermal units (joules)**.
 - 2) Battery Pack: Five-year lithium battery.
- e. Accuracy: Plus or minus 1 percent.
- f. Display: Visually indicates total fluid volume in **gallons (liters)** and thermal-energy flow in kilowatts per hour or **British thermal units (joules)**.
- g. Strainer: Full size of main line piping.
- h. Operating Instructions: Include complete instructions with each thermal-energy meter system.

2. Ultrasonic, Thermal-Energy Meters:

- a. Description: Meter with flow sensor, temperature sensors, transmitter, indicator, and connecting wiring.
- b. Flow Sensor: Transit-time ultrasonic type with transmitter.
- c. Temperature Sensors: Insertion-type or strap-on transducer.
- d. Indicator: Solid-state, integrating-type meter with integral battery pack, **as directed**.
 - 1) Data Output: Six-digit electromechanical counter with readout in kilowatts per hour or **British thermal units (joules)**.
 - 2) Battery Pack: Five-year lithium battery.
- e. Accuracy: Plus or minus 1 percent.
- f. Display: Visually indicates total fluid volume in **gallons (liters)** and thermal-energy flow in kilowatts per hour or **British thermal units (joules)**.
- g. Operating Instructions: Include complete instructions with each thermal-energy meter system.

1.3 EXECUTION

A. Installation

1. Install thermowells with socket extending a minimum of **2 inches (51 mm)** into fluid **OR** one-third of pipe diameter **OR** to center of pipe, **as directed**, and in vertical position in piping tees.
2. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

3. Install thermowells with extension on insulated piping.
 4. Fill thermowells with heat-transfer medium.
 5. Install direct-mounted thermometers in thermowells and adjust vertical and tilted positions.
 6. Install remote-mounted thermometer bulbs in thermowells and install cases on panels; connect cases with tubing and support tubing to prevent kinks. Use minimum tubing length.
 7. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.
 8. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.
 9. Install remote-mounted pressure gages on panel.
 10. Install valve and snubber in piping for each pressure gage for fluids (except steam).
 11. Install valve and syphon fitting in piping for each pressure gage for steam.
 12. Install test plugs in piping tees.
 13. Install flow indicators in piping systems in accessible positions for easy viewing.
 14. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.
 15. Install flowmeter elements in accessible positions in piping systems.
 16. Install wafer-orifice flowmeter elements between pipe flanges.
 17. Install differential-pressure-type flowmeter elements, with at least minimum straight lengths of pipe, upstream and downstream from element according to manufacturer's written instructions.
 18. Install permanent indicators on walls or brackets in accessible and readable positions.
 19. Install connection fittings in accessible locations for attachment to portable indicators.
 20. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.
 21. Install thermometers in the following locations:
 - a. Inlet and outlet of each hydronic zone.
 - b. Inlet and outlet of each hydronic boiler.
 - c. Two inlets and two outlets of each chiller.
 - d. Inlet and outlet of each hydronic coil in air-handling units.
 - e. Two inlets and two outlets of each hydronic heat exchanger.
 - f. Inlet and outlet of each thermal-storage tank.
 - g. Outside-, return-, supply-, and mixed-air ducts.
 22. Install pressure gages in the following locations:
 - a. Discharge of each pressure-reducing valve.
 - b. Inlet and outlet of each chiller chilled-water and condenser-water connection.
 - c. Suction and discharge of each pump.
- B. Connections
1. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.
 2. Connect flowmeter-system elements to meters.
 3. Connect flowmeter transmitters to meters.
 4. Connect thermal-energy meter transmitters to meters.
- C. Adjusting
1. After installation, calibrate meters according to manufacturer's written instructions.
 2. Adjust faces of meters and gages to proper angle for best visibility.
- D. Thermometer Schedule
1. Thermometers at inlet and outlet of each hydronic zone shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.

2. Thermometers at inlet and outlet of each hydronic boiler shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
3. Thermometers at inlets and outlets of each chiller shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
4. Thermometers at inlet and outlet of each hydronic coil in air-handling units and built-up central systems shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
5. Thermometers at inlets and outlets of each hydronic heat exchanger shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
6. Thermometers at inlet and outlet of each hydronic heat-recovery unit shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
7. Thermometers at inlet and outlet of each thermal-storage tank shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
 - e. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
8. Thermometers at outside-, return-, supply-, and mixed-air ducts shall be one of the following:
 - a. Liquid-filled **OR** Sealed, **as directed**, bimetallic-actuated type.
 - b. Direct-mounted **OR** Remote-mounted, **as directed**, metal-case **OR** plastic-case, **as directed**, vapor-actuated type.
 - c. Compact-style **OR** Industrial-style, **as directed**, liquid-in-glass type.
 - d. Direct-mounted **OR** Remote-mounted, **as directed**, light-activated type.
9. Thermometer stems shall be of length to match thermowell insertion length.

- E. Thermometer Scale-Range Schedule
1. Scale Range for Chilled-Water Piping: **Minus 40 to plus 160 deg F (Minus 40 to plus 100 deg C) OR Minus 40 to plus 160 deg F and minus 40 to plus 100 deg C, as directed.**
 2. Scale Range for Chilled-Water Piping: **0 to 100 deg F (Minus 20 to plus 50 deg C) OR 0 to 100 deg F and minus 20 to plus 50 deg C, as directed.**
 3. Scale Range for Chilled-Water Piping: **0 to 150 deg F (Minus 20 to plus 70 deg C) OR 0 to 150 deg F and minus 20 to plus 70 deg C, as directed.**
 4. Scale Range for Chilled-Water Piping: **0 to 250 deg F (0 to 150 deg C) OR 0 to 250 deg F and 0 to 150 deg C, as directed.**
 5. Scale Range for Condenser-Water Piping: **0 to 100 deg F (Minus 20 to plus 50 deg C) OR 0 to 100 deg F and minus 20 to plus 50 deg C, as directed.**
 6. Scale Range for Condenser-Water Piping: **0 to 150 deg F (Minus 20 to plus 70 deg C) OR 0 to 150 deg F and minus 20 to plus 70 deg C, as directed.**
 7. Scale Range for Condenser-Water Piping: **0 to 250 deg F (0 to 150 deg C) OR 0 to 250 deg F and 0 to 150 deg C, as directed.**
 8. Scale Range for Condenser-Water Piping: **20 to 240 deg F (0 to 150 deg C) OR 20 to 240 deg F and 0 to 150 deg C, as directed.**
 9. Scale Range for Condenser-Water Piping: **30 to 240 deg F (0 to plus 115 deg C) OR 30 to 240 deg F and 0 to plus 115 deg C, as directed.**
 10. Scale Range for Heating, Hot-Water Piping: **0 to 250 deg F (0 to 150 deg C) OR 0 to 250 deg F and 0 to 150 deg C, as directed.**
 11. Scale Range for Heating, Hot-Water Piping: **20 to 240 deg F (0 to 150 deg C) OR 20 to 240 deg F and 0 to 150 deg C, as directed.**
 12. Scale Range for Heating, Hot-Water Piping: **30 to 240 deg F (0 to plus 115 deg C) OR 30 to 240 deg F and 0 to plus 115 deg C, as directed.**
 13. Scale Range for Heating, Hot-Water Piping: **50 to 400 deg F (0 to 200 deg C) OR 50 to 400 deg F and 0 to 200 deg C, as directed.**
 14. Scale Range for Heating, Hot-Water Piping: **50 to 550 deg F (10 to 300 deg C) OR 50 to 550 deg F and 10 to 300 deg C, as directed.**
 15. Scale Range for Steam and Steam-Condensate Piping: **0 to 250 deg F (0 to 150 deg C) OR 0 to 250 deg F and 0 to 150 deg C, as directed.**
 16. Scale Range for Steam and Steam-Condensate Piping: **20 to 240 deg F (0 to 150 deg C) OR 20 to 240 deg F and 0 to 150 deg C, as directed.**
 17. Scale Range for Steam and Steam-Condensate Piping: **30 to 240 deg F (0 to plus 115 deg C) OR 30 to 240 deg F and 0 to plus 115 deg C, as directed.**
 18. Scale Range for Steam and Steam-Condensate Piping: **50 to 400 deg F (0 to 200 deg C) OR 50 to 400 deg F and 0 to 200 deg C, as directed.**
 19. Scale Range for Air Ducts: **Minus 40 to plus 110 deg F (Minus 40 to plus 45 deg C) OR Minus 40 to plus 110 deg F and minus 40 to plus 45 deg C, as directed.**
 20. Scale Range for Air Ducts: **Minus 40 to plus 160 deg F (Minus 40 to plus 100 deg C) OR Minus 40 to plus 160 deg F and minus 40 to plus 100 deg C, as directed.**
 21. Scale Range for Air Ducts: **0 to 100 deg F (Minus 20 to plus 50 deg C) OR 0 to 100 deg F and minus 20 to plus 50 deg C, as directed.**
 22. Scale Range for Air Ducts: **0 to 150 deg F (Minus 20 to plus 70 deg C) OR 0 to 150 deg F and minus 20 to plus 70 deg C, as directed.**
 23. Scale Range for Air Ducts: **0 to 250 deg F (0 to 150 deg C) OR 0 to 250 deg F and 0 to 150 deg C, as directed.**
 24. Scale Range for Air Ducts: **20 to 240 deg F (0 to 150 deg C) OR 20 to 240 deg F and 0 to 150 deg C, as directed.**
 25. Scale Range for Air Ducts: **30 to 240 deg F (0 to plus 115 deg C) OR 30 to 240 deg F and 0 to plus 115 deg C, as directed.**
 26. Scale Range for Air Ducts: **50 to 400 deg F (0 to 200 deg C) OR 50 to 400 deg F and 0 to 200 deg C, as directed.**
- F. Pressure-Gage Schedule

1. Pressure gages at discharge of each pressure-reducing valve shall be one of the following:
 - a. Liquid-filled **OR** Sealed **OR** Open-front, pressure-relief **OR** Solid-front, pressure-relief, **as directed**, direct-mounted **OR** remote-mounted, **as directed**, metal case.
 - b. Sealed, direct-mounted **OR** remote-mounted, **as directed**, plastic case.
 - c. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
 2. Pressure gages at inlet and outlet of each chiller chilled-water and condenser-water connection shall be one of the following:
 - a. Liquid-filled **OR** Sealed **OR** Open-front, pressure-relief **OR** Solid-front, pressure-relief, **as directed**, direct-mounted **OR** remote-mounted, **as directed**, metal case.
 - b. Sealed, direct-mounted **OR** remote-mounted, **as directed**, plastic case.
 - c. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
 3. Pressure gages at suction and discharge of each pump shall be one of the following:
 - a. Liquid-filled **OR** Sealed **OR** Open-front, pressure-relief **OR** Solid-front, pressure-relief, **as directed**, direct-mounted **OR** remote-mounted, **as directed**, metal case.
 - b. Sealed, direct-mounted **OR** remote-mounted, **as directed**, plastic case.
 - c. Test plug with chlorosulfonated polyethylene synthetic **OR** EPDM, **as directed**, self-sealing rubber inserts.
- G. Pressure-Gage Scale-Range Schedule
1. Scale Range for Chilled-Water Piping: **30 in. Hg to 15 psi (minus 100 to 0 kPa) OR 30 in. Hg to 15 psi and minus 100 to 0 kPa, as directed.**
 2. Scale Range for Chilled-Water Piping: **0 to 30 psi (0 to 240 kPa) OR 0 to 30 psi and 0 to 240 kPa, as directed.**
 3. Scale Range for Chilled-Water Piping: **0 to 100 psi (0 to 600 kPa) OR 0 to 100 psi and 0 to 600 kPa, as directed.**
 4. Scale Range for Chilled-Water Piping: **0 to 160 psi (0 to 1100 kPa) OR 0 to 160 psi and 0 to 1100 kPa, as directed.**
 5. Scale Range for Chilled-Water Piping: **0 to 200 psi (0 to 1400 kPa) OR 0 to 200 psi and 0 to 1400 kPa, as directed.**
 6. Scale Range for Chilled-Water Piping: **0 to 300 psi (0 to 2500 kPa) OR 0 to 300 psi and 0 to 2500 kPa, as directed.**
 7. Scale Range for Chilled-Water Piping: **0 to 600 psi (0 to 4000 kPa) OR 0 to 600 psi and 0 to 4000 kPa, as directed.**
 8. Scale Range for Condenser-Water Piping: **30 in. Hg to 15 psi (minus 100 to 0 kPa) OR 30 in. Hg to 15 psi and minus 100 to 0 kPa, as directed.**
 9. Scale Range for Condenser-Water Piping: **0 to 30 psi (0 to 240 kPa) OR 0 to 30 psi and 0 to 240 kPa, as directed.**
 10. Scale Range for Condenser-Water Piping: **0 to 100 psi (0 to 600 kPa) OR 0 to 100 psi and 0 to 600 kPa, as directed.**
 11. Scale Range for Condenser-Water Piping: **0 to 160 psi (0 to 1100 kPa) OR 0 to 160 psi and 0 to 1100 kPa, as directed.**
 12. Scale Range for Condenser-Water Piping: **0 to 200 psi (0 to 1400 kPa) OR 0 to 200 psi and 0 to 1400 kPa, as directed.**
 13. Scale Range for Condenser-Water Piping: **0 to 300 psi (0 to 2500 kPa) OR 0 to 300 psi and 0 to 2500 kPa, as directed.**
 14. Scale Range for Condenser-Water Piping: **0 to 600 psi (0 to 4000 kPa) OR 0 to 600 psi and 0 to 4000 kPa, as directed.**
 15. Scale Range for Heating, Hot-Water Piping: **30 in. Hg to 15 psi (minus 100 to 0 kPa) OR 30 in. Hg to 15 psi and minus 100 to 0 kPa, as directed.**
 16. Scale Range for Heating, Hot-Water Piping: **0 to 30 psi (0 to 240 kPa) OR 0 to 30 psi and 0 to 240 kPa, as directed.**
 17. Scale Range for Heating, Hot-Water Piping: **0 to 100 psi (0 to 600 kPa) OR 0 to 100 psi and 0 to 600 kPa, as directed.**

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18. Scale Range for Heating, Hot-Water Piping: **0 to 160 psi (0 to 1100 kPa)** **OR** 0 to 160 psi and 0 to 1100 kPa, **as directed**.
19. Scale Range for Heating, Hot-Water Piping: **0 to 200 psi (0 to 1400 kPa)** **OR** 0 to 200 psi and 0 to 1400 kPa, **as directed**.
20. Scale Range for Heating, Hot-Water Piping: **0 to 300 psi (0 to 2500 kPa)** **OR** 0 to 300 psi and 0 to 2500 kPa, **as directed**.
21. Scale Range for Heating, Hot-Water Piping: **0 to 600 psi (0 to 4000 kPa)** **OR** 0 to 600 psi and 0 to 4000 kPa, **as directed**.
22. Scale Range for Steam Piping: **30 in. Hg to 15 psi (minus 100 to 0 kPa)** **OR** 30 in. Hg to 15 psi and minus 100 to 0 kPa, **as directed**.
23. Scale Range for Steam Piping: **0 to 30 psi (0 to 240 kPa)** **OR** 0 to 30 psi and 0 to 240 kPa, **as directed**.
24. Scale Range for Steam Piping: **0 to 100 psi (0 to 600 kPa)** **OR** 0 to 100 psi and 0 to 600 kPa, **as directed**.
25. Scale Range for Steam Piping: **0 to 160 psi (0 to 1100 kPa)** **OR** 0 to 160 psi and 0 to 1100 kPa, **as directed**.
26. Scale Range for Steam Piping: **0 to 200 psi (0 to 1400 kPa)** **OR** 0 to 200 psi and 0 to 1400 kPa, **as directed**.
27. Scale Range for Steam Piping: **0 to 300 psi (0 to 2500 kPa)** **OR** 0 to 300 psi and 0 to 2500 kPa, **as directed**.
28. Scale Range for Steam Piping: **0 to 600 psi (0 to 4000 kPa)** **OR** 0 to 600 psi and 0 to 4000 kPa, **as directed**.

H. Flowmeter Schedule

1. Flowmeters for Chilled-Water Piping: Orifice **OR** Pitot-tube **OR** Turbine **OR** Venturi **OR** Vortex-shedding, **as directed**, type.
2. Flowmeters for Condenser-Water Piping: Orifice **OR** Pitot-tube **OR** Turbine **OR** Venturi **OR** Vortex-shedding, **as directed**, type.
3. Flowmeters for Heating, Hot-Water Piping: Orifice **OR** Pitot-tube **OR** Turbine **OR** Venturi **OR** Vortex-shedding, **as directed**, type.
4. Flowmeters for Steam and Steam-Condensate Piping: Orifice **OR** Turbine **OR** Venturi **OR** Vortex-shedding, **as directed**, type.

I. Thermal-Energy Meter Schedule

1. Thermal-Energy Meters for Chilled-Water Piping: Impeller-turbine **OR** Ultrasonic, **as directed**, type.
2. Thermal-Energy Meters for Condenser-Water Piping: Impeller-turbine **OR** Ultrasonic, **as directed**, type.
3. Thermal-Energy Meters for Heating, Hot-Water Piping: Impeller-turbine **OR** Ultrasonic, **as directed**, type.
4. Thermal-Energy Meters for Steam and Steam-Condensate Piping: Impeller-turbine **OR** Ultrasonic, **as directed**, type.

END OF SECTION 23 05 19 00

Task	Specification	Specification Description
23 05 19 00	01 95 99 99a	Common Work Results for Fire Suppression
23 05 19 00	01 95 99 99b	Common Work Results for Plumbing
23 05 19 00	22 05 19 00	Meters and Gages for Plumbing Piping
23 05 19 00	01 95 99 99g	Common Work Results for HVAC
23 05 19 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 05 23 00 - GENERAL-DUTY VALVES FOR HVAC PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of general-duty valves for HVAC piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Bronze angle valves.
 - b. Brass ball valves.
 - c. Bronze ball valves.
 - d. Iron ball valves.
 - e. Iron, single-flange butterfly valves.
 - f. Iron, grooved-end butterfly valves.
 - g. High-performance butterfly valves.
 - h. Bronze lift check valves.
 - i. Bronze swing check valves.
 - j. Iron swing check valves.
 - k. Iron swing check valves with closure control.
 - l. Iron, grooved-end swing-check valves.
 - m. Iron, center-guided check valves.
 - n. Iron, plate-type check valves.
 - o. Bronze gate valves.
 - p. Iron gate valves.
 - q. Bronze globe valves.
 - r. Iron globe valves.
 - s. Lubricated plug valves.
 - t. Eccentric plug valves.
 - u. Chainwheels.

C. Definitions

1. CWP: Cold working pressure.
2. EPDM: Ethylene propylene copolymer rubber.
3. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
4. NRS: Nonrising stem.
5. OS&Y: Outside screw and yoke.
6. RS: Rising stem.
7. SWP: Steam working pressure.

D. Submittals

1. Product Data: For each type of valve indicated.

E. Quality Assurance

1. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.
2. ASME Compliance:
 - a. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
 - b. ASME B31.1 for power piping valves.
 - c. ASME B31.9 for building services piping valves.

F. Delivery, Storage, And Handling

1. Prepare valves for shipping as follows:
 - a. Protect internal parts against rust and corrosion.
 - b. Protect threads, flange faces, grooves, and weld ends.
 - c. Set angle, gate, and globe valves closed to prevent rattling.
 - d. Set ball and plug valves open to minimize exposure of functional surfaces.
 - e. Set butterfly valves closed or slightly open.
 - f. Block check valves in either closed or open position.
2. Use the following precautions during storage:
 - a. Maintain valve end protection.
 - b. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.
3. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

1.2 PRODUCTS

A. General Requirements For Valves

1. Refer to HVAC valve schedule articles for applications of valves.
2. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.
3. Valve Sizes: Same as upstream piping unless otherwise indicated.
4. Valve Actuator Types:
 - a. Gear Actuator: For quarter-turn valves **NPS 8 (DN 200)** and larger.
 - b. Handwheel: For valves other than quarter-turn types.
 - c. Handlever: For quarter-turn valves **NPS 6 (DN 150)** and smaller except plug valves, **as directed**.
 - d. Wrench: For plug valves with square heads. Furnish the Owner with 1 wrench for every 5 **OR 10, as directed**, plug valves, for each size square plug-valve head.
 - e. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
5. Valves in Insulated Piping: With **2-inch (50-mm)** stem extensions and the following features:
 - a. Gate Valves: With rising stem.
 - b. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
 - c. Butterfly Valves: With extended neck.
6. Valve-End Connections:
 - a. Flanged: With flanges according to ASME B16.1 for iron valves.
 - b. Grooved: With grooves according to AWWA C606.
 - c. Solder Joint: With sockets according to ASME B16.18.
 - d. Threaded: With threads according to ASME B1.20.1.
7. Valve Bypass and Drain Connections: MSS SP-45.

B. Bronze Angle Valves

1. Class 125, Bronze Angle Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded.
 - 5) Stem and Disc: Bronze.
 - 6) Packing: Asbestos free.
 - 7) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.

2. Class 125, Bronze Angle Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **200 psig** (1380 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
 3. Class 150, Bronze Angle Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: **300 psig** (2070 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem and Disc: Bronze.
 - 6) Packing: Asbestos free.
 - 7) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
 4. Class 150, Bronze Angle Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: **300 psig** (2070 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
- C. Brass Ball Valves
1. One-Piece, Reduced-Port, Brass Ball Valves with Brass Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) CWP Rating: **400 psig** (2760 kPa).
 - 3) Body Design: One piece.
 - 4) Body Material: Forged brass.
 - 5) Ends: Threaded.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Brass.
 - 8) Ball: Chrome-plated brass.
 - 9) Port: Reduced.
 2. Two-Piece, Full-Port, Brass Ball Valves with Brass Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: **150 psig** (1035 kPa).
 - 3) CWP Rating: **600 psig** (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
 3. Two-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:
 - a. Description:

- 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Full.
4. Two-Piece, Regular-Port, Brass Ball Valves with Brass Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Regular.
5. Two-Piece, Regular-Port, Brass Ball Valves with Stainless-Steel Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Brass or bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Regular.
6. Three-Piece, Full-Port, Brass Ball Valves with Brass Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
7. Three-Piece, Full-Port, Brass Ball Valves with Stainless-Steel Trim:
- a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.

- 8) Stem: Stainless steel.
- 9) Ball: Stainless steel, vented.
- 10) Port: Full.

D. Bronze Ball Valves

1. One-Piece, Reduced-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) CWP Rating: 400 psig (2760 kPa).
 - 3) Body Design: One piece.
 - 4) Body Material: Bronze.
 - 5) Ends: Threaded.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Bronze.
 - 8) Ball: Chrome-plated brass.
 - 9) Port: Reduced.
2. One-Piece, Reduced-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) CWP Rating: 600 psig (4140 kPa).
 - 3) Body Design: One piece.
 - 4) Body Material: Bronze.
 - 5) Ends: Threaded.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Stainless steel.
 - 8) Ball: Stainless steel, vented.
 - 9) Port: Reduced.
3. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Bronze.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
4. Two-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Full.
5. Two-Piece, Regular-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).

- 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Bronze.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Regular.
6. Two-Piece, Regular-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Regular.
 7. Three-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Bronze.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full.
 8. Three-Piece, Full-Port, Bronze Ball Valves with Stainless-Steel Trim:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: 150 psig (1035 kPa).
 - 3) CWP Rating: 600 psig (4140 kPa).
 - 4) Body Design: Three piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Stainless steel.
 - 9) Ball: Stainless steel, vented.
 - 10) Port: Full.
- E. Iron Ball Valves
1. Class 125, Iron Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-72.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Split body.
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Ends: Flanged.
 - 6) Seats: PTFE or TFE.
 - 7) Stem: Stainless steel.
 - 8) Ball: Stainless steel.

9) Port: Full.

F. Iron, Single-Flange Butterfly Valves

1. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **150 psig (1035 kPa)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Aluminum bronze.
2. 150 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Aluminum-Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **150 psig (1035 kPa)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Aluminum bronze.
3. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Ductile-Iron Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **150 psig (1035 kPa)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Nickel-plated or -coated, **as directed**, ductile iron.
4. 150 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Ductile-Iron Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **150 psig (1035 kPa)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Nickel-plated or -coated, **as directed**, ductile iron.
5. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **150 psig (1035 kPa)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Stainless steel.
6. 150 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Stainless-Steel Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.

- 2) CWP Rating: 150 psig (1035 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Stainless steel.
7. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc:
- a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Aluminum bronze.
8. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Aluminum-Bronze Disc:
- a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Aluminum bronze.
9. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Ductile-Iron Disc:
- a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Nickel-plated or -coated, **as directed**, ductile iron.
10. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Ductile-Iron Disc:
- a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Nickel-plated or -coated, **as directed**, ductile iron.
11. 200 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Stainless-Steel Disc:
- a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: EPDM.

- 6) Stem: One- or two-piece stainless steel.
- 7) Disc: Stainless steel.
12. 200 CWP, Iron, Single-Flange Butterfly Valves with NBR Seat and Stainless-Steel Disc:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
 - 5) Seat: NBR.
 - 6) Stem: One- or two-piece stainless steel.
 - 7) Disc: Stainless steel.
- G. Iron, Grooved-End Butterfly Valves
 1. 175 CWP, Iron, Grooved-End Butterfly Valves:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) CWP Rating: **175 psig (1200 kPa)**.
 - 3) Body Material: Coated, ductile iron.
 - 4) Stem: Two-piece stainless steel.
 - 5) Disc: Coated, ductile iron.
 - 6) Seal: EPDM.
 2. 300 CWP, Iron, Grooved-End Butterfly Valves:
 - a. Description:
 - 1) Standard: MSS SP-67, Type I.
 - 2) **NPS 8 (DN 50)** and Smaller CWP Rating: **300 psig (2070 kPa)**.
 - 3) **NPS 10 (DN 250)** and Larger CWP Rating: **200 psig (1380 kPa)**.
 - 4) Body Material: Coated, ductile iron.
 - 5) Stem: Two-piece stainless steel.
 - 6) Disc: Coated, ductile iron.
 - 7) Seal: EPDM.
- H. High-Performance Butterfly Valves
 1. Class 150, Single-Flange, High-Performance Butterfly Valves:
 - a. Description:
 - 1) Standard: MSS SP-68.
 - 2) CWP Rating: **285 psig (1965 kPa) at 100 deg F (38 deg C)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: Carbon steel, cast iron, ductile iron, or stainless steel.
 - 5) Seat: Reinforced PTFE or metal.
 - 6) Stem: Stainless steel; offset from seat plane.
 - 7) Disc: Carbon steel.
 - 8) Service: Bidirectional.
 2. Class 300, Single-Flange, High-Performance Butterfly Valves:
 - a. Description:
 - 1) Standard: MSS SP-68.
 - 2) CWP Rating: **720 psig (4965 kPa) at 100 deg F (38 deg C)**.
 - 3) Body Design: Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
 - 4) Body Material: Carbon steel, cast iron, or ductile iron.
 - 5) Seat: Reinforced PTFE or metal.
 - 6) Stem: Stainless steel; offset from seat plane.
 - 7) Disc: Carbon steel.
 - 8) Service: Bidirectional.

- I. Bronze Lift Check Valves
 - 1. Class 125, Lift Check Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Vertical flow.
 - 4) Body Material: ASTM B 61 or ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: Bronze.
 - 2. Class 125, Lift Check Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Vertical flow.
 - 4) Body Material: ASTM B 61 or ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: NBR, PTFE, or TFE.
- J. Bronze Swing Check Valves
 - 1. Class 125, Bronze Swing Check Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 3.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: Bronze.
 - 2. Class 125, Bronze Swing Check Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 4.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: PTFE or TFE.
 - 3. Class 150, Bronze Swing Check Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 3.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: Bronze.
 - 4. Class 150, Bronze Swing Check Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 4.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Design: Horizontal flow.
 - 4) Body Material: ASTM B 62, bronze.
 - 5) Ends: Threaded.
 - 6) Disc: PTFE or TFE.
- K. Iron Swing Check Valves
 - 1. Class 125, Iron Swing Check Valves with Metal Seats:
 - a. Description:

- 1) Standard: MSS SP-71, Type I.
 - 2) **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**, CWP Rating: **200 psig (1380 kPa)**.
 - 3) **NPS 14 to NPS 24 (DN 350 to DN 600)**, CWP Rating: **150 psig (1035 kPa)**.
 - 4) Body Design: Clear or full waterway.
 - 5) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 6) Ends: Flanged.
 - 7) Trim: Bronze.
 - 8) Gasket: Asbestos free.
2. Class 125, Iron Swing Check Valves with Nonmetallic-to-Metal Seats:
- a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**, CWP Rating: **200 psig (1380 kPa)**.
 - 3) **NPS 14 to NPS 24 (DN 350 to DN 600)**, CWP Rating: **150 psig (1035 kPa)**.
 - 4) Body Design: Clear or full waterway.
 - 5) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 6) Ends: Flanged.
 - 7) Trim: Composition.
 - 8) Seat Ring: Bronze.
 - 9) Disc Holder: Bronze.
 - 10) Disc: PTFE or TFE.
 - 11) Gasket: Asbestos free.
3. Class 250, Iron Swing Check Valves with Metal Seats:
- a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**, CWP Rating: **500 psig (3450 kPa)**.
 - 3) **NPS 14 to NPS 24 (DN 350 to DN 600)**, CWP Rating: **300 psig (2070 kPa)**.
 - 4) Body Design: Clear or full waterway.
 - 5) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 6) Ends: Flanged.
 - 7) Trim: Bronze.
 - 8) Gasket: Asbestos free.
- L. Iron Swing Check Valves With Closure Control
1. Class 125, Iron Swing Check Valves with Lever- and Spring-Closure Control:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**, CWP Rating: **200 psig (1380 kPa)**.
 - 3) **NPS 14 to NPS 24 (DN 350 to DN 600)**, CWP Rating: **150 psig (1035 kPa)**.
 - 4) Body Design: Clear or full waterway.
 - 5) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 6) Ends: Flanged.
 - 7) Trim: Bronze.
 - 8) Gasket: Asbestos free.
 - 9) Closure Control: Factory-installed, exterior lever and spring.
 2. Class 125, Iron Swing Check Valves with Lever and Weight-Closure Control:
 - a. Description:
 - 1) Standard: MSS SP-71, Type I.
 - 2) **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**, CWP Rating: **200 psig (1380 kPa)**.
 - 3) **NPS 14 to NPS 24 (DN 350 to DN 600)**, CWP Rating: **150 psig (1035 kPa)**.
 - 4) Body Design: Clear or full waterway.
 - 5) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 6) Ends: Flanged.
 - 7) Trim: Bronze.
 - 8) Gasket: Asbestos free.
 - 9) Closure Control: Factory-installed, exterior lever and weight.

- M. Iron, Grooved-End Swing Check Valves
1. 300 CWP, Iron, Grooved-End Swing Check Valves:
 - a. Description:
 - 1) CWP Rating: 300 psig (2070 kPa).
 - 2) Body Material: ASTM A 536, ductile iron.
 - 3) Seal: EPDM.
 - 4) Disc: Spring operated, ductile iron or stainless steel.
- N. Iron, Center-Guided Check Valves
1. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Compact wafer.
 - 6) Seat: Bronze.
 2. Class 125, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: Bronze.
 3. Class 150, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 250 psig (1725 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Compact wafer.
 - 6) Seat: Bronze.
 4. Class 150, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 250 psig (1725 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: Bronze.
 5. Class 250, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Compact wafer, spring loaded.
 - 6) Seat: Bronze.
 6. Class 250, Iron, Globe, Center-Guided Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).

- 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: Bronze.
7. Class 300, Iron, Compact-Wafer, Center-Guided Check Valves with Metal Seat:
- a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 400 psig (2760 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Compact wafer, spring loaded.
 - 6) Seat: Bronze.
8. Class 300, Iron, Globe, Center-Guided Check Valves with Metal Seat:
- a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 400 psig (2760 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: Bronze.
9. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
- a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Compact wafer.
 - 6) Seat: EPDM **OR** BR, **as directed**.
10. Class 125, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
- a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: EPDM **OR** NBR, **as directed**.
11. Class 150, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
- a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 250 psig (1725 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Compact wafer.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
12. Class 150, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
- a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 250 psig (1725 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: EPDM **OR** NBR, **as directed**.

13. Class 250, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Compact wafer, spring loaded.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 14. Class 250, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 126, gray iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: EPDM **OR** NBR, **as directed**.
 15. Class 300, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 400 psig (2760 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Compact wafer, spring loaded.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 16. Class 300, Iron, Globe, Center-Guided Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: MSS SP-125.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 400 psig (2760 kPa).
 - 4) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 5) Style: Globe, spring loaded.
 - 6) Ends: Flanged.
 - 7) Seat: EPDM **OR** NBR, **as directed**.
- O. Iron, Plate-Type Check Valves
1. Class 125, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Seat: Bronze.
 2. Class 150, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 250 psig (1725 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 6) Seat: Bronze.
 3. Class 250, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.

- 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Seat: Bronze.
4. Class 300, Iron, Dual-Plate Check Valves with Metal Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 400 psig (2760 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 6) Seat: Bronze.
 5. Class 125, Iron, Single-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Design: Wafer, spring-loaded plate.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 6. Class 125, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 7. Class 150, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 300 psig (2070 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 250 psig (1725 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 8. Class 250, Iron, Wafer, Single-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Design: Wafer, spring-loaded plate.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 9. Class 250, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Design: Wafer, spring-loaded plates.
 - 5) Body Material: ASTM A 126, gray iron.
 - 6) Seat: EPDM **OR** NBR, **as directed**.
 10. Class 300, Iron, Dual-Plate Check Valves with Resilient Seat:
 - a. Description:
 - 1) Standard: API 594.

- 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
- 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 400 psig (2760 kPa).
- 4) Body Design: Wafer, spring-loaded plates.
- 5) Body Material: ASTM A 395/A 395M or ASTM A 536, ductile iron.
- 6) Seat: EPDM **OR** NBR, **as directed**.

P. Bronze Gate Valves

1. Class 125, NRS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
2. Class 125, RS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
3. Class 150, NRS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
4. Class 150, RS Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: Solid wedge; bronze.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.

Q. Iron Gate Valves

1. Class 125, NRS, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.

- 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Disc: Solid wedge.
 - 8) Packing and Gasket: Asbestos free.
 2. Class 125, OS&Y, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Disc: Solid wedge.
 - 8) Packing and Gasket: Asbestos free.
 3. Class 250, NRS, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Disc: Solid wedge.
 - 8) Packing and Gasket: Asbestos free.
 4. Class 250, OS&Y, Iron Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 500 psig (3450 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 5) Ends: Flanged.
 - 6) Trim: Bronze.
 - 7) Disc: Solid wedge.
 - 8) Packing and Gasket: Asbestos free.
- R. Bronze Globe Valves
1. Class 125, Bronze Globe Valves with Bronze Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 1.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem and Disc: Bronze.
 - 6) Packing: Asbestos free.
 - 7) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
 2. Class 125, Bronze Globe Valves with Nonmetallic Disc:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
 - 4) Ends: Threaded or solder joint, **as directed**.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.
 3. Class 150, Bronze Globe Valves with Nonmetallic Disc:

- a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) CWP Rating: 300 psig (2070 kPa).
 - 3) Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
 - 4) Ends: Threaded.
 - 5) Stem: Bronze.
 - 6) Disc: PTFE or TFE.
 - 7) Packing: Asbestos free.
 - 8) Handwheel: Malleable iron, bronze, or aluminum, **as directed**.

S. Iron Globe Valves

- 1. Class 125, Iron Globe Valves:
 - a. Description:
 - 1) Standard: MSS SP-85, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Packing and Gasket: Asbestos free.
- 2. Class 250, Iron Globe Valves:
 - a. Description:
 - 1) Standard: MSS SP-85, Type I.
 - 2) CWP Rating: 500 psig (3450 kPa).
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: Bronze.
 - 6) Packing and Gasket: Asbestos free.

T. Lubricated Plug Valves

- 1. Class 125, Regular-Gland, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.
- 2. Class 125, Regular-Gland, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.
- 3. Class 125, Cylindrical, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.

- 6) Plug: Cast iron or bronze with sealant groove.
4. Class 125, Cylindrical, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 200 psig (1380 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 150 psig (1035 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.
5. Class 250, Regular-Gland, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.
6. Class 250, Regular-Gland, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type II.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.
7. Class 250, Cylindrical, Lubricated Plug Valves with Threaded Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.
8. Class 250, Cylindrical, Lubricated Plug Valves with Flanged Ends:
 - a. Description:
 - 1) Standard: MSS SP-78, Type IV.
 - 2) NPS 2-1/2 to NPS 12 (DN 65 to DN 300), CWP Rating: 400 psig (2760 kPa).
 - 3) NPS 14 to NPS 24 (DN 350 to DN 600), CWP Rating: 300 psig (2070 kPa).
 - 4) Body Material: ASTM A 48/A 48M or ASTM A 126, Grade 40 cast iron with lubrication-sealing system.
 - 5) Pattern: Regular or short **OR** Venturi, **as directed**.
 - 6) Plug: Cast iron or bronze with sealant groove.

U. Eccentric Plug Valves

1. 175 CWP, Eccentric Plug Valves with Resilient Seating.
 - a. Description:
 - 1) Standard: MSS SP-108.
 - 2) CWP Rating: 175 psig (1200 kPa) minimum.
 - 3) Body and Plug: ASTM A 48/A 48M, gray iron; ASTM A 126, gray iron; or ASTM A 536, ductile iron.
 - 4) Bearings: Oil-impregnated bronze or stainless steel.
 - 5) Ends: Flanged.

- 6) Stem-Seal Packing: Asbestos free.
- 7) Plug, Resilient-Seating Material: Suitable for potable-water service unless otherwise indicated.

V. Chainwheels

1. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
 - a. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
 - b. Attachment: For connection to ball **OR** butterfly **OR** plug, **as directed**, valve stems.
 - c. Sprocket Rim with Chain Guides: Ductile iron **OR** Cast iron **OR** Aluminum **OR** Bronze, **as directed**, of type and size required for valve. Include zinc coating, **as directed**.
 - d. Chain: Hot-dip, galvanized steel **OR** Brass **OR** Stainless steel, **as directed**, of size required to fit sprocket rim.

1.3 EXECUTION

A. Valve Installation

1. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.
2. Locate valves for easy access and provide separate support where necessary.
3. Install valves in horizontal piping with stem at or above center of pipe.
4. Install valves in position to allow full stem movement.
5. Install chainwheels on operators for ball **OR** butterfly **OR** gate **OR** globe **OR** plug, **as directed**, valves **NPS 4 (DN 100)** and larger and more than **96 inches (2400 mm)** above floor. Extend chains to **60 inches (1520 mm)** above finished floor.
6. Install check valves for proper direction of flow and as follows:
 - a. Swing Check Valves: In horizontal position with hinge pin level.
 - b. Center-Guided and Plate-Type Check Valves: In horizontal or vertical position, between flanges.
 - c. Lift Check Valves: With stem upright and plumb.

B. Adjusting

1. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

C. General Requirements For Valve Applications

1. If valve applications are not indicated, use the following:
 - a. Shutoff Service: Ball, butterfly **OR** gate **OR** plug, **as directed**, valves.
 - b. Butterfly Valve Dead-End Service: Single-flange (lug) type.
 - c. Throttling Service except Steam: Globe **OR** angle **OR** ball **OR** butterfly, **as directed**, valves.
 - d. Throttling Service, Steam: Globe **OR** angle **OR** butterfly, **as directed**, valves.
 - e. Pump-Discharge Check Valves:
 - 1) **NPS 2 (DN 50)** and Smaller: Bronze swing check valves with bronze **OR** nonmetallic, **as directed**, disc.
 - 2) **NPS 2-1/2 (DN 65)** and Larger: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal **OR** resilient, **as directed**,-seat check valves.
2. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.
3. Select valves, except wafer types, with the following end connections:
 - a. For Copper Tubing, **NPS 2 (DN 50)** and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
 - b. For Copper Tubing, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

- c. For Copper Tubing, **NPS 5 (DN 125)** and Larger: Flanged ends.
- d. For Steel Piping, **NPS 2 (DN 50)** and Smaller: Threaded ends.
- e. For Steel Piping, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Flanged ends except where threaded valve-end option is indicated in valve schedules below.
- f. For Steel Piping, **NPS 5 (DN 125)** and Larger: Flanged ends.
- g. For Grooved-End Copper Tubing and Steel Piping except Steam and Steam Condensate Piping: Valve ends may be grooved.

D. Chilled-Water Valve Schedule

- 1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - b. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - c. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**, bronze.
 - f. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
- 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
 - a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves, **NPS 2-1/2 to NPS 10 (DN 65 to DN 250)**: Class 150.
 - c. Iron, Single-Flange Butterfly Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: 200 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - d. Iron, Single-Flange Butterfly Valves, **NPS 14 to NPS 24 (DN 350 to DN 600)**: 150 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - e. Iron, Grooved-End Butterfly Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: 175 **OR** 300, **as directed**, CWP.
 - f. High-Performance Butterfly Valves: Class 150 **OR** Class 300, **as directed**, single flange.
 - g. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - h. Iron Swing Check Valves with Closure Control, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125, lever and spring **OR** weight, **as directed**.
 - i. Iron, Grooved-End Check Valves, **NPS 3 to NPS 12 (DN 80 to DN 300)**: 300 CWP.
 - j. Iron, Center-Guided Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**, compact-wafer **OR** globe, **as directed**, metal **OR** resilient, **as directed**, seat.
 - k. Iron, Plate-Type Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**; single **OR** dual, **as directed**, plate; metal **OR** resilient, **as directed**, seat.
 - l. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - m. Iron Globe Valves: Class 125 **OR** Class 250, **as directed**.
 - n. Lubricated Plug Valves: Class 125 **OR** Class 250, **as directed**, regular gland **OR** cylindrical, **as directed**, threaded **OR** flanged, **as directed**.
 - o. Eccentric Plug Valves: 175 CWP, resilient seating.

E. Condenser-Water Valve Schedule

- 1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.

- b. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - c. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - f. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
- a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves, **NPS 2-1/2 to NPS 10 (DN 65 to DN 250)**: Class 150.
 - c. Iron, Single-Flange Butterfly Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: 200 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - d. Iron, Single-Flange Butterfly Valves, **NPS 14 to NPS 24 (DN 350 to DN 600)**: 150 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - e. Iron, Grooved-End Butterfly Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: 175 **OR** 300, **as directed**, CWP.
 - f. High-Performance Butterfly Valves: Class 150 **OR** Class 300, **as directed**, single flange.
 - g. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - h. Iron Swing Check Valves with Closure Control, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125, lever and spring **OR** weight, **as directed**.
 - i. Iron, Grooved-End Check Valves, **NPS 3 to NPS 12 (DN 80 to DN 300)**: 300 CWP.
 - j. Iron, Center-Guided Check Valves, **NPS 2-1/2 to NPS 24 (DN 65 to DN 600)**: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**, metal **OR** resilient, **as directed**, seat.
 - k. Iron, Plate-Type Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**; single **OR** dual, **as directed**, plate; metal **OR** resilient, **as directed**, seat.
 - l. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - m. Iron Globe Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125 **OR** Class 250, **as directed**.
 - n. Lubricated Plug Valves: Class 125 **OR** Class 250, **as directed**, regular gland **OR** cylindrical, **as directed**, threaded **OR** flanged, **as directed**.
- F. Heating-Water Valve Schedule
- 1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.
 - b. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - c. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - d. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - e. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - f. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:

- a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves, **NPS 2-1/2 to NPS 10 (DN 65 to DN 250)**: Class 150.
 - c. Iron, Single-Flange Butterfly Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: 200 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - d. Iron, Single-Flange Butterfly Valves, **NPS 14 to NPS 24 (DN 350 to DN 600)**: 150 CWP, EPDM **OR** NBR, **as directed**, seat, aluminum-bronze **OR** ductile-iron **OR** stainless-steel, **as directed**, disc.
 - e. Iron, Grooved-End Butterfly Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: 175 **OR** 300, **as directed**, CWP.
 - f. High-Performance Butterfly Valves: Class 150 **OR** Class 300, **as directed**, single flange.
 - g. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - h. Iron Swing Check Valves with Closure Control, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125, lever and spring **OR** weight, **as directed**.
 - i. Iron, Grooved-End Check Valves, **NPS 3 to NPS 12 (DN 80 to DN 300)**: 300 CWP.
 - j. Iron, Center-Guided Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**, compact-wafer **OR** globe, **as directed**, metal **OR** resilient, **as directed**, seat.
 - k. Iron, Plate-Type Check Valves: Class 125 **OR** Class 150 **OR** Class 250 **OR** Class 300, **as directed**; single **OR** dual, **as directed**, plate; metal **OR** resilient, **as directed**, seat.
 - l. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - m. Iron Globe Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125 **OR** Class 250, **as directed**.
- G. Low-Pressure Steam Valve Schedule (**15 psig (104 kPa)** Or Less)
1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - b. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - c. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - d. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - e. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
 - a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves, **NPS 2-1/2 to NPS 10 (DN 65 to DN 250)**: Class 150.
 - c. High-Performance Butterfly Valves: Class 150 **OR** Class 300, **as directed**, single flange.
 - d. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - e. Iron Swing Check Valves with Closure Control, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125, lever and spring **OR** weight, **as directed**.
 - f. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - g. Iron Globe Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125 **OR** Class 250, **as directed**.
- H. High-Pressure Steam Valve Schedule (More Than **15 psig (104 kPa)**)
1. Pipe **NPS 2 (DN 50)** and Smaller:
 - a. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.

- b. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - c. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - d. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**, bronze.
 - e. Globe Valves: Class 125 **OR** 150, **as directed**, bronze, bronze **OR** nonmetallic, **as directed**, disc.
2. Pipe Sizes **NPS 2-1/2 (DN 65)** and Larger:
- a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Ball Valves, **NPS 2-1/2 to NPS 10 (DN 65 to DN 250)**: Class 150, iron.
 - c. High-Performance Butterfly Valves: Class 150 **OR** Class 300, **as directed**, single flange.
 - d. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - e. Iron Swing Check Valves with Closure Control, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125, lever and spring **OR** weight, **as directed**.
 - f. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - g. Iron Globe Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125 **OR** Class 250, **as directed**.
- I. Steam-Condensate Valve Schedule
1. Pipe **NPS 2 (DN 50)** and Smaller:
- a. Bronze Angle Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - b. Ball Valves: One **OR** Two **OR** Three, **as directed**, piece, full **OR** regular **OR** reduced, **as directed**, port, brass **OR** bronze, **as directed**, with brass **OR** bronze **OR** stainless-steel, **as directed**, trim.
 - c. Bronze Swing Check Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
 - d. Bronze Gate Valves: Class 125 **OR** Class 150, **as directed**, NRS **OR** RS, **as directed**.
 - e. Bronze Globe Valves: Class 125 **OR** Class 150, **as directed**, bronze **OR** nonmetallic, **as directed**, disc.
2. Pipe **NPS 2-1/2 (DN 65)** and Larger:
- a. Iron Valves, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: May be provided with threaded ends instead of flanged ends.
 - b. Iron Ball Valves, **NPS 2-1/2 to NPS 10 (DN 65 to DN 250)**: Class 150.
 - c. High-Performance Butterfly Valves: Class 150 **OR** Class 300, **as directed**, single flange.
 - d. Iron Swing Check Valves: Class 125 **OR** Class 250, **as directed**, metal **OR** nonmetallic-to-metal, **as directed**, seats.
 - e. Iron Swing Check Valves with Closure Control: Class 125, lever and spring **OR** weight, **as directed**.
 - f. Iron Gate Valves: Class 125 **OR** Class 250, **as directed**, NRS **OR** OS&Y, **as directed**.
 - g. Iron Globe Valves, **NPS 2-1/2 to NPS 12 (DN 65 to DN 300)**: Class 125 **OR** Class 250, **as directed**.
 - h. Lubricated Plug Valves: Class 125 **OR** Class 250, **as directed**, regular gland **OR** cylindrical, **as directed**, threaded **OR** flanged, **as directed**.

END OF SECTION 23 05 23 00

Task	Specification	Specification Description
23 05 23 00	01 22 16 00	No Specification Required
23 05 23 00	22 05 23 00a	General-Duty Valves for Plumbing Piping
23 05 23 00	22 05 76 00	Storm Drainage Piping Specialties
23 05 23 00	22 11 16 00a	General-Service Compressed-Air Piping
23 05 23 00	23 21 13 23a	Hydronic Piping
23 05 23 00	23 21 23 13	Hydronic Pumps
23 05 23 00	22 11 16 00c	Refrigerant Piping
23 05 23 00	33 14 00 00	Water Distribution
23 05 23 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 05 29 00 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hangers and supports for plumbing piping and equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Metal pipe hangers and supports.
 - b. Trapeze pipe hangers.
 - c. Fiberglass pipe hangers.
 - d. Metal framing systems.
 - e. Fiberglass strut systems.
 - f. Thermal-hanger shield inserts.
 - g. Fastener systems.
 - h. Pipe stands.
 - i. Pipe positioning systems.
 - j. Equipment supports.

C. Definitions

1. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

D. Performance Requirements

1. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - b. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - c. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - a. Trapeze pipe hangers.
 - b. Metal framing systems.
 - c. Fiberglass strut systems.
 - d. Pipe stands.
 - e. Equipment supports.
3. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of trapeze hangers.

- b. Design Calculations: Calculate requirements for designing trapeze hangers.
4. Welding certificates.

F. Quality Assurance

1. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1.2 PRODUCTS

A. Metal Pipe Hangers And Supports

1. Carbon-Steel Pipe Hangers and Supports:
 - a. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - b. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - c. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - d. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - e. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel **OR** stainless steel, **as directed**.
2. Stainless-Steel Pipe Hangers and Supports:
 - a. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - b. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - c. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
3. Copper Pipe Hangers:
 - a. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - b. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel **OR** stainless steel, **as directed**.

B. Trapeze Pipe Hangers

1. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

C. Fiberglass Pipe Hangers

1. Clevis-Type, Fiberglass Pipe Hangers:
 - a. Description: Similar to MSS SP-58, Type 1, steel pipe hanger except hanger is made of fiberglass or fiberglass-reinforced resin.
 - b. Hanger Rods: Continuous-thread rod, washer, and nuts made of fiberglass, polyurethane or stainless steel.
2. Strap-Type, Fiberglass Pipe Hangers:
 - a. Description: Similar to MSS SP-58, Type 9 or Type 10, steel pipe hanger except hanger is made of fiberglass-reinforced resin.
 - b. Hanger Rod and Fittings: Continuous-thread rod, washer, and nuts made of stainless steel.

D. Metal Framing Systems

1. MFMA Manufacturer Metal Framing Systems:
 - a. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - b. Standard: MFMA-4.

- c. Channels: Continuous slotted steel channel with inturned lips.
 - d. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - e. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel **OR** stainless steel, **as directed**.
 - f. Metallic Coating: Electroplated zinc **OR** Hot-dipped galvanized **OR** Mill galvanized **OR** In-line, hot galvanized **OR** Mechanically-deposited zinc, **as directed**.
OR
Paint Coating: Vinyl **OR** Vinyl alkyd **OR** Epoxy **OR** Polyester **OR** Acrylic **OR** Amine **OR** Alkyd, **as directed**.
OR
Plastic Coating: PVC **OR** Polyurethane **OR** Epoxy **OR** Polyester, **as directed**.
OR
Combination Coating: **Coating materials in order of application** as directed by the Owner .
2. Non-MFMA Manufacturer Metal Framing Systems:
- a. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
 - b. Standard: Comply with MFMA-4.
 - c. Channels: Continuous slotted steel channel with inturned lips.
 - d. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - e. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel **OR** stainless steel, **as directed**.
 - f. Coating: Zinc **OR** Paint **OR** PVC, **as directed**.
- E. Fiberglass Strut Systems
- 1. Description: Shop- or field-fabricated pipe-support assembly similar to MFMA-4 for supporting multiple parallel pipes.
 - a. Channels: Continuous slotted fiberglass or other plastic channel with inturned lips.
 - b. Channel Nuts: Fiberglass nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - c. Hanger Rods: Continuous-thread rod, nuts, and washer made of fiberglass **OR** stainless steel, **as directed**.
- F. Thermal-Hanger Shield Inserts
- 1. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with **100-psig (688-kPa)** or ASTM C 591, Type VI, Grade 1 polyisocyanurate with **125-psig (862-kPa)** minimum compressive strength and vapor barrier.
 - 2. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with **100-psig (688-kPa)**, ASTM C 552, Type II cellular glass with **100-psig (688-kPa)** or ASTM C 591, Type VI, Grade 1 polyisocyanurate with **125-psig (862-kPa)** minimum compressive strength.
 - 3. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
 - 4. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
 - 5. Insert Length: Extend **2 inches (50 mm)** beyond sheet metal shield for piping operating below ambient air temperature.
- G. Fastener Systems
- 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated **OR** stainless-, **as directed**, steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

- H. Pipe Stands
 1. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
 2. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 3. Low-Type, Single-Pipe Stand: One-piece plastic **OR** stainless-steel, **as directed**, base unit with plastic roller, for roof installation without membrane penetration.
 4. High-Type, Single-Pipe Stand:
 - a. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 - b. Base: Plastic **OR** Stainless steel, **as directed**.
 - c. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - d. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
 5. High-Type, Multiple-Pipe Stand:
 - a. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 - b. Bases: One or more; plastic.
 - c. Vertical Members: Two or more protective-coated-steel channels.
 - d. Horizontal Member: Protective-coated-steel channel.
 - e. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
 6. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.
- I. Pipe Positioning Systems
 1. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.
- J. Equipment Supports
 1. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.
- K. Miscellaneous Materials
 1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
 2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - a. Properties: Nonstaining, noncorrosive, and nongaseous.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.

1.3 EXECUTION

- A. Hanger And Support Installation
 1. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
 2. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

- a. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
- b. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
3. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.
4. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
5. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.
6. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
7. Fastener System Installation:
 - a. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than **4 inches (100 mm)** thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - b. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
8. Pipe Stand Installation:
 - a. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - b. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Division 7 Section "Roof Accessories" for curbs.
9. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. See Division 15 plumbing fixture Sections for requirements for pipe positioning systems for plumbing fixtures.
10. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
11. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
12. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
13. Install lateral bracing with pipe hangers and supports to prevent swaying.
14. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, **NPS 2-1/2 (DN 65)** and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
15. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
16. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
17. Insulated Piping:
 - a. Attach clamps and spacers to piping.
 - 1) Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - 2) Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - 3) Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - b. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - 1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe **NPS 4 (DN 100)** and larger if pipe is installed on rollers.

- c. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - 1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe **NPS 4 (DN 100)** and larger if pipe is installed on rollers.
 - d. Shield Dimensions for Pipe: Not less than the following:
 - 1) **NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm)** long and **0.048 inch (1.22 mm)** thick.
 - 2) **NPS 4 (DN 100): 12 inches (305 mm)** long and **0.06 inch (1.52 mm)** thick.
 - 3) **NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm)** long and **0.06 inch (1.52 mm)** thick.
 - 4) **NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm)** long and **0.075 inch (1.91 mm)** thick.
 - 5) **NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm)** long and **0.105 inch (2.67 mm)** thick.
 - e. Pipes **NPS 8 (DN 200)** and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - f. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- B. Equipment Supports**
1. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
 2. Grouting: Place grout under supports for equipment and make bearing surface smooth.
 3. Provide lateral bracing, to prevent swaying, for equipment supports.
- C. Metal Fabrications**
1. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
 2. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
 3. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.
- D. Adjusting**
1. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
 2. Trim excess length of continuous-thread hanger and support rods to **1-1/2 inches (40 mm)**.
- E. Painting**
1. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - a. Apply paint by brush or spray to provide a minimum dry film thickness of **2.0 mils (0.05 mm)**.
- OR**
- Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 painting Sections **OR** Section "High-Performance Coatings", **as directed**.

2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
- F. Hanger And Support Schedule
1. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
 2. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
 3. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.
 4. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
 5. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
 6. Use stainless-steel pipe hangers and fiberglass pipe hangers and fiberglass strut systems and stainless-steel or corrosion-resistant attachments for hostile environment applications.
 7. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
 8. Use padded hangers for piping that is subject to scratching.
 9. Use thermal-hanger shield inserts for insulated piping and tubing.
 10. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - a. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes **NPS 1/2 to NPS 30 (DN 15 to DN 750)**.
 - b. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to **1050 deg F (566 deg C)**, pipes **NPS 4 to NPS 24 (DN 100 to DN 600)**, requiring up to **4 inches (100 mm)** of insulation.
 - c. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes **NPS 3/4 to NPS 36 (DN 20 to DN 900)**, requiring clamp flexibility and up to **4 inches (100 mm)** of insulation.
 - d. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes **NPS 1/2 to NPS 24 (DN 15 to DN 600)** if little or no insulation is required.
 - e. Pipe Hangers (MSS Type 5): For suspension of pipes **NPS 1/2 to NPS 4 (DN 15 to DN 100)**, to allow off-center closure for hanger installation before pipe erection.
 - f. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes **NPS 3/4 to NPS 8 (DN 20 to DN 200)**.
 - g. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.
 - h. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.
 - i. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.
 - j. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes **NPS 3/8 to NPS 8 (DN 10 to DN 200)**.
 - k. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes **NPS 3/8 to NPS 3 (DN 10 to DN 80)**.
 - l. U-Bolts (MSS Type 24): For support of heavy pipes **NPS 1/2 to NPS 30 (DN 15 to DN 750)**.
 - m. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - n. Pipe Saddle Supports (MSS Type 36): For support of pipes **NPS 4 to NPS 36 (DN 100 to DN 900)**, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 - o. Pipe Stanchion Saddles (MSS Type 37): For support of pipes **NPS 4 to NPS 36 (DN 100 to DN 900)**, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.

- p. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes **NPS 2-1/2 to NPS 36 (DN 65 to DN 900)** if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 - q. Single-Pipe Rolls (MSS Type 41): For suspension of pipes **NPS 1 to NPS 30 (DN 25 to DN 750)**, from two rods if longitudinal movement caused by expansion and contraction might occur.
 - r. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes **NPS 2-1/2 to NPS 24 (DN 65 to DN 600)**, from single rod if horizontal movement caused by expansion and contraction might occur.
 - s. Complete Pipe Rolls (MSS Type 44): For support of pipes **NPS 2 to NPS 42 (DN 50 to DN 1050)** if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 - t. Pipe Roll and Plate Units (MSS Type 45): For support of pipes **NPS 2 to NPS 24 (DN 50 to DN 600)** if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 - u. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes **NPS 2 to NPS 30 (DN 50 to DN 750)** if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
11. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers **NPS 3/4 to NPS 24 (DN 24 to DN 600)**.
 - b. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers **NPS 3/4 to NPS 24 (DN 20 to DN 600)** if longer ends are required for riser clamps.
12. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Steel Turnbuckles (MSS Type 13): For adjustment up to **6 inches (150 mm)** for heavy loads.
 - b. Steel Clevises (MSS Type 14): For **120 to 450 deg F (49 to 232 deg C)** piping installations.
 - c. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - d. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - e. Steel Weldless Eye Nuts (MSS Type 17): For **120 to 450 deg F (49 to 232 deg C)** piping installations.
13. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - b. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.
 - c. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - d. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - e. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 - f. C-Clamps (MSS Type 23): For structural shapes.
 - g. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 - h. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 - i. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 - j. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.

- k. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 - l. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - 1) Light (MSS Type 31): 750 lb (340 kg).
 - 2) Medium (MSS Type 32): 1500 lb (680 kg).
 - 3) Heavy (MSS Type 33): 3000 lb (1360 kg).
 - m. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 - n. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 - o. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.
14. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - b. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - c. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
15. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 - b. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed 1-1/4 inches (32 mm).
 - c. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 - d. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 - e. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 - f. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 - g. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 - h. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - 1) Horizontal (MSS Type 54): Mounted horizontally.
 - 2) Vertical (MSS Type 55): Mounted vertically.
 - 3) Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
16. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
17. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
18. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.
19. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

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SECTION 23 05 29 00a - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hangers and supports for HVAC piping and equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Metal pipe hangers and supports.
 - b. Trapeze pipe hangers.
 - c. Fiberglass pipe hangers.
 - d. Metal framing systems.
 - e. Fiberglass strut systems.
 - f. Thermal-hanger shield inserts.
 - g. Fastener systems.
 - h. Pipe stands.
 - i. Equipment supports.

C. Definitions

1. MSS: Manufacturers Standardization Society of The Valve and Fittings Industry Inc.

D. Performance Requirements

1. Delegated Design: Design trapeze pipe hangers and equipment supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Hangers and supports for HVAC piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
 - a. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
 - b. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
 - c. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following; include Product Data for components:
 - a. Trapeze pipe hangers.
 - b. Metal framing systems.
 - c. Fiberglass strut systems.
 - d. Pipe stands.
 - e. Equipment supports.
3. Delegated-Design Submittal: For trapeze hangers indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of trapeze hangers.
 - b. Design Calculations: Calculate requirements for designing trapeze hangers.

4. Welding certificates.

F. Quality Assurance

1. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

1.2 PRODUCTS

A. Metal Pipe Hangers And Supports

1. Carbon-Steel Pipe Hangers and Supports:
 - a. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - b. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
 - c. Nonmetallic Coatings: Plastic coating, jacket, or liner.
 - d. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - e. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel **OR** stainless steel, **as directed**.
2. Stainless-Steel Pipe Hangers and Supports:
 - a. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
 - b. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
 - c. Hanger Rods: Continuous-thread rod, nuts, and washer made of stainless steel.
3. Copper Pipe Hangers:
 - a. Description: MSS SP-58, Types 1 through 58, copper-coated-steel, factory-fabricated components.
 - b. Hanger Rods: Continuous-thread rod, nuts, and washer made of copper-coated steel **OR** stainless steel, **as directed**.

B. Trapeze Pipe Hangers

1. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

C. Fiberglass Pipe Hangers

1. Clevis-Type, Fiberglass Pipe Hangers:
 - a. Description: Similar to MSS SP-58, Type 1, steel pipe hanger except hanger is made of fiberglass or fiberglass-reinforced resin.
 - b. Hanger Rods: Continuous-thread rod, washer, and nuts made of fiberglass, polyurethane or stainless steel.
2. Strap-Type, Fiberglass Pipe Hangers:
 - a. Description: Similar to MSS SP-58, Type 9 or Type 10, steel pipe hanger except hanger is made of fiberglass-reinforced resin.
 - b. Hanger Rod and Fittings: Continuous-thread rod, washer, and nuts made of stainless steel.

D. Metal Framing Systems

1. MFMA Manufacturer Metal Framing Systems:
 - a. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.
 - b. Standard: MFMA-4.
 - c. Channels: Continuous slotted steel channel with inturned lips.

- d. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - e. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel **OR** stainless steel, **as directed**.
 - f. Metallic Coating: Electroplated zinc **OR** Hot-dipped galvanized **OR** Mill galvanized **OR** In-line, hot galvanized **OR** Mechanically-deposited zinc, **as directed**.
OR
Paint Coating: Vinyl **OR** Vinyl alkyd **OR** Epoxy **OR** Polyester **OR** Acrylic **OR** Amine **OR** Alkyd, **as directed**.
OR
Plastic Coating: PVC **OR** Polyurethane **OR** Epoxy **OR** Polyester, **as directed**.
OR
Combination Coating: as directed by the Owner.
2. Non-MFMA Manufacturer Metal Framing Systems:
- a. Description: Shop- or field-fabricated pipe-support assembly made of steel channels, accessories, fittings, and other components for supporting multiple parallel pipes.
 - b. Standard: Comply with MFMA-4.
 - c. Channels: Continuous slotted steel channel with inturned lips.
 - d. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - e. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel **OR** stainless steel, **as directed**.
 - f. Coating: Zinc **OR** Paint **OR** PVC, **as directed**.
- E. Fiberglass Strut Systems
- 1. Description: Shop- or field-fabricated pipe-support assembly similar to MFMA-4 for supporting multiple parallel pipes.
 - a. Channels: Continuous slotted fiberglass or other plastic channel with inturned lips.
 - b. Channel Nuts: Fiberglass nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.
 - c. Hanger Rods: Continuous-thread rod, nuts, and washer made of fiberglass **OR** stainless steel, **as directed**.
- F. Thermal-Hanger Shield Inserts
- 1. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with **100-psig (688-kPa)** or ASTM C 591, Type VI, Grade 1 polyisocyanurate with **125-psig (862-kPa)** minimum compressive strength and vapor barrier.
 - 2. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with **100-psig (688-kPa)**, ASTM C 552, Type II cellular glass with **100-psig (688-kPa)** or ASTM C 591, Type VI, Grade 1 polyisocyanurate with **125-psig (862-kPa)** minimum compressive strength.
 - 3. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.
 - 4. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.
 - 5. Insert Length: Extend **2 inches (50 mm)** beyond sheet metal shield for piping operating below ambient air temperature.
- G. Fastener Systems
- 1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
 - 2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated **OR** stainless-, **as directed**, steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- H. Pipe Stands

1. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.
 2. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.
 3. Low-Type, Single-Pipe Stand: One-piece plastic **OR** stainless-steel, **as directed**, base unit with plastic roller, for roof installation without membrane penetration.
 4. High-Type, Single-Pipe Stand:
 - a. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.
 - b. Base: Plastic **OR** Stainless steel, **as directed**.
 - c. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
 - d. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.
 5. High-Type, Multiple-Pipe Stand:
 - a. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
 - b. Bases: One or more; plastic.
 - c. Vertical Members: Two or more protective-coated-steel channels.
 - d. Horizontal Member: Protective-coated-steel channel.
 - e. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.
 6. Curb-Mounted-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.
- I. Equipment Supports
1. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.
- J. Miscellaneous Materials
1. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.
 2. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
 - a. Properties: Nonstaining, noncorrosive, and nongaseous.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.

1.3 EXECUTION

A. Hanger And Support Installation

1. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.
2. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.
 - a. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.
 - b. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.
3. Fiberglass Pipe-Hanger Installation: Comply with applicable portions of MSS SP-69 and MSS SP-89. Install hangers and attachments as required to properly support piping from building structure.

4. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.
5. Fiberglass Strut System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled fiberglass struts.
6. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.
7. Fastener System Installation:
 - a. Install powder-actuated fasteners for use in lightweight concrete or concrete slabs less than **4 inches (100 mm)** thick in concrete after concrete is placed and completely cured. Use operators that are licensed by powder-actuated tool manufacturer. Install fasteners according to powder-actuated tool manufacturer's operating manual.
 - b. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.
8. Pipe Stand Installation:
 - a. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
 - b. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Division 07 Section "Roof Accessories" for curbs.
9. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.
10. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
11. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.
12. Install lateral bracing with pipe hangers and supports to prevent swaying.
13. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, **NPS 2-1/2 (DN 65)** and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.
14. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.
15. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.
16. Insulated Piping:
 - a. Attach clamps and spacers to piping.
 - 1) Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
 - 2) Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
 - 3) Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.
 - b. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
 - 1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe **NPS 4 (DN 100)** and larger if pipe is installed on rollers.
 - c. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
 - 1) Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe **NPS 4 (DN 100)** and larger if pipe is installed on rollers.
 - d. Shield Dimensions for Pipe: Not less than the following:
 - 1) **NPS 1/4 to NPS 3-1/2 (DN 8 to DN 90): 12 inches (305 mm)** long and **0.048 inch (1.22 mm)** thick.
 - 2) **NPS 4 (DN 100): 12 inches (305 mm)** long and **0.06 inch (1.52 mm)** thick.
 - 3) **NPS 5 and NPS 6 (DN 125 and DN 150): 18 inches (457 mm)** long and **0.06 inch (1.52 mm)** thick.

- 4) NPS 8 to NPS 14 (DN 200 to DN 350): 24 inches (610 mm) long and 0.075 inch (1.91 mm) thick.
 - 5) NPS 16 to NPS 24 (DN 400 to DN 600): 24 inches (610 mm) long and 0.105 inch (2.67 mm) thick.
 - e. Pipes NPS 8 (DN 200) and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.
 - f. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.
- B. Equipment Supports
1. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.
 2. Grouting: Place grout under supports for equipment and make bearing surface smooth.
 3. Provide lateral bracing, to prevent swaying, for equipment supports.
- C. Metal Fabrications
1. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.
 2. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.
 3. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.
- D. Adjusting
1. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.
 2. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches (40 mm).
- E. Painting
1. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - a. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils (0.05 mm).

OR

Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 07 OR Division 09 Section(s) "High-performance Coatings", **as directed**.
 2. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.
- F. Hanger And Support Schedule
1. Specific hanger and support requirements are in Sections specifying piping systems and equipment.
 2. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.
 3. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

4. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.
5. Use carbon-steel pipe hangers and supports, metal trapeze pipe hangers and metal framing systems and attachments for general service applications.
6. Use stainless-steel pipe hangers and fiberglass pipe hangers and fiberglass strut systems and stainless-steel or corrosion-resistant attachments for hostile environment applications.
7. Use copper-plated pipe hangers and copper or stainless-steel attachments for copper piping and tubing.
8. Use padded hangers for piping that is subject to scratching.
9. Use thermal-hanger shield inserts for insulated piping and tubing.
10. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - a. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes **NPS 1/2 to NPS 30 (DN 15 to DN 750)**.
 - b. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of up to **1050 deg F (566 deg C)**, pipes **NPS 4 to NPS 24 (DN 100 to DN 600)**, requiring up to **4 inches (100 mm)** of insulation.
 - c. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes **NPS 3/4 to NPS 36 (DN 20 to DN 900)**, requiring clamp flexibility and up to **4 inches (100 mm)** of insulation.
 - d. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes **NPS 1/2 to NPS 24 (DN 15 to DN 600)** if little or no insulation is required.
 - e. Pipe Hangers (MSS Type 5): For suspension of pipes **NPS 1/2 to NPS 4 (DN 15 to DN 100)**, to allow off-center closure for hanger installation before pipe erection.
 - f. Adjustable, Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of noninsulated, stationary pipes **NPS 3/4 to NPS 8 (DN 20 to DN 200)**.
 - g. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of noninsulated, stationary pipes **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.
 - h. Adjustable Band Hangers (MSS Type 9): For suspension of noninsulated, stationary pipes **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.
 - i. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes **NPS 1/2 to NPS 8 (DN 15 to DN 200)**.
 - j. Split Pipe Ring with or without Turnbuckle Hangers (MSS Type 11): For suspension of noninsulated, stationary pipes **NPS 3/8 to NPS 8 (DN 10 to DN 200)**.
 - k. Extension Hinged or Two-Bolt Split Pipe Clamps (MSS Type 12): For suspension of noninsulated, stationary pipes **NPS 3/8 to NPS 3 (DN 10 to DN 80)**.
 - l. U-Bolts (MSS Type 24): For support of heavy pipes **NPS 1/2 to NPS 30 (DN 15 to DN 750)**.
 - m. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - n. Pipe Saddle Supports (MSS Type 36): For support of pipes **NPS 4 to NPS 36 (DN 100 to DN 900)**, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.
 - o. Pipe Stanchion Saddles (MSS Type 37): For support of pipes **NPS 4 to NPS 36 (DN 100 to DN 900)**, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate, and with U-bolt to retain pipe.
 - p. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes **NPS 2-1/2 to NPS 36 (DN 65 to DN 900)** if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.
 - q. Single-Pipe Rolls (MSS Type 41): For suspension of pipes **NPS 1 to NPS 30 (DN 25 to DN 750)**, from two rods if longitudinal movement caused by expansion and contraction might occur.
 - r. Adjustable Roller Hangers (MSS Type 43): For suspension of pipes **NPS 2-1/2 to NPS 24 (DN 65 to DN 600)**, from single rod if horizontal movement caused by expansion and contraction might occur.

- s. Complete Pipe Rolls (MSS Type 44): For support of pipes **NPS 2 to NPS 42 (DN 50 to DN 1050)** if longitudinal movement caused by expansion and contraction might occur but vertical adjustment is not necessary.
 - t. Pipe Roll and Plate Units (MSS Type 45): For support of pipes **NPS 2 to NPS 24 (DN 50 to DN 600)** if small horizontal movement caused by expansion and contraction might occur and vertical adjustment is not necessary.
 - u. Adjustable Pipe Roll and Base Units (MSS Type 46): For support of pipes **NPS 2 to NPS 30 (DN 50 to DN 750)** if vertical and lateral adjustment during installation might be required in addition to expansion and contraction.
11. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers **NPS 3/4 to NPS 24 (DN 24 to DN 600)**.
 - b. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers **NPS 3/4 to NPS 24 (DN 20 to DN 600)** if longer ends are required for riser clamps.
12. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Steel Turnbuckles (MSS Type 13): For adjustment up to **6 inches (150 mm)** for heavy loads.
 - b. Steel Clevises (MSS Type 14): For **120 to 450 deg F (49 to 232 deg C)** piping installations.
 - c. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
 - d. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
 - e. Steel Weldless Eye Nuts (MSS Type 17): For **120 to 450 deg F (49 to 232 deg C)** piping installations.
13. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
- a. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.
 - b. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joint construction, to attach to top flange of structural shape.
 - c. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.
 - d. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.
 - e. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.
 - f. C-Clamps (MSS Type 23): For structural shapes.
 - g. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.
 - h. Side-Beam Clamps (MSS Type 27): For bottom of steel I-beams.
 - i. Steel-Beam Clamps with Eye Nuts (MSS Type 28): For attaching to bottom of steel I-beams for heavy loads.
 - j. Linked-Steel Clamps with Eye Nuts (MSS Type 29): For attaching to bottom of steel I-beams for heavy loads, with link extensions.
 - k. Malleable-Beam Clamps with Extension Pieces (MSS Type 30): For attaching to structural steel.
 - l. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:
 - 1) Light (MSS Type 31): **750 lb (340 kg)**.
 - 2) Medium (MSS Type 32): **1500 lb (680 kg)**.
 - 3) Heavy (MSS Type 33): **3000 lb (1360 kg)**.
 - m. Side-Beam Brackets (MSS Type 34): For sides of steel or wooden beams.
 - n. Plate Lugs (MSS Type 57): For attaching to steel beams if flexibility at beam is required.
 - o. Horizontal Travelers (MSS Type 58): For supporting piping systems subject to linear horizontal movement where headroom is limited.

14. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - a. Steel-Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
 - b. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
 - c. Thermal-Hanger Shield Inserts: For supporting insulated pipe.
15. Spring Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
 - a. Restraint-Control Devices (MSS Type 47): Where indicated to control piping movement.
 - b. Spring Cushions (MSS Type 48): For light loads if vertical movement does not exceed **1-1/4 inches (32 mm)**.
 - c. Spring-Cushion Roll Hangers (MSS Type 49): For equipping Type 41, roll hanger with springs.
 - d. Spring Sway Braces (MSS Type 50): To retard sway, shock, vibration, or thermal expansion in piping systems.
 - e. Variable-Spring Hangers (MSS Type 51): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from hanger.
 - f. Variable-Spring Base Supports (MSS Type 52): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from base support.
 - g. Variable-Spring Trapeze Hangers (MSS Type 53): Preset to indicated load and limit variability factor to 25 percent to allow expansion and contraction of piping system from trapeze support.
 - h. Constant Supports: For critical piping stress and if necessary to avoid transfer of stress from one support to another support, critical terminal, or connected equipment. Include auxiliary stops for erection, hydrostatic test, and load-adjustment capability. These supports include the following types:
 - 1) Horizontal (MSS Type 54): Mounted horizontally.
 - 2) Vertical (MSS Type 55): Mounted vertically.
 - 3) Trapeze (MSS Type 56): Two vertical-type supports and one trapeze member.
16. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.
17. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.
18. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

END OF SECTION 23 05 29 00a

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SECTION 23 05 29 00b - STEAM DISTRIBUTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for steam distribution. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes underground piping outside the building for distribution of steam and condensate.

C. Performance Requirements

1. Provide components and installation capable of producing steam piping systems with the following minimum working-pressure ratings:
 - a. Steam Piping: **15 psig (104 kPa) OR 125 psig (860 kPa), as directed.**
 - b. Condensate Piping: **100 psig (690 kPa).**

D. Submittals

1. Product Data:
2. Shop Drawings:
3. Welding certificates.
4. Source quality-control test reports.
5. Field quality-control test reports.

E. Quality Assurance

1. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.
2. ASME Compliance: Comply with ASME B31.1, "Power Piping" **OR** ASME B31.9, "Building Services Piping," **as directed**, for materials, products, and installation.
3. ASME Compliance: Safety valves and pressure vessels shall bear appropriate ASME labels.

F. Project Conditions

1. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed utility interruptions.
 - b. Do not proceed with utility interruptions without written permission.

1.2 PRODUCTS

A. Piping Materials

1. Refer to Article 1.3 "Piping Application" for applications of pipes, tubes, fittings, and joining methods.
2. Refer to Division 33 Section "Common Work Results For Utilities" for commonly used joining materials.

B. Steel Pipes And Fittings

1. Steel Pipe: ASTM A 53/A 53M, Type E, Grade A, Standard Weight; with plain ends.
2. Nipples: ASTM A 733, Standard Weight, seamless, carbon-steel pipe complying with ASTM A 53/A 53M.

3. Malleable-Iron, Threaded Fittings: ASME B16.3, Classes 150 and 300, with threads according to ASME B1.20.1.
4. Cast-Iron, Threaded Fittings: ASME B16.4, Classes 125 and 250, standard pattern, with threads according to ASME B1.20.1.
5. Steel Welding Fittings: ASME B16.9 and ASTM A 234/A 234M, seamless or welded.

C. Conduit Piping

1. Description: Factory-fabricated and -assembled, airtight and watertight, drainable, pressure-tested piping with conduit, inner pipe supports, and insulated carrier piping. Fabricate so insulation can be dried in place by forcing dry air through conduit.
2. Carrier Pipe: Steel pipe complying with ASTM A 53/A 53M, Type E, Grade A with beveled **OR** socket, **as directed**, ends for welded joints.
3. Carrier Pipe Insulation:
 - a. Mineral-Wool Pipe Insulation: ASTM C 547, Type I, molded.
 - 1) Apparent Thermal Conductivity (k-Value): **0.31 at 200 deg F (0.044 at 93 deg C)** mean temperature.
 - 2) Density: Maximum **10 lb/cu. ft. (160 kg/cu. m)** average.
 - 3) Compressive Strength: **10 psig (69 kPa)** minimum at 5 percent deformation.
 - 4) Bands: ASTM A 666, Type 304, stainless steel, **3/4 inch (19 mm)** wide, **0.020 inch (0.5 mm)** thick.
 - b. Calcium Silicate Pipe Insulation: ASTM C 533, Type I; preformed, incombustible, inorganic, with non-asbestos fibrous reinforcement.
 - 1) Thermal Conductivity (k-Value): **0.60 at 500 deg F (0.087 at 260 deg C)**.
 - 2) Dry Density: **15 lb/cu. ft. (240 kg/cu. m)** maximum.
 - 3) Compressive Strength: **60 psig (414 kPa)** minimum at 5 percent deformation.
 - 4) Bands: ASTM A 666, Type 304, stainless steel, **3/4 inch (19 mm)** wide, **0.020 inch (0.5 mm)** thick.
 - c. Polyisocyanurate Foam Pipe Insulation: ASTM C 591, preformed, rigid, cellular.
 - 1) Thermal Conductivity (k-Value): **0.14 at 75 deg F (0.020 at 24 deg C)**.
 - 2) Service Temperature: **Minus 250 to plus 400 deg F (Minus 156 to plus 204 deg C)**.
 - 3) Moisture Absorption: ASTM D 2842, maximum 0.054 percent by volume.
 - 4) Minimum 90 percent closed cell.
 - 5) Dry Density: **2 lb/cu. ft. (32 kg/cu. m)** maximum.
 - 6) Compressive Strength: **35 psig (242 kPa)** minimum at 5 percent deformation.
 - 7) Water-Vapor Transmission: **1.26 perm inches (1.83 ng/Pa x s x m)** according to ASTM E 96.
 - d. Polyurethane Foam Pipe Insulation: ASTM C 591, preformed, rigid, cellular.
 - 1) Thermal Conductivity (k-Value): **0.13 at 75 deg F (0.019 at 24 deg C)**.
 - 2) Service Temperature: **Minus 250 to plus 200 deg F (Minus 156 to plus 93 deg C)**.
 - 3) Moisture Absorption: ASTM D 2842, maximum 0.054 percent by volume.
 - 4) Minimum 90 percent closed cell.
 - 5) Dry Density: **2 lb/cu. ft. (32 kg/cu. m)** maximum.
 - 6) Compressive Strength: **35 psig (242 kPa)** minimum at 5 percent deformation.
 - 7) Water-Vapor Transmission: **1.26 perm inches (1.83 ng/Pa x s x m)** according to ASTM E 96.
4. Minimum Clearance:
 - a. Between Carrier Pipe Insulation and Conduit: **1 inch (25 mm)**.
 - b. Between Insulation of Multiple Carrier Pipes: **3/16 inch (4.75 mm)**.
 - c. Between Bottom of Carrier Pipe Insulation and Conduit: **1 inch (25 mm)**.
 - d. Between Bottom of Bare, Carrier Pipe and Casing: **1-3/8 inches (35 mm)**.
5. Conduit: Spiral wound, steel. Finish conduit with 2 coats of fusion-bonded epoxy, minimum **20 mils (0.50 mm)** thick. Cover with polyurethane foam insulation with a high-density polyethylene jacket; thickness indicated in Part 1.3 "Piping Application" Article, **as directed**.
6. Conduit: Spiral wound, bare steel. Cover with polyurethane foam insulation with a high-density polyethylene jacket; thickness indicated in Part 1.3 "Piping Application" Article.

7. Carrier Piping Supports within Conduit: Corrugated galvanized steel with a maximum spacing of **10 feet (3 m)**.
8. Fittings: Factory-fabricated and -insulated elbows and tees. Elbows may be bent pipe equal to carrier pipe. Tees shall be factory fabricated and insulated, and shall be compatible with the carrier pipe.
9. Expansion Offsets and Loops: Size casing to contain piping expansion.
10. Conduit accessories include the following:
 - a. Water Shed: Terminal end protector for carrier pipes entering building through floor, **3 inches (75 mm)** deep and **2 inches (50 mm)** larger than casing; terminate casing **20 inches (500 mm)** above the floor level.
 - b. Guides and Anchors: Steel plate welded to carrier pipes and to casing, complete with vent and drainage openings inside casing.
 - c. End Seals: Steel plate welded to carrier pipes and to casing, complete with drain and vent openings on vertical centerline.
 - d. Gland Seals: Packed stuffing box and gland follower mounted on steel plate, welded to end of casing, permitting axial movement of carrier piping, with drain and vent connections on vertical centerline.
 - e. Joint Kit: Half-shell, pourable or split insulation and shrink-wrap sleeve.
11. Source Quality Control: Factory test the conduit to **15 psig (105 kPa)** for a minimum of 2 minutes with no change in pressure. Factory test the carrier pipe to 150 percent of the operating pressure of system. Furnish test certificates.

D. Cased Piping

1. Description: Factory-fabricated piping with carrier pipe, insulation, and casing.
2. Carrier Pipe: Steel pipe complying with ASTM A 53/A 53M, Type E, Grade A with beveled **OR** socket, **as directed**, ends for welded joints.
3. Carrier Pipe Insulation:
 - a. Polyurethane Foam Pipe Insulation: ASTM C 591, preformed, rigid, cellular.
 - 1) Thermal Conductivity (k-Value): **0.13 at 75 deg F (0.019 at 24 deg C)**.
 - 2) Service Temperature: **Minus 250 to plus 200 deg F (Minus 156 to plus 93 deg C)**.
 - 3) Moisture Absorption: ASTM D 2842, maximum 0.054 percent by volume.
 - 4) Minimum 90 percent closed cell.
 - 5) Dry Density: **2 lb/cu. ft. (32 kg/cu. m)** maximum.
 - 6) Compressive Strength: **35 psig (242 kPa)** minimum at 5 percent deformation.
 - 7) Water-Vapor Transmission: **1.26 perm inches (1.83 ng/Pa x s x m)** according to ASTM E 96.
4. Casing: High-density polyethylene **OR** Filament-wound, fiberglass-reinforced polyester resin **OR** PVC, **as directed**.
5. Casing accessories include the following:
 - a. Joint Kit: Half-shell, pourable or split insulation, casing sleeve, and shrink-wrap sleeve.
 - b. Expansion Blanket: Elastomeric foam, formed to fit over piping.
 - c. End Seals: Shrink wrap the casing material to seal watertight around casing and carrier pipe.
6. Source Quality Control: Factory test the carrier pipe to 150 percent of the operating pressure of system. Furnish test certificates.

E. Loose-Fill Insulation

1. Granular, Loose-Fill Insulation: Inorganic, nontoxic, nonflammable, sodium potassium aluminum silicate with calcium carbonate filler. Include chemical treatment that renders insulation hydrophobic.
 - a. Thermal Conductivity (k-Value): **0.60 at 175 deg F (0.087 at 79 deg C)** and **0.65 at 300 deg F (0.094 at 149 deg C)**.
 - b. Application Temperature Range: **35 to 800 deg F (2 to 426 deg C)**.
 - c. Dry Density: **40 to 42 lb/cu. ft. (640 to 672 kg/cu. m)**.
 - d. Strength: **12,000 lb/sq. ft. (58 600 kg/sq. m)**.

2. Powder, Loose-Fill Insulation: Inert, nontoxic, nonflammable, calcium carbonate particles. Include chemical treatment that renders insulation hydrophobic.
 - a. Thermal Conductivity (k-Value): ASTM C 177, **0.58 at 100 deg F (0.084 at 37 deg C)** and **0.68 at 300 deg F (0.098 at 149 deg C)**.
 - b. Application Temperature Range: **Minus 273 to plus 480 deg F (Minus 169 to plus 250 deg C)**.
 - c. Dry Density: Approximately **60 lb/cu. ft. (960 kg/cu. m)**.
 - d. Strength: **12,000 lb/sq. ft. (58 600 kg/sq. m)**.

1.3 EXECUTION

- A. Earthwork: Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
- B. Piping Application
 1. Steam Piping: Schedule 40 **OR** Schedule 80, **as directed**, steel pipe with cast-iron, threaded fittings and threaded **OR** steel fittings and welded **OR** ductile-iron, grooved-end fittings and mechanical, **as directed**, joints; granular **OR** powder, **as directed**, loose-fill insulation.
 2. Steam Piping: Conduit piping with mineral-wool **OR** calcium silicate **OR** polyisocyanurate **OR** polyurethane, **as directed**, carrier-pipe insulation and with coated, **unless directed otherwise to be coated and insulated**, conduit.
 - a. Insulation Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed**.
 3. Condensate Piping: Schedule 40 **OR** Schedule 80, **as directed**, steel pipe with cast-iron, threaded fittings and threaded **OR** steel welding fittings and welded **OR** ductile-iron, grooved-end fittings and mechanical, **as directed**, joints; granular **OR** powder, **as directed**, loose-fill insulation.
 4. Condensate Piping: Conduit piping with mineral-wool **OR** calcium silicate **OR** polyisocyanurate **OR** polyurethane, **as directed**, carrier-pipe insulation and with coated **OR** coated and insulated, **as directed**, conduit.
 - a. Insulation Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed**.
 5. Condensate Piping: Cased piping with polyurethane carrier-pipe insulation.
- C. Piping Installation
 1. General Locations and Arrangements: Drawings indicate general location and arrangement of piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved.
 2. Remove any standing water in the bottom of trench.
 3. Bed the pipe on a minimum **6-inch (150-mm)** layer of granular fill material with a minimum **6-inch (150-mm)** clearance between the pipes.
 4. Do not insulate piping or backfill piping trench until field quality-control testing has been completed and results approved.
 5. Install piping at uniform grade of 0.2 percent downward in direction of flow or as indicated.
 6. Install condensate piping at uniform grade of 0.4 percent downward in direction of flow.
 7. Install components with pressure rating equal to or greater than system operating pressure.
 8. Install piping free of sags and bends.
 9. Install fittings for changes in direction and branch connections.
 10. Refer to Division 23 Section "Common Work Results For Hvac" for sleeves and mechanical sleeve seals through exterior building walls.
 11. Secure anchors with concrete thrust blocks. Concrete is specified in Division 03 Section "Cast-in-place Concrete".
 12. Connect to steam and condensate piping where it passes through the building wall. Steam and condensate piping inside the building is specified in Division 23 Section "Steam And Condensate Heating Piping".

- D. Loose-Fill Insulation Installation
1. Do not disturb the bottom of trench, or compact and stabilize it to ensure proper support.
 2. Remove any standing water in the bottom of trench.
 3. Form insulation trench by excavation or by installing drywall side forms to establish the required height and width of the insulation.
 4. Support piping with proper pitch, separation, and clearance to backfill or side forms using temporary supporting devices that can be removed after back filling with insulation.
 5. Place insulation and backfill after field quality-control testing has been completed and results approved.
 6. Apply bitumastic coating to carbon-steel anchors and guides. Pour concrete thrust blocks and anchors. Refer to Division 03 Section "Cast-in-place Concrete" for concrete and reinforcement.
 7. Wrap piping at expansion loops and offsets with mineral-wool insulation of thickness appropriate for calculated expansion amount.
 8. Pour loose-fill insulation to required dimension agitating insulation to eliminate voids around piping.
 9. Remove temporary hangers and supports.
 10. Cover loose-fill insulation with polyethylene sheet a minimum of **4 mils (0.10 mm)** thick, and empty loose-fill insulation bags on top.
 11. Manually backfill **6 inches (150 mm)** of clean backfill. If mechanical compaction is required manually backfill to **12 inches (300 mm)** before using mechanical-compaction equipment.
- E. Joint Construction
1. Refer to Division 33 Section "Common Work Results For Utilities" for basic piping joint construction.
 2. Keyed-Coupling Joints: Cut- or roll-groove pipes. Assemble joints with keyed couplings, gaskets, lubricant, and bolts.
 3. Conduit and Cased Piping Joints: Assemble sections and finish joints with pourable or split insulation, exterior jacket sleeve, and apply shrink-wrap seals as required by manufacturer's written installation instructions.
- F. Identification: Install continuous plastic underground warning tapes during back filling of trenches for underground steam and condensate distribution piping. Locate **6 to 8 inches (150 to 200 mm)** below finished grade, directly over piping. Refer to Division 31 Section "Earth Moving" for warning-tape materials and devices and their installation.
- G. Field Quality Control
1. Prepare steam and condensate piping for testing according to ASME B31.1 and ASME B31.9 and as follows:
 - a. Leave joints, including welds, uninsulated and exposed for examination during test.
 - b. Isolate equipment. Do not subject equipment to test pressure.
 - c. Install relief valve set at pressure no more than one-third higher than test pressure.
 - d. Fill system with temperature water. Where there is risk of freezing, air or a safe, compatible liquid may be used.
 - e. Use vents installed at high points to release trapped air while filling system. Use drip legs installed at low points for complete removal of liquid.
 2. Test steam and condensate piping as follows:
 - a. Subject steam and condensate piping to hydrostatic test pressure that is not less than 1.5 times the design pressure.
 - b. After hydrostatic test pressure has been applied for 10 minutes, examine joints for leakage. Remake leaking joints using new materials and repeat hydrostatic test until no leaks exist.
 3. Test conduit as follows:
 - a. Seal vents and drains and subject conduit to **15 psig (105 kPa)** for 4 hours with no loss of pressure. Repair leaks and retest as required.
 4. Prepare a written report of testing.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



END OF SECTION 23 05 29 00b

Task	Specification	Specification Description
23 05 29 00	01 95 99 99a	Common Work Results for Fire Suppression
23 05 29 00	01 95 99 99b	Common Work Results for Plumbing
23 05 29 00	01 95 99 99g	Common Work Results for HVAC
23 05 29 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 05 48 13 - VIBRATION AND SEISMIC CONTROLS FOR HVAC PIPING AND EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of vibration and seismic controls for HVAC piping and equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Isolation pads.
 - b. Isolation mounts.
 - c. Restrained elastomeric isolation mounts.
 - d. Freestanding and Restrained spring isolators.
 - e. Housed spring mounts.
 - f. Elastomeric hangers.
 - g. Spring hangers.
 - h. Spring hangers with vertical-limit stops.
 - i. Pipe riser resilient supports.
 - j. Resilient pipe guides.
 - k. Freestanding and Restrained air-mounting system.
 - l. Restrained vibration isolation roof-curb rails.
 - m. Seismic snubbers.
 - n. Restraining braces and cables.
 - o. Steel and Inertia, vibration isolation equipment bases.

C. Definitions

1. IBC: International Building Code.
2. ICC-ES: ICC-Evaluation Service.
3. OSHPD: Office of Statewide Health Planning and Development for the State of California.

D. Performance Requirements

1. Wind-Restraint Loading:
 - a. Basic Wind Speed: As required to meet Project requirements.
 - b. Building Classification Category: **I OR II OR III OR IV, as directed.**
 - c. Minimum **10 lb/sq. ft. (48.8 kg/sq. m)** multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.
2. Seismic-Restraint Loading:
 - a. Site Class as Defined in the IBC: **A OR B OR C OR D OR E OR F, as directed.**
 - b. Assigned Seismic Use Group or Building Category as Defined in the IBC: **I OR II OR III, as directed.**
 - 1) Component Importance Factor: **1.0 OR 1.5, as directed.**
 - 2) Component Response Modification Factor: **1.5 OR 2.5 OR 3.5 OR 5.0, as directed.**
 - 3) Component Amplification Factor: **1.0 OR 2.5, as directed.**
 - c. Design Spectral Response Acceleration at Short Periods (0.2 Second): Percentage as directed.
 - d. Design Spectral Response Acceleration at 1-Second Period: Percentage as directed.

E. Submittals

1. Product Data: For each product indicated.

2. Delegated-Design Submittal: For vibration isolation and seismic-restraint calculations and details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Welding certificates.
4. Qualification Data: For professional engineer.
5. Field quality-control test reports.

F. Quality Assurance

1. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
2. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.

1.2 PRODUCTS

A. Vibration Isolators

1. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - a. Resilient Material: Oil- and water-resistant neoprene **OR** rubber **OR** hermetically sealed compressed fiberglass, **as directed**.
2. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.
 - a. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - b. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
3. Restrained Mounts: All-directional mountings with seismic restraint.
 - a. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
 - b. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.
4. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - a. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - b. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - c. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - d. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - e. Baseplates: Factory drilled for bolting to structure and bonded to **1/4-inch- (6-mm-)** thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to **500 psig (3447 kPa)**.

- f. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
5. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
 - a. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to 1/4-inch- (6-mm-) thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - b. Restraint: Seismic or limit stop as required for equipment and authorities having jurisdiction.
 - c. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - d. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - e. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - f. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Housed Spring Mounts: Housed spring isolator with integral seismic snubbers.
 - a. Housing: Ductile-iron or steel housing to provide all-directional seismic restraint.
 - b. Base: Factory drilled for bolting to structure.
 - c. Snubbers: Vertically adjustable to allow a maximum of 1/4-inch (6-mm) travel up or down before contacting a resilient collar.
7. Elastomeric Hangers: Single or double-deflection type, fitted with molded, oil-resistant elastomeric isolator elements bonded to steel housings with threaded connections for hanger rods. Color-code or otherwise identify to indicate capacity range.
8. Spring Hangers: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression.
 - a. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene. Steel-washer-reinforced cup to support spring and bushing projecting through bottom of frame.
 - g. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.
9. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.
 - a. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
 - b. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - g. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
 - h. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

10. Pipe Riser Resilient Support: All-directional, acoustical pipe anchor consisting of 2 steel tubes separated by a minimum of **1/2-inch- (13-mm-)** thick neoprene. Include steel and neoprene vertical-limit stops arranged to prevent vertical travel in both directions. Design support for a maximum load on the isolation material of **500 psig (3.45 MPa)** and for equal resistance in all directions.
 11. Resilient Pipe Guides: Telescopic arrangement of 2 steel tubes or post and sleeve arrangement separated by a minimum of **1/2-inch- (13-mm-)** thick neoprene. Where clearances are not readily visible, a factory-set guide height with a shear pin to allow vertical motion due to pipe expansion and contraction shall be fitted. Shear pin shall be removable and reinsertable to allow for selection of pipe movement. Guides shall be capable of motion to meet location requirements.
- B. Air-Mounting Systems
1. Air Mounts: Freestanding, single or multiple, compressed-air bellows.
 - a. Assembly: Upper and lower steel sections connected by a replaceable, flexible, nylon-reinforced neoprene bellows.
 - b. Maximum Natural Frequency: 3 Hz.
 - c. Operating Pressure Range: **25 to 100 psig (172 to 690 kPa)**.
 - d. Burst Pressure: At least three times manufacturer's published maximum operating pressure.
 - e. Leveling Valves: Minimum of 3 required to maintain leveling within plus or minus **1/8 inch (3 mm)**.
 2. Restrained Air Mounts: Housed compressed-air bellows.
 - a. Assembly: Upper and lower steel sections connected by a replaceable, flexible, nylon-reinforced neoprene bellows and spring, with angle-iron frame having vertical-limit stops and channel-section top with leveling adjustment and attachment screws.
 - b. Maximum Natural Frequency: 3 Hz.
 - c. Operating Pressure Range: **25 to 100 psig (172 to 690 kPa)**.
 - d. Burst Pressure: At least three times manufacturer's published maximum operating pressure.
 - e. Leveling Valves: Minimum of 3 required to maintain leveling within plus or minus **1/8 inch (3 mm)**.
- C. Restrained Vibration Isolation Roof-Curb Rails
1. General Requirements for Restrained Vibration Isolation Roof-Curb Rails: Factory-assembled, fully enclosed, insulated, air- and watertight curb rail designed to resiliently support equipment and to withstand seismic and wind, **as directed**, forces.
 2. Lower Support Assembly: Formed sheet-metal section containing adjustable and removable steel springs that support upper frame. Upper frame shall provide continuous support for equipment and shall be captive to resiliently resist seismic and wind, **as directed**, forces. Lower support assembly shall have a means for attaching to building structure and a wood nailer for attaching roof materials, and shall be insulated with a minimum of **2 inches (50 mm)** of rigid, glass-fiber insulation on inside of assembly.
 3. Spring Isolators: Adjustable, restrained spring isolators shall be mounted on **1/4-inch- (6-mm-)** thick, elastomeric vibration isolation pads and shall have access ports, for level adjustment, with removable waterproof covers at all isolator locations. Isolators shall be located so they are accessible for adjustment at any time during the life of the installation without interfering with the integrity of the roof.
 - a. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or wind, **as directed**, restraint.
 - 1) Housing: Steel with resilient vertical-limit stops and adjustable equipment mounting and leveling bolt.
 - 2) Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - 3) Minimum Additional Travel: 50 percent of the required deflection at rated load.

- 4) Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - 5) Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - b. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - 1) Resilient Material: Oil- and water-resistant standard neoprene **OR** natural rubber **OR** hermetically sealed compressed fiberglass, **as directed**.
 4. Snubber Bushings: All-directional, elastomeric snubber bushings at least **1/4 inch (6 mm)** thick.
 5. Water Seal: Galvanized sheet metal with EPDM seals at corners, attached to upper support frame, extending down past wood nailer of lower support assembly, and counterflashed over roof materials.
- D. Vibration Isolation Equipment Bases
1. Steel Base: Factory-fabricated, welded, structural-steel bases and rails.
 - a. Design Requirements: Lowest possible mounting height with not less than **1-inch (25-mm)** clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - 1) Include supports for suction and discharge elbows for pumps.
 - b. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - c. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
 2. Inertia Base: Factory-fabricated, welded, structural-steel bases and rails ready for placement of cast-in-place concrete.
 - a. Design Requirements: Lowest possible mounting height with not less than **1-inch (25-mm)** clearance above the floor. Include equipment anchor bolts and auxiliary motor slide bases or rails.
 - 1) Include supports for suction and discharge elbows for pumps.
 - b. Structural Steel: Steel shapes, plates, and bars complying with ASTM A 36/A 36M. Bases shall have shape to accommodate supported equipment.
 - c. Support Brackets: Factory-welded steel brackets on frame for outrigger isolation mountings and to provide for anchor bolts and equipment support.
 - d. Fabrication: Fabricate steel templates to hold equipment anchor-bolt sleeves and anchors in place during placement of concrete. Obtain anchor-bolt templates from supported equipment manufacturer.
- E. Seismic-Restraint Devices
1. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
 2. Snubbers: Factory fabricated using welded structural-steel shapes and plates, anchor bolts, and replaceable resilient isolation washers and bushings.
 - a. Anchor bolts for attaching to concrete shall be seismic-rated, drill-in, and stud-wedge or female-wedge type.
 - b. Resilient Isolation Washers and Bushings: Oil- and water-resistant neoprene.
 - c. Maximum **1/4-inch (6-mm)** air gap, and minimum **1/4-inch- (6-mm-)** thick resilient cushion.
 3. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.

4. Restraint Cables: ASTM A 603 galvanized-steel **OR** ASTM A 492 stainless-steel, **as directed**, cables with end connections made of steel assemblies with thimbles, brackets, swivel, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
5. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections **OR** Reinforcing steel angle clamped, **as directed**, to hanger rod.
6. Bushings for Floor-Mounted Equipment Anchor Bolts: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchor bolts and studs.
7. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices used.
8. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
9. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
10. Adhesive Anchor Bolts: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

F. Factory Finishes

1. Finish

- a. Manufacturer's standard prime-coat finish ready for field painting.

OR

Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

- 1) Powder coating on springs and housings.
- 2) All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
- 3) Baked enamel or powder coat for metal components on isolators for interior use.
- 4) Color-code or otherwise mark vibration isolation and seismic-control and wind-control, **as directed**, devices to indicate capacity range.

1.3 EXECUTION

A. Applications

1. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
2. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
3. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

B. Vibration-Control And Seismic-Restraint Device Installation

1. Comply with requirements in Division 07 Section "Roof Accessories" for installation of roof curbs, equipment supports, and roof penetrations.
2. Equipment Restraints:

- a. Install seismic snubbers on HVAC equipment mounted on vibration isolators. Locate snubbers as close as possible to vibration isolators and bolt to equipment base and supporting structure.
- b. Install resilient bolt isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds **0.125 inch (3.2 mm)**.
- c. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**, providing required submittals for component.
3. Piping Restraints:
 - a. Comply with requirements in MSS SP-127.
 - b. Space lateral supports a maximum of **40 feet (12 m)** o.c., and longitudinal supports a maximum of **80 feet (24 m)** o.c.
 - c. Brace a change of direction longer than **12 feet (3.7 m)**.
4. Install cables so they do not bend across edges of adjacent equipment or building structure.
5. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**, providing required submittals for component.
6. Install bushing assemblies for anchor bolts for floor-mounted equipment, arranged to provide resilient media between anchor bolt and mounting hole in concrete base.
7. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
8. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
9. Drilled-in Anchors:
 - a. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - b. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - c. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - d. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - e. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - f. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.
- C. Accommodation Of Differential Seismic Motion
 1. Install flexible connections in piping where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where the connections terminate with connection to equipment that is anchored to a different structural element from the one supporting the connections as they approach equipment. Comply with requirements in Division 23 Section "Hydronic Piping" for piping flexible connections.
- D. Field Quality Control
 1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.

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- b. Schedule test with the Owner before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 - c. Obtain approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - d. Test at least four of each type and size of installed anchors and fasteners selected.
 - e. Test to 90 percent of rated proof load of device.
 - f. Measure isolator restraint clearance.
 - g. Measure isolator deflection.
 - h. Verify snubber minimum clearances.
 - i. Air-Mounting System Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - j. Air-Mounting System Operational Test: Test the compressed-air leveling system.
 - k. Test and adjust air-mounting system controls and safeties.
 - l. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
3. Remove and replace malfunctioning units and retest as specified above.
 4. Prepare test and inspection reports.
- E. Adjusting
1. Adjust isolators after piping system is at operating weight.
 2. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
 3. Adjust air-spring leveling mechanism.
 4. Adjust active height of spring isolators.
 5. Adjust restraints to permit free movement of equipment within normal mode of operation.
- F. Demonstration
1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain air-mounting systems.

END OF SECTION 23 05 48 13

Task	Specification	Specification Description
23 05 48 13	01 22 16 00	No Specification Required
23 05 48 13	21 05 48 13	Vibration And Seismic Controls For Fire-Suppression Piping And Equipment
23 05 48 13	22 05 48 13	Vibration And Seismic Controls For Plumbing Piping And Equipment
23 05 48 13	22 11 16 00a	General-Service Compressed-Air Piping
23 05 48 13	23 21 13 23a	Hydronic Piping
23 05 48 13	22 11 16 00b	Steam And Condensate Piping
23 05 48 13	22 11 16 00c	Refrigerant Piping
23 05 48 13	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 05 53 00 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for identification for HVAC piping and equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Equipment labels.
 - b. Warning signs and labels.
 - c. Pipe labels.
 - d. Duct labels.
 - e. Stencils.
 - f. Valve tags.
 - g. Warning tags.

C. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Equipment Labels

1. Metal Labels for Equipment:
 - a. Material and Thickness: Brass, **0.032-inch (0.8-mm)** OR Stainless steel, **0.025-inch (0.64-mm)** OR Aluminum, **0.032-inch (0.8-mm)** OR anodized aluminum, **0.032-inch (0.8-mm)**, **as directed**, minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - b. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2 by 3/4 inch (64 by 19 mm)**.
 - c. Minimum Letter Size: **1/4 inch (6.4 mm)** for name of units if viewing distance is less than **24 inches (600 mm)**, **1/2 inch (13 mm)** for viewing distances up to **72 inches (1830 mm)**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - d. Fasteners: Stainless-steel rivets OR self-tapping screws, **as directed**.
 - e. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
2. Plastic Labels for Equipment:
 - a. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, **1/16 inch (1.6 mm)** OR **1/8 inch (3.2 mm)**, **as directed**, thick, and having predrilled holes for attachment hardware.
 - b. Letter Color: Black OR Blue OR Red OR White OR Yellow, **as directed**.
 - c. Background Color: Black OR Blue OR Red OR White OR Yellow, **as directed**.
 - d. Maximum Temperature: Able to withstand temperatures up to **160 deg F (71 deg C)**.
 - e. Minimum Label Size: Length and width vary for required label content, but not less than **2-1/2 by 3/4 inch (64 by 19 mm)**.
 - f. Minimum Letter Size: **1/4 inch (6.4 mm)** for name of units if viewing distance is less than **24 inches (600 mm)**, **1/2 inch (13 mm)** for viewing distances up to **72 inches (1830 mm)**, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 - g. Fasteners: Stainless-steel rivets OR self-tapping screws, **as directed**.

- h. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
 3. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.
 4. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch (A4) bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.
- B. Warning Signs And Labels
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) OR 1/8 inch (3.2 mm), as directed, thick, and having predrilled holes for attachment hardware.
 2. Letter Color: Black OR Blue OR Red OR White OR Yellow, as directed.
 3. Background Color: Black OR Blue OR Red OR White OR Yellow, as directed.
 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets OR self-tapping screws, as directed.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.
 9. Label Content: Include caution and warning information, plus emergency notification instructions.
- C. Pipe Labels
1. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.
 2. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover OR cover full, as directed, circumference of pipe and to attach to pipe without fasteners or adhesive.
 3. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent-adhesive backing.
 4. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
 - a. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.
 - b. Lettering Size: At least 1-1/2 inches (38 mm) high.
- D. Duct Labels
1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/16 inch (1.6 mm) OR 1/8 inch (3.2 mm), as directed, thick, and having predrilled holes for attachment hardware.
 2. Letter Color: Black OR Blue OR Red OR White OR Yellow, as directed.
 3. Background Color: Black OR Blue OR Red OR White OR Yellow, as directed.
 4. Maximum Temperature: Able to withstand temperatures up to 160 deg F (71 deg C).
 5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch (64 by 19 mm).
 6. Minimum Letter Size: 1/4 inch (6.4 mm) for name of units if viewing distance is less than 24 inches (600 mm), 1/2 inch (13 mm) for viewing distances up to 72 inches (1830 mm), and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
 7. Fasteners: Stainless-steel rivets OR self-tapping screws, as directed.
 8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

9. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.
 - a. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
 - b. Lettering Size: At least **1-1/2 inches (38 mm)** high.

- E. Stencils
 1. Stencils: Prepared with letter sizes according to ASME A13.1 for piping; minimum letter height of **1-1/4 inches (32 mm)** for ducts; and minimum letter height of **3/4 inch (19 mm)** for access panel and door labels, equipment labels, and similar operational instructions.
 - a. Stencil Material: Aluminum **OR** Brass **OR** Fiberboard, **as directed**.
 - b. Stencil Paint: Exterior, gloss, alkyd enamel **OR** acrylic enamel, **as directed**, black unless otherwise indicated. Paint may be in pressurized spray-can form.
 - c. Identification Paint: Exterior, alkyd enamel **OR** acrylic enamel, **as directed**, in colors according to ASME A13.1 unless otherwise indicated.

- F. Valve Tags
 1. Valve Tags: Stamped or engraved with **1/4-inch (6.4-mm)** letters for piping system abbreviation and **1/2-inch (13-mm)** numbers.
 - a. Tag Material: Brass, **0.032-inch (0.8-mm)** **OR** Stainless steel, **0.025-inch (0.64-mm)** **OR** Aluminum, **0.032-inch (0.8-mm)** **OR** anodized aluminum, **0.032-inch (0.8-mm)**, **as directed**, minimum thickness, and having predrilled or stamped holes for attachment hardware.
 - b. Fasteners: Brass wire-link chain **OR** beaded chain **OR** S-hook, **as directed**.
 2. Valve Schedules: For each piping system, on **8-1/2-by-11-inch (A4)** bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.
 - a. Valve-tag schedule shall be included in operation and maintenance data.

- G. Warning Tags
 1. Warning Tags: Preprinted or partially preprinted, accident-prevention tags, of plasticized card stock with matte finish suitable for writing.
 - a. Size: **3 by 5-1/4 inches (75 by 133 mm)** minimum **OR** Approximately **4 by 7 inches (100 by 178 mm)**, **as directed**.
 - b. Fasteners: Brass grommet and wire **OR** Reinforced grommet and wire or string, **as directed**.
 - c. Nomenclature: Large-size primary caption such as "DANGER," "CAUTION," or "DO NOT OPERATE."
 - d. Color: Yellow background with black lettering.

- 1.3 EXECUTION
 - A. Preparation
 1. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

 - B. Equipment Label Installation
 1. Install or permanently fasten labels on each major item of mechanical equipment.
 2. Locate equipment labels where accessible and visible.

 - C. Pipe Label Installation
 1. Piping Color-Coding: Painting of piping is specified in Division 09 Section(s) "Interior Painting" **OR** "High-performance Coatings", **as directed**.

2. Stenciled Pipe Label Option: Stenciled labels may be provided instead of manufactured pipe labels, at Installer's option. Install stenciled pipe labels with painted, color-coded bands or rectangles **OR** complying with ASME A13.1, **as directed**, on each piping system.
 - a. Identification Paint: Use for contrasting background.
 - b. Stencil Paint: Use for pipe marking.
 3. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:
 - a. Near each valve and control device.
 - b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
 - c. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
 - d. At access doors, manholes, and similar access points that permit view of concealed piping.
 - e. Near major equipment items and other points of origination and termination.
 - f. Spaced at maximum intervals of **50 feet (15 m)** along each run. Reduce intervals to **25 feet (7.6 m)** in areas of congested piping and equipment.
 - g. On piping above removable acoustical ceilings. Omit intermediately spaced labels.
 4. Pipe Label Color Schedule:
 - a. Chilled-Water Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - b. Condenser-Water Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **asa directed**.
 - c. Heating Water Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - d. Refrigerant Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - e. Low-Pressure Steam Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - f. High-Pressure Steam Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - g. Steam Condensate Piping:
 - 1) Background Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
 - 2) Letter Color: Black **OR** Blue **OR** Red **OR** White **OR** Yellow, **as directed**.
- D. Duct Label Installation
1. Install plastic-laminated **OR** self-adhesive, **as directed**, duct labels with permanent adhesive on air ducts in the following color codes:
 - a. Blue: For cold-air supply ducts.
 - b. Yellow: For hot-air supply ducts.
 - c. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.
 - d. ASME A13.1 Colors and Designs: For hazardous material exhaust.
 2. Stenciled Duct Label Option: Stenciled labels, showing service and flow direction, may be provided instead of plastic-laminated duct labels, at Installer's option, if lettering larger than **1 inch (25 mm)** high is needed for proper identification because of distance from normal location of required identification.
 3. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of **50 feet (15 m)** in each space where ducts are exposed or concealed by removable ceiling system.

E. Valve-Tag Installation

1. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.
2. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:
 - a. Valve-Tag Size and Shape:
 - 1) Chilled Water: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 2) Condenser Water: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 3) Refrigerant: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 4) Hot Water: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 5) Gas: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 6) Low-Pressure Steam: **1-1/2 inches (38 mm) 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 7) High-Pressure Steam: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - 8) Steam Condensate: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, round **OR** square, **as directed**.
 - b. Valve-Tag Color:
 - 1) Chilled Water: Natural **OR** Green, **as directed**.
 - 2) Condenser Water: Natural **OR** Green, **as directed**.
 - 3) Refrigerant: Natural **OR** Green, **as directed**.
 - 4) Hot Water: Natural **OR** Green, **as directed**.
 - 5) Gas: Natural **OR** Yellow, **as directed**.
 - 6) Low-Pressure Steam: Natural **OR** Yellow, **as directed**.
 - 7) High-Pressure Steam: Natural **OR** Green, **as directed**.
 - 8) Steam Condensate: Natural **OR** Green, **as directed**.
 - c. Letter Color:
 - 1) Chilled Water: Black **OR** White, **as directed**.
 - 2) Condenser Water: Black **OR** White, **as directed**.
 - 3) Refrigerant: Black **OR** White, **as directed**.
 - 4) Hot Water: Black **OR** White, **as directed**.
 - 5) Gas: Black **OR** White, **as directed**.
 - 6) Low-Pressure Steam: Black **OR** White, **as directed**.
 - 7) High-Pressure Steam: Black **OR** White, **as directed**.
 - 8) Steam Condensate: Black **OR** White, **as directed**.

F. Warning-Tag Installation

1. Write required message on, and attach warning tags to, equipment and other items where required.

END OF SECTION 23 05 53 00

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Task	Specification	Specification Description
23 05 53 00	22 05 53 00	Identification for Plumbing Piping and Equipment
23 05 53 00	23 01 10 91	Sequence Of Operation
23 05 66 00	09 65 66 00	Interlocking Resilient Flooring

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SECTION 23 05 93 00 - TESTING, ADJUSTING, AND BALANCING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for testing, adjusting and balancing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Balancing Air Systems:
 - 1) Constant-volume air systems.
 - 2) Dual-duct systems.
 - 3) Variable-air-volume systems.
 - 4) Multizone systems.
 - 5) Induction-unit systems.
 - b. Balancing Hydronic Piping Systems:
 - 1) Constant-flow hydronic systems.
 - 2) Variable-flow hydronic systems.
 - 3) Primary-secondary hydronic systems.

C. Definitions

1. AABC: Associated Air Balance Council.
2. NEBB: National Environmental Balancing Bureau.
3. TAB: Testing, adjusting, and balancing.
4. TABB: Testing, Adjusting, and Balancing Bureau.
5. TAB Specialist: An entity engaged to perform TAB Work.

D. Submittals

1. LEED Submittal:
 - a. Air-Balance Report for LEED Prerequisite EQ 1: Documentation of work performed for ASHRAE 62.1, Section 7.2.2, "Air Balancing."
2. Strategies and Procedures Plan: Within 30 **OR** 60 **OR** 90, **as directed**, days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.
3. Certified TAB reports.

E. Quality Assurance

1. TAB Contractor Qualifications: Engage a TAB entity certified by AABC **OR** NEBB **OR** TABB **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC **OR** NEBB **OR** TABB **OR** one who meets the requirements necessary for certification, **as directed**.
 - b. TAB Technician: Employee of the TAB contractor and who is certified by AABC **OR** NEBB **OR** TABB **OR** one who meets the requirements necessary for certification as a TAB technician, **as directed**.
2. Certify TAB field data reports and perform the following:
 - a. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
 - b. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.
3. TAB Report Forms: Use standard TAB contractor's forms approved by the Owner **OR** Commissioning Authority, **as directed**.

4. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

F. Project Conditions

1. Full the Owner Occupancy: the Owner will occupy the site and existing building during entire TAB period. Cooperate with the Owner during TAB operations to minimize conflicts with the Owner's operations.

OR

Partial the Owner Occupancy: the Owner may occupy completed areas of building before Final Completion. Cooperate with the Owner during TAB operations to minimize conflicts with the Owner's operations.

1.2 PRODUCTS (Not Applicable)

1.3 EXECUTION

A. Examination

1. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.
2. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.
3. Examine the approved submittals for HVAC systems and equipment.
4. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.
5. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section(s) "Metal Ducts" OR "Nonmetal Ducts", **as directed**, and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.
6. Examine equipment performance data including fan and pump curves.
 - a. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
 - b. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.
7. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.
8. Examine test reports specified in individual system and equipment Sections.
9. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.
10. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.
11. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.
12. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.
13. Examine heat-transfer coils for correct piping connections and for clean and straight fins.
14. Examine system pumps to ensure absence of entrained air in the suction piping.
15. Examine operating safety interlocks and controls on HVAC equipment.

16. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.
- B. Preparation
1. Prepare a TAB plan that includes strategies and step-by-step procedures.
 2. Complete system-readiness checks and prepare reports. Verify the following:
 - a. Permanent electrical-power wiring is complete.
 - b. Hydronic systems are filled, clean, and free of air.
 - c. Automatic temperature-control systems are operational.
 - d. Equipment and duct access doors are securely closed.
 - e. Balance, smoke, and fire dampers are open.
 - f. Isolating and balancing valves are open and control valves are operational.
 - g. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
 - h. Windows and doors can be closed so indicated conditions for system operations can be met.
- C. General Procedures For Testing And Balancing
1. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" **OR** ASHRAE 111 **OR** NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems" **OR** SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing", **as directed**, and in this Section.
 - a. Comply with requirements in ASHRAE 62.1, Section 7.2.2, "Air Balancing."
 2. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.
 - a. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
OR
After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories".
 - b. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "Hvac Insulation".
 3. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.
 4. Take and report testing and balancing measurements in inch-pound (IP) **OR** metric (SI) **OR** inch-pound (IP) and metric (SI), **as directed**, units.
- D. General Procedures For Balancing Air Systems
1. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.
 2. Prepare schematic diagrams of systems' "as-built" duct layouts.
 3. For variable-air-volume systems, develop a plan to simulate diversity.
 4. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.
 5. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.
 6. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.
 7. Verify that motor starters are equipped with properly sized thermal protection.
 8. Check dampers for proper position to achieve desired airflow path.
 9. Check for airflow blockages.
 10. Check condensate drains for proper connections and functioning.
 11. Check for proper sealing of air-handling-unit components.
 12. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts".

E. Procedures For Constant-Volume Air Systems

1. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
 - a. Measure total airflow.
 - 1) Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.
 - b. Measure fan static pressures as follows to determine actual static pressure:
 - 1) Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
 - 2) Measure static pressure directly at the fan outlet or through the flexible connection.
 - 3) Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
 - 4) Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.
 - c. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.
 - 1) Report the cleanliness status of filters and the time static pressures are measured.
 - d. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
 - e. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
 - f. Obtain approval from the Owner **OR** Commissioning Authority, **as directed**, for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 21 for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
 - g. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.
2. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.
 - a. Measure airflow of submain and branch ducts.
 - 1) Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.
 - b. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
 - c. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.
3. Measure air outlets and inlets without making adjustments.
 - a. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.
4. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.
 - a. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
 - b. Adjust patterns of adjustable outlets for proper distribution without drafts.

F. Procedures For Dual-Duct Systems

1. Verify that the cooling coil is capable of full-system airflow, and set mixing boxes at full-cold airflow position for fan volume.
2. Measure static pressure in both hot and cold ducts at the end of the longest duct run to determine that sufficient static pressure exists to operate controls of mixing boxes and to overcome resistance in the ducts and outlets downstream from mixing boxes.
 - a. If insufficient static pressure exists, increase airflow at the fan.
3. Test and adjust the constant-volume mixing boxes as follows:
 - a. Verify both hot and cold operations by adjusting the thermostat and observing changes in air temperature and volume.
 - b. Verify sufficient inlet static pressure before making volume adjustments.
 - c. Adjust mixing boxes to indicated airflows within specified tolerances. Measure airflow by Pitot-tube traverse readings or by measuring static pressure at mixing-box taps if provided by mixing-box manufacturer.
4. Do not overpressurize ducts.
5. Remeasure static pressure in both hot and cold ducts at the end of the longest duct run to determine that sufficient static pressure exists to operate controls of mixing boxes and to overcome resistance in the ducts and outlets downstream from mixing boxes.
6. Adjust variable-air-volume, dual-duct systems in the same way as constant-volume, dual-duct systems; adjust maximum- and minimum-airflow setting of each mixing box.

G. Procedures For Variable-Air-Volume Systems

1. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
 - a. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
 - b. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
 - c. Measure total system airflow. Adjust to within indicated airflow.
 - d. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 - e. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - 1) If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.
 - f. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - 1) Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
 - g. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
 - h. Record final fan-performance data.
3. Pressure-Dependent, Variable-Air-Volume Systems without Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

- a. Balance variable-air-volume systems the same as described for constant-volume air systems.
 - b. Set terminal units and supply fan at full-airflow condition.
 - c. Adjust inlet dampers of each terminal unit to indicated airflow and verify operation of the static-pressure controller. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 - d. Readjust fan airflow for final maximum readings.
 - e. Measure operating static pressure at the sensor that controls the supply fan if one is installed, and verify operation of the static-pressure controller.
 - f. Set supply fan at minimum airflow if minimum airflow is indicated. Measure static pressure to verify that it is being maintained by the controller.
 - g. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.
 - 1) If air outlets are out of balance at minimum airflow, report the condition but leave the outlets balanced for maximum airflow.
 - h. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
 - 1) Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
4. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:
- a. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
 - b. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
 - c. Set terminal units at full-airflow condition.
 - d. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
 - e. Adjust terminal units for minimum airflow.
 - f. Measure static pressure at the sensor.
 - g. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.
- H. Procedures For Multizone Systems
1. Set unit at maximum airflow through the cooling coil.
 2. Adjust each zone's balancing damper to achieve indicated airflow within the zone.
- I. Procedures For Induction-Unit Systems
1. Balance primary-air risers by measuring static pressure at the nozzles of the top and bottom units of each riser to determine which risers must be throttled. Adjust risers to indicated airflow within specified tolerances.
 2. Adjust each induction unit.
- J. General Procedures For Hydronic Systems
1. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.
 2. Prepare schematic diagrams of systems' "as-built" piping layouts.
 3. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

- a. Open all manual valves for maximum flow.
 - b. Check liquid level in expansion tank.
 - c. Check makeup water-station pressure gage for adequate pressure for highest vent.
 - d. Check flow-control valves for specified sequence of operation, and set at indicated flow.
 - e. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
 - f. Set system controls so automatic valves are wide open to heat exchangers.
 - g. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
 - h. Check air vents for a forceful liquid flow exiting from vents when manually operated.
- K. Procedures For Constant-Flow Hydronic Systems
1. Measure water flow at pumps. Use the following procedures except for positive-displacement pumps:
 - a. Verify impeller size by operating the pump with the discharge valve closed. Read pressure differential across the pump. Convert pressure to head and correct for differences in gage heights. Note the point on manufacturer's pump curve at zero flow and verify that the pump has the intended impeller size.
 - 1) If impeller sizes must be adjusted to achieve pump performance, obtain approval from the Owner **OR** Commissioning Authority, **as directed**, and comply with requirements in Division 23 Section "Hydronic Pumps".
 - b. Check system resistance. With all valves open, read pressure differential across the pump and mark pump manufacturer's head-capacity curve. Adjust pump discharge valve until indicated water flow is achieved.
 - 1) Monitor motor performance during procedures and do not operate motors in overload conditions.
 - c. Verify pump-motor brake horsepower. Calculate the intended brake horsepower for the system based on pump manufacturer's performance data. Compare calculated brake horsepower with nameplate data on the pump motor. Report conditions where actual amperage exceeds motor nameplate amperage.
 - d. Report flow rates that are not within plus or minus 10 percent of design.
 2. Measure flow at all automatic flow control valves to verify that valves are functioning as designed.
 3. Measure flow at all pressure-independent characterized control valves, with valves in fully open position, to verify that valves are functioning as designed.
 4. Set calibrated balancing valves, if installed, at calculated presettings.
 5. Measure flow at all stations and adjust, where necessary, to obtain first balance.
 - a. System components that have Cv rating or an accurately cataloged flow-pressure-drop relationship may be used as a flow-indicating device.
 6. Measure flow at main balancing station and set main balancing device to achieve flow that is 5 percent greater than indicated flow.
 7. Adjust balancing stations to within specified tolerances of indicated flow rate as follows:
 - a. Determine the balancing station with the highest percentage over indicated flow.
 - b. Adjust each station in turn, beginning with the station with the highest percentage over indicated flow and proceeding to the station with the lowest percentage over indicated flow.
 - c. Record settings and mark balancing devices.
 8. Measure pump flow rate and make final measurements of pump amperage, voltage, rpm, pump heads, and systems' pressures and temperatures including outdoor-air temperature.
 9. Measure the differential-pressure-control-valve settings existing at the conclusion of balancing.
 10. Check settings and operation of each safety valve. Record settings.
- L. Procedures For Variable-Flow Hydronic Systems
1. Balance systems with automatic two- and three-way control valves by setting systems at maximum flow through heat-exchange terminals and proceed as specified above for hydronic systems.

- M. Procedures For Primary-Secondary Hydronic Systems
1. Balance the primary circuit flow first and then balance the secondary circuits.
- N. Procedures For Steam Systems
1. Measure and record upstream and downstream pressure of each piece of equipment.
 2. Measure and record upstream and downstream steam pressure of pressure-reducing valves.
 3. Check settings and operation of automatic temperature-control valves, self-contained control valves, and pressure-reducing valves. Record final settings.
 4. Check settings and operation of each safety valve. Record settings.
 5. Verify the operation of each steam trap.
- O. Procedures For Heat Exchangers
1. Measure water flow through all circuits.
 2. Adjust water flow to within specified tolerances.
 3. Measure inlet and outlet water temperatures.
 4. Measure inlet steam pressure.
 5. Check settings and operation of safety and relief valves. Record settings.
- P. Procedures For Motors
1. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:
 - a. Manufacturer's name, model number, and serial number.
 - b. Motor horsepower rating.
 - c. Motor rpm.
 - d. Efficiency rating.
 - e. Nameplate and measured voltage, each phase.
 - f. Nameplate and measured amperage, each phase.
 - g. Starter thermal-protection-element rating.
 2. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.
- Q. Procedures For Chillers
1. Balance water flow through each evaporator and condenser, **as directed**, to within specified tolerances of indicated flow with all pumps operating. With only one chiller operating in a multiple chiller installation, do not exceed the flow for the maximum tube velocity recommended by the chiller manufacturer. Measure and record the following data with each chiller operating at design conditions:
 - a. Evaporator-water entering and leaving temperatures, pressure drop, and water flow.
 - b. For water-cooled chillers, condenser-water entering and leaving temperatures, pressure drop, and water flow.
 - c. Evaporator and condenser refrigerant temperatures and pressures, using instruments furnished by chiller manufacturer.
 - d. Power factor if factory-installed instrumentation is furnished for measuring kilowatts.
 - e. Kilowatt input if factory-installed instrumentation is furnished for measuring kilowatts.
 - f. Capacity: Calculate in tons of cooling.
 - g. For air-cooled chillers, verify condenser-fan rotation and record fan and motor data including number of fans and entering- and leaving-air temperatures.
- R. Procedures For Cooling Towers
1. Shut off makeup water for the duration of the test, and verify that makeup and blowdown systems are fully operational after tests and before leaving the equipment. Perform the following tests and record the results:
 - a. Measure condenser-water flow to each cell of the cooling tower.
 - b. Measure entering- and leaving-water temperatures.

- c. Measure wet- and dry-bulb temperatures of entering air.
 - d. Measure wet- and dry-bulb temperatures of leaving air.
 - e. Measure condenser-water flow rate recirculating through the cooling tower.
 - f. Measure cooling-tower spray pump discharge pressure.
 - g. Adjust water level and feed rate of makeup water system.
 - h. Measure flow through bypass.
- S. Procedures For Condensing Units
1. Verify proper rotation of fans.
 2. Measure entering- and leaving-air temperatures.
 3. Record compressor data.
- T. Procedures For Boilers
1. Hydronic Boilers: Measure and record entering- and leaving-water temperatures and water flow.
 2. Steam Boilers: Measure and record entering-water temperature and flow and leaving-steam pressure, temperature, and flow.
- U. Procedures For Heat-Transfer Coils
1. Measure, adjust, and record the following data for each water coil:
 - a. Entering- and leaving-water temperature.
 - b. Water flow rate.
 - c. Water pressure drop.
 - d. Dry-bulb temperature of entering and leaving air.
 - e. Wet-bulb temperature of entering and leaving air for cooling coils.
 - f. Airflow.
 - g. Air pressure drop.
 2. Measure, adjust, and record the following data for each electric heating coil:
 - a. Nameplate data.
 - b. Airflow.
 - c. Entering- and leaving-air temperature at full load.
 - d. Voltage and amperage input of each phase at full load and at each incremental stage.
 - e. Calculated kilowatt at full load.
 - f. Fuse or circuit-breaker rating for overload protection.
 3. Measure, adjust, and record the following data for each steam coil:
 - a. Dry-bulb temperature of entering and leaving air.
 - b. Airflow.
 - c. Air pressure drop.
 - d. Inlet steam pressure.
 4. Measure, adjust, and record the following data for each refrigerant coil:
 - a. Dry-bulb temperature of entering and leaving air.
 - b. Wet-bulb temperature of entering and leaving air.
 - c. Airflow.
 - d. Air pressure drop.
 - e. Refrigerant suction pressure and temperature.
- V. Procedures For Testing, Adjusting, And Balancing Existing Systems
1. Perform a preconstruction inspection of existing equipment that is to remain and be reused.
 - a. Measure and record the operating speed, airflow, and static pressure of each fan.
 - b. Measure motor voltage and amperage. Compare the values to motor nameplate information.
 - c. Check the refrigerant charge.
 - d. Check the condition of filters.
 - e. Check the condition of coils.
 - f. Check the operation of the drain pan and condensate-drain trap.
 - g. Check bearings and other lubricated parts for proper lubrication.

- h. Report on the operating condition of the equipment and the results of the measurements taken. Report deficiencies.
 2. Before performing testing and balancing of existing systems, inspect existing equipment that is to remain and be reused to verify that existing equipment has been cleaned and refurbished. Verify the following:
 - a. New filters are installed.
 - b. Coils are clean and fins combed.
 - c. Drain pans are clean.
 - d. Fans are clean.
 - e. Bearings and other parts are properly lubricated.
 - f. Deficiencies noted in the preconstruction report are corrected.
 3. Perform testing and balancing of existing systems to the extent that existing systems are affected by the renovation work.
 - a. Compare the indicated airflow of the renovated work to the measured fan airflows, and determine the new fan speed and the face velocity of filters and coils.
 - b. Verify that the indicated airflows of the renovated work result in filter and coil face velocities and fan speeds that are within the acceptable limits defined by equipment manufacturer.
 - c. If calculations increase or decrease the air flow rates and water flow rates by more than 5 percent, make equipment adjustments to achieve the calculated rates. If increase or decrease is 5 percent or less, equipment adjustments are not required.
 - d. Balance each air outlet.
- W. Tolerances
- X. Set HVAC system's air flow rates and water flow rates within the following tolerances:
 - a. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
 - b. Air Outlets and Inlets: Plus or minus 10 percent.
 - c. Heating-Water Flow Rate: Plus or minus 10 percent.
 - d. Cooling-Water Flow Rate: Plus or minus 10 percent.
- Y. Reporting
 1. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.
 2. Status Reports: Prepare weekly **OR** biweekly **OR** monthly, **as directed**, progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.
- Z. Final Report
 1. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.
 - a. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
 - b. Include a list of instruments used for procedures, along with proof of calibration.
 2. Final Report Contents: In addition to certified field-report data, include the following:
 - a. Pump curves.
 - b. Fan curves.
 - c. Manufacturers' test data.
 - d. Field test reports prepared by system and equipment installers.
 - e. Other information relative to equipment performance; do not include Shop Drawings and product data.
 3. General Report Data: In addition to form titles and entries, include the following data:

- a. Title page.
- b. Name and address of the TAB contractor.
- c. Project name.
- d. Project location.
- e. Architect's name and address.
- f. Engineer's name and address.
- g. Contractor's name and address.
- h. Report date.
- i. Signature of TAB supervisor who certifies the report.
- j. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.
- k. Summary of contents including the following:
 - 1) Indicated versus final performance.
 - 2) Notable characteristics of systems.
 - 3) Description of system operation sequence if it varies from the Contract Documents.
- l. Nomenclature sheets for each item of equipment.
- m. Data for terminal units, including manufacturer's name, type, size, and fittings.
- n. Notes to explain why certain final data in the body of reports vary from indicated values.
- o. Test conditions for fans and pump performance forms including the following:
 - 1) Settings for outdoor-, return-, and exhaust-air dampers.
 - 2) Conditions of filters.
 - 3) Cooling coil, wet- and dry-bulb conditions.
 - 4) Face and bypass damper settings at coils.
 - 5) Fan drive settings including settings and percentage of maximum pitch diameter.
 - 6) Inlet vane settings for variable-air-volume systems.
 - 7) Settings for supply-air, static-pressure controller.
 - 8) Other system operating conditions that affect performance.
4. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:
 - a. Quantities of outdoor, supply, return, and exhaust airflows.
 - b. Water and steam flow rates.
 - c. Duct, outlet, and inlet sizes.
 - d. Pipe and valve sizes and locations.
 - e. Terminal units.
 - f. Balancing stations.
 - g. Position of balancing devices.
5. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:
 - a. Unit Data:
 - 1) Unit identification.
 - 2) Location.
 - 3) Make and type.
 - 4) Model number and unit size.
 - 5) Manufacturer's serial number.
 - 6) Unit arrangement and class.
 - 7) Discharge arrangement.
 - 8) Sheave make, size in inches (mm), and bore.
 - 9) Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
 - 10) Number, make, and size of belts.
 - 11) Number, type, and size of filters.
 - b. Motor Data:
 - 1) Motor make, and frame type and size.
 - 2) Horsepower and rpm.
 - 3) Volts, phase, and hertz.
 - 4) Full-load amperage and service factor.
 - 5) Sheave make, size in inches (mm), and bore.
 - 6) Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).

- c. Test Data (Indicated and Actual Values):
 - 1) Total air flow rate in **cfm (L/s)**.
 - 2) Total system static pressure in **inches wg (Pa)**.
 - 3) Fan rpm.
 - 4) Discharge static pressure in **inches wg (Pa)**.
 - 5) Filter static-pressure differential in **inches wg (Pa)**.
 - 6) Preheat-coil static-pressure differential in **inches wg (Pa)**.
 - 7) Cooling-coil static-pressure differential in **inches wg (Pa)**.
 - 8) Heating-coil static-pressure differential in **inches wg (Pa)**.
 - 9) Outdoor airflow in **cfm (L/s)**.
 - 10) Return airflow in **cfm (L/s)**.
 - 11) Outdoor-air damper position.
 - 12) Return-air damper position.
 - 13) Vortex damper position.
6. Apparatus-Coil Test Reports:
 - a. Coil Data:
 - 1) System identification.
 - 2) Location.
 - 3) Coil type.
 - 4) Number of rows.
 - 5) Fin spacing in **fins per inch (mm) o.c.**
 - 6) Make and model number.
 - 7) Face area in **sq. ft. (sq. m)**.
 - 8) Tube size in **NPS (DN)**.
 - 9) Tube and fin materials.
 - 10) Circuiting arrangement.
 - b. Test Data (Indicated and Actual Values):
 - 1) Air flow rate in **cfm (L/s)**.
 - 2) Average face velocity in **fpm (m/s)**.
 - 3) Air pressure drop in **inches wg (Pa)**.
 - 4) Outdoor-air, wet- and dry-bulb temperatures in **deg F (deg C)**.
 - 5) Return-air, wet- and dry-bulb temperatures in **deg F (deg C)**.
 - 6) Entering-air, wet- and dry-bulb temperatures in **deg F (deg C)**.
 - 7) Leaving-air, wet- and dry-bulb temperatures in **deg F (deg C)**.
 - 8) Water flow rate in **gpm (L/s)**.
 - 9) Water pressure differential in **feet of head or psig (kPa)**.
 - 10) Entering-water temperature in **deg F (deg C)**.
 - 11) Leaving-water temperature in **deg F (deg C)**.
 - 12) Refrigerant expansion valve and refrigerant types.
 - 13) Refrigerant suction pressure in **psig (kPa)**.
 - 14) Refrigerant suction temperature in **deg F (deg C)**.
 - 15) Inlet steam pressure in **psig (kPa)**.
7. Gas- and Oil-Fired Heat Apparatus Test Reports: In addition to manufacturer's factory startup equipment reports, include the following:
 - a. Unit Data:
 - 1) System identification.
 - 2) Location.
 - 3) Make and type.
 - 4) Model number and unit size.
 - 5) Manufacturer's serial number.
 - 6) Fuel type in input data.
 - 7) Output capacity in **Btu/h (kW)**.
 - 8) Ignition type.
 - 9) Burner-control types.
 - 10) Motor horsepower and rpm.

- 11) Motor volts, phase, and hertz.
- 12) Motor full-load amperage and service factor.
- 13) Sheave make, size in inches (mm), and bore.
- 14) Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
- b. Test Data (Indicated and Actual Values):
 - 1) Total air flow rate in cfm (L/s).
 - 2) Entering-air temperature in deg F (deg C).
 - 3) Leaving-air temperature in deg F (deg C).
 - 4) Air temperature differential in deg F (deg C).
 - 5) Entering-air static pressure in inches wg (Pa).
 - 6) Leaving-air static pressure in inches wg (Pa).
 - 7) Air static-pressure differential in inches wg (Pa).
 - 8) Low-fire fuel input in Btu/h (kW).
 - 9) High-fire fuel input in Btu/h (kW).
 - 10) Manifold pressure in psig (kPa).
 - 11) High-temperature-limit setting in deg F (deg C).
 - 12) Operating set point in Btu/h (kW).
 - 13) Motor voltage at each connection.
 - 14) Motor amperage for each phase.
 - 15) Heating value of fuel in Btu/h (kW).
8. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:
 - a. Unit Data:
 - 1) System identification.
 - 2) Location.
 - 3) Coil identification.
 - 4) Capacity in Btu/h (kW).
 - 5) Number of stages.
 - 6) Connected volts, phase, and hertz.
 - 7) Rated amperage.
 - 8) Air flow rate in cfm (L/s).
 - 9) Face area in sq. ft. (sq. m).
 - 10) Minimum face velocity in fpm (m/s).
 - b. Test Data (Indicated and Actual Values):
 - 1) Heat output in Btu/h (kW).
 - 2) Air flow rate in cfm (L/s).
 - 3) Air velocity in fpm (m/s).
 - 4) Entering-air temperature in deg F (deg C).
 - 5) Leaving-air temperature in deg F (deg C).
 - 6) Voltage at each connection.
 - 7) Amperage for each phase.
9. Fan Test Reports: For supply, return, and exhaust fans, include the following:
 - a. Fan Data:
 - 1) System identification.
 - 2) Location.
 - 3) Make and type.
 - 4) Model number and size.
 - 5) Manufacturer's serial number.
 - 6) Arrangement and class.
 - 7) Sheave make, size in inches (mm), and bore.
 - 8) Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
 - b. Motor Data:
 - 1) Motor make, and frame type and size.
 - 2) Horsepower and rpm.
 - 3) Volts, phase, and hertz.
 - 4) Full-load amperage and service factor.

- 5) Sheave make, size in inches (mm), and bore.
- 6) Center-to-center dimensions of sheave, and amount of adjustments in inches (mm).
- 7) Number, make, and size of belts.
- c. Test Data (Indicated and Actual Values):
 - 1) Total airflow rate in cfm (L/s).
 - 2) Total system static pressure in inches wg (Pa).
 - 3) Fan rpm.
 - 4) Discharge static pressure in inches wg (Pa).
 - 5) Suction static pressure in inches wg (Pa).
10. Round, Flat-Oval, and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:
 - a. Report Data:
 - 1) System and air-handling-unit number.
 - 2) Location and zone.
 - 3) Traverse air temperature in deg F (deg C).
 - 4) Duct static pressure in inches wg (Pa).
 - 5) Duct size in inches (mm).
 - 6) Duct area in sq. ft. (sq. m).
 - 7) Indicated air flow rate in cfm (L/s).
 - 8) Indicated velocity in fpm (m/s).
 - 9) Actual air flow rate in cfm (L/s).
 - 10) Actual average velocity in fpm (m/s).
 - 11) Barometric pressure in psig (Pa).
11. Air-Terminal-Device Reports:
 - a. Unit Data:
 - 1) System and air-handling unit identification.
 - 2) Location and zone.
 - 3) Apparatus used for test.
 - 4) Area served.
 - 5) Make.
 - 6) Number from system diagram.
 - 7) Type and model number.
 - 8) Size.
 - 9) Effective area in sq. ft. (sq. m).
 - b. Test Data (Indicated and Actual Values):
 - 1) Air flow rate in cfm (L/s).
 - 2) Air velocity in fpm (m/s).
 - 3) Preliminary air flow rate as needed in cfm (L/s).
 - 4) Preliminary velocity as needed in fpm (m/s).
 - 5) Final air flow rate in cfm (L/s).
 - 6) Final velocity in fpm (m/s).
 - 7) Space temperature in deg F (deg C).
12. System-Coil Reports: For reheat coils and water coils of terminal units, include the following:
 - a. Unit Data:
 - 1) System and air-handling-unit identification.
 - 2) Location and zone.
 - 3) Room or riser served.
 - 4) Coil make and size.
 - 5) Flowmeter type.
 - b. Test Data (Indicated and Actual Values):
 - 1) Air flow rate in cfm (L/s).
 - 2) Entering-water temperature in deg F (deg C).
 - 3) Leaving-water temperature in deg F (deg C).
 - 4) Water pressure drop in feet of head or psig (kPa).
 - 5) Entering-air temperature in deg F (deg C).

- 6) Leaving-air temperature in **deg F (deg C)**.
13. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:
 - a. Unit Data:
 - 1) Unit identification.
 - 2) Location.
 - 3) Service.
 - 4) Make and size.
 - 5) Model number and serial number.
 - 6) Water flow rate in **gpm (L/s)**.
 - 7) Water pressure differential in **feet of head or psig (kPa)**.
 - 8) Required net positive suction head in **feet of head or psig (kPa)**.
 - 9) Pump rpm.
 - 10) Impeller diameter in **inches (mm)**.
 - 11) Motor make and frame size.
 - 12) Motor horsepower and rpm.
 - 13) Voltage at each connection.
 - 14) Amperage for each phase.
 - 15) Full-load amperage and service factor.
 - 16) Seal type.
 - b. Test Data (Indicated and Actual Values):
 - 1) Static head in **feet of head or psig (kPa)**.
 - 2) Pump shutoff pressure in **feet of head or psig (kPa)**.
 - 3) Actual impeller size in **inches (mm)**.
 - 4) Full-open flow rate in **gpm (L/s)**.
 - 5) Full-open pressure in **feet of head or psig (kPa)**.
 - 6) Final discharge pressure in **feet of head or psig (kPa)**.
 - 7) Final suction pressure in **feet of head or psig (kPa)**.
 - 8) Final total pressure in **feet of head or psig (kPa)**.
 - 9) Final water flow rate in **gpm (L/s)**.
 - 10) Voltage at each connection.
 - 11) Amperage for each phase.
14. Instrument Calibration Reports:
 - a. Report Data:
 - 1) Instrument type and make.
 - 2) Serial number.
 - 3) Application.
 - 4) Dates of use.
 - 5) Dates of calibration.

AA. Inspections

1. Initial Inspection:
 - a. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.
 - b. Check the following for each system:
 - 1) Measure airflow of at least 10 percent of air outlets.
 - 2) Measure water flow of at least 5 percent of terminals.
 - 3) Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
 - 4) Verify that balancing devices are marked with final balance position.
 - 5) Note deviations from the Contract Documents in the final report.
2. Final Inspection:
 - a. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by the Owner **OR** Commissioning Authority, **as directed**.

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- b. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of the Owner **OR** Commissioning Authority, **as directed**.
 - c. the Owner **OR** Commissioning Authority, **as directed**, shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
 - d. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
 - e. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.
3. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:
 - a. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
 - b. If the second final inspection also fails, the Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.
 4. Prepare test and inspection reports.

BB. Additional Tests

1. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.
2. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

END OF SECTION 23 05 93 00

Task	Specification	Specification Description
23 05 93 00	01 71 23 16	Cutting and Patching
23 05 93 00	02 41 19 13	Selective Demolition
23 05 93 00	23 01 10 91	Sequence Of Operation

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SECTION 23 07 13 00 - HVAC INSULATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for HVAC insulation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Insulation Materials:
 - 1) Calcium silicate.
 - 2) Cellular glass.
 - 3) Flexible elastomeric.
 - 4) Mineral fiber.
 - 5) Phenolic.
 - 6) Polyisocyanurate.
 - 7) Polyolefin.
 - 8) Polystyrene.
 - b. Fire-rated insulation systems.
 - c. Insulating cements.
 - d. Adhesives.
 - e. Mastics.
 - f. Lagging adhesives.
 - g. Sealants.
 - h. Factory-applied jackets.
 - i. Field-applied fabric-reinforcing mesh.
 - j. Field-applied cloths.
 - k. Field-applied jackets.
 - l. Tapes.
 - m. Securements.
 - n. Corner angles.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings:
 - a. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
 - b. Detail attachment and covering of heat tracing inside insulation.
 - c. Detail insulation application at pipe expansion joints for each type of insulation.
 - d. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
 - e. Detail removable insulation at piping specialties, equipment connections, and access panels.
 - f. Detail application of field-applied jackets.
 - g. Detail application at linkages of control devices.
 - h. Detail field application for each equipment type.
4. Field quality-control reports.

D. Quality Assurance

1. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.
 - a. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
 - b. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

E. Delivery, Storage, And Handling

1. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.2 PRODUCTS

A. Insulation Materials

1. Comply with requirements in Part 1.3 schedule articles for where insulating materials shall be applied.
2. Products shall not contain asbestos, lead, mercury, or mercury compounds.
3. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.
4. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.
5. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.
6. Calcium Silicate:
 - a. Preformed Pipe Sections: Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 - b. Flat-, curved-, and grooved-block sections of noncombustible, inorganic, hydrous calcium silicate with a non-asbestos fibrous reinforcement. Comply with ASTM C 533, Type I.
 - c. Prefabricated Fitting Covers: Comply with ASTM C 450 and ASTM C 585 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.
7. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - a. Block Insulation: ASTM C 552, Type I.
 - b. Special-Shaped Insulation: ASTM C 552, Type III.
 - c. Board Insulation: ASTM C 552, Type IV.
 - d. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.
 - e. Preformed Pipe Insulation with Factory-Applied ASJ **OR** ASJ-SSL, **as directed**: Comply with ASTM C 552, Type II, Class 2.
 - f. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
8. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
9. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I **OR** II with factory-applied vinyl jacket **OR** III with factory-applied FSK jacket **OR** III with factory-applied FSP jacket, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
10. High-Temperature, Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type V, without factory-applied jacket.

11. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied FSK jacket, **as directed**. For equipment applications, provide insulation without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied FSK jacket, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
12. High-Temperature, Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type III, without factory-applied jacket.
13. Mineral-Fiber, Preformed Pipe Insulation:
 - a. Type I, **850 deg F (454 deg C)** Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied ASJ-SSL, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
 - b. Type II, **1200 deg F (649 deg C)** Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type II, Grade A, without factory-applied jacket **OR** with factory-applied ASJ **OR** with factory-applied ASJ-SSL, **as directed**. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
14. Mineral-Fiber, Pipe Insulation Wicking System: Preformed pipe insulation complying with ASTM C 547, Type I, Grade A, with absorbent cloth factory applied to the entire inside surface of preformed pipe insulation and extended through the longitudinal joint to outside surface of insulation under insulation jacket. Factory apply a white, polymer, vapor-retarder jacket with self-sealing adhesive tape seam and evaporation holes running continuously along the longitudinal seam, exposing the absorbent cloth.
15. Mineral-Fiber, Pipe and Tank Insulation: Mineral or glass fibers bonded with a thermosetting resin. Semirigid board material with factory-applied ASJ **OR** FSK jacket, **as directed**, complying with ASTM C 1393, Type II or Type IIIA Category 2, or with properties similar to ASTM C 612, Type IB. Nominal density is **2.5 lb/cu. ft. (40 kg/cu. m)** or more. Thermal conductivity (k-value) at **100 deg F (55 deg C)** is **0.29 Btu x in./h x sq. ft. x deg F (0.042 W/m x K)** or less. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.
16. Phenolic:
 - a. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.
 - b. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.
 - c. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.
 - d. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - 1) Preformed Pipe Insulation: None **OR** ASJ, **as directed**.
 - 2) Board for Duct and Plenum Applications: None **OR** ASJ, **as directed**.
 - 3) Board for Equipment Applications: None **OR** ASJ, **as directed**.
17. Polyisocyanurate: Unfaced, preformed, rigid cellular polyisocyanurate material intended for use as thermal insulation.
 - a. Comply with ASTM C 591, Type I or Type IV, except thermal conductivity (k-value) shall not exceed **0.19 Btu x in./h x sq. ft. x deg F (0.027 W/m x K)** at **75 deg F (24 deg C)** after 180 days of aging.
 - b. Flame-spread index shall be 25 or less and smoke-developed index shall be 50 or less for thickness up to **1-1/2 inches (38 mm)** as tested by ASTM E 84.
 - c. Fabricate shapes according to ASTM C 450 and ASTM C 585.
 - d. Factory-Applied Jacket: Requirements are specified in "Factory-Applied Jackets" Article.
 - 1) Pipe Applications: None **OR** ASJ **OR** ASJ-SSL **OR** PVDC **OR** PVDC-SSL, **as directed**.
 - 2) Equipment Applications: None **OR** ASJ **OR** ASJ-SSL **OR** PVDC **OR** PVDC-SSL, **as directed**.
18. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials and Type II, Grade 1 for sheet materials.
19. Polystyrene: Rigid, extruded cellular polystyrene intended for use as thermal insulation. Comply with ASTM C 578, Type IV or Type XIII, except thermal conductivity (k-value) shall not exceed

0.26 Btu x in./h x sq. ft. x deg F (0.038 W/m x K) after 180 days of aging. Fabricate shapes according to ASTM C 450 and ASTM C 585.

B. Fire-Rated Insulation Systems

1. Fire-Rated Board: Structural-grade, press-molded, xonolite calcium silicate, fireproofing board suitable for operating temperatures up to 1700 deg F (927 deg C). Comply with ASTM C 656, Type II, Grade 6. tested and certified to provide a 1-hour **OR** 2-hour, **as directed**, fire rating by a NRTL acceptable to authority having jurisdiction.
2. Fire-Rated Blanket: High-temperature, flexible, blanket insulation with FSK jacket that is tested and certified to provide a 1-hour **OR** 2-hour, **as directed**, fire rating by a NRTL acceptable to authority having jurisdiction.

C. Insulating Cements

1. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.
2. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.
3. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449/C 449M.

D. Adhesives

1. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.
2. Calcium Silicate Adhesive: Fibrous, sodium-silicate-based adhesive with a service temperature range of 50 to 800 deg F (10 to 427 deg C).
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Cellular-Glass, Phenolic, Polyisocyanurate, and Polystyrene Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.
 - a. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
6. Polystyrene Adhesive: Solvent- or water-based, synthetic resin adhesive with a service temperature range of minus 20 to plus 140 deg F (29 to plus 60 deg C).
7. ASJ Adhesive, and FSK and PVDC Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
8. PVC Jacket Adhesive: Compatible with PVC jacket.
 - a. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Mastics

1. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.
 - a. For indoor applications, use mastics that have an approved VOC content or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.

- b. Service Temperature Range: **Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).**
 - c. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
 - d. Color: White.
 3. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **0.05 perm (0.03 metric perm)** at **35-mil (0.9-mm)** dry film thickness.
 - b. Service Temperature Range: **0 to 180 deg F (Minus 18 to plus 82 deg C).**
 - c. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.
 - d. Color: White.
 4. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **0.05 perm (0.033 metric perm)** at **30-mil (0.8-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).**
 - c. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.
 - d. Color: White.
 5. Breather Mastic: Water based; suitable for indoor and outdoor use on above ambient services.
 - a. Water-Vapor Permeance: ASTM F 1249, **3 perms (2 metric perms)** at **0.0625-inch (1.6-mm)** dry film thickness.
 - b. Service Temperature Range: **Minus 20 to plus 200 deg F (Minus 29 to plus 93 deg C).**
 - c. Solids Content: 63 percent by volume and 73 percent by weight.
 - d. Color: White.
- F. Lagging Adhesives
1. Description: Comply with MIL-A-3316C Class I, Grade A and shall be compatible with insulation materials, jackets, and substrates.
 - a. For indoor applications, use lagging adhesives that have an approved VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over duct, equipment, and pipe insulation.
 - c. Service Temperature Range: **Minus 50 to plus 180 deg F (Minus 46 to plus 82 deg C).**
 - d. Color: White.
- G. Sealants
1. Joint Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Permanently flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).**
 - d. Color: White or gray.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. FSK and Metal Jacket Flashing Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).**
 - d. Color: Aluminum.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:
 - a. Materials shall be compatible with insulation materials, jackets, and substrates.
 - b. Fire- and water-resistant, flexible, elastomeric sealant.
 - c. Service Temperature Range: **Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).**
 - d. Color: White.
 - e. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Factory-Applied Jackets

1. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:
 - a. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.
 - b. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.
 - c. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.
 - d. FSP Jacket: Aluminum-foil, fiberglass-reinforced scrim with polyethylene backing; complying with ASTM C 1136, Type II.
 - e. PVDC Jacket for Indoor Applications: 4-mil- (0.10-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.02 perms (0.013 metric perms) when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
 - f. PVDC Jacket for Outdoor Applications: 6-mil- (0.15-mm-) thick, white PVDC biaxially oriented barrier film with a permeance at 0.01 perms (0.007 metric perms) when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
 - g. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

- I. Vinyl Jacket: White vinyl with a permeance of 1.3 perms (0.86 metric perms) when tested according to ASTM E 96, Procedure A, and complying with NFPA 90A and NFPA 90B.

- J. Field-Applied Fabric-Reinforcing Mesh
 1. Woven Glass-Fiber Fabric for Pipe Insulation: Approximately 2 oz./sq. yd. (68 g/sq. m) with a thread count of 10 strands by 10 strands/sq. inch (4 strands by 4 strands/sq. mm) for covering pipe and pipe fittings.
 2. Woven Glass-Fiber Fabric for Duct and Equipment Insulation: Approximately 6 oz./sq. yd. (203 g/sq. m) with a thread count of 5 strands by 5 strands/sq. inch (2 strands by 2 strands/sq. mm) for covering equipment.
 3. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. inch (4 strands by 4 strands/sq. mm), in a Leno weave, for duct, equipment, and pipe.

- K. Field-Applied Cloths
 1. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. (271 g/sq. m).

- L. Field-Applied Jackets
 1. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.
 2. FSK Jacket: Aluminum-foil-face, fiberglass-reinforced scrim with kraft-paper backing.
 3. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.
 - a. Adhesive: As recommended by jacket material manufacturer.
 - b. Color: White **OR** Color-code jackets based on system. Color as selected by the Owner, **as directed**.
 - c. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.
 - 1) Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.
 - d. Factory-fabricated tank heads and tank side panels.
 4. Metal Jacket:

- a. Aluminum Jacket: Comply with **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105 or 5005, Temper H-14.
 - 1) Sheet and roll stock ready for shop or field sizing **OR** Factory cut and rolled to size, **as directed**.
 - 2) Finish and thickness are indicated in field-applied jacket schedules.
 - 3) Moisture Barrier for Indoor Applications: **1-mil- (0.025-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 4) Moisture Barrier for Outdoor Applications: **3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 5) Factory-Fabricated Fitting Covers:
 - a) Same material, finish, and thickness as jacket.
 - b) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c) Tee covers.
 - d) Flange and union covers.
 - e) End caps.
 - f) Beveled collars.
 - g) Valve covers.
 - h) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
- b. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.
 - 1) Sheet and roll stock ready for shop or field sizing **OR** Factory cut and rolled to size, **as directed**.
 - 2) Material, finish, and thickness are indicated in field-applied jacket schedules.
 - 3) Moisture Barrier for Indoor Applications: **1-mil- (0.025-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 4) Moisture Barrier for Outdoor Applications: **3-mil- (0.075-mm-)** thick, heat-bonded polyethylene and kraft paper **OR 2.5-mil- (0.063-mm-)** thick Polysurlyn, **as directed**.
 - 5) Factory-Fabricated Fitting Covers:
 - a) Same material, finish, and thickness as jacket.
 - b) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.
 - c) Tee covers.
 - d) Flange and union covers.
 - e) End caps.
 - f) Beveled collars.
 - g) Valve covers.
 - h) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.
5. Underground Direct-Buried Jacket: **125-mil- (3.2-mm-)** thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.
6. Self-Adhesive Outdoor Jacket: **60-mil- (1.5-mm-)** thick, laminated vapor barrier and waterproofing membrane for installation over insulation located aboveground outdoors; consisting of a rubberized bituminous resin on a crosslaminated polyethylene film covered with white **OR** stucco-embossed, **as directed**, aluminum-foil facing.
7. PVDC Jacket for Indoor Applications: **4-mil- (0.10-mm-)** thick, white PVDC biaxially oriented barrier film with a permeance at **0.02 perms (0.013 metric perms)** when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 20 when tested according to ASTM E 84.
8. PVDC Jacket for Outdoor Applications: **6-mil- (0.15-mm-)** thick, white PVDC biaxially oriented barrier film with a permeance at **0.01 perms (0.007 metric perms)** when tested according to ASTM E 96 and with a flame-spread index of 5 and a smoke-developed index of 25 when tested according to ASTM E 84.
9. PVDC-SSL Jacket: PVDC jacket with a self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip.

M. Tapes

1. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.
 - a. Width: **3 inches (75 mm)**.
 - b. Thickness: **11.5 mils (0.29 mm)**.
 - c. Adhesion: **90 ounces force/inch (1.0 N/mm)** in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: **40 lbf/inch (7.2 N/mm)** in width.
 - f. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.
2. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.
 - a. Width: **3 inches (75 mm)**.
 - b. Thickness: **6.5 mils (0.16 mm)**.
 - c. Adhesion: **90 ounces force/inch (1.0 N/mm)** in width.
 - d. Elongation: 2 percent.
 - e. Tensile Strength: **40 lbf/inch (7.2 N/mm)** in width.
 - f. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.
3. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive. Suitable for indoor and outdoor applications.
 - a. Width: **2 inches (50 mm)**.
 - b. Thickness: **6 mils (0.15 mm)**.
 - c. Adhesion: **64 ounces force/inch (0.7 N/mm)** in width.
 - d. Elongation: 500 percent.
 - e. Tensile Strength: **18 lbf/inch (3.3 N/mm)** in width.
4. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.
 - a. Width: **2 inches (50 mm)**.
 - b. Thickness: **3.7 mils (0.093 mm)**.
 - c. Adhesion: **100 ounces force/inch (1.1 N/mm)** in width.
 - d. Elongation: 5 percent.
 - e. Tensile Strength: **34 lbf/inch (6.2 N/mm)** in width.
5. PVDC Tape for Indoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - a. Width: **3 inches (75 mm)**.
 - b. Film Thickness: **4 mils (0.10 mm)**.
 - c. Adhesive Thickness: **1.5 mils (0.04 mm)**.
 - d. Elongation at Break: 145 percent.
 - e. Tensile Strength: **55 lbf/inch (10.1 N/mm)** in width.
6. PVDC Tape for Outdoor Applications: White vapor-retarder PVDC tape with acrylic adhesive.
 - a. Width: **3 inches (75 mm)**.
 - b. Film Thickness: **6 mils (0.15 mm)**.
 - c. Adhesive Thickness: **1.5 mils (0.04 mm)**.
 - d. Elongation at Break: 145 percent.
 - e. Tensile Strength: **55 lbf/inch (10.1 N/mm)** in width.

N. Securements

1. Bands:
 - a. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 **OR** Type 316, **as directed**; **0.015 inch (0.38 mm)** thick, **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, wide with wing seal **OR** closed seal, **as directed**.
 - b. Aluminum: **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105, or 5005; Temper H-14, **0.020 inch (0.51 mm)** thick, **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, wide with wing seal **OR** closed seal, **as directed**.
 - c. Springs: Twin spring set constructed of stainless steel with ends flat and slotted to accept metal bands. Spring size determined by manufacturer for application.
2. Insulation Pins and Hangers:

- a. Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.106-inch- (2.6-mm-)** **OR** **0.135-inch- (3.5-mm-)**, **as directed**, diameter shank, length to suit depth of insulation indicated.
 - b. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.106-inch- (2.6-mm-)** **OR** **0.135-inch- (3.5-mm-)**, **as directed**, diameter shank, length to suit depth of insulation indicated with integral **1-1/2-inch (38-mm)** galvanized carbon-steel washer.
 - c. Metal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Perforated, galvanized carbon-steel sheet, **0.030 inch (0.76 mm)** thick by **2 inches (50 mm)** square.
 - 2) Spindle: Copper- or zinc-coated, low carbon steel **OR** Aluminum **OR** Stainless steel, **as directed**, fully annealed, **0.106-inch- (2.6-mm-)** diameter shank, length to suit depth of insulation indicated.
 - 3) Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 - d. Nonmetal, Adhesively Attached, Perforated-Base Insulation Hangers: Baseplate fastened to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Perforated, nylon sheet, **0.030 inch (0.76 mm)** thick by **1-1/2 inches (38 mm)** in diameter.
 - 2) Spindle: Nylon, **0.106-inch- (2.6-mm-)** diameter shank, length to suit depth of insulation indicated, up to **2-1/2 inches (63 mm)**.
 - 3) Adhesive: Recommended by hanger manufacturer. Product with demonstrated capability to bond insulation hanger securely to substrates indicated without damaging insulation, hangers, and substrates.
 - e. Self-Sticking-Base Insulation Hangers: Baseplate welded to projecting spindle that is capable of holding insulation, of thickness indicated, securely in position indicated when self-locking washer is in place. Comply with the following requirements:
 - 1) Baseplate: Galvanized carbon-steel sheet, **0.030 inch (0.76 mm)** thick by **2 inches (50 mm)** square.
 - 2) Spindle: Copper- or zinc-coated, low carbon steel **OR** Aluminum **OR** Stainless steel, **as directed**, fully annealed, **0.106-inch- (2.6-mm-)** diameter shank, length to suit depth of insulation indicated.
 - 3) Adhesive-backed base with a peel-off protective cover.
 - f. Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch- (0.41-mm-)** thick, galvanized-steel **OR** aluminum **OR** stainless-steel, **as directed**, sheet, with beveled edge sized as required to hold insulation securely in place but not less than **1-1/2 inches (38 mm)** in diameter.
 - 1) Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in exposed locations.
 - g. Nonmetal Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch- (0.41-mm-)** thick nylon sheet, with beveled edge sized as required to hold insulation securely in place but not less than **1-1/2 inches (38 mm)** in diameter.
 3. Staples: Outward-clinching insulation staples, nominal **3/4-inch- (19-mm-)** wide, stainless steel or Monel.
 4. Wire: **0.080-inch (2.0-mm)** nickel-copper alloy **OR** **0.062-inch (1.6-mm)** soft-annealed, stainless steel **OR** **0.062-inch (1.6-mm)** soft-annealed, galvanized steel, **as directed**.
- O. Corner Angles
1. PVC Corner Angles: **30 mils (0.8 mm)** thick, minimum **1 by 1 inch (25 by 25 mm)**, PVC according to ASTM D 1784, Class 16354-C. White or color-coded to match adjacent surface.

2. Aluminum Corner Angles: **0.040 inch (1.0 mm)** thick, minimum **1 by 1 inch (25 by 25 mm)**, aluminum according to **ASTM B 209 (ASTM B 209M)**, Alloy 3003, 3005, 3105 or 5005; Temper H-14.
3. Stainless-Steel Corner Angles: **0.024 inch (0.61 mm)** thick, minimum **1 by 1 inch (25 by 25 mm)**, stainless steel according to ASTM A 167 or ASTM A 240/A 240M, Type 304 **OR** Type 316, **as directed**.

1.3 EXECUTION

A. Preparation

1. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.
OR
Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:
 - a. Stainless Steel: Coat 300 series stainless steel with an epoxy primer **5 mils (0.127 mm)** thick and an epoxy finish **5 mils (0.127 mm)** thick if operating in a temperature range between **140 and 300 deg F (60 and 149 deg C)**. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
 - b. Carbon Steel: Coat carbon steel operating at a service temperature between **32 and 300 deg F (0 and 149 deg C)** with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.
2. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.
3. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

B. General Installation Requirements

1. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.
2. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.
3. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.
4. Install insulation with longitudinal seams at top and bottom of horizontal runs.
5. Install multiple layers of insulation with longitudinal and end seams staggered.
6. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.
7. Keep insulation materials dry during application and finishing.
8. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.
9. Install insulation with least number of joints practical.
10. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.
 - a. Install insulation continuously through hangers and around anchor attachments.
 - b. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
 - c. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

- d. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.
11. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.
12. Install insulation with factory-applied jackets as follows:
 - a. Draw jacket tight and smooth.
 - b. Cover circumferential joints with **3-inch- (75-mm-)** wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced **4 inches (100 mm)** o.c.
 - c. Overlap jacket longitudinal seams at least **1-1/2 inches (38 mm)**. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at **2 inches (50 mm) OR 4 inches (100 mm), as directed**, o.c.
 - 1) For below ambient services, apply vapor-barrier mastic over staples.
 - d. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
 - e. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.
13. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.
14. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.
15. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least **4 inches (100 mm)** beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.
16. For above ambient services, do not install insulation to the following:
 - a. Vibration-control devices.
 - b. Testing agency labels and stamps.
 - c. Nameplates and data plates.
 - d. Manholes.
 - e. Handholes.
 - f. Cleanouts.

C. Penetrations

1. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.
 - a. Seal penetrations with flashing sealant.
 - b. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - c. Extend jacket of outdoor insulation outside roof flashing at least **2 inches (50 mm)** below top of roof flashing.
 - d. Seal jacket to roof flashing with flashing sealant.
2. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.
3. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.
 - a. Seal penetrations with flashing sealant.
 - b. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.
 - c. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least **2 inches (50 mm)**.
 - d. Seal jacket to wall flashing with flashing sealant.

4. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.
 5. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least **2 inches (50 mm)**.
 - a. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.
 6. Insulation Installation at Floor Penetrations:
 - a. Duct: Install insulation continuously through floor penetrations that are not fire rated. For penetrations through fire-rated assemblies, terminate insulation at fire damper sleeves and externally insulate damper sleeve beyond floor to match adjacent duct insulation. Overlap damper sleeve and duct insulation at least **2 inches (50 mm)**.
 - b. Pipe: Install insulation continuously through floor penetrations.
 - c. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping".
- D. Equipment, Tank, And Vessel Insulation Installation
1. Mineral Fiber, Pipe and Tank Insulation Installation for Tanks and Vessels: Secure insulation with adhesive and anchor pins and speed washers.
 - a. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 **OR** 50, **as directed**, percent coverage of tank and vessel surfaces.
 - b. Groove and score insulation materials to fit as closely as possible to equipment, including contours. Bevel insulation edges for cylindrical surfaces for tight joints. Stagger end joints.
 - c. Protect exposed corners with secured corner angles.
 - d. Install adhesively attached or self-sticking insulation hangers and speed washers on sides of tanks and vessels as follows:
 - 1) Do not weld anchor pins to ASME-labeled pressure vessels.
 - 2) Select insulation hangers and adhesive that are compatible with service temperature and with substrate.
 - 3) On tanks and vessels, maximum anchor-pin spacing is **3 inches (75 mm)** from insulation end joints, and **16 inches (400 mm)** o.c. in both directions.
 - 4) Do not overcompress insulation during installation.
 - 5) Cut and miter insulation segments to fit curved sides and domed heads of tanks and vessels.
 - 6) Impale insulation over anchor pins and attach speed washers.
 - 7) Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 - e. Secure each layer of insulation with stainless-steel or aluminum bands. Select band material compatible with insulation materials.
 - f. Where insulation hangers on equipment and vessels are not permitted or practical and where insulation support rings are not provided, install a girdle network for securing insulation. Stretch prestressed aircraft cable around the diameter of vessel and make taut with clamps, turnbuckles, or breather springs. Place one circumferential girdle around equipment approximately **6 inches (150 mm)** from each end. Install wire or cable between two circumferential girdles **12 inches (300 mm)** o.c. Install a wire ring around each end and around outer periphery of center openings, and stretch prestressed aircraft cable radially from the wire ring to nearest circumferential girdle. Install additional circumferential girdles along the body of equipment or tank at a minimum spacing of **48 inches (1200 mm)** o.c. Use this network for securing insulation with tie wire or bands.
 - g. Stagger joints between insulation layers at least **3 inches (75 mm)**.
 - h. Install insulation in removable segments on equipment access doors, manholes, handholes, and other elements that require frequent removal for service and inspection.

- i. Bevel and seal insulation ends around manholes, handholes, ASME stamps, and nameplates.
 - j. For equipment with surface temperatures below ambient, apply mastic to open ends, joints, seams, breaks, and punctures in insulation.
 2. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.
 - a. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
 - b. Seal longitudinal seams and end joints.
 3. Insulation Installation on Pumps:
 - a. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on **6-inch (150-mm)** centers, starting at corners. Install **3/8-inch- (10-mm-)** diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.
 - b. Fabricate boxes from galvanized steel **OR** aluminum **OR** stainless steel, **as directed**, at least **0.040 inch (1.0 mm) OR 0.050 inch (1.3 mm) OR 0.060 inch (1.6 mm)**, **as directed**, thick.
 - c. For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.
- E. General Pipe Insulation Installation
1. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.
 2. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:
 - a. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
 - b. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
 - c. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
 - d. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.
 - e. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
 - f. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
 - g. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
 - h. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and

- unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.
- i. Stencil or label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.
3. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.
 4. Install removable insulation covers at locations indicated. Installation shall conform to the following:
 - a. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
 - b. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
 - c. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
 - d. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least **2 inches (50 mm)** over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.
 - e. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.
- F. Calcium Silicate Insulation Installation
1. Insulation Installation on Boiler Breechings and Ducts:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation material.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 - c. On exposed applications without metal jacket, finish insulation surface with a skim coat of mineral-fiber, hydraulic-setting cement. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth. Overlap edges at least **1 inch (25 mm)**. Apply finish coat of lagging adhesive over glass cloth. Thin finish coat to achieve smooth, uniform finish.
 2. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation materials.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 - c. Apply a skim coat of mineral-fiber, hydraulic-setting cement to insulation surface. When cement is dry, apply flood coat of lagging adhesive and press on one layer of glass cloth or tape. Overlap edges at least **1 inch (25 mm)**. Apply finish coat of lagging adhesive over glass cloth or tape. Thin finish coat to achieve smooth, uniform finish.
 3. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

- c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 - d. Finish flange insulation same as pipe insulation.
 4. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - b. When preformed insulation sections of insulation are not available, install mitered sections of calcium silicate insulation. Secure insulation materials with wire or bands.
 - c. Finish fittings insulation same as pipe insulation.
 5. Insulation Installation on Valves and Pipe Specialties:
 - a. Install mitered segments of calcium silicate insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - b. Install insulation to flanges as specified for flange insulation application.
 - c. Finish valve and specialty insulation same as pipe insulation.
- G. Cellular-Glass Insulation Installation
 1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - c. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
 - d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least **1 inch (25 mm)**, and seal joints with flashing sealant.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
 - b. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of cellular-glass insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- H. Flexible Elastomeric Insulation Installation
 1. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Flanges:
 - a. Install pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

- c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install mitered sections of pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed valve covers manufactured of same material as pipe insulation when available.
 - b. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
 - d. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
- I. Mineral-Fiber Insulation Installation
 1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - c. For insulation with factory-applied jackets on above ambient surfaces, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets on below ambient surfaces, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.
 - d. Install jacket material with manufacturer's recommended adhesive, overlap seams at least **1 inch (25 mm)**, and seal joints with flashing sealant.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of same material as straight segments of pipe insulation when available.
 - b. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
 - c. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - d. Install insulation to flanges as specified for flange insulation application.
 5. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

- a. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 **OR** 50, **as directed**, percent coverage of duct and plenum surfaces.
 - b. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - c. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - 1) On duct sides with dimensions **18 inches (450 mm)** and smaller, place pins along longitudinal centerline of duct. Space **3 inches (75 mm)** maximum from insulation end joints, and **16 inches (400 mm)** o.c.
 - 2) On duct sides with dimensions larger than **18 inches (450 mm)**, place pins **16 inches (400 mm)** o.c. each way, and **3 inches (75 mm)** maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
 - 3) Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - 4) Do not overcompress insulation during installation.
 - 5) Impale insulation over pins and attach speed washers.
 - 6) Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
 - d. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing **2 inches (50 mm)** from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with **1/2-inch (13-mm)** outward-clinching staples, **1 inch (25 mm)** o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - 1) Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - 2) Install vapor stops for ductwork and plenums operating below **50 deg F (10 deg C)** at **18-foot (5.5-m)** intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than **3 inches (75 mm)**.
 - e. Overlap unfaced blankets a minimum of **2 inches (50 mm)** on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of **18 inches (450 mm)** o.c.
 - f. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 - g. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with **6-inch- (150-mm-)** wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced **6 inches (150 mm)** o.c.
6. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.
- a. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 **OR** 50, **as directed**, percent coverage of duct and plenum surfaces.
 - b. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.
 - c. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:
 - 1) On duct sides with dimensions **18 inches (450 mm)** and smaller, place pins along longitudinal centerline of duct. Space **3 inches (75 mm)** maximum from insulation end joints, and **16 inches (400 mm)** o.c.
 - 2) On duct sides with dimensions larger than **18 inches (450 mm)**, space pins **16 inches (400 mm)** o.c. each way, and **3 inches (75 mm)** maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.

- 3) Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
 - 4) Do not overcompress insulation during installation.
 - 5) Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.
- d. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing **2 inches (50 mm)** from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with **1/2-inch (13-mm)** outward-clinching staples, **1 inch (25 mm)** o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.
 - 1) Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
 - 2) Install vapor stops for ductwork and plenums operating below **50 deg F (10 deg C)** at **18-foot (5.5-m)** intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than **3 inches (75 mm)**.
 - e. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
 - f. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with **6-inch- (150-mm-)** wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced **6 inches (150 mm)** o.c.
- J. Phenolic Insulation Installation
1. General Installation Requirements:
 - a. Secure single-layer insulation with stainless-steel bands at **12-inch (300-mm)** intervals and tighten bands without deforming insulation materials.
 - b. Install 2-layer insulation with joints tightly butted and staggered at least **3 inches (75 mm)**. Secure inner layer with **0.062-inch (1.6-mm)** wire spaced at **12-inch (300-mm)** intervals. Secure outer layer with stainless-steel bands at **12-inch (300-mm)** intervals.
 2. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
 - b. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
 - c. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at **6 inches (150 mm)** o.c.
 - d. For insulation with factory-applied jackets with vapor retarders on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.
 3. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of block insulation of same material and thickness as pipe insulation.
 4. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 5. Insulation Installation on Valves and Pipe Specialties:

- a. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- K. Polyisocyanurate Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation to pipe with tape or bands and tighten without deforming insulation materials. Orient longitudinal joints between half sections in 3 and 9 o'clock positions on the pipe.
 - b. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs but secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
 - c. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
 2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed **1-1/2-inch (38-mm)** thickness.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyisocyanurate block insulation of same thickness as pipe insulation.
 3. Insulation Installation on Fittings and Elbows:
 - a. Install preformed sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed sections of polyisocyanurate insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.
- L. Polyolefin Insulation Installation
1. Insulation Installation on Straight Pipes and Tubes:
 - a. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 2. Insulation Installation on Pipe Flanges:
 - a. Install pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
 - d. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install mitered sections of polyolefin pipe insulation.
 - b. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.
 4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install cut sections of polyolefin pipe and sheet insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.

- d. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

M. Polystyrene Insulation Installation

1. Insulation Installation on Straight Pipes and Tubes:
 - a. Secure each layer of insulation with tape or bands and tighten bands without deforming insulation materials. Orient longitudinal joints between half sections in 3 and 9 o'clock positions on the pipe.
 - b. For insulation with factory-applied jackets with vapor barriers, do not staple longitudinal tabs but secure tabs with additional adhesive or tape as recommended by insulation material manufacturer and seal with vapor-barrier mastic.
 - c. All insulation shall be tightly butted and free of voids and gaps at all joints. Vapor barrier must be continuous. Before installing jacket material, install vapor-barrier system.
2. Insulation Installation on Pipe Flanges:
 - a. Install preformed pipe insulation to outer diameter of pipe flange.
 - b. Make width of insulation section same as overall width of flange and bolts, same thickness of adjacent pipe insulation, not to exceed **1-1/2-inch (38-mm)** thickness.
 - c. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polystyrene block insulation of same thickness as pipe insulation.
3. Insulation Installation on Pipe Fittings and Elbows:
 - a. Install preformed insulation sections of same material as straight segments of pipe insulation. Secure according to manufacturer's written instructions.
4. Insulation Installation on Valves and Pipe Specialties:
 - a. Install preformed section of polystyrene insulation to valve body.
 - b. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
 - c. Install insulation to flanges as specified for flange insulation application.

N. Field-Applied Jacket Installation

1. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.
 - a. Draw jacket smooth and tight to surface with **2-inch (50-mm)** overlap at seams and joints.
 - b. Embed glass cloth between two **0.062-inch- (1.6-mm-)** thick coats of lagging adhesive.
 - c. Completely encapsulate insulation with coating, leaving no exposed insulation.
2. Where FSK jackets are indicated, install as follows:
 - a. Draw jacket material smooth and tight.
 - b. Install lap or joint strips with same material as jacket.
 - c. Secure jacket to insulation with manufacturer's recommended adhesive.
 - d. Install jacket with **1-1/2-inch (38-mm)** laps at longitudinal seams and **3-inch- (75-mm-)** wide joint strips at end joints.
 - e. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.
3. Where PVC jackets are indicated, install with **1-inch (25-mm)** overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.
 - a. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.
4. Where metal jackets are indicated, install with **2-inch (50-mm)** overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands **12 inches (300 mm)** o.c. and at end joints.
5. Where PVDC jackets are indicated, install as follows:

- a. Apply three separate wraps of filament tape per insulation section to secure pipe insulation to pipe prior to installation of PVDC jacket.
 - b. Wrap factory-presizes jackets around individual pipe insulation sections with one end overlapping the previously installed sheet. Install presized jacket with an approximate overlap at butt joint of **2 inches (50 mm)** over the previous section. Adhere lap seal using adhesive or SSL, and then apply 1-1/4 circumferences of appropriate PVDC tape around overlapped butt joint.
 - c. Continuous jacket can be spiral wrapped around a length of pipe insulation. Apply adhesive or PVDC tape at overlapped spiral edge. When electing to use adhesives, refer to manufacturer's written instructions for application of adhesives along this spiral edge to maintain a permanent bond.
 - d. Jacket can be wrapped in cigarette fashion along length of roll for insulation systems with an outer circumference of **33-1/2 inches (850 mm)** or less. The **33-1/2-inch- (850-mm-)** circumference limit allows for **2-inch- (50-mm-)** overlap seal. Using the length of roll allows for longer sections of jacket to be installed at one time. Use adhesive on the lap seal. Visually inspect lap seal for "fishmouthing," and use PVDC tape along lap seal to secure joint.
 - e. Repair holes or tears in PVDC jacket by placing PVDC tape over the hole or tear and wrapping a minimum of 1-1/4 circumferences to avoid damage to tape edges.
- O. Fire-Rated Insulation System Installation
1. Where fire-rated insulation system is indicated, secure system to ducts and duct hangers and supports to maintain a continuous fire rating.
 2. Insulate duct access panels and doors to achieve same fire rating as duct.
 3. Install firestopping at penetrations through fire-rated assemblies. Fire-stop systems are specified in Division 07 Section "Penetration Firestopping".
- P. Finishes
1. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 07.
 - a. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.
 - 1) Finish Coat Material: Interior, flat, latex-emulsion size.
 2. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.
 3. Color: Final color as selected by the Owner. Vary first and second coats to allow visual inspection of the completed Work.
 4. Do not field paint aluminum or stainless-steel jackets.
- Q. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Inspect ductwork, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
 - b. Inspect field-insulated equipment, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to one location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
 - c. Inspect pipe, fittings, strainers, and valves, randomly selected by the Owner, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations

of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

3. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

R. Boiler Breeching Insulation Schedule

1. Round, exposed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** **OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
2. Round, concealed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** **OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
3. Rectangular, exposed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** **OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
4. Rectangular, concealed breeching and connector insulation shall be one of the following:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. High-Temperature Mineral-Fiber Blanket: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** nominal density.
 - c. High-Temperature Mineral-Fiber Board: **3 inches (75 mm)** thick and **3-lb/cu. ft. (48-kg/cu. m)** **OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.

S. Duct Insulation Schedule, General

1. Plenums and Ducts Requiring Insulation:
 - a. Indoor, concealed supply and outdoor air.
 - b. Indoor, exposed supply and outdoor air.
 - c. Indoor, concealed return located in nonconditioned space.
 - d. Indoor, exposed return located in nonconditioned space.
 - e. Indoor, concealed, Type I, commercial, kitchen hood exhaust.
 - f. Indoor, exposed, Type I, commercial, kitchen hood exhaust.
 - g. Indoor, concealed oven and warewash exhaust.
 - h. Indoor, exposed oven and warewash exhaust.
 - i. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
 - j. Indoor, exposed exhaust between isolation damper and penetration of building exterior.
 - k. Outdoor, concealed supply and return.
 - l. Outdoor, exposed supply and return.
2. Items Not Insulated:
 - a. Fibrous-glass ducts.
 - b. Metal ducts with duct liner of sufficient thickness to comply with energy code and ASHRAE/IESNA 90.1.
 - c. Factory-insulated flexible ducts.
 - d. Factory-insulated plenums and casings.
 - e. Flexible connectors.
 - f. Vibration-control devices.
 - g. Factory-insulated access panels and doors.

- T. Indoor Duct And Plenum Insulation Schedule
1. Concealed, round and flat-oval, supply-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
 2. Concealed, round and flat-oval, return-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
 3. Concealed, round and flat-oval, outdoor-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
 4. Concealed, round and flat-oval, exhaust-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
 5. Concealed, rectangular, supply-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.

6. Concealed, rectangular, return-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm), **as directed**, thick.
7. Concealed, rectangular, outdoor-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm), **as directed**, thick.
8. Concealed, rectangular, exhaust-air duct insulation between isolation damper and penetration of building exterior shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
9. Concealed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket **OR** board, **as directed**; thickness as required to achieve 2-hour fire rating.
10. Concealed, supply-air plenum insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
11. Concealed, return-air plenum insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.

- d. Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.**
- e. Polyolefin: **1 inch (25 mm) thick.**
- 12. Concealed, outdoor-air plenum insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.**
 - b. Mineral-Fiber Board: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.**
 - c. Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.**
- 13. Concealed, exhaust-air plenum insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.**
 - b. Mineral-Fiber Board: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.**
 - c. Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.**
- 14. Exposed, round and flat-oval, supply-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: **1 inch (25 mm) thick.**
 - b. Mineral-Fiber Blanket: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.**
 - c. Mineral-Fiber Board: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.**
 - d. Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.**
 - e. Polyolefin: **1 inch (25 mm) thick.**
- 15. Exposed, round and flat-oval, return-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: **1 inch (25 mm) thick.**
 - b. Mineral-Fiber Blanket: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.**
 - c. Mineral-Fiber Board: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.**
 - d. Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.**
 - e. Polyolefin: **1 inch (25 mm) thick.**
- 16. Exposed, round and flat-oval, outdoor-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: **1 inch (25 mm) thick.**
 - b. Mineral-Fiber Blanket: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.**
 - c. Mineral-Fiber Board: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.**
 - d. Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.**
 - e. Polyolefin: **1 inch (25 mm) thick.**
- 17. Exposed, round and flat-oval, exhaust-air duct insulation shall be one of the following:
 - a. Flexible Elastomeric: **1 inch (25 mm) thick.**

- b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
18. Exposed, rectangular, supply-air duct insulation shall be one of the following:
- a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96 kg/cu. m), as directed, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
19. Exposed, rectangular, return-air duct insulation shall be one of the following:
- a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
20. Exposed, rectangular, outdoor-air duct insulation shall be one of the following:
- a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
21. Exposed, rectangular, exhaust-air duct insulation shall be one of the following:
- a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
22. Exposed, Type I, Commercial, Kitchen Hood Exhaust Duct and Plenum Insulation: Fire-rated blanket OR board, as directed; thickness as required to achieve 2-hour fire rating.

23. Exposed, supply-air plenum insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
 24. Exposed, return-air plenum insulation shall be one of the following:
 - a. Flexible Elastomeric: 1 inch (25 mm) thick.
 - b. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - c. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - d. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 - e. Polyolefin: 1 inch (25 mm) thick.
 25. Exposed, outdoor-air plenum insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - b. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - c. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 26. Exposed, exhaust-air plenum insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - b. Mineral-Fiber Board: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - c. Phenolic: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
- U. Aboveground, Outdoor Duct And Plenum Insulation Schedule
1. Insulation materials and thicknesses are identified below. If more than one material is listed for a duct system, selection from materials listed is Contractor's option.
 2. Concealed, round and flat-oval, supply-air duct insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.
 - b. Mineral-Fiber Board: 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), **as directed**, nominal density.
 - c. Phenolic: 1-1/2 inches (38 mm) OR 2 inches (50 mm), **as directed**, thick.
 3. Concealed, round and flat-oval, return-air duct insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: 2 inches (50 mm) OR 3 inches (75 mm), **as directed**, and 0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), **as directed**, nominal density.

- b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
- c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 4. Concealed, round and flat-oval, outdoor-air duct insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 5. Concealed, rectangular, supply-air duct insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 6. Concealed, rectangular, return-air duct insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 7. Concealed, supply-air plenum insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 8. Concealed, return-air plenum insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 9. Exposed, round and flat-oval, supply-air duct insulation shall be one of the following:
 - a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m), as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- 10. Exposed, round and flat-oval, return-air duct insulation shall be one of the following:

- a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m)**, **as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
11. Exposed, rectangular, supply-air duct insulation shall be one of the following:
- a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m)**, **as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
12. Exposed, rectangular, return-air duct insulation shall be one of the following:
- a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m)**, **as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
13. Exposed, supply-air plenum insulation shall be one of the following:
- a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m)**, **as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
14. Exposed, return-air plenum insulation shall be one of the following:
- a. Mineral-Fiber Blanket: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, and **0.75-lb/cu. ft. (12-kg/cu. m) OR 1.5-lb/cu. ft. (24-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m)**, **as directed**, nominal density.
 - b. Mineral-Fiber Board: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
- V. Equipment Insulation Schedule
1. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.
 2. Insulate indoor and outdoor equipment in paragraphs below that is not factory insulated.
 3. Chillers: Insulate cold surfaces on chillers, including, but not limited to, evaporator bundles, condenser bundles, heat-recovery bundles, suction piping, compressor inlets, tube sheets, water boxes, and nozzles with one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
 4. Heat-exchanger (water-to-water for cooling service) insulation shall be one of the following:

- a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
5. Heat-exchanger (water-to-water for heating service) insulation shall be one of the following:
- a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
6. Steam-to-hot-water converter insulation shall be one of the following:
- a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
7. Hot-water-to-steam converter insulation shall be one of the following:
- a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
8. Chilled-water pump insulation shall be one of the following:
- a. Cellular Glass: **3 inches (75 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **2 inches (50 mm)** thick.
 - d. Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
9. Condenser-water pump insulation shall be one of the following:
- a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1 inch (25 mm)** thick.
 - d. Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
10. Dual-service heating and cooling pump insulation shall be one of the following:
- a. Cellular Glass: **3 inches (75 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **2 inches (50 mm)** thick.
 - d. Polyisocyanurate: **1 inch (25 mm)** thick.
11. Heating-hot-water pump insulation shall be one of the following:
- a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
12. Heat-recovery pump insulation shall be one of the following:
- a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Phenolic: **1 inch (25 mm)** thick.
 - d. Polyisocyanurate: **1-1/2 inches (38 mm)** thick.

13. Steam condensate pump and boiler feedwater pump insulation shall be one of the following:
 - a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
14. Chilled-water expansion/compression tank insulation shall be one of the following:
 - a. Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
15. Condenser-water expansion/compression tank insulation shall be one of the following:
 - a. Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
16. Dual-service heating and cooling expansion/compression tank insulation shall be one of the following:
 - a. Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
17. Heating-hot-water expansion/compression tank insulation shall be one of the following:
 - a. Calcium Silicate: **2 inches (50 mm)** thick.
 - b. Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
18. Heat-recovery expansion/compression tank insulation shall be one of the following:
 - a. Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.
 - f. Polyisocyanurate: **1 inch (25 mm)** thick.
 - g. Polyolefin: **1 inch (25 mm)** thick.
19. Chilled-water air-separator insulation shall be one of the following:
 - a. Cellular Glass: **2 inches (50 mm)** thick.
 - b. Flexible Elastomeric: **1 inch (25 mm)** thick.
 - c. Mineral-Fiber Board: **1 inch (25 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **1 inch (25 mm)** thick.
 - e. Phenolic: **1 inch (25 mm)** thick.

- f. Polyisocyanurate: 1 inch (25 mm) thick.
 - g. Polyolefin: 1 inch (25 mm) thick.
20. Condenser-water air-separator insulation shall be one of the following:
- a. Cellular Glass: 2 inches (50 mm) thick.
 - b. Flexible Elastomeric: 1 inch (25 mm) thick.
 - c. Mineral-Fiber Board: 1 inch (25 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: 1 inch (25 mm) thick.
 - e. Phenolic: 1 inch (25 mm) thick.
 - f. Polyisocyanurate: 1 inch (25 mm) thick.
 - g. Polyolefin: 1 inch (25 mm) thick.
21. Dual-service heating and cooling air-separator insulation shall be one of the following:
- a. Cellular Glass: 2 inches (50 mm) thick.
 - b. Flexible Elastomeric: 1 inch (25 mm) thick.
 - c. Mineral-Fiber Board: 1 inch (25 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: 1 inch (25 mm) thick.
 - e. Phenolic: 1 inch (25 mm) thick.
 - f. Polyisocyanurate: 1 inch (25 mm) thick.
 - g. Polyolefin: 1 inch (25 mm) thick.
22. Heating-hot-water air-separator insulation shall be one of the following:
- a. Calcium Silicate: 3 inches (75 mm) thick.
 - b. Cellular Glass: 3 inches (75 mm) thick.
 - c. Mineral-Fiber Board: 2 inches (50 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: 2 inches (50 mm) thick.
23. Heat-recovery air-separator insulation shall be one of the following:
- a. Cellular Glass: 2 inches (50 mm) thick.
 - b. Flexible Elastomeric: 1 inch (25 mm) thick.
 - c. Mineral-Fiber Board: 1 inch (25 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: 1 inch (25 mm) thick.
 - e. Phenolic: 1 inch (25 mm) thick.
 - f. Polyisocyanurate: 1 inch (25 mm) thick.
 - g. Polyolefin: 1 inch (25 mm) thick.
24. Thermal storage tank (brine, water, ice) insulation shall be one of the following:
- a. Cellular Glass: 4 inches (100 mm) thick.
 - b. Mineral-Fiber Board: 3 inches (75 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - c. Mineral-Fiber Pipe and Tank: 3 inches (75 mm) thick.
 - d. Phenolic: 3 inches (75 mm) thick.
 - e. Polyisocyanurate (Outdoor Application Only): 3 inches (75 mm) thick.
 - f. Polystyrene (Outdoor Application Only): 3 inches (75 mm) thick.
25. Deaerator insulation shall be one of the following:
- a. Calcium Silicate: 3 inches (75 mm) thick.
 - b. Cellular Glass: 3 inches (75 mm) thick.
 - c. Mineral-Fiber Board: 2 inches (50 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: 2 inches (50 mm) thick.
26. Steam condensate tank and receiver insulation shall be one of the following:
- a. Calcium Silicate: 3 inches (75 mm) thick.
 - b. Cellular Glass: 3 inches (75 mm) thick.
 - c. Mineral-Fiber Board: 2 inches (50 mm) thick and 2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m), as directed, nominal density.
 - d. Mineral-Fiber Pipe and Tank: 2 inches (50 mm) thick.

27. Steam flash-tank, flash-separator, and blow-off-tank insulation shall be one of the following:
 - a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 - c. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - d. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
 28. Piping system filter-housing insulation shall be one of the following:
 - a. Cellular Glass: **3 inches (75 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
 29. Outdoor, aboveground, heated, fuel-oil storage tank insulation shall be one of the following:
 - a. Cellular Glass: **3 inches (75 mm)** thick.
 - b. Mineral-Fiber Board: **2 inches (50 mm)** thick and **2-lb/cu. ft. (32-kg/cu. m) OR 3-lb/cu. ft. (48-kg/cu. m) OR 6-lb/cu. ft. (96-kg/cu. m)**, **as directed**, nominal density.
 - c. Mineral-Fiber Pipe and Tank: **2 inches (50 mm)** thick.
 - d. Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
- W. Piping Insulation Schedule, General
1. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.
 2. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:
 - a. Drainage piping located in crawl spaces.
 - b. Underground piping.
 - c. Chrome-plated pipes and fittings unless there is a potential for personnel injury.
- X. Indoor Piping Insulation Schedule
1. Condensate and Equipment Drain Water below **60 Deg F (16 Deg C)**:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1/2 inch (13 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.
 - 6) Polyolefin: **3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**, thick.
 2. Chilled Water and Brine, **40 Deg F (5 Deg C)** and below:
 - a. **NPS 3 (DN 80)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, thick.
 - 2) Mineral-Fiber, Preformed Pipe, Type I **OR** Pipe Insulation Wicking System, **as directed**: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, thick.
 - 3) Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**, thick.
 - 4) Polyisocyanurate: **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, thick.
 - b. **NPS 4 (DN 100) to NPS 12 (DN 300)**: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**, thick.
 - 2) Mineral-Fiber, Preformed Pipe, Type I **OR** Pipe Insulation Wicking System, **as directed**: **1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, thick.
 - 3) Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**, thick.
 - 4) Polyisocyanurate: **1 inch (25 mm) OR 1-1/2 inches (38 mm)**, **as directed**, thick.
 - c. **NPS 14 (DN 350)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**, thick.

- 2) Mineral-Fiber, Preformed Pipe, Type I **OR** Pipe Insulation Wicking System, **as directed: 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
3. Chilled Water and Brine, above **40 Deg F (5 Deg C)**:
- a. **NPS 12 (DN 300)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 2) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I **OR** Pipe Insulation Wicking System, **as directed: 1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 4) Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 5) Polyisocyanurate: **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, thick.
 - 6) Polyolefin: **1 inch (25 mm)** thick.
 - b. **NPS 14 (DN 350)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 2) Mineral-Fiber Preformed Pipe, Type I **OR** Pipe Insulation Wicking System, **as directed: 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
4. Condenser-Water Supply and Return:
- a. **NPS 12 (DN 300)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 2) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 4) Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, thick.
 - 5) Polyisocyanurate: **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, thick.
 - 6) Polyolefin: **1 inch (25 mm)** thick.
 - b. **NPS 14 (DN 350)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 2) Mineral-Fiber, Preformed Pipe, Type I: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
5. Heating-Hot-Water Supply and Return, **200 Deg F (93 Deg C)** and below:
- a. **NPS 12 (DN 300)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 2) Mineral-Fiber, Preformed Pipe, Type I: **1 inch (25 mm) OR 2 inches (50 mm), as directed**, thick.
 - 3) Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, thick.
 - b. **NPS 14 (DN 350)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 2) Mineral-Fiber, Preformed Pipe, Type I: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1-1/2 inches (38 mm)** thick.

6. Heating-Hot-Water Supply and Return, above 200 Deg F (93 Deg C):
 - a. **NPS 3/4 (DN 20)** and Smaller: Insulation shall be one of the following:
 - 1) Calcium Silicate: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 2) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - b. **NPS 1 (DN 25)** and Larger: Insulation shall be one of the following:
 - 1) Calcium Silicate: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
 - 2) Cellular Glass: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
7. Steam and Steam Condensate, 350 Deg F (177 Deg C) and below:
 - a. **NPS 3/4 (DN 20)** and Smaller: Insulation shall be one of the following:
 - 1) Calcium Silicate: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 2) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - b. **NPS 1 (DN 25)** and Larger: Insulation shall be one of the following:
 - 1) Calcium Silicate: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
 - 2) Cellular Glass: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
8. Steam and Steam Condensate, above 350 Deg F (177 Deg C):
 - a. **NPS 3/4 (DN 20)** and Smaller: Insulation shall be one of the following:
 - 1) Calcium Silicate: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 2) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - b. **NPS 1 (DN 25)** and Larger: Insulation shall be one of the following:
 - 1) Calcium Silicate: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
 - 2) Cellular Glass: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **3 inches (75 mm) OR 4 inches (100 mm), as directed**, thick.
9. Refrigerant Suction and Hot-Gas Piping:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch (25 mm)** thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.
 - 6) Polyolefin: **1 inch (25 mm)** thick.
10. Refrigerant Suction and Hot-Gas Flexible Tubing:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 2) Polyolefin: **1 inch (25 mm)** thick.
11. Dual-Service Heating and Cooling, 40 to 200 Deg F (5 to 93 Deg C):
 - a. **NPS 12 (DN 300)** and Smaller: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 2) Mineral-Fiber, Preformed Pipe, Type I: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, thick.
 - 3) Phenolic: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed**, thick.
 - b. **NPS 14 (DN 350)** and Larger: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.

- 2) Mineral-Fiber, Preformed Pipe, Type I: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 3) Phenolic: **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed**, thick.
 - 4) Polyisocyanurate: **1-1/2 inches (38 mm)** thick.
12. Heat-Recovery Piping:
- a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 2) Flexible Elastomeric: **1 inch (25 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch (25 mm)** thick.
 - 4) Phenolic: **1 inch (25 mm)** thick.
 - 5) Polyisocyanurate: **1 inch (25 mm)** thick.
 - 6) Polyolefin: **1 inch (25 mm)** thick.
13. Hot Service Drains:
- a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1 inch (25 mm)** thick.
14. Hot Service Vents:
- a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe, Type I or II: **1 inch (25 mm)** thick.
- Y. Outdoor, Aboveground Piping Insulation Schedule
1. Chilled Water and Brine:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **3 inches (75 mm)** thick.
 - 2) Flexible Elastomeric: **3 inches (75 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **3 inches (75 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **3 inches (75 mm)** thick.
 - 7) Polystyrene: **2 inches (50 mm)** thick.
 2. Condenser-Water Supply and Return:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **2 inches (50 mm)** thick.
 - 7) Polystyrene: **2 inches (50 mm)** thick.
 3. Heating-Hot-Water Supply and Return, **200 Deg F (93 Deg C)** and below:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **3 inches (75 mm)** thick.
 - 2) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 3) Phenolic: **2 inches (50 mm)** thick.
 - 4) Polyisocyanurate: **2 inches (50 mm)** thick.
 4. Heating-Hot-Water Supply and Return, above **200 Deg F (93 Deg C)**:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **3 inches (75 mm)** thick.
 - 2) Cellular Glass: **3 inches (75 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I or II: **2 inches (50 mm)** thick.
 5. Steam and Steam Condensate, **350 Deg F (177 Deg C)** and below:

- a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **4 inches (100 mm)** thick.
 - 2) Cellular Glass: **4 inches (100 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I or II: **3 inches (75 mm)** thick.
6. Steam and Steam Condensate, above **350 Deg F (177 Deg C)**:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **5 inches (125 mm)** thick.
 - 2) Cellular Glass: **5 inches (125 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I or II: **4 inches (100 mm)** thick.
7. Refrigerant Suction and Hot-Gas Piping:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **2 inches (50 mm)** thick.
 - 7) Polystyrene: **2 inches (50 mm)** thick.
8. Refrigerant Suction and Hot-Gas Flexible Tubing:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 2) Polyolefin: **2 inches (50 mm)** thick.
9. Heat-Recovery Piping:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Flexible Elastomeric: **2 inches (50 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 4) Phenolic: **2 inches (50 mm)** thick.
 - 5) Polyisocyanurate: **2 inches (50 mm)** thick.
 - 6) Polyolefin: **2 inches (50 mm)** thick.
 - 7) Polystyrene: **2 inches (50 mm)** thick.
10. Dual-Service Heating and Cooling:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **3 inches (75 mm)** thick.
 - 2) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
 - 3) Phenolic: **2 inches (50 mm)** thick.
 - 4) Polyisocyanurate: **2 inches (50 mm)** thick.
11. Hot Service Drains:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type I: **1 inch (25 mm)** thick.
12. Hot Service Vents:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Calcium Silicate: **1-1/2 inches (38 mm)** thick.
 - 2) Cellular Glass: **1-1/2 inches (38 mm)** thick.
 - 3) Mineral-Fiber, Preformed Pipe Insulation, Type II: **1 inch (25 mm)** thick.
13. Fuel Oil Piping, Heated:
 - a. All Pipe Sizes: Insulation shall be one of the following:
 - 1) Cellular Glass: **2 inches (50 mm)** thick.
 - 2) Mineral-Fiber, Preformed Pipe Insulation, Type I: **2 inches (50 mm)** thick.
- Z. Outdoor, Underground Piping Insulation Schedule
 1. Loose-fill insulation, for belowground piping, is specified in Division 28.
 2. Chilled Water, All Sizes: Cellular glass, **2 inches (50 mm)** thick.
 3. Condenser-Water Supply and Return, All Sizes: Cellular glass, **2 inches (50 mm)** thick.

4. Heating-Hot-Water Supply and Return, All Sizes, **200 Deg F (93 Deg C)** and below: Cellular glass, **3 inches (75 mm)** thick.
 5. Heating-Hot-Water Supply and Return, All Sizes, above **200 Deg F (93 Deg C)**:
 - a. Calcium Silicate: **3 inches (75 mm)** thick.
 - b. Cellular Glass: **3 inches (75 mm)** thick.
 6. Steam and Steam Condensate, All Sizes, **350 Deg F (177 Deg C)** and below:
 - a. Calcium Silicate: **4 inches (100 mm)** thick.
 - b. Cellular Glass: **4 inches (100 mm)** thick.
 7. Steam and Steam Condensate, All Sizes, above **350 Deg F (177 Deg C)**:
 - a. Calcium Silicate: **5 inches (125 mm)** thick.
 - b. Cellular Glass: **5 inches (125 mm)** thick.
 8. Dual-Service Heating and Cooling, All Sizes, **40 to 200 Deg F (4 to 93 Deg C)**: Cellular glass, **3 inches (75 mm)** thick.
 9. Fuel Oil Piping, All Sizes, Heated: Cellular glass, **2 inches (50 mm)** thick.
- AA. Indoor, Field-Applied Jacket Schedule
1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
 2. If more than one material is listed, selection from materials listed is Contractor's option.
 3. Ducts and Plenums, Concealed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed**, thick.
 4. Ducts and Plenums, Exposed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed**, thick.
 5. Equipment, Concealed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed**, thick.

- e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm)**, **as directed**, thick.
- 6. Equipment, Exposed, up to **48 Inches (1200 mm)** in Diameter or with Flat Surfaces up to **72 Inches (1800 mm)**:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed**: **20 mils (0.5 mm) OR 30 mils (0.8 mm)**, **as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm)**, **as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm)**, **as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm)**, **as directed**, thick.
- 7. Equipment, Exposed, Larger Than **48 Inches (1200 mm)** in Diameter or with Flat Surfaces Larger Than **72 Inches (1800 mm)**:
 - a. None.
 - b. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Stucco Embossed, **as directed**, with **1-1/4-Inch- (32-mm-)** Deep Corrugations **OR 2-1/2-Inch- (65-mm-)** Deep Corrugations **OR 4-by-1-Inch (100-by-25-mm)** Box Ribs, **as directed**: **0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm)**, **as directed**, thick.
 - c. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth **OR** Stucco Embossed, **as directed**, with **1-1/4-Inch- (32-mm-)** Deep Corrugations **OR 2-1/2-Inch- (65-mm-)** Deep Corrugations **OR 4-by-1-Inch (100-by-25-mm)** Box Ribs, **as directed**: **0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm)**, **as directed**, thick.
- 8. Piping, Concealed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed**: **20 mils (0.5 mm) OR 30 mils (0.8 mm)**, **as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm)**, **as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm)**, **as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm)**, **as directed**, thick.
- 9. Piping, Exposed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed**: **20 mils (0.5 mm) OR 30 mils (0.8 mm)**, **as directed**, thick.
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm)**, **as directed**, thick.
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm)**, **as directed**, thick.
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm)**, **as directed**, thick.

BB. Outdoor, Field-Applied Jacket Schedule

1. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
2. If more than one material is listed, selection from materials listed is Contractor's option.
3. Ducts and Plenums, Concealed:
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - d. Painted Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.
 - e. Stainless Steel, Type 304 OR Type 316, as directed, Smooth 2B Finish OR Corrugated OR Stucco Embossed, as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
4. Ducts and Plenums, Exposed, up to 48 Inches (1200 mm) in Diameter or with Flat Surfaces up to 72 Inches (1800 mm):
 - a. Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - b. Painted Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.
 - c. Stainless Steel, Type 304 OR Type 316, as directed, Smooth 2B Finish OR Corrugated OR Stucco Embossed, as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
5. Ducts and Plenums, Exposed, Larger Than 48 Inches (1200 mm) in Diameter or with Flat Surfaces Larger Than 72 Inches (1800 mm):
 - a. Aluminum OR Painted Aluminum, as directed, Smooth OR Stucco Embossed, as directed, with 1-1/4-Inch- (32-mm-) Deep Corrugations OR 2-1/2-Inch- (65-mm-) Deep Corrugations OR 4-by-1-Inch (100-by-25-mm) Box Ribs, as directed: 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - b. Stainless Steel, Type 304 OR Type 316, as directed, Smooth OR Stucco Embossed, as directed, with 1-1/4-Inch- (32-mm-) Deep Corrugations OR 2-1/2-Inch- (65-mm-) Deep Corrugations OR 4-by-1-Inch (100-by-25-mm) Box Ribs, as directed: 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
6. Equipment, Concealed:
 - a. None.
 - b. PVC OR PVC, Color-Coded by System, as directed: 20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed, thick.
 - c. Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.
 - d. Painted Aluminum, Smooth OR Corrugated OR Stucco Embossed, as directed: 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.
 - e. Stainless Steel, Type 304 OR Type 316, as directed, Smooth 2B Finish OR Corrugated OR Stucco Embossed, as directed: 0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.
7. Equipment, Exposed, up to 48 Inches (1200 mm) in Diameter or with Flat Surfaces up to 72 Inches (1800 mm):
 - a. Aluminum OR Painted Aluminum, as directed, Smooth OR Corrugated OR Stucco Embossed, as directed, with Z-Shaped Locking Seam, as directed: 0.016 inch (0.41 mm)

- OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.**
- b. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed** with Z-Shaped Locking Seam, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.**
8. Equipment, Exposed, Larger Than **48 Inches (1200 mm)** in Diameter or with Flat Surfaces Larger Than **72 Inches (1800 mm)**:
 - a. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Stucco Embossed, **as directed**, with **1-1/4-Inch- (32-mm-)** Deep Corrugations **OR** **2-1/2-Inch- (65-mm-)** Deep Corrugations **OR** **4-by-1-Inch (100-by-25-mm)** Box Ribs, **as directed**: **0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.**
 - b. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth **OR** Stucco Embossed, **as directed**, with **1-1/4-Inch- (32-mm-)** Deep Corrugations **OR** **2-1/2-Inch- (65-mm-)** Deep Corrugations **OR** **4-by-1-Inch (100-by-25-mm)** Box Ribs, **as directed**: **0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.**
 9. Piping, Concealed:
 - a. None.
 - b. PVC **OR** PVC, Color-Coded by System, **as directed**: **20 mils (0.5 mm) OR 30 mils (0.8 mm), as directed, thick.**
 - c. Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.**
 - d. Painted Aluminum, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm), as directed, thick.**
 - e. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.**
 10. Piping, Exposed:
 - a. PVC: **20 mils (0.5 mm) OR 30 mils (0.8 mm) OR 40 mils (1.0 mm), as directed, thick.**
 - b. Aluminum **OR** Painted Aluminum, **as directed**, Smooth **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: **0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm) OR 0.032 inch (0.81 mm) OR 0.040 inch (1.0 mm), as directed, thick.**
 - c. Stainless Steel, Type 304 **OR** Type 316, **as directed**, Smooth 2B Finish **OR** Corrugated **OR** Stucco Embossed, **as directed**, with Z-Shaped Locking Seam, **as directed**: **0.010 inch (0.25 mm) OR 0.016 inch (0.41 mm) OR 0.020 inch (0.51 mm) OR 0.024 inch (0.61 mm), as directed, thick.**
- CC. Underground, Field-Installed Insulation Jacket
1. For underground direct-buried piping applications, install underground direct-buried jacket over insulation material.

END OF SECTION 23 07 13 00

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23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 07 16 00	23 07 13 00	HVAC Insulation

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SECTION 23 09 00 00 - HVAC INSTRUMENTATION AND CONTROLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for HVAC instrumentation and controls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls.

C. Definitions

1. DDC: Direct digital control.
2. I/O: Input/output.
3. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.
4. MS/TP: Master slave/token passing.
5. PC: Personal computer.
6. PID: Proportional plus integral plus derivative.
7. RTD: Resistance temperature detector.

D. System Performance

1. Comply with the following performance requirements:
 - a. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
 - b. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.
 - c. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
 - d. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
 - e. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
 - f. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
 - g. Performance: Programmable controllers shall execute DDC PID control loops, and scan and update process values and outputs at least once per second.
 - h. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:
 - 1) Water Temperature: Plus or minus **1 deg F (0.5 deg C)**.
 - 2) Water Flow: Plus or minus 5 percent of full scale.
 - 3) Water Pressure: Plus or minus 2 percent of full scale.
 - 4) Space Temperature: Plus or minus **1 deg F (0.5 deg C)**.
 - 5) Ducted Air Temperature: Plus or minus **1 deg F (0.5 deg C)**.
 - 6) Outside Air Temperature: Plus or minus **2 deg F (1.0 deg C)**.
 - 7) Dew Point Temperature: Plus or minus **3 deg F (1.5 deg C)**.
 - 8) Temperature Differential: Plus or minus **0.25 deg F (0.15 deg C)**.
 - 9) Relative Humidity: Plus or minus 5 percent.
 - 10) Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
 - 11) Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
 - 12) Airflow (Terminal): Plus or minus 10 percent of full scale.

- 13) Air Pressure (Space): Plus or minus 0.01-inch wg (2.5 Pa).
- 14) Air Pressure (Ducts): Plus or minus 0.1-inch wg (25 Pa).
- 15) Carbon Monoxide: Plus or minus 5 percent of reading.
- 16) Carbon Dioxide: Plus or minus 50 ppm.
- 17) Electrical: Plus or minus 5 percent of reading.

E. Submittals

1. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.
 - a. DDC System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.
 - b. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
 - c. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Bill of materials of equipment indicating quantity, manufacturer, and model number.
 - b. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
 - c. Wiring Diagrams: Power, signal, and control wiring.
 - d. Details of control panel faces, including controls, instruments, and labeling.
 - e. Written description of sequence of operation.
 - f. Schedule of dampers including size, leakage, and flow characteristics.
 - g. Schedule of valves including flow characteristics.
 - h. DDC System Hardware:
 - 1) Wiring diagrams for control units with termination numbers.
 - 2) Schematic diagrams and floor plans for field sensors and control hardware.
 - 3) Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.
 - i. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.
 - j. Controlled Systems:
 - 1) Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
 - 2) Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
 - 3) Written description of sequence of operation including schematic diagram.
 - 4) Points list.
3. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with ASHRAE 135.
4. Data Communications Protocol Certificates: Certify that each proposed DDC system component complies with LonWorks.
5. Software and Firmware Operational Documentation: Include the following:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On a magnetic media or compact disc, complete with data files.
 - c. Device address list.
 - d. Printout of software application and graphic screens.
 - e. Software license required by and installed for DDC workstations and control systems.

6. Software Upgrade Kit: For the Owner to use in modifying software to suit future systems revisions or monitoring and control revisions.
7. Field quality-control test reports.
8. Operation and maintenance data.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with ASHRAE 135 for DDC system components.

G. Delivery, Storage, And Handling

1. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.
2. System Software: Update to latest version of software at Project completion.

1.2 PRODUCTS

A. Control System

1. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.
2. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.
3. Control system shall include the following:
 - a. Building intrusion detection system specified in Division 28 Section "Intrusion Detection".
 - b. Building clock control system specified in Division 27 Section "Clock Systems".
 - c. Building lighting control system specified in Division 26 Section "Network Lighting Controls".
 - d. Fire alarm system specified in Division 28 Section(s) "Digital, Addressable Fire-alarm System" OR "Zoned (dc Loop) Fire-alarm System", **as directed**.

B. DDC Equipment

1. Operator Workstation: One **OR** Two, **as directed**, PC-based microcomputer(s) with minimum configuration as follows:
 - a. Motherboard: With 8 integrated USB 2.0 ports, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.
 - b. Processor: Intel Pentium 4, **<Insert clock speed>** MHz.
 - c. Random-Access Memory: 512 MB.
 - d. Graphics: Video adapter, minimum 1280 x 1024 **OR** 1600 x 1200, **as directed**, pixels, 64-MB video memory, with TV out.
 - e. Monitor: **17 inches (430 mm) OR 19 inches (480 mm)**, **as directed**, LCD color.
 - f. Keyboard: QWERTY, 105 keys in ergonomic shape.
 - g. Floppy-Disk Drive: 1.44 MB.
 - h. Hard-Disk Drive: 80 GB.
 - i. CD-ROM Read/Write Drive: 48x24x48.
 - j. Mouse: Three button, optical.
 - k. Uninterruptible Power Supply: 2 kVa.
 - l. Operating System: Microsoft Windows XP Professional with high-speed Internet access.
 - 1) ASHRAE 135 Compliance: Workstation shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

- 2) LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
 - m. Printer: Black-and-white, laser-jet type as follows:
 - 1) Print Head: 1200 x 1200 dpi resolution.
 - 2) Paper Handling: Minimum of 250 sheet trays.
 - 3) Print Speed: Minimum of 120 characters per second.
 - n. Printer: Color, ink-jet type as follows:
 - 1) Print Head: 4800 x 1200 dpi optimized color resolution.
 - 2) Paper Handling: Minimum of 100 sheets.
 - 3) Print Speed: Minimum of 17 ppm in black and 12 ppm in color.
 - o. Application Software:
 - 1) I/O capability from operator station.
 - 2) System security for each operator via software password and access levels.
 - 3) Automatic system diagnostics; monitor system and report failures.
 - 4) Database creation and support.
 - 5) Automatic and manual database save and restore.
 - 6) Dynamic color graphic displays with up to 10 screen displays at once.
 - 7) Custom graphics generation and graphics library of HVAC equipment and symbols.
 - 8) Alarm processing, messages, and reactions.
 - 9) Trend logs retrievable in spreadsheets and database programs.
 - 10) Alarm and event processing.
 - 11) Object and property status and control.
 - 12) Automatic restart of field equipment on restoration of power.
 - 13) Data collection, reports, and logs. Include standard reports for the following:
 - a) Current values of all objects.
 - b) Current alarm summary.
 - c) Disabled objects.
 - d) Alarm lockout objects.
 - e) Logs.
 - 14) Custom report development.
 - 15) Utility and weather reports.
 - 16) Workstation application editors for controllers and schedules.
 - 17) Maintenance management.
 - p. Custom Application Software:
 - 1) English language oriented.
 - 2) Full-screen character editor/programming environment.
 - 3) Allow development of independently executing program modules with debugging/simulation capability.
 - 4) Support conditional statements.
 - 5) Support floating-point arithmetic with mathematic functions.
 - 6) Contains predefined time variables.
2. Diagnostic Terminal Unit: Portable notebook-style, PC-based microcomputer terminal capable of accessing system data by connecting to system network with minimum configuration as follows:
- a. System: With one integrated USB 2.0 port, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.
 - b. Processor: Intel Pentium 4, <Insert clock speed> MHz.
 - c. Random-Access Memory: 128 MB.
 - d. Graphics: Video adapter, minimum 800 x 600 **OR** 1024 x 768, **as directed**, pixels, 64-MB video memory.
 - e. Monitor: **17 inches (430 mm) OR 19 inches (480 mm)**, **as directed**, LCD color.
 - f. Keyboard: QWERTY 105 keys in ergonomic shape.
 - g. Floppy-Disk Drive: 1.44 MB.
 - h. Hard-Disk Drive: 800 MB.
 - i. CD-ROM Read/Write Drive: 48x24x48.
 - j. Pointing Device: Touch pad or other internal device.

3. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.
 - a. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.
 - b. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - 1) Global communications.
 - 2) Discrete/digital, analog, and pulse I/O.
 - 3) Monitoring, controlling, or addressing data points.
 - 4) Software applications, scheduling, and alarm processing.
 - 5) Testing and developing control algorithms without disrupting field hardware and controlled environment.
 - c. Standard Application Programs:
 - 1) Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, DDC with fine tuning, and trend logging.
 - 2) HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
 - 3) Chiller Control Programs: Control function of condenser-water reset, chilled-water reset, and equipment sequencing.
 - 4) Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
 - 5) Remote communications.
 - 6) Maintenance management.
 - 7) Units of Measure: Inch-pound and SI (metric).
 - d. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
 - e. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
 - f. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
4. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.
 - a. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.
 - b. Stand-alone mode control functions operate regardless of network status. Functions include the following:
 - 1) Global communications.
 - 2) Discrete/digital, analog, and pulse I/O.
 - 3) Monitoring, controlling, or addressing data points.
 - c. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
 - d. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.
 - e. LonWorks Compliance: Control units shall use LonTalk protocol and communicate using EIA/CEA 709.1 datalink/physical layer protocol.
5. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.
 - a. Binary Inputs: Allow monitoring of on-off signals without external power.
 - b. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
 - c. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.

- d. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation with three-position (on-off-auto) override switches and status lights, **as directed**.
- e. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA) with status lights, two-position (auto-manual) switch, and manually adjustable potentiometer, **as directed**.
- f. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
- g. Universal I/Os: Provide software selectable binary or analog outputs.
6. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:
 - a. Output ripple of 5.0 mV maximum peak to peak.
 - b. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
 - c. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.
7. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:
 - a. Minimum dielectric strength of 1000 V.
 - b. Maximum response time of 10 nanoseconds.
 - c. Minimum transverse-mode noise attenuation of 65 dB.
 - d. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

C. Unitary Controllers

1. Unitized, capable of stand-alone operation with sufficient memory to support its operating system, database, and programming requirements, and with sufficient I/O capacity for the application.
 - a. Configuration: Local keypad and display; diagnostic LEDs for power, communication, and processor; wiring termination to terminal strip or card connected with ribbon cable; memory with bios; and 72-hour battery backup.
 - b. Operating System: Manage I/O communication to allow distributed controllers to share real and virtual object information and allow central monitoring and alarms. Perform scheduling with real-time clock, **as directed**. Perform automatic system diagnostics; monitor system and report failures.
 - c. ASHRAE 135 Compliance: Communicate using read (execute and initiate) and write (execute and initiate) property services defined in ASHRAE 135. Reside on network using MS/TP datalink/physical layer protocol and have service communication port for connection to diagnostic terminal unit.
 - d. LonWorks Compliance: Communicate using EIA/CEA 709.1 datalink/physical layer protocol using LonTalk protocol.
 - e. Enclosure: Dustproof rated for operation at 32 to 120 deg F (0 to 50 deg C).
 - f. Enclosure: Waterproof rated for operation at 40 to 150 deg F (5 to 65 deg C).

D. Alarm Panels

1. Unitized cabinet with suitable brackets for wall or floor mounting. Fabricate of 0.06-inch- (1.5-mm-) thick, furniture-quality steel or extruded-aluminum alloy, totally enclosed, with hinged doors and keyed lock and with manufacturer's standard shop-painted finish. Provide common keying for all panels, **as directed**.
2. Indicating light for each alarm point, single horn, acknowledge switch, and test switch, mounted on hinged cover.
 - a. Alarm Condition: Indicating light flashes and horn sounds.
 - b. Acknowledge Switch: Horn is silent and indicating light is steady.
 - c. Second Alarm: Horn sounds and indicating light is steady.
 - d. Alarm Condition Cleared: System is reset and indicating light is extinguished.
 - e. Contacts in alarm panel allow remote monitoring by independent alarm company.

E. Analog Controllers

1. Step Controllers: 6- or 10-stage type, with heavy-duty switching rated to handle loads and operated by electric motor.
2. Electric, Outdoor-Reset Controllers: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range, adjustable set point, scale range **minus 10 to plus 70 deg F (minus 23 to plus 21 deg C)**, and single- or double-pole contacts.
3. Electronic Controllers: Wheatstone-bridge-amplifier type, in steel enclosure with provision for remote-resistance readjustment. Identify adjustments on controllers, including proportional band and authority.
 - a. Single controllers can be integral with control motor if provided with accessible control readjustment potentiometer.
4. Fan-Speed Controllers: Solid-state model providing field-adjustable proportional control of motor speed from maximum to minimum of 55 percent and on-off action below minimum fan speed. Controller shall briefly apply full voltage, when motor is started, to rapidly bring motor up to minimum speed. Equip with filtered circuit to eliminate radio interference.
5. Receiver Controllers: Single- or multiple-input models with control-point adjustment, direct or reverse acting with mechanical set-point adjustment with locking device, proportional band adjustment, authority adjustment, and proportional control mode.
 - a. Remote-control-point adjustment shall be plus or minus 20 percent of sensor span, input signal of **3 to 13 psig (21 to 90 kPa)**.
 - b. Proportional band shall extend from 2 to 20 percent for **5 psig (35 kPa)**.
 - c. Authority shall be 20 to 200 percent.
 - d. Air-supply pressure of **18 psig (124 kPa)**, input signal of **3 to 15 psig (21 to 103 kPa)**, and output signal of zero to supply pressure.
 - e. Gages: **1-1/2 inches (38 mm) OR 2-1/2 inches (64 mm) OR 3-1/2 inches (89 mm)**, **as directed**, in diameter, 2.5 percent wide-scale accuracy, and range to match transmitter input or output pressure.

F. Time Clocks

1. Seven-day, programming-switch timer with synchronous-timing motor and seven-day dial; continuously charged, nickel-cadmium-battery-driven, eight-hour, power-failure carryover; multiple-switch trippers; minimum of two and maximum of eight signals per day with two normally open and two normally closed output contacts.
2. Solid-state, programmable time control with 4 **OR 8, as directed**, separate programs each with up to 100 on-off operations; 1-second resolution; lithium battery backup; keyboard interface and manual override; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; system fault alarm; and communications package allowing networking of time controls and programming from PC.

G. Electronic Sensors

1. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.
2. Thermistor Temperature Sensors and Transmitters:
 - a. Accuracy: Plus or minus **0.5 deg F (0.3 deg C) OR 0.36 deg F (0.2 deg C)**, **as directed**, at calibration point.
 - b. Wire: Twisted, shielded-pair cable.
 - c. Insertion Elements in Ducts: Single point, **8 inches (200 mm) OR 18 inches (460 mm)**, **as directed**, long; use where not affected by temperature stratification or where ducts are smaller than **9 sq. ft. (0.84 sq. m)**.
 - d. Averaging Elements in Ducts: **36 inches (915 mm)** long, flexible **OR 72 inches (1830 mm)** long, flexible **OR 18 inches (460 mm)** long, rigid, **as directed**; use where prone to temperature stratification or where ducts are larger than **10 sq. ft. (1 sq. m)**.
 - e. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of **2-1/2 inches (64 mm)**.
 - f. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - 1) Set-Point Adjustment: Concealed **OR Exposed, as directed**.
 - 2) Set-Point Indication: Concealed **OR Keyed OR Exposed, as directed**.

- 3) Thermometer: Concealed **OR** Exposed **OR** Red-reading glass **OR** Spiral bimetal, **as directed**.
 - 4) Color: As selected from manufacturer's full range.
 - 5) Orientation: Vertical **OR** Horizontal, **as directed**.
 - g. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
 - h. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
 3. RTDs and Transmitters:
 - a. Accuracy: Plus or minus 0.2 percent at calibration point.
 - b. Wire: Twisted, shielded-pair cable.
 - c. Insertion Elements in Ducts: Single point, **8 inches (200 mm) OR 18 inches (460 mm), as directed**, long; use where not affected by temperature stratification or where ducts are smaller than **9 sq. ft. (0.84 sq. m)**.
 - d. Averaging Elements in Ducts: **18 inches (460 mm)** long, rigid **OR 24 inches (610 mm)** long, rigid **OR 48 inches (1200 mm)** long, rigid **OR 24 feet (7.3 m)** long, flexible, **as directed**; use where prone to temperature stratification or where ducts are larger than **9 sq. ft. (0.84 sq. m)**; length as required.
 - e. Insertion Elements for Liquids: Brass socket with minimum insertion length of **2-1/2 inches (64 mm)**.
 - f. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - 1) Set-Point Adjustment: Concealed **OR** Exposed, **as directed**.
 - 2) Set-Point Indication: Concealed **OR** Keyed **OR** Exposed, **as directed**.
 - 3) Thermometer: Concealed **OR** Exposed **OR** Red-reading glass **OR** Spiral bimetal, **as directed**.
 - 4) Color: As selected from manufacturer's full range.
 - 5) Orientation: Vertical **OR** Horizontal, **as directed**.
 - g. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
 - h. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.
 4. Humidity Sensors: Bulk polymer sensor element.
 - a. Accuracy: **5 OR 2, as directed**, percent full range with linear output.
 - b. Room Sensor Range: 20 to 80 percent relative humidity.
 - c. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - 1) Set-Point Adjustment: Concealed **OR** Exposed, **as directed**.
 - 2) Set-Point Indication: Concealed **OR** Keyed **OR** Exposed, **as directed**.
 - 3) Thermometer: Concealed **OR** Exposed **OR** Red-reading glass **OR** Spiral bimetal, **as directed**.
 - 4) Color: As selected from manufacturer's full range.
 - 5) Orientation: Vertical **OR** Horizontal, **as directed**.
 - d. Duct Sensor: 20 to 80 percent relative humidity range with element guard and mounting plate.
 - e. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of **32 to 120 deg F (0 to 50 deg C) OR minus 22 to plus 185 deg F (minus 30 to plus 85 deg C) OR minus 40 to plus 170 deg F (minus 40 to plus 76 deg C), as directed**.
 - f. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.
 5. Pressure Transmitters/Transducers:
 - a. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
 - 1) Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
 - 2) Output: 4 to 20 mA.
 - 3) Building Static-Pressure Range: **0- to 0.25-inch wg (0 to 62 Pa)**.
 - 4) Duct Static-Pressure Range: **0- to 5-inch wg (0 to 1240 Pa)**.

- b. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum **150-psig (1034-kPa)** operating pressure; linear output 4 to 20 mA.
 - c. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum **150-psig (1034-kPa)** operating pressure and tested to **300-psig (2070-kPa)**; linear output 4 to 20 mA.
 - d. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
 - e. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.
 - 6. Room Sensor Cover Construction: Manufacturer's standard locking covers.
 - a. Set-Point Adjustment: Concealed **OR** Exposed, **as directed**.
 - b. Set-Point Indication: Concealed **OR** Keyed **OR** Exposed, **as directed**.
 - c. Thermometer: Concealed **OR** Exposed **OR** Red-reading glass **OR** Spiral bimetal, **as directed**.
 - d. Color: As selected from manufacturer's full range.
 - e. Orientation: Vertical **OR** Horizontal, **as directed**.
 - 7. Room sensor accessories include the following:
 - a. Insulating Bases: For sensors located on exterior walls.
 - b. Guards: Locking; heavy-duty, transparent plastic; mounted on separate base **OR** Metal wire, tamperproof **OR** Locking, solid metal, ventilated, **as directed**.
 - c. Adjusting Key: As required for calibration and cover screws.
- H. Pneumatic Sensors
- 1. Pneumatic Transmitters: Vibration and corrosion resistant.
 - a. Space-Temperature Sensors: Linear-output type, **50 to 100 deg F (10 to 38 deg C)** range, with blank locking covers matching room thermostats.
 - b. Room Return-Air Temperature Sensors: Linear-output type with bimetal sensing element and corrosion-proof construction, **50 to 100 deg F (10 to 38 deg C)** range, designed to be mounted in light troffers.
 - c. Duct-Mounted or Immersion-Type Temperature Sensors: Range as required for **3- to 15-psig (21- to 103-kPa)** output signal.
 - d. Temperature Transmitters: Rigid-stem type with bimetal sensing elements unless averaging is required, **3- to 15-psig (21- to 103-kPa)** output signal.
 - 1) Averaging-Element Sensors: Single- or multiple-unit capillary elements.
 - 2) Tamperproof Sensors: Corrosion-resistant construction, suitable for mounting on vibrating surface with exposed capillary protected with temperature-compensated armor or protective tubing.
 - 3) Pipe-Mounted Temperature-Sensing Elements: Rod-and-tube type; with separable wells filled with heat-conductive compound.
 - 4) Outdoors: Provide bulb shield with mounting bracket.
 - e. Space and Duct Humidity Transmitters: One pipe, directly proportional, with minimum sensing span of 20 to 80 percent relative humidity for **3- to 15-psig (21- to 103-kPa)** output signal, corrosion resistant and temperature compensated, and with factory-calibrated adjustment.
 - 1) Space Mounting: With covers to match thermostats.
 - f. Differential-Pressure Transmitters: One pipe, direct acting for gas, liquid, or steam service; pressure sensor and transmitter of linear-output type; with range of **0 to 50 psig (0 to 344 kPa)**, and **3- to 15-psig (21- to 103-kPa)** output signal.
 - g. Differential-Air-Pressure Transmitters: One pipe, direct acting, double bell; unidirectional with suitable range for expected input; and temperature compensated.
 - 1) Accuracy: 5 percent of full range and 2 percent of full scale at midrange.
 - 2) Output Signal: **3 to 15 psig (21 to 103 kPa)**.
 - 2. Digital-to-Pneumatic Transducers: Convert plus or minus 12-V dc pulse-width-modulation outputs, or continuous proportional current or voltage to **0 to 20 psig (0 to 140 kPa)**.
 - 3. Pneumatic Valve/Damper Position Indicator: Potentiometer mounted in enclosure with adjustable crank-arm assembly connected to damper to transmit 0 to 100 percent valve/damper travel.

- I. Status Sensors
 - 1. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of **0- to 5-inch wg (0 to 1240 Pa)**.
 - 2. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of **8 to 60 psig (55 to 414 kPa)**, piped across pump.
 - 3. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.
 - 4. Voltage Transmitter (100- to 600-V ac): Comply with ISA 50.00.01, single-loop, self-powered transmitter, adjustable, with suitable range and 1 percent full-scale accuracy.
 - 5. Power Monitor: 3-phase type with disconnect/shorting switch assembly, listed voltage and current transformers, with pulse kilowatt hour output and 4- to 20-mA kW output, with maximum 2 percent error at 1.0 power factor and 2.5 percent error at 0.5 power factor.
 - 6. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.
 - 7. Electronic Valve/Damper Position Indicator: Visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.
 - 8. Water-Flow Switches: Bellows-actuated mercury or snap-acting type with pilot-duty rating, stainless-steel or bronze paddle, with appropriate range and differential adjustment, in NEMA 250, Type 1 enclosure.

- J. Gas Detection Equipment
 - 1. Carbon Monoxide Detectors: Single or multichannel, dual-level detectors using solid-state plug-in sensors with a 3-year minimum life; suitable over a temperature range of **32 to 104 deg F (0 to 40 deg C)**; with 2 factory-calibrated alarm levels at 50 and 100 **OR** 35 and 200, **as directed**, ppm.
 - 2. Carbon Dioxide Sensor and Transmitter: Single detectors using solid-state infrared sensors; suitable over a temperature range of **23 to 130 deg F (minus 5 to plus 55 deg C)** and calibrated for 0 to 2 percent, with continuous or averaged reading, 4- to 20-mA output, for wall mounting.
 - 3. Oxygen Sensor and Transmitter: Single detectors using solid-state zircon cell sensing; suitable over a temperature range of **minus 32 to plus 1100 deg F (0 to 593 deg C)** and calibrated for 0 to 5 percent, with continuous or averaged reading, 4- to 20-mA output; for wall mounting.
 - 4. Occupancy Sensor: Passive infrared, with time delay, daylight sensor lockout, sensitivity control, and 180-degree field of view with vertical sensing adjustment; for flush mounting.

- K. Flow Measuring Stations
 - 1. Duct Airflow Station: Combination of air straightener and multiport, self-averaging pitot tube station.
 - a. Casing: Galvanized-steel frame.
 - b. Flow Straightener: Aluminum honeycomb, **3/4-inch (20-mm)** parallel cell, **3 inches (75 mm)** deep.
 - c. Sensing Manifold: Copper manifold with bullet-nosed static pressure sensors positioned on equal area basis.

- L. Thermostats
 - 1. Combination Thermostat and Fan Switches: Line-voltage thermostat with push-button or lever-operated fan switch.
 - a. Label switches **"FAN ON-OFF" OR "FAN HIGH-LOW-OFF" OR "FAN HIGH-MED-LOW-OFF"**, **as directed**.
 - b. Mount on single electric switch box.
 - 2. Electric, solid-state, microcomputer-based room thermostat with remote sensor.
 - a. Automatic switching from heating to cooling.
 - b. Preferential rate control to minimize overshoot and deviation from set point.
 - c. Set up for four separate temperatures per day.
 - d. Instant override of set point for continuous or timed period from 1 hour to 31 days.
 - e. Short-cycle protection.

- f. Programming based on weekday, Saturday, and Sunday **OR** every day of week, **as directed**.
- g. Selection features include degree F or degree C display, 12- or 24-hour clock, keyboard disable, remote sensor, and fan on-auto.
- h. Battery replacement without program loss.
- i. Thermostat display features include the following:
 - 1) Time of day.
 - 2) Actual room temperature.
 - 3) Programmed temperature.
 - 4) Programmed time.
 - 5) Duration of timed override.
 - 6) Day of week.
 - 7) System mode indications include "heating," "off," "fan auto," and "fan on."
3. Low-Voltage, On-Off Thermostats: NEMA DC 3, 24-V, bimetal-operated, mercury-switch type, with adjustable or fixed anticipation heater, concealed set-point adjustment, **55 to 85 deg F (13 to 30 deg C)** set-point range, and **2 deg F (1 deg C)** maximum differential.
4. Line-Voltage, On-Off Thermostats: Bimetal-actuated, open contact or bellows-actuated, enclosed, snap-switch or equivalent solid-state type, with heat anticipator; listed for electrical rating; with concealed set-point adjustment, **55 to 85 deg F (13 to 30 deg C)** set-point range, and **2 deg F (1 deg C)** maximum differential.
 - a. Electric Heating Thermostats: Equip with off position on dial wired to break ungrounded conductors.
 - b. Selector Switch: Integral, manual on-off-auto.
5. Remote-Bulb Thermostats: On-off or modulating type, liquid filled to compensate for changes in ambient temperature; with copper capillary and bulb, unless otherwise indicated.
 - a. Bulbs in water lines with separate wells of same material as bulb.
 - b. Bulbs in air ducts with flanges and shields.
 - c. Averaging Elements: Copper tubing with either single- or multiple-unit elements, extended to cover full width of duct or unit; adequately supported.
 - d. Scale settings and differential settings are clearly visible and adjustable from front of instrument.
 - e. On-Off Thermostat: With precision snap switches and with electrical ratings required by application.
 - f. Modulating Thermostats: Construct so complete potentiometer coil and wiper assembly is removable for inspection or replacement without disturbing calibration of instrument.
6. Fire-Protection Thermostats: Listed and labeled by an NRTL acceptable to authorities having jurisdiction; with fixed or adjustable settings to operate at not less than **75 deg F (24 deg C)** above normal maximum operating temperature, and the following:
 - a. Reset: Manual.
OR
Reset: Automatic, with control circuit arranged to require manual reset at central control panel; with pilot light and reset switch on panel labeled to indicate operation.
7. Pneumatic Room Thermostats: One **OR** Two **OR** Three, **as directed**, pipe(s), fully proportional with adjustable throttling range and tamperproof locking settings, direct or reverse acting as required. Factory calibrated at **2.5 psig/deg F (17.2 kPa/deg C)**.
 - a. Factory Calibration: **2.5 psig/deg F (17.2 kPa/deg C)**.
 - b. Range: **45 to 85 deg F (7 to 30 deg C)**.
 - c. Sensitivity Adjustment Range: **1 to 4 psig/deg F (7 to 27.6 kPa/deg C)**.
 - d. Dual-Temperature Thermostats: Automatic changeover from normal setting to lower setting for unoccupied cycles, with manual-reset lever to permit return to normal temperatures during unoccupied cycles, with automatic reset to normal during next cycle of operation.
 - e. Limits: Field adjustable, to limit setting cooling set point below **75 deg F (24 deg C)**, and heating set point above **75 deg F (24 deg C)**.
 - f. Room Thermostat Cover Construction: Manufacturer's standard locking covers.
 - 1) Set-Point Adjustment: Concealed **OR** Exposed, **as directed**.

- 2) Set-Point Indication: Concealed **OR** Keyed **OR** Exposed, **as directed**.
 - 3) Thermometer: Concealed **OR** Exposed **OR** Red-reading glass **OR** Spiral bimetal, **as directed**.
 - 4) Color: As selected from manufacturer's full range.
 - 5) Orientation: Vertical **OR** Horizontal, **as directed**.
 - g. Room thermostat accessories include the following:
 - 1) Insulating Bases: For thermostats located on exterior walls.
 - 2) Thermostat Guards: Locking; heavy-duty, transparent plastic; mounted on separate base **OR** Metal wire, tamperproof **OR** Locking, solid metal, ventilated, **as directed**.
 - 3) Adjusting Key: As required for calibration and cover screws.
 - 4) Aspirating Boxes: For flush-mounted aspirating thermostats.
 - 5) Set-Point Adjustment: **1/2-inch- (13-mm-)** diameter, adjustment knob.
 8. Immersion Thermostat: Remote-bulb or bimetal rod-and-tube type, proportioning action with adjustable throttling range and adjustable set point.
 9. Airstream Thermostats: Two-pipe, fully proportional, single-temperature type; with adjustable set point in middle of range, adjustable throttling range, plug-in test fitting or permanent pressure gage, remote bulb, bimetal rod and tube, or averaging element.
 10. Electric, Low-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic-, **as directed**, reset switch that trips if temperature sensed across any **12 inches (300 mm)** of bulb length is equal to or below set point.
 - a. Bulb Length: Minimum **20 feet (6 m)**.
 - b. Quantity: One thermostat for every **20 sq. ft. (2 sq. m)** of coil surface.
 11. Electric, High-Limit Duct Thermostat: Snap-acting, single-pole, single-throw, manual- or automatic-, **as directed**, reset switch that trips if temperature sensed across any **12 inches (300 mm)** of bulb length is equal to or above set point.
 - a. Bulb Length: Minimum **20 feet (6 m)**.
 - b. Quantity: One thermostat for every **20 sq. ft. (2 sq. m)** of coil surface.
 12. Heating/Cooling Valve-Top Thermostats: Proportional acting for proportional flow, with molded-rubber diaphragm, remote-bulb liquid-filled element, direct and reverse acting at minimum shutoff pressure of **25 psig (172 kPa)**, and cast housing with position indicator and adjusting knob.
- M. Humidistats
1. Pneumatic Room Humidistats: Wall-mounting, proportioning type with adjustable throttling range, 20 to 90 **OR** 55 to 95 **OR** 25 to 65, **as directed**, percent operating range, and cover matching room thermostat cover.
 2. Duct-Mounting Humidistats: Electric insertion, 2-position type with adjustable, 2 percent throttling range, 20 to 80 percent operating range, and single- or double-pole contacts.
 3. Pneumatic Duct-Mounting Humidistats: Proportioning type with adjustable throttling range, 20 to 90 **OR** 55 to 95 **OR** 25 to 65, **as directed**, percent operating range, in galvanized-steel duct box.
- N. Actuators
1. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
 - a. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
 - c. Nonspring-Return Motors for Valves Larger Than **NPS 2-1/2 (DN 65)**: Size for running torque of **150 in. x lbf (16.9 N x m)** and breakaway torque of **300 in. x lbf (33.9 N x m)**.
 - d. Spring-Return Motors for Valves Larger Than **NPS 2-1/2 (DN 65)**: Size for running and breakaway torque of **150 in. x lbf (16.9 N x m)**.
 - e. Nonspring-Return Motors for Dampers Larger Than **25 Sq. Ft. (2.3 sq. m)**: Size for running torque of **150 in. x lbf (16.9 N x m)** and breakaway torque of **300 in. x lbf (33.9 N x m)**.

- f. Spring-Return Motors for Dampers Larger Than **25 Sq. Ft. (2.3 sq. m)**: Size for running and breakaway torque of **150 in. x lbf (16.9 N x m)**.
2. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
 - a. Valves: Size for torque required for valve close off at maximum pump differential pressure.
 - b. Dampers: Size for running torque calculated as follows:
 - 1) Parallel-Blade Damper with Edge Seals: **7 inch-lb/sq. ft. (86.8 kg-cm/sq. m)** of damper.
 - 2) Opposed-Blade Damper with Edge Seals: **5 inch-lb/sq. ft. (62 kg-cm/sq. m)** of damper.
 - 3) Parallel-Blade Damper without Edge Seals: **4 inch-lb/sq. ft (49.6 kg-cm/sq. m)** of damper.
 - 4) Opposed-Blade Damper without Edge Seals: **3 inch-lb/sq. ft. (37.2 kg-cm/sq. m)** of damper.
 - 5) Dampers with **2- to 3-Inch wg (500 to 750 Pa)** of Pressure Drop or Face Velocities of **1000 to 2500 fpm (5 to 13 m/s)**: Increase running torque by 1.5.
 - 6) Dampers with **3- to 4-Inch wg (750 to 1000 Pa)** of Pressure Drop or Face Velocities of **2500 to 3000 fpm (13 to 15 m/s)**: Increase running torque by 2.0.
 - c. Coupling: V-bolt and V-shaped, toothed cradle.
 - d. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
 - e. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
 - f. Power Requirements (Two-Position Spring Return): **24 OR 120 OR 230, as directed,-V ac.**
 - g. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
 - h. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
 - i. Temperature Rating: **Minus 22 to plus 122 deg F (Minus 30 to plus 50 deg C) OR 40 to 104 deg F (5 to 40 deg C), as directed.**
 - j. Temperature Rating (Smoke Dampers): **Minus 22 to plus 250 deg F (Minus 30 to plus 121 deg C).**
 - k. Run Time: 12 seconds open, 5 seconds closed **OR 30 seconds OR 60 seconds OR 120 seconds, as directed.**
3. Pneumatic Valve Operators: Rolling-diaphragm, spring-loaded, piston type with spring range as required and start-point adjustment and positioning relay, **as directed**. Operator shall maintain full shutoff at maximum pump differential pressure.
4. Pneumatic Damper Operators: Rolling-diaphragm, piston type with adjustable stops and spring return, sized to operate with sufficient reserve power to provide smooth modulating action or two-position action. Where actuators operate in sequence, provide pilot positioners.
 - a. Pilot Positioners: With the following characteristics:
 - 1) Start Point: Adjustable from **2 to 12 psig (14 to 83 kPa)**.
 - 2) Operating Span: Adjustable from **5 to 13 psig (35 to 90 kPa)**.
 - 3) Linearity: Plus or minus 10 percent of output signal span.
 - 4) Hysteresis: 3 percent of span.
 - 5) Response: **0.25-psig (1723-Pa)** input change.
 - 6) Maximum Pilot Signal Pressure: **20 psig (140 kPa)**.
 - 7) Maximum Control Air-Supply Pressure: **60 psig (410 kPa)**.
 - b. Actuator Housing: Molded or die-cast zinc or aluminum. Terminal unit actuators may be high-impact plastic with ambient temperature rating of **50 to 140 deg F (10 to 60 deg C)** unless located in return-air plenums, **as directed**.
 - c. Inlet-Vane Operators: High pressure, with pilot positioners.
- O. Control Valves
 1. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.
 2. Hydronic system globe valves shall have the following characteristics:

- a. **NPS 2 (DN 50)** and Smaller: Class 125 **OR** 250, **as directed**, bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
 - b. **NPS 2-1/2 (DN 65)** and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
 - c. Internal Construction: Replaceable plugs and stainless-steel or brass seats.
 - 1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom.
 - 2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom.
 - d. Sizing: **3-psig (21-kPa)** **OR** **5-psig (35-kPa)**, **as directed**, maximum pressure drop at design flow rate or the following:
 - 1) Two Position: Line size.
 - 2) Two-Way Modulating: Either the value specified above or twice the load pressure drop, whichever is more.
 - 3) Three-Way Modulating: Twice the load pressure drop, but not more than value specified above.
 - e. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
 - f. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of total system (pump) head for two-way valves and 100 percent of pressure differential across valve or 100 percent of total system (pump) head.
3. Steam system globe valves shall have the following characteristics:
- a. **NPS 2 (DN 50)** and Smaller: Class 125 bronze body, bronze trim, rising stem, renewable composition disc, and screwed ends with backseating capacity repackable under pressure.
 - b. **NPS 2-1/2 (DN 65)** and Larger: Class 125 iron body, bronze trim, rising stem, plug-type disc, flanged ends, and renewable seat and disc.
 - c. Internal Construction: Replaceable plugs and stainless-steel seats.
 - 1) Single-Seated Valves: Cage trim provides seating and guiding surfaces for plug on top and bottom of guided plugs.
 - 2) Double-Seated Valves: Balanced plug; cage trim provides seating and guiding surfaces for plugs on top and bottom of guided plugs.
 - d. Sizing: For pressure drop based on the following services:
 - 1) Two Position: 20 percent of inlet pressure.
 - 2) Modulating **15-psig (103-kPa)** Steam: 80 percent of inlet steam pressure.
 - 3) Modulating **16- to 50-psig (110- to 350-kPa)** Steam: 50 percent of inlet steam pressure.
 - 4) Modulating More Than **50-psig (350-kPa)** Steam: As indicated.
 - e. Flow Characteristics: Modified linear characteristics.
 - f. Close-Off (Differential) Pressure Rating: Combination of actuator and trim shall provide minimum close-off pressure rating of 150 percent of operating (inlet) pressure.
4. Butterfly Valves: **200-psig (1380-kPa)**, **150-psig (1034-kPa)** maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.
- a. Body Style: Wafer **OR** Lug **OR** Grooved, **as directed**.
 - b. Disc Type: Nickel-plated ductile iron **OR** Aluminum bronze **OR** Elastomer-coated ductile iron **OR** Epoxy-coated ductile iron, **as directed**.
 - c. Sizing: **1-psig (7-kPa)** maximum pressure drop at design flow rate.
5. Terminal Unit Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.
- a. Rating: Class 125 for service at **125 psig (860 kPa)** and **250 deg F (121 deg C)** operating conditions.
 - b. Sizing: **3-psig (21-kPa)** maximum pressure drop at design flow rate, to close against pump shutoff head.

- c. Flow Characteristics: Two-way valves shall have equal percentage characteristics; three-way valves shall have linear characteristics.
 - 6. Self-Contained Control Valves: Bronze body, bronze trim, two or three ports as indicated, replaceable plugs and seats, and union and threaded ends.
 - a. Rating: Class 125 for service at **125 psig (860 kPa)** and **250 deg F (121 deg C)** operating conditions.
 - b. Thermostatic Operator: Wax **OR** Liquid, **as directed**,-filled integral **OR** remote, **as directed**, sensor with integral **OR** remote, **as directed**, adjustable dial.
- P. Dampers
- 1. Dampers: AMCA-rated, parallel **OR** opposed, **as directed**,-blade design; **0.108-inch- (2.8-mm-)** minimum thick, galvanized-steel or **0.125-inch- (3.2-mm-)** minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than **0.064-inch- (1.6-mm-)** thick galvanized steel with maximum blade width of **8 inches (200 mm)** and length of **48 inches (1220 mm)**.
 - a. Secure blades to **1/2-inch- (13-mm-)** diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze **OR** nylon, **as directed**, blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
 - b. Operating Temperature Range: From **minus 40 to plus 200 deg F (minus 40 to plus 93 deg C)**.
 - c. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
OR
Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than **10 cfm per sq. ft. (50 L/s per sq. m)** of damper area, at differential pressure of **4-inch wg (1000 Pa)** when damper is held by torque of **50 in. x lbf (5.6 N x m)**; when tested according to AMCA 500D.
- Q. Air Supply
- 1. Control and Instrumentation Tubing: Copper tubing complying with **ASTM B 88, Type K (ASTM B 88M, Type A)** or ASTM B 280 Type ACR.
 - a. Fittings: Cast-bronze solder fittings complying with ASME B16.18; or wrought-copper solder fittings complying with ASME B16.22, except forged-brass compression-type fittings at connections to equipment.
 - b. Joining Method: Soldered or brazed.
OR
Control and Instrumentation Tubing: ASTM D 2737 Type FR plenum-rated polyethylene, flame-retardant, nonmetallic tubing rated for **30 psig (207 kPa)** and ambient temperature range of **10 to 150 deg F (minus 13 to plus 65 deg C)** with flame-retardant harness for multiple tubing.
 - c. Fittings: Compression or push-on polyethylene fittings.
 - 2. Tank: ASME storage tank with drain test cock, automatic moisture removal trap, tank relief valve, and rubber-cork vibration isolation mounting pads.
 - 3. Duplex Air Compressor: Capacity to supply compressed air to temperature-control system.
 - a. Pressure control with adjustable electric contacts, set to start and stop both compressors at different pressures.
 - b. Electrical alternation set with motor starters and disconnect to operate compressors alternately or on time schedule.
 - 4. Simplex Air Compressor: Tank-mounting compressor with capacity to supply compressed air to temperature-control system, with starter and disconnect.
 - a. Pressure control with adjustable electric contacts, set to start and stop compressor.
 - 5. Compressor Type: Reciprocating **OR** Scroll, **as directed**.
 - 6. Size compressor and tank to operate compressor not more than **20 OR 30, as directed**, minutes during a 60-minute period.
 - 7. Compressor Accessories: Low-resistance intake-air filter, and belt guards.

8. System Accessories: Air filter rated for 97 percent efficiency at rated airflow, and combination filter/pressure-reducing station or separate filter and pressure-reducing station.
9. Refrigerated Air Dryer: Self-contained, refrigerated air dryer complete with heat exchangers, moisture separator, internal wiring and piping, and with manual bypass valve.
 - a. Heat Exchangers: Air-to-refrigerant coils with centrifugal-type moisture separator and automatic trap assembly.
 - b. Refrigeration Unit: Hermetically sealed, operating to maintain dew point of **13 deg F (minus 11 deg C)** at **20 psig (140 kPa)**, housed in steel cabinet with access door and panel.
 - c. Accessories: Air-inlet temperature gage, air-inlet pressure gage, on-off switch, high-temperature light, power-on light, refrigerant gage on back, air-outlet temperature gage, air-outlet pressure gage, and with contacts for remote indication of power status and high-temperature alarm.
10. Desiccant Dryer: Obtains dew point in pneumatic air piping between compressor and tank at least **15 deg F (minus 9 deg C)** below inlet-air dew point at design conditions.
11. Pressure Gages: Black letters on white background, **2-1/2 inches (64 mm)** in diameter, flush or surface mounting, with front calibration screw to match sensor, and having a graduated scale in **psig (kPa)**.
12. Instrument Pressure Gages: Black letters on white background, **1-1/2 inches (38 mm)** in diameter, stem mounted, with suitable dial range.
13. Diaphragm Control and Instrument Valves: **1/4-inch (6-mm)** forged-brass body with reinforced polytetrafluoroethylene diaphragm, stainless-steel spring, and color-coded phenolic handle.
14. Gage Cocks: Tee or level handle, bronze, rated for **125 psig (860 kPa)**.
15. Relays: For summing, reversing, and amplifying highest or lowest pressure selection; with adjustable I/O ratio.
16. Switches: With indicating plates and accessible adjustment; calibrated and marked.
17. Pressure Regulators: Zinc or aluminum castings with elastomeric diaphragm, balanced construction to automatically prevent pressure buildup, and producing flat reduced-pressure curve.
18. Particle Filters: Zinc or aluminum castings with 97 percent filtration efficiency at rated airflow, quick-disconnect service devices, and aluminum or plastic bowl with metal guard and manual drain cock.
19. Combination Filter/Regulators: Zinc or aluminum castings with elastomeric diaphragm, balanced construction to automatically prevent pressure buildup, and producing flat reduced-pressure curve; with threaded pipe connections, quick-disconnect service devices, and aluminum or plastic bowl with metal guard and manual drain cock.
20. Airborne Oil Filter: Filtration efficiency of 99.9 percent for airborne lubricating oil particles of 0.025 micron or larger.
21. Pressure Relief Valves: ASME rated and labeled.
 - a. High Pressure: Size for installed capacity.
 - b. Low Pressure: Size for installed capacity of pressure regulators and set at 20 percent above low pressure.
22. Pressure-Reducing Stations: Two parallel pressure regulators.

R. Control Cable

1. Electronic and fiber-optic cables for control wiring are specified in Division 27 Section "Communications Horizontal Cabling".

1.3 EXECUTION

A. Installation

1. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.
2. Connect and configure equipment and software to achieve sequence of operation specified.

3. Mount compressor and tank unit on elastomeric mounts **OR** spring isolators with **1-inch (25 mm)** static deflection **OR** restrained spring isolators with **1-inch (25-mm)** static deflection, **as directed**. Vibration isolators are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Isolate air supply with wire-braid-reinforced rubber hose. Secure and anchor according to manufacturer's written instructions and seismic-control requirements.
 - a. Pipe manual and automatic drains to nearest floor drain.
 - b. Supply instrument air from compressor units through filter, pressure-reducing valve, and pressure relief valve, with pressure gages and shutoff and bypass valves.
 4. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices **48 inches (1220 mm) OR 60 inches (1530 mm)**, **as directed**, above the floor.
 - a. Install averaging elements in ducts and plenums in crossing or zigzag pattern.
 5. Install guards on thermostats in the following locations:
 - a. Entrances.
 - b. Public areas.
 - c. Where indicated.
 6. Install automatic dampers according to Division 23 Section "Air Duct Accessories".
 7. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.
 8. Install labels and nameplates to identify control components according to Division 23 Section "Identification For Hvac Piping And Equipment".
 9. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping".
 10. Install steam and condensate instrument wells, valves, and other accessories according to Division 23 Section "Steam And Condensate Heating Piping".
 11. Install refrigerant instrument wells, valves, and other accessories according to Division 23 Section "Refrigerant Piping".
 12. Install duct volume-control dampers according to Division 21 specifying air ducts.
 13. Install electronic and fiber-optic cables according to Division 27 Section "Communications Horizontal Cabling".
- B. Pneumatic Piping Installation
1. Install piping in mechanical equipment rooms inside mechanical equipment enclosures, in pipe chases, or suspended ceilings with easy access.
 - a. Install copper tubing with maximum unsupported length of **36 inches (915 mm)**, for tubing exposed to view.
 - b. Install polyethylene tubing in metallic raceways or electrical metallic tubing. Electrical metallic tubing materials and installation requirements are specified in Division 26 Section "Underfloor Raceways For Electrical Systems".
 2. Install terminal single-line connections, less than **18 inches (460 mm)** in length, with copper or polyethylene tubing run inside flexible steel protection.
 3. In concealed locations such as pipe chases and suspended ceilings with easy access, install copper **OR** polyethylene bundled and sheathed **OR** polyethylene tubing in electrical metallic, **as directed**, tubing. Electrical metallic tubing materials and installation requirements are specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
 4. In concrete slabs, furred walls, or ceilings with no access, install copper or polyethylene tubing in electrical metallic tubing or vinyl-jacketed polyethylene tubing.
 - a. Protect embedded-copper and vinyl-jacketed polyethylene tubing with electrical metallic tubing extending **6 inches (150 mm)** above finished slab and **6 inches (150 mm)** into slab. Pressure test tubing before and after pour for leak and pinch.
 - b. Install polyethylene tubing in electrical metallic tubing extending **6 inches (150 mm)** above floor line; pull tubing into electrical metallic tubing after pour.
 5. Install tubing with sufficient slack and flexible connections to allow for vibration of piping and equipment.
 6. Purge tubing with dry, oil-free compressed air before connecting control instruments.

- a. Bridge cabinets and doors with flexible connections fastened along hinge side; protect against abrasion. Tie and support tubing.
 7. Number-code or color-code control air piping for future identification and service of control system, except local individual room control tubing.
 8. Pressure Gages or Test Plugs: Install on branch lines at each receiver controller and on signal lines at each transmitter, except individual room controllers.
- C. Electrical Wiring And Connection Installation
1. Install raceways, boxes, and cabinets according to Division 26 Section "Raceway And Boxes For Electrical Systems".
 2. Install building wire and cable according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
 3. Install signal and communication cable according to Division 27 Section "Communications Horizontal Cabling".
 - a. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
 - b. Install exposed cable in raceway.
 - c. Install concealed cable in raceway.
 - d. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
 - e. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
 - f. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.
 - g. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.
 4. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.
 5. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.
- D. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
 - b. Test and adjust controls and safeties.
 - c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Pressure test control air piping at **30 psig (207 kPa)** or 1.5 times the operating pressure for 24 hours, with maximum **5-psig (35-kPa)** loss.
 - e. Pressure test high-pressure control air piping at **150 psig (1034 kPa)** and low-pressure control air piping at **30 psig (207 kPa)** for 2 hours, with maximum **1-psig (7-kPa)** loss.
 - f. Test calibration of pneumatic **OR** electronic, **as directed**, controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
 - g. Test each point through its full operating range to verify that safety and operating control set points are as required.
 - h. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
 - i. Test each system for compliance with sequence of operation.
 - j. Test software and hardware interlocks.
 2. DDC Verification:
 - a. Verify that instruments are installed before calibration, testing, and loop or leak checks.
 - b. Check instruments for proper location and accessibility.
 - c. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.

- d. Check instrument tubing for proper fittings, slope, material, and support.
- e. Check installation of air supply for each instrument.
- f. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
- g. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
- h. Check temperature instruments and material and length of sensing elements.
- i. Check control valves. Verify that they are in correct direction.
- j. Check air-operated dampers. Verify that pressure gages are provided and that proper blade alignment, either parallel or opposed, has been provided.
- k. Check DDC system as follows:
 - 1) Verify that DDC controller power supply is from emergency power supply, if applicable.
 - 2) Verify that wires at control panels are tagged with their service designation and approved tagging system.
 - 3) Verify that spare I/O capacity has been provided.
 - 4) Verify that DDC controllers are protected from power supply surges.
3. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

E. Adjusting

1. Calibrating and Adjusting:
 - a. Calibrate instruments.
 - b. Make three-point calibration test for both linearity and accuracy for each analog instrument.
 - c. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.
 - d. Control System Inputs and Outputs:
 - 1) Check analog inputs at 0, 50, and 100 percent of span.
 - 2) Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
 - 3) Check digital inputs using jumper wire.
 - 4) Check digital outputs using ohmmeter to test for contact making or breaking.
 - 5) Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.
 - e. Flow:
 - 1) Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
 - 2) Manually operate flow switches to verify that they make or break contact.
 - f. Pressure:
 - 1) Calibrate pressure transmitters at 0, 50, and 100 percent of span.
 - 2) Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.
 - g. Temperature:
 - 1) Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
 - 2) Calibrate temperature switches to make or break contacts.
 - h. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
 - i. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
 - j. Provide diagnostic and test instruments for calibration and adjustment of system.
 - k. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
2. Adjust initial temperature and humidity set points.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



3. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose.

F. Demonstration

1. Train the Owner's maintenance personnel to adjust, operate, and maintain HVAC instrumentation and controls.

END OF SECTION 23 09 00 00

Task	Specification	Specification Description
23 09 23 23	23 09 00 00	HVAC Instrumentation And Controls
23 09 23 27	23 09 00 00	HVAC Instrumentation And Controls
23 09 23 53	23 09 00 00	HVAC Instrumentation And Controls
23 09 23 53	26 29 13 13	Enclosed Controllers
23 09 43 00	23 09 00 00	HVAC Instrumentation And Controls

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SECTION 23 11 23 00 - FACILITY NATURAL-GAS PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for facility natural gas piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pipes, tubes, and fittings.
 - b. Piping specialties.
 - c. Piping and tubing joining materials.
 - d. Valves.
 - e. Pressure regulators.
 - f. Service meters.
 - g. Mechanical sleeve seals.
 - h. Grout.
 - i. Concrete bases.

C. Definitions

1. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Performance Requirements

1. Minimum Operating-Pressure Ratings:
 - a. Piping and Valves: **100 psig (690 kPa)** minimum unless otherwise indicated.
 - b. Service Regulators: **65 psig (450 kPa) OR 100 psig (690 kPa), as directed**, minimum unless otherwise indicated.
 - c. Minimum Operating Pressure of Service Meter: **5 psig (34.5 kPa) OR 10 psig (69 kPa) OR 20 psig (138 kPa) OR 65 psig (450 kPa), as directed.**
2. Natural-Gas System Pressure within Buildings: **0.5 psig (3.45 kPa)** or less **OR** More than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa) OR** More than **2 psig (13.8 kPa)** but not more than **5 psig (34.5 kPa), as directed.**
OR
 Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa)**, and is reduced to secondary pressure of **0.5 psig (3.45 kPa)** or less.
OR
 Natural-Gas System Pressures within Buildings: Two pressure ranges. Primary pressure is more than **2 psig (13.8 kPa)** but not more than **5 psig (34.5 kPa)**, and is reduced to secondary pressure of more than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa)**.
OR
 Natural-Gas System Pressures within Buildings: Three pressure ranges. Primary pressure is more than **2 psig (13.8 kPa)** but not more than **5 psig (34.5 kPa)**, and is reduced to secondary pressures of more than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa)**, and is reduced again to pressures of **0.5 psig (3.45 kPa)** or less.

3. Delegated Design: Design restraints and anchors for natural-gas piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For facility natural-gas piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
3. Delegated-Design Submittal: For natural-gas piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of seismic restraints.
 - b. Design Calculations: Calculate requirements for selecting seismic restraints.
4. Welding certificates.
5. Field quality-control reports.
6. Operation and maintenance data.

F. Quality Assurance

1. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Delivery, Storage, And Handling

1. Handling Flammable Liquids: Remove and dispose of liquids from existing natural-gas piping according to requirements of authorities having jurisdiction.
2. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.
3. Store and handle pipes and tubes having factory-applied protective coatings to avoid damaging coating, and protect from direct sunlight.
4. Protect stored PE pipes and valves from direct sunlight.

H. Project Conditions

1. Interruption of Existing Natural-Gas Service: Do not interrupt natural-gas service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of natural-gas supply according to requirements indicated:
 - a. Notify Owner no fewer than two days in advance of proposed interruption of natural-gas service.
 - b. Do not proceed with interruption of natural-gas service without Owner's written permission.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - a. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 - b. Wrought-Steel Welding Fittings: ASTM A 234/A 234M for butt welding and socket welding.
 - c. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.

- d. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1) Material Group: 1.1.
 - 2) End Connections: Threaded or butt welding to match pipe.
 - 3) Lapped Face: Not permitted underground.
 - 4) Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - 5) Bolts and Nuts: ASME B18.2.1, carbon steel aboveground and stainless steel underground.
- e. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - 1) Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
- f. Mechanical Couplings:
 - 1) Stainless-steel **OR** Steel, **as directed**, flanges and tube with epoxy finish.
 - 2) Buna-nitrile seals.
 - 3) Stainless-steel **OR** Steel, **as directed**, bolts, washers, and nuts.
 - 4) Coupling shall be capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - 5) Steel body couplings installed underground on plastic pipe shall be factory equipped with anode.
2. Corrugated, Stainless-Steel Tubing: Comply with ANSI/IAS LC 1.
 - a. Tubing: ASTM A 240/A 240M, corrugated, Series 300 stainless steel.
 - b. Coating: PE with flame retardant.
 - 1) Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a) Flame-Spread Index: 25 or less.
 - b) Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.
 - c. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with corrugated stainless-steel tubing and capable of metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
 - d. Striker Plates: Steel, designed to protect tubing from penetrations.
 - e. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections shall comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
 - f. Operating-Pressure Rating: **5 psig (34.5 kPa)**.
3. Aluminum Tubing: Comply with ASTM B 210 and ASTM B 241/B 241M.
 - a. Aluminum Alloy: Alloy 5456 is prohibited.
 - b. Protective Coating: Factory-applied coating capable of resisting corrosion on tubing in contact with masonry, plaster, insulation, water, detergents, and sewerage.
 - c. Flare Fittings: Comply with ASME B16.26 and SAE J513.
 - 1) Copper-alloy fittings.
 - 2) Metal-to-metal compression seal without gasket.
 - 3) Dryseal threads shall comply with ASME B1.20.3.
4. Drawn-Temper Copper Tube: Comply with **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B) OR** ASTM B 837, Type G, **as directed**.
 - a. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
 - b. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.
 - 1) Gasket Material: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - 2) Bolts and Nuts: ASME B18.2.1, carbon steel or stainless steel.
 - c. Protective Coating for Underground Tubing: Factory-applied, extruded PE a minimum of **0.022 inch (0.56 mm)** thick.
5. Annealed-Temper Copper Tube: Comply with **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B) OR** ASTM B 837, Type G, **as directed**.
 - a. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
 - b. Flare Fittings: Comply with ASME B16.26 and SAE J513.

- 1) Copper fittings with long nuts.
- 2) Metal-to-metal compression seal without gasket.
- 3) Dryseal threads complying with ASME B1.20.3.
- c. Protective Coating for Underground Tubing: Factory-applied, extruded PE a minimum of **0.022 inch (0.56 mm)** thick.
6. Tin-Lined Copper Tube: ASTM B 280, seamless, annealed, with interior tin-plated lining.
 - a. Flare Fittings: Comply with ASME B16.26 and SAE J513.
 - 1) Copper fittings with long nuts.
 - 2) Metal-to-metal compression seal without gasket.
 - 3) Dryseal threads complying with ASME B1.20.3.
7. PE Pipe: ASTM D 2513, SDR 11.
 - a. PE Fittings: ASTM D 2683, socket-fusion type or ASTM D 3261, butt-fusion type with dimensions matching PE pipe.
 - b. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D 2513, SDR 11; and steel pipe complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - c. Anodeless Service-Line Risers: Factory fabricated and leak tested.
 - 1) Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet.
 - 2) Casing: Steel pipe complying with ASTM A 53/A 53M, Schedule 40, black steel, Type E or S, Grade B, with corrosion-protective coating covering. Vent casing aboveground, **as directed**.
 - 3) Aboveground Portion: PE transition fitting.
 - 4) Outlet shall be threaded or flanged or suitable for welded connection.
 - 5) Tracer wire connection.
 - 6) Ultraviolet shield.
 - 7) Stake supports with factory finish to match steel pipe casing or carrier pipe.
 - d. Transition Service-Line Risers: Factory fabricated and leak tested.
 - 1) Underground Portion: PE pipe complying with ASTM D 2513, SDR 11 inlet connected to steel pipe complying with ASTM A 53/A 53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
 - 2) Outlet shall be threaded or flanged or suitable for welded connection.
 - 3) Bridging sleeve over mechanical coupling.
 - 4) Factory-connected anode.
 - 5) Tracer wire connection.
 - 6) Ultraviolet shield.
 - 7) Stake supports with factory finish to match steel pipe casing or carrier pipe.
 - e. Plastic Mechanical Couplings, **NPS 1-1/2 (DN 40)** and Smaller: Capable of joining PE pipe to PE pipe.
 - 1) PE body with molded-in, stainless-steel support ring.
 - 2) Buna-nitrile seals.
 - 3) Acetal collets.
 - 4) Electro-zinc-plated steel stiffener.
 - f. Plastic Mechanical Couplings, **NPS 2 (DN 50)** and Larger: Capable of joining PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - 1) Fiber-reinforced plastic body.
 - 2) PE body tube.
 - 3) Buna-nitrile seals.
 - 4) Acetal collets.
 - 5) Stainless-steel bolts, nuts, and washers.
 - g. Steel Mechanical Couplings: Capable of joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.
 - 1) Stainless-steel **OR Steel, as directed**, flanges and tube with epoxy finish.
 - 2) Buna-nitrile seals.
 - 3) Stainless-steel **OR Steel, as directed**, bolts, washers, and nuts.
 - 4) Factory-installed anode for steel-body couplings installed underground.

B. Piping Specialties

1. Appliance Flexible Connectors:
 - a. Indoor, Fixed-Appliance Flexible Connectors: Comply with ANSI Z21.24.
 - b. Indoor, Movable-Appliance Flexible Connectors: Comply with ANSI Z21.69.
 - c. Outdoor, Appliance Flexible Connectors: Comply with ANSI Z21.75.
 - d. Corrugated stainless-steel tubing with polymer coating.
 - e. Operating-Pressure Rating: **0.5 psig (3.45 kPa)**.
 - f. End Fittings: Zinc-coated steel.
 - g. Threaded Ends: Comply with ASME B1.20.1.
 - h. Maximum Length: **72 inches (1830 mm)**.
2. Quick-Disconnect Devices: Comply with ANSI Z21.41.
 - a. Copper-alloy convenience outlet and matching plug connector.
 - b. Nitrile seals.
 - c. Hand operated with automatic shutoff when disconnected.
 - d. For indoor or outdoor applications.
 - e. Adjustable, retractable restraining cable.
3. Y-Pattern Strainers:
 - a. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.
 - c. Strainer Screen: **40 OR 60, as directed**,-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: **125 psig (862 kPa)**.
4. Basket Strainers:
 - a. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.
 - c. Strainer Screen: **40 OR 60, as directed**,-mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: **125 psig (862 kPa)**.
5. T-Pattern Strainers:
 - a. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
 - b. End Connections: Grooved ends.
 - c. Strainer Screen: **40 OR 60, as directed**,-mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
 - d. CWP Rating: **750 psig (5170 kPa)**.
6. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

C. Joining Materials

1. Joint Compound and Tape: Suitable for natural gas.
2. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
3. Brazing Filler Metals: Alloy with melting point greater than **1000 deg F (540 deg C)** complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.

D. Manual Gas Shutoff Valves

1. See "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles for where each valve type is applied in various services.
2. General Requirements for Metallic Valves, **NPS 2 (DN 50)** and Smaller: Comply with ASME B16.33.
 - a. CWP Rating: **125 psig (862 kPa)**.

- b. Threaded Ends: Comply with ASME B1.20.1.
- c. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
- d. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
- e. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction for valves **1 inch (25 mm)** and smaller.
- f. Service Mark: Valves **1-1/4 inches (32 mm)** to **NPS 2 (DN 50)** shall have initials "WOG" permanently marked on valve body.
3. General Requirements for Metallic Valves, **NPS 2-1/2 (DN 65)** and Larger: Comply with ASME B16.38.
 - a. CWP Rating: **125 psig (862 kPa)**.
 - b. Flanged Ends: Comply with ASME B16.5 for steel flanges.
 - c. Tamperproof Feature: Locking feature for valves indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - d. Service Mark: Initials "WOG" shall be permanently marked on valve body.
4. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
 - a. Body: Bronze, complying with ASTM B 584.
 - b. Ball: Chrome-plated brass.
 - c. Stem: Bronze; blowout proof.
 - d. Seats: Reinforced TFE; blowout proof.
 - e. Packing: Separate packnut with adjustable-stem packing threaded ends.
 - f. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - g. CWP Rating: **600 psig (4140 kPa)**.
 - h. Listing: Valves **NPS 1 (DN 25)** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - i. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
5. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
 - a. Body: Bronze, complying with ASTM B 584.
 - b. Ball: Chrome-plated bronze.
 - c. Stem: Bronze; blowout proof.
 - d. Seats: Reinforced TFE; blowout proof.
 - e. Packing: Threaded-body packnut design with adjustable-stem packing.
 - f. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - g. CWP Rating: **600 psig (4140 kPa)**.
 - h. Listing: Valves **NPS 1 (DN 25)** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - i. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
6. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.
 - a. Body: Bronze, complying with ASTM B 584.
 - b. Ball: Chrome-plated bronze.
 - c. Stem: Bronze; blowout proof.
 - d. Seats: Reinforced TFE.
 - e. Packing: Threaded-body packnut design with adjustable-stem packing.
 - f. Ends: Threaded, flared, or socket as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - g. CWP Rating: **600 psig (4140 kPa)**.
 - h. Listing: Valves **NPS 1 (DN 25)** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - i. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
7. Bronze Plug Valves: MSS SP-78.
 - a. Body: Bronze, complying with ASTM B 584.
 - b. Plug: Bronze.

- c. Ends: Threaded, socket, or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
- d. Operator: Square head or lug type with tamperproof feature where indicated.
- e. Pressure Class: **125 psig (862 kPa)**.
- f. Listing: Valves **NPS 1 (DN 25)** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
- g. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- 8. Cast-Iron, Nonlubricated Plug Valves: MSS SP-78.
 - a. Body: Cast iron, complying with ASTM A 126, Class B.
 - b. Plug: Bronze or nickel-plated cast iron.
 - c. Seat: Coated with thermoplastic.
 - d. Stem Seal: Compatible with natural gas.
 - e. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - f. Operator: Square head or lug type with tamperproof feature where indicated.
 - g. Pressure Class: **125 psig (862 kPa)**.
 - h. Listing: Valves **NPS 1 (DN 25)** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - i. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- 9. Cast-Iron, Lubricated Plug Valves: MSS SP-78.
 - a. Body: Cast iron, complying with ASTM A 126, Class B.
 - b. Plug: Bronze or nickel-plated cast iron.
 - c. Seat: Coated with thermoplastic.
 - d. Stem Seal: Compatible with natural gas.
 - e. Ends: Threaded or flanged as indicated in "Underground Manual Gas Shutoff Valve Schedule" and "Aboveground Manual Gas Shutoff Valve Schedule" Articles.
 - f. Operator: Square head or lug type with tamperproof feature where indicated.
 - g. Pressure Class: **125 psig (862 kPa)**.
 - h. Listing: Valves **NPS 1 (DN 25)** and smaller shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - i. Service: Suitable for natural-gas service with "WOG" indicated on valve body.
- 10. PE Ball Valves: Comply with ASME B16.40.
 - a. Body: PE.
 - b. Ball: PE.
 - c. Stem: Acetal.
 - d. Seats and Seals: Nitrile.
 - e. Ends: Plain or fusible to match piping.
 - f. CWP Rating: **80 psig (552 kPa)**.
 - g. Operating Temperature: **Minus 20 to plus 140 deg F (Minus 29 to plus 60 deg C)**.
 - h. Operator: Nut or flat head for key operation.
 - i. Include plastic valve extension.
 - j. Include tamperproof locking feature for valves where indicated on Drawings.
- 11. Valve Boxes:
 - a. Cast-iron, two-section box.
 - b. Top section with cover with "GAS" lettering.
 - c. Bottom section with base to fit over valve and barrel a minimum of **5 inches (125 mm)** in diameter.
 - d. Adjustable cast-iron extensions of length required for depth of bury.
 - e. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head, and with stem of length required to operate valve.
- E. Motorized Gas Valves
 - 1. Automatic Gas Valves: Comply with ANSI Z21.21.
 - a. Body: Brass or aluminum.
 - b. Seats and Disc: Nitrile rubber.
 - c. Springs and Valve Trim: Stainless steel.

- d. Normally closed.
 - e. Visual position indicator.
 - f. Electrical **OR** Mechanical, **as directed**, operator for actuation by appliance automatic shutoff device.
2. Electrically Operated Valves: Comply with UL 429.
- a. Pilot operated.
 - b. Body: Brass or aluminum.
 - c. Seats and Disc: Nitrile rubber.
 - d. Springs and Valve Trim: Stainless steel.
 - e. 120-V ac, 60 Hz, Class B, continuous-duty molded coil, and replaceable.
 - f. NEMA ICS 6, Type 4, coil enclosure.
 - g. Normally closed.
 - h. Visual position indicator.
- F. Earthquake Valves
1. Earthquake Valves: Comply with ASCE 25.
- a. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - b. Maximum Operating Pressure: **5 psig (34.5 kPa)**.
 - c. Cast-aluminum body with nickel-plated chrome steel internal parts.
 - d. Nitrile-rubber valve washer.
 - e. Sight windows for visual indication of valve position.
 - f. Threaded end connections complying with ASME B1.20.1.
 - g. Wall mounting bracket with bubble level indicator.
2. Earthquake Valves: Comply with ASCE 25.
- a. Listing: Listed and labeled by an NRTL acceptable to authorities having jurisdiction.
 - b. Maximum Operating Pressure: **0.5 psig (3.45 kPa) OR 7 psig (48 kPa) OR 60 psig (414 kPa), as directed**.
 - c. Cast-aluminum body with stainless-steel internal parts.
 - d. Nitrile-rubber, reset-stem o-ring seal.
 - e. Valve position, open or closed, indicator.
 - f. Composition valve seat with clapper held by spring or magnet locking mechanism.
 - g. Level indicator.
 - h. End Connections: Threaded for valves **NPS 2 (DN 50)** and smaller; flanged for valves **NPS 2-1/2 (DN 65)** and larger.
- G. Pressure Regulators
1. General Requirements:
- a. Single stage and suitable for natural gas.
 - b. Steel jacket and corrosion-resistant components.
 - c. Elevation compensator.
 - d. End Connections: Threaded for regulators **NPS 2 (DN 50)** and smaller; flanged for regulators **NPS 2-1/2 (DN 65)** and larger.
2. Service Pressure Regulators: Comply with ANSI Z21.80.
- a. Body and Diaphragm Case: Cast iron or die-cast aluminum.
 - b. Springs: Zinc-plated steel; interchangeable.
 - c. Diaphragm Plate: Zinc-plated steel.
 - d. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
 - e. Orifice: Aluminum; interchangeable.
 - f. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 - g. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
 - h. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
 - i. Overpressure Protection Device: Factory mounted on pressure regulator.

- j. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
 - k. Maximum Inlet Pressure: **100 psig (690 kPa)**.
 - 3. Line Pressure Regulators: Comply with ANSI Z21.80.
 - a. Body and Diaphragm Case: Cast iron or die-cast aluminum.
 - b. Springs: Zinc-plated steel; interchangeable.
 - c. Diaphragm Plate: Zinc-plated steel.
 - d. Seat Disc: Nitrile rubber resistant to gas impurities, abrasion, and deformation at the valve port.
 - e. Orifice: Aluminum; interchangeable.
 - f. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 - g. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet, and no pressure sensing piping external to the regulator.
 - h. Pressure regulator shall maintain discharge pressure setting downstream, and not exceed 150 percent of design discharge pressure at shutoff.
 - i. Overpressure Protection Device: Factory mounted on pressure regulator.
 - j. Atmospheric Vent: Factory- or field-installed, stainless-steel screen in opening if not connected to vent piping.
 - k. Maximum Inlet Pressure: **2 psig (13.8 kPa) OR 5 psig (34.5 kPa) OR 10 psig (69 kPa), as directed.**
 - 4. Appliance Pressure Regulators: Comply with ANSI Z21.18.
 - a. Body and Diaphragm Case: Die-cast aluminum.
 - b. Springs: Zinc-plated steel; interchangeable.
 - c. Diaphragm Plate: Zinc-plated steel.
 - d. Seat Disc: Nitrile rubber.
 - e. Seal Plug: Ultraviolet-stabilized, mineral-filled nylon.
 - f. Factory-Applied Finish: Minimum three-layer polyester and polyurethane paint finish.
 - g. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
 - h. Maximum Inlet Pressure: **1 psig (6.9 kPa) OR 2 psig (13.8 kPa) OR 5 psig (34.5 kPa), as directed.**
- H. Service Meters
- 1. Diaphragm-Type Service Meters: Comply with ANSI B109.1 **OR** ANSI B109.2, **as directed.**
 - a. Case: Die-cast aluminum.
 - b. Connections: Steel threads.
 - c. Diaphragm: Synthetic fabric.
 - d. Diaphragm Support Bearings: Self-lubricating.
 - e. Compensation: Continuous temperature and pressure, **as directed.**
 - f. Meter Index: Cubic feet **OR** Liters **OR** Cubic feet and liters, **as directed.**
 - g. Meter Case and Index: Tamper resistant.
 - h. Remote meter reader compatible.
 - i. Maximum Inlet Pressure: **100 psig (690 kPa)**.
 - j. Pressure Loss: Maximum **0.5-inch wg (124 Pa) OR 2.0-inch wg (498 Pa), as directed.**
 - k. Accuracy: Maximum plus or minus 1.0 percent.
 - 2. Rotary-Type Service Meters: Comply with ANSI B109.3.
 - a. Case: Extruded aluminum.
 - b. Connection: Flange.
 - c. Impellers: Polished aluminum.
 - d. Rotor Bearings: Self-lubricating.
 - e. Compensation: Continuous temperature and pressure, **as directed.**
 - f. Meter Index: Cubic feet **OR** Liters **OR** Cubic feet and liters, **as directed.**
 - g. Tamper resistant.
 - h. Remote meter reader compatible.
 - i. Maximum Inlet Pressure: **100 psig (690 kPa)**.
 - j. Accuracy: Maximum plus or minus 2.0 percent.

3. Turbine Meters: Comply with ASME MFC-4M.
 - a. Housing: Cast iron or welded steel.
 - b. Connection Threads or Flanges: Steel.
 - c. Turbine: Aluminum or plastic.
 - d. Turbine Bearings: Self-lubricating.
 - e. Compensation: Continuous temperature and pressure, **as directed**.
 - f. Meter Index: Cubic feet **OR** Liters **OR** Cubic feet and liters, **as directed**.
 - g. Tamper resistant.
 - h. Remote meter reader compatible.
 - i. Maximum Inlet Pressure: **100 psig (690 kPa)**.
 - j. Accuracy: Maximum plus or minus 2.0 percent.
 4. Service-Meter Bars:
 - a. Malleable- or cast-iron frame for supporting service meter.
 - b. Include offset swivel pipes, meter nuts with o-ring seal, and factory- or field-installed dielectric unions.
 - c. Omit meter offset swivel pipes if service-meter bar dimensions match service-meter connections.
 5. Service-Meter Bypass Fittings:
 - a. Ferrous, tee, pipe fitting with capped side inlet for temporary natural-gas supply.
 - b. Integral ball-check bypass valve.
- I. Dielectric Fittings
1. Dielectric Unions:
 - a. Minimum Operating-Pressure Rating: **150 psig (1034 kPa)**.
 - b. Combination fitting of copper alloy and ferrous materials.
 - c. Insulating materials suitable for natural gas.
 - d. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.
 2. Dielectric Flanges:
 - a. Minimum Operating-Pressure Rating: **150 psig (1034 kPa)**.
 - b. Combination fitting of copper alloy and ferrous materials.
 - c. Insulating materials suitable for natural gas.
 - d. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.
 3. Dielectric-Flange Kits:
 - a. Minimum Operating-Pressure Rating: **150 psig (1034 kPa)**.
 - b. Companion-flange assembly for field assembly.
 - c. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or PE bolt sleeves, phenolic washers, and steel backing washers.
 - d. Insulating materials suitable for natural gas.
 - e. Combination fitting of copper alloy and ferrous materials with threaded, brazed-joint, plain, or welded end connections that match piping system materials.
- J. Sleeves
1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
- K. Mechanical Sleeve Seals
1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe and sleeve.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**.

- c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one nut and bolt for each sealing element.

L. Escutcheons

1. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to fit around pipe or tube, and OD that completely covers opening.
2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn, box-shaped brass with polished chrome-plated finish.
3. One-Piece, Cast-Brass Escutcheons: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
4. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
5. One-Piece, Stamped-Steel Escutcheons: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
6. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
7. One-Piece, Floor-Plate Escutcheons: Cast-iron floor plate.
8. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.

M. Grout

1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.
 - a. Characteristics: Post-hardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
 - b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
 - c. Packaging: Premixed and factory packaged.

N. Labeling And Identifying

1. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of **6 inches (150 mm)** wide and **4 mils (0.1 mm)** thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to **30 inches (750 mm)** deep; colored yellow.

1.3 EXECUTION

A. Preparation

1. Close equipment shutoff valves before turning off natural gas to premises or piping section.
2. Inspect natural-gas piping according to NFPA 54 **OR** the International Fuel Gas Code, **as directed**, to determine that natural-gas utilization devices are turned off in piping section affected.
3. Comply with NFPA 54 **OR** the International Fuel Gas Code, **as directed**, requirements for prevention of accidental ignition.

B. Outdoor Piping Installation

1. Comply with NFPA 54 **OR** the International Fuel Gas Code, **as directed**, for installation and purging of natural-gas piping.
2. Install underground, natural-gas piping buried at least **36 inches (900 mm)** below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
 - a. If natural-gas piping is installed less than **36 inches (900 mm)** below finished grade, install it in containment conduit.
3. Install underground, PE, natural-gas piping according to ASTM D 2774.
4. Steel Piping with Protective Coating:
 - a. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.

- b. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.

OR

Replace pipe having damaged PE coating with new pipe.

5. Copper Tubing with Protective Coating:
 - a. Apply joint cover kits over tubing to cover, seal, and protect joints.
 - b. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
6. Install fittings for changes in direction and branch connections.
7. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 - a. Install steel pipe for sleeves smaller than **6 inches (150 mm)** in diameter.
 - b. Install cast-iron "wall pipes" for sleeves **6 inches (150 mm)** and larger in diameter.
8. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
9. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
10. Install pressure gage downstream **OR** upstream and downstream, **as directed**, from each service regulator. Pressure gages are specified in Division 23 Section "Meters And Gages For Hvac Piping".

C. Indoor Piping Installation

1. Comply with NFPA 54 **OR** the International Fuel Gas Code, **as directed**, for installation and purging of natural-gas piping.
2. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
3. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
4. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
5. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
6. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
7. Locate valves for easy access.
8. Install natural-gas piping at uniform grade of 2 percent down toward drip and sediment traps.
9. Install piping free of sags and bends.
10. Install fittings for changes in direction and branch connections.
11. Install escutcheons at penetrations of interior walls, ceilings, and floors.
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - 2) Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

OR

Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - 3) Piping at Ceiling Penetrations in Finished Spaces: One-piece **OR** Split-casting, **as directed**, cast-brass type with polished chrome-plated finish.

- Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type **OR** Split-plate, stamped-steel type with concealed hinge, **as directed**, and set screw.
- 4) Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
Piping in Unfinished Service Spaces: One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - 5) Piping in Equipment Rooms: One-piece, cast-brass type.

Piping in Equipment Rooms: One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - 6) Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
- b. Existing Piping:
- 1) Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
OR
Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - 2) Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
OR
Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
 - 3) Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw or spring clips.
 - 4) Piping in Equipment Rooms: Split-casting, cast-brass type.
OR
Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.
 - 5) Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
12. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
 13. Verify final equipment locations for roughing-in.
 14. Comply with requirements in Sections specifying gas-fired appliances and equipment for roughing-in requirements.
 15. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - a. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than **3 inches (75 mm)** long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
 16. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
 17. Conceal pipe installations in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
 18. Concealed Location Installations: Except as specified below, install concealed natural-gas piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.

- a. Above Accessible Ceilings: Natural-gas piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
 - b. In Floors: Install natural-gas piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of **1-1/2 inches (38 mm)** of concrete. Piping may not be in physical contact with other metallic structures such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
 - c. In Floor Channels: Install natural-gas piping in floor channels. Channels must have cover and be open to space above cover for ventilation.
 - d. In Walls or Partitions: Protect tubing installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
 - 1) Exception: Tubing passing through partitions or walls does not require striker barriers.
 - e. Prohibited Locations:
 - 1) Do not install natural-gas piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - 2) Do not install natural-gas piping in solid walls or partitions.
19. Use concentric reducer fittings to make reductions in pipe sizes.
 20. Connect branch piping from top or side of horizontal piping.
 21. Install unions in pipes **NPS 2 (DN 50)** and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
 22. Do not use natural-gas piping as grounding electrode.
 23. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
 24. Install pressure gage downstream **OR** upstream and downstream, **as directed**, from each line regulator. Pressure gages are specified in Division 23 Section "Meters And Gages For Hvac Piping".
- D. Service-Meter Assembly Installation
1. Install service-meter assemblies aboveground, on concrete bases.
 2. Install metal shutoff valves upstream from service regulators. Shutoff valves are not required at second regulators if two regulators are installed in series.
 3. Install strainer on inlet of service-pressure regulator and meter set.
 4. Install service regulators mounted outside with vent outlet horizontal or facing down. Install screen in vent outlet if not integral with service regulator.
 5. Install metal shutoff valves upstream from service meters. Install dielectric fittings downstream from service meters.
 6. Install service meters downstream from pressure regulators.
 7. Install metal bollards to protect meter assemblies. Comply with requirements in Division 05 Section "Metal Fabrications" for pipe bollards.
- E. Valve Installation
1. Install manual gas shutoff valve for each gas appliance ahead of corrugated stainless-steel tubing, aluminum, or copper connector.
 2. Install underground valves with valve boxes.
 3. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
 4. Install earthquake valves aboveground outside buildings according to listing.
 5. Install anode for metallic valves in underground PE piping.
- F. Piping Joint Construction
1. Ream ends of pipes and tubes and remove burrs.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Threaded Joints:

- a. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - b. Cut threads full and clean using sharp dies.
 - c. Ream threaded pipe ends to remove burrs and restore full inside diameter of pipe.
 - d. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - e. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
4. Welded Joints:
 - a. Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators.
 - b. Bevel plain ends of steel pipe.
 - c. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
 5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
 6. Flanged Joints: Install gasket material, size, type, and thickness appropriate for natural-gas service. Install gasket concentrically positioned.
 7. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
 8. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - a. Plain-End Pipe and Fittings: Use butt fusion.
 - b. Plain-End Pipe and Socket Fittings: Use socket fusion.
- G. Hanger And Support Installation
1. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 2. Comply with requirements for pipe hangers and supports specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
 3. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - a. **NPS 1 (DN 25)** and Smaller: Maximum span, **96 inches (2438 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - b. **NPS 1-1/4 (DN 32)**: Maximum span, **108 inches (2743 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - c. **NPS 1-1/2 and NPS 2 (DN 40 and DN 50)**: Maximum span, **108 inches (2743 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 2-1/2 to NPS 3-1/2 (DN 65 to DN 90)**: Maximum span, **10 feet (3 m)**; minimum rod size, **1/2 inch (13 mm)**.
 - e. **NPS 4 (DN 100)** and Larger: Maximum span, **10 feet (3 m)**; minimum rod size, **5/8 inch (15.8 mm)**.
 4. Install hangers for horizontal drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:
 - a. **NPS 3/8 (DN 10)**: Maximum span, **48 inches (1220 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - b. **NPS 1/2 and NPS 5/8 (DN 15 and DN 18)**: Maximum span, **72 inches (1830 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - c. **NPS 3/4 and NPS 7/8 (DN 20 and DN 22)**: Maximum span, **84 inches (2134 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 1 (DN 25)**: Maximum span, **96 inches (2440 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 5. Install hangers for horizontal, corrugated stainless-steel tubing with the following maximum spacing and minimum rod sizes:
 - a. **NPS 3/8 (DN 10)**: Maximum span, **48 inches (1220 mm)**; minimum rod size, **3/8 inch (10 mm)**.

- b. **NPS 1/2 (DN 15)**: Maximum span, **72 inches (1830 mm)**; minimum rod size, **3/8 inch (10 mm)**.
- c. **NPS 3/4 (DN 20)** and Larger: Maximum span, **96 inches (2440 mm)**; minimum rod size, **3/8 inch (10 mm)**.

H. Connections

- 1. Connect to utility's gas main according to utility's procedures and requirements.
- 2. Install natural-gas piping electrically continuous, and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance according to NFPA 70.
- 3. Install piping adjacent to appliances to allow service and maintenance of appliances.
- 4. Connect piping to appliances using manual gas shutoff valves and unions. Install valve within **72 inches (1800 mm)** of each gas-fired appliance and equipment. Install union between valve and appliances or equipment.
- 5. Sediment Traps: Install tee fitting with capped nipple in bottom to form drip, as close as practical to inlet of each appliance.

I. Labeling And Identifying

- 1. Comply with requirements in Division 23 Section "Identification For Hvac Piping And Equipment" for piping and valve identification.
OR
Install detectable warning tape directly above gas piping, **12 inches (300 mm)** below finished grade, except **6 inches (150 mm)** below subgrade under pavements and slabs.

J. Painting

- 1. Comply with requirements in Division 07 for painting interior and exterior natural-gas piping.
- 2. Paint exposed, exterior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 - a. Alkyd System: MPI EXT 5.1D.
 - 1) Prime Coat: Alkyd anticorrosive metal primer.
 - 2) Intermediate Coat (for a Premium Grade system): Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - 4) Color: Gray, **unless directed otherwise**.
- 3. Paint exposed, interior metal piping, valves, service regulators, service meters and meter bars, earthquake valves, and piping specialties, except components, with factory-applied paint or protective coating.
 - a. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for a Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - 4) Color: Gray, **unless directed otherwise**.
 - b. Alkyd System: MPI INT 5.1E.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for a Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - 4) Color: Gray, **unless directed otherwise**.
- 4. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

K. Concrete Bases

- 1. Concrete Bases: Anchor equipment to concrete base according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.

- b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of the base.
 - c. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - f. Use **3000-psig (20.7-MPa)**, **unless directed otherwise**, 28-day, compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".
- L. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Test, inspect, and purge natural gas according to NFPA 54 **OR** the International Fuel Gas Code, **as directed**, and authorities having jurisdiction.
 3. Natural-gas piping will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- M. Outdoor Piping Schedule
1. Underground natural-gas piping shall be one of the following:
 - a. PE pipe and fittings joined by heat fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.
 - b. Steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.
 - c. Annealed **OR** Drawn, **as directed**,-temper copper tube with wrought-copper fittings and brazed joints. Coat pipe and fittings with protective coating for copper tubing.
 2. Aboveground natural-gas piping shall be one of the following:
 - a. Steel pipe with malleable-iron fittings and threaded joints.
 - b. Steel pipe with wrought-steel fittings and welded joints.
 - c. Annealed **OR** Drawn, **as directed**,-temper copper tube with wrought-copper fittings and brazed joints.
 3. Branch Piping in Cast-in-Place Concrete to Single Appliance: Annealed-temper copper tube with wrought-copper fittings and brazed **OR** flared, **as directed**, joints. Install piping embedded in concrete with no joints in concrete.
 4. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
- N. Indoor Piping Schedule For System Pressures Less Than **0.5 psig (3.45 kPa)**
1. Aboveground, branch piping **NPS 1 (DN 25)** and smaller shall be one of the following:
 - a. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
 - b. Annealed-temper, tin-lined copper tube with flared joints and fittings.
 - c. Annealed-temper, copper tube with wrought-copper fittings and brazed **OR** flared, **as directed**, joints.
 - d. Aluminum tube with flared fittings and joints.
 - e. Steel pipe with malleable-iron fittings and threaded joints.
 2. Aboveground, distribution piping shall be one of the following:
 - a. Steel pipe with malleable-iron fittings and threaded joints.
 - b. Steel pipe with wrought-steel fittings and welded joints.
 - c. Drawn-temper copper tube with wrought-copper fittings and brazed joints.
 3. Underground, below building, piping shall be one of the following:
 - a. Steel pipe with malleable-iron fittings and threaded joints.
 - b. Steel pipe with wrought-steel fittings and welded joints.
 4. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.

5. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.
- O. Indoor Piping Schedule For System Pressures More Than **0.5 psig (3.45 kPa)** And Less Than **5 psig (34.5 kPa)**
1. Aboveground, branch piping **NPS 1 (DN 25)** and smaller shall be one of the following:
 - a. Corrugated stainless-steel tubing with mechanical fittings having socket or threaded ends to match adjacent piping.
 - b. Annealed-temper, tin-lined copper tube with flared joints and fittings.
 - c. Annealed-temper, copper tube with wrought-copper fittings and brazed **OR** flared, **as directed**, joints.
 - d. Aluminum tube with flared fittings and joints.
 - e. Steel pipe with malleable-iron fittings and threaded joints.
 2. Aboveground, distribution piping shall be one of the following:
 - a. Steel pipe with malleable-iron fittings and threaded joints.
 - b. Steel pipe with steel welding fittings and welded joints.
 - c. Drawn-temper copper tube with wrought-copper fittings and brazed joints.
 3. Underground, below building, piping shall be one of the following:
 - a. Steel pipe with malleable-iron fittings and threaded joints.
 - b. Steel pipe with wrought-steel fittings and welded joints.
 4. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat underground pipe and fittings with protective coating for steel piping.
 5. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.
- P. Indoor Piping Schedule For System Pressures More Than **5 psig (34.5 kPa)**
1. Aboveground Piping: Maximum operating pressure more than **5 psig (34.5 kPa)**.
 2. Aboveground, Branch Piping: Steel pipe with steel welding fittings and welded joints.
 3. Aboveground, distribution piping shall be one of the following:
 - a. Steel pipe with steel welding fittings and welded joints.
 - b. Drawn-temper copper tube with wrought-copper fittings and brazed joints.
 4. Underground, below building, piping shall be one of the following:
 - a. Steel pipe with malleable-iron fittings and threaded joints.
 - b. Steel pipe with wrought-steel fittings and welded joints.
 5. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
 6. Containment Conduit Vent Piping: Steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.
- Q. Underground Manual Gas Shutoff Valve Schedule
1. Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping utility's gas mains and listed by an NRTL.
 2. Underground:
 - a. PE valves.
 - b. **NPS 2 (DN 50)** and Smaller: Bronze plug valves.
 - c. **NPS 2-1/2 (DN 65)** and Larger: Cast-iron, lubricated **OR** nonlubricated, **as directed**, plug valves.
- R. Aboveground Manual Gas Shutoff Valve Schedule
1. Valves for pipe sizes **NPS 2 (DN 50)** and smaller at service meter shall be one of the following:
 - a. One-piece, bronze ball valve with bronze trim.
 - b. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.

- c. Bronze plug valve.
2. Valves for pipe sizes **NPS 2-1/2 (DN 65)** and larger at service meter shall be one of the following:
 - a. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.
 - b. Bronze plug valve.
 - c. Cast-iron, nonlubricated plug valve.
3. Distribution piping valves for pipe sizes **NPS 2 (DN 50)** and smaller shall be one of the following:
 - a. One-piece, bronze ball valve with bronze trim.
 - b. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.
 - c. Bronze plug valve.
4. Distribution piping valves for pipe sizes **NPS 2-1/2 (DN 65)** and larger shall be one of the following:
 - a. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.
 - b. Bronze plug valve.
 - c. Cast-iron, nonlubricated **OR** lubricated, **as directed**, plug valve.
5. Valves in branch piping for single appliance shall be one of the following:
 - a. One-piece, bronze ball valve with bronze trim.
 - b. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.
 - c. Bronze plug valve.

END OF SECTION 23 11 23 00

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SECTION 23 11 23 00a - FACILITY LIQUEFIED-PETROLEUM GAS PIPING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes LPG distribution pipe, fittings, related components, and appurtenances that convey liquefied-petroleum gas (LPG) in its vapor phase from point of connection with existing or new storage container, or from utility service main to building service.
- B. Products include the following:
 - 1. Steel pipe and fittings.
 - 2. CSST and fittings.
 - 3. Aluminum tubing and fittings.
 - 4. Copper tubing and fittings.
 - 5. PE pipe, tubing, and fittings.
 - 6. Polyamide pipe, tubing, and fittings.
 - 7. Mechanical couplings.
 - 8. Piping specialties.
 - 9. Valves.
 - 10. Pressure regulators.
 - 11. Service meters.
 - 12. Dielectric fittings.
 - 13. Storage containers.
 - 14. Vaporizers.

1.2 DEFINITIONS

- A. CSST: Corrugated stainless steel tubing.
- B. CWP: Cold working pressure.
- C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- E. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
- F. LPG: Liquefied-petroleum gas.
- G. PE: Polyethylene.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of the following:

1. Piping specialties.
 2. CSST with associated components.
 3. Valves: Include pressure rating, capacity, settings, and electrical connection data of selected models.
 4. Pressure Regulators: Indicate pressure ratings and capacities.
 5. Service Meters: Indicate pressure ratings and capacities. Include bypass fittings, meter bars, and supports.
 6. Dielectric fittings.
 7. Storage containers.
 8. Transport truck-unloading specialties.
 9. Vaporizers.
- B. Shop Drawings: Provide plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
1. Shop Drawings Scale: **[1/4 inch per foot (1:50)]** or as directed by the Owner .
 2. Detail mounting, supports, and valve arrangements for service meter assembly and pressure regulator assembly.
- C. Delegated Design Submittals: Comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Detail fabrication and assembly of seismic restraints.
 2. Design Calculations: Calculate requirements for selecting seismic restraints.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Plans and details, drawn to scale, on which LPG piping is indicated and coordinated with other installations, using input from installers of the items involved.
- B. Site Survey: Plans, drawn to scale, on which LPG piping is shown and coordinated with other services and utilities.
- C. Seismic Qualification Data: Submit certification that vaporizer, air mixer, storage container supports, accessories, and components will withstand seismic forces defined in Section 230548 "Vibration and Seismic Controls for HVAC." Include the following:
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Certificates:
1. Welding certificates.
- E. Field Quality-Control Submittals:
1. Field quality-control reports.

F. Qualification Statements: For professional engineer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For LPG equipment and accessories.

1.6 QUALITY ASSURANCE

A. Steel Support Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators in accordance with ASME BVPC.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Handling Flammable Liquids: Remove and dispose of liquids from existing LPG piping according to requirements of authorities having jurisdiction.

B. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

C. Store pipes and tubes with protective PE coating to avoid damaging coating and protect from direct sunlight.

D. Protect stored PE pipes, tubing, and valves from direct sunlight.

1.8 PROJECT CONDITIONS

A. Perform site survey, research public utility records, and verify existing utility locations. Contact utility-locating service for area where Project is located.

B. Interruption of Existing LPG Service: Do not interrupt LPG service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide purging and startup of LPG supply according to requirements indicated:

1. Notify **[Architect] [Construction Manager] [Owner]** no fewer than **[two]** days or as directed by the Owner in advance of proposed interruption of LPG service.
2. Do not proceed with interruption of LPG service without **[Architect's] [Construction Manager's] [Owner's]** written permission.

1.9 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

B. Coordinate requirements for access panels and doors for valves installed concealed behind finished surfaces. Comply with requirements in Section 083113 "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 SOURCE LIMITATIONS

- A. Obtain each product type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of NFPA 58[, and] [, **NFPA 54**] [, and] [, **the International Fuel Gas Code**] for LPG distribution system, including materials, installation, and testing.
- B. Comply with requirements of authorities having jurisdiction.
- C. Comply with requirements of utility company supplying LPG.
- D. Minimum Operating-Pressure Ratings:
1. Minimum Operating Pressure for Piping and Valves: [**125 psig (862 kPa)**] or as directed by the Owner unless otherwise indicated.
 2. Minimum Operating Pressure of Service Meter: [**5 psig (34.5 kPa)**] [**10 psig (69 kPa)**] [**20 psig (138 kPa)**] [**65 psig (450 kPa)**] or as directed by the Owner .
- E. LPG System Pressure within Buildings:
1. System Pressure within Buildings, One Pressure Range: [**0.5 psig (3.45 kPa) or less**] [**More than 0.5 psig (3.45 kPa) but not more than 2 psig (13.8 kPa)**] [**More than 2 psig (13.8 kPa) but not more than 5 psig (34.5 kPa)**].
 2. System Pressure within Buildings, Two Pressure Ranges, Not More Than **2 psig (13.8 kPa)**: Primary pressure is more than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa)** and is reduced to secondary pressure of **0.5 psig (3.45 kPa)** or less.
 3. System Pressure within Buildings, Two Pressure Ranges, Not More Than **5 psig (34.5 kPa)**: Primary pressure is more than **2 psig (13.8 kPa)** but not more than **5 psig (34.5 kPa)** and is reduced to secondary pressure of more than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa)**.
 4. System Pressure within Buildings, Three Pressure Ranges: Primary pressure is more than **2 psig (13.8 kPa)** but not more than **5 psig (34.5 kPa)**, is reduced to secondary pressures of more than **0.5 psig (3.45 kPa)** but not more than **2 psig (13.8 kPa)**, and is reduced again to pressures of **0.5 psig (3.45 kPa)** or less.
- F. Delegated Design: Design restraints and anchors for LPG piping and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- H. Seismic Performance: Vaporizers and storage container supports are to withstand the effects of earthquake motions determined in accordance with [**ASCE/SEI 7**] or as directed by the Owner . See Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment."

1. The term "withstand" means "the piping/unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified[**and the piping system will be fully operational after the seismic event**]."
2. Component Importance Factor: **[1.5] [1.0]**.
3. **Requirements for Component Amplification Factor and Component Response Modification Factor** as directed by the Owner .

2.3 PIPE, TUBING, AND FITTINGS

A. Steel Pipe and Fittings:

1. Steel Pipe: ASTM A53/A53M black steel, Schedules 40 and 80, Type E or S, Grade B.
2. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
3. Wrought-Steel Welding Fittings: ASTM A234/A234M for butt welding and socket welding.
4. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
5. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Threaded or butt welding to match pipe.
 - c. Lapped Face: Not permitted underground.
 - d. Gasket Materials: ASME B16.20, metallic, flat, asbestos free, aluminum o-rings, and spiral-wound metal gaskets.
 - e. Bolts and Nuts: ASME B18.2.1, carbon steel aboveground, and stainless steel underground.
6. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - a. Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.

B. CSST and Fittings:

1. CSST:
 - a. Standard: ANSI LC 1/CSA 6.26.
 - b. Tubing: ASTM A240/A240M, corrugated, Series 300 stainless steel.
 - c. Jacket - Electrically Insulative and UV-Resistant Polymer with Flame Retardant:
 - 1) Surface-Burning Characteristics: As determined by testing identical products in accordance with ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a) Flame-Spread Index: **[25]** or as directed by the Owner .
 - b) Smoke-Developed Index: **[50] [450]** or as directed by the Owner .
 - d. Jacket - with Fully Vent-Capable PE Sleeve: Include associated fittings suitable for locations requiring vented containment.
2. Fittings: Copper-alloy mechanical fittings with ends made to fit and listed for use with CSST and suitable for metal-to-metal seal without gaskets. Include brazing socket or threaded ends complying with ASME B1.20.1.
3. Striker Plates: Steel, designed to protect tubing from penetrations.

4. Manifolds: Malleable iron or steel with factory-applied protective coating. Threaded connections are to comply with ASME B1.20.1 for pipe inlet and corrugated tubing outlets.
5. Operating-Pressure Rating: **25 psig (172 kPa)**.

C. Aluminum Tubing and Fittings:

1. Aluminum Tubing: ASTM B210/B210M and ASTM B241/B241M.
 - a. Material: Aluminum Alloy 5456 is prohibited.
2. Flare Fittings: Comply with ASME B16.26 and SAE J513.
 - a. Copper-alloy fittings.
 - b. Metal-to-metal compression seal without gasket.
 - c. Dryseal threads are to comply with ASME B1.20.3.
3. Protective Coating: Factory-applied coating suitable for resisting corrosion on tubing in contact with masonry, plaster, insulation, water, detergents, and sewerage.

D. Copper Tubing and Fittings:

1. Drawn-Temper Copper Tube: **[ASTM B88, Type K (ASTM B88M, Type A)] [ASTM B88, Type L (ASTM B88M, Type B)] [ASTM B837, Type G]**.
2. Annealed-Temper Copper Tube: **[ASTM B88, Type K (ASTM B88M, Type A)] [ASTM B88, Type L (ASTM B88M, Type B)] [ASTM B837, Type G]**.
3. Tin-Lined Copper Tube: ASTM B280, seamless, annealed, with interior tin-plated lining.
4. Copper Fittings: ASME B16.22, wrought copper, and streamlined pattern.
5. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.
 - a. Gasket Material: ASME B16.20, metallic, flat, asbestos-free, aluminum o-rings and spiral-wound metal gaskets.
6. Bolts and Nuts: ASME B18.2.1, carbon steel or stainless steel.
7. Flare Fittings: ASME B16.26 and SAE J513.
 - a. Copper fittings with long nuts.
 - b. Metal-to-metal compression seal without gasket.
 - c. Dryseal threads complying with ASME B1.20.3.
8. Protective Coating for Underground Tubing: Factory-applied, extruded PE a minimum of **0.022 inch (0.56 mm)** thick.

E. PE Pipe, Tubing, and Fittings:

1. PE Pipe and Tubing: ASTM D2513, SDR 11.
2. PE Fittings: ASTM D2683, socket-fusion type or ASTM D3261, butt-fusion type.
3. PE Transition Fittings: Factory-fabricated fittings with PE pipe complying with ASTM D2513, SDR 11, and steel pipe complying with ASTM A53/A53M, black steel, Schedule 40, Type E or S, Grade B.
4. Anodeless Service-Line Risers: Factory fabricated and leak tested.
 - a. Underground Portion: PE pipe complying with ASTM D2513, SDR 11 inlet.
 - b. Casing: Steel pipe complying with ASTM A53/A53M, Schedule 40, black steel, Type E or S, Grade B with corrosion-protective coating covering. **[Vent casing aboveground.]**
 - c. Aboveground Portion: PE transition fitting.
 - d. Outlet is to be threaded or flanged or suitable for welded connection.

- e. Tracer wire connection.
 - f. Ultraviolet shield.
 - g. Stake supports with factory finish to match steel pipe casing or carrier pipe.
5. Transition Service-Line Risers: Factory fabricated and leak tested.
- a. Underground Portion: PE pipe complying with ASTM D2513, SDR 11 inlet connected to steel pipe complying with ASTM A53/A53M, Schedule 40, Type E or S, Grade B, with corrosion-protective coating for aboveground outlet.
 - b. Outlet is to be threaded or flanged or suitable for welded connection.
 - c. Bridging sleeve over mechanical coupling.
 - d. Factory-connected anode.
 - e. Tracer wire connection.
 - f. Ultraviolet shield.
 - g. Stake supports with factory finish to match steel pipe casing or carrier pipe.

F. Polyamide Pipe, Tubing, and Fittings:

- 1. Polyamide pipe, tubing, and fittings: ASTM F2945.

2.4 COUPLINGS

A. Plastic Mechanical Couplings, **NPS 1-1/2 (DN 40)** and Smaller:

- 1. Standard: ASTM D2513.
- 2. PE body.
- 3. Elastomeric seals.
- 4. Independent gripping collets.
- 5. Couplings are suitable for joining PE pipe to PE pipe.

B. Plastic Mechanical Couplings, **NPS 2 (DN 50)** and Larger:

- 1. Standard: ASTM D2513.
- 2. Plastic body.
- 3. Body tube.
- 4. Seals.
- 5. Collets.
- 6. Stainless steel bolts, nuts, and washers.
- 7. Couplings are to be suitable for joining PE pipe to PE pipe, or steel pipe to PE pipe.

C. Steel Mechanical Couplings:

- 1. **[Stainless steel] [Steel]** flanges and tube with epoxy finish.
- 2. Buna-nitrile seals.
- 3. **[Stainless steel] [Steel]** bolts, washers, and nuts.
- 4. Factory-installed anode for steel-body couplings installed underground.
- 5. Couplings are to be suitable for joining plain-end PE pipe to PE pipe, steel pipe to PE pipe, or steel pipe to steel pipe.

2.5 PIPING SPECIALTIES

A. Flexible Piping Joints:

- 1. Approved for LPG service.

2. Stainless steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
3. Minimum working pressure of **250 psig (1723 kPa)** and **250 deg F (121 deg C)** operating temperature.
4. Flanged- or threaded-end connections to match equipment connected and to be capable of minimum **3/4-inch (20-mm)** misalignment.
5. Maximum **36-inch (914-mm)** length for liquid LPG lines.

B. Appliance Flexible Connectors:

1. Indoor, Fixed-Appliance Flexible Connectors: ANSI Z21.24.
2. Indoor, Movable-Appliance Flexible Connectors: ANSI Z21.69.
3. Outdoor, Appliance Flexible Connectors: ANSI Z21.75.
4. CSST with polymer coating.
5. Operating-Pressure Rating: **0.5 psig (3.45 kPa)**.
6. End Fittings: Zinc-coated steel.
7. Threaded Ends: ASME B1.20.1.
8. Maximum Length: **72 inches (1830 mm)**.

C. Quick-Disconnect Devices:

1. Standard: ANSI Z21.41/CSA 6.9.
2. Copper-alloy convenience outlet and matching plug connector.
3. Nitrile seals.
4. Hand operated with automatic shutoff when disconnected.
5. For indoor or outdoor applications.
6. Adjustable, retractable restraining cable.

D. Y-Pattern Strainers:

1. Body: ASTM A126, Class B, cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.
3. Strainer Screen: **[40] [60]**-mesh startup strainer and perforated stainless steel basket with 50 percent free area.
4. CWP Rating: **125 psig (862 kPa)**.

E. Basket Strainers:

1. Body: ASTM A126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
2. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.
3. Strainer Screen: **[40] [60]**-mesh startup strainer and perforated stainless steel basket with 50 percent free area.
4. CWP Rating: **125 psig (862 kPa)**.

F. T-Pattern Strainers:

1. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
2. End Connections: Grooved ends.
3. Strainer Screen: **[40] [60]**-mesh startup strainer and perforated stainless steel basket with 57 percent free area.
4. CWP Rating: **750 psig (5170 kPa)**.

- G. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.

2.6 JOINING MATERIALS

- A. Joint Compound and Tape: Suitable for LPG.
- B. Welding Filler Metals: AWS D10.12/D10.12M.
- C. Brazing Filler Metals: AWS A5.8/A5.8M alloy with melting point greater than **1000 deg F (540 deg C)**.

2.7 MANUAL GAS SHUTOFF VALVES

A. Manual Gas Shutoff Valves - Metallic:

1. Description: Metallic ball valve or metallic plug valve of type indicated in schedules under Part 3.
2. Standards:
 - a. ANSI Z21.15/CSA 9.1.
 - b. ASME B16.33.
 - c. ASME B16.44.
 - d. ANSI LC 4/CSA 6.32.
3. System Pressure Rating: **[0.5 psig (3.45 kPa) or less] [More than 0.5 psig (3.45 kPa) but not more than 2 psig (13.8 kPa)] [More than 2 psig (13.8 kPa) but not more than 5 psig (34.5 kPa)] [More than 5 psig (34.5 kPa) but not more than 125 psig (862 kPa)]** or as directed by the Owner .
4. End Connections:
 - a. Threaded Ends: ASME B1.20.1.
 - b. Dryseal Threads on Flare Ends: ASME B1.20.3.
 - c. Flanged Ends: ASME B16.5 for steel flanges.
5. Tamperproof locking feature.

B. Manual Gas Shutoff Ball Valves - PE:

1. Standard: ASME B16.40.
2. Body: PE.
3. Ball: Polypropylene.
4. Stem: Acetal.
5. Seats and Seals: NBR.
6. Ends: Plain or fusible to match piping.
7. CWP Rating: **[80 psig (552 kPa)]** or as directed by the Owner .
8. Operating Temperature: **[Minus 20 to plus 140 deg F (Minus 29 to plus 60 deg C)]** or as directed by the Owner .
9. Operator: Nut or flat head for key operation.
10. Plastic valve extension.
11. Tamperproof locking feature.

C. Valve Boxes:

1. Cast-iron, two-section box.

2. Top section with cover with "GAS" lettering.
3. Bottom section with base to fit over valve and barrel a minimum of **5 inches (125 mm)** in diameter.
4. Adjustable cast-iron extensions of length required for depth of bury.
5. Include tee-handle, steel operating wrench with socket end fitting valve nut or flat head and with stem of length required to operate valve.

2.8 MOTORIZED GAS VALVES

A. Hydrostatic Relief Valves:

1. Standard: NFPA 58.
2. Operating Pressure: [**350 psig (2413 kPa)**] or as directed by the Owner .
3. Body: Brass.
4. Spring: Stainless steel.
5. Disc and Seat: NBR.
6. Brass body and stainless steel, spring-operated valve with resilient rubber disc seat and protective cap.
7. Factory set and tested.
8. Valve is to reseal after relieving pressure.

B. Electrically Operated Automatic Gas Valves:

1. Standards:
 - a. ANSI Z21.21.
 - b. UL 429.
 - c. FM Global approved.
2. Pilot operated.
3. Body: Brass or aluminum.
4. Seats and Disc: Nitrile rubber.
5. Springs and Valve Trim: Stainless steel.
6. Coil: Continuous-duty, molded enclosure, replaceable.
7. Normally closed.
8. Visual position indicator.
9. Electrical Characteristics: [**120 V ac, 60 Hz**] [**24 V ac, 60 Hz**] [**24 V dc**] or as directed by the Owner .

2.9 EARTHQUAKE VALVES

- A. Description: Seismically activated automatic gas shutoff valve.
- B. Standard: ASCE/SEI 25.
- C. Maximum Operating Pressure: [**10 psig (69 kPa)**] [**60 psig (414 kPa)**] or as directed by the Owner .
- D. Sight windows for visual indication of valve position.
- E. Threaded complying with ASME B1.20.1.
- F. Threaded for valves **NPS 4 (DN 100)** and smaller; or flanged for valves **NPS 2 (DN 50)** and larger.

2.10 PRESSURE REGULATORS

A. Service Pressure Regulators:

1. Standards:
 - a. NFPA 58.
 - b. ANSI Z21.80/CSA 6.22.
2. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure-sensing piping external to the regulator.
3. Pressure regulator is to maintain discharge pressure-setting downstream and is not to exceed 150 percent of design discharge pressure at shutoff.
4. Maximum Inlet Pressure: **[100 psig (690 kPa)]** or as directed by the Owner .
5. Maximum Outlet Pressure: **[2 psig (13.8 kPa)] [5 psig (34.5 kPa)] [10 psig (69 kPa)] [20 psig (138 kPa)]** or as directed by the Owner .
6. End Connections: Threaded for regulators **NPS 2 (DN 50)** and smaller; flanged for regulators **NPS 2-1/2 (DN 65)** and larger.
7. Overpressure Protection Device: Factory mounted on pressure regulator.
8. Atmospheric Vent: Factory- or field-installed, stainless steel screen in opening if not connected to vent piping.

B. Line-Pressure Regulators:

1. Standards:
 - a. NFPA 58.
 - b. ANSI Z21.80/CSA 6.22.
2. Single-port, self-contained regulator with orifice no larger than required at maximum pressure inlet and no pressure-sensing piping external to the regulator.
3. Pressure regulator is to maintain discharge pressure-setting downstream and is not exceed 150 percent of design discharge pressure at shutoff.
4. Maximum Inlet Pressure: **[2 psig (13.8 kPa)] [5 psig (34.5 kPa)] [10 psig (69 kPa)]** or as directed by the Owner .
5. Maximum Outlet Pressure: **[2 psig (13.8 kPa)] [5 psig (34.5 kPa)]** or as directed by the Owner .
6. End Connections: Threaded for regulators **NPS 2 (DN 50)** and smaller; flanged for regulators **NPS 2-1/2 (DN 65)** and larger.
7. Overpressure Protection Device: Factory mounted on pressure regulator.
8. Atmospheric Vent: Factory- or field-installed, stainless steel screen in opening if not connected to vent piping.

C. Appliance Pressure Regulators:

1. Standards:
 - a. NFPA 58.
 - b. ANSI Z21.18/CSA 6.3.
2. Regulator may include vent-limiting device, instead of vent connection, if approved by authorities having jurisdiction.
3. Maximum Inlet Pressure: **[1 psig (6.9 kPa)] [2 psig (13.8 kPa)] [5 psig (34.5 kPa)]** or as directed by the Owner .
4. Maximum Outlet Pressure: **[1 psig (6.9 kPa)] [2 psig (13.8 kPa)]** or as directed by the Owner .
5. End Connections: Threaded for regulators **NPS 2 (DN 50)** and smaller; flanged for regulators **NPS 2-1/2 (DN 65)** and larger.

2.11 SERVICE METERS

A. Diaphragm-Type Service Meters:

1. Standard: **[ANSI B109.1] [ANSI B109.2]**.
2. Case: Die-cast aluminum.
3. Connections: Steel threads.
4. Diaphragm: Synthetic fabric.
5. Diaphragm Support Bearings: Self-lubricating.
6. Compensation: Continuous temperature **[and pressure]**.
7. Meter Index: **[Cubic feet] [Liters] [Cubic feet and liters]**.
8. Meter Case and Index: Tamper resistant.
9. Remote meter reader compatible.
10. Maximum Inlet Pressure: **[100 psig (690 kPa)]** or as directed by the Owner .
11. Pressure Loss: Maximum **[0.5 inch wg (124 Pa)] [2.0 inch wg (498 Pa)]** or as directed by the Owner .
12. Accuracy: Maximum plus or minus **[1.0]** percent or as directed by the Owner .

B. Rotary-Type Service Meters:

1. Standard: ANSI B109.3.
2. Case: Extruded aluminum.
3. Connection: Flange.
4. Impellers: Polished aluminum.
5. Rotor Bearings: Self-lubricating.
6. Compensation: Continuous temperature **[and pressure]**.
7. Meter Index: **[Cubic feet] [Liters] [Cubic feet and liters]**.
8. Tamper resistant.
9. Remote meter reader compatible.
10. Maximum Inlet Pressure: **[100 psig (690 kPa)]** or as directed by the Owner .
11. Accuracy: Maximum plus or minus **[2.0]** percent or as directed by the Owner .

C. Turbine Meters:

1. Standard: ASME MFC.4M.
2. Housing: Cast iron or welded steel.
3. Connection Threads or Flanges: Steel.
4. Turbine: Aluminum or plastic.
5. Turbine Bearings: Self-lubricating.
6. Compensation: Continuous temperature **[and pressure]**.
7. Meter Index: **[Cubic feet] [Liters] [Cubic feet and liters]**.
8. Tamper resistant.
9. Remote meter reader compatible.
10. Maximum Inlet Pressure: **[100 psig (690 kPa)]** or as directed by the Owner .
11. Accuracy: Maximum plus or minus **[2.0]** percent or as directed by the Owner .

D. Service-Meter Bars:

1. Malleable- or cast-iron frame for supporting service meter.
2. Include offset swivel pipes, meter nuts with o-ring seal, and factory- or field-installed dielectric unions.
3. Omit meter offset swivel pipes if service-meter bar dimensions match service-meter connections.

E. Service-Meter Bypass Fittings:

1. Ferrous, tee, pipe fitting with capped side inlet for temporary LPG supply.
2. Integral ball-check bypass valve.

2.12 DIELECTRIC FITTINGS

- A. Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.
- B. Dielectric Unions:
 1. Standard: ASSE 1079.
 2. Pressure Rating: [125 psig (860 kPa) minimum at 180 deg F (82 deg C)] [150 psig (1035 kPa)] [250 psig (1725 kPa)].
 3. End Connections: Solder-joint copper alloy and threaded ferrous.
- C. Dielectric Flanges:
 1. Standard: ASSE 1079.
 2. Factory-fabricated, bolted, companion-flange assembly.
 3. Pressure Rating: [125 psig (860 kPa) minimum at 180 deg F (82 deg C)] [150 psig (1035 kPa)] [175 psig (1200 kPa)] [300 psig (2070 kPa)] or as directed by the Owner .
 4. End Connections: Solder-joint copper alloy and threaded ferrous; threaded copper alloy and threaded ferrous.
- D. Dielectric-Flange Insulating Kits:
 1. Nonconducting materials for field assembly of companion flanges.
 2. Pressure Rating: [150 psig (1035 kPa)] or as directed by the Owner .
 3. Gasket: Neoprene or phenolic.
 4. Bolt Sleeves: Phenolic or PE.
 5. Washers: Phenolic with steel backing washers.

2.13 STORAGE CONTAINERS

- A. Description: Factory-designed, -fabricated, and -tested containers.
- B. Standards:
 1. NFPA 58.
 2. ASME BPVC-VIII-1.
 3. UL 125.
 4. UL 842.
 5. Department of Transportation (DOT) Regulations.
- C. Provide all appurtenances as required by NFPA 58, qualified to UL 125:
 1. Vapor-shutoff valve.
 2. Liquid-shutoff valve.
 3. Pressure-relief valve.
 4. Fixed maximum liquid level gauge.
 5. Filler valve.
 6. Overfilling protection device.
 7. Actuated liquid withdrawal excess-flow valve.
 8. Provide container appurtenances with a minimum service pressure rating of 250 psig (1724 kPa).

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- D. Provide exposed metal surfaces mechanically cleaned, primed, and painted for resistance to corrosion for outdoor installation.
- E. Provide ladders for access to valves more than **72 inches (1830 mm)** aboveground.
- F. Stainless Steel Nameplate: Attach to aboveground storage container or to adjacent structure for underground storage container.
 - 1. Name and address of supplier or trade name of container.
 - 2. Water capacity in gallons and liters.
 - 3. Design pressure in psig and kPa.
 - a. Statement: "This container does not contain a product having a vapor pressure in excess of **Maximum pressure in psig (kPa) at 100 deg F (37.8 deg C)** or as directed by the Owner ."
 - b. Outside surface area in square feet and square meters.
 - c. Year of manufacture.
 - d. Shell thickness in inches and millimeters.
 - e. Overall length in feet and meters.
 - f. OD in feet and meters.
 - g. Manufacturer's serial number.
 - h. ASME code label.
 - 4. Felt support pads and two concrete or painted-steel saddles per storage container. Corrosion protection required at container-to-felt contact.
 - 5. Tie straps for each saddle.
 - 6. Straps and anchors for tie-down slab.
 - 7. Asphalt-based coating for corrosion protection.
 - 8. Container connections and valves protected in manway at top of storage container.
 - 9. Manway equipped with ventilation louvers.

2.14 TRANSPORT TRUCK UNLOADING FACILITY

- A. Transport Truck Unloading Facility: Provide in accordance with the requirements in NFPA 58.
 - 1. Support structure consisting of a minimum **6-inch (150-mm)** steel channel or **6-by-4-inch (150-by-100-mm)** rectangular steel tubing, a minimum of **36 inches (914 mm)** above and below grade.
 - 2. Liquid-fill and vapor-return, quick-disconnect fittings.
 - 3. Liquid- and vapor-shutoff valves with hydrostatic relief valves mounted between the quick-disconnect fittings and shutoff valves.
 - 4. Excess-flow safety shutoff valve in vapor-return line.
 - 5. Backflow check valve in liquid-fill line.
 - 6. Remote emergency shutoff valve station with underground cable to the vapor emergency shutoff valve.

2.15 VAPORIZERS

- A. Description: Factory-fabricated, -assembled, -calibrated, and -tested vaporizers.
- B. Standards:
 - 1. NFPA 58.
 - 2. ASME BPVC-VIII-1.

3. NFPA 70.
 4. FM Global labeled.
- C. Vaporizers - Direct-Type, Direct-Fired Heat Exchanger:
1. ASME-rated and -stamped, LPG, vaporizer coil contained in an insulated enclosure insulated with a burner.
 2. Burner Tubes and Orifices: Stainless steel.
 3. Gas Train: Control devices and burner-control sequence are to be FM Global labeled. Provide shutoff valve, high- and low-pressure safety switches, pressure regulator, and main- and pilot-control valves.
 4. Burner Operating Controls:
 - a. Controls are to maintain safe operating conditions.
 - b. High-Pressure Cutoff: Manual reset stops burner if operating conditions rise above maximum design pressure.
 - c. Operating Vapor-Pressure Control: Factory piped and mounted to control burner.
- D. Vaporizers - Indirect-Type, Direct-Fired Heat Exchanger:
1. ASME-rated and -stamped, LPG, vaporizer vessel with a replaceable, immersion-type, electric heating element.
 2. Heating Element Operating Controls:
 - a. Controls are to maintain safe operating conditions.
 - b. Operating Vapor-Pressure Control: Factory wired and mounted to control heating element.
 - c. High-Pressure Cutoff: Manual reset stops burner if operating conditions rise above maximum design pressure.
 - d. Alarm Bell and Rotary Beacon: Factory mounted on control panel with silence switch; is to sound alarm for out-of-normal conditions.
 - e. Control Transformer: 115 V maximum control voltage.
- E. Vaporizers - Direct-Type, Water-Bath Heat Exchanger:
1. ASME-rated and -stamped, helical, LPG, vaporizer coil submerged in water bath. Straight, steel fire tubes welded into steel headers.
 2. Water Bath:
 - a. Water bath filled with water/glycol solution designed to prevent freezing at [minus 30 deg F (minus 34 deg C)] or as directed by the Owner .
 - b. Water-bath, high- and low-level sight glasses.
 - c. Low-water cutoff to stop burner and annunciate alarm.
 - d. Water/glycol fill and vent fitting.
 - e. Minimum NPS 3/4 (DN 20) hose-end drain valves.
 - f. Operating high- and low-limit aquastat controllers.
 - g. Water-bath temperature gage; a minimum of 2-1/2 inches (63 mm) in diameter. Gauges are to have operating-temperature ranges, so normal operating range is at approximately 50 percent of full range.
 3. Burner Tubes and Orifices: Stainless steel.
 4. Gas Train: Control devices and burner-modulation control sequence is to be FM Global labeled. Provide shutoff valve, high- and low-pressure safety switches, pressure regulator, and main- and pilot-control valves.
 5. Burner Operating Controls:
 - a. Operating controls are to maintain safe operating conditions.

- b. Operating Water-Bath Temperature Control: Factory wired and mounted to control burner.
- c. High-Temperature and High-Pressure Cutoff: Manual reset stops burner if operating conditions rise above maximum design temperature or vapor pressure.
- d. Alarm Bell and Rotary Beacon: Factory mounted on control panel with silence switch; is to sound alarm for out-of-normal conditions.
- e. Control Transformer: 115 V maximum control voltage.

F. Vaporizers - Indirect-Type, **[Steam][Hot Water]** Heat Exchanger:

1. ASME-rated and -stamped, LPG vaporizer with immersion tubes containing **[steam] [hot water]** and LPG in surrounding shell.
2. Operating Controls:
 - a. Controls are to maintain safe operating conditions.
 - b. High-Temperature and High-Pressure Cutoff: Manual reset if operating conditions rise above maximum design temperature or pressure.
 - c. Alarm Bell and Rotary Beacon: Factory mounted on control panel with silence switch; sound alarm for out-of-normal conditions.
 - d. Control Transformer: 115 V maximum control voltage.

G. Building Management System Interface: Factory-installed hardware and software to enable building management system to monitor and control set points and display vaporizer status and alarms.

H. Capacities and Characteristics:

1. Heating Fuel: **[Propane] [Butane] [Electric]**.
2. Vaporization Heat Exchanger:
 - a. Minimum Working-Pressure Rating: **[250 psig (1723 kPa)]** or as directed by the Owner .
 - b. Test Pressure: **[375 psig (2586 kPa)]** or as directed by the Owner .
3. LPG Vaporization Rate: **gph (mL/s)** as directed by the Owner .
4. Entering-LPG Temperature: **[Minus 30 deg F (Minus 34 deg C)]** or as directed by the Owner .
5. Leaving-LPG Temperature: **[80 deg F (26.7 deg C)]** or as directed by the Owner .
6. Discharge-LPG Pressure: **[90 psig (621 kPa)]** or as directed by the Owner .
7. Burner Gas Input: **Btu/h (kW)** as directed by the Owner .
8. Electric Burner Input: **kilowatts** as directed by the Owner .
9. **[Atmospheric] psig (kPa)** as directed by the Owner .
10. **[160 deg F (71 deg C)]** or as directed by the Owner .
11. Electrical Characteristics:
 - a. Volts: **[120] [240] [480]** V or as directed by the Owner .
 - b. Phase: **[Single] [Three]**.
 - c. Hertz: 60.
 - d. Minimum Circuit Ampacity: as directed by the Owner .
 - e. Maximum Overcurrent Protection: as directed by the Owner .

2.16 DETECTABLE WARNING TAPE

- A. Acid- and alkali-resistant PE film warning tape manufactured for marking and identifying underground utilities, a minimum of **6 inches (150 mm)** wide and **4 mils (0.1 mm)** thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to **30 inches (750 mm)** deep; colored yellow.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine roughing-in for LPG piping system to verify actual locations of piping connections before equipment installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.

3.3 PREPARATION

- A. Close equipment-shutoff valves before turning off LPG to premises or piping section.
- B. Inspect LPG piping in accordance with code(s) and authority having jurisdiction to determine that LPG utilization devices are turned off in piping section affected.
- C. Comply with requirements of code(s) and authority having jurisdiction for prevention of accidental ignition.

3.4 INSTALLATION OF OUTDOOR PIPING

- A. Comply with code and authority having jurisdiction requirements for installation and purging of LPG piping.
- B. Install underground, LPG piping buried a minimum of **[12 inches (300 mm)]** or as directed by the Owner below finished grade. Comply with requirements in Section 312000 "Earth Moving" for excavating, trenching, and backfilling.
- C. Steel Piping with Protective Coating:
 - 1. Apply joint cover kits to pipe after joining to cover, seal, and protect joints.
 - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
 - 3. Replace pipe having damaged PE coating with new pipe.
- D. Copper Tubing with Protective Coating:
 - 1. Apply joint cover kits over tubing to cover, seal, and protect joints.
 - 2. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer.
- E. Install fittings for changes in direction and branch connections.
- F. Joints for connection to inlets and outlets on vaporizers, regulators, and valves may be flanged or threaded to match the equipment.

- G. Install pressure gauge [**downstream**] [**upstream and downstream**] from each service regulator. Pressure gauges are specified in Section 230519 "Meters and Gauges for HVAC Piping."

3.5 INSTALLATION OF INDOOR PIPING

- A. Comply with requirements of the code(s) and authority having jurisdiction for installation and purging of LPG piping.
- B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.
- C. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction.
- D. Install piping in concealed locations unless otherwise indicated. Piping in equipment rooms and service areas may be installed exposed. Piping is not to be installed in inaccessible locations.
1. Conceal piping in walls, pipe spaces, utility spaces, above ceilings, below grade or floors, and in floor channels unless indicated to be exposed to view.
 2. Except as specified below, install concealed piping and piping installed under the building in containment conduit constructed of steel pipe with welded joints, as described in Part 2. Install a vent pipe from containment conduit to outdoors and terminate with weatherproof vent cap.
 - a. Above Accessible Ceilings: Piping, fittings, valves, and regulators may be installed in accessible spaces without containment conduit.
 - 1) Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 - b. In Floors: Install piping with welded or brazed joints and protective coating in cast-in-place concrete floors. Cover piping to be cast in concrete slabs with minimum of **1-1/2 inches (38 mm)** of concrete. Piping may not be in physical contact with other metallic structures, such as reinforcing rods or electrically neutral conductors. Do not embed piping in concrete slabs containing quick-set additives or cinder aggregate.
 - c. In Floor Channels: Channels must have cover and be open to space above cover for ventilation.
 - d. In Walls or Partitions: Protect piping installed inside partitions or hollow walls from physical damage using steel striker barriers at rigid supports.
 - 1) Exception: Piping passing through partitions or walls does not require striker barriers.
 - e. Prohibited Locations:
 - 1) Do not install piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - 2) Do not install piping in return-air plenums.
 - 3) Do not install piping in solid walls or partitions.
 - f. Under the Building: Install in vented containment conduit or CSST with integral vented sleeve and associated fittings.

- E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 - F. Locate valves for easy access from a standing position.
 - G. Install LPG piping at uniform grade of 2 percent down toward drip and sediment traps.
 - H. Install piping free of sags and bends.
 - I. Install fittings for changes in direction and branch connections.
 - J. Comply with requirements in Sections specifying gas-fired appliances and equipment, and verify final appliance and equipment locations for roughing-in.
 - K. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets. Locate where readily accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.
 - 1. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of three pipe diameters, but not less than **3 inches (75 mm)** long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
 - L. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors, and terminate with weatherproof vent cap.
 - M. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
 - N. Connect branch piping from top or side of horizontal piping.
 - O. Install unions in pipes **NPS 2 (DN 50)** and smaller, adjacent to each valve, at final connection to each piece of equipment. Unions are not required at flanged connections.
 - P. Do not use LPG piping as grounding electrode.
 - Q. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
 - R. Install pressure gauge [**downstream**] [**upstream and downstream**] from each line regulator. Pressure gauges are specified in Section 230519 "Meters and Gauges for HVAC Piping."
 - S. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
 - T. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 230517 "Sleeves and Sleeve Seals for HVAC Piping."
 - U. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 230518 "Escutcheons for HVAC Piping."
- 3.6 INSTALLATION OF SERVICE-METER ASSEMBLY
- A. Install service-meter assemblies aboveground[, **on concrete bases**].
 - B. Install metal shutoff valves upstream from service regulators. Shutoff valves are not required at second regulators if two regulators are installed in series.

- C. Install strainer on inlet of service-pressure regulator and meter set.
- D. Install service regulators mounted outside with vent outlet horizontal or facing down. Install screen in vent outlet if not integral with service regulator.
- E. Install metal shutoff valves upstream from service meters. Install dielectric fittings downstream from service meters.
- F. Install service meters downstream from pressure regulators.
- G. Install metal bollards to protect meter assemblies. Comply with requirements in Section 055000 "Metal Fabrications" for pipe bollards.

3.7 INSTALLATION OF VALVES

- A. Install manual gas shutoff valve for each gas appliance ahead of CSST, aluminum, or copper connector.
- B. Install underground valves with valve boxes.
- C. Install regulators and overpressure protection devices with maintenance access space adequate for servicing and testing.
- D. Install earthquake valves aboveground outside buildings according to listing.
- E. Install anode for metallic valves in underground PE piping.
- F. Do not install valves in return-air plenums.

3.8 PIPING JOINT CONSTRUCTION

- A. Ream ends of pipes and tubes and remove burrs.
- B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
- C. Threaded Joints:
 - 1. Thread pipe with tapered pipe threads complying with ASME B1.20.1.
 - 2. Cut threads full and clean using sharp dies.
 - 3. Ream threaded pipe ends to remove burrs and restore full ID of pipe.
 - 4. Apply appropriate tape or thread compound to external pipe threads unless dryseal threading is specified.
 - 5. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
- D. Welded Joints:
 - 1. Construct joints in accordance with AWS D10.12/D10.12M, using qualified processes and welding operators.
 - 2. Bevel plain ends of steel pipe.
 - 3. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.

- E. Brazed Joints: Construct joints in accordance with AWS's "Brazing Handbook," Ch. 22, "Pipe and Tube."
- F. Flanged Joints: Install gasket material, size, type, and thickness appropriate for LPG service. Install gasket concentrically positioned.
- G. Flared Joints: Cut tubing with roll cutting tool. Flare tube end with tool to result in flare dimensions complying with SAE J513. Tighten finger tight, then use wrench. Do not overtighten.
- H. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join in accordance with ASTM D2657.
 - 1. Plain-End Pipe and Fittings: Use butt fusion.
 - 2. Plain-End Pipe and Socket Fittings: Use socket fusion.

3.9 PIPING CONNECTIONS

- A. Connect to utility's gas main according to utility's procedures and requirements.
- B. Install LPG piping electrically continuous and bonded to gas appliance equipment grounding conductor of the circuit powering the appliance in accordance with NFPA 70.
- C. Install piping adjacent to appliances to allow service and maintenance of appliances.
- D. Connect piping to appliances using manual gas-shutoff valves and unions. Install valve within **72 inches (1830 mm)** of each gas-fired appliances and equipment. Install union between valve and appliances or equipment.

3.10 INSTALLATION OF TRANSPORT TRUCK UNLOADING FACILITY

- A. Install transport truck unloading in a cast-in-place concrete base, **48 inches (1220 mm)** square by **36 inches (914 mm)** deep. Set top of concrete base at least **6 inches (150 mm)** above finished grade.
- B. Install remote emergency shutoff station with cable release in an accessible location, a minimum of **25 ft. (7.6 m)** and a maximum of **100 ft. (30 m)** away from transport truck unloading.
- C. Install at least two **6-inch- (150-mm-)** diameter metal bollards set in and filled with concrete on both sides of transport truck unloading. Bollard length is to be at least **48 inches (1220 mm)** above and below grade, with concrete encasement a minimum of **12 inches (300 mm)** in diameter.

3.11 INSTALLATION OF STORAGE CONTAINER

- A. Do not install storage containers in a pit.
- B. Fill storage container to at least 80 percent capacity with **[butane] [propane]**.
- C. Install piping connections with swing joints or flexible connectors to allow for storage container settlement and for thermal expansion and contraction.
- D. Ground containers in accordance with NFPA 780. Grounding is specified in Section 264113 "Lightning Protection for Structures."

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- E. Set storage containers in felt pads on concrete or steel saddles. Install corrosion protection at container-to-felt contact.
- F. Install tie-downs over storage containers on saddles with proper tension.
- G. Set concrete saddles on dowels set in concrete base. Anchor steel saddles to concrete base.
- H. Set storage container on concrete ballast base large enough to offset buoyancy of empty storage container immersed in water.
- I. Install tie-down straps over container anchored in ballast base, and repair damaged coating.
- J. Backfill with a minimum coverage for underground or mounded storage containers in accordance with NFPA 58.
- K. Backfill with pea gravel as required in Section 312000 "Earth Moving."
- L. Install cathodic protection for storage container. Cathodic protection is specified in Section 134713 "Cathodic Protection."

3.12 INSTALLATION OF VAPORIZER

- A. Install vaporizer with access space for periodic maintenance.
- B. Set vaporizers on and anchor to concrete base.
- C. Connect liquid line from pump set, and connect vapor supply to distribution piping.
- D. Install backup connection from vapor space of container to inlet of pressure-regulating valve at vaporizer discharge to bypass the vaporizer during maintenance. Install shutoff valves to change source from vaporizer to storage container.

3.13 INSTALLATION OF LABELING AND IDENTIFICATION

- A. Comply with requirements in Section 230553 "Identification for HVAC Piping and Equipment" for piping and valve identification.
- B. Install detectable warning tape directly above gas piping, **12 inches (305 mm)** below finished grade, except **6 inches (150 mm)** below subgrade under pavements and slabs.
- C. Label and identify gas piping and pressure outside a multitenant building by tenant.

3.14 CONCRETE BASES

- A. Anchor equipment to concrete base in accordance with Project codes.
 - 1. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.
 - 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **[18-inch (451-mm)]** centers or as directed by the Owner around the full perimeter of the base.

3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Use [3000 psig (20.7 MPa)] or as directed by the Owner, 28-day, compressive-strength concrete and reinforcement, as specified in Section 033000 "Cast-in-Place Concrete."

3.15 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Comply with requirements of the code(s) and authority having jurisdiction for testing, inspection, and purging of LPG installation.

B. LPG installation will be considered defective if it does not pass tests and inspections. Defective products are to be replaced.

C. Prepare test and inspection reports.

3.16 DEMONSTRATION

A. **[Engage a factory-authorized service representative to train] [Train]** Owner's maintenance personnel to adjust, operate, and maintain LPG equipment.

3.17 OUTDOOR PIPING SCHEDULE

A. Underground piping is to be **[one of]** the following:

1. PE pipe, tubing, and fittings joined by heat-fusion, or mechanical couplings; service-line risers with tracer wire terminated in an accessible location.
2. Polyamide pipe, tubing, and fittings terminated in an accessible location.
3. Schedule 40, steel pipe with wrought-steel fittings and welded joints, or mechanical couplings. Coat pipe and fittings with protective coating for steel piping.
4. **[Annealed] [Drawn]-temper** copper tube, **Type L (Type B)** with wrought-copper fittings and brazed joints. Coat pipe and fittings with protective coating for copper tubing.
5. Containment Conduit: Schedule 40, steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
6. CSST tubing and fittings with integral vented sleeve terminated in an accessible location.

B. Aboveground piping is to be **[one of]** the following:

1. CSST and fittings.
2. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
3. Schedule 40, steel pipe with wrought-steel fittings and welded joints, or mechanical couplings.
4. **[Annealed] [Drawn]-temper** copper tube, **Type L (Type B,)** with wrought-copper fittings and brazed joints. Coat pipe and fittings with protective coating for copper tubing.

C. Branch Piping in Cast-in-Place Concrete to Single Appliance: Annealed-temper copper, with wrought-copper fittings and **[brazed] [flared]** joints. Install piping embedded in concrete with no pipe joints in concrete.

3.18 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES LESS THAN 0.5 PSIG (3.45 kPa)

- A. Aboveground piping is to be [one of] the following:
1. CSST and fittings.
 2. Annealed-temper, tin-lined copper tube with flared joints and fittings.
 3. Annealed-temper copper tube with wrought-copper fittings and [brazed] [flared] joints.
 4. Aluminum tube with flared fittings and joints.
 5. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
 6. Schedule 40, steel pipe with wrought-steel fittings and welded joints.
 7. Drawn-temper copper tube, Type L (Type B) with wrought-copper fittings and brazed joints.
- B. Underground, below building, piping is to be [one of] the following:
1. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
 2. Schedule 40, steel pipe with wrought-steel fittings and welded joints.
 3. Containment Conduit: Schedule 40, steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
 4. Containment Conduit Vent Piping: Schedule 40, steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.19 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 0.5 PSIG (3.45 kPa) AND LESS THAN 5 PSIG (34.5 kPa)

- A. Aboveground piping is to be [one of] the following:
1. CSST and fittings.
 2. Annealed-temper, tin-lined copper tube with flared joints and fittings.
 3. Annealed-temper copper tube, Type L (Type B) with wrought-copper fittings and [brazed] [flared] joints.
 4. Aluminum tube with flared fittings and joints.
 5. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
 6. Schedule 40, steel pipe with steel welding fittings and welded joints.
 7. Drawn-temper copper tube, [Type L (Type B)] [Type G] with wrought-copper fittings and brazed joints.
- B. Underground, below building, piping is to be [one of] the following:
1. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
 2. Schedule 40, steel pipe with wrought-steel fittings and welded joints.
 3. Containment Conduit: Schedule 40, steel pipe with wrought-steel fittings and welded joints. Coat underground pipe and fittings with protective coating for steel piping.
 4. Containment Conduit Vent Piping: Schedule 40, steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.20 INDOOR PIPING SCHEDULE FOR SYSTEM PRESSURES MORE THAN 5 PSIG (34.5 kPa)

- A. Aboveground Piping: Maximum operating pressure more than [5 psig (34.5 kPa)] or as directed by the Owner .
- B. Aboveground piping is to be [one of] the following:

1. CSST and fittings.
2. Schedule 40, steel pipe with steel welding fittings and welded joints.
3. Drawn-temper copper tube, [Type L (Type B)] [Type G] with wrought-copper fittings and brazed joints.

C. Underground, below building, piping is to be [one of] the following:

1. Schedule 40, steel pipe with malleable-iron fittings and threaded joints.
2. Schedule 40, steel pipe with wrought-steel fittings and welded joints.
3. Containment Conduit: Schedule 40, steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
4. Containment Conduit Vent Piping: Schedule 40, steel pipe with malleable-iron fittings and threaded or wrought-steel fittings with welded joints. Coat underground pipe and fittings with protective coating for steel piping.

3.21 UNDERGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Connections to Existing Gas Piping: Use valve and fitting assemblies made for tapping utility's gas mains and listed by an NRTL.

B. Underground Vapor Piping:

1. PE valves.
2. NPS 2 (DN 50) and Smaller: Bronze, [lubricated] [nonlubricated] plug valves.
3. NPS 2-1/2 (DN 65) and Larger: Cast-iron, [lubricated] [nonlubricated] plug valves.

3.22 ABOVEGROUND MANUAL GAS SHUTOFF VALVE SCHEDULE

A. Valves for pipe NPS 2 (DN 50) and smaller is to be [one of] the following:

1. One-piece, bronze ball valve with bronze trim.
2. Two-piece, [full] [regular]-port, bronze ball valves with bronze trim.
3. Bronze plug valve.

B. Valves for pipe NPS 2-1/2 (DN 65) and larger is to be [one of] the following:

1. Two-piece, [full] [regular]-port, bronze ball valves with bronze trim.
2. Bronze plug valve.
3. Cast-iron, [nonlubricated] [lubricated] plug valve.

END OF SECTION 23 11 23 00a

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SECTION 23 11 23 00b - MONITORING WELLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for monitoring wells including drilling, casing, well screen, gravel packing, grouting, development, monitoring device, and incidental related work complete and ready for operation. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. General Requirements

1. Each system, including equipment, materials, installation, and performance, shall be in accordance with local, State, and Federal regulations, ASTM D 5092, and EPA 600-4-89-034 except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" has been substituted for the word "should" wherever it appears. Reference to the "Project Representative" and the "Owner" shall be interpreted to mean the Owner. Additional requirements are included under Division 01 Section "Temporary Facilities And Controls". Mark and secure monitoring wells to avoid unauthorized access and tampering.

C. Submittals:

1. Shop Drawings: Well construction.
2. Product Data
 - a. Well casing
 - b. Well screen
 - c. Filter pack
 - d. Neat cement grout
 - e. Bentonite seal
3. Certificates
 - a. Well Drilling/Development Material Handling Plan
 - b. Health and Safety Plan
 - c. Field Sampling and Laboratory Testing Plan
 - d. Treatment facility permit
 - e. Installation Survey Report
 - f. Well Development Report
 - g. Borehole Analysis Report
4. Closeout Submittals
 - a. Well Construction Permit
 - b. Shipment manifests
 - c. Delivery certificates
 - d. Treatment and disposal certificates

D. Delivery, Storage, And Handling

1. Deliver materials in an undamaged condition. Unload and store with minimal handling. Store materials in on-site enclosures or under protective coverings. Store plastic piping and jointing materials, and rubber gaskets under cover, out of direct sunlight. Store materials off the ground. Keep insides of pipes and fittings free of dirt and debris. Replace defective or damaged materials with new materials.

E. Quality Assurance

1. Required Drawings: Submit well construction drawings showing components and details of well casing, well screen, filter pack, annular seal, and associated items. Drawings shall be prepared by a State certified professional geologist or hydrogeologist, or by a State registered professional

civil engineer, hereafter referred to as the Contractor's Professional Consultant (CPC). Drawings shall be sealed.

2. Well Drilling/Development Material Handling Plan: A material handling plan shall be furnished by the Contractor 15 days prior to initiation of the work that describes phases of dealing with the potentially contaminated soil and groundwater, including the following: a schedule to be employed in the well drilling and development stages, a sequence of operations, the method of drilling and development, material hauling, proposed equipment, handling of the contaminated materials, soil and water testing requirements, and safety precautions and requirements.
3. Health and Safety Plan (HASP): Describe safety precautions for each phase of the project as specifically related to handling of soil and water removed during well drilling and development operations. Identify appropriate requirements of 29 CFR 1910 and COE EM-385-1-1. Identify safety equipment and procedures to be available and used during the project. Furnish the name and qualifications based on education, training, and work experience of the proposed Health and Safety Officer (HASO) and the members of the drill crew. The CPC may perform the responsibilities of the HASO if properly qualified.
4. Field Sampling and Laboratory Testing Plan: Describe field sampling methods and quality control procedures. Identify laboratory and laboratory methods to be used for contamination testing. Sample reports shall show sample identification for location, date, time, sample method, contamination level, name of individual sampler, identification of laboratory, and quality control procedures.
5. Treatment Facility Permit: Verification that the proposed treatment facility is permitted to accept the contaminated materials specified, prior to the start of excavation.
6. Well Development Report: Provide report, containing the following data for each well: project name and location, well designation, date and time of well installation, date and time of well development, static water level from top of well casing before development and 24 hours after development, field measurements of pH, temperature, and specific conductivity, depth of well from top of casing to bottom of well, screen length, description of development methodology size/capacity of pump or bailer, pumping rate, and recharge rate.
7. Well Construction Permit: Submit a completed permit application and a proposed method of construction to the appropriate state agency prior to construction of the well. Construction of the wells will not be allowed until an approved Well Construction Permit has been submitted to the Owner.
8. Shipment Manifests: Copies of manifests and other documentation required for shipment of waste materials within 24 hours after removal of waste from the site. Shipment manifests shall be signed by the Owner.
9. Delivery Certificates: Verification that the wastes were actually delivered to the approved treatment facility, within 7 days of shipment.
10. Treatment and Disposal Certificates: Verification that the wastes were successfully treated and remediated to the levels specified herein.

1.2 PRODUCTS

A. Well Casing

1. Stainless Steel Piping: ASTM A 312/A 312M, Type 304, Schedule 40S, with flush threaded joint end fittings. Threaded joints shall be wrapped with fluoropolymer tape, and provided with nitrile O-ring gaskets.
2. PVC Piping: ASTM F 480, Type 1, Grade 1, PVC 12454, NSF wc or NSF pw, Schedule 40 **OR** 80, **as directed**, with flush threaded joint fittings. Threaded joints shall be wrapped with fluoropolymer tape, and provided with nitrile O-ring gaskets.

- #### B. Well Screen
- Well screens shall be located as directed. The length of each screen shall be as directed. Slot size shall be as required to meet project requirements. Slotted openings shall be distributed uniformly around the circumference of the screen. Open area shall approach the formation's natural porosity.

1. Stainless Steel Screens: ASTM A 312/A 312M, Type 304, Schedule 40S, continuous slot construction, wire wound, with flush threaded joint ends.
 2. PVC Screens: ASTM D 1785, PVC 1120, NSF wc or NSF pw, Schedule 40 **OR** 80, **as directed**, screen, Schedule 80, machine-slotted construction, flush threaded joint ends. Slots shall be even in width, length, and separation.
- C. Primary Filter Pack: Provide clean, durable, well-rounded, and washed quartz or granite, with less than 5 percent non-siliceous material. The filter pack shall not contain organic matter or friable materials. The filter pack shall allow free flow of water in the well, and shall prevent the infiltration of aquifer materials. Filter pack shall have a 30 percent finer than (d-30) grain size size as required to meet project requirements, and a uniformity coefficient less than 2.5, in accordance with ASTM C 117 and ASTM C 136.
- D. Secondary Filter Pack: Gradation in accordance with ASTM D 5092. Provide clean, durable, well-rounded, and washed quartz or granite. Pack shall not contain organic matter or friable materials.
- E. Annular Sealants
1. Bentonite Seal: Provide powdered, granular, pelletized, or chipped sodium **OR** calcium, **as directed**, montmorillonite in sealed containers from a commercial source, free of impurities. Diameter of pellets shall be less than one fifth the diameter of the borehole annular space to prevent bridging. Bentonite base grout shall be in accordance with ASTM D 5092.
 2. Neat Cement Grout: Provide neat cement grout in accordance with ASTM D 5092. Cement shall be in accordance with ASTM C 150. Quick setting admixtures shall not be allowed. Drilling mud or cuttings shall not be used as a sealing material.
- F. Bottom Plugs: Provide flush threaded solid plug at the bottom of the well. Plug shall be the same material as the well casing **OR** screen to which it is attached, **as directed**. Joints shall be wrapped with fluoropolymer tape and provided with nitrile O-ring gaskets.
- G. Locking Well Cap: Provide flush threaded, weatherproof, and non-removable locking well cap on the top of the well. Well cap shall be of the same material as the well casing to which it is attached. Well cap shall accommodate padlock. Provide a long shackled padlock in accordance with ASTM F 883. Provide two keys for the padlock, and turn them over to the Owner. Locks at the well site shall be keyed alike.
- H. Well Head Completions: Clearly mark and secure the well to avoid unauthorized access and tampering. Cast the words "MONITORING WELL" on the well head cover. Provide a sign reading, "WELL IS FOR MONITORING AND IS NOT SAFE FOR DRINKING." Provide stamped metal identification tag as follows:
- DO NOT DISTURB
ID #: _____ Date: _____
Installed By: _____
Total Depth: _____
Screened Interval: _____
TOC Elevation: _____
Other: _____
For Information, Call: _____
1. Aboveground Completions: Provide protective outer casing around the well casing extending above grade. The diameter of the protective outer casing shall be a minimum of **4 in. (100 mm)** larger than the well casing diameter. The top of the protective outer casing shall extend a minimum of **6 in. (150 mm)** above the top of the well casing cap. The protective outer casing shall be set in cement grout and the bottom of the protective well casing shall extend below the depth of the frost line **OR** to the depth indicated, **as directed**. A **1/4 in. (6 mm)** diameter weep hole shall be drilled in the protective outer casing **3 in. (75 mm)** above the ground surface. The annular space between the protective outer casing and the well casing shall be filled with pea gravel or coarse sand to just below the level of the cap on the well casing. The locking well cap

shall be provided on top of the protective outer casing. Provide **6 in. (150 mm)** diameter steel pipe bollards, filled with concrete as indicated to protect the exposed well head.

- a. Protective Outer Casing and Bollards: ASTM A 53, Type E or S, Grade B.
- b. Well Casing Cap: Provide cap on top of the protective outer casing. Cap shall be flush threaded and of the same material as the protective outer casing. Threaded joints shall be wrapped with fluoropolymer tape and provided with nitrile O-ring gaskets.

2. At-Grade Completions: Provide cast iron **OR** aluminum, **as directed**, vault box, **30 by 30 in. (750 by 750 mm) OR 12 in. (300 mm)** diameter, **as directed**, with watertight frame and cover. Vault shall support H-20 loading for traffic areas **OR** a **100,000 lb. (45,360 kg)** loading for airfield locations, **as directed**. The frame shall be **6 in. (150 mm)** deep, and shall be set in a concrete collar a minimum of **8 in. (200 mm)** thick, and extending **4 in. (100 mm)** beyond the edge of the frame in all directions. Frame and concrete collar shall be set flush with the level of the existing pavement **OR** set **3 in. (75 mm)** above the existing grade, **as directed**. Locking well cap shall be provided on top of the well casing, which will terminate inside the vault as indicated.

- I. Polyethylene Sheeting: ASTM D 4397.

1.3 EXECUTION

- A. General: Notify the Owner at least 15 days prior to commencement of work. Locations of wells shall be as indicated. Drilling, installation, and development of the monitoring wells shall be supervised, directed, and monitored by the CPC. Drilling, sampling, and well development equipment introduced to the well shall be decontaminated before and after each use in accordance with ASTM D 5088.

- B. Drilling: Borehole shall be advanced using conventional **10 in. (250 mm)** hollow-stem auger **OR** solid auger **OR** rotary wash, **as directed**, drilling methods. If it is the opinion of the CPC that an alternate drilling method is required, justification for a boring method change shall be submitted to the Owner, and approval for the change granted prior to drilling. Drill crew shall be experienced and trained in drilling and safety requirements for contaminated sites.

1. Sampling: Obtain samples in accordance with ASTM D 1586 or ASTM D 1587. Perform standard penetration tests at the following depths **0.0 to 1.5 ft (0 to 450 mm); 1.5 to 3.0 ft (450 to 900 mm); 3.0 to 4.5 ft (900 to 1350 mm); and 5 ft (1500 mm)** centers or at changes in soil formation thereafter. Each soil sample shall be screened in the field with an organic vapor analyzer/flame ionization device (OVA/FID) capable of detecting vapors to a minimum of one ppm. Log boring in accordance with ASTM D 2487 and ASTM D 2488. Groundwater elevation shall be indicated.
2. Analysis: The CPC shall review the log data from each borehole and compare the data with the well design requirements. The CPC shall verify the adequacy of the well design, or shall offer a proposed modification to the design based on the geologic and hydrogeologic data obtained from the borehole. This review and analysis shall be conducted for each borehole **OR** for one borehole considered representative of the entire project, **as directed**. The CPC shall submit the borehole boring logs, the analysis of the well design, and any proposed design modifications to the Owner in a Borehole Analysis Report. Any modifications to the well design approved by the Owner shall be considered a change to the contract documents and shall be negotiated in accordance with the "CHANGES" clause.
3. Alignment: Verify that the well is straight by lowering a **10 ft (3 m)** section of steel pipe **1/4 in. (6 mm)** smaller in diameter than the inside diameter of the casing in to the well. For wells deeper than **200 ft (60 m)**, Contractor shall verify that the well is plumb.

- C. Soil Removed From The Borehole

1. Temporary Containment of Soil Removed from the Borehole: Soil removed from the borehole shall be placed in a temporary containment area. Provide a temporary containment area near the well site. Cover containment area with **10 mil (0.25 mm)** reinforced polyethylene sheeting. Place soil removed from the borehole[s] on the impervious barrier and cover with **6 mil (0.15 mm)** reinforced polyethylene sheeting. Provide a straw bale berm around the outer limits of the

containment area and cover with polyethylene sheets. Secure edges of sheets with weights to keep the polyethylene sheeting in place. Water runoff shall be diverted from the stockpiled material. As an option, soil may be stockpiled in trucks suitable for transporting contaminated soils as specified herein.

2. Testing Requirements for Stockpiled Soils

a. Sampling: A minimum of one composite sample shall be developed and analyzed for each required test for every 100 cu. yds. (76.4 cu. m) or fraction thereof from a composite stockpile of soil removed from all well sites. To develop a composite sample of the size necessary to run the required tests, the Contractor shall take several samples from different areas along the surface and in the center of the stockpile. These samples shall be combined and thoroughly mixed to develop the composite sample.

b. Testing

- 1) The soil shall contain no free liquid as demonstrated by EPA SW-846, Method 9095, paint filter liquids test.
- 2) The sum of benzene, toluene, ethyl benzene, and xylene (BTEX) concentrations shall be determined by using EPA SW-846, Method 5030/8020.
- 3) TPH (total petroleum hydrocarbons) concentrations shall be determined by using EPA SW-846, Method 8015, which has been modified for use with soil.
- 4) Material shall be tested for TOX (total organic halogens) in accordance with EPA SW-846, Method 9020.
- 5) Material shall be analyzed for full TCLP in accordance with EPA SW-846, Method 1311 and for ignitability, corrosivity, and reactivity.
- 6) Material shall be tested for polychlorinated biphenyls (PCB's) in accordance with EPA SW-846, Method 8080.
- 7) Moisture content of the sample shall be determined in accordance with EPA Method 160.3.

c. Disposal of Stockpiled Soils

- 1) Soils exhibiting TPH less than 100 ppm, BTEX less than 10 ppm, TOX less than 100 ppm, passing TCLP tests, and testing negative for PCB's shall be considered clean as shall be disposed of on-site, as directed by the Owner.
- 2) Soils failing the TCLP test or exhibiting TOX greater than 100 ppm shall be managed in accordance with applicable State and local regulations. Payment for disposal of materials failing the TCLP metals test or TOX test shall be made in accordance with the "CHANGES" clause of the General Conditions.
- 3) If the concentration of total BTEX is greater than 10 ppm or TPH greater than 100 ppm, the soil shall be treated and disposed of at a permitted soil recycling facility.

D. Well Installation: Well installation shall be in accordance with ASTM D 5092 and EPA 600-4-89-034, and as indicated on the well construction drawings submitted by the CPC and approved by the Owner. Borehole shall be stable and shall be verified straight before beginning installation.

1. Casings and Screens: Well casings, screens, plugs, and caps shall be decontaminated prior to delivery by the manufacturer and shall be certified clean. Materials shall be delivered, stored, and handled in such manner as to ensure that grease, oil, or other contaminants do not contact any portion of the well screen and casing assembly prior to installation. If directed by the Owner, the well screen and casing assembly shall be cleaned with high pressure water prior to installation. Personnel shall wear clean cotton or surgical gloves while handling the assembly. Centralizers shall be used to ensure that the well screen and casing assembly is installed concentrically in the borehole. When the assembly has been installed at the appropriate elevation, it shall be adequately secured to preclude movement during placement of the filter packs and annular seals. The top of the well casing shall be capped during filter pack placement.
2. Primary and Secondary Filter Packs: Primary and secondary filter packs shall be placed as indicated on the approved well construction drawings to fill the entire annular space between the screen and casing assembly and the outside wall of the borehole. Place both the primary and secondary filters with a tremie pipe in accordance with EPA 600-4-89-034 and ASTM D 5092. Placement of the primary and secondary filters by gravity or free fall methods is not allowed. Control speed of filter placement to prevent bridging and to allow for settlement. Prior to

- commencement of work, equipment and methods required to place filters shall be approved by the Owner.
3. Bentonite Seal: Bentonite shall be placed as a slurry through a tremie pipe. Control speed of bentonite placement to prevent bridging or segregation of slurry. Additional water shall be added to the annular space as directed by the CPC to ensure complete hydration of the bentonite. Bentonite shall cure a minimum of 48 hours before the placement of cement grout to ensure complete hydration and expansion of the bentonite.
 4. Neat Cement Grout: Cement grout shall be placed in the annular space above the bentonite seal as indicated on the well construction drawings. Cement grout shall be placed as a slurry through a tremie pipe, and injected under pressure to reduce chance of voids. Grout shall be injected in one continuous operation until full strength grout flows out at the ground surface without evidence of drilling cuttings or fluid. Cement grout shall cure a minimum of 48 hours before beginning well development operations.
 5. Well Head Completions: Well head completions shall be as indicated and as specified herein.
- E. Well Development: Well development shall be in accordance with EPA 600-4-89-034 and ASTM D 5092 except as modified herein. Bailing, surging, and pumping/overpumping/backwashing are acceptable development methods. Air surging and jetting are prohibited. Method of development shall be chosen by the CPC and approved by the Owner. Well development shall not begin until the well installation is complete and accepted by the Owner. Well development operations shall be conducted continuously until development water flows clear and free of drilling fluids, cuttings, or other materials. At such time representative water samples shall be tested for pH, temperature, and specific conductivity in accordance with EPA 600-4-79-20. Samples shall be taken every 3 hours. When stabilized readings of these parameters, as accepted by the Owner, have been achieved for 12 consecutive hours, well development operations shall cease.
- F. Water From Well Development Operations: Water from the well development operations shall be containerized in accordance with State and local regulations. One sample shall be taken and analyzed for each required test for every 1000 gallons (3780 liters) of stored water from well development operations.
1. Testing
 - a. The sum of benzene, toluene, ethyl benzene, and xylene (BTEX) concentrations shall be determined by using EPA SW-846, Method 8020.
 - b. TPH (total petroleum hydrocarbons) concentrations shall be determined by using EPA SW-846, Method 8015.
 2. Disposal of Containerized Water
 - a. Water exhibiting TPH less than 0.5 ppm and BTEX less than 1 ppb shall be considered clean and shall be disposed of on-site as directed by the Owner.
 - b. If the concentration of total BTEX is greater than 1 ppb or TPH greater than 0.5 ppm, the water shall be treated and disposed of at a permitted facility.
- G. Transportation Of Contaminated Soil And Water: The Contractor shall be solely responsible for complying with Federal, State, and local requirements for transporting contaminated materials through the applicable jurisdictions and shall bear responsibility and cost for any noncompliance. In addition to those requirements, the Contractor shall do the following:
1. Inspect and document vehicles and containers for proper operation and covering.
 2. Inspect vehicles and containers for proper markings, manifest documents, and other requirements for waste shipment.
 3. Perform and document decontamination procedures prior to leaving the worksite and again before leaving the disposal site.
- H. Disposal Of Contaminated Soil And Water: Contaminated materials removed from the site shall be disposed of in a treatment/disposal facility permitted to accept such materials.

- I. Installation Survey: Upon completion of well installation and development and acceptance by the Owner therefor, the Contractor vertical and horizontal position of each well shall be determined by a registered land surveyor licensed in the State where the work is located . The survey shall document the vertical elevations of the top of the casing pipe and the ground surface elevation adjacent to each well. Survey shall be accurate to the nearest **0.01 ft (3 mm)**. This data shall be submitted with a well location map as the Installation Survey Report.

- J. Cleanup: Upon completion of the well construction, remove debris and surplus materials from the jobsite.

END OF SECTION 23 11 23 00b

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Task	Specification	Specification Description
23 11 23 00	01 95 99 99	Relief Wells
23 11 23 00	01 95 99 99a	Common Work Results for Fire Suppression
23 11 23 00	01 95 99 99b	Common Work Results for Plumbing
23 11 23 00	01 95 99 99g	Common Work Results for HVAC
23 11 23 00	01 95 99 99h	Water Supply Wells
23 11 23 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 11 23 00	33 31 11 00	Sanitary Sewerage
23 12 13 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 12 23 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 13 13 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 13 13 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 13 23 16	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 13 23 26	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 13 33 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 21 13 23 - FACILITY FUEL-OIL PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for facility fuel-oil piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fuel-oil, fuel-oil and diesel-fuel-oil, and diesel-fuel-oil distribution systems and the following:
 - a. Pipes, tubes, and fittings.
 - b. Piping and tubing joining materials.
 - c. Piping specialties.
 - d. Valves.
 - e. Vertical, steel, fuel-oil ASTs.
 - f. Horizontal, steel, fuel-oil ASTs.
 - g. Containment-dike, steel, fuel-oil ASTs.
 - h. Insulated, steel, fuel-oil ASTs.
 - i. Concrete-vaulted, steel, fuel-oil ASTs.
 - j. Steel, fuel-oil USTs with STI-P3.
 - k. Composite, steel, fuel-oil USTs.
 - l. Jacketed, steel, fuel-oil USTs.
 - m. FRP fuel-oil USTs.
 - n. Fuel-oil AST accessories.
 - o. Fuel-oil UST accessories.
 - p. Fuel-oil storage tank piping specialties.
 - q. Fuel-oil storage tank pumps.
 - r. Fuel-transfer pumps.
 - s. Fuel maintenance system.
 - t. Liquid-level gage system.
 - u. Leak-detection and monitoring system.
 - v. Mechanical sleeve seals.
 - w. Grout.
 - x. Concrete bases.

C. Definitions

1. AST: Aboveground storage tank.
2. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
3. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
4. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.
5. FPM: Vinylidene fluoride-hexafluoropropylene copolymer rubber.
6. FRP: Glass-fiber-reinforced plastic.
7. UST: Underground storage tank.

D. Performance Requirements

1. Maximum Operating-Pressure Ratings: **3-psig (21-kPa)** fuel-oil supply pressure at oil-fired appliances.

2. Delegated Design: Design restraint and anchors for fuel-oil piping, ASTs, and equipment, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Seismic Performance: Factory-installed support attachments for AST shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event, **as directed**."

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For facility fuel-oil piping layout. Include plans, piping layout and elevations, sections, and details for fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
3. Delegated-Design Submittal: For fuel-oil piping and equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of anchors and seismic restraints.
 - b. Design Calculations: Calculate requirements for selecting seismic restraints.
 - c. Detail fabrication and assembly of pipe anchors, hangers, supports for multiple pipes, and attachments of the same to building structure.
4. Seismic Qualification Certificates: For ASTs, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Brazing certificates.
6. Welding certificates.
7. Field quality-control reports.
8. Operation and Maintenance Data.
9. Warranty: Sample of special warranty.

F. Quality Assurance

1. Brazing: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
2. Steel Support Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. Comply with ASME B31.9, "Building Services Piping," for fuel-oil piping materials, installation, testing, and inspecting.
6. Comply with requirements of the EPA and of state and local authorities having jurisdiction. Include recording of fuel-oil storage tanks and monitoring of tanks and piping.

G. Delivery, Storage, And Handling

1. Lift and support fuel-oil storage tanks only at designated lifting or supporting points, as shown on Shop Drawings. Do not move or lift tanks unless empty.
2. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

3. Store pipes and tubes with protective PE coating to avoid damaging the coating and to protect from direct sunlight.
4. Store PE pipes and valves protected from direct sunlight.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-oil storage tanks and flexible, double-containment piping and related equipment that fail in materials or workmanship within specified warranty period.
 - a. Storage Tanks:
 - 1) Failures include, but are not limited to, the following when used for storage of fuel oil at temperatures not exceeding **150 deg F (66 deg C)**:
 - a) Structural failures including cracking, breakup, and collapse.
 - b) Corrosion failure including external and internal corrosion of steel tanks.
 - 2) Warranty Period: 30 years from date of Final Completion.
 - b. Flexible, Double-Containment Piping and Related Equipment:
 - 1) Failures due to defective materials or workmanship for materials installed together, including piping, dispenser sumps, entry boots, and sump mounting adapters.
 - 2) Warranty Period: **10 OR 30, as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. See Part 1.3 piping schedule articles for where pipes, tubes, fittings, and joining materials are applied in various services.
2. Steel Pipe: ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - a. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150, standard pattern.
 - b. Wrought-Steel Welding Fittings: ASTM A 234/A 234M, for butt and socket welding.
 - c. Unions: ASME B16.39, Class 150, malleable iron with brass-to-iron seat, ground joint, and threaded ends.
 - d. Forged-Steel Flanges and Flanged Fittings: ASME B16.5, minimum Class 150, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - 1) Material Group: 1.1.
 - 2) End Connections: Threaded or butt welding to match pipe.
 - 3) Lapped Face: Not permitted underground.
 - 4) Gasket Materials: Asbestos free, ASME B16.20 metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
 - 5) Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.
 - e. Protective Coating for Underground Piping: Factory-applied, three-layer coating of epoxy, adhesive, and PE.
 - 1) Joint Cover Kits: Epoxy paint, adhesive, and heat-shrink PE sleeves.
3. Drawn-Temper Copper Tube: Comply with **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**.
 - a. Copper Fittings: ASME B16.22, wrought copper, streamlined pattern.
 - b. Bronze Flanges and Flanged Fittings: ASME B16.24, Class 150.
 - 1) Gasket Material: Asbestos free, ASME B16.20, metallic, or ASME B16.21 nonmetallic, gaskets compatible with fuel oil.
 - 2) Bolts and Nuts: ASME B18.2.1, cadmium-plated steel.
4. Annealed-Temper Copper Tube: Comply with **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**.
 - a. Copper Fittings: ASME B16.22, wrought copper, streamlined pattern.
 - b. Flare Fittings: Comply with ASME B16.26 and SAE J513.
 - 1) Copper fittings with long nuts.
 - 2) Metal-to-metal compression seal without gasket.
 - 3) Dryseal threads complying with ASME B1.20.3.

- B. Double-Containment Pipe And Fittings
1. Flexible, Double-Containment Piping: Comply with UL 971.
 - a. Pipe Materials: PVDF complying with ASTM D 3222 for carrier pipe with mechanical couplings to seal carrier, and PE pipe complying with ASTM D 4976 for containment piping.
 - b. Fiberglass **OR** PE, **as directed**, sumps.
 - c. Watertight sump entry boots, pipe adapters with test ports and tubes, coaxial fittings, and couplings.
 - d. Minimum Operating Pressure Rating: **10 psig (69 kPa)**.
 - e. Plastic to Steel Pipe Transition Fittings: Factory-fabricated fittings with plastic end matching or compatible with carrier piping, and steel pipe end complying with ASTM A 53/A 53M, black steel, Schedule 40, Type E or S, Grade B.
 - f. Include design and fabrication of double-containment pipe and fitting assemblies with provision for field installation of cable leak-detection system in annular space between carrier and containment piping.
 2. Rigid, Double-Containment Piping: Comply with UL 971.
 - a. RTRP: ASTM D 2996 or ASTM D 2997 carrier and containment piping and mechanical couplings to seal carrier and containment piping or individually bonded joints.
 - 1) Minimum Operating-Pressure Rating for RTRP **NPS 2 and NPS 3 (DN 50 and DN 80): 150 psig (1035 kPa)**.
 - 2) Minimum Operating-Pressure Rating for RTRP **NPS 4 and NPS 6 (DN 100 and DN 150): 125 psig (860 kPa)**. Compliance with UL 971 is not required for **NPS 6 (DN 150)** and larger piping.
 - 3) Fittings: RTRF complying with ASTM D 2996 or ASTM D 2997, and made by RTRP manufacturer; watertight sump entry boots, termination, or other end fittings.
 - b. Include design and fabrication of double-containment pipe and fitting assemblies with provision for field installation of cable leak-detection system in annular space between carrier and containment piping.
- C. Piping Specialties
1. Flexible Connectors: Comply with UL 567.
 - a. Metallic Connectors:
 - 1) Listed and labeled for aboveground and underground applications by an NRTL acceptable to authorities having jurisdiction.
 - 2) Stainless-steel bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
 - 3) Minimum Operating Pressure: **150 psig (1035 kPa)**.
 - 4) End Connections: Socket, flanged, or threaded end to match connected piping.
 - 5) Maximum Length: **30 inches (762 mm)**.
 - 6) Swivel end, **50-psig (345-kPa)** maximum operating pressure.
 - 7) Factory-furnished anode.
 - b. Nonmetallic Connectors:
 - 1) Listed and labeled for underground applications by an NRTL acceptable to authorities having jurisdiction.
 - 2) PTFE bellows with woven, flexible, bronze or stainless-steel, wire-reinforcing protective jacket.
 - 3) Minimum Operating Pressure: **150 psig (1035 kPa)**.
 - 4) End Connections: Socket, flanged, or threaded end to match connected piping.
 - 5) Maximum Length: **30 inches (762 mm)**.
 - 6) Swivel end, **50-psig (345-kPa)** maximum operating pressure.
 - 7) Factory-furnished anode.
 2. Y-Pattern Strainers:
 - a. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.

- c. Strainer Screen: 60 **OR** 80, **as directed**, -mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: 125 psig (860 kPa).
 3. Basket Strainers:
 - a. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for NPS 2 (DN 50) and smaller; flanged ends for NPS 2-1/2 (DN 65) and larger.
 - c. Strainer Screen: 60 **OR** 80, **as directed**, -mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: 125 psig (860 kPa).
 4. T-Pattern Strainers:
 - a. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
 - b. End Connections: Grooved ends.
 - c. Strainer Screen: 60 **OR** 80, **as directed**, -mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
 - d. CWP Rating: 750 psig (5170 kPa).
 5. Manual Air Vents:
 - a. Body: Bronze.
 - b. Internal Parts: Nonferrous.
 - c. Operator: Screwdriver or thumbscrew.
 - d. Inlet Connection: NPS 1/2 (DN 15).
 - e. Discharge Connection: NPS 1/8 (DN 6).
 - f. CWP Rating: 150 psig (1035 kPa).
 - g. Maximum Operating Temperature: 225 deg F (107 deg C).
- D. Joining Materials
1. Joint Compound and Tape: Suitable for fuel oil.
 2. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 3. Brazing Filler Metals: Alloy with melting point greater than 1000 deg F (540 deg C) complying with AWS A5.8/A5.8M. Brazing alloys containing more than 0.05 percent phosphorus are prohibited.
 4. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
- E. Manual Fuel-Oil Shutoff Valves
1. See valve schedule in Part 1.3 for where each valve type is applied in various services.
 2. General Requirements for Metallic Valves, NPS 2 (DN 50) and Smaller for Liquid Service: Comply with UL 842.
 - a. CWP Rating: 125 psig (860 kPa).
 - b. Threaded Ends: Comply with ASME B1.20.1.
 - c. Dryseal Threads on Flare Ends: Comply with ASME B1.20.3.
 - d. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
 - e. Service Mark: Initials "WOG" shall be permanently marked on valve body.
 3. General Requirements for Metallic Valves, NPS 2-1/2 (DN 65) and Larger: Comply with UL 842.
 - a. CWP Rating: 125 psig (860 kPa).
 - b. Flanged Ends: Comply with ASME B16.5 for steel flanges.
 - c. Tamperproof Feature: Locking feature for valves indicated in the valve schedule.
 - d. Service Mark: Initials "WOG" shall be permanently marked on valve body.
 4. One-Piece, Bronze Ball Valve with Bronze Trim: MSS SP-110.
 - a. Body: Bronze, complying with ASTM B 584.
 - b. Ball: Chrome-plated brass.
 - c. Stem: Bronze; blowout proof.
 - d. Seats: Reinforced TFE; blowout proof.
 - e. Packing: Separate packnut with adjustable-stem packing threaded ends.

- f. Ends: Threaded, flared, or socket as indicated in the valve schedule.
 - g. CWP Rating: **600 psig (4140 kPa)**.
 - h. Service Mark: Initials "WOG" shall be permanently marked on valve body.
5. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim: MSS SP-110.
- a. Body: Bronze, complying with ASTM B 584.
 - b. Ball: Chrome-plated bronze.
 - c. Stem: Bronze; blowout proof.
 - d. Seats: Reinforced TFE; blowout proof.
 - e. Packing: Threaded-body packnut design with adjustable-stem packing.
 - f. Ends: Threaded, flared, or socket as indicated in the valve schedule.
 - g. CWP Rating: **600 psig (4140 kPa)**.
 - h. Service Mark: Initials "WOG" shall be permanently marked on valve body.
6. Two-Piece, Regular-Port Bronze Ball Valves with Bronze Trim: MSS SP-110.
- a. Body: Bronze, complying with ASTM B 584.
 - b. Ball: Chrome-plated bronze.
 - c. Stem: Bronze; blowout proof.
 - d. Seats: Reinforced TFE.
 - e. Packing: Threaded-body packnut design with adjustable-stem packing.
 - f. Ends: Threaded, flared, or socket as indicated in the valve schedule.
 - g. CWP Rating: **600 psig (4140 kPa)**.
 - h. Service Mark: Initials "WOG" shall be permanently marked on valve body.

F. Specialty Valves

1. Pressure Relief Valves: Comply with UL 842.
- a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Body: Brass, bronze, or cast steel.
 - c. Springs: Stainless steel, interchangeable.
 - d. Seat and Seal: Nitrile rubber.
 - e. Orifice: Stainless steel, interchangeable.
 - f. Factory-Applied Finish: Baked enamel.
 - g. Maximum Inlet Pressure: **150 psig (1035 kPa)**.
 - h. Relief Pressure Setting: **60 psig (414 kPa)**.
2. Oil Safety Valves: Comply with UL 842.
- a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Body: Brass, bronze, or cast steel.
 - c. Springs: Stainless steel.
 - d. Seat and Diaphragm: Nitrile rubber.
 - e. Orifice: Stainless steel, interchangeable.
 - f. Factory-Applied Finish: Baked enamel.
 - g. Manual override port.
 - h. Maximum Inlet Pressure: **60 psig (414 kPa)**.
 - i. Maximum Outlet Pressure: **3 psig (21 kPa)**.
3. Emergency Shutoff Valves: Comply with UL 842.
- a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Single **OR** Double, **as directed**, poppet valve.
 - c. Body: ASTM A 126, cast iron.
 - d. Disk: FPM.
 - e. Poppet Spring: Stainless steel.
 - f. Stem: Plated brass.
 - g. O-Ring: FPM.
 - h. Packing Nut: PTFE-coated brass.
 - i. Fusible link to close valve at **165 deg F (74 deg C)**.

- j. Thermal relief to vent line pressure buildup due to fire.
- k. Air test port.
- l. Maximum Operating Pressure: **0.5 psig (3.45 kPa)**.
- 4. Mechanical Leak Detector: Comply with UL 842.
 - a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Body: ASTM A 126, cast iron.
 - c. O-Rings: Elastomeric compatible with fuel oil.
 - d. Piston and Stem Seals: PTFE.
 - e. Stem and Spring: Stainless steel.
 - f. Piston Cylinder: Burnished brass.
 - g. Indicated Leak Rate: Maximum **3 gph (3 mL/s) at 10 psig (69 kPa)**.
 - h. Leak Indication: Reduced flow.
- G. Vertical, Steel, Fuel-Oil AST
 - 1. Description:
 - a. UL 142, single-wall, vertical, steel tank.
 - b. UL 142 and STI F921, **as directed**, double-wall, vertical, steel tank; with primary- and secondary-containment walls and interstitial space.
 - 2. Construction: Fabricated with welded, carbon steel suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and maintained temperature up to **150 deg F (66 deg C)**.
- H. Horizontal, Steel, Fuel-Oil AST
 - 1. Description:
 - a. UL 142, single-wall, horizontal, steel tank.
 - b. UL 142 and STI F921, **as directed**, double-wall, horizontal, steel tank; with primary- and secondary-containment walls and interstitial space.
 - 2. Construction: Fabricated with welded, carbon steel; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with maintained temperature up to **150 deg F (66 deg C)**.
 - 3. Supports:
 - a. Manufacturer's standard structural steel welded to tank.
 - b. Manufacturer's standard type and number, steel or cast-iron cradles, for field installation.
- I. Containment-Dike, Steel, Fuel-Oil AST
 - 1. Description: UL 142 and STI F911, single-wall, horizontal, steel tank; with open or enclosed **OR** enclosed, **as directed**, secondary-containment dike with capacity greater than tank capacity.
 - 2. Construction: Fabricated with welded, carbon steel; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with maintained temperature up to **150 deg F (66 deg C)**.
- J. Insulated, Steel, Fuel-Oil AST
 - 1. Description: UL 142 and UL 2085 **OR** UL 142, UL 2085, and STI F941, **as directed**, thermally insulated and fire-resistant, double-wall, horizontal, steel tank; with primary- and secondary-containment walls and insulation and with interstitial space.
 - 2. Construction: Fabricated with welded, carbon steel and insulation; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with test temperature according to UL 2085.
- K. Concrete-Vaulted, Steel, Fuel-Oil AST
 - 1. Description: UL 142 and UL 2085 **OR** UL 142, UL 2085, and STI F941, **as directed**; thermally insulated, fire-resistant and protected, double-wall, horizontal, steel tank; with primary- and secondary-containment walls and insulation and with interstitial space.

2. Construction: Fabricated with welded, carbon steel and insulation and encased in concrete that will protect from bullets; suitable for operation at atmospheric pressure and for storing fuel oil with specific gravity up to 1.1 and with test temperature according to UL 2085.
- L. Steel, Fuel-Oil UST With STI-P3
1. Description: UL 58 and STI P3, double-wall, horizontal, steel tank; with cathodic protection and electrical isolation.
 - a. Containment Method: STI-P3, Type I, with primary and secondary walls in contact **OR** Type II, with interstitial space, **as directed**.
 2. Construction: Fabricated with welded steel; suitable for operation at atmospheric pressure and for storing liquids with specific gravity up to 1.1; fabricated for the following loads:
 - a. Depth of Bury: **3 feet (1 m)** from top of tank to finished surface.
 - b. External Hydrostatic Pressure: To withstand general buckling with safety factor of 2:1 if hole is fully flooded.
 - c. Surface Loads: AASHTO's "Specifications for Highway Bridges," H-20 axle loads of **32,000 lb (14 515 kg)**.
 3. Corrosion-Protection System: Protect tank and factory-installed piping by engineered and installed corrosion-protection system according to STI P3, with means of monitoring cathodic protection.
- M. Composite, Steel, Fuel-Oil UST
1. Description: UL 58, double-wall, horizontal, composite tank; with coating complying with UL 1746 and STI F894.
 - a. Containment Method: STI F894, Type I, with primary and secondary walls in contact **OR** Type II, with interstitial space, **as directed**.
 2. Construction: Fabricated with welded steel and factory coating according to UL 1746 and STI F894; suitable for operation at atmospheric pressure and for storing liquids with specific gravity up to 1.1; fabricated for the following loads:
 - a. Depth of Bury: **3 feet (1 m)** from top of tank to finished surface.
 - b. External Hydrostatic Pressure: To withstand general buckling with safety factor of 2:1 if hole is fully flooded.
 - c. Surface Loads: AASHTO's "Specifications for Highway Bridges," H-20 axle loads of **32,000 lb (14 515 kg)**.
- N. Jacketed, Steel, Fuel-Oil UST
1. Description: Jacketed, horizontal, steel tank; complying with UL 58, and with plastic or fiberglass jacket and corrosion-protection system according to UL 1746 and STI F922, **as directed**.
 2. Construction: Tank fabricated with welded carbon steel, and jacket fabricated with plastic or fiberglass and vacuum-sealed interstitial space; suitable for operation at atmospheric pressure and with integral leak-detection device. Tank fabricated for the following loads:
 - a. Depth of Bury: **3 feet (1 m)** from top of tank to finished surface.
 - b. External Hydrostatic Pressure: To withstand general buckling with safety factor of 2:1 if hole is fully flooded.
 - c. Surface Loads: AASHTO's "Specifications for Highway Bridges," H-20 axle loads of **32,000 lb (14 515 kg)**.
- O. FRP Fuel-Oil UST
1. Description: Horizontal, FRP UST; UL 1316, double wall, with interstitial space and integral, hydrostatic, leak-detection and monitoring system, **as directed**.
 2. Construction: Fabricated with fiberglass-reinforced polyester resins; suitable for operation at atmospheric pressure; fabricated for the following loads:
 - a. Depth of Bury: **3 feet (1 m)** from top of tank to finished surface.
 - b. External Hydrostatic Pressure: To withstand general buckling with safety factor of 2:1 if hole is fully flooded.

- c. Surface Loads: AASHTO's "Specifications for Highway Bridges," H-20 axle loads of **32,000 lb (14 515 kg)**.
- P. Shop Painting Of AST
1. Apply manufacturer's standard prime coat to exterior steel surface of AST and supports.
 2. Prepare exterior steel surface of AST and tank supports.
 3. Shop Cleaning: After fabrication, blast clean according to SSPC-SP 6/NACE No. 3 **OR** SSPC-SP 10/NACE No. 2, **as directed**.
 4. After cleaning, remove dust or residue from cleaned surfaces.
 5. If surface develops rust before prime coat is applied, repeat surface preparation.
 6. Apply manufacturer's standard prime coat to shop-cleaned, dry surface same day as surface preparation.
 7. Apply manufacturer's standard two-component, epoxy finish coats.
- Q. Fuel-Oil AST Accessories
1. Tank Manholes (for horizontal tanks and some vertical tanks): **22-inch- (560-mm-)** minimum diameter; bolted, flanged, and gasketed; centered on top of tank.
 2. Tank Manholes (for vertical tanks): **22-inch- (560-mm-)** minimum diameter; bolted, flanged, and gasketed; on top and at side of tank.
 3. For Horizontal Tanks: Threaded pipe connection fittings on top of tank, for fill, supply, return, vent, sounding, and gaging. Include cast-iron plugs for shipping.
 4. For Vertical Tanks: Threaded pipe connection fittings on top or sides of tank as indicated, for fill, supply, return, vent, sounding, and gaging. Include cast-iron plugs for shipping.
 5. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.
 6. Lifting Lugs: For handling and installation.
 7. Ladders (for horizontal tanks and some vertical tanks): Carbon-steel ladder inside tank, anchored to top and bottom, and located as indicated. Include reinforcement of tank at bottom of ladder.
 8. Ladders (for vertical tanks): Carbon-steel ladder outside tank, anchored to top and side wall. Comply with requirements in Division 05 Section "Metal Fabrications" for exterior steel ladder.
 - a. Cage: Include welded steel cage around ladders for tanks **20 feet (6 m)** high or higher.
 9. Supply Tube: Extension of supply piping fitting into tank, terminating **6 inches (150 mm)** above tank bottom and cut at a **45-degree angle (1:1 slope)**.
 10. Sounding and Gage Tubes: Extension of fitting into tank, terminating **6 inches (150 mm)** above tank bottom and cut at a **45-degree angle (1:1 slope)**.
- R. Fuel-Oil UST Accessories
1. Tank Manholes: **22-inch- (560-mm-)** minimum diameter; bolted, flanged, and gasketed, with extension collar; for access to inside of tank.
 2. Steel Tank Masonry Supports: Two **6-by-6-by-3/8-inch (150-by-150-by-10-mm)** steel angles, **72 inches (1800 mm)** long, located longitudinally on tank on each side of manholes and continuously welded in place.
 3. Threaded pipe connection fittings on top of tank for fill, supply, return, vent, sounding, and gaging, in locations and of sizes indicated. Include cast-iron plugs for shipping.
 4. Striker Plates: Inside tank, on bottom below fill, vent, sounding, gage, and other tube openings.
 5. Lifting Lugs: For handling and installation.
 6. Ladders: Carbon-steel ladder inside tank, anchored to top and bottom. Include reinforcement of tank at bottom of ladder.
 7. Supply Tube: Extension of supply piping fitting into tank, terminating **6 inches (150 mm)** above tank bottom and cut at a **45-degree angle (1:1 slope)**.
 8. Sounding and Gage Tubes: Extension of fitting into tank, terminating **6 inches (150 mm)** above tank bottom and cut at a **45-degree angle (1:1 slope)**.
 9. Containment Sumps: Fiberglass **OR** PE, **as directed**, with sump base, add-on extension pieces as required, sump top, lid, and gasket-seal joints. Include sump entry boots for pipe penetrations through sidewalls.

10. Sump Entry Boots: Two-part pipe fitting for field assembly and of size required to fit over pipe. Include gaskets shaped to fit sump sidewall, sleeves, seals, and clamps as required for liquid-tight pipe penetrations.
 11. Anchor Straps: Storage tank manufacturer's standard anchoring system, with straps, strap-insulating material, cables and turnbuckles, of strength at least one and one-half times maximum uplift force of empty tank without backfill in place.
 12. Filter Mat: Geotextile woven or spun filter fabric, in 1 or more layers, for minimum total weight of **3 oz./sq. yd. (101.7 g/sq. m)**.
 13. Overfill Prevention Valves: Factory fabricated or shop or field assembled from manufacturer's standard components. Include drop tube, cap, fill nozzle adaptor, check valve mechanism or other devices, and vent if required to restrict flow at 95 percent of tank capacity and to provide complete shutoff of filling at 98 **OR** 99, **as directed**, percent of tank capacity.
- S. Fuel-Oil Storage Tank Piping Specialties
1. Fitting Materials: Cast iron, malleable iron, brass, or corrosion-resistant metal; suitable for fuel-oil service.
 - a. Surface, Flush-Mounted Fittings: Waterproof and suitable for truck traffic.
 - b. Aboveground-Mounted Fittings: Weatherproof.
 2. Spill-Containment Fill Boxes: Flush mounting, with drainage feature to drain oil into tank, threaded fill-pipe connection, and wrench operation.
 3. Fill Boxes: Flush mounting, with threaded fill-pipe connection and wrench operation.
 4. Locking Fill Boxes: Flush mounting, with locking-type inner fill cap for standard padlock and threaded fill-pipe connection.
 5. Supply and Sounding Drop Tubes: Fuel-oil supply piping or fitting, inside tank, terminating **6 inches (150 mm)** above bottom of tank, and with end cut at a **45-degree angle (1:1 slope)**.
 6. Pipe Adapters and Extensions: Compatible with piping and fittings.
 7. Suction Strainers and Check Valves: Bronze or corrosion-resistant metal components.
 8. Foot Valves and Antisiphon Valves: Poppet-type, bronze or corrosion-resistant metal components.
 9. Weatherproof Vent Cap: Cast- or malleable-iron increaser fitting with corrosion-resistant wire screen, with free area at least equal to cross-sectional area of connecting pipe and threaded-end connection.
 10. Metal Manholes: **22-inch- (560-mm-)** minimum diameter frame and cover. Furnish manhole units of adequate size for access to fittings if size is not indicated.
 11. Monitoring Well Caps: Locking pipe plug and manhole.
- T. Submersible Fuel-Oil Pumps
1. Description: Comply with UL 79, UL 87, and UL 343.
 - a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Impeller: Turbine.
 - c. Housing and Volute: Cast iron.
 - d. Bearings: Bronze, self-lubricating.
 - e. Seals: Mechanical.
 - f. Shaft: Polished steel.
 - g. Suspension Piping: Telescoping to accommodate tank diameter and depth of bury.
 - h. Base: Steel.
 - i. Pressure Relief: Built in.
 - j. Discharge Check Valve: Built in.
 - k. Drive: Direct, close coupled.
 2. Controls: Pump controller panel complying with UL 353 and UL 508C and with interlock and terminals for connections to fuel-oil-burning equipment **OR** diesel-driven fire pumps **OR** diesel-driven emergency generators **OR** diesel-fuel-oil dispenser, **as directed**.
 - a. Run pumps to maintain minimum manifold pressure with outdoor-air temperature less than **60 deg F (16 deg C)**.

- b. Run pumps on seven-day schedule.
 - c. Stage pumps on pressure at a common supply manifold.
 - d. Alternate pumps to equalize run time.
 - e. Alarm motor failure.
 - f. Manual reset dry-run protection. Stop pumps if fuel level falls below pump suction.
 - g. Deenergize and alarm pump locked rotor condition.
 - h. Alarm open circuit, high and low voltage.
 - i. Indicating lights for power on, run, and off normal conditions.
 - j. Interface with automatic control system is specified in Division 23 Section "Instrumentation And Control For Hvac" to control and indicate the following:
 - 1) Start/stop pump set when required by schedule, fuel-fired appliance operation, day tank level control, or weather conditions.
 - 2) Operating status.
 - 3) Alarm off-normal status.
3. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Thermal-Overload Protection: Motor-winding temperature sensor.
 - c. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.

U. Simplex Fuel-Oil Transfer Pumps

- 1. Description: Comply with UL 343, and HI M109.
 - a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Type: Positive-displacement, rotary type.
 - c. Impeller: Steel gear with crescent **OR** Carbon vane, **as directed**.
 - d. Housing: Cast-iron foot mounted.
 - e. Bearings: Bronze, self-lubricating.
 - f. Shaft: Polished steel.
 - g. Seals: Mechanical.
 - h. Base: Steel.
 - i. Pressure Relief: Built in.
 - j. Discharge Check Valve: Built in.
- 2. Drive: V-belt with guard; gear reducer; or direct, close coupled **OR** V-belt with guard **OR** Gear reducer **OR** Direct, close coupled, **as directed**.
- 3. Controls:
 - a. Run pump to maintain minimum manifold pressure with outdoor-air temperature less than **60 deg F (16 deg C)**.
 - b. Run pump on seven-day schedule.
 - c. Alarm motor failure.
 - d. Manual reset dry-run protection. Stop pump if fuel level falls below pump suction.
 - e. Deenergize and alarm pump locked rotor condition.
 - f. Alarm open circuit, high and low voltage.
 - g. Indicating lights for power on, run, and off normal conditions.
 - h. Interface with automatic control system is specified in Division 23 Section "Instrumentation And Control For Hvac" to control and indicate the following:
 - 1) Start/stop pump set when required by schedule, fuel-fired appliance operation, day tank level control, or weather conditions.
 - 2) Operating status.
 - 3) Alarm off-normal status.
- 4. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".

- a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
- b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.

V. Duplex **OR** Triplex, **as directed**, Fuel-Oil Transfer Pump Sets

1. Description: Comply with HI M109.
 - a. Listed and labeled for fuel-oil service by an NRTL acceptable to authorities having jurisdiction.
 - b. Type: Positive-displacement, rotary type.
 - c. Impeller: Steel gear with crescent **OR** Carbon vane, **as directed**.
 - d. Housing: Cast-iron foot mounted.
 - e. Bearings: Bronze, self-lubricating.
 - f. Shaft: Polished steel.
 - g. Seals: Mechanical.
 - h. Base: Steel.
 - i. Pressure Relief: Built in.
 - j. Discharge Check Valve: Built in.
2. Drive: V-belt with guard, gear reducer, or direct close coupled **OR** V-belt with guard **OR** Gear reducer **OR** Direct close coupled, **as directed**.
3. Controls:
 - a. Run pumps to maintain minimum manifold pressure with outdoor-air temperature less than **60 deg F (16 deg C)**.
 - b. Run pumps on seven-day schedule.
 - c. Stage pumps on pressure at a common supply manifold.
 - d. Alternate pumps to equalize run time.
 - e. Alarm motor failure.
 - f. Manual reset dry-run protection. Stop pumps if fuel level falls below pump suction.
 - g. Deenergize and alarm pump locked rotor condition.
 - h. Alarm open circuit, high and low voltage.
 - i. Indicating lights for power on, run, and off normal conditions.
 - j. Interface with automatic control system is specified in Division 23 Section "Instrumentation And Control For Hvac" to control and indicate the following:
 - 1) Start/stop pump set when required by schedule, fuel-fired appliance operation, day tank level control, or weather conditions.
 - 2) Operating status.
 - 3) Alarm off-normal status.
4. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
5. Piping Furnished with Pumps: Steel with ferrous fittings and threaded or welded joints.
6. Strainers Furnished with Pumps: Duplex, basket type with corrosion-resistant-metal-screen baskets.

W. Fuel Maintenance System

1. Description: Factory fabricated and wired fuel maintenance system for fuel-oil filtration; with enclosure, filter, fuel-oil pump, and controls; FMG approved, listed, and labeled by an NRTL acceptable to authorities having jurisdiction.
 - a. Enclosure: NEMA 250, Type 3R, painted steel containing pumps, filters, accessories, and controls. Hinged door on the front of enclosure.

- b. Pump: Comply with HI M109, steel-gear-with-crescent, positive-displacement, direct-coupled, rotary-type.
 - c. Materials: Cast-iron housing; bronze bearings; steel shaft; mechanical seals; and built-in, pressure relief bypass valve.
 - d. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 2) Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
 - e. Piping: Steel with malleable-iron fittings and threaded joints or wrought-steel fittings and welded joints.
 - f. Multistage Filter: Spin-on, replaceable types.
 - 1) Stage 1: 100-mesh strainer.
 - 2) Stage 2: Centrifuge to separate particulates and water from oil.
 - 3) Stage 3: Coalescing water and particulate filter.
 - 4) Stage 4: 30-micron particulate removal.
 - 5) Stage 5: 10-micron particulate removal.
 - 6) Stage 6: Minimum 99.5 percent water removal with see-through bowl and water-sensor probe.
 - 7) Stage 7: 1.5 **OR** 3, **as directed**, -micron particulate removal.
 - g. Multiple-Tank Manifolds:
 - 1) Manifold fabricated of Schedule 80, black steel pipe and threaded nipples for two **OR** three **OR** four, **as directed**, tanks.
 - 2) Solenoid valves for supply and return piping to each tank.
 - 3) Strainers for each tank supply connection.
 - h. Programmable Logic Controller:
 - 1) Alarm on maximum **15-in. Hg (51-kPa)** vacuum at pump suction indicating plugged filter.
 - 2) Alarm on high water level in filter.
 - 3) Alarm leak in enclosure.
 - 4) Touch screen; with minimum 2-line, 20-character, backlit, LCD display.
 - 5) Controller strip heater with thermostat.
 - i. Interface with automatic control system is specified in Division 23 Section "Instrumentation And Control For Hvac" to control and indicate the following:
 - 1) Start/stop system when required by schedule.
 - 2) Operating status.
 - 3) Alarm off-normal status.
- X. Liquid-Level Gage System
- 1. Description: Calibrated, liquid-level gage system complying with UL 180 with floats **OR** UL 1238 with probes, **as directed**, or other sensors and remote annunciator panel.
 - 2. Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in **gallons (liters)**, and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.
 - 3. Controls: Electrical, operating on 120-V ac.
- Y. Leak-Detection And Monitoring System
- 1. Cable and Sensor System: Comply with UL 1238.
 - a. Calibrated, leak-detection and monitoring system with probes and other sensors and remote alarm panel for fuel-oil storage tanks and fuel-oil piping.
 - b. Include fittings and devices required for testing.
 - c. Controls: Electrical, operating on 120-V ac.
 - d. Calibrated, liquid-level gage complying with UL 180 with floats **OR** UL 1238 with probes, **as directed**, or other sensors and remote annunciator panel.

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- e. Remote Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.
 - f. Controls: Electrical, operating on 120-V ac.
 2. Hydrostatic System: Comply with UL 1238.
 - a. Calibrated, leak-detection and monitoring system with brine antifreeze solution, reservoir sensor, and electronic control panel to monitor leaks in inner and outer tank walls.
 - b. Include fittings and devices required for testing.
 - c. Controls: Electrical, operating on 120-V ac.
 - d. Calibrated, liquid-level gage complying with UL 180 with floats **OR** UL 1238 with probes, **as directed**, or other sensors and remote annunciator panel.
 - e. Remote Annunciator Panel: With visual and audible, high-tank-level and low-tank-level alarms, fuel indicator with registration in gallons (liters), and overfill alarm. Include gage volume range that covers fuel-oil storage capacity.
 - f. Controls: Electrical, operating on 120-V ac.
- Z. Fuel Oil
1. Fuel Oil: ASTM D 396, Grade No. 1 **OR** No. 2, **as directed**.
 2. Diesel Fuel Oil: ASTM D 975, Grade Low Sulfur **OR** No. 1-D, special-purpose **OR** No. 2-D, general-purpose, **as directed**, high volatility.
- AA. Sleeves
1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
 2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.
- BB. Mechanical Sleeve Seals
1. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe and sleeve.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one nut and bolt for each sealing element.
- CC. Escutcheons
1. General Requirements for Escutcheons: Manufactured wall and ceiling escutcheons and floor plates, with ID to fit around pipe or tube and with OD that completely covers opening.
 2. One-Piece, Deep-Pattern Escutcheons: Deep-drawn brass with polished chrome-plated finish.
 3. One-Piece, Cast-Brass Escutcheons: With set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
 4. Split-Casting, Cast-Brass Escutcheons: With concealed hinge and set screw.
 - a. Finish: Polished chrome-plated **OR** Rough brass, **as directed**.
 5. One-Piece, Stamped-Steel Escutcheons: With set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 6. Split-Plate, Stamped-Steel Escutcheons: With concealed **OR** exposed-rivet, **as directed**, hinge, set screw **OR** spring clips, **as directed**, and chrome-plated finish.
 7. One-Piece, Floor-Plate Escutcheons: Cast-iron floor plate.
 8. Split-Casting, Floor-Plate Escutcheons: Cast brass with concealed hinge and set screw.
- DD. Grout
1. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

- a. Characteristics: Posthardening, volume adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
- b. Design Mix: **5000-psi (34.5-MPa)**, 28-day compressive strength.
- c. Packaging: Premixed and factory packaged.

EE. Labeling And Identifying

1. Detectable Warning Tape: Acid- and alkali-resistant, PE film warning tape manufactured for marking and identifying underground utilities, a minimum of **6 inches (152 mm)** wide and **4 mils (0.1 mm)** thick, continuously inscribed with a description of utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to **30 inches (762 mm)** deep; colored yellow.

FF. Concrete Manholes

1. Precast Concrete Manhole Sections: **ASTM C 478 (ASTM C 478M)**, base and concentric-cone sections with integral ladder or steps.
2. Cast-Iron Frame and Cover: Heavy-duty, water-resistant, cast-iron manhole frame, gasket, and bolted cover; **24-inch- (609-mm-)** diameter, inside opening dimension; **8-inch (203-mm)** frame riser height.

GG. Source Quality Control

1. Pressure test and inspect fuel-oil storage tanks, after fabrication and before shipment, according to ASME and the following:
 - a. Vertical **OR** Horizontal, **as directed**, Single-Wall Steel ASTs: UL 142.
 - b. Vertical **OR** Horizontal, **as directed**, Double-Wall Steel ASTs: UL 142, STI F921, and STI R931.
 - c. Horizontal, Containment-Dike, Steel ASTs: UL 142 and STI F911.
 - d. Horizontal, Concrete-Vaulted **OR** Concrete-Vaulted and Insulated **OR** Insulated, **as directed**, Steel ASTs: UL 142 and UL 2085.
 - e. Horizontal, Steel USTs with the STI-P3 Corrosion-Protection System: UL 58 and STI P3.
 - f. Composite **OR** Composite and Jacketed **OR** Jacketed, **as directed**, Steel USTs: UL 58.
 - g. FRP USTs: UL 1316.
2. Affix standards organization's code stamp.

1.3 EXECUTION

A. Earthwork

1. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

B. Preparation

1. Close equipment shutoff valves before turning off fuel oil to premises or piping section.
2. Comply with NFPA 30 and NFPA 31 requirements for prevention of accidental ignition.

C. Outdoor Piping Installation

1. Install underground fuel-oil piping buried at least **18 inches (457 mm)** below finished grade. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
 - a. If fuel-oil piping is installed with less than **12 inches (305 mm)** of cover to finished grade, install in containment piping.
2. Steel Piping with Protective Coating:
 - a. Apply joint cover kits to pipe after joining, to cover, seal, and protect joints.
 - b. Repair damage to PE coating on pipe as recommended in writing by protective coating manufacturer. Review protective coating damage prior to repair.

OR

Replace pipe having damaged PE coating with new pipe.

3. Install double-containment, fuel-oil pipe at a minimum slope of 1 percent downward toward fuel-oil storage tank sump.
4. Install vent pipe at a minimum slope of 2 percent downward toward fuel-oil storage tank sump.
5. Assemble and install entry boots for pipe penetrations through sump sidewalls for liquid-tight joints.
6. Install metal pipes and tubes, fittings, valves, and flexible connectors at piping connections to AST and UST.
7. Install fittings for changes in direction in rigid pipe.
8. Install system components with pressure rating equal to or greater than system operating pressure.
9. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Install sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
10. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
11. Mechanical Sleeve Seal Installation: Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
12. Install pressure gage on suction **OR** suction and discharge, **as directed**, from each pump. Pressure gages are specified in Division 23 Section "Meters And Gages For Hvac Piping".

D. Indoor Piping Installation

1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
2. Arrange for pipe spaces, chases, slots, sleeves, and openings in building structure during progress of construction, to allow for mechanical installations.
3. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.
4. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
5. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
6. Install piping free of sags and bends.
7. Install fittings for changes in direction and branch connections.
8. Install escutcheons for penetrations of walls, ceilings, and floors.
 - a. New Piping:
 - 1) Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
 - 2) Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
OR
Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
 - 3) Piping at Ceiling Penetrations in Finished Spaces: One-piece **OR** Split-casting, **as directed**, cast-brass type with polished chrome-plated finish.
OR
Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type **OR** Split-plate, stamped-steel type with concealed hinge, **as directed**, and set screw.
 - 4) Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR

- Piping in Unfinished Service Spaces: One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
- 5) Piping in Equipment Rooms: One-piece, cast-brass type.
OR
Piping in Equipment Rooms: One-piece, stamped-steel type with set screw **OR** spring clips, **as directed**.
 - 6) Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.
9. Existing Piping:
- 1) Piping at Wall and Floor Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
OR
Piping at Wall and Floor Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and spring clips.
 - 2) Piping at Ceiling Penetrations in Finished Spaces: Split-casting, cast-brass type with chrome-plated finish.
OR
Piping at Ceiling Penetrations in Finished Spaces: Split-plate, stamped-steel type with concealed hinge and set screw.
 - 3) Piping in Unfinished Service Spaces: Split-casting, cast-brass type with polished chrome-plated **OR** rough-brass, **as directed**, finish.
OR
Piping in Unfinished Service Spaces: Split-plate, stamped-steel type with concealed **OR** exposed-rivet, **as directed**, hinge and set screw or spring clips.
 - 4) Piping in Equipment Rooms: Split-casting, cast-brass type.
OR
Piping in Equipment Rooms: Split-plate, stamped-steel type with set screw or spring clips.
 - 5) Piping at Floor Penetrations in Equipment Rooms: Split-casting, floor-plate type.
10. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
 11. Verify final equipment locations for roughing-in.
 12. Comply with requirements for equipment specifications in Division 14 AND Division 21 for roughing-in requirements.
 13. Conceal pipe installations in walls, pipe spaces, or utility spaces; above ceilings; below grade or floors; and in floor channels unless indicated to be exposed to view.
 14. Prohibited Locations:
 - a. Do not install fuel-oil piping in or through circulating air ducts, clothes or trash chutes, chimneys or gas vents (flues), ventilating ducts, or dumbwaiter or elevator shafts.
 - b. Do not install fuel-oil piping in solid walls or partitions.
 15. Use eccentric reducer fittings to make reductions in pipe sizes. Install fittings with level side down.
 16. Connect branch piping from top or side of horizontal piping.
 17. Install unions in pipes **NPS 2 (DN 50)** and smaller at final connection to each piece of equipment and elsewhere as indicated. Unions are not required on flanged devices.
 18. Do not use fuel-oil piping as grounding electrode.
 19. Install Y-pattern **OR** basket **OR** T-pattern, **as directed**, strainer on inlet side of fuel-oil pump.
- E. Valve Installation
1. Install manual fuel-oil shutoff valves on branch connections to fuel-oil appliance.
 2. Install valves in accessible locations.
 3. Protect valves from physical damage.
 4. Install metal tag attached with metal chain indicating fuel-oil piping systems.
 5. Identify valves as specified in Division 23 Section "Identification For Hvac Piping And Equipment".
 6. Install oil safety valves at inlet of each oil-fired appliance.

7. Install pressure relief valves in distribution piping between the supply and return lines.
8. Install one-piece, bronze ball valve with hose end connection at low points in fuel-oil piping.
9. Install manual air vents at high points in fuel-oil piping.
10. Install emergency shutoff valves at dispensers (for systems with fuel-oil or diesel-fuel-oil dispensers).

F. Piping Joint Construction

1. Ream ends of pipes and tubes and remove burrs.
2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
4. Welded Joints: Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to "Quality Assurance" Article.
 - a. Bevel plain ends of steel pipe.
 - b. Patch factory-applied protective coating as recommended by manufacturer at field welds and where damage to coating occurs during construction.
5. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter.
6. Flanged Joints: Install gasket material, size, type, and thickness for service application. Install gasket concentrically positioned.
7. Flared Joints: Comply with SAE J513. Tighten finger tight, then use wrench according to fitting manufacturer's written recommendations. Do not overtighten.
8. Fiberglass-Bonded Joints: Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.

G. Fuel-Oil AST Installation

1. Install tank bases and supports.
2. Connect piping and vent fittings.
3. Install ground connections.
4. Install tank leak-detection and monitoring devices.
5. Install steel ASTs according to STI R912.
6. Install insulated and concrete-vaulted, steel ASTs according to STI R942.
7. Fill storage tanks with fuel oil.

H. Fuel-Oil UST Installation

1. Excavate to sufficient depth for a minimum of **3 feet (1 m)** of earth cover from top of tank to finished grade. Allow for cast-in-place, concrete-ballast base plus **6 inches (150 mm)** of sand or pea gravel between ballast base and tank. Extend excavation at least **12 inches (300 mm)** around perimeter of tank.
2. Set tie-down eyelets for hold-down straps in concrete-ballast base and tie to reinforcing steel.
3. Place **6 inches (152 mm)** of clean sand or pea gravel on top of concrete-ballast base.
4. Set tank on fill materials and install hold-down straps.
5. Connect piping.
6. Install tank leak-detection and monitoring devices.
7. Install containment sumps.
8. Backfill excavation with clean sand or pea gravel in **12-inch (305-mm)** lifts and tamp backfill lift to consolidate.
9. Install filter mat between top of backfill material and earth fill.
10. Install steel USTs with the STI-P3 corrosion-protection system according to STI R821 and STI R891. Protect anodes during tank placement and backfilling operations.

11. Install composite, steel USTs according to STI R913 and STI R891.
 12. Install jacketed, steel USTs according to STI R923 and STI R891.
 13. Install FRP USTs with FRP hold-down straps, manhole extensions, and manhole risers.
 14. Fill storage tanks with fuel oil.
- I. Hanger And Support Installation
1. Pipe hanger and support and equipment support materials and installation requirements are specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
 2. Install hangers for horizontal steel piping with the following maximum spacing and minimum rod sizes:
 - a. **NPS 1-1/4 (DN 32)** and Smaller: Maximum span, **84 inches (2130 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - b. **NPS 1-1/2 (DN 40)**: Maximum span, **108 inches (2740 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - c. **NPS 2 (DN 50)**: Maximum span, **10 feet (3 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 2-1/2 (DN 65)**: Maximum span, **11 feet (3.4 m)**; minimum rod size, **1/2 inch (13 mm)**.
 - e. **NPS 3 (DN 80)**: Maximum span, **12 feet (3.7 m)**; minimum rod size, **1/2 inch (13 mm)**.
 - f. **NPS 4 (DN 100)**: Maximum span, **13 feet (4 m)**; minimum rod size, **5/8 inch (16 mm)**.
 3. Support vertical steel pipe at each floor and at spacing not greater than **15 feet (4.5 m)**.
 4. Install hangers for horizontal, drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:
 - a. **NPS 3/4 (DN 20)** and Smaller: Maximum span, **60 inches (1524 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - b. **NPS 1 (DN 25)**: Maximum span, **72 inches (1830 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - c. **NPS 1-1/4 (DN 32)**: Maximum span, **84 inches (2130 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 1-1/2 and NPS 2 (DN 40 and DN 50)**: Maximum span, **96 inches (2440 mm)**; minimum rod size, **3/8 inch (10 mm)**.
 - e. **NPS 2-1/2 (DN 65)**: Maximum span, **108 inches (2740 mm)**; minimum rod size, **1/2 inch (13 mm)**.
 - f. **NPS 3 (DN 80)**: Maximum span, **10 feet (3 m)**; minimum rod size, **1/2 inch (13 mm)**.
 - g. **NPS 4 (DN 100)**: Maximum span, **11 feet (3.4 m)**; minimum rod size, **5/8 inch (16 mm)**.
 5. Support vertical copper tube at each floor and at spacing not greater than **10 feet (3 m)**.
- J. Fuel-Oil Pump Installation
1. Submersible Pumps:
 - a. Suspend pumps from supply piping and anchored to bottom of tank.
 2. Transfer Pumps:
 - a. Install pumps with access space for periodic maintenance including removal of motors, impellers, and accessories.
 - b. Set pumps on and anchor to concrete base.
 3. Install two-piece, full-port ball valves at suction and discharge of pumps.
 4. Install mechanical leak-detector valves at pump discharge.
 5. Install Y-pattern **OR** basket **OR** T-pattern, **as directed**, strainer on inlet side of simplex fuel-oil pumps.
 6. Install check valve on discharge of simplex fuel-oil pumps.
 7. Install suction piping with minimum fittings and change of direction.
 8. Install vacuum and pressure gage, upstream and downstream respectively, at each pump to measure the differential pressure across the pump. Pressure gages are specified in Division 23 Section "Meters And Gages For Hvac Piping".
- K. Fuel Maintenance System Installation
1. Install suction line, with foot valve, at one end of storage tank, **1 inch (25 mm)** from the bottom of tank.
 2. Install return line at the opposite end of storage tank from suction line.

- L. Liquid-Level Gage System Installation
1. Install liquid-level gage system. Locate panel inside building where indicated.
- M. Leak-Detection And Monitoring System Installation
1. Install leak-detection and monitoring system. Install alarm panel inside building where indicated.
 - a. Double-Wall, Fuel-Oil Storage Tanks: Install probes **OR** Install probes or use factory-installed integral probes **OR** Use factory-installed integral probes, **as directed**, in interstitial space.
 - b. Single-Wall, Fuel-Oil Storage Tanks: Install probes as indicated.
 - c. Double-Containment, Fuel-Oil Piping: Install leak-detection sensor probes in fuel-oil storage tank containment sumps and at low points in piping **OR** cable probes in interstitial space of double-containment piping, **as directed**.
 - d. Install liquid-level gage.
- N. Connections
1. Install piping adjacent to equipment to allow service and maintenance.
 2. Install unions, in piping **NPS 2 (DN 50)** and smaller, adjacent to each valve and at final connection to each piece of equipment having threaded pipe connection.
 3. Install flanges, in piping **NPS 2-1/2 (DN 65)** and larger, adjacent to flanged valves and at final connection to each piece of equipment having flanged pipe connection.
 4. Connect piping to equipment with ball valve and union. Install union between valve and equipment.
 5. Install flexible piping connectors at final connection to burners or oil-fired appliances that must be moved for maintenance access.
- O. Labeling And Identifying
1. Nameplates, pipe identification, and signs are specified in Division 23 Section "Identification For Hvac Piping And Equipment".
OR
Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on or near each service regulator, service meter, and earthquake valve.
 - a. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 2. Install detectable warning tape directly above fuel-oil piping, **12 inches (304 mm)** below finished grade, except **6 inches (152 mm)** below subgrade under pavements and slabs. Terminate tracer wire in an accessible area, and identify as "tracer wire" for future use with plastic-laminate sign.
 - a. Piping: Over underground fuel-oil distribution piping.
 - b. Fuel-Oil Storage Tanks: Over edges of each UST.
- P. Field Painting Of AST
1. If shop painting AST, prepare and touch up damaged exterior surface of AST and supports, **as directed**, as specified in "Shop Painting of AST" Article.
 2. If field painting AST, prepare exterior steel surface of AST and tank supports, **as directed**.
 3. Field Cleaning: After fabrication, blast clean according to SSPC-SP 6/NACE No. 3 **OR** SSPC-SP 10/NACE No. 2, **as directed**.
 4. After cleaning, remove dust or residue from cleaned surfaces.
 5. If surfaces develop rust before prime coat is applied, repeat surface preparation.
 6. Prepare surface of AST and supports, **as directed**, and apply painting systems according to specifications in Division 09 Section "High-performance Coatings" for severe **OR** moderate **OR** mild, **as directed**, environment high-gloss **OR** semigloss, **as directed**, finish for ferrous metal.
- Q. Field Painting Of Aboveground Piping
1. Comply with requirements in Division 07 for painting interior and exterior fuel-oil piping.

2. Paint exposed, exterior metal piping, valves, and piping specialties, except components with factory-applied paint or protective coating.
 - a. Alkyd System: MPI EXT 5.1D.
 - 1) Prime Coat: Alkyd anticorrosive metal primer.
 - 2) Intermediate Coat (for a Premium Grade system): Exterior alkyd enamel matching topcoat.
 - 3) Topcoat: Exterior alkyd enamel (flat) **OR** (semigloss) **OR** (gloss), **as directed**.
 - 4) Color: Gray, **as directed**.
3. Paint exposed, interior metal piping, valves, and piping specialties, except components with factory-applied paint or protective coating.
 - a. Latex Over Alkyd Primer System: MPI INT 5.1Q.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for a Premium Grade system): Interior latex matching topcoat.
 - 3) Topcoat: Interior latex (flat) **OR** (low sheen) **OR** (eggshell) **OR** (satin) **OR** (semigloss) **OR** (gloss), **as directed**.
 - 4) Color: Gray, **as directed**.
 - b. Alkyd System: MPI INT 5.1E.
 - 1) Prime Coat: Alkyd anticorrosive **OR** Quick-drying alkyd, **as directed**, metal primer.
 - 2) Intermediate Coat (for a Premium Grade system): Interior alkyd matching topcoat.
 - 3) Topcoat: Interior alkyd (flat) **OR** (eggshell) **OR** (semigloss) **OR** (gloss), **as directed**.
 - 4) Color: Gray, **as directed**.
4. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.

R. Concrete Bases

1. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (457-mm)** centers around the full perimeter of the base.
 - c. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - f. Use **3000-psi (20.7-MPa)**, **unless directed otherwise**, 28-day, compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".

S. Field Quality Control

1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Tanks: Minimum hydrostatic or compressed-air test pressures for fuel-oil storage tanks that have not been factory tested and do not bear the ASME code stamp or a listing mark acceptable to authorities having jurisdiction:
 - 1) Single-Wall Tanks: Minimum **3 psig (20.7 kPa)** and maximum **5 psig (34.5 kPa)**.
 - 2) Double-Wall Tanks:
 - a) Inner Tanks: Minimum **3 psig (20.7 kPa)** and maximum **5 psig (34.5 kPa)**.
 - b) Interstitial Space: Minimum **3 psig (20.7 kPa)** and maximum **5 psig (34.5 kPa)**, or **5.3-in. Hg (18-kPa)** vacuum.

- 3) Where vertical height of fill and vent pipes is such that the static head imposed on the bottom of the tank is greater than **10 psig (69 kPa)**, hydrostatically test the tank and fill and vent pipes to a pressure equal to the static head thus imposed.
- 4) Maintain the test pressure for one hour.
- b. Piping: Minimum hydrostatic or pneumatic test-pressures measured at highest point in system:
 - 1) Fuel-Oil Distribution Piping: Minimum **5 psig (34.5 kPa)** for minimum 30 minutes.
 - 2) Fuel-Oil, Double-Containment Piping:
 - a) Carrier Pipe: Minimum **5 psig (34.5 kPa)** for minimum 30 minutes.
 - b) Containment Conduit: Minimum **5 psig (34.5 kPa)** for minimum 60 minutes.
 - 3) Suction Piping: Minimum **20-in. Hg (68 kPa)** for minimum 30 minutes.
 - 4) Isolate storage tanks if test pressure in piping will cause pressure in storage tanks to exceed **10 psig (69 kPa)**.
- c. Inspect and test fuel-oil piping according to NFPA 31, "Tests of Piping" Paragraph; and according to requirements of authorities having jurisdiction.
- d. Test liquid-level gage for accuracy by manually measuring fuel-oil levels at not less than three **OR** four **OR** five, **as directed**, different depths while filling tank and checking against gage indication.
- e. Test leak-detection and monitoring system for accuracy by manually operating sensors and checking against alarm panel indication.
- f. Start fuel-oil transfer pumps to verify for proper operation of pump and check for leaks.
- g. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- h. Bleed air from fuel-oil piping using manual air vents.
3. Fuel-oil piping and equipment will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports.

T. Outdoor Piping Schedule

1. Underground fuel-oil piping shall be one of the following. Size indicated is carrier-pipe size.
 - a. Flexible, double-containment piping.
 - b. Rigid, double-containment piping.
2. Underground fuel-oil-tank fill and vent piping shall be one of the following:
 - a. **NPS 2 (DN 50)** and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints. Coat pipe and fittings with protective coating for steel piping.
 - b. **NPS 2-1/2 (DN 65)** and Larger: Steel pipe, steel welding fittings, and welded joints. Coat pipe and fittings with protective coating for steel piping.
3. Containment Conduit: Steel pipe with wrought-steel fittings and welded joints. Coat pipe and fittings with protective coating for steel piping.
4. Aboveground fuel-oil piping shall be one of the following:
 - a. **NPS 2 (DN 50)** and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints.
 - b. **NPS 2-1/2 (DN 65)** and Larger: Steel pipe, steel welding fittings, and welded joints.
 - c. Annealed **OR** Drawn, **as directed**,-temper copper tube with wrought-copper fittings and brazed joints.

U. Indoor Piping Schedule

1. Aboveground fuel-oil piping shall be one of the following:
 - a. **NPS 1/2 (DN 15)** and Smaller: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints **OR** Annealed-temper copper pipe, wrought copper fittings, and brazed or flared joints, **as directed**.
 - b. **NPS 5/8 to NPS 2 (DN 18 to DN 50)**: Steel pipe, steel or malleable-iron threaded fittings, and threaded joints **OR** Drawn temper copper pipe, wrought copper fittings, and brazed joints, **as directed**.

- c. **NPS 2-1/2 (DN 65)** and Larger: Steel pipe, steel fittings, and welded or flanged joints **OR** Drawn temper copper pipe, wrought copper fittings, and brazed or flanged joints, **as directed**.
 - d. Steel pipe with malleable-iron fittings and threaded joints.
 - e. Steel pipe with wrought-steel fittings and welded joints.
 - f. Annealed-temper copper tube, brass fittings, and flared joints.
 - g. Drawn-temper copper tubing, copper fittings, and brazed joints.
- V. Aboveground Manual Fuel-Oil Shutoff Valve Schedule
- 1. Distribution piping valves for pipe **NPS 2 (DN 50)** and smaller shall be one of the following:
 - a. One-piece, bronze ball valve with bronze trim.
 - b. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.
 - 2. Distribution piping valves for pipe **NPS 2-1/2 (DN 65)** and larger shall be one of the following:
 - a. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.
 - b. Bronze, nonlubricated **OR** lubricated, **as directed**, plug valve.
 - 3. Valves in branch piping for single appliance shall be one of the following:
 - a. One-piece, bronze ball valve with bronze trim.
 - b. Two-piece, full **OR** regular, **as directed**, -port, bronze ball valves with bronze trim.

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SECTION 23 21 13 23a - HYDRONIC PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hydronic piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes pipe and fitting materials, joining methods, special-duty valves, and specialties for the following:
 - a. Hot-water heating piping.
 - b. Chilled-water piping.
 - c. Dual-temperature heating and cooling water piping.
 - d. Condenser-water piping.
 - e. Glycol cooling-water piping.
 - f. Makeup-water piping.
 - g. Condensate-drain piping.
 - h. Blowdown-drain piping.
 - i. Air-vent piping.
 - j. Safety-valve-inlet and -outlet piping.

C. Definitions

1. PTFE: Polytetrafluoroethylene.
2. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
3. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

D. Performance Requirements

1. Hydronic piping components and installation shall be capable of withstanding the following minimum working pressure and temperature:
 - a. Hot-Water Heating Piping: **psig (kPa)**, as directed by the Owner at **200 deg F (93 deg C)**.
 - b. Chilled-Water Piping: **psig (kPa)**, as directed by the Owner at **200 deg F (93 deg C)**.
 - c. Dual-Temperature Heating and Cooling Water Piping: **psig (kPa)**, ethylene at **200 deg F (93 deg C)**.
 - d. Condenser-Water Piping: **psig (kPa)**, as directed by the Owner at **150 deg F (66 deg C)**.
 - e. Glycol Cooling-Water Piping: **psig (kPa)**, as directed by the Owner at **150 deg F (66 deg C)**.
 - f. Makeup-Water Piping: **80 psig (552 kPa)** at **150 deg F (66 deg C)**.
 - g. Condensate-Drain Piping: **150 deg F (66 deg C)**.
 - h. Blowdown-Drain Piping: **200 deg F (93 deg C)**.
 - i. Air-Vent Piping: **200 deg F (93 deg C)**.
 - j. Safety-Valve-Inlet and -Outlet Piping: Equal to the pressure of the piping system to which it is attached.

E. Submittals

1. Product Data: For each type of the following:
 - a. Plastic pipe and fittings with solvent cement.
 - b. RTRP and RTRF with adhesive.
 - c. Pressure-seal fittings.
 - d. Valves. Include flow and pressure drop curves based on manufacturer's testing for calibrated-orifice balancing valves and automatic flow-control valves.
 - e. Air control devices.

- f. Chemical treatment.
- g. Hydronic specialties.
2. LEED Submittal:
 - a. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
3. Shop Drawings: Detail, at **1/4 (1:50)** scale, the piping layout, fabrication of pipe anchors, hangers, supports for multiple pipes, alignment guides, expansion joints and loops, and attachments of the same to the building structure. Detail location of anchors, alignment guides, and expansion joints and loops.
4. Welding certificates.
5. Qualification Data: For Installer.
6. Field quality-control test reports.
7. Operation and Maintenance Data: For air control devices, hydronic specialties, and special-duty valves to include in emergency, operation, and maintenance manuals.
8. Water Analysis: Submit a copy of the water analysis to illustrate water quality available at Project site.

F. Quality Assurance

1. Installer Qualifications:
 - a. Installers of Pressure-Sealed Joints: Installers shall be certified by the pressure-seal joint manufacturer as having been trained and qualified to join piping with pressure-seal pipe couplings and fittings.
 - b. Fiberglass Pipe and Fitting Installers: Installers of RTRF and RTRP shall be certified by the manufacturer of pipes and fittings as having been trained and qualified to join fiberglass piping with manufacturer-recommended adhesive.
2. Steel Support Welding: Qualify processes and operators according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX.
 - a. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
 - b. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.
4. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation. Safety valves and pressure vessels shall bear the appropriate ASME label. Fabricate and stamp air separators and expansion tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

1.2 PRODUCTS

A. Copper Tube And Fittings

1. Drawn-Temper Copper Tubing: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M, Type C), as directed.**
2. Annealed-Temper Copper Tubing: **ASTM B 88, Type K (ASTM B 88M, Type A).**
3. DWV Copper Tubing: ASTM B 306, Type DWV.
4. Wrought-Copper Fittings: ASME B16.22.
 - a. Grooved-End Copper Fittings: **ASTM B 75 (ASTM B 75M)**, copper tube or ASTM B 584, bronze casting.
 - b. Grooved-End-Tube Couplings: Rigid pattern, unless otherwise indicated; gasketed fitting. Ductile-iron housing with keys matching pipe and fitting grooves, prelubricated, **as directed**, EPDM gasket rated for minimum **230 deg F (110 deg C)** for use with housing, and steel bolts and nuts.
5. Copper or Bronze Pressure-Seal Fittings:
 - a. Housing: Copper.
 - b. O-Rings and Pipe Stops: EPDM.

- c. Tools: Manufacturer's special tools.
 - d. Minimum **200-psig (1379-kPa)** working-pressure rating at **250 deg F (121 deg C)**.
 6. Copper, Mechanically Formed Tee Option: For forming T-branch on copper water tube.
 7. Wrought-Copper Unions: ASME B16.22.
- B. Steel Pipe And Fittings**
1. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; type, grade, and wall thickness as indicated in Part 1.3 "Piping Applications" Article.
 2. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in Part 1.3 "Piping Applications" Article.
 3. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in Part 1.3 "Piping Applications" Article.
 4. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in Part 1.3 "Piping Applications" Article.
 5. Cast-Iron Pipe Flanges and Flanged Fittings: ASME B16.1, Classes 25, 125, and 250; raised ground face, and bolt holes spot faced as indicated in Part 1.3 "Piping Applications" Article.
 6. Wrought-Steel Fittings: ASTM A 234/A 234M, wall thickness to match adjoining pipe.
 7. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, including bolts, nuts, and gaskets of the following material group, end connections, and facings:
 - a. Material Group: 1.1.
 - b. End Connections: Butt welding.
 - c. Facings: Raised face.
 8. Grooved Mechanical-Joint Fittings and Couplings:
 - a. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106, Grade B steel fittings with grooves or shoulders constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
 - b. Couplings: Ductile- or malleable-iron housing and synthetic rubber gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.
 9. Steel Pressure-Seal Fittings:
 - a. Housing: Steel.
 - b. O-Rings and Pipe Stop: EPDM.
 - c. Tools: Manufacturer's special tool.
 - d. Minimum **300-psig (2070-kPa)** working-pressure rating at **230 deg F (110 deg C)**.
 10. Steel Pipe Nipples: ASTM A 733, made of same materials and wall thicknesses as pipe in which they are installed.
- C. Plastic Pipe And Fittings**
1. CPVC Plastic Pipe: ASTM F 441/F 441M, Schedules 40 and 80, plain ends as indicated in Part 1.3 "Piping Applications" Article.
 2. CPVC Plastic Pipe Fittings: Socket-type pipe fittings, ASTM F 438 for Schedule 40 pipe; ASTM F 439 for Schedule 80 pipe.
 3. PVC Plastic Pipe: ASTM D 1785, Schedules 40 and 80, plain ends as indicated in Part 1.3 "Piping Applications" Article.
 4. PVC Plastic Pipe Fittings: Socket-type pipe fittings, ASTM D 2466 for Schedule 40 pipe; ASTM D 2467 for Schedule 80 pipe.
- D. Fiberglass Pipe And Fittings**
1. RTRP: ASTM D 2996, filament-wound pipe with tapered bell and spigot ends for adhesive joints.
 2. RTRF: Compression or spray-up/contact molded of same material, pressure class, and joining method as pipe.
 3. Flanges: ASTM D 4024. Full-face gaskets suitable for the service, minimum **1/8-inch (3.2-mm)** thick, 60-70 durometer. ASTM A 307, Grade B, hex head bolts with washers.

- E. Joining Materials
1. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.
 - a. ASME B16.21, nonmetallic, flat, asbestos free, **1/8-inch (3.2-mm)** maximum thickness unless thickness or specific material is indicated.
 - 1) Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
 - 2) Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.
 2. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.
 3. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
 4. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 5. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.
 6. Welding Filler Metals: Comply with AWS D10.12/D10.12M for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.
 7. Solvent Cements for Joining Plastic Piping:
 - a. CPVC Piping: ASTM F 493.
 - 1) Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 - 1) Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 8. Fiberglass Pipe Adhesive: As furnished or recommended by pipe manufacturer.
 - a. Use fiberglass adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 9. Gasket Material: Thickness, material, and type suitable for fluid to be handled and working temperatures and pressures.
- F. Transition Fittings
1. Plastic-to-Metal Transition Fittings:
 - a. CPVC **OR** PVC, **as directed**, one-piece fitting with one threaded brass or copper insert and one Schedule 80 solvent-cement-joint end.
 2. Plastic-to-Metal Transition Unions:
 - a. MSS SP-107, CPVC **OR** PVC, **as directed**, union. Include brass or copper end, Schedule 80 solvent-cement-joint end, rubber gasket, and threaded union.
- G. Dielectric Fittings
1. Description: Combination fitting of copper-alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.
 2. Insulating Material: Suitable for system fluid, pressure, and temperature.
 3. Dielectric Unions:
 - a. Factory-fabricated union assembly, for **250-psig (1725-kPa)** minimum working pressure at **180 deg F (82 deg C)**.
 4. Dielectric Flanges:
 - a. Factory-fabricated companion-flange assembly, for **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure as required to suit system pressures.
 5. Dielectric-Flange Kits:
 - a. Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

- b. Separate companion flanges and steel bolts and nuts shall have **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure where required to suit system pressures.
 - 6. Dielectric Couplings:
 - a. Galvanized-steel coupling with inert and noncorrosive thermoplastic lining; threaded ends; and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
 - 7. Dielectric Nipples:
 - a. Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
- H. Valves
 - 1. Gate, Globe, Check, Ball, and Butterfly Valves: Comply with requirements specified in Division 22 Section(s) "General-duty Valves For Plumbing Piping" OR Division 23 Section(s) "General-duty Valves For Hvac Piping".
 - 2. Automatic Temperature-Control Valves, Actuators, and Sensors: Comply with requirements specified in Division 23 Section "Instrumentation And Control For Hvac".
 - 3. Plastic Ball Valves:
 - a. Body: One-, two-, or three-piece CPVC or PVC to match piping.
 - b. Ball: Full-port CPVC or PVC to match piping.
 - c. Seats: PTFE.
 - d. Seals: EPDM.
 - e. End Connections: Socket, union, or flanged.
 - f. Handle Style: Tee shape.
 - g. CWP Rating: Equal to piping service.
 - h. Maximum Operating Temperature: Equal to piping service.
 - i. Comply with MSS SP-122.
 - 4. Plastic Butterfly Valves:
 - a. Body: PVC or CPVC to match piping wafer type for installation between flanges.
 - b. Disc: EPDM-coated steel.
 - c. Seats: PTFE.
 - d. Handle Style: Locking lever.
 - e. CWP Rating: Equal to piping service.
 - f. Maximum Operating Temperature: Equal to piping service.
 - 5. Plastic Check Valves:
 - a. Body: One-, two-, or three-piece PVC or CPVC to match piping.
 - b. Ends: Socket or flanged.
 - c. Seats: PTFE.
 - d. Check Style: Swing or ball type.
 - e. CWP Rating: Equal to piping service.
 - f. Maximum Operating Temperature: Equal to piping service.
 - 6. Bronze, Calibrated-Orifice, Balancing Valves:
 - a. Body: Bronze, ball or plug type with calibrated orifice or venturi.
 - b. Ball: Brass or stainless steel.
 - c. Plug: Resin.
 - d. Seat: PTFE.
 - e. End Connections: Threaded or socket.
 - f. Pressure Gage Connections: Integral seals for portable differential pressure meter.
 - g. Handle Style: Lever, with memory stop to retain set position.
 - h. CWP Rating: Minimum **125 psig (860 kPa)**.
 - i. Maximum Operating Temperature: **250 deg F (121 deg C)**.
 - 7. Cast-Iron or Steel, Calibrated-Orifice, Balancing Valves:
 - a. Body: Cast-iron or steel body, ball, plug, or globe pattern with calibrated orifice or venturi.
 - b. Ball: Brass or stainless steel.
 - c. Stem Seals: EPDM O-rings.
 - d. Disc: Glass and carbon-filled PTFE.
 - e. Seat: PTFE.

- f. End Connections: Flanged or grooved.
- g. Pressure Gage Connections: Integral seals for portable differential pressure meter.
- h. Handle Style: Lever, with memory stop to retain set position.
- i. CWP Rating: Minimum **125 psig (860 kPa)**.
- j. Maximum Operating Temperature: **250 deg F (121 deg C)**.
- 8. Diaphragm-Operated, Pressure-Reducing Valves:
 - a. Body: Bronze or brass.
 - b. Disc: Glass and carbon-filled PTFE.
 - c. Seat: Brass.
 - d. Stem Seals: EPDM O-rings.
 - e. Diaphragm: EPT.
 - f. Low inlet-pressure check valve.
 - g. Inlet Strainer: removable without system shutdown.
 - h. Valve Seat and Stem: Noncorrosive.
 - i. Valve Size, Capacity, and Operating Pressure: Selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
- 9. Diaphragm-Operated Safety Valves:
 - a. Body: Bronze or brass.
 - b. Disc: Glass and carbon-filled PTFE.
 - c. Seat: Brass.
 - d. Stem Seals: EPDM O-rings.
 - e. Diaphragm: EPT.
 - f. Wetted, Internal Work Parts: Brass and rubber.
 - g. Inlet Strainer: removable without system shutdown.
 - h. Valve Seat and Stem: Noncorrosive.
 - i. Valve Size, Capacity, and Operating Pressure: Comply with ASME Boiler and Pressure Vessel Code: Section IV, and selected to suit system in which installed, with operating pressure and capacity factory set and field adjustable.
- 10. Automatic Flow-Control Valves:
 - a. Body: Brass or ferrous metal.
 - b. Piston and Spring Assembly: Stainless steel **OR** Corrosion resistant, **as directed**, tamper proof, self cleaning, and removable.
 - c. Combination Assemblies: Include bronze or brass-alloy ball valve.
 - d. Identification Tag: Marked with zone identification, valve number, and flow rate.
 - e. Size: Same as pipe in which installed.
 - f. Performance: Maintain constant flow, plus or minus 5 percent over system pressure fluctuations.
 - g. Minimum CWP Rating: **175 psig (1207 kPa) OR 300 psig (2070 kPa), as directed**.
 - h. Maximum Operating Temperature: **200 deg F (93 deg C) OR 250 deg F (121 deg C), as directed**.
- I. Air Control Devices
 - 1. Manual Air Vents:
 - a. Body: Bronze.
 - b. Internal Parts: Nonferrous.
 - c. Operator: Screwdriver or thumbscrew.
 - d. Inlet Connection: **NPS 1/2 (DN 15)**.
 - e. Discharge Connection: **NPS 1/8 (DN 6)**.
 - f. CWP Rating: **150 psig (1035 kPa)**.
 - g. Maximum Operating Temperature: **225 deg F (107 deg C)**.
 - 2. Automatic Air Vents:
 - a. Body: Bronze or cast iron.
 - b. Internal Parts: Nonferrous.
 - c. Operator: Noncorrosive metal float.
 - d. Inlet Connection: **NPS 1/2 (DN 15)**.

- e. Discharge Connection: **NPS 1/4 (DN 8)**.
- f. CWP Rating: **150 psig (1035 kPa)**.
- g. Maximum Operating Temperature: **240 deg F (116 deg C)**.
3. Expansion Tanks:
 - a. Tank: Welded steel, rated for **125-psig (860-kPa)** working pressure and **375 deg F (191 deg C)** maximum operating temperature, with taps in bottom of tank for tank fitting and taps in end of tank for gage glass. Tanks shall be factory tested with taps fabricated and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - b. Air-Control Tank Fitting: Cast-iron body, copper-plated tube, brass vent tube plug, and stainless-steel ball check, **100-gal. (379-L)** unit only; sized for compression-tank diameter. Provide tank fittings for **125-psig (860-kPa)** working pressure and **250 deg F (121 deg C)** maximum operating temperature.
 - c. Tank Drain Fitting: Brass body, nonferrous internal parts; **125-psig (860-kPa)** working pressure and **240 deg F (116 deg C)** maximum operating temperature; constructed to admit air to compression tank, drain water, and close off system.
 - d. Gage Glass: Full height with dual manual shutoff valves, **3/4-inch- (20-mm-)** diameter gage glass, and slotted-metal glass guard.
4. Diaphragm-Type **OR** Bladder-Type, **as directed**, Expansion Tanks:
 - a. Tank: Welded steel, rated for **125-psig (860-kPa)** working pressure and **375 deg F (191 deg C)** maximum operating temperature. Factory test with taps fabricated and supports installed and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - b. Diaphragm **OR** Bladder, **as directed**: Securely sealed into tank to separate air charge from system water to maintain required expansion capacity.
 - c. Air-Charge Fittings: Schrader valve, stainless steel with EPDM seats.
5. Tangential-Type Air Separators:
 - a. Tank: Welded steel; ASME constructed and labeled for **125-psig (860-kPa)** minimum working pressure and **375 deg F (191 deg C)** maximum operating temperature.
 - b. Air Collector Tube: Perforated stainless steel, constructed to direct released air into expansion tank.
 - c. Tangential Inlet and Outlet Connections: Threaded for **NPS 2 (DN 50)** and smaller; flanged connections for **NPS 2-1/2 (DN 65)** and larger.
 - d. Blowdown Connection: Threaded.
 - e. Size: Match system flow capacity.
6. In-Line Air Separators:
 - a. Tank: One-piece cast iron with an integral weir constructed to decelerate system flow to maximize air separation.
 - b. Maximum Working Pressure: Up to **175 psig (1207 kPa)**.
 - c. Maximum Operating Temperature: Up to **300 deg F (149 deg C)**.
7. Air Purgers:
 - a. Body: Cast iron with internal baffles that slow the water velocity to separate the air from solution and divert it to the vent for quick removal.
 - b. Maximum Working Pressure: **150 psig (1035 kPa)**.
 - c. Maximum Operating Temperature: **250 deg F (121 deg C)**.
- J. Chemical Treatment
 1. Bypass Chemical Feeder: Welded steel construction; **125-psig (860-kPa)** working pressure; **5-gal. (19-L)** capacity; with fill funnel and inlet, outlet, and drain valves.
 - a. Chemicals: Specially formulated, based on analysis of makeup water, to prevent accumulation of scale and corrosion in piping and connected equipment.
 2. Ethylene and Propylene Glycol: Industrial grade with corrosion inhibitors and environmental-stabilizer additives for mixing with water in systems indicated to contain antifreeze or glycol solutions.
- K. Hydronic Piping Specialties
 1. Y-Pattern Strainers:

- a. Body: ASTM A 126, Class B, cast iron with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.
 - c. Strainer Screen: 40 **OR** 60, **as directed**, -mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: **125 psig (860 kPa)**.
2. Basket Strainers:
- a. Body: ASTM A 126, Class B, high-tensile cast iron with bolted cover and bottom drain connection.
 - b. End Connections: Threaded ends for **NPS 2 (DN 50)** and smaller; flanged ends for **NPS 2-1/2 (DN 65)** and larger.
 - c. Strainer Screen: 40 **OR** 60, **as directed**, -mesh startup strainer, and perforated stainless-steel basket with 50 percent free area.
 - d. CWP Rating: **125 psig (860 kPa)**.
3. T-Pattern Strainers:
- a. Body: Ductile or malleable iron with removable access coupling and end cap for strainer maintenance.
 - b. End Connections: Grooved ends.
 - c. Strainer Screen: 40 **OR** 60, **as directed**, -mesh startup strainer, and perforated stainless-steel basket with 57 percent free area.
 - d. CWP Rating: **750 psig (5170 kPa)**.
4. Stainless-Steel Bellow, Flexible Connectors:
- a. Body: Stainless-steel bellows with woven, flexible, bronze, wire-reinforcing protective jacket.
 - b. End Connections: Threaded or flanged to match equipment connected.
 - c. Performance: Capable of **3/4-inch (20-mm)** misalignment.
 - d. CWP Rating: **150 psig (1035 kPa)**.
 - e. Maximum Operating Temperature: **250 deg F (121 deg C)**.
5. Spherical, Rubber, Flexible Connectors:
- a. Body: Fiber-reinforced rubber body.
 - b. End Connections: Steel flanges drilled to align with Classes 150 and 300 steel flanges.
 - c. Performance: Capable of misalignment.
 - d. CWP Rating: **150 psig (1035 kPa)**.
 - e. Maximum Operating Temperature: **250 deg F (121 deg C)**.
6. Expansion fittings are specified in Division 22 Section(s) "Expansion Fittings And Loops For Plumbing Piping" OR Division 23 Section(s) "Expansion Fittings And Loops For Hvac Piping".

1.3 EXECUTION

1. Hot-water heating piping, aboveground, **NPS 2 (DN 50)** and smaller, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed **OR** pressure-seal, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; Class 125, cast-iron **OR** 150, malleable-iron **OR** 250, cast-iron **OR** 300, malleable-iron, **as directed**, fittings; cast-iron flanges and flange fittings; and threaded joints.
 - c. Schedule 5 steel pipe; steel, pressure-seal couplings and fittings; and pressure-seal joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
2. Hot-water heating piping, aboveground, **NPS 2-1/2 (DN 65)** and larger, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
 - c. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.

- d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
- e. RTRP and RTRF with adhesive or flanged joints.
3. Hot-water heating piping installed belowground and within slabs shall be either of the following:
 - a. Type **K (A)**, annealed-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints. Use the fewest possible joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
4. Chilled-water piping, aboveground, **NPS 2 (DN 50)** and smaller, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed **OR** pressure-seal, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; Class 125, cast-iron **OR** 150, malleable-iron **OR** 250, cast-iron **OR** 300, malleable-iron, **as directed**, fittings; cast-iron flanges and flange fittings; and threaded joints.
 - c. Schedule 5 steel pipe; steel, pressure-seal couplings and fittings; and pressure-seal joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
5. Chilled-water piping, aboveground, **NPS 2-1/2 (DN 65)** and larger, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
 - c. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
 - e. RTRP and RTRF with adhesive or flanged joints.
6. Chilled-water piping installed belowground and within slabs shall be either of the following:
 - a. Type **K (A)**, annealed-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints. Use the fewest possible joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
7. Dual-temperature heating and cooling water piping, aboveground, **NPS 2 (DN 50)** and smaller, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed **OR** pressure-seal, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; Class 125, cast-iron **OR** 150, malleable-iron **OR** 250, cast-iron **OR** 300, malleable-iron, **as directed**, fittings; cast-iron flanges and flange fittings; and threaded joints.
 - c. Schedule 5 steel pipe; steel, pressure-seal couplings and fittings; and pressure-seal joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
8. Dual-temperature heating and cooling water piping, aboveground, **NPS 2-1/2 (DN 65)** and larger, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
 - c. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
 - e. RTRP and RTRF with adhesive or flanged joints.
9. Dual-temperature heating and cooling water piping installed belowground and within slabs shall be either of the following:
 - a. Type **K (A)**, annealed-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints. Use the fewest possible joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
10. Condenser-water piping, aboveground, **NPS 2 (DN 50)** and smaller, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed **OR** pressure-seal, **as directed**, joints.

- b. Schedule 80 **OR** 40 **OR** 30 **OR** 20, **as directed**, steel pipe; Class 125, cast-iron **OR** 150, malleable-iron **OR** 250, cast-iron **OR** 300, malleable-iron, **as directed**, fittings; cast-iron flanges and flange fittings; and threaded joints.
- c. Schedule 5 steel pipe; steel, pressure-seal couplings and fittings; and pressure-seal joints.
- d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
11. Condenser-water piping, aboveground, **NPS 2-1/2 (DN 65)** and larger, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 80 **OR** 40 **OR** 30 **OR** 20, **as directed**, steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
 - c. Schedule 80 **OR** 40 **OR** 30 **OR** 20, **as directed**, steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
 - e. RTRP and RTRF with adhesive or flanged joints.
12. Condenser-water piping installed belowground and within slabs shall be either of the following:
 - a. Type **K (A)**, annealed-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints. Use the fewest possible joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
13. Glycol cooling-water piping, aboveground, **NPS 2 (DN 50)** and smaller, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed **OR** pressure-seal, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; Class 125, cast-iron **OR** 150, malleable-iron **OR** 250, cast-iron **OR** 300, malleable-iron, **as directed**, fittings; cast-iron flanges and flange fittings; and threaded joints.
 - c. Schedule 5 steel pipe; steel, pressure-seal couplings and fittings; and pressure-seal joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
14. Glycol cooling-water piping, aboveground, **NPS 2-1/2 (DN 65)** and larger, shall be any of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe, wrought-steel fittings and wrought-cast or forged-steel flanges and flange fittings, and welded and flanged joints.
 - c. Schedule 40 **OR** 30 **OR** 20, **as directed**, steel pipe; grooved, mechanical joint coupling and fittings; and grooved, mechanical joints.
 - d. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings and solvent-welded joints.
 - e. RTRP and RTRF with adhesive or flanged joints.
15. Glycol cooling-water piping installed belowground and within slabs shall be either of the following:
 - a. Type **K (A)**, annealed-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints. Use the fewest possible joints.
 - b. RTRP and RTRF with adhesive or flanged joints.
16. Makeup-water piping installed aboveground shall be either of the following:
 - a. Type **L (B) OR M (C)**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered **OR** brazed, **as directed**, joints.
 - b. Schedule 40 **OR** 80, **as directed**, CPVC plastic pipe and fittings, and solvent-welded joints.
17. Makeup-Water Piping Installed Belowground and within Slabs: Type **K (A)**, annealed-temper copper tubing, wrought-copper fittings, and soldered joints. Use the fewest possible joints.
18. Condensate-Drain Piping: Type **M (C) OR DWV**, **as directed**, drawn-temper copper tubing, wrought-copper fittings, and soldered joints or Schedule 40 PVC plastic pipe and fittings and solvent-welded joints, **as directed**.
OR
Condensate-Drain Piping: Schedule 40 PVC plastic pipe and fittings and solvent-welded joints.

19. Blowdown-Drain Piping: Same materials and joining methods as for piping specified for the service in which blowdown drain is installed.
 20. Air-Vent Piping:
 - a. Inlet: Same as service where installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.
 - b. Outlet: Type **K (A)**, annealed-temper copper tubing with soldered or flared joints.
 21. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to the piping manufacturer's written instructions.
- B. Valve Applications**
1. Install shutoff-duty valves at each branch connection to supply mains, and at supply connection to each piece of equipment.
 2. Install throttling-duty **OR** calibrated-orifice, balancing, **as directed**, valves at each branch connection to return main.
 3. Install calibrated-orifice, balancing valves in the return pipe of each heating or cooling terminal.
 4. Install check valves at each pump discharge and elsewhere as required to control flow direction.
 5. Install safety valves at hot-water generators and elsewhere as required by ASME Boiler and Pressure Vessel Code. Install drip-pan elbow on safety-valve outlet and pipe without valves to the outdoors; and pipe drain to nearest floor drain or as indicated on Drawings. Comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, for installation requirements.
 6. Install pressure-reducing valves at makeup-water connection to regulate system fill pressure.
- C. Piping Installations**
1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.
 2. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.
 3. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.
 4. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.
 5. Install piping to permit valve servicing.
 6. Install piping at indicated slopes.
 7. Install piping free of sags and bends.
 8. Install fittings for changes in direction and branch connections.
 9. Install piping to allow application of insulation.
 10. Select system components with pressure rating equal to or greater than system operating pressure.
 11. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.
 12. Install drains, consisting of a tee fitting, **NPS 3/4 (DN 20)** ball valve, and short **NPS 3/4 (DN 20)** threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.
 13. Install piping at a uniform grade of 0.2 percent upward in direction of flow.
 14. Reduce pipe sizes using eccentric reducer fitting installed with level side down.
 15. Install branch connections to mains using mechanically formed, **as directed**, tee fittings in main pipe, with the branch connected to the bottom of the main pipe. For up-feed risers, connect the branch to the top of the main pipe.
 16. Install valves according to Division 22 Section(s) "General-duty Valves For Plumbing Piping" OR Division 23 Section(s) "General-duty Valves For Hvac Piping".
 17. Install unions in piping, **NPS 2 (DN 50)** and smaller, adjacent to valves, at final connections of equipment, and elsewhere as indicated.

18. Install flanges in piping, **NPS 2-1/2 (DN 65)** and larger, at final connections of equipment and elsewhere as indicated.
19. Install strainers on inlet side of each control valve, pressure-reducing valve, solenoid valve, in-line pump, and elsewhere as indicated. Install **NPS 3/4 (DN 20)** nipple and ball valve in blowdown connection of strainers **NPS 2 (DN 50)** and larger. Match size of strainer blowoff connection for strainers smaller than **NPS 2 (DN 50)**.
20. Install expansion loops, expansion joints, anchors, and pipe alignment guides as specified in Division 22 Section(s) "Expansion Fittings And Loops For Plumbing Piping" OR Division 23 Section(s) "Expansion Fittings And Loops For Hvac Piping".
21. Identify piping as specified in Division 22 Section(s) "Identification For Plumbing Piping And Equipment" OR Division 23 Section(s) "Identification For Hvac Piping And Equipment".

D. Hangers And Supports

1. Hanger, support, and anchor devices are specified in Division 22 Section(s) "Hangers And Supports For Plumbing Piping And Equipment" OR Division 23 Section(s) "Hangers And Supports For Hvac Piping And Equipment". Comply with the following requirements for maximum spacing of supports.
2. Seismic restraints are specified in Division 21 Section(s) "Vibration And Seismic Controls For Fire-suppression Piping And Equipment" OR Division 22 Section(s) "Vibration And Seismic Controls For Plumbing Piping And Equipment" OR Division 23 Section(s) "Vibration And Seismic Controls For Hvac Piping And Equipment".
3. Install the following pipe attachments:
 - a. Adjustable steel clevis hangers for individual horizontal piping less than **20 feet (6 m)** long.
 - b. Adjustable roller hangers and spring hangers for individual horizontal piping **20 feet (6 m)** or longer.
 - c. Pipe Roller: MSS SP-58, Type 44 for multiple horizontal piping **20 feet (6 m)** or longer, supported on a trapeze.
 - d. Spring hangers to support vertical runs.
 - e. Provide copper-clad hangers and supports for hangers and supports in direct contact with copper pipe.
 - f. On plastic pipe, install pads or cushions on bearing surfaces to prevent hanger from scratching pipe.
4. Install hangers for steel piping with the following maximum spacing and minimum rod sizes:
 - a. **NPS 3/4 (DN 20)**: Maximum span, **7 feet (2.1 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - b. **NPS 1 (DN 25)**: Maximum span, **7 feet (2.1 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - c. **NPS 1-1/4 (DN 32)**: Maximum span, **7 feet (2.1 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 1-1/2 (DN 40)**: Maximum span, **9 feet (2.7 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - e. **NPS 2 (DN 50)**: Maximum span, **10 feet (3 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - f. **NPS 2-1/2 (DN 65)**: Maximum span, **11 feet (3.4 m)**; minimum rod size, **1/2 inch (12 mm)**.
 - g. **NPS 3 (DN 80)**: Maximum span, **12 feet (3.7 m)**; minimum rod size, **1/2 inch (12 mm)**.
 - h. **NPS 3-1/2 (DN 90)**: Maximum span, **13 feet (4 m)**; minimum rod size, **1/2 inch (12 mm)**.
 - i. **NPS 4 (DN 100)**: Maximum span, **14 feet (4.3 m)**; minimum rod size, **5/8 inch (16 mm)**.
 - j. **NPS 5 (DN 125)**: Maximum span, **16 feet (4.9 m)**; minimum rod size, **5/8 inch (16 mm)**.
 - k. **NPS 6 (DN 150)**: Maximum span, **17 feet (5.2 m)**; minimum rod size, **3/4 inch (20 mm)**.
 - l. **NPS 8 (DN 200)**: Maximum span, **19 feet (5.8 m)**; minimum rod size, **3/4 inch (20 mm)**.
 - m. **NPS 10 (DN 250)**: Maximum span, **22 feet (6.7 m)**; minimum rod size, **7/8 inch (20 mm)**.
 - n. **NPS 12 (DN 300)**: Maximum span, **23 feet (7 m)**; minimum rod size, **7/8 inch (20 mm)**.
 - o. **NPS 14 (DN 350)**: Maximum span, **25 feet (7.6 m)**; minimum rod size, **1 inch (24 mm)**.
 - p. **NPS 16 (DN 400)**: Maximum span, **27 feet (8.2 m)**; minimum rod size, **1 inch (24 mm)**.
 - q. **NPS 18 (DN 450)**: Maximum span, **28 feet (8.5 m)**; minimum rod size, **1 inch (24 mm)**.
 - r. **NPS 20 (DN 500)**: Maximum span, **30 feet (9.1 m)**; minimum rod size, **1-1/4 inches (30 mm)**.
5. Install hangers for drawn-temper copper tubing with the following maximum spacing and minimum rod sizes:
 - a. **NPS 3/4 (DN 20)**: Maximum span, **5 feet (1.5 m)**; minimum rod size, **3/8 inch (10 mm)**.

- b. **NPS 1 (DN 25):** Maximum span, **6 feet (1.8 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - c. **NPS 1-1/4 (DN 32):** Maximum span, **7 feet (2.1 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - d. **NPS 1-1/2 (DN 40):** Maximum span, **8 feet (2.4 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - e. **NPS 2 (DN 50):** Maximum span, **8 feet (2.4 m)**; minimum rod size, **3/8 inch (10 mm)**.
 - f. **NPS 2-1/2 (DN 65):** Maximum span, **9 feet (2.7 m)**; minimum rod size, **1/2 inch (12 mm)**.
 - g. **NPS 3 (DN 80):** Maximum span, **10 feet (3 m)**; minimum rod size, **1/2 inch (12 mm)**.
6. **Plastic Piping Hanger Spacing:** Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
 7. **Fiberglass Piping Hanger Spacing:** Space hangers according to pipe manufacturer's written instructions for service conditions. Avoid point loading. Space and install hangers with the fewest practical rigid anchor points.
 8. Support vertical runs at roof, at each floor, and at **10-foot (3-m)** intervals between floors.
- E. **Pipe Joint Construction**
1. Join pipe and fittings according to the following requirements and Division 21 specifying piping systems.
 2. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 3. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 4. **Soldered Joints:** Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
 5. **Brazed Joints:** Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 6. **Threaded Joints:** Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. **Damaged Threads:** Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 7. **Welded Joints:** Construct joints according to AWS D10.12/D10.12M, using qualified processes and welding operators according to Part 1.1 "Quality Assurance" Article.
 8. **Flanged Joints:** Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
 9. **Plastic Piping Solvent-Cemented Joints:** Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. **CPVC Piping:** Join according to ASTM D 2846/D 2846M Appendix.
 - c. **PVC Pressure Piping:** Join ASTM D 1785 schedule number, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule number PVC pipe and socket fittings according to ASTM D 2855.
 - d. **PVC Nonpressure Piping:** Join according to ASTM D 2855.
 10. **Fiberglass Bonded Joints:** Prepare pipe ends and fittings, apply adhesive, and join according to pipe manufacturer's written instructions.
 11. **Grooved Joints:** Assemble joints with coupling and gasket, lubricant, and bolts. Cut or roll grooves in ends of pipe based on pipe and coupling manufacturer's written instructions for pipe wall thickness. Use grooved-end fittings and rigid, grooved-end-pipe couplings.
 12. **Mechanically Formed, Copper-Tube-Outlet Joints:** Use manufacturer-recommended tool and procedure, and brazed joints.
 13. **Pressure-Sealed Joints:** Use manufacturer-recommended tool and procedure. Leave insertion marks on pipe after assembly.
- F. **Hydronic Specialties Installation**

1. Install manual air vents at high points in piping, at heat-transfer coils, and elsewhere as required for system air venting.
OR
Install automatic air vents at high points of system piping in mechanical equipment rooms only. Manual vents at heat-transfer coils and elsewhere as required for air venting.
2. Install piping from boiler air outlet, air separator, or air purger to expansion tank with a 2 percent upward slope toward tank.
3. Install in-line air separators in pump suction. Install drain valve on air separators **NPS 2 (DN 50)** and larger.
OR
Install tangential air separator in pump suction. Install blowdown piping with gate or full-port ball valve; extend full size to nearest floor drain.
4. Install bypass chemical feeders in each hydronic system where indicated, in upright position with top of funnel not more than **48 inches (1200 mm)** above the floor. Install feeder in minimum **NPS 3/4 (DN 20)** bypass line, from main with full-size, full-port, ball valve in the main between bypass connections. Install **NPS 3/4 (DN 20)** pipe from chemical feeder drain, to nearest equipment drain and include a full-size, full-port, ball valve.
5. Install expansion tanks above the air separator. Install tank fitting in tank bottom and charge tank. Use manual vent for initial fill to establish proper water level in tank.
 - a. Install tank fittings that are shipped loose.
 - b. Support tank from floor or structure above with sufficient strength to carry weight of tank, piping connections, fittings, plus tank full of water. Do not overload building components and structural members.
OR
Install expansion tanks on the floor. Vent and purge air from hydronic system, and ensure tank is properly charged with air to suit system Project requirements.

G. Terminal Equipment Connections

1. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.
2. Install control valves in accessible locations close to connected equipment.
3. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.
4. Install ports for pressure gages and thermometers at coil inlet and outlet connections according to Division 22 Section(s) "Meters And Gages For Plumbing Piping" OR Division 23 Section(s) "Meters And Gages For Hvac Piping".

H. Chemical Treatment

1. Perform an analysis of makeup water to determine type and quantities of chemical treatment needed to keep system free of scale, corrosion, and fouling, and to sustain the following water characteristics:
 - a. pH: 9.0 to 10.5.
 - b. "P" Alkalinity: 100 to 500 ppm.
 - c. Boron: 100 to 200 ppm.
 - d. Chemical Oxygen Demand: Maximum 100 ppm. Modify this value if closed system contains glycol.
 - e. Corrosion Inhibitor:
 - 1) Sodium Nitrate: 1000 to 1500 ppm.
 - 2) Molybdate: 200 to 300 ppm.
 - 3) Chromate: 200 to 300 ppm.
 - 4) Sodium Nitrate Plus Molybdate: 100 to 200 ppm each.
 - 5) Chromate Plus Molybdate: 50 to 100 ppm each.
 - f. Soluble Copper: Maximum 0.20 ppm.
 - g. Tolyriazole Copper and Yellow Metal Corrosion Inhibitor: Minimum 10 ppm.
 - h. Total Suspended Solids: Maximum 10 ppm.

- i. Ammonia: Maximum 20 ppm.
 - j. Free Caustic Alkalinity: Maximum 20 ppm.
 - k. Microbiological Limits:
 - 1) Total Aerobic Plate Count: Maximum 1000 organisms/ml.
 - 2) Total Anaerobic Plate Count: Maximum 100 organisms/ml.
 - 3) Nitrate Reducers: 100 organisms/ml.
 - 4) Sulfate Reducers: Maximum 0 organisms/ml.
 - 5) Iron Bacteria: Maximum 0 organisms/ml.
 2. Fill system with fresh water and add liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products from piping. Circulate solution for a minimum of 24 hours, drain, clean strainer screens, and refill with fresh water.
 3. Add initial chemical treatment and maintain water quality in ranges noted above for the first year of operation.
 4. Fill systems indicated to have antifreeze or glycol solutions with the following concentrations:
 - a. Hot-Water Heating Piping: Minimum percent ethylene, as directed by the Owner **OR** propylene, **as directed**, glycol.
 - b. Chilled-Water Piping: Minimum percent ethylene, as directed by the Owner **OR** propylene, **as directed**, glycol.
 - c. Dual-Temperature Heating and Cooling Water Piping: Minimum percent, as directed by the Owner ethylene **OR** propylene, **as directed**, glycol.
 - d. Glycol Cooling-Water Piping: Minimum percent ethylene, as directed by the Owner. **OR** propylene, **as directed**, glycol.
- I. Field Quality Control
1. Prepare hydronic piping according to ASME B31.9 and as follows:
 - a. Leave joints, including welds, uninsulated and exposed for examination during test.
 - b. Provide temporary restraints for expansion joints that cannot sustain reactions due to test pressure. If temporary restraints are impractical, isolate expansion joints from testing.
 - c. Flush hydronic piping systems with clean water; then remove and clean or replace strainer screens.
 - d. Isolate equipment from piping. If a valve is used to isolate equipment, its closure shall be capable of sealing against test pressure without damage to valve. Install blinds in flanged joints to isolate equipment.
 - e. Install safety valve, set at a pressure no more than one-third higher than test pressure, to protect against damage by expanding liquid or other source of overpressure during test.
 2. Perform the following tests on hydronic piping:
 - a. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
 - b. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
 - c. Isolate expansion tanks and determine that hydronic system is full of water.
 - d. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Verify that stress due to pressure at bottom of vertical runs does not exceed 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A in ASME B31.9, "Building Services Piping."
 - e. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
 - f. Prepare written report of testing.
 3. Perform the following before operating the system:
 - a. Open manual valves fully.
 - b. Inspect pumps for proper rotation.
 - c. Set makeup pressure-reducing valves for required system pressure.
 - d. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).

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- e. Set temperature controls so all coils are calling for full flow.
- f. Inspect and set operating temperatures of hydronic equipment, such as boilers, chillers, cooling towers, to specified values.
- g. Verify lubrication of motors and bearings.

END OF SECTION 23 21 13 23a

SECTION 23 21 13 23b - RADIANT HEATING PIPING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for radiant heating piping. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes radiant heating piping, including pipes, fittings, and piping specialties.

C. Definitions

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. PEX: Crosslinked polyethylene.
3. PEX/AL/PEX: Crosslinked polyethylene/aluminum/crosslinked polyethylene.

D. Submittals

1. Product Data: For each type of radiant heating pipe, fitting, manifold, specialty, and control.
 - a. For radiant heating piping and manifolds, include pressure and temperature rating, oxygen-barrier performance, fire-performance characteristics, and water flow and pressure drop characteristics.
2. Shop Drawings: Show piping layout and details drawn to scale, including valves, manifolds, controls, and support assemblies, and their attachments to building structure.
3. Operation and Maintenance Data.

1.2 PRODUCTS

A. PEX Pipe And Fittings

1. Pipe Material: PEX plastic according to ASTM F 876.
2. Oxygen Barrier: Limit oxygen diffusion through the tube to maximum 0.10 mg per cu. m/day at **104 deg F (40 deg C)** according to DIN 4726.
3. Fittings: ASTM F 1807, metal insert and copper crimp rings.
4. Pressure/Temperature Rating: Minimum **100 psig (690 kPa)** and **180 deg F (82 deg C)**.

B. PEX/AL/PEX Pipe And Fittings

1. Pipe Material: PEX plastic bonded to the inside and outside of a welded aluminum tube according to ASTM F 1281.
2. Oxygen Barrier: Limit oxygen diffusion through the pipe to maximum 0.10 mg per cu. m/day at **104 deg F (40 deg C)** according to DIN 4726.
3. Fittings: ASTM F 1974, metal insert fittings with split ring and compression nut (compression joint) or metal insert fittings with copper crimp rings (crimp joint).
4. Flame-Spread and Smoke-Developed Indexes: 25 and 50 or less, respectively, tested according to ASTM E 84.
5. Pressure/Temperature Rating: Minimum **100 psig (690 kPa)** and **210 deg F (99 deg C)**.

C. EPDM Pipe And Fittings

1. Pipe Material: Crosslinked EPDM inner and outer tubes.
2. Wall Thickness: Minimum **0.125 inch (3.2 mm)**.
3. Oxygen Barrier: Ductile aluminum foil layer applied to the inner tube to limit oxygen diffusion through the pipe to maximum 0.10 mg per cu. m/day at **104 deg F (40 deg C)** according to DIN 4726.

4. Reinforcing Braid: Braided-aluminum wire between the inner and outer tube.
5. Fittings: ASTM F 1807, copper with stainless-steel crimps or clamps.
6. Pressure/Temperature Rating: Minimum **100 psig (690 kPa)** and **210 deg F (99 deg C)**.

D. Distribution Manifolds

1. Manifold: Minimum **NPS 1 (DN 25)**, brass **OR** copper **OR** modular plastic **OR** stainless steel, **as directed**.
2. Main Shutoff Valves:
 - a. Factory installed on supply and return connections.
 - b. Two **OR** Three, **as directed**, -piece body.
 - c. Body: Brass or bronze.
 - d. Ball: Chrome-plated bronze.
 - e. Seals: PTFE.
 - f. CWP Rating: **150 psig (1035 kPa)**.
 - g. Maximum Operating Temperature: **225 deg F (107 deg C)**.
3. Manual Air Vents:
 - a. Body: Bronze.
 - b. Internal Parts: Nonferrous.
 - c. Operator: Key furnished with valve, or screwdriver bit.
 - d. Inlet Connection: **NPS 1/2 (DN 15)**.
 - e. Discharge Connection: **NPS 1/8 (DN 6)**.
 - f. CWP Rating: **150 psig (1035 kPa)**.
 - g. Maximum Operating Temperature: **225 deg F (107 deg C)**.
4. Balancing Valves:
 - a. Body: Plastic or bronze, ball or plug, or globe cartridge type.
 - b. Ball or Plug: Brass or stainless steel.
 - c. Globe Cartridge and Washer: Brass with EPDM composition washer.
 - d. Seat: PTFE.
 - e. Visual Flow Indicator: Flowmeter with visible indication in a clear plastic cap at top of valve.
OR
Differential Pressure Gage Connections: Integral seals for portable meter to measure loss across calibrated orifice.
 - f. Handle Style: Lever or knob, with memory stop to retain set position if used for shutoff.
 - g. CWP Rating: Minimum **125 psig (860 kPa)**.
 - h. Maximum Operating Temperature: **250 deg F (121 deg C)**.
5. Zone Control Valves:
 - a. Body: Plastic or bronze, ball or plug, or globe cartridge type.
 - b. Ball or Plug: Brass or stainless steel.
 - c. Globe Cartridge and Washer: Brass with EPDM composition washer.
 - d. Seat: PTFE.
 - e. Actuator: Replaceable electric motor.
 - f. CWP Rating: Minimum **125 psig (860 kPa)**.
 - g. Maximum Operating Temperature: **250 deg F (121 deg C)**.
6. Thermometers:
 - a. Mount on supply and return connections.
 - b. Case: Dry type, metal or plastic, **2-inch (50-mm)** diameter.
 - c. Element: Bourdon tube or other type of pressure element.
 - d. Movement: Mechanical, connecting element and pointer.
 - e. Dial: Satin-faced, nonreflective aluminum with permanently etched scale markings.
 - f. Pointer: Black metal.
 - g. Window: Plastic.
 - h. Connector: Rigid, back type.
 - i. Thermal System: Liquid- or mercury-filled bulb in copper-plated steel, aluminum, or brass stem.

- j. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.
 - 7. Mounting Brackets: Copper, or plastic or copper-clad steel, where in contact with manifold.
- E. Piping Specialties
- 1. Cable Ties:
 - a. Fungus-inert, self-extinguishing, 1-piece, self-locking, Type 6/6 nylon cable ties.
 - b. Minimum Width: **1/8 inch (3 mm)**.
 - c. Tensile Strength: **20 lb (9 kg)**, minimum.
 - d. Temperature Range: **Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C)**.
 - 2. Floor-Mounting Staples:
 - a. Steel, with corrosion-resistant coating and smooth finish without sharp edges.
 - b. Minimum Thickness: **3/32 inch (2.4 mm)**.
 - c. Width: Minimum, wider than tubing.
 - 3. Floor-Mounting Clamps:
 - a. Two bolt, steel, with corrosion-resistant coating and smooth finish without sharp edges.
 - b. Minimum Thickness: **3/32 inch (2.4 mm)**.
 - c. Width: Minimum, wider than tubing.
 - 4. Floor Mounting Tracks:
 - a. Aluminum or plastic channel track with smooth finish, no sharp edges.
 - b. Minimum Thickness: **1/16 inch (1.6 mm)**.
 - c. Slot Width: Snap fit to hold tubing.
 - d. Slot Spacing: **2-inch (50-mm) OR 3-inch (75-mm)**, **as directed**, intervals.
 - 5. Channeled Subfloor:
 - a. Plywood, APA-rated subfloor panel, composed of premium, tongue-and-groove, 7-layer, Douglas fir structural subfloor panels.
 - b. Particleboard manufactured to meet Federal Housing Authority standards of less than 0.3-ppm formaldehyde.
 - c. Clad panel with minimum **0.025-inch- (0.635-mm-)** thick aluminum recessed in the grooves sized to maintain contact with radiant piping.
 - 6. Modular Interlocking Blocks:
 - a. Polypropylene snap-together blocks with grooves to support piping.
 - b. Galvanized sheet metal or aluminum emission plates.
 - c. Natural mineralboard cover panel.
 - 7. Heat-Emission Plates:
 - a. Formed aluminum suitable for radiant heating piping.
 - b. Minimum Thickness: **1/16 inch (1.6 mm)**.
 - c. Slot Width: Snap fit to maintain pressure fit on tubing.
- F. Controls
- 1. Temperature-control devices and sequence of operations are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
 - 2. Wall-Mounting Thermostat:
 - a. Minimum temperature range from **50 to 90 deg F (10 to 32 deg C)**.
 - b. Manually operated with on-off switch.
 - c. Day and night setback and clock program with minimum four periods per day.
 - d. Operate pumps or open zone control valves if room temperature falls below the thermostat setting, and stop pumps or close zone control valves when room temperature rises above the thermostat setting.
 - 3. Heated-Panel Thermostat:
 - a. Remote bulb unit with adjustable temperature range from **50 to 90 deg F (10 to 32 deg C)**.
 - b. Snap action; open-on-rise, single-pole switch with minimum current rating adequate for connected pump or zone control valve.
 - c. Remote bulb on capillary tube, resistance temperature device, or thermistor for directly sensing radiant panel temperature.
 - d. Stop pump or close zone control valves if heated-panel thermostat setting is exceeded.

- e. Corrosion-resistant, waterproof control enclosure.
- 4. Heated-Panel Thermostat with Outdoor Temperature Reset:
 - a. Remote bulb unit with adjustable temperature range from **50 to 90 deg F (10 to 32 deg C)**.
 - b. Snap action; open-on-rise, single-pole switch with minimum current rating adequate for connected pump and zone control valve.
 - c. Remote bulb on capillary tube, resistance temperature device, or thermistor for directly sensing radiant panel temperature.
 - d. Remote bulb on capillary tube, resistance temperature device, or thermistor for directly sensing outdoor-air temperature.
 - e. Operate zone control valves to reset supply-water temperature inversely with outdoor-air temperature as follows:
 - 1) Low outdoor-air temperature, **zero deg F (minus 18 deg C)** with high supply-water temperature **110 deg F (43 deg C)**.
 - 2) High outdoor-air temperature, **60 deg F (16 deg C)** with low supply-water temperature **70 deg F (21 deg C)**.
 - f. Corrosion-resistant, waterproof control enclosure.
- 5. Precipitation and Temperature Sensor:
 - a. Microprocessor-based **OR** Automatic, **as directed**, control with manual on, automatic, and standby/reset switch.
 - b. Precipitation and temperature sensors shall sense the surface conditions of pavement and shall be programmed to operate pump and zone control valves as follows:
 - 1) Temperature Span: **34 to 44 deg F (1 to 7 deg C)**.
 - 2) Adjustable Delay Off Span: 30 to 90 minutes.
 - 3) Start Pump or Open Zone Control Valves: Following two-minute delay if ambient temperature is below set point and precipitation is detected.
 - 4) Stop Pump or Close Zone Control Valves: On detection of a dry surface plus time delay.
 - c. Corrosion-proof and waterproof enclosure suitable for outdoor mounting, for controls and precipitation and temperature sensors.
 - d. Minimum 30-A contactor to start pump and open valves.
 - e. Precipitation sensor shall be mounted in pavement.
 - f. Provide relay with contacts to indicate operational status, on or off, for interface with central HVAC control system workstation.

1.3 EXECUTION

A. Applications

- 1. Install the following types of radiant heating piping for the applications described:
 - a. Piping in Exterior Pavement: EPDM **OR** PEX **OR** PEX/AL/PEX, **as directed**.
 - b. Piping in Interior Reinforced-Concrete Floors: EPDM **OR** PEX **OR** PEX/AL/PEX, **as directed**.
 - c. Piping in Level Fill Concrete Floors (Not Reinforced): EPDM **OR** PEX **OR** PEX/AL/PEX, **as directed**.
 - d. Piping in Ceilings: EPDM **OR** PEX **OR** PEX/AL/PEX, **as directed**.
 - e. Piping in Subfloors: EPDM **OR** PEX **OR** PEX/AL/PEX, **as directed**.
 - f. Piping below Wood Floors: EPDM **OR** PEX **OR** PEX/AL/PEX, **as directed**.

B. Installation

- 1. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicate piping locations and arrangements if such were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop or Coordination Drawings.
- 2. Install radiant heating piping continuous from the manifold through the heated panel and back to the manifold without piping joints in heated panels.

3. Connect radiant piping to manifold in a reverse-return arrangement.
4. Do not bend pipes in radii smaller than manufacturer's minimum bend radius dimensions.
5. Install manifolds in accessible locations, or install access panels to provide maintenance access as required in Division 08 Section "Access Doors And Frames".
6. Refer to Division 23 Section "Hydronic Piping" for pipes and connections to hydronic systems and for glycol-solution fill requirements.
7. Fire- and Smoke-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials according to Division 07 Section "Penetration Firestopping".
8. Piping in Exterior Pavement:
 - a. Secure piping in concrete floors by attaching pipes to reinforcement using cable ties.
 - b. Space cable ties a maximum of **18 inches (457 mm)** o.c., and at center of turns or bends.
 - c. Maintain **3-inch (75-mm)** minimum cover.
 - d. Install a sleeve of **3/8-inch- (9.5-mm-)** thick, foam-type insulation or PE pipe around tubing and extending for a minimum of **10 inches (250 mm)** on each side of slab joints to protect the tubing passing through expansion or control joints. Anchor sleeve to slab form at control joints to provide maximum clearance for saw cut.
 - e. Maintain minimum **40-psig (275-kPa)** pressure in piping during concrete placement and continue for 24 hours after placement.
9. Piping in Interior Reinforced-Concrete Floors:
 - a. Secure piping in concrete floors by attaching pipes to reinforcement using cable ties.
 - b. Space cable ties a maximum of **18 inches (457 mm)** o.c., and at center of turns or bends.
 - c. Maintain **2-inch (50-mm)** minimum cover.
 - d. Install a sleeve of **3/8-inch- (9.5-mm-)** thick, foam-type insulation or PE pipe around tubing and extending for a minimum of **10 inches (250 mm)** on each side of slab joints to protect the tubing passing through expansion or control joints. Anchor sleeve to slab form at control joints to provide maximum clearance for saw cut.
 - e. Maintain minimum **40-psig (275-kPa)** pressure in piping during concrete placement and continue for 24 hours after placement.
10. Piping in Level Fill Concrete Floors (Not Reinforced):
 - a. Secure piping in concrete floors by attaching pipes to subfloor using tracks, clamps, or staples.
 - b. Space tracks, clamps, or staples a maximum of **18 inches (457 mm)** o.c., and at center of turns or bends.
 - c. Maintain **3/4-inch (19-mm)** minimum cover.
 - d. Install a sleeve of **3/8-inch- (9.5-mm-)** thick, foam-type insulation or PE pipe around tubing and extending for a minimum of **10 inches (250 mm)** on each side of slab joints to protect the tubing passing through expansion or control joints. Anchor sleeve to slab form at control joints to provide maximum clearance for saw cut.
 - e. Maintain minimum **40-psig (275-kPa)** pressure in piping during the concrete pour and continue for 24 hours during curing.
11. Piping in Ceiling:
 - a. Secure piping by attaching pipes to ceiling substrate using clamps or staples.
 - b. Space clamps or staples a maximum of **18 inches (457 mm)** o.c., and at center of turns or bends.
 - c. Maintain **1-1/2-inch (38-mm)** minimum plaster cover.
 - d. Maintain minimum **40-psig (275-kPa)** pressure in piping during the plaster application and continue for 24 hours during curing.
12. Piping in Subfloor:
 - a. Secure piping by laying piping in subfloor channels or modular interlocking blocks.
 - b. Use straight channel panels or blocks in the center, and curved channel panels or blocks at the ends.
 - c. Finish floor with mineralboard panel cover or finished floor surface.
13. Piping below Wood Floor:
 - a. Secure piping by attaching pipes to subfloor using heat-emission plates, clamps, or staples.

- b. Space heat-emission plates, clamps, or staples a maximum of **4 inches (100 mm)** o.c., and at center of turns or bends.
 - c. Install heat-emission plates on underside of wood subfloor with maximum space between plates, as noted above, to maintain pipe contact with floor.
 14. Revise locations and elevations from those indicated as required to suit field conditions and ensure integrity of piping and as approved.
 15. After system balancing has been completed, mark balancing valves to permanently indicate final position.
 16. Perform the following adjustments before operating the system:
 - a. Open valves to fully open position.
 - b. Check operation of automatic valves.
 - c. Set temperature controls so all zones call for full flow.
 - d. Purge air from piping.
 17. After the concrete or plaster heating panel has cured as recommended by concrete or plaster supplier, operate radiant heating system as follows:
 - a. Start system heating at a maximum of **10 deg F (6 deg C)** above the ambient radiant panel temperature, and increase **10 deg F (6 deg C)** each following day until design temperature is achieved.
 - b. For freeze protection, operate at a maximum of **60 deg F (16 deg C)** supply-water temperature.
- C. Field Quality Control
1. Prepare radiant heating piping for testing as follows:
 - a. Open all isolation valves and close bypass valves.
 - b. Open and verify operation of zone control valves.
 - c. Flush with clean water, and clean strainers.
 2. Tests and Inspections:
 - a. Leak Test: After installation, charge system and test for leaks. Subject piping to hydrostatic test pressure that is not less than 1.5 times the design pressure but not more than **100 psig (690 kPa)**. Repair leaks and retest until no leaks exist.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Remove and replace malfunctioning radiant heating piping components that do not pass tests, and retest as specified above.
 4. Prepare a written report of testing.

END OF SECTION 23 21 13 23b

Task	Specification	Specification Description
23 21 13 23	01 95 99 99	Relief Wells
23 21 13 23	01 95 99 99a	Common Work Results for Fire Suppression
23 21 13 23	01 95 99 99b	Common Work Results for Plumbing
23 21 13 23	22 11 16 00	Domestic Water Piping
23 21 13 23	22 13 16 00	Sanitary Waste And Vent Piping
23 21 13 23	01 95 99 99c	Storm Drainage Piping
23 21 13 23	22 11 16 00a	General-Service Compressed-Air Piping
23 21 13 23	01 95 99 99d	Compressed-Air Piping For Laboratory And Healthcare Facilities
23 21 13 23	01 95 99 99e	Vacuum Piping For Laboratory And Healthcare Facilities
23 21 13 23	01 95 99 99f	Gas Piping For Laboratory And Healthcare Facilities
23 21 13 23	01 95 99 99g	Common Work Results for HVAC
23 21 13 23	23 11 23 00	Facility Natural-Gas Piping
23 21 13 23	23 11 23 00a	Facility Liquefied-Petroleum Gas Piping
23 21 13 23	22 11 16 00b	Steam And Condensate Piping
23 21 13 23	22 11 16 00c	Refrigerant Piping
23 21 13 23	01 95 99 99h	Water Supply Wells
23 21 13 23	23 11 23 00b	Monitoring Wells
23 21 13 23	33 14 00 00	Water Distribution
23 21 13 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 21 13 23	33 31 11 00	Sanitary Sewerage
23 21 13 23	23 05 29 00b	Steam Distribution
23 21 16 00	01 22 16 00	No Specification Required
23 21 16 00	01 95 99 99a	Common Work Results for Fire Suppression
23 21 16 00	01 95 99 99b	Common Work Results for Plumbing
23 21 16 00	22 11 16 00a	General-Service Compressed-Air Piping
23 21 16 00	01 95 99 99g	Common Work Results for HVAC
23 21 16 00	23 21 13 23	Facility Fuel-Oil Piping
23 21 16 00	23 21 13 23a	Hydronic Piping
23 21 16 00	23 21 23 13	Hydronic Pumps
23 21 16 00	22 11 16 00b	Steam And Condensate Piping
23 21 16 00	22 11 16 00c	Refrigerant Piping
23 21 16 00	23 43 00 00	Electronic Air Cleaners
23 21 16 00	33 14 00 00	Water Distribution
23 21 16 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 21 16 00	23 05 29 00b	Steam Distribution

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SECTION 23 21 23 13 - HYDRONIC PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hydronic pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Close-coupled, in-line centrifugal pumps.
 - b. Close-coupled, end-suction centrifugal pumps.
 - c. Separately coupled, horizontal, in-line centrifugal pumps.
 - d. Separately coupled, vertical, in-line centrifugal pumps.
 - e. Separately coupled, base-mounted, end-suction centrifugal pumps.
 - f. Separately coupled, base-mounted, double-suction centrifugal pumps.
 - g. Separately coupled, vertical-mounted, double-suction centrifugal pumps.
 - h. Separately coupled, vertical-mounted, turbine centrifugal pumps.
 - i. Automatic condensate pump units.

C. Definitions

1. Buna-N: Nitrile rubber.
2. EPT: Ethylene propylene terpolymer.

D. Submittals

1. Product Data: Include certified performance curves and rated capacities, operating characteristics, furnished specialties, final impeller dimensions, and accessories for each type of product indicated. Indicate pump's operating point on curves.
2. Shop Drawings: Show pump layout and connections. Include setting drawings with templates for installing foundation and anchor bolts and other anchorages.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Operation and Maintenance Data: For pumps to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. UL Compliance: Comply with UL 778 for motor-operated water pumps.

F. Delivery, Storage, And Handling

1. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
2. Store pumps in dry location.
3. Retain protective covers for flanges and protective coatings during storage.
4. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
5. Comply with pump manufacturer's written rigging instructions.

1.2 PRODUCTS

A. Close-Coupled, In-Line Centrifugal Pumps

1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally or vertically. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa) OR 250-psig (1720-kPa)**, **as directed**, minimum working pressure and a continuous water temperature of **200 deg F (93 deg C) OR 225 deg F (107 deg C) OR 250 deg F (121 deg C)**, **as directed**.
2. Pump Construction:
 - a. Casing: Radially split, cast iron, with replaceable bronze wear rings, **as directed**, threaded gage tappings at inlet and outlet, and threaded companion-flange **OR** union end, **as directed**, connections.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - c. Pump Shaft: Steel, with copper-alloy shaft sleeve **OR** Stainless steel, **as directed**.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket. Include water slinger on shaft between motor and seal.
 - e. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 - f. Pump Bearings: Permanently lubricated ball bearings **OR** Oil lubricated; bronze-journal or thrust type, **as directed**.
3. Motor: Single speed, with permanently lubricated **OR** grease-lubricated, **as directed**, ball bearings, unless otherwise indicated; and rigidly mounted to pump casing. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

B. Close-Coupled, End-Suction Centrifugal Pumps

1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, close-coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa)**, **as directed**, minimum working pressure and a continuous water temperature of **225 deg F (107 deg C) OR 250 deg F (121 deg C)**, **as directed**.
2. Pump Construction:
 - a. Casing: Radially split, cast iron, with replaceable bronze wear rings, **as directed**, drain plug at bottom and air vent at top of volute, threaded gage tappings at inlet and outlet, and threaded companion-flange **OR** flanged, **as directed**, connections.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - c. Pump Shaft: Steel, with copper-alloy shaft sleeve **OR** Stainless steel, **as directed**.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket. Include water slinger on shaft between motor and seal.
 - e. Pump Bearings: Permanently lubricated ball bearings **OR** Oil lubricated; bronze-journal or thrust type, **as directed**.
 - f. Motor: Single speed, with permanently lubricated **OR** grease-lubricated, **as directed**, ball bearings, unless otherwise indicated; rigidly mounted to pump casing with integral pump support. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

C. Separately Coupled, Horizontal, In-Line Centrifugal Pumps

1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted horizontally. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa)**, **as**

- directed**, minimum working pressure and a continuous water temperature of **225 deg F (107 deg C) OR 250 deg F (121 deg C), as directed.**
2. Pump Construction:
 - a. Casing: Radially split, cast iron, with threaded gage tappings at inlet and outlet, and threaded companion-flange **OR** union end, **as directed**, connections.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
 - c. Pump Shaft: Steel, with copper-alloy shaft sleeve **OR** Stainless steel, **as directed**.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket. Include water slinger on shaft between motor and seal.
 - e. Pump Bearings: Permanently lubricated ball bearings **OR** Oil lubricated; bronze-journal or thrust type, **as directed**.
 3. Shaft Coupling: Molded rubber insert with interlocking spider **OR** Interlocking frame with interconnecting springs, **as directed**, capable of absorbing vibration.
 4. Motor: Single speed, with permanently lubricated ball **OR** oil-lubricated sleeve, **as directed**, bearings, unless otherwise indicated; and resiliently **OR** rigidly, **as directed**, mounted to pump casing. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- D. Separately Coupled, Vertical, In-Line Centrifugal Pumps
1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, in-line pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted vertically. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa) OR 250-psig (1720-kPa), as directed**, minimum working pressure and a continuous water temperature of **200 deg F (93 deg C) OR 225 deg F (107 deg C) OR 250 deg F (121 deg C), as directed.**
 2. Pump Construction:
 - a. Casing: Radially split, cast iron, with replaceable bronze wear rings, **as directed**, threaded gage tappings at inlet and outlet, and threaded companion-flange **OR** union end, **as directed**, connections.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - c. Pump Shaft: Steel, with copper-alloy shaft sleeve **OR** Stainless steel, **as directed**.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket. Include water slinger on shaft between motor and seal.
 - e. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 - f. Pump Bearings: Permanently lubricated ball bearings **OR** Oil lubricated; bronze-journal or thrust type, **as directed**.
 3. Shaft Coupling: Axially split spacer coupling.
 4. Motor: Single speed, with permanently lubricated **OR** grease-lubricated, **as directed**, ball bearings, unless otherwise indicated; rigidly mounted to pump casing with lifting eye and supporting lugs in motor enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- E. Separately Coupled, Base-Mounted, End-Suction Centrifugal Pumps
1. Description: Factory-assembled and -tested, centrifugal, overhung-impeller, separately coupled, end-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa) OR 250-psig (1720-kPa), as directed**, minimum working pressure and a continuous water temperature of **200 deg F (93 deg C) OR 225 deg F (107 deg C) OR 250 deg F (121 deg C), as directed.**
 2. Pump Construction:
 - a. Casing: Radially split, cast iron, with replaceable bronze wear rings, **as directed**, threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and threaded companion-flange **OR** flanged, **as directed**, connections. Provide integral mount

on volute to support the casing, and attached piping to allow removal and replacement of impeller without disconnecting piping or requiring the realignment of pump and motor shaft, **as directed**.

- b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, keyed to shaft, and secured with a locking cap screw. Trim impeller to match specified performance.
 - c. Pump Shaft: Steel, with copper-alloy shaft sleeve **OR** Stainless steel, **as directed**.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket.
 - e. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 - f. Pump Bearings: Grease-lubricated ball bearings contained in cast-iron housing with grease fittings.
3. Shaft Coupling: Molded rubber insert and interlocking spider capable of absorbing vibration. Couplings shall be drop-out type to allow disassembly and removal without removing pump shaft or motor **OR** EPDM coupling sleeve for variable-speed applications, **as directed**.
 4. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
 5. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.
 6. Motor: Single speed, with permanently lubricated **OR** grease-lubricated, **as directed**, ball bearings, unless otherwise indicated; secured to mounting frame, with adjustable alignment. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

F. Separately Coupled, Base-Mounted, Double-Suction Centrifugal Pumps

1. Description: Factory-assembled and -tested, centrifugal, impeller-between-bearings, separately coupled, double-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for base mounting, with pump and motor shafts horizontal. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa) OR 250-psig (1720-kPa)**, **as directed**, minimum working pressure and a continuous water temperature of **200 deg F (93 deg C) OR 225 deg F (107 deg C) OR 250 deg F (121 deg C)**, **as directed**.
2. Pump Construction:
 - a. Casing: Radially **OR** Horizontally, **as directed**, split, cast iron, with replaceable bronze wear rings, **as directed**, threaded gage tappings at inlet and outlet, drain plug at bottom and air vent at top of volute, and ASME B16.1, Class 125 **OR** 250, **as directed**, flanges. Casing supports shall allow removal and replacement of impeller without disconnecting piping, **as directed**.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
 - c. Pump Shaft: Stainless steel.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket.
 - e. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 - f. Pump Bearings: Grease-lubricated ball bearings contained in cast-iron housing with grease fittings.
3. Shaft Coupling: Molded rubber insert and interlocking spider capable of absorbing vibration. Couplings shall be drop-out type to allow disassembly and removal without removing pump shaft or motor **OR** EPDM coupling sleeve for variable-speed applications, **as directed**.
4. Coupling Guard: Dual rated; ANSI B15.1, Section 8; OSHA 1910.219 approved; steel; removable; attached to mounting frame.
5. Mounting Frame: Welded-steel frame and cross members, factory fabricated from ASTM A 36/A 36M channels and angles. Fabricate to mount pump casing, coupling guard, and motor.

6. Motor: Single speed, with grease-lubricated ball bearings, unless otherwise indicated; secured to mounting frame, with adjustable alignment. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- G. Separately Coupled, Vertical-Mounted, Double-Suction Centrifugal Pumps
1. Description: Factory-assembled and -tested, centrifugal, impeller-between-bearings, separately coupled, double-suction pump as defined in HI 1.1-1.2 and HI 1.3; designed for installation with pump and motor shafts mounted vertically. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa) OR 250-psig (1720-kPa)**, **as directed**, minimum working pressure and a continuous water temperature of **200 deg F (93 deg C) OR 225 deg F (107 deg C) OR 250 deg F (121 deg C)**, **as directed**.
 2. Pump Construction:
 - a. Casing: Radially split, cast iron, with replaceable bronze wear rings, **as directed**, threaded gage tappings at inlet and outlet, drain plug at bottom of volute, mounting support, and ASME B16.1, Class 125 **OR** 250, **as directed**, flanges.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
 - c. Pump Shaft: Stainless steel.
 - d. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N **OR** EPT, **as directed**, bellows and gasket.
 - e. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 - f. Pump Bearings: Grease-lubricated ball bearings contained in cast-iron housing with grease fittings.
 3. Shaft Coupling: Molded rubber insert and interlocking spider capable of absorbing vibration.
 4. Motor: Single speed, with grease-lubricated ball bearings, unless otherwise indicated; secured to casing. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- H. Separately Coupled, Vertical-Mounted, Turbine Centrifugal Pumps
1. Description: Factory-assembled and -tested, single-stage **OR** multistage, **as directed**, centrifugal, impeller-between-bearings, end-suction pump as defined in HI 2.1-2.2 and HI 2.3; designed for installation with pump and motor shafts mounted vertically and projecting into a sump. Rate pump for **125-psig (860-kPa) OR 175-psig (1204-kPa)**, **as directed**, minimum working pressure and a continuous water temperature of **200 deg F (93 deg C)**.
 2. Pump Construction:
 - a. Pump Bowl: Cast iron, with replaceable bronze wear ring, **as directed**, cone **OR** basket, **as directed**, strainer, and suction bell. Water passages of intermediate bowls shall be coated with porcelain enamel, **as directed**.
 - b. Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, and keyed to shaft. Trim impeller to match specified performance.
 - c. Pump Shaft: Carbon **OR** Stainless, **as directed**, steel sized per AWWA E-101.
 - d. Pump Bearings: Water-lubricated bronze and rubber sleeve bearings contained in cast-iron housing.
 - e. Pump Column: ASTM A 53/A 53M, Grade B steel pipe.
 - f. Mechanical Seal: Carbon rotating ring against a ceramic seat held by a stainless-steel spring, and Buna-N bellows and gasket. Seal shall be replaceable without removing the motor or disturbing the piping.
 - g. Packing Seal: Stuffing box, with a minimum of four rings of graphite-impregnated braided yarn with bronze lantern ring between center two graphite rings, and bronze packing gland.
 3. Shaft Coupling: Keyed with locking collets.
 4. Discharge Head: ASME B16.1, Class 125 **OR** 250, **as directed**, discharge flange with threaded gage tapping. Top of discharge head shall have a registered fit to accurately locate the driver.
 5. Drive Ratchet: Nonreversing ratchet.

6. Hollow Shaft Motor: Single speed, with grease-lubricated ball bearings, unless otherwise indicated; secured to discharge head. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- I. Automatic Condensate Pump Units
 1. Description: Packaged units with corrosion-resistant pump, plastic tank with cover, and automatic controls. Include factory- or field-installed check valve and a **72-inch- (1800-mm-)** minimum, electrical power cord with plug.
- J. Pump Specialty Fittings
 1. Suction Diffuser: Angle pattern, **175-psig (1204-kPa) OR 300-psig (2060-kPa)**, **as directed**, pressure rating, cast **OR** ductile, **as directed**,-iron body and end cap, pump-inlet fitting; with bronze startup and bronze or stainless-steel permanent strainers; bronze or stainless-steel straightening vanes; drain plug; and factory-fabricated support.
 2. Triple-Duty Valve: Angle or straight pattern, **175-psig (1204-kPa) OR 300-psig (2060-kPa)**, **as directed**, pressure rating, cast **OR** ductile, **as directed**,-iron body, pump-discharge fitting; with drain plug and bronze-fitted shutoff, balancing, and check valve features. Brass gage ports with integral check valve, and orifice for flow measurement.

1.3 EXECUTION

A. Concrete Bases

1. Install concrete bases of dimensions indicated for pumps and controllers. Refer to Division 23 Section "Common Work Results For Hvac"
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around full perimeter of base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
2. Cast-in-place concrete materials and placement requirements are specified in Division 31.

B. Pump Installation

1. Comply with HI 1.4 **OR** HI 2.4, **as directed**.
2. Install pumps with access for periodic maintenance including removal of motors, impellers, couplings, and accessories.
3. Independently support pumps and piping so weight of piping is not supported by pumps and weight of pumps is not supported by piping.
4. Install continuous-thread hanger rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stop, **as directed**, of sufficient size to support pump weight. Vibration isolation devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Fabricate brackets or supports as required. Hanger and support materials are specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
5. Suspend vertically mounted, in-line centrifugal pumps independent of piping. Install pumps with motor and pump shafts vertical. Use continuous-thread hanger rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stop, **as directed**, of sufficient size to support pump weight. Vibration isolation devices are specified in Division 21 Section(s) "Vibration And Seismic Controls For Fire-suppression Piping And Equipment" AND Division 23 Section(s) "Vibration And Seismic Controls For Hvac Piping And Equipment". Hanger and support materials are specified in Division 22 Section(s) "Hangers And Supports For Plumbing Piping And Equipment" AND Division 23 Section(s) "Hangers And Supports For Hvac Piping And Equipment".

6. Set base-mounted pumps on concrete foundation. Disconnect coupling before setting. Do not reconnect couplings until alignment procedure is complete.
 - a. Support pump baseplate on rectangular metal blocks and shims, or on metal wedges with small taper, at points near foundation bolts to provide a gap of **3/4 to 1-1/2 inches (19 to 38 mm)** between pump base and foundation for grouting.
 - b. Adjust metal supports or wedges until pump and driver shafts are level. Check coupling faces and suction and discharge flanges of pump to verify that they are level and plumb.
 7. Automatic Condensate Pump Units: Install units for collecting condensate and extend to open drain.
- C. Alignment
1. Align pump and motor shafts and piping connections after setting on foundation, grout has been set and foundation bolts have been tightened, and piping connections have been made.
 2. Comply with pump and coupling manufacturers' written instructions.
 3. Adjust pump and motor shafts for angular and offset alignment by methods specified in HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation" **OR** HI 2.1-2.5, "Vertical Pumps for Nomenclature, Definitions, Application and Operation", **as directed**.
 4. After alignment is correct, tighten foundation bolts evenly but not too firmly. Completely fill baseplate with nonshrink, nonmetallic grout while metal blocks and shims or wedges are in place. After grout has cured, fully tighten foundation bolts.
- D. Connections
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
 3. Connect piping to pumps. Install valves that are same size as piping connected to pumps.
 4. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.
 5. Install check valve and throttling **OR** triple-duty, **as directed**, valve on discharge side of pumps.
 6. Install Y-type strainer **OR** suction diffuser, **as directed**, and shutoff valve on suction side of pumps.
 7. Install flexible connectors on suction and discharge sides of base-mounted pumps between pump casing and valves.
 8. Install pressure gages on pump suction and discharge, at integral pressure-gage tapping, or install single gage with multiple input selector valve.
 9. Install check valve and gate or ball valve on each condensate pump unit discharge.
 10. Install electrical connections for power, controls, and devices.
 11. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 12. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

END OF SECTION 23 21 23 13

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Task	Specification	Specification Description
23 21 23 13	01 95 99 99h	Water Supply Wells
23 21 23 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 21 23 16	23 21 23 13	Hydronic Pumps
23 21 23 16	01 95 99 99h	Water Supply Wells
23 21 23 16	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 21 23 23 - ELECTRIC-DRIVE, VERTICAL-TURBINE FIRE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electric-drive, vertical-turbine fire pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Vertical-turbine fire pumps.
 - b. Fire-pump accessories and specialties.
 - c. Flowmeter systems.

C. Performance Requirements

1. Seismic Performance: Fire pumps shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Pump Equipment, Accessory, and Specialty Pressure Rating: **175 psig (1200 kPa)** minimum unless higher pressure rating is indicated.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.
2. Shop Drawings: For fire pumps, motor drivers, and fire-pump accessories and specialties. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Seismic Qualification Certificates: For fire pumps, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Product Certificates: For each fire pump, from manufacturer.
5. Source quality-control reports.
6. Field quality-control reports.
7. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. NFPA Compliance: Comply with NFPA 20, "Installation of Stationary Pumps for Fire Protection."

1.2 PRODUCTS

- A. General Requirements For Vertical-Turbine Fire Pumps
1. Description: Factory-assembled and -tested fire-pump and driver unit.
 2. Base: Fabricated and attached to fire-pump and driver unit with reinforcement to resist movement of pump during seismic events when base is anchored to building substrate.
 3. Finish: Red paint applied to factory-assembled and -tested unit before shipping.
- B. Vertical-Turbine Fire Pumps
1. Pump Head: Cast iron, for surface discharge.
 - a. Discharge Outlet: With flange according to ASME B16.1 except connections may be threaded according to ASME B1.20.1, in sizes where flanges are not available.
 - b. Pump Head Seal: Stuffing box and packing.
 - c. Base: Cast iron or steel with hole for electrical cable.
 2. Pump:
 - a. Standard: UL 448, for vertical-turbine pumps for fire service.
 - b. Line Shaft: Stainless steel or steel, with corrosion-resistant shaft sleeves.
 - c. Line Shaft Bearings: Rubber sleeve, water lubricated.
 - d. Line Shaft: Steel.
 - e. Line Shaft Bearings: Corrosion resistant, oil lubricated.
 - f. Impeller Shaft: Monel metal or stainless steel.
 - g. Bowl Section: Multiple cast-iron bowls with closed-type bronze or stainless-steel impellers.
 - h. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel fittings, in sections **10 feet (3 m)** or less.
 - i. Suction Strainer: Cast or fabricated, bronze or stainless steel, and sized to restrict passage of **0.5-inch (12.7-mm)** spheres.
 3. Driver:
 - a. Standard: UL 1004A.
 - b. Type: Electric motor; NEMA MG 1, polyphase Design B.
 - c. Mounting: On pump head above pump.
- C. Fire-Pump Accessories And Specialties
1. Automatic Air-Release Valves: Comply with NFPA 20 for installation in fire-pump discharge piping.
 2. Relief Valves:
 - a. Description: UL 1478, bronze or cast iron, spring loaded; for installation in fire-suppression water-supply piping.
 3. Outlet Fitting: Concentric tapered reducer at pump-head discharge outlet.
 4. Discharge Cone: Closed **OR** Open, **as directed**, type.
 5. Hose Valve Manifold Assembly:
 - a. Standard: Comply with requirements in NFPA 20.
 - b. Header Pipe: ASTM A 53/A 53M, Schedule 40, galvanized steel with ends threaded according to ASME B1.20.1.
 - c. Header Pipe Fittings: ASME B16.4, galvanized cast-iron threaded fittings.
 - d. Automatic Drain Valve: UL 1726.
 - e. Manifold:
 - 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Flush type, brass or ductile iron, with number of outlets required by NFPA 20.
 - 3) Nipples: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with ends threaded according to ASME B1.20.1.
 - 4) Adapters and Caps with Chain: Brass or bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 5) Escutcheon Plate: Brass or bronze; rectangular.
 - 6) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.

- 7) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, **as directed**, chrome plated, **as directed**.
 - 8) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
- OR**
- Manifold:
- 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Exposed type, brass, with number of outlets required by NFPA 20.
 - 3) Escutcheon Plate: Brass or bronze; round.
 - 4) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads. Include caps and chains.
 - 5) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, **as directed**, chrome plated, **as directed**.
 - 6) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."

D. Flowmeter Systems

1. Description: UL-listed or FM-Approved, fire-pump flowmeter system with capability to indicate flow to not less than 175 percent of fire-pump rated capacity.
2. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 250 psig (1725 kPa)**, **as directed**.
3. Sensor: Annubar probe, orifice plate, or venturi unless otherwise indicated. Sensor size shall match pipe, tubing, flowmeter, and fittings.
4. Permanently Mounted Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter. Include bracket or device for wall mounting.
 - a. Tubing Package: **NPS 1/8 or NPS 1/4 (DN 6 or DN 10)** soft copper **OR** plastic, **as directed**, tubing with copper or brass fittings and valves.

OR

Portable Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter and with two **12-foot- (3.7-m-)** long hoses in carrying case.

E. Grout

1. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
2. Characteristics: Nonshrink and recommended for interior and exterior applications.
3. Design Mix: **5000-psi (34-MPa)**, 28-day compressive strength.
4. Packaging: Premixed and factory packaged.

F. Source Quality Control

1. Testing: Test and inspect fire pumps according to UL 448 requirements for "Operation Test" and "Manufacturing and Protection Tests."
 - a. Verification of Performance: Rate fire pumps according to UL 448.
2. Fire pumps will be considered defective if they do not pass tests and inspections.
3. Prepare test and inspection reports.

1.3 EXECUTION

A. Installation

1. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.
2. Equipment Mounting: Install fire pumps on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.

- c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install fire-pump discharge piping equal to or larger than size required by NFPA 20.
 4. Support piping and pumps separately so weight of piping does not rest on pumps.
 5. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
 6. Install pressure gage on pump head discharge flange pressure-gage tapping. Comply with requirements for pressure gages specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
 7. Install flowmeters and sensors. Install flowmeter-system components and make connections according to NFPA 20 and manufacturer's written instructions.
 8. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.
 9. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- B. Alignment
1. Align pump and driver shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
 2. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
 3. Align piping connection.
 4. Align pump and driver shafts for angular and parallel alignment according to HI 2.4 and to tolerances specified by manufacturer.
- C. Connections
1. Comply with requirements for piping and valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to pumps and equipment to allow service and maintenance.
 3. Connect relief-valve discharge to drainage piping or point of discharge.
 4. Connect flowmeter-system meters, sensors, and valves to tubing.
 5. Connect fire pumps to their controllers.
- D. Identification
1. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.
- E. Field Quality Control
1. Test each fire pump with its controller as a unit. Comply with requirements for electric-motor-driver fire-pump controllers specified in Division 21 Section(s) "Electric-drive, Centrifugal Fire Pumps" OR "Diesel-drive, Centrifugal Fire Pumps" OR "Electric-drive, Vertical-turbine Fire Pumps" OR "Diesel-drive, Vertical-turbine Fire Pumps"
 2. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 3. Tests and Inspections:
 - a. After installing components, assemblies, and equipment including controller, test for compliance with requirements.
 - b. Test according to NFPA 20 for acceptance and performance testing.

- c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 4. Components, assemblies, and equipment will be considered defective if they do not pass tests and inspections.
 - 5. Prepare test and inspection reports.
 - 6. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Hoses are for tests only and do not convey to the Owner.
- F. Startup Service
- 1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
- G. Demonstration
- 1. Train the Owner's maintenance personnel to adjust, operate, and maintain fire pumps.

END OF SECTION 23 21 23 23

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SECTION 23 21 23 23a - DIESEL-DRIVE, VERTICAL-TURBINE FIRE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for diesel-drive, vertical-turbine fire pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Vertical-turbine fire pumps.
 - b. Fire-pump accessories and specialties.
 - c. Flowmeter systems.

C. Performance Requirements

1. Seismic Performance: Fire pumps shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Pump Equipment, Accessory, and Specialty Pressure Rating: **175 psig (1200 kPa)** minimum unless higher pressure rating is indicated.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, performance curves, electrical characteristics, and furnished specialties and accessories.
2. Shop Drawings: For fire pumps, right-angle gear drives, engine drivers, and fire-pump accessories and specialties. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Seismic Qualification Certificates: For fire pumps, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
4. Product Certificates: For each fire pump, from manufacturer.
5. Source quality-control reports.
6. Field quality-control reports.
7. Operation and maintenance data

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for location and application.
2. NFPA Compliance: Comply with NFPA 20, "Installation of Stationary Pumps for Fire Protection."

1.2 PRODUCTS

- A. General Requirements For Vertical-Turbine Fire Pumps
1. Description: Factory-assembled and -tested fire pump, right-angle gear drive, and driver.
 2. Base: Fabricated and attached to fire pump, right-angle gear drive, and driver with reinforcement to resist movement of pump, gear drive, and driver during seismic events when base is anchored to building substrate.
 3. Finish: Red paint applied to factory-assembled and -tested unit before shipping.
- B. Vertical-Turbine Fire Pumps
1. Pump Head: Cast iron, for surface discharge.
 - a. Discharge Outlet: With flange according to ASME B16.1 except connections may be threaded according to ASME B1.20.1, in sizes where flanges are not available.
 - b. Pump Head Seal: Stuffing box and packing.
 - c. Base: Cast iron or steel with hole for electrical cable.
 2. Pump:
 - a. Standard: UL 448, for vertical-turbine pumps for fire service.
 - b. For static water levels of 50 feet (15 m) or less and for water-lubricated bearings.
 - 1) Line Shaft: Stainless steel or steel, with corrosion-resistant shaft sleeves.
 - 2) Line Shaft Bearings: Rubber sleeve, water lubricated.
 - c. For static water levels between 50 and 200 feet (15 and 61 m) and for oil-lubricated bearings.
 - 1) Line Shaft: Steel.
 - 2) Line Shaft Bearings: Corrosion resistant, oil lubricated.
 - d. Impeller Shaft: Monel metal or stainless steel.
 - e. Bowl Section: Multiple cast-iron bowls with closed-type bronze or stainless-steel impellers.
 - f. Column Pipe: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with threaded ends and cast-iron or steel fittings, in sections **10 feet (3 m)** or less.
 - g. Suction Strainer: Cast or fabricated, bronze or stainless steel, and sized to restrict passage of **0.5-inch (12.7-mm)** spheres.
 3. Right-Angle Gear Drive:
 - a. Description: FM-Approved, speed-reduction gear drive for pump speed control. Provide ratio for outlet speed of approximately 1760 rpm.
 4. Engine-to-Gear Drive Shaft: FM-Approved, telescoping, steel drive shaft with universal joint and grease fitting at each end. Include metal shaft guard.
 5. Driver:
 - a. Standard: UL 1247.
 - b. Type: Diesel engine.
 - c. Emergency Manual Operator: Factory wired for starting and operating standby engine in case of malfunction in main controller or wiring.
 - d. Engine Cooling System: Factory-installed radiator.
 - 1) Coolant: Type recommended by driver manufacturer.

OR

Engine Cooling System: Factory-installed water piping, valves, strainer, pressure regulator, heat exchanger, coolant pump, bypass piping, and fittings.
 - 1) Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)**, copper water tube; ASME B16.22, wrought-copper, solder-joint pressure fittings; AWS A5.8/A5.8M, BCuP Series brazing filler metal; and brazed joints.
 - e. Engine-Jacket Water Heater: Factory-installed electric elements.
 - f. Dual Batteries: Lead-acid-storage type with 100 percent standby reserve capacity.
 - g. Fuel System: According to NFPA 20.
 - 1) Fuel Storage Tank: Size indicated but not less than required by NFPA 20. Include floor legs, direct-reading level gage, and secondary containment tank with capacity at least equal to fuel storage tank.

- h. Exhaust System: ASTM A 53/A 53M, Type E or S, Schedule 40, black steel pipe; ASME B16.9, weld-type pipe fittings; ASME B16.5, steel flanges; and ASME B16.21, nonmetallic gaskets. Fabricate double-wall, ventilated thimble from steel pipe.
 - 1) Exhaust Connector: Flexible type.
 - 2) Exhaust Silencer: Industrial **OR** Residential, **as directed**, type.
- C. Fire-Pump Accessories And Specialties
- 1. Automatic Air-Release Valves: Comply with NFPA 20 for installation in fire-pump discharge piping.
 - 2. Relief Valves:
 - a. Description: UL 1478, bronze or cast iron, spring loaded; for installation in fire-suppression water-supply piping.
 - 3. Outlet Fitting: Concentric tapered reducer at pump-head discharge outlet.
 - 4. Discharge Cone: Closed **OR** Open, **as directed**, type.
 - 5. Hose Valve Manifold Assembly:
 - a. Standard: Comply with requirements in NFPA 20.
 - b. Header Pipe: ASTM A 53/A 53M, Schedule 40, galvanized steel with ends threaded according to ASME B1.20.1.
 - c. Header Pipe Fittings: ASME B16.4, galvanized cast-iron threaded fittings.
 - d. Automatic Drain Valve: UL 1726.
 - e. Manifold:
 - 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Flush type, brass or ductile iron, with number of outlets required by NFPA 20.
 - 3) Nipples: ASTM A 53/A 53M, Schedule 40, galvanized-steel pipe with ends threaded according to ASME B1.20.1.
 - 4) Adapters and Caps with Chain: Brass or bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 5) Escutcheon Plate: Brass or bronze; rectangular.
 - 6) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads.
 - 7) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, **as directed**, chrome plated, **as directed**.
 - 8) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
- OR**
- e. Manifold:
 - 1) Test Connections: Comply with UL 405 except provide outlets without clappers instead of inlets.
 - 2) Body: Exposed type, brass, with number of outlets required by NFPA 20.
 - 3) Escutcheon Plate: Brass or bronze; round.
 - 4) Hose Valves: UL 668, bronze, with outlet threaded according to NFPA 1963 and matching local fire-department threads. Include caps and chains.
 - 5) Exposed Parts Finish: Polished **OR** Rough, **as directed**, brass, **as directed**, chrome plated, **as directed**.
 - 6) Escutcheon Plate Marking: Equivalent to "FIRE PUMP TEST."
- D. Flowmeter Systems
- 1. Description: UL-listed or FM-Approved, fire-pump flowmeter system with capability to indicate flow to not less than 175 percent of fire-pump rated capacity.
 - 2. Pressure Rating: **175 psig (1200 kPa)** minimum **OR 250 psig (1725 kPa)**, **as directed**.
 - 3. Sensor: Annubar probe, orifice plate, or venturi unless otherwise indicated. Sensor size shall match pipe, tubing, flowmeter, and fittings.
 - 4. Permanently Mounted Flowmeter: Compatible with flow sensor; with dial not less than **4-1/2 inches (115 mm)** in diameter. Include bracket or device for wall mounting.
 - a. Tubing Package: **NPS 1/8 or NPS 1/4 (DN 6 or DN 10)** soft copper **OR** plastic, **as directed**, tubing with copper or brass fittings and valves.

OR

Portable Flowmeter: Compatible with flow sensor; with dial not less than 4-1/2 inches (115 mm) in diameter and with two 12-foot- (3.7-m-) long hoses in carrying case.

- E. Grout
 1. Standard: ASTM C 1107, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.
 2. Characteristics: Nonshrink and recommended for interior and exterior applications.
 3. Design Mix: 5000-psi (34-MPa), 28-day compressive strength.
 4. Packaging: Premixed and factory packaged.

- F. Source Quality Control
 1. Testing: Test and inspect fire pumps according to UL 448 requirements for "Operation Test" and "Manufacturing and Production Tests."
 - a. Verification of Performance: Rate fire pumps according to UL 448.
 2. Fire pumps will be considered defective if they do not pass tests and inspections.
 3. Prepare test and inspection reports.

1.3 EXECUTION

- A. Installation
 1. Fire-Pump Installation Standard: Comply with NFPA 20 for installation of fire pumps, relief valves, and related components.
 2. Equipment Mounting: Install fire pumps on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install fire-pump discharge piping equal to or larger than size required by NFPA 20.
 4. Support piping and pumps separately so weight of piping does not rest on pumps.
 5. Install valves that are same size as connecting piping. Comply with requirements for fire-protection valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
 6. Install pressure gage on pump head discharge flange pressure-gage tapping. Comply with requirements for pressure gages specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**.
 7. Install piping hangers and supports, anchors, valves, gages, and equipment supports according to NFPA 20.
 8. Install fuel system according to NFPA 20.
 9. Install water supply and drain piping for diesel-engine heat exchangers. Extend drain piping from heat exchangers to point of disposal.
 10. Install exhaust system piping for diesel engines. Extend to point of termination outside structure. Install pipe and fittings with welded joints; install components having flanged connections with gasketed joints.
 11. Install condensate drain piping for diesel-engine exhaust system. Extend drain piping from low points of exhaust system to condensate traps and to point of disposal.
 12. Install flowmeters and sensors. Install flowmeter-system components and make connections according to NFPA 20 and manufacturer's written instructions.
 13. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not factory mounted. Furnish copies of manufacturers' wiring diagram submittals to electrical Installer.

14. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- B. Alignment
1. Align fire-pump-driver, right-angle gear-drive, and fire-pump shafts after complete unit has been leveled on concrete base, grout has set, and anchor bolts have been tightened.
 2. After alignment is correct, tighten anchor bolts evenly. Fill baseplate completely with grout, with metal blocks and shims or wedges in place. Tighten anchor bolts after grout has hardened. Check alignment and make required corrections.
 3. Align piping connections.
 4. Align pump and driver shafts for angular and parallel alignment according to HI 2.4 and to tolerances specified by manufacturer.
- C. Connections
1. Comply with requirements for piping and valves specified in Division 21 Section(s) "Fire-suppression Standpipes" OR "Wet-pipe Sprinkler Systems", **as directed**. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to pumps and equipment to allow service and maintenance.
 3. Connect relief-valve discharge to drainage piping or point of discharge.
 4. Connect flowmeter-system meters, sensors, and valves to tubing.
 5. Connect fire pumps to their controllers.
- D. Identification
1. Identify system components. Comply with requirements for fire-pump marking according to NFPA 20.
- E. Field Quality Control
1. Test each fire pump with its right-angle gear drive and controller as a unit. Comply with requirements for electric-motor-driver fire-pump controllers specified in Division 21 Section(s) "Electric-drive, Centrifugal Fire Pumps" OR "Diesel-drive, Centrifugal Fire Pumps" OR "Electric-drive, Vertical-turbine Fire Pumps" OR "Diesel-drive, Vertical-turbine Fire Pumps".
 2. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 3. Tests and Inspections:
 - a. After installing components, assemblies, and equipment including controller, test for compliance with requirements.
 - b. Test according to NFPA 20 for acceptance and performance testing.
 - c. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - d. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 4. Components, assemblies, and equipment will be considered defective if they do not pass tests and inspections.
 5. Prepare test and inspection reports.
 6. Furnish fire hoses in number, size, and length required to reach storm drain or other acceptable location to dispose of fire-pump test water. Hoses are for tests only and do not convey to the Owner.
- F. Startup Service
1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



G. Demonstration

1. Train the Owner's maintenance personnel to adjust, operate, and maintain fire pumps, right-angle gear drives, and fire-pump controllers.

END OF SECTION 23 21 23 23a

Task	Specification	Specification Description
23 21 23 23	01 95 99 99h	Water Supply Wells
23 21 23 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 21 29 00	23 21 23 13	Hydronic Pumps
23 21 29 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 22 16 00	22 05 19 00	Meters and Gages for Plumbing Piping
23 22 16 00	22 11 16 00a	General-Service Compressed-Air Piping
23 22 16 00	23 05 19 00	Meters and Gages for HVAC Piping
23 22 16 00	22 11 16 00b	Steam And Condensate Piping
23 22 16 00	22 11 16 00c	Refrigerant Piping
23 22 16 00	33 14 00 00	Water Distribution
23 22 16 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 22 16 00	23 05 29 00b	Steam Distribution

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SECTION 23 22 23 13 - STEAM CONDENSATE PUMPS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for steam condensate pumps. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes electric-driven and pressure-powered steam condensate pumps.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include details of installation.
 - a. Include wiring diagrams.
3. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: Fabricate and label steam condensate pumps to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

E. Delivery, Storage, and Handling

1. Manufacturer's Preparation for Shipping: Clean flanges and exposed machined metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
2. Store steam condensate pumps in dry location.
3. Retain protective covers for flanges and protective coatings during storage.
4. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
5. Comply with pump manufacturer's written rigging instructions.

1.2 PRODUCTS

A. Electric-Driven Steam Condensate Pumps

1. Description: Factory-fabricated, packaged, electric-driven pumps; with receiver, pump(s), controls, and accessories suitable for operation with steam condensate.
2. Configuration: Simplex **OR** Duplex, **as directed**, floor-mounting pump with receiver and float switch(es); rated to pump **200 deg F (93 deg C)** steam condensate.
 - a. Receiver: Floor-mounting, close-grained cast iron **OR** welded steel, **as directed**; with externally adjustable float switch(es), and flange(s) for pump mounting.
 - b. Pump(s): Centrifugal, close coupled, vertical design, permanently aligned, and bronze fitted; with replaceable bronze case ring and mechanical seal; mounted on receiver flange.
 - c. Factory Wiring: Between pump(s) and float switch(es), for single external electrical connection. Fused control power transformer if voltage exceeds 230 V.
 - d. Electrical **OR** Mechanical, **as directed**, pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate if the normal start level for a single pump is exceeded.
3. Configuration: Duplex floor-mounting pump with receiver and float switches; rated to pump **210 deg F (99 deg C)** steam condensate.

- a. Receiver: Floor-mounting, close-grained cast iron **OR** welded steel, **as directed**; with externally adjustable float switches and flanges for pump mounting.
 - b. Pumps: Regenerative turbine, close coupled, permanently aligned, and bronze fitted; with mechanical seals and an independent pump control circuit for each pump; mounted on base or receiver flange; rated to operate with a minimum of **2 feet (6 kPa)** of NPSH.
 - c. Factory Wiring: Between pumps and float switches, for single external electrical connection. Fused control power transformer if voltage exceeds 230 V.
 - d. Electrical **OR** Mechanical, **as directed**, pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate if the normal start level for a single pump is exceeded.
4. Configuration: Duplex floor-mounting pumps with receiver and float switches; rated to pump minimum **200 deg F (93 deg C) OR 210 deg F (99 deg C)**, **as directed**, steam condensate.
- a. Receiver: Floor-mounting, close-grained cast iron **OR** welded steel, **as directed**; externally adjustable float switches; with water-level gage, steam condensate thermometer, discharge-pressure gage for each pump, bronze gate valves between receiver and pumps, flanges for pump mounting, and lifting eyebolts.
 - b. Inlet Strainer: Cast iron with self-cleaning bronze screen, dirt pocket, and cleanout plug on receiver inlet.
 - c. Pumps: Centrifugal, close coupled, vertical design, permanently aligned, and bronze fitted; with replaceable bronze case rings, stainless-steel shafts, and mechanical seals; mounted on receiver flanges; rated to operate with a minimum of **2 feet (6 kPa)** of NPSH.
 - d. Control Panel: NEMA 250, Type 1 **OR** 2 **OR** 12, **as directed**, enclosure with hinged door and grounding lug, mounted on pump; factory wired for single external electrical connection; and with the following components within cabinet:
 - 1) Motor controller for each pump.
 - 2) Electrical pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate on receiver high level.
 - 3) Manual lead-lag control to override electrical pump alternator to manually select the lead pump.
 - 4) Momentary contact "TEST" push button on cover for each pump.
 - 5) Numbered terminal strip.
 - 6) Disconnect switch.
 - 7) Fused transformer for control circuit.
5. Configuration: Duplex floor-mounting pump with elevated receiver, float switches, and connecting piping; rated to pump **212 deg F (100 deg C)** steam condensate.
- a. Receiver: Close-grained cast iron **OR** Welded steel, **as directed**, mounted on fabricated-steel supports; externally adjustable float switches; with water-level gage, steam condensate thermometer, pump discharge pressure gages, bronze isolation valves between receiver and pumps, and lifting eyebolts.
 - b. Inlet Strainer: Cast iron with self-cleaning bronze screen, dirt pocket, and cleanout plug on receiver inlet.
 - c. Pumps: Centrifugal, close coupled, permanently aligned, and bronze fitted; with replaceable bronze case rings, stainless-steel shafts, and mechanical seals; mounted on base below receiver; rated to operate with a minimum of **2 feet (6 kPa)** of NPSH.
 - d. Pipe: ASTM A 53/A 53M, Type S, Grade B or ASTM A 106; Schedule 80; seamless steel.
 - e. Fittings **NPS 2 (DN 50)** and Smaller: ASME B16.1, Class 125 cast iron, threaded.
 - f. Fittings **NPS 2-1/2 (DN 65)** and Larger: ASTM A 234/A 234M, steel, for welded connections.
 - g. Control Panel: NEMA 250, Type 1 **OR** 2 **OR** 12, **as directed**, enclosure with hinged door and grounding lug; mounted on pump; factory wired for single external electrical connection; and with the following components within cabinet:
 - 1) Motor controller for each pump.
 - 2) Electrical pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate on receiver high level.

- 3) Manual lead-lag control to override electrical alternator to manually select the lead pump.
 - 4) Momentary contact "TEST" push button on cover for each pump.
 - 5) Numbered terminal strip.
 - 6) Disconnect switch.
 - 7) Fused transformer for control circuit.
6. Configuration: Underground duplex pump with basin and float switches; rated to pump **200 deg F (93 deg C)** steam condensate.
- a. Basin: Cast iron, with hub-type inlets.
 - b. Basin Cover: Cast iron or steel with gasketed openings for access, pumps, pump shafts, control rods, discharge piping, and vent connections.
 - 1) Anchor Flange: Cast iron, attached to basin, in location and of size required to anchor basin to concrete slab.
 - c. Pumps: Wet-pit mounted, vertical, flexible coupled, and suspended.
 - 1) Casing: Cast iron with open inlet.
 - 2) Shaft and Bearings: Stainless-steel shaft with oil-lubricated, bronze, intermediate sleeve bearings; **48-inch (1200-mm)** maximum intervals where basin depth is more than **48 inches (1200 mm)**; and grease-lubricated, ball-type, thrust bearings.
 - 3) Shaft Couplings: Flexible, capable of absorbing vibration.
 - 4) Seals: Mechanical; with carbon rotating ring, bearing on a ceramic seat held by a stainless-steel spring, and enclosed by a flexible bellows and gasket.
 - 5) Motors: Vertically mounted on cast-iron pedestal.
 - 6) Pump Discharge Piping: Manufacturer's standard steel or bronze pipe, unless otherwise indicated.
 - d. Control Panel: NEMA 250, Type 1 **OR** 2 **OR** 12, **as directed**, enclosure with hinged door and grounding lug; mounted on pump; factory wired for single external electrical connection; and with the following components within cabinet:
 - 1) Motor controller for each pump.
 - 2) Electrical pump alternator to operate pumps in lead-lag sequence and allow both pumps to operate on receiver high level.
 - 3) Manual lead-lag control to override electrical alternator to manually select the lead pump.
 - 4) Momentary contact "TEST" push button on cover for each pump.
 - 5) Numbered terminal strip.
 - 6) Disconnect switch.
 - 7) Fused transformer for control circuit.
- B. Pressure-Powered Steam Condensate Pumps
1. Description: Factory-fabricated, pressure-powered pumps with mechanical controls, valves, piping connections, and accessories suitable for pumping steam condensate using steam **OR** compressed air, **as directed**.
 2. Configuration: Simplex **OR** Duplex, **as directed**, pump with float-operated valve control.
 - a. Pump Body: Cast iron **OR** Welded steel, **as directed**.
 - b. Piping Connections: Threaded; for steam condensate, operating medium, vent, and indicated accessories.
 - c. Level Gage: Glass site gage with shutoff cocks.
 - d. Valves: Manufacturer's standard check valves on inlet and outlet.
 - e. Internal Parts: Stainless-steel float, springs, and actuating mechanism.
 - f. Valve Seals: Replaceable from exterior.
 - g. Receiver: Cast iron **OR** Welded steel, **as directed**, factory mounted on steel supports; with water-level site glass and threaded piping connections.
 - h. Pipe: ASTM A 53/A 53M, Type S, Grade B or ASTM A 106; Schedule 80; seamless steel.
 - i. Fittings: ASME B16.1, Class 125 cast iron, threaded.
- C. Motors

1. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

1.3 EXECUTION

A. Installation

1. Install pumps according to HI 1.1-1.5, "Centrifugal Pumps for Nomenclature, Definitions, Application and Operation."
2. Install pumps to provide access for periodic maintenance including removing motors, impellers, couplings, and accessories.
3. Support pumps and piping separately so piping is not supported by pumps.
4. Install pumps on concrete bases. Anchor pumps to bases using inserts or anchor bolts.
5. Install thermometers and pressure gages.

B. Connections

1. Install piping adjacent to machine to allow service and maintenance.
2. Install steam supply for pressure-powered pumps as required by Division 23 Section "Steam And Condensate Heating Piping".
3. Install compressed-air supply for pressure-powered pumps as required by Division 22 Section "General-service Compressed-air Piping".
4. Install gate and check valves on inlet and outlet of pressure-powered pumps.
5. Install check valve, gate valve, and globe valve at pump discharge connections for each electric-driven pump.
6. Pipe drain to nearest floor drain for overflow and drain piping connections.
7. Install full-size vent piping to outdoors, terminating in 180-degree elbow at point above highest steam system connection or as indicated.
8. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
9. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

END OF SECTION 23 22 23 13

Task	Specification	Specification Description
23 23 13 00	22 11 16 00c	Refrigerant Piping
23 23 13 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
23 23 16 00	01 95 99 99a	Common Work Results for Fire Suppression
23 23 16 00	01 95 99 99b	Common Work Results for Plumbing
23 23 16 00	22 13 16 00	Sanitary Waste And Vent Piping
23 23 16 00	01 95 99 99c	Storm Drainage Piping
23 23 16 00	01 95 99 99g	Common Work Results for HVAC
23 23 16 00	23 21 13 23a	Hydronic Piping
23 23 16 00	22 11 16 00c	Refrigerant Piping
23 23 16 00	23 01 60 71	Condensing Units
23 23 23 00	23 01 60 71	Condensing Units

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SECTION 23 25 13 00 - HVAC WATER TREATMENT

- A. Description Of Work
1. This specification covers the furnishing and installation of materials for HVAC water treatment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the products manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work
- B. Summary
1. This Section includes the following HVAC water-treatment systems:
 - a. Bypass chemical-feed equipment and controls.
 - b. Biocide chemical-feed equipment and controls.
 - c. Ozone-generator biocide equipment and controls.
 - d. UV-irradiation unit, biocide equipment, and controls.
 - e. Chemical treatment test equipment.
 - f. HVAC water-treatment chemicals.
 - g. Makeup water softeners.
 - h. RO equipment for HVAC makeup water.
 - i. Water filtration units for HVAC makeup water.
- C. Definitions
1. EEPROM: Electrically erasable, programmable read-only memory.
 2. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
 3. RO: Reverse osmosis.
 4. TDS: Total dissolved solids.
 5. UV: Ultraviolet.
- D. Performance Requirements
1. Water quality for HVAC systems shall minimize corrosion, scale buildup, and biological growth for optimum efficiency of HVAC equipment without creating a hazard to operating personnel or the environment.
 2. Base HVAC water treatment on quality of water available at Project site, HVAC system equipment material characteristics and functional performance characteristics, operating personnel capabilities, and requirements and guidelines of authorities having jurisdiction.
 3. Closed hydronic systems, including hot-water heating, chilled water, dual-temperature water, and glycol cooling, shall have the following water qualities:
 - a. pH: Maintain a value within 9.0 to 10.5.
 - b. "P" Alkalinity: Maintain a value within 100 to 500 ppm.
 - c. Boron: Maintain a value within 100 to 200 ppm.
 - d. Chemical Oxygen Demand: Maintain a maximum value of 100 ppm.
 - e. Soluble Copper: Maintain a maximum value of 0.20 ppm.
 - f. TDS: Maintain a maximum value of 10 ppm.
 - g. Ammonia: Maintain a maximum value of 20 ppm.
 - h. Free Caustic Alkalinity: Maintain a maximum value of 20 ppm.
 - i. Microbiological Limits:
 - 1) Total Aerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
 - 2) Total Anaerobic Plate Count: Maintain a maximum value of 100 organisms/ml.
 - 3) Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
 - 4) Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
 - 5) Iron Bacteria: Maintain a maximum value of 0 organisms/ml.
 4. Steam Boiler and Steam Condensate:
 - a. Steam Condensate:
 - 1) pH: Maintain a value within 7.8 to 8.4.
 - 2) Total Alkalinity: Maintain a value within 5 to 50 ppm.

- 3) Chemical Oxygen Demand: Maintain a maximum value of 15 ppm.
 - 4) Soluble Copper: Maintain a maximum value of 0.20 ppm.
 - 5) TDS: Maintain a maximum value of 10 ppm.
 - 6) Ammonia: Maintain a maximum value of 20 ppm.
 - 7) Total Hardness: Maintain a maximum value of 2 ppm.
 - b. Steam boiler operating at **15 psig (104 kPa)** and less shall have the following water qualities:
 - 1) "OH" Alkalinity: Maintain a value within 200 to 400 ppm.
 - 2) TDS: Maintain a value within 600 to 3000 ppm.
 - c. Steam boiler operating at more than **15 psig (104 kPa)** shall have the following water qualities:
 - 1) "OH" Alkalinity: 200 to 400 ppm.
 - 2) TDS: Maintain a value within 600 to 1200 ppm to maximum 30 times RO water TDS.
 5. Open hydronic systems, including condenser **OR** fluid-cooler spray, **as directed**, water, shall have the following water qualities:
 - a. pH: Maintain a value within 8.0 to 9.1.
 - b. "P" Alkalinity: Maintain a maximum value of 100 ppm.
 - c. Chemical Oxygen Demand: Maintain a maximum value of 100ppm.
 - d. Soluble Copper: Maintain a maximum value of 0.20 ppm.
 - e. TDS: Maintain a maximum value of 10 ppm.
 - f. Ammonia: Maintain a maximum value of 20 ppm.
 - g. Free "OH" Alkalinity: Maintain a maximum value of 0 ppm.
 - h. Microbiological Limits:
 - 1) Total Aerobic Plate Count: Maintain a maximum value of 10,000 organisms/ml.
 - 2) Total Anaerobic Plate Count: Maintain a maximum value of 1000 organisms/ml.
 - 3) Nitrate Reducers: Maintain a maximum value of 100 organisms/ml.
 - 4) Sulfate Reducers: Maintain a maximum value of 0 organisms/ml.
 - 5) Iron Bacteria: Maintain a maximum value of 0 organisms/ml.
 - i. Polymer Testable: Maintain a minimum value within 10 to 40.
 6. Passivation for Galvanized Steel: For the first 60 days of operation.
 - a. pH: Maintain a value within 7 to 8.
 - b. Calcium Carbonate Hardness: Maintain a value within 100 to 300 ppm.
 - c. Calcium Carbonate Alkalinity: Maintain a value within 100 to 300 ppm.
- E. Submittals
1. Product Data: For each type of product indicated.
 2. Shop Drawings: Pretreatment and chemical treatment equipment showing tanks, maintenance space required, and piping connections to HVAC systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: Power and control wiring.
 3. Field quality-control test reports.
 4. Manufacturer Seismic Qualification Certification
 5. Other Informational Submittals:
 - a. Water-Treatment Program: Written sequence of operation on an annual basis for the application equipment required to achieve water quality defined in the "Performance Requirements" Article above.
 - b. Water Analysis: Illustrate water quality available at Project site.
 - c. Passivation Confirmation Report: Verify passivation of galvanized-steel surfaces, and confirm this observation in a letter to the Owner.
- F. Quality Assurance
1. HVAC Water-Treatment Service Provider Qualifications: An experienced HVAC water-treatment service provider capable of analyzing water qualities, installing water-treatment equipment, and applying water treatment as specified in this Section.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Manual Chemical-Feed Equipment

1. Bypass Feeders: Steel, with corrosion-resistant exterior coating, minimum **3-1/2-inch (89-mm)** fill opening in the top, and **NPS 3/4 (DN 20)** bottom inlet and top side outlet. Quarter turn or threaded fill cap with gasket seal and diaphragm to lock the top on the feeder when exposed to system pressure in the vessel.
 - a. Capacity: **2 gal. (7.6 L) OR 5 gal. (19 L), as directed.**
 - b. Minimum Working Pressure: **125 psig (860 kPa) OR 175 psig (1210 kPa), as directed.**

B. Automatic Chemical-Feed Equipment

1. Water Meter:
 - a. AWWA C700, oscillating-piston, magnetic-drive, totalization meter.
 - b. Body: Bronze.
 - c. Maximum Pressure Loss at Design Flow: **3 psig (20 kPa).**
 - d. Registration: **Gallons (Liters) or cubic feet (cubic meters).**
 - e. Controls: Flow-control switch with normally open contacts; rated for maximum 10 A, 250-V ac; and that will close at adjustable increments of total flow.
2. Water Meter:
 - a. AWWA C701, turbine-type, totalization meter.
 - b. Body: Bronze.
 - c. Minimum Working-Pressure Rating: **100 psig (690 kPa).**
 - d. Maximum Pressure Loss at Design Flow: **3 psig (20 kPa).**
 - e. Registration: **Gallons (Liters) or cubic feet (cubic meters).**
 - f. End Connections: Threaded.
 - g. Control: Low-voltage signal capable of transmitting **1000 feet (305 m).**
3. Water Meter:
4. AWWA C701, turbine-type, totalization meter.
 - a. Body: Bronze **OR** Epoxy-coated cast iron, **as directed.**
 - b. Minimum Working-Pressure Rating: **150 psig (1035 kPa).**
 - c. Maximum Pressure Loss at Design Flow: **3 psig (20 kPa).**
 - d. Registration: **Gallons (Liters) or cubic feet (cubic meters).**
 - e. End Connections: Flanged.
 - f. Controls: Flow-control switch with normally open contacts; rated for maximum 10 A, 250-V ac; and that will close at adjustable increments of total flow.
5. Inhibitor Injection Timers:
 - a. Microprocessor-based controller with LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation And Control For Hvac".
 - b. Programmable timers with infinite adjustment over full range, and mounted in cabinet with hand-off-auto switches and status lights.
 - c. Test switch.
 - d. Hand-off-auto switch for chemical pump.
 - e. Illuminated legend to indicate feed when pump is activated.
 - f. Programmable lockout timer with indicator light. Lockout timer to deactivate the pump and activate alarm circuits.
 - g. LCD makeup totalizer to measure amount of makeup and bleed-off water from two water meter inputs.
6. pH Controller:

- a. Microprocessor-based controller, 1 percent accuracy in a range from zero to 14 units. Incorporate solid-state integrated circuits and digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation And Control For Hvac".
 - b. Digital display and touch pad for input.
 - c. Sensor probe adaptable to sample stream manifold.
 - d. High, low, and normal pH indication.
 - e. High or low pH alarm light, trip points field adjustable; with silence switch.
 - f. Hand-off-auto switch for acid pump.
 - g. Internal adjustable hysteresis or deadband.
7. TDS Controller:
- a. Microprocessor-based controller, 1 percent accuracy in a range from zero to 5000 micromhos. Incorporate solid-state integrated circuits and digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation And Control For Hvac".
 - b. Digital display and touch pad for input.
 - c. Sensor probe adaptable to sample stream manifold.
 - d. High, low, and normal conductance indication.
 - e. High or low conductance alarm light, trip points field adjustable; with silence switch.
 - f. Hand-off-auto switch for solenoid bleed-off valve.
 - g. Bleed-off valve activated indication.
 - h. Internal adjustable hysteresis or deadband.
 - i. Bleed Valves:
 - 1) Cooling Systems: Forged-brass body, globe pattern, general-purpose solenoid with continuous-duty coil, or motorized valve.
 - 2) Steam Boilers: Motorized ball valve, steel body, and TFE seats and seals.
8. Biocide Feeder Timer:
- a. Microprocessor-based controller with digital LCD display in NEMA 250, Type 12 enclosure with gasketed and lockable door. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation And Control For Hvac".
 - b. 24-hour timer with 14-day skip feature to permit activation any hour of day.
 - c. Precision, solid-state, bleed-off lockout timer and clock-controlled biocide pump timer. Prebleed and bleed lockout timers.
 - d. Solid-state alternator to enable use of two different formulations.
 - e. 24-hour display of time of day.
 - f. 14-day display of day of week.
 - g. Battery backup so clock is not disturbed by power outages.
 - h. Hand-off-auto switches for biocide pumps.
 - i. Biocide A and Biocide B pump running indication.
9. Chemical Solution Tanks:
- a. Chemical-resistant reservoirs fabricated from high-density opaque polyethylene with minimum 110 percent containment vessel.
 - b. Molded cover with recess for mounting pump.
 - c. Capacity: **30 gal. (114 L) OR 50 gal. (189 L) OR 120 gal. (454 L), as directed.**
10. Chemical Solution Injection Pumps:
- a. Self-priming, positive-displacement; rated for intended chemical with minimum 25 percent safety factor for design pressure and temperature.
 - b. Adjustable flow rate.
 - c. Metal and thermoplastic construction.
 - d. Built-in relief valve.
 - e. Fully enclosed, continuous-duty, single-phase motor. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

11. Chemical Solution Tubing: Polyethylene tubing with compression fittings and joints except ASTM A 269, Type 304, stainless steel for steam boiler injection assemblies.
 12. Injection Assembly:
 - a. Quill: Minimum **NPS 1/2 (DN 15)** with insertion length sufficient to discharge into at least 25 percent of pipe diameter.
 - b. Ball Valve: Three **OR** Two, **as directed**,-piece, stainless steel; selected to fit quill.
 - c. Packing Gland: Mechanical seal on quill of sufficient length to allow quill removal during system operation.
 - d. Assembly Pressure/Temperature Rating: Minimum **600 psig (4137 kPa)** at **200 deg F (93 deg C)**.
- C. Ozone-Generator Biocide Equipment
1. Corona discharge generator with stainless-steel generating cells, and transformer housed in a NEMA 250, Type 4 enclosure. Assembly shall be suitable for continuous duty. Provide site glasses to verify proper operation of generator.
 2. Water-cooled generators shall be provided with cooling water at maximum **70 deg F (21 deg C)** and **35 psig (241 kPa)**.
 3. Generator vessels exposed to system pressure shall be constructed according to ASME Boiler and Pressure Vessel Code and be equipped with pressure relief valve.
 4. External air compressor or induced airflow through a cleanable prefilter supplies concentrated oxygen through a molecular sieve with **minus 62 deg F (minus 52 deg C)** dew point to avoid the formation of nitric acid.
 5. Microprocessor-based control with software in EEPROM, surge protection, high-temperature cutout, and operational status lights. Interface for start/stop and status indication at central workstation as described in Division 23 Section "Instrumentation And Control For Hvac".
 6. Ozone Contactors:
 - a. Bubble diffusers.
 - b. Induction injection nozzle.
 - c. Injectors with static mixers.
 7. Ozone Detector and Alarm Devices:
 - a. Detector:
 - 1) Sensor: Metal dioxide semiconductor.
 - 2) Concentration Range: 0.01 to 0.14 ppm.
 - 3) Accuracy: Plus or minus 20 percent of range.
 - 4) Sensitivity: 0.01 ppm.
 - 5) Response Time: Maximum 10 seconds.
 - 6) Operating Temperature: **50 to 100 deg F (10 to 38 deg C)**.
 - 7) Relatively Humidity: 20 to 95 percent, noncondensing over the operating temperature range.
 - b. Horns:
 - 1) Electric-vibrating-polarized type.
 - 2) 24-V dc; with provision for housing the operating mechanism behind a grille.
 - 3) Horns shall produce a sound-pressure level of 90 dBA, measured **10 feet (3 m)** from the horn.
 - c. Visible Alarm Devices:
 - 1) Xenon strobe lights listed in UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate.
 - 2) Rated Light Output: **75 OR 110, as directed**, candela.
 - 3) Strobe Leads: Factory connected to screw terminals.
 8. Self-Contained Breathing Apparatus: Open-circuit, pressure-demand, compressed air includes completely assembled, portable, self-contained devices designed for hazardous breathing environment application.
 - a. Face Piece: EPDM or silicone rubber construction material, one-size-fits-all with double-sealing edge, stainless-steel speaking diaphragm and lens retainer, five adjustable straps to hold face piece to head (two straps on each side and one on top), exhalation valve in

mask, close-fitting nose piece to ensure no CO₂ buildup, and perspiration drain to avoid skin irritation and to prevent eyepiece, spectacle, and lens fogging.

- b. Backplate: Orthopedically designed of chemical and impact-resistant, glass-fiber composite **OR** aluminum, **as directed**.
- c. Harness and Carrier Assembly: Large triangular back pad, backplate, and adjustable waist and shoulder straps. Modular in design, detachable components, and easy to clean and maintain. Shoulder straps padded with flame-resistant material, reinforced with stainless-steel cable, and attached with T-nuts, washers, and screws.
- d. Air Cylinder: 30 **OR** 45 **OR** 60, **as directed**, -minute, low-pressure, air-supply-loaded fiberglass **OR** aluminum **OR** steel, **as directed**, cylinders fitted with quick-fill assembly for refilling and air transfer.
- e. Wall-Mounting Cabinet: Leakproof, corrosion-resistant, clear, plastic case.
- f. Tested and Certified: By the National Institute for Occupational Safety and Health and by the Mine Safety and Health Administration, according to 42 CFR 84, Subpart H.

D. Stainless-Steel Pipes And Fittings

- 1. Stainless-Steel Tubing: Comply with ASTM A 269, Type 316.
- 2. Stainless-Steel Fittings: Complying with ASTM A 815/A 815M, Type 316, Grade WP-S.
- 3. Two-Piece, Full-Port, Stainless-Steel Ball Valves: ASTM A 351, Type 316 stainless-steel body; ASTM A 276, Type 316 stainless-steel stem and vented ball, carbon-filled TFE seats, threaded body design with adjustable stem packing, threaded ends, and 250-psig (1725-kPa) SWP and 600-psig (4140-kPa) CWP ratings.
- 4. Three-Piece, Full-Port, Stainless-Steel Ball Valves: ASTM A 351, Type 316 stainless-steel body; ASTM A 276, Type 316 stainless-steel stem and vented ball, threaded body design with adjustable stem packing, threaded ends, and 150-psig (1035-kPa) SWP and 600-psig (4140-kPa) CWP rating.

E. UV Biocide Equipment

- 1. Target Irradiation: Minimum 30,000 microwatts x s/sq. cm.
- 2. Light Source Vessels:
 - a. ASTM A 666, Type 304 stainless steel.
 - b. Construct for minimum 150 psig (1035 kPa) at 150 deg F (65 deg C) according to ASME Boiler and Pressure Vessel Code, and equipped with pressure relief valve.
 - c. Light Source Sleeve: Quartz, with EPDM O-ring seals.
 - d. Light Source: Replaceable UV lamp producing minimum target irradiation of 254-nm wavelength light.
- 3. Controls: Interlock with pumps to operate when water is circulating.

F. Chemical Treatment Test Equipment

- 1. Test Kit: Manufacturer-recommended equipment and chemicals in a wall-mounting cabinet for testing pH, TDS, inhibitor, chloride, alkalinity, and hardness; sulfite and testable polymer tests for high-pressure boilers, and oxidizing biocide test for open cooling systems.
- 2. Sample Cooler:
 - a. Tube: Sample.
 - 1) Size: NPS 1/4 (DN 8) tubing.
 - 2) Material: ASTM A 666, Type 316 stainless steel.
 - 3) Pressure Rating: Minimum 2000 psig (13 790 kPa).
 - 4) Temperature Rating: Minimum 850 deg F (454 deg C).
 - b. Shell: Cooling water.
 - 1) Material: ASTM A 666, Type 304 stainless steel.
 - 2) Pressure Rating: Minimum 250 psig (1725 kPa).
 - 3) Temperature Rating: Minimum 450 deg F (232 deg C).
 - c. Capacities and Characteristics:
 - 1) Tube: Sample.
 - a) Flow Rate: 0.25 gpm (0.016 L/s).

- b) Entering Temperature: **400 deg F (204 deg C)**.
 - c) Leaving Temperature: **88 deg F (31 deg C)**.
 - d) Pressure Loss: **6.5 psig (44.8 kPa)**.
 - 2) Shell: Cooling water.
 - a) Flow Rate: **3 gpm (0.19 L/s)**.
 - b) Entering Temperature: **70 deg F (21 deg C)**.
 - c) Pressure Loss: **1.0 psig (6.89 kPa)**.
 3. Corrosion Test-Coupon Assembly: Constructed of corrosive-resistant material, complete with piping, valves, and mild steel and copper coupons. Locate copper coupon downstream from mild steel coupon in the test-coupon assembly.
 - a. Two-station rack for closed-loop systems.
 - b. Four-station rack for open systems.
- G. Chemicals
1. Chemicals shall be as recommended by water-treatment system manufacturer that are compatible with piping system components and connected equipment, and that can attain water quality specified in Part 1.1 "Performance Requirements" Article.
 2. Water Softener Chemicals:
 - a. Mineral: High-capacity, sulfonated-polystyrene ion-exchange resin that is stable over entire pH range with good resistance to bead fracture from attrition or shock. Resin exchange capacity minimum **30,000 grains/cu. ft. (69 kg/cu. m)** of calcium carbonate of resin when regenerated with **15 lb (6.8 kg)** of salt.
 - b. Salt for Brine Tanks: High-purity sodium chloride, free of dirt and foreign material. Rock and granulated forms are not acceptable.
- H. HVAC Makeup Water Softener
1. Description: Twin mineral tanks and one brine tank, factory mounted on skid.
 2. Fabricate supports and attachments to tanks with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure as recommended in writing by manufacturer.
 3. Mineral Tanks:
 - a. Fabricate and label steel filter tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - b. Fabricate and label FRP filter tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, if indicated.
 - c. Pressure Rating: **100 psig (690 kPa) OR 125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, minimum.
 - d. Wetted Components: Suitable for water temperatures from **40 to at least 100 deg F (5 to at least 38 deg C)**.
 - e. Freeboard: 50 percent, minimum, for backwash expansion above the normal resin bed level.
 - f. Support Legs or Skirt: Constructed of structural steel, welded or bonded to tank before testing and labeling.
 - g. Finish: Hot-dip galvanized on exterior and interior of tank after fabrication.
 - h. Upper Distribution System: Single-point type, fabricated from galvanized-steel pipe and fittings.
 - i. Lower Distribution System: Hub and radial-arm or header-lateral type; fabricated from PVC pipe and fittings with individual, fine-slotted, nonclogging PE strainers; arranged for even-flow distribution through resin bed.
 4. Controls: Automatic; factory mounted on mineral tanks and factory wired.
 - a. Adjustable duration of regeneration steps.
 - b. Push-button start and complete manual operation override.
 - c. Pointer on pilot-control valve shall indicate cycle of operation.
 - d. Means of manual operation of pilot-control valve if power fails.
 - e. Main Operating Valves: Industrial, automatic, multiport, diaphragm type with the following features:

- 1) Slow opening and closing, nonslam operation.
 - 2) Diaphragm guiding on full perimeter from fully open to fully closed.
 - 3) Isolated dissimilar metals within valve.
 - 4) Self-adjusting, internal, automatic brine injector that draws brine and rinses at constant rate independent of pressure.
 - 5) Float-operated brine valve to automatically measure the correct amount of brine to the softener and refill with fresh water.
 - 6) Sampling cocks for soft water.
 - f. Flow Control: Automatic control of backwash and flush rates over variations in operating pressures that do not require field adjustments. Equip mineral tanks with automatic-reset-head water meter that electrically activates cycle controller to initiate regeneration at preset total in gallons (liters), and automatically resets after regeneration to preset total in gallons (liters) for next service run. Include alternator to regenerate one mineral tank with the other in service.
 5. Brine Tank: Combination measuring and wet-salt storing system.
 - a. Tank and Cover Material: Fiberglass a minimum of 3/16 inch (4.8 mm) thick; or molded PE a minimum of 3/8 inch (9.5 mm) thick.
 - b. Brine Valve: Float operated and plastic fitted for automatic control of brine withdrawn and freshwater refill.
 - c. Size: Large enough for at least four regenerations at full salting.
 6. Factory-Installed Accessories:
 - a. Piping, valves, tubing, and drains.
 - b. Sampling cocks.
 - c. Main-operating-valve position indicators.
 - d. Water meters.
 7. Water Test Kit: Include water test kit in wall-mounting enclosure for water softener.
- I. RO Equipment For HVAC Makeup Water
1. Description: Factory fabricated and tested with RO membrane elements in housings, high-pressure pumps and motors, controls, valves, and prefilter; mounted on skid.
 2. Fabricate supports and attachments to tanks with reinforcement strong enough to resist tank movement during seismic event when tank supports are anchored to building structure as recommended in writing by manufacturer.
 3. Skid Assembly: Welded-steel frame coated with epoxy protective finish.
 4. RO Membrane and Housing:
 - a. Element: Thin-film composite with U-cup brine seal with minimum 98 percent salt rejection based on 2000-ppm water supplied at 225 psig (1551 kPa) and 77 deg F (25 deg C).
 - b. Housing: ASTM A 666, Type 304 stainless steel with PVC end caps held in place with stainless-steel straps.
 5. High-Pressure Pumps and Motors:
 - a. Pump:
 - 1) Vertical, multistage centrifugal operating at 3500 rpm with ASTM A 666, Type 304 stainless-steel casing, shaft, impellers, and inlet and discharge casting.
 - 2) Bearings shall be tungsten carbide and ceramic.
 - 3) Cast-iron frame and flanged suction and discharge connections.
 - b. Motor: NEMA-standard, C-faced TEFC motor supported on the pump-bearing frame. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 6. Controls:
 - a. Microprocessor-based controller with LCD display.
 - b. Interlock for remote start/stop control.
 - c. Membrane flush sequence when pumps shut down.
 - d. Run time indicator.
 - e. Low-pressure safety cutoff.
 - f. Panel-mounted gages as follows:

- 1) Product and concentrate.
 - 2) Inlet, cartridge filter outlet, RO feed, RO concentrate, and RO product pressures.
 - 3) Product conductivity monitor.
7. Valves:
- a. Stainless-steel pump, concentrate, and recycle throttling valves rated for minimum **300 psig (2068 kPa)**.
 - b. Automatic inlet shutoff valve, diaphragm type; solenoid actuated, normally closed, and constructed of glass-reinforced noryl thermoplastic.
 - c. PVC valves with EPDM seats and seals for isolation at inlet, and check and sample valves at product and concentrate. Sample valves at cartridge filter outlet, concentrate, and product outlet.
8. Prefilter:
- a. Housing: Polypropylene with built-in relief or vent valve.
 - b. Element: Spun-wound polypropylene.
9. Inlet Water Tempering Valve: Thermostatic water-tempering valve to maintain **77 deg F (25 deg C)**, **as directed**, inlet water temperature to RO unit.
10. Activated Carbon Filter:
- a. Media Tank: Fiberglass-reinforced polyester rated for minimum **150 psig (1035 kPa)** with internal backwash distributor and filtered water collector.
 - b. Media: 12 x 40-mesh, bituminous coal-based activated carbon.
 - c. Backwash Valve: Piston-operated control valve with drain-line, flow-control orifice.
 - d. Backwash Control: Seven-day time clock.
11. Atmospheric Storage Tank:
- a. Tank: Polyethylene single piece with closed top and flat bottom with manway in top, 0.2-micron filter vent, inlet, discharge, and drain piping connections, and bulkhead fittings for level controls.
 - b. Control: Level switches start and stop RO unit. Low-level limit shall stop repressurization pumps, and signal an alarm.
12. Repressurization Pumps:
- a. Pumps: Two close-coupled, single-stage centrifugal pumps, with mechanical seals. Wetted components ASTM A 666, Type 316 stainless steel.
 - b. Controls: NEMA-4X pump control panel constructed of fiberglass to control pumps, one operating, one standby, with automatic alternator and fail-over control.
 - c. Motor: ODP motor supported on the pump-bearing frame. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
13. Water Test Kit: Include water test kit in wall-mounting cabinet for RO unit.
- J. Filtration Equipment
1. Multimedia Filters:
 - a. Description: Factory-fabricated and -tested, simplex, multimedia filter system of filter tank, media, strainer, circulating pump, piping, and controls for removing particles from water.
 - 1) Filter Tank: Corrosion resistant with distribution system and media.
 - a) Fabricate and label steel filter tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - b) Fabricate and label FRP filter tanks to comply with ASME Boiler and Pressure Vessel Code: Section X, if indicated.
 - c) Pipe Connections **NPS 2 (DN 50)** and Smaller: Threaded according to ASME B1.20.1.
 - d) Steel Tank Pipe Connections **NPS 2-1/2 (DN 65)** and Larger: Steel, Class 150 flanges according to ASME B16.5 or grooved according to AWWA C606.
 - e) FRP Tank Pipe Connections **NPS 2-1/2 (DN 65)** and Larger: Type A, integral; Designation **E, 125-psig (0.862-MPa)** or **F, 150-psig (1.034-MPa)** pressure category flanges of grade same as tank material according to ASTM D 5421.

- 2) Motorized Valves: Flanged or grooved-end, ductile-iron butterfly type with EPDM valve seat and stem seal; with ASTM B 148 aluminum bronze disc.
 - 3) Strainer: Basket type mounted on pump suction.
 - 4) Piping: ASTM A 53/A 53M, Type S, F, or E; Grade B, Schedule 40 black steel, with flanged, grooved, or threaded joints and malleable, steel welding, or ductile-iron fittings.
 - 5) Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)** copper water tube, copper-alloy solder-joint fittings, and brazed, flanged, or grooved joints.
 - 6) Safety Valves: Automatic pressure relief.
 - 7) Circulating Pump: Overhung impeller, close coupled, single stage, end suction, centrifugal. Comply with UL 778 and with HI 1.1-1.2 and HI 1.3.
 - a) Casing: Radially split, cast iron.
 - b) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, minimum.
 - c) Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, closed, and keyed to shaft.
 - d) Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve.
 - e) Seal: Mechanical.
 - f) Motor: ODP motor supported on the pump-bearing frame. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 8) Controls: Automatic control of circulating pump and tank backwash; factory wired for single electrical connection.
 - a) Panel: NEMA 250, Type 4 enclosure with time clock and pressure gages.
 - b) Pump: Automatic and manual switching; manual switch position bypasses safeties and controls.
 - c) Backwash: Automatic; with time clock and differential pressure switch.
 - d) Backwash Valve: Tank mounted with valves interlocked to single actuator.
 - 9) Support: Skid mounting. Fabricate supports and base and attachment to tank with reinforcement strong enough to resist filter movement during a seismic event when filter base is anchored to building structure.
2. Self-Cleaning Strainers:
- a. Description: Factory-fabricated and -tested, ASTM A 126, Class B, cast-iron or steel, self-cleaning strainer system of tank, strainer, backwash arm or cleaning spiral, drive and motor, piping, and controls for removing particles from water.
 - 1) Fabricate and label ASTM A 126, Class B, cast-iron or steel strainer tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2) Pipe Connections:
 - a) **NPS 2 (DN 50)** and Smaller: Threaded according to ASME B1.20.1.
 - b) **NPS 2-1/2 (DN 65)** and Larger: Steel, Class 150 flanges according to ASME B16.5 or grooved according to AWWA C606.
 - b. Motorized Valves: Flanged or grooved-end, ductile-iron angle type with EPDM valve seat and stem seal; with ASTM B 148 aluminum bronze disc.
 - c. Strainer: ASTM A 666, Type 316 stainless steel.
 - d. Piping: ASTM A 53/A 53M, Type S, F, or E; Grade B, Schedule 40 black steel, with flanged, grooved, or threaded joints and malleable, steel welding, or ductile-iron fittings.
 - e. Safety Valves: Automatic pressure relief.
 - f. Backwash Arm Drive:
 - 1) Drive Casing: Cast iron.
 - 2) Worm Gears: Immersed in oil.
 - 3) Motor: ODP motor supported on the strainer-bearing frame. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - g. Controls: Automatic control of backwash; factory wired for single electrical connection.
 - 1) Panel: NEMA 250, Type 4 enclosure with time clock and pressure gages.

- 2) Backwash Arm Drive: Automatic and manual switching; manual switch position bypasses safeties and controls.
- 3) Backwash: Automatic; with time clock and differential pressure switch.
- 4) Backwash Valve: Electric actuator.
- h. Support: Skid mounting. Fabricate supports and base and attachment to tank with reinforcement strong enough to resist strainer movement during a seismic event when strainer base is anchored to building structure.
3. Bag **OR** Cartridge, **as directed**, -Type Filters:
 - a. Description: Floor-mounting housing with filter bags **OR** cartridges, **as directed**, for removing particles from water.
 - 1) Housing: Corrosion resistant; designed to separate inlet from outlet and to direct inlet through bag **OR** cartridge, **as directed**, -type water filter; with bag support and base, feet, or skirt.
 - a) Pipe Connections **NPS 2 (DN 50)** and Smaller: Threaded according to ASME B1.20.1.
 - b) Steel Housing Pipe Connections **NPS 2-1/2 (DN 65)** and Larger: Steel, Class 150 flanges according to ASME B16.5 or grooved according to AWWA C606.
 - c) Plastic Housing Pipe Connections **NPS 2-1/2 (DN 65)** and Larger: **150-psig (1035-kPa)** plastic flanges.
 - 2) Bag **OR** Cartridge, **as directed**: Replaceable; of shape to fit housing.
4. Centrifugal Separators:
 - a. Description: Simplex separator housing with baffles and chambers for removing particles from water by centrifugal action and gravity.
 - b. Housing: With manufacturer's proprietary system of baffles and chambers.
 - 1) Construction: Fabricate and label steel separator housing to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2) Inlet: Designed with tangential entry to produce centrifugal flow of feedwater.
 - 3) Vortex Chamber: Designed for downward vortex flow and gravity separation of particles.
 - 4) Collection Chamber: Designed to hold separated particles.
 - 5) Outlet: Near top of unit.
 - 6) Purge: At bottom of collection chamber.
 - 7) Pipe Connections **NPS 2 (DN 50)** and Smaller: Threaded according to ASME B1.20.1.
 - 8) Pipe Connections **NPS 2-1/2 (DN 65)** and Larger: Steel, Class 150 flanges according to ASME B16.5 or grooved according to AWWA C606. Provide stainless-steel flanges if tank is stainless steel.
 - c. Motorized Purge Valve: Gate or plug pattern valve.
 - 1) Motorized Valves: Butterfly-type, flanged or grooved-end, ductile-iron body, with EPDM valve seat and stem seal; with ASTM B 148 aluminum bronze disc.
 - d. Strainer: Stainless-steel basket type mounted on pump suction.
 - e. Piping: ASTM A 53/A 53M, Type S, F, or E; Grade B, Schedule 40 black steel, with flanged, grooved, or threaded joints and malleable, steel welding, or ductile-iron fittings.
 - f. Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)** copper water tube, copper-alloy solder-joint fittings, and brazed, flanged, or grooved joints.
 - g. Circulating Pump: Overhung impeller, close coupled, single stage, end suction, centrifugal. Comply with UL 778 and with HI 1.1-1.2 and HI 1.3.
 - 1) Casing: Radially split, cast iron.
 - 2) Pressure Rating: **125 psig (860 kPa) OR 150 psig (1035 kPa), as directed**, minimum.
 - 3) Impeller: ASTM B 584, cast bronze; statically and dynamically balanced, closed, and keyed to shaft.
 - 4) Shaft and Shaft Sleeve: Steel shaft, with copper-alloy shaft sleeve.
 - 5) Seal: Mechanical.

- 6) Motor: ODP motor supported on the pump-bearing frame. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- h. Controls: Automatic control of circulating pump and separator purge; factory wired for single electrical connection.
 - 1) Panel: NEMA 250, Type 4 enclosure.
 - 2) Pump: Automatic and manual switching; manual switch position bypasses safeties and controls.
 - 3) Separator Purge: Automatic and manual.
 - 4) TDS Controller Interlock: Open separator purge valve with bleed-off control.
- i. Support: Skid mounting. Fabricate supports and base and attachment to separator housing with reinforcement strong enough to resist separator movement during a seismic event when separator base is anchored to building structure.

1.3 EXECUTION

A. Water Analysis

1. Perform an analysis of supply water to determine quality of water available at Project site.

B. Installation

1. Install chemical application equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor chemical tanks and floor-mounting accessories to substrate.
2. Install seismic restraints for equipment and floor-mounting accessories and anchor to building structure. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for seismic restraints.
3. Install water testing equipment on wall near water chemical application equipment.
4. Install interconnecting control wiring for chemical treatment controls and sensors.
5. Mount sensors and injectors in piping circuits.
6. Bypass Feeders: Install in closed hydronic systems, including hot-water heating, chilled water, dual-temperature water, and glycol cooling, and equipped with the following:
 - a. Install bypass feeder in a bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
 - b. Install water meter in makeup water supply.
 - c. Install test-coupon assembly in bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
 - d. Install a gate or full-port ball isolation valves on inlet, outlet, and drain below feeder inlet.
 - e. Install a swing check on inlet after the isolation valve.
7. Install automatic chemical-feed equipment for steam boiler and steam condensate systems and include the following:
 - a. Install makeup water softener.
 - b. Install water meter in makeup water supply.
 - c. Install inhibitor injection pumps and solution tanks with injection timer sensing contacts in water meter.
 - 1) Pumps shall operate for timed interval when contacts close at water meter in makeup water supply connection. Injection pump shall discharge into boiler feedwater tank or feedwater supply connection at boiler.
 - d. Install test equipment and furnish test-kit to the Owner.
 - e. Install RO unit for makeup water.
 - f. Install TDS controller with sensor and bleed valves.
 - 1) Bleed valves shall cycle to maintain maximum TDS concentration.
 - g. Install inhibitor injection timer with injection pumps and solution tanks.

- 1) Pumps shall operate for timed interval on contact closure at water meter in makeup water supply connection. Injection pump shall discharge into main steam supply header.
8. Install automatic chemical-feed equipment for condenser **OR** fluid-cooler spray, **as directed**, water and include the following:
 - a. Install makeup water softener.
 - b. Install water meter in makeup water supply.
 - c. Install inhibitor injection pumps and solution tanks with injection timer sensing contacts in water meter.
 - 1) Pumps shall operate for timed interval on contact closure at water meter in makeup water supply connection. Injection pump shall discharge into boiler feedwater tank or feedwater supply connection at boiler.
 - d. Install test equipment and provide test-kit to the Owner. Install test-coupon assembly in bypass circuit around circulating pumps, unless otherwise indicated on Drawings.
 - e. Install TDS controller with sensor and bleed valves.
 - 1) Bleed valves shall cycle to maintain maximum TDS concentration.
 - f. Install pH sensor and controller with injection pumps and solution tanks.
 - 1) Injector pumps shall operate to maintain required pH.
 - g. Install biocide feeder alternating timer with two sets of injection pumps and solution tanks.
 - 1) Injection pumps shall operate to feed biocide on an alternating basis.
 - h. Install ozone generator with diffusers in condenser-water piping.
 - i. Ozone generator shall operate continuously with condenser-water flow.
 - j. Install UV-irradiation lamps in condenser-water piping.
 - 1) UV lights shall operate continuously with condenser-water flow.
- C. Ozone-Generator Installation
 1. Install ozone generator and equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor mineral and brine tanks and floor-mounting accessories to substrate.
 2. Install seismic restraints for equipment and floor-mounting accessories and anchor to building structure. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for seismic restraints.
 3. Pipe ozone from ozone generator to condenser water with stainless-steel pipe and fittings with welded joints.
 4. Install two **OR** three, **as directed**,-piece, stainless-steel ball valve in ozone supply to condenser water.
 5. Pipe cooling water to ozone generator, and to air-gap drain fitting with stainless-steel pipe and fittings with welded joints where enclosed in ozone-generator room.
 6. Install two **OR** three, **as directed**,-piece, stainless-steel ball valve in cooling water supply to ozone generator.
 7. Mounting supports for ozone generator shall be ASTM A 666, Type 316 stainless steel.
 8. Mount breathing apparatus outside ozone-generator room.
 9. Mount and install ozone detector, warning lights, and audible alarm inside ozone-generator room. Mount another set of warning lights and audible alarm just outside the main entrance to ozone-generator room.
- D. UV-Irradiation Unit Installation
 1. Install UV-irradiation units on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor mineral and brine tanks and floor-mounting accessories to substrate.
 2. Install seismic restraints for UV-irradiation units and floor-mounting accessories and anchor to building structure. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for seismic restraints.
- E. Water Softener Installation

1. Install water softener equipment on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor mineral and brine tanks and floor-mounting accessories to substrate.
2. Install seismic restraints for tanks and floor-mounting accessories and anchor to building structure. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for seismic restraints.
3. Install brine lines and fittings furnished by equipment manufacturer but not factory installed.
4. Prepare mineral-tank distribution system and underbed for minerals and place specified mineral into mineral tanks.
5. Install water-testing sets on wall adjacent to water softeners.

F. RO Unit Installation

1. Install RO unit and storage tank on concrete bases, level and plumb. Maintain manufacturer's recommended clearances. Arrange units so controls and devices that require servicing are accessible. Anchor RO unit and storage tank with pumps to substrate.
2. Install seismic restraints for tanks and floor-mounting accessories and anchor to building structure. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for seismic restraints.
3. Install interconnecting piping and controls furnished by equipment manufacturer but not factory installed.
4. Install water testing sets on wall adjacent to RO unit.

G. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to equipment to allow service and maintenance.
3. Make piping connections between HVAC water-treatment equipment and dissimilar-metal piping with dielectric fittings. Dielectric fittings are specified in Division 23 Section "Common Work Results For Hvac".
4. Install shutoff valves on HVAC water-treatment equipment inlet and outlet. Metal general-duty valves are specified in Division 23 Section "General-duty Valves For Hvac Piping".
5. Refer to Division 22 Section "Domestic Water Piping Specialties" for backflow preventers required in makeup water connections to potable-water systems.
6. Confirm applicable electrical requirements in Division 22 for connecting electrical equipment.
7. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
8. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

H. Field Quality Control

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
2. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
3. Tests and Inspections:
 - a. Inspect field-assembled components and equipment installation, including piping and electrical connections.
 - b. Inspect piping and equipment to determine that systems and equipment have been cleaned, flushed, and filled with water, and are fully operational before introducing chemicals for water-treatment system.
 - c. Place HVAC water-treatment system into operation and calibrate controls during the preliminary phase of HVAC systems' startup procedures.

- d. Do not enclose, cover, or put piping into operation until it is tested and satisfactory test results are achieved.
- e. Test for leaks and defects. If testing is performed in segments, submit separate report for each test, complete with diagram of portion of piping tested.
- f. Leave uncovered and unconcealed new, altered, extended, and replaced water piping until it has been tested and approved. Expose work that has been covered or concealed before it has been tested and approved.
- g. Cap and subject piping to static water pressure of **50 psig (345 kPa)** above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow test pressure to stand for four hours. Leaks and loss in test pressure constitute defects.
- h. Repair leaks and defects with new materials and retest piping until no leaks exist.
4. Remove and replace malfunctioning units and retest as specified above.
5. Sample boiler water at one-week intervals after boiler startup for a period of five weeks, and prepare test report advising the Owner of changes necessary to adhere to Part 1 "Performance Requirements" Article for each required characteristic. Sample boiler water at four **OR** six **OR** eight, **as directed**,-week intervals following the testing noted above to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section.
6. At four **OR** six **OR** eight, **as directed**,-week intervals following Final Completion, perform separate water analyses on hydronic systems to show that automatic chemical-feed systems are maintaining water quality within performance requirements specified in this Section. Submit written reports of water analysis advising the Owner of changes necessary to adhere to Part 1.1 "Performance Requirements" Article.
7. Comply with ASTM D 3370 and with the following standards:
 - a. Silica: ASTM D 859.
 - b. Steam System: ASTM D 1066.
 - c. Acidity and Alkalinity: ASTM D 1067.
 - d. Iron: ASTM D 1068.
 - e. Water Hardness: ASTM D 1126.
- I. Demonstration
 1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain HVAC water-treatment systems and equipment.

END OF SECTION 23 25 13 00

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Task	Specification	Specification Description
23 25 13 00	23 21 13 23a	Hydronic Piping
23 25 13 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 23 31 13 13 - HVAC CASINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for HVAC casings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Factory- and Shop-fabricated, field-assembled, single- and double-wall casings for HVAC equipment.

C. Performance Requirements

1. Static-Pressure Classes:
 - a. Upstream from Fan(s): **2-inch wg (500 Pa)**.
 - b. Downstream from Fan(s): **2-inch wg (500 Pa) OR 3-inch wg (750 Pa) OR 4-inch wg (1000 Pa) OR 6-inch wg (1500 Pa) OR 10-inch wg (2500 Pa), as directed.**
2. Acoustical Performance:
 - a. NRC: **1.09 OR 0.94, as directed**, according to ASTM C 423.
 - b. STC: **40 OR 34, as directed**, according to ASTM E 90.
3. Structural Performance:
 - a. Casings shall be fabricated to withstand 133 percent of the indicated static pressure without structural failure. Wall and roof deflection at the indicated static pressure shall not exceed **1/8 inch per foot (0.97 mm per meter)** of width.
 - 1) Fabricate outdoor casings to withstand wind load of **15 lbf/sq. ft. (720 N/sq. m)** and snow load of **30 lbf/sq. ft. (1440 N/sq. m)**.
4. Seismic Performance: HVAC casings shall withstand the effects of earthquake motions determined according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that duct systems comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
 - b. Product Data for Prerequisite EA 2: Documentation indicating that duct systems comply with ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
 - c. Leakage Test Report for Prerequisite EA 2: Documentation of work performed for compliance with ASHRAE/IESNA 90.1, Section 6.4.4.2.2 - "Duct Leakage Tests."
 - d. Duct-Cleaning Test Report for Prerequisite EQ 1: Documentation of work performed for compliance with ASHRAE 62.1, Section 7.2.4 - "Ventilation System Start-Up."
 - e. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings: For HVAC casings. Include plans, elevations, sections, components, and attachments to other work.
4. Welding certificates.
5. Field quality-control reports.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports **OR** AWS D9.1M/D9.1, "Sheet Metal Welding Code," for casing joint and seam welding, **as directed**.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
3. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

1.2 PRODUCTS

A. General Casing Fabrication Requirements

1. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 6, "Equipment and Casings," for acceptable materials, material thicknesses, and casing construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
 - a. Fabricate casings with more than **3-inch wg (750-Pa)** negative static pressure according to SMACNA's "Rectangular Industrial Duct Construction Standards."
 - b. Casings with more than **2-inch wg (500-Pa)** positive static pressure may be fabricated according to SMACNA's "Rectangular Industrial Duct Construction Standards."
2. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - a. Exterior Surface Galvanized Coating Designation: **G60 (Z180) OR G90 (Z275), as directed**.
 - b. Interior Surface Galvanized Coating Designation:
 - 1) Sections Not Exposed to Moisture: **G60 (Z180) OR G90 (Z275), as directed**.
 - 2) Sections Housing and Downstream from Cooling Coil and Humidifiers: **G90 (Z275)**.
3. Stainless Steel: ASTM A 480/A 480M, Type 304 **OR** Type 316, **as directed**, and having a No. 2D, **as directed**, finish.
4. Factory- or Shop-Applied Antimicrobial Coating:
 - a. Apply to the interior sheet metal surfaces of casing in contact with the airstream. Apply untreated clear coating to the exterior surface.
 - b. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 - c. Coating containing the antimicrobial compound shall have a hardness of 2H minimum when tested according to ASTM D 3363.
 - d. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to UL 723; certified by an NRTL.
 - e. Applied Coating Color: Standard **OR** Black **OR** White, **as directed**.
5. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
6. Sealing Requirement: SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Seal Class A. Seal all seams, joints, connections, and abutments to building.
7. Penetrations: Seal all penetrations airtight. Cover with escutcheons and gaskets, or fill with suitable compound so there is no exposed insulation. Provide shaft seals where fan shafts penetrate casing.
8. Access Doors: Fabricate access doors according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 6-11, "Casing Access Doors - 2-inch wg (500 Pa)," and Figure 6.12, "Casing Access Doors - 3-10-inch wg (750-2500 Pa)"; and according to pressure class of the plenum or casing section in which access doors are to be installed.
 - a. Size: **20 by 54 inches (500 by 1370 mm)**.
 - b. Vision Panel: Double-glazed, wire-reinforced safety glass with an airspace between panes and sealed with interior and exterior rubber seals.
 - c. Hinges: Piano or butt hinges and latches, number and size according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

- d. Latches: Minimum of two wedge-lever-type latches, operable from inside and outside.
 - e. Neoprene gaskets around entire perimeters of door frames.
 - f. Doors shall open against air pressure.
 9. Condensate Drain Pans: Formed sections of Type 304, stainless-steel sheet **OR G90 (Z275)** coated, galvanized sheet steel, **as directed**, complying with requirements in ASHRAE 62.1. Pans shall extend a minimum of **12 inches (300 mm)** past coil.
 - a. Double-wall construction shall have space between walls filled with foam insulation and sealed moisture tight.
 - b. Intermediate drain pan or drain trough shall collect condensate from top coil for units with stacked coils or stacked eliminators.
 - c. Insulation: Polystyrene or polyurethane.
 - d. Slopes shall be in a minimum of two planes to collect condensate from cooling coils (including coil piping connections and return bends), eliminators, and humidifiers when units are operating at maximum catalogued face velocity across cooling coil.
 - e. Each drain pan connection shall have a trap. Drain traps with depth and height differential between inlet and outlet equal or greater to the design static pressure plus **2-inch wg (500 Pa)**, **as directed**. Include slab height in trap calculation.
- B. Shop-Fabricated Casings
1. Single- and Double-Wall Casings: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for sheet metal thickness based on indicated static-pressure class unless otherwise indicated.
 2. Double-Wall Casing Inner Panel: Perforated, galvanized sheet steel having **3/32-inch- (2.4-mm-)** diameter perforations, with overall open area of 23 percent. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for sheet metal thickness based on indicated static-pressure class unless otherwise indicated.
OR
Double-Wall Casing Inner Panel: Solid sheet steel. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for sheet metal thickness based on indicated static-pressure class unless otherwise indicated.
 3. Interstitial Insulation: Polyurethane foam complying with NFPA 90A or NFPA 90B.
OR
Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - a. Maximum Thermal Conductivity: **0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
 - b. Coat insulation with antimicrobial coating.
 - c. Cover insulation with polyester film complying with UL 181, Class 1.**OR**
Interstitial Insulation: Flexible-elastomeric duct liner complying with ASTM C 534, Type II for sheet materials and with NFPA 90A or NFPA 90B.
 - a. Maximum Thermal Conductivity: **0.25 Btu x in./h x sq. ft. x deg F (0.034 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
 4. Fabricate casings with standing seams and angle-iron reinforcements unless otherwise indicated.
 5. Fabricate close-off sheets from casing to dampers, filter frames, and coils and between stacked coils. Use galvanized sheet steel of same thickness as casing and with a galvanized coating designation of **G90 (Z275)**.
 6. Bolt close-off sheets to frame flanges and housings. Support coils on stands fabricated from galvanized-steel angles or channels.
 7. Reinforce casings with galvanized-steel angles.
- C. Manufactured Casings
1. Description: Double-wall, insulated, pressurized equipment casing.
 2. Double-Wall Panel Fabrication: Solid, galvanized sheet steel exterior wall and solid **OR** perforated, **as directed**, galvanized sheet steel interior wall; with space between wall filled with insulation.

- a. Wall Thickness: **2 inches (50 mm) OR 4 inches (100 mm), as directed.**
 - b. Fabricate with a minimum number of joints.
 - c. Weld exterior and interior walls to perimeter; to interior, longitudinal, galvanized-steel channels; and to box-end internal closures. Paint welds.
 - d. Sheet metal thickness shall comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for static-pressure class indicated for casing.
OR
Sheet Metal Thicknesses:
 - 1) Exterior Wall Thickness: **0.040 inch (1.0 mm)** minimum.
 - 2) Interior Wall Thickness: **0.034 inch (0.85 mm)** minimum.
 - e. Double-Wall Casing Inner Panel: Perforated, galvanized sheet steel having **3/32-inch-(2.4-mm-)** diameter perforations, with overall open area of 23 percent.
OR
Double-Wall Casing Inner Panel: Solid sheet steel.
 - f. Fill each panel assembly with insulating material that is noncombustible, inert, mildew resistant and vermin proof and that complies with NFPA 90A.
 - g. Fabricate panels with continuous tongue-and-groove **OR** self-locking, **as directed**, joints effective inside and outside each panel.
3. Trim Items: Fabricate from a minimum of **0.052-inch (1.3-mm)** galvanized sheet steel, furnished in standard lengths for field cutting.

D. Casing Liner

1. Fibrous-Glass Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 - a. Maximum Thermal Conductivity:
 - 1) Type I, Flexible: **0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
 - 2) Type II, Rigid: **0.23 Btu x in./h x sq. ft. x deg F (0.033 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
 - b. Antimicrobial Erosion-Resistant Coating: Apply to surface of the liner that will form the interior surface of casing to act as a moisture repellent and an erosion-resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
 - c. Solvent **OR** Water, **as directed**, -Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.
 - 1) For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Flexible-Elastomeric Casing Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1, and with NFPA 90A or NFPA 90B.
 - a. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - b. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - 1) For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Natural-Fiber Casing Liner: 85 percent cotton, 10 percent borate, and 5 percent polybinding fibers, treated with a microbial growth inhibitor, and complying with NFPA 90A or NFPA 90B.
 - a. Maximum Thermal Conductivity: **0.24 Btu x in./h x sq. ft. x deg F (0.034 W/m x K)** at **75 deg F (24 deg C)** mean temperature when tested according to ASTM C 518.
 - b. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 - c. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - 1) For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

4. Insulation Pins and Washers:
 - a. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, **0.106-inch- (2.6-mm-) OR 0.135-inch- (3.5-mm-)**, **as directed**, diameter shank, length to suit depth of insulation indicated with integral **1-1/2-inch (38-mm)** galvanized carbon-steel washer.
 - b. Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch- (0.41-mm-)** thick, galvanized **OR** stainless, **as directed**, steel, with beveled edge sized as required to hold insulation securely in place but not less than **1-1/2 inches (38 mm)** in diameter.
 5. Shop or Factory Application of Casing Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-19, "Flexible Duct Liner Installation."
 - a. Adhere a single layer of indicated thickness of casing liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of casing liner is prohibited.
 - b. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 - c. Butt transverse joints without gaps, and coat joint with adhesive.
 - d. Fold and compress liner in corners of casings or cut and fit to ensure butted-edge overlapping.
 - e. Apply adhesive coating on longitudinal seams in casings with air velocity of **2500 fpm (12.7 m/s)**.
 - f. Secure liner with mechanical fasteners **4 inches (100 mm)** from corners and at intervals not exceeding **12 inches (300 mm)** transversely; at **3 inches (75 mm)** from transverse joints and at intervals not exceeding **18 inches (450 mm)** longitudinally.
 - g. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from casing wall. Fabricate edge facings at the following locations:
 - 1) Fan discharges.
 - 2) Intervals of lined casing preceding unlined duct.
 - 3) Upstream edges of transverse joints in casings where air velocities are higher than **2500 fpm (12.7 m/s)** or where indicated.
 - h. Secure insulation between perforated sheet metal inner wall of same thickness as specified for outer wall. Use mechanical fasteners that maintain inner wall at uniform distance from outer wall without compressing insulation.
- E. Sealant Materials
1. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
 2. Water-Based Joint and Seam Sealant:
 - a. Application Method: Brush on.
 - b. Solids Content: Minimum 65 percent.
 - c. Shore A Hardness: Minimum 20.
 - d. Water resistant.
 - e. Mold and mildew resistant.
 - f. VOC: Maximum 75 g/L (less water).
OR
For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - g. Maximum Static-Pressure Class: **10-inch wg (2500 Pa)**, positive or negative.
 - h. Service: Indoor or outdoor.
 - i. Substrate: Compatible with galvanized sheet steel or stainless steel.
 3. Solvent-Based Joint and Seam Sealant:
 - a. Application Method: Brush on.
 - b. Base: Synthetic rubber resin.
 - c. Solvent: Toluene and heptane.
 - d. Solids Content: Minimum 60 percent.

- e. Shore A Hardness: Minimum 60.
 - f. Water resistant.
 - g. Mold and mildew resistant.
 - h. VOC: Maximum 395 g/L.
OR
For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - i. Maximum Static-Pressure Class: **10-inch wg (2500 Pa)**, positive or negative.
 - j. Service: Indoor or outdoor.
 - k. Substrate: Compatible with galvanized sheet steel or stainless steel.
4. Flanged Joint Sealant: Comply with ASTM C 920.
- a. General: Single component, acid curing, silicone, elastomeric.
 - b. Type: S.
 - c. Grade: NS.
 - d. Class: 25.
 - e. Use: O.
 - f. For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

1.3 EXECUTION

A. Installation

- 1. Install casings according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- 2. Equipment Mounting: Install HVAC casings on concrete base. Comply with requirements for concrete base specified in Division 07 Section "Manufactured Roof Expansion Joints".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported casings, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
- 3. Install seismic restraints on casings. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment"
- 4. Apply sealant to joints, connections, and mountings.
- 5. Field-cut openings for pipe and conduit penetrations; insulate and seal according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- 6. Support casings on floor or foundation system. Secure and seal to base.
- 7. Support components rigidly with ties, braces, brackets, seismic restraints, **as directed**, and anchors of types that will maintain housing shape and prevent buckling.
- 8. Align casings accurately at connections, with **1/8-inch (3-mm)** misalignment tolerance and with smooth interior surfaces.

B. Field Quality Control

- 1. Tests and Inspections:
 - a. Perform field tests and inspections according to SMACNA's "HVAC Air Duct Leakage Test Manual."
 - b. Test the following systems:
 - 1) Systems required by ASHRAE/IESNA 90.1.
 - 2) Supply Air: 100 **OR** 50, **as directed**, percent of total installed duct area with a pressure class of **3-inch wg (750 Pa) OR 4-inch wg (1000 Pa)**, **as directed**, or higher.

- c. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
 - d. Determine leakage from entire system or section of system by relating leakage to surface area of test section. Comply with requirements for leakage classification of ducts connected to casings.
 - e. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
- 2. HVAC casings will be considered defective if they do not pass tests and inspections.
 - 3. Prepare test and inspection reports.
- C. Cleaning
- 1. Comply with requirements for cleaning in Division 23 Section "Metal Ducts".

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SECTION 23 31 13 13a - METAL DUCTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round[**and flat-oval**] ducts and fittings.
4. Double-wall round[**and flat-oval**] ducts and fittings.
5. Sheet metal materials.
6. Duct liner.
7. Sealants and gaskets.
8. Hangers and supports.

B. Related Requirements:

1. Section 230548 "Vibration and Seismic Controls for HVAC" for seismic restraint devices and installation.
2. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
3. Section 233116 "Nonmetal Ducts" for fibrous-glass ducts, thermoset fiber-reinforced plastic ducts, thermoplastic ducts, PVC ducts, and concrete ducts.
4. Section 233119 "HVAC Casings" for factory- and field-fabricated casings for mechanical equipment.
5. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

1.2 DEFINITIONS

- A. OSHPD:** Office of Statewide Health Planning and Development (State of California).

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.
2. Sealants and gaskets.
3. Seismic-restraint devices.

B. Sustainable Design Submittals:

1. as directed by the Owner .

C. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.

2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top **[and bottom]** of ducts.
5. Dimensions of **[main]** **[all]** duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment**[, seismic restraints,]** and vibration isolation.
13. **Lists of areas or systems requiring Shop Drawings as directed by the Owner .**

D. Delegated Design Submittals:

1. Sheet metal thicknesses.
2. Joint and seam construction and sealing.
3. Reinforcement details and spacing.
4. Materials, fabrication, assembly, and spacing of hangers and supports.
5. Design Calculations: Calculations **[, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation]** for selecting hangers and supports**[and seismic restraints]**.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: A single set of plans or BIM model, drawn to scale, showing the items described in this Section, and coordinated with all building trades.
- B. Welding certificates.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 1. **[AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports.]**
 2. **[AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports.]**
 3. **[AWS D9.1/D9.1M, "Sheet Metal Welding Code," for duct joint and seam welding.]**
- B. Mockups:
 1. Before installing duct systems, build mockups representing static-pressure classes in excess of **[3 (750) Static-pressure class inch wg (Pa)]** as directed by the Owner . Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - a. **[Five]** or as directed by the Owner transverse joints.
 - b. **[One]** or as directed by the Owner access door(s).
 - c. **[Two]** or as directed by the Owner typical branch connections, each with at least one elbow.
 - d. **[Two]** or as directed by the Owner typical flexible duct or flexible-connector connections for each duct and apparatus.

- e. **[One]** or as directed by the Owner 90-degree turn(s) with turning vanes.
 - f. **[One]** or as directed by the Owner fire damper(s).
 - g. **[One]** or as directed by the Owner smoke damper(s).
 - h. Perform leakage tests specified in "Field Quality Control" Article. Revise mockup construction and perform additional tests as required to achieve specified minimum acceptable results.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Duct Design: Duct construction, including sheet metal thicknesses, seam and joint construction, reinforcements, and hangers and supports, comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and with performance requirements and design criteria indicated in "Duct Schedule" Article.
- B. Structural Performance: Duct hangers and supports **[and seismic restraints]** are to withstand the effects of gravity **[and seismic]** loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" **[and] [ASCE/SEI 7] Applicable building code** as directed by the Owner . **[Seismically brace duct hangers and supports in accordance with] [SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems.]" [SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems - OSHPD Edition.]" Reference document as directed by the Owner .**
 1. Seismic Hazard Level (SHL): **[AA] [A] [B] [C] [D]**.
 2. Connection Level: **[1] [2]**.
- C. Seismic Performance: Ductwork to withstand the effects of earthquake motions determined in accordance with **[ASCE/SEI 7]** as directed by the Owner . See Section 230548 "Vibration and Seismic Controls for HVAC."
 1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified **[and the unit will be fully operational after the seismic event]**."
 2. Component Importance Factor: **[1.5] [1.0]**.
 3. **Requirements for Component Amplification Factor and Component Response Modification Factor** as directed by the Owner
- D. Wind Performance: Ducts are to withstand the effects of wind determined in accordance with to **[ASCE/SEI 7]** as directed by the Owner . See Section 230548 "Vibration and Seismic Controls for HVAC."
- E. Airstream Surfaces: Surfaces in contact with airstream comply with requirements in ASHRAE 62.1.
- F. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment," and Section 7 - "Construction and System Startup."
- G. ASHRAE/IES Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

- H. Duct Dimensions: Unless otherwise indicated, all duct dimensions indicated on Drawings are inside clear dimensions and do not include insulation or duct wall thickness.

2.2 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
1. Construct ducts of galvanized sheet steel unless otherwise indicated.
 2. For ducts exposed to weather, construct of **[Type 304]** **[Type 316]** stainless steel indicated by manufacturer to be suitable for outdoor installation.
- B. Transverse Joints: Fabricate joints in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
1. For ducts with longest side less than **36 inches (914 mm)**, select joint types in accordance with Figure 2-1.
 2. For ducts with longest side **36 inches (914 mm)** or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.
 3. **[Where specified for specific applications, all joints are to be welded.]**
- C. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."**[All longitudinal seams are to be Pittsburgh lock seams unless otherwise specified for specific application.]**
1. **[Where specified for specific applications, all joints are to be welded.]**
- D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

- A. Source Limitations: Obtain double-wall rectangular ducts and fittings from single manufacturer.
- B. Rectangular Ducts: Fabricate ducts with indicated dimensions for clear internal dimensions of the inner duct.
- C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.
1. Construct ducts of galvanized sheet steel unless otherwise indicated.
 2. For ducts exposed to weather, construct outer duct of **[Type 304]** **[Type 316]** stainless steel indicated by manufacturer to be suitable for outdoor installation.

- D. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
1. For ducts with longest side less than **36 inches (914 mm)**, select joint types in accordance with Figure 2-1.
 2. For ducts with longest side **36 inches (914 mm)** or greater, use flange joint connector Type T-22, T-24, T-24A, T-25a, or T-25b. Factory-fabricated flanged duct connection system may be used if submitted and approved by engineer of record.
 3. **[Where specified for specific applications, all joints are to be welded.]**
- E. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."**[All longitudinal seams are to be Pittsburgh lock seams unless otherwise specified for specific application.]**
1. **[Where specified for specific applications, all joints are to be welded.]**
- F. Interstitial Insulation, Fibrous Glass: Duct liner complying with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
1. Maximum Thermal Conductivity: **[0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K)]** as directed by the Owner at **75 deg F (24 deg C)** mean temperature.
 2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
 3. Coat insulation with antimicrobial coating.
 4. Cover insulation with polyester film complying with UL 181, Class 1.
- G. Interstitial Insulation, Flexible Elastomeric: Duct liner complying with ASTM C534/C534M, Type II for sheet materials, and with NFPA 90A or NFPA 90B.
1. Maximum Thermal Conductivity: **[0.25 Btu x in./h x sq. ft. x deg F (0.034 W/m x K)]** or as directed by the Owner at **75 deg F (24 deg C)** mean temperature.
- H. Inner Duct: Minimum **24-gauge (0.7-mm)** **[perforated galvanized sheet steel having 3/32-inch- (2.4-mm-) diameter perforations, with overall open area of 23 percent]** **[solid galvanized sheet steel]**.
- 2.4 SINGLE-WALL ROUND **[AND FLAT-OVAL]** DUCTS AND FITTINGS
- A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.
1. Construct ducts of galvanized sheet steel unless otherwise indicated.
 2. For ducts exposed to weather, construct of **[Type 304]** **[Type 316]** stainless steel indicated by manufacturer to be suitable for outdoor installation.
- B. Source Limitations: Obtain single-wall round **[and flat oval]** ducts and fittings from single manufacturer.
- C. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

- D. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
1. Transverse Joints in Ducts Larger Than **[60 (1524)] Inches (mm)** as directed by the Owner in Diameter: Flanged.
- E. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
1. Fabricate round ducts larger than **90 inches (2286 mm)** in diameter with butt-welded longitudinal seams.
 2. Fabricate flat-oval ducts larger than **72 inches (1830 mm)** in width (major dimension) with butt-welded longitudinal seams.
- F. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.5 DOUBLE-WALL ROUND [AND FLAT-OVAL] DUCTS AND FITTINGS

- A. Source Limitations: Obtain double-wall round **[and flat oval]** ducts and fittings from single manufacturer.
- B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.
- C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Ch. 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.
1. Construct ducts of galvanized sheet steel unless otherwise indicated.
 2. For ducts exposed to weather, construct outer duct of **[Type 304] [Type 316]** stainless steel indicated by manufacturer to be suitable for outdoor installation.
 3. Transverse Joints: Select joint types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - a. Transverse Joints in Ducts Larger Than **[60 (1524)] Inches (mm)** as directed by the Owner in Diameter: Flanged.
 4. Longitudinal Seams: Select seam types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - a. Fabricate round ducts larger than **90 inches (2286 mm)** in diameter with butt-welded longitudinal seams.
 - b. Fabricate flat-oval ducts larger than **72 inches (1830 mm)** in width (major dimension) with butt-welded longitudinal seams.

5. Tees and Laterals: Select types and fabricate in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
- D. Inner Duct: Minimum **24-gauge (0.7-mm)** [perforated galvanized sheet steel having **3/32-inch- (2.4-mm)- diameter perforations, with overall open area of 23 percent**] [solid galvanized sheet steel].
 - E. Interstitial Insulation, Fibrous Glass: Duct liner complying with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."
 1. Maximum Thermal Conductivity: [**0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K)**] or as directed by the Owner at **75 deg F (24 deg C)** mean temperature.
 2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
 3. Coat insulation with antimicrobial coating.
 4. Cover insulation with polyester film complying with UL 181, Class 1.
 - F. Interstitial Insulation, Flexible Elastomeric: Duct liner complying with ASTM C534/C534M, Type II for sheet materials, and with NFPA 90A or NFPA 90B.
 1. Maximum Thermal Conductivity: [**0.25 Btu x in./h x sq. ft. x deg F (0.034 W/m x K)**] or as directed by the Owner at **75 deg F (24 deg C)** mean temperature.
- 2.6 SHEET METAL MATERIALS
- A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials are to be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
 - B. Galvanized Sheet Steel: Comply with ASTM A653/A653M.
 1. Galvanized Coating Designation: [**G60 (Z180)**] [**G90 (Z275)**].
 2. Finishes for Surfaces Exposed to View: Mill phosphatized.
 - C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A653/A653M.
 1. Galvanized Coating Designation: [**G60 (Z180)**] [**G90 (Z275)**].
 2. Minimum Thickness for Factory-Applied PVC Coating: **4 mils (0.10 mm)** thick[**on sheet metal surface of ducts and fittings exposed to corrosive conditions, and minimum 1 mil (0.025 mm) thick on opposite surface**].
 3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.
 - D. Carbon-Steel Sheets: Comply with ASTM A1008/A1008M, with oiled, matte finish for exposed ducts.
 - E. Stainless Steel Sheets: Comply with ASTM A480/A480M, Type 304 or 316, as indicated in "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish is to be No. 2B, No. 2D, No. 3, or No. 4 as indicated in "Duct Schedule" Article.
 - F. Aluminum Sheets: Comply with **ASTM B209 (ASTM B209M)** Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

G. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating is to be applied to the exterior surface.
2. Antimicrobial compound is to be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound is to have a hardness of 2H, minimum, when tested in accordance with ASTM D3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: **[Black]** **[White]**.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

H. Reinforcement Shapes and Plates: ASTM A36/A36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

I. Tie Rods: Galvanized steel, **1/4-inch- (6-mm-)** minimum diameter for lengths **36 inches (900 mm)** or less; **3/8-inch- (10-mm-)** minimum diameter for lengths longer than **36 inches (900 mm)**.

2.7 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Source Limitations: Obtain fibrous-glass duct liner from single manufacturer.
2. Maximum Thermal Conductivity:
 - a. Type I, Flexible: **[0.27 Btu x in./h x sq. ft. x deg F (0.039 W/m x K)]** or as directed by the Owner at **75 deg F (24 deg C)** mean temperature.
 - b. Type II, Rigid: **[0.23 Btu x in./h x sq. ft. x deg F (0.033 W/m x K)]** or as directed by the Owner at **75 deg F (24 deg C)** mean temperature.
3. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-resistant coating. Antimicrobial compound is to be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
4. **[Solvent]** **[Water]**-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C916.

B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C534/C534M, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Source Limitations: Obtain flexible elastomeric duct liner from single manufacturer.
2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

- C. Fibrous-Glass-Free, Natural-Fiber Duct Liner: Made from partially recycled cotton or polyester products and containing no fiberglass. Airstream surface overlaid with fire-resistant facing to prevent surface erosion by airstream, complying with NFPA 90A or NFPA 90B. Treat natural-fiber products with antimicrobial coating.
1. Source Limitations: Obtain fibrous-glass-free, natural-fiber duct liner from single manufacturer.
 2. Maximum Thermal Conductivity: [**0.24 Btu x in./h x sq. ft. x deg F (0.034 W/m x K)**] or as directed by the Owner at **75 deg F (24 deg C)** mean temperature when tested in accordance with ASTM C518.
 3. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with ASTM E84; certified by an NRTL.
 4. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
- D. Polyolefin Duct Liner: Cross-linked, partially open-cell polyolefin foam sheet or roll materials, with reinforced aluminum foil facing and adhesive backing, complying with NFPA 90A or NFPA 90B; sheet (Type II) complying with ASTM C1427.
1. Source Limitations: Obtain polyolefin duct liner from single manufacturer.
 2. Foam Core Density: **1.5 pcf (25 kg/cm)**.
 3. Maximum Thermal Conductivity: [**0.25 Btu x in./h x sq. ft. x deg F (0.036 W/m x K)**] or as directed by the Owner at **75 deg F (24 deg C)** mean temperature when tested in accordance with ASTM C518.
 4. Minimum Noise Reduction Coefficient (NRC): 0.50 for **3/8-inch (10-mm)** thickness, 0.45 for **5/8-inch (15-mm)** thickness, 0.55 for **1-inch (24-mm)** thickness, 0.55 for **2-1/8-inch (54-mm)** thickness.
 5. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
 6. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
- E. Insulation Pins and Washers:
1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, [**0.106-inch- (2.6-mm-)**] [**0.135-inch- (3.5-mm-)**] diameter shank, length to suit depth of insulation indicated with integral **1-1/2-inch (38-mm)** galvanized carbon-steel washer.
 2. Insulation-Retaining Washers: Self-locking washers formed from **0.016-inch- (0.41-mm-)** thick [**galvanized steel**] [**aluminum**] [**stainless steel**]; with beveled edge sized as required to hold insulation securely in place, but not less than **1-1/2 inches (38 mm)** in diameter.
- F. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."
1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
 2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.
 3. Butt transverse joints without gaps, and coat joint with adhesive.
 4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
 5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.

6. Apply adhesive coating on longitudinal seams in ducts with air velocity of **2500 fpm (12.7 m/s)** or greater.
7. Secure liner with mechanical fasteners **4 inches (100 mm)** from corners and at intervals not exceeding **12 inches (300 mm)** transversely; at **3 inches (75 mm)** from transverse joints and at intervals not exceeding **18 inches (450 mm)** longitudinally.
8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:
 - a. Fan discharges.
 - b. Intervals of lined duct preceding unlined duct.
 - c. Upstream edges of transverse joints in ducts where air velocities are higher than **2500 fpm (12.7 m/s)** or where indicated.
9. Secure insulation between perforated sheet metal inner duct of same thickness as specified for outer shell. Use mechanical fasteners that maintain inner duct at uniform distance from outer shell without compressing insulation.
 - a. Sheet Metal Inner Duct Perforations: **3/32-inch (2.4-mm)** diameter, with an overall open area of 23 percent.
10. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.8 SEALANT AND GASKETS

- A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets are to be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested in accordance with UL 723; certified by an NRTL.
- B. Two-Part Tape Sealing System:
 1. Tape: Woven cotton fiber impregnated with mineral gypsum and modified acrylic/silicone activator to react exothermically with tape to form hard, durable, airtight seal.
 2. Tape Width: [**3 inches (76 mm)**] [**4 inches (102 mm)**] [**6 inches (152 mm)**].
 3. Sealant: Modified styrene acrylic.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. Maximum Static-Pressure Class: **10 inch wg (2500 Pa)**, positive and negative.
 7. Service: Indoor and outdoor.
 8. Service Temperature: **Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C)**.
 9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum.
- C. Water-Based Joint and Seam Sealant:
 1. Application Method: Brush on.
 2. Solids Content: Minimum 65 percent.
 3. Shore A Hardness: Minimum 20.
 4. Water resistant.
 5. Mold and mildew resistant.
 6. VOC: Maximum 75 g/L (less water).
 7. Maximum Static-Pressure Class: **10 inch wg (2500 Pa)**, positive and negative.

8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Solvent-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. Maximum Static-Pressure Class: 10-inch wg (2500 Pa), positive or negative.
9. Service: Indoor or outdoor.
10. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

E. Flanged Joint Sealant: Comply with ASTM C920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.

F. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

G. Round Duct Joint O-Ring Seals:

1. Seal is to provide maximum leakage class of 3 cfm/100 sq. ft. at 1-inch wg (0.14 L/s per sq. m at 250 Pa) and is to be rated for 10-inch wg (2500-Pa) static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.9 HANGERS AND SUPPORTS

- A. Hanger Rods for Noncorrosive Environments: Galvanized-steel rods and nuts.
- B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
- C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1 (Table 5-1M), "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
- D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A603.
- E. Steel Cables for Stainless Steel Ducts: Stainless steel complying with ASTM A492.
- F. Steel Cable End Connections: Galvanized-steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

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- G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
- H. Trapeze and Riser Supports:
 - 1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
 - 2. Supports for Stainless Steel Ducts: Stainless steel shapes and plates.
 - 3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

- A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and coordination drawings.
- B. Install ducts in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.
- C. Install ducts in maximum practical lengths with fewest possible joints.
- D. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.
- E. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
- F. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
- G. Install ducts with a clearance of **1 inch (25 mm)**, plus allowance for insulation thickness.
- H. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.
- I. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least **1-1/2 inches (38 mm)**.
- J. Install fire[, **combination fire/smoke,**] and smoke dampers where indicated on Drawings and as required by code, and by local authorities having jurisdiction. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers and specific installation requirements of the damper UL listing.
- K. Install heating coils, cooling coils, air filters, dampers, and all other duct-mounted accessories in air ducts where indicated on Drawings.
- L. Protect duct interiors from moisture, construction debris and dust, and other foreign materials both before and after installation.[**Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."**]

- M. Elbows: Use long-radius elbows wherever they fit.
 - 1. Fabricate 90-degree rectangular mitered elbows to include turning vanes.
 - 2. Fabricate 90-degree round elbows with a minimum of three segments for **12 inches (300 mm)** and smaller and a minimum of five segments for **14 inches (350 mm)** and larger.
- N. Branch Connections: Use lateral or conical branch connections.

3.2 INSTALLATION OF EXPOSED DUCTWORK

- A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.
- B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.
- C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.
- D. Maintain consistency, symmetry, and uniformity in arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.
- E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR TYPE 1 COMMERCIAL KITCHEN GREASE HOOD EXHAUST DUCT

- A. Install ducts in accordance with NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operation"; SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; and SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines" unless otherwise indicated.
- B. Install all ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.
- C. All ducts exposed to view are to be constructed of stainless steel as per "Duct Schedule" Article. All ducts concealed from view are to be **[stainless] [carbon]** steel as per "Duct Schedule" Article.
- D. All joints are to be welded and are to be telescoping, bell, or flange joint as per NFPA 96.
- E. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of **[20 (6)] [12 (3.7)] feet (m)** or as directed by the Owner in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings.
- F. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

3.4 ADDITIONAL INSTALLATION REQUIREMENTS FOR EXHAUST DUCTS SERVING COMMERCIAL DISHWASHERS AND OTHER HIGH-HUMIDITY LOCATIONS

- A. Install dishwasher exhaust ducts and other exhaust ducts from wet, high-humidity locations without dips and traps that may hold water. Slope ducts a minimum of 2 percent back to dishwasher or toward drain.

- B. Provide a drain pocket at each low point and at the base of each riser with a 1-inch (25-mm) trapped copper drain from each drain pocket to open site floor drain.
 - C. Minimize number of transverse seams.
 - D. Do not locate longitudinal seams on bottom of duct.
- 3.5 ADDITIONAL INSTALLATION REQUIREMENTS FOR LABORATORY EXHAUST AND FUME HOOD EXHAUST DUCTS
- A. Install ducts in accordance with NFPA 45, "Fire Protection for Laboratories Using Chemicals."
 - B. Install exhaust ducts without dips and traps that may hold water. Slope ducts a minimum of 2 percent back to hood or inlet. Where indicated on Drawings, install trapped drain piping.
 - C. Connect duct to fan, fume hood, and other equipment indicated on Drawings.
- 3.6 DUCTWORK EXPOSED TO WEATHER
- A. All external joints are to **[be welded] [have secure watertight mechanical connections]**. Seal all openings to provide weatherproof construction.
 - B. Construct ductwork to resist external loads of wind, snow, ice, and other effects of weather. Provide necessary supporting structures.
 - C. Single Wall:
 - 1. Ductwork is to be **[Type 304] [Type 316]** stainless steel.
 - 2. Ductwork is to be galvanized steel.
 - a. If duct outer surface is uninsulated, protect outer surface with suitable paint. Paint materials and application requirements are specified in Section 099113 "Exterior Painting."
 - 3. Where ducts have external insulation, provide weatherproof aluminum jacket. See Section 230713 "Duct Insulation."
 - D. Double Wall:
 - 1. Ductwork complies with requirements in "Double-Wall Rectangular Ducts and Fittings" or "Double-Wall Round **[and Flat-Oval]** Ducts and Fittings" Article.
 - 2. Ductwork outer wall is to be **[Type 304] [Type 316]** stainless steel indicated by manufacturer to be suitable for outdoor installation.
 - 3. Provide interstitial insulation.
- 3.7 DUCT SEALING
- A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
 - B. Seal ducts at a minimum to the following seal classes in accordance with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible":

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."
2. Outdoor, Supply-Air Ducts: Seal Class A.
3. Outdoor, Exhaust Ducts: Seal Class C.
4. Outdoor, Return-Air Ducts: Seal Class C.
5. Unconditioned Space, Supply-Air Ducts in Pressure Classes **2-Inch wg (500 Pa)** and Lower: Seal Class B.
6. Unconditioned Space, Supply-Air Ducts in Pressure Classes Higher Than **2-Inch wg (500 Pa)**: Seal Class A.
7. Unconditioned Space, Exhaust Ducts: Seal Class C.
8. Unconditioned Space, Return-Air Ducts: Seal Class B.
9. Conditioned Space, Supply-Air Ducts in Pressure Classes **2-Inch wg (500 Pa)** and Lower: Seal Class C.
10. Conditioned Space, Supply-Air Ducts in Pressure Classes Higher Than **2-Inch wg (500 Pa)**: Seal Class B.
11. Conditioned Space, Exhaust Ducts: Seal Class B.
12. Conditioned Space, Return-Air Ducts: Seal Class C.

3.8 HANGER AND SUPPORT INSTALLATION

- A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
- B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 1. Where practical, install concrete inserts before placing concrete.
 2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than **4 inches (100 mm)** thick.
 4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than **4 inches (100 mm)** thick.
 5. Do not use powder-actuated concrete fasteners for seismic restraints. Coordinate with Section 230548 "Vibration and Seismic Controls for HVAC."
- C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," **Table 5-1 (Table 5-1M)**, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within **24 inches (610 mm)** of each elbow and within **48 inches (1220 mm)** of each branch intersection.
- D. Hangers Exposed to View: Threaded rod and angle or channel supports.
- E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of **16 feet (5 m)**.
- F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.9 SEISMIC-RESTRAINT-DEVICE INSTALLATION

- A. See Section 230548 "Vibration and Seismic Controls for HVAC" for seismic restraint installation requirements.

3.10 DUCTWORK CONNECTIONS

- A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."
- B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.11 PAINTING

- A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.12 FIELD QUALITY CONTROL

- A. Perform tests and inspections.
- B. Leakage Tests:
 - 1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - 2. Test the following systems:
 - a. Ducts with a Pressure Class Higher Than **3-Inch wg (750 Pa)**: Test representative duct sections[, **selected by Architect from sections installed,**] totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - b. Supply Ducts with a Pressure Class of **[2- (500)] [3- (750)] [4- (1000)] Inch wg (Pa)** or as directed by the Owner or Higher: Test representative duct sections[, **selected by Architect from sections installed,**] totaling no less than **[50] [100]** percent of total or as directed by the Owner installed duct area for each designated pressure class.
 - c. Return Ducts with a Pressure Class of **[2- (500)] [3- (750)] [4- (1000)] Inch wg (Pa)** or as directed by the Owner or Higher: Test representative duct sections [, **selected by Architect from sections installed,**] totaling no less than **[50] [100]** percent of total as directed by the Owner installed duct area for each designated pressure class.
 - d. Exhaust Ducts with a Pressure Class of **[2- (500)] [3- (750)] [4- (1000)] Inch wg (Pa)** or as directed by the Owner or Higher: Test representative duct sections[, **selected by Architect from sections installed,**] totaling no less than **[50] [100]** percent of total or as directed by the Owner installed duct area for each designated pressure class.
 - e. Outdoor-Air Ducts with a Pressure Class of **[2- (500)] [3- (750)] [4- (1000)] Inch wg (Pa)** or as directed by the Owner : Test representative duct sections[, **selected by Architect from sections installed,**] totaling no less than **[50] [100]** percent of total or as directed by the Owner installed duct area for each designated pressure class.
 - 3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - 4. Testing of each duct section is to be performed with access doors, coils, filters, dampers, and other duct-mounted devices in place as designed. No devices are to be removed or blanked off so as to reduce or prevent additional leakage.
 - 5. Test for leaks before applying external insulation.

6. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
7. Give [**seven**] days' or as directed by the Owner advance notice for testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.
2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness in accordance with "Description of Method 3 - NADCA Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media is to not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.13 DUCT CLEANING

A. Clean new duct system(s) before testing, adjusting, and balancing.

B. For cleaning of existing ductwork, see Section 230130.52 "Existing HVAC Air Distribution System Cleaning."

C. Use duct cleaning methodology as indicated in NADCA ACR.

D. Use service openings for entry and inspection.

1. Provide openings with access panels appropriate for duct static-pressure and leakage class at dampers, coils, and any other locations where required for inspection and cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

E. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

F. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.

5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.
7. Dedicated exhaust and ventilation components and makeup air systems.

G. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans in accordance with NADCA ACR. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents in accordance with manufacturer's written instructions after removal of surface deposits and debris.

3.14 STARTUP

- A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.15 DUCT SCHEDULE

- A. Fabricate ducts with galvanized sheet steel except as otherwise indicated and as follows:

1. Fabricate all ducts to achieve SMACNA pressure class, seal class, and leakage class as indicated below.
2. Underground Ducts: Concrete-encased, **[galvanized sheet steel] [PVC-coated, galvanized sheet steel with thicker coating on duct exterior] [stainless steel]**.

- B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units **Equipment** as directed by the Owner :
 - a. Pressure Class: Positive **[1- (250)] [2- (500)] inch wg (Pa)** or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: **[A] [B] [C]**.
 - c. SMACNA Leakage Class for Rectangular: **[2] [4] [8] [16]**.
 - d. SMACNA Leakage Class for Round and Flat Oval: **[2] [4] [8] [16]**.
2. Ducts Connected to Constant-Volume Air-Handling Units **Equipment** as directed by the Owner :
 - a. Pressure Class: Positive **[2- (500)] [3- (750)] inch wg (Pa)** or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: **[A] [B]**.

- c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
3. Ducts Connected to Variable-Air-Volume Air-Handling Units **Equipment** as directed by the Owner :
- a. Pressure Class: Positive [3- (750)] [4- (1000)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B].
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
4. Ducts Connected to Equipment Not Listed Above:
- a. Pressure Class: Positive [2- (500)] [3- (750)] [4- (1000)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] [C].
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
- C. Return Ducts:
1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units **Equipment** as directed by the Owner :
- a. Pressure Class: Positive or negative [1- (250)] [2- (500)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] [C].
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
2. Ducts Connected to Air-Handling Units **Equipment as directed by the Owner** :
- a. Pressure Class: Positive or negative [2- (500)] [3- (750)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] [C].
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
3. Ducts Connected to Equipment Not Listed above:
- a. Pressure Class: Positive or negative [2- (500)] [3- (750)] [4- (1000)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] [C].
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
- D. Exhaust Ducts:
1. Ducts Connected to Fans Exhausting (ASHRAE 62.1, Class 1 and 2) Air:
- a. Pressure Class: Negative [1- (250)] [2- (500)] [3- (750)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] [C] if negative pressure, and A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].

2. Ducts Connected to Air-Handling Units **Equipment** as directed by the Owner :
 - a. Pressure Class: Positive or negative [2- (500)] [3- (750)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] [C] if negative pressure, and [A] [B] [C] if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].
3. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.
 - a. Exposed to View: Type 304, stainless steel sheet, [No. 4] [No. 3] or as directed by the Owner finish.
 - b. Concealed: [Type 304, stainless steel sheet, No. 2D finish] [Carbon-steel sheet].
 - c. Welded seams and joints.
 - d. Pressure Class: Positive or negative [2- (500)] [3- (750)] [4- (1000)] or as directed by the Owner .
 - e. Airtight/watertight.
4. Ducts Connected to Dishwashers, Dishwasher Hoods, and Other High-Humidity Locations:
 - a. Type 304, stainless steel sheet.
 - b. Exposed to View: [No. 4] [No. 3] finish or as directed by the Owner .
 - c. Concealed: [No. 2D] finish or as directed by the Owner .
 - d. Welded longitudinal seams; welded or flanged transverse joints with watertight EPDM gaskets.
 - e. Pressure Class: Positive or negative [2- (500)] [3- (750)] inch wg (Pa) or as directed by the Owner .
 - f. Airtight/watertight.
5. Ducts Connected to Fans Exhausting Fume Hood, Laboratory, and Process (ASHRAE 62.1, Class 3 and Class 4) Air:
 - a. [Type 316] [Type 304], stainless steel sheet.
 - 1) Exposed to View: [No. 4] [No. 3] finish or as directed by the Owner .
 - 2) Concealed: [No. 2B] [No. 2D] finish or as directed by the Owner .
 - b. PVC-coated, galvanized sheet steel with thicker coating on duct interior.
 - c. Pressure Class: Positive or negative [3- (750)] [4- (1000)] [6- (1500)] inch wg (Pa) or as directed by the Owner .
 - d. [Minimum SMACNA Seal Class A] [Welded seams and joints].
 - e. [SMACNA Leakage Class 2.]
 - f. [Airtight/watertight.]
6. Ducts Connected to Equipment Not Listed above:
 - a. Pressure Class: Positive or negative [2- (500)] [3- (750)] [4- (1000)] inch wg (Pa) or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [A] [B] if negative pressure; A if positive pressure.
 - c. SMACNA Leakage Class for Rectangular: [2] [4] [8] [16].
 - d. SMACNA Leakage Class for Round and Flat Oval: [2] [4] [8] [16].

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units **Equipment** as directed by the Owner :
 - a. Pressure Class: Positive or negative [**1- (250)**] [**2- (500)**] **inch wg (Pa)** or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [**A**] [**B**] [**C**].
 - c. SMACNA Leakage Class for Rectangular: [**8**] [**16**].
 - d. SMACNA Leakage Class for Round and Flat Oval: [**8**] [**16**].

2. Ducts Connected to Air-Handling Units **Equipment** as directed by the Owner :
 - a. Pressure Class: Positive or negative [**2- (500)**] [**3- (750)**] **inch wg (Pa)** or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [**A**] [**B**].
 - c. SMACNA Leakage Class for Rectangular: [**2**] [**4**] [**8**] [**16**].
 - d. SMACNA Leakage Class for Round and Flat Oval: [**2**] [**4**] [**8**] [**16**].

3. Ducts Connected to Equipment Not Listed Above:
 - a. Pressure Class: Positive or negative [**2- (500)**] [**3- (750)**] [**4- (1000)**] **inch wg (Pa)** or as directed by the Owner .
 - b. Minimum SMACNA Seal Class: [**A**] [**B**].
 - c. SMACNA Leakage Class for Rectangular: [**2**] [**4**] [**8**] [**16**].
 - d. SMACNA Leakage Class for Round and Flat Oval: [**2**] [**4**] [**8**] [**16**].

- F. Intermediate Reinforcement:
 1. Galvanized-Steel Ducts: [**Galvanized steel**] [**Carbon steel coated with zinc-chromate primer**] [**Galvanized steel or carbon steel coated with zinc-chromate primer**].
 2. PVC-Coated Ducts:
 - a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: [**Galvanized**] [**Match duct material**].
 3. Stainless Steel Ducts:
 - a. Exposed to Airstream: Match duct material.
 - b. Not Exposed to Airstream: [**Galvanized**] [**Match duct material**].
 4. Aluminum Ducts: [**Aluminum**] [**or**] [**galvanized steel coated with zinc chromate**].

- G. Liner:
 1. Supply-Air Ducts: [**Fibrous glass, Type I**] [**Flexible elastomeric**] [**Fibrous-glass-free, natural fiber**] [**Polyolefin**], [**5/8 (15)**] [**1 (25)**] [**1-1/2 (38)**] [**2 (51)**] **inch (mm)** thick or as directed by the Owner .
 2. Return-Air Ducts: [**Fibrous glass, Type I**] [**Flexible elastomeric**] [**Fibrous-glass-free, natural fiber**] [**Polyolefin**], [**5/8 (15)**] [**1 (25)**] [**1-1/2 (38)**] [**2 (51)**] **inch (mm)** thick or as directed by the Owner .
 3. Exhaust-Air Ducts: [**Fibrous glass, Type I**] [**Flexible elastomeric**] [**Fibrous-glass-free, natural fiber**] [**Polyolefin**], [**5/8 (15)**] [**1 (25)**] **inch (mm)** thick or as directed by the Owner .
 4. Supply Fan Plenums: [**Fibrous glass, Type II**] [**Flexible elastomeric**] [**Fibrous-glass-free, natural fiber**] [**Polyolefin**], [**5/8 (15)**] [**1 (25)**] [**1-1/2 (38)**] [**2 (51)**] **inch (mm)** thick or as directed by the Owner .

5. Return- and Exhaust-Fan Plenums: [Fibrous glass, Type II] [Flexible elastomeric] [Fiberglass-free, natural fiber] [Polyolefin], [5/8 (15)] [1 (25)] [1-1/2 (38)] [2 (51)] inches (mm) thick or as directed by the Owner .
6. Transfer Ducts: [Fibrous glass, Type I] [Flexible elastomeric] [Fibrous-glass-free, natural fiber] [Polyolefin], [5/8 (15)] [1 (25)] [1-1/2 (38)] [2 (51)] inch (mm) thick or as directed by the Owner .

H. Double-Wall Duct Interstitial Insulation:

1. Supply-Air Ducts: [1 (25)] [1-1/2 (38)] [2 (51)] inch (mm) thick or as directed by the Owner .
2. Return-Air Ducts: [1 (25)] [1-1/2 (38)] [2 (51)] inch (mm) thick or as directed by the Owner .
3. Exhaust-Air Ducts: [1 (25)] [1-1/2 (38)] [2 (51)] inch (mm) thick or as directed by the Owner .

I. Elbow Configuration:

1. Rectangular Duct - Requirements for Different Velocities: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Velocity 1000 fpm (5 m/s) or Lower:
 - 1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
 - 2) Mitered Type RE 4 without vanes.
 - b. Velocity 1000 to 1500 fpm (5 to 7.6 m/s):
 - 1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
 - c. Velocity 1500 fpm (7.6 m/s) or Higher:
 - 1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - 2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - 3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
2. Rectangular Duct - Requirements for All Velocities: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."
 - a. Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
 - b. Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
 - c. Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."
3. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."
 - a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

- 1) Velocity **1000 fpm (5 m/s)** or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
 - 2) Velocity **1000 to 1500 fpm (5 to 7.6 m/s)**: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
 - 3) Velocity **1500 fpm (7.6 m/s)** or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.
 - 4) Radius-to Diameter Ratio: 1.5.
- b. Round Elbows, [**12 (305) Inches (mm)**] or as directed by the Owner and Smaller in Diameter: Stamped or pleated.
 - c. Round Elbows, [**14 (356) Inches (mm)**] or as directed by the Owner and Larger in Diameter: [**Standing seam**] [**Welded**].
- J. Branch Configuration:
1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."
 - a. Rectangular Main to Rectangular Branch: 45-degree entry.
 - b. Rectangular Main to Round Branch: Conical spin in.
 2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.
 - a. Velocity **1000 fpm (5 m/s)** or Lower: 90-degree tap.
 - b. Velocity **1000 to 1500 fpm (5 to 7.6 m/s)**: Conical tap.
 - c. Velocity **1500 fpm (7.6 m/s)** or Higher: 45-degree lateral.

END OF SECTION 23 31 13 13a

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Task	Specification	Specification Description
23 31 13 16	23 31 13 13	HVAC Casings
23 31 13 16	23 31 13 13a	Metal Ducts

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SECTION 23 31 13 19 - DUCT ACCESSORIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for duct accessories. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Backdraft and pressure relief dampers.
 - b. Barometric relief dampers.
 - c. Manual volume dampers.
 - d. Control dampers.
 - e. Fire dampers.
 - f. Ceiling dampers.
 - g. Smoke dampers.
 - h. Combination fire and smoke dampers.
 - i. Corridor dampers.
 - j. Flange connectors.
 - k. Duct silencers.
 - l. Turning vanes.
 - m. Remote damper operators.
 - n. Duct-mounted access doors.
 - o. Flexible connectors.
 - p. Flexible ducts.
 - q. Duct security bars.
 - r. Duct accessory hardware.

C. Submittals

1. Product Data: For each type of product indicated.
 - a. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.
 - a. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:
 - 1) Special fittings.
 - 2) Manual volume damper installations.
 - 3) Control damper installations.
 - 4) Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
 - 5) Duct security bars.
 - 6) Wiring Diagrams: For power, signal, and control wiring.
4. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved.

5. Source quality-control reports.
6. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

D. Quality Assurance

1. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."
2. Comply with AMCA 500-D testing for damper rating.

1.2 PRODUCTS

A. Materials

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.
2. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.
 - a. Galvanized Coating Designation: **G60 (Z180) OR G90 (Z275), as directed.**
 - b. Exposed-Surface Finish: Mill phosphatized.
3. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and finish for exposed ducts or as directed by the Owner .
4. Aluminum Sheets: Comply with **ASTM B 209 (ASTM B 209M)**, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.
5. Extruded Aluminum: Comply with **ASTM B 221 (ASTM B 221M)**, Alloy 6063, Temper T6.
6. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.
7. Tie Rods: Galvanized steel, **1/4-inch (6-mm)** minimum diameter for lengths **36 inches (900 mm)** or less; **3/8-inch (10-mm)** minimum diameter for lengths longer than **36 inches (900 mm)**.

B. Backdraft And Pressure Relief Dampers

1. Description: Gravity balanced.
2. Maximum Air Velocity: **2000 fpm (10 m/s) OR 3000 fpm (15 m/s), as directed.**
3. Maximum System Pressure: **1-inch wg (0.25 kPa) OR 2-inch wg (0.5 kPa), as directed.**
4. Frame: **0.052-inch- (1.3-mm-) thick, galvanized sheet steel OR 0.063-inch- (1.6-mm-) thick extruded aluminum OR 0.052-inch- (1.3-mm-) thick stainless steel, as directed, with welded corners and mounting flange, as directed.**
5. Blades: Multiple single-piece blades, center-pivoted, **as directed**, maximum **6-inch (150-mm)** width, **0.025-inch- (0.6-mm-) thick, roll-formed aluminum OR 0.050-inch- (1.2-mm-) thick aluminum sheet OR noncombustible, tear-resistant, neoprene-coated fiberglass, as directed, with sealed edges.**
6. Blade Action: Parallel.
7. Blade Seals: Felt **OR Vinyl foam OR Extruded vinyl, mechanically locked OR Neoprene, mechanically locked, as directed.**
8. Blade Axles:
 - a. Material: Nonferrous metal **OR Galvanized steel OR Plated steel OR Stainless steel OR Non-metallic OR Aluminum, as directed.**
 - b. Diameter: **0.20 inch (5 mm).**
9. Tie Bars and Brackets: Aluminum **OR Galvanized steel, as directed.**
10. Return Spring: Adjustable tension.
11. Bearings: Steel ball **OR Synthetic pivot bushings OR Steel ball or synthetic pivot bushings, as directed.**
12. Accessories:
 - a. Adjustment device to permit setting for varying differential static pressure.
 - b. Counterweights and spring-assist kits for vertical airflow installations.

- c. Electric actuators.
 - d. Chain pulls.
 - e. Screen Mounting: Front mounted in sleeve.
 - 1) Sleeve Thickness: **20-gage (1.0-mm)** minimum.
 - 2) Sleeve Length: **6 inches (152 mm)** minimum.

OR

 - Screen Mounting: Rear mounted.
 - f. Screen Material: Galvanized steel **OR** Aluminum, **as directed**.
 - g. Screen Type: Bird **OR** Insect, **as directed**.
 - h. 90-degree stops.
- C. Barometric Relief Dampers
- 1. Suitable for horizontal or vertical mounting.
 - 2. Maximum Air Velocity: **2000 fpm (10 m/s) OR 2500 fpm (13 m/s), as directed**.
 - 3. Maximum System Pressure: **2-inch wg (0.5 kPa)**.
 - 4. Frame: **0.064-inch- (1.6-mm-)** thick, galvanized sheet steel **OR 0.063-inch- (1.6-mm-)** thick extruded aluminum, **as directed**, with welded corners and mounting flange, **as directed**.
 - 5. Blades:
 - a. Multiple, **0.025-inch- (0.6-mm-)** thick, roll-formed aluminum **OR 0.050-inch- (1.2-mm-)** thick aluminum sheet, **as directed**.
 - b. Maximum Width: **6 inches (150 mm)**.
 - c. Action: Parallel.
 - d. Balance: Gravity.
 - e. Eccentrically pivoted.
 - 6. Blade Seals: Vinyl **OR** Neoprene, **as directed**.
 - 7. Blade Axles: Galvanized steel **OR** Nonferrous metal, **as directed**.
 - 8. Tie Bars and Brackets:
 - a. Material: Aluminum **OR** Galvanized steel, **as directed**.
 - b. Rattle free with 90-degree stop.
 - 9. Return Spring: Adjustable tension.
 - 10. Bearings: Synthetic **OR** Stainless steel **OR** Bronze, **as directed**.
 - 11. Accessories:
 - a. Flange on intake.
 - b. Adjustment device to permit setting for varying differential static pressures.
- D. Manual Volume Dampers
- 1. Standard, Steel, Manual Volume Dampers:
 - a. Standard leakage rating, with linkage outside airstream, **as directed**.
 - b. Suitable for horizontal or vertical applications.
 - c. Frames:
 - 1) Hat-shaped, galvanized-steel **OR** stainless-steel, **as directed**, channels, **0.064-inch (1.62-mm)** minimum thickness.
 - 2) Mitered and welded corners.
 - 3) Flanges for attaching to walls and flangeless frames for installing in ducts.
 - d. Blades:
 - 1) Multiple or single blade.
 - 2) Parallel- or opposed-blade design.
 - 3) Stiffen damper blades for stability.
 - 4) Galvanized-steel **OR** Stainless-steel, **as directed**, **0.064 inch (1.62 mm)** thick.
 - e. Blade Axles: Galvanized steel **OR** Stainless steel **OR** Nonferrous metal, **as directed**.
 - f. Bearings:
 - 1) Oil-impregnated bronze **OR** Molded synthetic **OR** Stainless-steel sleeve, **as directed**.
 - 2) Dampers in ducts with pressure classes of **3-inch wg (750 Pa)** or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - g. Tie Bars and Brackets: Galvanized steel.

2. Standard, Aluminum, Manual Volume Dampers:
 - a. Standard leakage rating, with linkage outside airstream, **as directed**.
 - b. Suitable for horizontal or vertical applications.
 - c. Frames: Hat-shaped, **0.10-inch- (2.5-mm-)** thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
 - d. Blades:
 - 1) Multiple or single blade.
 - 2) Parallel- or opposed-blade design.
 - 3) Stiffen damper blades for stability.
 - 4) Roll-Formed Aluminum Blades: **0.10-inch- (2.5-mm-)** thick aluminum sheet.
OR
Extruded-Aluminum Blades: **0.050-inch- (1.2-mm-)** thick extruded aluminum.
 - e. Blade Axles: Galvanized steel **OR** Stainless steel **OR** Nonferrous metal, **as directed**.
 - f. Bearings:
 - 1) Oil-impregnated bronze **OR** Molded synthetic **OR** Stainless-steel sleeve, **as directed**.
 - 2) Dampers in ducts with pressure classes of **3-inch wg (750 Pa)** or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - g. Tie Bars and Brackets: Aluminum.
3. Low-Leakage, Steel, Manual Volume Dampers:
 - a. Low-leakage rating, with linkage outside airstream, **as directed**, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
 - b. Suitable for horizontal or vertical applications.
 - c. Frames:
 - 1) Hat **OR** U **OR** Angle, **as directed**, shaped.
 - 2) Galvanized-steel **OR** Stainless-steel, **as directed**, channels, **0.064 inch (1.62 mm)** thick.
 - 3) Mitered and welded corners.
 - 4) Flanges for attaching to walls and flangeless frames for installing in ducts.
 - d. Blades:
 - 1) Multiple or single blade.
 - 2) Parallel- or opposed-blade design.
 - 3) Stiffen damper blades for stability.
 - 4) Galvanized **OR** Stainless, **as directed**, roll-formed steel, **0.064 inch (1.62 mm)** thick.
 - e. Blade Axles: Galvanized steel **OR** Stainless steel **OR** Nonferrous metal, **as directed**.
 - f. Bearings:
 - 1) Oil-impregnated bronze **OR** Molded synthetic **OR** Stainless-steel sleeve, **as directed**.
 - 2) Dampers in ducts with pressure classes of **3-inch wg (750 Pa)** or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - g. Blade Seals: Felt **OR** Vinyl **OR** Neoprene, **as directed**.
 - h. Jamb Seals: Cambered stainless steel **OR** aluminum, **as directed**.
 - i. Tie Bars and Brackets: Galvanized steel **OR** Aluminum, **as directed**.
 - j. Accessories:
 - 1) Include locking device to hold single-blade dampers in a fixed position without vibration.
4. Low-Leakage, Aluminum, Manual Volume Dampers:
 - a. Low-leakage rating, with linkage outside airstream, **as directed**, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
 - b. Suitable for horizontal or vertical applications.
 - c. Frames: Hat **OR** U **OR** Angle, **as directed**, -shaped, **0.10-inch- (2.5-mm-)** thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.
 - d. Blades:
 - 1) Multiple or single blade.

- 2) Parallel- or opposed-blade design.
- 3) Roll-Formed Aluminum Blades: **0.10-inch- (2.5-mm-)** thick aluminum sheet.
OR
Extruded-Aluminum Blades: **0.050-inch- (1.2-mm-)** thick extruded aluminum.
- e. Blade Axles: Galvanized steel **OR** Stainless steel **OR** Nonferrous metal, **as directed**.
- f. Bearings:
 - 1) Oil-impregnated bronze **OR** Molded synthetic **OR** Stainless-steel sleeve, **as directed**.
 - 2) Dampers in ducts with pressure classes of **3-inch wg (750 Pa)** or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
- g. Blade Seals: Felt **OR** Vinyl **OR** Neoprene, **as directed**.
- h. Jamb Seals: Cambered stainless steel **OR** aluminum, **as directed**.
- i. Tie Bars and Brackets: Galvanized steel **OR** Aluminum, **as directed**.
- j. Accessories:
 - 1) Include locking device to hold single-blade dampers in a fixed position without vibration.
5. Jackshaft:
 - a. Size: **1-inch (25-mm)** diameter.
 - b. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
 - c. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.
6. Damper Hardware:
 - a. Zinc-plated, die-cast core with dial and handle made of **3/32-inch- (2.4-mm-)** thick zinc-plated steel, and a **3/4-inch (19-mm)** hexagon locking nut.
 - b. Include center hole to suit damper operating-rod size.
 - c. Include elevated platform for insulated duct mounting.
- E. Control Dampers
 1. Low-leakage rating, with linkage outside airstream, **as directed**, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.
 2. Frames:
 - a. Hat **OR** U **OR** Angle, **as directed**, shaped.
 - b. Galvanized-steel **OR** Stainless-steel, **as directed**, channels, **0.064 inch (1.62 mm)** thick.
 - c. Mitered and welded corners.
 3. Blades:
 - a. Multiple blade with maximum blade width of **8 inches (200 mm)**.
 - b. Parallel **OR** Parallel- and opposed **OR** Opposed, **as directed**,-blade design.
 - c. Galvanized **OR** Stainless, **as directed**, steel.
 - d. **0.064 inch (1.62 mm)** thick.
 - e. Blade Edging: Closed-cell neoprene edging.
OR
Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.
 4. Blade Axles: **1/2-inch- (13-mm-)** diameter; galvanized steel **OR** stainless steel **OR** nonferrous metal, **as directed**; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.
 - a. Operating Temperature Range: From **minus 40 to plus 200 deg F (minus 40 to plus 93 deg C)**.
 5. Bearings:
 - a. Oil-impregnated bronze **OR** Molded synthetic **OR** Stainless-steel sleeve, **as directed**.
 - b. Dampers in ducts with pressure classes of **3-inch wg (750 Pa)** or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
 - c. Thrust bearings at each end of every blade.
- F. Fire Dampers

1. Type: Static **OR** Dynamic **OR** Static and dynamic, **as directed**; rated and labeled according to UL 555 by an NRTL.
2. Closing rating in ducts up to **4-inch wg (1-kPa)** static pressure class and minimum **4000-fpm (20-m/s)** velocity.
3. Fire Rating: 1-1/2 **OR** 3, **as directed**, hours.
4. Frame: Curtain type with blades inside airstream **OR** Curtain type with blades outside airstream **OR** Multiple-blade type **OR** Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream, **as directed**; fabricated with roll-formed, **0.034-inch- (0.85-mm-)** thick galvanized steel; with mitered and interlocking corners.
5. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.
 - a. Minimum Thickness: **0.052 or 0.138 inch (1.3 or 3.5 mm)** thick, as indicated, and of length to suit application.
 - b. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.
6. Mounting Orientation: Vertical or horizontal as indicated.
7. Blades: Roll-formed, interlocking, **0.034-inch- (0.85-mm-)** thick, galvanized sheet steel. In place of interlocking blades, use full-length, **0.034-inch- (0.85-mm-)** thick, galvanized-steel blade connectors.
8. Horizontal Dampers: Include blade lock and stainless-steel closure spring.
9. Heat-Responsive Device: Replaceable, **165 deg F (74 deg C) OR 212 deg F (100 deg C)**, **as directed**, rated, fusible links.
OR
Heat-Responsive Device: Electric **OR** Pneumatic, **as directed**, resettable link and switch package, factory installed, **165 deg F (74 deg C) OR 212 deg F (100 deg C)**, **as directed**, rated.

G. Ceiling Dampers

1. General Requirements:
 - a. Labeled according to UL 555C by an NRTL.
 - b. Comply with construction details for tested floor- and roof-ceiling assemblies as indicated in UL's "Fire Resistance Directory."
2. Frame: Galvanized sheet steel, round or rectangular, style to suit ceiling construction.
3. Blades: Galvanized sheet steel with refractory insulation.
4. Heat-Responsive Device: Replaceable, **165 deg F (74 deg C) OR 212 deg F (100 deg C)**, **as directed**, rated, fusible links.
5. Fire Rating: 2 **OR** 3, **as directed**, hours.

H. Smoke Dampers

1. General Requirements: Label according to UL 555S by an NRTL.
2. Smoke Detector: Integral, factory wired for single-point connection.
3. Frame: Curtain type with blades inside airstream **OR** Curtain type with blades outside airstream **OR** Multiple-blade type **OR** Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream, **as directed**; fabricated with roll-formed, **0.034-inch- (0.85-mm-)** thick galvanized steel; with mitered and interlocking corners.
4. Blades: Roll-formed, horizontal, interlocking, **0.034-inch- (0.85-mm-)** thick, galvanized sheet steel. In place of interlocking blades, use full-length, **0.034-inch- (0.85-mm-)** thick, galvanized-steel blade connectors.
5. Leakage: Class I **OR** Class II, **as directed**.
6. Rated pressure and velocity to exceed design airflow conditions.
7. Mounting Sleeve: Factory-installed, **0.052-inch- (1.3-mm-)** thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking, **as directed**.
8. Damper Motors: Modulating **OR** Two-position, **as directed**, action.
9. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".

- a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 23 Section(s) "Instrumentation And Control For Hvac" OR Division 22, **as directed**.
 - c. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
 - d. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of **150 in. x lbf (17 N x m)** and breakaway torque rating of **150 in. x lbf (17 N x m)**.
 - e. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at **minus 40 deg F (minus 40 deg C)**.
 - f. Nonspring-Return Motors: For dampers larger than **25 sq. ft. (2.3 sq. m)**, size motor for running torque rating of **150 in. x lbf (17 N x m)** and breakaway torque rating of **300 in. x lbf (34 N x m)**.
 - g. Electrical Connection: 115 V, single phase, 60 Hz.
10. Accessories:
- a. Auxiliary switches for signaling **OR** fan control **OR** position indication, **as directed**.
 - b. Momentary test switch **OR** Test and reset switches, **as directed**, damper **OR** remote, **as directed**, mounted.
- I. Combination Fire And Smoke Dampers
1. Type: Static **OR** Dynamic **OR** Static and dynamic, **as directed**; rated and labeled according to UL 555 and UL 555S by an NRTL.
 2. Closing rating in ducts up to **4-inch wg (1-kPa)** static pressure class and minimum **4000-fpm (20-m/s)** velocity.
 3. Fire Rating: 1-1/2 **OR** 3, **as directed**, hours.
 4. Frame: Curtain type with blades inside airstream **OR** Curtain type with blades outside airstream **OR** Multiple-blade type **OR** Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream, **as directed**; fabricated with roll-formed, **0.034-inch- (0.85-mm-)** thick galvanized steel; with mitered and interlocking corners.
 5. Heat-Responsive Device: Replaceable, **165 deg F (74 deg C)** **OR** **212 deg F (100 deg C)**, **as directed**, rated, fusible links.
OR
Heat-Responsive Device: Electric **OR** Pneumatic, **as directed**, resettable link and switch package, factory installed, rated.
 6. Smoke Detector: Integral, factory wired for single-point connection.
 7. Frame: Curtain type with blades inside airstream **OR** Curtain type with blades outside airstream **OR** Multiple-blade type **OR** Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream, **as directed**; fabricated with roll-formed, **0.034-inch- (0.85-mm-)** thick galvanized steel; with mitered and interlocking corners.
 8. Blades: Roll-formed, horizontal, interlocking, **0.034-inch- (0.85-mm-)** thick, galvanized sheet steel. In place of interlocking blades, use full-length, **0.034-inch- (0.85-mm-)** thick, galvanized-steel blade connectors.
 9. Leakage: Class I **OR** Class II, **as directed**.
 10. Rated pressure and velocity to exceed design airflow conditions.
 11. Mounting Sleeve: Factory-installed, **0.052-inch- (1.3-mm-)** thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone caulking, **as directed**.
 12. Master control panel for use in dynamic smoke-management systems.
 13. Damper Motors: Modulating **OR** Two-position, **as directed**, action.
 14. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".

- a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 23 Section(s) "Instrumentation And Control For Hvac" OR Division 22, **as directed**.
 - c. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
 - d. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of **150 in. x lbf (17 N x m)** and breakaway torque rating of **150 in. x lbf (17 N x m)**.
 - e. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at **minus 40 deg F (minus 40 deg C)**.
 - f. Nonspring-Return Motors: For dampers larger than **25 sq. ft. (2.3 sq. m)**, size motor for running torque rating of **150 in. x lbf (17 N x m)** and breakaway torque rating of **300 in. x lbf (34 N x m)**.
 - g. Electrical Connection: 115 V, single phase, 60 Hz.
15. Accessories:
- a. Auxiliary switches for signaling **OR** fan control **OR** position indication, **as directed**.
 - b. Momentary test switch **OR** Test and reset switches, **as directed**, damper **OR** remote, **as directed**, mounted.

J. Corridor Dampers

1. General Requirements: Label combination fire and smoke dampers according to UL 555 for 1-1/2-hour rating by an NRTL.
2. Heat-Responsive Device: Replaceable, **165 deg F (74 deg C) OR 212 deg F (100 deg C)**, **as directed**, rated, fusible links.
OR
Heat-Responsive Device: Electric **OR** Pneumatic, **as directed**, resettable link and switch package, factory installed, rated.
3. Frame: Curtain type with blades inside airstream **OR** Curtain type with blades outside airstream **OR** Multiple-blade type **OR** Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream, **as directed**; fabricated with roll-formed, **0.034-inch- (0.85-mm-)** thick galvanized steel; with mitered and interlocking corners.
4. Blades: Roll-formed, horizontal, interlocking, **0.034-inch- (0.85-mm-)** thick, galvanized sheet steel. In place of interlocking blades, use full-length, **0.034-inch- (0.85-mm-)** thick, galvanized-steel blade connectors.
5. Mounting Sleeve: Factory-installed, **0.052-inch- (1.3-mm-)** thick, galvanized sheet steel; length to suit wall or floor application.
6. Damper Motors: Modulating **OR** Two-position, **as directed**, action.
7. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 23 Section(s) "Instrumentation And Control For Hvac" OR Division 22, **as directed**.
 - c. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
 - d. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of **150 in. x lbf (17 N x m)** and breakaway torque rating of **150 in. x lbf (17 N x m)**.

- e. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at **minus 40 deg F (minus 40 deg C)**.
 - f. Nonspring-Return Motors: For dampers larger than **25 sq. ft. (2.3 sq. m)**, size motor for running torque rating of **150 in. x lbf (17 N x m)** and breakaway torque rating of **300 in. x lbf (34 N x m)**.
 - g. Electrical Connection: 115 V, single phase, 60 Hz.
- K. Flange Connectors
1. Description: Add-on **OR** Roll-formed, **as directed**, factory-fabricated, slide-on transverse flange connectors, gaskets, and components.
 2. Material: Galvanized steel.
 3. Gage and Shape: Match connecting ductwork.
- L. Duct Silencers
1. General Requirements:
 - a. Factory fabricated.
 - b. Fire-Performance Characteristics: Adhesives, sealants, packing materials, and accessory materials shall have flame-spread index not exceeding 25 and smoke-developed index not exceeding 50 when tested according to ASTM E 84.
 - c. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 2. Shape:
 - a. Rectangular straight with splitters or baffles.
 - b. Round straight with center bodies or pods.
 - c. Rectangular elbow with splitters or baffles.
 - d. Round elbow with center bodies or pods.
 - e. Rectangular transitional with splitters or baffles.
 3. Rectangular Silencer Outer Casing: ASTM A 653/A 653M, **G90 (Z275) OR G60 (Z180), as directed**, galvanized sheet steel, **0.034 inch (0.85 mm) OR 0.040 inch (1.02 mm), as directed**, thick.
 4. Round Silencer Outer Casing: ASTM A 653/A 653M, **G90 (Z275) OR G60 (Z180), as directed**, galvanized sheet steel.
 - a. Sheet Metal Thickness for Units up to **24 Inches (600 mm)** in Diameter: **0.034 inch (0.85 mm)** thick.
 - b. Sheet Metal Thickness for Units **26 through 40 Inches (660 through 1000 mm)** in Diameter: **0.040 inch (1.02 mm)** thick.
 - c. Sheet Metal Thickness for Units **42 through 52 Inches (1060 through 1300 mm)** in Diameter: **0.052 inch (1.3 mm)** thick.
 - d. Sheet Metal Thickness for Units **54 through 60 Inches (1370 through 1500 mm)** in Diameter: **0.064 inch (1.62 mm)** thick.
 5. Inner Casing and Baffles: ASTM A 653/A 653M, **G90 (Z275) OR G60 (Z180), as directed**, galvanized sheet metal, **0.034 inch (0.85 mm)** thick, and with **1/8-inch- (3-mm-)** diameter perforations.
 6. Special Construction:
 - a. Suitable for outdoor use.
 - b. High transmission loss to achieve STC 45, **as directed**.
 7. Connection Sizes: Match connecting ductwork unless otherwise indicated.
 8. Principal Sound-Absorbing Mechanism:
 - a. Controlled impedance membranes and broadly tuned resonators without absorptive media.
 - b. Dissipative **OR** Film-lined, **as directed**, type with fill material.
 - 1) Fill Material: Inert and vermin-proof fibrous material, packed under not less than 5 percent compression **OR** Inert and vermin-proof fibrous material, packed under not less than 15 percent compression **OR** Moisture-proof nonfibrous material, **as directed**.
 - 2) Erosion Barrier: Polymer bag enclosing fill, and heat sealed before assembly.

- c. Lining: None **OR** Mylar **OR** Tedlar **OR** Fiberglas cloth, **as directed**.
 9. Fabricate silencers to form rigid units that will not pulsate, vibrate, rattle, or otherwise react to system pressure variations. Do not use mechanical fasteners for unit assemblies.
 - a. Lock form and seal or continuously weld joints **OR** Flange connections, **as directed**.
 - b. Suspended Units: Factory-installed suspension hooks or lugs attached to frame in quantities and spaced to prevent deflection or distortion.
 - c. Reinforcement: Cross or trapeze angles for rigid suspension.
 10. Accessories:
 - a. Integral 1-1/2 **OR** 3, **as directed**,-hour fire damper with access door. Access door to be high transmission loss to match silencer, **as directed**.
 - b. Factory-installed end caps to prevent contamination during shipping.
 - c. Removable splitters.
 - d. Airflow measuring devices.
 - e. Source Quality Control: Test according to ASTM E 477.
 - f. Testing to be witnessed by the Owner.
 - g. Record acoustic ratings, including dynamic insertion loss and generated-noise power levels with an airflow of at least **2000-fpm (10-m/s)** face velocity.
 - h. Leak Test: Test units for airtightness at 200 percent of associated fan static pressure or **6-inch wg (1500-Pa)** static pressure, whichever is greater.
- M. Turning Vanes
1. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 - a. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.
 2. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.
 3. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-3, "Vaness and Vane Runners," and 2-4, "Vane Support in Elbows."
 4. Vane Construction: Single **OR** Double, **as directed**, wall.
OR
Vane Construction: Single wall for ducts up to **48 inches (1200 mm)** wide and double wall for larger dimensions.
- N. Remote Damper Operators
1. Description: Cable system designed for remote manual damper adjustment.
 2. Tubing: Brass.
 3. Cable: Stainless steel.
 4. Wall-Box Mounting: Recessed, **3/4 inches (19 mm)** deep **OR** Recessed, **2 inches (50 mm)** deep **OR** Surface, **as directed**.
 5. Wall-Box Cover-Plate Material: Steel **OR** Stainless steel, **as directed**.
- O. Duct-Mounted Access Doors
1. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 2-10, "Duct Access Doors and Panels," and 2-11, "Access Panels - Round Duct."
 - a. Door:
 - 1) Double wall, rectangular.
 - 2) Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
 - 3) Vision panel.
 - 4) Hinges and Latches: **1-by-1-inch (25-by-25-mm)** butt or piano hinge and cam latches.
 - 5) Fabricate doors airtight and suitable for duct pressure class.

- b. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.
- c. Number of Hinges and Locks:
 - 1) Access Doors Less Than **12 Inches (300 mm)** Square: No hinges and two sash locks.
 - 2) Access Doors up to **18 Inches (460 mm)** Square: Two hinges and two sash locks.
 - 3) Access Doors up to **24 by 48 Inches (600 by 1200 mm)**: Three hinges and two compression latches with outside and inside handles, **as directed**.
 - 4) Access Doors Larger Than **24 by 48 Inches (600 by 1200 mm)**: Four hinges and two compression latches with outside and inside handles.
- 2. Pressure Relief Access Door:
 - a. Door and Frame Material: Galvanized sheet steel.
 - b. Door: Single wall **OR** Double wall with insulation fill, **as directed**, with metal thickness applicable for duct pressure class.
 - c. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
 - d. Factory set at **10-inch wg (2500 Pa)**.
 - e. Doors close when pressures are within set-point range.
 - f. Hinge: Continuous piano.
 - g. Latches: Cam.
 - h. Seal: Neoprene or foam rubber.
 - i. Insulation Fill: **1-inch- (25-mm-)** thick, fibrous-glass or polystyrene-foam board.
- P. Duct Access Panel Assemblies
 - 1. Labeled according to UL 1978 by an NRTL.
 - 2. Panel and Frame: Minimum thickness **0.0528-inch (1.3-mm)** carbon **OR** **0.0428-inch (1.1-mm)** stainless, **as directed**, steel.
 - 3. Fasteners: Carbon **OR** Stainless, **as directed**, steel. Panel fasteners shall not penetrate duct wall.
 - 4. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum **2000 deg F (1093 deg C)**.
 - 5. Minimum Pressure Rating: **10-inch wg (2500 Pa)**, positive or negative.
- Q. Flexible Connectors
 - 1. Materials: Flame-retardant or noncombustible fabrics.
 - 2. Coatings and Adhesives: Comply with UL 181, Class 1.
 - 3. Metal-Edged Connectors: Factory fabricated with a fabric strip **3-1/2 inches (89 mm)** **OR** **5-3/4 inches (146 mm)**, **as directed**, wide attached to 2 strips of **2-3/4-inch- (70-mm-)** wide, **0.028-inch- (0.7-mm-)** thick, galvanized sheet steel or **0.032-inch- (0.8-mm-)** thick aluminum sheets. Provide metal compatible with connected ducts.
 - 4. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.
 - a. Minimum Weight: **26 oz./sq. yd. (880 g/sq. m)**.
 - b. Tensile Strength: **480 lbf/inch (84 N/mm)** in the warp and **360 lbf/inch (63 N/mm)** in the filling.
 - c. Service Temperature: **Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C)**.
 - 5. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.
 - a. Minimum Weight: **24 oz./sq. yd. (810 g/sq. m)**.
 - b. Minimum Tensile Strength: **500 lbf/inch (88 N/mm)** in the warp and **440 lbf/inch (77 N/mm)** in the filling.
 - c. Service Temperature: **Minus 50 to plus 250 deg F (Minus 45 to plus 121 deg C)**.
 - 6. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.
 - a. Minimum Weight: **16 oz./sq. yd. (542 g/sq. m)**.
 - b. Tensile Strength: **285 lbf/inch (50 N/mm)** in the warp and **185 lbf/inch (32 N/mm)** in the filling.
 - c. Service Temperature: **Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C)**.

7. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.
 - a. Minimum Weight: 14 oz./sq. yd. (474 g/sq. m).
 - b. Tensile Strength: 450 lbf/inch (79 N/mm) in the warp and 340 lbf/inch (60 N/mm) in the filling.
 - c. Service Temperature: Minus 67 to plus 500 deg F (Minus 55 to plus 260 deg C).
 8. Thrust Limits: Combination coil spring and elastomeric insert with spring and insert in compression, and with a load stop. Include rod and angle-iron brackets for attaching to fan discharge and duct.
 - a. Frame: Steel, fabricated for connection to threaded rods and to allow for a maximum of 30 degrees of angular rod misalignment without binding or reducing isolation efficiency.
 - b. Outdoor Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
 - f. Elastomeric Element: Molded, oil-resistant rubber or neoprene.
 - g. Coil Spring: Factory set and field adjustable for a maximum of 1/4-inch (6-mm) movement at start and stop.
- R. Flexible Ducts
1. Noninsulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire.
 - a. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 - b. Maximum Air Velocity: 4000 fpm (20 m/s).
 - c. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
 2. Noninsulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire.
 - a. Pressure Rating: 4-inch wg (1000 Pa) positive and 0.5-inch wg (125 Pa) negative.
 - b. Maximum Air Velocity: 4000 fpm (20 m/s).
 - c. Temperature Range: Minus 20 to plus 175 deg F (Minus 29 to plus 79 deg C).
 3. Noninsulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire.
 - a. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 - b. Maximum Air Velocity: 4000 fpm (20 m/s).
 - c. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).
 4. Noninsulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire.
 - a. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 - b. Maximum Air Velocity: 4000 fpm (20 m/s).
 - c. Temperature Range: Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C).
 5. Noninsulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil.
 - a. Pressure Rating: 8-inch wg (2280 Pa) positive or negative.
 - b. Maximum Air Velocity: 5000 fpm (25 m/s).
 - c. Temperature Range: Minus 100 to plus 435 deg F (Minus 73 to plus 224 deg C).
 6. Insulated, Flexible Duct: UL 181, Class 1, 2-ply vinyl film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene **OR** aluminized, **as directed**, vapor-barrier film.
 - a. Pressure Rating: 10-inch wg (2500 Pa) positive and 1.0-inch wg (250 Pa) negative.
 - b. Maximum Air Velocity: 4000 fpm (20 m/s).
 - c. Temperature Range: Minus 10 to plus 160 deg F (Minus 23 to plus 71 deg C).
 - d. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 7. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene **OR** aluminized, **as directed**, vapor-barrier film.

- a. Pressure Rating: **4-inch wg (1000 Pa)** positive and **0.5-inch wg (125 Pa)** negative.
 - b. Maximum Air Velocity: **4000 fpm (20 m/s)**.
 - c. Temperature Range: **Minus 20 to plus 175 deg F (Minus 29 to plus 79 deg C)**.
 - d. Insulation R-Value: Comply with ASHRAE/IESNA 90.1.
 8. Insulated, Flexible Duct: UL 181, Class 1, multiple layers of aluminum laminate supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene **OR** aluminized, **as directed**, vapor-barrier film.
 - a. Pressure Rating: **10-inch wg (2500 Pa)** positive and **1.0-inch wg (250 Pa)** negative.
 - b. Maximum Air Velocity: **4000 fpm (20 m/s)**.
 - c. Temperature Range: **Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C)**.
 - d. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 9. Insulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire; fibrous-glass insulation; polyethylene **OR** aluminized, **as directed**, vapor-barrier film.
 - a. Pressure Rating: **10-inch wg (2500 Pa)** positive and **1.0-inch wg (250 Pa)** negative.
 - b. Maximum Air Velocity: **4000 fpm (20 m/s)**.
 - c. Temperature Range: **Minus 20 to plus 210 deg F (Minus 29 to plus 99 deg C)**.
 - d. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 10. Insulated, Flexible Duct: UL 181, Class 0, interlocking spiral of aluminum foil; fibrous-glass insulation; polyethylene **OR** aluminized, **as directed**, vapor-barrier film.
 - a. Pressure Rating: **8-inch wg (2280 Pa)** positive or negative.
 - b. Maximum Air Velocity: **5000 fpm (25 m/s)**.
 - c. Temperature Range: **Minus 20 to plus 250 deg F (Minus 29 to plus 121 deg C)**.
 - d. Insulation R-value: Comply with ASHRAE/IESNA 90.1.
 11. Flexible Duct Connectors:
 - a. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action **OR** Nylon strap, **as directed**, in sizes **3 through 18 inches (75 through 460 mm)**, to suit duct size.
 - b. Non-Clamp Connectors: Adhesive **OR** Liquid adhesive plus tape **OR** Adhesive plus sheet metal screws, **as directed**.
- S. Duct Security Bars
1. Description: Field-fabricated **OR** Factory-fabricated and field-installed **OR** Field- or factory-fabricated and field-installed, **as directed**, duct security bars.
 2. Configuration:
 - a. Frame: **10 gage by 2 inches (3.57 mm by 50 mm)**.
 - b. Sleeve: **3/16-inch (4.8-mm)**, continuously welded **OR** bent, **as directed**, steel frames with **1-by-1-by-3/16-inch (25-by-25-by-4.8-mm)** angle frame factory welded to 1 end **OR** furnished loose for field welding on other end, **as directed**. To be poured in place or set with concrete block or welded or bolted to wall, one side only. Duct connections on both sides.
 - c. Horizontal Bars: **1/2 inch (13 mm) OR 2 by 1/4 inch (50 by 6 mm)**, **as directed**.
 - d. Vertical Bars: **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**.
 - e. Bar Spacing: **6 inches (150 mm)**.
 - f. Mounting: Metal deck or roofing **OR** Bolted or welded **OR** Bolted or welded with masonry anchors **OR** Ductwork or other framing **OR** Poured in place or set with concrete block **OR** Welded or bolted to one wall (one side only) **OR** Bar extends **6 inches (150 mm)** into wall, **as directed**.
- T. Duct Accessory Hardware
1. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.
 2. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

1.3 EXECUTION

A. Installation

1. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.
2. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.
3. Install backdraft **OR** control, **as directed**, dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.
4. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.
 - a. Install steel volume dampers in steel ducts.
 - b. Install aluminum volume dampers in aluminum ducts.
5. Set dampers to fully open position before testing, adjusting, and balancing.
6. Install test holes at fan inlets and outlets and elsewhere as indicated.
7. Install fire and smoke, **as directed**, dampers according to UL listing.
8. Install duct security bars. Construct duct security bars from **0.164-inch (4.18-mm)** steel sleeve, continuously welded at all joints and **1/2-inch- (13-mm-)** diameter steel bars, **6 inches (150 mm)** o.c. in each direction in center of sleeve. Weld each bar to steel sleeve and each crossing bar. Weld **2-1/2-by-2-1/2-by-1/4-inch (63-by-63-by-6-mm)** steel angle to 4 sides and both ends of sleeve. Connect duct security bars to ducts with flexible connections. Provide **12-by-12-inch (300-by-300-mm)** hinged access panel with cam lock in duct in each side of sleeve.
9. Connect ducts to duct silencers with flexible duct connectors **OR** rigidly, **as directed**.
10. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:
 - a. On both sides of duct coils.
 - b. Upstream **OR** Upstream and downstream, **as directed**, from duct filters.
 - c. At outdoor-air intakes and mixed-air plenums.
 - d. At drain pans and seals.
 - e. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
 - f. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
 - g. At each change in direction and at maximum **50-foot (15-m)** spacing.
 - h. Upstream **OR** Upstream and downstream, **as directed**, from turning vanes.
 - i. Upstream or downstream from duct silencers.
 - j. Control devices requiring inspection.
 - k. Elsewhere as indicated.
11. Install access doors with swing against duct static pressure.
12. Access Door Sizes:
 - a. One-Hand or Inspection Access: **8 by 5 inches (200 by 125 mm)**.
 - b. Two-Hand Access: **12 by 6 inches (300 by 150 mm)**.
 - c. Head and Hand Access: **18 by 10 inches (460 by 250 mm)**.
 - d. Head and Shoulders Access: **21 by 14 inches (530 by 355 mm)**.
 - e. Body Access: **25 by 14 inches (635 by 355 mm)**.
 - f. Body plus Ladder Access: **25 by 17 inches (635 by 430 mm)**.
13. Label access doors according to Division 21 Section "Fire-suppression Systems Insulation" to indicate the purpose of access door.
14. Install flexible connectors to connect ducts to equipment.

15. For fans developing static pressures of **5-inch wg (1250 Pa)** and more, cover flexible connectors with loaded vinyl sheet held in place with metal straps.
16. Connect terminal units to supply ducts directly or, **as directed**, with maximum **12-inch (300-mm)** lengths of flexible duct. Do not use flexible ducts to change directions.
17. Connect diffusers or light troffer boots to ducts directly or, **as directed**, with maximum **60-inch (1500-mm)** lengths of flexible duct clamped or strapped in place.
18. Connect flexible ducts to metal ducts with adhesive **OR** liquid adhesive plus tape **OR** draw bands **OR** adhesive plus sheet metal screws, **as directed**.
19. Install duct test holes where required for testing and balancing purposes.
20. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of **1/4-inch (6-mm)** movement during start and stop of fans.

B. Field Quality Control

1. Tests and Inspections:
 - a. Operate dampers to verify full range of movement.
 - b. Inspect locations of access doors and verify that purpose of access door can be performed.
 - c. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
 - d. Inspect turning vanes for proper and secure installation.
 - e. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 31 13 19

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Task	Specification	Specification Description
23 31 13 19	23 31 13 13	HVAC Casings
23 31 13 19	23 31 13 13a	Metal Ducts
23 31 13 23	23 31 13 13	HVAC Casings
23 31 13 23	23 31 13 13a	Metal Ducts

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SECTION 23 31 16 13 - NONMETAL DUCTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for nonmetal ducts. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fibrous-glass ducts and fittings.
 - b. Phenolic-foam ducts and fittings.
 - c. Thermoset FRP ducts and fittings.
 - d. PVC ducts and fittings.

C. Performance Requirements

1. Delegated Duct Design: Duct construction, including duct closure, reinforcements, and hangers and supports, shall comply with SMACNA's "Fibrous Glass Duct Construction Standards" and performance requirements and design criteria indicated.
 - a. Static-Pressure Classes:
 - 1) Supply Ducts (except in Mechanical Rooms): 1-inch wg (250 Pa).
 - 2) Supply Ducts (Upstream from Air Terminal Units): 2-inch wg (500 Pa).
 - 3) Supply Ducts (Downstream from Air Terminal Units): 1-inch wg (250 Pa).
 - 4) Supply Ducts (in Mechanical Equipment Rooms): 2-inch wg (500 Pa).
 - 5) Return Ducts (Negative Pressure): 1-inch wg (250 Pa).
 - 6) Exhaust Ducts (Negative Pressure): 1-inch wg (250 Pa).
2. Structural Performance: Duct hangers and supports and seismic restraints, **as directed**, shall withstand the effects of gravity and seismic, **as directed**, loads and stresses within limits and under conditions to comply with ASCE/SEI 7 **OR** SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems", **as directed**.
 - a. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
OR
Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
OR
Seismic Hazard Level C: Seismic force to weight ratio, 0.15.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that duct systems comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
 - b. Product Data for Prerequisite EA 2: Documentation indicating that duct systems comply with ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
 - c. Leakage Test Report for Prerequisite EA 2: Documentation of work performed for compliance with ASHRAE/IESNA 90.1, Section 6.4.4.2.2 - "Duct Leakage Tests."
 - d. Duct-Cleaning Test Report for Prerequisite EQ 1: Documentation of work performed for compliance with ASHRAE 62.1, Section 7.2.4 - "Ventilation System Start-Up."
 - e. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings:

- a. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
 - b. Duct layout indicating sizes and pressure classes.
 - c. Elevation of top of ducts.
 - d. Dimensions of main duct runs from building grid lines.
 - e. Fittings.
 - f. Reinforcement and spacing.
 - g. Seam and joint construction.
 - h. Penetrations through fire-rated and other partitions.
 - i. Equipment installation based on equipment being used on Project.
 - j. Hangers and supports, including methods for duct and building attachment, seismic restraints, **as directed**, and vibration isolation.
4. Delegated-Design Submittal:
- a. Duct materials and thicknesses.
 - b. Joint and seam construction and sealing.
 - c. Reinforcement details and spacing.
 - d. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation, **as directed**, for selecting hangers and supports and seismic restraints, **as directed**.
5. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
- a. Duct installation in congested spaces, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
 - b. Suspended ceiling components.
 - c. Structural members to which duct will be attached.
 - d. Size and location of initial access modules for acoustical tile.
 - e. Penetrations of smoke barriers and fire-rated construction.
 - f. Items penetrating finished ceiling including the following:
 - 1) Lighting fixtures.
 - 2) Air outlets and inlets.
 - 3) Speakers.
 - 4) Sprinklers.
 - 5) Access panels.
 - 6) Perimeter moldings.
6. Welding certificates.
7. Field quality-control reports.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports **OR** AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports, **as directed**.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."
3. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."
4. NFPA Compliance:
 - a. NFPA 90A, "Installation of Air Conditioning and Ventilating Systems."
 - b. NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

1.2 PRODUCTS

A. Fibrous-Glass Ducts And Fittings

1. Fibrous-Glass Duct Materials: Resin-bonded fiberglass, faced on the outside surface with fire-resistant FSK vapor retarder and with a smooth fiberglass mat finish on the air-side surface.
 - a. Duct Board: Factory molded into rectangular boards.
 - b. Round Duct: Factory molded into straight round duct and smooth fittings.
 - c. Temperature Limits: **40 to 250 deg F (5 to 121 deg C)** inside ducts; **150 deg F (66 deg C)** ambient temperature surrounding ducts.
 - d. Maximum Thermal Conductivity: **0.24 Btu x in./h x sq. ft. x deg F (0.035 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
 - e. Moisture Absorption: Not exceeding 5 percent by weight at **120 deg F (49 deg C)** and 95 percent relative humidity for 96 hours when tested according to ASTM C 1104/C 1104M.
 - f. Permeability: **0.02 perms (1.15 ng/Pa x s x sq. m)** maximum when tested according to ASTM E 96/E 96M, Procedure A.
 - g. Antimicrobial Agent: Compound shall be tested for efficacy by an NRTL, and registered by the EPA for use in HVAC systems.
 - h. Noise-Reduction Coefficient: 0.65 minimum when tested according to ASTM C 423, Mounting A.
 - i. Required Markings: EI rating, UL label, and other markings required by UL 181 on each full sheet of duct board.
2. Closure Materials:
 - a. Pressure-Sensitive Tape: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-P," the manufacturer's name, and a date code.
 - 1) Tape: Aluminum foil-scrim tape imprinted with listing information.
 - 2) Minimum Tape Width: **2-1/2 inches (64 mm); 3 inches (76 mm)** for duct board thicker than **1 inch (25 mm)**.
 - 3) Staples: **1/2-inch (13-mm)** outward clinching, **2 inches (51 mm)** o.c. in tabs, one tab per joint.
 - 4) Water resistant.
 - 5) Mold and mildew resistant.
 - b. Heat-Activated Tape: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-H," the manufacturer's name, and a date code.
 - 1) Tape: Aluminum foil-scrim tape imprinted with listing information.
 - 2) Minimum Tape Width: **3 inches (76 mm)**.
 - 3) Heat-Sensitive Imprint: Printed indicator on tape to show proper heating during application has been achieved.
 - 4) Water resistant.
 - 5) Mold and mildew resistant.
 - c. Two-Part Tape Sealing System: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-M," the manufacturer's name, and a date code.
 - 1) Tape: Woven glass fiber impregnated with mineral gypsum.
 - 2) Minimum Tape Width: **3 inches (76 mm)**.
 - 3) Sealant: Modified styrene acrylic.
 - 4) Water resistant.
 - 5) Mold and mildew resistant.
 - 6) For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Fabrication:
 - a. Select joints, seams, transitions, elbows, and branch connections and fabricate according to SMACNA's "Fibrous Glass Duct Construction Standards," Chapter 2, "Specifications and Closure," and Chapter 4, "Fittings and Connections" **OR** NAIMA AH116, "Fibrous Glass Duct Construction Standards," Section II, "Fabrication of Straight Duct Modules," Section III, "Fabrication of Fittings from Modules or Flat Board," and Section IV, "Closure", **as directed**.
 - b. Fabricate 90-degree mitered elbows to include turning vanes.
 - c. Reinforcements: Comply with requirements in SMACNA's "Fibrous Glass Duct Construction Standards," Chapter 5, "Reinforcement" **OR** NAIMA AH116, "Fibrous Glass

Duct Construction Standards," Section V, "Reinforcement", **as directed**, for channel- and tie-rod reinforcement materials, spacing, and fabrication.

- d. Preformed Round Duct: Comply with NAIMA AH116, "Fibrous Glass Duct Construction Standards," Section VII, "Preformed Round Duct."

B. Phenolic-Foam Ducts And Fittings

1. Duct Panel: CFC-free phenolic-foam bonded on both sides with factory-applied **0.001-inch-(0.025-mm-)** thick, aluminum foil reinforced with fiberglass scrim.
 - a. Maximum Temperature: **158 deg F (70 deg C)** inside ducts or ambient temperature surrounding ducts.
 - b. Maximum Thermal Conductivity: **0.13 Btu x in./h x sq. ft. x deg F (0.019 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
 - c. Permeability: **0.0002 perms (0.0115 ng/Pa x s x sq. m)** maximum when tested according to ASTM E 96/E 96M, Procedure A.
 - d. Antimicrobial Agent: Compound shall be tested for efficacy by an NRTL, and registered by the EPA for use in HVAC systems.
 - e. Noise-Reduction Coefficient: 0.65 minimum when tested according to ASTM C 423, Mounting A.
 - f. Required Markings: UL label and other markings required by UL 181 on each full sheet of duct panel; UL ratings for closure materials.
2. Closure Materials:
 - a. V-Groove Adhesive: Silicone.
 - 1) For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Pressure-Sensitive Tape: Comply with UL 181A; imprinted by the manufacturer with the coding "181A-P," the manufacturer's name, and a date code.
 - 1) Tape: Aluminum foil tape imprinted with listing information.
 - 2) Minimum Tape Width: **3 inches (76 mm)**.
 - 3) Water resistant.
 - 4) Mold and mildew resistant.
 - c. Polymeric Sealing System:
 - 1) Structural Membrane: Woven glass fiber.
 - 2) Minimum Tape Width: **3 inches (76 mm)**.
 - 3) Sealant: Water based.
 - 4) Color: White.
 - 5) Water resistant.
 - 6) Mold and mildew resistant.
 - 7) For indoor applications, use sealant that has a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Fabrication:
 - a. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, access doors and panels, and damage repairs according to Knauf Insulation's "Knauf KoolDuct System Design Guide," Section 4, "Duct Construction," and Section 5, "Ductwork System General."
 - b. Fabricate 90-degree mitered elbows to include turning vanes.

C. Thermoset FRP Ducts And Fittings

1. Duct and Fittings:
 - a. Thermoset FRP Resin: Manufacture duct with resin that complies with UL 181, Class 1, maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested by an NRTL according to ASTM E 84.
 - b. Inner Liner: FSK liner rated by an NRTL to comply with UL 181, Class 1.
 - c. Round Duct: ASTM D 2996, Type I, Grade 2, Class E, filament-wound duct, minimum **0.125-inch (3.2-mm)** wall thickness, with tapered bell and spigot ends for adhesive joints, or plain ends with couplings.

- d. Round Fittings: Compression or spray-up/contact, molded of same material, pressure class, and joining method as duct.
 - e. Rectangular Fittings: Minimum **0.125-inch- (3.2-mm-)** thick flat sheet with fiberglass roving and resin-reinforced joints and seams.
 - f. Double-Wall Insulated Duct: Inner and outer duct complying with requirements for "Round Duct" description above. Polyurethane foam or isocyanurate insulation with maximum thermal conductivity of **0.14 Btu x in./h x sq. ft. x deg F (0.020 W/m x K)** at **75 deg F (24 deg C)** mean temperature.
2. Joining Materials: Roving and polyester resin.
 - a. Use fiberglass adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Fabrication:
 - a. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, and access doors and panels according to SMACNA's "Thermoset FRP Duct Construction Manual," Chapter 7, "Requirements."
 - b. Fabricate 90-degree rectangular mitered elbows to include turning vanes, 90-degree round elbows with a minimum of three segments for **12 inches (300 mm)** and smaller and a minimum of five segments for **14 inches (350 mm)** and larger.
 4. Drains: Formed drain pockets with a minimum of **NPS 1 (DN 25)** threaded pipe connections.
- D. PVC Ducts And Fittings
1. Duct and Fittings:
 - a. Round Duct: Comply with cell Classification 12454-B in ASTM D 1784, with external loading properties of ASTM D 2412.
 - b. Round Fittings: Socket end molded of same material, pressure class, and joining method as duct.
 - c. Rectangular Fittings: Minimum **0.125-inch- (3.2-mm-)** thick flat sheet with heat-formed corners and continuous welded butt joints.
 2. Joining Materials: PVC solvent cement complying with ASTM D 2564.
 - a. Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 3. Fabrication:
 - a. Fabricate joints, seams, transitions, reinforcement, elbows, branch connections, and access doors and panels according to SMACNA's "Thermoplastic Duct (PVC) Construction Manual," Chapter 3, "Standards of Construction for PVC Duct Systems."
 - b. Fabricate 90-degree rectangular mitered elbows to include turning vanes, 90-degree round elbows with a minimum of three segments for **12 inches (300 mm)** and smaller and a minimum of five segments for **14 inches (350 mm)** and larger.
 4. Drains: PVC drain pockets with a minimum of **NPS 1 (DN 25)** threaded PVC pipe connections.
- E. Hangers And Supports
1. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
 2. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
 3. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," **Table 4-1 (Table 4-1M)**, "Rectangular Duct Hangers Minimum Size," and Table 4-2, "Minimum Hanger Sizes for Round Duct."
 4. Steel Cables: ASTM A 603, galvanized **OR** ASTM A 492, stainless, **as directed**, steel with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
 5. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
 6. Trapeze and Riser Supports: Steel shapes complying with ASTM A 36/A 36M.

F. Seismic-Restraint Devices

1. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service **OR** the Office of Statewide Health Planning and Development for the State of California **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
2. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.
3. Restraint Cables: ASTM A 603, galvanized **OR** ASTM A 492, stainless, **as directed**, -steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.
4. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections **OR** Reinforcing steel angle clamped, **as directed**, to hanger rod.
5. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

1.3 EXECUTION

A. Duct Installation

1. Install ducts with fewest possible joints.
2. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.
3. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.
4. Install ducts with a clearance of **1 inch (25 mm)**, plus allowance for insulation thickness.
5. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges. Overlap openings on four sides by at least **1-1/2 inches (38 mm)**.
6. Where ducts pass through fire-rated interior partitions and exterior walls, install fire dampers. Comply with requirements in Division 23 Section "Air Duct Accessories" for fire and smoke dampers.
7. Protect duct interiors from the moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "Duct Cleanliness for New Construction Guidelines", **as directed**.
8. Install fibrous-glass ducts and fittings to comply with NAIMA AH116, "Fibrous Glass Duct Construction Standards" **OR** SMACNA's "Fibrous Glass Duct Construction Standards", **as directed**.
9. Install foam ducts and fittings to comply with Knauf Insulation's "Knauf KoolDuct System Design Guide."
10. Install thermoset FRP ducts and fittings to comply with SMACNA's "Thermoset FRP Duct Construction Manual."
11. Install PVC ducts and fittings to comply with SMACNA's "Thermoplastic Duct (PVC) Construction Manual."

B. Hanger And Support Installation

1. Install hangers and supports for fibrous-glass ducts and fittings to comply with SMACNA's "Fibrous Glass Duct Construction Standards," Chapter 6, "Hangers and Supports" **OR** NAIMA AH116, "Fibrous Glass Duct Construction Standards," Section VI, "Hangers and Supports", **as directed**.
2. Install hangers and supports for phenolic-foam ducts and fittings to comply with Knauf Insulation's "Knauf KoolDuct System Design Guide," Section 5, "Ductwork System General."

3. Install hangers and supports for thermoset FRP ducts and fittings to comply with SMACNA's "Thermoset FRP Duct Construction Manual," Chapter 7, "Requirements."
 4. Install hangers and supports for PVC ducts and fittings to comply with SMACNA's "Thermoplastic Duct (PVC) Construction Manual," Chapter 3, "Standards of Construction for PVC Duct Systems."
 5. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - a. Install concrete inserts before placing concrete.
 - b. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - c. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than **4 inches (100 mm)** thick.
 - d. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than **4 inches (100 mm)** thick.
 - e. Do not use powder-actuated concrete fasteners for seismic restraints.
 6. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.
- C. Seismic-Restraint-Device Installation
1. Install ducts with hangers and braces designed to support the duct and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" **OR ASCE/SEI 7, as directed.**
 - a. Space lateral supports a maximum of **40 feet (12 m)** o.c., and longitudinal supports a maximum of **80 feet (24 m)** o.c.
 - b. Brace a change of direction longer than **12 feet (3.7 m)**.
 2. Select sizes of components so strength will be adequate to carry present and future static and seismic loads within restraint device capacity.
 3. Install cables so they do not bend across edges of adjacent equipment or building structure.
 4. Install cable restraints where ducts are suspended with vibration isolators.
 5. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service **OR** the Office of Statewide Health Planning and Development for the State of California **OR** an agency acceptable to authorities having jurisdiction, **as directed.**
 6. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure to flanges of beams, to upper truss chords of bar joists, or to concrete members.
 7. Drilling for and Setting Anchors:
 - a. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the the Owner if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - b. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - c. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - d. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - e. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.
- D. Painting
1. Paint interior of thermoset FRP and PVC ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Division 07.
- E. Field Quality Control
1. Perform tests and inspections.
 2. Leakage Tests:

- a. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.
 - b. Test the following systems:
 - 1) Ducts with a Pressure Class Higher Than **3-Inch wg (750 Pa)**: Test representative duct sections, selected by the Owner from sections installed, **as directed**, totaling no less than 25 percent of total installed duct area for each designated pressure class.
 - 2) Supply Ducts with a Pressure Class of **2-Inch wg (500 Pa) OR 3-Inch wg (750 Pa) OR 4-Inch wg (1000 Pa)**, **as directed**, or Higher: Test representative duct sections, selected by the Owner from sections installed, **as directed**, totaling no less than 50 **OR** 100, **as directed**, percent of total installed duct area for each designated pressure class.
 - 3) Return Ducts with a Pressure Class of **2-Inch wg (500 Pa) OR 3-Inch wg (750 Pa) OR 4-Inch wg (1000 Pa)**, **as directed**, or Higher: Test representative duct sections, selected by the Owner from sections installed, **as directed**, totaling no less than 50 **OR** 100, **as directed**, percent of total installed duct area for each designated pressure class.
 - 4) Exhaust Ducts with a Pressure Class of **2-Inch wg (500 Pa) OR 3-Inch wg (750 Pa) OR 4-Inch wg (1000 Pa)**, **as directed**, or Higher: Test representative duct sections, selected by the Owner from sections installed, **as directed**, totaling no less than 50 **OR** 100, **as directed**, percent of total installed duct area for each designated pressure class.
 - 5) Outdoor Air Ducts with a Pressure Class of **2-Inch wg (500 Pa) OR 3-Inch wg (750 Pa) OR 4-Inch wg (1000 Pa)**, **as directed**, or Higher: Test representative duct sections, selected by the Owner from sections installed, **as directed**, totaling no less than 50 **OR** 100, **as directed**, percent of total installed duct area for each designated pressure class.
 - c. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
 - d. Test for leaks before applying external insulation.
 - e. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test entire system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure. Give seven days' advance notice for testing.
 3. Duct System Cleanliness Tests:
 - a. Visually inspect duct system to ensure that no visible contaminants are present.
 - b. Test sections of nonmetal duct system, chosen randomly by the Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."
 - 1) Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.
 4. Duct system will be considered defective if it does not pass tests and inspections.
 5. Prepare test and inspection reports.
- F. Duct Cleaning
1. Clean new **OR** existing **OR** new and existing, **as directed**, duct system(s) before testing, adjusting, and balancing.
 2. Use service openings for entry and inspection.
 - a. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch duct as recommended by duct manufacturer. Comply with Division 23 Section "Air Duct Accessories" for access panels and doors.
 - b. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
 - c. Remove and reinstall ceiling to gain access during the cleaning process.
 3. Particulate Collection and Odor Control:

- a. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
 - b. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.
 4. Clean the following components by removing surface contaminants and deposits:
 - a. Air outlets and inlets (registers, grilles, and diffusers).
 - b. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
 - c. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
 - d. Coils and related components.
 - e. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
 - f. Supply-air ducts, dampers, actuators, and turning vanes.
 - g. Dedicated exhaust and ventilation components and makeup air systems.
 5. Mechanical Cleaning Methodology:
 - a. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
 - b. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of ducts or duct accessories.
 - c. Clean fibrous-glass duct with HEPA vacuuming equipment; do not permit duct to get wet. Replace fibrous-glass duct that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
 - d. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
 - e. Provide drainage and cleanup for wash-down procedures.
 - f. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.
- G. Start Up
1. Air Balance: Comply with requirements in Division 23 Section "Testing, Adjusting, And Balancing For Hvac".
- H. Duct Schedule
1. Indoor Ducts and Fittings:
 - a. Fibrous-Glass Rectangular Ducts and Fittings:
 - 1) Minimum Flexural Rigidity: EI-475 **OR** 800 **OR** 1400, **as directed**.
 - 2) Minimum Board Thickness: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (51 mm), as directed.**
 - b. Fibrous-Glass Round Ducts and Fittings:
 - 1) Minimum Thickness: **1 inch (25 mm).**
 - c. Phenolic-Foam Rectangular Ducts and Fittings:
 - 1) Minimum Panel Thickness: **7/8 inch (22 mm) OR 1-3/32 inches (28 mm), as directed.**
 - 2) Aluminum Cladding: Minimum **0.025 inch (0.635 mm)** thick.
 2. Outdoor Ducts and Fittings:
 - a. Phenolic-Foam Rectangular Ducts and Fittings:
 - 1) Minimum Panel Thickness: **7/8 inch (22 mm) OR 1-3/32 inches (28 mm), as directed.**
 - 2) Aluminum Cladding: Minimum **0.032 inch (0.813 mm)** thick.

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- 3) Polymeric Sealing System: Coat ducts, including gang-nail couplings, grip flanges, and couplings.
 - b. Thermoset FRP Round Ducts and Fittings:
 - 1) Double-Wall Insulated Ducts: Minimum **5/8-inch (15.9-mm)** **OR** **7/8-inch (22.2-mm)**, **as directed**, insulation thickness.
 - c. PVC Round Ducts and Fittings:
3. Underground Ducts:
- a. Thermoset FRP Round Ducts and Fittings:
 - 1) Insulation Thickness: **1 inch (25 mm)**.
 - 2) Drain: Minimum **NPS 1 (DN 25)** PVC pipe with P-trap to air-gap drain.
 - b. PVC Round Ducts and Fittings:
 - 1) Drain: Minimum **NPS 1 (DN 25)** PVC pipe with P-trap to air-gap drain.

END OF SECTION 23 31 16 13

Task	Specification	Specification Description
23 31 16 13	23 31 13 13a	Metal Ducts
23 31 16 16	23 31 13 13a	Metal Ducts
23 31 16 16	23 31 16 13	Nonmetal Ducts
23 33 13 13	23 31 13 19	Duct Accessories
23 33 13 13	23 51 13 19	Draft Control Devices
23 33 13 16	23 31 13 19	Duct Accessories
23 33 13 33	23 31 13 19	Duct Accessories
23 33 13 43	23 31 13 19	Duct Accessories
23 33 23 00	23 31 13 19	Duct Accessories
23 33 33 00	23 31 13 19	Duct Accessories
23 33 43 00	23 31 13 19	Duct Accessories
23 33 46 00	23 31 13 13a	Metal Ducts
23 33 46 00	23 31 13 19	Duct Accessories
23 33 53 00	01 22 16 00	No Specification Required
23 33 53 00	23 31 13 13	HVAC Casings
23 33 53 00	23 31 13 13a	Metal Ducts
23 33 56 00	23 31 13 13a	Metal Ducts
23 33 56 00	23 31 13 19	Duct Accessories
23 33 59 00	23 31 13 19	Duct Accessories

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SECTION 23 34 13 00 - AXIAL FANS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for axial fans. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Tubeaxial fans.
 - b. Vaneaxial fans.
 - c. Mixed-flow fans.

C. Performance Requirements

1. Project Altitude: Base fan performance ratings on actual Project site elevations above sea level.
2. Operating Limits: Classify according to AMCA 99.

D. Submittals

1. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated and include the following:
 - a. Certified fan performance curves with system operating conditions indicated.
 - b. Certified fan sound-power ratings.
 - c. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - d. Material thickness and finishes, including color charts.
 - e. Dampers, including housings, linkages, and operators.
 - f. Fan speed controllers.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - c. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
3. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.
4. Field quality-control test reports.
5. Operation and Maintenance Data: For axial fans to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
3. NEMA Compliance: Motors and electrical accessories shall comply with NEMA standards.

F. Delivery, Storage, And Handling

1. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
2. Disassemble and reassemble units, as required for moving to final locations, according to manufacturer's written instructions.
3. Lift and support units with manufacturer's designated lifting or supporting points.

G. Coordination

1. Coordinate size and location of structural-steel support members.
2. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 31..
3. Coordinate installation of roof curbs, equipment supports, and roof penetrations. These items are specified in Division 07 Section "Roof Accessories".

1.2 PRODUCTS

A. Tubeaxial Fans

1. Description: Fan wheel and housing, factory-mounted motor with belt drive or direct drive, an inlet cone section, and accessories.
2. Housings: Steel **OR** Galvanized steel **OR** Aluminum **OR** Fiberglass-reinforced plastic **OR** Stainless steel, **as directed**, with flanged inlet and outlet connections.
3. Wheel Assemblies: Cast or extruded aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key **OR** Fiberglass-reinforced plastic cured under pressure with airfoil-shaped blades keyed to stainless steel shaft **OR** Cast aluminum, machined and fitted to shaft, **as directed**.
4. Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.2 **OR** 1.3 **OR** 1.4 **OR** 1.5, **as directed**.
 - b. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 - c. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
 - d. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - e. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - f. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
 - g. Motor Mount: Adjustable base.
 - h. Shaft Bearings: Radial, self-aligning ball or roller bearings.
 - 1) Ball-Bearing Rating Life: ABMA 9, L10 of 100,000 hours.
OR
Roller-Bearing Rating Life: ABMA 11, L10 of 100,000 hours.
 - 2) Extend lubrication lines to outside of casing and terminate with grease fittings.
5. Accessories:
 - a. Companion Flanges: Rolled flanges of same material as housing.
 - b. Inspection Door: Bolted door allowing limited access to internal parts of fan, of same material as housing.
 - c. Propeller Access Section Door: Short duct section bolted to fan inlet **OR** outlet **OR** inlet and outlet, **as directed**, allowing access to internal parts of fan for inspection and cleaning, of same material as housing.
 - d. Swingout Construction: Assembly allowing entire fan section to swing out from duct for cleaning and servicing, of same material as housing.
 - e. Mounting Clips: Horizontal ceiling **OR** Vertical mounting, **as directed**, clips welded to fan housing, of same material as housing.
 - f. Horizontal Support: Pair of supports bolted to fan housing, of same material as housing.
 - g. Vertical Support: Short duct section with welded brackets bolted to fan housing, of same material as housing.

- h. Inlet and Outlet Screens: Wire-mesh screen on fans not connected to ductwork, of same material as housing.
 - i. Backdraft Dampers: Butterfly style, for bolting to the discharge of fan or outlet cone, of same material as housing.
 - j. Shaft Seal: Elastomeric seal and Teflon wear plate, suitable for up to **300 deg F (149 deg C)**.
 - k. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
 - l. Inlet Vanes: Adjustable; with peripheral control linkage operated from outside of airstream, bronze sleeve bearings on each end of vane support, and provision for manual or automatic operation of same material as housing.
 - m. Inlet Bell: Curved inlet for when fan is not attached to duct, of same material as housing **OR aluminum, as directed.**
 - n. Inlet Cones: Round-to-round transition of same material as housing.
 - o. Outlet Cones: Round-to-round transition of same material as housing.
 - p. Stack Cap: Vertical discharge assembly with backdraft dampers, of same material as housing.
6. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- a. Enclosure Type: Totally enclosed, fan cooled **OR** Totally enclosed, nonventilated, **as directed.**
 - b. Direct-Driven Units: Encase motor in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing, **as directed.**
7. Factory Finishes:
- a. Sheet Metal Parts: Prime coat before final assembly.
 - b. Exterior Surfaces: Baked-enamel finish coat after assembly.
 - c. Coatings: Thermoplastic vinyl **OR** Epoxy **OR** Zinc **OR** Synthetic resin **OR** Phenolic **OR** Color-match enamel **OR** Polytetrafluoroethylene **OR** Vinyl ester **OR** Hot-dip galvanized **OR** Powder-baked enamel, **as directed.**
 - 1) Apply to finished housings.
 - 2) Apply to fan wheels.
- B. Vaneaxial Fans
- 1. Description: Fan wheel and housing, straightening vane section, factory-mounted motor with belt drive or direct drive, an inlet cone section, and accessories.
 - a. Variable-Pitch Fans: Internally mounted pneumatic **OR** electric **OR** electronic, **as directed**, actuator, externally mounted positive positioner, and mechanical-blade-pitch indicator.
 - 2. Housings: Steel **OR** Galvanized steel **OR** Aluminum **OR** Fiberglass-reinforced plastic **OR** Stainless steel, **as directed.**
 - a. Inlet and Outlet Connections: Flanges.
 - b. Guide Vane Section: Integral guide vanes downstream from fan wheel designed to straighten airflow.
 - 3. Wheel Assemblies: Cast aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key **OR** Fiberglass-reinforced plastic cured under pressure with airfoil-shaped blades keyed to stainless steel shaft **OR** Cast-aluminum hub assembly, machined and fitted with threaded bearing wells to receive blade-bearing assemblies with replaceable, cast-aluminum blades; factory mounted and balanced, **as directed.**
 - 4. Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.2 **OR** 1.3 **OR** 1.4 **OR** 1.5, **as directed.**
 - b. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 - c. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
 - d. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - e. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.

- f. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
 - g. Motor Mount: Adjustable base.
 - h. Shaft Bearings: Radial, self-aligning ball or roller bearings.
 - 1) Ball-Bearing Rating Life: ABMA 9, L10 of 100,000 hours.
OR
Roller-Bearing Rating Life: ABMA 11, L10 of 100,000 hours.
 - 2) Extend lubrication lines to outside of casing and terminate with grease fittings.
5. Accessories:
- a. Companion Flanges: Rolled flanges of same material as housing.
 - b. Inspection Door: Bolted door allowing limited access to internal parts of fan, of same material as housing.
 - c. Propeller Access Section Door: Short duct section bolted to fan inlet **OR** outlet **OR** inlet and outlet, **as directed**, allowing access to internal parts of fan for inspection and cleaning, of same material as housing.
 - d. Swingout Construction: Assembly allowing entire fan section to swing out from duct for cleaning and servicing, of same material as housing.
 - e. Mounting Clips: Horizontal ceiling **OR** Vertical mounting, **as directed**, clips welded to fan housing, of same material as housing.
 - f. Horizontal Support: Pair of supports bolted to fan housing, of same material as housing.
 - g. Vertical Support: Short duct section with welded brackets bolted to fan housing, of same material as housing.
 - h. Inlet and Outlet Screens: Wire-mesh screen on fans not connected to ductwork of same material as housing.
 - i. Backdraft Dampers: Butterfly style, for mounting with flexible connection to the discharge of fan or direct mounted to the discharge diffuser section of same material as housing.
 - j. Stall Alarm Probe: Sensing probe capable of detecting fan operation in stall and signaling control devices. Control devices and sequence of operation are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
 - k. Flow Measurement Port: Pressure measurement taps installed in the inlet of fan to detect and signal airflow readings to temperature-control systems. Control devices and sequence of operation are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
 - l. Shaft Seal: Elastomeric seal and Teflon wear plate, suitable for up to 300 deg F (148 deg C).
 - m. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
 - n. Inlet Vanes: Adjustable; with peripheral control linkage operated from outside of airstream, bronze sleeve bearings on each end of vane support, and provision for manual or automatic operation of same material as housing.
 - o. Inlet Bell: Curved inlet for when fan is not attached to duct, of same material as housing.
 - p. Inlet Cones: Round-to-round transition of same material as housing.
 - q. Outlet Cones: Round-to-round transition of same material as housing.
 - r. Stack Cap: Vertical discharge assembly with backdraft dampers, of same material as housing.
6. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- a. Enclosure Type: Totally enclosed, fan cooled **OR** Totally enclosed, nonventilated, **as directed**.
 - b. Direct-Driven Units: Encase motor in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing, **as directed**.
7. Factory Finishes:
- a. Sheet Metal Parts: Prime coat before final assembly.
 - b. Exterior Surfaces: Baked-enamel finish coat after assembly.

- c. Coatings: Thermoplastic vinyl **OR** Epoxy **OR** Zinc **OR** Synthetic resin **OR** Phenolic **OR** Color-match enamel **OR** Polytetrafluoroethylene **OR** Vinyl ester **OR** Hot-dip galvanized **OR** Powder-baked enamel, **as directed**.
 - 1) Apply to finished housings.
 - 2) Apply to fan wheels.
- C. Mixed-Flow Fans
1. Description: Fan wheel and housing, straightening vane section, **as directed**, factory-mounted motor with belt drive, and accessories.
 2. Housings: Steel **OR** Galvanized steel **OR** Aluminum, **as directed**.
 - a. Inlet and Outlet Connections: Outer mounting frame and companion flanges.
 - b. Guide Vane Section: Integral guide vanes downstream from fan wheel designed to straighten airflow.
 - c. Mixed-Flow Outlet Connection: One **OR** Two, **as directed**, flanged discharge(s) perpendicular to fan inlet.
 3. Wheel Assemblies: Cast aluminum with airfoil-shaped blades mounted on cast-iron wheel plate keyed to shaft with solid-steel key.
 4. Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.2 **OR** 1.3 **OR** 1.4 **OR** 1.5, **as directed**.
 - b. Fan Shaft: Turned, ground, and polished steel designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 - c. Fan Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
 - d. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - e. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - f. Motor Mount: Adjustable base.
 - g. Shaft Bearings: Radial, self-aligning ball or roller bearings.
 - 1) Ball-Bearing Rating Life: ABMA 9, L10 of 100,000 hours.
OR
Roller-Bearing Rating Life: ABMA 11, L10 of 100,000 hours.
 - 2) Extend lubrication lines to outside of casing and terminate with grease fittings.
 5. Accessories:
 - a. Mounting Clips: Horizontal ceiling **OR** Vertical mounting, **as directed**, clips welded to fan housing, of same material as housing.
 - b. Inlet and Outlet Screens: Wire-mesh screen on fans not connected to ductwork of same material as housing.
 - c. Backdraft Dampers: Butterfly style, for mounting with flexible connection to the discharge of fan or direct mounted to the discharge diffuser section of same material as housing.
 - d. Motor Cover: Cover with side vents to dissipate motor heat, of same material as housing.
 - e. Inlet Bell: Curved inlet for when fan is not attached to duct, of same material as housing.
 - f. Inlet Cones: Round-to-round transition of same material as housing.
 - g. Outlet Cones: Round-to-round transition of same material as housing.
 - h. Stack Cap: Vertical discharge assembly with backdraft dampers, of same material as housing.
 6. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Enclosure Type: Totally enclosed, fan cooled **OR** Totally enclosed, nonventilated, **as directed**.
 - b. Direct-Driven Units: Encase motor in housing outside of airstream, factory wired to disconnect switch located on outside of fan housing.
 7. Factory Finishes:
 - a. Sheet Metal Parts: Prime coat before final assembly.
 - b. Exterior Surfaces: Baked-enamel finish coat after assembly.

- c. Coatings: Thermoplastic vinyl **OR** Epoxy **OR** Zinc **OR** Synthetic resin **OR** Phenolic **OR** Color-match enamel **OR** Polytetrafluoroethylene **OR** Vinyl ester **OR** Hot-dip galvanized **OR** Powder-baked enamel, **as directed**.
 - 1) Apply to finished housings.
 - 2) Apply to fan wheels.

D. Source Quality Control

- 1. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- 2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

1.3 EXECUTION

A. Installation

- 1. Install axial fans level and plumb.
- 2. Support floor-mounting units using spring isolators **OR** restrained spring isolators, **as directed**, having a static deflection of **1 inch (25 mm)**. Vibration- and seismic-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.
- 3. Install floor-mounting units on concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-place Concrete".
- 4. Install floor-mounting units on concrete bases designed to withstand, without damage to equipment, the seismic force required by authorities having jurisdiction. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-place Concrete".
- 5. Support suspended units from structure using threaded steel rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stops, **as directed**, having a static deflection of **1 inch (25 mm)**. Vibration-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- 6. Install units with clearances for service and maintenance.
- 7. Label fans according to requirements specified in Division 23 Section "Identification For Hvac Piping And Equipment".

B. Connections

- 1. Duct installation and connection requirements are specified in other Division 21. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories".
- 2. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
- 3. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

- 1. Perform the following field tests and inspections and prepare test reports:
 - a. Verify that shipping, blocking, and bracing are removed.
 - b. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - c. Verify that cleaning and adjusting are complete.

- d. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - e. Adjust belt tension.
 - f. Adjust damper linkages for proper damper operation.
 - g. Verify lubrication for bearings and other moving parts.
 - h. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - i. Disable automatic temperature-control operators, energize motor and confirm proper motor rotation and unit operation, adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - j. Shut unit down and reconnect automatic temperature-control operators.
 - k. Remove and replace malfunctioning units and retest as specified above.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Adjusting
1. Adjust damper linkages for proper damper operation.
 2. Adjust belt tension.
 3. Lubricate bearings.

END OF SECTION 23 34 13 00

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SECTION 23 34 16 00 - CENTRIFUGAL FANS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for centrifugal fans. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Airfoil centrifugal fans.
 - b. Backward-inclined centrifugal fans.
 - c. Forward-curved centrifugal fans.
 - d. Plenum fans.
 - e. Plug fans.

C. Performance Requirements

1. Project Altitude: Base fan performance ratings on actual Project site elevations above sea level.
2. Operating Limits: Classify according to AMCA 99.

D. Submittals

1. Product Data: Include rated capacities, furnished specialties, and accessories for each type of product indicated.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Field quality-control test reports.
4. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. AMCA Compliance: Products shall comply with performance requirements and shall be licensed to use the AMCA-Certified Ratings Seal.
3. NEMA Compliance: Motors and electrical accessories shall comply with NEMA 1.

F. Delivery, Storage, And Handling

1. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations, with protective crating and covering.
2. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.
3. Lift and support units with manufacturer's designated lifting or supporting points.

1.2 PRODUCTS

A. Airfoil Centrifugal Fans

1. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, **as directed**, drive assembly, and support structure.

2. Housings: Formed panels to make curved-scroll housings with shaped cutoff, with doors or panels to allow access to internal parts and components.
 - a. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
 - b. Horizontally split, bolted-flange housing.
 - c. Spun inlet cone with flange.
 - d. Outlet flange.
3. Airfoil Wheels: Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange; heavy backplate; hollow die-formed, airfoil-shaped blades continuously welded at tip flange and backplate; and cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws; and special coating, **as directed**.
4. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - a. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
 - b. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
5. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
6. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
7. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
8. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.5 **OR** 1.4 **OR** 1.3 **OR** 1.2, **as directed**.
 - b. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - c. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - d. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - e. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
 - f. Motor Mount: Adjustable for belt tensioning.
9. Accessories:
 - a. Scroll Access Doors: Shaped to conform to scroll, with quick-opening latches and gaskets.
 - b. Cleanout Door: Bolted **OR** Quick-opening, latch-type, **as directed**, gasketed door allowing access to fan scroll, of same material as housing.
 - c. Scroll Drain Connection: **NPS 1 (DN 25)** steel pipe coupling welded to low point of fan scroll.
 - d. Companion Flanges: Rolled flanges for duct connections of same material as housing.
 - e. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
 - f. Discharge Dampers: Assembly with parallel **OR** opposed, **as directed**, blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.

- g. Inlet Screens: Grid screen of same material as housing.
 - h. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
 - i. Spark-Resistant Construction: AMCA 99.
 - j. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
 - k. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.
 - 10. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Enclosure Type: Totally enclosed, fan cooled.
- B. Backward-Inclined Centrifugal Fans**
1. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and support structure.
 2. Housings: Formed panels to make curved-scroll housings with shaped cutoff; with doors or panels to allow access to internal parts and components.
 - a. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
 - b. Spun inlet cone with flange.
 - c. Outlet flange.
 3. Backward-Inclined Wheels: Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate, **as directed**, and fastened to shaft with set screws.
 4. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - a. Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
 - b. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 5. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 6. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 7. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 8. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.5 **OR** 1.4 **OR** 1.3 **OR** 1.2, **as directed**].
 - b. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - c. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - d. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - e. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
 - f. Motor Mount: Adjustable for belt tensioning.
 9. Accessories:

- a. Scroll Access Doors: Shaped to conform to scroll, with quick-opening latches and gaskets.
 - b. Cleanout Door: Bolted **OR** Quick-opening, latch-type, **as directed**, gasketed door allowing access to fan scroll, of same material as housing.
 - c. Scroll Drain Connection: **NPS 1 (DN 25)** steel pipe coupling welded to low point of fan scroll.
 - d. Companion Flanges: Rolled flanges for duct connections of same material as housing.
 - e. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
 - f. Discharge Dampers: Assembly with parallel **OR** opposed, **as directed**, blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
 - g. Inlet Screens: Grid screen of same material as housing.
 - h. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
 - i. Spark-Resistant Construction: AMCA 99.
 - j. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
 - k. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.
10. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- a. Enclosure Type: Totally enclosed, fan cooled.

C. Forward-Curved Centrifugal Fans

1. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, **as directed**, drive assembly, and support structure.
2. Housings: Formed panels to make curved-scroll housings with shaped cutoff; with doors or panels to allow access to internal parts and components.
 - a. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
 - b. Horizontally split, bolted-flange housing.
 - c. Spun inlet cone with flange.
 - d. Outlet flange.
3. Forward-Curved Wheels: Black-enameled or galvanized steel construction with inlet flange, backplate, shallow blades with inlet and tip curved forward in direction of airflow, mechanically secured to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.
4. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - a. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
 - b. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
5. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
6. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
7. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.

8. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.5.
 - b. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - c. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - d. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - e. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
 - f. Motor Mount: Adjustable for belt tensioning.
 9. Accessories:
 - a. Scroll Access Doors: Shaped to conform to scroll, with quick-opening latches and gaskets.
 - b. Cleanout Door: Bolted **OR** Quick-opening, latch-type, **as directed**, gasketed door allowing access to fan scroll, of same material as housing.
 - c. Scroll Drain Connection: **NPS 1 (DN 25)** steel pipe coupling welded to low point of fan scroll.
 - d. Companion Flanges: Rolled flanges for duct connections of same material as housing.
 - e. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
 - f. Discharge Dampers: Assembly with parallel **OR** opposed, **as directed**, blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
 - g. Inlet Screens: Grid screen of same material as housing.
 - h. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
 - i. Spark-Resistant Construction: AMCA 99.
 - j. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
 - k. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.
 10. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Enclosure Type: Totally enclosed, fan cooled.
- D. Plenum Fans
1. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of wheel, fan shaft, bearings, motor and disconnect switch, **as directed**, drive assembly, and support structure.
 2. Airfoil Wheels: Single-width-single-inlet construction with smooth-curved inlet flange; heavy backplate; hollow die-formed, airfoil-shaped blades continuously welded at tip flange and backplate; and cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws; and special coating.
 3. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - a. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
 - b. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 4. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 5. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.

- a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
- b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
6. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
7. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.5 **OR** 1.4 **OR** 1.3 **OR** 1.2, **as directed**.
 - b. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - c. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - d. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - e. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
 - f. Motor Mount: Adjustable for belt tensioning.
8. Accessories:
 - a. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
 - b. Spark-Resistant Construction: AMCA 99.
 - c. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
9. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Enclosure Type: Totally enclosed, fan cooled.

E. Plug Fans

1. Description: Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of wheel, fan shaft, bearings, motor and disconnect switch, **as directed**, drive assembly, and support structure.
2. Airfoil Wheels: Single-width-single-inlet construction with smooth-curved inlet flange; heavy backplate; hollow die-formed, airfoil-shaped blades continuously welded at tip flange and backplate; and cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws; and special coating, **as directed**.
3. Shafts: Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - a. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
 - b. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
4. Prelubricated and Sealed Shaft Bearings: Self-aligning, pillow-block-type ball bearings.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
5. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
6. Grease-Lubricated Shaft Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
 - a. Ball-Bearing Rating Life: ABMA 9, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
 - b. Roller-Bearing Rating Life: ABMA 11, L10 at 50,000 hours **OR** 120,000 hours, **as directed**.
7. Belt Drives: Factory mounted, with final alignment and belt adjustment made after installation.

- a. Service Factor Based on Fan Motor Size: 1.5 **OR** 1.4 **OR** 1.3 **OR** 1.2, **as directed**.
 - b. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - c. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - d. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - e. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
 - f. Motor Mount: Adjustable for belt tensioning.
8. Accessories:
- a. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
 - b. Spark-Resistant Construction: AMCA 99.
 - c. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
9. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- a. Enclosure Type: Totally enclosed, fan cooled.

F. Source Quality Control

1. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

1.3 EXECUTION

A. Installation

1. Install centrifugal fans level and plumb.
2. Support floor-mounting units using spring isolators **OR** restrained spring isolators, **as directed**, having a static deflection of **1 inch (25 mm)**. Vibration- and seismic-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.
3. Install floor-mounting units on concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-place Concrete".
4. Install floor-mounting units on concrete bases designed to withstand, without damage to equipment, the seismic force required by authorities having jurisdiction. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-place Concrete".
5. Support suspended units from structure using threaded steel rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stops, **as directed**, having a static deflection of **1 inch (25 mm)**. Vibration-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
6. Install units with clearances for service and maintenance.
7. Label fans according to requirements specified in Division 23 Section "Identification For Hvac Piping And Equipment".

B. Connections

1. Duct installation and connection requirements are specified in other Division 21. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with

flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories".

2. Install ducts adjacent to fans to allow service and maintenance.
3. Install line-sized piping from scroll drain connection, with trap with seal equal to 1.5 times specified static pressure, to nearest floor drain.
4. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
5. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Perform the following field tests and inspections and prepare test reports:
 - a. Verify that shipping, blocking, and bracing are removed.
 - b. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - c. Verify that cleaning and adjusting are complete.
 - d. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - e. Adjust belt tension.
 - f. Adjust damper linkages for proper damper operation.
 - g. Verify lubrication for bearings and other moving parts.
 - h. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - i. Refer to Division 23 Section "Testing, Adjusting, And Balancing For Hvac" for testing, adjusting, and balancing procedures.
 - j. Remove and replace malfunctioning units and retest as specified above.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 23 34 16 00



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 34 16 00	01 22 16 00	No Specification Required
23 34 16 00	23 34 23 00	Power Ventilators

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SECTION 23 34 23 00 - POWER VENTILATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for power ventilators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Utility set fans.
 - b. Centrifugal roof ventilators.
 - c. Axial roof ventilators.
 - d. Upblast propeller roof exhaust fans.
 - e. Centrifugal wall ventilators.
 - f. Ceiling-mounting ventilators.
 - g. In-line centrifugal fans.
 - h. Propeller fans.

C. Performance Requirements

1. Project Altitude: Base fan-performance ratings on actual Project site elevations **OR** sea level, **as directed**.
2. Operating Limits: Classify according to AMCA 99.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Also include the following:
 - a. Certified fan performance curves with system operating conditions indicated.
 - b. Certified fan sound-power ratings.
 - c. Motor ratings and electrical characteristics, plus motor and electrical accessories.
 - d. Material thickness and finishes, including color charts.
 - e. Dampers, including housings, linkages, and operators.
 - f. Roof curbs.
 - g. Fan speed controllers.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Delegated-Design Submittal: For unit hangars and supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
4. Field quality-control reports.
 - a. Operation and Maintenance Data: For power ventilators to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended use.
2. AMCA Compliance: Fans shall have AMCA-Certified performance ratings and shall bear the AMCA-Certified Ratings Seal.
3. UL Standard: Power ventilators shall comply with UL 705. Power ventilators for use for restaurant kitchen exhaust shall also comply with UL 762.

1.2 PRODUCTS

A. Utility Set Fans

1. Description: Direct **OR** Belt, **as directed**, -driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.
2. Housing: Fabricated of galvanized, **as directed**, steel with side sheets fastened with a deep lock seam or welded to scroll sheets.
 - a. Housing Discharge Arrangement: Adjustable to eight standard positions.
3. Fan Wheels: Single-width, single inlet; welded to cast-iron or cast-steel hub and spun-steel inlet cone, with hub keyed to shaft.
 - a. Blade Materials: Steel **OR** Aluminum, **as directed**.
 - b. Blade Type: Backward inclined **OR** Forward curved **OR** Airfoil, **as directed**.
 - c. Spark-Resistant Construction: AMCA 99, Type A **OR** B **OR** C, **as directed**.
4. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
5. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings with ABMA 9, L₅₀ of 200,000 hours **OR** L₁₀ of 80,000 hours, **as directed**.
6. Belt Drives:
 - a. Factory mounted, with final alignment and belt adjustment made after installation.
 - b. Service Factor Based on Fan Motor Size: 1.5 **OR** 1.4 **OR** 1.3 **OR** 1.2, **as directed**.
 - c. Motor Pulleys: Adjustable pitch for use with motors through 5, **as directed**, hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - d. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - e. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
7. Accessories:
 - a. Inlet and Outlet: Flanged.
 - b. Companion Flanges: Rolled flanges for duct connections of same material as housing.
 - c. Backdraft Dampers: Gravity actuated with counterweight and interlocking aluminum blades with felt edges in steel frame installed on fan discharge.
 - d. Access Door: Gasketed door in scroll with latch-type handles.
 - e. Scroll Dampers: Single-blade damper installed at fan scroll top with adjustable linkage.
 - f. Inlet Screens: Removable wire mesh.
 - g. Drain Connections: **NPS 3/4 (DN 20)** threaded coupling drain connection installed at lowest point of housing.
 - h. Weather Hoods: Weather resistant with stamped vents over motor and drive compartment.
 - i. Discharge Dampers: Assembly with parallel **OR** opposed, **as directed**, blades constructed of two plates formed around and to shaft, channel frame, sealed ball bearings, with blades linked outside of airstream to single control lever of same material as housing.
 - j. Variable Inlet Vanes: With blades supported at both ends with two permanently lubricated bearings of same material as housing. Variable mechanism terminating in single control lever with control shaft for double-width fans.
 - k. Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.

B. Centrifugal Roof Ventilators

1. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.

2. Housing: Removable, spun-aluminum, dome top and outlet baffle **OR** extruded-aluminum, rectangular top **OR** galvanized steel, mushroom-domed top, **as directed**; square, one-piece, aluminum base with venturi inlet cone.
 - a. Upblast Units: Provide spun-aluminum discharge baffle to direct discharge air upward, with rain and snow drains and grease collector, **as directed**.
 - b. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
 3. Fan Wheels: Aluminum hub and wheel with backward-inclined blades.
 4. Belt-Driven Drive:
 - a. Resiliently mounted to housing.
 - b. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - c. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - d. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - e. Fan and motor isolated from exhaust airstream.
 5. Accessories:
 - a. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - b. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside **OR** outside, **as directed**, fan housing, factory wired through an internal aluminum conduit.
 - c. Bird Screens: Removable, **1/2-inch (13-mm)** mesh, aluminum or brass wire.
 - d. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 - e. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 6. Roof Curbs: Galvanized steel; mitered and welded corners; **1-1/2-inch- (40-mm-)** thick, rigid, fiberglass insulation adhered to inside walls; and **1-1/2-inch (40-mm)** wood nailer. Size as required to suit roof opening and fan base.
 - a. Configuration: Self-flashing without a cant strip, with mounting flange **OR** Built-in cant and mounting flange **OR** Built-in raised cant and mounting flange, **as directed**.
 - b. Overall Height: **8 inches (200 mm) OR 9-1/2 inches (240 mm) OR 12 inches (300 mm) OR 16 inches (400 mm) OR 18 inches (450 mm)**, **as directed**.
 - c. Sound Curb: Curb with sound-absorbing insulation matrix.
 - d. Pitch Mounting: Manufacture curb for roof slope.
 - e. Metal Liner: Galvanized steel.
 - f. Burglar Bars: **1/2-inch- (13-mm-) OR 5/8-inch- (16-mm-) OR 3/4-inch- (19-mm-)**, **as directed**, thick steel bars welded in place to form **6-inch (150-mm)** squares.
 - g. Mounting Pedestal: Galvanized steel with removable access panel.
 - h. Vented Curb: Unlined with louvered vents in vertical sides.
- C. Axial Roof Ventilators
1. Description: Direct- or belt-driven axial fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
 2. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; square, one-piece, hinged, aluminum base.
 - a. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
 3. Fan Wheel: Aluminum **OR** Steel, **as directed**, hub and blades.
 4. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
 - a. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - b. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - c. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 5. Accessories:
 - a. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside **OR** outside, **as directed**, fan housing, factory wired through an internal aluminum conduit.
 - b. Bird Screens: Removable, **1/2-inch (13-mm)** mesh, aluminum or brass wire.

- c. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in curb base; factory set to close when fan stops.
 - d. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
 6. Roof Curbs: Galvanized steel; mitered and welded corners; **1-1/2-inch- (40-mm-)** thick, rigid, fiberglass insulation adhered to inside walls; and **1-1/2-inch (40-mm)** wood nailer. Size as required to suit roof opening and fan base.
 - a. Configuration: Self-flashing without a cant strip, with mounting flange **OR** Built-in cant and mounting flange **OR** Built-in raised cant and mounting flange, **as directed**.
 - b. Overall Height: **8 inches (200 mm) OR 9-1/2 inches (240 mm) OR 12 inches (300 mm) OR 16 inches (400 mm) OR 18 inches (450 mm), as directed.**
 - c. Sound Curb: Curb with sound-absorbing insulation matrix.
 - d. Pitch Mounting: Manufacture curb for roof slope.
 - e. Metal Liner: Galvanized steel.
 - f. Burglar Bars: **1/2-inch- (13-mm-) OR 5/8-inch- (16-mm-) OR 3/4-inch- (19-mm-), as directed,** thick steel bars welded in place to form **6-inch (150-mm)** squares.
 - g. Mounting Pedestal: Galvanized steel with removable access panel.
- D. Upblast Propeller Roof Exhaust Fans
1. Description: Direct- or belt-driven propeller fans consisting of housing, wheel, butterfly-type discharge damper, fan shaft, bearings, motor and disconnect switch, drive assembly, curb base, and accessories.
 2. Wind Band, Fan Housing, and Base: Reinforced and braced galvanized steel **OR** aluminum, **as directed**, containing galvanized-steel **OR** aluminum, **as directed**, butterfly dampers and rain trough, motor and drive assembly, and fan wheel.
 - a. Damper Rods: Steel with bronze **OR** nylon, **as directed**, bearings.
 - b. Hinged Subbase: Galvanized-steel hinged arrangement permitting service and maintenance.
 3. Fan Wheel: Replaceable, cast **OR** extruded, **as directed**,-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.
 4. Belt-Driven Drive Assembly: Resiliently mounted to housing; weatherproof housing of same material as fan housing with the following features:
 - a. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - b. Shaft Bearings: Prelubricated and sealed, self-aligning, pillow-block-type ball bearings.
 - c. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - d. Motor Mount: On outside of fan cabinet, adjustable base for belt tensioning.
 5. Roof Curbs: Galvanized steel; mitered and welded corners; **1-1/2-inch- (40-mm-)** thick, rigid, fiberglass insulation adhered to inside walls; and **1-1/2-inch (40-mm)** wood nailer. Size as required to suit roof opening and fan base.
 - a. Configuration: Self-flashing without a cant strip, with mounting flange **OR** Built-in cant and mounting flange **OR** Built-in raised cant and mounting flange, **as directed**.
 - b. Overall Height: **8 inches (200 mm) OR 9-1/2 inches (240 mm) OR 12 inches (300 mm) OR 16 inches (400 mm) OR 18 inches (450 mm), as directed.**
 - c. Sound Curb: Curb with sound-absorbing insulation matrix.
 - d. Pitch Mounting: Manufacture curb for roof slope.
 - e. Metal Liner: Galvanized steel.
 - f. Burglar Bars: **1/2-inch- (13-mm-) OR 5/8-inch- (16-mm-) OR 3/4-inch- (19-mm-), as directed,** thick steel bars welded in place to form **6-inch (150-mm)** squares.
 - g. Mounting Pedestal: Galvanized steel with removable access panel.
- E. Centrifugal Wall Ventilators
1. Description: Direct- or belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor and disconnect switch, drive assembly, and accessories.
 2. Housing: Heavy-gage, removable, spun-aluminum, dome top and outlet baffle; venturi inlet cone.
 3. Fan Wheel: Aluminum hub and wheel with backward-inclined blades.

4. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
 - a. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - b. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - c. Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - d. Fan and motor isolated from exhaust airstream.
 5. Accessories:
 - a. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - b. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through internal aluminum conduit.
 - c. Bird Screens: Removable, **1/2-inch (13-mm)** mesh, aluminum or brass wire.
 - d. Wall Grille: Ring type for flush mounting.
 - e. Dampers: Counterbalanced, parallel-blade, backdraft dampers mounted in wall sleeve; factory set to close when fan stops.
 - f. Motorized Dampers: Parallel-blade dampers mounted in curb base with electric actuator; wired to close when fan stops.
- F. Ceiling-Mounting Ventilators
1. Description: Centrifugal fans designed for installing in ceiling or wall or for concealed in-line applications.
 2. Housing: Steel, lined with acoustical insulation.
 3. Fan Wheel: Centrifugal wheels directly mounted on motor shaft. Fan shrouds, motor, and fan wheel shall be removable for service.
 4. Grille: Plastic **OR** Stainless steel **OR** Aluminum **OR** Painted aluminum, **as directed**, louvered grille with flange on intake and thumbscrew attachment to fan housing.
 5. Electrical Requirements: Junction box for electrical connection on housing and receptacle for motor plug-in.
 6. Accessories:
 - a. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - b. Manual Starter Switch: Single-pole rocker switch assembly with cover and pilot light.
 - c. Time-Delay Switch: Assembly with single-pole rocker switch, timer, and cover plate.
 - d. Motion Sensor: Motion detector with adjustable shutoff timer.
 - e. Ceiling Radiation Damper: Fire-rated assembly with ceramic blanket, stainless-steel springs, and fusible link.
 - f. Filter: Washable aluminum to fit between fan and grille.
 - g. Isolation: Rubber-in-shear vibration isolators.
 - h. Manufacturer's standard roof jack or wall cap, and transition fittings.
- G. In-Line Centrifugal Fans
1. Description: In-line, direct **OR** belt, **as directed**,-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
 2. Housing: Split, spun aluminum with aluminum straightening vanes, inlet and outlet flanges, and support bracket adaptable to floor, side wall, or ceiling mounting.
 3. Direct-Driven Units: Motor mounted in airstream, factory wired to disconnect switch located on outside of fan housing; with wheel, inlet cone, and motor on swing-out service door, **as directed**.
 4. Belt-Driven Units: Motor mounted on adjustable base, with adjustable sheaves, enclosure around belts within fan housing, and lubricating tubes from fan bearings extended to outside of fan housing.
 5. Fan Wheels: Aluminum, airfoil blades welded to aluminum hub.
 6. Accessories:
 - a. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - b. Volume-Control Damper: Manually operated with quadrant lock, located in fan outlet.
 - c. Companion Flanges: For inlet and outlet duct connections.

- d. Fan Guards: **1/2- by 1-inch (13- by 25-mm)** mesh of galvanized steel in removable frame. Provide guard for inlet or outlet for units not connected to ductwork.
- e. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

H. Propeller Fans

- 1. Description: Direct- or belt-driven propeller fans consisting of fan blades, hub, housing, orifice ring, motor, drive assembly, and accessories.
- 2. Housing: Galvanized-steel sheet with flanged edges and integral orifice ring with baked-enamel finish coat applied after assembly.
- 3. Steel Fan Wheels: Formed-steel blades riveted to heavy-gage steel spider bolted to cast-iron hub.
- 4. Fan Wheel: Replaceable, cast **OR** extruded, **as directed**,-aluminum, airfoil blades fastened to cast-aluminum hub; factory set pitch angle of blades.
- 5. Belt-Driven Drive Assembly: Resiliently mounted to housing, statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with final alignment and belt adjustment made after installation.
 - a. Service Factor Based on Fan Motor Size: 1.4.
 - b. Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - c. Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 1) Ball-Bearing Rating Life: ABMA 9, L₁₀ of 100,000 hours.
 - d. Pulleys: Cast iron with split, tapered bushing; dynamically balanced at factory.
 - e. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - f. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
 - g. Belt Guards: Fabricate of steel for motors mounted on outside of fan cabinet.
- 6. Accessories:
 - a. Gravity Shutters: Aluminum blades in aluminum frame; interlocked blades with nylon bearings.
 - b. Motor-Side Back Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.
 - c. Wall Sleeve: Galvanized steel to match fan and accessory size.
 - d. Weathershield Hood: Galvanized steel to match fan and accessory size.
 - e. Weathershield Front Guard: Galvanized steel with expanded metal screen.
 - f. Variable-Speed Controller: Solid-state control to reduce speed from 100 to less than 50 percent.
 - g. Disconnect Switch: Nonfusible type, with thermal-overload protection mounted inside fan housing, factory wired through an internal aluminum conduit.

I. Motors

- 1. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- 2. Enclosure Type: Open dripproof **OR** Totally enclosed, fan cooled, **as directed**.

J. Source Quality Control

- 1. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.
- 2. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210, "Laboratory Methods of Testing Fans for Rating."

1.3 EXECUTION

A. Installation

1. Install power ventilators level and plumb.
2. Support units using elastomeric mounts **OR** restrained elastomeric mounts **OR** spring isolators **OR** restrained spring isolators, **as directed**, having a static deflection of **1 inch (25 mm)**. Vibration- and seismic-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Secure vibration and seismic controls to concrete bases using anchor bolts cast in concrete base.
3. For projects not in seismic areas, install floor-mounting units on concrete bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-place Concrete".
4. For projects in seismic areas, install floor-mounting units on concrete bases designed to withstand, without damage to equipment, the seismic force required by code. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-place Concrete".
5. Secure roof-mounting fans to roof curbs with cadmium-plated hardware. Refer to Division 07 Section "Roof Accessories" for installation of roof curbs.
6. Ceiling Units: Suspend units from structure; use steel wire or metal straps.
7. Support suspended units from structure using threaded steel rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stops, **as directed**, having a static deflection of **1 inch (25 mm)**. Vibration-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
8. Install units with clearances for service and maintenance.
9. Label units according to requirements specified in Division 23 Section "Identification For Hvac Piping And Equipment".
10. Duct installation and connection requirements are specified in other Division 21. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Division 23 Section "Air Duct Accessories".
11. Install ducts adjacent to power ventilators to allow service and maintenance.
12. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
13. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

B. Field Quality Control

1. Perform the following field tests and inspections and prepare test reports:
 - a. Verify that shipping, blocking, and bracing are removed.
 - b. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - c. Verify that cleaning and adjusting are complete.
 - d. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
 - e. Adjust belt tension.
 - f. Adjust damper linkages for proper damper operation.
 - g. Verify lubrication for bearings and other moving parts.
 - h. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
 - i. Disable automatic temperature-control operators, energize motor and adjust fan to indicated rpm, and measure and record motor voltage and amperage.
 - j. Shut unit down and reconnect automatic temperature-control operators.
 - k. Remove and replace malfunctioning units and retest as specified above.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 23 34 23 00

SECTION 23 34 33 00 - AIR CURTAINS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for air curtains. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes air curtains with hot-water heat, steam heat, electric heat, and gas-fired heater.

C. Submittals

1. Product Data: Include rated capacities, furnished specialties, and accessories for each unit indicated.
2. Shop Drawings: For air curtains. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Delegated-Design Submittal: For air curtains indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of air-curtain mounting assemblies.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints.
4. Operation and maintenance data: For air curtains to include in maintenance manuals.
5. Warranties: Sample of special warranties.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified and marked for intended location and application.
2. Comply with AMCA 220, "Laboratory Methods of Testing Air Curtains for Aerodynamic Performance Ratings," for airflow, outlet velocity, and power consumption.
3. Comply with ARI 410, "Forced-Circulation Air-Cooling and Air-Heating Coils," for components, construction, and rating.
 - a. Certify coils according to ARI 410.
4. Comply with NSF 37, "Air Curtains for Entranceways in Food and Food Service Establishments."

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of air curtains that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period (Nonheating Units): 24 months.
 - b. Warranty Period (Water or Steam Heating Units): 18 **OR** 24 months, **as directed**.
 - c. Warranty Period (Gas Heating Units): 18 **OR** 24 months, **as directed**.

1.2 PRODUCTS

A. Air-Curtain Unit

1. Housing:

- a. Materials: Galvanized steel with electrostatically applied epoxy enamel finish over powdered mirror
- b. Materials: One-piece, molded, high-impact, white polymer material
- c. Materials: Heavy-gage, electroplated-zinc steel with welded construction and polyester-coated finish.
- d. Materials: Heavy-gage, aluminum construction.
 - 1) Anodized Finish: Match finish and color of adjacent architectural metals. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 2) Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - a) Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: Nonspecular as fabricated; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
 - b) Class II, Color Anodic Finish: AA-M12C22A32/A34 (Mechanical Finish: Nonspecular as fabricated; Chemical Finish: Etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or electrolytically deposited color coating 0.010 mm or thicker).
- e. Materials: Stainless steel.
- f. Discharge Nozzle: Integral part of the housing, containing fixed air-directional vanes.
- g. Discharge Nozzle: Integral part of the housing, containing adjustable air-directional vanes with 40 **OR** 20 **OR** 15-degree sweep front to back, **as directed**.
- h. Discharge Nozzle: Integral part of the housing, containing air-directional vanes adjustable in 5-degree increments through a 45-degree sweep front to back.
2. Mounting Brackets: Steel, for wall **OR** ceiling mounting, **as directed**.
3. Air-Intake Louvers: Comply with requirements in Division 08 Section "Louvers And Vents".
4. Air-Intake Louvers **OR** Grille, **as directed**.
 - a. Louvers: Integral part of the housing, mechanically field adjustable and capable of reducing air-outlet velocity by 60 percent with louver in totally closed position.
 - b. Grille: Integral part of and same material as the housing.
 - c. Insect Screen: Aluminum **OR** Stainless steel, **as directed**, removable.
5. Fans
 - a. Centrifugal, forward curved, double width, double inlet **OR** Vane axial, **as directed**.
 - b. Galvanized steel **OR** Painted steel **OR** Aluminum, **as directed**.
 - c. Statically and dynamically balanced.
 - d. Direct drive **OR** Belt drive and equipped with belt guards and adjustable sheaves and pulleys for adjusting air-outlet velocity, **as directed**.
6. Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Single speed **OR** Two speed Multispeed, **as directed**.
 - c. Resiliently mounted.
 - d. Continuous duty.
 - e. Totally enclosed, air over **OR** totally enclosed, fan cooled, **OR**, open, dripproof **OR** explosion proof, **as directed**.
 - f. Integral thermal-overload protection.
 - g.
 - h. Bearings: Permanently sealed, lifetime, prelubricated, ball bearings.
 - i. Disconnect: Internal power cord with plug and receptacle.
7. Water Coils
 - a. Type: Continuous-circuit **OR** Self-draining **OR** Cleanable, **as directed**.
 - b. Piping Connections: Threaded on same end **OR** opposite ends, **as directed**.

- c. Tubes: Copper, complying with **ASTM B 75 (ASTM B 75M)**.
 - 1) Tube Diameter: **0.625 inch (15.9 mm)**.
 - d. Fins: Aluminum **OR** Copper, **as directed** with fin spacing **0.167 inch (4.23 mm) OR 0.125 inch (3.18 mm) OR 0.091 inch (2.31 mm) OR 0.071 inch (1.80 mm) OR 0.067 inch (1.70 mm) OR 0.056 inch (1.42 mm) OR 0.0075 inch (0.19 mm)**, **as directed**.
 - e. Fin and Tube Joint: Mechanical bond **OR** Silver brazed, **as directed**.
 - f. Headers: Cast iron with drain and air vent tappings **OR** Cast iron with cleaning plugs, and drain and air vent tappings **OR** Seamless copper tube with brazed joints, prime coated **OR** Fabricated steel with brazed joints, prime coated, **as directed**.
 - g. Frames: Galvanized-steel channel frame **0.052 inch (1.3 mm) OR 0.064 inch (1.6 mm) OR 0.079 inch (2.0 mm) OR 0.0625 inch (1.59 mm)**, **as directed**.
 - h. Ratings: According to ASHRAE 33.
 - i. Working-Pressure Ratings: **200 psig (1380 kPa), 325 deg F (163 deg C)**.
8. Steam Coils Distribution header coil **OR** Single-tube coil, **as directed** with threaded steam supply and condensate connections.
- a. Piping Connections: Same end **OR** Opposite ends **OR** Steam supply on both ends; condensate on one end, **as directed**.
 - b. Tube Material: Copper, complying with **ASTM B 75 (ASTM B 75M)**.
 - c. Tube Diameter: **0.625 inch (15.9 mm)**.
 - d. Fins: Aluminum **OR** Copper, **as directed** **0.167 inch (4.23 mm) OR 0.125 inch (3.18 mm) OR 0.091 inch (2.31 mm) OR 0.071 inch (1.80 mm) OR 0.067 inch (1.70 mm) OR 0.056 inch (1.42 mm) OR 0.0075 inch (0.19 mm)**, **as directed**.
 - e. Fin and Tube Joint: Mechanical bond **OR** Silver brazed, **as directed**.
 - f. Headers: Cast iron with drain and air vent tappings **OR** Cast iron with cleaning plugs, and drain and air vent tappings **OR** Seamless copper tube with brazed joints, prime coated **OR** Fabricated steel with brazed joints, prime coated, **as directed**.
 - g. Frames: Galvanized-steel channel frame, **0.052 inch (1.3 mm) OR 0.064 inch (1.6 mm) OR 0.079 inch (2.0 mm) OR 0.0625 inch (1.59 mm)**, **as directed**.
 - h. Pressure and Temperature Ratings: **100 psig (690 kPa), 400 deg F (205 deg C)** according to ASHRAE 33.
9. Electric-Resistance Coils:
- a. Coil Assembly: Comply with UL 1995.
 - b. Frame: Galvanized-steel frame.
 - c. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.
 - d. Heating Elements: Open-coil resistance wire of 80 percent nickel and 20 percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame.
 - e. Overtemperature Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or unit.
 - 1) Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.
 - f. Control Panel: Unit **OR** Remote, **as directed**, mounted with disconnecting means and overcurrent protection. Include the following controls:
 - 1) Magnetic contactor.
 - 2) Mercury contactor.
 - 3) Solid-state stepless pulse controller.
 - 4) Toggle switches; one per step.
 - 5) Step controller.
 - 6) Time-delay relay.
 - 7) Pilot lights; one per step.
 - 8) Airflow proving switch.
10. Gas-Fired Heaters:
- a. Comply with ANSI Z83.8/CSA, "Gas Unit Heaters and Gas-Fired Duct Furnaces."
 - 1) CSA Approval: Bear AGA label.

- 2) Type of Gas: Natural **OR** LP, **as directed**.
 - b. Assembly and Wiring: Heaters factory assembled, piped, wired, and tested for 120-V ac.
 - c. Housing: Steel, with integral draft hood and inserts for suspension-mounting rods.
 - d. External Casings and Cabinets: Baked enamel over corrosion-resistant-treated surface.
 - e. Heat Exchanger: Aluminized **OR** Stainless, **as directed**, steel.
 - f. Burners: Cast iron or aluminized steel with stainless-steel inserts.
 - g. Gravity vent.
 - h. Power Venter: 120-V ac, with stainless-steel shaft.
 - i. Automatic Gas Control: Single **OR** 2-stage, **as directed**, 24-V ac valve.
 - j. Ignition: Standing pilot **OR** Electronically controlled spark with flame sensor, **as directed**.
 11. Filters:
 - a. Disposable Panel Filters: Factory-fabricated, viscous-coated, flat-panel-type, disposable air filters with glass-fiber media sprayed with nonflammable adhesive in cardboard **OR** galvanized-steel, **as directed**, frame.
 - b. Washable Panel Filters: Removable, stainless-steel, baffle-type filters with spring-loaded fastening; with minimum **0.0781-inch- (1.984-mm-)** thick, stainless-steel filter frame.
 - c. Mounting Frames: Welded, galvanized steel with gaskets and fasteners and suitable for bolting together into built-up filter banks.
 12. Controls:
 - a. Built-in **OR** Field-Installed, **as directed**, Thermostat: Line voltage, factory installed and wired to the junction box on air curtain **OR** motor-control panel, **as directed**.
 - b. Automatic Door Switch: Plunger type installed in door area to activate air curtain when door opens and to deactivate air curtain when door closes.
 - c. Start-Stop, Push-Button Switch: Manually activates and deactivates air curtain.
 - d. Three-Speed Switch: Manually activates, deactivates, and controls air-curtain fan speed.
 - e. Time-Delay Relay: Factory installed and adjustable to allow air curtain to operate from 0.5 seconds to 10 hours.
 - f. Motor-Control Panel: Complete with motor starter, 115-V ac transformer with primary and secondary fuses, terminal strip, and NEMA 250, Type 1 **OR** 12, **as directed**, enclosure.
 13. Accessories:
 - a. Mounting Brackets: Adjustable mounting brackets for drum-type roll-up doors.
 - b. Discharge Extension Neck: For ceiling-recessed installation.
- B. Source Quality Control
1. Source Quality Control: Test to **300 psig (2070 kPa)** and to **200 psig (1380 kPa)** underwater.
 2. Testing: Test and inspect steam coils according to ASHRAE 33.
 3. Steam coils will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.

1.3 EXECUTION

A. Examination

1. Examine areas and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
2. Examine roughing-in for hot-water **OR** steam **OR** gas, **as directed**, piping systems to verify actual locations of piping connections before air-curtain installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Install air curtains with clearance for equipment service and maintenance.
2. Equipment Installation: Install air curtains with seismic-restraint devices. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

3. Comply with requirements for hangers and supports specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
- C. Connections
1. Comply with requirements for piping specified in Division 26 Section "Grounding And Bonding For Electrical Systems" and Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
 2. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
 3. Breaching: Comply with applicable requirements in Division 23 Section "Breechings, Chimneys, And Stacks". Connect breaching to full size at flue outlet.
- D. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. After installing air curtains completely, perform visual and mechanical check of individual components.
 - b. After electrical circuitry has been energized, start unit to confirm motor rotation and unit operation. Certify compliance with test parameters.
 - c. Inspect for water leaks.
 - d. Test gas train and verify that there are no gas leaks.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Air-curtain unit will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- E. Adjusting
1. Adjust belt tension.
 2. Adjust motor and fan speed to achieve specified airflow.
 3. Adjust discharge louver and dampers to regulate airflow.
 4. Adjust air-directional vanes.

END OF SECTION 23 34 33 00

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23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 35 13 13	01 22 16 00	No Specification Required
23 36 13 00	23 37 13 13	Diffusers, Registers, And Grilles

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SECTION 23 36 16 00 - AIR TERMINAL UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for air terminal units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Bypass, single-duct air terminal units.
 - b. Dual-duct air terminal units.
 - c. Fan-powered air terminal units.
 - d. Induction air terminal units.
 - e. Shutoff, single-duct air terminal units.
 - f. Diffuser-type air terminal units.

C. Performance Requirements

1. Structural Performance: Hangers and supports and seismic restraints, **as directed**, shall withstand the effects of gravity and seismic, **as directed**, loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" and ASCE/SEI 7 **OR** SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems", **as directed**.
 - a. Seismic Hazard Level A: Seismic force to weight ratio, 0.48.
 - b. Seismic Hazard Level B: Seismic force to weight ratio, 0.30.
 - c. Seismic Hazard Level C: Seismic force to weight ratio, 0.15.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1-2004, Section 5 - "Systems and Equipment."
3. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
 - c. Hangers and supports, including methods for duct and building attachment, seismic restraints, and vibration isolation.
4. Delegated-Design Submittal:
 - a. Materials, fabrication, assembly, and spacing of hangers and supports.
 - b. Design Calculations: Calculations, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation, **as directed**, for selecting hangers and supports and seismic restraints, **as directed**.
5. Field quality-control reports.
6. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

1.2 PRODUCTS

A. Bypass, Single-Duct Air Terminal Units

1. Configuration: Diverting-damper assembly inside unit casing with control components inside a protective metal shroud.
2. Casing: **0.034-inch (0.85-mm)** steel **OR** **0.032-inch (0.8-mm)** aluminum, **as directed**, single **OR** double, **as directed**, wall.
 - a. Casing Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.
OR
Cover liner with nonporous foil and perforated metal.
 - OR**
Casing Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Air Inlet: Round stub connection for duct attachment.
 - c. Air Outlet: S-slip and drive connections.
 - d. Access: Removable panels for access to diverting damper and other parts requiring service, adjustment, or maintenance; with airtight gasket.
 - e. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
3. Diverter Assembly: Galvanized-steel gate, with polyethylene linear bearings **OR** Aluminum blade, with nylon-fitted pivot points, **as directed**.
4. Multioutlet Attenuator Section: With two **OR** three **OR** four, **as directed**, **6-inch- (150-mm-)** **OR** **8-inch- (200-mm-)** **OR** **10-inch- (250-mm-)**, **as directed**, diameter collars, each with locking butterfly balancing damper.
5. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and rated for a minimum working pressure of **200 psig (1380 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.
OR
Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.
 - a. Access door interlocked disconnect switch.
 - b. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
 - c. Nickel chrome 80/20 heating elements.
 - d. Airflow switch for proof of airflow.
 - e. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
 - f. Mercury contactors.
 - g. Pneumatic-electric switches and relays.
 - h. Magnetic contactor for each step of control (for three-phase coils).
6. Electric Controls: Damper actuator and thermostat.
 - a. Damper Actuator: 24 V, powered closed, powered open with microswitch to energize heating control circuit, **as directed**.
 - b. Thermostat: Wall-mounted electric type with temperature display in Fahrenheit and Celsius, and space temperature set point.

- c. Changeover Thermostat: Duct-mounted, field-adjustable, electric type reverses action of zone thermostat when air temperature reaches **70 deg F (21 deg C)**.

OR

Electronic Controls: Bidirectional damper operator and microprocessor-based thermostat. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- d. Damper Actuator: 24 V, powered closed, powered open.
- e. Thermostat: Wall-mounted electronic type with the following features:
- 1) Temperature set-point display in Fahrenheit and Celsius.
 - 2) Auxiliary switch to energize heating control circuit.
 - 3) Changeover thermistor to reverse action.

B. Dual-Duct Air Terminal Units

1. Configuration: Two volume dampers inside unit casing with mixing attenuator section and control components inside a protective metal shroud with a third primary air inlet with volume damper, **as directed**.
 2. Casing: **0.034-inch (0.85-mm) steel OR 0.032-inch (0.8-mm) aluminum, as directed**, single **OR** double, **as directed**, wall.
 - a. Casing Lining: Adhesive attached, **1/2-inch- (13-mm-) OR 3/4-inch- (19-mm-) OR 1-inch- (25-mm-), as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.

OR

Cover liner with nonporous foil and perforated metal.

OR

Casing Lining: Adhesive attached, **1/2-inch- (13-mm-) OR 3/4-inch- (19-mm-) OR 1-inch- (25-mm-), as directed**, thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
 - c. Air Outlet: S-slip and drive connections.
 - d. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
 - e. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
3. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
 - a. Maximum Damper Leakage: ARI 880 rated, 3 percent of nominal airflow at **3-inch wg (750-Pa) OR 6-inch wg (1500-Pa), as directed**, inlet static pressure.
4. Velocity Sensors: Multipoint array with velocity sensors in cold- and hot-deck air inlets and air outlets.
5. Attenuator Section: **0.034-inch (0.85-mm) steel OR 0.032-inch (0.8-mm) aluminum, as directed**, sheet.
 - a. Lining: Adhesive attached, **1/2-inch- (13-mm-) OR 3/4-inch- (19-mm-) OR 1-inch- (25-mm-), as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.

OR

Cover liner with nonporous foil and perforated metal.

OR

Lining: Adhesive attached, **3/4-inch- (19-mm-)** thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index

- of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
- b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 6. Multioutlet Attenuator Section: With two **OR** three **OR** four, **as directed**, 6-inch- (150-mm-) **OR** 8-inch- (200-mm-) **OR** 10-inch- (250-mm-) **OR** 12-inch- (300-mm-), **as directed**, diameter collars, each with locking butterfly balancing damper.
 7. Pneumatic Controls: Damper operator, velocity controllers, and thermostat. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:
 - a. Pneumatic Damper Operator: 0- to 13-psig (0- to 90-kPa) spring range.
 - b. Velocity Controllers: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg (1000 Pa); and shall have a multipoint velocity sensor. Locate velocity sensors in cold- and hot-deck **OR** cold-, hot-, and ventilation- deck **OR** cold-deck, **as directed**, air inlets and supply air outlets.
 - c. Thermostat: Wall-mounted pneumatic type with appropriate mounting hardware.

OR

Electronic Controls: Bidirectional damper operator and microprocessor-based thermostat with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

 - a. Damper Actuator: 24 V, powered closed, spring return open **OR** powered open, **as directed**.
 - b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg (1000 Pa); and shall have a multipoint velocity sensor. Locate velocity sensors in cold-deck air inlets and air outlets.
 - c. Thermostat: Wall-mounted electronic type with temperature set-point display in Fahrenheit and Celsius, **as directed**.

OR

Direct Digital Controls: Single-package unitary controller and actuator specified in Division 23 Section "Instrumentation And Control For Hvac"

OR

Direct Digital Controls: Bidirectional damper operators and microprocessor-based controller and room sensor. Control devices shall be compatible with controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

 - d. Damper Actuators: 24 V, powered closed, spring return open **OR** powered open, **as directed**.
 - e. Terminal Unit Controller: Pressure-independent, variable-air **OR** constant, **as directed**, -volume controller with electronic airflow transducers factory calibrated to minimum and maximum air volumes, and having the following features:
 - 1) Occupied and unoccupied operating mode.
 - 2) Remote reset of airflow or temperature set points.
 - 3) Adjusting and monitoring with portable terminal.
 - 4) Communication with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac".
 - f. Room Sensor: Wall mounted with temperature set-point adjustment and access for connection of portable operator terminal. - 8. Control Sequence:
 - a. Modulate cold-air damper to maintain room temperature.
 - b. Modulate warm-air damper to maintain constant airflow.

C. Parallel Fan-Powered Air Terminal Units

1. Configuration: Volume-damper assembly and fan in parallel arrangement inside unit casing with control components inside a protective metal shroud.
2. Casing: **0.034-inch (0.85-mm)** steel **OR** **0.032-inch (0.8-mm)** aluminum, **as directed**, single **OR** double, **as directed**, wall.
 - a. Casing Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.
OR
Cover liner with nonporous foil and perforated metal.

OR

 Casing Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
 - c. Air Outlet: S-slip and drive connections.
 - d. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
 - e. Fan: Forward-curved centrifugal, located at plenum air inlet.
 - f. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
3. Volume Damper: Galvanized steel with flow-sensing ring and peripheral gasket and self-lubricating bearings.
 - a. Maximum Damper Leakage: ARI 880 rated, **2 OR 3, as directed**, percent of nominal airflow at **3-inch wg (750-Pa)** **OR** **6-inch wg (1500-Pa)**, **as directed**, inlet static pressure.
 - b. Damper Position: Normally open **OR** closed, **as directed**.
4. Velocity Sensors: Multipoint array with velocity sensors in cold- and hot-deck air inlets and air outlets.
5. Motor:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Type: Permanent-split capacitor with SCR for speed adjustment **OR** Electronically commutated motor, **as directed**.
 - c. Fan-Motor Assembly Isolation: Rubber isolators.
 - d. Enclosure: Open dripproof **OR** Totally enclosed, fan cooled **OR** Totally enclosed, air over **OR** Open, externally ventilated **OR** Totally enclosed, nonventilated **OR** Severe duty **OR** Explosion proof **OR** Dust-ignition-proof machine, **as directed**.
 - e. Enclosure Materials: Cast iron **OR** Cast aluminum **OR** Rolled steel, **as directed**.
6. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Material: Polyurethane foam having 70 percent arrestance and 3 MERV.
OR
Material: Glass fiber treated with adhesive; having 80 percent arrestance and 5 MERV.
OR
Material: Pleated cotton-polyester media having 90 percent arrestance and 7 MERV.
 - b. Thickness: **2 inches (50 mm)** **OR** **1 inch (25 mm)**, **as directed**.
7. Attenuator Section: **0.034-inch (0.85-mm)** steel **OR** **0.032-inch (0.8-mm)** aluminum, **as directed**, sheet.
 - a. Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and

having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

- 1) Cover liner with nonporous foil.

OR

Cover liner with nonporous foil and perforated metal.

- b. Lining: Adhesive attached, **3/4-inch- (19-mm-)** thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - c. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
8. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and rated for a minimum working pressure of **200 psig (1380 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.
- a. Location: Plenum air inlet.

OR

Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.

- a. Location: Plenum air inlet.
 - b. Stage(s): **1 OR 2 OR 3, as directed.**
 - c. Access door interlocked disconnect switch.
 - d. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
 - e. Nickel chrome 80/20 heating elements.
 - f. Airflow switch for proof of airflow.
 - g. Fan interlock contacts.
 - h. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
 - i. Mercury contactors.
 - j. Pneumatic-electric switches and relays.
 - k. Magnetic contactor for each step of control (for three-phase coils).
9. Factory-Mounted and -Wired Controls: Electrical components mounted in control box with removable cover. Incorporate single-point electrical connection to power source.
- a. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
 - b. Wiring Terminations: Fan and controls to terminal strip. Terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
 - c. Disconnect Switch: Factory-mounted, fuse type.
10. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.
11. Electric Controls: 24-V damper actuator with wall-mounted electric thermostat and appropriate mounting hardware.

OR

Pneumatic Controls: Damper operator, velocity controller, and thermostat. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Pneumatic Damper Operator: **0- to 13-psig (0- to 90-kPa)** spring range.
- b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while pressure independent up to **4-inch wg (1000 Pa)**; and shall have a multipoint velocity sensor at air inlet.
- c. Thermostat: Wall-mounted pneumatic type with appropriate mounting hardware.

OR

Electronic Controls: Bidirectional damper operator and microprocessor-based controller with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Occupied and unoccupied operating mode.
- b. Remote reset of airflow or temperature set points.
- c. Adjusting and monitoring with portable terminal.
- d. Communication with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac".

12. Control Sequence:

- a. Occupied (Primary Airflow On):
 - 1) Operate as throttling control for cooling.
 - 2) As cooling requirement decreases, control valve throttles toward minimum airflow.
 - 3) As heating requirement increases, fan energizes to draw in warm plenum air and electric heat is energized in steps, **as directed**.
- b. Unoccupied (Primary Airflow Off):
 - 1) When pressure at primary inlet is zero or less, fan is de-energized.
 - 2) As heating requirement increases, fan energizes to draw in warm plenum air and electric heat is energized in steps, **as directed**.

D. Series Fan-Powered Air Terminal Units

1. Configuration: Volume-damper assembly and fan in series arrangement inside unit casing with control components inside a protective metal shroud for installation above a ceiling and within a raised access floor, **as directed**.
2. Casing: **0.034-inch (0.85-mm)** steel **OR** **0.032-inch (0.8-mm)** aluminum, **as directed**, single **OR** double, **as directed**, wall.
 - a. Casing Lining: Adhesive attached, 1/2-inch- (13-mm-) **OR** 3/4-inch- (19-mm-) **OR** 1-inch- (25-mm-), **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.
OR
Cover liner with nonporous foil and perforated metal.

OR

 Casing Lining: Adhesive attached, **1/2-inch- (13-mm-) OR 3/4-inch- (19-mm-) OR 1-inch- (25-mm-)**, **as directed**, thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Air Inlets: Round stub connections or S-slip and drive connections for duct attachment.
 - c. Air Outlet: S-slip and drive connections.
 - d. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket and quarter-turn latches.
 - e. Fan: Forward-curved centrifugal.
 - f. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
3. Volume Damper: Galvanized steel with flow-sensing ring and peripheral gasket and self-lubricating bearings.
 - a. Maximum Damper Leakage: ARI 880 rated, 2 **OR** 3, **as directed**, percent of nominal airflow at **3-inch wg (750-Pa) OR 6-inch wg (1500-Pa)**, **as directed**, inlet static pressure.
 - b. Damper Position: Normally open **OR** closed, **as directed**.
4. Velocity Sensors: Multipoint array with velocity sensors in cold- and hot-deck air inlets and air outlets.
5. Motor:

- a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- b. Type: Permanent-split capacitor with SCR for speed adjustment **OR** Electronically commutated motor, **as directed**.
- c. Fan-Motor Assembly Isolation: Rubber isolators.
- d. Enclosure: Open dripproof **OR** Totally enclosed, fan cooled **OR** Totally enclosed, air over **OR** Open, externally ventilated **OR** Totally enclosed, nonventilated **OR** Severe duty **OR** Explosion proof **OR** Dust-ignition-proof machine, **as directed**.
- e. Enclosure Materials: Cast iron **OR** Cast aluminum **OR** Rolled steel, **as directed**.
6. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Material: Polyurethane foam having 70 percent arrestance and 3 MERV.
OR
Material: Glass fiber treated with adhesive; having 80 percent arrestance and 5 MERV.
OR
Material: Pleated cotton-polyester media having 90 percent arrestance and 7 MERV.
 - b. Thickness: **2 inches (50 mm) OR 1 inch (25 mm), as directed**.
7. Attenuator Section: **0.034-inch (0.85-mm) steel OR 0.032-inch (0.8-mm) aluminum, as directed**, sheet.
 - a. Lining: Adhesive attached, **1/2-inch- (13-mm-) OR 3/4-inch- (19-mm-) OR 1-inch- (25-mm-), as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.
OR
Cover liner with nonporous foil and perforated metal.
OR
Lining: Adhesive attached, **3/4-inch- (19-mm-)** thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
8. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and rated for a minimum working pressure of **200 psig (1380 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.
OR
Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.
 - a. Stage(s): **1 OR 2 OR 3, as directed**.
 - b. Access door interlocked disconnect switch.
 - c. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
 - d. Nickel chrome 80/20 heating elements.
 - e. Airflow switch for proof of airflow.
 - f. Fan interlock contacts.
 - g. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
 - h. Mercury contactors.
 - i. Pneumatic-electric switches and relays.
 - j. Magnetic contactor for each step of control (for three-phase coils).
9. Factory-Mounted and -Wired Controls: Electrical components mounted in control box with removable cover. Incorporate single-point electrical connection to power source.

- a. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
- b. Wiring Terminations: Fan and controls to terminal strip. Terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
- c. Disconnect Switch: Factory-mounted, fuse type.
- 10. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.
- 11. Electric Controls: 24-V damper actuator with wall-mounted electric thermostat and appropriate mounting hardware.

OR

Pneumatic Controls: Damper operator, velocity controller, and thermostat. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Pneumatic Damper Operator: 0- to 13-psig (0- to 90-kPa) spring range.
- b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while pressure independent up to 4-inch wg (1000 Pa); and shall have a multipoint velocity sensor at air inlet.
- c. Thermostat: Wall-mounted pneumatic type with appropriate mounting hardware.

OR

Electronic Controls: Bidirectional damper operator and microprocessor-based controller with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Occupied and unoccupied operating mode.
- b. Remote reset of airflow or temperature set points.
- c. Adjusting and monitoring with portable terminal.
- d. Communication with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac".

- 12. Control Sequence:

- a. Occupied (Primary Airflow On):
 - 1) When pressure at inlet is at least 1.2-inch wg (300 Pa).
 - 2) As cooling requirement decreases, control valve throttles toward minimum airflow.
- b. Unoccupied (Primary Airflow Off):
 - 1) When pressure at primary inlet is zero or less, fan is de-energized.

E. Induction Air Terminal Units

- 1. Configuration: Volume-damper assembly inside unit casing with mechanical induction damper mounted on casing and control components inside a protective metal shroud.
- 2. Casing: 0.034-inch (0.85-mm) steel **OR** 0.032-inch (0.8-mm) aluminum, **as directed**, single **OR** double, **as directed**, wall.
 - a. Casing Lining: Adhesive attached, 1/2-inch- (13-mm-) **OR** 3/4-inch- (19-mm-) **OR** 1-inch- (25-mm-), **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.

OR

Cover liner with nonporous foil and perforated metal.

OR

Casing Lining: Adhesive attached, 1/2-inch- (13-mm-) **OR** 3/4-inch- (19-mm-) **OR** 1-inch- (25-mm-), **as directed**, thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

- b. Air Inlet: Round stub connection for duct attachment.
 - c. Air Outlet: S-slip and drive connections, size matching inlet size, **as directed**.
 - d. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
 - e. Fan: Forward-curved centrifugal.
 - f. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
3. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
- a. Maximum Damper Leakage: ARI 880 rated, 2 **OR** 3, **as directed**, percent of nominal airflow at **3-inch wg (750-Pa) OR 6-inch wg (1500-Pa)**, **as directed**, inlet static pressure.
 - b. Damper Position: Normally open **OR** closed, **as directed**.
4. Induction Damper: Galvanized-steel, multiblade assembly with self-lubricating bearings.
5. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and rated for a minimum working pressure of **200 psig (1380 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.
- OR**
- Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.
- a. Access door interlocked disconnect switch.
 - b. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
 - c. Nickel chrome 80/20 heating elements.
 - d. Airflow switch for proof of airflow.
 - e. Fan interlock contacts.
 - f. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
 - g. Mercury contactors.
 - h. Pneumatic-electric switches and relays.
 - i. Magnetic contactor for each step of control (for three-phase coils).
6. Pneumatic Controls: Damper operator, velocity controller, and induction damper operator. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:
- a. Damper Operator: Pneumatic, **0- to 13-psig (0- to 90-kPa)** spring range.
 - b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to **4-inch wg (1000 Pa)**; and shall have a multipoint velocity sensor at air inlet.
 - c. Induction Damper Operator: Pneumatic, spring range matching reset range of controller.
 - d. Thermostat: Wall-mounted pneumatic type with appropriate mounting hardware.
- OR**
- Electronic Controls: Pneumatic damper operators, electronic controller integral airflow transducer, and electronic thermostat. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:
- a. Damper Actuator: Pneumatic, **0- to 13-psig (0- to 90-kPa)** spring range.
 - b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to **4-inch wg (1000 Pa)**; and shall have a multipoint velocity sensor at air inlet.
 - c. Induction Damper Operator: Pneumatic, spring range matching reset range of controller.
 - d. Thermostat: Wall-mounted electronic type with the following features:
 - 1) Proportional, plus integral control of room temperature.
 - 2) Time-proportional reheat-coil control.
 - 3) Temperature set-point display in Fahrenheit and Celsius.

- F. Shutoff, Single-Duct Air Terminal Units
1. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.
 2. Casing: **0.034-inch (0.85-mm)** steel **OR** **0.032-inch (0.8-mm)** aluminum, **as directed**, single **OR** double, **as directed**, wall.
 - a. Casing Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.

OR

 Cover liner with nonporous foil and perforated metal.

OR

 Casing Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
 - c. Air Outlet: S-slip and drive connections, size matching inlet size, **as directed**.
 - d. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
 - e. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 3. Regulator Assembly: System-air-powered bellows section incorporating polypropylene bellows for volume regulation and thermostatic control. Bellows shall operate at temperatures from **0 to 140 deg F (minus 18 to plus 60 deg C)**, shall be impervious to moisture and fungus, shall be suitable for **10-inch wg (2500-Pa)** static pressure, and shall be factory tested for leaks.
 4. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
 - a. Maximum Damper Leakage: ARI 880 rated, **2 OR 3, as directed**, percent of nominal airflow at **3-inch wg (750-Pa) OR 6-inch wg (1500-Pa)**, **as directed**, inlet static pressure.
 - b. Damper Position: Normally open **OR** closed, **as directed**.
 5. Attenuator Section: **0.034-inch (0.85-mm)** steel **OR** **0.032-inch (0.8-mm)** aluminum, **as directed**, sheet.
 - a. Lining: Adhesive attached, **1/2-inch- (13-mm-)** **OR** **3/4-inch- (19-mm-)** **OR** **1-inch- (25-mm-)**, **as directed**, thick, coated, fibrous-glass duct liner complying with ASTM C 1071, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - 1) Cover liner with nonporous foil.

OR

 Cover liner with nonporous foil and perforated metal.

OR

 Lining: Adhesive attached, **3/4-inch- (19-mm-)** thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.
 - b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 6. Multioutlet Attenuator Section: With two **OR** three **OR** four, **as directed**, **6-inch- (150-mm-)** **OR** **8-inch- (200-mm-)** **OR** **10-inch- (250-mm-)**, **as directed**, diameter collars, each with locking butterfly balancing damper.
 7. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and rated for a minimum working pressure of **200 psig (1380 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.
- OR**

Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.

- a. Access door interlocked disconnect switch.
 - b. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
 - c. Nickel chrome 80/20 heating elements.
 - d. Airflow switch for proof of airflow.
 - e. Fan interlock contacts.
 - f. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
 - g. Mercury contactors.
 - h. Pneumatic-electric switches and relays.
 - i. Magnetic contactor for each step of control (for three-phase coils).
8. Electric Controls: Damper actuator and thermostat.
- a. Damper Actuator: 24 V, powered closed, spring return open **OR** powered open, **as directed**.
 - b. Thermostat: Wall-mounted electronic type with clock display, temperature display in Fahrenheit and Celsius, and space temperature set point.

OR

Pneumatic Controls: Damper operator and velocity controller. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Pneumatic Damper Operator: 0- to 13-psig (0- to 90-kPa) spring range.
- b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg (1000 Pa); and shall have a multipoint velocity sensor at air inlet.
- c. Thermostat: Wall-mounted pneumatic type with appropriate mounting hardware.

OR

Electronic Controls: Bidirectional damper operator and microprocessor-based thermostat with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Damper Actuator: 24 V, powered closed, spring return open **OR** powered open, **as directed**.
- b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to 4-inch wg (1000 Pa); and shall have a multipoint velocity sensor at air inlet.
- c. Thermostat: Wall-mounted electronic type with temperature set-point display in Fahrenheit and Celsius.

OR

Direct Digital Controls: Single-package unitary controller and actuator specified in Division 23 Section "Instrumentation And Control For Hvac".

OR

Direct Digital Controls: Bidirectional damper operators and microprocessor-based controller and room sensor. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:

- a. Damper Actuator: 24 V, powered closed, spring return open **OR** powered open, **as directed**.
- b. Terminal Unit Controller: Pressure-independent, variable-air-volume controller with electronic airflow transducer with multipoint velocity sensor at air inlet, factory calibrated to minimum and maximum air volumes, and having the following features:
 - 1) Occupied and unoccupied operating mode.

- 2) Remote reset of airflow or temperature set points.
- 3) Adjusting and monitoring with portable terminal.
- 4) Communication with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac".
- c. Room Sensor: Wall mounted with temperature set-point adjustment and access for connection of portable operator terminal.
9. Control Sequence:
 - a. Suitable for operation with duct pressures between **0.25- and 3.0-inch wg (60- and 750-Pa)** inlet static pressure.
 - b. System-powered, wall-mounted thermostat.
- G. Diffuser-Type Air Terminal Units
 1. Configuration: Volume-damper, diffuser, controller assembly and electric heater, **as directed**, and wall-mounted thermostat with master-slave capability, **as directed**.
 2. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.
 - a. Damper Position: Normally open **OR** closed, **as directed**.
 3. Diffuser: Galvanized steel with white baked-enamel finish.
 4. Electronic Controls: Bidirectional damper operator and microprocessor-based thermostat with integral airflow transducer and room sensor. Control devices shall be compatible with temperature controls specified in Division 23 Section "Instrumentation And Control For Hvac" and shall have the following features:
 - a. Damper Actuator: 24 V, powered closed, spring return open **OR** powered open, **as directed**.
 - b. Velocity Controller: Factory calibrated and field adjustable to minimum and maximum air volumes; shall maintain constant airflow dictated by thermostat within 5 percent of set point while compensating for inlet static-pressure variations up to **4-inch wg (1000 Pa)**; and shall have a multipoint velocity sensor at air inlet.
 - c. Thermostat: Wall-mounted electronic type with the following features:
 - 1) Proportional, plus integral control of room temperature.
 - 2) Temperature set-point display in Fahrenheit and Celsius.
 5. Integral thermally powered actuators control diffusion dampers based on duct and room temperature.
- H. Hangers And Supports
 1. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
 2. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
 3. Steel Cables: Galvanized steel complying with ASTM A 603 **OR** Stainless steel complying with ASTM A 492, **as directed**.
 4. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
 5. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
 6. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.
- I. Seismic-Restraint Devices
 1. General Requirements for Restraint Components: Rated strengths, features, and applications shall be as defined in reports by an evaluation service member of the ICC Evaluation Service **OR** the Office of Statewide Health Planning and Development for the State of California **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
 2. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to

braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

3. Restraint Cables: ASTM A 603, galvanized **OR** ASTM A 492, stainless, **as directed**, -steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; with an automatic-locking and clamping device or double-cable clips.
4. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections **OR** Reinforcing steel angle clamped, **as directed**, to hanger rod.
5. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

J. Source Quality Control

1. Factory Tests, as directed: Test factory-assembled air terminal units according to ARI 880.
 - a. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, **as directed**, and ARI certification seal.

1.3 EXECUTION

A. Installation

1. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."
2. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.
3. Install wall-mounted thermostats.

B. Hanger And Support Installation

1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."
2. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.
 - a. Where practical, install concrete inserts before placing concrete.
 - b. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
 - c. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than **4 inches (100 mm)** thick.
 - d. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than **4 inches (100 mm)** thick.
 - e. Do not use powder-actuated concrete fasteners for seismic restraints.
3. Hangers Exposed to View: Threaded rod and angle or channel supports.
4. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

C. Seismic-Restraint-Device Installation

1. Install hangers and braces designed to support the air terminal units and to restrain against seismic forces required by applicable building codes. Comply with SMACNA's "Seismic Restraint Manual: Guidelines for Mechanical Systems" **OR** ASCE/SEI 7, **as directed**.
2. Select seismic-restraint devices with capacities adequate to carry present and future static and seismic loads.
3. Install cables so they do not bend across edges of adjacent equipment or building structure.
4. Install cable restraints on air terminal units that are suspended with vibration isolators.
5. Install seismic-restraint devices using methods approved by an evaluation service member of the ICC Evaluation Service **OR** the Office of Statewide Health Planning and Development for the State of California **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
6. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

7. Drilling for and Setting Anchors:
 8. Identify position of reinforcing steel and other embedded items before drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the the Owner if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 9. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 10. Wedge Anchors: Protect threads from damage during anchor installation. Install heavy-duty sleeve anchors with sleeve fully engaged in the structural element to which anchor is to be fastened.
 11. Set anchors to manufacturer's recommended torque, using a torque wrench.
 12. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.
- D. Connections
1. Install piping adjacent to air terminal unit to allow service and maintenance.
 2. Hot-Water Piping: In addition to requirements in Division 23 Section "Hydronic Piping", connect heating coils to supply with shutoff valve, strainer, control valve, and union or flange; and to return with balancing valve and union or flange.
 3. Connect ducts to air terminal units according to Division 23 Section(s) "Metal Ducts" OR "Nonmetal Ducts", **as directed**.
 4. Make connections to air terminal units with flexible connectors complying with requirements in Division 23 Section "Air Duct Accessories".
- E. Identification
1. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Division 23 Section "Identification For Hvac Piping And Equipment" for equipment labels and warning signs and labels.
- F. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
 - b. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Air terminal unit will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- G. Startup Service
1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
 - c. Verify that controls and control enclosure are accessible.
 - d. Verify that control connections are complete.
 - e. Verify that nameplate and identification tag are visible.
 - f. Verify that controls respond to inputs as specified.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



H. Demonstration

1. Train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

END OF SECTION 23 36 16 00

SECTION 23 37 13 13 - DIFFUSERS, REGISTERS, AND GRILLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for diffusers, registers and grilles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Round ceiling diffusers.
 - b. Rectangular and square ceiling diffusers.
 - c. Perforated diffusers.
 - d. Louver face diffusers.
 - e. Linear bar diffusers.
 - f. Linear slot diffusers.
 - g. Ceiling-integral continuous diffusers.
 - h. Light troffer diffusers.
 - i. Round induction diffusers.
 - j. Linear floor diffuser plenums.
 - k. Drum louvers.
 - l. Modular core supply grilles.
 - m. Continuous tubular diffusers.
 - n. Adjustable bar registers and grilles.
 - o. Security registers and grilles.
 - p. Fixed face registers and grilles.
 - q. Linear bar grilles.

C. Submittals

1. Product Data: For each type of product indicated, include the following:
 - a. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
 - b. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.
2. Samples: For each exposed product and for each color and texture specified.

1.2 PRODUCTS

A. Ceiling Diffusers

1. Round Ceiling Diffuser:
 - a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel **OR** Aluminum, **as directed**.
 - c. Finish: Baked enamel, white **OR** Baked enamel, color selected **OR** Anodized aluminum, **as directed**.
 - d. Face Style: Four **OR** Three **OR** Two, **as directed**, cone.
 - e. Mounting: Duct connection.
 - f. Pattern: Fully adjustable **OR** Two-position horizontal, **as directed**.
 - g. Dampers: Radial opposed blade **OR** Butterfly **OR** Combination damper and grid, **as directed**.
 - h. Accessories:
 - 1) Equalizing grid.

- 2) Plaster ring.
 - 3) Safety chain.
 - 4) Wire guard.
 - 5) Sectorizing baffles.
 - 6) Operating rod extension.
2. Rectangular and Square Ceiling Diffusers:
 - a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel **OR** Aluminum, **as directed**.
 - c. Finish: Baked enamel, white **OR** Baked enamel, color selected **OR** Anodized aluminum, **as directed**.
 - d. Face Size: **24 by 24 inches (600 by 600 mm) OR 20 by 20 inches (500 by 500 mm) OR 12 by 12 inches (300 by 300 mm), as directed**.
 - e. Face Style: Three cone **OR** Four cone **OR** Plaque, **as directed**.
 - f. Mounting: Surface **OR** T-bar **OR** Snap in **OR** Spline **OR** Mounting panel, **as directed**.
 - g. Pattern: Fixed **OR** Two position **OR** Adjustable, **as directed**.
 - h. Dampers: Radial opposed blade **OR** Butterfly **OR** Combination damper and grid, **as directed**.
 - i. Accessories:
 - 1) Equalizing grid.
 - 2) Plaster ring.
 - 3) Safety chain.
 - 4) Wire guard.
 - 5) Sectorizing baffles.
 - 6) Operating rod extension.
 3. Perforated Diffuser:
 - a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel backpan and pattern controllers, with steel **OR** aluminum, **as directed**, face.
 - c. Finish: Baked enamel, white **OR** Baked enamel, color selected **OR** Anodized aluminum, **as directed**.
 - d. Face Size: **12 by 12 inches (300 by 300 mm) OR 24 by 12 inches (600 by 300 mm) OR 36 by 12 inches (900 by 300 mm) OR 48 by 12 inches (1200 by 300 mm) OR 16 by 16 inches (400 by 400 mm) OR 20 by 20 inches (500 by 500 mm) OR 24 by 24 inches (600 by 600 mm) OR 36 by 24 inches (900 by 600 mm) OR 48 by 24 inches (1200 by 600 mm), as directed**.
 - e. Duct Inlet: Round **OR** Square, **as directed**.
 - f. Face Style: Flush **OR** Drop extended, **as directed**.
 - g. Mounting: Surface **OR** T-bar **OR** Snap in **OR** Spline **OR** Mounting panel, **as directed**.
 - h. Pattern Controller: Four louvered deflector patches **OR** Fixed with curved blades at inlet **OR** Adjustable with louvered pattern modules at inlet **OR** None, **as directed**.
 - i. Dampers: Opposed blade **OR** Radial opposed blade **OR** Butterfly **OR** Combination damper and grid **OR** Combination volume and fire, **as directed**.
 - j. Accessories:
 - 1) Equalizing grid.
 - 2) Plaster ring.
 - 3) Safety chain.
 - 4) Wire guard.
 - 5) Sectorizing baffles.
 - 6) Operating rod extension.
 4. Louver Face Diffuser:
 - a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel **OR** Aluminum, **as directed**.
 - c. Finish: Baked enamel, white **OR** Baked enamel, color selected **OR** Anodized aluminum, **as directed**.
 - d. Face Size: as directed by the Owner.

- e. Mounting: Surface **OR** Surface with beveled frame **OR** T-bar **OR** Snap in **OR** Spline **OR** Mounting panel, **as directed**.
 - f. Pattern: One-way **OR** Two-way **OR** Two-way corner **OR** Three-way **OR** Four-way **OR** Adjustable, **as directed**, core style.
 - g. Dampers: Radial opposed blade **OR** Butterfly **OR** Combination damper and grid, **as directed**.
 - h. Accessories:
 - 1) Square to round neck adaptor.
 - 2) Adjustable pattern vanes.
 - 3) Throw reducing vanes.
 - 4) Equalizing grid.
 - 5) Plaster ring.
 - 6) Safety chain.
 - 7) Wire guard.
 - 8) Sectorizing baffles.
 - 9) Operating rod extension.
- B. Ceiling Linear Slot Outlets
- 1. Linear Bar Diffuser:
 - a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel **OR** Aluminum **OR** Stainless steel, **as directed**.
 - c. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - d. Narrow Core Spacing Arrangement: **1/8-inch- (3-mm-)** thick blades spaced **1/4 inch (6 mm)** apart, zero **OR** 15, **as directed**, -degree deflection.
 - e. Wide Core Spacing Arrangement: **1/8-inch- (3-mm-)** thick blades spaced **1/2 inch (13 mm)** apart, zero **OR** 15, **as directed**, -degree deflection.
 - f. Wide Core Spacing Arrangement: **3/16-inch- (5-mm-)** thick blades spaced **1/2 inch (13 mm)** apart, zero **OR** 15 **OR** 30, **as directed**, -degree deflection.
 - g. Pencil-Proof Core Spacing Arrangement: **3/16-inch- (5-mm-)** thick blades spaced **7/16 inch (11 mm)** apart, zero **OR** 15 **OR** 30, **as directed**, -degree deflection.
 - h. One **OR** Two, **as directed**, -Way Deflection Vanes: Extruded construction fixed louvers with removable core.
 - i. Frame: **1-1/4 inches (32 mm)** **OR** **1 inch (25 mm)** **OR** **3/4 inch (19 mm)** **OR** **1/2 inch (13 mm)** **OR** **3/16 inch (5 mm)**, **as directed**, wide.
 - j. Mounting Frame: Filter.
 - k. Mounting: Countersunk screw **OR** Concealed bracket **OR** Spring clip, **as directed**.
 - l. Damper Type: Adjustable opposed-blade assembly **OR** Hinged single blade, **as directed**.
 - m. Accessories: Plaster frame **OR** Directional vanes **OR** Alignment pins **OR** Core clips **OR** Blank-off strips, **as directed**.
 - 2. Linear Slot Diffuser:
 - a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material - Shell: Steel **OR** Aluminum, **as directed**, insulated **OR** noninsulated, **as directed**.
 - c. Material - Pattern Controller and Tees: Aluminum.
 - d. Finish - Face and Shell: Baked enamel, black.
 - e. Finish - Pattern Controller: Baked enamel, black.
 - f. Finish - Tees: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - g. Slot Width: **1/2 inch (13 mm)** **OR** **3/4 inch (19 mm)** **OR** **1 inch (25 mm)** **OR** **1-1/2 inches (38 mm)**, **as directed**.
 - h. Number of Slots: One **OR** Two **OR** Three **OR** Four, **as directed**.
 - i. Length: **24 inches (600 mm)** **OR** **30 inches (750 mm)** **OR** **36 inches (900 mm)** **OR** **48 inches (1200 mm)** **OR** **60 inches (1500 mm)**, **as directed**.
 - j. Accessories: Plaster frame **OR** T-bar slot **OR** Center notch **OR** T-bar on inlet side **OR** T-bar on both sides **OR** T-bar clip on one side **OR** T-bar clips on both sides, **as directed**.
 - 3. Ceiling-Integral Continuous Diffuser:

- a. Slot Width: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 2-1/2 inches (63 mm) OR 3 inches (76 mm), as directed.**
 - b. Section Length: **12 feet (3.7 m).**
 - c. Straight and curved sections as required to accommodate layout.
 - d. Mitered tees and corners.
 - e. Pattern Controllers: **24 inches (600 mm) o.c.**
 - f. Material: Aluminum, extruded, heavy wall.
 - g. Finishes:
 - 1) Exterior: Standard white.
 - 2) Interior: Standard black.
 - h. Throw: Standard **OR High, as directed.**
 - i. Mounting: Ceiling **OR Sidewall, as directed.**
 - j. Plenum: Noninsulated **OR Insulated, as directed.**
 - k. Other Features:
 - 1) Painted interior.
 - 2) Blank-offs.
4. Light Troffer Diffuser:
- a. Devices shall be specifically designed for variable-air-volume flows.
 - b. Material: Steel with external insulation, **as directed.**
 - c. Finish: None **OR Black enamel on visible surfaces, as directed.**
 - d. Slot Width: **1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed.**
 - e. Number of Sides: One **OR Two, as directed.**
 - f. Length: **24 inches (600 mm) OR 36 inches (900 mm) OR 48 inches (1200 mm), as directed.**
 - g. Pattern: Fixed **OR Adjustable, as directed.**
 - h. Inlet: Top **OR Side, as directed.**
 - i. Inlet Size: **5 inches (125 mm) OR 6 inches (150 mm) OR 8 inches (200 mm), as directed.**
- C. Underfloor Air Distribution Diffusers
1. Round Induction Diffusers:
 - a. Airflow Principle: Swirl-pattern induction.
 - b. Material: Plastic, high impact, and resistant to cart and foot traffic.
 - c. Color: Gray **OR Black, as directed.**
 - d. Components:
 - 1) Diffuser core.
 - 2) Flow regulator.
 - 3) Dirt and liquid catch pan.
 - 4) Spacer flange.
 - 5) Gasketed, underfloor compression ring.
 2. Linear Floor Diffuser Plenums:
 - a. Material: Steel.
 - b. Finish: White baked acrylic.
 - c. Deflection: Zero **OR 15, as directed**, degrees.
 - d. Components:
 - 1) Aluminum diffuser core.
 - 2) Diffuser frame.
 - 3) Plenum, **0.034-inch (0.85-mm) steel.**
- D. High-Capacity Diffusers
1. Drum Louver:
 - a. Airflow Principle: Extended distance for high airflow rates.
 - b. Material: Aluminum, heavy gage extruded.
 - c. Finish: White baked acrylic.
 - d. Border: **1-1/4-inch (32-mm) width with countersunk screw holes.**

- e. Gasket between drum and border.
 - f. Body: Drum shaped; adjustable vertically.
 - g. Blades: Individually adjustable horizontally.
 - h. Mounting: Surface to duct **OR** wall, **as directed**.
 - i. Inlet Width: **6 inches (150 mm) OR 10 inches (250 mm) OR 12 inches (300 mm) OR 15 inches (380 mm), as directed.**
 - j. Inlet Length: **12 inches (300 mm) OR 24 inches (600 mm) OR 36 inches (900 mm) OR 60 inches (1500 mm), as directed.**
 - k. Accessories:
 - 1) Opposed-blade steel damper.
 - 2) Duct-mounting collars with countersunk screw holes.
2. Modular Core Supply Grilles:
- a. Throw: Extended distance for airflow rates.
 - b. Material: Steel.
 - c. Grilles per Unit: One **OR** Two **OR** Three **OR** Four, **as directed**.
 - d. Finish: White baked acrylic.
 - e. Border: **1-1/2-inch (38-mm)** width with countersunk screw holes.
 - f. Blades:
 - 1) Airfoil, individually adjustable horizontally.
 - 2) Double deflection.
 - 3) Set in modules.
 - g. Modules: Removable; rotatable.
 - h. Mounting: Surface.
 - i. Accessory: Opposed-blade steel damper.
- E. Flexible Diffusion Outlets
1. Continuous Tubular Diffuser:
- a. Material: Flame-retardant, woven polyethylene fabric **OR** Flame-retardant, coated polyester and fiberglass fabric **OR** Flame-retardant, permeable polyester and fiberglass fabric **OR** Polyethylene, **as directed**.
 - b. Duct Connection: Round.
 - c. Duct Connection Size: as directed by the Owner.
 - d. Diffusion Hole Size: as directed by the Owner.
 - e. Diffusion Hole Frequency - Number per **100 Feet (30 m)**: or as directed by the Owner .
 - f. Accessories:
 - 1) Quick-connect joint.
 - 2) Snap hooks.
 - 3) Cleanout zipper.
 - 4) Condensate drain.
- F. Registers And Grilles
1. Adjustable Bar Register:
- a. Material: Steel **OR** Aluminum **OR** Stainless steel, **as directed**.
 - b. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - c. Face Blade Arrangement: Horizontal **OR** Vertical, **as directed**, spaced **3 inches (76 mm) OR 1-1/2 inches (38 mm) OR 3/4 inch (19 mm) OR 1/2 inch (13 mm), as directed**, apart.
 - d. Core Construction: Integral **OR** Removable, **as directed**.
 - e. Rear-Blade Arrangement: Horizontal **OR** Vertical, **as directed**, spaced **3/4 inch (19 mm) OR 1/2 inch (13 mm), as directed**, apart.
 - f. Frame: **1-1/4 inches (32 mm) OR 1 inch (25 mm), as directed**, wide.
 - g. Mounting Frame: Filter.
 - h. Mounting: Countersunk screw **OR** Concealed **OR** Lay in, **as directed**.
 - i. Damper Type: Adjustable opposed blade **OR** NRTL listed, opposed blade, spring closing, and with fusible link for **160 deg F (71 deg C), as directed**.
 - j. Accessories:
 - 1) Front **OR** Rear, **as directed**,-blade gang operator.

- 2) Filter.
2. Adjustable Bar Grille:
 - a. Material: Steel **OR** Aluminum **OR** Stainless steel, **as directed**.
 - b. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - c. Face Blade Arrangement: Horizontal **OR** Vertical, **as directed**, spaced **3 inches (76 mm)** **OR 1-1/2 inches (38 mm)** **OR 3/4 inch (19 mm)** **OR 1/2 inch (13 mm)**, **as directed**, apart.
 - d. Core Construction: Integral **OR** Removable, **as directed**.
 - e. Rear-Blade Arrangement: Horizontal **OR** Vertical, **as directed**, spaced **3/4 inch (19 mm)** **OR 1/2 inch (13 mm)**, **as directed**, apart.
 - f. Frame: **1-1/4 inches (32 mm)** **OR 1 inch (25 mm)**, **as directed**, wide.
 - g. Mounting Frame: Filter.
 - h. Mounting: Countersunk screw **OR** Concealed **OR** Lay in, **as directed**.
3. Security Register:
 - a. Security Level: Maximum **OR** Medium **OR** Minimum, **as directed**, and suicide deterrent, **as directed**.
 - b. Application: Ducted return **OR** Air transfer **OR** Barrier, **as directed**.
 - c. Material: Steel **OR** Aluminum, **as directed**.
 - d. Material Thickness: **0.19 inch (4.8 mm)**.
 - e. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - f. Face Arrangement:
 - 1) Shape: Square **OR** Rectangular **OR** Round, **as directed**.
 - 2) Design: Fixed bar **OR** Perforated **OR** Lattice, **as directed**.
 - 3) Frame: Yes **OR** No, **as directed**.
 - 4) Deflection: Zero **OR** 38, **as directed**, degrees.
 - 5) Core: None **OR** Louvered, **as directed**.
 - 6) **3/16-inch- (5-mm-)** thick, front lattice plate with **2-by-2-inch- (50-by-50-mm-)** square holes and **1-inch (25-mm)** frets, **0.135-inch (3.43-mm)** wire mesh, and **1/4-inch- (6-mm-)** thick backer plate.
 - 7) **3/16-inch- (5-mm-)** thick, perforated faceplate with **5/16-inch- (8-mm-)** diameter holes spaced **7/16 inch (11 mm)** o.c., staggered at 60 degrees.
 - 8) **1-1/2-inch (38-mm)** bars and mandrel tubes and rods with zero **OR** 15, **as directed**, -degree deflection in **1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm)** angle border.
 - 9) **1-3/8-inch (35-mm)** bars and double mandrel tubes with zero **OR** 15, **as directed**, -degree deflection in **1-3/4-inch (45-mm)** angle border.
 - g. Damper Operation: None **OR** Face operated **OR** Rear operated, **as directed**.
 - h. Damper Type: Adjustable opposed blade **OR** NRTL listed, opposed blade, spring closing, and with fusible link for **160 deg F (71 deg C)**, **as directed**.
 - i. Wall Sleeve: **3/16 inch (5 mm)** welded to face **OR 1/8 inch (3 mm)** welded to face **OR** Mechanically fastened to border, **as directed**.
 - j. Mounting: **1-by-1-by-3/16-inch (25-by-25-by-5-mm)** retaining angle frame **OR 1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm)** retaining angle frame **OR 1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm)** cast-in-place frame and tamperproof machine screws, **as directed**.
4. Security Grille:
 - a. Security Level: Maximum **OR** Medium **OR** Minimum, **as directed**, and suicide deterrent, **as directed**.
 - b. Application: Ducted return **OR** Air transfer **OR** Barrier, **as directed**.
 - c. Material: Steel **OR** Aluminum, **as directed**.
 - d. Material Thickness: **0.19 inch (4.8 mm)**.
 - e. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - f. Face Arrangement:
 - 1) Shape: Square **OR** Rectangular **OR** Round, **as directed**.
 - 2) Design: Fixed bar **OR** Perforated **OR** Lattice, **as directed**.
 - 3) Frame: Yes **OR** No, **as directed**.
 - 4) Deflection: Zero **OR** 38, **as directed**, degrees.
 - 5) Core: None **OR** Louvered, **as directed**.

- 6) **3/16-inch- (5-mm-)** thick, front lattice plate with **2-by-2-inch- (50-by-50-mm-)** square holes and **1-inch (25-mm)** frets, **0.135-inch (3.43-mm)** wire mesh, and **1/4-inch- (6-mm-)** thick backer plate.
- 7) **3/16-inch- (5-mm-)** thick perforated faceplate with **5/16-inch- (8-mm-)** diameter holes spaced **7/16 inch (11 mm)** o.c., staggered at 60 degrees.
- 8) **1-1/2-inch (38-mm)** bars and mandrel tubes and rods with zero **OR 15, as directed,**-degree deflection in **1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm)** angle border.
- 9) **1-3/8-inch (35-mm)** bars and double mandrel tubes with zero **OR 15, as directed,**-degree deflection in **1-3/4-inch (45-mm)** angle border.
- g. Wall Sleeve: **3/16 inch (5 mm)** welded to face **OR 1/8 inch (3 mm)** welded to face **OR** Mechanically fastened to border, **as directed**.
- h. Mounting: **1-by-1-by-3/16-inch (25-by-25-by-5-mm)** retaining angle frame **OR 1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm)** retaining angle frame **OR 1-1/4-by-1-1/4-by-3/16-inch (32-by-32-by-5-mm)** cast-in-place frame and tamperproof machine screws, **as directed**.
5. Fixed Face Register:
 - a. Material: Steel **OR** Aluminum, **as directed**.
 - b. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - c. Face Arrangement: **1/2-by-1/2-by-1/2-inch (13-by-13-by-13-mm)** grid **OR** Perforated, **as directed**, core.
 - d. Core Construction: Integral **OR** Removable, **as directed**.
 - e. Frame: **1-1/4 inches (32 mm)** **OR 1 inch (25 mm)**, **as directed**, wide.
 - f. Mounting Frame: Filter.
 - g. Mounting: Countersunk screw **OR** Concealed **OR** Lay in, **as directed**.
 - h. Damper Type: Adjustable opposed blade **OR** NRTL listed, opposed blade, spring closing, and with fusible link for **160 deg F (71 deg C)**, **as directed**.
 - i. Accessory: Filter.
6. Fixed Face Grille:
 - a. Material: Steel **OR** Aluminum, **as directed**.
 - b. Finish: Baked enamel, white **OR** Baked enamel, color selected.
 - c. Face Arrangement: **1/2-by-1/2-by-1/2-inch (13-by-13-by-13-mm)** grid **OR** Perforated, **as directed**, core.
 - d. Core Construction: Integral **OR** Removable, **as directed**.
 - e. Frame: **1-1/4 inches (32 mm)** **OR 1 inch (25 mm)**, **as directed**, wide.
 - f. Mounting Frame: Filter.
 - g. Mounting: Countersunk screw **OR** Concealed **OR** Lay in, **as directed**.
 - h. Accessory: Filter.
7. Linear Bar Grille:
 - a. Material: Steel **OR** Aluminum, **as directed**.
 - b. Finish: Baked enamel, white **OR** Baked enamel, color selected, **as directed**.
 - c. Face Arrangement: **1/2-by-1/2-by-1/2-inch (13-by-13-by-13-mm)** grid **OR** Perforated, **as directed**, core.
 - d. Distribution plenum.
 - 1) Internal insulation.
 - 2) Inlet damper.
 - e. Frame: **1-1/4 inches (32 mm)** **OR 1 inch (25 mm)**, **as directed**, wide.
 - f. Mounting Frame: Filter.
 - g. Mounting: Countersunk screw **OR** Concealed **OR** Lay in, **as directed**.
 - h. Damper Type: Adjustable opposed blade **OR** NRTL listed, opposed blade, spring closing, and with fusible link for **160 deg F (71 deg C)**, **as directed**.
- G. Source Quality Control
 1. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

1.3 EXECUTION

A. Installation

1. Install diffusers, registers, and grilles level and plumb.
2. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify the Owner for a determination of final location.
3. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

B. Adjusting

1. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13 13

Task	Specification	Specification Description
23 37 13 13	23 31 13 19	Duct Accessories
23 37 13 43	23 31 13 19	Duct Accessories
23 37 13 43	23 37 13 13	Diffusers, Registers, And Grilles

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SECTION 23 37 23 13 - INTAKE AND RELIEF VENTILATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for intake and relief ventilators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Louvered-penthouse ventilators.
 - b. Roof hoods.
 - c. Goosenecks.

C. Performance Requirements

1. Delegated Design: Design ventilators, including comprehensive engineering analysis by a qualified professional engineer, using structural and seismic performance requirements and design criteria indicated.
2. Structural Performance: Ventilators shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of ventilator components, noise or metal fatigue caused by ventilator blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - a. Wind Loads: Determine loads based on pressures as indicated on Drawings.
OR
Wind Loads: Determine loads based on a uniform pressure of **20 lbf/sq. ft. (960 Pa)** **OR** **30 lbf/sq. ft. (1440 Pa)**, as directed by the Owner, acting inward or outward.
OR
Wind Loads: Determine loads based on pressures indicated below:
 - 1) Corner Zone: as directed by the Owner.
 - 2) Other Than Corner Zone: as directed by the Owner.
3. Seismic Performance: Ventilators, including attachments to other construction, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
4. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes, without buckling, opening of joints, overstressing of components, failure of connections, or other detrimental effects.
 - a. Temperature Change (Range): **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.
5. Water Entrainment: Limit water penetration through unit to comply with ASHRAE 62.1.

D. Submittals

1. Product Data: For each type of product indicated. For louvered-penthouse ventilators specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62., Section 5 - "Systems and Equipment."
3. Shop Drawings: For gravity ventilators. Include plans, elevations, sections, details, ventilator attachments to curbs, and curb attachments to roof structure.

- a. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
4. Samples: For each exposed product and for each color and texture specified.
5. Delegated-Design Submittal: For shop-fabricated ventilators indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of shop-fabricated ventilators.
6. Coordination Drawings: Roof framing plans and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Structural members to which roof curbs and ventilators will be attached.
 - b. Sizes and locations of roof openings.
7. Seismic Qualification Certificates: For ventilators, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
8. Welding certificates.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."

F. Coordination

1. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

1.2 PRODUCTS

A. Materials

1. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5 or T-52.
2. Aluminum Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 3003 or 5005 with temper as required for forming or as otherwise recommended by metal producer for required finish.
3. Galvanized-Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** zinc coating, mill phosphatized.
4. Stainless-Steel Sheet: ASTM A 666, Type 304, with No. 4 **OR** 6, **as directed**, finish.
5. Fasteners: Same basic metal and alloy as fastened metal or 300 Series stainless steel unless otherwise indicated. Do not use metals that are incompatible with joined materials.
 - a. Use types and sizes to suit unit installation conditions.
 - b. Use Phillips flat **OR** hex-head or Phillips pan, **as directed**, -head screws for exposed fasteners unless otherwise indicated.
6. Post-Installed Fasteners for Concrete and Masonry: Torque-controlled expansion anchors made from stainless-steel components, with capability to sustain without failure a load equal to 4 times the loads imposed for concrete, or 6 times the load imposed for masonry, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
7. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

B. Fabrication, General

1. Factory or shop fabricate gravity ventilators to minimize field splicing and assembly. Disassemble units to the minimum extent as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

2. Fabricate frames, including integral bases, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 3. Fabricate units with closely fitted joints and exposed connections accurately located and secured.
 4. Fabricate supports, anchorages, and accessories required for complete assembly.
 5. Perform shop welding by AWS-certified procedures and personnel.
- C. Louvered-Penthouse Ventilators
1. Construction: All-welded assembly with **4-inch (100-mm) OR 6-inch (150-mm)**, as directed,- deep louvers, mitered corners, and aluminum **OR** galvanized-steel **OR** stainless-steel, as directed, sheet roof with mineral-fiber insulation and vapor barrier, as directed.
 2. Frame and Blade Material and Nominal Thickness: Extruded aluminum, of thickness required to comply with structural performance requirements, but not less than **0.080 inch (2.0 mm)** for frames and **0.080 inch (2.0 mm) OR 0.060 inch (1.5 mm)**, as directed, for blades with condensate deflectors, as directed.
 - a. AMCA Seal: Mark units with the AMCA Certified Ratings Seal.
 - b. Exterior Corners: Prefabricated corner units with mitered and welded blades **OR** mitered blades with concealed close-fitting splices, as directed, and with fully recessed **OR** semirecessed, as directed, mullions at corners.
 3. Frame and Blade Material and Nominal Thickness: Galvanized-steel sheet, of thickness required to comply with structural performance requirements, but not less than **0.052 inch (1.3 mm)** for frames and **0.040 inch (1.0 mm) OR 0.052 inch (1.3 mm) OR 0.064 inch (1.6 mm)**, as directed, for blades with condensate deflectors, as directed.
 - a. AMCA Seal: Mark units with the AMCA Certified Ratings Seal.
 - b. Exterior Corners: Prefabricated corner units with mitered and welded blades **OR** mitered blades with concealed close-fitting splices, as directed, and with fully recessed **OR** semirecessed, as directed, mullions at corners.
 4. Frame and Blade Material and Nominal Thickness: Stainless-steel sheet, of thickness required to comply with structural performance requirements, but not less than **0.050 inch (1.27 mm) OR 0.062 inch (1.57 mm)**, as directed, with grain running parallel **OR** perpendicular, as directed, to length of blades and frame members with condensate deflectors, as directed.
 - a. AMCA Seal: Mark units with the AMCA Certified Ratings Seal.
 - b. Exterior Corners: Prefabricated corner units with mitered and welded blades **OR** mitered blades with concealed close-fitting splices, as directed, and with fully recessed **OR** semirecessed, as directed, mullions at corners.
 5. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; **1-1/2-inch- (40-mm-)** thick, rigid fiberglass insulation adhered to inside walls; and **1-1/2-inch (40-mm)** wood nailer. Size as required to fit roof opening and ventilator base.
 - a. Configuration: Self-flashing without a cant strip, with **OR** Built-in cant and **OR** Built-in raised cant and, as directed, mounting flange.
 - b. Overall Height: **8 inches (200 mm) OR 9-1/2 inches (240 mm) OR 12 inches (300 mm) OR 16 inches (400 mm) OR 18 inches (450 mm)**, as directed.
 6. Bird Screening: Galvanized-steel, **1/2-inch- (12.7-mm-)** square mesh, **0.041-inch (1.04-mm)** wire **OR** Aluminum, **1/2-inch- (12.7-mm-)** square mesh, **0.063-inch (1.6-mm)** wire **OR** Flattened, expanded aluminum, **3/4 by 0.050 inch (19 by 1.27 mm)** thick **OR** Stainless-steel, **1/2-inch- (12.7-mm-)** square mesh, **0.047-inch (1.19-mm)** wire, as directed.
OR
Insect Screening: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh, **0.012-inch (0.30-mm) OR** Stainless-steel, **18-by-18 (1.4-by-1.4-mm)** mesh, **0.009-inch (0.23-mm)**, as directed, wire.
 7. Galvanized-Steel Sheet Finish:
 - a. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
 - b. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.

- c. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat and an overall minimum dry film thickness of **2 mils (0.05 mm)**.
 - 1) Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- 8. Accessories:
 - a. Dampers:
 - 1) Location: Penthouse neck **OR** Inside louver face, **as directed**.
 - 2) Control: Manual **OR** Motorized, **as directed**.
- D. Roof Hoods
 - 1. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figures 5-6 and 5-7.
 - 2. Materials: Galvanized-steel sheet, minimum **0.064-inch- (1.62-mm-)** thick base and **0.040-inch- (1.0-mm-)** thick hood **OR** Aluminum sheet, minimum **0.063-inch- (1.6-mm-)** thick base and **0.050-inch- (1.27-mm-)** thick hood, **as directed**; suitably reinforced.
 - 3. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; **1-1/2-inch- (40-mm-)** thick, rigid fiberglass insulation adhered to inside walls; and **1-1/2-inch (40-mm)** wood nailer. Size as required to fit roof opening and ventilator base.
 - a. Configuration: Self-flashing without a cant strip, with **OR** Built-in cant and **OR** Built-in raised cant and, **as directed**, mounting flange.
 - b. Overall Height: **8 inches (200 mm) OR 9-1/2 inches (240 mm) OR 12 inches (300 mm) OR 16 inches (400 mm) OR 18 inches (450 mm)**, **as directed**.
 - 4. Bird Screening: Galvanized-steel, **1/2-inch- (12.7-mm-)** square mesh, **0.041-inch (1.04-mm)** wire **OR** Aluminum, **1/2-inch- (12.7-mm-)** square mesh, **0.063-inch (1.6-mm)** wire **OR** Flattened, expanded aluminum, **3/4 by 0.050 inch (19 by 1.27 mm)** thick **OR** Stainless-steel, **1/2-inch- (12.7-mm-)** square mesh, **0.047-inch (1.19-mm)** wire, **as directed**.
OR
Insect Screening: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh, **0.012-inch (0.30-mm)** **OR** Stainless-steel, **18-by-18 (1.4-by-1.4-mm)** mesh, **0.009-inch (0.23-mm)**, **as directed**, wire.
 - 5. Galvanized-Steel Sheet Finish:
 - a. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
 - b. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
 - c. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat and an overall minimum dry film thickness of **2 mils (0.05 mm)**.
 - 1) Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.
- E. Goosenecks
 - 1. Factory or shop fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 5-5; with a minimum of **0.052-inch- (1.3-mm-)** thick, galvanized-steel sheet.
 - 2. Roof Curbs: Galvanized-steel sheet; with mitered and welded corners; **1-1/2-inch- (40-mm-)** thick, rigid fiberglass insulation adhered to inside walls; and **1-1/2-inch (40-mm)** wood nailer. Size as required to fit roof opening and ventilator base.
 - a. Configuration: Self-flashing without a cant strip, with **OR** Built-in cant and **OR** Built-in raised cant and, **as directed**, mounting flange.
 - b. Overall Height: **8 inches (200 mm) OR 9-1/2 inches (240 mm) OR 12 inches (300 mm) OR 16 inches (400 mm) OR 18 inches (450 mm)**, **as directed**.

3. Bird Screening: Galvanized-steel, **1/2-inch- (12.7-mm-)** square mesh, **0.041-inch (1.04-mm)** wire **OR** Aluminum, **1/2-inch- (12.7-mm-)** square mesh, **0.063-inch (1.6-mm)** wire **OR** Flattened, expanded aluminum, **3/4 by 0.050 inch (19 by 1.27 mm)** thick **OR** Stainless-steel, **1/2-inch- (12.7-mm-)** square mesh, **0.047-inch (1.19-mm)** wire, **as directed**.
OR
Insect Screening: Aluminum, **18-by-16 (1.4-by-1.6-mm)** mesh, **0.012-inch (0.30-mm)** **OR** Stainless-steel, **18-by-18 (1.4-by-1.4-mm)** mesh, **0.009-inch (0.23-mm)**, **as directed**, wire.
4. Galvanized-Steel Sheet Finish:
 - a. Surface Preparation: Clean surfaces of dirt, grease, and other contaminants. Clean welds, mechanical connections, and abraded areas and repair galvanizing according to ASTM A 780. Apply a conversion coating suited to the organic coating to be applied over it.
 - b. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply an air-dried primer immediately after cleaning and pretreating.
 - c. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of **1 mil (0.025 mm)** for topcoat and an overall minimum dry film thickness of **2 mils (0.05 mm)**.
 - 1) Color and Gloss: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

1.3 EXECUTION

A. Installation

1. Install gravity ventilators level, plumb, and at indicated alignment with adjacent work.
2. Install goosenecks on curb base where throat size exceeds **9 by 9 inches (230 by 230 mm)**.
3. Install gravity ventilators with clearances for service and maintenance.
4. Install perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
5. Install concealed gaskets, flashings, joint fillers, and insulation as installation progresses. Comply with Division 07 Section "Joint Sealants" for sealants applied during installation.
6. Label gravity ventilators according to requirements specified in Division 23 Section "Identification For Hvac Piping And Equipment".
7. Protect galvanized and nonferrous-metal surfaces from corrosion or galvanic action by applying a heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry, or dissimilar metals.
8. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.

B. Connections

1. Duct installation and connection requirements are specified in other Division 21. Drawings indicate general arrangement of ducts and duct accessories.

C. Adjusting

1. Adjust damper linkages for proper damper operation.

END OF SECTION 23 37 23 13

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Task	Specification	Specification Description
23 38 13 16	01 22 16 00	No Specification Required
23 38 13 16	11 21 63 00	Food Service Equipment
23 38 13 16	23 31 13 13a	Metal Ducts
23 38 13 16	23 37 23 13	Intake and Relief Ventilators

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SECTION 23 41 13 00 - AIR FILTERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for particulate air infiltration. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Metal panel filters.
 - b. Flat panel filters.
 - c. Pleated panel filters.
 - d. Ring panel filters.
 - e. Nonsupported bag filters.
 - f. Supported bag filters.
 - g. Rigid cell box filters.
 - h. V-bank cell filters.
 - i. Self-supported pocket filters.
 - j. Automatic roll filters.
 - k. Bulk media.
 - l. Front- and rear-access filter frames.
 - m. Side-service housings.
 - n. Filter gages.

C. Submittals

1. Product Data: For each type of product indicated. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.
2. LEED Submittals:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
 - b. Product Data for Credit EQ 4.1: For adhesives and sealants, including printed statement of VOC content.
3. Shop Drawings: For air filters. Include plans, elevations, sections, details, and attachments to other work.
 - a. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
 - b. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
 - c. Wiring Diagrams: For power, signal, and control wiring.
4. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASHRAE Compliance:
 - a. Comply with applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality"; Section 5 - "Systems and Equipment"; and Section 7 - "Construction and Startup."

- b. Comply with ASHRAE 52.1 for arrestance and ASHRAE 52.2 for MERV for methods of testing and rating air-filter units.
3. Comply with NFPA 90A and NFPA 90B.

E. Coordination

1. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

1.2 PRODUCTS

A. Metal Panel Filters

1. Description: Factory-fabricated, self-supported, cleanable, all-metal, impingement-type, panel-type, permanent air filters with holding frames.
2. Media: Four **OR** Six, **as directed**, alternate layers of galvanized-steel **OR** aluminum **OR** stainless-steel, **as directed**, flat and herringbone-crimp screen.
 - a. Nonoiled for grease removal application.
 - b. Adhesive coating.
 - 1) Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Filter-Media Frame: Galvanized steel **OR** Hot-dip galvanized steel **OR** Aluminum **OR** Stainless steel, **as directed**, hinged, and with pull and retaining handles fastened to the media.
 - a. Drain holes.

B. Flat Panel Filters

1. Description: Factory-fabricated, self-supported, flat, nonpleated, panel-type, disposable air filters with holding frames.
2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
3. Media: Interlaced glass or synthetic fibers **OR** Cotton and synthetic fibers, **as directed**, coated with nonflammable adhesive.
 - a. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Media shall be coated with an antimicrobial agent.
 - c. Metal Retainer: Upstream side and downstream side.
4. Filter-Media Frame: Cardboard with perforated metal retainer **OR** Galvanized steel with metal grid on outlet side and steel rod grid on inlet side, hinged, with pull and retaining handles, **as directed**, sealed or bonded to the media.
5. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.

C. Pleated Panel Filters

1. Description: Factory-fabricated, self-supported, extended-surface, pleated, panel-type, disposable air filters with holding frames.
2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
3. Media: Interlaced glass or synthetic fibers **OR** Cotton and synthetic fibers, **as directed**, coated with nonflammable adhesive.
 - a. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Media shall be coated with an antimicrobial agent.
 - c. Separators shall be bonded to the media to maintain pleat configuration.
 - d. Welded wire grid shall be on downstream side to maintain pleat.
 - e. Media shall be bonded to frame to prevent air bypass.
 - f. Support members on upstream and downstream sides to maintain pleat spacing.
4. Filter-Media Frame: Cardboard frame with perforated metal retainer **OR** Galvanized steel **OR** Aluminized steel, **as directed**, with metal grid on outlet side and steel rod grid on inlet side, hinged, with pull and retaining handles, **as directed**, sealed or bonded to the media.

5. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- D. Ring Panel Filters
1. Description: Internally supported, flat panel filters for installation in a filter track.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Two **OR** Three **OR** Four, **as directed**, -ply polyester with sealed edges.
 - a. Panel Construction: Single with one edge unsealed for support removal, **as directed**, **OR** Linked, **as directed**.
 - b. Media shall be coated with an antimicrobial agent.
 4. Internal Support: 9-gage steel wire frame.
- E. Nonsupported Bag Filters
1. Description: Factory-fabricated, dry, extended-surface, nonsupported filters with header frames.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Glass-fiber **OR** Synthetic, **as directed**, material constructed so individual pockets are maintained in tapered form under rated-airflow conditions by flexible internal supports.
 - a. Media shall be coated with an antimicrobial agent.
 4. Filter-Media Frame: Galvanized steel **OR** Hard polyurethane foam, **as directed**.
 5. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- F. Supported Bag Filters
1. Description: Factory-fabricated, dry, extended-surface, self-supported filters with holding frames in steel, basket-type retainers.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Fibrous material constructed so individual pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports.
 - a. Media shall be coated with an antimicrobial agent.
 4. Filter-Media Frame: Galvanized steel **OR** Hard polyurethane foam, **as directed**.
 5. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- G. Rigid Cell Box Filters
1. Description: Factory-fabricated, adhesive-coated, **as directed**, disposable, packaged air filters with media perpendicular to airflow, and with holding frames.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Fibrous material constructed so individual pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports.
 - a. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Media shall be coated with an antimicrobial agent.
 4. Filter-Media Frames: Galvanized steel **OR** Hard polyurethane foam, **as directed**.
 5. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- H. V-Bank Cell Filters
1. Description: Factory-fabricated, adhesive-coated, **as directed**, disposable, packaged air filters with media angled to airflow, and with holding frames.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Fibrous material constructed so individual pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports.
 - a. Adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b. Media shall be coated with an antimicrobial agent.
 4. Filter-Media Frames: Galvanized steel **OR** Hard polyurethane foam, **as directed**.

5. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- I. Self-Supported Pocket Filters
1. Description: Factory-fabricated, panel-type, disposable air filters with contoured media for extended surface.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Fibrous material constructed so individual pleats are maintained in tapered form under rated-airflow conditions by flexible internal supports.
 - a. Media shall be coated with an antimicrobial agent.
 4. Configuration: Single-pocket cube **OR** Multipocket, **as directed**.
 5. Filter-Media Frame: Galvanized steel **OR** Hard polyurethane foam, **as directed**.
 6. Mounting Frames: Welded galvanized steel, with gaskets and fasteners; suitable for bolting together into built-up filter banks.
- J. Automatic Roll Filters
1. Description: Factory-fabricated, automatic, motor-driven, roll-type filters with holding casing.
 2. Arrangement: Horizontal **OR** Vertical, **as directed**.
 3. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 4. Media: Compressed and rolled, fibrous-glass material; viscous coated.
 - a. Media shall be coated with an antimicrobial agent.
 5. Holding Frame: Galvanized steel with enclosed, clean media roll arranged to allow upstream replacement of filter media.
 - a. Auxiliary Frame: Locate on downstream side of unit with downstream **OR** side, **as directed**, access.
 - b. Final Filter: Extended-surface, retained **OR** nonsupported, **as directed**, media.
 6. Control and Drive: Electric, gear-reducer, motor-driven, feed-control mechanism equipped with manual media advance and runout switches for stopping media movement of filter bank and operating remote warning signal lights.
 - a. Manual Control: Manual switch to advance media, and wired to override automatic controls.
 - b. Automatic Control: Prewired control package to advance media when filter resistance exceeds preselected high limit **OR** after preselected operating time, **as directed**.
- K. Bulk Media
1. Description: Air-filter media, factory custom cut or rolled.
 2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 3. Media: Spun glass **OR** Synthetic **OR** Polyester, **as directed**, in a roll **OR** cut into pads, **as directed**.
- L. Front- And Rear-Access Filter Frames
1. Framing System: Galvanized-steel **OR** Aluminum, **as directed**, framing members with access for either upstream (front) or downstream (rear) filter servicing, cut to size and prepunched for assembly into modules. Vertically support filters to prevent deflection of horizontal members without interfering with either filter installation or operation.
 2. Prefilters: Incorporate a separate track with spring clips, **as directed**, removable from front or back, **as directed**.
 3. Sealing: Factory-installed, positive-sealing device for each row of filters, to ensure seal between gasketed filter elements and to prevent bypass of unfiltered air.
- M. Side-Service Housings
1. Description: Factory-assembled, side-service housings, constructed of galvanized steel **OR** aluminum, **as directed**, with flanges to connect to duct or casing system.
 2. Prefilters: Integral tracks to accommodate **2-inch-** (50-mm-) deep, disposable or washable, **as directed**, filters.

3. Access Doors: Hinged, with continuous **OR** Continuous, **as directed**, gaskets on perimeter and positive-locking devices, and arranged so filter cartridges can be loaded from either access door.
4. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames and to prevent bypass of unfiltered air.

N. Filter Gages

1. Diaphragm-type gage with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.
 - a. Diameter: **4-1/2 inches (115 mm) OR 2 inches (50 mm), as directed.**
 - b. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5-Inch wg (125 Pa)** or Less: **0- to 0.5-inch wg (0 to 125 Pa).**
 - c. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5- to 1.0-Inch wg (125 to 250 Pa)** or Less: **0- to 1.0-inch wg (0 to 250 Pa).**
 - d. Scale Range for Filter Media Having a Recommended Final Resistance of **1.0- to 2.0-Inch wg (250 to 500 Pa)** or Less: **0- to 2.0-inch wg (0 to 500 Pa).**
 - e. Scale Range for Filter Media Having a Recommended Final Resistance of **2.0- to 3.0-Inch wg (500 to 750 Pa)** or Less: **0- to 3.0-inch wg (0 to 750 Pa).**
 - f. Scale Range for Filter Media Having a Recommended Final Resistance of **3.0- to 4.0-Inch wg (750 to 1000 Pa)** or Less: **0- to 4.0-inch wg (0 to 1000 Pa).**
2. Manometer-Type Filter Gage: Molded plastic, with epoxy-coated aluminum scale and logarithmic-curve tube gage with integral leveling gage, graduated to read from **0- to 3.0-inch wg (0 to 750 Pa)**, and accurate within 3 percent of the full scale range.
3. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

1.3 EXECUTION

A. Installation

1. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.
2. Install filters in position to prevent passage of unfiltered air.
3. Install filter gage for each filter bank.
4. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.
5. Install filter-gage, static-pressure taps upstream and downstream from filters. Install filter gages on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
6. Coordinate filter installations with duct and air-handling-unit installations.

B. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Operate automatic roll filters to demonstrate compliance with requirements.
 - b. Test for leakage of unfiltered air while system is operating.
3. Air filter will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports.

C. Cleaning

1. After completing system installation and testing, adjusting, and balancing of air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION 23 41 13 00

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SECTION 23 41 13 00a - GAS-PHASE AIR FILTRATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for gas-phase air infiltration. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Activated-carbon panel filters.
 - b. Activated-carbon, deep-V filters.
 - c. Activated carbon, V-cell filters.
 - d. Cylindrical-canister filters.
 - e. Permanganate filters.
 - f. Supported adsorber bag filters.
 - g. Front-access filter housings.
 - h. Side-service housings.
 - i. Filter gages.

C. Submittals

1. Product Data: For each type of product indicated. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with applicable requirements in ASHRAE 62.1, Section 5, "Systems and Equipment."
3. Shop Drawings: For air filters. Include plans, elevations, sections, details, and attachments to other work.
 - a. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
 - b. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
4. Field quality-control reports.
5. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

D. Quality Assurance

1. ASHRAE Compliance:
 - a. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
2. Comply with NFPA 90A and NFPA 90B.

1.2 PRODUCTS

A. Activated-Carbon Panel Filters

1. Description: Factory-fabricated unit with activated-carbon media.
2. Media: Flat-panel, disposable multilayer filter with an inlet layer of polyester fibers, a layer of activated-carbon granules bonded to fibers, and a layer of polyurethane foam; housed in a cardboard frame.

3. Media: Flat-panel, disposable honeycombed cellulose with cells filled with activated-carbon granules and a perforated mesh grid; housed in a cardboard frame.
4. Media: Pleated, multilayer filter with an inlet layer of cotton and synthetic fibers and a layer of activated-carbon granules bonded to synthetic fibers; media formed into deep-V-shaped pleats, held by self-wire grid, and housed in a cardboard frame.
5. Mounting Frames: Welded, galvanized, sheet-steel frame and galvanized-steel fasteners with polyurethane, **as directed**, gaskets; capable of bolting together into built-up filter banks.

B. Activated-Carbon, Deep-V Filters

1. Description: Factory-fabricated unit with activated-carbon trays in deep-V arrangement with disposable panel prefilter, **as directed**, and final filter, **as directed**.
2. Module Housing: **0.064-inch- (1.6-mm-)** thick, galvanized steel **OR** stainless steel **OR** double-wall casing with **1-inch- (25-mm-)** thick insulation, **as directed**, to hold media-filled panels; with side servicing through gasketed access doors on both sides and able to connect to other housings. Equip housings with metal slide channel tracks to hold activated-carbon trays and particulate prefilter, **as directed**, and final filter, **as directed**.
 - a. Finish: Factory primed **OR** primed and painted, **as directed**, outside **OR** inside and outside **OR** inside, **as directed**.
 - b. Pressure tap and fitting.
3. Media-Holding Panels: **1-inch- (25-mm-)** thick, perforated polystyrene to allow airflow through contained loose-fill media; with removable service cap for recharging.
OR
Media-Holding Panels: **1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**, deep and containing granular carbon bonded into a briquette form with a galvanized **OR** stainless, **as directed**, -steel frame.
4. Media: **45 lb (20.3 kg)** per **1000 cfm (470 L/s)** of loose-fill **OR** loose-fill or bonded-briquette **OR** bonded-briquette, **as directed**, coconut-shell activated carbon.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
5. Media: loose-fill **OR** loose-fill or bonded-briquette **OR** bonded-briquette, **as directed**, activated alumina impregnated with potassium permanganate.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
6. Media: loose-fill **OR** loose-fill or bonded-briquette **OR** bonded-briquette, **as directed**, impregnated carbon.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
7. Media: loose-fill **OR** loose-fill or bonded-briquette **OR** bonded-briquette, **as directed**, blended carbon and alumina impregnated with potassium permanganate.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.

- d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
- C. Activated-Carbon, V-Cell Filters
1. Description: Factory-fabricated, dry, V-shaped cartridges containing loose-fill media with holding frames.
 2. Cartridges: V-cell configuration, plastic enclosure caps, galvanized-steel frame with vertical galvanized-steel channel supports. Integral, **1-inch- (25-mm-)** deep panels constructed of honeycombed paper and nylon mesh.
 3. Fill Media: Coconut-shell activated carbon; **45 lb (20.3 kg)** of activated carbon per **1000 cfm (470 L/s)** of airflow.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
 4. Fill Media: Activated alumina impregnated with potassium permanganate; **10.5 lb (4.8 kg)** of adsorbent per **500 cfm (236 L/s)** of airflow.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
 5. Fill Media: Impregnated carbon; **8.0 lb (3.6 kg)** of adsorbent per **500 cfm (236 L/s)** of airflow.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
 6. Fill Media: Blended carbon and alumina impregnated with potassium permanganate; **7.0 lb (3.1 kg)** of adsorbent per **500 cfm (236 L/s)** of airflow.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
 7. Mounting Frames: Welded, galvanized, sheet-steel frame and galvanized-steel fasteners with gaskets; capable of bolting together into built-up filter banks.
- D. Cylindrical-Canister Filters
1. Description: Factory-fabricated, dry, cylindrical canisters containing loose-fill adsorbent with holding frames.
 2. Cylinders: **0.0455-inch- (1.2-mm-)** thick, perforated, electroplated **OR** stainless, **as directed**, steel, with end plate.
 3. Fill Media: **5.0 lb (2.3 kg) OR 6.7 lb (3.0 kg), as directed**, of coconut-shell activated carbon **OR** activated alumina impregnated with potassium permanganate **OR** impregnated carbon **OR** blended carbon and alumina impregnated with potassium permanganate, **as directed**, per canister.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.

- d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
 4. Mounting Frames: Welded galvanized, sheet steel with galvanized-steel fasteners **OR** stainless steel with stainless-steel fasteners, **as directed**, with gaskets; designed for bolting together into built-up filter banks.
- E. Permanganate Filters
1. Description: Factory-fabricated modules containing loose-fill adsorbent with holding frames.
 2. Modules: Permanent type, **24 inches wide by 24 inches high by 24 inches deep (600 mm wide by 600 mm high by 600 mm deep)**; shall hold both potassium permanganate and activated carbon. Manufactured in two pieces, each **12 inches (300 mm)** wide for ease of installation.
 3. Media: Porous spherical pellets formed from a combination of powdered, activated carbon and other binders, impregnated with potassium permanganate.
 - a. Leach Test: 180 minutes.
 - b. Potassium Permanganate Content: 4 percent minimum.
 - c. Moisture Content: 20 percent maximum.
 - d. Bulk Density: **34 lb/cu. ft. (0.54 g/mL) OR 50 lb/cu. ft. (0.8 g/mL), as directed.**
 - e. Crush Strength: **40 OR 50 OR 60, as directed**, percent maximum.
 - f. Abrasion: 4 percent maximum.
 - g. Nominal Pellet Diameter: **0.125 inch (3.175 mm)**.
 - h. Percent of Pellet Sizes: 80 to 85 percent after screening.
 4. Media: High-grade carbon, manufactured from coconut shells, bituminous coal, or a combination of both.
 - a. Ash Content: 2 to 3 percent.
 - b. Percent Carbon Tetrachloride Activity: 35 to 70 percent when tested according to ASTM D 3467.
 - c. Bulk Density: **32 lb/cu. ft. (510 kg/cu. m)**.
 - d. Mesh Size: **4 by 6 inches (100 by 150 mm)**, 90 percent minimum.
 - e. Hardness Factor: 95 when tested according to ASTM D 3802.
 5. Frame: Galvanized steel **OR** Hot-dip galvanized steel **OR** Aluminum **OR** Stainless steel, **as directed**, hinged, and with pull and retaining handles fastened to the media.
- F. Supported Adsorber Bag Filters
1. Description: Factory-fabricated, dry, extended-surface, self-supporting filters with holding frames.
 2. Media: Carbon-filled fibrous material constructed so individual pleats are maintained under rated-airflow conditions in tapered form by flexible internal supports.
 3. Filter-Media Frame: Galvanized steel.
 4. Mounting Frames: Welded, galvanized, sheet-steel frame and galvanized-steel fasteners with gaskets; capable of bolting together into built-up filter banks.
- G. Front-Access Filter Frames
1. Framing System: Galvanized-steel **OR** Aluminum, **as directed**, framing members with access for upstream (front) filter servicing, cut to size and prepunched for assembly into modules. Vertically support filters to prevent deflection of horizontal members without interfering with either filter installation or operation.
 2. Prefilters: Incorporate a separate track with spring clips, **as directed**, removable from front or back, **as directed**.
 3. Sealing: Factory-installed, positive-sealing device for each row of filters to ensure seal between gasketed filter elements to prevent bypass of unfiltered air.
- H. Side-Service Housings
1. Description: Factory-assembled, side-service housings constructed of galvanized steel **OR** aluminum, **as directed**, with flanges to connect to duct or casing system.
 2. Prefilters: Integral tracks to accommodate **2-inch- (50-mm-)** thick, disposable or washable, **as directed**, filters.

3. Access Doors: Hinged with continuous **OR** Continuous, **as directed**, gaskets on perimeter and with positive-locking devices. Arrange so filter cartridges can be loaded from either access door.
4. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.

I. Filter Gages

1. Diaphragm type, with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.
 - a. Diameter: **4-1/2 inches (115 mm) OR 2 inches (50 mm), as directed**.
 - b. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5-Inch wg (125 Pa)** or Less: **0- to 0.5-inch wg (0 to 125 Pa)**.
 - c. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5- to 1.0-Inch wg (125 to 250 Pa)** or Less: **0- to 1.0-inch wg (0 to 250 Pa)**.
 - d. Scale Range for Filter Media Having a Recommended Final Resistance of **1.0- to 2.0-Inch wg (250 to 500 Pa)** or Less: **0- to 2.0-inch wg (0 to 500 Pa)**.
 - e. Scale Range for Filter Media Having a Recommended Final Resistance of **2.0- to 3.0-Inch wg (500 to 750 Pa)** or Less: **0- to 3.0-inch wg (0 to 750 Pa)**.
 - f. Scale Range for Filter Media Having a Recommended Final Resistance of **3.0- to 4.0-Inch wg (750 to 1000 Pa)** or Less: **0- to 4.0-inch wg (0 to 1000 Pa)**.
2. Manometer-Type Filter Gage: Molded plastic, with epoxy-coated aluminum scale, logarithmic-curve tube gage with integral leveling gage; graduated to read from **0- to 3.0-inch wg (0 to 750 Pa)** and accurate within 3 percent of full-scale range.
3. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

1.3 EXECUTION

A. Installation

1. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.
2. Install filters in position to prevent passage of unfiltered air.
3. Install filter gage for each filter bank.
4. Do not operate fan system until particulate filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.
5. Do not install gas-phase filters until fan system is clean and there is no risk of construction debris loading the filter.
6. Install filter-gage, static-pressure taps upstream and downstream from filters. Install filter gages on filter banks with separate static-pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
7. Coordinate filter installations with duct and air-handling unit installations.

B. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Test for leakage of unfiltered air while system is operating.
3. Air filter will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports.

C. Cleaning

1. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new particulate filter media.

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Task	Specification	Specification Description
23 41 13 00	23 43 00 00	Electronic Air Cleaners
23 41 16 00	23 41 13 00	Air Filters
23 41 16 00	23 43 00 00	Electronic Air Cleaners
23 41 19 00	23 41 13 00	Air Filters
23 41 19 00	23 43 00 00	Electronic Air Cleaners

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SECTION 23 41 33 00 - HIGH-EFFICIENCY PARTICULATE FILTRATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for high-efficiency particulate filtration. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. HEPA rigid-cell box filters.
 - b. HEPA V-bank cell filters.
 - c. HEPA filter diffusers.
 - d. HEPA filter fan modules.
 - e. ULPA filters.
 - f. 95 percent DOP filters.
 - g. Front- and rear-access filter frames.
 - h. Side-service housings.
 - i. Filter gages.

C. Submittals

1. Product Data: For each type of product indicated. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.
2. LEED Submittals:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with applicable requirements in ASHRAE 62.1, Section 5, "Systems and Equipment."
3. Shop Drawings: For air filters. Include plans, elevations, sections, details, and attachments to other work.
 - a. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
 - b. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
 - c. Wiring Diagrams: For power, signal, and control wiring.
4. Field quality-control reports.
5. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended use.
2. ASHRAE Compliance:
 - a. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
3. Comply with IEST-RP-CC001.3.
4. Comply with UL 586.
5. Comply with IEST-RP-CC007.1.
6. Comply with NFPA 90A and NFPA 90B.

E. Coordination

1. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.

1.2 PRODUCTS

A. HEPA Rigid-Cell Box Filters

1. Description: Factory-fabricated, disposable, packaged air filters with media perpendicular to airflow and with holding frames.
2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
3. Media: Fibrous material, constructed so individual pleats are maintained under rated-airflow conditions.
 - a. Internal Separators: None **OR** Aluminum in media folds, **as directed**.
 - b. Gasket Material: None **OR** Neoprene **OR** Blue gel, **as directed**.
 - c. Gasket Location: None **OR** Upstream **OR** Upstream and Downstream **OR** Downstream, **as directed**.
 - d. Faceguard Material: Aluminum **OR** Stainless steel, **as directed**.
 - e. Faceguard Location: None **OR** Upstream **OR** Upstream and Downstream **OR** Downstream, **as directed**.
4. Filter-Media Frames:
 - a. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - b. Materials: Stainless steel **OR** Fire-retardant plywood **OR** Fabricated aluminum **OR** Fire-retardant particleboard **OR** Galvanized sheet **OR** Non-fire-retardant particleboard, **as directed**.
 - c. Style: Box **OR** Double-turned flange **OR** Deep channel **OR** Double-turned flange, one side, **as directed**.
5. Mounting Frames: Welded galvanized steel with gaskets and fasteners; suitable for bolting together into built-up filter banks.

B. HEPA V-Bank Cell Filters

1. Description: Factory-fabricated, disposable, packaged air filters with media at an angle to airflow and with holding frames.
2. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
3. Media: Fibrous material, constructed so individual pleats are maintained under rated-airflow conditions.
 - a. Internal Separators: None **OR** Aluminum in media folds, **as directed**.
 - b. Gasket Material: None **OR** Neoprene **OR** Blue gel, **as directed**.
 - c. Gasket Location: None **OR** Upstream **OR** Upstream and Downstream **OR** Downstream, **as directed**.
 - d. Faceguard Material: Aluminum **OR** Stainless steel, **as directed**.
 - e. Faceguard Location: None **OR** Upstream **OR** Upstream and Downstream **OR** Downstream, **as directed**.
4. Filter-Media Frames:
 - a. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - b. Materials: Stainless steel **OR** Fire-retardant plywood **OR** Fabricated aluminum **OR** Fire-retardant particleboard **OR** Galvanized sheet **OR** Non-fire-retardant particleboard, **as directed**.
 - c. Style: Box **OR** Double-turned flange **OR** Deep channel **OR** Double-turned flange, one side, **as directed**.
5. Mounting Frames: Welded galvanized steel with gaskets and fasteners; suitable for bolting together into built-up filter banks.

C. HEPA Filter Diffusers

1. Description: Factory-fabricated, individually ducted, HEPA filter-holding ceiling modules.
2. Media: Fibrous glass, constructed of continuous sheets with closely spaced pleats with glass filament separators.
 - a. Media to Module Side Bond: Urethane sealant.

- b. Media to Frame Side Bond: Polyurethane foam **OR** Silicone **OR** Neoprene adhesive **OR** Fiberglass-mat packing **OR** Thermosetting sealant **OR** Knife edge in fluid-filled channel, **as directed**.
 - c. Application: Class 100 **OR** Class 10 **OR** Class 1, **as directed**, clean room.
 - 3. Casing:
 - a. Configuration: Ducted inlet **OR** Plenum inlet **OR** Plenum inlet with prefilter, **as directed**.
 - b. Module Material: Extruded aluminum, 16 gage with mill finish.
 - c. Suspension: Ceiling grid.
 - 4. Accessories:
 - a. Diffusion damper.
 - b. Diffusion-damper adjustment port.
 - c. Filter test port.
- D. HEPA Filter Fan Modules
- 1. Description: Factory-fabricated, HEPA filter ceiling module with fan.
 - 2. Casing:
 - a. Configuration: Ducted inlet **OR** Plenum inlet **OR** Plenum inlet with prefilter, **as directed**.
 - b. Module Material: Extruded aluminum, 16 gage with mill finish.
 - c. Suspension: Ceiling grid **OR** Independent, **as directed**.
 - 3. Media: Fibrous glass, constructed of continuous sheets with closely spaced pleats with aluminum separators **OR** vinyl-coated aluminum separators **OR** separators of ribbons of filter media, **as directed**.
 - a. Frame Material: **3/4-inch- (19-mm-)** thick, fire-retardant plywood **OR** **3/4-inch- (19-mm-)** thick, fire-retardant particleboard **OR** **3/4-inch- (19-mm-)** thick plywood **OR** **3/4-inch- (19-mm-)** thick particleboard **OR** Galvanized steel **OR** Aluminized steel **OR** Cadmium-plated steel **OR** Stainless steel **OR** Aluminum, **as directed**.
 - b. Media to Frame Side Bond: Polyurethane foam **OR** Silicone **OR** Neoprene adhesive **OR** Fiberglass-mat packing **OR** Thermosetting sealant **OR** Knife edge in fluid-filled channel, **as directed**.
 - c. Face Gasket: Neoprene expanded rubber **OR** Ceramic fiber **OR** Silicone, **as directed**.
 - d. Faceguard: Plastic **OR** Stainless steel, **as directed**.
 - 4. Accessories: Filter test port.
 - 5. Control: Variable speed.
 - 6. Motor:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
 - c. Type: Permanent-split capacitor with SCR for speed adjustment **OR** Electronically commutated motor, **as directed**.
 - d. Fan-Motor Assembly Isolation: Rubber isolators.
 - e. Enclosure: Open dripproof **OR** Totally enclosed, fan cooled **OR** Totally enclosed, air over **OR** Open, externally ventilated **OR** Totally enclosed, nonventilated **OR** Severe duty **OR** Explosion proof **OR** Dust-ignition-proof machine, **as directed**.
 - f. Enclosure Materials: Cast iron **OR** Cast aluminum **OR** Rolled steel, **as directed**.
 - g. Motor Bearings: as directed by the Owner
 - h. Unusual Service Conditions:
 - 1) Ambient Temperature: as directed by the Owner .
 - 2) Altitude: as directed by the Owner above sea level.
 - 3) High humidity.
 - i. Efficiency: Premium efficient.
 - j. NEMA Design: as directed by the Owner .
 - k. Service Factor: as directed by the Owner .
 - l. Motor Speed: Single speed **OR** Multispeed, **as directed**.
 - 1) Speed Control: Infinitely adjustable with pneumatic-electric and electronic controls.

- E. ULPA Filters
1. Description: Factory-fabricated, ULPA filters with holding casing.
 2. Media: Fibrous glass, constructed of continuous sheets with closely spaced pleats with aluminum separators **OR** vinyl-coated aluminum separators **OR** separators of ribbons of filter media, **as directed**.
 3. Frame Material: **3/4-inch- (19-mm-)** thick, fire-retardant plywood **OR 3/4-inch- (19-mm-)** thick, fire-retardant particleboard **OR 3/4-inch- (19-mm-)** thick plywood **OR 3/4-inch- (19-mm-)** thick particleboard **OR** Galvanized steel **OR** Aluminized steel **OR** Cadmium-plated steel **OR** Stainless steel **OR** Aluminum, **as directed**.
 4. Media to Frame Side Bond: Polyurethane foam **OR** Silicone **OR** Neoprene adhesive **OR** Fiberglass-mat packing **OR** Thermosetting sealant **OR** Knife-edge in fluid-filled channel, **as directed**.
 5. Face Gasket: Neoprene expanded rubber **OR** Ceramic fiber **OR** Silicone, **as directed**.
 6. Mounting Frames: Construct downstream corners of holding device with cushion pads to protect media. Provide bolted filter-sealing mechanism to mount and continuously seal each individual filter.
- F. 95 Percent DOP Filters
1. Description: Factory-fabricated, 95 percent DOP filters with holding casing.
 2. Media: Fibrous glass, constructed of continuous sheets with closely spaced pleats with aluminum separators **OR** vinyl-coated aluminum separators **OR** separators of ribbons of filter media, **as directed**.
 3. Frame Material: **3/4-inch- (19-mm-)** thick, fire-retardant plywood **OR 3/4-inch- (19-mm-)** thick, fire-retardant particleboard **OR 3/4-inch- (19-mm-)** thick plywood **OR 3/4-inch- (19-mm-)** thick particleboard **OR** Galvanized steel **OR** Aluminized steel **OR** Cadmium-plated steel **OR** Stainless steel **OR** Aluminum, **as directed**.
 4. Frame Style: Box single header **OR** Double header **OR** Double turned flange **OR 3/4-inch- (19-mm-)** deep channel, **as directed**.
 5. Media to Frame Side Bond: Polyurethane foam **OR** Silicone **OR** Neoprene adhesive **OR** Fiberglass-mat packing **OR** Thermosetting sealant **OR** Knife edge in fluid-filled channel, **as directed**.
 6. Face Guard Material: Galvanized **OR** Aluminum, **as directed**, mesh.
 7. Face Guard Location: Upstream **OR** Upstream and Downstream **OR** Downstream, **as directed**.
 8. Gasket Material: Neoprene expanded rubber **OR** Ceramic fiber **OR** Silicone, **as directed**.
 9. Gasket Location: Upstream **OR** Upstream and Downstream **OR** Downstream, **as directed**.
 10. Mounting Frames: Construct downstream corners of holding device with cushion pads to protect media. Provide bolted filter-sealing mechanism to mount and continuously seal each individual filter.
- G. Front- And Rear-Access Filter Frames
1. Framing System: Aluminum framing members with access for either upstream (front) or downstream (rear) filter servicing, cut to size and prepunched for assembly into modules. Vertically support filters to prevent deflection of horizontal members without interfering with either filter installation or operation.
 2. Prefilters: Incorporate a separate track, removable from front or back.
 3. Sealing: Factory-installed, positive-sealing device for each row of filters to ensure seal between gasketed filter elements to prevent bypass of unfiltered air.
 4. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- H. Side-Service Housings
1. Description: Factory-assembled, side-service housings, constructed of **0.064-inch- (1.6-mm-)** thick, galvanized steel **OR** stainless steel **OR** double-wall casing with **1-inch (25-mm)** insulation, **as directed**, to hold filters. Side servicing is through gasketed access doors on one side, and

housings are capable of connection to other housings. Equip housings with metal slide channel tracks with clamping mechanisms to hold filters, and the following:

- a. Pressure tap and fitting.
- b. DOP/freon test ports.
- c. Decontamination ports.
- d. Isolation dampers.
- e. Lifting lugs.
2. Prefilters: Integral tracks to accommodate **2-, 4-, and 6-inch- (50-, 100-, and 150-mm-)** thick, disposable filters.
3. Access Doors: Continuous gaskets on perimeter and positive-locking swivel, **as directed**, devices. Provide ribbed bagging rim behind access door and PVC bags for bag-in, bag-out arrangement, **as directed**. Arrange so filter cartridges can be loaded from an access door for each tier and section of the following:
 - a. Combination prefilter and HEPA filter.
OR
Prefilter.
OR
HEPA filter.
 - b. Upstream and downstream test section.
4. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.
5. Accessories:
 - a. Filter change-out trays.
 - b. Document-storage pocket.
 - c. Filter removal rod.
6. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

I. Filter Gages

1. Diaphragm type with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.
 - a. Diameter: **4-1/2 inches (115 mm) OR 2 inches (50 mm), as directed.**
 - b. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5-Inch wg (125 Pa)** or Less: **0- to 0.5-inch wg (0 to 125 Pa).**
 - c. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5- to 1.0-Inch wg (125 to 250 Pa)** or Less: **0- to 1.0-inch wg (0 to 250 Pa).**
 - d. Scale Range for Filter Media Having a Recommended Final Resistance of **1.0- to 2.0-Inch wg (250 to 500 Pa)** or Less: **0- to 2.0-inch wg (0 to 500 Pa).**
 - e. Scale Range for Filter Media Having a Recommended Final Resistance of **2.0- to 3.0-Inch wg (500 to 750 Pa)** or Less: **0- to 3.0-inch wg (0 to 750 Pa).**
 - f. Scale Range for Filter Media Having a Recommended Final Resistance of **3.0- to 4.0-Inch wg (750 to 1000 Pa)** or Less: **0- to 4.0-inch wg (0 to 1000 Pa).**
2. Manometer-Type Filter Gage: Molded plastic, with epoxy-coated aluminum scale, logarithmic-curve tube gage with integral leveling gage; graduated to read from **0- to 3.0-inch wg (0 to 750 Pa)** and accurate within 3 percent of full-scale range.
3. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

1.3 EXECUTION

A. Installation

1. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.
2. Install filters in position to prevent passage of unfiltered air.
3. Install filter gage for each filter bank.

4. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters that were used during construction and testing with new, clean filters.
 5. Install filter-gage static-pressure taps upstream and downstream from filters. Install filter gages on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
 6. Coordinate filter installations with duct and air-handling unit installations.
- B. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Operate automatic roll filters to demonstrate compliance with requirements.
 - b. Test for leakage of unfiltered air while system is operating.
 - c. HEPA Filters: Pressurize housing to a minimum of **3.0-inch wg (750 Pa)** or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter with soapy water to check for air leaks.
 - d. HEPA Filters: Pressurize housing to a minimum of **3.0-inch wg (750 Pa)** or to designed operating pressure, whichever is higher; and test housing joints, door seals, and sealing edges of filter for air leaks according to pressure-decay method in ASME N510.
 3. Air filter will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- C. Cleaning
1. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new filter media.

END OF SECTION 23 41 33 00

Task	Specification	Specification Description
23 41 33 00	23 41 13 00	Air Filters
23 42 13 00	23 41 13 00	Air Filters
23 42 13 00	23 41 13 00a	Gas-Phase Air Filtration

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SECTION 23 43 00 00 - ELECTRONIC AIR CLEANERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electronic air cleaners. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Electronic air cleaners.
 - b. Side-service housings.
 - c. Front- and rear-access filter frames.
 - d. Filter gages.

C. Submittals

1. Product Data: For each type of product indicated. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: For each electronic air cleaner. Include plans, elevations, sections, details, and attachments to other work.
 - a. Show filter assembly, dimensions, materials, and methods of assembly of components.
 - b. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
 - c. Wiring Diagrams: For power, signal, and control wiring.
4. Field quality-control reports.
5. Operation and Maintenance Data: For each type of filter and housing to include in emergency, operation, and maintenance manuals.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASHRAE Compliance:
 - a. Comply with applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," and Section 7 - "Construction and Startup."
 - b. Comply with ASHRAE 52.1 for arrestance and with ASHRAE 52.2 for MERV for methods of testing and rating air-filter units.
3. Comply with NFPA 90A and NFPA 90B.
4. Comply with ARI 850.
5. Comply with UL 867.

1.2 PRODUCTS

A. Electronic Air Cleaners

1. Description: Factory-fabricated electronic air cleaner operating by electrostatic precipitation principles.

2. Prefilter Media: Four **OR** Six, **as directed**, alternate layers of galvanized-steel **OR** aluminum **OR** stainless-steel, **as directed**, flat and herringbone-crimp screen.
3. Prefilter: Comply with requirements in Division 23 Section "Particulate Air Filtration" for flat **OR** pleated **OR** ring, **as directed**, panel. Size and airflow capacity shall match those of electronic air cleaners.
 - a. Depth: **1 inch (25 mm) OR 2 inches (50 mm) OR 4 inches (100 mm)**, **as directed**.
 - b. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 - c. Arrestance: 85 percent when tested according to ASHRAE 52.1.
 - d. MERV: 8 when tested according to ASHRAE 52.2.
4. Final Filter: Comply with requirements in Division 23 Section "Particulate Air Filtration" for supported bag **OR** unsupported bag **OR** rigid-cell box **OR** V-bank cell **OR** self-supported pocket, **as directed**. Size and airflow capacity shall match those of gas-phase filters.
 - a. Depth: **12 inches (300 mm) OR 18 inches (450 mm) OR 24 inches (600 mm)**, **as directed**.
 - b. Filter Unit Class: UL 900, Class 1 **OR** Class 2, **as directed**.
 - c. Arrestance: 85 percent when tested according to ASHRAE 52.1.
 - d. MERV: 13 when tested according to ASHRAE 52.2.
5. Collection Cells: Aluminum, independently supported and nested.
 - a. Ionizing Section: Alternately spaced grounded struts and charged ionizing wires.
 - b. Collecting Section: Alternately grounded and charged plates, with insulators located out of airstream.
6. Power Pack: Self-contained, prewired rectifying unit to convert 120 **OR** 208/240 **OR** 480, **as directed**, -V ac, single-phase, 60-Hz power to approximately 12,000-V dc for ionizer and 6000-V dc for collector; include overload protection, on-off switch, pilot light showing operating status, and access door interlock.
7. Safety Accessories: Manual-reset safety switches and warning lights for filter plenum access doors, signal lights and safety switching upstream and downstream from unit within duct, and enameled high-voltage warning signs.
8. Collection Section Cleaning System:
 - a. Detergent Reservoir Tank: **30 gal. (110 L) OR 55 gal. (200 L)**, **as directed**, with pump, motor, solenoid valve, level sensor, backflow preventer, wye-strainer, and ball valve.
 - b. Detergent.
 - c. Dispensing System: Motor-driven oscillating copper manifolds with brass spray nozzles on each side of the collector.
9. Mist Eliminators: Upstream **OR** Upstream and downstream **OR** Downstream, **as directed**.
10. Controls: Programmable logic controller in remotely mounted NEMA 250, Type 12 enclosure; with integral time clock and manual override.
 - a. Contacts for enable-disable control by building automation system.
11. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

B. Fan Section

1. Fan: Forward curved, belt driven.
2. Motor:
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Type: Permanent-split capacitor with SCR for speed adjustment **OR** Electronically commutated motor, **as directed**.
 - c. Fan-Motor Assembly Isolation: Rubber isolators.
 - d. Enclosure: Totally enclosed, fan cooled, and explosion proof **OR** dust-ignition proof, **as directed**.
 - e. Enclosure Materials: Cast iron **OR** Cast aluminum **OR** Rolled steel, **as directed**.
 - f. Motor Bearings: Sealed ball.
 - g. Unusual Service Conditions:
 - 1) Ambient Temperature: as directed by the Owner .

- 2) Altitude: as directed by the Owner above sea level.
 - 3) High humidity.
 - h. Efficiency: Premium efficient.
 - i. NEMA Design: as directed by the Owner .
 - j. Service Factor: as directed by the Owner .
 - k. Motor Speed: Single speed **OR** Multispeed, **as directed**.
 - 1) Speed Control: Infinitely adjustable with pneumatic-electric and electronic controls.
- C. Cabinet
- 1. Description: 16-gage galvanized steel with epoxy powder finish for suspended, wall, frame, or duct mounting.
- D. Side-Service Housings
- 1. Description: Factory-assembled, side-service housings, with bottom drain, **as directed**, constructed of galvanized steel **OR** aluminum, **as directed**, and configured for stacking, with flanges to connect to duct or casing system.
 - 2. Access Doors: Hinged with continuous **OR** Continuous, **as directed**, gaskets on perimeter and positive-locking devices.
 - 3. Sealing: Incorporate positive-sealing gasket material on channels to seal top and bottom of filter cartridge frames to prevent bypass of unfiltered air.
 - 4. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- E. Front- And Rear-Access Filter Frames
- 1. Framing System: Galvanized-steel **OR** Aluminum, **as directed**, framing members with access for either upstream (front) or downstream (rear) filter servicing, cut to size and prepunched for assembly into modules with bottom drain, **as directed**, and configured for stacking. Vertically support filters to prevent deflection of horizontal members without interfering with either filter installation or operation.
 - 2. Prefilters: Incorporate a separate track with spring clips, **as directed**, removable from front or back, **as directed**.
 - 3. Final Filters: Integral tracks to accommodate particulate **OR** gas-phase, **as directed**, disposable filters.
 - 4. Sealing: Factory-installed, positive-sealing device for each row of filters to ensure seal between gasketed filter elements to prevent bypass of unfiltered air.
 - 5. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- F. Filter Gages
- 1. Diaphragm type, with dial and pointer in metal case, vent valves, black figures on white background, and front recalibration adjustment.
 - a. Diameter: **4-1/2 inches (115 mm) OR 2 inches (50 mm), as directed**.
 - b. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5-Inch wg (125 Pa)** or Less: **0- to 0.5-inch wg (0 to 125 Pa)**.
 - c. Scale Range for Filter Media Having a Recommended Final Resistance of **0.5- to 1-Inch wg (125 to 250 Pa)** or Less: **0- to 1.0-inch wg (0 to 250 Pa)**.
 - d. Scale Range for Filter Media Having a Recommended Final Resistance of **1.0- to 2.0-Inch wg (250 to 500 Pa)** or Less: **0- to 2.0-inch wg (0 to 500 Pa)**.
 - e. Scale Range for Filter Media Having a Recommended Final Resistance of **2.0- to 3.0-Inch wg (500 to 750 Pa)** or Less: **0- to 3.0-inch wg (0 to 750 Pa)**.
 - f. Scale Range for Filter Media Having a Recommended Final Resistance of **3.0- to 4.0-Inch wg (750 to 1000 Pa)** or Less: **0- to 4.0-inch wg (0 to 1000 Pa)**.
 - 2. Manometer-Type Filter Gage: Molded plastic, with epoxy-coated aluminum scale, logarithmic-curve tube gage, with integral leveling indicator, graduated to read from **0- to 3.0-inch wg (0 to 750 Pa)**, and accurate within 3 percent of full-scale range.
 - 3. Accessories: Static-pressure tips, tubing, gage connections, and mounting bracket.

1.3 EXECUTION

A. Installation

1. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.
2. Install filters in position to prevent passage of unfiltered air.
3. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing with new, clean filters.
4. Operate electronic air cleaners for 24 hours as part of startup before filters are put into operation.
5. Install filter-gage, static-pressure taps upstream and downstream from filters. Install filter gages on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.
6. Install and connect water-supply and drainage piping.
7. Coordinate filter installations with duct and air-handling-unit installations.

B. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections: Test for leakage of unfiltered air while system is operating.
3. Air filter will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports.

C. Cleaning

1. After completing system installation and testing, adjusting, and balancing air-handling and air-distribution systems, clean filter housings and install new prefilter and final-filter media.

END OF SECTION 23 43 00 00

Task	Specification	Specification Description
23 43 23 00	23 43 00 00	Electronic Air Cleaners
23 51 13 13	23 51 16 00	Breechings, Chimneys, And Stacks
23 51 13 16	23 51 16 00	Breechings, Chimneys, And Stacks

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SECTION 23 51 13 19 - DRAFT CONTROL DEVICES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for draft control devices. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Draft inducer fans.
 - b. Venturi-draft inducer fans.
 - c. Mechanical-draft vent fans.
 - d. Vent exhaust fans.
 - e. Barometric dampers.
 - f. Vent dampers.
 - g. Combustion-air fans.

C. Submittals

1. Product Data: For each type of product indicated.
2. Wiring Diagrams: Power, signal, and control wiring.
3. Operation and Maintenance Data.
4. Warranty: Warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

E. Warranty

1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of draft inducer fans, venturi-draft inducer fans, mechanical-draft vent fans, vent exhaust fans, barometric dampers, vent dampers, and/or combustion-air fans that fail in materials or workmanship within two **OR 10, as directed**, years from date of Final Completion.
 - a. Failures include failure of the fan due to corrosion.

1.2 PRODUCTS

A. Draft Inducer Fans

1. Fan Construction: Galvanized **OR** Aluminized, **as directed**,-steel housing and radial-blade centrifugal fan.
 - a. Fan Motor: Permanent split-capacitor type.
2. Controls:
 - a. Draft proving switch.
 - b. Control kit to cycle fan with gas flow to a single burner.

B. Venturi-Draft Inducer Fans

1. Fan Construction: Enameled-steel venturi tube for vents **20 inches (508 mm)** in diameter and smaller, and ASTM A 666, Type 304, stainless-steel venturi tube for vents **22 to 48 inches (559 to 1219 mm)** in diameter. Galvanized **OR** Enameled, **as directed**,-steel fan housing with radial-blade centrifugal wheel.

- a. Fan Motor: Permanent split-capacitor type.
 2. Controls:
 - a. Draft proving switch.
 - b. Control kit to cycle fan with gas flow to a single burner.
- C. Mechanical-Draft Vent Fans
1. Fan Construction: Forward-curved centrifugal fan and scroll fabricated of aluminized **OR** galvanized, **as directed**, steel; direct-drive, ball-bearing motor lubricated with synthetic oil; internal cooling fan; stainless-steel shaft; and integral pressure-sensing switch.
 - a. Fan Motor: Permanent split-capacitor type.
 2. Controls:
 - a. Draft proving switch.
 - b. Control kit to cycle fan with gas flow to single **OR** multiple, **as directed**, burner(s).
 3. Accessories:
 - a. Aluminized **OR** Stainless, **as directed**, -steel, wall-vent hood.
- D. Vent Exhaust Fans
1. General: Centrifugal fan with variable **OR** constant, **as directed**, -speed control mounted at end of sidewall **OR** vertical, **as directed**, vent.
 2. Test Standard: UL 378, for fans exposed to flue gases up to 640 deg F (337 deg C).
 3. Fan Construction: Cast-aluminum **OR** Galvanized-steel **OR** Stainless-steel, **as directed**, housing painted manufacturer's standard color of baked enamel, **as directed**. Galvanized **OR** Stainless, **as directed**, -steel vent. Cast-aluminum **OR** Stainless-steel, **as directed**, wheel. Backward-inclined centrifugal or axial fan wheel statically and dynamically balanced. Provide access to clean the discharge area. Concentric makeup air inlet duct surrounding the vent to allow zero clearance to combustibles, **as directed**.
 4. Motor: Fully enclosed, variable-speed duty, **as directed**, permanent split capacitor, out of the airstream, with prelubricated and sealed ball bearings.
 5. Constant-Speed Controls: Boiler interlock relay starts fan when burner control cycles on. Pressure switch permits burner operation via interlock with boiler. Fan proving switch is adjustable between **minus 0.07- and minus 0.15-inch wg (minus 17 and minus 37 Pa)**.
 6. Variable-Speed Controls: Boiler interlock relay starts fan when burner control cycles on. Pressure controller, control transformer, and miscellaneous controls for automatic modulation of fan speed to maintain preset negative pressure between **0- and minus 1.0-inch wg (0 and minus 249 Pa)**. Include controller with indicator lights, pressure differential transmitter, chimney pressure sensor probe, and fan proving switch adjustable between **minus 0.07- and minus 0.15-inch wg (minus 17 and minus 37 Pa)**. Include tubing.
- E. Barometric Dampers
1. Damper Construction: High-temperature-enamel-painted steel damper and housing with galvanized-steel breeching connection. Adjustable counterweight with lock. Include knife-edge bearings that do not require lubrication.
- F. Vent Dampers
1. Damper Construction: Stainless-steel damper blade, shaft, and vent pipe with metal, prelubricated bearings.
 - a. Electric motor sized to power damper open and closed in approximately 15 seconds in each direction. Power is off when damper is at rest.
 - b. Comply with ANSI Z21.66.
 2. Controls:
 - a. Control transformer.
 - b. Keyed wiring harness.
 - c. Damper end-switch to prove damper is open.
 - d. Interlock with boiler to permit burner operation when damper is open.
 - e. Hold-open switch for troubleshooting boiler controls.

G. Combustion-Air Fans

1. Fan Construction: Galvanized **OR** Aluminized, **as directed**, -steel housing; steel forward-curved fan and scroll; direct-drive, totally enclosed, fan-cooled motor with ball bearings; stainless-steel shaft; and integral pressure-sensing switch.
 - a. Internal bypass to temper supply-air temperature to room.
2. Controls:
 - a. Fan proving switch to permit burner operation when combustion-air fan is operating.
 - b. Multiple appliance control starts fan with operation of any one of three **OR** four, **as directed**, appliances.
 - c. Modulating combustion-air fan speed to control pressure differential in room with respect to outdoors.
 - d. Manual-reset, high-limit switch stops operation with **160 deg F (71 deg C)** room temperature.
 - e. Optional Controls:
 - 1) Alarm circuit.
 - 2) Excessive negative pressure limit.
 - 3) Interface relay for vent exhaust fan, draft inducer fan, or mechanical-draft vent fan.
 - 4) Galvanized-steel **OR** Aluminum, **as directed**, intake hood.

H. Motors

1. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

1.3 EXECUTION

A. Installation

1. Install listed components in a manner complying with the listing.
2. Secure barometric dampers to breechings with hardware compatible with connected materials.
3. Locate barometric and motorized vent dampers as close to draft hood collar as possible.
4. Secure barometric and motorized vent dampers to appliances, breechings, or chimneys with hardware compatible with connected materials.
5. Install draft inducer fans in single-wall vent section that is designed to couple with other vent materials.
6. Secure draft inducer fans to appliances, breechings, or stacks with hardware compatible with connected materials.
7. Install draft inducer fans with clearances for service and maintenance.
8. Install PVC, **as directed**, intake duct that is sized according to manufacturer's written instructions.

B. Connections

1. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
2. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
2. Remove and replace malfunctioning components and recheck.

D. Adjusting

1. Set field-adjustable switches and controls as indicated.

E. Demonstration

1. Engage a factory-authorized service representative to train **OR** Train, **as directed**, Owner's maintenance personnel to adjust, operate, and maintain draft control devices.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



END OF SECTION 23 51 13 19



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 51 13 19	23 31 13 19	Duct Accessories

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SECTION 23 51 16 00 - BREECHINGS, CHIMNEYS, AND STACKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for breechings, chimneys, and stacks. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Listed chimney liners.
 - b. Listed single-wall and double-wall vents and chimneys.
 - c. Listed, refractory-lined breechings and stacks.
 - d. Field-fabricated metal breechings and chimneys.
 - e. Listed grease and dishwasher ducts.

C. Submittals

1. Product Data: For the following:
 - a. Chimney liners.
 - b. Type B and BW vents.
 - c. Type L vents.
 - d. Special gas vents.
 - e. Building-heating-appliance chimneys.
 - f. Grease ducts.
 - g. Refractory-lined metal breechings and chimneys.
 - h. Guy wires and connectors.
2. Shop Drawings: For vents, breechings, chimneys, and stacks. Include plans, elevations, sections, details, and attachments to other work.
3. Welding certificates.
4. Manufacturer Seismic Qualification Certification: Submit certification that factory-fabricated breeching, chimneys, and stacks; accessories; and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
5. Warranty: Warranty specified in this Section.

D. Quality Assurance

1. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," for hangers and supports and AWS D9.1/D9.1M, "Sheet Metal Welding Code," for shop and field welding of joints and seams in vents, breechings, and stacks.

E. Warranty

1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of venting system that fail in materials or workmanship within 10 **OR** 15 **OR** 25, **as directed**, years from date of Final Completion. Failures include, but are not limited to, structural failures caused by expansion and contraction.

1.2 PRODUCTS

A. Listed Chimney Liners

1. Description: Straight **OR** Corrugated, **as directed**, single-wall chimney liner tested according to UL 1777 and rated for 1000 deg F (538 deg C) continuously, or 2100 deg F (1150 deg C) for 10 minutes; with negative or positive flue pressure complying with NFPA 211.

2. Straight Liner Materials: ASTM A 666, Type 304 **OR** Type 316, **as directed**, stainless steel.
 3. Corrugated Liner Materials: ASTM A 240/A 240M, Type 321 **OR** ASTM A 240/A 240M, Type 430 **OR** ASTM A 959, Type 29-4C, **as directed**, stainless steel.
 4. Accessories:
 - a. Fittings: Tees, elbows, increasers, draft-hood connectors, metal caps with bird barriers, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar or compatible materials and designs.
 - b. Sealant: Manufacturer's standard high-temperature sealant.
 - c. Insulating Fill: Manufacturer's standard high-temperature insulation fill material in annular space surrounding chimney liner including high-temperature, ceramic-fiber insulation required to seal chimney at top and bottom.
- B. Listed Type B And BW Vents
1. Description: Double-wall metal vents tested according to UL 441 and rated for **480 deg F (248 deg C)** continuously for Type B, or **550 deg F (288 deg C)** continuously for Type BW; with neutral or negative flue pressure complying with NFPA 211.
 2. Construction: Inner shell and outer jacket separated by at least a **1/4-inch (6-mm)** airspace.
 3. Inner Shell: **ASTM B 209 (ASTM B 209M)**, Type 1100 aluminum **OR** **ASTM B 209 (ASTM B 209M)**, Type 3003 aluminum **OR** **ASTM B 209 (ASTM B 209M)**, Type 3105 aluminum **OR** ASTM A 666, Type 430 stainless steel, **as directed**.
 4. Outer Jacket: Galvanized **OR** Aluminized, **as directed**, steel.
 5. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - a. Termination:
 - 1) Stack cap designed to exclude minimum 90 percent of rainfall.
OR
Round chimney top designed to exclude minimum 98 percent of rainfall.
OR
Exit cone with drain section incorporated into riser.
OR
Antibackdraft.
- C. Listed Type L Vents
1. Description: Double-wall metal vents tested according to UL 641 and rated for **570 deg F (300 deg C)** continuously, or **1700 deg F (926 deg C)** for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.
 2. Construction: Inner shell and outer jacket separated by at least a **1/4-inch (6-mm)** **OR** **1-inch (25-mm)** **OR** **2-inch (50-mm)** **OR** **4-inch (100-mm)**, **as directed**, airspace filled with high-temperature, ceramic-fiber **OR** mineral-wool, **as directed**, insulation.
 3. Inner Shell: ASTM A 666, Type 304 **OR** Type 316, **as directed**, stainless steel.
 4. Outer Jacket: Galvanized **OR** Aluminized **OR** Stainless, **as directed**, steel.
 5. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - a. Termination:
 - 1) Stack cap designed to exclude 90 percent of rainfall.
OR
Round chimney top designed to exclude 98 percent of rainfall.
OR
Exit cone with drain section incorporated into riser.
- D. Listed Special Gas Vents
1. Description: Double-wall metal vents tested according to UL 1738 and rated for **480 deg F (248 deg C)** continuously, with positive or negative flue pressure complying with NFPA 211.

2. Construction: Inner shell and outer jacket separated by at least a **1/2-inch (13-mm)** airspace.
 3. Inner Shell: ASTM A 959, Type 29-4C stainless steel.
 4. Outer Jacket: Aluminized **OR** Stainless, **as directed**, steel.
 5. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - a. Termination:
 - 1) Stack cap designed to exclude minimum 90 percent of rainfall.
OR
Round chimney top designed to exclude minimum 98 percent of rainfall.
OR
Exit cone with drain section incorporated into riser.
- E. Listed Building-Heating-Appliance Chimneys
1. Description for building-heating-appliance chimneys suitable for dual-fuel boilers, oven vents, water heaters, or exhaust for engines: Double-wall metal vents tested according to UL 103 and rated for **1000 deg F (538 deg C)** continuously, or **1700 deg F (926 deg C)** for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.
 - a. Construction: Inner shell and outer jacket separated by at least a **1/2-inch (25-mm) OR 1-inch (50-mm) OR 2-inch (50-mm) OR 3-inch (75-mm) OR 4-inch (100-mm)**, **as directed**, annular space filled with high-temperature, ceramic-fiber insulation, **as directed**.
 - b. Inner Shell: ASTM A 666, Type 304 **OR** Type 316, **as directed**, stainless steel.
 2. Description for 1400 deg F (760 deg C) chimneys suitable for dual-fuel boilers, oven vents, water heaters, or exhaust for engines: Double-wall metal vents tested according to UL 103 and UL 959 and rated for **1400 deg F (760 deg C)** continuously, or **1800 deg F (982 deg C)** for 10 minutes; with positive or negative flue pressure complying with NFPA 211.
 - a. Construction: Inner shell and outer jacket separated by at least a **1-inch (25-mm) OR 2-inch (50-mm) OR 3-inch (75-mm) OR 4-inch (100-mm)**, **as directed**, annular space filled with high-temperature, ceramic-fiber insulation.
 - b. Inner Shell: ASTM A 666, Type 304 **OR** Type 316, **as directed**, stainless steel.
 3. Description for Type HT chimneys suitable for fireplaces and other solid-fuel-burning appliances: Double-wall metal vents tested according to UL 103 and rated for **1000 deg F (538 deg C)** continuously, or **2100 deg F (1150 deg C)** for 10 minutes; with neutral or negative flue pressure complying with NFPA 211.
 - a. Construction: Inner shell and outer jacket separated by at least a **1-inch (25-mm) OR 1-1/2-inch (38-mm) OR 2-inch (50-mm) OR 4-inch (100-mm)**, **as directed**, annular space filled with high-temperature, ceramic-fiber insulation.
 - b. Inner Shell: ASTM A 666, Type 304 **OR** ASTM A 666, Type 316 **OR** ASTM A 240/A 240M, Type 430, **as directed**, stainless steel.
 4. Outer Jacket: Galvanized **OR** Aluminized **OR** Stainless, **as directed**, steel.
 5. Accessories: Tees, elbows, increasers, draft-hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly.
 - a. Termination:
 - 1) Stack cap designed to exclude minimum 90 percent of rainfall.
OR
Round chimney top designed to exclude minimum 98 percent of rainfall.
OR
Exit cone with drain section incorporated into riser.
- F. Listed Grease Ducts
1. Description: Double-wall metal vents tested according to UL 1978 and rated for **500 deg F (260 deg C)** continuously, or **2000 deg F (1093 deg C)** for 30 minutes; with positive or negative duct pressure and complying with NFPA 211.

2. Construction: Inner shell and outer jacket separated by at least a **1-inch (25-mm) OR 2-inch (50-mm) OR 3-inch (75-mm) OR 4-inch (100-mm)**, **as directed**, annular space filled with high-temperature, ceramic-fiber insulation.
 3. Inner Shell: ASTM A 666, Type 304 **OR** Type 316, **as directed**, stainless steel.
 4. Outer Jacket: Aluminized **OR** Stainless, **as directed**, steel where concealed. Stainless steel where exposed.
 5. Accessories: Tees, elbows, increasers, hood connectors, terminations, adjustable roof flashings, storm collars, support assemblies, thimbles, firestop spacers, and fasteners; fabricated from similar materials and designs as vent-pipe straight sections; all listed for same assembly. Include unique components required to comply with NFPA 96 including cleanouts, transitions, adapters and drain fittings.
- G. Listed, Refractory-Lined Metal Breechings And Chimneys
1. Comply with ASME STS-1.
 2. Design Wind Loads: **150 mph (241 km/h), as directed**.
 3. Design for seismic conditions at Project site.
 4. Chimney Outer Jacket: Aluminized **OR** Galvanized, **as directed**, steel with riveted **OR** welded, **as directed**, seams.
 5. Refractory Lining: Tested according to UL 959 for temperature and acid resistance, and bearing the testing laboratory label.
 - a. Temperature Rating: **1800 deg F (982 deg C)** continuously, and **2000 deg F (1093 deg C)** intermittently.
 - b. Acid Extraction: Maximum of 0.2 percent.
 - c. Cold Crushing Strength: Minimum of **3200 psig (22 MPa)**.
 - d. Thickness: Minimum of **2 inches (50 mm)**.
 6. Finish: Factory-applied, high-heat-resistant paint; color as selected.
 7. Base Section: Acid-resistant-coated, cast-iron anchor lugs for securing stack to foundation with anchorage designed by manufacturer, **as directed**.
 8. Reinforced Cleanout Section: Smoke-tight connection, with gasketed and bolt-tightened inspection plate; neck shall be welded to stack section.
 9. T or Y Sections: Smoke-tight connection, with welded joints and refractory lining; finished with smooth transition and with no exposed metal on inside.
 10. Spark Screen: ASTM A 666, Type 316 stainless steel, **0.0625 inch (1.6 mm)** thick, maximum **1/2-by-1/2-inch (13-by-13-mm)** mesh, with ASTM A 666, Type 304 stainless-steel rolled angle and drawband.
 11. Guy Bands: **8-inch- (200-mm-)** wide bands of same material as jacket, with bolted fasteners.
 12. Roof Penetration: Factory-fabricated thimbles, flashings, and counterflashings.
 13. Fabricate sections, fittings, and accessories as individual pieces or in combination lengths for field handling.
 14. Fabricate components with centrifugally cast refractory lining in lengths suitable for connection with drawbands.
 15. Bond refractory to steel jacket with calcium aluminate cement to prevent separation in finished product during shipping, handling, and installation.
 16. Fabricate stacks with anchor lugs; cleanout; T sections; flashings and counterflashings; and provisions for support, expansion, and contraction.
- H. Field-Fabricated Metal Breechings And Chimneys
1. Fabricate freestanding chimneys according to SMACNA's "Guide for Steel Stack Design and Construction."
 2. Fabricate breechings and chimneys from ASTM A 1011/A 1011M hot-rolled steel with continuously welded joints, complying with NFPA 211 for minimum metal thickness.
 - a. Equal to or Less Than **1.069 Sq. Ft. (0.099 Sq. m.)** or **14 Inches (356 mm)** in Diameter: **0.053 inch (1.35 mm)**.
 - b. Up to **1.396 Sq. Ft. (0.129 Sq. m)** or **16 Inches (406 mm)** in Diameter: **0.067 inch (1.7 mm)**.

- c. Up to **1.764 Sq. Ft. (0.164 Sq. m.)** or **18 Inches (457 mm)** in Diameter: **0.093 inch (2.36 mm)**.
- d. Larger Than Above: **0.123 inch (3.12 mm)**.
3. Fabricate chimneys and vent connectors from galvanized steel, complying with NFPA 211 for minimum metal thickness.
 - a. Equal to or Less Than **6 Inches (152 mm)** in Diameter: **0.019 inch (0.48 mm)**.
 - b. Up to **10 Inches (254 mm)** in Diameter: **0.024 inch (0.61 mm)**.
 - c. Up to **16 Inches (406 mm)** in Diameter: **0.029 inch (0.74 mm)**.
 - d. Larger Than Above: **0.056 inch (1.42 mm)**.
4. Fabricate chimneys and vent connectors from **ASTM B 209 (ASTM B 209M)**, Type 1100 or 3003, aluminum or stainless steel, complying with NFPA 211 for the following minimum metal thicknesses:
 - a. Aluminum: **0.027 inch (0.69 mm)**.
 - b. Stainless Steel: **0.012 inch (0.31 mm)**.
5. Fabricate cleanout doors from compatible material, same thickness as breeching, bolted and gasketed.
6. Fabricate engine exhaust from ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** Schedule 80, **as directed**, pipe; with welded joints and carbon-steel fittings and flanges.
 - a. Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
 - b. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150, including bolts, nuts, and gaskets.
- I. Guying And Bracing Materials
 1. Cable: Three **OR** Four, **as directed**, galvanized, stranded wires of the following thickness:
 - a. Minimum Size: **1/4 inch (6 mm)** in diameter.
 - b. For ID Sizes **4 to 15 Inches (100 to 381 mm)**: **5/16 inch (8 mm)**.
 - c. For ID Sizes **18 to 24 Inches (457 to 610 mm)**: **3/8 inch (9.5 mm)**.
 - d. For ID Sizes **27 to 30 Inches (685 to 762 mm)**: **7/16 inch (11 mm)**.
 - e. For ID Sizes **33 to 36 Inches (838 to 915 mm)**: **1/2 inch (13 mm)**.
 - f. For ID Sizes **39 to 48 Inches (990 to 1220 mm)**: **9/16 inch (14.3 mm)**.
 - g. For ID Sizes **51 to 60 Inches (1295 to 1524 mm)**: **5/8 inch (16 mm)**.
 2. Pipe: Two **OR** Three, **as directed**, galvanized steel, **NPS 1-1/4 (DN 32)**.
 3. Angle Iron: Two **OR** Three, **as directed**, galvanized steel, **2 by 2 by 0.25 inch (50 by 50 by 6 mm)**.

1.3 EXECUTION

A. Application

1. Listed Chimney Liners: High-efficiency boiler or furnace vents in masonry chimney, dishwasher exhaust, or Type II commercial kitchen hood.
2. Listed Type B and BW Vents: Vents for certified gas appliances.
3. Listed Type L Vents: Vents for low-heat appliances.
4. Listed Special Gas Vents: Condensing gas appliances.
5. Listed Building-Heating-Appliance Chimneys: Dual-fuel boilers, oven vents, water heaters, and exhaust for engines. Fireplaces and other solid-fuel-burning appliances.
6. Listed Grease Ducts: Type I commercial kitchen grease duct.
7. Listed, Refractory-Lined Metal Breechings and Chimneys: Freestanding dual-fuel boiler vents, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.
8. Field-Fabricated Metal Breechings and Chimneys: Dual-fuel boilers, oven vents, water heaters, exhaust for engines, fireplaces, and other solid-fuel-burning appliances.
9. Field-Fabricated Metal Breechings and Chimneys: Steel pipe for use with engine exhaust.

B. Installation Of Listed Vents And Chimneys

1. Locate to comply with minimum clearances from combustibles and minimum termination heights according to product listing or NFPA 211, whichever is most stringent.
 2. Seal between sections of positive-pressure vents and grease exhaust ducts according to manufacturer's written installation instructions, using sealants recommended by manufacturer.
 3. Support vents at intervals recommended by manufacturer to support weight of vents and all accessories, without exceeding appliance loading.
 4. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
 5. Lap joints in direction of flow.
 6. Connect base section to foundation using anchor lugs of size and number recommended by manufacturer.
 7. Join sections with acid-resistant joint cement to provide continuous joint and smooth interior finish.
 8. Erect stacks plumb to finished tolerance of no more than **1 inch (25 mm)** out of plumb from top to bottom.
- C. Installation Of Unlisted, Field-Fabricated Breechings And Chimneys
1. Suspend breechings and chimneys independent of their appliance connections.
 2. Install, support, and restrain according to seismic requirements.
 3. Align breechings at connections, with smooth internal surface and a maximum **1/8-inch (3-mm)** misalignment tolerance.
 4. Slope breechings down in direction of appliance, with condensate drain connection at lowest point piped to nearest drain.
 5. Lap joints in direction of flow.
 6. Support breechings and chimneys from building structure with bolts, concrete inserts, steel expansion anchors, welded studs, C-clamps, or beam clamps according to manufacturer's written instructions.
- D. Cleaning
1. After completing system installation, including outlet fittings and devices, inspect exposed finish. Remove burrs, dirt, and construction debris and repair damaged finishes.
 2. Clean breechings internally, during and after installation, to remove dust and debris. Clean external surfaces to remove welding slag and mill film. Grind welds smooth and apply touchup finish to match factory or shop finish.
 3. Provide temporary closures at ends of breechings, chimneys, and stacks that are not completed or connected to equipment.

END OF SECTION 23 51 16 00

SECTION 23 52 16 00 - CONDENSING BOILERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for condensing boilers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged, factory-fabricated and -assembled, gas-fired, pulse-combustion, fire-tube, water-tube, and water-jacketed condensing boilers, trim, and accessories for generating hot water or steam.

C. Submittals

1. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - a. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.
 - 1) Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 2) Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Include the following:
 4. Source quality-control test reports.
 5. Field quality-control test reports.
 6. Operation and maintenance data.
 7. Warranty: Special warranty specified in this Section.
 8. Other Informational Submittals:
 - a. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
3. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
4. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."
5. UL Compliance: Test boilers for compliance with UL 795, "Commercial-Industrial Gas Heating Equipment." Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Pulse-Combustion Boilers:
 - 1) Heat Exchanger Damaged by Thermal Shock: 10 years from date of Final Completion.
 - 2) Heat-Exchanger Corrosion: Prorated **OR** Nonprorated, **as directed**, for five years from date of Final Completion.
 - b. Warranty Period for Fire-Tube Condensing Boilers:
 - 1) Leakage and Materials: 10 years from date of Final Completion.
 - 2) Heat Exchanger Damaged by Thermal Stress and Corrosion: Prorated **OR** Nonprorated for five years from date of Final Completion.
 - c. Warranty Period for Water-Tube Condensing Boilers: 20 years from date of Final Completion.
 - d. Warranty Period for Water-Jacketed Condensing Boilers:
 - 1) Leakage and Materials: Eight years from date of Final Completion.
 - 2) Heat Exchanger Damaged by Thermal Stress and Corrosion: Prorated **OR** Nonprorated, **as directed**, for five years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Units: Pulse-Combustion Condensing Boilers.

1. Description: Factory-fabricated, -assembled, and -tested, pulse-combustion condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.
2. Heat Exchanger: Type 316L, stainless-steel **OR** Carbon-steel, **as directed**, primary and secondary combustion chamber.
3. Pressure Vessel: Carbon steel with welded heads and tube connections.
4. Exhaust Decoupler: Fiberglass composite material in a corrosion-resistant steel box.
5. Burner: Natural **OR** Propane, **as directed**, gas, self-aspirating and self-venting after initial start.
6. Blower: Centrifugal fan to operate only during start of each burner sequence.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
7. Gas Train: Combination gas valve with manual shutoff and pressure regulator.
8. Ignition: Spark ignition with 100 percent main-valve shutoff with electronic flame supervision.
9. Casing:
 - a. Jacket: Sheet metal, with snap-in or interlocking closures.
 - b. Control Compartment Enclosure: NEMA 250, Type 1A.
 - c. Finish: Baked-enamel **OR** Powder-coated, **as directed**, protective finish.
 - d. Insulation: Minimum **2-inch- (50-mm-)** thick, mineral-fiber insulation surrounding the heat exchanger.
 - e. Draft Hood: Integral **OR** External, **as directed**.
 - f. Combustion-Air Connection: Inlet duct collar and sheet metal closure over burner compartment.
 - g. Mounting base to secure boiler to concrete base.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler pressure vessel, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.

10. Mufflers: Carbon-steel intake muffler and stainless-steel exhaust.
 11. Condensate Trap: Cast-iron body with stainless-steel internal parts.
- B. Manufactured Units: Fire-Tube Condensing Boilers.
1. Description: Factory-fabricated, -assembled, and -tested, fire-tube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Water heating service only.
 2. Heat Exchanger: Nonferrous, corrosion-resistant combustion chamber.
 3. Pressure Vessel: Carbon steel with welded heads and tube connections.
 4. Burner: Natural **OR** Propane, **as directed**, gas, forced draft.
 5. Blower: Centrifugal fan to operate during each burner firing sequence and to prepurge and postpurge the combustion chamber.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 6. Gas Train: Combination gas valve with manual shutoff and pressure regulator.
 7. Ignition: Spark ignition with 100 percent main-valve shutoff with electronic flame supervision.
 8. Casing:
 - a. Jacket: Sheet metal **OR** Plastic, **as directed**, with snap-in or interlocking closures.
 - b. Control Compartment Enclosures: NEMA 250, Type 1A.
 - c. Finish: Baked-enamel **OR** Powder-coated, **as directed**, protective finish for sheet metal jacket.
 - d. Insulation: Minimum **2-inch- (50-mm-)** thick, mineral-fiber **OR** polyurethane-foam, **as directed**, insulation surrounding the heat exchanger.
 - e. Combustion-Air Connections: Inlet and vent duct collars.
 - f. Mounting base to secure boiler.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler pressure vessel, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
- C. Manufactured Units: Water-Tube Condensing Boilers.
1. Description: Factory-fabricated, -assembled, and -tested, water-tube condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Water heating service only.
 2. Heat Exchanger: Finned-copper primary and stainless-steel secondary heat exchangers.
 3. Combustion Chamber: Stainless steel, sealed.
 4. Burner: Natural **OR** Propane, **as directed**, gas, forced draft drawing from gas premixing valve.
 5. Blower: Centrifugal fan to operate during each burner firing sequence and to prepurge and postpurge the combustion chamber.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 6. Gas Train: Combination gas valve with manual shutoff and pressure regulator.
 7. Ignition: Silicone carbide hot-surface ignition that includes flame safety supervision and 100 percent main-valve shutoff.
 8. Integral Circulator: Cast-iron body and stainless-steel impeller sized for minimum flow required in heat exchanger.
 9. Casing:
 - a. Jacket: Sheet metal, with snap-in or interlocking closures.
 - b. Control Compartment Enclosures: NEMA 250, Type 1A.

- c. Finish: Textured epoxy.
 - d. Insulation: Minimum **1-inch- (25-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, thick, mineral-fiber insulation surrounding the heat exchanger.
 - e. Combustion-Air Connections: Inlet and vent duct collars.
 - f. Mounting base to secure boiler.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler pressure vessel, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
- D. Manufactured Units: Water-Jacketed Condensing Boilers.
- 1. Description: Factory-fabricated, -assembled, and -tested, water-jacketed condensing boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket; flue-gas vent; water supply, return, and condensate drain connections; and controls. Water heating service only.
 - 2. Heat Exchanger: Stainless-steel primary and secondary combustion chamber.
 - 3. Pressure Vessel: Carbon steel with welded heads and tube connections where not in contact with combustion or flue gases.
 - 4. Burner: Natural **OR** Propane, **as directed**, gas, forced draft; swing-open front and burner observation port.
 - 5. Blower: Centrifugal fan, forced draft. Include prepurge and postpurge of the combustion chamber.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 6. Gas Train: Combination gas valve with manual shutoff and pressure regulator. Include 100 percent safety shutoff with electronic flame supervision.
 - 7. Ignition: Electric-spark ignition with 100 percent main-valve shutoff with electronic flame supervision.
 - 8. Casing:
 - a. Jacket: Sheet metal, with snap-in or interlocking closures.
 - b. Control Compartment Enclosures: NEMA 250, Type 1A.
 - c. Finish: Powder-coated protective finish.
 - d. Insulation: Minimum **4-inch- (100-mm-)** thick, mineral-fiber insulation surrounding the heat exchanger.
 - e. Combustion-Air Connections: Inlet and vent duct collars.
 - f. Mounting base to secure boiler.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler pressure vessel, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
- E. Trim: For Hot-Water Boilers.
- 1. Include devices sized to comply with ANSI B31.1, "Power Piping **OR** ANSI B31.9, "Building Services Piping", **as directed**.
 - 2. Aquastat Controllers: Operating, firing rate, **as directed**, and high limit.
 - 3. Safety Relief Valve: ASME rated.
 - 4. Pressure and Temperature Gage: Minimum **3-1/2-inch- (89-mm-)** diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
 - 5. Boiler Air Vent: Automatic **OR** Manual, **as directed**.
 - 6. Drain Valve: Minimum **NPS 3/4 (DN 20)** hose-end gate valve.

7. Circulation Pump: Non-overloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.
- F. Trim: For Steam Boilers.
1. Include devices sized to comply with ANSI B31.1, "Power Piping **OR** ANSI B31.9, "Building Services Piping", **as directed**.
 2. Pressure Controllers: Operating, firing rate, **as directed**, and high limit.
 3. Safety Relief Valve:
 - a. Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code.
 - b. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
 - 1) Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
 4. Pressure Gage: Minimum **3-1/2-inch (89-mm)** diameter. Gage shall have normal operating pressure about 50 percent of full range.
 5. Water Column: Minimum **12-inch (300-mm)** glass gage with shutoff cocks.
 6. Drain Valves: Minimum **NPS 3/4 (DN 20)** or nozzle size with hose-end connection.
 7. Blowdown Valves: Factory-installed bottom and surface, slow-acting blowdown valves same size as boiler nozzle. Blowdown valves shall be combination of slow and quick acting as required by ANSI B31.1, **as directed**.
 8. Stop Valves: Boiler inlets and outlets, except safety relief valves or preheater inlet and outlet, shall be equipped with stop valve in an accessible location as near as practical to boiler nozzle and same size or larger than nozzle. Valves larger than **NPS 2 (DN 50)** shall have rising stem.
 9. Stop-Check Valves: Factory-installed, stop-check valve and stop valve at boiler outlet with free-blow drain valve factory installed between the two valves and visible when operating stop-check valve.
- G. Controls
1. Refer to Division 23 Section "Instrumentation And Control For Hvac".
OR
Boiler operating controls shall include the following devices and features:
 - a. Operating Pressure Control for Steam Boilers: Factory wired and mounted to cycle burner.
 - b. Low-Water Cutoff and Pump Control for Steam Boilers: Cycle feedwater pump(s) for makeup water control.
 - c. Sequence of Operation for Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.
OR
Sequence of Operation for Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At **0 deg F (minus 17 deg C)** outside-air temperature, set supply-water temperature at **200 deg F (93 deg C)**; at **60 deg F (15 deg C)** outside-air temperature, set supply-water temperature at **140 deg F (60 deg C)**.
 - d. Sequence of Operation for Steam Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain a constant steam pressure. Maintain pressure set point plus or minus 10 percent.
 - 1) Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.
 2. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - a. High Cutoff: Manual **OR** Automatic, **as directed**, reset stops burner if operating conditions rise above maximum boiler design temperature for hot-water boiler or pressure for steam boiler.

- b. Low-Water Cutoff Switch: Electronic for hot-water boilers or Float and electronic for steam boilers probe shall prevent burner operation on low water. Cutoff switch shall be manual **OR** automatic, **as directed**, -reset type.
- c. Blocked Inlet Safety Switch: Manual-reset pressure switch field mounted on boiler combustion-air inlet.
- d. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
- 3. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.
 - a. Hardwired Points:
 - 1) Monitoring: On/off status, common trouble alarm **OR** low water level alarm, **as directed**.
 - 2) Control: On/off operation, hot water supply temperature set-point adjustment **OR** steam pressure adjustment, **as directed**.
 - b. A communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building automation system.

H. Electrical Power

- 1. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
OR
Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 - a. House in NEMA 250, Type 1 enclosure.
 - b. Wiring shall be numbered and color-coded to match wiring diagram.
 - c. Install factory wiring outside of an enclosure in a metal raceway.
 - d. Field power interface shall be to wire lugs **OR** fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - e. Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker, **as directed**.
 - f. Provide each motor with overcurrent protection.

I. Venting Kits

- 1. Kit: Complete system, ASTM A 959, Type 29-4C stainless steel, pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.
- 2. Combustion-Air Intake: Complete system, stainless steel, pipe, vent terminal with screen, inlet air coupling, and sealant.

J. Source Quality Control

- 1. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
- 2. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
- 3. Allow the Owner access to source quality-control testing of boilers. Notify the Owner 14 days in advance of testing.

1.3 EXECUTION

A. Boiler Installation

1. Install boilers level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac", and concrete materials and installation requirements are specified in Division 31..
 2. Vibration Isolation for Equipment Supported on Slabs-On -Grade: Elastomeric isolation pads **OR** mounts, **as directed**, with a minimum static deflection of **0.25 inch (6.35 mm)**. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 3. Install gas-fired boilers according to NFPA 54.
 4. Assemble and install boiler trim.
 5. Install electrical devices furnished with boiler but not specified to be factory mounted.
 6. Install control wiring to field-mounted electrical devices.
- B. Connections
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to boiler to allow service and maintenance.
 3. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
 4. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service. Flexible connectors and their installation are specified in Division 23 Section "Common Work Results For Hvac".
 5. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
 6. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
 7. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.
 8. Install piping from safety relief valves to nearest floor drain.
 9. Install piping from safety valves to drip-pan elbow and to nearest floor drain.
 10. Boiler Venting:
 - a. Install flue venting kit and combustion-air intake.
 - b. Connect full size to boiler connections. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks".
 11. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 12. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Perform installation and startup checks according to manufacturer's written instructions.
 - b. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - c. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 1) Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level and water temperature **OR** steam pressure, **as directed**.
 - 2) Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 3. Remove and replace malfunctioning units and retest as specified above.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



4. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
 5. Performance Tests, **as directed**:
 - a. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - b. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment to comply.
 - c. Perform field performance tests to determine capacity and efficiency of boilers.
 - 1) Test for full capacity.
 - 2) Test for boiler efficiency at low fire 20, 40, 60, 80, 100, 80, 60, 40, and 20 percent of full capacity. Determine efficiency at each test point.
 - d. Repeat tests until results comply with requirements indicated.
 - e. Provide analysis equipment required to determine performance.
 - f. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
 - g. Notify the Owner in advance of test dates.
 - h. Document test results in a report and submit to the Owner.
- D. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 23 52 16 00

Task	Specification	Specification Description
23 52 16 13	23 52 16 00	Condensing Boilers
23 52 16 16	23 52 16 00	Condensing Boilers
23 52 16 19	23 52 16 00	Condensing Boilers
23 52 16 23	23 52 16 00	Condensing Boilers

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SECTION 23 52 33 13 - WATER-TUBE BOILERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for water-tube boilers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged, factory-fabricated and -assembled, gas-fired, finned water-tube boilers, trim, and accessories for generating hot water.
2. This Section includes packaged, water-tube boilers, trim, and accessories for generating hot water or steam with the following configurations, burners, and outputs:
 - a. Factory and Field assembled.
 - b. Atmospheric gas, Forced-draft gas, Oil, and Combination gas and oil burner.

C. Submittals

1. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - a. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.
 - 1) Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 2) Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Include the following:
4. Source quality-control test reports.
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.
8. Other Informational Submittals:
 - a. ASME "A" Stamp Certification and Report: Submit "A" stamp certificate of authorization as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.
 - b. Startup service reports.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
3. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
4. DOE Compliance: Minimum efficiency shall comply with 10 CFR 430, Subpart B, Appendix N, "Uniform Test Method for Measuring the Energy Consumption of Furnaces and Boilers."

5. I=B=R Compliance: Boilers shall be tested and rated according to HI's "Rating Procedure for Heating Boilers" and "Testing Standard for Commercial Boilers," with I=B=R emblem on a nameplate affixed to boiler.
6. UL Compliance: Test boilers for compliance with UL 726, "Oil-Fired Boiler Assemblies" **OR** UL 726, "Oil-Fired Boiler Assemblies" and UL 795, "Commercial-Industrial Gas Heating Equipment" **OR** UL 795, "Commercial-Industrial Gas Heating Equipment", **as directed**. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

E. Warranty

1. Special Warranty for Finned Water-Tube Boilers: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchangers damaged by thermal shock and vent dampers of boilers that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Heat Exchangers: 20 years from date of Final Completion.
 - b. Warranty Period for Vent Dampers: Five years from date of Final Completion.
2. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace drums, tubes, headers, cabinets, atmospheric gas burners, and pressure vessels of boilers that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Drums, Tubes, Headers, Cabinets, and Atmospheric Gas Burner: Five years from date of Final Completion, pro rata.
 - b. Warranty Period for Pressure Vessel: 20 years from date of Final Completion, for thermal shock.

1.2 PRODUCTS

A. Finned Water-Tube Boilers

1. Description: Factory-fabricated, -assembled, and -tested boiler with tubes sealed into headers pressure tight, and set on a steel base; including insulated jacket, flue-gas vent, combustion-air intake connections, water supply and return connections, and controls.
2. Heat Exchanger:
 - a. Finned copper **OR** steel **OR** copper-nickel, **as directed**, tubing with stainless-steel baffles.
 - b. Bronze **OR** Cast-iron **OR** Steel, **as directed**, headers.
 - c. Single-pass **OR** Two-pass, **as directed**, horizontal **OR** vertical **OR** coil, **as directed**, configuration.
 - d. Tubes shall be sealed in header with silicone O-ring gaskets **OR** by welding **OR** by mechanically rolling tubes in header, **as directed**.
3. Combustion Chamber Internal Insulation: Interlocking panels of refractory insulation, high-temperature cements, mineral fiber, and ceramic refractory tile for service temperatures to **2000 deg F (1100 deg C)**.
4. Casing:
 - a. Jacket: Sheet metal **OR** Stainless steel, **as directed**, with snap-in or interlocking closures.
 - b. Control Compartment Enclosure: NEMA 250, Type 1A.
 - c. Finish: Baked enamel over primer **OR** Baked enamel over galvanizing **OR** Powder coated, **as directed**.
 - d. Insulation: Minimum **1-inch- (25-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, thick, mineral-fiber insulation surrounding the heat exchanger.
 - e. Draft Hood: Integral **OR** External, **as directed**.
 - f. Combustion-Air Connection: Inlet duct collar and sheet metal closure over burner compartment.
 - g. Mounting base to secure boiler with accessory for mounting on combustible surface, **as directed**.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler pressure vessel, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And

Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.

5. Burner:
 - a. Burner Tubes and Orifices: Stainless steel, for natural **OR** propane, **as directed**, gas. Mount burner tubes in a slide-out burner drawer for ease of inspection, **as directed**.
 - 1) Sealed Combustion: Factory-mounted centrifugal fan to draw outside air into boiler and discharge into burner compartment.
 - 2) Direct Vent: Factory-mounted centrifugal fan to draw flue gas out of boiler and discharge into boiler vent.
 - b. Vertical Burner:
 - 1) High-temperature stainless steel **OR** Ceramic, **as directed**, to fire in a 360-degree pattern.
 - 2) Burner shall have a viewing port for observation of burner operation and a factory-mounted centrifugal fan to supply room **OR** outside, **as directed**, air through a replaceable 99 percent efficient (1-micrometer particles) filter, **as directed**, to boiler burner.
 - 3) Fan shall be controlled to prepurge and postpurge the combustion chamber before firing.
 - c. Gas Train for Commercial Boilers: Control devices and full-modulation **OR** on-off **OR** low-high-low **OR** proportional, **as directed**, control sequence shall comply with requirements in AGA **OR** ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**. In addition to these requirements, include shutoff cock, pressure regulator, and control valve.
 - d. Gas Train for Residential Boilers: Combination gas valve with manual shutoff, pressure regulator, and pilot adjustment.
 - e. Pilot: Standing **OR** Intermittent-electric-spark **OR** Hot-surface, **as directed**, pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 - f. Flue-Gas Recirculation Fans: Centrifugal fans on burner assembly to recirculate flue gas to decrease oxides of nitrogen emissions to less than 30 ppm.
 - g. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
6. Trim:
 - a. Aquastat Controllers: Operating, firing rate, **as directed**, and high limit.
 - b. Safety Relief Valve: ASME rated.
 - c. Pressure and Temperature Gage: Minimum **3-1/2-inch- (89-mm-)** diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
 - d. Boiler Air Vent: Automatic **OR** Manual, **as directed**.
 - e. Drain Valve: Minimum **NPS 3/4 (DN 20)** hose-end gate valve.
 - f. Circulation Pump: Non-overloading, in-line pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.
7. Controls:
 - a. Refer to Division 23 Section "Instrumentation And Control For Hvac".
OR
Boiler operating controls shall include the following devices and features:
 - 1) Control transformer.
 - 2) Motorized Vent Damper: Interlocked with burner to open before burner starts. If damper fails to open, stop burner operation.
 - 3) Set-Point Adjust: Set points shall be adjustable.
 - 4) Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.**OR**

Sequence of Operation: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At **0 deg F (minus 17 deg C)** outside-air temperature, set supply-water temperature at **200 deg F (93 deg C)**; at **60 deg F (15 deg C)** outside-air temperature, set supply-water temperature at **140 deg F (60 deg C)**.

- 5) Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.
 - b. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - 1) High Cutoff: Manual **OR** Automatic, **as directed**, reset stops burner if operating conditions rise above maximum boiler design temperature.
 - 2) Water Flow Switch: Automatic-reset paddle-switch shall prevent burner operation on low water flow.
 - 3) Blocked Vent Safety Switch: Manual-reset switch factory mounted on draft diverter.
 - 4) Rollout Safety Switch: Factory mounted on boiler combustion chamber.
 - 5) Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
 - c. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.
 - 1) Monitoring: On/off status, common trouble alarm **OR** low water level alarm, **as directed**.
 - 2) Control: On/off operation, hot water supply temperature set-point adjustment, **as directed**.
 - 3) A communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building automation system.
- B. Steel **OR** Flexible, **as directed**, Water-Tube Boilers
1. Description: Factory-fabricated and assembled **OR** Field-assembled, **as directed**, water-tube boiler with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket, flue-gas vent, supply and return connections, and controls.
 2. Heat-Exchanger Design: Straight steel tubes rolled into steel headers.
 - a. Accessible head plates at both ends.
 - b. Handholes or couplings, **as directed**, in headers for water-side inspections.
 - c. Accessible drain and blowdown tappings, both high and low, for surface and mud removal.
 - d. Lifting lugs on top of boiler.
 - e. Built-in air separator.
 3. Heat-Exchanger Design: Bent steel tubes swaged **OR** welded, **as directed**, into steel headers with membrane waterwall design, **as directed**.
 - a. Limit tube configurations to two **OR** four, **as directed**.
 - b. Accessible drain and blowdown tappings, both high and low, for surface and mud removal.
 - c. Accessible inspection ports in drum, mud legs, and tube manifolds.
 - d. Lifting lugs on top of boiler.
 - e. Built-in air separator.
 4. Combustion Chamber: Equipped with minimum **2-1/2-inch (64-mm) OR 3-inch (75-mm) OR 4-inch (100-mm)**, **as directed**, **2700 deg F (1482 deg C)** poured refractory on floor and minimum **2-inch (50-mm) OR 3-1/2-inch (89-mm)**, **as directed**, lap-jointed cast refractory with fiber-blanket joint seals on side walls. Combustion chamber shall have flame observation ports in front and back **OR** back, **as directed**.
 5. Casing:
 - a. Insulation: Minimum **2-inch (50-mm)** thick, lightweight refractory; **1-inch (25-mm)** thick insulating board; galvanized-steel membrane, and **2-inch (50-mm)** thick, mineral-fiber insulation surrounding the heat exchanger and combustion chamber **OR 2-inch (50-mm)**

- thick, mineral-fiber insulation surrounding the heat exchanger and combustion chamber, **as directed**.
- b. Top Flue Connection: Constructed of aluminized steel **OR** stainless steel, **as directed**.
 - c. Jacket: Mirror-finish stainless steel, with screw-fastened closures.
OR
Jacket: Sheet metal **OR** Galvanized sheet metal, **as directed**, with screw-fastened closures and baked-enamel **OR** powder-coated, **as directed**, protective finish.
 - d. Mounting base to secure boiler to concrete base.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
 - e. Control Compartment Enclosure: NEMA 250, Type 1A.
6. Draft Diverter **OR** Barometric Damper, **as directed**: Galvanized-steel assembly with flue-gas thermometer.
 7. Burner - Atmospheric Gas Burners:
 - a. Burner and Orifices: Stainless steel **OR** Cast iron, **as directed**, for natural **OR** propane, **as directed**, gas.
 - b. Gas Train for Commercial Boilers: Control devices and full-modulation **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in AGA **OR** ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - c. Gas Train for Residential Boilers: Combination gas valve with manual shutoff, pressure regulator, and pilot adjustment.
 - d. Pilot: Standing **OR** Intermittent-electric-spark, **as directed**, pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 8. Burner - Forced-Draft Gas Burners:
 - a. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for natural **OR** propane, **as directed**, gas. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
 - b. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - 1) Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - c. Gas Train: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in AGA **OR** ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - d. Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 - e. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - 1) Maximum Oxides of Nitrogen Emissions: 20 **OR** 30, **as directed**, ppm.
 9. Burner - Oil Burners:
 - a. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
 - b. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - 1) Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - c. Oil Supply: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.

- 1) Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower, **as directed**, shall be capable of producing 300-psig (2070-kPa) discharge pressure and 15-inch Hg (50.7-kPa) vacuum.
 - 2) Oil Piping Specialties:
 - a) Suction-line, manual, gate valve.
 - b) Removable-mesh oil strainer.
 - c) 0- to 30-inch Hg (0- to 101.3-kPa) vacuum; 0- to 30-psig (0- to 207-kPa) vacuum-pressure gage.
 - d) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
 - e) Nozzle-line, solenoid-safety-shutoff oil valve.
 - d. Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid using cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
 - e. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - 1) Maximum Oxides of Nitrogen Emissions: 30 ppm.
10. Burner - Combination Gas and Oil Burners:
- a. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil and natural **OR** propane, **as directed** gas. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
 - b. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - 1) Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - c. Oil Supply: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI, **as directed**.
 - 1) Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower, **as directed**, shall be capable of producing 300-psig (2070-kPa) discharge pressure and 15-inch Hg (50.7-kPa) vacuum.
 - 2) Oil Piping Specialties:
 - a) Suction-line, manual, gate valve.
 - b) Removable-mesh oil strainer.
 - c) 0- to 30-inch Hg (0- to 101.3-kPa) vacuum; 0- to 30-psig (0- to 207-kPa) vacuum-pressure gage.
 - d) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
 - e) Nozzle-line, solenoid-safety-shutoff oil valve.
 - d. Gas Train: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - e. Gas Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 - f. Oil Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid with cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
 - g. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - 1) Maximum Oxides of Nitrogen Emissions: 20 **OR** 30, **as directed**, ppm.
11. Trim for Hot-Water Boilers:
- a. Include devices sized to comply with ANSI B31.1, "Power Piping **OR** ANSI B31.9, "Building Services Piping", **as directed**.
 - b. Aquastat Controllers: Operating, firing rate, **as directed**, and high limit.
 - c. Safety Relief Valve: ASME rated.

- d. Pressure and Temperature Gage: Minimum **3-1/2-inch- (89-mm-)** diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
 - e. Boiler Air Vent: Automatic **OR** Manual, **as directed**.
 - f. Drain Valve: Minimum **NPS 3/4 (DN 20)** hose-end gate valve.
 - g. Tankless Heater: Carbon-steel **OR** Bronze, **as directed**, header with copper-tube heat exchanger, mounted in a port of upper drum and sealed with fiber gasket.
 - 1) Tappings **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2) Tappings **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
12. Trim for Steam Boilers:
- a. Include devices sized to comply with ANSI B31.1, "Power Piping **OR** ANSI B31.9, "Building Services Piping", **as directed**.
 - b. Pressure Controllers: Operating, firing rate, **as directed**, and high limit.
 - c. Safety Relief Valve:
 - 1) Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code.
 - 2) Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
 - a) Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
 - d. Pressure Gage: Minimum **3-1/2-inch (89-mm)** diameter. Gage shall have normal operating pressure about 50 percent of full range.
 - e. Water Column: Minimum **12-inch (300-mm)** glass gage with shutoff cocks.
 - f. Drain Valves: Minimum **NPS 3/4 (DN 20)** or nozzle size with hose-end connection.
 - g. Blowdown Valves: Factory-installed bottom and surface, slow-acting blowdown valves same size as boiler nozzle. Blowdown valves shall be combination of slow and quick acting as required by ANSI B31.1, **as directed**.
 - h. Stop Valves: Boiler inlets and outlets, except safety relief valves or preheater inlet and outlet, shall be equipped with stop valve in an accessible location as near as practical to boiler nozzle and same size or larger than nozzle. Valves larger than **NPS 2 (DN 50)** shall have rising stem.
 - i. Stop-Check Valves: Factory-installed, stop-check valve and stop valve at boiler outlet with free-blow drain valve factory installed between the two valves and visible when operating stop-check valve.
 - j. Tankless Heater: Carbon-steel header with copper-tube heat exchanger, mounted in a port of upper manifold and sealed with fiber gasket.
 - 1) Tappings **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - 2) Tappings **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.
13. Controls:
- a. Refer to Division 23 Section "Instrumentation And Control For Hvac".
OR
Boiler operating controls shall include the following devices and features:
 - 1) Control transformer.
 - 2) Set-Point Adjust: Set points shall be adjustable.
 - 3) Operating Pressure Control for Steam Boilers: Factory wired and mounted to cycle burner.
 - 4) Low-Water Cutoff and Pump Control for Steam Boilers: Cycle feedwater pump(s) for makeup water control.

- 5) Sequence of Operation for Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.
OR
Sequence of Operation for Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At 0 deg F (minus 17 deg C) outside-air temperature, set supply-water temperature at 200 deg F (93 deg C); at 60 deg F (15 deg C) outside-air temperature, set supply-water temperature at 140 deg F (60 deg C).
 - 6) Sequence of Operation for Steam Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain a constant steam pressure. Maintain pressure set point plus or minus 10 percent.
 - 7) Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.
 - b. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - 1) High Cutoff: Manual **OR** Automatic, **as directed**, reset stops burner if operating conditions rise above maximum boiler design temperature for hot-water boiler or design pressure for steam boiler.
 - 2) Low-Water Cutoff Switch: Electronic (for hot-water boilers) or Float and electronic (for steam boilers) probe shall prevent burner operation on low water. Cutoff switch shall be manual **OR** automatic, **as directed**, -reset type.
 - 3) Blocked Vent Safety Switch (Atmospheric Boilers): Manual-reset switch factory mounted on draft diverter.
 - 4) Rollout Safety Switch (Atmospheric Boilers): Factory mounted on boiler combustion chamber.
 - 5) Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
 - c. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.
 - 1) Monitoring: On/off status, common trouble alarm **OR** low water level alarm, **as directed**.
 - 2) Control: On/off operation, hot water supply temperature set-point adjustment **OR** steam pressure adjustment, **as directed**.
 - 3) A communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building automation system.
- C. Electrical Power
1. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
OR
Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 - a. House in NEMA 250, Type 1 enclosure.
 - b. Wiring shall be numbered and color-coded to match wiring diagram.
 - c. Install factory wiring outside of an enclosure in a metal, **as directed**, raceway.
 - d. Field power interface shall be to wire lugs **OR** fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - e. Provide branch power circuit to each motor and to controls with disconnect switch or circuit breaker, **as directed**.

- f. Provide each motor with overcurrent protection.

D. Venting Kits

1. Vent Damper (for Finned Water-Tube Boilers): Motorized, UL listed for use on atmospheric burner boiler equipped with draft hood; motor to open and close damper; stainless-steel vent coupling and damper blade; keyed wiring harness connector plug; and dual-position switches to permit burner operation.
2. Kit: Complete system, ASTM A 959, Type 29-4C, **as directed**, stainless steel, pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap, and sealant.
3. Combustion-Air Intake: Stainless steel, pipe, vent terminal with screen, inlet air coupling, and sealant.

E. Source Quality Control

1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
2. Burner and Hydrostatic Test (for Factory-Assembled Boilers): Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
3. Allow the Owner access to source quality-control testing of boilers. Notify the Owner 14 days in advance of testing.

1.3 EXECUTION

A. Boiler Installation

1. Install boilers level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac", and concrete materials and installation requirements are specified in Division 31.
2. Vibration Isolation: Elastomeric isolator pads **OR** mounts, **as directed**, with a minimum static deflection of **0.25 inch (6.35 mm)**. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
3. Install gas-fired boilers according to NFPA 54.
4. Install oil-fired boilers according to NFPA 31.
5. Assemble boiler tubes in sequence and seal each tube joint.
6. Assemble and install boiler trim.
7. Install electrical devices furnished with boiler but not specified to be factory mounted.
8. Install control wiring to field-mounted electrical devices.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to boiler to allow service and maintenance.
3. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
4. Connect oil piping full size to burner inlet with shutoff valve and union.
5. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
6. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.
7. Install piping from safety relief valves to nearest floor drain (for hot-water boilers).
8. Install piping from safety valves to drip-pan elbow and to nearest floor drain (for steam boilers).
9. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
10. Boiler Flue Venting (for Finned Water-Tube Boilers):
 - a. Install venting kit and combustion-air intake.

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- b. Connect full size to boiler connections. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks".
 11. Connect breeching to full size of boiler outlet. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for venting materials.
 12. Install flue-gas recirculation duct from vent to burner. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for recirculation duct materials.
 13. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 14. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Perform installation and startup checks according to manufacturer's written instructions.
 - b. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - c. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 1) Burner Test (for Field-Assembled Boilers): Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.
 - 2) Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature **OR** steam pressure, **as directed**.
 - 3) Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 3. Remove and replace malfunctioning units and retest as specified above.
 4. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
 5. Performance Tests, as directed:
 - a. Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - b. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment in order to comply.
 - c. Perform field performance tests to determine the capacity and efficiency of the boilers.
 - 1) For dual-fuel boilers, perform tests for each fuel.
 - 2) Test for full capacity.
 - 3) Test for boiler efficiency at low fire 20, 40, 60, 80, 100, 80, 60, 40 and 20, **as directed**, percent of full capacity. Determine efficiency at each test point.
 - d. Repeat tests until results comply with requirements indicated.
 - e. Provide analysis equipment required to determine performance.
 - f. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
 - g. Notify the Owner in advance of test dates.
 - h. Document test results in a report and submit to the Owner.
- D. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 23 52 33 13



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 52 33 16	23 52 33 13	Water-Tube Boilers

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SECTION 23 52 36 00 - FIRE-TUBE BOILERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fire-tube boilers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged, factory-fabricated and -assembled boilers, trim, and accessories for generating hot water **OR** steam, **as directed**, with the following configurations and burners:
 - a. Horizontal, fire-tube, Vertical, fire-tube, and Fire-box boiler.
 - b. Gas, Oil, and Combination gas and oil burner.

C. Submittals

1. Product Data: Include performance data, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: For boilers, boiler trim, and accessories. Include plans, elevations, sections, details, and attachments to other work.
 - a. Design calculations and vibration isolation base details, signed and sealed by a qualified professional engineer.
 - 1) Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - 2) Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that boiler, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Include the following:
4. Source quality-control test reports.
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.
8. Other Informational Submittals:
 - a. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.
 - b. Startup service reports.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.
3. ASHRAE/IESNA 90.1 Compliance: Boilers shall have minimum efficiency according to "Gas and Oil Fired Boilers - Minimum Efficiency Requirements."
4. UL Compliance: Test Boilers for compliance with UL 726, "Oil-Fired Boiler Assemblies" **OR** UL 726, "Oil-Fired Boiler Assemblies" and UL 795, "Commercial-Industrial Gas Heating Equipment" **OR** UL 795, "Commercial-Industrial Gas Heating Equipment", **as directed**. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace front- and rear-door refractories and heat exchangers of boilers that fail in materials or workmanship within specified warranty period.
 - a. Horizontal, Fire-Tube and Fire-Box Boilers: Refractory in front and rear doors, 10 years from date of startup by factory-authorized personnel.
 - b. Vertical, Fire-Tube Boilers and Heat Exchanger: Five years from date of Final Completion, if following water-treatment program recommended by manufacturer.

1.2 PRODUCTS

A. Manufactured Units - Horizontal, Fire-Tube Boilers

1. Description: Factory-fabricated, -assembled, and -tested, horizontal, fire-tube boilers with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket, flue-gas vent, water supply and return connections, and controls.
2. Pressure Vessel Design: Straight, steel tubes rolled **OR** welded, **as directed**, into steel headers. Three **OR** Four, **as directed**, passes with dry-back **OR** wet-back, **as directed**, design. Minimum heat-exchanger surface of **5 sq. ft./bhp (2.1 sq. m/10 kW)**. Include the following accessories:
 - a. Handholes for water-side inspections.
 - b. Lifting lugs on top of boiler.
 - c. Minimum **NPS 1 (DN 25)** hose-end drain valves at shell low point.
 - d. For hot-water boilers only:
 - 1) Tappings or flanges for supply- and return-water piping.
 - 2) Built-in air separator.
 - e. For steam boilers only:
 - 1) Accessible drain and blowdown tappings, both high and low, for surface and mud removal.
 - 2) Tappings for steam supply, makeup, level controls, and chemical treatment.
3. Front and Rear Doors:
 - a. Bolted **OR** Hinged **OR** Davited, **as directed**, sealed with heat-resistant gaskets and fastened with lugs and cap screws.
 - b. Designed so tube sheets and flues are fully accessible for inspection or cleaning when doors are open.
 - c. Include observation ports in doors at both ends of boiler for inspection of flame conditions.
 - d. Door refractory **OR** insulation, **as directed**, shall be accessible for inspection and maintenance.
4. Casing:
 - a. Insulation: Minimum **2-inch- (50-mm-)** thick, mineral-fiber insulation surrounding the boiler shell.
 - b. Flue Connection: Flange at top of boiler.
 - c. Jacket: Galvanized sheet **OR** Sheet, **as directed**, metal, with screw-fastened closures and baked-enamel **OR** powder-coated, **as directed**, protective finish.
 - d. Mounting base to secure boiler to concrete base.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
 - e. Control Compartment Enclosure: NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**.
5. Barometric Damper: Galvanized-steel assembly with flue-gas thermometer having a minimum **3-1/2-inch- (89-mm-)** diameter dial.

B. Manufactured Units - Vertical, Fire-Tube Boilers

1. Description: Factory-fabricated, -assembled, and -tested, vertical, fire-tube boilers with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket, flue-gas vent, water supply and return connections, and controls.
 2. Pressure Vessel Design: Straight, steel pipe welded in a concentric pattern to separate flue-gas and heating media to form two **OR** four, **as directed**, passes with welded fins to improve heat transfer in secondary flue-gas passages. Include the following accessories:
 - a. Handholes for water-side inspections.
 - b. Lifting lugs on top of boiler.
 - c. Minimum **NPS 1 (DN 25)** hose-end drain valves at water passage low point.
 - d. For hot-water boilers only:
 - 1) Tappings or flanges for supply- and return-water piping.
 - 2) Built-in air separator.
 - e. For steam boilers only:
 - 1) Accessible drain and blowdown tappings, both high and low, for surface and mud removal.
 - 2) Tappings for steam supply, makeup, level controls, and chemical treatment.
 3. Combustion Chamber: Equipped with flame retainer to lengthen flame-residence time.
 4. Casing:
 - a. Insulation: Minimum **4-inch- (100-mm-)** thick, mineral-fiber insulation surrounding the heat exchanger and combustion chamber.
 - b. Flue Connection: Top connection, constructed of aluminized **OR** stainless, **as directed**, steel.
 - c. Jacket: Mirror-finish stainless steel with screw-fastened closures.
OR
Jacket: Galvanized sheet **OR** Sheet, **as directed**, metal, with screw-fastened closures and baked-enamel **OR** powder-coated, **as directed**, protective finish.
 - d. Mounting base to secure boiler to concrete base.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 22 Section "Identification For Plumbing Piping And Equipment" when mounting base is anchored to building structure.
 - e. Control Compartment Enclosure: NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**.
 5. Barometric Damper: Galvanized-steel assembly with flue-gas thermometer having a minimum **3-1/2-inch- (89-mm-)** diameter dial.
- C. Manufactured Units - Fire-Box Boilers
1. Description: Factory-fabricated, -assembled, and -tested, fire-box boilers with heat exchanger sealed pressure tight, built on a steel base; including insulated jacket, flue-gas vent, water supply and return connections, and controls.
 2. Pressure Vessel Design: Straight, steel tubes rolled **OR** welded, **as directed**, into steel headers. Three passes with wet-back design. Minimum heat-exchanger surface of **5 sq. ft./bhp (2.1 sq. m/10 kW)**. Include the following features and accessories:
 - a. Tube Size and Thickness: Minimum **NPS 2 (DN 50)**, minimum **0.105 inch (2.667 mm)** thick.
 - b. Brass washout plugs.
 - c. Steel turbulators.
 - d. Lifting lugs on top of boiler.
 - e. Minimum **NPS 1 (DN 25)** hose-end drain valves at shell low point.
 - f. For hot-water boilers only:
 - 1) Tappings or flanges for supply- and return-water piping.
 - 2) Built-in air separator.
 - g. For steam boilers only:
 - 1) Accessible drain and blowdown tappings, both high and low, for surface and mud removal.
 - 2) Tappings for steam supply, makeup, level controls, and chemical treatment.

3. Combustion Chamber: Welded steel, waterwall and -floor design **OR** water-leg design with refractory insulation poured in the floor, **as directed**. Flame observation port.
4. Casing:
 - a. Insulation: Minimum **2-inch- (50-mm-)** thick, foil-backed, **as directed**, mineral-fiber insulation surrounding the boiler shell.
 - b. Insulated removable smoke boxes and reversing chamber cover.
 - c. Flue Connection: Steel top **OR** rear, **as directed**.
 - d. Jacket: Sheet metal, with screw-fastened closures and baked-enamel **OR** powder-coated, **as directed**, protective finish.
 - e. Control Compartment Enclosure: NEMA 250, Type 1 **OR** 1A **OR** 4 **OR** 4X **OR** 12, **as directed**.
 - f. Mounting base to secure boiler to concrete base.
 - 1) Seismic Fabrication Requirements: Fabricate mounting base and attachment to boiler, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
5. Barometric Damper: Galvanized-steel assembly with flue-gas thermometer having a minimum **3-1/2-inch- (89-mm-)** diameter dial.

D. Burner For Forced-Draft Gas Burners

1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for natural **OR** propane, **as directed**, gas. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
3. Gas Train: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
4. Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
5. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - a. Maximum Oxides of Nitrogen Emissions: 20 **OR** 30, **as directed**, ppm.

E. Burner For Oil Burners

1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
3. Oil Supply: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - a. Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower, **as directed**, shall be capable of producing **300-psig (2070-kPa)** discharge pressure and **15-inch Hg (50.7-kPa)** vacuum.
 - b. Oil Piping Specialties:
 - 1) Suction-line, manual, gate valve.
 - 2) Removable-mesh oil strainer.
 - 3) **0- to 30-inch Hg (0- to 101.3-kPa)** vacuum; **0- to 30-psig (0- to 207-kPa)** vacuum-pressure gage.

- 4) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
 - 5) Nozzle-line, solenoid-safety-shutoff oil valve.
4. Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid with cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
 5. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - a. Maximum Oxides of Nitrogen Emissions: 30 ppm.
- F. Burner For Combination Gas And Oil Burners
1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser for fuel oil and natural **OR** propane, **as directed**, gas. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
 2. Blower: Forward-curved centrifugal fan integral to burner, directly driven by motor; with adjustable, dual-blade damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Oil Supply: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - a. Oil Pump: Two-stage, gear-type oil pump integral to and directly driven by blower, **as directed**, shall be capable of producing 300-psig (2070-kPa) discharge pressure and 15-inch Hg (50.7-kPa) vacuum.
 - b. Oil Piping Specialties:
 - 1) Suction-line, manual, gate valve.
 - 2) Removable-mesh oil strainer.
 - 3) 0- to 30-inch Hg (0- to 101.3-kPa) vacuum; 0- to 30-psig (0- to 207-kPa) vacuum-pressure gage.
 - 4) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
 - 5) Nozzle-line, solenoid-safety-shutoff oil valve.
 4. Gas Train: Control devices and modulating **OR** on-off **OR** low-high-low, **as directed**, control sequence shall comply with requirements in ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 5. Gas Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
 6. Oil Pilot: Intermittent **OR** Interrupted, **as directed**, -electric-spark pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid with cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
 7. Flue-Gas Recirculation: Burner connections shall be equipped for recirculating flue gas.
 - a. Maximum Oxides of Nitrogen Emissions: 20 **OR** 30, **as directed**, ppm.
- G. Trim For Hot-Water Boilers
1. Include devices sized to comply with ANSI B31.1, "Power Piping **OR** ANSI B31.9, "Building Services Piping", **as directed**.
 2. Aquastat Controllers: Operating, firing rate, **as directed**, and high limit.
 3. Safety Relief Valve: ASME rated.
 4. Pressure and Temperature Gage: Minimum 3-1/2-inch- (89-mm-) diameter, combination water-pressure and -temperature gage. Gages shall have operating-pressure and -temperature ranges so normal operating range is about 50 percent of full range.
 5. Boiler Air Vent: Automatic **OR** Manual, **as directed**.
 6. Drain Valve: Minimum NPS 3/4 (DN 20) hose-end gate valve.
 7. Tankless Heater: Carbon-steel **OR** Bronze, **as directed**, header with copper-tube heat exchanger, mounted in a port of upper drum and sealed with fiber gasket.
 - a. Tappings NPS 2 (DN 50) and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.

- b. Tappings **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

H. Trim For Steam Boilers

1. Include devices sized to comply with ANSI B31.1, "Power Piping **OR** ANSI B31.9, "Building Services Piping", **as directed**.
2. Pressure Controllers: Operating, firing rate, **as directed**, and high limit.
3. Safety Relief Valve:
 - a. Size and Capacity: As required for equipment according to ASME Boiler and Pressure Vessel Code.
 - b. Description: Fully enclosed steel spring with adjustable pressure range and positive shutoff; factory set and sealed.
 - 1) Drip-Pan Elbow: Cast iron and having threaded inlet and outlet with threads complying with ASME B1.20.1.
4. Pressure Gage: Minimum **3-1/2-inch (89-mm)** diameter. Gage shall have normal operating pressure about 50 percent of full range.
5. Water Column: Minimum **12-inch (300-mm)** glass gage with shutoff cocks.
6. Drain Valves: Minimum **NPS 3/4 (DN 20)** or nozzle size with hose-end connection.
7. Blowdown Valves: Factory-installed bottom and surface, slow-acting blowdown valves same size as boiler nozzle. Blowdown valves shall be combination of slow and quick acting as required by ANSI B31.1, **as directed**.
8. Stop Valves: Boiler inlets and outlets, except safety relief valves or preheater inlet and outlet, shall be equipped with stop valve in an accessible location as near as practical to boiler nozzle and same size or larger than nozzle. Valves larger than **NPS 2 (DN 50)** shall have rising stem.
9. Stop-Check Valves: Factory-installed, stop-check valve and stop valve for field installation at boiler outlet with free-blow drain valve for field installation between the two valves and visible when operating stop-check valve.
10. Tankless Heater: Carbon-steel header with copper-tube heat exchanger, mounted in a port of upper manifold and sealed with fiber gasket.
 - a. Tappings **NPS 2 (DN 50)** and Smaller: Threaded ends according to ASME B1.20.1 for pipe threads.
 - b. Tappings **NPS 2-1/2 (DN 65)** and Larger: Flanged ends according to ASME B16.5 for steel and stainless-steel flanges, and according to ASME B16.24 for copper and copper-alloy flanges.

I. Controls

1. Refer to Division 23 Section "Instrumentation And Control For Hvac".
OR
Boiler operating controls shall include the following devices and features:
 - a. Control transformer.
 - b. Set-Point Adjust: Set points shall be adjustable.
 - c. Operating Pressure Control for steam boilers: Factory wired and mounted to cycle burner.
 - d. Low-Water Cutoff and Pump Control for steam boilers: Cycle feedwater pump(s) **OR** Operate feedwater pump(s) continuously and modulate valve, **as directed**, for makeup water control.
 - e. Sequence Of Operation For Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.
OR
Sequence Of Operation For Hot-Water Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to reset supply-water temperature inversely with outside-air temperature. At **0 deg F (minus 17 deg C)** outside-air temperature, set supply-water temperature at **200 deg F (93 deg C)**; at **60 deg F (15 deg C)** outside-air temperature, set supply-water temperature at **140 deg F (60 deg C)**.

- f. Sequence Of Operation For Steam Boilers: Electric, factory-fabricated and field-installed panel to control burner firing rate to maintain a constant steam pressure. Maintain pressure set point plus or minus 10 percent.
 - 1) Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.
 2. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.
 - a. High Cutoff: Manual **OR** Automatic, **as directed**, reset stops burner if operating conditions rise above maximum boiler design temperature for hot-water boiler **OR** design pressure for steam boiler, **as directed**.
 - b. Low-Water Cutoff Switch: Electronic for hot-water boilers **OR** Float and electronic for steam boilers, **as directed**, probe shall prevent burner operation on low water. Cutoff switch shall be manual **OR** automatic, **as directed**, -reset type.
 - c. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.
 3. Building Automation System Interface: Factory-install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.
 - a. Hardwired Points:
 - 1) Monitoring: On/off status, common trouble alarm **OR** low water level alarm, **as directed**.
 - 2) Control: On/off operation, hot water supply temperature set-point adjustment **OR** steam pressure adjustment, **as directed**.
 - b. A communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. Control features available, and monitoring points displayed, locally at boiler control panel shall be available through building automation system.
- J. Electrical Power
1. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22..
OR
Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.
 - a. House in NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**, enclosure.
 - b. Wiring shall be numbered and color-coded to match wiring diagram.
 - c. Install wiring outside of an enclosure in a metal, **as directed**, raceway.
 - d. Field power interface shall be to wire lugs **OR** fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - e. Provide branch power circuit to each motor and to controls with a disconnect switch or circuit breaker, **as directed**.
 - f. Provide each motor with overcurrent protection.
- K. Source Quality Control
1. Test and inspect factory-assembled boilers, before shipping, according to ASME Boiler and Pressure Vessel Code.
 2. Burner and Hydrostatic Test for factory-assembled boilers: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.
 3. Allow the Owner access to source quality-control testing of boilers. Notify the Owner 14 days in advance of testing.

1.3 EXECUTION

A. Boiler Installation

1. Install boilers level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac", and concrete materials and installation requirements are specified in Division 31.
2. Vibration Isolation: Elastomeric isolator pads **OR** mounts, **as directed**, with a minimum static deflection of **0.25 inch (6.35 mm)**. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
3. Install gas-fired boilers according to NFPA 54.
4. Install oil-fired boilers according to NFPA 31.
5. Assemble and install boiler trim.
6. Install electrical devices furnished with boiler but not specified to be factory mounted.
7. Install control wiring to field-mounted electrical devices.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to boiler to allow service and maintenance.
3. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas train connection. Provide a reducer if required.
4. Connect oil piping full size to burner inlet with shutoff valve and union.
5. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve and union or flange at each connection.
6. Connect steam and condensate piping to supply-, return-, and blowdown-boiler tappings with shutoff valve and union or flange at each connection.
7. Install piping from safety relief valves to nearest floor drain, for hot-water boilers.
8. Install piping from safety valves to drip-pan elbow and to nearest floor drain, for steam boilers.
9. Install piping from equipment drain connection to nearest floor drain. Piping shall be at least full size of connection. Provide an isolation valve if required.
10. Connect breeching full size to boiler outlet. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for venting materials.
11. Install flue-gas recirculation duct from vent to burner. Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for recirculation duct materials.
12. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
13. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Perform installation and startup checks according to manufacturer's written instructions.
 - b. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
 - c. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - 1) Burner Test for field-assembled boilers: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency.

- 2) Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature **OR** steam pressure, **as directed**.
 - 3) Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 3. Remove and replace malfunctioning units and retest as specified above.
 4. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
 5. Performance Tests, **as directed**:
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect component assemblies and equipment installations, including connections, and to conduct performance testing.
 - b. Boilers shall comply with performance requirements indicated, as determined by field performance tests. Adjust, modify, or replace equipment in order to comply.
 - c. Perform field performance tests to determine the capacity and efficiency of boilers.
 - 1) For dual-fuel boilers, perform tests for each fuel.
 - 2) Test for full capacity.
 - 3) Test for boiler efficiency at low fire, 20, 40, 60, 80, 100, 80, 60, 40 and 20, **as directed**, percent of full capacity. Determine efficiency at each test point.
 - d. Repeat tests until results comply with requirements indicated.
 - e. Provide analysis equipment required to determine performance.
 - f. Provide temporary equipment and system modifications necessary to dissipate the heat produced during tests if building systems are not adequate.
 - g. Notify the Owner in advance of test dates.
 - h. Document test results in a report and submit to the Owner.
- D. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain boilers.

END OF SECTION 23 52 36 00

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SECTION 23 53 16 00 - FEEDWATER EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for feedwater equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Feedwater pumps and receivers.
 - b. Vacuum-type feedwater pumps and receivers.

C. Definition

1. NPSH: Net-positive suction head.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacity, temperature and NPSH required, pump performance curves with selection points clearly indicated, and furnished specialties and accessories.
2. Shop Drawings: Include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, method of field assembly, and attachments to other work.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that feedwater equipment, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
4. Field quality-control test reports.
5. Operation and Maintenance Data.

E. Quality Assurance

1. Regulatory Requirements: Fabricate and test unit according to ASME PTC 12.1, "Closed Feedwater Heaters."
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. ASME Compliance: ASME B31.1, "Power Piping," for systems more than 15 psig (104 kPa); ASME B31.9, "Building Services Piping," for systems equal to or less than 15 psig (104 kPa). Safety valves and pressure vessels shall bear the appropriate ASME label.

F. Delivery, Storage, And Handling

1. Preparation for Shipping: Clean flanges and exposed-metal surfaces and treat with anticorrosion compound after assembly and testing. Protect flanges, pipe openings, and nozzles with wooden flange covers or with screwed-in plugs.
2. Store units in dry location.
3. Retain protective flange covers and machined-surface protective coatings during storage.
4. Protect bearings and couplings against damage from sand, grit, and other foreign matter.
5. Comply with manufacturer's written rigging instructions.

1.2 PRODUCTS

A. Feedwater Units

1. Description: Factory-assembled and -tested unit consisting of a receiver, simplex **OR** duplex, **as directed**, feedwater pumps, controls, and the following features and accessories:
 - a. Liquid-filled industrial **OR** Bimetal dial-type, **as directed**, thermometer graduated in Fahrenheit **OR** Celsius **OR** both Fahrenheit and Celsius, **as directed**.
 - b. Level gage glass, reflex flat type, **as directed**, with stops at top and bottom.
 - c. Lifting eyes.
 - d. Companion flanges.
 - e. Pump, suction and discharge isolation valve, inlet strainer, discharge check valve, and liquid-filled pressure gage.
 - f. Makeup Water Assembly: Float operated with integral valve **OR** Electric level controller and valve, **as directed**; with inlet strainer and three-valve bypass.
 - g. Feedwater Heater: Sparge tube, thermostat, and control valve.
 - h. Factory-Installed Pipe, **NPS 2-1/2 (DN 65)** and Smaller: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with threaded joints and fittings.
 - 1) Cast-Iron Threaded Fittings: ASME B16.4; Class 125 **OR** 250, **as directed**.
 - 2) Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 **OR** 300, **as directed**.
 - 3) Forged-Steel Fittings: ASME B16.11, Class 3000.
 - 4) Malleable-Iron Unions: ASME B16.39; Class 150 **OR** 300, **as directed**.
 - 5) Forged-Steel Unions: MSS SP-83, Class 3000.
 - i. Factory-Installed Pipe, **NPS 3 (DN 80)** and Larger: ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with welded joints and carbon-steel fittings and flanges.
 - 1) Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
 - 2) Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150 **OR** 300, **as directed**, including bolts, nuts, and gaskets.
2. Receiver:
 - a. Material: Close-grain cast iron **OR** Welded carbon steel **OR** Welded carbon steel galvanized after fabrication **OR** Stainless steel, **as directed**.
 - b. Additional corrosion protection:
 - 1) **0.07-inch (1.8-mm) OR 0.13-inch (3.3-mm) OR 0.19-inch (4.8-mm)**, **as directed**, thickness allowance.
 - 2) Electrolytic corrosion-inhibitor anode.
 - c. Finish: Primer **OR** Primer under enamel topcoat **OR** Primer under epoxy topcoat, **as directed**.
 - d. Factory-Applied Insulation and Jacket: Minimum thickness of **2 inches (50 mm)** for mineral-fiber pipe and tank insulation. Cover insulation with painted steel **OR** stucco-embossed aluminum **OR** stainless-steel, **as directed**, jacket.
 - e. Mounting Arrangement: Recessed below floor **OR** Floor mounted, **as directed**.
 - f. Mounting Frame: Structural-steel stand to support receiver and pumps. Fabricate stand with bracing adequate for seismic forces according to authorities having jurisdiction and to allow anchoring mounting frame to floor, **as directed**.
3. Vertical Feedwater Pump: Flange-mounted, close-coupled, single-stage, **OR** multistage, **as directed**, radially split-case-design centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of at least **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze **OR** Stainless steel, **as directed**.
 - b. Seals: Mechanical.
 - c. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
4. Horizontal Feedwater Pump: Base-mounted, single-stage, **OR** multistage, **as directed**, radially split-case-design centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of at least **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze **OR** Stainless steel, **as directed**.

- b. Coupling: Close **OR** Flexible, **as directed**.
 - c. Seals: Mechanical.
 - d. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
5. Control panel shall be unit mounted and factory wired and include the following:
- a. NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**, enclosure.
 - b. Single-point field power interface to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - 1) Branch power circuit to each motor and to controls with a disconnect switch or circuit breaker, **as directed**.
 - c. NEMA-rated motor controller for each motor, and include a hand-off-auto switch and overcurrent protection.
 - 1) Alternating controls for duplex units with intermittent operation as indicated by control sequence.
 - d. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - e. Wiring outside of an enclosure in a metal, **as directed**, raceway. Make connections to motor with liquidtight conduit.
 - f. Removable control mounting plate.
 - g. Visual indication of status and alarm with momentary test push button, **as directed**.
 - h. Audible alarm and silence switch.
 - i. Visual indication of elapsed run time, graduated in hours.
 - j. Fused control-circuit transformer.
 - k. Microprocessor-based controller.
6. Feedwater Simplex-Pump Control Sequence:
- a. Boiler water-level controller starts and stops pump to maintain boiler water-level set point.
 - b. Visual indication of pump on and off, **as directed**, status.
 - c. Visual and audible, **as directed**, alarm indication of pump failure.
7. Feedwater Duplex-Pump Control Sequence (for duplex-pump units with operating and standby pump):
- a. Boiler water-level controller starts and stops lead pump to maintain boiler water-level set point.
 - b. Lead and lag pumps alternate after each start **OR** to equalize run time, **as directed**.
 - c. Lead pump failure, lag pump automatically starts if lead pump cannot maintain set point **OR** is started manually, **as directed**.
 - d. Visual indication of pump on and off, **as directed**, status.
 - e. Visual indication of pump lead/lag status.
 - f. Visual and audible, **as directed**, alarm indication of pump failure.
8. Feedwater Duplex-Pump Control Sequence (for duplex-pump units with continuous pump operation and modulating control valve):
- a. Pump runs continuously while boiler operates. Electric interlock with boiler control starts lead pump when boiler starts.
 - b. Boiler water-level controller modulates feedwater control valve to maintain boiler water-level set point. Valve closes when boiler is off.
 - c. Lead and lag pumps alternate after each start **OR** to equalize run time, **as directed**.
 - d. Lead pump failure automatically starts lag pump.
 - OR**
 - Feedwater pressure controller starts and stops lag pump to maintain feedwater pressure set point.
 - e. Visual indication of pump on and off, **as directed**, status.
 - f. Visual indication of pump lead/lag status.
 - g. Visual and audible, **as directed**, alarm indication of pump failure.
9. Receiver Makeup Water Control Sequence:
- a. Electric level controller operates electric control valve to maintain receiver water-level set point.
 - OR**

- Mechanical float operates integral valve to maintain water-level set point.
- b. Visual and audible, **as directed**, alarm indication of low and high, **as directed**, receiver-water level.
10. Building Management System Interface: Factory install hardware to enable building management system to monitor and display points.
- a. Hardwired Monitoring Points: On/off status for each pump, failure alarm for each pump, receiver low-water-level alarm, receiver high-water-level alarm, feedwater temperature, **as directed**.
- B. Feedwater Unit With Vacuum Producer
1. Description: Receiver mounted, consisting of multijet vacuum producer, centrifugal pump and motor assembly mounted on separation chamber, and automatic pressure and water temperature controls. Include the following accessories:
 - a. Liquid-filled industrial **OR** Bimetal dial-type, **as directed**, thermometer graduated in Fahrenheit **OR** Celsius **OR** both Fahrenheit and Celsius, **as directed**.
 - b. Vacuum Gage: Dial-type register in **inches of mercury (kPa)**.
 - c. Level Gage Glass: Stops top and bottom.
 - d. Air-suction check valve.
 - e. Lifting eyes.
 - f. Companion flanges.
 - g. Low-water cutoff switch.
 - h. Cooling-Water Control: Aquastat, inlet strainer, and electric valve.
 - i. Air vent.
 - j. Overflow drain from vacuum-producer receiver.
 - k. Factory-Installed Pipe, **NPS 2-1/2 (DN 65)** and Smaller: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with threaded joints and fittings.
 - 1) Cast-Iron Threaded Fittings: ASME B16.4; Class 125 **OR** 250, **as directed**.
 - 2) Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 **OR** 300, **as directed**.
 - 3) Forged-Steel Fittings: ASME B16.11, Class 3000.
 - 4) Malleable-Iron Unions: ASME B16.39; Class 150 **OR** 300, **as directed**.
 - 5) Forged-Steel Unions: MSS SP-83, Class 3000.
 - l. Factory-Installed Pipe, **NPS 3 (DN 80)** and Larger: ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with welded joints and carbon-steel fittings and flanges.
 - 1) Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
 - 2) Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150 **OR** 300, **as directed**, including bolts, nuts, and gaskets.
 2. Vacuum-Producer Reservoir and Vacuum Receiver:
 - a. Material: Close-grain cast iron **OR** Welded carbon steel **OR** Welded carbon steel galvanized after fabrication **OR** Stainless steel, **as directed**.
 - b. Additional corrosion protection:
 - 1) **0.07-inch (1.8-mm) OR 0.13-inch (3.3-mm) OR 0.19-inch (4.8-mm)**, **as directed**, thickness allowance.
 - 2) Electrolytic corrosion-inhibitor anode.
 - c. Finish: Primer **OR** Primer under enamel topcoat **OR** Primer under epoxy topcoat, **as directed**.
 - d. Factory-Applied Insulation and Jacket: Minimum thickness of **2 inches (50 mm)** for mineral-fiber pipe and tank insulation. Cover insulation with painted steel **OR** stucco-embossed aluminum **OR** stainless-steel, **as directed**, jacket.
 - e. Mounting Arrangement: Recessed below floor **OR** Floor mounted, **as directed**.
 - f. Mounting Frame: Structural-steel stand to support receiver and pumps. Fabricate stand with bracing adequate for seismic forces according to authorities having jurisdiction and to allow anchoring mounting frame to floor, **as directed**.

3. Vertical Vacuum-Producer Pump: Flange-mounted, close-coupled, single-stage, radially split-case-design centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of at least **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze.
 - b. Shaft: Stainless steel.
 - c. Seals: Mechanical.
 - d. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
4. Horizontal Vacuum-Producer Pump: Base-mounted, single-stage, radially split-case-design centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of at least **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze.
 - b. Shaft: Stainless steel.
 - c. Coupling: Close **OR** Flexible, **as directed**.
 - d. Seals: Mechanical.
 - e. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
5. Vertical Feedwater Pump: Flange-mounted, close-coupled, single-stage, **OR** multistage, **as directed**, radially split-case-design centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of at least **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze **OR** Stainless steel, **as directed**.
 - b. Seals: Mechanical.
 - c. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
6. Horizontal Feedwater Pump: Base-mounted, single-stage, **OR** multistage, **as directed**, radially split-case-design centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of at least **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze **OR** Stainless steel, **as directed**.
 - b. Coupling: Close **OR** Flexible, **as directed**.
 - c. Seals: Mechanical.
 - d. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
7. Control panel shall be unit mounted and factory wired and include the following:
 - a. Vacuum Switches for Simplex Vacuum-Producer Pumps: Include pressure adjustment, and test push button. Factory set to operate pump between **3 and 6 inches of mercury (10.1 and 20.2 kPa)**.
OR
Vacuum Switches for Duplex Vacuum-Producer Pumps: Include pressure adjustment, and test push button. Factory set so one pump operates for **3 to 5 inches of mercury (10.1 to 16.9 kPa)** and both pumps operate for **4 to 6 inches of mercury (13.5 to 20.2 kPa)**.
 - b. NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**, enclosure.
 - c. Single-point field power interface to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - 1) Branch power circuit to each motor and to controls with a disconnect switch or circuit breaker, **as directed**.
 - d. NEMA-rated motor controller for each motor and include a hand-off-auto switch and overcurrent protection.
 - 1) Alternating control for units with intermittent operation as indicated by control sequence.
 - e. Terminal blocks with numbered and color-coded wiring to match wiring diagram.

- f. Wiring outside of an enclosure in a metal, **as directed**, raceway. Make connections to motor with liquidtight conduit.
 - g. Removable control mounting plate.
 - h. Visual indication of status and alarm with momentary test push button, **as directed**.
 - i. Audible alarm and silence switch.
 - j. Visual indication of elapsed run time, graduated in hours.
 - k. Fused control-circuit transformer.
8. Vacuum-Producer Control Sequence:
- a. Cycle pumps to maintain vacuum-pressure set point.
 - b. Visual indication of pump on and off, **as directed**, status.
 - c. Visual and audible, **as directed**, alarm indication of pump failure.
9. Feedwater Simplex-Pump Control Sequence:
- a. Boiler water-level controller starts and stops pump to maintain boiler water-level set point.
 - b. Visual indication of pump on and off, **as directed**, status.
 - c. Visual and audible, **as directed**, alarm indication of pump failure.
10. Feedwater Duplex-Pump Control Sequence (for duplex-pump units with operating and standby pump):
- a. Boiler water-level controller starts and stops lead pump to maintain boiler water-level set point.
 - b. Lead and lag pumps alternate after each start **OR** to equalize run time, **as directed**.
 - c. Lead pump failure, lag pump automatically starts if lead pump cannot maintain set point **OR** is started manually, **as directed**.
 - d. Visual indication of pump on and off, **as directed**, status.
 - e. Visual indication of pump lead/lag status.
 - f. Visual and audible, **as directed**, alarm indication of pump failure.
11. Feedwater Duplex-Pump Control Sequence (for duplex-pump units with continuous pump operation and modulating control valve):
- a. Pump runs continuously while boiler operates. Electric interlock with boiler control starts lead pump when boiler starts.
 - b. Boiler water-level controller modulates feedwater control valve to maintain boiler water-level set point. Valve closes when boiler is off.
 - c. Lead and lag pumps alternate after each start **OR** to equalize run time, **as directed**.
 - d. Lead pump failure automatically starts lag pump.
OR
Feedwater pressure controller starts and stops lag pump to maintain feedwater pressure set point.
 - e. Visual indication of pump on and off, **as directed**, status.
 - f. Visual indication of pump lead/lag status.
 - g. Visual and audible, **as directed**, alarm indication of pump failure.
12. Makeup Water Control Sequence:
- a. Electric level controller operates electric control valve to maintain water temperature set point.
 - b. Visual and audible, **as directed**, alarm indication of low and high, **as directed**, water level.
13. Building Management System Interface: Factory install hardware to enable building management system to monitor and display points.
- a. Hardwired Monitoring Points: On/off status for each pump, failure alarm for each pump, receiver low-water-level alarm, receiver high-water-level alarm, feedwater temperature, **as directed**.

1.3 EXECUTION

A. Installation

1. Install feedwater unit level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac", and concrete materials and installation requirements are specified in Division 31.
 2. Vibration Isolation: Elastomeric isolator pads **OR** mounts, **as directed**, with a minimum static deflection of **0.25 inch (6.35 mm)**. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 3. Install unit to permit access for maintenance.
 4. Support piping independent of pumps.
 5. Install base-mounted pumps on concrete bases with grouted base frames.
 6. Install parts and accessories shipped loose.
 7. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 8. Install piping adjacent to machine to allow service and maintenance.
 9. Connect makeup water piping and cooling-water piping with reduced-pressure backflow preventers.
 10. Install overflow drain piping to nearest floor drain.
 11. Install vents and extend to outdoors; terminate with elbow turned down and an insect screen.
 12. Adjust boiler water-level controls to properly stage unit.
 13. Set field-adjustable, makeup water and cooling-water controls.
 14. Clean equipment internally; remove coatings applied for protection during shipping and storage, foreign material, and oily residue according to manufacturer's written instructions.
 15. Clean strainers.
- B. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Inspect field-assembled components, equipment installation, and piping and electrical connections for compliance with manufacturer's written instructions.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - c. Check bearing lubrication.
 - d. Verify proper motor rotation.
 - e. Start up service.
 - f. Report results in writing.
 3. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 23 53 16 00

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SECTION 23 53 16 00a - DEAERATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for deaerators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged, factory-assembled deaerators.

C. Definitions

1. Feedwater Pump: Pump that moves feedwater from the deaerator to the boiler.
2. Transfer Pump: Pump that moves feedwater from the surge tank to the deaerator.
3. NPSH: Net-positive suction head.

D. Submittals

1. Product Data: For each type of product indicated. Include rated makeup water, feedwater, and steam flow rates; working pressure; tank capacities; storage capacity in minutes; temperature and NPSH required; pump performance curves with selection points clearly indicated; furnished specialties; and accessories.
2. Shop Drawings: For deaerators, signed and sealed by a qualified professional engineer; include plans, elevations, sections, details, dimensions, weights, loadings, required clearances, and attachments to other work.
 - a. For installed products indicated to comply with design loads, include structural analysis data.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing deaerator bases.
 - c. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that deaerators, accessories, and components will withstand seismic forces as indicated in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
4. Field quality-control test reports.
5. Operation and Maintenance Data: For deaerators to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASME Compliance: ASME B31.1, "Power Piping," for systems more than 15 psig (104 kPa); ASME B31.9, "Building Services Piping," for systems equal to or less than 15 psig (104 kPa). Safety valves and pressure vessels shall bear the appropriate ASME label.

F. Delivery, Storage, And Handling

1. Protect flanges, pipe openings, nozzles, bearings, and couplings from damage during shipping and storage.
2. Comply with manufacturer's written rigging instructions.
3. Deliver deaerators as factory-assembled units with protective crating and covering.

1.2 PRODUCTS

A. Manufactured Units

1. Horizontal **OR** Vertical, **as directed**, packed-column **OR** spray **OR** tray, **as directed**, single-compartment deaerator, and a separate packaged surge tank with transfer and feedwater pumps and controls to supply feedwater to deaerator, **as directed**.
OR
Horizontal **OR** Vertical, **as directed**, packed-column **OR** spray **OR** tray, **as directed**, two-compartment deaerator. One compartment for deaeration and one for surge volume, each with its own transfer and feedwater pumps and controls.
OR
Horizontal **OR** Vertical, **as directed**, packed-column **OR** spray **OR** tray, **as directed**, single-compartment deaerator and separate surge tank, both mounted on same factory-fabricated stand with necessary transfer and feedwater pumps and controls.
2. Material for Wetted Components: Components in contact with water that has not been deaerated shall be made of Type 304 **OR** 316, **as directed**, stainless steel.
3. Adjustable Spray Valves: Type 316 stainless steel. Arrange spray valves for counterflow of steam and condensate and so corrosive gases being vented do not contact deaerator's head or shell.
4. Vent Condenser: Stainless steel, with automatic and manual vent valves.
5. Deaerator and Storage Tank:
 - a. Material: Welded carbon steel **OR** Welded carbon steel galvanized after fabrication **OR** Stainless steel, **as directed**.
 - b. Additional Corrosion Protection:
 - 1) 0.07-inch (1.8-mm) **OR** 0.13-inch (3.3-mm) **OR** 0.19-inch (4.8-mm), **as directed**, thickness allowance.
 - 2) Electrolytic corrosion-inhibitor anode.
 - c. Access: Manhole in deaerator and storage tank for access to internal components for inspection and service.
 - d. Factory-Applied Insulation and Jacket: Minimum thickness of 2 inches (50 mm), **as directed**, for mineral-fiber pipe and tank insulation. Cover insulation with painted steel **OR** stucco-embossed aluminum **OR** stainless-steel, **as directed**, jacket.
 - e. Factory-Installed Pipe, NPS 2-1/2 (DN 65) and Smaller: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with threaded joints and fittings.
 - 1) Cast-Iron Threaded Fittings: ASME B16.4, Class 125 **OR** 250, **as directed**.
 - 2) Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 **OR** 300, **as directed**.
 - 3) Forged-Steel Fittings: ASME B16.11, Class 3000.
 - 4) Malleable-Iron Unions: ASME B16.39, Class 150 **OR** 300, **as directed**.
 - 5) Forged-Steel Unions: MSS SP-83, Class 3000.
 - f. Factory-Installed Pipe, NPS 3 (DN 80) and Larger: ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with welded joints and carbon-steel fittings and flanges.
 - 1) Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
 - 2) Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150 **OR** 300, **as directed**, including bolts, nuts, and gaskets.
6. Accessories:
 - a. Lifting eyes.
 - b. Companion flanges.
 - c. Pump suction piping with vortex breaker, isolation valve, strainer, and flexible connector.
 - d. Pump discharge piping with check valve, isolation valve, and liquid-filled pressure gage graduated in pounds force per square inch **OR** kilopascals **OR** both pounds force per square inch and kilopascals, **as directed**.
 - e. Pump-discharge bypass relief valve **OR** orifice plate **OR** relief valve with orifice plate, **as directed**.

- f. Makeup Water Assembly:
 - 1) Factory-mounted modulating valve with mechanical level control, external float cage, and stainless-steel float.
OR
Factory **OR** Field, **as directed**, -mounted, electric, pilot-operated, solenoid **OR** modulating, **as directed**, valve with factory-mounted, probe-type, **as directed**, water-level controller.
OR
Factory **OR** Field, **as directed**, -mounted, pneumatic modulating valve with factory-mounted water-level controller.
 - 2) Factory **OR** Field, **as directed**, -mounted, three-valve bypass and inlet strainer.
- g. Steam Pressure-Reducing Valve(s): Steam **OR** Electric **OR** Pneumatic, **as directed**, operated with three-valve bypass, **as directed**, and sized to reduce boiler outlet pressure to the deaerator design pressure.
- h. Tank Overflow Drain: Sized to relieve full capacity at operating pressure.
- i. Safety Valve(s): ASME labeled and sized to relieve full capacity of pressure-reducing valve.
- j. Vents: Manual and automatic vent valves.
- k. Vacuum breaker.
- l. Meters and Gages:
 - 1) Full-height, water-level gage glass, reflex flat type, **as directed**, and stop valve set.
 - 2) Liquid-filled industrial **OR** Bimetal dial-type, **as directed**, thermometer graduated in Fahrenheit **OR** Celsius **OR** both Fahrenheit and Celsius, **as directed**, mounted to measure temperature in storage and steam, **as directed**, section of tank.
 - 3) Pressure gage graduated in pounds force per square inch **OR** kilopascals **OR** both pounds force per square inch and kilopascals, **as directed**, mounted to measure pressure in steam section of tank.
- m. Provision for chemical injection quill.
- n. Chemical injection quill.
- o. Sampling connection with valve.
- p. Tank drain connection with valve.
- q. Oxygen test kit.
- 7. Support Frame: Structural-steel frame for supporting tank and pumps. Weld or bolt to tank.
 - a. Fabricate support frame with bracing adequate for seismic forces according to authorities having jurisdiction and to allow installation by anchoring deaerators to floor only, **as directed**.
- 8. Feedwater Pump: Cast-iron, flange **OR** base, **as directed**, -mounted volute; with bronze **OR** stainless-steel, **as directed**, multistage centrifugal **OR** turbine, **as directed**, impeller, renewable bronze case ring, and stainless-steel shaft.
 - a. Seals: Mechanical, suitable for 250 deg F (121 deg C).
 - b. Pump Motor: Vertical **OR** Horizontal, **as directed**, open dripproof **OR** totally enclosed **OR** totally enclosed fan-cooled, **as directed**, enclosure, close **OR** flexible, **as directed**, coupled to pump. Comply with requirements in Division 15 Section "Motors."
- 9. Feedwater Pump Control Panel: Factory mounted and wired and including the following:
 - a. NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**, enclosure.
 - b. Single-point, field power connection to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - 1) Branch power circuit to each motor and to controls with a disconnect switch or circuit breaker, **as directed**.
 - c. NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor.
 - 1) Alternating control as indicated by control sequence for each pump.
 - d. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - e. Metal raceway **OR** Raceway, **as directed**, for factory-installed wiring outside of enclosures. Make connections to motor with liquidtight conduit.
 - f. Removable control mounting plate.

- g. Visual indication of status and alarm with momentary test push button, **as directed**.
 - h. Audible alarm and silence switch.
 - i. Visual indication of elapsed run time, graduated in hours.
 - j. Fusible, control-circuit transformer.
 - k. Microprocessor-based controller.
10. Feedwater Pump Start-Stop Control Sequence (for intermittent pump operation):
- a. Boiler water-level controller starts and stops lead pump to maintain boiler water-level set point.
 - b. Lead and lag pumps alternate after each start **OR** to equalize run time, **as directed**.
 - c. Lead pump failure, lag pump automatically starts if lead pump cannot maintain set point **OR** is started manually, **as directed**.
 - d. Visual indication of pump on **OR** on and off, **as directed**, status.
 - e. Visual indication of pump lead/lag status.
 - f. Visual **OR** Visual and audible, **as directed**, alarm indication of pump failure.
11. Feedwater Pump Continuous Control Sequence (for continuous pump operation and modulating control valve):
- a. Pump runs continuously while boiler operates. Electric interlock with boiler control starts lead pump when boiler starts.
 - b. Boiler water-level controller modulates feedwater control valve to maintain boiler water-level set point. Valve closes when boiler is off.
 - c. Lead and lag pumps alternate after each start **OR** to equalize run time, **as directed**.
 - d. Lead pump failure automatically starts lag pump.
OR
Feedwater pressure controller starts and stops lag pump to maintain feedwater pressure set point.
 - e. Visual indication of pump on **OR** on and off, **as directed**, status.
 - f. Visual indication of pump lead/lag status.
 - g. Visual **OR** Visual and audible, **as directed**, alarm indication of pump failure.
12. Makeup Water Control Sequence:
- a. Electric level controller operates electric control valve to maintain tank water-level set point.
OR
Pneumatic level controller operates pneumatic control valve to maintain tank water-level set point.
OR
Mechanical float operates valve to maintain water-level set point.
 - b. Visual **OR** Visual and audible, **as directed**, alarm indication of low **OR** low and high, **as directed**, tank water level.
13. Building Management System Interface: Factory install hardware to enable building management system to monitor and display points.
- a. Hardwired Monitoring Points: On/off status for each pump, failure alarm for each pump, low-water level alarm, high-water level alarm, feedwater temperature, **as directed**.
- B. Surge Tank
- 1. Description: Factory-assembled and -tested unit consisting of a condensate receiver, transfer pumps, and controls.
 - 2. Accessories:
 - a. Liquid-filled industrial **OR** Bimetal dial-type, **as directed**, thermometer graduated in Fahrenheit **OR** Celsius **OR** both Fahrenheit and Celsius, **as directed**.
 - b. Level gage glass, reflex flat type, **as directed**, with stops at top and bottom.
 - c. Lifting eyes.
 - d. Companion flanges.
 - e. Pump suction piping with vortex breaker, isolation valve, strainer, and flexible connector.
 - f. Pump discharge piping with check valve, isolation valve, and liquid-filled pressure gage graduated in pounds force per square inch **OR** kilopascals **OR** both pounds force per square inch and kilopascals, **as directed**.

- g. Pump-discharge bypass relief valve **OR** orifice plate **OR** relief valve with orifice plate, **as directed**.
3. Factory-Installed Pipe, **NPS 2-1/2 (DN 65)** and Smaller: ASTM A 53/A 53M, Type S (seamless), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with threaded joints and fittings.
 - a. Cast-Iron Threaded Fittings: ASME B16.4, Class 125 **OR** 250, **as directed**.
 - b. Malleable-Iron Threaded Fittings: ASME B16.3, Class 150 **OR** 300, **as directed**.
 - c. Forged-Steel Fittings: ASME B16.11, Class 3000.
 - d. Malleable-Iron Unions: ASME B16.39, Class 150 **OR** 300, **as directed**.
 - e. Forged-Steel Unions: MSS SP-83, Class 3000.
4. Factory-Installed Pipe, **NPS 3 (DN 80)** and Larger: ASTM A 53/A 53M, Type E (electric-resistance welded), Grade B; or ASTM A 106, Type S, Grade B, Schedule 40 **OR** 80, **as directed**; with welded joints and carbon-steel fittings and flanges.
 - a. Wrought-Steel Fittings: ASME B16.9, wall thickness to match adjoining pipe.
 - b. Wrought Cast- and Forged-Steel Flanges and Flanged Fittings: ASME B16.5, Class 150 **OR** 300, **as directed**, including bolts, nuts, and gaskets.
5. Tank:
 - a. Material: Welded carbon steel **OR** Welded carbon steel galvanized after fabrication **OR** Stainless steel, **as directed**.
 - b. Additional Corrosion Protection:
 - 1) **0.07-inch (1.8-mm) OR 0.13-inch (3.3-mm) OR 0.19-inch (4.8-mm)**, **as directed**, thickness allowance.
 - 2) Electrolytic corrosion-inhibitor anode.
 - c. Access: Manhole in tank for access to internal components for inspection and service.
 - d. Factory-Applied Insulation and Jacket: Minimum thickness of **2 inches (50 mm)** for mineral-fiber pipe and tank insulation. Cover insulation with painted steel **OR** stucco-embossed aluminum **OR** stainless-steel, **as directed**, jacket.
6. Support Frame: Structural-steel frame for supporting tank. Weld or bolt to tank.
 - a. Fabricate support frame with bracing adequate for seismic forces according to authorities having jurisdiction and to allow installation by anchoring deaerators to floor only.
7. Transfer Pump: Vertical, flange-mounted, close-coupled, single-stage **OR** multistage, **as directed**, radially split-case centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze **OR** Stainless steel, **as directed**.
 - b. Seals: Mechanical.
 - c. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
8. Transfer Pump: Horizontal, base-mounted, single-stage **OR** multistage, **as directed**, radially split-case centrifugal pump; rated for **175-psig (1205-kPa)** minimum working pressure and a continuous water temperature of **225 deg F (107 deg C)**; with the following features:
 - a. Impeller: Bronze **OR** Stainless steel, **as directed**.
 - b. Coupling: Close **OR** Flexible, **as directed**.
 - c. Seals: Mechanical.
 - d. Motor: Open dripproof **OR** Totally enclosed **OR** Totally enclosed fan-cooled, **as directed**, enclosure. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
9. Transfer Pump Control Panel: Factory mounted and wired and including the following:
 - a. NEMA 250, Type 1 **OR** 4 **OR** 4X **OR** 12, **as directed**, enclosure.
 - b. Single-point, field power connection to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**.
 - 1) Branch power circuit to each motor and to controls with a disconnect switch or circuit breaker, **as directed**.
 - c. NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor.

- 1) Alternating control indicated by control sequence for each pump.
 - d. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - e. Metal raceway **OR** Raceway, **as directed**, for factory-installed wiring outside of enclosures. Make connections to motor with liquidtight conduit.
 - f. Removable control mounting plate.
 - g. Visual indication of on/off status and pump failure alarm with momentary test push button, **as directed**.
 - h. Audible alarm and silence switch.
 - i. Visual indication of elapsed run time, graduated in hours.
 - j. Fusible, control-circuit transformer.
 - k. Microprocessor-based controller.
10. Transfer Pump Start-Stop Control Sequence: Deaerator water-level controller controls lead pump; alternator switches lead and lag pump(s) after each start **OR** to equalize run time, **as directed**; failure of lead pump switches to lag pump and sounds audible alarm, **as directed**.
 11. Transfer Pump Continuous-Run Control Sequence: Lead pump runs continuously while deaerator is operating; deaerator water-level controller modulates water-level-control valve; lead and lag pump(s) switch to equalize run time; lag pump operates if lead pump fails; pump failure sounds audible alarm, **as directed**.
 12. Building Management System Interface: Factory install hardware to enable building management system to monitor and display points.
 - a. Hardwired Monitoring Points: On/off status for each pump, failure alarm for each pump, low-water level alarm, high-water level alarm, **as directed**.

C. Factory Finishes

1. Manufacturer's standard prime-coat finish ready for field painting.
2. Manufacturer's standard paint in standard colors, applied to factory-assembled and -tested unit before shipping.
3. Do not paint aluminum, galvanized-steel, and stainless-steel surfaces.

D. Source Quality Control

1. Fabricate and label deaerator tanks according to ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.
2. Factory install and test piping that connects pumps to tanks according to ASME B31.1, "Power Piping" **OR** ASME B31.9, "Building Services Piping," **as directed**.
3. Factory test performance and certify test results on packaged deaerator units, according to ASME PTC 12.3, before shipping to Project.

1.3 EXECUTION

A. Examination

1. Before deaerator installation, examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance, maintenance, and operations.
 - a. Final deaerator locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
 - b. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Install deaerators level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac", and concrete materials and installation requirements are specified in Division 31.
2. Vibration Isolation: Elastomeric isolator pads **OR** mounts, **as directed**, with a minimum static deflection of **0.25 inch (6.35 mm)**. Vibration isolation devices and installation requirements are

- specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
3. Install deaerators to permit access for service and maintenance.
 4. Support piping independent of pumps.
 5. Install base-mounted pumps on concrete base with grouted base frame.
 6. Install all parts and materials not factory installed.
 7. Extend overflow drains to floor drains.
 8. Extend vent piping to outside and terminate with manufacturer-approved cap furnished with deaerator.
 9. Install piping adjacent to machine to allow service and maintenance.
- C. Connections
1. Steam and condensate piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Connect steam and condensate piping to tank tapplings with shutoff valves and unions or flanges at each connection.
 3. Connect condensate drains, pump-discharge piping, vents, overflow drains, makeup water, steam supply, and cooling water piping.
- D. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 2. Tests and Inspections:
 - a. Inspect field-assembled components and equipment installation, including piping and electrical connections, for compliance with requirements.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - c. Verify bearing lubrication.
 - d. Verify proper motor rotation.
 - e. Test Reports: Prepare a written report to record the following:
 - 1) Test procedures used.
 - 2) Test results that comply with requirements.
 - 3) Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
 3. Remove and replace malfunctioning equipment and retest as specified above.
- E. Startup Service
1. Engage a factory-authorized service representative to perform startup service.
 2. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 - a. Set deaerator makeup water-level controls.
 - b. Verify bearing lubrication.
 - c. Verify proper motor rotation.
 - d. Start pumps according to manufacturer's written instructions.
- F. Adjusting And Cleaning
1. Adjust initial temperature and pressure set points.
 2. Set field-adjustable switches and circuit-breaker trip ranges.
 3. Clean strainers.
- G. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain deaerators.

END OF SECTION 23 53 16 00a

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SECTION 23 54 16 13 - FURNACES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for furnaces. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Gas-fired, noncondensing, Gas-fired, condensing, Oil-fired, and Electric furnaces and accessories complete with controls.
 - b. Air filters.
 - c. Air cleaners.
 - d. Ultraviolet germicidal lights.
 - e. Humidifiers.
 - f. Ventilation heat exchangers.
 - g. Refrigeration components.

C. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each of the following:
 - a. Furnace.
 - b. Thermostat.
 - c. Humidistat.
 - d. Air filter.
 - e. Air cleaner.
 - f. Ultraviolet germicidal light.
 - g. Humidifier.
 - h. Ventilation heat exchanger.
 - i. Refrigeration components.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Operation and maintenance data.
4. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
 - c. Product Data for Credit EQ 4.1: For solvent cements and adhesive primers, including printed statement of VOC content.
5. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
4. Comply with NFPA 70.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of furnaces that fail in materials or workmanship within specified warranty period:
 - a. Warranty Period, Commencing on Date of Final Completion:
 - 1) Furnace Heat Exchanger: 10 years **OR** 20 years **OR** Lifetime, **as directed**.
 - 2) Integrated Ignition and Blower Control Circuit Board: Five years.
 - 3) Draft-Inducer Motor: Five years.
 - 4) High-Efficiency Oil Furnace Burner: Three years.
 - 5) Refrigeration Compressors: 10 years **OR** Lifetime, **as directed**.
 - 6) Evaporator and Condenser Coils: Five years.

1.2 PRODUCTS

A. Gas-Fired Furnaces, Noncondensing

1. General Requirements for Gas-Fired, Noncondensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces," and with NFPA 54.
2. Cabinet: Steel **OR** Galvanized steel, **as directed**.
 - a. Cabinet interior around heat exchanger shall be factory-installed insulation.
 - b. Lift-out panels shall expose burners and all other items requiring access for maintenance.
 - c. Factory paint external cabinets in manufacturer's standard color.
 - d. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
3. Fan: Centrifugal, factory balanced, resilient mounted, direct drive **OR** belt drive **OR** direct or belt drive **OR** drive type indicated on Drawings, **as directed**.
 - a. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements For Hvac Equipment", and with internal thermal protection and permanent lubrication.
OR
Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
OR
Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
4. Type of Gas: Natural **OR** Propane, **as directed**.
5. Heat Exchanger: Aluminized **OR** Stainless, **as directed**, steel.
6. Burner:
 - a. Gas Valve: 100 percent safety two-stage **OR** modulating, **as directed**, main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 - b. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
7. Gas-Burner Safety Controls:
 - a. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 - b. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 - c. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.

8. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.
 9. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
 10. Vent Materials: Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks", for Type B metal vents.
- B. Gas-Fired Furnaces, Condensing
1. General Requirements for Gas-Fired, Condensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.47/CSA 2.3, "Gas-Fired Central Furnaces," and with NFPA 54.
 2. Cabinet: Steel **OR** Galvanized steel, **as directed**.
 - a. Cabinet interior around heat exchanger shall be factory-installed insulation.
 - b. Lift-out panels shall expose burners and all other items requiring access for maintenance.
 - c. Factory paint external cabinets in manufacturer's standard color.
 - d. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 3. Fan: Centrifugal, factory balanced, resilient mounted, direct drive.
 - a. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements For Hvac Equipment", and with internal thermal protection and permanent lubrication.
OR
Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
OR
Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
 4. Type of Gas: Natural **OR** Propane, **as directed**.
 5. Heat Exchanger:
 - a. Primary: Aluminized **OR** Stainless, **as directed**, steel.
 - b. Secondary: Polyethylene-coated **OR** Stainless, **as directed**, steel.
 6. Burner:
 - a. Gas Valve: 100 percent safety two-stage **OR** modulating, **as directed**, main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 - b. Ignition: Electric pilot ignition, with hot-surface igniter or electric spark ignition.
 7. Gas-Burner Safety Controls:
 - a. Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 - b. Flame Rollout Switch: Installed on burner box; prevents burner operation.
 - c. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
 8. Combustion-Air Inducer: Centrifugal fan with thermally protected motor and sleeve bearings prepurges heat exchanger and vents combustion products; pressure switch prevents furnace operation if combustion-air inlet or flue outlet is blocked.
 9. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; adjustable fan-on and fan-off timing; terminals for connection to accessories; diagnostic light with viewport, **as directed**.
 10. Accessories:
 - a. Combination Combustion-Air Intake and Vent: PVC plastic fitting to combine combustion-air inlet and vent through outside wall **OR** roof, **as directed**.
 - b. CPVC Plastic Vent Materials.
 - 1) CPVC Plastic Pipe: Schedule 40, complying with ASTM F 441/F 441M.

- 2) CPVC Plastic Fittings: Schedule 40, complying with ASTM F 438, socket type.
 - 3) CPVC Solvent Cement: ASTM F 493.
 - a) Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - c. PVC Plastic Vent Materials:
 - 1) PVC Plastic Pipe: Schedule 40, complying with ASTM D 1785.
 - 2) PVC Plastic Fittings: Schedule 40, complying with ASTM D 2466, socket type.
 - 3) PVC Solvent Cement: ASTM D 2564.
 - a) Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Oil-Fired Furnaces
1. General Requirements for Oil-Fired Furnaces: Factory assembled, piped, wired, and tested; complying with UL 727 and with NFPA 31.
 2. Cabinet: Steel **OR** Galvanized steel, **as directed**.
 - a. Cabinet interior around heat exchanger shall be factory-installed insulation.
 - b. Lift-out panels shall expose burners and all other items requiring access for maintenance.
 - c. Factory paint external cabinets in manufacturer's standard color.
 - d. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 3. Fan: Centrifugal, factory balanced, resilient mounted, direct drive **OR** belt drive **OR** drive type indicated on Drawings, **as directed**.
 - a. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 4. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements For Hvac Equipment", and with internal thermal protection and permanent lubrication.
OR
Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 5. Heat Exchanger: Welded steel with ceramic-fiber liner **OR** refractory insert, **as directed**, at the burner in the combustion chamber. Minimum **2-inch- (50-mm-)** diameter access ports in heat exchanger to permit access for cleaning.
 6. Burner: High-pressure atomizing type, with rubber-mounted, adjustable, combustion-air blower; integrated fuel pump; hinged, flame-inspection port; cadmium-sulfide flame sensor; electrodes; ignition transformer; and oil nozzle.
 - a. Time-Delay Relay: Limits time for establishing main flame.
 - b. Flame Sensor: Monitors flame and stops burner on flame failure.
 - c. Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
 7. Barometric Draft Regulator: Match furnace; for mounting in flue.
 8. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; and adjustable fan-on and fan-off timing; terminals for connection to accessories.
 9. Vent Materials: Comply with requirements in Division 23 Section "Breechings, Chimneys, And Stacks" for Type B metal vents.
- D. Electric Furnaces
1. General Requirements for Electric Furnaces: Factory assembled, piped, wired, and tested.
 2. Cabinet: Steel, with duct liner downstream from cooling coil, **as directed**.
 - a. Duct Liner: Fiberglass, minimum **1/2 inch (13 mm) OR 3/4 inch (19 mm)**, **as directed**, thick, complying with ASTM C 1071 and having a coated surface exposed to airstream

complying with NFPA 90A or NFPA 90B and with NAIMA's "Fibrous Glass Duct Liner Standard."

- 1) Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- b. Factory paint external cabinets in manufacturer's standard color.
3. Fan: Centrifugal, factory balanced, resilient mounted, direct drive.
 - a. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Special Motor Features: Single speed, Premium (TM) efficiency, as defined in Division 23 Section "Common Motor Requirements For Hvac Equipment", and with internal thermal protection and permanent lubrication.

OR

 Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.

OR

 Special Motor Features: Electronically controlled motor (ECM) controlled by integrated furnace/blower control.
4. Electric-Resistant Heating Elements: Helix-wound, nickel-chromium wire-heating elements in ceramic insulators mounted on steel supports.
5. Heating-Element Control: Sequencer relay with relay for each element; switches elements on and off, with delay between each increment; initiates, stops, or changes fan speed.
6. Summer Fan Switch: Connected to permit independent on-off switch of unit fan.

E. Thermostats And Humidistats

1. Solid-State Thermostat: Wall-mounting **OR** Freestanding **OR** Wireless, **as directed**, programmable, microprocessor-based unit with automatic **OR** manual, **as directed**, switching from heating to cooling, preferential rate control, seven-day programmability with minimum of four temperature presets per day, vacation mode, **as directed**, and battery backup protection against power failure for program settings.

OR

 Single-Stage, Heating-Cooling Thermostat: Adjustable, heating-cooling, wall-mounting unit with fan on-automatic selector.

OR

 Two-Stage, Heating-Cooling Thermostat: Adjustable, heating-cooling, wall-mounting unit with fan on-automatic selector.

OR

 Single-Stage **OR** Two-Stage, **as directed**, Heating-Only Thermostat: Wall-mounting unit with fan on-automatic selector.

OR

 Solid-State, Combination Thermostat and Humidistat: Wall-mounting **OR** Freestanding **OR** Wireless, **as directed**, programmable, microprocessor-based unit with automatic switching from heating to cooling and humidifying to dehumidifying, preferential rate control, seven-day programmability with minimum of four temperature presets per day, vacation mode, **as directed**, and battery backup protection against power failure for program settings.
2. Humidistat: Adjustable, wall-mounting **OR** duct-mounting, **as directed**, unit.
3. Control Wiring: Unshielded twisted-pair cabling.
 - a. No. 24 AWG, 100 ohm, four pair.
 - b. Cable Jacket Color: Blue.
4. Controls shall comply with requirements in ASHRAE/IESNA 90.1, "Controls."

F. Air Filters

1. Washable Filters: **1-inch- (25-mm-)** thick, urethane pad.
2. Disposable Filters: **1-inch- (25-mm-)** thick fiberglass media with ASHRAE 52.2 MERV rating of 6 or higher, **as directed**, in sheet metal frame.
3. Charged Media Air Filters: Sheet metal housing arranged to be ducted in return-air duct connection to furnace, generates electrostatic charge; MERV 10 rating.

4. HEPA Air Filter Units: Sheet metal housing with fan arranged to be ducted to return-air duct connection to furnace, with activated carbon prefilter, high-efficiency particulate air (HEPA) disposable filter, and carbon VOC, **as directed**. HEPA shall be as follows:
 - a. Standard: UL 586, "High-Efficiency, Particulate, Air Filter Units."
 - b. Rating: ASHRAE 52.1, dust-spot efficiency of 65 percent; ASHRAE 52.2, 99.97 percent efficiency to 0.03-micrometer particle size.

- G. Air Cleaners
 1. Electronic Air Cleaners: Packaged system, including sheet metal housing, prefilter, power supply, and automatic control device, arranged for mounting in return-air duct at furnace; equip with on-off and test switches and pilot light.
 - a. Standard: UL 586, "High-Efficiency, Particulate, Air Filter Units."
 - b. Rating: ASHRAE 52.2, particle size to 0.01 micrometer.
 - c. Static Pressure Drop: Maximum **0.14-inch wg (35 Pa)** at **300-fpm (1.52-m/s)** air velocity.

- H. Ultraviolet Germicidal Lights
 1. Description: Lighting unit in metal housing arranged for installation in supply-air duct and controlled to cycle on and off with furnace fan, with one **OR two, as directed**, 75-W ultraviolet-light bulb(s).

- I. Humidifiers
 1. Minimum capacity rating indicated according to ARI 610, "Central System Humidifiers for Residential Applications."
 2. Media-wheel bypass type with bypass damper and motor-driven media wheel in reservoir with float-valve level control; arranged for mounting on return duct or plenum with bypass connection to supply duct.

OR

Wetted-pad, continuous-drain, bypass type with bypass damper and water-flow control orifice; arranged for mounting on return duct or plenum with bypass connection to supply duct.

OR

Fan-powered, wetted-pad, continuous-drain type with water-flow control orifice and motor; arranged for mounting on duct or plenum.

OR

Pumped, fan-powered, wetted-pad type with reservoir-level control and pump and fan motors; arranged for mounting on duct or plenum.

OR

Steam type with electric heating element in stainless-steel reservoir with float-valve level control; arranged for attachment to duct or plenum and for control by humidistat.
 3. Comply with applicable requirements in ASHRAE 62.1.

- J. Ventilation Air Heat Exchanger
 1. Cabinet: Steel, with factory-installed interior insulation and manufacturer's standard factory finish. Fabricate with space for piping and electrical conduits.
 2. Heat-Recovery Device: Fixed-plate, polypropylene copolymer (high-density plastic) heat-exchanger plates evenly spaced and sealed and arranged for counter airflow.
 3. Supply and Exhaust Fans: Forward curved centrifugal with direct drive. Motors comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 4. Filters: **1-inch- (25-mm-)** thick disposable type with ASHRAE 52.2 MERV rating of 6 or higher, **as directed**, in galvanized-steel frame, mounted upstream of unit in both supply and exhaust airstreams.
 5. Wiring: Wire motors and controls so only external connections are required during installation.

- K. Refrigeration Components
 1. General Refrigeration Component Requirements:

- a. Refrigeration compressor, coils, and specialties shall be designed to operate with CFC-free refrigerants.
- b. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
2. Refrigerant Coil: Copper tubes mechanically expanded into aluminum fins. Comply with ARI 210/240, "Unitary Air-Conditioning and Air-Source Heat Pump Equipment." Match size with furnace. Include condensate drain pan with accessible drain outlet complying with ASHRAE 62.1, **as directed**.
 - a. Refrigerant Coil Enclosure: Steel, matching furnace and evaporator coil, with access panel and flanges for integral mounting at or on furnace cabinet and galvanized sheet metal drain pan coated with black asphaltic base paint.
3. Refrigerant Line Kits: Annealed-copper suction and liquid lines factory cleaned, dried, pressurized with nitrogen, sealed, and with suction line insulated. Provide in standard lengths for installation without joints, except at equipment connections.
 - a. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I, **1/2 inch (13 mm) OR 1 inch (25 mm), as directed**, thick.
4. Refrigerant Piping: Comply with requirements in Division 23 Section "Refrigerant Piping".
5. Air-Cooled, Compressor-Condenser Unit:
 - a. Casing: Steel, finished with baked enamel, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 - b. Compressor: Hermetically sealed reciprocating **OR** scroll, **as directed**, type.
 - 1) Crankcase heater.
 - 2) Restrained vibration **OR** Vibration, **as directed**, isolation mounts for compressor.
 - 3) Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - 4) Two-speed compressor motors shall have manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - 5) Refrigerant Charge: R-407C **OR** R-410A, **as directed**.
 - c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
 - d. Heat-Pump Components: Reversing valve and low-temperature air cut-off thermostat.
 - e. Fan: Aluminum-propeller type, directly connected to motor.
 - f. Motor: Permanently lubricated, with integral thermal-overload protection.
 - g. Low Ambient Kit: Permits operation down to **45 deg F (7 deg C)**.
 - h. Mounting Base: Polyethylene.

1.3 EXECUTION

A. Installation

1. Install gas-fired furnaces and associated fuel and vent features and systems according to NFPA 54.
2. Install oil-fired furnaces and associated fuel and vent piping according to NFPA 31.
3. Suspended Units: Suspend from structure using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.
 - a. Install seismic restraints to limit movement of furnace by resisting code-required seismic acceleration.
4. Base-Mounted Units: Secure units to substrate. Provide optional bottom closure base if required by installation conditions.
 - a. Anchor furnace to substrate to resist code-required seismic acceleration.
5. Controls: Install thermostats and humidistats at mounting height of **60 inches (1500 mm)** above floor.
6. Wiring Method: Install control wiring in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal control wiring except in unfinished spaces.

7. Install ground-mounted, compressor-condenser components on **4-inch- (100-mm-)** thick, reinforced concrete base; **4 inches (100 mm)** larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-place Concrete". Coordinate anchor installation with concrete base.

OR

Install ground-mounted, compressor-condenser components on polyethylene mounting base.

8. Install roof-mounted, compressor-condenser components on equipment supports specified in Division 07 Section "Roof Accessories". Anchor units to supports with removable, cadmium-plated fasteners.

B. Connections

1. Gas piping installation requirements are specified in Division 23 Section(s) "Facility Natural-gas Piping" OR "Facility Liquefied-petroleum Gas Piping", **as directed**. Drawings indicate general arrangement of piping, fittings, and specialties. Connect gas piping with union or flange and appliance connector valve.
2. Oil piping installation requirements are specified in Division 23 Section "Facility Fuel-oil Piping". Drawings indicate general arrangement of piping, fittings, and specialties. Connect oil piping with union or flange and ball **OR** gate, **as directed**, valve.
3. Install piping adjacent to equipment to allow service and maintenance.
4. Water piping installation requirements for furnaces with humidifiers are specified in Division 22 Section "Domestic Water Piping". Drawings indicate general arrangement of piping, fittings, and specialties. Connect water piping with union and ball valve.
5. Vent Connection, Noncondensing, Gas-Fired Furnaces: Connect Type B vents to furnace vent connection and extend outdoors. Type B vents and their installation requirements are specified in Division 23 Section "Breechings, Chimneys, And Stacks".
6. Vent and Outside-Air Connection, Condensing, Gas-Fired Furnaces: Connect plastic piping vent material to furnace connections and extend outdoors. Terminate vent outdoors with a cap and in an arrangement that will protect against entry of birds, insects, and dirt.
 - a. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 - b. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 - c. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - 1) Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - 2) CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
 - 3) PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - 4) Requirements for Low-Emitting Materials:
 - a) Use CPVC solvent cement that has a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - b) Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - c) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - d. Slope pipe vent back to furnace or to outside terminal.
7. Vent Connections, Oil-Fired Furnaces: Connect Type L vents to furnace vent connection and extend outdoors. Type L vents and their installation requirements are specified in Division 23 Section "Breechings, Chimneys, And Stacks".
8. Connect ducts to furnace with flexible connector. Comply with requirements in Division 23 Section "Air Duct Accessories".
9. Connect refrigerant tubing kits to refrigerant coil in furnace and to air-cooled, compressor-condenser unit.

- a. Flared Joints: Use ASME B16.26 fitting and flared ends, following procedures in CDA's "Copper Tube Handbook."
OR
Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.
OR
Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.
 10. Comply with requirements in Division 23 Section "Refrigerant Piping" for installation and joint construction of refrigerant piping.
- C. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. Perform electrical test and visual and mechanical inspection.
 - b. Leak Test: After installation, charge systems with refrigerant and oil and test for leaks. Repair leaks, replace lost refrigerant and oil, and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation, product capability, and compliance with requirements.
 - d. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
 - e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
- D. Startup Service
1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Inspect for physical damage to unit casings.
 - b. Verify that access doors move freely and are weathertight.
 - c. Clean units and inspect for construction debris.
 - d. Verify that all bolts and screws are tight.
 - e. Adjust vibration isolation and flexible connections.
 - f. Verify that controls are connected and operational.
 2. Adjust fan belts to proper alignment and tension.
 3. Start unit according to manufacturer's written instructions and complete manufacturer's operational checklist.
 4. Measure and record airflows.
 5. Verify proper operation of capacity control device.
 6. After startup and performance test, lubricate bearings and adjust belt tension, **as directed**.
- E. Adjusting
1. Adjust initial temperature and humidity set points.
 2. Set controls, burner, and other adjustments for optimum heating performance and efficiency. Adjust heat-distribution features, including shutters, dampers, and relays, to provide optimum heating performance and system efficiency.
- F. Cleaning
1. After completing installation, clean furnaces internally according to manufacturer's written instructions.
 2. Install new filters in each furnace within 14 days after Final Completion.
- G. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain condensing units.

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



END OF SECTION 23 54 16 13



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 54 19 00	23 54 16 13	Furnaces

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SECTION 23 55 23 13 - RADIANT HEATING AND COOLING UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for radiant heating and cooling units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Electric radiant heaters.
 - b. Prefabricated electric radiant heating panels.
 - c. Hydronic heating and cooling panels.

C. Definitions

1. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.

D. Submittals

1. Product Data: Include rated capacities, specialties, and accessories for each product indicated.
2. Manufacturer Seismic Qualification Certification.
3. Field quality-control test reports.
4. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Electric Radiant Heaters

1. Quartz Lamp Heating Elements: Coiled tungsten-wire heating element enclosed in clear quartz tube.
2. Quartz Tube Heating Elements: Nickel-chromium-wire heating element enclosed in quartz tube.
3. Metal-Sheathed Heating Elements: Nickel-chromium-wire heating element embedded in magnesium oxide powder and enclosed in metal sheath. Comply with UL 1030.
4. Comply with UL 499 and UL 2021, **as directed**.
5. Enclosures: Aluminized **OR** Stainless **OR** Painted, **as directed**,-steel housing with anodized-aluminum reflector.
 - a. Finish: Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.
6. Unit Controls:
 - a. Line-voltage thermostat.
 - b. Enclosed contactor for remote thermostat.
 - c. Snow and ice detector with moisture sensor and integral temperature sensor.

B. Prefabricated Electric Radiant Heating Panels

1. Description: Sheet-metal-enclosed panel with heating element suitable for lay-in installation flush with T-bar ceiling grid **OR** surface mounting **OR** recessed mounting, **as directed**. Comply with UL 2021.

- a. Panel: Minimum **0.0276-inch- (0.7-mm-)** thick, galvanized-steel sheet back panel riveted to minimum **0.0396-inch- (1.0-mm-)** thick, galvanized-steel sheet front panel with fused-on crystalline surface.
 - b. Heating Element: Powdered graphite sandwiched between sheets of electric insulation **OR** Insulated resistive wires, **as directed**.
 - c. Electrical Connections: Nonheating, high-temperature, insulated-copper leads, factory connected to heating element.
 - d. Exposed-Side Panel Finish:
 - 1) Apply silk-screened finish to match appearance of Architect-selected acoustical ceiling tiles.
OR
Factory prime coated, ready for field painting.
OR
Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.
 - e. Surface-Mounting Trim: Sheet metal with baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.
2. Wall Thermostat: Bimetal, sensing elements calibrated from **55 to 90 deg F (13 to 32 deg C)**; with contacts suitable for low **OR** line, **as directed**, -voltage circuit, and manually operated on-off switch with contactors, relays, and control transformers.
 3. Capacities and Characteristics:
 - a. Nominal Panel Size: **24 by 24 inches (600 by 600 mm) OR 24 by 36 inches (600 by 900 mm) OR 24 by 48 inches (600 by 1200 mm) OR 24 by 60 inches (600 by 1500 mm), as directed.**
 - b. Heating Capacity: **250 OR 375 OR 500 OR 570 OR 625 OR 750 OR 950, as directed,** kW.
- C. Hydronic Heating And Cooling, **as directed**, Panels
1. Description: Modular **OR** Linear, **as directed**, sheet metal panel with serpentine water piping, suitable for lay-in installation flush with T-bar ceiling grid **OR** surface mounting **OR** recessed mounting, **as directed**.
 - a. Panels: Minimum **0.0336-inch- (0.86-mm-)** thick, galvanized-steel **OR** **0.0396-inch- (1.0-mm-)** thick, aluminum, **as directed**, sheet.
 - b. Backing Insulation: Minimum **1-inch- (25-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, thick, mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB with factory-applied jacket.
 - c. Exposed-Side Panel Finish:
 - 1) Apply silk-screened finish to match appearance of selected acoustical ceiling tiles.
OR
Factory prime coated, ready for field painting.
OR
Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.
 - d. Factory Piping: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M, Type C), as directed**, copper tube with ASME B16.22 wrought-copper fittings and brazed joints. Piping shall be mechanically bonded to panel.
 - e. Surface-Mounting Trim: Sheet metal with baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.
 - f. Accessories:
 - 1) **5-inch (127-mm) OR 6-inch (152-mm) OR 8-inch (203-mm), as directed**, panel with drape track recess.
 - 2) **5-inch (127-mm)** male bullnose panel.
 - 3) **5-inch (127-mm)** female bullnose panel.
 - 4) **4-inch (102-mm)** male corner panel.
 - 5) **4-inch (102-mm)** female corner panel.

- 6) Inside corner panel.
- 7) **1/2-inch (13-mm)** filler panel.
2. Capacities and Characteristics:
 - a. Nominal Panel Size: **24 by 24 inches (600 by 600 mm) OR 24 by 36 inches (600 by 900 mm) OR 24 by 48 inches (600 by 1200 mm) OR 24 by 60 inches (600 by 1500 mm), as directed.**
 - b. Piping Inlet and Outlet: **NPS 1/2 (DN 15).**

1.3 EXECUTION

A. Installation

1. Install radiant heating and cooling units level and plumb.
2. Suspend radiant heaters from structure.
3. Support for Radiant Heating and Cooling Panels in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 - a. Install a minimum of four ceiling support system rods or wires for each panel. Locate not more than **6 inches (150 mm)** from panel corners.
 - b. Support Clips: Fasten to panel and to ceiling grid members at or near each panel corner with clips designed for the application.
 - c. Panels of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support panels independently with at least two **3/4-inch (19-mm)** metal channels spanning and secured to ceiling tees.
 - d. Install at least one independent support rod or wire from structure to a tab on panel. Wire or rod shall have breaking strength of the weight of panel at a safety factor of 3.
4. Verify locations of thermostats with Drawings and room details before installation. Install devices **48 inches (1220 mm) OR 60 inches (1525 mm), as directed**, above finished floor.
5. Piping installation requirements are specified in Division 23 Section "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
6. Unless otherwise indicated, install shutoff valve and union or flange at each connection.
7. Install piping adjacent to unit to allow service and maintenance.
8. Ground electric units according to Division 26 Section "Grounding And Bonding For Electrical Systems".
9. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

B. Field Quality Control

1. Testing: Perform the following field tests and inspections and prepare test reports:
 - a. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and units.
2. Remove and replace malfunctioning units and retest as specified above.
3. After installing panels, inspect unit cabinet for damage to finish. Remove paint splatters and other spots, dirt, and debris. Repair damaged finish to match original finish.

END OF SECTION 23 55 23 13

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SECTION 23 55 23 13a - RADIANT-HEATING ELECTRIC PANELS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for radiant-heating electric panels. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes prefabricated radiant-heating electric panels.

C. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.
2. Shop Drawings: For electric heating panels. Include plans, sections, details, and attachments to other work.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Field quality-control test reports.
4. Operation and Maintenance Data: For electric heating panels to include in operation and maintenance manuals.
5. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Prefabricated Radiant-Heating Electric Panels

1. Description: Sheet-metal-enclosed panel with heating element suitable for lay-in installation flush with T-bar ceiling grid **OR** surface mounting **OR** recessed mounting, **as directed**. Comply with UL 2021.
 - a. Panel: Minimum **0.0276-inch- (0.7-mm-)** thick, galvanized-steel sheet back panel riveted to minimum **0.0396-inch- (1.0-mm-)** thick, galvanized-steel sheet front panel with fused-on crystalline surface.
 - b. Heating Element:
 - 1) Powdered graphite sandwiched between sheets of electric insulation.
OR
Insulated resistive wires.
 - c. Electrical Connections: Nonheating, high-temperature, insulated-copper leads, factory connected to heating element.
 - d. Exposed-Side Panel Finish:
 - 1) Apply silk-screened finish to match appearance of selected acoustical ceiling tiles.
 - 2) Factory prime coated, ready for field painting.
 - 3) Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.
 - e. Surface-Mounting Trim: Sheet metal with baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, paint color as selected.

2. Wall Thermostat: Bimetal, sensing elements calibrated from 55 to 90 deg F (13 to 32 deg C); with contacts suitable for low **OR** line, **as directed**, -voltage circuit, and manually operated on-off switch with contactors, relays, and control transformers.

1.3 EXECUTION

A. Installation

1. Install radiant-heating panels level and plumb.
2. Support for Radiant-Heating Panels in or on Grid-Type Suspended Ceilings: Use grid as a support element.
 - a. Install a minimum of four ceiling support system rods or wires for each panel. Locate not more than 6 inches (150 mm) from panel corners.
 - b. Support Clips: Fasten to panel and to ceiling grid members at or near each panel corner with clips designed for the application.
 - c. Panels of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support panels independently with at least two 3/4-inch (19-mm) metal channels spanning and secured to ceiling tees.
 - d. Install at least one independent support rod or wire from structure to a tab on panel. Wire or rod shall have breaking strength of the weight of panel at a safety factor of 3.
3. Verify locations of thermostats with Drawings and room details before installation. Install devices 48 inches (1220 mm) **OR** 60 inches (1525 mm), **as directed**, above finished floor.

B. Connections

1. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
2. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Testing: Perform the following field tests and inspections and prepare test reports:
 - a. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - b. Test and adjust controls and safeties.
2. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 23 55 23 13a



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 55 33 13	23 82 39 13	Unit Heaters

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SECTION 23 55 33 16 - FUEL-FIRED UNIT HEATERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fuel-fired unit heaters. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes gas and oil-fired unit heaters.

C. Submittals

1. Product Data: For each type of fuel-fired unit heater indicated. Include rated capacities, operating characteristics, and accessories.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that fuel-fired unit heaters, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
4. Field quality-control test reports.
5. Operation and maintenance data.
6. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace heat exchanger of fuel-fired unit heater that fails in materials or workmanship within Two **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Gas-Fired Unit Heaters

1. Description: Factory assembled, piped, and wired, and complying with ANSI Z83.8/CSA 2.6.
2. Fuel Type: Design burner for natural **OR** propane, **as directed**, gas having characteristics same as those of gas available at Project site.
3. Type of Venting: Gravity **OR** Powered **OR** Indoor, separated combustion, power, **as directed**, vented.
4. Housing: Steel, with integral draft hood and inserts for suspension mounting rods.
 - a. External Casings and Cabinets: Baked enamel **OR** Powder coating, **as directed**, over corrosion-resistant-treated surface.
 - b. Suspension Attachments: Reinforce suspension attachments at connection to fuel-fired unit heaters.

- 1) Seismic Fabrication Requirements: Fabricate suspension attachments of fuel-fired unit heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when fuel-fired unit heater is anchored to building structure.
5. Heat Exchanger: Aluminized **OR** Stainless, **as directed**, steel.
6. Burner Material: Aluminized steel with stainless-steel inserts **OR** Stainless steel, **as directed**.
7. Unit Fan: Formed-steel **OR** Aluminum, **as directed**, propeller blades riveted to heavy-gage steel spider bolted to cast-iron hub, dynamically balanced, and resiliently mounted.
 - a. Fan-Blade Guard: Galvanized steel, complying with OSHA specifications, removable for maintenance.
 - b. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motors: Totally enclosed with internal thermal-overload protection and complying with Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 2) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 3) Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
8. Unit Fan: Steel, centrifugal fan dynamically balanced and resiliently mounted.
 - a. Belt-Driven Drive Assembly: Resiliently mounted to housing, with the following features:
 - 1) Fan Shaft: Turned, ground, and polished steel; keyed to wheel hub.
 - 2) Shaft Bearings: Permanently lubricated, permanently sealed, self-aligning ball bearings.
 - 3) Pulleys: Cast-iron, adjustable-pitch motor pulley.
 - b. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motors: Totally enclosed with internal thermal-overload protection and complying with Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 2) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 3) Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
9. Controls: Regulated redundant gas valve containing pilot solenoid valve, electric gas valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
 - a. Gas Control Valve: Single stage **OR** Two stage **OR** Modulating, **as directed**.
 - b. Ignition: Standing pilot **OR** Electronically controlled electric spark with flame sensor, **as directed**.
 - c. Fan Thermal Switch: Operates fan on heat-exchanger temperature.
 - d. Vent Flow Verification: Flame rollout switch **OR** Differential pressure switch to verify open vent, **as directed**.
 - e. Control transformer.
 - f. High Limit: Thermal switch or fuse to stop burner.
 - g. Thermostats: Devices and wiring are specified in Division 23 Section "Instrumentation And Control For Hvac".

OR
Thermostat: Single-stage, wall-mounting type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

OR
Thermostat: 2-stage, wall-mounting type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.

OR
Thermostat: Single-stage type with duct-mounting sensor and 50 to 90 deg F (10 to 32 deg C) operating range.

OR

- Thermostat: 2-stage type with duct-mounting sensor and 50 to 90 deg F (10 to 32 deg C) operating range.
10. Discharge Louvers: Independently adjustable horizontal blades.
 11. Accessories:
 - a. Vertical discharge louvers.
 - b. Discharge Nozzle: Discharge at 25 to 65 degrees (0.44 to 1.13 radians) OR 50 to 90 degrees (0.87 to 1.57 radians), as directed, from horizontal.
 - c. Four-point suspension kit.
 - d. Summer fan switch.
 - e. Unit-mounted thermostat bracket.
 - f. Power Venter: Centrifugal aluminized-steel fan, with stainless-steel shaft; 120-V ac motor.
 - g. Concentric, Terminal Vent Assembly: Combined combustion-air inlet and power-vent outlet with wall or roof caps. Include adapter assembly for connection to inlet and outlet pipes, and flashing for wall or roof penetration.
- B. Oil-Fired Unit Heaters
1. Description: Factory assembled, piped, and wired, and complying with UL 731.
 2. Housing: Steel, with inserts for suspension mounting rods.
 - a. External Casings and Cabinets: Baked enamel OR Powder coating, as directed, over corrosion-resistant-treated surface.
 - b. Suspension Attachments: Reinforce suspension attachments at connection to fuel-fired unit heaters.
 - 1) Seismic Fabrication Requirements: Fabricate suspension attachments of fuel-fired unit heaters, accessories mountings, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when fuel-fired unit heater is anchored to building structure.
 3. Heat Exchanger: Minimum 0.09-inch (2.2-mm) steel.
 4. Burners: Flame-retention, pressure-atomizing, forced-draft, gun type; with integral fuel pump and electronic spark ignition and flame safety.
 - a. Safety Device: Oil-pressure switch.
 5. Unit Fan: Propeller fan with aluminum blades dynamically balanced and resiliently mounted.
 - a. Steel fan-blade guard.
 - b. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motors: Totally enclosed with internal thermal-overload protection and complying with Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 2) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 3) Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
 6. Unit Fan: Steel, centrifugal fan dynamically balanced and resiliently mounted.
 - a. Belt driven with adjustable-pitch motor sheave.
 - b. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motors: Totally enclosed with internal thermal-overload protection and complying with Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 2) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - 3) Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
 7. Controls: Factory piped and prewired to electrical junction box mounted on unit, including the following:
 - a. Control Transformer: Integrally mounted, 120 to 24 V ac.
 - b. Cad-cell safety system.
 - c. Manual reset safety.

- d. Thermostat: Devices and wiring are specified in Division 23 Section "Instrumentation And Control For Hvac".
OR
Thermostat: Single-stage, 24-V ac, wall-mounting type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.
OR
Thermostat: 2-stage, 24-V ac, wall-mounting type with 50 to 90 deg F (10 to 32 deg C) operating range and fan on switch.
OR
Thermostat: Single-stage, 24-V ac type with duct-mounting sensor and 50 to 90 deg F (10 to 32 deg C) operating range.
OR
Thermostat: 2-stage, 24-V ac type with duct-mounting sensor and 50 to 90 deg F (10 to 32 deg C) operating range.
- 8. Automatic Fan Thermal Switch: Fan operates with heat-exchanger temperature more than 135 deg F (58 deg C).
- 9. Discharge Louvers: Independently adjustable horizontal blades.
- 10. Accessories:
 - a. Vertical discharge louvers.
 - b. Discharge Nozzle: Discharge at 25 to 65 degrees (0.44 to 1.13 radians) **OR** 50 to 90 degrees (0.87 to 1.57 radians), **as directed**, from horizontal.
 - c. Summer fan switch.
 - d. Unit-mounted thermostat bracket.
 - e. Oil Booster Pump: 30-gph (108-L/h) **OR** 70-gph (252-L/h), **as directed**, capacity; motor and 2-stage fuel unit with pressure-regulating valve and strainer.
 - f. Oil safety valve.
 - g. Outdoor Combustion-Air Adapter: Sealed to housing and fitted with quick access cover or door and fitting for terminating outdoor-air duct.

1.3 EXECUTION

A. Installation

- 1. Install and connect gas-fired unit heaters and associated fuel and vent features and systems according to NFPA 54 **OR** CAN/CSA B149.1, **as directed**, applicable local codes and regulations, and manufacturer's written installation instructions.
- 2. Install and connect oil-fired unit heaters and associated fuel and vent piping according to NFPA 31 **OR** CAN/CSA B139, **as directed**, applicable local codes and regulations, and manufacturer's written installation instructions.
- 3. Suspended Units: Suspend from substrate using threaded rods, spring hangers, and building attachments. Secure rods to unit hanger attachments. Adjust hangers so unit is level and plumb.
 - a. Restrain the unit to resist code-required horizontal acceleration.
- 4. Substrate-Mounted Units: Provide supports connected to substrate. Secure units to supports.
 - a. Spring hangers and seismic restraints are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - b. Anchor the unit to resist code-required horizontal acceleration.

B. Connections

- 1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
- 2. Install piping adjacent to fuel-fired unit heater to allow service and maintenance.
- 3. Gas Piping: Comply with Division 23 Section(s) "Facility Natural-gas Piping" **OR** "Facility Liquefied-petroleum Gas Piping", **as directed**. Connect gas piping to gas train inlet; provide union with enough clearance for burner removal and service.

4. Fuel Oil Piping: Comply Division 23 Section "Facility Fuel-oil Piping". Connect to fuel oil supply and return piping with shutoff valve and union at each connection.
 5. Vent Connections: Comply with Division 23 Section "Breechings, Chimneys, And Stacks".
 6. Electrical Connections: Comply with applicable requirements in Division 22.
 - a. Install electrical devices furnished with heaters but not specified to be factory mounted.
- C. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 2. Tests and Inspections:
 - a. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - b. Verify bearing lubrication.
 - c. Verify proper motor rotation.
 - d. Test Reports: Prepare a written report to record the following:
 - 1) Test procedures used.
 - 2) Test results that comply with requirements.
 - 3) Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
 3. Remove and replace malfunctioning units and retest as specified above.
- D. Adjusting
1. Adjust initial temperature set points.
 2. Adjust burner and other unit components for optimum heating performance and efficiency.
- E. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain fuel-fired unit heaters.

END OF SECTION 23 55 33 16

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23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 55 33 16	01 22 16 00	No Specification Required
23 55 33 16	23 82 39 13	Unit Heaters

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SECTION 23 57 13 00 - HEAT EXCHANGERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hydronic and steam heat exchangers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes shell-and-tube and plate heat exchangers.

C. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. Coordination Drawings: Equipment room, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Tube-removal space.
 - b. Structural members to which heat exchangers will be attached.
3. Manufacturer Seismic Qualification Certification: Submit certification that heat exchanger, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

D. Quality Assurance

1. ASME Compliance: Fabricate and label heat exchangers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

1.2 PRODUCTS

A. Shell-And-Tube Heat Exchangers

1. Configuration: U-tube with removable bundle.
2. Shell Materials: Steel.
3. Head:
 - a. Materials: Cast iron **OR** Cast stainless steel **OR** Fabricated steel **OR** Fabricated steel with removable cover **OR** Fabricated stainless steel **OR** Fabricated stainless steel with removable cover, **as directed**.
 - b. Flanged and bolted to shell.
4. Tube:
 - a. Seamless copper **OR** Steel **OR** Stainless-steel **OR** Cupronickel **OR** Admiralty-metal, **as directed**, tubes.
 - b. Tube diameter is determined by manufacturer based on service.
5. Tubesheet Materials: Steel **OR** Stainless-steel, **as directed**, tubesheets.
6. Baffles: Steel **OR** Stainless steel, **as directed**.
7. Piping Connections:
 - a. Shell: Flanged inlet and threaded **OR** Threaded inlet and **OR** Flanged inlet and, **as directed**, outlet fluid connections, threaded drain, and vent connections.
 - b. Head: Threaded **OR** Flanged, **as directed**, inlet and outlet fluid connections.
8. Support Saddles:
 - a. Fabricated of material similar to shell.
 - b. Foot mount with provision for anchoring to support.

- c. Fabricate attachment of saddle supports to pressure vessel with reinforcement strong enough to resist heat-exchanger movement during a seismic event when heat-exchanger saddles are anchored to building structure.

B. Gasketed Plate Heat Exchangers

1. Configuration: Freestanding assembly consisting of frame support, top and bottom carrying and guide bars, fixed and movable end plates, tie rods, individually removable plates, and one-piece gaskets.
2. Frame:
 - a. Capacity to accommodate 20 percent additional plates.
 - b. Painted carbon steel with provisions for anchoring to support.
3. Top and Bottom Carrying and Guide Bars: Painted carbon steel, aluminum, or stainless steel.
 - a. Fabricate attachment of heat-exchanger carrying and guide bars with reinforcement strong enough to resist heat-exchanger movement during a seismic event when heat-exchanger carrying and guide bars are anchored to building structure.
4. End-Plate Material: Painted carbon steel.
5. Tie Rods and Nuts: Steel or stainless steel.
6. Plate Material: **0.024 inch (0.6 mm) OR 0.031 inch (0.8 mm) OR 0.039 inch (1 mm), as directed**, thick before stamping; Type 304 **OR** 304L **OR** 316 **OR** 316L, **as directed**, stainless steel.
7. Gasket Material: Nitrile rubber **OR** EPDM, **as directed**.
8. Piping Connections:
 - a. Threaded port for **NPS 2 (DN 50)** and smaller. For larger sizes, furnish end-plate port with threaded studs suitable for flanged connection.
 - b. End plate with welded carbon-steel nozzles. Threaded pipe connection for **NPS 2 (DN 50)** and smaller; carbon-steel flanged pipe connection for larger sizes.
 - c. Line wetted surfaces with same material as plates.
9. Enclose plates in a solid aluminum **OR** stainless-steel, **as directed**, removable shroud.

C. Brazed Plate Heat Exchangers

1. Configuration: Brazed assembly consisting of two end plates, one with threaded nozzles and pattern-embossed plates.
2. End-Plate Material: Type 316 stainless steel.
3. Threaded Nozzles: Type 316 stainless steel.
4. Plate Material: Type 316 stainless steel.
5. Brazing Material: Copper or nickel.

1.3 EXECUTION

A. Heat-Exchanger Installation

1. Install shell-and-tube heat exchangers on saddle supports.
2. Install shell-and-tube heat exchangers on, and anchor to, concrete base.

B. Connections

1. Install shutoff valves at heat-exchanger inlet and outlet connections.
2. Install relief valves on heat-exchanger heated-fluid connection and install pipe relief valves, full size of valve connection, to floor drain.
3. Install vacuum breaker at heat-exchanger steam inlet connection.
4. Install hose end valve to drain shell.

END OF SECTION 23 57 13 00

Task	Specification	Specification Description
23 57 16 00	23 57 13 00	Heat Exchangers
23 57 19 19	23 57 13 00	Heat Exchangers
23 57 19 23	23 57 13 00	Heat Exchangers
23 61 16 00	23 64 16 16	Centrifugal Water Chillers
23 61 16 00	23 64 26 13	Rotary-Screw Water Chillers
23 62 23 00	23 01 60 71	Condensing Units

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SECTION 23 63 13 00 - AIR-COOLED CONDENSERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for air-cooled condensers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged, air-cooled condensers for outdoor and indoor installation.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Signed and sealed by a qualified professional engineer.
 - a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints, **as directed**, and for designing vibration isolation bases.
 - b. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails and equipment mounting frames.
 - c. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that air-cooled condensers, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Include the following:
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
4. Field quality-control test reports.
5. Operation and maintenance data.
6. LEED Submittal:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Fabricate and label refrigeration system according to ASHRAE 15, "Safety Code for Mechanical Refrigeration."
3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.2 PRODUCTS

A. Manufactured Units

1. Description: Factory assembled and tested; consisting of casing, condenser coils, condenser fans and motors, and unit controls.
2. Condenser Coil: Seamless copper-tube, finned coil; factory tested at 425 psig (2930 kPa).
 - a. Coil Fin: Aluminum **OR** Copper, **as directed**.
 - b. Coil Coating: **As directed**.
 - c. Circuit: To match compressors with liquid subcooling coil, **as directed**.
 - d. Refrigerant Accessories, **as directed**: Provide receiver, pressure control, and solenoid valve for each circuit.

3. Condenser Fans and Drives: Propeller fans with aluminum or galvanized-steel **OR** galvanized-steel **OR** stainless-steel, **as directed**, fan blades, for vertical **OR** horizontal, **as directed**, air discharge; directly driven with permanently lubricated ballbearing motors with integral current- and thermal-overload protection.
OR
Condenser Fans and Drives: Forward-curved centrifugal fans for vertical **OR** horizontal, **as directed**, air discharge.
 - a. Fan on steel shaft with self-aligning ball bearings.
 - b. V-belt drive with minimum of two belts; variable pitch drive pulley.
 - c. Motor mounted on adjustable slide base.
4. Operating and Safety Controls: Include condenser fan motor thermal and overload cutouts; 115-V control transformer, if required; magnetic contactors for condenser fan motors and a nonfused factory-mounted and -wired disconnect switch for single external electrical power connection.
5. Unit Casings: Galvanized or zinc-coated steel treated and finished with manufacturer's standard paint coating **OR** Stainless steel, **as directed**, designed for outdoor installation with weather protection for components and controls **OR** indoor installation, **as directed**, and with the following:
 - a. Removable panels for access to controls, condenser fans, motors, and drives.
 - b. Plated-steel **OR** Stainless-steel, **as directed**, fan guards.
 - c. Lifting eyes.
 - d. Removable legs.
 - e. **1-inch- (25-mm-)** thick inlet filter.

B. Motors

1. General requirements for motors are specified in Division 14 Section "Facility Chutes".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.

C. Source Quality Control

1. Verification of Performance: Rate air-cooled condensers according to ARI 460.
2. Testing Requirements: Factory test sound-power-level ratings according to ARI 270.

1.3 EXECUTION

A. Installation

1. Install units level and plumb, firmly anchored in locations indicated; maintain manufacturer's recommended clearances.
2. Install air-cooled condensers on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac" and concrete materials and installation requirements are specified in Division 31.
3. Concrete Bases:
 - a. Install dowel rods to connect concrete base to concrete slab. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around full perimeter of the base.
 - b. For equipment supported on structural slab, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - e. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
4. Install roof-mounting units on equipment supports specified in Division 07.

5. Vibration Isolation: Mount air-cooled condensers on rubber pads with a minimum deflection of **1/4 inch (6.35 mm)**. Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
OR
Vibration Isolation: Mount air-cooled condensers on restrained spring isolators with a minimum deflection as directed by the Owner . Vibration isolation devices and installation requirements are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 6. Support suspended units from structure using threaded steel rods and spring hangers having a static deflection of **1 inch (25 mm)**. Vibration- and seismic-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Secure vibration and seismic controls, and suspended units to structure.**OR**
Support suspended units from structure using threaded steel rods.
 7. Maintain manufacturer's recommended clearances for service and maintenance.
 8. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.
- B. Connections
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
 3. Refrigerant Piping: Connect piping to unit with pressure relief, service valve, filter-dryer, and moisture indicator on each refrigerant-circuit liquid line. Refrigerant piping and specialties are specified in Division 23 Section "Refrigerant Piping".
- C. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. Perform electrical test and visual and mechanical inspection.
 - b. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation. Complete manufacturer's starting checklist.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - e. Verify proper airflow over coils.
 2. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
 3. Remove and replace malfunctioning air-cooled condensers and retest as specified above.
- D. Startup Service
1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Inspect for physical damage to unit casing.
 - b. Verify that access doors move freely and are weathertight.
 - c. Clean units and inspect for construction debris.
 - d. Verify that all bolts and screws are tight.
 - e. Adjust vibration isolation and flexible connections.
 - f. Verify that controls are connected and operational.
 2. Lubricate bearings on fans.
 3. Verify that fan wheel is rotating in the correct direction and is not vibrating or binding.
 4. Start unit according to manufacturer's written instructions and complete manufacturer's startup checklist.
 5. Measure and record airflow over coils.
 6. Verify proper operation of capacity control device.

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7. Verify that vibration isolation and flexible connections properly dampen vibration transmission to structure.
 8. After startup and performance test, lubricate bearings.
- E. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain air-cooled condensers.

END OF SECTION 23 63 13 00

SECTION 23 63 13 00a - SPLIT-SYSTEM AIR-CONDITIONING UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for split-system air-conditioning units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes split-system air-conditioning and heat pump units consisting of separate evaporator-fan and compressor-condenser components. Units are designed for exposed or concealed mounting, and may be connected to ducts.

C. Submittals

1. Product Data: For each unit indicated. Include performance data in terms of capacities, outlet velocities, static pressures, sound power characteristics, motor requirements, and electrical characteristics.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: Diagram power, signal, and control wiring.
4. Field quality-control test reports.
5. Operation and maintenance data.
6. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

A. Concealed Evaporator-Fan Components

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
 - a. Insulation: Faced, glass-fiber duct liner.
 - b. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1, **as directed**.
 - c. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
 3. Water **OR** Steam, **as directed**, Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**; leak tested to **300 psig (2070 kPa)** underwater; and having a two-position control valve.
OR
Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.
 4. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
 5. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 6. Disposable Filters: **1 inch (25 mm)** thick, in fiberboard frames with ASHRAE 52.2 MERV rating of 6 or higher, **as directed**.
 7. Wiring Terminations: Connect motor to chassis wiring with plug connection.
- B. Floor-Mounting, Evaporator-Fan Components
1. Cabinet: Enameled steel with removable panels on front and ends in color selected by the Owner.
 - a. Discharge Grille: Steel with surface-mounted frame **OR** Welded steel bars forming a linear grille and welded into supporting panel, **as directed**.
 - b. Insulation: Faced, glass-fiber, duct liner.
 - c. Drain Pans: Galvanized steel, with connection for drain; insulated and complying with ASHRAE 62.1, **as directed**.
 - d. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
 3. Water **OR** Steam, **as directed**, Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**; leak tested to **300 psig (2070 kPa)** underwater; and having a 2-position control valve.
OR
Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.
 4. Fan: Direct drive, centrifugal, with power-induced outside air, **as directed**.
 5. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 6. Filters: Permanent, cleanable **OR** Disposable, with ASHRAE 52.2 MERV rating of 6 or higher, **as directed**.
- C. Wall-Mounting, Evaporator-Fan Components
1. Cabinet: Enameled steel with removable panels on front and ends in color selected by the Owner, and discharge drain pans with drain connection.
 - a. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - b. Drain Pan and Drain Connection: Comply with ASHRAE 62.1.
 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.

3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.
 4. Fan: Direct drive, centrifugal fan.
 5. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 6. Filters: Permanent, cleanable **OR** Disposable, with ASHRAE 52.2 MERV rating of 6 or higher, **as directed**.
- D. Ceiling-Mounting, Evaporator-Fan Components
1. Cabinet: Enameled steel with removable panels on front and ends in color selected by the Owner, and discharge drain pans with drain connection.
 - a. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - b. Drain Pan and Drain Connection: Comply with ASHRAE 62.1.
 2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with thermal-expansion valve.
 3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow proving device; and one-time fuses in terminal box for overcurrent protection.
 4. Fan: Direct drive, centrifugal fan, with power-induced outside air, **as directed**, and integral condensate pump.
 5. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Special Motor Features: Multitapped, multispeed with internal thermal protection and permanent lubrication.
 6. Filters: Permanent, cleanable **OR** Disposable, with ASHRAE 52.2 MERV rating of 6 or higher, **as directed**.
- E. Air-Cooled, Compressor-Condenser Components
1. Casing: Steel, finished with baked enamel in color selected by the Owner, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Reciprocating **OR** Scroll, **as directed**.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant: R-407C **OR** R-410A, **as directed**.
 3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins, complying with ARI 210/240, and with liquid subcooler.
 4. Heat Pump Components: Reversing valve and low-temperature air cut-off thermostat.
 5. Fan: Aluminum-propeller type, directly connected to motor.
 6. Motor: Permanently lubricated, with integral thermal-overload protection.
 7. Low Ambient Kit: Permits operation down to **45 deg F (7 deg C)**.
 8. Mounting Base: Polyethylene.
 9. Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
- F. Water-Cooled, Compressor-Condenser Components

1. Casing: Steel, with baked-enamel finish in color selected by the Owner, removable panels for access to controls, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.
 - a. Compressor Type: Reciprocating **OR** Scroll, **as directed**.
 - b. Two-speed compressor motor with manual-reset high-pressure switch and automatic-reset low-pressure switch.
 - c. Refrigerant: R-407C **OR** R-410A, **as directed**.
3. Heat Pump Components: Reversing valve.
4. Heat Exchanger: Copper tubes in copper tube or in steel shell, with water-temperature-actuated, water-regulating valve.
5. Minimum Energy Efficiency: Comply with ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."

G. Accessories

1. Control equipment and sequence of operation are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
2. Thermostat: Low voltage with subbase to control compressor and evaporator fan.
3. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:
 - a. Compressor time delay.
 - b. 24-hour time control of system stop and start.
 - c. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
 - d. Fan-speed selection, including auto setting.
4. Automatic-reset timer to prevent rapid cycling of compressor.
5. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.
 - a. Minimum Insulation Thickness: **1/2 inch (13 mm) OR 1 inch (25 mm), as directed**, thick.

1.3 EXECUTION

A. Installation

1. Install units level and plumb.
2. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.
3. Install ground-mounting, compressor-condenser components on **4-inch- (100-mm-)** thick, reinforced concrete base; **4 inches (100 mm)** larger on each side than unit. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-place Concrete". Coordinate anchor installation with concrete base.
OR
Install ground-mounting, compressor-condenser components on polyethylene mounting base.
4. Install roof-mounting compressor-condenser components on equipment supports specified in Division 07 Section "Roof Accessories". Anchor units to supports with removable, cadmium-plated fasteners.
5. Install seismic restraints.
6. Install compressor-condenser components on restrained, spring isolators with a minimum static deflection of **1 inch (25 mm)**. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
7. Install and connect precharged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 - a. Water Coil Connections: Comply with requirements in Division 23 Section "Hydronic Piping". Connect to supply and return coil with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - b. Remote Water-Cooled Condenser Connections: Comply with requirements in Division 23 Section "Hydronic Piping". Connect to supply and return with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - c. Steam Coil Connections: Comply with requirements in Division 23 Section "Steam And Condensate Heating Piping". Connect to steam piping with shutoff valve and union or flange; for condensate piping, starting from the coil connection, connect with union or flange, strainer, trap, and shutoff valve.
2. Install piping adjacent to unit to allow service and maintenance.
3. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts". Drawings indicate the general arrangement of ducts. Connect supply and return, **as directed**, ducts to split-system air-conditioning units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories".
4. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
5. Electrical Connections: Comply with requirements in Division 22 for power wiring, switches, and motor controls.

C. Field Quality Control

1. Perform the following field tests and inspections and prepare test reports:
 - a. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Remove and replace malfunctioning units and retest as specified above.

D. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

E. Demonstration

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain units.

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Task	Specification	Specification Description
23 63 13 00	23 01 60 71	Condensing Units

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SECTION 23 64 13 16 - DIRECT-FIRED ABSORPTION WATER CHILLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for direct-fired absorption water chillers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Packaged, water-cooled, direct-fired absorption chillers.
 - b. Heat-exchanger, brush-cleaning system.

C. Definitions

1. BAS: Building automation system.
2. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
3. IPLV: Integrated part-load value. A single-number, part-load efficiency figure of merit calculated per the method defined by ARI 560 and referenced to ARI standard rating conditions.
4. NPLV: Nonstandard part-load value. A single-number, part-load efficiency figure of merit calculated per the method defined by ARI 560 and intended for operating conditions other than the ARI standard rating conditions.

D. Performance Requirements

1. Seismic Performance: Direct-fired absorption chillers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Condenser-Fluid Temperature Performance:
 - a. Startup Condenser-Fluid Temperature: Chiller shall be capable of starting with an entering condenser-fluid temperature of **60 deg F (16 deg C)** and providing stable operation until the system temperature is elevated to the minimum operating entering condenser-fluid temperature.
 - b. Minimum Operating Condenser-Fluid Temperature: Chiller shall be capable of continuous operation over the entire capacity range indicated with an entering condenser-fluid temperature of **70 deg F (21 deg C)**.
 - c. Make factory modifications to standard chiller design if necessary to comply with performance indicated.
3. Site Altitude: Chiller shall be suitable for altitude at which it is installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.
4. Performance Tolerance: Comply with the following in lieu of ARI 560:
 - a. Allowable Capacity Tolerance: Zero percent.
 - b. Allowable IPLV/NPLV Performance Tolerance: Zero percent.

E. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, furnished specialties and accessories, and the following:
 - a. Performance at ARI standard conditions and at conditions indicated.
 - b. Performance at ARI standard unloading conditions.
 - c. Minimum evaporator flow rate.

- d. Absorbent capacity of chiller.
 - e. Refrigerant capacity of chiller.
 - f. Fluid capacity of evaporator and condenser.
 - g. Fluid capacity of generator.
 - h. Characteristics of safety relief devices.
 - i. Minimum entering condenser-fluid temperature.
 - j. Performance at varying capacities with constant design condenser-fluid temperature. Repeat performance at varying capacities for different condenser-fluid temperatures from design to minimum in 5 deg F (3 deg C) increments.
 - k. If equipped, fluid capacity of dedicated hot-water heater exchanger.
 - l. Combustion-air flow.
 - m. Exhaust gas airflow.
 - n. Exhaust gas minimum and maximum operating temperature.
 2. LEED Submittals:
 - a. Product Data for Prerequisite EA 2: Documentation indicating that units comply with applicable requirements in ASHRAE/IESNA 90.1.
 - b. Product Data for Prerequisite EA 3: Documentation indicating that refrigerants comply.
 - c. Product Data for Credit EA 4: Documentation indicating that equipment and refrigerants comply.
 3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, load distribution, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
 - c. Insulated Surface Diagrams: Indicating cold and hot surfaces requiring field-applied insulation with area tabulated for each.
 4. Coordination Drawings: Floor plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - a. Structural supports.
 - b. Piping roughing-in requirements.
 - c. Wiring roughing-in requirements, including spaces reserved for electrical equipment.
 - d. Access requirements, including working clearances for mechanical controls and electrical equipment, and clearances for tube pull and service.
 5. Certificates: For certification required in "Quality Assurance" Article.
 6. Seismic Qualification Certificates: For chillers, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 7. Source quality-control reports.
 8. Startup service reports.
 9. Operation and Maintenance Data: For each chiller to include in emergency, operation, and maintenance manuals.
 10. Warranty: Sample of special warranty.
- F. Quality Assurance
1. ARI Rating: Rate chiller performance according to requirements in ARI 560.
 2. ASHRAE Compliance:
 - a. ASHRAE 15 for safety code for mechanical refrigeration.
 - b. ASHRAE/IESNA 90.1.
 3. ASME Compliance: Fabricate and label chiller pressure vessels to comply with applicable portions of ASME Boiler and Pressure Vessel Code.
 4. Comply with NFPA 70.

5. Comply with requirements of UL and UL Canada, and include label by a qualified testing agency showing compliance.
 - a. UL Compliance: UL 726, "Oil-Fired Boiler Assemblies" **OR** UL 726, "Oil-Fired Boiler Assemblies"; and UL 795, "Commercial-Industrial Gas Heating Equipment" **OR** UL 795, "Commercial-Industrial Gas Heating Equipment", **as directed**.

G. Delivery, Storage, And Handling

1. Ship chillers factory charged with nitrogen.
2. Ship absorbent and refrigerant in chillers or in containers separate from chillers.
OR
Ship absorbent and refrigerant in containers separate from chillers.
3. Package chiller for export shipping in totally enclosed bagging **OR** crate **OR** crate with bagging, **as directed**.

H. Coordination

1. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.
2. Coordinate sizes, locations, and anchoring attachments of structural-steel support structures.

I. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chillers that fail in materials or workmanship within specified warranty period.
 - a. Extended warranties include, but are not limited to, the following:
 - 1) Complete chiller.
OR
Pumps and motors **OR** Purge unit **OR** Burner assembly, **as directed**.
OR
Absorbent **OR** Absorbent and refrigerant, **as directed**, only.
 - 2) Parts only **OR** only and labor, **as directed**.
 - 3) Loss of absorbent and refrigerant for any reason.
 - b. Warranty Period: Two **OR** Three **OR** Four **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Unit

1. Description: Factory-assembled and -tested, hermetic-design chiller complete with absorber, evaporator, condenser, generator, solution heat exchanger, controls, absorbent solution pump with motor, refrigerant pump with motor, purge unit with motor, burner assembly, motor controllers, rupture disk, interconnecting unit piping and wiring, indicated accessories, and mounting frame.
 - a. Disassemble chiller into major assemblies, as required by the installation, after factory testing and before packaging for shipment.
2. Absorbent and Refrigerant:
 - a. Absorbent: Lithium bromide solution with corrosion inhibitor.
 - b. Refrigerant: Deionized or distilled, **as directed**, water.
 - c. Performance Enhancer: Heat and mass transfer enhancer to improve performance.
3. Seismic Fabrication Requirements: Fabricate mounting base and attachment to chiller, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.

B. Pumps

1. Hermetically sealed, self-lubricating, and fitted with self-adjusting, spring-loaded, wear-compensating, tapered carbon bearings.
 2. Pump motor assembly shall be designed to operate for not less than 50,000 hours between inspections.
 3. Pump motors shall be cooled and bearings lubricated, either by fluid being pumped or by a filtered supply of liquid refrigerant.
 4. Pump suction and discharge shall be equipped with isolation valves.
 5. Absorbent solution and refrigerant shall have separate and dedicated pumps.
 - a. Absorbent solution and refrigerant flow-control method shall be manufacturer's choice to comply with operating requirements indicated.
 6. Purge System: Unit mounted and factory wired, equipped with controls and a pump to automatically remove noncondensable vapors.
 - a. Purge Pump Motor: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Enclosure: Open dripproof **OR** Totally enclosed, **as directed**.
- C. Heat-Exchanger Shells
1. Configuration: Two shells; one shell consists of the absorber/evaporator, low-stage generator/condenser and the other shell consists of the high-stage generator. Where indicated, equip chiller with a dedicated hot-water heat exchanger.
 2. Construction: Fabricated from continuously welded carbon-steel sheet or plate, or from seamless pipe.
 3. Design Pressure and Temperature Rating: Comply with applicable requirements in ASME Boiler and Pressure Vessel Code.
 4. End Tube Sheets: Carbon-steel plates continuously welded to each end of shell; drilled and reamed to accommodate tubes, with positive seal between fluid in tubes and refrigerant in shell.
 5. Intermediate Tube Sheets: Carbon-steel plates installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid tube contact resulting in abrasion and wear.
 6. Generator/Condenser Shell Pressure Relief Device: Manufacturer's standard rupture disk complying with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code.
- D. Absorber
1. Nozzle or Dispersion Trays: Designed to evenly distribute absorbent solution over tubes; constructed of brass, stainless steel, or another material that will not corrode.
 2. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR** 0.025 inch (0.6 mm) **OR** 0.028 inch (0.7 mm) **OR** 0.035 inch (0.9 mm), **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Enhanced **OR** Smooth, **as directed**.
 3. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine-type, **as directed**, water box with piping connections.
 - 1) Water boxes and marine-type water-box covers, **as directed**, shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine-type water-box covers.
 - c. Standard water box without piping connections.

- 1) Water boxes shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** Davited, **as directed**, water boxes.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
 4. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.

OR

Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.
 5. Absorber/Condenser Crossover Piping: Factory-furnished and -installed piping connecting fluid connection of absorber discharge to condenser inlet.
- E. Evaporator
1. Nozzle or Dispersion Trays: Designed to evenly distribute refrigerant over tubes; constructed of brass, stainless steel, or another material that will not corrode.
 2. Refrigerant Holding Pan: Steel or stainless steel.
 3. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Enhanced **OR** Smooth, **as directed**.
 4. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine-type, **as directed**, water box with piping connections.
 - 1) Water boxes and marine-type water-box covers, **as directed**, shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** Davited, **as directed**, water boxes.

OR

Hinged **OR** Davited, **as directed**, marine-type water-box covers.
 - c. Standard water box without piping connections.
 - 1) Water boxes shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** Davited, **as directed**, water boxes.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
- F. Condenser
1. Refrigerant Holding Pan: Steel or stainless steel.
 2. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.

- d. External Finish: Manufacturer's standard.
- e. Internal Finish: Enhanced **OR** Smooth, **as directed**.
- 3. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine-type, **as directed**, water box with piping connections.
 - 1) Water boxes and marine-type water-box covers, **as directed**, shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine-type water-box covers.
 - c. Standard water box without piping connections.
 - 1) Water boxes shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** Davited, **as directed**, water boxes.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
- 4. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.

G. First-Stage Generator

- 1. Tubes:
 - a. Replaceable, **as directed**, straight, or U tubes expanded into tube sheets.
 - b. Material: Manufacturer's standard **OR** Steel, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Manufacturer's choice; enhanced or smooth.
- 2. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard water box.
 - c. Water boxes shall have lifting lugs or eyebolts.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.

H. Second-Stage Generator

- 1. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Manufacturer's standard.

2. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard type.
 - c. Water boxes shall have lifting lugs or eyebolts.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.

- I. Dedicated Hot-Water Heat Exchanger
 1. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Manufacturer's standard.
 2. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard type.
 - c. Water boxes shall have lifting lugs or eyebolts.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.

- J. Solution Heat Exchanger
 1. Description: Shell-and-tube or brazed-plate heat exchanger, an integral part of chiller, increases cycle efficiency by preheating the weak solution on its way to the generator while precooling the strong solution returning from the generator.

- K. Burner Assembly
 1. Burner: Welded construction with multivane, stainless-steel, flame-retention diffuser suitable for natural gas **OR** propane **OR** fuel oil, **as directed**. Mount burner on hinged access door to permit access to combustion chamber, **as directed**.
 2. Blower: Centrifugal fan integral to burner, directly driven by motor; with adjustable damper assembly and locking quadrant to set air-fuel ratio.
 - a. Motors: Comply with requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 3. Oil Supply: Control devices and modulating control sequence shall comply with requirements of ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
 - a. Oil Pump: Two-stage, gear-type oil pump shall be capable of producing **300-psig (2070-kPa)** discharge pressure and **15-in. Hg (50.7-kPa)** vacuum.
 - b. Oil Piping Specialties:
 - 1) Suction-line, manual, gate valve.
 - 2) Removable-mesh oil strainer.

- 3) 0- to 30-in. Hg (0- to 101.3-kPa) vacuum; 0- to 30-psig (0- to 207-kPa) vacuum-pressure gage.
- 4) 0- to 300-psig (0- to 2070-kPa) oil-nozzle pressure gage.
- 5) Nozzle-line, solenoid-safety-shutoff oil valve.
4. Oil Pilot: Intermittent-electric-spark **OR** Interrupted-electric-spark, **as directed**, pilot ignition with 100 percent main-valve and pilot-safety shutoff solenoid with cadmium sulfide **OR** UV scanner, **as directed**, flame-safety control.
5. Gas Train: Control devices and modulating control sequence shall comply with requirements of ASME CSD-1 **OR** FMG **OR** IRI **OR** UL, **as directed**.
6. Gas Pilot: Intermittent-electric-spark **OR** Interrupted-electric-spark, **as directed**, pilot ignition with 100 percent main-valve and pilot-safety shutoff with electronic supervision of burner flame.
7. Burner assembly shall be equipped to limit nitrogen oxide emissions to 20 **OR** 30, **as directed**, ppm.

L. Electrical

1. Factory installed and wired, and functionally tested at factory before shipment.
2. Single-point, field-power connection to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
 - a. Branch power circuit to each motor, dedicated electrical load, and to controls with disconnect switch or circuit breaker, **as directed**.
 - 1) NEMA KS 1, heavy-duty fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit-trip set point.
 - b. NEMA ICS 2, Class A, full-voltage, nonreversing motor controller, hand-off-auto switch, and overcurrent protection for each motor.
 - c. Control-circuit transformer with primary and secondary side fuses.
3. Terminal blocks with numbered and color-coded, **as directed**, wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
4. Wiring Outside of Enclosures: Factory installed in metal raceway except make terminal connections with not more than a 24-inch (610-mm) length of liquidtight **OR** flexible metallic, **as directed**, conduit.

M. Controls

1. Chiller control panel shall be separate from burner control panel.
2. Burner Control Panel: Factory or field, **as directed**, mounted. Maintains safe operating conditions, burner safety limits, burner operation, and interface with chiller controls; include the following components:
 - a. On-off switch.
 - b. Flame safeguard.
 - c. Contacts for remote monitoring of flame failure.
 - d. Contacts for proof of combustion air.
 - e. Exhaust gas temperature limit switch.
 - f. Control-circuit transformer.
 - g. Burner motor controls.
 - h. Fuel-oil pump controls, if chiller is equipped with fuel-oil pump.
 - i. Visual indication of on/off status of ignition, blower, and main fuel.
 - j. Alarm bell.
3. Control: Standalone and microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.
4. Enclosure: Unit mounted, NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x, **as directed**, hinged or lockable.

5. Operator Interface: Multiple-character digital or graphic display with dynamic update of information and with keypad or touch-sensitive display located on front of control enclosure. Display the following information in either imperial or metric units selectable through the interface:
 - a. Date and time.
 - b. Operating or alarm status.
 - c. Operating hours.
 - d. Outdoor-air temperature if required for chilled-water reset.
 - e. Temperature and pressure of operating set points.
 - f. Entering and leaving temperatures of chilled and condenser water.
 - g. Refrigerant temperature.
 - h. Solution concentration and temperature.
 - i. Indication of solution and purge-pump operation.
 - j. Generator shell pressure.
 - k. Number of starts.
 - l. Number of purge cycles.
 - m. Entering and leaving hot-water temperatures.
 - n. Burner firing rate displayed in percent.
6. Control Functions:
 - a. Manual or automatic startup and shutdown time schedule.
 - b. Automatic cycle to prevent crystallization.
 - c. Entering and leaving chilled-water temperatures and control set points. Chilled-water temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
 - d. Entering and leaving hot-water temperatures and control set points. Hot-water temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
 - e. Condenser-fluid temperature.
 - f. Cooling provided and heating energy used within programmable time periods, minimum monthly.
 - g. Heating provided and heating energy used within programmable time periods, minimum monthly.
7. Capacity Control: Automatically controls burner firing rate to maintain chilled-water temperature set point for cooling loads and heating-water temperature set point for heating loads ranging from 30 to 100 percent.
8. Safety Shutdowns: Chiller shall automatically shut down and require manual restart. Display a message following each safety shutdown.
 - a. Crystallization.
 - b. Low refrigerant temperature.
 - c. Loss of chilled- or condenser-water flow.
 - d. Low leaving chilled-water temperature, **2 deg F (1 deg C)** below set point.
 - e. First-stage generator low-solution level.
 - f. First-stage generator high temperature or pressure.
 - g. Burner alarm or control malfunction.
 - h. Power failure.
 - i. Solution pump overloads.
 - j. External auxiliary safety shutdown.
 - k. High solution concentration.
 - l. Incomplete dilution cycle.
9. Warning Conditions: Chiller shall remain operational but inhibit burner firing rate to prevent safety shutdown. Control panel shall close warning contacts and generate a message when one of the following operating conditions is detected:
 - a. Low refrigerant temperature.
 - b. High generator temperature or pressure.
 - c. High or low entering condenser-water temperature.
 - d. Solution temperature sensor failure.
 - e. Low chilled-water flow.

- f. Purge-pump current overload.
 10. Cycling Shutdowns: Permit automatic restart when preprogrammed limits are reached. Display a message following each cycle shutdown.
 - a. Cooling Mode:
 - 1) Loss of condenser-water flow.
 - 2) Low leaving chilled-water temperature.
 - 3) Power failure.
 - b. Heating Mode:
 - 1) Loss of hot-water flow.
 - 2) High leaving hot-water temperature.
 - 3) Power failure.
 11. Trending: Capability to trend analog data up to five parameters simultaneously over an adjustable period and frequency of polling.
 12. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: view only; view and operate; and view, operate, and service.
 13. Control Authority: At least four conditions: Off, local manual control at chiller, local automatic control at chiller, and automatic control through a remote source.
 14. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer and a notebook computer.
 15. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display chiller status and alarms.
 - a. Hardwired Points:
 - 1) Monitoring: On-off status, common trouble alarm.
 - 2) Control: On-off operation, chilled-water, discharge temperature set-point adjustment **OR** hot-water, discharge temperature set-point adjustment, **as directed**.
 - b. ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the chiller from an operator workstation. Control features and monitoring points displayed locally at chiller control panel shall be available through the BAS.
- N. Finish
1. Paint chiller, using manufacturer's standard procedures, except comply with the following minimum requirements:
 - a. Provide at least one coat of primer with a total dry film thickness of at least **2 mils (0.05 mm)**.
 - b. Provide at least two coats of alkyd-modified, vinyl enamel **OR** epoxy **OR** polyurethane, **as directed**, finish with a total dry film thickness of at least **4 mils (0.10 mm)**.
 - c. Paint surfaces that are to be insulated before applying the insulation.
 - d. Paint installed insulation to match adjacent uninsulated surfaces.
 - e. Color of finish coat to be manufacturer's standard **OR** custom color selected by the Owner.
- O. Accessories
1. Sight Glasses: Equip unit with sight glasses for visual inspection of absorbent solution and refrigerant levels. Provide at least one sight glass in absorber and evaporator sections.
 2. Flow Switches:
 - a. Chiller manufacturer shall furnish a switch for each condenser **OR** evaporator and condenser, **as directed**, and shall verify field-mounting location before installation.
 - b. Paddle Flow Switches:
 - 1) Vane operated to actuate a double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
 - 2) Contacts: Platinum alloy, silver alloy, or gold-plated switch contacts with a rating of 10 A at 120-V ac.
 - 3) Pressure rating equal to pressure rating of heat exchanger.

- 4) Construct body and wetted parts of Type 316 stainless steel.
- 5) House switch in an NEMA 250, Type 4 enclosure constructed of die-cast aluminum.
- 6) Vane length to suit installation.
- c. Pressure Differential Switches:
 - 1) Construction: Wetted parts of body and trim constructed of Type 316 stainless steel.
 - 2) Performance: Switch shall withstand, without damage, the full-pressure rating of the heat exchanger applied to either port and exhibit zero set point shift due to variation in working pressure.
 - 3) Set Point: Screw type, field adjustable.
 - 4) Electrical Connections: Internally mounted, screw-type terminal blocks.
 - 5) Switch Enclosure: NEMA 250, Type 4.
 - 6) Switch Action: Double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
3. Vibration Isolation:
 - a. Chiller manufacturer shall furnish neoprene-pad vibration isolation for each chiller.
 - 1) Two layers of **0.375-inch- (10-mm-)** thick, ribbed- or waffle-pattern neoprene pads separated by a 16-gage, stainless-steel plate.
 - 2) Fabricate pads from 40- to 50-durometer neoprene.
 - 3) Provide stainless-steel square bearing plate to load the pad uniformly between **20 and 40 psig (138 and 276 kPa)** with a **0.12- to 0.16-inch (3- to 4-mm)** deflection.
- P. Heat-Exchanger, Brush-Cleaning System
 1. Furnish for field installation a brush-cleaning system on each chiller condenser for tube cleaning and improved heat transfer.
 2. System shall maintain tube fouling at or below design conditions without interrupting normal equipment operation.
 3. System shall consist of a brush inserted in each tube and a catch basket attached to each end of the tube. A four-way valve shall operate to reverse the direction of water flow to push the brush through the tube while removing tube deposits. Four-way reversing valve's actuator shall be controlled by a preset time cycle that provides regular tube brushing during equipment operation. Frequency of the brushing cycle shall be set up to match Project requirements.
 4. Components:
 - a. Brush: Each brush shall have nylon bristles, titanium wires, and polypropylene tips. Brush interference fit with the ID of the tube shall not exceed **0.025 inch (0.6 mm)**.
 - b. Basket: Single-piece polypropylene basket with neck OD to press fit inner diameter of tube. Design shall provide for insertion of eddy current probe or removal of brushes without removing baskets from the valve.
 - c. Four-Way Valve:
 - 1) Construct valve body of carbon steel with internal sealing parts of hard rubber and Type 304 stainless steel.
 - 2) Configure valve with parallel flow connections to minimize field installation piping.
 - 3) Construct valve to comply with ASME Boiler and Pressure Vessel Code , at a system working pressure equal to condenser.
 - 4) Pipe connections shall be flanged.
 - 5) Valve manufacturer to test and certify a maximum leakage rate of less than 0.05 percent of the design flow rate at operation conditions of maximum differential pressure.
 - 6) Hydrostatically test valve to 1.5 times the design working pressure.
 - 7) Design the valve to cause no more than **0.5-psig (3-kPa)** pressure drop at design flow conditions.
 - 8) Provide valve with valve-mounted indicating/warning light, which shall light before the valve begins rotation.
 - 9) Valve Actuator: Mount electric actuator to operate valve.

OR

 - Valve Actuator: Mount pneumatic piston-type actuator to operate valve. Actuator shall be suitable for operation using field-supplied air pressure.

- 10) Position Switches: Factory mount microswitches on valve to indicate the complete turn of valve in both normal and reverse flow.
- d. Control Panel: Factory or field mount a control panel on chiller. Control panel shall include the following features:
 - 1) NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, enclosure.
 - 2) Timer to automatically initiate the cleaning cycle over a 24-hour period.
 - 3) Manual override of preset cleaning cycle.
 - 4) Visual indication of "Power On," "Diverter Position," "Normal Flow," "Reverse Flow," and "Valve Malfunction" indicating a slow or incomplete valve turn.
 - 5) For pneumatic actuators, mount four-way solenoid valve for actuator operation in the control panel.
 - 6) Flow-switch bypass.
 - 7) Unloading signal to chiller.

Q. Source Quality Control

1. Perform functional run tests of chillers before shipping.
2. Factory test and inspect absorber, generator, evaporator, and condenser according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Pressure test tube-side of heat exchangers, including water boxes, to 1.5 times the rated pressure. Vacuum and pressure test shells for leaks.
3. Rate sound power level according to ARI 575.
4. Burner Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion requirements indicated.
5. Factory performance test chillers, before shipping, according to ARI 560.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with condenser fluid at design conditions.
OR
Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with varying entering condenser-fluid temperature from design to minimum conditions in 5 deg F (3 deg C) increments.
OR
At one **OR** two **OR** three **OR** four **OR** five **OR** 10, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
6. Factory sound test chillers, before shipping, according to ARI 575.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Chiller operating at calculated worst-case sound condition.
 - 3) At one **OR** two **OR** three **OR** four **OR** five, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
7. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.
8. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.

1.3 EXECUTION

A. Examination

1. Examine chillers before installation. Reject chillers that are damaged.
2. Examine roughing-in for equipment support, anchor-bolt sizes and locations, piping, and electrical connections to verify actual locations, sizes, and other conditions affecting chiller performance, maintenance, and operations before equipment installation.

- a. Final chiller locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Chiller Installation**
1. Install chillers on support structure indicated.
 2. Equipment Mounting (for equipment supported on concrete bases and vibration isolation devices): Install chiller on concrete bases using elastomeric pads. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm), as directed.**
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Equipment Mounting (for equipment supported on vibration isolation devices without a concrete base): Install chiller using elastomeric pads. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm), as directed.**
 4. Equipment Mounting (for equipment installed on concrete bases without vibration isolation devices): Install chiller on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 5. Install chillers with seismic-restraint device. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 6. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 7. Maintain manufacturer's recommended clearances for service and maintenance.
 8. Charge chiller with absorbent and refrigerant if not factory charged.
 9. Install separate devices furnished by manufacturer and not factory installed.
 10. Insulate hot and cold chiller surfaces that are recommended by chiller manufacturer to be insulated. Comply with requirements in Division 23 Section "Hvac Insulation".
 11. Install electrical devices furnished with chiller but not specified to be factory mounted.
 12. Install control wiring to field-mounted electrical devices.
- C. Heat-Exchanger, Brush-Cleaning System Installation**
1. Install brush-cleaning system control panel adjacent to chiller control panel.
 2. Arrange piping to provide service access to four-way valve assembly without affecting access to chiller. Secure valve to prevent lateral movement and vibration during operation.
 3. Provide field electric power, as required, to each system control panel and electric-actuated valve.

4. Provide pneumatic piping with pressure regulator and an isolation valve to each pneumatic supply connection. Coordinate field source of air with manufacturer to ensure that requirements are satisfied for proper valve operation.
5. Interconnect brush-cleaning system controls with chiller controls. Coordinate requirements to ensure safe, trouble-free operation.
6. Functionally test the entire brush-cleaning system, including the valve, actuator, position indicator, and control panel, with chiller in operation.

D. Connections

1. Comply with requirements for hydronic piping in Division 23 Section "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Comply with requirements for gas piping in Division 23 Section(s) "Facility Natural-gas Piping" OR "Facility Liquefied-petroleum Gas Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
3. Connect gas piping full size to gas-train inlet with shutoff valve and union.
4. Install gas-fired boilers according to NFPA 54.
5. Comply with requirements for fuel-oil piping in Division 23 Section "Facility Fuel-oil Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
6. Connect oil piping full size to burner inlet with shutoff valve and union.
7. Install oil-fired boilers according to NFPA 31.
8. Install piping adjacent to chiller to allow service and maintenance.
9. Hot-Water Heat-Exchanger Connections: Connect to heat-exchanger inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with shutoff valve and pressure gage. Connect to heat-exchanger outlet with shutoff valve, check valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, and drain connection with valve. Make connections to chiller with a flange or mechanical coupling.
10. Evaporator-Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with shutoff valve and pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, and drain connection with valve. Make connections to chiller with a flange or mechanical coupling.
11. Absorber/Condenser-Fluid Connections: Connect to inlet with shutoff valve, strainer, flexible connector, thermometer, and plugged tee with shutoff valve and pressure gage. Connect to outlet with shutoff valve, balancing valve, flexible connector, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, and drain connection with valve. Make connections to chiller with a flange or mechanical coupling.
 - a. If not factory furnished or installed, provide pipe connecting fluid connection of absorber discharge and condenser inlet.
12. Refrigerant Pressure Relief Device Connections: Extend vent piping **OR** separate vent piping for each chiller, **as directed**, to the outdoors without valves or restrictions. Comply with ASHRAE 15. Connect to chiller pressure relief device with flexible connector and dirt leg with drain valve.
13. Extend purge vent piping **OR** separate purge vent piping for each chiller, **as directed**, to the outdoors. Comply with ASHRAE 15.
14. Connect each chiller drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection.
15. Comply with requirements for chimney system in Division 23 Section "Breechings, Chimneys, And Stacks". Drawings indicate general arrangement of pipe, fittings, and specialties. Connect chimney system to chiller burner outlet and extend to the outdoors.
16. Connect fuel-fired burner assembly and blower and associated damper for combustion air.

E. Startup Service

1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

- b. Operate chiller for run-in period.
 - c. Verify that absorbent and refrigerant charge is sufficient and chiller has been leak tested.
 - d. Verify that pumps are installed and functional.
 - e. Verify that thermometers and gages are installed.
 - f. Operate chiller for run-in period.
 - g. Verify that refrigerant pressure relief device is vented to the outdoors.
 - h. Verify proper motor rotation.
 - i. Verify proper fuel supply. Adjust air-fuel ratio and combustion.
 - j. Verify proper combustion-air source.
 - k. Verify proper exhaust emissions.
 - l. Verify static deflection of vibration isolators including deflection during chiller startup and shutdown.
 - m. Verify and record performance of fluid flow and low-temperature interlocks for evaporator and condenser.
 - n. Verify and record performance of chiller protection devices.
 - o. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
 - p. Burner Test: Adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas.
2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assembly, installation, and connection.
 3. Prepare test and inspection startup reports.
- F. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain chillers. Video record the training sessions, **as directed**.

END OF SECTION 23 64 13 16

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SECTION 23 64 13 16a - INDIRECT-FIRED ABSORPTION WATER CHILLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for indirect-fired absorption water chillers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Packaged, water-cooled, single-effect and double-effect absorption chillers.
 - b. Heat-exchanger, brush-cleaning system.

C. Definitions

1. BAS: Building automation system.
2. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
3. IPLV: Integrated part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by ARI 560 and referenced to ARI standard rating conditions.
4. NPLV: Nonstandard part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by ARI 560 and intended for operating conditions other than the ARI standard rating conditions.

D. Performance Requirements

1. Seismic Performance: Indirect-fired absorption chillers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Condenser-Fluid Temperature Performance:
 - a. Startup Condenser-Fluid Temperature: Chiller shall be capable of starting with an entering condenser-fluid temperature of **60 deg F (16 deg C) OR 55 deg F (13 deg C) OR 40 deg F (4.4 deg C), as directed**, and providing stable operation until the system temperature is elevated to the minimum operating entering condenser-fluid temperature.
 - b. Minimum Operating Condenser-Fluid Temperature: Chiller shall be capable of continuous operation over the entire capacity range indicated with an entering condenser-fluid temperature of **65 deg F (18 deg C) OR 60 deg F (16 deg C) OR 55 deg F (13 deg C), as directed**.
 - c. Make factory modifications to standard chiller design if necessary to comply with performance indicated.
3. Site Altitude: Chiller shall be suitable for altitude at which installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.
4. Performance Tolerance: Comply with the following in lieu of ARI 560, **as directed**:
 - a. Allowable Capacity Tolerance: Zero percent.
 - b. Allowable IPLV/NPLV Performance Tolerance: Zero percent.

E. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, furnished specialties and accessories.
2. LEED Submittals:
 - a. Product Data for LEED-NC Prerequisite EA 2: Documentation indicating that units comply with ASHRAE 90.1.

- b. Product Data for LEED-NC Prerequisite EA 3: Documentation indicating that refrigerants comply.
- c. Product Data for LEED-NC Credit EA 4: Documentation indicating that equipment and refrigerants comply.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
4. Certificates: For certification required in "Quality Assurance" Article.
5. Seismic Qualification Certificates: For chillers, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
6. Startup service reports.
7. Operation and maintenance data.
8. Warranty: Sample of special warranty.

F. Quality Assurance

1. ARI Rating: Rate chiller performance according to requirements in ARI 560.
2. ASHRAE Compliance:
 - a. ASHRAE 15 for safety code for mechanical refrigeration.
 - b. ASHRAE/IESNA 90.1.
3. ASME Compliance: Fabricate and label chiller pressure vessels to comply with applicable portions of ASME Boiler and Pressure Vessel Code.
4. Comply with NFPA 70.
5. Comply with requirements of UL and UL Canada, and include label by a qualified testing agency showing compliance.

G. Delivery, Storage, And Handling

1. Ship chillers factory charged with nitrogen.
2. Ship absorbent and refrigerant in chillers or in containers separate from chillers.
OR
Ship absorbent and refrigerant, **as directed**, in containers separate from chillers.
3. Package chiller for export shipping in totally enclosed bagging **OR** crate **OR** crate with bagging, **as directed**.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chillers that fail in materials or workmanship within specified warranty period.
 - a. Extended warranties include, but are not limited to, the following:
 - 1) Complete chiller.
OR
Pumps and motors **OR** Purge unit, **as directed**.
OR
Absorbent **OR** Absorbent and refrigerant, **as directed**, only.
 - 2) Parts only **OR** Parts and labor, **as directed**.
 - 3) Loss of absorbent and refrigerant for any reason.
2. Warranty Period: Two **OR** Three **OR** Four **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Unit

1. Description: Factory-assembled and -tested, hermetic-design chiller complete with absorber, evaporator, condenser, generator, solution heat exchanger, controls, absorbent solution pump with motor, refrigerant pump with motor, purge unit with motor, motor controllers, rupture disk, interconnecting unit piping and wiring, indicated accessories, and mounting frame.
 - a. Disassemble chiller into major assemblies as required by the installation after factory testing and before packaging for shipment.
 2. Absorbent and Refrigerant:
 - a. Absorbent: Lithium bromide solution with corrosion inhibitor.
 - b. Refrigerant: Deionized or distilled, **as directed**, water.
 - c. Performance Enhancer: Heat and mass transfer enhancer to improve performance.
 3. Seismic Fabrication Requirements: Fabricate mounting base and attachment to chiller, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when mounting base is anchored to building structure.
- B. Pumps
1. Hermetically sealed, self-lubricating, and fitted with self-adjusting, spring-loaded, wear-compensating tapered carbon bearings.
 2. Pump motor assembly shall be designed to operate for not less than 25,000 **OR** 50,000, **as directed**, hours between inspections.
 3. Pump motors cooled, and bearings lubricated, either by fluid being pumped or by a filtered supply of liquid refrigerant.
 4. Pump suction and discharge equipped with isolation valves.
 5. Separate and dedicated pumps for absorbent solution and refrigerant.
 - a. Absorbent solution and refrigerant flow-control method shall be manufacturer's choice to comply with operating requirements indicated.
 6. Purge System: Unit mounted and factory wired, equipped with controls and a pump to automatically remove noncondensable vapors.
 - a. Purge Pump Motor: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Enclosure: Open dripproof **OR** Totally enclosed, **as directed**.
- C. Heat-Exchanger Shells
1. Configuration for Single-Effect Chillers: Two shells; one shell consists of the absorber/evaporator and the other shell consists of the condenser/generator.
 2. Configuration for Double-Effect Chillers: Two shells; one shell consists of the absorber/evaporator, low-stage generator/condenser and the other shell consists of the high-stage generator.
 3. Construction: Fabricated from continuously welded carbon-steel sheet or plate, or from seamless pipe.
 4. Design Pressure and Temperature Rating: Comply with applicable requirements in ASME Boiler and Pressure Vessel Code.
 5. End Tube Sheets: Carbon-steel plates continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
 6. Intermediate Tube Sheets: Carbon-steel plates installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.
 7. Generator/Condenser Shell Pressure Relief Device: Manufacturers standard rupture disk complying with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- D. Absorber
1. Nozzle or Dispersion Trays: Designed to evenly distribute absorbent solution over tubes. Constructed of brass, stainless steel, or another material that will not corrode.
 2. Tubes:

- a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end and without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR** 0.025 inch (0.6 mm) **OR** 0.028 inch (0.7 mm) **OR** 0.035 inch (0.9 mm), **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Enhanced **OR** Smooth, **as directed**.
3. Water Boxes:
- a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine, **as directed**, type for water box with piping connections.
 - 1) Water boxes and marine water-box covers, **as directed**, shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** davited, **as directed**, water boxes.
OR
Hinged **OR** davited, **as directed**, marine water-box covers.
 - c. **OR**
Standard type for water box without piping connections.
 - 1) Water boxes shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** davited, **as directed**, water boxes.
OR
Hinged **OR** davited, **as directed**, marine water-box covers.
 - c. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - d. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - e. Fit each water box with 3/4-inch (19-mm) **OR** 1-inch (25-mm) **OR** 3/4- or 1-inch (19- or 25-mm), **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
4. Additional Corrosion Protection:
- a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.
5. Absorber/Condenser Crossover Piping: Factory furnished **OR** installed, **as directed**, piping connecting fluid connection of absorber discharge to condenser inlet.
- E. Evaporator
1. Nozzle or Dispersion Trays: Designed to evenly distribute refrigerant over tubes. Constructed of brass, stainless steel, or another material that will not corrode.
 2. Refrigerant Holding Pan: Steel **OR** Stainless steel, **as directed**.
 3. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end and without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR** 0.025 inch (0.6 mm) **OR** 0.028 inch (0.7 mm) **OR** 0.035 inch (0.9 mm), **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Enhanced **OR** Smooth, **as directed**.
 4. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine, **as directed**, type for water box with piping connections.

- 1) Water boxes and marine water-box covers, **as directed**, shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** davited, **as directed**, water boxes.
OR
Hinged **OR** davited, **as directed**, marine water-box covers.
- OR**
Standard type for water box without piping connections.
- 1) Water boxes shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** davited, **as directed**, water boxes.
OR
Hinged **OR** davited, **as directed**, marine water-box covers.
- c. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - d. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - e. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm) OR 3/4- or 1-inch (19- or 25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.

F. Condenser

1. Refrigerant Holding Pan: Steel **OR** Stainless steel, **as directed**.
2. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end and without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Enhanced **OR** Smooth, **as directed**.
3. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine, **as directed**, type for water box with piping connections.
 - 1) Water boxes and marine water-box covers, **as directed**, shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** davited, **as directed**, water boxes.
OR
Hinged **OR** davited, **as directed**, marine water-box covers.

OR
Standard type for water box without piping connections.

 - 1) Water boxes shall have lifting lugs or eyebolts.
 - 2) Hinged **OR** davited, **as directed**, water boxes.
OR
Hinged **OR** davited, **as directed**, marine water-box covers.
 - c. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - d. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - e. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
4. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.

G. Generator For Single-Effect Chillers

1. Tubes:
 - a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end and without damage to tube sheets and other tubes.
 - b. Material: 90/10 copper-nickel alloy **OR** Stainless steel **OR** Titanium, as directed.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR** 0.035 inch (0.9 mm), as directed.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Smooth **OR** Enhanced, as directed
2. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard type water box.
 - c. Water boxes shall have lifting lugs or eyebolts.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, as directed.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with 3/4-inch (19-mm) **OR** 1-inch (25-mm), as directed, drain connection at low point and vent connection at high point, each with threaded plug.
3. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.

H. First-Stage Generator For Double-Effect Chillers

1. Tubes:
 - a. Replaceable, straight, or U tubes expanded into tube sheets.
 - b. Material: Manufacturer's standard **OR** 70/30 copper-nickel alloy **OR** Type 409 stainless steel **OR** Titanium, as directed.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR** 0.028 inch (0.7 mm) **OR** 0.035 inch (0.9 mm), as directed.
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Smooth **OR** Enhanced, as directed.
2. Water Boxes:
 - a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard type water box.
 - c. Water boxes shall have lifting lugs or eyebolts.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, as directed.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with 3/4-inch (19-mm) **OR** 1-inch (25-mm), as directed, drain connection at low point and vent connection at high point, each with threaded plug.
3. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.

I. Second-Stage Generator For Double-Effect Chillers

1. Tubes:

- a. Individually replaceable, straight tubes expanded into tube sheets. Replaceable from either end and without damage to tube sheets and other tubes.
 - b. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - c. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm), as directed.**
 - d. External Finish: Manufacturer's standard.
 - e. Internal Finish: Smooth **OR** Enhanced, **as directed**.
2. Water Boxes:
- a. Carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard type water box.
 - c. Water boxes shall have lifting lugs or eyebolts.
 - d. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - e. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - f. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm), as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
3. Additional Corrosion Protection:
- a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.
- J. Solution Heat Exchanger
1. Description: Shell-and-tube or brazed-plate heat exchanger; integral part of chiller to increase cycle efficiency by preheating the weak solution on its way to the generator while precooling the strong solution returning from the generator.
- K. Steam Condensate Drain Cooler
1. Description: Shell-and-tube heat exchanger constructed of carbon-steel shell and copper-nickel-alloy or stainless-steel tubes.
- L. Factory-Applied Insulation
1. Factory-Applied Insulation on Cold Surfaces:
 - a. Closed-cell, flexible elastomeric thermal insulation complying with ASTM C 534, Type I for tube and Type II for sheet materials.
 - 1) Thickness: **3/4 inch (19 mm) OR 1-1/2 inches (38 mm), as directed.**
 - b. Adhesive: As recommended by insulation manufacturer.
 - c. Factory apply insulation over all cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator shell and end tube sheets; evaporator water boxes including nozzles; refrigerant pump; cold surfaces of motor; and cold piping.
 - 1) Apply adhesive to 100 percent of insulation contact surface.
 - 2) Before insulating steel surfaces, prepare surfaces for paint, and prime and paint as indicated for other painted components. Do not insulate unpainted steel surfaces.
 - 3) Seal seams and joints to provide a vapor barrier.
 - 4) After adhesive has fully cured, paint exposed surfaces of insulation to match other painted parts.
 2. Factory-Applied Insulation on Hot Surfaces:
 - a. Mineral-fiber board, pipe or tank insulation complying with one of following:
 - 1) ASTM C 547, Type I or Type II, Grade A.
 - 2) ASTM C 612, Type IB.
 - 3) ASTM C 1393, Type II or Type IIIA, Category 2.
 - 4) Thickness: **1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed.**

- b. Adhesive: As recommended by insulation manufacturer.
- c. Factory apply materials over all hot surfaces to provide smooth, straight, and even surfaces; free of voids.
 - 1) Apply adhesive to insulation contact surface as recommended by insulation manufacturer.
 - 2) Install insulation anchor pins and washers if required by insulation manufacturer to secure insulation to surfaces to be insulated.
 - 3) Completely encapsulate insulation with metal jacket, leaving no exposed insulation. Provide removable jacket on components requiring access for service and inspection.
 - 4) Paint exposed surfaces of metal jacket to match other painted parts unless jacket material is aluminum or stainless steel.

M. Electrical

- 1. Factory installed and wired, and functionally tested at factory before shipment.
- 2. Single-point, field-power connection to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
 - a. Branch power circuit to each motor, dedicated electrical load, and controls with disconnect switch or circuit breaker, **as directed**.
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit-trip set point.
 - b. NEMA ICS 2, Class A, full-voltage, nonreversing motor controller, hand-off-auto switch, and overcurrent protection for each motor.
 - c. Control-circuit transformer with primary and secondary side fuses.
- 3. Terminal blocks with numbered and color-coded, **as directed**, wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
- 4. Wiring Outside of Enclosures: Factory installed in metal raceway except make terminal connections with not more than a **24-inch (610-mm)** length of liquidtight **OR** flexible metallic, **as directed**, conduit.

N. Controls

- 1. Control: Standalone and microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.
- 2. Enclosure: Unit mounted, NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x, **as directed**, hinged or lockable.
- 3. Operator Interface: Multiple-character digital or graphic display with dynamic update of information and with keypad or touch-sensitive display located on front of control enclosure. In either imperial or metric units selectable through the interface, display the following information:
 - a. Date and time.
 - b. Operating or alarm status.
 - c. Operating hours.
 - d. Outdoor-air temperature if required for chilled-water reset.
 - e. Temperature and pressure of operating set points.
 - f. Entering and leaving temperatures of chilled and condenser water.
 - g. Refrigerant temperature.
 - h. Solution concentration and temperature.
 - i. Indication of solution and purge-pump operation.
 - j. Generator shell pressure.
 - k. Number of starts.
 - l. Number of purge cycles.
 - m. Hot-water valve actuator potentiometer position (percentage).
 - n. Entering and leaving hot-water temperatures.

- o. Steam demand limit.
- p. Inlet steam pressure and temperature.
- q. Steam valve actuator potentiometer position (percentage).
- r. First-stage generator pressure and temperature.
- 4. Control Functions:
 - a. Manual or automatic startup and shutdown time schedule.
 - b. Automatic cycle to prevent crystallization.
 - c. Entering and leaving chilled-water temperatures and control set points. Chilled-water temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
 - d. Condenser-fluid temperature.
 - e. Cooling provided and heating energy used within programmable time periods, minimum monthly.
- 5. Capacity Control: Automatically controls input flow rate of heat source to maintain chilled-water temperature set point for cooling loads ranging from 10 to 100 percent.
- 6. Control Valve Package: Factory-furnished, for field installation, **OR** Factory-installed, **as directed**, control valve package suitable for energy source indicated.
 - a. Body: Cast-iron, carbon-steel, or stainless-steel body with flanged connections.
 - b. Type: Manufacturer's choice **OR** V-notch ball **OR** Butterfly **OR** Globe style with cage-guide plug, **as directed**, constructed of stainless steel.
 - c. Rating: Pressure and temperature rating to match heat exchanger.
 - d. Shutoff: Capable of bubble-tight shutoff against maximum system pressure.
 - e. Size: Determined by chiller manufacturer.
 - f. Modulation: Two-way **OR** Three-way, **as directed**.
 - g. Turndown: As required to achieve stable control through the indicated operating range.
 - h. Actuator: Electric powered from chiller control panel and installed on valve.
- 7. Safety Shutdowns:
 - a. Crystallization.
 - b. Low refrigerant temperature.
 - c. Loss of chilled- or condenser-water flow.
 - d. Low leaving chilled-water temperature, **2 deg F (1 deg C)** below set point, **as directed**.
 - e. First-stage generator low-solution level.
 - f. First-stage generator high temperature or pressure.
 - g. Power failure.
 - h. Solution pump overloads.
 - i. External auxiliary safety shutdown.
 - j. High solution concentration.
 - k. Incomplete dilution cycle.
 - l. High entering-water temperature.
 - m. High inlet steam pressure and temperature.
- 8. Warning Conditions: Control panel shall close warning contacts and generate a message when one of the following operating conditions is detected:
 - a. Low refrigerant temperature.
 - b. High generator temperature or pressure.
 - c. High entering generator-water temperature (single-stage generator only).
 - d. High or low entering condenser-water temperature.
 - e. Solution temperature sensor failure.
 - f. Low chilled-water flow.
- 9. Trending: Capability to trend analog data of up to five parameters simultaneously over an adjustable period and frequency of polling.
- 10. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: view only; view and operate; and view, operate, and service.
- 11. Control Authority: At least four conditions: Off, local manual control at chiller, local automatic control at chiller, and automatic control through a remote source.

12. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer and a notebook computer, **as directed**.
13. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display chiller status and alarms.
 - a. Hardwired Points:
 - 1) Monitoring: On-off status, common trouble alarm.
 - 2) Control: On-off operation, chilled-water, discharge temperature set-point adjustment **OR** generator heat source capacity limiting, **as directed**.
 - b. ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the chiller from an operator workstation. Control features and monitoring points displayed locally at chiller control panel shall be available through the BAS.

O. Finish

1. Paint chiller, using manufacturer's standard procedures, except comply with the following minimum requirements:
 - a. Provide at least one coat of primer with a total dry film thickness of at least **2 mils (0.05 mm)**.
 - b. Provide at least two coats of alkyd-modified, vinyl enamel **OR** epoxy **OR** polyurethane, **as directed**, finish with a total dry film thickness of at least **4 mils (0.10 mm)**.
 - c. Paint surfaces that are to be insulated before applying the insulation.
 - d. Paint installed insulation to match adjacent uninsulated surfaces.
 - e. Color of finish coat to be manufacturer's standard **OR** custom color selected by the Owner.
2. Provide the Owner with quart container of paint used in application of topcoat to use in touchup applications after Project Closeout.

P. Accessories

1. Sight Glasses: Equip unit with sight glasses for visual inspection of absorbent solution and refrigerant levels. Provide at least one sight glass in absorber and evaporator sections.
2. Flow Switches:
 - a. Chiller manufacturer shall furnish a switch for each condenser **OR** evaporator and condenser, **as directed**, and verify field-mounting location before installation.
 - b. Paddle Flow Switches:
 - 1) Vane operated to actuate a double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
 - 2) Contacts: Platinum alloy, silver alloy, or gold-plated switch contacts with a rating of 10 A at 120-V ac.
 - 3) Pressure rating equal to pressure rating of heat exchanger.
 - 4) Construct body and wetted parts of Type 316 stainless steel.
 - 5) House switch in a NEMA 250, Type 4 enclosure constructed of die-cast aluminum.
 - 6) Vane length to suit installation.

OR

Pressure Differential Switches:

 - 1) Construction: Wetted parts of body and trim constructed of Type 316 stainless steel.
 - 2) Performance: Switch shall withstand, without damage, the full-pressure rating of the heat exchanger applied to either port and exhibit zero set-point shift due to variation in working pressure.
 - 3) Set Point: Screw type, field adjustable.
 - 4) Electrical Connections: Internally mounted screw-type terminal blocks.
 - 5) Switch Enclosure: NEMA 250, Type 4.
 - 6) Switch Action: Double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
3. Vibration Isolation:
 - a. Chiller manufacturer shall furnish neoprene-pad vibration isolation for each chiller.

- 1) Two layers of **0.375-inch- (10-mm-)** thick, ribbed- or waffle-pattern neoprene pads separated by a 16-gage, stainless-steel plate.
 - 2) Fabricate pads from 40- to 50-durometer neoprene.
 - 3) Provide stainless-steel square bearing plate to load the pad uniformly between **20 and 40 psig (138 and 276 kPa)** with a **0.12- to 0.16-inch (3- to 4-mm)** deflection.
4. Lithium Bromide Filter, **as directed**:
- a. Factory install a filter, isolation valves, and associated piping.
 - b. Filter shall consist of a stainless-steel body, with removable and cleanable 150-micron, stainless-steel element.
 - c. Isolation valves shall provide isolation for filter servicing without disturbing operation of chiller.
- Q. Heat-Exchanger, Brush-Cleaning System
1. Furnish for field installation a brush-cleaning system on each chiller condenser, **as directed**, for tube cleaning and improved heat transfer.
 2. System shall maintain tube fouling at or below design conditions without interrupting normal equipment operation.
 3. System shall consist of a brush inserted in each tube and a catch basket attached to each end of the tube. A four-way valve shall operate to reverse the direction of water flow to push the brush through the tube while removing tube deposits. Four-way reversing valve's actuator shall be controlled by a preset time cycle that provides regular tube brushing during equipment operation. Frequency of the brushing cycle shall be set up to match Project requirements.
 4. Components:
 - a. Brush: Each brush shall have nylon bristles, titanium wires, and polypropylene tips. Brush interference fit with the ID of the tube shall not exceed **0.025 inch (0.6 mm)**.
 - b. Basket: Single-piece polypropylene basket with neck OD to press fit inner diameter of tube. Design shall provide for insertion of eddy current probe or removal of brushes without removing baskets from the valve.
 - c. Four-Way Valve:
 - 1) Construct valve body of carbon steel with internal sealing parts of hard rubber and Type 304 stainless steel.
 - 2) Configure valve with parallel flow connections to minimize field installation piping.
 - 3) Construct to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, at a system working pressure equal to condenser.
 - 4) Pipe connections shall be flanged.
 - 5) Valve manufacturer to test and certify a maximum leakage rate of less than 0.05 percent of the design flow rate at operation conditions of maximum differential pressure.
 - 6) Hydrostatically test to 1.5 times the design working pressure.
 - 7) Design the valve to cause no more than **0.5-psig (3-kPa)** pressure drop at design flow conditions.
 - 8) Provide valve with valve-mounted indicating/warning light, which shall light before the valve begins rotation.
 - 9) Valve Actuator: Mount electric actuator to operate valve.

OR

Valve Actuator: Mount pneumatic piston-type actuator to operate valve. Actuator shall be suitable for operation using field-supplied air pressure.
 - 10) Position Switches: Factory mount microswitches on the valve to indicate the complete turn of valve in both normal and reverse flow.
 - d. Control Panel: Factory or field mount a control panel on chiller. Control panel shall include the following features:
 - 1) NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, enclosure.
 - 2) Timer to automatically initiate the cleaning cycle over a 24-hour period.
 - 3) Manual override of preset cleaning cycle.
 - 4) Visual indication of "Power On," "Diverter Position," "Normal Flow," "Reverse Flow," and "Valve Malfunction" indicating a slow turn or incomplete valve turn.

- 5) For pneumatic actuators, mount four-way solenoid valve for actuator operation in the control panel.
- 6) Flow-switch bypass.
- 7) Unloading signal to chiller.

R. Source Quality Control

1. Perform functional tests **OR** run tests, **as directed**, of chillers before shipping.
2. Factory test and inspect absorber, generator, evaporator and condenser according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Pressure test tube-side of heat exchangers, including water boxes, to 1.5 times the rated pressure. Vacuum and pressure test shells for leaks.
3. Rate sound power level according to ARI 575.
4. Factory performance test chillers, before shipping, according to ARI 560, **as directed**.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with condenser fluid at design conditions.
OR
Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with varying entering condenser-fluid temperature from design to minimum conditions in 5 deg F (3 deg C) increments.
OR
At one **OR** two **OR** three **OR** four **OR** five **OR** 10, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
5. Factory sound test chillers, before shipping, according to ARI 575, **as directed**.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Chiller operating at calculated worst-case sound condition.
 - 3) At one **OR** two **OR** three **OR** four **OR** five, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
6. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.
7. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.

1.3 EXECUTION

A. Chiller Installation

1. Install chillers on support structure indicated.
2. Equipment Mounting: Install chiller on concrete bases using elastomeric pads. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: 1/4 inch (6 mm) **OR** 1/2 inch (13 mm), **as directed**.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Equipment Mounting: Install chiller using elastomeric pads. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

- a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm), as directed.**
 4. Equipment Mounting: Install chiller on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 5. Install chillers with seismic-restraint device. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 6. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 7. Maintain manufacturer's recommended clearances for service and maintenance.
 8. Charge chiller with absorbent and refrigerant if not factory charged.
 9. Install separate devices furnished by manufacturer and not factory installed.
 10. Insulate hot and cold chiller surfaces that are recommended by chiller manufacturer to be insulated, and are not factory insulated. Comply with requirements in Division 23 Section "Hvac Insulation".
- B. Heat-Exchanger, Brush-Cleaning System Installation
1. Install brush-cleaning system control panel adjacent to chiller control panel.
 2. Arrange piping to provide service access to four-way valve assembly without affecting access to chiller. Secure valve to prevent lateral movement and vibration during operation.
 3. Provide field electric power, as required, to each system control panel and electric actuated valve.
 4. Provide pneumatic piping with pressure regulator and isolation valve to each pneumatic supply connection. Coordinate field source of air with manufacturer to ensure that requirements are satisfied for proper valve operation.
 5. Interconnect brush-cleaning system controls with chiller controls. Coordinate requirements to ensure safe, trouble-free operation.
 6. Functionally test the entire brush-cleaning system, including the valve, actuator, position indicator, and control panel, with chiller in operation.
- C. Connections
1. Comply with requirements in Division 23 Section "Hydronic Piping" for hydronic piping. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Comply with requirements in Division 23 Section "Steam And Condensate Heating Piping" for steam and condensate piping. Drawings indicate general arrangement of piping, fittings, and specialties.
 3. Install piping adjacent to chiller to allow service and maintenance.
 4. Generator Steam Piping Connections:
 - a. Connect steam piping with trapped drip leg, gate valve, strainer, control valve, and pressure gage. Install pressure reducing valve and safety relief valve upstream from steam-control valve to protect control valve from excessive steam pressure. Make connections to chiller with a flange **OR** union, **as directed.**
 - b. Connect steam condensate piping with vacuum breaker, trapped drip leg, gate valve, strainer, float and thermostatic trap(s), condensate cooler, **as directed,** condensate receiver, **as directed,** condensate receiver and pump, **as directed,** and check valve. Make connections to chiller with a flange **OR** union, **as directed.**
 5. Generator Hot-Water Connections: Connect to generator inlet with shutoff valve, strainer, **as directed,** flexible connector, **as directed,** control valve, thermometer, and plugged tee with shutoff valve and pressure gage. Connect to generator outlet with shutoff valve, check valve, balancing valve, flexible connector, **as directed,** flow switch, thermometer, plugged tee with

shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.

6. Evaporator-Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with shutoff valve and pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
7. Absorber/Condenser-Fluid Connections: Connect to inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with shutoff valve and pressure gage. Connect to outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
 - a. If not factory furnished or installed, provide pipe connecting fluid connection of absorber discharge and condenser inlet.
8. Refrigerant Pressure Relief Device Connections: Extend vent piping **OR** separate vent piping for each chiller, **as directed**, to the outdoors without valves or restrictions. Comply with ASHRAE 15. Connect to chiller pressure relief device with flexible connector and dirt leg with drain valve.
9. Extend purge vent piping **OR** separate purge vent piping for each chiller, **as directed**, to the outdoors. Comply with ASHRAE 15.
10. Connect each chiller drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection.

D. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Operate chiller for run-in period.
 - c. Verify that absorbent and refrigerant charge is sufficient and chiller has been leak tested.
 - d. Verify that pumps are installed and functional.
 - e. Verify that thermometers and gages are installed.
 - f. Operate chiller for run-in period.
 - g. Verify that refrigerant pressure relief device is vented outside.
 - h. Verify proper motor rotation.
 - i. Verify static deflection of vibration isolators including deflection during chiller startup and shutdown.
 - j. Verify and record performance of fluid flow and low-temperature interlocks for evaporator and condenser.
 - k. Verify and record performance of chiller protection devices.
 - l. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assembly, installation, and connection.
3. Prepare test and inspection startup reports.

E. Demonstration

1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain chillers.

END OF SECTION 23 64 13 16a

SECTION 23 64 16 16 - CENTRIFUGAL WATER CHILLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for centrifugal water chillers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Packaged, water-cooled, electric-motor-driven centrifugal chillers.
 - b. Packaged, portable refrigerant recovery units.
 - c. Heat-exchanger, brush-cleaning system.

C. Definitions

1. BAS: Building automation system.
2. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
3. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in terms of Btu/h to the total power input given in terms of watts at any given set of rating conditions.
4. IPLV: Integrated part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and referenced to ARI standard rating conditions.
5. **kW/Ton (kW/kW)**: The ratio of total power input of the chiller in kilowatts to the net refrigerating capacity in **tons (kW)** at any given set of rating conditions.
6. NPLV: Nonstandard part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and intended for operating conditions other than the ARI standard rating conditions.

D. Performance Requirements

1. Seismic Performance: Centrifugal chillers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Condenser-Fluid Temperature Performance:
 - a. Startup Condenser-Fluid Temperature: Chiller shall be capable of starting with an entering condenser-fluid temperature of **60 deg F (16 deg C) OR 55 deg F (13 deg C) OR 40 deg F (4 deg C), as directed**, and providing stable operation until the system temperature is elevated to the minimum operating entering condenser-fluid temperature.
 - b. Minimum Operating Condenser-Fluid Temperature: Chiller shall be capable of continuous operation over the entire capacity range indicated with an entering condenser-fluid temperature of **65 deg F (18 deg C) OR 60 deg F (16 deg C) OR 55 deg F (13 deg C), as directed**.
 - c. Make factory modifications to standard chiller design if necessary to comply with performance indicated.
3. Site Altitude: Chiller shall be suitable for altitude at which installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.
4. Performance Tolerance: Comply with the following in lieu of ARI 550/590, **as directed**:
 - a. Allowable Capacity Tolerance: Zero percent.
 - b. Allowable IPLV/NPLV Performance Tolerance: Zero percent.

E. Submittals

1. Product Data: For each type of product indicated. Include refrigerant, rated capacities, operating characteristics, furnished specialties, and accessories.
2. LEED Submittal:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, load distribution, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
4. Certificates: For certification required in "Quality Assurance" Article.
5. Seismic Qualification Certificates: For chillers, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
6. Startup service reports.
7. Operation and maintenance data.
8. Warranty: Sample of special warranty.

F. Quality Assurance

1. ARI Certification: Certify chiller according to ARI 550 certification program.
2. ARI Rating: Rate chiller performance according to requirements in ARI 550/590.
3. ASHRAE Compliance:
 - a. ASHRAE 15 for safety code for mechanical refrigeration.
 - b. ASHRAE 147 for refrigerant leaks, recovery, and handling and storage requirements.
4. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
5. ASME Compliance: Fabricate and label chillers to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, as applicable to chiller design. For chillers charged with R-134a refrigerant, include an ASME U-stamp and nameplate certifying compliance.
6. Comply with NFPA 70.
7. Comply with requirements of UL and UL Canada, and include label by a qualified testing agency showing compliance.
8. Green Seal Compliance: Signed by manufacturer **OR** Green Seal, **as directed**, certifying compliance with GS-31.

G. Delivery, Storage, And Handling

1. Ship chillers from the factory fully charged with refrigerant.
OR
Ship each chiller with a full charge of refrigerant. Charge each chiller with nitrogen if refrigerant is shipped in containers separate from chiller.
2. Ship each oil-lubricated chiller with a full charge of oil.
 - a. Ship oil factory installed in chiller **OR** in containers separate from chiller, **as directed**.
3. Package chiller for export shipping in totally enclosed bagging **OR** crate **OR** crate with bagging, **as directed**.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chillers that fail in materials or workmanship within specified warranty period.
 - a. Extended warranties include, but are not limited to, the following:
 - 1) Complete chiller including refrigerant and oil charge.

OR

- Complete compressor and drive assembly including refrigerant and oil charge.
- OR**
- Refrigerant **OR** Refrigerant and oil, **as directed**, charge.
- 2) Parts only **OR** Parts and labor, **as directed**.
- 3) Loss of refrigerant charge for any reason.
- b. Warranty Period: Two **OR** Three **OR** Four **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Unit

1. Description: Factory-assembled and -tested chiller complete with compressor, compressor motor, compressor motor controller, evaporator **OR** lubrication system evaporator, **as directed**, condenser, heat-reclaim condenser as indicated, controls, interconnecting unit piping and wiring, and indicated accessories.
 - a. Disassemble chiller into major assemblies as required by the installation after factory testing and before packaging for shipment.
 - b. For chillers with dual compressors, provide each compressor with a dedicated motor and motor controller, and provide for continued operation when either compressor-drive assembly fails or is being serviced.
2. Fabricate chiller mounting base with reinforcement strong enough to resist chiller movement during a seismic event when chiller is anchored to field support structure.

B. Compressor-Drive Assembly

1. Description: Single-stage or multistage, variable-displacement, centrifugal-type compressor driven by an electric motor.
 - a. Where indicated, provide oil-free compressor technology using a permanent magnet synchronous motor, magnetic bearings, integral variable frequency controller, and digital electronic controls.
2. Compressor:
 - a. Casing: Cast iron, precision ground.
 - b. Impeller: High-strength cast aluminum or cast-aluminum alloy on carbon- or alloy-steel shaft.
3. Drive: Direct-drive, hermetic **OR** Gear-drive, hermetic **OR** Gear-drive, open **OR** Direct- or gear-drive, hermetic **OR** Direct- or gear-drive, open or hermetic, **as directed**, design using an electric motor as the driver.
 - a. Gear Drives: For chillers with gear drives, provide single- or double-helical gear design continuously coated with oil while chiller is operating. Gears shall comply with American Gear Manufacturer Association standards.
 - b. Drive Coupling: For chillers with open drives, provide flexible disc with all-metal construction and no wearing parts to ensure long life without the need for lubrication.
 - c. Seals: Seal drive assembly to prevent refrigerant leakage.
4. Compressor Motor:
 - a. Continuous-duty, squirrel-cage, induction-type, two-pole motor with energy efficiency required to suit chiller energy efficiency indicated.
 - b. Factory mounted, aligned, and balanced as part of compressor assembly before shipping.
 - c. Motor shall be of sufficient capacity to drive compressor throughout entire operating range without overload and with sufficient capacity to start and accelerate compressor without damage.
 - d. For chillers with open drives, provide motor with open-dripproof **OR** weather-protected, Type I **OR** weather-protected, Type II **OR** totally enclosed, **as directed**, enclosure.
 - e. Provide motor with thermistor or RTD in single motor winding **OR** each of three-phase motor windings, **as directed**, to monitor temperature and report information to chiller control panel.

- f. Provide motor with thermistor or RTD to monitor bearing temperature and report information to chiller control panel.
 - g. Provide open-drive motor with internal electric heater, internally powered from chiller power supply.
 5. Vibration Balance: Balance chiller compressor and drive assembly to provide a precision balance that is free of noticeable vibration over the entire operating range.
 - a. Overspeed Test: 25 percent above design operating speed.
 6. Service: Easily accessible for inspection and service.
 - a. Compressor's internal components shall be accessible without having to remove compressor-drive assembly from chiller.
 - b. Provide lifting lugs or eyebolts attached to casing.
 7. Economizers: For multistage chillers, provide interstage economizers.
 8. Capacity Control: Modulating, variable-inlet, guide-vane assembly combined with hot-gas bypass, if necessary, to achieve performance indicated.
 - a. Maintain stable operation that is free of surge, cavitation, and vibration throughout range of operation. Configure to achieve most energy-efficient operation possible.
 - b. Operating Range: From 100 to 15 **OR** 10 **OR** 5 **OR** zero, **as directed**, percent of design capacity.
 - c. Condenser-Fluid Unloading Requirements over Operating Range: Constant-design entering condenser-fluid temperature **OR** Drop-in entering condenser-fluid temperature of **2.5 deg F (1.4 deg C)** for each 10 percent in capacity reduction, **as directed**.
 - d. Chillers with variable frequency controllers shall modulate compressor speed with variable-inlet, guide-vane control to achieve optimum energy efficiency.
 9. Oil Lubrication System: Consisting of pump, filtration, heater, **as directed**, cooler, factory-wired power connection, and controls.
 - a. Provide lubrication to bearings, gears, and other rotating surfaces at all operating, startup, coastdown, and standby conditions including power failure.
 - b. Manufacturer's standard method **OR** Thermostatically controlled oil heater properly sized, **as directed**, to remove refrigerant from oil.
 - c. Oil filter **OR** Dual oil filters, one redundant, **as directed**, shall be the easily replaceable cartridge type, minimum 0.5-micron efficiency, with means of positive isolation while servicing.
 - d. Refrigerant **OR** Water, **as directed**, -cooled oil cooler.
 - e. Factory-installed and pressure-tested piping with isolation valves and accessories.
 - f. Oil compatible with refrigerant and chiller components.
 - g. Positive visual indication of oil level.
- C. Refrigeration
1. Refrigerant:
 - a. Type: R-123; ASHRAE 34, Class B1 **OR** R-134a; ASHRAE 34, Class A1, as directed.
 - b. Compatibility: Chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 2. Refrigerant Flow Control: Manufacturer's standard refrigerant flow-control device satisfying performance requirements indicated.
 3. Pressure Relief Device:
 - a. Comply with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - b. For Chillers Using R-123: Rupture disc constructed of frangible carbon **OR** Spring-loaded, pressure relief valve; single- or multiple-reseating type, **as directed**.
 - c. For Chillers Using R-134a: ASME-rated, spring-loaded, pressure relief valve; single- or multiple-reseating type. Pressure relief valve(s) shall be provided for each heat exchanger. Condenser shall have dual valves with one being redundant and configured to allow either valve to be replaced without loss of refrigerant.

4. Refrigeration Transfer: Provide service valves and other factory-installed accessories required to facilitate transfer of refrigerant from chiller to a remote refrigerant storage and recycling system. Comply with requirements in ASHRAE 15 and ASHRAE 147.
 5. Refrigerant Isolation for Chillers Using R-134a: Factory install positive shutoff, manual, **as directed**, isolation valves in the compressor discharge line to the condenser and the refrigerant liquid line leaving the condenser to allow for isolation and storage of full refrigerant charge in the chiller condenser shell. In addition, provide isolation valve on suction side of compressor from evaporator to allow for isolation and storage of full refrigerant charge in the chiller evaporator shell, **as directed**.
 6. Purge System:
 - a. For chillers operating at subatmospheric pressures (using R-123 refrigerant), factory install an automatic purge system for collection and return of refrigerant and lubricating oil and for removal of noncondensables including, but not limited to, water, water vapor, and noncondensable gases.
 - b. System shall be a thermal purge design, refrigerant or air cooled, equipped with a carbon filter that includes an automatic regeneration cycle.
 - c. Factory wire to chiller's main power supply and system complete with controls, piping, and refrigerant valves to isolate the purge system from the chiller.
 - d. Construct components of noncorrodible materials.
 - e. Controls shall interface with chiller control panel to indicate modes of operation, set points, data reports, diagnostics, and alarms.
 - f. Efficiency of not more than **0.02 lb of refrigerant per pound of air (9 g of refrigerant per gram of air)** when rated according to ARI 580.
 - g. Operation independent of chiller per ASHRAE 147.
 7. Positive-Pressure System:
 - a. For chillers operating at subatmospheric pressures (using R-123 refrigerant), factory install an automatic positive-pressure system.
 - b. During nonoperational periods, positive-pressure system shall automatically maintain a positive pressure for atmosphere in the refrigerant pressure vessel of not less than **0.5 psig (3 kPa)** (adjustable) up to a pressure that remains within the vessel design pressure limits.
 - c. System shall be factory wired and include controller, electric heat, pressure transmitter, or switch.
- D. Evaporator
1. Description: Shell-and-tube design with water in tubes and refrigerant surrounding tubes within shell. Shell is separate from condenser.
 2. Shell Material: Carbon-steel rolled plates with continuously welded seams or seamless pipe.
 3. Designed to prevent liquid refrigerant carryover from entering compressor.
 4. Provide evaporator with sight glass or other form of positive visual verification of liquid-refrigerant level.
 5. Tubes:
 - a. Individually replaceable from either end and without damage to tube sheets and other tubes.
 - b. Mechanically expanded into end sheets and physically attached to intermediate tube sheets.
 - c. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - d. Nominal OD: Manufacturer's choice **OR** **3/4 inch (19 mm)** **OR** **1 inch (25 mm)**, **as directed**.
 - e. Minimum Wall Thickness: Manufacturer's choice **OR** **0.025 inch (0.6 mm)** **OR** **0.028 inch (0.7 mm)** **OR** **0.035 inch (0.9 mm)**, **as directed**.
 - f. External Finish: Manufacturer's standard.
 - g. Internal Finish: Enhanced **OR** Smooth, **as directed**.
 6. End Tube Sheets: Continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
 7. Intermediate Tube Sheets: Installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.

8. Water Box:
 - a. Cast-iron or carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine, **as directed**, type for water box with piping connections. Standard type for water box without piping connections.
 - c. Provide water boxes and marine water-box covers, **as directed**, with lifting lugs or eyebolts.
 - d. Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine water-box covers.
 - e. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - f. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - g. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
9. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
OR
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.

E. Condenser

1. Description: Shell-and-tube design with water in tubes and refrigerant surrounding tubes within shell. Shell is separate from evaporator.
2. Shell Material: Carbon-steel rolled plates with continuously welded seams or seamless pipe.
3. Designed to prevent direct impingement of high-velocity hot gas from compressor discharge on tubes.
4. Provide condenser with sight glass or other form of positive visual verification of refrigerant charge and condition.
5. Tubes:
 - a. Individually replaceable from either end and without damage to tube sheets and other tubes.
 - b. Mechanically expanded into end sheets and physically attached to intermediate tube sheets.
 - c. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - d. Nominal OD: Manufacturer's choice **OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**
 - e. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - f. External Finish: Manufacturer's standard.
 - g. Internal Finish: Enhanced **OR** Smooth, **as directed**.
6. End Tube Sheets: Continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
7. Intermediate Tube Sheets: Installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.
8. Water Box:
 - a. Cast-iron or carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine, **as directed**, type for water box with piping connections. Standard type for water box without piping connections.
 - c. Provide water boxes and marine water-box covers, **as directed**, with lifting lugs or eyebolts.
 - d. Hinged **OR** Davited, **as directed**, water boxes.
OR

- Hinged **OR** Davited, **as directed**, marine water-box covers.
- e. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - f. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - g. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
9. Additional Corrosion Protection:
- a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.
- OR**
Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.
- F. Heat-Reclaim Condenser
1. Description: Shell-and-tube design with water in tubes and refrigerant surrounding tubes within shell. Shell is separate from evaporator and condenser.
 2. Shell Material: Carbon-steel rolled plates with continuously welded seams or seamless pipe.
 3. Designed to prevent direct impingement of high-velocity hot gas from compressor discharge on tubes.
 4. Tubes:
 - a. Individually replaceable from either end and without damage to tube sheets and other tubes.
 - b. Mechanically expanded into end sheets and physically attached to intermediate tube sheets.
 - c. Material: Copper **OR** Copper-nickel alloy **OR** Stainless steel **OR** Titanium, **as directed**.
 - d. Nominal OD: Manufacturer's choice **OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**.
 - e. Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - f. External Finish: Manufacturer's standard.
 - g. Internal Finish: Enhanced **OR** Smooth, **as directed**.
 5. End Tube Sheets: Continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
 6. Intermediate Tube Sheets: Installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.
 7. Water Box:
 - a. Cast-iron or carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - b. Standard **OR** Marine, **as directed**, type for water box with piping connections. Standard type for water box without piping connections.
 - c. Provide water boxes and marine water-box covers, **as directed**, with lifting lugs or eyebolts.
 - d. Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine water-box covers.
 - e. Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - f. Thermistor or RTD temperature sensor factory installed in each nozzle.
 - g. Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
 8. Additional Corrosion Protection:
 - a. Electrolytic corrosion-inhibitor anode.
 - b. Coat wetted surfaces with a corrosion-resistant finish.

OR

Using same material as tubes, clad surfaces of end tube sheets in contact with fluid. Coat other wetted surfaces, including water boxes, with a corrosion-resistant finish.

G. Insulation

1. Closed-cell, flexible elastomeric thermal insulation complying with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - a. Thickness: **3/4 inch (19 mm) OR 1-1/2 inches (38 mm), as directed.**
2. Adhesive: As recommended by insulation manufacturer.
3. Factory-applied insulation over all cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator shell and end tube sheets, evaporator water boxes including nozzles, refrigerant suction pipe from evaporator to compressor, cold surfaces of compressor, refrigerant-cooled motor, and auxiliary piping.
 - a. Apply adhesive to 100 percent of insulation contact surface.
 - b. Before insulating steel surfaces, prepare surfaces for paint, and prime and paint as indicated for other painted components. Do not insulate unpainted steel surfaces.
 - c. Seal seams and joints to provide a vapor barrier.
 - d. After adhesive has fully cured, paint exposed surfaces of insulation to match other painted parts.

H. Electrical

1. Factory installed and wired, and functionally tested at factory before shipment.
2. Single-point, field-power connection to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
 - a. Branch power circuit to each motor, electric heater, dedicated electrical load, and controls with disconnect switch or circuit breaker, **as directed**.
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit-trip set point.
 - b. NEMA ICS 2-rated motor controller for auxiliary motors, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller for each variable-speed motor furnished.
 - c. Control-circuit transformer with primary and secondary side fuses.
3. Terminal blocks with numbered and color-coded, **as directed**, wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
4. Factory-installed wiring outside of enclosures shall be in metal raceway except make terminal connections with not more than a **24-inch (610-mm)** length of liquidtight **OR** flexible metallic, **as directed**, conduit.
5. Factory install and wire capacitor bank for the purpose of power factor correction to 0.95 at all operating conditions.
 - a. If capacitors are mounted in a dedicated enclosure, use same NEMA enclosure type as motor controller. Provide enclosure with service entrance knockouts and bushings for conduit.
 - b. Capacitors shall be non-PCB dielectric fluid, metallized electrode design, low loss with low-temperature rise. The kVAR ratings shall be indicated and shall not exceed the maximum limitations set by NFPA 70. Provide individual cells as required.
 - c. Provide each cell with current-limiting replaceable fuses and carbon-film discharge resistors to reduce residual voltage to less than 50 V within one minute after de-energizing.
 - d. Provide a ground terminal and a terminal block or individual connectors for phase connection.

I. Motor Controller

1. Enclosure: Factory installed, unit mounted **OR** Factory furnished, field mounted, **as directed**, NEMA 250 **OR** NEMA ICS 6, **as directed**, Type 1 **OR** Type 4 **OR** Type 4X **OR** Type 12, **as directed**, with hinged full-front access door with lock and key or padlock and key, **as directed**.
2. Control Circuit: Obtained from integral control power transformer, **as directed**, with a control power transformer **OR** source, **as directed**, of enough capacity to operate connected control devices.
3. Overload Relay: Shall be sized according to UL 1995 or shall be an integral component of chiller control microprocessor.
4. Across-the-Line Controller: NEMA ICS 2, Class A, full voltage, nonreversing; include isolation switch and current-limiting fuses.
5. Star-Delta, Reduced-Voltage Controller: NEMA ICS 2, closed transition.
6. Autotransformer Reduced-Voltage Controller: NEMA ICS 2, closed transition; include isolation switch and current-limiting fuses.
7. Solid-State, Reduced-Voltage Controller: NEMA ICS 2.
 - a. Surge suppressor in solid-state power circuits providing three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - b. Visual indication of motor and control status, including the following conditions:
 - 1) Controller on.
 - 2) Overload trip.
 - 3) Loss of phase.
 - 4) Starter fault.
8. Accessories: Devices shall be factory installed in controller enclosure unless otherwise indicated.
 - a. Externally Operated, Door-Interlocked, **as directed**, Disconnect: Fused disconnect switch **OR** Nonfused disconnect switch **OR** Circuit breaker, **as directed**. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
 - b. Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.
 - c. Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
 - d. Control Relays: Time-delay relays.
 - e. Elapsed-Time Meters: Numerical readout in hours on face of enclosure.
 - f. Number-of-Starts Counter: Numerical readout on face of enclosure.
 - g. Meters: Panel type, **2-1/2 inches (64 mm) OR 4-1/4 inches (108 mm)**, **as directed**, with 90 **OR** 120 **OR** 270, **as directed**,-degree scale and 1 **OR** 2, **as directed**, percent accuracy. Where indicated, provide transfer device with an off position. Meters shall indicate the following:
 - 1) Ammeter: Output current for each phase, with current sensors rated to suit application.
 - 2) Voltmeter: Output voltage for each phase.
 - 3) Frequency Meter, **as directed**: Output frequency.
 - 4) Real-time clock with current time and date.
 - 5) Total run time.

OR

Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:

 - 1) Selectable, digital display of the following:
 - a) Phase Currents, Each Phase: Plus or minus 1 percent.
 - b) Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
 - c) Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
 - d) Three-Phase Real Power: Plus or minus 2 percent.
 - e) Three-Phase Reactive Power: Plus or minus 2 percent.
 - f) Power Factor: Plus or minus 2 percent.
 - g) Frequency: Plus or minus 0.5 percent.
 - h) Integrated Demand with Demand Interval Selectable from Five to 60 Minutes: Plus or minus 2 percent.

- i) Accumulated energy, in megawatt hours (joules), plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
 - 2) Mounting: Display and control unit flush or semirecessed in instrument compartment door.
 - h. Phase-Failure, Phase-Reversal, Undervoltage Relays: Solid-state sensing circuit with adjustable undervoltage setting and isolated output contacts for hardwired connection.
 - i. Power Protection: Chiller shall shut down within six cycles of power interruption.
- J. Variable Frequency Controller
 1. Motor controller shall be factory mounted and wired on the chiller to provide a single-point, field-power termination to the chiller and its auxiliaries.
 2. Description: NEMA ICS 2; listed and labeled as a complete unit and arranged to provide variable speed by adjusting output voltage and frequency.
 3. Enclosure: Unit mounted, NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, with hinged full-front access door with lock and key.
 4. Integral Disconnecting Means: Door-interlocked, **as directed**, NEMA AB 1, instantaneous-trip circuit breaker with lockable handle. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
 5. Technology: Pulse width modulated (PWM) output with insulated gate bipolar transistors (IGBT); suitable for variable torque loads.
 6. Controller shall consist of a rectifier converter section, a digital/analog driver regulator section, and an inverter output section.
 - a. Rectifier section shall be a full-wave diode bridge that changes fixed-voltage, fixed-frequency, ac line power to a fixed dc voltage. Silicon controller rectifiers, current source inverters, and paralleling of devices are unacceptable. Rectifier shall be insensitive to phase rotation of the ac line.
 - b. Regulator shall provide full digital control of frequency and voltage.
 - c. Inverter section shall change fixed dc voltage to variable-frequency, variable ac voltage, for application to a squirrel-cage motor. Inverter shall produce a sine-coded, pulse width modulated (PWM) output wave form and shall conduct no radio-frequency interference back to the input power supply.
 7. Output Rating: Three phase; with voltage proportional to frequency throughout voltage range.
 8. Operating Requirements:
 - a. Input AC Voltage Tolerance: 460-V ac, plus 10 percent or 506 V maximum, **as directed**.
 - b. Input frequency tolerance of 60 Hz, plus or minus 2 Hz.
 - c. Capable of driving full load, without derating, under the following conditions:
 - 1) Ambient Temperature: 0 to 50 deg C.
 - 2) Relative Humidity: Up to 90 **OR** 95, **as directed**, percent (noncondensing).
 - 3) Altitude: **3300 feet (1005 m) OR 6600 feet (2010 m), as directed**.
 - d. Minimum Efficiency: 96 percent at 60 Hz, full load.
 - e. Minimum Displacement Primary-Side Power Factor: 95 percent without harmonic filter, 98 percent with harmonic filter.
 - f. Overload Capability: 1.05 times the full-load current for 7 seconds.
 - g. Starting Torque: As required by compressor-drive assembly.
 - h. Speed Regulation: Plus or minus 1 percent.
 - i. Isolated control interface to allow controller to follow control signal over a 10:1 speed range.
 - j. To avoid equipment resonant vibrations, provide critical speed lockout circuitry to allow bands of operating frequency at which controller shall not operate continuously.
 - k. Capable of being restarted into a motor coasting in either the forward or reverse direction without tripping.
 9. Internal Adjustability Capabilities:
 - a. Minimum Output Frequency: 6 Hz.
 - b. Maximum Output Frequency: 60 Hz.
 - c. Acceleration: 2 seconds to a minimum of 60 seconds.

- d. Deceleration: 2 seconds to a minimum of 60 seconds.
 - e. Current Limit: 30 percent to a minimum of 100 percent of maximum rating.
 - 10. Self-Protection and Reliability Features: Subjecting the controller to any of the following conditions shall not result in component failure or the need for replacement:
 - a. Overtemperature.
 - b. Short circuit at controller output.
 - c. Ground fault at controller output. Variable frequency controller shall be able to start a grounded motor.
 - d. Open circuit at controller output.
 - e. Input undervoltage.
 - f. Input overvoltage.
 - g. Loss of input phase.
 - h. Reverse phase.
 - i. AC line switching transients.
 - j. Instantaneous overload, line to line or line to ground.
 - k. Sustained overload exceeding 100 percent of controller rated current.
 - l. Starting a rotating motor.
 - 11. Motor Protection: Controller shall protect motor against overvoltage and undervoltage, phase loss, reverse phase, overcurrent, overtemperature, and ground fault.
 - 12. Automatic Reset and Restart: Capable of three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Controller shall be capable of automatic restart on phase-loss and overvoltage and undervoltage trips.
 - 13. Visual Indication: On face of controller enclosure or chiller control enclosure; indicating the following conditions:
 - a. Power on.
 - b. Run.
 - c. Overvoltage.
 - d. Line fault.
 - e. Overcurrent.
 - f. External fault.
 - g. Motor speed (percent).
 - h. Fault or alarm status (code).
 - i. DC-link voltage.
 - j. Motor output voltage.
 - k. Input kilovolt amperes.
 - l. Total power factor.
 - m. Input kilowatts.
 - n. Input kilowatt-hours.
 - o. Three-phase input voltage.
 - p. Three-phase output voltage.
 - q. Three-phase input current.
 - r. Three-phase output current.
 - s. Three-phase input voltage total harmonic distortion.
 - t. Three-phase input current total harmonic distortion.
 - u. Output frequency (Hertz).
 - v. Elapsed operating time (hours).
 - w. Diagnostic and service parameters.
 - 14. Operator Interface: At controller or chiller control panel; with start-stop and auto-manual selector with manual-speed-control potentiometer.
 - 15. Control Signal Interface:
 - a. Electric Input Signal Interface: A minimum of two analog inputs (0 to 10 V or 0/4-20 mA) and six programmable digital inputs.
 - 16. Active Harmonic Distortion Filter: Factory mounted and wired to limit total voltage and current distortion to 5 percent.
- OR**
- Input Line Conditioning: as directed by the Owner .

17. Cooling: Air **OR** Refrigerant **OR** Water, **as directed**, cooled.
18. Accessories: Devices shall be factory installed in controller enclosure unless otherwise indicated.
 - a. Control Relays: Auxiliary and adjustable time-delay relays.
19. Chiller Capacity Control Interface: Equip chiller with adaptive control logic to automatically adjust the compressor motor speed and the compressor pre-rotation inlet vane position independently to achieve maximum part-load efficiency in response to sensor inputs that are integral to the chiller controls.

K. Controls

1. Control: Standalone and microprocessor based, with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.
2. Enclosure: Unit mounted, NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, hinged or lockable; factory wired with a single-point, field-power connection and a separate control circuit.
3. Operator Interface: Multiple-character digital or graphic display with dynamic update of information and with keypad or touch-sensitive display located on front of control enclosure. In either imperial or metric units selectable through the interface, display the following information:
 - a. Date and time.
 - b. Operating or alarm status.
 - c. Fault history with not less than last 10 faults displayed.
 - d. Set points of controllable parameters.
 - e. Trend data.
 - f. Operating hours.
 - g. Number of chiller starts.
 - h. Outdoor-air temperature or space temperature if required for chilled-water reset.
 - i. Entering- and leaving-fluid temperatures of evaporator and condenser.
 - j. Difference in fluid temperatures of evaporator and condenser.
 - k. Fluid flow of evaporator and condenser.
 - l. Fluid pressure drop of evaporator and condenser.
 - m. Refrigerant pressures in evaporator and condenser.
 - n. Refrigerant saturation temperature in evaporator and condenser shell.
 - o. Compressor refrigerant suction and discharge temperature.
 - p. Compressor bearing temperature.
 - q. Motor bearing temperature.
 - r. Motor winding temperature.
 - s. Oil temperature.
 - t. Oil discharge pressure.
 - u. Phase current.
 - v. Percent of motor rated load amperage.
 - w. Phase voltage.
 - x. Demand power (kilowatts).
 - y. Energy use (kilowatt-hours).
 - z. Power factor.
 - aa. For chillers equipped with variable frequency controllers and harmonic filters, include the following:
 - 1) Output voltage and frequency.
 - 2) Voltage total harmonic distortion for each phase.
 - 3) Supply current total demand distortion for each phase.
 - 4) Inlet vane position.
 - 5) Controller internal ambient temperature.
 - 6) Heatsink temperature.
 - bb. Purge suction temperature if purge system is provided.
 - cc. Purge elapsed time if purge system is provided.
4. Control Functions:
 - a. Manual or automatic startup and shutdown time schedule.

- b. Entering and leaving chilled-water temperatures, control set points, and motor load limits. Evaporator fluid temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
- c. Current limit and demand limit.
- d. Condenser-fluid temperature.
- e. External chiller emergency stop.
- f. Variable evaporator flow.
- g. Thermal storage.
- h. Heat reclaim.
- 5. Manually Reset Safety Controls: The following conditions shall shut down chiller and require manual reset:
 - a. Low evaporator pressure **OR** temperature, **as directed**; high condenser pressure.
 - b. Low evaporator fluid temperature.
 - c. Low oil differential pressure.
 - d. High or low oil pressure.
 - e. High oil temperature.
 - f. High compressor-discharge temperature.
 - g. Loss of condenser-fluid flow.
 - h. Loss of evaporator fluid flow.
 - i. Motor overcurrent.
 - j. Motor overvoltage.
 - k. Motor undervoltage.
 - l. Motor phase reversal.
 - m. Motor phase failure.
 - n. Sensor- or detection-circuit fault.
 - o. Processor communication loss.
 - p. Motor controller fault.
 - q. Extended compressor surge.
 - r. Excessive air-leakage detection for chillers using R-123 refrigerant.
- 6. Trending: Capability to trend analog data of up to five parameters simultaneously over an adjustable period and frequency of polling.
- 7. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: view only; view and operate; and view, operate, and service.
- 8. Control Authority: At least four conditions: Off, local manual control at chiller, local automatic control at chiller, and automatic control through a remote source.
- 9. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer and a notebook computer, **as directed**.
- 10. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display chiller status and alarms.
 - a. Hardwired Points:
 - 1) Monitoring: On-off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt-hours) **OR** power factor, **as directed**.
 - 2) Control: On-off operation, chilled-water, discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - b. ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the chiller from an operator workstation. Control features and monitoring points displayed locally at chiller control panel shall be available through the BAS.
- L. Finish
 - 1. Paint chiller, using manufacturer's standard procedures, except comply with the following minimum requirements:

- a. Provide at least one coat of primer with a total dry film thickness of at least **2 mils (0.05 mm)**.
 - b. Provide at least two coats of alkyd-modified, vinyl enamel **OR** epoxy **OR** polyurethane, **as directed**, finish with a total dry film thickness of at least **4 mils (0.10 mm)**.
 - c. Paint surfaces that are to be insulated before applying the insulation.
 - d. Paint installed insulation to match adjacent uninsulated surfaces.
 - e. Color of finish coat to be manufacturer's standard **OR** custom color selected by the Owner, **as directed**.
2. Provide the Owner with quart container of paint used in application of topcoat to use in touchup applications after Project Closeout.

M. Accessories

1. Flow Switches:

- a. Chiller manufacturer shall furnish a switch for each condenser **OR** evaporator and condenser, **as directed**, and verify field-mounting location before installation.
- b. Paddle Flow Switches:
 - 1) Vane operated to actuate a double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
 - 2) Contacts: Platinum alloy, silver alloy, or gold-plated switch contacts with a rating of 10 A at 120-V ac.
 - 3) Pressure rating equal to pressure rating of heat exchanger.
 - 4) Construct body and wetted parts of Type 316 stainless steel.
 - 5) House switch in a NEMA 250, Type 4, **as directed**, enclosure constructed of die-cast aluminum.
 - 6) Vane length to suit installation.

OR

Pressure Differential Switches:

- 1) Construction: Wetted parts of body and trim constructed of Type 316 stainless steel.
 - 2) Performance: Switch shall withstand, without damage, the full-pressure rating of the heat exchanger applied to either port and exhibit zero set-point shift due to variation in working pressure.
 - 3) Set Point: Screw type, field adjustable.
 - 4) Electrical Connections: Internally mounted screw-type terminal blocks.
 - 5) Switch Enclosure: NEMA 250, Type 4, **as directed**.
 - 6) Switch Action: Double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
2. Vibration Isolation:

- a. Chiller manufacturer shall furnish vibration isolation for each chiller.
- b. Neoprene Pad:

- 1) Two layers of **0.375-inch- (10-mm-)** thick, ribbed- or waffle-pattern neoprene pads separated by a 16-gage, stainless-steel plate.
- 2) Fabricate pads from 40- to 50-durometer neoprene.
- 3) Provide stainless-steel square bearing plate to load the pad uniformly between **20 and 40 psig (138 and 276 kPa)** with a **0.12- to 0.16-inch (3- to 4-mm)** deflection.

OR

Spring Isolator:

- 1) Stable in operation and designed for not less than 30 percent reserve deflection beyond actual operating conditions. Isolators shall be designed so that the Kx/Ky ratio shall be 1.0 or more for stability.
- 2) Provide PVC or neoprene-coated springs and hot-dip, galvanized-steel components. Aluminum components shall be etched and painted. Nuts, bolts, and washers shall be zinc electroplated.
- 3) Isolators shall be adjustable and with an open spring, having one or more coil springs attached to a top compression plate and a baseplate. An elastomeric pad with a minimum thickness of **0.25 inch (6 mm)** shall be bonded to the baseplate.

- 4) Spring assembly shall be removable and shall fit within a welded steel enclosure consisting of a top plate and rigid lower housing, which serves as a blocking device during installation. Isolated restraining bolts shall not be engaged during normal operation and shall connect the top plate and lower housing to prevent the isolated equipment from rising when drained of fluid.
 - 5) Isolators shall be selected for a nominal **1-inch (25-mm) OR 2-inch (50-mm), as directed**, deflection.
3. Sound Barrier:
- a. Furnish removable and reusable sound-barrier covers over the compressor housing, hermetic motor, compressor suction and discharge piping, and condenser shell.
 - b. Provide for repeated installation and removal without use of tape or caulk.
 - c. Inner and outer cover shall consist of a PTFE-impregnated fiberglass cloth enclosing heavy-density, needled fiberglass insulation material with a mass-loaded vinyl acoustic barrier.
 - d. Covers shall be double sewn and lock stitched with edges folded and sewn so no raw cut edges are exposed.
 - e. Form covers around control devices, gages, conduit, piping, and supports without degrading sound-barrier performance.
 - f. Continuously lap all exposed seams at least **2 inches (50 mm)** for better sound containment.
 - g. Permanently label each section of cover to indicate its location, description, size, and number sequence.
 - h. Randomly place stainless-steel quilting pins to prevent covers from shifting and sagging.
- N. Packaged Refrigerant Recovery Units
1. Packaged portable unit consisting of compressor, air-cooled condenser, recovery system, tank pressure gages, filter-dryer, and valving that allows for switching between liquid and vapor recovery mode. Refrigerant recovery unit shall be factory mounted on an ASME-constructed and -stamped refrigerant storage vessel that is sized to hold the full refrigerant charge of the largest chiller furnished.
- O. Heat-Exchanger, Brush-Cleaning System
1. Furnish for field installation a brush-cleaning system on each chiller condenser, **as directed**, for tube cleaning and improved heat transfer.
 2. System shall maintain tube fouling at or below design conditions without interrupting normal equipment operation.
 3. System shall consist of a brush inserted in each tube and a catch basket attached to each end of the tube. A four-way valve shall operate to reverse the direction of water flow to push the brush through the tube while removing tube deposits. Four-way reversing valve's actuator shall be controlled by a preset time cycle that provides regular tube brushing during equipment operation. Frequency of the brushing cycle shall be set up to match Project requirements.
 4. Components:
 - a. Brush: Each brush shall have nylon bristles, titanium wires, and polypropylene tips. Brush interference fit with the ID of the tube shall not exceed **0.025 inch (0.6 mm)**.
 - b. Basket: Single-piece polypropylene basket with neck OD to press fit inner diameter of tube. Design shall provide for insertion of eddy current probe or removal of brushes without removing baskets from the valve.
 - c. Four-Way Valve:
 - 1) Construct valve body of carbon steel with internal sealing parts of hard rubber and Type 304 stainless steel.
 - 2) Configure valve with parallel flow connections to minimize field installation piping.
 - 3) Construct to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, at a system working pressure equal to condenser.
 - 4) Pipe connections shall be flanged.

- 5) Valve manufacturer to test and certify a maximum leakage rate of less than 0.05 percent of the design flow rate at operation conditions of maximum differential pressure.
 - 6) Hydrostatically test to 1.5 times the design working pressure.
 - 7) Design the valve to cause no more than **0.5-psig (3-kPa)** pressure drop at design flow conditions.
 - 8) Provide valve with valve-mounted indicating/warning light, which shall light before the valve begins rotation.
 - 9) Valve Actuator: Mount electric actuator to operate valve.
OR
Valve Actuator: Mount pneumatic piston-type actuator to operate valve. Actuator shall be suitable for operation using field-supplied air pressure.
 - 10) Position Switches: Factory mount microswitches on the valve to indicate the complete turn of valve in both normal and reverse flow.
- d. Control Panel: Factory or field mount a control panel on chiller. Control panel shall include the following features:
- 1) NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, enclosure.
 - 2) Timer to automatically initiate the cleaning cycle over a 24-hour period.
 - 3) Manual override of preset cleaning cycle.
 - 4) Visual indication of "Power On," "Diverter Position," "Normal Flow," "Reverse Flow," and "Valve Malfunction" indicating a slow turn or incomplete valve turn.
 - 5) For pneumatic actuators, mount four-way solenoid valve for actuator operation in the control panel.
 - 6) Flow switch bypass.
 - 7) Unloading signal to chiller.

P. Source Quality Control

1. Perform functional **OR** functional run, **as directed**, tests of chillers before shipping.
2. Factory performance test chillers, before shipping, according to ARI 550/590.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with condenser fluid at design conditions.
OR
Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with varying entering condenser-fluid temperature from design to minimum conditions in **5 deg F (3 deg C)** increments.
OR
At one **OR** two **OR** three **OR** four **OR** five **OR** 10, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
 - b. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.
 - c. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.
3. Factory sound test chillers, before shipping, according to ARI 575, **s directed**.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Chiller operating at calculated worst-case sound condition.
 - 3) At one **OR** two **OR** three **OR** four **OR** five, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
 - b. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.
 - c. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.

4. For chillers using R-134a refrigerant, factory test and inspect evaporator and condenser **OR** condenser, and heat-reclaim condenser, **as directed**, according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
5. For chillers using R-123 refrigerant, factory test and inspect evaporator and condenser **OR** condenser and heat-reclaim condenser, **as directed**, according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Pressure test fluid side of heat exchangers, including water boxes, to 1.5 times the rated pressure. Pressure proof test refrigerant side of heat exchangers to a minimum of **45 psig (310 kPa)**. Vacuum and pressure test for leaks.
6. For chillers located indoors, rate sound power level according to ARI 575.

1.3 EXECUTION

A. Chiller Installation

1. Install chillers on support structure indicated.
2. Equipment Mounting: Install chiller on concrete bases using elastomeric pads **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm), as directed.**
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Equipment Mounting: Install chiller using elastomeric pads **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm), as directed.**
4. Equipment Mounting: Install chiller on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Maintain manufacturer's recommended clearances for service and maintenance.
6. Charge chiller with refrigerant and fill with oil if not factory installed.
7. Install separate devices furnished by manufacturer and not factory installed.

B. Heat-Exchanger, Brush-Cleaning System Installation

1. Install brush-cleaning system control panel adjacent to chiller control panel.
2. Arrange piping to provide service access to four-way valve assembly without affecting access to chiller. Secure valve to prevent lateral movement and vibration during operation.
3. Provide field electric power, as required, to each system control panel and electric actuated valve.
4. Provide pneumatic piping with pressure regulator and isolation valve to each pneumatic supply connection. Coordinate field source of air with manufacturer to ensure that requirements are satisfied for proper valve operation.

5. Interconnect brush-cleaning system controls with chiller controls. Coordinate requirements to ensure safe, trouble-free operation.
6. Functionally test the entire brush-cleaning system, including the valve, actuator, position indicator, and control panel, with chiller in operation.

C. Connections

1. Comply with requirements for piping specified in Division 23 Section(s) "Hydronic Piping" AND "Refrigerant Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to chiller to allow service and maintenance.
3. Evaporator Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
4. Condenser-Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
5. Heat-Reclaim Condenser-Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
6. Refrigerant Pressure Relief Device Connections: For chillers installed indoors, extend vent piping **OR** separate vent piping for each chiller, **as directed** to the outdoors without valves or restrictions. Comply with ASHRAE 15. Connect to chiller pressure relief device with flexible connector and dirt leg with drain valve.
7. For chillers equipped with a purge system, extend purge vent piping **OR** separate purge vent piping for each chiller, **as directed**, to the outdoors. Comply with ASHRAE 15 and ASHRAE 147.
8. Connect each chiller drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection.

D. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Verify that refrigerant charge is sufficient and chiller has been leak tested.
 - c. Verify that pumps are installed and functional.
 - d. Verify that thermometers and gages are installed.
 - e. Operate chiller for run-in period.
 - f. Check bearing lubrication and oil levels.
 - g. Verify that refrigerant pressure relief device is vented outside.
 - h. Verify proper motor rotation.
 - i. Verify static deflection of vibration isolators, including deflection during chiller startup and shutdown.
 - j. Verify and record performance of fluid flow and low-temperature interlocks for evaporator and condenser **OR** condenser, and heat-reclaim condenser, **as directed**.
 - k. Verify and record performance of chiller protection devices.
 - l. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assembly, installation, and connection.

3. Prepare test and inspection startup reports.

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SECTION 23 64 23 13 - SCROLL WATER CHILLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for scroll water chillers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Packaged, water-cooled, electric-motor-driven, scroll water chillers.
 - b. Packaged, air-cooled, electric-motor-driven, scroll water chillers.
 - c. Packaged refrigerant recovery units.

C. Definitions

1. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
2. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in terms of Btu/h to the total power input given in terms of watts at any given set of rating conditions.
3. IPLV: Integrated part-load value. A single number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and referenced to ARI standard rating conditions.
4. kW/Ton: The ratio of total power input of the chiller in kilowatts to the net refrigerating capacity in tons at any given set of rating conditions.
5. NPLV: Nonstandard part-load value. A single number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and intended for operating conditions other than the ARI standard rating conditions.

D. Performance Requirements

1. Seismic Performance: Scroll water chillers shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: Include refrigerant, rated capacities, operating characteristics, furnished specialties, and accessories.
2. LEED Submittal:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
3. Certificates: For certification required in "Quality Assurance" Article.
4. Seismic Qualification Certificates: For water chillers, accessories, and components from manufacturers.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Startup service reports.
6. Operation and maintenance data.
7. Warranty: Sample of special warranty.

- F. Quality Assurance
 - 1. ARI Certification: Certify chiller according to ARI 590 certification program.
 - 2. ARI Rating: Rate water chiller performance according to requirements in ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."
 - 3. ASHRAE Compliance: ASHRAE 15 for safety code for mechanical refrigeration.
 - 4. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
 - 5. ASME Compliance: Fabricate and stamp water chiller heat exchangers to comply with ASME Boiler and Pressure Vessel Code.
 - 6. Comply with NFPA 70.
- G. Delivery, Storage, And Handling
 - 1. Ship water chillers from the factory fully charged with refrigerant and filled with oil.
 - 2. Package water chiller for export shipping.
- H. Warranty
 - 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of water chillers that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

- A. Packaged Water-Cooled Water Chillers
 - 1. Description: Factory-assembled and run-tested water chiller complete with compressor(s), compressor motors and motor controllers, evaporator, condenser where indicated, electrical power, controls, and indicated accessories.
 - 2. Fabricate water chiller mounting base with reinforcement strong enough to resist water chiller movement during a seismic event when water chiller is anchored to field support structure.
 - 3. Compressors:
 - a. Description: Positive-displacement direct drive with hermetically sealed casing.
 - b. Each compressor provided with suction and discharge service valves, crankcase oil heater, and suction strainer.
 - c. Operating Speed: Nominal 3600 rpm for 60-Hz applications.
 - d. Capacity Control: On-off compressor cycling, plus hot-gas bypass, **as directed**.
 - e. Oil Lubrication System: Automatic pump with strainer, sight glass, filling connection, filter with magnetic plug, and initial oil charge.
 - f. Vibration Isolation: Mount individual compressors on vibration isolators.
 - g. Sound-reduction package shall consist of acoustic enclosures around the compressors that are designed to reduce sound level without affecting performance.
 - 4. Compressor Motors:
 - a. Hermetically sealed and cooled by refrigerant suction gas.
 - b. High-torque, two-pole induction type with inherent thermal-overload protection on each phase.
 - 5. Compressor Motor Controllers:
 - a. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing.
 - 6. Refrigeration:
 - a. Refrigerant: R-407C **OR** R-410A, **as directed**. Classified as Safety Group A1 according to ASHRAE 34.
 - b. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Circuit: Each circuit shall include a thermal-expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.

- d. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line and the refrigerant liquid-line to allow the isolation and storage of the refrigerant charge in the chiller condenser.
- 7. Evaporator:
 - a. Brazed-plate or shell-and-tube design, as indicated.
 - b. Shell and Tube:
 - 1) Description: Direct-expansion, shell-and-tube design with fluid flowing through the shell and refrigerant flowing through the tubes within the shell.
 - 2) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 3) Shell Material: Carbon steel.
 - 4) Shell Heads: Removable carbon-steel heads with multipass baffles designed to ensure positive oil return and located at each end of the tube bundle.
 - 5) Shell Nozzles: Fluid nozzles located along the side of the shell and terminated with mechanical-coupling end connections for connection to field piping.
 - 6) Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - c. Brazed Plate:
 - 1) Direct-expansion, single-pass, brazed-plate design.
 - 2) Type 316 stainless-steel construction.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 4) Fluid Nozzles: Terminate with mechanical-coupling end connections for connection to field piping.
- 8. Condenser:
 - a. Shell and tube or without integral condenser; as indicated.
 - b. Shell and Tube:
 - 1) Description: Shell-and-tube design with refrigerant flowing through the shell and fluid flowing through the tubes within the shell.
 - 2) Provides positive subcooling of liquid refrigerant.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 4) Shell Material: Carbon steel.
 - 5) Water Boxes: Removable, of carbon-steel construction, located at each end of the tube bundle with fluid nozzles terminated with mechanical-coupling end connections for connection to field piping.
 - 6) Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - 7) Provide each condenser with a pressure relief device, purge cock, and liquid-line shutoff valve.
 - c. Provide water chiller without an integral condenser and design chiller for field connection to remote condenser. Coordinate requirements with Division 23 Section "Air-cooled Refrigerant Condensers".
- 9. Electrical Power:
 - a. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to water chiller.
 - b. House in a unit-mounted, NEMA 250, Type 1, **as directed**, enclosure with hinged access door with lock and key or padlock and key.
 - c. Wiring shall be numbered and color-coded to match wiring diagram.
 - d. Install factory wiring outside of an enclosure in a raceway.
 - e. Field power interface shall be to wire lugs **OR** NEMA KS 1, heavy-duty, nonfused disconnect switch, **as directed**.
 - f. Provide branch power circuit to each motor and to controls with one of the following disconnecting means:
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.

- 2) NEMA KS 1, heavy-duty, nonfusible switch.
- 3) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
- g. Provide each motor with overcurrent protection.
- h. Overload relay sized according to UL 1995, or an integral component of water chiller control microprocessor.
- i. Phase-Failure and Undervoltage: Solid-state sensing with adjustable settings.
- j. Controls Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.
- k. Control Relays: Auxiliary and adjustable time-delay relays.
- l. Indicate the following for water chiller electrical power supply:
 - 1) Current, phase to phase, for all three phases.
 - 2) Voltage, phase to phase and phase to neutral for all three phases.
 - 3) Three-phase real power (kilowatts).
 - 4) Three-phase reactive power (kilovolt amperes reactive).
 - 5) Power factor.
 - 6) Running log of total power versus time (kilowatt hours).
 - 7) Fault log, with time and date of each.
10. Controls:
 - a. Stand-alone, microprocessor based.
 - b. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.
 - c. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, backlit, liquid-crystal display or light-emitting diodes. Display the following:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Operating hours.
 - 4) Outside-air temperature if required for chilled-water reset.
 - 5) Temperature and pressure of operating set points.
 - 6) Entering and leaving temperatures of chilled water.
 - 7) Entering and leaving temperatures of condenser water.
 - 8) Refrigerant pressures in evaporator and condenser.
 - 9) Saturation temperature in evaporator and condenser.
 - 10) No cooling load condition.
 - 11) Elapsed time meter (compressor run status).
 - 12) Pump status.
 - 13) Antirecycling timer status.
 - 14) Percent of maximum motor amperage.
 - 15) Current-limit set point.
 - 16) Number of compressor starts.
 - d. Control Functions:
 - 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperatures, control set points, and motor load limit. Chilled-water leaving temperature shall be reset based on return-water **OR** outside-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) Condenser-water temperature.
 - 5) External water chiller emergency stop.
 - 6) Antirecycling timer.
 - 7) Automatic lead-lag switching.
 - e. Manual-Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:
 - 1) Low evaporator pressure or high condenser pressure.
 - 2) Low chilled-water temperature.
 - 3) Refrigerant high pressure.

- 4) High or low oil pressure.
- 5) High oil temperature.
- 6) Loss of chilled-water flow.
- 7) Loss of condenser-water flow.
- 8) Control device failure.
- f. Building Automation System Interface: Factory-installed hardware and software to enable building automation system to monitor, control, and display water chiller status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On/off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt hours), **as directed**.
 - b) Control: On/off operation, chilled-water discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted open-protocol, **as directed**, communication interface with building automation system shall enable building automation system operator to remotely control and monitor the water chiller from an operator workstation. Control features and monitoring points displayed locally at water chiller control panel shall be available through building automation system.
11. Insulation:
 - a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I, for tubular materials and Type II, for sheet materials.
 - b. Thickness: **3/4 inch (19 mm)**.
 - c. Factory-applied insulation over cold surfaces of water chiller components.
 - 1) Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Apply protective coating to exposed surfaces of insulation.
12. Accessories:
 - a. Factory-furnished, chilled-water and condenser-water, **as directed**, flow switches for field installation.
 - b. Individual compressor suction and discharge pressure gages with shutoff valves for each refrigeration circuit.
 - c. Factory-furnished neoprene **OR** spring, **as directed**, isolators for field installation.
- B. Packaged Air-Cooled Water Chillers
 1. Description: Factory-assembled and run-tested water chiller complete with base and frame, condenser casing, compressors, compressor motors and motor controllers, evaporator, condenser coils, condenser fans and motors, electrical power, controls, and accessories.
 2. Fabricate base, frame, and attachment to water chiller components strong enough to resist movement during a seismic event when water chiller base is anchored to field support structure.
 3. Cabinet:
 - a. Base: Galvanized-steel base extending the perimeter of water chiller. Secure frame, compressors, and evaporator to base to provide a single-piece unit.
 - b. Frame: Rigid galvanized-steel frame secured to base and designed to support cabinet, condenser, control panel, and other chiller components not directly supported from base.
 - c. Casing: Galvanized steel.
 - d. Finish: Coat base, frame, and casing with a corrosion-resistant coating capable of withstanding a 500-hour salt-spray test according to ASTM B 117.
 - e. Sound-reduction package consisting of the following:
 - 1) Acoustic enclosure around compressors.
 - 2) Reduced-speed fans with acoustic treatment.
 - 3) Designed to reduce sound level without affecting performance.
 - f. Security Package: Provide security grilles with fasteners for additional protection of compressors, evaporator, and condenser coils. Grilles shall be coated for corrosion resistance and shall be removable for service access.
 4. Compressors:

- a. Description: Positive-displacement direct drive with hermetically sealed casing.
 - b. Each compressor provided with suction and discharge service valves, crankcase oil heater, and suction strainer.
 - c. Operating Speed: Nominal 3600 rpm for 60-Hz applications.
 - d. Capacity Control: On-off compressor cycling, plus hot-gas bypass, **as directed**.
 - e. Oil Lubrication System: Automatic pump with strainer, sight glass, filling connection, filter with magnetic plug, and initial oil charge.
 - f. Vibration Isolation: Mount individual compressors on vibration isolators.
5. Compressor Motors:
- a. Hermetically sealed and cooled by refrigerant suction gas.
 - b. High-torque, two-pole induction type with inherent thermal-overload protection on each phase.
6. Compressor Motor Controllers:
- a. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing.
7. Refrigeration:
- a. Refrigerant: R-407c **OR** R-410a, **as directed**. Classified as Safety Group A1 according to ASHRAE 34.
 - b. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Circuit: Each circuit shall include a thermal-expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.
 - d. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line and the refrigerant liquid-line to allow the isolation and storage of the refrigerant charge in the chiller condenser.
8. Evaporator:
- a. Brazed-plate or shell-and-tube design, as indicated.
 - b. Shell and Tube:
 - 1) Description: Direct-expansion, shell-and-tube design with fluid flowing through the shell and refrigerant flowing through the tubes within the shell.
 - 2) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 3) Shell Material: Carbon steel.
 - 4) Shell Heads: Removable carbon-steel heads with multipass baffles designed to ensure positive oil return and located at each end of the tube bundle.
 - 5) Shell Nozzles: Fluid nozzles located along the side of the shell and terminated with mechanical-coupling end connections for connection to field piping.
 - 6) Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - c. Brazed Plate:
 - 1) Direct-expansion, single-pass, brazed-plate design.
 - 2) Type 316 stainless-steel construction.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 4) Fluid Nozzles: Terminate with mechanical-coupling end connections for connection to field piping.
 - d. Heater: Factory-installed and -wired electric heater with integral controls designed to protect the evaporator to **minus 20 deg F (minus 29 deg C)**.
 - e. Remote Mounting: Designed for remote field mounting where indicated. Provide kit for field installation.
9. Air-Cooled Condenser:
- a. Plate-fin coil with integral subcooling on each circuit, rated at **450 psig (3103 kPa)**.
 - 1) Construct coils of copper tubes mechanically bonded to aluminum **OR** aluminum with precoated epoxy-phenolic **OR** copper, **as directed**, fins.

- 2) Coat coils with a baked epoxy corrosion-resistant coating after fabrication.
- 3) Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.
- b. Fans: Direct-drive propeller type with statically and dynamically balanced fan blades, arranged for vertical air discharge.
- c. Fan Motors: Totally enclosed nonventilating (TENV) or totally enclosed air over (TEAO) enclosure, with permanently lubricated bearings, and having built-in overcurrent- and thermal-overload protection.
- d. Fan Guards: Steel safety guards with corrosion-resistant coating.
10. Electrical Power:
 - a. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to water chiller.
 - b. House in a unit-mounted, NEMA 250, Type 3R, **as directed**, enclosure with hinged access door with lock and key or padlock and key.
 - c. Wiring shall be numbered and color-coded to match wiring diagram.
 - d. Install factory wiring outside of an enclosure in a raceway.
 - e. Field power interface shall be to wire lugs **OR** NEMA KS 1, heavy-duty, nonfused disconnect switch, **as directed**.
 - f. Provide branch power circuit to each motor and to controls with one of the following disconnecting means:
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA KS 1, heavy-duty, nonfusible switch.
 - 3) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - g. Provide each motor with overcurrent protection.
 - h. Overload relay sized according to UL 1995, or an integral component of water chiller control microprocessor.
 - i. Phase-Failure and Undervoltage: Solid-state sensing with adjustable settings.
 - j. Provide power factor correction capacitors to correct power factor to 0.90 **OR** 0.95, **as directed**, at full load.
 - k. Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.
 - 1) Power unit-mounted controls where indicated.
 - 2) Power unit-mounted, ground fault interrupt (GFI) duplex receptacle.
 - l. Control Relays: Auxiliary and adjustable time-delay relays.
 - m. Indicate the following for water chiller electrical power supply:
 - 1) Current, phase to phase, for all three phases.
 - 2) Voltage, phase to phase and phase to neutral for all three phases.
 - 3) Three-phase real power (kilowatts).
 - 4) Three-phase reactive power (kilovolt amperes reactive).
 - 5) Power factor.
 - 6) Running log of total power versus time (kilowatt hours).
 - 7) Fault log, with time and date of each.
11. Controls:
 - a. Stand-alone, microprocessor based.
 - b. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.
 - c. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, backlit, liquid-crystal display or light-emitting diodes. Display the following:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Operating hours.
 - 4) Outside-air temperature if required for chilled-water reset.
 - 5) Temperature and pressure of operating set points.
 - 6) Entering and leaving temperatures of chilled water.

- 7) Refrigerant pressures in evaporator and condenser.
 - 8) Saturation temperature in evaporator and condenser.
 - 9) No cooling load condition.
 - 10) Elapsed time meter (compressor run status).
 - 11) Pump status.
 - 12) Antirecycling timer status.
 - 13) Percent of maximum motor amperage.
 - 14) Current-limit set point.
 - 15) Number of compressor starts.
- d. Control Functions:
- 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperatures, control set points, and motor load limit. Chilled-water leaving temperature shall be reset based on return-water **OR** outside-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) External water chiller emergency stop.
 - 5) Antirecycling timer.
 - 6) Automatic lead-lag switching.
- e. Manual-Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:
- 1) Low evaporator pressure or high condenser pressure.
 - 2) Low chilled-water temperature.
 - 3) Refrigerant high pressure.
 - 4) High or low oil pressure.
 - 5) High oil temperature.
 - 6) Loss of chilled-water flow.
 - 7) Control device failure.
- f. Building Automation System Interface: Factory-installed hardware and software to enable building automation system to monitor, control, and display water chiller status and alarms.
- 1) Hardwired Points:
 - a) Monitoring: On/off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt hours), **as directed**.
 - b) Control: On/off operation, chilled-water discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Industry-accepted open-protocol, **as directed**, communication interface with building automation system shall enable building automation system operator to remotely control and monitor the water chiller from an operator workstation. Control features and monitoring points displayed locally at water chiller control panel shall be available through building automation system.
12. Insulation:
- a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I, for tubular materials and Type II, for sheet materials.
 - b. Thickness: **3/4 inch (19 mm) OR 1-1/2 inches (38 mm), as directed**.
 - c. Factory-applied insulation over cold surfaces of water chiller components.
 - 1) Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Apply protective coating to exposed surfaces of insulation.
13. Accessories:
- a. Factory-furnished, chilled-water and condenser-water, **as directed**, flow switches for field installation.
 - b. Individual compressor suction and discharge pressure gages with shutoff valves for each refrigeration circuit.
 - c. Factory-furnished neoprene **OR** spring, **as directed**, isolators for field installation.

- C. Packaged Refrigerant Recovery Units
 - 1. Packaged portable unit shall consist of compressor, air-cooled condenser, recovery system, tank pressure gages, filter-dryer, and valving that allows for switching between liquid and vapor recovery mode. Refrigerant recovery unit shall be factory mounted on an ASME-constructed and -stamped refrigerant storage vessel that is sized to hold the full refrigerant charge of the largest water chiller.

- D. Source Quality Control
 - 1. Perform functional test of water chillers before shipping.
 - 2. Factory performance test water chillers, **as directed**, before shipping, according to ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."
 - a. Allow the Owner access to place where water chillers are being tested. Notify the Owner 14 days in advance of testing.
 - 3. Factory test and inspect evaporator and water-cooled condenser, **as directed**, according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Stamp with ASME label.
 - 4. For water chillers located indoors, rate sound power level according to ARI 575 procedure.
 - 5. For water chillers located outdoors, rate sound power level according to ARI 370 procedure.

1.3 EXECUTION

- A. Water Chiller Installation
 - 1. Install water chillers on support structure indicated.
 - 2. Equipment Mounting: Install water chiller on concrete bases using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed.**
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 3. Equipment Mounting: Install water chiller using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed.**
 - 4. Equipment Mounting: Install water chiller on vibration isolation inertia bases. Comply with requirements specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - 5. Equipment Mounting: Install water chiller on concrete bases. Comply with requirements in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - 6. Maintain manufacturer's recommended clearances for service and maintenance.
 - 7. Charge water chiller with refrigerant if not factory charged and fill with oil if not factory installed.
 - 8. Install separate devices furnished by manufacturer and not factory installed.

B. Connections

1. Comply with requirements in Division 23 Section "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Comply with requirements in Division 23 Section "Refrigerant Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
3. Install piping adjacent to chiller to allow service and maintenance.
4. Evaporator Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to water chiller with a union **OR** flange **OR** mechanical coupling, **as directed**.
5. Condenser Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to water chiller with a union **OR** flange **OR** mechanical coupling, **as directed**.
6. Refrigerant Pressure Relief Valve Connections: For water chillers installed indoors, extend vent piping to the outside without valves or restrictions. Comply with ASHRAE 15, **as directed**.
7. Connect each drain connection with a union and drain pipe and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection if required.

C. Startup Service

1. Perform startup service.
2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
3. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
 - b. Verify that pumps are installed and functional.
 - c. Verify that thermometers and gages are installed.
 - d. Operate water chiller for run-in period.
 - e. Check bearing lubrication and oil levels.
 - f. Verify that refrigerant pressure relief device for chillers installed indoors is vented outside.
 - g. Verify proper motor rotation.
 - h. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.
 - i. Verify and record performance of chilled-water and condenser-water, **as directed**, flow and low-temperature interlocks.
 - j. Verify and record performance of water chiller protection devices.
 - k. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
4. Prepare a written startup report that records results of tests and inspections.

END OF SECTION 23 64 23 13

SECTION 23 64 23 16 - RECIPROCATING WATER CHILLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for reciprocating water chillers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Packaged, water-cooled, electric-motor-driven, reciprocating water chillers.
 - b. Packaged, air-cooled, electric-motor-driven, reciprocating water chillers.
 - c. Packaged refrigerant recovery units.

C. Definitions

1. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
2. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in terms of Btu/h to the total power input given in terms of watts at any given set of rating conditions.
3. IPLV: Integrated part-load value. A single number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and referenced to ARI standard rating conditions.
4. kW/Ton: The ratio of total power input of the chiller in kilowatts to the net refrigerating capacity in tons at any given set of rating conditions.
5. NPLV: Nonstandard part-load value. A single number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and intended for operating conditions other than the ARI standard rating conditions.

D. Performance Requirements

1. Seismic Performance: Reciprocating water chillers shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: Include refrigerant, rated capacities, operating characteristics, furnished specialties, and accessories.
2. Seismic Qualification Certificates: For water chillers, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
3. Source quality-control test reports.
4. Startup service reports.
5. Operation and maintenance data.
6. Warranty: Sample of special warranty.

F. Quality Assurance

1. ARI Certification: Certify chiller according to ARI 590 certification program.

2. ARI Rating: Rate water chiller performance according to requirements in ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."
3. ASHRAE Compliance: ASHRAE 15 for safety code for mechanical refrigeration.
4. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
5. ASME Compliance: Fabricate and stamp water chiller heat exchangers to comply with ASME Boiler and Pressure Vessel Code.
6. Comply with NFPA 70.

G. Delivery, Storage, And Handling

1. Ship water chillers from the factory fully charged with refrigerant and filled with oil.
2. Package water chiller for export shipping.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of water chillers that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

A. Packaged Water-Cooled Water Chillers

1. Description: Factory-assembled and run-tested water chiller complete with compressor(s), compressor motors and motor controllers, evaporator, condenser where indicated, electrical power, controls, and indicated accessories.
2. Fabricate water chiller mounting base with reinforcement strong enough to resist water chiller movement during a seismic event when water chiller is anchored to field support structure.
3. Compressors:
 - a. Description: Positive-displacement direct drive with semihermetically sealed and accessible bolted casings.
 - b. Each compressor provided with suction and discharge service valves, crankcase oil heater, and suction strainer.
 - c. Operating Speed: 1750 rpm for 60-Hz applications.
 - d. Capacity Control: Combinations of cylinder unloading and on-off compressor cycling of multiple compressors, **as directed**, plus hot-gas bypass, **as directed**. Compressor shall be capable of operating at part-load conditions without increased vibration over normal vibration at full-load operation and shall be capable of continuous operation at its lowest step of unloading.
 - e. Oil Lubrication System: Automatically reversible, positive-displacement pump with strainer, sight glass, filling connection, filter with magnetic plug, and initial oil charge.
 - f. Vibration Isolation: Mount individual compressors on either neoprene or spring isolators.
 - g. Sound-reduction package shall consist of acoustic enclosures around the compressors that are designed to reduce sound level without affecting performance.
4. Compressor Motors:
 - a. Hermetically sealed and cooled by refrigerant suction gas.
 - b. High-torque, four-pole induction type with inherent thermal-overload protection on each phase.
5. Compressor Motor Controllers:
 - a. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing.
OR
Part-Wind Start: NEMA ICS 2, Class A, reduced voltage, nonreversing.
6. Refrigeration:
 - a. Refrigerant: R-407C **OR** R-410A, **as directed**. Classified as Safety Group A1 according to ASHRAE 34.

- b. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Circuit: Each circuit shall include a thermal **OR** an electronic, **as directed**, expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.
 - d. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line and the refrigerant liquid-line to allow the isolation and storage of the refrigerant charge in the chiller condenser.
7. Evaporator:
- a. Brazed-plate or shell-and-tube design, as indicated.
 - b. Shell and Tube:
 - 1) Description: Direct-expansion, shell-and-tube design with fluid flowing through the shell and refrigerant flowing through the tubes within the shell.
 - 2) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 3) Shell Material: Carbon steel.
 - 4) Shell Heads: Removable carbon-steel heads with multipass baffles designed to ensure positive oil return and located at each end of the tube bundle.
 - 5) Shell Nozzles: Fluid nozzles located along the side of the shell and terminated with mechanical-coupling end connections for connection to field piping.
 - 6) Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - c. Brazed Plate:
 - 1) Direct-expansion, single-pass, brazed-plate design.
 - 2) Type 316 stainless-steel construction.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 4) Fluid Nozzles: Terminate with mechanical-coupling end connections for connection to field piping.
8. Condenser:
- a. Shell and tube, brazed plate, or without integral condenser; as indicated.
 - b. Shell and Tube:
 - 1) Description: Shell-and-tube design with refrigerant flowing through the shell and fluid flowing through the tubes within the shell.
 - 2) Provides positive subcooling of liquid refrigerant.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 4) Shell Material: Carbon steel.
 - 5) Water Boxes: Removable, of carbon-steel construction, located at each end of the tube bundle with fluid nozzles terminated with mechanical-coupling end connections for connection to field piping.
 - 6) Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - 7) Provide each condenser with a pressure relief device, purge cock, and liquid-line shutoff valve.
 - c. Brazed Plate:
 - 1) Single-pass, brazed-plate design provides positive subcooling of liquid refrigerant.
 - 2) Type 316 stainless-steel construction.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.
 - 4) Fluid Nozzles: Terminate with mechanical-coupling end connections for connection to field piping.
 - 5) Provide each condenser with a liquid-line shutoff valve.

- d. Provide water chiller without an integral condenser and design chiller for field connection to remote condenser. Coordinate requirements with Division 23 Section "Air-cooled Refrigerant Condensers".
- 9. Electrical Power:
 - a. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to water chiller.
 - b. House in a unit-mounted, NEMA 250, Type 1, **as directed**, enclosure with hinged access door with lock and key or padlock and key.
 - c. Wiring shall be numbered and color-coded to match wiring diagram.
 - d. Install factory wiring outside of an enclosure in a raceway.
 - e. Field power interface shall be to wire lugs **OR** NEMA KS 1, heavy-duty, nonfused disconnect switch, **as directed**.
 - f. Provide branch power circuit to each motor and to controls with one of the following disconnecting means:
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA KS 1, heavy-duty, nonfusible switch.
 - 3) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - g. Provide each motor with overcurrent protection.
 - h. Overload relay sized according to UL 1995, or an integral component of water chiller control microprocessor.
 - i. Phase-Failure and Undervoltage: Solid-state sensing with adjustable settings.
 - j. Controls Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.
 - k. Control Relays: Auxiliary and adjustable time-delay relays.
 - l. Indicate the following for water chiller electrical power supply:
 - 1) Current, phase to phase, for all three phases.
 - 2) Voltage, phase to phase and phase to neutral for all three phases.
 - 3) Three-phase real power (kilowatts).
 - 4) Three-phase reactive power (kilovolt amperes reactive).
 - 5) Power factor.
 - 6) Running log of total power versus time (kilowatt hours).
 - 7) Fault log, with time and date of each.
- 10. Controls:
 - a. Stand-alone, microprocessor based.
 - b. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.
 - c. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, backlit, liquid-crystal display or light-emitting diodes. Display the following:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Operating hours.
 - 4) Outside-air temperature if required for chilled-water reset.
 - 5) Temperature and pressure of operating set points.
 - 6) Entering and leaving temperatures of chilled water.
 - 7) Entering and leaving temperatures of condenser water.
 - 8) Refrigerant pressures in evaporator and condenser.
 - 9) Saturation temperature in evaporator and condenser.
 - 10) No cooling load condition.
 - 11) Elapsed time meter (compressor run status).
 - 12) Pump status.
 - 13) Antirecycling timer status.
 - 14) Percent of maximum motor amperage.
 - 15) Current-limit set point.

- 16) Number of compressor starts.
 - d. Control Functions:
 - 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperatures, control set points, and motor load limit. Chilled-water leaving temperature shall be reset based on return-water **OR** outside-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) Condenser-water temperature.
 - 5) External water chiller emergency stop.
 - 6) Antirecycling timer.
 - 7) Automatic lead-lag switching.
 - e. Manual-Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:
 - 1) Low evaporator pressure or high condenser pressure.
 - 2) Low chilled-water temperature.
 - 3) Refrigerant high pressure.
 - 4) High or low oil pressure.
 - 5) High oil temperature.
 - 6) Loss of chilled-water flow.
 - 7) Loss of condenser-water flow.
 - 8) Control device failure.
 - f. Building Automation System Interface: Factory-installed hardware and software to enable building automation system to monitor, control, and display water chiller status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On/off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt hours), **as directed**.
 - b) Control: On/off operation, chilled-water discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Industry-accepted open-protocol, **as directed**, communication interface with building automation system shall enable building automation system operator to control and monitor the water chiller from a remote operator workstation. Control features and monitoring points displayed locally at water chiller control panel shall be available through building automation system.
11. Insulation:
- a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I, for tubular materials and Type II, for sheet materials.
 - b. Thickness: **3/4 inch (19 mm)**.
 - c. Factory-applied insulation over cold surfaces of water chiller components.
 - 1) Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Apply protective coating to exposed surfaces of insulation.
12. Accessories:
- a. Factory-furnished, chilled-water and condenser-water, **as directed**, flow switches for field installation.
 - b. Individual compressor suction and discharge pressure gages with shutoff valves.
 - c. Factory-furnished spring isolators for field installation.
- B. Packaged Air-Cooled Water Chillers
- 1. Description: Factory-assembled and run-tested water chiller complete with base and frame, condenser casing, compressors, compressor motors and motor controllers, evaporator, condenser coils, condenser fans and motors, electrical power, controls, and accessories.
 - 2. Fabricate base, frame, and attachment to water chiller components strong enough to resist movement during a seismic event when water chiller base is anchored to field support structure.
 - 3. Cabinet:

- a. Base: Galvanized-steel base extending the perimeter of water chiller. Secure frame, compressors, and evaporator to base to provide a single-piece unit. Base shall be designed to limit deflection to L/200 and shall be a minimum of **4 inches (100 mm)** high.
 - b. Frame: Rigid galvanized-steel frame secured to base and designed to support cabinet, condenser, control panel, and other chiller components not directly supported from base.
 - c. Casing: Galvanized steel.
 - d. Finish: Coat base, frame, and casing with a corrosion-resistant coating capable of withstanding a 500-hour salt-spray test according to ASTM B 117.
 - e. Sound-reduction package consisting of the following:
 - 1) Acoustic enclosure around compressors.
 - 2) Reduced-speed fans with acoustic treatment.
 - 3) Designed to reduce sound level without affecting performance.
 - f. Security Package: Provide security grilles with fasteners for additional protection of compressors, evaporator, and condenser coils. Grilles shall be coated for corrosion resistance and shall be removable for service access.
4. Compressors:
- a. Description: Positive-displacement direct drive with semihermetically sealed and accessible bolted casings.
 - b. Each compressor provided with suction and discharge service valves, crankcase oil heater, and suction strainer.
 - c. Operating Speed: 1750 rpm for 60-Hz applications.
 - d. Capacity Control: Combinations of cylinder unloading and on-off compressor cycling of multiple compressors, plus hot-gas bypass, **as directed**. Compressor shall be capable of operating at part-load conditions without increased vibration over normal vibration at full-load operation and shall be capable of continuous operation at its lowest step of unloading.
 - e. Oil Lubrication System: Automatically reversible, positive-displacement pump with strainer, sight glass, filling connection, filter with magnetic plug, and initial oil charge.
 - f. Vibration Isolation: Mount individual compressors on spring isolators with an isolation efficiency of 95 percent.
5. Compressor Motors:
- a. Hermetically sealed and cooled by refrigerant suction gas.
 - b. High-torque, four-pole induction type with inherent thermal-overload protection on each phase.
6. Compressor Motor Controllers:
- a. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing.
OR
Part-Wind Start: NEMA ICS 2, Class A, reduced voltage, nonreversing.
7. Refrigeration:
- a. Refrigerant: R-407C **OR** R-410A, **as directed**. Classified as Safety Group A1 according to ASHRAE 34.
 - b. Refrigerant Compatibility: Parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Circuit: Each circuit shall include a thermal **OR** an electronic, **as directed**, expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.
 - d. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line and the refrigerant liquid-line to allow the isolation and storage of the refrigerant charge in the chiller condenser.
8. Evaporator:
- a. Description: Direct-expansion shell-and-tube design with fluid flowing through the shell and refrigerant flowing through the tubes within the shell.
 - b. Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code.

- c. Shell Material: Carbon steel.
 - d. Shell Heads: Removable carbon-steel heads with multipass baffles designed to ensure positive oil return and located at each end of the tube bundle.
 - e. Shell Nozzles: Fluid nozzles located along the side of the shell and terminated with mechanical-coupling end connections for connection to field piping.
 - f. Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - g. Heater: Factory-installed and -wired electric heater with integral controls designed to protect the evaporator to **minus 20 deg F (minus 29 deg C)**.
 - h. Remote Mounting: Designed for remote field mounting where indicated. Provide kit for field installation.
9. Air-Cooled Condenser:
- a. Plate-fin coil with integral subcooling circuit, leak tested at **150 psig (1034 kPa)**.
 - 1) Construct coils of copper tubes mechanically bonded to aluminum **OR** aluminum with precoated epoxy-phenolic **OR** copper, **as directed**, fins.
 - 2) Coat coils with a baked epoxy corrosion-resistant coating after fabrication.
 - 3) Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.
 - b. Fans: Direct-drive propeller type with statically and dynamically balanced fan blades, arranged for vertical air discharge.
 - c. Fan Motors: Totally enclosed air over (TEAO) enclosure, with permanently lubricated bearings, and having built-in overcurrent- and thermal-overload protection.
 - d. Fan Guards: Steel safety guards with corrosion-resistant coating.
10. Electrical Power:
- a. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to water chiller.
 - b. House in a unit-mounted, NEMA 250, Type 3R **OR** Type 4, **as directed**, enclosure with hinged access door with lock and key or padlock and key.
 - c. Wiring shall be numbered and color-coded to match wiring diagram.
 - d. Install factory wiring outside of an enclosure in a raceway.
 - e. Field power interface shall be to wire lugs **OR** NEMA KS 1, heavy-duty, nonfused disconnect switch, **as directed**.
 - f. Provide branch power circuit to each motor and to controls with one of the following disconnecting means:
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA KS 1, heavy-duty, nonfusible switch.
 - 3) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - g. Provide each motor with overcurrent protection.
 - h. Overload relay sized according to UL 1995, or an integral component of water chiller control microprocessor.
 - i. Phase-Failure and Undervoltage: Solid-state sensing with adjustable settings.
 - j. Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.
 - 1) Power unit-mounted controls where indicated.
 - 2) Power unit-mounted, ground-fault interrupt (GFI) duplex receptacle.
 - k. Control Relays: Auxiliary and adjustable time-delay relays.
 - l. Indicate the following for water chiller electrical power supply:
 - 1) Current, phase to phase, for all three phases.
 - 2) Voltage, phase to phase and phase to neutral for all three phases.
 - 3) Three-phase real power (kilowatts).
 - 4) Three-phase reactive power (kilovolt amperes reactive).
 - 5) Power factor.
 - 6) Running log of total power versus time (kilowatt hours).
 - 7) Fault log, with time and date of each.

11. Controls:
 - a. Stand-alone, microprocessor based.
 - b. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure of matching construction.
 - c. Operator Interface: Keypad or pressure-sensitive touch screen. Multiple-character, backlit, liquid-crystal display or light-emitting diodes. Display the following:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Operating hours.
 - 4) Outside-air temperature if required for chilled-water reset.
 - 5) Temperature and pressure of operating set points.
 - 6) Entering and leaving temperatures of chilled water.
 - 7) Refrigerant pressures in evaporator and condenser.
 - 8) Saturation temperature in evaporator and condenser.
 - 9) No cooling load condition.
 - 10) Elapsed time meter (compressor run status).
 - 11) Pump status.
 - 12) Antirecycling timer status.
 - 13) Percent of maximum motor amperage.
 - 14) Current-limit set point.
 - 15) Number of compressor starts.
 - d. Control Functions:
 - 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperature, control set points, and motor load limit. Chilled-water leaving temperature shall be reset based on return-water **OR** outside-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) External water chiller emergency stop.
 - 5) Antirecycling timer.
 - 6) Automatic lead-lag switching.
 - e. Manual-Reset Safety Controls: The following conditions shall shut down water chiller and require manual reset:
 - 1) Low evaporator pressure or high condenser pressure.
 - 2) Low chilled-water temperature.
 - 3) Refrigerant high pressure.
 - 4) High or low oil pressure.
 - 5) High oil temperature.
 - 6) Loss of chilled-water flow.
 - 7) Control device failure.
 - f. Building Automation System Interface: Factory-installed hardware and software to enable building automation system to monitor, control, and display water chiller status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On/off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt hours), **as directed**.
 - b) Control: On/off operation, chilled-water discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Industry-accepted open-protocol, **as directed**, communication interface with building automation system shall enable building automation system operator to control and monitor the water chiller from a remote operator workstation. Control features and monitoring points displayed locally at water chiller control panel shall be available through building automation system.
12. Insulation:

- a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I, for tubular materials and Type II, for sheet materials.
 - b. Thickness: **3/4 inch (19 mm)**.
 - c. Factory-applied insulation over cold surfaces of water chiller components.
 - 1) Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Apply protective coating to exposed surfaces of insulation.
13. Accessories:
- a. Factory-furnished, chilled-water and condenser-water, **as directed**, flow switches for field installation.
 - b. Individual compressor suction and discharge pressure gages with shutoff valves.
 - c. Factory-furnished spring isolators for field installation.
- C. Packaged Refrigerant Recovery Units
1. Packaged portable unit shall consist of compressor, air-cooled condenser, recovery system, tank pressure gages, filter-dryer, and valving that allows for switching between liquid and vapor recovery mode. Refrigerant recovery unit shall be factory mounted on an ASME-constructed and -stamped refrigerant storage vessel that is sized to hold the full refrigerant charge of the largest water chiller.
- D. Source Quality Control
1. Perform functional test of water chillers before shipping.
 2. Factory performance test water chillers, **as directed**, before shipping, according to ARI 550/590, "Water Chilling Packages Using the Vapor Compression Cycle."
 - a. Allow the Owner access to place where water chillers are being tested. Notify the Owner 14 days in advance of testing.
 3. Factory test and inspect evaporator and water-cooled condenser, **as directed**, according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1. Stamp with ASME label.
 4. For water chillers located indoors, rate sound power level according to ARI 575 procedure.
 5. For water chillers located outdoors, rate sound power level according to ARI 370 procedure.
- 1.3 EXECUTION
- A. Water Chiller Installation
1. Install water chillers on support structure indicated.
 2. Equipment Mounting: Install water chiller on concrete bases using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Equipment Mounting: Install water chiller using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.

4. Equipment Mounting: Install water chiller on vibration isolation inertia bases. Comply with requirements specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 5. Equipment Mounting: Install water chiller on concrete bases. Comply with requirements in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 6. Maintain manufacturer's recommended clearances for service and maintenance.
 7. Charge water chiller with refrigerant if not factory charged and fill with oil if not factory installed.
 8. Install separate devices furnished by manufacturer and not factory installed.
- B. Connections
1. Comply with requirements in Division 23 Section "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Comply with requirements in Division 23 Section "Refrigerant Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
 3. Install piping adjacent to chiller to allow service and maintenance.
 4. Evaporator Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to water chiller with a union **OR** flange **OR** mechanical coupling, **as directed**.
 5. Condenser Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to water chiller with a union **OR** flange **OR** mechanical coupling, **as directed**.
 6. Refrigerant Pressure Relief Valve Connections: For water chillers installed indoors, extend vent piping to the outside without valves or restrictions. Comply with ASHRAE 15, **as directed**.
 7. Connect each drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection if required.
- C. Startup Service
1. Perform startup service.
 2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
 3. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Verify that refrigerant charge is sufficient and water chiller has been leak tested.
 - b. Verify that pumps are installed and functional.
 - c. Verify that thermometers and gages are installed.
 - d. Operate water chiller for run-in period.
 - e. Check bearing lubrication and oil levels.
 - f. Verify that refrigerant pressure relief for chillers installed indoors is vented outside.
 - g. Verify proper motor rotation.
 - h. Verify static deflection of vibration isolators, including deflection during water chiller startup and shutdown.

- i. Verify and record performance of chilled-water and condenser-water, **as directed**, flow and low-temperature interlocks.
 - j. Verify and record performance of water chiller protection devices.
 - k. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
4. Prepare a written startup report that records results of tests and inspections.

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SECTION 23 64 26 13 - ROTARY-SCREW WATER CHILLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for rotary screw water chillers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Packaged, water-cooled, single-compressor chillers.
 - b. Packaged, water-cooled, multiple-compressor chillers.
 - c. Packaged, air-cooled chillers.
 - d. Packaged, portable refrigerant recovery units.
 - e. Heat-exchanger, brush-cleaning system.

C. Definitions

1. BAS: Building automation system.
2. COP: Coefficient of performance. The ratio of the rate of heat removal to the rate of energy input using consistent units for any given set of rating conditions.
3. EER: Energy-efficiency ratio. The ratio of the cooling capacity given in terms of Btu/h to the total power input given in terms of watts at any given set of rating conditions.
4. IPLV: Integrated part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and referenced to ARI standard rating conditions.
5. **kW/Ton (kW/kW)**: The ratio of total power input of the chiller in kilowatts to the net refrigerating capacity in **tons (kW)** at any given set of rating conditions.
6. NPLV: Nonstandard part-load value. A single-number part-load efficiency figure of merit calculated per the method defined by ARI 550/590 and intended for operating conditions other than ARI standard rating conditions.

D. Performance Requirements

1. Seismic Performance: Chillers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
2. Condenser-Fluid Temperature Performance:
 - a. Startup Condenser-Fluid Temperature: Chiller shall be capable of starting with an entering condenser-fluid temperature of **60 deg F (16 deg C) OR 55 deg F (13 deg C) OR 40 deg F (4 deg C)**, **as directed**, and providing stable operation until the system temperature is elevated to the minimum operating entering condenser-fluid temperature.
 - b. Minimum Operating Condenser-Fluid Temperature: Chiller shall be capable of continuous operation over the entire capacity range indicated with an entering condenser-fluid temperature of **65 deg F (18 deg C) OR 60 deg F (16 deg C) OR 55 deg F (13 deg C)**, **as directed**.
 - c. Make factory modifications to standard chiller design if necessary to comply with performance indicated.
3. Site Altitude: Chiller shall be suitable for altitude in which installed without affecting performance indicated. Make adjustments to affected chiller components to account for site altitude.
4. Performance Tolerance: Comply with the following in lieu of ARI 550/590, **as directed**:
 - a. Allowable Capacity Tolerance: Zero percent.
 - b. Allowable IPLV/NPLV Performance Tolerance: Zero percent.

- E. Submittals
1. Product Data: For each type of product indicated. Include refrigerant, rated capacities, operating characteristics, furnished specialties, and accessories.
 2. LEED Submittal:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, load distribution, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
 4. Certificates: For certification required in "Quality Assurance" Article.
 5. Seismic Qualification Certificates: For chillers, accessories, and components, from manufacturer.
 6. Startup service reports.
 7. Operation and maintenance data.
 8. Warranty: Sample of special warranty.
- F. Quality Assurance
1. ARI Certification: Certify chiller according to ARI 550 and ARI 590, **as directed**, certification program(s).
 2. ARI Rating: Rate chiller performance according to requirements in ARI 550/590.
 3. ASHRAE Compliance:
 - a. ASHRAE 15 for safety code for mechanical refrigeration.
 - b. ASHRAE 147 for refrigerant leaks, recovery, and handling and storage requirements.
 4. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
 5. ASME Compliance: Fabricate and label chiller to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, and include an ASME U-stamp and nameplate certifying compliance.
 6. Comply with NFPA 70.
 7. Comply with requirements of UL and UL Canada and include label by a qualified testing agency showing compliance.
- G. Delivery, Storage, And Handling
1. Ship chillers from the factory fully charged with refrigerant.
OR
Ship each chiller with a full charge of refrigerant. Charge each chiller with nitrogen if refrigerant is shipped in containers separate from chiller.
 2. Ship each oil-lubricated chiller with a full charge of oil.
 - a. Ship oil factory installed in chiller **OR** in containers separate from chiller, **as directed**.
 3. Package chiller for export shipping in totally enclosed crate and bagging, **as directed**.
- H. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of chillers that fail in materials or workmanship within specified warranty period.
 - a. Extended warranties include, but are not limited to, the following:
 - 1) Complete chiller including refrigerant and oil charge.
OR
Complete compressor and drive assembly including refrigerant and oil charge.
OR
Refrigerant **OR** Refrigerant and oil charge, **as directed**.
 - 2) Parts only **OR** Parts and labor, **as directed**.
 - 3) Loss of refrigerant charge for any reason.
 - b. Warranty Period: Two **OR** Three **OR** Four **OR** Five, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Packaged, Water-Cooled, Single-Compressor Chillers

1. Description: Factory-assembled and factory-tested **OR** run-tested, **as directed**, chiller with compressor, compressor motor, compressor motor controller, lubrication system, evaporator, condenser, heat-reclaim condenser as indicated, controls, interconnecting unit piping and wiring, and indicated accessories.
 - a. Disassemble chiller into major assemblies as required by the installation after factory testing and before packaging for shipment.
2. Fabricate chiller mounting base with reinforcement strong enough to resist chiller movement during a seismic event when chiller is anchored to field support structure.
3. Compressor:
 - a. Description: Hermetic **OR** Open, **as directed**, positive displacement, and oil lubricated.
 - b. Casing: Cast iron, precision machined for minimum clearance about periphery of rotors.
 - c. Rotors: Manufacturer's standard one-, two-, or three-rotor design.
 - d. Drive Coupling: For chillers with open drives, provide flexible disc with all-metal construction and no wearing parts to ensure long life without the need for lubrication.
 - e. Seals: Seal drive assembly to prevent refrigerant leakage.
4. Compressor Motor:
 - a. Continuous-duty, squirrel-cage, induction-type motor with energy efficiency required to suit chiller energy efficiency indicated.
 - b. Factory mounted, aligned, and balanced as part of compressor assembly before shipping.
 - c. Motor shall be of sufficient capacity to drive compressor throughout entire operating range without overload and with sufficient capacity to start and accelerate compressor without damage.
 - d. For chillers with open drives, provide motor with open-dripproof **OR** weather-protected, Type I **OR** weather-protected, Type II **OR** totally enclosed, **as directed**, enclosure.
 - e. Provide motor with thermistor or RTD in single motor winding **OR** each of three-phase motor windings, **as directed**, to monitor temperature and report information to chiller control panel.
 - f. Provide motor with thermistor or RTD to monitor bearing temperature and report information to chiller control panel.
 - g. Provide open-drive motor with internal electric heater, internally powered from chiller power supply.
5. Vibration Balance: Balance chiller compressor and drive assembly to provide a precision balance that is free of noticeable vibration over the entire operating range.
 - a. Overspeed Test: 25 percent above design operating speed.
6. Service: Easily accessible for inspection and service.
 - a. Compressor's internal components shall be accessible without having to remove compressor-drive assembly from chiller.
 - b. Provide lifting lugs or eyebolts attached to casing.
7. Capacity Control: Modulating slide-valve assembly or port unloaders combined with a variable frequency controller, if applicable, and hot-gas bypass, if necessary, to achieve performance indicated.
 - a. Maintain stable operation throughout range of operation. Configure to achieve most energy-efficient operation possible.
 - b. Operating Range: From 100 to 20 **OR** 15 **OR** 10 **OR** 5 **OR** zero, **as directed**, percent of design capacity.
 - c. Condenser-Fluid Unloading Requirements over Operating Range: Constant-design entering condenser-fluid temperature **OR** Drop-in entering condenser-fluid temperature of 2.5 deg F **1.4 deg C** drop for each 10 percent in capacity reduction, **as directed**.
8. Oil Lubrication System: Consisting of pump if required, filtration, heater, cooler, factory-wired power connection, and controls.
 - a. Provide lubrication to bearings, gears, and other rotating surfaces at all operating, startup, shutdown, and standby conditions including power failure.
 - b. Thermostatically controlled oil heater properly sized to remove refrigerant from oil.

- c. Oil filter **OR** Dual oil filters, one redundant, **as directed**, shall be the easily replaceable cartridge type, minimum 0.5-micron efficiency, with means of positive isolation while servicing.
- d. Refrigerant **OR** Water, **as directed**, -cooled oil cooler.
- e. Factory-installed and pressure-tested piping with isolation valves and accessories.
- f. Oil compatible with refrigerant and chiller components.
- g. Positive visual indication of oil level.
- 9. Refrigerant Circuit:
 - a. Refrigerant: Type as indicated on Drawings.
OR
Refrigerant Type: R-134a **OR** HFC, **as directed**. Classified as Safety Group A1 according to ASHRAE 34.
 - b. Refrigerant Compatibility: Chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Flow Control: Manufacturer's standard refrigerant flow-control device satisfying performance requirements indicated.
 - d. Pressure Relief Device:
 - 1) Comply with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2) ASME-rated, spring-loaded pressure relief valve; single- or multiple-reseating type. Pressure relief valve(s) shall be provided for each heat exchanger. Condenser shall have dual valves with one being redundant and configured to allow either valve to be replaced without loss of refrigerant.
 - e. Refrigeration Transfer: Provide service valves and other factory-installed accessories required to facilitate transfer of refrigerant from chiller to a remote refrigerant storage and recycling system. Comply with requirements in ASHRAE 15 and ASHRAE 147.
 - f. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line to the condenser and the refrigerant liquid line leaving the condenser to allow for isolation and storage of full refrigerant charge in the chiller condenser shell. In addition, provide isolation valve on suction side of compressor from evaporator to allow for isolation and storage of full refrigerant charge in the chiller evaporator shell, **as directed**.
- 10. Evaporator:
 - a. Description: Shell-and-tube design with water in tubes and refrigerant surrounding tubes within shell. Shell is separate from condenser.
 - b. Shell Material: Carbon-steel rolled plates with continuously welded seams or seamless pipe.
 - c. Designed to prevent liquid refrigerant carryover from entering compressor.
 - d. Provide evaporator with sight glass or other form of positive visual verification of liquid-refrigerant level.
 - e. Tubes:
 - 1) Individually replaceable from either end and without damage to tube sheets and other tubes.
 - 2) Mechanically expanded into end sheets and physically attached to intermediate tube sheets.
 - 3) Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - 4) Nominal OD: Manufacturer's choice **OR** 3/4 inch (19 mm) **OR** 1 inch (25 mm), **as directed**.
 - 5) Minimum Wall Thickness: Manufacturer's choice **OR** 0.025 inch (0.6 mm) **OR** 0.028 inch (0.7 mm) **OR** 0.035 inch (0.9 mm), **as directed**.
 - 6) External Finish: Manufacturer's standard.
 - 7) Internal Finish: Enhanced **OR** Smooth, **as directed**.
 - f. End Tube Sheets: Continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
 - g. Intermediate Tube Sheets: Installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.

- h. Water Box:
 - 1) Cast-iron or carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - 2) Standard **OR** Marine, **as directed**, type for water box with piping connections. Standard type for water box without piping connections.
 - 3) Provide water boxes and marine water-box covers, **as directed**, with lifting lugs or eyebolts.
 - 4) Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine water-box covers.
 - 5) Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - 6) Thermistor or RTD temperature sensor factory installed in each nozzle.
 - 7) Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
- i. Additional Corrosion Protection:
 - 1) Electrolytic corrosion-inhibitor anode.
 - 2) Coat wetted surfaces with a corrosion-resistant finish.
- 11. Condenser:
 - a. Description: Shell-and-tube design with water in tubes and refrigerant surrounding tubes within shell. Shell is separate from evaporator.
 - b. Shell Material: Carbon-steel rolled plates with continuously welded seams or seamless pipe.
 - c. Designed to prevent direct impingement of high-velocity hot gas from compressor discharge on tubes.
 - d. Provide condenser with sight glass or other form of positive visual verification of refrigerant charge and condition.
 - e. Tubes:
 - 1) Individually replaceable from either end and without damage to tube sheets and other tubes.
 - 2) Mechanically expanded into end sheets and physically attached to intermediate tube sheets.
 - 3) Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - 4) Nominal OD: Manufacturer's choice **OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**.
 - 5) Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - 6) External Finish: Manufacturer's standard.
 - 7) Internal Finish: Enhanced **OR** Smooth, **as directed**.
 - f. End Tube Sheets: Continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
 - g. Intermediate Tube Sheets: Installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.
 - h. Water Box:
 - 1) Cast-iron or carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - 2) Standard **OR** Marine, **as directed**, type for water box with piping connections. Standard type for water box without piping connections.
 - 3) Provide water boxes and marine water-box covers, **as directed**, with lifting lugs or eyebolts.
 - 4) Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine water-box covers.

- 5) Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - 6) Thermistor or RTD temperature sensor factory installed in each nozzle.
 - 7) Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
 - i. Additional Corrosion Protection:
 - 1) Electrolytic corrosion-inhibitor anode.
 - 2) Coat wetted surfaces with a corrosion-resistant finish.
12. Heat-Reclaim Condenser:
- a. Description: Shell-and-tube design with water in tubes and refrigerant surrounding tubes within shell. Shell is separate from evaporator and condenser.
 - b. Shell Material: Carbon-steel rolled plates with continuously welded seams or seamless pipe.
 - c. Designed to prevent direct impingement of high-velocity hot gas from compressor discharge on tubes.
 - d. Tubes:
 - 1) Individually replaceable from either end and without damage to tube sheets and other tubes.
 - 2) Mechanically expanded into end sheets and physically attached to intermediate tube sheets.
 - 3) Material: Copper **OR** Copper-nickel alloy, **as directed**.
 - 4) Nominal OD: Manufacturer's choice **OR 3/4 inch (19 mm) OR 1 inch (25 mm)**, **as directed**.
 - 5) Minimum Wall Thickness: Manufacturer's choice **OR 0.025 inch (0.6 mm) OR 0.028 inch (0.7 mm) OR 0.035 inch (0.9 mm)**, **as directed**.
 - 6) External Finish: Manufacturer's standard.
 - 7) Internal Finish: Enhanced **OR** Smooth, **as directed**.
 - e. End Tube Sheets: Continuously welded to each end of shell; drilled and reamed to accommodate tubes with positive seal between fluid in tubes and refrigerant in shell.
 - f. Intermediate Tube Sheets: Installed in shell and spaced along length of tube at intervals required to eliminate vibration and to avoid contact of tubes resulting in abrasion and wear.
 - g. Water Box:
 - 1) Cast-iron or carbon-steel construction; arranged to provide visual inspection and cleaning of tubes from either end without disturbing refrigerant in shell.
 - 2) Standard **OR** Marine, **as directed**, type for water box with piping connections. Standard type for water box without piping connections.
 - 3) Provide water boxes and marine water-box covers, **as directed**, with lifting lugs or eyebolts.
 - 4) Hinged **OR** Davited, **as directed**, water boxes.
OR
Hinged **OR** Davited, **as directed**, marine water-box covers.
 - 5) Nozzle Pipe Connections: Welded, ASME B16.5, flat-face flange **OR** Welded, ASME B16.5, raised-face flange **OR** Grooved for mechanical-joint coupling **OR** Grooved with mechanical-joint coupling and flange adapter, **as directed**.
 - 6) Thermistor or RTD temperature sensor factory installed in each nozzle.
 - 7) Fit each water box with **3/4-inch (19-mm) OR 1-inch (25-mm)**, **as directed**, drain connection at low point and vent connection at high point, each with threaded plug.
 - h. Additional Corrosion Protection:
 - 1) Electrolytic corrosion-inhibitor anode.
 - 2) Coat wetted surfaces with a corrosion-resistant finish.
13. Electrical Power:
- a. Factory installed and wired, and functionally tested at factory before shipment.

- b. Single-point, field-power connection to fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
 - 1) Provide branch power circuit to each motor, electric heater, dedicated electrical load, and controls with disconnect switch or circuit breaker, **as directed**.
 - 2) NEMA- and ICS 2-rated motor controller for auxiliary motors, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller for each variable-speed motor furnished.
 - 3) Control-circuit transformer with primary and secondary side fuses.
- c. Terminal blocks with numbered and color-coded, **as directed**, wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
- d. Factory-installed wiring outside of enclosures shall be in metal raceway except make connections to each motor and heater with not more than a **24-inch (610-mm)** length of liquidtight conduit.
- e. Factory install and wire capacitor bank for the purpose of power factor correction to 0.95 at all operating conditions.
 - 1) If capacitors are mounted in a dedicated enclosure, use same NEMA enclosure type as motor controller. Provide enclosure with service entrance knockouts and bushings for conduit.
 - 2) Capacitors shall be non-PCB dielectric fluid, metallized electrode design, low loss with low-temperature rise. The kVAr ratings shall be indicated and shall not exceed the maximum limitations set by NFPA 70. Provide individual cells as required.
 - 3) Provide each cell with current-limiting replaceable fuses and carbon-film discharge resistors to reduce residual voltage to less than 50 V within 1 minute after de-energizing.
 - 4) Provide a ground terminal and a terminal block or individual connectors for phase connection.
- 14. Motor Controller:
 - a. Enclosure: Factory installed, unit mounted **OR** Factory furnished, field mounted, **as directed**, NEMA 250 **OR** NEMA ICS 6, **as directed**, Type 1 **OR** Type 4 **OR** Type 4X **OR** Type 12, **as directed**, with hinged full-front access door with lock and key or padlock and key, **as directed**.
 - b. Control Circuit: Obtained from integral control power transformer, **as directed**, with a control power transformer **OR** source, **as directed**, of enough capacity to operate connected control devices.
 - c. Overload Relay: Shall be sized according to UL 1995 or shall be an integral component of chiller control microprocessor.
 - d. Across-the-Line Controller: NEMA ICS 2, Class A, full voltage, nonreversing; include isolation switch and current-limiting fuses.
 - e. Star-Delta, Reduced-Voltage Controller: NEMA ICS 2, closed transition.
 - f. Autotransformer Reduced-Voltage Controller: NEMA ICS 2, closed transition; include isolation switch and current-limiting fuses.
 - g. Solid-State, Reduced-Voltage Controller: NEMA ICS 2.
 - 1) Surge suppressor in solid-state power circuits providing three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - 2) Visual indication of motor and control status, including the following conditions:
 - a) Controller on.
 - b) Overload trip.
 - c) Loss of phase.
 - d) Starter fault.
 - h. Accessories: Devices shall be factory installed in controller enclosure unless otherwise indicated.
 - 1) Externally Operated, Door-Interlocked, **as directed**, Disconnect: Fused disconnect switch **OR** Nonfused disconnect switch **OR** Circuit breaker, **as directed**. Minimum

- withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000, **as directed**, A.
- 2) Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.
 - 3) Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
 - 4) Control Relays: Time-delay relays.
 - 5) Elapsed-Time Meters: Numerical readout in hours on face of enclosure.
 - 6) Number-of-Starts Counter: Numerical readout on face of enclosure.
 - 7) Meters: Panel type, **2-1/2 inches (64 mm) OR 4-1/4 inches (108 mm), as directed**, with 90 **OR** 120 **OR** 270, **as directed**,-degree scale and 1 **OR** 2, **as directed**, percent accuracy. Where indicated, provide transfer device with an off position. Meters shall indicate the following:
 - a) Ammeter: Output current for each phase, with current sensors rated to suit application.
 - b) Voltmeter: Output voltage for each phase.
 - c) Frequency Meter: Output frequency.
 - d) Real-time clock with current time and date.
 - e) Total run time.**OR**

Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:

 - a) Selectable, digital display of the following:
 - i. Phase Currents, Each Phase: Plus or minus 1 percent.
 - ii. Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
 - iii. Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
 - iv. Three-Phase Real Power: Plus or minus 2 percent.
 - v. Three-Phase Reactive Power: Plus or minus 2 percent.
 - vi. Power Factor: Plus or minus 2 percent.
 - vii. Frequency: Plus or minus 0.5 percent.
 - viii. Integrated Demand with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
 - ix. Accumulated energy, in megawatt hours (joules), plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
 - b) Mounting: Display and control unit flush or semirecessed in instrument compartment door.
 - 8) Phase-Failure, Phase-Reversal, Undervoltage Relays: Solid-state sensing circuit with adjustable undervoltage setting and isolated output contacts for hardwired connection.
 - 9) Power Protection: Chiller shall shut down within six cycles of power interruption.
15. Variable Frequency Controller:
- a. Motor controller shall be factory mounted and wired on the chiller to provide a single-point, field-power termination to the chiller and its auxiliaries.
 - b. Description: NEMA ICS 2; listed and labeled as a complete unit and arranged to provide variable speed by adjusting output voltage and frequency.
 - c. Enclosure: Unit mounted, NEMA 250, Type 1, **as directed**, with hinged full-front access door with lock and key.
 - d. Integral Disconnecting Means: Door-interlocked, **as directed**, NEMA AB 1, instantaneous-trip circuit breaker with lockable handle. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000 **OR** 100,000, **as directed**, A.
 - e. Technology: Pulse width modulated (PWM) output suitable for constant or variable torque loads.

- f. Output Rating: Three phase; with voltage proportional to frequency throughout voltage range.
- g. Operating Requirements:
 - 1) Input AC Voltage Tolerance: 460-V ac, plus 10 percent or 506 V maximum, **as directed**.
 - 2) Input frequency tolerance of 60 Hz, plus or minus 2 Hz.
 - 3) Capable of driving full load, without derating, under the following conditions:
 - a) Ambient Temperature: 0 to 40 deg C.
 - b) Relative Humidity: Up to 90 **OR** 95, **as directed**, percent (noncondensing).
 - c) Altitude: **3300 feet (1005 m) OR 6600 feet (2010 m), as directed**.
 - 4) Minimum Efficiency: 96 percent at 60 Hz, full load.
 - 5) Minimum Displacement Primary-Side Power Factor: 98 percent.
 - 6) Overload Capability: 1.05 times the full-load current for 7 seconds.
 - 7) Starting Torque: As required by compressor-drive assembly.
 - 8) Speed Regulation: Plus or minus 1 percent.
 - 9) Isolated control interface to allow controller to follow control signal over a 10:1 speed range.
 - 10) To avoid equipment resonant vibrations, provide critical speed lockout circuitry to allow bands of operating frequency at which controller shall not operate continuously.
 - 11) Capable of being restarted into a motor coasting in either the forward or reverse direction without tripping.
- h. Internal Adjustability Capabilities:
 - 1) Minimum Output Frequency: 6 Hz.
 - 2) Maximum Output Frequency: 60 Hz.
 - 3) Acceleration: 2 seconds to 60 seconds.
 - 4) Deceleration: Zero seconds to 60 seconds.
 - 5) Current Limit: 30 to a minimum of 100 percent of maximum rating.
- i. Self-Protection and Reliability Features: Subjecting the controller to any of the following conditions shall not result in component failure or the need for replacement:
 - 1) Overtemperature.
 - 2) Short circuit at controller output.
 - 3) Ground fault at controller output. Variable frequency controller shall be able to start a grounded motor.
 - 4) Open circuit at controller output.
 - 5) Input undervoltage.
 - 6) Input overvoltage.
 - 7) Loss of input-phase.
 - 8) Reverse phase.
 - 9) AC line switching transients.
 - 10) Instantaneous overload, line to line or line to ground.
 - 11) Sustained overload exceeding 100 percent of controller rated current.
 - 12) Starting a rotating motor.
- j. Motor Protection: Controller shall protect motor against overvoltage and undervoltage, phase loss, reverse phase, overcurrent, overtemperature, and ground fault.
- k. Automatic Reset and Restart: Capable of three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Controller shall be capable of automatic restart on phase-loss, and overvoltage and undervoltage trips.
- l. Visual Indication: On face of controller enclosure or chiller control enclosure; indicating the following conditions:
 - 1) Power on.
 - 2) Run.
 - 3) Overvoltage.
 - 4) Line fault.
 - 5) Overcurrent.

- 6) External fault.
 - 7) Motor speed (percent).
 - 8) Fault or alarm status (code).
 - 9) Motor output voltage.
 - 10) Input kilovolt amperes.
 - 11) Total power factor.
 - 12) Input kilowatts.
 - 13) Input kilowatt-hours.
 - 14) Three-phase input voltage.
 - 15) Three-phase output voltage.
 - 16) Three-phase input current.
 - 17) Three-phase output current.
 - 18) Output frequency (Hertz).
 - 19) Elapsed operating time (hours).
 - 20) Diagnostic and service parameters.
- m. Operator Interface: At controller or chiller control panel; with start-stop and auto-manual selector with manual-speed-control potentiometer.
- n. Harmonic Distortion Filter: Factory mounted and wired to limit total voltage and current distortion to 5 percent.
16. Controls:
- a. Standalone and microprocessor based with all memory stored in nonvolatile memory so that reprogramming is not required on loss of electrical power.
 - b. Enclosure: Unit mounted, NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, hinged or lockable; factory wired with a single-point, field-power connection and a separate control circuit.
 - c. Operator Interface: Multiple-character digital or graphic display with dynamic update of information and with keypad or touch-sensitive display located on front of control enclosure. In either imperial or metric units, display the following information:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Fault history with not less than last 10 faults displayed.
 - 4) Set points of controllable parameters.
 - 5) Trend data.
 - 6) Operating hours.
 - 7) Number of chiller starts.
 - 8) Outdoor-air temperature or space temperature if required for chilled-water reset.
 - 9) Temperature and pressure of operating set points.
 - 10) Entering- and leaving-fluid temperatures of evaporator and condenser.
 - 11) Difference in fluid temperatures of evaporator and condenser.
 - 12) Fluid flow of evaporator and condenser.
 - 13) Fluid pressure drop of evaporator and condenser.
 - 14) Refrigerant pressures in evaporator and condenser.
 - 15) Refrigerant saturation temperature in evaporator and condenser.
 - 16) Pump status.
 - 17) Antirecycling timer status.
 - 18) Percent of maximum motor amperage.
 - 19) Current-limit set point.
 - 20) Compressor bearing temperature.
 - 21) Motor bearing temperature.
 - 22) Motor winding temperature.
 - 23) Oil temperature.
 - 24) Oil discharge pressure.
 - 25) Phase current.
 - 26) Percent of motor rated load amperes.
 - 27) Phase voltage.

- 28) Demand power (kilowatts).
- 29) Energy use (kilowatt-hours).
- 30) Power factor.
- d. Control Functions:
 - 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperatures, control set points, and motor load limits. Evaporator fluid temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) Condenser-fluid temperature.
 - 5) External chiller emergency stop.
 - 6) Antirecycling timer.
 - 7) Variable evaporator flow.
 - 8) Thermal storage.
 - 9) Heat reclaim.
- e. Manually Reset Safety Controls: The following conditions shall shut down chiller and require manual reset:
 - 1) Low evaporator pressure or temperature; high condenser pressure.
 - 2) Low evaporator fluid temperature.
 - 3) Low oil differential pressure.
 - 4) High or low oil pressure.
 - 5) High oil temperature.
 - 6) High compressor-discharge temperature.
 - 7) Loss of condenser-fluid flow.
 - 8) Loss of evaporator-fluid flow.
 - 9) Motor overcurrent.
 - 10) Motor overvoltage.
 - 11) Motor undervoltage.
 - 12) Motor phase reversal.
 - 13) Motor phase failure.
 - 14) Sensor- or detection-circuit fault.
 - 15) Processor communication loss.
 - 16) Motor controller fault.
 - 17) Extended compressor surge.
- f. Trending: Capability to trend analog data of up to five parameters simultaneously over an adjustable period and frequency of polling.
- g. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: view only; view and operate; and view, operate, and service.
- h. Control Authority: At least four conditions: Off, local manual control at chiller, local automatic control at chiller, and automatic control through a remote source.
- i. Communication Port: RS-232 port or equivalent connection capable of connecting a printer and a notebook computer, **as directed**.
- j. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display chiller status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On-off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt-hours) **OR** power factor, **as directed**.
 - b) Control: On-off operation, chilled-water, discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the chiller from an operator workstation. Control features and monitoring points displayed locally at chiller control panel shall be available through the BAS.

17. Insulation:
 - a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - b. Thickness: **3/4 inch (19 mm) OR 1-1/2 inches (38 mm), as directed.**
 - c. Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Factory-applied insulation over cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator shell and end tube sheets, evaporator water boxes including nozzles, refrigerant suction pipe from evaporator to compressor, cold surfaces of compressor, refrigerant-cooled motor, and auxiliary piping.
 - 1) Before insulating steel surfaces, prepare surfaces for paint, and prime and paint as indicated for other painted components. Do not insulate unpainted steel surfaces.
 - 2) Seal seams and joints to provide a vapor barrier.
 - 3) After adhesive has fully cured, paint exposed surfaces of insulation to match other painted parts.
18. Finish:
 - a. Paint chiller, using manufacturer's standard procedures, except comply with the following minimum requirements:
 - 1) Provide at least one coat of primer with a total dry film thickness of at least **2 mils (0.05 mm).**
 - 2) Provide at least two coats of alkyd-modified, vinyl enamel **OR epoxy OR polyurethane, as directed,** finish with a total dry film thickness of at least **4 mils (0.10 mm).**
 - 3) Paint surfaces that are to be insulated before applying the insulation.
 - 4) Paint installed insulation to match adjacent uninsulated surfaces.
 - 5) Color of finish coat to be manufacturer's standard **OR** custom color selected by the Owner, **as directed.**
 - b. Provide the Owner with quart container of paint used in application of topcoat to use in touchup applications after Project Closeout.
19. Accessories:
 - a. Flow Switches:
 - 1) If required and not factory installed, chiller manufacturer shall furnish a switch for each condenser **OR** evaporator and condenser, **as directed,** and verify field-mounting location before installation.
 - 2) Paddle Flow Switches:
 - a) Vane operated to actuate a double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
 - b) Contacts: Platinum alloy, silver alloy, or gold-plated switch contacts with a rating of 10 A at 120-V ac.
 - c) Pressure rating equal to pressure rating of heat exchanger.
 - d) Construct body and wetted parts of Type 316 stainless steel.
 - e) House switch in a NEMA 250, Type 4, **as directed,** enclosure constructed of die-cast aluminum.
 - f) Vane length to suit installation.

OR

Pressure Differential Switches:

 - g) Construction: Wetted parts of body and trim constructed of Type 316 stainless steel.
 - h) Performance: Switch shall withstand, without damage, the full-pressure rating of the heat exchanger applied to either port and exhibit zero set-point shift due to variation in working pressure.
 - i) Set Point: Screw type, field adjustable.
 - j) Electrical Connections: Internally mounted screw-type terminal blocks.
 - k) Switch Enclosure: NEMA 250, Type 4, **as directed.**

- l) Switch Action: Double-pole, double-throw switch with one pole field wired to the chiller control panel and the other pole field wired to the BAS.
 - b. Vibration Isolation:
 - c. Chiller manufacturer shall furnish vibration isolation for each chiller.
 - 1) Neoprene Pad:
 - a) Two layers of **0.375-inch- (10-mm-)** thick, ribbed- or waffle-pattern neoprene pads separated by a 16-gage, stainless-steel plate.
 - b) Fabricate pads from 40- to 50-durometer neoprene.
 - c) Provide stainless-steel square bearing plate to load the pad uniformly between **20 and 40 psig (138 and 276 kPa)** with a **0.12- to 0.16-inch (3- to 4-mm)** deflection.
 - OR**
 - Spring Isolator:
 - d) Stable in operation and designed for not less than 30 percent reserve deflection beyond actual operating conditions. Isolators shall be designed such that the Kx/Ky ratio shall be 1.0 or more for stability.
 - e) Provide PVC or neoprene-coated springs and hot-dip, galvanized-steel components. Aluminum components shall be etched and painted. Nuts, bolts, and washers shall be zinc electroplated.
 - f) Isolators shall be adjustable and with an open spring, having one or more coil springs attached to a top compression plate and a baseplate. An elastomeric pad with a minimum thickness of **0.25 inch (6 mm)** shall be bonded to the baseplate.
 - g) Spring assembly shall be removable and shall fit within a welded steel enclosure consisting of a top plate and rigid lower housing, which serves as a blocking device during installation. Isolated restraining bolts shall not be engaged during normal operation and shall connect the top plate and lower housing to prevent the isolated equipment from rising when drained of fluid.
 - h) Isolators shall be selected for a nominal **1-inch (25-mm) OR 2-inch (50-mm), as directed**, deflection.
 - d. Sound Barrier:
 - 1) Furnish removable and reusable sound-barrier covers over the compressor housing, hermetic motor, compressor suction and discharge piping, and condenser shell.
 - 2) Provide for repeated installation and removal without use of tape or caulk.
 - 3) Inner and outer cover shall consist of a PTFE-impregnated fiberglass cloth enclosing heavy-density, needled fiberglass insulation material with a mass-loaded vinyl acoustic barrier.
 - 4) Covers shall be double sewn and lock stitched with edges folded and sewn so no raw cut edges are exposed.
 - 5) Form covers around control devices, gages, conduit, piping, and supports without degrading sound-barrier performance.
 - 6) Continuously lap all exposed seams at least **2 inches (50 mm)** for better sound containment.
 - 7) Permanently label each section of cover to indicate its location, description, size, and number sequence.
 - 8) Randomly place stainless-steel quilting pins to prevent covers from shifting and sagging.
- B. Packaged, Water-Cooled, Multiple-Compressor Chillers
1. Description: Factory-assembled and -tested **OR** run-tested, **as directed**, chiller with compressor(s), compressor motors and motor controllers, evaporator, condenser where indicated, electrical power, controls, and indicated accessories.
 - a. Disassemble chiller into major assemblies as required by the installation after factory testing and before packaging for shipment.

2. Fabricate chiller mounting base with reinforcement strong enough to resist chiller movement during a seismic event when chiller is anchored to field support structure.
3. Compressors:
 - a. Description: Positive displacement, hermetically sealed.
 - b. Casing: Cast iron, precision machined for minimum clearance about periphery of rotors.
 - c. Rotors: Manufacturer's standard one- or two-rotor design.
4. Service: Easily accessible for inspection and service.
 - a. Compressor's internal components shall be accessible without having to remove compressor-drive assembly from chiller.
 - b. Provide lifting lugs or eyebolts attached to casing.
5. Capacity Control: On-off compressor cycling and modulating slide-valve assembly or port unloaders combined with hot-gas bypass, if necessary, to achieve performance indicated.
 - a. Maintain stable operation throughout range of operation. Configure to achieve most energy-efficient operation possible.
 - b. Operating Range: From 100 to 20 **OR** 15 **OR** 10 **OR** 5 **OR** zero, **as directed**, percent of design capacity.
 - c. Condenser-Fluid Unloading Requirements over Operating Range: Constant-design entering condenser-fluid temperature **OR** Drop-in entering condenser-fluid temperature of **2.5 deg F (1.4 deg C)** drop for each 10 percent in capacity reduction, **as directed**.
6. Oil Lubrication System: Consisting of pump if required, filtration, heater, cooler, factory-wired power connection, and controls.
 - a. Provide lubrication to bearings, gears, and other rotating surfaces at all operating, startup, shutdown, and standby conditions including power failure.
 - b. Thermostatically controlled oil heater properly sized to remove refrigerant from oil.
 - c. Factory-installed and pressure-tested piping with isolation valves and accessories.
 - d. Oil compatible with refrigerant and chiller components.
 - e. Positive visual indication of oil level.
7. Vibration Control:
 - a. Vibration Balance: Balance chiller compressor and drive assembly to provide a precision balance that is free of noticeable vibration over the entire operating range.
 - 1) Overspeed Test: 25 percent above design operating speed.
 - b. Isolation: Mount individual compressors on vibration isolators.
8. Sound Control: Sound-reduction package shall consist of removable acoustic enclosures around the compressors and drive assemblies that are designed to reduce sound levels without affecting performance.
9. Compressor Motors:
 - a. Hermetically sealed and cooled by refrigerant suction gas.
 - b. High-torque, induction type with inherent thermal-overload protection on each phase.
10. Refrigerant Circuits:
 - a. Refrigerant: Type as indicated on Drawings.
OR
Refrigerant Type: R-134a **OR** HFC, **as directed**. Classified as Safety Group A1 according to ASHRAE 34.
 - b. Refrigerant Compatibility: Chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Circuit: Each shall include a thermal- or electronic-expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction, **as directed**, and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core, **as directed**, filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.
 - d. Pressure Relief Device:
 - 1) Comply with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2) ASME-rated, spring-loaded pressure relief valve; single- or multiple-reseating type.

- e. Refrigerant Isolation: Factory install positive shutoff isolation valves in the compressor discharge line to the condenser and the refrigerant liquid-line leaving the condenser to allow for isolation and storage of full refrigerant charge in the chiller condenser shell.
11. Evaporator:
- a. Description: Shell-and-tube design.
- 1) Direct-expansion (DX) type with fluid flowing through the shell, and refrigerant flowing through the tubes within the shell.
 - 2) Flooded type with fluid flowing through tubes and refrigerant flowing around tubes within the shell.
- b. Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
- c. Shell Material: Carbon steel.
- d. Shell Heads: Removable carbon-steel heads with multipass baffles, and located at each end of the tube bundle.
- e. Fluid Nozzles: Terminated with mechanical-coupling or flanged end connections for connection to field piping.
- f. Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
12. Condenser:
- a. Shell and tube, or without integral condenser; as indicated.
OR
Shell and Tube:
- 1) Description: Shell-and-tube design with refrigerant flowing through shell, and fluid flowing through tubes within shell.
 - 2) Provides positive subcooling of liquid refrigerant.
 - 3) Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 4) Shell Material: Carbon steel.
 - 5) Water Boxes: Removable, of carbon-steel construction, located at each end of the tube bundle with fluid nozzles terminated with mechanical-coupling end connections for connection to field piping.
 - 6) Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - 7) Provide each condenser with a pressure relief device, purge cock, and liquid-line shutoff valve.
- b. Provide chiller without an integral condenser and design chiller for field connection to remote condenser. Coordinate requirements with Division 23 Section "Air-cooled Refrigerant Condensers".
13. Electrical Power:
- a. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a multipoint **OR** single-point, **as directed**, field-power connection to chiller.
- b. House in a unit-mounted, NEMA 250, Type 1, **as directed**, enclosure with hinged access door with lock and key or padlock and key, **as directed**.
- c. Wiring shall be numbered and color-coded, **as directed**, to match wiring diagram.
- d. Install factory wiring outside of an enclosure in a raceway.
- e. Field-power interface shall be to wire lugs **OR** NEMA KS 1, heavy-duty, nonfused disconnect switch **OR** NEMA AB 1, instantaneous-trip circuit breaker with lockable handle, **as directed**.
- 1) Disconnect means shall be interlocked with door operation.
 - 2) Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000 **OR** 100,000, **as directed**, A.
- f. Provide branch power circuit to each motor and to controls with one of the following disconnecting means:
- 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.

- 2) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit-trip set point.
 - g. Provide each motor with overcurrent protection.
 - h. Overload relay sized according to UL 1995 or an integral component of chiller control microprocessor.
 - i. Phase-Failure and Undervoltage Relays: Solid-state sensing with adjustable settings.
 - j. Control Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.
 - k. Control Relays: Auxiliary and adjustable time-delay relays.
 - l. For chiller electrical power supply, indicate the following:
 - 1) Current and phase to phase for all three phases.
 - 2) Voltage, phase to phase, and phase to neutral for all three phases.
 - 3) Three-phase real power (kilowatts).
 - 4) Three-phase reactive power (kilovolt amperes reactive).
 - 5) Power factor.
 - 6) Running log of total power versus time (kilowatt-hours).
 - 7) Fault log, with time and date of each.
14. Compressor Motor Controllers:
- a. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing, or solid state, **as directed**.
 - b. Star-Delta, Reduced-Voltage Controller: NEMA ICS 2, closed or open transition, or solid state, **as directed**.
15. Controls:
- a. Standalone and microprocessor based.
 - b. Enclosure: Share enclosure with electrical-power devices or provide a separate enclosure of matching construction.
 - c. Operator Interface: Multiple-character digital or graphic display with dynamic update of information and with keypad or touch-sensitive display located on front of control enclosure. In either imperial or metric units, display the following information:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Fault history with not less than last 10 faults displayed.
 - 4) Set points of controllable parameters.
 - 5) Trend data.
 - 6) Operating hours.
 - 7) Number of chiller starts.
 - 8) Outdoor-air temperature or space temperature if required for chilled-water reset.
 - 9) Temperature and pressure of operating set points.
 - 10) Entering- and leaving-fluid temperatures of evaporator and condenser.
 - 11) Difference in fluid temperatures of evaporator and condenser.
 - 12) Refrigerant pressures in evaporator and condenser.
 - 13) Refrigerant saturation temperature in evaporator and condenser.
 - 14) No cooling load condition.
 - 15) Elapsed time meter (compressor run status).
 - 16) Pump status.
 - 17) Antirecycling timer status.
 - 18) Percent of maximum motor amperage.
 - 19) Current-limit set point.
 - 20) Number of compressor starts.
 - 21) Compressor refrigerant suction and discharge temperature.
 - 22) Oil temperature.
 - 23) Oil discharge pressure.
 - 24) Phase current.
 - 25) Percent of motor rated load amperes.
 - 26) Phase voltage.

- d. Control Functions:
 - 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperatures, control set points, and motor load limits. Chilled-water leaving temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) Condenser-fluid temperature.
 - 5) External chiller emergency stop.
 - 6) Antirecycling timer.
 - 7) Automatic lead-lag switching.
 - 8) Variable evaporator flow.
 - 9) Thermal storage.
 - e. Manually Reset Safety Controls: The following conditions shall shut down chiller and require manual reset:
 - 1) Low evaporator pressure, or high condenser pressure.
 - 2) Low chilled-water temperature.
 - 3) Refrigerant high pressure.
 - 4) High or low oil pressure.
 - 5) High oil temperature.
 - 6) Loss of chilled-water flow.
 - 7) Loss of condenser-fluid flow.
 - 8) Control device failure.
 - f. Trending: Capability to trend analog data of up to five parameters simultaneously over an adjustable period and frequency of polling.
 - g. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: view only; view and operate; and view, operate, and service.
 - h. Control Authority: At least four conditions: Off, local manual control at chiller, local automatic control at chiller, and automatic control through a remote source.
 - i. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display chiller status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On-off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt-hours), **as directed**.
 - b) Control: On-off operation, chilled-water, discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the chiller from an operator workstation. Control features and monitoring points displayed locally at chiller control panel shall be available through the BAS.
16. Insulation:
- a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - b. Thickness: **3/4 inch (19 mm)**.
 - c. Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Factory-applied insulation over cold surfaces of chiller capable of forming condensation. Components shall include, but not be limited to, evaporator shell and end tube sheets, evaporator water boxes including nozzles, refrigerant suction pipe from evaporator to compressor, cold surfaces of compressor, refrigerant-cooled motor, and auxiliary piping.
 - 1) Before insulating steel surfaces, prepare surfaces for paint, prime and paint as indicated for other painted components. Do not insulate unpainted steel surfaces.
 - 2) Seal seams and joints to provide a vapor barrier.

- 3) After adhesive has fully cured, paint exposed surfaces of insulation to match other painted parts.
 17. Finish:
 - a. Paint chiller, using manufacturer's standard procedures, except comply with the following minimum requirements:
 - 1) Provide at least one coat of primer.
 - 2) Provide finish coat of alkyd-modified, vinyl enamel, **as directed**.
 - 3) Paint surfaces that are to be insulated before applying the insulation.
 - 4) Paint installed insulation to match adjacent uninsulated surfaces.
 18. Accessories:
 - a. Factory-furnished, chilled- and condenser-, **as directed**, water flow switches for field installation.
 - b. Individual compressor suction and discharge pressure gages with shutoff valves for each refrigerant circuit.
 - c. Factory-furnished neoprene **OR** spring, **as directed**, isolators for field installation.
- C. Packaged, Air-Cooled Chillers
 1. Description: Factory-assembled and run-tested chiller complete with base and frame, condenser casing, compressors, compressor motors and motor controllers, evaporator, condenser coils, condenser fans and motors, electrical power, controls, and accessories.
 2. Fabricate base, frame, and attachment to chiller components strong enough to resist chiller movement during a seismic event when chiller base is anchored to field support structure.
 3. Cabinet:
 - a. Base: Galvanized-steel base extending the perimeter of chiller. Secure frame, compressors, and evaporator to base to provide a single-piece unit.
 - b. Frame: Rigid galvanized-steel frame secured to base and designed to support cabinet, condenser, control panel, and other chiller components not directly supported by base.
 - c. Casing: Galvanized steel.
 - d. Finish: Coat base, frame, and casing with a corrosion-resistant coating capable of withstanding a 500 **OR** 1000, **as directed**, -hour salt-spray test according to ASTM B 117.
 - e. Sound-reduction package designed to reduce sound level without affecting performance and consisting of the following:
 - 1) Acoustic enclosure around compressors.
 - 2) Reduced-speed fans with acoustic treatment.
 - f. Security Package: Provide removable grilles **OR** louvered panels, **as directed**, with fasteners for additional protection of compressors, evaporator, and condenser coils without inhibiting service access. Finish to match cabinet.
 4. Compressors:
 - a. Description: Positive displacement, hermetically sealed.
 - b. Casing: Cast iron, precision machined for minimum clearance about periphery of rotors.
 - c. Rotors: Manufacturer's standard one- or two-rotor design.
 - d. Each compressor provided with suction and, **as directed**, discharge shutoff valves, crankcase oil heater, and suction strainer.
 5. Service: Easily accessible for inspection and service.
 6. Capacity Control: On-off compressor cycling and modulating slide-valve assembly or port unloaders combined with hot-gas bypass, if necessary, to achieve performance indicated.
 7. Maintain stable operation throughout range of operation. Configure to achieve most energy-efficient operation possible.
 - a. Operating Range: From 100 to 20 **OR** 15 **OR** 10 **OR** 5 **OR** zero, **as directed**, percent of design capacity.
 - b. Condenser-Air Unloading Requirements over Operating Range: Constant-design entering condenser-air temperature **OR** Drop-in entering condenser-air temperature of 5 deg F (3 deg C) drop for each 10 percent in capacity reduction, **as directed**.

- c. For units equipped with a variable frequency controller, capacity control shall be both "valveless" and "stepless," requiring no slide valve or capacity-control valve(s) to operate at reduced capacity.
- 8. Oil Lubrication System: Consisting of pump if required, filtration, heater, cooler, factory-wired power connection, and controls.
 - a. Provide lubrication to bearings, gears, and other rotating surfaces at all operating, startup, shutdown, and standby conditions including power failure.
 - b. Thermostatically controlled oil heater properly sized to remove refrigerant from oil.
 - c. Factory-installed and pressure-tested piping with isolation valves and accessories.
 - d. Oil compatible with refrigerant and chiller components.
 - e. Positive visual indication of oil level.
- 9. Vibration Control:
 - a. Vibration Balance: Balance chiller compressors and drive assemblies to provide a precision balance that is free of noticeable vibration over the entire operating range.
 - 1) Overspeed Test: 25 percent above design operating speed.
 - b. Isolation: Mount individual compressors on vibration isolators.
- 10. Compressor Motors:
 - a. Hermetically sealed and cooled by refrigerant suction gas.
 - b. High-torque, induction type with inherent thermal-overload protection on each phase.
- 11. Compressor Motor Controllers:
 - a. Across the Line: NEMA ICS 2, Class A, full voltage, nonreversing, or solid state, **as directed**.
 - b. Star-Delta, Reduced-Voltage Controller: NEMA ICS 2, closed transition, or solid state, **as directed**.
 - c. Variable Frequency Controller:
 - 1) Motor controller shall be factory mounted and wired on the chiller to provide a single-point, field-power termination to the chiller and its auxiliaries.
 - 2) Description: NEMA ICS 2; listed and labeled as a complete unit and arranged to provide variable speed by adjusting output voltage and frequency.
 - 3) Enclosure: Unit mounted, NEMA 250, Type 3R, **as directed**, with hinged full-front access door with lock and key.
 - 4) Integral Disconnecting Means: Door-interlocked, **as directed**, NEMA AB 1, instantaneous-trip circuit breaker with lockable handle. Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR 65,000 OR 100,000, as directed, A.**
 - 5) Technology: Pulse width modulated (PWM) output suitable for constant or variable torque loads.
 - 6) Motor current at start shall not exceed the rated load amperes, providing no electrical inrush.
- 12. Refrigerant Circuits:
 - a. Refrigerant: Type as indicated on Drawings.
OR
Refrigerant Type: R-134a **OR** R-407c **OR** HFC, **as directed**: Classified as Safety Group A1 according to ASHRAE 34.
 - b. Refrigerant Compatibility: Chiller parts exposed to refrigerants shall be fully compatible with refrigerants, and pressure components shall be rated for refrigerant pressures.
 - c. Refrigerant Circuit: Each shall include a thermal- or electronic-expansion valve, refrigerant charging connections, a hot-gas muffler, compressor suction, **as directed**, and discharge shutoff valves, a liquid-line shutoff valve, a replaceable-core, **as directed**, filter-dryer, a sight glass with moisture indicator, a liquid-line solenoid valve, and an insulated suction line.
 - d. Pressure Relief Device:
 - 1) Comply with requirements in ASHRAE 15 and in applicable portions of ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - 2) ASME-rated, spring-loaded pressure relief valve; single- or multiple-reseating type.
- 13. Evaporator:

- a. Description: Shell-and-tube design.
 - 1) Direct-expansion (DX) type with fluid flowing through the shell, and refrigerant flowing through the tubes within the shell.
 - 2) Flooded type with fluid flowing through tubes and refrigerant flowing around tubes within the shell.
 - b. Code Compliance: Tested and stamped according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 - c. Shell Material: Carbon steel.
 - d. Shell Heads: Removable carbon-steel heads located at each end of the tube bundle.
 - e. Fluid Nozzles: Terminated with mechanical-coupling **OR** flanged, **as directed**, end connections for connection to field piping.
 - f. Tube Construction: Individually replaceable copper tubes with enhanced fin design, expanded into tube sheets.
 - g. Heater: Factory-installed and -wired electric heater with integral controls designed to protect the evaporator to **minus 20 deg F (minus 29 deg C)**.
 - h. Remote Mounting: Designed for remote field mounting where indicated. Provide kit for field installation.
14. Air-Cooled Condenser:
- a. Plate-fin coil with integral subcooling on each circuit, rated at **450 psig (3103 kPa)**.
 - 1) Construct coil casing of galvanized **OR** stainless, **as directed**, steel.
 - 2) Construct coils of copper tubes mechanically bonded to aluminum **OR** aluminum with precoated epoxy-phenolic **OR** copper, **as directed**, fins.
 - 3) Coat coils with a baked-epoxy, corrosion-resistant coating after fabrication.
 - 4) Hail Protection: Provide condenser coils with louvers, baffles, or hoods to protect against hail damage.
 - b. Fans: Direct-drive propeller type with statically and dynamically balanced fan blades, arranged for vertical air discharge.
 - c. Fan Motors: Totally enclosed nonventilating (TENV) or totally enclosed air over (TEAO) enclosure, with permanently lubricated bearings. Equip each motor with overload protection integral to either the motor or chiller controls.
 - d. Fan Guards: Steel safety guards with corrosion-resistant coating.
15. Electrical Power:
- a. Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a multipoint **OR** single-point, **as directed**, field-power connection to chiller.
 - b. House in a unit-mounted, NEMA 250, Type 3R, **as directed**, enclosure with hinged access door with lock and key or padlock and key, **as directed**.
 - c. Wiring shall be numbered and color-coded, **as directed**, to match wiring diagram.
 - d. Install factory wiring outside of an enclosure in a raceway.
 - e. Field-power interface shall be to wire lugs **OR** NEMA KS 1, heavy-duty, nonfused disconnect switch **OR** NEMA AB 1, instantaneous-trip circuit breaker with lockable handle, **as directed**.
 - 1) Disconnect means shall be interlocked with door operation.
 - 2) Minimum withstand rating shall be as required by electrical power distribution system, but not less than 42,000 **OR** 65,000 **OR** 100,000, **as directed**, A.
 - f. Provide branch power circuit to each motor and to controls with one of the following disconnecting means:
 - 1) NEMA KS 1, heavy-duty, fusible switch with rejection-type fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 60947-4-1.
 - 2) NEMA AB 1, motor-circuit protector (circuit breaker) with field-adjustable, short-circuit-trip set point.
 - g. Provide each motor with overcurrent protection.
 - h. Overload relay sized according to UL 1995 or an integral component of chiller control microprocessor.
 - i. Phase-Failure and Undervoltage Relays: Solid-state sensing with adjustable settings.

- j. Provide power factor correction capacitors to correct power factor to 0.90 **OR** 0.95, **as directed**, at full load.
 - k. Control Transformer: Unit-mounted transformer with primary and secondary fuses and sized with enough capacity to operate electrical load plus spare capacity.
 - 1) Power unit-mounted controls where indicated.
 - 2) Power unit-mounted, ground fault interrupt (GFI) duplex receptacle.
 - l. Control Relays: Auxiliary and adjustable time-delay relays.
 - m. For chiller electrical power supply, indicate the following:
 - 1) Current and phase to phase for all three phases.
 - 2) Voltage, phase to phase, and phase to neutral for all three phases.
 - 3) Three-phase real power (kilowatts).
 - 4) Three-phase reactive power (kilovolt amperes reactive).
 - 5) Power factor.
 - 6) Running log of total power versus time (kilowatt-hours).
 - 7) Fault log, with time and date of each.
16. Controls:
- a. Standalone and microprocessor based.
 - b. Enclosure: Share enclosure with electrical power devices or provide a separate enclosure for remote mounting in the field, **as directed**.
 - c. Operator Interface: Multiple-character digital or graphic display with dynamic update of information and with keypad or touch-sensitive display located on front of control enclosure. In either imperial or metric units, display the following information:
 - 1) Date and time.
 - 2) Operating or alarm status.
 - 3) Operating hours.
 - 4) Outdoor-air temperature if required for chilled-water reset.
 - 5) Temperature and pressure of operating set points.
 - 6) Entering and leaving temperatures of chilled water.
 - 7) Refrigerant pressures in evaporator and condenser.
 - 8) Saturation temperature in evaporator and condenser.
 - 9) No cooling load condition.
 - 10) Elapsed time meter (compressor run status).
 - 11) Pump status.
 - 12) Antirecycling timer status.
 - 13) Percent of maximum motor amperage.
 - 14) Current-limit set point.
 - 15) Number of compressor starts.
 - d. Control Functions:
 - 1) Manual or automatic startup and shutdown time schedule.
 - 2) Entering and leaving chilled-water temperatures, control set points, and motor load limits. Chilled-water leaving temperature shall be reset based on return-water **OR** outdoor-air **OR** space, **as directed**, temperature.
 - 3) Current limit and demand limit.
 - 4) External chiller emergency stop.
 - 5) Antirecycling timer.
 - 6) Automatic lead-lag switching.
 - 7) Variable evaporator flow.
 - 8) Thermal storage.
 - e. Manually Reset Safety Controls: The following conditions shall shut down chiller and require manual reset:
 - 1) Low evaporator pressure or high condenser pressure.
 - 2) Low chilled-water temperature.
 - 3) Refrigerant high pressure.
 - 4) High or low oil pressure.
 - 5) High oil temperature.
 - 6) Loss of chilled-water flow.

- 7) Control device failure.
 - f. Trending: Capability to trend analog data of up to five parameters simultaneously over an adjustable period and frequency of polling.
 - g. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: view only; view and operate; and view, operate, and service.
 - h. Control Authority: At least four conditions: Off, local manual control at chiller, local automatic control at chiller, and automatic control through a remote source.
 - i. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display chiller status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On-off status, common trouble alarm **OR** electrical power demand (kilowatts) **OR** electrical power consumption (kilowatt-hours), **as directed**.
 - b) Control: On-off operation, chilled-water, discharge temperature set-point adjustment **OR** electrical power demand limit, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the chiller from an operator workstation. Control features and monitoring points displayed locally at chiller control panel shall be available through the BAS.
17. Insulation:
- a. Material: Closed-cell, flexible elastomeric, thermal insulation complying with ASTM C 534, Type I for tubular materials and Type II for sheet materials.
 - b. Thickness: **3/4 inch (19 mm) OR 1-1/2 inches (38 mm), as directed**.
 - c. Factory-applied insulation over cold surfaces of chiller components.
 - 1) Adhesive: As recommended by insulation manufacturer and applied to 100 percent of insulation contact surface. Seal seams and joints.
 - d. Apply protective coating to exposed surfaces of insulation to protect insulation from weather.
18. Accessories:
- a. Factory-furnished, chilled-water flow switches for field installation.
 - b. Individual compressor suction and discharge pressure gages with shutoff valves for each refrigerant circuit.
 - c. Factory-furnished neoprene **OR** spring, **as directed**, isolators for field installation.
- D. Packaged Refrigerant Recovery Units
1. Packaged portable unit consisting of compressor, air-cooled condenser, recovery system, tank pressure gages, filter-dryer, and valving that allows for switching between liquid and vapor recovery mode. Refrigerant recovery unit shall be factory mounted on an ASME-constructed and -stamped refrigerant storage vessel that is sized to hold the full refrigerant charge of the largest chiller furnished.
- E. Heat-Exchanger, Brush-Cleaning System
1. Furnish for field installation a brush-cleaning system on each chiller condenser, **as directed**, for tube cleaning and improved heat transfer.
 2. System shall maintain tube fouling at or below design conditions without interrupting normal equipment operation.
 3. System shall consist of a brush inserted in each tube and a catch basket attached to each end of the tube. A four-way valve shall operate to reverse the direction of water flow to push the brush through the tube while removing tube deposits. Four-way reversing valve's actuator shall be controlled by a preset time cycle that provides regular tube brushing during equipment operation. Frequency of the brushing cycle shall be set up to match Project requirements.
 4. Components:

- a. Brush: Each brush shall have nylon bristles, titanium wires, and polypropylene tips. Brush interference fit with the ID of the tube shall not exceed **0.025 inch (0.6 mm)**.
- b. Basket: Single-piece polypropylene basket with neck OD to press fit ID of tube. Design shall provide for insertion of eddy current probe or removal of brushes without removing baskets from the valve.
- c. Four-Way Valve:
 - 1) Construct valve body of carbon steel with internal sealing parts of hard rubber and Type 304 stainless steel.
 - 2) Configure valve with parallel flow connections to minimize field installation piping.
 - 3) Construct to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, at a system working pressure equal to condenser.
 - 4) Pipe connections shall be flanged.
 - 5) Valve manufacturer to test and certify a maximum leakage rate of less than 0.05 percent of the design flow rate at operation conditions of maximum differential pressure.
 - 6) Hydrostatically test to 1.5 times the design working pressure.
 - 7) Design the valve to cause no more than **0.5-psig (3-kPa)** pressure drop at design flow conditions.
 - 8) Provide valve with valve-mounted indicating/warning light, which shall light before valve begins rotation.
 - 9) Valve Actuator: Mount electric actuator to operate valve.
OR
Valve Actuator: Mount pneumatic piston-type actuator to operate valve. Actuator shall be suitable for operation using field-supplied air pressure.
 - 10) Position Switches: Factory mount microswitches on valve to indicate the complete turn of valve in both normal and reverse flow.
- d. Control Panel: Factory or field mount a control panel on chiller. Control panel shall include the following features:
 - 1) NEMA 250, Type 1 **OR** Type 4 **OR** Type 4x **OR** Type 12, **as directed**, enclosure.
 - 2) Timer to automatically initiate the cleaning cycle over a 24-hour period.
 - 3) Manual override of preset cleaning cycle.
 - 4) Visual indication of "Power On," "Diverter Position," "Normal Flow," "Reverse Flow," and "Valve Malfunction" indicating a slow turn or incomplete valve turn.
 - 5) For pneumatic actuators, mount four-way solenoid valve for actuator operation in the control panel.
 - 6) Flow switch bypass.
 - 7) Unloading signal to chiller.

F. Source Quality Control

1. Perform functional tests of chillers before shipping.
2. Factory run test each air-cooled chiller with water flowing through evaporator.
3. Factory performance test water-cooled chillers, before shipping, according to ARI 550/590.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with condenser fluid at design conditions.
OR
Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with varying entering condenser-fluid temperature from design to minimum conditions in **5 deg F (3 deg C)** increments.
OR
At one **OR** two **OR** three **OR** four **OR** five **OR** 10, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
 - b. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.

- c. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.
4. Factory performance test air-cooled chillers, **as directed**, before shipping, according to ARI 550/590.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Reduction in capacity from design to minimum load in steps of 10 **OR** 25 **OR** 33, **as directed**, with condenser air at design conditions.
OR
At one **OR** two **OR** three **OR** four **OR** five, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
 - b. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.
 - c. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.
5. Factory sound test water-cooled chillers, **as directed**, before shipping, according to ARI 575 **OR** air-cooled chillers, before shipping, according to ARI 370, **as directed**.
 - a. Test the following conditions:
 - 1) Design conditions indicated.
 - 2) Chiller operating at calculated worst-case sound condition.
OR
At one **OR** two **OR** three **OR** four **OR** five, **as directed**, point(s) of varying part-load performance to be selected by the Owner at time of test.
 - b. Allow the Owner access to place where chillers are being tested. Notify the Owner 14 days in advance of testing.
 - c. Prepare test report indicating test procedures, instrumentation, test conditions, and results. Submit copy of results within one week of test date.
6. Factory test and inspect evaporator and condenser **OR** condenser, and heat-reclaim condenser, **as directed**, according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
7. For chillers located indoors, rate sound power level according to ARI 575.
8. For chillers located outdoors, rate sound power level according to ARI 370.

1.3 EXECUTION

A. Chiller Installation

1. Install chillers on support structure indicated.
2. Equipment Mounting: Install chiller on concrete bases using elastomeric pads **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm), as directed.**
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Equipment Mounting: Install chiller using elastomeric pads **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

- a. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm), as directed.**
 4. Equipment Mounting: Install chiller on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 5. Maintain manufacturer's recommended clearances for service and maintenance.
 6. Charge chiller with refrigerant and fill with oil if not factory installed.
 7. Install separate devices furnished by manufacturer and not factory installed.
- B. Heat-Exchanger, Brush-Cleaning System Installation**
1. Install brush-cleaning system control panel adjacent to chiller control panel.
 2. Arrange piping to provide service access to four-way valve assembly without affecting access to chiller. Secure valve to prevent lateral movement and vibration during operation.
 3. Provide field electric power, as required, to each system control panel and electric actuated valve.
 4. Provide pneumatic piping with pressure regulator and isolation valve to each pneumatic supply connection. Coordinate field source of air with manufacturer to ensure that requirements are satisfied for proper valve operation.
 5. Interconnect brush-cleaning system controls with chiller controls. Coordinate requirements to ensure safe, trouble-free operation.
 6. Functionally test the entire brush-cleaning system, including the valve, actuator, position indicator, and control panel, with chiller in operation.
- C. Connections**
1. Comply with requirements for piping specified in Division 23 Section(s) "Hydronic Piping" AND "Refrigerant Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to chiller to allow service and maintenance.
 3. Evaporator Fluid Connections: Connect to evaporator inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to evaporator outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
 4. Condenser Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
 5. Heat-Reclaim Condenser Fluid Connections: Connect to condenser inlet with shutoff valve, strainer, **as directed**, flexible connector, **as directed**, thermometer, and plugged tee with pressure gage. Connect to condenser outlet with shutoff valve, balancing valve, flexible connector, **as directed**, flow switch, thermometer, plugged tee with shutoff valve and pressure gage, flow meter, **as directed**, and drain connection with valve. Make connections to chiller with a flange **OR** mechanical coupling, **as directed**.
 6. Refrigerant Pressure Relief Device Connections: For chillers installed indoors, extend vent piping **OR** separate vent piping for each chiller, **as directed**, to the outdoors without valves or restrictions. Comply with ASHRAE 15. Connect vent to chiller pressure relief device with flexible connector and dirt leg with drain valve.
 7. Connect each chiller drain connection with a union and drain pipe, and extend pipe, full size of connection, to floor drain. Provide a shutoff valve at each connection.

D. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Verify that refrigerant charge is sufficient and chiller has been leak tested.
 - c. Verify that pumps are installed and functional.
 - d. Verify that thermometers and gages are installed.
 - e. Operate chiller for run-in period.
 - f. Check bearing lubrication and oil levels.
 - g. For chillers installed indoors, verify that refrigerant pressure relief device is vented outdoors.
 - h. Verify proper motor rotation.
 - i. Verify static deflection of vibration isolators, including deflection during chiller startup and shutdown.
 - j. Verify and record performance of fluid flow and low-temperature interlocks for evaporator and condenser **OR** condenser, and heat-reclaim condenser, **as directed**.
 - k. Verify and record performance of chiller protection devices.
 - l. Test and adjust controls and safeties. Replace damaged or malfunctioning controls and equipment.
2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assembly, installation, and connection.
3. Prepare test and inspection startup reports.

END OF SECTION 23 64 26 13

SECTION 23 65 13 16 - COOLING TOWERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cooling towers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Closed-circuit, forced-draft, counterflow cooling towers.
 - b. Closed-circuit, induced-draft, combined-flow cooling towers.
 - c. Closed-circuit, induced-draft, counterflow cooling towers.
 - d. Open-circuit, forced-draft, counterflow cooling towers.
 - e. Open-circuit, induced-draft, counterflow cooling towers.
 - f. Open-circuit, induced-draft, crossflow cooling towers.

C. Definitions

1. BMS: Building management system.
2. FRP: Fiber-reinforced polyester.

D. Performance Requirements

1. Delegated Design: Design cooling tower support structure and seismic restraints, **as directed**, and wind restraints, **as directed**, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Cooling tower support structure shall withstand the effects of gravity loads and loads and stresses within limits and under conditions indicated according to SEI/ASCE 7.
3. Seismic Performance: Cooling towers shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, pressure drop, fan performance data, rating curves with selected points indicated, furnished specialties, and accessories.
 - a. Maximum flow rate.
 - b. Minimum flow rate.
 - c. Drift loss as percent of design flow rate.
 - d. Volume of water in suspension for purposes of sizing a remote storage tank.
 - e. Sound power levels in eight octave bands for operation with fans off, fans at minimum, and design speed.
 - f. Performance curves for the following:
 - 1) Varying entering-water temperatures from design to minimum.
 - 2) Varying ambient wet-bulb temperatures from design to minimum.
 - 3) Varying water flow rates from design to minimum.
 - 4) Varying fan operation (off, minimum, and design speed).
 - g. Fan airflow, brake horsepower, and drive losses.
 - h. Pump flow rate, head, brake horsepower, and efficiency.

- i. Motor amperage, efficiency, and power factor at 100, 75, 50, and 25 percent of nameplate horsepower.
 - j. Electrical power requirements for each cooling tower component requiring power.
 2. Shop Drawings: Complete set of manufacturer's prints of cooling tower assemblies, control panels, sections and elevations, and unit isolation. Include the following:
 - a. Assembled unit dimensions.
 - b. Weight and load distribution.
 - c. Required clearances for maintenance and operation.
 - d. Sizes and locations of piping and wiring connections.
 - e. Wiring Diagrams: For power, signal, and control wiring.
 3. Delegated-Design Submittal: For cooling tower support structure indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of support structure.
 - b. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 - c. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints, **as directed**, and wind restraints, **as directed**, and for designing vibration isolation bases.
 - d. Coordination Drawings: Floor plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - e. Structural supports.
 - f. Piping roughing-in requirements.
 - g. Wiring roughing-in requirements, including spaces reserved for electrical equipment.
 - h. Access requirements, including working clearances for mechanical controls and electrical equipment, and tube pull and service clearances.
 4. Certificates: For certification required in "Quality Assurance" Article.
 5. Seismic Qualification Certificates: For cooling towers, accessories, and components, from manufacturers.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 6. Source quality-control reports.
 7. Field quality-control reports.
 8. Startup service reports.
 9. Operation and Maintenance Data: For each cooling tower to include in emergency, operation, and maintenance manuals.
 10. Warranty: Sample of special warranty.
- F. Quality Assurance
 1. Testing Agency Qualifications: Certified by CTI **OR** An NRTL, **as directed**.
 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
 4. ASME Compliance: Fabricate and label heat-exchanger coils to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 5. CTI Certification: Cooling tower thermal performance according to CTI STD 201, "Certification Standard for Commercial Water-Cooling Towers Thermal Performance."
 6. FMG approval and listing in the latest edition of FMG's "Approval Guide."

- G. Coordination
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Coordinate sizes, locations, and anchoring attachments of structural-steel support structures.
 3. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- H. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace the following components of cooling towers that fail in materials or workmanship within specified warranty period:
 - a. Fan assembly including fan, drive, and motor.
 - b. All components of cooling tower.
 - c. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

- A. Closed-Circuit, Forced-Draft, Counterflow Cooling Towers
1. Fabricate cooling tower mounting base with reinforcement strong enough to resist cooling tower movement during a seismic event when cooling tower is anchored to field support structure.
 2. Cooling tower designed to resist wind load of **30 lbf/sq. ft. (1.44 kPa) OR as directed.**
 3. Casing and Frame:
 - a. Casing **OR** Casing and Frame, **as directed**, Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - b. Frame Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - c. Fasteners: Galvanized **OR** Stainless, **as directed**, steel.
 - d. Joints and Seams: Sealed watertight.
 - e. Welded Connections: Continuous and watertight.
 4. Collection Basin: Configure tower for installation with a field-constructed collection basin.
OR
Collection Basin:
 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - b. Strainer: Removable stainless-steel, **as directed**, strainer with openings smaller than nozzle orifices.
 - c. Overflow and drain connections.
 - d. Makeup water connection.
 - e. Basin Sweeper Distribution Piping and Nozzles:
 - 1) Pipe Material: PVC.
 - 2) Nozzle Material: Plastic.
 - 3) Configure piping and nozzles to minimize sediment from collecting in the collection basin.
 5. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.
OR
Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve:
 - a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed.**
 - b. Sensor: Solid-state controls with multiple electrode probes and relays factory wired to a terminal strip to provide control of water makeup valve **OR** control of water makeup valve and low-level alarm **OR** control of water makeup valve and low- and high-level alarms **OR**

- control of water makeup valve, low- and high-level alarms, and output for shutoff of pump on low level, **as directed**.
- c. Electrode Probes: Stainless steel.
 - d. Water Stilling Chamber: Corrosion-resistant material **OR FRP OR Galvanized steel OR PVC pipe OR Stainless steel, as directed**.
 - e. Solenoid Valve: Slow closing with stainless-steel body, **as directed**, controlled and powered through level controller in response to water-level set point.
 - f. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
6. Electric Basin Heater:
- a. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
 - b. Heater Control Panel: Mounted on the side of each cooling tower cell.
 - c. Enclosure: NEMA 250, Type 3R **OR Type 4 OR Type 4X, as directed**.
 - d. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
 - e. Control-circuit transformer with primary and secondary side fuses.
 - f. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - g. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, and heater branch circuiting complying with NFPA 70.
 - h. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquidtight conduit.
- OR**
Hot-Water-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
Steam-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
Steam-Injector Basin Heater: Manufacturer's standard offering to provide capacity indicated.
7. Water Distribution Piping: Main header and lateral branch piping designed for even distribution over fill throughout the flow range without the need for balancing valves and for connecting individual, removable, nonclogging spray nozzles.
- a. Pipe Material: Fiberglass **OR PVC OR Galvanized steel, as directed**.
 - b. Spray Nozzle Material: Plastic **OR Polypropylene OR PVC, as directed**.
 - c. Piping Supports: Corrosion-resistant hangers and supports designed to resist movement during operation and shipment.
8. Recirculating Piping: PVC, **as directed**, with connections for separately provided, remote spray pump, **as directed**.
9. Spray Pump: Close-coupled, end-suction, single-stage, bronze-fitted centrifugal pump; with suction strainer and flow balancing valve, and mechanical seal suitable for outdoor service.
- a. General Requirements for Spray Pump Motor: Comply with NEMA designation and temperature-rating requirements specified in Division 15 Section "Common Motor Requirements for HVAC Equipment" and not indicated below.
 - b. Motor Enclosure: Totally enclosed **OR** Totally enclosed nonventilated (TENV) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - d. Service Factor: 1.0 **OR** 1.15, **as directed**.
10. Heat-Exchanger Coils:
- a. Tube and Tube Sheet Materials: Copper tube with stainless-steel sheet **OR** Stainless-steel tube and sheet **OR** Prime-coated steel tube and sheet with outer surface of tube and sheet hot-dip galvanized after fabrication, **as directed**.
 - b. Heat-Exchanger Arrangement: Serpentine tubes **OR** Serpentine tubes with removable cover plate on inlet and outlet headers **OR** Straight tubes with removable header cover

- plate on both ends of heat exchanger for straight-through access to each tube, **as directed**; and sloped for complete drainage of fluid by gravity.
- OR**
- ASME Compliance: Designed, manufactured, and tested according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1, and bearing ASME "U" stamp; and sloped for complete drainage of fluid by gravity.
- c. Field Piping Connections: Vent, supply, and return suitable for mating to ASME B16.5, Class 150 flange, **as directed**.
11. Removable, **as directed**, Drift Eliminator:
 - a. Material: FRP **OR** PVC, **as directed**; with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Configuration: Multipass, designed and tested to reduce water carryover to achieve performance indicated.
 12. Removable, **as directed**, Air-Intake Screens: Galvanized **OR** Polymer-coated, galvanized **OR** Stainless, **as directed**, -steel wire mesh.
 13. Centrifugal Fan: Double-width, double-inlet, forward-curved blades, and statically and dynamically balanced at the factory after assembly.
 - a. Number of Fans: Each cooling tower cell shall have a single fan or multiple fans connected to a common shaft.
 - b. Fan Wheel and Housing Materials: Galvanized steel.
 - c. Fan Shaft: Steel, coated to resist corrosion.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning, grease-lubricated ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**. Bearings designed for an L-10 life of 40,000 **OR** 50,000, **as directed**, hours.
 - f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.
 14. Belt Drive:
 - a. Belt-Drive Service Factor: 1.5 based on motor nameplate horsepower.
 - b. Sheaves: Fan and motor shafts shall have taper-lock sheaves fabricated from corrosion-resistant materials.
 - c. Belt: Multiple V-belt design with a matched set of cogged, **as directed**, belts.

OR

Belt: One-piece, multigrooved, solid-back belt.
 - d. Belt Material: Oil resistant, nonstatic conducting, and constructed of neoprene polyester cord.
 - e. Belt-Drive Guard: Comply with OSHA regulations.
 - f. Two-Motor, Single-Fan Drive:
 - 1) Two single-speed motors per fan, one sized for full speed and load, and the other sized for 67 percent of full-load speed.
 - 2) Belt Drives: Each motor shall have belt drive complying with requirements for belt drives and configured for operation when other motor fails.
 - 3) Motor controller and wiring same as two-speed, two-winding motor.
 15. Fan Motor:
 - a. General Requirements for Fan Motors: Comply with NEMA designation and temperature-rating requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment" and not indicated below.
 - b. Motor Enclosure: Totally enclosed **OR** Totally enclosed air over (TEAO) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - d. Service Factor: 1.15.
 - e. Insulation: Class F **OR** Class H, **as directed**.

- f. Variable-Speed Motors: Inverter-duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
 - g. Severe-duty rating with the following features:
 - 1) Rotor and stator protected with corrosion-inhibiting epoxy resin.
 - 2) Double-shielded, vacuum-degassed bearings lubricated with premium moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**.
 - 3) Internal heater automatically energized when motor is de-energized.
 - h. Motor Base: Adjustable, or other suitable provision for adjusting belt tension.
16. Discharge Hoods:
- a. Hood Configuration: Tapered **OR** Straight, **as directed**; totally surrounding drift eliminators and constructed of same material as casing; and having factory-installed insulation, **as directed**, and access doors.
 - b. Discharge Dampers: Positive-closure, automatic, isolation dampers with electric actuators.
 - 1) Provide field power and controls to open dampers when pump is energized and close dampers when pump is de-energized.
17. Capacity-Control Dampers: Galvanized-steel **OR** Stainless-steel, **as directed**, dampers, with linkages, electric operator, controller, limit switches, transformer, and weatherproof enclosure.
18. Vibration Switch: For each fan drive.
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Vibration Detection: Sensor with a field-adjustable acceleration sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
 - c. Provide switch with manual-reset button, **as directed**, for field connection to a BMS and, **as directed**, hardwired connection to fan motor electrical circuit.
 - d. Switch shall, on sensing excessive vibration, signal an alarm through the BMS and, **as directed**, shut down the fan.
19. Controls: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".
- OR**
- Control Package: Factory installed and wired, and functionally tested at factory before shipment.
- a. NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**, enclosure with removable internally mount backplate.
 - b. Control-circuit transformer with primary and secondary side fuses.
 - c. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
 - d. Microprocessor-based controller for automatic control of fan and spray pump, **as directed**, based on cooling tower leaving-water temperature with control features to improve operating efficiency based on outdoor ambient wet-bulb temperature by using adaptive logic.
 - e. Fan motor sequencer for multiple-cell and two-speed applications with automatic lead stage rotation.
 - f. Collection basin, electric/electronic level controller complying with requirements in "Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve" Paragraph.
 - g. Electric basin heaters with temperature control and low-water-level safety switch for each cell, complying with requirements in "Electric Basin Heater" Paragraph.
 - h. Vibration switch for each fan, complying with requirements in "Vibration Switch" Paragraph.
 - i. Controls and wiring for "two-motor, single-fan drives" shall be same as two-speed, two-winding motor.
 - j. Power and controls to open discharge hood dampers when pump is energized and close dampers when pump is de-energized.
 - k. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, for each cooling tower cell, **as directed**.

- 1) Branch power circuit to each motor and electric basin heater and to controls with a disconnect switch or circuit breaker, **as directed**.
 - 2) NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
 - l. Factory-installed wiring outside of enclosures shall be in metal raceway, except make connections to each motor and electric basin heater with liquidtight conduit.
 - m. Visual indication of status and alarm with momentary test push button, **as directed**, for each motor.
 - n. Audible alarm and silence switch.
 - o. Visual indication of elapsed run time, graduated in hours for each motor.
 - p. Cooling tower shall have hardware to enable BMS to remotely monitor and display the following:
 - 1) Operational status of each motor.
 - 2) Position of dampers.
 - 3) Cooling tower leaving-fluid temperature.
 - 4) Fan vibration alarm.
 - 5) Collection basin high **OR** low **OR** high- and low, **as directed**, -water-level alarms.
20. Personnel Access Components:
- a. Doors: Large enough for personnel to access cooling tower internal components from both, **as directed**, cooling tower end walls. Doors shall be operable from both sides of the door, **as directed**.
 - b. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
 - c. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
 - d. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard at platforms and around top of cooling tower. Comply with 29 CFR 1910.23.
 - e. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.
 - 1) Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
- B. Closed-Circuit, Induced-Draft, Combined-Flow Cooling Towers
1. Fabricate cooling tower mounting base with reinforcement strong enough to resist cooling tower movement during a seismic event when cooling tower is anchored to field support structure.
 2. Cooling tower designed to resist wind load of **30 lbf/sq. ft. (1.44 kPa) OR as directed**.
 3. Casing and Frame:
 - a. Casing and Frame, **as directed**, Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - b. Frame Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - c. Fasteners: Galvanized **OR** Stainless, **as directed**, steel.
 - d. Joints and Seams: Sealed watertight.
 - e. Welded Connections: Continuous and watertight.
 4. Collection Basin: Configure tower for installation with a field-constructed collection basin.

OR

Collection Basin:

 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - b. Strainer: Removable stainless-steel, **as directed**, strainer with openings smaller than nozzle orifices.
 - c. Overflow and drain connections.

- d. Makeup water connection.
 - e. Basin Sweeper Distribution Piping and Nozzles:
 - 1) Pipe Material: PVC, **as directed**.
 - 2) Nozzle Material: Plastic, **as directed**.
 - 3) Configure piping and nozzles to minimize sediment from collecting in the collection basin.
5. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.
- OR**
- Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve:
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Sensor: Solid-state controls with multiple electrode probes and relays factory wired to a terminal strip to provide control of water makeup valve **OR** control of water makeup valve and low-level alarm **OR** control of water makeup valve and low- and high-level alarms **OR** control of water makeup valve, low- and high-level alarms, and output for shutoff of pump on low level, **as directed**.
 - c. Electrode Probes: Stainless steel.
 - d. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed**.
 - e. Solenoid Valve: Slow closing with stainless-steel body, **as directed**, controlled and powered through level controller in response to water-level set point.
 - f. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
- OR**
- Ultrasonic Collection Basin Water-Level Controller with Solenoid Valve:
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Controller: Ultrasonic level sensor/transmitter and relays factory wired to a terminal strip to control water makeup valve and signal a level alarm. Controller shall provide continuous level indication through a 4- to 20-mA signal for connection to BMS, **as directed**.
 - c. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed**.
 - d. Solenoid Valve: Slow closing with stainless-steel body, **as directed**, controlled and powered through level controller in response to water-level set point.
 - e. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
6. Electric Basin Heater:
- a. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
 - b. Heater Control Panel: Mounted on the side of each cooling tower cell.
 - c. Enclosure: NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**.
 - d. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
 - e. Control-circuit transformer with primary and secondary side fuses.
 - f. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - g. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, and heater branch circuiting complying with NFPA 70.
 - h. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquidtight conduit.
- OR**
- Hot-Water-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
- Steam-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
- Steam-Injector Basin Heater: Manufacturer's standard offering to provide capacity indicated.

7. Gravity Water Distribution Basin: Nonpressurized design with head of water level in basin adequate to overcome spray nozzle losses and designed to evenly distribute water over fill throughout the flow range indicated.
 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - b. Location: Over each bank of fill with easily replaceable plastic, **as directed**, spray nozzles mounted in bottom of basin.
 - c. Joints and Seams: Sealed watertight.
 - d. Partitioning Dams: Same material as basin to distribute water over the fill to minimize icing while operating throughout the flow range indicated.
 - e. Removable Panels: Same material as basin to completely cover top of basin. Secure panels to basin with removable corrosion-resistant **OR** stainless-steel, **as directed**, hardware.
 - f. Valves: Manufacturer's standard valve installed at each inlet connection and arranged to balance or shut off flow to each gravity water distribution basin.
8. Pressurized Water Distribution Piping: Main header and lateral branch piping designed for even distribution over heat-exchanger coil or fill throughout the flow range without the need for balancing valves and for connecting individual, removable, nonclogging spray nozzles.
 - a. Pipe Material: PVC **OR** Galvanized steel, **as directed**.
 - b. Spray Nozzle Material: Plastic **OR** Polypropylene, **as directed**.
 - c. Piping Supports: Corrosion-resistant hangers and supports to resist movement during operation and shipment.
9. Recirculating Piping: PVC, **as directed**, with connections for separately provided, remote spray pump, **as directed**.
10. Spray Pump: Close-coupled, end-suction, single-stage, bronze-fitted centrifugal pump; with suction strainer and flow balancing valve, and mechanical seal suitable for outdoor service.
 - a. General Requirements for Spray Pump Motor: Comply with NEMA designation and temperature-rating requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment" and not indicated below.
 - b. Motor Enclosure: Totally enclosed **OR** Totally enclosed nonventilated (TENV) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - d. Service Factor: 1.0 **OR** 1.15, **as directed**.
11. Fill:
 - a. Materials: PVC, **as directed**, with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. Minimum Thickness: **15 mils (0.4 mm) OR 20 mils (0.5 mm)**, **as directed**, before forming.
 - c. Fabrication: Fill-type sheets fabricated, formed, and bonded together after forming into removable assemblies that are factory installed by manufacturer.
 - d. Fill Material Operating Temperature: Suitable for entering-water temperatures up through **120 deg F (49 deg C)**.
12. Heat-Exchanger Coils:
 - a. Tube and Tube Sheet Materials: Copper tube with stainless-steel sheet **OR** Stainless-steel tube and sheet **OR** Prime-coated steel tube and sheet with outer surface of tube and sheet hot-dip galvanized after fabrication, **as directed**.
 - b. Heat-Exchanger Arrangement: Serpentine tubes **OR** Serpentine tubes with removable cover plate on inlet and outlet headers **OR** Straight tubes with removable header cover plate on both ends of heat exchanger for straight-through access to each tube, **as directed**; and sloped for complete drainage of fluid by gravity.
OR
ASME Compliance: Designed, manufactured, and tested according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1 and bearing ASME "U" stamp; and sloped for complete drainage of fluid by gravity.

- c. Field Piping Connections: Vent, supply, and return suitable for mating to ASME B16.5, Class 150 flange, **as directed**.
- 13. Drift Eliminator:
 - a. Material: FRP **OR** PVC, **as directed**; with maximum flame-spread index of 5 according to ASTM E 84.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Configuration: Multipass, designed and tested to reduce water carryover to achieve performance indicated.
 - d. Fill Drift Eliminators: Integral to **OR** Separate and removable from, **as directed**, fill.
 - e. Heat-Exchanger Coil Drift Eliminators: Located on discharge side and removable.
- 14. Air-Intake Louvers:
 - a. Material: FRP **OR** PVC **OR** Matching casing, **as directed**.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Louver Blades: Arranged to uniformly direct air into cooling tower, to minimize air resistance, and to prevent water from splashing out of tower during all modes of operation including operation with fans off.
 - d. Location: Integral to **OR** Separate from, **as directed**, fill.
- 15. Removable, **as directed**, Air-Intake Screens: Galvanized **OR** Polymer-coated, galvanized **OR** Stainless, **as directed**, -steel wire mesh.
- 16. Axial Fan: Balanced at the factory after assembly.
 - a. Blade Material: Aluminum **OR** FRP, **as directed**.
 - b. Hub Material: Aluminum **OR** FRP, **as directed**.
 - c. Blade Pitch: Field adjustable.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**. Bearings designed for an L-10 life of 40,000 **OR** 50,000, **as directed**, hours.
 - f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.
- 17. Belt Drive:
 - a. Service Factor: 1.5 based on motor nameplate horsepower.
 - b. Sheaves: Fan and motor shafts shall have taper-lock sheaves fabricated from corrosion-resistant materials.
 - c. Belt: Multiple V-belt design with a matched set of cogged, **as directed**, belts.
OR
Belt: One-piece, multigrooved, solid-back belt.
 - d. Belt Material: Oil resistant, nonstatic conducting, and constructed of neoprene polyester cord.
 - e. Belt-Drive Guard: Comply with OSHA regulations.
 - f. Two-Motor, Single-Fan Drive:
 - 1) Two single-speed motors per fan, one sized for full speed and load and the other sized for 67 percent of full-load speed.
 - 2) Each motor with belt drive and configured for operation when other motor fails.
 - 3) Controls and wiring same as two-speed, two-winding motor.
- 18. Gear Drive: Right angle, reduced speed, and designed for cooling tower applications according to CTI STD 111. Motor and gear drive shall be aligned before shipment.
 - a. Gear Drive and Coupling Service Factor: 2.0 based on motor nameplate horsepower.
 - b. Housing: Cast iron, with epoxy or polyurethane finish, beveled high-strength steel gears continuously bathed in oil, and with lubrication to other internal parts at all operating speeds.
 - c. Mounting: Directly mounted to fan hub and connected to motor so motor shaft is in horizontal position.
 - d. Operation: Able to operate both forward and in reverse.

- e. Drive-to-Motor Connection: Close coupled to motor using a flexible coupling **OR** Connected to motor located outside of cooling tower casing by a full-floating drive shaft, **as directed**.
 - f. Drive Shaft Material: Corrosion resistant **OR** Stainless steel, **as directed**, and fitted with flexible couplings on both ends. Provide exposed shaft and couplings with guards according to OSHA regulations.
 - g. Extend oil fill, drain, and vent to outside of cooling tower casing using galvanized-steel piping. Provide installation with oil-level sight glass.
19. Fan Motor:
- a. General Requirements for Fan Motors: Comply with NEMA designation and temperature-rating requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment" and not indicated below.
 - b. Motor Enclosure: Totally enclosed **OR** Totally enclosed air over (TEAO) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - d. Service Factor: 1.15.
 - e. Insulation: Class F **OR** Class H, **as directed**.
 - f. Variable-Speed Motors: Inverter-duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
 - g. Motor Location: Mounted outside of cooling tower casing and cooling tower discharge airstream.
 - h. Severe-duty rating with the following features:
 - 1) Rotor and stator protected with corrosion-inhibiting epoxy resin.
 - 2) Double-shielded, vacuum-degassed bearings lubricated with premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**.
 - 3) Internal heater automatically energized when motor is de-energized.
 - i. Motor Base: Adjustable, or other suitable provision for adjusting belt tension.
20. Fan Discharge Stack: Material shall match casing, manufacturer's standard **OR** velocity recovery, **as directed**, design.
- a. Stack Extension: Fabricated to extend above fan deck unless otherwise indicated.
 - b. Stack Termination: Wire-mesh, galvanized-steel screens; complying with OSHA regulations.
21. Vibration Switch: For each fan drive.
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Vibration Detection: Sensor with a field-adjustable, acceleration-sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
 - c. Provide switch with manual-reset button, **as directed**, for field connection to a BMS, **as directed**, and hardwired connection to fan motor electrical circuit.
 - d. Switch shall, on sensing excessive vibration, signal an alarm through the BMS, **as directed**, and shut down the fan.
22. Gear-Drive, Oil-Level Switch: Low-oil-level warning switch for connection to a BMS, **as directed**.
- a. Switch shall, on reaching a low-oil-level set point recommended by cooling tower manufacturer, signal an alarm through the BMS, **as directed**.
23. Controls: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".
- OR**
- Control Package: Factory installed and wired, and functionally tested at factory before shipment.
- a. NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**, enclosure with removable internally mount backplate.
 - b. Control-circuit transformer with primary and secondary side fuses.
 - c. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.

- d. Microprocessor-based controller for automatic control of fan and spray pump, **as directed**, based on cooling tower leaving-water temperature with control features to improve operating efficiency based on outdoor ambient wet-bulb temperature by using adaptive logic.
 - e. Fan motor sequencer for multiple-cell and two-speed applications with automatic lead stage rotation.
 - f. Collection basin level controller complying with requirements in "Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve" **OR** "Ultrasonic Collection Basin Water-Level Controller with Solenoid Valve", **as directed**, Paragraph.
 - g. Electric basin heaters with temperature control and low-water-level safety switch for each cell, complying with requirements in "Electric Basin Heater" Paragraph.
 - h. Vibration switch for each fan, complying with requirements in "Vibration Switch" Paragraph.
 - i. Oil-level switch for each fan with a gear drive, complying with requirement in "Gear-Drive, Oil-Level Switch" Paragraph.
 - j. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, for each cooling tower cell, **as directed**.
 - 1) Branch power circuit to each motor and electric basin heater and to controls with a disconnect switch or circuit breaker, **as directed**.
 - 2) NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
 - k. Factory-installed wiring outside of enclosures shall be in metal raceway, except make connections to each motor and electric basin heater with liquidtight conduit.
 - l. Visual indication of status and alarm with momentary test push button, **as directed**, for each motor.
 - m. Audible alarm and silence switch.
 - n. Visual indication of elapsed run time, graduated in hours for each motor.
 - o. Cooling tower shall have hardware to enable BMS to remotely monitor and display the following:
 - 1) Operational status of each motor.
 - 2) Position of dampers.
 - 3) Cooling tower leaving-fluid temperature.
 - 4) Fan vibration alarm.
 - 5) Oil-level alarm.
 - 6) Collection basin high **OR** low **OR** high- and low, **as directed**, -water-level alarms.
24. Personnel Access Components:
- a. Doors: Large enough for personnel to access cooling tower internal components from both cooling tower end walls. Doors shall be operable from both sides of the door.
 - b. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
 - c. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
 - d. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard, around top of cooling tower. Comply with 29 CFR 1910.23.
 - e. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.
 - 1) Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
 - 2) Elevated internal platforms with handrails accessible from fixed vertical ladders to access the fan drive assembly when out of reach from collection basin platform.

C. Closed-Circuit, Induced-Draft, Counterflow Cooling Towers

1. Fabricate cooling tower mounting base with reinforcement strong enough to resist cooling tower movement during a seismic event when cooling tower is anchored to field support structure.
2. Cooling tower designed to resist wind load of **30 lbf/sq. ft. (1.44 kPa) OR as directed.**
3. Casing and Frame:
 - a. Casing and Frame, **as directed**, Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Stainless steel, **as directed.**
 - b. Frame Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - c. Fasteners: Galvanized **OR** Stainless, **as directed**, steel.
 - d. Joints and Seams: Sealed watertight.
 - e. Welded Connections: Continuous and watertight.
4. Collection Basin: Configure tower for installation with a field-constructed collection basin.
OR
Collection Basin:
 - a. Material: Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Stainless steel, **as directed.**
 - b. Overflow and drain connections.
 - c. Makeup water connection.
5. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.
OR
Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve:
 - a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed.**
 - b. Sensor: Solid-state controls with multiple electrode probes and relays factory wired to a terminal strip to provide control of water makeup valve **OR** control of water makeup valve and low-level alarm **OR** control of water makeup valve and low- and high-level alarms **OR** control of water makeup valve, low- and high-level alarms, and output for shutoff of pump on low level, **as directed.**
 - c. Electrode Probes: Stainless steel.
 - d. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed.**
 - e. Solenoid Valve: Slow closing with stainless-steel body, **as directed**; controlled and powered through level controller in response to water-level set point.
 - f. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
6. Electric Basin Heater:
 - a. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
 - b. Heater Control Panel: Mounted on the side of each cooling tower cell.
 - c. Enclosure: NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed.**
 - d. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
 - e. Control-circuit transformer with primary and secondary side fuses.
 - f. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - g. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, and heater branch circuiting complying with NFPA 70.
 - h. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquidtight conduit.

OR
Hot-Water-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
OR
Steam-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
OR

- Steam-Injector Basin Heater: Manufacturer's standard offering to provide capacity indicated.
7. Pressurized Water Distribution Piping: Main header and lateral branch piping designed for even distribution over heat-exchanger coil or fill throughout the flow range without the need for balancing valves and for connecting individual, removable, nonclogging spray nozzles.
 - a. Pipe Material: Fiberglass **OR** PVC **OR** Galvanized steel, **as directed**.
 - b. Spray Nozzle Material: Plastic **OR** Polypropylene **OR** PVC, **as directed**.
 - c. Piping Supports: Corrosion-resistant hangers and supports to resist movement during operation and shipment.
 8. Recirculating Piping: PVC, **as directed**, with connections for separately provided, remote spray pump, **as directed**.
 9. Spray Pump: Close-coupled, end-suction, single-stage, bronze-fitted centrifugal pump; with suction strainer and flow balancing valve, and mechanical seal suitable for outdoor service.
 10. General Requirements for Spray Pump Motor: Comply with NEMA designation and temperature-rating requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment" and not indicated below.
 - a. Motor Enclosure: Totally enclosed **OR** Totally enclosed nonventilated (TENV) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - b. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - c. Service Factor: 1.0 **OR** 1.15, **as directed**.
 11. Heat-Exchanger Coils:
 - a. Tube and Tube Sheet Materials: Copper tube with stainless-steel sheet **OR** Stainless-steel tube and sheet **OR** Prime-coated steel tube and sheet with outer surface of tube and sheet hot-dip galvanized after fabrication, **as directed**.
 - b. Heat-Exchanger Arrangement: Serpentine tubes **OR** Serpentine tubes with removable cover plate on inlet and outlet headers **OR** Straight tubes with removable header cover plate on both ends of heat exchanger for straight-through access to each tube, **as directed**; and sloped for complete drainage of fluid by gravity.
OR
ASME Compliance: Designed, manufactured, and tested according to ASME Boiler and Pressure Vessel Code: Section VIII, Division 1 and bearing ASME "U" stamp; and sloped for complete drainage of fluid by gravity.
 - c. Field Piping Connections: Vent, supply, and return suitable for mating to ASME B16.5, Class 150 flange, **as directed**.
 12. Removable, **as directed**, Drift Eliminator:
 - a. Material: FRP **OR** PVC, **as directed**; with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Configuration: Multipass, designed and tested to reduce water carryover to achieve performance indicated.
 13. Air-Intake Louvers:
 - a. Material: FRP **OR** PVC **OR** Matching casing, **as directed**.
 - b. UV Treatment: Treat louvers with inhibitors to protect against damage caused by UV radiation.
 - c. Louver Blades: Arranged to uniformly direct air into cooling tower, to minimize air resistance, and to prevent water from splashing out during all modes of operation including operation with fans off.
 14. Axial Fan: Balanced at the factory after assembly.
 - a. Blade Material: Aluminum **OR** FRP **OR** Galvanized steel, **as directed**.
 - b. Hub Material: Aluminum **OR** FRP **OR** Galvanized steel, **as directed**.
 - c. Blade Pitch: Field adjustable.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus**

- 300 deg F (minus 29 and plus 149 deg C).** Bearings designed for an L-10 life of 40,000 **OR** 50,000, **as directed**, hours.
- f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.
15. Belt Drive:
- a. Service Factor: 1.5 based on motor nameplate horsepower.
- b. Sheaves: Fan and motor shafts shall have taper-lock sheaves fabricated from corrosion-resistant materials.
- c. Belt: Multiple V-belt design with a matched set of cogged, **as directed**, belts.
OR
Belt: One-piece, multigrooved, solid-back belt.
- d. Belt Material: Oil resistant, nonstatic conducting, and constructed of neoprene polyester cord.
- e. Belt-Drive Guard: Comply with OSHA regulations.
- f. Two-Motor, Single-Fan Drive:
- 1) Two single-speed motors per fan, one sized for full speed and load and the other sized for 67 percent of full-load speed.
 - 2) Each motor with belt drive and configured for operation when other motor fails.
 - 3) Controls and wiring same as two-speed, two-winding motor.
16. Fan Motor:
- a. General Requirements for Fan Motors: Comply with NEMA designation and temperature-rating requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment" and not indicated below.
- b. Motor Enclosure: Totally enclosed **OR** Totally enclosed air over (TEAO) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
- c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
- d. Service Factor: 1.15.
- e. Insulation: Class F **OR** Class H, **as directed**.
- f. Variable-Speed Motors: Inverter-duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
- g. Severe-duty rating with the following features:
- 1) Rotor and stator protected with corrosion-inhibiting epoxy resin.
 - 2) Double-shielded, vacuum-degassed bearings lubricated with premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**.
 - 3) Internal heater automatically energized when motor is de-energized.
- h. Motor Base: Adjustable, or other suitable provision for adjusting belt tension.
17. Fan Discharge Stack: Material shall match casing, manufacturer's standard **OR** velocity recovery, **as directed**, design.
- a. Stack Extension: Fabricated to extend above fan deck unless otherwise indicated.
- b. Stack Termination: Wire-mesh, galvanized-steel screens; complying with OSHA regulations.
18. Vibration Switch: For each fan drive.
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
- b. Vibration Detection: Sensor with a field-adjustable, acceleration-sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
- c. Provide switch with manual-reset button, **as directed**, for field connection to a BMS, **as directed**, and hardwired connection to fan motor electrical circuit.
- d. Switch shall, on sensing excessive vibration, signal an alarm through the BMS, **as directed**, and shut down the fan.
19. Controls: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".
OR
Control Package: Factory installed and wired, and functionally tested at factory before shipment.

- a. NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**, enclosure with removable internally mount backplate.
 - b. Control-circuit transformer with primary and secondary side fuses.
 - c. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
 - d. Microprocessor-based controller for automatic control of fan and spray pump, **as directed**, based on cooling tower leaving-water temperature with control features to improve operating efficiency based on outdoor ambient wet-bulb temperature by using adaptive logic.
 - e. Fan motor sequencer for multiple-cell and two-speed applications with automatic lead stage rotation.
 - f. Collection basin electric/electronic level controller complying with requirements in "Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve" Paragraph.
 - g. Electric basin heaters with temperature control and low-water-level safety switch for each cell, complying with requirements in "Electric Basin Heater" Paragraph.
 - h. Vibration switch for each fan, complying with requirements in "Vibration Switch" Paragraph.
 - i. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker **OR** for each cooling tower cell, **as directed**.
 - 1) Branch power circuit to each motor and electric basin heater and to controls with a disconnect switch or circuit breaker, **as directed**.
 - 2) NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
 - j. Factory-installed wiring outside of enclosures shall be in metal raceway, except make connections to each motor and electric basin heater with liquidtight conduit.
 - k. Visual indication of status and alarm with momentary test push button, **as directed**, for each motor.
 - l. Audible alarm and silence switch.
 - m. Visual indication of elapsed run time, graduated in hours for each motor.
 - n. Cooling tower shall have hardware to enable BMS to remotely monitor and display the following:
 - 1) Operational status of each motor.
 - 2) Cooling tower leaving-fluid temperature.
 - 3) Fan vibration alarm.
 - 4) Collection basin high **OR** low **OR** high- and low, **as directed**, -water-level alarms.
20. Personnel Access Components:
- a. Doors: Large enough for personnel to access cooling tower internal components from both cooling tower end walls. Doors shall be operable from both sides of the door.
 - b. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
 - c. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
 - d. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard, around top of cooling tower. Comply with 29 CFR 1910.23.
 - e. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.
 - 1) Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
 - 2) Elevated internal platforms with handrails accessible from fixed vertical ladders to access the fan drive assembly when out of reach from collection basin platform.

D. Open-Circuit, Forced-Draft, Counterflow Cooling Towers

1. Fabricate cooling tower mounting base with reinforcement strong enough to resist cooling tower movement during a seismic event when cooling tower is anchored to field support structure.
2. Cooling tower designed to resist wind load of **30 lbf/sq. ft. (1.44 kPa) OR as directed.**
3. Casing and Frame:
 - a. Casing and Frame, **as directed**, Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - b. Frame Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - c. Fasteners: Galvanized **OR** Stainless, **as directed**, steel.
 - d. Joints and Seams: Sealed watertight.
 - e. Welded Connections: Continuous and watertight.
4. Collection Basin: Configure tower for installation with a field-constructed collection basin.
OR
Collection Basin:
 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - b. Strainer: Removable stainless-steel, **as directed**, strainer with openings smaller than nozzle orifices.
 - c. Overflow and drain connections.
 - d. Makeup water connection.
 - e. Basin Sweeper Distribution Piping and Nozzles:
 - 1) Pipe Material: PVC, **as directed.**
 - 2) Nozzle Material: Plastic, **as directed.**
 - 3) Configure piping and nozzles to minimize sediment from collecting in the collection basin.
5. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.
6. Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve:
 - a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed.**
 - b. Sensor: Solid-state controls with multiple electrode probes and relays factory wired to a terminal strip to provide control of water makeup valve **OR** control of water makeup valve and low-level alarm **OR** control of water makeup valve and low- and high-level alarms **OR** control of water makeup valve, low- and high-level alarms, and output for shutoff of pump on low level, **as directed.**
 - c. Electrode Probes: Stainless steel.
 - d. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed.**
 - e. Solenoid Valve: Slow closing with stainless-steel body, **as directed**, controlled and powered through level controller in response to water-level set point.
 - f. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
7. Electric Basin Heater:
 - a. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
 - b. Heater Control Panel: Mounted on the side of each cooling tower cell.
 - c. Enclosure: NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed.**
 - d. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
 - e. Control-circuit transformer with primary and secondary side fuses.
 - f. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - g. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, and heater branch circuiting complying with NFPA 70.

- h. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquidtight conduit.
 - i. Hot-Water-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
Steam-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
Steam-Injector Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- 8. Pressurized Water Distribution Piping: Main header and lateral branch piping designed for even distribution over heat-exchanger coil or fill throughout the flow range without the need for balancing valves and for connecting individual, removable, nonclogging spray nozzles.
 - a. Pipe Material: Fiberglass **OR** PVC **OR** Galvanized steel, **as directed**.
 - b. Spray Nozzle Material: Plastic **OR** Polypropylene **OR** PVC, **as directed**.
 - c. Piping Supports: Corrosion-resistant hangers and supports to resist movement during operation and shipment.
 - 9. Fill:
 - a. Materials: PVC, **as directed**, with maximum flame-spread index of 5 according to ASTM E 84.
 - b. Minimum Thickness: **15 mils (0.4 mm) OR 20 mils (0.5 mm), as directed**, before forming.
 - c. Fabrication: Fill-type sheets, fabricated, formed, and bonded together after forming into removable assemblies that are factory installed by manufacturer.
 - d. Fill Material Operating Temperature: Suitable for entering-water temperatures up through **120 deg F (49 deg C)**.
 - 10. Removable, **as directed**, Drift Eliminator:
 - a. Material: FRP **OR** PVC, **as directed**; with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Configuration: Multipass, designed and tested to reduce water carryover to achieve performance indicated.
 - 11. Removable, **as directed**, Air-Intake Screens: Galvanized **OR** Polymer-coated, galvanized **OR** Stainless, **as directed**, -steel wire mesh.
 - 12. Centrifugal Fan: Double-width, double-inlet, forward-curved blades, and statically and dynamically balanced at the factory after assembly.
 - a. Number of Fans: Each cooling tower cell shall have a single fan or multiple fans connected to a common shaft.
 - b. Fan Wheel and Housing Materials: Galvanized steel.
 - c. Fan Shaft: Steel, coated to resist corrosion.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning, grease-lubricated ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**. Bearings designed for an L-10 life of 40,000 **OR** 50,000, **as directed**, hours.
 - f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.
 - 13. Axial Fan: Balanced at the factory after assembly.
 - a. Blade Material: FRP, **as directed**.
 - b. Hub Material: Aluminum **OR** FRP, **as directed**.
 - c. Blade Pitch: Field adjustable.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**. Bearings designed for an L-10 life of 40,000 **OR** 50,000, **as directed**, hours.
 - f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.

14. Belt Drive:
 - a. Service Factor: 1.5 based on motor nameplate horsepower.
 - b. Sheaves: Fan and motor shafts shall have taper-lock sheaves fabricated from corrosion-resistant materials.
 - c. Belt: Multiple V-belt design with a matched set of cogged, **as directed**, belts.
OR
Belt: One-piece, multigrooved, solid-back belt.
 - d. Belt Material: Oil resistant, nonstatic conducting, and constructed of neoprene polyester cord.
 - e. Belt-Drive Guard: Comply with OSHA regulations.
 - f. Two-Motor, Single-Fan Drive:
 - 1) Two single-speed motors per fan, one sized for full speed and load and the other sized for 67 percent of full-load speed.
 - 2) Each motor with belt drive and configured for operation when other motor fails.
 - 3) Controls and wiring same as two-speed, two-winding motor.
15. Direct Drive: Fan hub directly connected, and properly secured, to motor shaft.
16. Fan Motor:
 - a. General Requirements for Fan Motors: Comply with NEMA designation and temperature-rating requirements specified in Division 15 Section "Common Motor Requirements for HVAC Equipment" and not indicated below.
 - b. Motor Enclosure: Totally enclosed **OR** Totally enclosed air over (TEAO) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - d. Service Factor: 1.15.
 - e. Insulation: Class F **OR** Class H, **as directed**.
 - f. Variable-Speed Motors: Inverter-duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
 - g. Severe-duty rating with the following features:
 - 1) Rotor and stator protected with corrosion-inhibiting epoxy resin.
 - 2) Double-shielded, vacuum-degassed bearings lubricated with premium, moisture-resistant grease suitable for temperatures between **minus 20 and 300 deg F (minus 29 and 149 deg C)**.
 - 3) Internal heater automatically energized when motor is de-energized.
 - h. Motor Base: Adjustable, or other suitable provision for adjusting belt tension.
17. Discharge Hoods:
 - a. Hood Configuration: Tapered **OR** Straight, **as directed**; totally surrounding drift eliminators and constructed of same material as casing; and having factory-installed insulation, **as directed**, and access doors.
 - b. Discharge Dampers: Positive-closure, automatic, isolation dampers with electric actuators.
 - 1) Provide field power and controls to open dampers when pump is energized and close dampers when pump is de-energized.
18. Capacity-Control Dampers: Galvanized-steel **OR** Stainless-steel, **as directed**, dampers, with linkages, electric operator, controller, limit switches, transformer, and weatherproof enclosure.
19. Vibration Switch: For each fan drive.
 - a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Vibration Detection: Sensor with a field-adjustable, acceleration-sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
 - c. Provide switch with manual-reset button, **as directed**, for field connection to a BMS, **as directed**, and hardwired connection to fan motor electrical circuit.
 - d. Switch shall, on sensing excessive vibration, signal an alarm through the BMS, **as directed**, and shut down the fan.
20. Controls: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".

OR

Control Package: Factory installed and wired, and functionally tested at factory before shipment.

- a. NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**, enclosure with removable internally mount backplate.
 - b. Control-circuit transformer with primary and secondary side fuses.
 - c. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
 - d. Microprocessor-based controller for automatic control of fan based on cooling tower leaving-water temperature with control features to improve operating efficiency based on outdoor ambient wet-bulb temperature by using adaptive logic.
 - e. Fan motor sequencer for multiple-cell and two-speed applications with automatic lead stage rotation.
 - f. Factory-installed and -wired, collection basin electric/electronic level controller.
 - g. Collection basin electric/electronic level controller complying with requirements in "Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve" Paragraph.
 - h. Electric basin heaters with temperature control and low-water-level safety switch for each cell, complying with requirements in "Electric Basin Heater" Paragraph.
 - i. Vibration switch for each fan, complying with requirements in "Vibration Switch" Paragraph.
 - j. Controls and wiring for "two-motor, single-fan drives" shall be same as two-speed, two-winding motor.
 - k. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, for each cooling tower cell, **as directed**.
 - 1) Branch power circuit to each motor and electric basin heater and to controls with a disconnect switch or circuit breaker, **as directed**.
 - 2) NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
 - l. Factory-installed wiring outside of enclosures shall be in metal raceway, except make connections to each motor and electric basin heater with liquidtight conduit.
 - m. Visual indication of status and alarm with momentary test push button, **as directed**, for each motor.
 - n. Audible alarm and silence switch.
 - o. Visual indication of elapsed run time, graduated in hours for each motor.
 - p. Cooling tower shall have hardware to enable BMS to remotely monitor and display the following:
 - 1) Operational status of each motor.
 - 2) Position of dampers.
 - 3) Cooling tower leaving-fluid temperature.
 - 4) Fan vibration alarm.
 - 5) Collection basin high **OR** low **OR** high- and low, **as directed**, -water-level alarms.
21. Personnel Access Components:
- a. Doors: Large enough for personnel to access cooling tower internal components from both cooling tower end walls. Doors shall be operable from both sides of the door.
 - b. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
 - c. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
 - d. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard, around top of cooling tower. Comply with 29 CFR 1910.23.
 - e. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.

- 1) Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
 - 2) Elevated internal platforms with handrails accessible from fixed vertical ladders to access the fan drive assembly when out of reach from collection basin platform.
- E. Open-Circuit, Induced-Draft, Counterflow Cooling Towers
1. Fabricate cooling tower mounting base with reinforcement strong enough to resist cooling tower movement during a seismic event when cooling tower is anchored to field support structure.
 2. Cooling tower designed to resist wind load of **30 lbf/sq. ft. (1.44 kPa) OR as directed.**
 3. Casing and Frame:
 - a. Casing and Frame, **as directed**, Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Stainless steel, **as directed.**
 - b. Frame Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Stainless steel, **as directed.**
 - c. Fasteners: Galvanized **OR** Stainless, **as directed**, steel.
 - d. Joints and Seams: Sealed watertight.
 - e. Welded Connections: Continuous and watertight.
 4. Collection Basin: Configure tower for installation with a field-constructed collection basin.
OR
Collection Basin:
 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G210 (Z600)** coating **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed.**
 - b. Strainer: Removable stainless-steel, **as directed**, strainer with openings smaller than nozzle orifices.
 - c. Overflow and drain connections.
 - d. Makeup water connection.
 - e. Outlet Connection: ASME B16.5, Class 150 flange.
 - f. Removable equalization flume plate between adjacent cells of multiple-cell towers.
 - g. Equalizer connection for field-installed equalizer piping.
 - h. Basin Sweeper Distribution Piping and Nozzles:
 - 1) Pipe Material: PVC, **as directed.**
 - 2) Nozzle Material: Plastic, **as directed.**
 - 3) Configure piping and nozzles to minimize sediment from collecting in the collection basin.
 5. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.
OR
Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve:
 - a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed.**
 - b. Sensor: Solid-state controls with multiple electrode probes and relays factory wired to a terminal strip to provide control of water makeup valve **OR** control of water makeup valve and low-level alarm **OR** control of water makeup valve and low- and high-level alarms **OR** control of water makeup valve, low- and high-level alarms, and output for shutoff of pump on low level, **as directed.**
 - c. Electrode Probes: Stainless steel.
 - d. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed.**
 - e. Solenoid Valve: Slow closing with stainless-steel body, **as directed**; controlled and powered through level controller in response to water-level set point.
 - f. Electrical Connection Requirements: 120 V, single phase, 60 Hz.**OR**
Ultrasonic Collection Basin Water-Level Controller with Solenoid Valve:

- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
- b. Controller: Ultrasonic level sensor/transmitter and relays factory wired to a terminal strip to control water makeup valve and signal a level alarm. Controller shall provide continuous level indication through a 4- to 20-mA signal for connection to BMS, **as directed**.
- c. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed**.
- d. Solenoid Valve: Slow closing with stainless-steel body, **as directed**; controlled and powered through level controller in response to water-level set point.
- e. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
6. Electric Basin Heater:
 - a. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
 - b. Heater Control Panel: Mounted on the side of each cooling tower cell.
 - c. Enclosure: NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**.
 - d. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
 - e. Control-circuit transformer with primary and secondary side fuses.
 - f. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - g. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, and heater branch circuiting complying with NFPA 70.
 - h. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquidtight conduit.

OR
Hot-Water-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.

OR
Steam-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.

OR
Steam-Injector Basin Heater: Manufacturer's standard offering to provide capacity indicated.
7. Pressurized Water Distribution Piping: Main header and lateral branch piping designed for even distribution over heat-exchanger coil or fill throughout the flow range without the need for balancing valves and for connecting individual, removable, nonclogging spray nozzles.
 - a. Pipe Material: Fiberglass **OR** PVC **OR** Galvanized steel, **as directed**.
 - b. Spray Nozzle Material: Plastic **OR** Polypropylene **OR** PVC, **as directed**.
 - c. Piping Supports: Corrosion-resistant hangers and supports to resist movement during operation and shipment.
8. Fill:
 - a. Materials: CPVC **OR** PVC, **as directed**, resistant to rot, decay, and biological attack; with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. Minimum Thickness: 15 mils (0.4 mm) **OR** 20 mils (0.5 mm), **as directed**, before forming.
 - c. Fabrication: Fill-type sheets, fabricated, formed, and bonded together after forming into removable assemblies that are factory installed by manufacturer.
 - d. Fill Material Operating Temperature: Suitable for entering-water temperatures up through 120 deg F (49 deg C).
9. Removable, **as directed**, Drift Eliminator:
 - a. Material: FRP **OR** PVC, **as directed**; resistant to rot, decay, and biological attack; with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Configuration: Multipass, designed and tested to reduce water carryover to achieve performance indicated.
10. Air-Intake Louvers:
 - a. Material: FRP **OR** PVC **OR** Matching casing, **as directed**.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.

- c. Louver Blades: Arranged to uniformly direct air into cooling tower, to minimize air resistance, and to prevent water from splashing out of tower during all modes of operation including operation with fans off.
- 11. Removable, **as directed**, Air-Intake Screens: Galvanized **OR** Polymer-coated, galvanized **OR** Stainless, **as directed**, -steel wire mesh.
- 12. Axial Fan: Balanced at the factory after assembly.
 - a. Blade Material: Aluminum **OR** FRP **OR** Galvanized steel, **as directed**.
 - b. Hub Material: Aluminum **OR** FRP **OR** Galvanized steel, **as directed**.
 - c. Blade Pitch: Field adjustable.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens, complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**. Bearings designed for an L-10 life of 40,000 **OR** 50,000, **as directed**, hours.
 - f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.
- 13. Belt Drive:
 - a. Service Factor: 1.5 based on motor nameplate horsepower.
 - b. Sheaves: Fan and motor shafts shall have taper-lock sheaves fabricated from corrosion-resistant materials.
 - c. Belt: Multiple V-belt design with a matched set of cogged, **as directed**, belts.
OR
Belt: One-piece, multigrooved, solid-back belt.
 - d. Belt Material: Oil resistant, nonstatic conducting, and constructed of neoprene polyester cord.
 - e. Belt-Drive Guard: Comply with OSHA regulations.
- 14. Direct Drive: Fan hub directly connected, and properly secured, to motor shaft.
- 15. Gear Drive: Right angle, reduced speed, and designed for cooling tower applications according to CTI STD 111. Motor and gear drive shall be aligned before shipment.
 - a. Gear Drive and Coupling Service Factor: 2.0 based on motor nameplate horsepower.
 - b. Housing: Cast iron, with epoxy or polyurethane finish, beveled high-strength steel gears continuously bathed in oil, and with lubrication to other internal parts at all operating speeds.
 - c. Mounting: Directly mounted to fan hub and connected to motor so motor shaft is in horizontal position.
 - d. Operation: Able to operate both forward and in reverse.
 - e. Drive-to-Motor Connection: Close coupled to motor using a flexible coupling **OR** Connected to motor located outside of cooling tower casing by a full-floating drive shaft, **as directed**.
 - f. Drive Shaft Material: Corrosion resistant **OR** Stainless steel, **as directed**, and fitted with flexible couplings on both ends. Provide exposed shaft and couplings with guards according to OSHA regulations.
 - g. Extend oil fill, drain, and vent to outside of cooling tower casing using galvanized-steel piping. Provide installation with oil-level sight glass.
- 16. Fan Motor:
 - a. General Requirements for Fan Motors: Comply with NEMA designation and temperature-rating requirements specified in Division 15 Section "Common Motor Requirements for HVAC Equipment" and not indicated below.
 - b. Motor Enclosure: Totally enclosed **OR** Totally enclosed air over (TEAO) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
 - c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
 - d. Service Factor: 1.15.
 - e. Insulation: Class F **OR** Class H, **as directed**.

- f. Variable-Speed Motors: Inverter-duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
 - g. Motor Location: Mounted outside of cooling tower casing and cooling tower discharge airstream.
 - h. Severe-duty rating with the following features:
 - 1) Rotor and stator protected with corrosion-inhibiting epoxy resin.
 - 2) Double-shielded, vacuum-degassed bearings lubricated with premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**.
 - 3) Internal heater automatically energized when motor is de-energized.
 - i. Motor Base: Adjustable, or other suitable provision for adjusting belt tension.
17. Fan Discharge Stack: Material shall match casing, manufacturer's standard **OR** velocity recovery, **as directed**, design.
- a. Stack Extension: Fabricated to extend above fan deck unless otherwise indicated.
 - b. Stack Termination: Wire-mesh, galvanized-steel screens; complying with OSHA regulations.
18. Vibration Switch: For each fan drive.
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Vibration Detection: Sensor with a field-adjustable, acceleration-sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
 - c. Provide switch with manual-reset button, **as directed**, for field connection to a BMS, **as directed**, and hardwired connection to fan motor electrical circuit.
 - d. Switch shall, on sensing excessive vibration, signal an alarm through the BMS, **as directed**, and shut down the fan.
19. Gear-Drive, Oil-Level Switch: Low-oil-level warning switch for connection to a BMS, **as directed**.
- a. Switch shall, on reaching a low-oil-level set point recommended by cooling tower manufacturer, signal an alarm through the BMS, **as directed**.
20. Controls: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".
- OR**
- Control Package: Factory installed and wired, and functionally tested at factory before shipment.
- a. NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**, enclosure with removable internally mount backplate.
 - b. Control-circuit transformer with primary and secondary side fuses.
 - c. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
 - d. Microprocessor-based controller for automatic control of fan based on cooling tower leaving-water temperature with control features to improve operating efficiency based on outdoor ambient wet-bulb temperature by using adaptive logic.
 - e. Fan motor sequencer for multiple-cell and two-speed applications with automatic lead stage rotation.
 - f. Collection basin level controller complying with requirements in "Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve" **OR** "Ultrasonic Collection Basin Water-Level Controller with Solenoid Valve", **as directed**, Paragraph.
 - g. Electric basin heaters with temperature control and low-water-level safety switch for each cell, complying with requirements in "Electric Basin Heater" Paragraph.
 - h. Vibration switch for each fan, complying with requirements in "Vibration Switch" Paragraph.
 - i. Oil-level switch for each fan with a gear drive, complying with requirement in "Gear-Drive, Oil-Level Switch" Paragraph.
 - j. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, for each cooling tower cell, **as directed**.
 - 1) Branch power circuit to each motor and electric basin heater and to controls with a disconnect switch or circuit breaker, **as directed**.

- 2) NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
 - k. Factory-installed wiring outside of enclosures shall be in metal raceway, except make connections to each motor and electric basin heater with liquidtight conduit.
 - l. Visual indication of status and alarm with momentary test push button, **as directed**, for each motor.
 - m. Audible alarm and silence switch.
 - n. Visual indication of elapsed run time, graduated in hours for each motor.
 - o. Cooling tower shall have hardware to enable BMS to remotely monitor and display the following:
 - 1) Operational status of each motor.
 - 2) Position of dampers.
 - 3) Cooling tower leaving-fluid temperature.
 - 4) Fan vibration alarm.
 - 5) Oil-level alarm.
 - 6) Collection basin high **OR** low **OR** high- and low, **as directed**, -water-level alarms.
21. Personnel Access Components:
- a. Doors: Large enough for personnel to access cooling tower internal components from both cooling tower end walls. Doors shall be operable from both sides of the door.
 - b. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
 - c. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
 - d. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard, around top of cooling tower. Comply with 29 CFR 1910.23.
 - e. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.
 - 1) Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
 - 2) Elevated internal platforms with handrails accessible from fixed vertical ladders to access the fan drive assembly when out of reach from collection basin platform.
- F. Open-Circuit, Induced-Draft, Crossflow Cooling Towers
1. Fabricate cooling tower mounting base with reinforcement strong enough to resist cooling tower movement during a seismic event when cooling tower is anchored to field support structure.
 2. Cooling tower designed to resist wind load of **30 lbf/sq. ft. (1.44 kPa)**, **as directed**.
 3. Casing and Frame:
 - a. Casing and Frame, **as directed**, Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - b. Frame Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - c. Fasteners: Galvanized **OR** Stainless, **as directed**, steel.
 - d. Joints and Seams: Sealed watertight.
 - e. Welded Connections: Continuous and watertight.
 4. Collection Basin: Configure tower for installation with a field-constructed collection basin.

OR

Collection Basin:

 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - b. Removable stainless-steel, **as directed**, strainer with openings smaller than nozzle orifices.
 - c. Overflow and drain connections.

- d. Makeup water connection.
 - e. Outlet Connection: ASME B16.5, Class 150 flange.
 - f. Removable equalization flume plate between adjacent cells of multiple-cell towers.
 - g. Equalizer connection for field-installed equalizer piping.
 - h. Basin Sweeper Distribution Piping and Nozzles:
 - 1) Pipe Material: PVC, **as directed**.
 - 2) Nozzle Material: Plastic, **as directed**.
 - 3) Configure piping and nozzles to minimize sediment from collecting in the collection basin.
5. Mechanically Operated, Collection Basin Water-Level Control: Manufacturer's standard adjustable, mechanical float assembly and valve.
- OR**
- Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve:
- a. Enclosures: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Sensor: Solid-state controls with multiple electrode probes and relays factory wired to a terminal strip to provide control of water makeup valve **OR** control of water makeup valve and low-level alarm **OR** control of water makeup valve and low- and high-level alarms **OR** control of water makeup valve, low- and high-level alarms, and output for shutoff of pump on low level, **as directed**.
 - c. Electrode Probes: Stainless steel.
 - d. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed**.
 - e. Solenoid Valve: Slow closing with stainless-steel body, **as directed**, controlled and powered through level controller in response to water-level set point.
 - f. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
- OR**
- Ultrasonic Collection Basin Water-Level Controller with Solenoid Valve:
- a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Controller: Ultrasonic level sensor/transmitter and relays factory wired to a terminal strip to control water makeup valve and signal a level alarm. Controller shall provide continuous level indication through a 4- to 20-mA signal for connection to BMS, **as directed**.
 - c. Water Stilling Chamber: Corrosion-resistant material **OR** FRP **OR** Galvanized steel **OR** PVC pipe **OR** Stainless steel, **as directed**.
 - d. Solenoid Valve: Slow closing with stainless-steel body, **as directed**; controlled and powered through level controller in response to water-level set point.
 - e. Electrical Connection Requirements: 120 V, single phase, 60 Hz.
6. Electric Basin Heater:
- a. Stainless-Steel Electric Immersion Heaters: Installed in a threaded coupling on the side of the collection basin.
 - b. Heater Control Panel: Mounted on the side of each cooling tower cell.
 - c. Enclosure: NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**.
 - d. Magnetic contactors controlled by a temperature sensor/controller to maintain collection basin water-temperature set point. Water-level probe shall monitor cooling tower water level and de-energize the heater when the water reaches low-level set point.
 - e. Control-circuit transformer with primary and secondary side fuses.
 - f. Terminal blocks with numbered and color-coded wiring to match wiring diagram.
 - g. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, and heater branch circuiting complying with NFPA 70.
 - h. Factory Wiring Method: Metal raceway for factory-installed wiring outside of enclosures, except make connections to each electric basin heater with liquidtight conduit.
- OR**
- Hot-Water-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.
- OR**
- Steam-Coil Basin Heater: Manufacturer's standard offering to provide capacity indicated.

OR

Steam-Injector Basin Heater: Manufacturer's standard offering to provide capacity indicated.

7. Gravity Water Distribution Basin: Nonpressurized design with head of water level in basin adequate to overcome spray nozzle losses and designed to evenly distribute water over fill throughout the flow range indicated.
 - a. Material: FRP with UV inhibitors **OR** Galvanized steel, ASTM A 653/A 653M, **G235 (Z700)** coating **OR** Polymer-coated galvanized steel **OR** Stainless steel, **as directed**.
 - b. Location: Over each bank of fill with easily replaceable plastic, **as directed**, spray nozzles mounted in bottom of basin.
 - c. Inlet Connection: ASME B16.5, Class 150 flange.
 - d. Joints and Seams: Sealed watertight.
 - e. Partitioning Dams: Same material as basin to distribute water over the fill to minimize icing while operating throughout the flow range indicated.
 - f. Removable Panels: Same material as basin to completely cover top of basin. Secure panels to basin with removable corrosion-resistant **OR** stainless-steel, **as directed**, hardware.
 - g. Valves: Manufacturer's standard valve installed at each inlet connection and arranged to balance or shut off flow to each gravity distribution basin.
 - h. Single-Inlet, Field Pipe Connection: Galvanized-steel **OR** PVC, **as directed**, pipe arranged to provide balancing of flow within cooling tower cell without the need for additional balancing valves. Pipe each cooling tower cell internally to a single, field connection suitable for mating to ASME B16.5, Class 150 flange and located on the bottom **OR** side, **as directed**, unless otherwise indicated.
8. Fill:
 - a. Materials: PVC, with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. Minimum Thickness: **15 mils (0.4 mm)** **OR** **20 mils (0.5 mm)**, **as directed**, before forming.
 - c. Fabrication: Fill-type sheets, fabricated, formed, and bonded together after forming into removable assemblies that are factory installed by manufacturer.
 - d. Fill Material Operating Temperature: Suitable for entering-water temperatures up through **120 deg F (49 deg C)**.
9. Drift Eliminator:
 - a. Material: FRP **OR** PVC, **as directed**; with maximum flame-spread index of 5 **OR** 25, **as directed**, according to ASTM E 84.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Configuration: Multipass, designed and tested to reduce water carryover to achieve performance indicated.
 - d. Location: Integral to **OR** Separate and removable from, **as directed**, fill.
10. Air-Intake Louvers:
 - a. Material: FRP **OR** PVC **OR** Matching casing, **as directed**.
 - b. UV Treatment: Inhibitors to protect against damage caused by UV radiation.
 - c. Louver Blades: Arranged to uniformly direct air into cooling tower, to minimize air resistance, and to prevent water from splashing out of tower during all modes of operation including operation with fans off.
 - d. Location: Integral to **OR** Separate from, **as directed**, fill.
11. Removable, **as directed**, Air-Intake Screens: Galvanized **OR** Polymer-coated, galvanized **OR** Stainless, **as directed**,-steel wire mesh.
12. Axial Fan: Balanced at the factory after assembly.
 - a. Blade Material: Aluminum **OR** FRP **OR** Galvanized steel, **as directed**.
 - b. Hub Material: Aluminum **OR** FRP **OR** Galvanized steel, **as directed**.
 - c. Blade Pitch: Field adjustable.
 - d. Protective Enclosure: Removable, galvanized-steel, wire-mesh screens complying with OSHA regulations.
 - e. Fan Shaft Bearings: Self-aligning ball or roller bearings with moisture-proof seals and premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus**

- 300 deg F (minus 29 and plus 149 deg C). Bearings designed for an L-10 life of 40,000 OR 50,000, **as directed**, hours.
- f. Bearings Grease Fittings: Extended lubrication lines to an easily accessible location.
13. Belt Drive:
- a. Service Factor: 1.5 based on motor nameplate horsepower.
- b. Sheaves: Fan and motor shafts shall have taper-lock sheaves fabricated from corrosion-resistant materials.
- c. Belt: Multiple V-belt design with a matched set of cogged, **as directed**, belts.
OR
Belt: One-piece, multigrooved, solid-back belt.
- d. Belt Material: Oil resistant, nonstatic conducting, and constructed of neoprene polyester cord.
- e. Belt-Drive Guard: Comply with OSHA regulations.
- f. Two-Motor, Single-Fan Drive:
- 1) Two single-speed motors per fan, one sized for full speed and load and the other sized for 67 percent of full-load speed.
- 2) Each motor with belt drive and configured for operation when other motor fails.
- 3) Controls and wiring same as two-speed, two-winding motor.
14. Gear Drive: Right angle, reduced speed, and designed for cooling tower applications according to CTI STD 111. Motor and gear drive shall be aligned before shipment.
- a. Gear Drive and Coupling Service Factor: 2.0 based on motor nameplate horsepower.
- b. Housing: Cast iron, with epoxy or polyurethane finish, beveled high-strength steel gears continuously bathed in oil, and with lubrication to other internal parts at all operating speeds.
- c. Mounting: Directly mounted to fan hub and connected to motor so motor shaft is in horizontal position.
- d. Operation: Able to operate both forward and in reverse.
- e. Drive-to-Motor Connection: Close coupled to motor using a flexible coupling **OR** Connected to motor located outside of cooling tower casing by a full-floating drive shaft, **as directed**.
- f. Drive Shaft Material: Corrosion resistant **OR** Stainless steel, **as directed**, and fitted with flexible couplings on both ends. Provide exposed shaft and couplings with guards according to OSHA regulations.
- g. Extend oil fill, drain, and vent to outside of cooling tower casing using galvanized-steel piping. Provide installation with oil-level sight glass.
15. Fan Motor:
- a. General Requirements for Fan Motors: Comply with NEMA designation and temperature-rating requirements specified in Division 23 Section "Common Motor Requirements For Hvac Equipment" and not indicated below.
- b. Motor Enclosure: Totally enclosed **OR** Totally enclosed air over (TEAO) **OR** Totally enclosed fan cooled (TEFC), **as directed**, with epoxy or polyurethane finish, **as directed**.
- c. Energy Efficiency: Comply with ASHRAE/IESNA 90.1 **OR** NEMA Premium Efficient, **as directed**.
- d. Service Factor: 1.15.
- e. Insulation: Class F **OR** Class H, **as directed**.
- f. Variable-Speed Motors: Inverter-duty rated per NEMA MG-1, Section IV, "Performance Standard Applying to All Machines," Part 31, "Definite-Purpose, Inverter-Fed, Polyphase Motors."
- g. Motor Location: Mounted outside of cooling tower casing and cooling tower discharge airstream.
- h. Severe-duty rating with the following features:
- 1) Rotor and stator protected with corrosion-inhibiting epoxy resin.
- 2) Double-shielded, vacuum-degassed bearings lubricated with premium, moisture-resistant grease suitable for temperatures between **minus 20 and plus 300 deg F (minus 29 and plus 149 deg C)**.

- 3) Internal heater automatically energized when motor is de-energized.
- i. Motor Base: Adjustable, or other suitable provision for adjusting belt tension.
- 16. Fan Discharge Stack: Material shall match casing, manufacturer's standard **OR** velocity recovery, **as directed**, design.
 - a. Stack Extension: Fabricated to extend above fan deck unless otherwise indicated.
 - b. Stack Termination: Wire-mesh, galvanized-steel screens; complying with OSHA regulations.
- 17. Vibration Switch: For each fan drive.
 - a. Enclosure: NEMA 250, Type 4 **OR** Type 4X, **as directed**.
 - b. Vibration Detection: Sensor with a field-adjustable, acceleration-sensitivity set point in a range of 0 to 1 g and frequency range of 0 to 3000 cycles per minute. Cooling tower manufacturer shall recommend switch set point for proper operation and protection.
 - c. Provide switch with manual-reset button, **as directed**, for field connection to a BMS, **as directed**, and hardwired connection to fan motor electrical circuit.
 - d. Switch shall, on sensing excessive vibration, signal an alarm through the BMS, **as directed**, and shut down the fan.
- 18. Gear-Drive, Oil-Level Switch: Low-oil-level warning switch for connection to a BMS, **as directed**.
 - a. Switch shall, on reaching a low-oil-level set point recommended by cooling tower manufacturer, signal an alarm through the BMS, **as directed**.
- 19. Capacity-Control Dampers: Galvanized-steel **OR** Stainless-steel, **as directed**, dampers, with linkages, electric operator, controller, limit switches, transformer, and weatherproof enclosure.
- 20. Controls: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".

OR

Control Package: Factory installed and wired, and functionally tested at factory before shipment.

- a. NEMA 250, Type 3R **OR** Type 4 **OR** Type 4X, **as directed**, enclosure with removable internally mount backplate.
- b. Control-circuit transformer with primary and secondary side fuses.
- c. Terminal blocks with numbered and color-coded wiring to match wiring diagram. Spare wiring terminal block for connection to external controls or equipment.
- d. Microprocessor-based controller for automatic control of fan based on cooling tower leaving-water temperature with control features to improve operating efficiency based on outdoor ambient wet-bulb temperature by using adaptive logic.
- e. Fan motor sequencer for multiple-cell and two-speed applications with automatic lead stage rotation.
- f. Collection basin level controller complying with requirements in "Electric/Electronic, Collection Basin Water-Level Controller with Solenoid Valve" **OR** "Ultrasonic Collection Basin Water-Level Controller with Solenoid Valve", **as directed**, Paragraph.
- g. Electric basin heaters with temperature control and low-water-level safety switch for each cell, complying with requirements in "Electric Basin Heater" Paragraph.
- h. Vibration switch for each fan, complying with requirements in "Vibration Switch" Paragraph.
- i. Oil-level switch for each fan with a gear drive, complying with requirement in "Gear-Drive, Oil-Level Switch" Paragraph.
- j. Single-point, field-power connection to a fused disconnect switch **OR** nonfused disconnect switch **OR** circuit breaker, **as directed**, for each cooling tower cell, **as directed**.
 - 1) Branch power circuit to each motor and electric basin heater and to controls with a disconnect switch or circuit breaker, **as directed**.
 - 2) NEMA-rated motor controller, hand-off-auto switch, and overcurrent protection for each motor. Provide variable frequency controller with manual bypass and line reactors for each variable-speed motor indicated.
- k. Factory-installed wiring outside of enclosures shall be in metal raceway, except make connections to each motor and electric basin heater with liquidtight conduit.
- l. Visual indication of status and alarm with momentary test push button, **as directed**, for each motor.
- m. Audible alarm and silence switch.
- n. Visual indication of elapsed run time, graduated in hours for each motor.

- o. Cooling tower shall have hardware to enable BMS to remotely monitor and display the following:
 - 1) Operational status of each motor.
 - 2) Position of dampers.
 - 3) Cooling tower leaving-fluid temperature.
 - 4) Fan vibration alarm.
 - 5) Oil-level alarm.
 - 6) Collection basin high **OR** low **OR** high- and low, **as directed**, -water-level alarms.
 - 21. Personnel Access Components:
 - a. Doors: Large enough for personnel to access cooling tower internal components from both cooling tower end walls. Doors shall be operable from both sides of the door.
 - b. External Ladders with Safety Cages: Aluminum, galvanized- or stainless-steel, fixed ladders with ladder extensions to access external platforms and top of cooling tower from adjacent grade without the need for portable ladders. Comply with 29 CFR 1910.27.
 - c. External Platforms with Handrails: Aluminum, FRP, or galvanized-steel bar grating at cooling tower access doors when cooling towers are elevated and not accessible from grade.
 - d. Handrail: Aluminum, galvanized steel, or stainless steel complete with kneerail and toeboard, around top of cooling tower. Comply with 29 CFR 1910.23.
 - e. Internal Platforms: Aluminum, FRP, or galvanized-steel bar grating.
 - 1) Spanning the collection basin from one end of cooling tower to the other and positioned to form a path between the access doors. Platform shall be elevated so that all parts are above the high water level of the collection basin.
 - 2) Elevated internal platforms with handrails accessible from fixed vertical ladders to access the fan drive assembly when out of reach from collection basin platform.
- G. Source Quality Control
- 1. Verification of Performance: Test and certify cooling tower performance according to CTI STD 201, "Certification Standard for Commercial Water-Cooling Towers Thermal Performance."
 - 2. Factory pressure test heat exchangers after fabrication and prove to be free of leaks.

1.3 EXECUTION

A. Examination

- 1. Before cooling tower installation, examine roughing-in for tower support, anchor-bolt sizes and locations, piping, and electrical connections to verify actual locations, sizes, and other conditions affecting tower performance, maintenance, and operation.
 - a. Cooling tower locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.
- 2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

- 1. Install cooling towers on support structure indicated.
- 2. Equipment Mounting: Install cooling tower on concrete bases using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed.**
 - b. Provide galvanized **OR** stainless, **as directed**, -steel plate to equally distribute weight over elastomeric pad.

- c. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
- d. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
- e. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
3. Equipment Mounting: Install cooling tower using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed.**
 - b. Provide galvanized **OR** stainless, **as directed**, -steel plate to equally distribute weight over elastomeric pad.
4. Equipment Mounting: Install cooling tower on concrete bases. Comply with requirements in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Maintain manufacturer's recommended clearances for service and maintenance.
7. Loose Components: Install electrical components, devices, and accessories that are not factory mounted.

C. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to cooling towers to allow service and maintenance.
3. Install flexible pipe connectors at pipe connections of cooling towers mounted on vibration isolators.
4. Provide drain piping with valve at cooling tower drain connections and at low points in piping.
5. Connect cooling tower overflows and drains, and piping drains to sanitary sewage system.
6. Domestic Water Piping: Comply with applicable requirements in Division 22 Section "Domestic Water Piping". Connect to water-level control with shutoff valve and union, flange, or mechanical coupling at each connection.
7. Supply and Return Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping". Connect to entering cooling tower connections with shutoff valve, balancing valve, thermometer, plugged tee with pressure gage, flow meter, **as directed**, and drain connection with valve. Connect to leaving cooling tower connection with shutoff valve. Make connections to cooling tower with a union **OR** flange **OR** mechanical coupling, **as directed**.
8. Equalizer Piping: Piping requirements to match supply and return piping. Connect an equalizer pipe, full size of cooling tower connection, between tower cells. Connect to cooling tower with shutoff valve.
9. Hot-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping". Connect to supply and return basin heater with shutoff valve, strainer, control valve, and union or flange on supply connection and union or flange and balancing valve on return connection. Provide supply and return piping with pressure gage and thermometer.
10. Steam and Condensate Piping: Comply with applicable requirements in Division 23 Section "Steam And Condensate Heating Piping". Connect steam supply to basin heater with shutoff valve, strainer, control valve, and union or flange and condensate piping with union or flange, shutoff valve, strainer, and an appropriate steam trap.

D. Field Quality Control

23 - Heating, Ventilating, and Air-Conditioning (HVAC)



1. Perform tests and inspections.
2. Tests and Inspections: Comply with ASME PTC 23, "ASME Performance Test Codes - Code on Atmospheric Water Cooling Equipment **OR** CTI ATC 105, "Acceptance Test Code for Water Cooling Towers", **as directed**.
3. Cooling towers will be considered defective if they do not pass tests and inspections.
4. Prepare test and inspection reports.

E. Startup Service

1. Perform startup service.
2. Inspect field-assembled components, equipment installation, and piping and electrical connections for proper assemblies, installations, and connections.
3. Obtain performance data from manufacturer.
 - a. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - 1) Clean entire unit including basins.
 - 2) Verify that accessories are properly installed.
 - 3) Verify clearances for airflow and for cooling tower servicing.
 - 4) Check for vibration isolation and structural support.
 - 5) Lubricate bearings.
 - 6) Verify fan rotation for correct direction and for vibration or binding and correct problems.
 - 7) Adjust belts to proper alignment and tension.
 - 8) Verify proper oil level in gear-drive housing. Fill with oil to proper level.
 - 9) Operate variable-speed fans through entire operating range and check for harmonic vibration imbalance. Set motor controller to skip speeds resulting in abnormal vibration.
 - 10) Check vibration switch setting. Verify operation.
 - 11) Verify water level in tower basin. Fill to proper startup level. Check makeup water-level control and valve.
 - 12) Verify operation of basin heater and control.
 - 13) Verify that cooling tower air discharge is not recirculating air into tower or HVAC air intakes. Recommend corrective action.
 - 14) Replace defective and malfunctioning units.
4. Start cooling tower and associated water pumps. Follow manufacturer's written starting procedures.
5. Prepare a written startup report that records the results of tests and inspections.

F. Adjusting

1. Set and balance water flow to each tower inlet.
2. Adjust water-level control for proper operating level.

G. Demonstration

1. Train Owner's maintenance personnel to adjust, operate, and maintain cooling towers.

END OF SECTION 23 65 13 16

Task	Specification	Specification Description
23 65 14 14	23 65 13 16	Cooling Towers
23 65 14 16	23 65 13 16	Cooling Towers

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SECTION 23 72 16 00 - AIR-TO-AIR ENERGY RECOVERY UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for air-to-air energy recovery equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Heat wheels.
 - b. Heat-pipe heat exchangers.
 - c. Fixed-plate sensible heat exchangers.
 - d. Fixed-plate total heat exchangers.
 - e. Packaged energy recovery units.

C. Performance Requirements

1. Delegated Design: Design vibration isolation and seismic-restraint details, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Seismic Performance: Air-to-air energy recovery equipment shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: For air-to-air energy recovery equipment. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
4. Delegated-Design Submittal: For air-to-air energy recovery equipment indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of air-to-air energy recovery equipment.
 - b. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 - c. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Coordination Drawings: Plans, elevations, and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:
 - a. Suspended ceiling components.

- b. Structural members to which equipment or suspension systems will be attached.
- 6. Seismic Qualification Certificates: For air-to-air energy recovery equipment, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- 7. Field quality-control reports.
- 8. Operation and Maintenance Data: For air-to-air energy recovery equipment to include in maintenance manuals.

E. Quality Assurance

- 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 2. ARI Compliance:
 - a. Capacity ratings for air-to-air energy recovery equipment shall comply with ARI 1060, "Performance Rating of Air-to-Air Heat Exchangers for Energy Recovery Ventilation Equipment."
 - b. Capacity ratings for air coils shall comply with ARI 410, "Forced-Circulation Air- Cooling and Air-Heating Coils."
- 3. ASHRAE Compliance:
 - a. Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
 - b. Capacity ratings for air-to-air energy recovery equipment shall comply with ASHRAE 84, "Method of Testing Air-to-Air Heat Exchangers."
- 4. NRCA Compliance: Roof curbs for roof-mounted equipment shall be constructed according to recommendations of NRCA.
- 5. UL Compliance:
 - a. Packaged heat recovery ventilators shall comply with requirements in UL 1812, "Ducted Heat Recovery Ventilators"; or UL 1815, "Nonducted Heat Recovery Ventilators."
 - b. Electric coils shall comply with requirements in UL 1995, "Heating and Cooling Equipment."

F. Coordination

- 1. Coordinate layout and installation of air-to-air energy recovery equipment and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- 2. Coordinate sizes and locations of concrete bases with actual equipment provided.
- 3. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

G. Warranty

- 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of air-to-air energy recovery equipment that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Packaged Energy Recovery Units: Two years.
 - b. Warranty Period for Fixed-Plate Total Heat Exchangers: 10 years.

1.2 PRODUCTS

A. Heat Wheels

- 1. Casing:
 - a. Steel with standard factory-painted finish.

- b. Integral purge section limiting carryover of exhaust air to between **0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg** (0.05 percent at 400-Pa and 0.20 percent at 1000-Pa) differential pressure.
- c. Casing seals on periphery of rotor and on duct divider and purge section.
- d. Support vertical rotors on grease-lubricated ball bearings having extended grease fittings or permanently lubricated bearings. Support horizontal rotors on tapered roller bearing.
2. Rotor: Aluminum segmented wheel strengthened with radial spokes, with nontoxic, noncorrosive, silica-gel desiccant coating, **as directed**.
 - a. Maximum Solid Size for Media to Pass: 500 **OR** 800 **OR** 1200, **as directed**, micrometer.
3. Rotor: Glass-fiber **OR** Polymer, **as directed**, segmented wheel strengthened with radial spokes impregnated with nonmigrating, water-selective, molecular-sieve desiccant coating.
 - a. Maximum Solid Size for Media to Pass: 800 **OR** 1200, **as directed**, micrometer.
4. Drive: Fractional horsepower motor and gear reducer, with speed changed by variable frequency controller, **as directed**, and self-adjusting multilink belt around outside of rotor.
 - a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - b. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
5. Controls:
 - a. Starting relay, factory mounted and wired, and manual motor starter for field wiring.
 - b. Variable frequency controller, factory mounted and wired, permitting input of field connected 4-20 mA or 1-10-V control signal.

OR

Variable frequency controller, factory mounted and wired, with exhaust-air sensor to vary rotor speed and maintain exhaust temperature above freezing.

OR

Variable frequency controller, factory mounted and wired, with exhaust- and outdoor-air sensors, automatic changeover thermostat and set-point adjuster, to vary rotor speed and maintain exhaust temperature above freezing and, **as directed**, air differential temperature above set point. Rotor speed shall increase to maximum when exhaust-air temperature is less than outdoor-air temperature.
 - c. Pilot-Light Indicator: Display rotor rotation and speed.
 - d. Speed Settings: Adjustable settings for maximum and minimum rotor speed limits.
6. Disposable Panel Filters:
 - a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, viscous-coated, flat-panel type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm)**, **as directed**.
 - e. Minimum Arrestance: 80, according to ASHRAE 52.1.
 - f. Minimum Merv: 5, according to ASHRAE 52.2.
 - g. Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent, **as directed**.
 - h. Frame: Galvanized steel with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.
7. Extended-Surface, Disposable Panel Filters:
 - a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, dry, extended-surface type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm) OR 4 inches (100 mm)**, **as directed**.
 - e. Minimum Arrestance: 90, according to ASHRAE 52.1.
 - f. Minimum Merv: 7, according to ASHRAE 52.2.

6. Bypass Plenum: Within casing, with gasketed face-and-bypass dampers having operating rods extended outside casing.
 7. Water Wash: Automatic system, with spray manifold to individual spray tubes or traversing type with stainless-steel-screw operating mechanism and electric motor drive; activated by time clock, with detergent injection, **as directed**.
 8. Disposable Panel Filters:
 - a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, viscous-coated, flat-panel type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed**.
 - e. Minimum Arrestance: 80, according to ASHRAE 52.1.
 - f. Minimum Merv: 5, according to ASHRAE 52.2.
 - g. Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent, **as directed**.
 - h. Frame: Galvanized steel with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.
 9. Extended-Surface, Disposable Panel Filters:
 - a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, dry, extended-surface type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm) OR 4 inches (100 mm), as directed**.
 - e. Minimum Arrestance: 90, according to ASHRAE 52.1.
 - f. Minimum Merv: 7, according to ASHRAE 52.2.
 - g. Media: Fibrous material formed into deep-V-shaped pleats with antimicrobial agent, **as directed**, and held by self-supporting wire grid.
 - h. Media-Grid Frame: Nonflammable cardboard **OR** Galvanized steel **OR** Fire-retardant, **3/4-inch (20-mm) particleboard with gaskets, as directed**.
 - i. Mounting Frames: Welded, galvanized steel with gaskets and fasteners, suitable for bolting together into built-up filter banks.
 10. Extended-Surface, Nonsupported-Media Filters:
 - a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, dry, extended-surface, self-supporting type.
 - d. Minimum Arrestance: 95, according to ASHRAE 52.1.
 - e. Minimum Merv: 13, according to ASHRAE 52.2.
 - f. Media: Fibrous material constructed so individual pleats are maintained in tapered form by flexible internal supports under rated-airflow conditions and antimicrobial agent, **as directed**.
 - g. Filter-Media Frame: Galvanized steel **OR** Hard polyurethane foam, **as directed**.
 - h. Mounting Frames: Welded, galvanized steel with gaskets and fasteners, suitable for bolting together into built-up filter banks with space for prefilter, **as directed**.
- D. Fixed-Plate Total Heat Exchangers
1. Casing: Galvanized steel.
 2. Plates: Evenly spaced and sealed and arranged for counter airflow.
 - a. Plate Material: Chemically treated paper with selective hydroscopicity and moisture permeability, and gas barrier properties.
 3. Bypass Plenum: Within casing, with gasketed face-and-bypass dampers having operating rods extended outside casing.
 4. Disposable Panel Filters:
 - a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.

- c. Factory-fabricated, viscous-coated, flat-panel type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed.**
 - e. Minimum Arrestance: 80, according to ASHRAE 52.1.
 - f. Minimum Merv: 5, according to ASHRAE 52.2.
 - g. Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent, **as directed.**
 - h. Frame: Galvanized steel with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.
5. Extended-Surface, Disposable Panel Filters:
- a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, dry, extended-surface type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm) OR 4 inches (100 mm), as directed.**
 - e. Minimum Arrestance: 90, according to ASHRAE 52.1.
 - f. Minimum Merv: 7, according to ASHRAE 52.2.
 - g. Media: Fibrous material formed into deep-V-shaped pleats with antimicrobial agent, **as directed**, and held by self-supporting wire grid.
 - h. Media-Grid Frame: Nonflammable cardboard **OR** Galvanized steel **OR** Fire-retardant, **3/4-inch (20-mm)** particleboard with gaskets, **as directed.**
 - i. Mounting Frames: Welded, galvanized steel with gaskets and fasteners, suitable for bolting together into built-up filter banks.

E. Packaged Energy Recovery Units

- 1. Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- 2. Housing: Manufacturer's standard construction with corrosion-protection coating and exterior finish, gasketed and calked weathertight, **as directed**, hinged access doors **OR** removable panels, **as directed**, with neoprene gaskets for inspection and access to internal parts, minimum **1-inch- (25-mm-) OR 2-inch- (50-mm-), as directed**, thick thermal insulation, knockouts for electrical and piping connections, exterior drain connection, and lifting lugs.
 - a. Inlet: Weatherproof hood **OR** louver, **as directed**, with damper for exhaust and supply.
 - 1) Exhaust: Gravity backdraft damper **OR** Spring-return, two-position, motor-operated damper, **as directed.**
 - 2) Supply: Gravity backdraft damper **OR** Spring-return, two-position, motor-operated damper, **as directed.**
 - b. Roof Curb: Refer to Division 07 Section "Roof Accessories" for roof curbs and equipment supports.
- 3. Heat Recovery Device: Heat wheel **OR** Heat-pipe heat exchanger **OR** Fixed-plate heat exchanger, **as directed.**
- 4. Supply and Exhaust Fans: Forward-curved, centrifugal **OR** Propeller **OR** Backward-inclined, SWSI centrifugal **OR** Backward-inclined, plenum centrifugal, **as directed**, fan with spring isolators **OR** restrained, spring isolators **OR** spring hangers **OR** spring hangers with vertical-limit stops, **as directed**, and insulated, **as directed**, flexible duct connections.
 - a. Motor and Drive: Direct driven **OR** Belt driven with adjustable sheaves, motor mounted on adjustable base **OR** Drive type indicated on Drawings, **as directed.**
 - b. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - c. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
 - e. Spring isolators on each fan having **1-inch (25-mm)** static deflection.
- 5. Disposable Panel Filters:
 - a. Comply with NFPA 90A.

- b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, viscous-coated, flat-panel type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed.**
 - e. Minimum Arrestance: 80, according to ASHRAE 52.1.
 - f. Minimum Merv: 5, according to ASHRAE 52.2.
 - g. Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent, **as directed.**
 - h. Frame: Galvanized steel with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.
6. Extended-Surface, Disposable Panel Filters:
- a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, dry, extended-surface type.
 - d. Thickness: **1 inch (25 mm) OR 2 inches (50 mm) OR 4 inches (100 mm), as directed.**
 - e. Minimum Arrestance: 90, according to ASHRAE 52.1.
 - f. Minimum Merv: 7, according to ASHRAE 52.2.
 - g. Media: Fibrous material formed into deep-V-shaped pleats with antimicrobial agent, **as directed**, and held by self-supporting wire grid.
 - h. Media-Grid Frame: Nonflammable cardboard **OR** Galvanized steel **OR** Fire-retardant, **3/4-inch (20-mm)** particleboard with gaskets, **as directed.**
 - i. Mounting Frames: Welded, galvanized steel with gaskets and fasteners, suitable for bolting together into built-up filter banks.
7. Extended-Surface, Nonsupported-Media Filters:
- a. Comply with NFPA 90A.
 - b. Filter Holding Frames: Arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lift out from access plenum.
 - c. Factory-fabricated, dry, extended-surface, self-supporting type.
 - d. Minimum Arrestance: 95, according to ASHRAE 52.1.
 - e. Minimum Merv: 13, according to ASHRAE 52.2.
 - f. Media: Fibrous material constructed so individual pleats are maintained in tapered form by flexible internal supports under rated-airflow conditions and antimicrobial agent, **as directed.**
 - g. Filter-Media Frame: Galvanized steel **OR** Hard polyurethane foam, **as directed.**
 - h. Mounting Frames: Welded, galvanized steel with gaskets and fasteners, suitable for bolting together into built-up filter banks with space for prefilter, **as directed.**
8. Cooling Coils: Rated according to ARI 410 and ASHRAE 33, and bearing the ARI label, **as directed.**
- a. Access: Fabricate coil section to allow removal and replacement of coil and to allow in-place access for service and maintenance of coil(s).
 - b. Casing: Manufacturer's standard material **OR** Aluminum **OR** Galvanized steel **OR** Stainless steel, **as directed.**
 - c. Tubes: Copper.
 - d. Tube Headers: Manufacturer's standard material **OR** Copper **OR** Carbon steel **OR** Red brass, **as directed.**
 - e. Fins: Aluminum **OR** Copper, **as directed.**
 - f. Fin and Tube Joint: Mechanical bond.
 - g. Leak Test: Coils shall be leak tested with air under water.
 - h. Refrigerant Coils:
 - 1) Capacity Reduction: Circuit coils for face **OR** row **OR** interleaved, **as directed**, control.
 - 2) Suction and Distributor: Seamless copper tube with brazed joints.
 - i. Coating: Phenolic epoxy corrosion-protection coating after assembly.
9. Cooling-Coil Condensate Drain Pans:

- a. Fabricated from galvanized steel **OR** stainless-steel, **as directed**, sheet and sloped in multiple planes to collect and drain condensate from cooling coils, coil piping connections, coil headers, and return bends.
 - b. Complying with requirements in ASHRAE 62.1.
 - c. Drain Connections: At low point of pan with minimum threaded nipple as directed by the Owner .
 - d. Units with stacked coils shall have an intermediate drain pan to collect and drain condensate from top coil.
10. Hot-Water Coils: Rated according to ARI 410 and ASHRAE 33, and bearing the ARI label, **as directed**.
- a. Access: Fabricate coil section to allow removal and replacement of coil and to allow in-place access for service and maintenance of coil(s).
 - b. Casing: Manufacturer's standard material **OR** Aluminum **OR** Galvanized steel **OR** Stainless steel, **as directed**.
 - c. Tubes: Copper.
 - d. Tube Headers: Manufacturer's standard material **OR** Copper **OR** Carbon steel **OR** Red brass, **as directed**.
 - e. Fins: Aluminum **OR** Copper, **as directed**.
 - f. Fin and Tube Joint: Mechanical bond.
 - g. Leak Test: Coils shall be leak tested with air under water.
 - h. Coating: Phenolic epoxy corrosion-protection coating after assembly.
11. Nonfreeze Type, **as directed**, Steam Coils: Rated according to ARI 410 and ASHRAE 33, and bearing the ARI label, **as directed**.
- a. Access: Fabricate coil section to allow removal and replacement of coil and to allow in-place access for service and maintenance of coil(s).
 - b. Casing: Manufacturer's standard material **OR** Aluminum **OR** Galvanized steel **OR** Stainless steel, **as directed**.
 - c. Tubes: Copper.
 - d. Tube Headers: Manufacturer's standard material **OR** Copper **OR** Carbon steel **OR** Red brass, **as directed**.
 - e. Fins: Aluminum **OR** Copper, **as directed**.
 - f. Fin and Tube Joint: Mechanical bond.
 - g. Leak Test: Coils shall be leak tested with air under water.
 - h. Coating: Phenolic epoxy corrosion-protection coating after assembly.
12. Electrical Coils, Controls, and Accessories: Comply with UL 1995.
- a. Casing Assembly: Slip-in **OR** Flanged, **as directed**, type with galvanized-steel frame.
 - b. Access: Fabricate coil section to allow removal and replacement of coil and to allow in-place access for service.
 - c. Sheathed Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.
OR
Open Heating Elements: Resistance wire of 80 percent nickel and 20 percent chromium supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame.
 - d. Overtemperature Protection: Disk-type, automatically resetting, thermal-cutout, safety device; serviceable through terminal box without removing heater from coil section.
 - e. Secondary Protection: Load-carrying, manually resetting or manually replaceable, thermal cutouts; factory wired in series with each heater stage.
 - f. Control Panel: Unit **OR** Remote, **as directed**, mounted with disconnecting means and overcurrent protection.
 - 1) Magnetic **OR** Mercury, **as directed**, contactor.
 - 2) Solid-state, stepless pulse controller.
 - 3) Toggle switches, one per step.
 - 4) Step controller.

- 5) Time-delay relay.
 - 6) Pilot lights, one per step.
 - 7) Airflow proving switch.
13. Indirect-Fired Gas Furnaces:
- a. Description: Factory assembled, piped, and wired; complying with NFPA 54, "National Fuel Gas Code," and ANSI Z21.47, "Gas-Fired Central Furnaces."
 - 1) AGA Approval: Furnace shall bear label of AGA.
 - b. Burners: Aluminized steel with stainless-steel inserts **OR** Stainless steel, **as directed**.
 - 1) Ignition: Electronically controlled electric spark with flame sensor.
 - 2) High-Altitude Model **OR** Kit, **as directed**: For Project at elevations more than **2000 feet (610 m)** above sea level.
 - c. Heat-Exchanger Drain Pan: Stainless steel.
 - d. Venting: Gravity vented.

OR

 Power Vent: Integral, motorized centrifugal fan interlocked with gas valve.
 - e. Gas Control Valve: Single stage **OR** Two stage **OR** Electronic modulating, **as directed**.
 - f. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff. Control devices and control sequence shall comply with requirements of FMG **OR** IRI, **as directed**.
 - g. Access: Fabricate section to allow removal and replacement of furnace and to allow in-place access for service.
14. Piping and Wiring: Fabricate units with space within housing for piping and electrical conduits. Wire motors and controls so only external connections are required during installation.
- a. Indoor Enclosure: NEMA 250, Type 12 enclosure contains relays, starters, and terminal strip.
 - b. Outdoor Enclosure: NEMA 250, Type 3R enclosure contains relays, starters, and terminal strip.
 - c. Include fused **OR** nonfused, **as directed**, disconnect switches.
 - d. Variable-speed controller to vary fan capacity from 100 to approximately 50 percent.
15. Accessories:
- a. Roof Curb: Steel **OR** Galvanized steel **OR** Aluminum, **as directed**, with gasketing, and factory-installed wood nailer; complying with NRCA standards; minimum height of **14 inches (350 mm) OR 24 inches (600 mm)**, **as directed**.
 - b. Intake weather hood with **2-inch- (50-mm-)** thick filters.
 - c. Louvered intake weather hood with **2-inch- (50-mm-)** thick filters in V-bank configuration.
 - d. Exhaust weather hood with birdscreen.
 - e. Low-Leakage, Isolation Dampers: Double-skin, airfoil-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with compressible jamb seals and extruded-vinyl blade edge seals, in opposed-blade **OR** parallel-blade, **as directed**, arrangement with steel **OR** cadmium-plated steel, **as directed**, operating rods rotating in stainless-steel sleeve **OR** sintered bronze or nylon, **as directed**, bearings mounted in a single galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, frame, with operating rods connected with a common linkage, and electric damper operator factory wired. Leakage rate shall not exceed **5 cfm/sq. ft. (0.22 L/s per sq. m)** at **1-inch wg (250 Pa)** and **9 cfm/sq. ft. (0.4 L/s per sq. m)** at **4-inch wg (1.0 MPa)**.

OR

 Isolation Dampers: Opposed-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with steel **OR** cadmium-plated steel, **as directed**, operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, frame with operating rods connected with a common linkage, and electric damper operator factory wired. Blades shall have gaskets and edge seals, and shall be mechanically fastened to operating rod.
 - f. Duct flanges.
 - g. Rubber-in-shear isolators for ceiling-mounted units.
 - h. Hinged access doors with quarter-turn latches.

- i. Drain pans for condensate removal complying with ASHRAE 62.1, **as directed**.
- j. Automatic, in-place, spray-wash system.
- k. Weatherproofing for tilt-control system.

F. Controls

1. Time Clock: Solid-state, programmable, microprocessor-based unit for wall mounting **OR** mounting in outdoor NEMA 250, Type 3R enclosure, **as directed**, with up to eight on/off cycles per day and battery backup protection of program settings against power failure to energize unit.
2. Motion (Occupancy) Sensor: Passive infrared sensor for wall **OR** ceiling, **as directed**, mounting with adjustable time-off delay of up to 30 minutes to energize unit.
3. Carbon Monoxide Sensor: Adjustable control from 600 to 2000 ppm for wall **OR** duct, **as directed**, mounting with digital display and computer/building management system interface to energize unit.
4. Humidistat: Adjustable, wall-mounted instrument to energize unit when space relative humidity exceeds 50 percent.
5. Chilled-Water-Cooling-Coils Controls:
 - a. For chilled-water cooling coils with discharge-air temperature control: Factory-mounted sensor in unit discharge **OR** Remote-mounted sensor for field installation in supply-air duct, **as directed**, with sensor adjustment located in control panel to modulate factory-mounted **OR** furnished, **as directed**, coil-control valve to maintain temperature.
 - b. For chilled-water cooling coils with remote temperature control: Wall-mounted, space-temperature sensor with temperature adjustment **OR** unit-mounted temperature adjustment **OR** adjustment on remote-control panel, **as directed**, to modulate factory-mounted **OR** furnished, **as directed**, coil-control valve to maintain temperature.
6. Refrigerant-Cooling-Coils Controls:
 - a. For refrigerant cooling coils with discharge-air temperature control: Factory-mounted sensor in unit discharge **OR** Remote-mounted sensor for field installation in supply-air duct, **as directed**, with sensor adjustment located in control panel to control remote condensing unit to maintain temperature.
 - b. For refrigerant cooling coils with remote temperature control: Wall-mounted, space-temperature sensor with temperature adjustment **OR** unit-mounted temperature adjustment **OR** adjustment on remote-control panel, **as directed**, controls remote condensing unit to maintain temperature.
 - c. Cooling Capacity Control: On/off **OR** Multiple steps, **as directed**.
7. Hot-Water- and Steam-Coils Controls:
 - a. For hot-water or steam coils with discharge-air temperature control: Factory-mounted sensor in unit discharge **OR** Remote-mounted sensor for field installation in supply-air duct, **as directed**, with sensor adjustment located in control panel to modulate factory-mounted **OR** furnished, **as directed**, coil-control valve to maintain temperature.
 - b. For hot-water or steam coils with remote temperature control: Wall-mounted, space-temperature sensor with temperature adjustment **OR** unit-mounted temperature adjustment **OR** adjustment on remote-control panel, **as directed**, to modulate factory-mounted **OR** furnished, **as directed**, coil-control valve to maintain temperature.
8. Electric-Coils Controls:
 - a. For electric coils with discharge-air temperature control: Factory-mounted sensor in unit discharge **OR** Remote-mounted sensor for field installation in supply-air duct, **as directed**, with sensor adjustment located in control panel to control electric coil to maintain temperature.
 - b. For electric coils with remote temperature control: Wall-mounted, space-temperature sensor with temperature adjustment **OR** unit-mounted temperature adjustment **OR** adjustment on remote-control panel, **as directed**, to control electric coil to maintain temperature.
 - c. Coil Controls: On/off **OR** Multiple steps **OR** Modulating SCR, **as directed**.
9. Indirect-Fired-Gas-Furnaces Controls:

- a. For indirect-fired gas furnaces with discharge-air temperature control: Factory-mounted sensor in unit discharge **OR** Remote-mounted sensor for field installation in supply-air duct, **as directed**, with sensor adjustment located in control panel to control gas furnace burner to maintain temperature.
- b. For indirect-fired gas furnaces with remote temperature control: Wall-mounted, space-temperature sensor with temperature adjustment **OR** unit-mounted temperature adjustment **OR** adjustment on remote-control panel, **as directed**, to control gas furnace burner to maintain temperature.
- c. Burner Controls: On/off **OR** Multiple steps **OR** Modulating, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
2. Examine casing insulation materials and filter media before air-to-air energy recovery equipment installation. Reject insulation materials and filter media that are wet, moisture damaged, or mold damaged.
3. Examine roughing-in for electrical services to verify actual locations of connections before installation.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Install heat wheels so supply and exhaust airstreams flow in opposite directions and rotation is away from exhaust side to purge section to supply side.
 - a. Install access doors in both supply and exhaust ducts, both upstream and downstream, for access to wheel surfaces, drive motor, and seals.
 - b. Install removable panels or access doors between supply and exhaust ducts on building side for bypass during startup.
 - c. Access doors and panels are specified in Division 23 Section "Air Duct Accessories".
2. Install heat-pipe heat exchangers so supply and exhaust airstreams flow in opposite directions. Install flexible connectors on ducts to enable tilt control; make connections airtight and with slack to compensate for full tilt.
 - a. Install heat exchanger with clearance space for heat-pipe coil removal.
 - b. Install duct access doors in both supply and exhaust ducts, both upstream and downstream, for access to both sides of heat-pipe coil. Access doors and panels are specified in Division 23 Section "Air Duct Accessories".
 - c. Install tilt-control components, including electronic controller, electric actuator and linkage, thermostats, and sensors.
3. Install fixed-plate heat exchangers so supply and exhaust airstreams flow in opposite directions.
 - a. Install duct access doors in both supply and exhaust ducts, both upstream and downstream, for access to heat exchanger. Access doors and panels are specified in Division 23 Section "Air Duct Accessories".
4. Install gas-fired furnaces according to NFPA 54, "National Fuel Gas Code."
5. Install floor-mounted units on **4-inch- (100-mm-)** high concrete base designed to withstand, without damage to equipment, seismic force required by code, **as directed**.
6. Equipment Mounting (for equipment supported on a concrete base on grade without vibration isolation devices): Install air-to-air energy recovery equipment on concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

7. Roof Curb: Install on roof structure or concrete base, level and secure, according to The NRCA "Roofing and Waterproofing Manual - Volume 4: Construction Details - Low-Slope Roofing," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts" **OR** ARI Guideline B, **as directed**. Install air-to-air energy recovery equipment on curbs and coordinate roof penetrations and flashing with roof construction specified in Division 07 Section "Roof Accessories". Secure air-to-air energy recovery equipment to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.
8. Unit Support: Install unit level on structural curbs **OR** pilings, **as directed**. Coordinate wall penetrations and flashing with wall construction. Secure air-to-air energy recovery equipment to structural support with anchor bolts.
9. Install wind and seismic restraints according to manufacturers' written instructions. Wind and seismically restrained vibration isolation roof-curb rails are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
10. Suspended Units: Suspend and brace, **as directed**, units from structural-steel support frame using threaded steel rods and spring hangers. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
11. Install units with clearances for service and maintenance.
12. Install new filters at completion of equipment installation and before testing, adjusting, and balancing.
13. Pipe drains from units and drain pans to nearest floor drain; use **ASTM B 88, Type L (ASTM B 88M, Type B)**, drawn-temper copper water tubing with soldered joints **OR** ASTM D 1785, Schedule 40 PVC pipe and solvent-welded fittings, **as directed**, same size as condensate drain connection.
 - a. Requirements for Low-Emitting Materials:
 - 1) Use PVC solvent cement that has a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2) Use adhesive primer that has a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Connections

1. Comply with requirements for piping specified in Division 23 Section "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to unit to allow service and maintenance.
3. Connect piping to units mounted on vibration isolators with flexible connectors.
4. Connect cooling condensate drain pans with air seal trap at connection to drain pan and install cleanouts at changes in pipe direction.
5. Chilled and Hot Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping". Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.
6. Steam and Condensate Piping: Comply with applicable requirements in Division 23 Section "Steam And Condensate Heating Piping". Install shutoff valve at steam coil connections, float and thermostatic trap, and union or flange at each coil return connection.
7. Refrigerant Piping: Comply with applicable requirements in Division 23 Section "Refrigerant Piping".
8. Gas Piping: Comply with requirements in Division 23 Section(s) "Facility Natural-gas Piping" **OR** "Facility Liquefied-petroleum Gas Piping", **as directed**. Connect gas piping with shutoff valve and union and with sufficient clearance for burner removal and service. Make connection with AGA-approved flexible connectors.
9. Comply with requirements for ductwork specified in Division 23 Section "Metal Ducts".
10. Indirect-Fired Furnace Vent Connections: Comply with Division 23 Section "Breechings, Chimneys, And Stacks".
11. Electrical Connections: Comply with applicable requirements in Division 22.
 - a. Install electrical devices furnished with units but not factory mounted.

- D. Field Quality Control
 - 1. Perform tests and inspections.
 - 2. Tests and Inspections:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Adjust seals and purge.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 - d. Set initial temperature and humidity set points.
 - e. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 - 3. Air-to-air energy recovery equipment will be considered defective if it does not pass tests and inspections.
 - 4. Prepare test and inspection reports.
- E. Demonstration
 - 1. Train Owner's maintenance personnel to adjust, operate, and maintain air-to-air energy recovery units.

END OF SECTION 23 72 16 00

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SECTION 23 73 13 00 - MODULAR INDOOR CENTRAL-STATION AIR-HANDLING UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for modular indoor central-station air-handling units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Constant-air-volume, single-zone air-handling units.
 - b. Constant-air-volume, multizone air-handling units.
 - c. Constant-air-volume, dual-duct air-handling units.
 - d. Variable-air-volume, single-zone air-handling units.
 - e. Variable-air-volume, dual-duct air-handling units.

C. Performance Requirements

1. Delegated Design: Design vibration isolation and seismic-restraint details, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Casing panels shall be self-supporting and capable of withstanding 133 percent of internal static pressures indicated, without panel joints exceeding a deflection of $L/200$ **OR** $L/100$, **as directed**, where "L" is the unsupported span length within completed casings.
3. Seismic Performance: Air-handling units shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

D. Submittals

1. Product Data: For each air-handling unit indicated.
 - a. Unit dimensions and weight.
 - b. Cabinet material, metal thickness, finishes, insulation, and accessories.
 - c. Fans:
 - 1) Certified fan-performance curves with system operating conditions indicated.
 - 2) Certified fan-sound power ratings.
 - 3) Fan construction and accessories.
 - 4) Motor ratings, electrical characteristics, and motor accessories.
 - d. Certified coil-performance ratings with system operating conditions indicated.
 - e. Dampers, including housings, linkages, and operators.
 - f. Filters with performance characteristics.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Delegated-Design Submittal: For vibration isolation and seismic restraints, **as directed**, indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints, **as directed**, and for designing vibration isolation bases.

4. Seismic Qualification Certificates: For air-handling units, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Source quality-control reports.
6. Field quality-control reports.
7. Operation and maintenance data

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. NFPA Compliance: Comply with NFPA 90A for design, fabrication, and installation of air-handling units and components.
3. ARI Certification: Air-handling units and their components shall be factory tested according to ARI 430, "Central-Station Air-Handling Units," and shall be listed and labeled by ARI.
4. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
5. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
6. Comply with NFPA 70.

1.2 PRODUCTS

A. Unit Casings

1. General Fabrication Requirements for Casings:
 - a. Forming: Form walls, roofs, and floors with at least two breaks at each joint.
 - b. Casing Joints: Sheet metal screws or pop rivets.
 - c. Sealing: Seal all joints with water-resistant sealant.
 - d. Factory Finish for Steel and Galvanized-Steel Casings: Apply manufacturer's standard primer immediately after cleaning and pretreating.
OR
Factory Finish for Steel and Galvanized-Steel Casings: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on enamel finish, consisting of prime coat and thermosetting topcoat.
OR
Casing Coating: Thermoplastic vinyl **OR** Epoxy **OR** Zinc **OR** Synthetic resin **OR** Phenolic **OR** Polytetrafluoroethylene **OR** Vinyl ester **OR** Hot-dip galvanized **OR** Powder-baked enamel, **as directed**.
 - e. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
2. Casing Insulation and Adhesive:
 - a. Materials: ASTM C 1071, Type I **OR** Type II, **as directed**.
 - b. Location and Application: Factory applied with adhesive and mechanical fasteners to the internal surface of section panels downstream from, and including, the cooling-coil section.
 - 1) Liner Adhesive: Comply with ASTM C 916, Type I.
 - 2) Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.

- 3) Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service-air velocity.
- OR**
- Location and Application: Encased between outside and inside casing.
3. Inspection and Access Panels and Access Doors:
 - a. Panel and Door Fabrication: Formed and reinforced, single- or double-wall and insulated panels of same materials and thicknesses as casing.
 - b. Inspection and Access Panels:
 - 1) Fasteners: Two or more camlock type for panel lift-out operation. Arrangement shall allow panels to be opened against air-pressure differential.
 - 2) Gasket: Neoprene, applied around entire perimeters of panel frames.
 - 3) Size: Large enough to allow inspection and maintenance of air-handling unit's internal components.
 - c. Access Doors:
 - 1) Hinges: A minimum of two ball-bearing hinges or stainless-steel piano hinge and two wedge-lever-type latches, operable from inside and outside. Arrange doors to be opened against air-pressure differential.
 - 2) Gasket: Neoprene, applied around entire perimeters of panel frames.
 - 3) Fabricate windows in fan section doors of double-glazed, wire-reinforced safety glass with an air space between panes and sealed with interior and exterior rubber seals.
 - 4) Size: At least **18 inches (450 mm) OR 24 inches (600 mm), as directed**, wide by full height of unit casing up to a maximum height of **60 inches (1500 mm) OR 72 inches (1800 mm), as directed**.
 - d. Locations and Applications:
 - 1) Fan Section: Inspection and access panels **OR** Doors **OR** Doors and inspection and access panels, **as directed**.
 - 2) Access Section: Doors.
 - 3) Coil Section: Inspection and access panel.
 - 4) Damper Section: Inspection and access panels **OR** Doors, **as directed**.
 - 5) Filter Section: Inspection and access panels **OR** Doors, **as directed**, large enough to allow periodic removal and installation of filters.
 - 6) Mixing Section: Doors.
 - 7) Humidifier Section: Doors.
 - e. Service Light: 100-W vaporproof fixture with switched junction box located outside **OR** inside, **as directed**, adjacent to door.
 - 1) Locations: Each section accessed with door **OR** Fan section, **as directed**.
 4. Condensate Drain Pans:
 - a. Fabricated with one **OR** two, **as directed**, percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and from humidifiers and to direct water toward drain connection.
 - 1) Length: Extend drain pan downstream from leaving face to comply with ASHRAE 62.1.
 - 2) Depth: A minimum of **2 inches (50 mm)** deep.
 - b. Formed sections **OR** Integral part of floor plating, **as directed**.
 - c. Single-wall, galvanized-steel **OR** stainless-steel, **as directed**, sheet.

OR

Double-wall, galvanized-steel **OR** stainless-steel, **as directed**, sheet with space between walls filled with foam insulation and moisture-tight seal.
 - d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on one end **OR** both ends, **as directed**, of pan.
 - 1) Minimum Connection Size: **NPS 1 (DN 25) OR NPS 2 (DN 50), as directed**.
 - e. Pan-Top Surface Coating: Asphaltic waterproofing compound, for galvanized-steel drain pans.

- f. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.
 - 5. Service Platform: Steel **OR** Galvanized steel **OR** Aluminum, **as directed**, 42 inches (1070 mm) wide running entire length of unit and located on service access side, with angle side rails, 4-inch (100-mm) kick plates, and expanded metal floor. Provide platform with a fixed ladder that extends from the top of the side rail to the floor.
 - 6. Air-Handling-Unit Mounting Frame: Formed galvanized-steel channel or structural channel supports, designed for low deflection, welded with integral lifting lugs.
 - a. Seismic Fabrication Requirements: Fabricate mounting base and attachment to air-handling unit sections, accessories, and components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when air-handling unit frame is anchored to building structure.
- B. Fan, Drive, And Motor Section
- 1. Fan and Drive Assemblies: Statically and dynamically balanced and designed for continuous operation at maximum-rated fan speed and motor horsepower.
 - a. Shafts: Designed for continuous operation at maximum-rated fan speed and motor horsepower, and with field-adjustable alignment.
 - 1) Turned, ground, and polished hot-rolled steel with keyway. Ship with a protective coating of lubricating oil.
 - 2) Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.
 - 2. Centrifugal Fan Housings: Formed- and reinforced-steel panels to form curved scroll housings with shaped cutoff and spun-metal inlet bell.
 - a. Bracing: Steel angle or channel supports for mounting and supporting fan scroll, wheel, motor, and accessories.
 - b. Horizontal-Flanged, Split Housing: Bolted construction.
 - c. Housing for Supply Fan: Attach housing to fan-section casing with metal-edged flexible duct connector.
 - d. Flexible Connector: Factory fabricated with a fabric strip 3-1/2 inches (89 mm) **OR** 5-3/4 inches (146 mm), **as directed**, wide attached to 2 strips of 2-3/4-inch- (70-mm-) wide, 0.028-inch- (0.7-mm-) thick, galvanized-steel sheet or 0.032-inch- (0.8-mm-) thick aluminum sheets; select metal compatible with casing.
 - 1) Flexible Connector Fabric: Glass fabric, double coated with neoprene. Fabrics, coatings, and adhesives shall comply with UL 181, Class 1.
 - a) Fabric Minimum Weight: 26 oz./sq. yd. (880 g/sq. m).
 - b) Fabric Tensile Strength: 480 lbf/inch (84 N/mm) in the warp and 360 lbf/inch (63 N/mm) in the filling.
 - c) Fabric Service Temperature: Minus 40 to plus 200 deg F (Minus 40 to plus 93 deg C).
 - 3. Plenum Fan Housings: Steel frame and panel; fabricated without fan scroll and volute housing.
 - 4. Backward-Inclined, Centrifugal Fan Wheels: Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

OR

Forward-Curved, Centrifugal Fan Wheels: Inlet flange, backplate, and shallow blades with inlet and tip curved forward in direction of airflow and mechanically fastened to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

OR

Airfoil, Centrifugal Fan Wheels: Smooth-curved inlet flange, backplate, and hollow die-formed airfoil-shaped blades continuously welded at tip flange and backplate; cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

OR

- Axial Fans: Fan wheel and housing, straightening-vane section, factory-mounted motor with belt drive or direct drive, an inlet cone section, and accessories.
- a. Variable-Pitch Fans: Internally mounted pneumatic **OR** electric **OR** electronic, **as directed**, actuator, externally mounted positive positioner, and mechanical-blade-pitch indicator.
 - b. Housings: Steel **OR** Galvanized steel **OR** Aluminum, **as directed**.
 - 1) Inlet and Outlet Connections: Flanges.
 - 2) Guide Vane Section: Integral guide vanes downstream from fan wheel designed to straighten airflow.
5. Fan Shaft Bearings:
- a. Prelubricated and Sealed, Ball Bearings: Self-aligning, pillow-block type with a rated life of 50,000 **OR** 120,000, **as directed**, hours according to ABMA 9.
OR
Grease-Lubricated, Tapered-Roller Bearings: Self-aligning, pillow-block type with double-locking collars and 2-piece, cast-iron housing with grease lines extended to outside unit, **as directed**, and a rated life of 50,000 **OR** 120,000, **as directed**, hours according to ABMA 11.
OR
Grease-Lubricated Bearings: Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing with grease lines extended to outside unit, **as directed**.
6. Belt Drives: Factory mounted, with adjustable alignment and belt tensioning, and with 1.5 **OR** 1.4 **OR** 1.3 **OR** 1.2, **as directed**, service factor based on fan motor.
- a. Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
 - b. Motor Pulleys: Adjustable pitch for use with 5-hp motors and smaller; fixed pitch for use with motors larger than 5 hp. Select pulley size so pitch adjustment is at the middle of adjustment range at fan design conditions.
 - c. Belts: Oil resistant, nonsparking, and nonstatic; in matched sets for multiple-belt drives.
 - d. Belt Guards: Comply with requirements specified by OSHA and fabricate according to SMACNA's "HVAC Duct Construction Standards"; 0.1046-inch- (2.7-mm-) thick, 3/4-inch (20-mm) diamond-mesh wire screen, welded to steel angle frame; prime coated.
7. Variable-Inlet Vanes: Steel, with blades supported at both ends with permanently lubricated bearings. Variable mechanism terminating in single lever for connection to control actuator with connecting shaft for second set of variable inlet vanes on double-width fans.
OR
Discharge Dampers: Heavy-duty steel assembly with channel frame and sealed ball bearings, and opposed **OR** parallel, **as directed**, blades constructed of two plates formed around and welded to shaft, with blades linked out of air stream to single control lever.
8. Internal Vibration Isolation and Seismic Control, **as directed**: Fans shall be factory mounted with manufacturer's standard restrained, **as directed**, vibration isolation mounting devices having a minimum static deflection of 1 inch (25 mm) **OR** 2 inches (50 mm), **as directed**.
- a. Seismic Fabrication Requirements: Fabricate fan section, internal mounting frame and attachment to fans, fan housings, motors, casings, accessories, and other fan section components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when fan-mounting frame and air-handling-unit mounting frame are anchored to building structure.
9. Motor: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- a. Enclosure Type: Totally enclosed, fan cooled.
 - b. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
 - c. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

- d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 21.
- e. Mount unit-mounted disconnect switches on exterior **OR** interior, **as directed**, of unit.
- 10. Variable Frequency Controllers:
 - a. Description: NEMA ICS 2, IGBT, PWM, VFC; listed and labeled as a complete unit and arranged to provide variable speed of an NEMA MG 1, Design B, 3-phase induction motor by adjusting output voltage and frequency.
 - b. Output Rating: 3-phase; 6 to 60 Hz, with voltage proportional to frequency throughout voltage range **OR** 66 Hz, with torque constant as speed changes **OR** 120 Hz, with horsepower constant throughout speed range, **as directed**.
 - c. Unit Operating Requirements:
 - 1) Input ac voltage tolerance of 208 V, plus or minus 5 **OR** 380 to 500 V, plus or minus 10 **OR** 525 to 575 V, plus or minus 10, **as directed**, percent.
 - 2) Input frequency tolerance of 50/60 Hz, plus or minus 6 percent.
 - 3) Minimum Efficiency: 96 percent at 60 Hz, full load.
 - 4) Minimum Displacement Primary-Side Power Factor: 96 percent.
 - 5) Overload Capability: 1.1 times the base load current for 60 seconds; 2.0 times the base load current for 3 seconds.
 - 6) Starting Torque: 100 percent of rated torque or as indicated.
 - 7) Speed Regulation: Plus or minus 1 percent.
 - d. Isolated control interface to allow controller to follow control signal over an 11:1 speed range.
 - e. Internal Adjustability Capabilities:
 - 1) Minimum Speed: 5 to 25 percent of maximum rpm.
 - 2) Maximum Speed: 80 to 100 percent of maximum rpm.
 - 3) Acceleration: 2 to a minimum of 22 seconds.
 - 4) Deceleration: 2 to a minimum of 22 seconds.
 - 5) Current Limit: 50 to a minimum of 110 percent of maximum rating.
 - f. Self-Protection and Reliability Features:
 - 1) Input transient protection by means of surge suppressors.
 - 2) Undervoltage and overvoltage trips; inverter overtemperature, overload, and overcurrent trips.
 - 3) Adjustable motor overload relays capable of NEMA ICS 2, Class 10 **OR** Class 20 **OR** Class 30, **as directed**, performance.
 - 4) Notch filter to prevent operation of the controller-motor-load combination at a natural frequency of the combination.
 - 5) Instantaneous line-to-line and line-to-ground overcurrent trips.
 - 6) Loss-of-phase protection.
 - 7) Reverse-phase protection.
 - 8) Short-circuit protection.
 - 9) Motor overtemperature fault.
 - g. Automatic Reset/Restart: Attempts three restarts after controller fault or on return of power after an interruption and before shutting down for manual reset or fault correction. Bidirectional autospeed search shall be capable of starting into rotating loads spinning in either direction and returning motor to set speed in proper direction, without damage to controller, motor, or load.
 - h. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped.
 - i. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
 - j. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
 - k. Door-mounted LED status lights shall indicate the following conditions:
 - 1) Power on.

- 2) Run.
- 3) Overvoltage.
- 4) Line fault.
- 5) Overcurrent.
- 6) External fault.
- l. Panel-Mounted Operator Station: Start-stop and auto-manual selector switches with manual-speed-control potentiometer and elapsed time meter.
- m. Meters or digital readout devices and selector switch, mounted flush in controller door and connected to indicate the following controller parameters:
 - 1) Output frequency (Hertz).
 - 2) Motor speed (rpm).
 - 3) Motor status (running, stop, fault).
 - 4) Motor current (amperes).
 - 5) Motor torque (percent).
 - 6) Fault or alarming status (code).
 - 7) Proportional-integral-derivative (PID) feedback signal (percent).
 - 8) DC-link voltage (volts direct current).
 - 9) Set-point frequency (Hertz).
 - 10) Motor output voltage (volts).
- n. Control Signal Interface:
 - 1) Electric Input Signal Interface: A minimum of 2 analog inputs (0 to 10 V or 0/4-20 mA) and 6 programmable digital inputs.
 - 2) Remote signal inputs capable of accepting any of the following speed-setting input signals from the control system:
 - a) 0 to 10-V dc.
 - b) 0-20 or 4-20 mA.
 - c) Potentiometer using up/down digital inputs.
 - d) Fixed frequencies using digital inputs.
 - e) RS485.
 - f) Keypad display for local hand operation.
 - 3) Output signal interface with a minimum of 1 analog output signal (0/4-20 mA), which can be programmed to any of the following:
 - a) Output frequency (Hertz).
 - b) Output current (load).
 - c) DC-link voltage (volts direct current).
 - d) Motor torque (percent).
 - e) Motor speed (rpm).
 - f) Set-point frequency (Hertz).
 - 4) Remote indication interface with a minimum of 2 dry circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - a) Motor running.
 - b) Set-point speed reached.
 - c) Fault and warning indication (overtemperature or overcurrent).
 - d) High- or low-speed limits reached.
- o. Communications: RS485 interface allows VFC to be used with an external system within a multidrop LAN configuration. Interface shall allow all parameter settings of VFC to be programmed via BMS control. Provide capability for VFC to retain these settings within the nonvolatile memory.
- p. Integral Disconnecting Means: NEMA AB 1, instantaneous-trip circuit breaker **OR** NEMA AB 1, molded-case switch **OR** NEMA KS 1, nonfusible switch **OR** NEMA KS 1, fusible switch, **as directed**, with lockable handle.
- q. Accessories:
 - 1) Devices shall be factory installed in controller enclosure unless otherwise indicated.
 - 2) Push-Button Stations, Pilot Lights, and Selector Switches: NEMA ICS 2, heavy-duty type.
 - 3) Standard Displays:

- a) Output frequency (Hertz).
- b) Set-point frequency (Hertz).
- c) Motor current (amperes).
- d) DC-link voltage (volts direct current).
- e) Motor torque (percent).
- f) Motor speed (rpm).
- g) Motor output voltage (volts).

C. Coil Section

1. General Requirements for Coil Section:

- a. Comply with ARI 410.
- b. Fabricate coil section to allow removal and replacement of coil for maintenance and to allow in-place access for service and maintenance of coil(s).
- c. For multizone units, provide air deflectors and air baffles to balance airflow across coils.
- d. Coils shall not act as structural component of unit.
- e. Seismic Fabrication Requirements: Fabricate coil section, internal mounting frame and attachment to coils, and other coil section components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when coil-mounting frame and air-handling-unit mounting frame are anchored to building structure.

2. Electrical Heating Coils, Controls, and Accessories: Comply with UL 1995.

- a. Casing Assembly: Slip-in **OR** Flanged, **as directed**, type with galvanized-steel frame.
- b. Sheathed Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.

OR

Open Heating Elements: Resistance wire of 80 percent nickel and 20 percent chromium supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame.

- c. Overtemperature Protection: Disk-type, automatically resetting, thermal-cutout, safety device; serviceable through terminal box without removing heater from coil section.
- d. Secondary Protection: Load-carrying, manually resetting or manually replaceable, thermal cutouts; factory wired in series with each heater stage.
- e. Control Panel: Unit **OR** Remote, **as directed**, mounted with disconnecting means and overcurrent protection.
 - 1) Magnetic **OR** Mercury, **as directed**, contactor.
 - 2) Solid-state, stepless pulse controller.
 - 3) Toggle switches, one per step.
 - 4) Step controller.
 - 5) Time-delay relay.
 - 6) Pilot lights, one per step.
 - 7) Airflow proving switch.

D. Air Filtration Section

1. General Requirements for Air Filtration Section:

- a. Comply with NFPA 90A.
- b. Provide minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
- c. Provide filter holding frames arranged for flat or angular orientation, with access doors on both sides of unit. Filters shall be removable from one side or lifted out from access plenum.

2. Disposable Panel Filters:

- a. Factory-fabricated, viscous-coated, flat-panel type.
- b. Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed.**
- c. Dust-Holding Capacity: as directed by the Owner.

- d. Initial Resistance: as directed by the Owner.
 - e. Recommended Final Resistance: as directed by the Owner.
 - f. Arrestance (ASHRAE 52.1): 80.
 - g. Merv (ASHRAE 52.2): 5.
 - h. Media: Interlaced glass fibers sprayed with nonflammable adhesive and antimicrobial agent, **as directed**.
 - i. Frame: Galvanized steel, with metal grid on outlet side, steel rod grid on inlet side, hinged, and with pull and retaining handles.
3. Extended-Surface, Disposable Panel Filters:
- a. Factory-fabricated, dry, extended-surface type.
 - b. Thickness: **1 inch (25 mm) OR 2 inches (50 mm) OR 4 inches (100 mm), as directed**.
 - c. Dust-Holding Capacity: as directed by the Owner.
 - d. Initial Resistance: as directed by the Owner.
 - e. Recommended Final Resistance: as directed by the Owner.
 - f. Arrestance (ASHRAE 52.1): 90.
 - g. Merv (ASHRAE 52.2): 7.
 - h. Media: Fibrous material formed into deep-V-shaped pleats with antimicrobial agent, **as directed**, and held by self-supporting wire grid.
 - i. Media-Grid Frame: Nonflammable cardboard **OR** Galvanized steel **OR** Fire-retardant, **3/4-inch (20-mm)** particleboard with gaskets, **as directed**.
 - j. Mounting Frames: Welded, galvanized steel, with gaskets and fasteners, suitable for bolting together into built-up filter banks.
4. Extended-Surface, Nonsupported-Media Filters:
- a. Factory-fabricated, dry, extended-surface, self-supporting type.
 - b. Dust-Holding Capacity: as directed by the Owner.
 - c. Initial Resistance: as directed by the Owner.
 - d. Recommended Final Resistance: as directed by the Owner.
 - e. Arrestance (ASHRAE 52.1): 95.
 - f. Merv (ASHRAE 52.2): 13.
 - g. Media: Fibrous material with antimicrobial agent, **as directed**, constructed so individual pleats are maintained in tapered form by flexible internal supports under rated-airflow conditions.
 - h. Filter-Media Frame: Galvanized steel **OR** Hard polyurethane foam, **as directed**.
 - i. Mounting Frames: Welded, galvanized steel, with gaskets and fasteners, suitable for bolting together into built-up filter banks with space for prefilter, **as directed**.
5. Automatic Roll Filters:
- a. Factory-fabricated, automatic, motor-driven, roll type.
 - b. Arrangement: Horizontal **OR** Vertical, **as directed**.
 - c. Dust-Holding Capacity: as directed by the Owner.
 - d. Initial Resistance: as directed by the Owner.
 - e. Recommended Final Resistance: as directed by the Owner.
 - f. Arrestance (ASHRAE 52.1): 80.
 - g. Merv (ASHRAE 52.2): 5.
 - h. Media: Compressed and rolled, fibrous-glass material viscous coated, and with antimicrobial agent, **as directed**.
 - i. Holding Frame: Galvanized steel, with enclosed, clean media roll arranged to allow upstream replacement of filter media.
 - j. Auxiliary Frame: Locate on downstream side of unit with downstream **OR** side, **as directed**, access.
 - k. Final Filter: Extended-surface, retained-media **OR** nonsupported-media **OR** HEPA, **as directed**, filters.
 - l. Control and Drive:
 - 1) Mechanism: Electric, gear-reducer, motor-driven, feed control equipped with manual media advance and runout switches for stopping media movement of filter bank and operating remote warning signal lights.

- 2) Manual Control: Manual switch to advance media and wired to override automatic controls.
 - 3) Automatic Control: Prewired control package to advance media when filter resistance exceeds adjustable high limit **OR** after adjustable operating time, **as directed**.
6. Activated-Carbon Panel Filters:
- a. Factory-fabricated unit with activated-carbon media.
 - b. Flat-Panel Media: Multilayer filter with inlet layer of polyester fibers, layer of activated-carbon granules bonded to fibers, layer of polyurethane foam, and housed in cardboard frame.
 - c. Pleated Media: Multilayer filter with inlet layer of cotton and synthetic fibers and layer of activated-carbon granules bonded to synthetic fibers, formed into deep-V-shaped pleats and held by self-wire grid, and housed in nonflammable cardboard frame.
 - d. Mounting Frames: Welded galvanized steel, with polyurethane gaskets and fasteners, capable of holding media and media frame in place and suitable for bolting together into built-up filter banks.
7. Activated-Carbon Filters:
- a. Factory-fabricated unit in deep-V arrangement with disposable panel prefilter.
 - b. Media: Activated carbon mounted in removable carbon-cell trays of epoxy-coated steel.
 - c. Activated-Carbon Capacity: **12 lb (5.4 kg)** of activated carbon per **500 cfm (236 L/s)** **OR** **8.8 lb (4.0 kg)** of activated carbon per **2000 cfm (944 L/s)**, **as directed**, of airflow.
 - d. Housing: **0.064-inch- (1.6-mm-)** thick, galvanized steel, for side servicing through gasketed access doors on both sides. Equip housings with metal slide channel tracks to hold activated-carbon trays.
8. HEPA Filters:
- a. Factory-fabricated unit.
 - b. Dust-Holding Capacity: as directed by the Owner.
 - c. Initial Resistance: as directed by the Owner.
 - d. Recommended Final Resistance: as directed by the Owner.
 - e. Arrestance (ASHRAE 52.1): 95 percent on 0.3-micrometer D.O.P. particles **OR** 99.97 percent on 0.3-micrometer D.O.P. particles **OR** 99.9995 percent on 0.1- and 0.2-micrometer D.O.P. particles **OR** 99.99995 percent on 0.1- and 0.2-micrometer D.O.P. particles, **as directed**.
 - f. Media: UL 586, fibrous glass, constructed of continuous sheets with closely spaced pleats with aluminum separators **OR** vinyl-coated aluminum separators **OR** separators of ribbons of filter media, **as directed**.
 - g. Frame Material: **3/4-inch- (19-mm-)** thick, fire-retardant plywood **OR** **3/4-inch- (19-mm-)** thick, fire-retardant particleboard **OR** **3/4-inch- (19-mm-)** thick plywood **OR** **3/4-inch- (19-mm-)** thick particleboard **OR** Galvanized steel **OR** Aluminized steel **OR** Cadmium-plated steel **OR** Stainless steel **OR** Aluminum, **as directed**.
 - h. Media to Frame Side Bond: Polyurethane foam **OR** Silicone **OR** Neoprene adhesive **OR** Fiberglass-mat packing **OR** Thermosetting sealant **OR** Knife edge in fluid-filled channel, **as directed**.
 - i. Face Gasket: Neoprene expanded rubber **OR** Ceramic fiber **OR** Silicone, **as directed**.
 - j. Mounting Frames: Downstream corners of holding device shall have cushion pads to protect media. Bolted filter-sealing mechanism shall mount and continuously seal each individual filter.
9. Filter Gage:
- a. **3-1/2-inch- (90-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, diameter, diaphragm-actuated dial in metal case.
 - b. Vent valves.
 - c. Black figures on white background.
 - d. Front recalibration adjustment.
 - e. **2 OR 3, as directed**, percent of full-scale accuracy.

- f. Range: **0- to 0.5-inch wg (0 to 125 Pa) OR 0- to 1.0-inch wg (0 to 250 Pa) OR 0- to 2.0-inch wg (0 to 500 Pa) OR 0- to 3.0-inch wg (0 to 750 Pa) OR 0- to 4.0-inch wg (0 to 1000 Pa), as directed.**
- g. Accessories: Static-pressure tips with integral compression fittings, **1/4-inch (6-mm) aluminum OR plastic, as directed,** tubing, and 2- or 3-way vent valves.

E. Dampers

- 1. General Requirements for Dampers: Leakage rate, according to AMCA 500, "Laboratory Methods for Testing Dampers for Rating," shall not exceed 2 percent of air quantity at **2000-fpm (10-m/s)** face velocity through damper and **4-inch wg (1000-Pa)** pressure differential.
- 2. Damper Operators: Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac".

OR

Electronic Damper Operators:

- a. Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.
- b. Electronic damper position indicator shall have visual scale indicating percent of travel and 2- to 10-V dc, feedback signal.
- c. Operator Motors:
 - 1) Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Work Results For Hvac".
 - 2) Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.
 - 3) Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
- d. Nonspring-Return Motors for Dampers Larger Than **25 Sq. Ft. (2.3 sq. m)**: Size for running torque of **150 in. x lbf (16.9 N x m)** and breakaway torque of **300 in. x lbf (33.9 N x m)**.
- e. Spring-Return Motors for Dampers Larger Than **25 Sq. Ft. (2.3 sq. m)**: Size for running and breakaway torque of **150 in. x lbf (16.9 N x m)**.
- f. Size dampers for running torque calculated as follows:
 - 1) Parallel-Blade Damper with Edge Seals: **7 inch-lb/sq. ft. (86.8 kg-cm/sq. m)** of damper.
 - 2) Opposed-Blade Damper with Edge Seals: **5 inch-lb/sq. ft. (62 kg-cm/sq. m)** of damper.
 - 3) Parallel-Blade Damper without Edge Seals: **4 inch-lb/sq. ft (49.6 kg-cm/sq. m)** of damper.
 - 4) Opposed-Blade Damper without Edge Seals: **3 inch-lb/sq. ft. (37.2 kg-cm/sq. m)** of damper.
 - 5) Dampers with **2- to 3-Inch wg (500 to 750 Pa)** of Pressure Drop or Face Velocities of **1000 to 2500 fpm (5 to 13 m/s)**: Increase running torque by 1.5.
 - 6) Dampers with **3- to 4-Inch wg (750 to 1000 Pa)** of Pressure Drop or Face Velocities of **2500 to 3000 fpm (13 to 15 m/s)**: Increase running torque by 2.0.
- g. Coupling: V-bolt and V-shaped, toothed cradle.
- h. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
- i. Fail-Safe Operation: Mechanical, spring-return mechanism with external, manual gear release on nonspring-return actuators.
- j. Power Requirements (Two-Position Spring Return): **24 OR 120 OR 230, as directed,-V ac.**
- k. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
- l. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
- m. Temperature Rating: **Minus 22 to plus 122 deg F (Minus 30 to plus 50 deg C) OR 40 to 104 deg F (5 to 40 deg C), as directed.**

- n. Run Time: 12 seconds open, 5 seconds closed **OR** 30 seconds **OR** 60 seconds **OR** 120 seconds, **as directed**.

OR

Pneumatic Damper Operators:

- a. Rolling-diaphragm piston type with adjustable stops and spring return, sized to operate with sufficient reserve power to provide smooth modulating action or two-position action. Where actuators operate in sequence, provide pilot positioners.
 - b. Pneumatic Damper Position Indicator: Potentiometer mounted in enclosure with adjustable crank-arm assembly connected to damper to transmit 0 to 100 percent valve/damper travel.
 - c. Pilot Positioners:
 - 1) Start Point: Adjustable from **2 to 12 psig (14 to 83 kPa)**.
 - 2) Operating Span: Adjustable from **5 to 13 psig (35 to 90 kPa)**.
 - 3) Linearity: Plus or minus 10 percent of output signal span.
 - 4) Hysteresis: 3 percent of span.
 - 5) Response: **0.25-psig (1723-Pa)** input change.
 - 6) Maximum Pilot Signal Pressure: **20 psig (140 kPa)**.
 - 7) Maximum Control Air-Supply Pressure: **60 psig (410 kPa)**.
 - d. Actuator Housing: Molded or die-cast zinc or aluminum. Terminal unit actuators may be high-impact plastic with ambient temperature rating of **50 to 140 deg F (10 to 60 deg C)** unless located in return-air plenums, **as directed**.
 - e. Inlet-Vane Operators: High pressure, with pilot positioners.
- 3. Zone Dampers: Two single-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers offset 90 degrees from each other on cadmium-plated, **as directed**, steel operating rod rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, frame. Provide blade gaskets and edge seals, and mechanically fasten blades to operating rod.
 - 4. Face-and-Bypass Dampers: Opposed-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with cadmium-plated, **as directed**, steel operating rods rotating in sintered bronze or nylon bearings mounted in a single galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, frame and with operating rods connected with a common linkage. Provide blade gaskets and edge seals, and mechanically fasten blades to operating rod.
 - 5. Outdoor- and Return-Air Mixing Dampers: Parallel-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers mechanically fastened to cadmium-plated, **as directed**, steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
 - 6. Outdoor- and Return-Air Dampers: Low-leakage, double-skin, airfoil-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with compressible jamb seals and extruded-vinyl blade edge seals in opposed-blade **OR** parallel-blade, **as directed**, arrangement with cadmium-plated, **as directed**, steel operating rods rotating in stainless-steel sleeve **OR** sintered bronze or nylon, **as directed**, bearings mounted in a single galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, frame, and with operating rods connected with a common linkage. Leakage rate shall not exceed **5 cfm/sq. ft. (0.22 L/s per sq. m)** at **1-inch wg (250 Pa)** and **9 cfm/sq. ft. (0.4 L/s per sq. m)** at **4-inch wg (1.0 MPa)**.
 - 7. Mixing Section: Multiple-blade, air-mixer assembly located immediately downstream of mixing section.
 - 8. Combination Filter and Mixing Section:
 - a. Cabinet support members shall hold **2-inch- (50-mm-)** thick, pleated, flat, permanent or throwaway filters.
 - b. Multiple-blade, air-mixer assembly shall mix air to prevent stratification, located immediately downstream of mixing box.

F. Humidifiers

- 1. Steam Grid Humidifier:
 - a. Manifold:

- 1) ASTM A 666, Type 304 stainless steel.
- 2) Steam jacketed.
- 3) Insulated with **1/2-inch (13-mm)** fiberglass and stainless-steel jacket.
- 4) Manifold shall extend the full width of unit with mounting brackets at ends.
- b. Steam Separator: Cast iron, **OR** ASTM A 666, Type 304 stainless steel, **as directed**, with separate, **as directed**, humidifier control valve.
- c. Humidifier Control Valve: Actuator: Pneumatic **OR** Electric, **as directed**, modulating with spring return.
OR
Humidifier Control Valve: Actuator: As specified in Division 23 Section "Instrumentation And Control For Hvac".
- d. Steam Trap: Inverted-bucket type, sized for a minimum of three times the maximum rated condensate flow of humidifier at **1/2-psig (3.4-kPa)** inlet pressure.
- e. Aquastat: For separate mounting on steam condensate, return piping to prevent cold operation of humidifier.
- f. Strainer: In-line type.
- g. Airflow Switch: To prevent humidifier operation in the absence of airflow.
2. Wet Glass Cell Washer Section:
 - a. **3-inch- (75-mm-)** deep cells with random packed, glass-fiber media in galvanized-steel **OR** stainless-steel, **as directed**, frames.
 - b. Access Door: Watertight with brass fittings, wire glass window, **as directed**, and locking handles.
 - c. Spray Tree Assembly: Brass **OR** Stainless-steel, **as directed**, nozzles and galvanized-steel **OR** stainless-steel, **as directed**, piping.
 - d. Eliminator: Galvanized-steel **OR** Stainless-steel, **as directed**, plates.
 - e. Tank:
 - 1) Welded steel **OR** stainless steel, **as directed**, with interior and exterior surfaces blasted and painted with zinc-chromate paint, **as directed**.
 - 2) Copper suction screen.
 - 3) Drain, overflow, and suction connections.
 - 4) Makeup connection with brass, **as directed**, float valve, and with quick-fill connection.
 - f. Insulate exterior with duct insulation and mount on **2-inch (-50-mm-)** thick, rigid insulation board.
3. Evaporative Humidifier Section:
 - a. Access Door: Watertight cast iron, **as directed**, with brass fittings, wire glass window, and locking handles.
 - b. Spray Tree Assembly: Brass nozzles and galvanized piping, galvanized eliminator plates with flooding nozzles and header, and galvanized antisplash baffles **OR** cross-fluted cellulose media, **as directed**.
 - c. Tank:
 - 1) Welded steel tank with interior and exterior surfaces blasted and painted with zinc-chromate paint.
 - 2) Copper suction screen, drain, overflow, and suction connections.
 - 3) Makeup connection with brass, **as directed**, float valve, and with quick-fill connection.
 - d. Insulation: Insulate with duct insulation on exterior and mount on **2-inch (-50-mm-)** thick, rigid insulation board.
- G. Air-To-Air Energy Recovery
 1. Heat Wheels:
 - a. Casing:
 - 1) Steel, with manufacturer's standard paint coating.
 - 2) Integral purge section limiting carryover of exhaust air to between **0.05 percent at 1.6-inch wg and 0.20 percent at 4-inch wg (0.05 percent at 400-Pa and 0.20 percent at 1000-Pa)** differential pressure.

- 3) Casing seals on periphery of rotor, on duct divider, and on purge section.
- 4) Support rotor on grease-lubricated ball bearings with extended grease fittings. Mount horizontal wheels on tapered roller bearing.
- b. Rotor: Aluminum, segmented wheel, strengthened with radial spokes, with nontoxic, noncorrosive, silica-gel desiccant coating, **as directed**. Construct media for passing maximum 500 **OR** 800 **OR** 1200, **as directed**, -micrometer solids.
OR
Rotor: Glass-fiber **OR** Polymer, **as directed**, segmented wheel, strengthened with radial spokes impregnated with nonmigrating, water-selective, molecular-sieve desiccant coating. Construct media for passing maximum 800 **OR** 1200, **as directed**, -micrometer solids.
- c. Drive: Fractional horsepower motor and gear reducer, with speed changed by variable frequency controller, **as directed**, and self-adjusting multilink belt around outside of rotor.
- d. Controls:
 - 1) Starting relay, factory mounted and wired, and manual motor starter for field wiring.
 - 2) Variable frequency controller, factory mounted and wired, permitting input of field connected 4-20 mA or 1-10-V control signal.
OR
Variable frequency controller, factory mounted and wired, with exhaust-air sensor to vary rotor speed and maintain exhaust temperature above freezing.
OR
Variable frequency controller, factory mounted and wired, with exhaust- and outdoor-air sensors, automatic changeover thermostat and set-point adjuster, to vary rotor speed and maintain exhaust temperature above freezing, **as directed**, and air differential temperature above set point. Provide maximum rotor speed when exhaust-air temperature is less than outdoor-air temperature.
 - 3) Pilot-Light Indicator: Display rotor rotation and speed.
 - 4) Speed Settings: Adjustable settings for maximum and minimum rotor speed limits.
2. Fixed-Plate Sensible Heat Exchangers:
 - a. Casing: Aluminum **OR** Galvanized steel **OR** Enameled steel, with galvanized-steel liner **OR** Enameled steel, **as directed**.
 - b. Plates: Evenly spaced and sealed and arranged for counter airflow.
 - c. Plate Material: Embossed aluminum **OR** Stainless steel **OR** Polypropylene copolymer (high-density plastic), **as directed**.
 - 1) Plate Coating: Epoxy **OR** Air-dried phenolic, **as directed**.
 - d. Bypass: Plenum within casing, with gasketed face-and-bypass dampers that have operating rods extended outside casing.
 - e. Water Wash: Automatic system, with spray manifold to individual spray tubes or traversing type with stainless-steel-screw operating mechanism and electric motor drive; activated by time clock, with detergent injection, **as directed**.
 - f. Heat-Exchanger Prefilters: **1 inch (25 mm)** thick, disposable **OR** **2 inches (50 mm)** thick, disposable **OR** Medium efficiency **OR** Electrostatic, **as directed**.
- H. Source Quality Control
 1. Fan Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Test fans according to AMCA 300, "Reverberant Room Method for Sound Testing of Fans." Fans shall bear AMCA-certified sound ratings seal.
 2. Fan Performance Rating: Factory test fan performance for airflow, pressure, power, air density, rotation speed, and efficiency. Rate performance according to AMCA 210, "Laboratory Methods of Testing Fans for Aerodynamic Performance Rating."
 3. Water Coils: Factory tested to **300 psig (2070 kPa)** according to ARI 410 and ASHRAE 33.
 4. Steam Coils: Factory tested to **300 psig (2070 kPa)** and to **200 psig (1380 kPa)** underwater according to ARI 410 and ASHRAE 33.
 5. Refrigerant Coils: Factory tested to **450 psig (3105 kPa)** according to ARI 410 and ASHRAE 33.

1.3 EXECUTION

A. Installation

1. Equipment Mounting: Install air-handling units on concrete bases using elastomeric pads **OR** using elastomeric mounts **OR** using restrained spring isolators **OR** without vibration isolation devices, **as directed**. Secure units to anchor bolts installed in concrete bases. Comply with requirements for concrete bases specified in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed.**
 - b. Install galvanized-steel **OR** stainless-steel, **as directed**, plate to equally distribute weight over elastomeric pad.
 - c. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - d. Install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - e. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - f. Install anchor bolts to elevations required for proper attachment to supported equipment.

OR

Equipment Mounting: Install air-handling unit using elastomeric pads **OR** using elastomeric mounts **OR** using restrained spring isolators **OR** without vibration isolation devices, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

- g. Minimum Deflection: **1/4 inch (6 mm) OR 1/2 inch (13 mm) OR 1 inch (25 mm) OR 2 inches (50 mm) OR 3 inches (75 mm), as directed.**
 - h. Install galvanized-steel **OR** stainless-steel, **as directed**, plate to equally distribute weight over elastomeric pad.
2. Suspended Units: Suspend and brace, **as directed**, units from structural-steel support frame using threaded steel rods and spring hangers. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 3. Arrange installation of units to provide access space around air-handling units for service and maintenance.
 4. Do not operate fan system until filters (temporary or permanent) are in place. Replace temporary filters used during construction and testing, with new, clean filters.
 5. Install filter-gage, static-pressure taps upstream and downstream of filters. Mount filter gages on outside of filter housing or filter plenum in accessible position. Provide filter gages on filter banks, installed with separate static-pressure taps upstream and downstream of filters.

B. Connections

1. Comply with requirements for piping specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to air-handling unit to allow service and maintenance.
3. Connect piping to air-handling units mounted on vibration isolators with flexible connectors.
4. Connect condensate drain pans using **NPS 1-1/4 (DN 32), ASTM B 88, Type M (ASTM B 88M, Type C)** copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan and install cleanouts at changes in direction.
5. Hot- and Chilled-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping". Install shutoff valve and union or flange at each coil supply connection. Install balancing valve and union or flange at each coil return connection.
6. Steam and Condensate Piping: Comply with applicable requirements in Division 23 Section "Steam And Condensate Heating Piping". Install shutoff valve at steam supply connections, float and thermostatic trap, and union or flange at each coil return connection. Install gate valve and

inlet strainer at supply connection of dry steam humidifiers, and inverted bucket steam trap to condensate return connection.

7. Refrigerant Piping: Comply with applicable requirements in Division 23 Section "Refrigerant Piping". Install shutoff valve and union or flange at each supply and return connection.
8. Connect duct to air-handling units with flexible connections. Comply with requirements in Division 23 Section "Air Duct Accessories".

C. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Leak Test: After installation, fill water and steam coils with water, and test coils and connections for leaks.
 - b. Charge refrigerant coils with refrigerant and test for leaks.
 - c. Fan Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Automatic-Roll-Filter Operational Test: Operate filters to demonstrate compliance with requirements. Test for leakage of unfiltered air while system is operating.
 - e. HEPA-Filter Operational Test: Pressurize housing to a minimum of **3-inch wg (750 Pa)** or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter with soapy water to check for air leaks.
 - f. HEPA-Filter Operational Test: Pressurize housing to a minimum of **3-inch wg (750 Pa)** or to designed operating pressure, whichever is higher; test housing joints, door seals, and sealing edges of filter for air leaks according to ASME N510, pressure-decay method.
 - g. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Air-handling unit or components will be considered defective if unit or components do not pass tests and inspections.
4. Prepare test and inspection reports.

D. Startup Service

1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Verify that shipping, blocking, and bracing are removed.
 - c. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, controllers, and switches.
 - d. Verify proper motor rotation direction, free fan wheel rotation, and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
 - e. Verify that bearings, pulleys, belts, and other moving parts are lubricated with factory-recommended lubricants.
 - f. Verify that zone dampers fully open and close for each zone.
 - g. Verify that face-and-bypass dampers provide full face flow.
 - h. Verify that outdoor- and return-air mixing dampers open and close, and maintain minimum outdoor-air setting.
 - i. Comb coil fins for parallel orientation.
 - j. Verify that proper thermal-overload protection is installed for electric coils.
 - k. Install new, clean filters.
 - l. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
2. Starting procedures for air-handling units include the following:
 - a. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace fan and motor pulleys as required to achieve design conditions, **as directed**.
 - b. Measure and record motor electrical values for voltage and amperage.

- c. Manually operate dampers from fully closed to fully open position and record fan performance.

- E. Adjusting
 - 1. Adjust damper linkages for proper damper operation.
 - 2. Comply with requirements in Division 23 Section "Testing, Adjusting, And Balancing For Hvac" for air-handling system testing, adjusting, and balancing.

- F. Cleaning
 - 1. After completing system installation and testing, adjusting, and balancing air-handling unit and air-distribution systems and after completing startup service, clean air-handling units internally to remove foreign material and construction dirt and dust. Clean fan wheels, cabinets, dampers, coils, and filter housings, and install new, clean filters.

- G. Demonstration
 - 1. Train Owner's maintenance personnel to adjust, operate, and maintain air-handling units.

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23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 73 13 00	07 72 23 00	Roof Accessories

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SECTION 23 74 16 13 - PACKAGED, OUTDOOR, CENTRAL-STATION AIR-HANDLING UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for packaged, outdoor, central-station air-handling units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:
 - a. Direct-expansion cooling.
 - b. Heat-pump refrigeration components.
 - c. Hot-gas reheat.
 - d. Electric-heating coils.
 - e. Gas furnace.
 - f. Economizer outdoor- and return-air damper section.
 - g. Integral, space temperature controls.
 - h. Roof curbs.

C. Definitions

1. DDC: Direct-digital controls.
2. ECM: Electrically commutated motor.
3. Outdoor-Air Refrigerant Coil: Refrigerant coil in the outdoor-air stream to reject heat during cooling operations and to absorb heat during heating operations. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
4. Outdoor-Air Refrigerant-Coil Fan: The outdoor-air refrigerant-coil fan in RTUs. "Outdoor air" is defined as the air outside the building or taken from outdoors and not previously circulated through the system.
5. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.
6. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
7. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.
8. VVT: Variable-air volume and temperature.

D. Performance Requirements

1. Delegated Design: Design RTU supports to comply with wind and seismic, **as directed**, performance requirements, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Wind-Restraint Performance:
 - a. Basic Wind Speed: as directed by the Owner .
 - b. Building Classification Category: **I OR II OR III OR IV, as directed.**
 - c. Minimum **10 lb/sq. ft (48.8 kg/sq. m)** multiplied by the maximum area of the mechanical component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.
3. Seismic Performance: RTUs shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.

- a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

E. Submittals

1. Product Data: Include manufacturer's technical data for each RTU, including rated capacities, dimensions, required clearances, characteristics, furnished specialties, and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.
4. Delegated-Design Submittal: For RTU supports indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints, **as directed**, and for designing vibration isolation bases.
 - b. Detail mounting, securing, and flashing of roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - c. Wind- and Seismic-Restraint Details, **as directed**: Detail fabrication and attachment of wind and seismic restraints and snubbers. Show anchorage details and indicate quantity, diameter, and depth of penetration of anchors.
5. Manufacturer Wind Loading Qualification Certification: Submit certification that specified equipment will withstand wind forces identified in "Performance Requirements" Article and in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculations.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of wind force and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
6. Manufacturer Seismic Qualification Certification: Submit certification that RTUs, accessories, and components will withstand seismic forces defined in "Performance Requirements" Article and in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
7. Field quality-control test reports.
8. Operation and maintenance data.
9. Warranty: Special warranty specified in this Section.

F. Quality Assurance

1. ARI Compliance:
 - a. Comply with ARI 210/240 and ARI 340/360 for testing and rating energy efficiencies for RTUs.
 - b. Comply with ARI 270 for testing and rating sound performance for RTUs.
2. ASHRAE Compliance:
 - a. Comply with ASHRAE 15 for refrigeration system safety.
 - b. Comply with ASHRAE 33 for methods of testing cooling and heating coils.

- c. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
4. NFPA Compliance: Comply with NFPA 90A and NFPA 90B.
5. UL Compliance: Comply with UL 1995.
6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Compressors: Manufacturer's standard, but not less than five **OR 10, as directed**, years from date of Final Completion.
 - b. Warranty Period for Gas Furnace Heat Exchangers: Manufacturer's standard, but not less than five **OR 10 OR 15 OR 20, as directed**, years from date of Final Completion.
 - c. Warranty Period for Solid-State Ignition Modules: Manufacturer's standard, but not less than three years from date of Final Completion.
 - d. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Final Completion.

1.2 PRODUCTS

A. Casing

1. General Fabrication Requirements for Casings: Formed and reinforced double-wall insulated panels, fabricated to allow removal for access to internal parts and components, with joints between sections sealed.
2. Exterior Casing Material: Galvanized steel with factory-painted finish, with pitched roof panels and knockouts with grommet seals for electrical and piping connections and lifting lugs.
 - a. Exterior Casing Thickness: **0.052 inch (1.3 mm) OR 0.0626 inch (1.6 mm) OR 0.079 inch (2.0 mm), as directed**, thick.
3. Inner Casing Fabrication Requirements:
 - a. Inside Casing: Galvanized steel, **0.034 inch (0.86 mm) OR 0.028 inch (0.7 mm), as directed**, thick, perforated 40 percent free area, **as directed**.
4. Casing Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 - a. Materials: ASTM C 1071, Type I.
 - b. Thickness: **1/2 inch (13 mm) OR 1 inch (25 mm), as directed**.
 - c. Liner materials shall have air-stream surface coated with an erosion- and temperature-resistant coating or faced with a plain or coated fibrous mat or fabric.
 - d. Liner Adhesive: Comply with ASTM C 916, Type I.
5. Condensate Drain Pans: Formed sections of galvanized-steel **OR** stainless-steel, **as directed**, sheet, a minimum of **2 inches (50 mm)** deep, and complying with ASHRAE 62.1, **as directed**.
 - a. Double-Wall Construction: Fill space between walls with foam insulation and seal moisture tight.
 - b. Drain Connections: Threaded nipple both sides of drain pan, **as directed**.
 - c. Pan-Top Surface Coating: Corrosion-resistant compound for galvanized-steel drain pans.
6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

B. Fans

1. Direct-Driven Supply-Air Fans: Double width, forward curved **OR** backward inclined, **as directed**, centrifugal; with permanently lubricated, multispeed **OR** ECM, **as directed**, motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.

OR

Belt-Driven Supply-Air Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the casing. Aluminum or painted-steel wheels, and galvanized- or painted-steel fan scrolls.

2. Condenser-Coil Fan: Propeller, mounted on shaft of permanently lubricated motor.
3. Relief-Air Fan: Propeller **OR** Forward curved **OR** Backward inclined, **as directed**, shaft mounted on permanently lubricated motor.
4. Seismic Fabrication Requirements: Fabricate fan section, internal mounting frame and attachment to fans, fan housings, motors, casings, accessories, and other fan section components with reinforcement strong enough to withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" when fan-mounted frame and RTU-mounted frame are anchored to building structure.
5. Fan Motor: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

C. Coils

1. Supply-Air Refrigerant Coil:
 - a. Aluminum-plate **OR** Copper-plate, **as directed**, fin and seamless internally grooved, **as directed**, copper tube in steel casing with equalizing-type vertical distributor.
 - b. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
 - c. Coil Split: Interlaced.
 - d. Baked phenolic **OR** Cathodic epoxy, **as directed**, coating.
 - e. Condensate Drain Pan: Galvanized steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, formed with pitch and drain connections complying with ASHRAE 62.1, **as directed**.
2. Outdoor-Air Refrigerant Coil:
 - a. Aluminum-plate **OR** Copper-plate, **as directed**, fin and seamless internally grooved, **as directed**, copper tube in steel casing with equalizing-type vertical distributor.
 - b. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
 - c. Baked phenolic **OR** Cathodic epoxy, **as directed**, coating.
3. Hot-Gas Reheat Refrigerant Coil:
 - a. Aluminum-plate **OR** Copper-plate, **as directed**, fin and seamless internally grooved, **as directed**, copper tube in steel casing with equalizing-type vertical distributor.
 - b. Polymer strip shall prevent all copper coil from contacting steel coil frame or condensate pan.
 - c. Baked phenolic **OR** Cathodic epoxy, **as directed**, coating.
4. Electric-Resistance Heating:
 - a. Open Heating Elements: Resistance wire of 80 percent nickel and 20 percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
 - b. Overtemperature Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box.
 - c. Overcurrent Protection: Manual-reset thermal cutouts, factory wired in each heater stage.
 - d. Control Panel: Unit mounted with disconnecting means and overcurrent protection. Include the following controls:
 - 1) Magnetic **OR** Mercury, **as directed**, contactors.
 - 2) Step Controller: Pilot lights and override toggle switch for each step.
 - 3) SCR Controller: Pilot lights operate on load ratio, a minimum of five steps.
 - 4) Time-delay relay.
 - 5) Airflow proving switch.

- D. Refrigerant Circuit Components
1. Number of Refrigerant Circuits: One **OR** Two, **as directed**.
 2. Compressor: Hermetic, reciprocating **OR** Semihermetic, reciprocating **OR** Hermetic, scroll, **as directed**, mounted on vibration isolators; with internal overcurrent and high-temperature protection, internal pressure relief, and crankcase heater, **as directed**.
 3. Refrigeration Specialties:
 - a. Refrigerant: R-407C **OR** R-410A, **as directed**.
 - b. Expansion valve with replaceable thermostatic element.
 - c. Refrigerant filter/dryer.
 - d. Manual-reset high-pressure safety switch.
 - e. Automatic-reset low-pressure safety switch.
 - f. Minimum off-time relay.
 - g. Automatic-reset compressor motor thermal overload.
 - h. Brass service valves installed in compressor suction and liquid lines.
 - i. Low-ambient kit high-pressure sensor.
 - j. Hot-gas reheat solenoid valve with a replaceable magnetic coil.
 - k. Hot-gas bypass solenoid valve with a replaceable magnetic coil.
 - l. Four-way reversing valve with a replaceable magnetic coil, thermostatic expansion valves with bypass check valves, and a suction line accumulator.
- E. Air Filtration
1. Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Glass Fiber: Minimum 80 percent arrestance, and MERV 5.
 - b. Pleated: Minimum 90 percent arrestance, and MERV 7.
- F. Gas Furnace
1. Description: Factory assembled, piped, and wired; complying with ANSI Z21.47 and NFPA 54.
 - a. CSA Approval: Designed and certified by and bearing label of CSA.
 2. Burners: Stainless steel.
 - a. Fuel: Natural **OR** Propane, **as directed**, gas.
 - b. Ignition: Electronically controlled electric spark or hot-surface igniter with flame sensor.
 - c. High-Altitude Model **OR** Kit, **as directed**: For Project elevations more than **2000 feet (610 m)** above sea level.
 3. Heat-Exchanger and Drain Pan: Stainless steel.
 4. Venting: Gravity vented with vertical extension, **as directed**.
OR
Power Vent: Integral, motorized centrifugal fan interlocked with gas valve with vertical extension, **as directed**.
 5. Safety Controls:
 - a. Gas Control Valve: Single stage **OR** Two stage **OR** Modulating, **as directed**.
 - b. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.
- G. Dampers
1. Outdoor-Air Damper: Linked damper blades, for 0 to 25 percent outdoor air, with manual **OR** motorized, **as directed**, damper filter.
 2. Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
 - a. Damper Motor: Modulating with adjustable minimum position.
 - b. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.
- H. Electrical Power Connection

1. Provide for single connection of power to unit with unit-mounted disconnect switch accessible from outside unit, **as directed**, and control-circuit transformer with built-in overcurrent protection.

I. Controls

1. Control equipment and sequence of operation are specified in Division 23 Section "Instrumentation And Control For Hvac".
2. Basic Unit Controls:
 - a. Control-voltage transformer.
 - b. Wall-mounted thermostat or sensor with the following features:
 - 1) Heat-cool-off switch.
 - 2) Fan on-auto switch.
 - 3) Fan-speed switch.
 - 4) Manual **OR** Automatic, **as directed**, changeover.
 - 5) Adjustable deadband.
 - 6) Concealed **OR** Exposed, **as directed**, set point.
 - 7) Concealed **OR** Exposed, **as directed**, indication.
 - 8) Degree F **OR** Degree C, **as directed**, indication.
 - 9) Unoccupied-period-override push button.
 - 10) Data entry and access port to input temperature and humidity, **as directed**, set points, occupied and unoccupied periods, and output room temperature and humidity, **as directed**, supply-air temperature, operating mode, and status.
 - c. Wall-mounted humidistat or sensor with the following features:
 - 1) Concealed **OR** Exposed, **as directed**, set point.
 - 2) Concealed **OR** Exposed, **as directed**, indication.
 - d. Remote Wall **OR** Unit, **as directed**, -Mounted Annunciator Panel for Each Unit:
 - 1) Lights to indicate power on, cooling, heating, fan running, filter dirty, and unit alarm or failure.
 - 2) DDC controller or programmable timer and interface with HVAC instrumentation and control system.
 - 3) Digital display of outdoor-air temperature, supply-air temperature, return-air temperature, economizer damper position, indoor-air quality, and control parameters.
3. Electronic **OR** DDC, **as directed**, Controller:
 - a. Controller shall have volatile-memory backup.
 - b. Safety Control Operation:
 - 1) Smoke Detectors: Stop fan and close outdoor-air damper if smoke is detected. Provide additional contacts for alarm interface to fire alarm control panel.
 - 2) Firestats: Stop fan and close outdoor-air damper if air greater than **130 deg F (54 deg C)** enters unit. Provide additional contacts for alarm interface to fire alarm control panel.
 - 3) Fire Alarm Control Panel Interface: Provide control interface to coordinate with operating sequence described in Division 28 Section(s) "Digital, Addressable Fire-alarm System" OR "Zoned (dc Loop) Fire-alarm System", **as directed**.
 - 4) Low-Discharge Temperature: Stop fan and close outdoor-air damper if supply air temperature is less than **40 deg F (4 deg C)**.
 - 5) Defrost Control for Condenser Coil: Pressure differential switch to initiate defrost sequence.
 - c. Scheduled Operation: Occupied and unoccupied periods on seven-day **OR** 365-day, **as directed**, clock with a minimum of two **OR** four, **as directed**, programmable periods per day.
 - d. Unoccupied Period:
 - 1) Heating Setback: **10 deg F (5.6 deg C)**.
 - 2) Cooling Setback: System off.
 - 3) Override Operation: Two hours.
 - e. Supply Fan Operation:

- 1) Occupied Periods: Run fan continuously.
- 2) Unoccupied Periods: Cycle fan to maintain setback temperature.
- f. Refrigerant Circuit Operation:
 - 1) Occupied Periods: Cycle or stage compressors, and operate hot-gas bypass, **as directed**, to match compressor output to cooling load to maintain room **OR** discharge, **as directed**, temperature and humidity, **as directed**. Cycle condenser fans to maintain maximum hot-gas pressure. Operate low-ambient control kit to maintain minimum hot-gas pressure.
 - 2) Unoccupied Periods: Compressors off **OR** Cycle compressors and condenser fans for heating to maintain setback temperature, **as directed**.
 - 3) Switch reversing valve for heating or cooling mode on air-to-air heat pump.
- g. Hot-Gas Reheat-Coil Operation:
 - 1) Occupied Periods: Humidistat opens hot-gas valve to provide hot-gas reheat, and cycles compressor.
 - 2) Unoccupied Periods: Reheat not required.
- h. Gas Furnace Operation:
 - 1) Occupied Periods: Cycle **OR** Stage **OR** Modulate, **as directed**, burner to maintain room **OR** discharge, **as directed**, temperature.
 - 2) Unoccupied Periods: Cycle burner to maintain setback temperature.
- i. Electric-Heating-Coil Operation:
 - 1) Occupied Periods: Cycle **OR** Stage **OR** Modulate, **as directed**, coil to maintain room **OR** discharge, **as directed**, temperature.
 - 2) Unoccupied Periods: Energize coil to maintain setback temperature.
 - 3) Operate supplemental electric heating coil with compressor for heating with outdoor temperature below **25 deg F (minus 4 deg C)**.
- j. Fixed Minimum Outdoor-Air Damper Operation:
 - 1) Occupied Periods: Open to 25 percent.
 - 2) Unoccupied Periods: Close the outdoor-air damper.
- k. Economizer Outdoor-Air Damper Operation:
 - 1) Occupied Periods: Open to 10 **OR** 25, **as directed**, percent fixed minimum intake, and maximum 100 percent of the fan capacity to comply with ASHRAE Cycle II. Controller shall permit air-side economizer operation when outdoor air is less than **60 deg F (15 deg C)**. Use outdoor-air temperature **OR** mixed-air and outdoor-air temperature **OR** outdoor-air enthalpy **OR** mixed-air temperature and select between outdoor-air and return-air enthalpy, **as directed**, to adjust mixing dampers. Start relief-air fan with end switch on outdoor-air damper, **as directed**. During economizer cycle operation, lock out cooling.
 - 2) Unoccupied Periods: Close outdoor-air damper and open return-air damper.
 - 3) Outdoor-Airflow Monitor: Accuracy maximum plus or minus 5 percent within 15 and 100 percent of total outdoor air. Monitor microprocessor shall adjust for temperature, and output shall range from 2- to 10-V dc **OR** 4 to 20 mA, **as directed**.
- l. Carbon Dioxide Sensor Operation:
 - 1) Occupied Periods: Reset minimum outdoor-air ratio down to minimum 10 percent to maintain maximum 1000-ppm concentration.
 - 2) Unoccupied Periods: Close outdoor-air damper and open return-air damper.
- m. VVT Relays:
 - 1) Provide heating- and cooling-mode changeover relays compatible with VVT terminal control system required in Division 23 Section(s) "Air Terminal Units" AND "Instrumentation And Control For Hvac".
4. Interface Requirements for HVAC Instrumentation and Control System:
 - a. Interface relay for scheduled operation.
 - b. Interface relay to provide indication of fault at the central workstation and diagnostic code storage.
 - c. Provide BACnet **OR** LonWorks, **as directed**, compatible interface for central HVAC control workstation for the following:
 - 1) Adjusting set points.

- 2) Monitoring supply fan start, stop, and operation.
- 3) Inquiring data to include outdoor-air damper position, **as directed**, supply- and room-air temperature and humidity, **as directed**.
- 4) Monitoring occupied and unoccupied operations.
- 5) Monitoring constant and variable motor loads.
- 6) Monitoring variable-frequency drive operation.
- 7) Monitoring cooling load.
- 8) Monitoring economizer cycles.
- 9) Monitoring air-distribution static pressure and ventilation air volume.

J. Accessories

1. Electric heater with integral thermostat maintains minimum **50 deg F (10 deg C)** temperature in gas burner compartment.
2. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet shall be energized even if the unit main disconnect is open, **as directed**.
3. Low-ambient kit using staged **OR** damper on **OR** variable-speed, **as directed**, condenser fans for operation down to **35 deg F (1.7 deg C)**.
4. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.
5. Coil guards of painted, galvanized-steel wire.
6. Hail guards of galvanized steel, painted to match casing.
7. Concentric diffuser with white louvers and polished aluminum return grilles, insulated diffuser box with mounting flanges, and interior transition.

K. Roof Curbs

1. Roof curbs with vibration isolators and wind or seismic restraints are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
OR
Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.
 - a. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 - 1) Materials: ASTM C 1071, Type I or II.
 - 2) Thickness: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**.
 - b. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
 - 1) Liner Adhesive: Comply with ASTM C 916, Type I.
 - 2) Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
 - 3) Liner materials applied in this location shall have air-stream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric depending on service air velocity.
 - 4) Liner Adhesive: Comply with ASTM C 916, Type I.
2. Curb Height: **14 inches (355 mm) OR 24 inches (610 mm) OR 36 inches (910 mm), as directed**.
3. Wind and Seismic Restraints: Metal brackets compatible with the curb and casing, painted to match RTU, used to anchor unit to the curb, and designed for loads at Project site. Comply with requirements in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for wind-load requirements.

1.3 EXECUTION

A. Installation

1. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.
 - a. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger than supported equipment and minimum **6 inches (150 mm)** above finished ground elevation.
 - b. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - d. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - e. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".
 2. Equipment Mounting: Install RTUs on concrete base using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed.**
OR
Roof Curb: Install on roof structure or concrete base, level and secure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts" **OR** ARI Guideline B, **as directed**. Install RTUs on curbs and coordinate roof penetrations and flashing with roof construction specified in Division 07 Section "Roof Accessories". Secure RTUs to upper curb rail, and secure curb base to roof framing or concrete base with anchor bolts.
 3. Unit Support: Install unit level on structural curbs **OR** pilings, **as directed**. Coordinate wall penetrations and flashing with wall construction. Secure RTUs to structural support with anchor bolts.
 4. Install wind and seismic restraints according to manufacturer's written instructions. Wind and seismically restrained vibration isolation roof-curb rails are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- B. Connections**
1. Install condensate drain, minimum connection size, with trap and indirect connection to nearest roof drain or area drain.
 2. Install piping adjacent to RTUs to allow service and maintenance.
 - a. Gas Piping: Comply with applicable requirements in Division 23 Section(s) "Facility Natural-gas Piping" **OR** "Facility Liquefied-petroleum Gas Piping", **as directed**. Connect gas piping to burner, full size of gas train inlet, and connect with union and shutoff valve with sufficient clearance for burner removal and service.
 3. Duct installation requirements are specified in other Division 21. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 - a. Install ducts to termination at top of roof curb.
 - b. Remove roof decking only as required for passage of ducts. Do not cut out decking under entire roof curb.
 - c. Connect supply ducts to RTUs with flexible duct connectors specified in Division 23 Section "Air Duct Accessories".
 - d. Install return-air duct continuously through roof structure.
 - e. Install normal-weight, **3000-psi (20.7-MPa)**, compressive strength (28-day) concrete mix inside roof curb, **4 inches (100 mm)** thick. Concrete, formwork, and reinforcement are specified in Division 31.
- C. Field Quality Control**
1. Perform tests and inspections and prepare test reports.
 2. Tests and Inspections:
 - a. After installing RTUs and after electrical circuitry has been energized, test units for compliance with requirements.
 - b. Inspect for and remove shipping bolts, blocks, and tie-down straps.

- c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Remove and replace malfunctioning units and retest as specified above.
- D. Startup Service
1. Engage a factory-authorized service representative to perform startup service.
 2. Complete installation and startup checks according to manufacturer's written instructions and do the following:
 - a. Inspect for visible damage to unit casing.
 - b. Inspect for visible damage to furnace combustion chamber.
 - c. Inspect for visible damage to compressor, coils, and fans.
 - d. Inspect internal insulation.
 - e. Verify that labels are clearly visible.
 - f. Verify that clearances have been provided for servicing.
 - g. Verify that controls are connected and operable.
 - h. Verify that filters are installed.
 - i. Clean condenser coil and inspect for construction debris.
 - j. Clean furnace flue and inspect for construction debris.
 - k. Connect and purge gas line.
 - l. Remove packing from vibration isolators.
 - m. Inspect operation of barometric relief dampers.
 - n. Verify lubrication on fan and motor bearings.
 - o. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - p. Adjust fan belts to proper alignment and tension.
 - q. Start unit according to manufacturer's written instructions.
 - 1) Start refrigeration system.
 - 2) Do not operate below recommended low-ambient temperature.
 - 3) Complete startup sheets and attach copy with Contractor's startup report.
 - r. Inspect and record performance of interlocks and protective devices; verify sequences.
 - s. Operate unit for an initial period as recommended or required by manufacturer.
 - t. Perform the following operations for both minimum and maximum firing. Adjust burner for peak efficiency.
 - 1) Measure gas pressure on manifold.
 - 2) Inspect operation of power vents.
 - 3) Measure combustion-air temperature at inlet to combustion chamber.
 - 4) Measure flue-gas temperature at furnace discharge.
 - 5) Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
 - 6) Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
 - u. Calibrate thermostats.
 - v. Adjust and inspect high-temperature limits.
 - w. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers.
 - x. Start refrigeration system and measure and record the following when ambient is a minimum of **15 deg F (8 deg C)** above return-air temperature:
 - 1) Coil leaving-air, dry- and wet-bulb temperatures.
 - 2) Coil entering-air, dry- and wet-bulb temperatures.
 - 3) Outdoor-air, dry-bulb temperature.
 - 4) Outdoor-air-coil, discharge-air, dry-bulb temperature.
 - y. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
 - z. Measure and record the following minimum and maximum airflows. Plot fan volumes on fan curve.

- 1) Supply-air volume.
 - 2) Return-air volume.
 - 3) Relief-air volume.
 - 4) Outdoor-air intake volume.
 - aa. Simulate maximum cooling demand and inspect the following:
 - 1) Compressor refrigerant suction and hot-gas pressures.
 - 2) Short circuiting of air through condenser coil or from condenser fans to outdoor-air intake.
 - bb. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
 - 1) High-temperature limit on gas-fired heat exchanger.
 - 2) Low-temperature safety operation.
 - 3) Filter high-pressure differential alarm.
 - 4) Economizer to minimum outdoor-air changeover.
 - 5) Relief-air fan operation.
 - 6) Smoke and firestat alarms.
 - cc. After startup and performance testing and prior to Final Completion, replace existing filters with new filters.
- E. Cleaning And Adjusting
1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to site during other-than-normal occupancy hours for this purpose.
 2. After completing system installation and testing, adjusting, and balancing RTU and air-distribution systems, clean filter housings and install new filters.
- F. Demonstration
- G. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain RTUs.

END OF SECTION 23 74 16 13

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SECTION 23 74 16 13a - ROOFTOP REPLACEMENT AIR UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for rooftop replacement-air units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes cooling-only and cooling and heating rooftop replacement-air units.

C. Definitions

1. DDC: Direct-digital controls.

D. Submittals

1. Product Data: Include rated capacities, furnished specialties, and accessories.
2. Shop Drawings: Include details of installation and wiring diagrams.
3. Coordination Drawings: Rooftop replacement-air units to roof-curb mounting details drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Size and location of rooftop replacement-air unit mounting rails and anchor points and methods for anchoring units to roof curb.
 - b. Required roof penetrations for ducts, pipes, and electrical raceways, including size and location of each penetration.
4. Startup service reports.
5. Operation and maintenance data.
6. Warranty: Special warranty specified in this Section.
7. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components listed below that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Final Completion.
 - b. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than five **OR** 10, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Cabinet

1. Construction: Single **OR** Double, **as directed**, wall.
2. Exterior Casing: Galvanized steel with baked-enamel paint finish and **OR** Stainless steel, **as directed**, with lifting lugs and knockouts for electrical and piping connections.
3. Interior Casing: Galvanized-steel **OR** Stainless steel, **as directed**.
4. Base Rails: Galvanized-steel **OR** Stainless-steel, **as directed**, rails for mounting on roof curb.
5. Service Doors: Hinged access doors with neoprene gaskets.
6. Internal Insulation: Fibrous-glass duct lining complying with ASTM C 1071, Type II.
 - a. Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed**.
 - b. Insulation Adhesive: Comply with ASTM C 916, Type I.
 - c. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to casing without damaging liner and without causing air leakage when applied as recommended by manufacturer.
7. Condensate Drain Pans: Formed sections of galvanized-steel **OR** stainless-steel, **as directed**, sheet designed for self-drainage. Fabricate pans and drain connection to comply with ASHRAE 62.1.
8. Roof Curb: Full-perimeter curb of sheet metal, minimum **8 inches (200 mm) OR 12 inches (300 mm) OR 16 inches (400 mm), as directed**, high, with wood nailer, neoprene sealing strip, and welded Z-bar flashing.
9. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

B. Supply-Air Fan

1. Fan: Forward-curved centrifugal; statically and dynamically balanced, galvanized **OR** coated, **as directed**, steel, mounted on solid-steel shaft with self-aligning, permanently lubricated ball bearings **OR** pillow-block bearings rated L₅₀ for 200,000 hours and having external grease fittings, **as directed**.
2. Motor: Open dripproof **OR** Totally enclosed, **as directed**, single-speed **OR** two-speed, **as directed**, motor.
3. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly with minimum 1.4 service factor.
4. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with restrained, **as directed**, elastomeric **OR** spring, **as directed**, isolators.

C. Refrigeration System

1. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Code for Mechanical Refrigeration."
2. Compressors: Reciprocating **OR** Scroll, **as directed**, compressors with integral vibration isolators, internal overcurrent and overtemperature protection, internal pressure relief, and crankcase heater, **as directed**.
3. Minimum Efficiency: As defined by ASHRAE/IESNA 90.1, "Energy Efficient Design of New Buildings except Low-Rise Residential Buildings."
4. Refrigerant: R-407C **OR** R-410A, **as directed**.
5. Refrigeration System Specialties:
 - a. Expansion valve with replaceable thermostatic element.
 - b. Refrigerant dryer.
 - c. High-pressure switch.
 - d. Low-pressure switch.
 - e. Thermostat for coil freeze-up protection during low ambient temperature operation or loss of air.
 - f. Brass service valves installed in discharge and liquid lines.
 - g. Operating charge of refrigerant.

6. Capacity Control: Hot-gas bypass refrigerant control for capacity control with continuous dehumidification on a single compressor.
 - OR**
 - Capacity Control: Patented, Rawal APR control with zero to 100 percent modulating capacity control using hot-gas bypass. Evaporator coil shall be continuously active for dehumidification.
 - OR**
 - Capacity Control: Single compressor with evaporator and condenser coil within the refrigerant section to provide initial precooling and reheat for humidity control.
 - OR**
 - Capacity Control: Heat-pipe heat exchanger shall wrap around the evaporator coil to precool the air entering the evaporator coil, and reheat the air leaving the evaporator coil to control humidity.
 7. Refrigerant Coils: Evaporator and condenser **OR** Evaporator, condenser, and reheat condenser, **as directed**, coils shall be designed, tested, fabricated, and rated according to ARI 410 and ASHRAE 33. Coils shall be leak tested under water with air at **315 psig (2170 kPa)**.
 - a. Capacity Reduction: Circuit coils for face **OR** row **OR** interleaved, **as directed**, control.
 - b. Tubes: Copper.
 - c. Fins: Aluminum **OR** Copper, **as directed**, with minimum fin spacing of **0.071 inch (1.81 mm)**, **as directed**.
 - d. Fin and Tube Joint: Mechanical bond.
 - e. Suction and Distributor: Seamless copper tube with brazed joints.
 - f. Coating: Phenolic epoxy corrosion-protection coating on both coils.
 - g. Source Quality Control: Test to **450 psig (3105 kPa)**, and to **300 psig (2070 kPa)** underwater.
 8. Condenser Fan: Propeller type, directly driven by motor.
 9. Safety Controls:
 - a. Compressor motor and outside-coil fan motor low ambient lockout.
 - b. Overcurrent protection for compressor motor and outside-coil fan motors.
- D. Direct-Fired Gas Furnace
1. Description: Factory assembled, piped, and wired; complying with NFPA 54, "National Fuel Gas Code"; ANSI Z83.4, "Non-Recirculating Direct Gas-Fired Industrial Air Heaters"; and ANSI Z83.18, "Direct Gas-Fired Industrial Air Heaters," for direct-fired gas furnace.
 2. Burners: Cast-iron burner with stainless-steel mixing plates.
 - a. Rated for a maximum turndown ratio of 30:1.
 - b. Fuel: Natural **OR** Propane, **as directed**, gas.
 3. Safety Controls:
 - a. Gas manifold safety switches and controls shall comply with ANSI standards and FMG **OR** and IRI, **as directed**.
 - b. Pilot: Intermittent spark igniter.
 - c. Purge-period timer shall automatically delay burner ignition and bypass low-limit control.
 - d. External gas-pressure regulator shall regulate pressure to not more than **0.5 psig (3.4 kPa)**.
 - e. Airflow Proving Switch: Dual pressure switch senses correct airflow before energizing pilot and requires airflow to be maintained within minimum and maximum pressure settings across burner.
 - f. Manual-Reset, High-Limit Switch: Stops burner and closes main gas valve if high-limit temperature is exceeded.
 - g. Gas Train: Redundant, main gas valves, electric pilot valve, main and pilot gas-pressure regulators, main and pilot manual shutoff valves, main and pilot pressure taps, and high-low gas-pressure switches **OR** to comply with FMG requirements **OR** to comply with IRI requirements, **as directed**.
- E. Indirect-Fired Gas Furnace
1. Description: Factory assembled, piped, and wired; complying with NFPA 54, "National Fuel Gas Code," and ANSI Z21.47, "Gas-Fired Central Furnaces."
 - a. AGA Approval: Designed and certified by and bearing label of AGA.

2. Burners: Aluminized steel with stainless-steel inserts **OR** Stainless steel, **as directed**.
 - a. Minimum AFUE: **Percent** as directed by the Owner .
OR
Minimum Thermal Efficiency: **Percent** as directed by the Owner .
OR
Minimum Combustion Efficiency: **Percent** as directed by the Owner .
 - b. Fuel: Natural **OR** Propane, **as directed**, gas.
 - c. Ignition: Electronically controlled electric spark with flame sensor.
 - d. High-Altitude Model **OR** Kit, **as directed**: For Project elevations more than **2000 feet (610 m)** above sea level.
 3. Heat-Exchanger Drain Pan: Stainless steel.
 4. Venting: Gravity vented.
OR
Power Vent: Integral, motorized centrifugal fan interlocked with gas valve.
 5. Safety Controls:
 - a. Gas Control Valve: Single stage **OR** Two stage **OR** Electronic modulating, **as directed**.
 - b. Gas Train: Single-body, regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff.
- F. Electric-Resistance Heating
1. Electric-Resistance Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.
OR
Electric-Resistance Heating Elements: Open-coil resistance wire of 80 percent nickel and 20 percent chromium; supported and insulated by floating ceramic bushings recessed into casing openings, fastened to supporting brackets, and mounted in galvanized-steel frame.
 - a. Heating Capacity: Low density **35 W per sq. in. (54 kW per sq. m)**, factory wired for single-point wiring connection; with time delay for element staging, and overcurrent and overheat protective devices.
 - b. Safety Controls:
 - 1) Blower-motor interlock, air-pressure switch.
 - 2) Quiet mercury contactors.
 - 3) Time delay between steps.
 - 4) Integral, nonfused power disconnect switch.
- G. Heating Coils
1. Hot-Water Coils: Continuous-circuit **OR** Self-draining **OR** Cleanable, **as directed**, coil fabricated and tested according to ARI 410 with aluminum fins and seamless copper tube in galvanized-steel **OR** stainless-steel, **as directed**, casing.
 - a. Headers: Cast iron with drain and air vent tappings **OR** Cast iron with cleaning plugs, and drain and air vent tappings **OR** Seamless copper tube with brazed joints, prime coated **OR** Fabricated steel with brazed joints, prime coated, **as directed**.
 - b. Control valves are specified in Division 23 Section "Instrumentation And Control For Hvac".
 2. Steam Coils: Distributing coil fabricated and tested according to ARI 410, with threaded steam supply and condensate connections. Nonfreeze type having aluminum-plate fin and seamless copper double tube in galvanized-steel casing, pitched for proper drainage; tested to **150 psig (1035 kPa)** and leak tested to **100 psig (690 kPa)** with air under water.
 - a. Control valves are specified in Division 23 Section "Instrumentation And Control For Hvac".
- H. Cooling Coils
1. Chilled-Water Coils: Continuous-circuit **OR** Self-draining **OR** Cleanable, **as directed**, coil fabricated and tested according to ARI 410 with aluminum fins and seamless copper tube in galvanized-steel **OR** stainless-steel, **as directed**, casing.

- a. Headers: Cast iron with drain and air vent tappings **OR** Cast iron with cleaning plugs, and drain and air vent tappings **OR** Seamless copper tube with brazed joints, prime coated **OR** Fabricated steel with brazed joints, prime coated, **as directed**.
 - b. Control valves are specified in Division 23 Section "Instrumentation And Control For Hvac".
- I. Outdoor-Air Intake And Dampers
1. Dampers: Leakage rate, according to AMCA 500, shall not exceed 2 percent of air quantity at face velocity of **2000 fpm (10 m/s)** through damper and pressure differential of **4-inch wg (1000 Pa)**.
 2. Damper Operators: Electric.
 3. Mixing Boxes: Parallel-blade, galvanized-steel dampers mechanically fastened to steel operating rod inside cabinet. Connect operating rods with common interconnecting linkages so dampers operate simultaneously.
 4. Outdoor-Air Intake Hoods: Galvanized-steel **OR** Stainless steel, **as directed**, with bird screen complying with ASHRAE 62.1 and finish to match cabinet.
- J. Filters
1. Comply with NFPA 90A.
 2. Cleanable Filters: **2-inch- (50-mm-)** thick, cleanable metal mesh.
OR
Disposable Panel Filters: **2-inch- (50-mm-)** thick, factory-fabricated, flat-panel-type, disposable air filters with holding frames, with a minimum efficiency report value of 6 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1, **as directed**.
 - a. Media: Interlaced glass fibers sprayed with nonflammable adhesive.
 - b. Frame: Galvanized steel.
- K. Controls
1. Factory-wire connection for controls' power supply.
 2. Control devices, including sensors, transmitters, relays, switches, thermostats, humidistats, detectors, operators, actuators, and valves, shall be manufacturer's standard items to accomplish indicated control functions.
 3. Unit Controls: Solid-state control board and components with field-adjustable control parameters.
 4. Supply-Fan Control: Units shall be electrically interlocked with corresponding exhaust fans, to operate continuously when exhaust fans are running. Time clock shall switch operation from occupied to unoccupied. Night setback thermostat shall cycle fan during unoccupied periods to maintain space temperature.
 - a. Timer: Seven-day electronic clock.
 - b. Electrically interlock kitchen hood fire-extinguishing system to de-energize replacement-air unit when fire-extinguishing system discharges.
 5. Remote **OR** Unit, **as directed**,-Mounted Status Panel:
 - a. Cooling/Off/Heating Controls: Control operational mode.
 - b. Damper Position: Indicates position of outdoor-air dampers in terms of percentage of outdoor air.
 - c. Status Lights:
 - 1) Filter dirty.
 - 2) Fan operating.
 - 3) Cooling operating.
 - 4) Heating operating.
 6. Refrigeration System Controls:
 - a. Unit-mounted enthalpy controller shall lock out refrigerant system when outdoor-air enthalpy is less than **28 Btu/lb (65 kJ/kg)** of dry air or outdoor-air temperature is less than **60 deg F (15 deg C)**.
 - b. Outdoor-air sensor de-energizes dehumidifier operation when outdoor-air temperature is less than **60 deg F (15 deg C)**.
 - c. Wall-mounting, relative-humidity sensor energizes dehumidifier operation when relative humidity is more than 60 percent.

7. Heating Controls:
 - a. Factory-mounted sensor in supply-fan outlet **OR** Remote-mounting sensor for field installation in supply-air duct, **as directed**, with sensor adjustment located in control panel modulates gas furnace burner to maintain space temperature.
 - b. Wall-mounting, space-temperature sensor with temperature adjustment **OR** unit-mounted temperature adjustment **OR** adjustment on remote-control panel, **as directed**, that modulates gas furnace burner to maintain space temperature.
 - c. Remote Setback Thermostat: Adjustable room thermostat selected by timer, set at **50 deg F (10 deg C)**; cycles supply fan and gas furnace burner to maintain space temperature.
 - d. Staged Burner Control: Two **OR** Four, **as directed**, steps of control.
OR
Electromechanical or Electronic Burner Control: 20 to 100 percent modulation of the firing rate. 10 to 100 percent with dual furnace units.
 8. Electric-Resistance Heating Controls: Wall-mounting thermostat controls SCR **OR** sequences stages, **as directed**.
 9. Damper Controls:
 - a. Wall-mounting pressure sensor modulates outdoor- and return-air dampers to maintain a positive pressure in space served by rooftop replacement-air unit at minimum **0.05-inch wg (12.4 Pa)**.
 - b. When exhaust fans stop, set outdoor- and return-air damper to 75 **OR** 50 **OR** 25, **as directed**, percent outdoor air. When exhaust fans start, close return-air damper and fully open outdoor-air damper.
 10. Integral Smoke Alarm: Smoke detector installed in supply and return air.
 11. DDC Temperature Control: Stand-alone control module for link between unit controls and DDC temperature-control system. Control module shall be compatible with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac". Links shall include the following:
 - a. Start/stop interface relay, and relay to notify DDC temperature-control system alarm condition.
 - b. Hardware interface or additional sensors for the following:
 - 1) Room temperature.
 - 2) Discharge air temperature.
 - 3) Refrigeration system operating.
 - 4) Furnace operating.
- L. Motors
1. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

1.3 EXECUTION

A. Installation

1. Install roof curb on roof structure, according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts" **OR** ARI Guideline B, **as directed**. Install and secure rooftop replacement-air units on curbs and coordinate roof penetrations and flashing with roof construction.
OR
Install restrained vibration isolation roof-curb rails on roof structure according to NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts" **OR** ARI Guideline B, **as directed**. Install and secure rooftop replacement-air units on rails and coordinate roof penetrations and flashing with roof construction. Restrainted isolation roof-curb rails are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

2. Install wall- and duct-mounting sensors, thermostats, and humidistats furnished by manufacturers for field installation. Install control wiring and make final connections to control devices and unit control panel.
 3. Install **3000-psi (20.7-MPa)**, compressive strength (28-day) concrete base inside roof curb, **4 inches (100 mm)** thick. Concrete and reinforcement are specified in Division 31.
- B. Connections**
1. Piping installation requirements are specified in other Division 21-. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
 - a. Gas Burner Connections: Comply with requirements in Division 23 Section(s) "Facility Natural-gas Piping" OR "Facility Liquefied-petroleum Gas Piping", **as directed**. Connect gas piping to burner, full size of gas train inlet, and connect with union, pressure regulator, **as directed**, and shutoff valve with sufficient clearance for burner removal and service.
 - b. Water Coil Connections: Comply with requirements in Division 23 Section "Hydronic Piping". Connect to supply and return coil with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - c. Steam Coil Connections: Comply with requirements in Division 23 Section "Steam And Condensate Heating Piping". Connect to steam piping with shutoff valve and union or flange; for condensate piping, starting from the coil connection, connect with union or flange, strainer, trap, and shutoff valve.
 3. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts". Drawings indicate the general arrangement of ducts. Connect supply and return, **as directed**, ducts to rooftop replacement-air units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories".
 4. Electrical Connections: Comply with requirements in Division 22 for power wiring, switches, and motor controls.
 5. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
- C. Startup Service**
1. Engage a factory-authorized service representative to perform startup service.
 2. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Inspect for visible damage to furnace combustion chamber.
 - b. Inspect for visible damage to compressor, air-cooled outside coil, and fans.
 - c. Inspect casing insulation for integrity, moisture content, and adhesion.
 - d. Verify that clearances have been provided for servicing.
 - e. Verify that controls are connected and operable.
 - f. Verify that filters are installed.
 - g. Clean outside coil and inspect for construction debris.
 - h. Clean furnace flue and inspect for construction debris.
 - i. Inspect operation of power vents.
 - j. Purge gas line.
 - k. Inspect and adjust vibration isolators and seismic restraints.
 - l. Verify bearing lubrication.
 - m. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - n. Adjust fan belts to proper alignment and tension.
 - o. Start unit.
 - p. Start refrigeration system when outdoor-air temperature is within normal operating limits.
 - q. Inspect and record performance of interlocks and protective devices including response to smoke detectors by fan controls and fire alarm.
 - r. Operate unit for run-in period.
 - s. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:

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- 1) Measure gas pressure at manifold.
 - 2) Measure combustion-air temperature at inlet to combustion chamber.
 - 3) Measure flue-gas temperature at furnace discharge.
 - 4) Perform flue-gas analysis. Measure and record flue-gas carbon dioxide and oxygen concentration.
 - 5) Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
 - t. Calibrate thermostats.
 - u. Adjust and inspect high-temperature limits.
 - v. Inspect outdoor-air dampers for proper stroke and interlock with return-air dampers, **as directed**.
 - w. Start refrigeration system and measure and record the following:
 - 1) Coil leaving-air, dry- and wet-bulb temperatures.
 - 2) Coil entering-air, dry- and wet-bulb temperatures.
 - 3) Outdoor-air, dry-bulb temperature.
 - 4) Outdoor-air-coil, discharge-air, dry-bulb temperature.
 - x. Verify operational sequence of controls.
 - y. Measure and record the following airflows. Plot fan volumes on fan curve.
 - 1) Supply-air volume.
 - 2) Return-air volume.
 - 3) Outdoor-air intake volume.
 - z. Simulate maximum cooling demand and inspect the following:
 - 1) Compressor refrigerant suction and hot-gas pressures.
 - 2) Short circuiting of air through outside coil or from outside coil to outdoor-air intake.
 - aa. Verify operation of remote panel including pilot-light operation and failure modes. Inspect the following:
 - 1) High-limit heat exchanger.
 - 2) Alarms.
 3. After startup and performance testing, change filters, verify bearing lubrication, and adjust belt tension.
 4. Remove and replace components that do not pass tests and inspections and retest as specified above.
 5. Prepare written report of the results of startup services.
- D. Adjusting
1. Adjust initial temperature and humidity set points.
 2. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 3. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project outside normal occupancy hours for this purpose.
- E. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain rooftop replacement-air units.

END OF SECTION 23 74 16 13a

SECTION 23 74 16 13b - SELF-CONTAINED AIR-CONDITIONERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for self-contained air-conditioners. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged air **OR** water-cooled air-conditioning units, **as directed**, with refrigerant compressors and controls, intended for indoor installations.

C. Submittals

1. Product Data: For each unit indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
4. Samples for Initial Selection: For units with factory-applied color finishes.
5. Operation and Maintenance Data: For self-contained air conditioners to include in emergency, operation, and maintenance manuals.
6. Warranty: Sample of special warranty.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency and marked for intended locations and application.
2. ARI Compliance:
 - a. Applicable requirements in ARI 210/240.
 - b. Applicable requirements in ARI 340/360.
 - c. Applicable requirements in ARI 390.
3. ASHRAE Compliance:
 - a. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - b. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."
4. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of self-contained air conditioners that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period:
 - 1) For Compressor: One **OR** Five year(s), **as directed**, from date of Final Completion.
 - 2) For Parts: One **OR** Five year(s), **as directed**, from date of Final Completion.
 - 3) For Labor: One **OR** Five year(s), **as directed**, from date of Final Completion.

1.2 PRODUCTS

A. Packaged Units

1. Description: Factory-assembled, wired, and tested, and fully charged with refrigerant and oil.
2. Configuration: Horizontal, ceiling-plenum mounted.
3. Configuration: Vertical, floor mounted; vertical and horizontal discharge.
4. Configuration: Horizontal, ceiling mounted and vertical, floor mounted; vertical and horizontal discharge.
5. Disconnect Switch: Factory mounted in control panel **OR** on equipment, **as directed**.

B. Cabinet

1. Frame and Panels: Structural-steel frame with galvanized-steel panels and access doors or panels.
 - a. Exterior-Surface Finish: Factory painted in color selected by Architect.
 - b. Interior-Surface Finish: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
2. Insulation: Minimum **1-inch- (25-mm-)**, thick, glass-fiber duct liner complying with ASTM C 1091 and having a microbial coating on cabinet interior and control panel. **1/2-inch- (13-mm-)** thick liner is acceptable for units smaller than **15 tons (50 kW)**.
3. Return-Air Opening: Rear, open **OR** flange for duct connection, **as directed**.
4. Corrosion-Resistant Treatment: Phenolic coating on unit interior and exterior.

C. Supply-Air Fan

1. Fan Material: Galvanized steel.
2. Configuration: Double-width, double-inlet, forward-curved **OR** airfoil, **as directed**, centrifugal fan; statically and dynamically balanced. Vertical **OR** Horizontal discharge, **as directed**, with flexible discharge collar.
3. Drive: Belt, with fan mounted on permanently lubricated bearings **OR** Direct, with fan and motor resiliently mounted, **as directed**.
4. Fan Sheaves: Variable pitch, dynamically balanced, bored to fit shafts and keyed for initial startup.
5. Motor Sheave: Variable and adjustable pitch dynamically balanced, and selected to achieve specified rpm when set at midposition.
6. Belt Rating: As recommended by the manufacturer or a minimum of one and one-half times nameplate rating of motor.
7. Bearings: Grease lubricated with grease lines extended to exterior of unit with L-50 life at 200,000 hours.
8. Variable Air Volume: Variable-frequency motor controller with bypass.
9. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Special Motor Features: Premium efficiency, as defined in Division 23 Section "Common Motor Requirements For Hvac Equipment".
10. Isolation: Mount fan and motor on common subbase and mount assembly on spring isolators with minimum static deflection of **1 inch (25 mm)**.
11. Outdoor-Air-Intake Accessories:
 - a. Barometric Outdoor-Air Damper: Adjustable-blade damper allowing induction of up to 25 percent outdoor air when evaporator fan is running.
 - b. Motorized Outdoor-Air Damper: Motorized, two-position blade damper allowing induction of up to 25 percent outdoor air; with spring-return, low-voltage damper motor.
 - c. Energy-Recovery Ventilator: Assembly of desiccant-coated, heat-recovery wheels and centrifugal exhaust fans to transfer approximately 67 percent of the difference between the sensible and latent heat of outdoor and exhaust air.

- d. Air-Side Economizer: Damper assembly allowing induction of up to 100 percent outdoor air to maintain a selected mixed-air temperature; and exhaust damper and spring-return, low-voltage, modulating damper motor with minimum position adjustment.
- D. Refrigeration System
1. Compressor: Scroll type, hermetically sealed, 3600 rpm maximum, and resiliently mounted with positive lubrication and internal motor protection.
 2. Refrigerant Coils (Indoor and Outdoor for Air-Cooled Units): Seamless copper tubes expanded into aluminum fins.
 - a. Corrosion-Resistant Treatment: Phenolic coating applied with multiple dips and baked.
 - b. Refrigerant Circuits: A separate circuit for each compressor, with externally equalized thermal-expansion valve with adjustable superheat, filter dryer, sight glass, high-pressure relief valve, and charging valves.
 - c. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1 and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir.
 - d. Refrigerant: R-407C or R-410A.
 - e. Expansion valve with replaceable thermostatic element.
 - f. Refrigerant dryer.
 - g. High-pressure switch.
 - h. Low-pressure switch.
 - i. Thermostat for coil freeze-up protection during low ambient temperature operation or loss of air.
 - j. Low ambient temperature switch.
 - k. Brass service valves installed in discharge and liquid lines.
 3. Water-Cooled Condenser:
 - a. Description: Factory assembled and tested; tube in tube coaxial type with water-regulating valve.
 - b. Tubing: Nonferrous **OR** Copper **OR** Cupro-nickel, **as directed**, inner tube; steel with corrosion-resistant coating; refrigerant and water-side leak tested to **400 psig (2760 kPa)** underwater.
 4. Water-Side Economizer Section:
 - a. Description: Factory assembled and tested; consisting of water coil, modulating valves, controls, piping with cleanouts, and access panels.
 - b. Water Coil: Two **OR** Four rows, **as directed**, copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and copper **OR** cast-iron, **as directed** headers; leak tested to **300 psig (2070 kPa)** underwater; and having a two-position control valve.
- E. Heating Coil
1. Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**; leak tested to **300 psig (2070 kPa)** underwater; and having a two-position control valve.
 2. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements with refractory ceramic support bushings; automatic-reset thermal cutout; built-in magnetic contactors; manual-reset thermal cutout; airflow-proving device; and one-time fuses in terminal box for overcurrent protection.
- F. Controls
1. Control Package: Factory wired, including contactor, high- and low-pressure cutouts, internal-winding thermostat for compressor, control-circuit transformer, and noncycling reset relay.
 2. Time-Delay Relay: Five-minute delay to prevent compressor cycling.
 3. Adjustable Thermostat: Unit mounted **OR** Remote, **as directed**, to control the following:
 - a. Supply fan.
 - b. Compressor.
 - c. Condenser.

- d. Hot-water coil valve.
 - e. Electric heater.
 4. System Selector Switch: Heat-off-cool **OR** Off-heat-auto-cool, **as directed**.
 5. Fan Control Switch: Auto-on.
 6. Time Clock, **as directed**: Cycle unit on and off.
 7. Microprocessor Control Panel: Controls unit functions, including refrigeration and safety controls, and the following:
 - a. Supply fan.
 - b. Supply-fan motor speed.
 - c. Compressors.
 - d. Air-cooled condenser.
 - e. Cooling tower pump.
 - f. Modulating, hot-water coil valve.
 - g. Multistep, electric heater.
 - h. Time-of-day control to cycle unit on and off.
 - i. Night-heat, morning warm-up cycle.
 - j. Economizer control.
 - k. Panel-mounted control switch to operate unit in remote or local control mode, or to stop or reset.
 - l. Panel-mounted indication of the following:
 - 1) Operating status.
 - 2) System diagnostics and safety alarms.
 - 3) Supply-air temperature set point.
 - 4) Zone heating-temperature set point.
 - 5) Supply-air pressure set point.
 - 6) Economizer minimum position set point.
 - 7) Supply-air-pressure, high-limit set point.
 - 8) Monitor constant and variable motor loads.
 - 9) Monitor variable-frequency drive operation.
 - 10) Monitor economizer cycle.
 - 11) Monitor cooling load.
 - 12) Monitor air distribution static pressure and ventilation air volumes.
- G. Evaporator Coil
1. Direct-Expansion Coil: Seamless copper tubes expanded into aluminum fins.
 - a. Corrosion-Resistant Treatment, **as directed**: Phenolic coating applied with multiple dips and baked.
 2. Refrigerant Circuits: A separate circuit for each compressor, with externally equalized thermal-expansion valve with adjustable superheat, **as directed**, filter-dryer, sight glass, high-pressure relief valve, **as directed**, and charging valves.
- H. Remote Air-Cooled Condenser
1. Description: Factory assembled and tested; consisting of condenser coil, fans and motors, and operating controls; suitable for roof mounting.
 - a. Condenser Coil: Aluminum-fin copper tube with integral subcooler; leak tested to **450 psig (3110 kPa)**.
 - b. Condenser Fans: Direct-drive propeller type.
 - c. Fan Motors: Three-phase, permanently lubricated, ball-bearing motors with built-in thermal-overload protection. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - d. Refrigerant Line Kits: Annealed-copper suction and liquid lines that are factory cleaned, dried, pressurized, and sealed; insulated suction line; flared fittings at evaporator end, no fitting at condenser end; and service valves for both suction and liquid lines.
 - e. Terminate suction and liquid refrigerant piping with service valves within unit.
 - f. Low Ambient Control: Cycles fans to permit operation down to **45 deg F (7 deg C)**.

OR

Low Ambient Control: Cycles fans and modulates condenser fan damper assembly to permit operation down to **0 deg F (minus 18 deg C)**.

- g. Coil Guard: Painted galvanized steel with louvered grilles.
 - h. Corrosion-Resistant Treatment: Phenolic coating applied in multiple dips and baked.
- I. Integral Air-Cooled Condenser For Units **15 Tons (50 kW)** And Smaller
- 1. Description: Factory assembled and tested; consisting of condenser coil, fans and motors, and cabinet.
 - a. Condenser Coil: Aluminum-fin copper tube with integral subcooler; leak tested to **425 psig (2930 kPa)**.
 - b. Condenser Fan: Direct-drive propeller type with permanently lubricated motor with built-in thermal-overload protection.
 - c. Low Ambient Control: Cycles fans to permit operation down to **0 deg F (minus 18 deg C)**.

J. Air Filters

- 1. Permanent Filters: **1-inch- (25-mm-)** thick, cleanable panel filters.
OR
Disposable Filters: **1-inch- (25-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, thick, glass-fiber, flat **OR** pleated, **as directed**, panel filters.
OR
Extended-Surface, Disposable Panel Filters: **2-inch- (50-mm-)** **OR** **4-inch- (100-mm-)**, **as directed**, thick, dry, filters with fibrous media material formed into deep-V-shaped pleats and held by self-supporting wire grid holding frames, with nonflammable cardboard media and media-grid frame.
 - a. Efficiency: ASHRAE 52.2 MERV rating of 6 or higher.
- 2. Air-Pressure Switch (for units larger than 15 tons (50 kW)): Indicates dirty filters.

K. Accessories:

- 1. Manual outdoor-air damper.
- 2. Motorized outdoor-air damper.
- 3. Air-side economizer.
- 4. Water-side economizer.
- 5. Hot-gas bypass.
- 6. Air Pressure Switch: Indicates when differential pressure exceeds set point representing dirty filters.

L. Single-Point Electrical Characteristics:

- 1. Volts: 120 **OR** 208 **OR** 230 **OR** 460, **as directed**.
- 2. Phase: Single **OR** Three, **as directed**.
- 3. Hertz: 60.
- 4. Full-Load Amperes: **as directed**.
- 5. Minimum Circuit Ampacity: **as directed**.
- 6. Maximum Overcurrent Protection: **as directed**.

1.3 EXECUTION

A. Installation

- 1. Install units level and plumb.
- 2. Anchor units to structure.
- 3. Install seismic restraints.
- 4. Install static-pressure probe (for units larger than 15 tons (50 kW) equipped with inlet vanes).

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5. Install water-cooled units with thermometer and pressure gage at the water supply and return connection.
 6. Install vibration spring isolators under base of unit, with minimum static deflection of **1 inch (25 mm)**. Refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- B. Connections
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 - a. Water Coil Connections: Comply with requirements in Division 23 Section "Hydronic Piping". Connect to supply and return coil with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 - b. Water-Cooled Condenser Connections: Comply with requirements in Division 23 Section "Hydronic Piping". Connect to supply and return with shutoff-duty valve and union or flange on the supply connection and with throttling-duty valve and union or flange on the return connection.
 2. Where installing piping adjacent to equipment, allow space for service and maintenance of equipment.
 3. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts". Drawings indicate the general arrangement of ducts. Connect supply and return, **as directed**, ducts to self-contained air-conditioners with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories".
- C. Field Quality Control
1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 2. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 3. Tests and Inspections:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 4. Units will be considered defective if they do not pass tests and inspections.
 5. Prepare test and inspection reports.
- D. Startup Service
1. Engage a factory-authorized service representative to perform **OR** perform startup service, **as directed**.
- E. Demonstration
1. Engage a factory-authorized service representative to train **OR train** the Owner's maintenance personnel, **as directed** to adjust, operate, and maintain units.

END OF SECTION 23 74 16 13b

SECTION 23 74 16 13c - UNIT VENTILATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for unit ventilators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes unit ventilators and accessories with the following heating and cooling features:
 - a. Hydronic, Steam, and Electric heating coil.
 - b. Hydronic, Steam, and Electric reheat coil.
 - c. Hydronic and Direct-expansion refrigerant cooling coil.

C. Definitions

1. BAS: Building automation system.
2. HGBP: Hot-gas bypass.

D. Submittals

1. Product Data: Include rated capacities, operating characteristics, and furnished specialties and accessories for each unit type and configuration.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Plans, elevations, sections, and details.
 - b. Details of anchorages and attachments to structure and to supported equipment.
 - c. Wiring Diagrams: Power, signal, and control wiring.
4. Manufacturer Seismic Qualification Certification: Submit certification that unit ventilators, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.
3. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
4. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Compressor failure.
 - 2) Condenser coil leak.
 - b. Warranty Period: Four **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
 - c. Warranty Period (Compressor Only): Five **OR** 10, **as directed**, years from date of Final Completion.
 - d. Warranty Period (Condenser Coil Only): Five years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Units

1. Description: Factory-packaged and -tested units rated according to ARI 840, ASHRAE 33, and UL 1995, including finished cabinet, filter, cooling coil, drain pan, supply-air fan and motor in blow-through **OR** draw-through, **as directed**, configuration, and hydronic cooling coil.

B. Cabinets

1. Insulation: Minimum **1/2-inch (13-mm) OR 1-inch (25-mm), as directed**, thick, coated glass fiber **OR** foil-covered, closed-cell foam **OR** matte-finish, closed-cell foam, **as directed**, complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 - a. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
2. Drain Pans: Plastic **OR** Insulated galvanized steel with plastic liner, **as directed**, formed as required by ASHRAE 62.1. Drain pan shall be removable, **as directed**.
3. Cabinet Frame and Access Panels: Welded-steel frame with removable panels fastened with hex-head tamperproof fasteners and key-operated control and valve access doors, **as directed**.
 - a. Steel components exposed to moisture shall be hot-dip galvanized after fabrication.
4. Cabinet Finish: Baked-on primer ready for field painting.
5. Cabinet Finish: Baked enamel, in manufacturer's standard **OR** custom, **as directed**, paint color as selected by the Owner.
6. Indoor-Supply-Air Grille: Steel **OR** Aluminum, **as directed**, double deflection, adjustable **OR** adjustable linear bar, **as directed**.
7. Return-Air Inlet: Front toe space **OR** Back inlet with top inlet grille, **as directed**.
8. End Panels: Matching material and finish of unit ventilator.
9. Outdoor-Air Wall Box: Minimum **0.1265-inch- (3.2-mm-)** thick, aluminum, rain-resistant louver and box with integral eliminators and bird screen.
 - a. Louver Configuration: Horizontal **OR** Vertical, **as directed**, rain-resistant louver.
 - b. Louver Material: Aluminum **OR** Steel, **as directed**.
 - c. Bird Screen: **1/2-inch (13-mm)** mesh screen on interior side of louver.
 - d. Decorative Grille: On outside of intake.
 - e. Finish: Anodized aluminum **OR** Baked enamel, **as directed**, color as selected by the Owner from manufacturer's standard **OR** custom, **as directed**, colors.

C. Coils

1. Test and rate unit ventilator coils according to ASHRAE 33.
2. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, rated for a minimum working pressure of **200 psig (1378 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.

3. Steam Coils: Copper distributing, **as directed**, tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, rated for a minimum working pressure of **75 psig (517 kPa)**.
 4. Electric-Resistance Heating Coils: Nickel-chromium heating wire or tubular elements in coil fins, free of expansion noise and hum, with fuses in terminal box for overcurrent protection, and continuous limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
 5. Indoor Refrigerant Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and brazed joints at fittings. Comply with ARI 210/240, and leak test to minimum **450 psig (3105 kPa)** for a minimum **300-psig (2070-kPa)** working pressure. Include thermal expansion valve.
- D. Indoor Fan
1. Fan and Motor Board: Removable.
 - a. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels; and aluminum, painted-steel, or galvanized-steel fan scrolls.
 - b. Fan Shaft and Bearings: Hollow steel shaft with permanently lubricated, resiliently mounted bearings.
 - c. Motor: Permanently lubricated, multispeed, resiliently mounted on motor board. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - d. Wiring Termination: Connect motor to chassis wiring with plug connection.
- E. Dampers
1. Mixing Dampers: Galvanized-steel blades with edge and end seals and nylon bearings; with electric **OR** pneumatic, **as directed**, actuator.
 2. Outdoor-Air Dampers: Galvanized-steel blades with edge and end seals and nylon bearings; with electric **OR** pneumatic, **as directed**, actuator.
 3. Face and Bypass Dampers: Galvanized-steel damper blades with edge and end seals and nylon bearings; with factory-mounted electric **OR** pneumatic, **as directed**, actuator.
 4. Comply with ASHRAE/IESNA 90.1.
- F. Accessories
1. Exhaust Shutter: Barometric **OR** Motorized, modulating, **as directed**, type designed to limit room pressure to maximum **0.10-inch wg (25 kPa)** with steel **OR** aluminum **OR** fabric, **as directed**, damper blades including edge and end seals, in galvanized-steel frame with outdoor **OR** indoor **OR** outdoor and interior, **as directed**, wall grille.
 2. Subbase: Sheet metal floor-mounting base with leveling screws and black enamel finish.
 3. Insulated false back with gasket seals on wall and outdoor-air plenum.
 - a. Insulation: Minimum **1/2-inch (13-mm) OR 1-inch (25-mm)**, **as directed**, thick, coated glass fiber **OR** foil-covered, closed-cell foam **OR** matte-finish, closed-cell foam, **as directed**, complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 - 1) Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - 2) Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 4. Return-air plenum, **6 inches (150 mm)** thick, designed to take return air from top inlet grilles in cabinets on both sides of unit ventilator with gasket seals on wall and outdoor-air plenum extension.
 5. Duct flanges for supply-, return-, and outdoor-air connections.
 6. Radiation Grille: Steel **OR** Aluminum, **as directed**, linear-bar **OR** stamped, **as directed**, grille with finish to match discharge-air grille.

7. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Washable Foam: 70 percent arrestance and 3 MERV.
OR
Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
OR
Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.
8. Energy Recovery Wheel:
 - a. Casing: Steel with manufacturer's standard paint coating and with the following:
 - 1) Integral purge section.
 - 2) Casing seals on periphery of rotor, on duct divider, and on purge section.
 - 3) Support rotor on grease-lubricated ball bearings with extended grease fittings. Mount horizontal wheels on tapered roller bearing.
 - b. Rotor: Corrugated-aluminum, segmented wheel strengthened with radial spokes, and having nontoxic, noncorrosive silica-gel desiccant coating. Construct media for passing maximum 800-micrometer solids and maximum 0.04 percent cross contamination by volume of exhaust air. Drive rotor with belt around outside of rotor.
 - c. Defrost Coils: Electric defrost coil in the exhaust airstream.
 - d. Drive: Fractional horsepower motor and gear reducer, with speed changed by adjustable variable frequency controller.
 - e. Inlet and Discharge Fans: Forward curved, centrifugal; resiliently mounted with flexible duct connections.
 - 1) Motor and Drive: Permanently lubricated, direct driven. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - f. Filters: **1-inch- (25-mm-)** thick, disposable type, mounted in galvanized-steel frame upstream of energy recovery wheel in both supply and exhaust airstreams.
 - g. Electrical: Single electrical connection from attached unit ventilator.
- G. Factory Hydronic Piping Package
 1. Piping: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M Type C), as directed**, copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet. Crossover piping, **NPS 1-1/2 (DN 40) OR NPS 2 (DN 50), as directed**, with shutoff valves.
 2. Control Valves: Electric **OR** Pneumatic, **as directed**, actuators compatible with terminal controller and building controls.
 - a. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for dual-temperature-water coil.
 - b. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for chilled-water coil.
 - c. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for hot-water heating coil.
 - d. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for hot-water reheat coil.
 3. Hose Kits: Minimum **400-psig (2758-kPa)** working pressure, and operating temperatures from **33 to 211 deg F (0.5 to 99 deg C)**. Tag hose kits to equipment designations.
 - a. Length: **24 inches (600 mm) OR 36 inches (900 mm), as directed**.
 - b. Minimum Diameter: Equal to unit ventilator connection size.
 4. Isolation Valves, Strainers, Unions, and Balance Valves:
 - a. Two-Piece Ball Valves: Bronze body with stainless-steel ball and stem and galvanized-steel lever handle for each supply and return connection. If balancing device is combination shutoff type with memory stop, isolation valve may be omitted on the return.
 - b. Calibrated-Orifice Balancing Valves: Bronze body, ball type; **125-psig (860-kPa)** working pressure, **250 deg F (121 deg C)** maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.

- c. Automatic Flow-Control Valve: Brass or ferrous-metal body; **300-psig (2070-kPa)** working pressure at **250 deg F (121 deg C)**, with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of **2 to 80 psig (13.8 to 552 kPa)**.
 - d. Y-Pattern Hydronic Strainers: Cast-iron body (ASTM A 126, Class B); **125-psig (860-kPa)** working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum **NPS 1/2 (DN 15)** hose-end, full-port, ball-type blowdown valve in drain connection.
 - e. Wrought-Copper Unions: ASME B16.22.
- H. Remote Condensing Units
1. Description: Factory assembled and tested; consisting of compressors, condenser coils, fans, motors, refrigerant receiver, and operating controls. Construct, test, and rate condensing units according to ARI 210/240 and ASHRAE 15.
 2. Casing: Steel with baked-enamel finish; removable panels for access to controls, weep holes for water drainage, and mounting holes in base.
 - a. Casing Finish: Baked enamel, in manufacturer's standard **OR** custom, **as directed**, paint color as selected by the Owner.
 3. Compressor: Hermetic, scroll **OR** reciprocating, **as directed**, type; internally isolated for vibration with factory-installed safety devices as follows:
 - a. Antirecycle timer.
 - b. High-pressure cutout.
 - c. Low-pressure cutout or loss-of-charge switch.
 - d. Internal thermal-overload protection.
 - e. Current and voltage sensitive safety devices.
 4. Compressor Motor: Start capacitor, relay, and contactor. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 5. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
 6. Refrigerant Piping Materials:
 - a. Drawn-Temper Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)**.
 - b. Annealed-Temper Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type K (ASTM B 88M, Type A), as directed**.
 - c. Wrought-Copper Fittings: ASME B16.22.
 7. Refrigerant: R-407C **OR** R-410A, **as directed**.
 8. Low ambient controls to permit operation down to **45 deg F (7 deg C)**.
 9. Crankcase heater.
 10. Charging and service fittings on exterior of casing.
 11. Filter dryer.
 12. Air-to-Air Heat Pump: Pilot-operated, sliding-type reversing valve with replaceable magnetic coil, and controls for air-to-air heat pump operation with supplemental heat.
 13. HGBP, constant-pressure expansion valve and controls to maintain continuous refrigeration system operation at 10 percent of full load.
 14. Condenser: Copper-tube, aluminum-fin coil, with liquid subcooler.
 15. Condenser Fan: Direct-drive, aluminum propeller fan; motor with thermal-overload protection.
 - a. Motor: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 16. Accessories: Polyethylene mounting base to provide a permanent foundation.
- I. Integral Cooling Chassis
1. Description: Assembly mounted within unit ventilator, factory assembled and tested; consisting of compressors, condenser coils, fans, motors, and refrigerant receivers; removable for maintenance, with plug and receptacle connections for control and power wiring. Construct, test, and rate condensing units according to ARI 210/240 and ASHRAE 15.
 2. Casing: Galvanized steel with removable panels for access to controls and refrigerant piping.
 3. Exterior Louver: Extruded aluminum.

4. Compressor: Hermetic, scroll **OR** reciprocating, **as directed**, type; internally isolated for vibration with factory-installed safety devices as follows:
 - a. Antirecycle timer.
 - b. High-pressure cutout.
 - c. Low-pressure cutout or loss-of-charge switch.
 - d. Internal thermal-overload protection.
 - e. Current- and voltage-sensitive safety devices.
 5. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
 6. Refrigerant Piping Materials:
 - a. Drawn-Temper Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)**.
 - b. Annealed-Temper Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type K (ASTM B 88M, Type A), as directed**.
 - c. Wrought-Copper Fittings: ASME B16.22.
 7. Refrigerant: R-407C **OR** R-410A, **as directed**.
 8. Low ambient controls to permit operation down to **45 deg F (7 deg C)**.
 9. Crankcase heater.
 10. Charging and service fittings.
 11. Filter dryer.
 12. Air-to-Air Heat Pump: Pilot-operated, sliding-type reversing valve with replaceable magnetic coil, and controls for air-to-air heat pump operation with supplemental heat.
 13. HGBP, constant-pressure expansion valve and controls to maintain continuous refrigeration system operation at 10 percent of full load.
 14. Condenser: Copper-tube, aluminum-fin coil, with liquid subcooler.
 15. Direct-Driven Condenser Fan: Forward curved, double width, centrifugal; thermoplastic or painted-steel wheels and galvanized-steel fan scrolls.
 - a. Motor: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
- J. Basic Unit Controls
1. Control devices and operational sequences are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
OR
Basic Unit Controls:
 - a. Control voltage transformer.
 - b. Wall-mounting **OR** Unit-mounted, **as directed**, thermostat with the following features.
 - 1) Heat-cool-off switch.
 - 2) Fan on-auto switch.
 - 3) Fan-speed switch.
 - 4) Manual **OR** Automatic, **as directed**, changeover.
 - 5) Adjustable deadband.
 - 6) Concealed **OR** Exposed, **as directed**, set point.
 - 7) Concealed **OR** Exposed, **as directed**, indication.
 - 8) Degree F **OR** Degree C, **as directed**, indication.
 - c. Wall-mounting **OR** Unit-mounted, **as directed**, humidistat.
 - 1) Concealed **OR** Exposed, **as directed**, set point.
 - 2) Concealed **OR** Exposed, **as directed**, indication.
 - d. Wall-mounting **OR** Unit-mounted, **as directed**, temperature sensor.
 - e. Unoccupied-period-override push button.
 - f. Data entry and access port.
 - 1) Input data includes room temperature and humidity set points, and occupied and unoccupied periods.
 - 2) Output data includes room temperature and humidity, supply-air temperature, entering-water temperature, operating mode, and status.
 2. DDC, **as directed**, Terminal Controller:

- a. Safety Controls Operation: Freezestat shall stop fan and close outdoor-air damper if air less than **38 deg F (3 deg C)** enters coils.
- b. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
- c. Unoccupied Period Override Operation: Two, **as directed**, hours.
- d. Dual-Temperature Coil Operation:
 - 1) Occupied Periods: When chilled water is available, open **OR** modulate, **as directed**, control valve if room temperature exceeds thermostat set point. When hot water is available, open **OR** modulate, **as directed**, control valve if room temperature falls below thermostat set point.
 - 2) Unoccupied Periods: When chilled water is available, close control valve. When hot water is available, open **OR** modulate, **as directed**, control valve if room temperature falls below thermostat setback temperature.
- e. Hydronic Cooling-Coil Operation:
 - 1) Occupied Periods: Open **OR** Modulate, **as directed**, control valve to provide cooling if room temperature exceeds thermostat set point.
 - 2) Unoccupied Periods: Close control valve.
- f. Refrigerant-Coil Operation:
 - 1) Occupied Periods: Start compressor to maintain room temperature.
 - 2) Unoccupied Periods: Stop compressor cooling **OR** Cycle compressor for heating to maintain setback temperature, **as directed**.
- g. Supplemental, **as directed**, Heating-Coil Operation:
 - 1) Occupied Periods: Open control valve **OR** Modulate control valve **OR** Energize electric-resistance coil, **as directed**, to provide heating if room temperature falls below thermostat set point.
 - 2) Unoccupied Periods: Start fan and open control valve **OR** modulate control valve **OR** energize electric-resistance coil, **as directed**, if room temperature falls below setback temperature.
 - 3) Switch refrigerant-reversing valve to operate supplemental coil for heating when outdoor temperature is below **25 deg F (4 deg C)**.
- h. Reheat-Coil Operation:
 - 1) Humidity Control for Occupied Periods: Humidistat opens control valve **OR** modulates control valve **OR** energizes electric-resistance coil, **as directed**, to provide heating. As room temperature rises above the set point, cooling coil valve opens **OR** modulates, **as directed**, to maintain room temperature.
 - 2) Humidity Control for Unoccupied Periods: Close control valve **OR** De-energize, **as directed**.
- i. Outdoor-Air Damper Operation: Open to 25 percent fixed minimum intake during occupied periods, and close during unoccupied periods.
- j. Outdoor-Air Damper Operation: Open to 25 percent fixed minimum intake, and maximum 100 percent of the fan capacity to comply with ASHRAE Cycle II during occupied periods, and close during unoccupied periods. Microprocessor controller shall permit air-side economizer operation when outdoor air is less than **60 deg F (15 deg C)**.
- k. Carbon Dioxide Sensor Operation: During occupied periods, reset minimum outdoor-air ratio down to minimum 10 percent to maintain maximum 800-ppm concentration.
- l. Face-and-Bypass Damper Operation: Position damper to face of coils until room temperature equals thermostat set point; bypass after room-temperature set point is achieved.
- m. Cooling Lockout: During economizer cycle operation, block out cooling.
- n. HGBP: Open HGBP solenoid valve to maintain minimum suction pressure at compressor.
- o. Energy Recovery Wheel Operation:
 - 1) Factory-mounted and -wired, starting relay and manual motor starter for field wiring.
 - 2) Occupied period is established by remote signal **OR** room occupancy sensor, **as directed**.
 - 3) Energy recovery wheel and inlet and discharge fans operate during occupied periods after room temperature set point has been achieved.

- 4) Energy recovery wheel operates during occupied periods, but stops when unit ventilator controls call for cooling, and outdoor-air temperatures permit free air cooling.
- 5) Energy recovery wheel and fans stop during unoccupied periods.
- p. Controller shall have volatile-memory backup.
3. BAS Interface Requirements:
 - a. Interface relay for scheduled operation.
 - b. Interface relay to provide indication of fault at the central workstation.
 - c. Provide BACnet **OR** LonWorks, **as directed**, interface for central BAS workstation for the following functions:
 - 1) Adjust set points.
 - 2) Unit ventilator start, stop, and operating status.
 - 3) Data inquiry to include outdoor-air damper position, **as directed**, supply- and room-air temperature and humidity, **as directed**.
 - 4) Occupied and unoccupied schedules.
4. Electrical Connection: Factory wire motors and controls for a single electrical connection.

K. Metal Shelves And Cabinets

1. Include manufacturer's standard cabinets to match unit ventilators with required installation hardware as indicated:
 - a. Open Shelving with Reinforced Shelves:
 - 1) Return-air plenum **OR** Radiation enclosure, **as directed**, and aluminum bar grille with finish to match unit ventilator grille.
 - 2) Through-piping enclosure with solid top.
 - b. Closed Shelving with Reinforced Shelves:
 - 1) Return-air plenum **OR** Radiation enclosure, **as directed**, and aluminum bar grille with finish to match unit ventilator grille.
 - 2) Through-piping enclosure with solid top.
 - 3) Two sliding doors with key-operated locks.
 - c. Utility compartment with access panel with key-operated lock.
 - d. Wall and corner filler sections, and end panels finished to match shelving.
2. Painted Finish: Manufacturer's standard **OR** custom, **as directed**, baked enamel, in color selected by the Owner, applied to shelving before shipping.
3. Cabinet Top: Plastic-laminate top in color and pattern selected by the Owner from manufacturer's standard **OR** custom, **as directed**, colors.

1.3 EXECUTION

A. Installation

1. Install unit ventilators to comply with NFPA 90A.
2. Suspend horizontal unit ventilators from structure with threaded steel rods and minimum **0.25-inch (6.35-mm)** static-deflection, elastomeric vibration isolation hanger **OR 1.0-inch (25-mm)** static-deflection spring hangers, **as directed**. Vibration isolators are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
3. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices **48 inches (1220 mm) OR 60 inches (1525 mm)**, **as directed**, above finished floor.
4. Refer to Division 23 Section "Packaged Compressor And Condenser Units" for condensing units matched to refrigerant cooling coil packaged in unit ventilators.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
 - a. Install piping adjacent to machine to allow service and maintenance.

- b. Connect piping to unit ventilator factory hydronic piping package. Install piping package if shipped loose.
 - c. Connect condensate drain to indirect waste.
 2. Install refrigerant piping as required by Division 23 Section "Refrigerant Piping", and add refrigerant as required to compensate for length of piping.
 3. Connect supply and return ducts to unit ventilators with flexible duct connectors specified in Division 23 Section "Air Duct Accessories". Comply with safety requirements in UL 1995 for duct connections.
 4. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 5. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
 1. Perform the following field tests and inspections and prepare test reports:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - c. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
 - d. Record temperatures entering and leaving energy recovery wheel when outdoor-air temperature is a minimum of **15 deg F (8.3 deg C)** higher, or **20 deg F (11 deg C)** lower, than room temperature.
 2. Remove and replace malfunctioning units and retest as specified above.
- D. Adjusting
 1. Adjust initial temperature and humidity set points.
 2. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
- E. Demonstration
 1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain unit ventilators.

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SECTION 23 74 23 13 - INDIRECT-FIRED, PACKAGED H&V UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for indirect-fired, H&V units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes indirect-fired H&V units with the following accessories:
 - a. Gas or Oil furnace.
 - b. Evaporative cooling package.

C. Submittals

1. Product Data: Include rated capacities, furnished specialties, and accessories.
2. Shop Drawings:
 - a. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
 - b. Mounting Details: For securing and flashing roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - c. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.
 - d. Wiring Diagrams: Power, signal, and control wiring.
3. Operation and maintenance data.
4. Warranty: Special warranty specified in this Section.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.

E. Warranty

1. Manufacturer's standard form in which manufacturer agrees to replace heat exchangers of indirect-fired H&V units that fail in materials or workmanship within five years **OR** 10 years, **as directed**, from date of Final Completion.

1.2 PRODUCTS

A. Packaged Units

1. Factory-assembled, prewired, self-contained unit consisting of cabinet, supply fan, controls, filters, evaporative cooling package, **as directed**, and indirect-fired gas **OR** oil, **as directed**, furnace to be installed outside **OR** inside, **as directed**, the building.

B. Cabinet

1. Cabinet: Single-wall **OR** Double-wall, **as directed**, galvanized-steel panels, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs. Cabinet shall be fully weatherized for outside installation, **as directed**.
2. Access Panels: Lift-out **OR** Piano hinged with cam-lock fasteners, **as directed**, for furnace and fan motor assemblies on both sides of unit.

3. Internal Insulation: Fibrous-glass duct lining, comply with ASTM C 1071, Type II, applied on complete unit for outside unit or furnace and fan sections only for inside unit.
 - a. Thickness: **1 inch (25 mm) OR 2 inches (50 mm), as directed.**
 - b. Insulation Adhesive: Comply with ASTM C 916, Type I.
 - c. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to casing without damaging liner when applied as recommended by manufacturer and without causing air leakage.
 4. Finish: Heat-resistant, baked enamel.
 5. Discharge: Horizontal-pattern **OR** Vertical-pattern, **as directed**, galvanized-steel assembly with diffusers incorporating individually adjustable vanes.
 6. Roof Curb: Full-perimeter curb of sheet metal, minimum **16 inches (400 mm)**, unless directed otherwise, high, with wood nailer, neoprene sealing strip, and welded Z-bar flashing.
- C. Supply-Air Fan
1. Fan Type: Centrifugal, rated according to AMCA 210; statically and dynamically balanced, galvanized steel; mounted on solid-steel shaft with heavy-duty, self-aligning, permanently lubricated ball bearings **OR** pillow-block bearings rated for L50 or 200,000 hours with external grease fittings, **as directed.**
 2. Motor: Open dripproof **OR** Totally enclosed, **as directed**, single-speed motor.
 3. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly.
 4. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with restrained (for seismic areas), elastomeric **OR** spring, **as directed**, isolators.
- D. Outdoor-Air Intake
1. Outdoor-Air Hood: Galvanized steel with rain baffles, bird screen, and finish to match cabinet; and sized to supply maximum 30 percent **OR** 100 percent, **as directed**, outdoor air.
- E. Air Filters
1. Comply with NFPA 90A.
 2. Cleanable Filters: **1-inch- (25-mm-) OR 2-inch- (50-mm-), as directed**, thick, cleanable metal mesh.
 3. Disposable Panel Filters: **1-inch- (25-mm-) OR 2-inch- (50-mm-), as directed**, thick, factory-fabricated, flat-panel-type, disposable air filters with holding frames, with a minimum efficiency report value of 6 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1.
 - a. Media: Interlaced glass **OR** polyester, **as directed**, fibers.
 - b. Frame: Galvanized steel.
- F. Dampers
1. Outdoor-Air and Return-Air, **as directed**, Damper: Galvanized-steel, opposed-blade dampers with vinyl blade seals and stainless-steel jamb seals, having a maximum leakage of **10 cfm/sq. ft. (51 L/s per sq. m)** of damper area, at differential pressure of **2-inch wg (448 Pa)**.
 2. Damper Operator: Direct coupled, electronic with spring return or fully modulating as required by the control sequence.
- G. Indirect-Fired Gas Furnace
1. Description: Factory assembled, piped, and wired; and complying with ANSI Z21.47, "Gas-Fired Central Furnaces," and NFPA 54, "National Fuel Gas Code."
 - a. AGA Approval: Designed and certified by and bearing label of AGA.
 - b. Burners: Aluminized steel with stainless-steel inserts **OR** Stainless steel, **as directed.**
 - 1) Gas Control Valve: Single stage **OR** Two stage **OR** Modulating, **as directed.**
 - 2) Fuel: Natural **OR** Propane, **as directed**, gas.
 - 3) Minimum Thermal Efficiency: 80 percent.
 - 4) Ignition: Electronically controlled electric spark with flame sensor.
 - 5) High-Altitude Model **OR** Kit, **as directed**: For Project elevation above sea level.

2. Venting: Gravity vented.
 3. Power Vent: Integral, motorized centrifugal fan interlocked with gas valve.
 4. Combustion-Air Intake: Separate combustion-air intake and vent terminal assembly.
 5. Inside Unit External Housing: Steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.
 6. Outside Unit External Housing: Weatherproof steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.
 - a. External Casing and Cabinet Finish: Baked enamel **OR** Powder coating, **as directed**, over corrosion-resistant-treated surface in color to match fan section.
 7. Internal Casing: Aluminized steel, arranged to contain airflow, with duct flanges at inlet and outlet.
 8. Heat Exchanger: Aluminized **OR** Stainless steel, **as directed**.
 9. Heat-Exchanger Drain Pan: Stainless steel.
 10. Safety Controls:
 - a. Vent Flow Verification: Differential pressure switch to verify open vent **OR** Flame rollout switch, **as directed**.
 - b. Control Transformer: 24-V ac.
 - c. High Limit: Thermal switch or fuse to stop burner.
 - d. Gas Train: Regulated, redundant, 24-V ac gas valve assembly containing pilot solenoid valve, hydraulic-modulating **OR** electronic-modulating, **as directed**, temperature control valve, pilot filter, pressure regulator, pilot shutoff, and manual shutoff all in one body.
 - e. Purge-period timer shall automatically delay burner ignition and bypass low-limit control.
 - f. Gas Manifold: Safety switches and controls to comply with ANSI standards and FMG **OR** IRI, **as directed**.
 - g. Airflow Proving Switch: Differential pressure switch senses correct airflow before energizing pilot.
 - h. Automatic-Reset, High-Limit Control Device: Stops burner and closes main gas valve if high-limit temperature is exceeded.
 - i. Safety Lockout Switch: Locks out ignition sequence if burner fails to light after three tries. Controls are reset manually by turning the unit off and on.
- H. Oil-Fired Furnace
1. Description: Factory assembled, piped, and wired; and complying with UL 727, "Oil-Fired Central Furnaces."
 2. Inside Unit External Housing: Steel cabinet with integral support inserts and removable bottom arranged to serve as a drain pan.
 3. Outside Unit External Housing: Weatherproof steel cabinet with integral support inserts and removable bottom arranged to serve as drain pan.
 - a. External Casing and Cabinet Finish: Baked enamel **OR** Powder coating, **as directed**, over corrosion-resistant-treated surface in color to match fan section.
 4. Internal Casing: Aluminized steel, arranged to contain airflow, with duct flanges at inlet and outlet.
 5. Heat Exchanger: Welded, stainless steel, unless directed otherwise, with flame observation port, carbon dioxide sample port, and access panels for clean-out and service.
 6. Burners: Flame-retention, pressure-atomizing, forced-draft, gun type; with integral fuel pump and electronic spark ignition.
 - a. Fuel: No. 2, unless directed otherwise, fuel oil.
 - b. Minimum Thermal Efficiency: 80 percent **OR** 81 percent, **as directed**.
 - c. Ignition: Electronically controlled electric spark with flame sensor.
 7. Safety Controls:
 - a. Factory piped and wired to electrical junction box mounted on unit.
 - b. Oil-pressure switch.
 - c. Control Transformer: Integrally mounted 24-V ac.
 - d. Cad-cell safety system.
 - e. Manual reset flame safety.
 8. Accessories:

- a. Factory mounted and wired to electrical junction box on unit.
 - b. Oil Booster Pump: **30-gph (108-L/h) OR 70-gph (252-L/h)**, **as directed**, capacity; motor and 2-stage fuel unit with pressure-regulating valve and strainer.
 - c. Oil-pressure relief valve.
 - d. Outdoor Combustion-Air Adapter: Sealed to housing and fitted with quick access cover, or door and fitting for terminating outdoor-air duct.
- I. Evaporative Cooling Package
1. Cabinet: Single-wall **OR** Double-wall, **as directed**, galvanized- or aluminized-steel panels lined with ABS polymer, as required, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs and having a stainless-steel reservoir with overflow and drain with full-port, brass-fitted ball valve. Cabinet shall be fully weatherized for outside installation, **as directed**.
 - a. External Casing and Cabinet Finish: Baked enamel, **unless directed otherwise to be** Powder coating, over corrosion-resistant-treated surface in color to match fan section.
 2. Media: UL 900, Class 2, **6-inch- (150-mm-) OR 8-inch- (200-mm-) OR 12-inch- (300-mm-)**, **as directed**, thick cellulose **OR** glass-fiber, **as directed**, media with rigidizing agents, fungicides, and wetting agents. Minimum 90 percent contact factor.
 - a. Moisture elimination pad.
 3. Water-Circulation System: Submersible centrifugal sump pump with inlet strainer, brass balancing valve located in pump discharge, and thermally protected motor; water distribution troughs or piping at top of media pads; and float-operated, makeup water and bleed-off valves.
 - a. Automatic Fill and Drain Kit: Water supply and drain, solenoid valves for initial sump fill and for draining sump.
 4. Water-Saver System: Timer, solenoid valve, and water distribution piping to apply the water supply to the media.
- J. Controls
1. Factory-wired, fuse-protected control transformer, connection for power supply and field-wired unit to remote control panel.
 2. Control Panel: Surface-mounted **OR** Recessed, **as directed**, with trim ring, remote panel, with engraved plastic cover, and the following lights and switches:
 - a. On-off **OR** On-off-auto, **as directed**, fan switch.
 - b. Summer-winter **OR** Heat-off-cool, **as directed**, switch. Automatic changeover, **as directed**.
 - c. Supply-fan operation indicating light.
 - d. Heating operation indicating light.
 - e. Damper position potentiometer.
 - f. Thermostat.
 - g. Cooling operation indicating light.
 - h. Dirty-filter indicating light operated by unit-mounted differential pressure switch.
 - i. Safety-lockout indicating light.
 3. Control Devices:
 - a. Remote Thermostat: Adjustable room thermostat with temperature readout.
 - b. Remote Setback Thermostat: Adjustable room thermostat without temperature readout.
 - c. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.
 - d. Fire-Protection Thermostats: Fixed or adjustable settings to operate at not less than **75 deg F (24 deg C)** above normal maximum operating temperature.
 - e. Timers: Seven-day, programming-switch timer with synchronous-timing motor and seven-day dial; continuously charged, nickel-cadmium-battery-driven, eight-hour, power-failure carryover; multiple-switch trippers; minimum of two and maximum of eight signals per day with two normally open and two normally closed output contacts.**OR**

- Timers: Solid-state, programmable time control with 4 separate programs; 24-hour battery carryover; individual on-off-auto switches for each program; 365-day calendar with 20 programmable holidays; choice of fail-safe operation for each program; and system fault alarm.
- f. Ionization-Type Smoke Detectors: 24-V dc, nominal; self-restoring; plug-in arrangement; integral visual-indicating light; sensitivity that can be tested and adjusted in place after installation; integral addressable module; remote controllability; responsive to both visible and invisible products of combustion; self-compensating for changes in environmental conditions.
 4. Fan Control: Interlock fan to start with exhaust fan(s). See Division 23 Section(s) "Axial Hvac Fans" OR "Centrifugal Hvac Fans" OR "Hvac Power Ventilators" OR "Sequence Of Operations For Hvac Controls", **as directed**, for exhaust fan controls.
 5. Fan Control: Timer starts and stops direct-fired H&V unit and exhaust fan(s).
 - a. Fan-Discharge Thermostat (for units with evaporative cooling package): Stops fan when discharge-air temperature is less than **40 deg F (4 deg C)**.
 - b. Smoke detectors, located in supply and return, **as directed**, air, shall stop fans when the presence of smoke is detected.
 6. Outdoor-Air Damper Control, 100 Percent Outdoor-Air Units: Outdoor-air damper shall open when supply fan starts, and close when fan stops.
 7. Mixed Outdoor- and Return-Air Damper Control: When fan is running, outdoor- and return-air dampers shall modulate to supply minimum outdoor air as follows:
 - a. Minimum 30 percent outdoor air.
 - b. Outdoor-air quantity adjusted by potentiometer on control panel.
 - c. Outdoor-air quantity to maintain minimum building static pressure.
 8. Temperature Control: Operates gas valve to maintain supply-air temperature.
 - a. Operates gas valve to maintain discharge-air temperature with factory-mounted sensor in blower outlet.
 - b. Operates gas valve to maintain space temperature with wall-mounting, field-wired sensor with temperature adjustment, **as directed**, and unit-mounted control adjustment, **OR** and adjustment on remote-control panel, **as directed**.
 - c. Timer shall select remote setback thermostat to maintain space temperature at **50 deg F (10 deg C)**.
 - d. Furnace Control: Two or four steps of control using one or two furnace sections in series. **OR**
Furnace Control: 20 to 100 percent modulation of the firing rate. 10 to 100 percent with dual furnace units.
 9. Evaporative Cooling Controls:
 - a. Start and stop water-circulation-system sump pump to maintain space temperature.
 - b. Automatic Fill Control: A switch in the unit control panel shall close sump drain valve and open makeup water valve.
 - c. Automatic Drain Control: Opens sump drain valve and closes makeup water valve from a switch in the unit control panel **OR** when an outside thermostat senses **40 deg F (4 deg C)** or less, **as directed**.
 - d. Water-Saver System: Remote thermostat shall open water-supply valve to maintain dry-bulb temperature in space. Timer shall activate thermostat circuit.
 10. DDC: Stand-alone control module for link between unit controls and DDC system. Control module shall be compatible with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac".
 - a. Provide start and stop interface relay, and relay to notify DDC system alarm condition.
 - b. Provide hardware interface or additional sensors as follows:
 - 1) Room temperature.
 - 2) Discharge-air temperature.
 - 3) Furnace operating.

K. Motors

1. Comply with requirements are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".

1.3 EXECUTION

A. Installation

1. Install gas-fired units according to NFPA 54, "National Fuel Gas Code."
2. Install oil-fired duct heaters and associated fuel and vent piping according to NFPA 31 and applicable local codes and regulations.
3. Install roof curb on roof structure, according to ARI Guideline B **OR** NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts," **as directed**. Install and secure direct-fired H&V units on curbs, and coordinate roof penetrations and flashing with roof construction.
OR
Install restrained vibration isolation roof-curb rails on roof structure according to ARI Guideline B **OR** NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts," **as directed**. Install and secure indirect-fired H&V units on rails, and coordinate roof penetrations and flashing with roof construction. Restrained isolation roof-curb rails are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
4. Install suspended units from spring hangers with minimum **1-inch (25-mm)** static deflection; refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
5. Install floor-mounted units on restrained, **as directed**, spring isolators with minimum **1-inch (25-mm)** static deflection; refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
6. Install controls and equipment shipped by manufacturer for field installation with indirect-fired H&V units.
7. Piping Connections: Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to machine to allow service and maintenance.
 - a. Gas Piping: Comply with requirements in Division 23 Section(s) "Facility Natural-gas Piping" **OR** "Facility Liquefied-petroleum Gas Piping", **as directed**. Connect gas piping with shutoff valve and union and with sufficient clearance for burner removal and service. Provide AGA-approved flexible connectors.
 - b. Fuel Oil Piping: Comply with requirements in Division 23 Section "Facility Fuel-oil Piping". Connect to fuel oil supply and return piping with shutoff valve and union at each connection.
 - c. Makeup Water: Comply with requirements in Division 22 Section "Domestic Water Piping" for valves and accessories on piping connections to evaporative cooling units.
 - d. Drain: Comply with requirements in Division 22 Section "Sanitary Waste And Vent Piping" for traps and accessories on piping connections to evaporative cooling units.
8. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts". Drawings indicate the general arrangement of ducts. Connect supply and return, **as directed**, ducts to indirect-fired H&V units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories".
9. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
10. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

END OF SECTION 23 74 23 13

SECTION 23 74 23 13a - DIRECT-FIRED, MAKEUP AIR UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for direct-fired H&V units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes direct-fired H&V units with an evaporative cooling package, **as directed**.

C. Submittals

1. Product Data: Include rated capacities, furnished specialties, and accessories.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings:
 - a. Mounting Details: For securing and flashing roof curb to roof structure. Indicate coordinating requirements with roof membrane system.
 - b. Wiring Diagrams: Power, signal, and control wiring.
4. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.
3. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
4. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.2 PRODUCTS

A. Packaged Units

1. Factory-assembled, prewired, self-contained unit consisting of cabinet, supply fan, controls, filters, **as directed**, evaporative cooling package, **as directed**, and direct-fired gas furnace to be installed outside **OR** inside, **as directed**, the building.

B. Cabinet

1. Cabinet: Single-wall **OR** Double-wall, **as directed**, galvanized-steel panels, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs. Cabinet shall be fully weatherized for outside installation, **as directed**.
2. Access Panels: Lift-out **OR** Piano hinged with cam-lock fasteners, **as directed**, for furnace and fan motor assemblies on both sides of unit.
3. Internal Insulation: Fibrous-glass duct lining, comply with ASTM C 1071, Type II, applied on complete unit **OR** furnace and fan sections only, **as directed**.
 - a. Thickness: **1 inch (25 mm) OR 2 inches (50 mm)**, **as directed**.
 - b. Insulation Adhesive: Comply with ASTM C 916, Type I.

- c. Mechanical Fasteners: Galvanized steel suitable for adhesive attachment, mechanical attachment, or welding attachment to casing without damaging liner when applied as recommended by manufacturer and without causing air leakage.
 4. Finish: Heat-resistant, baked enamel.
 5. Discharge: Horizontal **OR** Vertical, **as directed**, -pattern, galvanized-steel assembly with diffusers incorporating individually adjustable vanes.
 6. Roof Curb: Full-perimeter curb of sheet metal, minimum **16 inches (400 mm)** high, with wood nailer, neoprene sealing strip, and welded Z-bar flashing.
 7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
- C. Supply-Air Fan
1. Fan Type: Centrifugal, rated according to AMCA 210; statically and dynamically balanced, galvanized steel; mounted on solid-steel shaft with heavy-duty, self-aligning, permanently lubricated ball bearings **OR** pillow-block bearings rated for L50 or 200,000 hours with external grease fittings, **as directed**.
 2. Motor: Open dripproof **OR** Totally enclosed, **as directed**, single **OR** two, **as directed**, -speed motor.
 3. Drive: V-belt drive with matching fan pulley and adjustable motor sheaves and belt assembly.
 4. Mounting: Fan wheel, motor, and drives shall be mounted in fan casing with restrained, **as directed**, elastomeric **OR** spring, **as directed**, isolators.
- D. Outdoor-Air Intake
1. Outdoor-Air Hood: Galvanized steel with rain baffles, bird screen complying with ASHRAE 62.1, **as directed**, and finish to match cabinet; and sized to supply maximum 100 percent outdoor air.
- E. Air Filters
1. Comply with NFPA 90A.
 2. Cleanable Filters: **1-inch- (25-mm-)** **OR** **2-inch-0 (50-mm-)**, **as directed**, thick, cleanable metal mesh.
 3. Disposable Panel Filters: **1-inch- (25-mm-)** **OR** **2-inch- (50-mm-)**, **as directed**, thick, factory-fabricated, flat-panel-type, disposable air filters with holding frames, with a minimum efficiency report value of 6 according to ASHRAE 52.2 and 90 percent average arrestance according to ASHRAE 52.1, **as directed**.
 - a. Media: Interlaced glass **OR** polyester, **as directed**, fibers.
 - b. Frame: Galvanized steel.
- F. Dampers
1. Outdoor-Air and Return-Air, **as directed**, Damper: Galvanized-steel, opposed-blade dampers with vinyl blade seals and stainless-steel jamb seals, having a maximum leakage of **10 cfm/sq. ft. (51 L/s per sq. m)** of damper area, at differential pressure of **2-inch wg (448 Pa)**.
 2. Fan-Discharge Dampers: Galvanized-steel, opposed-blade damper.
 3. Balancing/Bypass Dampers: Galvanized-steel, opposed-blade damper.
 4. Damper Operator: Direct coupled, electronic with spring return or fully modulating as required by the control sequence.
- G. Direct-Fired Gas Furnace
1. Description: Factory assembled, piped, and wired; and complying with ANSI Z83.4, "Direct Gas-Fired Make-Up Air Heaters"; ANSI Z83.18, "Direct Gas-Fired Industrial Air Heaters"; and NFPA 54, "National Fuel Gas Code."
 2. Inside Unit External Housing: Steel cabinet with integral support inserts.
 3. Outside Unit External Housing: Weatherproof steel cabinet with integral support inserts.
 - a. External Casing and Cabinet Finish: Baked enamel **OR** Powder coating, **as directed**, over corrosion-resistant-treated surface in color to match fan section.
 4. Burners: Cast-iron burner with stainless-steel mixing plates.

- a. Control Valve: Single stage **OR** Two stage **OR** Modulating with minimum turndown ratio of 25:1 or as otherwise directed, **as directed**.
 - b. Fuel: Natural **OR** Propane, **as directed**, gas.
 - c. Pilot: Electrically ignited by hot-surface ceramic igniter.
5. Safety Controls:
- a. Gas Manifold: Safety switches and controls to comply with ANSI standards **OR** FMG **OR** IRI, **as directed**.
 - b. Purge-Period Timer: Automatically delays burner ignition and bypasses low-limit control.
 - c. Airflow Proving Switch: Dual pressure switch senses correct airflow before energizing pilot and requires airflow to be maintained within minimum and maximum pressure settings across burner.
 - d. Manual-Reset, High-Limit Control Device: Stops burner and closes main gas valve if high-limit temperature is exceeded.
 - e. Gas Train: Redundant, automatic main gas valves, electric pilot valve, hydraulic **OR** electronic, **as directed**,-modulating temperature control valve, main and pilot gas regulators, main and pilot manual shutoff valves, main and pilot pressure taps, and high-low gas pressure switches, **as directed**, to comply with IRI requirements **OR** to comply with FMG requirements, **as directed**.
 - f. Safety Lockout Switch: Locks out ignition sequence if burner fails to light after three tries. Controls are reset manually by turning the unit off and on.
 - g. Control Transformer: Integrally mounted 24-V ac.
- H. Evaporative Cooling Package
1. Cabinet: Single-wall **OR** Double-wall, **as directed**, galvanized- or aluminized-steel panels lined with ABS polymer, **as directed**, formed to ensure rigidity and supported by galvanized-steel channels or structural channel supports with lifting lugs and having a stainless-steel reservoir with overflow and drain with full-port, brass-fitted ball valve. Cabinet shall be fully weatherized for outside installation, **as directed**.
 - a. External Casing and Cabinet Finish: Baked enamel **OR** Powder coating, **as directed**, over corrosion-resistant-treated surface in color to match fan section.
 2. Media: UL 900, Class 2, **6-inch- (150-mm-)** **OR** **8-inch- (200-mm-)** **OR** **12-inch- (300-mm-)**, **as directed**, thick cellulose **OR** glass-fiber, **as directed**, media with rigidizing agents, fungicides, and wetting agents. Minimum 90 percent contact factor.
 - a. Moisture elimination pad.
 3. Water-Circulation System: Submersible centrifugal sump pump with inlet strainer, brass balancing valve located in pump discharge, and thermally protected motor; water distribution troughs or piping at top of media pads; and float-operated, makeup water and bleed-off valves.
 - a. Automatic Fill and Drain Kit: Water supply and drain, solenoid valves for initial sump fill and for draining sump.
 4. Water-Saver System: Timer, solenoid valve, and water distribution piping to apply the water supply to the media.
 5. Comply with applicable requirements in ASHRAE 62.1.
- I. Controls
1. Factory-wired, fuse-protected control transformer, connection for power supply and field-wired unit to remote control panel.
 2. Control Panel: Surface-mounted **OR** Recessed, with trim ring, **as directed**, remote panel, with engraved plastic cover, and the following lights and switches:
 - a. On-off **OR** On-off-auto, **as directed**, switch.
 - b. Summer-winter **OR** Heat-off-cool, **as directed**, switch. Automatic changeover, **as directed**.
 - c. Supply-fan operation indicating light.
 - d. Heating operation indicating light.
 - e. Damper position potentiometer.
 - f. Thermostat.
 - g. Cooling operation indicating light.

- b. Return-air dampers shall modulate in response to potentiometer on control panel **OR** building pressure control, **as directed**.
- c. Balancing/bypass dampers shall modulate to maintain minimum air velocity through the burner.
- 7. Temperature Control: Operates gas valve to maintain supply-air or room temperature.
 - a. Operates gas valve to maintain discharge-air temperature with factory-mounted sensor in fan outlet.
OR
Operates gas valve to maintain space temperature with wall-mounting, field-wired sensor with temperature adjustment, **as directed**, and unit-mounted control adjustment **OR** and adjustment on remote control panel, **as directed**.
 - b. Timer shall select remote setback thermostat to maintain space temperature at **50 deg F (10 deg C)**.
- 8. Evaporative Cooling Controls:
 - a. Start and stop water-circulation-system sump pump to maintain space temperature.
 - b. Automatic Fill Control: A switch in the unit control panel shall close sump drain valve and open makeup water valve.
 - c. Automatic Drain Control: Opens sump drain valve and closes makeup water valve from a switch in the unit control panel **OR** when an outside thermostat senses **40 deg F (4 deg C)** or less, **as directed**.
 - d. Water-Saver System: Remote thermostat shall open water-supply valve to maintain dry-bulb temperature in space. Timer shall activate thermostat circuit.
- 9. DDC: Stand-alone control module for link between unit controls and DDC system. Control module shall be compatible with temperature-control system specified in Division 23 Section "Instrumentation And Control For Hvac".
 - a. Provide start and stop interface relay, and relay to notify DDC system alarm condition.
 - b. Provide hardware interface or additional sensors as follows:
 - 1) Room temperature.
 - 2) Discharge-air temperature.
 - 3) Furnace operating.
- J. Motors
 - 1. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".

1.3 EXECUTION

A. Installation

- 1. Install gas-fired units according to NFPA 54, "National Fuel Gas Code."
- 2. Install roof curb on roof structure, according to ARI Guideline B **OR** NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts", **as directed**. Install and secure direct-fired H&V units on curbs, and coordinate roof penetrations and flashing with roof construction.
OR
Install restrained vibration isolation roof-curb rails on roof structure according to ARI Guideline B **OR** NRCA's "Low-Slope Membrane Roofing Construction Details Manual," Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts", **as directed**. Install and secure direct-fired H&V units on rails, and coordinate roof penetrations and flashing with roof construction. Restrained isolation roof-curb rails are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- 3. Install suspended units from spring hangers with minimum **1-inch (25-mm)** static deflection; refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
OR

Install floor-mounted units on restrained, **as directed**, spring isolators with minimum **1-inch (25-mm)** static deflection; refer to Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".

4. Install controls and equipment shipped by manufacturer for field installation with direct-fired H&V units.

B. Connections

1. Piping Connections: Drawings indicate general arrangement of piping, fittings, and specialties. Install piping adjacent to machine to allow service and maintenance.
 - a. Gas Piping: Comply with requirements in Division 23 Section(s) "Facility Natural-gas Piping" OR "Facility Liquefied-petroleum Gas Piping", **as directed**. Connect gas piping with shutoff valve and union and with sufficient clearance for burner removal and service. Provide AGA-approved flexible connectors.
 - b. Makeup Water: Comply with requirements in Division 22 Section "Domestic Water Piping" for valves and accessories on piping connections to evaporative cooling units.
 - c. Drain: Comply with requirements in Division 22 Section "Sanitary Waste And Vent Piping" for traps and accessories on piping connections to evaporative cooling units.
2. Duct Connections: Duct installation requirements are specified in Division 23 Section "Metal Ducts". Drawings indicate the general arrangement of ducts. Connect supply and return, **as directed**, ducts to direct-fired H&V units with flexible duct connectors. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories".
3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Startup Service

1. Complete installation and startup checks according to manufacturer's written instructions and perform the following:
 - a. Inspect for visible damage to furnace combustion chamber.
 - b. Inspect casing insulation for integrity, moisture content, and adhesion.
 - c. Verify that clearances have been provided for servicing.
 - d. Verify that controls are connected and operable.
 - e. Verify that filters are installed.
 - f. Purge gas line.
 - g. Inspect and adjust vibration isolators and seismic restraints, **as directed**.
 - h. Verify bearing lubrication.
 - i. Inspect fan-wheel rotation for movement in correct direction without vibration and binding.
 - j. Adjust fan belts to proper alignment and tension.
 - k. Start unit according to manufacturer's written instructions.
 - l. Complete startup sheets and attach copy with Contractor's startup report.
 - m. Inspect and record performance of interlocks and protective devices; verify sequences.
 - n. Operate unit for run-in period recommended by manufacturer.
 - o. Perform the following operations for both minimum and maximum firing and adjust burner for peak efficiency:
 - 1) Measure gas pressure on manifold.
 - 2) Measure combustion-air temperature at inlet to combustion chamber.
 - 3) Measure supply-air temperature and volume when burner is at maximum firing rate and when burner is off. Calculate useful heat to supply air.
 - p. Calibrate thermostats.
 - q. Adjust and inspect high-temperature limits.
 - r. Inspect dampers, if any, for proper stroke and interlock with return-air dampers.
 - s. Start evaporative cooler system and measure and record the following:
 - 1) Leaving-air, dry- and wet-bulb temperatures.
 - 2) Entering-air, dry- and wet-bulb temperatures.

- t. Inspect controls for correct sequencing of heating, mixing dampers, refrigeration, and normal and emergency shutdown.
 - u. Measure and record airflow. Plot fan volumes on fan curve.
 - v. Verify operation of remote panel, including pilot-operation and failure modes. Inspect the following:
 - 1) High-limit heat.
 - 2) Alarms.
 - w. After startup and performance testing, change filters, verify bearing lubrication, and adjust belt tension.
- 2. Remove and replace malfunctioning components that do not pass tests and inspections and retest as specified above.
 - 3. Prepare written report of the results of startup services.
- D. Adjusting
- 1. Adjust initial temperature set points.
 - 2. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 - 3. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- E. Demonstration
- 1. Train Owner's maintenance personnel to adjust, operate, and maintain direct-fired H&V units.

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SECTION 23 76 13 00 - DEHUMIDIFICATION UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for mechanical dehumidification units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes packaged, factory-assembled and -tested, refrigerant-type, mechanical dehumidification units designed for outdoor and indoor installation.

C. Performance Requirements

1. Seismic Performance: Dehumidification units shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

D. Submittals

1. Product Data: For each dehumidification unit indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5, "Systems and Equipment."
3. Shop Drawings: For each dehumidification unit indicated. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
4. Delegated-Design Submittal: For dehumidification units indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
 - b. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.
5. Seismic Qualification Certificates: For accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
6. Source quality-control reports.
7. Field quality-control reports.
8. Operation and Maintenance Data: For dehumidification units to include in emergency, operation, and maintenance manuals.
9. Warranty: Sample of special warranty.

- E. Quality Assurance
 - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 2. ASHRAE Compliance:
 - a. Applicable requirements in ASHRAE 62.1, Section 5, "Systems and Equipment" and Section 7, "Construction and Startup."
 - b. Applicable requirements in ASHRAE 15, "Safety Standard for Refrigeration Systems."
 - 3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6, "Heating, Ventilating, and Air-Conditioning."
- F. Coordination
 - 1. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.
 - 2. Coordinate installation of roof curbs, equipment supports, and roof penetrations.
- G. Warranty
 - 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of dehumidification units that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Compressors: Manufacturer's standard, but not less than two **OR** five, **as directed**, years from date of Final Completion.
 - b. Warranty Period for Refrigerant Coils: Manufacturer's standard, but not less than five years from date of Final Completion.

1.2 PRODUCTS

- A. Casings
 - 1. Casing: Single-wall **OR** Double-wall, **as directed**, construction with corrosion-protective coating and exterior baked-enamel **OR** powder-coated, **as directed**, finish, stainless-steel fasteners, knockouts for electrical and piping connections, condensate drain connection, and lifting lugs.
 - a. Access: Removable panels **OR** Hinged access doors, **as directed**, with neoprene gaskets.
 - b. Insulation: Minimum **1/2-inch- (13-mm-)** thick thermal insulation **OR 2-inch- (50-mm-)** thick, glass-fiber-insulation fill with no metal structure through the insulation, **as directed**.
 - c. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - 2. Drain Pan and Connection: Plastic **OR** Stainless steel, **as directed**; insulated and complying with ASHRAE 62.1, **as directed**.
- B. Fans
 - 1. Supply Fans: Forward curved **OR** Backward inclined, **as directed**, centrifugal; galvanized steel with baked-enamel **OR** powder-coated, **as directed**, finish; belt driven with adjustable sheaves and self-aligning, grease-lubricated ball bearings with extended grease fittings easily accessible inside the casing of dehumidification unit.
 - 2. Exhaust **OR** Return, **as directed**, Fans: Forward curved **OR** Backward inclined, **as directed**, centrifugal; galvanized steel with baked-enamel **OR** powder-coated, **as directed**, finish; belt driven with adjustable sheaves and self-aligning, grease-lubricated ball bearings with extended grease fittings easily accessible inside the casing of dehumidification unit.
 - 3. Fan Motor: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Enclosure Type: Totally enclosed, fan cooled.
- C. Filters
 - 1. Glass Fiber: Minimum 80 percent arrestance according to ASHRAE 52.1, and MERV 5 according to ASHRAE 52.2.

2. Pleated: Minimum 90 percent arrestance according to ASHRAE 52.1, and MERV 7 according to ASHRAE 52.2.
- D. Refrigeration System
1. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1.
 2. Refrigerant Coils: Copper tubes with mechanically bonded aluminum fins; factory fabricated and tested to comply with ASHRAE 33 and ARI 410; with multiple refrigerant circuits, seamless-copper headers with brazed connections, and galvanized **OR** stainless, **as directed**, -steel frame. Coil and fins shall have a polyester coating. Coils shall have a minimum **300-psig (2070-kPa)** working-pressure rating and be factory tested to **450 psig (3105 kPa)** and to **300 psig (2070 kPa)** while underwater.
 3. Compressors: Hermetic, scroll compressors with integral vibration isolators and crankcase heaters that de-energize during compressor operation; with thermal-expansion valves, filter-driers, sight glasses, compressor service valves, and liquid- and suction-line service valves.
 - a. Number of Refrigerant Circuits: Two for compressor capacities more than **7-1/2 tons (26.4 kW)**.
 - b. Refrigerant: R-134a **OR** R-407C **OR** R-410A, **as directed**.
 - c. Capacity Control:
 - 1) Hot-gas bypass valve and piping on one compressor.
 - 2) Cycle compressor.
 - d. Low-Pressure Cutout: Manual reset after three automatic-reset failures.
 - e. High-Pressure Cutout: Manual reset.
 - f. Compressor Motor Overload Protection: Manual reset.
 - g. Antirecycling Timing Device: Prevent compressor restart for five minutes after shutdown.
 - h. Defrost Cycle (for ice rinks): Adjustable timer shuts off supply fan. Compressor cycles until suction line temperature confirms thawed evaporator coil. Timer limits defrost time to 10 minutes.
 4. Energy Recovery Heat Exchanger (Pool Heater): Cupronickel, coaxial, vented, double-wall construction for potable-water service.
- E. Remote-Mounted, Air-Cooled Condenser Unit
1. Casing: Steel, finished with baked enamel; with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
 2. Refrigerant Coil: ARI 210/240, copper tube with mechanically bonded aluminum fins; with liquid subcooler.
 3. Fan: Aluminum-propeller type, directly connected to permanently lubricated motor with integral thermal-overload protection.
 4. Adjustable, Low Ambient Head-Pressure Control: Designed to operate at temperatures as low as **0 deg F (minus 18 deg C)** by cycling condenser fans and controlling speed of last fan of each circuit.
 5. Mounting Base: Polyethylene.
- F. Heating Coils
1. Hot-Water Coil: Continuous circuit coil fabricated according to ARI 410.
 - a. Tubes: Copper.
 - b. Fins: Aluminum **OR** Copper, **as directed**, with fin spacing **0.125 inch (3.18 mm) OR 0.091 inch (2.31 mm) OR 0.071 inch (1.80 mm) OR 0.067 inch (1.70 mm) OR 0.056 inch (1.42 mm) OR 0.0075 inch (0.19 mm), as directed**.
 - c. Fin and Tube Joints: Mechanical bond.
 - d. Headers: Cast iron with drain and air vent tappings.
 - e. Frames: Galvanized-steel channel, **0.052 inch (1.3 mm)**.
 - f. Ratings: Design tested and rated according to ASHRAE 33 and ARI 410.
 - 1) Working-Pressure Ratings: **200 psig (1380 kPa), 325 deg F (163 deg C)**.
 - g. Source Quality Control: Test to **300 psig (2070 kPa)**.

2. Steam Coil: Distribution header coil fabricated according to ARI 410, with threaded steam supply and condensate connections.
 - a. Tubes: Copper.
 - b. Fins: Aluminum **OR** Copper, **as directed**, with fin spacing **0.125 inch (3.18 mm) OR 0.091 inch (2.31 mm) OR 0.071 inch (1.80 mm) OR 0.067 inch (1.70 mm) OR 0.056 inch (1.42 mm) OR 0.0075 inch (0.19 mm), as directed.**
 - c. Fin and Tube Joints: Mechanical bond.
 - d. Headers: Cast iron with drain and air vent tappings.
 - e. Frames: Galvanized-steel channel, **0.052 inch (1.3 mm).**
 - f. Ratings: Design tested and rated according to ASHRAE 33 and ARI 410.
 - 1) Working-Pressure Ratings: **100 psig (690 kPa), 400 deg F (205 deg C).**
 - g. Source Quality Control: Test to **200 psig (1380 kPa).**
3. Electric-Resistance Heating Coil: Comply with UL 1995.
 - a. Heating Element: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium oxide powder in tubular-steel sheath; with spiral-wound, copper-plated steel fins continuously brazed to sheath.

OR

Heating Element: Open-coil resistance wire of 80 percent nickel and 20 percent chromium; supported and insulated by floating ceramic bushings recessed into casing openings; fastened to supporting brackets and mounted in galvanized-steel frame.
 - b. Overtemperature Protection: Disk-type, automatic-reset, thermal-cutout safety device; serviceable through terminal box without removing heater from unit.
 - c. Thermal Cutouts: Load carrying, manual reset or replaceable, and factory wired in series with each heater stage.
 - d. Control: Disconnecting means, overcurrent protection, and airflow proving switch.

G. Dampers

1. Outdoor-Air Dampers: Opposed-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with steel **OR** cadmium-plated steel, **as directed**, operating rod rotating in sintered bronze or nylon bearings. Provide blade gaskets and edge seals, and mechanically fasten blades to operating rod. Size for 0 to 25 percent outdoor air, with manual **OR** motorized, **as directed**, operator and filter.
2. Face-and-Bypass Dampers: Opposed-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with steel **OR** cadmium-plated steel, **as directed**, operating rods rotating in sintered bronze or nylon bearings with operating rods connected with a common linkage. Provide blade gaskets and edge seals, and mechanically fasten blades to operating rod.
3. Outdoor- and Return-Air **OR** Outdoor-, Return-, and Exhaust-Air, **as directed**, Dampers: Parallel-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers mechanically fastened to steel **OR** cadmium-plated steel, **as directed**, operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.
4. Outdoor- and Return-Air **OR** Outdoor-, Return-, and Exhaust-Air, **as directed**, Dampers: Low-leakage, double-skin, airfoil-blade, galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, dampers with compressible jamb seals and extruded-vinyl blade edge seals in opposed-blade **OR** parallel-blade, **as directed**, arrangement with steel **OR** cadmium-plated steel, **as directed**, operating rods rotating in stainless-steel sleeve **OR** sintered bronze or nylon, **as directed**, bearings mounted in a single galvanized-steel **OR** aluminum **OR** extruded-aluminum, **as directed**, frame, and with operating rods connected with a common linkage. Leakage rate shall not exceed **5 cfm/sq. ft. (0.22 L/s per sq. m)** at **1-inch wg (250 Pa)** and **9 cfm/sq. ft. (0.4 L/s per sq. m)** at **4-inch wg (1.0 MPa).**
5. Damper Operator: **115 OR 24, as directed**, -V ac, close coupled, with gear train sealed in oil and with spring return.

H. Controls

1. Comply with requirements in Division 23 Section "Instrumentation And Control For Hvac" for control equipment and in Division 23 Section "Sequence Of Operations For Hvac Controls".
2. Control Panel: Integral service compartment containing fan-motor thermal and overload cutouts, compressor thermal and overload cutouts, 115-V control transformer if required, magnetic contactors for fan and compressor motors, and a nonfused factory-mounted and -wired disconnect switch for single external electrical power connection.
3. Building Automation System Interface: Factory-installed hardware and software to enable the building automation system to monitor, control, and display status and alarms.
4. Operating Control: Space humidistat cycles the compressor. Humidistat shall incorporate fan on-off-auto switch.
5. Operating Controls (for indoor pool units with typical manufacturer's control panel): Factory-installed microprocessor controller, capable of being remotely mounted.
 - a. Display the following on the face of controller:
 - 1) System on.
 - 2) System dehumidifying mode.
 - 3) System air-conditioning mode.
 - 4) System outdoor-air (economizer) mode.
 - 5) System heating pool water.
 - 6) Auxiliary space heat is operating.
 - 7) Unit requires service.
 - 8) Return-air (space) temperature.
 - 9) Return-air (space) humidity.
 - 10) Pool-water temperature.
 - 11) Outdoor-air temperature.
 - b. Indicate the following sensor failures on panel:
 - 1) Airflow: Dirty air filter, blocked airflow, and fan failure.
 - 2) Refrigerant high and low pressure.
 - 3) High water temperature.
 - 4) High and low evaporator temperature.
 - 5) Low water flow.
 - 6) Communication fault.
 - 7) System off.
 - 8) Antishort cycle delay.
 - 9) Power failure.
 - c. Provide access to the following set points on panel:
 - 1) Space temperature.
 - 2) Space relative humidity.
 - 3) Outdoor ventilation/air-conditioning changeover temperature.
 - 4) Airflow alarm.
 - d. Provide the following displays on panel:
 - 1) Space temperature.
 - 2) Space relative humidity.
 - 3) Outdoor-air temperature.
 - 4) Supply-air temperature.
 - 5) Return-air temperature.
 - 6) Airflow rating.
 - 7) Air-off evaporator temperature.
 - 8) Return-air relative humidity.
 - 9) Service codes.
 - e. Provide the following controls on panel:
 - 1) System on-off, fan continues to run.
 - 2) Fan on-off.
 - 3) Service code access.
 - 4) System dehumidifying mode.
 - 5) System air-conditioning mode.
 - 6) System outdoor-air (economizer) mode.

- 7) Auxiliary space heat is operating.
 - 8) Outdoor-air-temperature, conditioned-space-temperature, and control set-point-temperature digital display.
 - 9) Outdoor enthalpy digital display.
 - 10) Filter pressure drop digital display.
 - 11) Status: Airflow, fans, system, unit operation, and operating mode.
 - 12) Alarm digital display.
6. Operating Controls: Factory-installed microprocessor controller.
- a. Factory-installed operator panel with backlit display, capable of being remotely mounted, allows menu-driven display for navigation and control of unit.
 - b. Integral clock.
 - c. Personal computer interface.
 - d. Integral local area network for direct connection to BACnet **OR** LonWorks **OR** MODBUS, **as directed**.
 - e. Factory programmed.
 - f. Unit-Mounted Sensors:
 - 1) Airflow switch.
 - 2) Compressor-discharge temperature.
 - 3) Evaporator-air temperature.
 - 4) Pool-water-out temperature.
 - 5) Pool-water-in temperature.
 - 6) Relative humidity.
 - 7) Return-air temperature.
 - 8) Supply-air temperature.
 - g. Integral diagnostics.
 - h. Nonvolatile memory.
 - i. IP or SI display.
 - j. Provide the following status and alarm functions:
 - 1) System: On-off.
 - 2) Power failure.
 - 3) Fan: Off, overload.
 - 4) Compressor: On, turned off, overload, high pressure, low pressure, overheat, oil failure, and pumpdown.
 - 5) Evaporator damper closed.
 - 6) Pool: Low water flow, heating on.
 - 7) Dehumidification: Call for, on.
 - 8) Air Conditioning: Call for, on.
 - 9) System outdoor-air (economizer) mode.
 - 10) Auxiliary space heat on.
 - 11) Alarms: Firestat, freezestat, and filters.
 - k. Provide the following controls via operator panel:
 - 1) Compressor auto-off.
 - 2) Fan auto-off.
 - 3) Set-Point Adjustments: Relative humidity, temperatures, deadbands, and differentials.
 - 4) Sensor calibration.
 - l. Monitor constant and variable motor loads.
 - m. Monitor cooling load.
 - n. Monitor economizer cycles.
 - o. Monitor ventilation air volumes.
- l. Accessories
1. Water-Cooling Heat Exchanger: Coaxial, vented, double-wall construction; with three-way refrigerant control valve.
 2. Smoke Detectors: Photoelectric detector located in return-air plenum, to de-energize unit.

- a. Operating Voltage: 24-V dc, nominal.
 - b. Self-Restoring: Detectors do not require resetting or readjusting after actuation to restore them to normal operation.
 - c. Plug-in Arrangement: Detector and associated electronic components mounted in module with tamper-resistant connection to fixed base with twist-locking plug. Terminals in fixed base accept building wiring.
 - d. Integral Visual-Indicating Light: Digital-display type indicating detector operation.
 - e. Sensitivity: Can be tested and adjusted in-place after installation.
 - f. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to the fire-alarm control panel.
 - g. Sensor: Digital display or infrared light source with matching silicon-cell receiver.
 - h. Detector Sensitivity: Between **2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm)** of smoke obscuration when tested according to UL 268A.
 - i. Integral Thermal Detector: Fixed-temperature type with **135 deg F (57 deg C)** setting.
3. Electrical Convenience Outlet: 115-V ac fused, duplex, straight-blade receptacles, separately fused and located inside casing of dehumidification unit or in roof-curb perimeter.

J. Roof Curbs

1. Roof curbs with vibration isolators and wind or seismic restraints are specified in Division 15 Section "Vibration and Seismic Controls for HVAC Piping and Equipment."
2. Materials: Galvanized steel with corrosion-protection coating, watertight gaskets, and factory-installed wood nailer; complying with NRCA standards.
3. Curb Insulation and Adhesive: Comply with NFPA 90A or NFPA 90B.
 - a. Materials: ASTM C 1071, Type I or II.
 - b. Thickness: **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed.**
 - c. Application: Factory applied with adhesive and mechanical fasteners to the internal surface of curb.
 - d. Liner Adhesive: Comply with ASTM C 916, Type I.
 - e. Mechanical Fasteners: Galvanized steel, suitable for adhesive attachment, mechanical attachment, or welding attachment to duct without damaging liner when applied as recommended by manufacturer and without causing leakage in cabinet.
 - f. Liner materials applied in this location shall have airstream surface coated with a temperature-resistant coating or faced with a plain or coated fibrous mat or fabric, depending on service-air velocity.
4. Curb Height: **14 inches (355 mm) OR 24 inches (610 mm) OR 36 inches (910 mm), as directed.**
5. Wind and Seismic Restraints: Metal brackets compatible with the curb and casing, painted to match dehumidification unit; used to anchor unit to the curb and designed for loads at Project site. Comply with requirements in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment" for wind-load requirements.

K. Source Quality Control

1. Verification of Performance: Factory test and rate dehumidification units according to ARI 910.
2. Sound-Power-Level Ratings: Factory test and rate dehumidification units according to ARI 575.

1.3 EXECUTION

A. Examination

1. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
2. Examine roughing-in for hot-water **OR** steam **OR** refrigerant, **as directed**, piping systems to verify actual locations of piping connections before equipment installation.
3. Examine walls, floors, and roofs for suitable conditions where dehumidification units will be installed.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Equipment Mounting (for indoor or outdoor equipment supported on slabs-on-grade without vibration isolation devices): Install dehumidification units on concrete base(s). Comply with requirements for concrete base(s) specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
2. Equipment Mounting (for indoor or outdoor equipment supported on concrete equipment base with vibration isolation devices): Install dehumidification units on concrete base(s) using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for concrete base(s) specified in Division 03 Section "Cast-in-place Concrete". Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Equipment Mounting (for installation of indoor or outdoor equipment on vibration isolation devices without concrete base): Install dehumidification units using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
4. Equipment Mounting (for installation of indoor or outdoor equipment on vibration isolation equipment base): Install dehumidification units on vibration isolation equipment base. Comply with requirements specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
5. For installation of indoor or outdoor equipment without vibration isolation devices, with seismic restraints, and without concrete base: Install dehumidification units with **Seismic-restraint device** as directed by the Owner . Comply with requirements for seismic-restraint devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
6. For indoor units suspended from structure: Install continuous-thread hanger rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stop, **as directed**, of size required to support weight of dehumidification unit.
 - a. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Fabricate brackets or supports as required.
 - b. Comply with requirements for hangers and supports specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
7. Curb Support (if curbs are furnished with dehumidification units for rooftop installations): Install roof curb on roof structure, level and secure, according to NRCA's "The NRCA Roofing and Waterproofing Manual, Fifth Edition." Install and secure dehumidification units on curbs, and coordinate roof penetrations and flashing with roof construction. Secure units to curb support with anchor bolts.

8. Unit Support: Install dehumidification units level on structural curbs **OR** pilings, **as directed**. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.
 9. Isolation Curb Support (for units mounted on isolation curbs): Install dehumidification units on isolation curbs, and install flexible duct connectors and vibration isolation and seismic-control devices. Flexible duct connectors are specified in Division 23 Section "Air Duct Accessories". Vibration isolation and seismic-control devices are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- C. Connections
1. Where piping is installed adjacent to dehumidification units, allow space for service and maintenance of dehumidification units.
 2. Connect piping to dehumidification units mounted on vibration isolators with flexible connectors.
 3. Connect condensate drain pans using minimum **NPS 1-1/4 (DN 32)** copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan, and install cleanout at changes in direction.
 4. Refrigerant Piping: Comply with requirements in Division 23 Section "Refrigerant Piping". Connect to supply and return coil tapplings with shutoff valve and union or flange at each connection.
 5. Hot-Water Piping: Comply with requirements in Division 23 Section "Hydronic Piping". Connect to supply coil tapplings with shutoff valve, return coil tapplings with balancing valve, and union or flange at each connection.
 6. Steam and Condensate Piping: Comply with requirements in Division 23 Section "Steam And Condensate Heating Piping". Connect with shutoff valve and union or flange.
 7. Duct installation requirements are specified in other Division 21. Drawings indicate the general arrangement of ducts. The following are specific connection requirements:
 - a. Install ducts to termination in roof-mounted frames. Where indicated, terminate return-air duct through roof structure and insulate the space between roof and bottom of dehumidification unit.
- D. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Leak Test: After installation, fill water coils with water, and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
 - b. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Dehumidification unit will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- E. Startup Service
1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 2. Perform the following final checks before startup:
 - a. Verify that shipping, blocking, and bracing are removed.
 - b. Verify that unit is secure on mountings and supporting devices and that connections to piping, ducts, and electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
 - c. Perform cleaning and adjusting specified in this Section.
 - d. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
 - e. Check lubrication of bearings, pulleys, belts, and other moving parts.
 - f. Set outside- and return-air mixing dampers to minimum outside-air setting.

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- g. Install clean filters.
 - h. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
 3. Starting procedures for dehumidification units include the following:
 - a. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace malfunctioning motors, bearings, and fan wheels.
 - b. Measure and record motor's electrical values for voltage and amperage.
 - c. Manually operate dampers from fully closed to fully open position and record fan performance.
 4. Comply with requirements in Division 23 Section "Testing, Adjusting, And Balancing For Hvac" for testing, adjusting, and balancing of dehumidification unit.
 5. Startup Report: Report findings during startup. Identify startup steps, corrective measures taken, and final results.
- F. Adjusting
1. Adjust damper linkages for proper damper operation.
 2. Adjust initial temperature and humidity set points.
- G. Cleaning
1. Clean dehumidification units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils' entering-air face.
 2. After completing system installation, testing, and startup service of dehumidification units, clean filter housings and install new filters.
- H. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain dehumidification units.

END OF SECTION 23 76 13 00



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Task	Specification	Specification Description
23 76 13 00	23 74 23 13	Indirect-Fired, Packaged H&V Units
23 76 13 00	23 74 23 13a	Direct-Fired, Makeup Air Units

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SECTION 23 81 13 11 - PACKAGED TERMINAL AIR CONDITIONERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for packaged terminal air conditioners. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes packaged terminal air conditioners and their accessories and controls, in the following configurations:
 - a. Through-the-wall and freestanding air conditioners.
 - b. Cooling-only units.
 - c. Heat-pump units.
 - d. Cooling units with electric heat.
 - e. Cooling units with hydronic heat.
 - f. Cooling units with indirect-fired gas heat.

C. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: For packaged terminal air conditioners. Include plans, elevations, sections, details for wall penetrations, seismic bracing, **as directed**, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
4. Color Samples: For unit cabinet, discharge grille, and exterior louver, and for each color and texture specified.
5. Field quality-control reports.
6. Operation and maintenance data.
7. Warranty: Sample of special warranty.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of packaged terminal air conditioners that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Sealed Refrigeration System: Manufacturer's standard, but not less than five years from date of Final Completion, including components and labor.
 - b. Warranty Period for Nonsealed System Parts: Manufacturer's standard, but not less than five years from date of Final Completion, including only components and excluding labor.

- c. Warranty Period for Heat Exchangers: Manufacturer's standard, but not less than five years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Units

1. Description: Factory-assembled and -tested, self-contained, packaged terminal air conditioner with room cabinet, electric refrigeration system, heating, **as directed**, and temperature controls; fully charged with refrigerant and filled with oil; with cord-connected **OR** hardwired, **as directed**, chassis.

B. Chassis

1. Cabinet: **0.052-inch- (1.32-mm-)** thick steel with removable front panel with concealed latches.
 - a. Mounting: Wall with wall sleeve **OR** Floor with subbase, **as directed**.
 - b. Discharge Grille: Punched-louver discharge grille allowing four-way discharge-air pattern **OR** Extruded-aluminum discharge grille **OR** Reversible polycarbonate discharge grille allowing upward and horizontal airflow, **as directed**.
 - c. Louvers: Extruded aluminum with enamel finish **OR** Stamped aluminum with clear-anodized finish **OR** Stamped steel with enamel finish, **as directed**; white **OR** bronze **OR** brown **OR** beige, **as directed**, color.
 - d. Finish: Epoxy coating **OR** Baked enamel, **as directed**.
 - e. Access Door: Hinged door in top of cabinet for access to controls.
 - f. Cabinet Extension: Matching cabinet in construction and finish, allowing diversion of airflow to adjoining room; with grille.
 - g. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - h. Subbase: Enameled steel with adjustable leveling feet and adjustable end plates, with factory-installed and -wired, fused disconnect switch and receptacle sized for unit, **as directed**.
 - i. Wall Sleeves: Galvanized steel with polyester finish **OR** Molded polymer **OR** Molded fiberglass-reinforced polyester, **as directed**.
2. Refrigeration System: Direct-expansion indoor coil with capillary restrictor; and hermetically sealed scroll compressor with vibration isolation and overload protection.
 - a. Indoor and Outdoor Coils: Seamless copper tubes mechanically expanded into aluminum fins with capillary tube distributor on indoor coil, **as directed**.
 - b. Accumulator.
 - c. Constant-pressure expansion valve.
 - d. Reversing valve.
 - e. Charge: R-407C **OR** R-410A, **as directed**.
3. Indoor Fan: Forward curved, centrifugal; with motor and positive-pressure ventilation damper with concealed manual **OR** electric, **as directed**, operator.
4. Filters: Washable polyurethane in molded plastic frame.
5. Condensate Drain: Drain pan to direct condensate to outdoor coil for re-evaporation **OR** and piping to direct condensate to building waste and vent piping, **as directed**.
 - a. Comply with ASHRAE 62.1 for drain pan construction and connections.
6. Outdoor Fan: Forward curved, centrifugal **OR** Propeller, **as directed**, type with separate **OR** driven by indoor fan, **as directed**, motor.
 - a. Indoor and Outdoor Fan Motors: Two speed; comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 1) Fan Motors: Permanently lubricated split capacitor.
 - 2) Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.

- 3) Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.

C. Heating

1. Electric-Resistance Heating Coil: Nickel-chromium-wire, electric-resistance heating elements with contactor and high-temperature-limit switch.
OR
Hot-Water Heating Coil: Seamless copper tubes mechanically expanded into aluminum fins with two-way modulating control valve and air vent.
OR
Gas Heat:
 - a. General Requirements for Gas-Fired, Noncondensing Furnaces: Factory assembled, piped, wired, and tested; complying with ANSI Z21.86/CSA 2.32, "Vented Gas-Fired Space Heating Appliances," and with NFPA 54.
 - b. Type of Gas: Natural **OR** Propane, **as directed**.
 - c. Heat Exchanger: Aluminized-steel **OR** Stainless steel, **as directed**.
 - d. Burner:
 - 1) Gas Valve: 100 percent safety two-stage **OR** modulating, **as directed**, main gas valve, main shutoff valve, pressure regulator, safety pilot with electronic flame sensor, limit control, transformer, and combination ignition/fan timer control board.
 - 2) Ignition: Electric pilot ignition with hot-surface igniter or electric spark ignition.
 - e. Gas-Burner Safety Controls:
 - 1) Electronic Flame Sensor: Prevents gas valve from opening until pilot flame is proven; stops gas flow on ignition failure.
 - 2) Flame Rollout Switch: Installed on burner box; prevents burner operation.
 - 3) Limit Control: Fixed stop at maximum permissible setting; de-energizes burner on excessive bonnet temperature; automatic reset.
 - f. Combustion-Air Inducer: Centrifugal fan prepurges heat exchanger and vents combustion products; thermally protected motor with sleeve bearings; pressure switch prevents operation if combustion-air inlet or flue outlet is blocked.
 - g. Furnace Controls: Solid-state board integrates ignition, heat, cooling, and fan speeds; adjustable fan-on and fan-off timing; and terminals for connection to accessories.

D. Controls

1. Control Module: Unit-mounted digital panel with touchpad temperature control and with touchpad for heating, cooling, and fan operation. Include the following features:
 - a. Low Ambient Lockout Control: Prevents cooling-cycle operation below **40 deg F (5 deg C)** outdoor air temperature.
 - b. Heat-Pump Ambient Control: Field-adjustable switch changes to heat-pump heating operation above **40 deg F (5 deg C)** and to supplemental heating below **plus 25 deg F (minus 4 deg C)**.
 - c. Temperature-Limit Control: Prevents occupant from exceeding preset setback **OR** setup, **as directed**, temperature.
 - d. Building Automation System Interface: Allows remote on-off control with setback temperature control.
 - e. Reverse-Cycle Defrost: Solid-state sensor monitors frost buildup on indoor **OR** outdoor, **as directed**, coil and reverses unit to melt frost.
2. Remote Control: Standard unit-mounted controls with remote-mounted, low-voltage adjustable thermostat with heat anticipator, heat-off-cool-auto **OR** heat-off-cool, **as directed**, switch, and on-auto, **as directed**, fan switch.
3. Outdoor Air: Manual **OR** Motorized, **as directed**, intake damper. Open intake when unit indoor air fan runs, **as directed**.

E. Source Quality Control

1. Sound-Power Level Ratings: Factory test to comply with ARI 300, "Sound Rating and Sound Transmission Loss of Packaged Terminal Equipment."

2. Unit Performance Ratings: Factory test to comply with ARI 310/380/CSA C744, "Packaged Terminal Air-Conditioners and Heat Pumps."

1.3 EXECUTION

A. Installation

1. Install units level and plumb, maintaining manufacturer's recommended clearances and tolerances.
2. Install wall sleeves in finished wall assembly; seal and weatherproof. Joint-sealant materials and applications are specified in Division 07 Section "Joint Sealants".
3. Install and anchor wall sleeves to withstand, without damage to equipment and structure, seismic forces required by building code.

B. Connections

1. Comply with requirements for piping specified in Division 23 Section "Hydronic Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
2. Comply with requirements for piping specified in Division 23 Section "Facility Natural-gas Piping". Drawings indicate general arrangement of piping, fittings, and specialties.
3. Install piping adjacent to machine to allow service and maintenance.

C. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - b. After installing packaged terminal air conditioners and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Packaged terminal air conditioners will be considered defective if they do not pass tests and inspections.
4. Prepare test and inspection reports.

D. Startup Service

1. Perform startup service.
2. After installation, verify the following:
 - a. Unit is level on base and is flashed in exterior wall.
 - b. Unit casing has no visible damage.
 - c. Compressor, air-cooled condenser coil, and fans have no visible damage.
 - d. Labels are clearly visible.
 - e. Controls are connected and operable.
 - f. Shipping bolts, blocks, and tie-down straps are removed.
 - g. Filters are installed and clean.
 - h. Drain pan and drain line are installed correctly.
 - i. Electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 22.
 - j. Installation. Perform startup checks according to manufacturer's written instructions, including the following:
 - 1) Lubricate bearings on fan.
 - 2) Check fan-wheel rotation for correct direction without vibration and binding.
3. After startup service and performance test, change filters.

E. Adjusting

1. Adjust initial temperature set points.
 2. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- F. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain packaged terminal air conditioners.

END OF SECTION 23 81 13 11

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Task	Specification	Specification Description
23 81 13 13	23 81 13 11	Packaged Terminal Air Conditioners
23 81 16 00	23 81 13 11	Packaged Terminal Air Conditioners

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SECTION 23 81 23 12 - COMPUTER-ROOM AIR-CONDITIONERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for computer-room air-conditioners. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Floor-mounted computer-room air conditioners, **6 tons (21 kW)** and larger.
 - b. Floor-mounted computer-room air conditioners, **5 tons (18 kW)** and smaller.
 - c. Ceiling-mounted computer-room air conditioners.
 - d. Console computer-room air conditioners.

C. Definition

1. BAS: Building automation system.

D. Performance Requirements

1. Seismic Performance: Computer-room air conditioners shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: For computer-room air conditioners. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
4. Color Samples: For unit cabinet, discharge grille, and exterior louver and for each color and texture specified.
5. Seismic Qualification Certificates: For computer-room air conditioners, accessories, and components, from manufacturer.
6. Field quality-control reports.
7. Operation and maintenance data.
8. Warranty: Sample of special warranty.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. ASHRAE Compliance:
 - a. Fabricate and label refrigeration system to comply with ASHRAE 15, "Safety Standard for Refrigeration Systems."

- b. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality," Section 5 - "Systems and Equipment," Section 6 - "Ventilation Rate Procedures," and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1.
4. ASME Compliance: Fabricate and label water-cooled condenser shell to comply with ASME Boiler and Pressure Vessel Code: Section VIII, "Pressure Vessels," Division 1.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of computer-room air conditioners that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Compressors: Manufacturer's standard, but not less than five **OR** 10, **as directed**, years from date of Final Completion.
 - b. Warranty Period for Humidifiers: Manufacturer's standard, but not less than three years from date of Final Completion.
 - c. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Final Completion.

1.2 PRODUCTS

A. Floor-Mounted Units **6 Tons (21 kW)** And Larger

1. Description: Packaged, factory assembled, prewired, and prepiped; consisting of cabinet, fans, filters, humidifier, and controls.
2. Cabinet and Frame: Welded steel, braced for rigidity, and supporting compressors and other mechanical equipment and fittings.
 - a. Doors and Access Panels: Galvanized steel with polyurethane gaskets, hinges, and concealed fastening devices.
 - b. Insulation: Thermally and acoustically insulate cabinet interior with **1-inch- (25-mm-)** thick duct liner.
 - c. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - d. Finish of Exterior Surfaces: Baked-on, textured vinyl enamel; color as selected from manufacturer's standard colors **OR** to match computer equipment, **as directed**.
 - e. Floor Stand: Welded tubular steel with adjustable legs and vibration isolation pads.
3. Supply-Air Fan(s):
 - a. Double-inlet, forward-curved centrifugal fan(s); statically and dynamically balanced.
 - b. Drive: V-belt, with steel shaft with self-aligning ball bearings and cast-iron or steel sheaves, variable- and adjustable-pitch motor sheave, minimum of two matched belts, with drive rated at a minimum of two times the nameplate rating of motor.
4. Refrigeration System:
 - a. Compressors: Semihermetic reciprocating; with suction-gas-cooled, 1750-rpm motors; thermal overloads; oil sight glass; suction-line strainer; and reversible oil pumps; with oil strainer, internal motor overload protection, **as directed**, resilient suspension system, crankcase heater, manual-reset high-pressure switch, and pump-down low-pressure switch.
OR
Compressors: Hermetic reciprocating; with oil strainer, internal motor overload protection, **as directed**, resilient suspension system, crankcase heater, manual-reset high-pressure switch, and pump-down low-pressure switch.

Compressors: Hermetic scroll; with oil strainer, internal motor overload protection, **as directed**, resilient suspension system, crankcase heater, manual-reset high-pressure switch, and pump-down low-pressure switch.

- b. Refrigeration Circuits: Two; each with hot-gas mufflers, thermal-expansion valve with external equalizer, liquid-line solenoid valve, liquid-line filter-dryer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
- c. Refrigerant: R-407C **OR** R-410A, **as directed**.
- d. Refrigerant Evaporator Coil: Alternate-row or split-face-circuit, direct-expansion coil of seamless copper tubes expanded into aluminum fins.
 - 1) Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.
- e. Integral, Water-Cooled Refrigerant Condenser: Shell-and-tube type fabricated and labeled according to ASME Boiler and Pressure Vessel Code: Section VIII **OR** Coaxial tube-in-tube type, **as directed**, with liquid-line stop valve and head-pressure-actuated, two-way **OR** three-way, **as directed**, regulating valve. Terminate fluid connections outside cabinet.
 - 1) Cooling Medium: Water **OR** Glycol solution, **as directed**.

OR

Remote Air-Cooled Refrigerant Condenser: Corrosion-resistant cabinet, copper-tube aluminum-fin coils arranged for two circuits, multiple direct-drive propeller fans with permanently lubricated ball bearings, and single-phase motors with internal overload protection and integral electric control panel and disconnect switch, **as directed**. Control capacity by cycling fans **OR** modulating fan speeds **OR** three-way refrigerant bypass with receiver and isolation valve, **as directed**.
- 5. Hydronic Cooling Coil: Seamless copper tubes expanded into aluminum fins with modulating two-way **OR** three-way, **as directed**, control valve.
 - a. Cooling Medium: Water **OR** Glycol solution, **as directed**.
 - b. Control Valve: Class 125 body.
 - 1) Maximum Pressure Drop: **3 psig (21 kPa) OR 5 psig (35 kPa)**, **as directed**, at design flow rate.
 - 2) Close-Off (Differential) Pressure Rating: 100 percent of pressure differential across valve or 100 percent of total system (pump) head.
 - c. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.

OR

Remote, Air-Cooled, Glycol-Solution Cooler: Corrosion-resistant cabinet, copper-tube aluminum-fin coil, multiple direct-drive propeller fans with fan guards, and single-phase motors with internal overload protection and integral electric control panel. Control capacity by cycling fans.

- d. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
- 6. Glycol-Solution Pump Package: Weatherproof and vented enclosure of enameled, galvanized steel on structural base frame containing one **OR** two, **as directed**, centrifugal pump(s) with mechanical seals; electrical-control cabinet with starters, lead-lag switch, automatic switchover, and alarm light.
 - a. Piping: Interconnecting piping, to and from remote, air-cooled, glycol-solution cooler, with shutoff valves, flow switches, check valves in pump discharge, unions, and pressurized expansion tank with air purge vent and system-charging connection.
 - b. Glycol: Inhibited ethylene glycol and water solution mixed 50:50, suitable for operating temperature of **minus 40 deg F (minus 40 deg C)**.
 - c. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
- 7. Electric-Resistance Heating Coil: Enclosed finned-tube electric elements arranged for minimum of three stages, with thermal safety switches, manual-reset overload protection, and branch-circuit overcurrent protection.

OR

Refrigerant Heating Coil: Hot-gas coil of seamless copper tubes expanded into aluminum fins with three-way solenoid valve on first-stage refrigerant circuit.

OR

Hot-Water Heating Coil: Seamless copper tubes expanded into aluminum fins with two-way modulating control valve and strainer.

- a. Control Valve: Class 125 body.
 - 1) Maximum Pressure Drop: **3 psig (21 kPa) OR 5 psig (35 kPa)**, as directed, at design flow rate.
 - 2) Close-Off (Differential) Pressure Rating: 100 percent of pressure differential across valve or 100 percent of total system (pump) head.

OR

Steam Heating Coil: Seamless copper tubes expanded into aluminum fins with two-way modulating control valve, strainer, and float-and-thermostatic trap.

- b. Control Valve: Class 125 body.
 - 1) Maximum Pressure Drop (**15-psig (103-kPa) Steam**): 80 percent of inlet steam pressure.
 - 2) Close-Off (Differential) Pressure Rating: 150 percent of operating (inlet) pressure.
8. Extended-Surface, Disposable, Panel Filter: Pleated, lofted, nonwoven, reinforced cotton fabric; supported and bonded to welded-wire grid; enclosed in cardboard frame with **2-inch- (50-mm-)** thick, disposable, glass-fiber prefilter, **as directed**.
 - a. Thickness: **2 inches (50 mm) OR 4 inches (100 mm)**, as directed.
 - b. Initial Resistance: as directed by the Owner.
 - c. Recommended Final Resistance: as directed by the Owner.
 - d. Arrestance (ASHRAE 52.1): 90 percent.
 - e. Merv (ASHRAE 52.2): 7.
9. Infrared Humidifier: High-intensity quartz lamps mounted above stainless-steel evaporator pan, serviceable without disconnecting water, drain, or electrical connections; prepiped and using condensate water from cooling coils with stainless-steel or brass float-valve mechanism; located in bypass airstream; with flush-cycle timer and solenoid drain valve.
10. Evaporative Pan Humidifier: Stainless-steel pan and cover, serviceable without disconnecting water, drain, or electrical connections; prepiped with stainless-steel or brass float-valve mechanism; electric-resistance heating coil; low-water-cutoff switch; flush-cycle timer; and solenoid drain valve.
11. Electrode Steam Humidifier: Self-contained, microprocessor-controlled unit with disposable, polypropylene-plastic cylinders, and having field-adjustable steel electrodes and stainless-steel steam dispersion tube.
 - a. Plumbing Components and Valve Bodies: Plastic, linked by flexible rubber hosing, with water fill with air gap and solenoid valve incorporating built-in strainer, pressure-reducing and flow-regulating orifice, and drain with integral air gap.
 - b. Control: Fully modulating to provide gradual 0 to 100 percent capacity with field-adjustable maximum capacity; with high-water probe.
 - c. Drain Cycle: Field-adjustable drain duration and drain interval.
12. Integral Electrical Controls: Unit-mounted electrical enclosure with piano-hinged door, grounding lug, combination magnetic starters with overload relays, circuit breakers and cover interlock, and fusible control-circuit transformer.
13. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
14. Electronic-Control System: Solid state, with start button, stop button, temporary loss of power indicator, manual-reset circuit breakers, temperature control, humidity control, and monitor panel.
 - a. Monitor Panel: Backlighted, with no visible indicator lights until operating function is activated; indicators include cooling, humidification, loss of airflow, change filters, high temperature, low temperature, high humidity, low humidity, high head pressure (each compressor), and low suction pressure (each compressor).
 - b. Temperature- and Humidity-Control Modules: Solid state, plug-in; with adjustable set point, push-to-test calibration check button, and built-in visual indicators to show mode of operation.
 - c. Location: Behind hinged door in front of unit; isolated from conditioned airstream to allow service while system is operating.

15. Microprocessor-Control System: Continuously monitors operation of process cooling system; continuously displays room temperature and room relative humidity; sounds alarm on system malfunction and simultaneously displays problem. If more than one malfunction occurs, system displays fault in sequence with room temperature and continues to display fault when malfunction is cleared until system is reset.
 - a. Malfunctions:
 - 1) Power loss.
 - 2) Loss of airflow.
 - 3) Clogged air filter.
 - 4) High room temperature.
 - 5) Low room temperature.
 - 6) High humidity.
 - 7) Low humidity.
 - 8) Smoke/fire.
 - 9) Water under floor.
 - 10) Supply fan overload.
 - 11) Compressor No. 1 - Overload.
 - 12) Compressor No. 1 - Low Pressure.
 - 13) Compressor No. 1 - High Pressure.
 - 14) Compressor No. 2 - Overload.
 - 15) Compressor No. 2 - Low Pressure.
 - 16) Compressor No. 2 - High Pressure.
 - b. Digital Display:
 - 1) Control power on.
 - 2) Humidifying.
 - 3) Dehumidifying.
 - 4) Compressor No. 1 - Operating.
 - 5) Compressor No. 2 - Operating.
 - 6) Heat operating.
 - 7) Economy cooling.
 - c. Push buttons shall stop and start process cooling system, silence audible alarm, test indicators, and display room's relative humidity.
 - d. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display unit status and alarms.
 - 1) Hardwired Points:
 - a) Monitoring: On-off status, common trouble alarm **OR** space temperature **OR** space relative humidity, **as directed**.
 - b) Control: On-off operation, space temperature set-point adjustment **OR** space relative humidity set-point adjustment, **as directed**.
 - 2) ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor the unit from an operator workstation. Control features and monitoring points displayed locally at unit control panel shall be available through the BAS.
- B. Floor-Mounted Units **5 Tons (18 kW)** And Smaller
1. Description: Self-contained, factory assembled, prewired, and prepiped; consisting of cabinet, fan, filters, and controls; for vertical floor mounting in upflow or downflow configuration.
 2. Cabinet and Frame: Welded tubular-steel frame with removable steel panels with baked-enamel finish, insulated with **1-inch- (25-mm-)** thick duct liner.
 - a. Floor Stand: Welded tubular steel with adjustable legs and vibration isolation pads.
 - b. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 3. Supply-Air Fan: Forward curved, centrifugal, and with adjustable V-belt drive.
 4. Refrigeration System:

- a. Compressor: Hermetic, with oil strainer, internal motor overload protection, resilient suspension system, and crankcase heater.
 - b. Refrigeration Circuit: Low-pressure switch, manual-reset high-pressure switch, thermal-expansion valve with external equalizer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
 - c. Refrigerant: R-407C **OR** R-410A, **as directed**.
 - d. Refrigerant Evaporator Coil: Direct-expansion coil of seamless copper tubes expanded into aluminum fins, with two circuits, each with solenoid valve.
 - 1) Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.
 - e. Integral, Water-Cooled Refrigerant Condenser: Brazed-plate type with liquid-line stop valve and head-pressure-actuated, two-way regulating valve.
 - 1) Cooling Medium: Water **OR** Glycol solution, **as directed**.

OR

Remote Air-Cooled Refrigerant Condenser: Integral, copper-tube aluminum-fin coil with propeller **OR** centrifugal, **as directed**, fan, direct **OR** belt, **as directed**, driven.

 - 2) Split system shall have suction- and liquid-line compatible fittings and refrigerant piping for field interconnection.
5. Hydronic Cooling Coil: Seamless copper tubes expanded into aluminum fins with modulating three-way control valve.
- a. Cooling Medium: Water **OR** Glycol solution, **as directed**.
 - b. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.
- OR**
- Remote Air-Cooled, Glycol-Solution Cooler: Corrosion-resistant cabinet, copper-tube aluminum-fin coil, direct-drive propeller fan with fan guards, and single-phase motors with internal overload protection.
- c. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
6. Glycol-Solution Pump Package: Weatherproof and vented enclosure of enameled, galvanized steel on structural base frame containing centrifugal pump with mechanical seal.
- a. Piping: Interconnecting piping, from suction to discharge, with shutoff valves, flow switches, unions, and pressurized expansion tank with air purge vent and system-charging connection.
 - b. Glycol: Inhibited ethylene glycol and water solution mixed 50:50, suitable for operating temperature of **minus 40 deg F (minus 40 deg C)**.
 - c. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
7. Electric-Resistance Heating Coil: Finned-tube electric elements with contactor and high-temperature-limit switches.
8. Filter: **2-inch- (50-mm-)** thick, disposable, glass-fiber media.
- a. Initial Resistance: as directed by the Owner.
 - b. Recommended Final Resistance: as directed by the Owner.
 - c. Arrestance (ASHRAE 52.1): 90 percent.
 - d. Merv (ASHRAE 52.2): 7.
9. Infrared Humidifier: High-intensity quartz lamps mounted above stainless-steel evaporator pan, serviceable without disconnecting water, drain, or electrical connections; prepiped and located in bypass airstream; with flush-cycle timer and solenoid drain valve.
10. Electrode Steam Humidifier: Self-contained, microprocessor-controlled unit with disposable, polypropylene-plastic cylinders and having field-adjustable steel electrodes and stainless-steel steam dispersion tube.

- a. Plumbing Components and Valve Bodies: Plastic, linked by flexible rubber hosing, with water fill with air gap and solenoid valve incorporating built-in strainer, pressure-reducing and flow-regulating orifice, and drain with integral air gap.
 - b. Control: Fully modulating to provide gradual 0 to 100 percent capacity with field-adjustable maximum capacity; with high-water probe.
 - c. Drain Cycle: Field-adjustable drain duration and drain interval.
 - 11. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
 - 12. Control System: Unit-mounted panel with main fan contactor, compressor contactor, compressor start capacitor, control transformer with circuit breaker, solid-state temperature- and humidity-, **as directed**, control modules, humidity contactor, **as directed**, time-delay relay, heating contactor, and high-temperature thermostat. Provide solid-state, wall-mounted control panel with start-stop switch, adjustable humidity set point, **as directed**, and adjustable temperature set point.
- C. Ceiling-Mounted Units
- 1. Description: Self-contained, factory assembled, prewired, and prepiped; consisting of cabinet, fan, filters, and controls; for horizontal ceiling mounting to fit T-bar ceiling opening of **24 by 48 inches (610 by 1220 mm)**.
 - 2. Cabinet: Galvanized steel with baked-enamel finish, insulated with **1/2-inch- (13-mm-)** thick duct liner.
 - a. Integral factory-supplied supply and return grille to fit ceiling grid kit of **24 by 48 inches (610 by 1220 mm)**, with filter.
 - b. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 - 3. Supply-Air Fan: Forward curved, centrifugal, and directly driven by two-speed motor.
 - 4. Refrigeration System:
 - a. Compressor: Hermetic, with oil strainer, internal motor overload protection, resilient suspension system, and crankcase heater.
 - b. Refrigeration Circuit: Low-pressure switch, manual-reset high-pressure switch, thermal-expansion valve with external equalizer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
 - c. Refrigerant: R-407C **OR** R-410A, **as directed**.
 - d. Refrigerant Evaporator Coil: Direct-expansion coil of seamless copper tubes expanded into aluminum fins.
 - 1) Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.
 - e. Integral, Water-Cooled Refrigerant Condenser: Coaxial, counterflow, tube-in-tube **OR** Brazed-plate, **as directed**, type with liquid-line stop valve and head-pressure-actuated, water-regulating valve.
 - 1) Cooling Medium: Water **OR** Glycol solution, **as directed**.

OR

 Remote Air-Cooled Refrigerant Condenser: Integral, copper-tube aluminum-fin coil with propeller **OR** centrifugal, **as directed**, fan, direct driven.
 - f. Split system shall have suction- and liquid-line compatible fittings and refrigerant piping for field interconnection.
 - 5. Hydronic Cooling Coil: Seamless copper tubes expanded into aluminum fins with two-way control valve.
 - a. Cooling Medium: Water **OR** Glycol solution, **as directed**.
 - b. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.

OR

 Remote, Air-Cooled, Glycol-Solution Cooler: Corrosion-resistant cabinet, copper-tube aluminum-fin coil, direct-drive propeller fan with fan guards, and single-phase motors with internal overload protection.

6. Glycol-Solution Pump Package: Weatherproof and vented enclosure of enameled, galvanized steel on structural base frame containing centrifugal pump with mechanical seal.
 - a. Piping: Interconnecting piping, to and from remote, air-cooled glycol-solution cooler, with shutoff valves, flow switches, unions, and pressurized expansion tank with air purge vent and system-charging connection.
 - b. Glycol: Inhibited ethylene glycol and water solution mixed 50:50, suitable for operating temperature of **minus 40 deg F (minus 40 deg C)**.
 7. Electric-Resistance Heating Coil: Finned-tube electric elements with contactor, dehumidification relay, and high-temperature-limit switches.
 8. Filter: **1-inch- (25-mm-)** thick, disposable, glass-fiber media.
 - a. Initial Resistance: as directed by the Owner.
 - b. Recommended Final Resistance: as directed by the Owner.
 - c. Arrestance (ASHRAE 52.1): 90 percent.
 - d. Merv (ASHRAE 52.2): 7.
 9. Atomizing Humidifier: Centrifugal atomizer with stainless-steel pan, demister pad, and solenoid valve.
 10. Electrode Steam Humidifier: Self-contained, microprocessor-controlled unit with disposable, polypropylene-plastic cylinders, and having field-adjustable steel electrodes and stainless-steel steam dispersion tube.
 - a. Plumbing Components and Valve Bodies: Plastic, linked by flexible rubber hosing, with water fill with air gap and solenoid valve incorporating built-in strainer, pressure-reducing and flow-regulating orifice, and drain with integral air gap.
 - b. Control: Fully modulating to provide gradual 0 to 100 percent capacity with field-adjustable maximum capacity; with high-water probe.
 - c. Drain Cycle: Field-adjustable drain duration and drain interval.
 11. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
 12. Control System: Unit-mounted panel with main fan contactor, compressor contactor, compressor start capacitor, control transformer with circuit breaker, solid-state temperature- and humidity-, **as directed**, control modules, humidity contactor, **as directed**, time-delay relay, heating contactor, and high-temperature thermostat. Provide solid-state, wall-mounted control panel with start-stop switch, adjustable humidity set point, **as directed**, and adjustable temperature set point.
- D. Console Units
1. Description: Split system consisting of evaporator section for floor or wall mounting and remote condensing section.
 2. Evaporator Cabinet: Furniture-grade steel with baked-enamel finish; with front access and containing direct-drive centrifugal fans and two-speed motor.
 - a. Finish of Interior Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 3. Condenser Cabinet: Steel with baked-enamel finish and containing compressor and condenser.
 4. Refrigeration System:
 - a. Compressor: Hermetic, with oil strainer, internal motor overload protection, resilient suspension system, and crankcase heater.
 - b. Refrigeration Circuit: Filter/dryer, manual-reset high-pressure switch, thermal-expansion valve with external equalizer, sight glass with moisture indicator, service shutoff valves, charging valves, and charge of refrigerant.
 - c. Refrigerant: R-407C **OR** R-410A, **as directed**.
 - d. Refrigerant Evaporator Coil: Direct-expansion coil of seamless copper tubes expanded into aluminum fins.
 - 1) Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.

- e. Integral, Water-Cooled Refrigerant Condenser: Coaxial, counterflow, tube-in-tube **OR** Brazed-plate, **as directed**, type with liquid-line stop valve and head-pressure-actuated, water-regulating valve.
OR
Remote Air-Cooled Refrigerant Condenser: Integral, copper-tube aluminum-fin coil with propeller **OR** centrifugal, **as directed**, fan, direct driven.
 - f. Split system shall have suction- and liquid-line compatible fittings and refrigerant piping for field interconnection.
 - 5. Hydronic Cooling Coil: Seamless copper tubes expanded into aluminum fins with modulating control valve.
 - a. Cooling Medium: Water **OR** Glycol solution, **as directed**.
 - b. Mount coil assembly over stainless-steel drain pan complying with ASHRAE 62.1, **as directed**, and having a condensate pump unit with integral float switch, pump-motor assembly, and condensate reservoir, **as directed**.

OR

Remote, Air-Cooled, Glycol-Solution Cooler: Corrosion-resistant cabinet, copper-tube aluminum-fin coil, direct-drive propeller fan with fan guards, and single-phase motor with internal overload protection.
 - 6. Glycol-Solution Pump Package: Weatherproof and vented enclosure of enameled, galvanized steel on structural base frame containing centrifugal pump with mechanical seal.
 - a. Piping: Interconnecting piping, to and from remote, air-cooled, glycol-solution cooler, with shutoff valves, flow switches, unions, and pressurized expansion tank with air purge vent and system-charging connection.
 - b. Glycol: Inhibited ethylene glycol and water solution mixed 50:50, suitable for operating temperature of **minus 40 deg F (minus 40 deg C)**.
 - 7. Electric-Resistance Heating Coil: Finned-tube electric elements with contactor and high-temperature-limit switches.
 - 8. Filter: Cleanable.
OR
Filter: **1-inch- (25-mm-)** thick, disposable, glass-fiber media.
 - a. Initial Resistance: as directed by the Owner.
 - b. Recommended Final Resistance: as directed by the Owner.
 - c. Arrestance (ASHRAE 52.1): 90 percent.
 - d. Merv (ASHRAE 52.2): 7.
 - 9. Electrode Steam Humidifier: Self-contained and microprocessor controlled; with replaceable cylinder.
 - 10. Disconnect Switch: Nonautomatic, molded-case circuit breaker with handle accessible when panel is closed and capable of preventing access until switched to off position.
 - 11. Control System: Unit-mounted panel with contactors, control transformer with circuit breaker, and solid-state temperature- and humidity-, **as directed**, control modules. Provide solid-state, unit-mounted control panel with start-stop switch, adjustable humidity set point, **as directed**, and adjustable temperature set point.
- E. Fan Motors
- 1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.

1.3 EXECUTION

A. Installation

1. Install computer-room air conditioners level and plumb, maintaining manufacturer's recommended clearances. Install according to ARI Guideline B, **as directed**.
 2. Computer-Room Air-Conditioner Mounting: Install using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 3. Suspended Computer-Room Air Conditioners: Install using continuous-thread hanger rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stop, **as directed**, of size required to support weight of computer-room air conditioner.
 - a. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment". Fabricate brackets or supports as required.
 - b. Comply with requirements for hangers and supports specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment".
 4. Air-Cooled Refrigerant Condenser Mounting: Install using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 5. Remote, Air-Cooled, Glycol-Solution Cooler Mounting: Install using elastomeric pads **OR** elastomeric mounts **OR** restrained spring isolators, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 - a. Minimum Deflection: **1/4 inch (6 mm) OR 1 inch (25 mm), as directed**.
 6. Glycol-Solution Pump Package Mounting: Install using elastomeric pads **OR** elastomeric mounts, **as directed**. Comply with requirements for vibration isolation devices specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- B. Connections
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
 3. Water and Drainage Connections: Comply with applicable requirements in Division 22 Section "Domestic Water Piping". Provide adequate connections for water-cooled units, condensate drain, and humidifier flushing system.
 4. Hot-Water Heating Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping". Provide shutoff valves in inlet and outlet piping to heating coils.
 5. Steam and Condensate Piping: Comply with applicable requirements in Division 23 Section "Steam And Condensate Heating Piping". Provide shutoff valves in steam inlet and steam trap in condensate outlet piping to heating coils.
 6. Condenser-Water Piping: Comply with applicable requirements in Division 23 Section "Hydronic Piping". Provide shutoff valves in water inlet and outlet piping on water-cooled units.
 7. Refrigerant Piping: Comply with applicable requirements in Division 23 Section "Refrigerant Piping". Provide shutoff valves and piping.
- C. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Inspect for and remove shipping bolts, blocks, and tie-down straps.
 - b. After installing computer-room air conditioners and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.

- d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Computer-room air conditioners will be considered defective if they do not pass tests and inspections.
 4. Prepare test and inspection reports.
 5. After startup service and performance test, change filters and flush humidifier.
- D. Adjusting
1. Adjust initial temperature and humidity, **as directed**, set points.
 2. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
 3. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- E. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain computer-room air conditioners.

END OF SECTION 23 81 23 12

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Task	Specification	Specification Description
23 81 23 13	23 81 23 12	Computer-Room Air-Conditioners
23 81 43 00	23 81 13 11	Packaged Terminal Air Conditioners
23 81 49 00	23 63 13 00a	Split-System Air-Conditioning Units

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SECTION 23 82 16 11 - AIR COILS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for air coils. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following types of air coils that are not an integral part of air-handling units:
 - a. Hot-water.
 - b. Chilled-water.
 - c. Steam.
 - d. Refrigerant.
 - e. Electric.

C. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each air coil. Include rated capacity and pressure drop for each air coil.
2. Shop Drawings: Diagram power, signal, and control wiring.
3. Field quality-control test reports.
4. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE Compliance:
 - a. Comply with ASHRAE 15 for refrigeration system safety.
 - b. Comply with ASHRAE 33 for methods of testing cooling and heating coils.
 - c. Comply with applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."

1.2 PRODUCTS

A. Water Coils

1. Performance Ratings: Tested and rated according to ARI 410 and ASHRAE 33.
2. Minimum Working-Pressure/Temperature Ratings: **200 psig (1380 kPa), 325 deg F (163 deg C).**
3. Source Quality Control: Factory tested to **300 psig (2070 kPa).**
4. Tubes: ASTM B 743 copper, minimum **0.020 inch (0.508 mm) OR 0.035 inch (0.889 mm) OR 0.049 inch (1.245 mm), as directed**, thick.
5. Fins: Aluminum **OR** Copper, **as directed**, minimum **0.006 inch (0.152 mm) OR 0.010 inch (0.254 mm), as directed**, thick.
6. Headers: Cast iron with drain and air vent tapings **OR** Cast iron with cleaning plugs, and drain and air vent tapings **OR** Seamless copper tube with brazed joints, prime coated **OR** Steel with brazed joints, prime coated, **as directed**.
7. Frames: Galvanized-steel channel frame, minimum **0.052 inch (1.3 mm) OR 0.064 inch (1.6 mm) OR 0.079 inch (2.0 mm) OR 0.0625 inch (1.6 mm), as directed**, thick for slip-in **OR** flanged, **as directed**, mounting.

OR

Frames: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel, minimum **0.0625 inch (1.6 mm)** thick for slip-in **OR** flanged, **as directed**, mounting.

8. Hot-Water Coil and Steam Coil, Face-and-Bypass Dampers: Alternating arrangement of coil segments and dampers.
 - a. Coil Configuration: Horizontal **OR** Vertical, **as directed**, tubes.
 - b. Dampers: Extruded-aluminum **OR** Galvanized-steel, **as directed**, blades with edge and end seals; full-length drive rod and mount for actuator in **OR** outside, **as directed**, the airstream.

B. Steam Coils

1. Performance Ratings: Tested and rated according to ARI 410 and ASHRAE 33.
2. Minimum Working-Pressure/Temperature Ratings: **100 psig (690 kPa)**, **400 deg F (204 deg C)**.
3. Source Quality Control: Factory tested to **300 psig (2070 kPa)**.
4. Tubes: ASTM B 743 copper, minimum **0.025 inch (0.635 mm)** **OR** **0.035 inch (0.889 mm)** **OR** **0.049 inch (1.245 mm)**, **as directed**, thick.
5. Fins: Aluminum **OR** Copper, **as directed**, minimum **0.006 inch (0.152 mm)** **OR** **0.010 inch (0.254 mm)**, **as directed**, thick.
6. Headers: Cast iron with drain and air vent tapplings **OR** Cast iron with cleaning plugs, and drain and air vent tapplings **OR** Seamless copper tube with brazed joints, prime coated **OR** Steel with brazed joints, prime coated, **as directed**.
7. Tube Type: Single or distributing as indicated.
8. Frames: Galvanized-steel channel frame, minimum **0.052 inch (1.3 mm)** **OR** **0.064 inch (1.6 mm)** **OR** **0.079 inch (2.0 mm)** **OR** **0.0625 inch (1.6 mm)**, **as directed**, thick for slip-in **OR** flanged, **as directed**, mounting.

OR

Frames: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel, minimum **0.0625 inch (1.6 mm)** thick for slip-in **OR** flanged, **as directed**, mounting.

9. Face-and-Bypass Dampers: Alternating arrangement of coil segments and dampers.
 - a. Coil Configuration: Horizontal **OR** Vertical, **as directed**, tubes.
 - b. Dampers: Extruded-aluminum **OR** Galvanized-steel, **as directed**, blades with edge and end seals; full-length drive rod and mount for actuator in **OR** outside, **as directed**, the airstream.

C. Refrigerant Coils

1. Performance Ratings: Tested and rated according to ARI 410 and ASHRAE 33.
2. Minimum Working-Pressure Rating: **300 psig (2070 kPa)**.
3. Source Quality Control: Factory tested to **450 psig (3105 kPa)**.
4. Tubes: ASTM B 743 copper, minimum **0.020 inch (0.508 mm)** **OR** **0.035 inch (0.889 mm)** **OR** **0.049 inch (1.245 mm)**, **as directed**, thick.
5. Fins: Aluminum **OR** Copper, **as directed**, minimum **0.006 inch (0.152 mm)** **OR** **0.010 inch (0.254 mm)**, **as directed**, thick.
6. Suction and Distributor Piping: **ASTM B 88, Type L (ASTM B 88M, Type B)** copper tube with brazed joints.
7. Frames: Galvanized-steel channel frame, minimum **0.052 inch (1.3 mm)** **OR** **0.064 inch (1.6 mm)** **OR** **0.079 inch (2.0 mm)** **OR** **0.0625 inch (1.6 mm)**, **as directed**, thick for slip-in **OR** flanged, **as directed**, mounting.

OR

Frames: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel, minimum **0.0625 inch (1.6 mm)** thick for slip-in **OR** flanged, **as directed**, mounting.

D. Electric Coils

1. Coil Assembly: Comply with UL 1995.

2. Heating Elements: Coiled resistance wire of 80 percent nickel and 20 percent chromium; surrounded by compacted magnesium-oxide powder in tubular-steel sheath; with spiral-wound, copper-plated, steel fins continuously brazed to sheath.
OR
Heating Elements: Open-coil resistance wire of 80 percent nickel and 20 percent chromium, supported and insulated by floating ceramic bushings recessed into casing openings, and fastened to supporting brackets.
3. High-Temperature Coil Protection: Disk-type, automatically reset, thermal-cutout, safety device; serviceable through terminal box without removing heater from duct or casing.
 - a. Secondary Protection: Load-carrying, manually reset or manually replaceable, thermal cutouts; factory wired in series with each heater stage.
4. Frames: Galvanized-steel channel frame, minimum **0.052 inch (1.3 mm) OR 0.064 inch (1.6 mm) OR 0.079 inch (2.0 mm) OR 0.0625 inch (1.6 mm)**, **as directed**, thick for slip-in **OR** flanged, **as directed**, mounting.
5. Control Panel: Unit **OR** Remote, **as directed**, mounted with disconnecting means and overcurrent protection. Include the following controls:
 - a. Magnetic contactor.
 - b. Mercury contactor.
 - c. Toggle switches; one per step.
 - d. Step controller.
 - e. Time-delay relay.
 - f. Pilot lights; one per step.
 - g. Airflow proving switch.
6. Refer to Division 23 Section "Instrumentation And Control For Hvac" for thermostat.
OR
Thermostats: Wall-mounted thermostats, with temperature range from **50 to 90 deg F (10 to plus 32 deg C)**, and **2.5 deg F (1.4 deg C)** throttling range.

1.3 EXECUTION

A. Installation

1. Install coils level and plumb.
2. Install coils in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
3. Install galvanized-steel **OR** stainless-steel, **as directed**, drain pan under each cooling coil.
 - a. Construct drain pans with connection for drain; insulated and complying with ASHRAE 62.1, **as directed**.
 - b. Construct drain pans to extend beyond coil length and width and to connect to condensate trap and drainage.
 - c. Extend drain pan upstream and downstream from coil face.
 - d. Extend drain pan under coil headers and exposed supply piping.
4. Install moisture eliminators for cooling coils. Extend drain pan under moisture eliminator.
5. Straighten bent fins on air coils.
6. Clean coils using materials and methods recommended in writing by manufacturers, and clean inside of casings and enclosures to remove dust and debris.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Install piping adjacent to coils to allow service and maintenance.
3. Connect water piping with unions and shutoff valves to allow coils to be disconnected without draining piping. Control valves are specified in Division 23 Section "Instrumentation And Control For Hvac", and other piping specialties are specified in Division 23 Section "Hydronic Piping".
4. Connect steam piping with gate valve and union and steam condensate piping with union, strainer, trap, and gate valve to allow coils to be disconnected without draining piping. Control

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valves are specified in Division 23 Section "Instrumentation And Control For Hvac", and other piping specialties are specified in Division 23 Section "Steam And Condensate Heating Piping".

5. Connect refrigerant piping according to Division 23 Section "Refrigerant Piping".
6. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
7. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Perform the following field tests and inspections and prepare test reports:
 - a. Operational Test: After electrical circuitry has been energized, operate electric coils to confirm proper unit operation.
 - b. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 23 82 16 11

Task	Specification	Specification Description
23 82 16 12	23 82 16 11	Air Coils
23 82 16 13	23 82 16 11	Air Coils
23 82 16 14	23 74 16 13c	Unit Ventilators

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SECTION 23 82 19 00 - FAN-COIL UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fan-coil units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes fan-coil units and accessories.

C. Definitions

1. BAS: Building automation system.

D. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 4: Documentation required by Credit EA 4 indicating that equipment and refrigerants comply.
 - b. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1, Section 5 - "Systems and Equipment."
3. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Wiring Diagrams: Power, signal, and control wiring.
4. Manufacturer Seismic Qualification Certification: Submit certification that fan-coil units, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA 90.1 Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."

F. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of condensing units that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Compressor failure.
 - 2) Condenser coil leak.
 - b. Warranty Period: Four **OR** Five **OR** 10, **as directed**, years from date of Final Completion.
 - c. Warranty Period (Compressor Only): Five **OR** 10, **as directed**, years from date of Final Completion.

- d. Warranty Period (Condenser Coil Only): Five years from date of Final Completion.

1.2 PRODUCTS

A. Fan-Coil Units

1. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.
2. Coil Section Insulation: **1/2-inch (13-mm) OR 1-inch (25-mm), as directed**, thick, coated glass fiber **OR** foil-covered, closed-cell foam **OR** matte-finish, closed-cell foam, **as directed**, complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 - a. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
3. Main and Auxiliary Drain Pans: Plastic **OR** Stainless steel **OR** Insulated galvanized steel with plastic liner, **as directed**. Fabricate pans and drain connections to comply with ASHRAE 62.1. Drain pans shall be removable, **as directed**.
4. Chassis: Galvanized steel where exposed to moisture. Floor-mounting units shall have leveling screws.
5. Cabinet: Steel with factory prime coating, ready for field painting **OR** baked-enamel finish in manufacturer's standard paint color as selected by the Owner **OR** baked-enamel finish in manufacturer's custom paint color as selected by the Owner, **as directed**.
 - a. Vertical Unit Front Panels: Removable, steel, with integral stamped **OR** polyethylene **OR** steel, **as directed**, discharge grille and channel-formed edges, cam fasteners, and insulation on back of panel.
 - b. Horizontal Unit Bottom Panels: Fastened to unit with cam fasteners and hinge and attached with safety chain; with integral stamped **OR** cast-aluminum, **as directed**, discharge grilles.
 - c. Stack Unit Discharge and Return Grille: Aluminum double-deflection discharge grille, and louvered- or panel-type return grille; color as selected by the Owner from manufacturer's standard **OR** custom, **as directed**, colors. Return grille shall provide maintenance access to fan-coil unit.
 - d. Steel recessing flanges for recessing fan-coil units into ceiling or wall.
6. Outdoor-Air Wall Box: Minimum **0.1265-inch- (3.2-mm-)** thick, aluminum, rain-resistant louver and box with integral eliminators and bird screen.
 - a. Louver Configuration: Horizontal **OR** Vertical, **as directed**, rain-resistant louver.
 - b. Louver Material: Aluminum **OR** Steel, **as directed**.
 - c. Bird Screen: **1/2-inch (13-mm)** mesh screen on interior side of louver.
 - d. Decorative Grille: On outside of intake.
 - e. Finish: Anodized aluminum **OR** Baked enamel, **as directed**, color as selected by the Owner from manufacturer's standard **OR** custom, **as directed**, colors.
7. Outdoor-Air Damper: Galvanized-steel blades with edge and end seals and nylon bearings; with electronic **OR** pneumatic, **as directed**, two-position **OR** modulating, **as directed**, actuators.
8. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Washable Foam: 70 percent arrestance and 3 MERV.
 - b. Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
 - c. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.
9. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, rated for a minimum working pressure of **200 psig (1378 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain valve.

10. Steam Coils: Copper distributing, **as directed**, tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, rated for a minimum working pressure of **75 psig (517 kPa)**.
11. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
12. Fan and Motor Board: Removable.
 - a. Fan: Forward curved, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
 - b. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - c. Wiring Termination: Connect motor to chassis wiring with plug connection.
13. Factory, Hydronic Piping Package: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M Type C)**, **as directed**, copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.
 - a. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for dual-temperature coil.
 - b. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for chilled-water coil.
 - c. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for heating coil.
 - d. Two **OR** Three, **as directed**, -way two-position **OR** modulating, **as directed**, control valve for hot-water reheat coil.
 - e. Hose Kits: Minimum **400-psig (2758-kPa)** working pressure, and operating temperatures from **33 to 211 deg F (0.5 to 99 deg C)**. Tag hose kits to equipment designations.
 - 1) Length: **24 inches (600 mm) OR 36 inches (900 mm)**, **as directed**.
 - 2) Minimum Diameter: Equal to fan-coil-unit connection size.
 - f. Two-Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and **600-psig (4140-kPa)** minimum CWP rating and blowout-proof stem.
 - g. Calibrated-Orifice Balancing Valves: Bronze body, ball type; **125-psig (860-kPa)** working pressure, **250-deg F (121-deg C)** maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
 - h. Automatic Flow-Control Valve: Brass or ferrous-metal body; **300-psig (2070-kPa)** working pressure at **250 deg F (121 deg C)**, with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of **2 to 80 psig (13.8 to 552 kPa)**.
 - i. Y-Pattern Hydronic Strainers: Cast-iron body (ASTM A 126, Class B); **125-psig (860-kPa)** working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum **NPS 1/2 (DN 15)** hose-end, full-port, ball-type blowdown valve in drain connection.
 - j. Wrought-Copper Unions: ASME B16.22.
 - k. Risers: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M Type C)**, **as directed**, copper pipe with hose and ball valve for system flushing.
14. Control devices and operational sequences are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
15. Basic Unit Controls:
 - a. Control voltage transformer.
 - b. Wall-mounting **OR** Unit-mounted, **as directed**, thermostat with the following features:
 - 1) Heat-cool-off switch.
 - 2) Fan on-auto switch.
 - 3) Fan-speed switch.

- 4) Manual **OR** Automatic, **as directed**, changeover.
 - 5) Adjustable deadband.
 - 6) Concealed **OR** Exposed, **as directed**, set point.
 - 7) Concealed **OR** Exposed, **as directed**, indication.
 - 8) Degree F **OR** Degree C, **as directed**, indication.
 - c. Wall-mounting **OR** Unit-mounted, **as directed**, humidistat.
 - 1) Concealed **OR** Exposed, **as directed**, set point.
 - 2) Concealed **OR** Exposed, **as directed**, indication.
 - d. Wall-mounting **OR** Unit-mounted, **as directed**, temperature sensor.
 - e. Unoccupied-period-override push button.
 - f. Data entry and access port.
 - 1) Input data includes room temperature, and humidity set points and occupied and unoccupied periods.
 - 2) Output data includes room temperature and humidity, supply-air temperature, entering-water temperature, operating mode, and status.
16. DDC, **as directed**, Terminal Controller:
- a. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
 - b. Unoccupied Period Override Operation: Two, **as directed**, hours.
 - c. Unit Supply-Air Fan Operation:
 - 1) Occupied Periods: Fan runs continuously.
 - 2) Unoccupied Periods: Fan cycles to maintain room setback temperature.
 - d. Hydronic-Cooling-Coil Operation:
 - 1) Occupied Periods: Open **OR** Modulate, **as directed**, control valve to maintain room temperature.
 - 2) Unoccupied Periods: Close control valve.
 - e. Heating-Coil Operation:
 - 1) Occupied Periods: Open control valve **OR** Modulate control valve **OR** Energize electric-resistance coil, **as directed**, to provide heating if room temperature falls below thermostat set point.
 - 2) Unoccupied Periods: Start fan and open control valve **OR** modulate control valve **OR** energize electric-resistance coil, **as directed**, if room temperature falls below setback temperature.
 - f. Dual-Temperature Hydronic-Coil Operation:
 - 1) Occupied Periods: When chilled water is available, open **OR** modulate, **as directed**, control valve if room temperature exceeds thermostat set point. When hot water is available, open control valve if temperature falls below thermostat set point.
 - 2) Unoccupied Periods: When chilled water is available, close control valve. When hot water is available, open **OR** modulate, **as directed**, control valve if room temperature falls below thermostat setback temperature.
 - g. Reheat-Coil Operation:
 - 1) Humidity Control for Occupied Periods:
 - a) Humidistat opens control valve **OR** modulates control valve **OR** energizes electric-resistance coil, **as directed**, to provide heating. As space temperature rises above the set point, cooling coil valve opens **OR** modulates, **as directed**, to maintain room temperature.
 - 2) Humidity Control for Unoccupied Periods: Close control valve **OR** De-energize, **as directed**.
 - 3) Occupied Periods:
 - a) Heating Operations: Open control valve **OR** Modulate control valve **OR** Energize electric-resistance coil, **as directed**, to provide heating if room temperature falls below thermostat set point.
 - b) Humidity-Control Operations: Humidistat opens control valve **OR** modulates control valve **OR** energizes electric-resistance coil, **as directed**, to provide

- heating. As space temperature rises above the set point, cooling coil valve opens **OR** modulates, **as directed**, to maintain room temperature.
- 4) Unoccupied Periods: Start fan and open control valve **OR** modulate control valve **OR** energize electric-resistance coil, **as directed**, if room temperature falls below setback temperature. Humidity control is not available.
 - h. Outdoor-Air Damper Operation:
 - 1) Occupied Periods: Open damper to fixed position for 25 percent outdoor air.
 - 2) Unoccupied periods: Close damper.
 - i. Outdoor-Air Damper Operation:
 - 1) Occupied Periods:
 - a) Outdoor-Air Temperature below Room Temperature: If room temperature is above thermostat set point, modulate outdoor-air damper to maintain room temperature (outdoor-air economizer). If room temperature is below thermostat set point, position damper to fixed minimum position.
 - b) Outdoor-Air Temperature above Room Temperature: Position damper to fixed minimum position for 25 percent outdoor air.
 - 2) Unoccupied Periods: Close damper.
 - j. Controller shall have volatile-memory backup.
17. BAS Interface Requirements:
- a. Interface relay for scheduled operation.
 - b. Interface relay to provide indication of fault at the central workstation.
 - c. Provide BACnet **OR** LonWorks, **as directed**, interface for central BAS workstation for the following functions:
 - 1) Adjust set points.
 - 2) Fan-coil-unit start, stop, and operating status.
 - 3) Data inquiry, including outdoor-air damper position, **as directed**, supply- and room-air temperature and humidity, **as directed**.
 - 4) Occupied and unoccupied schedules.
18. Electrical Connection: Factory wire motors and controls for a single electrical connection.
- B. Ducted Fan-Coil Units
1. Description: Factory-packaged and -tested units rated according to ARI 440, ASHRAE 33, and UL 1995.
 2. Coil Section Insulation: **1/2-inch (13-mm) OR 1-inch (25-mm), as directed**, thick coated **OR** foil-faced, **as directed**, glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
 - a. Fire-Hazard Classification: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - b. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.
 3. Drain Pans: Plastic **OR** Stainless steel **OR** Insulated galvanized steel with plastic liner, **as directed**. Fabricate pans and drain connections to comply with ASHRAE 62.1.
 4. Chassis: Galvanized steel where exposed to moisture, with baked-enamel finish and removable access panels.
 5. Cabinets: Steel with baked-enamel finish in manufacturer's standard paint color.
 - a. Supply-Air Plenum: Sheet metal plenum finished and insulated to match the chassis with mill-finish, aluminum, double-deflection grille, **as directed**.
 - b. Return-Air Plenum: Sheet metal plenum finished to match the chassis.
 - c. Mixing Plenum: Sheet metal plenum finished and insulated to match the chassis with outdoor- and return-air, formed-steel dampers.
 - d. Dampers: Galvanized steel with extruded-vinyl blade seals, flexible-metal jamb seals, and interlocking linkage.
 6. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Washable Foam: 70 percent arrestance and 3 MERV.

- b. Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
- c. Pleated Cotton-Polyester Media: 90 percent arrestance and 7 MERV.
- 7. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, rated for a minimum working pressure of **200 psig (1378 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain.
- 8. Indoor Refrigerant Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, and brazed joints at fittings. Comply with ARI 210/240, and leak test to minimum **450 psig (3105 kPa)** for a minimum **300-psig (2070-kPa)** working pressure. Include thermal expansion valve.
- 9. Steam Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)**, rated for a minimum working pressure of **75 psig (517 kPa)**.
- 10. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
- 11. Direct-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, multispeed motor resiliently mounted in the fan inlet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.

OR

- Belt-Driven Fans: Double width, forward curved, centrifugal; with permanently lubricated, single-speed motor installed on an adjustable fan base resiliently mounted in the cabinet. Aluminum or painted-steel wheels, and painted-steel or galvanized-steel fan scrolls.
- a. Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - 12. Factory, Hydronic Piping Package: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M Type C), as directed**, copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet, and outlet.
 - a. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for chilled-water coil.
 - b. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for heating coil.
 - c. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for dual-temperature coil.
 - d. Two **OR** Three, **as directed**, -way, two-position **OR** modulating, **as directed**, control valve for reheat coil.
 - e. Hose Kits: Minimum **400-psig (2758-kPa)** working pressure, and operating temperatures from **33 to 211 deg F (0.5 to 99 deg C)**. Tag hose kits to equipment designations.
 - 1) Length: **24 inches (600 mm) OR 36 inches (900 mm), as directed**.
 - 2) Minimum Diameter: Equal to fan-coil-unit connection size.
 - f. Two-Piece Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and **600-psig (4140-kPa)** minimum CWP rating and blowout-proof stem.
 - g. Calibrated-Orifice Balancing Valves: Bronze body, ball type; **125-psig (860-kPa)** working pressure, **250 deg F (121 deg C)** maximum operating temperature; with calibrated orifice or venturi, connections for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
 - h. Automatic Flow-Control Valve: Brass or ferrous-metal body; **300-psig (2070-kPa)** working pressure at **250 deg F (121 deg C)**; with removable, corrosion-resistant, tamperproof, self-cleaning piston spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of **2 to 80 psig (13.8 to 552 kPa)**.
 - i. Y-Pattern Hydronic Strainers: Cast-iron body (ASTM A 126, Class B); **125-psig (860-kPa)** working pressure, with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum **NPS 1/2 (DN 15)** hose-end, full-port, ball-type blowdown valve in drain connection.
 - j. Wrought-Copper Unions: ASME B16.22.

13. Remote condensing units are specified in Division 23 Section "Packaged Compressor And Condenser Units".
14. Remote Condensing Units: Factory assembled and tested, consisting of compressors, condenser coils, fans, motors, refrigerant receiver, and operating controls. Construct, test, and rate condensing units according to ARI 210/240 and ASHRAE 15.
 - a. Casing: Steel with baked-enamel finish, removable panels for access to controls, weep holes for water drainage, and mounting holes in base.
 - b. Compressor: Hermetic, scroll **OR** reciprocating, **as directed**, type; internally isolated for vibration with factory-installed safety devices as follows:
 - 1) Antirecycle timer.
 - 2) High-pressure cutout.
 - 3) Low-pressure cutout or loss-of-charge switch.
 - 4) Internal thermal-overload protection.
 - 5) Current and voltage sensitive safety devices.
 - c. Compressor Motor: Start capacitor, relay, and contactor. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - d. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IESNA 90.1, "Energy Standard for Buildings except Low-Rise Residential Buildings."
 - e. Refrigerant Piping Materials: ASTM B 743 copper tube with wrought-copper fittings and brazed joints.
 - f. Refrigerant: R-407C **OR** R-410A, **as directed**.
 - g. Low ambient controls to permit operation down to **45 deg F (7 deg C)**.
 - h. Crankcase heater.
 - i. Charging and service fittings on exterior of casing.
 - j. Filter dryer.
 - k. Air-to-Air Heat Pump: Pilot-operated, sliding-type reversing valve with replaceable magnetic coil, and controls for air-to-air heat pump operation with supplemental heat operation.
 - l. Hot-gas-bypass, constant-pressure expansion valve and controls to maintain continuous refrigeration system operation at 10 percent of full load.
 - m. Condenser: Copper-tube, aluminum-fin coil, with liquid subcooler.
 - n. Condenser Fan: Direct-drive, aluminum propeller fan.
 - 1) Motor: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - o. Accessories: Polyethylene mounting base to provide a permanent foundation.
15. Control devices and operational sequence are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
16. Basic Unit Controls:
 - a. Control voltage transformer.
 - b. Wall-mounting **OR** Unit-mounted, **as directed**, thermostat with the following features.
 - 1) Heat-cool-off switch.
 - 2) Fan on-auto switch.
 - 3) Fan-speed switch.
 - 4) Manual **OR** Automatic, **as directed**, changeover.
 - 5) Adjustable deadband.
 - 6) Concealed **OR** Exposed, **as directed**, set point.
 - 7) Concealed **OR** Exposed, **as directed**, indication.
 - 8) Degree F **OR** Degree C, **as directed**, indication.
 - c. Wall-mounting **OR** Unit-mounted, **as directed**, humidistat.
 - 1) Concealed **OR** Exposed, **as directed**, set point.
 - 2) Concealed **OR** Exposed, **as directed**, indication.
 - d. Wall-mounting **OR** Unit-mounted, **as directed**, temperature sensor.
 - e. Unoccupied-period-override push button.
 - f. Data entry and access port.
 - 1) Input data includes room temperature, and humidity set points and occupied and unoccupied periods.

- 2) Output data includes room temperature and humidity, supply-air temperature, entering-water temperature, operating mode, and status.
17. DDC, **as directed**, Terminal Controller:
- a. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
 - b. Unoccupied Period Override Operation: Two, **as directed**, hours.
 - c. Unit Supply-Air Fan Operation:
 - 1) Occupied Periods: Fan runs continuously.
 - 2) Unoccupied Periods: Fan cycles to maintain room setback temperature.
 - d. Hydronic-Cooling-Coil Operation:
 - 1) Occupied Periods: Open **OR** Modulate, **as directed**, control valve to maintain room temperature.
 - 2) Unoccupied Periods: Close control valve.
 - e. Refrigerant-Coil Operation:
 - 1) Occupied Periods: Start compressor to maintain room temperature or humidistat set point.
 - 2) Unoccupied Periods: Stop compressor cooling and cycle compressor for heating to maintain setback temperature.
 - f. Supplemental, **as directed**, Heating-Coil Operation:
 - 1) Occupied Periods: Open control valve **OR** Modulate control valve **OR** Energize electric-resistance coil, **as directed**, to provide heating if room temperature falls below thermostat set point.
 - 2) Unoccupied Periods: Start fan and open control valve **OR** modulate control valve **OR** energize electric-resistance coil, **as directed**, if room temperature falls below setback temperature.
 - 3) Switch refrigerant-reversing valve to operate supplemental coil for heating when outdoor temperature is below **25 deg F (4 deg C)**.
 - g. Dual-Temperature Hydronic-Coil Operation:
 - 1) Occupied Periods: When chilled water is available, open **OR** modulate, **as directed**, control valve if room temperature exceeds thermostat set point. When hot water is available, open **OR** modulate, **as directed**, control valve if temperature falls below thermostat set point.
 - 2) Unoccupied Periods: When chilled water is available, close valve. When hot water is available, open **OR** modulate, **as directed**, control valve if room temperature falls below thermostat setback temperature.
 - h. Reheat-Coil Operation:
 - 1) Humidity Control for Occupied Periods: Humidistat opens control valve **OR** modulates control valve **OR** energizes electric-resistance coil, **as directed**, to provide heating. As room temperature rises above the set point, cooling coil valve opens **OR** modulates, **as directed**, to maintain room temperature.
 - 2) Humidity Control for Unoccupied Periods: Close control valve **OR** De-energize, **as directed**.
 - 3) Occupied Periods:
 - a) Heating Operations: Open control valve **OR** Modulate control valve **OR** Energize electric-resistance coil, **as directed**, to provide heating if room temperature falls below thermostat set point.
 - b) Humidity-Control Operations: Humidistat opens control valve **OR** modulates control valve **OR** energizes electric-resistance coil, **as directed**, to provide heating. As room temperature rises above the set point, cooling coil valve opens **OR** modulates, **as directed**, to maintain room temperature.
 - 4) Unoccupied Periods: Start fan and open control valve **OR** modulate control valve **OR** energize electric-resistance coil, **as directed**, if room temperature falls below setback temperature. Humidity control is not available.
 - i. Outdoor-Air Damper Operation (for fixed, minimum outdoor-air intake):
 - 1) Occupied Periods: Open damper to fixed position for 25 percent outdoor air.

- 2) Unoccupied Periods: Close damper.
 - j. Outdoor-Air Damper Operation (for outdoor-air economizer cycle based on temperature):
 - 1) Occupied Periods:
 - a) Outdoor-Air Temperature below Room Temperature: If room temperature is above room-temperature set point, modulate outdoor- and return-air dampers to maintain room-temperature set point (outdoor-air economizer). If room temperature is below set point, position damper to fixed minimum setting.
 - b) Outdoor-Air Temperature above Room Temperature: Position damper to fixed minimum position for 25 percent outdoor air.
 - 2) Unoccupied Periods: Close outdoor-air damper and open return-air damper.
 - k. Outdoor-Air Damper Operation (for outdoor-air economizer cycle based on enthalpy):
 - 1) Occupied Periods:
 - a) Outdoor-Air Enthalpy below Room Enthalpy: If room temperature is above room-temperature set point, modulate outdoor-air damper to maintain room temperature (outdoor-air economizer). If room temperature is below set point, position damper to fixed minimum position for 25 percent outdoor air.
 - b) Outdoor-Air Enthalpy above Room Enthalpy: Position damper to fixed minimum position for 25 percent outdoor air.
 - 2) Unoccupied Periods: Close outdoor-air damper and open return-air damper.
 - l. Controller shall have volatile-memory backup.
18. BAS Interface Requirements:
- a. Interface relay for scheduled operation.
 - b. Interface relay to provide indication of fault at the central workstation.
 - c. Provide BACnet **OR** LonWorks, **as directed**, interface for central BAS workstation for the following functions:
 - 1) Adjust set points.
 - 2) Fan-coil-unit start, stop, and operating status.
 - 3) Data inquiry including outdoor-air damper position,, **as directed** supply- and room-air temperature and humidity, **as directed**.
 - 4) Occupied and unoccupied schedules.
19. Electrical Connection: Factory wire motors and controls for a single electrical connection.

1.3 EXECUTION

A. Installation

- 1. Install fan-coil units level and plumb.
- 2. Install fan-coil units to comply with NFPA 90A.
- 3. Suspend fan-coil units from structure with elastomeric hangers. Vibration isolators are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
- 4. Verify locations of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices **48 inches (1220 mm) OR 60 inches (1525 mm), as directed**, above finished floor.
- 5. Install new filters in each fan-coil unit within two weeks after Final Completion.

B. Connections

- 1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
 - a. Install piping adjacent to machine to allow service and maintenance.
 - b. Connect piping to fan-coil-unit factory hydronic piping package. Install piping package if shipped loose.
 - c. Connect condensate drain to indirect waste.
 - 1) Install condensate trap of adequate depth to seal against the pressure of fan. Install cleanouts in piping at changes of direction.

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2. Connect supply and return ducts to fan-coil units with flexible duct connectors specified in Division 23 Section "Air Duct Accessories". Comply with safety requirements in UL 1995 for duct connections.
 3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 4. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - c. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
 2. Remove and replace malfunctioning units and retest as specified above.
- D. Adjusting
1. Adjust initial temperature and humidity set points.
 2. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.
- E. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain fan-coil units.

END OF SECTION 23 82 19 00

SECTION 23 82 33 00 - CONVECTION HEATING UNITS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for convection heating units. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Hydronic, Steam, and Electric baseboard radiators.
 - b. Hydronic, Steam, and Electric finned-tube radiators.
 - c. Hydronic, Steam, and Electric convectors.
 - d. Flat-pipe steel radiators.

C. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each type of product indicated.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Field quality-control test reports.
4. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Electric Baseboard Radiators

1. Description: Factory-packaged units constructed according to UL 499, UL 1030, and UL 2021.
2. Heating Elements: Nickel-chromium-wire heating element enclosed in metallic sheath mechanically bonded to fins, with high-temperature cutout and sensor running the full length of the element. Element supports shall eliminate thermal expansion noise.
3. Enclosures: Minimum **0.0329-inch- (0.85-mm-)** **OR** **0.0428-inch- (1.1-mm-)**, **as directed**, thick steel, removable front cover.
4. Rust-Resistant Enclosures: Minimum **0.040-inch- (1.0-mm-)** **OR** **0.052-inch- (1.3-mm-)**, **as directed**, thick ASTM A 653/A 653M, G60 galvanized-steel, removable front cover.
 - a. Full-height back.
 - b. Full-length damper.
 - c. End panel.
 - d. Plastic end **OR** End, **as directed**, caps.
 - e. Inside and outside corners.
 - f. Joiner pieces to snap together.
 - g. Finish: Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, color as selected.
 - h. Element Brackets: Primed and painted steel to support front panel and element.
5. Unit Controls: Integral line-voltage thermostat **OR** Integral electronic thermostat **OR** Remote line-voltage thermostat, **as directed**.

6. Accessories:
 - a. Filler sections without a heating element matching the adjacent enclosure.
 - b. Straight-blade-type receptacles complying with DSCC W-C-596G/GEN, NEMA WD 1, NEMA WD 6, and UL 498; in color selected.
- B. Hot-Water Baseboard Radiators
 1. Performance Ratings: Rate baseboard radiators according to Hydronics Institute's "I=B=R Testing and Rating Standard for Baseboard Radiation."
 2. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on polypropylene element glides. One end of tube shall be belled.
 - a. Tube Diameter: **NPS 1/2 (DN 15) OR NPS 3/4 (DN 20) OR NPS 1 (DN 25) OR NPS 1-1/4 (DN 32), as directed.**
 - b. Fin Size: **2-1/2 by 2-1/2 inches (63 by 63 mm) OR 3 by 3 inches (76 by 76 mm), as directed.**
 - c. Fin Spacing: **40 per foot (131 per meter) OR 50 per foot (164 per meter) OR 58 per foot (190 per meter), as directed.**
 - d. Entering Air Temperature: **65 deg F (18 deg C).**
 - e. Average Water Temperature: **180 deg F (82 deg C).**
 - f. Minimum Water Velocity: **1/2 fps (0.15 m/s).**
 - g. Entering Steam Pressure: **1 psig (6.9 kPa).**
 3. Heating Elements: Steel tubing mechanically expanded into flanged collars of evenly spaced steel fins resting on polypropylene element glides. Tube ends shall be threaded.
 - a. Tube Diameter: **NPS 1-1/4 (DN 32).**
 - b. Fin Size: **3 by 3 inches (76 by 76 mm).**
 - c. Fin Spacing: **52 per foot (171 per meter).**
 - d. Entering Air Temperature: **65 deg F (18 deg C).**
 - e. Average Water Temperature: **180 deg F (82 deg C).**
 - f. Minimum Water Velocity: **1/2 fps (0.15 m/s).**
 - g. Entering Steam Pressure: **1 psig (6.9 kPa).**
 4. Enclosures: Minimum **0.0329-inch- (0.85-mm-) OR 0.0428-inch- (1.1-mm-), as directed**, thick steel, removable front cover.
 5. Rust-Resistant Enclosures: Minimum **0.040-inch- (1.0-mm-) OR 0.052-inch- (1.3-mm-), as directed**, thick ASTM A 653/A 653M, G60 galvanized-steel, removable front cover.
 - a. Full-height back.
 - b. Full-length damper.
 - c. End panel.
 - d. End caps.
 - e. Inside and outside corners.
 - f. Valve access door.
 - g. Joiner pieces to snap together.
 - h. Finish: Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, color as selected.
 - i. Element Brackets: Primed and painted steel to support front panel and element.
- C. Electric Finned-Tube Radiators
 1. Description: Factory-packaged units constructed according to UL 499, UL 1030, and UL 2021.
 2. Heating Elements: Nickel-chromium-wire heating element enclosed in metallic sheath mechanically bonded into fins, with high-temperature cutout and sensor running the full length of the element. Element supports shall eliminate thermal expansion noise.
 3. Front Panel: Minimum **0.0428-inch- (1.1-mm-) OR 0.0528-inch- (1.35-mm-), as directed**, thick steel.
 4. Rust-Resistant Front Panel: Minimum **0.052-inch- (1.3-mm-) OR 0.064-inch- (1.6-mm-), as directed**, thick ASTM A 653/A 653M, G60 galvanized steel.
 5. Wall-Mounting Back Panel: Minimum **0.0329-inch- (0.85-mm-)** thick steel, full height, with full-length channel support for front panel without exposed fasteners.

6. Floor-Mounting Pedestals: Conceal conduit for power and control wiring at maximum **36-inch (914-mm)** spacing. Pedestal-mounting back panel shall be solid panel matching front panel.
7. Support Brackets: Locate at maximum **36-inch (914-mm)** spacing to support front panel and element.
8. Finish: Baked-enamel **OR** epoxy, **as directed**, finish in manufacturer's standard **OR** custom, **as directed**, color as selected.
9. Damper: Knob-operated internal damper at enclosure outlet.
10. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size **6 by 7 inches (150 by 175 mm)**, integral with enclosure.
11. Enclosure Style: Sloped **OR** Flat, **as directed**, top.
 - a. Front Inlet Grille: Punched louver; painted to match enclosure.
 - b. Front Inlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
 - c. Top **OR** Front, **as directed**, Outlet Grille: Punched louver; painted to match enclosure.
 - d. Top **OR** Front, **as directed**, Outlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
12. Unit Controls: Integral line-voltage thermostat with minimum range of **60 to 90 deg F (15 to 32 deg C)** **OR** low-voltage relay and control transformer for remote thermostat, **as directed**.
13. Accessories: Integral disconnect switch, filler sections, corners, relay sections, and splice plates all matching the enclosure and grille finishes.

D. Hot-Water Finned-Tube Radiators

1. Performance Ratings: Rate finned-tube radiators according to Hydronics Institute's "I=B=R Testing and Rating Standard for Finned-Tube (Commercial) Radiation."
2. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on element supports. One tube end shall be belled.
 - a. Tube Diameter: **NPS 3/4 (DN 20) OR NPS 1 (DN 25) OR NPS 1-1/4 (DN 32)**, **as directed**.
 - b. Fin Size: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm)**, **as directed**.
 - c. Fin Spacing: **40 per foot (131 per meter) OR 50 per foot (164 per meter) OR 58 per foot (190 per meter)**, **as directed**.
 - d. Entering Air Temperature: **65 deg F (18 deg C)**.
 - e. Average Water Temperature: **180 deg F (82 deg C)**.
 - f. Minimum Water Velocity: **1/2 fps (0.15 m/s)**.
 - g. Entering Steam Pressure: **1 psig (6.9 kPa)**.
3. Heating Elements: Steel tubing mechanically expanded into flanged collars of evenly spaced steel fins resting on element supports. Tube ends shall be threaded.
 - a. Tube Diameter: **NPS 1-1/4 (DN 32)**.
 - b. Fin Size: **4 by 4 inches (102 by 102 mm)**.
 - c. Fin Spacing: **52 per foot (171 per meter)**.
 - d. Entering Air Temperature: **65 deg F (18 deg C)**.
 - e. Average Water Temperature: **180 deg F (82 deg C)**.
 - f. Minimum Water Velocity: **1/2 fps (0.15 m/s)**.
 - g. Entering Steam Pressure: **1 psig (6.9 kPa)**.
4. Element Supports: Ball-bearing cradle type to permit longitudinal movement on enclosure brackets.
5. Front Panel: Minimum **0.0428-inch- (1.1-mm-) OR 0.0528-inch- (1.35-mm-)**, **as directed**, thick steel.
6. Rust-Resistant Front Panel: Minimum **0.052-inch- (1.3-mm-) OR 0.064-inch- (1.6-mm-)**, **as directed**, thick, ASTM A 653/A 653M, G60 galvanized steel.

7. Wall-Mounting Back Panel: Minimum **0.0329-inch- (0.85-mm-)** thick steel, full height, with full-length channel support for front panel without exposed fasteners.
 8. Floor-Mounting Pedestals: Conceal insulated piping at maximum **36-inch (914-mm)** spacing. Pedestal-mounting back panel shall be solid panel matching front panel. Provide stainless-steel escutcheon for floor openings at pedestals.
 9. Support Brackets: Locate at maximum **36-inch (914-mm)** spacing to support front panel and element.
 10. Finish: Baked-enamel **OR**-epoxy, **as directed**, finish in manufacturer's standard **OR** custom, **as directed** color as selected.
 11. Damper: Knob-operated internal damper at enclosure outlet.
 12. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size **6 by 7 inches (150 by 175 mm)**, integral with enclosure.
 13. Enclosure Style: Sloped **OR** Flat, **as directed**, top.
 - a. Front Inlet Grille: Punched louver; painted to match enclosure.
 - b. Front Inlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish, color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
 - c. Top **OR** Front, **as directed**, Outlet Grille: Punched louver; painted to match enclosure.
 - d. Top **OR** Front, **as directed**, Outlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish, color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
 14. Accessories: Filler sections, corners, relay sections, and splice plates all matching the enclosure and grille finishes.
- E. Electric Convectors
1. Description: Factory-packaged units constructed according to UL 499, UL 1030, and UL 2021.
 2. Heating Elements: Nickel-chromium-wire heating element enclosed in metallic sheath mechanically bonded into fins, with high-temperature cutout and sensor running the full length of element. Element supports shall eliminate thermal expansion noise.
 - a. Heat Output: 300 **OR** 500 **OR** 750 **OR** 1000 **OR** 1250 **OR** 1500 **OR** 1750 **OR** 2000 **OR** 2250 **OR** 2500, **as directed**, W.
 3. Front and Top Panel: Minimum **0.0528-inch- (1.35-mm-)** **OR** **0.0677-inch- (1.7-mm-)**, **as directed** thick steel with exposed corners rounded; removable front panels with tamper-resistant fasteners braced and reinforced for stiffness.
 4. Wall-Mounting Back and End Panels: Minimum **0.0428-inch- (1.1-mm-)** thick steel.
 5. Floor-Mounting Pedestals: Conceal conduit for power and control wiring at maximum **36-inch (914-mm)** spacing. Pedestal-mounting back panel shall be solid panel matching front panel.
 6. Support Brackets: Locate at maximum **36-inch (914-mm)** spacing to support front panel and element.
 7. Insulation: **1/2-inch- (13-mm-)** thick, fibrous glass on inside of the back of the enclosure.
 8. Finish: Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, color as selected.
 9. Damper: Knob-operated internal damper.
 10. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size **6 by 7 inches (150 by 175 mm)**, integral with enclosure.
 11. Enclosure Style: Sloped **OR** Flat, **as directed**, top.
 - a. Front Inlet Grille: Punched louver; painted to match enclosure.
 - b. Front Inlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.

- 2) Anodized finish, color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
 - c. Top **OR** Front, **as directed**, Outlet Grille: Punched louver; painted to match enclosure.
 - d. Top **OR** Front, **as directed**, Outlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish, color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
 12. Unit Controls: Integral line-voltage thermostat with minimum range of **60 to 90 deg F (15 to 32 deg C)** **OR** low-voltage relay and control transformer for remote thermostat, **as directed**.
 13. Accessories: Integral disconnect switch, recessing flanges finished to match enclosure or overlapping front cover for fully recessed units, and rubber gaskets to seal cabinet at wall.
- F. Hot-Water Or Steam Convectors
1. Convector Elements: Seamless copper tubing mechanically expanded into evenly spaced aluminum fins and rolled into cast-iron or brass headers with inlet/outlet and air vent; steel side plates and supports. Factory-pressure-test element at minimum **100 psig (690 kPa)**.
 - a. Entering Air Temperature: **65 deg F (18 deg C)**.
 - b. Average Water Temperature: **180 deg F (82 deg C)**.
 - c. Temperature Drop: **10 deg F (5.56 deg C)** **OR** **20 deg F (11.1 deg C)** **OR** **30 deg F (16.6 deg C)**, **as directed**.
 - d. Entering Steam Pressure: **1 psig (6.9 kPa)**.
 2. Front and Top Panel: Minimum **0.0528-inch- (1.35-mm-)** **OR** **0.0677-inch- (1.7-mm-)**, **as directed**, thick steel with exposed corners rounded; removable front panels with tamper-resistant fasteners braced and reinforced for stiffness.
 3. Wall-Mounting Back and End Panels: Minimum **0.0428-inch- (1.1-mm-)** thick steel.
 4. Floor-Mounting Pedestals: Conceal conduit for power and control wiring at maximum **36-inch (914-mm)** spacing. Pedestal-mounting back panel shall be solid panel matching front panel.
 5. Support Brackets: Locate at maximum **36-inch (914-mm)** spacing to support front panel and element.
 6. Insulation: **1/2-inch- (13-mm-)** thick, fibrous glass on inside of the back of the enclosure.
 7. Finish: Baked-enamel finish in manufacturer's standard **OR** custom, **as directed** color as selected.
 8. Damper: Knob-operated internal damper.
 9. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size **6 by 7 inches (150 by 175 mm)**, integral with enclosure.
 10. Enclosure Style: Sloped **OR** Flat, **as directed**, top.
 - a. Front Inlet Grille: Punched louver; painted to match enclosure.
 - b. Front Inlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish, color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
 - c. Top **OR** Front, **as directed**, Outlet Grille: Punched louver; painted to match enclosure.
 - d. Top **OR** Front, **as directed**, Outlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
 - 1) Mill-finish aluminum.
 - 2) Anodized finish, color as selected from manufacturer's standard **OR** custom, **as directed**, colors.
 - 3) Painted to match enclosure.
- G. Flat-Pipe Steel Radiators
1. Heating Elements: Steel, welded and formed into flat, square, steel header with minimum thickness of **0.109 inches (2.76 mm)**. Include threaded piping and air vent connections.

- a. Working Pressure **56 psig (386 kPa): 0.048 inch (1.22 mm)**.
 - b. Working Pressure **85 psig (585 kPa): 0.058 inch (1.47 mm)**.
 - c. Working Pressure **128 psig (881 kPa): 0.078 inch (1.98 mm)**.
 - d. Room Air Temperature: **65 deg F (18 deg C)**.
 - e. Average Water Temperature: **180 deg F (82 deg C)**.
 - f. Temperature Drop: **10 deg F (5.56 deg C) OR 20 deg F (11.1 deg C) OR 30 deg F (16.6 deg C), as directed.**
2. Mounting: Wall brackets **OR** Floor pedestals, **as directed**, on maximum spacing of **36 inches (914 mm)**.
 3. Finish: Baked-enamel finish in manufacturer's standard **OR** custom, **as directed**, color as selected.
 4. Accessories:
 - a. Steel piping covers finished to match radiator finish.
 - b. Flexible Expansion Compensation Hoses: Minimum **400-psig (2758-kPa)** working pressure, and operating temperatures from **33 to 211 deg F (0.5 to 99.5 deg C)**.
 - 1) Length: **24 inches (600 mm) OR 36 inches (900 mm), as directed.**
 - 2) Minimum Diameter: Equal to connection size.

1.3 EXECUTION

A. Baseboard Radiator Installation

1. Install units level and plumb.
2. Install baseboard radiators according to Guide 2000 - Residential Hydronic Heating.
3. Install enclosure continuously around corners, using outside and inside corner fittings.
4. Join sections with splice plates and filler pieces to provide continuous enclosure.
5. Install access doors for access to valves.
6. Install enclosure continuously from wall to wall.
7. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.
8. Install valves within reach of access door provided in enclosure.
9. Install air-seal gasket between wall and recessing flanges or front cover of fully recessed unit.
10. Install piping within pedestals for freestanding units.

B. Finned-Tube Radiator Installation

1. Install units level and plumb.
2. Install finned-tube radiators according to Guide 2000 - Residential Hydronic Heating.
3. Install enclosure continuously around corners, using outside and inside corner fittings.
4. Join sections with splice plates and filler pieces to provide continuous enclosure.
5. Install access doors for access to valves.
6. Install enclosure continuously from wall to wall.
7. Terminate enclosures with manufacturer's end caps, except where enclosures are indicated to extend to adjoining walls.
8. Install valves within reach of access door provided in enclosure.
9. Install air-seal gasket between wall and recessing flanges or front cover of fully recessed unit.
10. Install piping within pedestals for freestanding units.

C. Convector Installation

1. Install units level and plumb.
2. Install valves within reach of access door provided in enclosure.
3. Install air-seal gasketing between wall and recessing flanges or front cover of fully recessed unit.
4. Install piping within pedestals for freestanding units.

D. Flat-Pipe Steel Radiator Installation

1. Install units level and plumb.

2. Install expansion compensation hoses.
3. Install piping covers.

E. Connections

1. Piping installation requirements are specified in Division 23 Section(s) "Hydronic Piping" OR "Steam And Condensate Heating Piping", **as applicable**. Drawings indicate general arrangement of piping, fittings, and specialties.
2. Connect hot-water units and components to piping according to Division 23 Section "Hydronic Piping".
 - a. Install shutoff valves on inlet and outlet, and balancing valve on outlet.
3. Connect steam units and components to piping according to Division 23 Section "Steam And Condensate Heating Piping".
 - a. Install shutoff valve on inlet; install strainer, steam trap, and shutoff valve on outlet.
4. Install control valves as required by Division 23 Section "Instrumentation And Control For Hvac".
5. Install piping adjacent to convection heating units to allow service and maintenance.
6. Ground electric convection heating units according to Division 26 Section "Grounding And Bonding For Electrical Systems".
7. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

F. Field Quality Control

1. Perform the following field tests and inspections and prepare test reports:
 - a. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, start units to confirm proper convection heating unit operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
2. Remove and replace convection heating units that do not pass tests and inspections and retest as specified above.

END OF SECTION 23 82 33 00

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Task	Specification	Specification Description
23 82 33 00	01 22 16 00	No Specification Required
23 82 36 00	01 22 16 00	No Specification Required
23 82 36 00	23 82 33 00	Convection Heating Units

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SECTION 23 82 39 13 - UNIT HEATERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for unit heaters. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Cabinet unit heaters with centrifugal fans and hot-water, steam, and electric-resistance heating coils.
 - b. Propeller unit heaters with hot-water, steam, and electric-resistance heating coils.
 - c. Wall and ceiling heaters with propeller fans and electric-resistance heating coils.

C. Definitions

1. BAS: Building automation system.
2. CWP: Cold working pressure.
3. PTFE: Polytetrafluoroethylene plastic.
4. TFE: Tetrafluoroethylene plastic.

D. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories for each product indicated.
2. LEED Submittal:
 - a. Product Data for Prerequisite EQ 1: Documentation indicating that units comply with ASHRAE 62.1-2004, Section 5 - "Systems and Equipment."
3. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - a. Plans, elevations, sections, and details.
 - b. Location and size of each field connection.
 - c. Details of anchorages and attachments to structure and to supported equipment.
 - d. Equipment schedules to include rated capacities, operating characteristics, furnished specialties, and accessories.
 - e. Location and arrangement of piping valves and specialties.
 - f. Location and arrangement of integral controls.
 - g. Wiring Diagrams: Power, signal, and control wiring.
4. Manufacturer Seismic Qualification Certification: Submit certification that cabinet unit heaters, accessories, and components will withstand seismic forces defined in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
5. Field quality-control test reports.
6. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
3. ASHRAE/IESNA 90.1-2004 Compliance: Applicable requirements in ASHRAE/IESNA 90.1-2004, Section 6 - "Heating, Ventilating, and Air-Conditioning."

1.2 PRODUCTS

A. Cabinet Unit Heaters

1. Description: A factory-assembled and -tested unit complying with ARI 440.
 - a. Comply with UL 2021.
2. Coil Section Insulation (for duct-liner-type, glass-fiber insulation): ASTM C 1071; surfaces exposed to airstream shall be aluminum-foil facing **OR** erosion-resistant coating, **as directed**, to prevent erosion of glass fibers.
 - a. Thickness: **1/2 inch (13 mm) OR 1 inch (25 mm) OR 1-1/2 inches (38 mm), as directed.**
 - b. Thermal Conductivity (k-Value): **0.26 Btu x in./h x sq. ft. at 75 deg F (0.037 W/m x K at 24 deg C)** mean temperature.
 - c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84.
 - d. Adhesive: Comply with ASTM C 916 and with NFPA 90A or NFPA 90B.
 - e. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
3. Coil Section Insulation (for flexible elastomeric insulation): Comply with NFPA 90A or NFPA 90B. Unicellular polyethylene thermal plastic, preformed sheet insulation complying with ASTM C 534, Type II, except for density.
 - a. Thickness: **3/8 inch (9 mm) OR 1/2 inch (13 mm) OR 3/4 inch (19 mm) OR 1 inch (25 mm), as directed.**
 - b. Thermal Conductivity (k-Value): **0.24 Btu x in./h x sq. ft. at 75 deg F (0.034 W/m x K at 24 deg C)** mean temperature.
 - c. Fire-Hazard Classification: Maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM C 411.
 - d. Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.
 - e. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
4. Cabinet (for surface, semi-recessed, and fully recessed units): Steel with factory prime coating, ready for field painting **OR** baked-enamel finish with manufacturer's standard paint, in color selected by the Owner **OR** baked-enamel finish with manufacturer's custom paint, in color selected by the Owner, **as directed**.
 - a. Vertical Unit, Exposed Front Panels: Minimum **0.0528-inch- (1.35-mm-) OR 0.0677-inch- (1.7-mm-), as directed**, thick, galvanized, **as directed**, sheet steel, removable panels with channel-formed edges secured with tamperproof cam fasteners.
 - b. Horizontal Unit, Exposed Bottom Panels: Minimum **0.0528-inch- (1.35-mm-) OR 0.0677-inch- (1.7-mm-), as directed**, thick, galvanized, **as directed**, sheet steel, removable panels secured with tamperproof cam fasteners and safety chain.
 - c. Recessing Flanges (for units that are semirecessed or fully recessed in walls or ceilings): Steel, finished to match cabinet.
 - d. Control Access Door: Key operated.
 - e. Base (for surface, vertical, wall-mounting units): Minimum **0.0528-inch- (1.35-mm-)** thick steel, finished to match cabinet, **4 inches (100 mm) OR 6 inches (150 mm), as directed**, high with leveling bolts.
 - f. Extended Piping Compartment: **8-inch- (200-mm-), as directed**, wide piping end pocket.
 - g. False Back (for vertical, wall-mounting units only): Minimum **0.0428-inch- (1.1-mm-)** thick steel, finished to match cabinet.
 - h. Outdoor-Air Wall Box (for vertical, wall-mounting units only): Minimum **0.1265-inch- (3.2-mm-)** thick, aluminum, rain-resistant louver and box with integral eliminators and bird screen. Aluminum louver with anodized **OR** baked-enamel, **as directed**, finish in color selected by the Owner from manufacturer's standard **OR** custom, **as directed**, colors.
 - 1) Outdoor-Air Damper: Galvanized-steel blades with edge and end seals and nylon bearings; with manual **OR** electronic **OR** pneumatic, **as directed**, two-position actuators.

5. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.
 - a. Washable Foam: 70 percent arrestance and 3 MERV.
 - b. Glass Fiber Treated with Adhesive: 80 percent arrestance and 5 MERV.
 - c. Pleated: 90 percent arrestance and 7 MERV.
6. Hot-Water Coil: Copper tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **200 psig (1378 kPa)** and a maximum entering-water temperature of **220 deg F (104 deg C)**. Include manual air vent and drain.
OR
 Steam Coil: Copper distributing, **as directed**, tube, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **75 psig (517 kPa)**.
OR
 Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with fuses in terminal box for overcurrent protection and limit controls for high-temperature protection. Terminate elements in stainless-steel machine-staked terminals secured with stainless-steel hardware.
7. Fan and Motor Board: Removable.
 - a. Fan: Forward curved, high static, **as directed**, double width, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls.
 - b. Motor: Permanently lubricated, multispeed; resiliently mounted on motor board. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - c. Wiring Terminations: Connect motor to chassis wiring with plug connection.
8. Factory, Hot-Water Piping Package: **ASTM B 88, Type L (ASTM B 88M, Type B) OR ASTM B 88, Type M (ASTM B 88M Type C), as directed**, copper tube with wrought-copper fittings and brazed joints. Label piping to indicate service, inlet and outlet.
 - a. Two **OR** Three, **as directed**,-way, two-position **OR** modulating, **as directed**, control valve. Three-way valve packages shall include bypass line with manually adjustable balance device, **as directed**.
 - b. Hose Kits: Minimum **400-psig (2758-kPa)** working pressure, and operating temperatures from **33 to 211 deg F (0.5 to 99 deg C)**. Tag hose kits to equipment designations.
 - 1) Length: **24 inches (600 mm) OR 36 inches (900 mm), as directed**.
 - 2) Minimum Diameter: Equal to cabinet unit heater connection size.
 - c. Two-Piece, Ball Valves: Bronze body with full-port, chrome-plated bronze ball; PTFE or TFE seats; and **600-psig (4140-kPa)** minimum CWP rating and blowout-proof stem.
 - d. Calibrated-Orifice Balancing Valves: Bronze body, ball type, **125-psig (860-kPa)** working pressure, **250 deg F (121 deg C)** maximum operating temperature; with calibrated orifice or venturi, connection for portable differential pressure meter with integral seals, threaded ends, and equipped with a memory stop to retain set position.
 - e. Automatic Flow-Control Valve: Brass or ferrous-metal body, **300-psig (2068-kPa)** working pressure at **250 deg F (121 deg C)**, with removable, corrosion-resistant, tamperproof, self-cleaning, piston-spring; factory set to maintain constant indicated flow with plus or minus 10 percent over differential pressure range of **2 to 80 psig (13.8 to 552 kPa)**.
 - f. Y-Pattern, Hot-Water Strainers: Cast-iron body (ASTM A 126, Class B); **125-psig (860-kPa)** minimum working pressure; with threaded connections, bolted cover, perforated stainless-steel basket, and bottom drain connection. Include minimum **NPS 1/2 (DN 15)** threaded pipe and full-port ball valve in strainer drain connection.
 - g. Wrought-Copper Unions: ASME B16.22.
9. Control devices and operational sequences are specified in Division 23 Section(s) "Instrumentation And Control For Hvac" AND "Sequence Of Operations For Hvac Controls".
10. Basic Unit Controls:
 - a. Control voltage transformer.
 - b. Wall-mounting **OR** Unit-mounted, **as directed**, thermostat with the following features.
 - 1) Heat-off switch.

- 2) Fan on-auto switch.
 - 3) Manual fan speed switch (for use with multispeed motors).
 - 4) Adjustable deadband.
 - 5) Concealed **OR** Exposed, **as directed**, set point.
 - 6) Concealed **OR** Exposed, **as directed**, indication.
 - 7) **Deg F (Deg C)** indication.
 - c. Wall-mounting **OR** Unit-mounted, **as directed**, temperature sensor.
 - d. Unoccupied period override push button.
 - e. Data entry and access port.
 - 1) Input data includes room temperature, and occupied and unoccupied periods.
 - 2) Output data includes room temperature, supply-air temperature, entering-water temperature, operating mode, and status.
 11. DDC, **as directed**, Terminal Controller:
 - a. Scheduled Operation: Occupied and unoccupied periods on seven-day clock with a minimum of four programmable periods per day.
 - b. Unoccupied Period Override: Two, **as directed**, hours.
 - c. Unit Supply-Air Fan Operations:
 - 1) Occupied Periods: Fan runs continuously.
 - 2) Unoccupied Periods: Fan cycles to maintain setback room temperature.
 - d. Heating Coil Operations:
 - 1) Occupied Periods: Open control valve **OR** Modulate control valve **OR** Energize electric-resistance coil, **as directed**, to provide heating if room temperature falls below thermostat set point.
 - 2) Unoccupied Periods: Start fan and open control valve **OR** modulate control valve **OR** energize electric-resistance coil, **as directed**, if room temperature falls below setback temperature.
 - e. Outdoor-Air Damper Operation:
 - 1) Occupied Periods: Open dampers. Delay damper opening if room temperature is more than three degrees below set point.
 - 2) Unoccupied Periods: Close damper.
 - f. Controller shall have volatile-memory backup.
 12. BAS Interface Requirements:
 - a. Interface relay for scheduled operation.
 - b. Interface relay to provide indication of fault at central workstation.
 - c. Interface shall be BAC-net **OR** LonWorks, **as directed**, compatible for central BAS workstation and include the following functions:
 - 1) Adjust set points.
 - 2) Cabinet unit heater start, stop, and operating status.
 - 3) Data inquiry, including outdoor-air damper position, **as directed**, supply-air and room-air temperature.
 - 4) Occupied and unoccupied schedules.
 13. Electrical Connection: Factory wire motors and controls for a single field connection.
- B. Propeller Unit Heaters
1. Description: An assembly including casing, coil, fan, and motor in vertical **OR** horizontal **OR** vertical and horizontal, **as directed**, discharge configuration with adjustable discharge louvers.
 2. Comply with UL 2021, for electric unit heaters.
 3. Comply with UL 823, for explosion-proof electric unit heaters.
 4. Cabinet: Removable panels for maintenance access to controls.
 5. Cabinet Finish: Manufacturer's standard **OR** custom, **as directed**, baked enamel applied to factory-assembled and -tested propeller unit heater before shipping.
 6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 7. Discharge Louver: Adjustable fin diffuser for horizontal units and conical diffuser for vertical units.

8. General Coil Requirements: Test and rate hot-water **OR** steam, **as directed**, propeller unit heater coils according to ASHRAE 33.
9. Hot-Water Coil: Copper tube, minimum **0.025-inch (0.635-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **200 psig (1380 kPa)** and a maximum entering-water temperature of **325 deg F (163 deg C)**, with manual air vent. Test for leaks to **350 psig (2413 kPa)** underwater.
OR
Hot-Water Coil: Cupronickel tube, minimum **0.031-inch (0.78-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **400 psig (2760 kPa)** and a maximum entering-water temperature of **450 deg F (232 deg C)**, with manual air vent. Test for leaks to **600 psig (4137 kPa)** underwater.
OR
Hot-Water Coil: Red brass tube, minimum **0.049-inch (1.24-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **260 psig (1793 kPa)** and a maximum entering-water temperature of **390 deg F (199 deg C)**, with manual air vent. Test for leaks to **390 psig (2689 kPa)** underwater.
OR
Hot-Water Coil: Steel tube, minimum **0.049-inch (1.24-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **400 psig (2760 kPa)** and a maximum entering-water temperature of **450 deg F (232 deg C)**, with manual air vent. Test for leaks to **600 psig (4137 kPa)** underwater.
OR
Hot-Water Coil: Vertical steel tube, minimum **0.065-inch (1.65-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **400 psig (2760 kPa)** and a maximum entering-water temperature of **450 deg F (232 deg C)**, with steel headers at top and bottom. Test for leaks to **600 psig (4137 kPa)** underwater.
OR
Steam Coil: Copper tube, minimum **0.025-inch (0.635-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **75 psig (520 kPa)**.
OR
Steam Coil: Red brass tube, minimum **0.049-inch (1.24-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **75 psig (520 kPa)**.
OR
Steam Coil: Vertical steel tube, minimum **0.065-inch (1.65-mm)** wall thickness, with mechanically bonded aluminum fins spaced no closer than **0.1 inch (2.5 mm)** and rated for a minimum working pressure of **100 psig (690 kPa) OR 200 psig (1380 kPa)**, **as directed**, with steel headers at top and bottom.
10. Electric-Resistance Heating Elements: Nickel-chromium heating wire, free from expansion noise and 60-Hz hum, embedded in magnesium oxide refractory and sealed in steel or corrosion-resistant metallic sheath with fins no closer than **0.16 inch (4 mm)**. Element ends shall be enclosed in terminal box. Fin surface temperature shall not exceed **550 deg F (288 deg C)** at any point during normal operation.
 - a. Circuit Protection: One-time fuses in terminal box for overcurrent protection and limit controls for high-temperature protection of heaters.
 - b. Wiring Terminations: Stainless-steel or corrosion-resistant material.
11. Fan: Propeller type with aluminum wheel directly mounted on motor shaft in the fan venturi.
12. Fan Motors: Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Type: Permanently lubricated, explosion proof **OR** multispeed **OR** variable speed, **as directed**.
13. Control Devices:
 - a. Unit-mounted **OR** Wall-mounting, **as directed**, variable, **as directed**, fan-speed switch.
 - b. Unit-mounted **OR** Wall-mounting, **as directed**, thermostat.

- C. Wall And Ceiling Heaters
1. Description: An assembly including chassis, electric heating coil, fan, motor, and controls. Comply with UL 2021.
 2. Cabinet:
 - a. Front Panel: Stamped-steel louver **OR** Extruded-aluminum bar grille, **as directed**, with removable panels fastened with tamperproof fasteners.
 - b. Finish: Baked enamel over baked-on primer with manufacturer's standard **OR** custom, **as directed**, color selected by the Owner, applied to factory-assembled and -tested wall and ceiling heaters before shipping.
 - c. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.
 3. Surface-Mounting Cabinet Enclosure: Steel with finish to match cabinet.
 4. Electric-Resistance Heating Coil: Nickel-chromium heating wire, free from expansion noise and hum, embedded in magnesium oxide refractory and sealed in corrosion-resistant metallic sheath. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware, and limit controls for high temperature protection. Provide integral circuit breaker for overcurrent protection, **as directed**.
 5. Fan: Aluminum propeller directly connected to motor.
 - a. Motor: Permanently lubricated, multispeed, **as directed**. Comply with requirements in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 6. Controls: Unit-mounted thermostat. Low-voltage relay with transformer kit, **as directed**.
 7. Electrical Connection: Factory wire motors and controls for a single field connection with disconnect switch, **as directed**.

1.3 EXECUTION

- A. Installation
1. Install wall boxes in finished wall assembly; seal and weatherproof. Joint-sealant materials and applications are specified in Division 07 Section "Joint Sealants".
 2. Install cabinet unit heaters to comply with NFPA 90A.
 3. Install propeller unit heaters level and plumb.
 4. Suspend cabinet unit heaters from structure with elastomeric hangers and seismic restraints, **as directed**. Vibration isolators and seismic restraints, **as directed**, are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 5. Suspend propeller unit heaters from structure with all-thread hanger rods and elastomeric hangers **OR** spring hangers **OR** spring hangers with vertical-limit stop, **as directed**. Hanger rods and attachments to structure are specified in Division 23 Section "Hangers And Supports For Hvac Piping And Equipment". Vibration hangers are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
 6. Install wall-mounting thermostats and switch controls in electrical outlet boxes at heights to match lighting controls. Verify location of thermostats and other exposed control sensors with Drawings and room details before installation.
 7. Install new filters in each fan-coil unit within two weeks of Final Completion.
- B. Connections
1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to machine to allow service and maintenance.
 3. Connect piping to cabinet unit heater's factory, hot-water piping package. Install the piping package if shipped loose.
 4. Connect supply and return ducts to cabinet unit heaters with flexible duct connectors specified in Division 23 Section "Air Duct Accessories".
 5. Comply with safety requirements in UL 1995.

6. Unless otherwise indicated, install union and gate or ball valve on supply-water connection and union and calibrated balancing valve on return-water connection of unit heater. Hydronic specialties are specified in Division 23 Section "Hydronic Piping".
 7. Unless otherwise indicated, install union and gate or ball valve on steam-supply connection and union, strainer, steam trap, and gate or ball valve on condensate-return connection of unit heater. Steam specialties are specified in Division 23 Section "Steam And Condensate Heating Piping".
 8. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 9. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - b. Operate electric heating elements through each stage to verify proper operation and electrical connections.
 - c. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
 2. Remove and replace malfunctioning units and retest as specified above.
- D. Adjusting
1. Adjust initial temperature set points.
 2. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- E. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain cabinet unit heaters.

END OF SECTION 23 82 39 13

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Task	Specification	Specification Description
23 82 39 13	01 22 16 00	No Specification Required
23 82 39 16	01 22 16 00	No Specification Required
23 82 39 16	23 82 39 13	Unit Heaters
23 82 39 19	01 22 16 00	No Specification Required
23 82 39 19	23 82 39 13	Unit Heaters

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SECTION 23 84 13 23 - HUMIDIFIERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for humidifiers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following humidifiers:
 - a. Atomizing.
 - b. Steam injection.
 - c. Self-contained.
 - d. Heated pan.
 - e. Heat exchanger.

C. Definition

1. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

D. Submittals

1. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, sections, details of components, manifolds, and attachments to other work.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Field quality-control test reports.
4. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with ARI 640, "Commercial and Industrial Humidifiers."

1.2 Products

A. Water-Pressure Atomizing Humidifiers

1. Nozzles: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel.
2. Manifold: ASTM A 269, Type 304 **OR** 316, **as directed**, stainless-steel piping.
3. Droplet Filter: Biocide-treated polyethylene with maximum **0.30-inch wg (75-Pa)** resistance.
4. Piping and Fittings: ASTM A 269, Type 304 **OR** 316, **as directed**, stainless-steel pipe and fittings.
OR
Piping and Fittings: **ASTM B 88 (ASTM B 88M)**, Type L copper pipe and wrought-copper fittings with brazed joints.
5. Water Pump: Enclosed belt-drive ceramic plunger pump with stainless-steel **OR** bronze, **as directed**, heads, and single **OR** variable, **as directed**,-speed, totally enclosed, fan-cooled motor.
6. Final Water-Filter Efficiency: Minimum 98 percent retention of suspended particles 10 **OR** 20, **as directed**, microns and larger from makeup water.

7. Final Water-Filter Pressure Drop: Maximum **2 psig (14 kPa)** at design flow when clean, the value when dirty: as directed by the Owner .
 8. Pump Controls:
 - a. Cycle **OR** Vary speed of, **as directed**, motor to satisfy humidistat.
 - b. High-pressure solenoid valve for each control zone shown on Drawings.
 - c. Building automation system interface for each control zone for start/stop and status indication and control at central workstation.
 9. Dispersion Fan:
 - a. Aluminum blade propeller fan with finger guard and single-speed motor interlocked to operate with humidifier.
 - b. Fan Mounting: Above and behind manifold on bracket integral to wall-mounting manifold.
 10. Accessories:
 - a. Humidistat: Wall **OR** Return-duct, **as directed**, -mounting, solid-state, electronic-sensor controller capable of full-modulation or cycling control.
 - b. Duct-mounting, high-limit humidistat.
 - c. Airflow switch for preventing humidifier operation without airflow.
- B. Compressed-Air Atomizing Humidifiers
1. Nozzles: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel.
 2. Manifold: ASTM A 269, Type 304 **OR** 316, **as directed**, stainless-steel piping.
 3. Droplet Filter: Biocide-treated polyethylene with maximum **0.30-inch wg (75-Pa)** resistance.
 4. Piping and Fittings: ASTM A 269, Type 304 **OR** 316, **as directed**, stainless-steel pipe and fittings.
 5. Compressed-Air and Water, **as directed**, Piping and Fittings: **ASTM B 88 (ASTM B 88M)**, Type L copper pipe and wrought-copper fittings with soldered joints.
 6. Final Water-Filter Efficiency: Minimum 98 percent retention of suspended particles **10 OR 20, as directed**, microns and larger from makeup water.
 7. Final Water-Filter Pressure Drop: Maximum **2 psig (14 kPa)** at design flow when clean and the value when dirty: as directed by the Owner .
 8. Air and Water Solenoid Controls:
 - a. Cycle valves to satisfy humidistat.
 - b. Solenoid valves for each control zone shown on Drawings.
 - c. Building automation system interface for each control zone for start/stop and status indication and control at central workstation.
 9. Dispersion Fan:
 - a. Aluminum blade propeller fan with finger guard and single-speed motor interlocked to operate with humidifier.
 - b. Fan Mounting: Above and behind manifold on bracket integral to wall-mounting manifold.
 10. Accessories:
 - a. Humidistat: Wall **OR** Return-duct, **as directed**, -mounting, solid-state, electronic-sensor controller capable of full-modulation or cycling control.
 - b. Duct-mounting, high-limit humidistat.
 - c. Airflow switch for preventing humidifier operation without airflow.
- C. Steam-Injection Humidifiers
1. Manifold: ASTM A 666, Type 304 stainless steel, steam jacketed, **as directed**; insulated with **1/2-inch (13-mm)** fiberglass and stainless-steel jacket; and , **as directed**, extending the full width of duct or plenum with mounting brackets at ends.
 2. Discharge Nozzle and Dispersion Fan:
 - a. Steam-jacketed discharge nozzle, aluminum blade propeller fan with finger guard, and single-speed motor interlocked to operate with humidifier.
 - b. Fan Mounting: Above and behind discharge outlet on bracket integral to discharge outlet.
 3. Steam Separator: Cast iron **OR** ASTM A 666, Type 304 stainless steel, **as directed**, with separate, **as directed**, humidifier control valve.
 4. Humidifier Control Valve:

- a. Actuator: Pneumatic **OR** Electric, **as directed**, modulating with spring return.
OR
Actuator: As specified in Division 23 Section "Instrumentation And Control For Hvac".
- 5. Steam Trap: Inverted-bucket type, sized for a minimum of 3 times the maximum rated condensate flow of humidifier at **1/2-psig (3.4-kPa)** inlet pressure.
- 6. Accessories:
 - a. Wall **OR** Return-duct, **as directed**, -mounting humidistat.
 - b. Duct-mounting, high-limit humidistat.
 - c. Aquastat mounted on steam condensate return piping to prevent cold operation of humidifier.
 - d. In-line strainer.
 - e. Airflow switch for preventing humidifier operation without airflow.
- D. Self-Contained Humidifiers
 - 1. Electric-Resistance Heater Container: Cleanable, ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel. Comply with UL 499.
 - 2. Electrode Cylinder: Replaceable plastic assembly with disposable ionic bed inserts, **as directed**. Comply with UL 499.
 - 3. Gas-Fired Steam Generator: Factory assembled and tested.
 - a. Standard: Fabricate and label steam generator to comply with CSA.
 - b. Maximum Steam Pressure: **10 inches wg (2488 Pa)**.
 - c. Burner Type: Natural-gas **OR** Propane, **as directed**, fired with modulating, low NOx infrared burner, minimum 82 percent efficient.
 - d. Gas Train: Safety shutoff valves, gas cock, strainer, pressure-regulating valve.
 - e. Ignition: Hot-surface ignition with flame safety system.
 - f. Combustion Chamber: Sealed with outdoor-air and flue-vent connections.
 - g. Heat-Exchanger Tank: Cleanable, ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel with corrosion-resistant coating and disposable ionic bed inserts, **as directed**.
 - 4. Manifold: Stainless-steel tube with integral fan to discharge vapor directly into occupied space.
OR
Manifold: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless-steel tube extending across entire width of duct or plenum and equipped with mounting brackets on ends.
 - 5. Cabinet: Sheet metal enclosure for housing heater cylinder, electrical wiring, components, controls, and control panel. Enclosure shall include baked-enamel finish, hinged or removable access door, and threaded outlet in bottom of cabinet for drain piping.
 - 6. Control Panel:
 - a. Factory-wired disconnect switch.
 - b. Liquid-crystal display.
 - c. Programmable keyboard.
 - d. Set-point adjustment.
 - e. Warning signal indicating end of replaceable cylinder or ionic bed insert, **as directed**, life.
 - f. Low-voltage, control circuit.
 - g. Diagnostic, maintenance, alarm, and status features.
 - h. High-water sensor **OR** float, **as directed**, to prevent overfilling.
 - 7. Controls:
 - a. Microprocessor-based control system for modulating or cycling control, and start/stop and status monitoring for interface to central HVAC instrumentation and controls.
 - b. Solenoid-fill and automatic drain valves to maintain water level and temper hot drain water.
 - c. Field-adjustable timer to control drain cycle for flush duration and interval.
 - d. Controls shall drain tanks if no demand for humidification for more than 72 hours.
 - e. Conductivity **OR** Float, **as directed**, -type level controls.
 - 8. Accessories:
 - a. Humidistat: Wall **OR** Return-duct, **as directed**, -mounting, solid-state, electronic-sensor controller capable of full modulation or cycling control.
 - b. Duct-mounting, high-limit humidistat.
 - c. Airflow switch for preventing humidifier operation without airflow.

- E. Heated-Pan Humidifiers
1. Heat Source: Hot water **OR** Steam **OR** Electric resistance, **as directed**.
 2. Comply with UL 499.
 3. Pan and Heat-Exchange Piping: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel with corrosion-resistant coating, overflow, and drain fittings. Include disposable ionic bed inserts, **as directed**.
 4. Manifold: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless-steel, duct-mounting, single- or manifold-grid connected to heated-pan housing with flexible hose and extending across width of duct or plenum. Manifold shall have mounting brackets at both ends.
OR
Manifold: Inverted, ASTM A 666, Type 304 **OR** 316, **as directed**, stainless-steel U-tube with humidifier mounted directly under the duct.
OR
Manifold: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless-steel tube with flexible hose to connect to humidifier, integral fan to discharge vapor directly into occupied space, and wall- or ceiling-mounting brackets.
 5. Controls:
 - a. Solenoid-fill and automatic drain valves to maintain water level and temper hot drain water.
 - b. Field-adjustable timer to control drain cycle for flush duration and interval.
 - c. Conductivity **OR** Float, **as directed**, -type level controls.
 6. Piping Specialties: Inlet strainer, control valve, and steam trap.
 7. Piping Specialties: Inlet strainer and control valve.
 8. Accessories:
 - a. Humidistat: Wall **OR** Return-duct, **as directed**, -mounting, solid-state, electronic-sensor controller capable of full modulation or cycling control.
 - b. Duct-mounting, high-limit humidistat.
 - c. Airflow switch for preventing humidifier operation without airflow.
- F. Heat-Exchanger Humidifiers
1. Fabricate and label steam generator to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
 2. Heat Exchanger: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless steel with corrosion-resistant coating, overflow, and drain fittings. Include disposable ionic bed inserts, **as directed**.
 3. Manifold: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless-steel, steam-jacketed, **as directed**, duct-mounting, single- or manifold-grid connected to steam generator with flexible hose and extending across width of duct or plenum. Manifold shall have mounting brackets for both ends. Insulate with **1/2-inch (13-mm)** fiberglass and stainless-steel jacket extending full width of duct or plenum with mounting brackets at ends, **as directed**.
OR
Manifold: ASTM A 666, Type 304 **OR** 316, **as directed**, stainless-steel tube with flexible hose to connect to humidifier and integral fan to discharge vapor directly into occupied space. Manifold shall have wall- or ceiling-mounting brackets.
 4. Controls:
 - a. Solenoid-fill and automatic drain valves to maintain water level and temper hot drain water.
 - b. Field-adjustable timer to control drain cycle for flush duration and interval.
 - c. Conductivity **OR** Float, **as directed**, -type level controls.
 5. Accessories:
 - a. Humidistat: Wall **OR** Return-duct, **as directed**, -mounting, solid-state, electronic-sensor controller capable of full modulation.
 - b. Duct-mounting, high-limit humidistat.
 - c. Airflow switch for preventing humidifier operation without airflow.

1.3 EXECUTION

A. Installation

1. Install humidifiers with required clearance for service and maintenance. Maintain path, downstream from humidifiers, clear of obstructions as required by ASHRAE 62.1, **as directed**.
2. Seal humidifier manifold duct or plenum penetrations with flange.
3. Install humidifier manifolds in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
4. Install galvanized **OR** stainless, **as directed**, -steel drain pan under each manifold mounted in duct.
 - a. Construct drain pans with connection for drain; insulated and complying with ASHRAE 62.1, **as directed**.
 - b. Connect to condensate trap and drainage piping.
 - c. Extend drain pan upstream and downstream from manifold a minimum distance recommended by manufacturer but not less than required by ASHRAE 62.1.
5. Install manifold supply piping pitched to drain condensate back to humidifier.
6. Install drip leg upstream from steam trap a minimum of **12 inches (300 mm)** tall for proper operation of trap.
7. Install steam generator level on concrete base. Concrete base is specified in Division 23 Section "Common Work Results For Hvac".
8. Concrete Bases: Anchor steam generator to concrete base.
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around full perimeter of base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - e. Cast-in-place concrete materials and placement requirements are specified in Division 31.
9. Install seismic restraints on humidifiers. Seismic restraints are specified in Division 23 Section "Vibration And Seismic Controls For Hvac Piping And Equipment".
10. Install gas-fired steam generators according to NFPA 54.

B. Connections

1. Piping installation requirements are specified in other Division 21. Drawings indicate general arrangement of piping, fittings, and specialties.
 - a. Install piping adjacent to humidifiers to allow service and maintenance.
 - b. Install shutoff valve, strainer, backflow preventer, and union in humidifier makeup line.
2. Install electrical devices and piping specialties furnished by manufacturer but not factory mounted.
3. Install piping from safety relief valves to nearest floor drain.
4. Connect gas piping full size to steam-generator, gas-train inlet with union. Gas piping materials and specialties are specified in Division 23 Section(s) "Facility Natural-gas Piping" OR "Facility Liquefied-petroleum Gas Piping", **as directed**.
5. Connect breeching full size to steam-generator outlet. Venting materials are specified in Division 23 Section "Breechings, Chimneys, And Stacks".
6. Connect combustion-air inlet to intake terminal using PVC piping with solvent-cemented joints. Run from boiler connection to outside and terminate adjacent to flue termination.
7. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
8. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Perform tests and inspections and prepare test reports.
2. Tests and Inspections:

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- a. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Remove and replace malfunctioning units and retest as specified above.
- D. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain humidifiers.

END OF SECTION 23 84 13 23



23 - Heating, Ventilating, and Air-Conditioning (HVAC)

Task	Specification	Specification Description
23 84 13 29	23 84 13 23	Humidifiers

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Task	Specification	Specification Description
25 55 00 00	23 09 00 00	HVAC Instrumentation And Controls

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Task	Specification	Specification Description
26 01 30 91	01 22 16 00	No Specification Required
26 01 50 51	01 22 16 00	No Specification Required
26 01 50 51	02 84 16 00	Removal of Fluorescent Light Ballasts/Capacitors and Fluorescent Light Tubes
26 01 50 51	26 51 00 00	Interior Lighting
26 01 50 51	26 56 00 00	Exterior Lighting
26 01 50 52	02 84 16 00	Removal of Fluorescent Light Ballasts/Capacitors and Fluorescent Light Tubes
26 01 50 52	26 51 00 00	Interior Lighting
26 01 50 52	26 56 00 00	Exterior Lighting
26 01 50 53	02 84 16 00	Removal of Fluorescent Light Ballasts/Capacitors and Fluorescent Light Tubes
26 01 50 53	26 51 00 00	Interior Lighting
26 01 50 53	26 56 00 00	Exterior Lighting
26 01 50 81	26 51 00 00	Interior Lighting

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SECTION 26 05 00 00 - COMMON WORK RESULTS FOR ELECTRICAL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common work results for electrical. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Electrical equipment coordination and installation.
 - b. Sleeves for raceways and cables.
 - c. Sleeve seals.
 - d. Grout.
 - e. Common electrical installation requirements.

C. Definitions

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Product Data: For sleeve seals.

1.2 PRODUCTS

A. Sleeves For Raceways And Cables

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
3. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - a. Minimum Metal Thickness:
 - 1) For sleeve cross-section rectangle perimeter less than **50 inches (1270 mm)** and no side more than **16 inches (400 mm)**, thickness shall be **0.052 inch (1.3 mm)**.
 - 2) For sleeve cross-section rectangle perimeter equal to, or more than, **50 inches (1270 mm)** and 1 or more sides equal to, or more than, **16 inches (400 mm)**, thickness shall be **0.138 inch (3.5 mm)**.

B. Sleeve Seals

1. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

C. Grout

1. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1.3 EXECUTION

A. Common Requirements For Electrical Installation

1. Comply with NECA 1.
2. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
3. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
4. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electrical equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
5. Right of Way: Give to piping systems installed at a required slope.

B. Sleeve Installation For Electrical Penetrations

1. Electrical penetrations occur when raceways, cables, wireways, cable trays, or busways penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
4. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
5. Cut sleeves to length for mounting flush with both surfaces of walls.
6. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
7. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and raceway or cable, unless indicated otherwise.
8. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - a. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
9. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants".
10. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
11. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
12. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel **OR** cast-iron, **as directed**, pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
13. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for **1-inch (25-mm)** annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

C. Sleeve-Seal Installation

1. Install to seal exterior wall penetrations.
2. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve

seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

D. Firestopping

1. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electrical installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping".

END OF SECTION 26 05 00 00

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SECTION 26 05 13 16 - MEDIUM-VOLTAGE CABLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of medium-voltage cables. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes cables and related splices, terminations, and accessories for medium-voltage electrical distribution systems.

C. Definitions

1. NETA ATS: Acceptance Testing Specification.

D. Submittals

1. Product Data: For each type of cable indicated. Include splices and terminations for cables and cable accessories.
2. Field quality-control test reports.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with IEEE C2 and NFPA 70.

1.2 PRODUCTS

A. Cables

1. Cable Type: MV90 **OR** MV105, **as directed**.
2. Comply with UL 1072, AEIC CS 8, ICEA S-93-639, and ICEA S-97-682, **OR** ICEA S-94-649, **as directed**.
3. Conductor: Copper **OR** Aluminum, **as directed**.
4. Conductor Stranding: Compact round, concentric lay, Class B) **OR** Concentric lay, Class B, **as directed**.
5. Strand Filling: Conductor interstices are filled with impermeable compound.
6. Conductor Insulation: Crosslinked polyethylene **OR** Ethylene-propylene rubber, **as directed**.
 - a. Voltage Rating: 5 **OR** 8 **OR** 15 **OR** 25 **OR** 35, **as directed**, kV.
 - b. Insulation Thickness: 100 **OR** 133, **as directed**, percent insulation level.
7. Shielding: Copper tape **OR** Solid copper wires, **as directed**, helically applied over semiconducting insulation shield.
8. Shielding and Jacket: Corrugated copper drain wires embedded in extruded, chlorinated, polyethylene jacket.
9. Three-Conductor Cable Assembly: Three insulated, shielded conductors cabled together with ground conductors, **as directed**.
 - a. Circuit Identification: Color-coded tape (black, red, blue) under the metallic shielding.
10. Cable Armor: Interlocked aluminum **OR** Interlocked galvanized steel **OR** Corrugated aluminum tube, **as directed**, applied over cable.
11. Cable Jacket: Sunlight-resistant PVC **OR** Chlorosulfonated polyethylene, CPE, **as directed**.

B. Splice Kits

1. Connectors and Splice Kits: Comply with IEEE 404; type as recommended by cable or splicing kit manufacturer for the application.
 2. Splicing Products: As recommended, in writing, by splicing kit manufacturer for specific sizes, ratings, and configurations of cable conductors. Include all components required for complete splice, with detailed instructions.
 - a. Combination tape and cold-shrink-rubber sleeve kit with re-jacketing by cast-epoxy-resin encasement or other waterproof, abrasion-resistant material.
 - b. Heat-shrink splicing kit of uniform, cross-section, polymeric construction with outer heat-shrink jacket.
 - c. Premolded, cold-shrink-rubber, in-line splicing kit.
 - d. Premolded EPDM splicing body kit with cable joint sealed by interference fit of mating parts and cable.
- C. Solid Terminations
1. Multiconductor Cable Sheath Seals: Type recommended by seal manufacturer for type of cable and installation conditions, including orientation.
 - a. Compound-filled, cast-metal body, metal-clad cable terminator for metal-clad cable with **OR** without, **as directed**, external plastic jacket.
 - b. Cold-shrink sheath seal kit with preformed sleeve openings sized for cable and insulated conductors.
 - c. Heat-shrink sheath seal kit with phase- and ground-conductor re-jacketing tubes, cable-end sealing boot, and sealing plugs for unused ground-wire openings in boot.
 - d. Cast-epoxy-resin sheath seal kit with wraparound mold and packaged, two-part, epoxy-resin casting material.
 2. Shielded-Cable Terminations: Comply with the following classes of IEEE 48. Insulation class is equivalent to that of cable. Include shield ground strap for shielded cable terminations.
 - a. Class 1 Terminations: Modular type, furnished as a kit, with stress-relief tube; multiple, molded-silicone rubber, insulator modules; shield ground strap; and compression-type connector.
 - b. Class 1 Terminations: Heat-shrink type with heat-shrink inner stress control and outer nontracking tubes; multiple, molded, nontracking skirt modules; and compression-type connector.
 - c. Class 1 Terminations: Modular type, furnished as a kit, with stress-relief shield terminator; multiple-wet-process, porcelain, insulator modules; shield ground strap; and compression-type connector.
 - d. Class 1 Terminations, Indoors: Kit with stress-relief tube, nontracking insulator tube, shield ground strap, compression-type connector, and end seal.
 - e. Class 2 Terminations, Indoors: Kit with stress-relief tube, nontracking insulator tube, shield ground strap, and compression-type connector. Include silicone-rubber tape, cold-shrink-rubber sleeve, or heat-shrink plastic-sleeve moisture seal for end of insulation whether or not supplied with kits.
 - f. Class 3 Terminations: Kit with stress cone and compression-type connector.
 3. Nonshielded-Cable Terminations: Kit with compression-type connector. Include silicone-rubber tape, cold-shrink-rubber sleeve, or heat-shrink plastic-sleeve moisture seal for end of insulation whether or not supplied with kits.
- D. Separable Insulated Connectors
1. Description: Modular system, complying with IEEE 386, with disconnecting, single-pole, cable terminators and with matching, stationary, plug-in, dead-front terminals designed for cable voltage and for sealing against moisture.
 2. Terminations at Distribution Points: Modular type, consisting of terminators installed on cables and modular, dead-front, terminal junctions for interconnecting cables.
 3. Load-Break Cable Terminators: Elbow-type units with 200-A load make/break and continuous-current rating; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.

4. Dead-Break Cable Terminators: Elbow-type unit with 600-A continuous-current rating; designed for de-energized disconnecting and connecting; coordinated with insulation diameter, conductor size, and material of cable being terminated. Include test point on terminator body that is capacitance coupled.
5. Dead-Front Terminal Junctions: Modular bracket-mounted groups of dead-front stationary terminals that mate and match with above cable terminators. Two-, three-, or four-terminal units as indicated, with fully rated, insulated, watertight conductor connection between terminals and complete with grounding lug, manufacturer's standard accessory stands, stainless-steel mounting brackets, and attaching hardware.
 - a. Protective Cap: Insulating, electrostatic-shielding, water-sealing cap with drain wire.
 - b. Portable Feed-Through Accessory: Two-terminal, dead-front junction arranged for removable mounting on accessory stand of stationary terminal junction.
 - c. Grounding Kit: Jumpered elbows, portable feed-through accessory units, protective caps, test rods suitable for concurrently grounding three phases of feeders, and carrying case.
 - d. Standoff Insulator: Portable, single dead-front terminal for removable mounting on accessory stand of stationary terminal junction. Insulators suitable for fully insulated isolation of energized cable-elbow terminator.
6. Test-Point Fault Indicators: Applicable current-trip ratings and arranged for installation in test points of load-break separable connectors, and complete with self-resetting indicators capable of being installed with shotgun hot stick and tested with test tool.
7. Tool Set: Shotgun hot stick with energized terminal indicator, fault-indicator test tool, and carrying case.

E. Arc-Proofing Materials

1. Tape for First Course on Metal Objects: **10-mil- (250-micrometer-)** thick, corrosion-protective, moisture-resistant, PVC pipe-wrapping tape.
2. Arc-Proofing Tape: Fireproof tape, flexible, conformable, intumescent to **0.3 inch (8 mm)** thick, compatible with cable jacket.
3. Glass-Cloth Tape: Pressure-sensitive adhesive type, **1/2 inch (13 mm)** wide.

F. Fault Indicators

1. Indicators: Automatically **OR** Manually, **as directed**, reset fault indicator with inrush restraint feature, arranged to clamp to cable sheath and provide a display after a fault has occurred in cable. Instrument shall not be affected by heat, moisture, and corrosive conditions and shall be recommended by manufacturer for installation conditions.
2. Resetting Tool: Designed for use with fault indicators, with moisture-resistant storage and carrying case.

G. Source Quality Control

1. Test and inspect cables according to ICEA S-97-682 **OR** ICEA S-94-649, **as directed**, before shipping.
2. Test strand-filled cables for water-penetration resistance according to ICEA T-31-610, using a test pressure of **5 psig (35 kPa)**.

1.3 EXECUTION

A. Installation

1. Install cables according to IEEE 576.
2. Pull Conductors: Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
 - a. Where necessary, use manufacturer-approved pulling compound or lubricant that will not deteriorate conductor or insulation.
 - b. Use pulling means, including fish tape, cable, rope, and basket-weave cable grips that will not damage cables and raceways. Do not use rope hitches for pulling attachment to cable.

3. Install exposed cables parallel and perpendicular to surfaces of exposed structural members and follow surface contours where possible.
 4. Support cables according to Division 26 Section "Common Work Results For Electrical".
 5. Install direct-buried cables on leveled and tamped bed of **3-inch- (75-mm-)** thick, clean sand. Separate cables crossing other cables or piping by a minimum of **4 inches (100 mm)** of tamped earth. Install permanent markers at ends of cable runs, changes in direction, and buried splices.
 6. Install "buried-cable" warning tape **12 inches (305 mm)** above cables.
 7. In manholes, handholes, pull boxes, junction boxes, and cable vaults, train cables around walls by the longest route from entry to exit and support cables at intervals adequate to prevent sag.
 8. Install cable splices at pull points and elsewhere as indicated; use standard kits.
 9. Install terminations at ends of conductors and seal multiconductor cable ends with standard kits.
 10. Install separable insulated-connector components as follows:
 - a. Protective Cap: At each terminal junction, with one on each terminal to which no feeder is indicated to be connected.
 - b. Portable Feed-Through Accessory: Three.
 - c. Standoff Insulator: Three.
 11. Arc Proofing: Unless otherwise indicated, arc proof medium-voltage cable at locations not protected by conduit, cable tray, direct burial, or termination materials. In addition to arc-proofing tape manufacturer's written instructions, apply arc proofing as follows:
 - a. Clean cable sheath.
 - b. Wrap metallic cable components with **10-mil (250-micrometer)** pipe-wrapping tape.
 - c. Smooth surface contours with electrical insulation putty.
 - d. Apply arc-proofing tape in one half-lapped layer with coated side toward cable.
 - e. Band arc-proofing tape with **1-inch- (25-mm-)** wide bands of half-lapped, adhesive, glass-cloth tape **2 inches (50 mm)** o.c.
 12. Seal around cables passing through fire-rated elements according to Division 07 Section "Penetration Firestopping".
 13. Install fault indicators on each phase where indicated.
 14. Ground shields of shielded cable at terminations, splices, and separable insulated connectors. Ground metal bodies of terminators, splices, cable and separable insulated-connector fittings, and hardware.
 15. Identify cables according to Division 26 Section "Identification For Electrical Systems".
- B. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
 - b. After installing medium-voltage cables and before electrical circuitry has been energized, test for compliance with requirements.
 2. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 13 16

SECTION 26 05 13 16a - UNDERCARPET ELECTRICAL POWER CABLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of undercarpet cables. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Undercarpet cable and service fittings for branch circuits.
 - b. Undercarpet cable and service fittings for communication and data transmission.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details of components, and attachments to other work.
 - a. Indicate cable types, accessories, and transition boxes.
 - b. Indicate proposed layering of cables, cable dimensions, and installation requirements.
3. Field quality-control test reports.
4. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NEMA UC 2, "Undercarpet Power Distribution Systems" and with NFPA 70.

1.2 PRODUCTS

A. Power Distribution Cable

1. Cable: Factory laminated and complying with NEMA UC 2; three-piece assembly including bottom shield, conductor assembly, and top shield.
 - a. Bottom Shield: Abrasion resistant, nonmetallic **OR** Metallic, **as directed**.
 - b. Conductor Assembly: Two **OR** Three **OR** Four, **as directed**,-wire branch circuit with insulated ground, **as directed**.
 - c. Top Shield: Copper or copper alloy.
2. Current Rating: 20 **OR** 30 **OR** 20 and 30, **as directed**, A.

B. Communication And Data Cable

1. Category 5e Communication and Data Cable: Extruded-vinyl jacket over 4 unshielded, twisted pairs, No. 24 AWG, copper; complying with TIA/EIA 568-B; and tested to 300-lb (136-kg) rollover test.

C. Pedestals

1. Description: Manufacturer's standard low **OR** regular, **as directed**,-profile type, single **OR** two **OR** three, **as directed**, gang with single **OR** duplex, **as directed**, receptacles and Category 5e modular connectors, **as directed**.
 - a. Pedestal Colors: As selected from manufacturer's full range.

D. Power Cable Transition Unit

1. Description: Interface transition unit, with junction box, for connecting three-, four-, or five-conductor, flat-conductor cable to building wiring system.

E. Communication And Data Cable Transition Unit

1. Description: Category 5 transition termination circuit board in wall-mounted box to convert round incoming cable to outgoing flat-undercarpet cable.

1.3 EXECUTION

A. Installation

1. Do not begin installation until heavy construction is completed and wheeled traffic is no longer a threat.
2. Do not stack cables in circulation routes.
3. Limit total installed height to **0.09 inch (2.29 mm)**.
4. Install cables in proper order with power-transmission cable first, followed by telephone cable and then data cable. Cross cables at 90-degree angles.
5. Install undercarpet cables and accessories using special tools as recommended by undercarpet cable manufacturer.

B. Connections

1. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
2. Connect undercarpet cable and components to branch circuits and to ground as indicated and instructed by manufacturer.

C. Field Quality Control

1. Perform tests and inspections and prepare test reports.
2. Tests and Inspections:
 - a. Branch-Circuit Cables: After cables have been installed and energized, perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - b. Communication and Data Cables: After cables have been installed and connected between telecommunications outlet and system cross-connect panel, test each cable according to TIA/EIA TSB67. Certify compliance with test parameters.
3. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 13 16a

Task	Specification	Specification Description
26 05 13 16	26 05 19 16a	Conductors And Cables

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SECTION 26 05 19 16 - ELECTRICAL RENOVATION

1.1 DESCRIPTION OF WORK

- A. This specification covers the furnishing and installation of materials for electrical renovation. Products shall be as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 GENERAL

A. Quality Assurance

1. Regulatory Requirements: Comply with following:
 - a. Electrical: National Fire Protection Association (NFPA): NFPA 70 - National Electrical Code (NEC).
 - b. Accessibility:
 - 1) Architectural Barriers Act of 1968 as amended (42 USC 4151-4157) and HUD implementing regulations (24 CFR Part 40).
 - a) Uniform Federal Accessibility Standards (UFAS).
 - 2) Section 504 of the Rehabilitation Act of 1973 as amended (29 USC 794) and HUD implementing regulations 24 CFR Part 8.
 - 3) Fair Housing Accessibility Guidelines (24 CFR Chapter 1).
 - 4) Americans with Disabilities Act of 1990 (ADA) (42 USC §§ 12101, et seq.) and implementing regulations (28 CFR Part 35).

B. Project Conditions

1. Existing Conditions: Buildings will be occupied during construction. See Division 1 Section "Summary of Work." Do not interfere with use of occupied portions of building. Maintain free and safe passage to and from occupied areas.

C. Scheduling And Sequencing

1. Scheduling and Completion: Comply with requirements of Detailed Scope of Work.

D. Alterations, Cutting And Protection

1. Protection: Protect existing finishes, equipment, utilities and adjacent work, which is scheduled to remain, from damage.
2. Existing Operating Facilities: Confine operations to immediate vicinity of new work and do not interfere with or obstruct ingress or egress to and from adjacent facilities.

1.3 PRODUCTS

A. Materials

1. Electrical Materials and Devices: Comply with NFPA 70 (NEC):
 - a. Boxes: Galvanized steel, not less than 1.6 mm (0.0625 inch) thickness (NEC 370-20) grounded in accordance with NEC, Article 250, suitable for recess mounting.
 - 1) Provide boxes of appropriate shape and size for intended purpose.
 - b. Devices:
 - 1) Duplex Receptacles: 15 A or 20 A 115 V, UL Listed with screw side connections and corrugated bearing pads.
 - a) GFCI Outlets: 115 V, 60 Hz, 15/20 A rating, UL Listed.
 - 2) Switches: 15 A. 115 V, single pole, single throw switch, UL Listed, with side screw connections and corrugated bearing pads.

- a) Garbage Disposal: Heavy duty, 120/277 VAC, 60 Hz, single pole, single throw, 20 A rate, UL listed and CSA certified.
- 3) Cover Plates: Smooth plastic in color to match existing.
- c. Wiring: Insulated wire, Type NM 600 V with ground wire, sized as appropriate for intended purpose and in accordance with NEC.
 - 1) Aluminum Wire: Not allowed unless existing wiring is aluminum.
 - 2) Provide necessary fittings in accordance with NEC.

1.4 EXECUTION

A. Examination

- 1. Units, Spaces and Areas to be Renovated: Inspect to become familiar with existing conditions and to take measurements which are necessary for renovation work to be completed in accordance with contract requirements.
 - a. Carefully inspect condition of existing spaces including, but not limited to walls, floors, plumbing, electrical, etc. as essential to successful completion of renovation work.
 - b. Survey each space and verify dimensions for work.

B. Preparation

- 1. Building Occupation: Carry out renovation work to cause as little inconvenience to occupants as possible. See Division 1 Section "Summary of Work."
- 2. Protection: Protect and be responsible for existing buildings, facilities, utilities, and improvements within areas of construction operations.
 - a. Tenant's Property: Be responsible for any damage or loss to residents' property and to other work. Replace any material, which, in opinion of the Owner, has become damaged to extent that it could not be restored to its original condition.
 - b. Take precautions to protect residents and public from injury from construction operations.

C. Laying Out Work

- 1. Discrepancies: Verify dimensions and elevations indicated in layout of existing work.
 - a. Prior to commencing work, carefully compare and check Drawings (if any), for discrepancies in locations or elevations of work to be executed.
 - b. Refer discrepancies among Drawings (if any), Specifications and existing conditions to the Owner for adjustment before work affected is performed.
 - 1) Failure to make such notification shall place responsibility on Contractor to carry out work in satisfactory, workmanlike manner.
- 2. Contractor: Responsible for location and elevation of construction contemplated by Construction Documents.

D. Location Of Equipment And Piping

- 1. Drawings (if any) indicating location of equipment, piping, ductwork, etc. are diagrammatic and job conditions shall not always permit their installation in location shown. When this situation occurs, bring condition to the Owner's attention immediately. Relocation will be determined in joint conference.
- 2. Contractor: Do not relocate any items without first obtaining the Owner's acceptance. Remove and relocate such relocated items at own expense if so directed.

E. Electrical Work

- 1. General: Install boxes, wiring, and devices as indicated and required to connect and control electrical devices in accordance with NFPA 70 (NEC).
 - a. Boxes: Solidly anchor to framing or blocking.
- 2. Removing Electrical Switch or Duplex Outlet (Non-Hazardous Locations):
 - a. Box to Remain:
 - 1) Remove electrical device; cap hot and neutral with set-screw wire connectors.

- 2) Attach ground wire to remaining box with solid screw attachment.
 - 3) Provide and install natural finish aluminum blank cover plate with screw fasteners integral to match size of box remaining.
 - b. Box to be removed:
 - 1) Remove electrical device and box and pull wire out of wall back to first circuit panel, disconnecting from circuit panel.
 - 2) Patch and repair hole in partition to match existing.
 3. Garbage Disposal Electrical Hook-up: See Section "Plumbing." Comply with NFPA 70 (NEC):
 - a. Wiring: Install from disposal through concealed spaces to house panel, anchoring wire, and providing necessary fittings.
 - b. Switch: Install above counter top backsplash.
 4. Range Hood Electrical Hook-up: See Section "Residential Appliances." Comply with NFPA 70 (NEC):
 - a. Electric service: Install insulated wire from range hood through concealed spaces to house panel, anchoring wire, and providing necessary fittings.
 5. Water Heater Electrical Hook-up: See Division 15 Section "Domestic Water Heaters." Comply with NFPA 70 (NEC).
 6. Furnace Electrical Hook-up: See Section "Furnaces." Comply with NFPA 70 (NEC).
 7. Smoke Detector Electrical Hook-up: See "Fire Alarm." Comply with NFPA 70 (NEC).
- F. Integrating Existing Work
1. Protection: Protect existing improvements from damage.
 - a. Where new work is to be connected to existing work, exercise special care not to disturb or damage existing work more than necessary.
 - b. Damaged Work: Replace, repair and restored to its original condition at no cost to the Owner.

END OF SECTION 26 05 19 16

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SECTION 26 05 19 16a - CONDUCTORS AND CABLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of conductors and cables. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Building wires and cables rated 600 V and less.
 - b. Connectors, splices, and terminations rated 600 V and less.
 - c. Sleeves and sleeve seals for cables.

C. Definitions

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Product Data: For each type of product indicated.
2. Field quality-control test reports.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.

1.2 PRODUCTS

A. Conductors And Cables

1. Aluminum and Copper, **as directed**, Conductors: Comply with NEMA WC 70.
2. Conductor Insulation: Comply with NEMA WC 70 for Types THW **OR** THHN-THWN **OR** XHHW **OR** UF **OR** USE **OR** SO, **as directed**.
3. Multiconductor Cable: Comply with NEMA WC 70 for armored cable, Type AC **OR** metal-clad cable, Type MC **OR** mineral-insulated, metal-sheathed cable, Type MI **OR** nonmetallic-sheathed cable, Type NM **OR** Type SO **OR** Type USE, **as directed**, with ground wire.

B. Connectors And Splices

1. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

C. Sleeves For Cables

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
3. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum **0.052- or 0.138-inch (1.3- or 3.5-mm)** thickness as indicated and of length to suit application.
4. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".

D. Sleeve Seals

1. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

1.3 EXECUTION

A. Conductor Material Applications

1. Feeders: Copper **OR** Aluminum for feeders smaller than No. 4 AWG; copper or aluminum for feeders No. 4 AWG and larger, **as directed**. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.
2. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Conductor Insulation And Multiconductor Cable Applications And Wiring Methods

1. Service Entrance: Type THHN-THWN, single conductors in raceway **OR** Type XHHW, single conductors in raceway **OR** Mineral-insulated, metal-sheathed cable, Type MI **OR** Type SE or USE multiconductor cable, **as directed**.
2. Exposed Feeders: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI **OR** Nonmetallic-sheathed cable, Type NM, **as directed**.
3. Feeders Concealed in Ceilings, Walls, Partitions, and Crawlspace: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI **OR** Nonmetallic-sheathed cable, Type NM, **as directed**.
4. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway **OR** Underground feeder cable, Type UF, **as directed**.
5. Feeders Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI, **as directed**.
6. Feeders in Cable Tray: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI **OR** Nonmetallic-sheathed cable, Type NM, **as directed**.
7. Exposed Branch Circuits, Including in Crawlspace: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI **OR** Nonmetallic-sheathed cable, Type NM, **as directed**.
8. Branch Circuits Concealed in Ceilings, Walls, and Partitions: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI **OR** Nonmetallic-sheathed cable, Type NM, **as directed**.
9. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THHN-THWN, single conductors in raceway **OR** Underground branch-circuit cable, Type UF, **as directed**.
10. Branch Circuits Installed below Raised Flooring: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI, **as directed**.

11. Branch Circuits in Cable Tray: Type THHN-THWN, single conductors in raceway **OR** Armored cable, Type AC **OR** Metal-clad cable, Type MC **OR** Mineral-insulated, metal-sheathed cable, Type MI, **as directed**.
 12. Cord Drops and Portable Appliance Connections: Type SO, hard service cord with stainless-steel, wire-mesh, strain relief device at terminations to suit application.
 13. Class 1 Control Circuits: Type THHN-THWN, in raceway.
 14. Class 2 Control Circuits: Type THHN-THWN, in raceway **OR** Power-limited cable, concealed in building finishes **OR** Power-limited tray cable, in cable tray, **as directed**.
- C. Installation Of Conductors And Cables
1. Conceal cables in finished walls, ceilings, and floors, unless otherwise indicated.
 2. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.
 3. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.
 4. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.
 5. Support cables according to Division 26 Section "Hangers And Supports For Electrical Systems".
 6. Identify and color-code conductors and cables according to Division 26 Section "Identification For Electrical Systems".
 7. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
 8. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.
 - a. Use oxide inhibitor in each splice and tap conductor for aluminum conductors.
 9. Wiring at Outlets: Install conductor at each outlet, with at least **6 inches (150 mm) OR 12 inches (300 mm)**, **as directed**, of slack.
- D. Sleeve Installation For Electrical Penetrations
1. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".
 2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
 3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
 4. Rectangular Sleeve Minimum Metal Thickness:
 - a. For sleeve rectangle perimeter less than **50 inches (1270 mm)** and no side greater than **16 inches (400 mm)**, thickness shall be **0.052 inch (1.3 mm)**.
 - b. For sleeve rectangle perimeter equal to, or greater than, **50 inches (1270 mm)** and 1 or more sides equal to, or greater than, **16 inches (400 mm)**, thickness shall be **0.138 inch (3.5 mm)**.
 5. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
 6. Cut sleeves to length for mounting flush with both wall surfaces.
 7. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
 8. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and cable unless sleeve seal is to be installed or unless seismic criteria require different clearance, **as directed**.
 9. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies, **as directed**.
 10. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and cable, using joint sealant appropriate for size, depth, and location of joint according to Division 07 Section "Joint Sealants".

11. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at cable penetrations. Install sleeves and seal with firestop materials according to Division 07 Section "Penetration Firestopping".
 12. Roof-Penetration Sleeves: Seal penetration of individual cables with flexible boot-type flashing units applied in coordination with roofing work.
 13. Aboveground Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Size sleeves to allow for 1-inch (25-mm) annular clear space between pipe and sleeve for installing mechanical sleeve seals.
 14. Underground Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for 1-inch (25-mm) annular clear space between cable and sleeve for installing mechanical sleeve seals.
- E. Sleeve-Seal Installation
1. Install to seal underground exterior-wall penetrations.
 2. Use type and number of sealing elements recommended by manufacturer for cable material and size. Position cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- F. Firestopping
1. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Division 07 Section "Penetration Firestopping".
- G. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 2. Tests and Inspections:
 - a. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors, and conductors feeding the following critical equipment and services, **as directed**, for compliance with requirements.
 - b. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - c. Infrared Scanning: After Final Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each splice in cables and conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner.
 - 1) Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each splice 11 months after date of Final Completion.
 - 2) Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 3) Record of Infrared Scanning: Prepare a certified report that identifies splices checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
 3. Test Reports: Prepare a written report to record the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.
 4. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 26 05 19 16a

SECTION 26 05 19 16b - COMMON WORK RESULTS FOR COMMUNICATIONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common work results for communications. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Communications equipment coordination and installation.
 - b. Sleeves for pathways and cables.
 - c. Sleeve seals.
 - d. Grout.
 - e. Common communications installation requirements.

C. Definitions

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Product Data: For sleeve seals.

1.2 PRODUCTS

A. Sleeves For Pathways And Cables

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
3. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - a. Minimum Metal Thickness:
 - 1) For sleeve cross-section rectangle perimeter less than **50 inches (1270 mm)** and no side more than **16 inches (400 mm)**, thickness shall be **0.052 inch (1.3 mm)**.
 - 2) For sleeve cross-section rectangle perimeter equal to, or more than, **50 inches (1270 mm)** and 1 or more sides equal to, or more than, **16 inches (400 mm)**, thickness shall be **0.138 inch (3.5 mm)**.

B. Sleeve Seals

1. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and pathway or cable.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of pathway or cable.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

C. Grout

1. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1.3 EXECUTION

A. Common Requirements For Communications Installation

1. Comply with NECA 1.
2. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
3. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
4. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both communications equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
5. Right of Way: Give to piping systems installed at a required slope.

B. Sleeve Installation For Communications Penetrations

1. Communications penetrations occur when pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
4. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
5. Cut sleeves to length for mounting flush with both surfaces of walls.
6. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
7. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and pathway or cable, unless indicated otherwise.
8. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - a. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
9. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and pathway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants".
10. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pathway and cable penetrations. Install sleeves and seal pathway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
11. Roof-Penetration Sleeves: Seal penetration of individual pathways and cables with flexible boot-type flashing units applied in coordination with roofing work.
12. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel **OR** cast-iron, **as directed**, pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
13. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for **1-inch (25-mm)** annular clear space between pathway or cable and sleeve for installing mechanical sleeve seals.

C. Sleeve-Seal Installation

1. Install to seal exterior wall penetrations.
2. Use type and number of sealing elements recommended by manufacturer for pathway or cable material and size. Position pathway or cable in center of sleeve. Assemble mechanical sleeve

seals and install in annular space between pathway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

D. Firestopping

1. Apply firestopping to penetrations of fire-rated floor and wall assemblies for communications installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping".

END OF SECTION 26 05 19 16b

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SECTION 26 05 19 16c - COMMUNICATIONS EQUIPMENT ROOM FITTINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for communications equipment room fittings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Telecommunications mounting elements.
 - b. Backboards.
 - c. Telecommunications equipment racks and cabinets.
 - d. Telecommunications service entrance pathways.
 - e. Grounding.

C. Definitions

1. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
2. BICSI: Building Industry Consulting Service International.
3. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel not exceeding **6 inches (152 mm)** in width.
4. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
5. LAN: Local area network.
6. RCDD: Registered Communications Distribution Designer.
7. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of a bottom without ventilation openings within integral or separate longitudinal side rails.
8. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.

D. Performance Requirements

1. Seismic Performance: Floor-mounted cabinets and cable pathways shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For communications equipment room fittings. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Equipment Racks and Cabinets: Include workspace requirements and access for cable connections.
 - c. Grounding: Indicate location of grounding bus bar and its mounting detail showing standoff insulators and wall mounting brackets.
3. Qualification Data: For Installer, qualified layout technician, installation supervisor, and field inspector.
4. Seismic Qualification Certificates: For floor-mounted cabinets, accessories, and components, from manufacturer.

- a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
- b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions. Base certification on the maximum number of components capable of being mounted in each rack type. Identify components on which certification is based.
- c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

F. Quality Assurance

1. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff **OR** personnel must possess the standards and experience for membership.
 - a. Layout Responsibility: Preparation of Shop Drawings shall be under the direct supervision of RCDD **OR** RCDD/NTS **OR** possess the standards and experience for membership **OR** Commercial Installer, Level 2, **as directed**.
 - b. Installation Supervision: Installation shall be under the direct supervision of Registered Technician **OR** Level 2 Installer, **as directed**, who shall be present at all times when Work of this Section is performed at Project site.
 - c. Field Inspector: Currently registered by BICSI as RCDD **OR** possess the standards and experience for membership **OR** Commercial Installer, Level 2, **as directed**, to perform the on-site inspection.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
4. Grounding: Comply with ANSI-J-STD-607-A.

G. Project Conditions

1. Environmental Limitations: Do not deliver or install equipment frames and cable trays until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and work above ceilings is complete.

H. Coordination

1. Coordinate layout and installation of communications equipment with the Owner's telecommunications and LAN equipment and service suppliers. Coordinate service entrance arrangement with local exchange carrier.
 - a. Meet jointly with telecommunications and LAN equipment suppliers, local exchange carrier representatives, and the Owner to exchange information and agree on details of equipment arrangements and installation interfaces.
 - b. Record agreements reached in meetings and distribute them to other participants.
 - c. Adjust arrangements and locations of distribution frames, cross-connects, and patch panels in equipment rooms to accommodate and optimize arrangement and space requirements of telephone switch and LAN equipment.
 - d. Adjust arrangements and locations of equipment with distribution frames, cross-connects, and patch panels of cabling systems of other communications, electronic safety and security, and related systems that share space in the equipment room.
2. Coordinate location of power raceways and receptacles with locations of communications equipment requiring electrical power to operate.

1.2 PRODUCTS

A. Pathways

1. General Requirements: Comply with TIA/EIA-569-A.

2. Cable Support: NRTL labeled. Cable support brackets shall be designed to prevent degradation of cable performance and pinch points that could damage cable. Cable tie slots fasten cable ties to brackets.
 - a. Comply with NFPA 70 and UL 2043 for fire-resistant and low-smoke-producing characteristics.
 - b. Support brackets with cable tie slots for fastening cable ties to brackets.
 - c. Lacing bars, spools, J-hooks, and D-rings.
 - d. Straps and other devices.
 3. Cable Trays:
 - a. Cable Tray Materials: Metal, suitable for indoors and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than **0.000472 inch (0.012 mm)** thick **OR** hot-dip galvanizing, complying with ASTM A 123/A 123M, Grade 0.55, not less than **0.002165 inch (0.055 mm)** thick, **as directed**.
 - 1) Basket Cable Trays: **6 inches (150 mm)** wide and **2 inches (50 mm)** deep. Wire mesh spacing shall not exceed **2 by 4 inches (50 by 100 mm)**.
 - 2) Trough Cable Trays: Nominally **6 inches (150 mm)** wide.
 - 3) Ladder Cable Trays: Nominally **18 inches (455 mm)** wide, and a rung spacing of **12 inches (305 mm)**.
 - 4) Channel Cable Trays: One-piece construction, nominally **4 inches (100 mm)** wide. Slot spacing shall not exceed **4-1/2 inches (115 mm)** o.c.
 - 5) Solid-Bottom Cable Trays: One-piece construction, nominally **12 inches (305 mm)** wide. Provide with **OR** without, **as directed**, solid covers.
 4. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems". Flexible metal conduit shall not be used.
 - a. Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.
- B. Backboards
1. Backboards: Plywood, fire-retardant treated, **as directed**, **3/4 by 48 by 96 inches (19 by 1220 by 2440 mm)**. Comply with requirements for plywood backing panels specified in Division 06 Section "Rough Carpentry".
- C. Equipment Frames
1. General Frame Requirements:
 - a. Distribution Frames: Freestanding and wall-mounting, modular-steel units designed for telecommunications terminal support and coordinated with dimensions of units to be supported.
 - b. Module Dimension: Width compatible with EIA 310 standard, **19-inch (480-mm)** panel mounting.
 - c. Finish: Manufacturer's standard, baked-polyester powder coat.
 2. Floor-Mounted Racks: Modular-type, steel **OR** aluminum, **as directed**, construction.
 - a. Vertical and horizontal cable management channels, top and bottom cable troughs, grounding lug, and a power strip, **as directed**.
 - b. Baked-polyester powder coat finish.
 3. Modular Freestanding Cabinets:
 - a. Removable and lockable side panels.
 - b. Hinged and lockable front and rear doors.
 - c. Adjustable feet for leveling.
 - d. Screened ventilation openings in the roof and rear door.
 - e. Cable access provisions in the roof and base.
 - f. Grounding bus bar.
 - g. Rack **OR** Roof, **as directed**, -mounted, **550-cfm (260-L/s)** fan with filter.
 - h. Power strip.
 - i. Baked-polyester powder coat finish.
 - j. All cabinets keyed alike.

4. Modular Wall Cabinets:
 - a. Wall mounting.
 - b. Steel **OR** Aluminum, **as directed**, construction.
 - c. Treated to resist corrosion.
 - d. Lockable front and rear doors.
 - e. Louvered side panels.
 - f. Cable access provisions top and bottom.
 - g. Grounding lug.
 - h. Rack **OR** Roof, **as directed**, -mounted, 250-cfm (118-L/s) fan.
 - i. Power strip.
 - j. All cabinets keyed alike.
 5. Cable Management for Equipment Frames:
 - a. Metal, with integral wire retaining fingers.
 - b. Baked-polyester powder coat finish.
 - c. Vertical cable management panels shall have front and rear channels, with covers.
 - d. Provide horizontal crossover cable manager at the top of each relay rack, with a minimum height of two rack units each.
- D. Power Strips
1. Power Strips: Comply with UL 1363.
 - a. Rack mounting.
 - b. Six, 15-A, 120-V ac, NEMA WD 6, Configuration 5-15R **OR** 20-A, 120-V ac, NEMA WD 6, Configuration 5-20R, **as directed**, receptacles.
 - c. LED indicator lights for power and protection status.
 - d. LED indicator lights for reverse polarity and open outlet ground.
 - e. Circuit Breaker and Thermal Fusing:
 - 1) When protection is lost, circuit opens and cannot be reset.
OR
Unit continues to supply power if protection is lost.
 - f. Close-coupled, direct plug-in **OR** Cord connected with 15-foot (4.5-m), **as directed**, line cord.
 - g. Rocker-type on-off switch, illuminated when in on position.
 - h. Peak Single-Impulse Surge Current Rating: 33 **OR** 26 **OR** 13, **as directed**, kA per phase.
 - i. Protection modes shall be line to neutral, line to ground, and neutral to ground. UL 1449 clamping voltage for all 3 modes shall be not more than 330 V.
- E. Grounding
1. Comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems" for grounding conductors and connectors.
 2. Telecommunications Main Bus Bar:
 - a. Connectors: Mechanical type, cast silicon bronze, solderless compression **OR** exothermic, **as directed**, -type wire terminals, and long-barrel, two-bolt connection to ground bus bar.
 - b. Ground Bus Bar: Copper, minimum 1/4 inch thick by 4 inches wide (6 mm thick by 100 mm wide) with 9/32-inch (7.14-mm) holes spaced 1-1/8 inches (28 mm) apart.
 - c. Stand-Off Insulators: Comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.
 3. Comply with ANSI-J-STD-607-A.
- F. Labeling
1. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

1.3 EXECUTION

A. Entrance Facilities

1. Contact telecommunications service provider and arrange for installation of demarcation point, protected entrance terminals, and a housing when so directed by service provider.
2. Install underground **OR** buried **OR** aerial, **as directed**, pathways complying with recommendations in TIA/EIA-569-A, "Entrance Facilities" Article.
 - a. Install underground **OR** buried, **as directed**, entrance pathway complying with Division 26 Section "Raceway And Boxes For Electrical Systems".

B. Installation

1. Comply with NECA 1.
2. Comply with BICSI TDMM for layout and installation of communications equipment rooms.
3. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
4. Bundle, lace, and train conductors and cables to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

C. Firestopping

1. Comply with requirements in Division 07 Section "Penetration Firestopping".
2. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
3. Comply with BICSI TDMM, "Firestopping Systems" Article.

D. Grounding

1. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
2. Comply with ANSI-J-STD-607-A.
3. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least **2-inch (50-mm)** clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
4. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
 - a. Bond the shield of shielded cable to the grounding bus bar in communications rooms and spaces.

E. Identification

1. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements in Division 26 Section "Identification For Electrical Systems".
2. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
3. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 **OR** Class 3 **OR** Class 4, **as directed**, level of administration including optional identification requirements of this standard, **as directed**.
4. Labels shall be preprinted or computer-printed type.

END OF SECTION 26 05 19 16c

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SECTION 26 05 19 16d - COMMUNICATIONS BACKBONE CABLING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for communications backbone cabling. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pathways.
 - b. UTP cable.
 - c. 50/125 and 62.5/125-micrometer, optical fiber cabling.
 - d. Coaxial cable.
 - e. Cable connecting hardware, patch panels, and cross-connects.
 - f. Cabling identification products.

C. Definitions

1. BICSI: Building Industry Consulting Service International.
2. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
3. EMI: Electromagnetic interference.
4. IDC: Insulation displacement connector.
5. LAN: Local area network.
6. RCDD: Registered Communications Distribution Designer.
7. UTP: Unshielded twisted pair.

D. Backbone Cabling Description

1. Backbone cabling system shall provide interconnections between communications equipment rooms, main terminal space, and entrance facilities in the telecommunications cabling system structure. Cabling system consists of backbone cables, intermediate and main cross-connects, mechanical terminations, and patch cords or jumpers used for backbone-to-backbone cross-connection.
2. Backbone cabling cross-connects may be located in communications equipment rooms or at entrance facilities. Bridged taps and splitters shall not be used as part of backbone cabling.

E. Performance Requirements

1. General Performance: Backbone cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.

F. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings:
 - a. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by the Owner.
 - b. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 - c. Cabling administration drawings and printouts.
 - d. Wiring diagrams to show typical wiring schematics including the following:
 - 1) Cross-connects.
 - 2) Patch panels.
 - 3) Patch cords.

- e. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
 - f. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements.
 - 3. Qualification Data: For Installer, **as directed**, qualified layout technician, installation supervisor, and field inspector.
 - 4. Source quality-control reports.
 - 5. Field quality-control reports.
 - 6. Maintenance Data.
 - 7. Software and Firmware Operational Documentation:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - c. Device address list.
 - d. Printout of software application and graphic screens.
- G. Quality Assurance
- 1. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff **OR** personnel must possess the standards and experience for membership, **as directed**.
 - a. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD **OR** personnel that possess the standards and experience for membership, **as directed**.
 - b. Installation Supervision: Installation shall be under the direct supervision of Registered Technician **OR** Level 2 Installer, **as directed**, who shall be present at all times when Work of this Section is performed at Project site.
 - 2. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.
 - 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 4. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
 - 5. Grounding: Comply with ANSI-J-STD-607-A.
- H. Delivery, Storage, And Handling
- 1. Test cables upon receipt at Project site.
 - a. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.
 - b. Test optical fiber cable while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector, including the loss value of each. Retain test data and include the record in maintenance data.
 - c. Test each pair of UTP cable for open and short circuits.
- I. Software Service Agreement
- 1. Technical Support: Beginning with Final Completion, provide software support for two years.
 - 2. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30 days' notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

A. Pathways

1. General Requirements: Comply with TIA/EIA-569-A.
2. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - a. Support brackets with cable tie slots for fastening cable ties to brackets.
 - b. Lacing bars, spools, J-hooks, and D-rings.
 - c. Straps and other devices.
3. Cable Trays:
 - a. Cable Tray Material: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than **0.000472 inches (0.012 mm)** thick **OR** hot-dip galvanizing, complying with ASTM A 123/A 123M, Grade 0.55, not less than **0.002165 inches (0.055 mm)** thick, **as directed**.
 - 1) Basket Cable Trays: **6 inches (150 mm)** wide and **2 inches (50 mm)** deep. Wire mesh spacing shall not exceed **2 by 4 inches (50 by 100 mm)**.
 - 2) Trough Cable Trays: Nominally **6 inches (150 mm)** wide.
 - 3) Ladder Cable Trays: Nominally **18 inches (455 mm)** wide, and a rung spacing of **12 inches (305 mm)**.
 - 4) Channel Cable Trays: One-piece construction, nominally **4 inches (100 mm)** wide. Slot spacing shall not exceed **4-1/2 inches (115 mm)** o.c.
 - 5) Solid-Bottom Cable Trays: One-piece construction, nominally **12 inches (305 mm)** wide. Provide with **OR** without, **as directed**, solid covers.
4. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems". Flexible metal conduit shall not be used.
 - a. Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.

B. Backboards

1. Backboards: Plywood, fire-retardant treated, **as directed**, **3/4 by 48 by 96 inches (19 by 1220 by 2440 mm)**. Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.

C. UTP Cable

1. Description: 100-ohm, 100-pair UTP, formed into 25-pair binder groups covered with a gray thermoplastic jacket and overall metallic shield.
 - a. Comply with ICEA S-90-661 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.1 for performance specifications.
 - c. Comply with TIA/EIA-568-B.2, Category 5e **OR** Category 6, **OR** Category 6e **as directed**.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - 1) Communications, General Purpose: Type CM or CMG; or MPP, CMP, MPR, CMR, MP, or MPG, **as directed**.
 - 2) Communications, Plenum Rated: Type CMP or MPP, **as directed**, complying with NFPA 262.
 - 3) Communications, Riser Rated: Type CMR; or MPP, CMP, or MPR, **as directed**, complying with UL 1666.
 - 4) Communications, Limited Purpose: Type CMX; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG, **as directed**.
 - 5) Multipurpose: Type MP or MPG; or MPP or MPR, **as directed**.
 - 6) Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - 7) Multipurpose, Riser Rated: Type MPR or MPP, **as directed**, complying with UL 1666.

D. UTP Cable Hardware

1. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
2. Connecting Blocks: 110-style IDC for Category 5e **OR** 110-style IDC for Category 6 **OR** 66-style IDC for Category 5e, **OR** 110-style IDC for Category 6e **as directed**. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
3. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
 - a. Number of Terminals per Field: One for each conductor in assigned cables.
4. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
 - a. Number of Jacks per Field: One for each four-pair UTP cable indicated **OR** conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria, **as directed**.
5. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
6. Patch Cords: Factory-made, 4-pair cables in **36-inch (900-mm) OR 48-inch (1200-mm), as directed**, lengths; terminated with 8-position modular plug at each end.
 - a. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
 - b. Patch cords shall have color-coded boots for circuit identification.

E. Optical Fiber Cable

1. Description: Multimode, 50/125 **OR** 62.5/125, **as directed**,-micrometer, 24-fiber, nonconductive, **as directed**, tight buffer, optical fiber cable.
 - a. Comply with ICEA S-83-596 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.3 for performance specifications.
 - c. Comply with TIA/EIA-492AAAA-B **OR** TIA/EIA-492AAAA-A, **as directed**, for detailed specifications.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1) General Purpose, Nonconductive: Type OFN or OFNG, or OFNR, OFNP, **as directed**.
 - 2) Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
 - 3) Riser Rated, Nonconductive: Type OFNR or OFNP, **as directed**, complying with UL 1666.
 - 4) General Purpose, Conductive: Type OFC or OFCG; or OFNG, OFN, OFCR, OFNR, OFCP, or OFNP, **as directed**.
 - 5) Plenum Rated, Conductive: Type OFCP or OFNP, **as directed**, complying with NFPA 262.
 - 6) Riser Rated, Conductive: Type OFCR; or OFNR, OFCP, or OFNP, **as directed**, complying with UL 1666.
 - e. Conductive cable shall be steel **OR** aluminum, **as directed**, armored type.
 - f. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - g. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
2. Jacket:
 - a. Jacket Color: Aqua for 50/125-micrometer cable **OR** Orange for 62.5/125-micrometer cable, **as directed**.
 - b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
 - c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed **40 inches (1000 mm)**.

F. Optical Fiber Cable Hardware

1. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
 - a. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
 2. Patch Cords: Factory-made, dual-fiber cables in **36-inch (900-mm)** lengths.
 3. Cable Connecting Hardware:
 - a. Comply with Optical Fiber Connector Interchangeability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
 - b. Quick-connect, simplex and duplex, Type SC **OR** Type ST **OR** Type LC **OR** Type MT-RJ, **as directed**, connectors. Insertion loss not more than 0.75 dB.
 - c. Type SFF connectors may be used in termination racks, panels, and equipment packages.
- G. Coaxial Cable
1. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.
 2. RG-11/U: NFPA 70, Type CATV.
 - a. No. 14 AWG, solid, copper-covered steel conductor.
 - b. Gas-injected, foam-PE insulation.
 - c. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
 - d. Jacketed with sunlight-resistant, black PVC or PE.
 - e. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.
 3. RG59/U: NFPA 70, Type CATVR.
 - a. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
 - b. Gas-injected, foam-PE insulation.
 - c. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
 - d. Color-coded PVC jacket.
 4. RG-6/U: NFPA 70, Type CATV or CM.
 - a. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - b. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
 - c. Jacketed with black PVC or PE.
 - d. Suitable for indoor installations.
 5. RG59/U: NFPA 70, Type CATV.
 - a. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - b. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
 - c. PVC jacket.
 6. RG59/U (Plenum Rated): NFPA 70, Type CMP.
 - a. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
 - b. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
 - c. Copolymer jacket.
 7. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70, "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
 - a. CATV Cable: Type CATV, or CATVP or CATVR, **as directed**.
 - b. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
 - c. CATV Riser Rated: Type CATVR; or CATVP, CATVR, or CATV, **as directed**, complying with UL 1666.
 - d. CATV Limited Rating: Type CATVX.
- H. Coaxial Cable Hardware
1. Coaxial-Cable Connectors: Type BNC, 75 ohms.
- I. Grounding

1. Comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems" for grounding conductors and connectors.
2. Comply with ANSI-J-STD-607-A.

J. Identification Products

1. Comply with TIA/EIA-606-A and UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

K. Source Quality Control

1. Testing Agency: Engage a qualified testing agency to evaluate cables.
2. Factory test cables on reels according to TIA/EIA-568-B.1.
3. Factory test UTP cables according to TIA/EIA-568-B.2.
4. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
5. Cable will be considered defective if it does not pass tests and inspections.
6. Prepare test and inspection reports.

1.3 EXECUTION

A. Entrance Facilities

1. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.

B. Wiring Methods

1. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
2. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
3. Wiring within Enclosures: Bundle, lace, and train cables within enclosures. Connect to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

C. Installation Of Pathways

1. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A.
2. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings". Drawings indicate general arrangement of pathways and fittings.
3. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
4. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
5. Install manufactured conduit sweeps and long-radius elbows whenever possible.
6. Pathway Installation in Communications Equipment Rooms:
 - a. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 - b. Install cable trays to route cables if conduits cannot be located in these positions.
 - c. Secure conduits to backboard when entering room from overhead.
 - d. Extend conduits **3 inches (76 mm)** above finished floor.

- e. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
7. Backboards: Install backboards with **96-inch (2440-mm)** dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

D. Installation Of Cables

1. Comply with NECA 1.
2. General Requirements for Cabling:
 - a. Comply with TIA/EIA-568-B.1.
 - b. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - c. Install 110-style IDC termination hardware unless otherwise indicated.
 - d. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.
 - e. Cables may not be spliced. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - f. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
 - g. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Use lacing bars and distribution spools.
 - h. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - i. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 - j. In the communications equipment room, install a **10-foot- (3-m-)** long service loop on each end of cable.
 - k. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
3. UTP Cable Installation:
 - a. Comply with TIA/EIA-568-B.2.
 - b. Do not untwist UTP cables more than **1/2 inch (12 mm)** from the point of termination to maintain cable geometry.
4. Optical Fiber Cable Installation:
 - a. Comply with TIA/EIA-568-B.3.
 - b. Cable may be terminated on connecting hardware that is rack or cabinet mounted.
5. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - b. Suspend UTP cable not in a wireway or pathway, a minimum of **8 inches (200 mm)** above ceilings by cable supports not more than **60 inches (1524 mm)** apart.
 - c. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
6. Installation of Cable Routed Exposed under Raised Floors:
 - a. Install plenum-rated cable only.
 - b. Install cabling after the flooring system has been installed in raised floor areas.
 - c. Coil cable **6 feet (1800 mm)** long not less than **12 inches (300 mm)** in diameter below each feed point.
7. Outdoor Coaxial Cable Installation:
 - a. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
 - b. Attach antenna lead-in cable to support structure at intervals not exceeding **36 inches (915 mm)**.
8. Group connecting hardware for cables into separate logical fields.
9. Separation from EMI Sources:

- a. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - b. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **5 inches (127 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **12 inches (300 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **24 inches (610 mm)**.
 - c. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **2-1/2 inches (64 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **6 inches (150 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **12 inches (300 mm)**.
 - d. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **3 inches (76 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **6 inches (150 mm)**.
 - e. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of **48 inches (1200 mm)**.
 - f. Separation between Communications Cables and Fluorescent Fixtures: A minimum of **5 inches (127 mm)**.
- E. Firestopping
1. Comply with requirements in Division 07 Section "Penetration Firestopping".
 2. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
 3. Comply with BICSI TDMM, "Firestopping Systems" Article.
- F. Grounding
1. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
 2. Comply with ANSI-J-STD-607-A.
 3. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least **2-inch (50-mm)** clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
 4. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
- G. Identification
1. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
 - a. Administration Class: **1 OR 2 OR 3 OR 4, as directed**.
 - b. Color-code cross-connect fields and apply colors to voice and data service backboards, connections, covers, and labels.
 2. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
 3. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class **2 OR Class 3 OR Class 4, as directed**, level of administration including optional identification requirements of this standard.

4. Comply with requirements in Division 27 Section "Communications Horizontal Cabling" for cable and asset management software.
 5. Cable Schedule: Install in a prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
 6. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and equipment grounding conductors.
 7. Cable and Wire Identification:
 - a. Label each cable within **4 inches (100 mm)** of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - b. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - c. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding **15 feet (4.5 m)**.
 - d. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - 1) Individually number wiring conductors connected to terminal strips and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device with name and number of particular device as shown.
 - 2) Label each unit and field within distribution racks and frames.
 - e. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
 8. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA 606-A, for the following:
 - a. Cables use flexible vinyl or polyester that flexes as cables are bent.
- H. Field Quality Control
1. Tests and Inspections:
 - a. Visually inspect UTP and optical fiber jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
 - b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - c. Test UTP copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - d. Optical Fiber Cable Tests:
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - 2) Link End-to-End Attenuation Tests:

- a) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
 - b) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
2. Data for each measurement shall be documented. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
 3. Remove and replace cabling where test results indicate that they do not comply with specified requirements.
 4. End-to-end cabling will be considered defective if it does not pass tests and inspections.
 5. Prepare test and inspection reports.

END OF SECTION 26 05 19 16d

SECTION 26 05 19 16e - COMMUNICATIONS HORIZONTAL CABLING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for communications horizontal cabling. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pathways.
 - b. UTP cabling.
 - c. 50/125 and 62.5/125-micrometer, optical fiber cabling.
 - d. Coaxial cable.
 - e. Multiuser telecommunications outlet assemblies.
 - f. Cable connecting hardware, patch panels, and cross-connects.
 - g. Telecommunications outlet/connectors.
 - h. Cabling system identification products.
 - i. Cable management system.

C. Definitions

1. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
2. BICSI: Building Industry Consulting Service International.
3. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel.
4. Consolidation Point: A location for interconnection between horizontal cables extending from building pathways and horizontal cables extending into furniture pathways.
5. Cross-Connect: A facility enabling the termination of cable elements and their interconnection or cross-connection.
6. EMI: Electromagnetic interference.
7. IDC: Insulation displacement connector.
8. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
9. LAN: Local area network.
10. MUTOA: Multiuser telecommunications outlet assembly, a grouping in one location of several telecommunications outlet/connectors.
11. Outlet/Connectors: A connecting device in the work area on which horizontal cable or outlet cable terminates.
12. RCDD: Registered Communications Distribution Designer.
13. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom without ventilation openings.
14. Trough or Ventilated Cable Tray: A fabricated structure consisting of longitudinal side rails and a bottom having openings for the passage of air.
15. UTP: Unshielded twisted pair.

D. Horizontal Cabling Description

1. Horizontal cable and its connecting hardware provide the means of transporting signals between the telecommunications outlet/connector and the horizontal cross-connect located in the communications equipment room. This cabling and its connecting hardware are called "permanent link," a term that is used in the testing protocols.
 - a. TIA/EIA-568-B.1 requires that a minimum of two telecommunications outlet/connectors be installed for each work area.

- b. Horizontal cabling shall contain no more than one transition point or consolidation point between the horizontal cross-connect and the telecommunications outlet/connector.
 - c. Bridged taps and splices shall not be installed in the horizontal cabling.
 - d. Splitters shall not be installed as part of the optical fiber cabling.
 - 2. A work area is approximately **100 sq. ft. (9.3 sq. m)**, and includes the components that extend from the telecommunications outlet/connectors to the station equipment.
 - 3. The maximum allowable horizontal cable length is **295 feet (90 m)**. This maximum allowable length does not include an allowance for the length of **16 feet (4.9 m)** to the workstation equipment. The maximum allowable length does not include an allowance for the length of **16 feet (4.9 m)** in the horizontal cross-connect.
- E. Performance Requirements
- 1. General Performance: Horizontal cabling system shall comply with transmission standards in TIA/EIA-568-B.1, when tested according to test procedures of this standard.
- F. Submittals
- 1. Product Data: For each type of product indicated.
 - 2. Shop Drawings:
 - a. System Labeling Schedules: Electronic copy of labeling schedules, in software and format selected by the Owner.
 - b. System Labeling Schedules: Electronic copy of labeling schedules that are part of the cabling and asset identification system of the software.
 - c. Cabling administration drawings and printouts.
 - d. Wiring diagrams to show typical wiring schematics, including the following:
 - 1) Cross-connects.
 - 2) Patch panels.
 - 3) Patch cords.
 - e. Cross-connects and patch panels. Detail mounting assemblies, and show elevations and physical relationship between the installed components.
 - f. Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements.
 - 3. Samples: For workstation outlets, jacks, jack assemblies, in specified finish, one for each size and outlet configuration and faceplates for color selection and evaluation of technical features.
 - 4. Qualification Data: For Installer, **as directed**, qualified layout technician, installation supervisor, and field inspector.
 - 5. Source quality-control reports.
 - 6. Field quality-control reports.
 - 7. Maintenance Data.
 - 8. Software and Firmware Operational Documentation:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - c. Device address list.
 - d. Printout of software application and graphic screens.
- G. Quality Assurance
- 1. Installer Qualifications: Cabling Installer must have personnel certified by BICSI on staff **OR** personnel must possess the standards and experience for membership, **as directed**.
 - a. Layout Responsibility: Preparation of Shop Drawings, Cabling Administration Drawings, and field testing program development by an RCDD **OR** personnel that possess the standards and experience for membership, **as directed**.
 - b. Installation Supervision: Installation shall be under the direct supervision of Registered Technician **OR** Level 2 Installer, **as directed**, who shall be present at all times when Work of this Section is performed at Project site.

2. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 **OR** 450, **as directions**, or less.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Telecommunications Pathways and Spaces: Comply with TIA/EIA-569-A.
5. Grounding: Comply with ANSI-J-STD-607-A.

H. Delivery, Storage, And Handling

1. Test cables upon receipt at Project site.
 - a. Test optical fiber cables to determine the continuity of the strand end to end. Use optical fiber flashlight or optical loss test set.
 - b. Test optical fiber cables while on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; including the loss value of each. Retain test data and include the record in maintenance data.
 - c. Test each pair of UTP cable for open and short circuits.

I. Software Service Agreement

1. Technical Support: Beginning with Final Completion, provide software support for two years.
2. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30 days' notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

A. Pathways

1. General Requirements: Comply with TIA/EIA-569-A.
2. Cable Support: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - a. Support brackets with cable tie slots for fastening cable ties to brackets.
 - b. Lacing bars, spools, J-hooks, and D-rings.
 - c. Straps and other devices.
3. Cable Trays:
 - a. Cable Tray Materials: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than **0.000472 inch (0.012 mm)** thick **OR** hot-dip galvanizing, complying with ASTM A 123/A 123M, Grade 0.55, not less than **0.002165 inch (0.055 mm)** thick, **as directed**.
 - 1) Basket Cable Trays: **6 inches (150 mm)** wide and **2 inches (50 mm)** deep. Wire mesh spacing shall not exceed **2 by 4 inches (50 by 100 mm)**.
 - 2) Trough Cable Trays: Nominally **6 inches (150 mm)** wide.
 - 3) Ladder Cable Trays: Nominally **18 inches (455 mm)** wide, and a rung spacing of **12 inches (305 mm)**.
 - 4) Channel Cable Trays: One-piece construction, nominally **4 inches (100 mm)** wide. Slot spacing shall not exceed **4-1/2 inches (115 mm)** o.c.
 - 5) Solid-Bottom Cable Trays: One-piece construction, nominally **12 inches (305 mm)** wide. Provide with **OR** without, **as directed**, solid covers.
4. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems". Flexible metal conduit shall not be used.

- a. Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.
- B. Backboards
 - 1. Backboards: Plywood, fire-retardant treated, **as directed**, **3/4 by 48 by 96 inches (19 by 1220 by 2440 mm)**. Comply with requirements in Division 06 Section "Rough Carpentry" for plywood backing panels.
- C. UTP Cable
 - 1. Description: 100-ohm, 4-pair UTP, formed into 25-pair, binder groups covered with a blue thermoplastic jacket.
 - a. Comply with ICEA S-90-661 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.1 for performance specifications.
 - c. Comply with TIA/EIA-568-B.2, Category 5e **OR** Category 6, **OR** Category 6e **as directed**.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - 1) Communications, General Purpose: Type CM or CMG; or MPP, CMP, MPR, CMR, MP, or MPG, **as directed**.
 - 2) Communications, Plenum Rated: Type CMP or MPP, **as directed**, complying with NFPA 262.
 - 3) Communications, Riser Rated: Type CMR; or MPP, CMP, or MPR, **as directed**, complying with UL 1666.
 - 4) Communications, Limited Purpose: Type CMX; or MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG, **as directed**.
 - 5) Multipurpose: Type MP or MPG; or MPP or MPR, **as directed**.
 - 6) Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - 7) Multipurpose, Riser Rated: Type MPR or MPP, **as directed**, complying with UL 1666.
- D. UTP Cable Hardware
 - 1. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.
 - 2. Connecting Blocks: 110-style IDC for Category 5e **OR** 110-style IDC for Category 6 **OR** 66-style IDC for Category 5e, **OR** 110-style IDC for Category 6e **as directed**. Provide blocks for the number of cables terminated on the block, plus 25 percent spare. Integral with connector bodies, including plugs and jacks where indicated.
 - 3. Cross-Connect: Modular array of connecting blocks arranged to terminate building cables and permit interconnection between cables.
 - a. Number of Terminals per Field: One for each conductor in assigned cables.
 - 4. Patch Panel: Modular panels housing multiple-numbered jack units with IDC-type connectors at each jack for permanent termination of pair groups of installed cables.
 - a. Number of Jacks per Field: One for each four-pair UTP cable indicated **OR** conductor group of indicated cables, plus spares and blank positions adequate to suit specified expansion criteria, **as directed**.
 - 5. Jacks and Jack Assemblies: Modular, color-coded, eight-position modular receptacle units with integral IDC-type terminals.
 - 6. Patch Cords: Factory-made, four-pair cables in **36-inch (900 mm)** **OR** **48-inch (1200-mm)**, **as directed**, lengths; terminated with eight-position modular plug at each end.
 - a. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 6 performance. Patch cords shall have latch guards to protect against snagging.
 - b. Patch cords shall have color-coded boots for circuit identification.
- E. Optical Fiber Cable

1. Description: Multimode, 50/125 **OR** 62.5/125, **as directed**,-micrometer, 24-fiber, nonconductive, **as directed**, tight buffer, optical fiber cable.
 - a. Comply with ICEA S-83-596 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.3 for performance specifications.
 - c. Comply with TIA/EIA-492AAAA-B **OR** TIA/EIA-492AAAA-A, **as directed**, for detailed specifications.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1) General Purpose, Nonconductive: Type OFN or OFNG, or OFNR, OFNP, **as directed**.
 - 2) Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
 - 3) Riser Rated, Nonconductive: Type OFNR or OFNP, **as directed**, complying with UL 1666.
 - 4) General Purpose, Conductive: Type OFC or OFCG; or OFNG, OFN, OFCR, OFNR, OFCP, or OFNP, **as directed**.
 - 5) Plenum Rated, Conductive: Type OFCP or OFNP, **as directed**, complying with NFPA 262.
 - 6) Riser Rated, Conductive: Type OFCR; or OFNR, OFCP, or OFNP, **as directed**, complying with UL 1666.
 - e. Conductive cable shall be steel **OR** aluminum, **as directed**, armored type.
 - f. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - g. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
 2. Jacket:
 - a. Jacket Color: Aqua for 50/125-micrometer cable **OR** Orange for 62.5/125-micrometer cable, **as directed**.
 - b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
 - c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed **40 inches (1000 mm)**.
- F. Optical Fiber Cable Hardware
1. Cross-Connects and Patch Panels: Modular panels housing multiple-numbered, duplex cable connectors.
 - a. Number of Connectors per Field: One for each fiber of cable or cables assigned to field, plus spares and blank positions adequate to suit specified expansion criteria.
 2. Patch Cords: Factory-made, dual-fiber cables in **36-inch (900-mm)** lengths.
 3. Cable Connecting Hardware:
 - a. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
 - b. Quick-connect, simplex and duplex, Type SC **OR** Type ST **OR** Type LC **OR** Type MT-RJ, **as directed**, connectors. Insertion loss not more than 0.75 dB.
 - c. Type SFF connectors may be used in termination racks, panels, and equipment packages.
- G. Coaxial Cable
1. Cable Characteristics: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.
 2. RG-11/U: NFPA 70, Type CATV.
 - a. No. 14 AWG, solid, copper-covered steel conductor.
 - b. Gas-injected, foam-PE insulation.
 - c. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
 - d. Jacketed with sunlight-resistant, black PVC or PE.
 - e. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.
 3. RG59/U: NFPA 70, Type CATVR.
 - a. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
 - b. Gas-injected, foam-PE insulation.

- c. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
 - d. Color-coded PVC jacket.
 - 4. RG-6/U: NFPA 70, Type CATV or CM.
 - a. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - b. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
 - c. Jacketed with black PVC or PE.
 - d. Suitable for indoor installations.
 - 5. RG59/U: NFPA 70, Type CATV.
 - a. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - b. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
 - c. PVC jacket.
 - 6. RG59/U (Plenum Rated): NFPA 70, Type CMP.
 - a. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
 - b. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
 - c. Copolymer jacket.
 - 7. NFPA and UL compliance, listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655 and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
 - a. CATV Cable: Type CATV or CATVP or CATVR, **as directed**.
 - b. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
 - c. CATV Riser Rated: Type CATVR; or CATVP, CATVR, or CATV, **as directed**, complying with UL 1666.
 - d. CATV Limited Rating: Type CATVX.
- H. Coaxial Cable Hardware
 - 1. Coaxial-Cable Connectors: Type BNC, 75 ohms.
- I. Consolidation Points
 - 1. Description: Consolidation points shall comply with requirements for cable connecting hardware.
 - a. Number of Terminals per Field: One for each conductor in assigned cables.
 - b. Number of Connectors per Field:
 - 1) One for each four-pair UTP cable indicated.
 - 2) One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
 - c. Mounting: Recessed in ceiling **OR** Wall **OR** Desk **OR** Furniture, **as directed**.
 - d. NRTL listed as complying with UL 50 and UL 1863.
 - e. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.
- J. Multiuser Telecommunications Outlet Assembly (MUTOA)
 - 1. Description: MUTOAs shall meet the requirements for cable connecting hardware.
 - a. Number of Terminals per Field: One for each conductor in assigned cables.
 - b. Number of Connectors per Field:
 - 1) One for each four-pair UTP cable indicated.
 - 2) One for each four-pair conductor group of indicated cables, plus 25 percent spare positions.
 - c. Mounting: Recessed in ceiling **OR** Wall **OR** Desk **OR** Furniture, **as directed**.
 - d. NRTL listed as complying with UL 50 and UL 1863.
 - e. Label shall include maximum length of work area cords, based on TIA/EIA-568-B.1.
 - f. When installed in plenums used for environmental air, NRTL listed as complying with UL 2043.
- K. Telecommunications Outlet/Connectors

1. Jacks: 100-ohm, balanced, twisted-pair connector; four-pair, eight-position modular. Comply with TIA/EIA-568-B.1.
2. Workstation Outlets: Two **OR** Four, **as directed**, -port-connector assemblies mounted in single or multigang faceplate.
 - a. Plastic Faceplate: High-impact plastic. Coordinate color with Division 26 Section "Wiring Devices".
 - b. Metal Faceplate: Stainless steel **OR** Brass, **as directed**, complying with requirements in Division 26 Section "Wiring Devices".
 - c. For use with snap-in jacks accommodating any combination of UTP, optical fiber, and coaxial work area cords.
 - 1) Flush mounting jacks, positioning the cord at a 45-degree angle.
 - d. Legend:
 - 1) Factory labeled by silk-screening or engraving for stainless steel **OR** brass, **as directed**, faceplates.
OR
Machine printed, in the field, using adhesive-tape label.
OR
Snap-in, clear-label covers and machine-printed paper inserts.

L. Grounding

1. Comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems" for grounding conductors and connectors.
2. Comply with ANSI-J-STD-607-A.

M. Identification Products

1. Comply with TIA/EIA-606-A and UL 969 for labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
2. Comply with requirements in Division 26 Section "Identification For Electrical Systems".

N. Cable Management System

1. Description: Computer-based cable management system, with integrated database and graphic, **as directed**, capabilities.
2. Document physical characteristics by recording the network, TIA/EIA details, and connections between equipment and cable.
3. Information shall be presented in database view, schematic plans, or technical drawings.
 - a. Microsoft Visio Professional or AutoCAD drawing software shall be used as drawing and schematic plans software.
4. System shall interface with the following testing and recording devices:
 - a. Direct upload tests from circuit testing instrument into the personal computer.
 - b. Direct download circuit labeling into labeling printer.

O. Source Quality Control

1. Testing Agency: Engage a qualified testing agency to evaluate cables.
2. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
3. Factory test UTP cables according to TIA/EIA-568-B.2.
4. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
5. Factory-sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
6. Cable will be considered defective if it does not pass tests and inspections.
7. Prepare test and inspection reports.

1.3 EXECUTION

A. Entrance Facilities

1. Coordinate backbone cabling with the protectors and demarcation point provided by communications service provider.
- B. Wiring Methods
1. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces, in attics, and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
 2. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
 3. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
- C. Installation Of Pathways
1. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
 2. Comply with requirements for demarcation point, pathways, cabinets, and racks specified in Division 27 Section "Communications Equipment Room Fittings". Drawings indicate general arrangement of pathways and fittings.
 3. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
 4. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
 5. Install manufactured conduit sweeps and long-radius elbows whenever possible.
 6. Pathway Installation in Communications Equipment Rooms:
 - a. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed, or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 - b. Install cable trays to route cables if conduits cannot be located in these positions.
 - c. Secure conduits to backboard when entering room from overhead.
 - d. Extend conduits **3 inches (76 mm)** above finished floor.
 - e. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
 7. Backboards: Install backboards with **96-inch (2440-mm)** dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.
- D. Installation Of Cables
1. Comply with NECA 1.
 2. General Requirements for Cabling:
 - a. Comply with TIA/EIA-568-B.1.
 - b. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - c. Install 110-style IDC termination hardware unless otherwise indicated.
 - d. MUTOA shall not be used as a cross-connect point.
 - e. Consolidation points may be used only for making a direct connection to telecommunications outlet/connectors:
 - 1) Do not use consolidation point as a cross-connect point, as a patch connection, or for direct connection to workstation equipment.
 - 2) Locate consolidation points for UTP at least **49 feet (15 m)** from communications equipment room.
 - f. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, cross-connects, and patch panels.

- g. Cables may not be spliced. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- h. Install lacing bars to restrain cables, to prevent straining connections, and to prevent bending cables to smaller radii than minimums recommended by manufacturer.
- i. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
- j. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- k. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
- l. In the communications equipment room, install a **10-foot- (3-m-)** long service loop on each end of cable.
- m. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
3. UTP Cable Installation:
 - a. Comply with TIA/EIA-568-B.2.
 - b. Do not untwist UTP cables more than **1/2 inch (12 mm)** from the point of termination to maintain cable geometry.
4. Optical Fiber Cable Installation:
 - a. Comply with TIA/EIA-568-B.3.
 - b. Cable may be terminated on connecting hardware that is rack or cabinet mounted.
5. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - b. Suspend UTP cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceilings by cable supports not more than **60 inches (1524 mm)** apart.
 - c. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
6. Installation of Cable Routed Exposed under Raised Floors:
 - a. Install plenum-rated cable only.
 - b. Install cabling after the flooring system has been installed in raised floor areas.
 - c. Coil cable **6 feet (1800 mm)** long not less than **12 inches (300 mm)** in diameter below each feed point.
7. Outdoor Coaxial Cable Installation:
 - a. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
 - b. Attach antenna lead-in cable to support structure at intervals not exceeding **36 inches (915 mm)**.
8. Group connecting hardware for cables into separate logical fields.
9. Separation from EMI Sources:
 - a. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - b. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **5 inches (127 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **12 inches (300 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **24 inches (610 mm)**.
 - c. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **2-1/2 inches (64 mm)**.

- 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **6 inches (150 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **12 inches (300 mm)**.
 - d. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **3 inches (76 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **6 inches (150 mm)**.
 - e. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of **48 inches (1200 mm)**.
 - f. Separation between Communications Cables and Fluorescent Fixtures: A minimum of **5 inches (127 mm)**.
- E. Firestopping
1. Comply with requirements in Division 07 Section "Penetration Firestopping".
 2. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
 3. Comply with BICSI TDMM, "Firestopping Systems" Article.
- F. Grounding
1. Install grounding according to BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
 2. Comply with ANSI-J-STD-607-A.
 3. Locate grounding bus bar to minimize the length of bonding conductors. Fasten to wall allowing at least **2-inch (50-mm)** clearance behind the grounding bus bar. Connect grounding bus bar with a minimum No. 4 AWG grounding electrode conductor from grounding bus bar to suitable electrical building ground.
 4. Bond metallic equipment to the grounding bus bar, using not smaller than No. 6 AWG equipment grounding conductor.
- G. Identification
1. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
 - a. Administration Class: **1 OR 2 OR 3 OR 4, as directed**.
 - b. Color-code cross-connect fields. Apply colors to voice and data service backboards, connections, covers, and labels.
 2. Using cable management system software specified in Part 2, develop Cabling Administration Drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable and label cable, jacks, connectors, and terminals to which it connects with same designation. At completion, cable and asset management software shall reflect as-built conditions.
 3. Comply with requirements in Division 09 Section "Interior Painting" for painting backboards. For fire-resistant plywood, do not paint over manufacturer's label.
 4. Paint and label colors for equipment identification shall comply with TIA/EIA-606-A for Class 2 **OR** Class 3 **OR** Class 4, **as directed**, level of administration, including optional identification requirements of this standard.
 5. Cable Schedule: Post in prominent location in each equipment room and wiring closet. List incoming and outgoing cables and their designations, origins, and destinations. Protect with rigid frame and clear plastic cover. Furnish an electronic copy of final comprehensive schedules for Project.
 6. Cabling Administration Drawings: Show building floor plans with cabling administration-point labeling. Identify labeling convention and show labels for telecommunications closets, backbone pathways and cables, entrance pathways and cables, terminal hardware and positions, horizontal cables, work areas and workstation terminal positions, grounding buses and pathways, and

- equipment grounding conductors. Follow convention of TIA/EIA-606-A. Furnish electronic record of all drawings, in software and format selected by the Owner.
7. Cable and Wire Identification:
 - a. Label each cable within **4 inches (100 mm)** of each termination and tap, where it is accessible in a cabinet or junction or outlet box, and elsewhere as indicated.
 - b. Each wire connected to building-mounted devices is not required to be numbered at device if color of wire is consistent with associated wire connected and numbered within panel or cabinet.
 - c. Exposed Cables and Cables in Cable Trays and Wire Troughs: Label each cable at intervals not exceeding **15 feet (4.5 m)**.
 - d. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - 1) Individually number wiring conductors connected to terminal strips, and identify each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with name and number of particular device as shown.
 - 2) Label each unit and field within distribution racks and frames.
 - e. Identification within Connector Fields in Equipment Rooms and Wiring Closets: Label each connector and each discrete unit of cable-terminating and connecting hardware. Where similar jacks and plugs are used for both voice and data communication cabling, use a different color for jacks and plugs of each service.
 - f. Uniquely identify and label work area cables extending from the MUTOA to the work area. These cables may not exceed the length stated on the MUTOA label.
 8. Labels shall be preprinted or computer-printed type with printing area and font color that contrasts with cable jacket color but still complies with requirements in TIA/EIA-606-A.
 - a. Cables use flexible vinyl or polyester that flex as cables are bent.
- H. Field Quality Control
1. Tests and Inspections:
 - a. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations in communications equipment rooms for compliance with color-coding for pin assignments, and inspect cabling connections for compliance with TIA/EIA-568-B.1.
 - b. Visually confirm Category 5e **OR** Category 6, **OR** Category 6e **as directed**, marking of outlets, cover plates, outlet/connectors, and patch panels.
 - c. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - d. Test UTP backbone copper cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross-connection.
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - e. Optical Fiber Cable Tests:
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - 2) Link End-to-End Attenuation Tests:
 - a) Horizontal and multimode backbone link measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.
 - b) Attenuation test results for backbone links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
 - f. UTP Performance Tests:

- 1) Test for each outlet and MUTOA. Perform the following tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.2:
 - a) Wire map.
 - b) Length (physical vs. electrical, and length requirements).
 - c) Insertion loss.
 - d) Near-end crosstalk (NEXT) loss.
 - e) Power sum near-end crosstalk (PSNEXT) loss.
 - f) Equal-level far-end crosstalk (ELFEXT).
 - g) Power sum equal-level far-end crosstalk (PSELFEXT).
 - h) Return loss.
 - i) Propagation delay.
 - j) Delay skew.
- g. Optical Fiber Cable Performance Tests: Perform optical fiber end-to-end link tests according to TIA/EIA-568-B.1 and TIA/EIA-568-B.3.
- h. Coaxial Cable Tests: Conduct tests according to Division 27 Section "Master Antenna Television System".
- i. Final Verification Tests: Perform verification tests for UTP and optical fiber systems after the complete communications cabling and workstation outlet/connectors are installed.
 - 1) Voice Tests: These tests assume that dial tone service has been installed. Connect to the network interface device at the demarcation point. Go off-hook and listen and receive a dial tone. If a test number is available, make and receive a local, long distance, and digital subscription line telephone call.
 - 2) Data Tests: These tests assume the Information Technology Staff has a network installed and is available to assist with testing. Connect to the network interface device at the demarcation point. Log onto the network to ensure proper connection to the network.
2. Document data for each measurement. Data for submittals shall be printed in a summary report that is formatted similar to Table 10.1 in BICSI TDMM, or transferred from the instrument to the computer, saved as text files, and printed and submitted.
3. End-to-end cabling will be considered defective if it does not pass tests and inspections.
4. Prepare test and inspection reports.

END OF SECTION 26 05 19 16e

SECTION 26 05 19 16f - COMMON WORK RESULTS FOR ELECTRONIC SAFETY AND SECURITY

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for common work results for electronic safety and security. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Electronic safety and security equipment coordination and installation.
 - b. Sleeves for raceways and cables.
 - c. Sleeve seals.
 - d. Grout.
 - e. Common electronic safety and security installation requirements.

C. Definitions

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

D. Submittals

1. Product Data: For sleeve seals.

1.2 PRODUCTS

A. Sleeves For Raceways And Cables

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
3. Sleeves for Rectangular Openings: Galvanized sheet steel.
 - a. Minimum Metal Thickness:
 - 1) For sleeve cross-section rectangle perimeter less than **50 inches (1270 mm)** and no side more than **16 inches (400 mm)**, thickness shall be **0.052 inch (1.3 mm)**.
 - 2) For sleeve cross-section rectangle perimeter equal to, or more than, **50 inches (1270 mm)** and 1 or more sides equal to, or more than, **16 inches (400 mm)**, thickness shall be **0.138 inch (3.5 mm)**.

B. Sleeve Seals

1. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and raceway or cable.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

C. Grout

1. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

1.3 EXECUTION

A. Common Requirements For Electronic Safety And Security Installation

1. Comply with NECA 1.
2. Measure indicated mounting heights to bottom of unit for suspended items and to center of unit for wall-mounting items.
3. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom consistent with these requirements.
4. Equipment: Install to facilitate service, maintenance, and repair or replacement of components of both electronic safety and security equipment and other nearby installations. Connect in such a way as to facilitate future disconnecting with minimum interference with other items in the vicinity.
5. Right of Way: Give to piping systems installed at a required slope.

B. Sleeve Installation For Electronic Safety And Security Penetrations

1. Electronic safety and security penetrations occur when raceways, pathways, cables, wireways, or cable trays penetrate concrete slabs, concrete or masonry walls, or fire-rated floor and wall assemblies.
2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
4. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
5. Cut sleeves to length for mounting flush with both surfaces of walls.
6. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
7. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and raceway or cable, unless indicated otherwise.
8. Seal space outside of sleeves with grout for penetrations of concrete and masonry
 - a. Promptly pack grout solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect grout while curing.
9. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint. Comply with requirements in Division 07 Section "Joint Sealants".
10. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway and cable penetrations. Install sleeves and seal raceway and cable penetration sleeves with firestop materials. Comply with requirements in Division 07 Section "Penetration Firestopping".
11. Roof-Penetration Sleeves: Seal penetration of individual raceways and cables with flexible boot-type flashing units applied in coordination with roofing work.
12. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel **OR** cast-iron, **as directed**, pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
13. Underground, Exterior-Wall Penetrations: Install cast-iron pipe sleeves. Size sleeves to allow for **1-inch (25-mm)** annular clear space between raceway or cable and sleeve for installing mechanical sleeve seals.

C. Sleeve-Seal Installation

1. Install to seal exterior wall penetrations.

2. Use type and number of sealing elements recommended by manufacturer for raceway or cable material and size. Position raceway or cable in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway or cable and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.
- D. Firestopping
1. Apply firestopping to penetrations of fire-rated floor and wall assemblies for electronic safety and security installations to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping".

END OF SECTION 26 05 19 16f

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SECTION 26 05 19 16g - CONDUCTORS AND CABLES FOR ELECTRONIC SAFETY AND SECURITY

1.1 GENERAL

A. Description of Work

1. This specification covers the furnishing and installation of materials for conductors and cables for electronic safety and security. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. UTP cabling.
 - b. 50/125 and 62.5/125-micrometer, multimode optical fiber cabling.
 - c. Coaxial cabling.
 - d. RS-232 cabling.
 - e. RS-485 cabling.
 - f. Low-voltage control cabling.
 - g. Control-circuit conductors.
 - h. Fire alarm wire and cable.
 - i. Identification products.

C. Definitions

1. BICSI: Building Industry Consulting Service International.
2. EMI: Electromagnetic interference.
3. IDC: Insulation displacement connector.
4. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
5. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
6. RCDD: Registered Communications Distribution Designer.

D. Performance Requirements

1. Seismic Performance: Pathways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated.
 - a. For coaxial cable, include the following installation data for each type used:
 - 1) Nominal OD.
 - 2) Minimum bending radius.
 - 3) Maximum pulling tension.
2. Shop Drawings: Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:
 - a. Vertical and horizontal offsets and transitions.
 - b. Clearances for access above and to side of cable trays.
 - c. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
3. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.
4. Seismic Qualification Certificates: For pathways, accessories, and components, from manufacturer.

- a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Source quality-control reports.
 6. Field quality-control reports.
 7. Operation and Maintenance Data: For wire and cable to include in operation and maintenance manuals. Include the following:
 - a. Allowable pulling tension of cable.
 - b. Cable connectors and terminations recommended by the manufacturer.

F. Quality Assurance

1. Testing Agency Qualifications: An NRTL.
 - a. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD **OR** possess the standards and experience for membership, **as directed**, to supervise on-site testing.
2. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Delivery, Storage, And Handling

1. Test cables upon receipt at Project site.
 - a. Test optical fiber cable to determine the continuity of the strand end to end. Use optical-fiber flashlight or optical loss test set.
 - b. Test optical fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
 - c. Test each pair of UTP cable for open and short circuits.

H. Project Conditions

1. Do not install conductors and cables that are wet, moisture damaged, or mold damaged.
 - a. Indications that wire and cables are wet or moisture damaged include, but are not limited to, discoloration and sagging of factory packing materials.
2. Environmental Limitations: Do not deliver or install UTP, optical fiber, and coaxial cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.2 PRODUCTS

A. Pathways

1. Support of Open Cabling: NRTL labeled for support of Category 5e **OR** Category 6, **OR** Category 6e **as directed**, cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - a. Support brackets with cable tie slots for fastening cable ties to brackets.
 - b. Lacing bars, spools, J-hooks, and D-rings.
 - c. Straps and other devices.
2. Cable Trays:

- a. Cable Tray Materials: Metal, suitable for indoors, and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than **0.000472 inch (0.012 mm)** thick **OR** hot-dip galvanizing, complying with ASTM A 123/A 123M Grade 0.55, not less than **0.002165 inch (0.055 mm)** thick, **as directed**.
 - 1) Basket Cable Trays: **6 inches (150 mm)** wide and **2 inches (50 mm)** deep, **as directed**. Wire mesh spacing shall not exceed **2 by 4 inches (50 by 100 mm)**.
 - 2) Trough Cable Trays: Nominally **6 inches (150 mm)**, **as directed**, wide.
 - 3) Ladder Cable Trays: Nominally **18 inches (455 mm)**, **as directed**, wide, and a rung spacing of **12 inches (305 mm)**, **as directed**.
 - 4) Channel Cable Trays: One-piece construction, nominally **4 inches (100 mm)**, **as directed**, wide. Slot spacing shall not exceed **4-1/2 inches (115 mm)** o.c.
 - 5) Solid-Bottom Cable Trays: One-piece construction, nominally **12 inches (305 mm)**, **as directed**, wide. Provide with **OR** without, **as directed**, solid covers.
 3. Conduit and Boxes: Comply with requirements in Division 16 Section "Raceways and Boxes." Flexible metal conduit shall not be used, **as directed**.
 4. Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.
- B. Backboards
1. Backboards: Plywood, fire-retardant treated, **as directed**, **3/4 by 48 by 96 inches (19 by 1220 by 2440 mm)**. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".
- C. UTP Cable
1. Description: 100-ohm, 4-pair UTP, covered with a blue thermoplastic jacket.
 - a. Comply with ICEA S-90-661 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.1 for performance specifications.
 - c. Comply with TIA/EIA-568-B.2, Category 5e **OR** Category 6, **OR** Category 6e **as directed**.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:
 - 1) Communications, General Purpose: Type CM or CMG; **OR** MPP, CMP, MPR, CMR, MP, or MPG, **as directed**.
 - 2) Communications, Plenum Rated: Type CMP **OR** MPP, **as directed**, complying with NFPA 262.
 - 3) Communications, Riser Rated: Type CMR; **OR** MPP, CMP, or MPR, **as directed**, complying with UL 1666.
 - 4) Communications, Limited Purpose: Type CMX; **OR** MPP, CMP, MPR, CMR, MP, MPG, CM, or CMG, **as directed**.
 - 5) Multipurpose: Type MP or MPG; **OR** MPP or MPR, **as directed**.
 - 6) Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
 - 7) Multipurpose, Riser Rated: Type MPR **OR** MPP, **as directed**, complying with UL 1666.
- D. UTP Cable Hardware
1. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.
 2. Connecting Blocks: 110-style for Category 5e **OR** 110-style for Category 6 **OR** 66-style for Category 5e, **OR** 110-style for Category 6e **as directed**. Provide blocks for the number of cables terminated on the block, plus 25, **as directed**, percent spare. Integral with connector bodies, including plugs and jacks where indicated.
- E. Optical Fiber Cable
1. Description: Multimode, 50/125 **OR** 62.5/125, **as directed**,-micrometer, 24-fiber, **as directed**, nonconductive, **as directed**, tight buffer, optical fiber cable.

- a. Comply with ICEA S-83-596 for indoor cable OR ICEA S-87-640 for outside plant, as directed, for mechanical properties.
 - b. Comply with TIA/EIA-568-B.3 for performance specifications.
 - c. Comply with TIA-492AAAB **OR** TIA-492AAAA-A, **as directed**, for detailed specifications.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1) General Purpose, Nonconductive: Type OFN or OFNG, **OR** OFNR, OFNP, **as directed**.
 - 2) Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
 - 3) Riser Rated, Nonconductive: Type OFNR or OFNP, complying with UL 1666.
 - 4) General Purpose, Conductive: Type OFC or OFCG; **OR** OFNG, OFN, OFCR, OFNR, OFCP, or OFNP, **as directed**.
 - 5) Plenum Rated, Conductive: Type OFCP or OFNP, complying with NFPA 262.
 - 6) Riser Rated, Conductive: Type OFCR; or OFNR, OFCP, or OFNP, **asa directed**, complying with UL 1666.
 - e. Conductive cable shall be steel **OR** aluminum, **as directed**, armored type.
 - f. Maximum Attenuation: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - g. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
2. Jacket:
- a. Jacket Color: Aqua for 50/125-micrometer cable **OR** Orange for 62.5/125-micrometer cable, **as directed**.
 - b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA-598-C.
 - c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed **40 inches (1000 mm)**.

F. Optical Fiber Cable Hardware

1. Cable Connecting Hardware: Meet the Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA-604-2-B, TIA-604-3-B, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
 - a. Quick-connect, simplex and duplex, Type SC **OR** Type ST **OR** Type LC **OR** Type MT-RJ, **as directed**, connectors. Insertion loss not more than 0.75 dB.
 - b. Type SFF connectors may be used in termination racks, panels, and equipment packages.

G. Coaxial Cable

1. General Coaxial Cable Requirements: Broadband type, recommended by cable manufacturer specifically for broadband data transmission applications. Coaxial cable and accessories shall have 75-ohm nominal impedance with a return loss of 20 dB maximum from 7 to 806 MHz.
2. RG-11/U: NFPA 70, Type CATV.
 - a. No. 14 AWG, solid, copper-covered steel conductor.
 - b. Gas-injected, foam-PE insulation.
 - c. Double shielded with 100 percent aluminum polyester tape and 60 percent aluminum braid.
 - d. Jacketed with sunlight-resistant, black PVC or PE.
 - e. Suitable for outdoor installations in ambient temperatures ranging from minus 40 to plus 85 deg C.
3. RG59/U: NFPA 70, Type CATVR.
 - a. No. 20 AWG, solid, silver-plated, copper-covered steel conductor.
 - b. Gas-injected, foam-PE insulation.
 - c. Triple shielded with 100 percent aluminum polyester tape and 95 percent aluminum braid; covered by aluminum foil with grounding strip.
 - d. Color-coded PVC jacket.
4. RG-6/U: NFPA 70, Type CATV or CM.
 - a. No. 16 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - b. Double shielded with 100 percent aluminum-foil shield and 60 percent aluminum braid.
 - c. Jacketed with black PVC or PE.

- d. Suitable for indoor installations.
- 5. RG59/U: NFPA 70, Type CATV.
 - a. No. 20 AWG, solid, copper-covered steel conductor; gas-injected, foam-PE insulation.
 - b. Double shielded with 100 percent aluminum polyester tape and 40 percent aluminum braid.
 - c. PVC jacket.
- 6. RG59/U (Plenum Rated): NFPA 70, Type CMP.
 - a. No. 20 AWG, solid, copper-covered steel conductor; foam fluorinated ethylene propylene insulation.
 - b. Double shielded with 100 percent aluminum-foil shield and 65 percent aluminum braid.
 - c. Copolymer jacket.
- 7. NFPA and UL Compliance: Coaxial cables shall be listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 1655, and with NFPA 70 "Radio and Television Equipment" and "Community Antenna Television and Radio Distribution" Articles. Types are as follows:
 - a. CATV Cable: Type CATV, **OR** CATVP or CATVR, **as directed**.
 - b. CATV Plenum Rated: Type CATVP, complying with NFPA 262.
 - c. CATV Riser Rated: Type CATVR; **OR** CATVP, CATVR, or CATV, **as directed**, complying with UL 1666.
 - d. CATV Limited Rating: Type CATVX.
- H. Coaxial Cable Hardware
 - 1. Coaxial-Cable Connectors: Type BNC, 75 ohms.
- I. RS-232 Cable
 - 1. Standard Cable: NFPA 70, Type CM.
 - a. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - b. Polypropylene insulation.
 - c. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 - d. PVC jacket.
 - e. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - f. Flame Resistance: Comply with UL 1581.
 - 2. Plenum-Rated Cable: NFPA 70, Type CMP.
 - a. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - b. Plastic insulation.
 - c. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 - d. Plastic jacket.
 - e. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - f. Flame Resistance: Comply with NFPA 262.
- J. RS-485 Cable
 - 1. Standard Cable: NFPA 70, Type CM **OR** CMG, **as directed**.
 - a. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with UL 1581.
 - 2. Plenum-Rated Cable: NFPA 70, Type CMP.
 - a. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
 - b. Fluorinated ethylene propylene insulation.
 - c. Unshielded.
 - d. Fluorinated ethylene propylene jacket.
 - e. Flame Resistance: NFPA 262, Flame Test.
- K. Low-Voltage Control Cable

1. Paired Cable: NFPA 70, Type CMG.
 - a. 1 pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with UL 1581.
 2. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - a. 1 pair, twisted, No. 16 AWG, stranded (19x29) and No. 18 AWG, stranded (19x30) tinned copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with NFPA 262.
- L. Control-Circuit Conductors
1. Class 1 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway **OR** Type XHHN, complying with UL 44, in raceway, **as directed**.
 2. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, complying with UL 83, in raceway **OR** power-limited cable, complying with UL 83, concealed in building finishes **OR** power-limited tray cable, complying with UL 83, in cable tray **OR** Type XHHN, complying with UL 44, in raceway, **as directed**.
 3. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or TF, complying with UL 83.
- M. Fire Alarm Wire And Cable
1. General Wire and Cable Requirements: NRTL listed and labeled as complying with NFPA 70, Article 760.
 2. Signaling Line Circuits: Twisted, shielded pair, not less than **OR** No. 18 AWG **OR** size as recommended by system manufacturer, **as directed**.
 - a. Circuit Integrity Cable: Twisted shielded pair, NFPA 70, Article 760, Classification CI, for power-limited fire alarm signal service Type FPL. NRTL listed and labeled as complying with UL 1424 and UL 2196 for a 2-hour rating.
 3. Non-Power-Limited Circuits: Solid-copper conductors with 600-V rated, 75 deg C, color-coded insulation.
 - a. Low-Voltage Circuits: No. 16 AWG, minimum.
 - b. Line-Voltage Circuits: No. 12 AWG, minimum.
 - c. Multiconductor Armored Cable: NFPA 70, Type MC, copper conductors, Type TFN/THHN conductor insulation, copper drain wire, copper armor with outer jacket, **as directed**, with red identifier stripe, NRTL listed for fire alarm and cable tray installation, plenum rated, and complying with requirements in UL 2196 for a 2-hour rating.
- N. Identification Products
1. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
 2. Comply with requirements in Division 26 Section "Identification For Electrical Systems".
- O. Source Quality Control
1. Testing Agency: Engage a qualified testing agency to evaluate cables.
 2. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
 3. Factory test UTP cables according to TIA/EIA-568-B.2.
 4. Factory test multimode optical fiber cables according to TIA-526-14-A and TIA/EIA-568-B.3.

5. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response, or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.
6. Cable will be considered defective if it does not pass tests and inspections.
7. Prepare test and inspection reports.

1.3 EXECUTION

A. Installation Of Pathways

1. Cable Trays: Comply with NEMA VE 2 and TIA-569-B.
2. Comply with TIA-569-B for pull-box sizing and length of conduit and number of bends between pull points.
3. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
4. Install manufactured conduit sweeps and long-radius elbows whenever possible.
5. Pathway Installation in Equipment Rooms:
 - a. Position conduit ends adjacent to a corner on backboard where a single piece of plywood is installed or in the corner of room where multiple sheets of plywood are installed around perimeter walls of room.
 - b. Install cable trays to route cables if conduits cannot be located in these positions.
 - c. Secure conduits to backboard when entering room from overhead.
 - d. Extend conduits **3 inches (75 mm)** above finished floor.
 - e. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
6. Backboards: Install backboards with **96-inch (2440-mm)** dimension vertical. Butt adjacent sheets tightly, and form smooth gap-free corners and joints.

B. Installation Of Hangers And Supports

1. Comply with requirements in Division 26 Section "Hangers And Supports For Electrical Systems" for installation of supports for pathways, conductors and cables.

C. Wiring Method

1. Install wiring in metal raceways and wireways. Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be **3/4 inch (21 mm)**. Control and data transmission wiring shall not share conduit with other building wiring systems.
2. Install wiring in raceways except in accessible indoor ceiling spaces and in interior hollow gypsum board partitions where cable may be used. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be **3/4 inch (21 mm)**. Control and data transmission wiring shall not share conduit with other building wiring systems.
3. Install cable, concealed in accessible ceilings, walls, and floors when possible.
4. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

D. Installation Of Conductors And Cables

1. Comply with NECA 1.
2. Conductors: Size according to system manufacturer's written instructions unless otherwise indicated.
3. General Requirements for Cabling:
 - a. Comply with TIA/EIA-568-B.1.
 - b. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."

- c. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
 - d. Cables may not be spliced. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - e. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
 - f. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - g. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
 - h. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
4. UTP Cable Installation: Install using techniques, practices, and methods that are consistent with Category 5e **OR** Category 6, **OR** Category 6e **as directed**, rating of components and that ensure Category 5e **OR** Category 6, **OR** Category 6e **as directed**, performance of completed and linked signal paths, end to end.
 - a. Comply with TIA/EIA-568-B.2.
 - b. Install 110-style IDC termination hardware unless otherwise indicated.
 - c. Do not untwist UTP cables more than **1/2 inch (12 mm)** from the point of termination to maintain cable geometry.
 5. Optical Fiber Cable Installation:
 - a. Comply with TIA/EIA-568-B.3.
 - b. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.
 6. Outdoor Coaxial Cable Installation:
 - a. Install outdoor connections in enclosures complying with NEMA 250, Type 4X. Install corrosion-resistant connectors with properly designed O-rings to keep out moisture.
 - b. Attach antenna lead-in cable to support structure at intervals not exceeding **36 inches (915 mm)**.
 7. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - b. Suspend copper cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceilings by cable supports not more than **60 inches (1525 mm)** apart.
 - c. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
 8. Installation of Cable Routed Exposed under Raised Floors:
 - a. Install plenum-rated cable only.
 - b. Install cabling after the flooring system has been installed in raised floor areas.
 - c. Coil cable **72 inches (1830 mm)** long shall be neatly coiled not less than **12 inches (300 mm)** in diameter below each feed point.
 9. Separation from EMI Sources:
 - a. Comply with BICSI TDMM and TIA-569-B recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - b. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **5 inches (127 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **12 inches (300 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **24 inches (600 mm)**.

- c. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **2-1/2 inches (64 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **6 inches (150 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **12 inches (300 mm)**.
 - d. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **3 inches (75 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **6 inches (150 mm)**.
 - e. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of **48 inches (1200 mm)**.
 - f. Separation between Cables and Fluorescent Fixtures: A minimum of **5 inches (127 mm)**.
- E. Fire Alarm Wiring Installation
1. Comply with NECA 1 and NFPA 72.
 2. Wiring Method: Install wiring in metal raceway according to Division 26 Section "Raceway And Boxes For Electrical Systems".
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Fire alarm circuits and equipment control wiring associated with the fire alarm system shall be installed in a dedicated raceway system. This system shall not be used for any other wire or cable.
 3. Wiring Method:
 - a. Cables and raceways used for fire alarm circuits, and equipment control wiring associated with the fire alarm system, may not contain any other wire or cable.
 - b. Fire-Rated Cables: Use of 2-hour, fire-rated fire alarm cables, NFPA 70, Types MI and CI, is **OR** is not, **as directed**, permitted.
 - c. Signaling Line Circuits: Power-limited fire alarm cables may **OR** shall not, **as directed**, be installed in the same cable or raceway as signaling line circuits.
 4. Wiring within Enclosures: Separate power-limited and non-power-limited conductors as recommended by manufacturer. Install conductors parallel with or at right angles to sides and back of the enclosure. Bundle, lace, and train conductors to terminal points with no excess. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with the fire alarm system to terminal blocks. Mark each terminal according to the system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
 5. Cable Taps: Use numbered terminal strips in junction, pull, and outlet boxes, cabinets, or equipment enclosures where circuit connections are made.
 6. Color-Coding: Color-code fire alarm conductors differently from the normal building power wiring. Use one color-code for alarm circuit wiring and another for supervisory circuits. Color-code audible alarm-indicating circuits differently from alarm-initiating circuits. Use different colors for visible alarm-indicating devices. Paint fire alarm system junction boxes and covers red.
 7. Risers: Install at least two vertical cable risers to serve the fire alarm system. Separate risers in close proximity to each other with a minimum one-hour-rated wall, so the loss of one riser does not prevent the receipt or transmission of signals from other floors or zones.
 8. Wiring to Remote Alarm Transmitting Device: **1-inch (25-mm)** conduit between the fire alarm control panel and the transmitter. Install number of conductors and electrical supervision for connecting wiring as needed to suit monitoring function.
- F. Power And Control-Circuit Conductors
1. 120-V Power Wiring: Install according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables" unless otherwise indicated.
 2. Minimum Conductor Sizes:
 - a. Class 1 remote-control and signal circuits, No. 14 AWG.

- b. Class 2 low-energy, remote-control and signal circuits, No. 16 AWG.
- c. Class 3 low-energy, remote-control, alarm and signal circuits, No. 12 AWG.

G. Connections

- 1. Comply with requirements in Division 28 Section "Perimeter Security Systems" for connecting, terminating, and identifying wires and cables.
- 2. Comply with requirements in Division 28 Section "Intrusion Detection" for connecting, terminating, and identifying wires and cables.
- 3. Comply with requirements in Division 28 Section "Access Control" for connecting, terminating, and identifying wires and cables.
- 4. Comply with requirements in Division 28 Section "Video Surveillance" for connecting, terminating, and identifying wires and cables.
- 5. Comply with requirements in Division 28 Section "Plc Electronic Detention Monitoring And Control Systems" for connecting, terminating, and identifying wires and cables.
- 6. Comply with requirements in Division 28 Section(s) "Digital, Addressable Fire-alarm System" OR "Zoned (dc Loop) Fire-alarm System", **as directed**, for connecting, terminating, and identifying wires and cables.
- 7. Comply with requirements in Division 28 Section "Refrigerant Detection And Alarm" for connecting, terminating, and identifying wires and cables.

H. Firestopping

- 1. Comply with requirements in Division 07 Section "Penetration Firestopping".
- 2. Comply with TIA-569-B, "Firestopping" Annex A.
- 3. Comply with BICSI TDMM, "Firestopping Systems" Article.

I. Grounding

- 1. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
- 2. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".

J. Identification

- 1. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".

K. Field Quality Control

- 1. Perform tests and inspections.
- 2. Tests and Inspections:
 - a. Visually inspect UTP and optical fiber cable jacket materials for NRTL certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
 - b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - c. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - d. Optical Fiber Cable Tests:

- 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
- 2) Link End-to-End Attenuation Tests:
 - a) Multimode Link Measurements: Test at 850 or 1300 nm in 1 direction according to TIA-526-14-A, Method B, One Reference Jumper.
 - b) Attenuation test results for links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
- e. Coaxial Cable Tests: Comply with requirements in Division 27 Section "Master Antenna Television System".
3. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
4. End-to-end cabling will be considered defective if it does not pass tests and inspections.
5. Prepare test and inspection reports.

END OF SECTION 26 05 19 16g

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Task	Specification	Specification Description
26 05 19 16	01 22 16 00	No Specification Required
26 05 19 16	26 05 00 00	Common Work Results for Electrical
26 05 19 16	26 05 13 16	Medium-Voltage Cables
26 05 19 16	26 05 13 16a	Undercarpet Electrical Power Cables
26 05 19 16	26 05 23 00	Control-Voltage Electrical Power Cables

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SECTION 26 05 23 00 - CONTROL-VOLTAGE ELECTRICAL POWER CABLES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of control-voltage electrical power cables. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. UTP cabling.
 - b. 50/125 **OR** 62.5/125, **as directed**,-micrometer, multimode optical fiber cabling.
 - c. RS-232 cabling.
 - d. RS-485 cabling.
 - e. Low-voltage control cabling.
 - f. Control-circuit conductors.
 - g. Identification products.

C. Definitions

1. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.
2. Channel Cable Tray: A fabricated structure consisting of a one-piece, ventilated-bottom or solid-bottom channel section.
3. EMI: Electromagnetic interference.
4. IDC: Insulation displacement connector.
5. Ladder Cable Tray: A fabricated structure consisting of two longitudinal side rails connected by individual transverse members (rungs).
6. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
7. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).
8. RCDD: Registered Communications Distribution Designer.
9. Solid-Bottom or Nonventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal side rails, and a bottom without ventilation openings.
10. Trough or Ventilated Cable Tray: A fabricated structure consisting of integral or separate longitudinal rails and a bottom having openings sufficient for the passage of air and using 75 percent or less of the plan area of the surface to support cables.
11. UTP: Unshielded twisted pair.

D. Submittals

1. Product Data: For each type of product indicated.
2. Field quality-control reports.
3. Maintenance data.

E. Quality Assurance

1. Testing Agency Qualifications: Member company of an NRTL.
 - a. Testing Agency's Field Supervisor: Currently certified by BICSI as an RCDD to supervise on-site testing **OR** possess the standards and experience for membership, **as directed**.
2. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 50 **OR** 450, **as directed**, or less.

3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

F. Delivery, Storage, And Handling

1. Test cables upon receipt at Project site.
 - a. Test optical fiber cable to determine the continuity of the strand end to end. Use optical fiber flashlight **OR** optical loss test set, **as directed**.
 - b. Test optical fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
 - c. Test each pair of UTP cable for open and short circuits.

1.2 PRODUCTS

A. Pathways

1. Support of Open Cabling: NRTL labeled for support of Category 5e **OR** Category 6, **as directed**, cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.
 - a. Support brackets with cable tie slots for fastening cable ties to brackets.
 - b. Lacing bars, spools, J-hooks, and D-rings.
 - c. Straps and other devices.
2. Cable Trays:
 - a. Cable Tray Materials: Metal, suitable for indoors and protected against corrosion by electroplated zinc galvanizing, complying with ASTM B 633, Type 1, not less than **0.000472 inch (0.012 mm)** thick **OR** hot-dip galvanizing, complying with ASTM A 123/A 123M, Grade 0.55, not less than **0.002165 inch (0.055 mm)** thick, **as directed**.
 - 1) Basket Cable Trays: **6 inches (150 mm)** wide and **2 inches (50 mm)** deep. Wire mesh spacing shall not exceed **2 by 4 inches (50 by 100 mm)**.
 - 2) Trough or Ventilated Cable Trays: Nominally **6 inches (150 mm)** wide.
 - 3) Ladder Cable Trays: Nominally **18 inches (455 mm)** wide, and a rung spacing of **12 inches (305 mm)**.
 - 4) Channel Cable Trays: One-piece construction, nominally **4 inches (100 mm)** wide. Slot spacing shall not exceed **4-1/2 inches (115 mm)** o.c.
 - 5) Solid-Bottom or Nonventilated Cable Trays: One-piece construction, nominally **12 inches (305 mm)** wide. Provide with **OR** without, **as directed**, solid covers.
3. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems". Flexible metal conduit shall not be used, **as directed**.
 - a. Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.

B. Backboards

1. Description: Plywood, fire-retardant treated, **as directed**, **3/4 by 48 by 96 inches (19 by 1220 by 2440 mm)**. Comply with requirements for plywood backing panels in Division 06 Section "Rough Carpentry".

C. UTP Cable

1. Description: 100-ohm, four-pair UTP, formed into 25-pair binder groups covered with a blue thermoplastic jacket, **as directed**.
 - a. Comply with ICEA S-90-661 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.1 for performance specifications.
 - c. Comply with TIA/EIA-568-B.2, Category 5e **OR** Category 6, **as directed**.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

- 1) Communications, General Purpose: Type CM or Type CMG; or Type MPP, Type CMP, Type MPR, Type CMR, Type MP, or Type MPG, **as directed**.
- 2) Communications, Plenum Rated: Type CMP or Type MPP, **as directed**, complying with NFPA 262.
- 3) Communications, Riser Rated: Type CMR; or Type MPP, Type CMP, or Type MPR, **as directed**; complying with UL 1666.
- 4) Communications, Limited Purpose: Type CMX; or Type MPP, Type CMP, Type MPR, Type CMR, Type MP, Type MPG, Type CM, or Type CMG, **as directed**.
- 5) Multipurpose: Type MP or Type MPG; or Type MPP or Type MPR, **as directed**.
- 6) Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
- 7) Multipurpose, Riser Rated: Type MPR or Type MPP, **as directed**, complying with UL 1666.

D. UTP Cable Hardware

1. UTP Cable Connecting Hardware: IDC type, using modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of the same category or higher.
2. Connecting Blocks: 110 style for Category 5e **OR** 110 style for Category 6 **OR** 66 style for Category 5e, **as directed**. Provide blocks for the number of cables terminated on the block, plus 25 percent spare; integral with connector bodies, including plugs and jacks where indicated.

E. Optical Fiber Cable

1. Description: Multimode, 50/125 **OR** 62.5/125, **as directed**,-micrometer, 24-fiber, nonconductive, **as directed**, tight buffer, optical fiber cable.
 - a. Comply with ICEA S-83-596 for mechanical properties.
 - b. Comply with TIA/EIA-568-B.3 for performance specifications.
 - c. Comply with TIA/EIA-492AAAA-B **OR** TIA/EIA-492AAAA-A, **as directed**, for detailed specifications.
 - d. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:
 - 1) General Purpose, Nonconductive: Type OFN or OFNG, or Type OFNR or Type OFNP, **as directed**.
 - 2) Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
 - 3) Riser Rated, Nonconductive: Type OFNR or Type OFNP, **as directed**, complying with UL 1666.
 - 4) General Purpose, Conductive: Type OFC or Type OFCG; or Type OFNG, Type OFN, Type OFCR, Type OFNR, Type OFCP, or Type OFNP, **as directed**.
 - 5) Plenum Rated, Conductive: Type OFCP or Type OFNP, **as directed**, complying with NFPA 262.
 - 6) Riser Rated, Conductive: Type OFCR; or Type OFNR, Type OFCP, or Type OFNP, **as directed**; complying with UL 1666.
 - e. Conductive cable shall be steel **OR** aluminum, **as directed**,-armored type.
 - f. Maximum Attenuation: 3.5 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
 - g. Minimum Modal Bandwidth: 160 MHz-km at 850 nm; 500 MHz-km at 1300 nm.
2. Jacket:
 - a. Jacket Color: Aqua for 50/125 **OR** Orange for 62.5/125, **as directed**,-micrometer cable.
 - b. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
 - c. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed **40 inches (1000 mm)**.

F. Optical Fiber Cable Hardware

1. Cable Connecting Hardware: Comply with the Fiber Optic Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
 - a. Quick-connect, simplex and duplex, Type SC **OR** Type ST **OR** Type LC **OR** Type MT-RJ, **as directed**, connectors. Insertion loss not more than 0.75 dB.
 - b. Type SFF connectors may be used in termination racks, panels, and equipment packages.

- G. RS-232 Cable
1. Standard Cable: NFPA 70, Type CM.
 - a. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - b. Polypropylene insulation.
 - c. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 - d. PVC jacket.
 - e. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
 - f. Flame Resistance: Comply with UL 1581.
 2. Plenum-Rated Cable: NFPA 70, Type CMP.
 - a. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - b. Plastic insulation.
 - c. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
 - d. Plastic jacket.
 - e. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned-copper drain wire.
 - f. Flame Resistance: Comply with NFPA 262.
- H. RS-485 Cable
1. Standard Cable: NFPA 70, Type CM or Type CMG, **as directed**.
 - a. Paired, two pairs, twisted, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with UL 1581.
 2. Plenum-Rated Cable: NFPA 70, Type CMP.
 - a. Paired, two pairs, No. 22 AWG, stranded (7x30) tinned-copper conductors.
 - b. Fluorinated ethylene propylene insulation.
 - c. Unshielded.
 - d. Fluorinated ethylene propylene jacket.
 - e. Flame Resistance: NFPA 262, Flame Test.
- I. Low-Voltage Control Cable
1. Paired Cable: NFPA 70, Type CMG.
 - a. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with UL 1581.
 2. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - a. One pair, twisted, No. 16 AWG, stranded (19x29) tinned-copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with NFPA 262.
 3. Paired Cable: NFPA 70, Type CMG.
 - a. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
 - b. PVC insulation.
 - c. Unshielded.
 - d. PVC jacket.
 - e. Flame Resistance: Comply with UL 1581.
 4. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - a. One pair, twisted, No. 18 AWG, stranded (19x30) tinned-copper conductors.
 - b. Fluorinated ethylene propylene insulation.
 - c. Unshielded.

- d. Plastic jacket.
 - e. Flame Resistance: NFPA 262, Flame Test.
- J. Control-Circuit Conductors
- 1. Class 1 Control Circuits: Stranded copper, Type THHN-THWN **OR** Type XHHN, **as directed**, in raceway, complying with UL 83 **OR** UL 44, **as directed**.
 - 2. Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway **OR** Type XHHN, in raceway **OR** power-limited cable, concealed in building finishes **OR** power-limited tray cable, in cable tray, **as directed**, complying with UL 83 **OR** UL 44, **as directed**.
 - 3. Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF, complying with UL 83.
- K. Identification Products
- 1. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.
 - 2. Comply with requirements in Division 26 Section "Identification For Electrical Systems".
- L. Source Quality Control
- 1. Testing Agency: Engage a qualified testing agency to evaluate cables.
 - 2. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.
 - 3. Factory test UTP cables according to TIA/EIA-568-B.2.
 - 4. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.
 - 5. Cable will be considered defective if it does not pass tests and inspections.
 - 6. Prepare test and inspection reports.

1.3 EXECUTION

- A. Installation Of Pathways
- 1. Cable Trays: Comply with NEMA VE 2 and TIA/EIA-569-A-7.
 - 2. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.
 - 3. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
 - 4. Install manufactured conduit sweeps and long-radius elbows if possible.
 - 5. Pathway Installation in Equipment Rooms:
 - a. Position conduit ends adjacent to a corner on backboard if a single piece of plywood is installed or in the corner of room if multiple sheets of plywood are installed around perimeter walls of room.
 - b. Install cable trays to route cables if conduits cannot be located in these positions.
 - c. Secure conduits to backboard if entering room from overhead.
 - d. Extend conduits **3 inches (75 mm)** above finished floor.
 - e. Install metal conduits with grounding bushings and connect with grounding conductor to grounding system.
 - 6. Backboards: Install backboards with 96-inch (2440-mm) dimension vertical. Butt adjacent sheets tightly and form smooth gap-free corners and joints.
- B. Installation Of Conductors And Cables
- 1. Comply with NECA 1.
 - 2. General Requirements for Cabling:
 - a. Comply with TIA/EIA-568-B.1.
 - b. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
 - c. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.

- d. Cables may not be spliced. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
- e. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
- f. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
- g. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.
- h. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.
3. UTP Cable Installation:
 - a. Comply with TIA/EIA-568-B.2.
 - b. Install 110-style IDC termination hardware unless otherwise indicated.
 - c. Do not untwist UTP cables more than **1/2 inch (12 mm)** from the point of termination to maintain cable geometry.
4. Installation of Control-Circuit Conductors:
 - a. Install wiring in raceways. Comply with requirements specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
5. Optical Fiber Cable Installation:
 - a. Comply with TIA/EIA-568-B.3.
 - b. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.
6. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - b. Suspend copper cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceilings by cable supports not more than **60 inches (1525 mm)** apart.
 - c. Cable shall not be run through structural members or in contact with pipes, ducts, or other potentially damaging items.
7. Installation of Cable Routed Exposed under Raised Floors:
 - a. Install plenum-rated cable only.
 - b. Install cabling after the flooring system has been installed in raised floor areas.
 - c. Coil cable **72 inches (1830 mm)** long shall be neatly coiled not less than **12 inches (305 mm)** in diameter below each feed point.
8. Separation from EMI Sources:
 - a. Comply with BICSI TDMM and TIA/EIA-569-A recommendations for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
 - b. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **5 inches (127 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **12 inches (305 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **24 inches (600 mm)**.
 - c. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:
 - 1) Electrical Equipment Rating Less Than 2 kVA: A minimum of **2-1/2 inches (64 mm)**.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of **6 inches (150 mm)**.
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of **12 inches (305 mm)**.
 - d. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

- 1) Electrical Equipment Rating Less Than 2 kVA: No requirement.
 - 2) Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches (75 mm).
 - 3) Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches (150 mm).
 - e. Separation between Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches (1200 mm).
 - f. Separation between Cables and Fluorescent Fixtures: A minimum of 5 inches (127 mm).
- C. Removal Of Conductors And Cables
1. Remove abandoned conductors and cables.
- D. Control-Circuit Conductors
1. Minimum Conductor Sizes:
 - a. Class 1 remote-control and signal circuits, No 14 AWG.
 - b. Class 2 low-energy, remote-control, and signal circuits, No. 16 AWG.
 - c. Class 3 low-energy, remote-control, alarm, and signal circuits, No 12 AWG.
- E. Firestopping
1. Comply with requirements in Division 07 Section "Penetration Firestopping".
 2. Comply with TIA/EIA-569-A, Annex A, "Firestopping."
 3. Comply with BICSI TDMM, "Firestopping Systems" Article.
- F. Grounding
1. For data communication wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.
 2. For low-voltage wiring and cabling, comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".
- G. Identification
- H. Identify system components, wiring, and cabling according to TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
- I. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
 - b. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
 - c. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not after cross connection.
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - d. Optical Fiber Cable Tests:
 - 1) Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
 - 2) Link End-to-End Attenuation Tests:
 - a) Multimode Link Measurements: Test at 850 or 1300 nm in one direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.

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- b) Attenuation test results for links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.
3. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.
4. End-to-end cabling will be considered defective if it does not pass tests and inspections.
5. Prepare test and inspection reports.

END OF SECTION 26 05 23 00

SECTION 26 05 26 00 - LIGHTNING PROTECTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for lightning protection. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes lightning protection for structures, structure elements and building site components.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For air terminals and mounting accessories.
 - a. Layout of the lightning protection system, along with details of the components to be used in the installation.
 - b. Include indications for use of raceway, data on how concealment requirements will be met, and calculations required by NFPA 780 for bonding of grounded and isolated metal bodies.
3. Qualification Data: For qualified Installer and manufacturer. Include data on listing or certification by UL.
4. Certification, signed by Contractor, that roof adhesive is approved by manufacturer of roofing material.
5. Field quality-control reports.
6. Comply with recommendations in NFPA 780, Annex D, "Inspection and Maintenance of Lightning Protection Systems," for maintenance of the lightning protection system.
7. Other Informational Submittals: Plans showing dimensioned as-built locations of grounding features, including the following:
 - a. Ground rods.
 - b. Ground loop conductor.

D. Quality Assurance

1. Installer Qualifications: Certified by UL or LPI as a Master Installer/Designer, trained and approved for installation of units required for this Project.
2. System Certificate:
 - a. UL Master Label.
OR
LPI System Certificate.
OR
UL Master Label Recertification.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 780, "Definitions" Article.

E. Coordination

1. Coordinate installation of lightning protection with installation of other building systems and components, including electrical wiring, supporting structures and building materials, metal bodies requiring bonding to lightning protection components, and building finishes.
2. Coordinate installation of air terminals attached to roof systems with roofing manufacturer and Installer.
3. Flashings of through-roof assemblies shall comply with roofing manufacturers' specifications.

1.2 PRODUCTS

- A. Lightning Protection System Components
1. Comply with UL 96 and NFPA 780, **as directed**.
 2. Roof-Mounted Air Terminals: NFPA 780, Class I **OR** Class II, **as directed**, aluminum **OR** copper, **as directed**, unless otherwise indicated.
 - a. Air Terminals More than **24 Inches (600 mm)** Long: With brace attached to the terminal at not less than half the height of the terminal.
 - b. Single-Membrane, Roof-Mounted Air Terminals: Designed specifically for single-membrane roof system materials. Comply with requirements in Division 07.
 3. Main and Bonding Conductors: Copper **OR** Aluminum, **as directed**.
 4. Ground Loop Conductor: The same size and type as the main conductor except tinned.
 5. Ground Rods: Copper-clad **OR** Zinc-coated **OR** Stainless, **as directed**, steel, sectional type, **as directed**; **3/4 inch (19 mm)** in diameter by **10 feet (3 m)** **OR** **5/8 inch (16 mm)** in diameter by **96 inches (2400 mm)**, **as directed**, long.
 6. Heavy-Duty, Stack-Mounted, Lightning Protection Components: Stainless steel **OR** Solid copper **OR** Monel metal **OR** Lead sheathed, **as directed**.

1.3 EXECUTION

- A. Installation
1. Install lightning protection components and systems according to UL 96A and NFPA 780.
 2. Install conductors with direct paths from air terminals to ground connections. Avoid sharp bends.
 3. Conceal the following conductors:
 - a. System conductors.
 - b. Down conductors.
 - c. Interior conductors.
 - d. Conductors within normal view of exterior locations at grade within **200 feet (60 m)** of building.
 4. Cable Connections: Use crimped or bolted connections for all conductor splices and connections between conductors and other components. Use exothermic-welded connections in underground portions of the system.
OR
Cable Connections: Use exothermic-welded connections for all conductor splices and connections between conductors and other components.
 - a. Exception: In single-ply membrane roofing, exothermic-welded connections may be used only below the roof level.
 5. Air Terminals on Single-Ply Membrane Roofing: Comply with roofing membrane and adhesive manufacturer's written instructions.
 6. Bond extremities of vertical metal bodies exceeding **60 feet (18 m)** in length to lightning protection components.
 7. Ground Loop: Install ground-level, potential equalization conductor and extend around the perimeter of structure **OR** area or item indicated, **as directed**.
 - a. Bury ground ring not less than **24 inches (600 mm)** from building foundation.
 - b. Bond ground terminals to the ground loop.
 - c. Bond grounded building systems to the ground loop conductor within **12 feet (3.6 m)** of grade level.
 8. Bond lightning protection components with intermediate-level interconnection loop conductors to grounded metal bodies of building at **60-foot (18-m)** intervals.
- B. Corrosion Protection
1. Do not combine materials that can form an electrolytic couple that will accelerate corrosion in the presence of moisture unless moisture is permanently excluded from junction of such materials.

2. Use conductors with protective coatings where conditions cause deterioration or corrosion of conductors.
- C. Field Quality Control
1. Notify the Owner at least 48 hours in advance of inspection before concealing lightning protection components.
 2. UL Inspection: Meet requirements to obtain a UL Master Label for system.
OR
LPI System Inspection: Meet requirements to obtain an LPI System Certificate.

END OF SECTION 26 05 26 00

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SECTION 26 05 26 00a - GROUNDING AND BONDING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for grounding and bonding. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes methods and materials for grounding systems and equipment, plus the following special applications, **as directed**:
 - a. Overhead-lines grounding.
 - b. Underground distribution grounding.
 - c. Common ground bonding with lightning protection system.

C. Submittals

1. Product Data: For each type of product indicated.
2. Informational Submittals: Plans showing dimensioned as-built locations of grounding features specified in "Field Quality Control" Article, including the following:
 - a. Test wells.
 - b. Ground rods.
 - c. Ground rings.
 - d. Grounding arrangements and connections for separately derived systems.
 - e. Grounding for sensitive electronic equipment.
3. Qualification Data: For qualified testing agency and testing agency's field supervisor.
4. Field quality-control test reports.
5. Operation and Maintenance Data: For grounding to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation And Maintenance Data", include the following:
 - a. Instructions for periodic testing and inspection of grounding features at test wells **OR** ground rings **OR** grounding connections for separately derived systems, **as directed** based on NETA MTS **OR** NFPA 70B, **as directed**.
 - 1) Tests shall determine if ground-resistance or impedance values remain within specified maximums, and instructions shall recommend corrective action if values do not.
 - 2) Include recommended testing intervals.

D. Quality Assurance

1. Testing Agency Qualifications: Member company of NETA or an NRTL **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA **OR** one who meets the requirements necessary for certification, **as directed**, to supervise on-site testing.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Comply with UL 467 for grounding and bonding materials and equipment.

1.2 PRODUCTS

A. Conductors

1. Insulated Conductors: Copper **OR** Tinned-copper, **as directed**, wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

2. Bare Copper Conductors:
 - a. Solid Conductors: ASTM B 3.
 - b. Stranded Conductors: ASTM B 8.
 - c. Tinned Conductors: ASTM B 33.
 - d. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, **1/4 inch (6 mm)** in diameter.
 - e. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
 - f. Bonding Jumper: Copper tape, braided conductors, terminated with copper ferrules; **1-5/8 inches (41 mm)** wide and **1/16 inch (1.6 mm)** thick.
 - g. Tinned Bonding Jumper: Tinned-copper tape, braided conductors, terminated with copper ferrules; **1-5/8 inches (41 mm)** wide and **1/16 inch (1.6 mm)** thick.
3. Bare Grounding Conductor and Conductor Protector for Wood Poles:
 - a. No. 4 AWG minimum, soft-drawn copper.
 - b. Conductor Protector: Half-round PVC or wood molding. If wood, use pressure-treated fir or cypress or cedar.
4. Grounding Bus: Predrilled rectangular bars of annealed copper, **1/4 by 2 inches (6 by 50 mm)**, **as directed**, in cross section, with **9/32-inch (7.14-mm)** holes spaced **1-1/8 inches (28 mm)** apart. Stand-off insulators for mounting shall comply with UL 891 for use in switchboards, 600 V. Lexan or PVC, impulse tested at 5000 V.

B. Connectors

1. Listed and labeled by a nationally recognized testing laboratory acceptable to authorities having jurisdiction for applications in which used, and for specific types, sizes, and combinations of conductors and other items connected.
2. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, bolted pressure-type, with at least two bolts.
 - a. Pipe Connectors: Clamp type, sized for pipe.
3. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.
4. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression **OR** exothermic-type wire terminals, **as directed**, and long-barrel, two-bolt connection to ground bus bar.

C. Grounding Electrodes

1. Ground Rods: Copper-clad **OR** Zinc-coated **OR** Stainless, **as directed**, steel, sectional type, **as directed**; **3/4 inch by 10 feet (19 mm by 3 m)** **OR** **5/8 by 96 inches (16 by 2400 mm)**, **as directed**, in diameter.
2. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
 - a. Termination: Factory-attached No. 4/0 AWG bare conductor at least **48 inches (1200 mm)** long.
 - b. Backfill Material: Electrode manufacturer's recommended material.

1.3 EXECUTION

A. Applications

1. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger, unless otherwise indicated.
2. Underground Grounding Conductors: Install bare copper **OR** tinned-copper, **as directed**, conductor, No. 2/0 AWG minimum. Bury at least **24 inches (600 mm)** below grade.
 - a. Bury at least **24 inches (600 mm)** below grade.
 - b. Duct-Bank Grounding Conductor: Bury **12 inches (300 mm)** above duct bank when indicated as part of duct-bank installation.

3. Isolated Grounding Conductors: Green-colored insulation with continuous yellow stripe. On feeders with isolated ground, identify grounding conductor where visible to normal inspection, with alternating bands of green and yellow tape, with at least three bands of green and two bands of yellow.
 4. Grounding Bus: Install in electrical and telephone equipment rooms, in rooms housing service equipment, and elsewhere as indicated.
 - a. Install bus on insulated spacers **1 inch (25 mm)**, minimum, from wall **6 inches (150 mm)** above finished floor, unless otherwise indicated.
 - b. Where indicated on both sides of doorways, route bus up to top of door frame, across top of doorway, down to specified height above floor, and connect to horizontal bus.
 5. Conductor Terminations and Connections:
 - a. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
 - b. Underground Connections: Welded connectors, except at test wells and as otherwise indicated.
 - c. Connections to Ground Rods at Test Wells: Bolted connectors.
 - d. Connections to Structural Steel: Welded connectors.
- B. Grounding Overhead Lines
1. Comply with IEEE C2 grounding requirements.
 2. Install 2 parallel ground rods if resistance to ground by a single, ground-rod electrode exceeds 25 ohms.
 3. Drive ground rods until tops are **12 inches (300 mm)** below finished grade in undisturbed earth.
 4. Ground-Rod Connections: Install bolted connectors for underground connections and connections to rods.
 5. Lightning Arrester Grounding Conductors: Separate from other grounding conductors.
 6. Secondary Neutral and Transformer Enclosure: Interconnect and connect to grounding conductor.
 7. Protect grounding conductors running on surface of wood poles with molding extended from grade level up to and through communication service and transformer spaces.
- C. Grounding Underground Distribution System Components
1. Comply with IEEE C2 grounding requirements.
 2. Grounding Manholes and Handholes: Install a driven ground rod through manhole or handhole floor, close to wall, and set rod depth so **4 inches (100 mm)** will extend above finished floor. If necessary, install ground rod before manhole is placed and provide No. 1/0 AWG bare, tinned-copper conductor from ground rod into manhole through a waterproof sleeve in manhole wall. Protect ground rods passing through concrete floor with a double wrapping of pressure-sensitive insulating tape or heat-shrunk insulating sleeve from **2 inches (50 mm)** above to **6 inches (150 mm)** below concrete. Seal floor opening with waterproof, nonshrink grout.
 3. Grounding Connections to Manhole Components: Bond exposed-metal parts such as inserts, cable racks, pulling irons, ladders, and cable shields within each manhole or handhole, to ground rod or grounding conductor. Make connections with No. 4 AWG minimum, stranded, hard-drawn copper bonding conductor. Train conductors level or plumb around corners and fasten to manhole walls. Connect to cable armor and cable shields as recommended by manufacturer of splicing and termination kits.
 4. Pad-Mounted Transformers and Switches: Install two ground rods and ground ring around the pad. Ground pad-mounted equipment and noncurrent-carrying metal items associated with substations by connecting them to underground cable and grounding electrodes. Install tinned-copper conductor not less than No. 2 AWG for ground ring and for taps to equipment grounding terminals. Bury ground ring not less than **6 inches (150 mm)** from the foundation.
- D. Equipment Grounding
1. Install insulated equipment grounding conductors with all feeders and branch circuits.
 2. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:
 - a. Feeders and branch circuits.

- b. Lighting circuits.
 - c. Receptacle circuits.
 - d. Single-phase motor and appliance branch circuits.
 - e. Three-phase motor and appliance branch circuits.
 - f. Flexible raceway runs.
 - g. Armored and metal-clad cable runs.
 - h. Busway Supply Circuits: Install insulated equipment grounding conductor from grounding bus in the switchgear, switchboard, or distribution panel to equipment grounding bar terminal on busway.
 - i. Computer and Rack-Mounted Electronic Equipment Circuits: Install insulated equipment grounding conductor in branch-circuit runs from equipment-area power panels and power-distribution units.
 - j. X-Ray Equipment Circuits: Install insulated equipment grounding conductor in circuits supplying x-ray equipment.
3. Air-Duct Equipment Circuits: Install insulated equipment grounding conductor to duct-mounted electrical devices operating at 120 V and more, including air cleaners, heaters, dampers, humidifiers, and other duct electrical equipment. Bond conductor to each unit and to air duct and connected metallic piping.
 4. Water Heater, Heat-Tracing, and Antifrost Heating Cables: Install a separate insulated equipment grounding conductor to each electric water heater and heat-tracing cable. Bond conductor to heater units, piping, connected equipment, and components.
 5. Isolated Grounding Receptacle Circuits: Install an insulated equipment grounding conductor connected to the receptacle grounding terminal. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
 6. Isolated Equipment Enclosure Circuits: For designated equipment supplied by a branch circuit or feeder, isolate equipment enclosure from supply circuit raceway with a nonmetallic raceway fitting listed for the purpose. Install fitting where raceway enters enclosure, and install a separate insulated equipment grounding conductor. Isolate conductor from raceway and from panelboard grounding terminals. Terminate at equipment grounding conductor terminal of the applicable derived system or service, unless otherwise indicated.
 7. Signal and Communication Equipment: For telephone, alarm, voice and data, and other communication equipment, provide No. 4 AWG minimum insulated grounding conductor in raceway from grounding electrode system to each service location, terminal cabinet, wiring closet, and central equipment location.
 - a. Service and Central Equipment Locations and Wiring Closets: Terminate grounding conductor on a **1/4-by-2-by-12-inch (6-by-50-by-300-mm)** grounding bus.
 - b. Terminal Cabinets: Terminate grounding conductor on cabinet grounding terminal.
 8. Metal and Wood Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.
- E. Installation
1. Grounding Conductors: Route along shortest and straightest paths possible, unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.
 2. Common Ground Bonding with Lightning Protection System: Comply with NFPA 780 and UL 96 when interconnecting with lightning protection system. Bond electrical power system ground directly to lightning protection system grounding conductor at closest point to electrical service grounding electrode. Use bonding conductor sized same as system grounding electrode conductor, and install in conduit.
 3. Ground Rods: Drive rods until tops are **2 inches (50 mm)** below finished floor or final grade, unless otherwise indicated.
 - a. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating, if any.

- b. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.
 4. Test Wells: Ground rod driven through drilled hole in bottom of handhole. Handholes are specified in Division 26 Section "Underground Ducts And Raceways For Electrical Systems" and shall be at least **12 inches (300 mm)** deep, with cover.
 - a. Test Wells: Install at least one test well for each service, unless otherwise indicated. Install at the ground rod electrically closest to service entrance. Set top of test well flush with finished grade or floor.
 5. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance, except where routed through short lengths of conduit.
 - a. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
 - b. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install so vibration is not transmitted to rigidly mounted equipment.
 - c. Use exothermic-welded connectors for outdoor locations, but if a disconnect-type connection is required, use a bolted clamp.
 6. Grounding and Bonding for Piping:
 - a. Metal Water Service Pipe: Install insulated copper grounding conductors, in conduit, from building's main service equipment, or grounding bus, to main metal water service entrances to building. Connect grounding conductors to main metal water service pipes, using a bolted clamp connector or by bolting a lug-type connector to a pipe flange, using one of the lug bolts of the flange. Where a dielectric main water fitting is installed, connect grounding conductor on street side of fitting. Bond metal grounding conductor conduit or sleeve to conductor at each end.
 - b. Water Meter Piping: Use braided-type bonding jumpers to electrically bypass water meters. Connect to pipe with a bolted connector.
 - c. Bond each aboveground portion of gas piping system downstream from equipment shutoff valve.
 7. Bonding Interior Metal Ducts: Bond metal air ducts to equipment grounding conductors of associated fans, blowers, electric heaters, and air cleaners. Install tinned bonding jumper to bond across flexible duct connections to achieve continuity.
 8. Grounding for Steel Building Structure: Install a driven ground rod at base of each corner column and at intermediate exterior columns at distances not more than **60 feet (18 m)** apart.
 9. Ground Ring: Install a grounding conductor, electrically connected to each building structure ground rod and to each steel column **OR** indicated item, **as directed**, extending around the perimeter of building **OR** area or item indicated, **as directed**.
 - a. Install tinned-copper conductor not less than No. 2/0 AWG for ground ring and for taps to building steel.
 - b. Bury ground ring not less than **24 inches (600 mm)** from building foundation.
 10. Ufer Ground (Concrete-Encased Grounding Electrode): Fabricate according to NFPA 70, using a minimum of **20 feet (6 m)** of bare copper conductor not smaller than No. 4 AWG.
 - a. If concrete foundation is less than **20 feet (6 m)** long, coil excess conductor within base of foundation.
 - b. Bond grounding conductor to reinforcing steel in at least four locations and to anchor bolts. Extend grounding conductor below grade and connect to building grounding grid or to grounding electrode external to concrete.
- F. Labeling
1. Comply with requirements in Division 26 Section "Identification For Electrical Systems" for instruction signs. The label or its text shall be green.
 2. Install labels at the telecommunications bonding conductor and grounding equalizer and at the grounding electrode conductor where exposed.
 - a. Label Text: "If this connector or cable is loose or if it must be removed for any reason, notify the facility manager."

- G. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Tests and Inspections:
 - a. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
 - b. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal, and at ground test wells.
 - 1) Measure ground resistance not less than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
 - 2) Perform tests by fall-of-potential method according to IEEE 81.
 - c. Prepare dimensioned drawings locating each test well, ground rod and ground rod assembly, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.
 3. Report measured ground resistances that exceed the following values:
 - a. Power and Lighting Equipment or System with Capacity 500 kVA and Less: 10 ohms.
 - b. Power and Lighting Equipment or System with Capacity 500 to 1000 kVA: 5 ohms.
 - c. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
 - d. Power Distribution Units or Panelboards Serving Electronic Equipment: 1 **OR** 3, **as directed**, ohm(s).
 - e. Substations and Pad-Mounted Equipment: 5 ohms.
 - f. Manhole Grounds: 10 ohms.
 4. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify the Owner promptly and include recommendations to reduce ground resistance.

END OF SECTION 26 05 26 00a

SECTION 26 05 26 00b - OVERHEAD ELECTRICAL DISTRIBUTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for overhead electrical distribution. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Conductors, connectors, and splices.
 - b. Poles and crossarms.
 - c. Hardware and accessories.
 - d. Surge arresters.
 - e. Cutouts, switches, and fuses.
 - f. Pole-mounted distribution transformers.
 - g. Primary metering equipment.

C. Definitions

1. BIL: Basic impulse level, stated in kilovolts.
2. RUS: Department of Agriculture, Rural Utilities Service.
3. Sag: The distance measured vertically from a conductor to the straight line joining its two points of support, measured at the midpoint of the span, unless otherwise indicated.
 - a. Final Sag: The sag of a conductor under specified conditions of loading and temperature applied after it has been subjected, for an appreciable period, to the loading prescribed for the loading district in which it is situated, or equivalent loading, and the loading removed. Final sag includes the effect of inelastic deformation (creep).
 - b. Initial Unloaded Sag: The sag of a conductor before the application of an external load.
4. Secondary: Conductors and components for circuits operating at the utilization voltage of 600 V or less.
5. Service: Set of insulated conductors extending from a pole to the metering point or service entrance connection at the location of utilization of electricity.

D. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Qualification Data: For qualified manufacturer **OR** testing agency, **as directed**.
3. Material Certificates: For the following items, from manufacturers:
 - a. Wood poles.
 - b. Concrete poles.
 - c. Wood crossarms.
4. Listing Documentation: Indicate that products comply with RUS listing requirements specified in "Quality Assurance" Article.
 - a. Time-Current Coordination Curves: Illustrate optimum coordination of protective devices involved in the Work of this Section.
 - b. Source quality-control test reports.
5. Field quality-control reports.
6. Operation and Maintenance Data: For switches **OR** transformers, **as directed**, to include in emergency, operation, and maintenance manuals.
7. Survey records for locations of pole, anchors, and other features for inclusion in Project Record Documents.

- E. Quality Assurance
1. Concrete Pole Manufacturer Qualifications: Certified by PCI as a qualified manufacturer of concrete utility poles of type and size indicated for this Project.
 2. Inspection Agency Qualifications for Pole and Crossarm Inspection: An independent agency, acceptable to authorities having jurisdiction, qualified to conduct inspections indicated.
 3. Testing Agency Qualifications: Member company of NETA or an NRTL.
 4. Testing Agency's Field Supervisor: Currently certified by NETA or an NRTL.
 5. Treatment Technician Qualifications for Field Treatment of Wood Poles and Crossarms: Certified by authorities having jurisdiction over environmental protection at the location of Project for field application of chemicals required.
 6. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 7. Overhead-Line Components, Devices, and Accessories: Currently listed in RUS Informational Publication 202-1 without restriction for the intended application.
 8. Comply with IEEE C2 **OR** CPUC General Order 95, **as directed**, except where stricter requirements are indicated or where local requirements that are stricter apply.
 9. Strength of Line and Line Components Selected by Contractor: Provide grades of construction and strength required by IEEE C2 for conditions encountered at Project site for heavy **OR** medium **OR** light, **as directed**, line loading unless otherwise indicated.
- F. Delivery, Storage, And Handling
1. Wood Pole Storage and Handling: Comply with ATIS O5.1. Do not use pointed handling tools capable of producing indentations greater than **1 inch (25 mm)**.
- G. Project Conditions
1. Interruption of Existing Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify Owner no fewer than two days in advance of proposed interruption of service.
 - b. Do not proceed with interruption of service without Owner's written permission.
- H. Coordination
1. Coordinate with utility supplying electricity to lines specified in this Section, and make final connections **OR** arrangements for final connections by utility, **as directed**.
 2. Coordinate with those responsible for voice **OR** data **OR** video, **as directed**, systems that will have cables supported by poles installed according to this Section.

1.2 PRODUCTS

- A. Conductors, Connectors, And Splices
1. Conductor Type AAC: Bare **OR** Bare and covered, **as directed**, all-aluminum, Alloy 1350-H19, complying with ASTM B 230/B 230M and ASTM B 231/B 231M.
OR
Conductor Type AAAC: Bare **OR** Bare and covered, **as directed**, all-aluminum-alloy, Alloy 6201-T81, complying with ASTM B 398/B 398M and ASTM B 399/B 399M.
OR
Conductor Type ACSR: Bare **OR** Bare and covered, **as directed**, aluminum conductor, steel reinforced, complying with ASTM B 232/B 232M.
OR
Conductor Type CU: Bare **OR** Bare and covered, **as directed**, hard-drawn copper, complying with ASTM B 1 and ASTM B 8.
 2. Conductor Covering: UV resistant, complying with ICEA-S-70-547. HDPE **OR** XLP, **as directed**, **150 mils (3.81 mm)** thick.

3. Self-Supported, Multiconductor, Insulated Medium-Voltage Wiring: Factory-assembled, messenger-supported type, listed under UL 1072 as sunlight-resistant Type MV cable for cable tray use.
 - a. Conductors: Aluminum, Alloy 1350, complying with ASTM B 230/B 230M and ASTM B 231/B 231M **OR** Hard-drawn copper, complying with ASTM B 1 and ASTM B 8, **as directed**; stranded for No. 2 AWG and larger.
 - b. Conductor Insulation: XLP, complying with NEMA WC 70/ICEA S-95-658 **OR** EPR, complying with NEMA WC 70/ICEA S-95-658, **as directed**.
 - c. Insulation Level: 100 **OR** 133, **as directed**, percent of rated circuit line-to-line voltage.
 - d. Conductor Shield: Extruded, nonconducting, thermoset material, complying with NEMA WC 70/ICEA S-95-658; **18-mil (0.046-mm)** minimum thickness.
 - e. Insulation Shield: Include the following two components:
 - 1) Nonmetallic conducting, material complying with NEMA WC 70/ICEA S-95-658 and UL 1072, extruded over, and free stripping from the insulation.
 - 2) Metallic Tape Shield: Bare copper, **5-mil (0.127-mm)** minimum thickness, helically applied with a 15 percent minimum overlap.
 - f. Conductor Jacket: Extruded, chlorosulfonated-polyethylene-based material, complying with NEMA WC 70/ICEA S-95-658.
 - g. Messenger: Copper **OR** Composite copper and copper, **as directed**, -clad steel.
 - h. Conductor Support Strap: Copper strap, wound around conductors and messenger the full length of the cable.
4. Secondary-Voltage Line Conductors: Aluminum conductor, steel **reinforced**, complying with ASTM B 232/B 232M **OR** Covered aluminum conductor, steel reinforced, complying with ICEA S-70-547, with HDPE or XLP covering, **as directed**, **60 mils (1.52 mm)** thick.

OR

Secondary-Voltage Line Conductors: Bare hard-drawn copper, complying with ASTM B 1 and ASTM B 8 **OR** Covered hard-drawn copper, complying with ICEA S-70-547, with HDPE or XLP covering, **as directed**, **60 mils (1.52 mm)** thick. Neutral-supported, secondary service-drop cable, **as directed**.

OR

Racked Secondary Conductors, 600 V and Less: Copper, insulated with XLP, complying with NEMA WC 70/ICEA S-95-658, **as directed**.
5. Neutral-Supported, Secondary Service-Drop Cable, 600 V and Less: Insulated conductors with bare neutral, complying with ICEA S-76-474, and using the following combination of materials:
 - a. Conductors and Neutral: Copper with copper-clad-steel neutral **OR** Aluminum with bare Alloy 1350 aluminum neutral **OR** Aluminum with ACSR neutral, **as directed**.
 - b. Insulation: XLP, complying with NEMA WC 70/ICEA S-95-658 **OR** High-modular-weight, low-density polyethylene **OR** Weather-resistant polyolefin, complying with ICEA S-70-547, **as directed**.
6. Connectors, Splices, and Conductor Securing and Protecting Components: Items include wire clamps, ties, conductor armor, fittings, connectors, and terminals. Listed for the specific applications and conductor types and combinations of materials used. Descriptions as follows for various applications:
 - a. Copper to Copper: Copper alloy, complying with UL 486A-486B.
 - b. Aluminum Composition to Aluminum Composition: Aluminum alloy, complying with UL 486A-486B.
 - c. Copper to Aluminum Composition: Type suitable for this purpose, complying with UL 486A-486B.
 - d. Connectors and Splices for Secondary Conductors: Listed and labeled for the conditions and materials involved in each application.
 - e. Taps for Medium-Voltage Line Conductors: Hot-line clamps, screw type, with concealed threads and bare, hard-drawn copper stirrups. Listed for the combination of materials being connected.
 - f. Splices under Tension: Compression type with strength exceeding the conductors spliced.

- g. Splices and Terminations for Covered Conductors: As recommended by conductor manufacturer for conductor and covering combination and for specific materials and physical arrangement of each splice.
 - h. Splices and Terminations for Insulated Medium-Voltage Conductors: Comply with requirements in Division 26 Section "Medium-voltage Cables".
- B. Wood Poles
- 1. Comply with ATIS O5.1 and RUS Bulletin 1728F-700, for wood poles pressure treated with creosote **OR** pentachlorophenol, **as directed**, **OR** ammoniacal copper arsenate, **OR** ammoniacal copper zinc arsenate **OR** chromated copper arsenate, **as directed**.
 - 2. Wood Species: Douglas fir **OR** Lodgepole pine **OR** Western larch **OR** Southern yellow pine, **as directed**.
 - 3. Pole Marking:
 - a. Manufacturer's Mark: Comply with ATIS O5.1; locate **10 feet (3 m)** from the pole butt for poles **50 feet (15 m)** long or less.
 - b. Pole Number: Machine-embossed aluminum, alphanumeric characters not less than **2-1/2 inches (65 mm)** high, with aluminum nails.
 - 4. Factory Operations: Machine trim poles by turning smooth, full length. Roof, gain, and bore poles before pressure treatment.
- C. Concrete Poles
- 1. Description: Spun-cast prestressed concrete, complying with requirements of ASTM C 1089.
 - a. Comply with requirements of RUS Bulletin 1724E-216.
 - 2. Design: Base design on calculation of strength required by IEEE C2 or indicated on Drawings, whichever is greater. Design shall be suitable for installation at a location where annual temperature range is between **minus 4 deg F and plus 100 deg F (minus 20 deg C and plus 38 deg C)**. Include pole design for embedded attachments matching fittings, brackets, and other items installed in the field.
 - 3. Shaft: Hollow, for poles at overhead-to-underground connections. Provide **3-1/2-inch- (89-mm-)** minimum cable raceway capacity, with conduit elbow **OR** cable entry port, **as directed**, at base.
 - 4. Water Absorption: Not more than 3 percent.
 - 5. Surface: Smooth, hard, nonporous, and resistant to soil acids **OR** road salts **OR** frost and freezing damage, **as directed**.
 - 6. Pole Marking:
 - a. Manufacturer's Mark: Comply with ATIS O5.1; locate **10 feet (3 m)** from the pole butt for poles **50 feet (15 m)** long or less.
 - b. Pole Number: Machine-embossed aluminum, alphanumeric characters not less than **2-1/2 inches (65 mm)** high.
- D. Crossarms
- 1. Description: Solid-wood distribution type, complying with RUS Bulletin 1728H-701 for specified construction grade **OR** Galvanized, steel angles, **as directed**, and complying with IEEE C2 for required climbing space and wire clearances.
 - 2. Braces: Galvanized, flat, ferrous-metal units; **1/4 inch (6 mm)** thick by **1-1/4 inches (30 mm)** wide, minimum, with length to suit crossarm dimensions.
- E. Guys And Anchors
- 1. Guy Strand Assemblies: Cable and attachment assemblies shall have uniform minimum breaking strength of the cable.
 - 2. Cable: Seven strands. Zinc-coated steel, complying with ASTM A 475 **OR** Aluminum-clad steel, complying with ASTM B 416 **OR** Copper-clad steel, complying with ASTM B 228, **as directed**. Breaking strength shall be not less than 10,000 lb (45 kN).
 - 3. Cable Termination:
 - 1) Thimble eye.
OR

2. Intermediate-Class Surge Arresters: Porcelain **OR** Polymer, **as directed**,-enclosed, gapless, metal-oxide type, complying with IEEE C62.11 and NEMA LA 1.
 - a. Voltage Rating: 3 **OR** 6 **OR** 9 **OR** 10 **OR** 12 **OR** 15 **OR** 27 **OR** 30 **OR** 36, **as directed**, kV, at the altitude of Project, unless otherwise indicated.

H. Cutouts, Switches, And Fuses

1. Description: Medium-voltage disconnect, protective, and bypass, **as directed**, units shall be rated for the line-to-line voltage of the systems in which installed, unless higher ratings are indicated. BIL ratings are 45 **OR** 60 **OR** 75 **OR** 95 **OR** 150 **OR** 200, **as directed**, kV.
 - a. Momentary Current Rating of Switching Devices: 20 **OR** 40, **as directed**, kA, asymmetrical at nominal system operating voltage.
 - b. Fuse Characteristics: Time-current characteristics for each set of fuses selected according to written recommendations of manufacturer of component protected by the fuses and coordinated with upstream and downstream protective devices. Prepare time-current coordination curves according to IEEE 242 that illustrate optimum coordination of devices in this Project.
 - c. Interrupting Rating of Fuses: **Value** as directed by the Owner symmetrical A at nominal system operating voltage.
2. Fuse Cutouts: Open **OR** enclosed, **as directed**, type, rated 100 **OR** 200, **as directed**, A, continuous, complying with ANSI C37.42.
 - a. Fuses: Enclosed link, Type K **OR** Type T, **as directed**, complying with ANSI C37.42.
 - b. Fuse Current Rating: 150 percent of the transformer full-load current unless otherwise indicated.
 - c. Switching Application: Include switch link instead of fuse.
 - d. Switch Current Interrupting Rating: Transformer magnetizing current.
3. Fused Switches: Single-pole, manual units.
 - a. Switch Rating: 400 **OR** 600, **as directed**,-A rms continuous and load-current interrupting.
 - b. Fuses: Dropout-type power fuses.
4. Nonfused Switches: Single-pole, manual units, rated 100 **OR** 200 **OR** 400 **OR** 600, **as directed**,-A rms continuous.
5. Group-Operated, Load-Interrupter Switches: Fused **OR** Nonfused, **as directed**, three-pole, single-throw units, manually operated by handle through insulated mechanical linkage.
 - a. High-pressure contact type, complying with ANSI C37.32.
 - b. Factory assembled to suit specific configuration and mounting conditions for this Project.
 - c. Operating Handle: Padlock equipped.
 - d. Current Interrupting Rating: Equal to continuous current rating of switch.
 - e. Fuses: Nondropout power type.
6. Group-Operated, Air-Break (Nonloadbreak) Switches: Three-pole, single-throw units, manually operated by handle through insulated mechanical linkage.
 - a. Comply with ANSI C37.32.
 - b. Factory assembled to suit specific configuration and mounting conditions for this Project.
 - c. Operating Handle: Padlock equipped.
 - d. Suitable for field conversion to load-interrupter switch by adding interrupter modules.

I. Distribution Transformers

1. Description: Single-phase, two-winding, single **OR** two, **as directed**,-bushing, liquid-filled, self-cooled, pole-mounting distribution type, suitable for external fuse and surge suppressor protection; complying with IEEE C 57.12.00, and tested according to IEEE C 57.12.90 and with the following additional requirements, **as directed**:
 - a. Cooling Class: OA.
 - b. Temperature Rise: 65 deg C.
 - c. Insulating Liquid: Mineral oil, ASTM D 3487, Type II.
OR
Insulating Liquid: High molecular weight, mineral oil based, and UL listed as less-flammable type.

OR

Insulating Liquid: Biodegradable insulating and cooling liquid, UL listed as less flammable type.

- d. Identification: Label the transformer as "non-PCB" and place manufacturer's name and type of fluid on the nameplate.
 2. BIL: 95 **OR** 75 **OR** 60, **as directed**, kV.
 3. Taps: Two, 2.5 percent above and below **OR** Four, 2.5 percent below, **as directed**, high-voltage and full-load rated. Tap changer shall have an external operating handle, **as directed**.
 4. Mounting Brackets: Single **OR** Double, **as directed**, integral; suitable for pole mounting, individually or in cluster, or on crossarm.
 5. Minimum Efficiency: Class 1, as defined by NEMA TP 1, based on test results that comply with requirements of NEMA TP 2.
 6. Bushings: Creepage distance shall exceed nominal value standard for unit rating by at least 75 percent.
 7. Hardware: Stainless steel.
 8. Tank and Cover: Stainless steel, complying with ASTM A 167, Type 304 or 304L, with paint coating exterior finish system complying with IEEE C57.12.28, including manufacturer's standard color finish coat.
 9. Show transformer kiloampere capacity using 2-1/2-inch (65-mm) numerals placed near the low-voltage bushings.
- J. Primary Metering Equipment
1. Metering Transformers: Outdoor current and potential transformers, designed for crossarm mounting, complying with IEEE C57.13, and having the following features:
 - a. BIL: 45 **OR** 60 **OR** 75 **OR** 95 **OR** 150 **OR** 200, **as directed**, kV.
 - b. Secondary connection box arranged for conduit connection.
 - c. Potential-Transformer Voltage Rating: 2.4 **OR** 4.16 **OR** 7.2 **OR** 12.0 **OR** 12.47, **as directed**, kV to 120-V ac, 60 Hz.
 - d. Potential-Transformer Accuracy Class: Minimum 0.3 at 75-VA burden.
 - e. Voltage Rating: 2.4 **OR** 4.16 **OR** 7.2 **OR** 12.0 **OR** 12.47, **as directed**, kV.
 - f. Current Rating: as directed by the Owner to 5 A.
 - g. Accuracy Class: Minimum 0.2 at 50-VA burden.
 2. Watt-Hour Meter: Outdoor solid-state unit, with demand register, **OR** arranged for pulse initiation, **as directed**, complying with ANSI C12.10, and including the following ratings and features:
 - a. Form: 8S **OR** 9S, **as directed**.
 - b. Element: 2 **OR** 2-1/2 **OR** 3, **as directed**.
 - c. Voltage: 120 V.
 - d. Current: 2-1/2 A.
 - e. Frequency: 60 Hz.
 - f. Kilowatt-Hour Register: Five-digit type.
 - g. Demand-Register Multiplier: A quantity in even hundreds, indicated on meter face.
 - h. Demand-Register Interval: 15 **OR** 30, **as directed**, minutes.
 - i. Mounting: On matching socket, complying with ANSI C12.7, and complete with automatic current short-circuiting device.
 - j. Meter Test Block: Matched to meter, and furnished and equipped with open knife switches designed to isolate each metering component for test.
 - k. Meter Cabinet: Galvanized steel; weatherproof enclosure with pole-mounting bracket and the following features:
 - 1) Hinged Door: Arranged for padlocking in closed position.
 - 2) Size: Adequate to house meter and other equipment indicated, but not less than **20 by 30 by 11 inches (510 by 760 by 280 mm)** deep.
- K. Source Quality Control
1. Factory Tests: Conduct routine tests of transformers **OR** medium-voltage switches **OR** metering equipment, **as directed**, according to referenced standards.

2. Testing Agency: Engage a qualified testing agency to inspect poles and crossarms before and after preservative treatment for compliance of wood poles and crossarms with requirements indicated. RUS quality mark "WQC" on each item is acceptable in place of inspection as evidence of compliance.
3. Poles and crossarms will be considered defective if they do not pass tests and inspections.
4. Prepare test and inspection reports.

1.3 EXECUTION

A. Right-Of-Way Clearance And Tree Trimming

1. Clear right of way according to Division 01 Section(s) "Temporary Tree And Plant Protection" AND Division 31 Section(s) "Site Clearing".
2. Clear right of way to maintain minimum clearances required by IEEE C2, unless Drawings indicate greater clearances or greater clearances are required by state or local codes or regulations. If no minimum requirements are mandated, maintain a minimum of **15 feet (4.5 m)** on both sides horizontally and below medium-voltage conductors and **60 inches (1500 mm)** on both sides horizontally and below secondary-voltage conductors. Remove overhanging branches.

B. General Installation Requirements

1. Install underground power and metering circuits and those circuits indicated to be in raceways according to Division 26 Section "Underground Ducts And Raceways For Electrical Systems" and Division 26 Section "Medium-voltage Cables", and make splices and terminations for those circuits according to the applicable Sections.
2. Engage the services of a licensed surveyor to verify dimensions by field measurement, to identify locations of poles, anchors, and other features, and to verify all clearances. The survey document shall also identify locations of connections to new and existing supply lines and to primary and secondary services. Notify the Owner of discrepancies and field conditions that are not indicated and that will affect installation.
3. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
4. Apply warning signs and equipment labels according to Division 26 Section "Identification For Electrical Systems".

C. Conductor Installation, General

1. Handle and string conductors to prevent cuts, gouges, scratches, kinks, flattening, or deformation. Remove damaged sections and splice conductors.
 - a. String new conductors to "initial" sag values recommended by manufacturer for type and size of conductor except as otherwise indicated.
 - b. Conductors Reinstalled or Resagged: String to "final" sag values recommended by manufacturer for type and size of conductor except as otherwise indicated.
2. Connections, Splices, and Terminations: Use kits listed for the specific type of connection and combination of materials in the connection or recommended for the specific use by manufacturer of material on which applied.
 - a. Splice Location: Do not install within **10 feet (3 m)** of a support.
 - b. Line Conductors and Service Drops: Install so strength exceeds ultimate rated strength of conductor.
 - c. Splices and Terminations of Covered Conductors: Comply with manufacturer's written instructions.
 - d. Splices and Terminations of Insulated Conductors of Self-Supported, Medium-Voltage Cable: Comply with manufacturer's written instructions.

D. Medium-Voltage Line Conductor Installation

1. Application: Install bare conductors unless otherwise indicated.

2. Armor Rod: Install to protect conductors if line conductors are supported by insulators.
 3. Flat Aluminum Armor Wire: Install to protect conductors if they are supported by, or attached to, galvanized or coated iron or steel clamps or fittings.
 4. Support line conductors and taps as follows:
 - a. Use wire ties for conductor attachment to pin and vertical post insulators unless otherwise indicated.
 - b. Install wire ties tight against conductor and insulator, and turn ends back and flat against conductor, to eliminate exposed wire ends.
 - c. Use wire clamps on horizontal post, dead end, and suspension insulators unless otherwise indicated.
- E. Pole And Crossarm Installation
1. Pole Orientation: Align curve of curved wood poles with straight-line runs of three or more poles. Align gained surfaces perpendicular to runs.
 2. Elevation of Line above Grade: Install poles with top at same elevation, unless grade changes dictate elevation change in poles, and according to the following:
 - a. On level ground, set poles so tops of consecutive poles vary not more than **60 inches (1500 mm)** in elevation.
 - b. Shorten wood poles by cutting off the top and make cuts to shed water. Apply preservative to cuts.
 3. Set poles according to the following:
 - a. Make pole holes vertical, uniform in diameter, and large enough to permit effective use of tamping bars all around. Bore or excavate holes with an average diameter at grade less than twice the diameter of the pole at the same grade.
 - b. Use minimum depths indicated, except at locations where hole is partly or entirely in rock and if hole is not vertical or has a diameter at grade more than two times the pole diameter at the same level; in these conditions, increase the depth of the hole by the following increments before setting the pole:
 - 1) Poles up to **35 Feet (10.6 m)** Long: **24 inches (600 mm)**.
 - 2) Poles **36 to 60 Feet (11 to 18.3 m)** Long: **30 inches (760 mm)**.
 - 3) Poles **61 to 75 Feet (18.6 to 22.9 m)** Long: **36 inches (900 mm)**.
 - c. For poles on slopes, indicated hole depth is from finished grade at lowest side of hole.
 - d. Set poles in alignment and plumb except at dead ends, angles, and points of extra strain; rake poles against conductor strain **1 inch (25 mm)** minimum, **2 inches (51 mm)** maximum, (after conductors are installed at required tension) for each **10 feet (3 m)** of pole length. Rake poles so they will not lean or bend in direction of strain when loaded.
 - e. Backfill holes in **6-inch (150-mm)** maximum lifts, and thoroughly tamp each layer before starting the next.
 - f. Place surplus earth around pole in a conical shape, and tamp thoroughly to provide drainage away from pole.
 - g. Set poles so alternate crossarm gains face in alternate directions, except at terminals and dead ends; place gains on last two poles on side facing terminal or dead end.
 - h. Poles Set in Concrete Paved Areas: Install poles with minimum of **6-inch- (150-mm-)** wide, unpaved gap between the pole and the edge of adjacent concrete slab. Fill unpaved ring with pea gravel to a level **1 inch (25 mm)** below top of concrete slab.
 4. Field treat factory-treated poles and crossarms as follows:
 - a. Poles Treated More Than One Year before Installation: Treat portion from **24 inches (600 mm)** above ground line to butt.
 - b. Field-Bored Holes and Field-Cut Gains and Pole Tops: Treat cut portions.
 - c. Unused Holes: Treat and plug with treated-wood-dowel drive pins.
 - d. Engage the services of a technician certified according to "Quality Assurance" Article to apply treatment. Comply with requirements in AWPA standards that govern original factory treatment for field-applied treatment and application of chemicals.
 5. Crossarm Installation: Set line crossarms at right angle to line for straight runs and for angles 45 degrees and more. Bisect angles less than 45 degrees.
 - a. Buck Arms: Install at corners and junction poles unless otherwise indicated.

- b. Double Crossarms: Install at dead ends, corners, angles, and line crossings.
 - c. Equipment Arms: Locate below lines and set parallel or at right angles to them, whichever provides best climbing space.
 - d. Gains: Install factory-cut or metal-pole gains only. Do not cut gains in field without specific written approval.
6. Locate pole numbers to provide maximum visibility from the road or patrol route.

F. Guy Installation

1. Install guys to resist unbalanced loads, including those developed at angles, corners, and dead ends. Install two or more guys if a single guy will not provide adequate strength. Install separate guys if unbalanced loads are separated by **36 inches (900 mm)** or more. Comply with IEEE C2.
 - a. Unless a thimble eye is used, at the pole end, install a minimum of two guy hooks and two guy strain plates.
 - b. At the anchor end, attach guy strand assembly with preformed grips.
2. Protect guy strands from damage. Replace damaged guy strands. Install guy insulators where required to comply with IEEE C2 clearance requirements.
3. Install guys with a lead-to-height ratio of 1 to 1 unless otherwise indicated. The minimum lead-to-height ratio shall be 1/2 to 1. When less than 1 to 1, increase guy strength by the ratio of the sine of the lead angle indicated to the sine of the lead angle provided.
4. Install screw-type guy anchors aligned in soil with guy. Set with anchor rod pointing at guy attachment on pole and rod projecting **6 to 9 inches (150 to 230 mm)** from ground.
5. Install strain insulators to provide a minimum of **12 inches (300 mm)** of clearance between the nearest energized surface and the strain insulator fitting farthest from the pole. When loaded to the tension indicated, fiberglass strain insulators shall be loaded to not more than two-thirds of manufacturer's published rating.
6. Guy Markers: Install at anchor end of guys to visually mark the guy wire at all accessible locations. Clamp to guy strand or anchor at top and bottom of marker.

G. Hardware And Accessories Installation

1. Install washers against wood and under nuts, including eyenuts and locknuts.
2. Install nuts and locknuts wrench-tight on threaded connections.

H. Insulator Installation

1. Medium-Voltage Line Application: Install pin **OR** post, **as directed**, type, except install suspension type at corners, angles, dead ends, and other locations where horizontal forces exceed rated values for pin or line-post-type units.
 - a. Install suspension insulators and hardware that have mechanical strength exceeding rated breaking strength of attached conductors.
 - b. Install horizontal line-post insulators for armless construction.
2. Post-Insulator Conductor Support: Where installed horizontally and for line angles more than 15 degrees, install clamp-top conductor clamps.
3. Install spool-type insulators for secondary lines mounted on clevis attachments or secondary racks.
4. Guy Strain Type: Install porcelain **OR** fiberglass-reinforced, **as directed**, units.

I. Surge Arresters

1. Install surge arresters to protect distribution **OR** metering equipment **OR** reclosers, **as directed**, group-operated, load-interrupter switches, **as directed**, aerial-to-underground transitions, **as directed**, and other items indicated.
 - a. Units Installed **6000 Feet (1800 m)** or More above Sea Level: Use arresters specifically rated for this service.

J. Cutout, Switch, And Fuse Installation

1. Hook-Stick-Operated Switches: Install to maximize safe operating access.

2. Group-Operated, Load-Interrupter Switches and Air-Break Switches: Install operating handle **42 inches (1067 mm)** above finished grade.
 - a. Locking Provisions: Install padlock at hasp.

- K. Metering Component Installation
 1. Current and Voltage Transformers: Install secondary conductors between transformers and cabinet in sleeves made of galvanized rigid steel **OR** intermediate metal **OR** PVC, **as directed**, conduit. Install to prevent collection of moisture in raceway and cabinet system.
 2. Meter Cabinet: Mount on pole, **72 inches (1825 mm)** above finished grade to center of cabinet.
 - a. Make conduit connections with raintight hubs.
 - b. Install metering transformer secondary leads without splices. Train leads at sides and bottom of enclosure, and secure with wire ties.
 - c. Install meter and meter test block within cabinet.
 - d. Install identical phase sequence, and color-code for both potential and current leads.
 - e. Identify leads using designations consistent with marking on transformer terminals.

- L. Field Quality Control
 1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Perform tests and inspections.
 3. Tests and Inspections:
 - a. Furnish instruments and equipment required for tests that comply with NETA Acceptance Testing Specification.
 - b. Guy Anchors: Test one of each type and capacity installed, plus additional units specifically indicated for testing, **as directed**. Apply rated pull-out force in the same pull direction applied by the guy at the test location.
 - 1) Acceptable Test Results: Denoted by movement of less than **3/8 inch (10 mm)** by the holding component of the anchor in the earth or other medium in which it is installed.
 - 2) Replace or reinstall, at the Owner 's option, all anchors of same type and capacity as anchor type that fails this test.
 - c. Ground Resistance: Comply with Division 26 Section "Grounding And Bonding For Electrical Systems". Measure resistance of each separate grounding electrode, including pole grounds. Also measure resistance of separate grounding electrode systems before bonding together.
 - 1) Perform tests and obtain acceptable results before energizing any portion of overhead electrical distribution system.
 - 2) Results and Follow-up: If ground resistance for a single ground electrode or pole ground, tested individually, exceeds 25 ohms, add a ground electrode not less than **10 feet (3 m)** away and interconnect with No. 2 AWG, minimum, bare conductor buried at least **12 inches (300 mm)** below furnished grade.
 - d. Aerial Conductor Sag and Tension: Observe procedures used by Contractor to verify that initial stringing sags and tensions comply with IEEE C2 and conductor manufacturer's product data and written recommendations.
 - e. Self-Supported, Medium-Voltage Cable: After installation, while cable is isolated, and after terminations are installed and before connecting or energizing, apply dc voltage between each phase conductor and grounding connections of sheath or metallic shield. Comply with NEMA WC 70/ICEA S-95-658 for method, voltage, duration, pass-fail performance, and other test criteria. Perform other field inspections and tests recommended by manufacturer.
 - f. Neutral-Supported, Secondary Service-Drop Cable: Test for insulation resistance while cable is isolated, before connecting or energizing. Minimum acceptable resistance is 100 megohms.
 - g. Existing Surge Arresters: Disconnect and measure resistance between line and ground terminals with a megger test rated 600 V or more. Acceptable resistance values are 300 megohms and more.

- h. New Surge Arresters, Cutouts, and Switches: Inspect after installation and connection to wiring. Verify that ratings and characteristics match approved submittals and comply with system requirements. Verify that installation complies with requirements and that clearances of units and connecting wiring comply with IEEE C2 requirements.
 - 1) Verify proper grounding of metallic equipment parts.
 - 2) Fuses and Disconnect Links: Verify that ratings and characteristics match submittals and comply with system requirements.
 - 3) Switches:
 - a) Manually operate each cutout and switch at least three times, to verify proper operation.
 - b) Verify correct contact alignment, blade penetration, travel stops, and arc interrupter operation.
 - 4) Group-Operated, Load-Interrupter Switches and Air-Break Switches:
 - a) Perform mechanical operator tests according to manufacturer's written instructions.
 - b) Test resistance to ground of parts to be energized. Acceptable value is 200,000 megohms.
 - c) Perform contact-resistance test across all switch blade contacts. Refer to manufacturer's data for acceptable contact resistance.
 - 5) Verify that clearances of energized parts and connecting wires comply with IEEE C2 requirements.
 - i. Distribution Transformers: Inspect after installation and connection to wiring and verify that ratings and characteristics match approved submittals and comply with system requirements. Verify the integrity and good condition of unit.
 - 1) Inspect for physical damage, cracked insulators, leaks, tightness of connections, and overall mechanical and electrical integrity.
 - 2) Perform preenergizing inspections and tests recommended by manufacturer.
 - 3) Verify proper equipment grounding.
 - 4) Verify that clearances of terminals and connecting wires comply with IEEE C2.
 - j. Metering Transformers: Inspect after installation and connection to wires, and verify that ratings and characteristics match approved submittals and comply with system requirements. Verify the integrity and good condition of unit.
 - 1) Verify proper connections, tightness of bolted connections, and integrity of mounting provisions.
 - 2) Verify that required grounding and shorting connections provide good contact.
 - 3) Verify that clearances of terminals and connecting wires comply with IEEE C2.
 - 4) Perform electrical tests according to manufacturer's written instructions, including insulation-resistance tests, polarity tests, and turns-ratio and ratio-verification tests.
 - k. Meters: Inspect after installation and connection to wiring and verify that ratings and characteristics match approved submittals and comply with system requirements. Verify the integrity and good condition of unit.
 - 1) Verify tightness of electrical connections.
 - 2) Verify accuracy at 25, 50, 75, and 100 percent of full-rated load and verify all instrument multipliers according to manufacturer's written instructions.
4. Prepare test and inspection reports.
- M. Adjusting
- 1. Distribution Transformers: Set voltage taps as directed by the Owner.
- N. Cleaning
- 1. After completing equipment installation, inspect equipment. Remove spots, dirt, and debris. Repair damaged finish to match original finish. For distribution transformer, use tank touchup paint provided by manufacturer.
 - a. Clean enclosures internally, on completion of installation, according to manufacturer's written instructions.

- O. Demonstration
 - 1. Train Owner's maintenance personnel to adjust, operate, and maintain overhead electrical distribution.

END OF SECTION 26 05 26 00b

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Task	Specification	Specification Description
26 05 26 00	01 22 16 00	No Specification Required

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SECTION 26 05 29 00 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hangers and supports for electrical systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Hangers and supports for electrical equipment and systems.
 - b. Construction requirements for concrete bases.

C. Definitions

1. EMT: Electrical metallic tubing.
2. IMC: Intermediate metal conduit.
3. RMC: Rigid metal conduit.

D. Performance Requirements

1. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.
3. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.
4. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

E. Submittals

1. Product Data: For the following:
 - a. Steel slotted support systems.
 - b. Nonmetallic slotted support systems.
2. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
 - a. Trapeze hangers. Include Product Data for components.
 - b. Steel slotted channel systems. Include Product Data for components.
 - c. Nonmetallic slotted channel systems. Include Product Data for components.
 - d. Equipment supports.
3. Welding certificates.

F. Quality Assurance

1. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. Comply with NFPA 70.

1.2 PRODUCTS

A. Support, Anchorage, And Attachment Components

1. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.
 - a. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
 - b. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
 - c. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
 - d. Channel Dimensions: Selected for applicable load criteria.
 2. Nonmetallic Slotted Support Systems: Structural-grade, factory-formed, glass-fiber-resin channels and angles with **9/16-inch- (14-mm-)** diameter holes at a maximum of **8 inches (200 mm)** o.c., in at least 1 surface.
 - a. Fittings and Accessories: Products of channel and angle manufacturer and designed for use with those items.
 - b. Fitting and Accessory Materials: Same as channels and angles, except metal items may be stainless steel.
 - c. Rated Strength: Selected to suit applicable load criteria.
 3. Raceway and Cable Supports: As described in NECA 1 and NECA 101.
 4. Conduit and Cable Support Devices: Steel **OR** Steel and malleable-iron, **as directed**, hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.
 5. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.
 6. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.
 7. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:
 - a. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.
 - b. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated steel **OR** stainless steel, **as directed**, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.
 - c. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
 - d. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
 - e. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
 - f. Toggle Bolts: All-steel springhead type.
 - g. Hanger Rods: Threaded steel.
- B. Fabricated Metal Equipment Support Assemblies
1. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.
 2. Materials: Comply with requirements in Division 05 Section "Metal Fabrications" for steel shapes and plates.

1.3 EXECUTION

A. Application

1. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.
2. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as required by **OR** scheduled in NECA 1, where its Table 1 lists maximum

- spacings less than stated in, **as directed**, NFPA 70. Minimum rod size shall be **1/4 inch (6 mm)** in diameter.
3. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.
 - a. Secure raceways and cables to these supports with two-bolt conduit clamps **OR** single-bolt conduit clamps **OR** single-bolt conduit clamps using spring friction action for retention in support channel, **as directed**.
 4. Spring-steel clamps designed for supporting single conduits without bolts may be used for **1-1/2-inch (38-mm)** and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.
- B. Support Installation
1. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.
 2. Raceway Support Methods: In addition to methods described in NECA 1, EMT **OR** IMC **OR** RMC, **as directed**, may be supported by openings through structure members, as permitted in NFPA 70.
 3. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus **200 lb (90 kg)**.
 4. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:
 - a. To Wood: Fasten with lag screws or through bolts.
 - b. To New Concrete: Bolt to concrete inserts.
 - c. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
 - d. To Existing Concrete: Expansion anchor fasteners.
 - e. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete **4 inches (100 mm)** thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than **4 inches (100 mm)** thick.
 - f. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts **OR** Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69 **OR** Spring-tension clamps, **as directed**.
 - g. To Light Steel: Sheet metal screws.
 - h. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.
 5. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.
- C. Installation Of Fabricated Metal Supports
1. Comply with installation requirements in Division 05 Section "Metal Fabrications" for site-fabricated metal supports.
 2. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.
 3. Field Welding: Comply with AWS D1.1/D1.1M.
- D. Concrete Bases
1. Construct concrete bases of dimensions indicated but not less than **4 inches (100 mm)** larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

2. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-place Concrete".
 3. Anchor equipment to concrete base.
 - a. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
 - c. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
- E. Painting
1. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.
 - a. Apply paint by brush or spray to provide minimum dry film thickness of **2.0 mils (0.05 mm)**.
 2. Touchup: Comply with requirements in Division 07 OR Division 09 Section(s) "High-performance Coatings" **as directed**, for cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal.
 3. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 26 05 29 00

SECTION 26 05 29 00a - VIBRATION AND SEISMIC CONTROLS FOR ELECTRICAL SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for vibration and seismic controls for electrical systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Isolation pads.
 - b. Spring isolators.
 - c. Restrained spring isolators.
 - d. Channel support systems.
 - e. Restraint cables.
 - f. Hanger rod stiffeners.
 - g. Anchorage bushings and washers.

C. Definitions

1. The IBC: International Building Code.
2. ICC-ES: ICC-Evaluation Service.
3. OSHPD: Office of Statewide Health Planning and Development for the State of California.

D. Performance Requirements

1. Seismic-Restraint Loading:
 - a. Site Class as Defined in the IBC: **A OR B OR C OR D OR E OR F, as directed.**
 - b. Assigned Seismic Use Group or Building Category as Defined in the IBC: **I OR II OR III, as directed.**
 - 1) Component Importance Factor: **1.0 OR 1.5, as directed.**
 - 2) Component Response Modification Factor: **1.5 OR 2.5 OR 3.5 OR 5.0, as directed.**
 - 3) Component Amplification Factor: **1.0 OR 2.5, as directed.**
 - c. Design Spectral Response Acceleration at Short Periods (0.2 Second): As required to meet Project requirements.
 - d. Design Spectral Response Acceleration at 1.0-Second Period: As required to meet Project requirements.

E. Submittals

1. Product Data: For the following:
 - a. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
 - b. Illustrate and indicate style, material, strength, fastening provision, and finish for each type and size of seismic-restraint component used.
 - 1) Tabulate types and sizes of seismic restraints, complete with report numbers and rated strength in tension and shear as evaluated by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed.**
 - 2) Annotate to indicate application of each product submitted and compliance with requirements.
 - c. Restrained-Isolation Devices: Include ratings for horizontal, vertical, and combined loads.
2. Delegated-Design Submittal: For vibration isolation and seismic-restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- a. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, seismic forces required to select vibration isolators and seismic restraints.
 - 1) Coordinate design calculations with wind-load calculations required for equipment mounted outdoors. Comply with requirements in other Division 22 for equipment mounted outdoors.
- b. Indicate materials and dimensions and identify hardware, including attachment and anchorage devices.
- c. Field-fabricated supports.
- d. Seismic-Restraint Details:
 - 1) Design Analysis: To support selection and arrangement of seismic restraints. Include calculations of combined tensile and shear loads.
 - 2) Details: Indicate fabrication and arrangement. Detail attachments of restraints to the restrained items and to the structure. Show attachment locations, methods, and spacings. Identify components, list their strengths, and indicate directions and values of forces transmitted to the structure during seismic events. Indicate association with vibration isolation devices.
 - 3) Preapproval and Evaluation Documentation: By an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**, showing maximum ratings of restraint items and the basis for approval (tests or calculations).
3. Welding certificates.
4. Field quality-control test reports.

F. Quality Assurance

1. Comply with seismic-restraint requirements in the IBC unless requirements in this Section are more stringent.
2. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPA number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings. Ratings based on independent testing are preferred to ratings based on calculations. If preapproved ratings are not available, submittals based on independent testing are preferred. Calculations (including combining shear and tensile loads) to support seismic-restraint designs must be signed and sealed by a qualified professional engineer.
4. Comply with NFPA 70.

1.2 PRODUCTS

A. Vibration Isolators

1. Pads: Arrange in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.
 - a. Resilient Material: Oil- and water-resistant neoprene **OR** rubber **OR** hermetically sealed compressed fiberglass, **as directed**.
2. Spring Isolators: Freestanding, laterally stable, open-spring isolators.
 - a. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - b. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - c. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - d. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

- e. Baseplates: Factory drilled for bolting to structure and bonded to **1/4-inch- (6-mm-)** thick, rubber isolator pad attached to baseplate underside. Baseplates shall limit floor load to **500 psig (3447 kPa)**.
 - f. Top Plate and Adjustment Bolt: Threaded top plate with adjustment bolt and cap screw to fasten and level equipment.
3. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic or limit-stop restraint.
- a. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to weight being removed; factory-drilled baseplate bonded to **1/4-inch- (6-mm-)** thick, neoprene or rubber isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - b. Restraint: Seismic or limit-stop as required for equipment and authorities having jurisdiction.
 - c. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
 - d. Minimum Additional Travel: 50 percent of the required deflection at rated load.
 - e. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - f. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
- B. Seismic-Restraint Devices
1. General Requirements for Restraint Components: Rated strengths, features, and application requirements shall be as defined in reports by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
 - a. Structural Safety Factor: Allowable strength in tension, shear, and pullout force of components shall be at least four times the maximum seismic forces to which they will be subjected.
 2. Channel Support System: MFMA-3, shop- or field-fabricated support assembly made of slotted steel channels with accessories for attachment to braced component at one end and to building structure at the other end and other matching components and with corrosion-resistant coating; and rated in tension, compression, and torsion forces.
 3. Restraint Cables: ASTM A 603 galvanized-steel **OR** ASTM A 492 stainless-steel, **as directed**, cables with end connections made of steel assemblies with thimbles, brackets, swivels, and bolts designed for restraining cable service; and with a minimum of two clamping bolts for cable engagement.
 4. Hanger Rod Stiffener: Steel tube or steel slotted-support-system sleeve with internally bolted connections **OR** Reinforcing steel angle clamped, **as directed**, to hanger rod. Do not weld stiffeners to rods.
 5. Bushings for Floor-Mounted Equipment Anchor: Neoprene bushings designed for rigid equipment mountings, and matched to type and size of anchors and studs.
 6. Bushing Assemblies for Wall-Mounted Equipment Anchorage: Assemblies of neoprene elements and steel sleeves designed for rigid equipment mountings, and matched to type and size of attachment devices.
 7. Resilient Isolation Washers and Bushings: One-piece, molded, oil- and water-resistant neoprene, with a flat washer face.
 8. Mechanical Anchor: Drilled-in and stud-wedge or female-wedge type in zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchors with strength required for anchor and as tested according to ASTM E 488. Minimum length of eight times diameter.
 9. Adhesive Anchor: Drilled-in and capsule anchor system containing polyvinyl or urethane methacrylate-based resin and accelerator, or injected polymer or hybrid mortar adhesive. Provide anchor bolts and hardware with zinc-coated steel for interior applications and stainless steel for exterior applications. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.
- C. Factory Finishes

1. Finish:
 - a. Manufacturer's standard prime-coat finish ready for field painting.
 - b. Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.
 - 1) Powder coating on springs and housings.
 - 2) All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
 - 3) Baked enamel or powder coat for metal components on isolators for interior use.
 - 4) Color-code or otherwise mark vibration isolation and seismic-control devices to indicate capacity range.

1.3 EXECUTION

A. Applications

1. Multiple Raceways or Cables: Secure raceways and cables to trapeze member with clamps approved for application by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**.
2. Hanger Rod Stiffeners: Install hanger rod stiffeners where indicated or scheduled on Drawings to receive them and where required to prevent buckling of hanger rods due to seismic forces.
3. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

B. Seismic-Restraint Device Installation

1. Equipment and Hanger Restraints:
 - a. Install restrained isolators on electrical equipment.
 - b. Install resilient, bolt-isolation washers on equipment anchor bolts where clearance between anchor and adjacent surface exceeds **0.125 inch (3.2 mm)**.
 - c. Install seismic-restraint devices using methods approved by an evaluation service member of ICC-ES **OR** OSHPD **OR** an agency acceptable to authorities having jurisdiction, **as directed**, providing required submittals for component.
2. Install bushing assemblies for mounting bolts for wall-mounted equipment, arranged to provide resilient media where equipment or equipment-mounting channels are attached to wall.
3. Attachment to Structure: If specific attachment is not indicated, anchor bracing to structure at flanges of beams, at upper truss chords of bar joists, or at concrete members.
4. Drilled-in Anchors:
 - a. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcing or embedded items during coring or drilling. Notify the structural engineer if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
 - b. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
 - c. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
 - d. Adhesive Anchors: Clean holes to remove loose material and drilling dust prior to installation of adhesive. Place adhesive in holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
 - e. Set anchors to manufacturer's recommended torque, using a torque wrench.
 - f. Install zinc-coated steel anchors for interior and stainless-steel anchors for exterior applications.

- C. Accommodation Of Differential Seismic Motion
 - 1. Install flexible connections in runs of raceways, cables, wireways, cable trays, and busways where they cross seismic joints, where adjacent sections or branches are supported by different structural elements, and where they terminate with connection to equipment that is anchored to a different structural element from the one supporting them as they approach equipment.

- D. Field Quality Control
 - 1. Tests and Inspections:
 - a. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
 - b. Schedule test with the Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
 - c. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
 - d. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
 - e. Test to 90 percent of rated proof load of device.
 - f. Measure isolator restraint clearance.
 - g. Measure isolator deflection.
 - h. Verify snubber minimum clearances.
 - i. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.
 - 2. Remove and replace malfunctioning units and retest as specified above.
 - 3. Prepare test and inspection reports.

- E. Adjusting
 - 1. Adjust isolators after isolated equipment is at operating weight.
 - 2. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.
 - 3. Adjust active height of spring isolators.
 - 4. Adjust restraints to permit free movement of equipment within normal mode of operation.

END OF SECTION 26 05 29 00a

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SECTION 26 05 33 00 - RACEWAYS AND BOXES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of raceways and boxes. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes raceways, fittings, boxes, enclosures, and cabinets for electrical wiring.

C. Definitions

1. EMT: Electrical metallic tubing.
2. ENT: Electrical nonmetallic tubing.
3. EPDM: Ethylene-propylene-diene terpolymer rubber.
4. FMC: Flexible metal conduit.
5. IMC: Intermediate metal conduit.
6. LFMC: Liquidtight flexible metal conduit.
7. LFNC: Liquidtight flexible nonmetallic conduit.
8. NBR: Acrylonitrile-butadiene rubber.
9. RNC: Rigid nonmetallic conduit.

D. Submittals

1. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.
2. Shop Drawings: For the following raceway components. Include plans, elevations, sections, details, and attachments to other work.
 - a. Custom enclosures and cabinets.
 - b. For handholes and boxes for underground wiring, including the following:
 - 1) Duct entry provisions, including locations and duct sizes.
 - 2) Frame and cover design.
 - 3) Grounding details.
 - 4) Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
 - 5) Joint details.
3. Samples: For each type of exposed finish required for wireways, nonmetallic wireways and surface raceways, prepared on Samples of size indicated below.
4. Coordination Drawings: Conduit routing plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - a. Structural members in the paths of conduit groups with common supports.
 - b. HVAC and plumbing items and architectural features in the paths of conduit groups with common supports.
5. Manufacturer Seismic Qualification Certification: Submit certification that enclosures and cabinets and their mounting provisions, including those for internal components, will withstand seismic forces defined in Division 26 Section(s) "Hangers And Supports For Electrical Systems" AND "Vibration And Seismic Controls For Electrical Systems". Include the following:
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 1) The term "withstand" means "the cabinet or enclosure will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will retain its enclosure characteristics, including its interior accessibility, after the seismic event."

- b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
6. Qualification Data: For professional engineer and testing agency.
 7. Source quality-control test reports.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.

1.2 PRODUCTS

A. Metal Conduit And Tubing

1. Rigid Steel Conduit: ANSI C80.1.
2. Aluminum Rigid Conduit: ANSI C80.5.
3. IMC: ANSI C80.6.
4. PVC-Coated Steel Conduit: PVC-coated rigid steel conduit **OR** IMC, **as directed**.
 - a. Comply with NEMA RN 1.
 - b. Coating Thickness: **0.040 inch (1 mm)**, minimum.
5. EMT: ANSI C80.3.
6. FMC: Zinc-coated steel **OR** Aluminum **OR** Zinc-coated steel or aluminum, **as directed**.
7. LFMC: Flexible steel conduit with PVC jacket.
8. Fittings for Conduit (Including all Types and Flexible and Liquidtight), EMT, and Cable: NEMA FB 1; listed for type and size raceway with which used, and for application and environment in which installed.
 - a. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886.
 - b. Fittings for EMT: Steel **OR** Die-cast, **as directed**, set-screw **OR** compression, **as directed**, type.
 - c. Coating for Fittings for PVC-Coated Conduit: Minimum thickness, **0.040 inch (1 mm)**, with overlapping sleeves protecting threaded joints.
9. Joint Compound for Rigid Steel Conduit or IMC: Listed for use in cable connector assemblies, and compounded for use to lubricate and protect threaded raceway joints from corrosion and enhance their conductivity.

B. Nonmetallic Conduit And Tubing

1. ENT: NEMA TC 13.
2. RNC: NEMA TC 2, Type EPC-40-PVC, unless otherwise indicated.
3. LFNC: UL 1660.
4. Fittings for ENT and RNC: NEMA TC 3; match to conduit or tubing type and material.
5. Fittings for LFNC: UL 514B.

C. Optical Fiber/Communications Cable Raceway And Fittings

1. Description: Comply with UL 2024; flexible type, approved for plenum **OR** riser **OR** general-use, **as directed**, installation.

D. Metal Wireways

1. Description: Sheet metal sized and shaped as indicated, NEMA 250, Type 1 **OR** 12 **OR** 3R, **as directed**, unless otherwise indicated.
2. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

3. Wireway Covers: Hinged type **OR** Screw-cover type **OR** Flanged-and-gasketed type **OR** As indicated, **as directed**.
 4. Finish: Manufacturer's standard enamel finish.
- E. Nonmetallic Wireways
1. Description: Fiberglass polyester, extruded and fabricated to size and shape indicated, with no holes or knockouts. Cover is gasketed with oil-resistant gasket material and fastened with captive screws treated for corrosion resistance. Connections are flanged, with stainless-steel screws and oil-resistant gaskets.
OR
Description: PVC plastic, extruded and fabricated to size and shape indicated, with snap-on cover and mechanically coupled connections with plastic fasteners.
 2. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
- F. Surface Raceways
1. Surface Metal Raceways: Galvanized steel with snap-on covers. Manufacturer's standard enamel finish in color selected **OR** Prime coating, ready for field painting, **as directed**.
 2. Surface Nonmetallic Raceways: Two-piece construction, manufactured of rigid PVC with texture and color selected from manufacturer's standard **OR** custom, **as directed**, colors.
- G. Boxes, Enclosures, And Cabinets
1. Sheet Metal Outlet and Device Boxes: NEMA OS 1.
 2. Cast-Metal Outlet and Device Boxes: NEMA FB 1, ferrous alloy **OR** aluminum, **as directed**, Type FD, with gasketed cover.
 3. Nonmetallic Outlet and Device Boxes: NEMA OS 2.
 4. Metal Floor Boxes: Cast metal **OR** Sheet metal, **as directed**, fully adjustable **OR** semi-adjustable, **as directed**, rectangular.
 5. Nonmetallic Floor Boxes: Nonadjustable, round.
 6. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
 7. Cast-Metal Access, Pull, and Junction Boxes: NEMA FB 1, cast aluminum **OR** galvanized, cast iron, **as directed**, with gasketed cover.
 8. Hinged-Cover Enclosures: NEMA 250, Type 1, with continuous-hinge cover with flush latch, unless otherwise indicated.
 - a. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
 - b. Nonmetallic Enclosures: Plastic, finished inside with radio-frequency-resistant paint, **as directed**.
 9. Cabinets:
 - a. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
 - b. Hinged door in front cover with flush latch and concealed hinge.
 - c. Key latch to match panelboards.
 - d. Metal barriers to separate wiring of different systems and voltage.
 - e. Accessory feet where required for freestanding equipment.
- H. Handholes And Boxes For Exterior Underground Wiring
1. Description: Comply with SCTE 77.
 - a. Color of Frame and Cover: Gray **OR** Green **as directed**.
 - b. Configuration: Units shall be designed for flush burial and have open **OR** closed **OR** integral closed, **as directed**, bottom, unless otherwise indicated.
 - c. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - d. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - e. Cover Legend: Molded lettering, "ELECTRIC" **OR** "TELEPHONE" **OR** as indicated for each service, **as directed**.

- f. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
- g. Handholes **12 inches wide by 24 inches long (300 mm wide by 600 mm long)** and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
2. Polymer-Concrete Handholes and Boxes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced with steel or fiberglass or a combination of the two.
3. Fiberglass Handholes and Boxes with Polymer-Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester-resin enclosure joined to polymer-concrete top ring or frame.
4. Fiberglass Handholes and Boxes: Molded of fiberglass-reinforced polyester resin, with covers of polymer concrete **OR** reinforced concrete **OR** cast iron **OR** hot-dip galvanized-steel diamond plate **OR** fiberglass, **as directed**.

I. Sleeves For Raceways

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, galvanized steel, plain ends.
2. Cast-Iron Pipe Sleeves: Cast or fabricated "wall pipe," equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.
3. Sleeves for Rectangular Openings: Galvanized sheet steel with minimum **0.052- or 0.138-inch (1.3- or 3.5-mm)** thickness as indicated and of length to suit application.
4. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".

J. Sleeve Seals

1. Description: Modular sealing device, designed for field assembly, to fill annular space between sleeve and cable.
 - a. Sealing Elements: EPDM **OR** NBR, **as directed**, interlocking links shaped to fit surface of cable or conduit. Include type and number required for material and size of raceway or cable.
 - b. Pressure Plates: Plastic **OR** Carbon steel **OR** Stainless steel, **as directed**. Include two for each sealing element.
 - c. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating **OR** Stainless steel, **as directed**, of length required to secure pressure plates to sealing elements. Include one for each sealing element.

K. Source Quality Control For Underground Enclosures

1. Handhole and Pull-Box Prototype Test: Test prototypes of handholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - a. Tests of materials shall be performed by a independent testing agency.
 - b. Strength tests of complete boxes and covers shall be by either an independent testing agency or manufacturer. A qualified registered professional engineer shall certify tests by manufacturer.
 - c. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

1.3 EXECUTION

A. Raceway Application

1. Outdoors: Apply raceway products as specified below, unless otherwise indicated:
 - a. Exposed Conduit: Rigid steel conduit **OR** IMC **OR** RNC, Type EPC-40-PVC **OR** RNC, Type EPC-80-PVC, **as directed**.
 - b. Concealed Conduit, Aboveground: Rigid steel conduit **OR** IMC **OR** EMT **OR** RNC, Type EPC-40-PVC, **as directed**.
 - c. Underground Conduit: RNC, Type EPC-40 **OR** 80, **as directed**, -PVC, direct buried.

- d. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LPMC **OR** LFNC, **as directed**.
- e. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R **OR** 4, **as directed**.
- f. Application of Handholes and Boxes for Underground Wiring:
 - 1) Handholes and Pull Boxes in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Polymer concrete **OR** Fiberglass enclosures with polymer-concrete frame and cover **OR** Fiberglass-reinforced polyester resin, **as directed**, SCTE 77, Tier 15 structural load rating.
 - 2) Handholes and Pull Boxes in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Polymer-concrete units **OR** Heavy-duty fiberglass units with polymer-concrete frame and cover, **as directed**, SCTE 77, Tier 8 structural load rating.
 - 3) Handholes and Pull Boxes Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin, structurally tested according to SCTE 77 with **3000-lbf (13 345-N)** vertical loading.
2. Comply with the following indoor applications, unless otherwise indicated:
 - a. Exposed, Not Subject to Physical Damage: EMT **OR** ENT **OR** RNC, **as directed**.
 - b. Exposed, Not Subject to Severe Physical Damage: EMT **OR** RNC identified for such use, **as directed**.
 - c. Exposed and Subject to Severe Physical Damage: Rigid steel conduit **OR** IMC, **as directed**. Includes raceways in the following locations:
 - 1) Loading dock.
 - 2) Corridors used for traffic of mechanized carts, forklifts, and pallet-handling units.
 - 3) Mechanical rooms.
 - d. Concealed in Ceilings and Interior Walls and Partitions: EMT **OR** ENT **OR** RNC, Type EPC-40-PVC, **as directed**.
 - e. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LPMC in damp or wet locations.
 - f. Damp or Wet Locations: Rigid steel conduit **OR** IMC, **as directed**.
 - g. Raceways for Optical Fiber or Communications Cable in Spaces Used for Environmental Air: Plenum-type, optical fiber/communications cable raceway **OR** EMT, **as directed**.
 - h. Raceways for Optical Fiber or Communications Cable Risers in Vertical Shafts: Riser-type, optical fiber/communications cable raceway **OR** EMT, **as directed**.
 - i. Raceways for Concealed General Purpose Distribution of Optical Fiber or Communications Cable: General-use, optical fiber/communications cable raceway **OR** Riser-type, optical fiber/communications cable raceway **OR** Plenum-type, optical fiber/communications cable raceway **OR** EMT, **as directed**.
 - j. Boxes and Enclosures: NEMA 250, Type 1, except use NEMA 250, Type 4, stainless steel **OR** nonmetallic, **as directed**, in damp or wet locations.
3. Minimum Raceway Size: **1/2-inch (16-mm) OR 3/4-inch (21-mm)**, **as directed**, trade size.
4. Raceway Fittings: Compatible with raceways and suitable for use and location.
 - a. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings, unless otherwise indicated.
 - b. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with that material. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer.
5. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.
6. Do not install aluminum conduits in contact with concrete.

B. Installation

1. Comply with NECA 1 for installation requirements applicable to products specified in Part 2 except where requirements on Drawings or in this Article are stricter.
2. Keep raceways at least **6 inches (150 mm)** away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

3. Complete raceway installation before starting conductor installation.
4. Support raceways as specified in Division 26 Section(s) "Hangers And Supports For Electrical Systems" AND "Vibration And Seismic Controls For Electrical Systems".
5. Arrange stub-ups so curved portions of bends are not visible above the finished slab.
6. Install no more than the equivalent of three 90-degree bends in any conduit run except for communications conduits, for which fewer bends are allowed.
7. Conceal conduit and EMT within finished walls, ceilings, and floors, unless otherwise indicated.
8. Raceways Embedded in Slabs:
 - a. Run conduit larger than **1-inch (27-mm)** trade size, parallel or at right angles to main reinforcement. Where at right angles to reinforcement, place conduit close to slab support.
 - b. Arrange raceways to cross building expansion joints at right angles with expansion fittings.
 - c. Change from ENT to RNC, Type EPC-40-PVC, rigid steel conduit, or IMC before rising above the floor.
9. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.
10. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors, including conductors smaller than No. 4 AWG.
11. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than **200-lb (90-kg)** tensile strength. Leave at least **12 inches (300 mm)** of slack at each end of pull wire.
12. Raceways for Optical Fiber and Communications Cable: Install raceways, metallic and nonmetallic, rigid and flexible, as follows:
 - a. **3/4-Inch (19-mm)** Trade Size and Smaller: Install raceways in maximum lengths of **50 feet (15 m)**.
 - b. **1-Inch (25-mm)** Trade Size and Larger: Install raceways in maximum lengths of **75 feet (23 m)**.
 - c. Install with a maximum of two 90-degree bends or equivalent for each length of raceway unless Drawings show stricter requirements. Separate lengths with pull or junction boxes or terminations at distribution frames or cabinets where necessary to comply with these requirements.
13. Install raceway sealing fittings at suitable, approved, and accessible locations and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings at the following points:
 - a. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
 - b. Where otherwise required by NFPA 70.
14. Expansion-Joint Fittings for RNC: Install in each run of aboveground conduit that is located where environmental temperature change may exceed **30 deg F (17 deg C)**, and that has straight-run length that exceeds **25 feet (7.6 m)**.
 - a. Install expansion-joint fittings for each of the following locations, and provide type and quantity of fittings that accommodate temperature change listed for location:
 - 1) Outdoor Locations Not Exposed to Direct Sunlight: **125 deg F (70 deg C)** temperature change.
 - 2) Outdoor Locations Exposed to Direct Sunlight: **155 deg F (86 deg C)** temperature change.
 - 3) Indoor Spaces: Connected with the Outdoors without Physical Separation: **125 deg F (70 deg C)** temperature change.
 - 4) Attics: **135 deg F (75 deg C)** temperature change.
 - b. Install fitting(s) that provide expansion and contraction for at least **0.00041 inch per foot of length of straight run per deg F (0.06 mm per meter of length of straight run per deg C)** of temperature change.

- c. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at the time of installation.
 15. Flexible Conduit Connections: Use maximum of **72 inches (1830 mm)** of flexible conduit for recessed and semirecessed lighting fixtures, **as directed**, equipment subject to vibration, noise transmission, or movement; and for transformers and motors.
 - a. Use LFMC in damp or wet locations subject to severe physical damage.
 - b. Use LFMC or LFNC in damp or wet locations not subject to severe physical damage.
 16. Recessed Boxes in Masonry Walls: Saw-cut opening for box in center of cell of masonry block, and install box flush with surface of wall.
 17. Set metal floor boxes level and flush with finished floor surface.
 18. Set nonmetallic floor boxes level. Trim after installation to fit flush with finished floor surface.
- C. Installation Of Underground Conduit
1. Direct-Buried Conduit:
 - a. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Division 31 Section "Earth Moving" for pipe less than **6 inches (150 mm)** in nominal diameter.
 - b. Install backfill as specified in Division 31 Section "Earth Moving"
 - c. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within **12 inches (300 mm)** of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving".
 - d. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.

OR

 Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - 1) Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with **3 inches (75 mm)** of concrete.

OR

 For stub-ups at equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of **60 inches (1500 mm)** from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
 - e. Warning Planks: Bury warning planks approximately **12 inches (300 mm)** above direct-buried conduits, placing them **24 inches (600 mm)** o.c. Align planks along the width and along the centerline of conduit.
- D. Installation Of Underground Handholes And Boxes
1. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.
 2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from **1/2-inch (12.5-mm)** sieve to **No. 4 (4.75-mm)** sieve and compacted to same density as adjacent undisturbed earth.
 3. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures **1 inch (25 mm)** above finished grade.
 4. Install handholes and boxes with bottom below the frost line, **Depth of frost line below grade at Project site** as directed by the Owner below grade.
 5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.

6. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

E. Sleeve Installation For Electrical Penetrations

1. Coordinate sleeve selection and application with selection and application of firestopping specified in Division 07 Section "Penetration Firestopping".
2. Concrete Slabs and Walls: Install sleeves for penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of slabs and walls.
3. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
4. Rectangular Sleeve Minimum Metal Thickness:
 - a. For sleeve cross-section rectangle perimeter less than **50 inches (1270 mm)** and no side greater than **16 inches (400 mm)**, thickness shall be **0.052 inch (1.3 mm)**.
 - b. For sleeve cross-section rectangle perimeter equal to, or greater than, **50 inches (1270 mm)** and 1 or more sides equal to, or greater than, **16 inches (400 mm)**, thickness shall be **0.138 inch (3.5 mm)**.
5. Fire-Rated Assemblies: Install sleeves for penetrations of fire-rated floor and wall assemblies unless openings compatible with firestop system used are fabricated during construction of floor or wall.
6. Cut sleeves to length for mounting flush with both surfaces of walls.
7. Extend sleeves installed in floors **2 inches (50 mm)** above finished floor level.
8. Size pipe sleeves to provide **1/4-inch (6.4-mm)** annular clear space between sleeve and raceway unless sleeve seal is to be installed or unless seismic criteria require different clearance.
9. Seal space outside of sleeves with grout for penetrations of concrete and masonry and with approved joint compound for gypsum board assemblies, **as directed**.
10. Interior Penetrations of Non-Fire-Rated Walls and Floors: Seal annular space between sleeve and raceway, using joint sealant appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.
11. Fire-Rated-Assembly Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at raceway penetrations. Install sleeves and seal with firestop materials. Comply with Division 07 Section "Penetration Firestopping".
12. Roof-Penetration Sleeves: Seal penetration of individual raceways with flexible, boot-type flashing units applied in coordination with roofing work.
13. Aboveground, Exterior-Wall Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for **1-inch (25-mm)** annular clear space between pipe and sleeve for installing mechanical sleeve seals.
14. Underground, Exterior-Wall Penetrations: Install cast-iron "wall pipes" for sleeves. Size sleeves to allow for **1-inch (25-mm)** annular clear space between raceway and sleeve for installing mechanical sleeve seals.

F. Sleeve-Seal Installation

1. Install to seal underground, exterior wall penetrations.
2. Use type and number of sealing elements recommended by manufacturer for raceway material and size. Position raceway in center of sleeve. Assemble mechanical sleeve seals and install in annular space between raceway and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

G. Firestopping

1. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly. Firestopping materials and installation requirements are specified in Division 07 Section "Penetration Firestopping".

H. Protection

1. Provide final protection and maintain conditions that ensure coatings, finishes, and cabinets are without damage or deterioration at time of Final Completion.

- a. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.
- b. Repair damage to PVC or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 26 05 33 00

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Task	Specification	Specification Description
26 05 33 13	26 05 19 16	Electrical Renovation
26 05 33 13	26 05 00 00	Common Work Results for Electrical
26 05 33 13	26 05 19 16a	Conductors And Cables
26 05 33 13	26 05 33 00	Raceways And Boxes
26 05 33 13	26 05 19 16b	Common Work Results for Communications
26 05 33 13	26 05 19 16c	Communications Equipment Room Fittings
26 05 33 13	26 05 19 16d	Communications Backbone Cabling
26 05 33 13	26 05 19 16e	Communications Horizontal Cabling
26 05 33 13	26 05 19 16f	Common Work Results for Electronic Safety and Security
26 05 33 13	26 05 19 16g	Conductors and Cables for Electronic Safety and Security
26 05 33 16	26 05 19 16	Electrical Renovation
26 05 33 16	26 05 33 00	Raceways And Boxes
26 05 33 16	26 27 26 00	Wiring Devices
26 05 33 23	26 05 33 00	Raceways And Boxes
26 05 33 23	26 05 39 00	Underfloor Raceways For Electrical Systems

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SECTION 26 05 36 00 - CABLE TRAYS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of cable trays. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes steel, aluminum, stainless-steel, and fiberglass cable trays and accessories.

C. Submittals

1. Product Data: Include data indicating dimensions and finishes for each type of cable tray indicated.
2. Shop Drawings: For each type of cable tray.
 - a. Show fabrication and installation details of cable tray, including plans, elevations, and sections of components and attachments to other construction elements. Designate components and accessories, including clamps, brackets, hanger rods, splice-plate connectors, expansion-joint assemblies, straight lengths, and fittings.
 - b. Seismic-Restraint Details, **as directed**: Signed and sealed by a qualified professional engineer, licensed in the state where Project is located, who is responsible for their preparation.
 - 1) Design Calculations: Calculate requirements for selecting seismic restraints.
 - 2) Detail fabrication, including anchorages and attachments to structure and to supported cable trays.
3. Field quality-control reports.
4. Operation and Maintenance Data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.

E. Delivery, Storage, And Handling

1. Steel cable tray, hot dip galvanized after fabrication, **OR** Aluminum cable tray **OR** Stainless-steel cable tray **OR** Fiberglass cable tray, **as directed** may be stored outside without cover, but shall be loosely stacked, elevated off the ground, and ventilated to prevent staining during storage.
2. Store indoors to prevent water or other foreign materials from staining or adhering to cable tray. Unpack and dry wet materials before storage.
3. Steel, mill galvanized **OR** electrogalvanized **OR** factory-primed, **as directed**, cable tray shall be stored in a well-ventilated, dry location. Unpack and dry wet materials before storage.
4. PVC-coated **OR** Field-painted, **as directed**, cable tray shall be stored indoors. Protect cable tray from scratching and marring of finish. Unpack and dry wet materials before storage.

1.2 PRODUCTS

A. Materials And Finishes

1. Cable Trays, Fittings, and Accessories: Steel, complying with NEMA VE 1.

- a. Factory-standard primer, ready for field painting; with cadmium-plated hardware according to ASTM B 766.
 - b. Mill galvanized before fabrication, complying with ASTM A 653/A 653M, **G90 (Z275)** coating; with hardware galvanized according to ASTM B 633 **OR** cadmium plated according to ASTM B 766, **as directed**.
 - c. Electrogalvanized before fabrication, complying with ASTM B 633; with hardware galvanized according to ASTM B 633.
 - d. Hot-dip galvanized after fabrication, complying with ASTM A 123/A 123M, Class B2; with chromium-zinc, ASTM F 1136, **OR** Type 316 stainless-steel, **as directed**, hardware.
 - e. PVC coating applied in a fluidized bed or by electrostatic spray; with chromium-zinc, ASTM F 1136 **OR** Type 316 stainless-steel, **as directed**, hardware.
 - f. Epoxy-resin paint over paint manufacturer's recommended primer and corrosion-inhibiting treatment; with cadmium-plated hardware according to ASTM B 766 **OR** Type 316 stainless-steel hardware, **as directed**.
2. Cable Trays, Fittings, and Accessories: Aluminum, complying with NEMA VE 1, Aluminum Association's Alloy 6063-T6 for rails, rungs, and cable trays, and Alloy 5052-H32 or Alloy 6061-T6 for fabricated parts; with chromium-zinc, ASTM F 1136, **OR** Type 316 stainless-steel, **as directed**, splice-plate fasteners, bolts, and screws
 3. Cable Trays, Fittings, and Accessories: Stainless steel, Type 304 **OR** 316, **as directed**, complying with NEMA VE 1.
 4. Cable Trays, Fittings, and Accessories: Fiberglass, complying with NEMA FG 1 and UL 568. Splice-plate fasteners, bolts, and screws shall be fiberglass-encapsulated stainless steel. Design fasteners so that no metal is visible when fully assembled and tightened. Fastener encapsulation shall not be damaged when torqued to manufacturer's recommended value.
 5. Sizes and Configurations: Refer to the Cable Tray Schedule on Drawings for specific requirements for types, materials, sizes, and configurations.
 - a. Center-hanger supports may be used only when specifically indicated.
- B. Cable Tray Accessories
1. Fittings: Tees, crosses, risers, elbows, and other fittings as indicated, of same materials and finishes as cable tray.
 2. Covers: Solid **OR** Louvered **OR** Ventilated-hat **OR** 2-in-3 pitch cover, **as directed**, type of same materials and finishes as cable tray.
 3. Barrier Strips: Same materials and finishes as cable tray.
 4. Cable tray supports and connectors, including bonding jumpers, as recommended by cable tray manufacturer.
- C. Warning Signs
1. Lettering: **1-1/2-inch- (40-mm-)** high, black letters on yellow background with legend "WARNING! NOT TO BE USED AS WALKWAY, LADDER, OR SUPPORT FOR LADDERS OR PERSONNEL."
 2. Materials and fastening are specified in Division 26 Section "Identification For Electrical Systems".

1.3 EXECUTION

A. Cable Tray Installation

1. Comply with recommendations in NEMA VE 2. Install as a complete system, including all necessary fasteners, hold-down clips, splice-plate support systems, barrier strips, hinged horizontal and vertical splice plates, elbows, reducers, tees, and crosses.
2. Remove burrs and sharp edges from cable trays.
3. Fasten cable tray supports to building structure and install seismic restraints, **as directed**.

- a. Design each fastener and support to carry load indicated by seismic requirements and to comply with seismic-restraint details according to Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 - b. Place supports so that spans do not exceed maximum spans on schedules.
 - c. Construct supports from channel members, threaded rods, and other appurtenances furnished by cable tray manufacturer. Arrange supports in trapeze or wall-bracket form as required by application.
 - d. Support bus assembly to prevent twisting from eccentric loading.
 - e. Manufacture center-hung support, designed for 60 percent versus 40 percent eccentric loading condition, with a safety factor of 3.
 - f. Locate and install supports according to NEMA FG 1 **OR** NEMA VE 1, **as directed**.
4. Make connections to equipment with flanged fittings fastened to cable tray and to equipment. Support cable tray independent of fittings. Do not carry weight of cable tray on equipment enclosure.
 5. Install expansion connectors where cable tray crosses building expansion joint and in cable tray runs that exceed dimensions recommended in NEMA FG 1 **OR** NEMA VE 1, **as directed**. Space connectors and set gaps according to applicable standard.
 6. Make changes in direction and elevation using standard fittings.
 7. Make cable tray connections using standard fittings.
 8. Seal penetrations through fire and smoke barriers according to Division 07 Section "Penetration Firestopping".
 9. Sleeves for Future Cables: Install capped sleeves for future cables through firestop-sealed cable tray penetrations of fire and smoke barriers.
 10. Workspace: Install cable trays with enough space to permit access for installing cables.
 11. Install barriers to separate cables of different systems, such as power, communications, and data processing; or of different insulation levels, such as 600, 5000, and 15 000 V.
 12. After installation of cable trays is completed, install warning signs in visible locations on or near cable trays.
- B. Cable Installation
1. Install cables only when cable tray installation has been completed and inspected.
 2. Fasten cables on horizontal runs with cable clamps or cable ties as recommended by NEMA VE 2. Tighten clamps only enough to secure the cable, without indenting the cable jacket. Install cable ties with a tool that includes an automatic pressure-limiting device.
 3. On vertical runs, fasten cables to tray every **18 inches (457 mm)**. Install intermediate supports when cable weight exceeds the load-carrying capacity of the tray rungs.
 4. In existing construction, remove inactive or dead cables from cable tray.
 5. Install covers after installation of cable is completed.
- C. Connections
1. Ground cable trays according to manufacturer's written instructions.
 2. Install an insulated equipment grounding conductor with cable tray, in addition to those required by NFPA 70.
- D. Field Quality Control
1. After installing cable trays and after electrical circuitry has been energized, survey for compliance with requirements. Perform the following field quality-control survey:
 - a. Visually inspect cable insulation for damage. Correct sharp corners, protuberances in cable tray, vibration, and thermal expansion and contraction conditions, which may cause or have caused damage.
 - b. Verify that the number, size, and voltage of cables in cable tray do not exceed that permitted by NFPA 70. Verify that communication or data-processing circuits are separated from power circuits by barriers.
 - c. Verify that there is no intrusion of such items as pipe, hangers, or other equipment that could damage cables.

- d. Remove deposits of dust, industrial process materials, trash of any description, and any blockage of tray ventilation.
 - e. Visually inspect each cable tray joint and each ground connection for mechanical continuity. Check bolted connections between sections for corrosion. Clean and retorque in suspect areas.
 - f. Check for missing or damaged bolts, bolt heads, or nuts. When found, replace with specified hardware.
 - g. Perform visual and mechanical checks for adequacy of cable tray grounding; verify that all takeoff raceways are bonded to cable tray.
2. Report results in writing.

E. Protection

1. Protect installed cable trays.
 - a. Repair damage to galvanized finishes with zinc-rich paint recommended by cable tray manufacturer.
 - b. Repair damage to PVC or paint finishes with matching touchup coating recommended by cable tray manufacturer.
 - c. Install temporary protection for cables in open trays to protect exposed cables from falling objects or debris during construction. Temporary protection for cables and cable tray can be constructed of wood or metal materials until the risk of damage is over.

END OF SECTION 26 05 36 00

SECTION 26 05 39 00 - UNDERFLOOR RACEWAYS FOR ELECTRICAL SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of underfloor raceways for electrical systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Flat-top, single-channel, underfloor raceways.
 - b. Flat-top, multichannel, underfloor raceways.
 - c. Flush, flat-top underfloor raceways.
 - d. Cellular metal underfloor raceways.
 - e. Trench-type underfloor raceways.
 - f. Electrical connection components for precast concrete, hollow-core, floor decks.
 - g. Electrical connection components for electrified cellular steel floor decks.
 - h. Service fittings.

C. Definitions

1. Flush Outlet: Underfloor raceway outlet installed so the top of the fixed portions of the receptacles, jacks, and connector assemblies is located approximately at the surface of the floor or floor covering, and with the bodies of connected plugs exposed above the surface of the floor.
2. Flush Underfloor Raceway: Rectangular cross-section, flat-top raceway installed with the top of the raceway flush with the surface of the concrete in which it is embedded.
3. Header Raceway: Rectangular cross-section, single-channel or multichannel, underfloor raceway arranged as feeder raceway to bring wires and cables to service raceways from panelboards and communication terminal components.
4. Recessed Outlet: Underfloor raceway outlet installed with the top of the fixed portion of the connector assemblies located below the surface of the floor or floor covering and arranged to receive plug connectors with the bodies of the plugs concealed below the floor level.
5. Service Raceway: Underfloor distribution raceway providing direct connection to service fittings using preset or afterset inserts.
6. Trench Header: Trench-type raceway arranged as feeder raceway to bring wires and cables to service raceways from panelboards and communication terminal equipment.
7. Underfloor Raceway: A conduit, duct, or cell assembly, or trench located within the floor material or with its top at the floor surface.

D. Submittals

1. Product Data: For underfloor raceway components, fittings, and accessories.
2. Shop Drawings: For underfloor raceways. Include floor plans, assembly drawings, sections, and details.
 - a. Identify components and accessories such as expansion-joint assemblies, straight raceway lengths, preset and afterset inserts, and service fittings.
 - b. Provide dimensions locating raceway header and distribution elements. Include spacing between preset inserts and between preset inserts and ends of duct runs, walls, columns, junction boxes, and header duct connections.
 - c. Show connections between raceway elements and relationships between components and adjacent structural and architectural elements including slab reinforcement, floor finish work, permanent partitions, architectural module lines, and pretensioning or post-tensioning components.

- d. Indicate height of preset inserts, junction boxes, and raceways coordinated with depth of concrete slab and floor fill.
 - e. Indicate thickening of slabs where required for adequate encasement of raceway components.
 - f. Document coordination of exposed components with floor-covering materials to ensure that fittings and trim are suitable for indicated floor-covering material.
 - g. Revise locations from those indicated in the Contract Documents, as required to suit field conditions and to ensure a functioning layout. Identify proposed deviations from the Contract Documents.
 - h. Show details of connections and terminations of underfloor raceways at panelboards and communication terminal equipment in equipment rooms, wire closets, and similar spaces.
 - i. Identify those cells of cellular floor deck that are to be connected and fitted for the following underfloor distribution:
 - 1) Power.
 - 2) Voice.
 - 3) Data.
 - 4) Signal.
 - 5) Communications.
3. Samples: For typical underfloor raceway products, in specified finish, including the following:
 - a. Service fittings and flush and recessed outlet and junction-box covers.
 - b. A section of each service raceway configuration with specified preset insert and service fitting installed.
 - c. A junction box of each size and type for use with underfloor raceway.
 - d. A section of each header raceway configuration, complete with provisions for connection with service raceway.
 - e. A section of trench-type raceway, complete with cover and required trim.
 - f. A junction box of each size and type, complete with cover and trim.
 4. Operation and Maintenance Data: For underfloor raceways, to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Manufacturer's written instructions for locating preset inserts and for installing afterset inserts.
- E. Quality Assurance
1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Comply with NFPA 70.

1.2 PRODUCTS

A. Flat-Top, Single-Channel, Underfloor Raceways

1. Description:
 - a. Material: Steel.
 - b. Cross-Section Shape: Rectangular.
 - c. Number of Levels: One **OR** Two, **as directed**.
 - d. Minimum Bending Radius for Communication Cables: Combination of raceways, fittings, inserts, junction boxes, service fittings, and mounting and connection arrangements for wiring devices and jacks shall provide a **2-inch- (50-mm-)** minimum bending radius for communication cables.
2. Service Raceways: Fitted with preset inserts.
 - a. Nominal Raceway Dimensions:
 - 1) Depth: **1-1/2 inches (38 mm)**.
 - 2) Power Service Raceway Width: **3-1/2 inches (90 mm)**.
 - 3) Communication Service Raceway Width: **3-1/2 inches (90 mm) OR 6-1/2 inches (165 mm), as directed**.

- b. Number of Single-Channel Raceways per Run: One **OR** Two **OR** Three **OR** Four **OR** Five, **as directed**, unless otherwise indicated.
 - c. Preset Inserts: Rectangular **OR** Round, **as directed**.
 - 1) Spacing: 24 inches (600 mm) **OR** 12 inches (300 mm), **as directed**, o.c.
 - 2) Size: Rectangular dimensions as required to accommodate mounting and connection of flush-mounted, duplex receptacle or dual communication-jack or connector service fitting.
 - 3) Size: 2 inches (50 mm) in diameter.
 - 4) Equip each insert with a disposable cover and select insert height so cover is 1/8 inch (3 mm) below surface of concrete.
 - 5) Arrange insert for optional attachment of flush-, surface-, or wiring- extension service fitting to replace disposable cover.
 - 3. Header Raceways: Single channel, without preset inserts (blank raceway).
 - a. Nominal Raceway Dimensions:
 - 1) Depth: 1-1/2 inches (38 mm).
 - 2) Power Header Raceway Width: 3-1/2 inches (90 mm).
 - 3) Communication Header Raceway Width: 3-1/2 inches (90 mm) **OR** 6-1/2 inches (165 mm), **as directed**.
 - b. Arrangement: In same plane as **OR** Below, **as directed**, service raceways.
 - c. Connections: Arranged to connect with service raceways at single-level **OR** two-level, **as directed**, junction boxes.
- B. Flat-Top, Multichannel, Underfloor Raceways
- 1. Description:
 - a. Material: Steel.
 - b. Cross-Section Shape: Rectangular.
 - c. Number of Longitudinal Channels: Two **OR** Three **OR** Four, **as directed**, separated by steel wall(s).
 - d. Number of Levels: One **OR** Two, **as directed**.
 - e. Minimum Bending Radius for Communication Cables: Combination of raceways, fittings, inserts, junction boxes, service fittings, and mounting and connection arrangements for wiring devices and jacks shall provide a 2-inch- (50-mm-) minimum bending radius for communication cables.
 - 2. Service Raceways: Fitted with preset inserts.
 - a. Nominal Raceway Dimensions:
 - 1) Depth: 1-3/8 inches (35 mm).
 - 2) Power Service Channel Width: 3-1/2 inches (90 mm) **OR** 4-3/8-inches (111 mm), **as directed**.
 - 3) Communication Service Channel Width: 3-1/2 inches (90 mm) **OR** 4 inches (102 mm) **OR** 6-1/2 inches (165 mm), **as directed**.
 - b. Preset Inserts:
 - 1) Spacing: 24 inches (600 mm) **OR** 12 inches (300 mm), **as directed**, o.c.
 - 2) Size: Dimensions as required to accommodate mounting and connection of flush- and surface-mounted, single- and multiple-system service fittings or to connect to wiring extensions for feeding wall outlets for power **OR** communications **OR** power and communications, **as directed**.
 - 3) Equip each insert with a disposable cover arranged for installation with top 1/8 inch (3 mm) below surface of concrete.
 - 4) Arrange inserts for optional attachment of flush-, surface-, or wiring-extension service fitting to replace disposable cover. Arrange brackets, mountings, barriers, and floor access covers to support, isolate, and provide access to flush or surface outlet-mounting connector, jack, and receptacle devices.
 - 3. Header Raceways: Multichannel, without preset inserts (blank raceway).
 - a. Nominal Raceway Dimensions:
 - 1) Header Raceway Depth: Same as service raceways **OR** 2-1/2 inches (64 mm) **OR** 2-3/4 inches (70 mm) **OR** 3 inches (76 mm) **OR** 3-1/2 inches (90 mm), **as directed**.

- 2) Power Header Channel Width: **3-1/2 inches (90 mm) OR 4-3/8-inches (111 mm), as directed.**
 - 3) Communication Header Channel Width: **3-1/2 inches (90 mm) OR 4 inches (102 mm) OR 6-1/2 inches (165 mm), as directed.**
 - b. Arrangement: In same plane as **OR Below, as directed**, service raceways.
 - c. Connections: Arranged to connect with service raceways at single-level **OR** two-level, **as directed**, junction boxes.
- C. Flush, Flat-Top Underfloor Raceways
1. Description:
 - a. Material: Steel.
 - b. Cross-Section Shape: Rectangular, single channel and multichannel, separated by steel wall(s).
 - c. Listed and labeled for installation with top flush with concrete floor.
 - d. Number of Levels: One.
 2. Service Raceways: Fitted with preset inserts.
 - a. Number of Longitudinal Channels per Multichannel Raceway: Two **OR** Three, **as directed.**
 - b. Number of Single-Channel Raceways per Run: One **OR** Two **OR** Three, **as directed**, unless otherwise indicated.
 - c. Nominal Channel Dimensions: **3 inches (76 mm)** wide by **1-1/4 inches (32 mm)** deep.
 - d. Preset Inserts: Threaded opening with removable steel plug that is flush with top of raceway when screwed in place.
 - 1) Spacing: **24 inches (600 mm) OR 12 inches (300 mm), as directed**, o.c., full length of each service raceway.
 - 2) Arrangement: Stagger insert locations on parallel raceways or channels to accommodate placement of adjacent service fittings.
 - 3) Size: **1-5/8-inch (41-mm)** diameter.
 3. Header Raceways: Raceways same as service raceways except without preset inserts (blank raceway).
 - a. Nominal Channel Dimensions: Same as service raceways.
 - b. Arrangement: In same plane as service raceways.
 - c. Connections: Arranged to connect with service raceways at junction boxes.
- D. Cellular Metal Underfloor Raceways
1. Service Raceways: Fitted with preset inserts.
 - a. Material: Steel.
 - b. Number of Longitudinal Cells: Three, separated by steel walls.
 - c. Nominal Dimensions of Cells:
 - 1) Overall Depth: **1-1/4 inches (32 mm)** unless otherwise indicated.
 - 2) Cross-Sectional Area of Cells: Power cells: **5-1/2 sq. in. (35.5 sq. cm);** communication system cells: **16 sq. in. (103 sq. cm).**
 - d. Minimum Bending Radius for Communication Cables: Combination of raceways, fittings, inserts, junction boxes, service fittings, and mounting and connection arrangements for wiring devices and jacks shall provide a **2-inch- (50-mm-)** minimum bending radius for communication cables.
 - e. Preset Inserts: Rectangular-shaped metal housing assemblies arranged to provide electrical outlet access to each cell of each raceway designated for service raceway use. Inserts shall be provided throughout the entire length of each such raceway.
 - 1) Spacing: **30 inches (762 mm) OR 24 inches (600 mm) OR 12 inches (300 mm), as directed**, o.c.
 - 2) Include housing and connecting provisions for a flush or recessed, single-, double-, or triple-system service fitting.
 - 3) Include mounting and connecting provisions for a surface, single- or multiple-system service fitting.

- 4) Include connecting provisions for a wiring-extension service fitting to feed wall outlets.
 - 5) Equip each insert with a disposable cover plate arranged for installation with top **1/8 inch (3 mm)** below surface of concrete. Arrange insert to receive a flush-, recessed-, or wiring-extension service fitting to replace disposable top.
2. Header Assembly: A junction box and raceway arrangement arranged to feed wires and cables to service raceways.
- a. Three-compartment junction box connecting blank, multicell cellular header raceway (no inserts) with cellular service raceways.
 - 1) Arrange junction box in the center of a **60-inch (152-cm)** length of header raceway.
 - 2) Cellular header raceway shall have same dimensions as service raceways.
 - 3) Provide capability for service raceways to be run in both directions from intersection with header raceway.
 - b. Three-compartment junction box preassembled with blank, flat-top, multichannel header raceway (no inserts) and fitted to connect with cellular service raceway at right angles to header raceway.
 - 1) Arrange junction box in the center of a **60-inch (152-cm)** length of header raceway.
 - 2) Provide capability for service raceways to be run in both directions from intersection with header raceway.
- E. Trench-Type Underfloor Raceways
1. Trench: Steel, shop or factory welded and fabricated to indicated sizes. Include the following features:
 - a. Slab Depth Adjustment: Minimum of minus **1/8 inch (3 mm)** to plus **5/8 inch (16 mm)** before and during concrete placement.
 - b. Cover Supports: Height adjustable, with leveling screws to rigidly support cover assembly.
 - c. Screed Strip: Extruded aluminum along both edges at proper elevation without requiring shim material.
 - d. Trim Strip: Select to accommodate floor finish material.
 - e. Partitions: Arranged to separate channels and isolate wiring of different systems.
 - f. Grommeted openings in active floor cells or service raceways.
 - g. Manufacturer's standard corrosion-resistant finish, applied after fabrication.
 2. Cover Plates: Removable, steel plates, **1/4 inch (6 mm)** thick, each weighing **60 lb (27 kg)** or less with full gasket attached to side units. Fabricate intermediate supports to limit unsupported spans to **15 inches (380 mm)** or less. Fabricate covers with appropriate depth recess to receive indicated floor finish.
- F. Electrical Connection Components For Cellular Steel Floor Deck
1. Preset Inserts: Rectangular metal-housing assemblies.
 - a. Spacing: **30 inches (762 mm) OR 24 inches (600 mm) OR 12 inches (300 mm), as directed, o.c.**
 - b. Size: As required to provide electrical outlet access to each cell of each group of three cells that is designated for electrical service raceway use.
 - c. Equip each insert with a disposable cover arranged for installation with top **1/8 inch (3 mm)** below surface of concrete. Arrange insert to receive a flush-, recessed-, or wiring-extension service fitting to replace disposable cover.
 - d. Include housing and connecting provisions for a flush or recessed, single-, double-, or triple-system service fitting.
 - e. Include mounting and connecting provisions for a surface, single-, double-, or triple-system service fitting.
 - f. Include connecting provisions for a wiring-extension service fitting to feed wall outlets.
- G. Electrical Connection Components For Cellular Concrete Floor Deck
1. Afterset Inserts: Round metal-nipple assembly with internal and external threading, arranged to screw into plug driven into **1-7/8-inch (48-mm)** hole drilled through floor fill, where present, and deck-cell wall into floor raceway cell.

- a. Inserts shall be compatible with floor-mounting service fittings.
 - b. Inserts shall provide wiring path from cell to power **OR** communication **OR** power and communication, **as directed**, wall and ceiling outlets.
 - c. Inserts shall provide wiring path from cell to header raceway.
- H. Supports, Fittings, And Hardware
1. Supports, fittings, and hardware shall be compatible with raceway and outlet system and shall be listed for use with raceway systems and components specified.
 2. Supports: Adjustable for height and arranged to maintain alignment and spacing of raceways during concrete placement. Include hold-down straps.
 3. Raceway Fittings: Couplings, expansion-joint sleeves, cross-under offsets, vertical and horizontal elbows, grounding screws, adapters, end caps, and other fittings suitable for use with basic components to form a complete installation.
- I. Junction Boxes
1. Description: Manufacturer's standard enclosure for indicated type, quantity, arrangement, and configuration of raceways at each raceway junction, intersection, and access location. Include the following accessories and features:
 - a. Mounting brackets.
 - b. Escutcheons and holders to accommodate surrounding floor covering.
 - c. Means for leveling and height adjustment more than **3/8 inch (10 mm)** before and after concrete is placed.
 - d. Raceway Openings: For underfloor raceways and conduits arranged to accommodate raceway layout.
 - e. Covers shall have appropriate depth recess to receive specific floor finish material.
 - f. Partitions to separate wiring of different systems.
- J. Service Fittings
1. Exposed Parts Finish: Brass **OR** Brushed Aluminum, **as directed**.
 2. Flush, Single-System Service Fitting for Round Inserts: Include mounting and cover to support and provide access to single connector, jack, or receptacle device; mounted flush with floor within body of insert.
 - a. Connector, Jack, and Receptacle Devices: Single modular type; complying with Division 26 Section(s) "Wiring Devices" AND Division 27 Section(s) "Communications Horizontal Cabling".
 - b. Power Receptacle Outlet: Suitable for 20-A device.
 3. Flush, Single- or Multiple-System Service Fitting for Rectangular Inserts: Include mounting, hinged cover, and trim to support and provide access to connector, jack, or receptacle devices mounted flush with floor within insert.
 - a. Connector, Jack, and Receptacle Devices: Modular type; complying with Division 26 Section(s) "Wiring Devices" AND Division 27 Section(s) "Communications Horizontal Cabling".
 - b. Power Receptacle Rating: 20 A, 120 V unless otherwise indicated.
 4. Recess-Mounted Service Fitting: Modular fittings compatible with preset inserts and shall include covers; provisions for receptacles, jacks, and connectors; and associated device plates for indicated systems. Include hinged flush handhole covers with recessed depth to match thickness of floor finish material. Provide for internally mounted receptacle- and communication-jack and connector assemblies complying with requirements in Division 26 Section(s) "Wiring Devices" AND Division 27 Section(s) "Communications Horizontal Cabling".
 - a. Duplex receptacle.
 - b. Duplex telephone-data jacks.
 - c. Double duplex receptacles.
 - d. Duplex receptacle and duplex telephone-data jacks.
 - e. Double duplex telephone-data jacks, Category 5 **OR** Category 5e **OR** Category 6, **as directed**.

- f. Fiber-optic cable connector.
- 5. Surface-Mounted Service Fitting: Modular pedestal type, with locking attachment matched to insert floor opening.
 - a. Power-outlet, double-faced, surface-mounted unit for duplex receptacle on both sides.
 - b. Power-outlet, single-faced, surface-mounted unit for duplex receptacle on one side.
 - c. Communication-outlet, double-faced, surface-mounted unit.
 - 1) Include bushed openings on both sides; **1-inch (25-mm)** minimum diameter; insulated with nonconducting material.
 - 2) Include provisions for modular dual fiber-optic connector assembly on both sides.
 - 3) Include provisions for modular dual jack-connector assembly, rated for Category 5 **OR** Category 5e **OR** Category 6, **as directed**, on both sides.
 - d. Communication-outlet, single-faced, surface-mounted unit with bushed opening on one side; **1-inch (25-mm)** minimum diameter; insulated with nonconducting material.
 - e. Combination surface-mounted unit for duplex receptacle on one side and with communication cable connection provision on opposite side.
 - 1) Communication Side: Include bushed opening; **1-inch (25-mm)** minimum diameter; insulated with nonconducting material.
 - 2) Communication Side: Include provisions for modular dual fiber-optic connector assembly.
 - 3) Communication Side: Include provisions for modular dual jack-connector assembly, rated for Category 5 **OR** Category 5e **OR** Category 6, **as directed**.
- 6. Flush-Mounted Service Fittings: Modular fittings compatible with preset inserts and shall include covers, provisions for receptacles jacks and connector assemblies and wiring extensions to wall-mounted outlets, and associated device plates for indicated systems. Include flush handhole covers, recessed to suit floor finish material. Internally mounted, modular, receptacle, jack and connector assemblies shall comply with requirements in Division 26 Section(s) "Wiring Devices" AND Division 27 Section(s) "Communications Horizontal Cabling".
 - a. Duplex convenience receptacle.
 - b. Duplex telephone-data outlets.
 - c. Double duplex convenience receptacles.
 - d. Duplex convenience receptacle and duplex telephone-data outlets.
 - e. Double duplex telephone-data outlets.
 - f. Duplex communication jack, rated for Category 5 **OR** Category 5e **OR** Category 6, **as directed**.
 - g. Duplex fiber-optic communication connector.
 - h. Wiring-Extension Service Fittings: Arrangement of brackets and mountings to support, and provide access to wiring or cabling of a cell, and to connect the cable or raceway that extends the system to an individual wall outlet. Provide for connection of FMC **OR** ENT **OR** Type MC cable, **as directed**, for power extensions, and FMC **OR** ENT **OR** optical fiber/communication cable raceway, **as directed**, for communication system extensions.

1.3 EXECUTION

A. Installation

- 1. Install raceways aligned and leveled and, unless otherwise indicated, parallel or perpendicular to building walls.
- 2. Provide a concrete base for support of cellular metal raceway.
- 3. Arrange supports to attain proper elevation, alignment, and spacing of raceways. Install supports securely at ends and at intervals not to exceed **60 inches (1500 mm)**, to prevent movement during concrete pour.
- 4. Level raceway components with finished slab and make adjustments for floor finishes.
- 5. Adjust supports to maintain a **1/16- to 3/8-inch (1.6- to 10-mm)** finished concrete cover over preset inserts.
- 6. Remove burrs, sharp edges, dents, and mechanical defects.
- 7. Cap or plug boxes, insert- and service-fitting openings, and open ends of raceways.

8. Seal raceways, cells, junction boxes, and inserts to prevent water, concrete, or foreign matter from entering raceways before and during pouring slab or placing fill. Tape joints, or seal with compound, as recommended in writing by underfloor raceway manufacturer.
 9. Junction Boxes: Install tops level and flush with finished floor. Install blank closure plates or plugs to close unused junction-box openings. Grout boxes in place to prevent movement during construction. Place top covers in inverted position during construction to prevent damage to surface of cover. Reinstall covers in proper position prior to final acceptance of Work.
 10. Afterset Inserts: Cut, hole saw, and drill slab and raceways to allow for installation.
 11. Ground underfloor raceway components.
 12. Install a marker at the center of the last insert of each cell and channel of each straight run of metal underfloor service raceway to locate the insert and identify the system.
 - a. Install markers at last inserts on both sides of permanent walls and at first inserts adjacent to each junction box.
 - b. Install markers flush at screed line before pouring slab or placing fill. Extend marker with grommited screw when floor covering is placed. Do not extend through carpet.
 - c. Use slotted-head screw to identify electrical power; use Phillips-head screw to identify conventional communications.
 - d. Use another distinctive screw head to identify third system such as special-purpose wiring.
 13. Level raceway components with finished slab and make adjustments in raceway component elevation to accommodate indicated floor finishes.
- B. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Perform visual inspection of interior of each junction box **OR** section of trench raceway, **as directed**, to verify absence of dirt, dust, construction debris, and moisture. Replace damaged and malfunctioning components.
 - b. Perform point-to-point tests of ground continuity and resistance of ground path between the most remote accessible fitting on each branch of each underfloor raceway system and the main electrical distribution grounding system.
 - 1) Determine cause and perform correction of any point-to-point resistance value that exceeds 0.05 ohms.
 - 2) Comply with NETA Acceptance Testing Specifications about safety, suitability of test equipment, test instrument calibration, and test report and records.
- C. Cleaning
1. Clean and swab out underfloor raceways, inserts, and junction boxes after finish has been applied to floor slab, and remove foreign material, dirt, and moisture. Leave interiors clean and dry.

END OF SECTION 26 05 39 00

SECTION 26 05 53 00 - ELECTRICAL IDENTIFICATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electrical identification. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Identification for raceways.
 - b. Identification of power and control cables.
 - c. Identification for conductors.
 - d. Underground-line warning tape.
 - e. Warning labels and signs.
 - f. Instruction signs.
 - g. Equipment identification labels.
 - h. Miscellaneous identification products.

C. Submittals

1. Product Data: For each electrical identification product indicated.
2. Samples: For each type of label and sign to illustrate size, colors, lettering style, mounting provisions, and graphic features of identification products.
3. Identification Schedule: An index of nomenclature of electrical equipment and system components used in identification signs and labels.

D. Quality Assurance

1. Comply with ANSI A13.1 and IEEE C2, **as directed**.
2. Comply with NFPA 70.
3. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.
4. Comply with ANSI Z535.4 for safety signs and labels.
5. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.2 PRODUCTS

A. Power Raceway Identification Materials

1. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.
2. Colors for Raceways Carrying Circuits at 600 V or Less:
 - a. Black letters on an orange field.
 - b. Legend: Indicate voltage and system or service type, **as directed**.
3. Colors for Raceways Carrying Circuits at More Than 600 V:
 - a. Black letters on an orange field.
 - b. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with **3-inch- (75-mm-)** high letters on **20-inch (500-mm)** centers.
4. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

5. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
 6. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
 7. Tape and Stencil for Raceways Carrying Circuits More Than 600 V: **4-inch- (100-mm-)** wide black stripes on **10-inch (250-mm)** centers diagonally over orange background that extends full length of raceway or duct and is **12 inches (300 mm)** wide. Stop stripes at legends.
 8. Metal Tags: Brass or aluminum, **2 by 2 by 0.05 inch (50 by 50 by 1.3 mm)**, with stamped legend, punched for use with self-locking cable tie fastener.
 9. Write-On Tags: Polyester tag, **0.010 inch (0.25 mm) OR 0.015 inch (0.38 mm)**, **as directed**, thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - a. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

OR

Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- B. Armored And Metal-Clad Cable Identification Materials
1. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
 2. Colors for Raceways Carrying Circuits at 600 V and Less:
 - a. Black letters on an orange field.
 - b. Legend: Indicate voltage and system or service type, **as directed**.
 3. Colors for Raceways Carrying Circuits at More Than 600 V:
 - a. Black letters on an orange field.
 - b. Legend: "DANGER CONCEALED HIGH VOLTAGE WIRING" with **3-inch- (75-mm-)** high letters on **20-inch (500-mm)** centers.
 4. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

OR

Self-Adhesive Vinyl Tape: Colored, heavy duty, waterproof, fade resistant; **2 inches (50 mm)** wide; compounded for outdoor use.
- C. Power And Control Cable Identification Materials
1. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.
 2. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
 3. Metal Tags: Brass or aluminum, **2 by 2 by 0.05 inch (50 by 50 by 1.3 mm)**, with stamped legend, punched for use with self-locking cable tie fastener.
 4. Write-On Tags: Polyester tag, **0.010 inch (0.25 mm) OR 0.015 inch (0.38 mm)**, **as directed**, thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - a. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.

OR

Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
 5. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

6. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
- D. Conductor Identification Materials
1. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than **3 mils (0.08 mm)** thick by **1 to 2 inches (25 to 50 mm)** wide.
 2. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.
 3. Snap-Around Labels: Slit, pretensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
 4. Snap-Around, Color-Coding Bands: Slit, pretensioned, flexible, solid-colored acrylic sleeve, **2 inches (50 mm)** long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.
 5. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.
 6. Write-On Tags: Polyester tag, **0.010 inch (0.25 mm) OR 0.015 inch (0.38 mm)**, **as directed**, thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.
 - a. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
OR
Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.
- E. Floor Marking Tape
1. **2-inch- (50-mm-)** wide, **5-mil (0.125-mm)** pressure-sensitive vinyl tape, with black and white stripes and clear vinyl overlay.
- F. Underground-Line Warning Tape
1. Tape:
 - a. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.
 - b. Printing on tape shall be permanent and shall not be damaged by burial operations.
 - c. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.
 2. Color and Printing:
 - a. Comply with ANSI Z535.1 through ANSI Z535.5.
 - b. Inscriptions for Red-Colored Tapes: **ELECTRIC LINE, HIGH VOLTAGE.**
 - c. Inscriptions for Orange-Colored Tapes: **TELEPHONE CABLE, CATV CABLE, COMMUNICATIONS CABLE, OPTICAL FIBER CABLE.**
 3. Tag: Type I:
 - a. Pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Thickness: **4 mils (0.1 mm).**
 - c. Weight: **18.5 lb/1000 sq. ft. (9.0 kg/100 sq. m).**
 - d. **3-Inch (75-mm)** Tensile According to ASTM D 882: **30 lbf (133.4 N)**, and **2500 psi (17.2 MPa).**
 4. Tag: Type II:
 - a. Multilayer laminate consisting of high-density polyethylene scrim coated with pigmented polyolefin, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Thickness: **12 mils (0.3 mm).**
 - c. Weight: **36.1 lb/1000 sq. ft. (17.6 kg/100 sq. m).**

- d. **3-Inch (75-mm)** Tensile According to ASTM D 882: **400 lbf (1780 N)**, and **11,500 psi (79.2 MPa)**.
 5. Tag: Type ID:
 - a. Detectable three-layer laminate, consisting of a printed pigmented polyolefin film, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Overall Thickness: **5 mils (0.125 mm)**.
 - c. Foil Core Thickness: **0.35 mil (0.00889 mm)**.
 - d. Weight: **28 lb/1000 sq. ft. (13.7 kg/100 sq. m)**.
 - e. **3-Inch (75-mm)** Tensile According to ASTM D 882: **70 lbf (311.3 N)**, and **4600 psi (31.7 MPa)**.
 6. Tag: Type IID:
 - a. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
 - b. Overall Thickness: **8 mils (0.2 mm)**.
 - c. Foil Core Thickness: **0.35 mil (0.00889 mm)**.
 - d. Weight: **34 lb/1000 sq. ft. (16.6 kg/100 sq. m)**.
 - e. **3-Inch (75-mm)** Tensile According to ASTM D 882: **300 lbf (1334 N)**, and **12,500 psi (86.1 MPa)**.
- G. Warning Labels And Signs
1. Comply with NFPA 70 and 29 CFR 1910.145.
 2. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.
 3. Baked-Enamel Warning Signs:
 - a. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
 - b. **1/4-inch (6.4-mm)** grommets in corners for mounting.
 - c. Nominal size, **7 by 10 inches (180 by 250 mm)**.
 4. Metal-Backed, Butyrate Warning Signs:
 - a. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with **0.0396-inch (1-mm)** galvanized-steel backing; and with colors, legend, and size required for application.
 - b. **1/4-inch (6.4-mm)** grommets in corners for mounting.
 - c. Nominal size, **10 by 14 inches (250 by 360 mm)**.
 5. Warning label and sign shall include, but are not limited to, the following legends:
 - a. Multiple Power Source Warning: "DANGER - ELECTRICAL SHOCK HAZARD - EQUIPMENT HAS MULTIPLE POWER SOURCES."
 - b. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR **36 INCHES (915 MM)**."
- H. Instruction Signs
1. Engraved, laminated acrylic or melamine plastic, minimum **1/16 inch (1.6 mm)** thick for signs up to **20 sq. inches (129 sq. cm)** and **1/8 inch (3.2 mm)** thick for larger sizes.
 - a. Engraved legend with black letters on white face.
 - b. Punched or drilled for mechanical fasteners.
 - c. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.
 2. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch (10 mm)**.
 3. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch (10 mm)**. Overlay shall provide a weatherproof and UV-resistant seal for label.

- I. Equipment Identification Labels
 1. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch (10 mm)**.
 2. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be **3/8 inch (10 mm)**. Overlay shall provide a weatherproof and UV-resistant seal for label.
 3. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be **3/8 inch (10 mm)**.
 4. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be **3/8 inch (10 mm)**.
 5. Stenciled Legend: In nonfading, waterproof, black ink or paint. Minimum letter height shall be **1 inch (25 mm)**.

- J. Cable Ties
 1. General-Purpose Cable Ties: Fungus inert, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - a. Minimum Width: **3/16 inch (5 mm)**.
 - b. Tensile Strength at **73 deg F (23 deg C)**, According to ASTM D 638: **12,000 psi (82.7 MPa)**.
 - c. Temperature Range: **Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C)**.
 - d. Color: Black except where used for color-coding.
 2. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.
 - a. Minimum Width: **3/16 inch (5 mm)**.
 - b. Tensile Strength at **73 deg F (23 deg C)**, According to ASTM D 638: **12,000 psi (82.7 MPa)**.
 - c. Temperature Range: **Minus 40 to plus 185 deg F (Minus 40 to plus 85 deg C)**.
 - d. Color: Black.
 3. Plenum-Rated Cable Ties: Self extinguishing, UV stabilized, one piece, self locking.
 - a. Minimum Width: **3/16 inch (5 mm)**.
 - b. Tensile Strength at **73 deg F (23 deg C)**, According to ASTM D 638: **7000 psi (48.2 MPa)**.
 - c. UL 94 Flame Rating: 94V-0.
 - d. Temperature Range: **Minus 50 to plus 284 deg F (Minus 46 to plus 140 deg C)**.
 - e. Color: Black.

- K. Miscellaneous Identification Products
 1. Paint: Comply with requirements in Division 07 for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).
 2. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

1.3 EXECUTION

- A. Installation
 1. Verify identity of each item before installing identification products.
 2. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.
 3. Apply identification devices to surfaces that require finish after completing finish work.
 4. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.
 5. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.
 6. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at **50-foot**

(15-m) maximum intervals in straight runs, and at 25-foot (7.6-m) maximum intervals in congested areas.

7. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.
8. Cable Ties: For attaching tags. Use general-purpose type, except as listed below:
 - a. Outdoors: UV-stabilized nylon.
 - b. In Spaces Handling Environmental Air: Plenum rated.
9. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches (400 mm) overall.
10. Painted Identification: Comply with requirements in Division 07 for surface preparation and paint application.

B. Identification Schedule

1. Concealed Raceways, Duct Banks, More Than 600 V, within Buildings: Tape and stencil 4-inch- (100-mm-) wide black stripes on 10-inch (250-mm) centers over orange background that extends full length of raceway or duct and is 12 inches (300 mm) wide. Stencil legend "DANGER CONCEALED HIGH VOLTAGE WIRING" with 3-inch- (75-mm-) high black letters on 20-inch (500-mm) centers. Stop stripes at legends. Apply to the following finished surfaces:
 - a. Floor surface directly above conduits running beneath and within 12 inches (300 mm) of a floor that is in contact with earth or is framed above unexcavated space.
 - b. Wall surfaces directly external to raceways concealed within wall.
 - c. Accessible surfaces of concrete envelope around raceways in vertical shafts, exposed in the building, or concealed above suspended ceilings.
2. Accessible Raceways, Armored and Metal-Clad Cables, More Than 600 V: Self-adhesive vinyl **OR** Snap-around, **as directed**, labels. Install labels at 10-foot (3-m) **OR** 30-foot (10-m), **as directed**, maximum intervals.
3. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label **OR** self-adhesive vinyl tape applied in bands, **as directed**. Install labels at 10-foot (3-m) **OR** 30-foot (10-m), **as directed**, maximum intervals.
4. Accessible Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive vinyl labels with the wiring system legend and system voltage. System legends shall be as follows:
 - a. Emergency Power.
 - b. Power.
 - c. UPS.
5. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use color-coding conductor tape to identify the phase.
 - a. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder, and branch-circuit conductors.
 - 1) Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
 - 2) Colors for 208/120-V Circuits:
 - a) Phase A: Black.
 - b) Phase B: Red.
 - c) Phase C: Blue.
 - 3) Colors for 480/277-V Circuits:
 - a) Phase A: Brown.
 - b) Phase B: Orange.
 - c) Phase C: Yellow.
 - 4) Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches (150 mm) from terminal points and in boxes where

- splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.
6. Power-Circuit Conductor Identification, More than 600 V: For conductors in vaults, pull and junction boxes, manholes, and handholes, use write-on tags **OR** nonmetallic plastic tag holder with adhesive-backed phase tags, and a separate tag with the circuit designation, **as directed**.
 7. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.
 8. Conductors to Be Extended in the Future: Attach write-on tags **OR** marker tape, **as directed**, to conductors and list source.
 9. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.
 - a. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.
 - b. Use system of marker tape designations that is uniform and consistent with system used by manufacturer for factory-installed connections.
 - c. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual.
 10. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring and optical fiber cable.
 - a. Limit use of underground-line warning tape to direct-buried cables.
 - b. Install underground-line warning tape for both direct-buried cables and cables in raceway.
 11. Workspace Indication: Install floor marking tape to show working clearances in the direction of access to live parts. Workspace shall be as required by NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.
 12. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels **OR** Baked-enamel warning signs **OR** Metal-backed, butyrate warning signs, **as directed**.
 - a. Comply with 29 CFR 1910.145.
 - b. Identify system voltage with black letters on an orange background.
 - c. Apply to exterior of door, cover, or other access.
 - d. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
 - 1) Power transfer switches.
 - 2) Controls with external control power connections.
 13. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.
 14. Emergency Operating Instruction Signs: Install instruction signs with white legend on a red background with minimum **3/8-inch- (10-mm-)** high letters for emergency instructions at equipment used for power transfer **OR** load shedding, **as directed**.
 15. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems include power, lighting, control, communication, signal, monitoring, and alarm systems unless equipment is provided with its own identification.
 - a. Labeling Instructions:
 - 1) Indoor Equipment: Adhesive film label **OR** Adhesive film label with clear protective overlay **OR** Self-adhesive, engraved, laminated acrylic or melamine label **OR** Engraved, laminated acrylic or melamine label, **as directed**. Unless otherwise indicated, provide a single line of text with **1/2-inch- (13-mm-)** high letters on **1-1/2-inch- (38-mm-)** high label; where two lines of text are required, use labels **2 inches (50 mm)** high.
 - 2) Outdoor Equipment: Engraved, laminated acrylic or melamine label **OR** Stenciled legend **4 inches (100 mm)** high, **as directed**.

- 3) Elevated Components: Increase sizes of labels and letters to those appropriate for viewing from the floor.
 - 4) Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.
- b. Equipment to Be Labeled:
- 1) Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Panelboard identification shall be self-adhesive, engraved **OR** engraved, **as directed**, laminated acrylic or melamine label.
 - 2) Enclosures and electrical cabinets.
 - 3) Access doors and panels for concealed electrical items.
 - 4) Switchgear.
 - 5) Switchboards.
 - 6) Transformers: Label that includes tag designation shown on Drawings for the transformer, feeder, and panelboards or equipment supplied by the secondary.
 - 7) Substations.
 - 8) Emergency system boxes and enclosures.
 - 9) Motor-control centers.
 - 10) Enclosed switches.
 - 11) Enclosed circuit breakers.
 - 12) Enclosed controllers.
 - 13) Variable-speed controllers.
 - 14) Push-button stations.
 - 15) Power transfer equipment.
 - 16) Contactors.
 - 17) Remote-controlled switches, dimmer modules, and control devices.
 - 18) Battery-inverter units.
 - 19) Battery racks.
 - 20) Power-generating units.
 - 21) Monitoring and control equipment.
 - 22) UPS equipment.

END OF SECTION 26 05 53 00

SECTION 26 05 53 00a - INTERCOMMUNICATIONS AND PROGRAM SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for intercommunications and program systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes: Manually switched and Microprocessor-switched intercommunications and program systems with the following components:
 - a. Master stations.
 - b. Speaker-microphone stations.
 - c. Call-switch unit.
 - d. All-call amplifier.
 - e. Intercommunication amplifier.
 - f. Paging amplifier.
 - g. Loudspeakers/speaker microphones.
 - h. Conductors and cables.
 - i. Raceways.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For intercommunications and program systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
 - 1) Identify terminals to facilitate installation, operation, and maintenance.
 - 2) Single-line diagram showing interconnection of components.
 - 3) Cabling diagram showing cable routing.
3. Field quality-control reports.
4. Operation and maintenance data.

D. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with NFPA 70.

1.2 PRODUCTS

A. Functional Description Of Manually Switched Systems

1. Master Station:
 - a. Communicating selectively with other master and speaker-microphone stations by actuating selector switches.
 - b. Communicating simultaneously with all other stations by actuating a single all-call switch.
 - c. Communicating with individual stations in privacy.
 - d. Including other master-station connections in a multiple-station conference call.
 - e. Accessing separate paging speakers or groups of paging speakers by actuating selector switches.
 - f. Overriding any conversation by a designated master station.

2. Speaker-Microphone Station:
 - a. Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
 - b. Communicating hands free.
 - c. Calling master station by actuating call switch.
 - d. Returning a busy signal to indicate that station is already in use.
 - e. Being free of noise and distortion during operation and when in standby mode.
 3. Speakers: Free of noise and distortion during operation and when in standby mode.
- B. Functional Description Of Microprocessor-Switched Systems
1. Master Station:
 - a. Communicating selectively with other master and speaker-microphone stations by dialing station's number on a 12-digit keypad.
 - b. Communicating simultaneously with all other stations by dialing a designated number on a 12-digit keypad.
 - c. Communicating with individual stations in privacy.
 - d. Including other master-station connections in a multiple-station conference call.
 - e. Accessing separate paging speakers or groups of paging speakers by dialing designated numbers on a 12-digit keypad.
 - f. Overriding any conversation by a designated master station.
 - g. Displaying selected station.
 2. Speaker-Microphone Station:
 - a. Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
 - b. Communicating hands free.
 - c. Calling master station by actuating call switch.
 - d. Returning a busy signal to indicate that station is already in use.
 - e. Being free of noise and distortion during operation and when in standby mode.
 3. Speakers: Free of noise and distortion during operation and when in standby mode.
- C. General Requirements For Equipment And Materials
1. Coordinate features and select components to form an integrated system. Match components and interconnections for optimum performance of specified functions.
 2. Expansion Capability: Increase number of stations in the future by 25 percent above those indicated without adding any internal or external components or main trunk cable conductors.
 3. Equipment: Modular type using solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.
 4. Weather-Resistant Equipment: Listed and labeled by an NRTL for duty outdoors or in damp locations.
- D. Master Station For Manually Switched Systems
1. Station-Selector and Talk-Listen Switches: Heavy-duty type with gold-plated contacts rated for five million operations.
 2. Volume Control: Regulates incoming-call volume.
 3. LED Annunciation: Identifies calling stations and stations in use. LED remains on until call is answered.
 4. Tone Annunciation: Momentary audible tone signal announces incoming calls.
 5. Speaker Microphone: Transmits and receives calls.
 6. Handset with Hook Switch: Telephone type with **18-inch- (450-mm-)** long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
 7. Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and auxiliary equipment.

- E. Master Station For Microprocessor-Switched Systems
1. 12-Digit Keypad Selector: Transmits calls to other stations and initiates commands for programming and operation.
 2. Volume Control: Regulates incoming-call volume.
 3. LED Annunciation: Identifies calling stations and stations in use. LED remains on until call is answered.
 4. Tone Annunciation: Momentary audible tone signal announces incoming calls.
 5. Handset with Hook Switch: Telephone type with **18-inch- (450-mm-)** long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
 6. Reset Control: Cancels call and resets system for next call.
 7. Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and other switching and control devices required for conversation channels and control functions.
- F. Speaker-Microphone Stations
1. Mounting: Flush unless otherwise indicated, and suitable for mounting conditions indicated.
 2. Faceplate: Stainless steel or anodized aluminum with tamperproof mounting screws.
 3. Back Box: Two-gang galvanized steel with **2-1/2-inch (64-mm)** minimum depth.
 4. Speaker: **3 inches (76 mm), 2.3 oz. (65 g)** minimum; permanent magnet.
 5. Tone Annunciation: Recurring momentary tone indicates incoming calls.
 6. Call Switch: Mount on faceplate. Permits calls to master station.
 7. Privacy Switch: Mount on faceplate. When in on position, switch prevents transmission of sound from remote station to system; when in off position, without further switch manipulation, response can be made to incoming calls.
 8. Handset with Hook Switch: Telephone type with **18-inch- (450-mm-)** long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
- G. Call-Switch Unit
1. Enclosure: Single-gang box with stainless-steel faceplate.
 2. Call Switch: Momentary contact signals system that a call has been placed.
 3. Privacy Switch: Prevents transmission of sound signals from station to system.
 4. Volume Control: Operated by screwdriver blade through a hole in faceplate to adjust output level of associated speaker.
 5. Handset with Hook Switch: Telephone type with **18-inch- (450-mm-)** long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
- H. All-Call Amplifier
1. Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.
 2. Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to quantity of stations connected in all-call mode of operation.
 3. Minimum Signal-to-Noise Ratio: 45 dB, at rated output.
 4. Frequency Response: Within plus or minus 3 dB from 70 to 12,000 Hz.
 5. Output Regulation: Maintains output level within 2 dB from full to no load.
 6. Input Sensitivity: Compatible with master stations and central equipment so amplifier delivers full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on master stations, speaker microphones, or handset transmitters.
 7. Amplifier Protection: Prevents damage from shorted or open output.
- I. Intercommunication Amplifier
1. Minimum Output Power: 2 W; adequate for all functions.
 2. Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to one station connected to output terminals.
 3. Minimum Signal-to-Noise Ratio: 45 dB, at rated output.
 4. Frequency Response: Within plus or minus 3 dB from 70 to 10,000 Hz.

5. Output Regulation: Maintains output level within 2 dB from full to no load.
 6. Input Sensitivity: Matched to input circuit and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on master stations, speaker microphones, or handset transmitters.
 7. Amplifier Protection: Prevents damage from shorted or open output.
- J. Paging Amplifier
1. Input Voltage: 120-V ac, 60 Hz.
 2. Frequency Response: Within plus or minus 3 dB from 60 to 10,000 Hz.
 3. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.
 4. Total Harmonic Distortion: Less than 3 percent at rated power output from 70 to 12,000 Hz.
 5. Output Regulation: Less than 2 dB from full to no load.
 6. Controls: On-off, input levels, and low-cut filter.
 7. Input Sensitivity: Matched to input circuit and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphones or handset transmitters.
 8. Amplifier Protection: Prevents damage from shorted or open output.
 9. Output Circuit: 70-V line.
- K. Cone-Type Loudspeakers/Speaker Microphones
1. Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.
 2. Frequency Response: Within plus or minus 3 dB from 70 to 15,000 Hz.
 3. Minimum Dispersion Angle: 100 degrees.
 4. Line Transformer: Maximum insertion loss of 0.5 dB, power rating equal to speaker's, and at least four level taps.
 5. Enclosures: Steel housings or back boxes, acoustically dampened, with front face of at least **0.0478-inch (1.2-mm)** steel and whole assembly rust proofed and factory primed; complete with mounting assembly and suitable for surface ceiling, flush ceiling, pendant or wall mounting; with relief of back pressure.
 6. Baffle: For flush speakers, minimum thickness of **0.032-inch (0.8-mm)** aluminum brushed to a satin sheen and lacquered **OR** with textured white finish, **as directed**.
 7. Vandal-Proof, High-Strength Baffle: For flush **OR** surface, **as directed**, -mounted speakers, self-aging cast aluminum with tensile strength of **44,000 psi (303 MN/sq. m)**, **0.025-inch (0.65-mm)** minimum thickness; countersunk heat-treated alloy mounting screws; and textured white epoxy finish.
 8. Size: **8 inches (200 mm)** with **1-inch (25-mm)** voice coil and minimum **5-oz. (140-g)** ceramic magnet.
- L. Horn-Type Loudspeakers/Speaker Microphones
1. Speakers shall be all-metal, weatherproof construction; complete with universal mounting brackets.
 2. Frequency Response: Within plus or minus 3 dB from 275 to 14,000 Hz.
 3. Minimum Power Rating of Driver: 15 W, continuous.
 4. Minimum Dispersion Angle: 110 degrees.
 5. Line Transformer: Maximum insertion loss of 0.5 dB, power rating equal to speaker's, and at least four level taps.
- M. Horn-Type Explosion-Proof Loudspeakers
1. Speakers shall be all-metal construction; complete with universal mounting brackets.
 2. Units in Hazardous (Classified) Locations: Listed and labeled for environment in which they are located.
 3. Frequency Response: Within plus or minus 3 dB from 300 to 12,000 Hz.
 4. Minimum Power Rating of Driver: 30 **OR** 60, **as directed**, W, continuous.
 5. Minimum Dispersion Angle: 95 **OR** 60 by 120, **as directed**, degrees.
 6. Line Transformer: Internally mounted and factory installed, power rating equal to speaker's, and at least four level taps.

N. Conductors And Cables

1. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.
2. Insulation: Thermoplastic, not less than **1/32 inch (0.8 mm)** thick.
3. Shielding: For speaker-microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG, tinned, soft-copper strands formed into a braid or equivalent foil.
 - a. Minimum Shielding Coverage on Conductors: 60 percent.
4. Plenum Cable: Listed and labeled for plenum installation.

O. Raceways

1. Intercommunication and Program System Raceways and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems".
2. Intercommunication and Program System Raceways and Boxes: Same as required for electrical branch circuits specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
3. Intercommunication and Program System Raceways and Boxes: EMT **OR** ENT **OR** RNC **OR** Optical-fiber/communication raceways and fittings **OR** Metal wireways **OR** Nonmetal wireways **OR** Surface metal raceways **OR** Surface nonmetal raceways, **as directed**.
4. Outlet boxes shall be not less than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.
5. Flexible metal conduit is prohibited.

1.3 EXECUTION

A. Wiring Methods

1. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters, and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
2. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
3. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

B. Installation Of Raceways

1. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
2. Install manufactured conduit sweeps and long-radius elbows whenever possible.

C. Installation Of Cables

1. Comply with NECA 1.
2. General Requirements:
 - a. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
 - b. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
 - c. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - d. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

- e. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - f. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
3. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunication spaces with terminating hardware and interconnection equipment.
 - b. Suspend speaker cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceiling by cable supports not more than **60 inches (1524 mm)** apart.
 - c. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
 4. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least **12 inches (300 mm)** apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
- D. Installation
1. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
 2. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
 3. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
 4. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.
 5. Connect wiring according to Division 26 Section "Grounding And Bonding For Electrical Systems".
- E. Grounding
1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
 2. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
 3. Install grounding electrodes as specified in Division 26 Section "Grounding And Bonding For Electrical Systems".
- F. System Programming
1. Programming: Fully brief the Owner on available programming options. Record the Owner's decisions and set up initial system program. Prepare a written record of decisions, implementation methodology, and final results.
- G. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Schedule tests with at least seven days' advance notice of test performance.
 - b. After installing intercommunications and program systems and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Operational Test: Test originating station-to-station, all-call, and page messages at each intercommunication station. Verify proper routing and volume levels and that system is

- free of noise and distortion. Test each available message path from each station on system.
- d. Frequency Response Test: Determine frequency response of two transmission paths, including all-call and paging, by transmitting and recording audio tones. Minimum acceptable performance is within 3 dB from 150 to 2500 Hz.
 - e. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:
 - 1) Disconnect speaker microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure signal-to-noise ratio at speakers or paging speakers.
 - 2) Repeat test for four speaker microphones and for each separately controlled zone of paging loudspeakers.
 - 3) Minimum acceptable ratio is 35 dB.
 - f. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 150, 200, 400, 1000, and 2500 Hz into each paging and all-call amplifier, and a minimum of two selected intercommunication amplifiers. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 5 percent total harmonics.
 - g. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at three locations in each paging zone. Maximum permissible variation in level is plus or minus 3 dB; in levels between adjacent zones, plus or minus 5 dB.
 - h. Power Output Test: Measure electrical power output of each paging amplifier at normal gain settings of 150, 1000, and 2500 Hz. Maximum variation in power output at these frequencies is plus or minus 3 dB.
 - i. Signal Ground Test: Measure and report ground resistance at system signal ground. Comply with testing requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".
3. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.
 4. Intercommunications and program systems will be considered defective if they do not pass tests and inspections.
 5. Prepare test and inspection reports.

END OF SECTION 26 05 53 00a

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Task	Specification	Specification Description
26 05 83 00	26 05 13 16	Medium-Voltage Cables
26 05 83 00	26 05 19 16a	Conductors And Cables
26 05 83 00	26 05 13 16a	Undercarpet Electrical Power Cables

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SECTION 26 09 23 00 - ELECTRICAL POWER MONITORING AND CONTROL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for electrical power monitoring and control. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following for monitoring and control of electrical power system:
 - a. PC-based workstation(s) and software.
 - b. Communication network and interface modules for RS-232; RS-485, Modbus TCP/IP; and IEEE 802.3 data transmission protocols.

C. Definitions

1. Ethernet: Local area network based on IEEE 802.3 standards.
2. Firmware: Software (programs or data) that has been written onto read-only memory (ROM). Firmware is a combination of software and hardware. Storage media with ROMs that have data or programs recorded on them are firmware.
3. HTML: Hypertext markup language.
4. I/O: Input/output.
5. KB: Short for kilobyte. When used to describe data storage, "KB" represents 1024 bytes.
6. KY Pulse: A term used by the metering industry to describe a method of measuring consumption of electricity that is based on a relay changing status in response to the rotation of the disk in the meter.
7. LAN: Local area network; sometimes plural as "LANs."
8. LCD: Liquid crystal display.
9. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or remote-control, signaling and power-limited circuits.
10. Modbus TCP/IP: An open protocol for exchange of process data.
11. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
12. PC: Personal computer; sometimes plural as "PCs."
13. rms: Root-mean-square value of alternating voltage, which is the square root of the mean value of the square of the voltage values during a complete cycle.
14. RS-232: A TIA standard for asynchronous serial data communications between terminal devices.
15. RS-485: A TIA standard for multipoint communications using two twisted-pairs.
16. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
17. THD: Total harmonic distortion.
18. UPS: Uninterruptible power supply; used both in singular and plural context.
19. WAN: Wide area network.

D. Submittals

1. Product Data: For each type of product indicated.
 - a. Attach copies of approved Product Data submittals for products (such as switchboards and switchgear) that describe power monitoring and control features to illustrate coordination among related equipment and power monitoring and control.
2. Shop Drawings: For power monitoring and control equipment. Include plans, elevations, sections, details, and attachments to other work.
 - a. Outline Drawings: Indicate arrangement of components and clearance and access requirements.

- b. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
 - c. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - d. Wiring Diagrams: Power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.
 - e. UPS sizing calculations for workstation.
 3. Software and Firmware Operational Documentation:
 - a. Self-study guide describing the process for setting equipment's network address; setting the Owner's options; procedures to ensure data access from any PC on the network, using a standard Web browser; and recommended firewall setup.
 - b. Software operating and upgrade manuals.
 - c. Software Backup: On a magnetic media or compact disc, complete with the Owner-selected options.
 - d. Device address list and the set point of each device and operator option, as set in applications software.
 - e. Graphic file and printout of graphic screens and related icons, with legend.
 4. Software Upgrade Kit: For the Owner to use in modifying software to suit future power system revisions or power monitoring and control revisions.
 5. Software licenses and upgrades required by and installed for operating and programming digital and analog devices.
 6. Field quality-control test reports.
 7. Operation and Maintenance Data: For power monitoring and control units, to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Operating and applications software documentation.
 - b. Software licenses.
 - c. Software service agreement.
 - d. PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Software shall include system restore, emergency boot diskettes, and drivers for all installed hardware. Provide separately for each PC.
 - e. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal.
 8. Other Informational Submittals:
 - a. System installation and setup guides, with data forms to plan and record options and setup decisions.
- E. Quality Assurance
1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- F. Software Service Agreement
1. Technical Support: Beginning with Final Completion, provide software support for two years.
 2. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include the operating systems. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30-day notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

A. Functional Description

1. Instrumentation and Recording Devices: Monitor and record load profiles and chart energy consumption patterns.
 - a. Calculate and Record the Following:
 - 1) Load factor.
 - 2) Peak demand periods.
 - 3) Consumption correlated with facility activities.
 - b. Measure and Record Metering Data for the Following:
 - 1) Electricity.
 - 2) Domestic water.
 - 3) Natural gas.
2. Software: Calculate allocation of utility costs.
 - a. Automatically Import Energy Usage Records to Allocate Energy Costs for the Following:
 - 1) At least 15 departments.
 - 2) At least 30 tenants.
 - 3) At least five processes.
 - 4) At least five buildings.
 - b. Verify utility bills and analyze alternate energy rates, **as directed**.
3. Power Quality Monitoring: Identify power system anomalies and measure, display, and record trends and alarms of the following power quality parameters:
 - a. Voltage regulation and unbalance.
 - b. Continuous three-phase rms voltage.
 - c. Periodic max./min./avg. samples.
 - d. Harmonics.
 - e. Voltage excursions.
4. Emergency Load Shedding. Preserve critical loads or avoid total shutdown due to unforeseen loss of power sources according to the following logic:
 - a. Determine system topology.
 - b. Evaluate remaining loads and sources.
 - c. Shed loads in less than 100 ms.
5. Demand Management:
 - a. Peaking or co-generator control.
 - b. Load interlocking.
 - c. Load shedding.
 - d. Load trimming.
6. System: Report equipment status and power system control.

B. System Requirements

1. Monitoring and Control System: Include PC-based workstation **OR** multiple PC-based workstations **OR** multiple PC-based workstations with graphics capability and Web access, **as directed**, with its operating system and application software, connected to data transmission network.
2. Surge Protection: For external wiring of each conductor entry connection to components to protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads.
 - a. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits".
 - b. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements as recommended by manufacturer for type of line being protected.
3. Addressable Devices: All transmitters and receivers shall communicate unique device identification and status reports to monitoring and control clients.

4. BAS Interface: Provide factory-installed hardware and software to enable the BAS to monitor, display, and record data for use in processing reports.
 - a. Hardwired Monitoring Points: Electrical power demand (kilowatts), electrical power consumption (kilowatt-hours), power factor, **as directed**.
OR
 ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely monitor meter information from a BAS operator workstation. Control features and monitoring points displayed locally at metering panel shall be available through the BAS.
- C. Operating System
1. Software: Configured to run on a portable laptop computer, a single PC, or a palm computer, with capability for accessing a single meter at a time. System is not connected to a LAN. Modbus TCP/IP, RS-232, and RS-485 digital communications.
OR
 Software: Configured to run on a single PC, with capability for accessing multiple devices simultaneously. Modbus TCP/IP, RS-232, and RS-485 digital communications.
OR
 Software: Configured for a server and multiple client PCs, each with capability for accessing multiple devices simultaneously. Ethernet, Modbus TCP/IP, RS-232, and RS-485 digital communications.
OR
 Software: Configured for a server and multiple client PCs, each with capability for accessing multiple devices simultaneously. Software shall include interactive graphics client and shall be Web enabled. Workstations and portable computers shall not require any software except for an Internet browser to provide connectivity and full functionality. Include a firewall recommended by manufacturer. 100 Base-T Ethernet, Modbus TCP/IP RS-232, and RS-485 digital communications.
 2. Operating System Software: Based on 32-bit, Microsoft Windows workstation operating system. Software shall have the following features:
 - a. Multiuser and multitasking to allow independent activities and monitoring to occur simultaneously at different workstations.
 - b. Graphical user interface to show pull-down menus and a menu tree format.
 - c. Capability for future additions within the indicated system size limits.
 3. Peer Computer Control Software: Shall detect a failure of workstation and associated server, **as directed**, and shall cause other workstation and associated server, **as directed**, to assume control of all system functions without interruption of operation. Drivers shall be provided in both central computers to support this mode of operation.
- D. Applications Software
1. Basic Requirements:
 - a. Fully compatible with and based on the approved operating system.
 - b. Password-protected operator login and access; three levels, minimum.
 - c. Password-protected setup functions.
 - d. Context sensitive on-line help.
 - e. Capability of creating, deleting, and copying files; and automatically maintaining a directory of all files, including size and location of each sequential and random-ordered record.
 - f. Capability for importing custom icons into graphic views to represent alarms and I/O devices.
 - g. Automatic and encrypted backups for database and history; automatically stored at central control PC **OR** selected workstation, **as directed**, and encrypted with a nine-character alphanumeric password, which must be used to restore or read data contained in backup.
 - h. Operator audit trail for recording and reporting all changes made to user-defined system options.
 2. Workstation Server Functions:

- a. Support other client PCs on the LAN and WAN, **as directed**.
- b. Maintain recorded data in databases accessible from other PCs on the LAN and WAN, **as directed**.
3. Data Formats:
 - a. User-programmable export and import of data to and from commonly used Microsoft Windows spreadsheet, database, billing, and other applications; using dynamic data exchange technology.
 - b. Option to convert reports and graphics to HTML format.
 - c. Interactive graphics.
 - d. Option to send preprogrammed or operator designed e-mail reports.
4. Metered Data: Display metered values in real time.
5. Remote Control:
 - a. Display circuit-breaker status and allow breaker control.
 - b. User defined with load-shedding automatically initiated and executed schemes responding to programmed time schedules, set points of metered demands, utility contracted load shedding, or combinations of these.
6. Equipment Documentation: Database for recording of equipment ratings and characteristics; with capability for graphic display on monitors.
7. Graphics: Interactive color-graphics platform with pull-down menus and mouse-driven generation of power system graphics, in formats widely used for such drafting; to include the following:
 - a. Site plan.
 - b. Floor plans.
 - c. Equipment elevations.
 - d. Single-line diagrams.
8. User-Defined Monitoring and Control Events: Display and record with date and time stamps accurate to 0.1 second, and including the following:
 - a. Operator log on/off.
 - b. Attempted operator log on/off.
 - c. All alarms.
 - d. Equipment operation counters.
 - e. Out-of-limit, pickup, trip, and no-response events.
9. Trending Reports: Display data acquired in real-time from different meters or devices, in historical format over user-defined time; unlimited as to interval, duration, or quantity of trends.
 - a. Spreadsheet functions of sum, delta, percent, average, mean, standard deviation, and related functions applied to recorded data.
 - b. Charting, statistical, and display functions of standard Windows-based spreadsheet.
10. Alarms: Display and record alarm messages from discrete input and controls outputs, according to user programmable protocol.
 - a. Functions requiring user acknowledgment shall run in background during computer use for other applications and override other presentations when they occur.
11. Waveform Data: Display and record waveforms on demand or automatically on an alarm or programmed event; include the graphic displays of the following, based on user-specified criteria:
 - a. Phase voltages, phase currents, and residual current.
 - b. Overlay of three-phase currents, and overlay each phase voltage and current.
 - c. Waveforms ranging in length from 2 cycles to 5 minutes.
 - d. Disturbance and steady-state waveforms up to 512 points per cycle.
 - e. Transient waveforms up to 83,333 points per cycle on 60-Hz base.
 - f. Calculated waveform on a minimum of four cycles of data of the following:
 - 1) THD.
 - 2) rms magnitudes.
 - 3) Peak values.
 - 4) Crest factors.
 - 5) Magnitude of individual harmonics.
12. Data Sharing: Allow export of recorded displays and tabular data to third-party applications software.
13. Tenant or Activity Billing Software:

- a. Automatically compute and prepare tenant bills **OR** activity demand and energy-use statements, **as directed**, based on metering of energy use and peak demand integrated over user-defined interval.
 - b. Intervals shall be same as used by electric utilities, including current vendor.
 - c. Import metered data from saved records that were generated by metering and monitoring software.
 - d. Maintain separate directory for each tenant's historical billing information.
 - e. Prepare summary reports in user-defined formats and time intervals.
14. Reporting: User commands initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.
- a. Print a record of user-defined alarm, supervisory, and trouble events on workstation printer.
 - b. Sort and report by device name and by function.
 - c. Report type of signal (alarm, supervisory, or trouble), description, date, and time of occurrence.
 - d. Differentiate alarm signals from other indications.
 - e. When system is reset, report reset event with same information concerning device, location, date, and time.
- E. Communication Components And Networks
1. Transient Voltage Surge Suppression and Electromagnetic-Interference Immunity: Include in solid-state equipment. Comply with IEEE C37.90.
 2. Network Configuration: High-speed, multi-access, open nonproprietary, industry standard communication protocol; LANs complying with EIA 485, 100 Base-T Ethernet, and Modbus TCP/IP.
- F. Power Monitors
1. Separately mounted, permanently installed instrument for power monitoring and control.
 - a. Enclosure: NEMA 250, Type 1 **OR** 12, **as directed**.
 2. Environmental Conditions: System components shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Indoor installation in non-air-conditioned **OR** nontemperature-controlled, **as directed**, spaces that have environmental controls to maintain ambient conditions of **0 to 122 deg F (minus 18 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
 3. rms Real-Time Measurements:
 - a. Current: Each phase, neutral, average of three phases, percent unbalance.
 - b. Voltage: Line-to-line each phase, line-to-line average of three phases, line-to-neutral each phase, line-to-neutral average of three phases, line-to-neutral percent unbalance.
 - c. Power: Per phase and three-phase total.
 - d. Reactive Power: Per phase and three-phase total.
 - e. Apparent Power: Per phase and three-phase total.
 - f. Power Factor: Per phase and three-phase total.
 - g. Displacement Power Factor: Per phase and three-phase total.
 - h. Frequency.
 - i. THD: Current and voltage.
 - j. Accumulated Energy: Real kWh, reactive kVARh, apparent kVAh (signed/absolute).
 - k. Incremental Energy: Real kWh, reactive kVARh, apparent kVAh (signed/absolute).
 - l. Conditional Energy: Real kWh, reactive kVARh, apparent kVAh (signed/absolute).
 4. Demand Current Calculations, per Phase, Three-Phase Average and Neutral:
 - a. Present.
 - b. Running average.
 - c. Last completed interval.
 - d. Peak.
 5. Demand Real Power Calculations, Three-Phase Total:

- a. Present.
- b. Running average.
- c. Last completed interval.
- d. Predicted.
- e. Peak.
- f. Coincident with peak kVA demand.
- g. Coincident with kVAR demand.
6. Demand Reactive Power Calculations, Three-Phase Total:
 - a. Present.
 - b. Running average.
 - c. Last completed interval.
 - d. Predicted.
 - e. Peak.
 - f. Coincident with peak kVA demand.
 - g. Coincident with kVAR demand.
7. Demand Apparent Power Calculations, Three-Phase Total:
 - a. Present.
 - b. Running average.
 - c. Last completed interval.
 - d. Predicted.
 - e. Peak.
 - f. Coincident with peak kVA demand.
 - g. Coincident with kVAR demand.
8. Average Power Factor Calculations, Demand Coincident, Three-Phase Total:
 - a. Last completed interval.
 - b. Coincident with kW peak.
 - c. Coincident with kVAR peak.
 - d. Coincident with kVA peak.
9. Power Analysis Values:
 - a. THD, Voltage and Current: Per phase, three phase, and neutral.
 - b. Displacement Power Factor: Per phase, three phase.
 - c. Fundamental Voltage, Magnitude and Angle: Per phase.
 - d. Fundamental Currents, Magnitude and Angle: Per phase.
 - e. Fundamental Real Power: Per phase, three phase.
 - f. Fundamental Reactive Power: Per phase.
 - g. Harmonic Power: Per phase, three phase.
 - h. Phase rotation.
 - i. Unbalance: Current and voltage.
 - j. Harmonic Magnitudes and Angles for Current and Voltages: Per phase, up to 31st **OR** 63rd, **as directed**, harmonic.
10. Power Demand Calculations: According to one of the following calculation methods, selectable by the user:
 - a. Thermal Demand: Sliding window updated every second for the present demand and at end of the interval for the last interval. Adjustable window that can be set in 1-minute intervals, from 1 to 60 minutes.
 - b. Block Interval with Optional Subintervals: Adjustable for 1-minute intervals, from 1 to 60 minutes. User-defined parameters for the following block intervals:
 - 1) Sliding block that calculates demand every second, with intervals less than 15 minutes, and every 15 seconds with an interval between 15 and 60 minutes.
 - 2) Fixed block that calculates demand at end of the interval.
 - 3) Rolling block subinterval that calculates demand at end of each subinterval and displays it at end of the interval.
 - c. Demand Calculation Initiated by a Synchronization Signal:
 - 1) Signal is a pulse from an external source. Demand period begins with every pulse. Calculation shall be configurable as either a block or rolling block calculation.

- 2) Signal is a communication signal. Calculation shall be configurable as either a block or rolling block calculation.
 - 3) Demand can be synchronized with clock in the power meter.
11. Sampling:
 - a. Current and voltage shall be digitally sampled at a rate high enough to provide accuracy to 63rd harmonic of 60-Hz fundamental.
 - b. Power monitor shall provide continuous sampling at a rate of 128 samples per cycle on all voltage and current channels in the meter.
 12. Minimum and Maximum Values: Record monthly minimum and maximum values, including date and time of record. For three-phase measurements, identify phase of recorded value. Record the following parameters:
 - a. Line-to-line voltage.
 - b. Line-to-neutral voltage.
 - c. Current per phase.
 - d. Line-to-line voltage unbalance.
 - e. Line-to-neutral voltage unbalance.
 - f. Power factor.
 - g. Displacement power factor.
 - h. Total power.
 - i. Total reactive power.
 - j. Total apparent power.
 - k. THD voltage L-L.
 - l. THD voltage L-N.
 - m. THD current.
 - n. Frequency.
 13. Harmonic Calculation: Display and record the following:
 - a. Harmonic magnitudes and angles for each phase voltage and current through 31st **OR** 63rd, **as directed**, harmonic. Calculate for all three phases, current and voltage, and residual current. Current and voltage information for all phases shall be obtained simultaneously from same cycle.
 - b. Harmonic magnitude reported as a percentage of the fundamental or as a percentage of rms values, as selected by user.
 14. Current and Voltage Ratings:
 - a. Designed for use with current inputs from standard instrument current transformers with 5-A secondary and shall have a metering range of 0-10 A.
 - b. Withstand ratings shall be not less than 15 A, continuous; 50 A, lasting over 10 seconds, no more frequently than once per hour; 500 A, lasting 1 second, no more frequently than once per hour.
 - c. Designed for use with voltage inputs from standard instrument potential transformers with a 120-V secondary.
 15. Accuracy:
 - a. Comply with ANSI C12.20, Class 0.5; and IEC 60687, Class 0.5 for revenue meters.
 - b. Accuracy from Light to Full Rating:
 - 1) Power: Accurate to 0.25 percent of reading, plus 0.025 percent of full scale.
 - 2) Voltage and Current: Accurate to 0.075 percent of reading, plus 0.025 percent of full scale.
 - 3) Power Factor: Plus or minus 0.002, from 0.5 leading to 0.5 lagging.
 - 4) Frequency: Plus or minus 0.01 Hz at 45 to 67 Hz.
 16. Waveform Capture:
 - a. Capture and store steady-state waveforms of voltage and current channels; initiated manually. Each capture shall be for 3 cycles, 128 data points for each cycle, allowing resolution of harmonics to 31st harmonic of basic 60 Hz.
 - b. Store captured waveforms in internal nonvolatile memory; available for PC display, archiving, and analysis.
 17. Input: One digital input signal(s).

- a. Normal mode for on/off signal.
 - b. Demand interval synchronization pulse, accepting a demand synchronization pulse from a utility demand meter.
 - c. Conditional energy signal to control conditional energy accumulation.
18. Outputs:
- a. Operated either by user command sent via communication link, or set to operate in response to user-defined alarm or event.
 - b. Closed in either a momentary or latched mode as defined by user.
 - c. Each output relay used in a momentary contact mode shall have an independent timer that can be set by user.
 - d. One digital KY pulse to a user-definable increment of energy measurement. Output ratings shall be up to 120-V ac, 300-V dc, 50 mA, and provide 3500-V rms isolation.
 - e. One relay output module(s), providing a load voltage range from 20- to 240-V ac or from 20- to 30-V dc, supporting a load current of 2 A.
 - f. Output Relay Control:
 - 1) Relay outputs shall operate either by user command sent via communication link or in response to user-defined alarm or event.
 - 2) Normally open and normally closed contacts, field configured to operate as follows:
 - a) Normal contact closure where contacts change state for as long as signal exists.
 - b) Latched mode when contacts change state on receipts of a pickup signal; changed state is held until a dropout signal is received.
 - c) Timed mode when contacts change state on receipt of a pickup signal; changed state is held for a preprogrammed duration.
 - d) End of power demand interval when relay operates as synchronization pulse for other devices.
 - e) Energy Pulse Output: Relay pulses quantities used for absolute kWh, absolute kVARh, kVAh, kWh In, kVARh In, kWh Out, and kVARh Out.
 - f) Output controlled by multiple alarms using Boolean-type logic.
19. Onboard Data Logging:
- a. Store logged data, alarms, events, and waveforms in 80 **OR** 800, **as directed**, KB of onboard nonvolatile memory.
 - b. Stored Data:
 - 1) Billing Log: User configurable; data shall be recorded every 15 minutes, identified by month, day, and 15-minute interval. Accumulate 24 months of monthly data, 32 days of daily data, and between 2 to 52 days of 15-minute interval data, depending on number of quantities selected.
 - 2) Custom Data Logs: One **OR** Three, **as directed**, user-defined log(s) holding up to 96 parameters. Date and time stamp each entry to the second and include the following user definitions:
 - a) Schedule interval.
 - b) Event definition.
 - c) Configured as "fill-and-hold" or "circular, first-in first-out."
 - 3) Alarm Log: Include time, date, event information, and coincident information for each defined alarm or event.
 - 4) Waveform Log: Store captured waveforms configured as "fill-and-hold" or "circular, first-in first-out."
 - c. Default values for all logs shall be initially set at factory, with logging to begin on device power up.
20. Alarms.
- a. User Options:
 - 1) Define pickup, dropout, and delay.
 - 2) Assign one of four severity levels to make it easier for user to respond to the most important events first.
 - 3) Allow for combining up to four alarms using Boolean-type logic statements for outputting a single alarm.

- b. Alarm Events:
 - 1) Over/undercurrent.
 - 2) Over/undervoltage.
 - 3) Current imbalance.
 - 4) Phase loss, current.
 - 5) Phase loss, voltage.
 - 6) Voltage imbalance.
 - 7) Over kW demand.
 - 8) Phase reversal.
 - 9) Digital input off/on.
 - 10) End of incremental energy interval.
 - 11) End of demand interval.
- 21. Control Power: 90- to 457-V ac or 100- to 300-V dc.
- 22. Communications:
 - a. Power monitor shall be permanently connected to communicate via Modbus TCP via a 100 Base-T Ethernet **OR** RS-485 Modbus TCP/IP, **as directed**.
 - b. Local plug-in connections shall be for RS-232 and 100 Base-T Ethernet.
- 23. Display Monitor:
 - a. Backlighted LCD to display metered data with touch-screen **OR** touch-pad, **as directed**, selecting device.
 - b. Touch-screen display shall be a minimum 12-inch diagonal, resolution of 800 by 600 RGB pixels, 256 colors; NEMA 250, Type 1 display enclosure.
 - c. Display four values on one screen at same time.
 - 1) Current, per phase rms, three-phase average and neutral, **as directed**.
 - 2) Voltage, phase to phase, phase to neutral, and three-phase averages of phase to phase and phase to neutral.
 - 3) Real power, per phase and three-phase total.
 - 4) Reactive power, per phase and three-phase total.
 - 5) Apparent power, per phase and three-phase total.
 - 6) Power factor, per phase and three-phase total.
 - 7) Frequency.
 - 8) Demand current, per phase and three-phase average.
 - 9) Demand real power, three-phase total.
 - 10) Demand apparent power, three-phase total.
 - 11) Accumulated energy (MWh and MVARh).
 - 12) THD, current and voltage, per phase.
 - d. Reset: Allow reset of the following parameters at the display:
 - 1) Peak demand current.
 - 2) Peak demand power (kW) and peak demand apparent power (kVA).
 - 3) Energy (MWh) and reactive energy (MVARh).
- G. Standalone, Web-Enabled Monitoring And Control Instrument
 - 1. Separately mounted, permanently installed instrument for power monitoring and control.
 - a. Enclosure: NEMA 250, Type 1 **OR** 12, **as directed**.
 - 2. Environmental Conditions: System components shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability.
 - a. Indoor installation in non-air-conditioned **OR** nontemperature-controlled, **as directed**, spaces that have environmental controls to maintain ambient conditions of **0 to 122 deg F (minus 18 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
 - 3. Power-Distribution Equipment Monitor: Web enabled, with integral network port and embedded Web server with factory-configured firmware and HTML-formatted Web pages for viewing of power monitoring and equipment status information from connected devices equipped with digital communication ports.

4. LAN Connectivity: Multipoint, RS-485 Modbus serial communication network, interconnecting all breaker trip units, protective relays, drives, and metering devices equipped with communications. Serial communication network connected to Ethernet server that functions as a gateway and server, providing data access via 10 Base-T **OR** 100 Base-T **OR** 100 Base-FX, **as directed**, LAN.
5. Communication Devices within the Equipment: Addressed at factory and tested to verify reliable communication with network server.
6. Server Configuration:
 - a. Initial network parameters set using a standard Web browser. Connect via a local operator interface, or an RJ-45 port accessible from front of equipment.
 - b. Network server shall be factory programmed with embedded HTML-formatted Web pages that are user configurable and that provide detailed communication diagnostic information for serial and Ethernet ports as status of RS-485 network; with internal memory management information pages for viewing using a standard Web browser.
 - c. Login: Password protected; password administration accessible from the LAN using a standard Web browser.
 - d. Operating Software: Suitable for local access; firewall protected.
7. Data Access:
 - a. Network server shall include embedded HTML pages providing real-time information from devices connected to RS-485 network ports via a standard Web browser.
8. Equipment Monitoring Options: Login shall be followed by a main menu for selecting summary Web pages that follow.
9. Summary Web pages shall be factory configured to display the following information for each communicating device within the power equipment lineup:
 - a. User-Configured Custom Home Page: Provide for the lineup, showing status-at-a-glance of key operating values, **as directed**.
 - b. Circuit Summary Page: Circuit name, three-phase average rms current, power (kW), power factor, and breaker status.
 - c. Load Current Summary Page: Circuit name, Phase A, B, and C rms current values.
 - d. Demand Current Summary Page: Circuit name, Phase A, B, and C average demand current values.
 - e. Power Summary Page: Circuit name, present demand power (kW), peak demand power (kW), and recorded time and date.
 - f. Energy Summary Page: Circuit name, energy (kWh), reactive energy (kVARh), and time/date of last reset.
 - g. Transformer Status Page: Transformer tag, coil temperatures, and cooling fan status.
 - h. Motor-Control Center Status Page: Circuit name, three-phase average rms current, thermal capacity (percentage), and drive output frequency (Hz) contactor status.
 - i. Specific Device Pages: Each individual communicating device shall display detailed, real-time information, as appropriate for device type.
 - 1) Display historical energy data that shall be logged automatically for each device, as appropriate for device type.
 - 2) Display historical data logged from each device in graphical time-trend plots. Value to be displayed on time-trend plot shall be user selectable. Time interval to be displayed on scale shall be for previous day or week.
 - j. Export historical energy data to a PC or workstation through network using FTP (File Transfer Protocol). Format exported data in a CSV (Comma Separated Variable) file format for importing into spreadsheet applications.
10. Communications:
 - a. Power monitor: Permanently connected to communicate via RS-485 Modbus TCP/IP **OR** Modbus TCP via an 100 Base-T Ethernet, **as directed**.
 - b. Local Plug-in Connections: RS-232 and 100 Base-T Ethernet.
 - c. Monitor Display: Backlighted LCD to display metered data with touch-screen **OR** touch-pad, **as directed**, selecting device.

H. Workstation Hardware

1. Environmental Conditions: System components shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Indoor installation in spaces that have environmental controls to maintain ambient conditions of **36 to 122 deg F (2 to 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
2. Computer: Standard unmodified PC of modular design. CPU word size shall be 32 bytes or larger; CPU operating speed shall be at least 66 MHz **OR** GHz, **as directed**.
 - a. Memory: 256 MB of usable installed memory, expandable to a minimum of 1024 MB without additional chassis or power supplies.
 - b. Real-Time Clock:
 - 1) Accuracy: Plus or minus 1 minute per month.
 - 2) Time Keeping Format: 24-hour time format including seconds, minutes, hours, date, day, and month; automatic reset by software.
 - 3) Clock shall function for one year without power.
 - 4) Provide automatic time correction once every 24 hours by synchronizing clock with the Time Service Department of the U.S. Naval Observatory.
 - c. Serial Ports: Two RS-232-F serial ports for general use, with additional ports as required. Data transmission rates shall be selectable under program control.
 - d. Parallel Port: Enhanced.
 - e. LAN Adapter Card: 10/100-Mbps PCI bus, internal network interface card.
 - f. Sound Card: For playback and recording of digital WAV sound files associated with audible warning and alarm functions.
 - g. Color Monitor: PC compatible, not less than **18 inches (455 mm)**, LCD type, with a minimum resolution of 1280 by 1024 pixels, noninterlaced, and a maximum dot pitch of 0.28 mm.
 - h. Keyboard: Minimum of 64 characters, standard ASCII character set based on ANSI INCITS 154.
 - i. Mouse: Standard, compatible with installed software.
 - j. Disk Storage: Include the following, each with appropriate controller:
 - 1) Minimum 80-GB hard disk, maximum average access time of 10 ms.
 - 2) Floppy Disk Drive: High density, **3-1/2-inch (90-mm)** size.
 - 3) PCMCIA slot with removable 500-MB media.
 - 4) 100-MB Iomega Zip drive.
 - 5) 250-MB Iomega Jaz drive.
 - k. Magnetic Tape System, **as directed**: 4-mm cartridge magnetic tape system with minimum **2 OR 4 OR 12 OR 20, as directed**,-GB formatted capacity per tape. Provide 10 tapes, each in a rigid cartridge with spring-loaded cover and operator-selectable write-protect feature.
 - l. Modem: 56,600 bps, full duplex for asynchronous communications. With error detection, auto answer/autodial, and call-in-progress detection. Modem shall comply with requirements in ITU-T v.34, ITU-T v.42, ITU-T v.42 Appendix VI for error correction, and ITU-T v.42 BIS for data compression standards; and shall be suitable for operating on unconditioned voice-grade telephone lines complying with 47 CFR 68.
 - m. Audible Alarm: Manufacturer's standard.
 - n. CD-ROM Drive:
 - 1) Nominal Storage Capacity: 650 MB.
 - 2) Data Transfer Rate: 1.2 Mbps.
 - 3) Average Access Time: 150 ms.
 - 4) Cache Memory: 256 KB.
 - 5) Data Throughput: 1 MB/second, minimum.
 - o. Report Printer: Minimum resolution 600 dpi laser printer.
 - 1) Connected to central station and designated workstations.
 - 2) RAM: 2 MB, minimum.
 - 3) Printing Speed: Minimum 12 pages per minute.

- 4) Paper Handling: Automatic sheet feeder with 250-sheet paper cassette and with automatic feed.
- p. Interface: Bidirectional parallel and universal serial bus.
- q. LAN Adapter Card: 10/100-Mbps internal network interface card.
3. Redundant Central Computer: Connected in a hot standby, peer configuration; automatically maintains copies of system software, application software, and data files. System transactions and other activities that alter system data files shall be updated to system files of redundant computer in near real-time. If central computer fails, redundant computer shall assume control immediately and automatically.
4. UPS: Self-contained; complying with requirements in Division 26 Section "Static Uninterruptible Power Supply".
 - a. Size: Provide a minimum of 6 hours of operation of workstation station equipment, including 2 hours of alarm printer operation, **as directed**.
 - b. Batteries: Sealed, valve regulated, recombinant, lead calcium.
 - c. Accessories:
 - 1) Transient voltage suppression.
 - 2) Input-harmonics reduction.
 - 3) Rectifier/charger.
 - 4) Battery disconnect device.
 - 5) Static bypass transfer switch.
 - 6) Internal maintenance bypass/isolation switch.
 - 7) External maintenance bypass/isolation switch.
 - 8) Output isolation transformer.
 - 9) Remote UPS monitoring.
 - 10) Battery monitoring.
 - 11) Remote battery monitoring.
- I. RS-232 ASCII Interface
 1. ASCII interface shall allow RS-232 connections to be made between a meter or circuit monitor operating as the host PC and any equipment that will accept RS-232 ASCII command strings, such as local display panels **OR** dial-up modems **OR** alarm transmitters, **as directed**.
 2. Pager System Interface: Alarms shall be able to activate a pager system with customized message for each input alarm.
 - a. RS-232 output shall be capable of connection to a pager interface that can be used to call a paging system or service and send a signal to a portable pager. System shall allow an individual alphanumeric message per alarm input to be sent to paging system. This interface shall support both numeric and alphanumeric pagers.
 3. Alarm System Interface:
 - a. RS-232 output shall be capable of transmitting alarms from other monitoring and alarm systems to workstation software.
 4. Cables:
 - a. PVC-Jacketed, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; PVC jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - 1) NFPA 70, Type CM.
 - 2) Flame Resistance: UL 1581, Vertical Tray.
 - b. Plenum-Type, RS-232 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage; plastic jacket. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - 1) NFPA 70, Type CMP.
 - 2) Flame Resistance: NFPA 262, Flame Test.
- J. LAN Cables
 1. Comply with Division 27 Section "Communications Horizontal Cabling".

2. RS-485 Cable:
 - a. PVC-Jacketed, RS-485 Cable: Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.
 - b. Plenum-Type, RS-485 Cable: Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket, and NFPA 70, Type CMP.
3. Unshielded Twisted Pair Cables: Category 5e **OR 6, as directed**, as specified for horizontal cable for data service in Division 27 Section "Communications Horizontal Cabling".

K. Low-Voltage Wiring

1. Low-Voltage Control Cable: Multiple conductor, color-coded, No. 20 AWG copper, minimum.
 - a. Sheath: PVC; except in plenum-type spaces, use sheath listed for plenums.
 - b. Ordinary Switching Circuits: Three conductors, unless otherwise indicated.
 - c. Switching Circuits with Pilot Lights or Locator Feature: Five conductors, unless otherwise indicated.

1.3 EXECUTION

A. Cabling

1. Comply with NECA 1.
2. Install cables and wiring according to requirements in Division 27 Section "Communications Horizontal Cabling".
3. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.
OR
Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
4. Install LAN cables using techniques, practices, and methods that are consistent with specified category rating of components and that ensure specified category performance of completed and linked signal paths, end to end.
5. Install cables without damaging conductors, shield, or jacket.

B. Identification

1. Identify components and power and control wiring according to Division 26 Section "Identification For Electrical Systems".
2. Label each power monitoring and control module with a unique designation.

C. Grounding

1. Comply with IEEE 1100, "Power and Grounding Sensitive Electronic Equipment."

D. Field Quality Control

1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Electrical Tests: Use caution when testing devices containing solid-state components.
 - b. Continuity tests of circuits.
 - c. Operational Tests: Set and operate controls at workstation and at monitored and controlled devices to demonstrate their functions and capabilities. Use a methodical sequence that cues and reproduces actual operating functions as recommended by

manufacturer. Submit sequences for approval. Note response to each test command and operation. Note time intervals between initiation of alarm conditions and registration of alarms at central-processing workstation.

- 1) Coordinate testing required by this Section with that required by Sections specifying equipment being monitored and controlled.
 - 2) Test LANs according to requirements in Division 27 Section "Communications Horizontal Cabling".
 - 3) System components with battery backup shall be operated on battery power for a period of not less than 10 percent of calculated battery operating time.
 - 4) Verify accuracy of graphic screens and icons.
 - 5) Metering Test: Load feeders, measure loads on feeder conductor with an rms reading clamp-on ammeter, and simultaneously read indicated current on the same phase at central-processing workstation. Record and compare values measured at the two locations. Resolve discrepancies greater than 5 percent and record resolution method and results.
 - 6) Record metered values, control settings, operations, cues, time intervals, and functional observations and submit test reports printed by workstation printer.
3. Correct deficiencies, make necessary adjustments, and retest. Verify that specified requirements are met.
 4. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
 5. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.
 6. Remove and replace malfunctioning devices and circuits and retest as specified above.

E. Demonstration

1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain systems.
 - a. Train the Owner's management and maintenance personnel in interpreting and using monitoring displays and in configuring and using software and reports. Include troubleshooting, servicing, adjusting, and maintaining equipment. Provide a minimum of 12 hours' training.
 - b. Training Aid: Use approved final versions of software and maintenance manuals as training aids.

END OF SECTION 26 09 23 00

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SECTION 26 09 23 00a - LIGHTING CONTROL DEVICES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for lighting control devices. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following lighting control devices:
 - a. Time switches.
 - b. Outdoor and Indoor photoelectric switches.
 - c. Indoor occupancy sensors.
 - d. Outdoor motion sensors.
 - e. Lighting contactors.
 - f. Emergency shunt relays.

C. Definitions

1. LED: Light-emitting diode.
2. PIR: Passive infrared.

D. Submittals

1. Product Data: For each type of product indicated.
2. Field quality-control test reports.
3. Operation and maintenance data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.2 PRODUCTS

A. Time Switches

1. Electronic Time Switches: Electronic, solid-state programmable units with alphanumeric display; complying with UL 917.
 - a. Contact Configuration: SPST **OR** DPST **OR** DPDT, **as directed**.
 - b. Contact Rating: 30-A inductive or resistive, 240-V ac **OR** 20-A ballast load, 120/240-V ac, **as directed**.
 - c. Program: 8 on-off set points on a 24-hour schedule and an annual holiday schedule that overrides the weekly operation on holidays, **as directed**.
OR
Program: 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week and an annual holiday schedule that overrides the weekly operation on holidays, **as directed**.
OR
Programs: channels; each channel shall be individually programmable with 8 on-off set points on a 24-hour schedule.
OR
Programs: channels; each channel shall be individually programmable with 2 on-off set points on a 24-hour schedule with skip-a-day weekly schedule.

OR

Programs: channels; each channel shall be individually programmable with 2 on-off set points on a 24-hour schedule, allowing different set points for each day of the week.

OR

Programs: channels; each channel shall be individually programmable with 40 on-off operations per week and an annual holiday schedule that overrides the weekly operation on holidays.

OR

Programs: channels; each channel shall be individually programmable with 40 on-off operations per week, plus 4 seasonal schedules that modify the basic program, and an annual holiday schedule that overrides the weekly operation on holidays.

OR

Program: Configuration, as directed by the Owner and an annual holiday schedule that overrides the weekly operation on holidays, **as directed**.

- d. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program on selected channels, **as directed**.
 - e. Astronomic Time: All **OR** Selected, **as directed**, channels.
 - f. Battery Backup: For schedules and time clock.
2. Electromechanical-Dial Time Switches: Type complying with UL 917.
- a. Contact Configuration: SPST **OR** DPST **OR** SPDT **OR** DPDT, **as directed**.
 - b. Contact Rating: 30-A inductive or resistive, 240-V ac **OR** 20-A ballast load, 120/240-V ac, **as directed**.
 - c. Circuitry: Allow connection of a photoelectric relay as substitute for on-off function of a program.
 - d. Astronomic time dial.
 - e. Eight-Day Program: Uniquely programmable for each weekday and holidays.
 - f. Skip-a-day mode.
 - g. Wound-spring reserve carryover mechanism to keep time during power failures, minimum of 16 hours.

B. Outdoor Photoelectric Switches

1. Description: Solid state, with SPST **OR** DPST, **as directed**, dry contacts rated for 1800-VA tungsten or 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.
 - a. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of photocell to prevent fixed light sources from causing turn-off, **as directed**.
 - b. Time Delay: 15-second minimum, to prevent false operation.
 - c. Surge Protection: Metal-oxide varistor, complying with IEEE C62.41.1, IEEE C62.41.2, and IEEE 62.45 for Category A1 locations.
 - d. Mounting: Twist lock complying with IEEE C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.

OR

Description: Solid state, with SPST **OR** DPST, **as directed**, dry contacts rated for 1800 VA to operate connected load, relay, or contactor coils; complying with UL 773.

- a. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lx), with an adjustment for turn-on and turn-off levels within that range.
- b. Time Delay: 30-second minimum, to prevent false operation.
- c. Lightning Arrester: Air-gap type.
- d. Mounting: Twist lock complying with IEEE C136.10, with base.

C. Indoor Photoelectric Switches

1. Ceiling-Mounted Photoelectric Switch: Solid-state, light-level sensor unit, with separate relay unit mounted on luminaire, **as directed**, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
 - a. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 - b. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 - c. Light-Level Monitoring Range: **10 to 200 fc (108 to 2152 lx) OR 100 to 1000 fc (1080 to 10 800 lx)**, **as directed**, with an adjustment for turn-on and turn-off levels within that range.
 - d. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
 - e. Indicator: Two LEDs to indicate the beginning of on-off cycles.
 2. Skylight Photoelectric Sensors: Solid-state, light-level sensor; housed in a threaded, plastic fitting for mounting under skylight, facing up at skylight; with separate relay unit mounted on luminaire, **as directed**, to detect changes in lighting levels that are perceived by the eye. Cadmium sulfide photoresistors are not acceptable.
 - a. Sensor Output: Contacts rated to operate the associated relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 - b. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 - c. Light-Level Monitoring Range: **1000 to 10,000 fc (10 800 to 108 000 lx)**, with an adjustment for turn-on and turn-off levels within that range.
 - d. Time Delay: Adjustable from 5 to 300 seconds to prevent cycling, with deadband adjustment.
 - e. Indicator: Two LEDs to indicate the beginning of on-off cycles.
- D. Indoor Occupancy Sensors
1. General Description: Wall- or ceiling-mounting, solid-state units with a separate relay unit.
 - a. Operation: Unless otherwise indicated, turn lights on when covered area is occupied and off when unoccupied; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 - b. Sensor Output: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 - c. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.
 - d. Mounting:
 - 1) Sensor: Suitable for mounting in any position on a standard outlet box.
 - 2) Relay: Externally mounted through a **1/2-inch (13-mm)** knockout in a standard electrical enclosure.
 - 3) Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 - e. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.
 - f. Bypass Switch: Override the on function in case of sensor failure.
 - g. Automatic Light-Level Sensor: Adjustable from **2 to 200 fc (21.5 to 2152 lx)**; keep lighting off when selected lighting level is present.
 2. PIR Type: Ceiling mounting; detect occupancy by sensing a combination of heat and movement in area of coverage.
 - a. Detector Sensitivity: Detect occurrences of **6-inch- (150-mm-)** minimum movement of any portion of a human body that presents a target of not less than **36 sq. in. (232 sq. cm)**.
 - b. Detection Coverage (Room): Detect occupancy anywhere in a circular area of **1000 sq. ft. (93 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.

- c. Detection Coverage (Corridor): Detect occupancy within **90 feet (27.4 m)** when mounted on a **10-foot- (3-m-)** high ceiling.
 - 3. Ultrasonic Type: Ceiling mounting; detect occupancy by sensing a change in pattern of reflected ultrasonic energy in area of coverage.
 - a. Detector Sensitivity: Detect a person of average size and weight moving not less than **12 inches (305 mm)** in either a horizontal or a vertical manner at an approximate speed of **12 inches/s (305 mm/s)**.
 - b. Detection Coverage (Small Room): Detect occupancy anywhere within a circular area of **600 sq. ft. (56 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
 - c. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of **1000 sq. ft. (93 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
 - d. Detection Coverage (Large Room): Detect occupancy anywhere within a circular area of **2000 sq. ft. (186 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
 - e. Detection Coverage (Corridor): Detect occupancy anywhere within **90 feet (27.4 m)** when mounted on a **10-foot- (3-m-)** high ceiling in a corridor not wider than **14 feet (4.3 m)**.
 - 4. Dual-Technology Type: Ceiling mounting; detect occupancy by using a combination of PIR and ultrasonic detection methods in area of coverage. Particular technology or combination of technologies that controls on-off functions shall be selectable in the field by operating controls on unit.
 - a. Sensitivity Adjustment: Separate for each sensing technology.
 - b. Detector Sensitivity: Detect occurrences of **6-inch- (150-mm-)** minimum movement of any portion of a human body that presents a target of not less than **36 sq. in. (232 sq. cm)**, and detect a person of average size and weight moving not less than **12 inches (305 mm)** in either a horizontal or a vertical manner at an approximate speed of **12 inches/s (305 mm/s)**.
 - c. Detection Coverage (Standard Room): Detect occupancy anywhere within a circular area of **1000 sq. ft. (93 sq. m)** when mounted on a **96-inch- (2440-mm-)** high ceiling.
- E. Outdoor Motion Sensors (PIR)
 - 1. Performance Requirements: Suitable for operation in ambient temperatures ranging from **minus 40 to plus 130 deg F (minus 40 to plus 54 deg C)**, rated as raintight according to UL 773A.
 - a. Operation: Turn lights on when sensing infrared energy changes between background and moving body in area of coverage; with a time delay for turning lights off, adjustable over a minimum range of 1 to 15 minutes.
 - b. Mounting:
 - 1) Sensor: Suitable for mounting in any position on a standard outdoor junction box.
 - 2) Relay: Internally mounted in a standard weatherproof electrical enclosure.
 - 3) Time-Delay and Sensitivity Adjustments: Recessed and concealed behind hinged door.
 - c. Bypass Switch: Override the on function in case of sensor failure.
 - d. Automatic Light-Level Sensor: Adjustable from **1 to 20 fc (11 to 215 lx)**; keep lighting off during daylight hours.
 - 2. Detector Sensitivity: Detect occurrences of **6-inch- (150-mm-)** minimum movement of any portion of a human body that presents a target of not less than **36 sq. in. (232 sq. cm)**.
 - 3. Detection Coverage: Up to **35 feet (11 m)**, with a field of view of 90 degrees **OR** Up to **100 feet (30 m)**, with a field of view of 60 degrees **OR** Up to **35 feet (11 m)**, with a field of view of 180 degrees **OR** Up to **52.5 feet (16 m)**, with a field of view of 270 degrees, **as directed**.
 - 4. Lighting Fixture Mounted Sensor: Suitable for switching 300 W of tungsten load at 120- or 277-V ac.
 - 5. Individually Mounted Sensor: Contacts rated to operate the connected relay, complying with UL 773A. Sensor shall be powered from the relay unit.
 - a. Relay Unit: Dry contacts rated for 20-A ballast load at 120- and 277-V ac, for 13-A tungsten at 120-V ac, and for 1 hp at 120-V ac. Power supply to sensor shall be 24-V dc, 150-mA, Class 2 power source as defined by NFPA 70.

- b. Indicator: LED, to show when motion is being detected during testing and normal operation of the sensor.

F. Lighting Contactors

- 1. Description: Electrically operated and mechanically **OR** electrically, **as directed**, held, combination type with fusible switch **OR** nonfused disconnect, **as directed**, complying with NEMA ICS 2 and UL 508.
 - a. Current Rating for Switching: Listing or rating consistent with type of load served, including tungsten filament, inductive, and high-inrush ballast (ballast with 15 percent or less total harmonic distortion of normal load current).
 - b. Fault Current Withstand Rating: Equal to or exceeding the available fault current at the point of installation.
 - c. Enclosure: Comply with NEMA 250.
 - d. Provide with control and pilot devices as indicated on Drawings **OR** scheduled, **as directed**, matching the NEMA type specified for the enclosure.
- 2. BAS Interface: Provide hardware interface to enable the BAS to monitor and control lighting contactors.
 - a. Monitoring: On-off status, as directed by the Owner.
 - b. Control: On-off operation, as directed by the Owner.

G. Emergency Shunt Relay

- 1. Description: Normally closed, electrically held relay, arranged for wiring in parallel with manual or automatic, **as directed**, switching contacts; complying with UL 924.
 - a. Coil Rating: 120 **OR** 277, **as directed**, V.

H. Conductors And Cables

- 1. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- 2. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 **OR** 22 **OR** 24, **as directed**, AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- 3. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 **OR** 16 **OR** 18, **as directed**, AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

1.3 EXECUTION

A. Sensor Installation

- 1. Install and aim sensors in locations to achieve not less than 90 percent coverage of areas indicated. Do not exceed coverage limits specified in manufacturer's written instructions.

B. Contactor Installation

- 1. Mount electrically held lighting contactors with elastomeric isolator pads, to eliminate structure-borne vibration, unless contactors are installed in an enclosure with factory-installed vibration isolators.

C. Wiring Installation

- 1. Wiring Method: Comply with Division 26 Section "Low-voltage Electrical Power Conductors And Cables". Minimum conduit size shall be **1/2 inch (13 mm)**.
- 2. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- 3. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.

4. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
- D. Identification
1. Identify components and power and control wiring according to Division 26 Section "Identification For Electrical Systems".
 - a. Identify controlled circuits in lighting contactors.
 - b. Identify circuits or luminaries controlled by photoelectric and occupancy sensors at each sensor.
 2. Label time switches and contactors with a unique designation.
- E. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. After installing time switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - b. Operational Test: Verify operation of each lighting control device, and adjust time delays.
 2. Lighting control devices that fail tests and inspections are defective work.

END OF SECTION 26 09 23 00a

SECTION 26 09 23 00b - LIGHTING CONTROLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for lighting controls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes manually operated lighting controls with relays, electrically operated circuit breakers, and control module.
2. This Section includes manually operated, PC-based, digital lighting controls with external signal source, relays, electrically operated circuit breakers, and control module.
3. This Section includes individually addressable lighting control devices communicating with data-entry and -retrieval devices using DALI protocol.

C. Definitions

1. BACnet: A networking communication protocol that complies with ASHRAE 135.
2. BAS: Building automation system.
3. DALI: Digital addressable lighting interface.
4. LonWorks: A control network technology platform for designing and implementing interoperable control devices and networks.
5. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.
6. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
7. PC: Personal computer; sometimes plural as "PCs."
8. Power Line Carrier: Use of radio-frequency energy to transmit information over transmission lines whose primary purpose is the transmission of power.
9. RS-485: A serial network protocol, similar to RS-232, complying with TIA/EIA-485-A.

D. Submittals

1. Product Data: For control modules, power distribution components, DALI network materials, manual switches and plates, and conductors and cables.
2. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on this Project.
 - a. Outline Drawings: Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
 - b. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices to be used. Describe characteristics of network and other data communication lines.
 - c. Wiring Diagrams: Power, signal, and control wiring. Coordinate nomenclature and presentation with a block diagram.
3. Coordination Drawings: Submit evidence that lighting controls are compatible with connected monitoring and control devices and systems specified in other Sections.
 - a. Show interconnecting signal and control wiring and interfacing devices that prove compatibility of inputs and outputs.
 - b. For networked controls, list network protocols and provide statements from manufacturers that input and output devices meet interoperability requirements of the network protocol.

4. Software and Firmware Operational Documentation:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On a magnetic media or compact disc, complete with data files.
 - c. Device address list.
 - d. Printout of software application and graphic screens.
 5. Field quality-control test reports.
 6. Software licenses and upgrades required by and installed for operation and programming of digital and analog devices.
 7. Operation and maintenance data.
 8. Warranty: Special warranty specified in this Section.
- E. Quality Assurance
1. Source Limitations: Obtain lighting control module and power distribution components through one source from a single manufacturer.
 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 3. Comply with 47 CFR, Subparts A and B, for Class A digital devices.
 4. Comply with protocol described in IEC 60929, Annex E, for DALI lighting control devices, wiring, and computer hardware and software.
 5. Comply with NFPA 70.
- F. Coordination
1. Coordinate lighting control components to form an integrated interconnection of compatible components. Match components and interconnections for optimum performance of lighting control functions.
 - a. Coordinate lighting controls with BAS **OR** HVAC controls, **as directed**. Design display graphics showing building areas controlled; include the status of lighting controls in each area.
 - b. Coordinate lighting controls with that in Sections specifying distribution components that are monitored or controlled by power monitoring and control equipment.
 2. Coordinate lighting control components specified in this Section with components specified in Division 26 Section "Panelboards".
- G. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of lighting controls that fail in materials or workmanship or from transient voltage surges within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Failure of software input/output to execute switching or dimming commands.
 - 2) Failure of modular relays to operate under manual or software commands.
 - 3) Damage of electronic components due to transient voltage surges.
 - b. Warranty Period: Two years from date of Final Completion.
 - c. Extended Warranty Period Failure Due to Transient Voltage Surges: Eight years.
 - d. Extended Warranty Period for Electrically Held Relays: 10 years from date of Final Completion.
- H. Software Service Agreement (May Not Be Allowed For Publicly Funded Projects)
1. Technical Support: Beginning with Final Completion, provide software support for two years.
 2. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revise licenses for use of the software.

- a. Provide 30-day notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment, if necessary.

1.2 PRODUCTS

A. System Requirements

1. Expandability: System shall be capable of increasing the number of control functions in the future by 25 percent of current capacity; to include equipment ratings, housing capacities, spare relays, terminals, number of conductors in control cables, and control software.
2. Performance Requirements (for programmable system that controls manual and automatic operation that is not PC based): Manual switch operation sends a signal to programmable-system control module that processes the signal according to its programming and routes an open or close command to one or more relays **OR** electrically operated circuit breakers, **as directed**, in the power-supply circuits to groups of lighting fixtures or other loads.
3. Performance Requirements (for PC-based programmable system that controls manual and automatic operation): Manual switches, an internal timing and control unit, and external sensors or other control signal sources send a signal to a PC-based programmable-system control module that processes the signal according to its programming and routes an open or close command to one or more relays **OR** electrically operated circuit breakers, **as directed**, in the power-supply circuits, or routes variable commands to one or more dimmers, for groups of lighting fixtures or other loads.
4. Performance Requirements (for DALI-compliant program): Individually addressable devices (such as electronic ballasts, dimmers, and manual switches) are operated from digital signals received through a DALI-compliant bus, from data-entry and -retrieval devices (such as PCs, personal digital assistants (PDAs), hand-held infrared programming devices, wired Ethernet hubs, wireless IEEE 802.11 hubs). Devices also report status to data-entry and -retrieval devices through the bus.
5. BAS Interface: Provide hardware and software to enable the BAS to monitor, control, display, and record data for use in processing reports.
 - a. Hardwired Points:
 - 1) Monitoring: On-off status, as directed by the Owner .
 - 2) Control: On-off operation, as directed by the Owner .
 - b. ASHRAE 135 (BACnet) **OR** LonTalk **OR** Modbus **OR** Industry-accepted, open-protocol, **as directed**, communication interface with the BAS shall enable the BAS operator to remotely control and monitor lighting from a BAS operator workstation. Control features and monitoring points displayed locally at lighting panel shall be available through the BAS.

B. Control Module

1. Control Module Description: (This is a generic, nonproprietary control module that is not PC based.) Comply with UL 916 (CSA C22.2, No. 205); microprocessor-based, solid-state, 365-day timing and control unit. Output circuits shall be switched on or off by internally programmed time signals or by program-controlled analog or digital signals from external sources. Output circuits shall be pilot-duty relays compatible with power switching devices. An integral keypad shall provide local programming and control capability. A key-locked cover and a programmed security access code shall protect keypad use. An integral alphanumeric LCD or LED shall display menu-assisted programming and control.
2. Control Module Description: (These are typical systems developed by time-switch manufacturers as an expansion and refinement of their microprocessor-based, digital, time-switch product lines - controls are not PC based.) Comply with UL 916 (CSA C22.2, No. 205); microprocessor-based, solid-state, 365-day timing and control unit. Unit shall be programmable for control of indicated number of output circuits. Output circuits shall be switched on or off by internally programmed time signals or by program-controlled analog or digital signals from external sources. Output circuits shall be pilot-duty relays compatible with power switching devices, all located in other enclosures. An integral keypad shall provide local programming and control capability. A key-locked cover and a programmed security access code shall protect keypad use. An integral

alphanumeric LCD shall display manual-control and programming steps. Modules and their associated control panels shall include the following features:

- a. Multichannel output with channels as directed by the Owner .
OR
Multiple inputs and multichannel output arranged for channels as directed by the Owner .
- b. Multiple inputs for indicated occupancy sensors and hand-held programming device.
3. Control Module Description: (These are low-voltage control systems developed by high-end, remote-control dimmer system manufacturers - controls are not PC based.) Comply with UL 916 (CSA C22.2, No. 205); microprocessor-based, solid-state, 365-day timing and control unit. Control units shall be programmable and capable of receiving inputs from indicated sensors and hand-held programmer. Output circuits shall be pilot-duty relays compatible with power switching devices. Output circuits shall include digital circuits arranged to transmit control commands to remote preset dimmers. Modules and their associated control panels shall include the following features:
 - a. Multichannel output with channels as directed by the Owner .
OR
Multiple inputs and multichannel output arranged for channels as directed by the Owner .
 - b. Multiple inputs for occupancy sensors, daylight sensors, and dimming systems with associated daylight sensors.
4. Control Module Description: (This is a low-voltage control system developed around panelboards with electrically operated, molded-case circuit breakers and control module installed in panelboard - controls are not PC based.) Panelboard mounted; comply with UL 916 (CSA C22.2, No. 205); microprocessor based, solid-state, 365-day timing and control unit. Control units shall be programmable and capable of receiving inputs from sensors and other sources. Panelboard shall use low-voltage-controlled, electrically operated, molded-case branch circuit breakers as prime power-circuit switching devices. Circuit breakers and a limited number of digital or analog, low-voltage control-circuit outputs shall be individually controlled by control module. Line-voltage components and wiring shall be separated from low-voltage components and wiring by barriers. Control module shall be locally programmable. Panelboard shall also comply with Division 26 Section "Panelboards".
5. Control Module Description: (This is a refinement of classic low-voltage control system originally developed for manual, multipoint lighting control using latching-type, single-pole relays to switch 120- and 277-V circuits - controls are not PC based.) Comply with UL 508 (CSA C22.2, No. 14); microprocessor-based, programmable, control unit; mounted in preassembled, modular relay panel. Low-voltage-controlled, latching-type, single-pole lighting circuit relays shall be prime output circuit devices. Where indicated, a limited number of digital or analog, low-voltage control-circuit outputs shall be supported by control unit and circuit boards associated with relays. Control units shall be capable of receiving inputs from sensors and other sources. Line-voltage components and wiring shall be separated from low-voltage components and wiring by barriers. Control module shall be locally programmable.
6. Control Module Description: (This is a typical PC-based software control system developed to operate panelboards with electrically operated circuit breakers, relay boards with latching-type control relays, and individually addressable DALI-compliant devices. This control scheme is also suitable for integrating one or more of these boards to a PC-based control network (such as BAS, detention monitoring and control system, and HVAC control system) specified in another Section.) Programmable, PC-based unit with 17-inch color video monitor **OR** 15-inch color LCD, **as directed**, and keyboard for graphic display and programming of system status and to override breaker status; and to display status of local override controls and diagnostic information. If the control module is applied to emergency lighting units, control unit shall indicate failure of normal power and that the lighting units are, or are not, powered by the alternate power source.
 - a. Display: Single graphic display for programming lighting control panelboards.
OR
Display: Separate graphic displays for programming each lighting control panelboard.
 - b. Interoperability: Control module shall be configured to connect with other control systems using RS-485 network to enable remote workstations to use control module functions.

OR

Interoperability: Control module shall be configured to connect to LonWorks-compliant **OR** BACnet-compliant, **as directed**, network, resulting in extending control to any network-compliant devices such as occupancy switches.

OR

Interoperability: Lighting control shall be configured to allow individual users to turn lighting on and off with their PCs. Software shall be written for Windows operating system, with Web page as the display and ActiveX controls that can be accessed through an Internet browser. Include at least three levels of password protection. Include an egress lighting option that will provide each user with a lighted path for exiting the building after normal working hours.

OR

Interoperability: Lighting control shall be configured to allow individual users to turn lighting on and off with DALI-compliant, digital-communication devices. Software shall be written for Windows operating system, with the full suite of DALI commands and device parameter settings.

- c. System Memory: Nonvolatile. System shall reboot program and reset time automatically without errors after power outages up to 90 days' duration.
- d. Software: Lighting control software shall be capable of linking switch inputs to relay outputs, retrieving links, viewing relay output status, controlling relay outputs, simulating switch inputs, setting device addresses, and assigning switch input and relay output modes.
- e. Automatic Time Adjustment: System shall automatically adjust for leap year and daylight saving time and shall provide weekly routine and annual holiday scheduling.
- f. Astronomic Control: Automatic adjustment of dawn and dusk switching.
- g. Demand Control: Demand shall be monitored through pulses from a remote meter and shall be controlled by programmed switching of loads. System capability shall include sliding window averaging and programming of load priorities and characteristics. Minimum of two different time-of-day demand schedules shall execute load-management control actions by switching output circuits or by transmitting other types of load-control signals.
- h. Confirmation: Each relay or contactor device operated by system shall have auxiliary contacts that provide a confirmation signal to the system of on or off status of device. On or off status confirmation for each electrically operated circuit breaker shall be provided by an auxiliary contact or by a sensing device at load terminal.
 - 1) Software shall interpret status signals, provide for their display, and initiate failure signals.

OR

Lamp or LED at control module or display panel shall identify status of each controlled circuit.

- i. Remote Communication Capability: Allow programming, data-gathering interrogation, status display, and controlled command override from a PC at a remote location over telephone lines **OR** data links **OR** DALI networks **OR** power line carrier, **as directed**. System shall include modem, communications and control software, and remote computer compatibility verification for this purpose.
- j. Telephone Override Capability: Override programmed lighting shutdown commands by telephoning computer and shall enter a voice-menu-guided, override touch-tone code specific to zone being controlled.
- k. Local Override Capability: Manual, low-voltage control devices shall override programmed shutdown of lighting and shall override other programmed control for intervals that may be duration programmed.
- l. Automatic Control of Local Override: Automatic control shall switch lighting off if lighting has been switched on by local override. Comply with provisions in California Code of Regulations, Title 24, Part 6, **as directed**.
- m. Automatic battery backup shall provide power to maintain program and system clock operation for 90 days' minimum duration when power is off.
- n. Programmed time signals shall change preset scenes and dimmer settings.

- o. Daylight Balancing Dimming Control: Control module shall interpret variable analog signal from photoelectric sensor and shall route dimming signals to dimming fluorescent ballast control circuits. Signal shall control dimming of fixture so illumination level remains constant as daylight contribution varies.
- p. Daylight Compensating Switch Control: Control module shall interpret a preset threshold illumination-level signal from a photoelectric relay and shall activate relays controlling power to selected groups of lighting fixtures to turn them on and off to maintain adjustable minimum illumination level as daylight contribution varies.
- q. Energy Conservation: Bilevel control of special ballasts or dimming circuits to comply with local energy codes.
- r. Flick Warning: Programmable momentary turnoff of lights shall warn that programmed shutoff will occur after a preset interval. Warning shall be repeated after a second preset interval before end of programmed override period.
- s. Diagnostics: When system operates improperly, software shall initiate factory-programmed diagnosis of failure and display messages identifying problem and possible causes.
- t. Additional Programming: In addition to system programming by the PC, individual control modules shall be programmable using data-entry and -retrieval (such as PCs, personal digital assistants (PDAs), hand-held infrared programming devices, wired Ethernet hubs, wireless IEEE 802.11 hubs).

C. Power Distribution Components (For DALI-Compliant Networks)

1. Modular Relay Panel: Comply with UL 508 (CSA C22.2, No. 14) and UL 916 (CSA C22.2, No. 205); factory assembled with modular single-pole relays, power supplies, and accessory components required for specified performance.
 - a. Cabinet: Steel with hinged, locking door.
 - 1) Barriers separate low-voltage and line-voltage components.
 - 2) Directory: Mounted on back of door. Identifies each relay as to load groups controlled and each programmed pilot device if any.
 - 3) Control Power Supply: Transformer and full-wave rectifier with filtered dc output.
 - b. Single-Pole Relays: Mechanically held unless otherwise indicated; split-coil, momentary-pulsed type.
 - 1) Low-Voltage Leads: Plug connector to the connector strip in cabinet and pilot light power where indicated.
 - 2) Rated Capacity (Mounted in Relay Panel): 20 A, 125-V ac for tungsten filaments; 20 A, 277-V ac for ballasts.
 - 3) Endurance: 50,000 cycles at rated capacity.
 - 4) Mounting: Provision for easy removal and installation in relay cabinet.
2. Electrically Operated, Molded-Case Circuit-Breaker Panelboard: Comply with NEMA PB 1 and UL 50 (CSA C22.2, No. 94), UL 67 (CSA C22.2, No. 29), UL 489 (CSA C22.2, No. 65), and UL 916 (CSA C22.2, No. 205).
 - a. Cabinets: In addition to requirements specified below, comply with Division 26 Section "Panelboards".
 - b. Electrically Operated, Molded-Case Circuit Breakers: Bolt-on type.
 - 1) Switching Endurance Ratings: Certified by manufacturer or by a nationally recognized testing laboratory (NRTL) for at least 20,000 open and close operations under rated load at 0.8 power factor.
 - 2) Minimum 30,000 open and close operations with load equal to circuit-breaker trip rating and consisting of 100 percent tungsten filament load.
 - 3) Minimum 30,000 open and close operations with load equal to circuit-breaker trip rating and consisting of 100 percent fluorescent ballasts rated for 10 percent total harmonic distortion.
 - 4) Listed and labeled as complying with UL SWD, HCAR, and HID ratings by a national recognized testing laboratory (NRTL) acceptable to authorities having jurisdiction.
3. Line-Voltage Surge Suppression: Factory installed as an integral part of 120- and 277-V ac, solid-state control panels.

OR

Line-Voltage Surge Suppression: Field-mounting surge suppressors that comply with Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" for Category A locations.

OR

Line-Voltage Surge Suppression: Factory installed as an integral part of 120- and 277-V ac, solid-state control panels or field-mounting surge suppressors that comply with Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" for Category A locations.

D. DALI Network Materials

1. Network Power Supply and Router: Interface device connecting TCP/IP control networks to DALI-compliant network.
 - a. DALI-Compliant Network Power Rating: One full-rated network for **OR** Two full-rated networks, each capable of, **as directed**, powering up to 64 addressable devices for each network; suitable for use with NFPA 70, Class 1 and Class 2 control circuits; and 16 V dc, 250 mA.
 - b. Primary Power: 120 or 277 V, field selectable; 12 VA.
 - c. 10basT Ethernet port.
 - d. LED indicator lights for Ethernet status (link, send, and receive), power-on, and DALI network failure.
2. Lighting Control Software:
 - a. Five-tier hierarchical architecture; high-speed, parallel query; and distributed-logic processing scalable from single rooms to full campuses.
 - b. Automatic backup for all settings and parameters.
 - c. TCP/IP network protocol.
 - d. Interactive with other building management systems at TCP/IP level.
 - e. At least three security levels.
 - f. Support the full suite of DALI commands and device parameter settings.
 - g. Scheduling modules to provide building-wide scene scheduling.
 - h. Billing modules to track energy use for multiple tenants and able to produce monthly billing statements.
 - i. Support load shedding, peak shaving, sweeps with local override, and other energy-conservation measures.
 - j. Able to report individual device status, including inoperative lamps, ballast failure detection, and dimmer position.

E. Manual Switches And Plates

1. Push-Button Switches: Modular, momentary-contact, low-voltage type.
 - a. Match color specified in Division 26 Section "Wiring Devices".
 - b. Integral green LED **OR** neon, **as directed**, pilot light to indicate when circuit is on.
 - c. Internal white LED **OR** neon, **as directed**, locator light to illuminate when circuit is off.
2. Manual, Maintained Contact, Full- or Low-Voltage Switch: Comply with Division 26 Section "Wiring Devices".
3. Wall-Box Dimmers: Comply with Division 26 Section "Wiring Devices".
4. Wall Plates: Single and multigang plates as specified in Division 26 Section "Wiring Devices"
5. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.

F. Conductors And Cables

1. Power Wiring to Supply Side of Class 2 Power Source: Not smaller than No. 12 AWG, complying with Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
2. Classes 2 and 3 Control Cables: Multiconductor cable with copper conductors not smaller than No. 18 **OR** 22 **OR** 24, **as directed**, AWG, complying with Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

3. Class 1 Control Cables: Multiconductor cable with copper conductors not smaller than No. 14 **OR** 16 **OR** 18, **as directed**, AWG, complying with Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
4. Digital and Multiplexed Signal Cables: Unshielded, twisted-pair cable with copper conductors, complying with TIA/EIA-568-B.2, Category 5e **OR** 6, **as directed**, for horizontal copper cable and with Division 28 Section "Conductors And Cables For Electronic Safety And Security".

1.3 EXECUTION

A. Wiring Installation

1. Comply with NECA 1.
2. Wiring Method: Install wiring in raceways except where installed in accessible ceilings and gypsum board partitions. Comply with Division 26 Section "Low-voltage Electrical Power Conductors And Cables". Minimum conduit size shall be **1/2 inch (13 mm)**.
3. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.
4. Install field-mounting transient voltage suppressors for lighting control devices in Category A locations that do not have integral line-voltage surge protection.
5. Size conductors according to lighting control device manufacturer's written instructions, unless otherwise indicated.
6. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in terminal cabinets, equipment enclosures, and in junction, pull, and outlet boxes.
7. Identify components and power and control wiring according to Division 26 Section "Identification For Electrical Systems".

B. Field Quality Control

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and assist in field testing. Report results in writing.
2. Perform the following field tests and inspections and prepare test reports:
 - a. Test for circuit continuity.
 - b. Verify that the control module features are operational.
 - c. Check operation of local override controls.
 - d. Test system diagnostics by simulating improper operation of several components selected by the Owner.

C. Software Installation

1. Install and program software with initial settings of adjustable values. Make backup copies of software and user-supplied values. Provide current licenses for software.

D. Adjusting

1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting sensors and to assist the Owner's personnel in making program changes to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

E. Demonstration

1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain lighting controls and software training for PC-based control systems.

END OF SECTION 26 09 23 00b

SECTION 26 09 23 00c - CENTRAL DIMMING CONTROLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for central dimming controls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes microprocessor-based central dimming controls with the following components:
 - a. Control network.
 - b. Master-control stations.
 - c. Partitioned-space master-control stations.
 - d. Wall stations.
 - e. Dimmer cabinets.
 - f. Manual switches and plates for controlling dimmers.

C. Definitions

1. Fade Override: The ability to temporarily set fade times to zero for all lighting scenes.
2. Fade Rate: The time it takes each zone to arrive at the next scene, dependent on the degree of change in lighting level.
3. Fade Time: The time it takes all zones to fade from one lighting scene to another, with all zones arriving at the next scene at the same time.
4. Low Voltage: As defined in NFPA 70, term for circuits and equipment operating at less than 50 V or for remote-control, signaling, and power-limited circuits.
5. Scene: The lighting effect created by adjusting several zones of lighting to the desired intensity.
6. SCR: Silicon-controlled rectifier.
7. Zone: A fixture or group of fixtures controlled simultaneously as a single entity. Also known as a "channel."

D. Submittals

1. Product Data: For each type of product indicated.
 - a. For central dimming controls; include elevation, features, characteristics, and labels.
 - b. For dimmer panels; include dimensions, features, dimmer characteristics, ratings, and directories.
 - c. Device plates, plate color, and material.
 - d. Ballasts and lamp combinations compatible with dimmer controls.
 - e. Sound data including results of operational tests of central dimming controls.
 - f. Operational documentation for software and firmware.
2. Shop Drawings: Detail assemblies of standard components, custom assembled for specific application on Project. Indicate dimensions, weights, arrangement of components, and clearance and access requirements.
 - a. Include elevation views of front panels of control and indicating devices and control stations.
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Samples: For master-control stations, partitioned-space master-control stations, wall stations, dimmer cabinets, and faceplates with factory-applied color finishes and technical features.
 - a. Operation and Maintenance Data: For central dimming controls with remote-mounting dimmers to include in emergency, operation, and maintenance manuals.
4. Warranty: Special warranty specified in this Section.

- E. Quality Assurance
 - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
 - 2. Comply with 47 CFR 15, Subparts A and B, for Class A digital devices.
 - 3. Comply with NFPA 70.

- F. Warranty
 - 1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of central dimming controls that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Damage from transient voltage surges.
 - b. Warranty Period: Cost to repair or replace any parts for two years from date of Final Completion.
 - c. Extended Warranty Period: Cost of replacement parts (materials only, f.o.b. the nearest shipping point to Project site), for eight years, that failed in service due to transient voltage surges.

- G. Software Service Agreement
 - 1. Services in this Article may not be allowed for publicly funded projects.
 - 2. Technical Support: Beginning with Final Completion, provide software support for two years.
 - 3. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30 days' notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

- A. General System Requirements
 - 1. Compatibility: Dimming control components shall be compatible with other elements of lighting fixtures, ballasts, transformers, and lighting controls.
 - 2. Line-Voltage Surge Suppression: Factory installed as an integral part of 120- and 277-V ac, solid-state dimmers and control panels.
 - a. Alternative Line-Voltage Surge Suppression: Comply with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" for Category A **OR** B, **as directed**, locations.
 - 3. Dimmers and Dimmer Modules: Comply with UL 508.
 - a. Audible Noise and Radio-Frequency Interference Suppression: Solid-state dimmers shall operate smoothly over their operating ranges without audible lamp or dimmer noise or radio-frequency interference. Modules shall include integral or external filters to suppress audible noise and radio-frequency interference.
 - b. Dimmer or Dimmer-Module Rating: Not less than 125 percent of connected load unless otherwise indicated.

- B. System Description
 - 1. Description: Microprocessor-based, solid-state controls consisting of control stations and a separately mounted dimmer cabinet.
 - a. Operation: Change variable dimmer settings of indicated number of zones simultaneously from one preset scene to another when a rocker switch **OR** pushbutton **OR** slider, **as directed**, is operated.
 - b. System control shall include master station(s), wall stations, and dimmer panels.
 - c. Each zone shall be configurable to control the following light sources:

- 1) Fluorescent lamps with electronic **OR** magnetic, **as directed**, ballasts.
 - 2) Line-voltage incandescent lamps.
 - 3) Low-voltage incandescent lamps.
 - 4) Cold cathode lamps.
 - 5) Non-dimmed loads.
 - 6) LED lamps.
 - d. Control of each zone shall interface with controls for the following accessory functions:
 - 1) Curtains and drapes.
 - 2) Blackout curtains.
 - 3) Projector screens.
 - 4) Motorized partitions.
 - 5) Manually positioned partitions.
 - e. Memory: Retain preset scenes and fade settings through power failures for at least 90 days by retaining physical settings of controls or by an on-board, automatically recharged battery.
- C. Control Network
1. Dimmers shall receive signals from control stations that are linked to dimmer cabinet with a common network data cable.
 2. Functions of network control stations shall be set up at master station that include the number and arrangement of scene presets, zones, and fade times at wall stations.
 - a. Control Voltage: 24- or 10-V dc.
 - b. Comply with USITT AMX 192 **OR** USITT DMX 512, **as directed**, for data transmission.
- D. Master-Control Stations
1. Functions and Features:
 - a. Control adjustment of the lighting level for each scene of each zone, and adjustment of fade-time setting for each scene change from one preset scene to another. Controls shall use analog manual sliders **OR** digital rocker switches with LCD graphic display of light level, **as directed**.
 - b. Master channel shall raise and lower lighting level of all zones.
 - c. Fade rate for each scene shall be adjustable from zero to 60 seconds.
 - d. Fade override control for each scene.
 - e. Recall each preset scene and allow adjustment of zone controls associated with that scene.
 - f. Lockout switch to prevent changes when set.
 - g. On and off scene controls for non-dim channel contactors.
 - h. Emergency-control pushbutton to bypass all controls, turning all dimmers to full bright and turning on non-dim channel contactors.
 - i. Master on and off switch; off position enables housekeeping controls.
 - j. Housekeeping controls to turn on selected lighting fixtures for housekeeping functions.
 - k. Pushbuttons for accessory functions.
 - l. Enable and disable wall stations.
 - m. Communications link to other master stations.
 - n. Provide for connecting a portable computer to program the master station.
 - o. Rear-illuminate all scene-select buttons.
 - p. Show lighting-level setting and fade-rate setting graphically using LEDs or backlighted bar-graph indicator.
 2. Mounting: Single, flush wall box with manufacturer's standard faceplate with hinged transparent locking cover, **as directed**.
- E. Partitioned-Space Master-Control Station
1. Functions and Features:
 - a. Automatically combine and separate lighting and accessory function controls as spaces are configured with movable partitions; with controls for adjustment of the lighting level for

- each scene of each dimmer, and adjustment of fade-rate setting for each scene change from one preset scene to another.
 - b. Master controls shall accommodate partitioning the space into six adjacent rooms.
 - c. Manual controls to set up six scenes for each room. Include wall stations in each room to control scenes.
 - d. Master channel to raise and lower the lighting level of all zones.
 - e. Adjustable fade rate for each scene from zero to 60 seconds.
 - f. Fade override control for each scene.
 - g. On and off scene controls for non-dim channel contactors.
 - h. Emergency-control pushbutton to bypass all controls, turning all dimmers to full bright and turning on non-dim channel contactors.
 - i. Master on and off switch; off position enables housekeeping controls.
 - j. Housekeeping controls to turn on selected lighting fixtures for housekeeping functions.
 - k. Pushbuttons for accessory functions.
 - l. Provide for connecting a portable computer to program the master station.
 - m. Rear-illuminate all scene-select buttons.
 - n. Show lighting-level setting and fade-rate setting graphically using LEDs or backlighted bar-graph indicator.
2. Custom Graphics. Include a graphical display of room configurations and the names for each. Indicate the current spaces configuration with LCD graphic or LED-illuminated indicators, and show which wall stations are active. Inactive wall stations shall be automatically deactivated.
 3. Mounting: Single, flush wall box with manufacturer's standard faceplate with hinged transparent locking cover, **as directed**.

F. Wall Stations

1. Functions and Features:
 - a. Wall stations shall function as a submaster to a master station, containing limited control of selected scenes of the master station.
 - b. Controls to adjust the lighting level of each dimmer for each scene, and the fade time setting for each scene change from one preset scene to another.
 - c. Numbered pushbuttons to select scenes.
 - d. Off switch to turn master station off. Operating the off switch at any remote station shall automatically turn on selected housekeeping lighting, **as directed**.
 - e. On switch turns all scenes of master station to full bright.
 - f. Pushbutton controls for accessory functions.
2. Mounting: Flush, wall box with manufacturer's standard faceplate.
3. Hand-held Cordless Control: Scene-select and accessory function pushbuttons using infrared **OR** radio-frequency, **as directed**, transmission.

G. Dimmer Cabinets

1. Factory wired, convection cooled without fans, with barriers to accommodate 120- and 277-V feeders and suitable to control designated lighting equipment or accessory functions.
2. Ambient Conditions:
 - a. Temperature: 60 to 95 deg F (15 to 35 deg C).
 - b. Relative Humidity: 10 to 90 percent, noncondensing.
 - c. Filtered air supply.
3. Dimmer Cabinet Assembly: NRTL listed and labeled.
4. Cabinet Type: Plug in, modular, and accepting dimmers of each specified type in any plug-in position.
 - a. Integrated Fault-Current Rating: 10,000-A RMS symmetrical.
5. Lighting Dimmers: Solid-state SCR dimmers.
 - a. Primary Protection: Magnetic or thermal-magnetic circuit breaker, also serving as the disconnecting means.
 - b. Dimmer response to control signal shall follow the "Square Law Dimming Curve" specified in IESNA's "IESNA Lighting Handbook."

- c. Dimming Range: 0 to 100 percent, full output voltage not less than 98 percent of line voltage.
- d. Dimmed circuits shall be filtered to provide a minimum 350-mic.sec. current-rise time at a 90-degree conduction angle and 50 percent of rated dimmer capacity. Rate of current rise shall not exceed 30 mA/mic.sec., measured from 10 to 90 percent of load-current waveform.
- e. Protect controls of each dimmer with a fuse and transient voltage surge suppression, **as directed**.
- 6. Non-dim modules shall include relays with contacts rated to switch 20-A tungsten-filament load at 120-V ac and 20-A electronic ballast load at 277-V ac.
- 7. Accessory function control modules shall be compatible with requirement of the accessory being controlled.
- 8. Digital Control Network:
 - a. Dimmers shall receive digital signals from digital network control stations that are linked to the dimmer cabinet with a common network data cable.
 - b. Functions of digital network control stations shall be set up at the dimmer cabinet's electronic controls that include indicated number and arrangement of scene presets, channels, and fade times.
- 9. Emergency Power Transfer Switch: Comply with UL 1008; factory prewired and pretested to automatically transfer load circuits from normal to emergency power supply when normal supply fails.
 - a. Transfer from normal to emergency supply when normal-supply voltage drops to 55 percent or less.
 - b. Retransfer immediately to normal on failure of emergency supply and after an adjustable time-delay of 10 to 90 seconds on restoration of normal supply while emergency supply is available.
 - c. Integrated Fault-Current Rating: Same value as listed for the panel.
 - d. Test Switch: Simulate failure of normal supply to test controls associated with transfer scheme.
 - e. Fabricate and test dimmer boards to withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
- H. Portable Computer
 - 1. Description: As recommended by master-control station manufacturer, to program master station and associated wall stations, and all interconnected master stations, **as directed**. Portable computer shall be laptop style with a battery runtime of at least two hours. Display shall be an **11-inch (280-mm)** interactive-matrix LCD and shall have required hardware, firmware, and software to program specified control functions of master-control stations.
 - 2. Software shall be configured and customized by master-station manufacturer.
- I. Manual Switches And Plates
 - 1. Switches: Modular, momentary pushbutton, low-voltage type.
 - a. Color: White unless otherwise indicated.
 - b. Integral Pilot Light: Indicate when circuit is on. Use where indicated.
 - c. Locator Light: Internal illumination.
 - d. Wall Plates: Comply with requirements in Division 26 Section "Wiring Devices" for materials, finish, and color. Use multigang plates if more than one switch is indicated at a location.
 - e. Legend: Engraved or permanently silk-screened on wall plate where indicated. Use designations indicated on Drawings.
- J. Conductors And Cables
 - 1. Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

2. Classes 2 and 3 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 **OR** 22 **OR** 24, **as directed**, AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
3. Class 1 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 14 **OR** 16 **OR** 18, **as directed**, AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
4. Unshielded, Twisted-Pair Data Cable: Category 5e **OR** 6, **as directed**. Comply with requirements in Division 27 Section "Communications Horizontal Cabling".

1.3 EXECUTION

A. Wiring Installation

1. Comply with NECA 1.
2. Wiring Method:
 - a. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables"
 - b. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Division 27 Section "Communications Horizontal Cabling".
 - c. Minimum conduit size shall be **1/2 inch (13 mm)**.
3. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
4. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
5. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
6. Install dimmer cabinets for each zone.

B. Identification

1. Comply with requirements in Division 26 Section "Identification For Electrical Systems" for identifying components and power and control wiring.
2. Label each dimmer module with a unique designation.
3. Label each scene control button with approved scene description.

C. Field Quality Control

1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Continuity tests of circuits.
 - b. Operational Test: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
 - 1) Include testing of dimming control equipment under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
 - c. Emergency Power Transfer: Test listed functions.
3. Remove and replace malfunctioning dimming control components and retest as specified above.
4. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
5. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.

D. Demonstration

1. Engage a factory-authorized service representative to train **OR** Train, **as directed**, the Owner's maintenance personnel to adjust, operate, and maintain central dimming controls. Laptop portable computer shall be used in training, **as directed**.
2. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control system specified in Division 26 Section "Network Lighting Controls".

END OF SECTION 26 09 23 00c

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SECTION 26 09 23 00d - MODULAR DIMMING CONTROLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for modular dimming controls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Manual modular dimming controls.
 - b. Integrated, multipreset modular dimming controls.

C. Definitions

1. **Fade Rate:** The time it takes each zone to arrive at the next scene, dependent on the degree of change in lighting level.
2. **Low Voltage:** As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling and power-limited circuits.
3. **Scene:** The lighting effect created by adjusting several zones of lighting to the desired intensity.
4. **SCR:** Silicon-controlled rectifier.
5. **Zone:** A fixture or group of fixtures controlled simultaneously as a single entity. Also known as a "channel."

D. Submittals

1. **Product Data:** For each type of product indicated.
 - a. For modular dimming controls; include elevation, dimensions, features, characteristics, ratings, and labels.
 - b. Device plates and plate color and material.
 - c. Ballasts and lamp combinations compatible with dimmers.
 - d. **Wiring Diagrams:** Power, signal, and control wiring.
2. **Samples:** For master and remote-control stations, and faceplates with factory-applied color finishes and technical features.

E. Quality Assurance

1. **Electrical Components, Devices, and Accessories:** Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.

1.2 PRODUCTS

A. General Dimming Device Requirements

1. **Compatibility:** Dimming control components shall be compatible with other elements of lighting fixtures, ballasts, transformers, and lighting controls.
2. **Dimmers and Dimmer Modules:** Comply with UL 508.
 - a. **Audible Noise and Radio-Frequency Interference Suppression:** Solid-state dimmers shall operate smoothly over their operating ranges without audible lamp or dimmer noise or radio-frequency interference. Modules shall include integral or external filters to suppress audible noise and radio-frequency interference.
 - b. **Dimmer or Dimmer-Module Rating:** Not less than 125 percent of connected load unless otherwise indicated.

B. Manual Modular Multiscene Dimming Controls

1. Description: Factory-fabricated equipment providing manual modular dimming control consisting of a wall-box-mounted, master-scene controller and indicated number of wall-box zone stations. Controls and dimmers shall be integrated for mounting in one-, two-, or three-gang wall box under a single wall plate. Each zone station shall be adjustable to indicated number of scenes, which shall be recorded on the zone controller.
2. Operation: Automatically change variable dimmer settings of indicated number of zones simultaneously from one preset scene to another when a push button is operated.
3. Each manual modular multiscene dimming controller shall include a master control and remote controls.
4. Each zone shall be configurable to control the following:
 - a. Fluorescent lamps with electronic **OR** magnetic, **as directed**, ballasts.
 - b. Incandescent lamps.
 - c. Low-voltage incandescent lamps.
5. Memory: Retain preset scenes through power failures for at least seven days.
6. Device Plates: Style, material, and color shall comply with Division 26 Section "Wiring Devices".
7. Master-Scene Controller: Suitable for mounting in a single flush wall box.
 - a. Switches: Master off, group dim, group bright, and selectors for each scene.
 - b. LED indicator lights, one associated with each scene switch, and one for the master off switch.
8. Fluorescent Zone Dimmer: Suitable for operating lighting fixtures and ballasts specified in Division 26 Section "Interior Lighting", and arranged to dim number of scenes indicated for the master-scene controller. Scene selection is at the master-scene controller for setting light levels of each zone associated with scene.
 - a. Switch: Rocker **OR** Slider, **as directed**, style for setting the light level for each scene.
 - b. LED indicator lights, one associated with each scene.
 - c. Electrical Rating: 1000 **OR** 2000, **as directed**, VA, 120 V.
9. Incandescent Zone Dimmer: Suitable for operating incandescent lamps at line-voltage or low-voltage lamps connected to a transformer and arranged to dim number of scenes indicated for the master-scene controller. Scene selection shall be at the master-scene controller for setting light levels of each zone associated with scene.
 - a. Switch: Rocker **OR** Slider, **as directed**, style for setting the light level for each scene.
 - b. LED indicator lights, one associated with each scene.
 - c. Voltage Regulation: Dimmer shall maintain a constant light level, with no visible flicker, when the source voltage varies plus or minus 2 percent in RMS voltage.

C. Integrated, Multipreset Modular Dimming Controls

1. Indicate number of wall-box, remote-control stations.
2. Description: Factory-fabricated, microprocessor-based, solid-state controls providing manual dimming control consisting of a master station and multiple wall-box, remote-control stations.
3. Operation: Automatically changes variable dimmer settings of indicated number of zones simultaneously from one preset scene to another when a push button is operated.
4. Each zone shall be configurable to control the following:
 - a. Fluorescent lamps with electronic **OR** magnetic, **as directed**, ballasts.
 - b. Incandescent lamps.
 - c. Low-voltage incandescent lamps.
5. Memory: Retain preset scenes and fade settings through power failures by retaining physical settings of controls.
6. Master Station:
 - a. Contains control panel and multiple control and dimmer modules.
 - b. Controls and commands adjustment of each dimmer-zone setting for each scene change from one preset scene to another.
 - 1) Master zone raises and lowers lighting level.
 - 2) Adjustable fade rate for each scene from 1 to 60 seconds.
 - c. Rear-illuminated, scene-select buttons.

- d. Lighting-level setting and fade-rate setting shall be graphically shown using LEDs or backlighted bar-graph indicator.
- e. Mounting: Flush wall box with manufacturer's standard faceplate.
- 7. Remote-Control Stations:
 - a. Numbered push buttons to select scenes.
 - b. Off switch to turn master station off. Operating the off switch at any remote station shall automatically turn on selected housekeeping lighting, **as directed**.
 - c. On switch turns all scenes of master station to full bright.
 - d. Control Wiring: NFPA 70, Class 2.
 - e. Mounting: Single flush wall box with manufacturer's standard faceplate.
- 8. Infrared Remote-Control Station: Same functions as for standard remote-control station, except that functions are input by a hand-held infrared transmitter.
- 9. Dimmers: Modular, plug-in type, with circuit breaker to protect the dimmer and branch circuit.
 - a. Dimming Circuit: Two SCR dimmers, in inverse parallel configuration.
 - b. Dimming Curve: Modified "square law" as specified in IESNA's "IESNA Lighting Handbook"; control voltage is 0- to 10-V dc.
 - c. Dimming Range: 0 to 100 percent, full output voltage not less than 98 percent of line voltage.
 - d. Voltage Regulation: Dimmer shall maintain a constant light level, with no visible flicker, when the source voltage varies plus or minus 2 percent in RMS voltage.
 - e. Short-Circuit Rating: 10 kA for 120 V, 14 kA for 277 V.

D. Conductors And Cables

- 1. Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- 2. Class 2 Control Cable: Multiconductor cable with stranded-copper conductors not smaller than No. 18 **OR 22 OR 24, as directed**, AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

1.3 EXECUTION

A. Wiring Installation

- 1. Comply with NECA 1.
- 2. Wiring Method: Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables". Minimum conduit size shall be **1/2 inch (13 mm)**.
- 3. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Separate power-limited and nonpower-limited conductors according to conductor manufacturer's written instructions.
- 4. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.
- 5. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

B. Identification

- 1. Comply with requirements in Division 26 Section "Identification For Electrical Systems" for identifying components and power and control wiring.
- 2. Label each dimmer module with a unique designation.
- 3. Label each scene control button with approved scene description.

C. Field Quality Control

- 1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

2. Tests and Inspections:
 - a. Continuity tests of circuits.
 - b. Operational Test: Set and operate controls to demonstrate their functions and capabilities in a methodical sequence that cues and reproduces actual operating functions.
 - 1) Include testing of modular dimming control equipment under conditions that simulate actual operational conditions. Record control settings, operations, cues, and functional observations.
 3. Remove and replace malfunctioning modular dimming control components and retest as specified above.
 4. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible agency and representative.
 5. Reports: Written reports of tests and observations. Record defective materials and workmanship and unsatisfactory test results. Record repairs and adjustments.
- D. Demonstration
1. Engage a factory-authorized service representative to train **OR** Train, **as directed**, Owner's maintenance personnel to adjust, operate, and maintain modular dimming controls. Laptop portable computer shall be used in training, **as directed**.
 2. Coordinate demonstration of products specified in this Section with demonstration requirements for low-voltage, programmable lighting control system specified in Division 26 Section "Network Lighting Controls".

END OF SECTION 26 09 23 00d

Task	Specification	Specification Description
26 09 23 00	02 84 16 00	Removal of Fluorescent Light Ballasts/Capacitors and Fluorescent Light Tubes
26 09 23 00	26 24 19 00a	Motor-Control Centers
26 09 23 00	26 51 00 00	Interior Lighting
26 09 23 00	26 56 00 00	Exterior Lighting
26 21 13 00	26 05 13 16	Medium-Voltage Cables
26 21 13 00	26 05 19 16a	Conductors And Cables
26 21 13 00	26 05 13 16a	Undercarpet Electrical Power Cables
26 21 13 00	26 05 26 00b	Overhead Electrical Distribution

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SECTION 26 22 13 00 - MEDIUM-VOLTAGE TRANSFORMERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for medium-voltage transformers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following types of transformers with medium-voltage primaries:
 - a. Liquid-filled distribution and power transformers.
 - b. Dry-type distribution and power transformers.
 - c. Pad-mounted, liquid-filled transformers.

C. Definitions

1. NETA ATS: Acceptance Testing Specification.

D. Submittals

1. Product Data: Include rated nameplate data, capacities, weights, dimensions, minimum clearances, installed devices and features, location of each field connection, and performance for each type and size of transformer indicated.
2. Shop Drawings: Diagram power signal and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that transformer assembly and components will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Field quality-control test reports.
5. Follow-up service reports.
6. Operation and Maintenance Data: For transformer and accessories to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with IEEE C2.
3. Comply with ANSI C57.12.10, ANSI C57.12.28, IEEE C57.12.70, and IEEE C57.12.80.
4. Comply with NFPA 70.

F. Delivery, Storage, And Handling

1. Store transformers protected from weather and so condensation will not form on or in units. Provide temporary heating according to manufacturer's written instructions.

G. Project Conditions

1. Service Conditions: IEEE C37.121, usual service conditions except for the following:
 - a. Exposure to significant solar radiation.
 - b. Altitudes above **3300 feet (1000 m)**.
 - c. Exposure to fumes, vapors, or dust.
 - d. Exposure to explosive environments.
 - e. Exposure to hot and humid climate or to excessive moisture, including steam, salt spray, and dripping water.
 - f. Exposure to seismic shock or to abnormal vibration, shock, or tilting.
 - g. Exposure to excessively high or low temperatures.

- h. Unusual transportation or storage conditions.
- i. Unusual grounding-resistance conditions.
- j. Unusual space limitations.

1.2 PRODUCTS

A. Liquid-Filled Distribution And Power Transformers

1. Description: IEEE C57.12.00 and UL 1062, liquid-filled, 2-winding transformers.
2. Insulating Liquid: Mineral oil, complying with ASTM D 3487, Type II, and tested according to ASTM D 117.
OR
Insulating Liquid: Less flammable, edible-seed-oil based, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.
OR
Insulating Liquid: Less flammable, dielectric, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.
OR
Insulating Liquid: Less flammable, silicone-based dielectric, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall have low toxicity and be nonhazardous.
3. Insulation Temperature Rise: 65/55 deg C, based on an average ambient temperature of 30 deg C over 24 hours with a maximum ambient temperature of 40 deg C. Insulation system shall be rated to continuously allow an additional 12 percent kilovolt-ampere output, at 65 deg C temperature rise, without decreasing rated transformer life.
OR
Insulation Temperature Rise: 65 deg C, based on an average ambient temperature of 30 deg C over 24 hours with a maximum ambient temperature of 40 deg C.
4. Basic Impulse Level: Comply with UL 1062.
OR
Basic Impulse Level: 60 **OR** 75 **OR** 95 **OR** 110, **as directed** kV.
5. Full-Capacity Voltage Taps: Four nominal 2.5 percent taps, 2 above and 2 below rated primary voltage; with externally operable tap changer for de-energized use and with position indicator and padlock hasp.
OR
Full-Capacity Voltage Taps: Four nominal 2.5 percent taps below rated primary voltage, with externally operable tap changer for de-energized use and with position indicator and padlock hasp.
6. Cooling System: Class OA, self-cooled **OR** OA/FA, self-cooled, and with forced-air-cooled rating **OR** OA/FFA, self-cooled, and with provisions for future forced-air-cooled rating, **as directed**. Cooling systems shall include auxiliary cooling equipment, automatic controls, and status indicating lights.
7. Sound level may not exceed sound levels listed in NEMA TR 1, without fans operating.
8. Accessories: Grounding pads, lifting lugs, and provisions for jacking under base. Transformers shall have a steel base and frame allowing use of pipe rollers in any direction, and an insulated, low-voltage, neutral bushing with removable ground strap. Include the following additional accessories:
 - a. Liquid-level gage.
 - b. Pressure-vacuum gage.
 - c. Liquid temperature indicator.
 - d. Drain and filter valves.
 - e. Pressure relief device.

B. Dry-Type Distribution And Power Transformers

1. Description: NEMA ST 20, IEEE C57.12.01, ANSI C57.12.50 for dry-type transformers rated up to 500 kVA, ANSI C57.12.51 for dry-type transformers rated 501 kVA and larger, or ANSI C57.12.52 for sealed dry-type transformers rated 501 kVA and larger, UL 1562 listed and labeled, dry-type, 2-winding transformers.
 - a. Indoor, ventilated **OR** Outdoor, ventilated **OR** Totally enclosed, nonventilated, **as directed**, cast coil/encapsulated coil, with primary and secondary windings individually cast in epoxy; with insulation system rated at 185 deg C with an 80 deg C average winding temperature rise above a maximum ambient temperature of 40 deg C.
 - b. Indoor, ventilated **OR** Outdoor, ventilated **OR** Totally enclosed, nonventilated, **as directed**, vacuum-pressure impregnated and with insulation system rated at 220 deg C with an 80 deg C average winding temperature rise above a maximum ambient temperature of 40 deg C.
2. Primary Connection: Air terminal compartment with removable **OR** hinged, **as directed**, door. Tin-plated copper bar for incoming line termination, predrilled to accept terminals for indicated conductors.
OR
Primary Connection: Transition terminal compartment with connection pattern to match switchgear.
3. Secondary Connection: Air terminal compartment with removable **OR** hinged, **as directed**, door. Tin-plated copper bar for incoming line termination, predrilled to accept terminals for indicated conductors.
OR
Secondary Connection: Transition terminal compartment with connection pattern to match switchgear **OR** bus duct, **as directed**.
4. Insulation Materials: IEEE C57.12.01, rated at 220 deg C.
5. Insulation Temperature Rise: 80 **OR** 115 **OR** 150, **as directed**, deg C, maximum rise above 40 deg C.
6. Basic Impulse Level: 60 **OR** 75 **OR** 95 **OR** 110, **as directed**, kV.
7. Full-Capacity Voltage Taps: Four nominal 2.5 percent taps, 2 above and 2 below rated primary voltage.
OR
Full-Capacity Voltage Taps: Four nominal 2.5 percent taps below rated primary voltage.
8. Cooling System: Class AA, self-cooled **OR** AA/FA, self-cooled, and with forced-air-cooled rating **OR** AA/FFA, self-cooled, and with provisions for future forced-air-cooled rating, **as directed**, complying with IEEE C57.12.01.
 - a. Automatic forced-air cooling system controls, including thermal sensors, fans, control wiring, temperature controller with test switch, power panel with current-limiting fuses, indicating lights, alarm, and alarm silencing relay.
 - b. Include mounting provision for fans.
9. Sound level may not exceed sound levels listed in NEMA TR 1, without fans operating.
10. High-Temperature Alarm: Sensor at transformer with local audible and visual alarm and contacts for remote alarm.

C. Pad-Mounted, Liquid-Filled Transformers

1. Description: ANSI C57.12.13, ANSI C57.12.26 for pad-mounted transformers with dead-front, separable, insulated, high-voltage, load-break cable connectors, IEEE C57.12.00 IEEE C57.12.22 for pad-mounted transformers with live-front high-voltage bushings pad-mounted, 2-winding transformers. Stainless-steel tank base and cabinet, **OR** cabinet, and sills, **as directed**.
2. Insulating Liquid: Mineral oil, complying with ASTM D 3487, Type II, and tested according to ASTM D 117.
OR
Insulating Liquid: Less flammable, edible-seed-oil based, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.

OR

Insulating Liquid: Less flammable, dielectric, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall be biodegradable and nontoxic.

OR

Insulating Liquid: Less flammable, silicone-based dielectric, and UL listed as complying with NFPA 70 requirements for fire point of not less than 300 deg C when tested according to ASTM D 92. Liquid shall have low toxicity and be nonhazardous.

3. Insulation Temperature Rise: 55 **OR** 65, **as directed**, deg C when operated at rated kVA output in a 40 deg C ambient temperature. Transformer shall be rated to operate at rated kilovolt ampere in an average ambient temperature of 30 deg C over 24 hours with a maximum ambient temperature of 40 deg C without loss of service life expectancy.
4. Basic Impulse Level: 30 **OR** 60 **OR** 95, **as directed**, kV.
5. Full-Capacity Voltage Taps: Four 2.5 percent taps, 2 above and 2 below rated high voltage; with externally operable tap changer for de-energized use and with position indicator and padlock hasp.
6. High-Voltage Switch: 200 **OR** 300 **OR** 400, **as directed**, A, make-and-latch rating of 10-kA RMS, symmetrical, arranged for radial feed with 3-phase, 2-position, gang-operated, load-break switch that is oil immersed in transformer tank with hook-stick operating handle in primary compartment.
- OR**
High-Voltage Switch: 200 **OR** 300 **OR** 400, **as directed**, A, make-and-latch rating of 10-kA RMS, symmetrical, arranged for loop feed with 3-phase, 4-position, gang-operated, load-break switch that is oil immersed in transformer tank with hook-stick operating handle in primary compartment.
7. Primary Fuses: 150-kV fuse assembly with fuses complying with IEEE C37.47. Rating of current-limiting fuses shall be 50-kA RMS at specified system voltage.
 - a. Current-limiting type in dry-fuse holder wells, mechanically interlocked with liquid-immersed switch in transformer tank to prevent disconnect under load.
 - b. Internal liquid-immersed cartridge fuses.
 - c. Bay-O-Net liquid-immersed fuses that are externally replaceable without opening transformer tank.
 - d. Bay-O-Net liquid-immersed fuses in series with liquid-immersed current-limiting fuses. Bay-O-Net fuses shall be externally replaceable without opening transformer tank.
 - e. Bay-O-Net liquid-immersed current-limiting fuses that are externally replaceable without opening transformer tank.
8. Surge Arresters: Distribution class, one for each primary phase; complying with IEEE C62.11 and NEMA LA 1; support from tank wall within high-voltage compartment. Transformers shall have three arresters for radial-feed **OR** three arresters for loop-feed **OR** six arresters for loop-feed, **as directed**, circuits.
9. High-Voltage Terminations and Equipment: Live front with externally clamped porcelain bushings and cable connectors suitable for terminating primary cable.

OR

High-Voltage Terminations and Equipment: Dead front with universal-type bushing wells for dead-front bushing-well inserts, complying with IEEE 386 and including the following:

- a. Bushing-Well Inserts: One for each high-voltage bushing well.
 - b. Surge Arresters: Dead-front, elbow-type, metal-oxide-varistor units.
 - c. Parking Stands: One for each high-voltage bushing well.
 - d. Portable Insulated Bushings: Arranged for parking insulated, high-voltage, load-break cable terminators; one for each primary feeder conductor terminating at transformer.
10. Accessories:
 - a. Drain Valve: 1 inch (25 mm), with sampling device.
 - b. Dial-type thermometer.
 - c. Liquid-level gage.
 - d. Pressure-vacuum gage.
 - e. Pressure Relief Device: Self-sealing with an indicator.
 - f. Mounting provisions for low-voltage current transformers.

- g. Mounting provisions for low-voltage potential transformers.
- h. Busway terminal connection at low-voltage compartment.
- i. Alarm contacts for gages and thermometer listed above.

D. Identification Devices

- 1. Nameplates: Engraved, laminated-plastic or metal nameplate for each transformer, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26 Section "Identification For Electrical Systems".

E. Source Quality Control

- 1. Factory Tests: Perform design and routine tests according to standards specified for components. Conduct transformer tests according to ANSI C57.12.50 for ventilated dry-type distribution transformers 1 to 500 kVA, single phase, and 15 to 500 kVA, 3 phase, with high voltage 601 to 34,500 V and low voltage 208Y/120 to 4160 V; ANSI C57.12.51 for ventilated dry-type power transformers 501 kVA and larger, 3 phase, with high voltage 601 to 34,500 V and low voltage 208Y/120 to 4160 V; IEEE C57.12.90 for liquid-filled transformers; and IEEE C57.12.91 for dry-type distribution and power transformers.
- 2. Factory Tests: Perform the following factory-certified tests on each transformer:
 - a. Resistance measurements of all windings on rated-voltage connection and on tap extreme connections.
 - b. Ratios on rated-voltage connection and on tap extreme connections.
 - c. Polarity and phase relation on rated-voltage connection.
 - d. No-load loss at rated voltage on rated-voltage connection.
 - e. Excitation current at rated voltage on rated-voltage connection.
 - f. Impedance and load loss at rated current on rated-voltage connection and on tap extreme connections.
 - g. Applied potential.
 - h. Induced potential.
 - i. Temperature Test: If transformer is supplied with auxiliary cooling equipment to provide more than one rating, test at lowest kilovolt-ampere Class OA or Class AA rating and highest kilovolt-ampere Class OA/FA or Class AA/FA rating.
 - 1) Temperature test is not required if record of temperature test on an essentially duplicate unit is available.

1.3 EXECUTION

A. Installation

- 1. Install transformers on concrete bases.
 - a. Anchor transformers to concrete bases according to manufacturer's written instructions, seismic codes at Project, and requirements in Division 26 Section "Hangers And Supports For Electrical Systems".
 - b. Construct concrete bases of dimensions indicated, but not less than **4 inches (100 mm)** larger in both directions than supported unit and **4 inches (100 mm)** high.
 - c. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".
 - d. Install dowel rods to connect concrete bases to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around full perimeter of base.
 - e. Install epoxy-coated anchor bolts, for supported equipment, that extend through concrete base and anchor into structural concrete floor.
 - f. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - g. Tack-weld or bolt transformers to channel-iron sills embedded in concrete bases. Install sills level and grout flush with floor or base.

2. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
- B. Identification
1. Identify field-installed wiring and components and provide warning signs as specified in Division 26 Section "Identification For Electrical Systems", **as directed**.
- C. Connections
1. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 2. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- D. Field Quality Control
1. Perform the following field tests and inspections and prepare test reports:
 - a. After installing transformers but before primary is energized, verify that grounding system at substation is tested at specified value or less.
 - b. After installing transformers and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Perform visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 2. Remove and replace malfunctioning units and retest as specified above.
 3. Test Reports: Prepare written reports to record the following:
 - a. Test procedures used.
 - b. Test results that comply with requirements.
 - c. Test results that do not comply with requirements and corrective actions taken to achieve compliance with requirements.
- E. Follow-Up Service
1. Voltage Monitoring and Adjusting: If requested by the Owner, perform the following voltage monitoring after Final Completion but not more than six months after Final Acceptance:
 - a. During a period of normal load cycles as evaluated by the Owner, perform seven days of three-phase voltage recording at secondary terminals of each transformer. Use voltmeters with calibration traceable to National Institute of Science and Technology standards and with a chart speed of not less than 1 inch (25 mm) per hour. Voltage unbalance greater than 1 percent between phases, or deviation of any phase voltage from nominal value by more than plus or minus 5 percent during test period, is unacceptable.
 - b. Corrective Actions: If test results are unacceptable, perform the following corrective actions, as appropriate:
 - 1) Adjust transformer taps.
 - 2) Prepare written request for voltage adjustment by electric utility.
 - c. Retests: After corrective actions have been performed, repeat monitoring until satisfactory results are obtained.
 - d. Report: Prepare written report covering monitoring and corrective actions performed.
 2. Infrared Scanning: Perform as specified in Division 26 Section "Medium-voltage Switchgear".

END OF SECTION 26 22 13 00

SECTION 26 22 13 00a - LOW-VOLTAGE TRANSFORMERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for low-voltage transformers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following types of dry-type transformers rated 600 V and less, with capacities up to 1000 kVA:
 - a. Distribution transformers.
 - b. Buck-boost transformers.

C. Submittals

1. Product Data: For each product indicated.
2. Shop Drawings: Indicate dimensions and weights.
 - a. Wiring Diagrams: Power, signal, and control wiring.
3. Manufacturer Seismic Qualification Certification: Submit certification that transformers, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Field quality-control test reports.
5. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with IEEE C57.12.91, "Test Code for Dry-Type Distribution and Power Transformers."

E. Delivery, Storage, And Handling

1. Temporary Heating: Apply temporary heat according to manufacturer's written instructions within the enclosure of each ventilated-type unit, throughout periods during which equipment is not energized and when transformer is not in a space that is continuously under normal control of temperature and humidity.

1.2 PRODUCTS

A. General Transformer Requirements

1. Description: Factory-assembled and -tested, air-cooled units for 60-Hz service.
2. Cores: Grain-oriented, non-aging silicon steel.
3. Coils: Continuous windings without splices except for taps.
 - a. Internal Coil Connections: Brazed or pressure type.
 - b. Coil Material: Aluminum **OR** Copper, **as directed**.

B. Distribution Transformers

1. Comply with NEMA ST 20, and list and label as complying with UL 1561.
2. Provide transformers that are constructed to withstand seismic forces specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
3. Cores: One leg per phase.
4. Enclosure: Ventiladed **OR** Totally enclosed, nonventilated, **as directed**, NEMA 250, Type 2.

- a. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
 5. Enclosure: Ventilated **OR** Totally enclosed, nonventilated, **as directed**, NEMA 250, Type 3R **OR** Type 4X, stainless steel, **as directed**.
 - a. Core and coil shall be encapsulated within resin compound, sealing out moisture and air.
 6. Transformer Enclosure Finish: Comply with NEMA 250.
 - a. Finish Color: Gray **OR** ANSI 49 gray **OR** ANSI 61 gray, **as directed**.
 7. Taps for Transformers Smaller Than 3 kVA: None **OR** One 5 percent tap above normal full capacity, **as directed**.
 8. Taps for Transformers 7.5 to 24 kVA: One 5 percent tap above and one 5 percent tap below normal full capacity **OR** Two 5 percent taps below rated voltage, **as directed**.
 9. Taps for Transformers 25 kVA and Larger: Two 2.5 percent taps above and two 2.5 percent taps below normal full capacity **OR** Two 2.5 percent taps above and four 2.5 percent taps below normal full capacity, **as directed**.
 10. Insulation Class: 220 deg C, UL-component-recognized insulation system with a maximum of 150 **OR** 115 **OR** 80, **as directed**, deg C rise above 40 deg C ambient temperature.
 11. Energy Efficiency for Transformers Rated 15 kVA and Larger:
 - a. Complying with NEMA TP 1, Class 1 efficiency levels.
 - b. Tested according to NEMA TP 2.
 12. K-Factor Rating: Transformers indicated to be K-factor rated shall comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.
 - a. Unit shall not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
 - b. Indicate value of K-factor on transformer nameplate.
 13. Electrostatic Shielding: Each winding shall have an independent, single, full-width copper electrostatic shield arranged to minimize interwinding capacitance.
 14. Wall Brackets: Manufacturer's standard brackets.
 15. Fungus Proofing: Permanent fungicidal treatment for coil and core.
 16. Low-Sound-Level Requirements: Minimum of 3 dBA less than NEMA ST 20 standard sound levels when factory tested according to IEEE C57.12.91.
- C. Buck-Boost Transformers
1. Description: Self-cooled, two-winding dry type, rated for continuous duty and with wiring terminals suitable for connection as autotransformer. Transformers shall comply with NEMA ST 1 and shall be listed and labeled as complying with UL 506 or UL 1561.
 2. Enclosure: Ventilated, NEMA 250, Type 2.
 - a. Finish Color: Gray **OR** ANSI 49 gray **OR** ANSI 61 gray, **as directed**.
- D. Identification Devices
1. Nameplates: Engraved, laminated-plastic or metal nameplate. Nameplates are specified in Division 26 Section "Identification For Electrical Systems".
- 1.3 EXECUTION
- A. Installation
1. Install wall-mounting transformers level and plumb with wall brackets fabricated by transformer manufacturer.
 - a. Brace wall-mounting transformers as specified in Division 26 Section "Hangers And Supports For Electrical Systems".
 2. Construct concrete bases and anchor floor-mounting transformers according to manufacturer's written instructions, seismic codes applicable to Project, **as directed**, and requirements in Division 26 Section "Hangers And Supports For Electrical Systems".
- B. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - b. Infrared Scanning: Two months after Final Completion, perform an infrared scan of transformer connections.
 - 1) Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
 - 2) Perform 2 follow-up infrared scans of transformers, one at 4 months and the other at 11 months after Final Completion.
 - 3) Prepare a certified report identifying transformer checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.
- C. Adjusting
 1. Adjust transformer taps to provide optimum voltage conditions at secondary terminals. Optimum is defined as not exceeding nameplate voltage plus 10 percent and not being lower than nameplate voltage minus 3 percent at maximum load conditions. Submit recording and tap settings as test results.
 2. Connect buck-boost transformers to provide nameplate voltage of equipment being served, plus or minus 5 percent, at secondary terminals.
 3. Output Settings Report: Prepare a written report recording output voltages and tap settings.
- D. Cleaning
 1. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

END OF SECTION 26 22 13 00a

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SECTION 26 24 13 00 - SWITCHBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Switchboards.
2. Surge protection devices.
3. Disconnecting and overcurrent protective devices.
4. Instrumentation.
5. Control power.
6. Accessory components and features.

B. Related Requirements

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 260573.19 "Arc-Flash Hazard Analysis" for arc-flash analysis and arc-flash label requirements.

1.2 COORDINATION

- A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- B. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Switchboards.
2. Overcurrent protective devices.
3. Surge protection devices.
4. Ground-fault protection devices.
5. Accessories.
6. Other components.
7. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

- B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types for types other than UL 50E, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
5. Include descriptive documentation of optional barriers specified for electrical insulation and isolation.
6. Detail utility company's metering provisions with indication of approval by utility company.
7. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for series rating of installed devices.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
10. Include diagram and details of proposed mimic bus.
11. Include schematic and wiring diagrams for power, signal, and control wiring.

C. Samples: Representative portion of mimic bus with specified material and finish, for color selection.

D. Field Quality-Control Submittals:

1. Field Quality-Control Reports:

- a. Test procedures used.
- b. Test results that comply with requirements.
- c. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.4 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation **AND / OR** testing instructions issued to Installer by manufacturer for the following:

1. Handling, storing, and providing temporary heat.
2. Mounting accessories and anchoring devices.
3. Testing and adjusting overcurrent protective devices.

B. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

A. Warranty documentation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Spare Parts: Furnish to Owner spare parts, for repairing switchboards, that are packaged with protective covering for storage on-site and identified with labels describing contents.

1. Potential Transformer Fuses: Equal to 10 percent of quantity installed for each size and type but no fewer than two of each size and type.
 2. Control-Power Fuses: Equal to 10 percent of quantity installed for each size and type, but no fewer than two of each size and type.
 3. Fuses and Fusible Devices for Fused Circuit Breakers: Equal to 10 percent of quantity installed for each size and type but no fewer than three of each size and type.
 4. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type but no fewer than three of each size and type.
 5. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type but no fewer than three of each size and type.
 6. Indicating Lights: Equal to 10 percent of quantity installed for each size and type but no less than one of each size and type.
- B. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to switchboards, that are packaged with protective covering for storage on-site and identified with labels describing contents.
1. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
 2. Portable Test Set: For testing functions of solid-state trip devices without removing from switchboard. Include relay and meter test plugs suitable for testing switchboard meters and switchboard class relays.
 3. Portable Circuit-Breaker Lifting Device: Floor-supported, roller-based, elevating carriage arranged for movement of circuit breakers in and out of compartments for present and future circuit breakers.
 4. Overhead Circuit-Breaker Lifting Device: Mounted at top front of switchboard, with hoist and lifting yokes matching each drawout circuit breaker.
 5. Spare-Fuse Cabinet: Suitably identified, wall-mounted, lockable, compartmented steel box or cabinet. Arrange for wall mounting.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.
 - B. Remove loose packing and flammable materials from inside switchboards and install temporary electric heating (250 W per section) **OR** connect factory-installed space heaters to temporary electrical service **as directed** to prevent condensation.
 - C. Handle and prepare switchboards for installation in accordance with NECA 400 **OR** NEMA PB 2.1.
- 1.8 WARRANTY
- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed switchboard perform in accordance with specified requirements and agrees to repair or replace components that fail to perform as specified within extended-warranty period.
 1. Extended-Warranty Period: Two years **OR** from date of Substantial Completion; full coverage for labor, materials, and equipment **as directed**.
 - B. Special Manufacturer Extended Warranty: Manufacturer warrants that switchboard performs in accordance with specified requirements and agrees to provide repair or replacement of components that fail to perform as specified within extended-warranty period.

1. Initial **OR** Extended-Warranty Period **as directed**: Three years **OR** from date of Substantial Completion **as directed**; full **OR** prorated coverage for labor, materials, and equipment **as directed**.
2. Follow-On Extended-Warranty Period: Five years **OR** as directed from date of Substantial Completion; full **OR** prorated coverage for materials that failed because of transient voltage surges only **as directed**, free on board origin **OR** destination, freight prepaid **as directed**.

PART 2 - PRODUCTS

2.1 SWITCHBOARDS

- A. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
- D. Comply with NEMA PB 2.
- E. Comply with NFPA 70.
- F. Comply with UL 891.
- G. Front-Connected, Front-Accessible Switchboards:
 1. Main Devices: Panel **OR** Fixed, individually mounted **as directed**.
 2. Branch Devices: Panel mounted.
 3. Sections front and rear aligned.
- H. Front- and Side-Accessible Switchboards:
 1. Main Devices: Fixed, individually mounted.
 2. Branch Devices: Panel mounted.
 3. Section Alignment: Front and Rear aligned.
- I. Front- and Rear-Accessible Switchboards:
 1. Main Devices: Fixed, individually **OR** Drawout mounted **as directed**.
 2. Branch Devices: Panel **OR** Fixed, individually **OR** Panel and fixed, individually **OR** Fixed and individually compartmented **OR** Individually compartmented and drawout mounted **as directed**.
 3. Sections front and rear **OR** rear aligned **as directed**.
- J. Nominal System Voltage: 480Y/277 V **OR** 208Y/120 V **as directed**.
- K. Main-Bus Continuous: 5000 **OR** 4000 **OR** 3000 **OR** 2500 **OR** 2000 **OR** 1600 **OR** 1200A **as directed**.
- L. Indoor Enclosures: Steel, UL 50E, Type 1 **OR** Type 2 **as directed**.

- M. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray **OR** custom color finish over rust-inhibiting primer on treated metal surface.
- N. Outdoor Enclosures: Type 3R **OR** Type 3R, with interior-lighted walk-in aisle **as directed**.
1. Finish: Factory-applied finish in manufacturer's standard **OR** custom color; undersurfaces treated with corrosion-resistant undercoating **as directed**.
 2. Enclosure: Flat **OR** Downward, rearward sloping roof; bolt-on rear covers **OR** rear hinged doors for each section, with provisions for padlocking **as directed**.
 3. Doors: Personnel door at each end of aisle, minimum width of **30 inch (762 mm) as directed**; opening outwards; with panic hardware and provisions for padlocking **OR** cylinder lock. At least one door must be sized to permit largest single switchboard section to pass through without disassembling doors, hinges, or switchboard section.
 4. Accessories: LED luminaires, ceiling mounted; wired to three-way light switch at each end of aisle; ground-fault circuit interrupter (GFCI) duplex receptacle; emergency battery pack luminaire installed on wall of aisle midway between personnel doors.
 5. Walk-in Aisle Heating and Ventilating:
 - a. Factory-installed electric unit heater(s), wall or ceiling mounted, with integral thermostat and disconnect and with capacities to maintain switchboard interior temperature of **40 deg F (5 deg C) as directed** with outside design temperature of **0 deg F (minus 18 deg C) as directed**.
 - b. Factory-installed exhaust fan with capacities to maintain switchboard interior temperature of **100 deg F (38 deg C) as directed** with outside design temperature of **90 deg F (32 deg C) as directed**.
 - c. Ventilating openings complete with replaceable fiberglass air filters.
 - d. Thermostat: Single stage; wired to control heat and exhaust fan.
 6. Power for Space Heaters, Ventilation, Lighting, and Receptacle: Include control-power transformer, with spare capacity of 25 percent, within switchboard. Supply voltage must be 120 V(ac) **OR** 120/240 V(ac) **OR** 120/208 V(ac) **as directed**.
 7. Power for space heaters, ventilation, lighting, and receptacle provided by remote source.
- O. Barriers: Between adjacent switchboard sections.
- P. Insulation and isolation for main bus of main section and main and vertical buses of feeder sections.
- Q. Space Heaters: Factory-installed electric space heaters of sufficient wattage in each vertical section to maintain enclosure temperature above expected dew point.
1. Space-Heater Control: Thermostats to maintain temperature of each section above expected dew point **OR** Manual switching of branch-circuit protective device **as directed**.
 2. Space-Heater Power Source: Transformer, factory installed in switchboard **OR** 120 V external branch circuit **as directed**.
- R. Service Entrance Rating: Switchboards intended for use as service entrance equipment may contain from one to six service disconnecting means with overcurrent protection, neutral bus with disconnecting link, grounding electrode conductor terminal, and main bonding jumper.
- S. Utility Metering Compartment: Barrier compartment and section complying with utility company's requirements; hinged sealable door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic switchboard. Provide service entrance label and necessary applicable service entrance features.

- T. Customer Metering Compartment: Separate customer metering compartment and section with front hinged door, and section with front hinged door, for indicated metering, and current transformers for each meter. Current transformer secondary wiring must be terminated on shorting-type terminal blocks. Include potential transformers having primary and secondary fuses with disconnecting means and secondary wiring terminated on terminal blocks.
- U. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.
- V. Removable, Hinged Rear Doors and Compartment Covers: Secured by captive thumb screws **OR** standard bolts, **as directed**, for access to rear interior of switchboard.
- W. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.
- X. Pull Box on Top of Switchboard:
1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.
 2. Set back from front to clear circuit-breaker removal mechanism.
 3. Removable covers may form top, front, and sides. Top covers at rear must be easily removable for drilling and cutting.
 4. Bottom must be insulating, fire-resistive material with separate holes for cable drops into switchboard.
 5. Cable supports must be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.
- Y. Buses and Connections: Three phase, four wire unless otherwise indicated.
1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from front of switchboard.
 2. Phase- and Neutral-Bus Material:
 - a. Hard-drawn copper of 98 percent conductivity silver-plated **OR as directed**.
 - b. Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.
 3. Copper feeder circuit-breaker line connections.
 4. Tin-plated aluminum feeder circuit-breaker line connections.
 5. Load Terminals: Insulated, rigidly braced, runback bus extensions, of same material as through buses, equipped with mechanical **OR** compression connectors for outgoing circuit conductors **as directed**. Provide load terminals for future circuit-breaker positions at full-ampere rating of circuit-breaker position.
 6. Ground Bus: **1/4 by 2 inch (6 by 50 mm-)** **OR 1/4 by 1 inch (6 by 25 mm-)** **OR** Minimum-size required by UL 891 **as directed**, hard-drawn copper of 98 percent conductivity, equipped with mechanical **OR** compression connectors for feeder and branch-circuit ground conductors **as directed**.
 7. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
 8. Disconnect Links:
 - a. Isolate neutral bus from incoming neutral conductors.
 - b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.
 9. Neutral Buses: 50 **OR** 100 percent of ampacity of phase buses unless otherwise indicated **as directed**, equipped with mechanical **OR** compression connectors for outgoing circuit neutral cables **as directed**. Brace bus extensions for busway feeder neutral bus.

- 10. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.
 - Z. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.
 - AA. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Minimum insulation temperature rating of 105 deg C.
 - BB. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components including instruments and instrument transformers.
- 2.2 SURGE PROTECTION DEVICES
- A. SPDs: Listed and labeled in accordance with UL 1449, Type 1 **OR** Type 2 **as directed**.
 - B. Features and Accessories:
 - 1. Integral disconnect switch.
 - 2. Internal thermal protection that disconnects SPD before damaging internal suppressor components.
 - 3. Indicator light display for protection status.
 - 4. Form-C contacts rated at 5 A and 250 V(ac) **OR** 2 A and 24 V(ac) **as directed**, one normally open and one normally closed, for remote monitoring of protection status. Contacts must reverse on failure of surge diversion module or on opening of current-limiting device. Coordinate with building power monitoring and control system.
 - 5. Surge counter.
 - C. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase may not be less than 200 kA **OR** 250 kA **OR** 300 kA **as directed**. Peak surge current rating must be arithmetic sum of ratings of individual MOVs in each mode.
 - D. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V **OR** 208Y/120 V **as directed**, three-phase, four-wire circuits may not exceed the following:
 - 1. Line to Neutral: 1200 V for 480Y/277 V **OR** 700 V for 208Y/120 V **as directed**.
 - 2. Line to Ground: 1200 V for 480Y/277 V **OR** 1200 V for 208Y/120 V **as directed**.
 - 3. Line to Line: 2000 V for 480Y/277 V **OR** 1000 V for 208Y/120 V **as directed**.
 - E. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits may not exceed the following:
 - 1. Line to Neutral: 700 V.
 - 2. Line to Ground: 700 V **OR** 1000 V **as directed**.
 - 3. Line to Line: 1000 V.
 - F. SCCR: Equal or exceed 100 kA **OR** 200 kA **as directed**.
 - G. Nominal Rating: 20 kA.
- 2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES
- A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with series-connected rating **OR** interrupting capacity to meet available fault currents **as directed**.

1. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 3. Electronic trip circuit breakers with RMS sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - a. Instantaneous trip.
 - b. Long- and short-time pickup levels.
 - c. Long and short time adjustments.
 - d. Ground-fault pickup level, time delay, and I squared t response.
 4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 5. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
 6. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6 mA trip).
 7. Ground-Fault Equipment Protection (GFEP) Circuit Breakers: Class B ground-fault protection (30 mA trip).
 8. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Lugs: Mechanical **OR** Compression style **as directed**, suitable for number, size, trip ratings, and conductor material.
 - c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - d. Ground-Fault Protection: Integrally mounted **OR** Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator **as directed**.
 - e. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
 - f. Communication Capability: Circuit-breaker-mounted **OR** Universal-mounted Integral **OR** Din-rail-mounted communication module **as directed**, with functions and features compatible with power monitoring and control system specified in Section 260913 "Electrical Power Monitoring and Control."
 - g. Shunt Trip: 120 V trip coil energized from separate circuit, set to trip at 55 **OR** 75 percent of rated voltage **as directed**.
 - h. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - i. Auxiliary Contacts: One SPDT switch **OR** Two SPDT switches with "a" and "b" contacts **as directed**; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 - j. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key must be removable only when circuit breaker is in off position.
- B. Insulated-Case Circuit Breaker (ICCB): 80 **OR** 100 percent rated **as directed**, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.
1. Fixed **OR** Drawout circuit-breaker mounting **as directed**.
 2. Two-step, stored-energy closing.
 3. Standard **OR** Full function microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings **as directed**:

- a. Instantaneous trip.
 - b. Time adjustments for long- and short-time pickup.
 - c. Ground-fault pickup level, time delay, and I squared t response.
4. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
 5. Remote trip indication and control.
 6. Communication Capability: Web enabled integral Ethernet communication module and embedded Web server with factory-configured Web pages (HTML file format). Provide functions and features compatible with power monitoring and control system specified in Section 260913 "Electrical Power Monitoring and Control."
 7. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key must be removable only when circuit breaker is in off position.
 8. Control Voltage: 40 V(dc) **OR** 125 V(dc) **OR** 250 V(dc) **OR** 120 V(ac) **as directed**.
- C. Bolted-Pressure Contact Switch: Operating mechanism uses rotary-mechanical-bolting action to produce and maintain high clamping pressure on switch blade after it engages stationary contacts.
1. Main-Contact Interrupting Capability: Minimum of 12 times switch current rating.
 2. Operating Mechanism: Manual handle operation to close switch; stores energy in mechanism for opening and closing.
 - a. Electrical Trip: Operation of lever or push-button trip switch, or trip signal from ground-fault relay or remote-control device, causes switch to open.
 - b. Mechanical Trip: Operation of mechanical lever, push button, or other device causes switch to open.
 3. Auxiliary Switches: Factory installed, SPDT, with leads connected to terminal block, and including one set more than quantity required for functional performance indicated.
 4. Service-Rated Switches: Labeled for use as service equipment.
 5. Ground-Fault Relay: Comply with UL 1053; self-powered type with mechanical ground-fault indicator, test function, tripping relay with internal memory, and three-phase current transformer/sensor.
 - a. Configuration: Integrally mounted **OR** Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator **as directed**.
 - b. Internal Memory: Integrates cumulative value of intermittent arcing ground-fault currents and uses effect to initiate tripping.
 - c. No-Trip Relay Test: Permits ground-fault simulation test without tripping switch.
 - d. Test Control: Simulates ground fault to test relay and switch (or relay only if "no-trip" mode is selected).
 6. Open-Fuse Trip Device: Arranged to trip switch open if phase fuse opens.
- D. High-Pressure, Butt-Type Contact Switch: Operating mechanism uses butt-type contacts and spring-charged mechanism to produce and maintain high-pressure contact when switch is closed.
1. Main-Contact Interrupting Capability: Minimum of 12 times switch current rating.
 2. Operating Mechanism: Manual handle operation to close switch; stores energy in mechanism for opening and closing.
 - a. Electrical Trip: Operation of lever or push-button trip switch, or trip signal from ground-fault relay or remote-control device, causes switch to open.

- b. Mechanical Trip: Operation of mechanical lever, push button, or other device causes switch to open.
- 3. Auxiliary Switches: Factory installed, SPDT, with leads connected to terminal block, and including one set more than quantity required for functional performance indicated.
- 4. Service-Rated Switches: Labeled for use as service equipment.
- 5. Ground-Fault Relay: Comply with UL 1053; self-powered type with mechanical ground-fault indicator, test function, tripping relay with internal memory, and three-phase current transformer/sensor.
 - a. Configuration: Integrally mounted **OR** Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator **as directed**.
 - b. Internal Memory: Integrates cumulative value of intermittent arcing ground-fault currents and uses effect to initiate tripping.
 - c. No-Trip Relay Test: Permits ground-fault simulation test without tripping switch.
 - d. Test Control: Simulates ground fault to test relay and switch (or relay only if "no-trip" mode is selected).
- 6. Open-Fuse Trip Device: Arranged to trip switch open if phase fuse opens.
- E. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
- F. Fuses are specified in Section 262813 "Fuses."

2.4 INSTRUMENTATION

- A. Instrument Transformers: NEMA EI 21.1, and the following:
 - 1. Potential Transformers: NEMA EI 21.1; 120 V, 60 Hz, single **OR** tapped **OR** double secondary **as directed**; disconnecting type with integral fuse mountings. Burden and accuracy must be consistent with connected metering and relay devices.
 - 2. Current Transformers: NEMA EI 21.1; 5 A, 60 Hz, secondary; wound **OR** bushing **OR** bar or window type **as directed**; single **OR** double secondary winding and secondary shorting device **as directed**. Burden and accuracy must be consistent with connected metering and relay devices.
 - 3. Control-Power Transformers: Dry type, mounted in separate compartments for units larger than 3 kVA.
 - 4. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, to provide selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker, ground-fault protection.
- B. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
 - 1. Switch-selectable digital display of the following values with maximum accuracy tolerances as indicated:
 - a. Phase Currents, Each Phase: Plus or minus 0.5 percent.
 - b. Phase-to-Phase Voltages, Three Phase: Plus or minus 0.5 percent.
 - c. Phase-to-Neutral Voltages, Three Phase: Plus or minus 0.5 percent.
 - d. Megawatts: Plus or minus 1 percent.
 - e. Megavars: Plus or minus 1 percent.
 - f. Power Factor: Plus or minus 1 percent.
 - g. Frequency: Plus or minus 0.1 percent.

- h. Accumulated Energy, Megawatt Hours: Plus or minus 1 percent; accumulated values unaffected by power outages up to 72 hours.
 - i. Megawatt Demand: Plus or minus 1 percent; demand interval programmable from five to 60 minutes.
 - j. Contact devices to operate remote impulse-totalizing demand meter.
 - 2. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.
- C. Analog Meters:
 - 1. Meters: **4 inch (100 mm)** diameter or **6 inch (150 mm)** square, flush or semiflush, with anti-parallax 250-degree scales and external zero adjustment.
- D. Voltmeters: Cover expanded-scale range of nominal voltage plus 10 percent.
- E. Instrument Switches: Rotary type with off position.
 - 1. Voltmeter Switches: Permit reading of phase-to-phase voltages and, where neutral is indicated, phase-to-neutral voltages.
 - 2. Ammeter Switches: Permit reading of current in each phase and maintain current-transformer secondaries in closed-circuit condition at all times.
- F. Ammeters: **2-1/2 inch (64 mm)** minimum size with 90- or 120-degree scale. Meter and transfer device with off position, located on overcurrent device door for indicated feeder circuits only.
- G. Watt-Hour Meters and Wattmeters:
 - 1. Comply with ANSI C12.1.
 - 2. Three-phase induction type with two stators, each with current and potential coil, rated 5 A, 120 V, 60 Hz.
 - 3. Suitable for connection to three- and four-wire circuits.
 - 4. Potential indicating lamps.
 - 5. Adjustments for light and full load, phase balance, and power factor.
 - 6. Four-dial clock register.
 - 7. Integral demand indicator.
 - 8. Contact devices to operate remote impulse-totalizing demand meter.
 - 9. Ratchets to prevent reverse rotation.
 - 10. Removable meter with drawout test plug.
 - 11. Semiflush mounted case with matching cover.
 - 12. Appropriate multiplier tag.
- H. Impulse-Totalizing Demand Meter:
 - 1. Comply with ANSI C12.1.
 - 2. Suitable for use with switchboard watt-hour meter, including two-circuit totalizing relay.
 - 3. Cyclometer.
 - 4. Four-dial, totalizing kilowatt-hour register.
 - 5. Positive chart drive mechanism.
 - 6. Capillary pen holding minimum of one month's ink supply.
 - 7. Roll chart with minimum 31-day capacity; appropriate multiplier tag.
 - 8. Capable of indicating and recording 5 **OR** 15 **OR** 30 minute integrated demand of totalized system **as directed**.

2.5 CONTROL POWER

- A. Control Circuits:
 - 1. 120 V(ac), supplied through secondary disconnecting devices from control-power transformer.
 - 2. 120 V(ac), supplied from remote branch circuit.
 - 3. Control voltage V(dc) **as directed**.
- B. Electrically Interlocked Main and Tie Circuit Breakers: Two control-power transformers in separate compartments, with interlocking relays, connected to primary side of each control-power transformer at line side of associated main circuit breaker. 120 V secondaries connected through automatic transfer relays to ensure fail-safe automatic transfer scheme.
- C. Control-Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.
- D. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.

2.6 ACCESSORY COMPONENTS AND FEATURES

- A. Mounting Accessories: For anchors, mounting channels, bolts, washers, and other mounting accessories, comply with requirements in Section 260548.16 "Seismic Controls for Electrical Systems" or manufacturer's instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store switchboards in accordance with NECA 400 **OR** NEMA PB 2.1 **as directed**.
 - 1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's published instructions.
 - 2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
 - 3. Protect from moisture, dust, dirt, and debris during storage and installation.
 - 4. Install temporary heating during storage in accordance with manufacturer's published instructions.
- B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.
- C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect performance of equipment.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

3.3 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
 - 1. Switchboards and Accessories: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 400 **OR** NEMA PB 2.1 **as directed**.
 - 2. Consult Architect for resolution of conflicting requirements.
- C. Special Techniques:
 - 1. Equipment Mounting: Install switchboards on concrete base, **4 inch (100 mm)** nominal thickness. Comply with requirements for concrete base specified in Section 260529 "Hangers and Supports for Electrical Systems."
 - a. Install conduits entering underneath switchboard, entering under vertical section where conductors will terminate. Install with couplings flush with concrete base. Extend **2 inch (50 mm)** above concrete base after switchboard is anchored in place.
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18 inch (450 mm)** centers around full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, published instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to switchboards.
 - f. Anchor switchboard to building structure at top of switchboard if required or recommended by manufacturer.
 - 2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.
 - 3. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 4. Operating Instructions: Frame and mount printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.
 - 5. Install filler plates in unused spaces of panel-mounted sections.
 - 6. Install overcurrent protective devices, surge protection devices, and instrumentation.
 - a. Set field-adjustable switches and circuit-breaker trip ranges.
 - 7. Install spare-fuse cabinet.

3.4 CONNECTIONS

- A. Comply with requirements for terminating feeder bus specified in Section 262500 "Enclosed Bus Assemblies." Drawings indicate general arrangement of bus, fittings, and specialties.

- B. Comply with requirements for terminating cable trays specified in Section 260536 "Cable Trays for Electrical Systems." Drawings indicate general arrangement of cable trays, fittings, and specialties.
- C. Bond conduits entering underneath switchboard to equipment ground bus with bonding conductor sized in accordance with NFPA 70.
- D. Support and secure conductors within switchboard in accordance with NFPA 70.
- E. Extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3.5 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- B. Switchboard Nameplates: Label each switchboard compartment with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Mimic Bus:
 - 1. Entire single-line switchboard bus work, as depicted on factory record drawing, on minimum **0.032 inch (0.813 mm)** thick anodized aluminum photoengraved nameplate, located at eye level on front cover of switchboard incoming service section.
 - 2. Entire single-line switchboard bus work, as depicted on factory record drawing, on engraved minimum **0.0625 inch (1.588 mm)** thick laminated-plastic (Gravoply) nameplate, located at eye level on front cover of switchboard incoming service section.
 - 3. Continuously integrated mimic bus factory applied to front of switchboard. Arrange in single-line diagram format, using symbols and letter designations consistent with final mimic-bus diagram.
 - 4. Coordinate mimic-bus segments with devices in switchboard sections to which they are applied. Produce concise visual presentation of principal switchboard components and connections.
 - 5. Presentation Media: Painted graphics in color contrasting with background color to represent bus and components, complete with lettered designations.
- E. Service Equipment Label: Labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for use as service equipment for switchboards with one or more service disconnecting and overcurrent protective devices.

3.6 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 - 1. **As directed.**
- B. Field tests and inspections must be witnessed by Architect **OR** Tenant **OR** authorities having jurisdiction **OR** Names or titles of witnesses **as directed.**

C. Tests and Inspections:

1. Acceptance Testing:

- a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.
 - b. Test continuity of each circuit.
2. Test ground-fault protection of equipment for service equipment in accordance with NFPA 70.
 3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 4. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 5. Perform the following infrared scan tests and inspections, and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each switchboard. Remove front **OR** front and rear panels so joints and connections are accessible to portable scanner **as directed**.
 - b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 6. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

D. Nonconforming Work:

1. Switchboard will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Collect, assemble, and submit test and inspection reports, including certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

F. Manufacturer Services:

1. Engage factory-authorized service representative to support **OR** supervise field tests and inspections **as directed**.

3.7 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated **OR** as specified in Section 260573.16 "Coordination Studies" **as directed**.

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3.8 PROTECTION

- A. Temporary Heating: Apply temporary heat, to maintain temperature in accordance with manufacturer's published instructions, until switchboard is ready to be energized and placed into service.

END OF SECTION 26 24 13 00

SECTION 26 24 13 00a - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Receptacle switches.
4. Shunt trip switches.
5. Molded-case circuit breakers (MCCBs).
6. Molded-case switches.
7. Enclosures.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 DEFINITIONS

- A. GFEP: Ground-fault circuit-interrupter for equipment protection.
- B. GFLS: Ground-fault circuit-interrupter for life safety.
- C. SPDT: Single pole, double throw.

1.3 ACTION SUBMITTALS

A. Product Data:

1. For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.
2. Enclosure types and details for types other than UL 50E, Type 1.
3. Current and voltage ratings.
4. Short-circuit current ratings (interrupting and withstand, as appropriate).
5. Include evidence of qualified electrical testing laboratory listing for series rating of installed devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
7. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device. Provide in **[PDF] [and] Calculation program format** as directed by the Owner in electronic format.

- B. Shop Drawings: For enclosed switches and circuit breakers.
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Include wiring diagrams for power, signal, and control wiring.

- C. Field Quality-Control Submittals:
 - 1. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Warranty documentation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts: Furnish to Owner spare parts, for repairing enclosed switches and circuit breakers, that are packaged with protective covering for storage on-site and identified with labels describing contents. [**Include the following:**]
 - 1. Fuses: Equal to [**10**] percent or as directed by the Owner of quantity installed for each size and type, but no fewer than [**three**] or as directed by the Owner of each size and type.
 - 2. Fuse Pullers: [**Two**] or as directed by the Owner for each size and type.

1.7 WARRANTY

- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed enclosed switches and circuit breakers perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.
 - 1. Extended-Warranty Period: [**Two**] years or as directed by the Owner from date of Substantial Completion; full coverage for labor, materials, and equipment.
- B. Special Manufacturer Extended Warranty: Manufacturer warrants that enclosed switches and circuit breakers perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within extended-warranty period.
 - 1. Extended-Warranty Period: [**Three**] years or as directed by the Owner from date of Substantial Completion; [**full**] [**prorated**] coverage for labor, materials, and equipment.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Source Limitations: Obtain products from single manufacturer.
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction and marked for intended location and application.

2.2 FUSIBLE SWITCHES

- A. Type HD, Heavy Duty:
 - 1. **[Single] [Double]** throw.
 - 2. **[Three] [six]** pole.
 - 3. **[240] [600]** V(ac).
 - 4. **[1200 A and smaller] [200 A and smaller]**.
 - 5. UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate **[specified] [indicated]** fuses.
 - 6. Lockable handle with capability to accept three padlocks and interlocked with cover in closed position.
- B. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
 - 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 5. Service-Rated Switches: Labeled for use as service equipment.
 - 6. Hookstick Handle: Allows use of hookstick to operate handle.
 - 7. Auxiliary Contact Kit: **[One] [Two]** NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - **[24 V(ac)] [120 V(ac)] [208 V(ac)] [240 V(ac)] [6 V(dc)] [12 V(dc)] [24 V(dc)]**.
 - 8. Lugs: **[Mechanical] [Compression]** type, suitable for number, size, and conductor material.

2.3 NONFUSIBLE SWITCHES

- A. Type GD, General Duty, Three Pole, Single Throw, 240 V(ac), 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.
- B. Type HD, Heavy Duty, Three Pole, Single Throw, **[240] [600]** V(ac), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

- C. Type HD, Heavy Duty, Six Pole, Single Throw, [240] [600] V(ac), 200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- D. Type HD, Heavy Duty, Three Pole, Double Throw, [240] [600] V(ac), 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.
- E. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
 - 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 5. Service-Rated Switches: Labeled for use as service equipment.
 - 6. Hookstick Handle: Allows use of hookstick to operate handle.
 - 7. Auxiliary Contact Kit: [One] [Two] NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - [24 V(ac)] [120 V(ac)] [208 V(ac)] [240 V(ac)] [6 V(dc)] [12 V(dc)] [24 V(dc)].
 - 8. Lugs: [Mechanical] [Compression] type, suitable for number, size, and conductor material.

2.4 RECEPTACLE SWITCHES

- A. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: [240] [600] V(ac), [30] [60] [100] A or as directed by the Owner ; UL 98 and NEMA KS 1; horsepower rated, with clips or bolt pads to accommodate [specified] [indicated] fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- B. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: [240] [600] V(ac), [30] [60] [100] A or as directed by the Owner ; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- C. Interlocking Linkage: Provided between receptacle and switch mechanism to prevent inserting or removing plug while switch is in on position, inserting plug other than specified, and turning switch on if incorrect plug is inserted or correct plug has not been fully inserted into receptacle.
- D. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).
- E. Accessories:
 - 1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
 - 2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 - 3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
 - 4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 - 5. Service-Rated Switches: Labeled for use as service equipment.
 - 6. Hookstick Handle: Allows use of hookstick to operate handle.

7. Auxiliary Contact Kit: **[One] [Two]** NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - **[24 V(ac)] [120 V(ac)] [208 V(ac)] [240 V(ac)] [6 V(dc)] [12 V(dc)] [24 V(dc)]**.
8. Lugs: **[Mechanical] [Compression]** type, suitable for number, size, and conductor material.

2.5 SHUNT TRIP SWITCHES

- A. General Requirements: Comply with **[ASME A17.1,]** UL 50, and UL 98, with Class J fuse block and 200 kA interrupting and short-circuit current rating.
- B. Type HD, Heavy-Duty, Three Pole, Single-Throw Fusible Switch: **[240] [600]** V(ac), **[30] [60] [100]** A or as directed by the Owner ; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, with clips or bolt pads to accommodate **[specified] [indicated]** fuses; lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- C. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: **[240] [600]** V(ac), **[30] [60] [100]** A or as directed by the Owner ; UL 98 and NEMA KS 1; integral shunt trip mechanism; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.
- D. Control Circuit: 120 V(ac); obtained from **[integral control power transformer, with primary and secondary fuses,]** **Source of control power** as directed by the Owner with control power **[transformer] [source]** of enough capacity to operate shunt trip, pilot, indicating and control devices.
- E. Accessories:
 1. Oiltight key switch for key-to-test function.
 2. Oiltight **[red] [green] [white] [yellow]** ON pilot light.
 3. Isolated neutral lug; **[100] [200]** percent rating.
 4. Mechanically interlocked auxiliary contacts that change state when switch is opened and closed.
 5. Three-pole, double-throw, fire-safety and alarm relay; **[120 V(ac)] [24 V(dc)]** coil voltage.
 6. Three-pole, double-throw, fire-alarm voltage monitoring relay complying with NFPA 72.
 7. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
 8. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
 9. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
 10. Service-Rated Switches: Labeled for use as service equipment.
 11. Hookstick Handle: Allows use of hookstick to operate handle.
 12. Form C alarm contacts that change state when switch is tripped.
 13. Auxiliary Contact Kit: **[One] [Two]** NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open. Contact rating - **[24 V(ac)] [120 V(ac)] [208 V(ac)] [240 V(ac)] [6 V(dc)] [12 V(dc)] [24 V(dc)]**.
 14. Lugs: **[Mechanical] [Compression]** type, suitable for number, size, and conductor material.

2.6 MOLDED-CASE CIRCUIT BREAKERS

- A. Circuit breakers must be constructed using glass-reinforced insulating material. Current carrying components must be completely isolated from handle and accessory mounting area.
- B. Circuit breakers must have toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. Circuit-breaker handle must be over center, be trip free, and reside in tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon must be clearly marked on and off in addition to providing international I/O markings. Equip

circuit breaker with push-to-trip button, located on face of circuit breaker to mechanically operate circuit-breaker tripping mechanism for maintenance and testing purposes.

- C. Maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings must be clearly marked on face of circuit breaker. Circuit breakers must be **[100 percent rated] [series rated] [100 percent rated or series rated as indicated on Drawings]. [Circuit breaker/circuit breaker] [Fuse/circuit breaker]** combinations for series connected interrupting ratings must be listed by UL as recognized component combinations. Series rated combination used must be marked on end-use equipment along with statement "Caution - Series Rated System. _____ Amps Available. Identical Replacement Component Required."
- D. MCCBs must be equipped with device for locking in isolated position.
- E. Lugs must be suitable for **[60 deg C rated wire on 125 A circuit breakers and below] [75 deg C rated wire] [90 deg C rated wire, sized in accordance with 75 deg C temperature rating in NFPA 70]**.
- F. Standard: Comply with UL 489 with required interrupting capacity for available fault currents.
- G. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
- H. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
- I. Electronic Trip Circuit Breakers: Field-replaceable rating plug, RMS sensing, with the following field-adjustable settings:
 1. Instantaneous trip.
 2. Long- and short-time pickup levels.
 3. Long- and short-time time adjustments.
 4. Ground-fault pickup level, time delay, and I-squared t response.
- J. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.
- K. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.
- L. GFLS Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6 mA trip).
- M. GFEP Circuit Breakers: With Class B ground-fault protection (30 mA trip).
- N. Features and Accessories:
 1. Standard frame sizes, trip ratings, and number of poles.
 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
 3. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 4. Alarm Switch: One **[NO] [NC]** contact that operates only when circuit breaker has tripped.
 5. Auxiliary Contacts: **[One SPDT switch] [Two SPDT switches]** with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

6. Lugs: **[Mechanical] [Compression]** type, suitable for number, size, trip ratings, and conductor material.
7. Ground-Fault Protection: Comply with UL 1053; **[integrally mounted, self-powered] [remote-mounted and powered]** type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
8. Communication Capability: **[Circuit-breaker-mounted] [Universal-mounted] [Integral] [Din-rail-mounted]** communication module with functions and features compatible with power monitoring and control system, specified in Section 260913 "Electrical Power Monitoring and Control."
9. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
10. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key must be removable only when circuit breaker is in off position.
11. Zone-Selective Interlocking: Integral with **[electronic] [ground-fault]** trip unit; for interlocking ground-fault protection function.
12. Electrical Operator: Provide remote control for on, off, and reset operations.
13. Accessory Control Power: **[Integrally mounted, self-powered] [Remote mounted and powered]; [24 V(ac)] [120 V(ac)] [208 V(ac)] [240 V(ac)] [12 V(dc)] [24 V(dc)] [120 V(dc)].**

2.7 MOLDED-CASE SWITCHES

- A. Description: MCCB with fixed, high-set instantaneous trip only, and short-circuit withstand rating equal to equivalent breaker frame size interrupting rating.
- B. Standard: Comply with UL 489 with interrupting capacity to comply with available fault currents.
- C. Features and Accessories:
 1. Standard frame sizes and number of poles.
 2. Lugs:
 - a. **[Mechanical] [Compression]** type, suitable for number, size, trip ratings, and conductor material.
 - b. Lugs must be suitable for **[60 deg C rated wire on 125 A circuit breakers and below] [75 deg C rated wire] [90 deg C rated wire, sized in accordance with 75 deg C temperature rating in NFPA 70].**
 3. Ground-Fault Protection: Comply with UL 1053; remote-mounted and powered type with mechanical ground-fault indicator; relay with adjustable pickup and time-delay settings, push-to-test feature, internal memory, and shunt trip unit; and three-phase, zero-sequence current transformer/sensor.
 4. Shunt Trip: Trip coil energized from separate circuit, with coil-clearing contact.
 5. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 6. Auxiliary Contacts: **[One SPDT switch] [Two SPDT switches]** with "a" and "b" contacts; "a" contacts mimic switch contacts, "b" contacts operate in reverse of switch contacts.
 7. Alarm Switch: One **[NO] [NC]** contact that operates only when switch has tripped.
 8. Key Interlock Kit: Externally mounted to prohibit switch operation; key must be removable only when switch is in off position.
 9. Zone-Selective Interlocking: Integral with ground-fault shunt trip unit; for interlocking ground-fault protection function.
 10. Electrical Operator: Provide remote control for on, off, and reset operations.
 11. Accessory Control Power Voltage: **[Integrally mounted, self-powered] [Remote mounted and powered]; [24 V(ac)] [120 V(ac)] [208 V(ac)] [240 V(ac)] [12 V(dc)] [24 V(dc)] [120 V(dc)].**

2.8 ENCLOSURES

- A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, UL 50E, and UL 50, to comply with environmental conditions at installed location.
- B. Enclosure Finish: Enclosure must be **[finished with] [gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (UL 50E Type 1)] [gray baked enamel paint, electrodeposited on cleaned, phosphatized galvanized steel (UL 50E Types 3R, 12)] [a brush finish on Type 304 stainless steel (UL 50E Type 4-4X stainless steel)] [copper-free cast aluminum alloy (UL 50E Types 7, 9)]**.
- C. Conduit Entry: UL 50E Types 4, 4X, and 12 enclosures may not contain knockouts. UL 50E Types 7 and 9 enclosures must be provided with threaded conduit openings in both endwalls.
- D. Operating Mechanism: Circuit-breaker operating handle must be **[externally operable with operating mechanism being integral part of box, not cover] [directly operable through front cover of enclosure (UL 50E Type 1)] [directly operable through dead front trim of enclosure (UL 50E Type 3R)] [externally operable with operating mechanism being integral part of cover (UL 50E Types 7, 9)]**. Cover interlock mechanism must have externally operated override. Override may not permanently disable interlock mechanism, which must return to locked position once override is released. Tool used to override cover interlock mechanism must not be required to enter enclosure in order to override interlock.
- E. Enclosures designated as UL 50E Type 4, 4X stainless steel, 12, or 12K must have dual cover interlock mechanism to prevent unintentional opening of enclosure cover when circuit breaker is ON and to prevent turning circuit breaker ON when enclosure cover is open.
- F. UL 50E Type 7/9 enclosures must be furnished with breather and drain kit to allow their use in outdoor and wet location applications.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Commencement of work will indicate Installer's acceptance of areas and conditions as satisfactory.

3.2 SELECTION OF ENCLOSURES

- A. Indoor, Dry and Clean Locations: UL 50E, **[Type 1]** or as directed by the Owner .
- B. Outdoor Locations: UL 50E, **[Type 3R] [Type 4X]** or as directed by the Owner .
- C. **[Kitchen] [Wash-Down]** Areas: UL 50E, **[Type 4X]** , **[stainless steel]** or as directed by the Owner .
- D. Other Wet or Damp, Indoor Locations: UL 50E, **[Type 4]** or as directed by the Owner .

- E. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: UL 50E, Type 12.
- F. Hazardous Areas Indicated on Drawings: UL 50E, **[Type 7] [Type 9]** or as directed by the Owner **[with cover attached by Type 316 stainless steel bolts]**.

3.3 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Special Techniques:
 - 1. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
 - 2. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.
 - 3. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 4. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
 - 5. Install fuses in fusible devices.

3.4 IDENTIFICATION

- A. Comply with requirements in Section 260553 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.5 FIELD QUALITY CONTROL

- A. **[Acceptance]** Testing Preparation:
 - 1. as directed by the Owner .
- B. Field tests and inspections must be witnessed by **[Architect] [Tenant] [authorities having jurisdiction] Names or titles of witnesses** as directed by the Owner .
- C. Tests and Inspections for Switches:
 - 1. Visual and Mechanical Inspection:
 - a. Inspect physical and mechanical condition.
 - b. Inspect anchorage, alignment, grounding, and clearances.
 - c. Verify that unit is clean.
 - d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
 - e. Verify that fuse sizes and types match the Specifications and Drawings.
 - f. Verify that each fuse has adequate mechanical support and contact integrity.
 - g. Inspect bolted electrical connections for high resistance using one of the following methods:
 - 1) Use low-resistance ohmmeter.

- a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.
 - 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS Table 100.12.
 - h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on Drawings.
 - i. Verify correct phase barrier installation.
 - j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.
2. Electrical Tests:
- a. Perform resistance measurements through bolted connections with low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
 - b. Measure contact resistance across each switchblade fuseholder. Drop values may not exceed high level of manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
 - c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In absence of manufacturer's published data, use Table 100.1 from NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.
 - e. Perform ground fault test in accordance with NETA ATS Section 7.14 "Ground Fault Protection Systems, Low-Voltage."
- D. Tests and Inspections for Molded-Case Circuit Breakers:
- 1. Visual and Mechanical Inspection:
 - a. Verify that equipment nameplate data are as described in the Specifications and shown on Drawings.
 - b. Inspect physical and mechanical condition.
 - c. Inspect anchorage, alignment, grounding, and clearances.
 - d. Verify that unit is clean.
 - e. Operate circuit breaker to ensure smooth operation.
 - f. Inspect bolted electrical connections for high resistance using one of the following methods:
 - 1) Use low-resistance ohmmeter.
 - a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of lowest value.

- 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.
 - a) Bolt-torque levels must be in accordance with manufacturer's published data. In absence of manufacturer's published data, use NETA ATS Table 100.12.
 - g. Inspect operating mechanism, contacts, and chutes in unsealed units.
 - h. Perform adjustments for final protective device settings in accordance with coordination study.
2. Electrical Tests:
- a. Perform resistance measurements through bolted connections with low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
 - b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In absence of manufacturer's published data, use Table 100.1 from NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.
 - c. Perform contact/pole resistance test. Drop values may not exceed high level of manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of lowest value.
 - d. Perform insulation resistance tests on control wiring with respect to ground. Applied potential must be 500 V(dc) for 300 V rated cable and 1000 V(dc) for 600 V rated cable. Test duration must be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values may be no less than 2 M Ω .
 - e. Determine the following by primary current injection:
 - 1) Long-time pickup and delay. Pickup values must be as specified. Trip characteristics may not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - 2) Short-time pickup and delay. Short-time pickup values must be as specified. Trip characteristics may not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - 3) Ground-fault pickup and time delay. Ground-fault pickup values must be as specified. Trip characteristics may not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.
 - 4) Instantaneous pickup. Instantaneous pickup values must be as specified and within manufacturer's published tolerances.
 - f. Test functionality of trip unit by means of primary current injection. Pickup values and trip characteristics must be as specified and within manufacturer's published tolerances.
 - g. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of shunt trip and close coils must be as indicated by manufacturer.
 - h. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset trip logs and indicators. Investigate units that do not function as designed.
 - i. Verify operation of charging mechanism. Investigate units that do not function as designed.
3. Test and adjust controls, remote monitoring, and safeties.

- E. Nonconforming Work:
 - 1. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.
 - 2. Remove and replace defective units and retest.
- F. Collect, assemble, and submit test and inspection reports.
 - 1. Test procedures used.
 - 2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
 - 3. List deficiencies detected, remedial action taken, and observations after remedial action.
- G. Manufacturer Services:
 - 1. Engage factory-authorized service representative to **[support]** **[supervise]** field tests and inspections.

3.6 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges[**as specified in Section 260573.16 "Coordination Studies."**] [**to values indicated on Drawings.**] [**to values indicated in attached schedule.**]

3.7 PROTECTION

- A. After installation, protect enclosed switches and circuit breakers from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.8 MAINTENANCE

- A. Infrared Scanning of Enclosed Switches and Breakers: Two months after Substantial Completion, perform infrared scan of joints and connections. Remove covers so joints and connections are accessible to portable scanner. Take visible light photographs at same locations and orientations as infrared scans for documentation to ensure follow-on scans match same conditions for valid comparison.
 - 1. Instruments and Equipment: Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - 2. Follow-up Infrared Scanning: Perform two follow-up infrared scans of enclosed switches and breakers, one at four months and another at 11 months after Substantial Completion.
 - 3. Instrument: Use infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide documentation of device calibration.
 - 4. Report: Prepare certified report that identifies units checked and that describes scanning results. Include notation of deficiencies detected, remedial actions taken, and scanning observations after remedial action.

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Task	Specification	Specification Description
26 24 13 00	26 27 13 00	Electricity Metering

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SECTION 26 24 16 00 - PANELBOARDS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Power panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.
4. Electronic-grade panelboards.
5. Disconnecting and overcurrent protective devices.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 DEFINITIONS

- A. GFEP:** Ground-fault equipment protection.
- B. MCCB:** Molded-case circuit breaker.
- C. VPR:** Voltage protection rating.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Power panelboards.
2. Lighting and appliance branch-circuit panelboards.
3. Load centers.
4. Electronic-grade panelboards.
5. Disconnecting and overcurrent protective devices.
6. Include materials, switching and overcurrent protective devices, SPDs, accessories, and components indicated.
7. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: For each panelboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.

3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for series rating of installed devices.
7. Include evidence of listing, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for SPD as installed in panelboard.
8. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
9. Include wiring diagrams for power, signal, and control wiring.
10. Key interlock scheme drawing and sequence of operations.
11. Include time-current coordination curves for each type and rating of overcurrent protective device included in panelboards. Submit on translucent log-log graph paper; include selectable ranges for each type of overcurrent protective device. Include Internet link for electronic access to downloadable PDF of coordination curves.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.4 INFORMATIONAL SUBMITTALS

- A. Panelboard Schedules: For installation in panelboards submit final versions after load balancing.
- B. Manufacturers' Published Instructions: Record copy of official installation and testing instructions issued to Installer by manufacturer for the following:
 1. Recommended procedures for installing panelboards.
 2. Recommended torque settings for bolted connections on panelboards.
 3. Recommended temperature range for energizing panelboards.
- C. Sample warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Warranty documentation.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Spare Parts: Furnish to Owner spare parts, for repairing panelboards, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:
 1. Keys: Two **OR** spares for each type of panelboard cabinet lock, **as directed**.
 2. Circuit Breakers Including GFCI and GFEP Types: Two **OR** spares for each panelboard, **as directed**.
 3. Fuses for Fused Switches: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.
 4. Fuses for Fused Power-Circuit Devices: Equal to 10 percent of quantity installed for each size and type, but no fewer than three of each size and type.

- B. Special Tools: Furnish to Owner proprietary equipment, keys, and software required to operate, maintain, repair, adjust, or implement future changes to panelboards, that are packaged with protective covering for storage on-site and identified with labels describing contents. Include the following:
 - 1. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.
 - 2. Portable Test Set: For testing functions of solid-state trip devices without removing from panelboard. Include relay and meter test plugs suitable for testing panelboard meters and switchboard class relays.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Remove loose packing and flammable materials from inside panelboards; install temporary electric heating (250 W per panelboard) to prevent condensation.
- B. Handle and prepare panelboards for installation in accordance with NECA 407 **OR** NEMA PB 1, **as directed**.

1.8 WARRANTY

- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed panelboards perform in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.
 - 1. Extended-Warranty Period: Two years **OR** from date of Substantial Completion; full coverage for labor, materials, and equipment, **as directed**.
- B. Special Manufacturer Extended Warranty: Manufacturer warrants that panelboards perform in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within extended-warranty period.
 - 1. Initial **OR** Extended-Warranty Period: Three **OR** Four years from date of Substantial Completion, **as directed**; full **OR** prorated coverage for labor, materials, and equipment, **as directed**.
 - 2. Follow-On Extended-Warranty Period: Five years from date of Substantial Completion, **as directed**; full **OR** prorated coverage for materials that failed because of transient voltage surges only, free on board origin **OR** destination, freight prepaid.

PART 2 - PRODUCTS

- 2.1 Existing Products: To be modified **OR** to be removed and re-installed, **as directed**.
 - A. Basis for Pricing: Name of manufacturer; model number or series for existing product.
 - B. Description: Description of existing product, including special features, options, and finishes that may impact Work, **as directed**.
 - C. Accessories: Accessories included with existing product, **as directed**.

2.2 PANELBOARDS AND LOAD CENTERS COMMON REQUIREMENTS

- A. Fabricate and test panelboards in accordance with IEEE 344 to withstand seismic forces defined in Section 260548.16 "Seismic Controls for Electrical Systems."
- B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
- C. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing agency recognized by authorities having jurisdiction, and marked for intended location and application.
- D. Comply with NEMA PB 1.
- E. Comply with NFPA 70.
- F. Enclosures: Flush **AND** Surface-mounted, dead-front cabinets.
 - 1. Rated for environmental conditions at installed location.
 - a. Indoor Dry and Clean Locations: UL 50E, Type 1, **as directed**.
 - b. Outdoor Locations: UL 50E, Type 3R, **as directed**.
 - c. Kitchen or Wash-Down Areas: UL 50E, Type 4X, stainless steel, **as directed**.
 - d. Other Wet or Damp Indoor Locations: UL 50E, Type 4, **as directed**.
 - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: UL 50E, Type 5 **OR** Type 12, **as directed**.
 - 2. Height: **7 ft (2.13 m)** maximum.
 - 3. Front: Secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims must cover live parts and may have no exposed hardware.
 - 4. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims must cover live parts and may have no exposed hardware.
 - 5. Skirt for Surface-Mounted Panelboards: Same gage and finish as panelboard front with flanges for attachment to panelboard, wall, and ceiling or floor.
 - 6. Gutter Extension and Barrier: Same gage and finish as panelboard enclosure; integral with enclosure body. Arrange to isolate individual panel sections.
 - 7. Finishes:
 - a. Panels and Trim: Steel and galvanized steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat, **as directed**.
 - b. Back Boxes: Galvanized steel **OR** Same finish as panels and trim, **as directed**.
 - c. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components.
- G. Incoming Mains:
 - 1. Location: Top **OR** Bottom **OR** Convertible between top and bottom, **as directed**.
 - 2. Main Breaker: Main lug interiors up to 400 A must be field convertible to main breaker.
- H. Phase, Neutral, and Ground Buses:
 - 1. Material: Tin-plated aluminum **OR** Hard-drawn copper, 98 percent conductivity, **as directed**.

- a. Plating must run entire length of bus.
 - b. Bus must be fully rated for entire length.
2. Interiors must be factory assembled into unit. Replacing switching and protective devices may not disturb adjacent units or require removing main bus connectors.
 3. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
 4. Isolated Ground Bus: Adequate for branch-circuit isolated ground conductors; insulated from box.
 5. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure.
 6. Extra-Capacity Neutral Bus: Neutral bus rated 200 percent of phase bus and listed and labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, as suitable for nonlinear loads in electronic-grade panelboards and others designated on Drawings. Connectors must be sized for double-sized or parallel conductors as indicated on Drawings.
 7. Do not mount neutral bus in gutter.
 8. Split Bus: Vertical buses divided into individual vertical sections.
- I. Conductor Connectors: Suitable for use with conductor material and sizes.
1. Material: Tin-plated aluminum **OR** Hard-drawn copper, 98 percent conductivity, **as directed**.
 2. Terminations must allow use of 75 deg C rated conductors without derating.
 3. Size: Lugs suitable for indicated conductor sizes, with additional gutter space, if required, for larger conductors.
 4. Main and Neutral Lugs: Compression **OR** Mechanical type, with lug on neutral bar for each pole in panelboard, **as directed**.
 5. Ground Lugs and Bus-Configured Terminators: Compression **OR** Mechanical type type, with lug on bar for each pole in panelboard, **as directed**.
 6. Feed-Through Lugs: Compression **OR** Mechanical type, suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device, **as directed**.
 7. Subfeed (Double) Lugs: Compression **OR** Mechanical type suitable for use with conductor material. Locate at same end of bus as incoming lugs or main device, **as directed**.
 8. Gutter-Tap Lugs: Compression **OR** Mechanical type suitable for use with conductor material and with matching insulating covers. Locate at same end of bus as incoming lugs or main device, **as directed**.
 9. Extra-Capacity Neutral Lugs: Rated 200 percent of phase lugs mounted on extra-capacity neutral bus.
- J. Quality-Control Label: Panelboards or load centers must be labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for use as service equipment with one or more main service disconnecting and overcurrent protective devices. Panelboards or load centers must have meter enclosures, wiring, connections, and other provisions for utility metering. Coordinate with utility company for exact requirements.
- K. Future Devices: Panelboards or load centers must have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.
1. Percentage of Future Space Capacity: 5 **OR** 10 **OR** 20 percent, **as directed**.
- L. Panelboard Short-Circuit Current Rating:
1. Rated for series-connected system with integral or remote upstream overcurrent protective devices and labeled by qualified electrical testing laboratory recognized by authorities having jurisdiction. Include label or manual with size and type of allowable upstream and branch devices

listed and labeled, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for series-connected short-circuit rating.

- a. Panelboards rated 240 V or less must have short-circuit ratings as shown on Drawings, but not less than 10 000 A(rms) symmetrical.
 - b. Panelboards rated above 240 V and less than 600 V must have short-circuit ratings as shown on Drawings, but not less than 14 000 A(rms) symmetrical.
2. Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed, by qualified electrical testing laboratory recognized by authorities having jurisdiction, for 100 percent interrupting capacity.
- a. Panelboards and overcurrent protective devices rated 240 V or less must have short-circuit ratings as shown on Drawings, but not less than 10 000 A(rms) symmetrical.
 - b. Panelboards and overcurrent protective devices rated above 240 V and less than 600 V must have short-circuit ratings as shown on Drawings, but not less than 14 000 A(rms) symmetrical.
- M. Surge Suppression: Factory installed as integral part of indicated panelboards, complying with UL 1449 SPD Type 1 **OR** Type 2, **as directed**.

2.3 POWER PANELBOARDS

- A. Listing Criteria: NEMA PB 1, distribution type.
- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
 1. For doors more than **36 inch (914 mm)** high, provide two latches, keyed alike, **as directed**.
- C. Mains: Circuit breaker **OR** Fused switch **OR** Lugs only, **as directed**.
- D. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes 125 A and Smaller: Plug-in circuit breakers **OR** Bolt-on circuit breakers **OR** Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal, **as directed**.
- E. Branch Overcurrent Protective Devices for Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers **OR** Plug-in circuit breakers where individual positive-locking device requires mechanical release for removal, **as directed**.
- F. Branch Overcurrent Protective Devices: Fused switches.
- G. Contactors in Main Bus: NEMA ICS 2, Class A, electrically **OR** mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard, **as directed**.
 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 2. External Control-Power Source: 120 V branch circuit **OR** 24 V control circuit, **as directed**.

2.4 LIGHTING AND APPLIANCE BRANCH-CIRCUIT PANELBOARDS

- A. Listing Criteria: NEMA PB 1, lighting and appliance branch-circuit type.

- B. Mains: Circuit breaker **OR** lugs only, **as directed**.
- C. Branch Overcurrent Protective Devices: Plug-in **OR** Bolt-on circuit breakers, replaceable without disturbing adjacent units, **as directed**.
- D. Contactors in Main Bus: NEMA ICS 2, Class A, electrically **OR** mechanically held, general-purpose controller, with same short-circuit interrupting rating as panelboard, **as directed**.
 - 1. Internal Control-Power Source: Control-power transformer, with fused primary and secondary terminals, connected to main bus ahead of contactor connection.
 - 2. External Control-Power Source: 120 V branch circuit **OR** 24 V control circuit, **as directed**.
- E. Doors: Door-in-door construction with concealed hinges; secured with flush **OR** multipoint latch with tumbler lock; keyed alike, **as directed**. Outer door must permit full access to panel interior. Inner door must permit access to breaker operating handles and labeling, but current carrying terminals and bus must remain concealed.
- F. Column-Type Panelboards: Single row of overcurrent devices with narrow gutter extension and overhead junction box equipped with ground and neutral terminal buses.
 - 1. Column-Type Panelboard Doors: Concealed hinges secured with multipoint latch with tumbler lock; keyed alike.

2.5 LOAD CENTERS

- A. Listing Criteria: Comply with UL 67.
- B. Mains: Circuit breaker **OR** lugs only, **as directed**.
- C. Branch Overcurrent Protective Devices: Plug-in circuit breakers, replaceable without disturbing adjacent units.
- D. Doors: Concealed hinges secured with flush latch with tumbler lock; keyed alike.
- E. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.

2.6 ELECTRONIC-GRADE PANELBOARDS

- A. Listing Criteria: NEMA PB 1; UL 67; and UL 1449 after installing SPD.
- B. Doors: Secured with vault-type latch with tumbler lock; keyed alike.
- C. Main Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- D. Branch Overcurrent Protective Devices: Bolt-on thermal-magnetic circuit breakers.
- E. Factory-Installed, Integral SPD:
 - 1. Peak Surge Current Rating: Minimum single-pulse surge current withstand rating per phase may not be less than 100 kA, **as directed**. Peak surge current rating must be arithmetic sum of ratings of individual MOVs in given mode.
 - 2. Protection modes and UL 1449 VPR for grounded wye circuits with 480Y/277 V **OR** 208Y/120 V, three-phase, four-wire circuits, **as directed**, may not exceed the following:

- a. Line to Neutral: 1200 V for 480Y/277 V **OR** 700 V for 208Y/120 V.
 - b. Line to Ground: 1200 V for 480Y/277 V **OR** 700 V for 208Y/120 V.
 - c. Neutral to Ground: 1200 V for 480Y/277 V **OR** 700 V for 208Y/120 V.
 - d. Line to Line: 2000 V for 480Y/277 V **OR** 1200 V for 208Y/120 V.
3. Protection modes and UL 1449 VPR for 240/120 V, single-phase, three-wire circuits may not exceed the following:
- a. Line to Neutral: 700 V.
 - b. Line to Ground: 700 V.
 - c. Neutral to Ground: 700 V.
 - d. Line to Line: 1200 V.
4. SCCR: Equal to SCCR of panelboard in which installed **OR** exceed 100 kA **OR** exceed 200 kA, **as directed**.
5. Nominal Rating: 20 kA **OR** 10 kA, **as directed**.

F. Buses:

1. Copper phase and neutral buses; 200 percent capacity neutral bus and lugs.
2. Copper equipment and isolated ground buses.

2.7 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. MCCB: Comply with UL 489, with series-connected rating **OR** interrupting capacity to meet available fault currents, **as directed**.

1. Thermal-Magnetic Circuit Breakers:
 - a. Inverse time-current element for low-level overloads.
 - b. Instantaneous magnetic trip element for short circuits.
 - c. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
2. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
3. Electronic Trip Circuit Breakers:
 - a. RMS sensing.
 - b. Field-replaceable rating plug or electronic trip.
 - c. Digital display of settings, trip targets, and indicated metering displays.
 - d. Multi-button keypad to access programmable functions and monitored data.
 - e. Ten-event, trip-history log. Each trip event must be recorded with type, phase, and magnitude of fault that caused trip.
 - f. Integral test jack for connection to portable test set or laptop computer.
 - g. Field-Adjustable Settings:
 - 1) Instantaneous trip.
 - 2) Long- and short-time pickup levels.
 - 3) Long and short time adjustments.
 - 4) Ground-fault pickup level, time delay, and I squared T response.
4. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.

5. GFCI Circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6 mA trip).
 6. GFEP Circuit Breakers: Class B ground-fault protection (30 mA trip).
 7. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240 V, single-pole configuration.
 8. Subfeed Circuit Breakers: Vertically mounted.
 9. MCCB Features and Accessories:
 - a. Standard frame sizes, trip ratings, and number of poles.
 - b. Breaker handle indicates tripped status.
 - c. UL listed for reverse connection without restrictive line or load ratings.
 - d. Lugs: Compression **OR** Mechanical style, suitable for number, size, trip ratings, and conductor materials, **as directed**.
 - e. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and HID lighting circuits.
 - f. Ground-Fault Protection: Integrally mounted **OR** Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator, **as directed**.
 - g. Communication Capability: Circuit-breaker-mounted **OR** Universal-mounted Integral **OR** Din-rail-mounted communication module with functions and features compatible with power monitoring and control system specified in Section 260913 "Electrical Power Monitoring and Control", **as directed**.
 - h. Shunt Trip: 120 V **OR** 24 V trip coil energized from separate circuit, set to trip at 55 **OR** 75 percent of rated voltage, **as directed**.
 - i. Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on **OR** off **OR** on or off position, **as directed**.
 - j. Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.
 - k. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional **OR** with field-adjustable 0.1- to 0.6-second time delay, **as directed**.
 - l. Rating Plugs: Three-pole breakers with ampere ratings greater than 150 A must have interchangeable rating plugs or electronic adjustable trip units.
 - m. Auxiliary Contacts: One, SPDT switch **OR** Two, SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts and "b" contacts operate in reverse of circuit-breaker contacts, **as directed**.
 - n. Alarm Switch: Single-pole, normally open contact that actuates only when circuit breaker trips.
 - o. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key must be removable only when circuit breaker is in off position.
 - p. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function with other upstream or downstream devices.
 - q. Multipole units enclosed in single housing with single handle **OR** factory assembled to operate as single unit, **as directed**.
- B. Fused Switch: NEMA KS 1, Type HD; clips to accommodate specified fuses; lockable handle.
1. Fuses and Spare-Fuse Cabinet: Comply with requirements specified in Section 262813 "Fuses."
 2. Fused Switch Features and Accessories:
 - a. Standard ampere ratings and number of poles.
 - b. Mechanical cover interlock with manual interlock override, to prevent opening of cover when switch is in on position. Interlock must prevent switch from being turned on with cover open. Operating handle must have lock-off means with provisions for three padlocks.
 - c. Auxiliary Contacts: One **OR** Two normally open and normally closed contact(s) that operate with switch handle operation, **as directed**.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify actual conditions with field measurements prior to ordering panelboards to verify that equipment fits in allocated space in, and comply with, minimum required clearances specified in NFPA 70.
- B. Receive, inspect, handle, and store panelboards in accordance with NECA 407 **OR** PB 1.1, **as directed**.
- C. Examine panelboards before installation. Reject panelboards that are damaged, rusted, or have been subjected to water saturation.
- D. Examine elements and surfaces to receive panelboards for compliance with installation tolerances and other conditions affecting performance of the Work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
 - 1. Panelboards: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with NECA 407 **OR** PB 1.1, **as directed**
 - 2. Consult Architect for resolution of conflicting requirements.
- C. Special Techniques:
 - 1. Equipment Mounting:
 - a. Install panelboards on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - b. Attach panelboard to vertical finished or structural surface behind panelboard.
 - c. Mount surface-mounted panelboards to steel slotted supports **5/8 inch (16 mm) OR 1-1/4 inch (32 mm)** in depth, **as directed**. Orient steel slotted supports vertically.
 - d. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 2. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from panelboards.
 - 3. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."
 - 4. Mount top of trim **7.5 ft (2.3 m)** above finished floor unless otherwise indicated.
 - 5. Mount panelboard cabinet plumb and rigid without distortion of box.
 - 6. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
 - 7. Install overcurrent protective devices and controllers not already factory installed.
 - a. Set field-adjustable, circuit-breaker trip ranges.

- b. Tighten bolted connections and circuit breaker connections using calibrated torque wrench or torque screwdriver in accordance with manufacturer's published instructions.
 8. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
 9. Install filler plates in unused spaces.
 10. Stub four **1 inch (25 mm)** empty conduits from panelboard into accessible ceiling space or space designated to be ceiling space in future. Stub four **1 inch (25 mm)** empty conduits into raised floor space or below slab not on grade.
 11. Arrange conductors in gutters into groups and bundle and wrap with wire ties after completing load balancing.
 12. Mount spare fuse cabinet in accessible location.
- D. Interfaces with Other Work:
1. Coordinate layout and installation of panelboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

3.3 IDENTIFICATION

- A. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems."
- B. Panelboard Nameplates: Label each panelboard with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- C. Device Nameplates: Label each branch circuit device in power panelboards with nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
- D. Install warning signs complying with requirements in Section 260553 "Identification for Electrical Systems" identifying source of remote circuit.
- E. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles must be located on interior of panelboard door.
- F. Breaker Labels: Faceplate must list current rating, UL and IEC certification standards, and AIC rating.
- G. Circuit Directory:
 1. Provide directory card inside panelboard door, mounted in transparent card holder **OR** metal frame with transparent protective cover, **as directed**.
 - a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.
 2. Provide computer-generated circuit directory mounted inside panelboard door with transparent plastic protective cover.
 - a. Circuit directory must identify specific purpose with detail sufficient to distinguish it from other circuits.

3. Create directory to indicate installed circuit loads **OR** after balancing panelboard loads, **as directed**; incorporate Owner's final room designations. Obtain approval before installing. Handwritten directories are not acceptable. Install directory inside panelboard door.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each panelboard bus, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Field tests and inspections must be witnessed by Architect **OR** Tenant **OR** authorities having jurisdiction, **as directed**. Names or titles of witnesses, **as directed**.

C. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test for low-voltage air circuit breakers and low-voltage surge arrestors stated in NETA ATS, Paragraph 7.6 Circuit Breakers and Paragraph 7.19.1 Surge Arrestors, Low-Voltage. Do not perform **OR** Perform optional tests, **as directed**. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Perform the following infrared scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform infrared scan of each panelboard. Remove front panels so joints and connections are accessible to portable scanner.
 - b. Follow-up Infrared Scanning: Perform additional follow-up infrared scan of each panelboard 11 months after date of Substantial Completion.
 - c. Instruments and Equipment:
 - 1) Use infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

D. Nonconforming Work:

1. Panelboards will be considered defective if they do not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Collect, assemble, and submit test and inspection reports, including certified report that identifies panelboards included and that describes scanning results, with comparisons of two scans. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

F. Manufacturer Services:

1. Engage factory-authorized service representative to support **OR** supervise field tests and inspections, **as directed**.

3.5 ADJUSTING

- A. Adjust moving parts and operable components to function smoothly and lubricate as recommended by manufacturer.
- B. Set field-adjustable circuit-breaker trip ranges as indicated **OR** as specified in Section 260573.16 "Coordination Studies," **as directed**.
- C. Load Balancing: After Substantial Completion, but not more than 60 days after Final Acceptance, measure load balancing and make circuit changes. Prior to making circuit changes to achieve load balancing, inform Architect of effect on phase color coding.
 - 1. Measure loads during period of normal facility operations.
 - 2. Perform circuit changes to achieve load balancing outside normal facility operation schedule or at times directed by Architect. Avoid disrupting services such as fax machines and on-line data processing, computing, transmitting, and receiving equipment.
 - 3. After changing circuits to achieve load balancing, recheck loads during normal facility operations. Record load readings before and after changing circuits to achieve load balancing.
 - 4. Tolerance: Maximum difference between phase loads, within panelboard, may not exceed 20 percent.

3.6 PROTECTION

- A. Temporary Heating: Prior to energizing panelboards, apply temporary heat to maintain temperature in accordance with manufacturer's published instructions.

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SECTION 26 24 19 00 - SWITCHGEAR

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for switchgear. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes metal-enclosed, low-voltage power circuit-breaker switchgear rated 1000 V and less for use in ac systems.

C. Definitions

1. ATS: Acceptance Testing Service.
2. GFCI: Ground-fault circuit interrupter.

D. Submittals

1. Product Data: For each type of switchgear, circuit breaker, accessory, and component indicated. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: For each type of switchgear and related equipment.
 - a. Dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Include the following:
 - b. Wiring Diagrams: Power, signal, and control wiring.
3. Coordination Drawings: Floor plans showing dimensioned layout, required working clearances, and required area above and around switchgear where pipe and ducts are prohibited. Show switchgear layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
4. Samples: Representative portion of mimic bus with specified finish. Manufacturer's color charts showing colors available for mimic bus.
5. Manufacturer Seismic Qualification Certification: Submit certification that switchgear, overcurrent protective devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
6. Field quality-control test reports.
7. Updated mimic-bus diagram reflecting field changes after final switchgear load connections have been made, for record.
8. Operation and Maintenance Data: For switchgear and components to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
 - b. Time-current curves, including selectable ranges for each type of overcurrent protective device.

E. Quality Assurance

1. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - a. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
3. Comply with NFPA 70.

F. Delivery, Storage, And Handling

1. Deliver switchgear in sections of lengths that can be moved past obstructions in delivery path.
2. Store switchgear indoors in clean dry space with uniform temperature to prevent condensation. Protect switchgear from exposure to dirt, fumes, water, corrosive substances, and physical damage.
3. If stored in areas subjected to weather, cover switchgear to provide protection from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside switchgear; install electric heating (250 W per section) to prevent condensation.

G. Project Conditions

1. Installation Pathway: Remove and replace building components and structures to provide pathway for moving switchgear into place.
2. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service.
3. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchgear, including clearances between switchgear, and adjacent surfaces and other items. Comply with indicated maximum dimensions.
4. Environmental Limitations: Rate equipment for continuous operation under the following conditions, unless otherwise indicated:
 - a. Ambient Temperature: Not exceeding 40 deg C.
 - b. Altitude: Not exceeding **6600 feet (2010 m)**.

1.2 PRODUCTS

A. Ratings

1. Nominal System Voltage: 480 V, 3 wire **OR** 480/277 V, 4 wire **OR** 240 V, 3 wire **OR** 208/120 V, 4 wire, **as directed**, 60 Hz.
2. Main-Bus Continuous: 4000 **OR** 3200 **OR** 2000 **OR** 1600, **as directed**, A.
3. Short-Time and Short-Circuit Current: Match rating of highest-rated circuit breaker in switchgear assembly.

B. Fabrication

1. Factory assembled and tested and complying with IEEE C37.20.1.
2. Indoor Enclosure Material: Steel.
3. Outdoor Enclosure Material: Galvanized steel.
4. Outdoor Enclosure Fabrication Requirements: Weatherproof; integral structural-steel base frame with factory-applied asphaltic undercoating; and each compartment equipped with the following features:
 - a. Structural design and anchorage adequate to resist loads imposed by **125-mph (200-km/h)**, **as directed**, wind.
 - b. Space heater operating at one-half or less of rated voltage, sized to prevent condensation.
 - c. Louvers equipped with insect and rodent screen and filter; arranged to permit air circulation while excluding insects, rodents, and exterior dust.
 - d. Hinged front door with padlocking provisions.
 - e. Interior light with switch.
 - f. Weatherproof duplex receptacle.

- g. Common internal aisle of sufficient width to permit protective-device withdrawal, disassembly, and servicing in aisle.
- h. Aisle access doors with outside padlocking provisions and interior panic latches.
- i. Aisle space heaters operating at one-half or less of rated voltage, thermostatically controlled.
- j. Vaporproof fluorescent aisle lights with low-temperature ballasts, controlled by wall switch at each entrance.
- k. GFCI duplex receptacles, a minimum of two, located in aisle.
- l. Aisle ventilation louvers equipped with insect and rodent screen and filter and arranged to permit air circulation while excluding insects, rodents, and exterior dust.
5. Finish: IEEE C37.20.1, manufacturer's standard gray finish over a rust-inhibiting primer on phosphatizing-treated metal surfaces.
6. Section barriers between main and tie circuit-breaker compartments shall be extended to rear of section.
7. Bus isolation barriers shall be arranged to isolate line bus from load bus at each main and tie circuit breaker.
8. Circuit-breaker compartments shall be equipped to house drawout-type circuit breakers and shall be fitted with hinged outer doors.
9. Fabricate enclosure with removable, hinged, rear cover panels to allow access to rear interior of switchgear.
10. Auxiliary Compartments: Match and align with basic switchgear assembly. Include the following:
 - a. Utility metering compartment that complies with utility company requirements.
 - b. Bus transition sections.
 - c. Incoming-line pull sections.
 - d. Hinged front panels for access to metering, accessory, and blank compartments.
 - e. Pull box on top of switchgear for extra room for pulling cable, with removable top, front, and side covers and ventilation provisions adequate to maintain air temperature in pull box within same limits as switchgear.
 - 1) Set pull box back from front to clear circuit-breaker lifting mechanism.
 - 2) Bottom: Insulating, fire-resistant material with separate holes for cable drops into switchgear.
 - 3) Cable Supports: Arranged to ease cabling and adequate to support cables indicated, including those for future installation.
11. Bus bars connect between vertical sections and between compartments. Cable connections are not permitted.
 - a. Main Phase Bus: Uniform capacity the entire length of assembly.
 - b. Neutral Bus: 50 **OR** 100, **as directed**, percent of phase-bus ampacity, except as indicated. Equip bus with pressure-connector terminations for outgoing circuit neutral conductors. Include braces for neutral-bus extensions for busway feeders.
 - c. Vertical Section Bus Size: Comply with IEEE C37.20.1, including allowance for spare circuit breakers and spaces for future circuit breakers.
 - d. Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent minimum conductivity, with copper feeder circuit-breaker line connections.
OR
 Phase- and Neutral-Bus Material: Silver- or tin-plated, high-strength, electrical-grade aluminum alloy, with copper or tin-plated aluminum circuit-breaker line connections.
OR
 Phase- and Neutral-Bus Material: Hard-drawn copper of 98 percent minimum conductivity or tin-plated, high-strength, electrical-grade aluminum alloy.
 - e. Use silver-plated copper or tin-plated aluminum for connecting circuit-breaker line to aluminum bus.
 - f. Use copper for connecting circuit-breaker line to copper bus.
 - g. Contact Surfaces of Buses: Silver plated.
 - h. Feeder Circuit-Breaker Load Terminals: Silver-plated copper bus extensions equipped with pressure connectors for outgoing circuit conductors.

- i. Ground Bus: Hard-drawn copper of 98 percent minimum conductivity, with pressure connector for feeder and branch-circuit ground conductors, minimum size **1/4 by 2 inches (6 by 50 mm)**.
- j. Supports and Bracing for Buses: Adequate strength for indicated short-circuit currents.
- k. Neutral bus equipped with pressure-connector terminations for outgoing circuit neutral conductors. Neutral-bus extensions for busway feeders are braced.
- l. Neutral Disconnect Link: Bolted, uninsulated, **1/4-by-2-inch (6-by-50-mm)** copper bus, arranged to connect neutral bus to ground bus.
- m. Provide for future extensions from either end of main phase, neutral, and ground bus by means of predrilled bolt-holes and connecting links.
- n. Bus-Bar Insulation: Individual bus bars wrapped with factory-applied, flame-retardant tape or spray-applied, flame-retardant insulation.
 - 1) Sprayed Insulation Thickness: **3 mils (0.08 mm)**, minimum.
 - 2) Bolted Bus Joints: Insulate with secure joint covers that can easily be removed and reinstalled.

C. Components

1. Instrument Transformers: Comply with IEEE C57.13.
 - a. Potential Transformers: Secondary-voltage rating of 120 V and NEMA accuracy class of 0.3 with burdens of W, X, and Y.
 - b. Current Transformers: Ratios as indicated; burden and accuracy class suitable for connected relays, meters, and instruments.
2. Multifunction Digital-Metering Monitor: UL-listed or -recognized, microprocessor-based unit suitable for three- or four-wire systems and with the following features:
 - a. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
 - b. Switch-selectable digital display of the following:
 - 1) Phase Currents, Each Phase: Plus or minus 1 percent.
 - 2) Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
 - 3) Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
 - 4) Three-Phase Real Power: Plus or minus 2 percent.
 - 5) Three-Phase Reactive Power: Plus or minus 2 percent.
 - 6) Power Factor: Plus or minus 2 percent.
 - 7) Frequency: Plus or minus 0.5 percent.
 - 8) Integrated Demand, with Demand Interval Selectable from 5 to 60 Minutes: Plus or minus 2 percent.
 - 9) Accumulated energy, in megawatt hours (joules), plus or minus 2 percent; stored values unaffected by power outages for up to 72 hours.
 - c. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.
3. Analog Instruments: Rectangular, **4-1/2-inch (115-mm)** square, accurate within 1 percent, semiflush mounting, with antiparallax 250-degree scale and external zero adjustment, complying with ANSI C39.1.
 - a. Voltmeters: Cover an expanded scale range of normal voltage plus 10 percent.
 - b. Voltmeter Selector Switch: Rotary type with off position to provide readings of phase-to-phase and phase-to-neutral voltages.
 - c. Ammeters: Cover an expanded scale range of bus rating plus 10 percent.
 - d. Ammeter Selector Switch: Permits current reading in each phase and keeps current-transformer secondary circuits closed in off position.
 - e. Locate meter and selector switch on circuit-breaker compartment door for indicated feeder circuits only.
 - f. Watt-Hour Meters: Flush- or semiflush-mounting type, 5 A, 120 V, 3 phase, 3 wire; with 3 elements, 15-minute indicating demand register, and provision for testing and adding pulse initiation.

- g. Recording Demand Meter: Usable as totalizing relay or indicating and recording maximum demand meter with 15-minute interval.
 - 1) Operation: Meter counts and records a succession of pulses entering two channels.
 - 2) Housing: Drawout, back-connected case arranged for semiflush mounting.
 - 4. Relays: Comply with IEEE C37.90, types and settings as indicated; with test blocks and plugs.
 - 5. Surge Arresters: Distribution class, metal-oxide-varistor type. Comply with IEEE C62.11 and NEMA LA 1.
 - a. Install in cable termination compartments and connect in each phase of circuit.
 - b. Coordinate rating with circuit voltage.
 - 6. Provision for Future Devices: Equip compartments with rails, mounting brackets, supports, necessary appurtenances, and bus connections.
 - 7. Fungus Proofing: Permanent fungicidal treatment for switchgear interior, including instruments and instrument transformers.
 - 8. Control Power Supply: Control power transformer supplying 120-V control circuits through secondary disconnect devices. Include the following features:
 - a. Dry-type transformers, in separate compartments for units larger than 3 kVA, including primary and secondary fuses.
 - b. Two control power transformers in separate compartments with necessary interlocking relays; each transformer connected to line side of associated main circuit breaker.
 - 1) Secondary windings connected through a relay or relays to control bus to effect an automatic transfer scheme.
 - 2) Secondary windings connected through an internal automatic transfer switch to switchgear control power bus.
 - c. Control Power Fuses: Primary and secondary fuses with current-limiting and overload protection.
 - d. Fuses are specified in Division 26 Section "Fuses".
 - 9. Control Wiring: Factory installed, complete with bundling, lacing, and protection; and complying with the following:
 - a. Flexible conductors for No. 8 AWG and smaller, for conductors across hinges and for conductors for interconnections between shipping units.
 - b. Conductors sized according to NFPA 70 for duty required.
- D. Circuit Breakers
- 1. Description: Comply with IEEE C37.13.
 - 2. Ratings: As indicated for continuous, interrupting, and short-time current ratings for each circuit breaker; voltage and frequency ratings same as switchgear.
 - 3. Operating Mechanism: Mechanically and electrically trip-free, stored-energy operating mechanism with the following features:
 - a. Normal Closing Speed: Independent of both control and operator.
 - b. Slow Closing Speed: Optional with operator for inspection and adjustment.
 - c. Stored-Energy Mechanism: Manually charged **OR** Electrically charged, with optional manual charging, **as directed**.
 - d. Operation counter.
 - 4. Trip Devices: Solid-state, overcurrent trip-device system consisting of one or two current transformers or sensors per phase, a release mechanism, and the following features:
 - a. Functions: Long-time-delay, short-time-delay, and instantaneous-trip functions, independent of each other in both action and adjustment.
 - b. Temperature Compensation: Ensures accuracy and calibration stability from minus 5 to plus 40 deg C.
 - c. Field-adjustable, time-current characteristics.
 - d. Current Adjustability: Dial settings and rating plugs on trip units or sensors on circuit breakers, or a combination of these methods.
 - e. Three bands, minimum, for long-time- and short-time-delay functions; marked "minimum," "intermediate," and "maximum."
 - f. Pickup Points: Five minimum, for long-time- and short-time-trip functions. Equip short-time-trip function for switchable I²t operation.

- g. Pickup Points: Five minimum, for instantaneous-trip functions.
 - h. Ground-fault protection with at least three short-time-delay settings and three trip-time-delay bands; adjustable current pickup. Arrange to provide protection for the following:
 - 1) Three-wire circuit or system.
 - 2) Four-wire circuit or system.
 - 3) Four-wire, double-ended substation.
 - i. Trip Indication: Labeled, battery-powered lights or mechanical targets on trip device to indicate type of fault.
5. Auxiliary Contacts: For interlocking or remote indication of circuit-breaker position, with spare auxiliary switches and other auxiliary switches required for normal circuit-breaker operation, quantity as indicated. Each consists of two Type "a" and two Type "b" stages (contacts) wired through secondary disconnect devices to a terminal block in stationary housing.
 6. Drawout Features: Circuit-breaker mounting assembly equipped with a racking mechanism to position circuit breaker and hold it rigidly in connected, test, and disconnected positions. Include the following features:
 - a. Interlocks: Prevent movement of circuit breaker to or from connected position when it is closed, and prevent closure of circuit breaker unless it is in connected, test, or disconnected position.
 - b. Circuit-Breaker Positioning: An open circuit breaker may be racked to or from connected, test, and disconnected positions only with the associated compartment door closed unless live parts are covered by a full dead-front shield. An open circuit breaker may be manually withdrawn to a position for removal from the structure with the door open. Status for connection devices for different positions includes the following:
 - 1) Test Position: Primary disconnect devices disengaged, and secondary disconnect devices and ground contact engaged.
 - 2) Disconnected Position: Primary and secondary devices and ground contact disengaged.
 7. Arc Chutes: Readily removable from associated circuit breaker when it is in disconnected position, and arranged to permit inspection of contacts without removing circuit breaker from switchgear.
 8. Padlocking Provisions: For installing at least three padlocks on each circuit breaker to secure its enclosure and prevent movement of drawout mechanism.
 9. Operating Handle: One for each circuit breaker capable of manual operation.
 10. Electric Close Button: One for each electrically operated circuit breaker.
 11. Mechanical Interlocking of Circuit Breakers: Uses a mechanical tripping lever or equivalent design and electrical interlocks.
 12. Key Interlocks: Arranged so keys are attached at devices indicated. Mountings and hardware are included where future installation of key-interlock devices is indicated.
 13. Undervoltage Trip Devices: Instantaneous, with adjustable pickup voltage **OR** Adjustable time-delay and pickup voltage, **as directed**.
 14. Shunt-Trip Devices: Where indicated.
 15. Fused Circuit Breakers: Circuit breaker and fuse combinations complying with requirements for circuit breakers and trip devices and with the following:
 - a. Fuses: NEMA FU 1, Class L current limiting, sized to coordinate with and protect associated circuit breaker.
 - b. Circuit Breakers with Frame Size 1600 A and Smaller: Fuses on line side of associated circuit breaker, on a common drawout mounting, arranged so fuses are accessible only when circuit breaker is in disconnected position.
 - c. Circuit Breakers with Frame Sizes More Than 1600 A: Fuses and circuit breakers may be installed in separate compartments on separate drawout mountings. Fuse drawout element is interlocked with associated power circuit breaker to prevent drawing out fuse element unless circuit breaker is in open position.
 - d. Open-Fuse Trip Device: Positive means of tripping and holding circuit breaker in open position when a fuse opens. Open-fuse status is indicated at front of circuit breaker or fuse drawout element.

16. Indicating Lights: To indicate circuit breaker is open or closed, for main and bus tie circuit breakers interlocked either with each other or with external devices.

E. Accessories

1. Accessory Set: Furnish tools and miscellaneous items required for circuit-breaker and switchgear test, inspection, maintenance, and operation.
 - a. Racking handle to manually move circuit breaker between connected and disconnected positions.
 - b. Portable test set for testing all functions of circuit-breaker, solid-state trip devices without removal from switchgear.
 - c. Relay and meter test plugs suitable for testing switchgear meters and switchgear class relays.
2. Circuit-Breaker Removal Apparatus: Portable, floor-supported, roller-base, elevating carriage arranged for moving circuit breakers in and out of compartments.
3. Circuit-Breaker Removal Apparatus: Overhead-circuit-breaker lifting device, track mounted at top front of switchgear and complete with hoist and lifting yokes matching each size of drawout circuit breaker installed.
4. Spare-Fuse Cabinet: Identified and compartmented steel box or cabinet with lockable door.
5. Storage for Manual: Include a rack or holder, near the operating instructions, for a copy of maintenance manual.

F. Identification

1. Mimic Bus: Continuous mimic bus, arranged in single-line diagram format, using symbols and lettered designations consistent with approved mimic-bus diagram.
 - a. Mimic-bus segments coordinated with devices in switchgear sections to which applied, to produce a concise visual presentation of principal switchgear components and connections.
 - b. Medium: Painted graphics, as selected by Architect.
 - c. Color: Contrasting with factory-finish background; as selected by Architect from manufacturer's full range.
2. System Power Riser Diagrams: Depict power sources, feeders, distribution components, and major loads. Include as-built data for low-voltage power switchgear and connections as follows:
 - a. Frame size of each circuit breaker.
 - b. Trip rating for each circuit breaker.
 - c. Conduit and wire size for each feeder.

1.3 EXECUTION

A. Installation

1. Comply with applicable portions of NECA 400.
2. Anchor switchgear assembly to **4-inch (100-mm)**, channel-iron floor sill embedded in floor **OR** concrete base, **as directed**, and attach by bolting.
 - a. Sills: Select to suit switchgear; level and grout flush into floor **OR** concrete base, **as directed**.
 - b. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details. See Division 26 Section "Hangers And Supports For Electrical Systems" for seismic-restraint requirements.
 - c. Concrete Bases: **4 inches (100 mm)** high, reinforced, with chamfered edges. Extend base no more than **3 inches (75 mm)** in all directions beyond the maximum dimensions of switchgear unless otherwise indicated or unless required for seismic anchor support. Construct concrete bases according to Division 26 Section "Hangers And Supports For Electrical Systems".
3. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, brackets, and temporary blocking of moving parts from switchgear units and components.

- B. Identification
1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs as specified in Division 26 Section "Identification For Electrical Systems".
 2. Diagram and Instructions:
 - a. Frame and mount under clear acrylic plastic on the front of switchgear.
 - 1) Operating Instructions: Printed basic instructions for switchgear, including control and key-interlock sequences and emergency procedures.
 - 2) System Power Riser Diagrams: Depict power sources, feeders, distribution components, and major loads.
 - b. Storage for Maintenance: Include a rack or holder, near the operating instructions, for a copy of maintenance manual.
- C. Connections
1. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 2. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- D. Field Quality Control
1. Prepare for acceptance tests as follows:
 - a. Test insulation resistance for each switchgear bus, component, connecting supply, feeder, and control circuit.
 - b. Test continuity of each circuit.
 2. Manufacturer's Field Service: Engage a factory-authorized service representative to perform the following:
 - a. Inspect switchgear installation, including wiring, components, connections, and equipment. Test and adjust components and equipment.
 - b. Verify that electrical control wiring installation complies with manufacturer's submittal by means of point-to-point continuity testing. Verify that wiring installation complies with requirements in Division 22.
 - c. Complete installation and startup checks according to manufacturer's written instructions.
 - d. Assist in field testing of equipment including pretesting and adjusting of equipment and components.
 - e. Report results in writing.
 3. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters. Perform NETA tests and inspections for each of the following NETA categories:
 - 1) Switchgear.
 - 2) Circuit breakers.
 - 3) Protective relays.
 - 4) Instrument transformers.
 - 5) Metering and instrumentation.
 - 6) Ground-fault systems.
 - 7) Battery systems.
 - 8) Surge arresters.
 - 9) Capacitors.
 - b. Remove and replace malfunctioning units and retest as specified above.
 4. Infrared Scanning: After Final Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchgear. Remove front and rear panels so joints and connections are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchgear 11 months after date of Final Completion.

- b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies switchgear checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- E. Adjusting
- 1. Set field-adjustable, protective-relay trip characteristics according to results in Division 26 Section "Overcurrent Protective Device Coordination Study".
 - 2. Set field-adjustable, protective-relay trip characteristics.
- F. Cleaning
- 1. On completion of installation, inspect interior and exterior of switchgear. Remove paint splatters and other spots. Vacuum dirt and debris; do not use compressed air to assist in cleaning. Repair exposed surfaces to match original finish.
- G. Protection
- 1. Temporary Heating: Apply temporary heat to switchgear, according to manufacturer's written instructions, throughout periods when switchgear environment is not controlled for temperature and humidity within manufacturer's stipulated service conditions.

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SECTION 26 24 19 00a - MOTOR-CONTROL CENTERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for motor-control centers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes MCCs for use with ac circuits rated 600 V and less and having the following factory-installed components:
 - a. Incoming main lugs and OCPDs.
 - b. Full-voltage magnetic controllers.
 - c. Reduced-voltage magnetic controllers.
 - d. Reduced-voltage, solid-state controllers.
 - e. Multispeed controllers.
 - f. VFCs.
 - g. Feeder-tap units.
 - h. TVSS.
 - i. Instrumentation.
 - j. Auxiliary devices.

C. Definitions

1. BAS: Building automation system.
2. CE: Conformance Europeene (European Compliance).
3. CPT: Control power transformer.
4. EMI: Electromagnetic interference.
5. GFCI: Ground fault circuit interrupting.
6. IGBT: Insulated-gate bipolar transistor.
7. LAN: Local area network.
8. LED: Light-emitting diode.
9. MCC: Motor-control center.
10. MCCB: Molded-case circuit breaker.
11. MCP: Motor-circuit protector.
12. NC: Normally closed.
13. NO: Normally open.
14. OCPD: Overcurrent protective device.
15. PCC: Point of common coupling.
16. PID: Control action, proportional plus integral plus derivative.
17. PT: Potential transformer.
18. PWM: Pulse-width modulated.
19. RFI: Radio-frequency interference.
20. SCR: Silicon-controlled rectifier.
21. TDD: Total demand (harmonic current) distortion.
22. THD(V): Total harmonic voltage demand.
23. TVSS: Transient voltage surge suppressor.
24. VFC: Variable-frequency controller.

D. Performance Requirements

1. Seismic Performance: MCCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

- a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of controller and each type of MCC. Include shipping and operating weights, features, performance, electrical ratings, operating characteristics, and furnished specialties and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 5: For continuous metering equipment for energy consumption.
3. Shop Drawings: For each MCC, manufacturer's approval, custom and production drawings as defined in UL 845. In addition to requirements specified in UL 845, include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details, including required clearances and service space around equipment.
 - a. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - 1) Each installed unit's type and details.
 - 2) Factory-installed devices.
 - 3) Enclosure types and details.
 - 4) Nameplate legends.
 - 5) Short-circuit current (withstand) rating of complete MCC, and for bus structure and each unit.
 - 6) Features, characteristics, ratings, and factory settings of each installed controller and feeder device, and installed devices.
 - 7) Specified optional features and accessories.
 - b. Schematic and Connection Wiring Diagrams: For power, signal, and control wiring for each installed controller.
 - c. Nameplate legends.
 - d. Vertical and horizontal bus capacities.
 - e. Features, characteristics, ratings, and factory settings of each installed unit.
4. Harmonic Analysis Study and Report: Comply with IEEE 399 and NETA Acceptance Testing Specification; identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze possible **OR** designated operating scenarios, including recommendations for VFC input filtering to limit TDD and THD(V) at each VFC **OR** at the defined PCC to specified levels, **as directed**.
5. Standard Drawings: For each MCC, as defined in UL 845.
6. Production Drawings: For each MCC, as defined in UL 845.
7. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around MCCs where pipe and ducts are prohibited. Show MCC layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
8. Seismic Qualification Certificates: For MCCs, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
9. Qualification Data: For qualified testing agency.
10. Product Certificates: For each MCC, from manufacturer.
11. Source quality-control reports.
12. Field quality-control reports.
13. Operation and Maintenance Data: For MCCs, all installed devices, and components to include in emergency, operation, and maintenance manuals. Include the following:

- a. Manufacturer's Record Drawings: As defined in UL 845. In addition to requirements specified in UL 845, include field modifications and field-assigned wiring identification incorporated during construction by manufacturer, Contractor, or both.
 - b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage, solid-state controllers.
 - e. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - f. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
14. Load-Current and Overload-Relay Heater List: Compile after motors have been installed and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
 15. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.
 16. Warranty: Sample of special warranty.
- F. Quality Assurance
1. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA **OR** one who meets the requirements necessary for certification to supervise on-site testing, **as directed**.
 2. Source Limitations: Obtain MCCs and controllers of a single type from single source from single manufacturer.
 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 4. Comply with NFPA 70.
 5. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
- G. Delivery, Storage, And Handling
1. Deliver MCCs in shipping splits of lengths that can be moved past obstructions in delivery paths.
 2. Handle MCCs according to the following:
 - a. NEMA ICS 2.3, "Instructions for the Handling, Installation, Operation, and Maintenance of Motor Control Centers Rated Not More Than 600 Volts."
 - b. NECA 402, "Recommended Practice for Installing and Maintaining Motor Control Centers."
 3. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside MCCs; install temporary electric heating, with at least 250 W per vertical section **OR** connect factory-installed space heaters to temporary electrical service, **as directed**.
- H. Project Conditions
1. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Less than 0 deg F (minus 18 deg C) **OR** exceeding 104 deg F (40 deg C), with an average value exceeding 95 deg F (35 deg C) over a 24-hour period, **as directed**.
 - b. Ambient Storage Temperature: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C).
 - c. Humidity: Less than 95 percent (noncondensing).
 - d. Altitude: Exceeding 6600 feet (2000 m), or 3300 feet (1000 m) if MCC includes solid-state devices.
 2. Interruption of Existing Electrical Service or Distribution Systems: Do not interrupt electrical service to, or distribution systems within, a facility occupied by the Owner or others unless

permitted under the following conditions, and then only after arranging to provide temporary electrical service according to requirements indicated:

- a. Notify the Owner no fewer than two days in advance of proposed interruption of electrical service.
 - b. Indicate method of providing temporary electrical service.
 - c. Do not proceed with interruption of electrical service without the Owner's written permission.
 - d. Comply with NFPA 70E.
3. Product Selection for Restricted Space: Drawings indicate maximum dimensions for MCCs, including clearances between MCCs and adjacent surfaces and other items.

I. Coordination

1. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.
2. Coordinate features of MCCs, installed units, and accessory devices with remote pilot devices and control circuits to which they connect.
3. Coordinate features, accessories, and functions of each MCC, each controller, and each installed unit with ratings and characteristics of supply circuits, motors, required control sequences, and duty cycle of motors and loads.

J. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace TVSS **OR** VFCs that fail in materials or workmanship within specified warranty period, **as directed**.
 - a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Units

1. General Requirements for MCCs: Comply with NEMA ICS 18 and UL 845, **as directed**.

B. Functional Features

1. Description: Modular arrangement of main units, controller units, control devices, feeder-tap units, instruments, metering, auxiliary devices, and other items mounted in vertical sections of MCC.
2. Controller Units: Combination controller units.
 - a. Install units up to and including Size 3 on drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
 - b. Equip units in Type B and Type C MCCs with pull-apart terminal strips for external control connections.
3. Feeder-Tap Units: Through 225-A rating shall have drawout mountings with connectors that automatically line up and connect with vertical-section buses while being racked into their normal, energized positions.
4. Future Units: Compartments fully bused and equipped with guide rails or equivalent, ready for insertion of drawout units.
5. Spare Units: Installed in compartments indicated "spare."

C. Incoming Mains

1. Incoming Mains Location: Top and bottom, **as directed**.
2. Main Lugs Only: Conductor connectors suitable for use with conductor material and sizes.
 - a. Material: Tin-plated aluminum **OR** Hard-drawn copper, 98 percent conductivity, **as directed**.
 - b. Main and Neutral Lugs: Compression **OR** Mechanical type, **as directed**.

3. MCCB: Comply with UL 489, with series-connected rating **OR** interrupting capacity to meet available fault currents, **as directed**.
 - a. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - b. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - c. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replaceable electronic trip; and the following field-adjustable settings:
 - 1) Instantaneous trip.
 - 2) Long- and short-time pickup levels.
 - 3) Long- and short-time time adjustments.
 - 4) Ground-fault pickup level, time delay, and I^2t response.
 - d. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - e. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
 - f. MCCB Features and Accessories:
 - 1) Standard frame sizes, trip ratings, and number of poles.
 - 2) Lugs: Mechanical **OR** Compression style, suitable for number, size, trip ratings, and conductor material, **as directed**.
 - 3) Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
 - 4) Ground-Fault Protection: Integrally mounted **OR** Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator, **as directed**.
 - 5) Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
 - 6) Communication Capability: Circuit-breaker-mounted **OR** Universal-mounted **OR** Integral **OR** Din-rail-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 16 Section "Electrical Power Monitoring and Control," **as directed**
 - 7) Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 **OR** 75 percent of rated voltage, **as directed**.
 - 8) Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - 9) Auxiliary Contacts: One SPDT switch **OR** Two SPDT switches, **as directed**, with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
 - 10) Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
4. Insulated-Case Circuit Breaker: 80 **OR** 100, **as directed**, percent rated, sealed, insulated-case power circuit breaker with interrupting capacity rating to meet available fault current.
 - a. Fixed **OR** Drawout, circuit-breaker mounting, **as directed**.
 - b. Two-step, stored-energy closing.
 - c. Standard **OR** Full function microprocessor-based trip units with interchangeable rating plug, trip indicators, and the following field-adjustable settings, **as directed**:
 - 1) Instantaneous trip.
 - 2) Long- and short-time time adjustments.
 - 3) Ground-fault pickup level, time delay, and I^2t response.
 - d. Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
 - e. Remote trip indication and control.

- f. Communication Capability: Integral communication module with functions and features compatible with power monitoring and control system specified in Division 16 Section "Electrical Power Monitoring and Control."
- g. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
- h. Control Voltage: 40 **OR** 125 **OR** 250 **OR** 120-V ac, **as directed**.

D. Combination Controllers

1. Full-Voltage Controllers:
 - a. General Requirements for Full-Voltage Enclosed Controllers: Comply with NEMA ICS 2, general purpose, Class A.
 - b. Magnetic Controllers: Full voltage, across the line, electrically held.
 - 1) Configuration: Nonreversing and reversing.
2. Reduced-Voltage Magnetic Controllers:
 - a. General Requirements for Reduced-Voltage Magnetic Controllers: Comply with NEMA ICS 2, general purpose, Class A; closed transition; adjustable time delay on transition.
 - b. Reduced-Voltage Magnetic Controllers: Reduced voltage, electrically held.
 - 1) Configuration:
 - a) Wye-Delta Controller: Four contactors, with a three-phase starting resistor/reactor bank.
 - b) Part-Winding Controller: Separate START and RUN contactors, field-selectable for one-half or two-thirds winding start mode, with either six- or nine-lead motors; with separate overload relays for starting and running sequences.
 - c) Autotransformer Reduced-Voltage Controller: Medium-duty service, with integral overtemperature protection; taps for starting at 50, 65, and 80 percent of line voltage; two START and one RUN contactors.
3. Reduced-Voltage, Solid-State Controllers:
 - a. General Requirements for Reduced-Voltage, Solid-State Controllers: Comply with UL 508.
 - b. Reduced-Voltage, Solid-State Controllers: An integrated unit with power SCRs, heat sink, microprocessor logic board, door-mounted digital display and keypad, bypass contactor, and overload relay; suitable for use with NEMA MG 1, Design B, polyphase, medium-induction motors.
 - 1) Configuration: Standard duty **OR** Severe duty; nonreversible **OR** reversible, **as directed**.
 - 2) Starting Mode: Voltage ramping **OR** Current limit **OR** Torque control **OR** Torque control with voltage boost, **as directed**; field selectable, **as directed**.
 - 3) Stopping Mode: Coast to stop **OR** Adjustable torque deceleration **OR** Adjustable braking, **as directed**; field selectable, **as directed**.
 - 4) Shorting (Bypass) Contactor: Operates automatically when full voltage is applied to motor and bypasses the SCRs. Solid-state controller protective features shall remain active when the shorting contactor is in the bypass mode.
 - 5) Shorting and Input Isolation, **as directed**, Contactor Coils: Pressure-encapsulated type; manufacturer's standard operating voltage, matching control power or line voltage, depending on contactor size and line-voltage rating. Provide coil transient suppressors, **as directed**.
 - 6) Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating.
 - 7) Adjustable acceleration-rate control using voltage or current ramp, and adjustable starting torque control with up to 400 percent current limitation for 20 seconds.
 - 8) SCR bridge shall consist of at least two SCRs per phase, providing stable and smooth acceleration with **OR** without, **as directed**, external feedback from the motor or driven equipment.

- 9) Keypad, front accessible; for programming the controller parameters, functions, and features; shall be manufacturer's standard and include not less than the following functions:
 - a) Adjusting motor full-load amperes, as a percentage of the controller's rating.
 - b) Adjusting current limitation on starting, as a percentage of the motor full-load current rating.
 - c) Adjusting linear acceleration and deceleration ramps, in seconds.
 - d) Initial torque, as a percentage of the nominal motor torque.
 - e) Adjusting torque limit, as a percentage of the nominal motor torque.
 - f) Adjusting maximum start time, in seconds.
 - g) Adjusting voltage boost, as a percentage of the nominal supply voltage.
 - h) Selecting stopping mode and adjusting parameters.
 - i) Selecting motor thermal-overload protection class between 5 and 30.
 - j) Activating and de-activating protection modes.
 - k) Selecting or activating communications modes.
- 10) Digital display, front accessible; for showing motor, controller, and fault status; shall be manufacturer's standard and include not less than the following:
 - a) Controller Condition: Ready, starting, running, stopping.
 - b) Motor Condition: Amperes, voltage, power factor, power, and thermal state.
 - c) Fault Conditions: Controller thermal fault, motor overload alarm and trip, motor underload, overcurrent, shorted SCRs, line or phase loss, phase reversal, and line frequency over or under normal.
- 11) Controller Diagnostics and Protection:
 - a) Microprocessor-based thermal protection system for monitoring SCR and motor thermal characteristics and providing controller overtemperature and motor overload alarm and trip; settings selectable via the keypad.
 - b) Protection from line-side reverse phasing; line-side and motor-side phase loss; motor jam, stall, and underload conditions; and line frequency over or under normal.
 - c) Input isolation contactor that opens when the controller diagnostics detect a faulted solid-state component, or when the motor is stopped.
OR
Shunt trip that opens the disconnecting means when the controller diagnostics detect a faulted solid-state component, **as directed**.
- 12) Remote Output Features:
 - a) All outputs prewired to terminal blocks.
 - b) Form C status contacts that change state when controller is running.
 - c) Form C alarm contacts that change state when a fault condition occurs.
- 13) Optional Features:
 - a) Analog output for field-selectable assignment of motor operating characteristics; 0 to 10-V dc **OR** 4 to 20-mA dc, **as directed**.
 - b) Additional field-assignable Form C contacts for alarm outputs.
 - c) Surge suppressors in solid-state power circuits providing three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - d) Full-voltage bypass contactor operating automatically **OR** manually, with NORMAL/BYPASS selector switch, **as directed**. Power contacts shall be totally enclosed, double break, and silver-cadmium oxide; and assembled to allow inspection and replacement without disturbing line or load wiring.
4. Multispeed Magnetic Controllers:
 - a. General Requirements for Multispeed Magnetic Controllers: Comply with NEMA ICS 2, general purpose, Class A.
 - b. Multispeed Magnetic Controllers: Two speed, full voltage, across the line, electrically held. Compelling relay to ensure that motor will start only at low speed.
 - 1) Configuration: Non-reversing **OR** Reversing; consequent pole **OR** two winding, **as directed**.

- 2) Compelling relays shall ensure that motor starts only at low speed.
 - 3) Accelerating timer relays shall ensure properly timed acceleration through speeds lower than that selected.
 - 4) Decelerating timer relays shall ensure automatically timed deceleration through each speed.
 - 5) Antiplugging timer relays shall ensure a time delay when transferring from FORWARD to REVERSE and back.
5. Disconnecting Means and OCPDs:
- a. Fusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J **OR** Class L fuses, **as directed**.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
 - b. MCP Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - 4) NC **OR** NO alarm contact that operates only when MCP has tripped **as directed**.
 - 5) Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
 - c. MCCB Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - 2) Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 3) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 4) Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
 - 5) NC **OR** NO alarm contact that operates only when MCCB has tripped, **as directed**.
 - d. Molded-Case Switch Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with in-line fuse block for Class J or L power fuses (depending on ampere rating), providing an interrupting capacity to comply with available fault currents; MCCB with fixed, high-set instantaneous trip only.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary contacts "a" and "b" arranged to activate with molded-case switch handle.
 - 4) NC **OR** NO alarm contact that operates only when molded-case switch has tripped, **as directed**.
6. Overload Relays:
- a. Melting-Alloy Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30 tripping characteristic, **as directed**.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - b. Bimetallic Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30 tripping characteristic, **as directed**.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 4) Ambient compensated.

- 5) Automatic resetting.
 - c. Solid-State Overload Relays:
 - 1) Switch or dial selectable for motor running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10 **OR** Class 20 **OR** Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing, **as directed**.
 - a) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - b) Analog communication module.
 - d. NC **OR** NO isolated overload alarm contact, **as directed**.
 - e. External overload reset push button.
 - 7. Control Power:
 - a. Control Circuits: 24 **OR** 120 V ac, **as directed**; obtained from integral CPT, with primary and secondary fuses, with CPT **OR** control power source, **as directed**, of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - 1) CPT Spare Capacity: 50 **OR** 100 **OR** 200VA, **as directed**.
- E. VFCS
- 1. General Requirements for VFCs: Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C, **as directed**.
 - 2. Application: Constant torque and variable torque, **as directed**.
 - 3. VFC Description: Variable-frequency power converter (rectifier, dc bus, and IGBT PWM inverter) factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
 - a. Units suitable for operation of NEMA MG 1, Design A and Design B motors as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."
 - b. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
 - c. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
 - d. Listed and labeled for single-phase use by an NRTL acceptable to authorities having jurisdiction.
 - 4. Design and Rating: Match load type such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
 - 5. Output Rating: Three-phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range **OR** 66 Hz, with torque constant as speed changes, **as directed**; maximum voltage equals input voltage.
 - 6. Unit Operating Requirements:
 - a. Input AC Voltage Tolerance: Plus 10 and minus 10 **OR** 15 percent of VFC input voltage rating, **as directed**.
 - b. Input AC Voltage Unbalance: Not exceeding 3 **OR** 5 percent, **as directed**.
 - c. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 - d. Minimum Efficiency: 96 **OR** 97 percent at 60 Hz, full load, **as directed**.
 - e. Minimum Displacement Primary-Side Power Factor: 96 **OR** 98 percent under any load or speed condition, **as directed**.
 - f. Overload Capability: 1.1 **OR** 1.5 times the base load current for 60 seconds **as directed**; minimum of 1.8 times the base load current for three seconds.
 - g. Starting Torque: Minimum of 100 percent of rated torque from 3 to 60 Hz.
 - h. Speed Regulation: Plus or minus 5 **OR** 10 percent, **as directed**.
 - i. Output Carrier Frequency: Selectable; 0.5 to 15 kHz.

- j. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- 7. Inverter Logic: Microprocessor based, 16 **OR** 32 bit isolated from all power circuits, **as directed**.
- 8. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
Signal: Electrical **OR** Pneumatic, **as directed**.
- 9. Internal Adjustability Capabilities:
 - a. Minimum Speed: 5 to 25 percent of maximum rpm.
 - b. Maximum Speed: 80 to 100 percent of maximum rpm.
 - c. Acceleration: 0.1 to 999.9 seconds.
 - d. Deceleration: 0.1 to 999.9 seconds.
 - e. Current Limit: 30 to a minimum of 150 percent of maximum rating.
- 10. Self-Protection and Reliability Features:
 - a. Input transient protection by means of surge suppressors to provide three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - b. Loss of Input Signal Protection: Selectable response strategy including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 - c. Under- and overvoltage trips.
 - d. Inverter overcurrent trips.
 - e. VFC and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing VFC overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved.
 - f. Critical frequency rejection, with three selectable, adjustable deadbands.
 - g. Instantaneous line-to-line and line-to-ground overcurrent trips.
 - h. Loss-of-phase protection.
 - i. Reverse-phase protection.
 - j. Short-circuit protection.
 - k. Motor overtemperature fault.
- 11. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
- 12. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
- 13. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
- 14. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
- 15. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
- 16. Integral Input Disconnecting Means and OCPD: NEMA AB 1, instantaneous-trip circuit breaker **OR** NEMA AB 1, molded-case switch, with power fuse block and current-limiting fuses **OR** NEMA AB 1, thermal-magnetic circuit breaker **OR** NEMA KS 1, nonfusible switch, with power fuse block and current-limiting fuses **OR** NEMA KS 1, fusible switch with pad-lockable, door-mounted handle mechanism, **as directed**.
 - a. Disconnect Rating (for VFCs without bypass systems): Not less than 115 percent of VFC input current rating.
 - b. Disconnect Rating (for VFCs with bypass systems): Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
 - c. Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
 - d. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
 - e. NC **OR** NO alarm contact that operates only when circuit breaker has tripped, **as directed**.

- F. VFC Controls And Indication
1. Status Lights: Door-mounted LED indicators displaying the following conditions:
 - a. Power on.
 - b. Run.
 - c. Overvoltage.
 - d. Line fault.
 - e. Overcurrent.
 - f. External fault.
 2. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
 - a. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 - b. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - 1) Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
 3. Historical Logging Information and Displays:
 - a. Running log of total power versus time.
 - b. Total run time.
 - c. Fault log, maintaining last four faults with time and date stamp for each.
 4. Indicating Devices: Digital display and additional readout devices as required, mounted flush in VFC door and connected to display VFC parameters, including, but not limited to:
 - a. Output frequency (Hz).
 - b. Motor speed (rpm).
 - c. Motor status (running, stop, fault).
 - d. Motor current (amperes).
 - e. Motor torque (percent).
 - f. Fault or alarming status (code).
 - g. PID feedback signal (percent).
 - h. DC-link voltage (V dc).
 - i. Set point frequency (Hz).
 - j. Motor output voltage (V ac).
 5. Control Signal Interfaces:
 - a. Electric Input Signal Interface:
 - 1) A minimum of two programmable analog inputs: 0- to 10-V dc **OR** 4- to 20-mA dc **OR** Operator-selectable "x"- to "y"-mA dc, **as directed**.
 - 2) A minimum of six multifunction programmable digital inputs.
 - b. Pneumatic Input Signal Interface: **3 to 15 psig (20 to 104 kPa)**.
 - c. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BAS or other control systems:
 - 1) 0- to 10-V dc.
 - 2) 4- to 20-mA dc.
 - 3) Potentiometer using up/down digital inputs.
 - 4) Fixed frequencies using digital inputs.
 - d. Output Signal Interface: A minimum of one programmable analog output signal(s) (0 to 10V dc **OR** 4 to 20mA dc **OR** operator-selectable "x" to "y" mA dc, **as directed**), which can be configured for any of the following:
 - 1) Output frequency (Hz).
 - 2) Output current (load).
 - 3) DC-link voltage (V dc).
 - 4) Motor torque (percent).
 - 5) Motor speed (rpm).
 - 6) Set point frequency (Hz).

- e. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - 1) Motor running.
 - 2) Set point speed reached.
 - 3) Fault and warning indication (overtemperature or overcurrent).
 - 4) PID high- or low-speed limits reached.
 6. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
 - a. Number of Loops: One **OR** Two, **as directed**.
 7. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display VFC status and alarms and energy usage, **as directed**. Allows VFC to be used with an external system within a multidrop LAN configuration; settings retained within VFC's nonvolatile memory.
 - a. Network Communications Ports: Ethernet and RS-422/485.
 - b. Embedded BAS Protocols for Network Communications: ASHRAE 135 BACnet **OR** Echelon LonWorks **OR** Ethernet TCP/IP **OR** Johnson Metasys N2 **OR** Modbus/Memobus **OR** Siemens System 600 APOGEE **OR** an acceptable equivalent protocols accessible via the communications ports, **as directed**.
- G. VFC Line Conditioning And Filtering
1. Input Line Conditioning: Based on the harmonic analysis study and report, provide input filtering, as required, to limit TDD at input terminals of VFCs to less than 5 **OR** 8 percent and THD(V) to 3 **OR** 5 percent, **as directed**.
 2. Input Line Conditioning: Based on the harmonic analysis study and report, provide input filtering, as required, to limit TDD and THD(V) at the defined PCC per IEEE 519.
 3. Input Line Conditioning: **Requirements** as directed by the Owner .
 4. VFC Output Filtering: **Requirements** as directed by the Owner .
 5. EMI/RFI Filtering: CE marked; certify compliance with IEC 61800-3 for Category C2.
- H. VFC Bypass Systems
1. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes, and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.
 2. Bypass Mode: Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor and retransfer shall only be allowed with the motor at zero speed.
OR
Bypass Mode: Field-selectable automatic **OR** manual, allows local and remote transfer between power converter and bypass contactor and retransfer, either via manual operator interface **OR** automatic control system feedback, **as directed**.
 3. Bypass Controller: Two-contactor-style bypass allows motor operation via the power converter or the bypass controller; with input isolating switch and barrier arranged to isolate the power converter and permit safe troubleshooting and testing, both energized and de-energized, while motor is operating in bypass mode, **as directed**.
 - a. Bypass Contactor: Load-break, IEC **OR** NEMA rated contactor, **as directed**.
 - b. Output Isolating Contactor: Non-load-break, IEC **OR** NEMA rated contactor, **as directed**.
 - c. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.
OR
Bypass Controller: Three-contactor-style bypass allows motor operation via the power converter or the bypass controller; with input isolating switch and barrier, **as directed**, arranged to isolate the power converter input and output and permit safe testing and

- troubleshooting of the power converter, both energized and de-energized, while motor is operating in bypass mode.
- a. Bypass Contactor: Load-break, IEC **OR** NEMA rated contactor, **as directed**.
 - b. Input and Output Isolating Contactors: Non-load-break, IEC **OR** NEMA rated contactors, **as directed**.
 - c. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.
4. Bypass Contactor Configuration: Full-voltage (across-the-line) **OR** Reduced-voltage (autotransformer) type, **as directed**.
 - a. NORMAL/BYPASS selector switch.
 - b. HAND/OFF/AUTO selector switch.
 - c. NORMAL/TEST Selector Switch: Allows testing and adjusting of VFC while the motor is running in the bypass mode.
 - d. Contactor Coils: Pressure-encapsulated type with coil transient suppressors, **as directed**.
 - 1) Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - 2) Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 - e. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT **OR** control power source of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices, **as directed**.
 - f. CPT Spare Capacity: 50 **OR** 100 **OR** 200 VA, **as directed**.
 5. Overload Relays: NEMA ICS 2.
 - a. Melting-Alloy Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30 tripping characteristic, **as directed**.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - b. Bimetallic Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30 tripping characteristic, **as directed**.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 4) Ambient compensated.
 - 5) Automatic resetting.
 - c. Solid-State Overload Relays:
 - 1) Switch or dial selectable for motor-running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10 **OR** Class 20 **OR** Class 10/20 selectable tripping characteristic selected to protect motor against voltage and current unbalance and single phasing, **as directed**.
 - 4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - 5) Analog communication module.
 - 6) NC **OR** NO isolated overload alarm contact, **as directed**.
 - 7) External overload reset push button.
- I. Optional VFC Features
 1. Multiple-Motor Capability: VFC suitable for variable-speed service to multiple motors. Overload protection shuts down VFC and motors served by it, and generates fault indications, when overload protection activates.
 - a. Configure to allow two or more motors to operate simultaneously at the same speed; separate overload relay for each controlled motor.

- b. Configure to allow two motors to operate separately; operator selectable via local or remote switch or contact closures; single overload relay for both motors; separate output magnetic contactors for each motor.
 - c. Configure to allow two motors to operate simultaneously and in a lead/lag mode, with one motor operated at variable speed via the power converter and the other at constant speed via the bypass controller **OR** separate overload relay for each controlled motor, **as directed**.
2. Damper control circuit with end of travel feedback capability.
 3. Sleep Function: Senses a minimal deviation of a feedback signal and stops the motor. On an increase in speed-command signal deviation, VFC resumes normal operation.
 4. Motor Preheat Function: Preheats motor when idle to prevent moisture accumulation in the motor.
 5. Firefighter's Override (Smoke Purge) Input: On a remote contact closure from the firefighter's control station **OR** smoke-control fan controller, **as directed**, this password-protected input:
 - a. Overrides all other local and external inputs (analog/digital, serial communication, and all keypad commands).
 - b. Forces VFC to operate motor, without any other run or speed command, at a field-adjustable, preset speed **OR** Forces VFC to transfer to Bypass Mode and operate motor at full speed, **as directed**.
 - c. Causes display of Override Mode on the VFC display.
 - d. Reset VFC to normal operation on removal of override signal automatically **OR** manually, **as directed**.
 6. Remote Indicating Circuit Terminals: Mode selection, controller status, and controller fault.
 7. Remote digital operator kit.
 8. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer and a notebook computer.
- J. Feeder-Tap Units
1. MCCB: Comply with UL 489, with series-connected rating **OR** interrupting capacity, **as directed**, to meet available fault currents.
 - a. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - b. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
 - c. Electronic trip circuit breakers with rms sensing; field-replaceable rating plug or field-replicable electronic trip; and the following field-adjustable settings:
 - 1) Instantaneous trip.
 - 2) Long- and short-time pickup levels.
 - 3) Long- and short-time time adjustments.
 - 4) Ground-fault pickup level, time delay, and I^2t response.
 - d. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller; let-through ratings less than NEMA FU 1, RK-5.
 - e. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker; trip activation on fuse opening or on opening of fuse compartment door.
 - f. MCCB Features and Accessories:
 - 1) Standard frame sizes, trip ratings, and number of poles.
 - 2) Lugs: Mechanical **OR** Compression style, suitable for number, size, trip ratings, and conductor material, **as directed**.
 - 3) Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.

- 4) Ground-Fault Protection: Integrally mounted **OR** Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator, **as directed**.
 - 5) Zone-Selective Interlocking: Integral with electronic trip unit; for interlocking ground-fault protection function.
 - 6) Communication Capability: Circuit-breaker-mounted **OR** Universal-mounted **OR** Integral **OR** Din-rail-mounted communication module with functions and features compatible with power monitoring and control system specified in Division 26 Section "Electrical Power Monitoring And Control", **as directed**.
 - 7) Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 **OR** 75 percent of rated voltage, **as directed**.
 - 8) Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - 9) Auxiliary Contacts: One SPDT switch **OR** Two SPDT switches with "a" and "b" contacts **OR** "a" contacts mimic circuit-breaker contacts **OR** "b" contacts operate in reverse of circuit-breaker contacts, **as directed**.
 - 10) Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.
2. Fusible Switch: NEMA KS 1, Type HD, clips to accommodate specified fuses with lockable handle.
 3. Fuses are specified in Division 26 Section "Fuses".

K. Transient Voltage Suppression Devices

1. Surge Protection Device Description: IEEE C62.41-compliant, integrally mounted, wired-in **OR** plug-in **OR** bolt-on solid-state, parallel-connected, modular (with field-replaceable modules) **OR** non-modular type, with sine-wave tracking suppression and filtering modules, UL 1449, second edition, short-circuit current rating matching or exceeding the MCC short-circuit rating, and with the following features and accessories, **as directed**:
 - a. Fuses, rated at 200-kA interrupting capacity.
 - b. Fabrication using bolted compression lugs for internal wiring.
 - c. Integral disconnect switch.
 - d. Redundant suppression circuits.
 - e. Redundant replaceable modules.
 - f. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
 - g. LED indicator lights for power and protection status.
 - h. Audible alarm, with silencing switch, to indicate when protection has failed.
 - i. Form-C contacts rated at 5 A and 250-V ac, one NO and one NC, for remote monitoring of system operation. Contacts shall reverse position on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 - j. Four **OR** Six digit transient-event counter set to totalize transient surges, **as directed**.
2. Peak Single-Impulse Surge Current Rating: 160 kA per mode/320 kA per phase **OR** 120 kA per mode/240 kA per phase **OR** 80 kA per mode/160 kA per phase, **as directed**.
3. Withstand Capabilities: 12,000 IEEE C62.41, Category C3 (10 kA), 8-by-20-mic.sec. surges with less than 5 percent change in clamping voltage.
4. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 **OR** 208Y/120 **OR** 600Y/347V, three-phase, four-wire circuits shall be as follows, **as directed**:
 - a. Line to Neutral: 800 V for 480Y/277 **OR** 400 V for 208Y/120 **OR** 1200 V for 600Y/347, **as directed**.
 - b. Line to Ground: 800 V for 480Y/277 **OR** 400 V for 208Y/120 **OR** 1200 V for 600Y/347, **as directed**.
 - c. Neutral to Ground: 800 V for 480Y/277 **OR** 400 V for 208Y/120 **OR** 1200 V for 600Y/347, **as directed**.

OR

Protection modes and UL 1449 SVR for 240/120-V, three-phase, four-wire circuits with high leg shall be as follows:

- a. Line to Neutral: 400 V, 800 V from high leg.
- b. Line to Ground: 400 V.
- c. Neutral to Ground: 400 V.

OR

Protection modes and UL 1449 SVR for 240 **OR** 480 **OR** 600-V, three-phase, three-wire, delta circuits shall be as follows:

- a. Line to Line: 2000 V for 480 V **OR** 1000 V for 240 V **OR** 2500 V for 600 V, **as directed**.
- b. Line to Ground: 1500 V for 480 V **OR** 800 V for 240 V **OR** 2500 V for 600 V, **as directed**.

L. Instrumentation

1. Instrument Transformers (for the Owner metering): IEEE C57.13, NEMA EI 21.1, and the following:
 - a. PTs: IEEE C57.13; 120 V, 60 Hz, single **OR** tapped **OR** double secondary; disconnecting type with integral fuse mountings, **as directed**. Burden and accuracy shall be consistent with connected metering and relay devices.
 - b. Current Transformers: IEEE C57.13; 5 A, 60 Hz, secondary; wound **OR** bushing **OR** bar **OR** window type, **as directed**; single **OR** double secondary winding and secondary shorting device, **as directed**. Burden and accuracy shall be consistent with connected metering and relay devices.
 - c. CPTs: Dry type, mounted in separate compartments for units larger than 3 kVA.
 - d. Current Transformers for Neutral and Ground-Fault Current Sensing: Connect secondary wiring to ground overcurrent relays, via shorting terminals, to provide selective tripping of main and tie circuit breaker. Coordinate with feeder circuit-breaker, ground-fault protection.
2. Multifunction Digital-Metering Monitor: Microprocessor-based unit suitable for three- or four-wire systems and with the following features:
 - a. Listed **OR** recognized by a nationally recognized testing laboratory.
 - b. Inputs from sensors or 5-A current-transformer secondaries, and potential terminals rated to 600 V.
 - c. Switch-selectable digital display of the following values with the indicated maximum accuracy tolerances:
 - 1) Phase Currents, Each Phase: Plus or minus 1 percent.
 - 2) Phase-to-Phase Voltages, Three Phase: Plus or minus 1 percent.
 - 3) Phase-to-Neutral Voltages, Three Phase: Plus or minus 1 percent.
 - 4) Three-Phase Real Power (Megawatts): Plus or minus 2 percent.
 - 5) Three-Phase Reactive Power (Megavars): Plus or minus 2 percent.
 - 6) Power Factor: Plus or minus 2 percent.
 - 7) Frequency: Plus or minus 0.5 percent.
 - 8) Accumulated Energy, Megawatt Hours: Plus or minus 2 percent; accumulated values unaffected by power outages up to 72 hours.
 - 9) Megawatt Demand: Plus or minus 2 percent; demand interval programmable from five to 60 minutes.
 - 10) Contact devices to operate remote impulse-totalizing demand meter.
 - d. Mounting: Display and control unit flush or semiflush mounted in instrument compartment door.
3. Ammeters, Voltmeters, and Power-Factor Meters: ANSI C39.1.
 - a. Meters: **4-inch (100-mm)** diameter **OR** **6 inches (150 mm)** square, flush **OR** semiflush, with antiparallax 250-degree scale and external zero adjustment, **as directed**.
 - b. Voltmeters: Cover an expanded-scale range of nominal voltage plus 10 percent.
4. Instrument Switches: Rotary type with off position.
 - a. Voltmeter Switches: Permit reading of all phase-to-phase voltages and phase-to-neutral voltages where a neutral is included.
 - b. Ammeter Switches: Permit reading of current in each phase and maintain current-transformer secondaries in a closed-circuit condition at all times.

5. Feeder Ammeters: **2-1/2-inch (64-mm)** minimum size with 90 **OR** 120 degree scale, **as directed**. Meter and transfer device with off position, located on overcurrent device door for feeder circuits, unless otherwise indicated.
 6. Watt-Hour Meters and Wattmeters:
 - a. Comply with ANSI C12.1.
 - b. Three-phase induction type with two stators, each with current and potential coil, rated 5 A, 120 V, 60 Hz.
 - c. Suitable for connection to three- and four-wire circuits.
 - d. Potential indicating lamps.
 - e. Adjustments for light and full load, phase balance, and power factor.
 - f. Four-dial clock register.
 - g. Integral demand indicator **OR** Contact devices to operate remote impulse-totalizing demand meter, **as directed**.
 - h. Ratchets to prevent reverse rotation.
 - i. Removable meter with drawout test plug.
 - j. Semiflush mounted case with matching cover.
 - k. Appropriate multiplier tag.
 7. Impulse-Totalizing Demand Meter:
 - a. Comply with ANSI C12.1.
 - b. Suitable for use with MCC watt-hour meter, including two-circuit totalizing relay.
 - c. Cyclometer.
 - d. Four-dial, totalizing kilowatt-hour register.
 - e. Positive chart drive mechanism.
 - f. Capillary pen holding a minimum of one month's ink supply.
 - g. Roll chart with minimum 31-day capacity; appropriate multiplier tag.
 - h. Capable of indicating and recording 5 **OR** 15 **OR** 30 minute integrated demand of totalized system, **as directed**.
- M. MCC Control Power
Control Circuits: 120-V ac, supplied through secondary disconnecting devices from CPT **OR** 120-V ac, supplied from remote branch circuit, **as directed**.
1. Electrically Interlocked Main and Tie Circuit Breakers: Two CPTs in separate compartments, with interlocking relays, connected to the primary side of each CPT at the line side of the associated main circuit breaker. 120-V secondaries connected through automatic transfer relays to ensure a fail-safe automatic transfer scheme.
 2. Control Power Fuses: Primary and secondary fuses for current-limiting and overload protection of transformer and fuses for protection of control circuits.
 3. Control Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
- N. Enclosures
1. Indoor Enclosures: Freestanding steel cabinets unless otherwise indicated. NEMA 250, Type 1 **OR** Type 1A **OR** Type 2 **OR** Type 12, **as directed**, unless otherwise indicated to comply with environmental conditions at installed location.
 2. Space Heaters: Factory-installed electric space heaters of sufficient wattage in each vertical section to maintain enclosure temperature above expected dew point.
 - a. Space-Heater Control: Thermostats to maintain temperature of each section above expected dew point **OR** Manual switching of branch-circuit protective device, **as directed**.
 - b. Space-Heater Power Source: Transformer, factory installed in MCC **OR** 120-V external branch circuit, **as directed**.
 3. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray **OR** custom color finish over a rust-inhibiting primer on treated metal surface, **as directed**.
 4. Outdoor Enclosures: Type 3R, non-walk-in aisle **OR** Type 3R, with interior-lighted walk-in aisle, **as directed**.

- a. Finish: Factory-applied finish in manufacturer's standard **OR** custom color, **as directed**; undersurfaces treated with corrosion-resistant undercoating.
 - b. Enclosure: Flat **OR** Downward, rearward sloping roof, **as directed**; bolt-on rear covers **OR** rear hinged doors for each section, with provisions for padlocking, **as directed**.
 - c. Doors: Personnel door at each end of aisle, minimum width of **30 inches (762 mm)**; opening outwards; with panic hardware and provisions for padlocking **OR** cylinder lock, **as directed**.
 - d. Accessories: Fluorescent lighting fixtures, ceiling mounted; wired to a three-way light switch at each end of aisle; GFCI duplex receptacle; emergency battery pack lighting fixture installed on wall of aisle midway between personnel doors.
 - e. Walk-in Aisle Heating and Ventilating:
 - 1) Factory-installed electric unit heater(s), wall **OR** ceiling mounted, with integral thermostat and disconnect and with capacities to maintain switchboard interior temperature of **40 deg F (5 deg C)** with outside design temperature of **104 deg F (40 deg C)**, **as directed**.
 - 2) Factory-installed exhaust fan with capacities to maintain switchboard interior temperature of **100 deg F (38 deg C)** with outside design temperature of **23 deg F (minus 5 deg C)**.
 - 3) Ventilating openings complete with replaceable fiberglass air filters, **as directed**.
 - 4) Thermostat: Single stage; wired to control heat and exhaust fan.
 - 5) Power for Space Heaters, Ventilation, Lighting, and Receptacle: Include a CPT within the switchboard.
 - 6) Supply voltage shall be 120 **OR** 120/240 **OR** 120/208V ac **OR** Power for space heaters, ventilation, lighting, and receptacle provided by a remote source, **as directed**.
5. Compartments: Modular; individual lift-off, **as directed**, doors with concealed hinges and quick-captive screw fasteners. Interlocks on units requiring disconnecting means in off position before door can be opened or closed, except by operating a permissive release device.
 6. Interchangeability: Compartments constructed to allow for removal of units without opening adjacent doors, disconnecting adjacent compartments, or disturbing operation of other units in MCC; same size compartments to permit interchangeability and ready rearrangement of units, such as replacing three single units with a unit requiring three spaces, without cutting or welding.
 7. Wiring Spaces:
 - a. Vertical wireways in each vertical section for vertical wiring to each unit compartment; supports to hold wiring in place.
 - b. Horizontal wireways in bottom **OR** top **OR** bottom and top of each vertical section for horizontal wiring between vertical sections, **as directed**; supports to hold wiring in place.
- O. Auxiliary Devices
1. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 - a. Push Buttons, Pilot Lights, and Selector Switches: Heavy **OR** Standard duty, oiltight type, **as directed**.
 - 1) Push Buttons: Covered **OR** Lockable **OR** Recessed **OR** Shielded **OR** Shrouded **OR** Unguarded types; maintained **OR** momentary contact unless otherwise indicated, **as directed**.
 - 2) Pilot Lights: Incandescent **OR** LED **OR** Neon **OR** Resistor **OR** Transformer, types, **as directed**; **Color(s)**, **as directed**; push to test, **as directed**.
 - 3) Selector Switches: Rotary type.
 - b. Elapsed-Time Meters: Heavy duty with digital readout in hours; nonresettable **OR** resettable, **as directed**.
 - c. Meters: Panel type, **2-1/2-inch (64-mm)** minimum size with 90 **OR** 120 degree scale and plus or minus 2 percent accuracy with selector switches having an off position, **as directed**.
 2. NC **OR** NO **OR** Reversible NC/NO contactor auxiliary contact(s), **as directed**.

3. Control Relays: Auxiliary and adjustable pneumatic **OR** solid-state time-delay relays, **as directed**.
4. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
5. Space heaters, with NC auxiliary contacts, to mitigate condensation in enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
6. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.
7. Cover gaskets for Type 1 enclosures.
8. Terminals for connecting power factor correction capacitors to the line **OR** load side of overload relays, **as directed**.
9. Spare control-wiring terminal blocks; unwired **OR** wired, **as directed**.
10. Spare-Fuse Cabinet: Identified and compartmented steel box **OR** cabinet with hinged lockable door, **as directed**.

P. Characteristics And Ratings

1. Wiring: NEMA ICS 18, Class I **OR** Class I-S, **as directed**, Type A **OR** Type B, for starters above Size 3 **OR** Type B-D, for starter Size 3 and below **OR** Type B-T, for starter Size 3 and below **OR** Type C, **as directed**.
OR
Wiring: NEMA ICS 18, Class II **OR** Class II-S, **as directed**, Type B, for starters above Size 3 **OR** Type B-D, for starter Size 3 and below **OR** Type B-T, for starter Size 3 and below **OR** Type C, **as directed**.
2. Control and Load Wiring: Factory installed, with bundling, lacing, and protection included. Provide flexible conductors for No. 8 AWG and smaller, for conductors across hinges, and for conductors for interconnections between shipping units.
3. Nominal System Voltage: 480 V, three phase, three wire **OR** 480Y/277 V, three phase, four wire, **as directed**.
OR
Nominal System Voltage: 208 V, three phase, three wire **OR** 208/120 V, three phase, four wire, **as directed**.
4. Short-Circuit Current Rating for Each Unit: Combination series rated **OR** Fully rated, **as directed**; 22 **OR** 42 **OR** 65 **OR** 100 kA, **as directed**.
5. Short-Circuit Current Rating of MCC: Combination series rated **OR** Fully rated, **as directed**, with its main overcurrent device; 22 **OR** 42 **OR** 65 **OR** 100 kA, **as directed**.
6. Environmental Ratings:
 - a. Ambient Temperature Rating: Not less than 0 deg F (minus 18 deg C) and not exceeding 104 deg F (40 deg C), with an average value not exceeding 95 deg F (35 deg C) over a 24-hour period.
 - b. Ambient Storage Temperature Rating: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C)
 - c. Humidity Rating: Less than 95 percent (noncondensing).
 - d. Altitude Rating: Not exceeding 6600 feet (2000 m), or 3300 feet (1000 m) if MCC includes solid-state devices.
7. Main-Bus Continuous Rating: 600 **OR** 800 **OR** 1000 **OR** 1200 **OR** 1600 **OR** 2000 A, **as directed**.
8. Vertical-Bus Minimum, **as directed**, Continuous Rating: 300 **OR** 600 **OR** 1200 A, **as directed**.
9. Horizontal and Vertical Bus Bracing (Short-Circuit Current Rating): Match MCC short-circuit current rating.
10. Main Horizontal and Equipment Ground Buses: Uniform capacity for entire length of MCC's main and vertical sections. Provide for future extensions from both ends, **as directed**. Brace bus extensions for busway feeder bus, **as directed**.
11. Vertical Phase and Equipment Ground Buses: Uniform capacity for entire usable height of vertical sections, except for sections incorporating single units.
12. Phase and Neutral Bus Material: Hard-drawn copper of 98 percent conductivity, silver **OR** tin plated, **as directed**.

OR

Phase and Neutral Bus Material: Tin-plated, high-strength, electrical-grade aluminum alloy, **as directed**.

13. Neutral Buses: 50 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical **OR** compression connectors for outgoing circuit neutral cables, **as directed**. Brace bus extensions for busway feeder neutral bus, **as directed**.

OR

Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical **OR** compression connectors for outgoing circuit neutral cables, **as directed**. Brace bus extensions for busway feeder neutral bus, **as directed**.

14. Ground Bus: Minimum size required by UL 845, hard-drawn copper of 98 percent conductivity, equipped with mechanical **OR** compression connectors for feeder and branch-circuit equipment grounding conductors, **as directed**. For busway feeders, extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run, **as directed**.
15. Front-Connected, Front-Accessible MCCs:
- Main Devices: Drawout **OR** Fixed mounted, **as directed**.
 - Controller Units: Drawout and fixed mounted, **as directed**.
 - Feeder-Tap Units: Drawout and fixed mounted, **as directed**.
 - Sections front and rear aligned.
16. Utility Metering Compartment: Fabricated, barrier compartment and section complying with utility company's requirements; hinged sealed door; buses provisioned for mounting utility company's current transformers and potential transformers or potential taps as required by utility company. If separate vertical section is required for utility metering, match and align with basic MCC. Provide service entrance label and necessary applicable service entrance features.
17. the Owner Metering Compartment: A separate customer metering compartment and section with front hinged door, metering, and current transformers for each meter. Current transformer secondary wiring shall be terminated on shorting-type terminal blocks. Include potential transformers having primary and secondary fuses with disconnecting means and secondary wiring terminated on terminal blocks, **as directed**.
18. Bus Transition and Incoming Pull Sections: Matched and aligned with basic MCC.
19. Pull Box on Top of an MCC:
- Adequate ventilation to maintain temperature in pull box within same limits as MCC.
 - Set back from front to clear circuit-breaker removal mechanism.
 - Removable covers forming top, front, and sides. Top covers at rear easily removable for drilling and cutting.
 - Insulated bottom of fire-resistive material with separate holes for cable drops into MCC.
 - Cable supports arranged to facilitate cabling and adequate to support cables, including those for future installation.
 - Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.
20. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of unit.
21. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Minimum insulation temperature rating of 105 deg C.
22. Fungus Proofing: Permanent fungicidal treatment for OCPDs and other components including instruments and instrument transformers.

Q. Source Quality Control

- MCC Testing: Inspect and test MCCs according to requirements in NEMA ICS 18.
- VFC Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 - Test each VFC while connected to its specified motor **OR** a motor that is comparable to that for which the VFC is rated, **as directed**.
 - Verification of Performance: Rate VFCs according to operation of functions and features specified.
- MCCs will be considered defective if they do not pass tests and inspections.
- Prepare test and inspection reports.

1.3 EXECUTION

A. Examination

1. Examine areas and surfaces to receive MCCs, with Installer present, for compliance with requirements for installation tolerances, and other conditions affecting performance of the Work.
2. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Harmonic Analysis Study

1. Perform a harmonic analysis study to identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze possible **OR** designated operating scenarios, including recommendations for VFC input filtering to limit TDD and THD(V) at the defined PCC to specified levels, **as directed**.
2. Prepare a harmonic analysis study report complying with IEEE 399 and NETA Acceptance Testing Specification.

C. Installation

1. Coordinate layout and installation of MCCs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
2. Floor-Mounting Controllers: Install MCCs on **4-inch (100-mm)** nominal thickness concrete base. Comply with requirements for concrete base specified in Division 3 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Seismic Bracing: Comply with requirements specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
5. Install fuses in each fusible switch.
6. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses".
7. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
8. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
9. Install power factor correction capacitors. Connect to the line **OR** load side of overload relays, **as directed**. If connected to the load side of overload relays, adjust overload heater sizes to accommodate the reduced motor full-load currents.
10. Comply with NECA 1.

D. Identification

1. Comply with requirements in Division 26 Section "Identification For Electrical Systems" for identification of MCC, MCC components, and control wiring.
 - a. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - b. Label MCC and each cubicle with engraved nameplate.
 - c. Label each enclosure-mounted control and pilot device.
 - d. Mark up a set of manufacturer's connection wiring diagrams with field-assigned wiring identifications and return to manufacturer for inclusion in Record Drawings.

2. Operating Instructions: Frame printed operating instructions for MCCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of MCCs.
- E. Control Wiring Installation
1. Install wiring between enclosed controllers **OR** master terminal boards, **as directed**, and remote devices and facility's BAS **OR** and facility's central-control system, **as directed**. Comply with requirements in Division 26 Section "Control-voltage Electrical Power Cables".
 2. Bundle, train, and support wiring in enclosures.
 3. Connect selector switches and other automatic-control selection devices where applicable.
 - a. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - b. Connect selector switches within enclosed controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.
- F. Connections
1. Comply with requirements for installation of conduit in Division 26 Section "Raceway And Boxes For Electrical Systems". Drawings indicate general arrangement of conduit, fittings, and specialties.
 2. Comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".
- G. Field Quality Control
1. Perform tests and inspections.
 2. Acceptance Testing Preparation:
 - a. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
 - b. Test continuity of each circuit.
 3. Tests and Inspections:
 - a. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 - b. Test insulation resistance for each enclosed controller element, component, connecting motor supply, feeder, and control circuits.
 - c. Test continuity of each circuit.
 - d. Verify that voltages at controller locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify the Owner before starting the motor(s).
 - e. Test each motor for proper phase rotation.
 - f. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - g. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - h. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:
 - 1) Initial Infrared Scanning: After Final Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multipole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.
 - 2) Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each multipole enclosed controller 11 months after date of Final Completion.
 - 3) Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - i. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

- j. Mark up a set of manufacturer's drawings with all field modifications incorporated during construction and return to manufacturer for inclusion in Record Drawings.
 - 4. Enclosed controllers will be considered defective if they do not pass tests and inspections.
 - 5. Prepare test and inspection reports, including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- H. Startup Service
 - 1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
- I. Adjusting
 - 1. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
 - 2. Adjust overload relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.
 - 3. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes **OR** 11 times for NEMA Premium Efficient motors, **as directed**. Where these maximum settings do not allow starting of a motor, notify the Owner before increasing settings.
 - 4. Set the taps on reduced-voltage autotransformer controllers at 50 **OR** 65 **OR** 80 percent, **as directed**.
 - 5. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage, solid-state controllers.
 - 6. Program microprocessors in VFCs for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Final Completion.
 - 7. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study".
- J. Protection
 - 1. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.
 - 2. Replace controllers whose interiors have been exposed to water or other liquids prior to Final Completion.
- K. Demonstration
 - 1. Train the Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage, solid-state controllers, **as directed**.

END OF SECTION 26 24 19 00a

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Task	Specification	Specification Description
26 24 19 00	01 22 16 00	No Specification Required
26 24 19 00	26 09 23 00	Electrical Power Monitoring And Control
26 24 19 00	26 27 33 00	Power Distribution Units
26 24 19 00	26 29 13 13	Enclosed Controllers

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SECTION 26 25 13 00 - ENCLOSED BUS ASSEMBLIES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for enclosed bus assemblies. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Feeder-bus assemblies.
 - b. Plug-in bus assemblies.
 - c. Bus plug-in devices.

C. Definitions

1. TVSS: Transient voltage surge suppressor.

D. Submittals

1. Shop Drawings: For each type of bus assembly **OR** bus assembly and plug-in device, **as directed**.
 - a. Show fabrication and installation details for enclosed bus assemblies. Include plans, elevations, and sections of components. Designate components and accessories, including clamps, brackets, hanger rods, connectors, straight lengths, and fittings.
 - b. Show fittings, materials, fabrication, and installation methods for listed fire-stop barriers and weather barriers.
 - c. Indicate required clearances, method of field assembly, and location and size of each field connection.
 - d. Detail connections to switchgear, switchboards, transformers, and panelboards.
 - e. Wiring Diagrams: Power and signal **OR** and control, **OR** signal, and control, **as directed**, wiring.
 - f. Seismic-Restraint Details: Signed and sealed by a qualified professional engineer.
 - 1) Design Calculations: Calculate requirements for selecting seismic restraints.
 - 2) Detail fabrication, including anchorages and attachments to structure and to supported equipment.
2. Coordination Drawings: Floor plans and sections, drawn to scale. Include scaled bus-assembly layouts and relationships between components and adjacent structural, mechanical, and electrical elements. Show the following:
 - a. Vertical and horizontal enclosed bus-assembly runs, offsets, and transitions.
 - b. Clearances for access above and to the side of enclosed bus assemblies.
 - c. Vertical elevation of enclosed bus assemblies above the floor or bottom of structure.
 - d. Support locations, type of support, and weight on each support.
3. Location of adjacent construction elements including light fixtures, HVAC and plumbing equipment, fire sprinklers and piping, signal and control devices, and other equipment.
4. Product Certificates: For each type of enclosed bus assembly, signed by product manufacturer.
5. Manufacturer Seismic Qualification Certification: Submit certification that enclosed bus assemblies, plug-in devices, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems" Include the following:
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 1) The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified."

- 2) The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
- c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- 6. Qualification Data: For professional engineer and testing agency.
- 7. Field quality-control test reports.
- 8. Operation and Maintenance Data: For enclosed bus assemblies to include in emergency, operation, and maintenance manuals.

E. Quality Assurance

- 1. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
 - a. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 1.3.
- 2. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.
- 3. Source Limitations: Obtain enclosed bus assemblies and plug-in devices through one source from a single manufacturer.
- 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- 5. Comply with NEMA BU 1, "Busways."
- 6. Comply with NFPA 70.

F. Delivery, Storage, And Handling

- 1. Deliver, store, and handle enclosed bus assemblies according to NEMA BU 1.1, "General Instructions for Proper Handling, Installation, Operation and Maintenance of Busway Rated 600 Volts or Less."

G. Project Conditions

- 1. Derate enclosed bus assemblies for continuous operation at indicated ampere ratings for ambient temperature not exceeding **122 deg F (50 deg C) OR 140 deg F (60 deg C), as directed.**

H. Coordination

- 1. Coordinate layout and installation of enclosed bus assemblies and suspension system with other construction that penetrates ceilings or floors or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.
- 2. Coordinate size and location of concrete curbs around openings for vertical bus. Concrete, reinforcement, and formwork requirements are specified in Division 31.

1.2 PRODUCTS

A. Enclosed Bus Assemblies

- 1. Feeder-Bus Assemblies: NEMA BU 1, low-impedance bus assemblies in nonventilated housing; single-bolt joints; ratings as indicated.
 - a. Seismic Fabrication Requirements: Fabricate mounting provisions and attachments for feeder-bus assemblies with reinforcement strong enough to withstand seismic forces

- defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems" when mounting provisions and attachments are anchored to building structure
- b. Voltage: 120/208 **OR** 240 **OR** 480 **OR** 277/480, **as directed**, V; 3 phase; 100 **OR** 200 **OR** percent neutral capacity, **as directed**.
 - c. Temperature Rise: 55 deg C above 40 deg C ambient maximum for continuous rated current.
 - d. Bus Materials: Current-carrying copper **OR** aluminum, **as directed**, conductors, fully insulated with Class 130C insulation except at joints; plated surface at joints.
 - e. Ground:
 - 1) 50 percent capacity integral with housing.
 - 2) 50 percent capacity internal bus bars of material matching bus material.
 - 3) 50 percent capacity isolated, internal bus bar of material matching bus material.
 - f. Enclosure: Steel with manufacturer's standard finish **OR** Aluminum with manufacturer's standard finish **OR** Weatherproof, steel or aluminum with manufacturer's standard finish, sealed seams, drains, and removable closures, **as directed**.
 - g. Fittings and Accessories: Manufacturer's standard.
 - h. Mounting: Arranged flat, edgewise, or vertically without derating.
2. Plug-in Bus Assemblies: NEMA BU 1, low-impedance bus assemblies in nonventilated housing; single-bolt joints; ratings as indicated.
- a. Seismic Fabrication Requirements: Fabricate mounting provisions and attachments for switchboards with reinforcement strong enough to withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems" when mounting provisions and attachments are anchored to building structure.
 - b. Voltage: 120/208 **OR** 240 **OR** 480 **OR** 277/480, **as directed**, V; 3 phase; 100 **OR** 200 **OR** percent neutral capacity, **as directed**.
 - c. Temperature Rise: 55 deg C above 40 deg C ambient maximum for continuous rated current.
 - d. Bus Materials: Current-carrying copper **OR** aluminum, **as directed**, conductors, fully insulated with Class 130C insulation except at stabs and joints; plated surface at stabs and joints.
 - e. Ground:
 - 1) 50 percent capacity integral with housing.
 - 2) 50 percent capacity internal bus bar of material matching bus material.
 - 3) 50 percent capacity isolated, internal bus bar of material matching bus material.
 - f. Enclosure: Steel, with manufacturer's standard finish, plug-in openings **24 inches (610 mm)** o.c., and hinged covers over unused openings **OR** Aluminum, with manufacturer's standard finish, plug-in openings **24 inches (610 mm)** o.c., and hinged covers over unused openings, **as directed**.
 - g. Fittings and Accessories: Manufacturer's standard.
 - h. Mounting: Arranged flat, edgewise, or vertically without derating.
- B. Plug-In Devices
1. Fusible Switches: NEMA KS 1, heavy duty; with R-type rejection **OR** J-type **OR** L-type, **as directed**, fuse clips to accommodate specified fuses; hookstick-operated handle, lockable with two padlocks, and interlocked with cover in closed position. See Division 16 Section "Fuses" for fuses and fuse installation requirements.
 2. Molded-Case Circuit Breakers: NEMA AB 1; hookstick-operated handle, lockable with two padlocks, and interlocked with cover in closed position.
 3. TVSS: NEMA 250, Type 1 enclosure with NEMA KS 1, fusible, disconnect switch and external handle to isolate TVSS from busway. TVSS product and installation requirements are specified in Division 16 Section "Transient Voltage Suppression."
 4. Motor Controllers: NEMA ICS 2, Class A, full voltage, nonreversing, across the line, unless otherwise indicated.
 - a. Control Circuit: 120 V; obtained from integral control power transformer, **as directed**, with a control power transformer **OR** source, **as directed**, of enough capacity to operate connected pilot, indicating and control devices, plus 100 percent spare capacity.

- b. Combination Controller: Factory-assembled combination controller and disconnect switch with or without overcurrent protection as indicated.
 - 1) Fusible Disconnecting Means: NEMA KS 1, heavy-duty, fusible switch with R-type rejection **OR** J-type, **as directed**, fuse clips rated for fuses. Select and size fuses to provide Type 2 protection according to IEC 947-4-1, as certified by a nationally recognized testing laboratory (NRTL) acceptable to authorities having jurisdiction. See Division 26 Section "Fuses" for fuses and fuse installation requirements.
OR
Nonfusible Disconnecting Means: NEMA KS 1, heavy-duty, nonfusible switch.
OR
Circuit-Breaker Disconnecting Means: NEMA AB 1, motor-circuit protector with field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
- c. Overload Relay: Ambient-compensated type with inverse-time-current characteristic and NEMA ICS 2, Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic. Overload relays shall have heaters or sensors in each phase matched to nameplate full-load current of specific motor to which they connect and with appropriate adjustment for duty cycle.
- d. Adjustable Overload Relay: Dipswitch selected for motor running overload protection with NEMA ICS 2, Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic, and selected to protect motor against voltage and current unbalance and single phasing. Adjustable overload relays shall have Class II ground-fault protection with start and run delays to prevent nuisance trip on starting.
- 5. Multispeed Motor Controllers: Match controller to motor type, application, and number of speeds; include the following accessories:
 - a. Compelling relay ensures motor starts only at low speed.
 - b. Accelerating relay ensures properly timed acceleration through speeds lower than that selected.
 - c. Decelerating relay ensures automatically timed deceleration through each speed.
- 6. Accessories: Hookstick operator, adjustable to maximum extension of **14 feet (4.3 m)**, **as directed**.

1.3 EXECUTION

A. Installation

- 1. Support bus assemblies independent of supports for other elements such as equipment enclosures at connections to panelboards and switchboards, pipes, conduits, ceilings, and ducts.
 - a. Design each fastener and support to carry load indicated by seismic requirements and to comply with seismic-restraint details according to Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 - b. Design each fastener and support to carry **200 lb (90 kg)** or 4 times the weight of bus assembly, whichever is greater.
 - c. Support bus assembly to prevent twisting from eccentric loading.
 - d. Support bus assembly with not less than **3/8-inch (10-mm)** steel rods. Install side bracing to prevent swaying or movement of bus assembly. Modify supports after completion to eliminate strains and stresses on bus bars and housings.
 - e. Fasten supports securely to building structure according to Division 26 Section "Hangers And Supports For Electrical Systems".
- 2. Install expansion fittings at locations where bus assemblies cross building expansion joints. Install at other locations so distance between expansion fittings does not exceed manufacturer's recommended distance between fittings.
- 3. Construct rated fire-stop assemblies where bus assemblies penetrate fire-rated elements such as walls, floors, and ceilings. Seal around penetrations according to Division 07 Section "Penetration Firestopping".

4. Install weatherseal fittings and flanges where bus assemblies penetrate exterior elements such as walls or roofs. Seal around openings to make weathertight. See Division 07 Section "Joint Sealants" for materials and application.
 5. Install a concrete curb at least **4 inches (100 mm)** high around bus-assembly floor penetrations.
 6. Coordinate bus-assembly terminations to equipment enclosures to ensure proper phasing, connection, and closure.
 7. Tighten bus-assembly joints with torque wrench or similar tool recommended by bus-assembly manufacturer. Tighten joints again after bus assemblies have been energized for 30 days.
 8. Install bus-assembly, plug-in units. Support connecting conduit independent of plug-in unit.
- B. Connections
1. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 2. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- C. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 2. Tests and Inspections:
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 3. Remove and replace units that do not pass tests and inspections and retest as specified above.
 4. Infrared Scanning: Two months after Final Completion, perform an infrared scan of bus assembly including joints and plug-in units.
 - a. Use an infrared-scanning device designed to measure temperature or detect significant deviations from normal values. Provide documentation of device calibration.
 - b. Perform 2 follow-up infrared scans of bus assembly, one at 4 months and the other at 11 months after Final Completion.
 - c. Prepare a certified report identifying bus assembly checked and describing results of scanning. Include notation of deficiencies detected, remedial action taken, and scanning observations after remedial action.
 5. Test Labeling: On completion of satisfactory testing of each unit, attach a dated and signed "Satisfactory Test" label to tested component.
- D. Adjusting
1. Set field-adjustable, circuit-breaker trip ranges and overload relay trip settings, **as directed**, as indicated.
- E. Cleaning
1. Vacuum dirt and debris; do not use compressed air to assist in cleaning.
- F. Protection
1. Provide final protection to ensure that moisture does not enter bus assembly.

END OF SECTION 26 25 13 00

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Task	Specification	Specification Description
26 25 16 00	26 25 13 00	Enclosed Bus Assemblies

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SECTION 26 27 13 00 - ELECTRICITY METERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. **[Electricity metering] [Work to accommodate utility company revenue meters, and Owner's electricity meters used to manage electrical power system].**

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 DEFINITIONS

- A. KY or KYZ Pulse:** Term used by metering industry to describe method of measuring consumption of electricity (kWh) that is based on relay opening and closing in response to rotation of disk in meter. Electronic meters generate pulses electronically.

1.3 COORDINATION

A. Electrical Service Connections:

1. Coordinate with utility companies and utility-furnished components.
 - a. Comply with requirements of utility providing electrical power services.
 - b. Coordinate installation and connection of utilities and services, including provision for electricity-metering components.

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of meter.
2. For metering infrastructure components.
3. For metering software.

B. Shop Drawings: For electricity-metering equipment.

1. Include elevation views of front panels of control and indicating devices and control stations.
2. Include diagrams for power, signal, and control wiring.
3. Wire Termination Diagrams and Schedules: Include diagrams for power, signal, and control wiring. Identify terminals and wiring designations and color-codes to facilitate installation,

operation, and maintenance. Indicate recommended types, wire sizes, and circuiting arrangements for field-installed wiring, and show circuit protection features. Differentiate between manufacturer-installed and field-installed wiring.

4. Include series-combination rating data for modular meter centers with main disconnect device.
5. Block Diagram: Show interconnections between components specified in this Section and devices furnished with power distribution system components. Indicate data communication paths and identify networks, data buses, data gateways, concentrators, and other devices used. Describe characteristics of network and other data communication lines.
6. Submit evidence that meters are compatible with connected monitoring and control devices and systems specified in [**Section 260913 "Electrical Power Monitoring and Control."**] **Section number and title** as directed by the Owner .
 - a. Show interconnecting signal and control wiring, and interface devices to show compatibility of meters.
 - b. For reporting and billing interfaces and adapters, list network protocols and provide statements from manufacturers that input and output devices comply with interoperability requirements of the protocol.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

- A. Manufacturers' Published Instructions: Record copy of official installation [**and testing**] instructions issued to Installer by manufacturer for the following:
 1. Installation of metering equipment.
- B. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Contracts:
 1. Software and firmware service agreement.
- B. Warranty documentation.

1.7 WARRANTY

- A. Special Installer Extended Warranty: Installer warrants that fabricated and installed metering equipment performs in accordance with specified requirements and agrees to repair or replace components or products that fail to perform as specified within extended-warranty period.
 1. Extended-Warranty Period: [**Two**] years or as directed by the Owner from date of Substantial Completion; full coverage for labor, materials, and equipment.
- B. Special Manufacturer Extended Warranty: Manufacturer warrants that metering equipment performs in accordance with specified requirements and agrees to provide repair or replacement of components or products that fail to perform as specified within extended-warranty period.

1. **[Initial]**Extended-Warranty Period: **[Three]** years or as directed by the Owner from date of Substantial Completion; **[full] [prorated]** coverage for labor, materials, and equipment.
2. Follow-On Extended-Warranty Period: **[Eight]** years or as directed by the Owner from date of Substantial Completion; **[full] [prorated]** coverage for materials **[that failed because of transient voltage surges]** only, free on board **[origin] [destination]**, freight prepaid.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
- B. Comply with UL 916.

2.2 UTILITY METERING INFRASTRUCTURE

- A. Install metering accessories furnished by utility company, complying with its requirements.
- B. Utility-Furnished Meters: Connect data transmission facility of metering equipment installed by Utility.
 1. Data Transmission: Transmit pulse data over control-circuit conductors, classified as Class 1 per NFPA 70, Article 725. Comply with Section 260523 "Control-Voltage Electrical Power Cables."
- C. Current-Transformer Cabinets: Comply with requirements of electrical-power utility company.
- D. Meter Sockets:
 1. Comply with requirements of electrical-power utility company.
 2. Meter Sockets: Steady-state and short-circuit current ratings must meet indicated circuit ratings.
- E. Modular Meter Center: Factory-coordinated assembly of main service **[terminal box with lugs only] [disconnect device]**, wireways, meter socket modules, and feeder circuit breakers arranged in adjacent vertical sections complete with interconnecting buses.
 1. Comply with requirements of utility company for meter center.
 - a. Comply with UL 67.
 2. Housing: UL 50E, **[Type 1] [Type 3R] [Type 4X]** enclosure.
 3. Meter Socket Rating: Coordinated with connected feeder circuit rating.
 4. Minimum Short-Circuit Rating: **[22 000 A] [42 000 A] [65 000 A] [100 000 A]** or as directed by the Owner symmetrical at rated voltage.
 5. Steady-state and short-circuit current ratings must have ratings that match connected circuit ratings.
 6. Main Disconnect Device:
 - a. Circuit breaker, series-combination rated for use with downstream feeder and branch circuit breakers and having adjustable magnetic trip setting for circuit-breaker frame sizes of 250 A and larger. Comply with requirements in Section 262816 "Enclosed Switches and

Circuit Breakers." Circuit breakers must be operable from outside enclosure to disconnect unit. Configure cover so it can be opened only when disconnect switch is open.

- b. Fusible switch, UL 98 Type GD, series-combination rated by fuse manufacturer to protect downstream feeder and branch circuit breakers. Comply with requirements in Section 262816 "Enclosed Switches and Circuit Breakers." Switch must be operable from outside enclosure to disconnect unit. Configure cover so that it can be opened only when disconnect switch is open.

7. Feeder Circuit Breakers: Series-combination-rated molded-case units, rated to protect downstream circuit breakers and to house load centers and panelboards that have [10 000 A] or as directed by the Owner interrupting capacity.

- a. Identification: Complying with requirements in Section 260553 "Identification for Electrical Systems."
- b. Physical Protection: Tamper resistant, with hasp for padlock.

8. Surge Protection:

- a. Factory-installed in main disconnect, integrally mounted, UL 1449 Type 1. Comply with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
- b. Field-mounted external to main disconnect, UL 1449 Type 2, with integral disconnect and overcurrent protective device. Comply with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
- c. Factory-installed in main terminal box, integrally mounted, UL 1449 Type 1. Comply with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."
- d. Field-mounted external to main terminal box, UL 1449 Type 2, with integral disconnect and overcurrent protective device. Comply with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits."

- F. Arc-Flash Warning Labels;

1. Comply with requirements for "Arc-Flash Warning Labels" in Section 260573.19 "Arc-Flash Studies." Apply 3-1/2-by-5 inch (76-by-127 mm) thermal transfer label of high-adhesion polyester for each work location included in the analysis.
2. Comply with requirements for "Self-Adhesive Equipment Labels" and "Signs" in Section 260553 "Identification for Electrical Systems." Apply 3-1/2-by-5 inch (76-by-127 mm) thermal transfer label of high-adhesion polyester for each work location included in the analysis. Labels must be machine printed, with no field-applied markings.

- a. Label must have orange header with wording, "WARNING, ARC-FLASH HAZARD," and must include the following information taken directly from arc-flash hazard analysis:

- 1) Location designation.
- 2) Nominal voltage.
- 3) Flash protection boundary.
- 4) Hazard risk category.
- 5) Incident energy.
- 6) Working distance.
- 7) Engineering report number, revision number, and issue date.

2.3 ELECTRICITY METERS

- A. System Description: Able to meter designated activity loads, with or without external alarm, control, and communication capabilities, or other optional features.

B. General Requirements for Meters:

1. Comply with NEMA ANSI C12.1 and NEMA ANSI C12.20, [0.1] [0.2] [0.5] accuracy class.
2. Ambient Temperature: Minus 22 deg F to plus 158 deg F (Minus 30 deg C to plus 70 deg C).
3. Humidity: Zero to 95 percent, noncondensing.
4. Capacities and Characteristics:
 - a. Circuit: 120/240 V(ac), 100 A.
 - b. Measure: kWh, onboard LED display.
 - c. Remote-Reading Options: None.
5. Billing Meters Accuracy: [0.2] [0.5] [1.0] percent of reading, complying with NEMA ANSI C12.20.
6. Meters Certification: Certified by [California Type Evaluation Program] or as directed by the Owner as complying with [4 CCR 4027, Article 2.2] State or Federal regulatory requirements as directed by the Owner .
7. Certify that meters comply with NEMA ANSI C12.20 requirements by laboratory accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) of the National Institute of Standards and Technology (NIST). Laboratory must use test equipment that is certified annually and is traceable to NIST standards.
8. Enclosure: Supplied by meter manufacturer, UL 50E, [Type 1] [Type 3R] [Type 4X] minimum, with provisions for locking or sealing.
9. Identification: Comply with requirements in Section 260553 "Identification for Electrical Systems."
10. Onboard Nonvolatile Data Storage: kWh, until reset.
11. Sensors: Current-sensing type, supplied by electronic meter manufacturer, with current or voltage output, selected for optimum range and accuracy for meters indicated for this application.
 - a. Type: [Split] [and] [solid] core, complying with recommendation of meter manufacturer.

C. kWh Meter: Electronic [single-phase] [and] [three-phase] meters, measuring electricity use.

1. Voltage and Phase Configuration: Meter must be designed for use on circuits with voltage rating and phase configuration indicated for its application.
2. Display:
 - a. LCD with characters not less than 0.25 inch (6 mm) high, indicating accumulative kWh and current kilowatt load. Retain accumulated kWh in nonvolatile memory, until reset.
 - b. Digital electromechanical counter, indicating accumulative kWh.

D. kWhd Meter: Electronic [single-phase] [and] [three-phase] meters, measuring electricity use and demand. Demand must be integrated over [15-minute] interval or as directed by the Owner .

1. Voltage and Phase Configuration: Meter must be designed for use on circuits with voltage rating and phase configuration indicated for its application.
2. Display: LCD with characters not less than 0.25 inch (6 mm) high, indicating the following:
 - a. Accumulative kWh.
 - b. Current time and date.
 - c. Current demand.
 - d. Historic peak demand.
 - e. Time and date of historic peak demand.
3. Retain accumulated kWh and historic peak demand in nonvolatile memory, until reset.

E. KY and KYZ Pulse Totalizer:

1. Pulse Totalizer: Instrument for demand and billing applications where one or more utility revenue meters stream KY or KYZ energy pulses. Instrument must totalize kWh accumulated over user-selected period and must log maximum and minimum kWhd for that period. Record each period with date/time stamp. Time period must be user selected from one to 60 minutes.
 - a. Pulse Input: **[One]** or as directed by the Owner , individually programmable, KYZ Form C (three-wire) contact pulse channels. Pulse interval, pulse rate, and minimum pulse width must be field adjustable, set for pulse stream provided by utility revenue meter.
 - b. Data Totalizing Capacity of Each Channel: Not less than 149 days at 15-minute intervals.
 - c. Instrument Power: User selectable, 120 V(ac) and 277 V(ac).
 - d. Clock: Line frequency.

- F. Remote Reading Options:
 1. Pulse Output: **[KY] [KYZ]**, complete with optical sensor and interface devices.
 2. TIA-232 serial interface.
 3. TIA-485 serial interface, with **[Modbus RTU protocol]** or as directed by the Owner .
 4. USB interface.
 5. TCP/IP adapter.

- G. Current-Transformer Cabinet: Size and configuration as recommended by metering equipment manufacturer for use with indicated connected feeder and sensors.

- H. Uninterruptible Power Supply: Single phase, 120 V(ac), sized and rated to provide continuous power to meter for operations of **[48]** hours or as directed by the Owner after interruption of normal power.
 1. Output: Sine wave, total harmonic distortion less than 5 percent at full load.
 2. Battery: Maintenance free, sealed, lead acid, and leakproof.
 3. Control Panel: LED status display of "on-battery," "replace battery," and "overload."

- I. Data Transmission Cable: Comply with requirements in Section 260523 "Control-Voltage Electrical Power Cables."

- J. Software: PC-based product **[of] [recommended by]** meter manufacturer, suitable for calculating utility cost allocation.
 1. Utility Cost Allocation: Automatically import electricity-usage records to allocate electricity costs for the following:
 - a. At least **[15]** departments or as directed by the Owner .
 - b. At least **[30]** tenants or activities or as directed by the Owner .
 - c. At least **[five]** processes or as directed by the Owner .
 - d. At least **[five]** buildings or as directed by the Owner .

 2. Activity Billing Software: Automatically import electricity-usage records to automatically compute and prepare electricity-use statements **[and invoices]** based on electricity use **[and peak demand]**. Maintain separate directory for each allocation. Prepare summary reports in user-defined formats and time intervals.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
 - 1. Install modular meter center according to switchboard installation requirements in NECA 400.
 - 2. Install arc-flash labels as required by NFPA 70.
- C. Special Techniques:
 - 1. Install meters furnished by utility company. Install raceways and equipment according to utility company's published instructions. Provide empty conduits for metering leads and extend grounding connections as required by utility company.
 - 2. Wiring Methods:
 - a. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 - b. Install unshielded, twisted-pair cable for control and signal transmission conductors, complying with Section 271513 "Communications Copper Horizontal Cabling."
 - c. Minimum conduit size is metric designator 16 (trade size 1/2).

3.2 IDENTIFICATION

- A. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."
 - 1. Series Combination Warning Label: Self-adhesive labels, with text as required by NFPA 70.
 - 2. Equipment Identification Labels: Self-adhesive labels with clear protective overlay. For residential meters, provide additional card holder suitable for **[printed, weather-resistant card]** **[typewritten card]** with occupant's name.

3.3 FIELD QUALITY CONTROL

- A. **[Acceptance]** Testing Preparation:
 - 1. as directed by the Owner .
- B. Field tests and inspections must be witnessed by **[Architect]** **[Tenant]** **[authorities having jurisdiction]** **Names or titles of witnesses** as directed by the Owner .
- C. Tests and Inspections:
 - 1. Equipment and Software Setup:
 - a. Set meter date and time clock.
 - b. Test, calibrate, and connect pulse metering system.
 - c. Set and verify billing demand interval for demand meters.
 - d. Report settings and calibration results.

e. Set up reporting and billing software, insert billing location names and initial constant values and variable needed for billing computations.

2. Connect load of known power rating, [1.5 kW] minimum or as directed by the Owner , to circuit supplied by metered feeder.
3. Turn off circuits supplied by metered feeder and secure them in off condition.
4. Run test load continuously for eight hours minimum, or longer, to obtain measurable meter indication. Use test-load placement and setting that ensures continuous, safe operation.
5. Check and record meter reading at end of test period and compare with actual electricity used, based on test-load rating, duration of test, and sample measurements of supply voltage at test-load connection. Record test results.
6. Generate test report and billing for each tenant or activity from meter reading tests.

D. Nonconforming Work:

1. Electricity metering will be considered defective if it does not pass tests and inspections.
2. Remove and replace defective units and retest.

E. Collect, assemble, and submit test and inspection reports.

F. Manufacturer Services:

1. Engage factory-authorized service representative to [support] [supervise] field tests and inspections.

3.4 PROTECTION

A. After installation, protect metering equipment from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.5 MAINTENANCE

A. Software and Firmware Service Agreement:

1. Technical Support: Beginning at Substantial Completion, verify that software and firmware service agreement includes software and firmware support for [two] years or as directed by the Owner .
2. Upgrade Service: At Substantial Completion, update software and firmware to latest version. Install and program software and firmware upgrades that become available within [two] years or as directed by the Owner from date of Substantial Completion. [**Verify that upgrading software includes operating system and new or revised licenses for using software.**]
 - a. Upgrade Notice: No fewer than [30] days or as directed by the Owner to allow Owner to schedule and access the system [and to upgrade computer equipment if necessary.]
3. Upgrade Reports: Prepare report after each update, documenting upgrades installed.

END OF SECTION 26 27 13 00

Task	Specification	Specification Description
26 27 13 00	26 05 26 00b	Overhead Electrical Distribution
26 27 16 00	26 05 33 00	Raceways And Boxes
26 27 16 00	26 09 23 00	Electrical Power Monitoring And Control
26 27 16 00	26 24 19 00a	Motor-Control Centers
26 27 19 00	26 05 33 00	Raceways And Boxes
26 27 19 00	26 05 39 00	Underfloor Raceways For Electrical Systems
26 27 23 00	26 27 26 00	Wiring Devices

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SECTION 26 27 26 00 - WIRING DEVICES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of wiring devices. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Receptacles, receptacles with integral GFCI, and associated device plates.
 - b. Twist-locking receptacles.
 - c. Receptacles with integral surge suppression units.
 - d. Wall-box motion sensors.
 - e. Isolated-ground receptacles.
 - f. Hospital-grade receptacles.
 - g. Snap switches and wall-box dimmers.
 - h. Solid-state fan speed controls.
 - i. Wall-switch and exterior occupancy sensors.
 - j. Communications outlets.
 - k. Pendant cord-connector devices.
 - l. Cord and plug sets.
 - m. Floor service outlets, poke-through assemblies, service poles, and multioutlet assemblies.

C. Definitions

1. EMI: Electromagnetic interference.
2. GFCI: Ground-fault circuit interrupter.
3. Pigtail: Short lead used to connect a device to a branch-circuit conductor.
4. RFI: Radio-frequency interference.
5. TVSS: Transient voltage surge suppressor.
6. UTP: Unshielded twisted pair.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: List of legends and description of materials and process used for premarking wall plates.
3. Samples: One for each type of device and wall plate specified, in each color specified.
4. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NFPA 70.

1.2 PRODUCTS

A. Straight Blade Receptacles

1. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

2. Hospital-Grade, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498 Supplement SD.
 3. Isolated-Ground, Duplex Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - a. Description: Straight blade; equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
 4. Tamper-Resistant Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.
 - a. Description: Labeled to comply with NFPA 70, "Health Care Facilities" Article, "Pediatric Locations" Section.
- B. GFCI Receptacles
1. General Description: Straight blade, feed **OR** non-feed, **as directed**,-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.
 2. Duplex GFCI Convenience Receptacles, 125 V, 20 A:
 3. Hospital-Grade, Duplex GFCI Convenience Receptacles, 125 V, 20 A: Comply with UL 498 Supplement SD.
- C. TVSS Receptacles
1. General Description: Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 1449, with integral TVSS in line to ground, line to neutral, and neutral to ground.
 - a. TVSS Components: Multiple metal-oxide varistors; with a nominal clamp-level rating of 400 volts and minimum single transient pulse energy dissipation of 240 J, according to IEEE C62.41.2 and IEEE C62.45.
 - b. Active TVSS Indication: Visual and audible, with light visible in face of device to indicate device is "active" or "no longer in service."
 2. Duplex TVSS Convenience Receptacles:
 - a. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.
 3. Isolated-Ground, Duplex Convenience Receptacles:
 - a. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
 4. Hospital-Grade, Duplex Convenience Receptacles: Comply with UL 498 Supplement SD.
 - a. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R.
 5. Isolated-Ground, Hospital-Grade, Duplex Convenience Receptacles:
 - a. Description: Straight blade, 125 V, 20 A; NEMA WD 6 configuration 5-20R. Comply with UL 498 Supplement SD. Equipment grounding contacts shall be connected only to the green grounding screw terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.
- D. Hazardous (Classified) Location Receptacles
1. Available Wiring Devices for Hazardous (Classified) Locations: Comply with NEMA FB 11 and UL 1010.
- E. Twist-Locking Receptacles
1. Single Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498.
 2. Isolated-Ground, Single Convenience Receptacles, 125 V, 20 A:
 - a. Description: Comply with NEMA WD 1, NEMA WD 6 configuration L5-20R, and UL 498. Equipment grounding contacts shall be connected only to the green grounding screw

terminal of the device and with inherent electrical isolation from mounting strap. Isolation shall be integral to receptacle construction and not dependent on removable parts.

F. Pendant Cord-Connector Devices

1. Description: Matching, locking-type plug and receptacle body connector; NEMA WD 6 configurations L5-20P and L5-20R, heavy-duty grade.
 - a. Body: Nylon with screw-open cable-gripping jaws and provision for attaching external cable grip.
 - b. External Cable Grip: Woven wire-mesh type made of high-strength galvanized-steel wire strand, matched to cable diameter, and with attachment provision designed for corresponding connector.

G. Cord And Plug Sets

1. Description: Match voltage and current ratings and number of conductors to requirements of equipment being connected.
 - a. Cord: Rubber-insulated, stranded-copper conductors, with Type SOW-A jacket; with green-insulated grounding conductor and equipment-rating ampacity plus a minimum of 30 percent.
 - b. Plug: Nylon body and integral cable-clamping jaws. Match cord and receptacle type for connection.

H. Snap Switches

1. Comply with NEMA WD 1 and UL 20.
2. Switches, 120/277 V, 20 A:
3. Pilot Light Switches, 20 A:
 - a. Description: Single pole, with neon-lighted handle, illuminated when switch is "ON."
4. Key-Operated Switches, 120/277 V, 20 A:
 - a. Description: Single pole, with factory-supplied key in lieu of switch handle.
5. Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors.
6. Key-Operated, Single-Pole, Double-Throw, Momentary Contact, Center-Off Switches, 120/277 V, 20 A; for use with mechanically held lighting contactors, with factory-supplied key in lieu of switch handle.

I. Wall-Box Dimmers

1. Dimmer Switches: Modular, full-wave, solid-state units with integral, quiet on-off switches, with audible frequency and EMI/RFI suppression filters.
2. Control: Continuously adjustable slider **OR** toggle switch **OR** rotary knob, **as directed**; with single-pole or three-way switching. Comply with UL 1472.
3. Incandescent Lamp Dimmers: 120 V; control shall follow square-law dimming curve. On-off switch positions shall bypass dimmer module.
 - a. 600 W; dimmers shall require no derating when ganged with other devices. Illuminated when "OFF," **as directed**.
4. Fluorescent Lamp Dimmer Switches: Modular; compatible with dimmer ballasts; trim potentiometer to adjust low-end dimming; dimmer-ballast combination capable of consistent dimming with low end not greater than 20 percent of full brightness.

J. Fan Speed Controls

1. Modular, 120-V, full-wave, solid-state units with integral, quiet on-off switches and audible frequency and EMI/RFI filters. Comply with UL 1917.
 - a. Continuously adjustable slider **OR** toggle switch **OR** rotary knob, **as directed**, 5 A **OR** 1.5 A, **as directed**.
 - b. Three-speed adjustable slider **OR** rotary knob, **as directed**, 1.5 A.

K. Occupancy Sensors

1. Wall-Switch Sensors:

- a. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).
 2. Wall-Switch Sensors:
 - a. Description: Adaptive-technology type, 120/277 V, adjustable time delay up to 20 minutes, 180-degree field of view, with a minimum coverage area of 900 sq. ft. (84 sq. m).
 3. Long-Range Wall-Switch Sensors:
 - a. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, with a minimum coverage area of 1200 sq. ft. (111 sq. m).
 4. Long-Range Wall-Switch Sensors:
 - a. Description: Dual technology, with both passive-infrared- and ultrasonic-type sensing, 120/277 V, adjustable time delay up to 30 minutes, 110-degree field of view, and a minimum coverage area of 1200 sq. ft. (111 sq. m).
 5. Wide-Range Wall-Switch Sensors:
 - a. Description: Passive-infrared type, 120/277 V, adjustable time delay up to 30 minutes, 150-degree field of view, with a minimum coverage area of 1200 sq. ft. (111 sq. m).
 6. Exterior Occupancy Sensors:
 - a. Description: Passive-infrared type, 120/277 V, weatherproof, adjustable time delay up to 15 minutes, 180-degree field of view, and 110-foot (34-m) detection range. Minimum switch rating: 1000-W incandescent, 500-VA fluorescent.
- L. Communications Outlets
1. Telephone Outlet:
 - a. Description: Single RJ-45 jack for terminating 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e. Comply with UL 1863.
 2. Combination TV and Telephone Outlet:
 - a. Description: Single RJ-45 jack for 100-ohm, balanced, four-pair UTP; TIA/EIA-568-B.1; complying with Category 5e; and one Type F coaxial cable connector.
- M. Wall Plates
1. Single and combination types to match corresponding wiring devices.
 - a. Plate-Securing Screws: Metal with head color to match plate finish.
 - b. Material for Finished Spaces: Steel with white baked enamel, suitable for field painting **OR** Smooth, high-impact thermoplastic **OR** 0.035-inch- (1-mm-) thick, satin-finished stainless steel **OR** 0.04-inch- (1-mm-) thick, brushed brass with factory polymer finish **OR** 0.05-inch- (1.2-mm-) thick anodized aluminum **OR** 0.04-inch- (1-mm-) thick steel with chrome-plated finish, **as directed**.
 - c. Material for Unfinished Spaces: Galvanized steel **OR** Smooth, high-impact thermoplastic, **as directed**.
 - d. Material for Damp Locations: Thermoplastic **OR** Cast aluminum, **as directed**, with spring-loaded lift cover, and listed and labeled for use in "wet locations."
 2. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant, die-cast aluminum **OR** thermoplastic, **as directed**, with lockable cover.
- N. Floor Service Fittings
1. Type: Modular, flush-type **OR** flap-type **OR** above-floor, **as directed**, dual-service units suitable for wiring method used.
 2. Compartments: Barrier separates power from voice and data communication cabling.
 3. Service Plate: Rectangular **OR** Round, **as directed**, die-cast aluminum **OR** solid brass, **as directed**, with satin finish.
 4. Power Receptacle: NEMA WD 6 configuration 5-20R, gray finish, unless otherwise indicated.
 5. Voice and Data Communication Outlet: Blank cover with bushed cable opening **OR** Two modular, keyed, color-coded, RJ-45 Category 5e jacks for UTP cable, **as directed**.
- O. Poke-Through Assemblies

1. Description: Factory-fabricated and -wired assembly of below-floor junction box with multichanneled, through-floor raceway/firestop unit and detachable matching floor service outlet assembly.
 - a. Service Outlet Assembly: Pedestal type with services indicated **OR** Flush type with two simplex receptacles and space for two RJ-45 jacks **OR** Flush type with four simplex receptacles and space for four RJ-45 jacks, **as directed**.
 - b. Size: Selected to fit nominal **3-inch (75-mm) OR 4-inch (100-mm)**, **as directed**, cored holes in floor and matched to floor thickness.
 - c. Fire Rating: Unit is listed and labeled for fire rating of floor-ceiling assembly.
 - d. Closure Plug: Arranged to close unused **3-inch (75-mm) OR 4-inch (100-mm)**, **as directed**, cored openings and reestablish fire rating of floor.
 - e. Wiring Raceways and Compartments: For a minimum of four No. 12 AWG conductors and a minimum of two **OR** four, **as directed**, 4-pair, Category 5e voice and data communication cables.

P. Multioutlet Assemblies

1. Components of Assemblies: Products from a single manufacturer designed for use as a complete, matching assembly of raceways and receptacles.
2. Raceway Material: Metal, with manufacturer's standard finish **OR** PVC, **as directed**.
3. Wire: No. 12 AWG.

Q. Service Poles

1. Description: Factory-assembled and -wired units to extend power and voice and data communication from distribution wiring concealed in ceiling to devices or outlets in pole near floor.
 - a. Poles: Nominal **2.5-inch- (65-mm-)** square cross section, with height adequate to extend from floor to at least **6 inches (150 mm)** above ceiling, and with separate channels for power wiring and voice and data communication cabling.
 - b. Mounting: Ceiling trim flange with concealed bracing arranged for positive connection to ceiling supports; with pole foot and carpet pad attachment.
 - c. Finishes: Manufacturer's standard painted finish and trim combination **OR** Satin-anodized aluminum, **as directed**.
 - d. Wiring: Sized for minimum of five No. 12 AWG power and ground conductors and a minimum of four, 4-pair, Category 3 or 5 voice and data communication cables.
 - e. Power Receptacles: Two duplex, 20-A, heavy-duty, NEMA WD 6 configuration 5-20R units.
 - f. Voice and Data Communication Outlets: Blank insert with bushed cable opening **OR** Two RJ-45 Category 5e jacks **OR** Four RJ-45 Category 5e jacks, **as directed**.

R. Finishes

1. Color: Wiring device catalog numbers in Section Text do not designate device color.
 - a. Wiring Devices Connected to Normal Power System: Almond **OR** Black **OR** Brown **OR** Gray **OR** Ivory **OR** White **OR** As selected, **as directed**, unless otherwise indicated or required by NFPA 70 or device listing.
 - b. Wiring Devices Connected to Emergency Power System: Red.
 - c. TVSS Devices: Blue.
 - d. Isolated-Ground Receptacles: Orange **OR** As specified above, with orange triangle on face, **as directed**.

1.3 EXECUTION

A. Installation

1. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.
2. Coordination with Other Trades:

- a. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
- b. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
- c. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
- d. Install wiring devices after all wall preparation, including painting, is complete.
3. Conductors:
 - a. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
 - b. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
 - c. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.
 - d. Existing Conductors:
 - 1) Cut back and pigtail, or replace all damaged conductors.
 - 2) Straighten conductors that remain and remove corrosion and foreign matter.
 - 3) Pigtailing existing conductors is permitted provided the outlet box is large enough.
4. Device Installation:
 - a. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
 - b. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
 - c. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
 - d. Connect devices to branch circuits using pigtails that are not less than **6 inches (152 mm)** in length.
 - e. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
 - f. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
 - g. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
 - h. Tighten unused terminal screws on the device.
 - i. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.
5. Receptacle Orientation:
 - a. Install ground pin of vertically mounted receptacles up **OR** down, **as directed**, and on horizontally mounted receptacles to the right **OR** left, **as directed**.
 - b. Install hospital-grade receptacles in patient-care areas with the ground pin or neutral blade at the top.
6. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.
7. Dimmers:
 - a. Install dimmers within terms of their listing.
 - b. Verify that dimmers used for fan speed control are listed for that application.
 - c. Install unshared neutral conductors on line and load side of dimmers according to manufacturers' device listing conditions in the written instructions.
8. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multigang wall plates.
9. Adjust locations of floor service outlets and service poles to suit arrangement of partitions and furnishings.

- B. Identification
1. Comply with Division 26 Section "Identification For Electrical Systems".
 - a. Receptacles: Identify panelboard and circuit number from which served. Use hot, stamped or engraved machine printing with black **OR** white **OR** red, **as directed**,-filled lettering on face of plate, and durable wire markers or tags inside outlet boxes.
- C. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 - a. In healthcare facilities, prepare reports that comply with recommendations in NFPA 99.
 - b. Test Instruments: Use instruments that comply with UL 1436.
 - c. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.
 2. Tests for Convenience Receptacles:
 - a. Line Voltage: Acceptable range is 105 to 132 V.
 - b. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
 - c. Ground Impedance: Values of up to 2 ohms are acceptable.
 - d. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
 - e. Using the test plug, verify that the device and its outlet box are securely mounted.
 - f. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.
 3. Test straight blade convenience outlets in patient-care areas **OR** hospital-grade convenience outlets, **as directed**, for the retention force of the grounding blade according to NFPA 99. Retention force shall be not less than **4 oz. (115 g)**.

END OF SECTION 26 27 26 00

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Task	Specification	Specification Description
26 27 26 00	01 22 16 00	No Specification Required
26 27 26 00	26 05 33 00	Raceways And Boxes
26 27 26 00	26 09 23 00	Electrical Power Monitoring And Control

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SECTION 26 27 33 00 - POWER DISTRIBUTION UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Manufactured power distribution units.
2. Input-output, circuit-breaker section.
3. Isolation transformer section.
4. SPD system.
5. Output panelboards.
6. Power distribution unit controls.
7. Monitoring, status, and alarm annunciation.

B. Related Requirements:

1. Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.

1.2 DEFINITIONS

- ##### **A. EPO: Emergency power-off.**

1.3 PREINSTALLATION MEETINGS

- ##### **A. Preinstallation Coordination Meeting(s):** For power distribution units. Conduct meeting(s) [**as videoconference**] [**or**] site location as directed by the Owner before **Construction activity** as directed by the Owner .

1. Attendees: Installers, fabricators, representatives of manufacturers, representatives of Owner, and administrators for field tests and inspections. Notify Architect [, **Construction Manager**] [, **and Owner's Commissioning Authority**] of scheduled meeting dates.
2. Coordinate layout and installation of power distribution units with Owner's equipment.
3. Record agreements reached in meetings and distribute record to other participants.
4. Adjust arrangements and locations of power distribution units to accommodate and optimize arrangement and space requirements of equipment.

1.4 ACTION SUBMITTALS

A. Product Data:

1. For each type of product.
2. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for power distribution units.

3. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, and **[mounting] [attachment]** details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

C. Certificates: For each type of power distribution unit, signed by product manufacturer.

D. Field Quality-Control Submittals:

1. Field quality-control reports.

1.5 INFORMATIONAL SUBMITTALS

A. Manufacturers' Published Instructions: Record copy of official installation **[and testing]** instructions issued to Installer by manufacturer for the following:

1. Installation and startup checks.

B. Source quality-control reports.

1. For each factory test of power distribution units.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver equipment in fully enclosed vehicles after specified environmental conditions have been permanently established in spaces where equipment is to be placed.

B. Store equipment in spaces with environments controlled within manufacturer's ambient temperature and humidity tolerances for non-operating equipment.

PART 2 - PRODUCTS

2.1 EXISTING PRODUCTS **[TO BE MODIFIED] [TO BE REMOVED AND RE-INSTALLED]**

A. Basis for Pricing: **Name of manufacturer; model number or series for existing product** as directed by the Owner .

B. Description: **Description of existing product, including special features, options, and finishes that may impact Work** as directed by the Owner .

C. Accessories: **Accessories included with existing product** as directed by the Owner .

2.2 MANUFACTURERS

- A. Source Limitations: Obtain products from single manufacturer.

2.3 MANUFACTURED POWER DISTRIBUTION UNITS

- A. Description: Integrated and coordinated assembly of power-line-conditioning and distribution components packaged in single cabinet or modular assembly of cabinets [**each with full-swivel casters mounted to bottom frame**]. Include the following components:
 - 1. Input-power, circuit-breaker section.
 - 2. Isolation transformer.
 - 3. SPD system.
 - 4. Output panelboard(s).
 - 5. Alarm, monitoring, and control system.
- B. Electrical Components, Devices, and Accessories: Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.
- C. Constructed to withstand seismic forces specified in Section 260011 "Facility Performance Requirements for Electrical."
- D. Wiring Access: [**Top**] [**and**] [**bottom**] wiring access.
- E. Unit Capacity Rating: Carry indicated RMS kilovolt-ampere load continuously without affecting normal operation of circuit breakers, monitoring system, or unit controls and without exceeding rated insulation temperature for the following input voltage and load current:
 - 1. Input Voltage: Within rated input-voltage tolerance band of unit.
 - 2. Load Current: Minimum of 3.0 crest factor and 85 percent total harmonic distortion.

2.4 INPUT-POWER, CIRCUIT-BREAKER SECTION

- A. Description: Three-pole, [**shunt-tripped**], thermal-magnetic-type circuit breaker, rated for indicated interrupting capacity and 125 percent of input current of unit at 100 percent rated load at unit capacity rating.
 - 1. Dual-Input Units:
 - a. Two input circuit breakers arranged to provide transfer between two input-power sources.
 - b. Controls and interfaces to allow selecting either open- or closed-transition transfer between two input-power sources.
 - c. Use 120 V permissive signal from both upstream voltage sources to indicate acceptable conditions for closed-transition transfer.
 - d. Open second circuit breaker automatically after closed-transition transfer is completed.
 - 2. Static Transfer Switch: Three-pole, double-throw; solid-state, automatic transfer switch.

2.5 ISOLATION TRANSFORMER SECTION

- A. Description: Dry-type, electrostatically shielded, three-phase, common-core, convection-air-cooled isolation transformer.
1. Comply with UL 1561[**including requirements for nonsinusoidal load-current-handling capability defined by designated K-factor**].
 2. Cores: Electrical grade, non-aging silicon steel with high permeability and low hysteresis losses, one leg per phase.
 3. Coil Material and Insulation: **[Aluminum] [Copper]** windings, 220 deg C insulation class.
 4. Temperature Rise: Designed for **[80] [115] [150]** deg C rise above 40 deg C ambient.
 5. Output Impedance: 3.5 plus or minus 0.5 percent.
 6. Regulation: 2 to 4 percent maximum, at full-resistive load; 5 percent maximum, at rated nonlinear load.
 7. Taps: Six full-capacity compensation taps at 2.5 percent increments; two above and four below nominal voltage.
 8. Full-Load Efficiency: Minimum 96 percent at rated[**nonlinear**] load.
 9. Magnetic-Field Strength External to Transformer Enclosure: Less than 0.1 G at **18 inch (450 mm)**.
 10. K-Factor Rating: Transformers indicated to be K-factor rated must comply with UL 1561 requirements for nonsinusoidal load current-handling capability to the degree defined by designated K-factor.
 - a. Unit may not overheat when carrying full-load current with harmonic distortion corresponding to designated K-factor.
 - b. Indicate value of K-factor on transformer nameplate.
 11. Electrostatic Shielding: Independently shield each winding with full-width, **[single] [double]**, copper, electrostatic shield arranged to minimize interwinding capacitance.
 - a. Coil leads and terminal trips must be arranged to minimize capacitive coupling between input and output connections.
 - b. Shield Terminal: Separate, and marked "Shield" for grounding connection. Shield must be connected to reference ground point for distribution panels.
 - c. Capacitance: Limit capacitance between primary and secondary windings to maximum of 33 pF over frequency range of 20 Hz to 1 MHz.
 - d. Common-Mode Noise Attenuation: 120 dB minimum, 0.5 to 1.5 kHz; minus 65 dB minimum, 1.5 to 100 kHz.
 - e. Normal-Mode Noise Attenuation: 52 dB minimum, 1.5 to 10 kHz.
 12. Neutral Rating: **[1.732 times] [200 percent of]** system full-load ampere rating.
 13. Shipping Restraints: Paint or otherwise color code bolts, wedges, blocks, and other restraints that are to be removed after installation and before energizing. Use fluorescent colors that are easily identifiable inside transformer enclosure.

2.6 SPD SYSTEM

- A. Description: Integrated SPD system, complying with Section 264313 "Surge Protection for Low-Voltage Electrical Power Circuits," to protect unit panelboard, and having the following features:
1. Disconnect Device: Manual, three-pole, fused disconnect switch to de-energize SPD system while permitting power distribution units to continue operation. Fuses must be rated for 200 kA interrupting capacity.
 2. Nonlinear Loading: System must accommodate rated-load current with minimum 3.0 crest factor and 85 percent total harmonic distortion.

2.7 OUTPUT PANELBOARDS

- A. Description: Panelboards complying with Section 262416 "Panelboards" except for mounting provisions. Mount **[single]** **[double]** panelboards on power distribution unit behind flush doors. Include the following features:
1. Construction: **[30]** **[42]** pole, **[208 V]** **[240 V]**, three phase; capable of accepting branch circuit breakers rated up to 100 A.
 2. Panelboard Rating: **[225 A]** or as directed by the Owner , with main circuit breaker.
 3. Panelboard Phase, Neutral, and Ground Buses: Copper, with neutral bus at least **[1.732]** **[two]** times nominal phase bus rating.
 4. Isolated Ground Bus: Copper, adequate for branch-circuit equipment ground conductors; insulated from supports.
 5. Branch Circuit Breakers: **[Bolt]** **[Plug]** on.
 6. Cable Racks: Removable and arranged for supporting and routing cables for panelboard entrance.
 7. Access Panels: Arranged so additional branch-circuit wiring can be installed and connected in future.

2.8 POWER DISTRIBUTION UNIT CONTROLS

- A. Include the following control features:
1. EPO switch integral with power distribution unit.
 2. Power-off input terminals for connection to remote EPO switch.
 3. Shutdown with automatic unit disconnection for the following alarm conditions:
 - a. High temperature in transformer coil.
 - b. High or low input or output voltage.
 - c. Phase loss.
 - d. Ground fault.
 - e. Reverse-phase rotation.
 4. Alarm Contacts: Electrically isolated, Form C (one normally open and one normally closed), summary alarm; contact set must change state if monitored function goes into alarm mode.
 5. Auxiliary Control Outputs: **Control function outputs** as directed by the Owner .

2.9 MONITORING, STATUS, AND ALARM ANNUNCIATION

- A. Description: Microprocessor-based monitoring, status, and alarm annunciation panel mounted flush in front of power distribution unit to provide status display and failure-indicating interface for the following:
1. Power Monitoring:
 - a. Input Voltage: Line-to-line, RMS.
 - b. Output Voltage: Line-to-line and line-to-neutral, RMS.
 - c. Output current.
 2. Status Indication: Unit on.
 3. Alarm Annunciation:
 - a. High temperature in transformer coil.
 - b. High and low input voltage.
 - c. High and low output voltage.

- d. Phase loss.
- e. Ground fault.
- f. Frequency.
- g. Phase rotation.
- h. SPD module failure.

- 4. Audible Alarm and Silencing Switch: Alarm sounds when alarm indication occurs. Silencing switch must silence audible alarm but leave visual indication active until alarm condition is corrected.

2.10 SOUND LEVEL

- A. Fully assembled products must have average audible sound levels [**more than 3 dB**] below the following maximum sound levels, without fans running, when factory tested in accordance with IEEE C57.12.91:

- 1. 9 kVA and Smaller: **[40]** dB(A-weighted) or as directed by the Owner .
- 2. 9.01 to 30 kVA: **[45]** dB(A-weighted) or as directed by the Owner .
- 3. 30.01 to 50 kVA: **[45]** **[48]** dB(A-weighted) or as directed by the Owner .
- 4. 50.01 to 150 kVA: **[50]** **[53]** dB(A-weighted) or as directed by the Owner .
- 5. 150.01 to 300 kVA: **[55]** **[58]** dB(A-weighted) or as directed by the Owner .
- 6. 300.01 to 500 kVA: **[60]** **[63]** dB(A-weighted) or as directed by the Owner .
- 7. 500.01 to 700 kVA: **[62]** **[65]** dB(A-weighted) or as directed by the Owner .
- 8. 700.01 to 1000 kVA: **[64]** **[67]** dB(A-weighted) or as directed by the Owner .

- B. Mount transformer on rubber isolation pads.

2.11 ENCLOSURE REQUIREMENTS

- A. Single, freestanding, galvanized steel, UL 50E Type 1 enclosure. Opening of exterior door may not provide access to live parts. Panels and covers that expose hazardous voltages must require tools to remove.
- B. Access from front, top, and side only for installation, operations, and normal maintenance, including infrared scanning of bus and breakers. Normal operating controls and instrumentation must be located on front of enclosure.
- C. Arrange enclosure to allow lifting and moving via forklift.

2.12 FINISHES

- A. Manufacturer's standard finish over corrosion-resistant pretreatment and primer.

2.13 SOURCE QUALITY CONTROL

- A. Owner will witness required factory tests. Notify Architect at least 14 days before date of tests and indicate their approximate duration.
- B. Testing Administrant: **[Owner will engage]** **[Engage]** qualified electrical testing agency to evaluate power distribution units.

- C. **[Factory]**Tests and Inspections: Test and inspect power distribution units, by, or under supervision of, qualified electrical testing laboratory recognized by authorities having jurisdiction, in accordance with referenced before delivering to site. Affix label with name and date of **[manufacturer's] [qualified electrical testing laboratory's]** certification of system compliance.
 - 1. Conduct factory sound-level tests.
- D. Nonconforming Work:
 - 1. Equipment that does not pass tests and inspections will be considered defective.
- E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's published instructions.
- B. Reference Standards:
 - 1. Connections to Connectors and Terminals: Unless more stringent requirements are specified in Contract Documents or manufacturers' published instructions, comply with torque-tightening values in UL 486A-486B.
 - 2. Consult Architect for resolution of conflicting requirements.
- C. Special Techniques:
 - 1. Arrange power distribution units to provide adequate access to equipment and circulation of cooling air. Locate transformers away from corners and not parallel to adjacent wall surface.
 - 2. Coordinate size and location of **[concrete bases] [access flooring support]** with actual power distribution unit provided.
 - 3. Equipment Mounting:
 - a. Install power distribution units on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 260529 "Hangers and Supports for Electrical Systems."
 - b. Comply with requirements for vibration isolation and seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
 - c. Supports must penetrate and be independent of access flooring.
- D. Interfaces with Other Work:
 - 1. Identify equipment and install warning signs in accordance with Section 260553 "Identification for Electrical Systems."
 - 2. Ground equipment in accordance with Section 260526 "Grounding and Bonding for Electrical Systems."
 - 3. Connect wiring in accordance with Section 260519 "Low-Voltage Electrical Power Conductors and Cables."
 - 4. Install flexible connections at conduit and conductor terminations and supports to eliminate sound and vibration transmission to building structure.

3.2 FIELD QUALITY CONTROL

- A. **[Acceptance]** Testing Preparation:
1. **Requirements** dB(A-weighted) as directed by the Owner .
- B. Field tests and inspections must be witnessed by **[Architect] [Tenant] [authorities having jurisdiction] Names or titles of witnesses** dB(A-weighted) as directed by the Owner .
- C. Tests and Inspections:
1. Perform manufacturer's recommended tests and inspections.
 2. Perform each visual and mechanical inspection and electrical test stated in NETA ATS for circuit breakers, molded case; and for transformers, dry type, air cooled, low voltage. Certify compliance with test parameters.
 3. Perform functional tests of power distribution units throughout their operating ranges. Test each monitoring, status, and alarm function.
 4. Test Labeling: On completion of satisfactory testing of each unit, attach dated and signed "Satisfactory Test" label to tested component.
- D. Nonconforming Work:
1. Power distribution unit will be considered defective if it does not pass tests and inspections.
 2. Remove and replace defective units and retest.
- E. Collect, assemble, and submit test and inspection reports.
- F. Manufacturer Services:
1. Engage factory-authorized service representative to **[support] [supervise]** field tests and inspections.

3.3 SYSTEM STARTUP

- A. **[Engage factory-authorized service representative to perform] [Perform]** startup service.
1. Complete installation and startup checks in accordance with manufacturer's published instructions.
 2. Verify that power distribution units are installed and connected in accordance with Contract Documents.
 3. Verify that electrical wiring installation complies with manufacturer's submittal and with published installation requirements in other electrical Sections.

3.4 ADJUSTING

- A. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
- B. Adjust power distribution units to provide optimal voltage to equipment served throughout normal operating cycle of loads served. Record input and output voltages and adjustment settings, and incorporate into test results.

3.5 CLEANING

- A. Vacuum dirt and debris; do not use compressed air to assist in cleaning.

3.6 PROTECTION

- A. After installation, protect power distribution units from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.7 MAINTENANCE

- A. Infrared Scanning of Power Distribution Units: Two months after Substantial Completion, perform infrared scan of conductor and bus joints and connections. Remove covers so joints and connections are accessible to portable scanner. Take visible light photographs at same locations and orientations as infrared scans for documentation to ensure follow-on scans match same conditions for valid comparison.
 - 1. Use infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide documentation of device calibration.
 - 2. Follow-up Infrared Scanning: Perform two follow-up infrared scans of power distribution units, one at four months and another at 11 months after Substantial Completion.
 - 3. Instrument: Use infrared-scanning device designed to measure temperature or to detect significant deviations from normal values. Provide documentation of device calibration.
 - 4. Report: Prepare certified report that identifies joints and connections checked and that describes scanning results. Include notation of deficiencies detected, remedial actions taken, and scanning observations after remedial action.

END OF SECTION 26 27 33 00

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Task	Specification	Specification Description
26 27 73 00	26 27 26 00	Wiring Devices

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SECTION 26 28 13 00 - FUSES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for fuses. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, panelboards, switchboards, enclosed controllers, and motor-control centers.
 - b. Plug fuses rated 125-V ac and less for use in plug-fuse-type enclosed switches, fuseholders, and panelboards.
 - c. Plug-fuse adapters for use in Edison-base, plug-fuse sockets.
 - d. Spare-fuse cabinets.

C. Submittals

1. Product Data: For each type of product indicated.
2. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NEMA FU 1 for cartridge fuses.
3. Comply with NFPA 70.
4. Comply with UL 248-11 for plug fuses.

E. Project Conditions

1. Where ambient temperature to which fuses are directly exposed is less than **40 deg F (5 deg C)** or more than **100 deg F (38 deg C)**, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.2 PRODUCTS

A. Cartridge Fuses

1. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

B. Plug Fuses

1. Characteristics: UL 248-11, nonrenewable plug fuses; 125-V ac.

C. Plug-Fuse Adapters

1. Characteristics: Adapters for using Type S, rejection-base plug fuses in Edison-base fuseholders or sockets; ampere ratings matching fuse ratings; irremovable once installed.

D. Spare-Fuse Cabinet

1. Characteristics: Wall-mounted steel unit with full-length, recessed piano-hinged door and key-coded cam lock and pull.
 - a. Size: Adequate for storage of spare fuses specified with 15 percent spare capacity minimum.

- b. Finish: Gray, baked enamel.
- c. Identification: "SPARE FUSES" in 1-1/2-inch- (38-mm-) high letters on exterior of door.
- d. Fuse Pullers: For each size of fuse, where applicable and available, from fuse manufacturer.

1.3 EXECUTION

A. Fuse Applications

- 1. Cartridge Fuses:
 - a. Service Entrance: Class L, fast acting **OR** Class L, time delay **OR** Class RK1, fast acting **OR** Class RK1, time delay **OR** Class J, fast acting **OR** Class J, time delay **OR** Class T, fast acting, **as directed**.
 - b. Feeders: Class L, fast acting **OR** Class L, time delay **OR** Class RK1, fast acting **OR** Class RK1, time delay **OR** Class RK5, fast acting **OR** Class RK5, time delay **OR** Class J, fast acting **OR** Class J, time delay, **as directed**.
 - c. Motor Branch Circuits: Class RK1 **OR** Class RK5, **as directed**, time delay.
 - d. Other Branch Circuits: Class RK1, time delay **OR** Class RK5, time delay **OR** Class J, fast acting **OR** Class J, time delay, **as directed**.
 - e. Control Circuits: Class CC, fast acting **OR** time delay, **as directed**.
- 2. Plug Fuses:
 - a. Motor Branch Circuits: Edison-base type, dual **OR** Edison-base type, single **OR** Type S, dual **OR** Type S, single, **as directed**, -element time delay.
 - b. Other Branch Circuits: Edison-base type, single-element fast acting **OR** Edison-base type, dual-element time delay **OR** Edison-base type, single-element time delay **OR** Type S, dual-element time delay **OR** Type S, single-element time delay, **as directed**.

B. Installation

- 1. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.
- 2. Install plug-fuse adapters in Edison-base fuseholders and sockets. Ensure that adapters are irremovable once installed.
- 3. Install spare-fuse cabinet(s).

C. Identification

- 1. Install labels complying with requirements for identification specified in Division 26 Section "Identification For Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 26 28 13 00

Task	Specification	Specification Description
26 28 13 00	26 24 19 00	Switchgear
26 28 16 13	26 24 16 00	Panelboards

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SECTION 26 29 13 13 - ENCLOSED CONTROLLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for enclosed controllers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes the following enclosed controllers rated 600 V and less:
 - a. Full-voltage manual.
 - b. Full-voltage magnetic.
 - c. Reduced-voltage magnetic.
 - d. Reduced-voltage solid state.
 - e. Multispeed.

C. Definitions

1. CPT: Control power transformer.
2. MCCB: Molded-case circuit breaker.
3. MCP: Motor circuit protector.
4. N.C.: Normally closed.
5. N.O.: Normally open.
6. OCPD: Overcurrent protective device.
7. SCR: Silicon-controlled rectifier.

D. Performance Requirements

1. Seismic Performance: Enclosed controllers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of enclosed controller. Include manufacturer's technical data on features, performance, electrical characteristics, ratings, and enclosure types and finishes.
2. Shop Drawings: For each enclosed controller. Include dimensioned plans, elevations, sections, details, and required clearances and service spaces around controller enclosures.
 - a. Show tabulations of the following:
 - 1) Each installed unit's type and details.
 - 2) Factory-installed devices.
 - 3) Nameplate legends.
 - 4) Short-circuit current rating of integrated unit.
 - 5) Listed and labeled for integrated short-circuit current (withstand) rating of OCPDs in combination controllers by an NRTL acceptable to authorities having jurisdiction.
 - 6) Features, characteristics, ratings, and factory settings of individual OCPDs in combination controllers.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Qualification Data: For qualified testing agency.
4. Seismic Qualification Certificates: For enclosed controllers, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

- b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - 5. Field quality-control reports.
 - 6. Operation and Maintenance Data: For enclosed controllers to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Routine maintenance requirements for enclosed controllers and installed components.
 - b. Manufacturer's written instructions for testing and adjusting circuit breaker and MCP trip settings.
 - c. Manufacturer's written instructions for setting field-adjustable overload relays.
 - d. Manufacturer's written instructions for testing, adjusting, and reprogramming reduced-voltage solid-state controllers.
 - 7. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate full-load currents.
 - 8. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed, and arrange to demonstrate that switch settings for motor running overload protection suit actual motors to be protected.
- F. Quality Assurance
- 1. Testing Agency Qualifications: Member company of NETA or an NRTL **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA **OR** one who meets the requirements necessary for certification, **as directed**, to supervise on-site testing.
 - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - 3. Comply with NFPA 70.
 - 4. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
- G. Delivery, Storage, And Handling
- 1. Store enclosed controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
 - 2. If stored in areas subject to weather, cover enclosed controllers to protect them from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install temporary electric heating, with at least 250 W per controller **OR** connect factory-installed space heaters to temporary electrical service, **as directed**.
- H. Project Conditions
- 1. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not less than **minus 22 deg F (minus 30 deg C)** and not exceeding **104 deg F (40 deg C)**.
 - b. Altitude: Not exceeding **6600 feet (2010 m)**.
 - 2. Interruption of Existing Electrical Systems: Do not interrupt electrical systems in facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of electrical systems.
 - b. Indicate method of providing temporary utilities.
 - c. Do not proceed with interruption of electrical systems without the Owner's written permission.
 - d. Comply with NFPA 70E.

- I. Coordination
 1. Coordinate layout and installation of enclosed controllers with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
 2. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 3.
 3. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.2 PRODUCTS

- A. Full-Voltage Controllers
 1. General Requirements for Full-Voltage Controllers: Comply with NEMA ICS 2, general purpose, Class A.
 2. Motor-Starting Switches: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off or on.
 - a. Configuration: Nonreversing **OR** Reversing **OR** Two speed, **as directed**.
 - b. Flush **OR** Surface, **as directed**, mounting.
 - c. Red **OR** Green, **as directed**, pilot light.
 - d. Additional Nameplates: FORWARD and REVERSE for reversing switches **OR** HIGH and LOW for two-speed switches, **as directed**.
 3. Fractional Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
 - a. Configuration: Nonreversing **OR** Two speed, **as directed**.
 - b. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters matched to nameplate full-load current of actual protected motor; external reset push button; bimetallic type **OR** melting alloy type, **as directed**.
 - c. Flush **OR** Surface, **as directed**, mounting.
 - d. Red **OR** Green, **as directed**, pilot light.
 - e. Additional Nameplates: HIGH and LOW for two-speed controllers.
 4. Integral Horsepower Manual Controllers: "Quick-make, quick-break" toggle or push-button action; marked to show whether unit is off, on, or tripped.
 - a. Configuration: Nonreversing **OR** Reversing **OR** Two speed, **as directed**.
 - b. Overload Relays: Inverse-time-current characteristics; NEMA ICS 2, Class 10 tripping characteristics; heaters and sensors in each phase, matched to nameplate full-load current of actual protected motor and having appropriate adjustment for duty cycle; external reset push button; bimetallic type **OR** melting alloy type, **as directed**.
 - c. Flush **OR** Surface, **as directed**, mounting.
 - d. Red **OR** Green, **as directed**, pilot light.
 - e. Additional Nameplates: FORWARD and REVERSE for reversing controllers **OR** HIGH and LOW for two-speed controllers, **as directed**.
 - f. N.O. **OR** N.C., **as directed**, auxiliary contact.
 5. Magnetic Controllers: Full voltage, across the line, electrically held.
 - a. Configuration: Nonreversing **OR** Reversing, **as directed**.
 - b. Contactor Coils: Pressure-encapsulated type with coil transient suppressors, **as directed**.
 - 1) Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - c. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 - d. Control Circuits: 24 **OR** 120, **as directed**, -V ac; obtained from integral CPT, with primary and secondary fuses, **as directed**, with CPT **OR** control power source, **as directed**, of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - 1) CPT Spare Capacity: 50 **OR** 100 **OR** 200, **as directed**, VA.
 - e. Melting Alloy Overload Relays:

- 1) Inverse-time-current characteristic.
- 2) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
- 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
- f. Bimetallic Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 4) Ambient compensated.
 - 5) Automatic resetting.
- g. Solid-State Overload Relay:
 - 1) Switch or dial selectable for motor running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10 **OR** Class 20 **OR** Class 10/20 selectable, **as directed**, tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - 4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - 5) Analog communication module.
- h. N.C. **OR** N.O., **as directed**, isolated overload alarm contact.
- i. External overload reset push button.
6. Combination Magnetic Controller: Factory-assembled combination of magnetic controller, OCPD, and disconnecting means.
 - a. Fusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J **OR** Class R **OR** indicated, **as directed**, fuses.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 - b. Nonfusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 - c. MCP Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - 4) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCP has tripped.
 - 5) Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
 - d. MCCB Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - 2) Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 3) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 4) Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.

- 5) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCCB has tripped.
- B. Reduced-Voltage Magnetic Controllers
1. General Requirements for Reduced-Voltage Magnetic Controllers: Comply with NEMA ICS 2, general purpose, Class A; closed-transition; adjustable time delay on transition.
 2. Reduced-Voltage Magnetic Controllers: Reduced voltage, electrically held.
 - a. Configuration:
 - 1) Wye-Delta Controller: Four contactors, with a three-phase starting resistor/reactor bank.
 - 2) Part-Winding Controller: Separate START and RUN contactors, field-selectable for 1/2- or 2/3-winding start mode, with either six- or nine-lead motors; with separate overload relays for starting and running sequences.
 - 3) Autotransformer Reduced-Voltage Controller: Medium-duty service, with integral overtemperature protection; taps for starting at 50, 65, and 80 percent of line voltage; two START and one RUN contactors.
 - b. Contactor Coils: Pressure-encapsulated type with coil transient suppressors, **as directed**.
 - 1) Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - c. Power Contacts: Totally enclosed, double-break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 - d. Control Circuits: 24 **OR** 120, **as directed**, -V ac; obtained from integral CPT, with primary and secondary fuses, **as directed**, with CPT **OR** control power source, **as directed**, of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - 1) CPT Spare Capacity: 50 **OR** 100 **OR** 200, **as directed**, VA.
 - e. Melting Alloy Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - f. Bimetallic Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 4) Ambient compensated.
 - 5) Automatic resetting.
 - g. Solid-State Overload Relay:
 - 1) Switch or dial selectable for motor running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10 **OR** Class 20 **OR** Class 10/20 selectable, **as directed**, tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - 4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - 5) Analog communication module.
 - h. N.C. **OR** N.O., **as directed**, isolated overload alarm contact.
 - i. External overload reset push button.
 3. Combination Reduced-Voltage Magnetic Controller: Factory-assembled combination of reduced-voltage magnetic controller, OCPD, and disconnecting means.
 - a. Fusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J **OR** Class R **OR** indicated, **as directed**, fuses.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

- 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 - b. Nonfusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 - c. MCP Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - 4) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCP has tripped.
 - 5) Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
 - d. MCCB Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - 2) Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 3) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 4) Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
 - 5) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCCB has tripped.
- C. Reduced-Voltage Solid-State Controllers
1. General Requirements for Reduced-Voltage Solid-State Controllers: Comply with UL 508.
 2. Reduced-Voltage Solid-State Controllers: An integrated unit with power SCRs, heat sink, microprocessor logic board, door-mounted digital display and keypad, bypass contactor, and overload relay; suitable for use with NEMA MG 1, Design B, polyphase, medium induction motors.
 - a. Configuration: Standard duty **OR** Severe duty, **as directed**; nonreversible **OR** reversible, **as directed**.
 - b. Starting Mode: Voltage ramping **OR** Current limit **OR** Torque control **OR** Torque control with voltage boost, **as directed**; field selectable, **as directed**.
 - c. Stopping Mode: Coast to stop **OR** Adjustable torque deceleration **OR** Adjustable braking, **as directed**; field selectable, **as directed**.
 - d. Shorting (Bypass) Contactor: Operates automatically when full voltage is applied to motor, and bypasses the SCRs. Solid-state controller protective features shall remain active when the shorting contactor is in the bypass mode.
 - e. Shorting and Input Isolation, **as directed**, Contactor Coils: Pressure-encapsulated type; manufacturer's standard operating voltage, matching control power or line voltage, depending on contactor size and line-voltage rating. Provide coil transient suppressors, **as directed**.
 - f. Logic Board: Identical for all ampere ratings and voltage classes, with environmental protective coating.
 - g. Control Circuits: 24 **OR** 120, **as directed**, -V ac; obtained from integral CPT, with primary and secondary fuses, **as directed**, with CPT **OR** control power source, **as directed**, of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - 1) CPT Spare Capacity: 100 **OR** 200, **as directed**, VA.

- h. Adjustable acceleration-rate control using voltage or current ramp, and adjustable starting torque control with up to 400 percent current limitation for 20 seconds.
- i. SCR bridge shall consist of at least two SCRs per phase, providing stable and smooth acceleration with **OR** without, **as directed**, external feedback from the motor or driven equipment.
- j. Keypad, front accessible; for programming the controller parameters, functions, and features; shall be manufacturer's standard and include not less than the following functions:
 - 1) Adjusting motor full-load amperes, as a percentage of the controller's rating.
 - 2) Adjusting current limitation on starting, as a percentage of the motor full-load current rating.
 - 3) Adjusting linear acceleration and deceleration ramps, in seconds.
 - 4) Initial torque, as a percentage of the nominal motor torque.
 - 5) Adjusting torque limit, as a percentage of the nominal motor torque.
 - 6) Adjusting maximum start time, in seconds.
 - 7) Adjusting voltage boost, as a percentage of the nominal supply voltage.
 - 8) Selecting stopping mode, and adjusting parameters.
 - 9) Selecting motor thermal overload protection class between 5 and 30.
 - 10) Activating and de-activating protection modes.
 - 11) Selecting or activating communication modes.
- k. Digital display, front accessible; for showing motor, controller, and fault status; shall be manufacturer's standard and include not less than the following:
 - 1) Controller Condition: Ready, starting, running, stopping.
 - 2) Motor Condition: Amperes, voltage, power factor, power, and thermal state.
 - 3) Fault Conditions: Controller thermal fault, motor overload alarm and trip, motor underload, overcurrent, shorted SCRs, line or phase loss, phase reversal, and line frequency over or under normal.
- l. Controller Diagnostics and Protection:
 - 1) Microprocessor-based thermal protection system for monitoring SCR and motor thermal characteristics, and providing controller overtemperature and motor-overload alarm and trip; settings selectable via the keypad.
 - 2) Protection from line-side reverse phasing; line-side and motor-side phase loss; motor jam, stall, and underload conditions; and line frequency over or under normal.
 - 3) Input isolation contactor that opens when the controller diagnostics detect a faulted solid-state component or when the motor is stopped.

OR

Shunt trip that opens the disconnecting means when the controller diagnostics detect a faulted solid-state component.
- m. Remote Output Features:
 - 1) All outputs prewired to terminal blocks.
 - 2) Form C status contacts that change state when controller is running.
 - 3) Form C alarm contacts that change state when a fault condition occurs.
- n. Optional Features:
 - 1) Analog output for field-selectable assignment of motor operating characteristics; 0 to 10-V dc **OR** 4 to 20-mA dc, **as directed**.
 - 2) Additional field-assignable Form C contacts, as indicated, for alarm outputs.
 - 3) Surge suppressors in solid-state power circuits providing three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - 4) Full-voltage bypass contactor operating automatically **OR** manually, with NORMAL/BYPASS selector switch, **as directed**. Power contacts shall be totally enclosed, double break, and silver-cadmium oxide; and assembled to allow inspection and replacement without disturbing line or load wiring.
 - 5) Melting Alloy Overload Relays:
 - a) Inverse-time-current characteristic.
 - b) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.

- c) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
- 6) Bimetallic Overload Relays:
 - a) Inverse-time-current characteristic.
 - b) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - c) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - d) Ambient compensated.
 - e) Automatic resetting.
- 7) Solid-State Overload Relay:
 - a) Switch or dial selectable for motor running overload protection.
 - b) Sensors in each phase.
 - c) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - d) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - e) Analog communication module.
- 8) N.C. **OR** N.O., **as directed**, isolated overload alarm contact.
- 9) External overload reset push button.
- 3. Combination Reduced-Voltage Solid-State Controller: Factory-assembled combination of reduced-voltage solid-state controller, OCPD, and disconnecting means.
 - a. Fusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J **OR** Class L **OR** indicated, **as directed**, fuses.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
 - b. MCP Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - 4) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCP has tripped.
 - 5) Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
 - c. MCCB Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - 2) Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 3) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 4) Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
 - 5) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCCB has tripped.
 - d. Molded-Case Switch Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with in-line fuse block for Class J or L power fuses (depending on ampere rating), providing an interrupting capacity to comply with available fault currents; MCCB with fixed, high-set instantaneous trip only.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.

- 3) Auxiliary contacts "a" and "b" arranged to activate with molded-case switch handle.
- 4) N.C. **OR** N.O., **as directed**, alarm contact that operates only when molded-case switch has tripped.

D. Multispeed Magnetic Controllers

1. General Requirements for Multispeed Magnetic Controllers: Comply with NEMA ICS 2, general purpose, Class A.
2. Multispeed Magnetic Controllers: Two speed, full voltage, across the line, electrically held.
 - a. Configuration: Nonreversing **OR** Reversing, **as directed**; consequent pole **OR** two winding, **as directed**.
 - b. Contactor Coils: Pressure-encapsulated type with coil transient suppressors, **as directed**.
 - 1) Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - c. Power Contacts: Totally enclosed, double break, silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 - d. Control Circuits: 24 **OR** 120, **as directed**, -V ac; obtained from integral CPT, with primary and secondary fuses, **as directed**, with CPT **OR** control power source, **as directed**, of sufficient capacity to operate integral devices and remotely located pilot, indicating, and control devices.
 - 1) CPT Spare Capacity: 50 **OR** 100 **OR** 200, **as directed**, VA.
 - e. Compelling relays shall ensure that motor will start only at low speed.
 - f. Accelerating timer relays shall ensure properly timed acceleration through speeds lower than that selected.
 - g. Decelerating timer relays shall ensure automatically timed deceleration through each speed.
 - h. Antiplugging timer relays shall ensure a time delay when transferring from FORWARD to REVERSE and back.
 - i. Melting Alloy Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - j. Bimetallic Overload Relays:
 - 1) Inverse-time-current characteristic.
 - 2) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - 3) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 4) Ambient compensated.
 - 5) Automatic resetting.
 - k. Solid-State Overload Relay:
 - 1) Switch or dial selectable for motor running overload protection.
 - 2) Sensors in each phase.
 - 3) Class 10 **OR** Class 20 **OR** Class 10/20 selectable, **as directed**, tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - 4) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - 5) Analog communication module.
 - l. N.C. **OR** N.O., **as directed**, isolated overload alarm contact.
 - m. External overload reset push button.
3. Combination Multispeed Magnetic Controller: Factory-assembled combination of reduced-voltage magnetic controller, OCPD, and disconnecting means.
 - a. Fusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, fusible switch with clips or bolt pads to accommodate Class J **OR** Class R **OR** indicated, **as directed**, fuses.

- 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
- 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
- b. Nonfusible Disconnecting Means:
 - 1) NEMA KS 1, heavy-duty, horsepower-rated, nonfusible switch.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary Contacts: N.O./N.C., arranged to activate before switch blades open.
- c. MCP Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents, instantaneous-only circuit breaker with front-mounted, field-adjustable, short-circuit trip coordinated with motor locked-rotor amperes.
 - 2) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 3) Auxiliary contacts "a" and "b" arranged to activate with MCP handle.
 - 4) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCP has tripped.
 - 5) Current-limiting module to increase controller short-circuit current (withstand) rating to 100 kA.
- d. MCCB Disconnecting Means:
 - 1) UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents; thermal-magnetic MCCB, with inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits.
 - 2) Front-mounted, adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.
 - 3) Lockable Handle: Accepts three padlocks and interlocks with cover in closed position.
 - 4) Auxiliary contacts "a" and "b" arranged to activate with MCCB handle.
 - 5) N.C. **OR** N.O., **as directed**, alarm contact that operates only when MCCB has tripped.

E. Enclosures

1. Enclosed Controllers: NEMA ICS 6, to comply with environmental conditions at installed location.
 - a. Dry and Clean Indoor Locations: Type 1.
 - b. Outdoor Locations: Type 3R **OR** Type 4X, **as directed**.
 - c. Kitchen **OR** Wash-Down, **as directed**, Areas: Type 4X, stainless steel.
 - d. Other Wet or Damp Indoor Locations: Type 4.
 - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.
 - f. Hazardous Areas Indicated on Drawings: Type 7 **OR** Type 9, **as directed**.

F. Accessories

1. General Requirements for Control Circuit and Pilot Devices: NEMA ICS 5; factory installed in controller enclosure cover unless otherwise indicated.
 - a. Push Buttons, Pilot Lights, and Selector Switches: Heavy **OR** Standard, **as directed**, -duty, oiltight, **as directed**, type.
 - 1) Push Buttons: Covered **OR** Lockable **OR** Recessed **OR** Shielded **OR** Shrouded **OR** Unguarded, **as directed**, types; maintained **OR** momentary, **as directed**, as indicated.
 - 2) Pilot Lights: Incandescent **OR** LED **OR** Neon **OR** Resistor **OR** Transformer, **as directed**, types; colors as indicated; push to test, **as directed**.
 - 3) Selector Switches: Rotary type.
 - b. Elapsed Time Meters: Heavy duty with digital readout in hours; nonresettable **OR** resettable, **as directed**.

- c. Meters: Panel type, **2-1/2-inch (64-mm)** minimum size with 90- or 120-degree scale and plus or minus two percent accuracy. Where indicated, provide selector switches with an off position.
2. N.C. **OR** N.O. **OR** Reversible N.C./N.O., **as directed**, auxiliary contact(s).
3. Control Relays: Auxiliary and adjustable pneumatic **OR** solid-state, **as directed**, time-delay relays.
4. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
5. Breather and drain assemblies, to maintain interior pressure and release condensation in Type 4 **OR** Type 4X **OR** Type 7 **OR** Type 9, **as directed**, enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
6. Space heaters, with N.C. auxiliary contacts, to mitigate condensation in Type 3R **OR** Type 4X **OR** Type 12, **as directed**, enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
7. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.
8. Cover gaskets for Type 1 enclosures.
9. Terminals for connecting power factor correction capacitors to the line **OR** load, **as directed**, side of overload relays.
10. Spare control wiring terminal blocks, quantity as indicated; unwired **OR** wired, **as directed**.

1.3 EXECUTION

A. Examination

1. Examine areas and surfaces to receive enclosed controllers, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
2. Examine enclosed controllers before installation. Reject enclosed controllers that are wet, moisture damaged, or mold damaged.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Installation

1. Wall-Mounted Controllers: Install enclosed controllers on walls with tops at uniform height unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not at walls, provide freestanding racks complying with Division 26 Section "Hangers And Supports For Electrical Systems".
2. Floor-Mounted Controllers: Install enclosed controllers on **4-inch (100-mm)** nominal-thickness concrete base. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Seismic Bracing: Comply with requirements specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
5. Install fuses in each fusible-switch enclosed controller.
6. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses".
7. Install heaters in thermal overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.

8. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
 9. Install power factor correction capacitors. Connect to the line **OR** load, **as directed**, side of overload relays. If connected to the load side of overload relays, adjust overload heater sizes to accommodate the reduced motor full-load currents.
 10. Comply with NECA 1.
- C. Identification
1. Identify enclosed controllers, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
 - a. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - b. Label each enclosure with engraved nameplate.
 - c. Label each enclosure-mounted control and pilot device.
- D. Control Wiring Installation
1. Install wiring between enclosed controllers and remote devices and facility's central control system, **as directed**. Comply with requirements in Division 26 Section "Control-voltage Electrical Power Cables".
 2. Bundle, train, and support wiring in enclosures.
 3. Connect selector switches and other automatic-control selection devices where applicable.
 - a. Connect selector switches to bypass only those manual- and automatic-control devices that have no safety functions when switch is in manual-control position.
 - b. Connect selector switches with enclosed-controller circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.
- E. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Perform tests and inspections.
 3. Acceptance Testing Preparation:
 - a. Test insulation resistance for each enclosed controller, component, connecting supply, feeder, and control circuit.
 - b. Test continuity of each circuit.
 4. Tests and Inspections:
 - a. Inspect controllers, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment, **as directed**.
 - b. Test insulation resistance for each enclosed-controller element, component, connecting motor supply, feeder, and control circuits.
 - c. Test continuity of each circuit.
 - d. Verify that voltages at controller locations are within plus or minus 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify the Owner before starting the motor(s).
 - e. Test each motor for proper phase rotation.
 - f. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - g. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - h. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:
 - 1) Initial Infrared Scanning: After Final Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each multi-pole enclosed controller. Remove front panels so joints and connections are accessible to portable scanner.
 - 2) Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each multi-pole enclosed controller 11 months after date of Final Completion.

- 3) Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - i. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
 5. Enclosed controllers will be considered defective if they do not pass tests and inspections.
 6. Prepare test and inspection reports including a certified report that identifies enclosed controllers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- F. Adjusting
1. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
 2. Adjust overload-relay heaters or settings if power factor correction capacitors are connected to the load side of the overload relays.
 3. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable instantaneous trip elements. Initially adjust to six times the motor nameplate full-load ampere ratings and attempt to start motors several times, allowing for motor cooldown between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify the Owner before increasing settings.
 4. Set the taps on reduced-voltage autotransformer controllers at 50 **OR** 65 **OR** 80, **as directed**, percent.
 5. Set field-adjustable switches and program microprocessors for required start and stop sequences in reduced-voltage solid-state controllers.
 6. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study", **as directed**.
- G. Protection
1. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.
 2. Replace controllers whose interiors have been exposed to water or other liquids prior to Final Completion.
- H. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain enclosed controllers, and to use and reprogram microprocessor-based, reduced-voltage solid-state controllers, **as directed**.

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Task	Specification	Specification Description
26 29 13 13	01 22 16 00	No Specification Required

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SECTION 26 29 23 00 - VARIABLE FREQUENCY CONTROLLERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for variable frequency controllers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes separately enclosed, pre-assembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

C. Definitions

1. BAS: Building automation system.
2. CE: Conformance Europeene (European Compliance).
3. CPT: Control power transformer.
4. EMI: Electromagnetic interference.
5. IGBT: Insulated-gate bipolar transistor.
6. LAN: Local area network.
7. LED: Light-emitting diode.
8. MCP: Motor-circuit protector.
9. NC: Normally closed.
10. NO: Normally open.
11. OCPD: Overcurrent protective device.
12. PCC: Point of common coupling.
13. PID: Control action, proportional plus integral plus derivative.
14. PWM: Pulse-width modulated.
15. RFI: Radio-frequency interference.
16. TDD: Total demand (harmonic current) distortion.
17. THD(V): Total harmonic voltage demand.
18. VFC: Variable-frequency motor controller.

D. Performance Requirements

1. Seismic Performance: VFCs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type and rating of VFC indicated. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, and furnished specialties and accessories.
2. LEED Submittals:
 - a. Product Data for Credit EA 5: For continuous metering equipment for energy consumption.
3. Shop Drawings: For each VFC indicated. Include dimensioned plans, elevations, and sections; and conduit entry locations and sizes, mounting arrangements, and details, including required clearances and service space around equipment.
 - a. Show tabulations of installed devices, equipment features, and ratings. Include the following:
 - 1) Each installed unit's type and details.
 - 2) Factory-installed devices.

- 3) Enclosure types and details.
 - 4) Nameplate legends.
 - 5) Short-circuit current (withstand) rating of enclosed unit.
 - 6) Features, characteristics, ratings, and factory settings of each VFC and installed devices.
 - 7) Specified modifications.
- b. Schematic and Connection Wiring Diagrams: For power, signal, and control wiring.
4. Harmonic Analysis Study and Report: Comply with IEEE 399 and NETA Acceptance Testing Specification; identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze possible **OR** designated, **as directed**, operating scenarios, including recommendations for VFC input filtering to limit TDD and THD(V) at each VFC **OR** at the defined PCC, **as directed**, to specified levels.
 5. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around VFCs. Show VFC layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
 6. Qualification Data: For qualified testing agency.
 7. Seismic Qualification Certificates: For VFCs, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based, and their installation requirements.
 8. Product Certificates: For each VFC, from manufacturer.
 9. Source quality-control reports.
 10. Field quality-control reports.
 11. Operation and Maintenance Data: For VFCs to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and MCP trip settings.
 - b. Manufacturer's written instructions for setting field-adjustable overload relays.
 - c. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - d. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
 12. Load-Current and Overload-Relay Heater List: Compile after motors have been installed, and arrange to demonstrate that selection of heaters suits actual motor nameplate, full-load currents.
 13. Load-Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motors to be protected.
- F. Quality Assurance
1. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Comply with NFPA 70.
 4. IEEE Compliance: Fabricate and test VFC according to IEEE 344 to withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
- G. Delivery, Storage, And Handling

1. If stored in space that is not permanently enclosed and air conditioned, remove loose packing and flammable materials from inside controllers and install temporary electric heating, with at least 250 W per controller **OR** connect factory-installed space heaters to temporary electrical service, **as directed**.

H. Project Conditions

1. Environmental Limitations: Rate equipment for continuous operation, capable of driving full load without derating, under the following conditions unless otherwise indicated:
 - a. Ambient Temperature: Not less than **14 deg F (minus 10 deg C)** and not exceeding **104 deg F (40 deg C)**.
 - b. Ambient Storage Temperature: Not less than minus **4 deg F (minus 20 deg C)** and not exceeding **140 deg F (60 deg C)**
 - c. Humidity: Less than 95 percent (noncondensing).
 - d. Altitude: Not exceeding **3300 feet (1005 m)**.
2. Interruption of Existing Electrical Systems: Do not interrupt electrical systems in facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - a. Notify Owner no fewer than two days in advance of proposed interruption of electrical systems.
 - b. Indicate method of providing temporary electrical service.
 - c. Do not proceed with interruption of electrical systems without Owner's written permission.
 - d. Comply with NFPA 70E.
3. Product Selection for Restricted Space: Drawings indicate maximum dimensions for VFCs, including clearances between VFCs, and adjacent surfaces and other items.

I. Coordination

1. Coordinate features of motors, load characteristics, installed units, and accessory devices to be compatible with the following:
 - a. Torque, speed, and horsepower requirements of the load.
 - b. Ratings and characteristics of supply circuit and required control sequence.
 - c. Ambient and environmental conditions of installation location.
2. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases.
3. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.

J. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Manufactured Units

1. General Requirements for VFCs: Comply with NEMA ICS 7, NEMA ICS 61800-2, and UL 508C.
2. Application: Constant torque and variable torque.
3. VFC Description: Variable-frequency power converter (rectifier, dc bus, and IGBT, PWM inverter) factory packaged in an enclosure, with integral disconnecting means and overcurrent and overload protection; listed and labeled by an NRTL as a complete unit; arranged to provide self-protection, protection, and variable-speed control of one or more three-phase induction motors by adjusting output voltage and frequency.
 - a. Units suitable for operation of NEMA MG 1, Design A and Design B motors as defined by NEMA MG 1, Section IV, Part 30, "Application Considerations for Constant Speed Motors Used on a Sinusoidal Bus with Harmonic Content and General Purpose Motors Used with Adjustable-Voltage or Adjustable-Frequency Controls or Both."

- b. Units suitable for operation of inverter-duty motors as defined by NEMA MG 1, Section IV, Part 31, "Definite-Purpose Inverter-Fed Polyphase Motors."
- c. Listed and labeled for integrated short-circuit current (withstand) rating by an NRTL acceptable to authorities having jurisdiction.
- 4. Design and Rating: Match load type, such as fans, blowers, and pumps; and type of connection used between motor and load such as direct or through a power-transmission connection.
- 5. Output Rating: Three-phase; 10 to 60 Hz, with voltage proportional to frequency throughout voltage range **OR** 66 Hz, with torque constant as speed changes, **as directed**; maximum voltage equals input voltage.
- 6. Unit Operating Requirements:
 - a. Input AC Voltage Tolerance: Plus 10 and minus 10 **OR** 15, **as directed**, percent of VFC input voltage rating.
 - b. Input AC Voltage Unbalance: Not exceeding 3 **OR** 5, **as directed**, percent.
 - c. Input Frequency Tolerance: Plus or minus 3 percent of VFC frequency rating.
 - d. Minimum Efficiency: 96 **OR** 97, **as directed**, percent at 60 Hz, full load.
 - e. Minimum Displacement Primary-Side Power Factor: 96 **OR** 98, **as directed**, percent under any load or speed condition.
 - f. Minimum Short-Circuit Current (Withstand) Rating: 10 **OR** 22 **OR** 65 **OR** 100, **as directed**, kA.
 - g. Ambient Temperature Rating: Not less than 14 deg F (minus 10 deg C) and not exceeding 104 deg F (40 deg C).
 - h. Ambient Storage Temperature Rating: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C)
 - i. Humidity Rating: Less than 95 percent (noncondensing).
 - j. Altitude Rating: Not exceeding 3300 feet (1005 m).
 - k. Vibration Withstand: Comply with IEC 60068-2-6.
 - l. Overload Capability: 1.1 **OR** 1.5, **as directed**, times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
 - m. Starting Torque: Minimum 100 percent of rated torque from 3 to 60 Hz.
 - n. Speed Regulation: Plus or minus 5 **OR** 10, **as directed**, percent.
 - o. Output Carrier Frequency: Selectable; 0.5 to 15, **as directed**, kHz.
 - p. Stop Modes: Programmable; includes fast, free-wheel, and dc injection braking.
- 7. Inverter Logic: Microprocessor based, 16 **OR** 32, **as directed**, bit, isolated from all power circuits.
- 8. Isolated Control Interface: Allows VFCs to follow remote-control signal over a minimum 40:1 speed range.
 - a. Signal: Electrical.
 - b. Signal: Pneumatic.
- 9. Internal Adjustability Capabilities:
 - a. Minimum Speed: 5 to 25 percent of maximum rpm.
 - b. Maximum Speed: 80 to 100 percent of maximum rpm.
 - c. Acceleration: 0.1 to 999.9 seconds.
 - d. Deceleration: 0.1 to 999.9 seconds.
 - e. Current Limit: 30 to minimum of 150 percent of maximum rating.
- 10. Self-Protection and Reliability Features:
 - a. Input transient protection by means of surge suppressors to provide three-phase protection against damage from supply voltage surges 10 percent or more above nominal line voltage.
 - b. Loss of Input Signal Protection: Selectable response strategy, including speed default to a percent of the most recent speed, a preset speed, or stop; with alarm.
 - c. Under- and overvoltage trips.
 - d. Inverter overcurrent trips.
 - e. VFC and Motor Overload/Overtemperature Protection: Microprocessor-based thermal protection system for monitoring VFCs and motor thermal characteristics, and for providing

- VFC overtemperature and motor overload alarm and trip; settings selectable via the keypad; NRTL approved.
- f. Critical frequency rejection, with three selectable, adjustable deadbands.
 - g. Instantaneous line-to-line and line-to-ground overcurrent trips.
 - h. Loss-of-phase protection.
 - i. Reverse-phase protection.
 - j. Short-circuit protection.
 - k. Motor overtemperature fault.
11. Automatic Reset/Restart: Attempt three restarts after drive fault or on return of power after an interruption and before shutting down for manual reset or fault correction; adjustable delay time between restart attempts.
 12. Power-Interruption Protection: To prevent motor from re-energizing after a power interruption until motor has stopped, unless "Bidirectional Autospeed Search" feature is available and engaged.
 13. Bidirectional Autospeed Search: Capable of starting VFC into rotating loads spinning in either direction and returning motor to set speed in proper direction, without causing damage to drive, motor, or load.
 14. Torque Boost: Automatically varies starting and continuous torque to at least 1.5 times the minimum torque to ensure high-starting torque and increased torque at slow speeds.
 15. Motor Temperature Compensation at Slow Speeds: Adjustable current fall-back based on output frequency for temperature protection of self-cooled, fan-ventilated motors at slow speeds.
 16. Integral Input Disconnecting Means and OCPD: NEMA AB 1, instantaneous-trip circuit breaker **OR** NEMA AB 1, molded-case switch, with power fuse block and current-limiting fuses **OR** NEMA AB 1, thermal-magnetic circuit breaker **OR** NEMA KS 1, nonfusible switch, with power fuse block and current-limiting fuses **OR** NEMA KS 1, fusible switch, **as directed**, with pad-lockable, door-mounted handle mechanism.
 - a. Disconnect Rating: Not less than 115 percent of VFC input current rating.
 - b. Disconnect Rating: Not less than 115 percent of NFPA 70 motor full-load current rating or VFC input current rating, whichever is larger.
 - c. Auxiliary Contacts: NO/NC, arranged to activate before switch blades open.
 - d. Auxiliary contacts "a" and "b" arranged to activate with circuit-breaker handle.
 - e. NC **OR** NO, **as directed**, alarm contact that operates only when circuit breaker has tripped.
- B. Controls And Indication
1. Status Lights: Door-mounted LED indicators displaying the following conditions:
 - a. Power on.
 - b. Run.
 - c. Overvoltage.
 - d. Line fault.
 - e. Overcurrent.
 - f. External fault.
 2. Panel-Mounted Operator Station: Manufacturer's standard front-accessible, sealed keypad and plain-English language digital display; allows complete programming, program copying, operating, monitoring, and diagnostic capability.
 - a. Keypad: In addition to required programming and control keys, include keys for HAND, OFF, and AUTO modes.
 - b. Security Access: Provide electronic security access to controls through identification and password with at least three levels of access: View only; view and operate; and view, operate, and service.
 - 1) Control Authority: Supports at least four conditions: Off, local manual control at VFC, local automatic control at VFC, and automatic control through a remote source.
 3. Historical Logging Information and Displays:
 - a. Real-time clock with current time and date.
 - b. Running log of total power versus time.

- c. Total run time.
- d. Fault log, maintaining last four faults with time and date stamp for each.
- 4. Indicating Devices: Digital display and additional readout devices as required, mounted flush in VFC door and connected to display VFC parameters including, but not limited to:
 - a. Output frequency (Hz).
 - b. Motor speed (rpm).
 - c. Motor status (running, stop, fault).
 - d. Motor current (amperes).
 - e. Motor torque (percent).
 - f. Fault or alarming status (code).
 - g. PID feedback signal (percent).
 - h. DC-link voltage (V dc).
 - i. Set point frequency (Hz).
 - j. Motor output voltage (V ac).
- 5. Control Signal Interfaces:
 - a. Electric Input Signal Interface:
 - 1) A minimum of two programmable analog inputs: 0- to 10-V dc **OR** 4- to 20-mA dc **OR** Operator-selectable "x"- to "y"-mA dc, **as directed**.
 - 2) A minimum of six multifunction programmable digital inputs.
 - b. Pneumatic Input Signal Interface: **3 to 15 psig (20 to 104 kPa)**.
 - c. Remote Signal Inputs: Capability to accept any of the following speed-setting input signals from the BAS or other control systems:
 - 1) 0- to 10-V dc.
 - 2) 4- to 20-mA dc.
 - 3) Potentiometer using up/down digital inputs.
 - 4) Fixed frequencies using digital inputs.
 - d. Output Signal Interface: A minimum of one programmable analog output signal(s) (0- to 10-V dc **OR** 4- to 20-mA dc **OR** operator-selectable "x"- to "y"-mA dc, **as directed**), which can be configured for any of the following:
 - 1) Output frequency (Hz).
 - 2) Output current (load).
 - 3) DC-link voltage (V dc).
 - 4) Motor torque (percent).
 - 5) Motor speed (rpm).
 - 6) Set point frequency (Hz).
 - e. Remote Indication Interface: A minimum of two programmable dry-circuit relay outputs (120-V ac, 1 A) for remote indication of the following:
 - 1) Motor running.
 - 2) Set point speed reached.
 - 3) Fault and warning indication (overtemperature or overcurrent).
 - 4) PID high- or low-speed limits reached.
- 6. PID Control Interface: Provides closed-loop set point, differential feedback control in response to dual feedback signals. Allows for closed-loop control of fans and pumps for pressure, flow, or temperature regulation.
 - a. Number of Loops: One **OR** Two, **as directed**.
- 7. BAS Interface: Factory-installed hardware and software to enable the BAS to monitor, control, and display VFC status and alarms and energy usage. Allows VFC to be used with an external system within a multidrop LAN configuration; settings retained within VFC's nonvolatile memory.
 - a. Network Communications Ports: Ethernet and RS-422/485.
 - b. Embedded BAS Protocols for Network Communications: ASHRAE 135 BACnet **OR** Echelon LonWorks **OR** Johnson Metasys N2 **OR** Modbus/Memobus **OR** Siemens System 600 APOGEE, **as directed**; protocols accessible via the communications ports.

C. Line Conditioning And Filtering

1. Input Line Conditioning: Based on the harmonic analysis study and report, provide input filtering, as required, to limit TDD at input terminals of all **OR** indicated, **as directed**, VFCs to less than 5 **OR** 8, **as directed**, percent and THD(V) to 3 **OR** 5, **as directed**, percent.
OR
Input Line Conditioning: Based on the harmonic analysis study and report, provide input filtering, as required, to limit TDD and THD(V) at the defined PCC per IEEE 519.
2. Output Filtering: as directed by the Owner .
3. EMI/RFI Filtering: CE marked; certify compliance with IEC 61800-3 for Category C2.

D. Bypass Systems

1. Bypass Operation: Safely transfers motor between power converter output and bypass circuit, manually, automatically, or both. Selector switches set modes and indicator lights indicate mode selected. Unit is capable of stable operation (starting, stopping, and running) with motor completely disconnected from power converter.
2. Bypass Mode: Manual operation only; requires local operator selection at VFC. Transfer between power converter and bypass contactor and retransfer shall only be allowed with the motor at zero speed.
OR
Bypass Mode: Field-selectable automatic or manual, allows local and remote transfer between power converter and bypass contactor and retransfer, either via manual operator interface or automatic control system feedback.
3. Bypass Controller: Two-contactor-style bypass allows motor operation via the power converter or the bypass controller; with input isolating switch and barrier arranged to isolate the power converter and permit safe troubleshooting and testing, both energized and de-energized, while motor is operating in bypass mode.
 - a. Bypass Contactor: Load-break, IEC **OR** NEMA **as directed**,-rated contactor.
 - b. Output Isolating Contactor: Non-load-break, IEC **OR** NEMA, **as directed**,-rated contactor.
 - c. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.**OR**
 Bypass Controller: Three-contactor-style bypass allows motor operation via the power converter or the bypass controller; with input isolating switch and barrier arranged to isolate the power converter input and output and permit safe testing and troubleshooting of the power converter, both energized and de-energized, while motor is operating in bypass mode.
 - a. Bypass Contactor: Load-break, IEC **OR** NEMA, **as directed**,-rated contactor.
 - b. Input and Output Isolating Contactors: Non-load-break, IEC **OR** NEMA, **as directed**,-rated contactors.
 - c. Isolating Switch: Non-load-break switch arranged to isolate power converter and permit safe troubleshooting and testing of the power converter, both energized and de-energized, while motor is operating in bypass mode; pad-lockable, door-mounted handle mechanism.
4. Bypass Contactor Configuration: Full-voltage (across-the-line) **OR** Reduced-voltage (autotransformer), **as directed**, type.
 - a. NORMAL/BYPASS selector switch.
 - b. HAND/OFF/AUTO selector switch.
 - c. NORMAL/TEST Selector Switch: Allows testing and adjusting of VFC while the motor is running in the bypass mode.
 - d. Contactor Coils: Pressure-encapsulated type with coil transient suppressors, **as directed**.
 - 1) Operating Voltage: Depending on contactor NEMA size and line-voltage rating, manufacturer's standard matching control power or line voltage.
 - 2) Power Contacts: Totally enclosed, double break, and silver-cadmium oxide; assembled to allow inspection and replacement without disturbing line or load wiring.
 - e. Control Circuits: 120-V ac; obtained from integral CPT, with primary and secondary fuses, with CPT **OR** control power source, **as directed**, of sufficient capacity to operate all integral devices and remotely located pilot, indicating, and control devices.
 - 1) CPT Spare Capacity: 50 **OR** 100 **OR** 200, **as directed**, VA.

- f. Overload Relays: NEMA ICS 2.
- 1) Melting-Alloy Overload Relays:
 - a) Inverse-time-current characteristic.
 - b) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - c) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - 2) Bimetallic Overload Relays:
 - a) Inverse-time-current characteristic.
 - b) Class 10 **OR** Class 20 **OR** Class 30, **as directed**, tripping characteristic.
 - c) Heaters in each phase matched to nameplate full-load current of actual protected motor and with appropriate adjustment for duty cycle.
 - d) Ambient compensated.
 - e) Automatic resetting.
 - 3) Solid-State Overload Relays:
 - a) Switch or dial selectable for motor-running overload protection.
 - b) Sensors in each phase.
 - c) Class 10 **OR** Class 20 **OR** Class 10/20 selectable, **as directed**, tripping characteristic selected to protect motor against voltage and current unbalance and single phasing.
 - d) Class II ground-fault protection, with start and run delays to prevent nuisance trip on starting.
 - e) Analog communication module.
 - 4) NC **OR** NO, **as directed**, isolated overload alarm contact.
 - 5) External overload reset push button.

E. Optional Features

1. Multiple-Motor Capability: VFC suitable for variable-speed service to multiple motors. Overload protection shuts down VFC and motors served by it, and generates fault indications, when overload protection activates.
 - a. Configure to allow two or more motors to operate simultaneously at the same speed; separate overload relay for each controlled motor.
OR
Configure to allow two motors to operate separately; operator selectable via local or remote switch or contact closures; single overload relay for both motors; separate output magnetic contactors for each motor.
OR
Configure to allow two motors to operate simultaneously and in a lead/lag mode, with one motor operated at variable speed via the power converter and the other at constant speed via the bypass controller; separate overload relay for each controlled motor.
2. Damper control circuit with end of travel feedback capability.
3. Sleep Function: Senses a minimal deviation of a feedback signal and stops the motor. On an increase in speed-command signal deviation, VFC resumes normal operation.
4. Motor Preheat Function: Preheats motor when idle to prevent moisture accumulation in the motor.
5. Firefighter's Override (Smoke Purge) Input: On a remote contact closure from the firefighter's control station **OR** smoke-control fan controller, **as directed**, this password-protected input:
 - a. Overrides all other local and external inputs (analog/digital, serial communication, and all keypad commands).
 - b. Forces VFC to operate motor, without any other run or speed command, at a field-adjustable, preset speed.
OR
Forces VFC to transfer to Bypass Mode and operate motor at full speed.
 - c. Causes display of Override Mode on the VFC display.
 - d. Reset VFC to normal operation on removal of override signal automatically **OR** manually, **as directed**.

6. Remote Indicating Circuit Terminals: Mode selection, controller status, and controller fault.
7. Remote digital operator kit.
8. Communication Port: RS-232 port, USB 2.0 port, or equivalent connection capable of connecting a printer and a notebook computer.

F. Enclosures

1. VFC Enclosures: NEMA 250, to comply with environmental conditions at installed location.
 - a. Dry and Clean Indoor Locations: Type 1.
 - b. Outdoor Locations: Type 3R **OR** Type 4X, **as directed**.
 - c. Kitchen **OR** Wash-Down, **as directed**, Areas: Type 4X, stainless steel.
 - d. Other Wet or Damp Indoor Locations: Type 4.
 - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12.
2. Plenum Rating: UL 1995; NRTL certification label on enclosure, clearly identifying VFC as "Plenum Rated."

G. Accessories

1. General Requirements for Control-Circuit and Pilot Devices: NEMA ICS 5; factory installed in VFC enclosure cover unless otherwise indicated.
 - a. Push Buttons, Pilot Lights, and Selector Switches: Heavy **OR** Standard, **as directed**, -duty, oiltight, **as directed**, type.
 - 1) Push Buttons: Covered **OR** Lockable **OR** Recessed **OR** Shielded **OR** Shrouded **OR** Unguarded, **as directed**, types; maintained **OR** momentary, **as directed**.
 - 2) Pilot Lights: Incandescent **OR** LED **OR** Neon **OR** Resistor **OR** Transformer, **as directed**, types; push to test.
 - 3) Selector Switches: Rotary type.
 - 4) Stop and Lockout Push-Button Station: Momentary-break, push-button station with a factory-applied hasp arranged so padlock can be used to lock push button in depressed position with control circuit open.
 2. NC **OR** NO **OR** Reversible NC/NO, **as directed**, bypass contactor auxiliary contact(s).
 3. Control Relays: Auxiliary and adjustable pneumatic **OR** solid-state, **as directed**, time-delay relays.
 4. Phase-Failure, Phase-Reversal, and Undervoltage and Overvoltage Relays: Solid-state sensing circuit with isolated output contacts for hard-wired connections. Provide adjustable undervoltage, overvoltage, and time-delay settings.
 - a. Current Transformers: Continuous current rating, basic impulse insulating level (BIL) rating, burden, and accuracy class suitable for connected circuitry. Comply with IEEE C57.13.
 5. Supplemental Analog **OR** Digital, **as directed**, Meters:
 - a. Elapsed-time meter.
 - b. Kilowatt meter.
 - c. Kilowatt-hour meter.
 6. Breather and drain assemblies, to maintain interior pressure and release condensation in NEMA 250, Type 4 **OR** Type 4X **OR** Type 12, **as directed**, enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
 7. Space heaters, with NC auxiliary contacts, to mitigate condensation in NEMA 250, Type 3R **OR** Type 4X **OR** Type 12, **as directed**, enclosures installed outdoors or in unconditioned interior spaces subject to humidity and temperature swings.
 8. Cooling Fan and Exhaust System: For NEMA 250, Type 1 **OR** Type 12, **as directed**; UL 508 component recognized: Supply fan, with composite **OR** stainless steel, **as directed**, intake and exhaust grills and filters, **as directed**; 120-V ac; obtained from integral CPT.
 9. Sun shields installed on fronts, sides, and tops of enclosures installed outdoors and subject to direct and extended sun exposure.
 10. Spare control-wiring terminal blocks; unwired **OR** wired, **as directed**.

H. Source Quality Control

1. Testing: Test and inspect VFCs according to requirements in NEMA ICS 61800-2.
 - a. Test each VFC while connected to its specified motor **OR** a motor that is comparable to that for which the VFC is rated, **as directed**.
 - b. Verification of Performance: Rate VFCs according to operation of functions and features specified.
2. VFCs will be considered defective if they do not pass tests and inspections.
3. Prepare test and inspection reports.

1.3 EXECUTION

A. Examination

1. Examine areas, surfaces, and substrates to receive VFCs, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
2. Examine VFC before installation. Reject VFCs that are wet, moisture damaged, or mold damaged.
3. Examine roughing-in for conduit systems to verify actual locations of conduit connections before VFC installation.
4. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Harmonic Analysis Study

1. Perform a harmonic analysis study to identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze possible **OR** designated, **as directed**, operating scenarios, including recommendations for VFC input filtering to limit TDD and THD(V) at each VFC **OR** at the defined PCC, **as directed**, to specified levels.
2. Prepare a harmonic analysis study and report complying with IEEE 399 and NETA Acceptance Testing Specification.

C. Installation

1. Coordinate layout and installation of VFCs with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
2. Wall-Mounting Controllers: Install VFCs on walls with tops at uniform height and with disconnect operating handles not higher than **79 inches (2000 mm)** above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Division 26 Section "Hangers And Supports For Electrical Systems".
3. Floor-Mounting Controllers: Install VFCs on **4-inch (100-mm)** nominal thickness concrete base. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
4. Roof-Mounting Controllers: Install VFC on roofs with tops at uniform height and with disconnect operating handles not higher than **79 inches (2000 mm)** above finished roof surface unless otherwise indicated, and by bolting units to curbs or mounting on freestanding, lightweight, structural-steel channels bolted to curbs. Seal roof penetrations after raceways are installed.
 - a. Curbs and roof penetrations are specified in Division 07 Section "Roof Accessories".
 - b. Structural-steel channels are specified in Division 26 Section "Hangers And Supports For Electrical Systems".

5. Seismic Bracing: Comply with requirements specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 6. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
 7. Install fuses in each fusible-switch VFC.
 8. Install fuses in control circuits if not factory installed. Comply with requirements in Division 26 Section "Fuses".
 9. Install heaters in thermal-overload relays. Select heaters based on actual nameplate full-load amperes after motors have been installed.
 10. Install, connect, and fuse thermal-protector monitoring relays furnished with motor-driven equipment.
 11. Comply with NECA 1.
- D. Identification
1. Identify VFCs, components, and control wiring. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
 - a. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - b. Label each VFC with engraved nameplate.
 - c. Label each enclosure-mounted control and pilot device.
 2. Operating Instructions: Frame printed operating instructions for VFCs, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of VFC units.
- E. Control Wiring Installation
1. Install wiring between VFCs and remote devices and facility's central-control system, **as directed**. Comply with requirements in Division 26 Section "Control-voltage Electrical Power Cables"
 2. Bundle, train, and support wiring in enclosures.
 3. Connect selector switches and other automatic control devices where applicable.
 - a. Connect selector switches to bypass only those manual- and automatic control devices that have no safety functions when switches are in manual-control position.
 - b. Connect selector switches with control circuit in both manual and automatic positions for safety-type control devices such as low- and high-pressure cutouts, high-temperature cutouts, and motor overload protectors.
- F. Field Quality Control
1. Perform tests and inspections.
 2. Acceptance Testing Preparation:
 - a. Test insulation resistance for each VFC element, bus, component, connecting supply, feeder, and control circuit.
 - b. Test continuity of each circuit.
 3. Tests and Inspections:
 - a. Inspect VFC, wiring, components, connections, and equipment installation. Test and adjust controllers, components, and equipment.
 - b. Test insulation resistance for each VFC element, component, connecting motor supply, feeder, and control circuits.
 - c. Test continuity of each circuit.
 - d. Verify that voltages at VFC locations are within 10 percent of motor nameplate rated voltages. If outside this range for any motor, notify Owner before starting the motor(s).
 - e. Test each motor for proper phase rotation.
 - f. Perform each electrical test and visual and mechanical inspection stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - g. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

- h. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:
 - 1) Initial Infrared Scanning: After Final Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each VFC. Remove front panels so joints and connections are accessible to portable scanner.
 - 2) Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each VFC 11 months after date of Final Completion.
 - 3) Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - i. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.
 - 4. VFCs will be considered defective if they do not pass tests and inspections.
 - 5. Prepare test and inspection reports, including a certified report that identifies the VFC and describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.
- G. Startup Service
- 1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
- H. Adjusting
- 1. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Final Completion.
 - 2. Set field-adjustable switches, auxiliary relays, time-delay relays, timers, and overload-relay pickup and trip ranges.
 - 3. Adjust the trip settings of MCPs and thermal-magnetic circuit breakers with adjustable, instantaneous trip elements. Initially adjust to six times the motor nameplate full-load amperes and attempt to start motors several times, allowing for motor cool-down between starts. If tripping occurs on motor inrush, adjust settings in increments until motors start without tripping. Do not exceed eight times the motor full-load amperes (or 11 times for NEMA Premium Efficient motors if required). Where these maximum settings do not allow starting of a motor, notify Owner before increasing settings.
 - 4. Set the taps on reduced-voltage autotransformer controllers.
 - 5. Set field-adjustable circuit-breaker trip ranges as specified in Division 26 Section "Overcurrent Protective Device Coordination Study".
 - 6. Set field-adjustable pressure switches.
- I. Protection
- 1. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
 - 2. Replace VFCs whose interiors have been exposed to water or other liquids prior to Final Completion.
- J. Demonstration
- 1. Train Owner's maintenance personnel to adjust, operate, reprogram, and maintain VFCs.

END OF SECTION 26 29 23 00

SECTION 26 29 33 13 - CONTROLLERS FOR FIRE-PUMP DRIVERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for controllers for fire-pump drivers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Full-service, full-voltage **OR** reduced-voltage, **as directed**, controllers rated 600 V and less.
 - b. Limited-service controllers rated 600 V and less.
 - c. Controllers for diesel-drive fire pumps.
 - d. Remote alarm panels.
 - e. Low-suction-shutdown panels.

C. Definitions

1. ATS: Automatic transfer switch(es).
2. ECM: Electronic control module.
3. MCCB: Molded-case circuit breaker.
4. N.O.: Normally open.

D. Performance Requirements

1. Seismic Performance: Fire-pump controllers and alarm panels shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Shop Drawings: For each type of product indicated. Include dimensioned plans, elevations, sections, details, and attachments to other work, including required clearances and service spaces around controller enclosures.
 - a. Show tabulations of the following:
 - 1) Each installed unit's type and details.
 - 2) Enclosure types and details for types other than NEMA 250, Type 2.
 - 3) Factory-installed devices.
 - 4) Nameplate legends.
 - 5) Short-circuit current (withstand) rating of integrated unit.
 - 6) Features, characteristics, ratings, and factory settings of individual overcurrent protective devices.
 - 7) Specified modifications.
 - b. Detail equipment assemblies and indicate dimensions, weights, loads, method of field assembly, components, and location and size of each field connection.
 - c. Schematic and Connection Diagrams: For power, signal, alarm, and control wiring and for pressure-sensing tubing.
3. Qualification Data: For qualified testing agency.
4. Seismic Qualification Certificates: For each type of product indicated, from manufacturer.

- a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Product Certificates: For each type of product indicated, from manufacturer.
 6. Manufacturer's factory test reports of fully assembled and tested equipment.
 7. Source quality-control reports.
 8. Field quality-control reports.
 9. Operation and Maintenance Data: For each type of product indicated to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.
 - b. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor-based logic controls.
- F. Quality Assurance
1. Testing Agency Qualifications: Member company of an NRTL.
 2. Source Limitations: Obtain fire-pump controllers and all associated equipment from single source or producer.
 3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 4. Comply with standards of authorities having jurisdiction pertaining to materials and installation.
 5. Comply with NFPA 20 and NFPA 70.
 6. IEEE Compliance: Fabricate and test enclosed controllers according to IEEE 344 to withstand seismic forces defined in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."
- G. Delivery, Storage, And Handling
1. Store controllers indoors in clean, dry space with uniform temperature to prevent condensation. Protect enclosed controllers from exposure to dirt, fumes, water, corrosive substances, and physical damage.
 2. If stored in areas subject to weather, protect controllers from weather, dirt, dust, corrosive substances, and physical damage. Remove loose packing and flammable materials from inside controllers; install temporary electric heating, with at least 250 W per controller **OR** connect factory-installed space heaters to temporary electrical service, **as directed**.
- H. Project Conditions
1. Environmental Limitations:
 - a. Ambient Temperature Rating: Not less than 40 deg F (5 deg C) and not exceeding 122 deg F (50 deg C) unless otherwise indicated.
 - b. Altitude Rating: Not exceeding 6600 feet (2010 m) unless otherwise indicated.
 2. Interruption of Existing Electric Service: Notify the Owner no fewer than seven days in advance of proposed interruption of electric service, and comply with NFPA 70E.
- I. Coordination
1. Coordinate layout and installation of controllers with other construction including conduit, piping, fire-pump equipment, and adjacent surfaces. Maintain required clearances for workspace and equipment access doors and panels. Ensure that controllers are within sight of fire-pump drivers.
 2. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.2 PRODUCTS

A. Full-Service Controllers

1. General Requirements for Full-Service Controllers:
 - a. Comply with NFPA 20 and UL 218.
 - b. Listed by an NRTL for electric-motor driver for fire-pump service.
 - c. Combined automatic and nonautomatic **OR** Nonautomatic, **as directed**, operation.
 - d. Factory assembled, wired, and tested; continuous-duty rated.
 - e. Service Equipment Label: NRTL labeled for use as service equipment.
2. Method of Starting:
 - a. Pressure **OR** Nonpressure, **as directed**, -switch actuated.
 - 1) Water-pressure-actuated switch and pressure transducer with independent high- and low-calibrated adjustments responsive to water pressure in fire-suppression piping.
 - 2) System pressure recorder, electric ac driven, with spring backup.
 - 3) Programmable minimum-run-time relay to prevent short cycling.
 - 4) Programmable timer for weekly tests.
 - b. Magnetic Controller: Across-the-line **OR** Autotransformer **OR** Part-winding **OR** Primary-resistor **OR** Wye-delta (open transition) **OR** Wye-delta (closed transition), **as directed**, type.
OR
Solid-State Controller: Reduced-voltage type.
 - c. Emergency Start: Mechanically operated start handle that closes and retains the motor RUN contactor independent of all electric or pressure actuators.
3. Method of Stopping: Automatic and nonautomatic shutdown after automatic starting **OR** Nonautomatic, **as directed**.
4. Capacity: Rated for fire-pump-driver horsepower and short-circuit-current (withstand) rating equal to or greater than short-circuit current available at controller location.
5. Method of Isolation and Overcurrent Protection: Interlocked isolating switch and nonthermal MCCB; with a common, externally mounted operating handle, and providing locked-rotor protection.
6. Door-Mounted Operator Interface and Controls:
 - a. Monitor, display, and control the devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
 - b. Method of Control and Indication:
 - 1) Microprocessor-based logic controller, with multiline digital readout.
 - 2) Membrane keypad.
 - 3) LED alarm and status indicating lights.
 - c. Local and Remote, **as directed**, Alarm and Status Indications:
 - 1) Controller power on.
 - 2) Motor running condition.
 - 3) Loss-of-line power.
 - 4) Line-power phase reversal.
 - 5) Line-power single-phase condition.
 - d. Audible alarm, with silence push button.
 - e. Nonautomatic START and STOP push buttons or switches.
7. Optional Features:
 - a. Extra Output Contacts:
 - 1) One N.O. contact(s) for motor running condition.
 - 2) One set(s) of contacts for loss-of-line power.
 - 3) One each, Form C contacts for high and low reservoir level.
 - b. Local alarm bell.
 - c. Door-mounted thermal or impact printer for alarm and status logs.
 - d. Operator Interface Communications Ports: USB, Ethernet, and RS485.
8. ATS:
 - a. Complies with NFPA 20, UL 218, and UL 1008.

- b. Integral with controller as a listed combination fire-pump controller and power transfer switch.
- c. Automatically transfers fire-pump controller from normal power supply to alternate power supply in event of power failure.
- d. Allows manual transfer from one source to the other.
- e. Alternate-Source Isolating and Disconnecting Means: Integral molded-case switch, with an externally mounted operating handle.
OR
Alternate-Source Isolating and Disconnecting Means: Mechanically interlocked isolation switch and circuit breaker rated at a minimum of 115 percent of rated motor full-load current, with an externally mounted operating handle; circuit breaker shall be provided with nonthermal sensing, instantaneous-only short-circuit overcurrent protection to comply with available fault currents.
- f. Local and Remote, **as directed**, Alarm and Status Indications:
 - 1) Normal source available.
 - 2) Alternate source available.
 - 3) In normal position.
 - 4) In alternate position.
 - 5) Isolating means open.
- g. Audible alarm, with silence push button.
- h. Nonautomatic (manual, nonelectric) means of transfer.
- i. Engine test push button.
- j. Start generator output contacts.
- k. Timer for weekly generator tests.

B. Limited-Service Controllers

1. General Requirements for Limited-Service Controllers:
 - a. Comply with NFPA 20 and UL 218.
 - b. Listed by an NRTL for electric-motor driver for fire-pump service.
 - c. Combined automatic and nonautomatic **OR** Nonautomatic, **as directed**, operation.
 - d. Factory assembled, wired, and tested; continuous-duty rated.
 - e. Service Equipment Label: NRTL labeled for use as service equipment.
2. Method of Starting:
 - a. Pressure **OR** Nonpressure, **as directed**, -switch actuated.
 - 1) Water-pressure-actuated switch and pressure transducer with independent high- and low-calibrated adjustments responsive to water pressure in fire-suppression piping.
 - 2) System pressure recorder, electric ac driven, with spring backup.
 - 3) Programmable minimum-run-time relay to prevent short cycling.
 - 4) Programmable timer for weekly tests.
 - b. Across-the-line magnetic controller.
 - c. Emergency Start: Mechanically operated start handle that closes and retains the motor RUN contactor independent of all electric or pressure actuators.
3. Method of Stopping: Automatic and nonautomatic shutdown after automatic starting **OR** Nonautomatic, **as directed**.
4. Capacity: Rated for fire-pump-driver horsepower and short-circuit-current (withstand) rating equal to or greater than short-circuit current available at controller location.
5. Method of Isolation and Overcurrent Protection: Inverse-time, nonadjustable MCCB, with an externally mounted operating handle.
6. Door-Mounted Operator Interface and Controls:
 - a. Monitor, display, and control the devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
 - b. Method of Control and Indication:
 - 1) Microprocessor-based logic controller, with multiline LCD digital readout.
 - 2) Membrane keypad.

- 3) LED alarm and status indicating lights.
- c. Local and Remote, **as directed** Alarm and Status Indications:
 - 1) Controller power on.
 - 2) Motor running condition.
 - 3) Loss-of-line power.
 - 4) Line-power phase reversal.
 - 5) Line-power single-phase condition.
- d. Audible alarm, with silence push button.
- e. Nonautomatic START and STOP push buttons.
- 7. Optional Features:
 - a. Extra Output Contacts:
 - 1) One N.O. contact(s) for motor running condition.
 - 2) One set(s) of contacts for loss-of-line power.
 - 3) One each, Form C contacts for high and low reservoir level.
 - b. Local alarm bell.
 - c. Door-mounted thermal or impact printer for alarm and status logs.
 - d. Operator Interface Communications Ports: USB, Ethernet, and RS485.
- 8. ATS:
 - a. Complies with NFPA 20, UL 218, and UL 1008.
 - b. Integral with controller as a listed combination fire-pump controller and power transfer switch.
 - c. Automatically transfers fire-pump controller from normal power supply to alternate power supply in event of power failure.
 - d. Allows manual transfer from one source to the other.
 - e. Alternate-Source Isolating and Disconnecting Means: Integral molded-case switch, with an externally mounted operating handle.
OR
Alternate-Source Isolating and Disconnecting Means: Mechanically interlocked isolation switch and circuit breaker rated at a minimum of 115 percent of rated motor full-load current, with an externally mounted operating handle; circuit breaker shall be provided with nonthermal sensing, instantaneous-only short-circuit overcurrent protection to comply with available fault currents.
 - f. Local and Remote, **as directed**, Alarm and Status Indications:
 - 1) Normal source available.
 - 2) Alternate source available.
 - 3) In normal position.
 - 4) In alternate position.
 - 5) Isolating means open.
 - g. Audible alarm, with silence push button.
 - h. Nonautomatic (manual, nonelectric) means of transfer.
 - i. Engine test push button.
 - j. Start generator output contacts.
 - k. Timer for weekly generator tests.
- C. Standalone ATS
 - 1. General Requirements for Standalone ATS:
 - a. Complies with NFPA 20, UL 218, and UL 1008.
 - b. Listed by an NRTL for fire-pump service.
 - c. Automatic and nonautomatic operation.
 - d. Separate from controller and individually listed as a fire-pump-controller power transfer switch.
 - e. Automatically transfers fire-pump controller from normal power supply to alternate power supply in event of power failure.
 - f. Allows manual transfer from one source to the other; factory assembled, wired, and tested.
 - 2. Capacity: Rated for fire-pump-driver horsepower and short-circuit-current (withstand) rating equal to or greater than short-circuit current available at ATS location.

3. Alternate-Source Isolating and Disconnecting Means: Integral molded-case switch, with an externally mounted operating handle.
 4. Alternate-Source Isolating and Disconnecting Means:
 - a. Mechanically interlocked isolation switch and circuit breaker rated at a minimum of 115 percent of rated motor full-load current.
 - b. Externally mounted operating handle.
 - c. Circuit breaker provided with nonthermal sensing, instantaneous-only, short-circuit overcurrent protection.
 - d. Equipped with a voltage surge arrester.
 5. Door-Mounted Operator Interface and Controls:
 - a. Monitor, display, and control devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
 - b. Method of Control and Indication:
 - 1) Microprocessor-based logic controller, with multiline LCD readout.
 - 2) Membrane keypad.
 - 3) LED alarm and status indicating lights.
 - c. Local and Remote, **as directed**, Alarm and Status Indications:
 - 1) Normal source available.
 - 2) Alternate source available.
 - 3) In normal position.
 - 4) In alternate position.
 - 5) Isolating means open.
 - d. Audible alarm, with silence push button.
 - e. Nonautomatic (manual, nonelectric) means of transfer.
 - f. Engine test push button.
 - g. Start generator output contacts.
 - h. Timer for weekly generator tests
 6. Optional Features:
 - a. Extra Output Contacts:
 - 1) One each, Form A; isolating means open.
 - 2) One each, Form C; in normal or alternate position
 - b. Door-mounted thermal or impact printer for alarm and status logs.
 - c. Operator Interface Communications Ports: USB, Ethernet, and RS485.
- D. Controllers For Diesel-Drive Fire Pumps
1. General Requirements for Controllers:
 - a. Comply with NFPA 20 and UL 218.
 - b. Listed by an NRTL for diesel-engine driver for fire-pump service.
 - c. Combined automatic and nonautomatic **OR** Nonautomatic, **as directed** operation.
 - d. Factory assembled, wired, and tested.
 2. Method of Starting:
 - a. Pressure **OR** Nonpressure, **as directed**, -switch actuated.
 - 1) Water-pressure-actuated switch and pressure transducer with independent high- and low-calibrated adjustments responsive to water pressure in fire-suppression piping.
 - 2) System pressure recorder, electric ac driven, with spring backup.
 - 3) Programmable minimum-run-time relay to prevent short cycling.
 - 4) Programmable timer for weekly tests.
 - b. Dual, redundant dc-voltage battery units, with automatic changeover.
 - c. Emergency Control: Bypasses all automatic control circuits during manual starting and running.
 - d. Automatic engine start on loss of ac power to the controller.
 3. Method of Stopping: Automatic and nonautomatic shutdown after automatic starting **OR** Nonautomatic, **as directed**.
 4. Door-Mounted Operator Interface and Controls:

- a. Monitor, display, and control devices, alarms, functions, and operations listed in NFPA 20 as required for drivers and controller types used.
 - b. Method of Control and Indication:
 - 1) Microprocessor-based logic controller, with multiline LCD readout.
 - 2) Membrane keypad.
 - 3) LED alarm and status indicating lights.
 - c. Local and Remote, **as directed**, Alarm and Status Indications:
 - 1) Controller power on.
 - 2) Engine-lubrication-system critically low oil pressure.
 - 3) Engine-jacket coolant high temperature.
 - 4) Engine fail-to-start.
 - 5) Engine overspeed shutdown.
 - 6) Low fuel level.
 - 7) Missing or failed battery.
 - 8) Battery charger failure.
 - 9) System overpressure.
 - 10) ECM selector switch in alternate ECM position.
 - 11) Fuel injector malfunction.
 - d. Audible alarm.
 - e. Nonautomatic START and STOP push buttons or switches.
 5. Optional Features:
 - a. Extra Output Contacts:
 - 1) One Form C contacts for low pump-room temperature.
 - 2) One each, Form C contacts for high and low fuel levels.
 - 3) One each, Form C contacts for high and low reservoir levels.
 - b. Door-mounted thermal or impact printer for alarm and status logs.
 - c. Operator Interface Communications Ports: USB, Ethernet, and RS485.
 - d. Powered louver contacts.
 - e. Powered engine-oil heater contacts.
 6. Battery Charger System:
 - a. Built-in, independent, dual battery chargers with automatic changeover; 12-V dc **OR** 24-V dc, **as directed**, for lead-acid **OR** nickel-cadmium, **as directed**, batteries.
 - b. Standard: UL 1236.
- E. Remote Alarm Panels
1. General Requirements for Remote Alarm Panels: Comply with NFPA 20 and UL 218; listed by an NRTL for fire-pump service.
 2. General Requirements for Remote Alarm Panels: Factory assembled, wired, and tested.
 3. Supervisory and Normal Control Voltage: 120-V ac **OR** 240-V ac, **as directed**; single **OR** dual, **as directed**, source.
 4. Audible and Visual Alarm and Status Indications:
 - a. Driver running.
 - b. Loss of phase.
 - c. Phase reversal.
 - d. Supervised power on.
 - e. Common **OR** Separate, **as directed**, trouble on the controller.
 - f. Controller connected to alternate power source.
 5. Audible and Visual Alarm and Status Indications: Manufacturer's standard indicating lights; push-to-test **OR** non-push-to-test, with separate test push button, **as directed**.
 - a. Engine running.
 - b. Controller main switch turned to the off or manual position.
 - c. Supervised power on.
 - d. Common **OR** Separate, **as directed**, trouble on the controller or engine.
 - e. Common pump room trouble.
 - f. Controller connected to alternate power source.
 6. Audible alarm, with silence push button.

7. Pump REMOTE START push button.

F. Low-Suction-Shutdown Panels

1. General Requirements for Low-Suction-Shutdown Panels:
 - a. Listed by an NRTL for fire-pump service.
 - b. Factory assembled, wired, and tested.
 - c. Prevents automatic start of fire pump, and shuts down automatically started fire pump, on low-suction pressure.
 - d. Automatic **OR** Manual, **as directed**, reset.
2. Operation: External contact input **OR** Integral pressure switch, **as directed**.
3. Supervisory and Normal Control Voltage: 120-V ac **OR** 240-V ac, **as directed**; single **OR** dual, **as directed**, source.
4. Include audible and visual alarms and status indications, with silence push button, for the following conditions:
 - a. Control power available.
 - b. Low-suction pressure.
 - c. Normal-suction pressure.

G. Enclosures

1. Fire-Pump Controllers, ATS, Remote Alarm Panels, and Low-Suction-Shutdown Panels: NEMA 250, to comply with environmental conditions at installed locations and NFPA 20.
 - a. Indoor, Dry and Clean Locations: Type 1 (IEC IP10).
 - b. Indoor Locations Subject to Dripping Noncorrosive Liquids: Type 2 (IEC IP11).
 - c. Outdoor Locations: Type 3R (IEC IP14) **OR** Type 4 (IEC IP56) **OR** Type 4X (IEC IP56), **as directed**.
 - d. Other Wet or Damp, Indoor Locations: Type 4 (IEC IP56) **OR** Type 4X (IEC IP56), **as directed**.
 - e. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: Type 12 (IEC IP12).
2. Enclosure Color: Manufacturer's standard "fire-pump-controller red".
3. Nameplates: Comply with NFPA 20; complete with capacity, characteristics, approvals, listings, and other pertinent data.
4. Optional Features:
 - a. Floor stands, 12 inches (305 mm) high, for floor-mounted controllers.
 - b. Space heater, 120-V ac **OR** 240-V ac, **as directed**, with humidistat, **as directed**, with thermostat, **as directed**.
 - c. Tropicalization.

H. Source Quality Control

1. Testing: Test and inspect fire-pump controllers according to requirements in NFPA 20 and UL 218.
 - a. Verification of Performance: Rate controllers according to operation of functions and features specified.
2. Fire-pump controllers will be considered defective if they do not pass tests and inspections.
3. Prepare test and inspection reports.

1.3 EXECUTION

A. Examination

1. Examine areas and surfaces to receive equipment, with Installer present, for compliance with requirements and other conditions affecting performance.
2. Examine equipment before installation. Reject equipment that is wet or damaged by moisture or mold.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Controller Installation

1. Install controllers within sight of their respective drivers.
2. Connect controllers to their dedicated pressure-sensing lines.
3. Wall-Mounting Controllers: Install controllers on walls with disconnect operating handles not higher than **79 inches (2006 mm)** above finished floor, and bottom of enclosure not less than **12 inches (305 mm)** above finished floor unless otherwise indicated. Bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For controllers not on walls, provide freestanding racks complying with Division 16 Section "Hangers and Supports for Electrical Systems."
4. Floor-Mounting Controllers: Install controllers on **4-inch (100-mm)** nominal-thickness concrete bases, using floor stands high enough so that the bottom of enclosure cabinet is not less than **12 inches (305 mm)** above finished floor. Comply with requirements for concrete bases specified in Division 3 Section "Cast-in-Place Concrete."
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Seismic Bracing: Comply with requirements specified in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."
6. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
7. Comply with NEMA ICS 15.

C. Standalone ATS Installation

1. Wall-Mounting ATS: Install ATS on walls with disconnect operating handles not higher than **79 inches (2006 mm)** above finished floor, and bottom of enclosure not less than **12 inches (305 mm)** above finished floor unless otherwise indicated. Bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For ATS not on walls, provide freestanding racks complying with Division 16 Section "Hangers and Supports for Electrical Systems."
2. Floor-Mounting ATS: Install ATS on **4-inch (100-mm)** nominal-thickness concrete bases, using floor stands high enough so that the bottom of enclosure cabinet is not less than **12 inches (305 mm)** above finished floor. Comply with requirements for concrete bases specified in Division 3 Section "Cast-in-Place Concrete."
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Seismic Bracing: Comply with requirements specified in Division 16 Section "Vibration and Seismic Controls for Electrical Systems."
4. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

D. Remote Alarm And Low-Suction-Shutdown, as directed, Panel Installation

1. Install panels on walls with tops not higher than **72 inches (1829 mm)** above finished floor unless otherwise indicated. Bolt units to wall or mount on lightweight structural-steel channels bolted to wall. For ATS not on walls, provide freestanding racks complying with Division 16 Section "Hangers and Supports for Electrical Systems."

E. Power Wiring Installation

1. Install power wiring between controllers and their services or sources, and between controllers and their drivers. Comply with requirements in NFPA 20, NFPA 70, and Division 16 Section "Conductors and Cables."
 2. Comply with NECA 1.
- F. Control And Alarm Wiring Installation
1. Install wiring between controllers and remote devices and facility's central monitoring system, **as directed**. Comply with requirements in NFPA 20, NFPA 70, and Division 16 Section "Control-Voltage Electrical Power Cables."
 2. Install wiring between remote alarm and low-suction-shutdown, **as directed**, panels and controllers. Comply with requirements in NFPA 20, NFPA 70, and Division 16 Section "Control-Voltage Electrical Power Cables."
 3. Install wiring between controllers and the building's fire-alarm system. Comply with requirements specified in Division 13 Section "Digital, Addressable Fire-Alarm System."
 4. Bundle, train, and support wiring in enclosures.
 5. Connect remote manual and automatic activation devices where applicable.
- G. Identification
1. Comply with requirements in NFPA 20 for marking fire-pump controllers.
 2. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification in NFPA 20 and as specified in Division 16 Section "Electrical Identification."
- H. Field Quality Control
1. Perform tests and inspections.
 2. Acceptance Testing Preparation:
 - a. Inspect and Test Each Component:
 - 1) Inspect wiring, components, connections, and equipment installations. Test and adjust components and equipment.
 - 2) Test insulation resistance for each element, component, connecting supply, feeder, and control circuits.
 - 3) Test continuity of each circuit.
 - b. Verify and Test Each Electric-Driver Controller:
 - 1) Verify that voltages at controller locations are within plus 10 or minus 1 percent of motor nameplate rated voltages, with motors off. If outside this range for any motor, notify the Owner before starting the motor(s).
 - 2) Test each motor for proper phase rotation.
 - c. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation.
 - d. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Field Acceptance Tests:
 - a. Do not begin field acceptance testing until suction piping has been flushed and hydrostatically tested and the certificate for flushing and testing has been submitted to the Owner and authorities having jurisdiction.
 - b. Prior to starting, notify authorities having jurisdiction of the time and place of the acceptance testing.
 - c. Engage manufacturer's factory-authorized service representative to be present during the testing.
 - d. Perform field acceptance tests as outlined in NFPA 20.
 4. Controllers will be considered defective if they do not pass tests and inspections.
 5. Prepare test and inspection reports.
- I. Startup Service
1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.

- J. Adjusting
 - 1. Adjust controllers and battery charger systems, **as directed**, to function smoothly and as recommended by manufacturer.
 - 2. Set field-adjustable switches, auxiliary relays, time-delay relays, and timers.
 - 3. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Final Completion.
 - 4. Set field-adjustable pressure switches.

- K. Protection
 - 1. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until enclosed controllers are ready to be energized and placed into service.
 - 2. Replace controllers whose interiors have been exposed to water or other liquids prior to Final Completion.

- L. Demonstration
 - 1. Train the Owner's maintenance personnel to adjust, operate, and maintain controllers, remote alarm panels, **as directed**, low-suction-shutdown panels, **as directed**, and to use and reprogram microprocessor-based controls within this equipment, **as directed**.

END OF SECTION 26 29 33 13

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Task	Specification	Specification Description
26 29 33 13	21 31 16 00	Diesel-Drive, Centrifugal Fire Pumps
26 29 33 13	21 34 13 00	Pressure-Maintenance Pumps

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SECTION 26 31 00 00 - PHOTOVOLTAIC ENERGY EQUIPMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for Photovoltaic Energy Equipment. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. PV laminates (cells laminated into rigid sheets, with connecting cables).
 - b. PV modules (laminates in mounting frames).
 - c. Charge controllers.
 - d. Inverters.
 - e. Mounting structures.

C. Definitions

1. CEC: California Energy Commission.
2. ETFE: Ethylene tetrafluoroethylene.
3. FEP: Fluorinated ethylene propylene.
4. IP Code: Required ingress protection to comply with IEC 60529.
5. MPPT: Maximum power point tracking.
6. PTC: USA standard conditions for PV.
7. PV: Photovoltaic.
8. STC: Standard Test Conditions defined in IEC 61215.

D. Action Submittals

1. Product Data: For each type of product.
 - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for PV panels.
 - b. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Shop Drawings: For PV modules.
 - a. Include plans, elevations, sections, and mounting details.
 - b. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - c. Detail fabrication and assembly.
 - d. Include diagrams for power, signal, and control wiring.

E. Informational Submittals

1. Field quality-control reports.
2. Sample Warranty: For manufacturer's special materials and workmanship warranty and minimum power output warranty.

F. Closeout Submittals

1. Operation and Maintenance Data: For PV modules to include in operation and maintenance manuals.

G. Warranty

1. Manufacturer's Special Materials and Workmanship Warranty: Manufacturer agrees to repair or replace components of PV modules that fail in materials or workmanship within specified warranty period.
 - a. Manufacturer's materials and workmanship warranties include, but are not limited to, the following:
 - 1) Faulty operation of PV modules.
 - b. Warranty Period: Two **OR** Five years from date of Final Completion.
2. Manufacturer's Special Minimum Power Output Warranty: Manufacturer agrees to repair or replace components of PV modules that fail to exhibit the minimum power output within specified warranty period. Special warranty, applying to modules only, applies to materials only, on a prorated basis, for period specified.
 - a. Manufacturer's minimum power output warranties include, but are not limited to, the following warranty periods, from date of Final Completion:
 - 1) Specified minimum power output to 80 percent or more, for a period of 25 years.

1.2 PRODUCTS

A. Performance Requirements

1. NRTL (Nationally Recognized Testing Laboratory) Listing: Entire assembly shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for electrical and fire safety, Class A **OR** Class C, according to UL 1703.
2. FM approved for NFPA 70, Class 1, Division 2, Group C and Group D hazardous locations.

B. System Description

1. Grid-Tied PV System:
 - a. Connected via a utility meter to the electrical utility.
 - b. An array of six modules to generate a total nominal 1000 rated W.
 - c. System Components:
 - 1) Cell materials.
 - 2) PV modules.
 - 3) Array frame.
 - 4) Charge controller.
 - 5) Inverter.
 - 6) Overcurrent protection/combiner box.
 - 7) Mounting structure.
 - 8) Utility meter.
2. Battery-Storage PV System:
 - a. Connected to a battery bank to provide electricity to Project.
 - b. An array of six modules to generate a total nominal 1000 rated W.
 - c. System Components:
 - 1) Cell materials.
 - 2) PV modules.
 - 3) Array frame.
 - 4) Charge controller.
 - 5) Inverter.
 - 6) Overcurrent protection/combiner box.
 - 7) Mounting structure.
 - 8) Battery charge controller(s).
 - 9) Batteries.
 - 10) Battery-storage structure.

C. Manufactured Units

1. Cell Materials: Amorphous silicon (a-Si) **OR** Cell Materials: Copper indium (di)selenide (CIS) **OR** Cell Materials: Copper indium gallium (di)selenide (CIGS) **OR** Cadmium telluride (CdTe) **OR**

- Cadmium sulfide **OR** Polycrystalline (c-Si) **OR** Polycrystalline (Gallium arsenide (GaAs) **OR** Monocrystalline (c-Si) **OR** Monocrystalline (Gallium arsenide (GaAs), **as directed.**
2. Module Construction:
 - a. Nominal Size: **32 inches (800 mm)** wide by **64 inches (1600 mm)** long.
 - b. Weight: **42.8 lb (19.4 kg)**.
 3. Insulating Substrate Film: Flexible **OR** Rigid, polyester **OR** polyimide, **as directed.**
 4. Conducting Substrate Film: Flexible **OR** Rigid **OR** luoropolymer, ETFE **OR** FEP, **as directed.**
 5. Encapsulant: Ethyl vinyl acetate.
 6. Front Panel: Fully tempered glass.
 7. Front Panel: **0.125-inch- (3.2-mm-)** thick glass.
 8. Front Panel: Low iron glass.
 9. Front Panel: Antireflective coating glass.
 10. Front Panel: Laminating film.
 11. Front Panel: Laminating material.
 12. Backing Material: Tempered glass.
 13. Backing Material: **0.125-inch- (3.2-mm-)** thick glass; color **as directed.**
 14. Backing Material: Polyester film.
 - a. **Layers: as directed.**
 - b. Color: White **OR as directed.**
 15. Backing Material: PVC film.
 - a. **Layers: as directed.**
 - b. Color: White **OR as directed.**
 16. Bypass Diode Protection: Internal.
 17. Junction Box:
 - a. Size: **1.56 by 3.96 by 0.52 inch (39.6 by 100.6 by 13.2 mm)**.
 - b. Fully potted, vandal resistant.
 - c. IP Code: IP65 **OR** IP66 **OR** IP67, **as directed.**
 - d. Flammability Test: UL 1703.
 18. Output Cabling:
 - a. **0.158 inch (4 mm)**.
 - b. Quick, multiconnect, polarized connectors.
 - c. Two-Conductor Harness: No traditional return wire is needed from the end of a row back to the source combiner.
 19. Series Fuse Rating: **as directed.**
- D. Capacities And Characteristics
1. Minimum Electrical Characteristics:
 - a. Rated Open Circuit Voltage (V_{oc}): **as directed.**
 - b. Maximum System Voltage: **as directed.**
 - c. Maximum Power at Voltage (V_{pm}): **as directed.**
 - d. Short-Circuit Temperature Coefficient: **as directed.**
 - e. Rated Short-Circuit Current (I_{sc}): **as directed.**
 - f. Maximum System: **as directed.**
 - g. Rated Operation Current (I_{mp}): **as directed.**
 - h. Maximum Power at STC (P_{max}): **as directed.**
 2. Additional Electrical Characteristics:
 - a. PTC Rating: **as directed.**
 - b. Peak Power per Unit Area: **as directed.**
 - c. Tolerance of P_{max} : **as directed.**
 - d. Minimum Peak Power: **as directed.**
 - e. Series Fuse Rating: **as directed.**
 - f. Module Efficiency: **as directed.**
 - g. Temperature Cycling Range: **as directed.**
 - h. Humidity, Freeze, Damp Heat Condition: **as directed.**
 - i. Wind Loading or Surface Pressure: **as directed.**
 - j. Maximum Distortion Angle: **as directed.**

- k. Hailstone Impact Withstand: **as directed.**
- l. Series Fuse Rating: **as directed.**
- 3. Normal Operating Temperature Characteristics (NOTC):
 - a. Temperature at Nominal Operating Cell Temperature: **as directed.**
 - b. Temperature Coefficient (NOTC P_{max}): **as directed.**
 - c. Temperature Coefficient (NOTC V_{oc}): **as directed.**
 - d. Temperature Coefficient (NOTC I_{sc}): **as directed.**
 - e. Temperature Coefficient (NOTC V_{mp}): **as directed.**
 - f. Temperature Coefficient (NOTC I_{mp}): **as directed.**
- E. Module Framing
 - 1. PV laminates mounted in anodized extruded-aluminum frames.
 - a. Entire assembly UL listed for electrical and fire safety, Class A **OR** Class C, according to UL 1703, complying with IEC 61215.
 - b. Frame strength exceeding requirements of certifying agencies in subparagraph above.
 - c. Finish: Anodized aluminum.
 - 1) Alloy and temper recommended by framing manufacturer for strength, corrosion resistance, and application of required finish.
 - 2) Color: As indicated by manufacturer's designations.
 - d. Finish: High-performance organic finish.
 - 1) Fluoropolymer Two-Coat System: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent PVC resin by weight.
 - 2) Color: As indicated by manufacturer's designations.
 - e. Finish: Baked-enamel finish.
 - 1) Color: As indicated by manufacturer's designations.
- F. Array Construction
 - 1. Framing:
 - a. Material: Extruded aluminum **OR** Galvanized steel **OR** Coated steel, **as directed.**
 - b. Maximum System Weight: Less than **4 lb/sq. ft. (19.53 kg/sq. m).**
 - c. Minimum Distance to Connectors: **as directed.**
 - d. Raceway Cover Plates: Plastic **OR** Aluminum **OR** Galvanized steel, **as directed.**
 - 2. Flat-Roof Mounting:
 - a. No roof penetrations.
 - b. Self-ballasting.
 - c. Wind-tunnel tested to **110-mph (160-km/h)** wind.
 - d. Service Life: **25** years.
 - e. Freestanding system.
- G. Charge Controller
 - 1. Charge Controller Electrical Characteristics:
 - a. Output Current Rating: **as directed.**
 - b. Nominal Battery Voltage: **as directed.**
 - c. PV Maximum Open Circuit Voltage: **as directed.**
 - d. Equalization Voltage: **as directed.**
 - e. Voltage Step-Down Capability: **as directed.**
 - f. Power Conversion Efficiency: **as directed.**
 - 2. Charge controllers shall have the following:
 - a. Digital display.
 - b. Data logging.
 - c. Remote interface.
 - d. External sensors.
 - e. Temperature compensation.

H. Inverter

1. Control Type: Pulse width modulation control.
2. Control Type: Maximum power point tracker control.
3. Inverter Electrical Characteristics:
 - a. Maximum Recommended PV Input Power: **as directed**.
 - b. Maximum Voc: **as directed**.
 - c. PV Start Voltage: **as directed**.
 - d. MPPT Voltage Range: **as directed**.
 - e. Maximum Input Current: **as directed**.
 - f. Number of String Inputs: **as directed**.
 - g. Number of Independent MPPT Circuits: **as directed**.
 - h. Nominal Output Voltage: **as directed**.
 - i. CEC Rated Power: **as directed**.
 - j. Nominal Output Voltage: **as directed**.
 - k. Maximum Output Current: **as directed**.
 - l. Peak Efficiency: **as directed**.
 - m. CEC Weighted Efficiency: **as directed**.
 - n. CEC Night Tare Loss: **as directed**.
 - o. DC/AC Terminal Range (AWG): **as directed**.
 - p. NEMA 250 Enclosure Rating: **as directed**.
4. Operating Conditions:
 - a. Operating Ambient Temperatures: **Minus 4 to plus 122 deg F (20 to plus 50 deg C)**.
 - b. Storage Temperature: **Minus 40 to plus 122 deg F (minus 40 to plus 50 deg C)**.
 - c. Relative Humidity: 0 to 95 percent, noncondensing.
5. Charge controllers shall have the following:
 - a. Overcurrent protection.
 - b. Generator input breaker box.
 - c. Automatic transfer relay.
 - d. Digital display.
 - e. Transformer.
 - f. Disconnect switch.
 - g. Shunt controller.
 - h. Shunt regulator.
 - i. Surge overload protection.
6. Enclosure:
 - a. NEMA 250, Type 3R.
 - b. Enclosure Material: Galvanized steel **OR** Steel, **as directed**.
 - c. Cooling Methods:
 - 1) Fan convection cooling.
 - 2) Passive cooling.
 - d. Protective Functions:
 - 1) AC over/under voltage.
 - 2) AC over/under frequency.
 - 3) Ground over current.
 - 4) Overtemperature.
 - 5) AC and dc overcurrent.
 - 6) DC over voltage.
 - e. Standard liquid crystal display, four lines, 20 characters, with user display and on/off toggle switch.
 - f. Weight: **260 lb (118 kg)**.
 - g. Dimensions: **54 by 36 by 19 inches (137 by 91 by 48 cm)**.
7. Disconnects:
 - a. Low-voltage disconnect.
 - b. Low-voltage reconnect.
 - c. High-temperature disconnect.
 - d. High-temperature reconnect.

- 8. Regulatory Approvals:
 - a. IEEE 1547.1.
 - b. IEEE 1547.3.
 - c. UL 1741.
- 9. Characteristics:
 - a. Inverter Dimensions: **as directed**.
 - b. Inverter Weight: **as directed**.

I. System Overcurrent Protection

- 1. Combiner Box:
 - a. Fuses: **as directed**.
 - b. Circuit Breakers: **as directed**.

J. Mounting Structures

- 1. Roof Mount: Extruded aluminum, two **OR** four rails, **as directed**, tilt legs, and roof standoffs.
- 2. Pole Mount: Top **OR** Panel tops **OR** Side, **as directed**.
- 3. Tracking Mounts: One **OR** Two axis, **as directed**.

1.3 EXECUTION

A. Examination

- 1. Examine substrate areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- 2. Do not begin installation until mounting surfaces have been properly prepared.
- 3. If preparation of mounting surfaces is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- 4. Examine modules and array frame before installation. Reject modules and arrays that are wet, moisture damaged, or mold damaged.
- 5. Examine roofs, supports, and supporting structures for suitable conditions where PV system will be installed.
- 6. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Field Quality Control

- 1. Perform tests and inspections **with the assistance of a factory-authorized service representative**.
- 2. PV module will be considered defective if it does not pass tests and inspections.
- 3. Prepare test and inspection reports.

END OF SECTION 26 31 00 00

Task	Specification	Specification Description
26 31 00 00	01 22 16 00	No Specification Required

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SECTION 26 32 13 13 - PACKAGED ENGINE GENERATORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for packaged engine generators. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes packaged engine-generator sets for emergency **OR** standby, **as directed**, power supply with the following features:
 - a. Gas and Diesel engine.
 - b. Unit-mounted and Remote-mounting cooling system.
 - c. Unit-mounted and Remote-mounting control and monitoring.
 - d. Performance requirements for sensitive loads.
 - e. Load banks.
 - f. Outdoor enclosure.

C. Definitions

1. Operational Bandwidth: The total variation from the lowest to highest value of a parameter over the range of conditions indicated, expressed as a percentage of the nominal value of the parameter.
2. LP: Liquid petroleum.

D. Submittals

1. Product Data: For each type of packaged engine generator and accessory indicated.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Manufacturer Seismic Qualification Certification: Submit certification that day tank, engine-generator set, batteries, battery racks, accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Source quality-control test reports.
5. Field quality-control test reports.
6. Operation and maintenance data.
7. Warranty: Special warranty specified in this Section.

E. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Manufacturer Qualifications: A qualified manufacturer. Maintain, within **200 miles (321 km)** of Project site, a service center capable of providing training, parts, and emergency maintenance repairs.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
4. Comply with ASME B15.1.
5. Comply with NFPA 37.
6. Comply with NFPA 70.
7. Comply with NFPA 99 for healthcare facilities.
8. Comply with NFPA 110 requirements for Level 1 **OR** 2, **as directed**, emergency power supply system.

9. Comply with UL 2200.
10. Engine Exhaust Emissions: Comply with applicable state and local government requirements.
11. Noise Emission: Comply with applicable state and local government requirements for maximum noise level at adjacent property boundaries due to sound emitted by generator set including engine, engine exhaust, engine cooling-air intake and discharge, and other components of installation.

F. Project Conditions

1. Environmental Conditions: Engine-generator system shall withstand the following environmental conditions without mechanical or electrical damage or degradation of performance capability:
 - a. Ambient Temperature: 5 to 40 deg C **OR** Minus 15 to plus 40 deg C, **as directed**.
 - b. Relative Humidity: 0 to 95 percent for outdoor units.
 - c. Altitude: Sea level to **1000 feet (300 m)**.
2. Unusual Service Conditions: Engine-generator equipment and installation are required to operate under the following conditions:
 - a. High salt-dust content in the air due to sea-spray evaporation.

1.2 PRODUCTS

A. Engine-Generator Set

1. Factory-assembled and -tested, engine-generator set.
2. Mounting Frame: Maintain alignment of mounted components without depending on concrete foundation; and have lifting attachments.
 - a. Rigging Diagram: Inscribed on metal plate permanently attached to mounting frame to indicate location and lifting capacity of each lifting attachment and generator-set center of gravity.
3. Capacities and Characteristics:
 - a. Power Output Ratings: Nominal ratings as indicated, with capacity as required to operate as a unit as evidenced by records of prototype testing.
 - b. Output Connections: Three-phase, three **OR** four, **as directed**, wire.
 - c. Nameplates: For each major system component to identify manufacturer's name and address, and model and serial number of component.
4. Generator-Set Performance:
 - a. Steady-State Voltage Operational Bandwidth: 3 percent of rated output voltage from no load to full load.
 - b. Transient Voltage Performance: Not more than 20 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within three seconds.
 - c. Steady-State Frequency Operational Bandwidth: 0.5 percent of rated frequency from no load to full load.
 - d. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 - e. Transient Frequency Performance: Less than 5 percent variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within five seconds.
 - f. Output Waveform: At no load, harmonic content measured line to line or line to neutral shall not exceed 5 percent total and 3 percent for single harmonics. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
 - g. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 250 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to generator system components.
 - h. Start Time: Comply with NFPA 110, Type 10, system requirements.

5. Generator-Set Performance for Sensitive Loads:
 - a. Oversizing generator compared with the rated power output of the engine is permissible to meet specified performance.
 - 1) Nameplate Data for Oversized Generator: Show ratings required by the Contract Documents rather than ratings that would normally be applied to generator size installed.
 - b. Steady-State Voltage Operational Bandwidth: 1 percent of rated output voltage from no load to full load.
 - c. Transient Voltage Performance: Not more than 10 percent variation for 50 percent step-load increase or decrease. Voltage shall recover and remain within the steady-state operating band within 0.5 second.
 - d. Steady-State Frequency Operational Bandwidth: Plus or minus 0.25 percent of rated frequency from no load to full load.
 - e. Steady-State Frequency Stability: When system is operating at any constant load within the rated load, there shall be no random speed variations outside the steady-state operational band and no hunting or surging of speed.
 - f. Transient Frequency Performance: Less than 2-Hz variation for 50 percent step-load increase or decrease. Frequency shall recover and remain within the steady-state operating band within three seconds.
 - g. Output Waveform: At no load, harmonic content measured line to neutral shall not exceed 2 percent total with no slot ripple. Telephone influence factor, determined according to NEMA MG 1, shall not exceed 50 percent.
 - h. Sustained Short-Circuit Current: For a 3-phase, bolted short circuit at system output terminals, system shall supply a minimum of 300 percent of rated full-load current for not less than 10 seconds and then clear the fault automatically, without damage to winding insulation or other generator system components.
 - i. Excitation System: Performance shall be unaffected by voltage distortion caused by nonlinear load.
 - 1) Provide permanent magnet excitation for power source to voltage regulator.
 - j. Start Time: Comply with NFPA 110, Type 10, system requirements.

B. Engine

1. Fuel: Fuel oil, Grade DF-2 **OR** Natural gas with automatic LP-gas standby **OR** Natural gas, **as directed**.
2. Rated Engine Speed: 1800 rpm.
3. Maximum Piston Speed for Four-Cycle Engines: **2250 fpm (11.4 m/s)**.
4. Lubrication System: The following items are mounted on engine or skid:
 - a. Filter and Strainer: Rated to remove 90 percent of particles 5 micrometers and smaller while passing full flow.
 - b. Thermostatic Control Valve: Control flow in system to maintain optimum oil temperature. Unit shall be capable of full flow and is designed to be fail-safe.
 - c. Crankcase Drain: Arranged for complete gravity drainage to an easily removable container with no disassembly and without use of pumps, siphons, special tools, or appliances.
5. Engine Fuel System:
 - a. Main Fuel Pump For Diesel-Fueled Engine: Mounted on engine. Pump ensures adequate primary fuel flow under starting and load conditions.
 - b. Relief-Bypass Valve For Diesel-Fueled Engine: Automatically regulates pressure in fuel line and returns excess fuel to source.
 - c. Dual Natural Gas with LP-Gas Backup (Vapor-Withdrawal) System:
 - 1) Carburetor.
 - 2) Secondary Gas Regulators: One for each fuel type.
 - 3) Fuel-Shutoff Solenoid Valves: One for each fuel source.
 - 4) Flexible Fuel Connectors: One for each fuel source.
6. Coolant Jacket Heater: Electric-immersion type, factory installed in coolant jacket system. Comply with NFPA 110 requirements for Level 1 equipment for heater capacity.
7. Governor: Adjustable isochronous, with speed sensing.

8. Cooling System:
 - a. Closed loop, liquid cooled, with radiator factory mounted on engine-generator-set mounting frame and integral engine-driven coolant pump.
 - 1) Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 - 2) Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 - 3) Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 - 4) Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
 - 5) Coolant Hose: Flexible assembly with inside surface of nonporous rubber and outer covering of aging-, ultraviolet-, and abrasion-resistant fabric.
 - a) Rating: **50-psig (345-kPa)** maximum working pressure with coolant at **180 deg F (82 deg C)**, and noncollapsible under vacuum.
 - b) End Fittings: Flanges or steel pipe nipples with clamps to suit piping and equipment connections.
 - b. Closed loop, liquid cooled, with remote radiator and integral engine-driven coolant pump.
 - 1) Configuration: Vertical **OR** Horizontal, **as directed**, air discharge.
 - 2) Radiator Core Tubes: Aluminum **OR** Nonferrous-metal construction other than aluminum, **as directed**.
 - 3) Size of Radiator: Adequate to contain expansion of total system coolant from cold start to 110 percent load condition.
 - 4) Expansion Tank: Constructed of welded steel plate and rated to withstand maximum closed-loop coolant system pressure for engine used. Equip with gage glass and petcock.
 - 5) Fan: Driven by multiple belts from engine shaft **OR** totally enclosed electric motor with sealed bearings, **as directed**.
 - 6) Coolant: Solution of 50 percent ethylene-glycol-based antifreeze and 50 percent water, with anticorrosion additives as recommended by engine manufacturer.
 - 7) Temperature Control: Self-contained, thermostatic-control valve modulates coolant flow automatically to maintain optimum constant coolant temperature as recommended by engine manufacturer.
9. Muffler/Silencer:
 - a. Critical type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - 1) Minimum sound attenuation of 25 dB at 500 Hz.
 - 2) Sound level measured at a distance of **10 feet (3 m)** from exhaust discharge after installation is complete shall be 85 dBA or less.
 - b. Residential type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - 1) Minimum sound attenuation of 18 dB at 500 Hz.
 - 2) Sound level measured at a distance of **10 feet (3 m)** from exhaust discharge after installation is complete shall be 95 dBA or less.
 - c. Industrial type, sized as recommended by engine manufacturer and selected with exhaust piping system to not exceed engine manufacturer's engine backpressure requirements.
 - 1) Minimum sound attenuation of 12 dB at 500 Hz.
 - 2) Sound level measured at a distance of **25 feet (8 m)** from exhaust discharge after installation is complete shall be 87 dBA or less.
10. Air-Intake Filter: Standard **OR** Heavy, **as directed**, -duty, engine-mounted air cleaner with replaceable dry-filter element and "blocked filter" indicator.
11. Starting System: 12 **OR** 24, **as directed**, -V electric, with negative ground.

- a. Components: Sized so they will not be damaged during a full engine-cranking cycle with ambient temperature at maximum specified in Part 1 "Project Conditions" Article.
- b. Cranking Motor: Heavy-duty unit that automatically engages and releases from engine flywheel without binding.
- c. Cranking Cycle: As required by NFPA 110 for system level specified **OR** 60 seconds, **as directed**.
- d. Battery: Adequate capacity within ambient temperature range specified in Part 1.1 "Project Conditions" Article to provide specified cranking cycle at least twice **OR** three times, **as directed**, without recharging.
- e. Battery Cable: Size as recommended by engine manufacturer for cable length indicated. Include required interconnecting conductors and connection accessories.
- f. Battery Compartment: Factory fabricated of metal with acid-resistant finish and thermal insulation. Thermostatically controlled heater shall be arranged to maintain battery above 10 deg C regardless of external ambient temperature within range specified in Part 1.1 "Project Conditions" Article. Include accessories required to support and fasten batteries in place.
- g. Battery-Charging Alternator: Factory mounted on engine with solid-state voltage regulation and 35-A minimum continuous rating.
- h. Battery Charger: Current-limiting, automatic-equalizing and float-charging type. Unit shall comply with UL 1236.
 - 1) Operation: Equalizing-charging rate of 10 A shall be initiated automatically after battery has lost charge until an adjustable equalizing voltage is achieved at battery terminals. Unit shall then be automatically switched to a lower float-charging mode and shall continue to operate in that mode until battery is discharged again.
 - 2) Automatic Temperature Compensation: Adjust float and equalize voltages for variations in ambient temperature from minus 40 deg C to plus 60 deg C to prevent overcharging at high temperatures and undercharging at low temperatures.
 - 3) Automatic Voltage Regulation: Maintain constant output voltage regardless of input voltage variations up to plus or minus 10 percent.
 - 4) Ammeter and Voltmeter: Flush mounted in door. Meters shall indicate charging rates.
 - 5) Safety Functions: Sense abnormally low battery voltage and close contacts providing low battery voltage indication on control and monitoring panel. Sense high battery voltage and loss of ac input or dc output of battery charger. Either condition shall close contacts that provide a battery-charger malfunction indication at system control and monitoring panel.
 - 6) Enclosure and Mounting: NEMA 250, Type 1, wall-mounted cabinet.

C. Fuel Oil Storage

1. Comply with NFPA 30.
2. Day Tank: Comply with UL 142, freestanding, factory-fabricated fuel tank assembly, with integral, float-controlled transfer pump and the following features:
 - a. Containment: Integral rupture basin with a capacity of 150 percent of nominal capacity of day tank.
 - 1) Leak Detector: Locate in rupture basin and connect to provide audible and visual alarm in the event of day-tank leak.
 - b. Tank Capacity: As recommended by engine manufacturer for an uninterrupted period of 4 hours' operation at 100 percent of rated power output of engine-generator system without being refilled.
 - c. Pump Capacity: Exceeds maximum flow of fuel drawn by engine-mounted fuel supply pump at 110 percent of rated capacity, including fuel returned from engine.
 - d. Low-Level Alarm Sensor: Liquid-level device operates alarm contacts at 25 percent of normal fuel level.
 - e. High-Level Alarm Sensor: Liquid-level device operates alarm and redundant fuel shutoff contacts at midpoint between overflow level and 100 percent of normal fuel level.

- f. Piping Connections: Factory-installed fuel supply and return lines from tank to engine; local fuel fill, vent line, overflow line; and tank drain line with shutoff valve.
 - g. Redundant High-Level Fuel Shutoff: Actuated by high-level alarm sensor in day tank to operate a separate motor device that disconnects day-tank pump motor. Sensor shall signal solenoid valve, located in fuel suction line between fuel storage tank and day tank, to close. Both actions shall remain in shutoff state until manually reset. Shutoff action shall initiate an alarm signal to control panel but shall not shut down engine-generator set.
 3. Base-Mounted Fuel Oil Tank: Factory installed and piped, complying with UL 142 fuel oil tank. Features include the following:
 - a. Tank level indicator.
 - b. Capacity: Fuel for eight hours' continuous operation at 100 percent rated power output.
 - c. Vandal-resistant fill cap.
 - d. Containment Provisions: Comply with requirements of authorities having jurisdiction.
- D. Control And Monitoring
1. Automatic Starting System Sequence of Operation: When mode-selector switch on the control and monitoring panel is in the automatic position, remote-control contacts in one or more separate automatic transfer switches initiate starting and stopping of generator set. When mode-selector switch is switched to the on position, generator set starts. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.
 2. Manual Starting System Sequence of Operation: Switching on-off switch on the generator control panel to the on position starts generator set. The off position of same switch initiates generator-set shutdown. When generator set is running, specified system or equipment failures or derangements automatically shut down generator set and initiate alarms.
 3. Configuration:
 - a. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common control and monitoring panel mounted on the generator set. Mounting method shall isolate the control panel from generator-set vibration.
 - b. Operating and safety indications, protective devices, basic system controls, and engine gages shall be grouped in a common wall-mounted control and monitoring panel.
 - c. Operating and safety indications, protective devices, basic system controls, engine gages, instrument transformers, generator disconnect switch or circuit breaker, and other indicated components shall be grouped in a combination control and power panel. Control and monitoring section of panel shall be isolated from power sections by steel barriers. Panel features shall include the following:
 - 1) Wall-Mounting Cabinet Construction: Rigid, self-supporting steel unit complying with NEMA ICS 6. Power bus shall be copper. Bus, bus supports, control wiring, and temperature rise shall comply with UL 891.
 - 2) Switchboard Construction: Freestanding unit complying with Division 26 Section "Switchboards".
 - 3) Switchgear Construction: Freestanding unit complying with Division 26 Section "Low-voltage Switchgear".
 - 4) Current and Potential Transformers: Instrument accuracy class.
 4. Indicating and Protective Devices and Controls: As required by NFPA 110 for Level 1 **OR** 2, **as directed**, system, and the following:
 - a. AC voltmeter.
 - b. AC ammeter.
 - c. AC frequency meter.
 - d. DC voltmeter (alternator battery charging).
 - e. Engine-coolant temperature gage.
 - f. Engine lubricating-oil pressure gage.
 - g. Running-time meter.
 - h. Ammeter-voltmeter, phase-selector switch(es).

- i. Generator-voltage adjusting rheostat.
 - j. Fuel tank derangement alarm.
 - k. Fuel tank high-level shutdown of fuel supply alarm.
 - l. Generator overload.
5. Indicating and Protective Devices and Controls:
- a. AC voltmeter.
 - b. AC ammeter.
 - c. AC frequency meter.
 - d. DC voltmeter (alternator battery charging).
 - e. Engine-coolant temperature gage.
 - f. Engine lubricating-oil pressure gage.
 - g. Running-time meter.
 - h. Ammeter-voltmeter, phase-selector switch(es).
 - i. Generator-voltage adjusting rheostat.
 - j. Start-stop switch.
 - k. Overspeed shutdown device.
 - l. Coolant high-temperature shutdown device.
 - m. Coolant low-level shutdown device.
 - n. Oil low-pressure shutdown device.
 - o. Fuel tank derangement alarm.
 - p. Fuel tank high-level shutdown of fuel supply alarm.
 - q. Generator overload.
6. Supporting Items: Include sensors, transducers, terminals, relays, and other devices and include wiring required to support specified items. Locate sensors and other supporting items on engine or generator, unless otherwise indicated.
7. Connection to Data Link: A separate terminal block, factory wired to Form C dry contacts, for each alarm and status indication is reserved for connections for data-link transmission of indications to remote data terminals. Data system connections to terminals are covered in Division 26 Section "Electrical Power Monitoring And Control".
8. Common Remote Audible Alarm:
- a. Comply with NFPA 110 requirements for Level 1 systems. Include necessary contacts and terminals in control and monitoring panel.
 - 1) Overcrank shutdown.
 - 2) Coolant low-temperature alarm.
 - 3) Control switch not in auto position.
 - 4) Battery-charger malfunction alarm.
 - 5) Battery low-voltage alarm.
 - b. Common Remote Audible Alarm for manually starting systems or for automatically starting systems not specified to comply with NFPA 110, Level 1, but where some remote alarm functions are needed. Signal the occurrence of any events listed below without differentiating between event types. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset.
 - 1) Engine high-temperature shutdown.
 - 2) Lube-oil, low-pressure shutdown.
 - 3) Overspeed shutdown.
 - 4) Remote emergency-stop shutdown.
 - 5) Engine high-temperature prealarm.
 - 6) Lube-oil, low-pressure prealarm.
 - 7) Fuel tank, low-fuel level.
 - 8) Low coolant level.
9. Remote Alarm Annunciator: Comply with NFPA 99. An LED labeled with proper alarm conditions shall identify each alarm event and a common audible signal shall sound for each alarm condition. Silencing switch in face of panel shall silence signal without altering visual indication. Connect so that after an alarm is silenced, clearing of initiating condition will reactivate alarm until silencing switch is reset. Cabinet and faceplate are surface- or flush-mounting type to suit mounting conditions indicated.

10. Remote Emergency-Stop Switch: Flush; wall mounted, unless otherwise indicated; and labeled. Push button shall be protected from accidental operation.

E. Generator Overcurrent And Fault Protection

1. Generator Circuit Breaker:
 - a. Molded-case, thermal-magnetic type; 100 percent rated; complying with NEMA AB 1 and UL 489.
 - 1) Tripping Characteristic: Designed specifically for generator protection.
 - 2) Trip Rating: Matched to generator rating.
 - 3) Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4) Mounting: Adjacent to or integrated with control and monitoring panel.
 - b. Molded-case, electronic-trip type; 100 percent rated; complying with UL 489.
 - 1) Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
 - 2) Trip Settings: Selected to coordinate with generator thermal damage curve.
 - 3) Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - 4) Mounting: Adjacent to or integrated with control and monitoring panel.
 - c. Insulated-case, electronic-trip type; 100 percent rated; complying with UL 489.
 - d. Tripping Characteristics: Adjustable long-time and short-time delay and instantaneous.
 - e. Trip Settings: Selected to coordinate with generator thermal damage curve.
 - f. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 - g. Mounting: Adjacent to or integrated with control and monitoring panel.
2. Generator Disconnect Switch: Molded-case type, 100 percent rated.
 - a. Rating: Matched to generator output rating.
 - b. Shunt Trip: Connected to trip switch when signaled by generator protector or by other protective devices.
3. Generator Protector: Microprocessor-based unit shall continuously monitor current level in each phase of generator output, integrate generator heating effect over time, and predict when thermal damage of alternator will occur. When signaled by generator protector or other generator-set protective devices, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from load circuits. Protector shall perform the following functions:
 - a. Initiates a generator overload alarm when generator has operated at an overload equivalent to 110 percent of full-rated load for 60 seconds. Indication for this alarm is integrated with other generator-set malfunction alarms.
 - b. Under single or three-phase fault conditions, regulates generator to 300 percent of rated full-load current for up to 10 seconds.
 - c. As overcurrent heating effect on the generator approaches the thermal damage point of the unit, protector switches the excitation system off, opens the generator disconnect device, and shuts down the generator set.
 - d. Senses clearing of a fault by other overcurrent devices and controls recovery of rated voltage to avoid overshoot.
 - e. Ground-Fault Indication: Comply with NFPA 70, "Emergency System" signals for ground-fault. Integrate ground-fault alarm indication with other generator-set alarm indications.

F. Generator, Exciter, And Voltage Regulator

1. Comply with NEMA MG 1.
2. Drive: Generator shaft shall be directly connected to engine shaft. Exciter shall be rotated integrally with generator rotor.
3. Electrical Insulation: Class H or Class F.
4. Stator-Winding Leads: Brought out to terminal box to permit future reconnection for other voltages if required.

5. Construction shall prevent mechanical, electrical, and thermal damage due to vibration, overspeed up to 125 percent of rating, and heat during operation at 110 percent of rated capacity.
6. Enclosure: Dripproof.
7. Instrument Transformers: Mounted within generator enclosure.
8. Voltage Regulator: Solid-state type, separate from exciter, providing performance as specified.
 - a. Adjusting rheostat on control and monitoring panel shall provide plus or minus 5 percent adjustment of output-voltage operating band.
9. Strip Heater: Thermostatically controlled unit arranged to maintain stator windings above dew point.
10. Windings: Two-thirds pitch stator winding and fully linked amortisseur winding.
11. Subtransient Reactance: 12 percent, maximum.

G. Load Bank

1. Description: Permanent, outdoor, weatherproof, remote-controlled, forced-air-cooled, resistive **OR** resistive and reactive, **as directed**, unit capable of providing a balanced 3-phase, delta-connected load to generator set at 100 percent rated-system capacity, at 80 percent power factor, lagging. Unit may be composed of separate resistive and reactive load banks controlled by a common control panel. Unit shall be capable of selective control of load in 25 percent steps and with minimum step changes of approximately 5 and 10 percent available.
2. Resistive Load Elements: Corrosion-resistant chromium alloy with ceramic and steel supports. Elements shall be double insulated and designed for repetitive on-off cycling. Elements shall be mounted in removable aluminized-steel heater cases.
3. Reactive Load Elements: Epoxy-encapsulated reactor coils.
4. Load-Bank Heat Dissipation: Integral fan with totally enclosed motor shall provide uniform cooling airflow through load elements. Airflow and coil operating current shall be such that, at maximum load, with ambient temperature at the upper end of specified range, load-bank elements operate at not more than 50 percent of maximum continuous temperature rating of resistance elements.
5. Load Element Switching: Remote-controlled contactors switch groups of load elements. Contactor coils are rated 120 V. Contactors shall be located in a separate NEMA 250, Type 3R enclosure within load-bank enclosure, accessible from exterior through hinged doors with tumbler locks.
6. Contactor Enclosures: Heated by thermostatically controlled strip heaters to prevent condensation.
7. Load-Bank Enclosures: NEMA 250, Type 3R, complying with NEMA ICS 6. Louvers at cooling-air intake and discharge openings shall prevent entry of rain and snow. Openings for airflow shall be screened with **1/2-inch- (13-mm-)** square, galvanized-steel mesh. Reactive load bank shall include automatic shutters at air intake and discharge.
8. Protective Devices: Power input circuits to load banks shall be fused, and fuses shall be selected to coordinate with generator circuit breaker. Fuse blocks shall be located in contactor enclosure. Cooling airflow and overtemperature sensors shall automatically shut down and lock out load bank until manually reset. Safety interlocks on access panels and doors shall disconnect load power, control, and heater circuits. Fan motor shall be separately protected by overload and short-circuit devices. Short-circuit devices shall be noninterchangeable fuses with 200,000-A interrupting capacity.
9. Remote-Control Panel: Separate from load bank in NEMA 250, Type 1 enclosure with a control power switch and pilot light, and switches controlling groups of load elements.
10. Control Sequence: Control panel may be preset for adjustable single-step loading of generator during automatic exercising.

H. Outdoor Generator-Set Enclosure

1. Description:
 - a. Vandal-resistant, weatherproof steel housing, wind resistant up to **100 mph (160 km/h)**. Multiple panels shall be lockable and provide adequate access to components requiring maintenance. Panels shall be removable by one person without tools. Instruments and control shall be mounted within enclosure.

- b. Prefabricated or preengineered walk-in enclosure with the following features:
 - 1) Construction: Galvanized-steel, metal-clad, integral structural-steel-framed building erected on concrete foundation.
 - 2) Structural Design and Anchorage: Comply with ASCE 7 for wind loads.
 - 3) Space Heater: Thermostatically controlled and sized to prevent condensation.
 - 4) Louvers: Equipped with bird screen and filter arranged to permit air circulation when engine is not running while excluding exterior dust, birds, and rodents.
 - 5) Hinged Doors: With padlocking provisions.
 - 6) Ventilation: Louvers equipped with bird screen and filter arranged to permit air circulation while excluding exterior dust, birds, and rodents.
 - 7) Thermal Insulation: Manufacturer's standard materials and thickness selected in coordination with space heater to maintain winter interior temperature within operating limits required by engine-generator-set components.
 - 8) Muffler Location: Within **OR** External to, **as directed**, enclosure.
 2. Engine Cooling Airflow through Enclosure: Maintain temperature rise of system components within required limits when unit operates at 110 percent of rated load for 2 hours with ambient temperature at top of range specified in system service conditions.
 - a. Louvers: Fixed-engine, cooling-air inlet and discharge. Storm-proof and drainable louvers prevent entry of rain and snow.
 - b. Automatic Dampers: At engine cooling-air inlet and discharge. Dampers shall be closed to reduce enclosure heat loss in cold weather when unit is not operating.
 3. Interior Lights with Switch: Factory-wired, vaporproof-type fixtures within housing; arranged to illuminate controls and accessible interior. Arrange for external electrical connection.
 - a. AC lighting system and connection point for operation when remote source is available.
 - b. DC lighting system for operation when remote source and generator are both unavailable.
 4. Convenience Outlets: Factory wired, GFCI. Arrange for external electrical connection.
- I. Motors
1. General requirements for motors are specified in Division 23 Section "Common Motor Requirements For Hvac Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are specified in Division 22.
- J. Vibration Isolation Devices
1. Elastomeric Isolator Pads: Oil- and water-resistant elastomer or natural rubber, arranged in single or multiple layers, molded with a nonslip pattern and galvanized-steel baseplates of sufficient stiffness for uniform loading over pad area, and factory cut to sizes that match requirements of supported equipment.
 - a. Material: Standard neoprene **OR** Natural rubber **OR** Bridge-bearing neoprene, complying with AASHTO M 251, **as directed**.
 - b. Durometer Rating: 30 **OR** 40 **OR** 45 **OR** 50 **OR** 60 **OR** 65 **OR** 70, **as directed**.
 - c. Number of Layers: One **OR** Two **OR** Three **OR** Four, **as directed**.
 2. Restrained Spring Isolators: Freestanding, steel, open-spring isolators with seismic restraint.
 - a. Housing: Steel with resilient vertical-limit stops to prevent spring extension due to wind loads or if weight is removed; factory-drilled baseplate bonded to **1/4-inch- (6-mm-)** thick, elastomeric isolator pad attached to baseplate underside; and adjustable equipment mounting and leveling bolt that acts as blocking during installation.
 - b. Outside Spring Diameter: Not less than 80 percent of compressed height of the spring at rated load.
 - c. Minimum Additional Travel: 50 percent of required deflection at rated load.
 - d. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
 - e. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.

- K. Finishes
 - 1. Indoor and Outdoor Enclosures and Components: Manufacturer's standard finish over corrosion-resistant pretreatment and compatible primer.
- L. Source Quality Control
 - 1. Prototype Testing: Factory test engine-generator set using same engine model, constructed of identical or equivalent components and equipped with identical or equivalent accessories.
 - a. Tests: Comply with NFPA 110, Level 1 Energy Converters and with IEEE 115.
 - b. Report factory test results within 10 days of completion of test.

1.3 EXECUTION

- A. Installation
 - 1. Comply with packaged engine-generator manufacturers' written installation and alignment instructions and with NFPA 110.
 - 2. Install packaged engine generator to provide access, without removing connections or accessories, for periodic maintenance.
 - 3. Install packaged engine generator with elastomeric isolator pads **OR** restrained spring isolators, **as directed**, having a minimum deflection of **1 inch (25 mm)** on **4-inch- (100-mm-)** high concrete base. Secure sets to anchor bolts installed in concrete bases. Concrete base construction is specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 - 4. Install remote radiator with elastomeric isolator pads **OR** restrained spring isolators, **as directed**, having a minimum deflection of **1 inch (25 mm)** on concrete base on grade **OR** roof equipment supports on roof, **as directed**.
 - 5. Install Schedule 40, black steel piping with welded joints for cooling water piping between engine-generator set and heat exchanger **OR** remote radiator, **as directed**. Piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping".
 - 6. Install Schedule 40, black steel piping with welded joints and connect to engine muffler. Install thimble at wall. Piping shall be same diameter as muffler outlet. Flexible connectors and steel piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping".
 - a. Install condensate drain piping to muffler drain outlet full size of drain connection with a shutoff valve, stainless-steel flexible connector, and Schedule 40, black steel pipe with welded joints. Flexible connectors and piping materials and installation requirements are specified in Division 23 Section "Hydronic Piping".
 - 7. Electrical Wiring: Install electrical devices furnished by equipment manufacturers but not specified to be factory mounted.
 - 8. Piping installation requirements are specified in Division 21. Drawings indicate general arrangement of piping and specialties.
 - 9. Connect fuel, cooling-system, and exhaust-system piping adjacent to packaged engine generator to allow service and maintenance.
 - 10. Connect cooling-system water piping to engine-generator set and remote radiator **OR** heat exchanger, **as directed** with flexible connectors.
 - 11. Connect engine exhaust pipe to engine with flexible connector.
 - 12. Connect fuel piping to engines with a gate valve and union and flexible connector.
 - a. Natural-gas piping, valves, and specialties for gas distribution are specified in Division 23 Section "Facility Natural-gas Piping".
 - b. LP-gas piping, valves, and specialties for gas piping are specified in Division 23 Section "Facility Liquefied-petroleum Gas Piping".
 - 13. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 - 14. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
 - 15. Identify system components according to Division 23 Section "Identification For Hvac Piping And Equipment" and Division 26 Section "Identification For Electrical Systems".

- B. Field Quality Control
1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Perform tests recommended by manufacturer and each electrical test and visual and mechanical inspection (except those indicated to be optional) for "AC Generators and for Emergency Systems" specified in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - b. NFPA 110 Acceptance Tests: Perform tests required by NFPA 110 that are additional to those specified here including, but not limited to, single-step full-load pickup test.
 - c. Battery Tests: Equalize charging of battery cells according to manufacturer's written instructions. Record individual cell voltages.
 - 1) Measure charging voltage and voltages between available battery terminals for full-charging and float-charging conditions. Check electrolyte level and specific gravity under both conditions.
 - 2) Test for contact integrity of all connectors. Perform an integrity load test and a capacity load test for the battery.
 - 3) Verify acceptance of charge for each element of the battery after discharge.
 - 4) Verify that measurements are within manufacturer's specifications.
 - d. Battery-Charger Tests: Verify specified rates of charge for both equalizing and float-charging conditions.
 - e. System Integrity Tests: Methodically verify proper installation, connection, and integrity of each element of engine-generator system before and during system operation. Check for air, exhaust, and fluid leaks.
 - f. Exhaust-System Back-Pressure Test: Use a manometer with a scale exceeding **40-inch wg (120 kPa)**. Connect to exhaust line close to engine exhaust manifold. Verify that back pressure at full-rated load is within manufacturer's written allowable limits for the engine.
 - g. Exhaust Emissions Test: Comply with applicable government test criteria.
 - h. Voltage and Frequency Transient Stability Tests: Use recording oscilloscope to measure voltage and frequency transients for 50 and 100 percent step-load increases and decreases, and verify that performance is as specified.
 - i. Harmonic-Content Tests: Measure harmonic content of output voltage under 25 percent and at 100 percent of rated linear load. Verify that harmonic content is within specified limits.
 - j. Noise Level Tests: Measure A-weighted level of noise emanating from generator-set installation, including engine exhaust and cooling-air intake and discharge, at four locations on the property line, and compare measured levels with required values.
 3. Coordinate tests with tests for transfer switches and run them concurrently.
 4. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 5. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 6. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 7. Remove and replace malfunctioning units and retest **OR** reinspect, **as directed**, as specified above.
 8. Retest: Correct deficiencies identified by tests and observations and retest until specified requirements are met.
 9. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation resistances, time delays, and other values and observations. Attach a label or tag to each tested component indicating satisfactory completion of tests.
- C. Demonstration

1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain packaged engine generators.

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Task	Specification	Specification Description
26 32 13 19	26 32 13 13	Packaged Engine Generators
26 32 29 00	26 32 13 13	Packaged Engine Generators

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SECTION 26 33 43 00 - CENTRAL BATTERY INVERTERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for central battery inverters. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes slow-transfer, fast-transfer, and UPS central battery inverters with the following features:
 - a. Output distribution section.
 - b. Internal maintenance bypass/isolation switch.
 - c. External maintenance bypass/isolation switch.
 - d. Multiple output voltages.
 - e. Emergency-only circuits.
 - f. Remote monitoring provisions.

C. Definitions

1. LCD: Liquid-crystal display.
2. LED: Light-emitting diode.
3. THD: Total harmonic distortion.
4. UPS: Uninterruptible power supply.

D. Submittals

1. Product Data: For the following:
 - a. Electrical ratings, including the following:
 - 1) Capacity to provide power during failure of normal ac.
 - 2) Inverter voltage regulation and THD of output current.
 - 3) Rectifier data.
 - 4) Transfer time of transfer switch.
 - 5) Data for specified optional features.
 - b. Transfer switch.
 - c. Inverter.
 - d. Battery charger.
 - e. Batteries.
 - f. Battery monitoring.
 - g. Battery-cycle warranty monitor.
2. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.
 - a. Wiring Diagrams: Detail internal and interconnecting wiring; and power, signal, and control wiring.
 - b. Elevation and details of control and indication displays.
 - c. Output distribution section.
3. Manufacturer Seismic Qualification Certification: Submit certification that central battery inverter equipment will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Operation and Maintenance Data.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Central Battery Inverter System: UL 924 and UL 1778, **as directed**, listed.
3. Comply with NFPA 70 and NFPA 101.

F. Delivery, Storage, And Handling

1. Deliver equipment in fully enclosed vehicles.
2. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace batteries that fail in materials or workmanship within specified warranty period. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for period specified.
 - a. Warranty Period: Include the following warranty periods, from date of Final Completion:
 - 1) Premium, Valve-Regulated, Recombinant, Lead-Calcium Batteries:
 - a) Full Warranty: One year.
 - b) Pro Rata: 19 years.
 - 2) Standard, Valve-Regulated, Recombinant, Lead-Calcium Batteries:
 - a) Full Warranty: One year.
 - b) Pro Rata: Nine years.
 - 3) Nickel-Cadmium, Wet-Cell Batteries:
 - a) Full Warranty: Five years.
 - b) Pro Rata: 15 years.
 - 4) Lead-Calcium, Wet-Cell Batteries:
 - a) Full Warranty: One year.
 - b) Pro Rata: Nine years.
 - 5) Lead-Antimony, Wet-Cell Batteries:
 - a) Full Warranty: One year.
 - b) Pro Rata: Nine years.

1.2 PRODUCTS

A. Inverter Performance Requirements

1. Slow-Transfer Central Battery Inverters: Automatically sense loss of normal ac supply and use an electromechanical switch to transfer loads. Transfer in one second or less from normal supply to battery-inverter supply.
 - a. Operation: Unit supplies power to output circuits from a single, external, normal supply source. Unit automatically transfers load from normal source to internal battery/inverter source. Retransfer to normal is automatic when normal power is restored.
2. Fast-Transfer Central Battery Inverters: Automatically sense loss of normal ac supply and use a solid-state switch to transfer loads. Transfer in 0.004 second or less from normal supply to battery-inverter supply.
 - a. Operation: Unit supplies power to output circuits from a single, external, normal supply source. Unit automatically transfers load from normal source to internal battery/inverter source. Retransfer to normal is automatic when normal power is restored.
3. UPS-Type Central Battery Inverters: Continuously provide ac power to connected electrical system.
 - a. Automatic Operation:
 - 1) Normal Conditions: Supply the load with ac power flowing from normal ac power input terminals, through rectifier-charger and inverter, with battery connected in parallel with rectifier-charger output.

- 2) Abnormal Supply Conditions: If normal ac supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, battery supplies constant, regulated, inverter ac power output to the load without switching or disturbance.
 - 3) If normal power fails, battery continues supply-regulated ac power through the inverter to the load without switching or disturbance.
 - 4) When power is restored at normal supply terminals of system, controls automatically synchronize inverter with the external source before transferring the load. Rectifier-charger then supplies power to the load through the inverter and simultaneously recharges battery.
 - 5) If battery becomes discharged and normal supply is available, rectifier-charger charges battery. When battery is fully charged, rectifier-charger automatically shifts to float-charge mode.
 - 6) If any element of central battery inverter system fails and power is available at normal supply terminals of system, static bypass transfer switch transfers the load to normal ac supply circuit without disturbance or interruption of supply.
 - 7) If a fault occurs in system supplied by central battery inverter and current flows in excess of the overload rating of central battery inverter system, static bypass transfer switch operates to bypass fault current to normal ac supply circuit for fault clearing.
 - 8) When fault has cleared, static bypass transfer switch returns the load to central battery inverter system.
 - 9) If battery is disconnected, central battery inverter continues to supply power to the load with no degradation of its regulation of voltage and frequency of output bus.
- b. Manual Operation:
- 1) Turning inverter off causes static bypass transfer switch to transfer the load directly to normal ac supply circuit without disturbance or interruption.
 - 2) Turning inverter on causes static bypass transfer switch to transfer the load to inverter.
4. Maximum Acoustical Noise: dB as directed by the Owner , "A" weighting, emanating from any UPS component under any condition of normal operation, measured **39 inches (990 mm)** from nearest surface of component enclosure.
- B. Service Conditions
1. Environmental Conditions: Inverter system shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Ambient Temperature for Electronic Components: **32 to 98 deg F (0 to 37 deg C)**.
 - b. Relative Humidity: 0 to 95 percent, noncondensing.
 - c. Altitude: Sea level to **4000 feet (1220 m)**.
- C. Inverters
1. Description: Solid-state type, with the following operational features:
 - a. Automatically regulate output voltage to within plus or minus 5 percent.
 - b. Automatically regulate output frequency to within plus or minus 1 Hz, from no load to full load at unit power factor over the operating range of battery voltage.
 - c. Output Voltage Waveform of Unit: Sine wave with maximum 10 percent THD throughout battery operating-voltage range, from no load to full load.
 - 1) THD may not exceed 5 percent when serving a resistive load of 100 percent of unit rating.
 - d. Output Protection: Current-limiting and short-circuit protection.
OR
Output Protection: Ferroresonant transformer to provide inherent overload and short-circuit protection.
 - e. Surge Protection: Panelboard **OR** Auxiliary panel, **as directed**, suppressors specified in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits".

- f. Overload Capability: 125 percent for 10 minutes; 150 percent surge.
- g. Brownout Protection: Produces rated power without draining batteries when input voltage is down to 75 percent of normal.

D. Battery Charger

- 1. Description: Solid-state, automatically maintaining batteries in fully charged condition when normal power is available. With LED indicators for "float" and "high-charge" modes.

E. Batteries

- 1. Description: Premium, valve-regulated, recombinant, lead-calcium **OR** Standard, valve-regulated, recombinant, lead-calcium **OR** Nickel-cadmium, wet-cell **OR** Lead-calcium, wet-cell **OR** Lead-antimony, wet-cell, **as directed**, batteries.
 - a. Capable of sustaining full-capacity output of inverter unit for minimum of 90 minutes.

F. Enclosures

- 1. NEMA 250, Type 1 steel cabinets with access to components through hinged doors with flush tumbler lock and latch.
- 2. Finish: Manufacturer's standard baked-enamel finish over corrosion-resistant prime treatment.

G. Seismic Requirements

- 1. Central battery inverter assemblies, subassemblies, components, fastenings, supports, and mounting and anchorage devices shall be designed and fabricated to withstand seismic forces, **as directed**. The term "withstand" is defined in the "Manufacturer Seismic Qualification Certification" Paragraph in Part 1.1 "Submittals" Article.

H. Control And Indication

- 1. Description: Group displays, indications, and basic system controls on common control panel on front of central battery inverter enclosure.
- 2. Minimum displays, indicating devices, and controls shall include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms shall include an audible signal and a visual display.
- 3. Indications: Labeled LED **OR** Plain-language messages on a digital LCD or LED, **as directed**.
 - a. Quantitative Indications:
 - 1) Input voltage, each phase, line to line.
 - 2) Input current, each phase, line to line.
 - 3) System output voltage, each phase, line to line.
 - 4) System output current, each phase.
 - 5) System output frequency.
 - 6) DC bus voltage.
 - 7) Battery current and direction (charge/discharge).
 - 8) Elapsed time-discharging battery.
 - b. Basic Status Condition Indications:
 - 1) Normal operation.
 - 2) Load-on bypass.
 - 3) Load-on battery.
 - 4) Inverter off.
 - 5) Alarm condition exists.
 - c. Alarm Indications:
 - 1) Battery system alarm.
 - 2) Control power failure.
 - 3) Fan failure.
 - 4) Overload.
 - 5) Battery-charging control faulty.
 - 6) Input overvoltage or undervoltage.
 - 7) Approaching end of battery operation.

- 8) Battery undervoltage shutdown.
 - 9) Inverter fuse blown.
 - 10) Inverter transformer overtemperature.
 - 11) Inverter overtemperature.
 - 12) Static bypass transfer switch overtemperature.
 - 13) Inverter power supply fault.
 - 14) Inverter output overvoltage or undervoltage.
 - 15) System overload shutdown.
 - 16) Inverter output contactor open.
 - 17) Inverter current limit.
- d. Controls:
- 1) Inverter on-off.
 - 2) Start.
 - 3) Battery test.
 - 4) Alarm silence/reset.
 - 5) Output-voltage adjustment.
4. Dry-form "C" contacts shall be available for remote indication of the following conditions:
- a. Inverter on battery.
 - b. Inverter on-line.
 - c. Inverter load-on bypass.
 - d. Inverter in alarm condition.
 - e. Inverter off (maintenance bypass closed).
5. Include the following minimum array:
- a. Ready, normal-power on light.
 - b. Charge light.
 - c. Inverter supply load light.
 - d. Battery voltmeter.
 - e. AC output voltmeter with minimum accuracy of 2 percent of full scale.
 - f. Load ammeter.
 - g. Test switch to simulate ac failure.
6. Enclosure: Steel, with hinged lockable doors, suitable for wall **OR** floor, **as directed**, mounting. Manufacturer's standard corrosion-resistant finish.
- I. Optional Features
1. Multiple Output Voltages: Supply unit branch circuits at different voltage levels if required. Transform voltages internally as required to produce indicated output voltages.
 2. Emergency-Only Circuits: Automatically energize only when normal supply has failed. Disconnect emergency-only circuits when normal power is restored.
 3. Maintenance Bypass/Isolation Switch: Load is supplied, bypassing central battery inverter system. Normal supply, electromechanical transfer switch, and system load terminals are completely disconnected from external circuits.
 4. Maintenance Bypass/Isolation Switch: Switch is interlocked so it cannot be operated unless static bypass transfer switch is in bypass mode. Switch provides manual selection among the following three conditions without interrupting supply to the load during switching:
 - a. Full Isolation: Load is supplied, bypassing central battery inverter system. Normal ac input circuit, static bypass transfer switch, and central battery inverter load terminals are completely disconnected from external circuits.
 - b. Maintenance Bypass: Load is supplied, bypassing central battery inverter system. Central battery inverter ac supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.
 - c. Normal: Normal central battery inverter ac supply terminals are energized and the load is supplied either through static bypass transfer switch and central battery inverter rectifier-charger and inverter or through battery and inverter.
- J. Output Distribution Section

1. Panelboard: Comply with Division 26 Section "Panelboards" except provide assembly integral to equipment cabinet.

K. System Monitoring And Alarms

1. Remote Status and Alarm Panel: Labeled LEDs on panel faceplate shall indicate five basic status conditions. Audible signal indicates alarm conditions. Silencing switch in face of panel silences signal without altering visual indication.
 - a. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.
2. Provisions for Remote Computer Monitoring: Communication module in unit control panel provides capability for remote monitoring of status, parameters, and alarms specified in Part 1.2 "Control and Indication" Article. Remote computer and connecting signal wiring will be provided by the Owner. Include the following features:
 - a. Connectors and network interface units or modems for data transmission via RS-232 link.
 - b. Software shall be designed to control and monitor inverter system functions and to provide on-screen explanations, interpretations, diagnosis, action guidance, and instructions for use of monitoring indications and development of reports. Include capability for storage and analysis of power-line transient records. Software shall be compatible with requirements in Division 26 Section "Electrical Power Monitoring And Control" and the operating system and configuration of the Owner-furnished computers.
3. Battery Ground-Fault Detector: Initiates alarm when resistance to ground of positive or negative bus of battery is less than 5000 ohms.
 - a. Annunciation of Alarms: At inverter system control panel.
4. Battery-Cycle Warranty Monitoring: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring charge-discharge cycle history of batteries covered by cycle-life warranty.
 - a. Basic Functional Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on integral LCD.
 - b. Additional monitoring functions and features shall include the following:
 - 1) Measuring and recording of total voltage at battery terminals; providing alarm for excursions outside proper float voltage level.
 - 2) Monitoring of ambient temperature at battery and initiating an alarm if temperature deviates from normally acceptable range.
 - 3) Keypad on device front panel provides access to monitored data using front panel display.
 - 4) Alarm contacts arranged to provide local **OR** remote, **as directed**, alarm for battery discharge events **OR** abnormal temperature **OR** abnormal battery voltage or temperature, **as directed**.
 - 5) Memory device to store recorded data in nonvolatile electronic memory.
 - 6) RS-232 port to permit downloading of data to a portable personal computer.
 - 7) Modem to make measurements and recorded data accessible to remote personal computer via telephone line. Computer will be provided by the Owner.

L. Source Quality Control

1. Factory test complete inverter system, including battery, before shipment. Include the following:
 - a. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
 - b. Full-load test.
 - c. Transient-load response test.
 - d. Overload test.
 - e. Power failure test.
2. Observation of Test: Give 14 days' advance notice of tests and provide access for the Owner's representative to observe tests at the Owner's option.
3. Report test results. Include the following data:

- a. Description of input source and output loads used. Describe actions required to simulate source load variation and various operating conditions and malfunctions.
- b. List of indications, parameter values, and system responses considered satisfactory for each test action. Include tabulation of actual observations during test.
- c. List of instruments and equipment used in factory tests.

1.3 EXECUTION

A. Installation

1. Install system components on floor **OR** concrete base, **as directed**, and attach by bolting.
 - a. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details. See Division 26 Section "Vibration And Seismic Controls For Electrical Systems" for seismic-restraint requirements.
 - b. Concrete Bases: **4 inches (100 mm)** high, reinforced, with chamfered edges. Extend base no more than **3 inches (75 mm)** in all directions beyond the maximum dimensions of switchgear unless otherwise indicated or unless required for seismic anchor support. Construct concrete bases according to Division 26 Section "Hangers And Supports For Electrical Systems".
 - c. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
 - e. Use **3000-psi (20.7-MPa)**, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-place Concrete".
2. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.

B. Connections

1. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams, unless otherwise indicated.
2. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 - a. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with NFPA 70.
3. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Identification

1. Identify equipment and components according to Division 26 Section "Identification For Electrical Systems".

D. Field Quality Control

1. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
2. Tests and Inspections:
 - a. Inspect interiors of enclosures for integrity of mechanical and electrical connections, component type and labeling verification, and ratings of installed components.
 - b. Test manual and automatic operational features and system protective and alarm functions.
 - c. Test communication of status and alarms to remote monitoring equipment.
 - d. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specifications. Certify compliance with test parameters.

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- e. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
3. Remove and replace malfunctioning units and retest as specified above.

E. Startup Service

1. Engage a factory-authorized service representative to perform startup service.
2. Verify that central battery inverter is installed and connected according to the Contract Documents.
3. Verify that electrical wiring installation complies with manufacturer's submittal and installation requirements in Division 22.
4. Complete installation and startup checks according to manufacturer's written instructions.

F. Adjusting And Cleaning

1. Set field-adjustable switches and circuit-breaker trip ranges as indicated.
2. Install new filters in each equipment cabinet within 14 days from date of Final Completion.

END OF SECTION 26 33 43 00

SECTION 26 33 43 00a - PUBLIC ADDRESS AND MASS NOTIFICATION SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of public address and mass notification systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Preamplifiers.
 - b. Power amplifiers.
 - c. Transfer to standby amplifier.
 - d. Microphones.
 - e. Volume limiter/compressors.
 - f. Control console.
 - g. Equipment cabinet.
 - h. Equipment rack.
 - i. Telephone paging adapters.
 - j. Tone generator.
 - k. Monitor panel.
 - l. Loudspeakers.
 - m. Noise-operated gain controllers.
 - n. Microphone and headphone outlets.
 - o. Battery backup power unit.
 - p. Conductors and cables.
 - q. Raceways.

C. Definitions

1. Channels: Separate parallel signal paths, from sources to loudspeakers or loudspeaker zones, with separate amplification and switching that permit selection between paths for speaker alternative program signals.
2. VU: Volume unit.
3. Zone: Separate group of loudspeakers and associated supply wiring that may be arranged for selective switching between different channels.

D. Performance Requirements

1. Delegated Design: Design supports and seismic restraints for control consoles, equipment cabinets and racks, and components, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Seismic Performance: Supports and seismic restraints for control consoles, equipment cabinets and racks, and components shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For supports and seismic restraints for control consoles, equipment cabinets and racks, and components. Include plans, elevations, sections, details, and attachments to other work.

- a. Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Console layouts.
 - c. Control panels.
 - d. Rack arrangements.
 - e. Calculations: For sizing backup battery.
 - f. Wiring Diagrams: For power, signal, and control wiring.
 - 1) Identify terminals to facilitate installation, operation, and maintenance.
 - 2) Single-line diagram showing interconnection of components.
 - 3) Cabling diagram showing cable routing.
3. Delegated-Design Submittal: For supports and seismic restraints for control consoles, equipment cabinets and racks, and components indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- a. Detail fabrication and assembly of supports and seismic restraints for control consoles, equipment cabinets and racks, and components.
4. Seismic Qualification Certificates: For control consoles, equipment cabinets and racks, accessories, and components, from manufacturer.
- a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Field quality-control reports.
6. Operation and maintenance data.
- F. Quality Assurance
1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Comply with NFPA 70.

1.2 PRODUCTS

A. Functional Description Of System

1. System Functions:
 - a. Selectively connect any zone to any available signal channel.
 - b. Selectively control sound from microphone outlets and other inputs.
 - c. "All-call" feature shall connect the all-call sound signal simultaneously to all zones regardless of zone or channel switch settings.
 - d. Telephone paging adapter shall allow paging by dialing an extension from any local telephone instrument and speaking into the telephone.
 - e. Produce a program-signal tone that is amplified and sounded over all speakers, overriding signals currently being distributed.
 - f. Reproduce high-quality sound that is free of noise and distortion at all loudspeakers at all times during equipment operation including standby mode with inputs off; output free of non-uniform coverage of amplified sound.

B. General Equipment And Material Requirements

1. Compatibility of Components: Coordinate component features to form an integrated system. Match components and interconnections for optimum performance of specified functions.
2. Equipment: Comply with UL 813. Equipment shall be modular, using solid-state components, and fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz.

3. Equipment Mounting: Where rack, cabinet, or console mounting is indicated, equipment shall be designed to mount in a **19-inch (483-mm)** housing complying with TIA/EIA-310-D.
 4. Weather-Resistant Equipment: Listed and labeled by a qualified testing agency for duty outdoors or in damp locations.
- C. Preamplifiers
1. Preamplifier: Separately mounted.
 2. Preamplifier: Integral to power amplifier.
 3. Output Power: Plus 4 dB above 1 mW at matched power-amplifier load.
 4. Total Harmonic Distortion: Less than 1 percent.
 5. Frequency Response: Within plus or minus 2 dB from 20 to 20,000 Hz.
 6. Input Jacks: Minimum of two. One matched for low-impedance microphone; the other matchable to cassette deck, CD player, or radio tuner signals without external adapters.
 7. Minimum Noise Level: Minus 55 dB below rated output.
 8. Controls: On-off, input levels, and master gain.
- D. Power Amplifiers
1. Mounting: Console **OR** Rack, **as directed**.
 2. Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.
 3. Total Harmonic Distortion: Less than 3 percent at rated power output from 50 to 12,000 Hz.
 4. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.
 5. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.
 6. Output Regulation: Less than 2 dB from full to no load.
 7. Controls: On-off, input levels, and low-cut filter.
 8. Input Sensitivity: Matched to preamplifier and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphone or handset transmitter.
- E. Transfer To Standby Amplifier
1. Monitoring Circuit and Sensing Relay: Detect reduction in output of power amplifier of 40 percent or more and, in such event, transfer load and signal automatically to standby amplifier.
- F. Microphones
1. Paging Microphone:
 - a. Type: Dynamic, with cardioid **OR** omni, **as directed**, polar characteristic.
 - b. Impedance: 150 ohms.
 - c. Frequency Response: Uniform, 50 to 14,000 Hz.
 - d. Output Level: Minus 58 dB, minimum.
 - e. Finish: Satin chrome.
 - f. Cable: C25J.
 - g. Mounting: Desk stand with integral-locking, press-to-talk switch.
- G. Volume Limiter/Compressor
1. Minimum Performance Requirements:
 - a. Frequency Response: 45 to 15,000 Hz, plus or minus 1 dB minimum.
 - b. Signal Reduction Ratio: At least a 10:1 and 5:1 selectable capability.
 - c. Distortion: 1 percent, maximum.
 - d. Rated Output: Minimum of plus 14 dB.
 - e. Inputs: Minimum of two inputs with variable front-panel gain controls and VU or decibel meter for input adjustment.
 - f. Rack mounting.
- H. Control Console
1. Cabinet: Modular, desktop **OR** desk style, **as directed**; complying with TIA/EIA-310-D.

2. Housing: Steel, 0.0478 inch (1.2 mm) minimum, with removable front and rear panels. Side panels are removable for interconnecting side-by-side mounting.
 3. Panel for Equipment and Controls: Rack mounted.
 4. Controls:
 - a. Switching devices to select signal sources for distribution channels.
 - b. Program selector switch to select source for each program channel.
 - c. Switching devices to select zones for paging.
 - d. All-call selector switch.
 5. Indicators: A visual annunciation for each distribution channel to indicate source being used.
 6. Self-Contained Power and Control Unit: A single assembly of basic control, electronics, and power supply necessary to accomplish specified functions.
 7. Spare Positions: 20 percent spare zone control and annunciation positions on console.
 8. Microphone jack.
- I. Equipment Cabinet
1. Comply with TIA/EIA-310-D.
 2. House amplifiers and auxiliary equipment at each location.
 3. Cabinet Housing:
 - a. Constructed of 0.0478-inch (1.2-mm) steel, minimum, with front- and rear-locking doors and standard TIA/EIA-310-D-compliant, 19-inch (483-mm) racks.
 - b. Arranged for floor or wall mounting as indicated.
 - c. Sized to house all equipment indicated, plus spare capacity.
 - d. Include 20 percent minimum spare capacity for future equipment in addition to space required for future cassette deck and CD player.
 4. Power Provisions: A single switch in cabinet shall disconnect cabinet power distribution system and electrical outlets, which shall be uniformly spaced to accommodate ac-power cords for each item of equipment.
 5. Ventilation: A low-noise fan for forced-air cabinet ventilation. Fan shall be equipped with a filtered input vent and shall be connected to operate from 105- to 130-V ac, 60 Hz; separately fused and switched; arranged to be powered when main cabinet power switch is on.
- J. Equipment Rack
1. Racks: 19 inches (483 mm) standard, complying with TIA/EIA-310-D.
 2. Power-Supply Connections: Compatible plugs and receptacles.
 3. Enclosure Panels: Ventilated rear and sides and solid top. Use louvers in panels to ensure adequate ventilation.
 4. Finish: Uniform, baked-enamel factory finish over rust-inhibiting primer.
 5. Power-Control Panel: On front of equipment housing, with master power on-off switch and pilot light; and with socket for 5-A cartridge fuse for rack equipment power.
 6. Service Light: At top rear of rack with an adjacent control switch.
 7. Vertical Plug Strip: Grounded receptacles, 12 inches (300 mm) o.c.; the full height of rack.
 8. Maintenance Receptacles: Duplex convenience outlets supplied independent of vertical plug strip and located in front and bottom rear of rack.
 9. Spare Capacity: 20 percent in rack for future equipment.
- K. Telephone Paging Adapter
1. Adapters shall accept voice signals from telephone extension dialing access and automatically provide amplifier input and program override for preselected zones.
 - a. Minimum Frequency Response: Flat, 200 to 2500 Hz.
 - b. Impedance Matching: Adapter matches telephone line to public address equipment input.
 - c. Rack mounting.
- L. Tone Generator
1. Generator shall provide clock and program interface with public address and mass notification system.

2. Signals: Minimum of seven distinct, audible signal types including wail, warble, high/low, alarm, repeating and single-stroke chimes, and tone.
 3. Pitch Control: Chimes and tone.
 4. Volume Control: All outputs.
 5. Activation-Switch Network: Establishes priority and hierarchy of output signals produced by different activation setups.
 6. Mounting: Rack.
- M. Monitor Panel
1. Monitor power amplifiers.
 2. Components: VU or dB meter, speaker with volume control, and multiple-position rotary selector switch.
 3. Selector Switch and Volume Control: Selective monitoring of output of each separate power amplifier via VU or dB meter and speaker.
 4. Mounting: Rack.
- N. Loudspeakers
1. Cone-Type Loudspeakers:
 - a. Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.
 - b. Frequency Response: Within plus or minus 3 dB from 50 to 15,000 Hz.
 - c. Size: 8 inches (200 mm) with 1-inch (25-mm) voice coil and minimum 5-oz. (140-g) ceramic magnet.
 - d. Minimum Dispersion Angle: 100 degrees.
 - e. Rated Output Level: 10 W.
 - f. Matching Transformer: Full-power rated with four taps. Maximum insertion loss of 0.5 dB.
 - g. Surface-Mounting Units: Ceiling, wall, or pendant mounting, as indicated, in steel back boxes, acoustically dampened. Front face of at least 0.0478-inch (1.2-mm) steel and whole assembly rust proofed and shop primed for field painting.
 - h. Flush-Ceiling-Mounting Units: In steel back boxes, acoustically dampened. Metal ceiling grille with white baked enamel.
 2. Horn-Type Loudspeakers:
 - a. Type: Single-horn units, double-reentrant design, with minimum full-range power rating of 15 W.
 - b. Matching Transformer: Full-power rated with four standard taps. Maximum insertion loss of 0.5 dB.
 - c. Frequency Response: Within plus or minus 3 dB from 250 to 12,000 Hz.
 - d. Dispersion Angle: 130 by 110 degrees.
 - e. Mounting: Integral bracket.
 - f. Units in Hazardous (Classified) Locations: Listed and labeled for environment in which they are located.
- O. Noise-Operated Gain Controller
1. Gain controller shall be designed to continuously sense space noise level and automatically adjust signal level to local speakers.
 2. Frequency Response: 20 to 20,000 Hz, plus or minus 1 dB.
 3. Level Adjustment Range: 20 dB minimum.
 4. Maximum Distortion: 1 percent.
 5. Control: Permits adjustment of sensing level of device.
- P. Outlets
1. Volume Attenuator Station: Wall-plate-mounted autotransformer type with paging priority feature.
 - a. Wattage Rating: 10 W unless otherwise indicated.
 - b. Attenuation per Step: 3 dB, with positive off position.
 - c. Insertion Loss: 0.4 dB maximum.

- d. Attenuation Bypass Relay: Single pole, double throw. Connected to operate and bypass attenuation when all-call, paging, program signal, or prerecorded message features are used. Relay returns to normal position at end of priority transmission.
- e. Label: "PA Volume."
- 2. Microphone Outlet: Three-pole, polarized, locking-type, microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed outlet covers.
- 3. Headphone Outlet (for the Hearing Impaired): Microphone receptacles in single-gang boxes. Equip wall outlets with brushed stainless-steel device plates. Equip floor outlets with gray tapered rubber or plastic cable nozzles and fixed-outlet covers.

Q. Battery Backup Power Unit

- 1. Unit shall be rack mounted, consisting of time-delay relay, sealed lead-calcium battery, battery charger, on-off switch, "normal" and "emergency" indicating lights, and adequate capacity to supply maximum equipment power requirements for one hour of continuous full operation.
- 2. Unit shall supply public address equipment with 12- to 15-V dc power automatically during an outage of normal 120-V ac power.
- 3. Battery shall be on float charge when not supplying system and to transfer automatically to supply system after three to five seconds of continuous outage of normal power, as sensed by time-delay relay.
- 4. Unit shall automatically retransfer system to normal supply when normal power has been reestablished for three to five seconds continuously.

R. Conductors And Cables

- 1. Jacketed, twisted pair and twisted multipair, untinned solid copper.
 - a. Insulation for Wire in Conduit: Thermoplastic, not less than **1/32 inch (0.8 mm)** thick.
 - b. Microphone Cables: Neoprene jacketed, not less than **2/64 inch (0.8 mm)** thick, over shield with filled interstices. Shield No. 34 AWG, tinned, soft-copper strands formed into a braid or approved equivalent foil. Shielding coverage on conductors is not less than 60 percent.
 - c. Plenum Cable: Listed and labeled for plenum installation.

S. Raceways

- 1. Conduit and Boxes: Comply with Division 26 Section "Raceway And Boxes For Electrical Systems". Flexible metal conduit shall not be used, unless directed otherwise.
 - a. Outlet boxes shall be not less than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.

1.3 EXECUTION

A. Wiring Methods

- 1. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters, and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used, **as directed**. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
- 2. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- 3. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

- B. Installation Of Raceways
1. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
 2. Install manufactured conduit sweeps and long-radius elbows whenever possible.
- C. Installation Of Cables
1. Comply with NECA 1.
 2. General Cable Installation Requirements:
 - a. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.
 - b. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
 - c. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - d. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
 - e. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - f. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
 3. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunications spaces with terminating hardware and interconnection equipment.
 - b. Suspend speaker cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceiling by cable supports not more than **60 inches (1524 mm)** apart.
 - c. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
 4. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least **12 inches (300 mm)** apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
- D. Installation
1. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
 2. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
 3. Equipment Cabinets and Racks:
 - a. Group items of same function together, either vertically or side by side, and arrange controls symmetrically. Mount monitor panel above the amplifiers.
 - b. Arrange all inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.
 - c. Blank Panels: Cover empty space in equipment racks so entire front of rack is occupied by panels.
 4. Volume Limiter/Compressor: Equip each zone with a volume limiter/compressor. Install in central equipment cabinet. Arrange to provide a constant input to power amplifiers.
 5. Wall-Mounted Outlets: Flush mounted.
 6. Floor-Mounted Outlets: Conceal in floor and install cable nozzles through outlet covers. Secure outlet covers in place. Trim with carpet in carpeted areas.

7. Conductor Sizing: Unless otherwise indicated, size speaker circuit conductors from racks to loudspeaker outlets not smaller than No. 18 AWG and conductors from microphone receptacles to amplifiers not smaller than No. 22 AWG.
 8. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
 9. Speaker-Line Matching Transformer Connections: Make initial connections using tap settings indicated on Drawings.
 10. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- E. Grounding
1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
 2. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
 3. Install grounding electrodes as specified in Division 26 Section "Grounding And Bonding For Electrical Systems".
- F. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Schedule tests with at least seven days' advance notice of test performance.
 - b. After installing public address and mass notification systems and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Operational Test: Perform tests that include originating program and page messages at microphone outlets, preamplifier program inputs, and other inputs. Verify proper routing and volume levels and that system is free of noise and distortion.
 - d. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:
 - 1) Disconnect microphone at connector or jack closest to it and replace it in the circuit with a signal generator using a 1000-Hz signal. Replace all other microphones at corresponding connectors with dummy loads, each equal in impedance to microphone it replaces. Measure signal-to-noise ratio.
 - 2) Repeat test for each separately controlled zone of loudspeakers.
 - 3) Minimum acceptance ratio is 50 dB.
 - e. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 50, 200, 400, 1000, 3000, 8000, and 12,000 Hz into each preamplifier channel. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 3 percent total harmonics.
 - f. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each zone. For spaces with seated audiences, maximum permissible variation in level is plus or minus 2 dB. In addition, the levels between locations in same zone and between locations in adjacent zones must not vary more than plus or minus 3 dB.
 - g. Power Output Test: Measure electrical power output of each power amplifier at normal gain settings of 50, 1000, and 12,000 Hz. Maximum variation in power output at these frequencies must not exceed plus or minus 1 dB.
 - h. Signal Ground Test: Measure and report ground resistance at public address equipment signal ground. Comply with testing requirements specified in Division 26 Section "Grounding And Bonding For Electrical Systems".

3. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging speaker-line matching transformers.
4. Public address and mass notification systems will be considered defective if they do not pass tests and inspections.
5. Prepare test and inspection reports.
 - a. Include a record of final speaker-line matching transformer-tap settings, and signal ground-resistance measurement certified by Installer.

END OF SECTION 26 33 43 00a

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SECTION 26 33 43 00b - NURSE CALL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for nurse call. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes visual/tone and audiovisual/voice nurse-call system.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment cabinets and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Cabling Diagrams: Single-line block diagrams showing cabling interconnection of all components for this specific equipment. Include cable type for each interconnection.
 - c. Station Installation Details: For built-in equipment, dimensioned and to scale.
3. Qualification Data: For qualified Installer.
4. Field quality-control reports.
5. Operation and Maintenance Data: For nurse-call equipment to include in emergency, operation, and maintenance manuals.
6. Warranty: Sample of special warranty.

D. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Compatibility: System shall be capable of integration with any brand of phone system (wired or wireless), staff locating system, CCTV, and fire-alarm system.
3. Electrical Components, Devices, and Accessories: Listed and labeled according to UL 1069 as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace batteries that fail in materials or workmanship within specified warranty period. Special warranty for batteries applies to materials only, on a prorated basis for specified period.
 - a. Warranty Period: Include the following warranty periods, from date of Final Completion:
 - 1) Nickel-Cadmium Batteries, Lithium Batteries, and Wet-Cell Batteries:
 - a) Full Warranty: Five years.
 - b) Pro Rata: 15 years.

1.2 PRODUCTS

A. Nurse-Call System General Requirements

1. Station Zones: Able to program 256 station zones for each master station in the network with eight priority levels and addressable visual and audible annunciation of audible devices such as smoke detectors and door contacts.
2. System shall provide integrated and centralized "Code Blue" and "Staff Emergency" calls.

3. Expansion Capability: Equipment ratings, housing volume, spare keys, switches, relays, annunciator modules, terminals, and cable conductor quantities adequate to increase the number of stations in the future by 25 percent above those indicated without adding internal or external components or main trunk cable conductors.
4. Existing System Compatibility: Functionally and electrically compatible with existing system so components and wiring operate as an extension or upgrade of the existing system and existing or upgraded functional performance of the existing system applies to the entire final system. Colors, tones, types, and durations of signal manifestation shall be common among new and existing systems.
5. Resistance to Electrostatic Discharge: System, components, and cabling, and the selection, arrangement, and connection of materials and circuits, shall be protected against damage or diminished performance when subjected to electrostatic discharges of up to 25,000 V in an environment with a relative humidity of 20 percent or less.
6. Equipment: Microprocessor, electronic, modular.
7. Master Nurse-Call Station: Programmed via a PC.
8. Wall-Mounted Component Connection Method: Components connect to system wiring in back boxes with factory-wired plug connectors.
9. Telephone Interface: Permit use of wired and wireless telephones to execute nurse-call master station functions.
10. Third-Party Pager Interface: Programmable to send tone, numeric, and alphanumeric message to pocket pagers or personal digital assistants and to use industry standard-protocol, RS-485 interface.

B. Visual/Tone Nurse-Call System

1. Operational Requirements:
 - a. Patient Station Call: Lights a steady call-placed lamp on the station, steady lamps in the zone light and corridor dome light associated with the patient's room, and steady lamps at the central annunciator and other system display devices and displays message on master and staff/duty stations. At the same time, it sounds a programmed tone at intervals, at the respective annunciator and master and staff/duty stations. Legends at the central annunciator and master station identify the calling station.
 - b. Pull-Cord-Call Station Call: Flashes a call-placed lamp on the station and distinctive-color lamps in the zone light and corridor dome light and at the central annunciator and staff/duty stations. At the same time, it sounds a programmed tone at intervals, at the central annunciator and master and staff/duty stations. A legend at the master station identifies the calling station, priority as programmed, and bed identification.
 - c. Emergency-Call Station Call: Produces the same responses as pull-cord-call station calls except rapidly flashing red emergency digital display and tone repetition rates are more frequent, tone frequency is higher, and lamps in the zone light and corridor dome light are a different color. Indicator lamps may be extinguished and the system reset only at the calling station. Displays message on pocket pagers, sounds programmed tone on phones, and displays message on display equipped phones.
 - d. System Reset: Operating reset button at the originating station cancels signals associated with the call. Illuminates a green digital display on the patient station and log presence on the master station.
 - e. Cord-Set Removal: Initiates a patient station call when the cord set is removed from the jack in the patient station faceplate. Displays location and "cord removed" message on master station, pocket pagers, and display equipped phones. Inserting a cord-set plug or a dummy plug into the jack and operating the station reset button resets the call.
 - f. Patient Control Unit: Controls entertainment volume and channel selection. Nurse button on the unit initiates a patient station call. Integral speaker reproduces entertainment sound.
 - g. Emergency Bath Station Call: Illuminates the digital display on the emergency bath station; rapidly flashes white dome lamp; displays location, priority, and bath on master

- station; and sounds programmed tone on master station display equipped phones and pocket pagers.
- h. Staff/Duty Station Operation: Operation shall be identified to patient station except the message staff shall display on all devices when the staff call button is activated.
 - i. Privacy Key Activation: When privacy key is activated on patient station, the system shall disconnect the patient station microphone and slowly flash yellow privacy digital display on the patient station. Displays "privacy" on master station when selecting this room/bed.
2. Central Annunciator:
 - a. Lamp type.
 - b. Lamp Legends: Machine lettered and legible from a distance of at least **48 inches (1200 mm)** when a call is present. Legend shall identify initiating station and priority of call.
 - c. Power-on Indicator: Digital, or push-to-test switch.
 - d. Audible Signal: Electronic tone.
 3. Central Equipment Cabinet:
 - a. Lockable metal.
 - b. Houses power supplies, controls, terminal strips, and other components.
 - c. Power-on indicator lamp.
 - d. Battery Backup Unit: Sealed nickel-cadmium, wet-cell battery supplies power through an automatic switch when normal power fails, for a period of not less than six minutes at rated output. System shall lose no unanswered calls or calls in progress during the transfer operation.
 - 1) Automatic retransfer to normal power, after a 15-minute time delay.
 - 2) Two-rate battery charger with an automatic trickle rate and a recharge rate.
 4. Single-Patient Station: Call-placed lamp, reset push button, and polarized receptacle matching cord-set plug; mounted in a single faceplate.
 5. Dual-Patient Station: Single call-placed lamp, single reset push button, and two polarized receptacles matching cord-set plug; mounted in a single faceplate.
 6. Ambulatory-Patient Station: Call push-button switch, call-placed lamp, and reset push button; mounted in a single faceplate.
 7. Staff/Duty Stations: A minimum of two call lamps, one for routine calls and one for emergency calls; and an audible tone signal device.
- C. Audiovisual/Voice Nurse-Call System
1. Operational Requirements:
 - a. Station Selection from Master Station: Capable of selectively communicating with other stations or groups of stations on its system by touch screen, mouse click, or manual switch; and capable of programming up to 256 stations for each master station in the network.
 - b. Master Station Privacy: Capable of conversing with individual stations in complete privacy.
 - c. Called Station:
 - 1) Capable of hands-free and two-way conversation.
 - 2) Pressing "talk/listen" key shall cause the annunciation tone to cease.
 - 3) Pressing "cancel" key terminates normal calls and conversations.
 - 4) Terminating of high-priority level 1 **OR 2 OR 3 OR 4, as directed**, shall not be allowed except at calling station location and shall send "remind" message if the call is not acknowledged at point of origin in programmed time frame.
 - d. Annunciation:
 - 1) At the master station, a programmable tone announces an incoming call; an annunciator light or digital display identifies the calling station and indicates the priority of the call.
 - 2) Call type indications include alarm assist, bath, bed, code, communication fault, cord out, door, emergency, and fire.
 - 3) Memory lamps or lighted displays identify stations selected for outgoing calls.
 - e. System Reset at Master Station: A normal, incoming call can be canceled, associated lights and audible tones extinguished, and the system reset when the station switch is returned to the normal position.

- f. Patient Station Calls:
 - 1) Lights the call-placed lamp at patient station, zone, and corridor dome lights.
 - 2) Sounds a tone and lights the call lights at staff/duty stations and actuates annunciation at the master station.
 - 3) When the calling station is selected at the master station, the patient can converse with the master station without moving and without raising or directing the voice.
 - 4) During voice communications, entertainment audio at the calling station is automatically muted.
- g. Pull-Cord-Call Station Calls and Emergency-Call Station Calls:
 - 1) Lights call-placed lamp and corridor dome light and flashes zone light.
 - 2) Master station tone pulses and annunciator light for that room flashes.
 - 3) When master station acknowledges the call by touch screen or switch, the tone stops but lights continue to flash until the call is canceled at the initiating point.
- h. Code Blue and Staff/Duty Station Calls:
 - 1) Lights the call-placed lamp at the station and actuates annunciation at the master station.
 - 2) When the called station is selected at the master station, the caller and the master station operator can converse.
 - 3) Code Blue: Unique sound and light pattern indicating the highest priority emergency.
 - 4) Staff Station: Unique sound and light pattern indicating an emergency.
 - 5) Duty Station: Sound and light pattern indicating a call to the nurse station.
- i. Handset Operation: Lifting the handset on master station disconnects speaker/microphone and transfers conversation to the handset.
- j. Station Privacy: No patient or staff/duty station can be remotely monitored without lighting a warning lamp at the monitored station.
- k. Patient Station Cord-Set Removal:
 - 1) A patient station call is initiated as described above when a patient station cord-set plug is removed from the jack in the station faceplate.
 - 2) Tone stops but lights continue to flash until the call is canceled at the initiating point or the plug is reinserted or replaced with a dummy plug when the master station call button for the station is pressed.
- l. Patient Control Unit:
 - 1) Controls entertainment volume and channel selection.
 - 2) Speaker is used for both nurse communication and entertainment sound.
 - 3) Entertainment sound is automatically muted when station is communicating with master station.
 - 4) Nurse button on the unit initiates a patient station call.
- m. Selective Paging: Master station is capable of initiating a message to selected groups of stations or speakers simultaneously by using station group switches.
- n. Staff Reminder:
 - 1) Master station can initiate a staff reminder that a patient requires direct staff response by operating a reminder control while in contact with the patient station.
 - 2) This reminder will light a distinctive-color lamp in the corridor dome light at the patient's room and in the appropriate zone lights.
 - 3) Reminder calls are canceled by operating a staff reminder cancel switch in the patient's room.
- o. Call Priority Indication:
 - 1) Capable of eight call priority levels in addition to normal.
 - 2) Call priority switch near each patient station, or integral with the master station, shall control priority status of the call transmitted by individual stations.
 - 3) Switch selects one of the following status levels:
 - a) Normal: No change to the normal call initiation and canceling sequence.

- b) Emergency: Call initiation produces signals and indications identical to those of emergency-call stations. Indicator lamps are extinguished and the system is reset only at the originating station.
- c) Priority: System response is the same for emergency status except voice communication between the master station and the calling station is locked in from the time of call initiation until the system is reset at the originating station.
- p. Additional Call:
 - 1) Waiting display window on the master station similar to current call window displays incoming calls.
 - 2) Master station shall have a call-overflow indicator when incoming calls exceed a **Number of calls** as directed by the Owner .
 - 3) System shall store unlimited number of incoming calls.
 - 4) System shall be capable of automatically answering incoming calls in order of priority.
- q. Calling Intercom Stations:
 - 1) Master station shall be capable of calling any intercom station using the handset or the hands-free speaker/microphone.
 - 2) Receipt of a call at the intercom station shall be preceded by an optional pre-announce tone.
 - 3) If there is a call in process, system shall place the active call on automatic hold while the new call is placed, then reestablish the previous call when the new call has ended.
- r. Privacy Override:
 - 1) Temporarily deactivates the "Privacy" mode of a called station by calling the station and instructing the called party to press the call-cord button.
 - 2) On completion of the conversation, the called station shall automatically return to the "Privacy" mode.
 - 3) When in "Privacy" mode, a called station shall be capable of hearing the master station; however, the master station shall not be capable of hearing the called station; a privacy message shall be indicated on the master station display.
- s. Master-Station-to-Master-Station Calls:
 - 1) Master stations shall be capable of calling other master stations using the handset.
 - 2) Calls from master stations shall be answered using the handset only.
 - 3) Busy master stations shall be indicated by a master station intercom busy tone.
- t. Voice Paging:
 - 1) Capable of voice paging to all stations using a single "All Call" key. The page shall be preceded by an optional pre-announce tone, **as directed**.
 - 2) Capable of voice paging to eight user-defined groups of stations by selecting the group and then the "All Call" key. The page shall be preceded by a pre-announce tone, **as directed**.
 - 3) Capable of voice paging to all staff/duty stations and all patient stations where staff has registered presence using a single "Public Address (PA)/Staff" key. The page shall be preceded by a pre-announce tone, **as directed**.
 - 4) Capable of voice paging through a third-party PA system.
 - 5) Capable of including or excluding any station from the voice paging function(s).
 - 6) Automatically places an active station call on hold during any page and reestablishes the connection at the end of the page.
 - 7) Automatically cancels a page if the talk mode is inactive for more than 15 seconds.
- u. Station Monitor:
 - 1) An audio monitor feature shall allow a user to sequentially or simultaneously listen to one or all stations that are included in the user-created list.
 - 2) Master station display shall indicate which station is being monitored when in sequential mode.
 - 3) The dwell time each station is monitored shall be user programmable.
 - 4) The user shall be able to stop the monitoring sequence by activating a "pause" key.

- 5) The user shall be able to manually sequence through stations using a "next" key.
- v. Night Service:
- 1) Functions shall be adaptable for nighttime staffing levels, patient traffic, and day/night operations.
 - 2) Staff Follow:
 - a) Capable of locating roving staff; forwarding visual and audible annunciation of incoming calls to station(s) where personnel have registered presence.
 - b) Master station shall display locations where staff have registered presence.
 - c) Incorporates a programmable timer that automatically cancels a forgotten staff presence registration.
 - 3) Tones:
 - a) Deactivates audio signals from a duty station and mini-master display telephones.
 - b) Capable of changing the tone volume at the master and duty stations.
 - c) Satellite function shall permit the user to deactivate audio signals from duty stations and other remote annunciator devices.
 - 4) Transfer:
 - a) Permits one nurse station to take control of all or individually selected bed call cords from another nurse station. It shall be possible to view transfer status of a nurse station.
 - b) Includes a minimum of three transfer modes to allow one nurse station to take control or share calls and operations from another nurse station.
 - i. Parallel Transfer Mode: Permits both nurse stations to share all calls and operations.
 - ii. Supervised Transfer Mode: Permits the transferred nurse station to share all calls and operations with the controlling nurse station; however, the controlling nurse station calls are not shared with the transferring station.
 - iii. Capture Transfer Mode: Transfers all calls and operations from the transferred nurse station to the controlling nurse station.
 - iv. Transferred station shall have no control over calls, and its display shall indicate calls have been transferred to another station.
 - c) Includes two "patient swing" modes to allow one nurse station to take control or share calls from one or many calls from another nurse station.
 - i. Supervised Transfer Mode: Permits the transferred calls to be shared with the controlling nurse station.
 - ii. Capture Transfer Mode: Transfers all calls from the call cord from the transferred nurse station to the controlling nurse station.
 - iii. Transferred station has no control over those transferred calls.
- w. Service Request:
- 1) Permits users to assign a service request to a substation, at programmable priority level.
 - 2) Displays service request on the nurse station display and light the green flashing corridor lamp at the respective substation and automatically generate a service reminder request.
 - 3) Cancels service requests only at the initiating point.
 - 4) Recall calls shall sound and be displayed at the master station if the service request has not been cancelled at the initiating point within the programmed period of time.
- x. Call Reminder Function:
- 1) Automatically generates a reminder call for a patient- or staff-initiated, high-priority 2 **OR 3 OR 4, as directed**, request that has had the call tones silenced, allowing time to physically attend to the request and cancel the call at the initiating point.
 - 2) Regenerated calls shall display the same tones and visual indications and priority as the original call and shall also display a "regenerated call" message.
 - 3) Capable of manually adding low-priority calls to the reminder list.

- 4) "Call Reminder" function and reminder timer shall be programmable by call priority.
- y. Hide Function: Prevents a selected station from displaying calls or generating tones on the nurse station.
- z. Door Control Function: Capable of being programmed to enable the user to remotely activate electric door locks.
- aa. Test and Diagnostics Feature:
 - 1) Able to automatically diagnose system faults and categorize them as warnings, communication errors, or fatal errors.
 - 2) Warnings shall indicate possible system problems.
 - 3) Communication errors shall indicate the inability of the master station to communicate with a substation or another nurse-call station.
 - 4) Fatal errors shall indicate a major hardware or software failure.
- bb. User-Configured System Programming - Access Code Not Required:
 - 1) Patient call-cord priority levels.
 - 2) Monitor list.
 - 3) "All Call" list.
 - 4) Master station communication parameters (volume, filtering, talk/listen, sensitivity).
 - 5) Master and duty station call annunciation tone volume.
 - 6) Date/time.
 - 7) Staff-follow operating mode.
 - 8) Transfer type.
 - 9) Pocket pager list assignment.
 - 10) Presence mode.
- cc. User-Configured System Programming - Access Code Required:
 - 1) Master station number.
 - 2) Room device type.
 - 3) Room number.
 - 4) Bed number.
 - 5) Bed alpha or numeric.
 - 6) Reminder duration.
 - 7) Staff presence registration cancel duration.
 - 8) Display language.
 - 9) Paging group assignment(s).
 - 10) Zone group assignments.
 - 11) Monitoring duration.
 - 12) Pocket pager number.
 - 13) Call tone assignment by priority.
 - 14) Pretone activation.
 - 15) Call tones minimum volume.
 - 16) Clock mode (12 h/24 h).
- 2. Master Station:
 - a. Speaker/microphone unit with operating controls.
 - b. Indicator lamps with legends or by digital display designate identification and priority of calling stations and called stations.
 - c. Pulse rate of incoming-call lights denotes priority of calls awaiting response.
 - d. Station Selection Controls: Touchpad select stations for two-way voice communications.
 - e. Signal Tones: Programmable to announce incoming calls.
 - f. Pulse rate and frequency of tone identify the highest priority call awaiting response at one time.
 - g. Volume Control: Regulates incoming-call volume.
 - h. Privacy Handset with Hook Switch: Of the type that does not require push-to-talk switch attached to each station unless otherwise indicated.
 - i. Staff Reminder Control: Initiates flashing of corresponding corridor dome lights for patients requiring service. Permits scanning equipment to indicate which patients are currently in reminder status.

- j. Call Priority Selection: Controls associated with patient-station selection switches determine the priority displayed when a call is initiated at a patient station.
- 3. Central Equipment Cabinet:
 - a. Lockable metal.
 - b. Houses amplifiers, tone generators, power supplies, controls, terminal strips, and other components.
 - c. Amplifier: With fidelity and overall gain necessary to achieve the sound-transmission and reproduction characteristics specified, considering interoperability with the installed speakers/microphones and wiring.
 - 1) Power Output: Not less than 3 W at a total harmonic distortion not exceeding 5 percent.
 - 2) Hum and Noise: 60 dB below full output with normal input open.
 - 3) Volume Control: Concealed within the amplifier unit to control the volume of sound reproduced at all stations.
 - 4) Protection: Circuit to prevent damage to the amplifier in case of shorted or open circuit.
 - d. Selective Paging Amplifiers: Plug-in card mounted in central equipment cabinet, rated 15 W.
 - e. System Power Supply:
 - 1) 24-V dc for operation of the call system.
 - 2) Equipment Rating: Suitable for continuous operation between 32 and 120 deg F (0 and 49 deg C), from a primary line voltage between 105- to 125-V ac, 60 Hz.
 - 3) Output: Regulated 24-V dc with protection against overloads. Line-to-load regulation shall not exceed 2-1/2 percent with ripple and noise remaining below the 10-mV, rms level.
 - 4) Overload Protection: Electronic fold-back circuit set to limit the volt-ampere output to less than 100 VA during overloaded or shorted output. Restore power output automatically on removal of overload without resetting circuit breakers or replacing fuses.
 - f. Power-on indicator lamp.
 - g. Surge Protector Device: Comply with Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" for auxiliary panel suppressors, with digital indicator lights for power and protection status.
 - h. Battery Backup Unit: Sealed nickel-cadmium, wet-cell battery supplies power through an automatic switch when normal power fails, for a period of not less than six minutes at rated output.
 - 1) Automatic retransfer to normal power, after a 15-minute time delay.
 - 2) Two-rate battery charger with an automatic trickle rate and a recharge rate.
- 4. Speaker/Microphones:
 - a. Type: Permanent-magnet, dynamic or ceramic, protected against dust and humidity.
 - b. Sound Reproduction: Sound level of 90 dB plus or minus 3 dB at a distance of 48 inches (1220 mm) on the axis without overdriving or distorting any frequencies between 300 and 3000 Hz when installed in an enclosure or in the pillow speaker.
 - c. Power Handling Capacity: Not susceptible to damage from overdriving within the range of power available from the amplifier.
 - d. Impedance Matching: Coordinated and matched to the input and output circuits of the amplifier, both for single connection and for group monitoring, to provide the sound reproduction specified. Subsystems or components shall not be combined, which could cause unacceptable distortion such as feedback between pillow speakers and unmuted room speaker/microphone combinations. This protection shall extend throughout the entire range of operation (volume control) of all components.
- 5. Single-Patient Station: Speaker/microphone with 2-inch (50-mm) dynamic cone, a polarized receptacle to match the cord-set plug, monitor lamp, reset switch, and call-placed lamp; assembled under a single faceplate.
- 6. Dual-Patient Station:

- a. Speaker/microphone with **2-inch (50-mm)** dynamic cone, two polarized receptacles to match cord-set plugs, monitor lamp, and reset switch; assembled under a single faceplate.
 - b. Single call-placed lamp serves both beds.
OR
Dual call-placed lamps, one for each bed.
 7. Staff/Duty Stations: Audible call-tone signal device, speaker/microphone with **2-inch (50-mm)** dynamic cone, monitor lamp, reset switch, routine-call lamp, emergency-call lamp, and call push button; assembled under a single faceplate.
 8. Code Blue Station: Audible call-tone signal device, speaker/microphone with **2-inch (50-mm)** dynamic cone, monitor lamp, reset switch, Code Blue emergency-call lamp, and call push button; assembled under a single faceplate.
 9. Ambulatory-Patient Station: Speaker/microphone with **2-inch (50-mm)** dynamic cone, monitor lamp, reset switch, call-placed lamp, and call push button; assembled under a single faceplate.
 10. Selective Paging Speakers: **8-inch (200-mm)** cone type with **1-inch (25-mm)** voice coil and minimum **5-oz. (140-g)** ceramic magnet, multitap matching transformer, flush-mounted steel back-box, and white enamel-finished metal ceiling grille.
 11. Call Priority Switch Station: Three-position, tamper-resistant priority selection switch. Positions designated by labeling "Normal," "Emergency," and "Priority."
 12. Staff Reminder Cancel Switch Station: Momentary contact.
- D. System Components
1. Emergency-Call Station: Locking-type push button, labeled "Push to Call Help"; reset trigger to release push button and cancel call; and call-placed lamp, mounted in a single faceplate.
 2. Emergency-Bath Station:
 - a. Consists of a sliding, chemical-resistant, ABS red fascia marked with the word "URGENT" in bold letters.
 - b. Capable of being activated with nylon pull cord or by sliding the face of the unit downwards.
 - c. Activation of the station shall illuminate a reassurance digital display on the face of the unit in addition to notifying the master station.
 - d. Water resistant and able to withstand routine cleaning and chemical disinfectants.
 - e. Uses magnetic reed switch technology for reliability and corrosion resistance.
 - f. Mounts on a single-gang electrical box wire to the respective patient station or input controller.
 3. Code Blue Station:
 - a. Consists of a sliding, chemical-resistant, ABS blue fascia marked with the word "CODE" in bold letters.
 - b. Capable of being activated with nylon pull cord or by sliding the face of the unit downwards.
 - c. Activation of the station shall illuminate a reassurance digital display on the face of the unit in addition to notifying the master station.
 - d. Water resistant and able to withstand routine cleaning and chemical disinfectants.
 - e. Uses magnetic reed switch technology for reliability and corrosion resistance.
 - f. Mounts on a single-gang electrical box wire to the respective patient station or input controller.
 4. Staff, Emergency Station:
 - a. Consists of a sliding, chemical-resistant, ABS red fascia marked with the word "EMERGENCY" in bold letters.
 - b. Capable of being activated with nylon pull cord or by sliding the face of the unit downwards.
 - c. Activation of the station shall illuminate a reassurance digital display on the face of the unit in addition to notifying the master station.
 - d. Mounts on a single-gang electrical box wire to the input controller.
 5. Pull-Cord-Call Station:
 - a. Pull-Down Switch: Lever-locking type, labeled "Pull Down to Call Help."
 - b. Reset trigger.

- c. Call-placed lamp.
- d. Water-resistant construction.
- 6. Patient Control Unit:
 - a. Equipped with plug and 96-inch- (2400-mm-) long white cord.
 - b. Ethylene oxide, sterilizable.
 - c. Light-Control Switch: Arranged for independent on-off control of patient's up and down light.
 - d. Integral Speaker: 2 inches (50 mm), with 0.35-oz. (9.9-g) magnet, rated 0.2 W.
 - e. Controls: Speaker volume, TV control, and nurse call.
 - f. Housing: High-impact white plastic.
 - g. Attachment: Stainless-steel bed clamp with permanently attached polyester film strap.
 - h. Quantity: 12 units for every 10 patient beds.
- 7. Call-Button Cord Set:
 - a. Plug and 72-inch (1800-mm) white cord; cord set shall be resistant to medical gas environment equipped with momentary-action, call-button switch.
 - b. Ethylene oxide, sterilizable.
 - c. Washable cord.
 - d. Palladium switch contacts in high-impact white housing with cord-set strain relief.
 - e. Attachment: Stainless-steel bed clamp with permanently attached polyester film strap.
 - f. Quantity: Three cord sets for every 10 patient beds.
- 8. Geriatric Call-Button Cord Set:
 - a. Plug and 72-inch (1800-mm) white cord.
 - b. Resistant to medical gas environment equipped with momentary-action, light-pressure switch in soft outer jacket.
 - c. Ethylene oxide, sterilizable.
 - d. Washable cord.
 - e. Palladium switch contacts in high-impact white housing with cord-set strain relief.
 - f. Attachment: Stainless-steel bed clamp with permanently attached polyester film strap.
 - g. Quantity: Two cord sets for every 10 patient beds.
- 9. Squeeze-Bulb Switch Cord Set:
 - a. Plug and 72-inch (1800-mm) washable tube with white cord set.
 - b. Resistant to medical gas environment; washable; equipped with neoprene squeeze-bulb activator, and plug-mounted, momentary contact switch.
 - c. Ethylene oxide, sterilizable.
 - d. Attachment: Stainless-steel bed clamp with permanently attached polyester film strap.
 - e. Quantity: Two cord sets for every 10 patient beds.
- 10. Breath Call Cord:
 - a. Flexible PVC jacketed cable and a momentary contact air-pressure sensitive switch.
 - b. Cord: 108 inches (2700 mm) long.
 - c. Include an adjustable arm for clamping and suitable for use in oxygen atmospheres.
 - d. Include 12 replacement straws.
- 11. Pillow Speakers:
 - a. Eight-conductor, DIN, flexible PVC jacketed cable.
 - b. Contain nurse-call button, volume control, speaker, and channel control in molded flame-retardant ABS housing.
 - c. Cord: 96 inches (2400 mm) long with sheet clip.
- 12. Call-Button Plug:
 - a. Designed to plug into patient station cord-set receptacle.
 - b. Button switches call circuit.
 - c. Two plugs for every 10 patient beds.
- 13. Dummy Plugs:
 - a. Designed to plug into patient station cord-set receptacle when call-button plug or patient cord set is not used.
 - b. Three plugs for every 10 patient beds.
- 14. Indicator Lamps: Digital type with rated life of 20 years unless otherwise indicated.

15. Station Faceplates:
 - a. Stainless steel, a minimum of **0.0375 inch (0.95 mm)** thick.
 - b. Finish: Brushed.
 - c. Machine-engraved labeling identifies indicator lamps and controls.

OR

Station Faceplates:

 - a. High-impact plastic.
 - b. Color: Beige.
 - c. Molded or machine-engraved labeling identifies indicator lamps and controls.
16. Corridor Dome Lights and Zone Lights:
 - a. Three-lamp signal lights.
 - b. Lamps: Front replaceable without tools, low voltage with rated life of 7500 hours. Barriers are such that only one color is displayed at a time.
 - c. Lenses: Heat-resistant, shatterproof, translucent polymer that will not deform, discolor, or craze when exposed to hospital cleaning agents.
 - d. Filters: Two per unit, amber and red.
17. Cable:
 - a. Conductors: Jacketed single and multiple, twisted-pair copper cables.
 - b. Sizes and Types: As recommended by equipment manufacturer.
 - c. Cable for Use in Plenums: Listed and labeled for plenum installation.
18. Grounding Components: Comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".

E. Software Requirements

1. Telephone System Interface:
 - a. Permits use of wired and/or wireless telephones to execute nurse-call master station.
 - b. Two-way communication with patient and staff stations.
 - c. Two-way communication with the master nurse station.
 - d. "All Call," group call, and staff call paging.
 - e. Capable of being programmed to forward calls destined for a master nurse station to any connected telephone.
 - f. Telephones connected to the telephone interface shall have the same call tone ring patterns as those generated at the master nurse station.
 - g. Telephones having a display shall indicate the call type, priority code, and the calling station number of incoming calls.
 - h. Telephones shall be capable of initiating a service request for a particular patient station, logging calls on the master station's reminder list, and activating door lock mechanisms associated with a call station.
 - i. Capable of routine setup and configuration changes using the keypads on display telephone and/or the master station.
2. Display Telephones:
 - a. Digital telephones for use as mini-master nurse-call stations.
 - b. Digital display shall indicate the call type, priority code, and calling station number of incoming calls.
 - c. Ring patterns shall be identical to those generated at the master station.
 - d. Capable of two-way communication with patient and staff stations and the master station, and other telephones interfaced with the system.
 - e. Capable of placing or answering outside calls when interfaced with the facility telephone system.
 - f. Capable of "All Call," group call, and staff call paging and of initiating service requests, logging calls to the reminder list, and activating optional door controls.
3. Third-Party Pocket Pager Interface:
 - a. Equipped with a standalone pocket pager interface.
 - b. Connects with the facility paging system and transmit alphanumeric messages to the pocket pagers as preprogrammed in the system.
4. Statistical Software:

- a. Includes a data statistical software package that stores, sorts, and analyzes activities occurring on the nurse-call system network.
 - b. Windows based and operated on a PC that is connected to the nurse-call system network.
 - c. Stores events on the PC's hard disk. Accumulation of these stored events shall make up the database that is used to generate reports and statistics.
 - d. Events stored by the software shall include date, day of week, time, ward, priority, and room number.
 - e. Capable of assigning a patient name to bed number.
 - f. Stored events shall include, but not be limited to, calls placed, call priority, calls cancelled at the nurse station, calls cancelled at the point of origin, regenerated calls, calls answered, calls sent to pager interface, staff presence registration, staff presence cancellation, service request, service cancellation, and system and network error messages.
5. Data Analysis Software:
- a. Capable of analyzing the stored information and generating computed analysis.
 - b. Analysis of the database can be conducted by specifying one, many, or all of the following parameters of the database: date, day of week, time, wards, priority, and room number.
 - c. Analysis shall include, but not be limited to, total number of calls placed, average call response time (from call placed to call cancellation), total number of presence registrations, average presence time in a room, total number of service requests, average response time (from audio answer to call cancellation), and average ring time (from call placed to audio answer).
6. Statistical Software Package:
- a. Capable of displaying multiple calls/events on a PC monitor or on a RS-485 data-bus-driven digital display panel.
 - b. Calls from patient or staff stations and associated devices shall be displayed by priority. Display shall be customizable as follows:
 - 1) Choice of color by type of call.
 - 2) Choice of display size (character size).
 - 3) Choice of priority levels, type of events, points of origin.
 - 4) Identification of facility.
 - 5) Identification of ward.
 - 6) Identification of patient with specific patient information.

F. Conductors And Cables

1. Audio Cables:
 - a. Conductors: Jacketed, twisted-pair and twisted-multipair, untinned solid copper. Sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.
 - b. Insulation: Thermoplastic, not less than **1/32 inch (0.8 mm)** thick.
 - c. Shielding: For speaker/microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG, tinned, soft-copper strands formed into a braid or equivalent foil.
 - d. Minimum Shielding Coverage on Conductors: 60 percent.
 - e. Plenum Cable: Listed and labeled for plenum installation.
2. Data Cable and Hardware: Category 5e **OR** Category 6, **as directed**, UTP and UTP hardware. Comply with requirements in Division 27 Section "Communications Horizontal Cabling".
3. Power Conductors and Cables: Copper, solid, No. 20 AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
4. Grounding Conductors and Cables: Copper, stranded, No. 16 AWG. Comply with requirements in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

1.3 EXECUTION

A. Installation

1. Wiring Method:

- a. Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used, **as directed**.
 - 1) Install plenum cable in environmental air spaces, including plenum ceilings.
 - 2) Conceal raceway and cables except in unfinished spaces.
 - b. Cable Trays: Comply with requirements in Division 27 Section "Communications Horizontal Cabling".
 - c. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems". Flexible metal conduit shall not be used, **as directed**.
 - 1) Outlet boxes shall be no smaller than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.
 2. Install cables without damaging conductors, shield, or jacket.
 3. Do not bend cables, while handling or installing, to radii smaller than as recommended by manufacturer.
 4. Pull cables without exceeding cable manufacturer's recommended pulling tensions.
 - a. Pull cables simultaneously if more than one is being installed in same raceway.
 - b. Use pulling compound or lubricant if necessary. Use compounds that will not damage conductor or insulation.
 - c. Use pulling means, including fish tape, cable, rope, and basket-weave wire or cable grips, that will not damage media or raceway.
 5. Install exposed raceways and cables parallel and perpendicular to surfaces or exposed structural members, and follow surface contours. Secure and support cables by straps, staples, or similar fittings designed and installed so as not to damage cables. Secure cable at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, or fittings.
 6. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
 7. Separation of Wires: Separate speaker/microphone, line-level, speaker-level, and power-wiring runs. Run in separate raceways or, if exposed or in same enclosure, provide **12-inch (300-mm)** minimum separation between conductors to speaker/microphones and adjacent parallel power and telephone wiring. Provide separation as recommended by equipment manufacturer for other conductors.
 8. Splices, Taps, and Terminations: Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Install terminal cabinets where there are splices, taps, or terminations for eight or more conductors.
 9. Impedance and Level Matching: Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks if required.
 10. Identification of Conductors and Cables: Comply with requirements in Division 27 Section "Communications Horizontal Cabling" for cable administration, cable schedule, and cable and wire identification.
 11. Equipment Identification:
 - a. Comply with requirements in Division 26 Section "Identification For Electrical Systems" for equipment labels and signs and labeling installation requirements.
 - b. Label stations, controls, and indications using approved consistent nomenclature.
- B. Existing Systems
1. Examine existing systems for proper operation, compatibility with new equipment, and deficiencies. If discrepancies or impairments to successful connection and operation of interconnected equipment are found, report them and do not proceed with installation until directed. Schedule existing systems' examination so there is reasonable time to resolve problems without delaying construction.
- C. Grounding
1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other signal impairments.

2. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding except at connection to main building ground bus.
3. Grounding Provisions: Comply with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".

D. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Schedule tests a minimum of seven days in advance.
 - b. Report: Submit a written record of test results.
 - c. Operational Test: Perform an operational system test and demonstrate proper operations, adjustment, and sensitivity of each station. Perform tests that include originating station-to-station and "All Call" messages and pages at each nurse-call station. Verify proper routing, volume levels, and freedom from noise and distortion. Test each available message path from each station on the system. Meet the following criteria:
 - 1) Speaker Output: 90 dB plus or minus 3 dB, 300 to 3000 Hz, reference level threshold of audibility 0 dB at 0.02 mPa of sound pressure.
 - 2) Gain from patient's bedside station to nurse station, with distortion less than 65 dB (plus or minus 3 dB, 300 to 3000 Hz).
 - 3) Signal-to-Noise Ratio: Hum and noise level at least 45 dB below full output.
 - d. Test Procedure:
 - 1) Frequency Response: Determine frequency response of two transmission paths by transmitting and recording audio tones.
 - 2) Signal-to-Noise Ratio: Measure the ratio of signal to noise of the complete system at normal gain settings using the following procedure: Disconnect a speaker/microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure the ratio of signal to noise and repeat the test for four speaker microphones.
 - 3) Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 300, 400, 1000, and 3000 Hz into each nurse-call equipment amplifier, and measure the distortion in the amplifier output.
3. Retesting: Rectify deficiencies indicated by tests and completely retest work affected by such deficiencies at Contractor's expense. Verify, by the system test, that the total system meets these Specifications and complies with applicable standards. Report results in writing.
4. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
5. Prepare test and inspection reports.

E. Adjusting

1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting sound levels and controls to suit actual occupied conditions. Provide up to three visits to Project during other-than-normal operating hours for this purpose.

F. Demonstration

1. Train Owner's maintenance personnel and caregiver staff to adjust, operate, and maintain nurse-call equipment.

END OF SECTION 26 33 43 00b

SECTION 26 33 53 00 - STATIC UNINTERRUPTIBLE POWER SUPPLY

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for static uninterruptible power supply. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Three-phase, on-line, double-conversion, static-type, UPS units with the following features:
 - 1) Surge suppression.
 - 2) Input harmonics reduction.
 - 3) Rectifier-charger.
 - 4) Inverter.
 - 5) Static bypass transfer switch.
 - 6) Battery and battery disconnect device.
 - 7) Internal and External maintenance bypass/isolation switch.
 - 8) Output isolation transformer.
 - 9) Remote UPS monitoring provisions.
 - 10) Battery monitoring.
 - 11) Remote monitoring.

C. Definitions

1. EMI: Electromagnetic interference.
2. LCD: Liquid-crystal display.
3. LED: Light-emitting diode.
4. PC: Personal computer.
5. THD: Total harmonic distortion.
6. UPS: Uninterruptible power supply.

D. Performance Requirements

1. Seismic Performance: UPS shall withstand the effects of earthquake motions determined according to ASCE/SEI 7, **as directed**.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated. Include data on features, components, ratings, and performance.
2. Shop Drawings: For UPS. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, components, and location and identification of each field connection. Show access, workspace, and clearance requirements; details of control panels; and battery arrangement.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Seismic Qualification Certificates: For UPS equipment, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.

- c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- 4. Factory Test Reports: Comply with specified requirements.
- 5. Field quality-control reports.
- 6. Operation and maintenance data.
- 7. Warranties: Sample of special warranties.

F. Quality Assurance

- 1. Testing Agency Qualifications: Member company of NETA or an NRTL **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA **OR** one who meets the requirements necessary for certification, **as directed**, to supervise on-site testing.
- 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- 3. UL Compliance: Listed and labeled under UL 1778 by an NRTL.
- 4. NFPA Compliance: Mark UPS components as suitable for installation in computer rooms according to NFPA 75.

G. Warranty

- 1. Special Battery Warranties: Specified form in which manufacturer and Installer agree to repair or replace UPS system storage batteries that fail in materials or workmanship within specified warranty period.
 - a. Warranted Cycle Life for Valve-Regulated, Lead-Calcium Batteries: Equal to or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of **77 deg F (25 deg C)**:

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.67	6 cycles
30 minutes	30 minutes	1.67	20 cycles
15 minutes	45 seconds	1.67	120 cycles

OR

Warranted Cycle Life for Premium Valve-Regulated, Lead-calcium Batteries: Equal to or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of **77 deg F (25 deg C)**:

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.67	40 cycles
30 minutes	30 minutes	1.67	125 cycles
15 minutes	1.5 minutes	1.67	750 cycles

OR

Warranted Cycle Life for Flooded Batteries: Equal to or greater than that represented in manufacturer's published table, including figures corresponding to the following, based on annual average battery temperature of **77 deg F (25 deg C)**:

Discharge Rate	Discharge Duration	Discharge End Voltage	Cycle Life
8 hours	8 hours	1.75	40 cycles
1 hour	1 hour	1.75	80 cycles
15 minutes	45 seconds	1.67	2700 cycles

2. Special UPS Warranties: Specified form in which manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within Two **OR** Three, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Operational Requirements

1. Automatic operation includes the following:
 - a. Normal Conditions: Load is supplied with power flowing from the normal power input terminals, through the rectifier-charger and inverter, with the battery connected in parallel with the rectifier-charger output.
 - b. Abnormal Supply Conditions: If normal supply deviates from specified and adjustable voltage, voltage waveform, or frequency limits, the battery supplies energy to maintain constant, regulated inverter power output to the load without switching or disturbance.
 - c. If normal power fails, energy supplied by the battery through the inverter continues supply-regulated power to the load without switching or disturbance.
 - d. When power is restored at the normal supply terminals of the system, controls automatically synchronize the inverter with the external source before transferring the load. The rectifier-charger then supplies power to the load through the inverter and simultaneously recharges the battery.
 - e. If the battery becomes discharged and normal supply is available, the rectifier-charger charges the battery. On reaching full charge, the rectifier-charger automatically shifts to float-charge mode.
 - f. If any element of the UPS system fails and power is available at the normal supply terminals of the system, the static bypass transfer switch switches the load to the normal ac supply circuit without disturbance or interruption.
 - g. If a fault occurs in the system supplied by the UPS, and current flows in excess of the overload rating of the UPS system, the static bypass transfer switch operates to bypass the fault current to the normal ac supply circuit for fault clearing.
 - h. When the fault has cleared, the static bypass transfer switch returns the load to the UPS system.
 - i. If the battery is disconnected, the UPS continues to supply power to the load with no degradation of its regulation of voltage and frequency of the output bus.
2. Manual operation includes the following:
 - a. Turning the inverter off causes the static bypass transfer switch to transfer the load directly to the normal ac supply circuit without disturbance or interruption.
 - b. Turning the inverter on causes the static bypass transfer switch to transfer the load to the inverter.
3. Maintenance Bypass/Isolation Switch Operation: Switch is interlocked so it cannot be operated unless the static bypass transfer switch is in the bypass mode. Device provides manual selection among the three conditions in subparagraphs below without interrupting supply to the load during switching:
 - a. Full Isolation: Load is supplied, bypassing the UPS. Normal UPS ac input circuit, static bypass transfer switch, and UPS load terminals are completely disconnected from external circuits.
 - b. Maintenance Bypass: Load is supplied, bypassing the UPS. UPS ac supply terminals are energized to permit operational checking, but system load terminals are isolated from the load.
 - c. Normal: Normal UPS ac supply terminals are energized and the load is supplied through either the static bypass transfer switch and the UPS rectifier-charger and inverter, or the battery and the inverter.
4. Environmental Conditions: The UPS shall be capable of operating continuously in the following environmental conditions without mechanical or electrical damage or degradation of operating capability, except battery performance.
 - a. Ambient Temperature for Electronic Components: **32 to 104 deg F (0 to 40 deg C)**.

- b. Ambient Temperature for Battery: 41 to 95 deg F (5 to 35 deg C).
- c. Relative Humidity: 0 to 95 percent, noncondensing.
- d. Altitude: Sea level to 4000 feet (1220 m).

B. Performance Requirements

1. The UPS shall perform as specified in this article while supplying rated full-load current, composed of any combination of linear and nonlinear load, up to 100 percent nonlinear load with a load crest factor of 3.0, under the following conditions or combinations of the following conditions:
 - a. Inverter is switched to battery source.
 - b. Steady-state ac input voltage deviates up to plus or minus 10 percent from nominal voltage.
 - c. Steady-state input frequency deviates up to plus or minus 5 percent from nominal frequency.
 - d. THD of input voltage is 15 percent or more with a minimum crest factor of 3.0, and the largest single harmonic component is a minimum of 5 percent of the fundamental value.
 - e. Load is 30 **OR** 50 **OR** 100, **as directed**, percent unbalanced continuously.
2. Minimum Duration of Supply: If battery is sole energy source supplying rated full UPS load current at 80 percent power factor, duration of supply is five **OR** 10 **OR** 15, **as directed**, minutes.
3. Input Voltage Tolerance: System steady-state and transient output performance remains within specified tolerances when steady-state ac input voltage varies plus 10, minus 15 **OR** 20 **OR** 30, **as directed**, percent from nominal voltage.
4. Overall UPS Efficiency:

NOMINAL OVERALL UPS EFFICIENCY RATINGS

SIZE RANGE OF UPS UNITS	EFFICIENCY AT 100% RATED LOAD	EFFICIENCY AT 75% RATED LOAD	EFFICIENCY AT 50% RATED LOAD
30 kVA and Smaller	86	85	84
37.5 to 74 kVA	89	88	87
75 to 124 kVA	90	88	87
125 to 224 kVA	90	89	88
225 kVA and Larger	90	89	88

5. Maximum Acoustical Noise:

NOMINAL OVERALL UPS AUDIBLE NOISE RATINGS

SIZE RANGE OF UPS UNITS	MAXIMUM NOISE VALUE	DISTANCE AT WHICH MEASURED
10 kVA and Smaller	58 dB	36 inches (900 mm)
20 to 125 kVA	60 dB	48 inches (1200 mm)
150 to 300 kVA	78 dB	48 inches (1200 mm)
300 kVA and Larger	83 dB	48 inches (1200 mm)

6. Maximum Energizing Inrush Current: Six **OR** Eight, **as directed**, times the full-load current.
7. Maximum AC Output-Voltage Regulation for Loads up to 50 Percent Unbalanced: Plus or minus 2 percent over the full range of battery voltage.
8. Output Frequency: 60 Hz, plus or minus 0.5 percent over the full range of input voltage, load, and battery voltage.
9. Limitation of harmonic distortion of input current to the UPS shall be as follows:

- a. Description: Either a tuned harmonic filter or an arrangement of rectifier-charger circuits shall limit THD to 5 **OR** 10, **as directed**, percent, maximum, at rated full UPS load current, for power sources with X/R ratio between 2 and 30.
OR
Description: THD is limited to a maximum of 32 percent, at rated full UPS load current, for power sources with X/R ratio between 2 and 30.
 10. Maximum Harmonic Content of Output-Voltage Waveform: 5 percent rms total and 3 percent rms for any single harmonic, for 100 percent rated nonlinear load current with a load crest factor of 3.0.
OR
Maximum Harmonic Content of Output-Voltage Waveform: 5 percent rms total and 3 percent rms for any single harmonic, for rated full load with THD up to 50 percent, with a load crest factor of 3.0.
 11. Minimum Overload Capacity of UPS at Rated Voltage: 125 percent of rated full load for 10 minutes, and 150 percent for 30 seconds in all operating modes.
 12. Maximum Output-Voltage Transient Excursions from Rated Value: For the following instantaneous load changes, stated as percentages of rated full UPS load, voltage shall remain within stated percentages of rated value and recover to, and remain within, plus or minus 2 percent of that value within 100 ms:
 - a. 50 Percent: Plus or minus 5 percent.
 - b. 100 Percent: Plus or minus 5 percent.
 - c. Loss of AC Input Power: Plus or minus 1 percent.
 - d. Restoration of AC Input Power: Plus or minus 1 percent.
 13. Input Power Factor: A minimum of 0.70 **OR** 0.85, **as directed**, lagging when supply voltage and current are at nominal rated values and the UPS is supplying rated full-load current.
 14. EMI Emissions: Comply with FCC Rules and Regulations and with 47 CFR 15 for Class A equipment.
- C. UPS Systems
1. Electronic Equipment: Solid-state devices using hermetically sealed, semiconductor elements. Devices include rectifier-charger, inverter, static bypass transfer switch, and system controls.
 2. Enclosures: Comply with NEMA 250, Type 1, unless otherwise indicated.
 3. Control Assemblies: Mount on modular plug-ins, readily accessible for maintenance.
 4. Surge Suppression: Protect internal UPS components from surges that enter at each ac power input connection including main disconnect switch, static bypass transfer switch, and maintenance bypass/isolation switch, **as directed**. Protect rectifier-charger, inverter, controls, and output components.
 - a. Use factory-installed surge suppressors tested according to IEEE C62.41.1 and IEEE C62.41.2, Category B **OR** Category C, **as directed**.
 - b. Additional Surge Protection: Protect internal UPS components from low-frequency, high-energy voltage surges described in IEEE C62.41.1 and IEEE C62.41.2. Design the circuits connecting with external power sources and select circuit elements, conductors, conventional surge suppressors, and rectifier components and controls so input assemblies will have adequate mechanical strength and thermal and current-carrying capacity to withstand stresses imposed by 40-Hz, 180 percent voltage surges described in IEEE C62.41.1 and IEEE C62.41.2.
 5. Maintainability Features (for units rated more than approximately 100 kVA): Mount rectifier-charger and inverter sections and the static bypass transfer switch on modular plug-ins, readily accessible for maintenance.
 6. Capacity Upgrade Capability: Arrange wiring, controls, and modular component plug-in provisions to permit future 25 percent increase in UPS capacity.
 7. Seismic-Restraint Design: UPS assemblies, subassemblies, and components (and fastenings and supports, mounting, and anchorage devices for them) shall be designed and fabricated to withstand static and seismic forces.
 8. UPS Cabinet Ventilation: Redundant fans or blowers draw in ambient air near the bottom of cabinet and discharge it near the top rear.

9. Output Circuit Neutral Bus, Conductor, and Terminal Ampacity (for a UPS with heavy nonlinear loading): Rated phase current times a multiple of 1.73, minimum.

D. Rectifier-Charger

1. Capacity: Adequate to supply the inverter during rated full output load conditions and simultaneously recharge the battery from fully discharged condition to 95 percent of full charge within 10 times the rated discharge time for duration of supply under battery power at full load.
2. Output Ripple: Limited by output filtration to less than 0.5 percent of rated current, peak to peak.
3. Control Circuits: Immune to frequency variations within rated frequency ranges of normal and emergency power sources.
 - a. Response Time: Field adjustable for maximum compatibility with local generator-set power source.
4. Battery Float-Charging Conditions: Comply with battery manufacturer's written instructions for battery terminal voltage and charging current required for maximum battery life.

E. Inverter

1. Description: Pulse-width modulated, with sinusoidal output.
OR
 Description (if the UPS may be supplied power from a standby engine-generator set): Pulse-width modulated, with sinusoidal output. Include a bypass phase synchronization window adjustment to optimize compatibility with local engine-generator-set power source.

F. Static Bypass Transfer Switch

1. Description: Solid-state switching device providing uninterrupted transfer. A contactor or electrically operated circuit breaker automatically provides electrical isolation for the switch.
2. Switch Rating: Continuous duty at the rated full UPS load current, minimum.

G. Battery

ALTERNATIVE BATTERY TYPES FOR UPS SYSTEMS

TYPE	NOMINAL LIFE EXPECTANCY (YEARS)*	TYPICAL WARRANTY (YEARS)*		MINIMUM NOMINAL MAINTENANCE INTERVAL	APPROX. INITIAL COST FACTOR**	SPECIAL FEATURES
		FULL	PRO RATA			
Premium quality, valve regulated, recombinant, lead calcium	20	1	19	1 year	2.5	Spill proof.
Standard quality, valve regulated, recombinant, lead calcium	10	1	9	1 year	1.0	Spill proof.
Nickel cadmium, flooded	25	5	15	3 years	4.0	Can operate in high ambient temperatures. Can be completely discharged without damage.
Lead calcium, flooded	20	1	9	6 months	2.5	-

*Life expectancy and warranty data apply to installations where batteries are considered to be in a "float-service"

application. Use the data only as a general guide because UPS batteries are typically considered to be in a separate service application category that accounts for the numerous discharges of varying duration they experience.

**Cost includes an allowance for space requirements and environmental control.

1. Description: Valve-regulated, recombinant, lead-calcium units, factory assembled in an isolated compartment of UPS cabinet, complete with battery disconnect switch.
 - a. Arrange for drawout removal of battery assembly from cabinet for testing and inspecting.

OR

Description: Valve-regulated, premium, heavy-duty, recombinant, lead-calcium units; factory assembled in an isolated compartment or in a separate matching cabinet, complete with battery disconnect switch.

 - a. Arrange for drawout removal of battery assembly from cabinet for testing and inspecting.

OR

Description: Flooded, lead-calcium, heavy-duty industrial units in styrene acrylonitrile containers mounted on three-tier, **as directed**, acid-resistant, painted steel racks. Assembly includes battery disconnect switch, intercell connectors, hydrometer syringe, and thermometer with specific gravity-correction scales.
2. Seismic-Restraint Design: Battery racks, cabinets, assemblies, subassemblies, and components (and fastenings and supports, mounting, and anchorage devices for them) shall be designed and fabricated to withstand static and seismic forces.

H. Controls And Indications

1. Description: Group displays, indications, and basic system controls on a common control panel on front of UPS enclosure.
2. Minimum displays, indicating devices, and controls include those in lists below. Provide sensors, transducers, terminals, relays, and wiring required to support listed items. Alarms include audible signals and visual displays.
3. Indications: Labeled LED **OR** Plain-language messages on a digital LCD or LED, **as directed**.
 - a. Quantitative indications shall include the following:
 - 1) Input voltage, each phase, line to line.
 - 2) Input current, each phase, line to line.
 - 3) Bypass input voltage, each phase, line to line.
 - 4) Bypass input frequency.
 - 5) System output voltage, each phase, line to line.
 - 6) System output current, each phase.
 - 7) System output frequency.
 - 8) DC bus voltage.
 - 9) Battery current and direction (charge/discharge).
 - 10) Elapsed time discharging battery.
 - b. Basic status condition indications shall include the following:
 - 1) Normal operation.
 - 2) Load-on bypass.
 - 3) Load-on battery.
 - 4) Inverter off.
 - 5) Alarm condition.
 - c. Alarm indications shall include the following:
 - 1) Bypass ac input overvoltage or undervoltage.
 - 2) Bypass ac input overfrequency or underfrequency.
 - 3) Bypass ac input and inverter out of synchronization.
 - 4) Bypass ac input wrong-phase rotation.
 - 5) Bypass ac input single-phase condition.
 - 6) Bypass ac input filter fuse blown.
 - 7) Internal frequency standard in use.
 - 8) Battery system alarm.
 - 9) Control power failure.
 - 10) Fan failure.

- 11) UPS overload.
 - 12) Battery-charging control faulty.
 - 13) Input overvoltage or undervoltage.
 - 14) Input transformer overtemperature.
 - 15) Input circuit breaker tripped.
 - 16) Input wrong-phase rotation.
 - 17) Input single-phase condition.
 - 18) Approaching end of battery operation.
 - 19) Battery undervoltage shutdown.
 - 20) Maximum battery voltage.
 - 21) Inverter fuse blown.
 - 22) Inverter transformer overtemperature.
 - 23) Inverter overtemperature.
 - 24) Static bypass transfer switch overtemperature.
 - 25) Inverter power supply fault.
 - 26) Inverter transistors out of saturation.
 - 27) Identification of faulty inverter section/leg.
 - 28) Inverter output overvoltage or undervoltage.
 - 29) UPS overload shutdown.
 - 30) Inverter current sensor fault.
 - 31) Inverter output contactor open.
 - 32) Inverter current limit.
- d. Controls shall include the following:
- 1) Inverter on-off.
 - 2) UPS start.
 - 3) Battery test.
 - 4) Alarm silence/reset.
 - 5) Output-voltage adjustment.
4. Dry-form "C" contacts shall be available for remote indication of the following conditions:
- a. UPS on battery.
 - b. UPS on-line.
 - c. UPS load-on bypass.
 - d. UPS in alarm condition.
 - e. UPS off (maintenance bypass closed).
5. Emergency Power Off Switch: Capable of local operation and operation by means of activation by external dry contacts.
- I. Maintenance Bypass/Isolation Switch
1. Description: Manually operated switch or arrangement of switching devices with mechanically actuated contact mechanism arranged to route the flow of power to the load around the rectifier-charger, inverter, and static bypass transfer switch.
 - a. Switch shall be electrically and mechanically interlocked to prevent interrupting power to the load when switching to bypass mode.
 - b. Switch shall electrically isolate other UPS components to permit safe servicing.
 2. Comply with NEMA PB 2 and UL 891.
 3. Switch Rating: Continuous duty at rated full UPS load current.
 4. Mounting Provisions: Internal to system cabinet **OR** Separate wall- or floor-mounted unit, **as directed**.
 5. Key interlock requires unlocking maintenance bypass/isolation switch before switching from normal position with key that is released only when the UPS is bypassed by the static bypass transfer switch. Lock is designed specifically for mechanical and electrical component interlocking.
- J. Output Isolation Transformer

1. Description: Shielded unit **OR** Unit, **as directed**, with low forward transfer impedance up to 3 kHz, minimum. Include the following features:
 - a. Comply with applicable portions of UL 1561, including requirements for nonlinear load current-handling capability for a K-factor of approximately 4 **OR** 9 **OR** 13 **OR** 20, **as directed**.
 - b. Output Impedance at Fundamental Frequency: Between 3 and 4 percent.
 - c. Regulation: 5 percent, maximum, at rated nonlinear load current.
 - d. Full-Load Efficiency at Rated Nonlinear Load Current: 96 percent, minimum.
 - e. Electrostatic Shielding of Windings: Independent for each winding.
 - f. Coil Leads: Physically arranged for minimum interlead capacitance.
 - g. Shield Grounding Terminal: Separately mounted; labeled "Shield Ground."
 - h. Capacitive Coupling between Primary and Secondary: 33 picofarads, maximum, over a frequency range of 20 Hz to 1 MHz.

- K. Output Distribution Section
 1. Panelboards: Comply with Division 26 Section "Panelboards" except provide assembly integral to UPS cabinet.

- L. Monitoring By Remote Status And Alarm Panel
 1. Description: Labeled LEDs on panel faceplate indicate five basic status conditions. Audible signal indicates alarm conditions. Silencing switch in face of panel silences signal without altering visual indication.
 - a. Cabinet and Faceplate: Surface or flush mounted to suit mounting conditions indicated.

- M. Monitoring By Remote Computer
 1. Description: Communication module in unit control panel provides capability for remote monitoring of status, parameters, and alarms specified in "Controls and Indications" Article. The remote computer and the connecting signal wiring are not included in this Section. Include the following features:
 - a. Connectors and network interface units or modems for data transmission via RS-232 link.
 - b. Software designed for control and monitoring of UPS functions and to provide on-screen explanations, interpretations, diagnosis, action guidance, and instructions for use of monitoring indications and development of meaningful reports. Permit storage and analysis of power-line transient records. Designs for Windows applications, software, and computer are not included in this Section.
 - c. Software and Hardware: Compatible with that specified in Division 26 Section "Electrical Power Monitoring And Control".

- N. Basic Battery Monitoring
 1. Battery Ground-Fault Detector: Initiates alarm when resistance to ground of positive or negative bus of battery is less than 5000 ohms.
 2. Battery compartment smoke/high-temperature detector initiates an alarm when smoke or a temperature greater than 75 deg C occurs within the compartment.
 3. Annunciation of Alarms: At UPS control panel.

- O. Additional Battery Monitoring
 1. Monitoring features and components shall include the following:
 - a. Factory-wired sensing leads to cell and battery terminals and cell temperature sensors.
 - b. Connections for data transmission via RS-232 link, network interface and, **as directed**, modem and, **as directed**, external signal wiring to computer **OR** electrical power monitoring and control equipment, **as directed**. External signal wiring and computer are not specified in this Section.
 - c. PC-based software designed to store and analyze battery data. Software compiles reports on individual-cell parameters and total battery performance trends, and provides data for scheduling and prioritizing battery maintenance.

2. Performance: Automatically measures and electronically records the following parameters on a routine schedule and during battery discharge events. During discharge events, records measurements timed to nearest second; includes measurements of the following parameters:
 - a. Total battery voltage and ambient temperature.
 - b. Individual-cell voltage, impedance, and temperature. During battery-discharging events such as utility outages, measures battery and cell voltages timed to nearest second.
 - c. Individual-cell electrolyte levels.

P. Battery-Cycle Warranty Monitoring

1. Description: Electronic device, acceptable to battery manufacturer as a basis for warranty action, for monitoring of charge-discharge cycle history of batteries covered by cycle-life warranties.
2. Performance: Automatically measures and records each discharge event, classifies it according to duration category, and totals discharges according to warranty criteria, displaying remaining warranted battery life on front panel display.
3. Additional monitoring functions and features shall include the following:
 - a. Measuring and Recording: Total voltage at battery terminals; initiates alarm for excursions outside the proper float-voltage level.
 - b. Monitors: Ambient temperature at battery; initiates alarm if temperature deviates from normally acceptable range.
 - c. Keypad on Device Front Panel: Provides access to monitored data using front panel display.
 - d. Alarm Contacts: Arranged to initiate local **OR** remote, **as directed**, alarm for battery discharge events **OR** abnormal temperature **OR** abnormal battery voltage or temperature, **as directed**.
 - e. Memory: Stores recorded data in nonvolatile electronic memory.
 - f. RS-232 Port: Permits downloading of data to a portable PC.
 - g. Modem: Makes measurements and recorded data accessible to a remote PC via telephone line. Computer is not specified in this Section.

Q. Source Quality Control

1. Factory test complete UPS system before shipment. Use actual batteries that are part of final installation **OR** simulated battery testing, **as directed**. Include the following:
 - a. Test and demonstration of all functions, controls, indicators, sensors, and protective devices.
 - b. Full-load test.
 - c. Transient-load response test.
 - d. Overload test.
 - e. Power failure test.
2. Observation of Test: Give 14 days' advance notice of tests and provide opportunity for Owner's representative to observe tests at Owner's choice.
3. Report test results. Include the following data:
 - a. Description of input source and output loads used. Describe actions required to simulate source load variation and various operating conditions and malfunctions.
 - b. List of indications, parameter values, and system responses considered satisfactory for each test action. Include tabulation of actual observations during test.
 - c. List of instruments and equipment used in factory tests.

1.3 EXECUTION

A. Installation

1. Equipment Mounting: Install UPS on concrete base. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.

- b. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to supported equipment.
 2. Maintain minimum clearances and workspace at equipment according to manufacturer's written instructions and NFPA 70.
 3. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams unless otherwise indicated.
- B. Grounding
1. Separately Derived Systems: If not part of a listed power supply for a data-processing room, comply with NFPA 70 requirements for connecting to grounding electrodes and for bonding to metallic piping near isolation transformer.
- C. Identification
1. Identify components and wiring according to Division 26 Section "Identification For Electrical Systems".
 - a. Identify each battery cell individually.
- D. Battery Equalization
1. Equalize charging of battery cells according to manufacturer's written instructions. Record individual-cell voltages.
- E. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Comply with manufacturer's written instructions.
 - b. Inspect interiors of enclosures, including the following:
 - 1) Integrity of mechanical and electrical connections.
 - 2) Component type and labeling verification.
 - 3) Ratings of installed components.
 - c. Inspect batteries and chargers according to requirements in NETA Acceptance Testing Specifications.
 - d. Test manual and automatic operational features and system protective and alarm functions.
 - e. Test communication of status and alarms to remote monitoring equipment.
 - f. Load the system using a variable-load bank to simulate kilovolt amperes, kilowatts, and power factor of loads for unit's rating. Use instruments calibrated within the previous six months according to NIST standards.
 - 1) Simulate malfunctions to verify protective device operation.
 - 2) Test duration of supply on emergency, low-battery voltage shutdown, and transfers and restoration due to normal source failure.
 - 3) Test harmonic content of input and output current less than 25, 50, and 100 percent of rated loads.
 - 4) Test output voltage under specified transient-load conditions.
 - 5) Test efficiency at 50, 75, and 100 percent of rated loads.
 - 6) Test remote status and alarm panel functions.
 - 7) Test battery-monitoring system functions.
 3. Seismic-restraint tests and inspections shall include the following:
 - a. Inspect type, size, quantity, arrangement, and proper installation of mounting or anchorage devices.

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-
- b. Test mounting and anchorage devices according to requirements in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 4. The UPS system will be considered defective if it does not pass tests and inspections.
 5. Record of Tests and Inspections: Maintain and submit documentation of tests and inspections, including references to manufacturers' written instructions and other test and inspection criteria. Include results of tests, inspections, and retests.
 6. Prepare test and inspection reports.
- F. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain the UPS.

END OF SECTION 26 33 53 00

Task	Specification	Specification Description
26 33 53 00	26 33 43 00	Central Battery Inverters

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SECTION 26 35 33 16 - POWER FACTOR CORRECTION CAPACITORS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for power factor correction capacitors. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes power and automatic power factor correction equipment rated 600 V and less.

C. Performance Requirements

1. Seismic Performance: Power factor correction equipment shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

D. Submittals

1. Product Data: For each type of product indicated. Include dimensions, operating characteristics of multiple capacitor cells or elements, and data on features, ratings, and performance.
2. Shop Drawings: For automatic power factor correction units.
 - a. Detail equipment assemblies and indicate dimensions, weights, method of field assembly, components, and location and size of each field connection. Show access and workspace requirements and required clearances.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Qualification Data: For qualified testing agency.
4. Seismic Qualification Certificates: For capacitors, accessories, and components, from manufacturer.
 - a. Basis of Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
5. Field quality-control reports.
6. Operation and Maintenance Data: For equipment to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Lists of spare parts and replacement components recommended for storage at Project site.
 - b. Detailed instructions covering operation under both normal and abnormal conditions.
7. Warranty: Sample of special warranty.

E. Quality Assurance

1. Testing Agency Qualifications: Member company of NETA or an NRTL **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA **OR** one who meets the requirements necessary for certification, **as directed**, to supervise on-site testing.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with IEEE 18 and NEMA CP 1.
4. Comply with NFPA 70.

- F. Coordination
1. Coordinate sensor-communication module package with data network and with monitoring equipment specified in Division 26 Section "Electrical Power Monitoring And Control" for successful transmission and remote readout of remote monitoring data specified in this Section.
- G. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace capacitor-bank components that fail in materials or workmanship within five years from date of Final Completion.

1.2 PRODUCTS

- A. Capacitors, General
1. Comply with UL 810.
 2. Service Conditions: Capacitor equipment suitable for the following conditions:
 - a. Operating Temperature: **Minus 40 to plus 115 deg F (Minus 40 to plus 46 deg C).**
 - b. Maximum Altitude: **6000 feet (1800 m).**
 - c. Humidity: 0 to 95 percent, noncondensing.
 3. Construction: Multiple capacitor cells or elements, factory wired in three-phase groups and mounted in metal enclosures.
 4. Cells: Dry metallized-dielectric, self-healing type. Each cell shall be encapsulated in thermosetting resin inside plastic container.
 5. Rupture Protection: Pressure-sensitive circuit interrupter for each cell.
- B. Fixed Capacitors
1. Description: Factory wired, ready for field connection to external circuits at a single set of pressure terminals. Comply with UL 810.
 2. Fuses: Current-limiting, noninterchangeable type; factory installed in each phase and located within the equipment enclosure. Features include the following:
 - a. Interrupting Capacity: 100,000 **OR** 200,000, **as directed**, A
 - b. Fuse Ratings and Characteristics: As recommended by capacitor manufacturer.
 - c. Neon Indicator Lamp for Each Fuse: Connect to illuminate when fuse has opened, but is still in place, and locate so it is visible from outside the enclosure.
 3. Discharge Resistors: Factory installed and wired.
 4. Enclosure: NEMA 250, steel **OR** aluminum, **as directed**, arranged to contain the fluid leakage from capacitor cells; factory equipped with mounting brackets suitable for type of mounting indicated.
 - a. Indoor Enclosures: NEMA 250, Type 12 or as indicated.
OR
Outdoor Enclosures: NEMA 250, Type 3R or as indicated.
OR
Outdoor Enclosures: NEMA 250, Type 4, equipped with watertight conduit connections.
- C. Automatic Power Factor Correction Units
1. Description: Capacitors, contactors, controls, and accessories factory installed in independent enclosures **OR** motor-control center, with a connection to motor-control center bus, **as directed**, complying with NEMA ICS 2. Comply with UL 810.
 2. Performance Requirements: Controls permit selection of a target power factor, adjustable to any value between unity and 0.80 lagging. Controls continuously sense the power factor on circuits being corrected and, when the power factor differs from the target setting for more than 10 seconds, operate a contractor to switch a capacitor bank into or out of the circuit. Contactors are opened or closed as required to bring the corrected circuit power factor closer to the target setting. Provide number of switching steps indicated on the Three-Phase Capacitor-Bank Schedule.

3. Current Transformer: Type, configuration, and ratio to suit sensing and mounting conditions.
4. Main Circuit Breaker: Thermal-magnetic, inverse time-current element for low-level overloads, and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. Operable from outside the enclosure to disconnect the unit.
5. Controls: Solid-state, microprocessor-based controls, including the following:
 - a. Undervoltage relay that interrupts capacitor switching and disconnects capacitors for power-supply interruptions longer than 15 minutes.
 - b. "Advance" and "Retard" push buttons on the control panel to permit manually controlled capacitor-bank switching.
6. Contactors: Three pole; rated for the repetitive high-inrush-switching duty in the capacitor application.
7. Fuses for Protection of Capacitor Banks: Rated to protect contactor, interconnecting wiring, and capacitors.
 - a. Spare-Fuse Cabinet: Identified and compartmented steel box **OR** cabinet with hinged lockable door, **as directed**.
8. Discharge Resistors: Factory installed and wired.
OR
Inductors: Air-core type, connected in capacitor circuits; rated to limit switching surges to within contactor ratings.
9. Precharge Capacitor Circuit: Resistive, precharge circuit to charge capacitors prior to switching and to limit switching surges to within contactor ratings.
10. Enclosure: NEMA 250, Type 1 **OR** Type 3R **OR** Type 12, **as directed**, steel or aluminum, with hinged door and hand-operated catch. Door shall be interlocked with controls or main circuit breaker to de-energize capacitors when door is opened.
 - a. Factory Finish: Manufacturer's standard enamel over corrosion-resistant treatment or primer coat.
11. Local Display: LED or liquid-crystal digital type, mounted in door of enclosure, indicating the following:
 - a. Target and actual power factors accurate to plus or minus 1 percent of reading.
 - b. Steps energized.
 - c. Step reconnection delay.
 - d. Real and reactive currents.
 - e. Voltage total harmonic distortion.
 - f. Alarm codes.
12. System Alarms: Alarm relay and local display indication of the following conditions:
 - a. Low power factor.
 - b. Leading power factor.
 - c. Frequency not detected.
 - d. Overcurrent.
 - e. Overvoltage.
 - f. Overtemperature.
 - g. Excessive voltage total harmonic distortion.
 - h. Capacitor overload.
 - i. Loss of capacitance.
13. Remote Monitoring Components: Sensors, associated communication modules, and network interface units, matched to and compatible with electrical power monitoring and control network. Communication module shall have capability to transmit the following data to remote monitoring devices:
 - a. System in alarm.
 - b. Power factor set point.
 - c. Corrected power factor.
 - d. Number of capacitor steps activated.

D. Source Quality Control

1. Factory test power factor correction equipment before shipment. Comply with NEMA CP 1. Include the following:
 - a. Routine capacitor production tests, including short-time overvoltage, capacitance, leak, and dissipation-factor tests.
 - b. Functional test of all operations, controls, indicators, sensors, and protective devices.

1.3 EXECUTION

A. Installation

1. Install freestanding equipment on concrete bases. Cast-in-place concrete is specified in Division 3.
2. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
3. Maintain minimum workspace according to manufacturer's written instructions.
4. Connect remote monitoring communication module to electrical power monitoring and control data network through appropriate network interface unit.
5. Identify components according to Division 26 Section "Identification For Electrical Systems".

B. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Perform tests and inspections.
3. Tests and Inspections: Perform each visual and mechanical inspection and electrical test stated in the following Sections, except optional tests, in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - a. Current Transformers.
 - b. Capacitors and Reactors, Capacitors.

C. Startup Service

1. Perform startup service.
 - a. Complete installation and startup checks according to manufacturer's written instructions.
 - b. Connect and run installed motors and equipment to verify the automatic switching of the capacitors. Verification shall include automatic switching of the total capacity of installed capacitors.
 - 1) Provide sufficient inductive/reactive load banks, in combination with resistive load banks, for the test.

D. Demonstration

1. Train Owner's maintenance personnel to adjust, operate, and maintain automatic power factor correction units.

END OF SECTION 26 35 33 16

Task	Specification	Specification Description
26 35 33 16	26 09 23 00	Electrical Power Monitoring And Control
26 35 53 00	26 32 13 13	Packaged Engine Generators

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SECTION 26 36 13 00 - TRANSFER SWITCHES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for transfer switches. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes transfer switches rated 600 V and less, including the following:
 - a. Automatic transfer switches.
 - b. Bypass/isolation switches.
 - c. Nonautomatic transfer switches.
 - d. Remote annunciation systems.
 - e. Remote annunciation and control systems.

C. Submittals

1. Product Data: Include rated capacities, weights, operating characteristics, furnished specialties, and accessories.
2. Shop Drawings: Dimensioned plans, elevations, sections, and details showing minimum clearances, conductor entry provisions, gutter space, installed features and devices, and material lists for each switch specified.
3. Manufacturer Seismic Qualification Certification: Submit certification that transfer switches accessories, and components will withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems". Include the following:
4. Field quality-control test reports.
5. Operation and maintenance data.

D. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
2. Comply with NEMA ICS 1.
3. Comply with NFPA 70.
4. Comply with NFPA 99.
5. Comply with NFPA 110.
6. Comply with UL 1008 unless requirements of these Specifications are stricter.

1.2 PRODUCTS

A. General Transfer-Switch Product Requirements

1. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.
2. Tested Fault-Current Closing and Withstand Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.
 - a. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
3. Solid-State Controls: Repetitive accuracy of all settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

4. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.41. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.
 5. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism, mechanically and electrically interlocked in both directions.
 6. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.
 - a. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are not acceptable.
 - b. Switch Action: Double throw; mechanically held in both directions.
 - c. Contacts: Silver composition or silver alloy for load-current switching. Conventional automatic transfer-switch units, rated 225 A and higher, shall have separate arcing contacts.
 7. Neutral Switching. Where four-pole switches are indicated, provide neutral pole switched simultaneously with phase poles **OR** overlapping neutral contacts, **as directed**.
 8. Neutral Terminal: Solid and fully rated, unless otherwise indicated.
 9. Oversize Neutral: Ampacity and switch rating of neutral path through units indicated for oversize neutral shall be double the nominal rating of circuit in which switch is installed.
 10. Heater: Equip switches exposed to outdoor temperatures and humidity, and other units indicated, with an internal heater. Provide thermostat within enclosure to control heater.
 11. Battery Charger: For generator starting batteries.
 - a. Float type rated 2 **OR** 10, **as directed**, A.
 - b. Ammeter to display charging current.
 - c. Fused ac inputs and dc outputs.
 12. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.
 13. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, either by color-code or by numbered or lettered wire and cable tape markers at terminations. Color-coding and wire and cable tape markers are specified in Division 26 Section "Identification For Electrical Systems".
 - a. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
 - b. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
 - c. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
 14. Enclosures: General-purpose NEMA 250, Type 1 **OR** 3R **OR** 12, **as directed**, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.
- B. Automatic Transfer Switches
1. Comply with Level 1 equipment according to NFPA 110.
 2. Switching Arrangement: Double-throw type, incapable of pauses or intermediate position stops during normal functioning, unless otherwise indicated.
 3. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.
 4. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.
 5. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval is adjustable from 1 to 30 seconds.
 6. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.
 7. Transfer Switches Based on Molded-Case-Switch Components: Comply with NEMA AB 1, UL 489, and UL 869A.
 8. Automatic Closed-Transition Transfer Switches: Include the following functions and characteristics:

- a. Fully automatic make-before-break operation.
- b. Load transfer without interruption, through momentary interconnection of both power sources not exceeding 100 ms.
- c. Initiation of No-Interruption Transfer: Controlled by in-phase monitor and sensors confirming both sources are present and acceptable.
 - 1) Initiation occurs without active control of generator.
 - 2) Controls ensure that closed-transition load transfer closure occurs only when the 2 sources are within plus or minus 5 electrical degrees maximum, and plus or minus 5 percent maximum voltage difference.
- d. Failure of power source serving load initiates automatic break-before-make transfer.
9. In-Phase Monitor: Factory-wired, internal relay controls transfer so it occurs only when the two sources are synchronized in phase. Relay compares phase relationship and frequency difference between normal and emergency sources and initiates transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer is initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.
10. Motor Disconnect and Timing Relay: Controls designate starters so they disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters is through wiring external to automatic transfer switch. Time delay for reconnecting individual motor loads is adjustable between 1 and 60 seconds, and settings are as indicated. Relay contacts handling motor-control circuit inrush and seal currents are rated for actual currents to be encountered.
11. Programmed Neutral Switch Position: Switch operator has a programmed neutral position arranged to provide a midpoint between the two working switch positions, with an intentional, time-controlled pause at midpoint during transfer. Pause is adjustable from 0.5 to 30 seconds minimum and factory set for 0.5 second, unless otherwise indicated. Time delay occurs for both transfer directions. Pause is disabled unless both sources are live.
12. Automatic Transfer-Switch Features:
 - a. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage is adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
 - b. Adjustable Time Delay: For override of normal-source voltage sensing to delay transfer and engine start signals. Adjustable from zero to six seconds, and factory set for one second.
 - c. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
 - d. Time Delay for Retransfer to Normal Source: Adjustable from 0 to 30 minutes, and factory set for 10 minutes to automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
 - e. Test Switch: Simulate normal-source failure.
 - f. Switch-Position Pilot Lights: Indicate source to which load is connected.
 - g. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.
 - 1) Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - 2) Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."
 - h. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
 - i. Transfer Override Switch: Overrides automatic retransfer control so automatic transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.

- j. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
- k. Engine Shutdown Contacts: Instantaneous; shall initiate shutdown sequence at remote engine-generator controls after retransfer of load to normal source.
- l. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
- m. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods are adjustable from 10 to 30 minutes. Factory settings are for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:
 - 1) Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
 - 2) Push-button programming control with digital display of settings.
 - 3) Integral battery operation of time switch when normal control power is not available.

C. Bypass/Isolation Switches

- 1. Comply with requirements for Level 1 equipment according to NFPA 110.
- 2. Description: Manual type, arranged to select and connect either source of power directly to load, isolating transfer switch from load and from both power sources. Include the following features for each combined automatic transfer switch and bypass/isolation switch:
 - a. Means to lock bypass/isolation switch in the position that isolates transfer switch with an arrangement that permits complete electrical testing of transfer switch while isolated. While isolated, interlocks prevent transfer-switch operation, except for testing or maintenance.
 - b. Drawout Arrangement for Transfer Switch: Provide physical separation from live parts and accessibility for testing and maintenance operations.
 - c. Bypass/Isolation Switch Current, Voltage, Closing, and Short-Circuit Withstand Ratings: Equal to or greater than those of associated automatic transfer switch, and with same phase arrangement and number of poles.
 - d. Contact temperatures of bypass/isolation switches shall not exceed those of automatic transfer-switch contacts when they are carrying rated load.
 - e. Operability: Constructed so load bypass and transfer-switch isolation can be performed by 1 person in no more than 2 operations in 15 seconds or less.
 - f. Legend: Manufacturer's standard legend for control labels and instruction signs shall describe operating instructions.
 - g. Maintainability: Fabricate to allow convenient removal of major components from front without removing other parts or main power conductors.
- 3. Interconnection of Bypass/Isolation Switches with Automatic Transfer Switches: Factory-installed copper bus bars; plated at connection points and braced for the indicated available short-circuit current.

D. Nonautomatic Transfer Switches

- 1. Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternate Source." Switch shall be capable of transferring load in either direction with either or both sources energized.
- 2. Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternate Source." In addition, removable manual handle provides quick-make, quick-break manual-switching action. Switch shall be capable of electrically or manually transferring load in either direction with either or both sources energized. Control circuit disconnects from electrical operator during manual operation.
- 3. Double-Throw Switching Arrangement: Incapable of pauses or intermediate position stops during switching sequence.

4. Nonautomatic Transfer-Switch Accessories:
 - a. Pilot Lights: Indicate source to which load is connected.
 - b. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and alternate-source sensing circuits.
 - 1) Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
 - 2) Emergency Power Supervision: Red light with nameplate engraved "Alternate Source Available."
 - c. Unassigned Auxiliary Contacts: One set of normally closed contacts for each switch position, rated 10 A at 240-V ac.

- E. Remote Annunciator System
 1. Functional Description: Remote annunciator panel shall annunciate conditions for indicated transfer switches. Annunciation shall include the following:
 - a. Sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - b. Switch position.
 - c. Switch in test mode.
 - d. Failure of communication link.
 2. Annunciator Panel: LED-lamp type with audible signal and silencing switch.
 - a. Indicating Lights: Grouped for each transfer switch monitored.
 - b. Label each group, indicating transfer switch it monitors, location of switch, and identity of load it serves.
 - c. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.
 - d. Lamp Test: Push-to-test or lamp-test switch on front panel.

- F. Remote Annunciator And Control System
 1. Functional Description: Include the following functions for indicated transfer switches:
 - a. Indication of sources available, as defined by actual pickup and dropout settings of transfer-switch controls.
 - b. Indication of switch position.
 - c. Indication of switch in test mode.
 - d. Indication of failure of digital communication link.
 - e. Key-switch or user-code access to control functions of panel.
 - f. Control of switch-test initiation.
 - g. Control of switch operation in either direction.
 - h. Control of time-delay bypass for transfer to normal source.
 2. Malfunction of annunciator, annunciation and control panel, or communication link shall not affect functions of automatic transfer switch. In the event of failure of communication link, automatic transfer switch automatically reverts to stand-alone, self-contained operation. Automatic transfer-switch sensing, controlling, or operating function shall not depend on remote panel for proper operation.
 3. Remote Annunciation and Control Panel: Solid-state components. Include the following features:
 - a. Controls and indicating lights grouped together for each transfer switch.
 - b. Label each indicating light control group. Indicate transfer switch it controls, location of switch, and load it serves.
 - c. Digital Communication Capability: Matched to that of transfer switches supervised.
 - d. Mounting: Flush, modular, steel cabinet, unless otherwise indicated.

- G. Source Quality Control
 1. Factory test and inspect components, assembled switches, and associated equipment. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

1.3 EXECUTION**A. Installation**

1. Design each fastener and support to carry load indicated by seismic requirements and according to seismic-restraint details. See Division 26 Section "Hangers And Supports For Electrical Systems".
2. Floor-Mounting Switch: Anchor to floor by bolting.
 - a. Concrete Bases: **4 inches (100 mm)** high, reinforced, with chamfered edges. Extend base no more than **4 inches (100 mm)** in all directions beyond the maximum dimensions of switch, unless otherwise indicated or unless required for seismic support. Construct concrete bases according to Division 26 Section "Hangers And Supports For Electrical Systems".
3. Annunciator and Control Panel Mounting: Flush in wall, unless otherwise indicated.
4. Identify components according to Division 26 Section "Identification For Electrical Systems".
5. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

B. Connections

1. Wiring to Remote Components: Match type and number of cables and conductors to control and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to the Owner if necessary to accommodate required wiring.
2. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
3. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

C. Field Quality Control

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
2. Perform tests and inspections and prepare test reports.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist in testing.
 - b. After installing equipment and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
 - d. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.
 - 1) Check for electrical continuity of circuits and for short circuits.
 - 2) Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
 - 3) Verify that manual transfer warnings are properly placed.
 - 4) Perform manual transfer operation.
 - e. After energizing circuits, demonstrate interlocking sequence and operational function for each switch at least three times.
 - 1) Simulate power failures of normal source to automatic transfer switches and of emergency source with normal source available.
 - 2) Simulate loss of phase-to-ground voltage for each phase of normal source.
 - 3) Verify time-delay settings.
 - 4) Verify pickup and dropout voltages by data readout or inspection of control settings.
 - 5) Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for 1 pole deviating by more than 50 percent from other poles.

- 6) Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.
 - f. Ground-Fault Tests: Coordinate with testing of ground-fault protective devices for power delivery from both sources.
 - 1) Verify grounding connections and locations and ratings of sensors.
 3. Coordinate tests with tests of generator and run them concurrently.
 4. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.
 5. Remove and replace malfunctioning units and retest as specified above.
 6. Infrared Scanning: After Final Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.
 - a. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Final Completion.
 - b. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
 - c. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
- D. Demonstration
1. Engage a factory-authorized service representative to train the Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment as specified below.
 2. Coordinate this training with that for generator equipment.

END OF SECTION 26 36 13 00

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Task	Specification	Specification Description
26 36 13 00	26 24 13 00a	Enclosed Switches And Circuit Breakers
26 36 23 00	26 24 13 00a	Enclosed Switches And Circuit Breakers
26 36 23 00	26 36 13 00	Transfer Switches

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SECTION 26 43 13 00 - TRANSIENT VOLTAGE SUPPRESSION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for transient voltage suppression. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes field-mounted TVSS for low-voltage (120 to 600 V) power distribution and control equipment.

C. Definitions

1. ATS: Acceptance Testing Specifications.
2. SVR: Suppressed voltage rating.
3. TVSS: Transient voltage surge suppressor(s), both singular and plural; also, transient voltage surge suppression.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating weights, electrical characteristics, furnished specialties, and accessories.
2. Field quality-control reports.
3. Operation and maintenance data.
4. Warranties: Sample of special warranties.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a testing agency, and marked for intended location and application.
2. Comply with IEEE C62.41.2 and test devices according to IEEE C62.45.
3. Comply with NEMA LS 1.
4. Comply with UL 1283, **as directed**, and UL 1449.
5. Comply with NFPA 70.

F. Project Conditions

1. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - a. Notify Owner no fewer than two days in advance of proposed electrical service interruptions.
 - b. Do not proceed with interruption of electrical service without Owner's written permission.
2. Service Conditions: Rate TVSS devices for continuous operation under the following conditions unless otherwise indicated:
 - a. Maximum Continuous Operating Voltage: Not less than 115 percent of nominal system operating voltage.
 - b. Operating Temperature: **30 to 120 deg F (0 to 50 deg C)**.
 - c. Humidity: 0 to 85 percent, noncondensing.
 - d. Altitude: Less than **20,000 feet (6090 m)** above sea level.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of surge suppressors that fail in materials or workmanship within Five years from date of Final Completion.

2. Special Warranty for Cord-Connected, Plug-in Surge Suppressors: Manufacturer's standard form in which manufacturer agrees to repair or replace electronic equipment connected to circuits protected by surge suppressors.

1.2 PRODUCTS

A. Service Entrance Suppressors

1. Surge Protection Devices:

- a. Non-modular.
- b. LED indicator lights for power and protection status.
- c. Audible alarm, with silencing switch, to indicate when protection has failed.
- d. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

OR

Surge Protection Devices:

- e. Comply with UL 1449.
 - f. Modular design (with field-replaceable modules) **OR** Non-modular design, **as directed**.
 - g. Fuses, rated at 200-kA interrupting capacity.
 - h. Fabrication using bolted compression lugs for internal wiring.
 - i. Integral disconnect switch (if a fused switch or circuit breaker is not provided for the TVSS in the panelboard and the TVSS will not have a direct bus bar connection).
 - j. Redundant suppression circuits.
 - k. Redundant replaceable modules.
 - l. Arrangement with copper bus bars and for bolted connections to phase buses, neutral bus, and ground bus.
- OR**
- Arrangement with wire connections to phase buses, neutral bus, and ground bus.
- m. LED indicator lights for power and protection status.
 - n. Audible alarm, with silencing switch, to indicate when protection has failed.
 - o. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 - p. Four **OR** Six, **as directed**, -digit transient-event counter set to totalize transient surges.
2. Peak Single-Impulse Surge Current Rating: 320 kA per mode/640 kA **OR** 240 kA per mode/480 kA **OR** 160 kA per mode/320 kA, **as directed**, per phase.
 3. Minimum single impulse current ratings, using 8-by-20-mic.sec waveform described in IEEE C62.41.2
 - a. Line to Neutral: 70,000 A.
 - b. Line to Ground: 70,000 A.
 - c. Neutral to Ground: 50,000 A.
 4. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 V **OR** 208Y/120 V **OR** 600Y/347 V, **as directed**, 3-phase, 4-wire circuits shall be as follows:
 - a. Line to Neutral: 800 V for 480Y/277 V **OR** 400 V for 208Y/120 V **OR** 1200 V for 600Y/347 V, **as directed**.
 - b. Line to Ground: 800 V for 480Y/277 V **OR** 400 V for 208Y/120 V **OR** 1200 V for 600Y/347 V, **as directed**.
 - c. Neutral to Ground: 800 V for 480Y/277 V **OR** 400 V for 208Y/120 V **OR** 1200 V for 600Y/347 V, **as directed**.

OR

Protection modes and UL 1449 SVR for 240/120 V, single-phase, 3-wire circuits shall be as follows:

- a. Line to Neutral: 400 V.
- b. Line to Ground: 400 V.
- c. Neutral to Ground: 400 V.

OR

Protection modes and UL 1449 SVR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:

- a. Line to Neutral: 400 V, 800 V from high leg.
- b. Line to Ground: 400 V.
- c. Neutral to Ground: 400 V.

OR

Protection modes and UL 1449 SVR for 240 V, 480 V, or 600 V, 3-phase, 3-wire, delta circuits shall be as follows:

- a. Line to Line: 2000 V for 480 V **OR** 1000 V for 240 V **OR** 2500 V for 600 V, **as directed**.
- b. Line to Ground: 2000 V for 480 V **OR** 1000 V for 240 V **OR** 2500 V for 600 V, **as directed**.

B. Panelboard Suppressors

1. Surge Protection Devices:

- a. Non-modular.
- b. LED indicator lights for power and protection status.
- c. Audible alarm, with silencing switch, to indicate when protection has failed.
- d. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.

OR

Surge Protection Devices:

- a. Comply with UL 1449.
 - b. Modular design (with field-replaceable modules) **OR** Non-modular design, **as directed**.
 - c. Short-circuit current rating complying with UL 1449, and matching or exceeding the panelboard short-circuit rating and redundant suppression circuits; with individually fused metal-oxide varistors.
 - d. Fuses, rated at 200-kA interrupting capacity.
 - e. Fabrication using bolted compression lugs for internal wiring.
 - f. Integral disconnect switch (if a fused switch or circuit breaker is not provided for the TVSS in the panelboard and the TVSS will not have a direct bus bar connection).
 - g. Redundant suppression circuits.
 - h. Redundant replaceable modules.
 - i. Arrangement with wire connections to phase buses, neutral bus, and ground bus.
 - j. LED indicator lights for power and protection status.
 - k. Audible alarm, with silencing switch, to indicate when protection has failed.
 - l. Form-C contacts rated at 5 A and 250-V ac, one normally open and one normally closed, for remote monitoring of protection status. Contacts shall reverse on failure of any surge diversion module or on opening of any current-limiting device. Coordinate with building power monitoring and control system.
 - m. Four **OR** Six, **as directed**, -digit transient-event counter set to totalize transient surges.
2. Peak Single-Impulse Surge Current Rating: 160 kA per mode/320 kA **OR** 120 kA per mode/240 kA **OR** 80 kA per mode/160 kA, **as directed**, per phase.
3. Minimum single impulse current ratings, using 8-by-20-mic.sec waveform described in IEEE C62.41.2:
- a. Line to Neutral: 70,000 A.
 - b. Line to Ground: 70,000 A.
 - c. Neutral to Ground: 50,000 A.
4. Protection modes and UL 1449 SVR for grounded wye circuits with 480Y/277 V **OR** 208Y/120 V **OR** 600Y/347 V, **as directed**, 3-phase, 4-wire circuits shall be as follows:
- a. Line to Neutral: 800 V for 480Y/277 V **OR** 400 V for 208Y/120 V **OR** 1200 V for 600Y/347 V, **as directed**.

- b. Line to Ground: 800 V for 480Y/277 V **OR** 400 V for 208Y/120 V **OR** 1200 V for 600Y/347 V, **as directed**.
- c. Neutral to Ground: 800 V for 480Y/277 V **OR** 400 V for 208Y/120 V **OR** 1200 V for 600Y/347 V, **as directed**.

OR

Protection modes and UL 1449 SVR for 240/120-V, single-phase, 3-wire circuits shall be as follows:

- a. Line to Neutral: 400 V.
- b. Line to Ground: 400 V.
- c. Neutral to Ground: 400 V.

OR

Protection modes and UL 1449 SVR for 240/120-V, 3-phase, 4-wire circuits with high leg shall be as follows:

- a. Line to Neutral: 400 V, 800 V from high leg.
- b. Line to Ground: 400 V.
- c. Neutral to Ground: 400 V.

OR

Protection modes and UL 1449 SVR for 240 V, 480 V, or 600 V, 3-phase, 3-wire, delta circuits shall be as follows:

- a. Line to Line: 2000 V for 480 V **OR** 1000 V for 240 V **OR** 2500 V for 600 V, **as directed**.
- b. Line to Ground: 1500 V for 480 V **OR** 800 V for 240 V **OR** 2500 V for 600 V, **as directed**.

C. Enclosures

- 1. Indoor Enclosures: NEMA 250 Type 1 **OR** Type 12, **as directed**.
- 2. Outdoor Enclosures: NEMA 250 Type 3R **OR** Type 4 **OR** Type 4X, **as directed**.

1.3 EXECUTION

A. Installation

- 1. Install TVSS devices at service entrance on load side, with ground lead bonded to service entrance ground.
- 2. Install TVSS devices for panelboards and auxiliary panels with conductors or buses between suppressor and points of attachment as short and straight as possible. Do not exceed manufacturer's recommended lead length. Do not bond neutral and ground.
 - a. Provide multiple, 30 **OR** 60 **OR** 100, **as directed**, -A circuit breaker as a dedicated disconnecting means for TVSS unless otherwise indicated.

B. Field Quality Control

- 1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- 2. Tests and Inspections:
 - a. Perform each visual and mechanical inspection and electrical test stated in NETA ATS, "Surge Arresters, Low-Voltage Surge Protection Devices" Section. Certify compliance with test parameters.
 - b. After installing TVSS devices but before electrical circuitry has been energized, test for compliance with requirements.
 - c. Complete startup checks according to manufacturer's written instructions.
- 3. TVSS device will be considered defective if it does not pass tests and inspections.
- 4. Prepare test and inspection reports.

C. Startup Service

- a. Do not energize or connect service entrance equipment **OR** panelboards **OR** control terminals **OR** data terminals, **as directed**, to their sources until TVSS devices are installed and connected.
 - b. Do not perform insulation resistance tests of the distribution wiring equipment with the TVSS installed. Disconnect before conducting insulation resistance tests, and reconnect immediately after the testing is over.
- D. Demonstration
- a. Train Owner's maintenance personnel to maintain TVSS devices.

END OF SECTION 26 43 13 00

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SECTION 26 51 00 00 - INTERIOR LIGHTING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for interior lighting. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Interior lighting fixtures, lamps, and ballasts.
 - b. Emergency lighting units.
 - c. Exit signs.
 - d. Lighting fixture supports.
 - e. Retrofit kits for fluorescent lighting fixtures.

C. Definitions

1. BF: Ballast factor.
2. CCT: Correlated color temperature.
3. CRI: Color-rendering index.
4. HID: High-intensity discharge.
5. LER: Luminaire efficacy rating.
6. Lumen: Measured output of lamp and luminaire, or both.
7. Luminaire: Complete lighting fixture, including ballast housing if provided.

D. Submittals

1. Product Data: For each type of lighting fixture, arranged in order of fixture designation. Include data on features, accessories, finishes, and the following:
 - a. Physical description of lighting fixture including dimensions.
 - b. Emergency lighting units including battery and charger.
 - c. Ballast, including BF.
 - d. Energy-efficiency data.
 - e. Air and Thermal Performance Data: For air-handling lighting fixtures. Furnish data required in "Submittals" Article in Division 23 Section "Diffusers, Registers, And Grilles".
 - f. Sound Performance Data: For air-handling lighting fixtures. Indicate sound power level and sound transmission class in test reports certified according to standards specified in Division 23 Section "Diffusers, Registers, And Grilles".
 - g. Life, output (lumens, CCT, and CRI), and energy-efficiency data for lamps.
 - h. Photometric data and adjustment factors based on laboratory tests, complying with IESNA Lighting Measurements Testing & Calculation Guides, of each lighting fixture type. The adjustment factors shall be for lamps, ballasts, and accessories identical to those indicated for the lighting fixture as applied in this Project.
 - 1) Testing Agency Certified Data: For indicated fixtures, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining fixtures shall be certified by manufacturer.
OR
Manufacturer Certified Data: Photometric data shall be certified by a manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.
2. Shop Drawings: For nonstandard or custom lighting fixtures. Include plans, elevations, sections, details, and attachments to other work.

- a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Wiring Diagrams: For power, signal, and control wiring.
 3. Samples: For each lighting fixture indicated in the Interior Lighting Fixture Schedule. Each Sample shall include the following:
 - a. Lamps and ballasts, installed.
 - b. Cords and plugs.
 - c. Pendant support system.
 4. Installation instructions.
 5. Coordination Drawings: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - a. Lighting fixtures.
 - b. Suspended ceiling components.
 - c. Partitions and millwork that penetrate the ceiling or extends to within **12 inches (305 mm)** of the plane of the luminaires.
 - d. Ceiling-mounted projectors.
 - e. Structural members to which suspension systems for lighting fixtures will be attached.
 - f. Other items in finished ceiling including the following:
 - 1) Air outlets and inlets.
 - 2) Speakers.
 - 3) Sprinklers.
 - 4) Smoke and fire detectors.
 - 5) Occupancy sensors.
 - 6) Access panels.
 - g. Perimeter moldings.
 6. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
 7. Product Certificates: For each type of ballast for bi-level and dimmer-controlled fixtures, from manufacturer.
 8. Field quality-control reports.
 9. Operation and Maintenance Data: For lighting equipment and fixtures to include in emergency, operation, and maintenance manuals.
 - a. Provide a list of all lamp types used on Project; use ANSI and manufacturers' codes.
 10. Warranty: Sample of special warranty.
- E. Quality Assurance
1. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
OR
Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910, complying with the IESNA Lighting Measurements Testing & Calculation Guides.
 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Comply with NFPA 70.
 4. FM Global Compliance: Lighting fixtures for hazardous locations shall be listed and labeled for indicated class and division of hazard by FM Global.
- F. Coordination
1. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

G. Warranty

1. Special Warranty for Emergency Lighting Batteries: Manufacturer's standard form in which manufacturer of battery-powered emergency lighting unit agrees to repair or replace components of rechargeable batteries that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period for Emergency Lighting Unit Batteries: 10 years from date of Final Completion. Full warranty shall apply for first year, and prorated warranty for the remaining nine years.
 - b. Warranty Period for Emergency Fluorescent Ballast and Self-Powered Exit Sign Batteries: Seven years from date of Final Completion. Full warranty shall apply for first year, and prorated warranty for the remaining six years.

1.2 PRODUCTS

A. General Requirements For Lighting Fixtures And Components

1. Recessed Fixtures: Comply with NEMA LE 4 for ceiling compatibility for recessed fixtures.
2. Incandescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5A.
3. Fluorescent Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
4. HID Fixtures: Comply with UL 1598. Where LER is specified, test according to NEMA LE 5B.
5. Metal Parts: Free of burrs and sharp corners and edges.
6. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
7. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position.
8. Diffusers and Globes:
 - a. Acrylic Lighting Diffusers: 100 percent virgin acrylic plastic. High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
 - 1) Lens Thickness: At least 0.125 inch (3.175 mm) minimum unless otherwise indicated.
 - 2) UV stabilized.
 - b. Glass: Annealed crystal glass unless otherwise indicated.
9. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
 - a. Label shall include the following lamp and ballast characteristics:
 - 1) "USE ONLY" and include specific lamp type.
 - 2) Lamp diameter code (T-4, T-5, T-8, T-12, etc.), tube configuration (twin, quad, triple, etc.), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
 - 3) Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
 - 4) Start type (preheat, rapid start, instant start, etc.) for fluorescent and compact fluorescent luminaires.
 - 5) ANSI ballast type (M98, M57, etc.) for HID luminaires.
 - 6) CCT and CRI for all luminaires.
10. Electromagnetic-Interference Filters: Factory installed to suppress conducted electromagnetic interference as required by MIL-STD-461E. Fabricate lighting fixtures with one filter on each ballast indicated to require a filter.
11. Air-Handling Fluorescent Fixtures: For use with plenum ceiling for air return and heat extraction and for attaching an air-diffuser-boot assembly specified in Division 15 Section "Diffusers, Registers, and Grilles."
 - a. Air-Supply Units: Slots in one or both side trims join with air-diffuser-boot assemblies.

- b. Heat-Removal Units: Air path leads through lamp cavity.
- c. Combination Heat-Removal and Air-Supply Unit: Heat is removed through lamp cavity at both ends of the fixture door with air supply same as for air-supply units.
- d. Dampers: Operable from outside fixture for control of return-air volume.
- e. Static Fixture: Air-supply slots are blanked off, and fixture appearance matches active units.

B. Ballasts For Linear Fluorescent Lamps

1. General Requirements for Electronic Ballasts:
 - a. Comply with UL 935 and with ANSI C82.11.
 - b. Designed for type and quantity of lamps served.
 - c. Ballasts shall be designed for full light output unless another BF, dimmer, or bi-level control is indicated.
 - d. Sound Rating: Class A **OR** Class A except Class B for T8/HO and T12/Slimline lamp ballasts, **as directed**.
 - e. Total Harmonic Distortion Rating: Less than 10 **OR** 20, **as directed**, percent.
 - f. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 - g. Operating Frequency: 42 kHz or higher.
 - h. Lamp Current Crest Factor: 1.7 or less.
 - i. BF: 0.88 or higher.
 - j. Power Factor: 0.95 **OR** 0.98, **as directed**, or higher.
 - k. Parallel Lamp Circuits: Multiple lamp ballasts shall comply with ANSI C82.11 and shall be connected to maintain full light output on surviving lamps if one or more lamps fail.
2. Luminaires controlled by occupancy sensors shall have programmed-start ballasts.
3. Electronic Programmed-Start Ballasts for T5 **OR** T8 **OR** T5HO **OR** T5 and T5HO, **as directed**, Lamps: Comply with ANSI C82.11 and the following:
 - a. Lamp end-of-life detection and shutdown circuit for T5 diameter lamps.
 - b. Automatic lamp starting after lamp replacement.
4. Electromagnetic Ballasts: Comply with ANSI C82.1; energy saving, high-power factor, Class P, and having automatic-reset thermal protection.
 - a. Ballast Manufacturer Certification: Indicated by label.
5. Single Ballasts for Multiple Lighting Fixtures: Factory wired with ballast arrangements and bundled extension wiring to suit final installation conditions without modification or rewiring in the field.
6. Ballasts for Low-Temperature Environments:
 - a. Temperatures **0 Deg F (Minus 17 Deg C)** and Higher: Electronic or electromagnetic type rated for **0 deg F (minus 17 deg C)** starting and operating temperature with indicated lamp types.
 - b. Temperatures **Minus 20 Deg F (Minus 29 Deg C)** and Higher: Electromagnetic type designed for use with indicated lamp types.
7. Ballasts for Residential Applications: Fixtures designated as "Residential" may use low-power-factor electronic ballasts having a Class B sound rating and total harmonic distortion of approximately 30 percent.
8. Ballasts for Low Electromagnetic-Interference Environments: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for consumer equipment.
9. Ballasts for Dimmer-Controlled Lighting Fixtures: Electronic type.
 - a. Dimming Range: 100 to 5 percent of rated lamp lumens.
 - b. Ballast Input Watts: Can be reduced to 20 percent of normal.
 - c. Compatibility: Certified by manufacturer for use with specific dimming control system and lamp type indicated.
 - d. Control: Coordinate wiring from ballast to control device to ensure that the ballast, controller, and connecting wiring are compatible.
10. Ballasts for Bi-Level Controlled Lighting Fixtures: Electronic type.

- a. Operating Modes: Ballast circuit and leads provide for remote control of the light output of the associated lamp between high- and low-level and off.
 - 1) High-Level Operation: 100 percent of rated lamp lumens.
 - 2) Low-Level Operation: 30 percent of rated lamp lumens.
 - b. Ballast shall provide equal current to each lamp in each operating mode.
 - c. Compatibility: Certified by manufacturer for use with specific bi-level control system and lamp type indicated.
11. Ballasts for Tri-Level Controlled Lighting Fixtures: Electronic type.
- a. Operating Modes: Ballast circuit and leads provide for remote control of the light output of the associated lamp between high- and low-level and off.
 - 1) High-Level Operation: 100 percent of rated lamp lumens.
 - 2) Low-Level Operation: 30 and 50 **OR** 30 and 60, **as directed**, percent of rated lamp lumens.
 - b. Ballast shall provide equal current to each lamp in each operating mode.
 - c. Compatibility: Certified by manufacturer for use with specific tri-level control system and lamp type indicated.
- C. Ballasts For Compact Fluorescent Lamps
1. Description: Electronic-programmed rapid-start type, complying with UL 935 and with ANSI C 82.11, designed for type and quantity of lamps indicated. Ballast shall be designed for full light output unless dimmer or bi-level control is indicated:
 - a. Lamp end-of-life detection and shutdown circuit.
 - b. Automatic lamp starting after lamp replacement.
 - c. Sound Rating: Class A.
 - d. Total Harmonic Distortion Rating: Less than 20 percent.
 - e. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 - f. Operating Frequency: 20 kHz or higher.
 - g. Lamp Current Crest Factor: 1.7 or less.
 - h. BF: 0.95 or higher unless otherwise indicated.
 - i. Power Factor: 0.95 **OR** 0.98, **as directed**, except fixtures designated as "Residential" may use low-power-factor electronic ballasts, **as directed**, or higher.
 - j. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
- D. Emergency Fluorescent Power Unit
1. Internal Type: Self-contained, modular, battery-inverter unit, factory mounted within lighting fixture body and compatible with ballast. Comply with UL 924.
 - a. Emergency Connection: Operate one fluorescent lamp(s) continuously at an output of 1100 lumens each. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 - b. Nightlight Connection: Operate one fluorescent lamp continuously.
 - c. Test Push Button and Indicator Light: Visible and accessible without opening fixture or entering ceiling space.
 - 1) Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 2) Indicator Light: LED indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - d. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - e. Charger: Fully automatic, solid-state, constant-current type with sealed power transfer relay.
 - f. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.

- g. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
- 2. External Type: Self-contained, modular, battery-inverter unit, suitable for powering one or more fluorescent lamps, remote mounted from lighting fixture. Comply with UL 924.
 - a. Emergency Connection: Operate one fluorescent lamp continuously. Connect unswitched circuit to battery-inverter unit and switched circuit to fixture ballast.
 - b. Nightlight Connection: Operate one fluorescent lamp in a remote fixture continuously.
 - c. Battery: Sealed, maintenance-free, nickel-cadmium type.
 - d. Charger: Fully automatic, solid-state, constant-current type.
 - e. Housing: NEMA 250, Type 1 enclosure.
 - f. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - g. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - h. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - i. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

E. Ballasts For HID Lamps

- 1. Electromagnetic Ballast for Metal-Halide Lamps: Comply with ANSI C82.4 and UL 1029. Include the following features unless otherwise indicated:
 - a. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
 - b. Minimum Starting Temperature: **Minus 22 deg F (Minus 30 deg C)** for single-lamp ballasts.
 - c. Rated Ambient Operating Temperature: **104 deg F (40 deg C)**.
 - d. Open-circuit operation that will not reduce average life.
 - e. Low-Noise Ballasts: Manufacturers' standard epoxy-encapsulated models designed to minimize audible fixture noise.
- 2. Electronic Ballast for Metal-Halide Lamps: Include the following features unless otherwise indicated:
 - a. Minimum Starting Temperature: **Minus 20 deg F (Minus 29 deg C)** for single-lamp ballasts.
 - b. Rated Ambient Operating Temperature: **130 deg F (54 deg C)**.
 - c. Lamp end-of-life detection and shutdown circuit.
 - d. Sound Rating: Class A.
 - e. Total Harmonic Distortion Rating: Less than 20 percent.
 - f. Transient Voltage Protection: IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
 - g. Lamp Current Crest Factor: 1.5 or less.
 - h. Power Factor: 0.90 or higher.
 - i. Interference: Comply with 47 CFR 18, Ch. 1, Subpart C, for limitations on electromagnetic and radio-frequency interference for nonconsumer equipment.
 - j. Protection: Class P thermal cutout.
 - k. Bi-Level Dimming Ballast: Ballast circuit and leads provide for remote control of the light output of the associated fixture between high- and low-level and off.
 - 1) High-Level Operation: 100 percent of rated lamp lumens.
 - 2) Low-Level Operation: **35 OR 50, as directed**, percent of rated lamp lumens.
 - 3) Compatibility: Certified by ballast manufacturer for use with specific bi-level control system and lamp type indicated. Certified by lamp manufacturer that ballast operating modes are free from negative effect on lamp life and color-rendering capability.
 - l. Continuous Dimming Ballast: Dimming range shall be from 100 to 35 percent of rated lamp lumens without flicker.

- 1) Ballast Input Watts: Reduced to a maximum of 50 percent of normal at lowest dimming setting.
 3. High-Pressure Sodium Ballasts: Electromagnetic type, with solid-state igniter/starter. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.
 - a. Instant-Restrike Device: Integral with ballast, or solid-state potted module, factory installed within fixture and compatible with lamps, ballasts, and mogul sockets up to 150 W.
 - b. Minimum Starting Temperature: **Minus 40 deg F (Minus 40 deg C).**
- F. Quartz Lamp Lighting Controller
1. General Requirements for Controllers: Factory installed by lighting fixture manufacturer. Comply with UL 1598.
 2. Standby (Quartz Restrike): Automatically switches quartz lamp on when a HID lamp in the fixture is initially energized and during the HID lamp restrike period after brief power outages.
 3. Connections: Designed for a single branch -circuit connection.
 4. Switching Off: Automatically switches quartz lamp off when HID lamp strikes.
- OR**
- Switching Off: Automatically switches quartz lamp off when HID lamp reaches approximately 60 percent light output.
- G. Exit Signs
1. General Requirements for Exit Signs: Comply with UL 924; for sign colors, visibility, luminance, and lettering size, comply with authorities having jurisdiction.
 2. Internally Lighted Signs:
 - a. Lamps for AC Operation: Fluorescent, two for each fixture, 20,000 hours of rated lamp life.

OR

Lamps for AC Operation: LEDs, 50,000 hours minimum rated lamp life.
 - b. Self-Powered Exit Signs (Battery Type): Integral automatic charger in a self-contained power pack.
 - 1) Battery: Sealed, maintenance-free, nickel-cadmium type.
 - 2) Charger: Fully automatic, solid-state type with sealed transfer relay.
 - 3) Operation: Relay automatically energizes lamp from battery when circuit voltage drops to 80 percent of nominal voltage or below. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - 4) Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - 5) LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - 6) Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - 7) Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.
 - c. Master/Remote Sign Configurations:
 - 1) Master Unit: Comply with requirements above for self-powered exit signs, and provide additional capacity in LED power supply **OR** ballast **OR** battery, **as directed**, for power connection to remote unit.
 - 2) Remote Unit: Comply with requirements above for self-powered exit signs, except omit power supply, battery, and test features. Arrange to receive full power requirements from master unit. Connect for testing concurrently with master unit as a unified system.

3. Self-Luminous Signs: Powered by tritium gas, with universal bracket for flush-ceiling, wall, or end mounting. Signs shall be guaranteed by manufacturer to maintain the minimum brightness requirements in UL 924 for 10 **OR** 15 **OR** 20, **as directed**, years.

OR

Self-Luminous Signs: Using strontium oxide aluminate compound to store ambient light and release the stored energy when the light is removed. Provide with universal bracket for flush-ceiling, wall, or end mounting.

H. Emergency Lighting Units

1. General Requirements for Emergency Lighting Units: Self-contained units complying with UL 924.
 - a. Battery: Sealed, maintenance-free, lead-acid type.
 - b. Charger: Fully automatic, solid-state type with sealed transfer relay.
 - c. Operation: Relay automatically turns lamp on when power-supply circuit voltage drops to 80 percent of nominal voltage or below. Lamp automatically disconnects from battery when voltage approaches deep-discharge level. When normal voltage is restored, relay disconnects lamps from battery, and battery is automatically recharged and floated on charger.
 - d. Test Push Button: Push-to-test type, in unit housing, simulates loss of normal power and demonstrates unit operability.
 - e. LED Indicator Light: Indicates normal power on. Normal glow indicates trickle charge; bright glow indicates charging at end of discharge cycle.
 - f. Wire Guard: Heavy-chrome-plated wire guard protects lamp heads or fixtures.
 - g. Integral Time-Delay Relay: Holds unit on for fixed interval of 15 minutes when power is restored after an outage.
 - h. Remote Test: Switch in hand-held remote device aimed in direction of tested unit initiates coded infrared signal. Signal reception by factory-installed infrared receiver in tested unit triggers simulation of loss of its normal power supply, providing visual confirmation of either proper or failed emergency response.
 - i. Integral Self-Test: Factory-installed electronic device automatically initiates code-required test of unit emergency operation at required intervals. Test failure is annunciated by an integral audible alarm and a flashing red LED.

I. Fluorescent Lamps

1. T8 rapid-start lamps, rated 32 W maximum, nominal length of **48 inches (1220 mm)**, 2800 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life 20,000 hours unless otherwise indicated.
2. T8 rapid-start lamps, rated 17 W maximum, nominal length of **24 inches (610 mm)**, 1300 initial lumens (minimum), CRI 75 (minimum), color temperature 3500 K, and average rated life of 20,000 hours unless otherwise indicated.
3. T5 rapid-start lamps, rated 28 W maximum, nominal length of **45.2 inches (1150 mm)**, 2900 initial lumens (minimum), CRI 85 (minimum), color temperature 3000 K, and average rated life of 20,000 hours unless otherwise indicated.
4. T5HO rapid-start, high-output lamps, rated 54 W maximum, nominal length of **45.2 inches (1150 mm)**, 5000 initial lumens (minimum), CRI 85 (minimum), color temperature 4100 K, and average rated life of 20,000 hours unless otherwise indicated.
5. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500 K, average rated life of 10,000 hours at three hours operation per start, and suitable for use with dimming ballasts, **as directed**.

J. HID Lamps

1. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), color temperature 1900 K, and average rated life of 24,000 hours, minimum.

- a. Dual-Arc Tube Lamps: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.
 2. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and color temperature 4000 K.
 3. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and color temperature 4000 K.
 4. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and color temperature 4000 K.
 5. Low-Pressure Sodium Lamps: ANSI 78.41, CRI 0, and color temperature 1800 K.
- K. Lighting Fixture Support Components
1. Comply with Division 26 Section "Hangers And Supports For Electrical Systems" for channel- and angle-iron supports and nonmetallic channel and angle supports.
 2. Single-Stem Hangers: **1/2-inch (13-mm)** steel tubing with swivel ball fittings and ceiling canopy. Finish same as fixture.
 3. Twin-Stem Hangers: Two, **1/2-inch (13-mm)** steel tubes with single canopy designed to mount a single fixture. Finish same as fixture.
 4. Wires: ASTM A 641/A 641M, Class 3, soft temper, zinc-coated steel, **12 gage (2.68 mm)**.
 5. Wires for Humid Spaces: ASTM A 580/A 580M, Composition 302 or 304, annealed stainless steel, **12 gage (2.68 mm)**.
 6. Rod Hangers: **3/16-inch (5-mm)** minimum diameter, cadmium-plated, threaded steel rod.
 7. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.
- L. Retrofit Kits For Fluorescent Lighting Fixtures
1. Reflector Kit: UL 1598, Type I. Suitable for two- to four-lamp, surface-mounted or recessed lighting fixtures by improving reflectivity of fixture surfaces.
 2. Ballast and Lamp Change Kit: UL 1598, Type II. Suitable for changing existing ballast, lamps, and sockets.

1.3 EXECUTION

- A. Installation
1. Lighting fixtures:
 - a. Set level, plumb, and square with ceilings and walls unless otherwise indicated.
 - b. Install lamps in each luminaire.
 2. Temporary Lighting: If it is necessary, and approved by the Owner, to use permanent luminaires for temporary lighting, install and energize the minimum number of luminaires necessary. When construction is sufficiently complete, remove the temporary luminaires, disassemble, clean thoroughly, install new lamps, and reinstall.
 3. Remote Mounting of Ballasts: Distance between the ballast and fixture shall not exceed that recommended by ballast manufacturer. Verify, with ballast manufacturers, maximum distance between ballast and luminaire.
 4. Lay-in Ceiling Lighting Fixture Supports: Use grid as a support element.
 - a. Install ceiling support system rods or wires, independent of the ceiling suspension devices, **as directed**, for each fixture. Locate not more than **6 inches (150 mm)** from lighting fixture corners.
 - b. Support Clips: Fasten to lighting fixtures and to ceiling grid members at or near each fixture corner with clips that are UL listed for the application.
 - c. Fixtures of Sizes Less Than Ceiling Grid: Install as indicated on reflected ceiling plans or center in acoustical panel, and support fixtures independently with at least two **3/4-inch (20-mm)** metal channels spanning and secured to ceiling tees.
 - d. Install at least one independent support rod or wire from structure to a tab on lighting fixture. Wire or rod shall have breaking strength of the weight of fixture at a safety factor of 3.
 5. Suspended Lighting Fixture Support:
 - a. Pendants and Rods: Where longer than **48 inches (1200 mm)**, brace to limit swinging.

- b. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.
 - c. Continuous Rows: Use tubing or stem for wiring at one point and tubing or rod for suspension for each unit length of fixture chassis, including one at each end.
 - d. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.
6. Air-Handling Lighting Fixtures: Install with dampers closed and ready for adjustment.
7. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
- B. Identification
- 1. Install labels with panel and circuit numbers on concealed junction and outlet boxes. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
- C. Field Quality Control
- 1. Test for Emergency Lighting: Interrupt power supply to demonstrate proper operation. Verify transfer from normal power to battery and retransfer to normal.
 - 2. Verify that self-luminous exit signs are installed according to their listing and the requirements in NFPA 101.
 - 3. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- D. Startup Service
- 1. Burn-in all lamps that require specific aging period to operate properly, prior to occupancy by the Owner. Burn-in fluorescent and compact fluorescent lamps intended to be dimmed, for at least 100 hours at full voltage.
- E. Adjusting
- 1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting aimable luminaires to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Some of this work may be required after dark.
 - a. Adjust aimable luminaires in the presence of the Owner.

END OF SECTION 26 51 00 00

Task	Specification	Specification Description
26 51 13 00	26 51 00 00	Interior Lighting
26 51 16 00	26 51 00 00	Interior Lighting
26 51 19 00	26 51 00 00	Interior Lighting
26 51 23 00	26 51 00 00	Interior Lighting
26 51 33 00	02 84 16 00	Removal of Fluorescent Light Ballasts/Capacitors and Fluorescent Light Tubes
26 51 33 00	26 51 00 00	Interior Lighting
26 51 33 00	26 56 00 00	Exterior Lighting
26 52 13 16	26 51 00 00	Interior Lighting
26 55 13 00	01 22 16 00	No Specification Required
26 55 13 00	26 56 00 00	Exterior Lighting
26 55 16 00	26 51 00 00	Interior Lighting
26 55 16 00	26 56 00 00	Exterior Lighting
26 55 29 00	26 56 00 00	Exterior Lighting
26 55 53 11	26 56 00 00	Exterior Lighting

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SECTION 26 55 61 00 - STAGE LIGHTING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for stage lighting. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Dimmer racks.
 - b. Control console and control devices.
 - c. Lighting fixtures and accessories.
 - d. Distribution components.

C. Performance Requirements

1. Seismic Performance: Dimmer racks shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event," **as directed**.

D. Submittals

1. Product Data: For each type of product indicated.
2. Seismic Qualification Certificates: For **Equipment** as directed by the Owner , accessories, and components, from manufacturer.
3. Field quality-control reports.
4. Operation and maintenance data.
5. Software and Firmware Operational Documentation.

E. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NECA 1.
3. Comply with NFPA 70.

F. Software Service Agreement (if allowed)

1. Technical Support: Beginning with Final Completion, provide software support for two years.
2. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30 days' notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

A. Plug Connectors

1. Pin Type: USITT S3, two-pole, three-wire, 20-A.
2. Twist-Locking Type: NEMA WD 6, two-pole, three-wire, 20-A.

B. Lighting Fixtures And Accessories

1. General:
 - a. Comply with UL 1573 and listed and labeled by an NRTL.
 - b. Fixtures: Equipped with pigtail, yoke with pipe clamp, safety cable for batten mounting, and filter holder.
 - c. Metal Parts: Free of burrs, sharp corners, and edges.
 - d. Sheet Metal Components: Steel unless otherwise indicated. Form and support to prevent warping and sagging.
 - e. Fixture Doors and Their Internal Access: Smooth operating, free of light leakage under operating conditions, and arranged to permit relamping without use of tools. Doors, lenses, diffusers, and other pieces arranged to prevent accidental falling during relamping and when secured in operating position.
 - f. Pigtail: Factory wired, **36-inch- (900-mm-)** long, three-wire cord and plug connector assembly with cord encased in woven fiberglass or silicone tubing.
 - g. Lamp Sockets: Relampable without disturbing alignment or focus adjustment.
 - h. Fixture Ventilation Openings: Baffled against light leaks.
 - i. Fixture Operating Controls and Handles: Thermally insulated.
 - j. Lenses: Borosilicate glass in silicone mountings.
 - k. Framing Shutters: Stainless steel, four way; with each blade in a separate plane under adjustable tension mounting. Blades adjust plus or minus 30 degrees of rotation in gate, for 120-degree-minimum total angular rotation between adjacent blades.
 - l. Color Filter Frame Holder: Attached to front of fixture.
 - m. Fixture Yoke: Rigid metal, arranged for vertical aiming of unit and equipped with T-bolt or hand screw to lock alignment.
2. Ellipsoidal Spotlights: Fixtures with an elliptical reflector mounted in a fixed relationship to the lamp. Light shall be projected through a gate where the beam is shaped by using shutters, a gobo, or an iris. The shaped beam shall then be focused by a system of lenses.
 - a. Tag: ES-1:
 - 1) Lamp: 1000 W Q1000/4CL, ANSI FEL.
 - 2) Pattern Holders: Three for each fixture, with framing shutters.
 - 3) Color Frame: Black, metal.
 - 4) Minimum Cosine Illumination Performance Ratings When Operated with ANSI C78 Series, FEL Lamp:
 - a) 171,000 beam candlepower at 20-degree field angle.
 - b) 48,000 beam candlepower at 40-degree field angle.
3. Zoom Ellipsoidal Spotlights: Fixtures with an elliptical reflector mounted in an adjustable relationship to the lamp. Light shall be projected through a gate where the beam is shaped by using shutters, a gobo, or an iris. The shaped beam shall then be focused by a system of lenses.
 - a. Tag: ZES-1:
 - 1) Lamp: 1000 W Q1000/4CL, ANSI FEL.
 - 2) Pattern Holders: Three for each fixture, with framing shutters.
 - 3) Operator adjustable from 25- to 50-degree field angle.
 - 4) Field-angle adjustment scale label on instrument housing for field reference.
 - 5) Minimum Cosine Illumination Performance Rating When Operated with ANSI C78 Series, FEL Lamp: 82,000 beam candlepower at 35-degree field angle.
4. Fresnel Lens Spotlights:
 - a. Die-cast extruded-aluminum housing, with hinged front for relamping.
 - b. Tag: FLS-1.
 - 1) Lamp: 1000 W Q1000T7/4CL, ANSI EGT.
 - 2) Lens: **6 inches (152 mm)**.
 - 3) Illumination Performance Rating When Operated with ANSI C78 Series, EGT Lamp:
 - a) 175,000 beam candlepower at 12.5-degree field angle in spot focus.
 - b) 12,000 beam candlepower at 74.6-degree field angle in flood focus.
 - 4) Barn Doors: Two 4-leaf rotatable metal flaps for every three fixtures.
5. Follow Spotlights:

- a. Tag: FS-1:
 - 1) Lamp: Metal halide, G22 medium bi-post, CRI: 90, color: 6000 K, life: 750 hours, HMI 575 W/GS 95 V.
 - 2) Adjustable lenses in metal housing.
 - 3) Lamp: Quartz-projector type, Adjustable, underslung base stand mounted on **3-inch (75-mm)**, locking-type, rubber-tired, ball-bearing casters.
 - 4) Adjustable lamp holder and socket assembly with precision tuning adjustment; relampable without tools.
 - 5) Three-leaf, full-range mechanical dimmer.
 - 6) Adjustable iris and framing shutters.
 - 7) Automatic color boom.
 - 8) Removable power cable, **25 feet (8 m)** long.
 - 9) Iris Open, Spot-Focus Performance: 800,000, **as directed**, beam candlepower at 7.2, **as directed**, -degree field angle.
 - 10) Iris Open, Flood-Focus Performance: 330,000, **as directed**, beam candlepower at 12.2, **as directed**, -degree field angle.
6. PAR Lamp Holders:
 - a. Tag: PLH-1:
 - 1) Lamp: 300 W PAR 38.
 - 2) Housing: Steel or aluminum, flat black color, **as directed**, with porcelain-plated shell socket.
 - 3) Barn Doors: Two 4-leaf rotatable metal flaps for every three fixtures.
 - b. Tag: **Drawing designation** as directed by the Owner .
 - 1) Lamp: 575 W tungsten halogen, 90 GLA 575 W, 230 V, color: 3200 K, ANSI GKV.
 - 2) Housing: Steel or aluminum, with porcelain-plated shell socket and color frame, **as directed**.
 - 3) Barn Doors: Two 4-leaf rotatable metal flaps for every three fixtures.
 - 4) With Lens Holder and Replaceable Lenses:
 - a) Drawing designations for the following as directed by the Owner :
 - b) Very narrow spot.
 - c) Narrow spot.
 - d) Medium flood.
 - e) Wide flood.
 - f) Very wide.
 - 5) Motorized **OR** Manual, **as directed**, color wheel.
7. Borderlight Units: Compartmented, three-circuit striplight with nine 150-W, PAR 38/SP **OR** 150-W, PAR 38/FL **OR** 250-W, PAR 38/SP **OR** 150-W, R40/FL, **as directed**, lamps in porcelain sockets and steel sheet housing, **90 inches (2286 mm)** long. Compartments shall be in line and wired on two **OR** three **OR** four, **as directed**, alternate circuits, each producing a different color.
 - a. Front Door: Spring loaded; designed to hold either filter frames or color roundels.
 - b. Color Roundels: One for each lamp; alternating red, blue, and clear, **as directed**.
 - 1) Additional Roundels: **Number** As directed by the Owner amber and **Number** as directed by the Owner green.
 - c. Hanger: Adjustable, steel-strap type equipped at each end with pipe clamp and safety cable for suspension from a batten.
8. Cyclorama Lights: Suitable for lighting cycloramas from above.
 - a. Tag: CL-1:
 - 1) Lamp: 1000 W Q1000T3/1CL, ANSI FFT.
 - 2) Housing: Aluminum or steel, **as directed**, flat black color, **as directed**, with color frame, **as directed**.
9. Black Lights: Portable, producing a wash of UV light for special effects.
 - a. Tag: BL-1:
 - 1) Lamp: 250 W blacklight flood, H37KB-250, with integral filter to eliminate far-UV effect while maximizing the near-UV effect.
 - 2) Housing: Steel or aluminum, **as directed**, flat black color, **as directed**, with carry handle.

- 3) C-clamp for using on light pipe.
10. Moving Lights:
 - a. Tag: ML-1:
 - 1) General: 700-W, 120-V, metal halide, motorized remote-controlled lighting instrument; NRTL listed.
 - 2) Lamp: Short-arc metal halide, 14,500 lumens; color temperature of 5600 K, CRI of 80.
 - 3) Color System: Three-filter CYM (cyan, yellow, magenta) cross-fading mechanism, and 11 standard colors on a fixed wheel.
 - 4) Optics: Zoom optics with continuously variable field angle from 18.5 to 42 degrees, programmable over a timed range of 2 seconds to 20 minutes; with a mechanical iris for beam-size control. Variable beam focus to soften the edges of gobos and light beams. Zoom combined with iris can project a beam with a field angle of 8 degrees.
 - 5) Dimming: Coated glass dimmer wheel, with controls to provide smooth timed fades.
 - 6) Strobe for strobe lighting effects.
 - 7) Gobo: One rotating wheel with five rotatable wheel positions and one open position. One fixed gobo wheel with 11 pattern positions and one open position.
 - 8) Beam Orientation Control: Smooth pan and tilt using a three-phase stepper motor system. Pan, 540 degrees; tilt, 270 degrees at 0.3-degree repeatability on either axis.
 - 9) Control: ANSI E1.11 (USITT DMX512-A) protocol using five pin connectors.

C. Distribution Components

1. Connector Strip: Listed and labeled by an NRTL; factory-wired wireway and receptacle assembly.
 - a. Wireway: Steel or extruded aluminum, with removable cover and nominal cross-section dimensions of **3 by 4-1/2 inches (75 by 115 mm)**.
 - b. Accessories: Cable clamps, support cradles, and cable strain relief grips for each cable.
 - c. Receptacles: Pigtail mounted, **18 inches (450 mm)** long, with strain relief at wireway wall penetration.
OR
Receptacles: Flush mounted in wireway cover.
 - d. Receptacle Wiring: For connecting to terminal blocks; with 125 deg C, crosslinked, PE-insulated, identification-labeled wire.
 - e. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 - f. Mounting Hardware: Furnished with each unit; permits surface, single-pipe-bracket, or double-pipe-bracket mounting.
 - g. Finish: Semigloss or matte black.
2. Plug-in Boxes: Listed and labeled by an NRTL; factory-wired wireway and receptacle assembly, **24 inches (600 mm)** long unless otherwise indicated; with the following features:
 - a. Wireway: Steel or extruded aluminum, with removable cover and nominal cross-section dimensions of **3 by 4-1/2 inches (75 by 115 mm)**.
 - b. Accessories: Cable clamps, support cradles, and cable strain relief grips for each cable.
 - c. Receptacles: Pigtail mounted, **18 inches (450 mm)** long, with strain relief at wireway wall penetration.
OR
Receptacles: Flush mounted in wireway cover.
 - d. Receptacle Wiring: For connecting to terminal blocks; with 125 deg C, crosslinked, PE-insulated, identification-labeled wire.
 - e. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 - f. Surface or Grid Mounting: With accessories for surface mounting or with pipe-mounting accessory bracket.
 - g. Recessed Mounting: With flanged cover suitable for recessed mounting in wall.
 - h. Finish: Semigloss or matte black.

3. Gridiron Junction Boxes: Listed and labeled by an NRTL; factory wired with terminal strips and concentric knockouts on all sides.
 - a. Terminal Blocks: Molded-barrier type with screw lugs to suit supply conductors.
 - b. Accessories: Cable clamps, support cradles, and cable strain relief grips for each cable, and brackets for surface or pipe mounting.
 - c. Finish: Semigloss or matte black.
4. Floor Pockets: Listed and labeled by an NRTL; flush-mounted, receptacle outlet assembly.
 - a. Box: **0.0598-inch (1.5-mm)** steel sheet, **10 inches (250 mm)** deep.
 - b. Cover Plate: Steel, cast iron, or cast aluminum with nonskid safety tread surface and self-closing, hinged door with cable notches.
 - c. Barrier for allowing installation of low-voltage control receptacle for console input or handheld remotes.

D. Wire And Cable

1. Building Wire in Raceways: Comply with requirements specified in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
2. Portable Power Cable: Listed and labeled by an NRTL; flexible stage and lighting power cable; Type SC, SCE, or SCT; 600 V; multiconductor; 60 deg C temperature rating.
3. Ethernet Cabling: Comply with requirements specified in Division 26 Section "Control-voltage Electrical Power Cables".
 - a. For 10/100BaseT, comply with provisions for UTP cable and hardware.
 - b. For 10Base-FL, comply with provisions for 50/125 **OR** 62.5/125, **as directed**,-micrometer, multimode, optical-fiber cable and hardware.
4. ANSI E1.11 (USITT DMX512-A) Control Cabling: Comply with requirements specified in Division 26 Section "Control-voltage Electrical Power Cables".
 - a. Standard Cable: NFPA 70, Type CM **OR** Type CMG, **as directed**.
 - 1) Paired, low-capacitance computer cable for ANSI E1.11 (USITT DMX512-A) applications. Two pairs, twisted, No. 22 AWG **OR** No. 24 AWG, **as directed**, stranded, tinned-copper conductors.
 - 2) PE insulation.
 - 3) Inner Shield: 100 percent coverage, aluminum foil-polyester tape.
 - 4) Outer Shield: 90 percent coverage, tinned-copper braid.
 - 5) Outer Shield Drain Wire: Stranded, tinned copper.
 - 6) PVC jacket.
 - 7) Flame Resistance: Comply with UL 1581.
 - b. Plenum-Rated Cable: NFPA 70, Type CMP.
 - 1) Paired, low-capacitance computer cable for ANSI E1.11 (USITT DMX512-A) applications. Two pairs, twisted, No. 22 AWG **OR** No. 24 AWG, **as directed**, stranded, tinned-copper conductors.
 - 2) Insulation: Foam fluoridated ethylene propylene.
 - 3) Inner Shield: 100 percent coverage, aluminum foil-polyester tape.
 - 4) Outer Shield: 90 percent coverage, tinned-copper braid.
 - 5) Outer Shield Drain Wire: Stranded, tinned copper.
 - 6) Low-smoke PVC jacket.
 - 7) Flame Resistance: Comply with NFPA 262.
5. Low-Voltage Control Cabling:
 - a. Control-Cable Conductors:
 - 1) Class 1 Control Circuits: Stranded copper, Type THHN-THWN, in raceway; complying with UL 83.
OR
Class 1 Control Circuits: Stranded copper, Type THHN, in raceway; complying with UL 44.
 - 2) Class 2 Control Circuits: Stranded copper, Type THHN-THWN, in raceway **OR** power-limited cable, concealed in building finishes **OR** power-limited tray cable, in cable tray, **as directed**; complying with UL 83.
OR

Class 2 Control Circuits: Stranded copper, Type THHN, in raceway **OR** power-limited cable, concealed in building finishes **OR** power-limited tray cable, in cable tray, **as directed**; complying with UL 44.

- 3) Class 3 Remote-Control and Signal Circuits: Stranded copper, Type TW or Type TF; complying with UL 83.
- b. Paired Cable: NFPA 70, Type CMG.
 - 1) One pair, twisted, No. 16 AWG, stranded, tinned-copper conductors.
 - 2) PVC insulation.
 - 3) Unshielded.
 - 4) PVC jacket.
 - 5) Flame Resistance: Comply with UL 1581.
- c. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1) One pair, twisted, No. 16 AWG, stranded (19x29), tinned-copper conductors.
 - 2) PVC insulation.
 - 3) Unshielded.
 - 4) PVC jacket.
 - 5) Flame Resistance: Comply with NFPA 262.
- d. Paired Cable: NFPA 70, Type CMG.
 - 1) One pair, twisted, No. 18 AWG, stranded (19x30), tinned-copper conductors.
 - 2) PVC insulation.
 - 3) Unshielded.
 - 4) PVC jacket.
 - 5) Flame Resistance: Comply with UL 1581.
- e. Plenum-Rated, Paired Cable: NFPA 70, Type CMP.
 - 1) One pair, twisted, No. 18 AWG, stranded (19x30), tinned-copper conductors.
 - 2) Fluorinated ethylene propylene insulation.
 - 3) Unshielded.
 - 4) Plastic jacket.
 - 5) Flame Resistance: Comply with NFPA 262.

E. Lighting Control System

1. Description: Microprocessor-based modular system consisting of dimmer and control modules operated from remote-control stations and a control console.
 - a. Comply with UL 508.
 - b. Comply with USITT AMX192 **OR** ANSI E1.11 (USITT DMX512-A), **as directed**, for data transmission.
2. Dimmer Racks: Listed and labeled by an NRTL; dead-front, front-access, wall-mounted **OR** freestanding, **as directed**, rack for mounting modular dimmers; formed-steel or extruded-aluminum structural members; completely enclosed with steel or aluminum panels. Painted with manufacturer's standard corrosion-resistant primer and finish coats, and having the following features:
 - a. Primary Circuit Breaker: Fault-current withstand rating of the rack; not less than 10,000 **OR** 50,000, **as directed**, A, symmetrical.
 - b. Hinged, locking front door, with openings to allow air intake across the face of all dimmer modules.
 - c. Individual rack sections shall not exceed **84 inches high by 25 inches deep by 30 inches wide (2134 mm high by 635 mm deep by 762 mm wide)**. Multisection racks shall be interconnected with busbars.
 - d. For each module position, provide support rails and control-pin configurations, constructed for precise alignment of dimmer modules into power and signal connector sockets.
 - e. Forced-air cooling of each rack for maintaining operating temperature at each dimmer, assuming full load, in ambient temperature not to exceed 40 deg C. Exhaust rates shall be variable, using temperature sensors and fan-speed control electronics. Individual control of multiple fans is acceptable in lieu of fan-speed control. Fan(s) shall start and stop automatically. Fan noise at full load shall be less than 3.1 sones.

- f. Each rack shall have an automatic air-temperature sensor to shut off all dimmers in the rack should the internal temperature rise above maximum safe operating limits. In an overheat condition, the fan shall continue operating. When a safe operating temperature is restored, the system shall automatically reset to allow normal user control.
- g. Fabricate and test dimmer racks to withstand seismic forces defined in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
3. Dimmers: Modular solid-state units that operate smoothly over their operating ranges without audible lamp noise or radio-frequency interference at any setting. Modules shall be dead-front, draw-out type with floating line, load, and control sockets for smooth insertion and withdrawal; with load-side thermal-magnetic circuit breaker, speed-controlled cooling fan, and overtemperature sensor.
 - a. Non-Dim Units: On-off relay control only. Capable of serving inductive loads such as motors or high-intensity-discharge fixtures.
 - b. Surge Protection: Modules shall withstand power-line surges of 6000 V/3000 A according to IEEE C62.41.1 and IEEE C62.41.2.
 - c. Filter each dimmed circuit to provide a minimum 350-mic.sec., current-rise time at a 90-degree conduction angle at 50 percent of rated dimmer capacity. At any load within rating, rate of current rise shall not exceed 30 mA/mic.sec., measured from 10 to 90 percent of load current waveform.
4. Control System: Microprocessor-based control system, ANSI E1.11 (USITT DMX512-A) protocol, with a nonvolatile system memory to adjust dimmer channel settings for different scenes, to patch dimmers to channels, and to manually or automatically change dimmer settings from one preset scene to another.
 - a. Control shall support Ethernet-based LAN at every control device.
 - b. Provide means to create and monitor show data on a PC using software by console manufacturer. Software shall be capable of the following:
 - 1) Creating show and providing for use of USITT show files.
 - 2) Playing back show in a console-simulation mode.
 - 3) Accessing all remote-control stations associated with the console and control system.
 - 4) Providing standard Ethernet connection between the console control system and the PC.
 - c. Display the following system status information on a color, 17-inch (430-mm) LCD monitor associated with the control console:
 - 1) Current channel intensities.
 - 2) Cue information.
 - 3) Monitor.
 - d. Moving Lights: Include a standard control library, a program patch specific to fixture(s) provided, and selective programming with ANSI E1-11 (USITT DMX512-A) addressing of fade, focus points, beam, image, color, or as directed by the Owner and position.
5. Control Console: Tabletop unit with manual and computer-based programming controls, memory units, indicating devices, and the following features:
 - a. Servicing access through hinged top panel.
 - b. Grand-master level control.
 - c. Blackout switch.
 - d. 12 submaster level controls with overlapping pile-on performance.
OR
24 submaster level controls with overlapping pile-on performance.
 - e. Bump buttons for momentary control of channels or submasters, one for each submaster level control.
 - f. Two cross-fade controls for split dipless fade between scenes, each with its own fade progress indicator.
 - g. One set of scene level controls for each scene when used in two-scene preset mode. Second set of scene level controls to allow setting levels into memory for expanded single scenes when used in multiple single-channel scene mode. Each set shall have same quantity of scene level controls as is used for submaster level controls.

- h. Multibutton keypad for programming in multiscene memory mode.
 - i. Fade time control for assigning fade time to cues, with individual cue adjustment from one second to five minutes, minimum.
 - j. Light-emitting diode **OR** LCD **OR** Computer monitor cathode-ray tube, **as directed**, with associated display controls, for displaying operating menus and memory readout.
 - k. Controls for setting levels into memory.
 - l. Cord and connector for connecting console to outlets for console power and control.
6. System Operation: Selectable between multichannel two-scene preset and four-channel single-scene memory. Console features include electronic patching of control signals for up to 512 dimmers and off-line data storage using internal, **3-1/2-inch (90-mm)** disk-drive unit. Operational capability includes the following:
- a. Live and blind programming.
 - b. Special effects programmability for automatic operation of lights in pulsating, sequential dimming and brightening, and other special operating modes. Special effects menu displays operator guidance for programming and individual step levels.
 - c. Signal from fire-alarm control panel that automatically brings selected circuits to fully on or fully bright condition, overriding normal dimming and on-off controls.
 - d. Inserting cues between designated cues without renumbering.
 - e. Out-of-sequence playback of cues.
 - f. Controlling houselights and stage lights from console by assigning their dimmers or non-dim on-off controls to a channel.
 - g. Retaining programmed cues in memory for minimum of one year after power outage.
 - h. Automatic sequential execution of programmed cues.
 - i. Printing cues using parallel or serial printer port, cable, and printer. Cable and printer are not included with this system.
7. PC: Standard, unmodified, with accessories and peripherals that are configured to install and run control-console manufacturer's written requirements, but not less than the following:
- a. CPU operating speed shall be at least 1.6 GHz.
 - b. Memory: 1024 MB.
 - c. Serial Ports: Provide two for general use.
 - d. Parallel Port: Enhanced.
 - e. LAN Adapter: 10/100/1000 Mbps, internal network interface card.
 - f. Three USB 2.0 ports.
 - g. Sound Card: For playback and recording of digital WAV sound files that are associated with audible warning and alarm functions.
 - h. Color Monitor: Not less than **17 inches (430 mm)**, with a minimum resolution of 1280 by 1024 pixels, noninterlaced, and a maximum dot pitch of 0.28 mm. Video card shall support at least 256 colors at a resolution of 1280 by 1024 pixels at a minimum refresh rate of 70 Hz.
 - i. Keyboard: With a minimum of 64 characters; standard ASCII character set based on ANSI INCITS 154 (formerly ANSI X3.154).
 - j. Mouse: Standard, compatible with installed software.
 - k. Disk storage shall include the following, each with appropriate controller:
 - 1) Minimum 60 GB hard disk, 5400 rpm.
 - 2) Floppy Disk Drive: High density, **3-1/2-inch (90-mm)** size.
 - l. CD-ROM Drive: 24x/10x/24x CD-RW/8x DVD combination.
8. Console Power and Control Outlets: Multiple receptacles matched to connector on console connector cord.
9. House Lighting Control Station: Architectural-type, multichannel, remote-dimmer-control station with the following features:
- a. System controls designated houselights, stage lights, and other lights.
 - b. Stage lighting controls compatible with dimming and control system.
 - c. Flush mounting.
 - d. Brushed-aluminum wall plate.

- e. Five **OR** Six, **as directed**, channels, each with slider potentiometer control.
 - f. Master-slider potentiometer that controls lights on all channels proportionally from completely dimmed to degree of brightness that corresponds to individual slider positions.
 - g. Fully on switch that turns all channels on at full brightness regardless of slider position.
 - h. Take-control/off switch that places station in control of channels and sets lighting to levels dictated by channel and master-slider controls.
 - i. Legend on face of wall plate that identifies items as "House Lighting Control Station" and identifies functions of each slider and switch position, with slider positions individually graduated from zero to 10.
 - j. Illuminated push buttons for activating preset scenes of house lighting and labeled "Entry" **OR** "Panic" **OR** "Entry" and "Panic," **as directed**.
 - k. Flush wall mounted unless otherwise indicated.
10. Entry Station: Push button activates or deactivates indicating light and presets scene of house lighting control system.
- a. Light-emitting-diode indicating light illuminates when preset command is executed.
 - b. Labeled "Entry."
 - c. Flush wall mounted unless otherwise indicated.
11. Key-Entry Station: Key-operated switch controls station to activate or deactivate indicating light and presets scene of lighting control system.
- a. Light-emitting-diode indicating light illuminates when preset command is executed.
 - b. Labeled "Entry."
 - c. Flush wall mounted unless otherwise indicated.
12. Emergency Lighting Control Station: Key-operated, **as directed**, push button activates indicating light and brings selected dimmers to fully bright condition, i.e., the "Panic" preset. Operating push button a second time returns dimmers to previous setting.
- a. Emergency mode indicating light.
 - b. Labeled "Emergency Lights."
 - c. Flush wall mounted unless otherwise indicated.

F. Rigging Components

- 1. Pipe Clamps: Malleable iron, suitable for clamping fixtures or items to pipe from **3/4 to 2 inches (20 to 51 mm)** in OD. Arranged for horizontal rotation of yoke for aiming; equipped with T-bolt to lock alignment.
- 2. Safety Cables: Heavy-duty, flexible steel; **30-inch (762-mm)** nominal length, with spring clip at one end and steel ring at the other end.
- 3. Cable Grips: Stainless **OR** Galvanized, **as directed**, steel; basket-weave type for supporting stage cables.

1.3 EXECUTION

A. Installation

- 1. Set permanently mounted items level, plumb, and square with ceilings and walls.
- 2. Indicated mounting heights are to bottom of unit for suspended items and to center of unit for wall-mounted items.
- 3. Mount and connect fixtures, and install and connect distribution devices.
 - a. If arrangement is not indicated, install so each fixture, dimmer, house lighting circuit, control channel, and outlet circuit can be operated, and complete system demonstrated, in all operating modes.
 - b. Install safety cables secured to stage rigging or gridiron for all pipe-mounted electrical fixtures and equipment.
- 4. Dimmer Rack Mounting: Install and anchor dimmer racks level on **4-inch- (100-mm-)** high concrete base. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around full perimeter of base.

- b. For dimmer racks, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - c. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - d. Install anchor bolts to elevations required for proper attachment to dimmer racks.
5. Comply with mounting and anchoring requirements specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".

B. Wiring

1. Power Wiring:
 - a. Install wiring as specified in Division 26 Section "Low-voltage Electrical Power Conductors And Cables" for hardwired connections. Install wiring in raceways except cable and plug connections.
 - b. Install power wiring with a separate neutral for each output circuit from main dimmer and for each house and stage lighting circuit.
2. Signaling, Remote-Control, and Power-Limited Circuits:
 - a. Comply with requirements specified in Division 26 Section "Control-voltage Electrical Power Cables" for installation of wiring. Install wiring in raceways except cable and plug connections.
 - b. Comply with the following unless otherwise indicated:
 - 1) Size conductors according to lighting control device manufacturer's written instructions.
 - 2) Select cable insulation, shielding, drain wire, and jacket complying with lighting control device manufacturer's written instructions.
 - 3) Install circuits to eliminate radio-frequency interference and electromagnetic interference.
 - c. Remote-control circuits associated with emergency lighting control shall be installed complying with Class 1 Circuit standards in NFPA 70.
3. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points.
4. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes and in terminal cabinets and equipment enclosures.
5. Remove wall plates and protect devices and assemblies during painting.
6. Support lighting fixtures, distribution components, and accessories as specified in Division 26 Section "Hangers And Supports For Electrical Systems". Equip all pipe-mounted equipment with safety cables that are secured to supporting pipe.
7. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".

C. Identification

1. Identify components, power, and control wiring according to Division 26 Section "Identification For Electrical Systems".
2. Label each fixture, lighting outlet, distribution device, and dimmer module with unique designation. Labels on elevated components shall be readable from the floor.

D. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Schedule visual and mechanical inspections and electrical tests with at least seven days' advance notice.
 - b. Visual and Mechanical Tests and Inspections:
 - 1) Inspect each fixture, outlet, module, control, and device for defects, finish failure, corrosion, physical damage, labeling by an NRTL, and nameplate.
 - 2) Exercise and perform operational tests on mechanical parts and operable devices according to manufacturer's written instructions.
 - 3) Check tightness of electrical connections with torque wrench.

- 4) Verify proper protective device settings, fuse types, and ratings.
 - 5) Record results of tests and inspections.
 - c. Electrical Tests: Perform tests according to manufacturer's written instructions.
 - 1) Continuity tests of circuits.
 - 2) Operational Tests: Connect each outlet to a fixture and a dimmer output circuit so each dimmer module, dimmer control and output circuit, outlet, and fixture in a typical operating mode will be sequentially tested. Set and operate controls to demonstrate fixtures, outlets, dimmers, and controls in a sequence that cues and reproduces actual operating functions for a typical system of the size and scope installed. Include operation and control of houselights and stage lights from each control location and station including optional plug-in, control-console outlet locations. Record fixture and outlet assignments, control settings, operations, cues, and observations of performance.
 - d. Test Labeling: After satisfactory completion of tests and inspections, apply a label to tested components indicating test results, date, and responsible organization and individual.
 3. Stage lighting will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
 - a. Prepare a schedule of lighting outlets by number; indicate circuits, dimmers, connected fixtures, and control-channel assignments. Prepare a schedule of control settings and circuit assignments for house control channels. Prepare written reports of tests and observations. Report defective materials, workmanship, and unsatisfactory test results. Include records of repairs and adjustments made.
- E. Adjusting
1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

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SECTION 26 55 68 00 - ATHLETIC FIELD LIGHTING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for exterior athletic lighting. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes lighting for the following outdoor sports venues:
 - a. Baseball fields.
 - b. Softball fields.
 - c. Football fields.
 - d. Soccer fields.
 - e. Outdoor tennis courts.

C. Definitions

1. CV: Coefficient of variation; a statistical measure of the weighted average of all relevant illumination values for the playing area, expressed as the ratio of the standard deviation for all illuminance values to the mean illuminance value.
2. Delegated-Design Submittals: Documents, including drawings, calculations, and material and product specifications prepared as a responsibility of Contractor to obtain acceptance by the Owner and authorities having jurisdiction.
3. Illuminance: The metric most commonly used to evaluate lighting systems. It is the density of luminous flux, or flow of light, reaching a surface divided by the area of that surface.
 - a. Horizontal Illuminance: Measurement in foot-candles (lux), on a horizontal surface 36 inches (914 mm) above ground unless otherwise indicated.
 - b. Target Illuminance: Average maintained illuminance level, calculated by multiplying initial illuminance by LLF.
 - c. Vertical Illuminance: Measurement in foot-candles (lux), in two **OR** four, **as directed**, directions on a vertical surface, at an elevation coinciding with plane height of horizontal measurements.
4. LC: Lighting Certified.
5. Light Trespass: Light spill into areas and properties outside the playing areas, which is either annoying or unwanted.
6. LLD: Lamp lumen depreciation, which is the decrease in lamp output as the lamp ages.
7. LLF: Light loss factor, which is the product of all factors that contribute to light loss in the system.
8. Luminaire: Complete lighting fixture, including ballast housing if integral.
9. UG: Uniformity gradient; the rate of change of illuminance on the playing field, expressed as a ratio between the illuminances of adjacent measuring points on a uniform grid.

D. Performance Requirements

1. Facility Type: Professional **OR** College **OR** Semiprofessional **OR** Sports club **OR** Amateur league **OR** High school **OR** Training facility **OR** Elementary school **OR** Recreational or social facility, **as directed**.
2. Illumination Criteria:
 - a. Minimum average target illuminance level for each lighted area for each sports venue and for the indicated class of play according to IESNA RP-6.
 - b. CV and maximum-to-minimum uniformity ratios for each lighted area equal to or less than those listed in IESNA RP-6 for the indicated class of play.
 - c. UG levels within each lighted area equal to or less than those listed in IESNA RP-6 for the indicated speed of sport.

3. Illumination Criteria:
 - a. Minimum Average Target Illumination: **<Insert value>**.
 - b. CV: **<Insert value>**.
 - c. Maximum-to-Minimum Uniformity Ratio: **<Insert value>**.
 - d. UG Level: **<Insert value>**.
4. Illumination Calculations: Computer-analyzed point method complying with IESNA RP-6 to optimize selection, location, and aiming of luminaires.
 - a. Grid Pattern Dimensions: For playing areas of each sport and areas of concern for spill-light control, correlate and reference calculated parameters to the grid areas. Each grid point represents the center of the grid area defined by the length and width of the grid spacing.
 - b. Spill-Light Control: Minimize spill light for each playing area on adjacent and nearby areas.
 - 1) Prevent light trespass on properties near Project as defined by **<Insert name(s) of authorities having jurisdiction>**.
 - 2) For areas indicated on Drawings as "spill-light critical," limit the level of illuminance directed into the area from any luminaire or group of luminaires, and measured **36 inches (914 mm)** above grade to the following:
 - a) Maximum Horizontal Illuminance: **0.25 fc (2.7 lux) OR 0.5 fc (5.4 lux) OR 0.75 fc (8.1 lux), as directed.**
 - b) Maximum Vertical Illuminance from the Direction of the Greatest Contribution of Light: **1.0 fc (10.8 lux) OR 2.0 fc (21.5 lux) OR 3.0 fc (32.3 lux), as directed.**
 - 3) Calculate the horizontal and vertical illuminance due to spill light for points spaced **20 feet (6 m)** apart in areas indicated on Drawings as "spill-light critical," to ensure that design meets the above limits.
 - c. Glare Control: Design illumination for each playing area to minimize direct glare in adjacent and nearby areas.
 - 1) Design source intensity of luminaires that may be observed at an elevation of **60 inches (1524 mm)** above finished grade from nearby properties to be less than 12,000 **OR 20,000 OR 30,000, as directed**, candela when so observed.
 - 2) Design source intensity of luminaires that may be observed at an elevation of **60 inches (1524 mm)** above finished grade from designated "spill-light critical" areas to be less than 12,000 **OR 20,000 OR 30,000, as directed**, candela when so observed.
 - d. Determine LLF according to IESNA RP-6 and manufacturer's test data.
 - 1) Use LLD at 100 percent of rated lamp life. LLF shall be applied to initial illumination to ensure that target illumination is achieved at 100 percent of lamp life and shall include consideration of field factor.
 - 2) LLF shall not be higher than 70 percent, and may be lower when determined by manufacturer after application of the ballast output and optical system output according to IESNA RP-6.
 - e. Luminaire Mounting Height: Comply with IESNA RP-6, with consideration for requirements to minimize spill light and glare.
 - f. Luminaire Placement: Luminaire clusters shall be outside the glare zones defined by IESNA RP-6.
5. Baseball Fields:
 - a. IESNA RP-6, Class of Play: **I OR II OR III OR IV, as directed.**
 - b. Speed of Sport: **Fast OR Moderate OR Slow, as directed.**
 - c. Grid Pattern Dimensions: **30 by 30 feet (9 by 9 m).**
6. Softball Fields:
 - a. IESNA RP-6, Class of Play: **I OR II OR III OR IV, as directed.**
 - b. Speed of Sport: **Fast OR Moderate OR Slow, as directed.**
 - c. Grid Pattern Dimensions: **20 by 20 feet (6 by 6 m).**
7. Football Fields:
 - a. IESNA RP-6, Class of Play: **I OR II OR III OR IV, as directed.**

- b. Speed of Sport: Fast **OR** Moderate **OR** Slow, **as directed**.
- c. Grid Pattern Dimensions: **30 by 30 feet (9 by 9 m)**.
- 8. Soccer Fields:
 - a. IESNA RP-6, Class of Play: I **OR** II **OR** III **OR** IV, **as directed**.
 - b. Speed of Sport: Fast **OR** Moderate **OR** Slow, **as directed**.
 - c. Grid Pattern Dimensions: **30 by 30 feet (9 by 9 m)**.
- 9. Outdoor Tennis Courts:
 - a. IESNA RP-6, Class of Play: I **OR** II **OR** III **OR** IV, **as directed**.
 - b. Speed of Sport: Fast **OR** Moderate **OR** Slow, **as directed**.
 - c. Grid Pattern Dimensions: **10 by 10 feet (3 by 3 m)**.
- 10. Egress Lighting: In case of power failure, provide a minimum of **1.0-fc (10.8-lux)** illumination, within 30 seconds, measured at grade in spectator and spectator egress areas.
 - a. Duration of emergency illumination shall be not less than 15 minutes.
 - b. Momentary Power Interruptions: Provide emergency illumination immediately following restoration of power to the lighting circuits. Emergency illumination shall automatically extinguish after 15 minutes.
- 11. Lighting Control: Manual, low voltage, or digital; providing the following functions, integrated into a single control station, with multiple subcontrol stations as indicated:
 - a. Control Station: Key-operated master switch, manual push-button controls, and system status indicator lights. Test switch of egress lighting system, **as directed**.
 - b. Light Levels: Two levels of control - 100/50 percent of minimum target illumination.
- 12. Electric Power Distribution Requirements:
 - a. Electric Power: 208 **OR** 230 **OR** 480, **as directed**, V; three phase.
 - 1) Include roughing-in of service indicated for nonsports improvements on Project site.
 - 2) Balance load between phases. Install wiring to balance three phases at each support structure.
 - 3) Include required overcurrent protective devices and individual lighting control for each sports field or venue.
 - 4) Include indicated feeder capacity and panelboard provisions for future lighted sports field construction.
- 13. Maximum Total Load: **<Insert number> A**.
 - a. Maximum Total Voltage Drop from Source to Load: 5 percent, including voltage drops in branch circuit, subfeeder, and feeder.
- 14. Seismic Performance: Luminaires, ballasts, and support structures shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
- 15. Life-Cycle Cost Criteria:
 - a. Estimated life-cycle cost of lighting system for period of **<Insert number>** years based on the parameters below:
 - 1) Energy Cost: **<Insert value>** {Calculate energy costs by multiplying (number of luminaires) x (kilowatt demand per luminaire) x (power cost at \$/kilowatts) x (number of annual usage hours) x (number of years)}.
 - 2) Lamp Replacement Cost: **<Insert value>** (Calculate replacement costs by multiplying (cost to replace a lamp) x (number of luminaires) x (number of relamps over the period of years used in calculating the energy cost)).
 - 3) General Maintenance: **<Insert value>** (Calculate maintenance costs by multiplying (number of repairs) x (cost per repair) over the life cycle).

OR

Life-Cycle Cost Criteria: **<Insert value>** (Calculate according to Federal Energy Management Program's "Building Life-Cycle Cost").

E. Submittals

- 1. Product Data: For each type of lighting product indicated. Include the following:

- a. Lamp life, output, and energy-efficiency data. Lamp data certified by NVLAP or NRTL; comply with IESNA LM-47.
 - b. Photometric data based on laboratory tests of each luminaire type, complete with lamps, ballasts, and accessories; comply with IESNA LM-5.
 - 1) Photometric data shall be certified by a qualified independent testing agency.
OR
Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the NVLAP for Energy Efficient Lighting Products.
 2. Delegated-Design Submittal: For exterior athletic lighting indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Drawings and specifications for construction of lighting system.
 - b. Manufacturer's determination of LLF used in design calculations.
 - c. Lighting system design calculations for the following:
 - 1) Target illuminance.
 - 2) Point calculations of horizontal and vertical illuminance, CV, and UG at minimum grid size and area.
 - 3) Point calculations of horizontal and vertical illuminance in indicated areas of concern for spill light.
 - 4) Calculations of source intensity of luminaires observed at eye level from indicated properties near the playing fields.
 - d. Electrical system design calculations for the following:
 - 1) Short-circuit current calculations for rating of panelboards.
 - 2) Total connected and estimated peak-demand electrical load, in kilowatts, of lighting system.
 - 3) Capacity of feeder **OR** service, **as directed**, required to supply lighting system.
 - e. Wiring requirements, including required conductors and cables and wiring methods.
 - f. Structural analysis data and calculations used for pole selection.
 - 1) Manufacturer Wind-Load Strength Certification: Submit certification that selected total support system, including poles, complies with AASHTO LTS-4-M for location of Project.
 3. Qualification Data: For qualified Installer, manufacturer, professional engineer, luminaire photometric data testing laboratory and field testing agency.
 4. Seismic Qualification Certificates: For luminaires, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 5. Manufacturer Certificates: For support structures, including brackets, arms, appurtenances, bases, anchorages, and foundations, from manufacturer.
 6. Welding certificates.
 7. Field quality-control reports.
 8. Operation and Maintenance Data: For sports lighting system components to include in emergency, operation, and maintenance manuals.
 9. Warranty: Sample of special warranty.
- F. Quality Assurance
1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
 2. Manufacturer Qualifications: Manufacturer's responsibilities include fabricating sports lighting and providing professional engineering services needed to assume engineering responsibility.

- a. Engineering Responsibility: Preparation of delegated-design submittals and comprehensive engineering analysis by a qualified professional engineer who is additionally LC by the National Council on Qualifications for the Lighting Professions, **as directed**.
3. Luminaire Photometric Data Testing Laboratory: By manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.
4. Luminaire Photometric Data Testing Laboratory: By an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL.
5. Field Testing Agency Qualifications: An independent testing agency that is accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products, or an NRTL as defined in 29 CFR 1910, with the experience and capability to conduct field testing according to IESNA LM-5.

OR

Field Testing Agency Qualifications: A qualified independent professional engineer not associated with Contractor or lighting equipment manufacturer, who is additionally LC by the National Council on Qualifications for the Lighting Professions, **as directed**.

6. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel" and AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
7. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of luminaires, lamps, and luminaire alignment products and to correct misalignment that occurs subsequent to successful acceptance tests. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, and unauthorized repairs and alterations from special warranty coverage.
 - a. Luminaire Warranty: Luminaire and luminaire assembly (excluding fuses and lamps) shall be free from defects in materials and workmanship for a period of five years from date of Final Completion.
 - b. Lamp Warranty:
 - 1) Replace lamps and fuses that fail within 12 months from date of Final Completion.
 - 2) Provide replacement lamps for lamps that fail within the second 12 months from date of Final Completion.
 - c. Alignment Warranty: Accuracy of alignment of luminaires shall remain within specified illuminance uniformity ratios for a period of five years from date of successful completion of acceptance tests.
 - 1) Realign luminaires that become misaligned during the warranty period.
 - 2) Replace alignment products that fail within the warranty period.
 - 3) Verify successful realignment of luminaires by retesting as specified in "Field Quality Control" Article.

1.2 PRODUCTS

A. Luminaires, Lamps, And Ballasts

1. Luminaires: Listed and labeled, by an NRTL acceptable to authorities having jurisdiction, for compliance with UL 1598 for installation in wet locations.
 - a. Doors, Frames, and Other Internal Access: Smooth operating, free from light leakage under operating conditions, and arranged to permit relamping without using tools. Arrange doors, frames, lenses, diffusers, and other pieces to prevent their accidental falling during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lens.
 - b. Exposed Hardware: Stainless-steel latches, fasteners, and hinges.

- c. Spill-Light Control Devices: Internal louvers and external baffles furnished by manufacturer and designed for secure attachment to specific luminaire.
 - d. Luminaires for tennis courts shall be bracket-mounted, full-cutoff type with integral ballasts.
 - e. Lamps for Tennis Court Luminaires: Metal halide, rated 1000 W.
2. Ballast Mounting: Grouped in cabinets, remote from **OR** At, **as directed**, location of associated luminaires unless otherwise indicated.

B. Support Structures

- 1. Support-Structure Wind-Load Strength: Poles and other support structures, brackets, arms, appurtenances, bases, anchorages, and foundations shall comply with AASHTO LTS-4-M and shall be certified by manufacturers to withstand winds up to **100 mph (160 km/h)** without permanent deflection or whipping.
- 2. Support-Structure Seismic Strength: Poles or other support structures, brackets, arms, appurtenances, bases, anchorages, and foundations shall be designed to prevent separation of components or fracture of poles, luminaire supports, or pole foundations during a seismic event.
- 3. Mountings, Fasteners, and Appurtenances:
 - a. Corrosion resistant, compatible with support components, and which shall not cause galvanic action at contact points.
 - 1) Steel Components: Hot-dip galvanized after fabrication, complying with ASTM A 123/A 123M.
 - 2) Mounting Hardware Fasteners: Hot-dip galvanized, complying with ASTM A 153/A 153M, or minimum 18-8 grade stainless steel.
 - b. Accommodate attachments and wiring of other indicated systems.
- 4. Concrete for Pole Foundations: **3000-psi (20.7-MPa)**, 28-day minimum compressive strength. Concrete, reinforcement, and formwork are specified in Division 03 Section "Cast-in-place Concrete".
- 5. Direct-buried steel structures or poles shall not be used.

C. Power Distribution And Control

- 1. Wiring Method for Feeders, Subfeeders, Branch Circuits, and Control Wiring: Underground nonmetallic raceway; No. 10 AWG minimum conductor size for power wiring.
- 2. Overhead-, pole-, or structure-supported wiring and transformers are **OR** are not, **as directed**, permitted.
- 3. Electrical Enclosures Exposed to Weather: NEMA 250, Type 3R enclosure constructed from stainless steel **OR** corrosion-resistant material, **as directed**, with hinged doors fitted with padlock hasps or lockable latches.

D. Surge Protection

- 1. Surge Protection: Comply with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" and include surge suppressors with the following requirements:
 - a. Panelboard type.
 - b. Nonmodular, with digital indicator lights and one set of dry contacts, **as directed**.
 - c. Peak Single-Impulse Surge Current Rating: **<Insert number>** kA per phase.

E. Pole And Base Protection

- 1. Pole Pads: Wraparound pad, with **4 inches (100 mm)** of extra-firm polyfoam, 360-degree coverage of ground-mounted poles and supports, continuous hook-and-loop fastening, and not less than **72 inches (1820 mm)** high.

1.3 EXECUTION

A. Installation

1. Use web fabric slings (not chain or cable) to raise and set structural members. Protect equipment during installation to prevent corrosion.
 2. Install poles and other structural units level, plumb, and square.
 3. Except for embedded structural members, grout void between pole base and foundation. Use nonshrinking or expanding concrete grout firmly packed in entire void space. Use a short piece of **1/2-inch- (13-mm-)** diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole. Nonshrink grout is specified in Division 05 Section "Metal Fabrications".
 4. Install pole pads at all poles inside playing field boundaries and when located within **20 feet (6 m)** of the field boundary.
 5. Extend cast-in-place bolted base foundations **36 inches (914 mm)** above grade, minimum.
 6. Install protective pipe bollards on two **OR** three, **as directed**, sides of each embedded pole installed in paved areas. See Division 05 Section "Metal Fabrications" for pipe bollards.
 7. Install controls and ballast housings in cabinets mounted on support structure at least **10 feet (3 m)** above finished grade.
- B. Field Quality Control
1. Perform tests, inspections, and analysis according to IESNA RP-6 and IESNA LM-5 where applicable.
 2. Tests and Inspections:
 - a. After installing sports lighting system and after electrical circuits have been energized, perform proof-of-performance field measurements and analysis for compliance with requirements.
 - b. Playing and Other Designated Areas: Make field measurements at intersections of grids, dimensioned and located as specified in "Performance Requirements" Article and as described below:
 - 1) Baseball Fields: Measure at least 25 points of the infield and 87 points of the outfield. Extend the grid **15 feet (5 m)** outside the foul lines, extending to outfield boundary or fence.
 - 2) Softball Fields: Measure at least 16 points of the infield and 48 points of the outfield. Extend the grid **15 feet (5 m)** outside the foul lines, extending to outfield boundary.
 - 3) Football Fields: Lighted area is **180 by 360 feet (55 by 110 m)**. Measure at least 91 points.
 - 4) Soccer Fields: Lighted area is **210 by 370 feet (64 by 113 m)**. Measure at least 91 points.
 - 5) Tennis Courts: Measure at least 30 points for a double court.
 - c. Make field measurements at established test points in areas of concern for spill light and glare.
 - d. Perform analysis to demonstrate correlation of field measurements with specified illumination quality and quantity values and corresponding computer-generated values that were submitted with engineered design documents. Submit a report of the analysis. For computer-generated values, use manufacturer's lamp lumens that are adjusted to lamp age at time of field testing.
 3. Correction of Illumination Deficiencies for Playing Areas: Make corrections to illumination quality or quantity, measured in field quality-control tests, that varies from specified illumination criteria by plus or minus 10 percent.
 - a. Add or replace luminaires, or change mounting height, revise aiming, or install louvers, shields, or baffles.
 - b. If luminaires are added or mounting height is changed, revise aiming and recalculate and modify or replace support structures if indicated.
 - c. Do not replace luminaires with units of higher or lower wattage without the Owner's approval.
 - d. Retest as specified above after repairs, adjustments, or replacements are made.
 - e. Report results in writing.

4. Correction of Excessive Illumination in Spill-Light-Critical Areas: If measurements indicate that specified limits for spill light are exceeded, make corrections to illumination quantity, measured in field quality-control tests, that reduce levels to within specified maximum values.
 - a. Replace luminaires, or change mounting heights, revise aiming, or install louvers, shields, or baffles.
 - b. Obtain the Owner's approval to replace luminaires with units of higher or lower wattage.
 - c. If mounting height is changed, revise aiming and recalculate and modify or replace support structures if indicated.
 - d. Retest as specified above after repairs, adjustments, or replacements are made.
 - e. Report results in writing.
 5. Sports lighting will be considered defective if it does not pass tests and inspections.
 6. Prepare test and inspection reports.
- C. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain exterior athletic lighting.

END OF SECTION 26 55 68 00

SECTION 26 56 00 00 - EXTERIOR LIGHTING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for exterior lighting. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Exterior luminaires with lamps and ballasts.
 - b. Luminaire-mounted photoelectric relays.
 - c. Poles and accessories.
 - d. Luminaire lowering devices.

C. Definitions

1. CCT: Correlated color temperature.
2. CRI: Color-rendering index.
3. HID: High-intensity discharge.
4. LER: Luminaire efficacy rating.
5. Luminaire: Complete lighting fixture, including ballast housing if provided.
6. Pole: Luminaire support structure, including tower used for large area illumination.
7. Standard: Same definition as "Pole" above.

D. Structural Analysis Criteria For Pole Selection

1. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.
2. Live Load: Single load of **500 lbf (2224 N)**, distributed as stated in AASHTO LTS-4-M.
3. Ice Load: Load of **3 lbf/sq. ft. (145 Pa)**, applied as stated in AASHTO LTS-4-M Ice Load Map.
4. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.
 - a. Basic wind speed for calculating wind load for poles exceeding **49.2 feet (15 m)** in height is **100 mph (45 m/s) OR 90 mph (40 m/s), as directed.**
 - 1) Wind Importance Factor: 1.0.
 - 2) Minimum Design Life: 50 years.
 - 3) Velocity Conversion Factors: 1.0.
 - b. Basic wind speed for calculating wind load for poles **50 feet (15 m)** high or less is **100 mph (45 m/s) OR 90 mph (40 m/s).**
 - 1) Wind Importance Factor: 1.0.
 - 2) Minimum Design Life: 25 years.
 - 3) Velocity Conversion Factors: 1.0.

E. Submittals

1. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:
 - a. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
 - b. Details of attaching luminaires and accessories.
 - c. Details of installation and construction.
 - d. Luminaire materials.
 - e. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.

- 1) Testing Agency Certified Data: For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

OR

Manufacturer Certified Data: Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

- f. Photoelectric relays.
- g. Ballasts, including energy-efficiency data.
- h. Lamps, including life, output, CCT, CRI, lumens, and energy-efficiency data.
- i. Materials, dimensions, and finishes of poles.
- j. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
- k. Anchor bolts for poles.
- l. Manufactured pole foundations.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
 - c. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
 - d. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For products designated for sample submission in the Exterior Lighting Device Schedule. Each Sample shall include lamps and ballasts.
4. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer.
5. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.
6. Field quality-control reports.
7. Operation and Maintenance Data: For luminaires and poles **OR** luminaire lowering devices, **as directed**, to include in emergency, operation, and maintenance manuals.
8. Warranty: Sample of special warranty.

F. Quality Assurance

1. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

OR

Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with IEEE C2, "National Electrical Safety Code."
4. Comply with NFPA 70.

G. Delivery, Storage, And Handling

1. Package aluminum poles for shipping according to ASTM B 660.
2. Store poles on decay-resistant-treated skids at least **12 inches (300 mm)** above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.
3. Handle wood poles so they will not be damaged. Do not use pointed tools that can indent pole surface more than **1/4 inch (6 mm)** deep. Do not apply tools to section of pole to be installed below ground line.

4. Retain factory-applied pole wrappings on fiberglass and laminated wood poles until right before pole installation. Handle poles with web fabric straps.
5. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

H. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.
 - a. Warranty Period for Luminaires: Five years from date of Final Completion.
 - b. Warranty Period for Metal Corrosion: Five years from date of Final Completion.
 - c. Warranty Period for Color Retention: Five years from date of Final Completion.
 - d. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Final Completion.

1.2 PRODUCTS

A. General Requirements For Luminaires

1. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.
 - a. LER Tests Incandescent Fixtures: Where LER is specified, test according to NEMA LE 5A.
 - b. LER Tests Fluorescent Fixtures: Where LER is specified, test according to NEMA LE 5 and NEMA LE 5A as applicable.
 - c. LER Tests HID Fixtures: Where LER is specified, test according to NEMA LE 5B.
2. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.
3. Metal Parts: Free of burrs and sharp corners and edges.
4. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.
5. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.
6. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.
7. Exposed Hardware Material: Stainless steel.
8. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.
9. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.
10. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:
 - a. White Surfaces: 85 percent.
 - b. Specular Surfaces: 83 percent.
 - c. Diffusing Specular Surfaces: 75 percent.
11. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.
12. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.
13. Factory-Applied Finish for Steel Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- a. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
 - b. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - 1) Color: As selected from manufacturer's standard catalog of colors **OR** As selected from manufacturer's full range, **as directed**.
14. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- a. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - b. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
 - c. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - d. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1) Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black, **as directed**.
15. Factory-Applied Labels: Comply with UL 1598. Include recommended lamps and ballasts. Labels shall be located where they will be readily visible to service personnel, but not seen from normal viewing angles when lamps are in place.
- a. Label shall include the following lamp and ballast characteristics:
 - 1) "USES ONLY" and include specific lamp type.
 - 2) Lamp diameter code (T-4, T-5, T-8, T-12), tube configuration (twin, quad, triple), base type, and nominal wattage for fluorescent and compact fluorescent luminaires.
 - 3) Lamp type, wattage, bulb type (ED17, BD56, etc.) and coating (clear or coated) for HID luminaires.
 - 4) Start type (preheat, rapid start, instant start) for fluorescent and compact fluorescent luminaires.
 - 5) ANSI ballast type (M98, M57, etc.) for HID luminaires.
 - 6) CCT and CRI for all luminaires.
- B. Luminaire-Mounted Photoelectric Relays
1. Comply with UL 773 or UL 773A.
 2. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at **1.5 to 3 fc (16 to 32 lx)** and off at **4.5 to 10 fc (48 to 108 lx)** with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff, **as directed**.
 - a. Relay with locking-type receptacle shall comply with ANSI C136.10.
 - b. Adjustable window slide for adjusting on-off set points.
- C. Fluorescent Ballasts And Lamps
1. Ballasts for Low-Temperature Environments:
 - a. Temperatures **0 Deg F (Minus 17 Deg C)** and Higher: Electronic or electromagnetic type rated for **0 deg F (minus 17 deg C)** starting and operating temperature with indicated lamp types.
 - b. Temperatures **Minus 20 Deg F (Minus 29 Deg C)** and Higher: Electromagnetic type designed for use with indicated lamp types.
 2. Ballast Characteristics:
 - a. Power Factor: 90 percent, minimum.

- b. Sound Rating: Class A **OR** Class A except Class B for T8/HO ballasts, **as directed**.
 - c. Total Harmonic Distortion Rating: Less than 10 **OR** 20, **as directed**, percent.
 - d. Electromagnetic Ballasts: Comply with ANSI C82.1, energy-saving, high power factor, Class P, automatic-reset thermal protection.
 - e. Case Temperature for Compact Lamp Ballasts: 65 deg C, maximum.
 - f. Transient-Voltage Protection: Comply with IEEE C62.41.1 and IEEE C62.41.2, Category A or better.
3. Low-Temperature Lamp Capability: Rated for reliable starting and operation with ballast provided at temperatures **0 deg F (minus 18 deg C) OR minus 20 deg F (minus 29 deg C)**, **as directed**, and higher.
- D. Ballasts For HID Lamps
1. Comply with ANSI C82.4 and UL 1029 and capable of open-circuit operation without reduction of average lamp life. Include the following features unless otherwise indicated:
 - a. Ballast Circuit: Constant-wattage autotransformer or regulating high-power-factor type.
 - b. Minimum Starting Temperature: **Minus 22 deg F (Minus 30 deg C)**.
 - c. Normal Ambient Operating Temperature: **104 deg F (40 deg C)**.
 - d. Ballast Fuses: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by ballast manufacturer.
 2. Auxiliary, Instant-On, Quartz System: Factory-installed feature automatically switches quartz lamp on when fixture is initially energized and when momentary power outages occur. System automatically turns quartz lamp off when HID lamp reaches approximately 60 percent of light output.
 3. High-Pressure Sodium Ballasts: Electromagnetic type with solid-state igniter/starter and capable of open-circuit operation without reduction of average lamp life. Igniter/starter shall have an average life in pulsing mode of 10,000 hours at an igniter/starter-case temperature of 90 deg C.
 - a. Instant-Restrike Device: Integral with ballast, or solid-state potted module, factory installed within fixture and compatible with lamps, ballasts, and mogul sockets up to 150 W.
 - 1) Restrike Range: 105- to 130-V ac.
 - 2) Maximum Voltage: 250-V peak or 150-V ac rms.
 - b. Minimum Starting Temperature: **Minus 40 deg F (Minus 40 deg C)**.
- E. HID Lamps
1. High-Pressure Sodium Lamps: ANSI C78.42, CRI 21 (minimum), CCT color temperature 1900 K, and average rated life of 24,000 hours, minimum.
 - a. Dual-Arc Tube Lamp: Arranged so only one of two arc tubes is lighted at one time and, when power is restored after an outage, the cooler arc tube, with lower internal pressure, lights instantly, providing an immediate 8 to 15 percent of normal light output.
 2. Low-Pressure Sodium Lamps: ANSI C78.43.
 3. Metal-Halide Lamps: ANSI C78.43, with minimum CRI 65, and CCT color temperature 4000 K.
 4. Pulse-Start, Metal-Halide Lamps: Minimum CRI 65, and CCT color temperature 4000 K.
 5. Ceramic, Pulse-Start, Metal-Halide Lamps: Minimum CRI 80, and CCT color temperature 4000 K.
- F. General Requirements For Poles And Support Components
1. Structural Characteristics: Comply with AASHTO LTS-4-M.
 - a. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
 - b. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.
 2. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.
 3. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

- a. Materials: Shall not cause galvanic action at contact points.
- b. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
- c. Anchor-Bolt Template: Plywood or steel.
4. Handhole: Oval-shaped, with minimum clear opening of **2-1/2 by 5 inches (65 by 130 mm)**, with cover secured by stainless-steel captive screws. Provide on all, except wood poles.
5. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Division 3 Section "Cast-in-Place Concrete."
6. Power-Installed Screw Foundations: Factory fabricated by pole manufacturer, with structural steel complying with ASTM A 36/A 36M and hot-dip galvanized according to ASTM A 123/A 123M; and with top-plate and mounting bolts to match pole base flange and strength required to support pole, luminaire, and accessories.
7. Breakaway Supports: Frangible breakaway supports, tested by an independent testing agency acceptable to authorities having jurisdiction, according to AASHTO LTS-4-M.

G. Steel Poles

1. Poles: Comply with ASTM A 500, Grade B, carbon steel with a minimum yield of **46,000 psig (317 MPa)**; one-piece construction up to **40 feet (12 m)** in height with access handhole in pole wall.
 - a. Shape: Round, tapered **OR** Round, straight **OR** Square, tapered **OR** Square, straight, **as directed**.
 - b. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
2. Steel Mast Arms: Single-arm **OR** Truss **OR** Davit, **as directed**, type, continuously welded to pole attachment plate. Material and finish same as pole.
3. Brackets for Luminaires: Detachable, cantilever, without underbrace.
 - a. Adapter fitting welded to pole, allowing the bracket to be bolted to the pole mounted adapter, then bolted together with stainless **OR** galvanized, **as directed**, -steel bolts.
 - b. Cross Section: Tapered oval, with straight tubular end section to accommodate luminaire.
 - c. Match pole material and finish.
4. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
5. Steps: Fixed steel, with nonslip treads, positioned for **15-inch (381-mm)** vertical spacing, alternating on opposite sides of pole; first step at elevation **10 feet (3 m)** above finished grade.
6. Intermediate Handhole and Cable Support: Weathertight, **3-by-5-inch (76-by-127-mm)** handhole located at midpoint of pole with cover for access to internal welded attachment lug for electric cable support grip.
7. Grounding and Bonding Lugs: Welded **1/2-inch (13-mm)** threaded lug, complying with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems", listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
8. Cable Support Grip: Wire-mesh type with rotating attachment eye, sized for diameter of cable and rated for a minimum load equal to weight of supported cable times a 5.0 safety factor.
9. Platform for Lamp and Ballast Servicing: Factory fabricated of steel with finish matching that of pole.
10. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
11. Galvanized Finish: After fabrication, hot-dip galvanize complying with ASTM A 123/A 123M.
12. Factory-Painted Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - a. Surface Preparation: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, and other contaminants that could impair paint bond. Grind welds and polish surfaces to a smooth, even finish. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or with SSPC-SP 8, "Pickling."

- b. Interior Surfaces of Pole: One coat of bituminous paint, or otherwise treat for equal corrosion protection.
- c. Exterior Surfaces: Manufacturer's standard finish consisting of one or more coats of primer and two finish coats of high-gloss, high-build polyurethane enamel.
 - 1) Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range, **as directed**.

H. Aluminum Poles

- 1. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.
- 2. Poles: **ASTM B 209 (ASTM B 209M)**, 5052-H34 marine sheet alloy with access handhole in pole wall.
 - a. Shape: Round, tapered **OR** Round, straight **OR** Square, tapered **OR** Square, straight, **as directed**.
 - b. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.
- 3. Pole-Top Tenons: Fabricated to support luminaire or luminaires and brackets indicated, and securely fastened to pole top.
- 4. Grounding and Bonding Lugs: Welded **1/2-inch (13-mm)** threaded lug, complying with requirements in Division 26 Section "Grounding And Bonding For Electrical Systems", listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.
- 5. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.
 - a. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
 - b. Finish: Same as pole **OR** luminaire, **as directed**.
- 6. Prime-Coat Finish: Manufacturer's standard prime-coat finish ready for field painting.
- 7. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - a. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
 - b. Natural Satin Finish: Provide fine, directional, medium satin polish (AA-M32); buff complying with AA-M20; and seal aluminum surfaces with clear, hard-coat wax.
 - c. Class I, Clear Anodic Finish: AA-M32C22A41 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.
 - d. Class I, Color Anodic Finish: AA-M32C22A42/A44 (Mechanical Finish: medium satin; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1) Color: Light bronze **OR** Medium bronze **OR** Dark bronze **OR** Black **OR** As selected from manufacturer's full range, **as directed**.

I. Fiberglass Poles

- 1. Poles: Designed specifically for supporting luminaires, with factory-formed cable entrance and handhole. Not less than 65 percent fiberglass, with resin and pigment making up the remainder.
 - a. Resin Color: Dark bronze; provide uniform coloration throughout entire wall thickness.
 - b. Surface Finish: Pigmented polyurethane, with a minimum dry film thickness of **1.5 mils (0.04 mm)**. Polyurethane may be omitted if the surface layer of pole is inherently UV inhibited.

J. Decorative Poles

- 1. Pole Material:
 - a. Cast ductile iron.
 - b. Cast gray iron, according to ASTM A 48/A 48M, Class 30.
 - c. Cast aluminum.
 - d. Cast concrete.

- e. Spun concrete.
 - f. Steel tube, covered with closed-cell polyurethane foam, with a polyethylene exterior.
2. Mounting Provisions:
 - a. Bolted to concrete foundation.
 - b. Embedded.
 3. Fixture Brackets:
 - a. Cast ductile iron.
 - b. Cast gray iron.
 - c. Cast aluminum.
 4. Pole Finish: as directed by the Owner .
- K. Laminated Wood Poles
1. Species and Grades for Structural Glulam Timber: Engineer and fabricate structural laminated wood poles, complying with ANSI A190.1. Use southern pine **OR** Douglas fir **OR** Alaska cedar **OR** any species listed in AITC 117, **as directed**, to withstand indicated structural loads without exceeding allowable design working stresses according to AITC 117.
 2. Features: Include wood bracket **OR** wood crossarm **OR** pole-top adapter, **as directed**, for mounting luminaire(s), metal pole cap, **as directed**, and concealed raceway path connected to access handhole.
 3. Mounting Provisions: Embedded.
 4. Appearance Grade: Architectural appearance grade complying with AITC 110.
 5. Preservative Treatment: Pressure treat lumber before gluing according to AWPA C28 for waterborne preservatives. After dressing and end-cutting each member to final size and shape, apply a field-treatment preservative to comply with AWPA M4 to surfaces cut to a depth of more than **1/16 inch (1.6 mm)**.
 6. Adhesive: Wet-use type complying with ASTM D 2559.
 7. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
 8. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.
 9. Finish: Natural, unstained wood **OR** Semitransparent stain applied after erection **OR** Semitransparent stain applied at factory, **as directed**, color as selected.
- L. Wood Poles
1. Poles: Douglas fir **OR** Southern yellow pine, **as directed**, machine trimmed by turning, **as directed**, complying with ANSI O5.1 and with AWPA C4 for wood species used; and bored, roofed, and gained before treatment.
 - a. Mounting Provisions: Embedded.
 2. Preservative Treatment: Pressure treat poles with creosote **OR** pentachlorophenol **OR** ammoniacal copper arsenate, **as directed**, according to AWPA C1 and AWPA C4.
 3. Luminaire Brackets: Comply with ANSI C136.13.
- M. Prestressed Concrete Poles
1. Poles: Manufactured by centrifugal spin-casting process **OR** of cast concrete, **as directed**.
 - a. Shape: Round, tapered **OR** Round, straight **OR** Square, tapered **OR** Square, straight, **as directed**.
 - b. Mounting Provisions: Steel butt flange for bolted mounting to foundation or breakaway support **OR** Embedded, **as directed**.
 - c. Finishing: Capped at top and plugged at bottom. Seat each steel reinforcing strand with epoxy adhesive.
 - d. Grounding: Continuous copper ground wire cast into pole. Terminate at top of pole and attach to **24-inch (610-mm)** lightning rod, **as directed**.
 2. Cure with wet steam and age for a minimum of 15 days before installation.
 3. Fabricate poles with a hard, nonporous surface that is resistant to water, frost, and road and soil chemicals and that has a maximum water-absorption rate of 3 percent.

4. Cast aluminum nameplate into pole wall at approximately **5 feet (1.5 m)** above ground line, listing name of manufacturer, Project identifier, overall height, and approximate weight.
5. Pole Brackets: Comply with ANSI C136.13.
6. Finish Color: Provided by color material complying with ASTM C 979, uniformly impregnated throughout the pole concrete. Color material shall provide a uniform, stable, permanent color and be as follows:
 - a. Inert, and carbon free.
 - b. Unaffected by environmental conditions and contaminants including, but not limited to, UV solar radiation, salts, and alkalis.
7. Finish Texture: Standard form **OR** Polished exposed aggregate **OR** Etched exposed aggregate, **as directed**.
 - a. Exposed aggregate shall be of **Aggregate type selected from manufacturers' lists** as directed by the Owner type.

N. Pole Accessories

1. Duplex Receptacle: 120 V, 20 A in a weatherproof assembly complying with Division 16 Section "Wiring Devices" for ground-fault circuit-interrupter type.
 - a. Surface mounted **OR** Recessed, **as directed**, **12 inches (300 mm)** above finished grade.
 - b. Nonmetallic polycarbonate plastic or reinforced fiberglass, weatherproof in use, cover, that when mounted results in NEMA 250, Type 3R **OR** Type 4X, **as directed**, enclosure.
 - c. With cord opening.
 - d. With lockable hasp and latch that complies with OSHA lockout and tag-out requirements.
2. Minimum 1800-W transformer, protected by replaceable fuses, mounted behind access cover.
3. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.
4. Transformer Type Base: Same material and color as pole. Coordinate dimensions to suit pole's base flange and accept ballast(s) **OR** indicated accessories, **as directed**.
5. Decorative accessories, supplied by decorative pole manufacturer, include the following:
 - a. Banner Arms: as directed by the Owner .
 - b. Flag Holders: as directed by the Owner .
 - c. Ladder Rests: as directed by the Owner .

O. Lowering System For Luminaires

1. Arrange system to lower luminaire **OR** luminaire assembly, **as directed**, to a servicing position within **36 inches (900 mm)** of finished grade in winds up to **30 mph (49 km/h)** and to provide for manual plug connection to electrical power in the lowered position for testing.
2. Coordinate with luminaire and pole manufacturers for assembly details, wind-load and vibration analysis, and compatibility of materials for electrolysis-free attachment and connection for luminaire mounting assembly, lowering device, lowering cable, and portable winch.
3. Structural and Mechanical Design: Use a minimum safety factor of 5.0 for static and dynamic loads of load-bearing components, including cable.
4. Luminaire Mounting and Disconnect Arrangement: Multiple ring **OR** carriage, **as directed**, -mounted luminaires, arranged for lowering and rising as a group.
 - a. Electrical cable for normal operating power to luminaires manually disconnects inside pole base, using weatherproof multipin connector, and shall be arranged to move within the pole during lowering and rising of luminaire assembly.
OR
Electrical cable for normal operating power to luminaires automatically disconnects at a weatherproof multipin connector within the pole-top lowering head at the beginning of the lowering cycle and reconnects when luminaire or luminaire assembly is raised to the operating position.
5. Lowering Device: Weatherproof, cast-aluminum housing and multiple mechanical latches. Moving parts of latching assembly shall be located in the portion of the unit that is lowered to the servicing position. Positive latching in the operating position shall be indicated to the operator at the base of the pole by a clear visual signal, or by other means acceptable to the Owner or authorities having jurisdiction.

6. Lowering Cable: Zinc-electroplated- or stainless-steel aircraft cable.
7. Portable Winch: Manual **OR** 120-V electric, **as directed**, type. One required.
 - a. Winch Power Connection: Cord and plug.
 - b. Winch Raise-Lower Control: Remote-control station with **15 feet (5 m)** of cable.
8. Winch Transformer: Portable, totally enclosed, encapsulated, single-phase, dry type. Primary rated at lighting-circuit voltage; secondary rated at 120 V. Permanent, primary and secondary, twist-locking plug connectors on pigtails shall match pole-base power outlet and winch plug.

1.3 EXECUTION

A. Luminaire Installation

1. Install lamps in each luminaire.
2. Fasten luminaire to indicated structural supports.
 - a. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.
3. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation, **as directed**.

B. Pole Installation

1. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.
2. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:
 - a. Fire Hydrants and Storm Drainage Piping: **60 inches (1520 mm)**.
 - b. Water, Gas, Electric, Communication, and Sewer Lines: **10 feet (3 m)**.
 - c. Trees: **15 feet (5 m)** from tree trunk.
3. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Division 03 Section "Cast-in-place Concrete".
4. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.
 - a. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
 - b. Grout void between pole base and foundation. Use nonshrink or expanding concrete grout firmly packed to fill space.
 - c. Install base covers unless otherwise indicated.
 - d. Use a short piece of **1/2-inch- (13-mm-)** diameter pipe to make a drain hole through grout. Arrange to drain condensation from interior of pole.
5. Embedded Poles with Tamped Earth Backfill: Set poles to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
 - a. Dig holes large enough to permit use of tampers in the full depth of hole.
 - b. Backfill in **6-inch (150-mm)** layers and thoroughly tamp each layer so compaction of backfill is equal to or greater than that of undisturbed earth.
6. Embedded Poles with Concrete Backfill: Set poles in augered holes to depth below finished grade indicated on Drawings, but not less than one-sixth of pole height.
 - a. Make holes **6 inches (150 mm)** in diameter larger than pole diameter.
 - b. Fill augered hole around pole with air-entrained concrete having a minimum compressive strength of **3000 psi (20 MPa)** at 28 days, and finish in a dome above finished grade.
 - c. Use a short piece of **1/2-inch- (13-mm-)** diameter pipe to make a drain hole through concrete dome. Arrange to drain condensation from interior of pole.
 - d. Cure concrete a minimum of 72 hours before performing work on pole.
7. Poles and Pole Foundations Set in Concrete Paved Areas: Install poles with minimum of **6-inch- (150-mm-)** wide, unpaved gap between the pole or pole foundation and the edge of adjacent

- concrete slab. Fill unpaved ring with pea gravel to a level **1 inch (25 mm)** below top of concrete slab.
8. Raise and set poles using web fabric slings (not chain or cable).
- C. Bollard Luminaire Installation
1. Align units for optimum directional alignment of light distribution.
 2. Install on concrete base with top **4 inches (100 mm)** above finished grade or surface at bollard location. Cast conduit into base, and shape base to match shape of bollard base. Finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 03 Section "Cast-in-place Concrete".
- D. Installation Of Individual Ground-Mounting Luminaires
1. Install on concrete base with top **4 inches (100 mm)** above finished grade or surface at luminaire location. Cast conduit into base, and finish by troweling and rubbing smooth. Concrete materials, installation, and finishing are specified in Division 03 Section "Cast-in-place Concrete".
- E. Corrosion Prevention
1. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.
 2. Steel Conduits: Comply with Division 26 Section "Raceway And Boxes For Electrical Systems". In concrete foundations, wrap conduit with **0.010-inch- (0.254-mm-)** thick, pipe-wrapping plastic tape applied with a 50 percent overlap.
- F. Grounding
1. Ground metal poles and support structures according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 - a. Install grounding electrode for each pole unless otherwise indicated.
 - b. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.
 2. Ground nonmetallic poles and support structures according to Division 26 Section "Grounding And Bonding For Electrical Systems".
 - a. Install grounding electrode for each pole.
 - b. Install grounding conductor and conductor protector.
 - c. Ground metallic components of pole accessories and foundations.
- G. Field Quality Control
1. Inspect each installed fixture for damage. Replace damaged fixtures and components.
 2. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.
 - a. Verify operation of photoelectric controls.
 3. Illumination Tests:
 - a. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):
 - 1) IESNA LM-5, "Photometric Measurements of Area and Sports Lighting Installations."
 - 2) IESNA LM-50, "Photometric Measurements of Roadway Lighting Installations."
 - 3) IESNA LM-52, "Photometric Measurements of Roadway Sign Installations."
 - 4) IESNA LM-64, "Photometric Measurements of Parking Areas."
 - 5) IESNA LM-72, "Directional Positioning of Photometric Data."
 4. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.
- H. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain luminaire lowering devices.

26 - Electrical



END OF SECTION 26 56 00 00

Task	Specification	Specification Description
26 56 13 00	01 22 16 00	No Specification Required
26 56 13 00	02 41 19 13	Selective Demolition
26 56 13 00	26 56 00 00	Exterior Lighting
26 56 13 00	26 05 26 00b	Overhead Electrical Distribution
26 56 18 00	26 56 00 00	Exterior Lighting
26 56 19 00	26 51 00 00	Interior Lighting
26 56 19 00	26 56 00 00	Exterior Lighting
26 56 21 00	01 22 16 00	No Specification Required
26 56 21 00	26 56 00 00	Exterior Lighting
26 56 21 00	26 05 26 00b	Overhead Electrical Distribution

Task	Specification	Specification Description
27 05 26 00	26 05 53 00a	Intercommunications and Program Systems
27 11 16 00	26 05 53 00a	Intercommunications and Program Systems
27 11 19 00	27 13 23 13	Loose-Tube Gel-Filled Fiber Optic Cables
27 11 19 00	26 05 53 00a	Intercommunications and Program Systems
27 11 23 00	26 05 53 00a	Intercommunications and Program Systems
27 13 13 13	26 05 13 16	Medium-Voltage Cables
27 13 13 13	26 05 19 16a	Conductors And Cables
27 13 13 13	26 05 13 16a	Undercarpet Electrical Power Cables
27 13 13 13	26 05 53 00a	Intercommunications and Program Systems

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SECTION 27 13 23 13 - LOOSE-TUBE GEL-FILLED FIBER OPTIC CABLES

GENERAL

Description Of Work

1. This specification covers the furnishing and installation of loose-tube gel-filled fiber optic cables. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

Shop Drawings And Samples

2. The following shall be submitted:
 - a. Complete bill of materials.
 - b. Drawings indicating the locations of all pull boxes with station numbers.
 - c. Catalog data on all testing devices proposed for use plus certifications of accuracy, calibration, and traceability to standards of the National Institute for Standards and Testing.
 - d. Cable pulling calculations for all conduit runs. Indicate on the submittal any additional pull boxes that are required, including station number and a written description, of the location.
 - e. A cable pulling and splicing work plan shall be submitted a minimum of 45 days prior to the planned initiation of cable pulling. The pulling plan and pull tension calculations may be prepared by using a software program such as Pull-Planner 2000 by American Polywater Corporation. The cable pulling and splicing work plan must be approved a minimum of 15 days prior to pulling cable. Work plan shall include the following:
 - 1) Pull tension calculations
 - 2) Calculated amount of lubrication required
 - 3) Detailed description of pull operation methods for all conduit runs

Quality Assurance

3. All work described in this section shall meet or exceed the applicable provisions of the following documents:
 - a. ANSI C8.471983, American National Standard for Polyolefin Insulated Thermoplastic Jacketed Communication Cables.
 - b. EIA-455 (addendum 1 through 5) Standard Test Procedures for Fiber Optics, Cables, Transducers, Connecting and Terminating Devices.
 - c. EIA-455-27A, Method of Measuring (Uncoated) Diameter of Optical Waveguide Fibers.
 - d. EIA-455-28A, Method For Measuring Tensile Failure Point of Optical Waveguide Fibers.
 - e. EIA-455-34, Interconnection Device Insertion Loss Test.
 - f. EIA-455-89, Fiber Optic Cable Jacket Elongation and Tensile Strength.

Warranty

4. The Contractor shall provide an unconditional warranty on all installed cable for a minimum period of two (2) years.

PRODUCTS

Materials

5. Fiber Optic Cable - 24 strand
 - a. Cable type: Outdoor Plant Stranded Loose-Tube, Gel-Filled Fiber Optic Cable, Corning Altos 024RW4-14101A20 or Lucent Lightpack 7D1X-024-BXD.
 - b. Number of fibers: 24 fibers.
 - c. Buffer Tubes: All optical fibers shall be placed inside a loose buffer tube. The optical cable shall contain three buffer tubes, numbered 1, 2, and 3. The tubes shall be color coded according to the table below:

Buffer Tube Number	Buffer Tube Color
1	Blue
2	Orange
3	Green

- d. Each buffer tube shall contain 8 singlemode fibers. Each fiber shall be numbered and distinguishable by means of the color coding established in the main body of the specification.
 - e. The colors of the individual fibers shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto each other or into the gel filling material. Colors shall not cause fibers to stick together.
 - f. The fibers shall not adhere to the inside walls of the loose buffer tube. Buffer tubes shall be kink resistant within the specified minimum bend radius.
 - g. Filler may be included in the cable core composition to lend symmetry to the cable cross-section where needed.
 - h. A central anti-buckling member shall be included into the cable to prevent buckling of the cable. The anti-buckling member shall be composed of a glass reinforced plastic rod.
 - i. Each buffer tube shall be filled with a non-hygroscopic, non-nutritive to fungus, electrically non-conductive, homogenous gel. The gel shall be free from dirt and foreign matter. The gel shall be readily removable with conventional nontoxic solvents.
 - j. Buffer tubes shall be stranded around a central member using the reverse oscillation, or "S-Z", stranding process.
 - k. The cable core shall contain a water-blocking material. The water blocking material shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.
 - l. Binders shall be applied with sufficient tension to secure the buffer tubes to the member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking and dialectic with low shrinkage.
 - m. Tensile strength shall be provided by a combination of high tensile strength dielectric yarns. The high tensile strength dielectric yarns shall be helically stranded evenly around the cable core.
 - n. The all-dielectric cable shall be sheathed with medium density polyethylene (MDPE). The minimum nominal jacket thickness shall be 1.4 mm. Jacketing material shall be applied directly over the tensile strength members and water blocking material. The jacket or sheath shall be free of holes, splits, and blisters. The cable jacket shall contain no metallic elements and shall be of a consistent thickness.
 - o. The cable shall contain at least one ripcord under the sheath for easy sheath removal.
6. Fiber Optic Cable - 36 Strand
- a. Cable type: Outdoor Plant Stranded Loose-Tube, Gel-Filled Fiber Optic Cable, Corning Altos 036RW4-14101A20 or Lucent Lightpack 7D1X-036-BXD.
 - b. Number of fibers: 36 fibers.
 - c. Buffer Tubes: All optical fibers shall be placed inside a loose buffer tube. The optical cable shall contain three buffer tubes, numbered 1, 2, and 3. The tubes shall be color coded according to the table below:

Buffer Tube Number	Buffer Tube Color
1	Blue
2	Orange
3	Green

- d. Each buffer tube shall contain 12 single mode fibers. Each fiber shall be numbered and distinguishable by means of the color coding established in the main body of the specification.

- e. The colors of the individual fibers shall be stable across the specified storage and operating temperature range and not subject to fading or smearing onto each other or into the gel filling material. Colors shall not cause fibers to stick together.
 - f. The fibers shall not adhere to the inside walls of the loose buffer tube. Buffer tubes shall be kink resistant within the specified minimum bend radius.
 - g. Filler may be included in the cable core composition to lend symmetry to the cable cross-section where needed.
 - h. A central anti-buckling member shall be included into the cable to prevent buckling of the cable. The anti-buckling member shall be composed of a glass reinforced plastic rod.
 - i. Each buffer tube shall be filled with a non-hygroscopic, non-nutritive to fungus, electrically non-conductive, homogenous gel. The gel shall be free from dirt and foreign matter. The gel shall be readily removable with conventional nontoxic solvents.
 - j. Buffer tubes shall be stranded around a central member using the reverse oscillation, or "S-Z", stranding process.
 - k. The cable core shall contain a water-blocking material. The water blocking material shall be non-nutritive to fungus, electrically non-conductive and homogenous. It shall also be free from dirt and foreign matter and shall be readily removable with conventional nontoxic solvents.
 - l. Binders shall be applied with sufficient tension to secure the buffer tubes to the member without crushing the buffer tubes. The binders shall be non-hygroscopic, non-wicking and dielectric with low shrinkage.
 - m. Tensile strength shall be provided by a combination of high tensile strength dielectric yarns. The high tensile strength dielectric yarns shall be helically stranded evenly around the cable core.
 - n. The all-dielectric cable shall be sheathed with medium density polyethylene (MDPE). The minimum nominal jacket thickness shall be 1.4 mm. Jacketing material shall be applied directly over the tensile strength members and water blocking material. The jacket or sheath shall be free of holes, splits, and blisters. The cable jacket shall contain no metallic elements and shall be of a consistent thickness.
 - o. The cable shall contain at least one ripcord under the sheath for easy sheath removal.
7. Fan-Out Termination for Loose Tube Cables
- a. Individual fibers within the loose tube cable require handling protection inside the termination cabinets. Fan-out kits shall be installed in the patch panel enclosures to transition the loose tube fibers to ruggedized tight-buffered fiber pigtail cables. Fan-out tubes or furcation kits shall not be used. Optical fusion splices shall connect the loose tube fibers to the tight-buffered pigtail cables. The optical splice loss shall comply with the specifications for optical splices. Splice protection sleeves shall be employed on all splices to protect the splices. A wall-mountable splice center shall house the splices and serve to fully protect excess lengths of loose tube fibers from exposure.
 - b. The tight-buffered pigtails shall be terminated with ST connectors as specified.
8. Fan-out Pigtail Cable Specifications
- a. Singlemode fiber (Corning SMF-28) shall be used in the pigtails. Optical characteristics shall comply with the optical fiber performance specifications.

Buffer material	Thermoplastic
Buffer O.D.	900 um
Strength Member	Kevlar
Jacket Material	PVC
Jacket O.D.	3.0 mm
Temperature Range	-20 to +70 C

- 9. Fiber Optic Termination Patch Panels:
 - a. Where shown on the plans or in the Appendix, the fiber optic cable shall terminate inside a communications cabinet on a termination patch panel. All fiber sub-cables within the cable shall be terminated with "ST™ compatible" connectors. The patch panel shall have a 24-fiber capacity, and shall facilitate fiber-optic cable cross-connection between outside plant

- cables and opto-electronic interface equipment cabling. The patch panel shall contain "ST™" type bayonet couplings. All unused couplings shall have protective dust covers. Factory-terminated, tight-buffered, aramid-reinforced fiber optic jumper assemblies or interconnect cables, standard 3.0-mm O.D., shall connect the optical cable terminations to the patch panel couplings.
- b. The termination panel shall be equipped with a suitable means for routing and securing of cables and shall provide a suitable means of protection for the mounted fiber connectors, to prevent damage to fibers and connectors during all regular operation and maintenance functions. Bend diameters on cable fibers and jumpers must be greater than four (4) inches at all times to ensure optical and mechanical integrity of the optical fibers.
10. Optical Connectors
- a. All connectors shall be field-installable and perfectly matched to the cable used. The connectors shall provide tight fitting termination, to the cladding and buffer coating. Epoxy-based or "hot melt " adhesives shall be used to bond the fiber and buffer to the connector ferrule and body prior to polishing the end face. No dry-termination or "quick crimp" connectors are allowed.
 - b. After termination with connectors, the fiber ends must be visually inspected at a magnification of not less than 100 power to check for cracks or pits in the end face of the fiber. If any irregularities found cannot be removed by further polishing, the entire process must be redone by cutting off and disposing the connector body.
 - c. Connectors shall have a maximum allowable connection loss of 0.3 dB per mated pair, as measured per EIA-455-34. No index-matching gel is to be used, dry interfaces only. Singlemode connectors shall be capable of field installation on 9/125 micron fibers with 900 micron buffers (OD).
 - d. Each connector shall be of the industry standard ST type compatible, designed for singlemode tolerances, and shall meet or exceed the applicable provisions of EIA-455-5, 455-2A, and 455-34, and shall be capable of 100 repeated matings with a maximum loss increase of 0.1 dB. Connectors shall incorporate a key-way design and shall have a zirconia ceramic ferrule. Connector bodies and couplings shall be made of corrosion-resistant and oxidation-resistant materials, such as nickel plated zinc, designed to operate in humid environments without degradation of surface finishes.
11. Splice Closures:
- a. Splice closures shall be of the re-enterable type, with an external moisture-proof shell, inner closure and encapsulant.
 - b. Closure shall have removable interior splice trays.
 - c. Closures shall be Corning Cable Systems (Siecor) type SCN or equal.

EXECUTION

Fiber Optic Cable Installation

12. General:
- a. The Contractor shall determine a suitable cable installation method to ensure that all cable installation requirements shall be met in all conduit sections. All work shall be carried out in accordance and consistent with the highest standards of quality and craftsmanship in the communication industry with regard to the electrical and mechanical integrity of the connections; the finished appearance of the installation; as well as the accuracy and completeness of the documentation.
 - b. The Contractor shall make a physical survey of the project site for the purpose of establishing the exact cable routing and cutting lengths prior to the commencement of any work or committing any materials.
 - c. The cable shall be carefully inspected for jacket defects as it is removed from the reel. If defects are noticed, the pulling operation shall be terminated immediately and the the Owner notified.

- d. Precautions shall be taken during installation to prevent the cable from being kinked or crushed. Crushed or kinked cable shall be replaced with new cable. As the cable is pulled into the conduit system, it shall be sufficiently lubricated with a lubricant that shall be the water-based type and approved by the cable manufacturer. Lubricant shall be applied at a rate to provide a continuous 10-mil coating, as recommended by the manufacturer. Lubricant shall be Polywater F® manufactured by American Polywater, or approved equivalent.
- e. The mechanical stress placed upon the cable during installation shall not be such that the cable is twisted and stretched or exceeds manufacturer's specifications.
- f. The pulling of the cable shall be hand assisted at each handhole or pullbox. When pulling through intermediate pullboxes, the cable shall be placed on the ground near the pullbox and care taken to prevent damage by vehicles or other objects. The cable shall not be crushed, kinked or forced around a sharp corner. A minimum of 3 foot slack shall be left in each pullbox and enough left at each end of the cable to allow proper cable termination.
13. Fiber optic cables shall be installed in continuous lengths without intermediate splices throughout the project. Cable installation personnel shall be familiar with the manufacturer's recommended procedures including, but not limited to the following:
 - a. Proper attachment to the cable strength elements for pulling during installation. Depending on cable design, this will involve direct attachment to internal strength members or attaching an external "Kellums" or split mesh grip using a 600 lb breakaway swivel.
 - b. Cable tensile limitations and tension monitoring procedures.
 - c. Cable bending radius limitations.
 - d. Cable twisting limitations.
14. The Contractor shall comply with the cable manufacturer's recommended installation procedures at all times. Cable installation procedures shall conform to Belcore guidelines.
15. To accommodate long continuous installation lengths, bi-directional "center pull" techniques for pulling of the fiber optic cable is acceptable and shall be implemented as follows:
 - a. From the midpoint, pull the fiber optic cable into the conduit from the shipping reel in accordance with the manufacturer's specifications.
 - b. When this portion of the pull is complete, the remainder of the cable must be removed from the reel to make the inside end available for pulling in the opposite direction.
 - c. This is accomplished by hand pulling the cable from the reel and laying into large "figure eight" loops on the ground.
 - d. The purpose of the figure eight pattern is to avoid cable tangling and kinking.
 - e. The loops shall be laid carefully one upon the other (to prevent subsequent tangling) and shall be in a protected area.
 - f. The inside reel end of the cable is then available for installation.
 - g. In some cases, it may be necessary to set up a winch at an intermediate cable vault.
 - h. The required length of cable shall be pulled to that point, and brought out of the cable vault and coiled into a figure eight.
 - i. The figure eight is then turned over to gain access to the free cable end. This can then be reinserted into the duct system for installation into the next section.
16. At pullboxes, the Contractor shall provide 30 feet of cable slack. The fiber optic cable shall be coiled and secured with cable ties in the pullbox. The Contractor shall ensure that the minimum bending radius of the fiber optic cable is not compromised when preparing this stored cable slack.
17. The pulling eye/sheath termination hardware on the fiber optic cables shall not be pulled over any sheave blocks.
18. When power equipment is used to install fiber optic cabling, the pulling speed shall not exceed 30 meters per minute. The pulling tension, bending radius and twist limitation for fiber optic cable shall not be exceeded under any circumstances.
19. Large diameter wheels, pulling sheaves, and cable guides shall be used to maintain the appropriate bending radius. Tension monitoring shall be accomplished using commercial dynamometers or loadcell instruments.
 - a. All pulls shall be documented by a graph which is annotated with the following information:
 - 1) Reel number
 - 2) Station from and station to

- 3) Date and tune
- 4) Explanations of abnormalities in readings or interruptions
- 5) Sign-off by Contractor and the Owner
- b. Under no conditions shall the FOC be left exposed or unattended.
20. Repairs: Repair of cable jacket will not be permitted. Jacket damage will require removal and re-installation of a new cable run at the Contractor's expense.
21. Splicing:
 - a. Splicing of fiber optic cable shall not be permitted except in emergency conditions or as specified on the plans or in the special conditions for a specified project. Fiber optic cable runs and required looping of the cable shall be provided in one continuous length. When splicing is authorized by the the Owner, splicing shall be by trained, authorized persons only. Any allowed splicing of fiber optic cable shall be by fusion splice only, no mechanical splices are permitted.
 - b. All fusion splicing equipment shall be in good working order, properly calibrated, and meeting all industry standards and safety regulations. Cable preparation, closure installation and splicing shall be accomplished in accordance with accepted and approved industry standards.
 - c. Spices shall be made in pullboxes and shall use re-enterable splice closures.
 - d. The average splice loss shall be 0.1 dB or less per splice. The average splice loss is defined as the summation of the loss as measured in both directions using an optical time domain reflectometer (OTDR) through the fusion splice, divided by two. No individual splice loss measured in a single direction shall exceed 0.15 dB.
 - e. Upon completion of the splicing operation, all waste material shall be deposited in suitable containers, removed from the job site, arid disposed of in an environmentally acceptable manner.
22. After the cables are installed and spliced, they shall be racked and all conduits sealed. A minimum of 30 feet of FOC shall be stored at each end of one splice. Racking shall conform to the following:
 - a. Cables shall be loosely secured in racked position with Ty-Raps or equal.
 - b. Imprinted plastic coated cloth identification/warning tags shall be securely attached to the cables in at least two locations in each handhole. Tags shall be by Brady or Thomas & Betts.
 - c. All coiled cable shall be suitably protected to prevent damage to the cable and fibers. Racking shall include securing cables to brackets and racking hardware that extend from the sidewalls of the handhole.
 - d. When all cables at each handhole are securely racked, unused conduits and void areas around conduit containing cables shall be sealed.

Cable Protection During Installation

23. All fiber optic cable shall be pulled in conduit except as specified on the plans. Care shall be exercised during cable pulls through conduit bends and looping in pull boxes.
24. To reduce the possibility of damage to the outer jacket of the fiber optic cable, protective measures shall be used when the cable is installed. The requirements herein shall be followed, but does not limit the installation to only those identified. The purpose of the installation specifications is to ensure protection, of the fiber optic cable when it is installed. Other protective measures not specified herein may be taken during installation if it will ensure protection of the cable.
25. A cable feeder guide shall be used between the cable reel and the face of the duct and conduit to protect the cable and guide it off the reel and into the duct. The cable shall be carefully inspected for jacket defects as it is removed from the reel. If defects are noticed, the pulling operation shall be terminated immediately and the the Owner notified.
26. Precautions shall be taken during installation to prevent the cable from being kinked, crushed or twisted. A pulling eye shall be attached to the cable end and be used to pull the cable through the duct and conduit system. As the cable is pulled off the reel and into the cable feeder guide, it shall

- be sufficiently lubricated with a lubricant that shall be of the water based type and approved by the cable manufacturer.
27. Dynamometers or break away pulling swings shall be used to ensure the pulling line tension does not exceed the installation tension values specified by the cable manufacturer. The mechanical stress placed upon the cable during installation shall not be such that the cable is twisted and stretched. Maximum allowable cable strain during installation shall be less than 0.75%.
 28. The pulling of the cable shall be hand assisted at each handhole or pullbox. The cable shall not be crushed, kinked or forced around a sharp corner. Sufficient slack shall be left at each end of the cable to allow proper cable termination.
 29. The cable shall be looped in all pull boxes as noted on the plans to provide approximately thirty (30) feet of extra cable in the pull box. At termination points, such as at cabinets or computers, a thirty (30) foot loop shall also be provided wherever space permits.
 30. Cable Marking: At each pullbox and at each cabinet, the cable shall be visibly marked with yellow warning tape as follows:

"CAUTION - FIBER OPTIC CABLE"

Fiber Optic Cable Testing

31. General: The Contractor shall perform pre-installation and post-installation FOC tests. The the Owner shall be notified a minimum of 10 days in advance so that these tests are witnessed. All test equipment shall be traceable to NIST standards.
32. Test equipment: The Contractor, shall use the following to perform pre-installation and post-installation FOC tests:
 - a. Optical time domain reflectometer (OTDR). The OTDR shall be laser precision, ALT Inc. MODEL 5200 LRFL, or equal.
33. Pre-installation tests
 - a. The purpose of these tests is to perform acceptance tests on the cable prior to installation to verify that the cable conforms to the manufacturer's specifications, and is free of defects, breaks and damages by transportation and manufacturing processes.
 - b. Prior to removal of each cable from the delivery reel, all optical fibers within the cables shall be tested by the Contractor using an OTDR. The OTDR tests shall consist of end-to-end length and fiber attenuation (dB/km) measurements to ensure proper performance of the fiber optic cable. The tests shall be performed from both ends of each fiber to ensure complete fiber continuity within the cable structure.
 - c. Pre-installation, "on-reel" test results shall be compared with the manufacturer's test report delivered with the cable. Gross dissimilarities shall be noted and remedied between the Contractor and manufacturer. In all cases, all fibers must meet the optical attenuation specifications prior to cable installation.
 - d. The Contractor shall perform tests on all reels of cable. The the Owner shall be notified a minimum of 15 days prior to any test.
 - e. The Contractor shall document each test and submit the report to the the Owner for review. Documentation shall consist of both hard copy and 3-1/2 inch electronic disk complete with all application software.
 - f. Cable shall not be installed until the the Owner has reviewed the test report.
 - g. Maximum allowable attenuation is 0.5 dB/km at 1310 and 1550 nm.
34. Post-installation tests: After FOC has been installed the following tests shall be performed:
 - a. A recording OTDR shall be used to test for end-to-end continuity and attenuation of each optical fiber. The OTDR shall be equipped with a 1310 nm and 1550 nm light source for the single mode fiber (SMF). The OTDR shall have an X-Y plotter to provide a hard copy record of each trace of each fiber: The OTDR shall be equipped with sufficient internal masking to allow the entire cable section to be tested. This may be achieved by using an optical fiber pigtail of 30 feet or more to display the required cable section.
 - b. The OTDR shall be calibrated for the correct index of refraction to provide proper length measurement for the known length of reference fiber.

- c. A transmission test shall be performed with the use of a 1310 and 1550 nm stabilized light sources and 1310 nm/1550 nm power meters for SMF. This test shall be conducted in both directions on each fiber of each cable.
 - d. Hard and electronic copy of test documentation shall be submitted to the the Owner. The documentation shall include the trace plot, index, dB/km loss, cable length, date and time of test, wavelength, pulse width, the test site, cable ID, fiber number and type, and operator's initials. The Contractor shall compare the pre-installation test results to the post-installation results. If a deviation of greater than one dB occurs, the the Owner shall be notified in writing by the Contractor, and the cable shall be removed and replaced at no additional cost to the Owner.
 - e. Upon completion of the previous tests all FOC coils shall be secured with ends capped to prevent intrusion of dirt and water.
35. Required OTDR Trace Information:
- a. All traces shall display the entire length of cable under test, highlighting any localized loss discontinuities (installation-induced losses and/or connector losses). The trace shall display fiber length (in kilofeet), fiber loss (dB), and average fiber attenuation (in dB/km) as measured between two markers placed as near to the opposite ends of the fiber under test as is possible while still allowing an accurate reading. Care shall be taken to ensure that the markers are placed in the linear region of the trace: away from the front-end response and far-end Fresnel reflection spike. Time averaging shall be used to improve the display signal to noise ratio. The pulse width of the OTDR shall be set to a sufficient width to provide adequate injected power to measure the entire length the fiber under test.
 - b. If connectors exist in the cable under test, then two traces shall be recorded. One trace shall record the fiber loss (dB) and average attenuation (dB/km) of the entire cable segment under test, including connectors. The second trace shall display a magnified view of the connector regions, revealing the connector losses (dB). All connector losses shall be measured using the 5-point splice loss measurement technique.
 - c. The OTDR trace shall also include the following information:
 - 1) The date and time of the test
 - 2) The cable ID number
 - 3) The cable segment ID number
 - 4) The fiber color or sub-cable number
 - 5) Launch point connector number
 - 6) The optical wavelength used for the test
 - 7) The refractive index setting of the OTDR
 - 8) The pulse width setting of the OTDR
 - 9) The averaging interval of the test

END OF SECTION 27 13 23 13

Task	Specification	Specification Description
27 15 13 00	26 05 13 16	Medium-Voltage Cables
27 15 13 00	26 05 19 16a	Conductors And Cables
27 15 13 00	26 05 13 16a	Undercarpet Electrical Power Cables
27 15 13 00	26 05 23 00	Control-Voltage Electrical Power Cables
27 15 33 00	26 05 19 16a	Conductors And Cables
27 15 43 00	26 05 53 00a	Intercommunications and Program Systems
27 15 53 00	27 13 23 13	Loose-Tube Gel-Filled Fiber Optic Cables
27 16 16 00	27 13 23 13	Loose-Tube Gel-Filled Fiber Optic Cables
27 16 19 00	26 05 19 16a	Conductors And Cables
27 16 19 00	27 13 23 13	Loose-Tube Gel-Filled Fiber Optic Cables
27 21 16 00	27 13 23 13	Loose-Tube Gel-Filled Fiber Optic Cables
27 21 16 00	26 05 53 00a	Intercommunications and Program Systems
27 32 13 00	26 27 26 00	Wiring Devices
27 32 13 00	26 05 53 00a	Intercommunications and Program Systems
27 32 26 00	26 05 53 00a	Intercommunications and Program Systems

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SECTION 27 51 43 00 - EDUCATIONAL INTERCOMMUNICATIONS AND PROGRAM SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for educational intercommunications and program systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes: Manually switched intercommunications, Microprocessor-switched intercommunications, Microprocessor-switched telephone/intercommunications and program systems with the following components:
 - a. Master stations.
 - b. Call control console.
 - c. Speaker-microphone stations.
 - d. Call-switch unit.
 - e. All-call amplifier.
 - f. Intercommunication amplifier.
 - g. Paging amplifier.
 - h. Loudspeakers/speaker microphones.
 - i. Conductors and cables.
 - j. Raceways.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For educational intercommunications and program systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
 - 1) Identify terminals to facilitate installation, operation, and maintenance.
 - 2) Single-line diagram showing interconnection of components.
 - 3) Cabling diagram showing cable routing.
3. Field quality-control reports.
4. Operation and maintenance data.

D. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for location and application.
3. Comply with NFPA 70.

1.2 PRODUCTS

A. Functional Description Of Manually Switched Systems

1. Master Station:
 - a. Communicating selectively with other master and speaker-microphone stations by actuating selector switches.
 - b. Communicating simultaneously with all other stations by actuating a single all-call switch.
 - c. Communicating with individual stations in privacy.
 - d. Including other master-station connections in a multiple-station conference call.

- e. Accessing separate paging speakers or groups of paging speakers by actuating selector switches.
 - f. Overriding any conversation by a designated master station.
 2. Speaker-Microphone Station:
 - a. Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
 - b. Communicating hands free.
 - c. Calling master station by actuating call switch.
 - d. Returning a busy signal to indicate that station is already in use.
 - e. Being free of noise and distortion during operation and when in standby mode.
 3. Speakers: Free of noise and distortion during operation and when in standby mode.
- B. Functional Description Of Microprocessor-Switched Systems
1. Master Station:
 - a. Communicating selectively with other master and speaker-microphone stations by dialing station's number on a 12-digit keypad.
 - b. Communicating with individual stations in privacy.
 - c. Communicating on a minimum of three voice channels with up to two simultaneous conversations between master stations and one conversation between a master station and a speaker-microphone station.
 - d. Increasing the number of conversation channels by adding a module in central-control cabinet.
 - e. Including up to three other station connections in a conference call.
 - f. Accessing separate paging speakers or groups of paging speakers by dialing designated numbers on a 12-digit keypad.
 - g. Overriding any conversation by a designated master station.
 - h. Displaying selected station.
 - i. Communicating simultaneously with all other stations by dialing a designated number on a 12-digit keypad.
 - j. Automatically controlling gain to ensure constant intercom speech level.
 - k. Controlling the simultaneous distribution of program material to various combinations of speaker-microphone stations or groups over two program channels by using keypad to control sources and distribute programs.
 - l. Operating and correcting secondary clocks and controlling class-change signals to speakers and bells by using keypad.
 - m. User-programmable features include the following:
 - 1) Station calling by room number.
 - 2) Room station call-in priority levels.
 - 3) Clock signal schedule functions.
 - 4) Schedule characteristics of audible signals.
 - 5) Call-in tone characteristic.
 - 6) Precedence among master stations as destinations for incoming calls from room stations.
 - 7) Grouping of rooms and speakers into zones for paging and program distribution purposes.
 2. Speaker-Microphone Station:
 - a. Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
 - b. Communicating hands free.
 - c. Calling master station by actuating call switch.
 - d. Returning a busy signal to indicate that station is already in use.
 3. Speakers: Free of noise and distortion during operation and when in standby mode.

C. Functional Description Of Telephone/Intercommunication Systems

1. Integrated central system with the following:
 - a. Direct-dial, full duplex private telephone communications between all locations equipped with telephones. Call initiation among master stations and between master and remote stations by dialing station's number on a 12-digit keypad.
 - b. 16 channels for unrestricted simultaneous communications.
 - c. Initial system operation with **Number** as directed by the Owner master and remote stations, expandable to 360 stations.
 - d. Direct-dial, two-way amplified voice intercommunication between master telephones and remote stations without use of press-to-talk or talk-listen switches.
 - e. Automatic queuing for intercommunication channels, with automatic call waiting.
 - f. Call transfer among master stations.
 - g. Display of selected station and answering calling station by pressing a single "response button."
 - h. Simultaneous communication with other stations on system by dialing a designated number on a 12-digit keypad.
 - i. Automatic gain control to ensure constant intercom speech level.
 - j. Simultaneous distribution of emergency announcements to all locations equipped with speakers by dialing a predetermined code number.
 - k. User-selectable facility for providing selected telephones with dial tone.
 - l. User-selectable facility for permitting linkage of selected stations to media retrieval center and for permitting on- and off-premise computer linkage.
 - m. Assignment of speaker locations within any one or more of eight zones for zone paging or time signal reception.
 - n. Digital readout displays on which up to three incoming calls are displayed with additional calls stored for subsequent display.
 - o. Off-site diagnostics through a serial data port on central-control station.
 - p. Control of simultaneous distribution of program material to various combinations of remote stations or groups by using keypad to control sources and distribute programs.
 - q. Operation and correction of secondary clocks and control of class-change signals to speakers and bells by using keypad.
 - r. User-programmable features include the following:
 - 1) Station calling by room number.
 - 2) Room station call-in priority levels.
 - 3) Clock signal schedule functions.
 - 4) Schedule characteristics of audible signals.
 - 5) Call-in tone characteristic.
 - 6) Precedence among master stations as destinations for incoming calls from room stations.
 - 7) Grouping rooms and speakers into zones for paging and program distribution purposes.
 - s. Telephone interconnect features include the following:
 - 1) Direct connection to central office trunk lines with initial system wiring for a **Number** as directed by the Owner of trunk lines.
 - 2) Routing of outside trunk lines for "attendant answer incoming" and "direct inward line" functions.
 - 3) Station programming for access to outside trunk lines to be any of the following:
 - a) Totally unrestricted access.
 - b) Restricted access.
 - c) No access.
 - 4) System programming to allow or disallow local prefixes, and to authorize access for as many as three area codes.
 - 5) Discriminating ringing for identifying internal and outside calls.
 - 6) Circular hunting for outside trunks to prevent excess usage of any one trunk.
 - 7) Direct connection of a single trunk to designated telephone with transfer to attendant if unanswered.

- 8) Call parking allowing paged party to remotely pick up outside call from any master station.
 - 9) Night-answer mode to allow one or all of the following:
 - a) Incoming call transferred to predetermined extension.
 - b) Tone transmitted to speakers to notify key personnel to answer telephone.
 - c) Dial tone to remote stations to allow answering call from all locations.
 - 10) Call control console to do as follows:
 - a) Identify, answer, and route incoming outside calls, with reminder and recall features.
 - b) Directly access outside trunk lines.
 - c) Hold, park, and transfer calls.
 - d) Screen outside calls.
2. Remote Stations:
- a. Speaker-Microphone Station:
 - 1) Having privacy from remote monitoring without a warning tone signal at monitored station. Designated speaker-microphone stations have a privacy switch to prevent another station from listening and to permit incoming calls.
 - 2) Communicating hands free.
 - 3) Calling master station by actuating call switch.
 - 4) Returning a busy signal to indicate that station is already in use.
 3. Speakers: Free of noise and distortion during operation and when in standby mode.
- D. General Requirements For Equipment And Materials
1. Coordinate features and select components to form an integrated system. Match components and interconnections for optimum performance of specified functions.
 2. Expansion Capability: Increase number of stations in the future by 25 percent above those indicated without adding any internal or external components or main trunk cable conductors.
 3. Equipment: Modular type using solid-state components, fully rated for continuous duty unless otherwise indicated. Select equipment for normal operation on input power usually supplied at 110 to 130 V, 60 Hz. Comply with UL 813.
 4. Weather-Resistant Equipment: Listed and labeled by an NRTL for duty outdoors or in damp locations.
- E. Master Station For Manually Switched Systems
1. Station-Selector and Talk-Listen Switches: Heavy-duty type with gold-plated contacts rated for five million operations.
 2. Volume Control: Regulates incoming-call volume.
 3. LED Annunciation: Identifies calling stations and stations in use. LED remains on until call is answered.
 4. Tone Annunciation: Momentary audible tone signal announces incoming calls.
 5. Speaker Microphone: Transmits and receives calls.
 - a. Minimum Speaker Sensitivity: 91 dB at one meter, with 1-W input.
 6. Handset with Hook Switch: Telephone type with **18-inch- (450-mm-)** long, permanently coiled cord. Arrange to disconnect speaker when handset is lifted.
 7. Central-Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and auxiliary equipment.
- F. Master Station For Microprocessor-Switched Systems
1. 12-Digit Keypad Selector: Transmits calls to other stations and initiates commands for programming and operation.
 2. Volume Control: Regulates incoming-call volume.
 3. Tone Annunciation: Momentary audible tone signal announces incoming calls.
 4. Lamp Annunciation: Identifies calling stations and stations in use. Lamp remains on until call is answered.

5. Speaker Microphone: Transmits intercom voice signals when used via a voice-operated switch.
 - a. Minimum Speaker Sensitivity: 91 dB at one meter, with 1-W input.
 6. Link Button: To transfer calls.
 7. Reset Control: Cancels call and resets system for next call.
 8. Digital Display: 16-digit alphanumeric LCD readout to register up to four three-digit station numbers.
 9. Central-Equipment Cabinet: Comply with TIA/EIA-310-D. Lockable, ventilated metal cabinet houses terminal strips, power supplies, amplifiers, system volume control, and other switching and control devices required for conversation channels and control functions.
- G. Call Control Console
1. Microprocessor-based instrument to process outside and internal calls with a 12-digit keypad selector.
 2. 20-character alphanumeric display for the following:
 - a. Simultaneous display of up to three calling stations plus last station dialed.
 - b. Display of calls in order received with emergency calls taking precedence on the display.
 - c. Review of calls stored in groups of four.
 - d. Display of prompt messages to assist in system operation.
 3. Programmable Keys: Minimum of 20 with LED indicators for ringing/busy status; programmable for trunk and operator functions.
 4. Transfer Button: Calls to busy extensions and unanswered calls automatically returned to call control console.
 5. Hold Button: With reminder feature every 30 seconds for parked calls or calls placed on hold.
 6. Release Button: For use with parked calls or calls placed on hold.
 7. Page Button: For engaging system paging functions.
 8. Programmable for night answer, remote answer, and remote pickup features.
 9. Programmable for distribution of emergency announcements, all-page announcements, zone-page announcements, and emergency/evacuation alert.
 10. Central-Control Cabinet Equipment: Central switching equipment, central office adapter module, line link modules, power supplies, chassis adapters, and other switching and control devices required for trunk and internal conversation channels and control functions.
- H. Speaker-Microphone Stations
1. Mounting: Flush unless otherwise indicated, and suitable for mounting conditions indicated.
 2. Faceplate: Stainless steel or anodized aluminum with tamperproof mounting screws.
 3. Back Box: Two-gang galvanized steel with **2-1/2-inch (64-mm)** minimum depth.
 4. Speaker: Minimum axial sensitivity shall be 91 dB at one meter, with 1-W input. Voice coil shall be not less than **3 inches (76 mm)**, **2.3 oz. (65 g)** minimum; permanent magnet.
 5. Tone Annunciation: Recurring momentary tone indicates incoming calls.
 6. Call Switch: Mount on faceplate. Permits calls to master station.
 7. Privacy Switch: Mount on faceplate. When in on position, switch prevents transmission of sound from remote station to system; when in off position, without further switch manipulation, response can be made to incoming calls.
- I. Call-Switch Unit
1. Enclosure: Single-gang box with stainless-steel faceplate.
 2. Call Switch: Momentary contact signals system that a call has been placed.
 3. Privacy Switch: Prevents transmission of sound signals from station to system.
 4. Volume Control: Operated by screwdriver blade through a hole in faceplate to adjust output level of associated speaker.
- J. All-Call Amplifier
1. Output Power: 70-V balanced line. 80 percent of the sum of wattage settings of connected for each station and speaker connected in all-call mode of operation, plus an allowance for future stations.

2. Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to quantity of stations connected in all-call mode of operation.
 3. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.
 4. Frequency Response: Within plus or minus 2 dB from 50 to 12,000 Hz.
 5. Output Regulation: Maintains output level within 2 dB from full to no load.
 6. Input Sensitivity: Compatible with master stations and central equipment so amplifier delivers full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on master stations, speaker microphones, or handset transmitters.
 7. Amplifier Protection: Prevents damage from shorted or open output.
- K. Intercommunication Amplifier
1. Minimum Output Power: 15 W; adequate for all functions.
 2. Total Harmonic Distortion: Less than 5 percent at rated output power with load equivalent to one station connected to output terminals.
 3. Minimum Signal-to-Noise Ratio: 50 dB, at rated output.
 4. Frequency Response: Within plus or minus 3 dB from 70 to 10,000 Hz.
 5. Output Regulation: Maintains output level within 2 dB from full to no load.
 6. Input Sensitivity: Matched to input circuit and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on microphones in master stations, speaker microphones, or handset transmitters.
 7. Amplifier Protection: Prevents damage from shorted or open output.
- L. Paging Amplifier
1. Input Voltage: 120-V ac, 60 Hz.
 2. Frequency Response: Within plus or minus 3 dB from 60 to 10,000 Hz.
 3. Minimum Signal-to-Noise Ratio: 60 dB, at rated output.
 4. Total Harmonic Distortion: Less than 3 percent at rated output power from 70 to 12,000 Hz.
 5. Output Regulation: Less than 2 dB from full to no load.
 6. Controls: On-off, input levels, and low-cut filter.
 7. Input Sensitivity: Matched to input circuit and to provide full-rated output with sound-pressure level of less than 10 dynes/sq. cm impinging on speaker microphones or handset transmitters.
 8. Amplifier Protection: Prevents damage from shorted or open output.
- M. Cone-Type Loudspeakers/Speaker Microphones
1. Minimum Axial Sensitivity: 91 dB at one meter, with 1-W input.
 2. Frequency Response: Within plus or minus 3 dB from 70 to 15,000 Hz.
 3. Minimum Dispersion Angle: 100 degrees.
 4. Line Transformer: Maximum insertion loss of 0.5 dB, power rating equal to speaker's, and at least four level taps.
 5. Enclosures: Steel housings or back boxes, acoustically dampened, with front face of at least **0.0478-inch (1.2-mm)** steel and whole assembly rust proofed and factory primed; complete with mounting assembly and suitable for surface ceiling, flush ceiling, pendant or wall mounting; with relief of back pressure.
 6. Baffle: For flush speakers, minimum thickness of **0.032-inch (0.8-mm)** aluminum brushed to a satin sheen and lacquered **OR** with textured white finish, **as directed**.
 7. Vandal-Proof, High-Strength Baffle: For flush **OR** surface, **as directed**,-mounted speakers, self-aging cast aluminum with tensile strength of **44,000 psi (303 MN/sq. m)**, **0.025-inch (0.65-mm)** minimum thickness; countersunk heat-treated alloy mounting screws; and textured white epoxy finish.
 8. Size: **8 inches (200 mm)** with **1-inch (25-mm)** voice coil and minimum **5-oz. (140-g)** ceramic magnet.
- N. Horn-Type Loudspeakers/Speaker Microphones
1. Speakers shall be all-metal, weatherproof construction; complete with universal mounting brackets.

2. Frequency Response: Within plus or minus 3 dB from 275 to 14,000 Hz.
3. Minimum Power Rating of Driver: 15 W, continuous.
4. Minimum Dispersion Angle: 110 degrees.
5. Line Transformer: Maximum insertion loss of 0.5 dB, power rating equal to speaker's, and at least four level taps.

O. Conductors And Cables

1. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but no smaller than No. 22 AWG.
2. Insulation: Thermoplastic, not less than **1/32 inch (0.8 mm)** thick.
3. Shielding: For speaker-microphone leads and elsewhere where recommended by manufacturer; No. 34 AWG, tinned, soft-copper strands formed into a braid or equivalent foil.
 - a. Minimum Shielding Coverage on Conductors: 60 percent.
4. Plenum Cable: Listed and labeled for plenum installation.

P. Raceways

1. Educational Intercommunication and Program System Raceways and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems".
2. Educational Intercommunication and Program System Raceways and Boxes: Same as required for electrical branch circuits specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
3. Educational Intercommunication and Program System Raceways and Boxes: EMT **OR** ENT **OR** RNC **OR** Optical-fiber/communication raceways and fittings **OR** Metal wireways **OR** Nonmetal wireways **OR** Surface metal raceways **OR** Surface nonmetal raceways, **as directed**.
4. Outlet boxes shall be not less than **2 inches (50 mm)** wide, **3 inches (75 mm)** high, and **2-1/2 inches (64 mm)** deep.
5. Flexible metal conduit is prohibited.

1.3 EXECUTION

A. Wiring Methods

1. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters, and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used, **as directed**. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway And Boxes For Electrical Systems".
2. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
3. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.

B. Installation Of Raceways

1. Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems" for installation of conduits and wireways.
2. Install manufactured conduit sweeps and long-radius elbows whenever possible.

C. Installation Of Cables

1. Comply with NECA 1.
2. General Requirements:
 - a. Terminate conductors; no cable shall contain unterminated elements. Make terminations only at outlets and terminals.

- b. Splices, Taps, and Terminations: Arrange on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Cables may not be spliced.
 - c. Secure and support cables at intervals not exceeding **30 inches (760 mm)** and not more than **6 inches (150 mm)** from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
 - d. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.
 - e. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
 - f. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used.
3. Open-Cable Installation:
 - a. Install cabling with horizontal and vertical cable guides in telecommunication spaces with terminating hardware and interconnection equipment.
 - b. Suspend speaker cable not in a wireway or pathway a minimum of **8 inches (200 mm)** above ceiling by cable supports not more than **60 inches (1524 mm)** apart.
 - c. Cable shall not be run through structural members or be in contact with pipes, ducts, or other potentially damaging items.
 4. Separation of Wires: Separate speaker-microphone, line-level, speaker-level, and power wiring runs. Install in separate raceways or, where exposed or in same enclosure, separate conductors at least **12 inches (300 mm)** apart for speaker microphones and adjacent parallel power and telephone wiring. Separate other intercommunication equipment conductors as recommended by equipment manufacturer.
- D. Installation
1. Match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
 2. Identification of Conductors and Cables: Color-code conductors and apply wire and cable marking tape to designate wires and cables so they identify media in coordination with system wiring diagrams.
 3. Weatherproof Equipment: For units that are mounted outdoors, in damp locations, or where exposed to weather, install consistent with requirements of weatherproof rating.
 4. Connect wiring according to Division 26 Section "Grounding And Bonding For Electrical Systems".
- E. Grounding
1. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
 2. Signal Ground Terminal: Locate at main equipment cabinet. Isolate from power system and equipment grounding.
 3. Install grounding electrodes as specified in Division 26 Section "Grounding And Bonding For Electrical Systems".
- F. System Programming
1. Programming: Fully brief the Owner on available programming options. Record the Owner's decisions and set up initial system program. Prepare a written record of decisions, implementation methodology, and final results.
- G. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

2. Tests and Inspections:
 - a. Schedule tests with at least seven days' advance notice of test performance.
 - b. After installing educational intercommunications and program systems and after electrical circuitry has been energized, test for compliance with requirements.
 - c. Operational Test: Test originating station-to-station **OR** originating station-to-station, all-call, and page, **as directed**, messages at each intercommunication station. Verify proper routing and volume levels and that system is free of noise and distortion. Test each available message path from each station on system.
 - d. Frequency Response Test: Determine frequency response of two transmission paths, including all-call and paging, **as directed**, by transmitting and recording audio tones. Minimum acceptable performance is within 3 dB from 150 to 2500 Hz.
 - e. Signal-to-Noise Ratio Test: Measure signal-to-noise ratio of complete system at normal gain settings as follows:
 - 1) Disconnect speaker microphone and replace it in the circuit with a signal generator using a 1000-Hz signal. Measure signal-to-noise ratio at paging, **as directed**, speakers.
 - 2) Repeat test for three speaker microphones, one master station microphone, and for each separately controlled zone of paging loudspeakers.
 - 3) Minimum acceptable ratio is 45 dB.
 - f. Distortion Test: Measure distortion at normal gain settings and rated power. Feed signals at frequencies of 150, 200, 400, 1000, and 2500 Hz into each intercom **OR** intercom, paging, and all-call amplifier, **as directed**. For each frequency, measure distortion in the paging and all-call amplifier outputs. Maximum acceptable distortion at any frequency is 5 percent total harmonics.
 - g. Acoustic Coverage Test: Feed pink noise into system using octaves centered at 500 and 4000 Hz. Use sound-level meter with octave-band filters to measure level at five locations in each paging zone. Maximum permissible variation in level is plus or minus 3 dB; in levels between adjacent zones, plus or minus 5 dB.
 - h. Power Output Test: Measure electrical power output of each paging amplifier at normal gain settings of 150, 1000, and 2500 Hz. Maximum variation in power output at these frequencies is plus or minus 3 dB.
 - i. Signal Ground Test: Measure and report ground resistance at system signal ground. Comply with testing requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".
3. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified. Prepare a list of final tap settings of paging and independent room speaker-line matching transformers.
4. Educational intercommunications and program systems will be considered defective if they do not pass tests and inspections.
5. Prepare test and inspection reports.

END OF SECTION 27 51 43 00

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Task	Specification	Specification Description
27 51 43 00	26 33 43 00a	Public Address and Mass Notification Systems

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SECTION 27 53 13 13 - CLOCK AND PROGRAM CONTROL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for clock and program control. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
2. Master clock and program control unit.
3. Secondary indicating clocks.
4. Program signal devices.
5. Clock circuit power boosters.
6. Interface with intercom and public-address system.
7. System wire and cable.

C. Definitions

1. NIST: The National Institute of Science and Technology.
2. PC: Personal computer.
3. UTC: Universal time coordinated. The precisely measured time at zero degrees longitude; a worldwide standard for time synchronization.

D. Performance Requirements

1. Seismic Performance: Master clock and housing shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
2. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes (including available colors) for each product indicated and describe features and operating sequences, both automatic and manual.
2. Shop Drawings: For clock systems. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring and correction circuits.
 - 1) Identify terminals and wiring color codes to facilitate installation, operation, and maintenance.
 - 2) Indicate recommended wire types and sizes, and circuiting arrangements for field-installed system wiring. Show protection from overcurrent, static discharge, and voltage surge.
 - b. Details of seismic restraints including mounting, anchoring, and fastening devices for the following system components:
 - 1) Surface-mounted and semirecessed secondary indicating clocks.
 - 2) Master clock enclosures **OR** mounting racks, **as directed**.
 - 3) Clock circuit power boosters.
 - c. Details of seismic strengthening of master clock enclosures **OR** mounting racks, **as directed**.

- d. Dimensioned Outline Drawings of the Mounting Rack for the Master Clock: Show internal seismic bracing, and locate center of gravity of fully equipped and assembled unit. Locate and describe mounting and anchorage provisions.
3. Delegated-Design Submittal: For the master clock and housing indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Detail fabrication and assembly of the master clock and housing.
 - b. Design Calculations: Calculate requirements for selecting seismic restraints.
4. Seismic Qualification Certificates: For the master clock, accessories, and components, from manufacturer.
5. Field quality-control reports.
6. Operation and maintenance data.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Comply with NFPA 70.

1.2 PRODUCTS

A. Master And Secondary Clock System

1. System Functions and Features:
 - a. Supply power to remote indicating clocks except those indicated to have correction signals applied through a data circuit.
 - b. Maintain correct synchronized time and transmit time-correction signals over dedicated system wiring from a master clock to any one **OR** two, **as directed**, type(s) of secondary indicating clocks, including the following:
 - 1) Analog Synchronous Clocks: Correct for minute- and second-hand synchronization at least once each hour and for hour-hand synchronization at least once each day.
 - 2) Digital Clocks: Test clocks automatically for synchronization with master time control at least once every hour and automatically correct those not synchronized with the time reference unit. Automatically correct clocks immediately when power is restored after an outage of power to the master clock.
 - c. Initiate and execute programs for scheduled automatic operation of remote devices. Include audible signal devices and visual signal devices, **as directed**, and on and off switching of equipment and circuits, **as directed**.
 - d. Provide for manual control of programmed signal and equipment-switching circuits.
 - e. Communicate with remote PC for access to UTC time base and to permit programming from remote location, **as directed**.
 - f. Maintain system access security with a minimum of one level **OR** two levels **OR** three levels, **as directed**, of user-access control to restrict use of system controls to authorized personnel. Levels of access apply to both local access and access from a remote computer, **as directed**. Access to user programming and control functions is accomplished by entering a minimum three-digit code. Access levels include the following:
 - 1) Access to review existing programs only.
 - 2) Access to normal system operating controls.
 - 3) Access to all user-programming and control functions.
 - g. Regulate system timing functions using power-line frequency, backed up for power outages by an internal battery-powered, crystal-controlled oscillator.
OR
Regulate system timing functions using power-line frequency, backed up for power outages by an internal battery-powered, crystal-controlled oscillator, and automated periodic reference to NIST or UTC time signals via internal telephone modem and automatic dialup connection **OR** internal modem and network or microcomputer Internet

access **OR** dedicated internal radio receiver tuned to NIST time signal broadcasts, **as directed**. Reference time signals shall be automatically accessed at programmable intervals.

- h. Provide for programming multiple independent event schedules into memory and running them simultaneously for different output circuits.
 - 1) Quantity of Programmable Schedules: Three **OR** Four **OR** Eight **OR** 18 **OR** 250, **as directed**, minimum.
 - 2) Number of Weekly Events That Can Be Programmed for Each Schedule: 64 **OR** 128 **OR** 300 **OR** 600 **OR** 2500, **as directed**, minimum.
 - 3) Simultaneous operation of independent schedules shall be limited only by the number of signal-device and equipment-switching output circuits.
 - 4) Advance Programming for Automatic Holiday Schedule Changes: Number of schedule changes that can be programmed to suit holidays and vacations shall be 10 **OR** 16 **OR** 50 **OR** 100, **as directed**, and each change may be programmed up to a year in advance to occur on any day of the calendar year.
- i. Automatically check functioning of LEDs, switches, input keys, central processor, read-only memory, random access memory, and output circuits. A display on the control panel or a remote computer with the proper access code, **as directed**, shall indicate failure by identifying faulty component or circuit and shall recommend corrective action.
- j. Provide manually initiated **OR** programming for automatic, **as directed**, daylight savings time correction.
- k. Provide for adjustments to master clock output signals. Duration of momentary signal shall be individually programmable for each signal and equipment-control output circuit from 1 to 99 seconds. Signals shall be programmable for either on or off switching to suit equipment-operation scheduling.

B. Master Clock

- 1. Description: Microprocessor-based, software-controlled unit complying with Class A device requirements in 47 CFR 15.
 - a. Programming and control switches.
 - b. Informational Display: LED or backlit LCD type.
 - 1) Normally shows current time, date, and day of week, **as directed**, display.
 - 2) Provides programming cues when system is being programmed.
 - c. Output Circuits for Power and Correction of Secondary Indicating Clocks:
 - 1) Wired Synchronous Clock Power-and-Correction Circuits: For analog and digital, **as directed**, clocks; a minimum of one **OR** two, **as directed**, required. Relay controlled.
OR
Wired Synchronous Digital Clock Power-and-Correction Circuits: One, **as directed**, required.
 - 2) Existing Clock Power-and-Correction Circuit: An output circuit suitable for the of existing power-and-correction circuit and number of clocks to be connected.
 - d. Data Output Port for Digital, **as directed**, Secondary Clock Correction Circuit: RS485 or similar circuit for scheduled periodic correction signals.
 - e. Modem and PC interface software suitable for remote programming and automatic NIST or UTC synchronization, **as directed**.
 - f. Circuits for Audible and Visual, **as directed**, Signal Devices: Relay controlled, manually switchable, using controls on the master clock. Rated 120-V ac, five **OR** 10, **as directed**, A minimum. A minimum of two **OR** four **OR** six **OR** eight, **as directed**, circuits.
 - g. Circuits for Programmable Switching of Remote Equipment and Circuits: Relay controlled, manually switchable, using controls on the master clock. Rated 120-V ac, 5 **OR** 10, **as directed**, A minimum. A minimum of two **OR** four **OR** six **OR** eight, **as directed**, circuits.
 - h. Power Supplies: Capacity for internal loads and power-and correction circuits of connected clocks.

- i. Enclosure: Metal cabinet with locking front panel. When cabinet is locked, display indication shall be visible on or through front panel face. Arrange cabinet for surface, semirecessed, or flush mounting as indicated.
OR
Housing: Rack-mounting metal enclosure with display indication visible on front panel face.
 - 1) Reinforce mounting and attachment capable of resisting seismic forces described in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
- j. Battery Backup for Time Base: Lithium battery to maintain the timekeeping function and retain the programs in memory during outage of normal ac power supply for up to 10 years.
- k. Electrostatic Discharge Resistance: Master clock and secondary indicating clocks, **as directed**, shall be tested and certified according to IEC 61000-4-2 in both human-discharge and direct-injection modes.

C. Secondary Indicating Clocks

- 1. Analog Clock: Equipped with a sweep second hand. Movement shall be driven by self-starting, permanently lubricated, sealed synchronous motor equipped with a correcting solenoid actuator, or be a microprocessor-based, second impulse unit, compatible with the master clock.
- 2. Digital Clock: Microprocessor-controlled unit complying with Class A device requirements in 47 CFR 15, with red LED digital time display of hours and minutes **OR**, minutes, and seconds, **as directed**.
 - a. Display Height: 2-1/2-Inch (64-mm) Clock: Hour and minute numerals readable at 50 feet (15 m).
OR
Display Height: 4-Inch (102-mm) Clock: Hour and minute numerals readable at 100 feet (30 m).
 - b. Display Format: Selectable between 12-hour with "PM" LED display and 24-hour formats.
 - c. Connections for Power and Correction:
 - 1) Wired synchronous connection to the master clock for both operating power and correction.
 - a) Time-Base Backup: Internal alkaline battery shall back up internal time base to maintain timekeeping during power outages of up to six days' duration.
OR
Time-Base Backup: Internal capacitor shall back up internal time base to maintain timekeeping during power outages of up to 12 hours' duration.
 - b) Correction by RS485, Ethernet, or similar data line with operating power supplied over a separate connection.
 - c) Power Connection for Secondary Indicating Clocks: Plug connector **OR** Wire pigtail or compression splice, **as directed**.
- 3. Interval-Timer Clock: Digital microprocessor-controlled, 4-inch (102-mm) unit with 2-1/2-inch (64-mm), red LED digital display for hours and minutes and 1-5/16-inch (33-mm) display for seconds; a separately mounted, mode-control switch; and the following features:
 - a. Display Visibility: Hour and minute numerals readable at 30 feet (10 m) in normal ambient light.
 - b. Operating Modes:
 - 1) Normal: Clock operates as a regular secondary system clock, displaying corrected time in normal display configuration, selectable between 12- and 24-hour formats, with "PM" digital display for 12-hour format.
 - 2) Count-Down or Count-Up Timer: Selected by mode-control switch count-up and count-down positions, and capable of being preset at the mode-control station.
 - 3) Code Blue: Automatically selected by a signal through a wiring connection from the code-blue system. This signal captures control of the clock regardless of current mode or correction status and instantly initiates count-up operation, starting at time 00:00:00. While in this mode, other clock functions, including correction, shall run in

- the background. Clock shall revert to normal operating mode when the initiating-signal system is reset.
- c. Mode-Selector Switch: Push-button or rotary, multiposition type, flush mounted; with start, stop, and reset capability in both count-up and count-down modes.
 - d. Audible tone signal: Housed in clock or mode-selector-switch box. Sounds at end of preset up or down count.
4. Provision for Modular Panel Installation: Equip designated clock for panel mounting. Mount flush or semirecessed with arrangement and trim as indicated. Coordinate wiring with other modular panel components, including room lighting switches **OR** intercom devices **OR** convenience outlets **OR** data outlets **OR** speaker **OR** other similar devices, **as directed**.
 5. Provision for Time-Tone-Unit Installation: Equip indicated clocks for housing or mounting in an acoustically treated and baffled speaker compartment specified in Division 27 Section "Public Address And Mass Notification Systems".
- D. Secondary Indicating Clock Characteristics:
- a. Clock Type: Analog **OR** Digital, **as directed**.
 - b. Face Configuration: Single **OR** Double, **as directed**.
 - c. Mounting: Recessed **OR** Semirecessed **OR** Pendant **OR** Surface **OR** Suspended **OR** Within time-tone unit **OR** Within modular panel, **as directed**.
 - d. Nominal Dimensions: as directed by the Owner.
 - e. Casing Finish: Types and colors, as directed by the Owner.
 - f. Special Environmental Conditions: Describe conditions such as corrosive, damp, or wet locations, as directed by the Owner.
 - g. For analog clocks.
 - 1) Dial Face Color: as directed by the Owner.
 - 2) Analog Clock Crystal: Clear glass **OR** acrylic **OR** polycarbonate, **as directed**.
 - h. For digital clocks.
 - 1) Face Color: as directed by the Owner.
 - 2) Display Height: as directed by the Owner.
 - 3) Seconds Display: Yes **OR** No, **as directed**.
 - 4) Digital Clock Lens: Antiglare acrylic material.
 - 5) Battery Backup: Yes **OR** No, **as directed**.
 - 6) Interval-Timer Display: Yes **OR** No, **as directed**.
- E. Program Signal Devices
1. Bells: Heavy-duty, modular, vibrating type with the following sound-output ratings measured at 10 feet (3 m):
 - a. 4-Inch (100-mm) Bell: 90 dB.
 - b. 6-Inch (150-mm) Bell: 95 dB.
 - c. 10-Inch (250-mm) Bell: 104 dB.
 2. Chimes: Heavy-duty, modular, vibrating chimes with polished-chrome tone bar and enamel-finished housing. Minimum sound-output rating measured at 10 feet (3 m) shall be 75 dB.
 3. Clock Buzzers: Adjustable output signal device designed for mounting within clock housing or outlet box.
 - a. Sound-Output Rating Measured at 3 Feet (1 m): 75 dB.
 - b. Audible Tone Frequency: Manufacturer's standard between 120 Hz and 2 kHz.
 4. Horns: Modular, adjustable-output, vibrating type with minimum full-intensity-rated sound output of 103 dB measured at 10 feet (3 m).
 5. Projector Horns: Adjustable-output, vibrating type with single **OR** double, **as directed**, projector arranged to channel sound in the direction of the projector axis, and with minimum full-intensity-rated sound output of 104 dB measured at 10 feet (3 m).
 6. Loudspeakers for Audible Tones: See Division 27 Section "Public Address And Mass Notification Systems".
 7. Visible Signal Devices: Strobe lights with blue **OR** yellow, **as directed**, polycarbonate lens and xenon flash tube, with lens mounted on an aluminum faceplate and the word "Program" engraved

in letters at least 1 inch (25 mm) high on lens. Lamp unit shall have a minimum rated light output of 75 candela.

8. Combination Audible and Visible Signal Devices: Factory-integrated horn and strobe light in a single mounting assembly.
 9. Outdoor Signal Equipment: Weatherproof models listed for outdoor use.
 10. Mounting Arrangement for Signal Devices: Designed for attachment with screws on the mounting plate of a flush-mounted back box unless otherwise indicated.
 11. Enclosures for Flush-Mounting Bells and Horns: Enclosure, mounting plate, and grille assembly shall be furnished by device manufacturer to match features of the device to be mounted. Enclosure shall be recessed in wall, completely enclosing the device, with grille mounting over the open side of the enclosure and flush with the wall.
 12. Connection Provision for Signal-Indicating Devices: Plug connector **OR** Wire pigtail or compression splice, **as directed**.
- F. Clock Circuit Power Booster
1. Description: Transformer power supply, mounted in steel cabinet with hinged door, and having fuse-protected input and output circuits.
- G. Back Boxes For Secondary Indicating Clocks And Program Devices
1. Description: Box and cover-plate assembly shall be furnished by device manufacturer and be suitable for device to be mounted. Back boxes shall be equipped with knockouts and hanger straps or mounting adapters arranged for flush mounting the device unless otherwise indicated.
- H. Guards
1. Description: Formed-steel wire, shaped to fit around guarded device, with 1-inch (25-mm) maximum clearance.
 - a. Mounting Provisions: Fixed tabs, welded to guard and arranged for screw attachment to mounting surface.
 - b. Finish for Indoor Devices: Clear epoxy lacquer over zinc plating.
 - c. Finish for Outdoor Devices: Black powder coat over zinc plating and primer.
- I. Rack-Mounting Provision For Master Clock
1. Equipment Cabinet: Floor **OR** Wall, **as directed**, -mounted, rack type. Comply with EIA-310-D and the following:
 - a. Cabinet Housing: Constructed of steel, with front and rear, **as directed**, doors; with manufacturer's standard tumbler locks, keyed alike.
 - 1) Front door shall have a clear panel in front of the master clock display.
 - 2) Housing shall enclose master clock and auxiliary clock system components, plus a minimum of 20 percent spare capacity for future equipment.
 - b. Forced Ventilation: Internal low-noise fan with a filtered intake vent, connected to operate from 105- to 130-V ac, 60 Hz; separately fused and switchable and arranged to be powered when main cabinet power switch is on.
OR
Natural Ventilation: Ventilated rear and sides with louvers and solid top.
 - c. For freestanding, floor-mounting cabinet, arrange inputs, outputs, interconnections, and test points so they are accessible at rear of rack for maintenance and testing, with each item removable from rack without disturbing other items or connections.
 - d. Blank Panels: Cover empty space in equipment racks so entire front of rack is occupied by equipment or panels.
 - e. Finish: Uniform, baked-enamel, manufacturer's standard color finish over rust-inhibiting primer.
 - f. Power-Control Panel: On front of equipment housing; with master power on-off switch and pilot light, and socket for a 5-A, indicating, cartridge fuse for rack equipment power.
 - g. Vertical Plug Strip: Grounded receptacles, 12 inches (300 mm) o.c. the full height of rack, to supply rack-mounting equipment.

- h. Maintenance Receptacles: Duplex convenience outlet with supply terminals separate from equipment plug strip and located in front of rack.

J. Conductors And Cables

1. Conductors: Jacketed, twisted pair and twisted multipair, untinned solid copper. Sizes as recommended by system manufacturer, but not smaller than No. 22 AWG. Voltage drop for signal, control, and clock correction circuits shall not exceed 10 percent under peak load conditions. Comply with requirements in Division 27 Section "Communications Horizontal Cabling".
2. 120-V AC and Class 1 Signal and Control Circuits: Stranded, single conductors of size and type recommended by system manufacturer. Materials and installation requirements are specified in Division 26 Section "Low-voltage Electrical Power Conductors And Cables".
3. Class 2 and Class 3 Signal and Control Circuits: Single conductor or twisted-pair cable, unshielded, unless manufacturer recommends shielded cable.
4. Data Circuits: Category 6 minimum, unshielded, twisted-pair cable, unless manufacturer recommends shielded cable.
5. Insulation: Thermoplastic, not less than 1/32 inch (0.8 mm) thick.
6. Plenum Cable: Listed and labeled for plenum installation.
7. Conductor Color-Coding: Uniformly identified and coordinated with wiring diagrams.
8. Shielding: For speaker-microphone leads and at other locations recommended by manufacturer; No. 34 AWG tinned, soft-copper strands formed into a braid or equivalent foil.
 - a. Minimum Shielding Coverage on Conductors: 60 percent.

K. Pathways

1. Intercommunication and Program System Raceways and Boxes: Comply with requirements in Division 26 Section "Raceway And Boxes For Electrical Systems".

OR

Intercommunication and Program System Raceways and Boxes: Same as required for electrical branch circuits specified in Division 26 Section "Raceway And Boxes For Electrical Systems".

OR

Intercommunication and Program System Raceways and Boxes: Optical fiber/communications raceway and fittings **OR** Metal wireways **OR** Nonmetal wireways **OR** Surface metal raceways **OR** Surface nonmetal raceways, **as directed**.
2. Outlet boxes shall be no smaller than 2 inches (50 mm) wide, 3 inches (75 mm) high, and 2-1/2 inches (64 mm) deep.
3. Flexible metal conduit is prohibited.

1.3 EXECUTION

A. Installation

1. Mount system components with fastening methods and devices designed to resist the seismic forces indicated in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".

B. Wiring Methods

1. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Conceal raceway and cables except in unfinished spaces.
 - a. Install plenum cable in environmental air spaces, including plenum ceilings.
 - b. Comply with requirements for raceways and boxes specified in Division 26 Section "Raceway And Boxes For Electrical Systems".

OR

Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.

2. Wiring within Enclosures: Bundle, lace, and train cables to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
 3. Support cables not enclosed in raceways on J-Hooks. Install, size, and space J-Hooks to comply with TIA/EIA-568-B.
- C. Electrical Connections
1. Make splices, taps, and terminations on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
 2. Use plug connectors **OR** splices, **as directed**, for connections to clocks and signal devices.
 3. Ground clocks, programming equipment, and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
- D. Identification
1. Comply with Division 26 Section "Identification For Electrical Systems".
 2. Color-code wires, and apply wire and cable marking tape to designate wires and cables so they are uniformly identified and coordinated with wiring diagrams throughout the system.
- E. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
 2. Tests and Inspections:
 - a. Perform operational-system tests to verify compliance with the Specifications and make adjustments to bring system into compliance. Include operation of all modes of clock correction and all programming and manually programmed signal and relay operating functions.
 - b. Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
 3. Clock system will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- F. Adjusting
1. Program system according to the Owner's requirements. Set system so signal devices operate on the Owner-required schedules and are activated for durations selected by the Owner. Program equipment-control output circuits to suit the Owner's operating schedule for equipment controlled.
 2. Adjust sound-output level of adjustable signal devices to suit the Owner's requirements.
 3. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.
- G. Demonstration
1. Train the Owner's maintenance personnel to adjust, operate, and maintain clock-and-program-control system components.

END OF SECTION 27 53 13 13

Task	Specification	Specification Description
27 53 13 16	27 53 13 13	Clock And Program Control

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SECTION 28 16 11 00 - SECURITY ACCESS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for security access. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Security access central-control station.
 - b. One or more security access networked workstations.
 - c. Security access operating system and application software.
 - d. Security access controllers connected to high-speed electronic-data transmission network.

C. Definitions

1. CCTV: Closed-circuit television.
2. CPU: Central processing unit.
3. Credential: Data assigned to an entity and used to identify that entity.
4. dpi: Dots per inch.
5. DTS: Digital Termination Service. A microwave-based, line-of-sight communication provided directly to the end user.
6. GFI: Ground fault interrupter.
7. Identifier: A credential card; keypad personal identification number; or code, biometric characteristic, or other unique identification entered as data into the entry-control database for the purpose of identifying an individual. Where this term is presented with an initial capital letter, this definition applies.
8. I/O: Input/Output.
9. LAN: Local area network.
10. Location: A Location on the network having a PC-to-controller communications link, with additional controllers at the Location connected to the PC-to-controller link with a TIA 485-A communications loop. Where this term is presented with an initial capital letter, this definition applies.
11. PC: Personal computer. Applies to the central station, workstations, and file servers.
12. PCI Bus: Peripheral Component Interconnect. A peripheral bus providing a high-speed data path between the CPU and the peripheral devices such as a monitor, disk drive, or network.
13. PDF: Portable Document Format. The file format used by the Acrobat document-exchange-system software from Adobe.
14. RAS: Remote access services.
15. RF: Radio frequency.
16. ROM: Read-only memory. ROM data are maintained through losses of power.
17. TCP/IP: Transport control protocol/Internet protocol incorporated into Microsoft Windows.
18. TWAIN: Technology without an Interesting Name. A programming interface that lets a graphics application, such as an image editing program or desktop publishing program, activate a scanner, frame grabber, or other image-capturing device.
19. UPS: Uninterruptible power supply.
20. USB: Universal serial bus.
21. WAN: Wide area network.
22. WAV: The digital audio format used in Microsoft Windows.
23. WMP: Windows media player.
24. Wiegand: Patented magnetic principle that uses specially treated wires embedded in the credential card.

25. Windows: Operating system by Microsoft Corporation.
26. Workstation: A PC with software that is configured for specific, limited security-system functions.
27. WYSIWYG: What You See Is What You Get. Text and graphics appear on the screen the same as they will in print.

D. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories. Reference each product to a location on Drawings. Test and evaluation data presented in Product Data shall comply with SIA BIO-01.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
 - a. Diagrams for cable management system.
 - b. System labeling schedules, including electronic copy of labeling schedules that are part of the cable and asset identification system of the software specified in Parts 1.2 and 1.3.
 - c. Wiring Diagrams. For power, signal, and control wiring. Show typical wiring schematics including the following:
 - 1) Workstation outlets, jacks, and jack assemblies.
 - 2) Patch cords.
 - 3) Patch panels.
 - d. Cable Administration Drawings: As specified in Part 1.3 "Identification" Article.
 - e. Battery and charger calculations for Central Station, workstations, and Controllers.
3. Samples: For workstation outlets, jacks, jack assemblies, and faceplates. For each exposed product and for each color and texture specified.
4. Other Action Submittals:
 - a. Project planning documents as specified in Part 1.3.
5. Field quality-control test reports.
6. Operation and Maintenance Data: For security system to include in emergency, operation, and maintenance manuals. Include the following:
 - a. Microsoft Windows software documentation.
 - b. PC installation and operating documentation, manuals, and software for the PC and all installed peripherals. Software shall include system restore, emergency boot diskettes, and drivers for all installed hardware. Provide separately for each PC.
 - c. Hard copies of manufacturer's specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM of the hard-copy submittal.
 - d. System installation and setup guides, with data forms to plan and record options and setup decisions.

E. Quality Assurance

1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
 - a. Cable installer must have on staff a registered communication distribution designer certified by Building Industry Consulting Service International.
2. Source Limitations: Obtain Central Station, workstations, Controllers, Identifier readers, and all software through one source from a single manufacturer.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70 by a qualified testing agency, and marked for intended use.
4. Comply with NFPA 70, "National Electrical Code."
5. Comply with SIA DC-01 and SIA DC-03 and SIA DC-07, **as directed**.

F. Delivery, Storage, And Handling

1. Central Station, Workstations, and Controllers:
 - a. Store in temperature- and humidity-controlled environment in original manufacturer's sealed containers. Maintain ambient temperature between 50 and 85 deg F (10 and 30 deg C), and not more than 80 percent relative humidity, noncondensing.
 - b. Open each container; verify contents against packing list, and file copy of packing list, complete with container identification for inclusion in operation and maintenance data.

- c. Mark packing list with designations that have been assigned to materials and equipment for recording in the system labeling schedules that are generated by cable and asset management system specified in Part 2.
- d. Save original manufacturer's containers and packing materials and deliver as directed under provisions covering extra materials.

G. Project Conditions

1. Environmental Conditions: System shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Control Station: Rated for continuous operation in ambient conditions of **60 to 85 deg F (16 to 30 deg C)** and a relative humidity of 20 to 80 percent, noncondensing.
 - b. Indoor, Controlled Environment: NEMA 250, Type 1 enclosure. System components, except central-station control unit, installed in air-conditioned **OR** temperature-controlled, **as directed**, indoor environments shall be rated for continuous operation in ambient conditions of **36 to 122 deg F (2 to 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
 - c. Indoor, Uncontrolled Environment: NEMA 250, Type 3R **OR** 4 **OR** 12 **OR** 12K, **as directed**, enclosures. System components installed in non-air-conditioned **OR** non-temperature-controlled, **as directed**, interior environments shall be rated for continuous operation in ambient conditions of **0 to 122 deg F (minus 18 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
 - d. Outdoor Environment: NEMA 250, Type 3 **OR** 3R **OR** 3S **OR** 4 **OR** 4X, **as directed**, enclosures. System components installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of **minus 30 to plus 122 deg F (minus 34 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation where exposed to rain as specified in NEMA 250, winds up to **85 mph (137 km/h)** and snow cover up to **24 inches (610 mm)** thick.
 - e. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.
 - f. Corrosive Environment: For system components subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, provide NEMA 250, Type 4X **OR** 6P, **as directed**, enclosures.

1.2 PRODUCTS

A. Description

1. Security Access System: PC-based central station, one or more networked PC-based workstations, and field-installed controllers, connected by a high-speed electronic-data transmission network.
2. System Software: Based on 32-bit, central-station, workstation operating system, server operating system, and application software. Software shall have the following capabilities:
 - a. Multiuser and multitasking to allow for independent activities and monitoring to occur simultaneously at different workstations.
 - b. Graphical user interface to show pull-down menus and a menu-tree format that complies with interface guidelines of Microsoft Windows.
 - c. System license for the entire system including capability for future additions that are within the indicated system size limits specified in this Section.
 - d. Open-architecture system that allows importing and exporting of data and interfacing with other systems that are compatible with Microsoft Windows.
 - e. Password-protected operator login and access.
 - f. Open-database-connectivity compliant.
3. Network connecting the central station and workstations shall be a LAN **OR** WAN, **as directed**, using Microsoft Windows-based TCP/IP with a capacity of connecting up to 99 workstations.

System shall be portable across multiple communication platforms without changing system software.

4. Network(s) connecting PCs and controllers shall consist of one or more of the following:
 - a. Local area, IEEE 802.3 Fast Ethernet Gigabit-Ethernet **OR** 100 BASE-TX, **as directed**, star topology network based on TCP/IP.
 - b. Direct-connected, RS-232 cable from the COM port of the central station to the first controller, then RS-485 cable to interconnect the remaining controllers at that Location.
 - c. Dial-up and cable modem connection using a standard cable or dial-up telephone line.

B. Operation

1. Security access system shall use a single database for access-control and credential-creation functions.
2. Distributed Processing: A fully distributed processing system.
 - a. Access-control information, including time, date, valid codes, access levels, and similar data, shall be downloaded to controllers so each controller can make access-control decisions.
 - b. Intermediate controllers for access control are prohibited.
 - c. In the event that communications with the central controller are lost, controllers shall automatically buffer event transactions until communications are restored, at which time buffered events shall be uploaded to the central station.
3. Number of Locations:
 - a. Support at least 32,000 separate Locations using a single PC with combinations of direct-connect, dial-up, or TCP/IP LAN connections to each Location.
 - b. Each Location shall have its own database and history in the central station.
 - c. Locations may be combined to share a common database.
4. Data Capacity:
 - a. 130 different card-reader formats.
 - b. 999 comments.
 - c. 48 graphic file types for importing maps.
5. Location Capacity:
 - a. 128 reader-controlled doors.
 - b. 50,000 total-access credentials.
 - c. 2048 supervised alarm inputs.
 - d. 2048 programmable outputs.
 - e. 32,000 custom action messages per Location to instruct operator on action required when alarm is received.
6. System Network Requirements:
 - a. System components shall be interconnected and shall provide automatic communication of status changes, commands, field-initiated interrupts, and other communications required for proper system operation.
 - b. Communication shall not require operator initiation or response and shall return to normal after partial- or total-network interruption such as power loss or transient upset.
 - c. System shall automatically annunciate communication failures to the operator and shall identify the communications link that has experienced a partial or total failure.
 - d. Communications controller may be used as an interface between the central-station display systems and the field device network. Communications controller shall provide functions required to attain the specified network communications performance.
7. Central station shall provide operator interface, interaction, display, control, and dynamic and real-time monitoring. Central station shall control system networks to interconnect all system components, including workstations and field-installed controllers.
8. Field equipment shall include controllers, sensors, and controls.
 - a. Controllers shall serve as an interface between the central station and sensors and controls.
 - b. Data exchange between the central station and the controllers shall include down-line transmission of commands, software, and databases to controllers.

- c. The up-line data exchange from the controller to the central station shall include status data such as intrusion alarms, status reports, and entry-control records.
 - d. Controllers are classified as alarm-annunciation or entry-control type.
 9. System Response to Alarms:
 - a. Field device network shall provide a system end-to-end response time of one second(s) or less for every device connected to the system.
 - b. Alarms shall be annunciated at the central station within one second of the alarm occurring at a controller or at a device controlled by a local controller, and within 100 ms if the alarm occurs at the central station.
 - c. Alarm and status changes shall be displayed within 100 ms after receipt of data by the central station.
 - d. All graphics shall be displayed, including graphics-generated map displays, on the console monitor within five seconds of alarm receipt at the security console.
 - e. This response time shall be maintained during system heavy load.
 10. False-Alarm Reduction: The design of the central station and controllers shall contain features to reduce false alarms. Equipment and software shall comply with SIA CP-01.
 11. Error Detection:
 - a. Use a cyclic code method to detect single- and double-bit errors, burst errors of eight bits or fewer, and at least 99 percent of all other multibit and burst errors between controllers and the central station.
 - b. Interactive or product error-detection codes alone will not be acceptable.
 - c. A message shall be in error if one bit is received incorrectly.
 - d. Retransmit messages with detected errors.
 - e. Allow for an operator-assigned two-digit decimal number to each communications link representing the number of retransmission attempts.
 - f. Central station shall print a communication failure alarm message when the number of consecutive retransmission attempts equals the assigned quantity.
 - g. Monitor the frequency of data transmission failure for display and logging.
 12. Data Line Supervision: System shall initiate an alarm in response to opening, closing, shorting, or grounding of data transmission lines.
 13. Door Hardware Interface:
 - a. Comply with requirements in Division 8 Sections for door hardware required to be monitored or controlled by the security access system.
 - b. Electrical characteristics of controllers shall match the signal and power requirements of door hardware.
- C. Application Software
1. System Software: Based on 32-bit, Microsoft Windows central-station and workstation operating system and application software.
 - a. Multiuser multitasking shall allow independent activities and monitoring to occur simultaneously at different workstations.
 - b. Graphical user interface shall show pull-down menus and a menu-tree format.
 - c. Capability for future additions within the indicated system size limits.
 - d. Open architecture that allows importing and exporting of data and interfacing with other systems that are compatible with operating system.
 - e. Password-protected operator login and access.
 2. Peer Computer Control Software: Detect a failure of a central computer and cause the other central computer to assume control of all system functions without interruption of operation. Both central computers shall have drivers to support this mode of operation.
 3. Application Software: Interface between the alarm annunciation and entry-control controllers to monitor sensors and DTS links, operate displays, report alarms, generate reports, and help train system operators.
 - a. Reside at the central station, workstations, and controllers as required to perform specified functions.
 - b. Operate and manage peripheral devices.

- c. Manage files for disk I/O, including creating, deleting, and copying files; and automatically maintain a directory of all files, including size and location of each sequential and random-ordered record.
 - d. Import custom icons into graphics to represent alarms and I/O devices.
 - e. Globally link I/O so that any I/O can link to any other I/O within the same Location without requiring interaction with the host PC. This operation shall be at the controller.
 - f. Globally code I/O links so that any access-granted event can link to any I/O with the same Location without requiring interaction with the host PC. This operation shall be at the controller.
 - g. Messages from PC to controllers and controllers to controllers shall be on a polled network that utilizes check summing and acknowledgment of each message. Communication shall be automatically verified, buffered, and retransmitted if message is not acknowledged.
 - h. Selectable poll frequency and message time-out settings shall handle bandwidth and latency issues for TCP/IP, RF, and other PC-to-controller communications methods by changing the polling frequency and the amount of time the system waits for a response.
 - i. Automatic and encrypted backups for database and history backups shall be automatically stored at the central-control PC **OR** a selected workstation, **as directed**, and encrypted with a nine-character alphanumeric password that must be used to restore or read data contained in backup.
 - j. Operator audit trail for recording and reporting all changes made to database and system software.
 - k. Support network protocol and topology, TCP/IP, Novel Netware, Digital Pathworks, Banyan Vines, LAN/WAN, and RAS.
4. Workstation Software:
- a. Password levels shall be individually customized at each workstation to allow or disallow operator access to program functions for each Location.
 - b. Workstation event filtering shall allow user to define events and alarms that will be displayed at each workstation. If an alarm is unacknowledged (not handled by another workstation) for a preset amount of time, the alarm will automatically appear on the filtered workstation.
5. Controller Software:
- a. Controllers shall operate as autonomous, intelligent processing units.
 - 1) Controllers shall make decisions about access control, alarm monitoring, linking functions, and door-locking schedules for their operation, independent of other system components.
 - 2) Controllers shall be part of a fully distributed processing-control network.
 - 3) The portion of the database associated with a controller, and consisting of parameters, constraints, and the latest value or status of points connected to that controller, shall be maintained in the controller.
 - b. The following functions shall be fully implemented and operational within each controller:
 - 1) Monitoring inputs.
 - 2) Controlling outputs.
 - 3) Automatically reporting alarms to the central station.
 - 4) Reporting of sensor and output status to the central station on request.
 - 5) Maintaining real time, automatically updated by the central station at least once a day.
 - 6) Communicating with the central station.
 - 7) Executing controller resident programs.
 - 8) Diagnosing.
 - 9) Downloading and uploading data to and from the central station.
 - c. Controller Operations at a Location:
 - 1) Up to 64 controllers connected to TIA 485-A communications loop. Globally operating I/O linking and anti-passback functions between controllers within the same Location without central-station or workstation intervention. Linking and anti-

- passback shall remain fully functional within the same Location even when the central station or workstations are off-line.
- 2) In the event of communication failure between the central station and a Location, there shall be no degradation in operations at the controllers at that Location. Controllers at each Location shall be connected to a memory buffer with a capacity to store up to 10,000 events; there shall be no loss of transactions in system history files until the buffer overflows.
 - 3) Buffered events shall be handled in a first-in-first-out mode of operation.
- d. Individual Controller Operation:
- 1) Controllers shall transmit alarms, status changes, and other data to the central station when communications circuits are operable. If communications are not available, controllers shall function in a stand-alone mode; operational data, including the status and alarm data normally transmitted to the central station, shall be stored for later transmission to the central station. Storage capacity for the latest 1024 events shall be provided at each controller.
 - 2) Card-reader ports of a controller shall be custom configurable for at least 120 different card-reader or keypad formats. Multiple reader or keypad formats may be used simultaneously at different controllers or within the same controller.
 - 3) Controllers shall provide a response to card readers or keypad entries in less than 0.25 seconds, regardless of system size.
 - 4) Controllers that are reset, or powered up from a nonpowered state, shall automatically request a parameter download and reboot to their proper working state. This shall happen without any operator intervention.
 - 5) Initial Startup: When controllers are brought on-line, database parameters shall be automatically downloaded to them. After initial download is completed, only database changes shall be downloaded to each controller.
 - 6) On failure for any reason, controllers shall perform an orderly shutdown and force controller outputs to a predetermined failure-mode state, consistent with the failure modes shown and the associated control device.
 - 7) After power is restored, following a power failure, startup software shall initiate self-test diagnostic routines, after which controllers shall resume normal operation.
 - 8) After controller failure, if the database and application software are no longer resident, controllers shall not restart but shall remain in the failure mode until repaired. If database and application programs are resident, controllers shall immediately resume operation. If not, software shall be restored automatically from the central station.
- e. Communications Monitoring:
- 1) System shall monitor and report status of TIA 485-A communications loop of each Location.
 - 2) Communication status window shall display which controllers are currently communicating, a total count of missed polls since midnight, and which controller last missed a poll.
 - 3) Communication status window shall show the type of CPU, the type of I/O board, and the amount of RAM for each controller.
- f. Operating systems shall include a real-time clock function that maintains seconds, minutes, hours, day, date, and month. The real-time clock shall be automatically synchronized with the central station at least once a day to plus or minus 10 seconds. The time synchronization shall be automatic, without operator action and without requiring system shutdown.
6. PC-to-Controller Communications:
- a. Central-station or workstation communications shall use the following:
 - 1) Direct connection using serial ports of the PC.
 - 2) TCP/IP LAN interface cards.
 - 3) Dial-up or cable modems for connections to Locations.
 - b. Each serial port used for communications shall be individually configurable for "direct communications," "modem communications incoming and outgoing," or "modem

- communications incoming only," or as an ASCII output port. Serial ports shall have adjustable data transmission rates and shall be selectable under program control.
- c. Use multiport communications board if more than two serial ports are needed.
 - 1) Use a 4-, 8-, or 16-serial port configuration that is expandable to 32- or 64-serial ports.
 - 2) Connect the first board to an internal PCI bus adapter card.
 - d. Direct serial, TCP/IP, and dial-up, cable, or satellite communications shall be alike in the monitoring or control of the system except for the connection that must first be made to a dial-up or voice-over IP Location.
 - e. TCP/IP network interface card (NIV) shall have an option to set the poll-frequency and message-response time-out settings.
 - f. PC-to-controller and controller-to-controller communications (direct, dial-up, or TCP/IP) shall use a polled-communication protocol that checks sum and acknowledges each message. All communications in this subparagraph shall be verified and buffered, and retransmitted if not acknowledged.
7. Direct Serial or TCP/IP PC-to-Controller Communications:
- a. Communication software on the PC shall supervise the PC-to-controller communications link.
 - b. Loss of communications to any controller shall result in an alarm at all PCs running the communication software.
 - c. When communications are restored, all buffered events shall automatically upload to the PC, and any database changes shall be automatically sent to the controller.
8. Dial-up Modem or Cable Modem PC-to-Controller Communications:
- a. Communication software on the PC shall supervise the PC-to-controller communications link during dial-up modem connect times.
 - b. Communication software shall be programmable to routinely poll each of the remote dial-up or cable modem Locations, collecting event logs and verifying phone lines at operator-selectable time intervals for each Location.
 - c. System shall be programmable for dialing and connecting to all dial-up or cable modem Locations and for retrieving the accrued history transactions on an automatic basis as often as once every 10 minutes and up to once every 9999 minutes.
 - d. Failure to communicate to a dial-up Location three times in a row shall result in an alarm at the PC.
 - e. Time offset capabilities shall be present so that Locations in a different geographical time zone than the host PC will be set to, and maintained at, the proper local time. This feature shall allow for geographical time zones that are ahead of or behind the host PC.
 - f. The controller connected to a dial-up or cable modem shall automatically buffer all normal transactions until its buffer reaches 80 percent of capacity. When the transaction buffer reaches 80 percent, the controller shall automatically initiate a call to the central station and upload all transactions.
 - g. Alarms shall be reported immediately.
 - h. Dial-up or cable modems shall be provided by manufacturer of the system. Modems used at the controller shall be powered by the controller. Power to the modem shall include battery backup if the controller is so equipped.
9. Controller-to-Controller Communications:
- a. TIA 485-A, four-wire, point-to-point, regenerative (repeater) communications network methodology.
 - b. TIA 485-A communications signal shall be regenerated at each controller.
10. Database Downloads:
- a. All data transmissions from PCs to a Location, and between controllers at a Location, shall include a complete database checksum to check the integrity of the transmission. If the data checksum does not match, a full data download shall be automatically retransmitted.
 - b. If a controller is reset for any reason, it shall automatically request and receive a database download from the PC. The download shall restore data stored at the controller to their normal working state and shall take place with no operator intervention.

- c. Software shall provide for setting downloads via dial-up connection to once per 24-hour period, with time selected by the operator.
- d. Software shall provide for setting delays of database downloads for dial-up connections. Delays change the download from immediately to a delay ranging from one to 999 minutes.
- 11. Operator Interface:
 - a. Inputs in system shall have two icon representations, one for the normal state and one for the abnormal state.
 - b. When viewing and controlling inputs, displayed icons shall automatically change to the proper icon to display the current system state in real time. Icons shall also display the input's state, whether armed or bypassed, and if the input is in the armed or bypassed state due to a time zone or a manual command.
 - c. Outputs in system shall have two icon representations, one for the secure (locked) state and one for the open (unlocked) state.
 - d. Icons displaying status of the I/O points shall be constantly updated to show their current real-time condition without prompting by the operator.
 - e. The operator shall be able to scroll the list of I/Os and press the appropriate toolbar button, or right click, to command the system to perform the desired function.
 - f. Graphic maps or drawings containing inputs, outputs, and override groups shall include the following:
 - 1) Database to import and store full-color maps or drawings and allow for input, output, and override group icons to be placed on maps.
 - 2) Maps to provide real-time display animation and allow for control of points assigned to them.
 - 3) System to allow inputs, outputs, and override groups to be placed on different maps.
 - 4) Software to allow changing the order or priority in which maps will be displayed.
 - g. Override Groups Containing I/Os:
 - 1) System shall incorporate override groups that provide the operator with the status and control over user-defined "sets" of I/Os with a single icon.
 - 2) Icon shall change automatically to show the live summary status of points in that group.
 - 3) Override group icon shall provide a method to manually control or set to time-zone points in the group.
 - 4) Override group icon shall allow the expanding of the group to show icons representing the live status for each point in the group, individual control over each point, and the ability to compress the individual icons back into one summary icon.
 - h. Schedule Overrides of I/Os and Override Groups:
 - 1) To accommodate temporary schedule changes that do not fall within the holiday parameters, the operator shall have the ability to override schedules individually for each input, output, or override group.
 - 2) Each schedule shall be composed of a minimum of two dates with separate times for each date.
 - 3) The first time and date shall be assigned the override state that the point shall advance to when the time and date become current.
 - 4) The second time and date shall be assigned the state that the point shall return to when the time and date become current.
 - i. Copy command in database shall allow for like data to be copied and then edited for specific requirements, to reduce redundant data entry.
- 12. Operator Access Control:
 - a. Control operator access to system controls through three password-protected operator levels. System operators and managers with appropriate password clearances shall be able to change operator levels for operators.
 - b. Three successive attempts by an operator to execute functions beyond their defined level during a 24-hour period shall initiate a software tamper alarm.
 - c. A minimum of 32 passwords shall be available with the system software. System shall display the operator's name or initials in the console's first field. System shall print the operator's name or initials, action, date, and time on the system printer at login and logoff.

- d. The password shall not be displayed or printed.
 - e. Each password shall be definable and assignable for the following:
 - 1) Selected commands to be usable.
 - 2) Access to system software.
 - 3) Access to application software.
 - 4) Individual zones that are to be accessed.
 - 5) Access to database.
13. Operator Commands:
- a. Command Input: Plain-language words and acronyms shall allow operators to use the system without extensive training or data-processing backgrounds. System prompts shall be a word, a phrase, or an acronym.
 - b. Command inputs shall be acknowledged and processing shall start in not less than one second(s).
 - c. Tasks that are executed by operator's commands shall include the following:
 - 1) Acknowledge Alarms: Used to acknowledge that the operator has observed the alarm message.
 - 2) Place Zone in Access: Used to remotely disable intrusion-alarm circuits emanating from a specific zone. System shall be structured so that console operator cannot disable tamper circuits.
 - 3) Place Zone in Secure: Used to remotely activate intrusion-alarm circuits emanating from a specific zone.
 - 4) System Test: Allows the operator to initiate a system-wide operational test.
 - 5) Zone Test: Allows the operator to initiate an operational test for a specific zone.
 - 6) Print reports.
 - 7) Change Operator: Used for changing operators.
 - 8) Security Lighting Controls: Allows the operator to remotely turn on or turn off security lights.
 - 9) Display Graphics: Used to show any graphic displays implemented in the system. Graphic displays shall be completed within 20 seconds from time of operator command.
 - 10) Run system tests.
 - 11) Generate and format reports.
 - 12) Request help with the system operation.
 - a) Include in main menus.
 - b) Provide unique, descriptive, context-sensitive help for selections and functions with the press of one function key.
 - c) Provide navigation to specific topic from within the first help window.
 - d) Help shall be accessible outside the application program.
 - 13) Entry-Control Commands:
 - a) Lock (secure) or unlock (open) each controlled entry and exit up to four times a day through time-zone programming.
 - b) Arm or disarm each monitored input up to four times a day through time-zone programming.
 - c) Enable or disable readers or keypads up to two times a day through time-zone programming.
 - d) Enable or disable cards or codes up to four times a day per entry point through access-level programming.
 - d. Command Input Errors: Show operator input assistance when a command cannot be executed because of operator input errors. Assistance screen shall use plain-language words and phrases to explain why the command cannot be executed. Error responses that require an operator to look up a code in a manual or other document are not acceptable. Conditions causing operator assistance messages include the following:
 - 1) Command entered is incorrect or incomplete.
 - 2) Operator is restricted from using that command.
 - 3) Command addresses a point that is disabled or out of service.

- 4) Command addresses a point that does not exist.
 - 5) Command is outside the system's capacity.
14. Alarms:
- a. System Setup:
 - 1) Assign manual and automatic responses to incoming-point status change or alarms.
 - 2) Automatically respond to input with a link to other inputs, outputs, or operator-response plans; unique sound with use of WAV files; and maps or images that graphically represent the point location.
 - 3) Sixty-character message field for each alarm.
 - 4) Operator-response-action messages shall allow message length of at least 65,000 characters, with database storage capacity of up to 32,000 messages. Setup shall assign messages to access point **OR** zone **OR** sensor, **as directed**.
 - 5) Secondary messages shall be assignable by the operator for printing to provide further information and shall be editable by the operator.
 - 6) Allow 25 secondary messages with a field of four lines of 60 characters each.
 - 7) Store the most recent 1000 alarms for recall by the operator using the report generator.
 - b. Software Tamper:
 - 1) Annunciate a tamper alarm when unauthorized changes to system database files are attempted. Three consecutive unsuccessful attempts to log onto system shall generate a software tamper alarm.
 - 2) Annunciate a software tamper alarm when an operator or other individual makes three consecutive unsuccessful attempts to invoke functions beyond the authorization level.
 - 3) Maintain a transcript file of the last 5000 commands entered at each central station to serve as an audit trail. System shall not allow write access to system transcript files by any person, regardless of their authorization level.
 - 4) Allow only acknowledgment of software tamper alarms.
 - c. Read access to system transcript files shall be reserved for operators with the highest password authorization level available in system.
 - d. Animated Response Graphics: Highlight alarms with flashing icons on graphic maps; display and constantly update the current status of alarm inputs and outputs in real time through animated icons.
 - e. Multimedia Alarm Annunciation: WAV files to be associated with alarm events for audio annunciation or instructions.
 - f. Alarm Handling: Each input may be configured so that an alarm cannot be cleared unless it has returned to normal, with options of requiring the operator to enter a comment about disposition of alarm. Allow operator to silence alarm sound when alarm is acknowledged.
 - g. Alarm Automation Interface: High-level interface to central-station alarm automation software systems. Allows input alarms to be passed to and handled by automation systems in the same manner as burglar alarms, using a TIA 232-F ASCII interface.
 - h. CCTV Alarm Interface: Allow commands to be sent to CCTV systems during alarms (or input change of state) through serial ports.
 - i. Camera Control: Provides operator ability to select and control cameras from graphic maps.
15. Alarm Monitoring: Monitor sensors, controllers, and DTS circuits and notify operators of an alarm condition. Display higher-priority alarms first and, within alarm priorities, display the oldest unacknowledged alarm first. Operator acknowledgment of one alarm shall not be considered acknowledgment of other alarms nor shall it inhibit reporting of subsequent alarms.
- a. Displayed alarm data shall include type of alarm, location of alarm, and secondary alarm messages.
 - b. Printed alarm data shall include type of alarm, location of alarm, date and time (to nearest second) of occurrence, and operator responses.
 - c. Maps shall automatically display the alarm condition for each input assigned to that map if that option is selected for that input location.

- d. Alarms initiate a status of "pending" and require the following two handling steps by operators:
 - 1) First Operator Step: "Acknowledged." This action shall silence sounds associated with the alarm. The alarm remains in the system "Acknowledged" but "Un-Resolved."
 - 2) Second Operator Step: Operators enter the resolution or operator comment, giving the disposition of the alarm event. The alarm shall then clear.
 - e. Each workstation shall display the total pending alarms and total unresolved alarms.
 - f. Each alarm point shall be programmable to disallow the resolution of alarms until the alarm point has returned to its normal state.
 - g. Alarms shall transmit to the central station in real time except for allowing connection time for dial-up locations.
 - h. Alarms shall be displayed and managed from a minimum of four different windows.
 - 1) Input Status Window: Overlay status icon with a large red blinking icon. Selecting the icon will acknowledge the alarm.
 - 2) History Log Transaction Window: Display name, time, and date in red text. Selecting red text will acknowledge the alarm.
 - 3) Alarm Log Transaction Window: Display name, time, and date in red. Selecting red text will acknowledge the alarm.
 - 4) Graphic Map Display: Display a steady colored icon representing each alarm input location. Change icon to flashing red when the alarm occurs. Change icon from flashing red to steady red when the alarm is acknowledged.
 - i. Once an alarm is acknowledged, the operator shall be prompted to enter comments about the nature of the alarm and actions taken. Operator's comments may be manually entered or selected from a programmed predefined list, or a combination of both.
 - j. For locations where there are regular alarm occurrences, provide programmed comments. Selecting that comment shall clear the alarm.
 - k. The time and name of the operator who acknowledged and resolved the alarm shall be recorded in the database.
 - l. Identical alarms from the same alarm point shall be acknowledged at the same time the operator acknowledges the first alarm. Identical alarms shall be resolved when the first alarm is resolved.
 - m. Alarm functions shall have priority over downloading, retrieving, and updating database from workstations and controllers.
 - n. When a reader-controlled output (relay) is opened, the corresponding alarm point shall be automatically bypassed.
16. Monitor Display: Display text and graphic maps that include zone status integrated into the display. Colors are used for the various components and current data. Colors shall be uniform throughout the system.
- a. Color Code:
 - 1) FLASHING RED: Alerts operator that a zone has gone into an alarm or that primary power has failed.
 - 2) STEADY RED: Alerts operator that a zone is in alarm and alarm has been acknowledged.
 - 3) YELLOW: Advises operator that a zone is in access.
 - 4) GREEN: Indicates that a zone is secure and that power is on.
 - b. Graphics:
 - 1) Support 32,000 graphic display maps and allow import of maps from a minimum of 16 standard formats from another drawing or graphics program.
 - 2) Allow I/O to be placed on graphic maps by the drag-and-drop method.
 - 3) Operators shall be able to view the inputs, outputs, and the point's name by moving the mouse cursor over the point on the graphic map.
 - 4) Inputs or outputs may be placed on multiple graphic maps. The operator shall be able to toggle to view graphic maps associated with I/Os.

- 5) Each graphic map shall have a display-order sequence number associated with it to provide a predetermined order when toggled to different views.
 - 6) Camera icons shall have the ability to be placed on graphic maps that, when selected by an operator, will open a video window, display the camera associated with that icon, and provide pan-tilt-zoom control.
 - 7) Input, output, or camera placed on a map shall allow the ability to arm or bypass an input, open or secure an output, or control the pan-tilt-zoom function of the selected camera.
17. System test software enables operators to initiate a test of the entire system or of a particular portion of the system.
- a. Test Report: The results of each test shall be stored for future display or printout. The report shall document the operational status of system components.
18. Report-Generator Software: Include commands to generate reports for displaying, printing, and storing on disk and tape. Reports shall be stored by type, date, and time. Report printing shall be the lowest-priority activity. Report-generation mode shall be operator selectable but set up initially as periodic, automatic, or on request. Include time and date printed and the name of operator generating the report. Report formats may be configured by operators.
- a. Automatic Printing: Setup shall specify, modify, or inhibit the report to be generated; the time the initial report is to be generated; the time interval between reports; the end of the period; and the default printer.
 - b. Printing on Request: An operator may request a printout of any report.
 - c. Alarm Reports: Reporting shall be automatic as initially set up. Include alarms recorded by system over the selected time and information about the type of alarm such as door alarm, intrusion alarm, tamper alarm, etc, the type of sensor, the location, the time, and the action taken.
 - d. Access and Secure Reports: Document zones placed in access, the time placed in access, and the time placed in secure mode.
 - e. Custom Reports: Reports tailored to exact requirements of who, what, when, and where. As an option, custom report formats may be stored for future printing.
 - f. Automatic History Reports: Named, saved, and scheduled for automatic generation.
 - g. Cardholder Reports: Include data, or selected parts of the data, as well as the ability to be sorted by name, card number, imprinted number, or by any of the user-defined fields.
 - h. Cardholder by Reader Reports: Based on who has access to a specific reader or group of readers by selecting the readers from a list.
 - i. Cardholder by Access-Level Reports: Display everyone that has been assigned to the specified access level.
 - j. Who Is "In" (Muster) Report:
 - 1) Emergency Muster Report: One-click operation on toolbar launches report.
 - 2) Cardholder Report. Contain a count of persons who are "In" at a selected Location and a detailed listing of name, date, and time of last use, sorted by the last reader used or by the group assignment.
 - k. Panel Labels Reports: Printout of control-panel field documentation including the actual location of equipment, programming parameters, and wiring identification. Maintain system installation data within system database so that data are available on-site at all times.
 - l. Activity and Alarm On-Line Printing: Activity printers for use at workstations; prints all events, or alarms only.
 - m. History Reports: Custom reports that allow the operator to select any date, time, event type, device, output, input, operator, Location, name, or cardholder to be included or excluded from the report.
 - 1) Initially store history on the hard disk of the host PC.
 - 2) Permit viewing of the history on workstations or print history to any system printer.
 - 3) The report shall be definable by a range of dates and times with the ability to have a daily start and stop time over a given date range.
 - 4) Each report shall depict the date, time, event type, event description, and device; or I/O name, cardholder group assignment, and cardholder name or code number.

- 5) Each line of a printed report shall be numbered to ensure that the integrity of the report has not been compromised.
 - 6) Total number of lines of the report shall be given at the end of the report. If the report is run for a single event such as "Alarms," the total shall reflect how many alarms occurred during that period.
 - n. Reports shall have the following four options:
 - 1) View on screen.
 - 2) Print to system printer. Include automatic print spooling and "Print To" options if more than one printer is connected to the system.
 - 3) "Save to File" with full path statement.
 - 4) System shall have the ability to produce a report indicating status of system inputs and outputs or of inputs and outputs that are abnormal, out of time zone, manually overridden, not reporting, or in alarm.
 - o. Custom Code List Subroutine: Allow the access codes of system to be sorted and printed according to the following criteria:
 - 1) Active, inactive, or future activate or deactivate.
 - 2) Code number, name, or imprinted card number.
 - 3) Group, Location access levels.
 - 4) Start and stop code range.
 - 5) Codes that have not been used since a selectable number of days.
 - 6) In, out, or either status.
 - 7) Codes with trace designation.
 - p. The reports of system database shall allow options so that every data field may be printed.
 - q. The reports of system database shall be constructed so that the actual position of the printed data shall closely match the position of the data on the data-entry windows.
19. Anti-Passback:
- a. System shall have global and local anti-passback features, selectable by Location. System shall support hard and soft anti-passback.
 - b. Hard Anti-Passback: Once a credential holder is granted access through a reader with one type of designation (IN or OUT), the credential holder may not pass through that type of reader designation until the credential holder passes through a reader of opposite designation.
 - c. Soft Anti-Passback: Should a violation of the proper IN or OUT sequence occur, access shall be granted, but a unique alarm shall be transmitted to the control station, reporting the credential holder and the door involved in the violation. A separate report may be run on this event.
 - d. Timed Anti-Passback: A controller capability that prevents an access code from being used twice at the same device (door) within a user-defined amount of time.
 - e. Provide four separate zones per Location that can operate without requiring interaction with the host PC (done at controller). Each reader shall be assignable to one or all four anti-passback zones. In addition, each anti-passback reader can be further designated as "Hard," "Soft," or "Timed" in each of the four anti-passback zones. The four anti-passback zones shall operate independently.
 - f. The anti-passback schemes shall be definable for each individual door.
 - g. The Master Access Level shall override anti-passback.
 - h. System shall have the ability to forgive (or reset) an individual credential holder or the entire credential-holder population anti-passback status to a neutral status.
20. Visitor Assignment:
- a. Provide for and allow an operator to be restricted to only working with visitors. The visitor badging subsystem shall assign credentials and enroll visitors. Allow only those access levels that have been designated as approved for visitors.
 - b. Provide an automated log of visitor name, time and doors accessed, and name of person contacted.
 - c. Allow a visitor designation to be assigned to a credential holder.

- d. Security access system shall be able to restrict the access levels that may be assigned to credentials issued to visitors.
 - e. Allow operator to recall visitors' credential-holder file once a visitor is enrolled in the system.
 - f. The operator may designate any reader as one that deactivates the credential after use at that reader. The history log shall show the return of the credential.
 - g. System shall have the ability to use the visitor designation in searches and reports. Reports shall be able to print all or any visitor activity.
21. Time and Attendance:
- a. Time and attendance reporting shall be provided to match IN and OUT reads and display cumulative time in for each day and cumulative time in for length designated in the report.
 - b. Shall be provided to match IN and OUT reads and display cumulative time in for each day and cumulative time in for length designated in the report.
 - c. System software setup shall allow designation of selected access-control readers as time and attendance hardware to gather the clock-in and clock-out times of the users at these readers.
 - 1) Reports shall show in and out times for each day, total time in for each day, and a total time in for period specified by the user.
 - 2) Allow the operator to view and print the reports, or save the reports to a file.
 - 3) Alphabetically sort reports on the person's last name, by Location or location group. Include all credential holders or optionally select individual credential holders for the report.
22. Training Software: Enables operators to practice system operation, including alarm acknowledgment, alarm assessment, response force deployment, and response force communications. System shall continue normal operation during training exercises and shall terminate exercises when an alarm signal is received at the console.
23. Entry-Control Enrollment Software: Database management functions that allow operators to add, delete, and modify access data as needed.
- a. The enrollment station shall not have alarm response or acknowledgment functions.
 - b. Provide multiple, password-protected access levels. Database management and modification functions shall require a higher operator access level than personnel enrollment functions.
 - c. The program shall provide means to disable the enrollment station when it is unattended, to prevent unauthorized use.
 - d. The program shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations. In the case of personnel identity-verification subsystems, this shall include biometric data. Allow entry of personnel identifying information into the system database using menu selections and data fields. The data field names shall be customized during setup to suit user and site needs. Personnel identity-verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.
 - e. Cardholder Data: Provide 99 user-defined fields. System shall have the ability to run searches and reports using any combination of these fields. Each user-defined field shall be configurable, using any combination of the following features:
 - 1) MASK: Determines a specific format with which data must comply.
 - 2) REQUIRED: Operator is required to enter data into field before saving.
 - 3) UNIQUE: Data entered must be unique.
 - 4) DEACTIVATE DATE: Data entered will be evaluated as an additional deactivate date for all cards assigned to this cardholder.
 - 5) NAME ID: Data entered will be considered a unique ID for the cardholder.
 - f. Personnel Search Engine: A report generator with capabilities such as search by last name, first name, group, or any predetermined user-defined data field; by codes not used in definable number of days; by skills; or by seven other methods.
 - g. Multiple Deactivate Dates for Cards: User-defined fields to be configured as additional stop dates to deactivate any cards assigned to the cardholder.

- h. Batch card printing.
- i. Default card data can be programmed to speed data entry for sites where most card data are similar.
- j. Enhanced ASCII File Import Utility: Allows the importing of cardholder data and images.
- k. Card Expire Function: Allows readers to be configured to deactivate cards when a card is used at selected devices.

D. System Database

1. Database and database management software shall define and modify each point in database using operator commands. Definition shall include parameters and constraints associated with each system device.
2. Database Operations:
 - a. System data management shall be in a hierarchical menu tree format, with navigation through expandable menu branches and manipulated with use of menus and icons in a main menu and system toolbar.
 - b. Navigational Aids:
 - 1) Toolbar icons for add, delete, copy, print, capture image, activate, deactivate, and muster report.
 - 2) Point and click feature to facilitate data manipulation.
 - 3) Next and previous command buttons visible when editing database fields to facilitate navigation from one record to the next.
 - 4) Copy command and copy tool in the toolbar to copy data from one record to create a new similar record.
 - c. Data entry shall be automatically checked for duplicate and illegal data and shall verify that data are in a valid format.
 - d. System shall generate a memo or note field for each item that is stored in database, allowing the storing of information about any defining characteristics of the item. Memo field is used for noting the purpose the item was entered for, reasons for changes that were made, and the like.
3. File Management:
 - a. File management shall include backup and restoration system, allowing selection of storage media, including 3.5-inch floppy disk, Zip and Jaz drives, and designated network resources.
 - b. Operations shall be both manual and automatic mode. The number of automatic sequential backups before the oldest backup becomes overwritten; FIFO mode shall be operator selectable.
 - c. Backup program shall provide manual operation from any PC on the LAN and shall operate while system remains operational.
4. Operator Passwords:
 - a. Software shall support up to 32,000 individual system operators, each with a unique password.
 - b. One to eight alphanumeric characters.
 - c. Allow passwords to be case sensitive.
 - d. Passwords shall not be displayed when entered.
 - e. Passwords shall have unique and customizable password profile, and allow several operators to share a password profile. Include the following features in the password profile:
 - 1) Allow for at least 32,000 operator password profiles.
 - 2) Predetermine the highest-level password profile for access to all functions and areas of program.
 - 3) Allow or disallow operator access to any program operation, including the functions of View, Add, Edit, and Delete.
 - 4) Restrict which doors an operator can assign access to.

- f. Operators shall use a user name and password to log on to system. This user name and password shall be used to access database areas and programs as determined by the associated profile.
- g. Make provision to allow the operator to log off without fully exiting program. User may be logged off but program will remain running while displaying the login window for the next operator.
5. Access Card/Code Operation and Management: Access authorization shall be by card, by a manually entered code (PIN), or by a combination of both (card plus PIN).
 - a. Access authorization shall verify the facility code first, the card or card-and-PIN validation second, and the access level (time of day, day of week, date), anti-passback status, and number of uses last.
 - b. Use data-entry windows to view, edit, and issue access levels. Access authorization entry management system shall maintain and coordinate all access levels to prevent duplication or the incorrect creation of levels.
 - c. Allow assignment of multiple cards/codes to a cardholder.
 - d. Allow assignment of up to four access levels for each Location to a cardholder. Each access level may contain any combination of doors.
 - e. Each door may be assigned four time zones.
 - f. Access codes may be up to 11 digits in length.
 - g. Software shall allow the grouping of locations so cardholder data can be shared by all locations in the group.
 - h. Visitor Access: Issue a visitor badge for data tracking or photo ID purposes without assigning that person a card or code.
 - i. Cardholder Tracing: Allow for selection of cardholder for tracing. Make a special audible and visual annunciation at control station when a selected card or code is used at a designated code reader. Annunciation shall include an automatic display of the cardholder image.
 - j. Allow each cardholder to be given either an unlimited number of uses or a number from 1 to 9998 that regulates the number of times the card can be used before it is automatically deactivated.
 - k. Provide for cards and codes to be activated and deactivated manually or automatically by date. Provide for multiple deactivate dates to be preprogrammed.
6. Security Access Integration:
 - a. Photo ID badging and photo verification shall use same database as the security access and may query data from cardholder, group, and other personal information to build a custom ID badge.
 - b. Automatic or manual image recall and manual access based on photo verification shall also be a means of access verification and entry.
 - c. System shall allow sorting of cardholders together by group or other characteristic for a fast and efficient method of reporting on, and enabling or disabling, cards or codes.
7. Key control and tracking shall be an integrated function of cardholder data.
 - a. Provide the ability to store information about which conventional metal keys are issued and to whom, along with key construction information.
 - b. Reports shall be designed to list everyone that has possession of a specified key.
8. Facility Codes: System shall accommodate up to 2048 facility codes per Location, with the option of allowing facility codes to work at all doors or only particular doors.
9. Operator Comments:
 - a. With the press of one appropriate button on toolbar, the user shall be permitted to make operator comments into history at anytime.
 - b. Automatic prompting of operator comment shall occur before the resolution of each alarm.
 - c. Operator comments shall be recorded by time, date, and operator number.
 - d. Comments shall be sorted and viewed through reports and history.
 - e. The operator may enter comments in two ways; either or both may be used:
 - 1) Manually entered through keyboard data entry (typed), up to 65,000 characters per each alarm.
 - 2) Predefined and stored in database for retrieval on request.

- f. System shall have a minimum of 999 predefined operator comments with up to 30 characters per comment.
10. Group:
 - a. Group names may be used to sort cardholders into groups that allow the operator to determine the tenant, vendor, contractor, department, division, or any other designation of a group to which the person belongs.
 - b. System software shall have the capacity to assign 1 of 32,000 group names to an access authorization.
 - c. Make provision in software to deactivate and reactivate all access authorizations assigned to a particular group.
 - d. Allow sorting of history reports and code list printouts by group name.
11. Time Zones:
 - a. Each zone consists of a start and stop time for 7 days of the week and three holiday schedules. A time zone is assigned to inputs, outputs, or access levels to determine when an input shall automatically arm or disarm, when an output automatically opens or secures, or when access authorization assigned to an access level will be denied or granted.
 - b. Up to four time zones may be assigned to inputs and outputs to allow up to four arm or disarm periods per day or four lock or unlock periods per day; up to three holiday override schedules may be assigned to a time zone.
 - c. Data-entry window shall display a dynamically linked bar graph showing active and inactive times for each day and holiday, as start and stop times are entered or edited.
 - d. System shall have the capacity for 2048 time zones for each Location.
12. Holidays:
 - a. Three different holiday schedules may be assigned to a time zone. Holiday schedule consists of date in format MM/DD/YEAR and a description. When the holiday date matches the current date of the time zone, the holiday schedule replaces the time zone schedule for that 24-hour period.
 - b. System shall have the capacity for 32,000 holidays.
 - c. Three separate holiday schedules may be applied to a time zone.
 - d. Holidays have an option to be designated as occurring on the designated date each year. These holidays remain in system and will not be purged.
 - e. Holidays not designated to occur each year shall be automatically purged from database after the date expires.
13. Access Levels:
 - a. System shall allow for the creation up to 32,000 access levels.
 - b. One level shall be predefined as the Master Access Level. The Master Access Level shall work at all doors at all times and override any anti-passback.
 - c. System shall allow for access to be restricted to any area by reader and by time. Access levels shall determine when and where an Identifier is authorized.
 - d. System shall be able to create multiple door and time zone combinations under same access level so that an Identifier may be valid during different time periods at different readers even if the readers are on the same Controller.
14. User-Defined Fields:
 - a. System shall provide a minimum of 99 user-defined fields, each with up to 50 characters, for specific information about each credential holder.
 - b. System shall accommodate a title for each field; field length shall be 20 characters.
 - c. A "Required" option may be applied to each user-defined field that, when selected, forces the operator to enter data in the user-defined field before the credential can be saved.
 - d. A "Unique" option may be applied to each user-defined field that, when selected, will not allow duplicate data from different credential holders to be entered.
 - e. Data format option may be assigned to each user-defined field that will require the data to be entered with certain character types in specific spots in the field entry window.
 - f. A user-defined field, if selected, will define the field as a deactivate date. The selection shall automatically cause the data to be formatted with the windows MM/DD/YEAR date format. The credential of the holder will be deactivated on that date.

- g. A search function shall allow any one user-defined field or combination of user-defined fields to be searched to find the appropriate cardholder. The search function shall include search for a character string.
 - h. System shall have the ability to print cardholders based on and organized by the user-defined fields.
15. Code Tracing:
- a. System shall perform code tracing selectable by cardholder and by reader.
 - b. Any code may be designated as a "traced code" with no limit to how many codes can be traced.
 - c. Any reader may be designated as a "trace reader" with no limit to which or how many readers can be used for code tracing.
 - d. When a traced code is used at a trace reader, the access-granted message that usually appears on the monitor window of the Central Station shall be highlighted with a different color than regular messages. A short singular beep shall occur at the same time the highlighted message is displayed on the window.
 - e. The traced cardholder image (if image exists) shall appear on workstations when used at a trace reader.
- E. Surge And Tamper Protection
- 1. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor-entry connection to components.
 - a. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits".
 - b. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.
 - 2. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station control-unit alarm display shall identify tamper alarms and indicate locations.
- F. Central-Station Hardware
- 1. Central-Station Computer: Standard unmodified PC of modular design. The CPU word size shall be 32 bytes or larger; the CPU operating speed shall be at least 66 MHz **OR** GHz, **as directed**.
 - a. Memory: 256 MB of usable installed memory, expandable to a minimum of 1024 MB without additional chassis or power supplies.
 - b. Power Supply: Minimum capacity of 250 W.
 - c. Real-Time Clock:
 - 1) Accuracy: Plus or minus 1 minute per month.
 - 2) Time Keeping Format: 24-hour time format including seconds, minutes, hours, date, day, and month; resettable by software.
 - 3) Clock shall function for 1 year without power.
 - 4) Provide automatic time correction once every 24 hours by synchronizing clock with the Time Service Department of the U.S. Naval Observatory.
 - d. Serial Ports: Provide two TIA 232-F serial ports for general use, with additional ports as required. Data transmission rates shall be selectable under program control.
 - e. Parallel Port: An enhanced parallel port.
 - f. LAN Adapter Card: 10/100 Mbps PCI bus, internal network interface card.
 - g. Sound Card: For playback and recording of digital WAV sound files that are associated with audible warning and alarm functions.
 - h. Color Monitor: Not less than **17 inches (430 mm)**, with a minimum resolution of 1280 by 1024 pixels, noninterlaced, and a maximum dot pitch of 0.28 mm. The video card shall

- support at least 256 colors at a resolution of 1280 by 1024 at a minimum refresh rate of 70 Hz.
- i. Keyboard: With a minimum of 64 characters, standard ASCII character set based on ANSI INCITS 154.
 - j. Mouse: Standard, compatible with the installed software.
 - k. Special function keyboard attachments or special function keys to facilitate data input of the following operator tasks:
 - 1) Help.
 - 2) Alarm Acknowledge.
 - 3) Place Zone in Access.
 - 4) Place Zone in Secure.
 - 5) System Test.
 - 6) Print Reports.
 - 7) Change Operator.
 - l. Disk storage shall include the following, each with appropriate controller:
 - 1) Minimum 10 GB hard disk, maximum average access time of 10 ms.
 - 2) Floppy Disk Drive: High density, 3-1/2-inch (90-mm) size.
 - 3) PCMCIA slot with removable 500 MB media.
 - 4) 100 MB Iomega Zip drive.
 - 5) 250 MB Iomega Jaz drive.
 - m. Magnetic Tape System: 4-mm cartridge magnetic tape system with minimum 2 **OR 4 OR 12 OR 20, as directed**, GB formatted capacity per tape. Provide 10 tapes, each in a rigid cartridge with spring-loaded cover and operator-settable write-protect feature.
 - n. Modem: 56,600 bps, full duplex for asynchronous communications. With error detection, auto answer/autodial, and call-in-progress detection. Modem shall comply with requirements in ITU-T v.34, ITU-T v.42 for error correction, and ITU-T v.42 BIS for data compression standards; and shall be suitable for operating on unconditioned voice-grade telephone lines complying with 47 CFR 68.
 - o. Audible Alarm: Manufacturer's standard.
 - p. CD-ROM Drive:
 - 1) Nominal storage capacity of 650 MB.
 - 2) Data Transfer Rate: 1.2 Mbps.
 - 3) Average Access Time: 150 ms.
 - 4) Cache Memory: 256 KB.
 - 5) Data Throughput: 1 MB/second, minimum.
 - q. Dot Matrix Alarm Printer:
 - 1) Connected to the Central Station.
 - 2) Minimum of 96 characters, standard ASCII character set based on ANSI INCITS 154, and with graphics capability and programmable control of top-of-form.
 - 3) Prints in both red and black without ribbon change.
 - 4) Adjustable sprockets for paper width up to 11 inches.
 - 5) 80 columns per line, minimum speed of 200 characters per second.
 - 6) Character Spacing: Selectable at 10, 12, or 17 characters per inch.
 - 7) Paper: Sprocket-fed fan fold paper.
 - r. Report Printer:
 - 1) Connected to the Central Station and designated workstations.
 - 2) Laser printer with minimum resolution of 600 dpi.
 - 3) RAM: 2 MB, minimum.
 - 4) Printing Speed: Minimum 12 pages per minute.
 - 5) Paper Handling: Automatic sheet feeder with 250-sheet paper cassette and with automatic feed.
 - s. Interface: Bidirectional parallel and universal serial bus.
 - t. LAN Adapter Card: 10/100 Mbps internal network interface card.
2. Redundant Central Computer: One identical redundant central computer, connected in a hot standby, peer configuration. This computer shall automatically maintain its own copies of system

- software, application software, and data files. System transactions and other activities that alter system data files shall be updated to system files of redundant computer in near real-time. If central computer fails, redundant computer shall assume control immediately and automatically.
3. UPS: Self-contained; complying with requirements in Division 26 Section "Static Uninterruptible Power Supply".
 - a. Size: Provide a minimum of 6 hours of operation of the central-station equipment, including 2 hours of alarm printer operation.
 - b. Batteries: Sealed, valve regulated, recombinant, lead calcium.
 - c. Accessories:
 - 1) Transient voltage suppression.
 - 2) Input-harmonics reduction.
 - 3) Rectifier/charger.
 - 4) Battery disconnect device.
 - 5) Static bypass transfer switch.
 - 6) Internal maintenance bypass/isolation switch.
 - 7) External maintenance bypass/isolation switch.
 - 8) Output isolation transformer.
 - 9) Remote UPS monitoring.
 - 10) Battery monitoring.
 - 11) Remote battery monitoring.
- G. Standard Workstation Hardware
1. Workstation shall consist of a standard unmodified PC, with accessories and peripherals that configure the workstation for a specific duty.
 2. Workstation Computer: Standard unmodified PC of modular design. The CPU word size shall be 32 bytes or larger; the CPU operating speed shall be at least 66 MHz **OR GH, as directed**.
 - a. Memory: 512 MB of usable installed memory, expandable to a minimum of 8 GB without additional chassis or power supplies.
 - b. Power Supply: Minimum capacity of 250 W.
 - c. Real-Time Clock:
 - 1) Accuracy: Plus or minus 1 minute per month.
 - 2) Time Keeping Format: 24-hour time format including seconds, minutes, hours, date, day, and month; resettable by software.
 - 3) Provide automatic time correction once every 24 hours by synchronizing clock with the Central Station.
 - d. Serial Ports: Provide two TIA 232-F USB serial ports for general use, with additional ports as required. Data transmission rates shall be selectable under program control.
 - e. Parallel Port: An enhanced parallel port.
 - f. Sound Card: For playback and recording of digital WMP sound files that are associated with audible warning and alarm functions.
 - g. Color Monitor: Not less than **17 inches (430 mm)**, with a minimum resolution of 1280 by 1024 pixels, noninterlaced, and a maximum dot pitch of 0.28 mm. The video card shall support at least 256 colors at a resolution of 1280 by 1024 at a minimum refresh rate of 70 Hz.
 - h. Keyboard: With a minimum of 64 characters, standard ASCII character set based on ANSI INCITS 154.
 - i. Mouse: Standard, compatible with the installed software. Minimum resolution shall be 400 dpi.
 - j. Disk storage shall include the following, each with appropriate controller:
 - 1) Minimum 20 GB hard disk, maximum average access time of 10 ms.
 - 2) Floppy Disk Drive: High density, **3-1/2-inch (90-mm)** size.
 - k. CD-ROM Drive:
 - 1) Nominal storage capacity of 700 MB.
 - 2) Data Transfer Rate: 3.6 Mbps.
 - 3) Average Access Time: 150 ms.
 - 4) Cache Memory: 512 KB.

- 5) Data Throughput: 3.6 MB/second, minimum.
 - 6) Read Speed: 48x.
 - 7) Write Speed: 32x.
 - I. DVD/DVD-RW Drive:
 - 1) Nominal Storage Capacity: 4.7 GB.
 - 2) Data Transfer Rate: 3.6 Mbps.
 - 3) Cache Memory: 512 KB.
 - 4) Read Speed: 24x.
 - 5) Write Speed: 6x.
 - m. Printer:
 - 1) Connected to the Central Station and designated workstations.
 - 2) Laser printer with minimum resolution of 600 dpi.
 - 3) RAM: 8 MB, minimum.
 - 4) Printing Speed: Minimum 12 pages per minute.
 - 5) Paper Handling: Automatic sheet feeder with 250-sheet paper cassette and with automatic feed.
 - n. Interface: Bidirectional parallel, and universal serial bus.
 - o. LAN Adapter Card: 10/100 Mbps internal network interface card.
 3. Redundant Workstation: One identical redundant workstation, connected in a hot standby, peer configuration. This workstation shall automatically maintain its own copies of system software, application software, and data files. System transactions and other activities that alter system data files shall be updated to system files of redundant workstation in near real time. If its associated workstation fails, redundant workstation shall assume control immediately and automatically.
 4. UPS: Self-contained, complying with requirements in Division 26 Section "Static Uninterruptible Power Supply".
 - a. Size: Provide a minimum of 6 hours of operation of the central-station equipment, including 2 hours of alarm printer operation.
 - b. Batteries: Sealed, valve regulated, recombinant, lead calcium.
 - c. Accessories:
 - 1) Transient voltage suppression.
 - 2) Input-harmonics reduction.
 - 3) Rectifier/charger.
 - 4) Battery disconnect device.
 - 5) Static bypass transfer switch.
 - 6) Internal maintenance bypass/isolation switch.
 - 7) External maintenance bypass/isolation switch.
 - 8) Output isolation transformer.
 - 9) Remote UPS monitoring.
 - 10) Battery monitoring.
 - 11) UPS operation monitoring.
 - 12) Abnormal operation. Visible and audible indication.
 - 13) Remote battery monitoring.
- H. Communications Workstation
1. Standard workstation, modified as follows:
 - a. Additional TIA 232-F serial ports. The CPU word size shall be 32 bytes or larger; the CPU operating speed shall be at least 66 MHz. Multiplexed serial ports shall be expandable with 8 character transmit and receive buffers for each port. Total buffer size shall be a minimum of 1 MB.
 - b. Redundant workstation is not required.
 - c. Printer is not required.
 - I. Fixed Map Display: A fixed map display shall show layout of the protected facilities. Zones corresponding to those monitored by system shall be highlighted on the display. Status of each zone

shall be displayed using LEDs as required within each designated zone. An LED test switch shall be provided on the map display.

J. Controllers

1. Controllers: Intelligent peripheral control unit, complying with UL 294, that stores time, date, valid codes, access levels, and similar data downloaded from the Central Station or workstation for controlling its operation.
2. Subject to compliance with requirements in this Article, manufacturers may use multipurpose Controllers.
3. Battery Backup: Sealed, lead acid; sized to provide run time during a power outage of 90 minutes, complying with UL 924.
4. Alarm Annunciation Controller:
 - a. The Controller shall automatically restore communication within 10 seconds after an interruption with the field device network with dc line supervision on each of its alarm inputs.
 - 1) Inputs: Monitor dry contacts for changes of state that reflect alarm conditions. Provides at least eight alarm inputs, which are suitable for wiring as normally open or normally closed contacts for alarm conditions.
 - 2) Alarm-Line Supervision:
 - a) Supervise the alarm lines by monitoring each circuit for changes or disturbances in the signal, and for conditions as described in UL 1076 for line security equipment **OR** by monitoring for abnormal open, grounded, or shorted conditions, **as directed**, using dc change measurements. System shall initiate an alarm in response to an abnormal current, which is a dc change of 5 **OR** 10, **as directed**, percent or more for longer than 500 ms.
 - b) Transmit alarm-line-supervision alarm to the Central Station during the next interrogation cycle after the abnormal current condition.
 - 3) Outputs: Managed by Central Station software.
 - b. Auxiliary Equipment Power: A GFI service outlet inside the Controller enclosure.
5. Entry-Control Controller:
 - a. Function: Provide local entry-control functions including one- and two-way communications with access-control devices such as card readers, keypads, biometric personal identity verification devices, door strikes, magnetic latches, gate and door operators, and exit push-buttons.
 - 1) Operate as a stand-alone portal Controller using the downloaded database during periods of communication loss between the Controller and the field-device network.
 - 2) Accept information generated by the entry-control devices; automatically process this information to determine valid identification of the individual present at the portal:
 - a) On authentication of the credentials or information presented, check privileges of the identified individual, allowing only those actions granted as privileges.
 - b) Privileges shall include, but not be limited to, time of day control, day of week control, group control, and visitor escort control.
 - 3) Maintain a date-, time-, and Location-stamped record of each transaction. A transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.
 - b. Inputs:
 - 1) Data from entry-control devices; use this input to change modes between access and secure.
 - 2) Database downloads and updates from the Central Station that include enrollment and privilege information.
 - c. Outputs:
 - 1) Indicate success or failure of attempts to use entry-control devices and make comparisons of presented information with stored identification information.
 - 2) Grant or deny entry by sending control signals to portal-control devices and mask intrusion alarm annunciation from sensors stimulated by authorized entries.

- 3) Maintain a date-, time-, and Location-stamped record of each transaction and transmit transaction records to the Central Station.
 - 4) Door Prop Alarm: If a portal is held open for longer than 20 seconds **OR** time listed in a schedule, **as directed**, alarm sounds.
 - d. With power supplies sufficient to power at voltage and frequency required for field devices and portal-control devices.
 - e. Data Line Problems: For periods of loss of communications with Central Station, or when data transmission is degraded and generating continuous checksum errors, the Controller shall continue to control entry by accepting identifying information, making authentication decisions, checking privileges, and controlling portal-control devices.
 - 1) Store up to 1000 transactions during periods of communication loss between the Controller and access-control devices for subsequent upload to the Central Station on restoration of communication.
 - f. Controller Power: NFPA 70, Class II power supply transformer, with 12- or 24-V ac secondary, backup battery and charger.
 - 1) Backup Battery: Premium, valve-regulated, recombinant-sealed, lead-calcium battery; spill proof; with a full 1-year warranty and a pro rata 19-year warranty. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
 - 2) Backup Battery: Valve-regulated, recombinant-sealed, lead-acid battery; spill proof. With single-stage, constant-voltage-current, limited battery charger, comply with battery manufacturer's written instructions for battery terminal voltage and charging current recommendations for maximum battery life.
 - 3) Backup Power Supply Capacity: 5 **OR** 90, **as directed**, minutes of battery supply. Submit battery and charger calculations.
 - 4) Power Monitoring: Provide manual dynamic battery load test, initiated and monitored at the control center; with automatic disconnection of the Controller when battery voltage drops below Controller limits. Report by using local Controller-mounted LEDs and by communicating status to Central Station. Indicate and report the following:
 - a) Trouble Alarm: Normal power off load assumed by battery.
 - b) Trouble Alarm: Low battery.
 - c) Alarm: Power off.
- K. Secondary Alarm Annunciator
1. Secondary Alarm Annunciation Site: A workstation with limited I/O capacity, consisting of a secondary alarm annunciation workstation to allow the operator to duplicate functions of the main operator interface, and to show system status changes **OR** to display alarms or system status changes only, **as directed**.
- L. Card Readers, Credential Cards, And Keypads
1. Card-Reader Power: Powered from its associated controller, including its standby power source, and shall not dissipate more than 5 W.
 2. Response Time: Card reader shall respond to passage requests by generating a signal that is sent to the controller. Response time shall be 800 ms or less, from the time the card reader finishes reading the credential card until a response signal is generated.
 3. Enclosure: Suitable for surface, semi-flush, pedestal, or weatherproof mounting. Mounting types shall additionally be suitable for installation in the following locations:
 - a. Indoors, controlled environment.
 - b. Indoors, uncontrolled environment.
 - c. Outdoors, with built-in heaters or other cold-weather equipment to extend the operating temperature range as needed for operation at the site.

4. Display: Digital visual indicator shall provide visible and audible status indications and user prompts. Indicate power on or off, whether user passage requests have been accepted or rejected, and whether the door is locked or unlocked.
5. Stripe Swipe Readers: Bidirectional, reading cards swiped in both directions, powered by the controller. Reader shall be set up for ABA Track.
 - a. ABA Track: Magnetic stripe that is encoded on track 2, at 75-bpi density in binary-coded decimal format; for example, 5-bit, 16-character set.
 - b. Readers for outdoors shall be in a polymeric plastic enclosure with all electronics potted in plastic. Rated for operation in ambient conditions of **minus 40 to plus 160 deg F (minus 40 to plus 70 deg C)** in a humidity range of 10 to 90 percent.
6. Wiegand Swipe Reader: Set up for 33 **OR** 26-bit data cards, **as directed**. Comply with SIA AC-01.
7. Wiegand Key-Insert Reader: Set up for 33 **OR** 26-bit data cards, **as directed**.
8. Bar-Code Reader: Set up for Code 39 **OR** 93 **OR** 128, **as directed**.
9. Insert Readers: Requiring the card to be inserted from the bottom **OR** side, **as directed**, powered by the controller.
10. Touch-Plate and Proximity Readers:
 - a. Active-detection proximity card readers shall provide power to compatible credential cards through magnetic induction, and shall receive and decode a unique identification code number transmitted from the credential card.
 - b. Passive-detection proximity card readers shall use a swept-frequency, RF field generator to read the resonant frequencies of tuned circuits laminated into compatible credential cards. The resonant frequencies read shall constitute a unique identification code number.
 - c. The card reader shall read proximity cards in a range from direct contact to at least **6 inches (150 mm)** from the reader.
11. Keypads:
 - a. Entry-control keypads shall use a unique combination of alphanumeric and other symbols as an Identifier.
 - b. Keypads shall contain an integral alphanumeric/special symbols keyboard with symbols arranged in ascending ASCII-code ordinal sequence **OR** random scrambled order, **as directed**.
 - c. Communication protocol shall be compatible with the local processor.
12. Keypad Display:
 - a. Keypads shall include a digital visual indicator and shall provide visible **OR** visible and audible status indications and user prompts, **as directed**.
 - b. Display shall indicate power on or off and whether user passage requests have been accepted or rejected.
 - c. Design of the keypad display or keypad enclosure shall limit viewing angles of the keypad as follows:
 - 1) Maximum Horizontal Viewing Angle: Plus or minus 5 degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display.
 - 2) Maximum Vertical Viewing Angle: Plus or minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.
13. Keypad Response Time:
 - a. The keypad shall respond to passage requests by generating a signal to the local processor. The response time shall be 800 ms or less from the time the last alphanumeric symbol is entered until a response signal is generated.
14. Keypad Power:
 - a. The keypad shall be powered from the source as shown and shall not dissipate more than 150 W.
15. Keypad Mounting Method:
 - a. Keypads shall be suitable for surface, semi-flush, pedestal, or weatherproof mounting as required.
16. Keypad Duress Codes:
 - a. Keypads shall provide a means for users to indicate a duress situation by entering a special code.

17. Keypad and Wiegand-Swipe-Reader Combination: Designed to require an entry on the keypad before presenting the credential card.
 - a. Keypad: Allow the entry of four numeric digits **OR** alphanumeric characters, **as directed**, that are associated with a specific credential. Keypads shall contain an integral alphanumeric/special symbol keyboard with symbols arranged in ascending ASCII-code ordinal sequence **OR** random scrambled order, **as directed**. Keypad display or enclosure shall limit viewing angles of the keypad as follows:
 - 1) Maximum Horizontal Viewing Angle: Plus or minus 5 degrees or less off a vertical plane perpendicular to the plane of the face of the keypad display.
 - 2) Maximum Vertical Viewing Angle: Plus or minus 15 degrees or less off a horizontal plane perpendicular to the plane of the face of the keypad display.
 - b. Wiegand Swipe Reader: Set up for 33 OR 26-bit data cards, **as directed**, to generate a unique card identification code. Comply with SIA AC-01.
 18. Communication Protocol: Compatible with local processor.
 19. Touch-Plate and Contactless Card Reader: The reader shall have "flash" download capability to accommodate card format changes. The card reader shall have capability of transmitting data to security control panel and shall comply with ISO/IEC 7816.
 20. Credential Card Modification: Entry-control cards shall be able to be modified by lamination direct print process during the enrollment process without reduction of readability. The design of the credential cards shall allow for the addition of at least one slot or hole to accommodate the attachment of a clip for affixing the credential card to the badge holder used at the site.
 21. Specify the standard card size of 2-1/8 by 3-3/8 inches (54 by 85 mm) unless a different size card is needed. If a nonstandard size card is specified, verify that the card size will work with the photo badging system and the card reader specified.
 22. Card Size and Dimensional Stability: Credential cards shall be **2-1/8 by 3-3/8 inches (54 by 86 mm)**. The credential card material shall be dimensionally stable so that an undamaged card with deformations resulting from normal use shall be readable by the card reader.
 23. Card Material: Abrasion resistant, nonflammable, nontoxic, and impervious to solar radiation and effects of ultraviolet light.
 24. Insert additional security enhancements in paragraph below if needed. Retain card lamination and assembly equipment if needed at the site.
 25. Card Construction:
 - a. Core and laminate or monolithic construction.
 - b. Lettering, logos, and other markings shall be hot stamped into the credential material or direct printed.
 - c. Incorporate holographic images **OR** phosphorous ink, **as directed**, as a security enhancement.
 - d. Furnish equipment for on-site assembly and lamination of credential cards.
- M. Biometric Identity Verification Equipment
1. Biometric identity verification templates shall be stored as part of system database files and used as a comparative base by the identity verification equipment to generate an appropriate signal to the associated Controller.
 2. Eye Retina Scanner: Designed to incorporate positive measures to establish that the eye retina being scanned by the device belongs to a living human being.
 - a. Scanner shall not require eye contact with the retina scan equipment. Scan initiation shall be manual.
 - b. The efficiency and accuracy of scanner shall not be affected by contact lenses.
 - c. Storage space of each eye template shall not exceed 512 8-bit bytes.
 - d. Light-emitting source used for retina scans may not use light levels exceeding 20 percent of the maximum safe level established in the American Conference of Governmental Industrial Hygienists limit values.
 - e. Template Update: Eye scanner shall not automatically update a user's template. Significant changes in an individual's eye shall require re-enrollment.

- f. Scan acceptance tolerance or template match criteria shall be under system manager/operator control. Eye scanner shall determine automatically when multiple attempts are needed to verify the eye being scanned, prompting automatically for additional attempts, up to a maximum of three. Three failed attempts shall generate an entry-control alarm.
 - g. Time of Verification: Eye scanner shall respond to passage requests by generating an entry request signal to the Controller. The verification time shall be 1.5 seconds or less from the moment eye scanner initiates the scan process until eye scanner generates a response signal.
 - h. Modes: Eye scanner shall provide an enrollment mode, a recognition mode, and a code/credential verification mode.
 - 1) In the enrollment mode, eye scanner shall create an eye template for new personnel and enter the template into system database file created for that person. Template information shall be compatible with system application software.
 - 2) In the recognition mode, eye scanner shall allow passage when the eye scan data from the verification attempt match an eye template stored in database files.
 - 3) In the code/credential verification mode, eye scanner shall allow passage when the eye scan data from the verification attempt match the eye scan template associated with the identification code entered into a keypad, or they match the eye scan template associated with credential card data read by a card reader.
 - i. Reports: Eye scanner shall create and store template match scores for all transactions involving eye retinal scans. Template match scores shall be stored in the matching personnel data file used for report generation.
 - j. Power: Scanner shall be powered from its associated Controller, requiring not more than 45 W.
 - k. Enclosure: Eye scanners shall be available with enclosures that are suitable for surface, semiflush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:
 - 1) Indoors, controlled environment.
 - 2) Indoors, uncontrolled environment.
 - l. Display: LED or other type of visual indicator display shall provide visual and audible status indications and user prompts. Indicate power on/off, and whether user passage requests have been accepted or rejected.
3. Hand Geometry: Use unique human hand measurements to identify authorized, enrolled personnel. The design of this device shall incorporate positive measures to establish that the hand being measured by the device belongs to a living human being.
- a. The user's hand shall remain in full view of the user at all times. The scan process of the hand geometry device shall make three-dimensional measurements of the size and shape of the subject's hand. Scanning shall start automatically once the user's hand is properly positioned by the alignment system.
 - b. Hand geometry device shall be able to use either left or right hand for enrollment and verification.
 - c. Storage space of each eye template shall not exceed 50 8-bit bytes.
 - d. Template Update and Acceptance Tolerances: Hand geometry devices shall not automatically update a user's profile. Significant changes in an individual's hand geometry shall require re-enrollment. Hand geometry devices shall provide an adjustable acceptance tolerance or template match criteria under system manager/operator control. Hand geometry device shall determine when multiple attempts are needed for hand geometry verification and shall automatically prompt the user for additional attempts up to a maximum of three. Three failed attempts shall generate an entry-control alarm.
 - e. Average Verification Time: Hand geometry device shall respond to passage requests by generating an entry request signal to the Controller. The verification time shall be 1.5 seconds or less from the moment hand geometry device initiates the scan process until hand geometry device generates a response signal.
 - f. Modes: Hand geometry device shall provide an enrollment mode, a recognition mode, and a code/credential verification mode.

- 1) In the enrollment mode, hand geometry device shall create a hand template for new personnel and enter the template into system database file created for that person. Template information shall be compatible with system application software.
 - 2) In the recognition mode, hand geometry device shall allow passage when the hand scan data from the verification attempt match a hand geometry template stored in database files.
 - 3) In the code/credential verification mode, hand geometry device shall allow passage when the hand scan data from the verification attempt match the hand geometry template associated with the identification code entered into a keypad, or they match the hand geometry template associated with credential card data read by a card reader.
- g. Reports: Hand geometry device shall create and store template match scores for all transactions involving hand geometry scans. Template match scores shall be stored in the matching personnel data file used for report generation.
- h. Power: Hand geometry device shall be powered from its associated Controller, requiring not more than 45 W.
- i. Enclosure: Geometry readers shall be available with enclosures that are suitable for surface, semiflush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:
- 1) Indoors, controlled environment.
 - 2) Indoors, uncontrolled environment.
 - 3) Outdoors.
- j. Display: LED or other type of visual indicator display shall provide visual and audible status indications and user prompts. Indicate power on/off, and whether user passage requests have been accepted or rejected.
4. Fingerprint Analysis Scanner: Use a unique human fingerprint pattern to identify authorized, enrolled personnel. The design of this device shall incorporate positive measures to establish that the hand or fingers being scanned by the device belong to a living human being.
- a. The user's hand shall remain in full view of the user at all times. The scan process of the fingerprint analysis scanner shall perform an optical or other type of scan of the enrollee's fingers. Scanning shall start automatically when the user's fingers are properly positioned.
 - b. Storage space for each fingerprint template shall not require more than 1250 8-bit bytes.
 - c. Template Update and Acceptance Tolerances: Fingerprint analysis scanners shall not automatically update a user's profile. Significant changes in an individual's fingerprints shall require re-enrollment. Fingerprint analysis scanners shall provide an adjustable acceptance tolerance or template match criteria under system manager/operator control. Fingerprint analysis scanner shall determine when multiple attempts are needed for fingerprint verification and shall automatically prompt the enrollee for additional attempts up to a maximum of three. Three failed attempts shall generate an entry-control alarm.
 - d. Average Verification Time: Fingerprint analysis scanner shall respond to passage requests by generating an entry request signal to the Controller. The verification time shall be 2 seconds or less from the moment fingerprint analysis scanner initiates the scan process until fingerprint analysis scanner generates a response signal.
 - e. Modes: Fingerprint analysis scanner shall provide an enrollment mode, a recognition mode, and a code/credential verification mode.
 - 1) In the enrollment mode, fingerprint analysis scanner shall create a fingerprint template for new personnel and enter the template into the system database file created for that person.
 - 2) In the recognition mode, fingerprint analysis scanner shall allow passage when the fingerprint data from the verification attempt match a fingerprint template stored in database files.
 - 3) In the code/credential verification mode, fingerprint analysis scanner shall allow passage when the fingerprint data from the verification attempt match the fingerprint template associated with the identification code entered into a keypad, or they match the fingerprint template associated with credential card data read by a card reader.

- f. Reports: Fingerprint analysis device shall create and store pattern match scores for all transactions involving fingerprint scans. Template match scores shall be stored in the matching personnel data file used for report generation.
 - g. Power: Fingerprint analysis scanner shall be powered from its associated Controller, requiring not more than 45 W.
 - h. Enclosure: Scanners shall be available with enclosures that are suitable for surface, semiflush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:
 - 1) Indoors, controlled environment.
 - 2) Indoors, uncontrolled environment.
 - 3) Outdoors.
 - i. Display: LED or other type of visual indicator display shall provide visual and audible status indications and user prompts. Indicate power on/off, and whether user passage requests have been accepted or rejected.
5. Iris Scan Device: Use the unique patterns found in the iris of the human eye to identify authorized, enrolled personnel. The device shall use ambient light to capture an image of the iris of a person for identification. The resulting video image shall be compared against a stored template that was captured during the enrollment process. When the presented image is sufficiently similar to the stored image template, then the device shall authenticate the presenting individual as identified. The threshold of similarity shall be adjustable.
- a. Enrollees who wear contact lenses or eyeglasses shall not adversely affect the efficiency and accuracy of the device.
 - b. Iris scan device shall provide a means for enrollees to align their eye for identification that does not require facial contact with the device. A manual push-button shall be provided to initiate the scan process when the enrollee's eye is aligned in front of the device.
 - c. The device shall include adjustments to accommodate differences in enrollee height.
 - d. Template Update: Iris scanners shall not automatically update an enrollee's template. Significant changes in an individual's eye shall require re-enrollment.
 - e. Scan acceptance tolerance or template match criteria shall be under system manager/operator control. Iris scanner shall determine when multiple attempts are needed to verify the iris being scanned and shall automatically prompt the enrollee for additional attempts up to three. Three failed attempts shall generate an entry-control alarm.
 - f. Average Verification Time: Iris scanner shall respond to passage requests by generating an entry request signal to the Controller. The verification time shall be 1.5 seconds or less from the moment iris scanner initiates the scan process until iris scanner generates a response signal.
 - g. Modes: Iris scanner shall provide an enrollment mode, a recognition mode, and a code/credential verification mode.
 - 1) In the enrollment mode, iris scanner shall create an iris template for new personnel and enter the template into system database file created for that person. Template information shall be compatible with system application software.
 - 2) In the recognition mode, iris scanner shall allow passage when the iris scan data from the verification attempt match an iris template stored in database files.
 - 3) In the code/credential verification mode, iris scanner shall allow passage when the iris scan data from the verification attempt match the iris scan template associated with the identification code entered into a keypad, or they match the iris scan template associated with credential card data read by a card reader.
 - h. Reports: Iris imaging shall create and store template match scores for all transactions involving iris scans. Template match scores shall be stored in the matching personnel data file used for report generation.
 - i. Power: Iris scanner shall be powered from its associated Controller, requiring not more than 45 W.
 - j. Enclosure: Eye scanners shall be available with enclosures that are suitable for surface, semiflush, or pedestal mounting. Mounting types shall additionally be suitable for installation in the following locations:
 - 1) Indoors, controlled environment.

- 2) Indoors, uncontrolled environment.
- k. Display: LED or other type of visual indicator display shall provide visual and audible status indications and user prompts. Indicate power on/off, and whether user passage requests have been accepted or rejected.

N. Enrollment Center

1. Equipment for enrolling personnel into, and removing personnel from, system database, using a dedicated workstation PC **OR** central-station equipment, **as directed**.
 - a. Include equipment to enroll selected biometric credentials.
2. Enrollment equipment shall support encoding of credential cards including cryptographic and other internal security checks as required for system.
 - a. Allow only authorized entry-control enrollment personnel to access the enrollment equipment using passwords.
 - b. Include enrollment subsystem configuration controls and electronic diagnostic aids for subsystem setup and troubleshooting with the Central Station.
 - c. Enrollment station records printer shall meet requirements of the report printer.
3. Entry-Control Enrollment Software:
 - a. Shall include database management functions for the system, and shall allow an operator to change and modify the data entered in the system as needed.
 - b. Software shall not have alarm response or acknowledgment functions as a programmable function.
 - c. Multiple, password-protected access levels shall be provided at the enrollment station.
 - d. Database management and modification functions shall require a higher operator-access level than personnel enrollment functions.
 - e. Software shall provide a means for disabling the enrollment station when it is unattended, to prevent unauthorized use.
 - f. Software shall provide a method to enter personnel identifying information into the entry-control database files through enrollment stations to include a credential unit in use at the installation.
 - g. In the case of personnel identity-verification subsystems, this data shall include biometric data.
 - h. Software shall allow entry of this data into the system database files through the use of simple menu selections and data fields. The data field names shall be customized to suit user and site needs.
 - i. Personnel identity-verification subsystems selected for use with the system shall fully support the enrollment function and shall be compatible with the entry-control database files.
4. Accessories:
 - a. Steel desk-type console, swivel chair on casters, and equipment racks.
 - b. Console and Equipment Racks: Comply with EIA-310-D.
 - c. Equipment, with the exception of the printers, shall be rack mounted in the console and equipment racks.
 - d. Storage Cabinet: Locking cabinet approximately 72 inches (1830 mm) high, 36 inches (915 mm) wide, and 24 inches (610 mm) deep, with 3 adjustable shelves and 2 storage racks for storage of disks, tapes, printouts, printer paper, ribbons, manuals, and other documentation.
5. System Capacity: Number of badges shall be limited only by hard disk space. Badge templates and images shall be in color, supporting the maximum color capability of Microsoft Windows operating system.
6. Badge Configuration:
 - a. Software for badge template creation shall include a template consisting of background and predetermined locations of photographs, text objects and data fields for text, and bar-code and biometric information. Include automatic sizing of data fields placed on a badge to compensate for names, which may otherwise be too large to fit in the area designated.
 - b. Allow different badge templates to be used for each department, tenant, or visitor.

- c. As a setup option, templates shall be automatically selected for the badge, based on the group the credential holder is assigned to. Allow the operator to override the automatic template selection and use a template chosen by the operator for creating a badge.
- d. Setup shall determine which graphics and credential holder information will be displayed and where on the card it will be placed. All data in the security access system such as name, code, group, access level, and any of the 99 user-defined fields shall be selectable, with the ability to place them anywhere on the card.
- e. System shall include an importing, filing, and recall system of stored images and shapes that can be placed on the badge.
- f. Allow multiple images on same badge, including, but not be limited to, bar codes, digital photos, and signatures.
- g. Support transparent backgrounds so that image is only surrounded by the intended background, but not its immediate background.
- 7. Photo Imaging: Integral to security access.
 - a. Import images from bitmap file formats, digital cameras, TWAIN cameras, or scanners. Allow image cropping and editing, WYSIWYG badge building application, and badge print preview and printing capabilities.
 - b. System shall support multiple images stored for each credential holder, including signatures, portrait views, and profile views.
- 8. Text Objects: Badge configuration shall provide for creation of custom text as an object, allowing font selection, typing, scaling, and formatting of the text object. Formatting options shall include changing font, font size, text flow, and text alignment; bending or curving the text object into a circle or semicircle; applying 3-D effects; and applying predefined effects such as tilt, extrusion, or beveling. Text shall be placed and optionally automatically centered within any region of the badge layout.
- 9. Badges and Credential Cards:
 - a. Badges are credential cards that do not contain data to be read by card readers.
 - b. Credential cards shall store uniquely coded data used by card readers as an Identifier.
 - 1) Magnetic-Stripe Cards: Comply with ISO 7810, ISO 7811-1, ISO 7811-2, ISO 7811-3, and ISO 7811-6. Use single-layer magnetic tape material that is coated with a plastic slick protective coat and affixed to the back of the credential card near the top.
 - 2) Wiegand Wire Effect Cards: Ferromagnetic wires laminated into the credential card using binary digits specified for Wiegand readers to generate a unique credential card identification code.
 - 3) Proximity Cards **OR** Key Fobs, **as directed**: Use proximity detection without physical contact with the proximity reader for proper operation.
 - c. Allow entry-control card to be modified by lamination or direct print process during the enrollment process for use as a picture and identification badge without reduction of readability. The design shall allow for the addition of at least one slot or hole to accommodate the attachment of a clip for affixing the credential card to the type of badge holder used at the site.
 - 1) Card Size and Dimensional Stability: Standard size, **2-1/8 by 3-3/8 inches (54 by 85 mm)**; dimensionally stable so that an undamaged card with deformations resulting from normal use is readable by the card reader.
 - 2) Card Material: Abrasion resistant, nonflammable, and nontoxic; and impervious to solar radiation and effects of ultraviolet light.
 - 3) Card Construction: Core and laminate or monolithic construction. Lettering, logos, and other markings shall be hot stamped into the credential material or direct printed.
 - a) With holographic images **OR** phosphorous ink, **as directed**, as a security enhancement.
 - b) Furnish equipment for on-site assembly and lamination of credential cards.
 - 4) Card Durability and Maintainability: Designed and constructed to yield a useful lifetime of at least 5 years or 5000 insertions or swipes, whichever results in a longer

period of time. Allow credential cards to be cleaned by wiping with a sponge or cloth wetted with soap and water.

10. Card-Making Equipment: Consisting of a workstation, video camera, video-imaging equipment, and a printer.
 - a. Camera: NTSC color standard, RGB video output, 470 lines minimum horizontal resolution, and automatic white balance with full rated output under illumination of 0.5 fc (5 lx).
 - b. Video Imaging: Live-image capture software and hardware and a digital signature capture pad.
 - c. Standard workstation, modified as follows:
 - 1) Redundant workstation is not required.
 - 2) Printer is not required.
 - 3) UPS is not required.
 - 4) Sound card is not required.
 - d. Printer: Dye-sublimation resin thermal transfer, 300 dpi resolution, 16.7 million colors, accepting cards ranging in size from 2.1 by 3 inches to 2.6 by 3.7 inches (53 by 76 mm to 66 by 94 mm) and having card thickness ranging from 0.020 to 0.060 inch (0.5 to 1.5 mm). Printer shall have options for encoding magnetic stripe using tracks 1, 2, and 3. Throughput shall be not less than 60 seconds per card.

O. Push-Button Switches

1. Push-Button Switches: Momentary-contact back-lighted push buttons, with stainless-steel switch enclosures.
 - a. Electrical Ratings:
 - 1) Minimum continuous current rating of 10 A at 120 V ac or 5 A at 240-V ac.
 - 2) Contacts that will make 720 VA at 60 A and that will break at 720 VA at 10 A.
 - b. Enclosures: Flush or surface mounting. Push buttons shall be suitable for flush mounting in the switch enclosures.
 - c. Enclosures shall additionally be suitable for installation in the following locations:
 - 1) Indoors, controlled environment.
 - 2) Indoors, uncontrolled environment.
 - 3) Outdoors.
 - d. Power: Push-button switches shall be powered from their associated Controller, using dc control.

P. Door And Gate Hardware Interface

1. Exit Device with Alarm: Operation of the exit device shall generate an alarm and annunciate a local alarm. Exit device and alarm contacts are specified in Division 08 Section "Door Hardware".
2. Exit Alarm: Operation of a monitored door shall generate an alarm. Exit devices and alarm contacts are specified in Division 08 Section "Door Hardware".
3. Electric Door Strikes: Use end-of-line resistors to provide power line supervision. Signal switches shall transmit data to Controller to indicate when the bolt is not engaged and the strike mechanism is unlocked, and shall report a forced entry. Power and signal shall be from the Controller. Electric strikes are specified in Division 08 Section "Door Hardware".
4. Electromagnetic Locks: End-of-line resistors shall provide power line supervision. Lock status sensing signal shall positively indicate door is secure. Power and signal shall be from the Controller. Electromagnetic locks are specified in Division 08 Section "Door Hardware".
5. Vehicle Gate Operator: Interface electrical operation of gate with controls of this Section. Vehicle gate operators shall be connected, monitored, and controlled, by the security access Controllers. Vehicle gate and accessories are specified in Division 32 Section "Chain Link Fences And Gates".

Q. Field-Processing Software

1. Operating System:

- a. Local processors shall contain an operating system that controls and schedules that local processor's activities in real time.
 - b. Local processor shall maintain a point database in its memory that includes parameters, constraints, and the latest value or status of all points connected to that local processor.
 - c. Execution of local processor application programs shall utilize the data in memory resident files.
 - d. Operating system shall include a real-time clock function that maintains the seconds, minutes, hours, date, and month, including day of the week.
 - e. Local processor real-time clock shall be automatically synchronized with the central station at least once per day to plus or minus 10 seconds (the time synchronization shall be accomplished automatically, without operator action and without requiring system shutdown).
2. Startup Software:
 - a. Causes automatic commencement of operation without human intervention, including startup of all connected I/O functions.
 - b. Local processor restart program based on detection of power failure at the local processor shall be included in the local processor software.
 - c. Initiates operation of self-test diagnostic routines.
 - d. Upon failure of the local processor, if the database and application software are no longer resident, the local processor shall not restart and systems shall remain in the failure mode indicated until the necessary repairs are made.
 - e. If the database and application programs are resident, the local processor shall immediately resume operation.
 3. Operating Mode:
 - a. Local processors shall control and monitor inputs and outputs as specified, independent of communications with the central station or designated workstations.
 - b. Alarms, status changes, and other data shall be transmitted to the central station or designated workstations when communications circuits are operable.
 - c. If communications are not available, each local processor shall function in a stand-alone mode and operational data, including the status and alarm data normally transmitted to the central station or designated workstations, shall be stored for later transmission to the central station or designated workstations.
 - d. Storage for the latest 4000 events shall be provided at local processors, as a minimum.
 - e. Local processors shall accept software downloaded from the central station.
 - f. Panel shall support flash ROM technology to accomplish firmware downloads from a central location.
 4. Failure Mode: Upon failure for any reason, each local processor shall perform an orderly shutdown and force all local processor outputs to a predetermined (failure-mode) state, consistent with the failure modes shown and the associated control device.
 5. Functions:
 - a. Monitoring of inputs.
 - b. Control of outputs.
 - c. Reporting of alarms automatically to the central station.
 - d. Reporting of sensor and output status to central station upon request.
 - e. Maintenance of real time, automatically updated by the central station at least once a day.
 - f. Communication with the central station.
 - g. Execution of local processor resident programs.
 - h. Diagnostics.
 - i. Download and upload data to and from the central station.
- R. Field-Processing Hardware
1. Alarm Annunciation Local Processor:
 - a. Respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.

- b. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
 - c. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
 - d. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
 - e. Local processor shall report line supervision alarms to the central station.
 - f. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 milliseconds.
 - g. Alarm condition shall be transmitted to the central computer during the next interrogation cycle.
 - h. Local processor outputs shall reflect the state of commands issued by the central station.
 - i. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
 - j. Local processor shall have at least four command outputs.
 - k. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.
2. Processor Power Supply:
- a. Local processor and sensors shall be powered from an uninterruptible power source.
 - b. Uninterruptible power source shall provide eight hours of battery back-up power in the event of primary power failure and shall automatically fully recharge the batteries within 12 hours after primary power is restored.
 - c. If the facility is without an emergency generator, the uninterruptible power source shall provide 24 hours of battery backup power.
 - d. There shall be no equipment malfunctions or perturbations or loss of data during the switch from primary to battery power and vice versa.
 - e. Batteries shall be sealed, non-outgassing type.
 - f. Power supply shall be equipped with an indicator for ac input power and an indicator for dc output power.
 - g. Loss of primary power shall be reported to the central station as an alarm.
3. Auxiliary Equipment Power: A GFI service outlet shall be furnished inside the local processor's enclosure.
4. Entry-Control Local Processor:
- a. Entry-control local processor shall respond to interrogations from the field device network, recognize and store alarm status inputs until they are transmitted to the central station, and change outputs based on commands received from the central station.
 - b. Local processor shall also automatically restore communication within 10 seconds after an interruption with the field device network and provide dc line supervision on each of its alarm inputs.
 - c. Entry-control local processor shall provide local entry-control functions including communicating with field devices such as card readers, keypads, biometric personnel identity-verification devices, door strikes, magnetic latches, gate and door operators, and exit push buttons.
 - d. Processor shall also accept data from entry-control field devices as well as database downloads and updates from the central station that include enrollment and privilege information.
 - e. Processor shall send indications of successful or failed attempts to use entry-control field devices and shall make comparisons of presented information with stored identification information.
 - f. Processor shall grant or deny entry by sending control signals to portal-control devices and mask intrusion-alarm annunciation from sensors stimulated by authorized entries.

- g. Entry-control local processor shall use inputs from entry-control devices to change modes between access and secure.
 - h. Local processor shall maintain a date-time- and location-stamped record of each transaction and transmit transaction records to the central station.
 - i. Processor shall operate as a stand-alone portal controller using the downloaded database during periods of communication loss between the local processor and the central station.
 - j. Processor shall store a minimum of 4000 transactions during periods of communication loss between the local processor and the central station for subsequent upload to the central station upon restoration of communication.
 - k. Local processor inputs shall monitor dry contacts for changes of state that reflect alarm conditions.
 - l. Local processor shall have at least eight alarm inputs which allow wiring contacts as normally open or normally closed for alarm conditions; and shall also provide line supervision for each input by monitoring each input for abnormal open, grounded, or shorted conditions using dc current change measurements.
 - m. Local processor shall report line supervision alarms to the central station.
 - n. Alarms shall be reported for any condition that remains abnormal at an input for longer than 500 ms.
 - o. Alarm condition shall be transmitted to the central station during the next interrogation cycle.
 - p. Entry-control local processor shall include the necessary software drivers to communicate with entry-control field devices. Information generated by the entry-control field devices shall be accepted by the local processor and automatically processed to determine valid identification of the individual present at the portal.
 - q. Upon authentication of the credentials or information presented, the local processor shall automatically check privileges of the identified individual, allowing only those actions granted as privileges.
 - r. Privileges shall include, but are not limited to, time of day control, day of week control, group control, and visitor escort control. The local processor shall maintain a date-time- and location-stamped record of each transaction.
 - s. Transaction is defined as any successful or unsuccessful attempt to gain access through a controlled portal by the presentation of credentials or other identifying information.
 - t. Local processor outputs shall reflect the state of commands issued by the central station.
 - u. Outputs shall be a form C contact and shall include normally open and normally closed contacts.
 - v. Local processor shall have at least four addressable outputs.
 - w. The entry-control local processor shall also provide control outputs to portal-control devices.
 - x. Local processor shall be able to communicate with the central station via RS-485 or TCP/IP as a minimum.
 - y. The system manufacturer shall provide strategies for downloading database information for panel configurations and cardholder data to minimize the required download time when using IP connectivity.
- S. Tia 232-F Ascii Interface Specifications
- 1. ASCII interface shall allow TIA 232-F connections to be made between the control station operating as the host PC and any equipment that will accept TIA 232-F ASCII command strings, such as CCTV switches, intercoms, and paging systems.
 - a. Alarm inputs in system shall allow for individual programming to output up to four unique ASCII character strings through two different COM ports on the host PC.
 - b. Inputs shall have the ability to be defined to transmit a unique ASCII string for alarm and one for restore through one COM port, and a unique ASCII string for a nonalarm, abnormal condition and one for a normal condition through the same or different COM port.
 - c. Predefined ASCII character strings shall have the ability to be up to 420 characters long with full use of all the ASCII control characters, such as return or line feed. Character

strings shall be defined in the system database and then assigned to the appropriate inputs.

- d. COM ports of the host PC used to interface with external equipment shall be defined in the setup portion of the software. COM port's baud rate, word length, stop bits, and parity shall be definable in the software to match that of the external equipment.
2. Pager-System Interface: Alarms shall be able to activate a pager system with customized message for each input alarm.
 - a. TIA 232-F output shall be capable of connection to a pager interface that can be used to call a paging system or service and send a signal to a portable pager. System shall allow an individual alphanumeric message per alarm input to be sent to the paging system. This interface shall support both numeric and alphanumeric pagers.
3. Alarm-System Interface:
 - a. TIA 232-F output shall be capable of transmitting alarms from other monitoring and alarm systems to central-station automation software.
 - b. Alternatively, alarms that are received by this access-control system are to be transferred to the alarm automation system as if they were sent through a digital alarm receiver.
 - 1) System shall be able to transmit an individual message from any alarm input to a burglar-alarm automation monitoring system.
 - 2) System shall be able to append to each message a predefined set of character strings as a prefix and a suffix.

T. Floor Select Elevator Control

1. Elevator access control shall be integral to security access.
 - a. System shall be capable of providing full elevator security and control through dedicated Controllers without relying on the control-station host PC for elevator control decisions.
 - b. Access-control system shall enable and disable car calls on each floor and floor select buttons in each elevator car, restricting passengers' access to the floors where they have been given access.
 - c. System setup shall, through programming, automatically secure and unsecure each floor select button of a car individually by time and day. Each floor select button within a car shall be separately controlled so that some floors may be secure while others remain unsecure.
 - d. When a floor select button is secure, it shall require the passenger to use his/her access code and have access to that floor before the floor select button will operate. The passenger's credential shall determine which car call and floor select buttons are to be enabled, restricting access to floors unless authorized by system's access code database. Floor select button shall be enabled only in the car where the credential holder is the passenger.
2. Security access system shall record which call button is pressed, along with credential and time information.
 - a. System Controller shall record elevator access data.
 - b. The Controller shall reset all additional call buttons that may have been enabled by the user's credential.
 - c. The floor select elevator control shall allow for manual override either individually by floor or by cab as a group from a workstation PC.

U. Real-Time Guard Tour

1. Guard tour module shall provide the ability to plan, track, and route tours. Module shall input an alarm during tour if guard fails to make a station. Tours can be programmed for sequential or random tour-station order.
 - a. Guard tour setup shall define specific routes or tours for the guard to take, with time restrictions in which to reach every predefined tour station.
 - b. Guard tour activity shall be automatically logged to the central-station PC's hard drive.
 - c. If the guard is early or late to a tour station, a unique alarm per station shall appear at the Central Station to indicate the time and station.

- d. Guard tour setup shall allow the tours to be executed sequentially or in a random order with an overall time limit set for the entire tour instead of individual times for each tour station.
 - e. Setup shall allow recording of predefined responses that will display for the operator at the control station should a "Failed to Check-in" alarm occur.
 2. Guard tour module shall allow proprietary direct-connected systems to use security access-control hardware to perform guard tour management in real time.
 3. A tour station is a physical location a guard shall reach and perform an action indicating that the guard has arrived. This action, performed at the tour station, shall be 1 of 13 different events with any combination of station types within the same tour. A tour station shall be one of the following event types:
 - a. Access Granted.
 - b. Access Denied Code.
 - c. Access Denied Card plus PIN.
 - d. Access Denied Time Zone.
 - e. Access Denied Level.
 - f. Access Denied Facility.
 - g. Access Denied Code Timer.
 - h. Access Denied Anti-Passback.
 - i. Access Granted Passback Violation.
 - j. Alarm.
 - k. Restored.
 - l. Input Normal.
 - m. Input Abnormal.
 4. Guard tour and other system features shall operate simultaneously with no interference.
 5. Guard Tour Module Capacity: 999 possible guard tour definitions with each tour having up to 99 tour stations. System shall allow all 999 tours to be running at same time.
- V. Video And Camera Control
1. Control station or designated workstation displays live video from a CCTV source.
 - a. Control Buttons: On the display window, with separate control buttons to represent Left, Right, Up, Down, Zoom In, Zoom Out, Scan, and a minimum of two custom command auxiliary controls.
 - b. Provide at least seven icons to represent different types of cameras, with ability to import custom icons. Provide option for display of icons on graphic maps to represent their physical location.
 - c. Provide the alarm-handling window with a command button that will display the camera associated with the alarm point.
 2. Display mouse-selectable icons representing each camera source, to select source to be displayed. For CCTV sources that are connected to a video switcher, control station shall automatically send control commands through a COM port to display the requested camera when the camera icon is selected.
 3. Allow cameras with preset positioning to be defined by displaying a different icon for each of the presets. Provide control with Next and Previous buttons to allow operator to cycle quickly through the preset positions.
- W. Cables
1. General Cable Requirements: Comply with requirements in Division 28 Section "Conductors And Cables For Electronic Safety And Security" and as recommended by system manufacturer for integration requirement.
 2. PVC-Jacketed, TIA 232-F Cables:
 - a. Two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, and individual aluminum-foil/polyester-tape shielded pairs with 100 percent shield coverage; PVC jacket.
 - b. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.

- c. NFPA 70, Type CM.
 - d. Flame Resistance: UL 1581 vertical tray.
 3. Plenum-Type, TIA 232-F Cables:
 - a. Two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, and individual aluminum-foil/polyester-tape shielded pairs with 100 percent shield coverage; plastic jacket.
 - b. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
 - c. NFPA 70, Type CMP.
 - d. Flame Resistance: NFPA 262 flame test.
 4. PVC-Jacketed, TIA 485-A Cables: Two pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, PVC insulation, unshielded, PVC jacket, and NFPA 70, Type CMG.
 5. Plenum-Type, TIA 485-A Cables:
 - a. Two pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and fluorinated-ethylene-propylene jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 flame test.
 6. Multiconductor, PVC Readers and Wiegand Keypads Cables:
 - a. No. 22 AWG, paired and twisted multiple conductors, stranded (7x30) tinned copper conductors, semirigid PVC insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage, plus tinned copper braid shield with 65 percent shield coverage, and PVC jacket.
 - b. NFPA 70, Type CMG.
 - c. Flame Resistance: UL 1581 Vertical Tray.
 - d. For TIA 232-F applications.
 7. Paired PVC Readers and Wiegand Keypad Cables:
 - a. Three pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
 - b. NFPA 70, Type CM.
 - c. Flame Resistance: UL 1581 Vertical Tray.
 8. Paired PVC Readers and Wiegand Keypads Cable:
 - a. Three 3 pairs, twisted, No. 20 AWG, stranded (7x28) tinned copper conductors, polyethylene (polyolefin) insulation, individual aluminum foil-polyester tape shielded pairs each with No. 22 AWG, stranded (19x34) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
 - b. NFPA 70, Type CM.
 - c. Flame Resistance: UL 1581 Vertical Tray.
 9. Paired, Plenum-Type, Reader and Wiegand Keypad Cable:
 - a. Three pairs, No. 22 AWG, stranded (7x30) tinned copper conductors, plastic insulation, individual aluminum foil-polypropylene tape shielded pairs each with No. 22 AWG, stranded tinned copper drain wire, 100 percent shield coverage, and fluorinated-ethylene-propylene jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 Flame Test.
 10. Multiconductor, Plenum-Type, Reader and Wiegand Keypad Cable:
 - a. Six conductors, No. 20 AWG, stranded (7x28) tinned copper conductors, fluorinated-ethylene-propylene insulation, overall aluminum foil-polyester tape shield with 100 percent shield coverage plus tinned copper braid shield with 85 percent shield coverage, and fluorinated-ethylene-propylene jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 Flame Test.
 11. Paired Lock Cable:

- a. One pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
- b. NFPA 70, Type CMG.
- c. Flame Resistance: UL 1581 Vertical Tray.
12. Paired, Plenum-Type, Lock Cable:
 - a. One pair, twisted, No. 16 AWG, stranded (19x29) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 Flame Test.
13. Paired Lock Cable:
 - a. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
 - b. NFPA 70, Type CMG.
 - c. Flame Resistance: UL 1581 Vertical Tray.
14. Paired, Plenum-Type, Lock Cable:
 - a. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 Flame Test.
15. Paired Input Cable:
 - a. One pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, polypropylene insulation, overall aluminum foil-polyester tape shield with No. 22 AWG, stranded (7x30) tinned copper drain wire, 100 percent shield coverage, and PVC jacket.
 - b. NFPA 70, Type CMR.
 - c. Flame Resistance: UL 1666 Riser Flame Test.
16. Paired, Plenum-Type, Input Cable:
 - a. One pair, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, aluminum foil-polyester tape shield (foil side out), with No. 22 AWG drain wire, 100 percent shield coverage, and plastic jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 Flame Test.
17. Paired AC Transformer Cable:
 - a. One pair, twisted, No. 18 AWG, stranded (7x26) tinned copper conductors, PVC insulation, unshielded, and PVC jacket.
 - b. NFPA 70, Type CMG.
18. Paired, Plenum-Type, AC Transformer Cable:
 - a. One pair, twisted, No. 18 AWG, stranded (19x30) tinned copper conductors, fluorinated-ethylene-propylene insulation, unshielded, and plastic jacket.
 - b. NFPA 70, Type CMP.
 - c. Flame Resistance: NFPA 262 Flame Test.
19. Elevator Travel Cable:
 - a. Steel center core, with shielded, twisted pairs, No. 20 AWG conductor size.
 - b. Steel center support shall be preformed, flexible, low-torsion, zinc-coated, steel wire rope; insulated with 60 deg C flame-resistant PVC and covered with a nylon or cotton braid.
 - c. Shielded Pairs: Insulated copper conductors; color-coded, insulated with 60 deg C flame-resistant PVC; each pair shielded with bare copper braid for 85 percent coverage.
 - d. Electrical grade, dry jute filler
 - e. Helically wound synthetic fiber binder
 - f. Rayon or cotton braid applied with 95 percent coverage.
 - g. 60 deg C PVC jacket specifically compounded for flexibility and abrasion resistance and complying with UL VW-1 and CSA FT1 flame rated.
20. LAN Cabling:
 - a. Comply with requirements in Division 28 Section "Conductors And Cables For Electronic Safety And Security".
 - b. NFPA 262.

- X. Transformers: NFPA 70, Class II control transformers, NRTL listed. Transformers for security access-control system shall not be shared with any other system.
- Y. Cable And Asset Management Software
 - 1. Computer-based cable and asset management system, with fully integrated database and graphic capabilities, complying with requirements in TIA/EIA-606.
 - a. Document physical characteristics by recording the network, asset, user, TIA/EAI details, device configurations, and exact connections between equipment and cabling.
 - 1) Manage the physical layer of security system.
 - 2) List device configurations.
 - 3) List and display circuit connections.
 - 4) Record firestopping data.
 - 5) Record grounding and bonding connections and test data.
 - b. Information shall be presented in database view, schematic plans, or technical drawings.
 - 1) Microsoft Visio Technical Drawing shall be used as drawing and schematic plans software. Drawing symbols, system layout, and design shall comply with SIA/IAPSC AG-01.
 - c. System shall interface with the following testing and recording devices:
 - 1) Direct upload tests from circuit testing instrument into the PC.
 - 2) Direct download circuit labeling into labeling printer.
 - 2. Software shall be designed for Microsoft Windows of same version as security access system's Central Station and workstations and shall be installed on the designated PC, using a hard drive dedicated only to this management function. Hard-drive capacity shall be not less than 50 GB.

1.3 EXECUTION

- A. Examination
 - 1. Examine pathway elements intended for cables. Check raceways, cable trays, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.
 - 2. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, card readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.
 - 3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Preparation
 - 1. Comply with recommendations in SIA CP-01.
 - 2. Comply with TIA/EIA 606-A, "Administration Standard for Commercial Telecommunications Infrastructure."
 - 3. Obtain detailed Project planning forms from manufacturer of access-control system; develop custom forms to suit Project. Fill in all data available from Project plans and specifications and publish as Project planning documents for review and approval.
 - a. Record setup data for control station and workstations.
 - b. For each Location, record setup of controller features and access requirements.
 - c. Propose start and stop times for time zones and holidays, and match up access levels for doors.
 - d. Set up groups, facility codes, linking, and list inputs and outputs for each controller.
 - e. Assign action message names and compose messages.
 - f. Set up alarms. Establish interlocks between alarms, intruder detection, and video surveillance features.
 - g. Prepare and install alarm graphic maps.
 - h. Develop user-defined fields.
 - i. Develop screen layout formats.
 - j. Propose setups for guard tours and key control.

- k. Discuss badge layout options; design badges.
 - l. Complete system diagnostics and operation verification.
 - m. Prepare a specific plan for system testing, startup, and demonstration.
 - n. Develop acceptance test concept and, on approval, develop specifics of the test.
 4. Develop cable and asset-management system details; input data from construction documents. Include system schematics and Visio Technical Drawings in electronic format.
 5. In meetings with the Owner, present Project planning documents and review, adjust, and prepare final setup documents. Use final documents to set up system software.
- C. Cabling
1. Comply with NECA 1, "Good Workmanship in Electrical Contracting."
 2. Install cables and wiring according to requirements in Division 28 Section "Conductors And Cables For Electronic Safety And Security".
 3. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters. Conceal raceway and wiring except in unfinished spaces.
 4. Wiring Method: Install wiring in raceway and cable tray except within consoles, cabinets, desks, and counters and except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use NRTL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
 5. Install LAN cables using techniques, practices, and methods that are consistent with Category 5E rating of components and fiber-optic rating of components, and that ensure Category 6 performance and fiber-optic performance of completed and linked signal paths, end to end.
 6. Boxes and enclosures containing security system components or cabling, and which are easily accessible to employees or to the public, shall be provided with a lock. Boxes above ceiling level in occupied areas of the building shall not be considered to be accessible. Junction boxes and small device enclosures below ceiling level and easily accessible to employees or the public shall be covered with a suitable cover plate and secured with tamperproof screws.
 7. Install end-of-line resistors at the field device location and not at the Controller or panel location.
- D. Cable Application
1. Comply with TIA-569-B, "Commercial Building Standard for Telecommunications Pathways and Spaces."
 2. Cable application requirements are minimum requirements and shall be exceeded if recommended or required by manufacturer of system hardware.
 3. TIA 232-F Cabling: Install at a maximum distance of **50 feet (15 m)**.
 4. TIA 485-A Cabling: Install at a maximum distance of **4000 feet (1220 m)**.
 5. Card Readers and Keypads:
 - a. Install number of conductor pairs recommended by manufacturer for the functions specified.
 - b. Unless manufacturer recommends larger conductors, install No. 22 AWG wire if maximum distance from Controller to the reader is **250 feet (75 m)**, and install No. 20 AWG wire if maximum distance is **500 feet (150 m)**.
 - c. For greater distances, install "extender" or "repeater" modules recommended by manufacturer of the Controller.
 - d. Install minimum No. 18 AWG shielded cable to readers and keypads that draw 50 mA or more.
 6. Install minimum No. 16 AWG cable from Controller to electrically powered locks. Do not exceed **250 feet (75 m) OR 500 feet (150 m), as directed**.
 7. Install minimum No. 18 AWG ac power wire from transformer to Controller, with a maximum distance of **25 feet (8 m)**.
- E. Grounding
1. Comply with Division 26 Section "Grounding And Bonding For Electrical Systems".
 2. Comply with IEEE 1100, "Recommended Practice for Power and Grounding Electronic Equipment."

3. Ground cable shields, drain conductors, and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
 4. Bond shields and drain conductors to ground at only one point in each circuit.
 5. Signal Ground:
 - a. Terminal: Locate in each equipment room and wiring closet; isolate from power system and equipment grounding.
 - b. Bus: Mount on wall of main equipment room with standoff insulators.
 - c. Backbone Cable: Extend from signal ground bus to signal ground terminal in each equipment room and wiring closet.
- F. Installation
1. Push Buttons: Where multiple push buttons are housed within a single switch enclosure, they shall be stacked vertically with each push-button switch labeled with **1/4-inch- (6.4-mm-)** high text and symbols as required. Push-button switches shall be connected to the Controller associated with the portal to which they are applied, and shall operate the appropriate electric strike, electric bolt, or other facility release device.
 2. Install card readers, keypads, push buttons, and biometric readers.
- G. Identification
1. In addition to requirements in this Article, comply with applicable requirements in Division 26 Section "Identification For Electrical Systems" and with TIA/EIA-606.
 2. Using software specified in "Cable and Asset Management Software" Article, develop cable administration drawings for system identification, testing, and management. Use unique, alphanumeric designation for each cable, and label cable and jacks, connectors, and terminals to which it connects with the same designation. Use logical and systematic designations for facility's architectural arrangement.
 3. Label each terminal strip and screw terminal in each cabinet, rack, or panel.
 - a. All wiring conductors connected to terminal strips shall be individually numbered, and each cable or wiring group being extended from a panel or cabinet to a building-mounted device shall be identified with the name and number of the particular device as shown.
 - b. Each wire connected to building-mounted devices is not required to be numbered at the device if the color of the wire is consistent with the associated wire connected and numbered within the panel or cabinet.
 4. At completion, cable and asset management software shall reflect as-built conditions.
- H. System Software and Hardware
1. Develop, install, and test software and hardware, and perform database test for the complete and proper operation of systems involved. Assign software license to the Owner.
- I. Field Quality Control
1. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installation, including connections, and to assist testing.
 2. Testing and Inspections:
 - a. LAN Cable Procedures: Inspect for physical damage and test each conductor signal path for continuity and shorts. Use Class 2, bidirectional, Category 5 tester. Test for faulty connectors, splices, and terminations. Test according to TIA/EIA-568-B.1, "Commercial Building Telecommunications Cabling Standards - Part 1 General Requirements." Link performance for UTP cables must comply with minimum criteria in TIA/EIA-568-B.
 - b. Test each circuit and component of each system. Tests shall include, but are not limited to, measurements of power supply output under maximum load, signal loop resistance, and leakage to ground where applicable. System components with battery backup shall be operated on battery power for a period of not less than 10 percent of the calculated battery

- operating time. Provide special equipment and software if testing requires special or dedicated equipment.
- c. Operational Test: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.
 3. Devices and circuits will be considered defective if they do not pass tests and inspections.
 4. Prepare test and inspection reports.
- J. Startup Service
1. Engage a factory-authorized service representative to supervise and assist with startup service.
 - a. Complete installation and startup checks according to approved procedures that were developed in "Preparation" Article and with manufacturer's written instructions.
 - b. Enroll and prepare badges and access cards for Owner's operators, management, and security personnel.
- K. Protection
1. Maintain strict security during the installation of equipment and software. Rooms housing the control station, and workstations that have been powered up shall be locked and secured, with an activated burglar alarm and access-control system reporting to a Central Station complying with UL 1610, "Central-Station Burglar-Alarm Units," during periods when a qualified operator in the employ of Contractor is not present.

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SECTION 28 16 11 00a - INTRUSION DETECTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for intrusion detection. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes:
 - a. Intrusion detection with communication links to perform monitoring, alarm, and control functions.
2. Integration of other electronic and electrical systems and equipment.

C. Definitions

1. CCTV: Closed-circuit television.
2. PIR: Passive infrared.
3. RFI: Radio-frequency interference.
4. UPS: Uninterruptible power supply.
5. Control Unit: System component that monitors inputs and controls outputs through various circuits.
6. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.
7. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.
8. Protected Zone: A protected premises or an area within a protected premises that is provided with means to prevent an unwanted event.
9. Standard Intruder: A person who weighs **100 lb (45 kg)** or less and whose height is **60 inches (1525 mm)** or less; dressed in a long-sleeved shirt, slacks, and shoes unless environmental conditions at the site require protective clothing.
10. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.
11. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.
12. Zone. A defined area within a protected premises. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit.

D. Action Submittals

1. Product Data: Components for sensing, detecting, systems integration, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
2. Show Drawings: Detail assemblies of standard components that are custom assembled for specific application on the Project.
 - a. Functional Block Diagram: Show single-line interconnections between components including interconnections between components specified in this Section and those furnished under other Sections. Indicate methods used to achieve systems integration. Indicate control, signal, and data communication paths and identify programmable logic controllers **OR** networks, **as directed** and control interface devices and media to be used. Describe characteristics of network and other data communication lines.

- 1) Indicate methods used to achieve systems integration.
 - 2) Indicate control, signal, and data communication paths and identify PLCs, networks, control interface devices, and media to be used.
 - 3) Describe characteristics of network and other data communication lines.
 - 4) Describe methods used to protect against power outages and transient voltages including types and ratings of isolation and surge suppression devices used in data, communication, signal, control, and ac and dc power circuits.
- b. Raceway Riser Diagrams: Detail raceway runs required for intrusion detection and for systems integration. Include designation of devices connected by raceway, raceway type and size, and type and size of wire and cable fill for each raceway run.
 - c. UPS: Sizing calculations.
 - d. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building. Include room layout for master control-unit console, terminal cabinet, racks, and UPS.
 - e. Master Control-Unit Console Layout: Show required artwork and device identification.
 - f. Device Address List: Coordinate with final system programming.
 - g. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.
 - h. Details of surge-protection devices and their installation.
 - i. Sensor detection patterns and adjustment ranges.
3. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are unacceptable.
 4. Samples for Initial Selection: For units with factory-applied color finishes.
 5. Samples for Verification: For each type of exposed finish required.
- E. Information Submittals
1. Qualification Data: For Installer **OR** intrusion detection systems integrator **OR** testing agency, **as directed**.
 2. Field quality-control reports.
 3. Warranty: Sample of special warranty.
 4. Other Information Submittals:
 - a. Test Plan and Schedule: Test plan defining all tests required to ensure that system meets technical, operational, and performance specifications within 60 days of date of Contract award.
 - b. Examination reports documenting inspections of substrates, areas, and conditions.
 - c. Anchor inspection reports documenting inspections of built-in and cast-in anchors.
- F. Closeout Submittals
1. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals," include the following:
 - a. Data for each type of product, including features and operating sequences, both automatic and manual.
 - b. Master control-unit hardware and software data.
- G. Quality Assurance
1. Installer Qualifications:
 - a. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association **OR** possess the standards and experience for certification, **as directed**.
 - b. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

2. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
3. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the National Burglar & Fire Alarm Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to Owner's insurance underwriter.
 - a. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar & Fire Alarm Association **OR** possess the standards and experience for certification, **as directed**, to supervise on-site testing specified in Part 3.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
5. Control Units, Devices, and Communications with Monitoring Station: Listed and labeled by a qualified testing agency for compliance with SIA CP-01.
6. FM Global Compliance: FMG-Approved and -labeled intrusion detection devices and equipment.
7. Comply with NFPA 70.

H. Project Conditions

1. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Altitude: Sea level to **4000 feet (1220 m)**.
 - b. Master Control Unit: Rated for continuous operation in an ambient of **60 to 85 deg F (16 to 29 deg C)** and a relative humidity of 20 to 80 percent, noncondensing.
 - c. Interior, Controlled Environment: System components, except master station control unit, installed in air-conditioned **OR** temperature-controlled, **as directed**, interior environments shall be rated for continuous operation in ambients of **36 to 122 deg F (2 to 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
 - d. Interior, Uncontrolled Environment: System components installed in non-air-conditioned **OR** non-temperature-controlled, **as directed**, interior environments shall be rated for continuous operation in ambients of **0 to 122 deg F (minus 18 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing.
 - e. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambients of **minus 30 to plus 122 deg F (minus 34 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, condensing. Comply with UL 294 and UL 639 for outdoor-use equipment. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to **85 mph (137 km/h)** and snow cover up to **24 inches (610 mm)** thick.
 - f. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings shall be rated, listed, and installed according to NFPA 70.

I. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.
2. Warranty Period: Two years from date of Final Completion.

1.2 PRODUCTS

A. Functional Description Of System

1. Description: Hard-wired **OR** Multiplexed, modular, microprocessor-based controls, intrusion sensors and detection devices, and communication links to perform monitoring, alarm, and control functions.

2. Supervision: System components shall be continuously monitored for normal, alarm, supervisory, and trouble conditions. Indicate deviations from normal conditions at any location in system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.
 - a. Alarm Signal: Display at master station control unit and actuate audible and visual alarm devices.
 - b. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or controller failure.
 - c. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or controller.
3. System Control: Master station control unit shall directly monitor intrusion detection units and connecting wiring.

OR

System Control: Master station control unit shall directly monitor intrusion detection devices, perimeter detection units **OR** controllers associated with perimeter detection units, **as directed**, and connecting wiring in a multiplexed distributed control system or as part of a network.
4. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance.
5. Operator Commands:
 - a. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
 - b. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
 - c. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
 - d. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
 - e. Protected Zone Test: Initiate operational test of a specific protected zone.
 - f. System Test: Initiate system-wide operational test.
 - g. Print Reports.
6. Timed Control at Master station control unit: Allow automatically timed "secure" and "access" functions of selected protected zones.
7. Automatic Control of Related Systems: Alarm or supervisory signals from certain intrusion detection devices control the following functions in related systems:
 - a. Switch selected lights.
 - b. Shift elevator control to a different mode.
 - c. Open a signal path between certain intercommunication stations.
 - d. Shift sound system to "listening mode" and open a signal path to certain system speakers.
 - e. Switch signal to selected monitor from closed-circuit television camera in vicinity of sensor signaling an alarm.
8. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When master station control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands shall initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.
9. Response Time: Two seconds between actuation of any alarm and its indication at master station control unit.
10. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, and sensors from master station control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at

master station control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

11. Programmed Secure-Access Control: System shall be programmable to automatically change status of various combinations of protected zones between secure and access conditions at scheduled times. Status changes may be preset for repetitive, daily, and weekly; specially scheduled operations may be preset up to a year in advance. Manual secure-access control stations shall override programmed settings.
12. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.

B. System Component Requirements

1. Compatibility: Detection devices and their communication features, connecting wiring, and master station control unit shall be selected and configured with accessories for full compatibility with existing equipment:
2. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.
 - a. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits".
 - b. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.
3. Intrusion Detection Units: Listed and labeled by a qualified testing agency for compliance with UL 639.
4. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.
5. Tamper Protection: Tamper switches on detection devices, controllers, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central-station control-unit alarm display shall identify tamper alarms and indicate locations.
6. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to master station control unit.
7. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to master station control unit as an alarm signal.
8. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to master station control unit.
9. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at master station control unit for calibration, sensitivity, and alarm condition.

C. Enclosures

1. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.
2. Interior Electronics: NEMA 250, Type 12.
3. Exterior Electronics: NEMA 250, Type 4X fiberglass **OR** stainless steel, **as directed**.
4. Corrosion Resistant: NEMA 250, Type 4X PVC **OR** stainless steel, **as directed**.
5. Screw Covers: Where enclosures are accessible to inmates, secure with security fasteners of type appropriate for enclosure.

D. Secure And Access Devices

1. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.
 2. Key-Operated Switch: Change protected zone between secure and access conditions.
- E. Door And Window Switches
1. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of two **OR** three, **as directed**, encapsulated reed switches shall resist compromise from introduction of foreign magnetic fields.
 2. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.
 3. Overhead Door Switch: Balanced-magnetic type, listed for outdoor locations, and having door-mounting magnet and floor-mounting switch unit.
 4. Remote Test: Simulate movement of actuating magnet from master station control unit.
- F. PIR Sensors
1. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.
 2. Description: Sensors detect intrusion by monitoring infrared wavelengths emitted from a human body within their protected zone and by being insensitive to general thermal variations.
 - a. Wall-Mounting Unit Maximum Detection Range: 125 percent of indicated distance for individual units and not less than **50 feet (15 m)**. Provide adjustable coverage pattern as indicated.
 - b. Ceiling-Mounting Unit Spot-Detection Pattern: Full 360-degree conical.
 - c. Ceiling-Mounting Unit Pattern Size: **84-inch (2135-mm)** diameter at floor level for units mounted **96 inches (2440 mm)** above floor; **18-foot (5.5-m)** diameter at floor level for units mounted **25 feet (7.6 m)** above floor.
 3. Device Performance:
 - a. Sensitivity: Adjustable pattern coverage to detect a change in temperature of **2 deg F (1deg C)** or less, and standard-intruder movement within sensor's detection patterns at any speed between **0.3 to 7.5 fps (0.09 to 2.3 m/s)** across 2 adjacent segments of detector's field of view.
 - b. Test Indicator: LED test indicator that is not visible during normal operation. When visible, indicator shall light when sensor detects an intruder. Locate test enabling switch under sensor housing cover.
 - c. Remote Test: When initiated by master station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.
- G. Microwave Intrusion Detectors (Interior)
1. Device Performance: Microwave transmitter establishes an electromagnetic field in an adjustable detection pattern and detects intrusion by monitoring changes in that pattern.
 - a. Sensitivity: Adjustable, able to detect standard-intruder movement within sensor's detection pattern at any speed between **0.3 to 7.5 fps (0.09 to 2.3 m/s)**. Sensor sensitivity adjustments shall be accessible only when sensor housing is removed, and sensors shall comply with 47 CFR 15.
 - b. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test-enabling switch under sensor housing cover.
 - c. Remote Test: When initiated by master station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.
- H. Acoustic-Type, Glass-Break Sensors
1. Listed and labeled by a qualified testing agency for compliance with SIA GB-01.
 2. Device Performance: Detect unique, airborne acoustic energy spectrum caused by breaking glass.

- a. Sensor Element: Microprocessor-based, digital device to detect breakage of plate, laminate, tempered, and wired glass while rejecting common causes of false alarms. Detection pattern shall be at least a **20-foot (6-m)** range.
 - b. Hookup Cable: Factory installed, not less than **72 inches (1830 mm)**.
 - c. Activation Indicator: LED on sensor housing that lights when responding to vibrations, remaining on until manually reset at sensor controller or at master station control unit.
 - d. Controller: Integral with sensor housing or in a separate assembly, locally adjustable by control under housing cover.
 - e. Glass-Break Simulator: A device to induce frequencies into protected glass pane that simulate breaking glass without causing damage to glass.
- I. Piezoelectric-Type, Glass-Break Sensors
1. Listed and labeled by a qualified testing agency for compliance with SIA GB-01.
 2. Device Performance: Detect unique, high-frequency vibrations caused by breaking glass.
 - a. Sensor Element: Piezoelectric crystals in a housing designed to mount directly to glass surface with adhesive provided by element manufacturer. Circular detection pattern, with at least a **60-inch (1525-mm)** radius on a continuous glass pane. Sensor element shall not be larger than **4 sq. in. (25.80 sq. cm)**.
 - b. Hookup Cable: Factory installed, not less than **72 inches (1830 mm)**.
 - c. Activation Indicator: LED on sensor housing that lights when responding to vibrations, remaining on until manually reset at sensor controller or at master station control unit.
 - d. Controller: Integral with sensor housing or in a separate assembly, locally adjustable by control under housing cover.
 - e. Glass-Break Simulator: A device to induce frequencies into protected glass pane that simulate breaking glass without causing damage to glass.
- J. Vibration Sensors
1. Listed and labeled by a qualified testing agency for compliance with SIA GB-01.
 2. Description: A sensor controller and piezoelectric crystal sensor elements that are designed to be rigidly mounted to structure being protected.
 3. Device Performance: Detects high-frequency vibrations generated by use of such tools as oxyacetylene torches, oxygen lances, high-speed drills and saws, and explosives that penetrate a structure while not responding to any other mechanical vibration.
 - a. Circular detection pattern, with at least a **72-inch (1830-mm)** radius on protected structure.
 - b. Hookup Cable: Factory installed, not less than **72 inches (1830 mm)**.
 - c. Controller: Integral with sensor housing or in a separate assembly, locally adjustable by control under housing cover.
 - d. Glass-Break Simulator: A device to induce frequencies to protected glass pane that simulate breaking glass without causing damage to glass.
- K. Photoelectric Sensors
1. Device Performance: Detect an interruption of a pulsed, infrared, light beam that links transmitter and receiver.
 - a. Sensitivity: Detect standard-intruder movement within sensor's detection patterns at any speed of less than **7.5 fps (2.3 m/s)** though the beam. Allow installation of multiple sensors within same protected zone that will not interfere with each other.
 - b. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test enabling switch under sensor housing cover.
 - c. Remote Test: When initiated by master station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.
- L. Microwave-PIR Dual-Technology Motion Sensors

1. Description: Single unit combining a sensor that detects changes in microwave signals and a PIR sensor that detects changes in ambient level of infrared emissions caused by standard-intruder movement within detection pattern.
2. Device Performance: An alarm is transmitted when either sensor detects a standard intruder within a period of three to eight seconds from when the other sensor detects a standard intruder.
 - a. Minimum Detection Pattern: A room **20 by 30 feet (6 by 9 m)**.
 - b. PIR Sensor Sensitivity: Adjustable pattern coverage to detect a change in temperature of **2 deg F (1 deg C)** or less, and standard-intruder movement within sensor's detection patterns at any speed between **0.3 to 7.5 fps (0.09 to 2.3 m/s)** across 2 adjacent segments of detector's field of view.
 - c. Microwave Sensor Sensitivity: Adjustable, able to detect standard-intruder movement within sensor's detection pattern at any speed between **0.3 to 7.5 fps (0.09 to 2.3 m/s)**. Sensor sensitivity adjustments shall be accessible only when sensor housing is removed, and sensors shall comply with 47 CFR 15.
 - d. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test enabling switch under sensor housing cover.
 - e. Remote Test: When initiated by master station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

M. Duress-Alarm Switches

1. Description: A switch with a shroud over the activating lever that allows an individual to covertly send a duress signal to master station control unit, with no visible or audible indication when activated. Switch shall lock in activated position until reset with a key.
 - a. Minimum Switch Rating: 50,000 operations.
 - b. Foot Rail: Foot activated, floor mounting.
 - c. Push Button: Finger activated, suitable for mounting on horizontal or vertical surface.

N. Video Motion Sensor (Interior)

1. Device Performance: Detect changes in video signal within a user-defined protected zone. Video inputs shall be composite video as defined in EIA 170. Provide an alarm output for each video input.
 - a. Detect movement within protected zone of standard intruders wearing clothing with a reflectivity that differs from that of background scene by a factor of 2. Reject all other changes in video signal.
 - b. Modular design that allows for expansion or modification of number of inputs.
 - c. Controls:
 - 1) Number of detection zones.
 - 2) Size of detection zones.
 - 3) Sensitivity of detection of each protected zone.
 - d. Mounting: Standard **19-inch (480-mm)** rack as described in EIA 310.

O. Master Control Units

1. Description: Supervise sensors and detection subsystems and their connecting communication links, status control (secure or access) of sensors and detector subsystems, activation of alarms and supervisory and trouble signals, and other indicated functions.
 - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Addressable initiation devices that communicate device identity and status.
 - d. Control circuits for operation of mechanical equipment in response to an alarm.
2. Construction: Freestanding equipment rack **OR** Desk-mounted console, **as directed** modular, with separate and independent alarm and supervisory system modules. Alarm-initiating protected

- zone boards shall be plug-in cards. Arrangements that require removal of field wiring for module replacement are unacceptable.
3. Comply with UL 609 **OR** UL 1023 **OR** UL 1076, **as directed**.
 4. Console Controls and Displays: Arranged for interface between human operator at master control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - a. Annunciator and Display: LCD, one **OR** two **OR** three line(s), as directed of 40 **OR** 80 characters, as directed, minimum.
 - b. Keypad: Arranged to permit entry and execution of programming, display, and control commands.
 - c. Control-Unit Network: Automatic communication of alarm, status changes, commands, and other communications required for system operation. Communication shall return to normal after partial or total network interruption such as power loss or transient event. Total or partial signaling network failures shall identify the failure and record the failure at the annunciator display and at the system printer.
 - d. Field Device Network: Communicate between the control unit and field devices of the system. Communications shall consist of alarm, network status, and status and control of field-mounted processors. Each field-mounted device shall be interrogated during each interrogation cycle.
 - e. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists. Include the following:
 - 1) Acknowledge alarm.
 - 2) Silence alarm.
 - 3) System reset.
 - 4) LED test.
 - f. Timing Unit: Solid state, programmable, 365 days.
 - g. Confirmation: Relays, contactors, and other control devices shall have auxiliary contacts that provide confirmation signals to system for their on or off status. Software shall interpret such signals, display equipment status, and initiate failure signals.
 - h. Alarm Indication: Audible signal sounds and a plain-language identification **OR** LED **OR** LCD **OR** cathode ray-tube display at master control unit identifying the protected zone **OR** addressable detector, **as directed** originating the alarm. Annunciator panel displays a common alarm light and sounds an audible tone.
 - i. Alarm activation sounds a bell or siren or strobe **OR** bell or siren and strobe, **as directed**.
 5. Protected Zones: Quantity of alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 25 percent.
 6. Power Supply Circuits: Master station control units shall provide power for remote power-consuming detection devices. Circuit capacity shall be adequate for at least a 25 percent increase in load.
 7. UPS: Comply with Division 26 Section "Static Uninterruptible Power Supply". UPS shall be sized to provide a minimum of six hours of central-station control-unit operation.
 8. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than **1 inch (25 mm)** high. Identify, with permanent labels, individual components and modules within cabinets.
 9. Transmission to Monitoring Station: A communications device to automatically transmit alarm, supervisory, and trouble signals to the monitoring station, operating over a standard voice grade telephone leased line. Comply with UL 1635.
 10. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print

system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

P. Audible And Visual Alarm Devices

1. Bell: **10 inches (254 mm)** in diameter, rated to produce a minimum sound output of 84 dB at **10 feet (3 m)** from master control unit.
 - a. Enclosure: Weather-resistant steel box equipped with tamper switches on cover and on back of box.
2. Klaxon Weatherproof Motor-Driven Hooter: UL listed, rated to produce a minimum sound output of 120 dB at **3 feet (1 m)**, plus or minus 3 dB, at a frequency of 470 Hz. Rated for intermittent use: two minutes on and five minutes off.
 - a. Designed for use in industrial areas and in high-noise, severe-weather marine environments.
3. Siren: 30-W speaker with siren driver, rated to produce a minimum sound output of 103 dB at **10 feet (3 m)** from master control unit.
 - a. Enclosure: Weather-resistant steel box with tamper switches on cover and on back of box.
4. Strobe: Xenon light complying with UL 1638, with a clear polycarbonate lens.
 - a. Light Output: 115 cd, minimum.
 - b. Flash Rate: 60 per minute.

Q. Security Fasteners

1. Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength.
2. Drive System Types: Pinned Torx-Plus **OR** pinned Torx **OR** pinned hex (Allen), **as directed**.
3. Socket Flat Countersunk Head Fasteners:
 - a. Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - b. Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
4. Socket Button Head Fasteners:
 - a. Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - b. Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
5. Socket Head Cap Fasteners:
 - a. Heat-treated alloy steel, **ASTM A 574 (ASTM A 574M)**.
 - b. Stainless steel, **ASTM F 837 (ASTM F 837M)**, Group 1 CW.
6. Protective Coatings for Heat-Treated Alloy Steel:
 - a. Zinc chromate, ASTM F 1135, Grade 3 or Grade 4, for exterior applications and interior applications where indicated.
 - b. Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide unless otherwise indicated.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.
2. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.
3. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.
4. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.
 - a. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.

- b. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.
 5. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.
 6. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. System Integration
 1. Electronic door hardware.
 2. Elevators.
 3. Network lighting controls.
 4. Intercommunications and program systems.
 5. Public address and mass notification systems.
 6. Access control.
 7. Fire-alarm system.
 8. Perimeter security system.
 9. Video surveillance.
- C. System Installation
 1. Comply with UL 681 and NFPA 731.
 2. Equipment Mounting: Install master control unit on finished floor with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 - a. Comply with requirements for seismic-restraint devices specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 3. Install wall-mounted equipment, with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 - a. Comply with requirements for seismic-restraint devices specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 4. Connecting to Existing Equipment: Verify that existing perimeter security system is operational before making changes or connections.
 - a. Connect new equipment to existing control panel in existing part of the building.
 - b. Connect new equipment to existing monitoring equipment at the Supervising Station.
 - c. Expand, modify, and supplement existing control **OR** monitoring equipment, **as directed** as necessary to extend existing control **OR** monitoring functions, **as directed** to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
 5. Security Fasteners: Where accessible to inmates, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials.
- D. Wiring Installation
 1. Wiring Method: Install wiring in metal raceways according to Division 26 Section "Raceway And Boxes For Electrical Systems". Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be **1/2 inch (13 mm)**. Control and data transmission wiring shall not share conduit with other building wiring systems.
 2. Wiring Method: Install wiring in raceways except in accessible indoor ceiling spaces and in interior hollow gypsum board partitions where cable may be used. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be **1/2 inch (13 mm)**. Control and data transmission wiring shall not share conduit with other building wiring systems.
 3. Wiring Method: Cable, concealed in accessible ceilings, walls, and floors when possible.
 4. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according

to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

5. Wires and Cables:
 - a. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.
 - b. 120-V Power Wiring: Install according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables", unless otherwise indicated.
 - c. Control and Signal Transmission Conductors: Install unshielded, twisted-pair cable, unless otherwise indicated or if manufacturer recommends shielded cable, according to Division 28 Section "Conductors And Cables For Electronic Safety And Security".
 - d. Data and Television Signal Transmission Cables: Install according to Division 28 Section "Conductors And Cables For Electronic Safety And Security".
6. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
7. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.
8. Identify components with engraved, laminated-plastic or metal nameplate for master station control unit and each terminal cabinet, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 26 Section "Identification For Electrical Systems".

E. Identification

1. Identify system components, wiring, cabling, and terminals. Comply with identification requirements as specified in Division 26 Section "Identification For Electrical Systems".
2. Install instructions frame in a location visible from master control unit.

F. Grounding

1. Ground the master control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to master control unit.
2. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
3. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.
4. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".

G. Field Quality Control

1. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
 - a. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.
2. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections.
3. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect test, and adjust components, assemblies, and equipment installations connections.
4. Perform tests and inspections.
 - a. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
5. Test and Inspections: Comply with provisions in NFPA 731, Ch.9, "Testing and Inspections."

- a. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
 - b. Test Methods: Intrusion detection systems and other systems and equipment that are associated with detection and accessory equipment shall be tested according to Table "Test Methods" and Table "Test Methods of Initiating Devices."
 6. Documentation: Comply with provisions in NFPA 731, Ch. 4, "Documentation."
 7. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.
 - 8.
- H. Adjusting
1. Occupancy Adjustments: When requested within 12 months of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.
- I. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain intrusion detection system. Comply with documentation provisions in NFPA 731, Ch.4, "Documentation and User Training."

END OF SECTION 28 16 11 00a

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SECTION 28 16 11 00b - PERIMETER SECURITY

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for perimeter security. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Perimeter detection and alarm system.
 - b. Integration of other electronic and electrical systems and equipment.

C. Definitions

1. CCTV: Closed-circuit television.
2. EMI: Electromagnetic interference.
3. PIR: Passive infrared.
4. RFI: Radio-frequency interference.
5. UPS: Uninterruptible power supply.
6. Control Unit: System component that monitors inputs and controls outputs through various circuits.
7. Master Control Unit: System component that accepts inputs from other control units and may also perform control-unit functions. The unit has limited capacity for the number of protected zones and is installed at an unattended location or at a location where it is not the attendant's primary function to monitor the security system.
8. Monitoring Station: Facility that receives signals and has personnel in attendance at all times to respond to signals. A central station is a monitoring station that is listed.
9. Protected Zone: A protected premises or an area within a protected premise that is provided with means to prevent an unwanted event.
10. Standard Intruder: A person who weighs **100 lb (45 kg)** or less and whose height is **60 inches (1525 mm)** or less; dressed in a long-sleeved shirt, slacks, and shoes unless environmental conditions at the site require protective clothing.
11. Standard-Intruder Movement: Any movement, such as walking, running, crawling, rolling, or jumping, of a "standard intruder" in a protected zone.
12. Systems Integration: The bringing together of components of several systems containing interacting components to achieve indicated functional operation of combined systems.
13. Zone. A defined area within a protected premise. It is a space or area for which an intrusion must be detected and uniquely identified. The sensor or group of sensors must then be assigned to perform the detection, and any interface equipment between sensors and communication must link to master control unit.

D. Action Submittals

1. Product Data: Components for sensing, detecting, systems integration, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.
 - a. Functional Block Diagram: Show single-line interconnections between components including interconnections between components specified in this Section and those furnished under other Sections. Indicate methods used to achieve systems integration. Indicate control, signal, and data communication paths and identify programmable logic controllers **OR** networks, **as directed**, and control interface devices and media to be used. Describe characteristics of network and other data communication lines.

- 1) Indicate methods used to achieve systems integration.
 - 2) Indicate control, signal, and data communication paths and identify PLCs, networks, control interface devices, and media to be used.
 - 3) Describe characteristics of network and other data communication lines.
 - 4) Describe methods used to protect against power outages and transient voltages including types and ratings of isolation and surge suppression devices used in data, communication, signal, control, and ac and dc power circuits.
- b. Raceway Riser Diagrams: Detail raceway runs required for perimeter security and for systems integration. Include designation of devices connected by raceway, raceway type, and size, and type and size of wire and cable fill for each raceway run.
 - c. UPS: Sizing calculations.
 - d. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building. Include room layout for central-station control-unit console, terminal cabinet, racks, and UPS.
 - e. Master Control Unit Console Layout: Show required artwork and device identification.
 - f. Device Address List: Coordinate with final system programming.
 - g. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.
 - h. Details of surge-protection devices and their installation.
 - i. Sensor detection patterns and adjustment ranges.
3. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.
 4. Samples for Initial Selection: For units with factory-applied color finishes.
 5. Samples for Verification: For each type of exposed finish required.

E. Informational Submittals

1. Qualification Data: For Installer, security systems integrator, and testing agency.
2. Field quality-control test reports.
3. Warranty: Sample of special warranty.
4. Other Information Submittals:
 - a. Test Plan and Schedule: Test plan defining all tests required to ensure that system meets technical, operational, and performance specifications within 60 days of date of Contract award.
 - b. Examination reports documenting inspections of substrates, areas, and conditions.
 - c. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

F. Closeout Submittals

1. Operation and Maintenance Data: For perimeter security system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation And Maintenance Data", include the following:
 - a. Data for each type of product, including features and operating sequences, both automatic and manual.
 - b. Master control-unit hardware and software data.

G. Maintenance Material Submittals

1. One spare control-unit board(s) for strain-sensitive cable system and one cable repair and splice kit(s).
2. One of each type of microwave sensor and one of each type of power supply for microwave perimeter security system.
3. One of each spare sensor and PIR unit and one alignment telescope(s) for long-range PIR system.
4. One spare control-unit board(s) for electrostatic-field system.

5. One spare control-unit board(s) for buried, ported coaxial cable system, **10 feet (3 m)** of cable; and one cable repair and splice kit(s).
6. Fuses: Three of each kind and size.
7. Tool Kit: Provide six sets of tools for use with security fasteners, each packaged in a compartmented kit configured for easy handling and storage.
8. Security Fasteners: Furnish no fewer than 1 box for every 50 boxes or fraction thereof, of each type and size of security fastener installed.

H. Quality Assurance

1. Installer Qualifications:
 - a. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.
 - b. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
2. Security Systems Integrator Qualifications: An experienced perimeter security equipment supplier and Installer who has completed systems integration work for installations similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
3. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. FMG Compliance: FMG-approved and -labeled perimeter security devices and equipment.
6. Comply with NFPA 70.

I. Project Conditions

1. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Altitude: Sea level to **4000 feet (1220 m)**.
 - b. Master Control Unit: Rated for continuous operation in an ambient of **60 to 85 deg F (16 to 29 deg C)** and a relative humidity of 20 to 80 percent, noncondensing.
 - c. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambients of **minus 30 to plus 122 deg F (minus 34 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, condensing. Comply with UL 294 and UL 639 for outdoor-use equipment. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to **85 mph (137 km/h)** and snow cover up to **24 inches (610 mm)** thick.
 - d. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings shall be rated, listed, and installed according to NFPA 70.

J. Warranty:

1. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of perimeter security devices and equipment that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Two years from date of Final Completion.

1.2 PRODUCTS

A. Functional Description Of System

1. Description: Perimeter protection system with fence-mounted systems **OR** buried sensors **OR** volumetric detectors, **as directed**, integrated into a single perimeter detection and alarm system.
2. Supervision: System components shall be continuously monitored for normal, alarm, supervisory and trouble conditions. Indicate deviations from normal conditions at any location in

- system. Indication includes identification of device or circuit in which deviation has occurred and whether deviation is an alarm or malfunction.
- a. Alarm Signal: Display at central-station control unit and actuate audible and visual alarm devices.
 - b. Trouble Condition Signal: Distinct from other signals, indicating that system is not fully functional. Trouble signal shall indicate system problems such as battery failure, open or shorted transmission line conductors, or controller failure.
 - c. Supervisory Condition Signal: Distinct from other signals, indicating an abnormal condition as specified for the particular device or controller.
3. System Control: Central-station control unit shall directly monitor gate detection devices, perimeter detection units, and connecting wiring.
- OR**
- System Control: One or more remote, addressable controllers operate under control of a central-station control-unit microcomputer in a multiplexed distributed control system or as part of a network. Controllers shall receive programming by multiplexed signal transmission from a central-station control-unit microprocessor or microcomputer and hold data in nonvolatile memory. System shall automatically reboot program without error or loss of status or alarm data after any system disturbance, **as directed**.
4. Operator Commands:
 - a. Help with System Operation: Display all commands available to operator. Help command, followed by a specific command, shall produce a short explanation of the purpose, use, and system reaction to that command.
 - b. Acknowledge Alarm: To indicate that alarm message has been observed by operator.
 - c. Place Protected Zone in Access: Disable all intrusion-alarm circuits of a specific protected zone. Tamper circuits may not be disabled by operator.
 - d. Place Protected Zone in Secure: Activate all intrusion-alarm circuits of a protected zone.
 - e. Protected Zone Test: Initiate operational test of a specific protected zone.
 - f. System Test: Initiate system-wide operational test.
 - g. Print Reports.
 5. Timed Control at Central-Station Control Unit: Allow automatically timed "secure" and "access" functions of selected protected zones.
 6. Automatic Control of Related Systems: Alarm or supervisory signals from certain perimeter security devices control the following functions in related systems:
 - a. Switch selected lights.
 - b. Open a signal path between certain intercommunication stations.
 - c. Shift sound system to "listening mode" and open a signal path to certain system speakers.
 - d. Switch signal to selected monitor from closed-circuit television camera in vicinity of sensor signaling an alarm.
 7. Printed Record of Events: Print a record of alarm, supervisory, and trouble events on system printer. Sort and report by protected zone, device, and function. When central-station control unit receives a signal, print a report of alarm, supervisory, or trouble condition. Report type of signal (alarm, supervisory, or trouble), protected zone description, date, and time of occurrence. Differentiate alarm signals from other indications. When system is reset, report reset event with the same information concerning device, location, date, and time. Commands shall initiate the reporting of a list of current alarm, supervisory, and trouble conditions in system or a log of past events.
 8. Response Time: Two seconds between actuation of any alarm and its indication at central-station control unit.
 9. Circuit Supervision: Supervise all signal and data transmission lines, links with other systems, controllers, and sensors from central-station control unit. Indicate circuit and detection device faults with both protected zone and trouble signals, sound a distinctive audible tone, and illuminate an LED. Maximum permissible elapsed time between occurrence of a trouble condition and indication at central-station control unit is 20 seconds. Initiate an alarm in response to opening, closing, shorting, or grounding of a signal or data transmission line.

10. Programmed Secure-Access Control: System shall be programmable to automatically change status of various combinations of protected zones between secure and access conditions at scheduled times. Status changes may be preset for repetitive, daily, and weekly; specially scheduled operations may be preset up to a year in advance. Manual secure-access control stations shall override programmed settings.
 11. Manual Secure-Access Control: Coded entries at manual stations shall change status of associated protected zone between secure and access conditions.
- B. System Component Requirements
1. Compatibility: Detection devices and their communication features, connecting wiring, and master control unit shall be selected and configured with accessories for full compatibility with the existing equipment.
 2. Perimeter Security Units: Listed and labeled by a qualified testing agency for compliance with UL 639.
 3. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.
 - a. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits".
 - b. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 26 Section "Transient-voltage Suppression For Low-voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.
 4. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.
 5. Tamper Protection: Tamper switches on detection devices, controllers, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central-station control-unit alarm display shall identify tamper alarms and indicate locations.
 6. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to central-station control unit.
 7. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to central-station control unit as an alarm signal.
 8. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to central-station control unit.
 9. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at central-station control unit for calibration, sensitivity, and alarm condition.
- C. Enclosures
1. Interior Sensors: Enclosures that protect against dust, falling dirt, and dripping noncorrosive liquids.
 2. Interior Electronics: NEMA 250, Type 12.
 3. Exterior Electronics: NEMA 250, Type 4X fiberglass **OR** stainless steel, **as directed**.
 4. Corrosion Resistant: NEMA 250, Type 4X PVC **OR** stainless steel, **as directed**.
 5. Terminal cabinets in handholes and manholes shall be NEMA 250, Type 6 **OR** 6P, **as directed**.
 6. Screw Covers: Where enclosures are accessible to inmates, secure with security fasteners of type appropriate for enclosure.
- D. Secure And Access Devices
1. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

2. Key-Operated Switch: Change protected zone between secure and access conditions.

E. Strain-Sensitive Cable

1. Description: Strain-sensitive, coaxial transducer cable shall monitor chain-link-type and welded-mesh-type fence and generate an alarm when a standard intruder attempts to climb over, cut through, or lift fence fabric.
2. Environment: Suitable for exterior installation and the following conditions:
 - a. Ambient Temperatures: Ranging from **minus 22 to plus 158 deg F** (**minus 30 to plus 70 deg C**).
3. Transducer Cable:
 - a. Ultraviolet-resistant cable furnished by system manufacturer.
 - b. Suitable for up to **1000 feet (300 m)** of sensor cable per single-zone controller and up to **2000 feet (600 m)** of sensor cable per dual-zone processor.
 - c. Sensitivity shall be uniform throughout its entire length, requiring only one variable sensitivity adjustment throughout its entire length.
4. Control Unit:
 - a. Field mounted, with tamper switch at controller board.
 - b. Electronic circuitry shall discriminate between acceptable fence movement and intrusion-related disturbances.
 - c. Sensitivity, count control, and climb-over processors shall be adjustable with a minimum of five individual count-control and climb-over adjustments.
 - d. Controller output shall have adjustable pulse width to adjust the time the alarm relay will activate per detected intrusion attempt.
5. System Performance:
 - a. Immune to RFI and EMI environments; interference shall have no effect on normal operational characteristics.
 - b. Trouble and Tamper: Entire sensor system shall be fully supervised with individually monitored tamper and supervision alarms. Disconnecting, cutting, or shorting of strain-sensitive cable results in supervisory alarm.
 - c. Intrusion Simulation: Each zone shall have a self-test feature that, when activated by a signal from central-station control unit, will produce an intrusion alarm and verify operation of sensor.

F. Microwave Intrusion Detectors

1. Description: Volumetric microwave detection system.
2. Device Performance: Microwave transmitter establishes an electromagnetic field in an adjustable detection pattern and detects intrusion by monitoring changes in that pattern.
 - a. Movement Sensitivity: Adjustable, able to detect standard-intruder movement within sensor's detection pattern at any speed between **0.1 to 50 fps** (**0.03 to 15.2 m/s**). Sensor sensitivity adjustments shall be accessible only when sensor housing is removed, and sensors shall comply with 47 CFR 15.
 - b. Detection range: **15 to 600 feet** (**5 to 180 m**).
 - c. Range Sensitivity: Adjustable for setting area of protection between **15 to 500 feet** (**5 to 152 m**) in range and from **2 to 40 feet** (**0.6 to 12 m**) in beam diameter.
 - d. Trouble and Tamper: Fully supervised with individually monitored tamper and supervision alarms. System failure shall result in tamper alarm. System jamming or wrong modulation shall result in supervisory alarm.
 - e. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test-enabling switch under sensor housing cover.
 - f. Remote Test: When initiated by central-station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.
3. Environment: Suitable for exterior installation and the following conditions:

- a. Ambient Temperatures: Ranging from **minus 30 to plus 158 deg F** (minus 34 to plus 70 deg C) and in rainfall up to **4 inches (100 mm)**.
- G. Electrostatic Field
1. Description: Electronically balanced phase electrostatic-field detection system consisting of a field generator that generates an electrical field in one or more field wires and that has two or more sensing wires, a sense filter, amplifier, and a controller. Detection fields shall have a minimum of four different frequencies so adjacent zones cannot interfere with each other.
 2. Environment: Suitable for exterior installation and the following conditions:
 - a. Ambient Temperatures: Ranging from **minus 22 to plus 158 deg F** (minus 30 to plus 70 deg C).
 3. System Performance:
 - a. Detect, via sense wires, a compound signal form consisting of amplitude change, rate of change, and pre-set time disturbance that forms a "signature" of human movement. Generate an alarm when all exist simultaneously. Provide detection fields of not less than four different frequencies so adjacent zones do not interfere with each other.
 - b. Control Units: Single or multiple zone, with sense filter. Front panel with calibration meter, status of alarm transmitter, sensitivity selector, test point selector, power indicator, and power control. Control unit shall reject signals due to wind and small objects striking the wires.
 - c. Motion Detection: Sense standard-intruder movement at rates from **0.15 to 26 fps (0.045 to 8.0 m/s)**.
 - d. Zone Length: Not to exceed **500 feet (152 m) OR 325 feet (100 m), as directed**.
 - e. Supervision: Generate trouble signal if field or sense wires are cut or shorted to ground or to each other. Generate supervisory alarm if received signal is substantially reduced.
 4. Insulators, Wire-Tensioning Devices, and Brackets: Manufacturer's standard for mounting and tensioning of wires.
 5. Field and Sensing Wires: Stainless steel.
- H. Buried, Ported Coaxial Cable
1. Description: Buried electrostatic-field detection system consisting of parallel, ported coaxial cables that generate a detection field between cables.
 2. Environment: Suitable for exterior installation and the following conditions:
 - a. Ambient Temperatures: Ranging from **minus 22 to plus 158 deg F** (minus 30 to plus 70 deg C).
 3. System Performance: One of two parallel cables receives a continuous wave signal from a transmitter module. Second cable, connected to a sensor module, detects, preamplifies, and analyzes variations in signal. When system senses "signature" of a standard intruder in the detection zone, based on mass, motion, and time of day, it generates an alarm.
 - a. Transmitter: Locate at one end of zone, with standby battery.
 - b. Preamplifier-Sensor: Locate at opposite end from transmitter, with standby battery.
 - c. Front panel with sensitivity calibration meter, calibrated self-test potentiometer, power switch, and LED normal and malfunction indicators.
 - d. Electromagnetic Radiation: Less than 50 mV per meter at 30 m.
 - e. Motion Detection: Sense standard-intruder movement at rates from **0.17 to 26 fps (0.05 to 8.0 m/s)**.
 - f. Zone Length: Not to exceed **500 feet (152 m) OR 325 feet (100 m), as directed**.
 - g. Zone Width: Not to exceed **15 feet (4.6 m)**, with an average width of **12 feet (3.7 m)**.
 - h. Zone Height: Approximately **3.3 feet (1.0 m)**, depending on sensitivity setting.
 - i. Supervision: Generate trouble signal if cable is cut or shorted to ground. Generate supervisory alarm if cabinets are tampered with.
 4. Enclosures: Hinged cover with tamper switch and security fasteners.
 5. Buried, Ported Coaxial Cable: Approximately **1/2-inch (1.3-mm)** diameter, minimum 10 AWG center conductor, foam polyethylene dielectric, braided copper outer conductor, and polyethylene jacket.

- I. Long-Range PIR Detectors
 1. Description: Volumetric passive infrared detection system.
 2. Listed and labeled by a qualified testing agency for compliance with SIA PIR-01.
 3. Environment: Suitable for exterior installation and the following conditions:
 - a. Ambient Temperatures: Ranging from **minus 30 to plus 150 deg F** (minus 34 to plus 65 deg C).
 4. System Performance: Detect an interruption of dual-infrared light beams that link transmitters and receivers. Generate an alarm when signal is interrupted due to presence of an object that interrupts both beams.
 - a. Sensitivity: Field adjustable to allow adjustment of range from **25 to 500 feet (7.6 to 152 m)**, generating an alarm within 20 to 50 ms when both beams are interrupted.
 - b. Detection system shall adjust automatically to compensate for weather, including fog, rain, snow, blowing dust, and rapid temperature changes.
 - c. Motion Detection: Detect standard-intruder movement at rates from **0.1 to 50 fps (0.03 to 15.2 m/s)**.
 - d. Supervision: Generate supervisory alarm if any portion of system is tampered with.
 - e. Remote Test: When initiated by central-station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

- J. Geophone Fence Detection
 1. Description: Fence-mounted system to detect attempts to cut or climb the protected fence, using geophone sensors that respond to specific shock or vibrations.
 2. Environment: Suitable for exterior installation and the following conditions:
 - a. Ambient Temperatures: Ranging from **minus 30 to plus 150 deg F** (minus 34 to plus 65 deg C).
 3. System Performance:
 - a. Controller: 10 zone capacity for processing geophone generated analog signals. Each zone shall consist of not more than 10 sensors.
 - 1) Adjustments: For each zone provide stepped gain control for sensitivity, and switches for geophone signal filters to minimize nuisance alarms. System shall adjust automatically to compensate for weather, including fog, rain, snow, blowing dust, and rapid temperature changes.
 - 2) Trouble Condition Signal: Generate when any zone fails.
 - 3) Supervisory Condition Signal: Generate on interference with controller operation or when detecting a break-in into a enclosure housing electronics.
 - b. Sensors: Fence mounted **20 feet (6 m)** o.c.
 - c. Cable for Interconnection of System Components: Shielded, PVC jacketed and armored, as supplied by system manufacturer.
 - d. Test each zone simulating an alarm condition. Test by command from central-station control **OR** test switch at controller inside the enclosure, **as directed**.

- K. Video Motion Sensor
 1. Description: Video-surveillance based detection system.
 2. Device Performance: Detect changes in video signal within a user-defined protected zone. Provide an alarm output for each video input.
 - a. Detect movement within protected zone of standard intruders wearing clothing with a reflectivity that differs from that of background scene by a factor of 2. Reject all other changes in video signal.
 - b. Modular design that allows for expansion or modification of number of inputs.
 - c. Adjustable Controls:
 - 1) Number of detection zones.
 - 2) Size of detection zones.
 - 3) Sensitivity of detection of each protected zone.
 - d. Mounting: Standard **19-inch (480-mm)** rack as described in EIA 310.

3. Environment: Suitable for installation in interior air-conditioned spaces.

L. Gate Units

1. Description: Fence mounted gate-movement detector, blanced-magnetic type, UL listed for outdoor locations. Units shall be designed for mounting on single- or double-leaf swinging or rolling gates and have armored jumper cables between switch and stationary junction box for wiring to central-station control unit and tamper switches in junction box.
2. Device Performance: Bias magnet and at least three encapsulated-reed switches that resist compromise from introduction of foreign magnetic fields, with integral overcurrent protective device to limit current to 80 percent of switch capacity.
3. Remote Test: Simulate movement of actuating magnet from central-station control unit.

M. Field-Mounted Control Units

1. Field-mounted control units shall include the power supply and detector specific functions, and provide for communications with the master control unit. Control unit shall include read-only resident software needed for startup, a time clock, and all automatic operations. Software shall be downloaded from the master control unit.
2. Battery Backup: UPS, providing 6 hours of run time during a power outage, with 2-rate automatic battery charger to fully recharge batteries within 12 hours after normal power is restored.
 - a. Batteries: Rechargeable, valve-regulated, recombinant, sealed, lead-acid type with nominal 10-year life expectancy.
 - b. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger shall recharge fully discharged battery within 24 hours.
3. Annunciation: Indicate a change in system condition and switching of system or component to backup power.

N. Master Control Unit

1. Description: Supervise sensors and detection subsystems and their connecting communication links, status control (secure or access) of sensors and detector subsystems, activation of alarms and supervisory and trouble signals, and other indicated functions.
 - a. System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
 - b. Include a real-time clock for time annotation of events on the event recorder and printer.
 - c. Addressable initiation devices that communicate device identity and status.
 - d. Control circuits for operation of mechanical equipment in response to an alarm.
2. Construction: Freestanding equipment rack **OR** Desk-mounted console, **as directed**, modular, with separate and independent alarm and supervisory system modules. Alarm-initiating protected zone boards shall be plug-in cards. Arrangements that require removal of field wiring for module replacement are unacceptable.
3. Comply with UL 609 **OR** UL 681 **OR** UL 1076, **as directed**.
4. Console Controls and Displays: Arranged for interface between human operator at master control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - a. Annunciator and Display: LCD type, one **OR** two **OR** three line(s) of 40 **OR** 80 characters, minimum, **as directed**.
 - b. Keypad: Arranged to permit entry and execution of programming, display, and control commands
 - c. Control-Unit Network: Automatic communication of alarm, status changes, commands, and other communications required for system operation. Communication shall return to normal after partial or total network interruption such as power loss or transient event. Total or partial signaling network failures shall identify the failure and record the failure at the annunciator display and at the system printer.
 - d. Field Device Network: Communicate between the control unit and field devices of the system. Communications shall consist of alarm, network status, and status and control of

- field-mounted processors. Each field-mounted device shall be interrogated during each interrogation cycle.
- e. Operator Controls: Manual switches and push-to-test buttons that do not require a key to operate. Prevent resetting of alarm, supervisory, or trouble signals while alarm or trouble condition persists. Include the following:
 - 1) Acknowledge alarm.
 - 2) Silence alarm.
 - 3) System reset.
 - 4) LED test.
 - f. Timing Unit: Solid state, programmable, 365 days.
 - g. Confirmation: Relays, contactors, and other control devices shall have auxiliary contacts that provide confirmation signals to system for their on or off status. Software shall interpret such signals, display equipment status, and initiate failure signals.
 - h. Alarm Indication: An audible signal sounds and an LED lights at master control unit identifying the protected zone **OR** addressable detector, **as directed**, originating the alarm. Annunciator panel displays a common alarm light and sounds an audible tone.
 - i. Alarm Indication: An audible signal sounds and a plain-language identification of the protected zone **OR** addressable detector, **as directed** originating the alarm appears on LED or LCD display at master control unit. Annunciator panel displays a common alarm light and sounds an audible tone.
 - j. Alarm Indication: An audible signal sounds and a plain-language identification of the protected zone **OR** addressable detector, **as directed** originating the alarm appears on LED, LCD or cathode-ray-tube display, **as directed** at master control unit. Annunciator panel alarm light and audible tone identify protected zone signaling an alarm.
 - k. Alarm activation sounds a bell **OR** siren **OR** strobe **OR** bell or siren and strobe, **as directed**.
- 5. Protected Zones: Quantity of alarm and supervisory zones as indicated, with capacity for expanding number of protected zones by a minimum of 25 percent.
 - 6. Power Supply Circuits: Master control units shall provide power for remote power-consuming detection devices. Circuit capacity shall be adequate for at least a 25 percent increase in load.
 - 7. UPS: Comply with Division 26 Section "Static Uninterruptible Power Supply". UPS shall be sized to provide a minimum of six hours of master control-unit operation.
 - 8. Cabinet: Lockable, steel enclosure arranged so operations required for testing, normal operation, and maintenance are performed from front of enclosure. If more than a single cabinet is required to form a complete control unit, provide exactly matching modular enclosures. Accommodate all components and allow ample gutter space for field wiring. Identify each enclosure by an engraved, laminated, phenolic-resin nameplate. Lettering on enclosure nameplate shall not be less than **1 inch (25 mm)** high. Identify, with permanent labels, individual components and modules within cabinets.
 - 9. Transmission to Monitoring Station: A communications device to automatically transmit alarm, supervisory, and trouble signals to the monitoring station, operating over a standard voice grade telephone leased line. Comply with UL 1635.
 - 10. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.
- O. Audible And Visual Alarm Devices
- 1. Bell: UL listed, **10 inches (254 mm)** in diameter, rated to produce a minimum sound output of 84 dB at **10 feet (3 m)** from central-station control unit.
 - a. Enclosure: Weather-resistant steel box equipped with tamper switches on cover and on back of box.

2. Klaxon Weatherproof Motor-Driven Hooter: UL listed, rated to produce a minimum sound output of 120 dB at **3 feet (1 m)**, plus or minus 3 dB, at a frequency of 470 Hz. Rated for intermittent use - two minutes on, five minutes off.
 - a. Designed for use in industrial areas and in high noise, severe weather marine environments.
3. Siren: 30-W speaker with siren driver, rated to produce a minimum sound output of 103 dB at **10 feet (3 m)** from central-station control unit.
 - a. Enclosure: Weather-resistant steel box with tamper switches on cover and on back of box.
4. Strobe: Xenon light complying with UL 1638, with a clear polycarbonate lens.
 - a. Light Output: 115 cd, minimum.
 - b. Flash Rate: 60 per minute.

P. Security Fasteners

1. Operable only by tools produced for use on specific type of fastener by fastener manufacturer or other licensed fabricator. Drive system type, head style, material, and protective coating as required for assembly, installation, and strength.
2. Drive System Types: Pinned Torx-Plus, pinned Torx, or pinned hex (Allen).
3. Socket Flat Countersunk Head Fasteners:
 - a. Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - b. Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
4. Socket Button Head Fasteners:
 - a. Heat-treated alloy steel, **ASTM F 835 (ASTM F 835M)**.
 - b. Stainless steel, **ASTM F 879 (ASTM F 879M)**, Group 1 CW.
5. Socket Head Cap Fasteners:
 - a. Heat-treated alloy steel, **ASTM A 574 (ASTM A 574M)**.
 - b. Stainless steel, **ASTM F 837 (ASTM F 837M)**, Group 1 CW.
6. Protective Coatings for Heat-Treated Alloy Steel:
 - a. Zinc chromate, ASTM F 1135, Grade 3 or 4; for exterior applications and interior applications where indicated.
 - b. Zinc phosphate with oil, ASTM F 1137, Grade I, or black oxide, unless otherwise indicated.

Q. Source Quality Control

1. Electrostatic-Field and Buried, Ported Coaxial Cable Systems Electronics: Precondition at factory by subjecting modules to at least 4 days' operational burn-in at temperatures not less than **140 deg F (60 deg C)**.

1.3 EXECUTION

A. Examination

1. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of perimeter security.
2. Examine roughing-in for embedded and built-in anchors to verify actual locations of perimeter security connections before perimeter security installation.
3. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of perimeter security.
4. Inspect built-in and cast-in anchor installations, before installing perimeter security, to verify that anchor installations comply with requirements. Prepare inspection reports.
 - a. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.
 - b. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.
5. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.
6. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Systems Integration

1. Integrate perimeter security system with the following systems and equipment:
 - a. Electronic door hardware.
 - b. Elevators.
 - c. Network lighting controls.
 - d. Intercommunications and program systems.
 - e. Public address and mass notification systems.
 - f. Access control.
 - g. Fire-alarm system.
 - h. Intrusion detection system.
 - i. Video surveillance.

C. System Installation

1. Comply with UL 681 and NFPA 731.
2. Equipment Mounting: Install master control unit on finished floor with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 - a. Comply with requirements for seismic-restraint devices specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
3. Install wall-mounted equipment, with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 - a. Comply with requirements for seismic-restraint devices specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Connecting to Existing Equipment: Verify that existing perimeter security system is operational before making changes or connections.
 - a. Connect new equipment to existing control panel in existing part of the building.
 - b. Connect new equipment to existing monitoring equipment at the Supervising Station.
 - c. Expand, modify, and supplement existing **control** or **monitoring** equipment as necessary to extend existing **control** or **monitoring** functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
5. Security Fasteners: Where accessible to inmates, install perimeter security components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials.
6. Wiring Method: Install power, signal, and data transmission wire and cable in raceways according to Division 26 Section(s) "Underground Ducts And Raceways For Electrical Systems" AND "Raceway And Boxes For Electrical Systems". Minimum conduit size shall be **1/2 inch (13 mm)**. Control and data transmission wiring shall not share raceways with any other system.
7. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with perimeter security system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.
8. Wires and Cables:
 - a. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.
 - b. 120-V Power Wiring: Install according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables", unless otherwise indicated.
 - c. Cable for Low-Voltage Control and Signal Circuits: Install unshielded, twisted-pair cable, unless otherwise indicated or if manufacturer recommends shielded cable, according to Division 28 Section "Conductors And Cables For Electronic Safety And Security".

- d. Data and Television Signal Transmission Cables: Install according to Division 28 Section "Conductors And Cables For Electronic Safety And Security"
 9. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.
 10. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.
 11. Stain-Sensitive Transducer Cable: Attached to fence at **12-inch (300-mm)** intervals with tie wraps.
 12. Electrostatic-Field System: Install field and sense wires on insulators and standoffs on a fence, wall, or roof. Provide intermediate supports recommended in writing by manufacturer as needed for specified performance.
 13. Buried, Ported Coaxial Cable: Transmitters may be located at one end of parallel coaxial cables, and preamplifier-sensor module may be located at opposite end. Install cable so shield is uniform throughout the length, without twisting or distorting cable during installation. Field-cut cables to exact zone length at the site. To attach data transmission cable to sensing cable, use heat-shrink splice kits approved by manufacturer. Provide sufficient overlap of detector cables to eliminate the possibility of entry between zones.
- D. Identification
1. Identify system components wiring, cabling, and terminals. Comply with identification requirements in Division 26 Section "Identification For Electrical Systems".
 2. Install instructions frame in a location visible from master control unit.
- E. Grounding
1. Ground the master control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to master control unit.
 2. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.
 3. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.
 4. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Division 26 Section "Grounding And Bonding For Electrical Systems".
- F. Field Quality Control
1. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.
 - a. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.
 2. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections.
 3. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components and equipment installations, including connections.
 4. Tests and Inspections: Comply with provisions in NFPA 731, Ch.9, "Testing and Inspections."
 - a. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.
 - b. Operational Tests: Schedule tests after pretesting has been successfully completed. Test all modes of system operation and perimeter security at each detection device. Test for detection of intrusion and for false alarms in each protected zone. Test for false alarms by simulating activities outside indicated detection patterns.
 - c. Electrical Tests: Comply with NFPA 72, Section A-7. Minimum required tests are as follows:

- 1) Verify the absence of unwanted voltages between circuit conductors and ground.
 - 2) Test all conductors for short circuits using an insulation-testing device.
 - 3) With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit on Record Drawings.
 - 4) Verify that each controller is in normal condition as detailed in manufacturer's operation and maintenance manual.
 - 5) Test signal and data transmission circuits complying with requirements in Division 28 Section "Conductors And Cables For Electronic Safety And Security" for proper signal transmission under open-circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.
 - 6) Verify that transient surge-protection devices are installed according to manufacturer's written instructions.
 - 7) Test each initiating and indicating device for alarm operation and proper response at central-station control unit.
 - 8) Test both primary and secondary power. Verify, by test, that UPS is capable of operating the system for period and in manner specified.
- d. Geophone System Tests: Test each zone at a minimum of two different locations. Test each zone as follows:
- 1) Horizontal Movement: Adjust sensitivity to screen out alarms from wind.
 - 2) Vertical Climb: 100 percent detection required. Set count at 3 occurrences within 90-second window.
 - 3) Cut Test: 100 percent detection required. Set count at 2 occurrences within 120-second window.
 - 4) Set sensitivity to value as low as possible, consistent with reliable detection.
 - 5) If performance tests fail, make adjustments to sensors to comply with requirements. Retest failing and adjacent zones to comply with test.
- e. Strain-Sensitive Cable System Tests: Adjust sensitivity and count control to value as low as possible, consistent with reliable detection.
- f. Microwave Perimeter Security System Tests: Adjust sensitivity to value as low as possible, consistent with reliable detection.
- g. Long-Range PIR System Tests: Adjust sensitivity and hold time between activity duration to value as low as possible, consistent with reliable detection.
5. Report of Tests and Inspections: Prepare a written record of tests, inspections, and detailed test results in the form of a test log.
 6. Tag all equipment, stations, and other components at which tests have been satisfactorily completed.
- G. Demonstration
1. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain perimeter security.
- H. Adjusting
1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.

END OF SECTION 28 16 11 00b

Task	Specification	Specification Description
28 16 11 00	27 51 43 00	Educational Intercommunications and Program Systems
28 16 11 00	26 33 43 00a	Public Address and Mass Notification Systems

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SECTION 28 21 31 00 - VIDEO SURVEILLANCE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for video surveillance. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes a video surveillance system consisting of cameras, digital video recorder, data transmission wiring, and a control station with its associated equipment.
2. Video surveillance system shall be integrated with monitoring and control system specified in Division 13 Section "Perimeter Security", "Intrusion Detection", "Security Access", and PLC Electronic Detention Monitoring and Control Systems", which specifies systems integration.

C. Definitions

1. AGC: Automatic gain control.
2. BNC: Bayonet Neill-Concelman - type of connector.
3. B/W: Black and white.
4. CCD: Charge-coupled device.
5. FTP: File transfer protocol.
6. IP: Internet protocol.
7. LAN: Local area network.
8. MPEG: Moving picture experts group.
9. NTSC: National Television System Committee.
10. PC: Personal computer.
11. PTZ: Pan-tilt-zoom.
12. RAID: Redundant array of independent disks.
13. TCP: Transmission control protocol - connects hosts on the Internet.
14. UPS: Uninterruptible power supply.
15. WAN: Wide area network.

D. Performance Requirements

1. Seismic Performance: Video surveillance system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

E. Submittals

1. Product Data: For each type of product indicated. Include dimensions and data on features, performance, electrical characteristics, ratings, and finishes.
2. Shop Drawings: For video surveillance. Include plans, elevations, sections, details, and attachments to other work.
 - a. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
 - b. Functional Block Diagram: Show single-line interconnections between components for signal transmission and control. Show cable types and sizes.
 - c. Dimensioned plan and elevations of equipment racks, control panels, and consoles. Show access and workspace requirements.
 - d. UPS: Sizing calculations.
 - e. Wiring Diagrams: For power, signal, and control wiring.

3. Equipment List: Include every piece of equipment by model number, manufacturer, serial number, location, and date of original installation. Add pretesting record of each piece of equipment, listing name of person testing, date of test, set points of adjustments, name and description of the view of preset positions, description of alarms, and description of unit output responses to an alarm.
 4. Seismic Qualification Certificates: For video surveillance, cameras, camera-supporting equipment, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
 - d. Field quality-control reports.
 - e. Operation and Maintenance Data: For cameras, power supplies, infrared illuminators, monitors, videotape recorders, digital video recorders, video switches, and control-station components to include in emergency, operation, and maintenance manuals. Include the following:
 - 1) Lists of spare parts and replacement components recommended to be stored at the site for ready access.
 5. Warranty: Sample of special warranty.
- F. Quality Assurance
1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. Comply with NECA 1.
 3. Comply with NFPA 70.
 4. Electronic data exchange between video surveillance system with an access-control system shall comply with SIA TVAC.
- G. Project Conditions
1. Environmental Conditions: Capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:
 - a. Control Station: Rated for continuous operation in ambient temperatures of **60 to 85 deg F (16 to 29 deg C)** and a relative humidity of 20 to 80 percent, noncondensing.
 - b. Interior, Controlled Environment: System components, except central-station control unit, installed in air-conditioned **OR** temperature-controlled, **as directed**, interior environments shall be rated for continuous operation in ambient temperatures of **36 to 122 deg F (2 to 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 1 enclosures.
 - c. Interior, Uncontrolled Environment: System components installed in non-air-conditioned **OR** non-temperature-controlled, **as directed**, interior environments shall be rated for continuous operation in ambient temperatures of **0 to 122 deg F (minus 18 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 3R **OR** Type 4 **OR** Type 12 **OR** Type 12K, **as directed**, enclosures.
 - d. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of **minus 30 to plus 122 deg F (minus 34 to plus 50 deg C)** dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to **85 mph (137 km/h)** and snow cover up to **24 inches (610 mm)** thick, **as directed**. Use NEMA 250, Type 3 **OR** Type 3R **OR** Type 3S **OR** Type 4 **OR** Type 4X, **as directed**, enclosures.
 - e. Hazardous Environment: System components located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.

- f. Corrosive Environment: System components subject to corrosive fumes, vapors, and wind-driven salt spray in coastal zones. Use NEMA 250, Type 4X **OR** Type 6P, **as directed**, enclosures.
- g. Security Environment: Camera housing for use in high-risk areas where surveillance equipment may be subject to physical violence.

H. Warranty

- 1. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of cameras, equipment related to camera operation, and control-station equipment that fail in materials or workmanship within specified warranty period.
 - a. Warranty Period: Three years from date of Final Completion.

1.2 PRODUCTS

A. System Requirements

- 1. Video-signal format shall comply with NTSC standard, composite interlaced video. Composite video-signal termination shall be 75 ohms.
- 2. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor's entry connection to components.
 - a. Minimum Protection for Power Connections 120 V and More: Auxiliary panel suppressors complying with requirements in Division 16 Section "Transient Voltage Suppression."
 - b. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Connections: Comply with requirements in Division 16 Section "Transient Voltage Suppression" as recommended by manufacturer for type of line being protected.
- 3. Tamper Protection: Tamper switches on enclosures, control units, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled. Control-station, control-unit alarm display shall identify tamper alarms and indicate locations.

B. Standard Cameras

- 1. B/W Camera:
 - a. Comply with UL 639.
 - b. Pickup Device: CCD interline transfer, 252,000 512(H) by 492(V) pixels, **unless directed otherwise**.
 - c. Horizontal Resolution: 380 lines.
 - d. Signal-to-Noise Ratio: Not less than 46 dB.
 - e. With AGC, manually selectable on or off.
 - f. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination, as directed by the Owner, with camera AGC off, **as directed**.
OR
Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
 - g. Manually selectable modes for backlight compensation or normal lighting.
 - h. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
 - i. Motion Detector: Built-in digital.
- 2. Color Camera:
 - a. Comply with UL 639.
 - b. Pickup Device: CCD interline transfer, 380,000 771(H) by 492(V) pixels, **unless directed otherwise**.
 - c. Horizontal Resolution: 480 lines.
 - d. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.

- e. With AGC, manually selectable on or off.
 - f. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination, as directed by the Owner, with camera AGC off, **as directed.**
OR
Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
 - g. Manually selectable modes for backlight compensation or normal lighting.
 - h. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
 - i. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
 - j. Motion Detector: Built-in digital.
3. Automatic Color Dome Camera: Assembled and tested as a manufactured unit, containing dome assembly, color camera, motorized pan and tilt, zoom lens, and receiver/driver.
- a. Comply with UL 639.
 - b. Pickup Device: CCD interline transfer, 380,000 768(H) by 494(V) pixels, **unless directed otherwise.**
 - c. Horizontal Resolution: 480 lines.
 - d. Signal-to-Noise Ratio: Not less than 50 dB, with camera AGC off.
 - e. With AGC, manually selectable on or off.
 - f. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination, as directed by the Owner, with camera AGC off, **as directed.**
OR
Sensitivity: Camera shall deliver 1-V peak-to-peak video signal at the minimum specified light level. Illumination for the test shall be with lamps rated at approximately 2200-K color temperature, and with camera AGC off.
 - g. Manually selectable modes for backlight compensation or normal lighting.
 - h. Pan and Tilt: Direct-drive motor, 360-degree rotation angle, and 180-degree tilt angle. Pan-and-tilt speed shall be controlled by operator. Movement from preset positions shall be not less than 300 degrees per second.
 - i. Preset Positioning: Eight user-definable scenes, each allowing 16-character titles. Controls shall include the following:
 - 1) In "sequence mode," camera shall continuously sequence through preset positions, with dwell time and sequencing under operator control.
 - 2) Motion detection shall be available at each camera position.
 - 3) Up to four preset positions may be selected to be activated by an alarm. Each of the alarm positions may be programmed to output a response signal.
 - j. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
 - k. White Balance: Auto-tracing white balance, with manually settable fixed balance option.
 - l. Motion Detector: Built-in digital.
 - m. Dome shall support multiplexed control communications using coaxial cable recommended by manufacturer.
- C. Submersible Cameras
- 1. Camera: Color, designed for underwater monitoring and for inspecting pipes and storm drains. Attributes as follows:
 - a. Infrared LEDs to provide illumination in zero-light conditions.
 - b. **60-foot (18.3-m)** factory-installed cable with BNC connector for video and a 2.1-mm jack for 12-V dc power supply.
 - c. An adjustable swivel mount and attachment base.
 - d. Pickup Device: CCD interline transfer, 290,000 500(H) by 580(V) pixels, **unless directed otherwise.**

- e. Horizontal Resolution: 380 lines.
 - f. Signal-to-Noise Ratio: Not less than 50 dB.
 - g. With AGC, from 4 to 39 dB.
 - h. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of 0.1 lux at f/2.0.
 - i. Scanning Synchronization: Internal.
 - j. White Balance: Auto-tracing white balance, for colors ranging from 2800 to 8200 deg K.
- D. Reinforced Dome Cameras
- 1. Camera: Designed for high-abuse locations, with a weathertight semirecessed **OR** surface, **as directed**, mounting, impact-resistance polycarbonate dome, and heavy-gage, 6061 T6 aluminum body.
 - a. Suitable for exterior environment, rated for continuous operation in ambient temperatures of **minus 40 to plus 122 deg F (minus 40 to plus 50 deg C)** dry bulb and up to 85 percent relative humidity.
 - b. Pickup Device: CCD interline transfer, 290,000 510(H) by 492(V) pixels, **unless directed otherwise**.
 - c. Horizontal Resolution: 350 lines.
 - d. Signal-to-Noise Ratio: Not less than 46 dB.
 - e. With AGC and automatic backlight compensation.
 - f. Sensitivity: Camera shall provide usable images in low-light conditions, delivering an image at a scene illumination of 6 lux at f/2.0.
 - g. Scanning Synchronization: Determined by external synch over the coaxial cable. Camera shall revert to internally generated synchronization on loss of external synch signal.
 - h. White Balance: Auto-tracing white balance.
- E. Lenses
- 1. Description: Optical-quality coated lens, designed specifically for video-surveillance applications and matched to specified camera. Provide color-corrected lenses with color cameras.
 - a. Auto-Iris Lens: Electrically controlled iris with circuit set to maintain a constant video level in varying lighting conditions.
 - b. Fixed Lens: With calibrated focus ring.
 - c. Zoom Lens: Motorized, remote-controlled unit, rated as "quiet operating." Features include the following:
 - 1) Electrical Leads: Filtered to minimize video signal interference.
 - 2) Motor Speed: Variable.
 - 3) Lens shall be available with preset positioning capability to recall the position of specific scenes.
- F. Power Supplies
- 1. Low-voltage power supplies matched for voltage and current requirements of cameras and accessories, and of type as recommended by manufacturer of camera, infrared illuminator, **as directed**, and lens.
 - a. Enclosure: NEMA 250, Type 1 **OR** Type 3 **OR** Type 4X, **as directed**.
- G. Infrared Illuminators
- 1. Description: Lighting fixtures that emit light only in the infrared spectrum, suitable for use with cameras indicated, for nighttime surveillance, without emitting visible light.
 - a. Field-Selectable Beam Patterns: Narrow, medium, and wide.
 - b. Rated Lamp Life: More than 8000 hours.
 - c. Power Supply: 12-V ac/dc **OR** 120-V ac, **as directed**.
 - 2. Area Coverage: Illumination to **150 feet (50 m)** in a narrow beam pattern.
 - 3. Exterior housings shall be suitable for same environmental conditions as the associated camera.
- H. Camera-Supporting Equipment

1. Minimum Load Rating: Rated for load in excess of the total weight supported times a minimum safety factor of two.
 2. Pan Units: Motorized automatic-scanning units arranged to provide remote-controlled manual and automatic camera panning action, and equipped with matching mounting brackets.
 - a. Scanning Operation: Silent, smooth, and positive.
 - b. Stops: Adjustable without disassembly, to limit the scanning arc.
 3. Pan-and-Tilt Units: Motorized units arranged to provide remote-controlled aiming of cameras with smooth and silent operation, and equipped with matching mounting brackets.
 - a. Panning Rotation: 0 to 355 degrees, with adjustable stops.
 - b. Tilt Movement: 90 degrees, plus or minus 5 degrees, with adjustable stops.
 - c. Speed: 12 degrees per second in both horizontal and vertical planes.
 - d. Wiring: Factory prewired for camera and zoom lens functions and pan-and-tilt power and control.
 - e. Built-in encoders or potentiometers for position feedback, and thermostat-controlled heater, **as directed**.
 - f. Pan-and-tilt unit shall be available with preset positioning capability to recall the position of a specific scene.
 4. Mounting Brackets for Fixed Cameras: Type matched to items supported and mounting conditions. Include manual pan-and-tilt adjustment.
 5. Protective Housings for Fixed and Movable Cameras: Steel or 6061 T6 aluminum, **as directed**, enclosures with internal camera mounting and connecting provisions that are matched to camera/lens combination and mounting and installing arrangement of camera to be housed.
 - a. Tamper switch on access cover sounds an alarm signal when unit is opened or partially disassembled. Central-control unit shall identify tamper alarms and indicate location in alarm display. Tamper switches and central-control unit are specified in Division 13 Section "Intrusion Detection."
 - b. Camera Viewing Window: Polycarbonate **OR** Lexan, **as directed**, window, aligned with camera lens.
 - c. Duplex Receptacle: Internally mounted.
 - d. Alignment Provisions: Camera mounting shall provide for field aiming of camera and permit removal and reinstallation of camera lens without disturbing camera alignment.
 - e. Built-in, thermostat-activated heater and blower units. Units shall be automatically controlled so the environmental limits of the camera equipment are not exceeded.
 - f. Sun shield shall not interfere with normal airflow around the housing.
 - g. Mounting bracket and hardware for wall or ceiling mounting of the housing. Bracket shall be of same material as the housing; mounting hardware shall be stainless steel.
 - h. Finish: Housing and mounting bracket shall be factory finished using manufacturer's standard finishing process suitable for the environment.
 - i. Enclosure Rating: as directed by the Owner.
- I. Monitors
1. Monochrome:
 - a. Metal cabinet units designed for continuous operation.
 - b. Screen Size (Diagonal Dimension): as directed by the Owner.
 - c. Horizontal Resolution: 600 lines, minimum, at center.
 - d. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, horizontal-hold, vertical-hold, and contrast controls.
 - e. Mounting: Adjustable tilting and training.
 - f. Mounting: Single, **14-inch (356-mm)** **OR** Dual, **9-inch (229-mm)**, **as directed**, vertical, EIA **19-inch (483-mm)** electronic equipment rack or cabinet complying with CEA 310-E.
 - g. Electrical: 120-V ac, 60 Hz.
 2. Color:
 - a. Metal cabinet units designed for continuous operation.
 - b. Screen Size (Diagonal Dimension): as directed by the Owner.
 - c. Horizontal Resolution: 300 lines.

- d. Minimum Front Panel Devices and Controls: Power switch; power-on indicator; and brightness, contrast, color, and tint controls.
- e. Degaussing: Automatic.
- f. Mounting: Single, **14-inch (356-mm)** OR Dual, **9-inch (229-mm)**, **as directed**, vertical, EIA **19-inch (483-mm)** electronic equipment rack or cabinet complying with CEA 310-E.
- g. Electrical: 120-V ac, 60 Hz.

J. Videotape Recorders

- 1. Description: Industrial, time-lapse type recorder, designed for continuous operation. Tape format is **1/2 inch (13 mm)** using industrial-grade, T-120 cassettes.
 - a. Horizontal Resolution: 400 lines, minimum.
 - b. Recording Heads: Rotary-scan type.
 - c. Integral Timer: Permits programming of recording operation for adjustable daily and weekly periods.
 - d. Time-Lapse Operating Modes: Multiple, covering 24 to 240 hours, minimum.
 - e. Other Operating Modes:
 - 1) Manual play and recording at two- and six-hour speeds.
 - 2) Forward and reverse high-speed search.
 - 3) Reverse, slow, and single-frame play.
 - f. Alarm Recording: Operating mode is automatically switched from time-lapse to two- or six-hour recording mode when an externally generated alarm signal is received.
 - g. Audio Recording: 70 to 7000 Hz. Phono and microphone input; phono output.
 - h. Time and Date Generator: Records time and date legend in corner of recorded scenes.
 - i. Tape Counter: Displays tape position.
 - j. Manual Recording Lock: Key or keypad operated. Prevents unauthorized tampering or control changes during preset operation.
 - k. Signal-to-Noise Ratio: 45 dB for video output in standard play mode.
 - l. Mounting: Standard **19-inch (483-mm)** rack complying with CEA 310-E, or freestanding desktop.

K. Digital Video Recorders

- 1. Description: Digital, time-lapse type, full-frame and motion recorder, with removable hard drive.
 - a. Recording Time: 400 hours minimum.
 - b. Resolution: 720 by 480 lines, minimum.
 - c. Programming shall be from trackball and push buttons on face of the recorder, settings shall be displayed on any video monitor connected to the recorder. Programming shall include the following:
 - 1) Motion analysis graph.
 - 2) Password protection.
 - 3) Alarm and timer controls.
 - 4) Continuous recording option.
 - 5) Time-lapse operating modes.
 - 6) Search video by time, event, or motion.
 - d. Programming: SmartMedia card for software updating, image archiving, and image transfer to a PC.
 - e. Storage: 80-GB, **unless directed otherwise**, removable hard drive. Software shall permit hot-swapping drives.
 - f. Compression: MPEG-2.
 - g. Time and Date Generator: Records time (hr:min:sec) and date legend of each frame.
 - h. Audio Recording: 70 to 7000 Hz. Phono and microphone input; phono output.
 - i. Mounting: Standard **19-inch (483-mm)** rack complying with CEA 310-E, or freestanding desktop.

L. Network Video Recorders

- 1. External storage or internal 250-1, 500-GB hard disk drive.
 - a. Video and audio recording over TCP/IP network.

- b. Video recording of MPEG-2 and MPEG-4 streams.
- c. Video recording up to 48 Mbps for internal storage and up to 100 Mbps for external storage.
- d. Duplex Operation: Simultaneous recording and playback.
- e. Continuous and alarm-based recording.
- f. Full-Featured Search Capabilities: Search based on camera, time, or date.
- g. Automatic data replenishment to ensure recording even if network is down.
- h. Digital certification by watermarking.
- i. Internal RAID storage or non-RAID storage of up to 1500 GB.
- j. Capable of adding external RAID storage up to 7000 GB for models with no internal storage.
- k. Full integration with LAN, Intranet, or Internet through standard Web browser or video management software.
- l. Integrated Web server FTP server functionality.
- m. Supports up to 16, 32, or 64 devices.

M. Digital Switchers

- 1. Quad Switch: For displaying images from four cameras on a single monitor. Provide color switcher if one or more cameras or monitors are in color.
 - a. Controls: Unit-mounted front panel.
 - b. Resolution: 720 by 480 lines, **unless directed otherwise**.
 - c. Modes: Auto, manual, and alarm. In manual mode, each channel can also be viewed in single display mode. In the event of an alarm, alarming channel shall automatically switch to full screen. If several alarms are activated, channels in alarm shall be in auto-switching mode.
 - d. Channel Loss Alarm: Audible buzzer; occurrence details shall be recorded.
 - e. Time: Indicate date and time.
 - f. Timing of Auto-Switcher: 1 to 30 seconds, selectable.
 - g. Mounting: Standard **19-inch (483-mm)** rack complying with CEA 310-E, or freestanding desktop.
- 2. Manual Switch Bank: Low-loss, high-isolation, multiple-video switch to allow manual switching of multiple quad switches and cameras to a single output. Switches shall be illuminated.
- 3. Sequential Switchers: Automatically sequence outputs of multiple cameras to single monitor and videotape recorder.
 - a. Switching Time Interval: Continuously adjustable, 5 to 20 seconds minimum, with manual override.
 - b. Skip-Sequential-Hold Switch: One for each camera, with LED to indicate active camera.
 - c. Camera Identification Legend: Either on-screen message or label at skip-sequential switch.
 - d. Alarm Switching: In the event of an alarm, alarming channel shall automatically switch the monitor to full screen.
 - e. Mounting: Standard **19-inch (483-mm)** rack complying with CEA 310-E.
- 4. PTZ Controls: Arranged for multiple-camera control, with switches to select camera to be controlled.
 - a. Pan-and-Tilt Control: Joystick type.
 - b. Zoom Control: Momentary-contact, "in-out" push button.
 - c. Automatic-Scan Control: A push button for each camera with pan capability that places camera in automatic-scanning mode.

N. IP Video Systems

- 1. Description:
 - a. System shall provide high-quality delivery and processing of IP-based video, audio, and control data using standard Ethernet-based networks.
 - b. System shall have seamless integration of all video surveillance and control functions.

- c. Graphical user interface software shall manage all IP-based video matrix switching and camera control functions, two-way audio communication, alarm monitoring and control, and recording and archive/retrieval management. IP system shall also be capable of integrating into larger system environments.
 - d. System design shall include all necessary compression software for high-performance, dual-stream, MPEG-2/MPEG-4 video. Unit shall provide connections for all video cameras, camera PTZ control data, bidirectional audio, discreet sensor inputs, and control system outputs.
 - e. All camera signals shall be compressed, encoded, and delivered onto the network for processing and control by the IP video-management software.
 - f. Camera system units shall be ruggedly built and designed for extreme adverse environments, complying with NEMA Type environmental standards.
 - g. Encoder/decoder combinations shall place video, audio, and data network stream that can be managed from multiple workstations on the user's LAN or WAN.
 - h. All system interconnect cables, workstation PCs, PTZ joysticks, and network intermediate devices shall be provided for full performance of specified system.
- O. Video Motion Sensors (Interior)
- 1. Device Performance: Detect changes in video signal within a user-defined protected zone. Video inputs shall be composite video as defined in SMPTE 170M. Provide an alarm output for each video input.
 - a. Detect movement within protected zone of intruders wearing clothing with a reflectivity that differs from that of background scene by a factor of two. Reject all other changes in video signal.
 - b. Modular design that allows for expansion or modification of number of inputs.
 - c. Controls:
 - 1) Size of detection zones.
 - 2) Sensitivity of detection of each protected zone.
 - d. Mounting: Standard **19-inch (483-mm)** rack complying with CEA 310-E.
- P. Control Stations
- 1. Description: Heavy-duty, freestanding, modular, metal furniture units arranged to house electronic equipment. Coordinate component arrangement and wiring with components and wiring of other systems.
 - 2. Equipment Mounting: Standard **19-inch (483-mm)** rack complying with CEA 310-E.
 - 3. Normal System Power Supply: 120 V, 60 Hz, through a locked disconnect device and an isolation transformer in central-station control unit. Central-station control unit shall supply power to all components connected to it unless otherwise indicated.
 - 4. Power Continuity for Control Station: Batteries in power supplies of central-station control units and individual system components shall maintain continuous system operation during outages of both normal and backup ac system supply.
 - a. Batteries: Rechargeable, valve-regulated, recombinant, sealed, lead-acid type with nominal 10-year life expectancy. Capacity adequate to operate portions of system served including audible trouble signal devices for up to four hours and audible and visual alarm devices under alarm conditions for an additional 10 minutes.
 - b. Battery Charger: Solid-state, fully automatic, variable-charging-rate type. Charger shall recharge fully discharged battery within 24 hours.
 - 5. Annunciation: Indicate change in system condition and switching of system or component to backup power.
- Q. Signal Transmission Components
- 1. Cable: Coaxial cable elements have 75-ohm nominal impedance. Comply with requirements in Division 16 Section "Conductors and Cables for Electronic Safety and Security."
 - 2. Video Surveillance Coaxial Cable Connectors: BNC type, 75 ohms. Comply with requirements in Division 16 Section "Conductors and Cables for Electronic Safety and Security."

1.3 EXECUTION

A. Examination

1. Examine pathway elements intended for cables. Check raceways and other elements for compliance with space allocations, installation tolerance, hazards to camera installation, and other conditions affecting installation.
2. Examine roughing-in for LAN, WAN, and IP network before device installation.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Wiring

1. Comply with requirements in Division 16 Section "Raceways and Boxes."

OR

Wiring Method: Install cables in raceways unless otherwise indicated.

- a. Except raceways are not required in accessible indoor ceiling spaces and attics.
OR
Except raceways are not required in hollow gypsum board partitions.
- b. Conceal raceways and wiring except in unfinished spaces.
2. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Provide and use lacing bars and distribution spools.
3. Splices, Taps, and Terminations: For power and control wiring, use numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.
4. For LAN connection and fiber-optic and copper communication wiring, comply with Division 16 Sections "Communications Backbone Cabling" and "Communications Horizontal Cabling."
5. Grounding: Provide independent-signal circuit grounding recommended in writing by manufacturer.

C. Video Surveillance System Installation

1. Install cameras and infrared illuminators level and plumb.
2. Install cameras with **84-inch- (2134-mm-)** minimum clear space below cameras and their mountings. Change type of mounting to achieve required clearance.
3. Set pan unit and pan-and-tilt unit stops to suit final camera position and to obtain the field of view required for camera. Connect all controls and alarms, and adjust.
4. Install power supplies and other auxiliary components at control stations unless otherwise indicated.
5. Install tamper switches on components indicated to receive tamper switches, arranged to detect unauthorized entry into system-component enclosures and mounted in self-protected, inconspicuous positions.
6. Avoid ground loops by making ground connections only at the control station.
 - a. For 12- and 24-V dc cameras, connect the coaxial cable shields only at the monitor end.
7. Identify system components, wiring, cabling, and terminals according to Division 16 Section "Electrical Identification."

D. Field Quality Control

1. Perform tests and inspections.
2. Tests and Inspections:
 - a. Inspection: Verify that units and controls are properly installed, connected, and labeled, and that interconnecting wires and terminals are identified.
 - b. Pretesting: Align and adjust system and pretest components, wiring, and functions to verify that they comply with specified requirements. Conduct tests at varying lighting levels, including day and night scenes as applicable. Prepare video-surveillance equipment for acceptance and operational testing as follows:
 - 1) Prepare equipment list described in "Submittals" Article.

- 2) Verify operation of auto-iris lenses.
 - 3) Set back-focus of fixed focal length lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Adjust until image is in focus with and without the filter.
 - 4) Set back-focus of zoom lenses. At focus set to infinity, simulate nighttime lighting conditions by using a dark glass filter of a density that produces a clear image. Additionally, set zoom to full wide angle and aim camera at an object **50 to 75 feet (17 to 23 m)** away. Adjust until image is in focus from full wide angle to full telephoto, with the filter in place.
 - 5) Set and name all preset positions; consult Owner's personnel.
 - 6) Set sensitivity of motion detection.
 - 7) Connect and verify responses to alarms.
 - 8) Verify operation of control-station equipment.
- c. Test Schedule: Schedule tests after pretesting has been successfully completed and system has been in normal functional operation for at least 14 days. Provide a minimum of 10 days' notice of test schedule.
 - d. Operational Tests: Perform operational system tests to verify that system complies with Specifications. Include all modes of system operation. Test equipment for proper operation in all functional modes.
3. Video surveillance system will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.
- E. Adjusting
1. Occupancy Adjustments: When requested within 12 months of date of Final Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose. Tasks shall include, but are not limited to, the following:
 - a. Check cable connections.
 - b. Check proper operation of cameras and lenses. Verify operation of auto-iris lenses and adjust back-focus as needed.
 - c. Adjust all preset positions; consult Owner's personnel.
 - d. Recommend changes to cameras, lenses, and associated equipment to improve Owner's use of video surveillance system.
 - e. Provide a written report of adjustments and recommendations.
- F. Cleaning
1. Clean installed items using methods and materials recommended in writing by manufacturer.
 2. Clean video-surveillance-system components, including camera-housing windows, lenses, and monitor screens.
- G. Demonstration
1. Train Owner's maintenance personnel to adjust, operate, and maintain video-surveillance equipment.

END OF SECTION 28 21 31 00

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Task	Specification	Specification Description
28 21 31 00	01 22 16 00	No Specification Required
28 21 31 00	26 09 23 00	Electrical Power Monitoring And Control
28 21 31 00	28 16 11 00	Security Access
28 46 00 00	33 44 36 00	Oil/Water Separator

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SECTION 28 46 13 31 - ZONED (DC LOOP) FIRE-ALARM SYSTEM

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for zoned (DC loop) fire alarm system. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fire-alarm control unit.
 - b. Manual fire-alarm boxes.
 - c. System smoke detectors.
 - d. Nonsystem smoke detectors.
 - e. Heat detectors.
 - f. Notification appliances.
 - g. Magnetic door holders.
 - h. Remote annunciator.
 - i. Digital alarm communicator transmitter.
 - j. Radio alarm transmitter.

C. Definitions

1. LED: Light-emitting diode.
2. NICET: National Institute for Certification in Engineering Technologies.

D. System Description

1. Noncoded system, dedicated to fire-alarm service only.

E. Submittals

1. General Submittal Requirements:
 - a. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the Owner.
 - b. Shop Drawings shall be prepared by persons with the following qualifications:
 - 1) Trained and certified by manufacturer in fire-alarm system design.
 - 2) NICET-certified fire-alarm technician, Level III **OR** Level IV **OR** one who meets the requirements necessary for certification, **as directed**, minimum.
 - 3) Licensed or certified by authorities having jurisdiction.
2. Product Data: For each type of product indicated.
3. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.
 - a. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
 - b. Include voltage drop calculations for notification appliance circuits.
 - c. Include battery size calculations.
 - d. Include performance parameters and installation details for each detector, verifying that each detector is listed for the complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
 - e. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.

- f. Include floor plans to indicate final outlet locations showing zone designation of each device. Show size and route of cable and conduits.
 4. Delegated-Design Submittal: For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data, signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Drawings showing the location of each smoke and heat detector, the ratings of each, and installation details as needed to comply with the listing conditions of the detector.
 - b. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.
 5. Qualification Data: For qualified Installer.
 6. Field quality-control reports.
 7. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. Deliver copies to authorities having jurisdiction, **as directed**, and include the following:
 - a. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - b. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 - c. Record copy of site-specific software.
 - d. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - 1) Frequency of testing of installed components.
 - 2) Frequency of inspection of installed components.
 - 3) Requirements and recommendations related to results of maintenance.
 - 4) Manufacturer's user training manuals.
 - e. Manufacturer's required maintenance related to system warranty requirements.
 - f. Abbreviated operating instructions for mounting at fire-alarm control unit.
 - g. Copy of NFPA 25.
- F. Quality Assurance
1. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
 2. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II **OR** Level III **OR** Level IV **OR** one who meets the requirements necessary for certification, **as directed**, technician.
 3. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
 4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Project Conditions
1. Interruption of Existing Fire-alarm Service: Do not interrupt fire-alarm service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of fire-alarm service.
 - b. Do not proceed with interruption of fire-alarm service without the Owner 's written permission.
- H. Sequencing And Scheduling
1. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

2. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.2 PRODUCTS

A. Systems Operational Description

1. Fire-alarm signal initiation shall be by one or more of the following devices and systems, **as directed**:
 - a. Manual stations.
 - b. Heat detectors.
 - c. Smoke detectors.
 - d. Duct smoke detectors.
 - e. Automatic sprinkler system water flow.
 - f. Fire-extinguishing system operation.
 - g. Fire standpipe system.
2. Fire-alarm signal shall initiate the following actions:
 - a. Continuously operate alarm notification appliances.
 - b. Identify alarm zone at fire-alarm control unit and remote annunciators, **as directed**.
 - c. Transmit an alarm signal to the remote alarm receiving station.
3. Supervisory signal initiation shall be by one or more of the following devices and systems:
 - a. Valve supervisory switch.
4. System trouble signal initiation shall be by one or more of the following devices and actions:
 - a. Open circuits, shorts, and grounds in designated circuits.
 - b. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - c. Loss of primary power at fire-alarm control unit.
 - d. Ground or a single break in fire-alarm control unit internal circuits.
 - e. Abnormal ac voltage at fire-alarm control unit.
 - f. Break in standby battery circuitry.
 - g. Failure of battery charging.
 - h. Abnormal position of any switch at fire-alarm control unit or annunciator, **as directed**.
5. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators, **as directed**.

B. Fire-Alarm Control Unit

1. General Requirements for Fire-Alarm Control Unit:
 - a. Modular, power-limited design with electronic modules, UL 864 listed.
 - 1) Include a real-time clock for time annotation of events.
2. Alphanumeric Display and System Controls: Display alarm, supervisory, and component status messages and the programming and control menu.
 - a. Annunciator and Display: Liquid-crystal type, one line of 40 **OR** 80, **as directed**, characters, minimum.
3. Circuits:
 - a. No Fewer Than Five Initiating Device Circuits:
 - 1) Four circuits, NFPA 72, Class B.
 - 2) One circuit(s), NFPA 72, Class A, Style 6
 - b. No Fewer Than Two Notification Appliance Circuits: NFPA 72, Class B, Style Y.
4. Notification Appliance Circuit: Operation shall sound in a **Pattern** as directed by the Owner .
5. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be **OR** not be, **as directed**, connected to fire-alarm system.
6. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
7. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals **OR**

supervisory and digital alarm communicator transmitters **OR** digital alarm radio transmitters, **as directed**, shall be powered by the 24-V dc source.

- a. Alarm current draw of the entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
8. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - a. Batteries: Sealed lead calcium **OR** Sealed, valve-regulated, recombinant lead acid **OR** Vented, wet-cell pocket, plate nickel cadmium, **as directed**.
9. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

C. Manual Fire-Alarm Boxes

1. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - a. Single-action mechanism, breaking-glass or plastic-rod **OR** pull-lever, **as directed**, type.
 - b. Double-action mechanism requiring two actions to initiate an alarm, breaking-glass or plastic-rod **OR** pull-lever, **as directed**, type.
 - c. Station Reset: Key- or wrench-operated switch.
 - d. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - e. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

D. System Smoke Detectors

1. General Requirements for System Smoke Detectors:
 - a. Operating at 24-V dc, nominal.
 - b. Detectors shall be four **OR** two, **as directed**, -wire type.
 - c. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - d. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - e. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status, **as directed**.
 - f. Provide multiple levels of detection sensitivity for each sensor, with alarm-verification feature, **as directed**.
2. Photoelectric Smoke Detectors: Comply with UL 268.
3. Ionization Smoke Detector: Comply with UL 268.
4. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 - a. Remote indication and test, **as directed**, station. Operating key switch initiates an alarm test, **as directed**.
 - b. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
 - c. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - d. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.

E. Nonsystem Smoke Detectors

1. Single-Station Smoke Detectors:

- a. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device, **as directed**.
 - b. Auxiliary Relays: One Form C rated at 0.5 A **OR** Form A and one Form C, both rated at 0.5 A, **as directed**.
 - c. Audible Notification Appliance: Piezoelectric sounder rated at 90 dBA at **10 feet (3 m)** according to UL 464.
 - d. Visible Notification Appliance: 177-cd strobe.
 - e. Heat sensor, **135 deg F (57 deg C)** combination rate-of-rise and fixed temperature, **as directed**.
 - f. Test Switch: Push-to-test; simulates smoke at rated obscuration.
 - g. Tandem Connection: Allow tandem connection of number of indicated detectors; alarm on one detector shall actuate notification on all connected detectors.
 - h. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - i. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
 - j. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status, **as directed**.
2. Single-Station Duct Smoke Detectors:
- a. Comply with UL 268A; operating at 120-V ac.
 - b. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. The fixed base shall be designed for mounting directly to air duct. Provide terminals in the fixed base for connection to building wiring.
 - 1) Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
 - c. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - d. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
- F. Heat Detectors
1. General Requirements for Heat Detectors: Comply with UL 521.
 2. Heat Detector, Combination Type: Actuated by either a fixed temperature of **135 deg F (57 deg C)** or a rate of rise that exceeds **15 deg F (8 deg C)** per minute unless otherwise indicated.
 - a. Mounting: Adapter plate for outlet box mounting **OR** Twist-lock base interchangeable with smoke-detector bases, **as directed**.
 3. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of **190 deg F (88 deg C)**.
 - a. Mounting: Adapter plate for outlet box mounting **OR** Twist-lock base interchangeable with smoke-detector bases, **as directed**.
- G. Notification Appliances
1. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
 - a. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
 2. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
 3. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured **10 feet (3 m)** from the horn, using the coded signal prescribed in UL 464 test protocol.

4. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum **1-inch- (25-mm-)** high letters on the lens.
 - a. Rated Light Output:
 - 1) Indicated on Drawings.
 - 2) **15 OR 30 OR 75 OR 110 OR 177, as directed, cd.**
OR
15/30/75/110 cd, selectable in the field.
 - b. Mounting: Indicated on Drawings **OR** Wall mounted, **as directed**.
 - c. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - d. Flashing shall be in a temporal pattern, synchronized with other units.
 - e. Strobe Leads: Factory connected to screw terminals.
 - f. Mounting Faceplate: Factory finished, red **OR** white, **as directed**.

- H. Magnetic Door Holders
 1. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
 - a. Electromagnet: Requires no more than 3 W to develop **25-lbf (111-N)** holding force.
 - b. Wall-Mounted Units: Flush mounted unless otherwise indicated.
 - c. Rating: 24-V ac or dc.
 - d. Rating: 120-V ac.
 2. Material and Finish: Match door hardware.

- I. Remote Annunciator
 1. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 - a. Mounting: Flush **OR** Surface, **as directed**, cabinet, NEMA 250, Type 1.
 2. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

- J. Digital Alarm Communicator Transmitter
 1. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.
 2. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one **OR** two, **as directed**, telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either, **as directed**, line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
 3. Local functions and display at the digital alarm communicator transmitter shall include the following:
 - a. Verification that both telephone lines are available.
 - b. Programming device.
 - c. LED display.
 - d. Manual test report function and manual transmission clear indication.
 - e. Communications failure with the central station or fire-alarm control unit.
 4. Digital data transmission shall include the following:
 - a. Zone of the alarm initiating device.
 - b. Zone of the supervisory signal.
 - c. Zone of the trouble initiating device.

- d. Loss of ac supply or loss of power.
 - e. Low battery.
 - f. Abnormal test signal.
 - g. Communication bus failure.
 5. Secondary Power: Integral rechargeable battery and automatic charger.
 6. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.
- K. Radio Alarm Transmitter
1. Transmitter shall comply with NFPA 1221 and shall be listed and labeled by an NRTL.
 2. Comply with 47 CFR 90.
 3. Description: Manufacturer's standard commercial product; factory assembled, wired, tested, and ready for installation and operation.
 - a. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
 - b. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote alarm receiving station designated by the Owner.
 - c. Normal Power Input: 120-V ac.
 - d. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
 - e. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand 100 mph (160 km/h) with a gust factor of 1.3 without failure.
 - f. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
 - g. Antenna-Cable Connectors: Weatherproof.
 - h. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.
 4. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:
 - a. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
 - b. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
 - c. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
 - d. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
 - e. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
 - f. Local Fire-Alarm-System Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm, **as directed**.
- L. Device Guards
1. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - a. Factory fabricated and furnished by manufacturer of the device.
 - b. Finish: Paint of color to match the protected device.

1.3 EXECUTION

A. Equipment Installation

1. Comply with NFPA 72 for installation of fire-alarm equipment.
2. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - a. Connect new equipment to the existing control panel in the existing part of the building.
 - b. Connect new equipment to the existing monitoring equipment at the supervising station.
 - c. Expand, modify, and supplement the existing control **OR** monitoring, **as directed**, equipment as necessary to extend the existing control **OR** monitoring, **as directed**, functions to the new points. New components shall be capable of merging with the existing configuration without degrading the performance of either system.
3. Smoke- or Heat-Detector Spacing:
 - a. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 - b. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 - c. Smooth ceiling spacing shall not exceed **30 feet (9 m)**, **as directed**.
 - d. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A or Appendix B, **as directed**, in NFPA 72.
 - e. HVAC: Locate detectors not closer than **3 feet (1 m) OR 5 feet (1.5 m)**, **as directed**, from air-supply diffuser or return-air opening.
 - f. Lighting Fixtures: Locate detectors not closer than **12 inches (300 mm)** from any part of a lighting fixture.
4. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
5. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
6. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
7. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
8. Audible Alarm-Indicating Devices: Install not less than **6 inches (150 mm)** below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
9. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least **6 inches (150 mm)** below the ceiling.
10. Device Location-Indicating Lights: Locate in public space near the device they monitor.
11. Fire-Alarm Control Unit: Surface mounting, with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
12. Annunciator: Install with top of panel not more than **72 inches (1830 mm)** above the finished floor.
13. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that will resist **100-mph (160-km/h)**, **as directed**, wind load with a gust factor of 1.3 without damage.

B. Connections

1. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware". Connect hardware and devices to fire-alarm system.
 - a. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.

2. Connect supervised interface devices to the following devices and systems. Install the interface device less than **3 feet (1 m)** from the device controlled.
 - a. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - b. Supervisory connections at valve supervisory switches.
 - c. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - d. Supervisory connections at fire-pump engine control panel.
- C. Identification
 1. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
 2. Install framed instructions in a location visible from fire-alarm control unit.
- D. Grounding
 1. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- E. Field Quality Control
 1. Field tests shall be witnessed by authorities having jurisdiction.
 2. Tests and Inspections:
 - a. Visual Inspection: Conduct the visual inspection prior to testing.
 - 1) Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - 2) Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - b. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing, and Maintenance" Chapter in NFPA 72.
 - c. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - d. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - e. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 3. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
 4. Fire-alarm system will be considered defective if it does not pass tests and inspections.
 5. Prepare test and inspection reports.
 6. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
 7. Annual Test and Inspection: One year after date of Final Completion, test fire-alarm system complying with the visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

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SECTION 28 46 13 31a - DIGITAL, ADDRESSABLE FIRE-ALARM SYSTEM

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for digital, addressable fire alarm system. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Fire-alarm control unit.
 - b. Manual fire-alarm boxes.
 - c. System smoke detectors.
 - d. Nonsystem smoke detectors.
 - e. Heat detectors.
 - f. Notification appliances.
 - g. Firefighters' two-way telephone communication service.
 - h. Magnetic door holders.
 - i. Remote annunciator.
 - j. Addressable interface device.
 - k. Digital alarm communicator transmitter.
 - l. Radio alarm transmitter.
 - m. System printer.

C. Definitions

1. LED: Light-emitting diode.
2. NICET: National Institute for Certification in Engineering Technologies.

D. System Description

1. Noncoded, UL-certified **OR** FMG-placarded, **as directed**, addressable system, with multiplexed signal transmission, dedicated to fire-alarm service only.
2. Noncoded addressable system, with automatic sensitivity control of certain smoke detectors and multiplexed signal transmission, dedicated to fire-alarm service only.

E. Performance Requirements

1. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to SEI/ASCE 7.
 - a. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event," **as directed**.

F. Submittals

1. General Submittal Requirements:
 - a. Submittals shall be approved by authorities having jurisdiction prior to submitting them to the Owner.
 - b. Shop Drawings shall be prepared by persons with the following qualifications:
 - 1) Trained and certified by manufacturer in fire-alarm system design.
 - 2) NICET-certified fire-alarm technician, Level III **OR** Level IV, **as directed**, minimum.
 - 3) Licensed or certified by authorities having jurisdiction.
2. Product Data: For each type of product indicated.
3. Shop Drawings: For fire-alarm system. Include plans, elevations, sections, details, and attachments to other work.

- a. Comply with recommendations in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72.
- b. Include voltage drop calculations for notification appliance circuits.
- c. Include battery-size calculations.
- d. Include performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
- e. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale and coordinating installation of duct smoke detectors and access to them. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators. Locate detectors according to manufacturer's written recommendations.
- f. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
- g. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits.
4. Delegated-Design Submittal: For smoke and heat detectors indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Drawings showing the location of each smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the detector.
 - b. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72.
5. Qualification Data: For qualified Installer.
6. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
 - a. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - b. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - c. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
7. Field quality-control reports.
8. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals. Deliver copies to authorities having jurisdiction and include the following:
 - a. Comply with the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - b. Provide "Record of Completion Documents" according to NFPA 72 article "Permanent Records" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter.
 - c. Record copy of site-specific software.
 - d. Provide "Maintenance, Inspection and Testing Records" according to NFPA 72 article of the same name and include the following:
 - 1) Frequency of testing of installed components.
 - 2) Frequency of inspection of installed components.
 - 3) Requirements and recommendations related to results of maintenance.
 - 4) Manufacturer's user training manuals.
 - e. Manufacturer's required maintenance related to system warranty requirements.
 - f. Abbreviated operating instructions for mounting at fire-alarm control unit.
 - g. Copy of NFPA 25.
9. Software and Firmware Operational Documentation:
 - a. Software operating and upgrade manuals.
 - b. Program Software Backup: On magnetic media or compact disk, complete with data files.
 - c. Device address list.
 - d. Printout of software application and graphic screens.

G. Quality Assurance

1. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.
2. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level II **OR** Level III **OR** Level IV, **as directed**, technician.
3. Source Limitations for Fire-Alarm System and Components: Obtain fire-alarm system from single source from single manufacturer. Components shall be compatible with, and operate as, an extension of existing system.
4. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
5. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL.
6. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.
7. NFPA Certification: Obtain certification according to NFPA 72 in the form of a placard by an FMG-approved alarm company.
8. NFPA Certification: Obtain certification according to NFPA 72 by agency having jurisdiction.

H. Project Conditions

1. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of fire-alarm service.
 - b. Do not proceed with interruption of fire-alarm service without the Owner written permission.

I. Sequencing And Scheduling

1. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.
2. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

J. Software Service Agreement

1. Comply with UL 864.
2. Technical Support: Beginning with Final Completion, provide software support for two years.
3. Upgrade Service: Update software to latest version at Project completion. Install and program software upgrades that become available within two years from date of Final Completion. Upgrading software shall include operating system. Upgrade shall include new or revised licenses for use of software.
 - a. Provide 30 days' notice to the Owner to allow scheduling and access to system and to allow the Owner to upgrade computer equipment if necessary.

1.2 PRODUCTS

A. Systems Operational Description

1. Fire-alarm signal initiation shall be by one or more of the following devices and systems, **as directed**:
 - a. Manual stations.
 - b. Heat detectors.
 - c. Flame detectors.
 - d. Smoke detectors.
 - e. Duct smoke detectors.
 - f. Verified automatic alarm operation of smoke detectors.
 - g. Automatic sprinkler system water flow.
 - h. Heat detectors in elevator shaft and pit.

- i. Fire-extinguishing system operation.
- j. Fire standpipe system.
2. Fire-alarm signal shall initiate the following actions:
 - a. Continuously operate alarm notification appliances.
 - b. Identify alarm at fire-alarm control unit and remote annunciators, **as directed**.
 - c. Transmit an alarm signal to the remote alarm receiving station.
 - d. Unlock electric door locks in designated egress paths.
 - e. Release fire and smoke doors held open by magnetic door holders.
 - f. Activate voice/alarm communication system.
 - g. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
 - h. Activate smoke-control system (smoke management) at firefighter smoke-control system panel.
 - i. Activate stairwell and elevator-shaft pressurization systems.
 - j. Close smoke dampers in air ducts of designated air-conditioning duct systems.
 - k. Recall elevators to primary or alternate recall floors.
 - l. Activate emergency lighting control.
 - m. Activate emergency shutoffs for gas and fuel supplies.
 - n. Record events in the system memory.
 - o. Record events by the system printer.
3. Supervisory signal initiation shall be by one or more of the following devices and actions:
 - a. Valve supervisory switch.
 - b. Low-air-pressure switch of a dry-pipe sprinkler system.
 - c. Elevator shunt-trip supervision.
4. System trouble signal initiation shall be by one or more of the following devices and actions:
 - a. Open circuits, shorts, and grounds in designated circuits.
 - b. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
 - c. Loss of primary power at fire-alarm control unit.
 - d. Ground or a single break in fire-alarm control unit internal circuits.
 - e. Abnormal ac voltage at fire-alarm control unit.
 - f. Break in standby battery circuitry.
 - g. Failure of battery charging.
 - h. Abnormal position of any switch at fire-alarm control unit or annunciator.
 - i. Fire-pump power failure, including a dead-phase or phase-reversal condition.
 - j. Low-air-pressure switch operation on a dry-pipe or preaction sprinkler system.
5. System Trouble and Supervisory Signal Actions: Initiate notification appliance and annunciate at fire-alarm control unit and remote annunciators, **as directed**. Record the event on system printer.

B. Fire-Alarm Control Unit

1. General Requirements for Fire-Alarm Control Unit:
 - a. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864 and listed and labeled by an NRTL.
 - 1) System software and programs shall be held in flash electrically erasable programmable read-only memory (EEPROM), retaining the information through failure of primary and secondary power supplies.
 - 2) Include a real-time clock for time annotation of events on the event recorder and printer.
 - b. Addressable initiation devices that communicate device identity and status.
 - 1) Smoke sensors shall additionally communicate sensitivity setting and allow for adjustment of sensitivity at fire-alarm control unit, **as directed**.
 - 2) Temperature sensors shall additionally test for and communicate the sensitivity range of the device.
 - c. Addressable control circuits for operation of mechanical equipment.

2. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.
 - a. Annunciator and Display: Liquid-crystal type, 1 **OR** 2 **OR** 3, **as directed**, line(s) of 40 **OR** 80, **as directed**, characters, minimum.
 - b. Keypad: Arranged to permit entry and execution of programming, display, and control commands and to indicate control commands to be entered into the system for control of smoke-detector sensitivity and other parameters, **as directed**.
3. Circuits:
 - a. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class A.
 - 1) Initiating Device Circuits: Style D **OR** Style E, **as directed**.
 - 2) Notification Appliance Circuits: Style Z.
 - 3) Signaling Line Circuits: Style 2 **OR** Style 5 **OR** Style 6 **OR** Style 7, **as directed**.
 - 4) Install no more than 50 addressable devices on each signaling line circuit.
 - b. Initiating Device, Notification Appliance, and Signaling Line Circuits: NFPA 72, Class B.
 - 1) Initiating Device Circuits: Style A **OR** Style B **OR** Style C, **as directed**.
 - 2) Notification Appliance Circuits: Style W **OR** Style X **OR** Style Y, **as directed**.
 - 3) Signaling Line Circuits: Style 0.5 **OR** Style 1 **OR** Style 3 **OR** Style 3.5 **OR** Style 4 **OR** Style 4.5, **as directed**.
 - 4) Install no more than 50 addressable devices on each signaling line circuit.
 - c. Serial Interfaces: Two RS-232 ports for printers.
4. Stairwell Pressurization: Provide an output signal using an addressable relay to start the stairwell pressurization system. Signal shall remain on until alarm conditions are cleared and fire-alarm system is reset. Signal shall not stop in response to alarm acknowledge or signal silence commands.
 - a. Pressurization starts when any alarm is received at fire-alarm control unit.
 - b. Alarm signals from smoke detectors at pressurization air supplies have a higher priority than other alarm signals that start the system.
5. Smoke-Alarm Verification:
 - a. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
 - b. Activate an NRTL-listed and -approved "alarm-verification" sequence at fire-alarm control unit and detector.
 - c. Record events by the system printer.
 - d. Sound general alarm if the alarm is verified.
 - e. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.
6. Notification Appliance Circuit: Operation shall sound in a **Pattern** as directed by the Owner .
7. Elevator Recall:
 - a. Smoke detectors at the following locations shall initiate automatic elevator recall. Alarm-initiating devices, except those listed, shall not start elevator recall, **as directed**.
 - 1) Elevator lobby detectors except the lobby detector on the designated floor.
 - 2) Smoke detector in elevator machine room.
 - 3) Smoke detectors in elevator hoistway.
 - b. Elevator lobby detectors located on the designated recall floors shall be programmed to move the cars to the alternate recall floor.
 - c. Water-flow alarm connected to sprinkler in an elevator shaft and elevator machine room shall shut down elevators associated with the location without time delay.
 - 1) Water-flow switch associated with the sprinkler in the elevator pit may have a delay to allow elevators to move to the designated floor.
8. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke barrier walls shall be **OR** not be, **as directed**, connected to fire-alarm system.
9. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-

adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

10. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.
11. Voice/Alarm Signaling Service: Central emergency communication system with redundant microphones, preamplifiers, amplifiers, and tone generators provided in a separate cabinet located in the fire command center **OR** as a special module that is part of fire-alarm control unit, **as directed**.
 - a. Indicated number of alarm channels for automatic, simultaneous transmission of different announcements to different zones or for manual transmission of announcements by use of the central-control microphone. Amplifiers shall comply with UL 1711 and be listed by an NRTL.
 - 1) Allow the application of and evacuation signal to indicated number of zones and, at same time, allow voice paging to the other zones selectively or in any combination.
 - 2) Programmable tone and message sequence selection.
 - 3) Standard digitally recorded messages for "Evacuation" and "All Clear."
 - 4) Generate tones to be sequenced with audio messages of type recommended by NFPA 72 and that are compatible with tone patterns of notification appliance circuits of fire-alarm control unit.
 - b. Status Annunciator: Indicate the status of various voice/alarm speaker zones and the status of firefighters' two-way telephone communication zones.
 - c. Preamplifiers, amplifiers, and tone generators shall automatically transfer to backup units, on primary equipment failure.
12. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.
13. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals **OR** supervisory and digital alarm communicator transmitters **OR** digital alarm radio transmitters, **as directed**, shall be powered by 24-V dc source.
 - a. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.
14. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.
 - a. Batteries: Sealed lead calcium **OR** Sealed, valve-regulated, recombinant lead acid **OR** Vented, wet-cell pocket, plate nickel cadmium, **as directed**.
15. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

C. Manual Fire-Alarm Boxes

1. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
 - a. Single-action mechanism, breaking-glass or plastic-rod **OR** pull-lever, **as directed**, type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
 - b. Double-action mechanism requiring two actions to initiate an alarm, breaking-glass or plastic-rod **OR** pull-lever, **as directed**, type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.

- c. Station Reset: Key- or wrench-operated switch.
 - d. Indoor Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
 - e. Weatherproof Protective Shield: Factory-fabricated clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.
- D. System Smoke Detectors
1. General Requirements for System Smoke Detectors:
 - a. Comply with UL 268; operating at 24-V dc, nominal.
 - b. Detectors shall be four **OR** two, **as directed**, -wire type.
 - c. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 - d. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - e. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
 - f. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status, **as directed**.
 - g. Remote Control: Unless otherwise indicated, detectors shall be analog-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.
 - 1) Rate-of-rise temperature characteristic shall be selectable at fire-alarm control unit for **15 or 20 deg F (8 or 11 deg C)** per minute.
 - 2) Fixed-temperature sensing shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at **135 or 155 deg F (57 or 68 deg C)**.
 - 3) Provide multiple levels of detection sensitivity for each sensor.
 2. Photoelectric Smoke Detectors:
 - a. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - b. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - 1) Primary status.
 - 2) Device type.
 - 3) Present average value.
 - 4) Present sensitivity selected.
 - 5) Sensor range (normal, dirty, etc.).
 3. Ionization Smoke Detector:
 - a. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - b. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - 1) Primary status.
 - 2) Device type.
 - 3) Present average value.
 - 4) Present sensitivity selected.
 - 5) Sensor range (normal, dirty, etc.).
 4. Duct Smoke Detectors: Photoelectric type complying with UL 268A.
 - a. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
 - b. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:
 - 1) Primary status.
 - 2) Device type.
 - 3) Present average value.

- 4) Present sensitivity selected.
 - 5) Sensor range (normal, dirty, etc.).
 - c. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
 - d. Each sensor shall have multiple levels of detection sensitivity.
 - e. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - f. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
- E. Nonsystem Smoke Detectors
1. Single-Station Smoke Detectors:
 - a. Comply with UL 217; suitable for NFPA 101, residential occupancies; operating at 120-V ac with 9-V dc battery as the secondary power source. Provide with "low" or "missing" battery chirping-sound device, **as directed**.
 - b. Auxiliary Relays: One Form C rated at 0.5 A **OR** Form A and one Form C, both rated at 0.5 A, **as directed**.
 - c. Audible Notification Appliance: Piezoelectric sounder rated at 90 dBA at **10 feet (3 m)** according to UL 464.
 - d. Visible Notification Appliance: 177-cd strobe.
 - e. Heat sensor, **135 deg F (57 deg C)** combination rate-of-rise, **as directed**, and fixed temperature.
 - f. Test Switch: Push to test; simulates smoke at rated obscuration.
 - g. Tandem Connection: Allow tandem connection of number of indicated detectors; alarm on one detector shall actuate notification on all connected detectors.
 - h. Plug-in Arrangement: Detector and associated electronic components shall be mounted in a plug-in module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
 - i. Self-Restoring: Detectors shall not require resetting or readjustment after actuation to restore them to normal operation.
 - j. Integral Visual-Indicating Light: LED type indicating detector has operated and power-on status, **as directed**.
 2. Single-Station Duct Smoke Detectors:
 - a. Comply with UL 268A; operating at 120-V ac.
 - b. Sensor: LED or infrared light source with matching silicon-cell receiver.
 - 1) Detector Sensitivity: Smoke obscuration between **2.5 and 3.5 percent/foot (0.008 and 0.011 percent/mm)** when tested according to UL 268A.
 - c. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. The fixed base shall be designed for mounting directly to air duct. Provide terminals in the fixed base for connection to building wiring.
 - 1) Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector.
 - d. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
 - e. Relay Fan Shutdown: Rated to interrupt fan motor-control circuit.
- F. Heat Detectors
1. General Requirements for Heat Detectors: Comply with UL 521.
 2. Heat Detector, Combination Type: Actuated by either a fixed temperature of **135 deg F (57 deg C)** or a rate of rise that exceeds **15 deg F (8 deg C)** per minute unless otherwise indicated.
 - a. Mounting: Adapter plate for outlet box mounting **OR** Twist-lock base interchangeable with smoke-detector bases, **as directed**.
 - b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.

3. Heat Detector, Fixed-Temperature Type: Actuated by temperature that exceeds a fixed temperature of **190 deg F (88 deg C)**.
 - a. Mounting: Adapter plate for outlet box mounting **OR** Twist-lock base interchangeable with smoke-detector bases, **as directed**.
 - b. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
 4. Continuous Linear Heat-Detector System:
 - a. Detector Cable: Rated detection temperature **155 deg F (68 deg C)**. NRTL listed for "regular" service and a standard environment. Cable includes two steel actuator wires twisted together with spring pressure, wrapped with protective tape, and finished with PVC outer sheath. Each actuator wire is insulated with heat-sensitive material that reacts with heat to allow the cable twist pressure to short-circuit wires at the location of elevated temperature.
 - b. Control Unit: Two-zone or multizone unit as indicated. Provide same system power supply, supervision, and alarm features as specified for fire-alarm control unit.
 - c. Signals to Fire-Alarm Control Unit: Any type of local system trouble shall be reported to fire-alarm control unit as a composite "trouble" signal. Alarms on each detection zone shall be individually reported to central fire-alarm control unit as separately identified zones.
 - d. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
- G. Notification Appliances
1. General Requirements for Notification Appliances: Individually addressed, connected to a signaling line circuit, equipped for mounting as indicated and with screw terminals for system connections.
 2. General Requirements for Notification Appliances: Connected to notification appliance signal circuits, zoned as indicated, equipped for mounting as indicated and with screw terminals for system connections.
 - a. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated and with screw terminals for system connections.
 3. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.
 4. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.
 5. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured **10 feet (3 m)** from the horn, using the coded signal prescribed in UL 464 test protocol.
 6. Visible Notification Appliances: Xenon strobe lights comply with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum **1-inch- (25-mm-)** high letters on the lens.
 - a. Rated Light Output:
 - 1) **15 OR 30 OR 75 OR 110 OR 177, as directed, cd.**
OR
15/30/75/110 cd, selectable in the field.
 - b. Mounting: Wall mounted unless otherwise indicated.
 - c. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
 - d. Flashing shall be in a temporal pattern, synchronized with other units.
 - e. Strobe Leads: Factory connected to screw terminals.
 - f. Mounting Faceplate: Factory finished, red **OR** white, **as directed**.
 7. Voice/Tone Notification Appliances:
 - a. Appliances shall comply with UL 1480 and shall be listed and labeled by an NRTL.
 - b. High-Range Units: Rated 2 to 15 W.
 - c. Low-Range Units: Rated 1 to 2 W.
 - d. Mounting: Flush **OR** Semirecessed **OR** Surface mounted and bidirectional, **as directed**.

- e. Matching Transformers: Tap range matched to acoustical environment of speaker location.
- H. Firefighters' Two-Way Telephone Communication Service
- 1. Dedicated, two-way, supervised, telephone voice communication links between fire-alarm control unit, the fire command center, **as directed**, and remote firefighters' telephone stations. Supervised telephone lines shall be connected to talk circuits by controls in a control module. Provide the following:
 - a. Common-talk type for firefighter use only.
 - b. Selective-talk type for use by firefighters and fire wardens.
 - c. Controls to disconnect phones from talk circuits if too many phones are in use simultaneously.
 - d. Audible Pulse and Tone Generator, and High-Intensity Lamp: When a remote telephone is activated, it causes audible signal to sound and high-intensity lamp to flash.
 - e. Selector panel controls shall provide for simultaneous operation of up to six telephones in selected zones. Indicate ground faults and open or shorted telephone lines on the panel front by individual LEDs.
 - f. Display: Graphic **OR** Liquid-crystal digital, **as directed**, to indicate location of caller.
 - g. Remote Telephone Cabinet: Flush- or surface-mounted cabinet as indicated, factory-standard red finish, with handset.
 - 1) Install one-piece handset to cabinet with vandal-resistant armored cord. Silk-screened or engraved label on cabinet door, designating "Fire Warden Phone" **OR** "Fire Emergency Phone", **as directed**.
 - 2) With "break-glass" type door access lock.
 - h. Remote Telephone Jack Stations: Single-gang, stainless-steel-plate mounted plug, engraved "Fire Warden Phone" **OR** "Fire Emergency Phone", **as directed**.
 - i. Handsets: **Number** As directed by the Owner push-to-talk-type sets with noise-canceling microphone, **as directed**, stored in a cabinet adjacent to fire-alarm control unit **OR** in the fire command center, **as directed**.
- I. Magnetic Door Holders
- 1. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.
 - a. Electromagnet: Requires no more than 3 W to develop **25-lbf (111-N)** holding force.
 - b. Wall-Mounted Units: Flush mounted unless otherwise indicated.
 - c. Rating: 24-V ac or dc.
 - d. Rating: 120-V ac.
 - 2. Material and Finish: Match door hardware.
- J. Remote Annunciator
- 1. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.
 - a. Mounting: Flush **OR** Surface, **as directed**, cabinet, NEMA 250, Type 1.
 - 2. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.
- K. Addressable Interface Device
- 1. Description: Microelectronic monitor module, NRTL listed for use in providing a system address for alarm-initiating devices for wired applications with normally open contacts.
 - 2. Integral Relay: Capable of providing a direct signal to elevator controller to initiate elevator recall **OR** to circuit-breaker shunt trip for power shutdown, **as directed**.
- L. Digital Alarm Communicator Transmitter

1. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632 and be listed and labeled by an NRTL.
2. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture one **OR** two, **as directed**, telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either, **as directed**, line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.
3. Local functions and display at the digital alarm communicator transmitter shall include the following:
 - a. Verification that both telephone lines are available.
 - b. Programming device.
 - c. LED display.
 - d. Manual test report function and manual transmission clear indication.
 - e. Communications failure with the central station or fire-alarm control unit.
4. Digital data transmission shall include the following:
 - a. Address of the alarm-initiating device.
 - b. Address **OR** Zone, **as directed**, of the supervisory signal.
 - c. Address **OR** Zone, **as directed**, of the trouble-initiating device.
 - d. Loss of ac supply or loss of power.
 - e. Low battery.
 - f. Abnormal test signal.
 - g. Communication bus failure.
5. Secondary Power: Integral rechargeable battery and automatic charger.
6. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

M. Radio Alarm Transmitter

1. Transmitter shall comply with NFPA 1221 and shall be listed and labeled by an NRTL.
2. Comply with 47 CFR 90.
3. Description: Manufacturer's standard commercial product; factory assembled, wired, tested, and ready for installation and operation.
 - a. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
 - b. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote alarm receiving station designated by the Owner.
 - c. Normal Power Input: 120-V ac.
 - d. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
 - e. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand **100 mph (160 km/h)**, **as directed**, with a gust factor of 1.3 without failure.
 - f. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
 - g. Antenna-Cable Connectors: Weatherproof.
 - h. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.
4. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-

reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:

- a. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
- b. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
- c. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
- d. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
- e. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
- f. Local Fire-Alarm-System Supervisory-Alarm Message: Actuated when the building alarm system indicates a supervisory alarm, **as directed**.

N. System Printer

1. Printer shall be listed and labeled by an NRTL as an integral part of fire-alarm system.

O. Device Guards

1. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.
 - a. Factory fabricated and furnished by manufacturer of device.
 - b. Finish: Paint of color to match the protected device.

1.3 EXECUTION

A. Equipment Installation

1. Comply with NFPA 72 for installation of fire-alarm equipment.
2. Equipment Mounting: Install fire-alarm control unit on concrete base with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor. Comply with requirements for concrete base specified in Division 03 Section "Cast-in-place Concrete".
 - a. Install seismic bracing. Comply with requirements in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
 - b. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 - c. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 - d. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - e. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Equipment Mounting: Install fire-alarm control unit on finished floor with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 - a. Comply with requirements for seismic-restraint devices specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
4. Install wall-mounted equipment, with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 - a. Comply with requirements for seismic-restraint devices specified in Division 26 Section "Vibration And Seismic Controls For Electrical Systems".
5. Connecting to Existing Equipment: Verify that existing fire-alarm system is operational before making changes or connections.
 - a. Connect new equipment to existing control panel in existing part of the building.
 - b. Connect new equipment to existing monitoring equipment at the supervising station.

- c. Expand, modify, and supplement existing control **OR** monitoring, **as directed**, equipment as necessary to extend existing control **OR** monitoring, **as directed**, functions to the new points. New components shall be capable of merging with existing configuration without degrading the performance of either system.
 6. Smoke- or Heat-Detector Spacing:
 - a. Comply with NFPA 72, "Smoke-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for smoke-detector spacing.
 - b. Comply with NFPA 72, "Heat-Sensing Fire Detectors" Section in the "Initiating Devices" Chapter, for heat-detector spacing.
 - c. Smooth ceiling spacing shall not exceed **30 feet (9 m)**
 - d. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Appendix A or Appendix B in NFPA 72.
 - e. HVAC: Locate detectors not closer than **3 feet (1 m) OR 5 feet (1.5 m)**, **as directed**, from air-supply diffuser or return-air opening.
 - f. Lighting Fixtures: Locate detectors not closer than **12 inches (300 mm)** from any part of a lighting fixture.
 7. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct.
 8. Heat Detectors in Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location.
 9. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.
 10. Remote Status and Alarm Indicators: Install near each smoke detector and each sprinkler water-flow switch and valve-tamper switch that is not readily visible from normal viewing position.
 11. Audible Alarm-Indicating Devices: Install not less than **6 inches (150 mm)** below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille.
 12. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least **6 inches (150 mm)** below the ceiling.
 13. Device Location-Indicating Lights: Locate in public space near the device they monitor.
 14. Fire-Alarm Control Unit: Surface mounted, with tops of cabinets not more than **72 inches (1830 mm)** above the finished floor.
 15. Annunciator: Install with top of panel not more than **72 inches (1830 mm)** above the finished floor.
 16. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that will resist **100-mph (160-km/h)**, **as directed**, wind load with a gust factor of 1.3 without damage.
- B. Connections
1. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Division 08 Section "Door Hardware". Connect hardware and devices to fire-alarm system.
 - a. Verify that hardware and devices are NRTL listed for use with fire-alarm system in this Section before making connections.
 2. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than **3 feet (1 m)** from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.
 - a. Alarm-initiating connection to smoke-control system (smoke management) at firefighter smoke-control system panel.
 - b. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
 - c. Smoke dampers in air ducts of designated air-conditioning duct systems.
 - d. Alarm-initiating connection to elevator recall system and components.
 - e. Alarm-initiating connection to activate emergency lighting control.
 - f. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.

- g. Supervisory connections at valve supervisory switches.
 - h. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
 - i. Supervisory connections at elevator shunt trip breaker.
 - j. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.
 - k. Supervisory connections at fire-pump engine control panel.
- C. Identification
- 1. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Division 26 Section "Identification For Electrical Systems".
 - 2. Install framed instructions in a location visible from fire-alarm control unit.
- D. Grounding
- 1. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.
- E. Field Quality Control
- 1. Field tests shall be witnessed by authorities having jurisdiction.
 - 2. Tests and Inspections:
 - a. Visual Inspection: Conduct visual inspection prior to testing.
 - 1) Inspection shall be based on completed Record Drawings and system documentation that is required by NFPA 72 in its "Completion Documents, Preparation" Table in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter.
 - 2) Comply with "Visual Inspection Frequencies" Table in the "Inspection" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.
 - b. System Testing: Comply with "Test Methods" Table in the "Testing" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - c. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
 - d. Test audible appliances for the private operating mode according to manufacturer's written instructions.
 - e. Test visible appliances for the public operating mode according to manufacturer's written instructions.
 - f. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" Section of the "Fundamentals of Fire Alarm Systems" Chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" Section of the "Inspection, Testing and Maintenance" Chapter in NFPA 72.
 - 3. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.
 - 4. Fire-alarm system will be considered defective if it does not pass tests and inspections.
 - 5. Prepare test and inspection reports.
 - 6. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.
 - 7. Annual Test and Inspection: One year after date of Final Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

END OF SECTION 28 46 13 31a

Task	Specification	Specification Description
28 49 11 00	28 16 11 00	Security Access
28 49 11 00	28 16 11 00a	Intrusion Detection
28 49 11 00	28 16 11 00b	Perimeter Security

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SECTION 31 05 13 00 - EARTH MOVING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for earthwork. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Preparing subgrades for slabs-on-grade, walks, pavements, turf and grasses, and plants.
 - b. Excavating and backfilling for buildings and structures.
 - c. Drainage course for concrete slabs-on-grade.
 - d. Subbase course for concrete walks and pavements.
 - e. Subbase course and base course for asphalt paving.
 - f. Subsurface drainage backfill for walls and trenches.
 - g. Excavating and backfilling trenches for utilities and pits for buried utility structures.
 - h. Excavating well hole to accommodate elevator-cylinder assembly.

C. Definitions

1. Backfill: Soil material or controlled low-strength material used to fill an excavation.
 - a. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
 - b. Final Backfill: Backfill placed over initial backfill to fill a trench.
2. Base Course: Aggregate layer placed between the subbase course and hot-mix asphalt paving.
3. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.
4. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.
5. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.
6. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.
 - a. Authorized Additional Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions as directed by the Owner. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - b. Bulk Excavation: Excavation more than **10 feet (3 m)** in width and more than **30 feet (9 m)** in length.
 - c. Unauthorized Excavation: Excavation below subgrade elevations or beyond indicated lines and dimensions without direction by the Owner. Unauthorized excavation, as well as remedial work directed by the Owner, shall be without additional compensation.
7. Fill: Soil materials used to raise existing grades.
8. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material that exceed **1 cu. yd. (0.76 cu. m)** for bulk excavation or **3/4 cu. yd. (0.57 cu. m)** for footing, trench, and pit excavation that cannot be removed by rock excavating equipment equivalent to the following in size and performance ratings, without systematic drilling, ram hammering, ripping, or blasting, when permitted:
 - a. Excavation of Footings, Trenches, and Pits: Late-model, track-mounted hydraulic excavator; equipped with a **42-inch- (1065-mm-)** wide, maximum, short-tip-radius rock bucket; rated at not less than **138-hp (103-kW)** flywheel power with bucket-curling force of not less than **28,700 lbf (128 kN)** and stick-crowd force of not less than **18,400 lbf (82 kN)** with extra-long reach boom; measured according to SAE J-1179.

- b. Bulk Excavation: Late-model, track-mounted loader; rated at not less than **230-hp (172-kW)** flywheel power and developing a minimum of **47,992-lbf (213.3-kN)** breakout force with a general-purpose bare bucket; measured according to SAE J-732.
9. If Standard Penetration Values are used to Define Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material **3/4 cu. yd. (0.57 cu. m)** or more in volume that exceed a standard penetration resistance of **100 blows/2 inches (97 blows/50 mm)** when tested by a geotechnical testing agency, according to ASTM D 1586.
10. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.
11. Subbase Course: Aggregate layer placed between the subgrade and base course for hot-mix asphalt pavement, or aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete or hot-mix asphalt walk.
12. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.
13. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

D. Submittals

1. Product Data: For each type of the following manufactured products required:
 - a. Geotextiles.
 - b. Controlled low-strength material, including design mixture.
 - c. Geofoam.
 - d. Warning tapes.
2. Samples: For the following products, in sizes indicated below:
 - a. Geotextile: **12 by 12 inches (300 by 300 mm)**.
 - b. Warning Tape: **12 inches (300 mm)** long; of each color.
3. Qualification Data: For qualified testing agency.
4. Material Test Reports: For each on-site and borrow soil material proposed for fill and backfill as follows:
 - a. Classification according to ASTM D 2487.
 - b. Laboratory compaction curve according to ASTM D 698 **OR** ASTM D 1557, **as directed**.
5. Blasting plan approved by authorities having jurisdiction.
6. Seismic survey report from seismic survey agency.
7. Pre-excavation Photographs or Videotape: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earth moving operations. Submit before earth moving begins.

E. Quality Assurance

1. Blasting:
 - a. Blasting will not be allowed.

OR

Comply with applicable requirements in NFPA 495, "Explosive Materials Code," and prepare a blasting plan reporting the following:

 - 1) Types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.
 - 2) Seismographic monitoring during blasting operations.
2. Seismic Survey Agency: An independent testing agency, acceptable to authorities having jurisdiction, experienced in seismic surveys and blasting procedures to perform the following services:
 - a. Report types of explosive and sizes of charge to be used in each area of rock removal, types of blasting mats, sequence of blasting operations, and procedures that will prevent damage to site improvements and structures on Project site and adjacent properties.

- b. Seismographic monitoring during blasting operations.
- 3. Geotechnical Testing Agency Qualifications: Qualified according to ASTM E 329 and ASTM D 3740 for testing indicated.
- 4. Pre-excavation Conference: Conduct conference at Project site.

F. Project Conditions

- 1. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.
 - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.
 - b. Provide alternate routes around closed or obstructed traffic ways if required by the Owner or authorities having jurisdiction.
- 2. Improvements on Adjoining Property: Authority for performing earth moving indicated on property adjoining the Owner's property will be obtained by the Owner before award of Contract.
- 3. Do not proceed with work on adjoining property until directed by the Owner.
- 4. Utility Locator Service: Notify utility locator service **OR** "Miss Utility" **OR** "Call Before You Dig" **OR** "Dig Safe System" **OR** "One Call", **as directed**, for area where Project is located before beginning earth moving operations.
- 5. Do not commence earth moving operations until temporary erosion- and sedimentation-control measures, specified in Division 01 Section(s) "Temporary Facilities And Controls" **OR** Division 31 Section(s) "Site Clearing", **as directed**, are in place.
- 6. Do not commence earth moving operations until plant-protection measures specified in Division 01 Section "Temporary Tree And Plant Protection" are in place.
- 7. The following practices are prohibited within protection zones:
 - a. Storage of construction materials, debris, or excavated material.
 - b. Parking vehicles or equipment.
 - c. Foot traffic.
 - d. Erection of sheds or structures.
 - e. Impoundment of water.
 - f. Excavation or other digging unless otherwise indicated.
 - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- 8. Do not direct vehicle or equipment exhaust towards protection zones.
- 9. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

1.2 PRODUCTS

A. Soil Materials

- 1. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.
- 2. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 **OR** Groups A-1, A-2-4, A-2-5, and A-3 according to AASHTO M 145, **as directed**, or a combination of these groups; free of rock or gravel larger than **3 inches (75 mm)** in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.
- 3. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 **OR** Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7 according to AASHTO M 145, **as directed**, or a combination of these groups.
 - a. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.
- 4. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a **1-1/2-inch (37.5-mm)** sieve and not more than 12 percent passing a **No. 200 (0.075-mm)** sieve.
- 5. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a **1-1/2-inch (37.5-mm)** sieve and not more than 8 percent passing a **No. 200 (0.075-mm)** sieve.

6. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a **1-1/2-inch (37.5-mm)** sieve and not more than 12 percent passing a **No. 200 (0.075-mm)** sieve.
7. Bedding Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; except with 100 percent passing a **1-inch (25-mm)** sieve and not more than 8 percent passing a **No. 200 (0.075-mm)** sieve.
8. Drainage Course: Narrowly graded mixture of washed, **as directed**, crushed stone, or crushed or uncrushed gravel; ASTM D 448; coarse-aggregate grading Size 57; with 100 percent passing a **1-1/2-inch (37.5-mm)** sieve and 0 to 5 percent passing a **No. 8 (2.36-mm)** sieve.
9. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a **1-inch (25-mm)** sieve and 0 to 5 percent passing a **No. 4 (4.75-mm)** sieve.
10. Sand: ASTM C 33; fine aggregate.
11. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

B. Geotextiles

1. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - a. Survivability: Class 2; AASHTO M 288.
 - b. Apparent Opening Size: **No. 40 (0.425-mm) OR No. 60 (0.250-mm) OR No. 70 (0.212-mm), as directed**, sieve, maximum; ASTM D 4751.
 - c. Permittivity: 0.5 **OR** 0.2 **OR** 0.1, **as directed**, per second, minimum; ASTM D 4491.
 - d. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
2. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - a. Survivability: Class 2; AASHTO M 288.
 - b. Apparent Opening Size: **No. 60 (0.250-mm)** sieve, maximum; ASTM D 4751.
 - c. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 - d. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

C. Controlled Low-Strength Material

1. Controlled Low-Strength Material: Self-compacting, low-density, **as directed**, flowable concrete material produced from the following:
 - a. Portland Cement: ASTM C 150, Type I **OR** Type II **OR** Type III, **as directed**.
 - b. Fly Ash: ASTM C 618, Class C or F.
 - c. Normal-Weight Aggregate: ASTM C 33, **3/4-inch (19-mm) OR 3/8-inch (10-mm), as directed**, nominal maximum aggregate size.
 - d. Foaming Agent (if low-density, controlled low-strength material is required): ASTM C 869.
 - e. Water: ASTM C 94/C 94M.
 - f. Air-Entraining Admixture (not required for low-density, controlled low-strength material using foaming agent): ASTM C 260.
2. Produce low-density, controlled low-strength material with the following physical properties:
 - a. As-Cast Unit Weight: **30 to 36 lb/cu. ft. (480 to 576 kg/cu. m) OR 36 to 42 lb/cu. ft. (576 to 675 kg/cu. m), as directed**, at point of placement, when tested according to ASTM C 138/C 138M.
 - b. Compressive Strength: **80 psi (550 kPa) OR 140 psi (965 kPa), as directed**, when tested according to ASTM C 495.

OR

Produce conventional-weight, controlled low-strength material with **80-psi (550-kPa) OR 140-psi (965-kPa), as directed**, compressive strength when tested according to ASTM C 495.

D. Geofoam

1. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.55-lb/cu. ft. (25-kg/cu. m) density, 25-psi (173-kPa) compressive strength **OR** Type X, 1.30-lb/cu. ft. (21-kg/cu. m) density, 15-psi (104-kPa) compressive strength **OR** Type VI, 1.80-lb/cu. ft. (29-kg/cu. m) density, 40-psi (276-kPa) compressive strength **OR** Type VII, 2.20-lb/cu. ft. (35-kg/cu. m) density, 60-psi (414-kPa) compressive strength **OR** Type V, 3.00-lb/cu. ft. (48-kg/cu. m) density, 100-psi (690-kPa) compressive strength, **as directed**.
2. Molded-Polystyrene Board Insulation: ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) density, 10-psi (69-kPa) compressive strength **OR** Type VIII, 1.15-lb/cu. ft. (18-kg/cu. m) density, 13-psi (90-kPa) compressive strength **OR** Type II, 1.35-lb/cu. ft. (22-kg/cu. m) density, 15-psi (104-kPa) compressive strength, **as directed**.
 - a. Manufacture molded polystyrene with an inorganic mineral registered with the EPA and suitable for application as a termite deterrent.
3. Rigid Cellular Polystyrene Geofoam: ASTM D 6817, Type EPS 19, 1.15-lb/cu. ft. (18.4-kg/cu. m) density, 5.8-psi (40-kPa) compressive strength at 1 percent deformation; 16-psi (110-kPa) compressive strength at 10 percent deformation **OR** Type EPS 39, 2.40-lb/cu. ft. (38.4-kg/cu. m) density, 15-psi (103-kPa) compressive strength at 1 percent deformation; 40-psi (276-kPa) compressive strength at 10 percent deformation, **as directed**.
4. Connectors: Geofoam manufacturer's multibarbed, galvanized-steel sheet connectors **OR** Deformed steel reinforcing bars, 3/4 inch (19 mm) in diameter, **as directed**.

E. Accessories

1. Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility; colored as follows:
 - a. Red: Electric.
 - b. Yellow: Gas, oil, steam, and dangerous materials.
 - c. Orange: Telephone and other communications.
 - d. Blue: Water systems.
 - e. Green: Sewer systems.

OR

Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches (150 mm) wide and 4 mils (0.1 mm) thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches (750 mm) deep; colored as follows:

 - f. Red: Electric.
 - g. Yellow: Gas, oil, steam, and dangerous materials.
 - h. Orange: Telephone and other communications.
 - i. Blue: Water systems.
 - j. Green: Sewer systems.

1.3 EXECUTION

A. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.
2. Protect and maintain erosion and sedimentation controls during earth moving operations.
3. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

B. Dewatering

1. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

2. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.
 - a. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

C. Explosives

1. Explosives: Do not use explosives.
OR
Explosives: Obtain written permission from authorities having jurisdiction before bringing explosives to Project site or using explosives on Project site.
 - a. Perform blasting without damaging adjacent structures, property, or site improvements.
 - b. Perform blasting without weakening the bearing capacity of rock subgrade and with the least-practicable disturbance to rock to remain.

D. Excavation, General

1. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.
 - a. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
 - b. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:
 - 1) 24 inches (600 mm) outside of concrete forms other than at footings.
 - 2) 12 inches (300 mm) outside of concrete forms at footings.
 - 3) 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
 - 4) Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - 5) 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
 - 6) 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.
2. Classified Excavation: Excavate to subgrade elevations. Material to be excavated will be classified as earth and rock. Do not excavate rock until it has been classified and cross sectioned by the Owner. The Contract Sum will be adjusted for rock excavation according to unit prices included in the Contract Documents. Changes in the Contract Time may be authorized for rock excavation.
 - a. Earth excavation includes excavating pavements and obstructions visible on surface; underground structures, utilities, and other items indicated to be removed; together with soil, boulders, and other materials not classified as rock or unauthorized excavation.
 - 1) Intermittent drilling; blasting, if permitted; ram hammering; or ripping of material not classified as rock excavation is earth excavation.
 - b. Rock excavation includes removal and disposal of rock. Remove rock to lines and subgrade elevations indicated to permit installation of permanent construction without exceeding the following dimensions:
 - 1) 24 inches (600 mm) outside of concrete forms other than at footings.
 - 2) 12 inches (300 mm) outside of concrete forms at footings.
 - 3) 6 inches (150 mm) outside of minimum required dimensions of concrete cast against grade.
 - 4) Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
 - 5) 6 inches (150 mm) beneath bottom of concrete slabs-on-grade.
 - 6) 6 inches (150 mm) beneath pipe in trenches, and the greater of 24 inches (600 mm) wider than pipe or 42 inches (1065 mm) wide.

E. Excavation For Structures

1. Excavate to indicated elevations and dimensions within a tolerance of plus or minus **1 inch (25 mm)**. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.
 - a. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
 - b. Pile Foundations: Stop excavations **6 to 12 inches (150 to 300 mm)** above bottom of pile cap before piles are placed. After piles have been driven, remove loose and displaced material. Excavate to final grade, leaving solid base to receive concrete pile caps.
 - c. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus **1 inch (25 mm)**. Do not disturb bottom of excavations intended as bearing surfaces.
2. Excavations at Edges of Tree- and Plant-Protection Zones:
 - a. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
 - b. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree And Plant Protection".

F. Excavation For Walks And Pavements

1. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

G. Excavation For Utility Trenches

1. Excavate trenches to indicated gradients, lines, depths, and elevations.
 - a. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.
2. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to **12 inches (300 mm)** higher than top of pipe or conduit unless otherwise indicated.
 - a. Clearance: **12 inches (300 mm)** each side of pipe or conduit **OR** As indicated, **as directed**.
3. Trench Bottoms (if a bedding course is not required under pipe and conduit): Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.
 - a. For pipes and conduit less than **6 inches (150 mm)** in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
 - b. For pipes and conduit **6 inches (150 mm)** or larger in nominal diameter, shape bottom of trench to support bottom 90 degrees of pipe or conduit circumference. Fill depressions with tamped sand backfill.
 - c. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
 - d. Excavate trenches **6 inches (150 mm)** deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
4. Trench Bottoms (if a bedding course is required under pipe and conduit): Excavate trenches **4 inches (100 mm)** deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.
 - a. Excavate trenches **6 inches (150 mm)** deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.
5. Trenches in Tree- and Plant-Protection Zones:
 - a. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

- b. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.
 - c. Cut and protect roots according to requirements in Division 01 Section "Temporary Tree And Plant Protection".
- H. Excavation For Elevator Cylinder
- 1. Drill well hole plumb in elevator pit to accommodate installation of elevator-cylinder assembly. Coordinate with applicable requirements for diameter and tolerances in Division 14 Section(s) "Hydraulic Elevators" OR "Hydraulic Freight Elevators", **as directed**.
 - 2. Provide well casing as necessary to retain walls of well hole.
- I. Subgrade Inspection
- 1. Notify the Owner when excavations have reached required subgrade.
 - 2. If the Owner determines that unsatisfactory soil is present, continue excavation and replace with compacted backfill or fill material as directed.
 - 3. Proof-roll subgrade below the building slabs and pavements with a pneumatic-tired and loaded 10-wheel, tandem-axle dump truck weighing not less than **15 tons (13.6 tonnes)** to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - a. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to **3 mph (5 km/h)**.
 - b. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Owner, and replace with compacted backfill or fill as directed.
 - 4. Authorized additional excavation and replacement material will be paid for according to Contract provisions for changes in the Work.
 - 5. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner, without additional compensation.
- J. Unauthorized Excavation
- 1. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of **2500 psi (17.2 MPa)**, may be used when approved by the Owner.
 - a. Fill unauthorized excavations under other construction, pipe, or conduit as directed by the Owner.
- K. Storage Of Soil Materials
- 1. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - a. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.
- L. Backfill
- 1. Place and compact backfill in excavations promptly, but not before completing the following:
 - a. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
 - b. Surveying locations of underground utilities for Record Documents.
 - c. Testing and inspecting underground utilities.
 - d. Removing concrete formwork.
 - e. Removing trash and debris.
 - f. Removing temporary shoring and bracing, and sheeting.
 - g. Installing permanent or temporary horizontal bracing on horizontally supported walls.
 - 2. Place backfill on subgrades free of mud, frost, snow, or ice.
- M. Utility Trench Backfill
- 1. Place backfill on subgrades free of mud, frost, snow, or ice.

2. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.
3. Trenches under Footings: Backfill trenches excavated under footings and within **18 inches (450 mm)** of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-place Concrete".
4. Trenches under Roadways: Provide **4-inch- (100-mm-)** thick, concrete-base slab support for piping or conduit less than **30 inches (750 mm)** below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of **4 inches (100 mm)** of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Cast-in-place Concrete".
5. Backfill voids with satisfactory soil while removing shoring and bracing.
6. If soil material is required as initial backfill, place and compact initial backfill of subbase material **OR** satisfactory soil, **as directed**, free of particles larger than **1 inch (25 mm)** in any dimension, to a height of **12 inches (300 mm)** over the pipe or conduit.
 - a. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.
7. Controlled Low-Strength Material: If controlled low-strength material is permitted or required as initial backfill, place initial backfill of controlled low-strength material to a height of **12 inches (300 mm)** over the pipe or conduit. Coordinate backfilling with utilities testing.
8. If satisfactory soil material is required as final backfill, place and compact final backfill of satisfactory soil to final subgrade elevation.
9. Controlled Low-Strength Material: If controlled low-strength material is permitted or required as final backfill, place final backfill of controlled low-strength material to final subgrade elevation.
10. Install warning tape directly above utilities, **12 inches (300 mm)** below finished grade, except **6 inches (150 mm)** below subgrade under pavements and slabs.

N. Soil Fill

1. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.
2. Place and compact fill material in layers to required elevations as follows:
 - a. Under grass and planted areas, use satisfactory soil material.
 - b. Under walks and pavements, use satisfactory soil material.
 - c. Under steps and ramps, use engineered fill.
 - d. Under building slabs, use engineered fill.
 - e. Under footings and foundations, use engineered fill.
3. Place soil fill on subgrades free of mud, frost, snow, or ice.

O. Geofom Fill

1. Place a leveling course of sand, **2 inches (50 mm)** thick, over subgrade. Finish leveling course to a tolerance of **1/2 inch (13 mm)** when tested with a **10-foot (3-m)** straightedge.
 - a. Place leveling course on subgrades free of mud, frost, snow, or ice.
 - b. Install geofom blocks in layers with abutting edges and ends and with the long dimension of each block at right angles to blocks in each subsequent layer. Offset joints of blocks in successive layers.
 - c. Install geofom connectors at each layer of geofom to resist horizontal displacement according to geofom manufacturer's written instructions.
2. Cover geofom with subdrainage **OR** separation, **as directed**, geotextile before placing overlying soil materials.

P. Soil Moisture Control

1. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.
 - a. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.

- b. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

Q. Compaction Of Soil Backfills And Fills

1. Place backfill and fill soil materials in layers not more than **8 inches (200 mm)** in loose depth for material compacted by heavy compaction equipment, and not more than **4 inches (100 mm)** in loose depth for material compacted by hand-operated tampers.
2. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.
3. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698 **OR** ASTM D 1557, **as directed**:
 - a. Under structures, building slabs, steps, and pavements, scarify and recompact top **12 inches (300 mm)** of existing subgrade and each layer of backfill or fill soil material at 95 percent.
 - b. Under walkways, scarify and recompact top **6 inches (150 mm)** below subgrade and compact each layer of backfill or fill soil material at 92 percent.
 - c. Under turf or unpaved areas, scarify and recompact top **6 inches (150 mm)** below subgrade and compact each layer of backfill or fill soil material at 85 percent.
 - d. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

R. Grading

1. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 - a. Provide a smooth transition between adjacent existing grades and new grades.
 - b. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.
2. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
 - a. Turf or Unpaved Areas: Plus or minus **1 inch (25 mm)**.
 - b. Walks: Plus or minus **1 inch (25 mm)**.
 - c. Pavements: Plus or minus **1/2 inch (13 mm)**.
3. Grading inside Building Lines: Finish subgrade to a tolerance of **1/2 inch (13 mm)** when tested with a **10-foot (3-m)** straightedge.

S. Subsurface Drainage

1. Subdrainage Pipe: Specified in Division 33 Section "Storm Utility Drainage Piping".
2. Subsurface Drain: If nonwoven geotextile is used in subsurface drainage applications, place subsurface drainage geotextile around perimeter of subdrainage trench. Place a **6-inch (150-mm)** course of filter material on subsurface drainage geotextile to support subdrainage pipe. Encase subdrainage pipe in a minimum of **12 inches (300 mm)** of filter material, placed in compacted layers **6 inches (150 mm)** thick, and wrap in subsurface drainage geotextile, overlapping sides and ends at least **6 inches (150 mm)**.
 - a. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 **OR** with a minimum of two passes of a plate-type vibratory compactor, **as directed**.
3. Drainage Backfill: If using free-draining granular backfill against walls, place and compact filter material over subsurface drain, in width indicated, to within **12 inches (300 mm)** of final subgrade, in compacted layers **6 inches (150 mm)** thick. Overlay drainage backfill with one layer of subsurface drainage geotextile, overlapping sides and ends at least **6 inches (150 mm)**.
 - a. Compact each filter material layer to 85 percent of maximum dry unit weight according to ASTM D 698 **OR** with a minimum of two passes of a plate-type vibratory compactor, **as directed**.

subgrades may be based on a visual comparison of subgrade with tested subgrade when approved by the Owner.

5. Testing agency will test compaction of soils in place according to ASTM D 1556, ASTM D 2167, ASTM D 2922, and ASTM D 2937, as applicable. Tests will be performed at the following locations and frequencies:
 - a. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, at least one test for every 2000 sq. ft. (186 sq. m) or less of paved area or building slab, but in no case fewer than three tests.
 - b. Foundation Wall Backfill: At each compacted backfill layer, at least one test for every 100 feet (30 m) or less of wall length, but no fewer than two tests.
 - c. Trench Backfill: At each compacted initial and final backfill layer, at least one test for every 150 feet (46 m) or less of trench length, but no fewer than two tests.
6. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; recompact and retest until specified compaction is obtained.

W. Protection

1. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
2. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.
 - a. Scarify or remove and replace soil material to depth as directed by the Owner; reshape and recompact.
3. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.
 - a. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

X. Disposal Of Surplus And Waste Materials

1. Remove surplus satisfactory soil and waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off the Owner's property.
OR
Transport surplus satisfactory soil to designated storage areas on the Owner's property. Stockpile or spread soil as directed by the Owner.
 - a. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off the Owner's property.

END OF SECTION 31 05 13 00

SECTION 31 05 13 00a - SUBDRAINAGE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Perforated-wall pipe and fittings.
 2. Drainage conduits.
 3. Drainage panels.
 4. Geotextile filter fabrics.

1.2 ACTION SUBMITTALS

- A. Product Data:
1. Drainage conduits, including rated capacities.
 2. Drainage panels, including rated capacities.
 3. Geotextile filter fabrics.

PART 2 - PRODUCTS

2.1 PERFORATED-WALL PIPES AND FITTINGS

- A. Perforated PE Pipe and Fittings:
1. **NPS 6 (DN 150)** and Smaller: ASTM F405 or AASHTO M 252, Type CP; corrugated, for coupled joints.
 2. **NPS 8 (DN 200)** and Larger: ASTM F667; AASHTO M 252, Type CP; or AASHTO M 294, Type CP; corrugated; for coupled joints.
 3. Couplings: Manufacturer's standard, band type.
- B. Perforated PVC Sewer Pipe and Fittings: ASTM D2729, bell-and-spigot ends, for loose joints.

2.2 DRAINAGE CONDUITS

- A. Molded-Sheet Drainage Conduits: Prefabricated geocomposite with cusped, molded-plastic drainage core wrapped in geotextile filter fabric.
1. Nominal Size:
 - a. **12 Inches (305 mm)** High by Approximately **1 Inch (25 mm)** Thick: With minimum in-plane flow of [**30 gpm (114 L/min.)**] or as directed by the Owner at hydraulic gradient of [**1.0**] or as directed by the Owner when tested in accordance with ASTM D4716.

- b. 18 Inches (457 mm) High by Approximately 1 Inch (25 mm) Thick: With minimum in-plane flow of [45 gpm (170 L/min.)] or as directed by the Owner at hydraulic gradient of [1.0] or as directed by the Owner when tested in accordance with ASTM D4716.
 2. Filter Fabric: PP geotextile.
 3. Fittings: HDPE with combination NPS 4 and NPS 6 (DN 100 and DN 150) outlet connection.
- B. Multipipe Drainage Conduits: Prefabricated geocomposite with interconnected, corrugated, perforated-pipe core molded from HDPE complying with ASTM D1248 and wrapped in geotextile filter fabric.
 1. Nominal Size:
 - a. 6 Inches (152 mm) High by Approximately 1-1/4 Inches (31 mm) Thick: With minimum in-plane flow of [15 gpm (57 L/min.)] or as directed by the Owner when tested in accordance with ASTM D4716.
 - b. 12 Inches (305 mm) High by Approximately 1-1/4 Inches (31 mm) Thick: With minimum in-plane flow of [30 gpm (114 L/min.)] or as directed by the Owner at hydraulic gradient of [1.0] or as directed by the Owner when tested in accordance with ASTM D4716.
 - c. 18 Inches (457 mm) High by Approximately 1-1/4 Inches (31 mm) Thick: With minimum in-plane flow of [45 gpm (170 L/min.)] or as directed by the Owner at hydraulic gradient of [1.0] or as directed by the Owner when tested in accordance with ASTM D4716.
 2. Filter Fabric: Nonwoven, needle-punched geotextile.
 3. Fittings: HDPE with combination NPS 4 and NPS 6 (DN 100 and DN 150) outlet connection.
 4. Couplings: HDPE.
- C. Single-Pipe Drainage Conduits: Prefabricated geocomposite with perforated corrugated core molded from HDPE complying with ASTM D3350 and wrapped in geotextile filter fabric.
 1. Nominal Size:
 - a. 12 Inches (305 mm) High by Approximately 1 Inch (25 mm) Thick: With minimum in-plane flow of [30 gpm (114 L/min.)] or as directed by the Owner at hydraulic gradient of [1.0] or as directed by the Owner when tested in accordance with ASTM D4716.
 - b. 18 Inches (457 mm) High by Approximately 1 Inch (25 mm) Thick: With minimum in-plane flow of [45 gpm (170 L/min.)] or as directed by the Owner at hydraulic gradient of [1.0] or as directed by the Owner when tested in accordance with ASTM D4716.
 2. Filter Fabric: PP geotextile.
 3. Fittings: HDPE with combination NPS 4 and NPS 6 (DN 100 and DN 150) outlet connection.
 4. Couplings: Corrugated HDPE band.
- D. Mesh Fabric Drainage Conduits: Prefabricated geocomposite with plastic-filament drainage core wrapped in geotextile filter fabric. Include fittings for bends and connection to drainage piping.
 1. Nominal Size: 6 inches (150 mm) high by approximately 0.9 inch (23 mm) thick.
 - a. Minimum In-Plane Flow: [2.4 gpm (9.1 L/min.)] or as directed by the Owner at hydraulic gradient of [1.0] or as directed by the Owner when tested in accordance with ASTM D4716.

2. Filter Fabric: Nonwoven geotextile made of PP or polyester fibers or combination of both. Flow rates range from **120 to 200 gpm/sq. ft. (81 to 136 L/s per sq. m)** when tested in accordance with ASTM D4491.
- E. Ring Fabric Drainage Conduits: Drainage conduit with HDPE rings-in-grid pattern drainage core, for field-applied geotextile filter fabric. Include fittings for bends and connection to drainage piping.
1. Nominal Size:
 - a. **18 Inches (0.5 m)** High by **1 Inch (25 mm)** Thick: With minimum in-plane flow of [**82 gpm (310 L/min.)**] or as directed by the Owner at hydraulic gradient of [**1.0**] or as directed by the Owner when tested in accordance with ASTM D4716.
 - b. **36 Inches (1 m)** High by **1 Inch (25 mm)** Thick: With minimum in-plane flow of [**164 gpm (621 L/min.)**] or as directed by the Owner at hydraulic gradient of [**1.0**] or as directed by the Owner when tested in accordance with ASTM D4716.
 2. Filter Fabric: Comply with requirements for flat geotextile filter fabric specified in Part 2 "Geotextile Filter Fabrics" Article.

2.3 DRAINAGE PANELS

- A. Molded-Sheet Drainage Panels: Prefabricated geocomposite, [**36 to 60 inches (915 to 1525 mm)**] or as directed by the Owner wide with drainage core faced with geotextile filter fabric.
1. Drainage Core: Three-dimensional, nonbiodegradable, molded PP.
 - a. Minimum Compressive Strength: [**10,000 lbf/sq. ft. (479 kPa)**] [**15,000 lbf/sq. ft. (718 kPa)**] [**18,000 lbf/sq. ft. (862 kPa)**] [**21,000 lbf/sq. ft. (1005 kPa)**] or as directed by the Owner when tested in accordance with ASTM D1621.
 - b. Minimum In-Plane Flow Rate: [**2.8 gpm/ft. (35 L/min. per m)**] [**7 gpm/ft. (87 L/min. per m)**] [**15 gpm/ft. (186 L/min. per m)**] or as directed by the Owner of unit width at hydraulic gradient of [**1.0**] or as directed by the Owner and compressive stress of [**25 psig (172 kPa)**] or as directed by the Owner when tested in accordance with ASTM D4716.
 2. Filter Fabric, Nonwoven: Needle-punched geotextile, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with the following properties determined in accordance with AASHTO M 288:
 - a. Survivability: [**Class 1**] [**Class 2**] [**Class 3**].
 - b. Apparent Opening Size: [**No. 40 (0.425-mm)**] [**No. 60 (0.25-mm)**] [**No. 70 (0.212-mm)**] sieve, maximum.
 - c. Permittivity: [**0.5**] [**0.2**] [**0.1**] per second, minimum.
 3. Filter Fabric, Woven: Geotextile fabric, manufactured for subsurface drainage, made from polyolefins or polyesters; with elongation less than 50 percent; complying with the following properties determined in accordance with AASHTO M 288:
 - a. Survivability: [**Class 1**] [**Class 2**] [**Class 3**].
 - b. Apparent Opening Size: [**No. 40 (0.425-mm)**] [**No. 60 (0.25-mm)**] [**No. 70 (0.212-mm)**] [**No. 30 (0.6-mm)**] sieve, maximum.
 - c. Permittivity: [**0.5**] [**0.2**] [**0.1**] [**0.02**] per second, minimum.
 4. Film Backing: Polymeric film bonded to drainage core surface.

- B. Mesh Fabric Drainage Panels: Prefabricated geocomposite with drainage core faced with geotextile filter fabric.
 - 1. Drainage Core: Open-construction, resilient, plastic-filament mesh, approximately 0.4 inches (10.2 mm) thick.
 - a. Minimum In-Plane Flow Rate: [2.4 gpm/ft. (30 L/min. per m)] or as directed by the Owner of unit width at hydraulic gradient of [1.0] or as directed by the Owner and normal pressure of 25 psig (172 kPa) when tested in accordance with ASTM D4716.
 - 2. Filter Fabric: Nonwoven geotextile of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. (81 to 136 L/s per sq. m) when tested in accordance with ASTM D4491.
- C. Net Fabric Drainage Panels: Prefabricated geocomposite with drainage core faced with geotextile filter fabric.
 - 1. Drainage Core: Three-dimensional, PE nonwoven-strand geonet, approximately 0.25 inches (6 mm) thick.
 - a. Minimum In-Plane Flow Rate: [2.4 gpm/ft. (30 L/min. per m)] [5 gpm/ft. (62 L/min. per m)] or as directed by the Owner of unit width at hydraulic gradient of [1.0] or as directed by the Owner and normal pressure of 25 psig (172 kPa) when tested in accordance with ASTM D4716.
 - 2. Filter Fabric: Nonwoven geotextile of PP or polyester fibers or combination of both. Flow rates range from 120 to 200 gpm/sq. ft. (81 to 136 L/s per sq. m) when tested in accordance with ASTM D4491.
- D. Ring Fabric Drainage Panels: Drainage-core panel for field application of geotextile filter fabric.
 - 1. Drainage Core: Three-dimensional, HDPE rings-in-grid pattern, approximately 1 inch (25 mm) thick.
 - a. Minimum In-Plane Flow Rate: [40 gpm/ft. (500 L/min. per m)] or as directed by the Owner of unit width at hydraulic gradient of [1.0] or as directed by the Owner and normal pressure of 25 psig (172 kPa) when tested in accordance with ASTM D4716.

2.4 SOIL MATERIALS

- A. Soil materials are specified in Section 312000 "Earth Moving."

2.5 WATERPROOFING FELTS

- A. Material: Comply with [ASTM D226, Type I, asphalt] [or] [ASTM D227, coal-tar]-saturated organic felt.

2.6 GEOTEXTILE FILTER FABRICS

- A. Description: Fabric of PP or polyester fibers or combination of both, with flow rate range from **110 to 330 gpm/sq. ft. (4480 to 13 440 L/min. per sq. m)** when tested in accordance with ASTM D4491.
- B. Structure Type: Nonwoven, needle-punched continuous filament.
 - 1. Survivability: AASHTO [**M 288 Class 2**] or as directed by the Owner .
 - 2. Styles: Flat and sock.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces and areas for suitable conditions where subdrainage systems are to be installed.
- B. If subdrainage is required for landscaping, locate and mark existing utilities, underground structures, and aboveground obstructions before beginning installation and avoid disruption and damage of services.
- C. Verify that drainage panels installed as part of foundation wall waterproofing is properly positioned to drain into subdrainage system.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EARTHWORK

- A. Excavating, trenching, and backfilling are specified in Section 312000 "Earth Moving."

3.3 FOUNDATION DRAINAGE INSTALLATION

- A. Place impervious fill material on subgrade adjacent to bottom of footing after concrete footing forms have been removed. Place and compact impervious fill to dimensions indicated, but not less than **6 inches (150 mm)** deep and **12 inches (300 mm)** wide.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than **4 inches (100 mm)**.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with [**adhesive**] [**or**] [**tape**].
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for foundation subdrainage.
- F. Add drainage course to width of at least **6 inches (150 mm)** on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping to width of at least **6 inches (150 mm)** on side away from footing and above top of pipe to within **12 inches (300 mm)** of finish grade.

- H. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- I. Place layer of **[flat-style geotextile filter fabric]** **[waterproofing felt]** over top of drainage course, overlapping edges at least **4 inches (100 mm)**.
- J. Install drainage panels on foundation walls as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at base of footing. Install as indicated in Part 3 "Piping Installation" Article.
 - 3. Separate **4 inches (100 mm)** of fabric at beginning of roll and cut away **4 inches (100 mm)** of core. Wrap fabric around end of remaining core.
 - 4. Attach panels to wall beginning at subdrainage pipe. Place and secure molded-sheet drainage panels, with geotextile facing away from wall.
- K. Place backfill material over compacted drainage course. Place material in loose-depth layers not exceeding **6 inches (150 mm)**. Thoroughly compact each layer. Final backfill to finish elevations and slope away from building.

3.4 UNDERSLAB DRAINAGE INSTALLATION

- A. Excavate for underslab drainage system after subgrade material has been compacted but before drainage course has been placed. Include horizontal distance of at least **6 inches (150 mm)** between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.
- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than **4 inches (100 mm)**.
- D. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with **[adhesive]** **[or]** **[tape]**.
- E. Install drainage piping as indicated in Part 3 "Piping Installation" Article for underslab subdrainage.
- F. Add drainage course to width of at least **6 inches (150 mm)** on side away from wall and to top of pipe to perform tests.
- G. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Install horizontal drainage panels as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at inside edge of footing.
 - 3. Place drainage panel over drainage pipe with core side up. Peel back fabric and wrap fabric around pipe. Locate top of core at bottom elevation of floor slab.
 - 4. Butt additional panels against other installed panels. If panels have plastic flanges, overlap installed panel with flange.

3.5 RETAINING-WALL DRAINAGE INSTALLATION

- A. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- B. Place supporting layer of drainage course over compacted subgrade to compacted depth of not less than **4 inches (100 mm)**.
- C. Encase pipe with sock-style geotextile filter fabric before installing pipe. Connect sock sections with **[adhesive] [or] [tape]**.
- D. Install drainage piping as indicated in Part 3 "Piping Installation" Article for retaining-wall subdrainage.
- E. Add drainage course to width of at least **6 inches (150 mm)** on side away from wall and to top of pipe to perform tests.
- F. After satisfactory testing, cover drainage piping to width of at least **6 inches (150 mm)** on side away from footing and above top of pipe to within **12 inches (300 mm)** of finish grade.
- G. Place drainage course in layers not exceeding **3 inches (75 mm)** in loose depth; compact each layer placed and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of **[flat-style geotextile filter fabric] [waterproofing felt]** over top of drainage course, overlapping edges at least **4 inches (100 mm)**.
- I. Install drainage panels on wall as follows:
 - 1. Coordinate placement with other drainage materials.
 - 2. Lay perforated drainage pipe at base of footing as described elsewhere in this Specification. Do not install aggregate.
 - 3. If weep holes are used instead of drainage pipe, cut **1/2-inch- (13-mm-)** diameter holes on core side at weep-hole locations. Do not cut fabric.
 - 4. Mark horizontal chalk line on wall at a point **6 inches (150 mm)** less than panel width above footing bottom. Before marking wall, subtract footing width.
 - 5. Separate **4 inches (100 mm)** of fabric at beginning of roll and cut away **4 inches (100 mm)** of core. Wrap fabric around end of remaining core.
 - 6. Attach panel to wall at horizontal mark and at beginning of wall corner. Place core side of panel against wall. Use concrete nails with washers through product. Place nails from **2 to 6 inches (50 to 150 mm)** below top of panel, approximately **48 inches (1200 mm)** apart. **Construction adhesives, metal stick pins, or double-sided tape may be used instead of nails.** Do not penetrate waterproofing. Before using adhesives, discuss with waterproofing manufacturer.
 - 7. If another panel is required on same row, cut away **4 inches (100 mm)** of installed panel core and wrap fabric over new panel.
 - 8. If additional rows of panel are required, overlap lower panel with **4 inches (100 mm)** of fabric.
 - 9. Cut panel as necessary to keep top **12 inches (300 mm)** below finish grade.
 - 10. For inside corners, bend panel. For outside corners, cut core to provide **3 inches (75 mm)** for overlap.
- J. Fill to Grade: Place satisfactory soil fill material over compacted drainage course. Place material in loose-depth layers not exceeding **6 inches (150 mm)**. Thoroughly compact each layer. Fill to finish grade.

3.6 LANDSCAPING DRAINAGE INSTALLATION

- A. Provide trench width to allow installation of drainage conduit. Grade bottom of trench excavations to required slope, and compact to firm, solid bed for drainage system.

- B. Lay flat-style geotextile filter fabric in trench and overlap trench sides.
- C. Place supporting layer of drainage course over compacted subgrade and geotextile filter fabric, to compacted depth of not less than **4 inches (100 mm)**.
- D. Install drainage conduits as indicated in Part 3 "Piping Installation" Article for landscaping subdrainage with horizontal distance of at least **6 inches (150 mm)** between conduit and trench walls. Wrap drainage conduits without integral geotextile filter fabric with flat-style geotextile filter fabric before installation. Connect fabric sections with **[adhesive] [or] [tape]**.
- E. Add drainage course to top of drainage conduits.
- F. After satisfactory testing, cover drainage conduit to within **12 inches (300 mm)** of finish grade.
- G. Install drainage course and wrap top of drainage course with flat-style geotextile filter fabric.
- H. Place layer of **[flat-style geotextile filter fabric] [waterproofing felt]** over top of drainage course, overlapping edges at least **4 inches (100 mm)**.
- I. Fill to Grade: Place satisfactory soil fill material over drainage course. Place material in loose-depth layers not exceeding **6 inches (150 mm)**. Thoroughly compact each layer. Fill to finish grade.

3.7 PIPING INSTALLATION

- A. Install piping beginning at low points of system, true to grades and alignment indicated, with unbroken continuity of invert. Bed piping with full bearing in filtering material. Install gaskets, seals, sleeves, and couplings in accordance with manufacturer's written instructions and other requirements indicated.
 - 1. Foundation Subdrainage: Install piping level and with a minimum cover of **[36 inches (915 mm)]** or as directed by the Owner unless otherwise indicated.
 - 2. Underslab Subdrainage: Install piping level.
 - 3. Plaza Deck Subdrainage: Install piping level.
 - 4. Retaining-Wall Subdrainage: When water discharges at end of wall into stormwater piping system, install piping level and with a minimum cover of **[36 inches (915 mm)]** or as directed by the Owner unless otherwise indicated.
 - 5. Landscaping Subdrainage: Install piping pitched down in direction of flow, at a minimum slope of **[0.5]** or as directed by the Owner percent and with a minimum cover of **[36 inches (915 mm)]** or as directed by the Owner unless otherwise indicated.
 - 6. Lay perforated pipe with perforations down.
 - 7. Excavate recesses in trench bottom for bell ends of pipe. Lay pipe with bells facing upslope and with spigot end entered fully into adjacent bell.
- B. Use increasers, reducers, and couplings made for different sizes or materials of pipes and fittings being connected. Reduction of pipe size in direction of flow is prohibited.
- C. Install thermoplastic piping in accordance with ASTM D2321.

3.8 PIPE JOINT CONSTRUCTION

- A. Join perforated PE pipe and fittings with couplings in accordance with ASTM D3212 with loose banded, coupled, or push-on joints.

- B. Join perforated PVC sewer pipe and fittings in accordance with ASTM D3212 with loose bell-and-spigot, push-on joints.
- C. Special Pipe Couplings: Join piping made of different materials and dimensions with special couplings made for this application. Use couplings that are compatible with and fit materials and dimensions of both pipes.

3.9 BACKWATER VALVE INSTALLATION

- A. Comply with requirements for backwater valves specified in Section 334100 "Storm Utility Drainage Piping."
- B. Install horizontal backwater valves in header piping downstream from perforated subdrainage piping.
- C. Install horizontal backwater valves in piping[**in manholes or pits**] where indicated.

3.10 CLEANOUT INSTALLATION

- A. Comply with requirements for cleanouts specified in Section 334100 "Storm Utility Drainage Piping."
- B. Cleanouts for [**Foundation**] [**Retaining-Wall**] [**and**] [**Landscaping**] Subdrainage:
 1. Install cleanouts from piping to grade. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 2. In vehicular-traffic areas, use **NPS 4 (DN 100)** cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, [**18 by 18 by 12 inches (450 by 450 by 300 mm)**] or as directed by the Owner deep. Set top of cleanout flush with grade.
 3. In nonvehicular-traffic areas, use **NPS 4 (DN 100)** [**cast-iron**] [**PVC**] pipe and fittings for piping branch fittings and riser extensions to cleanout. Set cleanout frames and covers in a cast-in-place concrete anchor, [**12 by 12 by 4 inches (300 by 300 by 100 mm)**] or as directed by the Owner deep. Set top of cleanout [**1 inch (25 mm)**] [**2 inches (50 mm)**] or as directed by the Owner above grade.
 4. Comply with requirements for concrete specified in Section 033000 "Cast-in-Place Concrete."
- C. Cleanouts for Underslab Subdrainage:
 1. Install cleanouts and riser extensions from piping to top of slab. Locate cleanouts at beginning of piping run and at changes in direction. Install fittings so cleanouts open in direction of flow in piping.
 2. Use **NPS 4 (DN 100)** cast-iron soil pipe and fittings for piping branch fittings and riser extensions to cleanout flush with top of slab.

3.11 CONNECTIONS

- A. Comply with requirements for piping specified in Section 334100 "Storm Utility Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect low elevations of subdrainage system to [**building's**] solid-wall-piping storm drainage system.
- C. Where required, connect low elevations of [**foundation**] [**underslab**] subdrainage to stormwater sump pumps. Comply with requirements for sump pumps specified in Section 221429 "Sump Pumps."

3.12 IDENTIFICATION

- A. Arrange for installation of green warning tapes directly over piping. Comply with requirements for underground warning tapes specified in specified in Section 312000 "Earth Moving."
 - 1. Install PE warning tape or detectable warning tape over ferrous piping.
 - 2. Install detectable warning tape over nonferrous piping and over edges of underground structures.

3.13 FIELD QUALITY CONTROL

- A. Tests and Inspections:
 - 1. After installing drainage course to top of piping, test drain piping with water to ensure free flow before backfilling.
 - 2. Remove obstructions, replace damaged components, and repeat test until results are satisfactory.
- B. Drain piping will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.14 CLEANING

- A. Clear interior of installed piping and structures of dirt and other superfluous material as work progresses. Maintain swab or drag in piping and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of each day or when work stops.

END OF SECTION 31 05 13 00a

Task	Specification	Specification Description
31 05 16 00	31 05 13 00	Earth Moving
31 05 16 00	31 05 13 00a	Subdrainage

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SECTION 31 11 00 00 - SITE CLEARING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for site clearing. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Protecting existing vegetation to remain.
 - b. Removing existing vegetation.
 - c. Clearing and grubbing.
 - d. Stripping and stockpiling topsoil.
 - e. Removing above- and below-grade site improvements.
 - f. Disconnecting, capping or sealing, and removing site utilities **OR** abandoning site utilities in place, **as directed**.
 - g. Temporary erosion- and sedimentation-control measures.

C. Definitions

1. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
OR
Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.
2. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow.
OR
Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil and is the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than **2 inches (50 mm)** in diameter; and free of subsoil and weeds, roots, toxic materials, or other nonsoil materials.
3. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
OR
Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings **OR** defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated, **as directed**.
4. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

D. Material Ownership

1. Except for stripped topsoil and other materials indicated to be stockpiled or otherwise remain the Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

E. Submittals

1. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - a. Use sufficiently detailed photographs or videotape.

- b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.
- 2. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.

F. Quality Assurance

- 1. Preinstallation Conference: Conduct conference at Project site.

G. Project Conditions

- 1. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction.
 - b. Provide alternate routes around closed or obstructed traffic ways if required by the Owner or authorities having jurisdiction.
- 2. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining the Owner's property will be obtained by the Owner before award of Contract.
 - a. Do not proceed with work on adjoining property until directed by the Owner.
- 3. Salvable Improvements: Carefully remove items indicated to be salvaged and store on the Owner's premises where indicated.
- 4. Utility Locator Service: Notify utility locator service **OR** Miss Utility **OR** Call Before You Dig **OR** Dig Safe System **OR** One Call, **as directed**, for area where Project is located before site clearing.
- 5. Do not commence site clearing operations until temporary erosion- and sedimentation-control and plant-protection measures are in place.
- 6. The following practices are prohibited within protection zones:
 - a. Storage of construction materials, debris, or excavated material.
 - b. Parking vehicles or equipment.
 - c. Foot traffic.
 - d. Erection of sheds or structures.
 - e. Impoundment of water.
 - f. Excavation or other digging unless otherwise indicated.
 - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
- 7. Do not direct vehicle or equipment exhaust towards protection zones.
- 8. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.
- 9. Soil Stripping, Handling, and Stockpiling: Perform only when the topsoil is dry or slightly moist.

1.2 PRODUCTS

A. Materials

- 1. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Division 31 Section "Earth Moving".
 - a. If soil backfill is required in below-grade areas after site clearing, obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.
- 2. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with MPI #79, Alkyd Anticorrosive Metal Primer **OR** SSPC-Paint 20 or SSPC-Paint 29 zinc-rich coating, **as directed**.
 - a. Use coating with a VOC content of **420 g/L (3.5 lb/gal.)** or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1.3 EXECUTION

A. Preparation

1. Protect and maintain benchmarks and survey control points from disturbance during construction.
 2. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag **OR** Wrap a **1-inch (25-mm)** blue vinyl tie tape flag around, **as directed**, each tree trunk at **54 inches (1372 mm)** above the ground.
 3. Protect existing site improvements to remain from damage during construction.
 - a. Restore damaged improvements to their original condition, as acceptable to the Owner.
- B. Temporary Erosion And Sedimentation Control**
1. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
 2. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
 3. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- C. Tree And Plant Protection**
1. General: Protect trees and plants remaining on-site according to requirements in Division 01 Section "Temporary Tree And Plant Protection".
 2. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Owner.
- D. Existing Utilities**
1. the Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
OR
Verify that utilities have been disconnected and capped before proceeding with site clearing.
 2. Locate, identify, disconnect, and seal or cap utilities indicated to be removed.
 - a. Arrange with utility companies to shut off indicated utilities.
OR
the Owner will arrange to shut off indicated utilities when requested by Contractor.
 3. Locate, identify, and disconnect utilities indicated to be abandoned in place.
 4. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - a. Notify the Owner not less than two days in advance of proposed utility interruptions.
 - b. Do not proceed with utility interruptions without the Owner's written permission.
 5. Excavate for and remove underground utilities indicated to be removed.
OR
Removal of underground utilities is included in Division 21 OR Division 22 OR Division 23 OR Division 26 OR Division 28.
- E. Clearing And Grubbing**
1. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
 - a. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 - b. Grind down stumps and remove roots, obstructions, and debris to a depth of **18 inches (450 mm)** below exposed subgrade.
 - c. Use only hand methods for grubbing within protection zones.
 - d. Chip removed tree branches and stockpile in areas approved by the Owner **OR** dispose of off-site, **as directed**.
 2. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.

- a. Place fill material in horizontal layers not exceeding a loose depth of **8 inches (200 mm)**, and compact each layer to a density equal to adjacent original ground.

F. Topsoil Stripping

1. Remove sod and grass before stripping topsoil.
2. Strip topsoil to depth indicated on Drawings **OR** to depth of **6 inches (150 mm)**, **as directed**, in a manner to prevent intermingling with underlying subsoil or other waste materials.
 - a. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects more than **2 inches (50 mm)** in diameter; trash, debris, weeds, roots, and other waste materials.
3. Stockpile topsoil away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
 - a. Limit height of topsoil stockpiles to **72 inches (1800 mm)**.
 - b. Do not stockpile topsoil within protection zones.
 - c. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
 - d. Stockpile surplus topsoil to allow for respreading deeper topsoil.

G. Site Improvements

1. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
2. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 - a. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 - b. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

H. Disposal Of Surplus And Waste Materials

1. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off the Owner's property.
2. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

END OF SECTION 31 11 00 00

Task	Specification	Specification Description
31 13 13 00	31 11 00 00	Site Clearing
31 13 13 00	31 13 16 00	Tree Protection And Trimming

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SECTION 31 13 16 00 - TREE PROTECTION AND TRIMMING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for tree protection and trimming. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

C. Definitions

1. Caliper: Diameter of a trunk measured by a diameter tape or the average of the smallest and largest diameters at **6 inches (150 mm)** above the ground for trees up to, and including, **4-inch (100-mm)** size; and **12 inches (300 mm)** above the ground for trees larger than **4-inch (100-mm)** size.
2. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.
3. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and indicated on Drawings **OR** defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated, **as directed**.
4. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

D. Submittals

1. Product Data: For each type of product indicated.
2. Tree Pruning Schedule: Written schedule detailing scope and extent of pruning of trees to remain that interfere with or are affected by construction.
3. Qualification Data: For qualified arborist and tree service firm.
4. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.
5. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
6. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
 - a. Use sufficiently detailed photographs or videotape.
 - b. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

E. Quality Assurance

1. Arborist Qualifications: Certified Arborist as certified by ISA **OR** Certified Arborist-Municipal Specialist as certified by ISA **OR** Licensed arborist in jurisdiction where Project is located **OR** Current member of ASCA **OR** Registered Consulting Arborist as designated by ASCA, **as directed**.
2. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.
3. Preinstallation Conference: Conduct conference at Project site.

F. Project Conditions

1. The following practices are prohibited within protection zones:
 - a. Storage of construction materials, debris, or excavated material.
 - b. Parking vehicles or equipment.
 - c. Foot traffic.
 - d. Erection of sheds or structures.
 - e. Impoundment of water.
 - f. Excavation or other digging unless otherwise indicated.
 - g. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.
2. Do not direct vehicle or equipment exhaust toward protection zones.
3. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

1.2 PRODUCTS

A. Materials

1. Topsoil: Natural or cultivated top layer of the soil profile or manufactured topsoil; containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than **1 inch (25 mm)** in diameter; and free of weeds, roots, and toxic and other nonsoil materials.
 - a. Obtain topsoil only from well-drained sites where topsoil is **4 inches (100 mm)** deep or more; do not obtain from bogs or marshes.

OR

Topsoil: Stockpiled topsoil from location shown on Drawings **OR** Imported or manufactured topsoil complying with ASTM D 5268, **as directed**.
2. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
 - a. Type: Shredded hardwood **OR** Ground or shredded bark **OR** Wood and bark chips, **as directed**.
 - b. Size Range: **3 inches (76 mm)** maximum, **1/2 inch (13 mm)** minimum.
3. Protection-Zone Fencing: Fencing fixed in position and meeting one of the following requirements, **as directed**. Previously used materials may be used when approved by the Owner.
 - a. Chain-Link Protection-Zone Fencing: Galvanized-steel **OR** Polymer-coated steel **OR** Polymer-coated galvanized-steel, **as directed**, fencing fabricated from minimum **2-inch (50-mm)** opening, **0.148-inch- (3.76-mm-)** diameter wire chain-link fabric; with pipe posts, minimum **2-3/8-inch- (60-mm-)** OD line posts, and **2-7/8-inch- (73-mm-)** OD corner and pull posts; with **1-5/8-inch- (42-mm-)** OD top rails **OR** with **0.177-inch- (4.5-mm-)** diameter top tension wire, **as directed**, and **0.177-inch- (4.5-mm-)** diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
 - 1) Height: **4 feet (1.2 m) OR 6 feet (1.8 m) OR 8 feet (2.4 m)**, **as directed**.
 - 2) Polymer-Coating Color (if polymer coating is required): Dark green **OR** Olive green **OR** Brown **OR** Black, **as directed**.
 - b. Plywood Protection-Zone Fencing: Plywood framed with four **2-by-4-inch (50-by-100-mm)** rails, with **4-by-4-inch (100-by-100-mm)** preservative-treated wood posts spaced not more than **8 feet (2.4 m)** apart.
 - 1) Height: **4 feet (1.2 m) OR 6 feet (1.8 m)**, **as directed**.
 - 2) Plywood and Lumber: Comply with requirements in Division 06 Section "Rough Carpentry" **OR** Division 06 Section "Miscellaneous Rough Carpentry", **as directed**.
 - c. Wood Protection-Zone Fencing: Constructed of two **2-by-4-inch (50-by-100-mm)** horizontal rails, with **4-by-4-inch (100-by-100-mm)** preservative-treated wood posts spaced not more than **8 feet (2.4 m)** apart, and lower rail set halfway between top rail and ground.
 - 1) Height: **4 feet (1.2 m)**.

- 2) Lumber: Comply with requirements in Division 06 Section "Rough Carpentry" **OR** Division 06 Section "Miscellaneous Rough Carpentry", **as directed**.
- d. Plastic Protection-Zone Fencing: Plastic construction fencing constructed of high-density extruded and stretched polyethylene fabric with **2-inch (50-mm)** maximum opening in pattern and weighing a minimum of **0.4 lb/ft. (0.6 kg/m)**; remaining flexible from **minus 60 to plus 200 deg F (minus 16 to plus 93 deg C)**; inert to most chemicals and acids; minimum tensile yield strength of **2000 psi (13.8 MPa)** and ultimate tensile strength of **2680 psi (18.5 MPa)**; secured with plastic bands or galvanized-steel or stainless-steel wire ties; and supported by tubular or T-shape galvanized-steel posts spaced not more than **8 feet (2.4 m)** apart.
 - 1) Height: **4 feet (1.2 m)**.
 - 2) Color: High-visibility orange, nonfading.
- e. Gates: Single **OR** Double, **as directed**, swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width **24 inches (610 mm) OR 36 inches (914 mm) OR** As indicated, **as directed**.
- 4. Protection-Zone Signage: Shop-fabricated, rigid plastic or metal sheet with attachment holes prepunched and reinforced; legibly printed with nonfading lettering and as follows:
 - a. Size and Text: As shown on Drawings.
 - b. Lettering: **3-inch- (75-mm-)** high minimum, white **OR** black, **as directed**, characters on white **OR** red, **as directed**, background.

1.3 EXECUTION

A. Examination

- 1. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- 2. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

B. Preparation

- 1. Locate and clearly identify trees, shrubs, and other vegetation to remain or to be relocated. Flag **OR** Tie a **1-inch (25-mm)** blue-vinyl tape around, **as directed**, each tree trunk at **54 inches (1372 mm)** above the ground.
- 2. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.
- 3. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
 - a. Apply **4-inch (100-mm) OR 6-inch (150-mm)**, **as directed**, average thickness of organic mulch. Do not place mulch within **6 inches (150 mm)** of tree trunks.

C. Tree- And Plant-Protection Zones

- 1. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones before materials or equipment are brought on the site and construction operations begin in a manner that will prevent people and animals from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
 - a. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
 - b. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to the Owner.
 - c. Access Gates: Install where indicated; adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption,

or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

2. Protection-Zone Signage: Install protection-zone signage in visibly prominent locations in a manner approved by the Owner. Install one sign spaced approximately every **20 feet (6 m) OR 35 feet (10.5 m) OR 50 feet (15 m)**, **as directed**, on protection-zone fencing, but no fewer than four signs with each facing a different direction.
3. Maintain protection zones free of weeds and trash.
4. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Owner.
5. Maintain protection-zone fencing and signage in good condition as acceptable to the Owner and remove when construction operations are complete and equipment has been removed from the site.
 - a. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
 - b. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

D. Excavation

1. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements in Division 31 Section "Earth Moving".
2. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.
3. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately **3 inches (75 mm)** back from new construction and as required for root pruning.
4. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

E. Root Pruning

1. Prune roots that are affected by temporary and permanent construction. Prune roots as follows:
 - a. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
 - b. Cut Ends: Do not paint cut root ends **OR** Coat cut ends of roots more than **1-1/2 inches (38 mm)** in diameter with an emulsified asphalt or other coating formulated for use on damaged plant tissues and that is acceptable to arborist, **as directed**.
 - c. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
 - d. Cover exposed roots with burlap and water regularly.
 - e. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving".
2. Root Pruning at Edge of Protection Zone: Prune roots **12 inches (300 mm)** outside **OR 12 inches (300 mm)** inside **OR 6 inches (150 mm)** outside **OR 6 inches (150 mm)** inside **OR** flush with the edge, **as directed**, of the protection zone, by cleanly cutting all roots to the depth of the required excavation.
3. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

- F. Crown Pruning
1. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
 - a. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
 - b. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:
 - 1) Type of Pruning: Cleaning **OR** Thinning **OR** Raising **OR** Reduction, **as directed**.
 - 2) Specialty Pruning: Restoration **OR** Vista **OR** Palm **OR** Utility, **as directed**.
 - c. Cut branches with sharp pruning instruments; do not break or chop.
 - d. Do not apply pruning paint to wounds.
 2. Chip removed branches and spread over areas identified by the Owner **OR** stockpile in areas approved by the Owner **OR** dispose of off-site, **as directed**.
- G. Regrading
1. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
OR
Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
 - a. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.
 2. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
OR
Minor Fill within Protection Zone: Where existing grade is **2 inches (50 mm)** or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.
- H. Field Quality Control
1. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.
- I. Repair And Replacement
1. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by the Owner.
 - a. Submit details of proposed root cutting and tree and shrub repairs.
 - b. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
 - c. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
 - d. Perform repairs within 24 hours.
 - e. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by the Owner.
 2. Trees: Remove and replace trees indicated to remain that are more than **25 OR 66, as directed**, percent dead or in an unhealthy condition before the end of the corrections period or are damaged during construction operations that the Owner determines are incapable of restoring to normal growth pattern.
 - a. Provide new trees of same size and species as those being replaced for each tree that measures **6 inches (150 mm) OR 4 inches (100 mm), as directed**, or smaller in caliper size.
OR
Provide one **OR** two, **as directed**, new tree(s) of **6-inch (150-mm) OR 4-inch (100-mm), as directed**, caliper size for each tree being replaced that measures more than **6 inches (150 mm) OR 4 inches (100 mm), as directed**, in caliper size.
 - 1) Species: Species selected by the Owner.

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- b. Plant and maintain new trees as specified in Division 32 Section "Plants".
- 3. Soil Aeration: Where directed by the Owner, aerate surface soil compacted during construction. Aerate **10 feet (3 m)** beyond drip line and no closer than **36 inches (900 mm)** to tree trunk. Drill **2-inch- (50-mm-)** diameter holes a minimum of **12 inches (300 mm)** deep at **24 inches (600 mm)**
 - o.c. Backfill holes with an equal mix of augered soil and sand.
- J. Disposal Of Surplus And Waste Materials
 - 1. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION 31 13 16 00

Task	Specification	Specification Description
31 13 16 00	31 11 00 00	Site Clearing
31 22 19 13	31 05 13 00	Earth Moving

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SECTION 31 23 16 13 - EXCAVATION SUPPORT AND PROTECTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for excavation support and protection. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Performance Requirements

1. Design, **as directed**, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.
 - a. Delegated Design: Design excavation support and protection system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - b. Prevent surface water from entering excavations by grading, dikes, or other means.
 - c. Install excavation support and protection systems without damaging existing buildings, structures, and site improvements adjacent to excavation.
 - d. Monitor vibrations, settlements, and movements.

C. Submittals

1. Shop Drawings: For excavation support and protection system.
2. Delegated-Design Submittal: For excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

D. Quality Assurance

1. Preinstallation Conference: Conduct conference at Project site.

E. Project Conditions

1. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of utility.
 - b. Do not proceed with interruption of utility without the Owner's written permission.
2. Survey Work: Engage a qualified land surveyor or professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.
 - a. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify the Owner if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

1.2 PRODUCTS

A. Materials

1. General: Provide materials that are either new or in serviceable condition.
2. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.
3. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

- a. Corners: Site-fabricated mechanical interlock **OR** Roll-formed corner shape with continuous interlock, **as directed**.
4. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of size and strength required for application, **OR 3 inches (75 mm) OR 4 inches (100 mm), as directed**.
5. Shotcrete: Comply with Division 03 Section "Shotcrete" for shotcrete materials and mixes, reinforcement, and shotcrete application.
6. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.
7. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
8. Tiebacks: Steel bars, ASTM A 722/A 722M.
9. Tiebacks: Steel strand, ASTM A 416/A 416M.

1.3 EXECUTION

A. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.
 - a. Shore, support, and protect utilities encountered.
2. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.
 - a. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from the Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
3. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.
4. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.
5. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

B. Soldier Piles And Lagging

1. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than **2 inches (50 mm)** from a horizontal line and not more than 1:120 out of vertical alignment.
2. Install wood lagging within flanges of soldier piles as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.
3. Install wales horizontally at locations indicated on Drawings and secure to soldier piles.

C. Sheet Piling

1. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to **60 inches (1500 mm)**. Accurately align exposed faces of sheet piling to vary not more than **2 inches (50 mm)** from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

D. Tiebacks

1. Tiebacks: Drill, install, grout, and tension tiebacks. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.
 - a. Test loading shall be observed by a qualified professional engineer responsible for design of excavation support and protection system.

- b. Maintain tiebacks in place until permanent construction is able to withstand lateral soil and hydrostatic pressures.
- E. Bracing
- 1. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.
 - a. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by the Owner.
 - b. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
 - c. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.
- F. Removal And Repairs
- 1. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.
 - a. Remove excavation support and protection systems to a minimum depth of **48 inches (1200 mm)** below overlying construction and abandon remainder.
 - b. Fill voids immediately with approved backfill compacted to density specified in Division 31 Section "Earth Moving".
 - c. Repair or replace, as approved by the Owner, adjacent work damaged or displaced by removing excavation support and protection systems.
 - 2. Leave excavation support and protection systems permanently in place.

END OF SECTION 31 23 16 13

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Task	Specification	Specification Description
31 23 16 13	31 05 13 00	Earth Moving
31 23 16 16	31 13 16 00	Tree Protection And Trimming
31 23 16 16	32 31 13 13	Chain-Link Fences And Gates
31 23 16 33	31 05 13 00	Earth Moving
31 23 16 36	31 05 13 00	Earth Moving
31 23 16 36	31 23 16 13	Excavation Support And Protection
31 23 23 23	31 05 13 00	Earth Moving
31 23 23 33	31 05 13 00	Earth Moving
31 23 23 33	31 23 16 13	Excavation Support And Protection

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SECTION 31 24 13 00 - EMBANKMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the reuse of suitable excavated material or furnishing material at the Contractor's expense to construct embankments where and as required by the Owner.

B. Submittals

1. Preconstruction Submittals
 - a. Construction equipment list.
 - b. Contractor shall record Existing Conditions prior to starting work in accordance with the paragraph entitled, "Existing Conditions," of this section.
 - c. Location of Utilities
 - d. Location of Tests
 - e. Location of Inspection
 - f. Location of Approved Utilities
 - g. A protection plan verifying the Existing Utilities left in place.
2. Test Reports for Soil Test within three working days of test date. Soil test shall comply with paragraph entitled, "Quality Control Testing During Construction."
3. Certificates of compliance for Proposed Soil Materials shall be submitted in accordance with paragraph entitled, "Tests for Proposed Soil Materials."

C. Definitions

1. Soil Materials
 - a. Cohesionless soil materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Moisture-density relations of compacted cohesionless soils when plotted on graphs will show straight lines or reverse-shaped moisture-density curves.
 - b. Cohesive soil materials include clayey and silty gravels, sand-clay mixtures, gravel-silt mixtures, clayey and silty sands, sand-silt mixtures, clays, silts, and very fine sands. Moisture density relations of compacted cohesive soils when plotted on graphs will show normal moisture-density curves.
2. Subgrade shall mean the top surface of a backfill or fill or the uppermost surface of an excavation, graded to conform to the required subgrade elevation and compacted to densities indicated.
3. Degree of compaction required is expressed as a percentage of the maximum density obtained by the test procedure in AASHTO T 180, Method B or D.
4. Classified Excavation: Separate consideration will be given to the nature of the materials excavated, in accordance with the following designations and classifications.
 - a. Rock excavation shall include blasting, excavating, grading, and disposing of material classified as rock and shall include the satisfactory removal and disposition of boulders **1/2-cu yd (0.4 cu m)** or more in volume; solid rock; rock material in ledges, bedded deposits, and unstratified masses which cannot be removed without systematic drilling and blasting; and conglomerate deposits that are so firmly cemented as to possess the characteristics of solid rock that is impossible to remove without systematic drilling and blasting. The removal of any concrete or masonry structures, except pavements, exceeding **1/2-cu yd (0.4 cu m)** in volume that may be encountered in the work shall be included in this classification.
 - b. Common excavation shall include the satisfactory removal and disposition of materials not classified as rock excavation.
5. Unclassified Excavation: No consideration will be given to the nature of the materials, and all excavation will be designated as unclassified excavation.

D. Sampling And Testing

1. Soil Test and Inspection Service: Soil survey for satisfactory soil materials and samples of soil materials shall be furnished by the Contractor. A certified soil testing service approved by the Owner shall be provided by the Contractor. Testing shall include soil survey for satisfactory soil materials, sampling and testing soil materials proposed for use in the work, and field-testing facilities for quality control during construction period.
2. Tests for Proposed Soil Materials: Soil materials proposed for use in the work shall be tested. The materials shall be approved by the Owner prior to start of work as follows:

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>	<u>NUMBER OF TESTS</u>
Satisfactory soil materials	Sampling	AASHTO T 2	One for each source of materials to determine conformance to definition of satisfactory soil materials; additional tests whenever there is any apparent change
	Preparation of samples	AASHTO T 87	
	Sieve analysis of fine and coarse aggregate	ASTM C 136	
	Mechanical analysis of soils	ASTM D 422	
	Liquid limit of Soils	ASTM D 4318	
	Plastic limit and plasticity index of soils	ASTM D 4318	
	Moisture-density relations of soil	AASHTO T 180, Method B or D	

3. Quality Control Testing During Construction: Soil Test on materials shall be performed during construction as follows:

<u>MATERIAL</u>	<u>REQUIREMENT</u>	<u>TEST METHOD</u>	<u>MATERIAL TESTED AND NUMBER OF TESTS</u>
Soil material-in-place after compaction	Density of soil-in-place	ASTM D 1556 Sand Cone Method or ASTM D 2922 Nuclear Method	At least three daily for each subgrade soil material, and for each layer of soil material; additional tests whenever there is any change in moisture

4. Field Testing Facilities at Subbase Mixing Plant: Field-testing facilities for the purpose of testing subbase course material at the mixing plant shall be provided by the Contractor's soil-testing service.
5. Reports: No soil material shall be used until soil test reports have been reviewed and approved.
6. Evaluation of Test Results
- a. Soil materials of any classification shall not have a moisture content at the time of compaction that would be classified as unsatisfactory soil materials in the paragraph entitled, "Definitions."
 - b. Results of density of soil-in-place tests shall be considered satisfactory if the average of any group of four consecutive density tests which may be selected is in each instance equal to or greater than the specified density, and if no density test has a value more than 2 percentage points below the specified density.

E. Use Of Explosives:

1. Explosives shall not be used or brought to the project site without prior written approval. Such approval shall not be construed as relieving the Contractor of responsibility for injury to persons or for damage to property due to blasting operations. Blasting shall be performed by skilled personnel in accordance with governing authorities and as approved. Minimum safety requirements for blasting shall be in accordance with OSHA Regulations 29 CFR 1926, Subpart U.
OR
The use of explosives will not be permitted.

F. Protection Of Persons And Property

1. Excavations shall be barricaded and posted with warning signs for the safety of persons. Warning lights shall be provided during hours of darkness.
2. Structures, utilities, sidewalks, pavements, and other facilities immediately adjacent to excavations shall be protected against damage including settlement, lateral movement, undermining, and washout.
3. Topsoil removal operations shall be conducted to ensure safety of persons and to prevent damage to existing structures and utilities, construction in progress, trees and vegetation to remain standing, and other property.

G. Construction Equipment List: Construction Equipment List for all major equipment to be used in this section shall be submitted to the Owner prior to start of work.

H. Existing Conditions

1. Records of Existing Conditions shall be submitted by the Contractor prior to the start of work. The Contractor shall verify the existing conditions are correct as shown on the plans and described in the specifications. the Owner shall be notified immediately if any discrepancies are found.

2. Records of underground utilities, Location of Utilities, Location of Inspection, Location of Tests, and Location of Approved Utilities shall be submitted to the Owner prior to start of work.

1.2 PRODUCTS

A. Materials

1. Satisfactory Materials shall mean AASHTO M 145 (ASTM D 3282), Soil Classification Groups A-1, A-2-4, A-2-5, and A-3.
2. Unsatisfactory Materials shall mean AASHTO M 145, Soil Classification Groups A-2-6, A-2-7, A-4, A-5, A-6, and A-7, peat and other highly organic soils, and soil materials of any classification that have a moisture content, at the time of compaction, beyond the range of 1 percentage point below and 3 percentage points above the optimum moisture content of the soil material as determined by moisture-density relations test.
3. Topsoil shall be any soil removed from the project site which consists of clay or sandy loam. The topsoil shall be reasonably free from subsoil, clay lumps, brush, objectionable weeds, and other litter, and shall be free from stones, stumps, roots, and other objectionable material larger than **2 in. (50 mm)** in any dimension.
4. Compost shall be yard trimmings or yard waste compost processed and graded according to state and local regulations.
5. Topsoil Blend: Where insufficient topsoil is removed from the project site for later reuse, the topsoil removed shall be stockpiled and blended with compost at the site to achieve the required volume.

1.3 EXECUTION

A. Blasting:

1. Where explosives are used in rock excavation, the charges shall be so proportioned and placed that they will not loosen the rock outside the excavation lines indicated, or as specified. Contractor shall remove, at no additional cost, any material outside the authorized cross section that may be shattered or loosened by blasting.

OR

Blasting is not required or permitted.

- ### B. Conservation Of Topsoil:
- Topsoil shall be stripped to a depth of not less than **4 in. (100 mm)**; when stored it shall be kept separate from other excavated materials, free of roots, stones, and other undesirable materials. Where indicated, topsoil shall be removed without contamination with subsoil and spread on areas already graded and prepared for topsoil, or when so specified, topsoil shall be transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later or at locations indicated or specified by the Owner. Topsoil blend shall be used on all embankments when there is not enough topsoil available.

C. Excavation

1. Excavations specified shall be done on either a classified or unclassified basis as directed by the Owner.
2. Contractor shall perform excavation of every type of material encountered by cutting accurately to the cross sections to the lines, grades, and elevations indicated. Grading shall be in conformity with the typical sections indicated and the tolerances specified in paragraph entitled, "Finishing."
3. Satisfactory excavated materials shall be transported to and placed in fill or embankment areas within the limits of the work. Unsatisfactory materials encountered within the limits of the work shall be excavated below grade and replaced with satisfactory materials as directed. Surplus satisfactory excavated material not required for fill or embankment shall be disposed in areas approved for surplus materials storage or designated waste areas. Unsatisfactory excavated material shall be disposed in designated waste or spoil areas. During construction, excavation

- and filling shall be performed in a manner and sequence that will provide proper drainage at all times. Material required for fill or embankment in excess of that produced by excavation within the grading limits shall be excavated from the borrow areas indicated or from other approved areas selected by the Owner.
4. Excavation of Ditches, Gutters, and Channels: Care shall be taken not to excavate ditches and gutters below grades shown. Excessive open-ditch or gutter excavation shall be backfilled with suitable materials to grades indicated at no additional cost. Materials excavated shall be disposed as indicated, except that in no case shall material be deposited less than **3 ft. (1 m)** from the edge of a ditch. Contractor shall maintain excavations free from debris until final acceptance of the work.
 5. Excavation for Drainage Structures
 - a. Dimensions and elevations of footings and foundation excavations indicated are only approximate and may be changed if necessary to ensure adequate foundation support. Trenches and foundation pits shall be of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations. Rock or other hard foundation material shall be cleaned of loose debris and cut to a firm surface, either level, stepped, or serrated. Loose disintegrated rock and thin strata shall be removed. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation. Excavation to the final grade level shall not be made until just before concrete or masonry is to be placed.
 - b. Where pile foundations are to be used, the excavation of each pit shall be stopped at an elevation **1 ft. (300 mm)** above the base of the footing, as specified, before piles are driven. After pile driving has been completed, loose and displaced material shall be removed and excavation completed, leaving a smooth, solid, undisturbed surface to receive concrete or masonry.
 6. Protection or Removal of Utility Lines: Existing Utilities that are indicated to be retained, or the locations of which have been ascertained from the Owner utility drawings, as well as utility lines encountered during excavation, shall be protected from damage during excavation and backfilling. However, reliance on the information obtained from the Owner drawings does not absolve the Contractor of responsibility for damages, so careful hand methods shall be used to verify the location of underground utilities. Damage shall be reported immediately and satisfactorily repaired by the Contractor at no additional cost. The Contractor shall provide sketches of existing conditions if there are variances, as well as any modifications, on "as-built" drawings. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall give notice in ample time for the necessary measures to be taken to prevent interruption of service.
- D. Classification Of Excavation: Excavations specified shall be done on either a classified or unclassified basis as provided for under the item designations of the Contract.
- E. Utilization Of Excavation Materials: Unsatisfactory materials removed from excavations shall be disposed in designated areas. Satisfactory material removed from excavations shall be used, insofar as practicable, in the construction of fills, embankments, subgrades, shoulders, bedding; as backfill; and for similar purposes. No satisfactory excavated material shall be wasted without specific written authorization. Satisfactory material authorized to be wasted shall be disposed in designated areas approved for surplus material storage or designated waste areas as directed. Coarse rock from excavations shall be stockpiled and used for constructing slopes of embankments adjacent to streams, for constructing slopes or sides and bottoms of channels, and for protecting against erosion. Hand placing of coarse rock from excavations will not be required. Excavated material shall not be disposed in a manner as to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.
- F. Selection Of Borrow Material: Borrow material shall be selected to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Borrow material shall be obtained from the borrow areas indicated on the plans or from other approved sources, either private or within the limits of the project site, selected by the Contractor. Unless otherwise provided in the

contract, the Contractor shall obtain from the Owner the right to procure material, pay all royalties and other charges involved, and bear all expense of developing the sources, including rights-of-way for hauling. Borrow material from approved sources on the Owner-controlled land may be obtained without payment of royalties. Unless specifically provided, no borrow shall be obtained within the limits of the project site without prior written approval. Necessary clearing, grubbing, and satisfactory drainage of borrow pits and the disposal of debris shall be considered related operations to the borrow excavation and shall be performed by the Contractor at no additional cost to the Owner.

- G. **Opening And Drainage Of Excavation And Borrow Pits:** The Contractor shall give notice sufficiently in advance of the opening of any excavation or borrow pit to permit elevations and measurements of the undisturbed ground surface to be taken. Unless otherwise permitted, borrow pits and other excavation areas shall be excavated in such manner as will afford adequate drainage. Overburden and other spoil material shall be transported to designated spoil areas or otherwise disposed as directed. Borrow pits shall be neatly trimmed and left in such shape as will facilitate accurate measurements after the excavation is completed.
- H. **Grading Areas:** When so provided and indicated, work under contract will be divided into grading areas, within which satisfactory excavated material shall be placed in embankments, fills, and required backfills. Contractor shall not haul satisfactory material excavated in one grading area to another grading area, except when so directed in writing.
- I. **Preparation Of Ground Surface For Embankments**
1. Ground surface on which fill is to be placed shall be stripped of live, dead, or decayed vegetation, rubbish, debris, and other unsatisfactory material; shall be plowed, disked, or otherwise broken up; pulverized; moistened or aerated as necessary; mixed; and compacted to at least 90 percent maximum density for cohesive materials or 100 percent maximum density for cohesionless materials.
 2. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment. The prepared ground surface shall be scarified and moistened or aerated just prior to placement of embankment materials to ensure adequate bond between embankment material and the prepared ground surface.
- J. **Embankments**
1. **Earth Embankments**
 - a. Earth embankments shall be constructed from satisfactory materials free of organic or frozen material and rocks with maximum dimensions not greater than **3 in. (75 mm)**. The material shall be placed in successive horizontal layers of loose material not more than **6 in. (150 mm)** in depth. Each layer shall be spread uniformly on a prepared surface, i.e., a soil surface that has been moistened or aerated and scarified plowed, disked, or otherwise broken up in such a manner that the fill will bond with the surface on which it is placed, mixed, and compacted to at least 90 percent maximum density for borrow materials or 100 percent maximum density for excavated materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements shall be identical to those requirements specified in paragraph entitled, "Subgrade Preparation."
 - b. Compaction shall be accomplished by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment.
 2. **Rock Embankments**
 - a. Rock embankments shall be constructed from material essentially classified as rock excavation, placed in successive horizontal layers of loose material not more than **8 to 10 in. (200 to 250 mm)** in depth. Pieces of rock larger than **8 to 10 in. (200 to 250 mm)** in greatest dimension shall not be used.
 - b. Each layer of material shall be spread uniformly and shall be completely saturated and compacted to density as directed by the Owner.

- c. Each layer of material shall be spread uniformly and shall be completely saturated and compacted until the interstices are filled with well-compacted materials and the entire layer is a dense, compacted mass.
 - d. Each successive layer of material shall adequately bond to the material on which it is placed.
 - e. Compaction shall be accomplished with vibratory compactors with a minimum static weight of **20,000 lbs. (90 kN)**, heavy rubber-tired rollers weighing not less than **25,000 lbs. (110 kN)** or steel-wheeled rollers with a loaded weight of not less than **4,000 lb/ft (58,400 N/m)** of drum length.
 - f. Rock shall not be used above a point **6 in. (150 mm)** below the surface of an embankment that is to be paved.
- K. Subgrade Preparation
- 1. Construction
 - a. Subgrade shall be shaped to line, grade, and cross section and compacted as specified. This operation shall include plowing, disking, and any moistening or aerating required to obtain proper compaction. Soft or otherwise unsatisfactory material shall be removed and replaced with satisfactory excavated material or other approved material as directed. Rock encountered in the cut sections shall be excavated to a depth of **6 in. (150 mm)** below finished grade for the subgrade. Low areas resulting from removal of unsatisfactory material or excavation of rock shall be brought up to required grade with satisfactory materials, and the entire subgrade shall be shaped to line, grade, and cross section and compacted as specified.
 - b. After rolling, the surface of the subgrade for roadways and/or airfields shall indicate a deviation not greater than **3/8 in. (10 mm)** when tested with a **10-ft (3.0 m)** straightedge applied both parallel with, and at right angles to, the centerline of the area.
 - c. Elevation of the finished subgrade shall vary not more than **1/4-in. (6 mm)** from the established grade and approved cross section.
 - 2. Compaction: Compaction for pavements and shoulders shall be accomplished with approved equipment until the layer is compacted to the full depth to at least 95 percent maximum density.
- L. Shoulder Construction: Shoulders shall be constructed of satisfactory excavated or borrow materials or as otherwise indicated on the plans. Shoulders shall be constructed as soon as possible after adjacent paving is complete, but in the case of rigid pavements, shoulders shall not be constructed until permission has been obtained. The entire shoulder area shall be compacted to at least the percentage of maximum density as specified for specific ranges of depth below the surface of the shoulder. Compaction shall be accomplished with approved equipment. Shoulder construction shall be done in proper sequence in such a manner that adjacent ditches will be drained effectively and no damage of any kind is done to the adjacent, completed pavement. The completed shoulders shall be true to alignment and grade and shaped to drain in conformity with the cross section indicated.
- M. Finishing: Surface of excavations, embankments, and subgrades shall be finished to a reasonably smooth and compact surface substantially in accordance with the lines, grades, and cross sections or elevations indicated. Degree of finish for graded areas shall be within **1/10 ft (30 mm)** of the grades and elevations indicated, except that the degree of finish for subgrades shall be as specified. Gutters and ditches shall be finished as indicated. Surface of areas to be turfed shall be finished to a smoothness suitable for the application of turfing materials.
- N. Subgrade And Embankment Protection: During construction, embankments and excavations shall be kept shaped and drained. Ditches and drains along subgrade shall be maintained in such a manner as to drain effectively at all times. Finished subgrade shall not be disturbed by traffic or other operations and shall be protected and maintained by the Contractor in a satisfactory condition until ballast, subbase, base, or pavement is placed. Storage or stockpiling materials on finished subgrade will not be permitted. Subbase, base course, ballast, or pavement shall not be laid until the subgrade has been checked and approved, and in no case shall subbase, base, surfacing, pavement, or ballast be placed on a muddy, spongy, or frozen subgrade.

31 - Earthwork



END OF SECTION 31 24 13 00

SECTION 31 24 13 00a - LEVEE CLOSURE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor and materials for providing levee closures.

1.2 PRODUCTS - (Not Used)

1.3 EXECUTION

A. If there is deemed, by the Owner, to be considerable risk of flooding involved with removing drainage structures and gates in the existing Levee System, the Contractor shall perform the work of this contract as follows:

1. Only one drainage structure/flap gate will be allowed to be disrupted at one time. All proposed work at each drainage structure shall be completed before proceeding to the next structure.
2. The Contractor shall have all materials required for each structure installation secured on site, before beginning construction on that structure.
3. The Contractor shall have all necessary materials on site to temporarily plug existing and/or proposed piping through the levee.
4. Weather and river flow conditions shall be monitored at all times by the Contractor while each drainage structure is open to flow. The Contractor shall construct an adequate closure in a timely fashion to plug the drainage structure preventing flow through the levee.

END OF SECTION 31 24 13 00a

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Task	Specification	Specification Description
31 24 13 00	31 05 13 00	Earth Moving

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SECTION 31 25 14 00 - STABILIZATION MEASURES FOR EROSION AND SEDIMENTATION CONTROL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor and equipment for sediment removal.

1.2 PRODUCTS - (Not Used)

1.3 EXECUTION

- A. The Contractor shall remove all material from areas as required to meet project requirements. Water and sediment removed from these areas shall be discharged to a sedimentation basin constructed and maintained by the Contractor. All work shall be in strict compliance with Pollution Control requirements and Dewatering requirements. All material removed shall be disposed of in an approved landfill in accordance with all State and Federal Regulations.

END OF SECTION 31 25 14 00

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Task	Specification	Specification Description
31 25 14 13	01 56 26 00	Erosion and Sedimentation Controls
31 25 14 13	31 25 14 00	Stabilization Measures for Erosion and Sedimentation Control
31 25 14 13	31 32 19 13	Geosynthetic Fabric
31 25 14 16	01 56 26 00	Erosion and Sedimentation Controls
31 25 14 16	31 25 14 00	Stabilization Measures for Erosion and Sedimentation Control
31 25 14 16	31 32 19 13	Geosynthetic Fabric

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SECTION 31 25 14 23 - UNIT PAVERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for unit pavers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Brick pavers set in aggregate, bituminous or mortar setting beds.
 - b. Concrete pavers set in aggregate, bituminous or mortar setting beds.
 - c. Asphalt-block pavers set in bituminous setting beds.
 - d. Stone pavers set in aggregate or mortar setting beds.
 - e. Plastic or Steel or Aluminum edge restraints.
 - f. Cast-in-place concrete edge restraints.
 - g. Precast concrete curbs.
 - h. Stone curbs.

C. Preconstruction Testing

1. Preconstruction Adhesion and Compatibility Testing: Submit to latex-additive manufacturer, for testing as indicated below, samples of paving materials that will contact or affect mortar and grout that contain latex additives.
 - a. Use manufacturer's standard test methods to determine whether mortar and grout materials will obtain optimum adhesion with, and will be nonstaining to, installed pavers and other materials constituting paver installation.

D. Action Submittals

1. Product Data: For materials other than water and aggregates.
2. Product Data: For the following:
 - a. Pavers.
 - b. Bituminous setting materials.
 - c. Mortar and grout materials.
 - d. Edge restraints.
 - e. Precast concrete curbs.
 - f. Stone curbs.
3. LEED Submittals:
 - a. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
4. Adhesion and Compatibility Test Reports: From latex-additive manufacturer for mortar and grout containing latex additives.
5. Sieve Analyses: For aggregate setting-bed materials, according to ASTM C 136.
6. Samples for Initial Selection: For the following:
 - a. Each type of unit paver indicated.
 - b. Joint materials involving color selection.
 - c. Exposed edge restraints involving color selection.
 - d. Precast concrete curbs.
 - e. Granite for stone curbs.
7. Samples for Verification:

- a. Full-size units of each type of unit paver indicated. Assemble no fewer than five Samples of each type of unit on suitable backing and grout joints.]
- b. Joint materials.
- c. Exposed edge restraints.
- d. Precast concrete curbs.
- e. Stone curbs.

E. Quality Assurance

1. Source Limitations: Obtain each type of unit paver, joint material, and setting material from single source with resources to provide materials and products of consistent quality in appearance and physical properties.
2. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - a. Approved mockups may become part of the completed Work if undisturbed at time of Final Completion.
3. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
2. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
3. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
4. Store liquids in tightly closed containers protected from freezing.
5. Store asphalt cement and other bituminous materials in tightly closed containers.

G. Project Conditions

1. Cold-Weather Protection: Do not use frozen materials or build on frozen subgrade or setting beds.
2. Weather Limitations for Bituminous Setting Bed:
 - a. Install bituminous setting bed only when ambient temperature is above 40 deg F (4 deg C) and when base is dry.
 - b. Apply asphalt adhesive only when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (2 deg C) for 12 hours immediately before application. Do not apply when setting bed is wet or contains excess moisture.
3. Weather Limitations for Mortar and rout:
 - a. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - b. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.
 - 1) When ambient temperature exceeds 100 deg F (38 deg C), or when wind velocity exceeds 8 mph (13 km/h) and ambient temperature exceeds 90 deg F (32 deg C), set pavers within 1 minute of spreading setting-bed mortar.

1.2 PRODUCTS

A. Brick Pavers

1. Regional Materials: Provide brick pavers that have been manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

2. Brick Pavers: Light-traffic paving brick; ASTM C 902; Class SX for exposure to freezing weather **OR** Class MX for exterior uses that do not expose brick to freezing, **as directed**, Type I for locations exposed to extensive abrasion, such as sidewalks and driveways in public spaces **OR** Type II for locations exposed to intermediate abrasion, such as heavily traveled residential walkways and driveways **OR** Type III for locations exposed to low abrasion, such as floors and patios exposed in single-family homes, **as directed**. Application PS normal tolerance for installation with grouted joints **OR** Application PX close tolerance for ungrouted joints **OR** Application PA non-uniform sized for decorative effect, **as directed**. Provide brick without frogs or cores in surfaces exposed to view in the completed Work.
 - a. Thickness: 1-1/4 inches (32 mm) **OR** 1-1/2 inches (38 mm) **OR** 1-5/8 inches (41 mm) **OR** 2-1/4 inches (57 mm) **OR** 2-5/8 inches (67 mm), **as directed**.
 - b. Face Size: 3-3/4 by 7-1/2 inches (95 by 190 mm) **OR** 3-5/8 by 7-5/8 inches (92 by 194 mm) **OR** 3-5/8 by 11-5/8 inches (92 by 295 mm) **OR** 7-5/8 by 7-5/8 inches (194 by 194 mm) **OR** 4 by 8 inches (102 by 203 mm) **OR** 4 by 12 inches (102 by 305 mm) **OR** 8 by 8 inches (203 by 203 mm), **as directed**.
 - c. Color: As selected from manufacturer's full range.
 3. Brick Pavers: Heavy vehicular paving brick; ASTM C 1272, Type F, Application PX **OR** Type R, Application PS **OR** Type R, Application PX **OR** Type R, Application PA, **as directed**. Provide brick without frogs or cores in surfaces exposed to view in the completed Work.
 - a. Type R is for units set in a mortar setting bed or a bituminous setting bed supported by an adequate base. Type F is for units set in a sand setting bed with sand between the pavers. Application PS is for general use; Application PX is for pavers with close dimensional tolerances. Application PX must be selected if specifying Type F
 - b. Thickness: 2-1/4 inches (57 mm) **OR** 2-5/8 inches (67 mm), **as directed**.
 - c. Face Size: 3-3/4 by 7-1/2 inches (95 by 190 mm) **OR** 3-5/8 by 7-5/8 inches (92 by 194 mm) **OR** 3-5/8 by 11-5/8 inches (92 by 295 mm) **OR** 7-5/8 by 7-5/8 inches (194 by 194 mm) **OR** 4 by 8 inches (102 by 203 mm) **OR** 4 by 12 inches (102 by 305 mm) **OR** 8 by 8 inches (203 by 203 mm), **as directed**.
 - d. Color: As selected from manufacturer's full range.
 4. Efflorescence: Brick shall be rated "not effloresced" when tested according to ASTM C 67.
 5. Temporary Protective Coating: Precoat exposed surfaces of brick pavers with a continuous film of a temporary protective coating that is compatible with brick, mortar, and grout products and can be removed without damaging grout or brick. Do not coat unexposed brick surfaces; handle brick to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.
- B. Concrete Pavers
1. Concrete Pavers: Solid interlocking paving units complying with ASTM C 936 and resistant to freezing and thawing when tested according to ASTM C 67, made from normal-weight aggregates.
 - a. Thickness: 2-3/8 inches (60 mm) **OR** 3-1/8 inches (80 mm), **as directed**.
 - b. Face Size and Shape: 3-7/8 inches (98 mm) square **OR** 4-7/16 inches (113 mm) **OR** 8-7/8 inches (225 mm) **OR** 9 inches (229 mm) square, **as directed**.
 - c. Face Size and Shape: 3-7/8-by-7-7/8 inch (98-by-200 mm) **OR** 4-by-8-inch (102-by-203-mm) **OR** 4-7/16-by-8-7/8 inch (113-by-225-mm), **as directed**, rectangle.
 - d. Face Size and Shape: 5-1/2-inch (140-mm) octagon with attached 3-1/2-inch (89-mm) square **OR** 4-1/2-by-9 inch (114-by-229 mm) rectangle with saw-tooth edges **OR** 4-3/4-inch (121-mm) rectangular and trapezoidal units arranged in semicircular courses to produce fan-shaped pattern, **as directed**.
 - e. Color: As selected from manufacturer's full range.
 2. Concrete Pavers: Solid paving units, made from normal-weight concrete with a compressive strength not less than 5000 psi (34 MPa) **OR** 6000 psi (41 MPa), **as directed**, water absorption not more than 5 percent according to ASTM C 140, and no breakage and not more than 1 percent mass loss when tested for freeze-thaw resistance according to ASTM C 67.

- a. Thickness: 1-5/8 inches (41 mm) OR 1-3/4 inches (45 mm) OR 2 inches (51 mm) OR 2-3/8 inches (60 mm), **as directed**.
 - b. Face Size and Shape: 8-7/8 inches (225 mm) square OR 9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 24 inches (610 mm) square, **as directed**.
 - c. Face Size and Shape: 9-by-18 inch (229-by-457 mm) OR 12-by-24 inch (305-by-610 mm), **as directed**, rectangle.
 - d. Face Size and Shape: As indicated.
 - e. Color: As selected from manufacturer's full range.
3. Concrete Pavers: Solid paving units complying with ASTM C 1491, made from lightweight concrete.
- a. Thickness: 1-5/8 inches (41 mm) OR 1-3/4 inches (45 mm) OR 2 inches (51 mm), **as directed**.
 - b. Face Size and Shape: 9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square, **as directed**.
 - c. Color: As selected from manufacturer's full range.
- C. Asphalt-Block Pavers
1. Asphalt-Block Pavers: Solid units made from asphalt cement complying with ASTM D 312, Type III; inorganic stone dust or cement filler; and coarse aggregate, consisting of clean, hard, unweathered stone crushed into angular particles varying in size up to 3/8 inch (9.5 mm).
 - a. Thickness: 1-1/4 inches (32 mm) OR 2 inches (51 mm) OR 3 inches (76 mm), **as directed**.
 - b. Face Size: 4 by 6 inches (102 by 152 mm) OR 6 by 6 inches (152 by 152 mm) OR 8 by 8 inches (203 by 203 mm) OR 5 by 12 inches (127 by 305 mm) OR 6 by 12 inches (152 by 305 mm) OR 8-inch- (203-mm-) wide hexagon, **as directed**.
 - c. Finish: Natural, smooth OR Ground OR Ground and sandblasted, **as directed**.
 - d. Color: As selected from manufacturer's full range.
- D. Stone Pavers
1. Granite Pavers: Rectangular paving slabs made from granite complying with ASTM C 615
 - a. Color and Grain: Light gray OR Dark gray OR Buff OR White OR Black OR Pink, **as directed**, with medium OR fine, **as directed**, grain.
 - b. Finish: Honed OR Thermal, **as directed**.
 - c. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - d. Thickness: Not less than 3/4 inch (20 mm) OR 30 mm OR 1-1/4 inches (32 mm) OR 1-5/8 inches (40 mm), **as directed**, unless otherwise indicated.
 - e. Face Size: 9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 9 by 18 inches (229 by 457 mm), **as directed**.
 2. Limestone Pavers: Rectangular paving slabs made from limestone complying with ASTM C 568.
 - a. Classification: II Medium-Density OR III High-Density, **as directed**.
 - b. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241 or ASTM C 1353.
 - c. Finish: Smooth OR Chat sawed OR Shot sawed, **as directed**.
 - d. Match Architect's samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - e. Thickness: Not less than 1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-5/8 inches (40 mm) OR 2 inches (50 mm), **as directed**, unless otherwise indicated.
 - f. Face Size: 9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 9 by 18 inches (229 by 457 mm), **as directed**.
 3. Marble Pavers: Rectangular paving slabs made from marble complying with ASTM C 503.
 - a. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241 or ASTM C 1353.
 - b. Description: Uniform, fine- to medium-grained, white stone with only slight veining.

- c. Finish: Honed **OR as directed.**
 - d. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - e. Thickness: Not less than **3/4 inch (20 mm) OR 30 mm OR 1-1/4 inches (32 mm), as directed.**
 - f. Face Size: **9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 9 by 18 inches (229 by 457 mm) as directed.**
4. Quartz-Based Stone Pavers: Rectangular paving slabs **OR** Random polygonal flagstones made from quartz-based stone complying with ASTM C 616, Classification I Sandstone **OR** II Quartzitic Sandstone **OR** III Quartzite, **as directed.**
- a. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241 or ASTM C 1353.
 - b. Finish: Sand rubbed **OR** Natural cleft **OR** Thermal, **as directed.**
 - c. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - d. Thickness: Not less than **1 inch (25 mm) OR 1-1/4 inches (32 mm) OR 1-1/2 inches (38 mm) OR 1-5/8 inches (40 mm) OR 2 inches (50 mm), as directed.**
 - e. Face Size: **9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 9 by 18 inches (229 by 457 mm), as directed.**
5. Slate Pavers: Rectangular paving slabs **OR** Random polygonal flagstones made from slate complying with ASTM C 629, Classification I Exterior, with a fine, even grain and unfading color, from clear, sound stock.
- a. Color: Black **OR** Blue-black **OR** Gray **OR** Blue-gray **OR** Green **OR** Purple **OR** Mottled purple and green **OR** Red, **as directed.**
 - b. Stone Abrasion Resistance: Minimum value of 8, based on testing according to ASTM C 241 or ASTM C 1353.
 - c. Finish: Honed **OR** Sand rubbed **OR** Natural cleft, **as directed.**
 - d. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - e. Thickness: Not less than **1/2 inch (13 mm) OR 3/4 inch (20 mm) OR 1 inch (25 mm), as directed.**
 - f. Face Size: **9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 9 by 18 inches (229 by 457 mm), as directed.**
6. Travertine Pavers: Rectangular paving slabs made from travertine complying with ASTM C 1527, Classification I Exterior.
- a. Stone Abrasion Resistance: Minimum value of 10, based on testing according to ASTM C 241 or ASTM C 1353.
 - b. Cut: Vein cut.
 - c. Filling: Fill pores on faces of stone with cementitious filler of color as selected by the Owner.
 - d. Finish: Honed **OR as directed.**
 - e. Match samples for color, finish, and other stone characteristics relating to aesthetic effects.
 - f. Thickness: Not less than **3/4 inch (20 mm) OR 30 mm OR 1-1/4 inches (32 mm), as directed.**
 - g. Face Size: **9 inches (229 mm) square OR 12 inches (305 mm) square OR 18 inches (457 mm) square OR 9 by 18 inches (229 by 457 mm), as directed.**
7. Rough-Stone Pavers: Rectangular tumbled paving stones, with split or thermal-finished faces and edges, made from granite complying with ASTM C 615.
- a. Granite Color and Grain: Light gray **OR** Dark gray **OR** Buff **OR** White **OR** Black **OR** Pink, **as directed**, with medium **OR** fine, **as directed**, grain.
 - b. Thickness: **1-1/4 inches (32 mm) OR 2 inches (51 mm) OR 3 inches (76 mm) OR 4 inches (102 mm) OR 4 inches (102 mm)**, plus or minus **1/2 inch (13 mm)**, **as directed.**
 - c. Face Size: **4 by 4 inches (100 by 100 mm)**, plus or minus **1/2 inch (13 mm) OR 3 to 5 inches (75 to 125 mm) by 8 to 12 inches (200 to 300 mm), as directed.**
- E. Curbs And Edge Restraints
- 1. Plastic Edge Restraints: Manufacturer's standard triangular PVC extrusions **1-3/4 inches (45 mm) high by 3-1/2 inches (89 mm) wide OR 3-1/8 inches (79 mm) high by 9-1/2 inches (241 mm) wide, as directed**, designed to serve as edge restraints for unit pavers; rigid type for straight

edges and flexible type for curved edges, with pipe connectors and 3/8-inch (9.5-mm) diameter by 12-inch- (300-mm-) long steel spikes.

2. Steel Edge Restraints: Manufacturer's standard painted steel edging 3/16 inch (4.8 mm) thick by 4 inches (100 mm) high **OR** 1/4 inch (6.4 mm) thick by 5 inches (125 mm) high, **as directed** with loops pressed from or welded to face to receive stakes at 36 inches (900 mm) o.c., and steel stakes 15 inches (380 mm) long for each loop.
 - a. Color: As selected from manufacturer's full range.
3. Aluminum Edge Restraints: Manufacturer's standard straight, 1/8-inch- (3.2-mm-) thick by 4-inch- (100-mm-) high **OR** straight, 3/16-inch- (4.8-mm-) thick by 4-inch- (100-mm-) high **OR** L-shaped, 1/8-inch- (3.2-mm-) thick by 1-3/8-inch- (35-mm-) high **OR** L-shaped, 3/16-inch- (4.8-mm-) thick by 2-1/4-inch- (57-mm-) high, **as directed** extruded-aluminum edging with loops pressed from face to receive stakes at 12 inches (300 mm) o.c., and aluminum stakes 12 inches (300 mm) long for each loop.
4. Job-Built Concrete Edge Restraints: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 3000 psi (20 MPa).
5. Precast Concrete Curbs: Made from normal-weight concrete with a compressive strength not less than 5000 psi (34 MPa) **OR** 6000 psi (41 MPa), **as directed** and water absorption not more than 5 percent, in shapes and sizes indicated.
6. Stone Curbs: Granite curbing, with face battered 1 inch per foot (1:12), produced in random lengths not less than 36 inches (900 mm) from granite complying with ASTM C 615.
 - a. Granite Color and Grain: Light gray **OR** Dark gray **OR** Buff **OR** White **OR** Black **OR** Pink, **as directed** with fine **OR** medium **OR** coarse grain, **as directed**.
 - b. Top Width: 4 inches (102 mm) **OR** 5 inches (127 mm) **OR** 6 inches (152 mm), **as directed**.
 - c. Face Height: 4 inches (102 mm) **OR** 6 inches (152 mm) **OR** 8 inches (203 mm), **as directed**.
 - d. Total Height: 12 inches (305 mm) **OR** 16 inches (406 mm) **OR** 18 inches (457 mm), **as directed**.
 - e. Top Finish: Sawed **OR** Thermal **OR** Bush hammered, **as directed**.
 - f. Face Finish: Split **OR** Sawed **OR** Thermal **OR** Bush hammered, **as directed**.

F. Accessories

1. Cork Joint Filler: Preformed strips complying with ASTM D 1752, Type II.
2. Compressible Foam Filler: Preformed strips complying with ASTM D 1056, Grade 2A1.

G. Aggregate Setting-Bed Materials

1. Graded Aggregate for Sub-base: Sound, crushed stone or gravel complying with ASTM D 448 for Size No. 57 **OR** ASTM D 2940, sub-base material **OR** requirements in Division 31 Section "Earth Moving" for sub-base material, **as directed**.
2. Graded Aggregate for Base: Sound, crushed stone or gravel complying with ASTM D 448 for Size No. 8 **OR** ASTM D 2940, base material **OR** requirements in Division 31 Section "Earth Moving" for base course, **as directed**.
3. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
4. Stone Screenings for Leveling Course: Sound stone screenings complying with ASTM D 448 for Size No. 10.
5. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 (1.18-mm) sieve and no more than 10 percent passing No. 200 (0.075-mm) sieve.
 - a. Provide sand of color needed to produce required joint color.
6. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - a. Survivability: Class 2, AASHTO M 288.
 - b. Apparent Opening Size: No. 60 (0.250-mm) sieve, maximum; ASTM D 4751.

- c. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 - d. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.
 7. Drainage Geotextile: Nonwoven needle-punched geotextile made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - a. Survivability: Class 2, AASHTO M 288.
 - b. Apparent Opening Size: **No. 40 (0.425-mm)** sieve, maximum; ASTM D 4751.
 - c. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - d. UV Stability: 50 percent after 500 hours' exposure, ASTM D 4355.
 8. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form.
- H. Bituminous Setting-Bed Materials
1. Primer for Base: ASTM D 2028, cutback asphalt, grade as recommended by unit paver manufacturer.
 2. Fine Aggregate for Setting Bed: ASTM D 1073, No. 2 or No. 3.
 3. Asphalt Cement: ASTM D 3381, Viscosity Grade AC-10 or Grade AC-20.
 4. Neoprene-Modified Asphalt Adhesive: Paving manufacturer's standard adhesive consisting of oxidized asphalt combined with 2 percent neoprene and 10 percent long-fibered mineral fibers containing no asbestos.
 5. Sand for Joints: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing **No. 16 (1.18-mm)** sieve and no more than 10 percent passing **No. 200 (0.075-mm)** sieve.
 - a. Provide sand of color needed to produce required joint color.
- I. Mortar Setting-Bed Materials
1. Portland Cement: ASTM C 150, Type I or II.
 2. Hydrated Lime: ASTM C 207, Type S.
 3. Sand: ASTM C 144.
 4. Latex Additive: Manufacturer's standard, acrylic resin or styrene-butadiene-rubber water emulsion, **as directed** serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed, and not containing a retarder.
 5. Thinset Mortar: Latex-modified portland cement mortar complying with ANSI A118.4.
 - a. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - b. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site, as directed.
 6. Water: Potable.
 7. Reinforcing Wire Fabric: Galvanized, welded wire fabric, **2-by-2-inch (51-by-51-mm)** by **0.062-inch- (1.57-mm-)** diameter wire; comply with ASTM A 1064/A 1064M and ASTM A 82/A 82M except for minimum wire size.
- J. Grout Materials
1. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement, unfading mineral pigments and white or colored sand as required to produce required color.
 - a. Colored Mortar Pigments for Grout: Natural and synthetic iron and chromium oxides, compounded for use in mortar and grout mixes. Use only pigments that have proved, through testing and experience, to be satisfactory for use in portland cement grout.
 2. Standard Cement Grout: ANSI A118.6, sanded.
 3. Polymer-Modified Grout: ANSI A118.7, sanded grout; in color indicated.
 - a. Polymer Type: Ethylene-vinyl acetate or acrylic additive in dry, redispersible form; prepackaged with other dry ingredients.
 - b. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid-latex form for addition to prepackaged dry-grout mix.
 4. Grout Colors: As selected from manufacturer's full range.
 5. Water: Potable.

- K. Bituminous Setting-Bed Mix
1. Mix bituminous setting-bed materials at an asphalt plant in approximate proportion, by weight, of 7 percent asphalt cement to 93 percent fine aggregate, unless otherwise indicated. Heat mixture to **300 deg F (149 deg C)**.
- L. Mortar And Grout Mixes
1. General: Comply with referenced standards and with manufacturers' written instructions. Discard mortars and grout if they have reached their initial set before being used.
 2. Mortar-Bed Bond Coat: Mix neat cement or cement and sand with latex additive **OR** water, **as directed**, to a creamy consistency.
 3. Portland Cement-Lime Setting-Bed Mortar: Type M complying with ASTM C 270, Proportion Specification.
 4. Latex-Modified, Portland Cement Setting-Bed Mortar: Proportion and mix portland cement, sand, and latex additive for setting bed to comply with written instructions of latex-additive manufacturer and as necessary to produce stiff mixture with a moist surface when bed is ready to receive pavers.
 5. Latex-Modified, Portland Cement Slurry Bond Coat: Proportion and mix portland cement, aggregate, and liquid latex for bond coat to comply with written instructions of liquid-latex manufacturer.
 6. Thinset Mortar Bond Coat: Proportion and mix thinset mortar ingredients according to manufacturer's written instructions.
 7. Job-Mixed Portland Cement Grout: Proportion and mix job-mixed portland cement and aggregate grout to match setting-bed mortar except omit hydrated lime and use enough water to produce a pourable mixture.
 - a. Pigmented Grout: Select and proportion pigments with other ingredients to produce color required. Do not exceed pigment-to-cement ratio of 1:10, by weight.
 - b. Colored-Aggregate Grout: Produce color required by combining colored sand with portland cement of selected color.
 8. Package Grout Mix: Proportion and mix grout ingredients according to grout manufacturer's written instructions.

1.3 EXECUTION

- A. Examination
1. Examine areas indicated to receive paving, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
 2. Where pavers are to be installed over waterproofing, examine waterproofing installation, with waterproofing Installer present, for protection from paving operations, including areas where waterproofing system is turned up or flashed against vertical surfaces.
 3. Proceed with installation only after unsatisfactory conditions have been corrected and waterproofing protection is in place.
- B. Preparation
1. Remove substances from concrete substrates that could impair mortar bond, including curing and sealing compounds, form oil, and laitance.
 2. Sweep concrete substrates to remove dirt, dust, debris, and loose particles.
 3. Proof-roll prepared subgrade according to requirements in Division 31 Section "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.
- C. Installation, General
1. Do not use unit pavers with chips, cracks, voids, discolorations, or other defects that might be visible or cause staining in finished work.

2. Mix pavers from several pallets or cubes, as they are placed, to produce uniform blend of colors and textures.
3. Cut unit pavers with motor-driven masonry saw equipment to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible.
 - a. For concrete pavers, a block splitter may be used.
4. Handle protective-coated brick pavers to prevent coated surfaces from contacting backs or edges of other units. If, despite these precautions, coating does contact bonding surfaces of brick, remove coating from bonding surfaces before setting brick.
5. Joint Pattern: Running bond **OR** Herringbone **OR** Basket weave **OR** Match and continue existing unit paver joint pattern, **as directed**.
6. Pavers over Waterproofing: Exercise care in placing pavers and setting materials over waterproofing so protection materials are not displaced and waterproofing is not punctured or otherwise damaged. Carefully replace protection materials that become displaced and arrange for repair of damaged waterproofing before covering with paving.
 - a. Provide joint filler at waterproofing that is turned up on vertical surfaces, unless otherwise indicated; where unfilled joints are indicated, provide temporary filler or protection until paver installation is complete.
7. Tolerances: For smooth pavers where slopes to drains are critical. Do not exceed **1/32-inch (0.8-mm)** unit-to-unit offset from flush (lippage) nor **1/8 inch in 10 feet (3 mm in 3 m)** from level, or indicated slope, for finished surface of paving.
OR
Tolerances: For smooth, flat pavers. Do not exceed **1/16-inch (1.6-mm)** unit-to-unit offset from flush (lippage) nor **1/8 inch in 24 inches (3 mm in 600 mm)** and **1/4 inch in 10 feet (6 mm in 3 m)** from level, or indicated slope, for finished surface of paving.
8. Expansion and Control Joints: Provide for sealant-filled joints at locations and of widths indicated. Provide compressible foam filler as backing for sealant-filled joints unless otherwise indicated; where unfilled joints are indicated, provide temporary filler until paver installation is complete. Install joint filler before setting pavers. Sealant materials and installation are specified in Division 07 Section "Joint Sealants".
OR
Expansion and Control Joints: Provide cork joint filler at locations and of widths indicated. Install joint filler before setting pavers. Make top of joint filler flush with top of pavers.
9. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
 - a. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation.
 - b. For metal edge restraints with top edge exposed, drive stakes at least **1 inch (25 mm)** below top edge.
 - c. Install job-built concrete edge restraints to comply with requirements in Division 03 Section "Cast-in-place Concrete".
 - d. Where pavers set in mortar bed are indicated as edge restraints for pavers set in aggregate setting bed, install pavers set in mortar and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.
 - e. Where pavers embedded in concrete are indicated as edge restraints for pavers set in aggregate setting bed, install pavers embedded in concrete and allow concrete to cure before placing aggregate setting bed and remainder of pavers. Hold top of concrete below aggregate setting bed.
10. Provide steps made of pavers as indicated. Install paver steps before installing adjacent pavers.
 - a. Where pavers set in mortar bed are indicated for steps constructed adjacent to pavers set in aggregate setting bed, install steps and allow mortar to cure before placing aggregate setting bed and remainder of pavers. Cut off mortar bed at a steep angle so it will not interfere with aggregate setting bed.

D. Aggregate Setting-Bed Applications

1. Compact soil subgrade uniformly to at least 95 percent of ASTM D 698 **OR** ASTM D 1557, **as directed**, laboratory density.

2. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined, and replace with compacted backfill or fill as directed.
3. Place separation geotextile over prepared subgrade, overlapping ends and edges at least **12 inches (300 mm)**.
4. Place aggregate subbase and base **OR** base, **as directed**.
 - a. For light-traffic compact by tamping with plate vibrator, and screed to depth indicated.
 - b. For heavy duty compact to 100 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.
5. Place drainage geotextile over compacted base course, overlapping ends and edges at least **12 inches (300 mm)**.
6. Place leveling course and screed to a thickness of **1 to 1-1/2 inches (25 to 38 mm)**, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.
7. Treat leveling course with herbicide to inhibit growth of grass and weeds.
8. Set pavers with a minimum joint width of **1/16 inch (1.5 mm)** and a maximum of **1/8 inch (3 mm)**, being careful not to disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use string lines to keep straight lines. Fill gaps between units that exceed **3/8 inch (10 mm)** with pieces cut to fit from full-size unit pavers.
 - a. When installation is performed with mechanical equipment, use only unit pavers with spacer bars on sides of each unit.
9. Vibrate pavers into leveling course with a low-amplitude plate vibrator capable of a **3500- to 5000-lbf (16- to 22-kN)** compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.
 - a. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least **36 inches (900 mm)** of uncompacted pavers adjacent to temporary edges.
 - b. Before ending each day's work, compact installed concrete pavers except for **36-inch (900 mm)** width of uncompacted pavers adjacent to temporary edges (laying faces).
 - c. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within **36 inches (90 mm)** of laying face.
 - d. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and cover leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.
10. Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of sand on the surface for joint filling.
11. Do not allow traffic on installed pavers until sand has been vibrated into joints.
12. Repeat joint-filling process 30 days later.

E. Bituminous Setting-Bed Applications

1. Apply primer to concrete slab or binder course immediately before placing setting bed.
2. Prepare for setting-bed placement by locating **3/4-inch- (19-mm-)** deep control bars approximately **11 feet (3.3 m)** apart, to serve as guides for striking board. Adjust bars for accurate setting of paving units to finished grades indicated.
3. Place bituminous setting bed between control bars. Spread mix at a minimum temperature of **250 deg F (121 deg C)**. Strike setting bed smooth, firm, even, and not less than **3/4 inch (19 mm)** thick. Add fresh bituminous material to low, porous spots after each pass of striking board. Carefully fill depressions that remain after removing depth-control bars.
 - a. Roll setting bed with power roller to a nominal depth of **3/4 inch (19 mm)**. Adjust thickness as necessary to allow accurate setting of unit pavers to finished grades indicated. Complete rolling before mix temperature cools to **185 deg F (85 deg C)**.
4. Apply neoprene-modified asphalt adhesive to cold setting bed by squeegeeing or troweling to a uniform thickness of **1/16 inch (1.6 mm)**. Proceed with setting of paving units only after adhesive is tacky and surface is dry to touch.

5. Place pavers carefully by hand in straight courses, maintaining accurate alignment and uniform top surface. Protect newly laid pavers with plywood panels on which workers can stand. Advance protective panels as work progresses, but maintain protection in areas subject to continued movement of materials and equipment to avoid creating depressions or disrupting alignment of pavers. If additional leveling of paving is required, and before treating joints, roll paving with power roller after sufficient heat has built up in the surface from several days of hot weather.
 6. Joint Treatment: Place unit pavers with hand-tight joints. Fill joints by sweeping sand over paved surface until joints are filled. Remove excess sand after joints are filled.
- F. Mortar Setting-Bed Applications
1. Saturate concrete sub-base with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.
 2. Apply mortar-bed bond coat over surface of concrete sub-base about 15 minutes before placing setting bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed **1/16-inch (1.6-mm)** thickness for bond coat.
 3. Apply mortar bed over bond coat immediately after applying bond coat. Spread and screed to subgrade elevations required for accurate setting of pavers to finished grades indicated.
 4. Place reinforcing wire over concrete sub-base, lapped at joints by at least one full mesh and supported so mesh becomes embedded in the middle of setting bed. Hold edges back from vertical surfaces approximately **1/2 inch (13 mm)**.
 5. Place mortar bed with reinforcing wire fully embedded in middle of setting bed. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.
 6. Mix and place only that amount of mortar that can be covered with pavers before initial set. Cut back and discard setting-bed material that has reached initial set before placing pavers.
 7. Wet brick pavers before laying if the initial rate of absorption exceeds **30 g/30 sq. in. (30 g/194 sq. cm)** per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.
 8. Place pavers before initial set of cement occurs. Immediately before placing pavers, apply uniform **1/16-inch- (1.5-mm-)** thick, slurry bond coat to bed or to back of each paver.
 9. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.
 10. Spaced Joint Widths: Provide **3/8-inch (10-mm) OR 1/2-inch (13-mm) OR 3/4-inch (19-mm)**, as directed, nominal joint width with variations not exceeding plus or minus **1/16 inch (1.5 mm) OR 1/8 inch (3 mm) OR 3/16 inch (4.5 mm)**, as directed.
 11. Grouted Joints: Grout paver joints complying with ANSI A108.10.
 12. Grout joints as soon as possible after initial set of setting bed.
 - a. Force grout into joints, taking care not to smear grout on adjoining surfaces.
 - b. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.
 - c. Tool exposed joints slightly concave when thumbprint hard.
 - d. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.
 13. Cure grout by maintaining in a damp condition for seven days, unless otherwise recommended by grout or liquid-latex manufacturer.
- G. Repairing, Pointing, And Cleaning
1. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
 2. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

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3. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.
 - a. Remove temporary protective coating as recommended by coating manufacturer and as acceptable to paver and grout manufacturers.
 - b. Do not allow protective coating to enter floor drains. Trap, collect, and remove coating material.

END OF SECTION 31 25 14 23

Task	Specification	Specification Description
31 25 14 23	01 56 26 00	Erosion and Sedimentation Controls
31 25 14 23	31 25 14 00	Stabilization Measures for Erosion and Sedimentation Control
31 25 14 23	31 32 19 13	Geosynthetic Fabric

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SECTION 31 25 14 26 - SILT FENCES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor, material and equipment for the installation of silt fencing.

1.2 PRODUCTS

A. Materials

1. Fabricated Units
 - a. Posts: 36" long, 2" hardwood or "T" or "U" type steel.
 - b. Fence: Woven wire, 14-1/2 ga. 6-inch max. mesh opening.
 - c. Filter Cloth: MIRAFI 100X or approved equal.
2. Prefabricated Units
 - a. Envirofence by MIRAFI or approved equal.

1.3 EXECUTION

- A. The Contractor shall provide and install silt fences as directed by the Owner. It shall be the Contractor's option to provide fabricated reinforced silt fence or prefabricated units, unless otherwise directed. In all installations, the bottom flap of filter cloth shall be firmly embedded into undisturbed or stabilized grade. Embedment shall resist pullout and prevent flow under the installation.

END OF SECTION 31 25 14 26

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Task	Specification	Specification Description
31 25 14 26	01 56 26 00	Erosion and Sedimentation Controls
31 25 14 26	31 25 14 00	Stabilization Measures for Erosion and Sedimentation Control

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SECTION 31 31 19 13 - SOIL STERILIZATION

1.1 GENERAL

A. Description Of Work

1. This specification covers soil sterilization. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations.

1.2 PRODUCTS

- A. Weed Eradication and Soil Fumigation: Products approved by the Environmental Protection Agency.
- B. Liquid and Dry Herbicides:
 1. Bare Ground Herbicides: Bromacil powder mixture or an ammonium sulfamate spray.
 2. Wetting Agents: As required.
- C. Equipment: Equipment shall be appropriate to the application and approved before use by the Owner.

1.3 EXECUTION

- A. Soil: After the subgrade has been prepared, all areas to be surfaced shall be treated with a weed eradicator and soil fumigant only in the designated areas.
- B. Wetting Agents may be used as an additive to improve the performance of weed and brush herbicides.

END OF SECTION 31 31 19 13

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Task	Specification	Specification Description
31 32 13 16	31 32 13 19	Soil Stabilization-Lime

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SECTION 31 32 13 19 - SOIL STABILIZATION-LIME

1.1 GENERAL

A. Description Of Work

1. This specification covers furnishing of materials and the preparation and production of a stabilized subgrade by the addition of hydrated lime to the native material.

1.2 PRODUCTS

A. Hydrated lime material requirements shall be as follows:

1. Available Lime Index as Calcium Hydroxide: 90 percent minimum.
2. Residue retained on No. 30 Sieve: 1 percent maximum.
3. Residue retained on No. 200 Sieve: 20 percent maximum.

1.3 EXECUTION:

- A. Preparation: Scarify the subgrade to the depth required and pulverize the material until it is substantially free of lumps greater than three inches in diameter.
- B. Installation: Lime shall be applied to the pulverized material as a slurry, unless otherwise directed. Water shall be added as needed to provide a moisture content of not less than 20 percent. Surface-applied lime slurry shall be plowed and/or disked into the soil as necessary. The resulting mixture shall be aged for not less than 48 hours before compaction.

END OF SECTION 31 32 13 19

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Task	Specification	Specification Description
31 32 13 19	31 45 13 00	Soil Stabilization-Vibroflotation
31 32 13 29	31 32 13 19	Soil Stabilization-Lime

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SECTION 31 32 19 13 - GEOSYNTHETIC FABRIC

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of labor, material and equipment for the installation of geosynthetic fabric.

1.2 PRODUCTS

A. Materials

1. Erosion Control Fabric - Photo and biodegradable plastic Curlex Blanket as manufactured by American Excelsior Co. or approved equal.
2. Drainage/Leach Bed - Non-woven polypropylene/polyethylene fabric, Mirafi 140N or approved equal.
3. Road Base and Structure Reinforcement - Woven polypropylene fabric, Mirafi 600X or approved equal.
4. Sediment and Job Site erosion control - woven polypropylene fabric - Envirofence by Mirafi or approved equal.

1.3 EXECUTION

- A. For sediment and job site erosion control fabric, the Contractor shall provide and install silt fence as detailed on the Storm Water Management and Erosion Control Plan. It shall be the Contractor's option to provide fabricated reinforced silt fence or prefabricated units, unless otherwise noted. In all installations, the bottom flap of filter cloth shall be firmly embedded into undisturbed or stabilized grade. Embedment shall resist pullout and prevent flow under the installation.

END OF SECTION 31 32 19 13

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Task	Specification	Specification Description
31 32 19 13	31 32 13 19	Soil Stabilization-Lime

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SECTION 31 32 19 16 - SEWAGE TREATMENT LAGOONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for the repair and maintenance of sewage treatment lagoons. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Materials

1. Concrete Block shall comply with ASTM C 129.
2. Concrete Grout shall comply with Fed. Spec. MMM-A-001993.
3. Riprap Stone shall comply with AREA-01.
4. Concrete Repair Material shall comply with Fed. Spec. MMM-A-001993.
5. Sand shall comply with ASTM C 33.
6. Portland Cement shall comply with ASTM C 150, Type V.
7. Rubble shall consist of broken concrete or broken stone.

1.3 EXECUTION

- A. Algae Removal shall be by mechanical or manual methods and shall include, but not be limited to, skimming, pumping through a screen, raking, or draining and cleaning the lagoon.
- B. Slope and Dike Reconstruction shall be made to re-establish the original design configuration and grades. Place riprap, where required, so that its angle of repose is not exceeded.
- C. Liner Reconstruction and Repair shall be made with materials compatible with the existing liner and compatible with the wastewater and sludge to be contained therein.
- D. Repairs to Elastomeric Membrane Liners shall be made with like material and shall overlap all cuts, tears, fractures or other defects a minimum of 4 inches. Cut repair pieces square or rectangular. The method of bonding the new material to existing material shall be similar to the original joint banding method, except when the original joints have failed. In this case, the material supplier shall demonstrate that an alternate jointing system shall be satisfactory to the Owner. Replace earth or sand cover removed during repair or replacement of plastic liner to the same thickness as the original installation.
- E. Repairs to Non-Elastomeric Membrane Liners shall be made by cutting out defective areas back to sound liner material and replacing with similar material. Joints shall be watertight.

END OF SECTION 31 32 19 16

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SECTION 31 32 19 16a - POND RESERVOIR LINERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for pond and reservoir liners. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes geomembrane liners and floating covers for ponds and reservoirs.

C. Definitions

1. Plastics Terminology: See ASTM D 1600 for definitions of abbreviated terms for plastics not otherwise defined in this Section.
2. CSPE: Chlorosulfonated polyethylene.
3. EIA: Ethylene interpolymer alloy.
4. EPDM: Ethylene-propylene-diene terpolymer.
5. PE: Polyethylene.
6. PP: Polypropylene.

D. Performance Requirements

1. Provide geomembrane liners and floating covers, **as directed**, that prevent the passage of water and gas, **as directed**.

E. Submittals

1. Product Data: For each type of product indicated. Include the following:
 - a. Sheets for geomembrane liners and floating covers.
 - b. Seaming adhesives, solvents, and extrusions.
 - c. Penetration assemblies.
 - d. Accessories for floating covers.
2. Shop Drawings: Show fabrication and installation details for geomembrane liners. Show panel layout, seams, penetrations, perimeter anchorage, floating cover, and methods of attachment and sealing to other construction. Differentiate between factory and field seams and joints.
3. Samples: For the following products, in sizes indicated:
 - a. Geomembrane Panels: For each type, not less than one **12-inch (300-mm)** seam length for factory-bonded sheets and one **12-inch (300-mm)** seam length for field-bonded sheets.
4. Qualification Data: For qualified Installer **OR** testing agency, **as directed**.
5. Product Certificates: For each type of geomembrane liner and floating cover, from manufacturer.
6. Product Test Reports: For each geomembrane sheet, based on evaluation of comprehensive tests performed by a qualified testing agency.
7. Source quality-control reports.
8. Field quality-control reports.
9. Maintenance Data: For geomembrane liner and floating cover to include in maintenance manuals.
10. Warranty: Special warranty specified in this Section.

F. Quality Assurance

1. Installer Qualifications: Fabricator of products **OR** An employer of workers trained and approved by manufacturer, **as directed**.
2. Source Limitations: Obtain geomembrane liner and floating cover, accessories, and required seaming materials, solvents, and adhesives from single source.
3. Preinstallation Conference: Conduct conference at Project site.

- a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
- b. Review structural load limitations.
- c. Review limitations on equipment and Installer's personnel.
- d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- e. Review required testing, inspecting, and certifying procedures.
- f. Review existing and forecasted weather conditions and procedures for unfavorable conditions.

G. Project Conditions

1. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit placement and seaming of geomembrane liners and floating covers to be performed according to manufacturers' written instructions and warranty requirements.

H. Warranty

1. Special Warranty: Specified form in which geomembrane manufacturer, geomembrane liner and floating cover fabricator, and geomembrane liner and floating cover Installer agree to repair or replace geomembrane liner and floating cover that fail(s) in materials or workmanship or that deteriorate(s) under conditions of normal weather within specified warranty period. Warranty does not include deterioration or failure of geomembrane liner and floating cover due to exposure to harmful chemicals, gases or vapors, abnormal and severe weather phenomena, fire, earthquakes, floods, vandalism, or abuse by persons, animals, or equipment.
 - a. Failures include, but are not limited to, the following:
 - 1) Leaks in geomembrane liner and floating cover.
 - 2) Defects in seams.
 - 3) Cracks and holes in floating cover.
 - b. Warranty Period: One **OR** Five **OR** 10, **as directed**, year(s) from date of Final Completion.

1.2 PRODUCTS

A. CSPE Sheet Materials

1. CSPE Sheet: Formulated from CSPE for use in hydraulic structures and formed into uniform, flexible sheets.
 - a. Reinforcing Scrim: One-ply polyester fabric totally encapsulated between two sheets.
 - 1) Construction: 6 x 6 - 1000 d **OR** 8 x 8 - 250 d **OR** 10 x 10 - 1000 d, **as directed**.
 - b. Nominal Thickness: **45-mil- (1.14-mm-)** thick sheet per ASTM D 5199 or ASTM D 751, Optical Method.
 - c. Nominal Thickness over Scrim: **11-mil- (0.28-mm-)** thick sheet per ASTM D 5199 or ASTM D 751, Optical Method.
 - d. Breaking Strength: Not less than **200 lbf (0.89 kN)** minimum average per ASTM D 751, Procedure A.
 - e. Tear Strength, Initial: Not less than **70 lbf (0.31 kN)** minimum average per ASTM D 5884 or ASTM D 751, Procedure B.
 - f. Tear Strength, after Aging: Not less than **35 lbf (0.16 kN)** minimum average per ASTM D 5884 or ASTM D 751, Procedure B.
 - g. Puncture Resistance: Not less than **200 lbf (0.89 kN)** minimum average per ASTM D 4833.
 - h. Hydrostatic Resistance: Not less than **250-psi (1725-kPa)** minimum average resistance per ASTM D 5514, Procedure A or ASTM D 751, Method A, Procedure 1.
 - i. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 2 percent per ASTM D 1204.
 - j. Low-Temperature Flexibility: Pass, **1/8-inch (3-mm)** mandrel, four hours at **minus 40 deg F (minus 40 deg C)**, and per ASTM D 2136.

- k. UV-Light Resistance: Pass, 4000 hours at **176 deg F (80 deg C)**, per ASTM G 155.
- l. Ply Adhesion: Not less than **7 lbf/in. (1.2 kN/m)** **OR** **10 lbf/in. (1.75 kN/m)**, **as directed**, of seam width, or film tearing bond, according to ASTM D 413, Machine Method.
- m. Water Absorption (for low-water-absorption CSPE): Not more than 2 percent at **70 deg F (21 deg C)** and not more than 30 percent at **158 deg F (70 deg C)** for 30 days each per ASTM D 471, **30-mil- (0.76-mm-)** thick sheet.

B. EIA Sheet Materials

- 1. EIA Sheet: Formulated from EIA for use in hydraulic structures and formed into uniform, flexible sheets.
 - a. Reinforcing Scrim: One-ply polyester fabric totally encapsulated between two sheets.
 - 1) Construction: 6 x 6 - 1000 d **OR** 8 x 8 - 500 d **OR** 10 x 10 - 1000 d **OR** 10 x 11 - 2520 d x 2000 d, **as directed**.
 - b. Nominal Thickness: **36-mil- (0.91-mm-)** thick sheet per ASTM D 1593 or ASTM D 751, Optical Method.
 - c. Tensile Strength: Not less than **400 lbf (1.8 kN)** minimum average per ASTM D 751, Procedure A.
 - d. Tear Strength: Not less than **35 lbf (0.16 kN)** minimum average per ASTM D 5884 or ASTM D 751, Procedure B.
 - e. Puncture Resistance: Not less than **150 lbf (0.67 kN)** minimum average per ASTM D 4833.
 - f. Hydrostatic Resistance: Not less than **100-psi (690-kPa)** minimum average resistance per ASTM D 751, Procedure A.
 - g. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 2 percent per ASTM D 1204.
 - h. Low-Temperature Flexibility: Pass, **1/8-inch (3-mm)** mandrel, four hours at **minus 30 deg F (minus 34 deg C)**, and per ASTM D 2136.
 - i. UV-Light Resistance: Pass, 4000 hours at **176 deg F (80 deg C)**, per ASTM G 155.
 - j. Ply Adhesion: Not less than **7 lbf/in. (1.2 kN/m)** **OR** **10 lbf/in. (1.75 kN/m)**, **as directed**, of seam width, or film tearing bond, according to ASTM D 413, Machine Method.

C. EPDM Sheet Materials

- 1. EPDM Sheet: Formulated from EPDM, compounded for use in hydraulic structures and formed into uniform, flexible sheets.
 - a. Reinforcing Scrim: One-ply polyester fabric totally encapsulated between two sheets.
 - 1) Construction: 9 x 9 - 1000 d **OR** 10 x 10 - 1000 d, **as directed**.
 - b. Nominal Thickness: **45-mil- (1.14-mm-)** thick sheet per ASTM D 5199 or ASTM D 751, Optical Method.
 - c. Breaking Strength: Not less than **190 lbf (0.85 kN)** minimum average per ASTM D 882, ASTM D 7004, or ASTM D 751, Procedure A.
 - d. Tear Resistance: Not less than **130 lb (0.58 kN)** minimum average per ASTM D 1004.
 - e. Puncture Strength: Not less than **60 lbf (0.27 kN)** minimum average per ASTM D 4833.

D. PE Sheet Materials

- 1. PE Sheet: Formulated from virgin PE, compounded for use in hydraulic structures, and formed into uniform sheets.
 - a. Sheet Texture: One side smooth; other side smooth **OR** textured, **as directed**.
 - b. Nominal Density: Low density, 0.910 to 0.925 g/cu. cm **OR** Linear low density, 0.919 to 0.925 g/cu. cm **OR** Medium density, 0.926 to 0.939 g/cu. cm **OR** High density, 0.940 to 0.959 g/cu. Cm, **as directed**, per ASTM D 1505.
 - c. Nominal Thickness: **60-mil- (1.5-mm-)** thick sheet per ASTM D 5199 **OR** ASTM D 5994, **as directed**.
 - d. Melt Flow Index: Not more than **0.035 oz./10 minutes (1.0 g/10 minutes)** per ASTM D 1238, Condition 190/2.16.
 - e. Carbon Black Content: 2 to 3 percent per ASTM D 1603 or ASTM D 4218.
 - f. Carbon Black Dispersion: Per ASTM D 5596, Category 1 and 2.

- g. Oxidation Induction Time: Not less than 100 minutes per ASTM D 3895.
 - h. Tensile Properties: Not less than indicated for each direction, per ASTM D 638, Type IV or ASTM D 6693, Type IV.
 - 1) Strength at Yield: Not less than 126 lbf/in. (22 kN/m) and 2100 psi (14.5 MPa) minimum average.
 - 2) Strength at Break: Not less than 228 lbf/in. (40 kN/m) and 3800 psi (26.2 MPa) minimum average.
 - 3) Elongation at Yield: Not less than 12 percent minimum average.
 - 4) Elongation at Break: Not less than 700 percent minimum average.
 - i. Tear Resistance: Not less than 39 lbf (0.18 kN) minimum average per ASTM D 1004.
 - j. Puncture Resistance: Not less than 108 lbf (0.48 kN) minimum average per ASTM D 4833.
 - k. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 2 percent per ASTM D 1204.
 - l. Low-Temperature Brittleness: Four hours at minus 76 deg F (minus 60 deg C) per ASTM D 746.
 - m. Environmental Stress Cracking Resistance: Not less than 1500 hours per ASTM D 1693, Condition B.
- E. PP Sheet Materials
- 1. PP Sheet: Formulated from virgin PP, compounded for use in hydraulic structures, and formed into uniform, flexible sheets.
 - a. Reinforcing Scrim: One-ply polyester fabric totally encapsulated between two sheets.
 - 1) Construction: 9 x 9 - 1000 d **OR** 10 x 10 - 1000 d, **as directed**.
 - b. Sheet Texture: One side smooth; other side smooth **OR** textured, **as directed**.
 - c. Nominal Thickness: 45-mil- (1.14-mm-) thick sheet per ASTM D 5199 or ASTM D 751, Optical Method **OR** ASTM D 5994, **as directed**.
 - d. Tensile Strength: Not less than 250 lbf (1.1 kN) minimum average per ASTM D 412, ASTM D 7003, ASTM D 6693, or ASTM D 751, Procedure A.
 - e. Tear Resistance: Not less than 55 lbf (0.24 kN) minimum average per ASTM D 1004, ASTM D 5884, ASTM D 7003, or ASTM D 751, Procedure B.
 - f. Puncture Resistance: Not less than 200 lbf (0.88 kN) minimum average per ASTM D 4833 or ASTM D 7003.
 - g. Low-Temperature Flexibility: Pass, 1/8-inch (3-mm) mandrel, four hours at minus 40 deg F (minus 40 deg C), and per ASTM D 2136.
 - h. Hydrostatic Resistance: Not less than 250-psi (1725-kPa) minimum average resistance per ASTM D 5514, Procedure A or ASTM D 751, Method A, Procedure 1.
 - i. Dimensional Stability, Reinforced Sheet: Not more than plus or minus 1 percent per ASTM D 1204.
 - j. Ply Adhesion: Not less than 20 lbf/in. (3.5 kN/m) of seam width, or film tearing bond, according to ASTM D 413, Machine Method.
- F. PVC Sheet Materials
- 1. PVC Sheet: Formulated from virgin PVC with plasticizers and other modifiers, compounded for use in hydraulic structures, and formed into uniform, flexible sheets with material properties complying with ASTM D 7176 **OR** PGI 1104, "Specification for PVC Geomembranes", **as directed**, for nominal thickness indicated.
 - a. Nominal Thickness: 10 mils (0.25 mm) **OR** 20 mils (0.51 mm) **OR** 30 mils (0.76 mm) **OR** 40 mils (1.02 mm) **OR** 50 mils (1.3 mm) **OR** 60 mils (1.5 mm), **as directed**.
 - b. Sheet Texture: One side smooth; other side smooth **OR** matte **OR** faille textured, **as directed**.
- G. Floating Cover Accessories
- 1. Screened Scupper Hoses: Manufacturer's standard.

2. Flotation Blocks: Closed-cell polyethylene foam blocks approximately **4 by 12 inches (102 by 300 mm)**, **2.2 lb/cu. ft. (35.2 kg/cu. m)**.
3. Access Hatch: Manufacturer's standard, in size indicated.

H. Miscellaneous Materials

1. Adhesives: Provide types of adhesive primers, compounds, solvents, and tapes recommended in writing by geomembrane liner manufacturer for bonding to structures (if required), for sealing of seams in geomembrane liner, and for sealing penetrations through geomembrane liner.
2. Penetration Assemblies: Provide manufacturer's standard factory-fabricated assemblies for sealing penetrations. Include joint sealant recommended in writing by geomembrane liner manufacturer and compatible with geomembrane liner, containment conditions, and materials.
3. Battens: Long-length strips of material indicated, size as shown on Drawings. Fabricate battens with sharp projections removed and edges eased and then predrilled or punched for anchors. Provide anchors, or other type of attachment, of type and spacing recommended in writing by geomembrane liner manufacturer for attaching geomembrane liner system to substrate and as indicated.
 - a. Batten Material: Liner manufacturer's standard system.
OR
 Batten Material: Aluminum; with stainless-steel anchors, complete with gasket and sealant compatible with geomembrane liner, containment conditions, and materials.
OR
 Batten Material: Stainless steel; with stainless-steel anchors, complete with gasket and sealant compatible with geomembrane liner, containment conditions, and materials.
OR
 Batten Material: Plastic compatible with geomembrane liner, cast in place or fastened with stainless-steel anchors, designed to continuously seal geomembrane liner to batten.
4. Sand: ASTM C 33; fine aggregate, natural or manufactured sand.

I. Fabrication

1. Fabricate geomembrane liner and floating cover, **as directed**, panels from sheets in sizes as large as possible with factory-sealed seams, consistent with limitations of weight and installation procedures. Minimize field seaming.
2. Fabricate flotation blocks, wrap in geomembrane, and attach to underside of floating cover according to manufacturer's written instructions.
3. Fabricate ballast tubes of sand-filled geomembrane and attach to top surface of floating cover according to manufacturer's written instructions.
4. Install built-in accessories, hatches, access panels, vents, and walkways on geomembrane floating cover.

J. Source Quality Control

1. Testing Agency: Engage a qualified testing agency to evaluate geomembrane seams.
2. Destructive Testing: Test for bonded seam strength and peel adhesion every **3000 feet (915 m)** or once per panel, whichever is more frequent.
3. CSPE Liner and Floating Cover: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion not less than **10 lbf/in. (1.75 kN/m)** of seam width and for bonded seam strength not less than **180 lbf/in. (32 kN/m)** of seam width for seams constructed from two scrim-reinforced sheets, each with nominal sheet thickness of not less than **45 mils (1.14 mm)**.
4. EIA Liner and Floating Cover: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion not less than **10 lbf/in. (1.75 kN/m)** of seam width and for bonded seam strength not less than **270 lbf/in. (48 kN/m)** of seam width for seams constructed from two scrim-reinforced sheets, each with nominal sheet thickness of not less than **36 mils (0.91 mm)**.
5. EPDM Liner: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion not less than **10 lbf/in. (1.75 kN/m)** of seam width and for bonded seam strength not less than **160 lbf/in. (28 kN/m)** of seam width for seams constructed from two scrim-reinforced sheets, each with nominal sheet thickness of not less than **45 mils (1.14 mm)**.

6. PE Liner: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion and for bonded seam strength indicated.
 - a. Peel Adhesion/Extrusion: Film tear bond and not less than **78 lbf/in. (13.7 kN/m)** of extrusion-bonded seam width.
OR
Peel Adhesion/Fusion: Film tear bond and not less than **90 lbf/in. (15.8 kN/m)** of fused seam width.
 - b. Bonded Seam Strength: Not less than **120 lbf/in. (21 kN/m)** of seam width for seams constructed from two scrim-reinforced sheets, each with nominal sheet thickness of not less than **45 mils (1.14 mm)**.
7. PP Liner and Floating Cover: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion not less than **20 lbf/in. (3.5 kN/m)** of seam width and for bonded seam strength not less than **200 lbf/in. (35 kN/m)** of seam width for seams constructed from two scrim-reinforced sheets, each with nominal sheet thickness of not less than **45 mils (1.14 mm)**.
8. PVC Liner and Floating Cover: Test and inspect factory seams, according to ASTM D 4545, for peel adhesion not less than **10 lbf/in. (1.75 kN/m)** of seam width and for bonded seam strength not less than that indicated below for seams constructed from two sheets of minimum nominal thickness indicated for each:
 - a. Bonded Seam Strength for **10-mil- (0.25-mm-)** Thick Sheets: **20 lbf/in. (3.5 kN/m)** of seam width.
 - b. Bonded Seam Strength for **20-mil- (0.51-mm-)** Thick Sheets: **38.5 lbf/in. (6.7 kN/m)** of seam width.
 - c. Bonded Seam Strength for **30-mil- (0.76-mm-)** Thick Sheets: **58.4 lbf/in. (10.2 kN/m)** of seam width.
 - d. Bonded Seam Strength for **40-mil- (1.02-mm-)** Thick Sheets: **77.6 lbf/in. (13.6 kN/m)** of seam width.
 - e. Bonded Seam Strength for **50-mil- (1.3-mm-)** Thick Sheets: **96 lbf/in. (16.8 kN/m)** of seam width.
 - f. Bonded Seam Strength for **60-mil- (1.5-mm-)** Thick Sheets: **116 lbf/in. (20.3 kN/m)** of seam width.

1.3 EXECUTION

A. Examination

1. Examine substrates, with Installer present, for compliance with requirements for soil compaction and grading; for subgrade free from angular rocks, rubble, roots, vegetation, debris, voids, protrusions, and ground water; and for other conditions affecting performance of geomembrane liner.
2. Examine anchor trench excavation **OR** concrete perimeter, **as directed**, where geomembrane liner and floating cover, **as directed**, will be secured, for substrate conditions indicated above and for correct location and configuration.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Provide temporary ballast, until edges are permanently secured, that does not damage geomembrane liner or substrate, to prevent uplift of geomembrane liner in areas with prevailing winds.
2. Prepare surfaces of construction penetrating through geomembrane liner according to geomembrane liner manufacturer's written instructions.
3. Remove curing compounds and coatings from concrete surfaces to be sealed to geomembrane liner.

C. Installation

1. General: Place geomembrane liner over prepared surfaces to ensure minimum handling. Install according to Shop Drawings and in compliance with geomembrane liner manufacturer's written instructions. Begin placing geomembrane liner at Project's upwind direction and proceed downwind. Install geomembrane liner in a relaxed condition, free from stress and with minimum wrinkles, and in full contact with subgrade. Do not bridge over voids or low areas in the subgrade. Fit closely and seal around inlets, outlets, and other projections through geomembrane liner. Permanently secure edges.
 2. Field Seams: Comply with geomembrane liner and floating cover manufacturer's written instructions. Form seams by lapping edges of panels **2 to 4 inches (50 to 102 mm)** unless instructions require a larger overlap. Wipe contact surfaces clean and free of dirt, dust, moisture, and other foreign materials. Use solvent-cleaning methods and grind geomembrane seam surfaces if recommended by geomembrane liner manufacturer. Proceed with seaming at required temperatures for materials and ambient conditions. Continuously bond sheet to sheet to construct single or double seams of width recommended for method of seaming used. Seal or fuse free seam edges. Inspect seams and reseal voids.
 - a. Adhesive Bonding: Apply bonding cement to both contact surfaces in seam area and press together immediately, or use other seaming methods as instructed by geomembrane liner manufacturer. Roll to press surfaces together, to distribute adhesive to leading edges of panels, and to remove wrinkles and fishmouths. Remove excess adhesive.
OR
Thermal Bonding: Use thermal-welding technique recommended by geomembrane liner manufacturer. Apply pressure to smoothly bond surfaces together. Examine for and patch wrinkles and fishmouths.
 3. Installation in Anchor Trench: Install geomembrane liner and floating cover in trench according to manufacturer's written instructions. Backfill and compact to lock liner into trench.
 4. Attachment to Concrete: Use manufacturer's standard system to suit Project conditions. Support adhesive and geomembrane on minimum **8-inch- (200-mm-)** wide concrete substrate unless otherwise indicated.
 - a. Install batten strips over geomembrane liner and floating cover as shown on Drawings.
 - b. Install antichafing strips of geomembrane sheet between geomembrane liner and floating cover according to manufacturer's written instructions.
 - c. Install floating cover with perimeter fold.
 5. Floating Cover Flotation Control: Connect drainage hoses in perimeter fold, sumps, or scuppers to pump or gravity drain system.
 6. Liner Repairs: Repair tears, punctures, and other imperfections in geomembrane liner field and seams using patches of geomembrane liner material, liner-to-liner bonding materials, and bonding methods according to geomembrane liner manufacturer's written instructions. Apply bonding solvent or weld to contact surfaces of both patch and geomembrane liner, and press together immediately. Roll to remove wrinkles.
- D. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Nondestructive Testing: Visually inspect seams and patches. Comply with ASTM D 4437 for Air Lance Test, Vacuum Box Testing, or Ultrasonic (High Frequency) Pulse Echo Testing or with GRI Test Method GM6, as applicable to geomembrane liner and floating cover and seam construction. Record locations of failed seams and patches. Individually number and date occurrences and details of leak and remedial action. Repair leaking seams and patches.
 3. Prepare test and inspection reports.
- E. Disinfection
1. Disinfect the complete installation according to procedures in AWWA C652.
- F. Protection
1. Protect installed geomembrane liner and floating cover according to manufacturer's written instructions. Repair or replace areas of geomembrane liner damaged by scuffing, punctures, traffic, rough subgrade, or other unacceptable conditions.

31 - Earthwork



2. Before initial filling of pond or placement of earth cover, inspect seams and patched areas to ensure tight, continuously bonded installation. Repair damaged geomembrane and seams and reinspect repaired work.

END OF SECTION 31 32 19 16a

Task	Specification	Specification Description
31 32 19 16	31 32 13 19	Soil Stabilization-Lime
31 32 19 16	31 32 19 13	Geosynthetic Fabric
31 32 19 16	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 31 36 13 00 - WIRE MESH GABIONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of wire mesh gabions. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Description: Gabion units shall consist of compartmented rectangular basket containers filled with stone. The required sizes of the gabion units are Length times Width times Depth. Twisted or welded wire mesh shall be used. Baskets shall be fabricated from galvanized steel wire formed into a nonraveling mesh.

C. Submittals

1. Samples: Stone fill material submitted for approval prior to delivery.

1.2 PRODUCTS

A. Steel Twisted Wire Mesh Gabions: Gabion basket units shall be of nonraveling construction and fabricated from a double twisted hexagonal wire mesh. The size of mesh openings shall be approximately **3-1/4 in. by 4-1/2 in. (80 by 115 mm)**. The gabion mesh wires shall be wrapped around the selvage wire no less than 1 1/2 times and shall interconnect with adjacent mesh wires. All steel wire used shall be galvanized prior to fabrication into mesh. All gabion diaphragm and frame wire shall equal or exceed ASTM A 641, and possess soft tensile strength of **60,000 psi (415 Mpa)** with a tolerance of minus **2,000 psi (14 Mpa)**. The galvanized wire shall have a Finish 5, Class 3, zinc coating, as indicated in ASTM A 641. The weight of coating shall be determined by ASTM A 90. The grade of zinc used for coating shall be High Grade or Special High Grade as prescribed in ASTM B 6, Table 1. The uniformity of coating shall equal or exceed four 1-minute dips by the Preece Test, as determined by ASTM A 239.

B. Steel Welded Wire Mesh Gabions: Gabion basket units shall be of nonraveling construction and fabricated from a welded square wire mesh. The size of mesh openings shall be approximately **3 in. by 3 in. (75 by 75 mm)**. The welded joints of the wire mesh shall conform to ASTM A 1064 except that the weld shears shall be at least **600 lbs (2700 N)**. All gabion diaphragm and frame wire shall equal or exceed ASTM A 641, and possess soft tensile strength of **60,000 psi (415 Mpa)** with a tolerance of minus **2,000 psi (14 Mpa)**. The galvanized wire shall have a Finish 5 Class 3 zinc coating, indicated in ASTM A 641. The weight of coating shall be determined by ASTM A 90. The grade of zinc used for coating shall be High Grade or Special High Grade as prescribed in ASTM B 6, Table 1. The uniformity of coating shall equal or exceed four 1-minute dips by the Preece Test, as determined by ASTM A 239.

C. Mesh wire shall be minimum **0.120-in. (3.05 mm)** diameter after coating with **0.85 oz/sq ft (240 g/sq m)** zinc coating.

D. Selvage wire shall be minimum **0.150-in. (3.80 mm)** diameter after coating with **0.85 oz/sq ft (240 g/sq m)** zinc coating.

E. Wire used for lacing or as internal connecting wire within basket cells shall be minimum **0.087-in. (2.21 mm)** diameter after coating with **0.70 oz/sq ft (220 g/sq m)** zinc coating and may have soft tensile strength designation.

F. Stone Fill

1. Quality: Stone shall be durable and of suitable quality to ensure permanence in the structure and climate in which it is to be used. It shall be free of cracks, seams, and other defects that would tend to increase unduly its deterioration from natural causes or reduce its size to that which could not be retained in the gabion baskets. The inclusion of more than 5% by weight of dirt, sand, clay, and rock fines will not be permitted. The sources from which the Contractor proposes to obtain the material shall be selected well in advance of the time when the material will be required in the work. Suitable samples of stone fill material shall be collected in the presence of the Owner's representative and submitted to the Owner for approval prior to delivery of any such material to the site of the work. Unless otherwise specified, all test samples shall be obtained by the Contractor and delivered at its expense to the Owner. Suitable tests and/or service records will be used to determine the acceptability of the stone. In the event suitable test reports and service records are not available, the material shall be subjected to such tests as are necessary to determine its acceptability for use in the work. Tests to which the material may be subjected include petrographic analysis, specific gravity, absorption, wetting and drying, freezing and thawing, and such other tests as may be considered necessary to demonstrate to the satisfaction of the Owner that the materials are acceptable for use in the work.
2. Gradation: Stone fill used in the gabions shall be a well-graded mixture with sizes ranging between 4 in. and 8 in. (100 and 200 mm), based on US Standard square mesh sieves. No stone shall have a minimum dimension less than 4 in. (100 mm) and a maximum dimension greater than 12 in. (300 mm) in any direction. The ratio of the maximum dimension to the minimum dimension shall not be greater than two. If the height of the gabion basket is 12 in. (300 mm) or less, stone shall have no dimensions greater than 8 in. (200 mm) in any direction.
3. Filter Material: The material shall be composed of tough durable particles, reasonably free from thin, flat, and elongated pieces, and contain no organic matter or soft friable particles in quantities considered objectionable by the Owner. Filter material shall consist of sand and gravel or crushed stone, well graded between the prescribed limits listed below, and conform to the requirements of paragraph STONE FILL, subparagraph QUALITY as to quality.

1.3 EXECUTION:

- A. Foundation Preparation: No foundation preparation work shall take place on frozen or snow-covered ground. After excavation or stripping to the extent indicated on the drawings or as directed by the Owner, all remaining loose or otherwise unsuitable materials shall be removed. All depressions shall be carefully backfilled to grade. If pervious materials are encountered in the foundation depressions, the areas shall be backfilled with free-draining materials. Otherwise, the depressions shall be backfilled with suitable materials from adjacent required excavation, or other approved source, and compacted to a density at least equal to that of the adjacent foundation. Any buried debris protruding from the foundation that will impede the proper installation and final appearance of the gabion layer shall also be removed, and the voids carefully backfilled and compacted as specified above. Immediately prior to placing the material, the prepared foundation surface shall be inspected by the Owner, and no material shall be placed thereon until that area has been approved.
- B. Filter Placement: Filter material shall be spread uniformly on the prepared foundation surface in a manner satisfactory to the Owner, and to the slopes, lines, and grades as indicated on the drawings or as directed. Placing of filter material by methods which will tend to segregate particle sizes will not be permitted. Any damage to the foundation surface during filter placement shall be repaired before proceeding with the work. Compaction of the filter materials will not be required, but it shall be finished to present a reasonably even surface free from mounds or windrows.
- C. Fabrication: Gabions shall be fabricated in such a manner that the sides, ends, lid, and diaphragms can be assembled at the construction site into rectangular baskets of the sizes specified and shown on the drawings. Gabions shall be of single unit construction, i.e., the base, lid, ends, and sides shall be either woven into a single unit, or one edge of these members connected to the base section of the gabion in such a manner that the minimum strengths of the wire mesh and connections as stated in paragraph

MATERIALS are met. Where the length of the gabion exceeds one and one-half its horizontal width, the gabion shall be equally divided by diaphragms of the same mesh and gage as the body of the gabions, into cells whose length does not exceed the horizontal width. The gabion shall be furnished with the necessary diaphragms secured in proper position on the base in such a manner that no additional tying at this juncture will be necessary. For twisted wire gabions, all perimeter edges of the mesh forming the gabion shall be securely selvaged. In addition, the selvaged edges shall be so wrapped and reinforced with the mesh ends that the selvaige wire will not be deformed locally about the lacing wire or wire fasteners when baskets are filled or during lid closing. Lacing wire, connecting wire, and/or wire fasteners shall be supplied in sufficient quantity for securely fastening all diaphragms and edges of the gabion.

- D. Assembly And Installation: For gabion units in excess of **4 ft. (1.3 m)** in thickness, and placed in horizontal or near horizontal position to resist high velocity flow, or as part of a stilling basin feature, a minimum of two uniformly spaced vertical connecting wires per cell linking the foundation mesh to basket lid mesh should be specified. Empty gabion units shall be assembled individually and placed on the approved surface with the sides, ends, and diaphragms erected in such a manner to ensure the correct position of all creases and that the tops of all sides are level. Filling of gabion units in one place and then transporting them to their final position in the work will not be permitted. The front row of gabion units shall be placed first and successively constructed toward the top of the slope or the back of the structure. All gabion units shall be properly staggered horizontally and vertically. Finished gabion structure shall have no gaps along the perimeter of the contact surfaces between adjoining gabion basket units. All adjoining empty gabion units shall be connected by lacing wire/or wire fasteners along the perimeter of their contact surfaces in order to obtain a monolithic structure. Lacing of adjoining basket units shall be accomplished by continuous stitching with alternating single and double loops at intervals of not more than **5 in. (125 mm)**, and a half hitch shall be included at every double loop. All lacing wire terminals shall be securely fastened. Wire fasteners may be used in lieu of lacing wire for forming individual baskets and joining empty baskets together prior to stone filling. All joining shall be made through selvaige-to-selvaige or selvaige-to-edge wire connection; mesh-to-mesh or selvaige-to-mesh wire connection is prohibited except in the case where baskets are offset or stacked and selvaige-to-mesh or mesh-to-mesh wire connection would be necessary. Wire fasteners shall not be used to tie or join stone-filled baskets, unless approved by the Owner. As a minimum, a fastener shall be installed at each mesh opening at the location where mesh wire meets selvaige or edge wire. The initial line of basket units shall be placed on the prepared filter layer surface and partially filled to provide anchorage against deformation and displacement during filling operations. After adjoining empty basket units are set to line and grade and common sides with adjacent units thoroughly laced or fastened, they shall be placed in tension and stretched to remove any kinks from the mesh and to a uniform alignment. The stretching of empty basket units shall be accomplished in such a manner as to prevent any possible unraveling. Stone filling operations shall carefully proceed with placement by hand or machine so as not to damage galvanized wire coating, to assure a minimum of voids between the stones, and the maintenance of alignment throughout the filling process. Undue deformation and bulging of the mesh shall be corrected prior to further stone filling. To avoid localized deformation, the basket units in any row are to be filled in stages consisting of maximum **12-in. (300 mm)** courses, and at no time shall any cell be filled to a depth exceeding **1 ft. (300 mm)** more than the adjoining cell. The maximum height from which the stone may be dropped into the basket units shall be **36 in. (1 m)**. For gabion units in excess of **2 ft. (0.67 m)** in height, two uniformly spaced internal connecting wires shall be placed between each stone layer in all front and side gabion units, connecting the back and the front faces of the compartments. Connecting wires or alternatively the preformed stiffeners shall be looped around two twisted wire mesh openings or a welded wire joint at each basket face and the wire terminals shall be securely twisted to prevent their loosening. For twisted wire gabions, the internal connecting wires or preformed stiffeners are installed. For welded wire gabion units, preformed stiffeners are installed across the corners of gabion panels. Along all exposed faces, the outer layer of stone shall be carefully placed and arranged by hand to ensure a neat and compact appearance. The last layer of stone shall be uniformly overfilled **1 to 2 in. (25 to 50 mm)** to compensate for the future settlement in rock but still allow for the proper closing of the lid and to provide an even surface that is uniform in appearance. Final adjustments for compaction and surface tolerance shall be done by hand. Lids shall be stretched tight over the stone fill using only an approved lid closing tool, until the lid meets the perimeter edges of

the front and end panels. Using crowbars or other single point leverage bars for lid closing shall be prohibited. The lid shall then be tightly tied with lacing wire, or with wire fasteners if approved by the Owner, along all edges, ends, and internal cell diaphragms by continuous stitching with alternating single and double loops at intervals of not more than 5 in. (125 mm), and a half hitch shall be included at every double loop. Special attention shall be given to see that all projections or wire ends are turned into the baskets. The Contractor shall have the option of providing gabion baskets with separate roll-out lids for the slope baskets. Roll-out lids shall be fabricated of the same material as the basket units and shall be furnished in widths as required for the contract work. as directed by the Owner, or where a complete gabion unit cannot be installed because of space limitations, the basket unit shall be cut, folded, and wired together to suit existing site conditions. The mesh must be cleanly cut and the surplus mesh cut out completely, or folded back and neatly wired to an adjacent gabion face. The assembling, installation, filling, lid closing, and lacing of the reshaped gabion units shall be carried out as specified above.

END OF SECTION 31 36 13 00

SECTION 31 37 13 00 - RIPRAP

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of riprap. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

- A. Riprap: Stone used for dumped riprap shall be hard, durable, angular in shape, resistant to weathering and to water action, and free from overburden, spoil, shale, and organic material. Neither width nor thickness of a single stone should be less than one third its length. Rounded stone, boulders, shale, and stone with shale seams will not be acceptable. The minimum density of the riprap material shall be 162 pounds per cubic foot. Each load of riprap shall be reasonably well graded. Sand and rock dust exceeding 5 percent by weight of each load shall not be permitted.
- B. Riprap Bedding: The riprap bedding blanket shall consist of well graded gravel, crushed rock, sand, or a combination thereof with a maximum size of 6 inches. All material comprising the riprap bedding blanket shall be composed of tough, durable particles, reasonably free from thin, flat, and elongated pieces, and shall contain no organic matter nor soft, friable particles in excess quantities.

1.3 EXECUTION

- A. Preparation: Prepare earth slopes by grading and compacting.
- B. Installation:
 1. Riprap Bedding Blanket Layers shall be placed on the prepared slope or area to develop the full thickness. Each layer shall be placed in one operation, using methods that will not cause segregation of particle sizes within the bedding. The surface of the finished layer should be reasonably even and free from mounds or windows.
 2. Stone for Riprap shall be placed on the prepared slope or area in a manner that will product a reasonably well-graded mass of stone with the minimum practicable percentage of voids. Riprap shall be placed to its full course in one operation and in such a manner as to avoid displacing the underlying material. The larger stones shall be well distributed and the entire mass of stone shall be well-graded. The result shall be a compact, uniform riprap layer.

END OF SECTION 31 37 13 00

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Task	Specification	Specification Description
31 37 13 00	31 32 19 16	Sewage Treatment Lagoons
31 41 16 13	31 23 16 13	Excavation Support And Protection

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SECTION 31 45 13 00 - SOIL STABILIZATION-VIBROFLOTATION

1.1 GENERAL

- A. This specification covers soil stabilization of sandy subsurfaces by the method of vibroflotation.

1.2 PRODUCTS - (Not Used)

1.3 EXECUTION

- A. The vibroflotation process shall be applied only to areas of clean, granular soils, with not over 20 percent silt or 10 percent clay. Vibrators shall be water-jetted into the soil mass to the depth required. The vibrator shall be withdrawn in 1 foot increments as the saturated soil compacts laterally and at a rate of approximately 1 ft/min to a minimum relative density of 70 percent. As the surface crater forms, sand or crushed rock shall be added and compacted to the appropriate line and grade. The horizontal distance between successive treatments shall not exceed 5 feet, or as directed.

END OF SECTION 31 45 13 00

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SECTION 31 62 13 23 - PRESTRESSED CONCRETE PILES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for relief wells. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Submit shop drawings.
2. Statements
 - a. Before installation, all well screen shall be approved.
 - b. The filter pack material and its gradation shall be approved before it is placed.
 - c. Submit the cement grout mixture proportion to be used in plugging abandoned wells.
3. Reports: Submit sampling and testing reports for each relief well, logs of the borings, well screen and riser pipe, backfill material, and pump tests. Register each well with the state as required by the state in which the well is installed.

- #### C. Regulatory Requirements: The state statutory and regulatory requirements form a part of this specification.

1.2 PRODUCTS

- #### A. Well Screen: The Contractor may, at its option, furnish and install well screen of any of the alternate types specified. The clear inside diameter of the screen shall be as directed by the Owner. Screen openings shall be uniform in size and pattern, and shall be spaced approximately equally around the circumference of the pipe.

1. PVC Pipe Screen: Pipe, fittings, and screen shall be of the size and types specified. Pipe, fittings, and screen shall conform to ASTM D 1784, ASTM D 1785, ASTM D 2466, or ASTM D 2467. All joints in the PVC pipe shall include couplings and shall be glued with a solvent cement conforming to ASTM D 2564. The PVC pipe strength properties shall be equivalent to PVC 1120 Schedule 40 **OR 80, as directed**, unthreaded plastic pipe.
 - a. Couplings: Couplings shall be bonded socket **OR** threaded, **OR** certilock, **as directed**, type. Fittings shall be produced of the same material and equal quality as specified for plastic pipe screen. Socket type fitting connections of pipe sections shall be bonded with solvent cement. The determination of the proportions and preparation of adhesives, the method of application, and the procedure used for making and curing the connections shall be the responsibility of the Contractor. The system for making joints at the relief well site shall provide a curing period adequate to develop the ultimate strength of the solvent cement. Self-tapping screws or other devices for holding pipe in the couplings during the setting period may be utilized as long as the screws do not penetrate the inside of the pipe. In no case shall a newly-made joint in the casing be stressed, lowered into the relief well, or be submerged in water prior to complete curing of the solvent cement adhesive.
 - b. Perforations: The PVC well screen shall be mill slot **OR** continuous wire wrapped rod base **OR** continuous wire wrapped rod base on perforated pipe **OR** continuous wire wrapped on perforated pipe screen **OR** similar to that manufactured by Johnson Well Equipment, Inc., Pensacola, FL, telephone (904) 453-3131, **as directed**. All well screen shall have smooth, sharp-edged openings free of burns, chipped edges, or broken areas on the interior and exterior surfaces of the pipe. The slots or groups of slots shall be distributed in a uniform pattern around the periphery of the pipe and shall be oriented with the length of the slot parallel to, normal to, or diagonal with the axis of the pipe.

2. **Fiberglass Pipe Screen:** Fiberglass pipe screen and fittings shall be manufactured from thermosetting epoxy resins and glass fiber by either a centrifugal casting process or by a filament winding process. Glass fiber used shall be continuous filament, electrical glass with a finish compatible with epoxy resins. Each glass fiber or filament shall be thoroughly impregnated with epoxy resin. Fiberglass pipe wall thickness, strength and durability requirements shall be equivalent to the Fiberglass/Epoxy pipe produced by Fiberglass Resources Corporation of Farmingdale, New York or Burgess Well Company, Inc., Minden, Nebraska, telephone (308) 832-1642. All fiberglass pipe and fittings shall be round and straight, of uniform quality and workmanship, and free from all defects including indentation, delamination, bends, cracks, blisters, porosity, dry spots, resin segregation and resin-starved areas. The inside of the pipe and fittings shall be smooth and uniform. The impregnation of the glass fiber with resin shall be such that when the pipe is cut or slotted, no fraying or looseness of glass fiber occurs.
 - a. **Couplings:** Couplings for fiberglass pipe sections shall be socket threaded or mechanical key-type couplings. The couplings shall be manufactured of the same materials used for the fiberglass pipe specified herein and may be either cast integrally with the pipe sections or as separate components for attachment to the pipe in the manufacturers plant. Key-type couplings shall consist of male and female halves designed for joining and locking together by means of a key strip inserted in grooves in the coupling halves. The minimum wall thickness remaining at any grooved section shall not be less than the minimum thickness specified for pipe. Key strips and locking strips shall be of fiberglass, plastic or other non-corrosive material capable of withstanding shearing and bearing stresses equivalent to the design load for the coupling. Socket type fitting connections of the pipe sections shall be bonded with epoxy adhesive. The epoxy materials and bonding agents shall be as recommended by the pipe manufacturer. Self-tapping screws or other devices for holding adhesive-joined pipe in the couplings during the curing period may be utilized. In no case shall a newly-made joint in the casing pipe be lowered into the relief well, or be submerged in water prior to complete curing of the adhesive.
 - b. **Perforations:** All fiberglass well screen shall be mill slot **OR** continuous wire wrapped rod base, **as directed**. All relief well screen shall have smooth, sharp-edged openings free of burrs, chipped edges, or broken areas on the interior and exterior surfaces of the pipe. The slots or groups of slots shall be distributed in a uniform pattern around the periphery of the pipe and shall be oriented with the length of the slot parallel to, normal to, or diagonal with the axis of the pipe.
3. **Steel Pipe Screen:** Steel well screen shall consist of perforated or slotted sections of steel pipe conforming to the requirements of ASTM A 53.
 - a. **Couplings:** Couplings for steel pipe screen shall be welded joints or threaded couplings. Welding shall be performed in accordance with requirements in ASME B31.9. Couplings shall meet the material requirements specified for steel pipe screen, except perforations shall be omitted. All threaded pipe and fittings shall be threaded in accordance with ASME B1.20.1. All threaded pipe sections may be field connected. Couplings shall be given the same protection against corrosion as specified for the well screen pipe. Protective coatings damaged while making couplings shall have the areas recoated.
 - b. **Perforations:** All steel pipe to be used as relief well screen shall be provided with perforations which shall consist of either machine-cut slots; drilled or punched openings. The slots or groups of slots shall be distributed in a uniform pattern around the periphery of the pipe and shall be oriented with the length of the slot parallel to, normal to, or diagonal with the axis of the pipe. The pattern of the openings shall be uniformly spaced around the periphery of the pipe.
4. **Stainless Steel Well Screen:** The perforated well screen and fittings shall be fabricated entirely from stainless steel conforming to ASTM A 312/A 312M, Type 304, 304-L, 316 or 316-L. The well screen shall be of stainless steel with a keystone wire-wrapped continuous slot strainer equivalent to that manufactured by Howard Smith Screen Company, Houston, TX, telephone (713) 869-5771 or Johnson Screens, St. Paul, MN 55164, telephone (612) 636-3900.
 - a. **Couplings:** Couplings for the stainless steel well screen shall consist of the same material as the well screen and shall be threaded, flanged, and/or fitted with a welding ring. The

couplings shall conform in design to the couplings recommended by the manufacturer of the well screen.

- b. Tailpipe for Well Screen: The tailpipe for each well screen shall be made of the same material and at least the same minimum thickness as the riser pipe and shall include a bottom plug.
- B. Riser Pipe: The relief well riser pipe material and method of manufacture shall conform to the requirements specified in paragraph WELL SCREEN, except that the screen perforations or opening shall be omitted. The relief well riser pipe diameter and discharge details shall be as directed. Couplings to the well screen and between riser pipe sections shall be as specified in paragraph COUPLING.
 - C. Filter Pack: Material for the filter pack around the riser pipes and screens shall be a washed grave, **OR** washed sand **OR** dry processed sand, **as directed**, composed of hard, tough, and durable particles free from adherent coating. The filter pack shall not be crushed stone. The filter pack material shall contain no detrimental quantities of organic matter nor soft, friable, thin, or elongated particles in accordance with the quality requirements in ASTM C 33, Table 1 and Table 3, Class 5S, and in ASTM E 11, Table 1.
 - D. Outlet For Relief Well: Check Valve.
 1. The check valve shall be a one piece reinforced all rubber (neoprene) check valve with an integral elastomer flange similar and equal to the Red Valve Series 35, manufactured by Red Valve Company, Inc., 700 North Bell Ave., Pittsburgh, PA 15106, telephone (412) 279-0044. The backup ring for the check valve shall be stainless steel. Stainless steel bolts, washers, and nuts shall be used to fasten the valves onto the flanged end of the pipes. The check valve shall be installed with the flared end duck bill in a vertical position.
OR
Fabricate check valves of brass **OR** stainless steel **OR** aluminum, **as directed**, plate, threaded fasteners and rods. Fabricate sealing disc of silicone sponge rubber free of porous areas, foreign materials, and visible defects.
 2. Workmanship and metalwork fabrication of check valves shall be as directed. Install check valves accurately vertically and adjust to the required elevation.
 - E. Concrete: Concrete shall conform to the requirements specified in Division 03 Section "Cast-in-place Concrete".

1.3 EXECUTION

- A. Drilling: Wells may be drilled by the reverse rotary circulation method or other method approved, which will ensure proper placement of the well screen, riser pipe, and filter pack. Methods which involve radical displacement of the formation, or which may reduce the yield of the well, will not be permitted. Excavated material shall be disposed of as directed.
 1. Reverse Circulation Method: If the reverse circulation method is used for drilling wells, all of the drilling fluid shall be removed from the filter pack and the natural pervious formation. If in the opinion of the Owner the walls of the hole above the top of the filter pack require support during development operations, a temporary casing similar to that specified in paragraph TEMPORARY CASING shall be placed so as to extend from the ground surface to at least **3 ft (1 m)** below the top of the filter pack. The diameter of the hole shall be such as will permit the placement of the minimum thickness of filter pack as specified in paragraph FILTER PACK PLACEMENT. The drilling fluid shall be a suspension of fine grained soil or shall be a commercial product of a recognized manufacturer, shall be approved by the Owner, and shall have the characteristic of being readily removable from the filter pack and the walls of the formation by development as specified in paragraph DEVELOPMENT. The use of bentonite will not be permitted.
 2. Temporary Casing: Temporary well casing of either iron or steel of sufficient length to case to the bottom of all borings shall be available at the construction site. the Owner will direct the use of a temporary casing to the bottom of the boring during drilling and placement of screen, riser, and

filter pack when it believes it is necessary to provide adequate support to the sides of the hole. When the walls of the boring will require support only during development operations a temporary casing will be required to extend only to a depth **3 ft (3 m)** below the top of the filter pack. The temporary casing, shall have sufficient thickness to retain its shape and maintain a true section throughout its depth, and may be in sections of any convenient length. The temporary casing shall be such as to permit its removal without disturbing the filter pack, riser, or well screen. The setting of temporary casing shall be such that no cavity will be created outside of it at any point along its length. In the event the temporary casing should become unduly distorted or bent it shall be discarded and a new casing shall be used during installation of any additional relief wells.

B. Installation Of Riser Pipe And Screen

1. **Assembly:** All riser pipe and screen shall be in good condition before installation and all couplings and other accessory parts shall be securely fastened in place. The successive lengths of pipe shall be arranged to provide accurate placement of the screen sections in the bore hole. The riser-pipe shall be provided with an approved cap and a flanged top section, the top of which shall be set at the elevation directed. Centralizers shall be attached to the assembled riser pipe and screen in such numbers and of a type that they will satisfactorily center the riser pipe and screen in the well and will hold it securely in position while the filter pack material is being placed.
2. **Joints:** Sections of relief well pipe shall be joined together as specified in paragraph COUPLINGS. Joints shall be designed and constructed to have the strength of the pipe and where possible a strength capable to support the weight of the relief well stem as it is lowered into the hole. When not practicable to construct joints that will support the weight of the relief well stem, the stem shall be supported at the lower end by any approved means that will assure that the joints do not open while being lowered into place in the well.
3. **Installation:** The assembled riser pipe and screen shall be placed in the bore hole in such manner as to avoid jarring impacts and to ensure that the assembly is centered and not damaged or disconnected. The screen shall be suspended in the hole and not resting on the bottom of the hole. After the screen and riser pipe have been placed, a filter pack shall be constructed around the screen section as specified in paragraph FILTER PACK PLACEMENT and the well developed as specified in paragraph DEVELOPMENT. The top of the riser pipe shall be held at the designated elevation during placement of the filter pack.
4. **Check for Plumbness and Alignment:** The well shall be constructed and all casing set round, plumb, and true. The Contractor shall perform the following tests after the installation of the well but prior to backfilling, and before its acceptance. Additional tests may be made during the performance of the work at the option of the Contractor. Should the Contractor fail to correct, at no additional cost to the Owner, any faulty alignment or plumbness disclosed as a result of these tests, the Owner may refuse to accept the well. the Owner may waive the requirements for plumbness if in its judgement the Contractor has exercised all possible care in constructing the well and the defect is due to circumstances beyond its control or if the utility of the completed well is not materially affected or if the cost of necessary remedial measures will be excessive. In no event will the provisions with respect to alignment be waived.
 - a. **Plumbness:** Plumbness shall be tested by use of a plumb line. The plummet shall be suspended from a small diameter wire rope and its point of suspension shall be in the exact center of the plummet. The plummet shall be sufficiently heavy to stretch the wire rope taut. The wire rope shall pass over a guide sheave which shall be positioned above the top of the well and adjusted horizontally so that the plummet hangs in the center of the well. Displacement of the wire rope during the plumbness check shall be measured by means of a transparent plastic sheet on which a number of concentric circles shall be scribed or drawn, and which is centered on the top of the well. The exact center of these circles shall be marked, and then a slot, slightly larger than the plumb line and extending from this center to the edge, shall be cut in the plastic sheet. As the plummet is lowered, any out-of-plumb condition of the well will be indicated by the wire rope tending to drift away from the center, and the plastic sheet shall be rotated until the slot is oriented in the direction of this drift, while at all times maintaining the center of the concentric circles coincident with the center of the well. Measurement of the amount of drift shall be made

along the edge of the slot for each increment by which the plummet is lowered into the well. Drift at any depth shall be determined by multiplying the measured plumb line displacement by the total length of the plumb line and dividing the result by the fixed distance between the guide sheave and the top of the well. If desired, alignment may be calculated from the plumbness data in lieu of the alignment check described in paragraph ALIGNMENT. Should the well vary from the vertical in excess of allowable, the plumbness of the well shall be corrected by the Contractor at no additional cost to the Owner.

- b. Alignment: Alignment shall be tested by lowering into the well a section of cylinder or a dummy of the same length. The outside diameter of cylinder shall be smaller than the inside diameter of the well. Should the cylinder fail to move freely throughout the length of the well, the alignment of the well shall be corrected by the Contractor at no additional expense to the Owner.
- C. Filter Pack Placement: After the well screen and riser pipe have been installed, the filter pack material shall be placed by tremie, when using a well graded material, in an approved manner such that segregation will not occur. When using a uniform graded filter material, the material may be poured around the well screen at a rate that will prevent bridging of the material. The material shall be placed around all sides of the screen to assure that the screen is not pushed against the side of the bore hole causing the screen to come in contact with foundation material or prevent the proper thickness of filter from being placed uniformly around the screen. The filter pack shall be placed at a constant rate from the start of placement until it has reached the elevation directed. If a tremie is required, a double string of tremie pipe shall be used. The pipes shall be placed on opposite sides of the screen and/or casing, that is, 180 degrees apart, and shall be guided in such a manner that they will remain in this position throughout the placing process. The tremie pipes shall be set in place, filled completely with filter pack prior to being lifted off the bottom of the hole. The filter pack in the tremie pipe shall be kept above the water surface in the well throughout the placing process. In no case shall the gradation of the filter pack fall outside of the range specified in paragraph FILTER PACK.
- D. Development
1. General: Following placement of filter pack materials, the Contractor shall develop the relief well by jetting, surging, intermittent pumping, or other approved methods as may be necessary to give the maximum yield of water. At the time of development of any relief well, the well shall be free of drawdown or surcharge effects due to pump testing, developing or drilling at another location. The Contractor shall be responsible for maintaining at the relief well the needed access and work area and clearance in the relief well necessary to accomplish development. The Contractor shall furnish, install, or construct the necessary discharge line and troughs to conduct and dispose of the discharge a sufficient distance from the work areas to prevent damage. Development shall be conducted to achieve a stable well of maximum efficiency and shall be continued until a satisfactory sand test, as specified in paragraph SAND TEST, is obtained. As development proceeds, filter pack material shall be added to the annular space around the screen to maintain the top elevation of the filter pack to the specified elevation. The Contractor shall provide an open tube or other approved means for accurately determining the water level in the well under all conditions. If at any time during the development process it becomes apparent in the opinion of the Owner that the well may be damaged, development operations shall be immediately terminated. the Owner may require a change in method if the method selected does not accomplish the desired results. the Owner may order that wells which continue to produce excessive amounts of fines after development for 6 hours be abandoned, plugged, and backfilled, and may require the Contractor to construct new wells nearby. All materials pulled into the well by the development process shall be removed prior to performing the pumping test.
 - a. Jetting: Jetting should be performed using either a single or double ring jet. The jetting tool shall be constructed of high-strength material and conservatively designed and proportioned so that it will withstand high pressures. The jetting tool shall have two hydraulically balanced nozzles spaced 180 degrees **OR** four diameter holes spaced 90 degrees, **as directed**, apart and which shall exert the jetting force horizontally through the screen slots. The rings shall be constructed such that the tips of the jets shall be within **1/2 in. (13 mm)** from the inner surface of the well screen. The pump used in conjunction with

the jetting tool shall be capable of providing a minimum jetting fluid exit velocity of **150 feet per second (45 meters per second)**. Prior to commencing jetting, and following each jetting cycle, all sand and/or other materials shall be removed from inside the screen. All wells shall be pumped during the jetting cycle to remove incoming sand and other material. Such pumping shall be at a rate not less than 115 percent of the rate at which fluid is introduced through the jetting tool. This will allow a flow of material into the well as it is being developed. Water used for development shall be free of sand. the Owner may require other means of developing the well such as intermittent pumping method, variation of the intermittent pumping method, or surge block if it appears that the development of the well is not producing the desired results.

- b. Intermittent Pumping: Intermittent pumping shall be performed by pumping the well at a capacity sufficient to produce a rapid drawdown, stopping the pump (backflow through pump will not be permitted) to permit the water surface to rise to its former elevation, and repeating this procedure. Cycle time for this procedure will vary as directed but will not be more than 3 cycles per minute. A deep well turbine pump, or electric submersible pump with check valve, shall be used with any attachment necessary to accomplish rapid starting and stopping for intermittent pumping. The intake shall be set below the maximum expected drawdown in the well. Prior to commencing intermittent pumping, and periodically during development by this method, all sand and/or other materials shall be removed from inside the screen. The amount of drawdown may be decreased if, in the opinion of the Owner, the efficiency of the well might otherwise be impaired.
 - c. Surging: Surging of the well shall require use of a circular block which is smaller in diameter than the inside diameter of the relief well and is constructed of a material which will not damage the screen if the block comes in contact with the screen, and a bailer or pump to remove materials drawn into the well. The surging shall be continued for a period of approximately one hour or until little or no additional material from the foundation or filter pack can be pulled through the screen. The surge block shall be moved by a steady motion up and down the full length of the well screen. Prior to commencing surging, and periodically during development by this method, all sand and/or other materials shall be removed from inside the screen. All materials pulled into the well by the surging process shall be removed by the Contractor.
- E. Backfilling: After the well has been developed, additional filter pack shall be added if necessary to meet the requirements of paragraph FILTER PACK PLACEMENT. Then the annular space above the filter pack, shall be backfilled by first placing a layer of concrete sand on the filter pack and then filling the remainder of the space up to the finished ground surface **OR** well pit, **as directed**, with grout or concrete. The concrete backfill shall be placed to a depth at least equal to the existing impervious blanket. For PVC riser pipe, after the well has been developed, additional filter pack shall be added if necessary for it to meet the requirements of paragraph FILTER PACK PLACEMENT. Then the remaining annular space above the filter pack shall be backfilled by first placing a layer of concrete sand on the filter pack and then filling the remainder of the space up to the finished ground surface **OR** well pit, **as directed**, with bentonite. The temporary casing, if used, shall be withdrawn in increments as the backfill is placed. The Contractor shall fill with impervious material to original grade all pits such as those incidental to the reverse rotary circulation method of drilling.
- F. Plugging Of Abandoned Wells: The Contractor has the option of attempting to remove the well screen. If the well screen can be removed, the Contractor will grout the bore hole starting from the bottom of the hole. The grouting shall start at the elevation of the bottom of the tailpipe of the well. If the well screen can not be removed or breaks off during the removal attempt, the Contractor shall still be responsible for grouting the well from the bottom of the tailpipe to within **3 ft (1 m)** of ground surface. Either of the above abandonment procedures may require the Contractor to redrill the hole so that the bore hole can be grouted. The well shall be grouted from the bottom of the tailpipe. After the grout has setup the riser pipe shall be cutoff. Then the hole shall be backfilled. The cement grout mixture proportion to be used shall be submitted for approval.

G. Tests

1. **Pump Test:** Upon completion but before acceptance, each well shall be subjected to a pump test of which a sand test will form a part. The Contractor shall provide a deep well turbine pump, capable of producing the specified drawdowns over periods of time sufficient to satisfactorily perform the pump test specified herein. The intake shall be set below the maximum expected drawdown in the well. The amount of sand shall be measured after each test. The pump shall be complete with either gasoline, diesel, or electric motor of adequate size. In case an electric motor is used, the Contractor shall provide, without additional cost to the Owner, the electric power and the necessary wiring. The Contractor shall provide an open tube or other approved means for accurately determining the water level in the well. The Contractor shall furnish and install an orifice meter of approved design or other approved equipment for the purpose of measuring the discharge from the well during the pumping test. The Contractor shall furnish, install, or construct the necessary pipe discharge line, troughs, or ditches necessary to dispose of the pumping test discharge a sufficient distance from the work area to prevent damage. The tests will be conducted under the direction of the Owner and may be made as soon as each well is completed. Test data will be recorded by the Owner. The Contractor shall test each well by pumping continuously for a minimum of 6 hours. Prior to starting the pump test all material shall be removed from the bottom of the well. If the test is interrupted, other than by order of the Owner, prior to the completion of the specified period of continuous operation, the test shall be re-run. In addition to the required pumping test, the Owner may direct the Contractor to perform additional pump tests. Such additional testing shall conform in general to the requirements specified herein except that the duration of the tests and the approximate draw-down will be determined by the Owner. In the event that sand or other material collects in the well as a result of the pump test, accurate measurements shall be taken as to the quantity of material in the well and all such material shall be removed by the Contractor. Upon completion of the pump test, the Contractor shall remove all equipment, discharge lines, electrical lines, lumber, and debris, and shall backfill any excavated areas with impervious material.
2. **Sand Test:** As part of each Pump Test or at the end of each intermittent pumping a determination of the amount of sand (filter pack and/or foundation material) a well is producing shall be performed. Prior to starting the sand test all material shall be removed from the bottom of the tailpipe. After the pump is at the desired pumping rate the flow from the discharge shall be diverted into a container that will collect all the sand being carried by the water **OR** through a Rossum Sand Tester, **as directed**. Upon completion of the test the amount of sand in the tailpipe shall be determined to verify that no material is being deposited in the bottom of the well.
3. **Filter Pack Sampling and Testing:** The Contractor shall verify that all materials conform to the specifications before delivery to the project. The particle size distribution of the filter pack shall be sampled and tested by the Contractor in accordance with ASTM C 136 and ASTM D 75. Within 48 hours before being placed in the relief well to be back-filled, the filter pack shall be sampled from the material stockpiled at the project site. There shall be at least one particle size distribution test on the filter pack for each well. A pump test shall be performed in accordance with technical provisions herein specified.
4. **Reports:** Reports shall include, for each relief well, logs of the boring, elevations of the well screen, top of riser pipe, bottom of the tailpipe, filter pack gradation, quantity of filter pack added during development, pump test, sand test, and report of backfilling. The log of backfill material shall include the filter pack particle size distribution test data, and notes concerning installation and development of the relief well. The pump test log shall include the duration of the test and the draw-down response data with time in the pumped well, in adjacent wells, and in nearby piezometers. The relief well log and the pump test log shall be submitted to the Owner. The Contractor shall also submit a report of the well installation to the appropriate public agency and in the form required by state statutory and/or regulatory requirements specified in paragraph REGULATORY REQUIREMENTS.

END OF SECTION 31 62 13 23

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SECTION 31 62 16 16 - STEEL H PILES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for steel H piles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes steel H piles.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For steel piles. Show fabrication and installation details for piles, including details of driving points, splices, and pile caps.
 - a. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - b. Include arrangement of static pile reaction frame, test and anchor piles, equipment, and instrumentation. Submit structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Welding certificates.
4. Mill Test Reports: For steel H piles, steel castings, and steel plate, signed by manufacturer.
5. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.
6. Static Pile Test Reports: Submit within three days of completing each test.
7. Pile-Driving Records: Submit within three days of driving each pile.
8. Field quality-control reports.
9. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

D. Quality Assurance

1. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
2. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent buckling or physical damage.
 - a. Painted Piles: Protect finish and touch up paint damage before driving piles.

F. Project Conditions

1. Protect structures, underground utilities, and other construction from damage caused by pile driving.
2. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Provide photographs **OR** video, **as directed**, of conditions that might be misconstrued as damage caused by pile driving.

1.2 PRODUCTS

A. Steel H Piles

1. High-Strength, Low-Alloy, Columbium-Vanadium Structural Steel: ASTM A 572/A 572M, **Grade 50 (Grade 345) OR Grade 60 (Grade 415), as directed.**
 2. High-Strength, Low-Alloy, Nickel, Copper, Phosphorous Steel H Piles: ASTM A 690/A 690M.
 3. High-Strength, Low-Alloy, Structural Steel: ASTM A 588/A 588M.
- B. Pile Accessories
1. Driving Points: Manufacturer's standard one-piece driving point, fabricated from steel castings as follows to provide full bearing of web and flange of pile tip:
 - a. Carbon-Steel Castings: ASTM A 27/A 27M, **Grade 65-35 (Grade 450-240), heat treated OR Grade N1, as directed.**
 - b. High-Strength Steel Castings: ASTM A 148/A 148M, **Grade 80-40 (Grade 550-275) OR Grade 90-60 (Grade 620-415), as directed.**
 2. Splice Unit: Manufacturer's standard splice unit, fabricated from two connected steel plates, of same material as H pile or material of equal strength, shaped to encase web and part of each flange.
- C. Paint
1. Paint, **as directed**: SSPC-Paint 16; self-priming, two-component, coal-tar epoxy polyamide, black **OR** red **OR** manufacturer's standard color, **as directed**.
- D. Fabrication
1. Fabricate and assemble piles in shop to greatest extent possible.
 2. Pile-Length Markings: Mark each pile with horizontal lines at **12-inch (305-mm)** intervals; label the distance from pile tip at **60-inch (1.52-m)** intervals. Maintain markings on piles until driven.
 3. Fabricate full-length piles to eliminate splicing during driving, with ends square.
OR
Fabricate full-length piles by splicing lengths of H pile together. Accurately mill meeting ends of piles and bevel for welding. Maintain axial alignment of pile lengths. Maintain structural properties of pile across splice.
 4. Splice Units: Notch web of pile, fit splice unit into position, and weld according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
OR
Continuously Welded Splices: Splice piles by continuously welding according to AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - a. Splice piles during fabrication or field installation, **as directed**.
 5. Fit and weld driving points to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
- E. Shop Painting, **as directed**
1. General: Shop paint steel pile surfaces, except for surfaces to be encased in concrete, as follows:
 - a. Extend painting to a depth of **60 inches (1.52 m)** below finished grade **OR** low-tide level, **as directed**, to top of exposed pile.
 2. Surface Preparation: Clean surfaces to be painted. Remove loose rust and loose mill scale, spatter, slag, and flux deposits. Prepare surfaces according to SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
 3. Painting: Immediately after surface preparation, apply coat of paint according to manufacturer's written instructions to provide a dry film thickness of not less than **8 mils (0.2 mm)**.
 - a. Apply second coat to provide a dry film thickness of not less than **8 mils (0.2 mm)**, resulting in a two-coat paint system thickness of not less than **16 mils (0.4 mm)**.

- b. Apply second and third coats with each coat having a dry film thickness of not less than **8 mils (0.2 mm)**, resulting in a three-coat paint system thickness of not less than **24 mils (0.6 mm)**.
- c. Mark pile lengths after shop painting.

1.3 EXECUTION

A. Examination

1. Site Conditions: Do not start pile-driving operations until earthwork fills have been completed or excavations have reached an elevation of **6 to 12 inches (152 to 305 mm)** above bottom of footing or pile cap.

B. Driving Equipment

1. Pile Hammer: Air-, steam-, hydraulic-, or diesel-powered type capable of consistently delivering adequate peak-force duration and magnitude to develop the ultimate capacity required for type and size of pile driven and character of subsurface material anticipated.
2. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap as recommended by hammer manufacturer and as required to drive pile without damage.
3. Leads: Use fixed, semifixed, or hanging-type pile-driver leads that will hold full length of pile firmly in position and in axial alignment with hammer.

C. Static Pile Tests, **as directed**

1. General: Static pile tests will be used to verify driving criteria and pile lengths and to confirm allowable load of piles.
 - a. Furnish test piles **60 inches (1.52 m)** longer than production piles.
 - b. Determination of actual length of piles will be based on results of static pile tests.
2. Pile Tests: Arrange and perform the following pile tests:
 - a. Axial Compressive Static Load Test: ASTM D 1143.
 - b. Axial Tension Static Load Test: ASTM D 3689.
 - c. Lateral Load Test: ASTM D 3966.
3. Equip each test pile with two telltale rods, according to ASTM D 1143, for measuring deformation during load test.
4. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify the Owner at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.
 - a. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.
 - b. Number of Test Piles: One pile **OR** As indicated, **as directed**.
5. Driving Test Piles: Drive test piles at locations indicated to the minimum penetration or driving resistance indicated. Use test piles identical to those required for Project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.
6. Approval Criteria: Allowable load shall be the load acting on the test pile when the lesser of, **as directed**, the following criteria are met, divided by a factor of safety of 2:
 - a. Net settlement, after deducting rebound, of not more than **0.01 inch/ton (0.25 mm/907 kg)** of test load.
 - b. Total settlement exceeds the pile elastic compression by **0.15 inch (4 mm)**, plus 1.0 percent of the tip diagonal dimension.
 - c. A plunging failure or sharp break in the load settlement curve.
7. Test Pile-Driving Records: Prepare driving records for each test pile, compiled and attested to by a qualified professional engineer, **as directed**. Include same data as required for driving records of permanent piles.
8. Test piles that comply with requirements, including location tolerances, may be used on Project.

D. Driving Piles

1. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles, **as directed**. Establish and maintain axial alignment of leads and piles before and during driving.
2. Predrilling, **as directed**: Provide pre-excavated holes where indicated, to depths indicated. Drill holes with a diameter less than the largest cross-section dimension of pile.
 - a. Firmly seat pile in predrilled hole by driving with reduced energy before starting final driving.
3. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.
4. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
 - a. Location: **4 inches (102 mm)** from location indicated after initial driving, and **6 inches (152 mm)** after pile driving is completed.
 - b. Plumb: Maintain **1 inch (25 mm)** in **4 feet (1.2 m)** from vertical, or a maximum of **4 inches (102 mm)**, measured when pile is aboveground in leads.
 - c. Batter Angle: Maximum **1 inch (25 mm)** in **4 feet (1.2 m)** from required angle, measured when pile is aboveground in leads.
5. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances.
 - a. Fill holes left by withdrawn piles using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact in lifts not exceeding **72 inches (1.83 m)**.

OR

Fill holes left by withdrawn piles as directed by the Owner.

OR

Abandon and cut off rejected piles as directed by the Owner. Leave rejected piles in place and install new piles in locations as directed by the Owner.
6. Cutting Off: Cut off tops of driven piles square with pile axis and at elevations indicated.
7. Pile-Driving Records: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer, **as directed**. Include the following data:
 - a. Project name and number.
 - b. Name of Contractor.
 - c. Pile location in pile group and designation of pile group.
 - d. Sequence of driving in pile group.
 - e. Pile dimensions.
 - f. Ground elevation.
 - g. Elevation of tips after driving.
 - h. Final tip and cutoff elevations of piles after driving pile group.
 - i. Records of re-driving.
 - j. Elevation of splices.
 - k. Type, make, model, and rated energy of hammer.
 - l. Weight and stroke of hammer.
 - m. Type of pile-driving cap used.
 - n. Cushion material and thickness.
 - o. Actual stroke and blow rate of hammer.
 - p. Pile-driving start and finish times, and total driving time.
 - q. Time, pile-tip elevation, and reason for interruptions.
 - r. Number of blows for every **12 inches (305 mm)** of penetration, and number of blows per **1 inch (25 mm)** for the last **6 inches (152 mm)** of driving.
 - s. Pile deviations from location and plumb.
 - t. Preboring, jetting, or special procedures used.
 - u. Unusual occurrences during pile driving.

E. Field Quality Control

1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. Pile foundations.
 2. Testing Agency: Engage a qualified independent testing agency to perform tests and inspections.
 3. Tests and Inspections:
 - a. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on five single piles **OR** 3 percent of piles, **as directed**.
 - b. Weld Testing: In addition to visual inspection, welds shall be tested and inspected according to AWS D1.1/D1.1M and inspection procedures listed below, at testing agency's option. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.
 - 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3) Radiographic Inspection: ASTM E 94, minimum quality level "2-2T."
 - 4) Ultrasonic Inspection: ASTM E 164.
- F. Touchup Painting, **as directed**
1. Clean field welds, splices, and abraded painted areas and field-apply paint according to SSPC-PA 1. Use same paint and apply same number of coats as specified for shop painting.
 - a. Apply touchup paint before driving piles to surfaces that will be immersed or inaccessible after driving.
- G. Disposal
1. Remove withdrawn piles and cutoff sections of piles from site and legally dispose of them off Owner's property.

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Task	Specification	Specification Description
31 62 16 19	31 62 23 00	Concrete-Filled Steel Piles

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SECTION 31 62 19 00 - TIMBER PILES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for timber piles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes round timber piles.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For timber piles. Show fabrication and installation details for piles, including details of driving shoes, tips or boots, and pile butt protection.
 - a. Include arrangement of static pile reaction frame, test and anchor piles, equipment, and instrumentation. Submit structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Round timber pile treatment data as follows, including chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material:
 - a. For each type of preservative-treated timber product include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - b. For waterborne-treated products include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
4. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.
5. Static Pile Test Reports: Submit within three days of completing each test.
6. Pile-Driving Records: Submit within three days of driving each pile.
7. Field quality-control reports.
8. Warranty of chemical treatment manufacturer for each type of treatment.
9. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

D. Quality Assurance

1. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
2. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent breaks, cuts, abrasions, or other physical damage and as required by AWPA M4.
 - a. Do not drill holes or drive spikes or nails into pile below cutoff elevation.

F. Project Conditions

1. Protect structures, underground utilities, and other construction from damage caused by pile driving.
2. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Provide photographs **OR** video, **as directed**, of conditions that might be misconstrued as damage caused by pile driving.

1.2 PRODUCTS

A. Timber Piles

1. Round Timber Piles: ASTM D 25, unused, clean peeled, one piece from butt to tip; of the following species and size basis:
 - a. Species: Coastal Douglas fir **OR** Southern yellow pine, **as directed**.
 - b. Size Basis: Butt circumference **OR** Class A **OR** Class B **OR** Tip circumference **OR** 8-inch (203-mm) tip and natural taper, **as directed**.
2. Pressure-treat round timber piles according to AWWA C3 and, **as directed**, AWWA C18 **OR** AWWA C14, **as directed**, as follows:
 - a. Service Condition: Land and freshwater **OR** Foundation **OR** Saltwater **OR** Marine piles - dual treatment, **as directed**.
 - b. Treatment: Waterborne preservative **OR** Creosote or creosote solution **OR** Oil-borne preservative **OR** Waterborne preservative, severe marine borer hazard **OR** Dual treatment consisting of waterborne preservative, followed by creosote or creosote solution, **as directed**.

B. Pile Accessories

1. Driving Shoes: Fabricate from ASTM A 1011/A 1011M, hot-rolled carbon-steel strip to suit pile-tip diameter, of the following type and thickness, and secure to pile tip so as to not affect pile alignment during driving:
 - a. Type: Flat boot **OR** Arrow point, **as directed**.
 - b. Thickness: 3/16 inch (4.8 mm) **OR** 1/4 inch (6 mm), **as directed**.

C. Fabrication

1. Pile Tips: Cut and shape pile tips to accept driving shoes. Fit and fasten driving shoes to pile tips according to manufacturer's written instructions.
2. Pile Butt: Trim pile butt and cut perpendicular to longitudinal axis of pile. Chamfer and shape butt to fit tightly to driving cap of hammer.
3. Field-Applied Wood Preservative: Treat field cuts, holes, and other penetrations according to AWWA M4.
 - a. Coal-tar roofing cement for treating drilled holes or sealing cutoffs shall be free of asbestos.
4. Pile Splices: Splices will not be permitted.
5. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch (305-mm) intervals; label the distance from pile tip at 60-inch (1.52-m) intervals. Maintain markings on piles until driven.

1.3 EXECUTION

A. Examination

1. Site Conditions: Do not start pile-driving operations until earthwork fills have been completed or excavations have reached an elevation of 6 to 12 inches (152 to 305 mm) above bottom of footing or pile cap.

B. Driving Equipment

1. Pile Hammer: Air-, steam-, hydraulic-, or diesel-powered type capable of consistently delivering adequate peak-force duration and magnitude to develop the ultimate capacity required for type and size of pile driven and character of subsurface material anticipated.
2. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap as recommended by hammer manufacturer and as required to drive pile without damage.
3. Leads: Use fixed, semifixed, or hanging-type pile-driver leads that will hold full length of pile firmly in position and in axial alignment with hammer.

C. Static Pile Tests, as directed

1. General: Static pile tests will be used to verify driving criteria and pile lengths and to confirm allowable load of piles.
 - a. Furnish test piles **60 inches (1.52 m)** longer than production piles.
 - b. Determination of actual length of piles will be based on results of static pile tests.
2. Pile Tests: Arrange and perform the following pile tests:
 - a. Axial Compressive Static Load Test: ASTM D 1143.
 - b. Axial Tension Static Load Test: ASTM D 3689.
 - c. Lateral Load Test: ASTM D 3966.
3. Equip each test pile with two telltale rods, according to ASTM D 1143, for measuring deformation during load test.
4. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify the Owner at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.
 - a. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.
 - b. Number of Test Piles: One pile **OR** As indicated, **as directed**.
5. Driving Test Piles: Drive test piles at locations indicated to the minimum penetration or driving resistance indicated. Use test piles identical to those required for Project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.
6. Approval Criteria: Allowable load shall be the load acting on the test pile when the lesser of, **as directed**, the following criteria are met, divided by a factor of safety of 2:
 - a. Net settlement, after deducting rebound, of not more than **0.01 inch/ton (0.25 mm/907 kg)** of test load.
 - b. Total settlement exceeds the pile elastic compression by **0.15 inch (4 mm)**, plus 1.0 percent of the tip diagonal dimension.
 - c. A plunging failure or sharp break in the load settlement curve.
7. Test Pile-Driving Records: Prepare driving records for each test pile, compiled and attested to by a qualified professional engineer, **as directed**. Include same data as required for driving records of permanent piles.
8. Test piles that comply with requirements, including location tolerances, may be used on Project.

D. Driving Piles

1. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles, **as directed**. Establish and maintain axial alignment of leads and piles before and during driving.
2. Spudding: Drive spud piles through overlying highly resistant strata or obstructions and withdraw for reuse.
3. Predrilling, **as directed**: Provide pre-excavated holes where indicated, to depths indicated. Drill holes with a diameter less than the largest cross-section dimension of pile.
 - a. Firmly seat pile in predrilled hole by driving with reduced energy before starting final driving.
4. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.
5. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
 - a. Location: **4 inches (102 mm)** from location indicated after initial driving, and **6 inches (152 mm)** after pile driving is completed.
 - b. Plumb: Maintain **1 inch (25 mm)** in **4 feet (1.2 m)** from vertical, or a maximum of **4 inches (102 mm)**, measured when pile is aboveground in leads.
 - c. Batter Angle: Maximum **1 inch (25 mm)** in **4 feet (1.2 m)** from required angle, measured when pile is aboveground in leads.
6. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances.

- a. Fill holes left by withdrawn piles using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact in lifts not exceeding **72 inches (1.83 m)**.

OR

Fill holes left by withdrawn piles as directed by the Owner.

OR

Abandon and cut off rejected piles as directed by the Owner. Leave rejected piles in place and install new piles in locations as directed by the Owner.

- 7. Cutting Off: Cut off butts of driven piles square with pile axis and at elevations indicated.
 - a. Cover cut-off piling surfaces with caps overlapping pile end by minimum **2 inches (51 mm)** **OR** minimum three coats of preservative treatment, **as directed**, according to AWP4 M4.
- 8. Pile-Driving Records: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer, **as directed**. Include the following data:
 - a. Project name and number.
 - b. Name of Contractor.
 - c. Pile species.
 - d. Pile location in pile group and designation of pile group.
 - e. Sequence of driving in pile group.
 - f. Pile dimensions.
 - g. Ground elevation.
 - h. Elevation of tips after driving.
 - i. Final tip and cutoff elevations of piles after driving pile group.
 - j. Records of re-driving.
 - k. Elevation of splices.
 - l. Type, make, model, and rated energy of hammer.
 - m. Weight and stroke of hammer.
 - n. Type of pile-driving cap used.
 - o. Cushion material and thickness.
 - p. Actual stroke and blow rate of hammer.
 - q. Pile-driving start and finish times, and total driving time.
 - r. Time, pile-tip elevation, and reason for interruptions.
 - s. Number of blows for every **12 inches (305 mm)** of penetration, and number of blows per **1 inch (25 mm)** for the last **6 inches (152 mm)** of driving.
 - t. Pile deviations from location and plumb.
 - u. Preboring, jetting, or special procedures used.
 - v. Unusual occurrences during pile driving.

E. Field Quality Control

- 1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. Pile foundations.
- 2. Testing Agency: Engage a qualified independent testing agency to perform tests and inspections.
- 3. Tests and Inspections:
 - a. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on five single piles **OR** 3 percent of piles, **as directed**.

F. Disposal

- 1. Remove withdrawn piles and cutoff sections of piles from site and legally dispose of them off Owner's property.

END OF SECTION 31 62 19 00

SECTION 31 62 23 00 - CONCRETE-FILLED STEEL PILES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for concrete-filled steel piles. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes concrete-filled steel shell and pipe piles.

C. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For composite piles. Show fabrication and installation details for piles, including splices and tip details.
 - a. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld.
 - b. Indicate locations, sizes, type, and arrangement of reinforcement.
 - c. Include arrangement of static pile reaction frame, test and anchor piles, equipment, and instrumentation. Submit structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
3. Welding certificates.
4. Design Mixes: For each concrete mix. Include revised mix proportions when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
5. Material Certificates: For steel shell piles and accessories, steel pipe piles and accessories, steel reinforcement and concrete admixtures, from manufacturer.
6. Material Test Reports: For concrete materials.
7. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.
 - a. Include mandrel type and details.
8. Static Pile Test Reports: Submit within three days of completing each test.
9. Pile-Driving Records: Submit within three days of driving each pile.
10. Field quality-control reports.
11. Preconstruction Photographs: Photographs or video of existing conditions of adjacent construction. Submit before the Work begins.

D. Quality Assurance

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
2. Comply with requirements in ACI 301, "Specifications for Structural Concrete."
3. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel"
 - b. AWS D1.3, "Structural Welding Code - Sheet Steel."
4. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver piles to Project site in such quantities and at such times to ensure continuity of installation. Handle and store piles at Project site to prevent physical damage.
 - a. Painted Piles: Protect finish and touch up damage before driving piles.

F. Project Conditions

1. Protect structures, underground utilities, and other construction from damage caused by pile driving.
2. Preconstruction Photographs: Inventory and record the condition of adjacent structures, underground utilities, and other construction. Provide photographs **OR** video, **as directed**, of conditions that might be misconstrued as damage caused by pile driving.

1.2 PRODUCTS

A. Steel Shell Piles

1. Fluted Pile Shells: Manufacturer's standard, vertically fluted pile shells; cold formed from steel sheet; **50,000-psi (345-MPa)** minimum yield strength after forming. Fabricate watertight, uniformly tapered sections with forged-steel conical nose welded to tip.
 - a. Constant Diameter Extensions: Fabricate with splice overlap capable of telescoping into tapered section.
 - b. Taper: **0.14 inch in 12 inches (1:86) OR 0.25 inch in 12 inches (1:48) OR 0.40 inch in 12 inches (1:30), as directed.**
 - c. Thickness: **0.150 inch (3.80 mm) OR 0.179 inch (4.55 mm) OR 0.209 inch (5.31 mm) OR 0.239 inch (6.07 mm), as directed.**
2. Helically Corrugated Pile Shells: Manufacturer's standard, helically corrugated, uniform-diameter, steel sheet shell piles; of sufficient strength and thickness to remain watertight and resist distortion and buckling due to soil pressure, internal mandrel operation, or re-driving. Fabricate in one-piece lengths with **3/16-inch- (4.76-mm-)** thick, minimum steel-plate boot continuously welded to tip and as follows:
 - a. Nominal Diameter: **8-5/8 inches (219 mm) OR 10-5/8 inches (270 mm) OR 11-1/8 inches (283 mm) OR 12-1/4 inches (311 mm) OR 14 inches (350 mm) OR 16-1/8 inches (410 mm), as directed.**
 - b. Thickness: **0.048 inch (1.21 mm), minimum OR 0.060 inch (1.52 mm), minimum OR 0.075 inch (1.90 mm), minimum OR 0.105 inch (2.66 mm), as directed.**

B. Steel Pipe Piles

1. Steel Pipe: ASTM A 252, Grade 2 **OR** Grade 3, **as directed**; seamless or welded.

C. Steel Reinforcement

1. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**; deformed.
2. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M.
3. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending, as follows:
 - a. Steel Reinforcement: ASTM A 615/A 615M, **Grade 60 (Grade 420) OR ASTM A 706/A 706M, as directed**; deformed.
4. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M, as follows:
 - a. Steel Reinforcement: ASTM A 615/A 615M, **Grade 60 (Grade 420) OR ASTM A 706/A 706M, as directed**; deformed.
5. Plain Steel Wire: ASTM A 82/A 82M, as drawn **OR** galvanized, **as directed**.
6. Deformed-Steel Wire: ASTM A 496/A 496M.
7. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain **OR** deformed, **as directed**.

D. Concrete Materials

1. Portland Cement: ASTM C 150, Type I or II.
 - a. Fly Ash: ASTM C 618, Class C or F.
 - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** Type IP, portland-pozzolan **OR** Type I (PM), pozzolan-modified portland **OR** Type I (SM), slag-modified Portland, **as directed**, cement.

3. Normal-Weight Aggregates: ASTM C 33, Class 4S **OR** Class 4M **OR** Class 1N, **as directed**, uniformly graded, **3/4-inch (19-mm)** maximum aggregate size. Provide aggregates from a single source.
 4. Water: Potable, complying with ASTM C 94/C 94M requirements.
 5. Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent chloride ions by mass of cementitious material.
 - a. Air-Entraining Admixture: ASTM C 260.
 - b. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - c. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - d. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - e. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - f. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - g. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- E. Pile Accessories
1. Driving Points: Manufacturer's standard 60-degree conical driving point, with integral reinforcing ribs, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:
 2. Inside Cutting Shoes: Manufacturer's standard, inside-flanged, open-ended cutting shoe, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:
 3. Outside Cutting Shoes: Manufacturer's standard, outside-flanged, open-ended cutting shoe, to provide full bearing of pipe pile tip. Fabricate from steel castings as follows:
 - a. Carbon-Steel Castings: ASTM A 27/A 27M, **Grade 65-35 (Grade 450-240)**, heat treated **OR** Grade N1, **as directed**.
 - b. High-Strength Steel Castings: ASTM A 148/A 148M, **Grade 80-40 (Grade 550-275) OR Grade 90-60 (Grade 620-415)**, **as directed**.
 4. Splice Coupling: Manufacturer's standard splice coupling, rolled from ASTM A 36/A 36M, carbon-steel bar or cast from heat-treated carbon steel, ASTM A 27/A 27M, **Grade 65-35 (Grade 450-240)**, with interior stop and internally tapered for friction fit driving.
- F. Paint
1. Paint: SSPC-Paint 16; self-priming, two-component, coal-tar epoxy polyamide, black **OR** red **OR** manufacturer's standard color, **as directed**.
- G. Concrete Mixes
1. Prepare concrete design mixes according to ACI 301, determined by either laboratory trial batch or field test data basis.
 - a. Use a qualified testing agency for preparing and reporting proposed mix designs determined by laboratory trial batch.
 2. Proportion mixes according to ACI 301 to provide normal-weight concrete suitable for piles with the following properties:
 - a. Compressive Strength (28 Days): **5000 psi (34.5 MPa) OR 4000 psi (27.6 MPa) OR 3000 psi (20.7 MPa)**, **as directed**.
 - b. Maximum Water-Cementitious Material Ratio at Point of Placement: 0.45 **OR** 0.50, **as directed**.
 - c. Slump Limit: **5 inches (127 mm) OR 8 inches (203 mm)**, **as directed**, plus or minus **1 inch (25 mm)**.
 3. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content of 6.0 percent, plus or minus 1.5 **OR** 2.5 to 4.5, **as directed**, percent.
 4. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 limits as if concrete were exposed to deicing chemicals.
 5. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 **OR** 0.30, **as directed**, percent by weight of cement.
 6. Concrete-mix design adjustments may be considered if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant. Resubmit and obtain approval from the Owner of proposed changes to concrete-mix proportions.

H. Fabrication

1. Fabricate and assemble piles in shop to greatest extent possible.
2. Fabricate full-length piles to eliminate splicing during driving.

OR

Fabricate full-length piles by splicing pile lengths together. Maintain axial alignment of pile lengths. Maintain structural properties of pile across splice.

- a. Splice Coupling: Fit splice coupling into position and weld to adjoining steel pipe pile sections according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - b. Welded Splices: Accurately mill meeting ends of steel pipe piles and bevel for welding. Continuously weld pile according to AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - c. Welded Splices: Continuously weld steel shell pile according to manufacturer's written instructions and AWS D1.1/D1.1M and AWS D1.3, **as directed**, for procedures, appearance and quality of welds, and methods used in correcting welding work.
 - d. Splice piles during fabrication or field installation.
3. Fit and weld driving points to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.

OR

Fit and weld cutting shoes to tip of pile according to manufacturer's written instructions and AWS D1.1/D1.1M for procedures, appearance and quality of welds, and methods used in correcting welding work.

4. Pile-Length Markings: Mark each pile with horizontal lines at **12-inch (305-mm)** intervals; label the distance from pile tip at **60-inch (1.52-m)** intervals. Maintain markings on piles until driven.

I. Shop Painting, **as directed**

1. General: Shop paint steel pile surfaces, except for surfaces to be encased in concrete, as follows:
 - a. Extend painting to a depth of **60 inches (1.52 m)** below finished grade **OR** low-tide level, **as directed**, to top of exposed pile.
2. Surface Preparation: Clean surfaces to be painted. Remove loose rust and loose mill scale, and remove spatter, slag, or flux deposits. Prepare surfaces according to SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
3. Painting: Immediately after surface preparation, apply coat of paint according to manufacturer's written instructions to provide a dry film thickness of not less than **8 mils (0.2 mm)**.
 - a. Apply second coat to provide a dry film thickness of not less than **8 mils (0.2 mm)**, resulting in a two-coat paint system thickness of not less than **16 mils (0.4 mm)**.
 - b. Apply second and third coats with each coat having a dry film thickness of not less than **8 mils (0.2 mm)**, resulting in a three-coat paint system thickness of not less than **24 mils (0.6 mm)**.
 - c. Mark pile lengths after shop painting.

J. Concrete Mixing

1. Ready-Mixed Concrete: Comply with ASTM C 94/C 94M.
 - a. Do not add water to concrete mix after mixing.
 - b. Maintain concrete temperature to not exceed **90 deg F (32 deg C)**.

1.3 EXECUTION

A. Examination

1. Site Conditions: Do not start pile-driving operations until earthwork fills have been completed or excavations have reached an elevation of **6 to 12 inches (152 to 305 mm)** above bottom of footing or pile cap.
- B. Driving Equipment
1. Pile Hammer: Air-, steam-, hydraulic-, or diesel-powered type capable of consistently delivering adequate peak-force duration and magnitude to develop the ultimate capacity required for type and size of pile driven and character of subsurface material anticipated.
 2. Hammer Cushions and Driving Caps: Between hammer and top of pile, provide hammer cushion and steel driving cap as recommended by hammer manufacturer and as required to drive pile without damage.
 3. Leads: Use fixed, semifixed, or hanging-type pile-driver leads that will hold full length of pile firmly in position and in axial alignment with hammer.
 4. Mandrel: Expandable mandrel, capable of distributing driving energy throughout length of steel shell pile.
- C. Static Pile Tests, **as directed**
1. General: Static pile tests will be used to verify driving criteria and pile lengths and to confirm allowable load of piles.
 - a. Furnish test piles **60 inches (1.52 m)** longer than production piles.
 - b. Determination of actual length of piles will be based on results of static pile tests.
 2. Pile Tests: Arrange and perform the following pile tests:
 - a. Axial Compressive Static Load Test: ASTM D 1143.
 - b. Axial Tension Static Load Test: ASTM D 3689.
 - c. Lateral Load Test: ASTM D 3966.
 3. Equip each test pile with two telltale rods, according to ASTM D 1143, for measuring deformation during load test.
 4. Provide pile reaction frame, anchor piles, equipment, and instrumentation with sufficient reaction capacity to perform tests. Notify the Owner at least 48 hours in advance of performing tests. On completion of testing, remove testing structure, anchor piles, equipment, and instrumentation.
 - a. Allow a minimum of seven days to elapse after driving test piles before starting pile testing.
 - b. Number of Test Piles: One pile **OR** As indicated, **as directed**.
 5. Driving Test Piles: Drive test piles at locations indicated to the minimum penetration or driving resistance indicated. Use test piles identical to those required for Project and drive with appropriate pile-driving equipment operating at rated driving energy to be used in driving permanent piles.
 - a. Pile Design Load: As indicated **OR as directed**.
 6. Approval Criteria: Allowable load shall be the load acting on the test pile when the lesser of, **as directed**, the following criteria are met, divided by a factor of safety of 2:
 - a. Net settlement, after deducting rebound, of not more than **0.01 inch/ton (0.25 mm/907 kg)** of test load.
 - b. Total settlement exceeds the pile elastic compression by **0.15 inch (4 mm)**, plus 1.0 percent of the tip diagonal dimension.
 - c. A plunging failure or sharp break in the load settlement curve.
 7. Test Pile-Driving Records: Prepare driving records for each test pile, compiled and attested to by a qualified professional engineer, **as directed**. Include same data as required for driving records of permanent piles.
 8. Test piles that comply with requirements, including location tolerances, may be used on Project.
- D. Steel Reinforcement
1. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 2. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.
 3. Fabricate and install reinforcement cages symmetrically about axis of pile shell **OR** pipe, **as directed**, in a single unit.

4. Accurately position, support, and secure reinforcement against displacement during concreting. Maintain minimum cover on reinforcement.
5. Protect exposed ends of extended reinforcement, dowels, or anchor bolts from mechanical damage and exposure to weather.

E. Concrete Placement

1. Do not place concrete until other piles within a radius of **20 feet (6 m)** have been driven and approved.
2. Inspection: Before placing concrete, allow testing and inspecting agency to visually inspect and verify that each pile shell **OR** pipe, **as directed**, is clean, watertight, plumb, and free of distortion or other defects.
3. Place concrete in a continuous operation and without segregation immediately after cleaning out pile shell **OR** pipe, **as directed**.
4. Place concrete by means of bottom discharge bucket, flexible drop chute, steep-sided funnel hopper, or tremie or pump concrete into place.
5. Place concrete in a dry pile shell **OR** pipe, **as directed**, unless placement underwater is approved by the Owner.
 - a. Place concrete underwater by tremie method or pumping. Control placement operations to ensure tremie is embedded no less than **60 inches (1.52 m)** into concrete, and flow of tremied concrete is continuous from bottom to top of pile shell **OR** pipe, **as directed**.
 - b. Other methods of depositing concrete may be used if approved by the Owner.
6. Consolidate final **10 feet (3 m)** of concrete during placement to ensure that concrete is thoroughly worked around steel reinforcement and into corners.
7. Screed concrete level at cutoff elevation and apply a scoured, rough finish.

F. Driving Piles

1. General: Continuously drive piles to elevations or penetration resistance indicated or established by static load testing of piles, **as directed**. Establish and maintain axial alignment of leads and piles before and during driving.
2. Predrilling, **as directed**: Provide pre-excavated holes where indicated, to depths indicated. Drill holes with a diameter less than the largest cross-section dimension of pile.
 - a. Firmly seat pile in predrilled hole by driving with reduced energy before starting final driving.
3. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.
4. Pile Splices: Splice piles during installation and align pile segments concentrically.
5. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
 - a. Location: **4 inches (102 mm)** from location indicated after initial driving, and **6 inches (152 mm)** after pile driving is completed.
 - b. Plumb: Maintain **1 inch (25 mm)** in **4 feet (1.2 m)** from vertical, or a maximum of **4 inches (102 mm)**, measured when pile is aboveground in leads.
 - c. Batter Angle: Maximum **1 inch (25 mm)** in **4 feet (1.2 m)** from required angle, measured when pile is aboveground in leads.
6. Excavation: Clean out steel pipe pile by removing soil and debris from inside pile before placing steel reinforcement or concrete.
7. Withdraw damaged or defective piles and piles that exceed driving tolerances and install new piles within driving tolerances.
 - a. Fill holes left by withdrawn piles using cohesionless soil material such as gravel, broken stone, and gravel-sand mixtures. Place and compact in lifts not exceeding **72 inches (1.83 m)**.

OR

Fill holes left by withdrawn piles as directed by the Owner.

OR

Abandon and cut off rejected piles as directed by the Owner. Leave rejected piles in place and install new piles in locations as directed by the Owner.

8. Cutting Off: Cut off tops of driven piles square with pile axis and at elevations indicated.
 9. Pile-Driving Records: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer, **as directed**. Include the following data:
 - a. Project name and number.
 - b. Name of Contractor.
 - c. Pile location in pile group and designation of pile group.
 - d. Sequence of driving in pile group.
 - e. Pile dimensions.
 - f. Ground elevation.
 - g. Elevation of tips after driving.
 - h. Final tip and cutoff elevations of piles after driving pile group.
 - i. Records of re-driving.
 - j. Elevation of splices.
 - k. Type, make, model, and rated energy of hammer.
 - l. Weight and stroke of hammer.
 - m. Type of pile-driving cap used.
 - n. Cushion material and thickness.
 - o. Actual stroke and blow rate of hammer.
 - p. Pile-driving start and finish times, and total driving time.
 - q. Time, pile-tip elevation, and reason for interruptions.
 - r. Number of blows for every **12 inches (305 mm)** of penetration, and number of blows per **1 inch (25 mm)** for the last **6 inches (152 mm)** of driving.
 - s. Pile deviations from location and plumb.
 - t. Preboring, jetting, or special procedures used.
 - u. Unusual occurrences during pile driving.
- G. Field Quality Control
1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. Pile foundations.
 2. Testing Agency: Engage a qualified independent testing agency to perform tests and inspections.
 3. Tests and Inspections:
 - a. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D 4945 during initial driving and during restriking on 5 single piles **OR** 3 percent of piles, **as directed**.
 - b. Low-strain integrity measurement shall be performed and reported for each pile.
 - c. Weld Testing: In addition to visual inspection, welds shall be tested and inspected according to AWS D1.1/D1.1M and the inspection procedures listed in subparagraphs below, at testing agency's option. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
 - 1) Liquid Penetrant Inspection: ASTM E 165.
 - 2) Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - 3) Radiographic Inspection: ASTM E 94; minimum quality level "2-2T."
 - 4) Ultrasonic Inspection: ASTM E 164.
 - d. Concrete: Sampling and testing of concrete for quality control shall include the following:
 - 1) Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94/C 94M.
 - a) Slump: ASTM C 143/C 143M; one test at point of placement for each compressive-strength test, but no fewer than one test for each concrete load.
 - b) Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is **40 deg F (5 deg C)** and below or when **80 deg F (27 deg C)** and above, and one test for each set of compressive-strength specimens.

- c) Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test unless otherwise indicated. Mold and store cylinders for laboratory-cured test specimens unless field-cured test specimens are required.
 - d) Compressive-Strength Tests: ASTM C 39/C 39M; one set for each truck load. One specimen shall be tested at seven days, two specimens shall be tested at 28 days, and one specimen shall be retained in reserve for later testing if required.
- 2) When frequency of testing will provide fewer than five strength tests for a given class of concrete, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3) When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing in-place concrete.
 - 4) Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi (3.45 MPa).
 - 5) Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, concrete type and class, location of concrete batch in piles, design compressive strength at 28 days, concrete-mix proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - 6) Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as sole basis for acceptance or rejection.
 - 7) Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate concrete strengths or other requirements have not been met.

H. Touchup Painting, as directed

- 1. Clean field welds, splices, and abraded painted areas and field-apply paint according to SSPC-PA 1. Use same paint and apply same number of coats as specified for shop painting.
 - a. Apply touchup paint before driving piles to surfaces that will be immersed or inaccessible after driving.

I. Disposal

- 1. Remove withdrawn piles and cutoff sections of piles from site and legally dispose of them off Owner's property.

END OF SECTION 31 62 23 00

Task	Specification	Specification Description
31 62 23 13	31 62 23 00	Concrete-Filled Steel Piles

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SECTION 31 64 13 00 - DRILLED PIERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for drilled piers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Dry-installed drilled piers.
 - b. Slurry displacement-installed drilled piers.

C. Submittals

1. Product Data: For each type of product indicated.
2. Design Mixtures: For each concrete mixture.
3. Shop Drawings: For concrete reinforcement.
4. Welding certificates.
5. Material certificates **OR** test reports, **as directed**.

D. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to the following:
 - a. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - b. AWS D1.4, "Structural Welding Code - Reinforcing Steel."
2. Drilled-Pier Standard: Comply with ACI 336.1 unless modified in this Section.
3. Preinstallation Conference: Conduct conference at Project site.

E. Project Conditions

1. Existing Utilities: Locate existing underground utilities before excavating drilled piers. If utilities are to remain in place, provide protection from damage during drilled-pier operations.
 - a. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, adapt drilling procedure if necessary to prevent damage to utilities. Cooperate with the Owner and utility companies in keeping services and facilities in operation without interruption. Repair damaged utilities to satisfaction of utility the Owner.
2. Interruption of Existing Utilities: Do not interrupt any utility to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of utility.
 - b. Do not proceed with interruption of utility without the Owner's written permission.
3. Survey Work: Engage a qualified land surveyor or professional engineer to perform surveys, layouts, and measurements for drilled piers. Before excavating, lay out each drilled pier to lines and levels required. Record actual measurements of each drilled pier's location, shaft diameter, bottom and top elevations, deviations from specified tolerances, and other specified data.
 - a. Record and maintain information pertinent to each drilled pier and cooperate with the Owner's testing and inspecting agency to provide data for required reports.

1.2 PRODUCTS

A. Steel Reinforcement

1. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
2. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

3. Galvanized Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420) OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 767/A 767M, Class I **OR** Class II, **as directed**, zinc coated after fabrication and bending.
4. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420) OR** ASTM A 706/A 706M, **as directed**, deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each **12-inch (300-mm)** bar length.
5. Plain-Steel Wire: ASTM A 82, as drawn **OR** galvanized, **as directed**.
6. Deformed-Steel Wire: ASTM A 496.
7. Epoxy-Coated Wire: ASTM A 884/A 884M, Class A, Type 1 coated, as-drawn, plain **OR** deformed, **as directed**, -steel wire, with less than 2 percent damaged coating in each **12-inch (300-mm)** wire length.
8. Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, plain. Cut bars true to length with ends square and free of burrs.

B. Concrete Materials

1. Cementitious Material: Use the following cementitious materials, of same type, brand, and source, throughout Project:
 - a. Portland Cement: ASTM C 150, Type I **OR** Type II **OR** Type I/II **OR** Type III **OR** Type V, **as directed**. Supplement with the following, **as directed**:
 - 1) Fly Ash: ASTM C 618, Class C **OR** Class F, **as directed**.
 - 2) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** Type IP, portland-pozzolan **OR** Type I (PM), pozzolan-modified portland **OR** Type I (SM), slag-modified Portland, **as directed**, cement.
2. Normal-Weight Aggregate: ASTM C 33, graded, **3/4-inch- (19-mm-)** nominal maximum coarse-aggregate size.
 - a. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Water: ASTM C 94/C 94M and potable.
4. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - b. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - c. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - d. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
5. Sand-Cement Grout: Portland cement, ASTM C 150, Type II; clean natural sand, ASTM C 404; and water to result in grout with a minimum 28-day compressive strength of **1000 psi (6.9 MPa)**, of consistency required for application.

C. Steel Casings

1. Steel Pipe Casings: ASTM A 283/A 283M, Grade C, or ASTM A 36/A 36M, carbon-steel plate, with joints full-penetration welded according to AWS D1.1/D1.1M.
2. Corrugated-Steel Pipe Casings: ASTM A 929/A 929M, steel sheet, zinc coated.
3. Liners: Comply with ACI 336.1.

D. Slurry

1. Slurry: Pulverized bentonite, pulverized attapulgite, or polymers mixed with water to form stable colloidal suspension; complying with ACI 336.1 for density, viscosity, sand content, and pH.

E. Concrete Mixtures

1. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
2. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 limits as if concrete were exposed to deicing chemicals.

3. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 **OR** 0.30, **as directed**, percent by weight of cement.
4. Proportion normal-weight concrete mixture as follows:
 - a. Compressive Strength (28 Days): **6000 psi (41.4 MPa) OR 5000 psi (34.5 MPa) OR 4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed.**
 - b. Maximum Water-Cementitious Materials Ratio: 0.50 **OR** 0.45 **OR** 0.40, **as directed.**
 - c. Minimum Slump: Capable of maintaining the following slump until completion of placement:
 - 1) **4 inches (100 mm)** for dry, uncased, or permanent-cased drilling method.
 - 2) **6 inches (150 mm)** for temporary-casing drilling method.
 - 3) **7 inches (175 mm)** for slurry displacement method.
 - d. Air Content: Do not air entrain concrete.

F. Fabricating Reinforcement

1. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

G. Concrete Mixing

1. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - a. When air temperature is between **85 and 90 deg F (30 and 32 deg C)**, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F (32 deg C)**, reduce mixing and delivery time to 60 minutes.

1.3 EXECUTION

A. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by drilled-pier operations.

B. Excavation

1. Unclassified Excavation: Excavate to bearing elevations regardless of character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions.
 - a. Obstructions: Unclassified excavation may include removal of unanticipated boulders, concrete, masonry, or other subsurface obstructions. No changes in the Contract Sum or the Contract Time will be authorized for removal of obstructions.
2. Classified Excavation: Excavation is classified as standard excavation, special excavation, and obstruction removal and includes excavation to bearing elevations as follows:
 - a. Standard excavation includes excavation accomplished with conventional augers fitted with soil or rock teeth, drilling buckets, or underreaming tools attached to drilling equipment of size, power, torque, and downthrust necessary for the Work.
 - b. Special excavation includes excavation that requires special equipment or procedures above or below indicated depth of drilled piers where drilled-pier excavation equipment used in standard excavation, operating at maximum power, torque, and downthrust, cannot advance the shaft.
 - 1) Special excavation requires use of special rock augers, core barrels, air tools, blasting, or other methods of hand excavation.
 - 2) Earth seams, rock fragments, and voids included in rock excavation area will be considered rock for full volume of shaft from initial contact with rock.
 - c. Obstructions: Payment for removing unanticipated boulders, concrete, masonry, or other subsurface obstructions that cannot be removed by conventional augers fitted with soil or rock teeth, drilling buckets, or underreaming tools attached to drilling equipment of size, power, torque, and downthrust necessary for the Work will be according to Contract provisions for changes in the Work.

3. Prevent surface water from entering excavated shafts. Conduct water to site drainage facilities.
 4. Excavate shafts for drilled piers to indicated elevations. Remove loose material from bottom of excavation.
 - a. Excavate bottom of drilled piers to level plane within 1:12 tolerance.
 - b. Remove water from excavated shafts before concreting.
 - c. Excavate rock sockets of dimensions indicated.
 - d. Cut series of grooves about perimeter of shaft to height from bottom of shaft, vertical spacing, and dimensions indicated.
 5. Notify and allow testing and inspecting agency to test and inspect bottom of excavation. If unsuitable bearing stratum is encountered, make adjustments to drilled piers as determined by the Owner.
 - a. Do not excavate shafts deeper than elevations indicated unless approved by the Owner.
 - b. Payment for additional authorized excavation will be according to Contract provisions for changes in the Work.
 6. End-Bearing Drilled Piers: If further exploration below bearing elevation is required for end-bearing piers or if soft soils are suspected, probe with auger to a depth below bearing elevation, equal to diameter of the bearing area of drilled pier. Determine whether voids, clay seams, or solution channels exist.
 - a. Fill augur-probe holes with grout.
 7. End-Bearing Drilled Piers: If drilled piers bear on clay or hardpan, probe with auger to a depth of **96 inches (2450 mm)** below bottom elevation of shaft, and visually inspect and classify soil. Verify continuity and thickness of stratum.
 8. Excavate shafts for closely spaced drilled piers and for drilled piers occurring in fragile or sand strata only after adjacent drilled piers are filled with concrete and allowed to set.
 9. Slurry Displacement Method: Stabilize excavation with slurry maintained a minimum of **60 inches (1500 mm)** above ground-water level and above unstable soil strata to prevent caving or sloughing of shaft. Maintain slurry properties before concreting.
 - a. Excavate and complete concreting of drilled pier on same day if possible, or redrill, clean, and test slurry in excavation before concreting.
 - b. Clean bottom of each shaft before concreting.
 10. Temporary Casings: Install watertight steel casings of sufficient length and thickness to prevent water seepage into shaft; to withstand compressive, displacement, and withdrawal stresses; and to maintain stability of shaft walls.
 - a. Remove temporary casings, maintained in plumb position, during concrete placement and before initial set of concrete, or leave temporary casings in place, **as directed**.
 11. Bells: Excavate bells for drilled piers to shape, base thickness, and slope angle indicated. Excavate bottom of bells to level plane and remove loose material before placing concrete.
 - a. Shore bells in unstable soil conditions to prevent cave-in during excavation, inspection, and concreting.
 12. Tolerances: Construct drilled piers to remain within ACI 336.1 tolerances.
 - a. If location or out-of-plumb tolerances are exceeded, provide corrective construction. Submit design and construction proposals to the Owner for review before proceeding.
- C. Permanent Steel Casings
1. Install steel casings of minimum wall thickness indicated and of diameter not less than diameter of drilled pier.
 - a. Install casings as excavation proceeds, to maintain sidewall stability.
 - b. Fabricate bottom edge of lowest casing section with cutting shoe capable of penetrating rock and achieving water seal.
 - c. Connect casing sections by continuous penetration welds to form watertight, continuous casing.
 - d. Remove and replace or repair casings that have been damaged during installation and that could impair strength or efficiency of drilled pier.
 - e. Fill annular void between casing and shaft wall with grout.

2. Corrugated-Steel Casings: Provide corrugated-steel casings formed from zinc-coated steel sheet.
 - a. Corrugated casings may be delivered in sections or panels of convenient length and field connected according to manufacturer's written instructions.

- D. Steel Reinforcement
 1. Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 2. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.
 3. Fabricate and install reinforcing cages symmetrically about axis of shafts in a single unit.
 4. Accurately position, support, and secure reinforcement against displacement during concreting. Maintain minimum cover over reinforcement.
 5. Use templates to set anchor bolts, leveling plates, and other accessories furnished in work of other Sections. Provide blocking and holding devices to maintain required position during final concrete placement.
 6. Protect exposed ends of extended reinforcement, dowels, or anchor bolts from mechanical damage and exposure to weather.

- E. Concrete Placement
 1. Place concrete in continuous operation and without segregation immediately after inspection and approval of shaft by the Owner's independent testing and inspecting agency.
 - a. Construct a construction joint if concrete placement is delayed more than one hour. Level top surface of concrete and insert joint dowel bars, **as directed**. Before placing remainder of concrete, clean surface laitance, roughen, and slush concrete with commercial bonding agent or with sand-cement grout mixed at ratio of 1:1.
 2. Dry Method: Place concrete to fall vertically down the center of drilled pier without striking sides of shaft or steel reinforcement.
 - a. Where concrete cannot be directed down shaft without striking reinforcement, place concrete with chutes, tremies, or pumps.
 - b. Vibrate top **60 inches (1500 mm)** of concrete.
 3. Slurry Displacement Method: Place concrete in slurry-filled shafts by tremie methods or pumping. Control placement operations to ensure that tremie or pump pipe is embedded no fewer than **60 inches (1500 mm)** into concrete and that flow of concrete is continuous from bottom to top of drilled pier.
 4. Coordinate withdrawal of temporary casings with concrete placement to maintain at least a **60-inch (1500-mm)** head of concrete above bottom of casing.
 - a. Vibrate top **60 inches (1500 mm)** of concrete after withdrawal of temporary casing.
 5. Screed concrete at cutoff elevation level and apply scoured, rough finish. Where cutoff elevation is above the ground elevation, form top section above grade and extend shaft to required elevation.
 6. Protect concrete work, according to ACI 301, from frost, freezing, or low temperatures that could cause physical damage or reduced strength.
 - a. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - b. Do not use calcium chloride, salt, or other mineral-containing antifreeze agents or chemical accelerators.
 7. If hot-weather conditions exist that would seriously impair quality and strength of concrete, place concrete according to ACI 301 to maintain delivered temperature of concrete at no more than **90 deg F (32 deg C)**.
 - a. Place concrete immediately on delivery. Keep exposed concrete surfaces and formed shaft extensions moist by fog sprays, wet burlap, or other effective means for a minimum of seven days.

- F. Field Quality Control

1. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
 - a. Drilled piers.
 - b. Excavation.
 - c. Concrete.
 - d. Steel reinforcement welding.
2. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
3. Drilled-Pier Tests and Inspections: For each drilled pier, before concrete placement.
 - a. Soil Testing: Bottom elevations, bearing capacities, and lengths of drilled piers indicated have been estimated from available soil data. Actual elevations and drilled-pier lengths and bearing capacities will be determined by testing and inspecting agency. Final evaluations and approval of data will be determined by the Owner.
 - 1) Bearing Stratum Tests: Testing agency will take undisturbed hardpan **OR** rock, **as directed**, core samples from drilled-pier bottoms and test each sample for compression, moisture content, and density, and will report results and evaluations.
4. Concrete Tests and Inspections: ASTM C 172 except modified for slump to comply with ASTM C 94/C 94M.
 - a. Slump: ASTM C 143/C 143M; one test at point of placement for each compressive-strength test but no fewer than one test for each concrete load.
 - b. Concrete Temperature: ASTM C 1064/C 1064M; 1 test hourly when air temperature is **40 deg F (4.4 deg C)** and below and **80 deg F (27 deg C)** and above, and 1 test for each set of compressive-strength specimens.
 - c. Compression Test Specimens: ASTM C 31/C 31M; one set of four standard cylinders for each compressive-strength test unless otherwise indicated. Mold and store cylinders for laboratory-cured test specimens unless field-cured test specimens are required.
 - d. Compressive-Strength Tests: ASTM C 39; one set for each drilled pier but not more than one set for each truck load. One specimen will be tested at 7 days, 2 specimens will be tested at 28 days, and 1 specimen will be retained in reserve for later testing if required.
 - e. If frequency of testing will provide fewer than five strength tests for a given class of concrete, testing will be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - f. If strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 - g. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than **500 psi (3.4 MPa)**.
 - h. Report test results in writing to the Owner, concrete manufacturer, and Contractor within 48 hours of testing. List Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests in reports of compressive-strength tests.
 - i. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but will not be used as sole basis for approval or rejection of concrete.
 - j. Additional Tests: Testing and inspecting agency will make additional tests of concrete if test results indicate that slump, compressive strengths, or other requirements have not been met, as directed by the Owner.
 - 1) Continuous coring of drilled piers may be required, at Contractor's expense, if temporary casings have not been withdrawn within specified time limits or if observations of placement operations indicate deficient concrete quality, presence of voids, segregation, or other possible defects.

- k. Perform additional testing and inspecting, at Contractor's expense, to determine compliance of replaced or additional work with specified requirements.
- l. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
5. An excavation, concrete, or a drilled pier will be considered defective if it does not pass tests and inspections.
6. Prepare test and inspection reports for each drilled pier as follows:
 - a. Actual top and bottom elevations.
 - b. Actual drilled-pier diameter at top, bottom, and bell.
 - c. Top of rock elevation.
 - d. Description of soil materials.
 - e. Description, location, and dimensions of obstructions.
 - f. Final top centerline location and deviations from requirements.
 - g. Variation of shaft from plumb.
 - h. Shaft excavating method.
 - i. Design and tested bearing capacity of bottom.
 - j. Depth of rock socket.
 - k. Levelness of bottom and adequacy of cleanout.
 - l. Properties of slurry and slurry test results at time of slurry placement and at time of concrete placement.
 - m. Ground-water conditions and water-infiltration rate, depth, and pumping.
 - n. Description, purpose, length, wall thickness, diameter, tip, and top and bottom elevations of temporary or permanent casings. Include anchorage and sealing methods used and condition and weather tightness of splices if any.
 - o. Description of soil or water movement, sidewall stability, loss of ground, and means of control.
 - p. Bell dimensions and variations from original design.
 - q. Date and time of starting and completing excavation.
 - r. Inspection report.
 - s. Condition of reinforcing steel and splices.
 - t. Position of reinforcing steel.
 - u. Concrete placing method, including elevation of consolidation and delays.
 - v. Elevation of concrete during removal of casings.
 - w. Locations of construction joints.
 - x. Concrete volume.
 - y. Concrete testing results.
 - z. Remarks, unusual conditions encountered, and deviations from requirements.
- G. Disposal Of Surplus And Waste Materials
 1. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 31 64 13 00

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SECTION 31 66 15 00 - RESISTANCE PIER SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of 2-Piece Resistance Piers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Scope of Work: The work includes, but is not limited, to the following:

1. All soil excavation;
2. Preparation of the footing and stem wall or foundation grade beam;
3. Installation of the Pier Bracket including concrete anchors;
4. Mounting of the Drive Stand Assembly and the installation of steel Pier Sections to designed specifications;
5. Installation of the Top Pier Platform and Two Piece Lift Head Assembly;
6. Lifting of the structure with hydraulic rams and the restoration of the structure to a permanent elevation;
7. Replacement of the soil and general site clean-up.

1.2 PRODUCTS

A. Pier Bracket

1. Standard 2-Piece Pier Bracket (2-7/8" Diameter Pier Pipe): The Pier Bracket shall be a welded assembly of 5/8 and 1/2 inch thick flame cut steel plates conforming to ASTM A36, A568 and A569. The Pier Bracket shall provide 69 square inches of bearing surface against the bottom of the footing and a minimum of 48 square inches against the vertical face of the foundation. The Pier Bracket shall have guides for the top pier platform, two 9/16 inch diameter bracket mounting holes, two 11/16 inch diameter pier pin holes and four 1-1/32 inch diameter alignment and equipment mounting holes.
2. Standard 2-Piece Pier Bracket (3-1/2" & 4" Diameter Pier Pipe): The Pier Bracket for the 3-1/2 inch or 4-inch diameter pier shall be a welded assembly of 5/8 and 1/2 inch thick flame cut steel plates conforming to ASTM A36, A568 and A569. The Pier Bracket shall provide 74 square inches of bearing surface against the bottom of the footing and a minimum of 59 square inches against the vertical face of the foundation. The Pier Bracket shall have guides for the Top Pier Platform, two 9/16 inch diameter bracket mounting holes, two 11/16 inch diameter pier pin holes and six 1-1/32 inch diameter alignment and equipment mounting holes.
3. Heavy Duty 2-Piece Pier Bracket (4-1/2" Diameter Pier Pipe): The Pier Bracket shall be a welded assembly of 5/8 and 1/2 inch thick flame cut steel plates conforming to ASTM A36, A568 and A569. The Pier Bracket shall provide 74 square inches of bearing surface against the bottom of the footing and a minimum of 128 square inches against the vertical face of the foundation. The Pier Bracket shall have guides for the Top Pier Platform, four 9/16 inch diameter bracket mounting holes, two 7/8 inch diameter pier pin holes and six 1-1/32 inch diameter alignment and equipment mounting holes.
4. Flat Plate 2-Piece Pier Bracket (2-7/8", 3-1/2" & 4" Diameter Pier Pipe): The Pier Bracket shall be a welded assembly of 5/8 and 1/2-inch thick flame cut steel plates conforming to ASTM A36, A568 and A569. The Pier Bracket shall provide 320 square inches of surface contact against a vertical face of the stem wall or column. The Pier Bracket shall have guides for the Top Pier Platform, four 1 inch and four 1-1/8 inch diameter bracket mounting holes, four 11/16 inch diameter pier pin holes and six 1-1/32 inch diameter alignment and equipment mounting holes.
5. Curved Plate 2-Piece Pier Bracket (2-7/8", 3-1/2" & 4" Diameter Pier Pipe): The Curved Plate series of Pier Brackets shall be constructed as specified in Paragraph A.1 above with the

exception that the plate that mounts against the circular column shall be rolled to conform to the diameter of the column.

B. Anchor Bolts

1. Standard Pier Anchor Bolts: Each Pier Bracket requires two 1/2 inch diameter by 5-1/2 inch long (minimum) steel concrete expansion bolts (Four required for the 4-1/2" Diameter Heavy Duty 2-Piece Pier), cadmium plated with an ultimate pull out capacity of 6,300 pounds, working load 2,400 pounds. Bolts are required for mounting only. The Anchor Bolts shall be supplied with a flat washer and nut.
2. Plate Pier Anchor Bolts: Each Pier Bracket requires two 1/2 inch diameter by 5-1/2 inch long (minimum), four 3/4 inch diameter by 7-1/2 inch long (minimum) and four 3/4 inch diameter (minimum) by 10 inch long (minimum) steel concrete expansion bolts, cadmium plated with an ultimate pull out capacity of 7,250 pounds (minimum) to achieve maximum capacity. (Lighter bolt design may be used with lighter load applications.) The Anchor Bolts shall be supplied with a flat washer and nut.

C. Grout (Optional)

1. Pressure Bearing Grout: Quick setting premixed mortar with a 4,500 psi (minimum), three day strength. Master Builder's 713 Non-Shrink Grout or equivalent.
2. Flowable Pipe Grout: Quick setting, neat cement flowable grout with a 4,000 psi (minimum), three day strength.
3. Flowable Grout Fill: The grout slurry shall consist of sand, soil or other suitable void fill material mixed with any recognized lubricant such as 12 per cent cement (2-1/2 sack mix), bentonite or other lubricant to promote proper flow characteristics.

D. Drive Stand Assembly: The Drive Stand Assembly shall be a welded steel frame with a double acting hydraulic actuator capable of pressing the 42 inch long steel Pier Sections through the soil to a load bearing strata. The Drive Stand Assembly shall be temporarily attached to the Pier Bracket by means of one inch diameter by 2-3/4 inch long high strength locking pins.

E. Pier Section

1. Pier Section (2-7/8" Diameter x 0.165" Wall Thickness): Each Pier Section shall be fabricated from a 2-7/8 inch outside diameter by 42-inch long mill rolled, induction heat treated steel section with a 0.165 inch wall thickness. Yield strength shall be 50,000 psi and tensile strength shall be 55,000 psi. The initial section shall have a 3-1/2 inch outside diameter collar welded to the lead end of the pipe to assist in reducing wall friction during driving of the pier to capacity. The Pier Sections that follow shall each have a Coupling welded to one end. Steel in this section shall conform to ASTM A513.
2. Standard Pier Section (3-1/2" Diameter x 0.160" Wall Thickness): Each Pier Section shall be fabricated from a 3-1/2 inch outside diameter by 42-inch long mill rolled galvanized steel section with a 0.160 inch wall thickness. Yield strength shall be 50,000 psi and tensile strength shall be 55,000 psi. A triple coat corrosion protection of zinc chromate and clear polymer coating shall be provided. The initial section shall have a 4 inch outside diameter collar welded to the lead end of the pipe to assist in reducing wall friction during driving of the pier to capacity. The Pier Sections that follow shall each have a Coupling welded to one end. Steel in this section shall conform to ASTM A53, A513, A588, and B6.
3. Pier Section (4" Diameter x 0.219" Wall Thickness): Each Pier Section shall be fabricated from a 4 inch outside diameter by 42-inch long mill rolled steel section with a 0.219 inch wall thickness. Yield strength shall be 50,000 psi and tensile strength shall be 55,000 psi. The initial section shall have a 4-1/2 inch outside diameter collar welded to the lead end of the pipe to assist in reducing wall friction during driving of the pier to capacity. The Pier Sections that follow shall each have a Coupling welded to one end. Steel in this section shall conform to ASTM A513.
4. Heavy Duty Pier Section (4-1/2" Diameter x 0.238" Wall Thickness): Each Pier Section shall be fabricated from a 4-1/2 inch diameter, 0.238 wall thick pipe. Yield strength shall be 50,000 psi and tensile strength shall be 55,000 psi. The initial section shall have a 5 inch outside diameter

collar welded to the lead end of the pipe to assist in reducing wall friction during driving of the pier to capacity. The Pier Sections that follow shall each have a Coupling welded to one end. Steel in this section shall conform to ASTM A513.

- F. Coupling: The Pier Coupling shall be a 6-inch long tubular steel section of suitable diameter to fit inside the Pier Section. The Coupling shall be inserted and attached 3 inches inside one end of each Pier Section that follows the initial Pier Section. The remaining 3 inches of the Coupling shall extend beyond the Pier Section. All components shall conform to ASTM A513. On the 3-1/2" Pier Pipe, the Coupling shall be attached by an embossed mechanical connection. On all other Pier Pipe sizes, the Coupling shall be attached by plug welding the Coupling to the Pier Pipe.
- G. Modified Sleeve Pier Section (Modified Pier Only): The Modified Sleeve Pier Section shall be fabricated from a 3-1/2 inch diameter, 0.216 inch thick wall or 4 inch diameter, 0.219 inch thick wall mill rolled steel pipe, by 42 inches long. The yield strength shall be 50,000 psi. The Pipe Sleeve shall be mounted over the last Pier Section and shall be used to increase the moment transfer capacity from the Top Pier Platform to the Pier Section. Steel in this section shall conform to ASTM A36.
- H. Pier Sleeving (Optional): Pier Sleeving shall be used to stiffen the segmented joints through areas of weak soils. Depending upon the product, the sleeve sections shall be fabricated from 3 inch diameter, schedule 40 pipe, or 4 inch diameter, 0.219 inch thick wall mill rolled steel pipe, or 4-1/2 inch diameter, 0.238 thick wall mill rolled steel pipe by 42 inches long. The Sleeving shall be driven over the Pier Sections in the area of weak soils. The Sleeving shall be installed in a manner that staggers the joints in the Pier with the joints in the Sleeving. Steel in this section shall conform to one or more of ASTM A53, A513, A588, B6.
- I. Top Pier Platform
 - 1. Top Pier Platform For Standard, Modified And Plate Piers: The Standard Pier Platform shall be a welded assembly consisting of an 18 inch long steel tube of suitable size to fit over the Pier Section that shall form the cap cylinder. The cap cylinder shall have two 10 inch long by 5/8 inch thick steel plates welded as vertical stabilizers to the sides of the steel cap cylinder. The top of the Top Pier Platform shall be a 1 inch thick steel plate welded to the top of the cap cylinder. All steel elements shall conform to ASTM A36.
 - 2. Top Pier Platform For 4-1/2" Diameter Piers: A 4 inch outside diameter by 20 inch long steel pipe shall be welded to the inside of a 4-1/2 outside diameter by 10 inch long steel pipe to form the cap cylinder. The cap cylinder shall have two 9-1/2 inch long by 5/8 inch thick steel plates welded as vertical stabilizers to the sides of the steel cap cylinder. At the top of the Top Pier Platform shall be a 1 inch thick steel plate welded to the top of the cap cylinder. All steel elements shall conform to ASTM A36.
- J. High Strength Pier Pins
 - 1. High Strength Pier Pins For Standard, Modified And Plate Piers: Two 5/8 inch diameter by three inch long high strength, heat treated cadmium plated Pier Pins are required per pier. The Pier Pins shall be capable of providing 55,000 pounds of ultimate shear resistance capacity in double shear configuration. Pier Pins shall be 10B21 Boron Steel and heat treated to RC36 +/- . Pins shall conform to ASTM A490.
 - 2. High Strength Pier Pins For 4-1/2" Diameter Piers: Two 3/4 inch diameter by 3-1/4 inch long high strength cadmium plated Pier Pins are required per pier. The Pier Pins are capable of providing a minimum 30,000 pounds of shear capacity at each point of shear. Pier Pins shall be equivalent to Grade 8.
- K. Lift Shims: The Lift Shims shall be 5/8 inch by 1-1/2 inch and either 7 gauge or 16 gauge cadmium plated hot rolled steel. Lift Shims shall be used as required. The steel shall conform to ASTM A36.
- L. Two Piece Lift Head Assembly: The Two Piece Lift Head shall be a welded assembly that consists of 5/8 inch thick and 1 inch thick steel plates and is capable of providing a minimum of 45,000 pounds resistance capacity. The Two Piece Lift Head Assembly shall be temporarily attached to the Pier

Bracket by means of one inch diameter by 2-3/4 inch long high strength locking pins that are inserted through matching 1-1/32 inch diameter holes.

- M. Lateral Support Device: The Lateral Support Device is a specialized tool used to provide a horizontal force to the bottom of the Pier Bracket during Pier Section installation. The Lateral Support Device shall help counteract the torque developed between the structure and the Pier Bracket during Pier Section installation. The Lateral Support Device is a welded assembly of steel plate and tubing that has an adjustable length by means of a hand actuated thread and by a steel pin inserted through adjustment holes in the Lateral Support Device.
- N. Helical Outrigger Assembly (Optional): The Helical Outrigger Assembly shall provide supplemental drive resistance when installing the Pier Sections. This optional assembly is for use on light structures with low structural integrity. It is also used to push the Pier Section through weak or unsuitable strata and to develop a higher factor of safety. The Helical Outrigger Assembly shall consist of Helical Anchors, Helical Extension Sections, Connector Pins and Extension Rods.
- O. Weldments: All welded connections shall conform to the requirements of the American Welding Society, "Structural Welding Code AWS D1.1", and applicable revisions.

1.3 EXECUTION

- A. Exposure Of Footing Or Grade Beam: An area shall be excavated immediately adjacent to the building foundation to expose the footing, bottom of the grade beam, stem wall or column to a width of at least 36 inches and at least 15 inches beneath the proposed elevation of the base of the Pier Bracket. A chipping hammer shall be used to smooth and prepare the foundation for mounting of the Pier Bracket. The vertical and bottom face of the footing, if applicable, shall, to the extent possible, be smooth and at right angles to each other. The spread footing, if present, shall be notched to allow the Pier Bracket to mount directly under the bearing load of the stem wall, or shall be core drilled to allow the Pier Pipe from the Plate Pier to be installed. DO NOT cut any reinforcing steel in the footing element without approval by the engineer. The surfaces shall be smooth, free of all dirt, debris, and loose concrete so as to provide firm bearing surfaces for the Pier Bracket.
- B. Installation Of The Pier Bracket
 - 1. Installation Of The Standard & Heavy Duty Two Piece Pier Bracket
 - a. The Pier Bracket shall be temporarily mounted to the Drive Stand Assembly using one inch diameter locking pins and retaining clips. This assembly shall be lowered into the excavation adjacent to the foundation. The Pier Bracket shall then be seated flush against the footing using a hydraulic actuator or ram. The Pier Bracket shall be then fastened to the footing with two expansion Anchor Bolts. If the Pier Bracket does not have continuous bearing support on either the vertical or horizontal face, then Pressure Bearing Grout shall be used to provide proper bearing prior to driving the pier. Care should be exercised to insure that the Drive Stand Assembly frame is aligned plumb prior to driving each Pier Section. A carpenter's level may be used to verify the vertical alignment.
 - b. Install a Lateral Support Device between the bottom front side of the Pier Bracket and the vertical wall of the excavation opposite the pier. During installation of the Pier Sections, maintain support against the Pier Bracket with the Lateral Support Device. If required, install the optional Helical Outrigger Assembly to provide Supplemental Drive Resistance at this time.
 - 2. Installation Of The Two-Piece Plate Pier Bracket: A bolt template shall be used to properly locate and align the Pier Bracket at the location directed by the designer or directly over the cored hole in the footing element, if present. Once the anchor bolt holes are located, the 8 bolts shall be installed to the vertical face. The Plate Pier Bracket shall be installed with the nuts and washers provided with the anchor bolts. The longer bolts mount to the lower holes. Follow manufacturer's recommendations for bolt installation and maintain maximum embedment of the bolts. If the Pier

Bracket does not have continuous bearing support on the vertical face, then Pressure Bearing Grout shall be used to provide proper bearing prior to driving the pier. Care should be exercised to insure that the Pier Bracket is aligned plumb. A carpenter's level may be used to verify the vertical alignment.

C. Driving And Testing Pier Sections

1. **Driving Of Pier Sections:** All Pier Sections shall be continuously driven by use of the Drive Stand Assembly. The initial Pier Section shall have the friction reduction collar on the bottom end. Additional Pier Sections shall be added as the pier driving operation continues. Driving of the Pier Sections will continue until rock or an equal bearing strata is reached.
2. **Load Testing Pier Section**
 - a. **Using The Double Acting Hydraulic Actuator:** The pier shall be driven using the Drive Stand Assembly and the double acting hydraulic actuator until the maximum operating pressure of the hydraulic cylinder is reached or until lift of the structure is achieved, whichever occurs first. If the maximum hydraulic cylinder operating pressure is reached without lifting the structure, load test the Pier Section per Paragraph b following.
 - b. **Using A Hydraulic Ram:** Load testing the Pier to a force greater than the capacity of the hydraulic cylinder shall be achieved by removing the double acting hydraulic actuator from the Drive Stand Assembly and replacing it with the Supplemental Block. Install a 25 or 50 ton hydraulic ram, depending upon test force required, between the last Pier Section and the Supplemental Block. The hydraulic ram shall be actuated with a hand pump until bearing strata is verified as defined by a maximum installation force of:
 - 45,000 lbs. for 2-7/8" Dia. x 0.165" 2-Piece Pier & Plate Pier,
 - 52,500 lbs. for 2-7/8" Dia. x 0.165" 2-Piece Modified Pier & Modified Plate Pier,
 - 65,000 lbs. for 3-1/2" Dia. x 0.160" 2-Piece Pier & Plate Pier,
 - 67,500 lbs. for 3-1/2" Dia. x 0.160" 2-Piece Modified Pier & Modified Plate Pier,
 - 71,250 lbs. for 4" Dia. x 0.219" 2-Piece Pier & Plate Pier
 - 75,000 lbs. for 4" Dia. x 0.219" 2-Piece Modified Pier & Modified Plate Pier
 - 82,500 lbs. for 4-1/2" Dia. Heavy Duty 2-Piece Pier;
or until lift of the structure is achieved, whichever is less.
3. **Drive Equipment Removal:** The Drive Stand Assembly shall be then removed from the Pier Bracket by removing the one inch diameter locking pins. The optional Helical Outrigger Assembly shall be removed at this time. (NOTE: If the 3-1/2" Diameter Modified Pier is being installed, or if the Pier is to be sleeved; perform the operations in Paragraph 4. following, before removing the Drive Stand Assembly.)
4. **Cutting Final Pier Section:** It is likely that the final installed Pier Section will have to be removed from the hole and cut to a length suitable to provide space for installing the Top Pier Platform. Mark and cut the Pier Section to the proper length using a metal cutting saw capable of a smooth cut at 90 degrees to the length of the Pier Section. After cutting to length, the final Pier Section is replaced.

- D. Driving Of Pipe Sleeve (Optional):** Once the capacity of the pier is achieved, the Drive Stand Assembly shall be used to push the Modified Sleeving Pier Section or plain Pier Sleeving over the last Pier Section or sections. **Do not exceed the manufacturer's rated operating capacity for the hydraulic cylinder.** The joints between the Pier Sleeves shall be staggered with the Couplings on the Pier Sections. Once the Pipe Sleeve(s) are installed, the Drive Stand Assembly shall be removed from the Pier Bracket by removing the one inch diameter locking pins.

- E. Installing Pipe Grout (Optional):** Once the pier is installed to load bearing stratum and cut to the proper elevation, a neat cement flowable grout may be installed to the pier pipe. The grout will increase the moment of inertia (stiffness) and corrosion resistance of the pier. The grout shall be introduced to the bottom of the pier by means of a tube inserted into the pier pipe. As the grout is pumped into the pier pipe the tube shall be removed as the elevation of the grout increases. The process shall be executed carefully so that air is not entrained into the grout.

- F. Installation Of The Top Pier Platform: The Top Pier Platform shall be installed over the last installed Pier Section. Align the vertical stabilizers within the channels on the legs of the Pier Bracket and tap the Top Pier Platform until it contacts the top of the final Pier Section. A small port shall be provided between the cap cylinder and the platform to verify contact.
- G. Installation Of The Two Piece Lift Head Assembly: The Two Piece Lift Head Assembly shall be temporarily attached to the Pier Bracket by aligning the holes in each assembly. The one inch diameter locking pins and clips are used to align and hold the two pieces together.
- H. Lifting And Holding: The lifting and holding operation is designed to raise the structure and to restore it to as close to the original elevation as the construction will allow. Normally this lift and hold operation is accomplished with several Pier placements simultaneously. Install one 25 or 30 ton hydraulic ram as required between the Two Piece Lift Head Assembly and the Top Pier Platform on each pier. Install 3-1/2 inch square pier shims or equal to reduce excess space between the ram and the Two Piece Lift Head Assembly. The rams shall be actuated simultaneously to raise the structure. Lifting shall continue until the structure is restored to its approximate original elevation or to design specifications. Once restored, install the cadmium plated Lift Shims above the vertical stabilizer plates of the Top Pier Platform. The 7 gauge shims shall always be used for this operation. The 16 gauge shims shall only be used for fine adjustments between the stack of shims and the bottom of the pier pin holes in the Pier Bracket. Install two High Strength Pier Pins into the holes in the Pier Bracket by tapping the High Strength Pier Pins into place. There must be a snug fit of the High Strength Pier Pins and the Lift Shims. The load is transferred to the Pier System by removing the pressure from the hydraulic rams. Remove the ram and then remove the one inch locking pins along with the Two Piece Lift Head Assembly from the Pier Bracket.
- I. Documentation: The installer shall carefully monitor the driving force applied to the Pier Sections as the pier is installed. It is recommended that the driving force be recorded at 3-1/2 foot unless directed otherwise by the Engineer. The form of the data may be as directed by the customer or the Engineer. The Lifting Force, Lift, and Pier Depth shall also be recorded and presented in a tabular form. In addition, the installer shall know and have the desired terminal pressure that will create the desired driving force approved by the Engineer prior to beginning the pier installation.
- J. Void Filling (Optional - Depends upon soil characteristics, structure, and amount of lift): After raising operations are complete, voids created between the foundation and underlying soil shall be filled using a low pressure injection of grout slurry. Injection shall be through holes through the foundation. The contractor shall inject the grout in such a manner as to completely fill the void without trapping pockets of air. When the operation is complete, the contractor shall repair the injection holes by filling the holes with high strength non-shrinking grout and finishing to reasonably match the existing surface textures and elevations.
- K. Clean Up: Once all of the equipment has been removed, the area shall be backfilled using the previously excavated soil. The backfill shall be made by placing no more than 8 inches of loose material in a lift and compacting that soil prior to placement of the next 8-inch lift. Sufficient lifts shall be used to restore the ground to its original elevation and density. Slope the soil contour for drainage away from the foundation.

END OF SECTION 31 66 15 00

SECTION 32 01 11 53 - TRAFFIC COATINGS

1.1 GENERAL

A. Description Of Work:

1. This specification covers the furnishing and installation of materials for traffic coating. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes traffic coatings for the following applications:
 - a. Interior and exterior pedestrian traffic.
 - b. Vehicular traffic.
 - c. Pavement markings.

C. Submittals

1. Product Data: For each product indicated.
2. Shop Drawings: Show extent of each traffic coating. Include details for treating substrate joints and cracks, flashings, deck penetrations, and other termination conditions.
3. Samples: For each type of finish indicated.
4. Material test reports.
5. Material certificates.
6. Qualification data.
7. Maintenance data.
8. Warranty.
9. LEED Submittal:
 - a. Product Data for Credit EQ 4.2: For interior field-applied traffic coatings and pavement marking paints, including printed statement of VOC content.

D. Quality Assurance

1. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of traffic coatings required for this Project.
2. Fire-Test-Response Characteristics: Provide traffic coating materials with the fire-test-response characteristics as determined by testing identical products per test method below for deck type and slopes indicated by an independent testing and inspecting agency that is acceptable to authorities having jurisdiction.
 - a. Class A **OR B OR C, as directed**, roof covering per ASTM E 108 or UL 790.
3. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels showing the following information:
 - a. Manufacturer's brand name.
 - b. Type of material.
 - c. Directions for storage.
 - d. Date of manufacture and shelf life.
 - e. Lot or batch number.
 - f. Mixing and application instructions.
 - g. Color.
2. Store materials in a clean, dry location protected from exposure to direct sunlight. In storage areas, maintain environmental conditions within range recommended in writing by manufacturer.

F. Project Conditions

1. Environmental Limitations: Apply traffic coatings within the range of ambient and substrate temperatures recommended in writing by manufacturer. Do not apply traffic coatings to damp or wet substrates, when temperatures are below **40 deg F (5 deg C)**, when relative humidity exceeds 85 percent, or when temperatures are less than **5 deg F (3 deg C)** above dew point.
 - a. Do not apply traffic coatings in snow, rain, fog, or mist, or when such weather conditions are imminent during the application and curing period. Apply only when frost-free conditions occur throughout the depth of substrate.
2. Do not install traffic coating until items that will penetrate membrane have been installed.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which traffic coating manufacturer agrees to repair or replace traffic coatings that deteriorate during the specified warranty period. Warranty does not include deterioration or failure of traffic coating due to unusual weather phenomena, failure of prepared and treated substrate, formation of new substrate cracks exceeding **1/16 inch (1.6 mm)** in width, fire, vandalism, or abuse by snowplow, maintenance equipment, and truck traffic.
 - a. Deterioration of traffic coatings includes the following:
 - 1) Adhesive or cohesive failures.
 - 2) Abrasion or tearing failures.
 - 3) Surface crazing or spalling.
 - 4) Intrusion of water, oils, gasoline, grease, salt, deicer chemicals, or acids into deck substrate.
 - b. Warranty Period: Five years from date of Final Completion.

1.2 PRODUCTS

A. Materials

1. Traffic Coatings: Complying with ASTM C 957.
2. Material Compatibility: Provide primers; base, intermediate, and topcoats; and miscellaneous materials that are compatible with one another and with substrate under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. VOC Content: Provide traffic coatings and pavement marking paints, for use inside the weatherproofing system, with VOC content of 150 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Traffic Coating

1. Primer: Manufacturer's standard factory-formulated primer recommended for substrate and conditions indicated.
 - a. Material: Epoxy **OR** Urethane, **as directed**.
2. Preparatory and Base Coats: Single- or multicomponent, aromatic liquid urethane elastomer.
3. Intermediate Coat: Single- or multicomponent, aromatic liquid urethane elastomer **OR** Single- or multicomponent, aliphatic liquid urethane elastomer **OR** Liquid epoxy, **as directed**.
4. Topcoat: Single- or multicomponent, aromatic liquid urethane elastomer **OR** Single- or multicomponent, aliphatic liquid urethane elastomer **OR** Single- or multicomponent, aromatic liquid urethane elastomer with UV inhibitors **OR** Liquid epoxy, **as directed**.
 - a. Color: As selected by the Owner from manufacturer's full range.
5. Aggregate: Uniformly graded, washed silicon carbide sand **OR** Uniformly graded, washed silica sand **OR** Uniformly graded, washed flint shot silica **OR** Walnut shell granules **OR** Aluminum-oxide grit, **as directed**, of particle sizes, shape, and minimum hardness recommended in writing by traffic coating manufacturer.
 - a. Spreading Rate: As recommended by manufacturer for substrate and service conditions indicated, but not less than the following:
 - 1) Intermediate Coat: **8 to 10 lb/100 sq. ft. (3.6 to 4.5 kg/10 sq. m)** **OR** To refusal, **as directed**.

- 2) Topcoat: **8 to 10 lb/100 sq. ft. (3.6 to 4.5 kg/10 sq. m) OR** As required to achieve slip-resistant finish, **as directed**.

C. Miscellaneous Materials

1. Joint Sealants: As specified in Division 07 Section "Joint Sealants".
2. Sheet Flashing: Nonstaining.
 - a. Minimum Thickness: **60 mils (1.5 mm) OR 50 mils (1.3 mm), as directed**.
 - b. Material: Sheet material recommended in writing by traffic coating manufacturer **OR** Uncured neoprene sheet **OR** Cured neoprene sheet, **as directed**.
3. Adhesive: Contact adhesive recommended in writing by traffic coating manufacturer.
4. Reinforcing Strip: Fiberglass mesh recommended in writing by traffic coating manufacturer.

D. Pavement Markings

1. Pavement-Marking Paint: Alkyd-resin ready mixed, complying with AASHTO M 248, Type S **OR N OR F, as directed**.
 - a. Color: White **OR** Yellow **OR** As indicated, **as directed**.
 - 1) Use blue for spaces accessible to people with disabilities.
2. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than three **OR 45, as directed**, minutes.
 - a. Color: White **OR** Yellow **OR** As indicated, **as directed**.
 - 1) Use blue for spaces accessible to people with disabilities.
3. Glass Beads: AASHTO M 247, Type 1.

1.3 EXECUTION

A. Examination

1. Examine substrates, with Installer present, for compliance with requirements and for other conditions affecting performance of traffic coatings.
 - a. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
 - b. Verify compatibility with and suitability of substrates.
 - c. Begin coating application only after minimum concrete curing and drying period recommended by traffic coating manufacturer has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry.
 - d. Verify that substrates are visibly dry and free of moisture.
 - 1) Test for moisture vapor transmission by plastic sheet method according to ASTM D 4263.
 - 2) Test for moisture content by measuring with an electronic moisture meter **OR** method recommended in writing by manufacturer, **as directed**.
 - e. Application of coating indicates acceptance of surfaces and conditions.

B. Preparation

1. Clean and prepare substrates according to ASTM C 1127 and manufacturer's written recommendations to produce clean, dust-free, dry substrate for traffic coating application.
2. Mask adjoining surfaces not receiving traffic coatings, deck drains, and other deck substrate penetrations to prevent spillage, leaking, and migration of coatings.
3. Concrete Substrates: Mechanically abrade concrete surfaces to a uniform profile according to ASTM D 4259. Do not acid etch.
 - a. Remove grease, oil, paints, and other penetrating contaminants from concrete.
 - b. Remove concrete fins, ridges, and other projections.
 - c. Remove laitance, glaze, efflorescence, curing compounds, concrete hardeners, form-release agents, and other incompatible materials that might affect coating adhesion.
 - d. Remove remaining loose material to provide a sound surface, and clean surfaces according to ASTM D 4258.

- C. Terminations And Penetrations
 1. Prepare vertical and horizontal surfaces at terminations and penetrations through traffic coatings and at expansion joints, drains, and sleeves according to ASTM C 1127 and manufacturer's written recommendations.
 2. Provide sealant cants at penetrations and at reinforced and nonreinforced, deck-to-wall butt joints.
 3. Terminate edges of deck-to-deck expansion joints with preparatory base-coat strip.
 4. Install sheet flashings at deck-to-wall expansion and dynamic joints, and bond to deck and wall substrates according to manufacturer's written recommendations.

- D. Joint And Crack Treatment
 1. Prepare, treat, rout, and fill joints and cracks in substrates according to ASTM C 1127 and manufacturer's written recommendations. Before coating surfaces, remove dust and dirt from joints and cracks according to ASTM D 4258.
 - a. Comply with recommendations in ASTM C 1193 for joint-sealant installation.

- E. Traffic Coating Application
 1. Apply traffic coating material according to ASTM C 1127 and manufacturer's written recommendations.
 - a. Start traffic coating application in presence of manufacturer's technical representative.
 - b. Verify that wet film thickness of each component coat complies with requirements every **100 sq. ft. (9 sq. m)**.
 2. Apply traffic coatings to prepared wall terminations and vertical surfaces to height indicated, and omit aggregate on vertical surfaces.
 3. Cure traffic coatings according to manufacturer's written recommendations. Prevent contamination and damage during application and curing stages.

- F. Pavement Markings
 1. Do not apply traffic paint for striping and other markings until traffic coating has cured according to manufacturer's written recommendations.
 2. Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates for a **15-mil- (0.38-mm-)** minimum wet film thickness.
 3. Spread glass beads uniformly into wet traffic paint at a rate of **6 lb/gal. (0.72 kg/L)**.

- G. Field Quality Control
 1. Testing: Engage a qualified testing agency to perform the following field tests and inspections and prepare test reports:
 - a. Samples of material delivered to Project site shall be taken, identified, sealed, and certified in presence of the Owner and Contractor.
 - b. Testing agency shall perform tests for characteristics specified, using applicable referenced testing procedures.
 - c. Testing agency shall verify thickness of coatings during traffic coating application.
 - d. If test results show traffic coating materials do not comply with requirements, remove noncomplying materials, prepare surfaces, and reapply traffic coatings.
 2. Flood Testing: Flood test each deck area for leaks, according to recommendations in ASTM D 5957, after traffic coating has completely cured. Install temporary containment assemblies, plug or dam drains, and flood with potable water.
 - a. Flood to an average depth of **2-1/2 inches (65 mm)** with a minimum depth of **1 inch (25 mm)** and not exceeding a depth of **4 inches (100 mm)**.
 - b. Flood each area for 24 **OR** 48 **OR** 72, **as directed**, hours.
 - c. After flood testing, repair leaks, repeat flood tests, and make further repairs until traffic coating installation is watertight.
 - d. Engage an independent testing agency to observe flood testing and examine underside of decks and terminations for evidence of leaks during flood testing.

3. Final Traffic Coating Inspection: Arrange for traffic coating manufacturer's technical personnel to inspect membrane installation on completion.
 - a. Notify the Owner 48 hours in advance of date and time of inspection.
 4. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- H. Protecting And Cleaning
1. Protect traffic coatings from damage and wear during remainder of construction period.
 2. Clean spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 32 01 11 53

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SECTION 32 01 13 61 - SPRAY APPLICATIONS, SEAL COATS, AND SURFACE TREATMENTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for the spray applications, seal coats, and surface treatments of asphalt concrete pavements. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Bituminous Material: Bituminous material shall be liquid asphalt complying with ASTM D 2028, Grade RC-250, or tar complying with ASTM D 490, Grade RT-6.

- B. Aggregate: Aggregates shall consist of crushed stone, crushed gravel, or crushed slag. The moisture content of the aggregate shall be such that the aggregate will be readily coated with the bituminous material. Aggregate gradations shall be in compliance with ASTM C 136.

C. Construction Equipment

1. Bituminous Distributor shall be designed and equipped to distribute the bituminous material uniformly at even heat on variable widths of surface at readily determined and controlled rates and pressures recommended by the manufacturer and with an allowable variation from any specified rate not exceeding 5 percent.
2. Single-Pass Surface Treatment Machine shall be capable of distributing the bituminous material and aggregates uniformly in controlled amounts in a single-pass operation over the surface to be sealed.
3. Heating Equipment for Storage Tanks shall consist of steam coils, hot oil coils, or electrical coils. If steam or hot oil coils are used, the coils must be so designed and maintained that the bituminous material cannot become contaminated.
4. Power Rollers shall be the self-propelled tandem and three-wheel type rollers, weighing not less than 5 tons and shall be suitable for rolling bituminous pavements.
5. Self-Propelled Pneumatic-Tired rollers shall have a total compacting width of not less than 60 inches. The gross weight shall be adjustable within the ranges of 200 to 350 lb/in. of compacting width.
6. Spreading Equipment: Aggregate spreading equipment shall be adjustable and capable of spreading aggregate at controlled amounts per square yard.
7. Drags: Broom drags shall consist of brooms mounted on a frame, designed to spread fine aggregate uniformly over the surface of a bituminous pavement. Towing equipment shall have pneumatic tires.
8. Brooms and Blowers shall be of the power type and shall be suitable for cleaning surfaces of bituminous pavements.

1.3 EXECUTION

A. Installation

1. Spreading Aggregate: Application of seal aggregate shall immediately follow the application of bituminous material, and in no case shall the time to application exceed 15 minutes.

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2. Brooming and Rolling: Begin the rolling operations immediately following the application of cover aggregate. Rolling shall be accomplished with pneumatic-tired rollers; steel-wheeled rollers shall be used in a supplementary capacity only. All surplus aggregate shall be swept off the surface and removed not less than 26 hours or more than four days after rolling is completed.

END OF SECTION 32 01 13 61

SECTION 32 01 13 61a - CRACK SEALING OF BITUMINOUS PAVEMENTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for crack sealing of bituminous pavements. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. **Manufacturer's Recommendations:** Where installation procedures, or any part thereof, are required to be in accordance with the manufacturer's recommendations, printed copies of these recommendations shall be submitted to the Owner. Installation of the material will not be allowed until the recommendations are received. Failure to furnish these recommendations can be cause for rejection of the material.
2. **Schedules/Construction Equipment List:** List of proposed equipment to be used in performance of construction work including descriptive data shall be submitted to the Owner.
3. **Samples:** Samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval shall be submitted to the Owner. No material will be allowed to be used until it has been approved.

- C. **Safety:** Joint sealant shall not be placed within 25 feet of any liquid oxygen (LOX) equipment, LOX storage, or LOX piping. Joints in this area shall be thoroughly cleaned and left unsealed.

- D. **Test Requirements:** The joint sealant and backup or separating material shall be tested for conformance with the referenced applicable material specification. Testing of the materials shall be performed in an approved independent laboratory and certified copies of the test reports shall be submitted and approved prior to the use of the materials at the job site. Samples will be retained by the Owner for possible future testing should the materials appear defective during or after application. Conformance with the requirements of the laboratory tests specified will not constitute final acceptance of the materials. Final acceptance will be based on the performance of the in-place materials.

- E. **Equipment:** Machines, tools, and equipment used in the performance of the work required by this section shall be approved before the work is started and shall be maintained in satisfactory condition at all times.

1.2 PRODUCTS

A. Materials

1. **Liquid Asphalt:** ASTM D 2027, Grade MC-250.
2. **Emulsified Asphalt:** ASTM D 977, Grade AS-2.
3. **Sealing Compound:** ASTM D 3405.
4. **Backer Rod:** ASTM D 5249.
5. **Fine Aggregate:** Natural sand or crusher dust having a maximum size of not more than 1/8 inch and be free of clay or organic-matter.

1.3 EXECUTION

A. Preparation:

1. All cracks to be sealed shall be cleaned of dirt and debris, and moisture shall be removed.

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2. Crack Cleaning Equipment shall consist of a portable air compressor with hose and nozzles for directing air directly into cracks and stiff bristle brooms.
3. Heating Equipment for Liquid Asphalt shall be mobile and shall be equipped with an agitating device for stirring material during heating, a thermometer, regulating equipment for heat control, and a gravity-type draw-off valve.
4. Heating Equipment for Sealing Compound: Unless otherwise required by the manufacturer's recommendations, the equipment shall be mobile and shall consist of double-boiler, agitator-type kettles with oil medium in the outer space for heat transfer. The applicator unit shall be so designed that the sealant will circulate through the delivery hose and return to the inner kettle when not sealing cracks.
5. Application Equipment shall have a spout or nozzle of such size that the sealing material will be placed in the cracks without entrapping air in cracks or spreading material on adjacent pavement surface.

B. Installation:

1. Backer Rod: Install backer in accordance with manufacturer's instructions where required under sealing compound.
2. Sealing Compound: All cracks 1/8 inch wide and wider shall be sealed. The application temperature for sealing compound shall comply with ASTM C 1193. Cracks 1/2 inch wide and wider shall be filled with a slurry of fine sand and an emulsified asphalt or liquid asphalt. After the slurry has cured, cracks shall be sealed with liquid asphalt or emulsified asphalt and lightly sanded.
3. Liquid and Emulsified Asphalt Sealer: The temperature shall be varied so that it flows freely into cracks and completely fills cracks without entrapping air. Cracks shall be free of moisture before filling and shall be filled slightly above the pavement surface. When excess sealer has been removed, the sealer shall be covered with fine sand.
4. Traffic Control: Traffic will not be permitted over sealed cracks until the sealer has cooled so that it is not picked up by vehicle tires. The Contractor will be responsible for all barricades and flagmen necessary to control traffic.

END OF SECTION 32 01 13 61a

Task	Specification	Specification Description
32 01 13 61	32 12 16 13	Asphalt Paving

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SECTION 32 01 16 71 - GRINDING/GROOVING PAVEMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of grinding/grooving pavement. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS - Not Used

1.3 EXECUTION

A. Grinding: This covers grinding asphalt concrete or portland cement concrete pavement and roadway surfaces of structures as shown on the plans and as specified in these specifications and the special provisions

1. Grinding shall be performed with abrasive grinding equipment utilizing diamond cutting blades.
2. Existing portland cement concrete pavement not constructed as part of the project shall be ground as follows:
 - a. Grinding shall be performed so that the pavement surface on both sides of all transverse joints and cracks has essentially the same depth of texture and does not vary from a true plane enough to permit a 1.9 mm thick shim 75 mm wide to pass under a one-meter straightedge adjacent to either side of the joint or crack when the straightedge is laid on the pavement parallel to centerline with its midpoint at the joint or crack. After grinding has been completed, the pavement shall conform to the straightedge and profile requirements specified in paving specification, paragraph "Final Finishing," except that pavement on tangent alignment and on horizontal curves of any radius shall have a profile index of 19 mm or less per 0.1-km.
 - b. Abnormally depressed areas due to subsidence or other localized causes will be excluded from testing with the profilograph and 3.6-m±0.06-m straightedge. The accumulated total of the excluded areas shall not exceed 5 percent of the total area to be ground. Profilograph testing shall end 8 m prior to excluded areas and shall resume 8 m following the excluded areas.
3. Existing asphalt concrete pavement not constructed as part of the project shall be ground so that the finished surface shall not vary from a true plane enough to permit a 3-mm thick shim 75 mm wide to pass under a straightedge 3.6 m±0.06-m long when the straightedge is laid on the finished surface parallel with the centerline. The transverse slope of the finished surface shall be uniform to a degree such that a 6 mm thick shim 75 mm wide will not pass under a straightedge 3.6 m±0.06-m long when the straightedge is laid on the finished surface in a direction transverse to the centerline and extending from edge to edge of a 3.6-m traffic lane.
4. Ground areas on structures, approach slabs and the adjacent 15 m of approach pavement shall conform to the provisions for smoothness and concrete cover over reinforcing steel.
5. Ground surfaces shall not be smooth or polished and, except as otherwise specified, shall have a coefficient of friction of not less than 0.30.
6. Residue from grinding operations shall be picked up by means of a vacuum attachment to the grinding machine and shall not be allowed to flow across the pavement nor be left on the surface of the pavement. Residue from grinding portland cement concrete pavement shall be disposed of

as directed. Residue from grinding asphalt concrete shall be disposed of outside the highway right of way.

7. At the option of the Contractor, the residue from grinding portland cement concrete pavement may be disposed of as directed by the authorities having jurisdiction over the site. A copy of the approval shall be delivered to the Engineer before disposing of residue at the site.
8. The noise level created by the combined grinding operation shall not exceed 86 dBA at a distance of 15 m at right angles to the direction of travel.

B. Grooving: This work shall consist of grooving the surface of asphalt concrete or Portland cement concrete pavement and bridge decks as shown on the plans and as specified in these specifications and the special provisions

1. Grooved areas shall begin and end at lines normal to the pavement center line and shall be centered within the lane width. If new concrete pavement is grooved, the grooving in any lane shall cover the full lane width.
2. Grooving blades shall be 2.41 mm \pm 0.13-mm wide and shall be spaced 19 mm on centers. The grooves shall be cut not less than 3 mm nor more than 7 mm deep. The grooves on bridge decks shall be cut not less than 3 mm nor more than 5 mm deep. Grooves over inductive loop detectors shall be cut not less than 2 mm nor more than 3 mm deep.
3. At the beginning of each work shift, all grooving machines shall be equipped with a full complement of grooving blades that are capable of cutting grooves of the specified width, depth and spacing.
4. If during the course of work a single grooving blade on any individual grooving machine becomes incapable of cutting a groove, work will be permitted to continue for the remainder of the work shift, and the Contractor will not be required to otherwise cut the groove omitted because of the failed blade. Should 2 or more grooving blades on any individual grooving machine become incapable of cutting grooves the Contractor shall either:
 - a. Discontinue work with the affected grooving machine within 15 m of the location where more than one blade became incapable, in which event the Contractor will not be required to otherwise cut the grooves omitted because of the failed blades; **OR**
Continue work with the affected grooving machine for the remainder of the work shift and by other means cut all grooves omitted, including grooves omitted because a single blade was incapable, by the affected grooving machine within that work shift. The omitted grooves shall be cut before any of the grooving work performed during the time the grooves were omitted will be accepted.
5. The actual grooved area of any selected 0.6-m by 30 m longitudinal area of pavement specified to be grooved shall be not less than 95 percent of the selected area. Grooves which are omitted as permitted for blades which become incapable will be measured as being actually grooved. No area will be measured until omitted grooves, which are required to be cut before the area is accepted, have been cut. Except as provided for omitted grooves due to an incapable blade, any area within the selected area not grooved shall be due only to irregularities in the pavement surface and for no other reason.
6. Residue from grooving operations shall be picked up by means of a vacuum attachment to the grooving machine and shall not be allowed to flow across the pavement nor be left on the surface of the pavement. Residue from grooving portland cement concrete pavement shall be disposed of as directed. Residue from grooving asphalt concrete shall be disposed of outside the highway right of way.
7. At the option of the Contractor, the residue from grooving portland cement concrete pavement may be disposed as directed by the authorities having jurisdiction over the site. A copy of the approval shall be delivered to the Engineer before disposing of residue at the site.
8. The noise level created by the combined grooving operation shall not exceed 86 dBA at a distance of 15 m at right angles to the direction of travel.

C. Highway or Street Grooving: AASHTO recommends the following groove specifications: 2.4 mm wide; depth of 3.2 to 4.8 mm, and a center-to-center spacing of 19.1 mm (0.75 inches) (7). The center 10-foot portion of a 12-foot lane is typically grooved, leaving a 1-foot strip ungrooved at the edge of each lane.

- D. Boat Ramp Grooving: Grooves shall be non-skid V-grooves spaced 2 inches on center, 1/2-inch radius, 1/2-inch deep.
- E. Runway Grooving
1. General
 - a. The grooving dimensions shall be as follows:
 - 1) Depth - One-quarter (1/4) inch \pm one sixteenth (1/16) inch
 - 2) Width - One-quarter (1/4) inch \pm one sixteenth (1/16) inch
 - 3) Center to center - One and one-half (1 1/2) inch \pm one eighth (1/8) inch
 - b. Grooving shall not begin until new pavement has properly cooled/cured and permission is given.
 - c. In no case shall final painted pavement markings be applied prior to grooving.
 2. The pavement must be grooved by approved diamond bladed saw-cutting equipment. Variations in the grooving contour will not be permitted without approval. All reasonable precautions shall be taken to avoid breaking or chipping the pavement surfaces between grooves. Excessive spalling of the grooved edges will not be permitted.
 3. The Contractor shall groove bituminous concrete and portland cement concrete pavements according to the following specifications (from FAA Advisory Circular 150/5320-12B, Section IV):
 - a. The depth of 90 percent or more of the groove shall not be less than 1/4 inch.
 - b. The grooves shall be continuous for the entire runway length and transverse (perpendicular) to the direction of aircraft landing and takeoff operations.
 - c. The grooves shall be continued to the end of the runway where the concrete meets the asphalt.
 - d. The grooves shall not vary more than 3 inches in alignment for 75 feet, allowing for realignment every 500 feet.
 - e. Grooves shall not be closer than 3 inches or more than 9 inches from transverse joints in concrete pavements.
 - f. Grooving through longitudinal or diagonal saw kerfs where lighting cables are installed shall be avoided. Grooves may be continued through longitudinal construction joints.
 - g. Grooves shall be sawed no closer than 6 inches and no more than 18 inches from in-pavement light fixtures.
 4. Cleanup is extremely important and should be continuous throughout the grooving operations. Accumulation of debris resulting from the grooving operations shall be cleaned from the grooves and removed from the pavement by air jets, high pressure water streams, or other approved methods, after each grooving operation at hourly intervals. The Contractor shall provide water for cleanup operations. The waste material shall not be flushed into the storm or sanitary sewer system. The waste material shall not be allowed to drain onto the shoulders or left on the runway surface in order to prevent foreign object damage.

END OF SECTION 32 01 16 71

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SECTION 32 01 16 74 - BITUMINOUS REJUVENATION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of bituminous rejuvenation of airfield pavements, roads, streets, parking areas, and other general applications by the use of a chemical rejuvenator. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Rejuvenator: The asphalt rejuvenating agent shall be composed of a petroleum resin-oil base uniformly emulsified with water and shall conform to the following physical and chemical requirements:

B. Property Test Method Requirement

Viscosity, S.F. at 77 F, sec.	ASTM D 244	15-40
Residue, % (1)	ASTM D 244 (Mod.)	60-65(min.)
Sieve Test, %	ASTM D 244 (Mod.)	0.10 (max.)
Viscosity @ 140 F, centistokes (2)	ASTM D 2170	80-500
Flash Point, Cleveland Open Cup(COC), °F (3)	ASTM D 92	350 (min.)

(1) ASTM D 244 Modified Evaporation Test for percent residue is made by heating 50 gm samples to 300°F until foaming ceases; then cool immediately and calculate results.

(2) Viscosity on residue obtained from evaporation test.

(3) Flash point on residue from evaporation test.

- C. Aggregate: Gradation of mineral aggregate shall meet the following requirements:

Sieve Percent by Designation	Weight Passing
No. 16	100
No. 30	40-75
No. 50	4-12
No. 100	0-5

1.3 EXECUTION

- A. Bituminous Storage Tanks shall be capable of heating the bituminous material under effective and positive control at all times to the required temperature.

- B. Bituminous Distributor shall be designed and equipped to spray the bituminous material in a uniform double to triple lap at the temperature recommended by the manufacturer, at variable widths, and at readily determined and controlled rates from 0.04 to 0.2 gallons per square yard, plus or minus 5 percent.

- C. Brooms and Blowers shall be of the power type.

- D. Preparation of Surface: Immediately before applying the rejuvenator, all loose material, dirt, clay, or other objectionable material shall be removed from the surface to be treated.

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- E. Application of Rejuvenator: The rejuvenator shall be uniformly applied over the surface at the approved rate with an allowable variation of plus or minus 20 percent. Materials shall be applied at the temperature recommended by the manufacturer.
- F. Excess Rejuvenator Material: Approved mineral aggregate shall be provided by the Contractor and shall be spread in sufficient quantity to effectively blot up any excess rejuvenator material remaining on the treated pavement surface after 24 hours.
- G. Insufficient Rejuvenator Material: When it is determined by the Owner that the actual application rate of the rejuvenator is more than 20 percent below the approved application rate, subsequent application(s) shall be made within 24 hours to ensure adequate penetration into the pavement surface.

END OF SECTION 32 01 16 74

SECTION 32 01 16 74a - COLD MIX RECYCLING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of cold mix recycling of existing paving and the addition of new materials. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Aggregates:

1. General: Aggregates shall consist of material obtained from milling, or removing and crushing the existing in situ material, and/or new aggregate material as needed.
2. Aggregate Quality and Gradation: Aggregate for bituminous mixture shall be of such size that the material can be spread with a paver to the desired thickness and compacted to meet the specified smoothness, grade, and density requirements. New aggregates shall be approved and be equal to or better than the reclaimed aggregate in quality. Maximum size of new aggregate shall not exceed one-half of the layer thickness and in no case shall the maximum aggregate size exceed 1 inch.

- B. Bituminous Materials: Bituminous materials, if required, shall be an emulsified asphalt conforming to ASTM D 977 or ASTM D 2397, grade as required.

- C. Job-Mix Formula: The Job-Mix Formula (JMF) for the recycled mixture will be furnished by the Contractor to the Owner. The formula will indicate a definite percentage of water and asphalt to be added to the mixture. The JMF will be allowed an asphalt content tolerance of 0.3 percent. The asphalt content may be adjusted by the Owner to improve paving mixture, without adjustment in contract unit price. When asphalt is added, the optimum asphalt content will be selected to provide the following properties when samples are compacted at 250 F with 75 blows of standard Marshall hammer on each side of the specimen.

Property Requirement	
Stability minimum, pounds	1,800
Flow maximum, 1/100-inch units	16
Voids in total mix, percent	3-5
Voids filled with bitumen, percent	70-80

The water content will be selected to provide maximum density when samples are prepared at the optimum asphalt content and compacted with 75 blows of Marshall hammer at ambient temperature. When no asphalt binder is added to the mixture, the water content will be selected by the Owner to provide maximum density.

1.3 EXECUTION

- A. Preparation of Bituminous Mixtures: The required amount of bituminous material for each batch, or calibrated amount of continuous mixing, shall be introduced into the mixer. Aggregates, asphalt emulsion, and water shall be mixed for 35 seconds or longer, as necessary, to thoroughly coat all

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particles with bituminous material. When longer mixing time is necessary, additional mixing time shall be determined by the Owner.

- B. Conditioning of Existing Surface: Ruts or soft yielding spots that appear in the existing pavement areas and deviations of surface from requirements specified shall be corrected. An asphalt tack coat shall be applied to all contact surfaces in advance of the recycled overlayment. The asphalt tack shall be placed at an asphalt residue coverage rate of 0.05 gal/sq. yd.
- C. Placing:
 - 1. Layer Thickness and Curing: Each layer of compacted mixture shall be no more than 2-1/2 inches in thickness; each layer of bituminous mixture shall be allowed to cure for at least 5 days before placing a succeeding layer.
 - 2. Compaction of Mixture: Bituminous mixtures shall be rolled until all roller marks are eliminated and a density of at least 86 percent of the theoretical maximum density has been obtained when tested in accordance with MIL-STD-620, Method 101 or ASTM D 2041. When bituminous material is not added to the cold recycled mixture, the material shall be compacted to 100 percent of density determined by MIL-STD-621, Method 100, compaction effort designation CE-55.
 - 3. Joints: Longitudinal joints shall be offset at least 1 foot from existing joints. Transverse joints shall be offset at least 2 feet from existing transverse joints.
 - 4. Surface Smoothness: After final rolling, the pavement surface shall not vary in excess of 1/8 inch from a straightedge laid on the surface.

END OF SECTION 32 01 16 74a

SECTION 32 01 16 74b - CENTRAL PLANT HOT-MIX RECYCLING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of central plant hot-mix recycling of existing asphalt concrete intermediate and wearing courses for airfields, heliports, and heavy-duty pavements. The specification also includes the addition of new materials, as required to meet project requirements. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Aggregates:

1. General: Aggregates shall consist of material obtained from milling, or removing and crushing the existing in-situ material, and/or new aggregate material as needed.
2. Aggregate Quality and Gradation: Aggregate for the bituminous mixture shall be such size that the material can be spread with a paver to the desired thickness and compacted to meet the specified smoothness, grade, and density requirements. New aggregates shall be approved and shall be equal to or better than the reclaimed aggregate in quality. Maximum size of new aggregate shall not exceed one-half of the layer thickness, and in no case shall the maximum aggregate size exceed one inch. Aggregate gradations shall be as prescribed by local usage, with the approval of the Owner. In order to meet pollution requirements and ensure the recycled mixture is satisfactory, the amount of reclaimed asphalt pavement shall not exceed 60 percent for drum mixers or 50 percent for batch plants.

B. Mineral Filler shall conform to ASTM D 242.

C. Bituminous Materials:

1. New Asphalt Cement: The appropriate types and grades of bituminous materials for the anticipated use and climactic environment shall be used. Requirements of ASTM D 946 shall be used to specify penetration-graded asphalt cement, or ASTM D 3381 for viscosity-graded asphalt cement.
2. Recycled Asphalt Cement: The penetration of asphalt cement recovered from the recycled mixture shall be in accordance with ASTM D 1856 and shall have a penetration between 50 and 70 percent of that specified for the particular region for new asphalt cement, measured in accordance with ASTM D 5.

D. Job-Mix Formula (JMF): The JMF for the recycled mixture will be furnished by the Contractor to the Owner. The formula will indicate the percentage of reclaimed asphalt pavement, the percentage of bitumen, and the temperature of the completed mixture when discharged from the mixer. The requirements for stability, flow, and voids are shown in the following tables for nonabsorptive and absorptive mixtures, respectively.

1. Nonabsorptive-Aggregate Mixture

	Wearing Property Course	Intermediate Course
Stability minimum, lbs	1,800	1,800
Flow maximum, 1/100-inch units	16	16

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Voids total mix, percent	3-5	5-7
Voids filled with bitumen, percent	70-80	50-70
2. Absorptive-Aggregate Mixture		
	Wearing Property Course	Intermediate Course
Stability minimum, lbs.	1,800	1,800
Flow maximum, 1/100-inch units	16	16
Voids total mix, percent	2-4	4-6
Voids filled with bitumen, percent	75-80	55-75

When the water-absorption value of the entire blend of aggregate does not exceed 2.5 percent, the aggregate is designated as nonabsorptive. When the water-absorption value exceeds 2.5 percent as determined by ASTM C 127 and ASTM C 128, the aggregate is designated as absorptive.

1.3 EXECUTION

- A. Preparation of Bituminous Mixtures: Aggregates, reclaimed asphalt pavement, mineral filler, bitumen, and recycling agent shall be conveyed into the mixer in proportionate quantities required to meet the JMF. Particles larger than 2 inches shall be removed from the reclaimed asphalt pavement prior to being added to the mixer. Mixing time shall be as required to obtain a uniform coating of the aggregate with the bituminous material. Temperature of bitumen at time of mixing will be as required to meet project requirements. Temperature of aggregate and mineral filler in the mixer shall not exceed 325 F when bitumen is added.
- B. Surface Preparation of Underlying Course: Prior to placing of intermediate or wearing course, the underlying course shall be cleaned of all foreign or objectionable matter. The surface of previously constructed base course shall be sprayed with a prime coat at an asphalt residue coverage rate of 0.25 gal/sq. yd. Contact surfaces of previously constructed pavement, curbs, manholes, and other structures shall be sprayed with a thin tack coat at an asphalt residue coverage rate of 0.05 gal/sq. yd.
- C. Placing:
1. Layer Thickness and Curing: A required uncompacted thickness of intermediate course, 7 inches or less, may be spread and compacted in one layer. Where the required thickness of base is more than 7 inches, the mixture shall be spread and compacted in two or more layers. Each layer of compacted mixture for the surface course shall be no more than 2-1/2 inches in thickness. Each layer of bituminous mixture shall be allowed to cure for at least 5 days before placing a succeeding layer.
 2. Compaction of Mixture: Rolling shall begin as soon after placing as the mixture will bear roller without undue displacement. After the Contractor is assured of meeting crown, grade, and smoothness requirements, rolling shall be continued until a mat density of 98 to 100.0 percent and a joint density of 96.5 to 100.0 percent of density is obtained. Places inaccessible to rollers shall be thoroughly compacted with hot hand tampers.
 3. Joints: Longitudinal joints shall be offset at least 1 foot from existing joints. Transverse joints shall be offset at least 2 feet from existing transverse joints.
 4. Surface Smoothness: After final rolling, the pavement surface shall not vary in excess of 1/8 inch from a straightedge laid on the surface.

END OF SECTION 32 01 16 74b

Task	Specification	Specification Description
32 01 16 74	32 12 16 13	Asphalt Paving
32 01 17 61	32 01 13 61	Spray Applications, Seal Coats, And Surface Treatments
32 01 17 61	32 12 16 13	Asphalt Paving
32 01 17 61	32 01 13 61a	Crack Sealing Of Bituminous Pavements
32 01 17 63	32 12 16 13	Asphalt Paving
32 01 90 13	31 13 16 00	Tree Protection And Trimming
32 01 90 19	01 22 16 00	No Specification Required
32 01 90 23	31 13 16 00	Tree Protection And Trimming
32 01 90 26	31 13 16 00	Tree Protection And Trimming
32 01 90 36	31 13 16 00	Tree Protection And Trimming
32 01 90 36	31 31 19 13	Soil Sterilization
32 01 90 39	31 13 16 00	Tree Protection And Trimming
32 01 90 43	31 13 16 00	Tree Protection And Trimming
32 01 90 46	31 13 16 00	Tree Protection And Trimming
32 01 90 53	31 13 16 00	Tree Protection And Trimming

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SECTION 32 11 23 16 - CRUSHED STONE

1.1 GENERAL

A. Description Of Work

1. The work under this section consists of furnishing, placing and compacting crushed stone where called for and as detailed, in conformance with lines, grades and typical as follows or as directed by the Owner.

1.2 PRODUCTS

A. Materials

1. Material shall consist of clean, coating free, durable, sharp angled fragments of crushed stone, crushed ledge rock, or blends thereof that conform to the specific requirements of the following table. Shale will not be acceptable.
2. Crushed Stone used in Absorption Beds shall be washed and free of fines.
3. Gradation: Crushed stone sizes shall meet the gradation requirements of Table 1-1.

TABLE 1-1 (1)GRADATION OF CRUSHED STONE

Size Designation	4"	3"	2-1/2"	2"	1-1/2"	1"	1/2"	1/4"	1/8"	No.80 Sieve
Screening (2)							100	90-100		
1B								100	90-100	0-15
1A							100	90-100	0-15	
1 ST							100	0-15		
1						100	90-100	0-15		
2					100	90-100	0-15			
3A				100	90-100	0-15				
3			100	90-100	5-70	0-15				
4A		100	90-100		0-20					
4	100	90-100		0-15						
5	90-100	0-15								

- a. Percentage by weight passing the following square openings.
- b. Screenings shall include all of the fine material passing a 1/4-inch screen.
4. All crushing plants shall be fitted with tailing chutes so that no aggregate will reach the bins other than that which passes through the proper screens

- B. Soundness: Material furnished under this item shall be substantially free of shale or other soft, poor durability particles. A visual inspection of particle composition by the Owner will generally be the basis

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for acceptance. Where the State elects to test for this requirement, a Magnesium Sulfate Soundness Loss exceeding 35 percent will be cause for rejection.

- C. Contamination: Contamination of the crushed stone with any deleterious material, such as silt, clay, mud, ice, snow or organic materials, through any cause whatsoever, shall be corrected by the Contractor by excavation and replacement of the material in the affected areas.
- D. Sampling: Samples and certified gradations shall be furnished by the Contractor to the Owner and approval of these samples must be received prior to delivery or placement of the material.

1.3 EXECUTION

- A. Compaction: All material shall be placed in uniform horizontal layers not exceeding 6-inches thickness before compaction. All portions of each layer shall be mechanically compacted to the satisfaction of the Owner. Compaction equipment shall be approved by the Owner.

END OF SECTION 32 11 23 16

SECTION 32 11 23 16a - SELECT GRAVEL

1.1 GENERAL

A. Description Of Work

1. The work under this section consists of furnishing, placing and compacting select gravel where called for and as detailed, in conformance with lines, grades and typical sections as provided or directed by the Owner.

1.2 PRODUCTS

A. Materials

1. Material shall consist of clean, durable gravel or crushed stone free from coating.
2. Select Gravel used for stone paving shall be manufactured from crushed stone and contain no gravel.
3. Gradation of gravel or stone shall be as follows with percent passing calculated by weight:

Select Gravel	
Sieve	Percent Passing
2"	100
1/4"	30 - 65
No. 40	5 - 40
No. 200	0 - 10

1.3 EXECUTION

- A. Soundness: Materials furnished under this item shall be substantially free of shale, organic or other soft, poor durability particles. A visual inspection of particle composition by the Owner will generally be the basis for acceptance. Where the Owner elects to test for this requirement, a Magnesium Sulfate Soundness Loss exceeding 35 percent will be cause for rejection.
- B. Contamination: Contamination of the Select Gravel with any deleterious material, such as silt, clay, mud, ice, snow or organic material, through any cause whatsoever, shall be corrected by the Contractor by excavation and replacement of the material in the affected area.
- C. Sampling: Samples and certified gradations shall be furnished by the Contractor to the Owner and approval of these samples must be received prior to delivery or placement of the material.
- D. Compaction:
 1. All material shall be placed in uniform horizontal layers not exceeding 6-inches thickness before compaction. All portions of each layer shall be mechanically compacted to the percentage of the Standard Proctor Maximum Density (AASHTO T-99) as follows, unless noted otherwise. Compaction equipment approval shall be made by the Owner.
 2. Density determination.
 - a. Structures (entire area within 10 feet outside perimeter) 95%
 - b. Building Slabs and Steps: 95%
 - c. Lawn or Unpaved Areas: 90%
 - d. Pavements and Walkways: 95%
 - e. Pipes and Tunnels: 95%
 - f. Pipe Bedding: 100%

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END OF SECTION 32 11 23 16a

SECTION 32 11 23 16b - CRUSHED STONE PAVING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of crushed stone paving. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

A. Aggregates: Aggregates shall consist of crushed stone or slag, crushed gravel, angular sand, or other approved materials. Aggregates shall be durable, sound, and free from foreign material.

1. Coarse Aggregates, consisting of angular fragments of uniform density and quality, shall have a percentage of wear not to exceed 50 percent after 500 revolutions when tested in accordance with ASTM C131. The amount of flat and elongated particles (length to width greater than 3 to 1) shall not exceed 30 percent.
2. Crushed Gravel shall be manufactured from gravel particles with the following gradation:

100% passing	2" sieve
25 - 60% passing	1/4" sieve
5 - 40% passing	#40 sieve
0 - 10%	#200 sieve
3. Crushed Stone shall contain at least 50 percent by weight of crushed pieces having two or more freshly fractured faces for each range of sizes.
4. Slag shall be an air-cooled blast-furnace product having a dry weight of not less than 65 pcf.

B. Binder Material shall consist of screenings, angular sand, or other finely divided mineral matter processed or naturally combined with the coarse aggregate.

1.3 EXECUTION

A. Installation:

1. **Mixing and Placing:** Materials shall be mixed in such a manner as to obtain a uniform stabilized-aggregate material and a uniform optimum water content for compaction. Mixing and placing procedures shall produce true grades, minimize segregation and degradation, optimize water content, and ensure a satisfactory base course.
2. **Compaction:** Each layer of stabilized-aggregate paving shall be compacted. Water content shall be maintained at optimum. Areas inaccessible to the rollers shall be compacted, with mechanical tampers and shall be shaped and finished by hand methods.
3. **Layer Thickness:** No layer shall be in excess of 8 inches nor less than 3 inches in compacted thickness.
4. **Proof Rolling:** Materials in paving or underlying materials that produce unsatisfactory results by rolling shall be removed and replaced with satisfactory materials and recompact.
5. **Edges of Paving:** Approved materials shall be placed along edges of stabilized-aggregate paving course in such quantities as will compact to thickness of the course being constructed, allowing at least a 1-foot width of the shoulder to be rolled and compacted simultaneously with rolling and compacting of each layer of the paving course.
6. **Finishing:** Finished surface shall be of uniform grade and texture.
7. **Thickness Control:** Compacted thickness of the stabilized paving course shall be within 1/2 inch of the thickness required.

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END OF SECTION 32 11 23 16b

SECTION 32 12 13 13 - ASPHALTIC CONCRETE OVERLAYS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of asphaltic concrete overlays. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Asphalt Cement: The asphalt cement shall comply with ASTM D 946 penetration grade 85-100 requirements and shall show a negative spot test when tested in compliance with AASHTO T 102.

- B. Mineral Aggregates: Shall comply with ASTM D 3515 for 3/4-inch maximum aggregate mix.

- C. Test Properties: The bituminous mixture shall meet the following requirements when tested in compliance with MIL-STD 620.

Stability minimum, lb	500
Flow maximum, 1/100-in. units	20
Voids total mix, %	3-5
Voids filled with bitumen, %	75-85

1.3 EXECUTION

- A. Preparation of Existing Surface: The Contractor shall raise and reset all structures such as manhole frames, valve boxes, drainage structures, etc., to meet the required grade. An asphalt tack coat shall be applied to all contact surfaces in advance of the asphalt concrete overlay placement. The asphalt tack shall be placed at an asphalt residue coverage rate of 0.05 gal/sq yd.

B. Installation:

1. Joints: Longitudinal joints of the overlay shall be offset at least 1 foot from existing joints. Transverse joints shall be offset at least 2 feet from existing transverse joints.
2. All Asphalt Concrete Mixture and Pavement that are contaminated, damaged, or defective shall be removed and replaced by the Contractor. Skin patching of rolled pavement will not be permitted.
3. Compaction of Mixture: The asphalt concrete mixture shall be rolled until a density of not less than 95 percent and not more than 100 percent of laboratory compacted specimen is obtained.
4. Surface Smoothness: After final rolling, the pavement surface shall not vary in excess of 1/8 inch from a 10-foot straightedge laid on the surface.

END OF SECTION 32 12 13 13

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SECTION 32 12 13 13a - BITUMINOUS PAVING-REPAIR AND RESURFACING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials repair and resurfacing of bituminous pavements. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Reports: Copies of test results, within 24 hours after completion of tests.
2. Waybills and Delivery Tickets: Copies of waybills or delivery tickets, during the progress of the work.

1.2 PRODUCTS:

A. Asphaltic Concrete:

1. Hot-Mixed, Hot-Mixed Asphaltic Concrete and Emulsified asphalt shall comply with requirements of ASTM D 3515.
2. Plant-Mixed, Stockpiled Asphalt Cold Mixes shall comply with the requirements of Asphalt Institute Specification PM-2.

B. Bituminous Prime: Bituminous primer shall comply with ASTM D 2027.

C. Base Course: Base course material shall comply with State highway department specification for dense-graded, high-quality material.

D. Bituminous Tack Coat: Bituminous tack coat shall comply with ASTM D 2027.

1.3 EXECUTION:

A. Preparation of Areas for Patching:

1. Pot Holes: Trim the perimeter of each hole to a vertical face with a carborundum blade in a square or rectangular pattern at least 18 inches from ragged edge. Remove material to a depth that provides a uniform well-compacted bottom surface. Remove all loose material resulting from trimming or otherwise existing in the hole. If subbase is disturbed, reestablish in a like manner to adjacent substrate. Areas to be repaired shall be dry before repair is started.
2. Alligator-Cracked and Rutted Areas: The pavement shall be sawed or cut with pavement breakers to a smooth vertical face 18 inches outside of the alligator-cracked area. Unsatisfactory material shall be removed in a manner not to disturb the sides of the excavated area.
3. Slippage Areas: Saw a rectangular area around the slippage area that overlaps into the well-bonded material by at least 18 inches. The depth of the saw cut shall be equal to the thickness of the layer of material that is slipping. The surface where slipping is occurring shall be broomed clean and all loose material removed.

B. Installation:

1. Application Temperatures: Application temperatures for all asphalt material shall comply with provisions of the Asphalt Institute Publications and the applicable ASTM Standards.

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2. Base Course: Place base course material in layers not exceeding a compacted thickness of 6 inches. After placing, compact each layer by mechanical compactors to a density of not less than the density of the corresponding layer of the adjacent pavement structure.
3. Prime Coat: Prime base course with MC-70 liquid asphalt at a rate of 0.20 to 0.30 gallon per sq. yd. Bolt excess prime with sand before the surfacing material is applied.
4. Tack Coat: Give the edges of existing asphaltic concrete or surfaces of Portland cement concrete and asphaltic concrete a tack coat of MC-70 liquid asphalt at a rate of 0.05 to 0.15 gallon per sq. yd. Allow the material to cure before placing the surfacing material.
5. Hot-Mixed Asphaltic Concrete: Place the material in layers not exceeding 2-1/2 inches in thickness and compact to a density equal to the density of the adjacent asphaltic concrete.
6. Stockpiled Cold Mixes: The compacted thickness of each layer of material shall not exceed 2 inches. Before compaction, the material shall be allowed to aerate, if necessary, until the proper amount of cohesion has developed to obtain adequate compaction. When more than one layer is used, each layer shall be thoroughly cured before the succeeding layer is placed.

END OF SECTION 32 12 13 13a

Task	Specification	Specification Description
32 12 13 13	32 12 16 13	Asphalt Paving
32 12 13 19	32 12 13 13	Asphaltic Concrete Overlays
32 12 13 19	32 12 13 13a	Bituminous Paving-Repair And Resurfacing
32 12 13 19	32 12 16 13	Asphalt Paving

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SECTION 32 12 16 13 - ASPHALT PAVING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for asphalt paving. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Cold milling of existing hot-mix asphalt pavement.
 - b. Hot-mix asphalt patching.
 - c. Hot-mix asphalt paving.
 - d. Hot-mix asphalt paving overlay.
 - e. Asphalt surface treatments.
 - f. Pavement-marking paint.
 - g. Traffic-calming devices.
 - h. Imprinted asphalt.

C. Definition

1. Hot-Mix Asphalt Paving Terminology: Refer to ASTM D 8 for definitions of terms.

D. Submittals

1. Product Data: For each type of product indicated. Include technical data and tested physical and performance properties.
 - a. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.
 - b. Job-Mix Designs: For each job mix proposed for the Work.
2. Material Certificates: For each paving material, from manufacturer.

E. Quality Assurance

1. Manufacturer Qualifications: A paving-mix manufacturer registered with and approved by authorities having jurisdiction or the DOT of state in which Project is located.
2. Regulatory Requirements: Comply with materials, workmanship, and other applicable requirements of State or local DOT for asphalt paving work.
 - a. Measurement and payment provisions and safety program submittals included in standard specifications do not apply to this Section.
3. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.
2. Store pavement-marking materials in a clean, dry, protected location within temperature range required by manufacturer. Protect stored materials from direct sunlight.

G. Project Conditions

1. Environmental Limitations: Do not apply asphalt materials if subgrade is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:
 - a. Prime Coat: Minimum surface temperature of 60 deg F (15.6 deg C).
 - b. Tack Coat: Minimum surface temperature of 60 deg F (15.6 deg C).

- c. Slurry Coat: Comply with weather limitations in ASTM D 3910.
 - d. Asphalt Base Course: Minimum surface temperature of **40 deg F (4.4 deg C)** and rising at time of placement.
 - e. Asphalt Surface Course: Minimum surface temperature of **60 deg F (15.6 deg C)** at time of placement.
2. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of **40 deg F (4.4 deg C)** for oil-based materials **OR 55 deg F (12.8 deg C)** for water-based materials, **as directed**, and not exceeding **95 deg F (35 deg C)**.
 3. Imprinted Asphalt Paving: Proceed with coating imprinted pavement only when air temperature is at least **50 deg F (10 deg C)** and rising and will not drop below **50 deg F (10 deg C)** within 8 hours of coating application. Proceed only if no precipitation is expected within two hours after applying the final layer of coating.

1.2 PRODUCTS

A. Aggregates

1. General: Use materials and gradations that have performed satisfactorily in previous installations.
2. Coarse Aggregate: ASTM D 692, sound; angular crushed stone, crushed gravel, or cured, crushed blast-furnace slag.
3. Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.
 - a. For hot-mix asphalt, limit natural sand to a maximum of 20 percent by weight of the total aggregate mass.
4. Mineral Filler: ASTM D 242 or AASHTO M 17, rock or slag dust, hydraulic cement, or other inert material.

B. Asphalt Materials

1. Asphalt Binder: AASHTO M 320 or AASHTO MP 1a, PG 64-22 **OR PG 58-28 OR PG 70-22, as directed.**
2. Asphalt Cement: ASTM D 3381 for viscosity-graded material **OR ASTM D 946 for penetration-graded material, as directed.**
3. Prime Coat:
 - a. ASTM D 2027, medium-curing cutback asphalt, MC-30 or MC-70 **OR MC-250, as directed.**
OR
Asphalt emulsion prime coat complying with State or local DOT requirements.
4. Tack Coat: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.
5. Fog Seal: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.
6. Slurry Seal: ASTM D 3910, Type 1 **OR Type 2 OR Type 3, as directed.**
7. Chip Seal: ASTM D 977 or AASHTO M 140 emulsified asphalt, or ASTM D 2397 or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application. **RS-2 OR RS-2P OR CRS-2 OR CRS-2P OR HFRS-2 OR HFRS-2P, as directed.**
8. Sand Seal: AASHTO M 140 emulsified asphalt or AASHTO M 208 cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application. Sand shall meet the following gradation as tested by AASHTO T27.
9. Water: Potable.
10. Undersealing Asphalt: ASTM D 3141, pumping consistency.

C. Auxiliary Materials

1. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.
2. Sand: ASTM D 1073 or AASHTO M 29, Grade Nos. 2 or 3.
3. Paving Geotextile: AASHTO M 288, nonwoven polypropylene; resistant to chemical attack, rot, and mildew; and specifically designed for paving applications.
4. Joint Sealant: ASTM D 6690 or AASHTO M 324, Type I **OR** Type II or III **OR** Type IV, **as directed**, hot-applied, single-component, polymer-modified bituminous sealant.
5. Pavement-Marking Paint: Color shall be White **OR** Yellow **OR** Blue, **as directed**.
 - a. Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N **OR** Type F **OR** Type S, **as directed**; colors complying with FS TT-P-1952.
OR
MPI #32 Alkyd Traffic Marking Paint.
OR
Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than three **OR** 45, **as directed**, minutes.
OR
MPI #97 Latex Traffic Marking Paint.
6. Glass Beads: AASHTO M 247, Type 1.
7. Wheel Stops:
 - a. Precast, air-entrained concrete, **2500-psi (17.2-MPa)** minimum compressive strength, **4-1/2 inches (115 mm)** high by **9 inches (225 mm)** wide by **72 inches (1800 mm)** long. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.
OR
Solid, integrally colored, 96 percent recycled HDPE or commingled postconsumer and postindustrial recycled plastic; UV stabilized; **4 inches (100 mm)** high by **6 inches (150 mm)** wide by **72 inches (1800 mm)** long. Provide chamfered corners, drainage slots on underside, and holes for anchoring to substrate.
 - b. Dowels: Galvanized steel, **3/4-inch (19-mm)** diameter, **10-inch (254-mm)** minimum length.
 - c. Adhesive: As recommended by wheel-stop manufacturer for application to asphalt pavement.

D. Preformed Traffic-Calming Devices

1. Speed Bumps **OR** Humps **OR** Cushions, **as directed**: Solid, integrally colored, 100 percent postconsumer or commingled postconsumer and postindustrial recycled rubber **OR** plastic, **as directed**; UV stabilized. Provide holes for anchoring to substrate.
 - a. Size: Modular bumps **2 inches (51 mm)** high by **10 inches (254 mm)** wide by **72 inches (1800 mm)** long, with overall length as dimensioned on Drawings.
 - b. Size: Modular assemblies **3 inches (76 mm)** high by **12 feet (3.7 m)** in overall width **OR** **4 inches (102 mm)** high by **14 feet (4.3 m)** in overall width, **as directed**, with overall length as dimensioned on Drawings.
 - c. Mounting Hardware: Galvanized-steel spike, **1/2-inch (13-mm)** diameter, **10-inch (254-mm)** minimum length **OR** lag screw, shield, and washers; **1/2-inch (13-mm)** diameter, **8-inch (203-mm)** minimum length **OR** hardware as standard with device manufacturer, **as directed**.
 - d. Adhesive: As recommended by device manufacturer.

E. Imprinted Asphalt Materials

1. Templates: Imprinted-asphalt manufacturer's standard flexible templates for imprinting pattern into hot asphalt paving.
 - a. Pattern: Running bond brick **OR** Cobblestone **OR** Custom pattern indicated on Drawings, **as directed**.
2. Coating System: Imprinted-asphalt manufacturer's standard system formulated for exterior application on asphalt paving surfaces.
 - a. Base Coating: Portland cement and epoxy-modified acrylic polymer blended with sand and aggregate, formulated for exterior application on asphalt paving surfaces.

- b. Top Coating: Epoxy-modified acrylic polymer blended with sand and aggregate, formulated for exterior application on asphalt paving surfaces.
 - c. Colorant: UV-stable pigment blend, added to each coating layer.
 - d. Color: White **OR** Yellow, **as directed**.
3. Precut Marking Material: Imprinted-asphalt manufacturer's standard, reflectorized, thermoplastic, **90-mil (2.3-mm)** minimum thickness, formulated for exterior application on asphalt paving surfaces, and matching the imprinted pattern of templates.

F. Mixes

1. Hot-Mix Asphalt: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction; designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types"; and complying with the following requirements:
 - a. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - b. Base Course: In accordance with state or local DOT specifications.
 - c. Surface Course: In accordance with state or local DOT specifications.
2. Hot-Mix Asphalt Based on ASTM D 3515 Requirements: Dense, hot-laid, hot-mix asphalt plant mixes approved by authorities having jurisdiction and designed according to procedures in AI MS-2, "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types."
 - a. Provide mixes with a history of satisfactory performance in geographical area where Project is located.
 - b. Provide mixes complying with composition, grading, and tolerance requirements in ASTM D 3515 for the following nominal, maximum aggregate sizes:
 - 1) Base Course: **1 inch (25 mm)**.
 - 2) Surface Course: **1/2 inch (13 mm)**.
3. Emulsified-Asphalt Slurry: ASTM D 3910, Type 1 **OR** Type 2 **OR** Type 3, **as directed**.

1.3 EXECUTION

A. Examination

1. Verify that subgrade is dry and in suitable condition to begin paving.
2. Proof-roll subgrade below pavements with heavy pneumatic-tired equipment to identify soft pockets and areas of excess yielding. Do not proof-roll wet or saturated subgrades.
 - a. Completely proof-roll subgrade in one direction, repeating proof-rolling in direction perpendicular to first direction. Limit vehicle speed to **3 mph (5 km/h)**.
 - b. Proof roll with a loaded 10-wheel, tandem-axle dump truck weighing not less than **15 tons (13.6 tonnes)**.
 - c. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Owner, and replace with compacted backfill or fill as directed.
3. Proceed with paving only after unsatisfactory conditions have been corrected.
4. Verify that utilities, traffic loop detectors, and other items requiring a cut and installation beneath the asphalt surface have been completed and that asphalt surface has been repaired flush with adjacent asphalt prior to beginning installation of imprinted asphalt.

B. Cold Milling

1. Clean existing pavement surface of loose and deleterious material immediately before cold milling. Remove existing asphalt pavement by cold milling to grades and cross sections indicated.
 - a. Mill to a depth of **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 3 inches (75 mm)**, **as directed**.
 - b. Mill to a uniform finished surface free of excessive gouges, grooves, and ridges.
 - c. Control rate of milling to prevent tearing of existing asphalt course.
 - d. Repair or replace curbs, manholes, and other construction damaged during cold milling.

- e. Excavate and trim unbound-aggregate base course, if encountered, and keep material separate from milled hot-mix asphalt.
- f. Transport milled hot-mix asphalt to asphalt recycling facility.
- g. Keep milled pavement surface free of loose material and dust.

C. Patching

1. **Hot-Mix Asphalt Pavement:** Saw cut perimeter of patch and excavate existing pavement section to sound base. Excavate rectangular or trapezoidal patches, extending **12 inches (300 mm)** into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Remove excavated material. Recompact existing unbound-aggregate base course to form new subgrade.
2. **Portland Cement Concrete Pavement:** Break cracked slabs and roll as required to reseat concrete pieces firmly.
 - a. Pump hot undersealing asphalt under rocking slab until slab is stabilized or, if necessary, crack slab into pieces and roll to reseat pieces firmly.
 - b. Remove disintegrated or badly cracked pavement. Excavate rectangular or trapezoidal patches, extending into adjacent sound pavement, unless otherwise indicated. Cut excavation faces vertically. Recompact existing unbound-aggregate base course to form new subgrade.
3. **Tack Coat:** Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of **0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m)**.
 - a. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
 - b. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.
4. **Patching:**
 - a. Fill excavated pavements with hot-mix asphalt base mix for full thickness of patch and, while still hot, compact flush with adjacent surface.
OR
Partially fill excavated pavements with hot-mix asphalt base mix and, while still hot, compact. Cover asphalt base course with compacted, hot-mix surface layer finished flush with adjacent surfaces.

D. Repairs

1. **Leveling Course:** Install and compact leveling course consisting of hot-mix asphalt surface course to level sags and fill depressions deeper than **1 inch (25 mm)** in existing pavements.
 - a. Install leveling wedges in compacted lifts not exceeding **3 inches (75 mm)** thick.
2. **Crack and Joint Filling:** Remove existing joint filler material from cracks or joints to a depth of **1/4 inch (6 mm)**.
 - a. Clean cracks and joints in existing hot-mix asphalt pavement.
 - b. Use emulsified-asphalt slurry to seal cracks and joints less than **1/4 inch (6 mm)** wide. Fill flush with surface of existing pavement and remove excess.
 - c. Use hot-applied joint sealant to seal cracks and joints more than **1/4 inch (6 mm)** wide. Fill flush with surface of existing pavement and remove excess.

E. Surface Preparation

1. **General:** Immediately before placing asphalt materials, remove loose and deleterious material from substrate surfaces. Ensure that prepared subgrade is ready to receive paving.
2. **Herbicide Treatment:** Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
 - a. Mix herbicide with prime coat if formulated by manufacturer for that purpose.
3. **Prime Coat:** Apply uniformly over surface of compacted unbound-aggregate base course at a rate of **0.15 to 0.50 gal./sq. yd. (0.7 to 2.3 L/sq. m)**. Apply enough material to penetrate and seal but not flood surface. Allow prime coat to cure.
 - a. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.

- a. Complete compaction before mix temperature cools to **185 deg F (85 deg C)**.
 2. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.
 3. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:
 - a. Average Density:
 - 1) 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.

OR

 - 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.
 4. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.
 5. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.
 6. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.
 7. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.
 8. Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.
- J. Asphalt Curbs
1. Construct hot-mix asphalt curbs over compacted pavement surfaces. Apply a light tack coat unless pavement surface is still tacky and free from dust. Spread mix at minimum temperature of **250 deg F (121 deg C)**.
 - a. Asphalt Mix: Same as pavement surface-course mix.
 2. Place hot-mix asphalt to curb cross section indicated or, if not indicated, to local standard shapes, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.
- K. Asphalt Traffic-Calming Devices
1. Construct hot-mix asphalt speed bumps, humps, cushions, and tables over compacted pavement surfaces. Apply a tack coat unless pavement surface is still tacky and free from dust. Spread mix at minimum temperature of **250 deg F (121 deg C)**.
 - a. Tack Coat Application: Apply uniformly to surfaces of existing pavement at a rate of **0.05 to 0.15 gal./sq. yd. (0.2 to 0.7 L/sq. m)**.
 - b. Asphalt Mix: Same as pavement surface-course mix.
 - c. Before installation, mill pavement that will be in contact with bottom of traffic-calming device. Mill to a depth of **1 inch (25 mm)** from top of pavement to a clean, rough profile.
 2. Place hot-mix asphalt to cross section indicated, by machine or by hand in wood or metal forms. Tamp hand-placed materials and screed to smooth finish. Remove forms after hot-mix asphalt has cooled.
- L. Installation Tolerances
1. Pavement Thickness: Compact each course to produce the thickness indicated within the following tolerances:
 - a. Base Course: Plus or minus **1/2 inch (13 mm)**.
 - b. Surface Course: Plus **1/4 inch (6 mm)**, no minus.
 2. Pavement Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a **10-foot (3-m)** straightedge applied transversely or longitudinally to paved areas:
 - a. Base Course: **1/4 inch (6 mm)**.

- b. Surface Course: **1/8 inch (3 mm)**.
- c. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is **1/4 inch (6 mm)**.
3. Traffic-Calming Devices: Compact and form asphalt to produce the contour indicated and within a tolerance of plus or minus **1/8 inch (3 mm)** of height indicated above pavement surface.

M. Surface Treatments

1. Fog Seals: Apply fog seal at a rate of **0.10 to 0.15 gal./sq. yd. (0.45 to 0.7 L/sq. m)** to existing asphalt pavement and allow to cure. With fine sand, lightly dust areas receiving excess fog seal.
2. Slurry Seals: Apply slurry coat in a uniform thickness according to ASTM D 3910 and allow to cure.
 - a. Roll slurry seal to remove ridges and provide a uniform, smooth surface.
3. Chip Seals: Apply asphalt binder directly to the pavement followed by a layer of ¼ inch aggregate chips **OR** as directed, and roll to embed aggregate into the binder.
 - a. Can be applied as double **OR** triple layers, **as directed**, which are accomplished by applying additional layers of asphaltic material and aggregate. After applying each layer of aggregate, the surface is compacted using a roller to embed aggregates in the binder.
4. Sand Seals: Spray emulsion directly to the pavement followed by a layer of sand. The sand can be spread immediately for maximum stick, **OR** wait until after the emulsion breaks and be rolled with a pneumatic tire roller, **as directed**.

N. Pavement Marking

1. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Owner.
2. Allow paving to age for 30 **OR** 90, **as directed**, days before starting pavement marking.
3. Sweep and clean surface to eliminate loose material and dust.
4. Apply paint with mechanical equipment to produce pavement markings, of dimensions indicated, with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of **15 mils (0.4 mm)**.
 - a. Broadcast glass beads uniformly into wet pavement markings at a rate of **6 lb/gal. (0.72 kg/L)**.

O. Wheel Stops

1. Install wheel stops in bed of adhesive as recommended by manufacturer.
2. Securely attach wheel stops to pavement with not less than two galvanized-steel dowels embedded at one-quarter to one-third points. Securely install dowels into pavement and bond to wheel stop. Recess head of dowel beneath top of wheel stop.

P. Preformed Traffic-Calming Devices

1. Install preformed speed bumps **OR** humps **OR** cushions, **as directed**, in bed of adhesive as recommended by manufacturer for heavy traffic.
2. Securely attach preformed speed bumps **OR** humps **OR** cushions, **as directed**, to pavement with hardware spaced as recommended by manufacturer for heavy traffic. Recess head of hardware beneath top surface.

Q. Imprinting Asphalt

1. General: Imprint asphalt according to manufacturer's written instructions, using manufacturer's recommended equipment.
2. Freshly Laid Asphalt: Immediately after asphalt has been laid and compacted but still plastic, begin the surface imprinting process.
 - a. Monitor asphalt surface temperature in compliance with manufacturer's written recommendations to ensure required temperature to perform surface imprinting.
 - b. Reheat asphalt if surface temperature drops below that required.
3. Reheating Asphalt: Soften asphalt pavement surface by heating to a depth of at least **1/2 inch (13 mm)** without burning asphalt.

- a. Heat to a temperature of **300 to 325 deg F (149 to 163 deg C)** immediately before applying templates.
 - b. Regularly monitor the pavement temperature to prevent overheating.
 - c. Direct flame heaters are not permitted.
 - d. If pavement is overheated and begins to emit black smoke, remove damaged pavement by milling down **1 inch (25 mm)** and replace removed pavement with new, compacted surface course prior to resuming imprinting work.
4. Surface Imprinting: Apply and imprint templates to a minimum depth of **1/4 inch (6 mm)** **OR** as required to embed precut marking material flush or barely beneath pavement surface, **as directed**.
 5. Coating Application: After imprinted surface has cooled, apply two layers of base coating followed by two layers of top coating **OR** four layers of top coating, **as directed**. Do not allow traffic until coating has completely dried and cured.
 6. Precut Marking Material Application: Position precut marking material aligned with imprinted pattern and slowly heat to a temperature no higher than **325 deg F (163 deg C)** until marking material begins to liquefy and flow. Do not allow traffic until installed marking material has cooled to ambient temperature.
- R. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.
 3. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.
 4. Traffic-Calming Devices: Finished height of asphalt speed bumps, humps, cushions, and tables above pavement will be measured for compliance with tolerances.
 5. In-Place Density: Testing agency will take samples of uncompacted paving mixtures and compacted pavement according to ASTM D 979 or AASHTO T 168.
 - a. Reference maximum theoretical density will be determined by averaging results from four samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 2041, and compacted according to job-mix specifications.
 - b. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.
 - 1) One core sample will be taken for every **1000 sq. yd. (836 sq. m)** or less of installed pavement, with no fewer than 3 cores taken.
 - 2) Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.
 6. Replace and compact hot-mix asphalt where core tests were taken.
 7. Remove and replace or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements.
- S. Disposal
1. Except for material indicated to be recycled, remove excavated materials from Project site and legally dispose of them in an EPA-approved landfill.
 - a. Do not allow milled materials to accumulate on-site.

END OF SECTION 32 12 16 13

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SECTION 32 12 16 13a - PAVEMENT JOINT SEALANTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for pavement joint sealants. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Cold-applied joint sealants.
 - b. Cold-applied, jet-fuel-resistant joint sealants.
 - c. Hot-applied joint sealants.
 - d. Hot-applied, jet-fuel-resistant joint sealants.

C. Preconstruction Testing

1. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, eight, Samples of materials that will contact or affect joint sealants. Use ASTM C 1087 **OR** manufacturer's standard test method, **as directed**, to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.

D. Submittals

1. Product Data: For each joint-sealant product indicated.
2. Samples: For each kind and color of joint sealant required.
3. Pavement-Joint-Sealant Schedule: Include the following information:
 - a. Joint-sealant application, joint location, and designation.
 - b. Joint-sealant manufacturer and product name.
 - c. Joint-sealant formulation.
 - d. Joint-sealant color.
4. Product certificates.
5. Product test reports.
6. Preconstruction compatibility and adhesion test reports.

E. Quality Assurance

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021.
2. Preinstallation Conference: Conduct conference at Project site.

F. Project Conditions

1. Do not proceed with installation of joint sealants under the following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below **40 deg F (5 deg C)**.
 - b. When joint substrates are wet.
 - c. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - d. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.2 PRODUCTS

A. Materials

1. Compatibility: Provide joint sealants, backing materials, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer based on testing and field experience.
2. Colors of Exposed Joint Sealants: As selected from manufacturer's full range.

B. Cold-Applied Joint Sealants

1. Single-Component, Nonsag, Silicone Joint Sealant for Concrete: ASTM D 5893, Type NS.
2. Single-Component, Self-Leveling, Silicone Joint Sealant for Concrete: ASTM D 5893, Type SL.
3. Multicomponent, Pourable, Traffic-Grade, Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

C. Cold-Applied, Jet-Fuel-Resistant Joint Sealants

1. Jet-Fuel-Resistant, Single-Component, Pourable, Traffic-Grade, Modified-Urethane Joint Sealant for Concrete: ASTM C 920, Type S, Grade P, Class 25, for Use T.
2. Jet-Fuel-Resistant, Multicomponent, Pourable, Traffic-Grade, Modified-Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 12-1/2, for Use T.
3. Jet-Fuel-Resistant, Multicomponent, Pourable, Traffic-Grade, Modified-Urethane Joint Sealant for Concrete: ASTM C 920, Type M, Grade P, Class 25, for Use T.

D. Hot-Applied Joint Sealants

1. Hot-Applied, Single-Component Joint Sealant for Concrete: ASTM D 3406.
2. Hot-Applied, Single-Component Joint Sealant for Concrete and Asphalt: ASTM D 6690, Types I, II, and III.

E. Hot-Applied, Jet-Fuel-Resistant Joint Sealants

1. Hot-Applied, Jet-Fuel-Resistant, Single-Component Joint Sealant for Concrete: ASTM D 7116, Type I.
2. Hot-Applied, Jet-Fuel-Resistant, Single-Component Joint Sealant for Concrete and Tar Concrete: Single-component formulation complying with ASTM D 3581.

F. Joint-Sealant Backer Materials

1. General: Provide joint-sealant backer materials that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by joint-sealant manufacturer based on field experience and laboratory testing.
2. For use in joints such as contraction joints cut partially through paving material:
 - a. Round Backer Rods for Cold- and Hot-Applied Joint Sealants: ASTM D 5249, Type 1, of diameter and density required to control sealant depth and prevent bottom-side adhesion of sealant.
 - b. Round Backer Rods for Cold-Applied Joint Sealants: ASTM D 5249, Type 3, of diameter and density required to control joint-sealant depth and prevent bottom-side adhesion of sealant.
3. For use in joints such as expansion joints extending through the full depth of the pavement:
 - a. Backer Strips for Cold- and Hot-Applied Joint Sealants: ASTM D 5249; Type 2; of thickness and width required to control joint-sealant depth, prevent bottom-side adhesion of sealant, and fill remainder of joint opening under sealant.

G. Primers

1. Primers: Product recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

1.3 EXECUTION

A. Installation Of Joint Sealants

1. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated unless more stringent requirements apply.
2. Cleaning of Joints: Clean out joints immediately before installing joint sealants.
3. Joint-Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
4. Install joint-sealant backings of kind indicated to support joint sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - a. Do not leave gaps between ends of joint-sealant backings.
 - b. Do not stretch, twist, puncture, or tear joint-sealant backings.
 - c. Remove absorbent joint-sealant backings that have become wet before sealant application and replace them with dry materials.
5. Install joint sealants using proven techniques that comply with the following and at the same time backings are installed:
 - a. Place joint sealants so they directly contact and fully wet joint substrates.
 - b. Completely fill recesses in each joint configuration.
 - c. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
6. Tooling of Nonsag Joint Sealants: Immediately after joint-sealant application and before skinning or curing begins, tool sealants according to the following requirements to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint:
 - a. Remove excess joint sealant from surfaces adjacent to joints.
 - b. Use tooling agents that are approved in writing by joint-sealant manufacturer and that do not discolor sealants or adjacent surfaces.
7. Provide joint configuration to comply with joint-sealant manufacturer's written instructions unless otherwise indicated.

B. Cleaning

1. Clean off excess joint sealant or sealant smears adjacent to joints as the Work progresses, by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

C. Protection

1. Protect joint sealants, during and after curing period, from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Final Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately and replace with joint sealant so installations in repaired areas are indistinguishable from the original work.

END OF SECTION 32 12 16 13a

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Task	Specification	Specification Description
32 12 16 13	32 12 13 13	Asphaltic Concrete Overlays
32 12 16 13	32 12 13 13a	Bituminous Paving-Repair And Resurfacing
32 12 16 19	32 12 13 13	Asphaltic Concrete Overlays
32 12 16 19	32 12 13 13a	Bituminous Paving-Repair And Resurfacing
32 12 16 39	31 32 13 19	Soil Stabilization-Lime
32 12 16 39	31 32 19 13	Geosynthetic Fabric
32 12 16 43	32 01 13 61	Spray Applications, Seal Coats, And Surface Treatments
32 12 16 43	32 12 16 13	Asphalt Paving
32 12 16 43	32 01 13 61a	Crack Sealing Of Bituminous Pavements
32 12 33 00	32 12 13 13	Asphaltic Concrete Overlays
32 12 33 00	32 12 13 13a	Bituminous Paving-Repair And Resurfacing
32 12 33 00	32 12 16 13	Asphalt Paving
32 12 36 13	32 12 16 13	Asphalt Paving
32 12 36 13	32 01 13 61a	Crack Sealing Of Bituminous Pavements
32 12 36 16	32 01 13 61	Spray Applications, Seal Coats, And Surface Treatments
32 12 36 16	32 12 16 13	Asphalt Paving
32 12 36 16	32 01 13 61a	Crack Sealing Of Bituminous Pavements
32 12 36 23	32 01 13 61	Spray Applications, Seal Coats, And Surface Treatments
32 12 36 23	32 12 16 13	Asphalt Paving
32 12 36 23	32 01 13 61a	Crack Sealing Of Bituminous Pavements

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SECTION 32 13 13 33 - CEMENT CONCRETE PAVEMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for cement concrete pavement. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Driveways.
 - b. Roadways.
 - c. Parking lots.
 - d. Curbs and gutters.
 - e. Walks.

C. Definitions

1. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements. For each design mixture submitted, include an equivalent concrete mixture that does not contain portland cement replacements, to determine amount of portland cement replaced.
3. Shop Drawings: Indicate pavement markings, lane separations, and defined parking spaces. Indicate, with international symbol of accessibility, spaces allocated for people with disabilities.
4. Samples: For each type of product or exposed finish, prepared as Samples of size indicated below:
 - a. Exposed Aggregate: **10-lb (4.5-kg)** Sample of each mix.
 - b. Wheel Stops: **6 inches (150 mm)** long showing cross section; with fasteners.
 - c. Preformed Traffic-Calming Devices: **6 inches (150 mm)** long showing cross section; with fasteners.
5. Other Action Submittals:
 - a. Design Mixtures: For each concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
6. Qualification Data: For qualified Installer of detectable warnings, ready-mix concrete manufacturer and testing agency.
7. Material Certificates: For the following, from manufacturer:
 - a. Cementitious materials.
 - b. Steel reinforcement and reinforcement accessories.
 - c. Fiber reinforcement.
 - d. Admixtures.
 - e. Curing compounds.
 - f. Applied finish materials.

- g. Bonding agent or epoxy adhesive.
- h. Joint fillers.
8. Material Test Reports: For each of the following:
 - a. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
9. Field quality-control reports.

E. Quality Assurance

1. Detectable Warning Installer Qualifications: An employer of workers trained and approved by manufacturer of stamped concrete paving systems.
2. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
3. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
4. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
5. ACI Publications: Comply with **ACI 301 (ACI 301M)** unless otherwise indicated.
6. Preinstallation Conference: Conduct conference at Project site.

F. Project Conditions

1. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
2. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of **40 deg F (4.4 deg C)** for oil-based materials **OR 55 deg F (12.8 deg C)** for water-based materials, **as directed**, and not exceeding **95 deg F (35 deg C)**.

1.2 PRODUCTS

A. Forms

1. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - a. Use flexible or uniformly curved forms for curves with a radius of **100 feet (30.5 m)** or less. Do not use notched and bent forms.
2. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

B. Steel Reinforcement

1. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel **OR** galvanized-steel, **as directed**, wire into flat sheets.
3. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
4. Epoxy-Coated Welded Wire Reinforcement: ASTM A 884/A 884M, Class A, plain steel.
5. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**; deformed.
6. Galvanized Reinforcing Bars: ASTM A 767/A 767M, Class II zinc coated, hot-dip galvanized after fabrication and bending; with ASTM A 615/A 615M, **Grade 60 (Grade 420)** deformed bars.

7. Epoxy-Coated Reinforcing Bars: ASTM A 775/A 775M or ASTM A 934/A 934M; with ASTM A 615/A 615M, **Grade 60 (Grade 420)** deformed bars.
8. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed bars; assembled with clips.
9. Plain-Steel Wire: ASTM A 82/A 82M, as drawn **OR** galvanized, **as directed**.
10. Deformed-Steel Wire: ASTM A 496/A 496M.
11. Epoxy-Coated-Steel Wire: ASTM A 884/A 884M, Class A coated, plain **OR** deformed, **as directed**.
12. Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)** plain-steel bars; zinc coated (galvanized) after fabrication according to ASTM A 767/A 767M, Class I coating, **as directed**. Cut bars true to length with ends square and free of burrs.
13. Epoxy-Coated, Joint Dowel Bars: ASTM A 775/A 775M; with ASTM A 615/A 615M, **Grade 60 (Grade 420)**, plain-steel bars.
14. Tie Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed.
OR
Hook Bolts: **ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6)**, internally and externally threaded. Design hook-bolt joint assembly to hold coupling against paving form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.
15. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - a. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.
 - b. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
16. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating, compatible with epoxy coating on reinforcement.
17. Zinc Repair Material: ASTM A 780.

C. Concrete Materials

1. Cementitious Material: Use the following cementitious materials, of same type, brand, and source throughout Project:
 - a. Portland Cement: ASTM C 150, gray **OR** white, **as directed**, portland cement Type I **OR** Type II **OR** Type I/II **OR** Type III **OR** Type V, **as directed**. Supplement with the following, **as directed**:
 - 1) Fly Ash: ASTM C 618, Class C or Class F.
 - 2) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** Type IP, portland-pozzolan, **as directed**, cement.
2. Normal-Weight Aggregates: ASTM C 33, Class 4S **OR** Class 4M **OR** Class 1N, **as directed**, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials, **as directed**.
 - a. Maximum Coarse-Aggregate Size: **1-1/2 inches (38 mm) OR 1 inch (25 mm) OR 3/4 inch (19 mm), as directed**, nominal.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
3. Exposed Aggregate: Selected, hard, and durable; washed; free of materials with deleterious reactivity to cement or that cause staining; from a single source, with gap-graded coarse aggregate as follows:
 - a. Aggregate Sizes: **3/4 to 1 inch (19 to 25 mm) OR 1/2 to 3/4 inch (13 to 19 mm) OR 3/8 to 5/8 inch (10 to 16 mm), as directed**, nominal.
 - b. Aggregate Source, Shape, and Color: **As required to meet Project requirements**.
4. Water: Potable and complying with ASTM C 94/C 94M.
5. Air-Entraining Admixture: ASTM C 260.

6. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - b. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - c. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 - d. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 - e. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 - f. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
 7. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, **as directed**, nonfading, and resistant to lime and other alkalis.
- D. Fiber Reinforcement
1. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in concrete paving, complying with ASTM C 1116/C 1116M, Type III, **1/2 to 1-1/2 inches (13 to 38 mm)** long.
- E. Curing Materials
1. Absorptive Cover: AASHTO M 182, Class 3, burlap cloth made from jute or kenaf, weighing approximately **9 oz./sq. yd. (305 g/sq. m)** dry or cotton mats.
 2. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
 3. Water: Potable.
 4. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
 5. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 6. White, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B, dissipating.
- F. Related Materials
1. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
 2. Slip-Resistive Aggregate Finish: Factory-graded, packaged, rustproof, nonglazing, abrasive aggregate of fused aluminum-oxide granules or crushed emery aggregate containing not less than 50 percent aluminum oxide and not less than 20 percent ferric oxide; unaffected by freezing, moisture, and cleaning materials.
 3. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
 4. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - a. Types I and II, non-load bearing **OR** Types IV and V, load bearing, **as directed**, for bonding hardened or freshly mixed concrete to hardened concrete.
 5. Chemical Surface Retarder: Water-soluble, liquid, set retarder with color dye, for horizontal concrete surface application, capable of temporarily delaying final hardening of concrete to a depth of **1/8 to 1/4 inch (3 to 6 mm)**.
 6. Pigmented Mineral Dry-Shake Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
 7. Rock Salt: Sodium chloride crystals, kiln dried, coarse gradation with 100 percent passing **3/8-inch (9.5-mm)** sieve and 85 percent retained on a **No. 8 (2.36-mm)** sieve.
- G. Detectable Warning Materials

1. Detectable Warning Stamp: Semirigid polyurethane mats with formed underside capable of imprinting detectable warning pattern on plastic concrete; perforated with a vent hole at each dome.
 - a. Size of Stamp: One piece matching detectable warning area shown on Drawings **OR 24 by 24 inches (610 by 610 mm) OR 24 by 36 inches (610 by 914 mm) OR 24 by 48 inches (610 by 1220 mm) OR 26 by 26 inches (660 by 660 mm) OR 26 by 36 inches (660 by 914 mm), as directed.**
 2. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation designed to facilitate release of stamp mats.
- H. Pavement Markings
1. Pavement-Marking Paint: Alkyd-resin type, lead and chromate free, ready mixed, complying with AASHTO M 248, Type N **OR** Type F **OR** Type S, **as directed**; colors complying with FS TT-P-1952.
 - a. Color: White **OR** Yellow **OR** Blue **OR** As indicated, **as directed**.
 2. Pavement-Marking Paint: MPI #32 Alkyd Traffic Marking Paint.
 - a. Color: White **OR** Yellow **OR** Blue **OR** As indicated, **as directed**.
 3. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, Type II, with drying time of less than three **OR** 45, **as directed**, minutes.
 - a. Color: White **OR** Yellow **OR** Blue **OR** As indicated, **as directed**.
 4. Pavement-Marking Paint: MPI #97 Latex Traffic Marking Paint.
 - a. Color: White **OR** Yellow **OR** Blue **OR** As indicated, **as directed**.
 5. Glass Beads: AASHTO M 247, Type 1 **OR** FS TT-B-1325, Type 1A, **as directed**.
- I. Wheel Stops
1. Wheel Stops: Precast, air-entrained concrete, **2500-psi (17.2-MPa)** minimum compressive strength, **4-1/2 inches (115 mm)** high by **9 inches (225 mm)** wide by **72 inches (1820 mm)** long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.
 - a. Dowels: Galvanized steel, **3/4 inch (19 mm)** in diameter, **10-inch (254-mm)** minimum length.
 2. Wheel Stops: Solid, integrally colored, 96 percent recycled HDPE, or commingled postconsumer and postindustrial recycled rubber or plastic; UV stabilized; **4 inches (100 mm)** high by **6 inches (150 mm)** wide by **72 inches (1820 mm)** long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.
 - a. Color: Black **OR** Yellow **OR** Gray **OR** Green **OR** Blue, **as directed**.
 - b. Dowels: Galvanized steel, **3/4 inch (19 mm)** in diameter, **10-inch (254-mm)** minimum length.
 - c. Adhesive: As recommended by wheel stop manufacturer for application to concrete pavement.
- J. Preformed Traffic-Calming Devices
1. Speed Bumps **OR** Humps **OR** Cushions, **as directed**: Solid, integrally colored, 100 percent postconsumer or commingled postconsumer and postindustrial recycled rubber or plastic; UV stabilized. Provide holes for anchoring to substrate.
 - a. Bump Size: Modular **2 inches (50 mm)** high by **10 inches (254 mm)** wide by **72 inches (1800 mm)** long, with overall length as dimensioned on Drawings.
 - b. Hump **OR** Cushion, **as directed**, Size: Modular assemblies **3 inches (75 mm)** high by **12 feet (3.7 m)** in overall width **OR** **4 inches (100 mm)** high by **14 feet (4.3 m)** in overall width, **as directed**, with overall length as dimensioned on Drawings.
 - c. Color: Black **OR** Yellow, **as directed**.
 - d. Mounting Hardware: Galvanized-steel lag screw, shield, and washers; **1/2-inch (13-mm)** diameter, **8-inch (200-mm)** minimum length **OR** hardware as standard with device manufacturer for use with concrete paving, **as directed**.
 - e. Adhesive: As recommended by device manufacturer.

K. Concrete Mixtures

1. Prepare design mixtures, proportioned according to **ACI 301 (ACI 301M)**, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - a. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 - b. When automatic machine placement is used, determine design mixtures and obtain laboratory test results that meet or exceed requirements.
2. Proportion mixtures to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): **4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed.**
 - b. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45 **OR** 0.50, **as directed.**
 - c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm) OR 8 inches (200 mm), as directed,** plus or minus **1 inch (25 mm).**
3. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - a. Air Content: **5-1/2 OR 4-1/2 OR 2-1/2, as directed,** percent plus or minus 1.5 percent for **1-1/2-inch (38-mm)** nominal maximum aggregate size.
 - b. Air Content: **6 OR 4-1/2 OR 3, as directed,** percent plus or minus 1.5 percent for **1-inch (25-mm)** nominal maximum aggregate size.
 - c. Air Content: **6 OR 5 OR 3-1/2, as directed,** percent plus or minus 1.5 percent for **3/4-inch (19-mm)** nominal maximum aggregate size.
4. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 **OR** 0.30, **as directed,** percent by weight of cement.
5. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - a. Use water-reducing admixture **OR** high-range, water-reducing admixture **OR** high-range, water-reducing and retarding admixture **OR** plasticizing and retarding admixture, **as directed,** in concrete as required for placement and workability.
 - b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
6. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to **ACI 301 (ACI 301M)** requirements for concrete exposed to deicing chemicals **OR** as follows, **as directed:**
 - a. Fly Ash or Pozzolan: 25 percent.
 - b. Ground Granulated Blast-Furnace Slag: 50 percent.
 - c. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
7. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than **1.0 lb/cu. yd. (0.60 kg/cu. m) OR 1.5 lb/cu. yd. (0.90 kg/cu. m), as directed.**
8. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

L. Concrete Mixing

1. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, **as directed.** Furnish batch certificates for each batch discharged and used in the Work.
 - a. When air temperature is between **85 and 90 deg F (30 and 32 deg C),** reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above **90 deg F (32 deg C),** reduce mixing and delivery time to 60 minutes.
2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - a. For concrete batches of **1 cu. yd. (0.76 cu. m)** or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

- b. For concrete batches larger than **1 cu. yd. (0.76 cu. m)**, increase mixing time by 15 seconds for each additional **1 cu. yd. (0.76 cu. m)**.
- c. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

1.3 EXECUTION

A. Examination

1. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
2. Proof-roll prepared subbase surface below concrete paving to identify soft pockets and areas of excess yielding.
 - a. Completely proof-roll subbase in one direction and repeat in perpendicular direction, **as directed**. Limit vehicle speed to **3 mph (5 km/h)**.
 - b. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than **15 tons (13.6 tonnes)**.
 - c. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of **1/2 inch (13 mm)** according to requirements in Division 31 Section "Earth Moving".
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Remove loose material from compacted subbase surface immediately before placing concrete.

C. Edge Forms And Screed Construction

1. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
2. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

D. Steel Reinforcement

1. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
2. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
3. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
5. Zinc-Coated Reinforcement: Use galvanized-steel wire ties to fasten zinc-coated reinforcement. Repair cut and damaged zinc coatings with zinc repair material.
6. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.
7. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum **2-inch (50-mm)** overlap of adjacent mats.

E. Joints

1. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - a. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.

2. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - a. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - b. Provide tie bars at sides of paving strips where indicated.
 - c. Butt Joints: Use bonding agent **OR** epoxy bonding adhesive, **as directed**, at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - d. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least **1-1/2 inches (38 mm)** into concrete.
 - e. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
 3. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, other fixed objects, and where indicated.
 - a. Locate expansion joints at intervals of **50 feet (15.25 m)** unless otherwise indicated.
 - b. Extend joint fillers full width and depth of joint.
 - c. Terminate joint filler not less than **1/2 inch (13 mm)** or more than **1 inch (25 mm)** below finished surface if joint sealant is indicated.
 - d. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - e. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.
 - f. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
 4. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent concrete paving:
 - a. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces, **as directed**.
 - 1) Tolerance: Ensure that grooved joints are within **3 inches (75 mm)** either way from centers of dowels.
 - b. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3-mm-)** wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - 1) Tolerance: Ensure that sawed joints are within **3 inches (75 mm)** either way from centers of dowels.
 - c. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
 - d. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces, **as directed**.
- F. Concrete Placement
1. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
 2. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.

3. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
 4. Comply with **ACI 301 (ACI 301M)** requirements for measuring, mixing, transporting, and placing concrete.
 5. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
 6. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
 7. Consolidate concrete according to **ACI 301 (ACI 301M)** by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - a. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
 8. Screed paving surface with a straightedge and strike off.
 9. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
 10. Curbs and Gutters: Use design mixture for automatic machine placement. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing.
 11. Slip-Form Paving: Use design mixture for automatic machine placement. Produce paving to required thickness, lines, grades, finish, and jointing.
 - a. Compact subbase and prepare subgrade of sufficient width to prevent displacement of slip-form paving machine during operations.
 12. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - a. When air temperature has fallen to or is expected to fall below **40 deg F (4.4 deg C)**, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than **50 deg F (10 deg C)** and not more than **80 deg F (27 deg C)** at point of placement.
 - b. Do not use frozen materials or materials containing ice or snow.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
 13. Hot-Weather Placement: Comply with **ACI 301 (ACI 301M)** and as follows when hot-weather conditions exist:
 - a. Cool ingredients before mixing to maintain concrete temperature below **90 deg F (32 deg C)** at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - c. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
- G. Float Finishing
1. General: Do not add water to concrete surfaces during finishing operations.
 2. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
 - a. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.

- b. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface perpendicular to line of traffic to provide a uniform, fine-line texture.
- c. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface **1/16 to 1/8 inch (1.6 to 3 mm)** deep with a stiff-bristled broom, perpendicular to line of traffic.

H. Special Finishes

1. Monolithic Exposed-Aggregate Finish: Expose coarse aggregate in paving surface as follows:
 - a. Immediately after float finishing, spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 - b. Cover paving surface with plastic sheeting, sealing laps with tape, and remove when ready to continue finishing operations.
 - c. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 - d. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
2. Seeded Exposed-Aggregate Finish: Immediately after initial floating, spread a single layer of aggregate uniformly on paving surface. Tamp aggregate into plastic concrete and float finish to entirely embed aggregate with mortar cover of **1/16 inch (1.6 mm)**.
 - a. Spray-apply chemical surface retarder to paving according to manufacturer's written instructions.
 - b. Cover paving surface with plastic sheeting, sealing laps with tape, and remove sheeting when ready to continue finishing operations.
 - c. Without dislodging aggregate, remove mortar concealing the aggregate by lightly brushing surface with a stiff, nylon-bristle broom. Do not expose more than one-third of the average diameter of the aggregate and not more than one-half of the diameter of the smallest aggregate.
 - d. Fine-spray surface with water and brush. Repeat cycle of water flushing and brushing until cement film is removed from aggregate surfaces to depth required.
3. Slip-Resistive Aggregate Finish: Before final floating, spread slip-resistive aggregate finish on paving surface according to manufacturer's written instructions and as follows:
 - a. Uniformly spread **25 lb/100 sq. ft. (12 kg/10 sq. m) OR 40 lb/100 sq. ft. (19.5 kg/10 sq. m) OR 60 lb/100 sq. ft. (29 kg/10 sq. m)**, **as directed**, of dampened, slip-resistive aggregate over paving surface in two applications. Tamp aggregate flush with surface using a steel trowel, but do not force below surface.
 - b. Uniformly distribute approximately two-thirds of slip-resistive aggregate over paving surface with mechanical spreader, allow to absorb moisture, and embed by power floating. Follow power floating with a second slip-resistive aggregate application, uniformly distributing remainder of material at right angles to first application to ensure uniform coverage, and embed by power floating.
 - c. Cure concrete with curing compound recommended by slip-resistive aggregate manufacturer. Apply curing compound immediately after final finishing.
 - d. After curing, lightly work surface with a steel wire brush or abrasive stone and water to expose nonslip aggregate.
4. Rock-Salt Finish: After initial floating **OR** troweling **OR** brooming, **as directed**, uniformly spread rock salt over paving surface at the rate of **5 lb/100 sq. ft. (0.2 kg/10 sq. m)**.
 - a. Embed rock salt into plastic concrete with roller or magnesium float.
 - b. Cover paving surface with **1-mil- (0.025-mm-)** thick polyethylene sheet and remove sheet when concrete has hardened and seven-day curing period has elapsed.
 - c. After seven-day curing period, saturate concrete with water and broom-sweep surface to dissolve remaining rock salt, thereby leaving pits and holes.
5. Pigmented Mineral Dry-Shake Hardener Finish: After initial floating, apply dry-shake materials to paving surface according to manufacturer's written instructions and as follows:

- a. Uniformly spread dry-shake hardener at a rate of **100 lb/100 sq. ft. (49 kg/10 sq. m)**, unless greater amount is recommended by manufacturer to match paving color required.
 - b. Uniformly distribute approximately two-thirds of dry-shake hardener over the concrete surface with mechanical spreader; allow hardener to absorb moisture and embed it by power floating. Follow power floating with a second application of pigmented mineral dry-shake hardener, uniformly distributing remainder of material at right angles to first application to ensure uniform color, and embed hardener by final power floating.
 - c. After final power floating, apply a hand-trowel finish followed by a broom finish.
 - d. Cure concrete with curing compound recommended by dry-shake hardener manufacturer. Apply curing compound immediately after final finishing.
- I. Detectable Warnings
1. Blockouts: Form blockouts in concrete for installation of detectable paving units specified in Division 32 Section "Unit Paving".
 - a. Tolerance for Opening Size: Plus **1/4 inch (6 mm)**, no minus.
 2. Stamped Detectable Warnings: Install stamped detectable warnings as part of a continuous concrete paving placement and according to stamp-mat manufacturer's written instructions.
 - a. Before using stamp mats, verify that the vent holes are unobstructed.
 - b. Apply liquid release agent to the concrete surface and the stamp mat.
 - c. Stamping: While initially finished concrete is plastic **OR** After application and final floating of pigmented mineral dry-shake hardener, **as directed**, accurately align and place stamp mats in sequence. Uniformly load, gently vibrate, and press mats into concrete to produce imprint pattern on concrete surface. Load and tamp mats directly perpendicular to the stamp-mat surface to prevent distortion in shape of domes. Press and tamp until mortar begins to come through all of the vent holes. Gently remove stamp mats.
 - d. Trimming: After 24 hours, cut off the tips of mortar formed by the vent holes.
 - e. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.
- J. Concrete Protection And Curing
1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 2. Comply with ACI 306.1 for cold-weather protection.
 3. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching **0.2 lb/sq. ft. x h (1 kg/sq. m x h)** before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.
 4. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
 5. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
 - a. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - 1) Water.
 - 2) Continuous water-fog spray.
 - 3) Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with **12-inch (300-mm)** lap over adjacent absorptive covers.
 - b. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover, placed in widest practicable width, with sides and ends lapped at least **12 inches (300 mm)** and sealed by waterproof tape or adhesive. Immediately repair any holes or tears occurring during installation or curing period using cover material and waterproof tape.
 - c. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to

heavy rainfall within three hours after initial application. Maintain continuity of coating, and repair damage during curing period.

K. Paving Tolerances

1. Comply with tolerances in ACI 117 and as follows:
 - a. Elevation: **3/4 inch (19 mm)**.
 - b. Thickness: Plus **3/8 inch (10 mm)**, minus **1/4 inch (6 mm)**.
 - c. Surface: Gap below **10-foot- (3-m-)** long, unlevelled straightedge not to exceed **1/2 inch (13 mm)**.
 - d. Alignment of Tie-Bar End Relative to Line Perpendicular to Paving Edge: **1/2 inch per 12 inches (13 mm per 300 mm)** of tie bar.
 - e. Lateral Alignment and Spacing of Dowels: **1 inch (25 mm)**.
 - f. Vertical Alignment of Dowels: **1/4 inch (6 mm)**.
 - g. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: **1/4 inch per 12 inches (6 mm per 300 mm)** of dowel.
 - h. Joint Spacing: **3 inches (75 mm)**.
 - i. Contraction Joint Depth: Plus **1/4 inch (6 mm)**, no minus.
 - j. Joint Width: Plus **1/8 inch (3 mm)**, no minus.

L. Pavement Marking

1. Do not apply pavement-marking paint until layout, colors, and placement have been verified with the Owner.
2. Allow concrete paving to cure for a minimum of 28 days and be dry before starting pavement marking.
3. Sweep and clean surface to eliminate loose material and dust.
4. Apply paint with mechanical equipment to produce markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum wet film thickness of **15 mils (0.4 mm)**.
 - a. Apply graphic symbols and lettering with paint-resistant, die-cut stencils, firmly secured to concrete surface. Mask an extended area beyond edges of each stencil to prevent paint application beyond stencil. Apply paint so that it cannot run beneath stencil.
 - b. Broadcast glass beads uniformly into wet markings at a rate of **6 lb/gal. (0.72 kg/L)**.

M. Wheel Stops

1. Install wheel stops in bed of adhesive applied as recommended by manufacturer.
2. Securely attach wheel stops to paving with not less than two steel **OR** galvanized-steel, **as directed**, dowels located at one-quarter to one-third points. Install dowels in drilled holes in the paving and bond dowels to wheel stop. Recess head of dowel beneath top of wheel stop.

N. Preformed Traffic-Calming Devices

1. Install preformed speed bumps **OR** humps **OR** cushions, **as directed**, in bed of adhesive applied as recommended by manufacturer for heavy traffic.
2. Securely attach preformed speed bumps **OR** humps **OR** cushions, **as directed**, to paving with hardware spaced as recommended by manufacturer for heavy traffic. Recess head of hardware beneath top surface.

O. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - a. Testing Frequency: Obtain at least one composite sample for each **100 cu. yd. (76 cu. m) OR 5000 sq. ft. (465 sq. m)**, **as directed**, or fraction thereof of each concrete mixture placed each day.

- 1) When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - b. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - c. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - d. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when it is 80 deg F (27 deg C) and above, and one test for each composite sample.
 - e. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - f. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - 1) A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.
 3. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
 4. Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 5. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but will not be used as sole basis for approval or rejection of concrete.
 6. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Owner.
 7. Concrete paving will be considered defective if it does not pass tests and inspections.
 8. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 9. Prepare test and inspection reports.
- P. Repairs And Protection
1. Remove and replace concrete paving that is broken, damaged, or defective or that does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by the Owner.
 2. Drill test cores, where directed by the Owner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory paving areas with portland cement concrete bonded to paving with epoxy adhesive.
 3. Protect concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
 4. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Final Completion inspections.

END OF SECTION 32 13 13 33

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SECTION 32 13 13 33a - DECORATIVE CEMENT CONCRETE PAVEMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for decorative cement concrete pavement. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section includes colored, stamped, stenciled, and stained concrete paving.

C. Definitions

1. Cementitious Materials: Portland cement alone or in combination with one or more of blended hydraulic cement, fly ash and other pozzolans, and ground granulated blast-furnace slag.

D. Submittals

1. Product Data: For each type of product indicated.
2. LEED Submittals:
 - a. Product Data for Credit MR 4.1 and Credit MR 4.2, **as directed**: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
 - b. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements. For each design mixture submitted, include an equivalent concrete mixture that does not contain portland cement replacements, to determine amount of portland cement replaced.
3. Samples: For each type of exposed color, pattern, or texture indicated.
4. Other Action Submittals:
 - a. Design Mixtures: For each decorative concrete paving mixture. Include alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
5. Qualification Data: For qualified Installer, ready-mix concrete manufacturer, and testing agency.
6. Material Certificates: For the following, from manufacturer:
 - a. Cementitious materials.
 - b. Steel reinforcement and reinforcement accessories.
 - c. Fiber reinforcement.
 - d. Admixtures.
 - e. Curing compounds.
 - f. Applied finish materials.
 - g. Bonding agent or epoxy adhesive.
 - h. Joint fillers.
7. Material Test Reports: For each of the following:
 - a. Aggregates. Include service-record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.
8. Field quality-control reports.

E. Quality Assurance

1. Installer Qualifications: An employer of workers trained and approved by manufacturer of decorative concrete paving systems.
2. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

- a. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
3. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - a. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
4. Source Limitations: Obtain decorative concrete paving products and each type or class of cementitious material of the same brand from same manufacturer's plant, and obtain each aggregate from single source.
5. Concrete Testing Service: Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.
6. ACI Publications: Comply with **ACI 301 (ACI 301M)** unless otherwise indicated.
7. Preinstallation Conference: Conduct conference at Project site.

F. Project Conditions

1. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

1.2 PRODUCTS

A. Forms

1. Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide full-depth, continuous, straight, and smooth exposed surfaces.
 - a. Use flexible or uniformly curved forms for curves of a radius of **100 feet (30.5 m)** or less. Do not use notched and bent forms.
2. Forms for Textured Finish Concrete: Units of face design, size, arrangement, and configuration indicated. Provide solid backing and form supports to ensure stability of textured form liners.
3. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and that will not impair subsequent treatments of concrete surfaces.

B. Steel Reinforcement

1. Recycled Content: Provide steel reinforcement with an average recycled content of steel so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
2. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, fabricated from as-drawn steel wire into flat sheets.
3. Reinforcing Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)**; deformed.
4. Steel Bar Mats: ASTM A 184/A 184M; with ASTM A 615/A 615M, **Grade 60 (Grade 420)**, deformed bars; assembled with clips.
5. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
6. Joint Dowel Bars: ASTM A 615/A 615M, **Grade 60 (Grade 420)** plain-steel bars. Cut bars true to length with ends square and free of burrs.
7. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars, welded wire reinforcement, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete of greater compressive strength than concrete specified, and as follows:
 - a. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

C. Concrete Materials

1. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

- a. Portland Cement: ASTM C 150, gray **OR** white, **as directed**, portland cement Type I **OR** Type II **OR** Type I/II **OR** Type III **OR** Type V, **as directed**. Supplement with the following, **as directed**:
 - 1) Fly Ash: ASTM C 618, Class C or F.
 - 2) Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
 - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag **OR** Type IP, portland-pozzolan, **as directed**, cement.
 2. Normal-Weight Aggregates: ASTM C 33, Class 4S **OR** Class 4M **OR** Class 1N, **as directed**, uniformly graded. Provide aggregates from a single source with documented service-record data of at least 10 years' satisfactory service in similar paving applications and service conditions using similar aggregates and cementitious materials, **as directed**.
 - a. Maximum Aggregate Size: **1-1/2 inches (38 mm) OR 1 inch (25 mm) OR 3/4 inch (19 mm)**, **as directed**, nominal.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
 3. Water: Potable and complying with ASTM C 94/C 94M.
 4. Air-Entraining Admixture: ASTM C 260.
 5. Chemical Admixtures: Admixtures certified by manufacturer to be compatible with other admixtures and to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material.
 - a. Water-Reducing Admixture: ASTM C 494/C 494M, Type A, colored, **as directed**.
 - b. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D, colored, **as directed**.
 - c. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
 6. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, **as directed**, nonfading, and resistant to lime and other alkalis.
- D. Fiber Reinforcement
1. Synthetic Fiber: Monofilament or fibrillated polypropylene fibers engineered and designed for use in decorative concrete paving, complying with ASTM C 1116/C 1116M, Type III, **1/2 to 1-1/2 inches (13 to 38 mm)** long.
- E. Surface Coloring Materials
1. Pigmented Mineral Dry-Shake Hardener: Factory-packaged, dry combination of portland cement, graded quartz aggregate, color pigments, and plasticizing admixture. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
 2. Pigmented Powder Release Agent: Factory-packaged, dry combination of surface-conditioning and dispersing agents interground with color pigments that facilitates release of stamp mats. Use color pigments that are finely ground, nonfading mineral oxides interground with cement.
 3. Liquid Release Agent: Manufacturer's standard, clear, evaporating formulation that facilitates release of stamp mats and texture rollers.
- F. Stamping Devices
1. Stamp Mats: Semirigid polyurethane mats with projecting textured and ridged underside capable of imprinting texture and joint patterns on plastic concrete.
 2. Stamp Tools: Open-grid, aluminum or rigid-plastic stamp tool capable of imprinting joint patterns on plastic concrete.
 3. Rollers: Manually controlled, water-filled aluminum rollers with projecting ridges on drum capable of imprinting texture and joint patterns on plastic concrete.
 4. Texture Rollers: Manually controlled, abrasion-resistant polyurethane rollers capable of imprinting texture on plastic concrete.
- G. Stencil Materials
1. Stencils: Manufacturer's standard, moisture-resistant paper or reusable plastic stencils, designed for use on plastic concrete.

- H. Stain Materials
1. Reactive Stain: Acidic-based stain with wetting agents and high-grade, UV-stable metallic salts that react with calcium hydroxide in cured concrete to produce permanent, variegated, or translucent color effects.
 2. Penetrating Stain: Water-based, acrylic latex, penetrating stain with colorfast pigments.
- I. Curing And Sealing Materials
1. Curing Paper: Nonstaining, waterproof paper, consisting of two layers of kraft paper cemented together and reinforced with fiber, and complying with ASTM C 171.
 2. Evaporation Retarder: Waterborne, monomolecular, film forming, manufactured for application to fresh concrete.
 3. Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type I, Class B, manufactured for colored concrete.
 - a. For integrally colored concrete, curing compound shall be pigmented type approved by coloring admixture manufacturer.
 - b. For concrete indicated to be sealed, curing compound shall be compatible with sealer.
 4. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type I, Class A, manufactured for use with colored concrete.
 5. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type I, Class A, manufactured for use with colored concrete.
 6. Clear Acrylic Sealer: Manufacturer's standard, waterborne, nonyellowing and UV-resistant, membrane-forming, medium-gloss, acrylic copolymer emulsion solution, manufactured for colored concrete, containing not less than 15 percent solids by volume.
 7. Slip-Resistance-Enhancing Additive: Manufacturer's standard finely graded aggregate or polymer additive, designed to be added to clear acrylic sealer to enhance slip resistance of sealed paving surface.
- J. Related Materials
1. Joint Fillers: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork in preformed strips.
 2. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
 3. Epoxy Bonding Adhesive: ASTM C 881/C 881M, two-component epoxy resin capable of humid curing and bonding to damp surfaces; of class suitable for application temperature, of grade complying with requirements, and of the following types:
 - a. Types I and II, non-load bearing **OR** Types IV and V, load bearing, **as directed**, for bonding hardened or freshly mixed concrete to hardened concrete.
 4. Polyethylene Film: ASTM D 4397, **1 mil (0.025 mm)** thick, clear.
- K. Concrete Mixtures
1. Prepare design mixtures, proportioned according to **ACI 301 (ACI 301M)**, for each type and strength of normal-weight concrete, and as determined by either laboratory trial mixtures or field experience.
 - a. Use a qualified independent testing agency for preparing and reporting proposed concrete design mixtures for the trial batch method.
 2. Proportion mixtures to provide normal-weight concrete with the following properties:
 - a. Compressive Strength (28 Days): **4500 psi (31 MPa) OR 4000 psi (27.6 MPa) OR 3500 psi (24.1 MPa) OR 3000 psi (20.7 MPa), as directed.**
 - b. Maximum Water-Cementitious Materials Ratio at Point of Placement: 0.45 **OR** 0.50, **as directed.**
 - c. Slump Limit: **4 inches (100 mm) OR 5 inches (125 mm), as directed**, plus or minus **1 inch (25 mm).**
 3. Add air-entraining admixture at manufacturer's prescribed rate to result in normal-weight concrete at point of placement having an air content as follows:
 - a. Air Content: **5-1/2 OR 4-1/2 OR 2-1/2, as directed**, percent plus or minus 1.5 percent for **1-1/2-inch (38-mm)** nominal maximum aggregate size.

- b. Air Content: 6 **OR** 4-1/2 **OR** 3, **as directed**, percent plus or minus 1.5 percent for 1-inch (25-mm) nominal maximum aggregate size.
- c. Air Content: 6 **OR** 5 **OR** 3-1/2, **as directed**, percent plus or minus 1.5 percent for 3/4-inch (19-mm) nominal maximum aggregate size.
4. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 **OR** 0.30, **as directed**, percent by weight of cement.
5. Chemical Admixtures: Use admixtures according to manufacturer's written instructions.
 - a. Use water-reducing admixture **OR** water-reducing and retarding admixture **OR** water-reducing and accelerating admixture, **as directed**, in concrete as required for placement and workability.
 - b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
6. Cementitious Materials: Limit percentage by weight of cementitious materials other than portland cement according to **ACI 301 (ACI 301M)** requirements for concrete exposed to deicing chemicals **OR** as follows, **as directed**:
 - a. Fly Ash or Pozzolan: 25 percent.
 - b. Ground Granulated Blast-Furnace Slag: 50 percent.
 - c. Combined Fly Ash or Pozzolan, and Ground Granulated Blast-Furnace Slag: 50 percent, with fly ash or pozzolan not exceeding 25 percent.
7. Synthetic Fiber: Uniformly disperse in concrete mixture at manufacturer's recommended rate, but not less than 1.0 lb/cu. yd. (0.60 kg/cu. m).
8. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

L. Concrete Mixing

1. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, **as directed**. Furnish batch certificates for each batch discharged and used in the Work.
 - a. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
2. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
 - a. For concrete batches of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
 - b. For concrete batches larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
 - c. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixing time, quantity, and amount of water added.

1.3 EXECUTION

A. Examination

1. Examine exposed subgrades and subbase surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.
2. Proof-roll prepared subbase surface below decorative concrete paving to identify soft pockets and areas of excess yielding.
 - a. Completely proof-roll subbase in one direction and repeat in perpendicular direction. Limit vehicle speed to 3 mph (5 km/h).
 - b. Proof-roll with a pneumatic-tired and loaded, 10-wheel, tandem-axle dump truck weighing not less than 15 tons (13.6 tonnes).
 - c. Correct subbase with soft spots and areas of pumping or rutting exceeding depth of 1/2 inch (13 mm) according to requirements in Division 31 Section "Earth Moving".

3. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Preparation
1. Remove loose material from compacted subbase surface immediately before placing concrete.
 2. Protect adjacent construction from discoloration and spillage during application of color hardeners, release agents, stains, curing compounds, and sealers.
- C. Edge Forms And Screed Construction
1. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.
 2. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.
- D. Steel Reinforcement
1. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 2. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.
 3. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.
 4. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.
 5. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum **2-inch (50-mm)** overlap to adjacent mats.
- E. Joints
1. General: Form construction, isolation, and contraction joints and tool edges true to line, with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline unless otherwise indicated.
 - a. When joining existing paving, place transverse joints to align with previously placed joints unless otherwise indicated.
 2. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than one-half hour unless paving terminates at isolation joints.
 - a. Continue steel reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of paving strips unless otherwise indicated.
 - b. Butt Joints: Use bonding agent **OR** epoxy bonding adhesive, **as directed**, at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - c. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys unless otherwise indicated. Embed keys at least **1-1/2 inches (38 mm)** into concrete.
 - d. Dowelled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
 3. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
 - a. Locate expansion joints at intervals of **50 feet (15.25 m)** unless otherwise indicated.
 - b. Extend joint fillers full width and depth of joint.
 - c. Terminate joint filler not less than **1/2 inch (13 mm)** or more than **1 inch (25 mm)** below finished surface if joint sealant is indicated.
 - d. Place top of joint filler flush with finished concrete surface if joint sealant is not indicated.
 - e. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

- f. During concrete placement, protect top edge of joint filler with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
4. Contraction Joints: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows, to match jointing of existing adjacent decorative concrete paving, **as directed**:
 - a. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint with grooving tool to a **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, radius. Repeat grooving of contraction joints after applying surface finishes. Eliminate grooving-tool marks on concrete surfaces.
 - 1) Tolerance: Ensure that grooved joints are within **3 inches (75 mm)** either way from centers of dowels.
 - b. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut **1/8-inch- (3-mm-)** wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before developing random contraction cracks.
 - 1) Tolerance: Ensure that sawed joints are within **3 inches (75 mm)** in both directions from center of dowels.
 - c. Doweled Contraction Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or coat with asphalt one-half of dowel length to prevent concrete bonding to one side of joint.
5. Edging: After initial floating, tool edges of paving, gutters, curbs, and joints in concrete with an edging tool to a **1/4-inch (6-mm) OR 3/8-inch (10-mm)**, **as directed**, radius. Repeat tooling of edges after applying surface finishes. Eliminate edging tool marks on concrete surfaces.

F. Concrete Placement

1. Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast-in.
2. Remove snow, ice, or frost from subbase surface and steel reinforcement before placing concrete. Do not place concrete on frozen surfaces.
3. Moisten subbase to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.
4. Comply with **ACI 301 (ACI 301M)** requirements for measuring, mixing, transporting, and placing concrete.
5. Do not add water to concrete during delivery or at Project site. Do not add water to fresh concrete after testing.
6. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
7. Consolidate concrete according to **ACI 301 (ACI 301M)** by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.
 - a. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.
8. Screed paving surface with a straightedge and strike off.
9. Commence initial floating using bull floats or darbies to impart an open-textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.
10. Cold-Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
 - a. When air temperature has fallen to or is expected to fall below **40 deg F (4.4 deg C)**, uniformly heat water and aggregates before mixing to obtain a concrete mixture

- temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
- b. Do not use frozen materials or materials containing ice or snow.
 - c. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.
11. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and as follows when hot-weather conditions exist:
- a. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - b. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - c. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
- G. Float Finishing
1. General: Do not add water to concrete surfaces during finishing operations.
 2. Float Finish: Begin the second floating operation when bleed-water sheen has disappeared and concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats or by hand floating if area is small or inaccessible to power units. Finish surfaces to true planes. Cut down high spots and fill low spots. Refloat surface immediately to uniform granular texture.
- H. Integrally Colored Concrete Finish
1. Integrally Colored Concrete Finish: After final floating, apply the following finish:
 - a. Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 - b. Medium-to-Fine-Textured Broom Finish: Draw a soft-bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
 - c. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface 1/16 to 1/8 inch (1.6 to 3 mm) deep with a stiff-bristled broom, perpendicular to line of traffic.
- I. Stenciling
1. Cut stencils to slab width and lay on wet concrete. Overlap "mortar joint" on trailing edge of each section of stencil onto leading "mortar joint" of previous section.
 2. Trim stencils to fit slab and adjacent patterns.
 3. Slightly embed stencil into concrete by rolling with stencil roller.
 4. Apply pigmented mineral dry-shake hardener materials to concrete surfaces according to manufacturer's written instructions.
 5. Stencil Rolling:
 - a. Apply pigmented powder release agent **OR** liquid release agent, **as directed**, according to manufacturer's written instructions prior to applying texture roller to surface of concrete.
 - b. Perform rolling operation to produce required texture on concrete surface.
 6. Remove stencils when concrete has sufficiently cured to bear weight. Do not leave stencils in concrete overnight.
 7. Remove debris with mechanical blower prior to application of curing compound. If release agent is applied, delay removal of debris for 24 hours, then flood area with low-pressure water hose, wetting release agent, and follow by cleaning surface with pressure washer.
- J. Pigmented Mineral Dry-Shake Hardener
1. Pigmented Mineral Dry-Shake Hardener Finish: After initial floating, apply dry-shake materials to paving surfaces according to manufacturer's written instructions and as follows:

- a. Uniformly apply dry-shake hardener at a rate of **100 lb/100 sq. ft. (49 kg/10 sq. m)** unless greater amount is recommended by manufacturer to match paving color required.
- b. Uniformly distribute approximately two-thirds of dry-shake hardener over the concrete surface with mechanical spreader; allow hardener to absorb moisture and embed it by power floating. Follow power floating with a second application of pigmented mineral dry-shake hardener, uniformly distributing remainder of material at right angles to first application to ensure uniform color, and embed hardener by final power floating.
- c. After final power floating, apply the following finish:
 - 1) Burlap Finish: Drag a seamless strip of damp burlap across float-finished concrete, perpendicular to line of traffic, to provide a uniform, gritty texture.
 - 2) Medium-to-Fine-Textured Broom Finish: Draw a soft bristle broom across float-finished concrete surface, perpendicular to line of traffic, to provide a uniform, fine-line texture.
 - 3) Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating float-finished concrete surface **1/16 to 1/8 inch (1.6 to 3 mm)** deep with a stiff-bristled broom, perpendicular to line of traffic.
2. Pigmented Powder Release Agent: Uniformly distribute onto dry-shake-hardened and still-plastic concrete at a rate of **3 to 4 lb/100 sq. ft. (1.5 to 2 kg/10 sq. m)**.
3. Liquid Release Agent: Uniformly mist surface of dry-shake-hardened and still-plastic concrete at a rate of **5 gal/1000 sq. ft. (0.2 L/sq. m)**.

K. Stamping

1. Mat Stamping: After floating and while concrete is plastic, apply mat-stamped finish.
 - a. Pigmented Powder Release Agent: Uniformly distribute onto concrete at a rate of **3 to 4 lb/100 sq. ft. (1.5 to 2 kg/10 sq. m)**.
 - b. Liquid Release Agent: Apply liquid release agent to the concrete surface and the stamp mat. Uniformly mist surface of concrete at a rate of **5 gal/1000 sq. ft. (0.2 L/sq. m)**.
 - c. After application of release agent, accurately align and place stamp mats in sequence.
 - d. Uniformly load mats and press into concrete to produce required imprint pattern and depth of imprint on concrete surface. Gently remove stamp mats. Hand stamp edges and surfaces unable to be imprinted by stamp mats.
 - e. Remove residual release agent according to manufacturer's written instructions, but no fewer than three days after stamping concrete. High-pressure-wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.
2. Tool Stamping: After floating and while concrete is plastic, apply tool-stamped finish.
 - a. Cover surface with polyethylene film, stretch taut to remove wrinkles, lap sides and ends **3 inches (75 mm)**, and secure to edge forms. Lightly broom surface to remove air bubbles.
 - b. Accurately align and place stamp tools in sequence and tamp into concrete to produce required imprint pattern and depth of imprint on concrete surface. Gently remove stamp tools. Hand stamp edges and surfaces unable to be imprinted by stamp tools.
 - c. Carefully remove polyethylene film immediately after tool stamping.
3. Roller Stamping: After floating and while concrete is plastic, apply roller-stamped finish.
 - a. Cover surface with polyethylene film, stretch taut to remove wrinkles, lap sides and ends **3 inches (75 mm)**, and secure to edge forms. Lightly broom surface to remove air bubbles.
 - b. Accurately align roller and perform rolling operation to produce required imprint pattern and depth of imprint on concrete surface. Hand stamp surfaces inaccessible to roller.
 - c. Carefully remove polyethylene film immediately after roller stamping.

L. Concrete Protection And Curing

1. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
2. Comply with ACI 306.1 for cold-weather protection.
3. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching **0.2 lb/sq. ft. x h (1 kg/sq. m x h)** before and during

finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete but before float finishing.

4. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.
5. Curing Compound: Apply curing compound immediately after final finishing. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas that have been subjected to heavy rainfall within three hours after application. Maintain continuity of coating, and repair damage during curing period.
 - a. Cure integrally colored concrete with a pigmented, **as directed**, curing compound.
 - b. Cure concrete finished with pigmented mineral dry-shake hardener with a pigmented, **as directed**, curing compound.
6. Curing and Sealing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
7. Curing Paper: Cure with unwrinkled curing paper in pieces large enough to cover the entire width and edges of slab. Do not lap sheets. Fold curing paper down over paving edges and secure with continuous banks of earth to prevent displacement or billowing due to wind. Immediately repair holes or tears in paper.

M. Staining

1. Newly placed concrete paving shall be at least 14 **OR** 30, **as directed**, days old before staining.
2. Prepare surfaces according to manufacturer's written instructions and as follows:
 - a. Clean concrete thoroughly by scraping, applying solvents or stripping agents, sweeping and pressure washing, or scrubbing with a rotary floor machine and detergents recommended by stain manufacturer. Rinse until water is clear and allow surface to dry.
 - 1) Do not use acidic solutions to clean surfaces.
 - b. Test surfaces with droplets of water. If water beads and does not penetrate surface, or penetrates only in some areas, profile surfaces by acid etching, grinding, sanding, or abrasive blasting. Retest and continue profiling surface until water droplets immediately darken and uniformly penetrate concrete surfaces.
 - c. Apply acidic solution to dampened concrete surfaces, scrubbing with uncolored, acid-resistant nylon-bristle brushes until bubbling stops and concrete surface has texture of 120-grit sandpaper. Do not allow solution to dry on concrete surfaces. Rinse until water is clear. Control, collect, and legally dispose of runoff.
 - d. Neutralize concrete surfaces and rinse until water is clear. Test surface for residue with clean white cloth. Test surface according to ASTM F 710 to ensure pH is between 7 and 8.
3. Scoring: Score decorative jointing in paving surfaces **1/16 inch (1.6 mm)** deep with diamond blades to match pattern indicated. Rinse until water is clear. Score after **OR** before, **as directed**, staining.
 - a. Joint Width: **3/8 inch (10 mm)**.
4. Allow paving surface to dry before applying stain. Verify readiness of paving to receive stain according to ASTM D 4263 by tightly taping **18-by-18-inch (450-by-450-mm)**, **4-mil- (0.1-mm-)** thick polyethylene sheet to a representative area of paving surface. Apply stain only if no evidence of moisture has accumulated under sheet after 16 hours.
5. Reactive Stain: Apply reactive stain to paving surfaces according to manufacturer's written instructions and as follows:
 - a. Apply stain by uncolored bristle brush, roller, or high-volume, low-pressure sprayer and immediately scrub into concrete surface with uncolored, acid-resistant nylon-bristle brushes in continuous, circular motion. Do not spread stain after fizzing stops. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
 - b. Remove stain residue after four hours by wet scrubbing with commercial-grade detergent recommended by stain manufacturer. Rinse until water is clear. Control, collect, and legally dispose of runoff.

6. Penetrating Stain: Apply penetrating stain to paving surfaces according to manufacturer's written instructions and as follows:
 - a. Apply first coat of stain to dry, clean surfaces by airless sprayer or by high-volume, low-pressure sprayer.
 - b. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
 - c. Rinse until water is clear. Control, collect, and legally dispose of runoff.

N. Sealer

1. Clear Acrylic Sealer: Apply uniformly in two coats in continuous operations according to manufacturer's written instructions. Allow first coat to dry before applying second coat, at 90 degrees to the direction of the first coat using same application methods and rates.
 - a. Begin sealing dry surface no sooner than 14 days after concrete placement.
 - b. Allow stained concrete surfaces to dry before applying sealer.
 - c. Thoroughly mix slip-resistance-enhancing additive into sealer before applying sealer according to manufacturer's written instructions. Stir sealer occasionally during application to maintain even distribution of additive.

O. Paving Tolerances

1. Comply with tolerances in ACI 117 and as follows:
 - a. Elevation: **3/4 inch (19 mm)**.
 - b. Thickness: Plus **3/8 inch (10 mm)**, minus **1/4 inch (6 mm)**.
 - c. Surface: Gap below **10-foot- (3-m-)** long, unlevelled straightedge not to exceed **1/2 inch (13 mm)**.
 - d. Lateral Alignment and Spacing of Dowels: **1 inch (25 mm)**.
 - e. Vertical Alignment of Dowels: **1/4 inch (6 mm)**.
 - f. Alignment of Dowel-Bar End Relative to Line Perpendicular to Paving Edge: **1/4 inch per 12 inches (6 mm per 300 mm)** of dowel.
 - g. Joint Spacing: **3 inches (75 mm)**.
 - h. Contraction Joint Depth: Plus **1/4 inch (6 mm)**, no minus.
 - i. Joint Width: Plus **1/8 inch (3 mm)**, no minus.

P. Field Quality Control

1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
2. Testing Services: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - a. Testing Frequency: Obtain at least one composite sample for each **100 cu. yd. (76 cu. m) OR 5000 sq. ft. (465 sq. m)**, **as directed**, or fraction thereof of each concrete mixture placed each day.
 - 1) When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - b. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - c. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - d. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is **40 deg F (4.4 deg C)** and below and when it is **80 deg F (27 deg C)** and above, and one test for each composite sample.
 - e. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.
 - f. Compressive-Strength Tests: ASTM C 39/C 39M; test one specimen at seven days and two specimens at 28 days.
 - 1) A compressive-strength test shall be the average compressive strength from two specimens obtained from same composite sample and tested at 28 days.

3. Strength of each concrete mixture will be satisfactory if average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than **500 psi (3.4 MPa)**.
4. Test results shall be reported in writing to the Owner, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
5. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by the Owner but will not be used as sole basis for approval or rejection of concrete.
6. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by the Owner.
7. Decorative concrete paving will be considered defective if it does not pass tests and inspections.
8. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
9. Prepare test and inspection reports.

Q. Repairs And Protection

1. Remove and replace decorative concrete paving that is broken or damaged or does not comply with requirements in this Section. Remove work in complete sections from joint to joint unless otherwise approved by the Owner.
2. Detailing: Grind concrete "squeeze" left from tool placement. Color ground areas with slurry of color hardener mixed with water and bonding agent. Remove excess release agent with high-velocity blower.
3. Protect decorative concrete paving from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.
4. Maintain decorative concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep paving not more than two days before date scheduled for Final Completion inspections.

END OF SECTION 32 13 13 33a

Task	Specification	Specification Description
32 13 13 33	03 31 13 00a	Steel Reinforced Portland Cement Concrete Overlays
32 13 13 33	03 31 13 00b	Fiber Reinforced Portland Cement Concrete Overlays
32 13 13 33	03 31 13 00c	Roller Compacted Concrete Pavement
32 13 73 16	32 01 13 61	Spray Applications, Seal Coats, And Surface Treatments
32 13 73 16	32 12 16 13	Asphalt Paving
32 13 73 16	32 01 13 61a	Crack Sealing Of Bituminous Pavements
32 13 73 19	32 01 13 61	Spray Applications, Seal Coats, And Surface Treatments
32 13 73 19	32 12 16 13	Asphalt Paving

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SECTION 32 14 09 00 - EXTERIOR PLANTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for exterior plants. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Plants.
 - b. Planting soils.
 - c. Tree stabilization.
 - d. Landscape edgings.
 - e. Tree grates.

C. Definitions

1. Backfill: The earth used to replace or the act of replacing earth in an excavation.
2. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with ball size not less than sizes indicated **OR** diameter and depth recommended by ANSI Z60.1 for type and size of plant required, **as directed**; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.
3. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated **OR** diameter and depth recommended by ANSI Z60.1 for type and size of plant required, **as directed**.
4. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than minimum root spread according to ANSI Z60.1 for type and size of plant required.
5. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.
6. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
7. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.
8. Finish Grade: Elevation of finished surface of planting soil.
9. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
10. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
11. Pests: Living organisms that occur where they are not desired, or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
12. Planting Area: Areas to be planted.

13. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
14. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.
15. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.
16. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.
17. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.
18. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
19. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil; but in disturbed areas such as urban environments, the surface soil can be subsoil.

D. Submittals

1. Product Data: For each type of product indicated, including soils.
2. Samples of mineral mulch.
3. Product certificates.
4. Maintenance Instructions: Recommended procedures to be established by the Owner for maintenance of plants during a calendar year.

E. Quality Assurance

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - a. Pesticide Applicator: State licensed, commercial.
2. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
 - a. The soil-testing laboratory shall oversee soil sampling.
 - b. Report suitability of tested soil for plant growth.
 - 1) State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - 2) Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
3. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
4. Preinstallation Conference: Conduct conference at Project site.

F. Delivery, Storage, And Handling

1. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws if applicable.
2. Bulk Materials:
 - a. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - b. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - c. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
3. Deliver bare-root stock plants freshly dug. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting.

4. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
5. Handle planting stock by root ball.
6. Store bulbs, corms, and tubers in a dry place at **60 to 65 deg F (16 to 18 deg C)** until planting.
7. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
 - a. Heel-in bare-root stock. Soak roots that are in dry condition in water for two hours. Reject dried-out plants.
 - b. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 - c. Do not remove container-grown stock from containers before time of planting.
 - d. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly-wet condition.

G. Warranty

1. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by the Owner, or incidents that are beyond Contractor's control.
 - 2) Structural failures including plantings falling or blowing over.
 - 3) Faulty performance of tree stabilization, edgings, or tree grates.
 - 4) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - b. Warranty Periods from Date of Planting Completion **OR** Final Completion, **as directed**:
 - 1) Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
 - 2) Ground Covers, Biennials, Perennials, and Other Plants: 12 **OR** Nine **OR** Six **OR** Three, **as directed**, months.
 - 3) Annuals: Three **OR** Two, **as directed**, months.

H. Maintenance Service

1. Initial Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in Part 1.3. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established but for not less than maintenance period below.
 - a. Maintenance Period for Trees and Shrubs: 12 **OR** Six **OR** Three, **as directed**, months from date of planting completion **OR** Final Completion, **as directed**.
 - b. Maintenance Period for Ground Cover and Other Plants: Six **OR** Three, **as directed**, months from date of planting completion **OR** Final Completion, **as directed**.
2. Continuing Maintenance Proposal: From Installer to the Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.2 PRODUCTS

A. Plant Material

1. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant Schedule or Plant Legend shown on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 - a. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than **3/4 inch (19 mm)** in diameter; or with stem girdling roots will be rejected.
 - b. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.
 2. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
 3. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery and that are in bud but not yet in bloom.
- B. Inorganic Soil Amendments
1. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - a. Class: T, with a minimum of 99 percent passing through **No. 8 (2.36-mm)** sieve and a minimum of 75 percent passing through **No. 60 (0.25-mm)** sieve.
OR
Class: O, with a minimum of 95 percent passing through **No. 8 (2.36-mm)** sieve and a minimum of 55 percent passing through **No. 60 (0.25-mm)** sieve.
 - b. Provide lime in form of ground dolomitic limestone **OR** calcitic limestone **OR** mollusk shells, **as directed**.
 2. Sulfur: Granular, biodegradable, and containing a minimum of 90 percent sulfur, with a minimum of 99 percent passing through **No. 6 (3.35-mm)** sieve and a maximum of 10 percent passing through **No. 40 (0.425-mm)** sieve.
 3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
 4. Aluminum Sulfate: Commercial grade, unadulterated.
 5. Perlite: Horticultural perlite, soil amendment grade.
 6. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through **No. 50 (0.30-mm)** sieve.
 7. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
 8. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
OR
Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.
- C. Organic Soil Amendments
1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **1-inch (25-mm) OR 3/4-inch (19-mm) OR 1/2-inch (13-mm)**, **as directed**, sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - a. Organic Matter Content: 50 to 60 percent of dry weight.
 - b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
 2. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or granular texture, with a pH range of 3.4 to 4.8.

3. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
 - a. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of **0.15 lb/cu. ft. (2.4 kg/cu. m)** of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of **0.25 lb/cu. ft. (4 kg/cu. m)** of loose sawdust or ground bark.
5. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, debris, and material harmful to plant growth.

D. Fertilizers

1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 **OR** 4, **as directed**, percent nitrogen and 10 **OR** 20, **as directed**, percent phosphoric acid.
2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: **1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m)** of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - b. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
 - b. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
5. Planting Tablets: Tightly compressed chip type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.
 - a. Size: 5-gram **OR** 10-gram **OR** 21-gram, **as directed**, tablets.
 - b. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.
6. Chelated Iron: Commercial-grade FeEDDHA for dicots and woody plants, and commercial-grade FeDTPA for ornamental grasses and monocots.

E. Planting Soils

1. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 2 percent organic material content **OR** Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process **OR** Existing, in-place surface soil **OR** Imported topsoil or manufactured topsoil from off-site sources; do not obtain from agricultural land, bogs or marshes, **as directed**. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Ratio of Loose Compost to Topsoil by Volume: 1:4 **OR** 1:3 **OR** 1:2, **as directed**.
 - b. Ratio of Loose Sphagnum **OR** Muck, **as directed**, Peat to Topsoil by Volume: as directed by the Owner.
 - c. Ratio of Loose Wood Derivatives to Topsoil by Volume: as directed by the Owner.
 - d. Weight of Lime per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.

- e. Weight of Sulfur **OR** Iron Sulfate **OR** Aluminum Sulfate, **as directed**, per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - f. Weight of Agricultural Gypsum per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - g. Volume of Sand Plus 10 Percent Diatomaceous Earth **OR** Zeolites, **as directed**, per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - h. Weight of Bonemeal per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - i. Weight of Superphosphate per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - j. Weight of Commercial Fertilizer per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - k. Weight of Slow-Release Fertilizer per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
- F. Mulches
1. Organic Mulch: Shredded hardwood **OR** Ground or shredded bark **OR** Wood and bark chips **OR** Pine straw **OR** Salt hay or threshed straw **OR** Pine needles **OR** Peanut, pecan, and cocoa-bean shells, **as directed**.
 2. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **1-inch (25-mm)** sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings.
 3. Mineral Mulch: Rounded riverbed gravel or smooth-faced stone **OR** Crushed stone or gravel **OR** Marble chips **OR** Granite chips, **as directed**.
 - a. Size Range: **1-1/2 inches (38 mm)** maximum, **3/4 inch (19 mm)** minimum **OR** **3/4 inch (19 mm)** maximum, **1/4 inch (6.4 mm)** minimum, **as directed**.
 - b. Color: Uniform tan-beige color range acceptable to the Owner **OR** Readily available natural gravel color range, **as directed**.
- G. Weed-Control Barriers
1. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, **3 oz./sq. yd. (101g/sq. m)** minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally-encountered chemicals, alkalis, and acids.
 2. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, **4.8 oz./sq. yd. (162 g/sq. m)**.
- H. Pesticides
1. General: Pesticide registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
 2. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 3. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.
- I. Tree Stabilization Materials
1. Stakes and Guys:
 - a. Upright and Guy Stakes: Rough-sawn, sound, new hardwood **OR** softwood with specified wood pressure-preservative treatment, **as directed**, free of knots, holes, cross grain, and other defects, **2-by-2-inch nominal (38-by-38-mm actual)** by length indicated, pointed at one end.
 - b. Wood Deadmen: Timbers measuring **8 inches (200 mm)** in diameter and **48 inches (1200 mm)** long, treated with specified wood pressure-preservative treatment.
 - c. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or turnbuckles **OR** compression springs, **as directed**.
 - d. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, **0.106 inch (2.7 mm)** in diameter.

- e. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
 - f. Guy Cables: Five-strand, **3/16-inch- (4.8-mm-)** diameter, galvanized-steel cable, with zinc-coated turnbuckles **OR** compression springs, **as directed**, a minimum of **3 inches (75 mm)** long, with two **3/8-inch (10-mm)** galvanized eyebolts.
 - g. Flags: Standard surveyor's plastic flagging tape, white, **6 inches (150 mm)** long.
 - h. Proprietary Staking-and-Guying Devices: Proprietary stake and adjustable tie systems to secure each new planting by plant stem; sized as indicated and per manufacturer's written recommendations.
2. Root-Ball Stabilization Materials:
- a. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, **2-by-2-inch nominal (38-by-38-mm actual)** by length indicated; stakes pointed at one end.
 - b. Wood Screws: ASME B18.6.1.
 - c. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball; sized per manufacturer's written recommendations unless otherwise indicated.
3. Palm Bracing: Battens or blocks, struts, straps, and protective padding as indicated.
- a. Battens or Blocks and Struts: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, **2-by-4-inch nominal (38-by-89-mm actual)** by lengths indicated.
 - b. Straps: Adjustable steel or plastic package banding straps.
 - c. Padding: Burlap.
 - d. Proprietary Palm-Bracing Devices: Proprietary systems to secure each new planting by trunk; sized per manufacturer's written recommendations unless otherwise indicated.
- J. Landscape Edgings
1. Wood Edging: Of sizes shown on Drawings, and wood stakes as follows:
- a. Species: Western red cedar, all heart **OR** Southern pine with specified wood pressure-preservative treatment, **as directed**.
 - b. Stakes: Same species as edging, **1-by-2-inch nominal (19-by-38-mm actual)** by **18 inches (450 mm)** long, with galvanized nails for anchoring edging.
2. Steel Edging: Standard commercial-steel edging, rolled edge, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.
- a. Edging Size: **3/16 inch (4.8 mm)** wide by **4 inches (100 mm)** deep **OR 1/4 inch (6.4 mm)** wide by **5 inches (125 mm)** deep **OR 1/4 inch (6.4 mm)** wide by **4 inches (100 mm)** deep **OR 1/8 inch (3.2 mm)** wide by **4 inches (100 mm)** deep **OR 1/8 inch (3.2 mm)** wide by **6 inches (150 mm)** deep **OR 0.1 inch (2.5 mm)** wide by **4 inches (100 mm)** deep, **as directed**.
 - b. Stakes: Tapered steel, a minimum of **12 inches (300 mm)** **OR 15 inches (380 mm)**, **as directed**, long.
 - c. Accessories: Standard tapered ends, corners, and splicers.
 - d. Finish: Standard paint **OR** Zinc coated **OR** Unfinished, **as directed**.
 - e. Paint Color: Black **OR** Green **OR** Brown, **as directed**.
3. Aluminum Edging: Standard-profile extruded-aluminum edging, **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T6, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes.
- a. Edging Size: **3/16 inch (4.8 mm)** wide by **5-1/2 inches (140 mm)** deep **OR 3/16 inch (4.8 mm)** wide by **4 inches (100 mm)** deep **OR 1/8 inch (3.2 mm)** wide by **5-1/2 inches (140 mm)** deep **OR 1/8 inch (3.2 mm)** wide by **4 inches (100 mm)** deep, **as directed**.
 - b. Stakes: Aluminum, **ASTM B 221 (ASTM B 221M)**, Alloy 6061-T6, approximately **1-1/2 inches (38 mm)** wide by **12 inches (300 mm)** long.
 - c. Finish: Manufacturer's standard paint **OR** Powder-coat paint **OR** Mill (natural aluminum) **OR** Black anodized, **as directed**.
 - d. Paint Color: Black **OR** Green **OR** Brown, **as directed**.

4. Plastic Edging: Standard black polyethylene or vinyl edging, V-lipped bottom **OR** horizontally grooved, **as directed**, extruded in standard lengths, with **9-inch (225-mm)** steel angle **OR** plastic, **as directed**, stakes.
 - a. Edging Size: **0.1 inch (2.5 mm)** wide by **5 inches (125 mm)** deep **OR** **0.07 inch (1.8 mm)** wide by **5 inches (125 mm)** deep, **as directed**.
 - b. Top Profile: Straight, with top **2 inches (50 mm)** being **1/4 inch (6.4 mm)** thick.
 - c. Top Profile: Round top, **1/2 inch (13 mm)** **OR** **1 inch (25 mm)**, **as directed**, in diameter.
 - d. Accessories: Manufacturer's standard alignment clips or plugs.

K. Tree Grates

1. Tree Grates and Frames: ASTM A 48/A 48M, **Class 35 (Class 250)** or better, gray-iron castings of shape, pattern, and size indicated.
OR
Tree Grates and Frames: ASTM A 48/A 48M, **Class 35 (Class 250)** or better, gray-iron castings and ASTM A 36/A 36M steel-angle frames of shape, pattern, and size indicated; steel frames hot-dip galvanized.
2. Shape and Size: As indicated **OR** Round, **36 inches (914 mm)** in diameter **OR** Round, **72 inches (1828 mm)** in diameter **OR** **48 inches (1219 mm)** square **OR** **60 inches (1524 mm)** square **OR** Rectangular, **36 by 60 inches (914 by 1524 mm)** **OR** Rectangular, **48 by 72 inches (1219 by 1828 mm)**, **as directed**.
3. Finish: As fabricated **OR** Powder-coat finish, **as directed**.
 - a. Color: Low-gloss black **OR** dark brown **OR** dark green **OR** dark gray, **as directed**.

L. Miscellaneous Products

1. Wood Pressure-Preservative Treatment: AWPAC2, with waterborne preservative for soil and freshwater use, acceptable to authorities having jurisdiction, and containing no arsenic; including ammoniacal copper arsenate, ammoniacal copper zinc arsenate, and chromated copper arsenate.
2. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, **85 mils (2.2 mm)** thick, with vertical root deflecting ribs protruding **3/4 inch (19 mm)** out from panel, and each panel **18 inches (457 mm)** **OR** **24 inches (610 mm)**, **as directed**, wide.
3. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
4. Burlap: Non-synthetic, biodegradable.
5. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
6. Planter Filter Fabric: Woven **OR** Nonwoven, **as directed**, geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.
7. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per **lb (0.45 kg)** of vesicular-arbuscular mycorrhizal fungi and 95 million spores per **lb (0.45 kg)** of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

1.3 EXECUTION

A. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
2. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
3. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

4. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
 5. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - a. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
 6. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- B. Planting Area Establishment**
1. Loosen subgrade of planting areas to a minimum depth of **4 inches (100 mm) OR 6 inches (150 mm) OR 8 inches (200 mm) OR 12 inches (300 mm), as directed**. Remove stones larger than **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm), as directed**, in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the Owner's property.
 - a. Apply superphosphate fertilizer directly to subgrade before loosening.
 - b. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 - 1) Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - 2) Mix lime with dry soil before mixing fertilizer.
 - c. Spread planting soil to a depth of **4 inches (100 mm) OR 6 inches (150 mm) OR 8 inches (200 mm) OR 12 inches (300 mm), as directed**, but not less than required to meet finish grades after natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - 1) Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top **2 inches (50 mm) OR 4 inches (100 mm), as directed**, of subgrade. Spread remainder of planting soil.
 2. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
 3. Before planting, obtain the Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
 4. Application of Mycorrhizal Fungi: At time directed by the Owner, broadcast dry product uniformly over prepared soil at application rate indicated on Drawings.
- C. Excavation For Trees And Shrubs**
1. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - a. Excavate approximately three times as wide as ball diameter for balled and burlapped **OR** balled and potted **OR** container-grown **OR** fabric bag-grown, **as directed**, stock.
 - b. Excavate at least **12 inches (300 mm)** wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - c. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - d. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - e. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - f. Maintain supervision of excavations during working hours.
 - g. Keep excavations covered or otherwise protected overnight **OR** after working hours **OR** when unattended by Installer's personnel, **as directed**.

- d. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside the root ball about **1 inch (25 mm)** from root tips; do not place tablets in bottom of the hole.
 - e. Continue backfilling process. Water again after placing and tamping final layer of soil.
 - f. Set and support bare-root stock in center of planting pit or trench with root flare **1 inch (25 mm)** above **OR 2 inches (50 mm)** above, **as directed**, adjacent finish grade.
6. Use planting soil for backfill.
 - a. Spread roots without tangling or turning toward surface, and carefully work backfill around roots by hand. Puddle with water until backfill layers are completely saturated. Plumb before backfilling, and maintain plumb while working backfill around roots and placing layers above roots.
 - b. Place planting tablets in each planting pit when pit is approximately one-half filled; in amounts recommended in soil reports from soil-testing laboratory. Place tablets beside soil-covered roots about **1 inch (25 mm)** from root tips; do not place tablets in bottom of the hole or touching the roots.
 - c. Continue backfilling process. Water again after placing and tamping final layer of soil.
 7. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.
- E. Mechanized Tree Spade Planting
1. Trees shall **OR** may, **as directed**, be planted with an approved mechanized tree spade at the designated locations. Do not use tree spade to move trees larger than the maximum size allowed for a similar field-grown, balled-and-burlapped root-ball diameter according to ANSI Z60.1, or larger than the manufacturer's maximum size recommendation for the tree spade being used, whichever is smaller.
 2. When extracting the tree, center the trunk within the tree spade and move tree with a solid ball of earth.
 3. Cut exposed roots cleanly during transplanting operations.
 4. Use the same tree spade to excavate the planting hole as was used to extract and transport the tree.
 5. Plant trees as shown on Drawings, following procedures in "Tree, Shrub, and Vine Planting" Article.
 6. Where possible, orient the tree in the same direction as in its original location.
- F. Tree, Shrub, And Vine Pruning
1. Remove only dead, dying, or broken branches. Do not prune for shape.
 2. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.
 3. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
 4. Do not apply pruning paint to wounds.
- G. Tree Stabilization
1. Install trunk stabilization as follows unless otherwise indicated:
 - a. Upright Staking and Tying: Stake trees of **2- through 5-inch (50- through 125-mm)** caliper. Stake trees of less than **2-inch (50-mm)** caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least **18 inches (450 mm)** below bottom of backfilled excavation and to extend to the dimension shown on Drawings **OR** at least **72 inches (1830 mm)** **OR** one-third of trunk height, **as directed**, above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
 - b. Use two stakes for trees up to **12 feet (3.6 m)** high and **2-1/2 inches (63 mm)** or less in caliper; three stakes for trees less than **14 feet (4.2 m)** high and up to **4 inches (100 mm)** in caliper. Space stakes equally around trees.

- c. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
OR
Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
2. Staking and Guying: Stake and guy trees more than **14 feet (4.2 m)** in height and more than **3 inches (75 mm)** in caliper unless otherwise indicated. Securely attach no fewer than three guys to stakes **30 inches (760 mm)** long, driven to grade.
 - a. Site-Fabricated Staking-and-Guying Method:
 - 1) For trees more than **6 inches (150 mm)** in caliper, anchor guys to wood deadmen buried at least **36 inches (900 mm)** below grade. Provide turnbuckle **OR** compression spring, **as directed**, for each guy wire and tighten securely.
 - 2) Support trees with bands of flexible ties at contact points with tree trunk and reaching to turnbuckle **OR** compression spring, **as directed**. Allow enough slack to avoid rigid restraint of tree.
 - 3) Support trees with strands of cable or multiple strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to turnbuckle **OR** compression spring, **as directed**. Allow enough slack to avoid rigid restraint of tree.
 - 4) Attach flags to each guy wire, **30 inches (760 mm)** above finish grade.
OR
Paint turnbuckles **OR** compression springs, **as directed**, with luminescent white paint.
 - b. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.
3. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.
 - a. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.
 - 1) Install stakes of length required to penetrate at least to the dimension shown on Drawings **OR 18 inches (450 mm)**, **as directed**, below bottom of backfilled excavation. Saw stakes off at horizontal stake.
 - 2) Install screws through horizontal hold-down and penetrating at least **1 inch (25 mm)** into stakes. Predrill holes if necessary to prevent splitting wood.
 - 3) Install second set of stakes on other side of root trunk for larger trees as indicated.
 - b. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.
4. Palm Bracing: Install bracing system at three or more places equally spaced around perimeter of trunk to secure each palm until established unless otherwise indicated.
 - a. Site-Fabricated Palm-Bracing Method:
 - 1) Place battens over padding and secure battens in place around trunk perimeter with at least two straps, tightened to prevent displacement. Ensure that straps do not contact trunk.
 - 2) Place diagonal braces and cut to length. Secure upper ends of diagonal braces with galvanized nails into battens or into nail-attached blocks on battens. Do not drive nails, screws, or other securing devices into palm trunk; do not penetrate palm trunk in any fashion. Secure lower ends of diagonal braces with stakes driven into ground to prevent outward slippage of braces.
 - b. Proprietary Palm-Bracing Device: Install palm-bracing system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

H. Root-Barrier Installation

1. Install root barrier where trees are planted within **60 inches (1500 mm) OR 48 inches (1200 mm), as directed**, of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings.
2. Align root barrier vertically **OR** with bottom edge angled at 20 degrees away from the paving or other hardscape element, **as directed**, and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.
3. Install root barrier continuously for a distance of **60 inches (1500 mm)** in each direction from the tree trunk, for a total distance of **10 feet (3 m)** per tree. If trees are spaced closer, use a single continuous piece of root barrier.
 - a. Position top of root barrier flush with finish grade **OR 1/2 inch (13 mm)** above finish grade **OR** per manufacturer's recommendations, **as directed**.
 - b. Overlap root barrier a minimum of **12 inches (300 mm)** at joints.
 - c. Do not distort or bend root barrier during construction activities.
 - d. Do not install root barrier surrounding the root ball of tree.

I. Planting In Planters

1. Place a layer of drainage gravel at least **4 inches (100 mm)** thick in bottom of planter. Cover bottom with filter fabric and wrap filter fabric **4 inches (100 mm) OR 6 inches (150 mm), as directed**, up on all sides. Duct tape along the entire top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.
2. Fill planter with lightweight on-structure planting soil. Place soil in lightly compacted layers to an elevation of **1-1/2 inches (38 mm)** below top of planter, allowing natural settlement.

J. Ground Cover And Plant Planting

1. Set out and space ground cover and plants other than trees, shrubs, and vines **9 inches (225 mm) apart OR 12 inches (300 mm) apart OR 18 inches (450 mm) apart OR 24 inches (600 mm) apart OR as indicated, as directed**, in even rows with triangular spacing.
2. Use planting soil for backfill.
3. Dig holes large enough to allow spreading of roots.
4. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.
5. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
6. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
7. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

K. Planting Area Mulching

1. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of **6 inches (150 mm) OR 12 inches (300mm), as directed**, and secure seams with galvanized pins.
2. Mulch backfilled surfaces of planting areas and other areas indicated.
 - a. Trees and Tree-like Shrubs in Turf Areas: Apply organic **OR** mineral, **as directed**, mulch ring of **2-inch (50-mm) OR 3-inch (75-mm), as directed**, average thickness, with **12-inch (300-mm) OR 24-inch (600-mm) OR 36-inch (900-mm), as directed**, radius around trunks or stems. Do not place mulch within **3 inches (75 mm) OR 6 inches (150 mm), as directed**, of trunks or stems.
 - b. Organic Mulch in Planting Areas: Apply **2-inch (50-mm) OR 3-inch (75-mm), as directed**, average thickness of organic mulch extending **12 inches (300 mm)** beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level with adjacent finish grades. Do not place mulch within **3 inches (75 mm) OR 6 inches (150 mm), as directed**, of trunks or stems.
 - c. Mineral Mulch in Planting Areas: Apply **2-inch (50-mm) OR 3-inch (75-mm), as directed**, average thickness of mineral mulch extending **12 inches (300 mm)** beyond edge of individual planting pit or trench and over whole surface of planting area, and finish level

with adjacent finish grades. Do not place mulch within **3 inches (75 mm)** OR **6 inches (150 mm)**, **as directed**, of trunks or stems.

L. Edging Installation

1. Wood Edging: Install edging where indicated. Mitre cut joints and connections at a 45 degree angle. Fasten each cut joint or connection with two galvanized nails. Anchor with wood stakes spaced up to **36 inches (900 mm)** apart, driven at least **1 inch (25 mm)** below top elevation of edging. Use two galvanized nails per stake to fasten edging, of length as needed to penetrate both edging and stake and provide **1/2-inch (13-mm)** clinch at point. Pre-drill stakes if needed to avoid splitting. Replace stakes that crack or split during installation process.
2. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately **30 inches (760 mm)** apart, driven below top elevation of edging.
3. Aluminum Edging: Install aluminum edging where indicated according to manufacturer's written instructions. Anchor with aluminum stakes spaced approximately **36 inches (900 mm)** OR **48 inches (1200 mm)**, **as directed**, apart, driven below top elevation of edging.
4. Plastic Edging: Install plastic edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately **36 inches (900 mm)** OR **48 inches (1200 mm)**, **as directed**, apart, driven through upper base grooves or V-lip of edging.
5. Shovel-Cut Edging: Separate mulched areas from turf areas, curbs, and paving with a 45-degree, **4- to 6-inch- (100- to 150-mm-)** deep, shovel-cut edge as shown on Drawings.

M. Tree Grate Installation

1. Tree Grates: Set grate segments flush with adjoining surfaces as shown on Drawings. Shim from supporting substrate with soil-resistant plastic. Maintain a **3-inch- (75-mm-)** minimum growth radius around base of tree; break away units of casting, if necessary, according to manufacturer's written instructions.

N. Plant Maintenance

1. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
2. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
3. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

O. Pesticide Application

1. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with the Owner's operations and others in proximity to the Work. Notify the Owner before each application is performed.
2. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas.
3. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

P. Cleanup And Protection

1. During planting, keep adjacent paving and construction clean and work area in an orderly condition.

2. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
 3. After installation and before Final Completion, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.
- Q. Disposal
1. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off the Owner's property.

END OF SECTION 32 14 09 00

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SECTION 32 14 11 00 - ASPHALT CONCRETE SIDEWALKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of asphalt concrete sidewalks. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Asphaltic Concrete:

1. Hot-Mixed, Hot-Laid Bituminous Paving Mixtures: ASTM D 3515.
2. Plant-Mixed, Stockpiled Asphalt Cold Mixes: Asphalt Institute Manual MS-14.

B. Bituminous Prime: ASTM D 2027, Grades MC-30 or MC-70; ASTM D 2028, Grade RC-70; or ASTM D 2026, Grade SC-70.

C. Base Course: ASTM D 2940.

D. Bituminous Tack Coat: ASTM D 977, Grades RS-1, MS-1 or SS-1h; ASTM D 2027, Grade MC-30; ASTM D 2028, Grade RC-70; ASTM D 2026, Grade SC-70; or ASTM D 2397, Grades CRS-1 or CSS-1.

E. Seal Coat: ASTM D 2027, Grade HC-250 or MC-800; or D 2028, Grade RC-250 or RC-800.

F. Slurry Coat Mixture shall be comprised of 70 percent sand or fine aggregate, 10 percent water, and 20 percent liquid or emulsified asphalt.

1. Fine Aggregate: ASTM D 1073, Grade 2.
2. Emulsified Asphalt: ASTM D 977, Grades SS-1 or SS-1h.

1.3 EXECUTION

A. Application Temperatures: Application temperatures for all asphalt materials shall comply with provisions of the Asphalt Institute publications and the applicable ASTM standards.

B. Subgrade: Construct the subgrade for walkway replacement true to grade and compact as required.

C. Base Course

1. Placing: Spread the base course material evenly upon the prepared subgrade, in a layer of such depth that when compacted the layer will be uniform and of the thickness required.
2. Compaction: Immediately following the spreading of the material, compact the base course with equipment to a density as required.

D. Surface Course

1. Placing: Apply prime coat, and allow it to cure. The placing of the mixture shall be continuous. Paint all contact surfaces of previously constructed sidewalk with a tack coat of rapid-setting liquid asphalt just before the fresh mixture is placed.

2. Forms: Set forms with the upper edge true to line and hold grade rigidly in place by stakes placed on the outside of the forms and set flush with the top edge of the forms.
3. Compaction: Immediately following the placement of the asphalt concrete mixture, compact the surface course with equipment to a density as required.
4. Backfilling: After removing the forms and debris, backfill the exposed or excavated area adjoining the sidewalk with granular material, grade, and compact to conform to the surrounding area.

E. Patching

1. For Repair Operations Involving Raveling, Heaving, Spalling, and Alligating: Cut asphalt concrete paving back to solid material, making cut area rectangular with vertical sides. Remove deteriorated pavement including base material if required. Replace base course, compact, and tack coat the base material and the vertical surfaces of cut area. Fill area with new asphalt concrete and compact level with existing walkway. Dust patched area with sand or mineral dust.
2. Pothole Repair: Cut rectangular hole around pothole back to solid pavement leaving straight, vertical edges. Remove loose material and water to firm base. Fill holes and compact to within 3 inches of the surface in layers not exceeding 6 inches with either base material or asphalt mixture. Apply tack coat to base material and vertical edges. On the surface layer, fill with asphalt mixture and mound to such height that when compacted the mix will be level with surrounding walkway surface. Dust patched area with sand or mineral dust.
3. Low Spot or Depression Repair: Determine limits of depression with straightedge, and mark outline with crayon. Apply tack coat, 0.05 to 0.15 gallon per square yard, to the cleaned area, and allow to cure. Spread area with asphalt concrete mix and feather edge by raking and manipulation of the material. Roll and compact area to surrounding walkway level. Recheck with straightedge. Apply a sand seal to the patched area to prevent entrance of water.
4. Polished Aggregate Repair: Clean and dry area thoroughly. Apply tack coat at a rate of 0.05 to 0.15 gallon per square yard; overlay area with new asphalt concrete mix to a minimum 1-1/2 inch thickness and feather to adjoining walkway surfaces. Roll with pneumatic or steel rollers.
5. Damaged Edging Repair: Remove damaged or deteriorated edging materials and replace.
6. Prime Coat: Prime new base course with MC-70 liquid asphalt at a rate of 0.20 to 0.30 gallon per square yard. Take care to apply to more asphalt than will penetrate into the base course during curing. Blot excess prime with sand before the surfacing material is applied.
7. Tack Coat: Surfaces and cut edges of existing asphalt concrete shall be given a tack coat of MC-70 liquid asphalt at a rate of 0.05 to 0.15 gallon per square yard. After application of the tack coat, allow time for the material to cure before surfacing and patching material is placed.
8. Seal Coat Spray Application: Walkway surfaces that are to be sealed shall receive a liquid asphalt coat applied at a rate of 0.15 to 0.20 gallon per square yard, along with a fine aggregate at a rate of 15 to 20 pounds per square yard.

- F. Crack Repair: Fill cracks after drying with liquid asphalt, sand asphalt emulsion water mixture, or slurry seal. After thorough cleaning, work the mixture into cracks by broom or squeegee. Cracks 1/8 to 1/2 inch width shall be slurry sealed and filled with liquid asphalt. Dust repaired cracks with fine aggregate or mineral dust to prevent cracking. Final thickness of the slurry seal shall be 1/8 inch minimum.

END OF SECTION 32 14 11 00

SECTION 32 14 11 00a - PRECAST SIDEWALKS AND PAVERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of precast sidewalks and pavers. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
 - a. For stone varieties proposed for use on Project, include data on physical properties specified or required by referenced ASTM standards.
2. Stone Samples: For each color, grade, finish, and variety of stone required.

1.2 PRODUCTS

- A. Precast Concrete Patio Blocks: ASTM C 936. Natural or colored, minimum 2 inches thick.

- B. Exposed Aggregate or Granite: ASTM C 615 and National Building Granite Quarries Association, Inc.

1. Exposed Limestone: Limestone (Oolitic), ASTM C 568, Category II.
2. Exposed White Tumblestone Aggregate: As required to meet project requirements.

C. Stone Pavers

1. Bluestone Flagging Paver: Irregular cut, 1 inch thick.
2. White Marble, Crushed Stone: ASTM C 503 and Marble Institute of America (MIA), 3 inches thick.
3. Bluestone, Crushed Stone: 3 inches thick.
4. Natural Cleft Slate: ASTM C 629, 3/4-inch irregular cut, 1/2-inch random rectangular cut, or 1/4-inch random rectangular butted joints.

- D. Granite Blocks: Blocks shall be 3 to 5 inches thick and comply with requirements of ASTM C 615 and National Building Granite Quarries Association, Inc. Sizes shall be 3-1/2 inches square; 4 to 12 inches by 3 to 5 inches; and 6 to 15 inches by 3 to 6 inches.

E. Mortar and Grout

1. Portland Cement: ASTM C 150 and the staining requirements of ASTM C 91.
2. Masonry Cement: ASTM C 91, non-staining.
3. Hydrated Lime: ASTM C 207, Type S.
4. Sand: ASTM C 144.
 - a. White Pointing Mortar: Natural white sand or ground white stone.
 - b. Colored Pointing Mortar: Marble, granite, or sound stone.

1.3 EXECUTION

A. Preparation

1. Clean stone or concrete block with clear water.
2. Ferrous Metal: Apply a heavy coat of bituminous paint on metal surfaces in contact with block.

B. Installation

1. Expansion Joints: Install continuous strips of preformed joint filler.

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2. Clean sub-base and saturate with clean water.
3. Slush Coat: Apply 1/16-in. thick slush coat of cement grout over concrete sub-base about 15 minutes prior to placing setting bed.
4. Setting Bed: Mix one 94-lb. bag of cement to 3 cu. ft. of sand. Use only enough water to produce a moist surface when setting bed is ready for setting of stone. Spread and screed to a uniform thickness.
5. Set stone or concrete block before initial set of cement bed occurs. Wet stone or block thoroughly before setting. Apply a thin layer of neat cement paste 1/32-in. to 1/16-in. thick to setting bed, or bottom of stone or block.
6. Grout joints as soon as possible after initial set of setting bed and tool slightly concave. Use grout mix of one bag Portland cement to 2 cu. ft. sand. Cure grout by maintaining in a moist condition for 7 days. Do not permit traffic on surface during setting of units or for at least 24 hours after final grouting of joints.

END OF SECTION 32 14 11 00a

Task	Specification	Specification Description
32 14 11 00	31 25 14 23	Unit Pavers
32 14 11 00	32 16 23 00	Miscellaneous Sidewalks
32 14 13 19	32 13 13 33	Cement Concrete Pavement
32 14 16 00	10 14 19 00	Vitrified Brick Pavement Replacement
32 14 16 00	31 25 14 23	Unit Pavers
32 14 16 00	32 16 23 00	Miscellaneous Sidewalks
32 14 16 00	32 14 11 00	Asphalt Concrete Sidewalks
32 14 16 00	32 14 11 00a	Precast Sidewalks And Pavers

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SECTION 32 14 33 13 - POROUS UNIT PAVING

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for porous unit paving. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Porous paving consisting of concrete pavers set in aggregate setting beds.
 - b. Edge restraints.
 - c. Cast-in-place concrete edge restraints.
 - d. Precast concrete curbs.
 - e. Granite curbs.

C. Submittals

1. Product Data: For materials other than aggregates.
2. Sieve Analyses: For aggregate materials, according to ASTM C 136.
3. Samples:
 - a. Full-size units of each type of unit paver indicated.
 - b. Exposed edge restraints.
 - c. Precast concrete curbs.
 - d. Granite curbs.
 - e. Aggregate fill.
4. Material Certificates: For unit pavers. Include statements of material properties indicating compliance with requirements, including compliance with standards. Provide for each type and size of unit.

D. Quality Assurance

1. Preinstallation Conference: Conduct conference at Project site.

E. Delivery, Storage, And Handling

1. Store pavers on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied.
2. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.2 PRODUCTS

A. Concrete Unit Pavers

1. Concrete Grid Pavers: Grid paving units complying with ASTM C 1319, made from normal-weight aggregates.
2. Solid Concrete Pavers for Porous Paving: Solid interlocking paving units of shapes that provide openings between units, complying with ASTM C 936, resistant to freezing and thawing when tested according to ASTM C 67, **as directed**, and made from normal-weight aggregates.
 - a. Thickness: **2-3/8 inches (60 mm) OR 3-1/8 inches (80 mm) OR 3-1/2 inches (90 mm) OR 4 inches (100 mm), as directed.**
 - b. Face Size and Shape: As indicated.
 - c. Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.

B. Accessories

1. Plastic Edge Restraints: Triangular PVC extrusions, 1-3/4 inches (45 mm) high by 3-1/2 inches (90mm) wide **OR** 3-1/8 inches (80 mm) high by 9-1/2 inches (240 mm) wide, **as directed**, designed to serve as edge restraints for unit pavers; rigid type for straight edges and flexible type for curved edges, with pipe connectors and 3/8-inch- (9.5-mm-) diameter by 12-inch- (300-mm-) long steel spikes.
2. Steel Edge Restraints: Painted steel edging, 3/16 inch (4.8 mm) thick by 4 inches (100 mm) high **OR** 1/4 inch (6.4 mm) thick by 5 inches (125 mm) high, **as directed**, with loops pressed from or welded to face to receive stakes at 36 inches (900 mm) o.c., and with steel stakes 15 inches (380 mm) long for each loop.
 - a. Color: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
3. Aluminum Edge Restraints: Straight, 1/8-inch- (3.2-mm-) thick by 4-inch- (100-mm-) high **OR** Straight, 3/16-inch- (4.8-mm-) thick by 4-inch- (100-mm-) high **OR** L-shaped, 1/8-inch- (3.2-mm-) thick by 1-3/8-inch- (35-mm-) high **OR** L-shaped, 3/16-inch- (4.8-mm-) thick by 2-1/4-inch- (57-mm-) high, **as directed**, extruded-aluminum edging, with loops pressed from face to receive stakes at 12 inches (300 mm) o.c., and with aluminum stakes 12 inches (300 mm) long for each loop.
4. Precast Concrete Curbs: Made from normal-weight concrete with a compressive strength not less than 5000 psi (35 MPa) **OR** 6000 psi (41 MPa), **as directed**, and water absorption not more than 5 percent, in shapes and sizes indicated.
 - a. Color and Texture: As indicated by manufacturer's designations **OR** Match the Owner's sample **OR** As selected by the Owner from manufacturer's full range, **as directed**.
5. Granite Curbs: Granite curbing, with face battered 1 inch per foot (1:12), produced in random lengths not less than 36 inches (900 mm) from granite complying with ASTM C 615.
 - a. Granite Color and Grain: Light gray **OR** Dark gray **OR** Buff **OR** White **OR** Black **OR** Pink, **as directed**, with fine **OR** medium **OR** coarse, **as directed**, grain.
 - b. Top Width: 4 inches (100 mm) **OR** 5 inches (125 mm) **OR** 6 inches (150 mm), **as directed**.
 - c. Face Height: 4 inches (100 mm) **OR** 6 inches (150 mm) **OR** 8 inches (200 mm), **as directed**.
 - d. Total Height: 12 inches (300 mm) **OR** 16 inches (400 mm) **OR** 18 inches (450 mm), **as directed**.
 - e. Top Finish: Sawed **OR** Thermal **OR** Bushhammered, **as directed**.
 - f. Face Finish: Split **OR** Sawed **OR** Thermal **OR** Bushhammered, **as directed**.

C. Aggregate Setting-Bed Materials

1. Graded Aggregate for Subbase: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 57 **OR** ASTM D 448 for Size No. 5 **OR** ASTM D 2940, subbase material **OR** requirements in Division 31 Section "Earth Moving" for subbase material, **as directed**.
2. Graded Aggregate for Base Course: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8 **OR** ASTM D 448 for Size No. 57 **OR** ASTM D 2940, base-course material **OR** requirements in Division 31 Section "Earth Moving" for base-course material, **as directed**.
3. Sand for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
4. Soil Mix for Leveling Course: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate blended with planting soil mix complying with requirements in Division 32 Section(s) "Turf And Grasses" **OR** "Plants", **as directed**. Use blend consisting of 1/2 sand and 1/2 soil mix **OR** 2/3 sand and 1/3 soil mix, **as directed**.
5. Graded Aggregate for Leveling Course: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8 **OR** 9, **as directed**.
6. Soil for Porous Paver Fill: Planting soil mix complying with requirements in Division 32 Section(s) "Turf And Grasses" **OR** "Plants", **as directed**.

7. Graded Aggregate for Porous Paver Fill: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8 **OR** 9, **as directed**.
 - a. Provide stone of color indicated **OR** to match the Owner's sample, **as directed**.
8. Grass Seed: Comply with requirements in Division 32 Section "Turf And Grasses".
9. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - a. Survivability: Class 2; AASHTO M 288.
 - b. Apparent Opening Size: **No. 60 (0.250-mm)** sieve, maximum; ASTM D 4751.
 - c. Permittivity: 0.02 per second, minimum; ASTM D 4491.
 - d. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.
10. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:
 - a. Survivability: Class 2; AASHTO M 288.
 - b. Apparent Opening Size: **No. 40 (0.425-mm)** sieve, maximum; ASTM D 4751.
 - c. Permittivity: 0.5 per second, minimum; ASTM D 4491.
 - d. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

1.3 EXECUTION

A. Preparation

1. Proof-roll prepared subgrade according to requirements in Division 31 Section "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with porous paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base **OR** base, **as directed**, course for porous paving.

B. Installation, General

1. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be structurally unsound or visible in finished work.
2. Cut unit pavers with motor-driven masonry saw equipment or a block splitter, **as directed**, to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.
3. Tolerances:
 - a. Variation in Plane between Adjacent Units (Lipping): Do not exceed **1/16-inch (1.5-mm)** unit-to-unit offset from flush.
 - b. Variation from Level or Indicated Slope: Do not exceed **1/8 inch in 24 inches (3 mm in 600 mm)** and **1/4 inch in 10 feet (6 mm in 3 m)** or a maximum of **1/2 inch (13 mm)**.
4. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.
 - a. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after porous paver installation.
 - b. For metal edge restraints with top edge exposed, drive stakes at least **1 inch (25 mm)** below top edge.
 - c. Install job-built concrete edge restraints to comply with requirements in Division 32 Section "Concrete Paving".
5. Provide curbs as indicated. Install curbs before placing unit pavers.
 - a. Install precast concrete **OR** granite, **as directed**, curbs on a bedding of compacted base-course material over compacted subgrade. Install curbs before placing base course for pavers. Set curbs at elevations indicated, accurately aligned, and place and compact base-course material behind curbs as indicated.
 - b. Install precast concrete curbs on aggregate base course after placing and compacting base course for pavers. Set curbs with top edge **1 inch (25 mm)** below top of pavers. Anchor curbs with metal stakes driven through holes in curbs into base-course material.

- c. Install precast concrete curbs on aggregate-base course after placing and compacting base course for pavers. Set curbs with top surface **1/2 inch (13 mm) OR 2 inches (50 mm) OR 4 inches (100 mm), as directed**, above top of pavers. Anchor curbs with metal stakes driven behind curbs into base-course material.

C. Setting-Bed Installation

1. Compact soil subgrade uniformly to at least 95 percent of ASTM D 698 **OR** ASTM D 1557, **as directed**, laboratory density.
2. Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Owner, and replace with compacted backfill or fill as directed.
3. Place separation **OR** drainage, **as directed**, geotextile over prepared subgrade, overlapping ends and edges at least **12 inches (300 mm)**.
4. For light-traffic uses, place aggregate subbase **OR** subbase and base, **as directed**, compact by tamping with plate vibrator, and screed to depth indicated.
5. For heavy-duty applications, place aggregate subbase **OR** subbase and base, **as directed**, compact to 100 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated.
6. Place drainage geotextile over compacted subbase, overlapping ends and edges at least **12 inches (300 mm)**.
7. Place drainage geotextile over compacted base course, overlapping ends and edges at least **12 inches (300 mm)**.
8. Place leveling course and screed to a thickness of **1 to 1-1/2 inches (25 to 38 mm) OR 2 to 2-1/2 inches (50 to 64 mm) OR 3 inches (76 mm), as directed**, taking care that moisture content remains constant and density is loose and constant until pavers are set and compacted.

D. Paver Installation

1. Set unit pavers on leveling course, being careful not to disturb leveling base. If pavers have lugs or spacer bars to control spacing, place pavers hand tight against lugs or spacer bars. If pavers do not have lugs or spacer bars, place pavers with a **1/16-inch- (1.6-mm-)** minimum and **1/8-inch- (3.2-mm-)** maximum joint width. Use string lines to keep straight lines. Fill gaps between units that exceed **3/8 inch (10 mm)** with pieces cut to fit from full-size pavers.
 - a. When installation is performed with mechanical equipment, use only unit pavers with lugs or spacer bars on sides of each unit.
2. Compact pavers into leveling course with a low-amplitude plate vibrator capable of a **3500- to 5000-lbf (16- to 22-kN)** compaction force at 80 to 90 Hz. Use vibrator with neoprene mat on face of plate or other means as needed to prevent cracking and chipping of pavers. Perform at least three passes across paving with vibrator.
 - a. Compact pavers when there is sufficient surface to accommodate operation of vibrator, leaving at least **36 inches (900 mm)** of uncompacted pavers adjacent to temporary edges.
 - b. Before ending each day's work, compact installed concrete pavers except for **36-inch (900 mm)** width of uncompacted pavers adjacent to temporary edges (laying faces).
 - c. As work progresses to perimeter of installation, compact installed pavers that are adjacent to permanent edges unless they are within **36 inches (90 mm)** of laying face.
 - d. Before ending each day's work and when rain interrupts work, cover pavers that have not been compacted and leveling course on which pavers have not been placed with nonstaining plastic sheets to protect them from rain.
3. Place soil fill as follows, immediately after vibrating pavers into leveling course. Spread and screed soil fill level with tops of pavers. Vibrate pavers and add soil fill until porous paving is filled to about **3/4 inch (19 mm)** from top surface; remove excess soil fill if any.
 - a. Before ending each day's work, place soil fill in installed porous paving except for **42-inch (1067-mm)** width of unfilled paving adjacent to temporary edges (laying faces).
 - b. As work progresses to perimeter of installation, place soil fill in installed paving that is adjacent to permanent edges unless it is within **42 inches (1067 mm)** of laying face.

- c. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.
 4. After filling pavers with soil, sow seed to comply with requirements in Division 32 Section "Turf And Grasses". except sow seed at half the rate specified for seeding lawns. Sweep seed from surfaces of pavers into voids and water with fine spray.
 - a. Within 24 hours after sowing seed, spread an additional **3/16 inch (4.8 mm)** of soil fill over seed and soak with water.
 5. Place graded aggregate fill immediately after vibrating pavers into leveling course. Spread and screed aggregate fill level with tops of pavers.
 - a. Before ending each day's work, place aggregate fill in installed porous paving except for **42-inch (1067-mm)** width of unfilled paving adjacent to temporary edges (laying faces).
 - b. As work progresses to perimeter of installation, place aggregate fill in installed paving that is adjacent to permanent edges unless it is within **42 inches (1067 mm)** of laying face.
 - c. Before ending each day's work and when rain interrupts work, cover paving that has not been filled with nonstaining plastic sheets to protect it from rain.
 6. Remove and replace pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.
- E. Maintenance And Protection
 1. Water newly planted grass and keep moist until grass is established. Maintain grass that is planted in paving to comply with requirements in Division 32 Section "Turf And Grasses".
 2. Erect barricades and warning signs as required to protect newly planted areas from traffic. Maintain barricades for 60 days after planting.

END OF SECTION 32 14 33 13

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Task	Specification	Specification Description
32 14 33 13	10 14 19 00	Vitrified Brick Pavement Replacement
32 15 40 00	32 11 23 16	Crushed Stone
32 15 40 00	32 11 23 16a	Select Gravel
32 15 40 00	32 11 23 16b	Crushed Stone Paving
32 16 13 13	32 13 13 33	Cement Concrete Pavement
32 16 13 13	32 16 13 16	Steel Curbs
32 16 13 14	32 13 13 33	Cement Concrete Pavement
32 16 13 14	32 16 13 16	Steel Curbs

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SECTION 32 16 13 16 - STEEL CURBS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of steel curbs. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- #### **A. Standard Steel Curb Sections: Noncorrosive steel sections as required to match existing.**

- #### **B. Coating: Steel curb sections shall be zinc coated.**

C. Joint Materials

1. Expansion Joint Fillers: ASTM D 1751 or ASTM D 1752.
2. Joint Sealers: ASTM D 1850.

- #### **D. Concrete: Concrete shall have a minimum compressive strength of 3,000 psi. The maximum size of aggregate shall be 1-1/2 inches. Concrete shall have a slump of not more than 3 inches and an air content by volume of concrete of 3 to 6 percent.**

1.3 EXECUTION

- #### **A. Preparation: The subgrade shall be constructed to grade and cross section. The subgrade shall be of materials equal in bearing quality to the subgrade under the adjacent pavement and shall be compacted. The subgrade shall be maintained in a smooth, compacted condition, in conformity with the required section and established grade until the concrete is placed. The subgrade shall be in a moist condition when concrete is placed.**

B. Installation

1. Steel Curb Setting: Steel curbs shall be carefully set to alignment and grade and to conform to the dimensions of the curb.
2. Concrete Placement And Finishing: Concrete shall be placed in layers not to exceed 6 inches. Concrete shall be thoroughly consolidated. Floated surfaces shall then be brushed with longitudinal strokes. The top surface of the entrance shall be finished to grade with a wood float. Expansion joints and contraction joints shall be constructed at right angles to the line of curb. Contraction joints shall be constructed by means of 1/8-inch thick separators, of a section conforming to the cross section of the curb and gutter. Contraction joints shall match joints in abutting Portland cement concrete pavement. At other pavements, construction joints shall be placed at not less than 5 feet nor greater than 15 feet apart. Expansion joints shall be formed by means of preformed expansion joint filler material cut and shaped to the cross section of curb. Expansion joints shall be provided in curb at the end of all returns. Expansion joints shall match expansion joints of abutting Portland cement concrete pavement. At other pavements, expansion joints at least 1/2 inch in width shall be provided at intervals not exceeding 45 feet. Exposed concrete surfaces shall be cured for not less than 7 days.

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3. Backfilling: After curing, debris shall be removed and the area adjoining the concrete shall be backfilled, graded, and compacted.
4. Sealing Joints: Expansion joints and the top 1-inch depth of contraction joints shall be sealed with joint sealer. The joint opening shall be thoroughly cleaned before the sealing material is placed. Excess material on exposed surfaces of the concrete shall be removed immediately and exposed concrete surfaces cleaned.

END OF SECTION 32 16 13 16

Task	Specification	Specification Description
32 16 13 16	32 13 13 33	Cement Concrete Pavement
32 16 13 19	32 13 13 33	Cement Concrete Pavement
32 16 13 23	32 13 13 33	Cement Concrete Pavement
32 16 13 23	32 16 13 16	Steel Curbs
32 16 13 33	32 13 13 33	Cement Concrete Pavement
32 16 13 33	32 16 13 16	Steel Curbs
32 16 13 43	32 14 33 13	Porous Unit Paving

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SECTION 32 16 23 00 - MISCELLANEOUS SIDEWALKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of miscellaneous sidewalks. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Aggregate shall comply with the following:

1. Surface Course Aggregates shall be well-graded, crushed stone, 3/4- to 1-1/4 inch size, consisting of clean, sound, durable particles.
2. Masonry Grout Aggregate: ASTM C 404, Size 2.

B. Base Course: Base course material shall be a granular dense-graded, high-quality compactable material.

C. Ready-Mixed Concrete: Ready-mixed concrete shall comply with ASTM C 94. The concrete shall attain a minimum compressive strength of 3,000 psi at 28 days.

D. Portland Cement Concrete: Cement shall comply with ASTM C 150.

E. Joint Filler: Masonry joint filler shall be Portland cement concrete mix with cement complying with ASTM C 150.

F. Masonry Units: Color and texture shall match the existing as nearly as is practicable.

G. Wood and Preservatives: Footboards and supports shall be 1-1/2 inch thick Number 1 dense Douglas fir or yellow pine lumber, pressure-treated with chromated copper arsenate (CCA) preservative complying with applicable ASTM Standards. Retention shall be a minimum of 0.25 pounds per cubic foot.

1.3 EXECUTION

A. Base Course Repair: Remove material in soft spots to such depth required to provide a firm foundation for surface materials and fill with granular material of a quality that will compact when moistened. Roll or tamp this material to obtain the proper density.

B. Surface Repair

1. Aggregate Walkways: Spread the surface material evenly on the base course in a layer of such depth that when compacted, the layer will be uniform with a minimum thickness of 4 inches.
2. Joint Filling: Completely remove and clean the joint of all loose joint material, dirt, clay, or other foreign matter. Fill the joint flush with concrete to provide a uniform surface.
3. Wood Walkways: Secure wood members with galvanized nails, screws, bolts, or other approved fasteners to ensure tight joints.

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4. Masonry Walkways: New or salvaged masonry units will be placed on a 3/4-inch mortar setting bed with mortar joints matching the existing walkway. Place the setting bed on a fresh 3-inch thick Portland cement concrete slab.

END OF SECTION 32 16 23 00

Task	Specification	Specification Description
32 16 23 00	01 22 16 00	No Specification Required
32 16 23 00	31 25 14 23	Unit Pavers
32 16 23 00	32 14 11 00	Asphalt Concrete Sidewalks
32 16 23 00	32 14 11 00a	Precast Sidewalks And Pavers
32 16 43 00	32 12 16 13	Asphalt Paving
32 17 13 23	11 12 16 00	Parking Control Equipment
32 17 13 23	13 34 23 16	Prefabricated Control Booths
32 17 13 26	11 12 16 00	Parking Control Equipment
32 17 13 26	13 34 23 16	Prefabricated Control Booths
32 17 16 00	32 12 16 13	Asphalt Paving
32 17 23 13	32 01 11 53	Traffic Coatings
32 17 23 13	32 12 16 13	Asphalt Paving
32 17 23 13	32 13 13 33	Cement Concrete Pavement
32 17 23 23	32 01 11 53	Traffic Coatings
32 17 23 23	32 12 16 13	Asphalt Paving
32 17 23 23	32 13 13 33	Cement Concrete Pavement
32 17 23 33	32 01 11 53	Traffic Coatings
32 17 23 33	32 12 16 13	Asphalt Paving
32 17 23 33	32 13 13 33	Cement Concrete Pavement

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SECTION 32 17 26 00 - TACTILE/DETECTABLE WARNING TILE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for tactile/detectable warning tile. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product data for each specified product.
2. Shop drawings, showing detailed plans of tile profile, fastener locations, and installation methods
3. Two (2) tile samples, minimum size 6" x 8" of the kind proposed for use.
4. Material Test Reports: Submit test reports from qualified independent testing laboratory indicating that materials proposed for use are in compliance with requirements and meet the properties indicated. All test reports shall be conducted on a cast-in-place tactile panel system as certified by a qualified independent testing laboratory.
5. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of tactile tile and accessory as required.

C. Quality Control

1. Americans with Disabilities Act (ADA): Provide tactile warning surfaces, which comply with the detectable warnings on walking surfaces, section of the Americans with Disabilities Act (Title 49 CFR TRANSPORTATION, PART 37.9 STANDARDS FOR ACCESSIBLE TRANSPORTATION FACILITIES, Appendix A, Section 4.29.2 DETECTABLE WARNINGS ON WALKING SURFACES.
2. California Code of Regulations (CCR): Provide only approved DSAAC detectable warning products as provided in the California Code of Regulations (CCR). Title 24, Part 1, Articles 2, 3 and 4 and Part 2, Section 205 definition of "Detectable Warning". Section 1127B.5 for "Curb Ramps" and Section 1133B.8.5 for "Detectable Warnings at Hazardous Vehicle Area's".
3. Performance: Tiles shall meet or exceed the following criteria:
 - a. Water Absorption: 0.35% maximum, when tested in accordance with ASTM D570.
 - b. Slip Resistance: 0.90 minimum combined wet/ dry static coefficient of friction on top of domes and field area, when tested in accordance with ASTM C1028.
 - c. Compressive Strength: 18,000 psi minimum, when tested in accordance with ASTM D695.
 - d. Tensile Strength: 10,000 psi minimum, when tested in accordance with ASTM D638.
 - e. Flexural Strength: 24,000 psi minimum, when tested in accordance with ASTM C293.
 - f. Gardner Impact: 450 inch-pounds per inch minimum, when tested in accordance with Geometry "GE" of ASTM D5420.
 - g. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, urine, calcium chloride, stamp pad ink, gum and red aerosol paint, when tested in accordance with ASTM D543.
 - h. Wear Depth: 0.03" maximum, after 1000 abrasion cycles of 40 grit Norton Metallite sandpaper, when tested in accordance with ASTM D2486-Modified.
 - i. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.
 - j. Accelerated Weathering: No deterioration, fading or chalking for 2000 hours, when tested in accordance with ASTM D2565.
4. Tactile warning tiles embedded in or adhered to concrete shall meet or exceed the following performance criteria:
 - a. Accelerated Aging and Freeze Thaw of Adhesive System: No cracking, delamination, warping, checking, blistering, color change, loosening, etc. when tested in accordance with ASTM D1037.
 - b. Salt and Spray Performance: No deterioration after 100 hours of exposure, when tested in accordance with ASTM B117.

- D. Delivery, Storage And Handling
 - 1. Tiles shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings, and tile type shall be identified by part number.
 - 2. Tiles shall be delivered to location at building site for storage prior to installation.
- E. Warranty
 - 1. Installed tiles shall be warranted for a minimum of five (5) years against failure of adhesives, fasteners and sealants.

1.2 PRODUCT

- A. Materials
 - 1. Vitrified Polymer Composite (VPC) tiles shall be an epoxy polymer composition with an ultra violet stabilized coating employing aluminum oxide particles in the truncated domes. The tile shall incorporate an in-line dome pattern of truncated domes. For wheelchair safety the field area shall consist of a non-slip surface with a minimum of 40 - 90° raised points 0.045" high, per square inch.
 - 2. Color: Safety Yellow, (Federal Color # 33538) colorfast, UV stabilized coating. Color shall be homogeneous throughout the tile.
- B. Cast-In-Place Tactile Tile
 - 1. Tile shall be minimum 1-3/8" thick, with minimum 3/8" thick face and ribs designed for after-pour embedment in concrete.
- C. Surface Applied Detectable Warning Surface Tile
 - 1. The tile shall have with countersunk fastening holes and perimeter beveled edges.
 - 2. Accessories:
 - a. Fasteners: Color matched, corrosion resistant, flat head drive anchor, 1/4" diameter x 1-3/4" long.
 - b. Adhesive: Urethane elastomeric adhesive.
 - c. Sealants: Epoxy two component sealant.
- D. Modular Paver Tactile Tile
 - 1. Pre-cast with a 1-3/8" thick reinforced epoxy polymer concrete core.
 - a. Polymer Concrete and/or epoxy resin properties shall meet or exceed the following criteria:

Tensile Strength of Resin:	greater than 7,000psi; ASTM D638
Modulus of Elasticity of Resin:	greater than 4,000psi; ASTM D638
Bond Strength of Polymeric Concrete:	greater than 8,000psi; ASTM C551
 - 2. Accessories:
 - a. Adhesive: Urethane elastomeric adhesive.
 - b. Backer Rod: ASTM C 1330, Type C (closed-cell material with a surface skin) **OR** Type O (open-cell material) **OR** Type B (bicellular material with a surface skin), **as directed**, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance
- E. Surface Applied Detectable Guidance Tiles
 - 1. Accessories:
 - a. Adhesive: Heavy-duty polyurethane elastomeric adhesive.
 - b. Sealants: Heavy-duty polyurethane elastomeric sealant.
- F. Surface Applied Detectable Directional Bar Tiles
 - 1. Accessories:
 - a. Fasteners: Stainless steel low profile expansion anchors, 3/16" diameter by 2" long.

- b. Adhesive: Heavy-duty polyurethane elastomeric adhesive.
- c. Sealants: Heavy-duty polyurethane elastomeric sealant.

1.3 EXECUTION

A. Installation

- 1. Installation shall be in strict compliance with manufacturer's printed instructions.

END OF SECTION 32 17 26 00

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SECTION 32 18 16 13 - TRACK, COURT, AND PLAYGROUND MARKINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing of materials and the installation of track, court, and playground markings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Submit product data and manufacturer's recommendations for each marking to be furnished.
2. Submit sample of each marking to be furnished.
3. Submit "Line Layout Drawing" prior to installation of marking and upon completion of markings, submit three (3) certified line layout drawings indicating all lines and colors.

C. Quality Assurance: Personnel shall have a minimum of three years marking experience.

D. Delivery, Storage and Handling: Deliver paint to site in original sealed containers or drums, with labels legible, intact and unbroken. Comply with all health and fire regulations.

E. Environmental Requirements: Do not install markings on wet or frozen surfaces. Comply with manufacturer's instructions for temperature requirements.

1.2 PRODUCTS

A. Manufacturers

1. Line Paint for Resilient Surface: Aliphatic polyurethane paint, such as Hi-Build Aliphatic Polyurethane paint by Sherwin-Williams, or approved equivalent.
2. Line Paint for Asphaltic Concrete Pavement: Latex traffic marking paint, such as Setfast Latex Traffic Marking paint by Sherwin-Williams, or approved equivalent.
3. Line Paint for Athletic Wearing Surface (Plexipave): 100% acrylic latex paint, such as Plexicolor by California Products, or approved equivalent.

1.3 EXECUTION

A. Application

1. Line Painting
 - a. Accurately measure and layout line markings.
 - b. Apply paint with mechanical equipment.
 - c. Paint lines as specified below under "Track Marking".
 - d. Provide uniform straight edges.
 - e. Apply not less than two coats in accordance with manufacturer's recommended rates.
 - f. Lines shall be **2 in. (50 mm)** wide unless otherwise specified.
2. Track Marking
 - a. Employ a licensed land surveyor to accurately measure and lay out line markings in accordance with National Federation of State High School Athletic Association Regulations or other Standards set forth by the Owner.
 - b. Events:
 - 1) 100 meter dash
 - 2) 200 meter dash
 - 3) 400 meter dash

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- 4) 800 meter run
 - 5) 1600 meter run
 - 6) 3200 meter run
 - 7) One mile run
 - 8) 4 x 100 meter relay
 - 9) 4 x 200 meter relay
 - 10) 4 x 400 meter relay
 - 11) 4 x 800 meter relay
 - 12) 110 meter high hurdles
 - 13) 300 meter intermediate hurdles
 - 14) Girls 100 meter hurdles
 - 15) Girls 300 meter hurdles
- c. Hurdle location markers: yellow hash marks.
 - d. Lane lines: white (min. 42 in. (105 cm) apart).
 - e. Exchange zones:
 - 1) 4 x100 m green
 - 2) 4 x 200 m blue
 - 3) 4 x 400 m yellow
 - 4) 12 in. (305 mm) across entire lane width.
 - f. Lane numbers: Stenciled in three locations from inside to outside. Numbers shall be 24 in. (60 cm) high and white in color.
 - g. Finish line to be located near bleachers.
 - h. All starts and finishes to be white.
- B. Cleaning: Upon completion of work, remove containers and debris and leave site in clean orderly condition acceptable to the Owner.
- C. Protection
1. Erect temporary barriers to protect paint during drying period.
 2. Protect markings from damage until completion of project.

END OF SECTION 32 18 16 13

SECTION 32 18 16 13a - PLAYGROUND SURFACE SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for playground surface systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Unitary synthetic seamless surface.
 - b. Synthetic, dual-density tile surface.
 - c. Organic loose-fill surface.
 - d. Inorganic loose-fill surface.

C. Definitions

1. Critical Height: Standard measure of shock attenuation. According to CPSC No. 325, this means "the fall height below which a life-threatening head injury would not be expected to occur."
2. SBR: Styrene-butadiene rubber.

D. Performance Requirements

1. Impact Attenuation: According to ASTM F 1292.
2. Accessibility of Surface Systems: According to ASTM F 1951.
3. Minimum Characteristics for Organic Loose-Fill Surfaces: According to ASTM F 2075.

E. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Show the following:
 - a. Installation details for curbs, ramps, and accessories.
 - b. Colors and pattern of surfaces.
 - c. Location of wear mats in organic loose-fill surfaces.
 - d. Location of drainage accessories.
3. Samples: For each type of playground surface system indicated.
 - a. Minimum **1-quart (0.95-L)** loose-fill surface sealed in a container.
 - b. Minimum **6-by-6-inch- (150-by-150-mm-)** square Sample of unitary synthetic seamless **OR** synthetic tile **OR** synthetic, dual-density, tile, **as directed**, surface.
 - c. **6-inch (150-mm)** long by full-size cross section of border edging.
 - d. **Minimum 12-by-12-inch (300-by-300-mm)** Sample of geosynthetic fabric.
 - e. **Minimum 6-by-6-inch (150-by-150-mm)** Sample of geosynthetic, molded-sheet drainage panel.
4. Qualification Data: For Installer and testing agency.
5. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - a. Unitary synthetic seamless surface.
 - b. Synthetic tile surface.
 - c. Organic loose-fill surface.
 - d. Inorganic loose-fill surface.
6. Material Certificates: For each playground surface system product, signed by manufacturers.
7. Field quality-control test reports.
8. Maintenance Data: For playground surface system to include in maintenance manuals.
9. Warranty: Special warranty specified in this Section.

F. Quality Assurance

1. Installer Qualifications: An employer of workers trained and approved by manufacturer.
2. Testing Agency Qualifications: An independent agency qualified according to ANSI Z34.1 for testing indicated.
3. Source Limitations: Obtain playground surface system materials, including primers and binders, through one source from a single manufacturer.
 - a. Provide secondary materials including adhesives, primers, geosynthetics, and repair materials of type and from source recommended by manufacturer of playground surface system materials.

G. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of playground surface system that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Reduction in impact attenuation.
 - b. Deterioration of surface and other materials beyond normal weathering.
2. Warranty Period: Three **OR** Five **OR** 10, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Unitary Synthetic Seamless Surface

1. Surface System: Poured-in-place, single-layer system. Provide manufacturer's standard thickness as required for overall thickness indicated, tested for impact attenuation according to ASTM F 1292 and for accessibility according to ASTM F 1951.
 - a. Cushion Course: Manufacturer's standard blend of recycled SBR and EPDM rubber, particles forming an integral wearing course and cushion course, site mixed and applied.
 - b. Binder: Weather-resistant, UV-stabilized, flexible, nonhardening, 100 percent solids polyurethane complying with requirements of authorities having jurisdiction for nontoxic and low VOC content.
 - c. Critical Height: **3 feet (1 m) OR 4 feet (1.2 m) OR 5 feet (1.5 m) OR 6 feet (1.8 m) OR 7 feet (2.1 m) OR 8 feet (2.4 m) OR 9 feet (2.7 m) OR 10 feet (3 m) OR 12 feet (3.7 m), as directed.**
 - d. Overall Thickness: Not less than as required for critical height indicated **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 2-1/2 inches (64 mm) OR 3 inches (75 mm) OR 3-1/2 inches (89 mm) OR 4 inches (100 mm), as directed.**
 - e. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location indicated.
 - f. Color(s): As selected from manufacturer's full range.
2. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by playground surface system manufacturer.

B. Unitary Synthetic Dual-Density Seamless Surface

1. Surface System: Poured-in-place, two-layer system with wearing course over cushion course. Provide manufacturer's standard thickness for each layer as required for overall thickness indicated, tested for impact attenuation according to ASTM F 1292 and for accessibility according to ASTM F 1951.
 - a. Wearing Course: Formulation of EPDM rubber particles, with minimum of 20 percent and maximum of 26 percent of ethylene propylene-diene-saturated polymethylene main chain along with other organic and inorganic components.
 - b. Cushion Course: Manufacturer's standard formulation of recycled SBR particles and polyurethane, site mixed and applied.
 - c. Binder: Weather-resistant, UV-stabilized, flexible, nonhardening, 100 percent solids polyurethane complying with requirements of authorities having jurisdiction for nontoxic and low VOC content.
 - d. Lacquer Top Coat: Manufacturer's standard polyurethane-based formulation.

- e. Critical Height: **3 feet (1 m) OR [4 feet (1.2 m) OR 5 feet (1.5 m) OR 6 feet (1.8 m) OR 7 feet (2.1 m) OR 8 feet (2.4 m) OR 9 feet (2.7 m) OR 10 feet (3 m) OR 12 feet (3.7 m), as directed.**
 - f. Overall Thickness: Not less than as required for critical height indicated **1-1/2 inches (38 mm) OR 2 inches (50 mm) OR 2-1/2 inches (64 mm) OR 3 inches (75 mm) OR 3-1/2 inches (89 mm) OR 4 inches (100 mm) OR 4-1/2 inches (114 mm) OR 5 inches (125 mm) OR 5-1/2 inches (140 mm), as directed.**
 - g. Primer/Adhesive: Manufacturer's standard primer and weather-resistant, moisture-cured polyurethane adhesive suitable for unit, substrate, and location indicated.
 - h. Wearing Course Color(s): As selected from manufacturer's full range.
 - 1) Color **Pattern OR Graphics**: As directed.
2. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by playground surface system manufacturer.
- C. Unitary Synthetic Tile Surface
1. Tile System: Manufacturer's standard blend of recycled SBR, EPDM rubber, or PVC particles forming an integral wearing course and cushion course, tested for impact attenuation according to ASTM F 1292 and for accessibility according to ASTM F 1951.
 - a. Unit Size: **24 by 24 inches (600 by 600 mm).**
 - b. Base Profile: With integral ribbed or grid-patterned underside forming channels for water drainage between surface and substrate.
 - c. Border Edge and Corner Units: Tapered, bevel-edged units that transition from the face of playground surface to the adjacent surface below it with a straight-sloped outside edge; size compatible with field units maintaining layout pattern continuity. Provide border edge and corner units where surface does not abut vertical surfaces.
 - d. Critical Height: **7 feet (2.1 m) OR 12 feet (3.7 m), as directed.**
 - e. Overall Thickness: Not less than as required for critical height indicated **1-3/4 inches (45 mm) OR 2-3/4 inches (70 mm) OR 4 inches (100 mm), as directed.**
 - f. Anchors: Manufacturer's standard.
 - g. Anchor Cement: Manufacturer's standard nonshrink grout or polymer resin.
 - h. Tile Color(s): **As directed.**
 - 1) Color **Pattern OR Graphics**: As selected from manufacturer's full range.
 - i. Filler/Sealant: Manufacturer's standard clear silicone or polyurethane filler/sealant suitable for exterior use.
 2. Leveling and Patching Material: Portland cement-based grout or epoxy- or polyurethane-based formulation suitable for exterior use and approved by playground surface system manufacturer.
- D. Organic Loose-Fill Surface
1. Wood Chips: Random-sized wood chips suitable for mulching trees and shrubs.
 2. Double-Shredded Bark Mulch: Random-sized bark, shredded twice, suitable for mulching trees and shrubs.
 3. Engineered Wood Fibers: Random-sized wood fibers, in manufacturer's standard fiber size, approximately 10 times longer than wide; containing no bark, leaves, twigs, or foreign or toxic materials according to ASTM F 2075; graded according to manufacturer's standard specification for material consistency for playground surfaces and for accessibility according to ASTM F 1951.
 - a. Critical Height: **6 feet (1.8 m) OR 9 feet (2.7 m) OR 10 feet (3 m) OR 11 feet (3.4 m), as directed.**
 - b. Uncompressed Material Depth: Not less than as required for critical height indicated **OR 6 inches (150 mm) OR 9 inches (229 mm) OR 12 inches (305 mm), as directed.**
- E. Inorganic Loose-Fill Surface
1. Inorganic Aggregate Materials: Clean, washed, and free of loam, clay, organic matter, debris, and other foreign substances.
 - a. Fine Sand: Complying with ASTM C 136 for the following sieve analysis test results; provide minimum depth of material with critical height indicated according to CPSC No. 325:

- 1) Sieve Sizes and Percent Passing through Screen: No. 16 passing 100 percent, No. 30 passing 98 percent, No. 50 passing 62 percent, No. 100 passing 17 percent, and No. 200 passing 0 to 1 percent.
 - b. Coarse Sand: Complying with ASTM C 136 for the following sieve analysis test results; provide minimum depth of material with critical height indicated according to CPSC No. 325:
 - 1) Sieve Sizes and Percent Passing through Screen: No. 4 passing 98 percent, No. 8 passing 73 percent, No. 16 passing 4 percent, No. 30 passing 1 percent, and No. 50 passing 0 to 1 percent.
 - c. Fine Gravel: Rounded, hard, durable stone, free of sand, with particle size less than **3/8 inch (9.5 mm)** in diameter complying with ASTM C 136 for the following sieve analysis test results; provide minimum depth of material with critical height indicated according to CPSC No. 325:
 - 1) Sieve Sizes and Percent Passing through Screen: **3/8 inch (9.5 mm)** passing 100 percent, No. 3-1/2 passing 93 percent, No. 4 passing 65 percent, No. 8 passing 8 percent, No. 16 passing 5 percent, and No. 30 passing 4 percent.
 - d. Medium Gravel: Rounded, hard, durable, riverbed gravel or tumbled stone, free of sand, with particle size less than **1/2 inch (13 mm)** in diameter complying with ASTM C 136 for the following sieve analysis test results; provide minimum depth of material with critical height indicated according to CPSC No. 325:
 - 1) Sieve Sizes and Percent Passing through Screen: **1/2 inch (13 mm)** passing 100 percent, **3/8 inch (9.5 mm)** passing 80 percent, **5/16 inch (8 mm)** passing 20 percent, No. 4 passing 8 percent, and No. 16 passing 3 percent.
 2. Shredded Tires: Rubber particles from 100 percent recycled tires, free from steel wires, rubber dust, and other foreign substances, tested for impact attenuation according to ASTM F 1292 and for accessibility according to ASTM F 1951.
 - a. Critical Height: **6 feet (1.8 m) OR 9 feet (2.7 m) OR 10 feet (3 m) OR 11 feet (3.4 m), as directed.**
 - b. Uncompressed Material Depth: Not less than as required for critical height indicated **OR 6 inches (150 mm) OR 9 inches (229 mm) OR 12 inches (305 mm), as directed.**
- F. Loose-Fill Accessories
1. Edgings: Anchored-in-place, weather-resistant containment barrier designed to minimize sharp edges, protrusions, and tripping hazards; formed by interconnected, modular units.
 - a. Polyethylene Units: UV-light-stabilized, 100 percent recycled polyethylene, not less than **1/4-inch (6-mm)** wall thickness; made into smooth-surfaced straight and curved units with radiused exposed edges and integral, molded-in color; in manufacturer's standard sizes.
 - 1) Color: As selected from manufacturer's full range.
 - b. Metal Units: Steel fabricated with radiused exposed edges and finished with PVC plastisol coating, straight **OR** right-angled corner, **as directed**, and curved units, in manufacturer's standard sizes.
 - 1) Color: As selected from manufacturer's full range.
 - c. Rubber Units: Compression molded from 100 percent recycled SBR, in manufacturer's standard sizes.
 - 1) Color: As selected from manufacturer's full range.
 - d. Anchor Stakes: Manufacturer's standard, of corrosion-resistant-coated metal or noncorrodible material, designed to be nonprotruding when installed, for connecting units and securing in-place.
 2. Stabilizing Mats: Manufacturer's standard, water-permeable PVC or rubber mats tested for impact attenuation according to ASTM F 1292, and rated for use in the following locations, with anchoring system designed to anchor mat securely to subgrade through engineered wood:
 - a. Location: At excessive wear areas and as follows:
 - 1) On top of loose-fill surface.
 - 2) Below top of loose-fill surface.
 - 3) On subgrade below loose-fill surface.

- 4) Under and in front of slide exits.
- 5) Under and around swings.
- 6) At finished grade around transfer stations at accessible perimeter.
- 7) At high-traffic areas and playground equipment where indicated.
- 8) Where indicated.
- b. Size: **36 by 36 inches (914 by 914 mm) OR 40 by 40 inches (1016 by 1016 mm) OR 48 by 48 inches (1200 by 1200 mm), as directed.**
- c. Color: As selected from manufacturer's full range.

G. Geosynthetics

- 1. Drainage/Separation Geotextile: Nonwoven, needle-punched geotextile, manufactured for subsurface drainage applications and made from polyolefins or polyesters; complying with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - a. Weight: **4 oz./sq. yd. (136 g/sq. m)** according to ASTM D 5261.
 - b. Water Flow Rate: **100 gpm/sq. ft. (68 L/s per sq. m) OR 150 gpm/sq. ft. (102 L/s per sq. m), as directed,** according to ASTM D 4491.
- 2. Molded-Sheet Drainage Panel: Prefabricated, composite drainage panels made with drainage core and filter fabric.
 - a. Drainage Core: Three-dimensional, nonbiodegradable, molded-plastic-sheet material designed to effectively drain water under maximum fill pressures.
 - b. Fabric: Nonwoven, needle-punched geotextile, specifically manufactured as a filter geotextile and made from polyolefins or polyesters; complying with the following minimum properties determined according to ASTM D 4759 and referenced standard test methods:
 - 1) Weight: **4 oz./sq. yd. (136 g/sq. m)** according to ASTM D 5261.
 - 2) Water Flow Rate: **100 gpm/sq. ft. (68 L/s per sq. m) OR 150 gpm/sq. ft. (102 L/s per sq. m), as directed,** according to ASTM D 4491.
 - c. Minimum Flow Rate: **9 gpm/foot (1.9 L/s per m)** according to ASTM D 4491.
- 3. Weed-Control Barrier: Composite fabric geotextile consisting of woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, weighing not less than 4.8 oz./sq. yd. (160 g/sq. m).

1.3 EXECUTION

A. Preparation

- 1. General: Prepare substrates to receive surfacing products according to playground surface system manufacturer's written instructions. Verify that substrates are sound and without high spots, ridges, holes, and depressions.
- 2. Concrete **OR** Asphalt, **as directed**, Substrates: Provide sound surface free of laitance, efflorescence, curing compounds, and other contaminants incompatible with playground surface system.
 - a. Repair unsatisfactory surfaces and fill holes and depressions.
 - b. Mechanically scarify or otherwise prepare concrete substrates to achieve recommended degree of roughness.
 - c. Saw cut concrete **OR** asphalt, **as directed**, for terminal edges of playground surface systems as indicated.
 - d. Treat control joints and other nonmoving substrate cracks to prevent telegraphing through playground surface system.

B. Installation, General

- 1. General: Comply with playground surface system manufacturer's written installation instructions. Install playground surface system over area and in thickness indicated.

C. Geosynthetic Installation

1. General: Install geosynthetics according to playground surface system manufacturer's and geosynthetic manufacturer's written instructions.
 - a. Geotextiles: Completely cover area indicated, overlapping sides and edges a minimum of **4 inches (100 mm) OR 8 inches (200 mm)**, **as directed**, with manufacturer's standard treatment for **OR** overlapping loosely laid **OR** adhesively bonded, **as directed**, seams.
 - 1) Perimeter: Adhere edges on all sides to top of perimeter curb or footing.
- D. Installation Of Seamless Playground Surface Systems
 1. Seamless Surface: Mix and apply components of playground surface system according to manufacturer's written instructions.
 - a. Substrate Primer: Apply over prepared substrate at manufacturer's standard spreading rate for type of substrate.
 - b. Cushion Course: Spread evenly over primed substrate to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation, with a minimum of cold joints.
 - c. Cushion Course: Lay out tile units from center marks established with principal perimeter edges, discounting minor offsets, so units at opposite edges of installation are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a unit at perimeter.
 - d. Intercoat Primer: Over cured cushion course, apply primer at manufacturer's standard spreading rate.
 - e. Wearing Course: Spread over primed base course to form a uniform layer applied at manufacturer's standard spreading rate in one continuous operation and, except where color changes, with no **OR** a minimum of, **as directed**, cold joints. Finish surface to produce manufacturer's standard wearing-surface texture.
 - 1) Where colored pattern is **OR** graphics are, **as directed**, indicated, place adjacent colored material as soon as placed colored material is sufficiently cured, using primer or adhesive if required by manufacturer's written instructions.
 - f. Edge Treatment: Flush **OR** Extended surface course **OR** Saw-cut base and vertical pour, **as directed**.
- E. Installation Of Tile Playground Surface Systems
 1. Tile Units: Provide a uniform wearing surface with no unaligned units, raised edges, or surface imperfections.
 - a. Lay out units from center marks established with principal perimeter edges, discounting minor offsets, so units at opposite edges of installation are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a unit at perimeter. Allow for border edge.
 - 1) Alignment Axis and Pattern: Lay units along axis and in grid pattern indicated.
OR
Alignment Axis: Lay units square **OR** at a 45-degree angle, **as directed**, with playground equipment axis.
 - 2) Pattern: Lay units in straight-line grid pattern with joints aligned.
OR
Pattern: Lay units in half-unit, offset grid pattern with staggered joints.
 - b. Cut and fit units around playground equipment supports and vertical surfaces. Do not create voids greater than **3/8 inch (9.5 mm)** wide.
 - 1) Do not stretch units during installation.
 - c. Adhesively Applied Units: Adhere units to substrates using a full spread of adhesive applied to substrate or to unit and to each other.
 - d. Mechanically Fastened Units: Anchor to substrates.
 - e. Mechanically Attached Units (only for solid revulcanized rubber units): Mechanically attach all four sides of units, including border edge and corner units, to each other using number of fasteners per side as recommended by system manufacturer. Free lay sheet of attached units on substrate.

- f. Mechanically Attached Units Retained by Adhesively Applied Perimeter Units: Mechanically attach all four sides of units to each other using number of fasteners per side as recommended by system manufacturer. Adhere not less than one course of perimeter units and border edge and corner units to substrates using a full spread of adhesive applied to substrate or to unit and to each other.
 - g. Edge Borders: Maintain fully cushioned thickness.
 - h. Filler/Sealant: Mask area surrounding cutouts around playground equipment supports and other obstructions. Apply a full bead of filler/sealant, filling cutouts immediately after laying tile with cutout.
- F. Installation Of Loose-Fill Playground Surface Systems
- 1. Loose-Fill Edgings: Place as indicated, and permanently secure in place and attach to each other according to edging manufacturer's written instructions.
 - 2. Loose Fill: Place playground surface system materials including manufacturer's standard amount of excess material for compacting naturally with time **OR** including manufacturer's standard amount of excess material for compacting mechanically, **as directed**, to required depths after Installation of playground equipment support posts and foundations.
 - 3. Stabilizing Mats: Coordinate installation of mats and mat anchoring system with placing and compacting of loose-fill.
 - 4. Compacting and Grading: Uniformly compact and grade loose-fill according to manufacturer's written instructions to an even surface free from irregular surface changes as indicated.
 - 5. Finish Grading: Hand rake to a smooth finished surface and to required elevations.
- G. Field Quality Control
- 1. Testing Services: Testing and inspecting of completed applications of playground surface system shall take place according to ASTM F 1292.
 - 2. Remove and replace applications of playground surface system where test results indicate that it does not comply with requirements.
 - 3. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with requirements.
- H. Protection
- 1. Seamless **OR** Tile, **as directed**, Systems: Prevent traffic over system for not less than 48 hours after installation.

END OF SECTION 32 18 16 13a

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Task	Specification	Specification Description
32 18 16 13	11 68 13 00	Playground Equipment And Structures
32 18 16 13	32 18 23 39	Synthetic Running Track Surface
32 18 16 13	11 68 13 00a	Recreational Facilities

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SECTION 32 18 23 29 - COLORED ATHLETIC WEARING SURFACE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of colored athletic wearing surface on asphaltic concrete base. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

- B. Submittals: Submit product data and manufacturer's application instruction.

1.2 PRODUCTS

- A. Manufacturer: Athletic wearing surface shall be the "Plexipave" system by California Products Corporation, 169 Waverly Street, Cambridge Ma. 02139 or approved equal.

- B. Plexipave Court Patch Binder prepared as per manufacturers recommendations.

- C. California Acrylic Resurfacer prepared as per manufacturers recommendations.

- D. Fortified Plexipave Job Mix prepared as per manufacturers recommendations.

- E. Plexipave Color Base as required to meet project requirements.

- F. Plexichrome Color as required to meet project requirements.

1.3 EXECUTION:

- A. Personnel used to install athletic wearing surface must have a minimum of three years experience and at least three jobs with similar square footage of placement.

- B. When required, asphaltic concrete base shall be placed to conform to manufacturer's planarity requirements.

- C. Protect adjacent surfaces not to receive coating during application.

- D. All finished surfaces must have a uniform appearance and be free of ridges and tool marks and shall not vary more than 1/8" in 10 feet measured in any direction.

END OF SECTION 32 18 23 29

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SECTION 32 18 23 29a - SYNTHETIC TURF

1.1 GENERAL

A. Description Of Work

1. This section covers the furnishing and/or installation of: synthetic turf with covers for cut-outs; paint lines and markings for football, soccer and baseball fields; the painting of a logo at midfield; line painter equipment, portable blower for ground clean-up, turf vacuum cleaner, and pylon markers. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals:

1. Turf covers for baseball infield cutouts.
2. Painting template for a logo.
3. Layouts for lines and markings of game fields.
4. Maintenance Manual: 2 copies, providing a full description of materials to be used for maintaining Synthetic Turf System.
5. Manufacturer's literature for line painter equipment, turf vacuum cleaner, and portable blowers.
6. Warranties: For synthetic turf, for line painter equipment, for turf vacuum cleaner, and for portable blowers.
7. Synthetic turf: Sample, technical data and manufacturer's directions for installation and maintenance.
8. Line Paint: Manufacturer's literature and application directions.

C. Warranties: The warranty submitted shall have the following characteristics:

1. Shall provide full coverage for eight (8) years, from date of first use.
2. Shall warrant materials and workmanship.
3. Shall warrant that the materials installed meet or exceed the product specifications.
4. Shall have a provision to either: (a) make repairs or (b) replace such portions of the installed materials that are no longer serviceable, to maintain a serviceable and playable surface, and make good without cost or expense to the Owner.
5. Shall state all limitations and exclusions.
6. Shall be a warranty from a single source covering workmanship and all self-manufactured or procured materials.
7. Warranty shall be for full value, not prorated.

1.2 PRODUCTS

A. Synthetic Turf

1. Synthetic turf shall be Astro Turf-8, by Astro Turf Industries, Inc., 809 Kenner Street, Dalton, Georgia 30720, or approved equivalent.
2. Turf fabric: Knitted of nylon 6.6 ribbon with a polyester filament backing yarns and weighing approximately 63 ounces per square yard.
3. Pile material: 500 denier, textured nylon, 6.6 ribbon with a 1/2-inch pile height to give the appearance of mown grass; weight 50 ounces per square yard; pigmented green and stabilized for outdoor exposure.
4. Backing Yarns: High strength polyester fiber yarns, heat set for maximum dimensional stability.

B. Underpad

1. Underpad: 5/8-inch thick, energy-absorbing, made of closed cell foam, reinforced with carbon black, and perforated for drainage.
2. Pad density: 7.5 pounds per cubic foot.
3. Compression module: 25%, 8 pounds per square inch.

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4. Perforations: 3/8-inch holes, 3 on center in a staggered pattern, factory perforated.
 - C. Adhesives for bonding the synthetic turf to the pad shall be weather-resistant to withstand the climate of the site and shall be compatible with the materials of the turf and pad.
 - D. All butt seams of the turf surface shall be sewn and glued.
 - E. Paint shall be Sherwin-Williams "Watch-Guard System Metalex" semi-gloss enamel, or approved equivalent.
 - F. Line painter shall be Model 98-331, as manufactured by Binks Co., or approved equivalent, with 5 gallon pressure-tested tank, adjustable line marker, quick disconnect for ease of cleaning, 12" front pneumatic wheels, 5HP 4-cycle air-cooled gasoline engine, air-actuated spray gun, dual cylinder compressor.
 - G. Turf vacuum cleaner shall be Model BT-80-VIC, manufactured by the Billy Goat Industries, Inc., Lees Summit, MO, or approved equivalent. Vacuum shall be 8 HP Push-gasoline Big Wheel model complete with 5" intake hose kit (Part No. 800521) exhaust hose kit (Part No. 800077), and caster assembly (Part No. 800065).
 - H. Portable Blower for Ground Cleanup
 1. Windmill "Fast-Blo", Model No. 22B hand-held gas power blower as supplied by A.M. Leonard Inc., Piqua, Ohio, or approved equivalent.
 2. Variable speed control, 2-cycle gas engine type, weighing 10 pounds.
 - I. Football Pylons: Model No. "WP-12"
 1. "Ethafoam", water and mildew resistant, size 4" x 4" x18", of standard bright color.
 2. Weighted: Springs back upon impact.
 3. Provide two (2) sets of twelve (12) pylons for a total of 24, for football field.
 - J. Soccer Flags
 1. Soccer Flags: Model "WSF" as manufactured by Marty Gilman, Inc., Gilman, CT. 06336, or approved equivalent.
 2. Provide two (2) sets of four (4) flags for a total of eight, for soccer field.
 - K. Baseball Infield Conversion System
 1. Submit Shop Drawings indicating method of detailing conversion panels for approval.
 2. Panels shall be removable in conversion area.
 3. Cut panels from same synthetic turf material as football field, to match.
 4. Provide spacers and pad wedges.
- 1.3 EXECUTION
- A. Before any synthetic turf is installed, the Contractor shall inspect the asphaltic concrete base and, when satisfied with its condition, shall notify the Owner in writing of acceptance of the base.
 - B. A manufacturer's representative shall be present at the job site when the synthetic turf is installed. Turf shall be laid in strict accordance with the manufacturer's instructions by workmen who are skilled in this type of work.
 - C. Turf material shall be protected before, during and after installation.
 - D. Installed work and materials of other trades shall be protected.

- E. Assurance
 - 1. Qualified bidders must have successfully installed at least five (5) other outdoor installations of synthetic stadium surface within the last three (3) years of a type described herein.
 - 2. The field installation shall be made under the direct, active, personal supervision of technical representatives of the synthetic turf manufacturer. All key positions shall be manned by experienced employees of the installer.
 - 3. The synthetic turf contractor shall keep a full-time superintendent on the project during the installation of the synthetic turf.
 - 4. The synthetic turf system supplied shall be of previous acceptance at all levels of competition, including University and Professional.

- F. Underpad Installation
 - 1. At "float drain" system: strip glue underpad at all joints.
 - 2. At "vertical drain" system: provide intermittent gluing at a spread rate of 150-160 sq. ft./gal.
 - 3. Sew Pad joints, using thread and stitching recommended by the synthetic turf manufacturer.
 - 4. Lay out work so that seams of the underpad are offset from the seams of turf, but not less than 12".

- G. Turf Installation
 - 1. The synthetic turf shall be bonded to the pad with no wrinkles, ripples or bubbles. Slits in the fabric to relieve such defects are not permitted. Joints in the turf shall be offset from joints of the pad by not less than 12".
 - 2. Side seams in the fabric shall be at 15'-0" intervals, at 5-yard lines for the football field. There shall be no cross or head seams.
 - 3. Sew seams with high strength polyester fiber cord and lay with a bed of adhesive. Seams shall be flat, tight and permanent, with no separation or fraying.
 - 4. Covers for the baseball infield cut-outs shall be flush and tight. Install covers and check for proper fittings.
 - 5. Insert edges of turf in trench drain receptor at perimeter of field for "float drain" systems; terminated edges at concrete curb and wood nailer at "vertical drain" systems.
 - 6. Provide covering caps for football and soccer goal posts and markers within the playing fields.
 - 7. At completion, remove all excess materials and all debris resulting from operations of Work in this Section. Leave entire Work in neat, clean condition.

- H. Painting
 - 1. Lines and markings for game fields shall be painted in accordance with the approved Shop Drawings.
 - 2. Any logo shall be painted at midfield in accordance with the approved Shop Drawings.

- I. Maintenance
 - 1. Manual shall describe the materials, devices and procedures to be followed for use and maintenance of the synthetic turf system, including the cleaning, paint application and removal, and conversion techniques. Include any precautions required by the warranty.
 - 2. Training: Give demonstrations and training sessions, devoting a sufficient amount of time to thoroughly instruct the Owner's personnel in operation and maintenance (for cleaning, conversion of baseball-to-football, and line striping) of the synthetic turf system and equipment.

- J. Acceptance
 - 1. Before the acceptance of the work, should any imperfect areas or spots develop in the surface, such areas shall be removed and replaced with new materials.
 - 2. All such repair work shall be done at no additional cost to the Owner.

- K. At the completion of the Work, remove all material scraps, debris, and equipment from the site and leave the synthetic turf area ready for use.

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END OF SECTION 32 18 23 29a

Task	Specification	Specification Description
32 18 23 29	32 18 16 13	Track, Court, And Playground Markings
32 18 23 29	11 68 23 13	Playing Fields
32 18 23 33	32 18 23 29	Colored Athletic Wearing Surface
32 18 23 33	32 18 16 13	Track, Court, And Playground Markings
32 18 23 33	32 18 23 29a	Synthetic Turf
32 18 23 33	32 18 23 39	Synthetic Running Track Surface

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SECTION 32 18 23 39 - SYNTHETIC RUNNING TRACK SURFACE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of synthetic running track surface. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals: Submit the following:

1. Sample of the actual sport surface in the standard color(s) selected.
2. Technical data sheets of the product.
3. Adhesive product data sheets and manufacturer's certificate indicating approval for the proposed application.
4. Line paint data sheets and the manufacturer's certificate indicating approval for the proposed application.
5. Submit 3 copies of the maintenance instruction.

C. Delivery and Storage: Deliver and store the material in the original packaging with the labels intact in a controlled environment of a minimum temperature of 55°F (13°C) and under 50% relative humidity. Protect work until accepted by the Owner.

D. Warranty: Provide manufacturer's standard warranty.

1.2 PRODUCTS

A. Acrylic Color Coating System

1. Manufacturer: Copeland Coating Company or approved equivalent.
2. System shall consist of stone base, asphalt binder/top, cushion made of granulated rubber particles suspended in acrylic emulsions (**as directed**), acrylic filler coat(s), acrylic finish coat, and acrylic line paint.
3. Design and construction shall be by materials manufacturer.

B. Polyurethane

1. Manufacturer: Conica Sports Surfaces or approved equivalent.
2. Impermeable, full polyurethane, 3 layer athletic track system. In-situ applied with a granular colored EPDM finish. IAAF certified as required.

C. Rubber Granule Surface

1. Manufacturer: Atlas Track & Tennis or approved equivalent.
2. Rubber granules applied "dry" to the surface and adhered by spray application of a resin binder. This process is repeated until the specified thickness is achieved, allowing sufficient curing time between each application. The process is then finished with a structural spray coating of highly pigmented polyurethane coating.

D. Prefabricated Rubber Surface

1. Manufacturer: Mondo USA, or approved equivalent.
2. Prefabricated rubber sport surface to be 6 mm (1/4") **OR** 8mm (5/16") **OR** 10mm (3/8") **OR** 12mm (1/2") **OR** 14mm (9/16"), **as directed**, thickness, with a non-slip, non-reflecting, highly spike resistant top surface. Provided in manufacturer's standard colors.
3. Prefabricated rubber surface to be sheet goods, double durometer or homogenous vulcanized and calandered, with a particular closed cell structure, based on special isoprenic rubbers, mineral fillers, vulcanizing and stabilizing agents and color pigments, highly resistant to UV rays

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and atmospherical agents, with system of differentiated elasticity between top surface and base, supplied in rolls of suitable size and thickness. Surface shall have a special texture including adhesive and striping

4. Prefabricated rubber sport surface to be manufactured in two layers, which are vulcanized together. The shore hardness of the lower layer to be less than the upper layer, shore hardness of the respected layers to be recommended by the manufacturer and within the limits hereinafter specified. Field laminated triple durometer are unacceptable.
5. Adhesive: Rubber sport surface adhesive to be two part polyurethane adhesive suitable for adherence of a sheet good to asphalt, concrete or urethane substrate. Adhesive to be supplied or approved/recommended by sport surface manufacturer.

E. Patching Compound: Patching compound to be supplied or approved/recommended by sport surface manufacturer.

F. Line marking: Line marking paint to be supplied by sport surface manufacturer.

1.3 EXECUTION

A. Installation

1. Install sport flooring in accordance with manufacturer's printed instructions.
2. Prefabricated sport flooring shall be unrolled and allowed to relax.
3. Cut and adjust prefabricated sport flooring prior to adhesion.
4. Mix adhesive in accordance with manufacturer's instructions.
5. Hold all seams in place with suitable weights for a minimum of 12 hours.
6. Lines to be painted as per manufacturer's recommendations.
7. Surface to be protected before, during and after installation until project's acceptance by the the Owner or his agent.

END OF SECTION 32 18 23 39

Task	Specification	Specification Description
32 18 23 39	32 18 23 29	Colored Athletic Wearing Surface
32 18 23 39	32 18 16 13	Track, Court, And Playground Markings
32 18 23 39	32 18 23 29a	Synthetic Turf
32 18 23 53	32 18 16 13	Track, Court, And Playground Markings
32 18 23 53	11 68 23 13	Playing Fields
32 18 23 56	32 18 23 29	Colored Athletic Wearing Surface
32 18 23 56	32 18 16 13	Track, Court, And Playground Markings
32 18 23 56	11 68 23 13	Playing Fields
32 18 23 56	32 18 23 29a	Synthetic Turf
32 18 23 61	32 18 23 29	Colored Athletic Wearing Surface
32 18 23 61	32 18 16 13	Track, Court, And Playground Markings
32 18 23 61	32 18 23 29a	Synthetic Turf
32 31 11 00	32 31 13 13	Chain-Link Fences And Gates

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SECTION 32 31 13 13 - CHAIN-LINK FENCES AND GATES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for chain-link fences and gates. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Chain-link fences.
 - b. Gates: Manually and Motor operated, horizontal slide and swing.

C. Performance Requirements

1. Delegated Design: Design chain-link fences and gates, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Structural Performance: Chain-link fence and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7:
 - a. Minimum Post Size and Maximum Spacing: Determine according to CLFMI WLG 2445, based on mesh size and pattern specified and on the following:
 - 1) Wind Loads: as directed by the Owner .
 - 2) Exposure Category: B **OR** C **OR** D, **as directed**.
 - 3) Fence Height: **10 feet (3 m)**.
 - 4) Material Group: IA, ASTM F 1043, Schedule 40 steel pipe **OR** IC, electric-resistance-welded round steel pipe, **as directed**.
3. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

D. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates.
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Accessories: Privacy slats **OR** Barbed wire **OR** Barbed tape, **as directed**.
 - d. Gates and hardware.
 - e. Gate operators, including operating instructions.
 - f. Motors: Show nameplate data, ratings, characteristics, and mounting arrangements.
2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.
 - a. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - b. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: Prepared on Samples of size indicated below:
 - a. Polymer-Coated Components: In **6-inch (150-mm)** lengths for components and on full-sized units for accessories.
4. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

5. Qualification Data: For qualified professional engineer **OR** testing agency **OR** factory-authorized service representative, **as directed**.
6. Product Certificates: For each type of chain-link fence, operator, and gate, from manufacturer.
7. Product Test Reports: For framing strength according to ASTM F 1043.
8. Field quality-control reports.
9. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:
 - a. Polymer finishes.
 - b. Gate hardware.
 - c. Gate operator.
10. Warranty: Sample of special warranty.

E. Quality Assurance

1. Testing Agency Qualifications: For testing fence grounding. Member company of NETA or an NRTL.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for gates with automatic gate operators serving as a required means of access.
4. Preinstallation Conference: Conduct conference at Project site.

F. Project Conditions

1. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

G. Warranty

1. Special Warranty: Manufacturer's standard form in which manufacturer **OR** Installer, **as directed**, agrees to repair or replace components of chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Faulty operation of gate operators and controls.
 - 2) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - b. Warranty Period: Five **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Chain-Link Fence Fabric

1. General: Provide fabric in one-piece heights measured between top and bottom of outer edge of selvage knuckle or twist. Comply with CLFMI Product Manual and with requirements indicated below:
 - a. Fabric Height: As indicated on Drawings **OR** As directed.
 - b. Steel Wire Fabric: Wire with a diameter of **0.192 inch (4.88 mm) OR 0.148 inch (3.76 mm) OR 0.120 inch (3.05 mm) OR 0.113 inch (2.87 mm), as directed.**
 - 1) Mesh Size: **2-1/8 inches (54 mm) OR 2 inches (50 mm) OR 1-3/4 inches (44 mm) OR 1 inch (25 mm), as directed.**
 - 2) Aluminum-Coated Fabric: ASTM A 491, Type I, **0.40 oz./sq. ft. (122 g/sq. m) OR 0.35 oz./sq. ft. (107 g/sq. m) OR 0.30 oz./sq. ft. (92 g/sq. m), as directed.**
 - 3) Zinc-Coated Fabric: ASTM A 392, Type II, Class 1, **1.2 oz./sq. ft. (366 g/sq. m) OR Class 2, 2.0 oz./sq. ft. (610 g/sq. m), as directed**, with zinc coating applied before **OR** after, **as directed**, weaving.

- 4) Zn-5-Al-MM Aluminum-Mischmetal-Coated Fabric: ASTM F 1345, Type III, Class 1, **0.60 oz./sq. ft. (183 g/sq. m) OR Class 2, 1.0 oz./sq. ft. (305 g/sq. m), as directed.**
- 5) Polymer-Coated Fabric: ASTM F 668, Class 1 **OR** Class 2a **OR** Class 2b, **as directed**, over aluminum **OR** zinc **OR** Zn-5-Al-MM-alloy, **as directed**, -coated steel wire.
 - a) Color: Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.
- 6) Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.
- c. Aluminum Wire Fabric: ASTM F 1183, with mill **OR** caustic-cleaned or etched, **as directed**, finish, and wire diameter of **0.148 inch (3.76 mm) OR 0.192 inch (4.88 mm), as directed.**
 - 1) Mesh Size: **2 inches (50 mm) OR 1 inch (25 mm), as directed.**
- d. Selvage: Knuckled at both selvages **OR** Twisted top and knuckled bottom, **as directed.**

B. Fence Framing

1. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts. Provide members with minimum dimensions and wall thickness according to ASTM F 1043 or ASTM F 1083, **as directed**, based on the following:
 - a. Fence Height: **72 inches (1830 mm) OR 96 inches (2440 mm) OR** As indicated on Drawings, **as directed.**
 - b. Light Industrial Strength: Material Group IC-L, round steel pipe, electric-resistance-welded pipe **OR** Group II-L, roll-formed steel C-section shapes **OR** Group III-L, hot-rolled H-beam shapes **OR** Group IV, Alternative Design, **as directed.**
 - 1) Line Post: **1.9 inches (48 mm) in diameter OR 2.375 inches (60 mm) in diameter OR 2.875 inches (73 mm) in diameter OR 2.25 by 1.7 inches (57 by 43 mm), as directed.**
 - 2) End, Corner and Pull Post: **2.375 inches (60 mm) OR 2.875 inches (73 mm) OR 4.0 inches (102 mm) OR 2.25 by 1.7 inches (57 by 43 mm), as directed.**
 - c. Heavy Industrial Strength: Material Group IA, round steel pipe, Schedule 40 **OR** Group IC, round steel pipe, electric-resistance-welded pipe **OR** Group II, roll-formed steel C-section shapes **OR** Group III, hot-rolled H-beam shapes **OR** Group IV, Alternative Design, **as directed.**
 - 1) Line Post: **1.9 inches (48 mm) in diameter OR 2.375 inches (60 mm) in diameter OR 2.875 inches (73 mm) in diameter OR 4.0 inches (102 mm) in diameter OR 6.625 inches (168 mm) in diameter OR 1.875 by 1.63 inches (48 by 41 mm) OR 2.25 by 1.70 inches (67 by 43 mm) OR 3.25 by 2.50 inches (83 by 64 mm), as directed.**
 - 2) End, Corner and Pull Post: **2.375 inches (60 mm) in diameter OR 2.875 inches (73 mm) in diameter OR 4.0 inches (102 mm) in diameter OR 6.625 inches (168 mm) in diameter OR 2.25 by 1.70 inches (67 by 43 mm) OR 3.25 by 2.50 inches (83 by 64 mm) OR 3.5 by 1.5 inches (89 by 38 mm), as directed.**
 - d. Horizontal Framework Members: Intermediate, top and bottom rails, **as directed**, complying with ASTM F 1043.
 - 1) Top Rail: **1.66 inches (42 mm) in diameter OR 1.25 by 1.63 inches (32 by 41 mm), as directed.**
 - e. Brace Rails: Comply with ASTM F 1043.
 - f. Metallic Coating for Steel Framing:
 - 1) Type A, consisting of not less than minimum **2.0-oz./sq. ft. (0.61-kg/sq. m)** average zinc coating per ASTM A 123/A 123M or **4.0-oz./sq. ft. (1.22-kg/sq. m)** zinc coating per ASTM A 653/A 653M.
 - 2) Type B, zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
 - 3) External, Type B, zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear,

verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than **0.3-mil- (0.0076-mm-)** thick, zinc-pigmented coating.

- 4) Type C, Zn-5-Al-MM alloy, consisting of not less than **1.8-oz./sq. ft. (0.55-kg/sq. m)** coating.
- 5) Coatings: Any coating above.
- g. Polymer coating over metallic coating.
 - 1) Color: Match chain-link fabric **OR** Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.

C. Tension Wire

1. Metallic-Coated Steel Wire: **0.177-inch- (4.5-mm-)** diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824, with the following metallic coating:
 - a. Type I, aluminum coated (aluminized).
 - b. Type II, zinc coated (galvanized) by hot-dip **OR** electrolytic, **as directed**, process, with the following minimum coating weight:
 - 1) Class 3: Not less than **0.8 oz./sq. ft. (244 g/sq. m)** of uncoated wire surface.
 - 2) Class 4: Not less than **1.2 oz./sq. ft. (366 g/sq. m)** of uncoated wire surface.
 - 3) Class 5: Not less than **2 oz./sq. ft. (610 g/sq. m)** of uncoated wire surface.
 - 4) Matching chain-link fabric coating weight.
 - c. Type III, Zn-5-Al-MM alloy with the following minimum coating weight:
 - 1) Class 60: Not less than **0.6 oz./sq. ft. (183 g/sq. m)** of uncoated wire surface.
 - 2) Class 100: Not less than **1 oz./sq. ft. (305 g/sq. m)** of uncoated wire surface.
 - 3) Matching chain-link fabric coating weight.
2. Polymer-Coated Steel Wire: **0.177-inch- (4.5-mm-)** **OR** **0.148-inch- (3.8-mm-)**, **as directed**, diameter, tension wire complying with ASTM F 1664, Class 1 **OR** Class 2a **OR** Class 2b, **as directed**, over aluminum **OR** zinc **OR** Zn-5-Al-MM-alloy, **as directed**, -coated steel wire.
 - a. Color: Match chain-link fabric **OR** Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.
3. Aluminum Wire: **0.192-inch- (4.88-mm-)** diameter tension wire, mill finished, complying with **ASTM B 211 (ASTM B211M)**, Alloy 6061-T94 with **50,000-psi (344-MPa)** minimum tensile strength.

D. Swing Gates

1. General: Comply with ASTM F 900 for gate posts and single **OR** double, **as directed**, swing gate types. Provide automated vehicular gates that comply with ASTM F 2200, **as directed**.
 - a. Gate Leaf Width: **36 inches (914 mm)** **OR** As indicated, **as directed**.
 - b. Gate Fabric Height: **72 inches (1830 mm)** or less **OR** More than **72 inches (1830 mm)** **OR** As indicated, **as directed**.
2. Pipe and Tubing:
 - a. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing **OR** manufacturer's standard protective coating and finish, **as directed**.
 - b. Aluminum: Comply with ASTM B 429/B 429M; mill **OR** manufacturer's standard, **as directed**, finish.
 - c. Gate Posts: Round tubular steel **OR** Rectangular tubular steel **OR** Round tubular aluminum **OR** Rectangular tubular aluminum, **as directed**.
 - d. Gate Frames and Bracing: Round tubular steel **OR** Rectangular tubular steel **OR** Round tubular aluminum **OR** Rectangular tubular aluminum, **as directed**.
3. Frame Corner Construction: Welded **OR** Assembled with corner fittings, **as directed**.
4. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame **12 inches (300 mm)** **OR** as indicated, **as directed**, to attach barbed wire **OR** tape, **as directed**, assemblies.
5. Hardware:

- a. Hinges: 180-degree inward **OR** 180-degree outward **OR** 360-degree inward and outward, **as directed**, swing.
 - b. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate, **as directed**.
 - c. Padlock and Chain: Owner furnished.
 - d. Lock: Manufacturer's standard internal device furnished in lieu of gate latch, **as directed**.
 - e. Closer: Manufacturer's standard, **as directed**.
- E. Horizontal-Slide Gates
1. General: Comply with ASTM F 1184 for gate posts and single **OR** double, **as directed**, sliding gate types. Provide automated vehicular gates that comply with ASTM F 2200, **as directed**.
 - a. Classification: Type I Overhead Slide (opening widths to 40 feet (12.2 m) with an overhead clearance of up to 22 feet (6.7 m)).
 - 1) Gate Leaf Width: As indicated **OR** As directed.
 - 2) Gate Fabric Height: **72 inches (1830 mm)** or less **OR** More than **72 inches (1830 mm)** **OR** As indicated, **as directed**.
 - b. Classification: Type II Cantilever Slide (opening widths to 30 feet (9.1 m) and heights to 8 feet (2.44 m))
 - 1) Class 1 with external **OR** Class 2 with internal, **as directed**, roller assemblies.
 - 2) Gate Frame Width and Height: **48 inches (1200 mm)** wide or less by **72 inches (1830 mm)** high or less **OR** More than **48 inches (1200 mm)** wide by any height **OR** As indicated, **as directed**.
 2. Pipe and Tubing:
 - a. Zinc-Coated Steel: Protective coating and finish to match fence framing **OR** Manufacturer's standard protective coating and finish, **as directed**.
 - b. Aluminum: Comply with ASTM B 429/B 429M; mill **OR** manufacturer's standard, **as directed**, finish.
 - c. Gate Posts: Comply with ASTM F 1184. Provide round tubular steel **OR** rectangular tubular steel **OR** round tubular aluminum **OR** rectangular tubular aluminum, **as directed**, posts.
 - d. Gate Frames and Bracing: Round tubular steel **OR** Rectangular tubular steel **OR** Round tubular aluminum **OR** Rectangular tubular aluminum, **a directed**.
 3. Frame Corner Construction: Welded **OR** Assembled with corner fittings, **as directed**.
 4. Extended Gate Posts and Frame Members: Extend gate posts and frame end members above top of chain-link fabric at both ends of gate frame **12 inches (300 mm)** **OR** as indicated, **as directed**, as required to attach barbed wire **OR** tape, **as directed**, assemblies.
 5. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.
 6. Hardware:
 - a. Latches permitting operation from both sides of gate with provision for padlocking accessible from both sides of gate, **as directed**.
 - b. Padlock and Chain: Owner furnished.
 - c. Lock: Manufacturer's standard internal device furnished in lieu of gate latch, **as directed**.
 - d. Hangers, roller assemblies, and stops fabricated from galvanized steel **OR** galvanized malleable iron **OR** mill-finished Grade 319 aluminum-alloy casting with stainless-steel fasteners, **as directed**.
- F. Fittings
1. General: Comply with ASTM F 626.
 2. Post Caps: Provide for each post.
 - a. Provide line post caps with loop to receive tension wire or top rail.
 3. Rail and Brace Ends: For each gate, corner, pull, and end post.
 4. Rail Fittings: Provide the following:
 - a. Top Rail Sleeves: Pressed-steel or round-steel tubing **OR** Aluminum Alloy 6063, **as directed**, not less than **6 inches (152 mm)** long.

- b. Rail Clamps: Line and corner boulevard clamps for connecting intermediate, and bottom, **as directed**, rails in the fence line-to-line posts.
 - 5. Tension and Brace Bands: Pressed steel **OR** Aluminum Alloy 6063, **as directed**.
 - 6. Tension Bars: Steel **OR** Aluminum **OR** Fiberglass, **as directed**, length not less than **2 inches (50 mm)** shorter than full height of chain-link fabric. Provide one bar for each gate and end post, and two for each corner and pull post, unless fabric is integrally woven into post.
 - 7. Truss Rod Assemblies: Steel, hot-dip galvanized after threading **OR** Mill-finished aluminum, **as directed**, rod and turnbuckle or other means of adjustment.
 - 8. Barbed Wire Arms: Pressed steel or cast iron **OR** Aluminum, **as directed**, with clips, slots, or other means for attaching strands of barbed wire, and means for attaching to posts **OR** integral with post cap, **as directed**; for each post unless otherwise indicated, and as follows:
 - a. Provide line posts with arms that accommodate top rail or tension wire.
 - b. Provide corner arms at fence corner posts, unless extended posts are indicated.
 - c. Type I, single slanted arm.
 - d. Type II, single vertical arm.
 - e. Type III, V-shaped arm.
 - f. Type IV, A-shaped arm.
 - 9. Tie Wires, Clips, and Fasteners: According to ASTM F 626.
 - a. Standard Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - 1) Hot-Dip Galvanized Steel: **0.106-inch- (2.69-mm-)** **OR** **0.148-inch- (3.76-mm-)**, **as directed**, diameter wire; galvanized coating thickness matching coating thickness of chain-link fence fabric, **as directed**.
 - 2) Aluminum: **ASTM B 211 (ASTM B 211M)**; Alloy 1350-H19; **0.148-inch- (3.76-mm-)** **OR** **0.192-inch- (4.88-mm-)**, **as directed**, diameter, mill-finished wire.
 - 10. Finish:
 - a. Metallic Coating for Pressed Steel or Cast Iron: Not less than **1.2 oz. /sq. ft. (366 g /sq. m)** zinc.
 - 1) Polymer coating over metallic coating.
 - b. Aluminum: Mill finish.
- G. Privacy Slats
- 1. Material: PVC, UV-light stabilized, flame resistant, four ply, **as directed**, not less than **0.006 inch (0.15 mm)** **OR** **0.023 inch (0.58 mm)**, **as directed**, thick; attached to not less than **0.0475-inch- (1.21-mm-)** diameter, twisted galvanized wire; hedge-type lattice, **as directed**; sized to fit mesh specified for direction indicated.

OR

Material: Polyethylene tubular slats, not less than **0.023 inch (0.58 mm)** thick, manufactured for chain-link fences from virgin polyethylene containing UV inhibitor, sized to fit mesh specified for direction indicated; with vandal-resistant fasteners and lock strips **OR** fins for increased privacy factor, **as directed**.

OR

Material: Fiber-glass-reinforced plastic, UV-light stabilized, not less than **0.06 inch (1.5 mm)** thick, sized to fit mesh specified for direction indicated; with vandal-resistant fasteners and lock strips, **as directed**.

OR

Material: Aluminum, not less than **0.01 inch (0.25 mm)** thick, sized to fit mesh specified for direction indicated.

OR

Material: Redwood, **5/16 inch (7.9 mm)** thick, sized to fit mesh specified for direction indicated.
 - 2. Color: As indicated by manufacturer's designations **OR** As selected from manufacturer's full range **OR** As indicated on Drawings, **as directed**.
- H. Barbed Wire

1. Steel Barbed Wire: Comply with ASTM A 121, for two-strand barbed wire, **0.099-inch- (2.51-mm-)** diameter line wire with **0.080-inch- (2.03-mm-)** diameter, four-point round barbs spaced not more than **5 inches (127 mm)** o.c.
 - a. Aluminum Coating: Type A.
 - b. Zinc Coating: Type Z, Class 3.
 2. Polymer-Coated, Galvanized-Steel Barbed Wire: Comply with ASTM F 1665 two-strand barbed wire, **0.080-inch- (2.03-mm-)** diameter line wire with **0.080-inch- (2.03-mm-)** diameter, four-point round aluminum alloy **OR** galvanized-steel, **as directed**, barbs spaced not more than **5 inches (127 mm)** o.c.:
 - a. Polymer Coating: Class 1 **OR** Class 2a **OR** Class 2b, **as directed**, over aluminum **OR** zinc **OR** Zn-5-Al-MM-alloy, **as directed**, -coated steel wire.
 - 1) Color: Match chain-link fabric **OR** Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.
- I. Barbed Tape
1. Wire-Reinforced Tape: ASTM F 1910; with four-point, needle-sharp barbs permanently cold clenched around a core wire.
 - a. Core Wire: High-tensile-strength, zinc-coated steel **OR** stainless steel, **as directed**.
 2. Clips: Stainless steel, **0.065 inch (1.7 mm)** thick by **0.375 inch (9.5 mm)** wide, capable of withstanding a minimum **150-lbf (667-N)** pull load to limit extension of coil, resulting in a concertina pattern when deployed.
 3. Tie Wires: Stainless steel, **0.065 inch (1.7 mm)** in diameter.
 4. Fabrication: Continuous coils of barbed tape as defined in ASTM F 1379 for the following characteristics:
 - a. Configuration: Single **OR** Double, **as directed**, coil.
 - b. Style: Helical **OR** Concertina, **as directed**, pattern.
 - c. Coil Diameter(s): **18 inches (457 mm) OR 24 inches (610 mm) OR 24-inch (610-mm)** inner coil and **30-inch (762-mm)** outer coil **OR** As indicated on Drawings, **as directed**.
 - d. Coil Loop Spacing(s): **12 inches (300 mm) OR** Manufacturer's standard **OR** As indicated on Drawings, **as directed**.
 - e. Barb Length Classification: Long, **1.2-inch (30.5-mm) OR** Medium, **0.4-inch (10.2-mm) OR** Short, **0.1875-inch (4.76-mm)**, **as directed**, barb.
 - f. Barb Spacing: **4 inches (102 mm)** o.c.
 - g. Barb Set: Straight **OR** Offset **OR** Manufacturer's standard, **as directed**.
- J. Gate Operators
1. General: Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
 - a. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
 - b. Provide operator with UL approval **OR** -approved components, **as directed**.
 - c. Provide electronic components with built-in troubleshooting diagnostic feature.
 - d. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
 2. Comply with NFPA 70.
 3. UL Standard: Fabricate and label gate operators to comply with UL 325.
 4. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:
 - a. Voltage: 12-V dc **OR** 120 V **OR** 208-220 V **OR** NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected, **as directed**.
 - b. Horsepower: 1/4 **OR** 1/3 **OR** 3/4, **as directed**.
 - c. Enclosure: Open dripproof **OR** Totally enclosed **OR** Manufacturer's standard, **as directed**.

- d. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 feet (1005 m) above sea level.
 - e. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - f. Phase: One OR Polyphase, **as directed**.
5. Gate Operators: Gate OR Equipment base/pad OR Pedestal post OR In ground, **as directed**, mounted and as follows:
- a. Hydraulic Swing OR Slide, **as directed**, Gate Operators:
 - 1) Duty: Light OR Medium OR Heavy, **as directed**, duty, residential OR commercial/industrial, **as directed**.
 - 2) Gate Speed: Minimum 45 feet (13.7 m) OR 60 feet (18.2 m), **as directed**, per minute.
 - 3) Maximum Gate Weight: 300 lb (137 kg).
 - 4) Frequency of Use: 10 cycles per hour OR 25 cycles per hour OR Continuous duty, **as directed**.
 - 5) Locking: Hydraulic in both directions.
 - 6) Heater: Manufacturer's standard track and roller heater with thermostatic control.
 - 7) Operating Type: Crank arm OR Wheel and rail drive OR Roller chain, **as directed**, with manual release, **as directed**.
 - b. Mechanical Swing OR Slide, **as directed**, Gate Operators:
 - 1) Duty: Light OR Medium OR Heavy, **as directed**, duty, residential OR commercial/industrial, **as directed**.
 - 2) Gate Speed: Minimum 45 feet (13.7 m) per minute OR 60 feet (18.2 m) per minute OR variable speed, **as directed**.
 - 3) Maximum Gate Weight: 600 lb (272 kg) OR 800 lb (363 kg), **as directed**.
 - 4) Frequency of Use: 10 cycles per hour OR 25 cycles per hour OR 60 cycles per hour OR Continuous duty, **as directed**.
 - 5) Operating Type: Crank arm OR Wheel and rail drive OR Roller chain, **as directed**, with manual release, **as directed**.
 - 6) Drive Type: Enclosed worm gear OR worm gear and chain-and-sprocket, **as directed**, reducers, roller-chain drive.
OR
Drive Type: V-belt and worm gear OR chain-and-sprocket, **as directed**, reducers, roller-chain drive.
6. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA ICS 6, Type 1 OR NEMA ICS 6, Type 4, **as directed**, enclosure for surface OR recessed or flush OR equipment base/pad OR pedestal, **as directed**, mounting and with space for additional optional equipment. Provide the following remote-control device(s):
- a. Control Station: Keyed, two OR three, **as directed**, -position switch, located remotely from gate. Provide two keys per station.
OR
Control Station: Momentary-contact, single OR three, **as directed**, -button-operated; located remotely from gate. Key switch to lock out open and close buttons, **as directed**.
 - 1) Function: Open, stop, **as directed**, and close.
 - b. Card Reader: Functions only when authorized card is presented. Programmable, magnetic multiple OR single, **as directed**, -code system, permitting four different access time periods, **as directed**; face-lighted unit fully visible at night, **as directed**.
 - 1) Reader Type: Touch plate OR Swipe OR Insertion OR Proximity, **as directed**.
 - 2) Features: Timed anti-passback OR Limited-time usage OR Capable of monitoring and auditing gate activity, **as directed**.
 - c. Digital Keypad Entry Unit: Multiple-code capability OR Multiple-programmable, code capability, **as directed**, of not less than five OR 500 OR 2500, **as directed**, possible individual codes, consisting of one- to seven OR four OR five, **as directed**, -digit codes, and permitting four different access time periods, **as directed**.
 - 1) Features: Timed anti-passback OR Limited-time usage OR Capable of monitoring and auditing gate activity, **as directed**.

- 2) Face-lighted unit with metal-keyed **OR** keyless-membrane, **as directed**, keypad fully visible at night.
- d. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide one **OR** two, **as directed**, programmable transmitter(s) with multiple-code capability permitting validating or voiding of not less than 1000 **OR** 10,000, **as directed**, codes per channel configured for the following functions:
 - 1) Transmitters: Single **OR** Three, **as directed**, -button operated, with open **OR** open and close, **as directed**, function.
 - 2) Channel Settings: Two **OR** Three **OR** Four, **as directed**, independent channel settings controlling separate receivers for operating more than one gate from each transmitter.
- e. Telephone Entry System: Hands-free voice-communication system for connection to building telephone system with digital-entry code activation of gate operator and auxiliary keypad entry, **as directed**.
 - 1) Residential System: Designed to be wired to same line with telephone.
OR
Multiunit System: Designed to be wired to a dedicated telephone line, with capacity to access 20 **OR** 100, **as directed**, telephones and with electronic directory, **as directed**.
- f. Vehicle Loop Detector: System including automatic closing timer with adjustable time delay before closing, timer cut-off switch, **as directed**, and loop detector designed to open and close gate **OR** hold gate open until traffic clears **OR** reverse gate, **as directed**. Provide electronic detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator. Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, as recommended in writing by detection system manufacturer for function indicated.
 - 1) Loop: Wire, in size indicated for field assembly, for pave-over **OR** saw-cut with epoxy-grouted, **as directed**, installation.
OR
Loop: Factory preformed in size indicated; style for pave-over **OR** saw-cut with epoxy-grouted, **as directed**, installation.
- g. Vehicle Presence Detector: System including automatic closing timer with adjustable time delay before closing, timer cut-off switch, **as directed**, and presence detector designed to open and close gate **OR** hold gate open until traffic clears **OR** reverse gate, **as directed**. Provide retroreflective **OR** emitter/receiver, **as directed**, detector with adjustable detection zone pattern and sensitivity, designed to detect the presence or transit of a vehicle in gate pathway when infrared beam in zone pattern is interrupted, and to emit a signal activating the gate operator.
7. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
 - a. Action: Reverse gate in both opening and closing cycles and hold until clear of obstruction **OR** Stop gate in opening cycle and reverse gate in closing cycle and hold until clear of obstruction, **as directed**.
 - b. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
 - c. Sensor Edge: Contact-pressure-sensitive safety edge, profile, and sensitivity designed for type of gate and component indicated, in locations as follows. Connect to control circuit using take-up cable reel **OR** self-coiling cable **OR** gate edge transmitter and operator receiver system, **as directed**.
 - 1) Along entire gate leaf leading edge (for swing gates and slide gates).
 - 2) Along entire gate leaf trailing edge (for slide gates).
 - 3) Across entire gate leaf bottom edge (for vehicular swing and slide gates complying with UL 325 or to suit Project; consider retaining for pedestrian gates).

- 4) Along entire length of gate posts (for slide gates; revise for sensor edge at pinch point post of swing gates).
- 5) Along entire length of gate guide posts (for Type II Cantilever Slide, Class 1 gates).
- 6) Where indicated on Drawings.
- d. Photoelectric/Infrared Sensor System: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.
8. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
 - a. Type: Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge **OR** Mechanical device, key, or crank-activated release, **as directed**.
9. Operating Features:
 - a. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability for monitoring and auditing gate activity, **as directed**. Provide unit that is isolated from voltage spikes and surges.
 - b. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
 - c. Master/Slave Capability: Control stations designed and wired for gate pair operation.
 - d. Automatic Closing Timer: With adjustable time delay before closing and timer cut-off switch, **as directed**.
 - e. Open Override Circuit: Designed to override closing commands.
 - f. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
 - g. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
 - h. Clock Timer: 24-hour **OR** Seven-day, **as directed**, programmable for regular events.
10. Accessories:
 - a. Warning Module: Audio **OR** Visual, **as directed**, constant **OR** strobe, **as directed**, light alarm sounding three to five seconds in advance of gate operation and continuing until gate stops moving; compliant with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
 - b. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system.
 - 1) Fail Safe: Gate opens and remains open until power is restored.
 - 2) Fail Secure: Gate cycles on battery power, then fail safe when battery is discharged.
 - c. External electric-powered solenoid **OR** magnetic, **as directed**, lock with delay timer allowing time for lock to release before gate operates.
 - d. Fire **OR** Postal, **as directed**, box.
 - e. Fire strobe **OR** siren, **as directed**, alarm.
 - f. Intercom System: as directed by the Owner
 - g. Instructional, Safety, and Warning Labels and Signs: According to UL 325 **OR** Manufacturer's standard for components and features specified **OR** As indicated on Drawings, **as directed**.
 - h. Equipment Bases/Pads: Cast-in-place or precast concrete, depth not less than **12 inches (300 mm)**, dimensioned and reinforced according to gate-operator component manufacturer's written instructions and as indicated on Drawings.
- K. Grout And Anchoring Cement
 1. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
 2. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to

erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer, for exterior applications.

- L. Fence Grounding
 - 1. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - a. Material above Finished Grade: Copper **OR** Aluminum, **as directed**.
 - b. Material on or below Finished Grade: Copper.
 - c. Bonding Jumpers: Braided copper tape, **1 inch (25 mm)** wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
 - 2. Connectors and Grounding Rods: Comply with UL 467.
 - a. Connectors for Below-Grade Use: Exothermic welded type.
 - b. Grounding Rods: Copper-clad steel, **5/8 by 96 inches (16 by 2440 mm)**.

1.3 EXECUTION

- A. Examination
 - 1. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, **as directed**, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - a. Do not begin installation before final grading is completed unless otherwise permitted by the Owner.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.
- B. Preparation
 - 1. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet (152.5 m)** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.
- C. Installation, General
 - 1. Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated.
 - a. Install fencing on established boundary lines inside property line.
- D. Chain-Link Fence Installation
 - 1. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
 - 2. Post Setting: Set posts in concrete **OR** with mechanical anchors **OR** by mechanically driving into soil, **as directed**, at indicated spacing into firm, undisturbed soil.
 - a. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - b. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - 1) Exposed Concrete: Extend **2 inches (50 mm)** above grade; shape and smooth to shed water.
 - 2) Concealed Concrete: Top **2 inches (50 mm)** below grade as indicated on Drawings to allow covering with surface material.
 - 3) Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout **OR** anchoring cement, **as directed**, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
 - 4) Posts Set into Voids in Concrete: Form or core drill holes not less than **5 inches (125 mm)** deep and **3/4 inch (20 mm)** larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with

- nonshrink, nonmetallic grout **OR** anchoring cement, **as directed**, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
- c. Mechanically Driven Posts: Drive into soil to depth of **30 inches (762 mm) OR 36 inches (914 mm), as directed**. Protect post top to prevent distortion.
 3. Terminal Posts: Locate terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more **OR** 30 degrees or more **OR** as indicated on Drawings, **as directed**.
 4. Line Posts: Space line posts uniformly at **96 inches (2440 mm) OR 10 feet (3 m), as directed**, o.c.
 5. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.
 - a. Locate horizontal braces at midheight of fabric **72 inches (1830 mm)** or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
 6. Tension Wire: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with **0.120-inch- (3.05-mm-)** diameter hog rings of same material and finish as fabric wire, spaced a maximum of **24 inches (610 mm)** o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
 - a. Extended along top **OR** bottom **OR** top and bottom, **as directed**, of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within **6 inches (152 mm)** of bottom of fabric and tie to each post with not less than same diameter and type of wire.
 - b. Extended along top of barbed wire arms **OR** extended posts, **as directed**, and top of fence fabric for supporting barbed tape.
 - c. As indicated.
 7. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended in writing by fencing manufacturer.
 8. Intermediate and Bottom Rails: Install and secure to posts with fittings.
 9. Chain-Link Fabric: Apply fabric to outside **OR** inside, **as directed**, of enclosing framework. Leave **1 inch (25.4 mm) OR 2 inches (50 mm), as directed**, between finish grade or surface and bottom selvage unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
 10. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than **15 inches (380 mm)** o.c.
 11. Tie Wires: Use wire of proper length to firmly secure fabric to line posts and rails. Attach wire at one end to chain-link fabric, wrap wire around post a minimum of 180 degrees, and attach other end to chain-link fabric per ASTM F 626. Bend ends of wire to minimize hazard to individuals and clothing.
 - a. Maximum Spacing: Tie fabric to line posts at **12 inches (300 mm)** o.c. and to braces at **24 inches (610 mm)** o.c.
 12. Fasteners: Install nuts for tension bands and carriage bolts on the side of the fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts, **as directed**.
 13. Privacy Slats: Install slats in direction indicated, securely locked in place.
 - a. Vertically **OR** Horizontally, **as directed**, for privacy factor of 70 to 75.
OR
Diagonally, for privacy factor of 80 to 85.
OR
Direction and privacy factor, **as directed**, as indicated.

14. Barbed Wire: Install barbed wire uniformly spaced, angled toward security side of fence **OR** as indicated on Drawings, **as directed**. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.
 15. Barbed Tape: Comply with ASTM F 1911. Install barbed tape uniformly in configurations indicated and fasten securely to prevent movement or displacement.
- E. Gate Installation
1. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- F. Gate Operator Installation
1. General: Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
 2. Excavation for Support Posts **OR** Pedestals **OR** Equipment Bases/Pads, **as directed**: Hand-excavate holes for bases/pads, in firm, undisturbed soil to dimensions and depths and at locations as required by gate-operator component manufacturer's written instructions and as indicated.
 3. Vehicle Loop Detector System: Cut grooves in pavement and bury **OR** Bury, **as directed**, and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.
 4. Comply with NFPA 70 and manufacturer's written instructions for grounding of electric-powered motors, controls, and other devices.
- G. Grounding And Bonding
1. Fence Grounding: Install at maximum intervals of **1500 feet (450 m)**, **as directed**, except as follows:
 - a. Fences within **100 Feet (30 m)** of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of **750 feet (225 m)**, **as directed**.
 - 1) Gates and Other Fence Openings: Ground fence on each side of opening.
 - a) Bond metal gates to gate posts.
 - b) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least **18 inches (460 mm)** below finished grade.
 2. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of **150 feet (45 m)** on each side of crossing.
 3. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
 4. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is **6 inches (150 mm)** below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location, including the following:
 - a. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
 - b. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
 5. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
 6. Connections: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - b. Make connections with clean, bare metal at points of contact.
 - c. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.

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- d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
 7. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.
- H. Field Quality Control
1. Grounding-Resistance Testing: Engage a qualified testing agency to perform tests and inspections.
 - a. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance no fewer than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
 - b. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify the Owner promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
 - c. Report: Prepare test reports certified by a testing agency of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.
- I. Adjusting
1. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
 2. Automatic Gate Operator: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, alarms, **as directed**, and limit switches.
 - a. Hydraulic Operator: Purge operating system, adjust pressure and fluid levels, and check for leaks.
 - b. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - c. Test and adjust controls, alarms, **as directed**, and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Lubricate hardware, gate operator, **as directed**, and other moving parts.
- J. Demonstration
1. Train the Owner's personnel to adjust, operate, and maintain chain-link fences and gates.

END OF SECTION 32 31 13 13

SECTION 32 31 13 13a - HIGH-SECURITY CHAIN-LINK FENCES AND GATES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for high-security chain-link fences and gates. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. High-security chain-link fences.
 - b. Gates: Motor operated, horizontal slide and swing.

C. Performance Requirements

1. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
2. Structural Performance: Chain-link fences and gate framework shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7:
 - a. Minimum Post Size: Determine according to ASTM F 1043 for framework up to **12 feet (3.66 m)** high, and post spacing not to exceed **10 feet (3 m)** for Material Group IA, ASTM F 1043, Schedule 40 steel pipe **OR** Group IC, electric-resistance-welded round steel pipe, **as directed**.
OR
Minimum Post Size and Maximum Spacing: Provide line posts of size and in spacing indicated, but not less than sizes and spacings determined according to ASTM F 1916, including Appendix **OR** CLFMI WLG 2445, **as directed**, based on mesh size and pattern specified and the following:
 - 1) Wind Loads: Determine design wind loads applicable to Project from basic wind speed and exposure category according to CLFMI WLG 2445.
 - 2) Exposure Category: B **OR** C **OR** D, **as directed**.
 - 3) Fence Height: **10 feet (3 m)**.
 - 4) Material Group: IA, ASTM F 1043, Schedule 40 steel pipe **OR** IC, electric-resistance-welded round steel pipe, **as directed**.
 - b. Fabric Tension: Provide fences in which fabric deflections do not exceed those indicated in Table X1.1 of ASTM F 1916 when tested by applying a **30-lbf (133-N)** force at midpoint between rails and horizontally between posts for every eighth lower panel along the fence line.
 - c. Fence Post Rigidity: Provide fences in which post deflections do not exceed **3/4 inch (19 mm)** when tested according to ASTM F 1916 by applying a **50-lbf (222-N)** force at midheight of every eighth post along the fence line.
3. Lightning Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

D. Submittals

1. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for chain-link fences and gates, **as directed**.
 - a. Fence and gate posts, rails, and fittings.
 - b. Chain-link fabric, reinforcements, and attachments.
 - c. Accessories: Barbed wire **OR** Barbed tape, **as directed**.

- d. Gates and hardware.
 - e. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - f. Wiring Diagrams: For power, signal, and control wiring.
 2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Show accessories, hardware, gate operation, and operational clearances.
 - a. Gate Operator: Show locations and details for installing operator components, switches, and controls. Indicate motor size, electrical characteristics, drive arrangement, mounting, and grounding provisions.
 - b. Wiring Diagrams: For power, signal, and control wiring.
 3. Samples: Prepared on Samples of size indicated below:
 - a. Polymer-Coated Components: In **6-inch (150-mm)** lengths for components and on full-sized units for accessories.
 4. Delegated-Design Submittal: For chain-link fences and gate framework indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 5. Qualification Data: For qualified professional engineer **OR** testing agency **OR** factory-authorized service representative, **as directed**.
 6. Product Certificates: For each type of chain-link fence, operator, **as directed**, and gate, from manufacturer.
 7. Product Test Reports: For framing strength according to ASTM F 1043.
 8. Field quality-control reports.
 9. Soil sterilization certificate of treatment stating materials and quantities used, and date of application.
 10. Operation and Maintenance Data: For the following to include in emergency, operation, and maintenance manuals:
 - a. Polymer finishes.
 - b. Gate hardware.
 - c. Gate operator.
 11. Warranty: Sample of special warranty.
- E. Quality Assurance
1. Testing Agency Qualifications: For testing fence grounding. Member company of NETA or an NRTL **OR** one who meets the requirements necessary for certification, **as directed**.
 - a. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing **OR** one who meets the requirements necessary for certification, **as directed**.
 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 3. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators serving as a required means of access.
 4. Preinstallation Conference: Conduct conference at Project site.
- F. Project Conditions
1. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.
- G. Warranty
1. Special Warranty: Manufacturer's standard form in which manufacturer **OR** Installer, **as directed**, agrees to repair or replace components of high-security chain-link fences and gates that fail in materials or workmanship within specified warranty period.
 - a. Failures include, but are not limited to, the following:
 - 1) Deflection of fence fabric beyond design limits.

- 2) Deterioration of metals, metal finishes, and other materials beyond normal weathering.
- 3) Faulty operation of gate operators and controls.
- b. Warranty Period: Five **OR** 15, **as directed**, years from date of Final Completion.

1.2 PRODUCTS

A. Chain-Link Fence Fabric

1. Chain-Link Fence Fabric: Provide fabric in one **OR** two, **as directed**,-piece heights measured between top and bottom of outer edge of selvage. Comply with CLFMI Product Manual and with requirements indicated below:
 - a. Fabric Height: As indicated on Drawings **OR** As directed.
 - 1) Steel Wire Fabric: Wire with a diameter of **0.192 inch (4.88 mm) OR 0.148 inch (3.76 mm) OR 0.120 inch (3.05 mm) OR 0.113 inch (2.87 mm), as directed.**
 - a) Mesh Size: **2 inches (51 mm) OR 1 inch (25.4 mm) OR 3/8 inch (9.5 mm), as directed.**
 - 2) Steel Wire Lower Fabric: Wire with a diameter of **0.192 inch (4.88 mm) OR 0.148 inch (3.76 mm) OR 0.120 inch (3.05 mm) OR 0.113 inch (2.87 mm), as directed.**
 - a) Mesh Size: **2 inches (51 mm) OR 1 inch (25.4 mm) OR 3/8 inch (9.5 mm), as directed.**
 - 3) Steel Wire Upper Fabric: Wire with a diameter of 0.120 inch (3.05 mm).
 - a) Mesh Size: **3/8 inch (9.5 mm).**
 - b. Fabric Heights and Overlap: As indicated on Drawings **OR** As directed.
 - 1) Steel Wire Lower Fabric: Wire with a diameter of **0.192 inch (4.88 mm) OR 0.148 inch (3.76 mm) OR 0.120 inch (3.05 mm) OR 0.113 inch (2.87 mm), as directed.**
 - a) Mesh Size: **2 inches (51 mm) OR 1 inch (25.4 mm) OR 3/8 inch (9.5 mm), as directed.**
 - 2) Steel Wire Upper Fabric: Wire with a diameter of 0.120 inch (3.05 mm).
 - a) Mesh Size: **3/8 inch (9.5 mm).**
 - c. Aluminum-Coated Fabric: ASTM A 491, Type I, **0.40 oz./sq. ft. (122 g/sq. m) OR 0.35 oz./sq. ft. (107 g/sq. m) OR 0.30 oz./sq. ft. (92 g/sq. m), as directed.**
 - d. Zinc-Coated Fabric: ASTM A 392, Type II, Class 1, **1.2 oz./sq. ft. (366 g/sq. m) OR Class 2, 2.0 oz./sq. ft. (610 g/sq. m), as directed**, with zinc coating applied before **OR** after, **as directed**, weaving.
 - e. Zn-5-Al-MM Aluminum-Mischmetal-Coated Fabric: ASTM F 1345, Type III, Class 2, **1.0 oz./sq. ft. (305 g/sq. m).**
 - f. Polymer-Coated Fabric: ASTM F 668, Class 2b over aluminum **OR** zinc **OR** Zn-5-Al-MM-alloy, **as directed**, -coated steel wire.
 - 1) Color: Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected by the Owner from manufacturer's full range, **as directed**, complying with ASTM F 934.
 - g. Coat selvage ends of fabric that is metallic coated before the weaving process with manufacturer's standard clear protective coating.
 - h. Selvage: Twisted and barbed top and bottom.

B. Security Fence Framing

1. Posts and Rails: Comply with ASTM F 1043 for framing, including rails, braces, and line; terminal; and corner posts.
 - a. Fence Height: **96 inches (2440 mm) OR 12 feet (3.66 m) OR** As indicated on Drawings, **as directed.**
 - b. Heavy **OR** Light, **as directed**, Industrial Strength: Material Group IA, round steel pipe, Schedule 40 **OR** Group IC, round steel pipe, electric resistance-welded pipe, **as directed.**
 - 1) Line Post: **2.375 inches (60 mm) in diameter OR 2.875 inches (73 mm) in diameter OR 4 inches (100-mm) in diameter OR 6.625 inches (168 mm) in diameter OR 8.625 inches (168 mm) in diameter OR 2.25 by 1.70 inches (67 by 43 mm) OR 3.25 by 2.50 inches (83 by 64 mm), as directed.**
 - 2) End, Corner, and Pull Post: **2.875 inches (73 mm) in diameter OR 4.0 inches (102 mm) in diameter OR 6.625 inches (168 mm) in diameter OR 8.625 inches (168 mm) in diameter, as directed.**
 - c. Rail Members: Intermediate, top, and brace, **as directed**, rails complying with ASTM F 1043 for Heavy Industrial.
 - d. Metallic Coating for Steel Framing:

- 1) Type A, consisting of not less than minimum **2.0-oz./sq. ft. (0.61-kg/sq. m)** average zinc coating per ASTM A 123/A 123M or **4.0-oz./sq. ft. (1.22-kg/sq. m)** zinc coating per ASTM A 653/A 653M.
 - 2) Type B, zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film.
 - 3) External, Type B, zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear, verifiable polymer film. Internal, Type D, consisting of 81 percent, not less than **0.3-mil- (0.0076-mm-)** thick, zinc-pigmented coating.
 - 4) Type C, Zn-5-Al-MM alloy, consisting of not less than **1.8-oz./sq. ft. (0.55-kg/sq. m)** coating.
 - 5) Coatings: Any coating above.
- e. Polymer coating over metallic coating.
- 1) Color: Match chain-link fabric **OR** Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.
- C. Tension Wire
1. Metallic-Coated Steel Wire: **0.177-inch- (4.5-mm-)** diameter, marcelled tension wire complying with ASTM A 817 and ASTM A 824, with the following metallic coating:
 - a. Type I, aluminum coated (aluminized).
 - b. Type II, zinc coated (galvanized) by hot-dip **OR** electrolytic, **as directed**, process, with Class 5 minimum coating weight of not less than **2.0 oz./sq. ft. (610 g/sq. m)** of uncoated wire surface.
 2. Polymer-Coated Steel Wire: **0.177-inch- (4.5-mm-)** diameter, tension wire complying with ASTM F 1664, Class 1 **OR** Class 2a **OR** Class 2b, **as directed**, over aluminum **OR** zinc **OR** Zn-5-Al-MM-alloy, **as directed**, -coated steel wire.
 - a. Color: Match chain-link fabric **OR** Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.
- D. Swing Gates
1. General: Comply with ASTM F 900 for gate posts and single **OR** double, **as directed**, swing gate types. Provide automated vehicular gates that comply with ASTM F 2200, **as directed**.
 - a. Gate Leaf Width: **36 inches (914 mm)** **OR** As indicated, **as directed**.
 - b. Gate Fabric Height: **72 inches (1830 mm)** or less **OR** More than **72 inches (1830 mm)** **OR** As indicated, **as directed**.
 2. Pipe and Tubing:
 - a. Zinc-Coated Steel: Comply with ASTM F 1043 and ASTM F 1083; protective coating and finish to match fence framing **OR** manufacturer's standard protective coating and finish, **as directed**.
 - b. Aluminum: Comply with ASTM B 429/B 429M; mill **OR** manufacturer's standard, **as directed**, finish.
 - c. Gate Post Size and Weight: Not less than required by ASTM F 900 **OR** ASTM F 1916, **as directed**.
 - d. Gate Posts: Round tubular steel **OR** Rectangular tubular steel **OR** Round tubular aluminum **OR** Rectangular tubular aluminum, **as directed**.
 - e. Gate Frames and Bracing: Round tubular steel **OR** Rectangular tubular steel **OR** Round tubular aluminum **OR** Rectangular tubular aluminum, **as directed**.
 3. Frame Corner Construction: Welded **OR** Assembled with corner fittings, **as directed**, and **3/8-inch- (9.5-mm-)** diameter, adjustable truss rods for panels **5 feet (1.52 m)** or wider.
 4. Extended Gate Posts and Frame Members: Extend above top of chain-link fabric at both ends of gate frame **12 inches (300 mm)** **OR** as indicated, **as directed**, as required to attach barbed wire **OR** tape, **as directed**, assemblies.
 5. Provide separate isolated gate frame according to ASTM F 1916 and as indicated.

- a. Separation between Hinge and Latch Post and Fence Termination Post: **2 inches (51 mm)** minimum, **2-1/2 inches (63.5 mm)** maximum.
6. Hardware: Comply with ASTM F 1916.
 - a. Hinges: 180-degree inward **OR** 180-degree outward **OR** 360-degree inward and outward, **as directed**, swing.
 - b. Latches permitting operation from one side **OR** both sides, **as directed**, of gate with provision for padlocking accessible from both sides of gate, **as directed**.
 - c. Padlock and Chain: the Owner furnished.
 - d. Lock: Manufacturer's standard, **as directed**, internal device furnished in lieu of gate latch, **as directed**.
 - e. Closer: Manufacturer's standard, **as directed**.
 - f. For gates **14 feet (4.27 m)** and higher, add locking device to transom.
- E. Horizontal-Slide Gates
 1. General: Comply with ASTM F 1184 for gate posts and single **OR** double, **as directed**, sliding gate types. Provide automated vehicular gates that comply with ASTM F 2200, **as directed**.
 - a. Classification: Type I Overhead Slide.
 - 1) Gate Leaf Width: As indicated.
 - 2) Gate Fabric Height: **72 inches (1830 mm)** or less **OR** More than **72 inches (1830 mm)** **OR** As indicated, **as directed**.
 - b. Classification: Type II Cantilever Slide, Class 1 with external **OR** Class 2 with internal, **as directed**, roller assemblies.
 - 1) Gate Frame Width and Height: **48 inches (1200 mm)** wide or less by **72 inches (1830 mm)** high or less **OR** More than **48 inches (1200 mm)** wide by any height **OR** As indicated, **as directed**.
 2. Pipe and Tubing:
 - a. Zinc-Coated Steel: Protective coating and finish to match fence framing **OR** Manufacturer's standard protective coating and finish, **as directed**.
 - b. Aluminum: Comply with ASTM B 429/B 429M; mill **OR** manufacturer's standard, **as directed**, finish.
 - c. Gate Post Size and Weight: Not less than required by ASTM F 1184 **OR** ASTM F 1916, **as directed**.
 - d. Gate Frames and Bracing: Round tubular steel **OR** Rectangular tubular steel **OR** Round tubular aluminum **OR** Rectangular tubular aluminum, **as directed**.
 3. Frame Corner Construction: Welded **OR** Assembled with corner fittings, **as directed**, and **3/8-inch- (9.5-mm-)** diameter, adjustable truss rods for panels **5 feet (1.52 m)** or wider.
 4. Extended Gate Posts and Frame Members: Extend above top of chain-link fabric at both ends of gate frame **12 inches (300 mm)** **OR** as indicated, **as directed**, as required to attach barbed wire **OR** tape, **as directed**, assemblies.
 5. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.
 6. Hardware:
 - a. Latches permitting operation from one side **OR** both sides, **as directed**, of gate with provision for padlocking accessible from both sides of gate, **as directed**.
 - b. Padlock and Chain: the Owner furnished.
 - c. Lock: Manufacturer's standard, **as directed**, internal device furnished in lieu of gate latch, **as directed**.
 - d. Hangers, roller assemblies, and stops fabricated from galvanized steel **OR** galvanized malleable iron **OR** mill-finished Grade 319 aluminum-alloy casting with stainless-steel fasteners, **as directed**.
- F. Fittings
 1. General: Comply with ASTM F 626.
 2. Post Caps: Provide for each post.
 - a. Provide line post caps with loop to receive tension wire or top rail.

3. Rail and Brace Ends: For each gate, corner, pull, and end post.
 4. Rail Fittings: Provide the following:
 - a. Top-Rail Sleeves: Pressed steel or round steel tubing not less than **6 inches (152 mm)** long.
 - b. Rail Clamps: Line and corner boulevard clamps for connecting intermediate and bottom, **as directed**, rails in the fence line to line posts.
 5. Tension and Brace Bands, Tension Bars, and Truss Rod Assemblies: Comply with ASTM F 2611.
 6. Barbed Wire Arms: Pressed steel or cast iron **OR** Aluminum, **as directed**, with clips, slots, or other means for attaching strands of barbed wire, and means for attaching to posts **OR** integral with post cap, **as directed**; for each post unless otherwise indicated, and as follows:
 - a. Provide line posts with arms that accommodate top rail or tension wire.
 - b. Provide corner arms at fence corner posts, unless extended posts are indicated.
 - c. Type I, single slanted arm.
 - d. Type II, single vertical arm.
 - e. Type III, V-shaped arm.
 - f. Type IV, A-shaped arm.
 - g. Bolts or rivets for connection to post.
 7. Tie Wires, Clips, and Fasteners: Comply with ASTM F 626 and ASTM F 1916.
 - a. High-Security Round Wire Ties: For attaching chain-link fabric to posts, rails, and frames, complying with the following:
 - 1) Metallic-Coated Steel: **0.148-inch- (3.76-mm-)** **OR** **0.192-inch- (4.88-mm-)**, **as directed**, diameter wire; zinc **OR** aluminum, **as directed**, coating.
 - 2) Stainless steel.
 8. Power-Driven Fabric Fasteners: Comply with ASTM F 1916.
 9. Finish:
 - a. Metallic Coating for Pressed Steel or Cast Iron: Not less than **1.2 oz. /sq. ft. (366 g/sq. m)** of zinc.
 - 1) Polymer coating over metallic coating.
 - b. Aluminum: Mill finish.
- G. Barbed Wire
1. Steel Barbed Wire: Comply with ASTM A 121, High Security Grade, for two-strand barbed wire; **0.099-inch- (2.51-mm-)** diameter line wire with **0.080-inch- (2.03-mm-)** diameter, four-point round barbs spaced not more than **3 inches (76 mm)** o.c.
 - a. Aluminum Coating: Type A.
 2. Polymer-Coated, Galvanized-Steel Barbed Wire: Comply with ASTM F 1665, Type II, for two-strand barbed wire; **0.080-inch- (2.03-mm-)** diameter line wire with **0.080-inch- (2.03-mm-)** diameter, four-point round aluminum-alloy **OR** galvanized-steel, **as directed**, barbs spaced not more than **3 inches (76 mm)** o.c.
 - a. Polymer Coating: Class 1 **OR** Class 2a **OR** Class 2b, **as directed**, over aluminum **OR** zinc **OR** Zn-5-Al-MM-alloy, **as directed**, -coated steel wire.
 - 1) Color: Match chain-link fabric **OR** Dark green **OR** Olive green **OR** Brown **OR** Black **OR** As selected from manufacturer's full range, **as directed**, complying with ASTM F 934.
- H. Barbed Tape
1. Wire-Reinforced Tape: ASTM F 1910; with four-point, needle-sharp barbs permanently cold clenched around a core wire.
 - a. Core Wire: High-tensile-strength, zinc-coated steel or stainless steel.
 2. Clips: Stainless steel, **0.065 inch (1.65 mm)** thick by **0.375 inch (9.5 mm)** wide; capable of withstanding a minimum **150-lbf (667-N)** pull load to limit extension of coil, resulting in a concertina pattern when deployed.
 3. Tie Wires: Stainless steel, **0.065 inch (1.65 mm)** in diameter.

4. Fabrication: Continuous coils of barbed tape as defined in ASTM F 1379 for the following characteristics:
 - a. Configuration: Single **OR** Double, **as directed**, coil.
 - b. Style: Helical **OR** Concertina, **as directed**, pattern.
 - c. Coil Diameter(s): **18 inches (457 mm) OR 24 inches (610 mm) OR 24-inch (610-mm)** inner coil and **30-inch (762-mm)** outer coil **OR** As indicated on Drawings, **as directed**.
 - d. Coil Loop Spacing(s): **12 inches (305 mm) OR** Manufacturer's standard **OR** As indicated on Drawings, **as directed**.
 - e. Barb Length Classification: Long, **1.2-inch (30.5-mm) OR** Medium, **0.4-inch (10.2-mm) OR** Short, **0.1875-inch (4.76-mm)**, **as directed**, barb.
 - f. Barb Spacing: **4 inches (102 mm)** o.c.
 - g. Barb Set: Straight **OR** Offset **OR** Manufacturer's standard, **as directed**.
 5. Ground Barrier Stakes: **3/8-inch- (9.5-mm-)** diameter galvanized reinforcing bar, **18 inches (457 mm)** long with 180-degree end hook **3-1/2 inches (89 mm)** long.
- I. Gate Operators
1. General: Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
 - a. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
 - b. Provide operator with UL approval **OR** UL-approved components, **as directed**.
 - c. Provide electronic components with built-in troubleshooting diagnostic feature.
 - d. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
 2. Comply with NFPA 70.
 3. UL Standard: Manufacturer and label gate operators to comply with UL 325.
 4. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1 and the following:
 - a. Voltage: **12-V dc OR 120 V OR 208-220 V OR** NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected, **as directed**.
 - b. Horsepower: **1/4 OR 1/3 OR 3/4, as directed**.
 - c. Enclosure: Open dripproof **OR** Totally enclosed **OR** Manufacturer's standard, **as directed**.
 - d. Duty: Continuous duty at ambient temperature of **105 deg F (40 deg C)** and at altitude of **3300 feet (1005 m)** above sea level.
 - e. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - f. Phase: One **OR** Polyphase, **as directed**.
 5. Gate Operators: Gate **OR** Equipment base/pad **OR** Pedestal post **OR** In ground, **as directed**, mounted and as follows:
 - a. Hydraulic Swing **OR** Slide, **as directed**, Gate Operators:
 - 1) Duty: Medium **OR** Heavy, **as directed**.
 - 2) Gate Speed: Minimum **45 feet (13.7 m) OR 60 feet (18.2 m)**, **as directed**, per minute.
 - 3) Maximum Gate Weight: **800 lb (363 kg)**.
 - 4) Frequency of Use: 10 cycles per hour **OR** 25 cycles per hour **OR** Continuous duty, **as directed**.
 - 5) Operating Type: Wheel and rail drive with manual release, **as directed**.
 - 6) Hydraulic Fluid: Of viscosity required for gate operation at ambient temperature range for Project.
 - 7) Locking: Hydraulic in both directions.
 - 8) Heater: Manufacturer's standard track and roller heater with thermostatic control.
 - b. Mechanical Swing **OR** Slide, **as directed**, Gate Operators:
 - 1) Duty: Medium **OR** Heavy **OR** Maximum security, **as directed**.

- 2) Gate Speed: Minimum **45 feet (13.7 m)** per minute **OR 60 feet (18.2 m)** per minute **OR** variable speed, **as directed**.
 - 3) Maximum Gate Weight: **800 lb (363 kg)** **OR 3000 lb (1360 kg)**, **as directed**.
 - 4) Frequency of Use: 10 cycles per hour **OR** 25 cycles per hour **OR** 60 cycles per hour **OR** Continuous duty, **as directed**.
 - 5) Operating Type: Crank arm **OR** Enclosed **OR** Wheel and rail drive **OR** Roller chain, **as directed**, with manual release, **as directed**.
 - 6) Drive Type: Enclosed worm gear and chain-and-sprocket, **as directed**, reducers, roller-chain drive.
OR
Drive Type: V-belt and worm gear **OR** chain-and-sprocket, **as directed**, reducers, roller-chain drive.
6. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA ICS 6, Type 1 **OR** NEMA ICS 6, Type 4, **as directed**, enclosure for surface **OR** recessed or flush **OR** equipment base/pad **OR** pedestal, **as directed**, mounting and with space for additional optional equipment. Provide the following remote-control device(s):
- a. Control Station: Keyed, two **OR** three, **as directed**, -position switch, located remotely from gate. Provide two keys per station.
OR
Control Station: Momentary contact, single **OR** three, **as directed**, -button operated, located remotely from gate. Key switch to lock out open and close buttons, **as directed**.
 - 1) Function: Open, stop, **as directed**, and close.
 - b. Card Reader: Functions only when authorized card is presented. Programmable, magnetic multiple **OR** single, **as directed**, -code system, permitting four different access time periods, **as directed**; face-lighted unit fully visible at night, **as directed**.
 - 1) Reader Type: Touch plate **OR** Swipe **OR** Insertion **OR** Proximity, **as directed**.
 - 2) Features: Timed anti-passback **OR** Limited-time usage **OR** Capable of monitoring and auditing gate activity, **as directed**.
 - c. Digital Keypad Entry Unit: Multiple-code capability **OR** Multiple-programmable code capability, **as directed**, of not less than five **OR** 500 **OR** 2500, **as directed**, possible individual codes, consisting of one- to seven **OR** four **OR** five, **as directed**, -digit codes and permitting four different access time periods, **as directed**.
 - 1) Features: Timed anti-passback **OR** Limited-time usage **OR** Capable of monitoring and auditing gate activity, **as directed**.
 - 2) Face-lighted unit with metal-keyed **OR** keyless-membrane, **as directed**, keypad fully visible at night.
 - d. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide one **OR** two, **as directed**, programmable transmitter(s) with multiple-code capability permitting validating or voiding of not less than 1000 **OR** 10,000, **as directed**, codes per channel configured for the following functions:
 - 1) Transmitters: Single **OR** Three, **as directed**, -button operated, with open **OR** open and close, **as directed**, function.
 - 2) Channel Settings: Two **OR** Three **OR** Four, **as directed**, independent channel settings controlling separate receivers for operating more than one gate from each transmitter.
 - e. Telephone Entry System: Hands-free voice-communication system for connection to building telephone system with digital-entry code activation of gate operator and auxiliary keypad entry, **as directed**.
 - 1) System: Designed to be wired to same line with telephone.
OR
Multiunit System: Designed to be wired to a dedicated telephone line, with capacity to access 20 **OR** 100, **as directed**, telephones and with electronic directory, **as directed**.

- f. Vehicle Loop Detector: System including automatic closing timer with adjustable time delay before closing, timer cut-off switch, **as directed**, and loop detector designed to open and close gate **OR** hold gate open until traffic clears **OR** reverse gate, **as directed**. Provide electronic detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator. Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, as recommended in writing by detection system manufacturer for function indicated.
 - 1) Loop: Wire, in size indicated for field assembly, for pave-over **OR** saw-cut with epoxy-grouted, **as directed**, installation.
OR
Loop: Factory preformed in size indicated; style for pave-over **OR** saw-cut with epoxy-grouted, **as directed**, installation.
- g. Vehicle Presence Detector: System including automatic closing timer with adjustable time delay before closing, timer cut-off switch, **as directed**, and presence detector designed to open and close gate **OR** hold gate open until traffic clears **OR** reverse gate, **as directed**. Provide retroreflective **OR** emitter/receiver, **as directed**, detector with adjustable detection zone pattern and sensitivity, designed to detect presence or transit of a vehicle in gate pathway when an infrared beam in zone pattern is interrupted, and to emit a signal activating the gate operator.
7. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
 - a. Action: Reverse gate in both opening and closing cycles and hold until clear of obstruction **OR** Stop gate in opening cycle and reverse gate in closing cycle and hold until clear of obstruction, **as directed**.
 - b. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
 - c. Sensor Edge: Contact-pressure-sensitive safety edge, profile, and sensitivity designed for type of gate and component indicated, in locations as follows. Connect to control circuit using take-up cable reel **OR** self-coiling cable **OR** gate edge transmitter and operator receiver system, **as directed**.
 - 1) Along entire gate leaf leading edge (for swing gates and slide gates).
 - 2) Along entire gate leaf trailing edge (for slide gates).
 - 3) Across entire gate leaf bottom edge (for vehicular swing and slide gates complying with UL 325 or to suit Project; consider retaining for pedestrian gates).
 - 4) Along entire length of gate posts (for slide gates; revise for sensor edge at pinch point post of swing gates).
 - 5) Along entire length of gate guide posts (for Type II Cantilever Slide, Class 1 gates).
 - 6) Where indicated on Drawings.
 - d. Photoelectric/Infrared Sensor: System designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.
8. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
9. Emergency Release Mechanism: Quick-disconnect release of operator drive system of the following type of mechanism, permitting manual operation if operator fails. Design system so control circuit power is disconnected during manual operation.
 - a. Type: Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge **OR** Mechanical device, key, or crank-activated release, **as directed**.
10. Operating Features:
 - a. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability of monitoring and auditing gate activity, **as directed**. Provide unit that is isolated from voltage spikes and surges.
 - b. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
 - c. Master/Slave Capability: Control stations designed and wired for gate pair operation.

- d. Automatic Closing Timer: With adjustable time delay before closing and timer cut-off switch, **as directed**.
 - e. Open Override Circuit: Designed to override closing commands.
 - f. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
 - g. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
 - h. Clock Timer: 24-hour **OR** Seven-day, **as directed**, programmable for regular events.
11. Accessories:
- a. Warning Module: Audio **OR** Visual, **as directed**, constant **OR** strobe, **as directed**, -light alarm sounding three to five seconds in advance of gate operation and continuing until gate stops moving; compliant with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.
 - b. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system.
 - 1) Fail Safe: Gate opens and remains open until power is restored.
 - 2) Fail Secure: Gate cycles on battery power, then fail safe when battery is discharged.
 - c. External electric-powered solenoid **OR** magnetic, **as directed**, lock with delay timer allowing time for lock to release before gate operates.
 - d. Fire **OR** Postal, **as directed**, box.
 - e. Fire strobe **OR** siren, **as directed**, sensor.
 - f. Intercom System: As required to meet Project requirements.
 - g. Instructional, Safety, and Warning Labels and Signs: According to UL 325 **OR** Manufacturer's standard for components and features specified **OR** As indicated on Drawings, **as directed**.
 - h. Equipment Bases/Pads: Precast concrete, depth not less than **12 inches (305 mm)**, dimensioned and reinforced according to gate operator component manufacturer's written instructions and as indicated on Drawings.
- J. Grout And Anchoring Cement
- 1. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout, recommended in writing by manufacturer, for exterior applications.
 - 2. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended in writing by manufacturer for exterior applications.
- K. Fence Grounding
- 1. Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - a. Material above Finished Grade: Copper **OR** Aluminum, **as directed**.
 - b. Material on or below Finished Grade: Copper.
 - c. Bonding Jumpers: Braided copper tape, **1 inch (25.4 mm)** wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
 - 2. Connectors and Grounding Rods: Listed in UL 467.
 - a. Connectors for Below-Grade Use: Exothermic welded type.
 - b. Grounding Rods: Copper-clad steel, **5/8 by 96 inches (16 by 2440 mm)**.
- L. Soil Sterilization
- 1. Soil Sterilant: Type approved by authorities having jurisdiction.
 - 2. Polyethylene Sheeting: **6 mils (0.15 mm)** thick, black, and serving as soil separation fabric.
 - 3. Stone Ground Cover: **3/4- to 2-inch (19- to 51-mm)** crushed stone or washed gravel.

1.3 EXECUTION

A. Examination

1. Examine areas and conditions, with Installer present, for compliance with requirements for a verified survey of property lines and legal boundaries, **as directed**, site clearing, earthwork, pavement work, and other conditions affecting performance of the Work.
 - a. Do not begin installation before final grading is completed unless otherwise permitted by the Owner.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet (152 m)** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

C. Installation, General

1. Install chain-link fencing to comply with ASTM F 567 **OR** ASTM F 1916, **as directed**, and more stringent requirements specified.
 - a. Install fencing on established boundary lines inside property line.

D. Chain-Link Fence Installation

1. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed soil.
2. Post Setting: Set posts in concrete **OR** with mechanical anchors **OR** by mechanically driving into soil, **as directed**, at indicated spacing into firm, undisturbed soil.
 - a. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - b. Concrete Fill: Place concrete around posts to dimensions indicated and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - 1) Exposed Concrete: Extend **2 inches (51 mm)** above grade or to same elevation as concrete grade beam, **as directed**; shape and smooth to shed water.
 - 2) Concealed Concrete: Top **2 inches (51 mm)** below grade as indicated on Drawings to allow covering with surface material.
 - 3) Posts Set into Concrete in Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout **OR** anchoring cement, **as directed**, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
 - 4) Posts Set into Voids in Concrete: Form or core drill holes not less than **5 inches (127 mm)** deep and **3/4 inch (19 mm)** larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout **OR** anchoring cement, **as directed**, mixed and placed to comply with anchoring material manufacturer's written instructions, and finished sloped to drain water away from post.
3. Terminal Posts: Locate and install terminal end, corner, and gate posts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of 15 degrees or more, at any abrupt change in grade, and at intervals not greater than **500 feet (152 m)**. For runs exceeding **500 feet (152 m)**, space pull posts an equal distance between corner or end posts.
4. Line Posts: Space line posts uniformly at **96 inches (2440 mm)** **OR** **10 feet (3 m)**, **as directed**, o.c.
5. Post Bracing and Intermediate Rails: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Diagonally brace terminal posts to adjacent line posts with truss rods and turnbuckles. Install braces at end and gate posts and at both sides of corner and pull posts.

- a. Locate horizontal braces at midheight of fabric **72 inches (1830 mm)** or higher, on fences with top rail and at two-third fabric height on fences without top rail. Install so posts are plumb when diagonal rod is under proper tension.
 6. Barbed Wire Arms: Bolt or rivet to top of post. Angle single arms away from approach side of fence.
 7. Tension Wire: Install according to ASTM F 567 and ASTM F 1916, maintaining plumb position and alignment of fencing. Pull wire taut, without sags. Fasten fabric to tension wire with **0.120-inch- (3.05-mm-)** diameter hog rings of same material and finish as fabric wire, spaced a maximum of **24 inches (610 mm)** o.c. Install tension wire in locations indicated before stretching fabric. Provide horizontal tension wire at the following locations:
 - a. Extended along top and bottom, **as directed**, of fence fabric. Install top tension wire through post cap loops. Install bottom tension wire within **6 inches (152 mm)** of bottom of fabric and tie to each post with not less than same diameter and type of wire.
 - b. Extended along top of barbed wire arms **OR** extended posts, **as directed**, and top of fence fabric for supporting barbed tape.
 - c. As indicated.
 8. Top Rail: Install according to ASTM F 567, maintaining plumb position and alignment of fencing. Run rail continuously through line post caps, bending to radius for curved runs and terminating into rail end attached to posts or post caps fabricated to receive rail at terminal posts. Provide expansion couplings as recommended by fencing manufacturer.
 9. Bottom Rails: Install and secure to posts with fittings; anchor rail at midspan to concrete footing **OR** continuous grade beam, **as directed**.
 10. Chain-Link Fabric: Apply fabric on the approach side of fence, inside of enclosing framework. Pull fabric taut and tie to posts, rails, and tension wires. Anchor to framework so fabric remains under tension after pulling force is released.
 - a. Leave **1-1/2 inches (38 mm)** **OR** **2 inches (51 mm)**, **as directed**, between finish grade or surface and bottom selvage unless otherwise indicated.
 - b. Where indicated, bury an **18-inch- (457-mm-)** wide, polymer-coated fabric **12 inches (305 mm)** into trench; overlap above-grade fabric **6 inches (152 mm)** and secure to bottom rail with tie wires. Backfill and compact trench.
 - c. Overlapping Fabric: At or between post or rail according to ASTM F 1916, with wire ties or steel strap method.
 11. Tension or Stretcher Bars: Thread through fabric and secure to end, corner, pull, and gate posts with tension bands spaced not more than **15 inches (381 mm)** o.c.
 12. Tie Wires: Power-fastened or manually fastened ties configured to wrap a full 360 degrees around rail or post and a minimum of one complete diamond of fabric. Twist ends one and one-half machine twists or three full manual twists, and cut off protruding ends to preclude untwisting by hand.
 - a. Maximum Spacing: Tie fabric to line posts at **12 inches (305 mm)** o.c. and to braces at **24 inches (610 mm)** o.c.
 13. Power-Driven Fasteners: Fasten **0.192- or 0.148-inch (4.87- or 3.76-mm)** wire fabric with **2- or 1-inch (51- or 25.4-mm)** mesh size.
 - a. Fasten fabric to line posts **12 inches (305 mm)** o.c. and to braces **24 inches (610 mm)** o.c.
 14. Fasteners: Install nuts for tension bands and carriage bolts on the side of fence opposite the fabric side. Peen ends of bolts or score threads to prevent removal of nuts, **as directed**.
 15. Barbed Wire: Install barbed wire uniformly spaced as indicated on Drawings **OR** as directed. Pull wire taut, install securely to extension arms, and secure to end post or terminal arms.
 16. Barbed Tape: Comply with ASTM F 1911. Install barbed tape uniformly in configurations indicated and fasten securely to prevent movement or displacement.
 17. Ground Barrier Stakes: Stake coils at **10 feet (3 m)** o.c., driven to full depth.
- E. Gate Installation
1. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-

resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.

F. Gate Operator Installation

1. General: Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
2. Excavation for Support Posts **OR** Pedestals **OR** Equipment Bases/Pads, **as directed**: Hand-excavate holes for bases/pads, in firm, undisturbed soil to dimensions and depths and at locations as required by gate operator component manufacturer's written instructions and as indicated.
3. Vehicle Loop Detector System: Cut grooves in pavement and bury **OR** Bury, **as directed**, and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.
4. Comply with NFPA 70 and manufacturer's written instructions for grounding of electric-powered motors, controls, and other devices.

G. Grounding And Bonding

1. Fence Grounding: Install at maximum intervals of **100 feet (30 m)** except as follows:
 - a. Gates and Other Fence Openings: Ground fence on each side of opening.
 - 1) Bond metal gates to gate posts.
 - 2) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least **18 inches (457 mm)** below finished grade.
 2. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of **150 feet (45 m)** on each side of crossing.
 3. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
 4. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is **6 inches (152 mm)** below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at grounding location, including the following:
 - a. Make grounding connections to each barbed wire strand with wire-to-wire connectors designed for this purpose.
 - b. Make grounding connections to each barbed tape coil with connectors designed for this purpose.
 5. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
 6. Connections: Make connections to minimize possibility of galvanic action or electrolysis. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - b. Make connections with clean, bare metal at points of contact.
 - c. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
 7. Bonding to Lightning Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning protection down conductor or lightning protection grounding conductor complying with NFPA 780.

H. Soil Sterilization

1. General: Comply with ASTM F 1916.
2. Apply sterilant after completing grounding and other below-grade electrical work along fence line and within zone between double-row chain-link fence installation.

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3. Install soil separation fabric continuously between double-row chain-link fence installation, overlapping punctures and joints **6 inches (152 mm)**.
4. Lay continuous **3-inch- (75-mm-)** deep bed of crushed stone or washed gravel over soil separation fabric.
5. Extend soil sterilization **4 feet (1.2 m) OR 6 feet (1.8 m)**, **as directed**, beyond outside and inside of fence.

I. Field Quality Control

1. Fabric Testing: Test fabric tension according to ASTM F 1916.
2. Fence Post Rigidity Testing: Test line posts for rigidity according to ASTM F 1916.
3. Grounding-Resistance Testing: Engage a qualified testing agency to perform tests and inspections.
 - a. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance no fewer than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
 - b. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify the Owner promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
 - c. Report: Prepare test reports, certified by testing agency, of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.

J. Adjusting

1. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.
2. Automatic Gate Operator: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, alarms, **as directed**, and limit switches.
 - a. Hydraulic Operator: Purge operating system, adjust pressure and fluid levels, and check for leaks.
 - b. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 - c. Test and adjust controls, alarms, **as directed**, and safeties. Replace damaged and malfunctioning controls and equipment.
3. Lubricate hardware, gate operator, **as directed**, and other moving parts.

K. Demonstration

1. Train the Owner's personnel to adjust, operate, and maintain high-security chain-link fences and gates.

END OF SECTION 32 31 13 13a

Task	Specification	Specification Description
32 31 13 13	01 22 16 00	No Specification Required
32 31 13 13	31 13 16 00	Tree Protection And Trimming

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SECTION 32 31 19 00 - ORNAMENTAL METAL FENCES AND GATES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of ornamental metal fences and gates. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Decorative metallic-coated steel tubular picket fences.
 - b. Decorative metallic-coated steel wire fences.
 - c. Decorative metallic-coated steel security fences.
 - d. Decorative steel fences.
 - e. Decorative aluminum fences.
 - f. Swing gates.
 - g. Horizontal-slide gates.
 - h. Gate operators, including controls.

C. Performance Requirements

1. Lightning-Protection System: Maximum grounding-resistance value of 25 ohms under normal dry conditions.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: For gates. Include plans, elevations, sections, details, and attachments to other work.
 - a. Wiring Diagrams: For power, signal, and control wiring.
3. Samples: For each fence material and for each color specified.
 - a. Provide Samples **12 inches (300 mm)** in length for linear materials.
 - b. Provide Samples **12 inches (300 mm)** square for wire mesh, bar grating, and sheet or plate materials.
4. Welding certificates.
5. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for decorative metallic-coated steel tubular picket fences, including finish, indicating compliance with referenced standard and other specified requirements.
6. Maintenance Data: For gate operators to include in maintenance manuals.

E. Quality Assurance

1. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel **OR** AWS D1.2/D1.2M, "Structural Welding Code - Aluminum", **as directed**.
2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. UL Standard: Provide gate operators that comply with UL 325.
4. Emergency Access Requirements: Comply with requirements of authorities having jurisdiction for automatic gate operators on gates that must provide emergency access.
5. Preinstallation Conference: Conduct conference at Project site.

1.2 PRODUCTS

A. Aluminum

1. Aluminum, General: Provide alloys and tempers with not less than the strength and durability properties of alloy and temper designated in paragraphs below for each aluminum form required.
2. Extrusions: **ASTM B 221 (ASTM B 221M)**, Alloy 6063-T5.
3. Tubing: ASTM B 429, Alloy 6063-T6.
4. Plate and Sheet: **ASTM B 209 (ASTM B 209M)**, Alloy 6061-T6.
5. Die and Hand Forgings: **ASTM B 247 (ASTM B 247M)**, Alloy 6061-T6.
6. Castings: ASTM B 26/B 26M, Alloy A356.0-T6.

B. Steel And Iron

1. Plates, Shapes, and Bars: ASTM A 36/A 36M.
2. Bars (Pickets): Hot-rolled, carbon steel complying with ASTM A 29/A 29M, Grade 1010.
3. Tubing: ASTM A 500, cold formed steel tubing.
4. Bar Grating: NAAMM MBG 531.
 - a. Bars: Hot-rolled steel strip, ASTM A 1011/A 1011M, Commercial Steel, Type B.
 - b. Wire Rods: **ASTM A 510 (ASTM A 510M)**.
5. Uncoated Steel Sheet: Hot-rolled steel sheet, ASTM A 1011/A 1011M, Structural Steel, **Grade 45 (Grade 310)** or cold-rolled steel sheet, ASTM A 1008/A 1008M, Structural Steel, **Grade 50 (Grade 340)**.
6. Galvanized-Steel Sheet: ASTM A 653/A 653M, structural quality, **Grade 50 (Grade 340)**, with **G90 (Z275) OR G60 (Z180)**, **as directed**, coating.
7. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, structural quality, **Grade 50 (Grade 340)**, with **AZ60 (AZM180)** coating.
8. Castings: Either gray or malleable iron unless otherwise indicated.
 - a. Gray Iron: ASTM A 48/A 48M, Class 30.
 - b. Malleable Iron: ASTM A 47/A 47M.

C. Coating Materials

1. Shop Primers for Steel: Provide primers that comply with Division 09 Section(s) "Exterior Painting" OR "High-performance Coatings", **as directed**.
2. Epoxy Zinc-Rich Primer for Steel: Complying with MPI #20 and compatible with coating specified to be applied over it.
 - a. Use primer with a VOC content of 420 g/L **OR** 400 g/L **OR** 340 g/L, **as directed**, or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Epoxy Primer for Galvanized Steel: Complying with MPI #101 and compatible with coating specified to be applied over it.
 - a. Use primer with a VOC content of 420 g/L **OR** 400 g/L **OR** 300 g/L, **as directed**, or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
4. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
 - a. Use product with a VOC content of 420 g/L **OR** 400 g/L **OR** 250 g/L, **as directed**, or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
5. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
 - a. Use product with a VOC content of 420 g/L **OR** 400 g/L **OR** 250 g/L, **as directed**, or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Miscellaneous Materials

1. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - a. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for strength and compatibility in fabricated items.
2. Concrete: Normal-weight, air-entrained, ready-mix concrete complying with requirements in Division 03 Section "Miscellaneous Cast-in-place Applications) Concrete" with a minimum 28-day compressive strength of **3000 psi (20 MPa)**, **3-inch (75-mm)** slump, and **1-inch (25-mm)**

- maximum aggregate size or dry, packaged, normal-weight concrete mix complying with ASTM C 387 mixed with potable water according to manufacturer's written instructions.
3. Nonshrink Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107 and specifically recommended by manufacturer for exterior applications.
- E. Grounding Materials
1. Grounding Conductors: Bare, solid wire for No. 6 AWG and smaller; stranded wire for No. 4 AWG and larger.
 - a. Material above Finished Grade: Copper **OR** Aluminum, **as directed**.
 - b. Material on or below Finished Grade: Copper.
 - c. Bonding Jumpers: Braided copper tape, **1 inch (25 mm)** wide, woven of No. 30 AWG bare copper wire, terminated with copper ferrules.
 2. Grounding Connectors and Grounding Rods: Comply with UL 467.
 - a. Connectors for Below-Grade Use: Exothermic-welded type.
 - b. Grounding Rods: Copper-clad steel.
 - 1) Size: **5/8 by 96 inches (16 by 2440 mm)**.
- F. Decorative Metallic-Coated Steel Tubular Picket Fences
1. Decorative Metallic-Coated Steel Tubular Picket Fences: Comply with ASTM F 2408, for residential **OR** light industrial (commercial) **OR** industrial, **as directed**, application (class) unless otherwise indicated.
 2. Metallic-Coated Steel Sheet: Galvanized-steel sheet or aluminum-zinc alloy-coated steel sheet.
 3. Interior surface of tubes formed from uncoated steel sheet shall be hot-dip zinc coated same as exterior or coated with zinc-rich thermosetting coating to comply with ASTM F 2408.
 4. Posts:
 - a. End and Corner Posts: Square tubes **2-1/2 by 2-1/2 inches (64 by 64 mm)** **OR** **3 by 3 inches (76 by 76 mm)**, **as directed**, formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
 - b. Swing Gate Posts:
 - 1) Square tubes **3 by 3 inches (76 by 76 mm)** formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
OR
Square steel tubing **3 by 3 inches (76 by 76 mm)** **OR** **4 by 4 inches (102 by 102 mm)**, **as directed**, with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized.
 - c. Horizontal-Slide Gate Post, Openings up to **12 Feet (3.7 m)**: Square steel tubing **3 by 3 inches (76 by 76 mm)** **OR** **4 by 4 inches (102 by 102 mm)**, **as directed**, with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized.
 - d. Horizontal-Slide Gate Post, Openings Wider Than **12 Feet (3.7 m)**: Square steel tubing **4 by 4 inches (102 by 102 mm)** with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized.
 - e. Guide Posts for Class 1 Horizontal-Slide Gates:
 - 1) Square tubes **3 by 3 inches (76 by 76 mm)** formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication; installed adjacent to gate post to permit gate to slide in space between.
OR
Square steel tubing **3 by 3 inches (76 by 76 mm)** **OR** **4 by 4 inches (102 by 102 mm)**, **as directed**, with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized; installed adjacent to gate post to permit gate to slide in space between.
 5. Post Caps: Formed from steel sheet and hot-dip galvanized after forming **OR** UV-resistant plastic **OR** Aluminum castings **OR** Aluminum castings with round ball finials, **as directed**.
 6. Rails: Square tubes **OR** Double-wall channels, **as directed**.
 - a. Size: **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **1-3/4 by 1-3/4 inches (45 by 45 mm)**, **as directed**.

- b. Metal and Thickness: **0.079-inch (2.01-mm)** nominal-thickness, metallic-coated steel sheet or **0.075-inch (1.90-mm)** nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.
 7. Pickets: Square tubes.
 - a. Terminate tops of pickets at top rail for flush top appearance **OR** Extend pickets beyond top rail as indicated and terminate with UV-resistant plastic caps **OR** Extend pickets beyond top rail as indicated and terminate with galvanized-steel caps **OR** Extend pickets beyond top rail as indicated and press flat and trim to produce spear point shape, **as directed**.
 - b. Picket Spacing: **6 inches (152.4 mm)** **OR** **4 inches (101.6 mm)** **OR** **1-3/4 inches (44 mm)**, **as directed**, clear, maximum.
 8. Fasteners: Manufacturer's standard concealed fastening system.
 9. Fasteners: Manufacturer's standard tamperproof, **as directed**, corrosion-resistant, color-coated fasteners matching fence components, with resilient polymer washers, **as directed**.
 10. Galvanizing: For components indicated to be galvanized and for which galvanized coating is not specified in ASTM F 2408, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
 11. Finish: Organic coating complying with requirements in ASTM F 2408 **OR** Powder coating, **as directed**.
- G. Decorative Metallic-Coated Steel Wire Fences
 1. Metallic-Coated Steel Wire: Welded-wire fence fabric, hot-dip galvanized after fabrication. Weight of zinc coating shall be not less than **1.0 oz./sq. ft. (305 g/sq. m)**.
 - a. Spacing of Vertical Wires: **1-3/4 inches (44 mm)** **OR** **2 inches (51 mm)** **OR** **3-1/2 inches (89 mm)** **OR** **4 inches (102 mm)** **OR** As indicated, **as directed**.
 - b. Vertical Wire Size: **0.187 inch (4.76 mm)** **OR** **0.192 inch (4.88 mm)** **OR** **0.225 inch (5.72 mm)** **OR** **0.25 inch (6.35 mm)** **OR** **0.262 inch (6.67 mm)**, **as directed**.
 - c. Spacing of Horizontal Wires: **1-3/4 inches (44 mm)** **OR** **2 inches (51 mm)** **OR** **4 inches (102 mm)** **OR** **8 inches (203 mm)** **OR** As indicated, **as directed**.
 - d. Horizontal Wire Size: **0.187 inch (4.76 mm)** **OR** **0.192 inch (4.88 mm)** **OR** **0.225 inch (5.72 mm)** **OR** **0.25 inch (6.35 mm)** **OR** **0.312 inch (7.94 mm)**, **as directed**.
 2. Metallic-Coated Steel Sheet: Galvanized-steel sheet or aluminum-zinc alloy-coated steel sheet.
 3. Interior surface of tubes formed from uncoated steel sheet shall be hot-dip zinc coated same as exterior or coated with zinc-rich thermosetting coating to comply with ASTM F 2408.
 4. Posts:
 - a. Line Posts: Square tubes **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)** **OR** **3 by 3 inches (76 by 76 mm)**, **as directed**, formed from **0.064-inch (1.63-mm)** **OR** **0.079-inch (2.01-mm)** **OR** **0.108-inch (2.74-mm)**, **as directed**, nominal-thickness, metallic-coated steel sheet or formed from **0.060-inch (1.52-mm)** **OR** **0.075-inch (1.90-mm)** **OR** **0.105-inch (2.66-mm)**, **as directed**, nominal-thickness steel sheet and hot-dip galvanized after fabrication.
 - b. End and Corner Posts: Square tubes **2-1/2 by 2-1/2 inches (64 by 64 mm)** **OR** **3 by 3 inches (76 by 76 mm)**, **as directed**, formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
 - c. Swing Gate Posts:
 - 1) Square tubes **3 by 3 inches (76 by 76 mm)** formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
OR
Square steel tubing **3 by 3 inches (76 by 76 mm)** **OR** **4 by 4 inches (102 by 102 mm)**, **as directed**, with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized.
 - d. Horizontal-Slide Gate Post, Openings up to **12 Feet (3.7 m)**: Square steel tubing **3 by 3 inches (76 by 76 mm)** **OR** **4 by 4 inches (102 by 102 mm)**, **as directed**, with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized.

- e. Horizontal-Slide Gate Post, Openings Wider Than **12 Feet (3.7 m)**: Square steel tubing **4 by 4 inches (102 by 102 mm)** with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized.
 - f. Guide Posts for Class 1 Horizontal-Slide Gates:
 - 1) Square tubes **3 by 3 inches (76 by 76 mm)** formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication; installed adjacent to gate post to permit gate to slide in space between.
OR
Square steel tubing **3 by 3 inches (76 by 76 mm)** **OR 4 by 4 inches (102 by 102 mm)**, **as directed**, with **3/16-inch (4.76-mm)** wall thickness, hot-dip galvanized; installed adjacent to gate post to permit gate to slide in space between.
 5. Post Caps: Formed from steel sheet and hot-dip galvanized after forming **OR** UV-resistant plastic **OR** Aluminum castings **OR** Aluminum castings with round ball finials, **as directed**.
 6. Rails: Square tubes.
 - a. Size: **1-3/16 by 1-1/2 inches (30 by 38 mm)** **OR 1-3/8 by 1-1/2 inches (35 by 38 mm)** **OR 1-1/2 by 1-1/2 inches (38 by 38 mm)**, **as directed**.
 - b. Metal and Thickness: **0.064-inch (1.63-mm)** **OR 0.079-inch (2.01-mm)**, **as directed**, nominal-thickness, metallic-coated steel sheet or **0.060-inch (1.52-mm)** **OR 0.075-inch (1.90-mm)**, **as directed**, nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.
 7. Fasteners: Manufacturer's standard tamperproof, **as directed**, corrosion-resistant, color-coated fasteners matching fence components with resilient polymer washers or clips, **as directed**.
 8. Galvanizing: For components indicated to be galvanized and for which galvanized coating is not specified, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
 9. Finish: Organic coating complying with requirements in ASTM F 2408 **OR** Powder coating, **as directed**.
- H. Decorative Metallic-Coated Steel Security Fences
1. Posts: **1-3/4-by-4-inch (45-by-102-mm)** double-thickness, I-shaped sections.
 - a. Metal and Thickness: **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or **0.105-inch (2.66-mm)** nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.
 2. Post Caps: Aluminum castings.
 3. Rails: **2-by-2-1/2-inch (50-by-64-mm)** pentagon-shaped box channel designed to shed water and to enclose wire rope reinforcement.
 - a. Metal and Thickness: **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or **0.105-inch (2.66-mm)** nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.
 - b. Wire Rope Reinforcement: **3/4-inch (19-mm)** zinc-coated steel wire rope.
 4. Pickets: **3/4-by-2-3/4-inch (19-by-70-mm)** M-shaped pales.
 - a. Metal and Thickness: **0.079-inch (2.01-mm)** nominal-thickness, metallic-coated steel sheet or **0.075-inch (1.90-mm)** nominal-thickness, uncoated steel sheet, hot-dip galvanized after fabrication.
 - b. Extend pickets beyond top rail as indicated and terminate with rounded edge **OR** cut and split to form three points, **as directed**.
 - c. Picket Spacing: **6 inches (152.4 mm)** o.c.
 5. Fasteners: Stainless-steel carriage bolts with tamperproof nuts.
 6. Galvanizing: For components indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M unless otherwise indicated. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
 7. Finish: Powder coating.
- I. Decorative Steel Fences
1. Decorative Steel Fences: Fences made from steel tubing bars, **as directed**, and shapes, hot-dip galvanized, **as directed**.

2. Posts: Square steel tubing.
 - a. Line Posts: **2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm), as directed**, with **1/8-inch (3.2-mm) OR 3/16-inch (4.76-mm), as directed**, wall thickness.
 - b. End and Corner Posts: **2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm), as directed**, with **1/8-inch (3.2-mm) OR 3/16-inch (4.76-mm), as directed**, wall thickness.
 - c. Swing Gate Posts: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm), as directed**, with **3/16-inch (4.76-mm)** wall thickness.
 - d. Horizontal-Slide Gate Post, Openings up to **12 Feet (3.7 m)**: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm), as directed**, with **3/16-inch (4.76-mm)** wall thickness.
 - e. Horizontal-Slide Gate Post, Openings Wider Than **12 Feet (3.7 m)**: **4 by 4 inches (102 by 102 mm)** with **3/16-inch (4.76-mm)** wall thickness.
 - f. Guide Posts for Class 1 Horizontal-Slide Gates: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm), as directed**, with **3/16-inch (4.76-mm)** wall thickness; installed adjacent to gate post to permit gate to slide in space between.
3. Post Caps: Formed from steel sheet **OR** Formed from steel sheet and hot-dip galvanized after forming **OR** Aluminum castings **OR** Aluminum castings with round ball finials, **as directed**.
4. Rails:
 - a. Steel Tube Rails: Square steel tubing **2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm), as directed**, with **1/8-inch (3.2-mm)** wall thickness.
 - b. Steel Channel Rails: Steel channels **2 by 1 inch (50 by 25 mm) OR 1-1/2 by 3/4 inch (38 by 19 mm) OR 1-1/2 by 1/2 inch (38 by 13 mm), as directed**.
5. Pickets: **1/2-inch- (13-mm-) square steel bars OR 3/4-inch- (19-mm-) square steel bars OR** Decorative steel bars of pattern and size indicated **OR 5/8 inch (16 mm) square by 0.065-inch (1.65-mm) steel tubes OR 5/8 inch (16 mm) square by 0.083-inch (2.11-mm) steel tubes OR 3/4 inch (19 mm) square by 0.065-inch (1.65-mm) steel tubes OR 3/4 inch (19 mm) square by 0.083-inch (2.11-mm) steel tubes OR 1 inch (25 mm) square by 0.065-inch (1.65-mm) steel tubes OR 1 inch (25 mm) square by 0.083-inch (2.11-mm) steel tubes, as directed**.
 - a. Terminate tops of pickets at top rail for flush top appearance **OR** Extend pickets beyond top rail as indicated and mill ends to pyramid shaped points **OR** Extend pickets beyond top rail as indicated and press flat and trim to produce spear point shape **OR** Extend pickets beyond top rail as indicated and cap with metal spear point finial **OR** Extend pickets beyond top rail as indicated and cap with metal tripoint finial, **as directed**.
 - b. Picket Spacing: **6 inches (152.4 mm) OR 4 inches (101.6 mm) OR 1-3/4 inches (44 mm), as directed**, clear, maximum.
 - c. Treillage: Provide iron castings of pattern indicated between each pair of pickets.
6. Infill: Forge-welded steel bar grating.
 - a. Perimeter Bars: Steel flat bars **1 by 1/8 inch (25 by 3.2 mm)**.
 - b. Vertical Main Bars: Steel flat bars **1 by 1/8 inch (25 by 3.2 mm) OR 1-3/16 by 5/32 inch (30 by 4 mm), as directed**.
 - c. Vertical Main Bar Spacing: **1-21/32 inches (42 mm) OR 1-7/8 inches (48 mm) OR 2-7/16 inches (62 mm), as directed**, o.c.
 - d. Horizontal Cross Rods: **3/16-inch- (4.8-mm-) OR 1/4-inch- (6.4-mm-), as directed**, diameter, steel rods.
 - e. Horizontal Cross Rod Spacing: **1-3/4 inches (45 mm) OR 2-19/32 inches (66 mm) OR 5-3/16 inches (132 mm), as directed**, o.c.
7. Infill: Custom design as indicated on Drawings.
 - a. Bars: **1/2-inch- (12.7 -mm-) square steel bars OR 3/4-inch- (19-mm-) square steel bars OR 1/2-inch- (12.7 -mm-) diameter, round steel bars OR 3/4-inch- (19-mm-) diameter, round steel bars OR 1-by-1/8-inch (25-by-3.2-mm) steel flat bars OR 1-by-1/4-inch (25-by-6.4-mm) steel flat bars OR 1-by-1/2-inch (25-by-12.7 -mm) steel flat bars, as directed**, unless otherwise indicated.

- b. Square Tubes: Square steel tubing **2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, with **1/8-inch (3.2-mm)** wall thickness unless otherwise indicated.
 - c. Round Tubes: **1-inch- (25-mm-) OR 1-1/2-inch- (38-mm-) OR 2-inch- (50-mm-) OR 2-1/2-inch- (64-mm-)**, **as directed**, diameter, round steel tubing with **1/8-inch (3.2-mm)** wall thickness unless otherwise indicated.
 - d. Steel Plate: **1/8 inch (3.2 mm) OR 3/16 inch (4.8 mm) OR 1/4 inch (6.4 mm)**, **as directed**, thick unless otherwise indicated.
 - e. Perforated Metal Sheet: Uncoated steel sheet, perforated as indicated, **0.060-inch (1.52-mm) OR 0.075-inch (1.90-mm) OR 0.105-inch (2.66-mm)**, **as directed**, nominal thickness.
8. Fasteners: Stainless-steel carriage bolts and tamperproof, **as directed**, nuts.
9. Fabrication:
- a. Assemble fences into sections by welding pickets to rails.
 - 1) Fabricate sections with clips welded to rails for fastening to posts in field.
 - 2) Drill posts and clips for fasteners before finishing to maximum extent possible.
 - b. Fabricate bar grating infill into sections of size indicated.
 - 1) Fabricate rails with clips welded to rails for fastening to posts in field.
 - 2) Drill posts, clips, **as directed**, and bar grating for fasteners before finishing to maximum extent possible.
10. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay **OR** Finish #3 - partially dressed weld with splatter removed **OR** Finish #4 - good-quality, uniform undressed weld with minimal splatter, **as directed**.
11. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
- a. Hot-dip galvanize posts and rails, **as directed**.
 - b. Hot-dip galvanize rail and picket assemblies after fabrication.
 - c. Hot-dip galvanize bar grating infill after fabrication.
 - d. Hot-dip galvanize custom-design rail and infill assemblies after fabrication.
12. Finish for Bar Grating Infill: Powder coating.
13. Finish for Steel Items Other than Bar Grating Infill: Primed **OR** Shop painted **OR** High-performance coating, **as directed**.
14. Finish for Metallic-Coated Steel Items Other than Bar Grating Infill: High-performance coating **OR** Galvanized finish, **as directed**.
- J. Decorative Aluminum Fences
- 1. Decorative Aluminum Fences: Fences made from aluminum extrusions.
 - 2. Posts: Square extruded tubes.
 - a. Line Posts: **2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm)**, **as directed**, with **0.062-inch (1.57-mm) OR 0.080-inch (2.03-mm) OR 0.093-inch (2.36-mm) OR 0.100-inch (2.54-mm) OR 0.125-inch (3.18-mm)**, **as directed**, wall thickness.
 - b. End and Corner Posts: **2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm)**, **as directed**, with **0.062-inch (1.57-mm) OR 0.080-inch (2.03-mm) OR 0.093-inch (2.36-mm) OR 0.100-inch (2.54-mm) OR 0.125-inch (3.18-mm)**, **as directed**, wall thickness.
 - c. Swing Gate Posts: **2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm)**, **as directed**, with **0.125-inch (3.18-mm) OR 0.250-inch (6.35-mm)**, **as directed**, wall thickness.
 - d. Horizontal-Slide Gate Post, Openings up to **12 Feet (3.7 m)**: **2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm)**, **as directed**, with **0.125-inch (3.18-mm) OR 0.250-inch (6.35-mm)**, **as directed**, wall thickness.
 - e. Horizontal-Slide Gate Post, Openings Wider Than **12 Feet (3.7 m)**: **3 by 3 inches (76 by 76 mm) OR 4 by 4 inches (102 by 102 mm) OR 6 by 6 inches (152 by 152 mm)**, **as directed**, with **0.125-inch (3.18-mm) OR 0.250-inch (6.35-mm)**, **as directed**, wall thickness.

- f. Guide Posts for Class 1 Horizontal-Slide Gates: **2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm) OR 3 by 3 inches (76 by 76 mm), as directed**, with **0.062-inch (1.57-mm) OR 0.093-inch (2.36-mm) OR 0.125-inch (3.18-mm), as directed**, wall thickness; installed adjacent to gate post to permit gate to slide in space between.
 3. Post Caps: Aluminum castings that cover entire top of posts **OR** project at least **1/4 inch (6 mm)** beyond posts, **as directed**, with round ball finial, **as directed**.
 4. Rails: Extruded-aluminum channels, **1-1/2 by 1-1/2 inches (38 by 38 mm)**, with **0.100-inch- (2.54-mm-)** thick sidewalls and **0.070-inch- (1.78-mm-)** thick top **OR 1 by 1-1/2 inches (25 by 38 mm)**, with **0.082-inch- (2.08-mm-)** thick sidewalls and **0.055-inch- (1.40-mm-)** thick top **OR 1-1/4 by 1-1/4 inches (32 by 32 mm)**, with **0.078-inch- (1.98-mm-)** thick sidewalls and **0.062-inch- (1.57-mm-)** thick top **OR 1 by 1 inch (25 by 25 mm)**, with **0.080-inch- (2.03-mm-)** thick sidewalls and **0.055-inch- (1.40-mm-)** thick top **OR 1 by 1 inch (25 by 25 mm)**, with **0.078-inch- (1.98-mm-)** thick sidewalls and **0.062-inch- (1.57-mm-)** thick top, **as directed**.
 5. Pickets: Extruded-aluminum tubes, **1 inch (25 mm)** square, with **0.062-inch (1.57-mm)** wall thickness **OR 1 inch (25 mm)** square, with **0.060-inch (1.52-mm)** wall thickness **OR 3/4 inch (19 mm)** square, with **0.050-inch (1.27-mm)** wall thickness **OR 1 by 5/8 inch (25 by 16 mm)**, with **0.050-inch (1.27-mm)** wall thickness **OR 5/8 inch (16 mm)** square, with **0.050-inch (1.27-mm)** wall thickness, **as directed**.
 - a. Terminate tops of pickets at top rail for flush top appearance **OR** Extend pickets beyond top rail as indicated and terminate with UV-resistant plastic caps **OR** Extend pickets beyond top rail as indicated and terminate with cast-aluminum caps **OR** Extend pickets beyond top rail as indicated and press flat and trim to produce spear point shape **OR** Extend pickets beyond top rail as indicated and terminate with cast-aluminum spear point finial **OR** Extend pickets beyond top rail as indicated and terminate with cast-aluminum tripoint finial, **as directed**.
 - b. Picket Spacing: **6 inches (152.4 mm) OR 4 inches (101.6 mm) OR 1-3/4 inches (44 mm), as directed**, clear, maximum.
 6. Fasteners:
 - a. Manufacturer's standard concealed fastening system.
OR
Manufacturer's standard tamperproof, **as directed**, corrosion-resistant, color-coated fasteners matching fence components with resilient polymer washers, **as directed**.
 7. Fabrication: Assemble fences into sections by welding **OR** fastening, **as directed**, pickets to rails.
 - a. Fabricate sections with clips welded to rails for fastening to posts in field.
 - b. Drill clips for fasteners before finishing.
 8. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay **OR** Finish #3 - partially dressed weld with splatter removed **OR** Finish #4 - good-quality, uniform undressed weld with minimal splatter, **as directed**.
 9. Finish: Baked enamel or powder coating.
- K. Swing Gates
1. Gate Configuration: Single leaf **OR** Double leaf, **unless directed otherwise**.
 2. Gate Frame Height: **72 inches (1830 mm), unless directed otherwise**.
 3. Gate Opening Width: **36 inches (914 mm), unless directed otherwise**.
 4. Galvanized-Steel Frames and Bracing: Fabricate members from square tubes **1-1/2 by 1-1/2 inches (38 by 38 mm) OR 1-3/4 by 1-3/4 inches (45 by 45 mm) OR 2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm), as directed**, formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
 5. Steel Frames and Bracing: Fabricate members from square steel tubing **1-1/2 by 1-1/2 inches (38 by 38 mm) OR 2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm), as directed**, with **1/8-inch (3.2-mm)** wall thickness. Hot-dip galvanize frames after fabrication, **as directed**.

6. Aluminum Frames and Bracing: Fabricate members from square extruded-aluminum tubes **1-1/2 by 1-1/2 inches (38 by 38 mm) OR 2 by 2 inches (50 by 50 mm) OR 2-1/2 by 2-1/2 inches (64 by 64 mm), as directed**, with **0.100-inch (2.54-mm) OR 0.125-inch (3.18-mm) OR 0.140-inch (3.56-mm) OR 0.154-inch (3.91-mm), as directed**, wall thickness.
7. Frame Corner Construction: Welded or assembled with corner fittings and **5/16-inch- (7.9-mm-)** diameter, adjustable truss rods for panels **5 feet (1.52 m)** wide or wider.
8. Additional Rails: Provide as indicated, complying with requirements for fence rails.
9. Infill: Comply with requirements for adjacent fence.
10. Picket Size, Configuration, and Spacing: Comply with requirements for adjacent fence.
 - a. Treillage: Provide iron castings of pattern indicated between each pair of pickets. Finish as specified for adjacent fence **OR gates, as directed**.
11. Hardware: Latches permitting operation from both sides of gate, hinges, and keepers for each gate leaf more than **5 feet (1.52 m)** wide. Provide center gate stops and cane bolts for pairs of gates. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate, **as directed**.
12. Spring Hinges: BHMA A156.17, Grade 1, suitable for exterior use.
 - a. Function: 320 - Gate spring pivot hinge. Adjustable tension **OR** 321 - Gate spring pivot hinge. Fixed tension, **as directed**.
 - b. Material: Malleable iron.
13. Hinges: BHMA A156.1, Grade 1, suitable for exterior use.
 - a. Function: 39 - Full surface, triple weight, antifriction bearing.
 - b. Material: Wrought steel, forged steel, cast steel, or malleable iron.
14. Rim Locks: BHMA A156.5, Grade 1, suitable for exterior use.
 - a. Function: 621 - Latchbolt by key from outside and by turn from inside. Latchbolt is held retracted by device from inside **OR** 622 - Deadbolt by key from outside and by turn from inside **OR** 629 - Deadlocking latchbolt by key from outside and by turn from inside **OR** 626 - Interlocking deadbolt operated by key from either side **OR** 627 - Interlocking deadbolt operated by key from outside and by turn from inside, **as directed**.
 - b. Material: Cast, forged, or extruded brass or bronze.
 - c. Mounting Plate: Configuration necessary for mounting locks. Fabricate from **1/8-inch- (3.2-mm-)** thick, steel **OR** aluminum, **as directed**, plate.
15. Mortise Locks: BHMA A156.13, Grade 1, suitable for exterior use.
 - a. Function: F06 - Holdback lock **OR** F07 - Storeroom or closet lock **OR** F09 - Apartment, exit, or public toilet lock **OR** F16 - Double-cylinder dead lock **OR** F17 - Dead lock, **as directed**.
 - b. Material: Brass or bronze.
 - c. Levers: Cast, forged, or extruded brass or bronze.
 - d. Mounting Box: Configuration necessary to enclose locks. Fabricate from **1/8-inch- (3.2-mm-)** thick, steel **OR** aluminum, **as directed**, plate.
16. Electric Strikes: BHMA A156.31, Grade 1, of configuration required for use with lock specified, fail safe **OR** fail secure, **as directed**, and suitable for exterior use.
 - a. Mounting Plate: Configuration necessary for mounting electric strikes. Fabricate from **1/8-inch- (3.2-mm-)** thick, steel **OR** aluminum, **as directed**, plate.
 - b. Mounting: Mortise into post.
17. Exit Hardware: BHMA A156.3, Grade 1, Type 1 (rim exit device), with push pad actuating bar, suitable for exterior use.
 - a. Function: 01 - Exit only, no trim or blank escutcheon **OR** 04 - Entrance by trim when latch bolt is released by key or set in a retracted position by key **OR** 08 - Entrance by lever. Key locks or unlocks lever **OR** 09 - Entrance by lever only when released by key. Key removable only when locked, **as directed**.
 - b. Mounting Channel: Bent-plate channel formed from **1/8-inch- (3.2-mm-)** thick, steel **OR** aluminum, **as directed**, plate. Channel spans gate frame. Exit device is mounted on channel web, recessed between flanges, with flanges extending **1/8 inch (3.2 mm)** beyond push pad surface.
18. Cane Bolts: Provide for inactive leaf of pairs of gates. Fabricated from **1/2-inch- (12.7 -mm-) OR 3/4-inch- (19-mm-), as directed**, diameter, round steel bars, hot-dip galvanized after fabrication.

Finish to match gates. Provide galvanized-steel pipe strikes to receive cane bolts in closed position **OR** both open and closed positions, **as directed**.

19. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay **OR** Finish #3 - partially dressed weld with splatter removed **OR** Finish #4 - good-quality, uniform undressed weld with minimal splatter, **as directed**.
20. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M unless otherwise indicated. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
21. Metallic-Coated Steel Finish: High-performance coating **OR** Galvanized finish, **as directed**.
22. Steel Finish: Primed **OR** Shop painted **OR** High-performance coating, **as directed**.
23. Aluminum Finish: Baked enamel or powder coating.

L. Horizontal-Slide Gates

1. Gate Configuration: Single leaf **OR** Double leaf **OR** As indicated, **as directed**.
 - a. Type:
 - 1) Overhead slide.
OR
Cantilever slide, with external **OR** internal, **as directed**, roller assemblies.
2. Gate Frame Height: **72 inches (1830 mm)**, **unless directed otherwise**.
3. Gate Opening Width: **36 inches (914 mm)**, **unless directed otherwise**.
4. Galvanized-Steel Frames and Bracing: Fabricate members from square tubing.
 - a. Frame Members: Square tubes **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **1-3/4 by 1-3/4 inches (45 by 45 mm)** **OR** **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
 - b. Bracing Members: Square tubes **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **1-3/4 by 1-3/4 inches (45 by 45 mm)** **OR** **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, formed from **0.108-inch (2.74-mm)** nominal-thickness, metallic-coated steel sheet or formed from **0.105-inch (2.66-mm)** nominal-thickness steel sheet and hot-dip galvanized after fabrication.
5. Steel Frames and Bracing: Fabricate members from square tubing. Hot-dip galvanize frames after fabrication, **as directed**.
 - a. Frame Members: Steel tubing **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, with **1/8-inch (3.2-mm)** wall thickness.
 - b. Bracing Members: Steel tubing **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, with **1/8-inch (3.2-mm)** wall thickness.
6. Aluminum Frames and Bracing: Fabricate members from square tubing.
 - a. Frame Members: Extruded-aluminum tubes **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, with **0.100-inch (2.54-mm)** **OR** **0.125-inch (3.18-mm)** **OR** **0.140-inch (3.56-mm)** **OR** **0.154-inch (3.91-mm)**, **as directed**, wall thickness.
 - b. Bracing Members: Extruded-aluminum tubes **1-1/2 by 1-1/2 inches (38 by 38 mm)** **OR** **2 by 2 inches (50 by 50 mm)** **OR** **2-1/2 by 2-1/2 inches (64 by 64 mm)**, **as directed**, with **0.100-inch (2.54-mm)** **OR** **0.125-inch (3.18-mm)** **OR** **0.140-inch (3.56-mm)** **OR** **0.154-inch (3.91-mm)**, **as directed**, wall thickness.
7. Frame Corner Construction:
 - a. Welded frame with panels assembled with bolted or riveted corner fittings and **5/16-inch (7.9-mm-)** diameter, adjustable truss rods for panels **5 feet (1.52 m)** wide or wider.
 - b. Overhead Slide Gates: Welded or assembled with corner fittings including **5/16-inch (7.9-mm-)** diameter, adjustable truss rods for panels **5 feet (1.52 m)** wide or wider.
8. Additional Rails: Provide as indicated, complying with requirements for fence rails.
9. Infill: Comply with requirements for adjacent fence.

10. Picket Size, Configuration, and Spacing: Comply with requirements for adjacent fence.
 - a. Treillage: Provide iron castings of pattern indicated between each pair of pickets. Finish as specified for adjacent fence **OR** gates, **as directed**.
11. Overhead Track Assembly: Manufacturer's standard track, with overhead framing supports, bracing, and accessories, engineered to support size, weight, width, operation, and design of gate and roller assemblies.
12. Hardware: Latches permitting operation from both sides of gate, locking devices, hangers, roller assemblies, and stops fabricated from galvanized steel **OR** galvanized malleable iron **OR** mill-finished, Grade 319 aluminum-alloy casting with stainless-steel fasteners, **as directed**. Fabricate latches with integral eye openings for padlocking; padlock accessible from both sides of gate, **as directed**.
13. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay **OR** Finish #3 - partially dressed weld with splatter removed **OR** Finish #4 - good-quality, uniform undressed weld with minimal splatter, **as directed**.
14. Galvanizing: For items other than hardware that are indicated to be galvanized, hot-dip galvanize to comply with ASTM A 123/A 123M unless otherwise indicated. For hardware items, hot-dip galvanize to comply with ASTM A 153/A 153M.
15. Metallic-Coated Steel Finish: High-performance coating **OR** Galvanized finish, **as directed**.
16. Steel Finish: Primed **OR** Shop painted **OR** High-performance coating, **as directed**.
17. Aluminum Finish: Baked enamel or powder coating.

M. Gate Operators

1. General: Provide factory-assembled automatic operating system designed for gate size, type, weight, and operation frequency. Provide operation control system with characteristics suitable for Project conditions, with remote-control stations, safety devices, and weatherproof enclosures; coordinate electrical requirements with building electrical system.
 - a. Provide operator designed so motor may be removed without disturbing limit-switch adjustment and without affecting auxiliary emergency operator.
 - b. Provide operator with UL approval **OR** UL-approved components, **as directed**.
 - c. Provide electronic components with built-in troubleshooting diagnostic feature.
 - d. Provide unit designed and wired for both right-hand/left-hand opening, permitting universal installation.
 - e. Provide controllers, electrical devices, and wiring that comply with requirements specified in Division 22.
2. Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Division 11 Section "Common Motor Requirements For Equipment".
 - a. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
 - b. Horsepower: Not less than 1/4 **OR** 1/3 **OR** 1/2 **OR** 3/4, **as directed**.
 - c. Enclosure: Open dripproof **OR** Totally enclosed **OR** Manufacturer's standard, **as directed**.
 - d. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 feet (1005 m) above sea level.
 - e. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 - f. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Division 22.
3. Gate Operators: Gate **OR** Concrete base **OR** Post **OR** In-ground, **as directed**, mounted and as follows:
 - a. Hydraulic Swing **OR** Slide, **as directed**, Gate Operators:
 - 1) Duty: Light **OR** Medium **OR** Heavy, **as directed**, duty, residential **OR** commercial/industrial, **as directed**.
 - 2) Gate Speed: Minimum 45 feet (13.7 m) **OR** 60 feet (18.2 m), **as directed**, per minute.
 - 3) Maximum Gate Weight: Not to exceed operator manufacturer's recommendations.
 - 4) Frequency of Use: 10 cycles per hour **OR** 25 cycles per hour **OR** Continuous duty, **as directed**.

- 5) Locking: Hydraulic in both directions.
- 6) Heater: Manufacturer's standard track and roller heater with thermostatic control, as directed.
- 7) Operating Type: Crank arm **OR** Wheel and rail drive **OR** Roller chain, **as directed**, with manual release, **as directed**.
- b. Mechanical Swing **OR** Slide, **as directed**, Gate Operators:
 - 1) Duty: Light **OR** Medium **OR** Heavy, **as directed**, duty, residential **OR** commercial/industrial, **as directed**.
 - 2) Gate Speed: Minimum 45 feet (13.7 m) per minute **OR** 60 feet (18.2 m) per minute **OR** variable speed, **as directed**.
 - 3) Maximum Gate Weight: 600 lb (272 kg) **OR** 800 lb (363 kg), **as directed**.
 - 4) Frequency of Use: 10 cycles per hour **OR** 25 cycles per hour **OR** 60 cycles per hour **OR** Continuous duty, **as directed**.
 - 5) Operating Type: Crank arm **OR** Wheel and rail drive **OR** Roller chain, **as directed**, with manual release, **as directed**.
 - 6) Drive Type:
 - a) Enclosed worm gear and chain-and-sprocket, **as directed**, reducers, roller-chain drive.
OR
V-belt and worm gear **OR** chain-and-sprocket, **as directed**, reducers, roller-chain drive.
4. Remote Controls: Electric controls separated from gate and motor and drive mechanism, with NEMA ICS 6, Type 1 **OR** NEMA ICS 6, Type 4, **as directed**, enclosure for surface **OR** recessed or flush, **as directed**, concrete base **OR** pedestal, **as directed**, mounting, and with space for additional optional equipment. Provide the following remote-control device(s):
 - a. Control Station:
 - 1) Keyed, two-position **OR** three-position, **as directed**, switch with open, stop, **as directed**, and close function; located remotely from gate. Provide two keys per station.
OR
Momentary-contact, single-button-operated **OR** three-button-operated, **as directed**, with open, stop, **as directed**, and close function; located remotely from gate. Key switch to lock out open and close buttons, **as directed**.
 - b. Card Reader: Functions only when authorized card is presented. Programmable, multiple-code **OR** single-code, **as directed**, system, permitting four different access time periods, **as directed**, face-lighted unit fully visible at night, **as directed**.
 - 1) Reader Type: Touch plate **OR** Swipe **OR** Insertion **OR** Proximity, **as directed**.
 - 2) Features: Timed antipassback **OR** Limited-time usage **OR** Capable of monitoring and auditing gate activity, **as directed**.
 - c. Digital Keypad Entry Unit: Multiple-programmable **OR** Multiple-code, **as directed**, capability of not less than 5 **OR** 500 **OR** 2500, **as directed**, possible individual codes, consisting of 1- to 7 **OR** 4 **OR** 5, **as directed**,-digit codes, and permitting 4 different access time periods, **as directed**.
 - 1) Features: Timed antipassback **OR** Limited-time usage **OR** Capable of monitoring and auditing gate activity, **as directed**.
 - 2) Face-lighted unit with metal-keyed **OR** keyless-membrane, **as directed**, keypad fully visible at night.
 - d. Radio Control: Digital system consisting of code-compatible universal receiver for each gate, located where indicated, with remote antenna with coaxial cable and mounting brackets designed to operate gates. Provide 1 **OR** 2, **as directed**, programmable transmitter(s) with multiple-code capability permitting validating or voiding of not less than 1000 **OR** 10,000, **as directed**, codes per channel configured for the following functions:
 - 1) Transmitters: Single **OR** Three, **as directed**,-button operated, with open and close, **as directed**, function.

- 2) Channel Settings: Two **OR** Three **OR** Four, **as directed**, independent channel settings controlling separate receivers for operating more than one gate from each transmitter.
- e. Telephone Entry System: Hands-free, voice-communication system for connection to building telephone system with digital-entry code activation of gate operator and auxiliary keypad entry, **as directed**.
 - 1) Residential System: Designed to be wired to same line with telephone.
 - 2) Multiunit System: Designed to be wired to a dedicated telephone line, with capacity to access 20 **OR** 100, **as directed**, telephones, and with electronic directory, **as directed**.
- f. Vehicle Loop Detector: System including automatic closing timer with adjustable time delay before closing, timer cutoff switch, **as directed**, and loop detector designed to open and close gate **OR** hold gate open until traffic clears **OR** reverse gate, **as directed**. Provide electronic detector with adjustable detection patterns, adjustable sensitivity and frequency settings, and panel indicator light designed to detect presence or transit of a vehicle over an embedded loop of wire and to emit a signal activating the gate operator. Provide number of loops consisting of multiple strands of wire, number of turns, loop size, and method of placement at location shown on Drawings, as recommended in writing by detection system manufacturer for function indicated.
 - 1) Loop:
 - a) Wire, in size indicated for field assembly, for pave-over **OR** saw cut with epoxy-grouted, **as directed**, installation.
OR
Loop: Factory preformed in size indicated; style for pave-over **OR** saw cut with epoxy-grouted, **as directed**, installation.
- g. Vehicle Presence Detector: System including automatic closing timer with adjustable time delay before closing, timer cutoff switch, **as directed**, and presence detector designed to open and close gate **OR** hold gate open until traffic clears **OR** reverse gate, **as directed**. Provide retroreflective **OR** emitter/receiver, **as directed**, detector with adjustable detection zone pattern and sensitivity, designed to detect the presence or transit of a vehicle in gate pathway when infrared beam in zone pattern is interrupted, and to emit a signal activating the gate operator.
5. Obstruction Detection Devices: Provide each motorized gate with automatic safety sensor(s). Activation of sensor(s) causes operator to immediately function as follows:
 - a. Action:
 - 1) Reverse gate in both opening and closing cycles and hold until clear of obstruction.
OR
Stop gate in opening cycle and reverse gate in closing cycle and hold until clear of obstruction.
 - b. Internal Sensor: Built-in torque or current monitor senses gate is obstructed.
 - c. Sensor Edge: Contact-pressure-sensitive safety edge, profile, and sensitivity designed for type of gate and component indicated, in locations as follows. Connect to control circuit using take-up cable reel **OR** self-coiling cable **OR** gate edge transmitter and operator receiver system, **as directed**.
 - 1) Along entire gate leaf leading edge **OR** Along entire gate leaf trailing edge **OR** Across entire gate leaf bottom edge **OR** Along entire length of gate posts **OR** Along entire length of gate guide posts **OR** Where indicated on Drawings, **as directed**.
 - d. Photoelectric/Infrared Sensor System: Designed to detect an obstruction in gate's path when infrared beam in the zone pattern is interrupted.
6. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop gate at fully retracted and fully extended positions.
7. Emergency Release Mechanism: Quick-disconnect release of operator drive system of the following type of mechanism, permitting manual operation if operator fails. Design system so control-circuit power is disconnected during manual operation.
 - a. Type:

- 1) Integral fail-safe release, allowing gate to be pushed open without mechanical devices, keys, cranks, or special knowledge.
OR
Mechanical device, key, or crank-activated release.
8. Operating Features:
 - a. Digital Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features with capability for monitoring and auditing gate activity, **as directed**. Provide unit that is isolated from voltage spikes and surges.
 - b. System Integration: With controlling circuit board capable of accepting any type of input from external devices.
 - c. Master/Slave Capability: Control stations designed and wired for gate pair operation.
 - d. Automatic Closing Timer: With adjustable time delay before closing and timer cutoff switch, **as directed**.
 - e. Open Override Circuit: Designed to override closing commands.
 - f. Reversal Time Delay: Designed to protect gate system from shock load on reversal in both directions.
 - g. Maximum Run Timer: Designed to prevent damage to gate system by shutting down system if normal time to open gate is exceeded.
 - h. Clock Timer: 24-hour **OR** Seven-day, **as directed**, programmable for regular events.
9. Accessories:
 - a. Warning Module: Audio **OR** Visual, **as directed**, ADA/ABA-compliant, constant-light **OR** strobe-light, **as directed**, alarm sounding three to five seconds in advance of gate operation and continuing until gate stops moving.
 - b. Battery Backup System: Battery-powered drive and access-control system, independent of primary drive system:
 - 1) Fail Safe: Gate opens and remains open until power is restored.
 - 2) Fail Secure: Gate cycles on battery power, then fail safe when battery is discharged.
 - c. External electric-powered solenoid **OR** magnetic, **as directed**, lock with delay timer allowing time for lock to release before gate operates.
 - d. Fire **OR** Postal, **as directed**, box.
 - e. Fire strobe **OR** siren, **as directed**, alarm.
 - f. Intercom System: as directed by the Owner.
 - g. Instructional, Safety, and Warning Labels and Signs: According to UL 325 **OR** Manufacturer's standard for components and features specified **OR** As indicated on Drawings, **as directed**.
- N. Aluminum Finishes
 1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of **2 mils (0.05 mm)**. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - a. Color and Gloss: As selected from manufacturer's full range.
- O. Steel Finishes
 1. Surface Preparation: Clean surfaces according to SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" **OR** SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning", **as directed**.
 - a. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
 2. Powder Coating: Immediately after cleaning, apply 2-coat finish consisting of epoxy primer and TGIC polyester topcoat, with a minimum total dry film thickness of not less than **8 mils (0.20 mm)**. Comply with coating manufacturer's written instructions.
 - a. Color and Gloss: As selected from manufacturer's full range.
 3. Primer Application: Apply zinc-rich epoxy primer immediately after cleaning, to provide a minimum dry film thickness of **2 mils (0.05 mm)** per applied coat, to surfaces that will be exposed after assembly and installation, and to concealed surfaces.

4. Shop-Painted Finish: Comply with Division 09 Section(s) "Exterior Painting" OR "High-performance Coatings", **as directed**.
5. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - a. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

P. Metallic-Coated Steel Finishes

1. Galvanized Finish: Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
2. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a zinc-phosphate, **as directed**, conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
3. Powder Coating: Immediately after cleaning and pretreating, apply TGIC polyester powder-coat finish, with a minimum dry film thickness of **2 mils (0.05 mm)**.
 - a. Color and Gloss: As selected from manufacturer's full range.
4. Powder Coating: Immediately after cleaning and pretreating, apply 2-coat finish consisting of zinc-rich, **as directed**, epoxy prime coat and TGIC polyester topcoat, with a minimum dry film thickness of **2 mils (0.05 mm)** for topcoat. Comply with coating manufacturer's written instructions to achieve a minimum total dry film thickness of **4 mils (0.10 mm)**.
 - a. Color and Gloss: As selected from manufacturer's full range.
 - b. Comply with surface finish testing requirements in ASTM F 2408 except change corrosion-resistance requirement to 3000 hours without failure, **as directed**.
5. High-Performance Coating: Apply epoxy primer, epoxy intermediate coat, and polyurethane topcoat to prepared surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
 - a. Match approved Samples for color, texture, and coverage. Remove and refinish, or recoat work that does not comply with specified requirements.

1.3 EXECUTION

A. Examination

1. Examine areas and conditions, with Installer present, for compliance with requirements for site clearing, earthwork, pavement work, construction layout, and other conditions affecting performance of the Work.
2. Do not begin installation before final grading is completed unless otherwise permitted by the Owner.
3. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Preparation

1. Stake locations of fence lines, gates, and terminal posts. Do not exceed intervals of **500 feet (152.5 m)** or line of sight between stakes. Indicate locations of utilities, lawn sprinkler system, underground structures, benchmarks, and property monuments.

C. Decorative Fence Installation

1. Install fences according to manufacturer's written instructions.
OR
Install fences by setting posts as indicated and fastening rails and infill panels to posts. Peen threads of bolts after assembly to prevent removal, **as directed**.

2. Post Excavation: Drill or hand-excavate holes for posts in firm, undisturbed soil. Excavate holes to a diameter of not less than 4 times post size and a depth of not less than **24 inches (600 mm)** plus **3 inches (75 mm)** for each **foot (300 mm)** or fraction of **a foot (300 mm)** that fence height exceeds **4 feet (1200 mm)**.
3. Post Setting: Set posts in concrete **OR** with mechanical anchors **OR** by mechanically driving into soil, **as directed**, at indicated spacing into firm, undisturbed soil.
 - a. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during setting with concrete or mechanical devices.
 - b. Concrete Fill: Place concrete around posts and sleeves, **as directed**, and vibrate or tamp for consolidation. Protect aboveground portion of posts from concrete splatter.
 - 1) Exposed Concrete: Extend **2 inches (50 mm)** above grade. Finish and slope top surface to drain water away from post.
 - 2) Concealed Concrete: Top **2 inches (50 mm)** below grade as indicated on Drawings to allow covering with surface material. Slope top surface of concrete to drain water away from post.
 - c. Posts Set in Concrete: Extend post to within **6 inches (150 mm)** of specified excavation depth, but not closer than **3 inches (75 mm)** to bottom of concrete.
 - d. Posts Set into Concrete in Sleeves: Use galvanized-steel pipe sleeves with inside diameter at least **3/4 inch (20 mm)** larger than outside diagonal dimension of post, preset and anchored into concrete for installing posts.
 - 1) Extend posts at least **5 inches (125 mm)** into sleeve.
 - 2) After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink grout, mixed and placed to comply with grout manufacturer's written instructions; shape and smooth to shed water. Finish and slope top surface of grout to drain water away from post.
 - e. Posts Set into Voids in Concrete: Form or core drill holes not less than **3/4 inch (20 mm)** larger than outside diagonal dimension of post.
 - 1) Extend posts at least **5 inches (125 mm)** into concrete.
 - 2) Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink grout, mixed and placed to comply with grout manufacturer's written instructions. Finish and slope top surface of grout to drain water away from post.
 - f. Mechanically Driven Posts: Drive into soil to depth of **30 inches (762 mm)** **OR** **36 inches (914 mm)**, **as directed**. Protect post top to prevent distortion.
 - g. Space posts uniformly at **6 feet (1.83 m)** **OR** **8 feet (2.44 m)**, **as directed**, o.c.
- D. Gate Installation
 1. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation and lubricate where necessary.
- E. Gate Operator Installation
 1. General: Install gate operators according to manufacturer's written instructions, aligned and true to fence line and grade.
 2. Excavation for Support Posts **OR** Pedestals **OR** Concrete Bases, **as directed**: Hand-excavate holes for bases, in firm, undisturbed soil to dimensions and depths and at locations as required by gate operator component manufacturer's written instructions and as indicated.
 3. Concrete Bases: Cast-in-place or precast concrete, depth not less than **12 inches (300 mm)** **OR** **6 to 12 inches (150 to 300 mm)** below frost line, **as directed**, dimensioned and reinforced according to gate operator component manufacturer's written instructions and as indicated on Drawings.
 4. Vehicle Loop Detector System: Cut grooves in pavement, **as directed**, and bury and seal wire loop according to manufacturer's written instructions. Connect to equipment operated by detector.

5. Comply with NFPA 70 and manufacturer's written instructions for grounding of electric-powered motors, controls, and other devices.
- F. Grounding And Bonding
1. Fence Grounding: Install at maximum intervals of **1500 feet (450 m)** except as follows:
 - a. Fences within **100 Feet (30 m)** of Buildings, Structures, Walkways, and Roadways: Ground at maximum intervals of **750 feet (225 m)**.
 - 1) Gates and Other Fence Openings: Ground fence on each side of opening.
 - a) Bond metal gates to gate posts.
 - b) Bond across openings, with and without gates, except openings indicated as intentional fence discontinuities. Use No. 2 AWG wire and bury it at least **18 inches (460 mm)** below finished grade.
 2. Protection at Crossings of Overhead Electrical Power Lines: Ground fence at location of crossing and at a maximum distance of **150 feet (45 m)** on each side of crossing.
 3. Fences Enclosing Electrical Power Distribution Equipment: Ground as required by IEEE C2 unless otherwise indicated.
 4. Grounding Method: At each grounding location, drive a grounding rod vertically until the top is **6 inches (150 mm)** below finished grade. Connect rod to fence with No. 6 AWG conductor. Connect conductor to each fence component at the grounding location.
 5. Bonding Method for Gates: Connect bonding jumper between gate post and gate frame.
 6. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact will be galvanically compatible.
 - a. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
 - b. Make connections with clean, bare metal at points of contact.
 - c. Make aluminum-to-steel connections with stainless-steel separators and mechanical clamps.
 - d. Make aluminum-to-galvanized-steel connections with tin-plated copper jumpers and mechanical clamps.
 - e. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.
 7. Bonding to Lightning-Protection System: If fence terminates at lightning-protected building or structure, ground the fence and bond the fence grounding conductor to lightning-protection down conductor or lightning-protection grounding conductor, complying with NFPA 780.
- G. Field Quality Control
1. Grounding-Resistance Testing: Engage a qualified testing agency to perform tests and inspections.
 - a. Grounding-Resistance Tests: Subject completed grounding system to a megger test at each grounding location. Measure grounding resistance not less than two full days after last trace of precipitation, without soil having been moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural grounding resistance. Perform tests by two-point method according to IEEE 81.
 - b. Excessive Grounding Resistance: If resistance to grounding exceeds specified value, notify the Owner promptly. Include recommendations for reducing grounding resistance and a proposal to accomplish recommended work.
 - c. Report: Prepare test reports certified by a testing agency of grounding resistance at each test location. Include observations of weather and other phenomena that may affect test results.
- H. Adjusting
1. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire

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operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

2. Automatic Gate Operators: Energize circuits to electrical equipment and devices. Adjust operators, controls, safety devices, alarms, **as directed**, and limit switches.
 - a. Hydraulic Operators: Purge Operating System, Adjust Pressure And Fluid Levels, And Check For Leaks.
 - b. Operational Test: After Electrical Circuitry Has Been Energized, Start Units To Confirm Proper Motor Rotation And Unit Operation.
 - c. Test And Adjust Controls, Alarms, **as directed**, And Safeties. Replace Damaged And Malfunctioning Controls And Equipment.
 3. Lubricate hardware, gate operators, **as directed**, and other moving parts.
- I. Demonstration
1. Train Owner's personnel to adjust, operate, and maintain gates.

END OF SECTION 32 31 19 00

Task	Specification	Specification Description
32 31 19 00	01 22 16 00	No Specification Required
32 31 19 00	32 31 13 13a	High-Security Chain-Link Fences And Gates

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SECTION 32 31 26 13 - WIRE FENCES WITH STEEL POSTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of farm-type wire fencing. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Fabric shall be galvanized steel wire complying with ASTM A 116.

B. Framework

1. Steel
 - a. Posts shall comply with ASTM A 702, T-section, zinc-coated.
 - b. Stays shall be 9-1/2 gauge twisted wire, galvanized in compliance with ASTM A 641, Class 3.
2. Wood: Posts shall be cut from cedar, Douglas fir, pine, or other approved species of timber. Posts shall be peeled, treated, dressed, and cured and shall contain no unsound knots. All posts shall match existing post dimensions. All wood posts and braces shall be given a pressure preservative treatment in a closed retort. The treatment shall comply with AWWA C2.
 - a. Preservative. Wood cut or sawed after treatment shall have the cut surfaces well-coated with the preservative used in the treatment. All wood shall be pressure treated in accordance with AWWA C1 or AWWA C2, as applicable.

- C. Braces: Steel braces shall have the same configuration as line posts and uprights without the anchor plate. Braces shall meet all of the requirements for wood posts.

D. Connectors

1. Wire for Attaching Fabric to Posts shall be 12-1/2 gauge or coarser, galvanized in compliance with ASTM A 641, Class 3.
2. Staples and Nails shall comply with Fed. Spec. FF-N-105. Staples and nails shall be zinc-coated and of sufficient length for purpose required.

E. Gates

1. Tubular Steel:
 - a. Frame shall be a minimum of 1-3/8 inch outside diameter tubular steel, braced with a sturdy center bar and diagonal adjustable brace wire to prevent sagging. Gates shall be fitted with hinges. All material shall be hot-dipped zinc-coated.
 - b. Fabric for Gates shall be as specified for the fence and shall be securely tied to the framework at top, bottom, and sides with 9-gauge wire.
2. Angle Iron
 - a. Frame shall be fabricated of angle iron with cross ties and stays of light angle iron. Frame shall be zinc-coated in compliance with ASTM A 120 or A 153.
 - b. Fabric for Gates shall be as specified for the fence and shall be securely tied to the framework at top, bottom, and sides with 9-gauge wire.
3. Wood: Provide a 3/8-inch minimum diameter galvanized steel truss rod and turnbuckle.

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- F. Barbed Wire shall comply with ASTM A 121 and shall be made from 2 strands of 12-1/2 gauge galvanized steel wire, twisted, with four-point barbs spaced five inches apart. Wire shall have Class 2 zinc coating.
- G. Hardware:
 - 1. Gate Hardware shall include the following:
 - a. Bottom Hinge shall be designed to carry the weight of the gate.
 - b. The Upper Hinge shall be adjustable.
 - c. Lock with Chain shall be 1-3/4 inch size complying with ASTM F 883.
 - d. Keeper shall automatically engage and hold the gate leaf open until manually released.
 - e. Center Plunger Rod.
 - f. Center Stop.
 - g. Vertical Lift.
 - h. Sliding Track.
 - 2. Lightning Arresters, Insulators and Insulator Clamps, Fasteners, Signs, and Other Accessories shall be provided and installed as required.

1.3 EXECUTION

- A. Installation
 - 1. Wood Posts: Hold in line in a true vertical position by temporary bracing until backfilling is completed. Compact by hand tamping or other suitable methods to a density comparable to that of adjacent ground. Refasten all braces, gates, hardware, fabric, and other accessories.
 - 2. Steel Posts: Steel posts shall be held in a vertical position and driven to the required depths by an approved post driver. Tops of posts shall not be damaged by driving operation.
 - 3. Corner, Brace, or End Panels: Corner, brace, or end panels shall be constructed at the beginning and terminal ends, at gate openings, at all intersections, at all corners or changes in horizontal alignment of fences, in existing fence on both sides of junction with new fence, (except when junction is at a corner already braced), and on both sides of cattle guards.
 - 4. Pull Posts shall be constructed when the distance of unbraced fencing exceeds 640 feet. Pull posts shall be spaced equidistant in the fence at intervals of 640 feet or less.
 - 5. Wire Installation: Barbed and/or woven wire fabric shall be stretched to proper tension and securely fastened to posts. Top and bottom wires of fabric shall be tied or stapled to each post. Tie or staple every other wire to alternating posts. Every wire shall be tied to corner, pull, end, and gate posts. Wire for tying woven wire fabric and barbed wire shall be 9-gauge.
 - 6. Restretching Existing Fabric: Fabric indicated to be restretched shall be restretched to proper tension and refastened to posts. Excess fabric extending beyond the post shall be removed.
 - 7. Alignment: Finished fencing shall be plumb and in proper alignment with posts, and all wire work shall be taut.

END OF SECTION 32 31 26 13

SECTION 32 31 29 00 - PERMANENT WOOD FENCING

1.1 GENERAL

A. Description Of Work

1. The specification covers the furnishing and installation of materials for repair and maintenance of permanent wood fencing. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

- B. Submittals: Shop drawings shall be submitted for approval.

1.2 PRODUCTS

- A. Review MSDS and Manufacturers Application Instructions.

B. Pickets:

1. Size: Wood For picket shall match the existing fencing in material, configuration, dimensions, texture, and finishes,
2. Attachment: Hot-dipped galvanized nails complying with Fed. Spec. FF-N-105 shall be used to fasten pickets to rails.

C. Framework:

1. Line Posts: 4 x 4 of required length to match existing post height and extend into the ground as required to ensure rigid installation.
2. Terminal and Corner Posts: 4 x 4 of required length.
3. Gate Posts: 4 x 6 and of the length required for firm embedment to resist gate action.
4. Top Rail: 2 x 4 of length required to span between posts.
5. Where bracing is required, it shall match top and bottom rails in dimension and finish.
6. Metal Posts and Rails: Solid mild steel galvanized in compliance with ASTM A 123 of the length and style required to match existing.

D. Gates:

1. Frame: 2 x 4 members with attached pickets. Configuration of gate shall match that of existing gates.
2. Bracing: Single 2 x 4 running diagonally across the gate to opposite corners of the frame.
3. Hardware: Hinges, latches, and other hardware shall be hot dipped galvanized and of configurations to match existing hardware. Bolts and nuts shall comply with ASTM A 307 and galvanized in compliance with ASTM A 153.

- E. Finish: All wood fence members shall be given a pressure preservative treatment in a closed retort. The treatment shall comply with Fed. Spec. TT-W-571. Wood cut or sawed after treatment shall have the cut surfaces well brush-coated with the preservative used in the treatment. Paint to match existing after treatment and installation.

1.3 EXECUTION

- A. Posts: Hold in line in a true vertical position by temporary bracing until backfilling is completed. Compact by hand tamping or other suitable methods to a density comparable to that of adjacent ground. Posts of fencing that are higher than four feet and exposed to strong winds and posts at all gates shall be of heavy construction and shall be embedded in concrete.

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- B. Rails: Install at the height and in the manner required to match existing fencing, and secure to post with fasteners similar to existing.
 - C. Pickets: Space, attach, and position to match existing pattern and attachment methods.
 - D. Accessories: Install to match existing conditions.

END OF SECTION 32 31 29 00

Task	Specification	Specification Description
32 31 29 00	01 22 16 00	No Specification Required
32 32 13 00	32 32 23 13a	Segmental Retaining Walls
32 32 16 00	03 48 29 00	Plant-Precast Structural Concrete

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SECTION 32 32 23 13 - MODULAR RETAINING WALLS

1.1 GENERAL

A. Description

1. This specification covers the furnishing and installation of materials for modular retaining wall, and furnishing and installing accessories, all as indicated. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Definitions

1. Block Facing Units - Hollow concrete structural retaining wall units, plant cast from Portland cement, water, and mineral aggregates with or without the inclusion of other materials. The units are intended for use in the construction of mortarless, segmental retaining walls.
2. Geogrid - A geosynthetic formed by a regular network of integrally connected tensile elements with apertures of sufficient size to allow interlocking with surrounding soil, rock, or earth and function primarily as reinforcement.
3. Unit Fill - Compacted fill for the voids in the precast concrete wall units.
4. Wall Fill - Compacted soil which is within the geogrid reinforced soil mass.
5. Retained backfill - Any compacted soil which is behind the reinforced wall fill.
6. Foundation Soil - Compacted or in-situ soil beneath the entire wall.

C. Submittals

1. Product Data: For each type of product indicated.
2. Submittals: Shop drawings shall be submitted for approval.

D. Quality Control

1. Test units for 28-day strength in accordance with ASTM C 140. Average compressive strength shall be not less than **3000 psi (210 kg/sq cm)**.
2. Test units for freeze/thaw protection in accordance with ASTM C 90, and for water retention in accordance with ASTM C 941.
3. After unit samples have been accepted, erect and clean sample wall, of minimum of **15 sq ft (1.4 sq m)**, of each type of retaining wall. Sample wall shall be representative of retaining wall exposed in finished areas. Each sample wall will be checked for shade range, texture, soundness of construction, surface cleanliness, and conformity with other requirements of this Section. Secure acceptance of each cleaned sample wall from the Owner before starting work. Protect wall from damage. Remove sample wall after retaining walls have been accepted.

E. Job Conditions

1. Protect surfaces of weather-exposed units at end of each day and at start of each shut-down period with nonstaining waterproof cover extending at least two feet down on all sides of structure.
2. Protect surfaces and products adjacent to work that could possibly be damaged by water and cleaner.

F. Delivery, Storage And Handling

1. Retaining Wall Facing Units:
 - a. Contractor shall check the units and connection accessories upon delivery to ensure that proper materials have been received.
 - b. Contractor shall prevent excessive mud, wet cement, epoxy, and like materials from coming in contact with and affixing to the units.
 - c. Contractor shall protect the units from damage (i.e. cracks, chips, spalls). Damaged units shall be evaluated for usage in the wall according to ASTM C 90 and ASTM C 145.

2. Geogrid
 - a. Contractor shall check the geogrid upon delivery to ensure that the proper material has been received.
 - b. Geogrids shall be stored above **-20°F (-29°C)**.
 - c. Contractor shall prevent excessive mud, wet cement, epoxy, and like materials from coming in contact with and affixing to the geogrid material.
 - d. Rolled geogrid material may be laid flat or stood on end for storage.

1.2 PRODUCTS

A. Concrete Retaining Wall Units

1. Modular unit face dimensions of **8 in. (200 mm)** thick by **18 in. (450 mm)** long. Depth dimensions shall be no less than **20 in. (500 mm)**. Dry unit weight of wall units shall be no less than **90 lbs (35 kg)**. When tested in accordance with ASTM C 426, average linear shrinkage of three specimens shall be less than 0.045 percent. Color of faces and texture exposed to view shall be determined by the Owner.
 - a. Standard modular units: ASTM C 90, lightweight, two-cell type. Aggregate: ASTM C 331 (C 33).
 - b. Solid mini or cap units: ASTM C145, lightweight type. Aggregate: ASTM C 331 (C 33).
2. Connecting Pins: Poltruded polyester resin rods with fiberglass reinforcement; minimum flexural strength **100,000 psi (7 030 kg/sq cm)**.
3. Geogrid: The geogrids shall be a regular grid structure of select high density polyethylene or polypropylene resin and meet or exceed the design pullout test values required to stabilize and retain the fill above retaining wall.
4. Unit Fill: Gradation Size No. 67, or crushed stone drainage material acceptable to modular unit manufacturer.
5. Base Material: Material shall consist of compacted sand, gravel, crushed rock or leveling concrete (non-reinforced) as shown on construction drawing. The compacted leveling pad shall be a minimum **6 in. (150 mm)** thick.
6. Backfill, Foundation Backfill And Wall Fill: As specified in Division 31 Section "Earth Moving".
7. Underdrain: As specified in Division 33 Section "Subdrainage".
8. Cleaner: ProSoCo, Inc.'s Sure Klean, or accepted equivalent. Cleaner shall be capable of removing contaminants without damaging units.

1.3 EXECUTION

A. Installation

1. Place base material to a minimum of **6 in. (150 mm)** of compacted thickness. Material shall be compacted so as to provide a level hard surface on which to place the first course of units. Compaction shall be to 95% of standard proctor for sand or gravel type materials. For crushed rock, material shall be densely compacted. Grade top of base to plus/minus **1/4 in. (6 mm)** of indicated level. Install underdrain UNDERDRAIN SYSTEMS.
2. Install first course of units in full contact with base, with vertical joints butted and top dead level; align unit faces. Install connecting pins, if required, and fill voids; tamp void fill and sweep top of units clean.
3. Lay successive units locking onto laid course at prescribed batter. Fill voids as work progresses.
4. Place geogrid on compacted, level backfill at indicated elevations and orientation. Hook leading edge over connecting pins and pull taut; anchor before placing additional backfill. Tracked mechanical equipment is not permitted on geogrid. Compaction of fill within **3 ft (1 m)** of wall face shall be by hand operated equipment.
5. Tolerances
 - a. Variation from designed incline lines and controlling surface of walls: within **2 in. (50 mm)** in **20 ft (6 m)** vertical.

- b. Variation from conspicuous vertical lines: within **1 in. (25 mm)** of **20 ft (6 m)** vertical.
- c. Variation from level and other conspicuous horizontal lines: within **1 in. (25 mm)** in **20 ft (6 m)** horizontal, and within **2 in. (50 mm)** in **40 ft (12 m)**, and more, horizontal.
- d. Variation of linear wall lines from established position in plan: within **1 in. (25 mm)** in **20 ft (12 m)**, and within **2 in. (50 mm)** in **40 ft (24 m)**, and more.

B. Cleaning

- 1. Clean installed work after completion of setting and backfill.
- 2. Before cleaning, protect adjacent surfaces and plants sensitive to masonry cleaner.
- 3. Wet wall and apply cleaner in accordance with cleaner manufacturer's printed instructions. Rinse units with clean water to remove masonry cleaner and sand. Installed work shall be clean and free from discoloration, stains, and smears.

END OF SECTION 32 32 23 13

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SECTION 32 32 23 13a - SEGMENTAL RETAINING WALLS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for segmental retaining walls. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes single- and multiple- depth segmental retaining walls with and without soil reinforcement.

C. Performance Requirements

1. Basis of Design: Design of segmental retaining walls is based on products indicated. If comparable products of other manufacturers are proposed, provide engineering design for proposed products, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
2. Delegated Design: Design segmental retaining walls, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
3. Structural Performance: Engineering design shall be based on the following loads and be according to NCMA's "Design Manual for Segmental Retaining Walls."
4. Gravity loads due to soil pressures resulting from grades and sloped backfill indicated.
 - a. Superimposed loads (surcharge) indicated on Drawings.
5. Seismic Performance: Engineering design shall be based on the following loads and factors and be according to NCMA's "Segmental Retaining Walls - Seismic Design Manual."
 - a. Gravity loads due to soil pressures resulting from grades and sloped backfill indicated.
 - b. Superimposed loads (surcharge) indicated on Drawings.
 - c. Horizontal Peak Ground Acceleration (A) for Project: **As directed.**

D. Preconstruction Testing

1. Preconstruction Testing Service: Engage a qualified testing agency to perform the following preconstruction testing:
 - a. Test soil reinforcement and backfill materials for pullout resistance according to ASTM D 6706.
 - b. Test soil reinforcement and backfill materials for coefficient of friction according to ASTM D 5321.

E. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each color and texture of concrete unit required. Submit full-size units **OR** sections of units not less than **3 inches (75 mm)** square, **as directed.**
 - a. Include one full-size unit for each type of concrete unit required.
3. Delegated-Design Submittal: For segmental retaining walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - a. Compliance Review: Qualified professional engineer responsible for segmental retaining wall design shall review and approve submittals and source and field quality-control reports for compliance of materials and construction with design.
4. Product Certificates: For segmental retaining wall units and soil reinforcement, from manufacturer.

- a. Include test data for shear strength between segmental retaining wall units according to ASTM D 6916.
 - b. Include test data for connection strength between segmental retaining wall units and soil reinforcement according to ASTM D 6638.
5. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for segmental retaining wall units and soil reinforcement.
- a. Include test data for freeze-thaw durability of segmental retaining wall units.
 - b. Include test data for shear strength between segmental retaining wall units according to ASTM D 6916.
 - c. Include test data for connection strength between segmental retaining wall units and soil reinforcement according to ASTM D 6638.

F. Quality Assurance

1. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
2. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects.
 - a. Build mockup of segmental retaining wall as shown on Drawings **OR** approximately **72 inches (1800 mm)** long by not less than **36 inches (900 mm)** high above finished grade at front of wall, **as directed**.
 - 1) Include typical soil reinforcement.
 - 2) Include typical base and cap or finished top construction.
 - 3) Include backfill to typical finished grades at both sides of wall.
 - 4) Include typical end construction at one end of mockup.
 - 5) Include **36-inch (900-mm)** return at 1 end of mockup, with typical corner construction.
 - b. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
3. Preinstallation Conference: Conduct conference at Project site.
 - a. Review methods and procedures related to segmental retaining walls including, but not limited to, the following:
 - 1) Structural load limitations.
 - 2) Construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3) Field quality-control procedures.

G. Delivery, Storage, And Handling

1. Store and handle concrete units and accessories to prevent deterioration or damage due to contaminants, breaking, chipping, or other causes.
2. Store geosynthetics in manufacturer's original packaging with labels intact. Store and handle geosynthetics to prevent deterioration or damage due to sunlight, chemicals, flames, temperatures above **160 deg F (71 deg C)** or below **32 deg F (0 deg C)**, and other conditions that might damage them. Verify identification of geosynthetics before using and examine them for defects as material is placed.

1.2 PRODUCTS

A. Segmental Retaining Wall Units

1. Concrete Units: ASTM C 1372, Normal Weight, except that maximum water absorption shall not exceed 7 percent by weight and units shall not differ in height more than plus or minus **1/16 inch (1.6 mm)** from specified dimension.
 - a. Provide units that comply with requirements for freeze-thaw durability.
 - b. Provide units that interlock with courses above and below by means of integral lugs or lips, pins, clips, or hollow cores filled with drainage fill.
2. Color: As selected from manufacturer's full range.

3. Shape and Texture: Provide units of basic shape and dimensions indicated with machine-split textured **OR** smooth, **as directed**, exposed faces.
4. Shape and Texture: Provide units matching basic shape, dimensions, and face texture indicated by referencing manufacturer's pattern designation.
5. Shape and Texture: Provide units of any basic shape and dimensions that will produce segmental retaining walls of dimensions and profiles indicated without interfering with other elements of the Work and with machine-split textured, flat exposed face **OR** shaped exposed face with deeply beveled vertical edges, **as directed**.
6. Batter: Provide units that offset from course below to provide at least 1:24 **OR** 1:16 **OR** 1:14 **OR** 1:8 **OR** 1:5, **as directed**, batter.
7. Cap Units: Provide cap units of shape indicated **OR** same shape as other units, **as directed**, with smooth, as-cast top surfaces without holes or lugs.
8. Special Units: Provide corner units, end units, and other shapes as needed to produce segmental retaining walls of dimensions and profiles indicated and to provide texture on exposed surfaces matching face **OR** as indicated, **as directed**.

B. Installation Materials

1. Pins: Product supplied by segmental retaining wall unit manufacturer for use with units provided, made from nondegrading polymer reinforced with glass fibers.
2. Clips: Product supplied by segmental retaining wall unit manufacturer for use with units provided, made from nondegrading polymer reinforced with glass fibers.
3. Cap Adhesive: Product supplied or recommended by segmental retaining wall unit manufacturer for adhering cap units to units below.
4. Leveling Base: Comply with requirements in Division 31 Section "Earth Moving" for base material **OR** Division 33 Section "Subdrainage" for drainage fill, **as directed**.
 - a. Leveling Course: Lean concrete with a compressive strength of not more than **500 psi (3.4 MPa)**.
5. Drainage Fill: Comply with requirements in Division 33 Section "Subdrainage".
6. Reinforced-Soil Fill: ASTM D 2487; GW, GP, SW, SP, and SM soil classification groups or a combination of these groups; free of debris, waste, frozen materials, vegetation, and other deleterious matter; meeting the following gradation according to ASTM C 136: 20 to 100 percent passing **No. 4 (4.75-mm)** sieve, 0 to 60 percent passing **No. 40 (0.425-mm)** sieve, 0 to 35 percent passing **No. 200 (0.075-mm)** sieve, and with fine fraction having a plasticity index of less than 20.
7. Nonreinforced-Soil Fill: Comply with requirements in Division 31 Section "Earth Moving" for satisfactory soils.
8. Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent.
 - a. Apparent Opening Size: **No. 70 to 100 (0.212- to 0.150-mm)** sieve, maximum; ASTM D 4751.
 - b. Minimum Grab Tensile Strength: **110 lb (49.9 kg)**; ASTM D 4632.
 - c. Minimum Weight: **4 oz./sq. yd. (132 g/sq. m)**.
9. Subdrainage Pipe and Filter Fabric: Comply with requirements in Division 33 Section "Subdrainage".
 - a. Product Type: Knitted or woven geogrid made from polyester yarns with a protective coating **OR** Molded geogrid made from high-density polyethylene **OR** Woven geotextile made from polyamides, polyesters, or polyolefins, **as directed**.

C. Source Quality Control

1. Direct manufacturer to test and inspect each roll of soil reinforcement at the factory for minimum average roll values for geosynthetic index property tests, including the following:
 - a. Weight.
 - b. Roll size.
 - c. Grab or single-rib strength.
 - d. Aperture opening.
 - e. Rib or yarn size.

1.3 EXECUTION

A. Examination

1. Examine areas and conditions, with Installer present, for compliance with requirements for excavation tolerances, condition of subgrades, and other conditions affecting performance of segmental retaining walls.
2. Proceed with installation only after unsatisfactory conditions have been corrected.

B. Retaining Wall Installation

1. General: Place units according to NCMA's "Segmental Retaining Wall Installation Guide" and segmental retaining wall unit manufacturer's written instructions.
 - a. Lay units in running bond **OR** bond pattern indicated, **as directed**.
 - b. Form corners and ends by using special units **OR** cutting units with motor-driven saw **OR** splitting units with mason's hammer and chisel, **as directed**.
2. Leveling Base: Place and compact base material to thickness indicated and with not less than 95 percent maximum dry unit weight according to ASTM D 698.
 - a. Leveling Course: At Contractor's option, unreinforced lean concrete may be substituted for upper **1 to 2 inches (25 to 50 mm)** of base **OR** Place unreinforced lean concrete over leveling base **1 to 2 inches (25 to 50 mm)** thick, **as directed**. Compact and screed concrete to a smooth, level surface.
3. First Course: Place first course of segmental retaining wall units for full length of wall. Place units in firm contact with each other, properly aligned and level.
 - a. Tamp units into leveling base as necessary to bring tops of units into a level plane.
4. Subsequent Courses: Remove excess fill and debris from tops of units in course below. Place units in firm contact, properly aligned, and directly on course below.
 - a. For units with lugs designed to fit into holes in adjacent units, lay units so lugs are accurately aligned with holes, and bedding surfaces are firmly seated on beds of units below.
 - b. For units with lips at front of units, slide units as far forward as possible for firm contact with lips of units below.
 - c. For units with lips at bottom rear of units, slide units as far forward as possible for firm contact of lips with units below.
 - d. For units with pins, install pins and align units.
 - e. For units with clips, install clips and align units.
5. Cap Units: Place cap units and secure with cap adhesive.

C. Fill Placement

1. General: Comply with requirements in Division 31 Section "Earth Moving", NCMA's "Segmental Retaining Wall Installation Guide," and segmental retaining wall unit manufacturer's written instructions.
2. Fill voids between and within units with drainage fill. Place fill as each course of units is laid.
3. Place, spread, and compact drainage fill and soil fill in uniform lifts for full width and length of embankment as wall is laid. Place and compact fills without disturbing alignment of units. Where both sides of wall are indicated to be filled, place fills on both sides at same time. Begin at wall and place and spread fills toward embankment.
 - a. Use only hand-operated compaction equipment within **48 inches (1200 mm)** of wall, or one-half of height above bottom of wall, whichever is greater.
 - b. Compact reinforced-soil fill to not less than 95 percent maximum dry unit weight according to ASTM D 698.
 - 1) In areas where only hand-operated compaction equipment is allowed, compact fills to not less than 90 percent maximum dry unit weight according to ASTM D 698.
 - 2) In areas where fill height exceeds **15 feet (4.5 m)**, compact reinforced-soil fill that will be more than **15 feet (4.5 m)** below finished grade to not less than 98 percent maximum dry unit weight according to ASTM D 698.

- 3) In areas where fill height exceeds **30 feet (9 m)**, compact reinforced-soil fill that will be more than **30 feet (9 m)** below finished grade to not less than 100 percent maximum dry unit weight according to ASTM D 698.
 - c. Compact nonreinforced-soil fill to comply with Division 31 Section "Earth Moving".
 4. Place drainage geotextile against back of wall and place layer of drainage fill at least **12 inches (300 mm) OR 6 inches (150 mm)**, **as directed**, wide behind drainage geotextile to within **12 inches (300 mm)** of finished grade. Place another layer of drainage geotextile between drainage fill and soil fill.
 5. Place a layer of drainage fill at least **12 inches (300 mm) OR 6 inches (150 mm)**, **as directed**, wide behind wall to within **12 inches (300 mm)** of finished grade. Place a layer of drainage geotextile between drainage fill and soil fill.
 6. Wrap subdrainage pipe with filter fabric and place in drainage fill as indicated, sloped not less than 0.5 percent to drain.
 7. Place impervious fill over top edge of drainage fill layer.
 8. Slope grade at top of wall away from wall unless otherwise indicated. Slope grade at base of wall away from wall. Provide uniform slopes that will prevent ponding.
 9. Place soil reinforcement in horizontal joints of retaining wall where indicated and according to soil-reinforcement manufacturer's written instructions. Embed reinforcement a minimum of **8 inches (200 mm)** into retaining wall and stretch tight over compacted backfill. Anchor soil reinforcement before placing fill.
 - a. Place additional soil reinforcement at corners and curved walls to provide continuous reinforcement.
 - b. Place geosynthetics with seams, if any, oriented perpendicular to segmental retaining walls.
 - c. Do not dump fill material directly from trucks onto geosynthetics.
 - d. Place at least **6 inches (150 mm)** of fill over reinforcement before compacting with tracked vehicles or **4 inches (100 mm)** before compacting with rubber-tired vehicles.
 - e. Do not turn vehicles on fill until first layer of fill is compacted and second layer is placed over each soil-reinforcement layer.
- D. Construction Tolerances
1. Variation from Level: For bed-joint lines along walls, do not exceed **1-1/4 inches in 10 feet (32 mm in 3 m)**, **3 inches (75 mm)** maximum.
 2. Variation from Indicated Batter: For slope of wall face, do not vary from indicated slope by more than **1-1/4 inches in 10 feet (32 mm in 3 m)**.
 3. Variation from Indicated Wall Line: For walls indicated as straight, do not vary from straight line by more than **1-1/4 inches in 10 feet (32 mm in 3 m)**.
- E. Field Quality Control
1. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
 2. Comply with requirements in Division 31 Section "Earth Moving" for field quality control.
 - a. In each compacted backfill layer, perform at least 1 field in-place compaction test for each **150 feet (45 m)** or less of segmental retaining wall length.
 - b. In each compacted backfill layer, perform at least 1 field in-place compaction test for each **24 inches (600 mm)** of fill depth and each **50 feet (15 m)** or less of segmental retaining wall length.
- F. Adjusting
1. Remove and replace segmental retaining wall construction of the following descriptions:
 - a. Broken, chipped, stained, or otherwise damaged units. Units may be repaired if the Owner approves methods and results.
 - b. Segmental retaining walls that do not match approved Samples.
 - c. Segmental retaining walls that do not comply with other requirements indicated.
 2. Replace units so segmental retaining wall matches approved Samples and mockups, complies with other requirements, and shows no evidence of replacement.

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END OF SECTION 32 32 23 13a

Task	Specification	Specification Description
32 32 26 00	32 32 23 13a	Segmental Retaining Walls
32 32 29 00	32 32 23 13a	Segmental Retaining Walls
32 32 53 00	32 32 23 13a	Segmental Retaining Walls

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SECTION 32 33 23 00 - SITE FURNISHINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for site furnishings. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Seating.
 - b. Tables.
 - c. Bicycle racks.
 - d. Bicycle lockers.
 - e. Trash receptacles.
 - f. Ash receptacles.
 - g. Planters.
 - h. Bollards.

C. Submittals

1. Product Data: For each type of product indicated.
2. Samples: For each type of exposed finish required.
3. Product Schedule: For site furnishings. Use same designations indicated on Drawings.
4. Material Certificates: For site furnishings, signed by manufacturers.
 - a. Wood Preservative Treatment: Include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - b. Sustainably Harvested Wood: Include certification by manufacturer and from sources that participate in sustained yield programs.
 - c. Recycled plastic.
5. Maintenance Data: For site furnishings to include in maintenance manuals.

1.2 PRODUCTS

A. Materials

1. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated; free of surface blemishes and complying with the following:
 - a. Rolled or Cold-Finished Bars, Rods, and Wire: **ASTM B 211 (ASTM B 211M)**.
 - b. Extruded Bars, Rods, Wire, Profiles, and Tubes: **ASTM B 221 (ASTM B 221M)**.
 - c. Structural Pipe and Tube: ASTM B 429.
 - d. Sheet and Plate: **ASTM B 209 (ASTM B 209M)**.
 - e. Castings: ASTM B 26/B 26M.
2. Steel and Iron: Free of surface blemishes and complying with the following:
 - a. Plates, Shapes, and Bars: ASTM A 36/A 36M.
 - b. Steel Pipe: Standard-weight steel pipe complying with ASTM A 53, or electric-resistance-welded pipe complying with ASTM A 135.
 - c. Tubing: Cold-formed steel tubing complying with ASTM A 500.
 - d. Mechanical Tubing: Cold-rolled, electric-resistance-welded carbon or alloy steel tubing complying with ASTM A 513, or steel tubing fabricated from steel complying with ASTM A 1011/A 1011M and complying with dimensional tolerances in ASTM A 500; zinc coated internally and externally.

- e. Sheet: Commercial steel sheet complying with ASTM A 1011/A 1011M.
- f. Perforated Metal: From steel sheet not less than **0.0747-inch (1.9-mm)** **OR** **0.0897-inch (2.3-mm)** **OR** **0.1196-inch (3.0-mm)**, **as directed**, nominal thickness; manufacturer's standard perforation pattern.
- g. Expanded Metal: Carbon-steel sheets, deburred after expansion, and complying with ASTM F 1267.
- h. Malleable-Iron Castings: ASTM A 47/A 47M, grade as recommended by fabricator for type of use intended.
- i. Gray-Iron Castings: ASTM A 48/A 48M, Class 200.
3. Stainless Steel: Free of surface blemishes and complying with the following:
 - a. Sheet, Strip, Plate, and Flat Bars: ASTM A 666.
 - b. Pipe: Schedule 40 steel pipe complying with ASTM A 312/A 312M.
 - c. Tubing: ASTM A 554.
4. Wood: Surfaced smooth on four sides with eased edges; kiln dried, free of knots, solid stock of species indicated.
 - a. Wood Species: Manufacturer's standard.
 - 1) Douglas Fir: Clear Grade, vertical grain.
 - 2) Pine: Southern pine; No. 2 or better; preservative treated, kiln dried after treatment.
 - 3) Eastern White **OR** Red **OR** Yellow **OR** Cedar, **as directed**: Select Grade or better.
 - 4) Redwood: Clear all heart **OR** Construction heart or better, **as directed**, free-of-heart center.
 - 5) Teak (Tectona Grandis): Clear Grade. Provide wood obtained from sources that participate in a well-managed forest and chain-of-custody program certified by an independent agency accredited by FSC.
 - 6) Finish: Manufacturer's standard stain and transparent sealer **OR** transparent wood preservative treatment and sealer, **as directed**.
5. Fiberglass: Multiple laminations of glass-fiber-reinforced polyester resin with UV-light stable, colorfast, nonfading, weather- and stain-resistant, colored polyester gel coat, and manufacturer's standard finish.
6. Plastic: Color impregnated, color and UV-light stabilized, and mold resistant.
 - a. Polyethylene: Fabricated from virgin plastic HDPE resin.
 - b. Recycled Polyethylene: Fabricated from not less than 96 percent recycled, purified, fractional-melt plastic resin with not less than 90 percent recycled postconsumer waste by weight HDPE.
7. Anchors, Fasteners, Fittings, and Hardware: Stainless steel **OR** Brass **OR** Galvanized steel **OR** Zinc-plated steel **OR** Manufacturer's standard, corrosion-resistant-coated or noncorrodible materials, **as directed**; commercial quality, tamperproof, vandal and theft resistant **OR** concealed, recessed, and capped or plugged, **as directed**.
 - a. Angle Anchors: For inconspicuously bolting legs of site furnishings to on **OR** below, **as directed** -grade substrate; one per leg **OR** extent as indicated, **as directed**.
 - b. Antitheft Hold-Down Brackets: For securing site furnishings to substrate; two per unit **OR** extent as indicated on Drawings, **as directed**.
8. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107; recommended in writing by manufacturer, for exterior applications.
9. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with potable water at Project site to create pourable anchoring, patching, and grouting compound; resistant to erosion from water exposure without needing protection by a sealer or waterproof coating; recommended in writing by manufacturer, for exterior applications.
10. Galvanizing: Where indicated for steel and iron components, provide the following protective zinc coating applied to components after fabrication:
 - a. Zinc-Coated Tubing: External, zinc with organic overcoat, consisting of a minimum of **0.9 oz./sq. ft. (0.27 kg/sq. m)** of zinc after welding, a chromate conversion coating, and a clear,

- polymer film. Internal, same as external or consisting of 81 percent zinc pigmented coating, not less than **0.3 mil (0.0076 mm)** thick.
- b. Hot-Dip Galvanizing: According to ASTM A 123/A 123M, ASTM A 153/A 153M, or ASTM A 924/A 924M.
- B. Seating And Tables**
1. Frame: Cast aluminum **OR** Cast iron **OR** Steel **OR** Stainless steel **OR** Wrought iron **OR** Cedar **OR** Teak, **as directed**.
 2. Seat **OR** Seat and Back, **as directed**:
 - a. Material:
 - 1) Aluminum Sheet: Perforated **OR** Expanded, **as directed**, metal.
 - 2) Steel **OR** Painted Steel, **as directed**: Perforated metal **OR** Expanded metal **OR** Evenly spaced, parallel flat straps or bars **OR** Evenly woven, flat straps or bars **OR** Edge framed, evenly spaced, parallel rods or rolled bars, **as directed**.
 - 3) Stainless Steel: Perforated metal **OR** Expanded metal **OR** Evenly spaced, parallel flat straps or bars **OR** Evenly woven, flat straps or bars **OR** Edge framed, evenly spaced, parallel rods or rolled bars, **as directed**.
 - 4) Wood: Douglas fir **OR** Pine **OR** Cedar **OR** Redwood **OR** Teak, **as directed**; formed into evenly spaced parallel slats **OR** planks, **as directed**.
 - 5) Recycled **OR** Plastic **OR** fiberglass, **as directed**, Planks: Evenly spaced, parallel.
 - 6) Recycled **OR** Plastic **OR** Fiberglass, **as directed**, Sheet: Solid **OR** Perforated, **as directed**.
 - b. Seat Height: As indicated.
 - c. Seat Surface Shape: Flat **OR** Contoured or dished, **as directed**.
 - d. Overall Height: As indicated.
 - e. Overall Width: As indicated.
 - f. Overall Depth: As indicated.
 - g. Arms: None **OR** One, as indicated **OR** Two, one at each end **OR** Three, one at each end and in center, **as directed**.
 - 1) Arm Material: Match frame **OR** seat, **as directed**.
 - h. Seating Configuration: Multiple units as indicated.
 - 1) Straight **OR** Angled **OR** Curved, **as directed**, shape.
 - 2) Closed hexagon **OR** circle **OR** shape indicated, **as directed**, around a tree trunk **OR** planter **OR** light post, **as directed**.
 3. Table Top:
 - a. Material:
 - 1) Aluminum Sheet: Perforated **OR** Expanded, **as directed**, metal.
 - 2) Steel **OR** Painted Steel, **as directed**: Perforated metal **OR** Expanded metal **OR** Evenly spaced, parallel flat straps or bars **OR** Evenly woven, flat straps or bars **OR** Edge framed, evenly spaced, parallel rods or rolled bars, **as directed**.
 - 3) Stainless Steel: Perforated metal **OR** Expanded metal **OR** Evenly spaced, parallel flat straps or bars **OR** Evenly woven, flat straps or bars **OR** Edge framed, evenly spaced, parallel rods or rolled bars, **as directed**.
 - 4) Wood: Douglas fir **OR** Pine **OR** Cedar **OR** Redwood **OR** Teak, **as directed**; formed into evenly spaced parallel slats **OR** planks, **as directed**.
 - 5) Recycled **OR** Plastic **OR** Fiberglass, **as directed**, Planks: Evenly spaced, parallel.
 - 6) Recycled **OR** Plastic **OR** Fiberglass, **as directed**, Sheet: Solid **OR** Perforated, **as directed**.
 - b. Surface Shape: Round **OR** Hexagon **OR** Shape indicated, **as directed**.
 - c. Feature: Center umbrella hole.
 4. Aluminum Finish: Mill finish **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 5. Steel Finish: Galvanized and color **OR** PVC-color, **as directed**, coated.
 - a. Color: As selected from manufacturer's full range.
 6. Stainless-Steel Finish: Dull Satin No. 6.

7. Wood Finish: Unfinished **OR** Factory-applied transparent finish **OR** Factory-applied stain and transparent finish **OR** Factory-applied opaque finish **OR** Manufacturer's standard finish, **as directed**.
 - a. Stain: Manufacturer's standard.
 8. Fiberglass **OR** HDPE, **as directed**, Color: As selected from manufacturer's full range.
 9. Graphics: Surface-applied **OR** Engraved **OR** Attached brass plaque with engraved, **as directed**, copy, content, and style per manufacturer's standard **OR** as indicated on Drawings, **as directed**.
- C. Bicycle Racks
1. Bicycle Rack Construction:
 - a. Frame: Aluminum **OR** Steel **OR** Galvanized steel **OR** Stainless steel **OR** Steel and redwood **OR** Steel and pine, **as directed**.
 - 1) Pipe **OR** Tubing, **as directed**, OD: Not less than 1-5/8 inches (41 mm) **OR** 2-3/8 inches (60 mm) **OR** 2-7/8 inches (73 mm) **OR** 4-1/2 inches (115 mm), **as directed**.
 - 2) Locking Bars: Solid round bar, not less than 3/4 inch (19 mm) **OR** 1 inch (25 mm), **as directed**, in diameter.
 - b. Style: Single-side parking **OR** Double-side parking **OR** Bollard **OR** As indicated, **as directed**.
 - 1) Capacity: Designed to accommodate no fewer than two **OR** three **OR** four, **as directed**, bicycles.
 - c. Security: Designed to lock wheel and frame.
 - d. Accessories: Base covers for each pipe and tubing anchored end **OR** Wheel stops, **as directed**.
 - e. Installation Method: Freestanding **OR** Surface flange anchored at finished grade to substrate indicated **OR** Surface flange anchored below finished grade to substrate indicated **OR** Cast in concrete **OR** Bolted to cast-in anchor bolts **OR** Wall mounted **OR** As indicated, **as directed**.
 2. Aluminum Finish: Mill finish **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 3. Steel Finish: Galvanized **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 4. Stainless-Steel Finish: Directional Satin No. 4.
 5. Wood Finish: Unfinished **OR** Manufacturer's standard finish, **as directed**.
- D. Bicycle Lockers
1. Bicycle Locker Construction:
 - a. Locker: Molded one-piece fiberglass **OR** Sheet steel, 0.053 inch (1.4 mm) thick, **OR** Sheet steel, 0.053 inch (1.4 mm) thick, with perforated metal sides, **as directed**, with welded tubular steel frame.
 - b. Door: Molded one-piece fiberglass **OR** Sheet steel, 0.053 inch (1.4 mm) thick, **as directed**, with tubular steel frame **OR** Match locker, **as directed**.
 - c. View Window **OR** Grille, **as directed**: Lexan, 12 inches (305 mm) square **OR** Perforated metal, **as directed**.
 - d. Lock: Manufacturer's standard **OR** Key lock with internal locking bar **OR** Coin/token lock, **as directed**.
 - 1) Provide four keys.
 - e. Overall Height: As indicated.
 - f. Overall Width: As indicated.
 - g. Overall Depth: As indicated.
 - h. Capacity: Designed to accommodate one **OR** two, **as directed**, bicycle(s).
 - i. Installation Method: Locker anchored at finished grade to substrate indicated **OR** Locker anchored below finished grade to substrate indicated **OR** As indicated, **as directed**.
 - j. Locker Configuration: Multiple **OR** Four, **as directed**, units as indicated, in straight row **OR** curved shape **OR** shape indicated, **as directed**.
 2. Steel Finish: Color coated.

- a. Color: As selected from manufacturer's full range.
 3. Fiberglass Color: As selected from manufacturer's full range.
- E. Trash And Ash Receptacles
1. Aluminum Facing Surrounds: Aluminum sheet **OR** Perforated aluminum sheet **OR** Grid in tubular frame **OR** Evenly patterned, parallel flat aluminum straps, bars, or tubular shapes **OR** Match benches, **as directed**.
 2. Steel Facing Surrounds: Steel sheet **OR** Perforated-steel sheet **OR** Evenly patterned, parallel flat steel straps, bars, or tubular shapes **OR** Evenly patterned, parallel round steel rods, bars, or tubular shapes **OR** Grid in tubular frame **OR** Match benches, **as directed**.
 3. Stainless-Steel Facing Surrounds: Steel sheet **OR** Perforated-steel sheet **OR** Evenly patterned, parallel flat steel straps, bars, or tubular shapes **OR** Evenly patterned, parallel round steel rods, bars, or tubular shapes **OR** Grid in tubular frame **OR** Match benches, **as directed**.
 4. Wood Facing Surrounds: Evenly spaced, Douglas fir slats **OR** Evenly spaced pine slats **OR** Evenly spaced cedar slats **OR** Redwood panels **OR** Evenly spaced redwood slats **OR** Teak panels **OR** Evenly spaced teak slats **OR** Match benches, **as directed**.
 5. Fiberglass Facing Surrounds: Molded fiberglass shape.
 6. Plastic Facing Surrounds: Molded HDPE shape **OR** Evenly spaced HDPE slats **OR** Evenly spaced, recycled HDPE slats **OR** Match benches, **as directed**.
 7. Support Frames: Steel **OR** Galvanized steel, **as directed**; welded.
 8. Trash and Ash Receptacles:
 - a. Receptacle Shape and Form: Round cylinder **OR** Round cylinder with tapered funnel top **OR** Round, tapered column **OR** Square column **OR** Rectangular column **OR** As indicated, **as directed**; with opening for depositing trash in lid or top **OR** side of lid or top **OR** receptacle side, **as directed**.
 - b. Ash Receptacle Function: Uncovered receptacle with sand pan **OR** Uncovered receptacle with bowl and funnel **OR** Covered receptacle with sand pan **OR** Covered receptacle with bowl and screen **OR** Covered receptacle with slots **OR** Uncovered receptacle with sand pan attaching to side of trash receptacle, **as directed**, for depositing cigarette butts; fire-proof design; bowl and pan removable for cleaning.
 - c. Lids and Tops: Matching facing panels **OR** Aluminum **OR** Steel **OR** HDPE **OR** Recycled HDPE, **as directed**, secured by cable or chain, hinged, swiveled, or permanently secured.
 - 1) Description: Flat rim ring lid with center opening **OR** Dome top **OR** Arched top **OR** Elevated flat or shallow dome rain-cap lid **OR** Combination ash sand pan and rim lid **OR** Combination ash sand pan and dome top **OR** Combination ash sand pan and elevated flat or shallow dome rain-cap lid, **as directed**.
 - 2) Opening for depositing trash covered by self-closing, spring-loaded-hinged, push-in **OR** rotating, **as directed**, weather flap.
 - d. Inner Container: Aluminum **OR** Galvanized steel sheet **OR** Perforated-metal **OR** Fiberglass **OR** Rigid plastic, **as directed**, container with drain holes **OR** lift-out handles, **as directed**; designed to be removable and reusable.
 - e. Disposable Liners: Provide receptacle designed to accommodate disposable liners.
 - f. Capacity: Not less than 22 gal. (83 L) **OR** 28 gal. (106 L) **OR** 30 gal. (114 L) **OR** 32 gal. (121 L) **OR** 40 gal. (151 L) **OR** 55 gal. (208 L), **as directed**.
 - g. Service Access: Removable lid or top **OR** Fixed lid or top, side access, **as directed**; inner container and disposable liner lift or slide out for emptying; lockable with padlock hasps **OR** keyed lock with two keys per receptacle **OR** self-latching hinge, **as directed**.
 - h. Post Mount: Color-coated steel pipe; color to match receptacle **OR** Galvanized steel pipe **OR** Wood, **as directed**; for mounting one **OR** two **OR** three, **as directed**, receptacle(s).
 - i. Ash Receptacle Accessories: Sand sifter **OR** Butt stub-out, **as directed**.
 9. Aluminum Finish: Mill finish **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 10. Steel Finish: Galvanized and color **OR** PVC-color, **as directed**, coated.
 - a. Color: As selected from manufacturer's full range.
 11. Stainless-Steel Finish: Dull Satin No. 6.

32 - Exterior Improvements



12. Wood Finish: Unfinished **OR** Factory-applied transparent finish **OR** Factory-applied stain and transparent finish **OR** Factory-applied opaque finish **OR** Manufacturer's standard finish, **as directed**.
 - a. Stain: Manufacturer's standard.
13. Fiberglass **OR** HDPE, **as directed**, Color: As selected from manufacturer's full range.
14. Graphics: Surface-applied **OR** Engraved **OR** Attached brass plaque with engraved, **as directed**, copy, content, and style per manufacturer's standard **OR** as indicated on Drawings, **as directed**.
 - a. Copy: Litter **OR** Trash **OR** Waste **OR** Recycle, **as directed**.

F. Planters

1. Aluminum Facing Surrounds: Aluminum sheet **OR** Perforated aluminum sheet **OR** Grid in tubular frame **OR** Evenly patterned, parallel flat aluminum, **as directed**, straps, bars, or tubular shapes **OR** Match benches, **as directed**.
2. Steel Facing Surrounds: Steel sheet **OR** Perforated-steel sheet **OR** Evenly patterned, parallel flat steel straps, bars, or tubular shapes **OR** Evenly patterned, parallel round steel rods, bars, or tubular shapes **OR** Grid in tubular frame **OR** Match benches, **as directed**.
3. Stainless-Steel Facing Surrounds: Steel sheet **OR** Perforated-steel sheet **OR** Evenly patterned, parallel flat steel straps, bars, or tubular shapes **OR** Evenly patterned, parallel round steel rods, bars, or tubular shapes **OR** Grid in tubular frame **OR** Match benches, **as directed**.
4. Wood Facing Surrounds: Evenly spaced, Douglas fir slats **OR** Evenly spaced pine slats **OR** Evenly spaced cedar slats **OR** Redwood panels **OR** Evenly spaced redwood slats **OR** Teak panels **OR** Evenly spaced teak slats **OR** Match benches, **as directed**.
5. Fiberglass Facing Surrounds: Molded fiberglass shape.
6. Plastic Facing Surrounds: Molded HDPE shape **OR** Evenly spaced HDPE slats **OR** Evenly spaced, recycled HDPE slats **OR** Match benches, **as directed**.
7. Support Frames: Steel **OR** Galvanized steel, **as directed**; welded.
8. Planter Shape and Form: Round cylinder **OR** Round cylinder with tapered funnel top **OR** Round, tapered column **OR** Square column **OR** Rectangular column **OR** As indicated, **as directed**.
9. Style: To match benches **OR** As indicated by manufacturer's designation, **as directed**.
10. Inner Container: Aluminum **OR** Galvanized steel sheet **OR** Fiberglass **OR** Rigid plastic, **as directed**, container with drain holes.
11. Capacity: Not less than 22 gal. (83 L) **OR** 28 gal. (106 L) **OR** 30 gal. (114 L) **OR** 32 gal. (121 L) **OR** 40 gal. (151 L) **OR** 55 gal. (208 L), **as directed**.
12. Installation Method: Freestanding **OR** Freestanding with weighted base **OR** Anchored to substrate indicated on Drawings **OR** Wall mounted **OR** Post mounted **OR** Mounted on elevated leg angles anchored at finished grade to substrate indicated on Drawings **OR** Mounted on elevated leg angles anchored below finished grade to substrate indicated on Drawings **OR** As indicated on Drawings, **as directed**.
 - a. Post Mount: Color-coated steel pipe; color to match receptacle **OR** Galvanized steel pipe **OR** Wood, **as directed**; for mounting one **OR** two **OR** three, **as directed**, planter(s).
13. Aluminum Finish: Color coated.
 - a. Color: As selected from manufacturer's full range.
14. Steel Finish: Galvanized and color **OR** PVC-color, **as directed**, coated.
 - a. Color: As selected from manufacturer's full range.
15. Stainless-Steel Finish: Dull Satin No. 6.
16. Wood Finish: Unfinished **OR** Factory-applied transparent finish **OR** Factory-applied stained and transparent finish, **as directed**.
17. Fiberglass **OR** HDPE, **as directed**, Color: As selected from manufacturer's full range.
 - a. Finish: Smooth **OR** Textured, **as directed**.

G. Bollards

1. Bollard Construction:
 - a. Pipe **OR** Tubing **OR** Cast, **as directed** OD: Not less than 4-1/2 inches (115 mm), fluted, **as directed**.
 - 1) Steel: Schedule 40 **OR** 80, **as directed**, pipe.

- 2) Aluminum: Extruded pipe and tubes **OR** Castings, **as directed**.
 - 3) Stainless Steel: Tubes **OR** Pipe, **as directed**.
 - 4) Cast Iron: Tapered **OR** As indicated, **as directed**.
 - b. Round **OR** Square, **as directed**, Wood: Cedar, **8 inches (203 mm)** square **OR 10 inches (254 mm)** in diameter, **as directed**.
 - c. Style: Manufacturer's standard **OR** Chamfered top **OR** Dome top **OR** Ornamental cap **OR** As indicated, **as directed**.
 - d. Accessories: Eye bolts.
 - e. Installation Method: Surface flange anchored at finished grade to substrate indicated **OR** Surface flange anchored below finished grade to substrate indicated **OR** Cast in concrete **OR** Bolted to cast-in anchor bolts **OR** As indicated, **as directed**.
 2. Aluminum Finish: Mill finish **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 3. Steel Finish: Galvanized **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 4. Cast-Iron Finish: Manufacturer's standard **OR** Galvanized **OR** Color coated, **as directed**.
 - a. Color: As selected from manufacturer's full range.
 5. Stainless-Steel Finish: Directional Satin No. 4.
 6. Wood Finish: Unfinished **OR** Manufacturer's standard finish, **as directed**.
- H. Fabrication
1. Metal Components: Form to required shapes and sizes with true, consistent curves, lines, and angles. Separate metals from dissimilar materials to prevent electrolytic action.
 2. Welded Connections: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.
 3. Pipes and Tubes: Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.
 4. Preservative-Treated Wood Components: Complete fabrication of treated items before treatment if possible. If cut after treatment, apply field treatment complying with AWWA M4 to cut surfaces.
 5. Exposed Surfaces: Polished, sanded, or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded, or capped.
 6. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.
- I. Finishes, General
1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 2. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- J. Aluminum Finishes
1. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.
- K. Steel And Galvanized Steel Finishes
1. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

2. PVC Finish: Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application, and minimum dry film thickness.

L. Iron Finishes

1. Baked-Enamel, Powder-Coat Finish: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, including pretreatment, application, baking, and minimum dry film thickness.

M. Stainless-Steel Finishes

1. Remove tool and die marks and stretch lines or blend into finish.
2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

1.3 EXECUTION

A. Installation, General

1. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
2. Unless otherwise indicated, install site furnishings after landscaping and paving have been completed.
3. Install site furnishings level, plumb, true, and securely anchored **OR** positioned, **as directed**, at locations indicated on Drawings.
4. Post Setting: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.
5. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and **3/4 inch (19 mm)** larger than OD of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.
6. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions, with top smoothed and shaped to shed water.

B. Cleaning

1. After completing site furnishing installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 32 33 23 00

SECTION 32 33 23 00a - MISCELLANEOUS SITE AND STREET FURNISHINGS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of miscellaneous site and street furnishings. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Fabrication and installation drawings for each type of product indicated.
2. Product Data: For each type of product indicated.

C. Qualification Of Welders

1. Qualify welders in accordance with AWS D1.1 using procedures, materials, and equipment of the type required for the work.

D. Delivery, Storage, And Protection

1. Protect from corrosion, staining, and other types of damage. Store items in an enclosed area free from contact with soil and weather. Remove and replace damaged items with new items.

1.2 PRODUCTS

A. Precast Benches

1. Design precast benches in accordance with manufacturer's standards, size as indicated. Finish and color as indicated selected from manufacturer's standards.
2. Glass Fiber Reinforced Concrete (GFRC) Benches
 - a. Provide glass fiber reinforced concrete (GFRC) benches at locations as directed. Comply with PCI MNL-128 recommended practice for glass fiber reinforced concrete, including Appendix G, Polymer Modified Glass Fiber Reinforced Concrete Panels.
 - b. Design precast benches to sustain a live load of not less than **200 pounds per square foot (10 kPa)**, constructed of minimum 3000 psi concrete with ASTM C 150 cement, white or grey color consistent with final finish, using alkali resistant (AR) glass fibers produced specifically for use in glass fiber reinforced concrete, minimum three percent glass fiber content. Aggregate shall be clear silica sand aggregate; washed, dried and free from deleterious materials. Provide type with successful history of uses in GFRC fabrication standard with the manufacturer. Provide manufacturer's standard acrylic thermoplastic copolymer admixture.
 - c. Provide factory finished units standard with the manufacturer; texture and color as selected.
3. Precast Concrete/Cast Stone Benches
 - a. Provide reinforced precast concrete benches consisting of a mixture of cement, aggregates and mineral colors suitable for exterior use, located as directed.
 - b. Design benches to sustain a live load of not less than **200 pounds per square foot (10 kPa)**.
 - 1) Portland cement: ASTM C150 Type I, II, or III.
 - 2) Aggregate: ASTM C33, maximum size **3/4 inch (19 mm)**.
 - 3) Reinforcing steel: ASTM A615/A615M
 - 4) Galvanized wire mesh: ASTM A1064
 - 5) Integral color: ASTM C979, pure mineral oxide, limeproof and non-fading.
 - 6) Provide minimum **5000 psi (35 MPa)** 28 day compressive strength concrete, maximum five percent absorption.

- 7) Admixture: ASTM C260 for air-entraining.
- B. Precast Concrete Bicycle Rack
1. Provide one-piece precast concrete bicycle rack base with embedded galvanized metal hitching loops. Design bicycle rack with wheel notches for bike support and wheel locking device.
- C. Precast Concrete Bollards
1. Provide reinforced concrete bollards **12 inch (300 mm) OR 18 inch (450 mm), as directed**, square **OR** round, **as directed**, height as indicated, suitable for ground mount installation. Provide exposed aggregate or sandblast finish as indicated; manufacturer's standard clear acrylic sealer.
 - a. Portland cement: ASTM C150, Type I II or III.
 - b. Aggregate: ASTM C33, maximum size **3/4 inch (19 mm)**.
 - c. Reinforcing steel: ASTM A615/A615M.
 - d. Integral color: ASTM C979, pure mineral oxide, limeproof and non-fading.
 - e. Concrete strength: **5000 psi (35 MPa)**, 28 day minimum compressive strength.
 - f. Admixture: ASTM C260 for air-entraining.
- D. Planters, Receptacles, Ash Receptacles
1. Provide for waste receptacles spun aluminum **OR** reinforced fiberglass, **as directed**, flat **OR** domed, **as directed**, tops and removable semi-rigid plastic liner insert. Provide top-mounted ash trays for ash receptacles.
 2. Glass Fiber Reinforced Concrete (GFRC) Precast:
 - a. Provide glass fiber reinforced concrete (GFRC) precast planters/waste receptacles/ash receptacles at locations as directed. Comply with PCI MNL-117 and PCI MNL-128.
 - b. Materials: Provide manufacturer's standard shell thickness of **3/8 to 5/8 inch (9 to 16 mm)**.
 - 1) Cement: ASTM C150, use only one brand and type of cement throughout the Project.
 - 2) Glass Fibers: Alkali resistant (AR) glass fibers produced specifically for use in glass fiber reinforced concrete. Glass content of GFRC unit to be a minimum of three percent.
 - 3) Aggregates: clear silica sand; washed, dried, and free from deleterious materials; provide type with successful history of use in GFRC and as standard with the manufacturer.
 - 4) Compressive Strength: Minimum **3000 psi (20/25 MPa)** 28 day strength.
 - 5) Density: Approximately **120 pcf (1921 kg/cu. m)**.
 - 6) Polymer Admixture: Manufacturer's standard acrylic thermoplastic copolymer.
 - c. Finishes: Provide factory finished units with manufacturer's standard texture or sandblasted finish as selected.
 - 1) Cement: White or grey as consistent with final finish.
 3. Precast Concrete/Cast Stone Planters
 - a. Provide reinforced precast concrete planters/waste receptacles/ash receptacles consisting of a mixture of cement, aggregates, and mineral colors suitable for exterior use as located on the drawings. Provide manufacturer's standard exposed aggregate or sandblast finish (with clear acrylic coating) as selected.
 - 1) Portland Cement: ASTM C150, gray, Type I.
 - 2) Aggregate: ASTM C33, crushed limestone and sand.
 - 3) Galvanized Steel Mesh: ASTM A1064.
 - 4) Integral Color: ASTM C979, pure mineral oxide, limeproof and non-fading.
 - 5) Concrete Strength: **4000 psi (30 MPa)** minimum compressive strength at 28 days.
 - 6) Admixture: ASTM C260 for air-entraining.
 4. Wood Planters
 - a. Provide manufacturer's standard wood planter/waste receptacle/ash receptacles fabricated of **3/4 inch (19 mm)** thick tongue and grooved wood slats permanently bonded with

fiberglass interior shell. Provide wood top trim for square planters and fiberglass top trim for round planters.

- 1) Wood Species: As directed.
 - 2) Fiberglass: Molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins with a finish of **12-15 mil (0.30-0.38 mm)** color impregnated polyester gel coat.
 - 3) Metal Frame: Black color-coated steel frame.
5. Wood Planters with Metal Frames
- a. Provide manufacturer's standard wood planter/waste receptacle/ash receptacle with galvanized steel welded frames, and nominal **2 inch (50 mm)** tongue and grooved, beveled or square cut wood staves. Attach wood staves to metal frame from inside with steel plated screws.
 - 1) Wood species: Kiln dried, maximum 19 percent moisture content, species as directed.
 - 2) Metal frame: Reinforced with steel bars as per manufacture's standard construction, black color factory finish coated.
 - 3) Bottom: **1/4 inch (6.25 mm)** exterior grade redwood with drain holes.
 - 4) Liners: Removable galvanized steel or manufacturer's standard.
 - 5) Tops: Hinged top opening, spun aluminum open top with molded rim, ash top.
6. Fiberglass Planters/Waste Receptacles/Ash Receptacles
- a. Provide reinforced fiberglass planters/waste receptacles/ash receptacles molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins; with **12-15 mil (0.30-0.38 mm)** color impregnated polyester gel coat finish; minimum thickness of **1/4 inch (6.25 mm)**; color as selected.
 - b. Receptacles:
 - 1) Shall be manufactured by Maglin,
 - 2) Color: Malaga Green

E. Shelters

1. AISC S342L; AISC S335. Provide prefabricated shelter systems to meet design conditions indicated. Shelter design shall conform to all applicable State and Local Building Codes and shall meet manufacturer's standards of construction and materials. Shelter systems shall be preglazed, pre-drilled and pre-cut, shipped with all hardware and accessories necessary for complete field assembly.
2. Framing Systems: Framing system; columns, rafters, ridge, purlins and other structural framing members shall be aluminum/steel/wood as indicated. Manufacturer shall provide shop drawings and calculations prepared by a structural engineer.
 - a. Extruded aluminum alloy tubing shall conform to ASTM B429 6063-T5 or 3003-H14, anodized or powder coat finish, color as directed. Framing sizes and configurations shall be as required for size of structure indicated meeting manufacturer's standards and applicable building codes.
 - b. Structural steel shall conform to ASTM A36/A36M or ASTM A500, **36,000 psi (248 MPa)** yield strength and **58,000 psi (400 MPa)** tensile strength, factory finished with rust inhibited primer and powder coat conforming to ASTM D3451. Framing sizes and configurations shall be as required for size of structure indicated meeting manufacturer's standard and applicable building codes.
 - c. Wood framing system shall consist of surfaced four sides (S4S), #2 grade southern yellow pine solid timber columns with eased edges, pressure treated CCA (Copper Chrome Arsinat) **0.6 PCF (9.6 kg/cu.m)** against decay, fungi and insect infestation, surfaced four sides (S4S), #1 grade, southern pine, glue-laminated columns manufactured in accordance with ANSI/AITC A190.1 and AITC certified glue-laminated structural grade southern yellow pine beams, rafters and purlins, factory sealed and individually wrapped for protection during shipment. Factory stain all wood members prior to shipment.
3. Roof Panels/Decking: Provide manufacturer's standard molded acrylic translucent roof panel, OR standing seam metal roof panel, OR wood decking, OR V-beam aluminum roof panels, OR

FRP roof panels, as indicated. Materials shall be factory finished and shipped with all necessary fasteners and accessories as required for complete site assembly.

4. Glazing: Factory installed in separate structural window frames, gasketed and glazed as per manufacturer's standard, interchangeable, glazing system. Provide **1/4 inch (6.25 mm)** acrylic sheet, OR tempered glass, OR polycarbonate plastic sheet OR mar-resistant polycarbonate plastic sheet, clear OR color.

F. Tables

1. Precast Concrete Tables: Provide reinforced precast concrete tables with smooth tops; minimum **4500 psi (35 MPa)** concrete, 28 day minimum compressive strength, consisting of a mixture of cement, aggregates, and mineral colors suitable for exterior use as located on the drawings. Provide manufacturer's standard exposed aggregate or sandblast finish with clear acrylic coating.
 - a. Portland cement: ASTM C150, gray, Type I.
 - b. Aggregate: ASTM C33, washed limestone and sand.
 - c. Galvanized wire mesh: **14 gage (1.9 mm)**, **2 by two inch (50 by 50 mm)**.
 - d. Welded wire fabric: ASTM A1064.
 - e. Reinforcing steel: ASTM A615/A615M.
 - f. Integral color: ASTM C979, pure mineral oxide, limeproof and non-fading.
 - g. Admixture: ASTM C260 for air-entraining..
2. Fiberglass Tables: Provide reinforced fiberglass table tops molded with multiple laminations of glass fiber impregnated with polyester isophthalic thermosetting resins, minimum thickness of **1/4 inch (6.25 mm)** with **12-15 mil (0.30-0.38 mm)** thickness color impregnated polyester gel coat, color as selected.
 - a. Steel pedestal base: ASTM A53 Schedule 40 steel pipe.
 - b. Mounting: Type as indicated.
 - c. Metal finish: Powder coating conforming to ASTM D3451 testing.
3. Perforated Steel Tables: Provide **14 gage (1.9 mm)** OR **16 gage (1.6 mm)**, as directed, perforated steel sheet table tops with solid metal edges as per manufacturer's standard. Weld tops to base as required for frame support.
 - a. Steel pedestal base: ASTM A53 Schedule 40 steel pipe, **2 3/8 inch (60 mm)** O.D.
 - b. Mounting: Type as indicated.
 - c. Hardware: Zinc or cadmium plated nuts, bolts, screws, and lock washers.
 - d. Metal finish: Powder coating conforming to ASTM D3451 testing.
4. Wood Seats and Tables
 - a. Provide manufacturer's standard wood seats and tables, minimum **1-5/8 inches (40 mm)** thick with rounded edges, with wood or metal bases as indicated. Provide fasteners and accessories required for on site assembly. Kiln dry and pressure treat wood components to manufacturer's standard, maximum 19 percent moisture content. Pre-treat metal components and provide manufacturer's standard primer and powder coat finish complying with ASTM D3451, color as selected.
 - 1) Design wood tables to sustain a live load of not less than **200 pounds per square foot (10 kPa)**.
 - 2) Provide kiln dried, surfaced four sides (S4S), clear all sides wood slats of species and sizes indicated.
 - a) Species: As directed.
 - b) Nominal wood slat sizes: As directed.
 - b. Support Base: Provide wood or metal support bases as per manufacturer's standard.
 - 1) Wood: Match in species, grade, grain, color and finish of the wood slats.
 - 2) Steel: ASTM A653/A653M.
 - 3) Cast grey iron: ASTM A 48/A48M, Class 30 or recycled cast grey iron ASTM A48/A48M, Class 25.
 - 4) Cast aluminum: ASTM B26/B26M or ASTM B108 as applicable.
 - 5) Design bases to support the loads imposed in the design of the tables.

G. Grates

1. Provide cast aluminum **OR** cast iron **OR** cast bronze **OR** punched steel **OR** stainless steel, **as directed**, tree grates in round **OR** square, **as directed**, model of sizes indicated on the drawings. Furnish complete with angle steel frames with finish to match tree grates.

H. Fabrication Finishes

1. Galvanizing: Hot-dip galvanize items specified to be zinc-coated, after fabrication where practicable. Galvanizing: ASTM A123/A123M, ASTM A153/A153M or ASTM A653/A653M, as applicable.
2. Galvanize: Anchor bolts, grating fasteners, washers, and parts or devices necessary for proper installation, unless indicated otherwise.
3. Repair of Zinc-Coated Surfaces: Repair damaged surfaces with galvanizing repair method and paint conforming to ASTM A780 or by the application of stick or thick paste material specifically designed for repair of galvanizing, as approved. Clean areas to be repaired and remove the slag from the welds. Heat surfaces to which stick or paste material is applied, with a torch to a temperature sufficient to melt the metallics in stick or paste; spread the molten material uniformly over surfaces to be coated and wipe the excess material off.
4. Pretreatment, Priming and Painting: Apply pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a minimum dry film thickness of **1.0 mil (0.03 mm)**. Tint additional prime coat with a small amount of tinting pigment.
5. Nonferrous Metal Surfaces: Protect by plating, anodic, or organic coatings.
6. Aluminum Surfaces
 - a. Surface Condition: Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks, stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform appearance of finished surfaces.

1.3 EXECUTION

A. Installation

1. Install items at locations indicated, according to manufacturer's instructions. Items listed below require additional procedures.
 - a. Assembly and Erection of Components: Items shall be shipped knocked-down (KD) ready for site assembly. Packaged components shall be complete including all accessories and hardware. Follow manufacturer's instructions for assembly and erection. Provide mounting bolts or hardware for mounting items to substrate.

B. Anchorage, Fastenings, And Connections

1. Provide anchorage where necessary for fastening furniture or furnishings securely in place. Include for anchorage not otherwise specified or indicated slotted inserts, expansion shields, and powder-driven fasteners, when approved for concrete; toggle bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts, and screws for wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make exposed fastenings of compatible materials, generally matching in color and finish, to which fastenings are applied. Conceal fastenings where practicable.

C. Built-In-Work

1. Form for anchorage metal work built-in with concrete or masonry, or provide with suitable anchoring devices as indicated or as required. Furnish metal work in ample time for securing in place as the work progresses.

D. Welding

1. Perform welding, welding inspection, and corrective welding, in accordance with AWS D1.1. Use continuous welds on all exposed connections. Grind visible welds smooth in the finished installation.

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- E. Finishes: Dissimilar Materials
 - 1. Where dissimilar metals are in contact, protect surfaces with a coat conforming to FS TT-P-664 to prevent galvanic or corrosive action. Where aluminum is in contact with concrete, mortar, masonry, wood, or absorptive materials subject to wetting, protect with ASTM D1187, asphalt-base emulsion.

- F. Bollards
 - 1. Install in pipe sleeves embedded in concrete and filled with non-shrink grout or quick setting anchoring cement.

- G. Shelters
 - 1. Secure to the adjacent construction with the clip angles attached to the concrete. Secure to concrete with not less than two **1/2 inch (12 mm)** diameter expansion bolts.
 - a. Glazing: Factory install windows into separate structural frame. Miter corners and connect internally by extruded aluminum corner keys or screw bosses with tamper-proof stainless steel screws. Provide continuous gasketing around windows set to metal frames. Provide **1/2 to 3/4 inch (13 to 19 mm)** deep pocket for polycarbonate glazing. Fully gasket and frame in independent interchangeable factory assembled units. Affix to shelter frame with **3/16 inch (5 mm)** shallow head aluminum rivets at approximately **13 1/4 inches (331 mm)** on centers for full **360 degrees (6.28 rad)**, rivet from inside of shelter.
 - b. Roof: Provide manufacturer's standard roof system including fascia **OR** gutter, **as directed**, assembly, ensuring a weather-tight seal and installation.

END OF SECTION 32 33 23 00a

Task	Specification	Specification Description
32 33 23 00	01 22 16 00	No Specification Required
32 33 33 00	32 33 23 00	Site Furnishings
32 33 33 00	32 33 23 00a	Miscellaneous Site and Street Furnishings
32 33 43 13	32 33 23 00	Site Furnishings
32 33 43 53	32 33 23 00a	Miscellaneous Site and Street Furnishings
32 33 53 00	01 22 16 00	No Specification Required
32 39 23 00	32 33 23 00a	Miscellaneous Site and Street Furnishings

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SECTION 32 82 00 00 - IRRIGATION SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for irrigation systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Piping.
 - b. Encasement for piping.
 - c. Manual valves.
 - d. Pressure-reducing valves.
 - e. Automatic control valves.
 - f. Automatic drain valves.
 - g. Transition fittings.
 - h. Dielectric fittings.
 - i. Miscellaneous piping specialties.
 - j. Sprinklers.
 - k. Quick couplers.
 - l. Drip irrigation specialties.
 - m. Controllers.
 - n. Boxes for automatic control valves.

C. Definitions

1. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
2. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
3. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
4. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

D. Performance Requirements

1. Irrigation zone control shall be automatic operation with controller and automatic control **OR** manual operation with manual, **as directed**, valves.
2. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.
3. Delegated Design: Design 100 percent coverage irrigation system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
 - a. Available land records indicate the following soil conditions:
 - 1) Type: Coarse **OR** Medium **OR** Fine, **as directed**.
 - 2) Texture:
 - a) Sand: as directed by the Owner.
 - b) Silt: as directed by the Owner .
 - c) Clay: as directed by the Owner.
 - 3) Particle Size:
 - a) Sand: as directed by the Owner.
 - b) Silt: as directed by the Owner.

- c) Clay: as directed by the Owner.
 - 4) Structure: Single grained **OR** Granular **OR** Platy **OR** Blocky, **as directed**.
 - 5) Density: as directed by the Owner.
 - 6) Moisture Content: as directed by the Owner.
 - 7) Infiltration Rate: as directed by the Owner.
4. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:
- a. Irrigation Main Piping: **200 psig (1380 kPa)**.
 - b. Circuit Piping: **150 psig (1035 kPa)**.

E. Submittals

1. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Delegated-Design Submittal: For irrigation systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
4. Zoning Chart: Show each irrigation zone and its control valve.
5. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
6. Field quality-control reports.
7. Operation and maintenance data.

F. Quality Assurance

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Delivery, Storage, And Handling

1. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
2. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

H. Project Conditions

1. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of water service.
 - b. Do not proceed with interruption of water service without the Owner's written permission.

1.2 PRODUCTS

A. Pipes, Tubes, And Fittings

1. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
2. Galvanized-Steel Pipe: ASTM A 53/A 53M, Standard Weight, Type E, Grade B.
 - a. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless-steel pipe with threaded ends.
 - b. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.
 - c. Malleable-Iron Unions: ASME B16.39, Class 150, hexagonal-stock body with ball-and-socket, metal-to-metal, bronze seating surface, and female threaded ends.
 - d. Cast-Iron Flanges: ASME B16.1, Class 125.
3. Ductile-Iron Pipe with Mechanical Joints: AWWA C151, with mechanical-joint bell and spigot ends.

- a. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 1) Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 4. Ductile-Iron Pipe with Push-on Joint: AWWA C151, with push-on-joint bell and spigot ends.
 - a. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 1) Gaskets: AWWA C111, rubber.
 5. Soft Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)**, water tube, annealed temper.
 - a. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - b. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
 - c. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
 6. Hard Copper Tube: **ASTM B 88, Type L (ASTM B 88M, Type B)**, and **ASTM B 88, Type M (ASTM B 88M, Type C)**, water tube, drawn temper.
 - a. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - b. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
 - c. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
 7. PE Pipe with Controlled ID: ASTM F 771, PE 3408 compound; SIDR 11.5 and SIDR 15.
 - a. Insert Fittings for PE Pipe: ASTM D 2609, nylon or propylene plastic with barbed ends. Include bands or other fasteners.
 8. PE Pipe with Controlled OD: ASTM F 771, PE 3408 compound, SDR 11.
 - a. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
 - b. PE Socket-Type Fittings: ASTM D 2683.
 9. PE Pressure Pipe: AWWA C906, with DR of 7.3, 9, or 9.3 and PE compound number required to give pressure rating not less than **160 psig (1100 kPa) OR 200 psig (1380 kPa), as directed**.
 - a. PE Butt, Heat-Fusion Fittings: ASTM D 3261.
 - b. PE Socket-Type Fittings: ASTM D 2683.
 10. PVC Pipe: ASTM D 1785, PVC 1120 compound, Schedule 40 **OR** Schedule 80, **as directed**.
 - a. PVC Socket Fittings: ASTM D 2466, Schedule 40 **OR** Schedule 80, **as directed**.
 - b. PVC Threaded Fittings: ASTM D 2464, Schedule 80.
 - c. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket ends.
 11. PVC Pipe, Pressure Rated: ASTM D 2241, PVC 1120 compound, SDR 21 and SDR 26.
 - a. PVC Socket Fittings: ASTM D 2467, Schedule 80.
 - b. PVC Socket Unions: Construction similar to MSS SP-107, except both headpiece and tailpiece shall be PVC with socket or threaded ends.
- B. Piping Joining Materials
1. Pipe-Flange Gasket Materials: AWWA C110, rubber, flat face, **1/8 inch (3.2 mm)** thick unless otherwise indicated; full-face or ring type unless otherwise indicated.
 2. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
 3. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
 4. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
 5. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.
 6. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.
- C. Encasement For Piping
1. Standard: ASTM A 674 or AWWA C105.

2. Form: Sheet **OR** Tube, **as directed**.
3. Material: LLDPE film of **0.008-inch (0.20-mm)** **OR** LLDPE film of **0.008-inch (0.20-mm)** minimum thickness or high-density, cross-laminated PE film of **0.004-inch (0.10-mm)** **OR** High-density, cross-laminated PE film of **0.004-inch (0.10-mm)**, **as directed**, minimum thickness.
4. Color: Black **OR** Natural, **as directed**.

D. Manual Valves

1. Curb Valves:
 - a. Description:
 - 1) Standard: AWWA C800.
 - 2) **NPS 1 (DN 25)** and Smaller Pressure Rating: **100 psig (690 kPa)** minimum **OR 150 psig (1035 kPa)**, **as directed**.
 - 3) **NPS 1-1/4 to NPS 2 (DN 32 to DN 50)** Pressure Rating: **80 psig (550 kPa)** minimum **OR 150 psig (1035 kPa)**, **as directed**.
 - 4) Body Material: Brass or bronze with ball or ground-key plug.
 - 5) End Connections: Matching piping.
 - 6) Stem: With wide-tee head.
 2. Curb-Valve Casing:
 - a. Standard: Similar to AWWA M44 for cast-iron valve casings.
 - b. Top Section: Telescoping, of length required for depth of burial of curb valve.
 - c. Barrel: Approximately **3-inch (75-mm)** diameter.
 - d. Plug: With lettering "WATER."
 - e. Bottom Section: With base of size to fit over valve.
 - f. Base Support: Concrete collar **OR** wood frame, **as directed**.
 3. Shutoff Rods for Curb-Valve Casings: Furnish one **OR** two, **as directed**, steel, tee-handle shutoff rod(s) with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve for Project.
 4. Brass Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: **150 psig (1035 kPa)**.
 - 3) CWP Rating: **600 psig (4140 kPa)**.
 - 4) Body Design: Two piece.
 - 5) Body Material: Forged brass.
 - 6) Ends: Threaded or solder joint if indicated.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Brass.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full **OR** regular, but not reduced, **as directed**.
 5. Bronze Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-110.
 - 2) SWP Rating: **150 psig (1035 kPa)**.
 - 3) CWP Rating: **600 psig (4140 kPa)**.
 - 4) Body Design: Two piece.
 - 5) Body Material: Bronze.
 - 6) Ends: Threaded or solder joint if indicated.
 - 7) Seats: PTFE or TFE.
 - 8) Stem: Bronze.
 - 9) Ball: Chrome-plated brass.
 - 10) Port: Full **OR** regular, but not reduced, **as directed**.
 6. Iron Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-72.
 - 2) CWP Rating: **200 psig (1380 kPa)**.

- 3) Body Design: Split body.
- 4) Body Material: ASTM A 126, gray iron.
- 5) Ends: Flanged.
- 6) Seats: PTFE or TFE.
- 7) Stem: Stainless steel.
- 8) Ball: Stainless steel.
- 9) Port: Full.
7. Plastic Ball Valves:
 - a. Description:
 - 1) Standard: MSS SP-122.
 - 2) Pressure Rating: **125 psig (860 kPa)** minimum **OR 150 psig (1035 kPa)**, **as directed**.
 - 3) Body Material: PVC.
 - 4) Type: Union.
 - 5) End Connections: Socket or threaded.
 - 6) Port: Full.
8. Bronze Gate Valves:
 - a. Description:
 - 1) Standard: MSS SP-80, Type 2.
 - 2) Class: 125.
 - 3) CWP Rating: **200 psig (1380 kPa)**.
 - 4) Body Material: ASTM B 62 bronze with integral seat and screw-in bonnet.
 - 5) Ends: Threaded or solder joint.
 - 6) Stem: Bronze, nonrising.
 - 7) Disc: Solid wedge; bronze.
 - 8) Packing: Asbestos free.
 - 9) Handwheel: Malleable iron, bronze, or aluminum.
9. Iron Gate Valves, Resilient Seated:
 - a. Description:
 - 1) Standard: AWWA C509.
 - 2) Pressure Rating: **200 psig (1380 kPa)** **OR 250 psig (1725 kPa)**, **as directed**, minimum.
 - 3) Body Material: Ductile or gray iron with bronze trim.
 - 4) End Connections: Mechanical joint or push-on joint.
 - 5) Interior Coating: Comply with AWWA C550.
 - 6) Body Design: Nonrising stem.
 - 7) Operator: Stem nut.
 - 8) Disc: Solid wedge with resilient coating.
10. Iron Gate Valve Casings:
 - a. Standard: AWWA M44 for cast-iron valve casings.
 - b. Top Section: Adjustable extension of length required for depth of burial of valve.
 - c. Barrel: Approximately **5-inch (125-mm)** diameter.
 - d. Plug: With lettering "WATER."
 - e. Bottom Section: With base of size to fit over valve.
 - f. Base Support: Concrete collar **OR** wood frame, **as directed**.
11. Operating Wrenches for Iron Gate Valve Casings: Furnish one **OR** two, **as directed**, steel, tee-handle operating wrench(es) with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut for Project.
12. Iron Gate Valves, NRS:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) CWP Rating: **200 psig (1380 kPa)**.
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: All bronze.
 - 6) Disc: Solid wedge.

- 7) Packing and Gasket: Asbestos free.
13. Iron Gate Valves, OS&Y:
 - a. Description:
 - 1) Standard: MSS SP-70, Type I.
 - 2) CWP Rating: 200 psig (1380 kPa).
 - 3) Body Material: ASTM A 126, gray iron with bolted bonnet.
 - 4) Ends: Flanged.
 - 5) Trim: All bronze.
 - 6) Disc: Solid wedge.
 - 7) Packing and Gasket: Asbestos free.
- E. Pressure-Reducing Valves
 1. Water Regulators:
 - a. Description:
 - 1) Standard: ASSE 1003.
 - 2) Body Material: Bronze for NPS 2 (DN 50) and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
 - 3) Pressure Rating: Initial pressure of 150 psig (1035 kPa).
 - 4) End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 and NPS 3 (DN 65 and DN 80).
 2. Water Control Valves:
 - a. Description: Pilot-operation, diaphragm-type, single-seated main water control valve. Include small pilot control valve, restrictor device, specialty fittings, and sensor piping.
 - 1) Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.
 - 2) Pattern: Angle-valve **OR** Globe-valve, **as directed**, design.
 - 3) Trim: Stainless steel.
 - 4) Pressure Rating: Initial pressure of 150 psig (1035 kPa) minimum.
 - 5) End Connections: Threaded for NPS 2 (DN 50) and smaller; flanged for NPS 2-1/2 (DN 65) and larger.
- F. Automatic Control Valves
 1. Bronze, Automatic Control Valves:
 - a. Description: Cast-bronze body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.
 2. Plastic, Automatic Control Valves:
 - a. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.
- G. Automatic Drain Valves
 1. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig (17 to 20 kPa).
- H. Transition Fittings
 1. General Requirements: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.
 2. Transition Couplings:
 - a. Description: AWWA C219, metal sleeve-type coupling for underground pressure piping.
 3. Plastic-to-Metal Transition Fittings:
 - a. Description: PVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert, and one solvent-cement-socket or threaded end.
 4. Plastic-to-Metal Transition Unions:

- a. Description: MSS SP-107, PVC four-part union. Include one brass or stainless-steel threaded end, one solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.
- I. Dielectric Fittings
 1. General Requirements: Assembly of copper alloy and ferrous materials or ferrous material body with separating nonconductive insulating material suitable for system fluid, pressure, and temperature.
 2. Dielectric Unions:
 - a. Description: Factory-fabricated union, **NPS 2 (DN 50)** and smaller.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum **OR 250 psig (1725 kPa)**, **as directed**, at **180 deg F (82 deg C)**.
 - 2) End Connections: Solder-joint copper alloy and threaded ferrous; threaded ferrous.
 3. Dielectric Flanges:
 - a. Description: Factory-fabricated, bolted, companion-flange assembly, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)** and larger.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum **OR 175 psig (1200 kPa)** minimum **OR 300 psig (2070 kPa)**, **as directed**.
 - 2) End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.
 4. Dielectric-Flange Kits:
 - a. Description: Nonconducting materials for field assembly of companion flanges, **NPS 2-1/2 (DN 65)** and larger.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum.
 - 2) Gasket: Neoprene or phenolic.
 - 3) Bolt Sleeves: Phenolic or polyethylene.
 - 4) Washers: Phenolic with steel backing washers.
 5. Dielectric Couplings:
 - a. Description: Galvanized-steel coupling.
 - 1) Pressure Rating: **300 psig (2070 kPa)** at **225 deg F (107 deg C)**.
 - 2) End Connections: Female threaded.
 - 3) Lining: Inert and noncorrosive, thermoplastic lining.
 6. Dielectric Nipples:
 - a. Description: Electroplated steel nipple complying with ASTM F 1545.
 - 1) Pressure Rating: **300 psig (2070 kPa)** at **225 deg F (107 deg C)**.
 - 2) End Connections: Male threaded or grooved.
 - 3) Lining: Inert and noncorrosive, propylene.
 - J. Miscellaneous Piping Specialties
 1. Water Hammer Arresters: ASSE 1010 or PDI WH 201, with bellows or piston-type pressurized cushioning chamber and in sizes complying with PDI WH 201, Sizes A to F.
 2. Pressure Gages: ASME B40.1. Include **4-1/2-inch- (115-mm-)** diameter dial, dial range of two times system operating pressure, and bottom outlet.
 - K. Sprinklers
 1. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.
 2. Metal, Exposed, Impact-Drive Rotary Sprinklers:
 - a. Description:
 - 1) Construction: Brass and other corrosion-resistant metals.
 - 2) Mounting: Aboveground, exposed on riser.
 3. Plastic, Exposed, Impact-Drive Rotary Sprinklers:
 - a. Description:
 - 1) Construction: ABS and corrosion-resistant metals.
 - 2) Mounting: Aboveground, exposed on riser.
 4. Plastic, Pop-up, Gear-Drive Rotary Sprinklers:

- a. Description:
 - 1) Body Material: ABS.
 - 2) Nozzle: ABS **OR** Brass, **as directed**.
 - 3) Retraction Spring: Stainless steel.
 - 4) Internal Parts: Corrosion resistant.
 5. Metal, Pop-up, Impact-Drive Rotary Sprinklers:
 - a. Description:
 - 1) Case: Brass.
 - 2) Body Material: Brass.
 - 3) Pop-up Height: Approximately **3 inches (75 mm)**.
 - 4) Sprinkler Construction: Brass and other corrosion-resistant metals.
 6. Plastic, Pop-up, Impact-Drive Rotary Sprinklers:
 - a. Description:
 - 1) Case: ABS.
 - 2) Pop-up Height: Approximately **3 inches (75 mm)**.
 - 3) Sprinkler Construction: ABS and other corrosion-resistant metals.
 7. Metal, Surface Spray Sprinklers:
 - a. Description:
 - 1) Body Material and Flange: Brass.
 - 2) Nozzle: Brass.
 - 3) Pattern: Fixed, with flow adjustment.
 8. Plastic, Surface Spray Sprinklers:
 - a. Description:
 - 1) Body Material and Flange: ABS.
 - 2) Pattern: Fixed, with flow adjustment.
 9. Metal, Surface, Pop-up Spray Sprinklers:
 - a. Description:
 - 1) Body Material and Flange: Brass.
 - 2) Nozzle: Brass.
 - 3) Pattern: Fixed, with flow adjustment.
 10. Plastic, Surface, Pop-up Spray Sprinklers:
 - a. Description:
 - 1) Body Material and Flange: ABS.
 - 2) Pattern: Fixed, with flow adjustment.
 11. Plastic, Pop-up Spray Sprinklers:
 - a. Description:
 - 1) Body Material: ABS.
 - 2) Nozzle: ABS **OR** Brass, **as directed**.
 - 3) Retraction Spring: Stainless steel.
 - 4) Internal Parts: Corrosion resistant.
 - 5) Pattern: Fixed, with flow adjustment.
 12. Metal Shrub Sprinklers:
 - a. Description:
 - 1) Body Material: Brass.
 - 2) Nozzle: Brass.
 - 3) Pattern: Fixed, with flow adjustment.
 13. Plastic Shrub Sprinklers:
 - a. Description:
 - 1) Body Material: ABS or other plastic.
 - 2) Pattern: Fixed, with flow adjustment.
- L. Quick Couplers
1. Description: Factory-fabricated, bronze or brass, two-piece assembly. Include coupler water-seal valve; removable upper body with spring-loaded or weighted, rubber-covered cap; hose swivel with ASME B1.20.7, 3/4-11.5NH threads for garden hose on outlet; and operating key.

- a. Locking-Top Option: Vandal-resistant locking feature. Include one **OR** two, **as directed**, matching key(s).

M. Drip Irrigation Specialties

1. Freestanding Emitters: Device to deliver water at approximately 20 psig (138 kPa).
 - a. Body Material: PE or vinyl, with flow control.
 - b. Riser to Emitter: PE or PVC flexible tubing.
2. Manifold Emitter Systems: Manifold with tubing and emitters.
 - a. Manifold: With multiple outlets to deliver water to emitters.
 - 1) Body Material: Plastic.
 - 2) Outlet Caps: Plastic, for outlets without installed tubing.
 - 3) Operation: Automatic pressure compensating.
 - b. Tubing: PE or PVC; 1/8-inch (3-mm) minimum ID.
 - c. Emitter: Device to deliver water at approximately 20 psig (138 kPa).
 - 1) Body Material: PE or vinyl, with flow control.
3. Multiple-Outlet Emitter Systems: Emitter with tubing and button-type outlets.
 - a. Emitter: With multiple outlets to deliver water to remote outlets.
 - 1) Body Material: Plastic, with flow control.
 - 2) Outlet Caps: Plastic, for outlets without installed tubing.
 - 3) Operation: Automatic pressure compensating.
 - 4) Emitters: Devices to deliver water at approximately 20 psig (138 kPa).
 - b. Tubing: PE or PVC; 1/8-inch (3-mm) minimum ID.
4. Drip Tubes with Direct-Attached Emitters:
 - a. Tubing: Flexible PE or PVC with plugged end.
 - b. Emitters: Devices to deliver water at approximately 20 psig (138 kPa).
 - 1) Body Material: PE or vinyl, with flow control.
 - 2) Mounting: Inserted into tubing at set intervals.
5. Drip Tubes with Remote Discharge:
 - a. Tubing: Flexible PE or PVC with plugged end.
 - b. Emitters: Devices to deliver water at approximately 20 psig (138 kPa).
 - 1) Body Material: PE or vinyl, with flow control.
 - 2) Mounting: Inserted into tubing at set intervals.
6. Off-Ground Supports: Plastic stakes.
7. Application Pressure Regulators: Brass or plastic housing, NPS 3/4 (DN 20), with corrosion-resistant internal parts; capable of controlling outlet pressure to approximately 20 psig (138 kPa).
8. Filter Units: Brass or plastic housing, with corrosion-resistant internal parts; of size and capacity required for devices downstream from unit.
9. Air Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.
10. Vacuum Relief Valves: Brass or plastic housing, with corrosion-resistant internal parts.

N. Controllers

1. Description:
 - a. Controller Stations for Automatic Control Valves: Each station is variable from approximately 5 to 60 minutes. Include switch for manual or automatic operation of each station.
 - b. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.
 - 1) Body Material: Enameled-steel sheet metal **OR** Stainless-steel sheet metal **OR** Molded plastic, **as directed**.
 - 2) Mounting: Freestanding type for concrete base **OR** Surface type for wall, **as directed**.
 - c. Interior Control Enclosures: NEMA 250, Type 12, dripproof, with locking cover and two matching keys.
 - 1) Body Material: Enameled-steel sheet metal **OR** Stainless-steel sheet metal **OR** Molded plastic, **as directed**.

- 2) Mounting: Freestanding type for concrete base **OR** Surface type for wall, **as directed**.
- d. Control Transformer: 24-V secondary, with primary fuse.
- e. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate two or more times daily.
 - 1) Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
 - 2) Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.
 - 3) Surge Protection: Metal-oxide-varistor type on each station and primary power.
- f. Moisture Sensor: Adjustable from one to seven days, to shut off water flow during rain.
- g. Wiring: UL 493, Type UF multiconductor, with solid-copper conductors; insulated cable; suitable for direct burial.
 - 1) Feeder-Circuit Cables: No. 12 AWG minimum, between building and controllers.
 - 2) Low-Voltage, Branch-Circuit Cables: No. 14 AWG minimum, between controllers and automatic control valves; color-coded different from feeder-circuit-cable jacket color; with jackets of different colors for multiple-cable installation in same trench.
 - 3) Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.
- h. Concrete Base: Reinforced precast concrete not less than **36 by 24 by 4 inches (900 by 600 by 100 mm)** thick, and **6 inches (150 mm)** greater in each direction than overall dimensions of controller. Include opening for wiring.

O. Boxes For Automatic Control Valves

1. Plastic Boxes:
 - a. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
 - 1) Size: As required for valves and service.
 - 2) Shape: Round **OR** Square **OR** Rectangular, **as directed**.
 - 3) Sidewall Material: PE **OR** PE, ABS, or FRP, **as directed**.
 - 4) Cover Material: PE **OR** PE, ABS, or FRP, **as directed**.
 - a) Lettering: "VALVE BOX" **OR** "IRRIGATION," **as directed**.
2. Polymer-Concrete Boxes:
 - a. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
 - 1) Size: As required for valves and service.
 - 2) Shape: Round **OR** Square **OR** Rectangular, **as directed**.
 - 3) Sidewall Material: Polymer concrete with lateral and vertical sidewall design loading of **5000 lb (2268 kg) OR 10,000 lb (4536 kg) OR 15,000 lb (6800 kg)**, **as directed**, minimum over **10 by 10 inches (254 by 254 mm)** square.
 - 4) Cover Material: Polymer concrete **OR** Reinforced polymer concrete, **as directed**, with cover design loading of **5000 lb (2268 kg) OR 10,000 lb (4536 kg) OR 15,000 lb (6800 kg)**, **as directed**, minimum over **10 by 10 inches (254 by 254 mm)** square.
 - a) Lettering: "VALVE BOX" **OR** "IRRIGATION," **as directed**.
3. Drainage Backfill: Cleaned gravel or crushed stone, graded from **3/4 inch (19 mm)** minimum to **3 inches (75 mm)** maximum.

1.3 EXECUTION

A. Earthwork

1. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving".
2. Install warning tape directly above pressure piping, **12 inches (300 mm)** below finished grades, except **6 inches (150 mm)** below subgrade under pavement and slabs.

3. Drain Pockets: Excavate to sizes indicated. Backfill with cleaned gravel or crushed stone, graded from **3/4 to 3 inches (19 to 75 mm)**, to **12 inches (300 mm)** below grade. Cover gravel or crushed stone with sheet of asphalt-saturated felt and backfill remainder with excavated material.
4. Provide minimum cover over top of underground piping according to the following:
 - a. Irrigation Main Piping: Minimum depth of **36 inches (900 mm)** below finished grade, or not less than **18 inches (450 mm)** below average local frost depth, whichever is deeper.
 - b. Circuit Piping: **12 inches (300 mm)**.
 - c. Drain Piping: **12 inches (300 mm)**
 - d. Sleeves: **24 inches (600 mm)**.

B. Piping Installation

1. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
2. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
3. Install piping free of sags and bends.
4. Install groups of pipes parallel to each other, spaced to permit valve servicing.
5. Install fittings for changes in direction and branch connections.
6. Install unions adjacent to valves and to final connections to other components with **NPS 2 (DN 50)** or smaller pipe connection.
7. Install flanges adjacent to valves and to final connections to other components with **NPS 2-1/2 (DN 65)** or larger pipe connection.
8. Install underground thermoplastic piping according to ASTM D 2774 and ASTM F 690.
9. Install expansion loops in control-valve boxes for plastic piping.
10. Lay piping on solid subbase, uniformly sloped without humps or depressions.
11. Install ductile-iron piping according to AWWA C600.
12. Install PVC piping in dry weather when temperature is above **40 deg F (5 deg C)**. Allow joints to cure at least 24 hours at temperatures above **40 deg F (5 deg C)** before testing.
13. Install water regulators with shutoff valve and strainer on inlet and pressure gage on outlet. Install shutoff valve on outlet. Install aboveground or in control-valve boxes.
14. Water Hammer Arresters: Install between connection to building main and circuit valves aboveground or in control-valve boxes.
15. Install piping in sleeves under parking lots, roadways, and sidewalks.
16. Install sleeves made of Schedule 40 **OR** Schedule 80, **as directed**, PVC pipe and socket fittings, and solvent-cemented joints.
17. Install transition fittings for plastic-to-metal pipe connections according to the following:
 - a. Underground Piping:
 - 1) **NPS 1-1/2 (DN 40)** and Smaller: Plastic-to-metal transition fittings.
 - 2) **NPS 2 (DN 50)** and Larger: AWWA transition couplings.
 - b. Aboveground Piping:
 - 1) **NPS 2 (DN 50)** and Smaller: Plastic-to-metal transition fittings **OR** unions, **as directed**.
 - 2) **NPS 2 (DN 50)** and Larger: Use dielectric flange kits with one plastic flange.
18. Install dielectric fittings for dissimilar-metal pipe connections according to the following:
 - a. Underground Piping:
 - 1) **NPS 2 (DN 50)** and Smaller: Dielectric coupling or dielectric nipple.
 - 2) **NPS 2-1/2 (DN 65)** and Larger: Prohibited except in control-valve box.
 - b. Aboveground Piping:
 - 1) **NPS 2 (DN 50)** and Smaller: Dielectric union.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Dielectric flange.
 - 3) **NPS 5 (DN 125)** and Larger: Dielectric flange kit.
 - c. Piping in Control-Valve Boxes:
 - 1) **NPS 2 (DN 50)** and Smaller: Dielectric union.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Dielectric flange.
 - 3) **NPS 5 (DN 125)** and Larger: Dielectric flange kit.

C. Joint Construction

1. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.
 2. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.
 3. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:
 - a. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
 - b. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.
 4. Flanged Joints: Select rubber gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.
 5. Ductile-Iron Piping Gasketed Joints: Comply with AWWA C600 and AWWA M41.
 6. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.
 7. Copper-Tubing Soldered Joints: Apply ASTM B 813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.
 8. PE Piping Fastener Joints: Join with insert fittings and bands or fasteners according to piping manufacturer's written instructions.
 9. PE Piping Heat-Fusion Joints: Clean and dry joining surfaces by wiping with clean cloth or paper towels. Join according to ASTM D 2657.
 - a. Plain-End PE Pipe and Fittings: Use butt fusion.
 - b. Plain-End PE Pipe and Socket Fittings: Use socket fusion.
 10. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:
 - a. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
 - b. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
 - c. PVC Nonpressure Piping: Join according to ASTM D 2855.
- D. Valve Installation
1. Underground Curb Valves: Install in curb-valve casings with tops flush with grade.
 2. Underground Iron Gate Valves, Resilient Seat: Comply with AWWA C600 and AWWA M44. Install in valve casing with top flush with grade.
 - a. Install valves and PVC pipe with restrained, gasketed joints.
 3. Aboveground Valves: Install as components of connected piping system.
 4. Pressure-Reducing Valves: Install in boxes for automatic control valves or aboveground between shutoff valves. Install full-size valved bypass, **as directed**.
 5. Throttling Valves: Install in underground piping in boxes for automatic control valves.
 6. Drain Valves: Install in underground piping in boxes for automatic control valves.
- E. Sprinkler Installation
1. Install sprinklers after hydrostatic test is completed.
 2. Install sprinklers at manufacturer's recommended heights.
 3. Locate part-circle sprinklers to maintain a minimum distance of **4 inches (100 mm)** from walls and **2 inches (50 mm)** from other boundaries unless otherwise indicated.
- F. Drip Irrigation Specialty Installation
1. Install freestanding emitters on pipe riser to mounting height indicated.
 2. Install manifold emitter systems with tubing to emitters. Plug unused manifold outlets. Install emitters on off-ground supports at height indicated.

3. Install multiple-outlet emitter systems with tubing to outlets. Plug unused emitter outlets. Install outlets on off-ground supports at height indicated.
 4. Install drip tubes with direct-attached emitters on ground.
 5. Install drip tubes with remote-discharge on ground with outlets on off-ground supports at height indicated.
 6. Install off-ground supports of length required for indicated mounted height of device.
 7. Install application pressure regulators and filter units in piping near device being protected, and aboveground **OR** in control-valve boxes, **as directed**.
 8. Install air relief valves and vacuum relief valves in piping, and aboveground **OR** in control-valve boxes, **as directed**.
- G. Automatic Irrigation-Control System Installation
1. Equipment Mounting: Install interior controllers on floor **OR** concrete bases **OR** wall, **as directed**.
 - a. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
 2. Equipment Mounting: Install exterior freestanding controllers on precast concrete bases.
 - a. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Install anchor bolts to elevations required for proper attachment to supported equipment.
 3. Install control cable in same trench as irrigation piping and at least **2 inches (51 mm)** below or beside piping. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas.
- H. Connections
1. Comply with requirements for piping specified in Division 22 Section "Facility Water Distribution Piping" for water supply from exterior water service piping, water meters, protective enclosures, and backflow preventers. Drawings indicate general arrangement of piping, fittings, and specialties.
 2. Install piping adjacent to equipment, valves, and devices to allow service and maintenance.
 3. Connect wiring between controllers and automatic control valves.
- I. Identification
1. Identify system components. Comply with requirements for identification specified in Division 22 Section "Identification For Plumbing Piping And Equipment".
 2. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
 - a. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
 3. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches. See Division 31 Section "Earth Moving" for warning tapes.
- J. Field Quality Control
1. Perform tests and inspections.
 2. Tests and Inspections:
 - a. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
 3. Any irrigation product will be considered defective if it does not pass tests and inspections.
 4. Prepare test and inspection reports.

- K. Adjusting
1. Adjust settings of controllers.
 2. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
 3. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with, or not more than **1/2 inch (13 mm)** above, finish grade.
- L. Cleaning
1. Flush dirt and debris from piping before installing sprinklers and other devices.
- M. Piping Schedule
1. Install components having pressure rating equal to or greater than system operating pressure.
 2. Piping in control-valve boxes and aboveground may be joined with flanges or unions instead of joints indicated.
 3. Aboveground irrigation main piping, **NPS 4 (DN 100)** and smaller, shall be one of the following:
 - a. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube, wrought- or cast-copper fittings, and brazed **OR** soldered, **as directed**, joints.
 - c. Schedule 40 **OR** Schedule 80, **as directed**, PVC pipe; socket-type PVC fittings; and solvent-cemented joints.
 - d. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.
 4. Aboveground irrigation main piping, **NPS 5 (DN 125)** and larger, shall be one of the following:
 - a. Galvanized-steel pipe and galvanized-steel pipe nipples; galvanized, gray-iron threaded fittings; and threaded joints.
 - b. Schedule 40 **OR** Schedule 80, **as directed**, PVC pipe and socket fittings; and solvent-cemented joints.
 - c. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.
 5. Underground irrigation main piping, **NPS 4 (DN 100)** and smaller, shall be one of the following:
 - a. **NPS 3 and NPS 4 (DN 80 and DN 100)** ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings, glands, bolts, and nuts; and gasketed joints.
 - b. **NPS 3 and NPS 4 (DN 80 and DN 100)** ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings and gaskets; and gasketed joints.
 - c. **Type L (Type B)** soft copper tube, wrought-copper fittings, and brazed joints.
 - d. **NPS 4 (DN 100)** PE pressure pipe; PE butt, heat-fusion or socket-type fittings; and heat-fusion joints.
 - e. Schedule 40 **OR** Schedule 80, **as directed**, PVC pipe and socket fittings, and solvent-cemented joints.
 - f. Schedule 80, PVC pipe; Schedule 80, threaded PVC fittings; and threaded joints.
 - g. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.
 6. Underground irrigation main piping, **NPS 5 (DN 125)** and larger, shall be one of the following:
 - a. **NPS 6 (DN 150)** and larger ductile-iron, mechanical-joint pipe; ductile-iron, mechanical-joint fittings, glands, bolts, and nuts; and gasketed joints.
 - b. **NPS 6 (DN 150)** and larger ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings and gaskets; and gasketed joints.
 - c. PE pressure pipe; PE butt, heat-fusion fittings; and heat-fusion joints.
 - d. Schedule 40 **OR** Schedule 80, **as directed**, PVC pipe and socket fittings; and solvent-cemented joints.
 - e. SDR 21, PVC, pressure-rated pipe; Schedule 80, PVC socket fittings; and solvent-cemented joints.
 7. Circuit piping, **NPS 2 (DN 50)** and smaller, shall be one of the following:
 - a. SDR 7 **OR** SDR 9, **as directed**, PE, controlled ID pipe; insert fittings for PE pipe; and fastener joints.

- b. DR 9 **OR** DR 11, **as directed**, PE, controlled OD pipe; PE butt, heat-fusion, or PE socket-type fittings; and heat-fusion joints.
 - c. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
 - d. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.
8. Circuit piping, **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**, shall be one of the following:
 - a. SIDR 7 **OR** SIDR 9, **as directed**, PE, controlled ID pipe; insert fittings for PE pipe; and banded or fastener joints.
 - b. DR 9 **OR** DR 11, **as directed**, PE, controlled OD pipe; PE socket or butt-fusion fittings; and heat-fusion joints. **NPS 3 (DN 80)** pipe and fittings if **NPS 2-1/2 (DN 65)** pipe and fittings are not available.
 - c. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
 - d. SDR 26, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.
 9. Underground Branches and Offsets at Sprinklers and Devices: Schedule 80, PVC pipe; threaded PVC fittings; and threaded joints.
 - a. Option: Plastic swing-joint assemblies, with offsets for flexible joints, manufactured for this application.
 10. Risers to Aboveground Sprinklers and Specialties: **Type L (Type B) OR Type M (Type C), as directed**, hard copper tube, wrought-copper fittings, and brazed **OR** soldered, **as directed**, joints.
 11. Risers to Aboveground Sprinklers and Specialties: Schedule 80, PVC pipe and socket fittings; and solvent-cemented joints.
 12. Drain piping shall be one of the following:
 - a. SIDR 9, 11.5, or 15, PE, controlled ID pipe; insert fittings for PE pipe; and banded or fastener joints.
 - b. Schedule 40, PVC pipe and socket fittings; and solvent-cemented joints.
 - c. SDR 21, 26, or 32.5, PVC, pressure-rated pipe; Schedule 40, PVC socket fittings; and solvent-cemented joints.
- N. Valve Schedule
1. Underground, Shutoff-Duty Valves: Use the following:
 - a. **NPS 2 (DN 50)** and Smaller: Curb valve, curb-valve casing, and shutoff rod.
 - b. **NPS 3 (DN 80)** and Larger: Iron gate valve, resilient seated; iron gate valve casing; and operating wrench(es).
 2. Aboveground, Shutoff-Duty Valves:
 - a. **NPS 2 (DN 50)** and Smaller: Brass **OR** Bronze **OR** Plastic, **as directed**, ball valve.
 - b. **NPS 2 (DN 50)** and Smaller: Bronze gate valve.
 - c. **NPS 2-1/2 (DN 65)** and Larger: Iron ball valve.
 - d. **NPS 2-1/2 (DN 65)** and Larger: Iron gate valve, NRS **OR** OS&Y, **as directed**.
 3. Throttling-Duty Valves:
 - a. **NPS 2 (DN 50)** and Smaller: Bronze **OR** Plastic, **as directed**, automatic control valve.
 - b. **NPS 2 (DN 50)** and Smaller: Brass **OR** Bronze **OR** Plastic, **as directed**, ball valve.
 - c. **NPS 2-1/2 and NPS 3 (DN 65 and DN 80)**: Bronze **OR** Plastic, **as directed**, automatic control valve.
 - d. **NPS 2-1/2 and NPS 3 (DN 65 and DN 80)**: Iron ball valve.
 4. Drain Valves:
 - a. **NPS 1/2 and NPS 3/4 (DN 15 and DN 20)**: Automatic drain valve.
 - b. **NPS 1/2 and NPS 3/4 (DN 15 and DN 20)**: Brass **OR** Bronze **OR** Plastic, **as directed**, ball valve.
 - c. **NPS 1/2 and NPS 3/4 (DN 15 and DN 20)**: Bronze gate valve.
 - d. **NPS 1 to NPS 2 (DN 25 to DN 50)**: Brass **OR** Bronze **OR** Plastic, **as directed**, ball valve.
 - e. **NPS 1 to NPS 2 (DN 25 to DN 50)**: Bronze gate valve.

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Task	Specification	Specification Description
32 84 00 00	07 21 13 13	Modified Bitumous Protected Membrane Roofing
32 84 13 00	07 21 13 13	Modified Bitumous Protected Membrane Roofing
32 84 13 00	32 82 00 00	Irrigation Systems
32 84 23 00	01 22 16 00	No Specification Required
32 84 23 00	03 05 13 00	Cast-In-Place Concrete
32 84 23 00	07 21 13 13	Modified Bitumous Protected Membrane Roofing
32 84 23 00	01 95 99 99a	Common Work Results for Fire Suppression
32 84 23 00	01 95 99 99b	Common Work Results for Plumbing
32 84 23 00	01 95 99 99g	Common Work Results for HVAC
32 84 23 00	32 82 00 00	Irrigation Systems

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SECTION 32 91 13 16 - TREE RELOCATION

1.1 GENERAL

A. Description Of Work

1. This specification covers labor, materials, necessary equipment and services to complete the tree relocation work. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.
2. Before tree excavation, pruning, removal, or relocation of existing trees, contractor shall notify:
 - a. the Owner of schedule of operation.
 - b. Appropriate utility companies and the Owner for flagging and coordination of service disconnection as necessary to complete work.
 - c. Coordinate work with other trades.

B. Definitions

1. Toxic Substances: Do not deliver any toxic substance or item as defined by the state, to the site without furnishing to the Owner a Material Safety Data Sheet (MSDS). Provide current MSDS information with each initial shipment.
 - a. The MSDS shall contain the following information:
 - 1) The chemical name and the common name of the toxic substance.
 - 2) The hazards or other risks in the use of the toxic substance, including:
 - a) The potential for fire, explosion, corrosivity and reactivity.
 - b) The known acute and chronic health effects of risks from exposure, including the medical conditions which are generally recognized as being aggravated by exposure to the toxic substance.
 - c) The primary routes of entry and symptoms of overexposure.
 - 3) The proper precautions, handling practices, necessary personal protective equipment, any other safety precautions in the use of or exposure to the toxic substance including appropriate emergency treatment in case of overexposure.
 - 4) The emergency procedure for spills, fire disposal, and first aid.
 - 5) A description in lay terms of the known specific potential health risks posed by the toxic substance intended to alert any person reading this information.
 - 6) The year and month, if available, that the information was compiled and the name, address, and emergency telephone number of the manufacturer responsible for preparing the information.

C. Description

1. Protect existing trees to remain during construction phases. Provide tree protection barriers for those existing trees adjacent to tree transplantation operations. Any trees scarred or destroyed, designated to remain, will be replaced at the Contractor's expense, with similar species, size, and quality.
2. Remove other vegetation as necessary and as required to meet project requirements to accommodate new plantings. Prepare areas to be planted according to Division 32 Section "Plants".
3. Resulting tree pits of relocated material shall be backfilled with clean fill and brought back flush with surrounding grade, unless the pits are to be immediately replanted. Stabilize grade if required. Correct problems caused by erosion, wind, etc., in the reclaimed area. Pits to be quickly replanted shall be surrounded by safety barricades to prevent accidental falls into pits.
 - a. In areas where new plant material will replace relocated plant material, appropriate planting soil mix shall be used as backfill.

D. Submittals

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1. Submit a list of equipment, procedure, and labor force anticipated for use for tree relocation for approval by the Owner.
 2. Submit a schedule by day indicating units to be dug and relocated. Note materials requiring root pruning, and that the relocation schedule is to begin at the end of the specified root pruning period.
 3. Obtain permits required by authority having jurisdiction.
 4. Submit written certification that trees indicated to remain have been protected during the course of construction according to recognized standards of the industry. Certify that where damage did occur:
 - a. Trees were promptly and properly treated.
 - b. Indicate which damaged trees (if any) are incapable of retaining full growth potential and are recommended to be replaced.
 5. Submit for approval, proposed methods, and schedule for effecting tree and plant protection.
- E. Quality Assurance
1. Unless otherwise specified, tree transplanting shall comply with NAA Ref.1.
 2. Comply with NAA standards for pruning and remove branches from trees to remain to clear new construction.
 3. Recommend procedures to compensate for loss of roots (if any) and perform initial pruning of branches and stimulation of root growth where removed to accommodate new construction.
 4. Perform tree repair work for damage incurred by new construction.
 5. Provide routine progress evaluation reports on relocated trees until the end of the maintenance period.
 6. Evaluate existing trees and verify trees are free of disease and ready to survive relocation from the site to their new location on-site or off-site.
- F. Delivery, Storage, and Handling
1. Properly handle trees and palms during moving so trunks will not be scarred or damaged and to avoid broken limbs. Broken limbs not causing the tree to be rejected shall be repaired as follows:
 - a. Properly prune dead, dying, or damaged branches with clean, sharp equipment.
 - b. Remove injured bark and wood of a tree would with a clean, sharp knife to a point where healthy bark and wood make contact at their margins.
 - c. Inspect and treat wound for insect and disease.
 - d. Seal wounds with bituminous base wound paint for all oak limbs greater than 3 inch diameter.
 2. Transport trees on vehicles of adequate size to prevent overcrowding, broken limbs, foliage damage, or root ball damage.
 3. Keep root balls moist during relocation.
 4. Protect tree crowns with shade cloth to prevent desiccation and wind burn. Crowns shall be periodically sprayed with water to help ensure against desiccation.
 5. Handle plant material only in ways and means accepted by the landscaping industry and accepted by the Owner.
 6. Plant material shall be planted the same day it is dug. Coordinate preparation of planting pits or beds to ensure this schedule.
- G. Warranty
1. Relocated plant material does not fall under the standard 12 month guarantee.
 2. For relocated trees or palms that die, replace their canopy area with new trees as specified.
 - a. Canopy spread for all palms and trees shall be listed on proposal when submitted for relocation work.
 - b. Replacements (mitigation plantings) shall be provided at no additional cost to the Owner.
 - c. Submit the attached form to the Owner for review and approval.
 - d. Proposed replacement canopy tree species shall be the Owner accepted trees and palms.
 3. Repair damage to other plants and lawn or construction work within the relocation area during tree transplantation at no cost to the Owner. This includes, but is not limited to, damage to curbs,

walks, roads, fences, site furnishings, etc. Replacing and replanting of damaged trees or shrubs shall be according to Division 32 Section "Plants" Replacing and replanting of damaged turf shall be according to Division 32 Section "Turf And Grasses".

H. Maintenance

1. Maintain relocated plant materials immediately after each item is planted and continued until the 90 day watering period is completed, upon which time the Owner will take over maintenance of materials following procedures and recommendations of contractor and specifications.
2. During the maintenance period, maintain relocated plant materials.

1.2 PRODUCT

A. Materials

1. Bone meal shall be readily available steamed bone meal, useable as a natural organic nitrogen fertilizer.
2. Peat moss, topsoil, planting soil, mulch, staking, and guying shall be as specified in Division 32 Section "Plants".

1.3 EXECUTION

A. Transplantation

1. Transplanting shall consist of on-site or off-site transplanting of existing trees or palms from proposed construction areas to permanent positions.
2. Digging, Wrapping, and Handling: Plants shall be dug and prepared for moving in a manner that will not cause damage to branches, shape, root system, and development.
3. Balled and Burlapped Plants:
 - a. Balls shall be firmly wrapped with burlap or accepted cloth substitute.
 - b. No balled plant will be acceptable if the ball is cracked and broken or if the stem or trunk is loose in the ball, either before or during transplanting.
 - c. Balled plants shall be lifted and handled from the bottom of the ball.
 - d. Protect ball and deliver to the site, plant immediately, and water thoroughly.
 - e. Ball sizes shall be as recommended in ANSI Z 60.1.

B. Planting

1. Relocated Material
 - a. Relocated trees/palms shall be planted according to procedures described for new material, Division 32 Section "Plants". Verify final grades have been established before planting operations. Ensure proposed planting pits drain by test-filling with water before transplantation.
 - b. Continue watering and caring for relocated material as specified.
 - c. Mulch tree pit areas to reduce weeds, discourage foot traffic, conserve moisture, and minimize temperature fluctuations.
 - d. Brace trunk and leave in place for approximately one year until trees are wind firm.
 - e. Wrap trunks and structural branches of thin-barked trees to protect against sun scald and dehydration. Retain through at least one growing season, and through cold season.
 - f. Feed with a diluted solution of N-P-K in solution form with a soil needle, providing water, air, and nutrients.
 - g. Where foliage is retarded, spray with one of the soluble types of foliage feeders.
 - h. At time of planting, fill air pockets and keep roots, especially feeder roots, moist, live, and healthy. Use soil needles for watering new transplants. Direct fine spray at foliage to help harden-off new leaves.

- C. Staking And Guying: Stake and guy designated material according to procedures described for new plant materials, Division 32 Section "Plants".

- D. Watering
1. Following transplantation, water trees daily for the first two weeks, every other day for the next three weeks, and every third day for the balance of the three month watering/maintenance period. Such watering shall thoroughly saturate the root ball to its full depth.
 2. Following relocation, trees designated for transplanting shall be watered as specified in this section. Such watering shall thoroughly saturate the root ball to its full depth.
 3. Provide manual watering of relocated plant materials for 90 days. If used, after watering period, Contractor shall be responsible for the complete removal of all temporary watering systems.
- E. Tagging: Trees within the designated areas for relocation shall be clearly marked by means of yellow plastic surveyor's ribbons and coordinated with, inspected, and accepted by the Owner before root pruning and digging.
- F. Root Preparation
1. Trees to be relocated shall be root pruned at least 45 days before digging with clean, sharp equipment.
 - a. Maintain root pruned materials by watering, weeding, mowing, spraying, fertilizing, and other horticulture practices.
 - b. After root pruning, backfill with good rooting medium, fertilize with organic fertilizer to promote root growth.
 - c. Mulch to reduce weeds, discourage foot traffic, conserve moisture, and minimize temperature fluctuation.
 2. Root Ball Size Chart: Root ball sizes shall be according to minimum standards set forth in Grades and Standards for Nursery Plants Part II, Palms and Trees, local state Department of Agriculture.
 - a. Trees-Minimum Ball Sizes:

Caliper	Minimum Ball Diameter
3-1/2" to 4"	28"
4" to 4-1/2"	30"
4-1/2" to 5"	32"
5" to 5-1/2"	34"
Larger sizes increase proportionally.	
 - b. Minimum Ball Depth:

Ball Diameter	Depth
Less than 20"	Not less than 75 percent of diameter.
20" to 30"	Not less than 65 percent of diameter.
30" to 48"	Not less than 60 percent of diameter.
- G. Crown Preparation
1. Shade and Flowering Trees
 - a. Shade Trees: Selectively prune and thin crown to remove approximately one third of the branches. Preserve the basic shape and form of the tree, eliminate cross-branching and dead or diseased branches.
 - b. Hand strip selected species of all leaves following pruning and before moving.
 2. Palms: Follow standard procedure for transplantation of palms.
- H. Hand Digging: Burlapping is required. Trees that are burlapped for relocation shall comply and be handled in same manner as new plant material specified in Section "Exterior Plants."

- I. Special Conditions
 - 1. Multi-Trunk Trees: Relocate multi-trunk tree as one unit. Measure unit by taking the aggregate total of all DBH measurements.
 - 2. Multi-Trunk Palms: Relocate multi-trunk palms as one unit. Unit shall be measured as follows:
 - a. 50 percent of the value in dollars of the largest trunk in the grouping times the number of trunks in the clump.
 - 3. On-site relocation
 - a. On-site relocation shall include root pruning, canopy pruning, on-site transportation, hauling and dumping of debris, and 90-day maintenance.
 - b. If the tree or palm should die within the 90-day maintenance period, remove the tree, replace the material, and restore the site at no additional cost to the Owner.

- J. Cleaning
 - 1. Cleaning up the Site
 - a. Upon completion of the work, thoroughly clean up the project site.
 - b. In addition to removing equipment, unused materials, deleterious material, and surplus excavated material, the Contractor shall fine grade all disturbed areas and the areas adjacent to the transplanted material to provide a neat and uniform site.
 - c. All damaged or altered existing structures, as a result of the landscape work, shall be corrected.

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Task	Specification	Specification Description
32 91 13 26	32 91 13 16	Tree Relocation

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SECTION 32 91 13 33 - LAWNS AND GRASSES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for lawns and grasses. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Seeding.
 - b. Hydroseeding.
 - c. Sodding.
 - d. Plugging.
 - e. Sprigging.
 - f. Meadow grasses and wildflowers.
 - g. Turf renovation.
 - h. Erosion-control material(s).
 - i. Grass paving.

C. Definitions

1. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.
2. Finish Grade: Elevation of finished surface of planting soil.
3. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.
4. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.
5. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.
6. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.
7. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.
8. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.
9. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

D. Submittals

1. Product Data: For each type of product indicated.
2. Certification of Grass Seed.
 - a. Certification of each seed mixture for turfgrass sod **OR** plugs, **as directed**.
3. Product Certificates: For soil amendments and fertilizers, from manufacturer.
4. Maintenance Instructions: Recommended procedures to be established by the Owner for maintenance of turf and meadows during a calendar year. Submit before expiration of required initial maintenance periods.

- E. Quality Assurance
1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 - a. Pesticide Applicator: State licensed, commercial.
 2. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory.
 - a. The soil-testing laboratory shall oversee soil sampling.
 - b. Report suitability of tested soil for turf growth.
 - 1) State recommendations for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
 - 2) Report presence of problem salts, minerals, or heavy metals; if present, provide additional recommendations for corrective action.
- F. Delivery, Storage, And Handling
1. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.
 2. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod in time for planting within 24 hours of harvesting. Protect sod from breakage and drying.
 3. Bulk Materials:
 - a. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
 - b. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 - c. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.
- G. Maintenance Service
1. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 1.3. Begin maintenance immediately after each area is planted and continue until acceptable turf is established but for not less than the following periods:
 - a. Seeded Turf: 60 days from date of planting completion **OR** Final Completion, **as directed**.
 - 1) When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.
 - b. Sodded Turf: 30 days from date of planting completion **OR** Final Completion, **as directed**.
 - c. Plugged Turf: 30 days from date of planting completion **OR** Final Completion, **as directed**.
 - d. Sprigged Turf: 30 days from date of planting completion **OR** Final Completion, **as directed**.
 2. Initial Meadow Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 1.3. Begin maintenance immediately after each area is planted and continue until acceptable meadow is established, but for not less than 40 days from date of planting completion **OR** Final Completion, **as directed**.
 3. Continuing Maintenance Proposal: From Installer to the Owner, in the form of a standard yearly (or other period) maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.2 PRODUCTS

A. Seed

1. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.
2. Seed Species: If grass seed is required to be certified by the State Department of Agriculture, State-certified seed of grass species as follows:
OR
Seed Species: If grass seed is not required to be certified by the State Department of Agriculture, seed of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
 - a. Warm-season grass
 - 1) Full Sun: Bermudagrass (*Cynodon dactylon*).
 - b. Cool-season grass
 - 1) Full Sun: Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.
 - 2) Sun and Partial Shade: Proportioned by weight as follows:
 - a) 50 percent Kentucky bluegrass (*Poa pratensis*).
 - b) 30 percent chewings red fescue (*Festuca rubra* variety).
 - c) 10 percent perennial ryegrass (*Lolium perenne*).
 - d) 10 percent redtop (*Agrostis alba*).
 - 3) Shade: Proportioned by weight as follows:
 - a) 50 percent chewings red fescue (*Festuca rubra* variety).
 - b) 35 percent rough bluegrass (*Poa trivialis*).
 - c) 15 percent redtop (*Agrostis alba*).
3. Grass Seed Mix: Proprietary seed mix as directed by the Owner.

B. Turfgrass Sod

1. Turfgrass Sod: Certified **OR** Approved **OR** Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, **as directed**, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.
2. Turfgrass Species (warm-season grass): Bermudagrass (*Cynodon dactylon*) **OR** Carpetgrass (*Axonopus affinis*) **OR** Centipedegrass (*Eremochloa ophiuroides*) **OR** St. Augustinegrass (*Stenotaphrum secundatum*) **OR** Zoysiagrass (*Zoysia japonica*) **OR** Zoysiagrass (*Zoysia matrella*), **as directed**.
3. Turfgrass Species (cool-season grass): Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:
 - a. Full Sun: Kentucky bluegrass (*Poa pratensis*), a minimum of three cultivars.
 - b. Sun and Partial Shade: Proportioned by weight as follows:
 - 1) 50 percent Kentucky bluegrass (*Poa pratensis*).
 - 2) 30 percent chewings red fescue (*Festuca rubra* variety).
 - 3) 10 percent perennial ryegrass (*Lolium perenne*).
 - 4) 10 percent redtop (*Agrostis alba*).
 - c. Shade: Proportioned by weight as follows:
 - 1) 50 percent chewings red fescue (*Festuca rubra* variety).
 - 2) 35 percent rough bluegrass (*Poa trivialis*).
 - 3) 15 percent redtop (*Agrostis alba*).

C. Plugs

1. Plugs: Turfgrass sod, certified **OR** approved **OR** Number 1 Quality/Premium, including limitations on thatch, weeds, diseases, nematodes, and insects, **as directed**, complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, cut into square or round plugs, strongly rooted,

and capable of vigorous growth and development when planted; of the following turfgrass species and plug size:

- a. Turfgrass Species (warm-season grass): Bermudagrass (*Cynodon dactylon*) **OR** Carpetgrass (*Axonopus affinis*) **OR** Centipedegrass (*Eremochloa ophiuroides*) **OR** St. Augustinegrass (*Stenotaphrum secundatum*) **OR** Zoysiagrass (*Zoysia japonica*) **OR** Zoysiagrass (*Zoysia matrella*), **as directed**.
- b. Plug Size: **2 inches (50 mm) OR 3 inches (75 mm) OR 4 inches (100 mm), as directed.**

D. Sprigs

1. Sod Sprigs: Healthy living stems, rhizomes, or stolons with a minimum of two nodes and attached roots free of soil, of the following turfgrass species:
 - a. Turfgrass Species (warm-season grass): Bermudagrass (*Cynodon dactylon*) **OR** Carpetgrass (*Axonopus affinis*) **OR** Centipedegrass (*Eremochloa ophiuroides*) **OR** St. Augustinegrass (*Stenotaphrum secundatum*) **OR** Zoysiagrass (*Zoysia japonica*) **OR** Zoysiagrass (*Zoysia matrella*), **as directed**.
 - b. Turfgrass Species (cool-season grass): Creeping bentgrass (*Agrostis palustris*).

E. Meadow Grasses And Wildflowers

1. Wildflower Seed: Fresh, clean, and dry new seed, of mixed species as directed.
2. Native Grass Seed: Fresh, clean, and dry new seed, of mixed species as directed.
3. Wildflower and Native Grass Seed: Fresh, clean, and dry new seed, of mixed species as directed.
4. Seed Carrier: Inert material, sharp clean sand or perlite, mixed with seed at a ratio of not less than two parts seed carrier to one part seed.

F. Inorganic Soil Amendments

1. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:
 - a. Class T, with a minimum of 99 percent passing through **No. 8 (2.36-mm)** sieve and a minimum of 75 percent passing through **No. 60 (0.25-mm)** sieve.
OR
Class O, with a minimum of 95 percent passing through **No. 8 (2.36-mm)** sieve and a minimum of 55 percent passing through **No. 60 (0.25-mm)** sieve.
 - b. Provide lime in form of ground dolomitic limestone **OR** calcitic limestone **OR** mollusk shells, **as directed**.
2. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through **No. 6 (3.35-mm)** sieve and a maximum of 10 percent passing through **No. 40 (0.425-mm)** sieve.
3. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.
4. Aluminum Sulfate: Commercial grade, unadulterated.
5. Perlite: Horticultural perlite, soil amendment grade.
6. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through **No. 50 (0.30-mm)** sieve.
7. Sand: Clean, washed, natural or manufactured, and free of toxic materials.
8. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.
OR
Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

G. Organic Soil Amendments

1. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **1-inch (25-mm) OR 3/4-inch (19-mm) OR 1/2-inch (12.5-mm)**, **as directed**, sieve; soluble salt content of 5 to 10

decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

- a. Organic Matter Content: 50 to 60 percent of dry weight.
- b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
2. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.
3. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
4. Wood Derivatives: Decomposed, nitrogen-treated sawdust, ground bark, or wood waste; of uniform texture and free of chips, stones, sticks, soil, or toxic materials.
 - a. In lieu of decomposed wood derivatives, mix partially decomposed wood derivatives with ammonium nitrate at a minimum rate of **0.15 lb/cu. ft. (2.4 kg/cu. m)** of loose sawdust or ground bark, or with ammonium sulfate at a minimum rate of **0.25 lb/cu. ft. (4 kg/cu. m)** of loose sawdust or ground bark.
5. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

H. Fertilizers

1. Bonemeal: Commercial, raw or steamed, finely ground; a minimum of 1 **OR** 4, **as directed**, percent nitrogen and 10 **OR** 20, **as directed**, percent phosphoric acid.
2. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.
3. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
 - a. Composition: **1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m)** of actual nitrogen, 4 percent phosphorous, and 2 percent potassium, by weight.
 - b. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.
4. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:
 - a. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.
OR
Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

I. Planting Soils

1. Planting Soil: ASTM D 5268 topsoil, with pH range of 5.5 to 7, a minimum of 2 percent organic material content **OR** Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process **OR** Existing, in-place surface soil **OR** Imported topsoil or manufactured topsoil from off-site sources; do not obtain from agricultural land, bogs or marshes, **as directed**. Verify suitability of soil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clods, clay lumps, pockets of coarse sand, concrete slurry, concrete layers or chunks, cement, plaster, building debris, and other extraneous materials harmful to plant growth. Mix soil with the following soil amendments and fertilizers in the following quantities to produce planting soil:
 - a. Ratio of Loose Compost to Topsoil by Volume: 1:4 **OR** 1:3 **OR** 1:2, **as directed**.
 - b. Ratio of Loose Sphagnum **OR** Muck, **as directed**, Peat to Topsoil by Volume: as directed by the Owner .
 - c. Ratio of Loose Wood Derivatives to Topsoil by Volume: as directed by the Owner.
 - d. Weight of Lime per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.

- e. Weight of Sulfur **OR** Iron Sulfate **OR** Aluminum Sulfate, **as directed**, per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - f. Weight of Agricultural Gypsum per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - g. Volume of Sand Plus 10 Percent Diatomaceous Earth **OR** Zeolites, **as directed**, per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - h. Weight of Bonemeal per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - i. Weight of Superphosphate per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - j. Weight of Commercial Fertilizer per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
 - k. Weight of Slow-Release Fertilizer per **1000 Sq. Ft. (92.9 Sq. m)**: as directed by the Owner.
- J. Mulches
1. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.
 2. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.
 3. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.
 4. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through **1-inch (25-mm)** sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:
 - a. Organic Matter Content: 50 to 60 percent of dry weight.
 - b. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.
 5. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.
 6. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.
 7. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.
- K. Pesticides
1. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
 2. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.
 3. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.
- L. Erosion-Control Materials
1. Erosion-Control Blankets: Biodegradable wood excelsior, straw, or coconut-fiber mat enclosed in a photodegradable plastic mesh. Include manufacturer's recommended steel wire staples, **6 inches (150 mm)** long.
 2. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of **0.92 lb/sq. yd. (0.5 kg/sq. m)**, with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, **6 inches (150 mm)** long.
 3. Erosion-Control Mats: Cellular, non-biodegradable slope-stabilization mats designed to isolate and contain small areas of soil over steeply sloped surface, of **3-inch (75-mm) OR 4-inch (100-mm) OR 6-inch (150-mm)**, **as directed**, nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.

M. Grass-Paving Materials

1. Grass Paving: Cellular, non-biodegradable plastic mats, designed to contain small areas of soil and enhance the ability of turf to support vehicular and pedestrian traffic, of **1-inch (25-mm) OR 1-3/4-inch (45-mm) OR 2-inch (50-mm) OR** manufacturer's standard, **as directed**, nominal mat thickness. Include manufacturer's recommended anchorage system for slope conditions.
2. Base Course: Sound crushed stone or gravel complying with ASTM D 448 for Size No. 8 **OR** Division 31 Section "Earth Moving" for base-course material, **as directed**.
3. Sand: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.
4. Proprietary Growing Mix: As submitted and acceptable to the Owner.
5. Sandy Loam Soil Mix: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate blended with planting soil as specified. Use blend consisting of 1/2 sand and 1/2 planting soil **OR** 2/3 sand and 1/3 planting soil, **as directed**.
6. Soil for Paving Fill: Planting soil as specified.

1.3 EXECUTION

A. Preparation

1. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.
 - a. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
 - b. Protect grade stakes set by others until directed to remove them.
2. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

B. Turf Area Preparation

1. Limit turf subgrade preparation to areas to be planted.
2. Newly Graded Subgrades: Loosen subgrade to a minimum depth of **4 inches (100 mm) OR 6 inches (150 mm) OR 8 inches (200 mm)**, **as directed**. Remove stones larger than **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off the Owner's property.
 - a. Apply superphosphate fertilizer directly to subgrade before loosening.
 - b. Thoroughly blend planting soil off-site before spreading or spread topsoil, apply soil amendments and fertilizer on surface, and thoroughly blend planting soil.
 - 1) Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - 2) Mix lime with dry soil before mixing fertilizer.
 - c. Spread planting soil to a depth of **4 inches (100 mm) OR 6 inches (150 mm) OR 8 inches (200 mm)**, **as directed**, but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.
 - 1) Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top **2 inches (50 mm) OR 4 inches (100 mm)**, **as directed**, of subgrade. Spread remainder of planting soil.
 - 2) Reduce elevation of planting soil to allow for soil thickness of sod.
3. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:
 - a. Remove existing grass, vegetation, and turf. Do not mix into surface soil.
 - b. Loosen surface soil to a depth of at least **6 inches (150 mm) OR 8 inches (200 mm)**, **as directed**. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top **4 inches (100 mm) OR 6 inches (150 mm)**, **as directed**, of soil. Till soil to a homogeneous mixture of fine texture.
 - 1) Apply superphosphate fertilizer directly to surface soil before loosening.
 - c. Remove stones larger than **1 inch (25 mm) OR 1-1/2 inches (38 mm) OR 2 inches (50 mm)**, **as directed**, in any dimension and sticks, roots, trash, and other extraneous matter.

- d. Legally dispose of waste material, including grass, vegetation, and turf, off the Owner's property.
 4. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus **1/2 inch (13 mm)** of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.
 5. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
 6. Before planting, obtain the Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- C. Preparation For Erosion-Control Materials
1. Prepare area as specified in "Turf Area Preparation" Article.
 2. For erosion-control mats, install planting soil in two lifts, with second lift equal to thickness of erosion-control mats. Install erosion-control mat and fasten as recommended by material manufacturer.
 3. Fill cells of erosion-control mat with planting soil and compact before planting.
 4. For erosion-control blanket or mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.
 5. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- D. Preparation For Grass-Paving Materials
1. Reduce subgrade elevation soil to allow for thickness of grass-paving system. Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade so that installed paving is within plus or minus **1/2 inch (13 mm)** of finish elevation. Roll and rake, remove ridges, and fill depressions.
 2. Install base course **OR** sand course **OR** base course and sand course, **as directed**, and sandy loam soil mix **OR** proprietary growing mix **OR** soil for paving fill, **as directed**, as recommended by paving-material manufacturer for site conditions; comply with details shown on Drawings. Compact according to paving-material manufacturer's written instructions.
 3. Install paving mat and fasten according to paving-material manufacturer's written instructions.
 4. Before planting, fill cells of paving mat with planting soil **OR** sandy loam soil mix **OR** proprietary growing mix **OR** sand half full, **as directed**, and compact according to manufacturer's written instructions.
 5. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.
- E. Seeding
1. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds **5 mph (8 km/h)**. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - a. Do not use wet seed or seed that is moldy or otherwise damaged.
 - b. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.
 2. Sow seed at a total rate of **2 lb/1000 sq. ft. (0.9 kg/92.9 sq. m)** **OR** **3 to 4 lb/1000 sq. ft. (1.4 to 1.8 kg/92.9 sq. m)** **OR** **5 to 8 lb/1000 sq. ft. (2.3 to 3.6 kg/92.9 sq. m)**, **as directed**.
 3. Rake seed lightly into top **1/8 inch (3 mm)** of soil, roll lightly, and water with fine spray.
 4. Protect seeded areas with slopes exceeding 1:4 with erosion-control blankets and 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.
 5. Protect seeded areas with erosion-control mats where shown on Drawings; install and anchor according to manufacturer's written instructions.
 6. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of **2 tons/acre (42 kg/92.9 sq. m)** to form a continuous blanket **1-1/2 inches (38 mm)** in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

- a. Anchor straw mulch by crimping into soil with suitable mechanical equipment.
 - b. Bond straw mulch by spraying with asphalt emulsion at a rate of **10 to 13 gal./1000 sq. ft. (38 to 49 L/92.9 sq. m)**. Take precautions to prevent damage or staining of structures or other plantings adjacent to mulched areas. Immediately clean damaged or stained areas.
7. Protect seeded areas from hot, dry weather or drying winds by applying compost mulch **OR** peat mulch **OR** planting soil, **as directed**, within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of **3/16 inch (4.8 mm)**, and roll surface smooth.
- F. Hydroseeding
1. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.
 - a. Mix slurry with nonasphaltic **OR** asphalt-emulsion **OR** fiber-mulch manufacturer's recommended, **as directed**, tackifier.
 - b. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than **1500-lb/acre (15.6-kg/92.9 sq. m)** dry weight, and seed component is deposited at not less than the specified seed-sowing rate.
OR
Apply slurry uniformly to all areas to be seeded in a two-step process. Apply first slurry coat at a rate so that mulch component is deposited at not less than **500-lb/acre (5.2-kg/92.9 sq. m)** dry weight, and seed component is deposited at not less than the specified seed-sowing rate. Apply slurry cover coat of fiber mulch (hydromulching) at a rate of **1000 lb/acre (10.4 kg/92.9 sq. m)**.
- G. Sodding
1. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.
 2. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.
 - a. Lay sod across angle of slopes exceeding 1:3.
 - b. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.
 3. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of **1-1/2 inches (38 mm)** below sod.
- H. Plugging
1. Plant plugs in holes or furrows, spaced **12 inches (300 mm) OR 18 inches (450 mm)**, **as directed**, apart in both directions. On slopes, contour furrows to near level.
- I. Sprigging
1. Plant freshly shredded sod sprigs in furrows **1 to 1-1/2 inches (25 to 38 mm) OR 1-1/2 to 2 inches (38 to 50 mm) OR 2-1/2 to 3 inches (64 to 75 mm)**, **as directed**, deep. Place individual sprigs with roots and portions of stem in moistened soil, **6 inches (150 mm) OR 12 inches (300 mm)**, **as directed**, apart in rows **10 inches (250 mm) OR 18 inches (450 mm)**, **as directed**, apart, and fill furrows without covering growing tips. Lightly roll and firm soil around sprigs after planting.
 2. Broadcast sprigs uniformly over prepared surface at a rate of **10 cu. ft./1000 sq. ft. (0.28 cu. m/92.9 sq. m)** and mechanically force sprigs into lightly moistened soil.
 - a. Spread a **1/4-inch- (6-mm-)** thick layer of compost mulch **OR** peat mulch **OR** planting soil, **as directed**, on sprigs.
 - b. Lightly roll and firm soil around sprigs after planting.

- c. Water sprigs immediately after planting and keep moist by frequent watering until well rooted.

J. Turf Renovation

1. Renovate existing turf.
2. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.
 - a. Reestablish turf where settlement or washouts occur or where minor regrading is required.
 - b. Install new planting soil as required.
3. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.
4. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.
5. Mow, dethatch, core aerate, and rake existing turf.
6. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.
7. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off the Owner's property.
8. Till stripped, bare, and compacted areas thoroughly to a soil depth of **6 inches (150 mm)**.
9. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top **4 inches (100 mm)** of existing soil. Install new planting soil to fill low spots and meet finish grades.
10. Apply seed and protect with straw mulch **OR** sod, **as directed**, as required for new turf.
11. Water newly planted areas and keep moist until new turf is established.

K. Turf Maintenance

1. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.
 - a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
 - b. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - c. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
2. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of **4 inches (100 mm)**.
 - a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - b. Water turf with fine spray at a minimum rate of **1 inch (25 mm)** per week unless rainfall precipitation is adequate.
3. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:
 - a. Mow bentgrass to a height of **1/2 inch (13 mm)** or less.
 - b. Mow bermudagrass to a height of **1/2 to 1 inch (13 to 25 mm)**.
 - c. Mow carpetgrass, centipedegrass, perennial ryegrass, and zoysiagrass to a height of **1 to 2 inches (25 to 50 mm)**.
 - d. Mow Kentucky bluegrass, buffalograss, annual ryegrass, and chewing red fescue to a height of **1-1/2 to 2 inches (38 to 50 mm)**.

- e. Mow bahiagrass, turf-type tall fescue, and St. Augustinegrass to a height of **2 to 3 inches (50 to 75 mm)**.
 4. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.
 - a. Use fertilizer that will provide actual nitrogen of at least **1 lb/1000 sq. ft. (0.45 kg/92.9 sq. m)** to turf area.
- L. Satisfactory Turf
1. Turf installations shall meet the following criteria as determined by Architect:
 - a. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any **10 sq. ft. (0.92 sq. m)** and bare spots not exceeding **5 by 5 inches (125 by 125 mm)**.
 - b. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.
 - c. Satisfactory Plugged Turf: At end of maintenance period, the required number of plugs has been established as well-rooted, viable patches of grass, and areas between plugs are free of weeds and other undesirable vegetation.
 - d. Satisfactory Sprigged Turf: At end of maintenance period, the required number of sprigs has been established as well-rooted, viable plants, and areas between sprigs are free of weeds and other undesirable vegetation.
 2. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.
- M. Meadow
1. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds **5 mph (8 km/h)**. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.
 - a. Do not use wet seed or seed that is moldy or otherwise damaged.
 2. Sow seed at a total rate of **4 oz./1000 sq. ft. (113 g/92.9 sq. m) OR 5 oz./1000 sq. ft. (142 g/92.9 sq. m) OR 6 oz./1000 sq. ft. (170 g/92.9 sq. m), as directed**.
 3. Brush seed into top **1/16 inch (1.6 mm)** of soil, roll lightly, and water with fine spray.
 4. Protect seeded areas from hot, dry weather or drying winds by applying peat or compost mulch within 24 hours after completing seeding operations. Soak areas, scatter mulch uniformly to a thickness of **3/16 inch (4.8 mm)**, and roll surface smooth.
 5. Water newly planted areas and keep moist until meadow is established.
- N. Meadow Maintenance
1. Maintain and establish meadow by watering, weeding, mowing, trimming, replanting, and performing other operations as required to establish a healthy, viable meadow. Roll, regrade, and replant bare or eroded areas and remulch. Provide materials and installation the same as those used in the original installation.
 - a. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and meadow damaged or lost in areas of subsidence.
 - b. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
 - c. Apply treatments as required to keep meadow and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.
 2. Watering: Install and maintain temporary piping, hoses, and meadow-watering equipment to convey water from sources and to keep meadow uniformly moist.
 - a. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
 - b. Water meadow with fine spray at a minimum rate of **1/2 inch (13 mm)** per week for four **OR** six **OR** eight, **as directed**, weeks after planting unless rainfall precipitation is adequate.

32 - Exterior Improvements



- O. Pesticide Application
 1. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with the Owner's operations and others in proximity to the Work. Notify the Owner before each application is performed.
 2. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

- P. Cleanup And Protection
 1. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.
 2. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.
 3. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 32 91 13 33

Task	Specification	Specification Description
32 91 13 33	31 13 16 00	Tree Protection And Trimming
32 91 13 33	31 05 13 00	Earth Moving
32 91 13 33	31 24 13 00	Embankment
32 91 13 36	32 91 13 33	Lawns And Grasses
32 91 13 36	32 91 13 16	Tree Relocation

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SECTION 32 91 19 13 - CONCRETE REVETMENT

1.1 GENERAL

A. Description Of Work

1. This specification covers installation of a concrete revetment. Work includes but is not limited to furnishing all labor, materials, equipment and supervision necessary to construct concrete revetment as follows or as directed by the Owner.

1.2 PRODUCTS

- A. The Concrete Revetment shall be an articulating cellular concrete block system, as manufactured by American Excelsior Company, or approved equal, (800-713-8245), is a block structure installed over a geotextile fabric as described herein. The cellular blocks are made of Portland Cement Concrete cast into "lock" blocks and "key" blocks to provide a three directional interlock to resist lateral movement. The articulating cellular concrete block system is a "flexible" concrete revetment which allows the blocks to traverse changes in terrain without disruption of the placement pattern and interlock feature.

1. The minimum concrete strength shall be 3,000 psi. Nominal block thickness shall be either 4 inches, 6 inches or 8 inches, as required to meet project requirements. Block weights, per pair of "key" and "lock" blocks, shall be approximately 50, 70 and 90 pounds for #4010-4 inch, #4015-6 inch and #4020-8 inch thick blocks, respectively. Each pair of "key" and "lock" blocks shall cover approximately 1.54 square feet, including uncovered openings between the blocks. The system shall provide approximately 80 percent coverage of the area with blocks, leaving approximately 20 percent, but not less than 16 percent, uncovered area at the ground surface.

- B. Filter fabric shall be Tri-Lock Fabric #792 as supplied by American Excelsior Company, or approved equal, (800) 713-8245; roll values:

<u>Property</u>	<u>Specification</u>	<u>Test Method</u>
Weight	7.4 oz/sy	ASTM D3776
Thickness	25 mils	ASTM D1777
Permeability	0.5 cm/sec	ASTM D4491
Abrasion Resistance	Warp: 58 percent	ASTM N3884
(% strength retained)	Fill: 81 percent	
Tensile Grab Strength	350 lbs. x 395 lbs	ASTM D4632
Grab Elongation	24% x 24%	ASTM D4632
Burst Strength	780 psi	ASTM D3786
Trapezoid Tear	120 lbs x 110 lbs.	ASTM D4533
Puncture Strength	165 lbs.	ASTM D4833
Apparent Opening Size	40-70	ASTM D-4751
UV Resistance @ 500 hours	90 percent	ASTM D-4355

- C. Tri-Lock block size selection shall be determined from documented hydraulic characteristics, derived from test procedures outlined in: "Hydraulic Stability of Articulating Concrete block Revetment Systems During Overtopping Flow." Report No. FHWA-RD-89-199, and "Minimizing Embankment Damage During Overtopping Flow." Report No. FHWA-RD-88-181.

- D. Backfill: Topsoil and seeding shall be as per Division 31 Section(s) "Earth Moving" AND Division 32 Section(s) "Turf And Grasses".

1.3 EXECUTION

32 - Exterior Improvements



- A. Excavation shall be made so that the placement of the geotextile and concrete blocks shall be in conformity with the lines and grades shown on the plans or as required to meet project requirements. The area for placement shall be free from obstructions such as tree roots, projecting stones or other foreign matter and graded smooth. Voids or soft areas shall be filled with suitable materials and compacted to non-movement. Place the geotextile on the prepared subgrade. Lock the edges into a key trench as required to meet project requirements. The concrete blocks shall be assembled overlaying a geotextile in a manner that allows maximum flexibility but discourages vertical movement of any single component. Fill open areas of the blocks with concrete at the interface to concrete structure. After placement, the open areas of the block system shall be backfilled with topsoil to the top of the blocks. The backfilling shall be completed within 14 days of placement of the geotextile.

END OF SECTION 32 91 19 13

SECTION 32 91 19 13a - SEPTIC TANK SYSTEMS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for septic tank systems. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Septic tanks.
 - b. Distribution boxes.
 - c. Pipe and fittings.
 - d. Absorption systems

C. Submittals

1. Product Data: For each type of product indicated.
 - a. Include construction details, material descriptions, dimensions of individual components, and profiles.
 - b. Include manhole openings, covers, and pipe connections.
2. Shop Drawings: For [trench absorption systems] [bed absorption systems].
 - a. Include manhole openings, covers, pipe connections, and accessories.
 - b. Include piping with sizes and invert elevations.
 - c. Include underground structures.
 - d. Include other utilities.

1.2 PRODUCTS

A. Septic Tanks

1. Precast Concrete Septic Tanks: ASTM C 1227, single-chamber **OR** two-chamber, **as directed**, precast, reinforced-concrete tank with internal baffle, **as directed**, and covers.
 - a. Design: For A-8 (H10-44) **OR** A-12 (HS15-44) **OR** A-16 (HS20-44), **as directed**, traffic loading according to ASTM C 890.
 - b. Manholes: **20-inch- (508-mm-) OR 22-inch- (559-mm-) OR 24-inch- (610-mm-), as directed**, minimum diameter opening with reinforced-concrete risers to grade and access lid with steel lift rings. Include manhole in center of each septic tank compartment top.
 - c. Filter Access: Reinforced-concrete access hole, large enough to remove filter, over filter position.
 - d. Inlet and Outlet Access: **12-inch- (300-mm-)** minimum diameter, reinforced-concrete access lids with steel lift rings. Include access centered over inlet and outlet.
 - e. Resilient Connectors: **ASTM C 923 (ASTM C 923M)**, of size required for piping, fitted into inlet and outlet openings.
2. Fiberglass Septic Tanks: UL 1316, single-chamber, FRP construction; fabricated for septic tank application with at least one access riser and manhole.
 - a. Manholes: **22-inch- (559-mm-) OR 24-inch- (610-mm-), as directed**, minimum diameter opening with FRP access risers to grade and cover.
 - b. Filter Access: Include access hole, large enough to remove filter, over filter position.
 - c. Resilient Connectors: **ASTM C 923 (ASTM C 923M)** or other watertight seal, of size required for piping, fitted into inlet and outlet openings.
3. Polyethylene Septic Tanks: Single-chamber, molded, HDPE or PE construction; fabricated for septic tank application, with baffle, **as directed**, and at least one access riser and manhole.

4. Polyethylene Septic Tanks: Two-chamber, molded, HDPE or PE construction; fabricated for septic tank application, with access risers and manholes.
 - a. Manholes: **18-inch- (457-mm-) OR 20-inch- (508-mm-) OR 22-inch- (559-mm-), as directed**, minimum diameter opening with HDPE or PE access risers to grade and cover.
 - b. Filter Access: Include access hole, large enough to remove filter, over filter position.
 - c. Resilient Connectors: **ASTM C 923 (ASTM C 923M)** or other watertight seal, of size required for piping, fitted into inlet and outlet openings.
- B. Filters
 1. Description: Removable, septic-tank-outlet filter that restricts discharge solids to **1/8 inch (3.2 mm)**.
 - a. Housing: HDPE or PVC.
 - b. Outlet Size: **NPS 4 (DN 100) OR NPS 6 (DN 150), as directed.**
- C. Dosing Tanks
 1. Dosing Tanks: Comply with ASTM C 913 for precast, reinforced-concrete tank and cover; designed for structural loading according to ASTM C 890.
 - a. Design: For effluent pump, **OR** automatic siphon, **as directed**, installation and A-8 (H10-44) **OR** A-12 (HS15-44) **OR** A-16 (HS20-44), **as directed**, traffic loading according to ASTM C 890.
 - b. Manholes: **20-inch- (508-mm-) OR 22-inch- (559-mm-) OR 24-inch- (610-mm-), as directed**, minimum diameter opening with reinforced-concrete risers to grade and access lid with steel lift rings. Include manhole in center of each septic tank compartment top.
 - c. Resilient Connectors: **ASTM C 923 (ASTM C 923M)**, of size required for piping, fitted into inlet and outlet openings.
- D. Automatic Siphons
 1. Description: Manufactured siphon assembly of molded-HDPE trap, pipe, and bell, with PVC vent piping and stainless-steel bolts.
- E. Distribution Boxes
 1. Description: Precast concrete, single-chamber box and cover.
 - a. Design: Made according to ASTM C 913, and for A-8 (H10-44) **OR** A-12 (HS15-44) **OR** A-16 (HS20-44), **as directed**, traffic loading according to ASTM C 890. Include baffle opposite inlet.
 - b. Manholes: **20-inch- (508-mm-) OR 22-inch- (559-mm-) OR 24-inch- (610-mm-), as directed**, minimum diameter opening with reinforced-concrete risers to grade and cover with steel lift rings in center of distribution box cover.
 - c. Pipe Connections: **ASTM C 923 (ASTM C 923M)** resilient connectors, of size required for piping, fitted into inlet and outlet openings. Include watertight plugs in outlets not required.
 2. Description: Molded-HDPE or -PE, single-chamber box and cover.
 - a. Manholes: **18-inch- (457-mm-) OR 20-inch- (508-mm-) OR 22-inch- (559-mm-), as directed**, minimum diameter opening with HDPE or PE access risers to grade and cover. Access for PE distribution boxes may be a removable plastic cover and is usually small.
OR
Manufacturer's standard cover or other access opening of size that permits access to distribution-box inlet and outlets.
 - b. Pipe Connections: With seal that prevents leakage. Include watertight plugs in outlets not required.
- F. Leaching Pipes And Fittings
 1. Pipe: PE, complying with ASTM F 810, perforated.
 - a. Fittings: ASTM D 2729 PVC for loose joints; ASTM D 3034, PVC for gasketed joints; or ASTM D 2751, ABS for gasketed joints.

2. Tube and Fittings: PE, complying with ASTM F 405, perforated corrugated tube with solid-wall fittings.
 - a. Couplings: PE band, matching tube and fitting dimensions.
 3. Pipe and Fittings: PVC, complying with ASTM D 2729, perforated, for solvent-cement joints.
 - a. Solvent Cement: ASTM D 2564. Include primer according to ASTM F 656
 4. Drainage Tile: Clay drain tile, complying with ASTM C 4, Standard class, drain tile with regular and smooth ends, for open joints.
- G. Nonpressure-Type Pipe Couplings
1. Description: Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - a. Sleeve Materials:
 - 1) For Concrete Pipes: **ASTM C 443 (ASTM C 443M)**, rubber.
 - 2) For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - 3) For Vitrified-Clay Pipes: ASTM C 425, rubber.
 - 4) For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
- H. Leaching Chambers
1. Description: Arched, molded-PE structures with solid top, perforated sides, open ends, and open bottom.
 - a. End Pieces: Solid and solid with pipe opening types.
 - b. Effluent Distribution Piping: PE or PVC pipe, with holes or slots along pipe, attached to underside of top of chambers.
- I. Trench **OR** Bed, **as directed**, Absorption-System Materials
1. Filtering Material: ASTM D 448, Size No. 24, **3/4 to 2-1/2 inches (19 to 63 mm)**, washed, crushed stone or gravel; or broken, hard-burned clay brick.
 2. Filter Mat: Geotextile woven or spun filter fabric, in 1 or more layers, for minimum total unit weight of **3 oz./sq. yd. (101 g/sq. m)** **OR** Untreated building paper or similar porous material, **as directed**.
 3. Cover for Distribution Pipe: Geotextile woven filter fabric, in 1 or more layers, for minimum total unit weight of **3 oz./sq. yd. (101 g/sq. m)**.
 4. Fill Material: Soil removed from trench.
- J. Mound Absorption-System Materials
1. Sand Filtering Material: 25 percent or more of very coarse, coarse, or medium sand or combination; maximum of 50 percent fine or very fine sand or combination; and silt and clay combination not to exceed 25 percent. If clay exceeds 60 percent in combination with silt, mixture cannot exceed 15 percent of sand filtering material.
 2. Aggregate Filtering Material: Coarse, **1/2 to 2-1/2 inches (13 to 63 mm)**.
 3. Cap: Clay, silt, or combination of clay and silt.
 4. Topsoil: Good quality, free of stones, metal, and glass.
 5. Vegetation Cover: Grass compatible with adjacent ground cover. No shrubs or trees.
 6. Filter Mat: Geotextile woven or spun filter fabric, in 1 or more layers, for minimum total unit weight of **3 oz./sq. yd. (101 g/sq. m)** **OR** Untreated building paper or similar porous material, **as directed**.
 7. Cover for Distribution Pipe: Geotextile woven filter fabric, in 1 or more layers, for minimum total unit weight of **3 oz./sq. yd. (101 g/sq. m)**.
- K. Chamber Absorption-System Materials
1. Chamber: Arched, molded-PE structures with solid top, perforated sides, open ends, and open bottom.
 2. End Pieces: Blank without opening for distribution pipe at end of last chamber in row, and with opening for distribution pipe where pipe penetrates chamber.

3. Retain first paragraph below to run piping through chambers to improve distribution.
4. Effluent Distribution Piping: PE or PVC pipe, with holes or slots along pipe, attached to underside of top of chambers.

L. Seepage Pit Absorption-System Materials

1. Constructed-in-Place-Type Seepage Pit: Include the following materials.
 - a. Pit Lining: ASTM C 62, Type SW, clay bricks; ASTM C 55, concrete bricks; ASTM C 90, hollow, concrete masonry units; or precast concrete rings with notches or weep holes.
 - b. Filtering Material: ASTM D 448, Size No. 24, 3/4 to 2-1/2 inches (19 to 63 mm), washed, crushed stone or gravel; or broken, hard-burned clay brick.
 - c. Cover: Precast concrete slab; designed for A-8 (H10-44) OR A-12 (HS15-44) OR A-16 (HS20-44), **as directed**, traffic loading according to ASTM C 890 and made according to ASTM C 913. Include slab dimensions that will extend minimum of 12 inches (300 mm) beyond edge of excavation. Cast cover with opening for manhole in center.
 - d. Manholes: 20-inch- (508-mm-) OR 22-inch- (559-mm-) OR 24-inch- (610-mm-), **as directed**, minimum diameter opening with reinforced-concrete risers to grade and access lid with steel lift rings.

1.3 EXECUTION

A. Earthwork

1. Excavating, trenching, and backfilling for piping and seepage pits are specified in Division 31 Section "Earth Moving".
 - a. Stockpile topsoil for reuse in finish grading without intermixing with other excavated material. Stockpile materials away from edge of excavation and do not store within drip line of remaining trees.
 - b. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
2. Excavating and Backfilling for Septic and Dosing Tanks:
 - a. Excavate sufficient width and length for tanks to depth determined by tank inlet elevation. Provide level bottom.
 - b. Backfill with excavated soil, mounding soil above original grade without compacting.
3. Excavating and Backfilling for Trench OR Bed, **as directed**, Absorption Fields:
 - a. Excavate for trench absorption fields 30 inches (760 mm) wide and 24 inches (600 mm) deep, minimum.
 - b. Backfill trench absorption fields with excavated soil, mounding soil above original grade without compacting.
 - c. Excavate for bed absorption fields of width indicated and 24 inches (600 mm) deep, minimum.
 - d. Backfill bed absorption fields with excavated soil, mounding soil above original grade without compacting.

B. Excavating and Backfilling for Chamber Absorption Systems:

1. Excavate for trench-type chamber absorption systems 30 inches (762 mm) wide and 24 inches (610 mm) deep, minimum.
2. Excavate for bed-type chamber absorption systems of width indicated and 24 inches (610 mm) deep, minimum.
3. Backfill chamber absorption systems with excavated soil, mounding soil above original grade without compacting.

C. Excavating and Backfilling for Seepage-Pit Absorption Systems:

1. Excavate sufficient hole diameter for pits to depth determined by tank inlet and bottom elevations. Provide level bottom.
2. Backfill with excavated soil, mounding soil above original grade without compacting.

- D. Septic Tank Installation
1. Install precast concrete septic tanks level according to ASTM C 891.
 2. Install septic tanks level.
 3. Connect septic tank to concrete ballast pad.
 4. Install filter in septic tank outlet. Secure filter to septic tank wall. Make direct connections to distribution piping.
 5. Install insulation on exterior sides and top of septic tank.
 6. Fill septic tank with water.
- E. Dosing Tank Installation
1. Install dosing tanks level and according to ASTM C 891.
 2. Install automatic siphons embedded in precast concrete dosing tank. Make direct connections to distribution piping.
 3. Set submersible effluent pumps on dosing tank floor. Make direct connections to distribution piping.
 4. Fill dosing tanks with water.
- F. Distribution Box Installation
1. Install precast concrete distribution boxes according to ASTM C 891 and at invert elevations indicated. Set level and plumb.
 2. Install PE distribution boxes at invert elevations indicated and according to manufacturer's written instructions. Set level and plumb.
- G. Piping Installation
1. Install leaching piping according to the following:
 - a. Use perforated pipe and fittings for trench **OR** bed **OR** mound, **as directed**, absorption fields with perforations at bottom.
 - b. PE Tube and Fittings: ASTM F 481.
 - c. PVC Sewer Pipe and Fittings: ASTM F 481.
- H. Pipe Joint Construction
1. Basic piping joint construction is specified in Division 33 Section "Common Work Results For Utilities". Where specific joint construction is not indicated, follow piping manufacturer's written instructions.
 2. Join distribution piping with or according to the following:
 - a. Install leaching pipe and fittings for trench **OR** bed **OR** mound, as directed, absorption fields with closed joints, unless otherwise indicated.
 - b. PE Tube and Fittings: With PE band couplings.
 - c. PVC Sewer Pipe and Fittings: With solvent-cemented joints according to ASTM F 402 and ASTM D 2321.
 3. Join dissimilar pipe materials according to ASTM D 5926, with couplings and gaskets compatible with pipe materials being joined.
- I. Cleanout Installation
1. Install cleanouts according to the following:
 - a. Inlet and Outlet of Septic Tanks: Cast-iron cleanouts.
 - b. Inlet and Outlet of Dosing Tanks: Cast-iron cleanouts.
 - c. Inlet and Outlet of Distribution Boxes: Cast-iron **OR** PVC cleanouts.
 - d. At Each Change in Direction of Sewer Piping: Cast-iron **OR** PVC cleanouts.
 - e. At Ends of Each Row and at Each Change in Direction of Distribution Piping: Cast-iron **OR** PVC cleanouts.
 2. Cast-Iron Cleanouts: Install with PVC fitting riser from distribution and leaching piping to cast-iron cleanout housing at grade. Use **NPS 4 (DN 100)** PVC sewer pipe and fittings with solvent-cemented joints for risers. Attach riser to cleanout housing with rubber gasket or coupling.

3. PVC Cleanouts: Install with PVC riser from distribution and leaching piping to PVC cleanout at grade. Use **NPS 4 (DN 100)** PVC sewer pipe and fittings with solvent-cemented joints for risers and cleanout fitting.
 4. Cleanout Support: Set cleanouts in concrete blocks **18 by 18 by 12 inches (457 by 457 by 305 mm)** deep, unless location is in concrete pavement. Formwork, reinforcement, and concrete are specified in Division 03 Section "Cast-in-place Concrete".
 5. Set top of cleanout **1 inch (25 mm) OR 2 inches (50 mm)**, **as directed**, above surrounding rough grade, or set flush with grade if installed in pavement.
- J. Trench **OR** Bed **OR** Absorption-Field, **as directed**, Installation
1. Filtering Material: Place supporting layer of filtering material over the compacted trench **OR** bed, **as directed**, base to a compacted depth not less than **6 inches (150 mm)** below bottom of pipe.
 2. Refer to Part 1.3 "Piping Installation" and "Pipe Joint Construction" articles for specific piping material installation.
 3. Install distribution piping at minimum slope of 1 percent and maximum slope of 2 percent.
 4. Install leaching piping solidly bedded in filtering material, with full bearing for each pipe section throughout its length. Maintain pipe alignment with no slope.
 - a. Install perforated pipe with perforations down and joints tightly closed. Install collars and couplings as required.
 - b. Install open-joint pipe with **1/2-inch (13-mm)** space, maximum, between ends, unless otherwise indicated. Cover top two-thirds of joint opening with joint cover, and tie with corrosion-resistant wire. Commercial joint-cover assemblies may be provided.
 - c. Install elbow fittings with tight joints.
 - d. Place additional filtering material around sides to a minimum compacted depth of **8 inches (200 mm)** above the top of leaching piping.
 5. Install filter mat over filter material before backfilling.
 6. Install leaching chambers with no slope in bottom of trench **OR** bed, **as directed**.
 - a. Install leaching chamber distribution piping with tight joints throughout chambers.
 7. Backfill according to Part 1.3 "Earthwork" Article.
- K. Mound Absorption-Field Installation
1. Plow top **6 inches (150 mm)** of surface.
 2. Place layers of sand, aggregate, **as directed**, cap, and topsoil above plowed area. Provide grass topping to match adjacent vegetation. Provide side slope not steeper than 3:1. Tie slope toe smoothly into existing grade.
 3. Refer to Part 1.3 "Piping Installation" and "Pipe Joint Construction" articles for specific piping material installation.
 4. Provide solid vent pipe with vent cap extending **12 inches (300 mm)** above top of mounds.
 5. Install distribution piping with no slope for pressurized effluent system.
 6. Install distribution piping at a minimum slope of 1 percent and a maximum slope of 2 percent for gravity effluent system.
 7. Install leaching piping solidly bedded in filtering material, with full bearing for each pipe section throughout its length. Maintain pipe alignment with no slope.
 - a. Install perforated pipe with perforations down and joints tightly closed. Install collars and couplings as required.
 - b. Install open-joint pipe with **1/2-inch (13-mm)** space, maximum, between ends, unless otherwise indicated. Cover top two-thirds of joint opening with joint cover, and tie with corrosion-resistant wire. Commercial joint-cover assemblies may be provided.
 - c. Install elbow fittings with tight joints.
 8. Install leaching chambers with no slope above plowed area.
 - a. Install leaching chamber distribution piping with tight joints throughout chambers.
 9. Provide adequate grading around mound absorption field to prevent storm runoff from washing away a portion of mound absorption field and to prevent exposing pipes.
- L. Seepage Pit Installation

1. Excavate hole to minimum diameter of **6 inches (150 mm)** greater than outside of pit lining.
2. Do not extend pit depth into ground-water table.
3. Install constructed-in-place seepage pits according to the following procedure if no requirements of authorities having jurisdiction apply:
 - a. Install brick pit lining material dry and laid flat with staggered joints for seepage.
 - b. Install block pit lining material dry with staggered joints and a minimum of 20 percent of blocks on side for seepage. Install precast concrete rings with notches or weep holes for seepage.
 - c. Extend pit lining material so top of manhole will be approximately **8 inches (200 mm)** below finished grade.
 - d. Backfill bottom of inside of pit with filtering material at least **12 inches (300 mm)** above bottom of lining material.
 - e. Extend effluent inlet pipe **12 inches (300 mm)** into seepage pit and terminate into side of tee fitting.
 - f. Backfill around outside of pit lining with filtering material to top of lining.
 - g. Install manhole risers from top of pit to grade. Support cover on undisturbed soil. Do not support cover on pit lining.

M. Identification

1. Identification materials and their installation are specified in Division 31 Section "Earth Moving". Arrange for installation of green warning tape directly over piping (including absorption-field piping), at outside edges of underground structures, and at outside edges of absorption fields.
2. Use detectable warning tape over piping, over edges of underground structures, and over edges of absorption fields.

N. Field Quality Control

1. System Tests: Perform testing of completed septic tank system piping and structures according to authorities having jurisdiction.
2. Additional Tests: Fill underground structures with water and let stand overnight. If water level recedes, locate and repair leaks and retest. Repeat tests and repairs until no leaks exist.

O. Cleaning

1. Clear interior of piping and structures of dirt and other superfluous material as work progresses.
2. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plugs in ends of uncompleted pipe at end of workday or when work stops.

END OF SECTION 32 91 19 13a

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Task	Specification	Specification Description
32 91 19 13	02 41 13 13	Portland Cement Concrete Removal
32 91 19 13	31 11 00 00	Site Clearing
32 91 19 13	31 13 16 00	Tree Protection And Trimming
32 91 19 13	31 05 13 00	Earth Moving
32 91 19 13	31 24 13 00	Embankment
32 91 19 13	32 91 13 33	Lawns And Grasses
32 92 16 00	32 91 13 33	Lawns And Grasses
32 92 19 13	32 91 13 33	Lawns And Grasses
32 92 19 19	32 91 13 33	Lawns And Grasses
32 92 23 00	32 91 13 33	Lawns And Grasses
32 93 13 00	32 14 09 00	Exterior Plants
32 93 23 00	32 14 09 00	Exterior Plants
32 93 33 00	31 11 00 00	Site Clearing
32 93 33 00	32 14 09 00	Exterior Plants
32 93 43 00	32 14 09 00	Exterior Plants
32 93 83 00	31 13 16 00	Tree Protection And Trimming
32 93 83 00	32 14 09 00	Exterior Plants
32 93 83 00	32 91 13 16	Tree Relocation
32 94 13 00	32 13 13 33	Cement Concrete Pavement
32 94 13 00	32 14 09 00	Exterior Plants
32 94 16 00	32 14 09 00	Exterior Plants
32 94 43 00	01 22 16 00	No Specification Required
32 94 43 00	32 33 23 00a	Miscellaneous Site and Street Furnishings
32 94 49 00	01 22 16 00	No Specification Required
32 94 49 00	31 13 16 00	Tree Protection And Trimming
32 94 49 00	32 14 09 00	Exterior Plants
32 96 33 00	32 91 13 16	Tree Relocation
32 96 43 00	32 91 13 16	Tree Relocation

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SECTION 33 01 10 58 - REPAIR AND MAINTENANCE OF IMHOFF TANKS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for repair and maintenance of sewage treatment plant Imhoff tanks. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Coatings:

1. Epoxy-Filler Compound for concrete surfaces shall comply with Fed. Spec. MMM-A-001993.
2. Coal-Tar Epoxy shall comply with SSPC-PAINT 16.
3. Epoxy Paint shall comply with Mil. Spec. MIL-P-24441.
4. Red-Lead Base Paint shall comply with Fed. Spec. TT-P-86, Type I.
5. Aluminum Finish Paint shall comply with Fed. Spec. TT-P-38.

- #### B. Steel Tank Repair Material for minor leaks shall be a two-component epoxy sealing compound. For badly corroded areas, a steel plate of the same composition and thickness as the original tank shall be used.

- #### C. Pipe and Fittings for replacement shall be equivalent to the existing pipe and fittings.

1.3 EXECUTION

- #### A. Preparation: Drain the contents of the tank and dispose of the sludge and sewage.

B. Leak Repair:

1. Concrete Tanks: Repair concrete tank leaks by cleaning and chipping or sandblasting the area of the leak and applying two-component epoxy concrete sealant.
2. Steel Tanks: Repair steel tank leaks by cleaning, scraping, chipping, or sandblasting the area of the leak and applying epoxy steel sealant. Repair badly corroded areas of steel tanks by cutting out the corroded area and welding a section of new steel plate in place. Welding shall be in compliance with AWS D1.1.

- #### C. Pipe and Fittings: Replace pipe and fittings as required.

D. Cleaning and Coatings:

1. Interior Concrete Surfaces of the tank shall be cleaned with high pressure water or steam to remove dirt and residue, allowed to dry, and brush sandblasted.
2. Holes and Voids in the concrete surfaces left from the blast cleaning shall be filled by means of troweling and squeeze application of epoxy filler. Two coats of coal-tar epoxy shall be applied to the surface after the epoxy has cured.
3. Submerged Ferrous Metal Surfaces such as piping and equipment that are exposed to the sewage shall be sandblasted and coated with two coats of coal-tar epoxy.

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4. Exterior Concrete Surfaces of the tank shall be cleaned by means of brush sandblast. The surfaces shall be blown down with air to remove the blasting residue and dust, and two coats of epoxy-polyamide paint shall be applied.
5. Ferrous Metal Surfaces that are not submerged shall be cleaned by means of sandblasting. Coat surfaces with one coat of red-lead base paint. After the base paint has dried sufficiently, apply two coats of aluminum finish paint.

END OF SECTION 33 01 10 58

Task	Specification	Specification Description
33 01 10 58	33 01 30 41	Sewer Line Cleaning
33 01 10 58	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 01 30 11	01 22 16 00	No Specification Required

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SECTION 33 01 30 41 - SEWER LINE CLEANING

1.1 GENERAL

A. Description Of Work

1. This specification covers sewer line cleaning. Cleaning procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

- B. Submittals: Submit product data and manufacturer's instruction.

1.2 PRODUCTS

- A. All materials shall be clean, free of defects, corrosion, and damage. All items shall be of proper type, size, design, and characteristics for the use intended. Unless otherwise specified, all items shall be factory-made.
- B. Portable Cleaning Equipment: Equipment used in the cleaning of sewer lines shall be as required to complete the work for the size, length, and conditions of the sewer. Portable and mobile equipment shall comply with Water Pollution Control Federation Manual No. 7.
- C. Chemicals shall be of the strength required to perform the work. The chemicals shall not be damaging to pipe materials, manholes, pumping equipment, nor treatment process and shall not be contaminated by foreign substances.

1.3 EXECUTION

A. Preparation

1. Protection required to prevent damage to adjacent materials, equipment, fixtures, and finishes shall be provided. Necessary protective clothing and accessories for personnel working with chemicals shall be provided.
2. Ventilation of Sewers: Contractor shall provide proper ventilation for personnel working in the sewer.
3. Alternate Sewage Discharge: Contractor shall provide an alternate routing of sewage discharge to a downstream manhole.
4. Traffic: Contractor shall provide all traffic signs required to safely direct traffic at and around work areas.

B. Installation

1. Direction of Work: Sewer line cleaning work, with the exception of hydraulic scouring, shall proceed in the downstream direction. Cleaning by hydraulic scouring shall proceed in the upstream direction.
2. Testing: Upon completion of cleaning operation, test sewer lines for proper operation and observe for a period of 24 hours. Clean out all stoppages and the retest the line for proper operation.

END OF SECTION 33 01 30 41

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Task	Specification	Specification Description
33 01 30 42	33 01 10 58	Repair And Maintenance Of Imhoff Tanks
33 01 30 42	33 01 30 41	Sewer Line Cleaning
33 01 30 42	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 33 01 30 81 - REPAIR AND MAINTENANCE OF SIPHON TANK AND SIPHONS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for the repair and maintenance of sewage treatment plant dosing siphon tanks. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Tank Repair Material shall be epoxy type grout complying with Fed. Spec. MMM-A-001993.

B. Concrete Coatings:

1. Outside and Above Grade shall be epoxy type in compliance with Mil. Spec. MIL-P-24441.
2. Inside and Below Grade shall be coal-tar epoxy type in compliance with SSPC-PAINT 16.

- C. Steel Repair Material shall be steel plate or epoxy cement and fiberglass cloth.

- D. Corroded or Defective Siphons: Replace those parts corroded or defective with new parts compatible with the unit, as recommended by the manufacturer.

E. Steel Coatings:

1. Red-Lead Base Coat shall comply with Fed. Spec. TT-P-86, Type I.
2. Aluminum Paint shall comply with Fed. Spec. TT-P-38.

1.3 EXECUTION

- A. Corroded or Broken Pipe and Fittings: Replace as required.

- B. Minor Leaks: Repair minor leaks in the tank using material and surface preparation and application methods recommended by the material manufacturer.

- C. Spalled Areas: Repair as required.

D. Cleaning and Coating:

1. Interior Concrete Surfaces of the tank shall be cleaned with high pressure water or steam to remove all dirt and residue, allowed to dry, and brush sandblasted in compliance with SSPC-SP 7.
2. The Exterior Concrete Surfaces of the tank shall be cleaned by means of brush sandblasting in compliance with SSPC-SP 7. The surfaces shall be blown down with air to remove the blasting residue and dust, and two coats of epoxy-polyamide paint shall be applied.
3. Holes and Voids in the concrete surfaces left from the blast cleaning shall be filled by means of troweling and squeeze application of an epoxy filler. The surfacing material shall be allowed to cure overnight, and then two coats of coal-tar epoxy complying with SSPC-PAINT 16 shall be applied.

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4. Submerged Ferrous Metal Surfaces that are exposed to the sewage shall be sandblasted in compliance with SSPC-SP 10 and coated with two coats of coal-tar epoxy.
5. Ferrous Metal Surfaces that are not submerged shall be cleaned by means of sandblasting in compliance with SSPC-SP 6. Surfaces inaccessible to sandblasting shall be power tool cleaned in compliance with SSPC-SP 3. Surfaces shall be coated with one coat of red-lead base paint. After the base paint has dried sufficiently, two coats of aluminum finish paint shall be applied.

END OF SECTION 33 01 30 81

SECTION 33 01 30 81a - UNDERGROUND DUCTS AND UTILITY STRUCTURES

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for underground ducts and utility structures. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes the following:
 - a. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs\.
 - b. Handholes and pull boxes.
 - c. Manholes.

C. Definition

1. RNC: Rigid nonmetallic conduit.

D. Submittals

1. Product Data: For the following:
 - a. Duct-bank materials, including separators and miscellaneous components.
 - b. Ducts and conduits and their accessories, including elbows, end bells, bends, fittings, and solvent cement.
 - c. Accessories for manholes, handholes, pull boxes, and other utility structures.
 - d. Warning tape.
 - e. Warning planks.
2. Shop Drawings for Precast or Factory-Fabricated Underground Utility Structures: Include plans, elevations, sections, details, attachments to other work, and accessories, including the following:
 - a. Duct entry provisions, including locations and duct sizes.
 - b. Reinforcement details.
 - c. Frame and cover design and manhole frame support rings.
 - d. Ladder **OR** Step, **as directed**, details.
 - e. Grounding details.
 - f. Dimensioned locations of cable rack inserts, pulling-in and lifting irons, and sumps.
 - g. Joint details.
3. Shop Drawings for Factory-Fabricated Handholes and Pull Boxes Other Than Precast Concrete: Include dimensioned plans, sections, and elevations, and fabrication and installation details, including the following:
 - a. Duct entry provisions, including locations and duct sizes.
 - b. Cover design.
 - c. Grounding details.
 - d. Dimensioned locations of cable rack inserts, and pulling-in and lifting irons.
4. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.
 - a. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.
 - b. Drawings shall be signed and sealed by a qualified professional engineer.
5. Product Certificates: For concrete and steel used in precast concrete manholes and handholes, as required by ASTM C 858.
6. Qualification Data: For qualified professional engineer and testing agency.
7. Source quality-control reports
8. Field quality-control test reports.

- E. Quality Assurance
 - 1. Comply with IEEE C2.
 - 2. Comply with NFPA 70.
- F. Delivery, Storage, And Handling
 - 1. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.
 - 2. Store precast concrete and other factory-fabricated underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.
 - 3. Lift and support precast concrete units only at designated lifting or supporting points.
- G. Project Conditions
 - 1. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of electrical service.
 - b. Do not proceed with interruption of electrical service without the Owner's written permission.

1.2 PRODUCTS

- A. Conduit
 - 1. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.
 - 2. RNC: NEMA TC 2, Type EPC-40-PVC and Type EPC-80-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.
- B. Nonmetallic Ducts And Duct Accessories
 - 1. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type EB-20-PVC, ASTM F 512, UL 651A, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
 - 2. Underground Plastic Utilities Duct: NEMA TC 6 & 8, Type DB-60-PVC and Type DB-120-PVC, ASTM F 512, with matching fittings by the same manufacturer as the duct, complying with NEMA TC 9.
 - 3. Duct Accessories:
 - a. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
 - b. Warning Tape: Underground-line warning tape specified in Division 26 Section "Identification For Electrical Systems".
 - c. Concrete Warning Planks: Nominal 12 by 24 by 3 inches (300 by 600 by 76 mm) in size, manufactured from 6000-psi (41-MPa) concrete.
 - 1) Color: Red dye added to concrete during batching.
 - 2) Mark each plank with "ELECTRIC" in 2-inch- (50-mm-) high, 3/8-inch- (10-mm-) deep letters.
- C. Precast Concrete Handholes And Pull Boxes
 - 1. Comply with ASTM C 858 for design and manufacturing processes.
 - 2. Ferrous metal hardware shall be hot-dip galvanized in accordance with ASTM A153 (ASTM A153M) and ASTM A123 (ASTM A123M).
 - 3. Description: Factory-fabricated, reinforced-concrete, monolithically poured walls and bottom unless open-bottom enclosures are indicated. Frame and cover shall form top of enclosure and shall have load rating consistent with that of handhole or pull box.

- a. Frame and Cover: Weatherproof cast-iron frame, with cast-iron cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
 - b. Frame and Cover: Weatherproof steel frame, with steel cover with recessed cover hook eyes and tamper-resistant, captive, cover-securing bolts.
 - c. Frame and Cover: Weatherproof steel frame, with hinged steel access door assembly with tamper-resistant, captive, cover-securing bolts.
 - 1) Cover Hinges: Concealed, with hold-open ratchet assembly.
 - 2) Cover Handle: Recessed.
 - d. Frame and Cover: Weatherproof aluminum frame with hinged aluminum access door assembly with tamper-resistant, captive, cover-securing stainless-steel bolts.
 - 1) Cover Hinges: Concealed, with hold-open ratchet assembly.
 - 2) Cover Handle: Recessed.
 - e. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - f. Cover Legend: Molded lettering, "ELECTRIC" **OR** "TELEPHONE" **OR** As indicated for each service, **as directed**.
 - g. Configuration: Units shall be designed for flush burial and have open **OR** closed **OR** integral closed, **as directed**, bottom, unless otherwise indicated.
 - h. Extensions and Slabs: Designed to mate with bottom of enclosure. Same material as enclosure.
 - 1) Extension shall provide increased depth of **12 inches (300 mm)**.
 - 2) Slab: Same dimensions as bottom of enclosure, and arranged to provide closure.
 - i. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional **12 inches (300 mm)** vertically and horizontally to accommodate alignment variations.
 - 1) Windows shall be located no less than **6 inches (150 mm)** from interior surfaces of walls, floors, or frames and covers of handholes, but close enough to corners to facilitate racking of cables on walls.
 - 2) Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
 - 3) Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
 - j. Duct Entrances in Handhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - 1) Type and size shall match fittings to duct or conduit to be terminated.
 - 2) Fittings shall align with elevations of approaching ducts and be located near interior corners of handholes to facilitate racking of cable.
 - k. Handholes **12 inches wide by 24 inches long (300 mm wide by 600 mm long)** and larger shall have inserts for cable racks and pulling-in irons installed before concrete is poured.
- D. Handholes and Pull Boxes Other Than Precast Concrete
1. Description: Comply with SCTE 77.
 - a. Color: Gray **OR** Green, **as directed**.
 - b. Configuration: Units shall be designed for flush burial and have open **OR** closed **OR** integral closed, **as directed**, bottom, unless otherwise indicated.
 - c. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
 - d. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
 - e. Cover Legend: Molded lettering, "ELECTRIC" **OR** "TELEPHONE" **OR** As indicated for each service, **as directed**.
 - f. Direct-Buried Wiring Entrance Provisions: Knockouts equipped with insulated bushings or end-bell fittings, selected to suit box material, sized for wiring indicated, and arranged for secure, fixed installation in enclosure wall.
 - g. Duct Entrance Provisions: Duct-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
 - h. Handholes **12 inches wide by 24 inches long (300 mm wide by 600 mm long)** and larger shall have factory-installed inserts for cable racks and pulling-in irons.

2. Polymer Concrete Handholes and Pull Boxes with Polymer Concrete Cover: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.
3. Fiberglass Handholes and Pull Boxes with Polymer Concrete Frame and Cover: Sheet-molded, fiberglass-reinforced, polyester resin enclosure joined to polymer concrete top ring or frame.
4. Fiberglass Handholes and Pull Boxes: Molded of fiberglass-reinforced polyester resin, with covers of polymer concrete **OR** reinforced concrete **OR** cast iron **OR** hot-dip galvanized-steel diamond plate **OR** fiberglass, **as directed**.
5. High-Density Plastic Pull Boxes: Injection molded of high-density polyethylene or copolymer-polypropylene. Cover shall be polymer concrete **OR** hot-dip galvanized-steel diamond plate **OR** plastic, **as directed**.

E. Precast Manholes

1. Comply with ASTM C 858, with structural design loading as specified in Para. 1.3 "Underground Enclosure Application" Article and with interlocking mating sections, complete with accessories, hardware, and features.
 - a. Windows: Precast openings in walls, arranged to match dimensions and elevations of approaching ducts and duct banks plus an additional **12 inches (300 mm)** vertically and horizontally to accommodate alignment variations.
 - 1) Windows shall be located no less than **6 inches (150 mm)** from interior surfaces of walls, floors, or roofs of manholes, but close enough to corners to facilitate racking of cables on walls.
 - 2) Window opening shall have cast-in-place, welded wire fabric reinforcement for field cutting and bending to tie in to concrete envelopes of duct banks.
 - 3) Window openings shall be framed with at least two additional No. 4 steel reinforcing bars in concrete around each opening.
 - b. Duct Entrances in Manhole Walls: Cast end-bell or duct-terminating fitting in wall for each entering duct.
 - 1) Type and size shall match fittings to duct or conduit to be terminated.
 - 2) Fittings shall align with elevations of approaching ducts and be located near interior corners of manholes to facilitate racking of cable.
2. Concrete Knockout Panels: **1-1/2 to 2 inches (38 to 50 mm)** thick, for future conduit entrance and sleeve for ground rod.
3. Joint Sealant: Asphaltic-butyl material with adhesion, cohesion, flexibility, and durability properties necessary to withstand maximum hydrostatic pressures at the installation location with the ground-water level at grade.

F. Cast-In-Place Manholes

1. Description: Underground utility structures, constructed in place, complete with accessories, hardware, and features. Include concrete knockout panels for conduit entrance and sleeve for ground rod.
2. Materials: Comply with ASTM C 858 and with Division 03 Section "Cast-in-place Concrete".
 - a. Concrete shall have a minimum compressive strength of **3000 psi (20 MPa)**.
3. Structural Design Loading: As specified in "Underground Enclosure Application" Article.

G. Utility Structure Accessories

1. Ferrous metal hardware, where indicated, shall be hot-dip galvanized complying with ASTM **A 153 (A 153M)** and **A 123 (A 123M)**.
2. Manhole Frames, Covers, and Chimney Components: Comply with structural design loading specified for manhole.
 - a. Frame and Cover: Weatherproof, gray cast iron complying with ASTM A 48/A 48M, Class 30B **OR** cast aluminum, **as directed**, with milled cover-to-frame bearing surfaces; diameter, **26 inches (660 mm) OR 29 inches (737 mm)**, **as directed**.
 - 1) Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.

- 2) Special Covers: Recess in face of cover designed to accept finish material in paved areas.
- b. Cover Legend: Cast in. Selected to suit system.
 - 1) Legend: "ELECTRIC-LV" for duct systems with power wires and cables for systems operating at 600 V and less.
 - 2) Legend: "ELECTRIC-HV" for duct systems with medium-voltage cables.
 - 3) Legend: "SIGNAL" for communications, data, and telephone duct systems.
- c. Manhole Chimney Components: Precast concrete rings with dimensions matched to those of roof opening.
 - 1) Mortar for Chimney Ring and Frame and Cover Joints: Comply with ASTM C 270, Type M, except for quantities less than **2.0 cu. ft. (60 L)** where packaged mix complying with ASTM C 387, Type M, may be used.
3. Manhole Sump Frame and Grate: ASTM A 48/A 48M, Class 30B, gray cast iron.
4. Pulling Eyes in Concrete Walls: Eyebolt with reinforcing-bar fastening insert, **2-inch- (50-mm-)** diameter eye, and **1-by-4-inch (25-by-100-mm)** bolt.
 - a. Working Load Embedded in **6-Inch (150-mm), 4000-psi (27.6-MPa)** Concrete: **13,000-lbf (58-kN)** minimum tension.
5. Pulling Eyes in Nonconcrete Walls: Eyebolt with reinforced fastening, **1-1/4-inch- (32-mm-)** diameter eye, rated **2500-lbf (11-kN)** minimum tension.
6. Pulling-In and Lifting Irons in Concrete Floors: **7/8-inch- (22-mm-)** diameter, hot-dip galvanized, bent steel rod; stress relieved after forming; and fastened to reinforcing rod. Exposed triangular opening.
 - a. Ultimate Yield Strength: **40,000-lbf (180-kN)** shear and **60,000-lbf (270-kN)** tension.
7. Bolting Inserts for Concrete Utility Structure Cable Racks and Other Attachments: Flared, threaded inserts of noncorrosive, chemical-resistant, nonconductive thermoplastic material; **1/2-inch (13-mm)** ID by **2-3/4 inches (69 mm)** deep, flared to **1-1/4 inches (32 mm)** minimum at base.
 - a. Tested Ultimate Pullout Strength: **12,000 lbf (53 kN)** minimum.
8. Expansion Anchors for Installation after Concrete Is Cast: Zinc-plated, carbon-steel-wedge type with stainless-steel expander clip with **1/2-inch (13-mm)** bolt, **5300-lbf (24-kN)** rated pullout strength, and minimum **6800-lbf (30-kN)** rated shear strength.
9. Cable Rack Assembly: Steel, hot-rolled **OR** hot-dip, **as directed**, galvanized, except insulators.
 - a. Stanchions: T-section or channel; **2-1/4-inch (57-mm)** nominal size; punched with 14 holes on **1-1/2-inch (38-mm)** centers for cable-arm attachment.
 - b. Arms: **1-1/2 inches (38 mm)** wide, lengths ranging from **3 inches (75 mm)** with **450-lb (204-kg)** minimum capacity to **18 inches (460 mm)** with **250-lb (114-kg)** minimum capacity. Arms shall have slots along full length for cable ties and be arranged for secure mounting in horizontal position at any vertical location on stanchions.
 - c. Insulators: High-glaze, wet-process porcelain arranged for mounting on cable arms.
10. Cable Rack Assembly: Nonmetallic. Components fabricated from nonconductive, fiberglass-reinforced polymer.
 - a. Stanchions: Nominal **36 inches (900 mm)** high by **4 inches (100 mm)** wide, with minimum of 9 holes for arm attachment.
 - b. Arms: Arranged for secure, drop-in attachment in horizontal position at any location on cable stanchions, and capable of being locked in position. Arms shall be available in lengths ranging from **3 inches (75 mm)** with **450-lb (204-kg)** minimum capacity to **20 inches (508 mm)** with **250-lb (114-kg)** minimum capacity. Top of arm shall be nominally **4 inches (100 mm)** wide, and arm shall have slots along full length for cable ties.
11. Duct-Sealing Compound: Nonhardening, safe for contact with human skin, not deleterious to cable insulation, and workable at temperatures as low as **35 deg F (2 deg C)**. Capable of withstanding temperature of **300 deg F (150 deg C)** without slump and adhering to clean surfaces of plastic ducts, metallic conduits, conduit coatings, concrete, masonry, lead, cable sheaths, cable jackets, insulation materials, and common metals.
12. Fixed Manhole Ladders: Arranged for attachment to roof or wall **OR** and floor, **as directed**, of manhole. Ladder and mounting brackets and braces shall be fabricated from nonconductive, structural-grade, fiberglass-reinforced resin **OR** hot-dip galvanized steel, **as directed**.

13. Portable Manhole Ladders: UL-listed, heavy-duty wood **OR** fiberglass, **as directed**, specifically designed for portable use for access to electrical manholes. Minimum length equal to distance from deepest manhole floor to grade plus **36 inches (900 mm)**. One required.
14. Cover Hooks: Heavy duty, designed for lifts **60 lbf (270 N)** and greater **OR** Light duty, designed for lifts less than **60 lbf (270 N)**, **as directed**. Two required.

H. Source Quality Control

1. Test and inspect precast concrete utility structures according to ASTM C 1037.
2. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and pull boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.
 - a. Engage a qualified testing agency to evaluate nonconcrete handholes and pull boxes.
 - b. Testing machine pressure gages shall have current calibration certification complying with ISO 9000 and ISO 10012, and traceable to NIST standards.

1.3 EXECUTION

A. Corrosion Protection

1. Aluminum shall not be installed in contact with earth or concrete.

B. Underground Duct Application

1. Ducts for Electrical Cables Over 600 V: RNC, NEMA Type EPC-80 **OR** EPC-40 **OR** EB-20, **as directed**, -PVC, in concrete-encased duct bank, unless otherwise indicated.
2. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-80 **OR** EPC-40 **OR** EB-20, **as directed**, -PVC, in concrete-encased duct bank, unless otherwise indicated.
3. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-80 **OR** EPC-40 **as directed**, -PVC, in direct-buried duct bank, unless otherwise indicated.
4. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-80 **OR** EPC-40, **as directed**, -PVC, in direct-buried duct bank, unless otherwise indicated.
5. Underground Ducts for Telephone, Communications, or Data Utility Service Cables: RNC, NEMA Type EPC-40 **OR** EB-20, **as directed**, -PVC, in concrete-encased duct bank, unless otherwise indicated.
6. Underground Ducts for Telephone, Communications, or Data Utility Service Cables: RNC, NEMA Type EPC-40-PVC **OR** Underground plastic utilities duct, NEMA Type DB-60-PVC **OR** Underground plastic utilities duct, NEMA Type DB-120-PVC, **as directed**, installed in direct-buried **OR** concrete-encased, **as directed**, duct bank, unless otherwise indicated.
7. Underground Ducts for Telephone, Communications, or Data Circuits: RNC, NEMA Type EPC-40 **OR** DB-60 **OR** DB-120, **as directed**, -PVC, in direct-buried duct bank, unless otherwise indicated.
8. Underground Ducts for Telephone, Communications, or Data Circuits: RNC, NEMA Type EB-20-PVC, in concrete-encased duct bank, unless otherwise indicated.
9. Underground Ducts Crossing Paved Paths **OR** Walks and Driveways **OR** Roadways and Railroads, **as directed**: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

C. Underground Enclosure Application

1. Handholes and Pull Boxes for 600 V and Less, Including Telephone, Communications, and Data Wiring:
 - a. Units in Roadways and Other Deliberate Traffic Paths: Precast concrete, AASHTO HB 17, H-10 **OR** H-20, **as directed**, structural load rating.
 - b. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 **OR** Polymer concrete, SCTE 77, Tier 15 **OR** Fiberglass enclosures with polymer concrete frame and cover, SCTE 77, Tier 15 **OR** Fiberglass-reinforced polyester resin, SCTE 77, Tier 15 **OR** High-density plastic, SCTE 77, Tier 15, **as directed**, structural load rating.

- c. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10 **OR** Polymer concrete units, SCTE 77, Tier 8 **OR** Heavy-duty fiberglass units with polymer concrete frame and cover, SCTE 77, Tier 8 **OR** High-density plastic, SCTE 77, Tier 8, **as directed**, structural load rating.
- d. Units Subject to Light-Duty Pedestrian Traffic Only: Fiberglass-reinforced polyester resin **OR** High-density plastic, **as directed**, structurally tested according to SCTE 77 with **3000-lbf (13 345-N)** vertical loading.
2. Manholes: Precast or cast-in-place concrete.
 - a. Units Located in Roadways and Other Deliberate Traffic Paths by Heavy or Medium Vehicles: H-20 structural load rating according to AASHTO HB 17.
 - b. Units Not Located in Deliberate Traffic Paths by Heavy or Medium Vehicles: H-10 load rating according to AASHTO HB 17.

D. Earthwork

1. Excavation and Backfill: Comply with Division 31 Section "Earth Moving", but do not use heavy-duty, hydraulic-operated, compaction equipment.
2. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.
3. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Division 32 Section(s) "Turf And Grasses" AND "Plants".
4. Cut and patch existing pavement in the path of underground ducts and utility structures according to Division 01 Section "Cutting And Patching".

E. Duct Installation

1. Slope: Pitch ducts a minimum slope of 1:300 down toward manholes and handholes and away from buildings and equipment. Slope ducts from a high point in runs between two manholes to drain in both directions.
2. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep bends with a minimum radius of **48 inches (1220 mm) OR 12.5 feet (4 m) OR 25 feet (7.5 m)**, **as directed**, both horizontally and vertically, at other locations, unless otherwise indicated.
3. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.
4. Duct Entrances to Manholes and Concrete and Polymer Concrete Handholes: Use end bells, spaced approximately **10 inches (250 mm)** o.c. for **5-inch (125-mm)** ducts, and vary proportionately for other duct sizes.
 - a. Begin change from regular spacing to end-bell spacing **10 feet (3 m)** from the end bell without reducing duct line slope and without forming a trap in the line.
 - b. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to manhole or handhole.
 - c. Grout end bells into structure walls from both sides to provide watertight entrances.
5. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least **10 feet (3 m)** outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Division 26 Section "Common Work Results For Electrical".
6. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least **15-psig (1.03-MPa)** hydrostatic pressure.
7. Pulling Cord: Install **100-lbf- (445-N-)** test nylon cord in ducts, including spares.
8. Concrete-Encased Ducts: Support ducts on duct separators.
 - a. Separator Installation: Space separators close enough to prevent sagging and deforming of ducts, with not less than **4 OR 5**, **as directed**, spacers per **20 feet (6 m)** of duct. Secure

- separators to earth and to ducts to prevent floating during concreting. Stagger separators approximately **6 inches (150 mm)** between tiers. Tie entire assembly together using fabric straps; do not use tie wires or reinforcing steel that may form conductive or magnetic loops around ducts or duct groups.
- b. Concreting Sequence: Pour each run of envelope between manholes or other terminations in one continuous operation.
 - 1) Start at one end and finish at the other, allowing for expansion and contraction of ducts as their temperature changes during and after the pour. Use expansion fittings installed according to manufacturer's written recommendations, or use other specific measures to prevent expansion-contraction damage.
 - 2) If more than one pour is necessary, terminate each pour in a vertical plane and install **3/4-inch (19-mm)** reinforcing rod dowels extending **18 inches (450 mm)** into concrete on both sides of joint near corners of envelope.
 - c. Pouring Concrete: Spade concrete carefully during pours to prevent voids under and between conduits and at exterior surface of envelope. Do not allow a heavy mass of concrete to fall directly onto ducts. Use a plank to direct concrete down sides of bank assembly to trench bottom. Allow concrete to flow to center of bank and rise up in middle, uniformly filling all open spaces. Do not use power-driven agitating equipment unless specifically designed for duct-bank application.
 - d. Reinforcement: Reinforce concrete-encased duct banks where they cross disturbed earth and where indicated. Arrange reinforcing rods and ties without forming conductive or magnetic loops around ducts or duct groups.
 - e. Forms: Use walls of trench to form side walls of duct bank where soil is self-supporting and concrete envelope can be poured without soil inclusions; otherwise, use forms.
 - f. Minimum Space between Ducts: **3 inches (75 mm)** between ducts and exterior envelope wall, **2 inches (50 mm)** between ducts for like services, and **4 inches (100 mm)** between power and signal ducts.
 - g. Depth: Install top of duct bank at least **24 inches (600 mm)** below finished grade in areas not subject to deliberate traffic, and at least **30 inches (750 mm)** below finished grade in deliberate traffic paths for vehicles, unless otherwise indicated.
 - h. Stub-Ups:
 - 1) Use manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Extend concrete encasement throughout the length of the elbow.
OR
Use manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.
 - a) Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with **3 inches (75 mm)** of concrete.
 - b) Stub-Ups to Equipment: For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of **60 inches (1500 mm)** from edge of base. Install insulated grounding bushings on terminations at equipment.
 - i. Warning Tape: Bury warning tape approximately **12 inches (300 mm)** above all concrete-encased ducts and duct banks. Align tape parallel to and within **3 inches (75 mm)** of the centerline of duct bank. Provide an additional warning tape for each **12-inch (300-mm)** increment of duct-bank width over a nominal **18 inches (450 mm)**. Space additional tapes **12 inches (300 mm)** apart, horizontally.
9. Direct-Buried Duct Banks:
 - a. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
 - b. Space separators close enough to prevent sagging and deforming of ducts, with not less than **4 OR 5, as directed**, spacers per **20 feet (6 m)** of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement

due to expansion and contraction as temperature changes. Stagger spacers approximately **6 inches (150 mm)** between tiers.

- c. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Division 31 Section "Earth Moving" for pipes less than **6 inches (150 mm)** in nominal diameter.
- d. Install backfill as specified in Division 31 Section "Earth Moving".
- e. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to **4 inches (100 mm)** over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Division 31 Section "Earth Moving".
- f. Install ducts with a minimum of **3 inches (75 mm)** between ducts for like services and **6 inches (150 mm)** between power and signal ducts.
- g. Depth: Install top of duct bank at least **36 inches (900 mm)** below finished grade, unless otherwise indicated.
- h. Set elevation of bottom of duct bank below the frost line.
- i. Install manufactured duct elbows for stub-ups at poles and equipment and at building entrances through the floor, unless otherwise indicated. Encase elbows for stub-up ducts throughout the length of the elbow.

OR

Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances through the floor.

- 1) Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with **3 inches (75 mm)** of concrete.
- 2) For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of **60 inches (1500 mm)** from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.
- j. Warning Planks: Bury warning planks approximately **12 inches (300 mm)** above direct-buried ducts and duct banks, placing them **24 inches (600 mm)** o.c. Align planks along the width and along the centerline of duct bank. Provide an additional plank for each **12-inch (300-mm)** increment of duct-bank width over a nominal **18 inches (450 mm)**. Space additional planks **12 inches (300 mm)** apart, horizontally.

F. Installation Of Concrete Manholes, Handholes, And Pull Boxes

- 1. Cast-in-Place Manhole Installation:
 - a. Finish interior surfaces with a smooth-troweled finish.
 - b. Windows for Future Duct Connections: Form and pour concrete knockout panels **1-1/2 to 2 inches (38 to 50 mm)** thick, arranged as indicated.
 - c. Cast-in-place concrete, formwork, and reinforcement are specified in Division 03 Section "Cast-in-place Concrete".
- 2. Precast Concrete Handhole and Manhole Installation:
 - a. Comply with ASTM C 891, unless otherwise indicated.
 - b. Install units level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances.
 - c. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from **1-inch (25-mm)** sieve to **No. 4 (4.75-mm)** sieve and compacted to same density as adjacent undisturbed earth.
- 3. Elevations:
 - a. Manhole Roof: Install with rooftop at least **15 inches (380 mm)** below finished grade.
 - b. Manhole Frame: In paved areas and trafficways, set frames flush with finished grade. Set other manhole frames **1 inch (25 mm)** above finished grade.
 - c. Install handholes with bottom below the frost line, below grade.

- d. Handhole Covers: In paved areas and trafficways, set surface flush with finished grade. Set covers of other handholes **1 inch (25 mm)** above finished grade.
 - e. Where indicated, cast handhole cover frame integrally with handhole structure.
 4. Drainage: Install drains in bottom of manholes where indicated. Coordinate with drainage provisions indicated.
 5. Manhole Access: Circular opening in manhole roof; sized to match cover size.
 - a. Manholes with Fixed Ladders: Offset access opening from manhole centerlines to align with ladder.
 - b. Install chimney, constructed of precast concrete collars and rings to support frame and cover and to connect cover with manhole roof opening. Provide moisture-tight masonry joints and waterproof grouting for cast-iron frame to chimney.
 6. Waterproofing: Apply waterproofing to exterior surfaces of manholes and handholes after concrete has cured at least three days. Waterproofing materials and installation are specified in Division 07 Section(s) "Elastomeric Sheet Waterproofing" OR "Thermoplastic Sheet Waterproofing", **as directed**. After ducts have been connected and grouted, and before backfilling, waterproof joints and connections and touch up abrasions and scars. Waterproof exterior of manhole chimneys after mortar has cured at least three days.
 7. Dampproofing: Apply dampproofing to exterior surfaces of manholes and handholes after concrete has cured at least three days. Dampproofing materials and installation are specified in Division 07 Section "Bituminous Dampproofing". After ducts have been connected and grouted, and before backfilling, dampproof joints and connections and touch up abrasions and scars. Dampproof exterior of manhole chimneys after mortar has cured at least three days.
 8. Hardware: Install removable hardware, including pulling eyes, cable stanchions, and cable arms, and insulators, as required for installation and support of cables and conductors and as indicated.
 9. Fixed Manhole Ladders: Arrange to provide for safe entry with maximum clearance from cables and other items in manholes.
 10. Field-Installed Bolting Anchors in Manholes and Concrete Handholes: Do not drill deeper than **3-7/8 inches (98 mm)** for manholes and **2 inches (50 mm)** for handholes, for anchor bolts installed in the field. Use a minimum of two anchors for each cable stanchion.
 11. Warning Sign: Install "Confined Space Hazard" warning sign on the inside surface of each manhole cover.
- G. Installation Of Handholes And Pull Boxes Other Than Precast Concrete
1. Install handholes and pull boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.
 2. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from **1/2-inch (12.7-mm)** sieve to **No. 4 (4.75-mm)** sieve and compacted to same density as adjacent undisturbed earth.
 3. Elevation: In paved areas and trafficways, set so cover surface will be flush with finished grade. Set covers of other handholes **1 inch (25 mm)** above finished grade.
 4. Install handholes and pull boxes with bottom below the frost line, below grade.
 5. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables, but short enough to preserve adequate working clearances in the enclosure.
 6. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.
 7. For enclosures installed in asphalt paving and subject to occasional, nondeliberate, heavy-vehicle loading, form and pour a concrete ring encircling, and in contact with, enclosure and with top surface screeded to top of box cover frame. Bottom of ring shall rest on compacted earth.
 - a. Concrete: **3000 psi (20 kPa)**, 28-day strength, complying with Division 03 Section "Cast-in-place Concrete", with a troweled finish.

- b. Dimensions: 10 inches wide by 12 inches deep (250 mm wide by 300 mm deep).
- H. Grounding
- 1. Ground underground ducts and utility structures according to Division 26 Section "Grounding And Bonding For Electrical Systems".
- I. Field Quality Control
- 1. Perform the following tests and inspections:
 - a. Demonstrate capability and compliance with requirements on completion of installation of underground ducts and utility structures.
 - b. Pull aluminum or wood test mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
 - c. Test manhole and handhole grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Division 26 Section "Grounding And Bonding For Electrical Systems".
 - 2. Correct deficiencies and retest as specified above to demonstrate compliance.
 - 3. Prepare test and inspection reports.
- J. Cleaning
- 1. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.
 - 2. Clean internal surfaces of manholes, including sump. Remove foreign material.

END OF SECTION 33 01 30 81a

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Task	Specification	Specification Description
33 01 30 81	01 22 16 00	No Specification Required
33 01 30 81	33 01 10 58	Repair And Maintenance Of Imhoff Tanks
33 01 30 81	31 32 19 16	Sewage Treatment Lagoons
33 01 30 81	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 01 30 81	33 31 11 00	Sanitary Sewerage
33 01 30 81	33 42 11 00	Storm Drainage
33 01 30 82	01 22 16 00	No Specification Required
33 01 30 83	01 22 16 00	No Specification Required
33 01 30 83	33 01 10 58	Repair And Maintenance Of Imhoff Tanks
33 01 30 83	33 01 30 81	Repair And Maintenance Of Siphon Tank And Siphons
33 01 30 83	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 01 70 51	01 22 16 00	No Specification Required
33 05 61 00	33 31 11 00	Sanitary Sewerage
33 05 61 00	33 42 11 00	Storm Drainage
33 05 63 00	33 01 30 81a	Underground Ducts And Utility Structures
33 05 81 00	01 22 16 00	No Specification Required
33 05 81 00	33 01 30 81a	Underground Ducts And Utility Structures
33 05 81 00	31 32 19 16	Sewage Treatment Lagoons
33 05 81 00	33 31 11 00	Sanitary Sewerage
33 05 81 00	33 42 11 00	Storm Drainage
33 05 83 00	33 01 30 81a	Underground Ducts And Utility Structures
33 05 83 00	31 32 19 16	Sewage Treatment Lagoons
33 05 83 00	33 31 11 00	Sanitary Sewerage
33 05 83 00	33 42 11 00	Storm Drainage
33 05 84 00	01 22 16 00	No Specification Required
33 05 84 00	31 32 19 16	Sewage Treatment Lagoons
33 05 84 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 05 84 00	33 31 11 00	Sanitary Sewerage
33 05 84 00	33 42 11 00	Storm Drainage
33 11 13 00	01 95 99 99h	Water Supply Wells
33 11 13 00	22 05 23 00b	Piped Utilities Basic Materials And Methods

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SECTION 33 14 00 00 - WATER DISTRIBUTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for water distribution. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes water-distribution piping and related components outside the building for water service **OR** fire-service mains **OR** combined water service and fire-service mains, **as directed**.
2. Utility-furnished products include water meters that will be furnished to the site, ready for installation.

C. Definitions

1. EPDM: Ethylene propylene diene terpolymer rubber.
2. LLDPE: Linear, low-density polyethylene plastic.
3. PA: Polyamide (nylon) plastic.
4. PE: Polyethylene plastic.
5. PP: Polypropylene plastic.
6. PVC: Polyvinyl chloride plastic.
7. RTRF: Reinforced thermosetting resin (fiberglass) fittings.
8. RTRP: Reinforced thermosetting resin (fiberglass) pipe.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings: Detail precast concrete vault assemblies and indicate dimensions, method of field assembly, and components.
 - a. Wiring Diagrams: Power, signal, and control wiring for alarms.
3. Field quality-control test reports.
4. Operation and Maintenance Data.

E. Quality Assurance

1. Regulatory Requirements:
 - a. Comply with requirements of utility company supplying water. Include tapping of water mains and backflow prevention.
 - b. Comply with standards of authorities having jurisdiction for potable-water-service piping, including materials, installation, testing, and disinfection.
 - c. Comply with standards of authorities having jurisdiction for fire-suppression water-service piping, including materials, hose threads, installation, and testing.
2. Piping materials shall bear label, stamp, or other markings of specified testing agency.
3. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
4. Comply with ASTM F 645 for selection, design, and installation of thermoplastic water piping.
5. Comply with FMG's "Approval Guide" or UL's "Fire Protection Equipment Directory" for fire-service-main products.
6. NFPA Compliance: Comply with NFPA 24 for materials, installations, tests, flushing, and valve and hydrant supervision for fire-service-main piping for fire suppression.
7. NSF Compliance:

- a. Comply with NSF 14 for plastic potable-water-service piping. Include marking "NSF-pw" on piping.
- b. Comply with NSF 61 for materials for water-service piping and specialties for domestic water.

F. Delivery, Storage, And Handling

1. Preparation for Transport: Prepare valves, including fire hydrants, according to the following:
 - a. Ensure that valves are dry and internally protected against rust and corrosion.
 - b. Protect valves against damage to threaded ends and flange faces.
 - c. Set valves in best position for handling. Set valves closed to prevent rattling.
2. During Storage: Use precautions for valves, including fire hydrants, according to the following:
 - a. Do not remove end protectors unless necessary for inspection; then reinstall for storage.
 - b. Protect from weather. Store indoors and maintain temperature higher than ambient dew-point temperature. Support off the ground or pavement in watertight enclosures when outdoor storage is necessary.
3. Handling: Use sling to handle valves and fire hydrants if size requires handling by crane or lift. Rig valves to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.
4. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
5. Protect stored piping from moisture and dirt. Elevate above grade. Do not exceed structural capacity of floor when storing inside.
6. Protect flanges, fittings, and specialties from moisture and dirt.
7. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

G. Project Conditions

1. Interruption of Existing Water-Distribution Service: Do not interrupt service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water-distribution service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of service.
 - b. Do not proceed with interruption of water-distribution service without the Owner's written permission.

H. Coordination

1. Coordinate connection to water main with utility company.

1.2 PRODUCTS

A. Copper Tube And Fittings

1. Soft Copper Tube: **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**, water tube, annealed temper.
 - a. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
 - b. Copper, Pressure-Seal Fittings:
 - 1) **NPS 2 (DN 50) and Smaller**: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
2. Hard Copper Tube: **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**, water tube, drawn temper.
 - a. Copper, Solder-Joint Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper, solder-joint pressure type. Furnish only wrought-copper fittings if indicated.
 - b. Copper, Pressure-Seal Fittings:

- 1) **NPS 2 (DN 50)** and Smaller: Wrought-copper fitting with EPDM O-ring seal in each end.
 - 2) **NPS 2-1/2 to NPS 4 (DN 65 to DN 100)**: Bronze fitting with stainless-steel grip ring and EPDM O-ring seal in each end.
 3. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end. Furnish Class 300 flanges if required to match piping.
 4. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.
- B. Ductile-Iron Pipe And Fittings**
1. Mechanical-Joint, Ductile-Iron Pipe: AWWA C151, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - a. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - b. Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
 2. Push-on-Joint, Ductile-Iron Pipe: AWWA C151, with push-on-joint bell and plain spigot end unless grooved or flanged ends are indicated.
 - a. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - b. Gaskets: AWWA C111, rubber.
 3. Grooved-Joint, Ductile-Iron Pipe: AWWA C151, with cut, rounded-grooved ends.
 - a. Grooved-End, Ductile-Iron Pipe Appurtenances:
 - 1) Grooved-End, Ductile-Iron Fittings: ASTM A 47/A 47M, malleable-iron castings or ASTM A 536, ductile-iron castings with dimensions matching pipe.
 - 2) Grooved-End, Ductile-Iron-Piping Couplings: AWWA C606, for ductile-iron-pipe dimensions. Include ferrous housing sections, gasket suitable for water, and bolts and nuts.
 4. Flanges: ASME 16.1, Class 125, cast iron.
- C. PE Pipe And Fittings**
1. PE, ASTM Pipe: ASTM D 2239, SIDR No. 5.3, 7, or 9; with PE compound number required to give pressure rating not less than **160 psig (1100 kPa) OE 200 psig (1380 kPa), as directed**.
 - a. Insert Fittings for PE Pipe: ASTM D 2609, made of PA, PP, or PVC with serrated male insert ends matching inside of pipe. Include bands or crimp rings.
 - b. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
 2. PE, AWWA Pipe: AWWA C906, DR No. 7.3, 9, or 9.3; with PE compound number required to give pressure rating not less than **160 psig (1100 kPa) OR 200 psig (1380 kPa), as directed**.
 - a. PE, AWWA Fittings: AWWA C906, socket- or butt-fusion type, with DR number matching pipe and PE compound number required to give pressure rating not less than **160 psig (1100 kPa) OR 200 psig (1380 kPa), as directed**.
 3. PE, Fire-Service Pipe: ASTM F 714, AWWA C906, or equivalent for PE water pipe; FMG approved, with minimum thickness equivalent to FMG Class 150 and Class 200.
 - a. Molded PE Fittings: ASTM D 3350, PE resin, socket- or butt-fusion type, made to match PE pipe dimensions and class.
- D. PVC Pipe And Fittings**
1. PVC, Schedule 40 Pipe: ASTM D 1785.
 - a. PVC, Schedule 40 Socket Fittings: ASTM D 2466.
 2. PVC, Schedule 80 Pipe: ASTM D 1785.
 - a. PVC, Schedule 80 Socket Fittings: ASTM D 2467.
 - b. PVC, Schedule 80 Threaded Fittings: ASTM D 2464.
 3. PVC, AWWA Pipe: AWWA C900, Class 150 **OR** Class 200, **as directed**, with bell end with gasket, and with spigot end.
 - a. Comply with UL 1285 for fire-service mains if indicated.

- b. PVC Fabricated Fittings: AWWA C900, Class 150 **OR** Class 200, **as directed**, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 - c. PVC Molded Fittings: AWWA C907, Class 150, with bell-and-spigot or double-bell ends. Include elastomeric gasket in each bell.
 - d. Push-on-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 1) Gaskets: AWWA C111, rubber.
 - e. Mechanical-Joint, Ductile-Iron Fittings: AWWA C110, ductile- or gray-iron standard pattern or AWWA C153, ductile-iron compact pattern.
 - 1) Glands, Gaskets, and Bolts: AWWA C111, ductile- or gray-iron glands, rubber gaskets, and steel bolts.
- E. Fiberglass Pipe And Fittings
- 1. AWWA RTRP: AWWA C950, Class 150 **OR** Class 200 **OR** Class 250, **as directed**, Type I **OR** II, **as directed**, Grade 1, epoxy **OR** Grade 2, polyester, **as directed**, with bell-and-spigot ends for bonded **OR** with gasket or seal for gasketed, **as directed**, joints. Liner is optional, unless otherwise indicated. Include FMG approval if used for fire-service mains.
 - a. RTRF: AWWA C950, similar to pipe in material, pressure class, and joining method.
 - 2. UL RTRP: UL 1713, Class 150 **OR** Class 200 **OR** Class 250, **as directed**, with bell-and-spigot ends with gasket or seal for gasketed joints. Liner is optional, unless otherwise indicated.
 - a. RTRF: Similar to pipe in material, pressure class, and joining method.
- F. Special Pipe Fittings
- 1. Ductile-Iron Rigid Expansion Joints:
 - a. Description: Three-piece, ductile-iron assembly consisting of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Select and assemble components for expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - 1) Pressure Rating: **250 psig (1725 kPa)** minimum.
 - 2) Expansion Required: As directed by the manufacturer or as directed by the Owner.
 - 2. Ductile-Iron Flexible Expansion Joints:
 - a. Description: Compound, ductile-iron fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections. Assemble components for offset and expansion indicated. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - 1) Pressure Rating: **250 psig (1725 kPa)** minimum.
 - 2) Offset: As directed by the manufacturer or as directed by the Owner.
 - 3) Expansion Required: As directed by the manufacturer or as directed by the Owner.
 - 3. Ductile-Iron Deflection Fittings:
 - a. Description: Compound, ductile-iron coupling fitting with sleeve and 1 or 2 flexing sections for up to 15-degree deflection, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include AWWA C111, ductile-iron glands, rubber gaskets, and steel bolts.
 - 1) Pressure Rating: **250 psig (1725 kPa)** minimum.
- G. Joining Materials
- 1. Refer to Division 33 Section "Common Work Results For Utilities" for commonly used joining materials.
 - 2. Brazing Filler Metals: AWS A5.8, BCuP Series.
 - 3. Bonding Adhesive for Fiberglass Piping: As recommended by fiberglass piping manufacturer.
 - 4. Plastic Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.
- H. Piping Specialties

1. Transition Fittings: Manufactured fitting or coupling same size as, with pressure rating at least equal to and ends compatible with, piping to be joined.
2. Tubular-Sleeve Pipe Couplings:
 - a. Description: Metal, bolted, sleeve-type, reducing or transition coupling, with center sleeve, gaskets, end rings, and bolt fasteners and with ends of same sizes as piping to be joined.
 - 1) Standard: AWWA C219.
 - 2) Center-Sleeve Material: Manufacturer's standard **OR** Carbon steel **OR** Stainless steel **OR** Ductile iron **OR** Malleable iron, **as directed**.
 - 3) Gasket Material: Natural or synthetic rubber.
 - 4) Pressure Rating: **150 psig (1035 kPa) OR 200 psig (1380 kPa), as directed**, minimum.
 - 5) Metal Component Finish: Corrosion-resistant coating or material.
3. Split-Sleeve Pipe Couplings:
 - a. Description: Metal, bolted, split-sleeve-type, reducing or transition coupling with sealing pad and closure plates, O-ring gaskets, and bolt fasteners.
 - 1) Standard: AWWA C219.
 - 2) Sleeve Material: Manufacturer's standard **OR** Carbon steel **OR** Stainless steel, **as directed**.
 - 3) Sleeve Dimensions: Of thickness and width required to provide pressure rating.
 - 4) Gasket Material: O-rings made of EPDM rubber, unless otherwise indicated.
 - 5) Pressure Rating: **150 psig (1035 kPa) OR 200 psig (1380 kPa), as directed**, minimum.
 - 6) Metal Component Finish: Corrosion-resistant coating or material.
4. Flexible Connectors:
 - a. Nonferrous-Metal Piping: Bronze hose covered with bronze wire braid; with copper-tube, pressure-type, solder-joint ends or bronze flanged ends brazed to hose.
 - b. Ferrous-Metal Piping: Stainless-steel hose covered with stainless-steel wire braid; with ASME B1.20.1, threaded steel pipe nipples or ASME B16.5, steel pipe flanges welded to hose.
5. Dielectric Fittings: Combination of copper alloy and ferrous; threaded, solder, or plain end types; and matching piping system materials.
 - a. Dielectric Unions: Factory-fabricated union assembly, designed for **250-psig (1725-kPa)** minimum working pressure at **180 deg F (82 deg C)**. Include insulating material that isolates dissimilar metals and ends with inside threads according to ASME B1.20.1.
 - b. Dielectric Flanges: Factory-fabricated companion-flange assembly, for **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure to suit system pressures.
 - c. Dielectric-Flange Insulation Kits: Field-assembled companion-flange assembly, full-face or ring type. Components include neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.
 - 1) Provide separate companion flanges and steel bolts and nuts for **150- or 300-psig (1035- or 2070-kPa)** minimum working pressure to suit system pressures.
 - d. Dielectric Couplings: Galvanized-steel couplings with inert and noncorrosive thermoplastic lining, with threaded ends and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
 - e. Dielectric Nipples: Electroplated steel nipples with inert and noncorrosive thermoplastic lining, with combination of plain, threaded, or grooved end types, and **300-psig (2070-kPa)** minimum working pressure at **225 deg F (107 deg C)**.
- I. Corrosion-Protection Piping Encasement
 1. Encasement for Underground Metal Piping:
 - a. Standards: ASTM A 674 or AWWA C105.
 - b. Form: Sheet **OR** Tube, **as directed**.
 - c. Material: LLDPE film of **0.008-inch (0.20-mm)** minimum thickness.
 - d. Material: LLDPE film of **0.008-inch (0.20-mm)** minimum thickness, or high-density, crosslaminated PE film of **0.004-inch (0.10-mm)** minimum thickness.

- e. Material: High-density, crosslaminated PE film of 0.004-inch (0.10-mm) minimum thickness.
- f. Color: Black **OR** Natural, **as directed**.

J. Gate Valves

1. AWWA, Cast-Iron Gate Valves:
 - a. Nonrising-Stem, Metal-Seated Gate Valves:
 - 1) Description: Gray- or ductile-iron body and bonnet; with cast-iron or bronze double-disc gate, bronze gate rings, bronze stem, and stem nut.
 - a) Standard: AWWA C500.
 - b) Minimum Pressure Rating: 200 psig (1380 kPa).
 - c) End Connections: Mechanical joint.
 - d) Interior Coating: Complying with AWWA C550.
 - b. Nonrising-Stem, Resilient-Seated Gate Valves:
 - 1) Description: Gray- or ductile-iron body and bonnet; with bronze or gray- or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - a) Standard: AWWA C509.
 - b) Minimum Pressure Rating: 200 psig (1380 kPa).
 - c) End Connections: Mechanical joint.
 - d) Interior Coating: Complying with AWWA C550.
 - c. Nonrising-Stem, High-Pressure, Resilient-Seated Gate Valves:
 - 1) Description: Ductile-iron body and bonnet; with bronze or ductile-iron gate, resilient seats, bronze stem, and stem nut.
 - a) Standard: AWWA C509.
 - b) Minimum Pressure Rating: 250 psig (1725 kPa).
 - c) End Connections: Push on or mechanical joint.
 - d) Interior Coating: Complying with AWWA C550.
 - d. OS&Y, Rising-Stem, Metal-Seated Gate Valves:
 - 1) Description: Cast- or ductile-iron body and bonnet, with cast-iron double disc, bronze disc and seat rings, and bronze stem.
 - a) Standard: AWWA C500.
 - b) Minimum Pressure Rating: 200 psig (1380 kPa).
 - c) End Connections: Flanged.
 - e. OS&Y, Rising-Stem, Resilient-Seated Gate Valves:
 - 1) Description: Cast- or ductile-iron body and bonnet, with bronze or gray- or ductile-iron gate, resilient seats, and bronze stem.
 - a) Standard: AWWA C509.
 - b) Minimum Pressure Rating: 200 psig (1380 kPa).
 - c) End Connections: Flanged.
2. UL/FMG, Cast-Iron Gate Valves:
 - a. UL/FMG, Nonrising-Stem Gate Valves:
 - 1) Description: Iron body and bonnet with flange for indicator post, bronze seating material, and inside screw.
 - a) Standards: UL 262 and FMG approved.
 - b) Minimum Pressure Rating: 175 psig (1207 kPa).
 - c) End Connections: Flanged.
 - b. OS&Y, Rising-Stem Gate Valves:
 - 1) Description: Iron body and bonnet and bronze seating material.
 - a) Standards: UL 262 and FMG approved.
 - b) Minimum Pressure Rating: 175 psig (1207 kPa).
 - c) End Connections: Flanged.
3. Bronze Gate Valves:
 - a. OS&Y, Rising-Stem Gate Valves:
 - 1) Description: Bronze body and bonnet and bronze stem.
 - a) Standards: UL 262 and FMG approved.

- b) Minimum Pressure Rating: **175 psig (1207 kPa)**.
 - c) End Connections: Threaded.
 - b. Nonrising-Stem Gate Valves:
 - 1) Description: Class 125, Type 1, bronze with solid wedge, threaded ends, and malleable-iron handwheel.
 - a) Standard: MSS SP-80.
- K. Gate Valve Accessories And Specialties
- 1. Tapping-Sleeve Assemblies:
 - a. Description: Sleeve and valve compatible with drilling machine.
 - 1) Standard: MSS SP-60.
 - 2) Tapping Sleeve: Cast- or ductile-iron or stainless-steel, two-piece bolted sleeve with flanged outlet for new branch connection. Include sleeve matching size and type of pipe material being tapped and with recessed flange for branch valve.
 - 3) Valve: AWWA, cast-iron, nonrising-stem, metal **OR** resilient, **as directed**,-seated gate valve with one raised face flange mating tapping-sleeve flange.
 - 2. Valve Boxes: Comply with AWWA M44 for cast-iron valve boxes. Include top section, adjustable extension of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over valve and with a barrel approximately **5 inches (125 mm)** in diameter.
 - a. Operating Wrenches: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and socket matching valve operating nut.
 - 3. Indicator Posts: UL 789, FMG-approved, vertical-type, cast-iron body with operating wrench, extension rod, and adjustable cast-iron barrel of length required for depth of burial of valve.
- L. Check Valves
- 1. AWWA Check Valves:
 - a. Description: Swing-check type with resilient seat. Include interior coating according to AWWA C550 and ends to match piping.
 - 1) Standard: AWWA C508.
 - 2) Pressure Rating: **175 psig (1207 kPa)**.
 - 2. UL/FMG, Check Valves:
 - a. Description: Swing-check type with pressure rating; rubber-face checks, unless otherwise indicated; and ends matching piping.
 - 1) Standards: UL 312 and FMG approved.
 - 2) Pressure Rating: **175 psig (1207 kPa) OR 250 psig (1725 kPa), as directed**.
- M. Detector Check Valves
- 1. Detector Check Valves:
 - a. Description (with water meter): Galvanized cast-iron body, bolted cover with air-bleed device for access to internal parts, and flanged ends. Include one-piece bronze disc with bronze bushings, pivot, and replaceable seat. Include threaded bypass taps in inlet and outlet for bypass meter connection. Set valve to allow minimal water flow through bypass meter when major water flow is required.
 - 1) Standards: UL 312 and FMG approved.
 - 2) Pressure Rating: **175 psig (1207 kPa)**.
 - 3) Water Meter: AWWA C700, disc type, at least one-fourth size of detector check valve. Include meter, bypass piping, gate valves, check valve, and connections to detector check valve.
 - b. Description (without water meter): Iron body, corrosion-resistant clapper ring and seat ring material, flanged ends, with connections for bypass and installation of water meter.
 - 1) Standards: UL 312 and FMG approved.
 - 2) Pressure Rating: **175 psig (1207 kPa)**.
- N. Butterfly Valves
- 1. AWWA Butterfly Valves:

- a. Description: Rubber seated.
 - 1) Standard: AWWA C504.
 - 2) Body: Cast or ductile iron.
 - 3) Body Type: Wafer **OR** Flanged, **as directed**.
 - 4) Pressure Rating: **150 psig (1035 kPa)**.
 - 2. UL Butterfly Valves:
 - a. Description: Metal on resilient material seating.
 - 1) Standards: UL 1091 and FMG approved.
 - 2) Body: Cast or ductile iron.
 - 3) Body Type: Wafer **OR** Flanged, **as directed**.
 - 4) Pressure Rating: **175 psig (1207 kPa)**.
- O. Plug Valves
- 1. Plug Valves:
 - a. Description: Resilient-seated eccentric.
 - 1) Standard: MSS SP-108.
 - 2) Body: Cast iron.
 - 3) Pressure Rating: **175-psig (1207-kPa)** minimum CWP.
 - 4) Seat Material: Suitable for potable-water service.
- P. Corporation Valves And Curb Valves
- 1. Service-Saddle Assemblies: Comply with AWWA C800. Include saddle and valve compatible with tapping machine.
 - a. Service Saddle: Copper alloy with seal and AWWA C800, threaded outlet for corporation valve.
 - b. Corporation Valve: Bronze body and ground-key plug, with AWWA C800, threaded inlet and outlet matching service piping material.
 - c. Manifold (if utility company requires multiple connections): Copper fitting with two to four inlets as required, with ends matching corporation valves and outlet matching service piping material.
 - 2. Curb Valves: Comply with AWWA C800. Include bronze body, ground-key plug or ball, and wide tee head, with inlet and outlet matching service piping material.
 - 3. Service Boxes for Curb Valves: Similar to AWWA M44 requirements for cast-iron valve boxes. Include cast-iron telescoping top section of length required for depth of burial of valve, plug with lettering "WATER," and bottom section with base that fits over curb valve and with a barrel approximately **3 inches (75 mm)** in diameter.
 - a. Shutoff Rods: Steel, tee-handle with one pointed end, stem of length to operate deepest buried valve, and slotted end matching curb valve.
- Q. Water Meters
- 1. Water meters will be furnished by utility company.
NOTE: If water meters are specified in this Section, delete paragraph above and retain and edit paragraphs and subparagraphs below.
 - 2. Displacement-Type Water Meters:
 - a. Description: With bronze main case.
 - 1) Standard: AWWA C700.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters)**, **as directed**.
 - 3. Turbine-Type Water Meters:
 - a. Description:
 - 1) Standard: AWWA C701.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters)**, **as directed**.
 - 4. Compound-Type Water Meters:
 - a. Description:
 - 1) Standard: AWWA C702.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters)**, **as directed**.

5. Remote Registration System:
 - a. Description: Utility company standard; direct-reading type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
 - 1) Standard: AWWA C706.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters), as directed.**
 6. Remote Registration System:
 - a. Description: Utility company standard; encoder type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
 - 1) Standard: AWWA C707.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters), as directed.**
 - 3) Data-Acquisition Units: Comply with utility company requirements for type and quantity.
OR
Visible Display Units: Comply with utility company requirements for type and quantity.
- R. Detector-Type Water Meters
1. Detector-Type Water Meters
 2. Description: Main line, proportional meter with second meter on bypass. Register flow in **gallons (liters) OR cubic feet (cubic meters), as directed.**
 - a. Standards: AWWA C703, UL listed, and FMG approved.
 - b. Pressure Rating: **150 psig (1035 kPa).**
 - c. Bypass Meter: AWWA C701, turbine **OR** AWWA C702, compound, **as directed**,-type, bronze case.
 - 1) Size: At least one-half nominal size of main-line meter.
 3. Description: Main-line turbine meter with strainer and second meter on bypass. Register flow in **gallons (liters) OR cubic feet (cubic meters), as directed.**
 - a. Standards: AWWA C703, UL listed, and FMG approved.
 - b. Pressure Rating: **175 psig (1207 kPa).**
 - c. Bypass Meter: AWWA C701, turbine-type, bronze case.
 - 1) Size: At least **NPS 2 (DN 50).**
 4. Remote Registration System:
 - a. Description: Utility company standard; direct-reading type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
 - 1) Standard: AWWA C706.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters), as directed.**
 5. Remote Registration System:
 - a. Description: Utility company standard; encoder type. Include meter modified with signal-transmitting assembly, low-voltage connecting wiring, and remote register assembly.
 - 1) Standard: AWWA C707.
 - 2) Registration: Flow in **gallons (liters) OR cubic feet (cubic meters), as directed.**
 - 3) Data-Acquisition Units: Comply with utility company requirements for type and quantity.
OR
Visible Display Units: Comply with utility company requirements for type and quantity.
- S. Pressure-Reducing Valves
1. Water Regulators:
 - a. Standard: ASSE 1003.
 - b. Pressure Rating: Initial pressure of **150 psig (1035 kPa).**
 - c. Size: As directed by the manufacturer or as directed by the Owner.
 - d. Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - e. Design Inlet Pressure: As directed by the manufacturer or as directed by the Owner.
 - f. Design Outlet Pressure Setting: As directed by the manufacturer or as directed by the Owner.

- g. Body: Bronze with chrome-plated finish, **as directed**, for **NPS 2 (DN 50)** and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved, **as directed**, for **NPS 2-1/2 and NPS 3 (DN 65 and DN 80)**.
 - h. Valves for Booster Heater Water Supply: Include integral bypass.
 - i. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; flanged for **NPS 2-1/2 and NPS 3 (DN 65 and DN 80)**.
2. Water Control Valves:
- a. Description: Pilot-operation, diaphragm-type, single-seated main water control valve with AWWA C550 or FDA-approved, interior epoxy coating. Include small pilot control valve, restrictor device, specialty fittings, and sensor piping.
 - 1) Pressure Rating: Initial pressure of **150 psig (1035 kPa)** minimum.
 - 2) Main Valve Body: Cast- or ductile-iron body with AWWA C550 or FDA-approved, interior epoxy coating; or stainless-steel body.
 - a) Size: As directed by the manufacturer or as directed by the Owner.
 - b) Pattern: Angle **OR** Globe, **as directed**, -valve design.
 - c) Trim: Stainless steel.
 - 3) Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - 4) Design Inlet Pressure: As directed by the manufacturer or as directed by the Owner.
 - 5) Design Outlet Pressure Setting: As directed by the manufacturer or as directed by the Owner.
 - 6) End Connections: Threaded for **NPS 2 (DN 50)** and smaller; flanged, **as directed**, for **NPS 2-1/2 (DN 65)** and larger.
- T. Relief Valves
- 1. Air-Release Valves:
 - a. Description: Hydromechanical device to automatically release accumulated air.
 - 1) Standard: AWWA C512.
 - 2) Pressure Rating: **300 psig (2070 kPa)**, **as directed**.
 - 3) Body Material: Cast iron, **as directed**.
 - 4) Trim Material: Stainless steel, brass, or bronze, **as directed**.
 - 5) Water Inlet Size: As directed by the manufacturer or as directed by the Owner.
 - 6) Air Outlet Size: As directed by the manufacturer or as directed by the Owner.
 - 7) Orifice Size: As directed by the manufacturer or as directed by the Owner.
 - 8) Design Air-Release Capacity: As directed by the manufacturer or as directed by the Owner.
 - 2. Air/Vacuum Valves:
 - a. Description: Direct-acting, float-operated, hydromechanical device with large orifice to automatically release accumulated air or to admit air during filling of piping.
 - 1) Standard: AWWA C512.
 - 2) Pressure Rating: **300 psig (2070 kPa)**, **as directed**.
 - 3) Body Material: Cast iron, **as directed**.
 - 4) Trim Material: Stainless steel, brass, or bronze, **as directed**.
 - 5) Inlet and Outlet Size: As directed by the manufacturer or as directed by the Owner.
 - 6) Orifice Size: As directed by the manufacturer or as directed by the Owner.
 - 7) Design Air Capacity: As directed by the manufacturer or as directed by the Owner.
 - 3. Combination Air Valves:
 - a. Description: Float-operated, hydromechanical device to automatically release accumulated air or to admit air.
 - 1) Standard: AWWA C512.
 - 2) Pressure Rating: **300 psig (2070 kPa)**, **as directed**.
 - 3) Body Material: Cast iron, **as directed**.
 - 4) Trim Material: Stainless steel, brass, or bronze, **as directed**.
 - 5) Inlet and Outlet Size: As directed by the manufacturer or as directed by the Owner.
 - 6) Orifice Size: As directed by the manufacturer or as directed by the Owner.
 - 7) Design Air Capacity: As directed by the manufacturer or as directed by the Owner.

U. Vacuum Breakers

1. Pressure Vacuum Breaker Assembly:
 - a. Standard: ASSE 1020.
 - b. Operation: Continuous-pressure applications.
 - c. Pressure Loss: **5 psig (35 kPa), as directed**, maximum, through middle 1/3 of flow range.
 - d. Size: As directed by the manufacturer or as directed by the Owner.
 - e. Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - f. Selected Unit Flow Range Limits: As directed by the manufacturer or as directed by the Owner.
 - g. Pressure Loss at Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - h. Accessories: Ball valves on inlet and outlet.

V. Backflow Preventers

1. Reduced-Pressure-Principle Backflow Preventers:
 - a. Standard: ASSE 1013 **OR** AWWA C511, **as directed**.
 - b. Operation: Continuous-pressure applications.
 - c. Pressure Loss: **12 psig (83 kPa), as directed**, maximum, through middle 1/3 of flow range.
 - d. Size: As directed by the manufacturer or as directed by the Owner.
 - e. Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - f. Selected Unit Flow Range Limits: As directed by the manufacturer or as directed by the Owner.
 - g. Pressure Loss at Design Flow Rate: As directed by the manufacturer or as directed by the Owner.for **NPS 2 (DN 50)** and smaller; As directed by the manufacturer or as directed by the Owner.for **NPS 2-1/2 (DN 65)** and larger.
 - h. Body: Bronze for **NPS 2 (DN 50)** and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved **OR** steel with interior lining complying with AWWA C550 or that is FDA approved **OR** stainless steel, **as directed**, for **NPS 2-1/2 (DN 65)** and larger.
 - i. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; flanged, **as directed**, for **NPS 2-1/2 (DN 65)** and larger.
 - j. Configuration: Designed for horizontal, straight through **OR** vertical inlet, horizontal center section, and vertical outlet **OR** vertical, **as directed**, flow.
 - k. Accessories:
 - 1) Valves: Ball type with threaded ends on inlet and outlet of **NPS 2 (DN 50)** and smaller; OS&Y gate type with flanged ends on inlet and outlet of **NPS 2-1/2 (DN 65)** and larger.
 - 2) Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
2. Double-Check, Backflow-Prevention Assemblies:
 - a. Standard: ASSE 1015 **OR** AWWA C510, **as directed**.
 - b. Operation: Continuous-pressure applications, unless otherwise indicated.
 - c. Pressure Loss: **5 psig (35 kPa), as directed**, maximum, through middle 1/3 of flow range.
 - d. Size: As directed by the manufacturer or as directed by the Owner.
 - e. Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - f. Selected Unit Flow Range Limits: As directed by the manufacturer or as directed by the Owner.
 - g. Pressure Loss at Design Flow Rate: As directed by the manufacturer or as directed by the Owner.for **NPS 2 (DN 50)** and smaller; As directed by the manufacturer or as directed by the Owner.for **NPS 2-1/2 (DN 65)** and larger.
 - h. Body: Bronze for **NPS 2 (DN 50)** and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved **OR** steel with interior lining complying with AWWA C550 or that is FDA approved **OR** stainless steel, **as directed**, for **NPS 2-1/2 (DN 65)** and larger.
 - i. End Connections: Threaded for **NPS 2 (DN 50)** and smaller; flanged, **as directed**, for **NPS 2-1/2 (DN 65)** and larger.

- j. Configuration: Designed for horizontal, straight through, **as directed**, flow.
 - k. Accessories: Ball valves with threaded ends on inlet and outlet of **NPS 2 (DN 50)** and smaller; OS&Y gate valves with flanged ends on inlet and outlet of **NPS 2-1/2 (DN 65)** and larger.
3. Reduced-Pressure-Detector, Fire-Protection Backflow Preventer Assemblies:
- a. Standards: ASSE 1047 and UL listed or FMG approved.
 - b. Operation: Continuous-pressure applications.
 - c. Pressure Loss: **12 psig (83 kPa)**, **as directed**, maximum, through middle 1/3 of flow range.
 - d. Size: As directed by the manufacturer or as directed by the Owner. Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - e. Selected Unit Flow Range Limits: As directed by the manufacturer or as directed by the Owner.
 - f. Pressure Loss at Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - g. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved **OR** Steel with interior lining complying with AWWA C550 or that is FDA approved **OR** Stainless steel, **as directed**.
 - h. End Connections: Flanged.
 - i. Configuration: Designed for horizontal, straight through **OR** vertical inlet, horizontal center section, and vertical outlet **OR** vertical, **as directed**, flow.
 - j. Accessories:
 - 1) Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.
 - 2) Air-Gap Fitting: ASME A112.1.2, matching backflow preventer connection.
 - 3) Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.
4. Double-Check, Detector-Assembly Backflow Preventers:
- a. Standards: ASSE 1048 and UL listed or FMG approved.
 - b. Operation: Continuous-pressure applications.
 - c. Pressure Loss: **5 psig (35 kPa)**, **as directed**, maximum, through middle 1/3 of flow range.
 - d. Size: As directed by the manufacturer or as directed by the Owner.
 - e. Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - f. Selected Unit Flow Range Limits: As directed by the manufacturer or as directed by the Owner.
 - g. Pressure Loss at Design Flow Rate: As directed by the manufacturer or as directed by the Owner.
 - h. Body: Cast iron with interior lining complying with AWWA C550 or that is FDA approved **OR** Steel with interior lining complying with AWWA C550 or that is FDA approved **OR** Stainless steel, **as directed**.
 - i. End Connections: Flanged.
 - j. Configuration: Designed for horizontal, straight through **OR** vertical inlet, horizontal center section, and vertical outlet **OR** vertical, **as directed**, flow.
 - k. Accessories:
 - 1) Valves: UL 262, FMG-approved, OS&Y gate type with flanged ends on inlet and outlet.
 - 2) Bypass: With displacement-type water meter, shutoff valves, and reduced-pressure backflow preventer.
5. Backflow Preventer Test Kits:
- a. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.
- W. Water Meter Boxes
- 1. Description: Cast-iron body and cover for disc-type water meter, with lettering "WATER METER" in cover; and with slotted, open-bottom base section of length to fit over service piping.

- a. Option: Base section may be cast-iron, PVC, clay, or other pipe.
2. Description: Cast-iron body and double cover for disc-type water meter, with lettering "WATER METER" in top cover; and with separate inner cover; air space between covers; and slotted, open-bottom base section of length to fit over service piping.
3. Description: Polymer-concrete body and cover for disc-type water meter, with lettering "WATER" in cover; and with slotted, open-bottom base section of length to fit over service piping. Include vertical and lateral design loadings of **15,000 lb minimum over 10 by 10 inches (6800 kg minimum over 254 by 254 mm)** square.
 - a. Use of this meter box is permitted in walks or unpaved areas away from traffic; do not use in roadways.

X. Concrete Vaults

1. Description: Precast, reinforced-concrete vault, designed for A-16 load designation according to ASTM C 857 and made according to ASTM C 858.
 - a. Ladder: ASTM A 36/A 36M, steel or polyethylene-encased steel steps.
 - b. Manhole: ASTM A 48/A 48M Class No. 35A minimum tensile strength, gray-iron traffic frame and cover.
 - 1) Dimension: **24-inch (610-mm)** minimum diameter, unless otherwise indicated.
 - c. Manhole: ASTM A 536, Grade 60-40-18, ductile-iron traffic frame and cover.
 - 1) Dimension: **24-inch- (610-mm-)** minimum diameter, unless otherwise indicated.
 - d. Drain: ASME A112.6.3, cast-iron floor drain with outlet of size indicated. Include body anchor flange, light-duty cast-iron grate, bottom outlet, and integral or field-installed bronze ball or clapper-type backwater valve.

Y. Protective Enclosures

1. Freeze-Protection Enclosures:
 - a. Description: Insulated enclosure designed to protect aboveground water piping, equipment, or specialties from freezing and damage, with heat source to maintain minimum internal temperature of **40 deg F (4 deg C)** when external temperatures reach as low as **minus 34 deg F (minus 36 deg C)**.
 - 1) Standard: ASSE 1060.
 - 2) Class I: For equipment or devices other than pressure or atmospheric vacuum breakers.
 - 3) Class I-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
 - a) Housing: Reinforced-aluminum **OR** -fiberglass, **as directed**, construction.
 - i. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
 - ii. Drain opening for units with drain connection.
 - iii. Access doors with locking devices.
 - iv. Insulation inside housing.
 - v. Anchoring devices for attaching housing to concrete base.
 - b) Electric heating cable or heater with self-limiting temperature control.
2. Weather-Resistant Enclosures:
 - a. Description: Uninsulated enclosure designed to protect aboveground water piping, equipment, or specialties from weather and damage.
 - 1) Standard: ASSE 1060.
 - 2) Class III: For equipment or devices other than pressure or atmospheric vacuum breakers.
 - 3) Class III-V: For pressure or atmospheric vacuum breaker equipment or devices. Include drain opening in housing.
 - i. Housing: Reinforced-aluminum **OR** -fiberglass, **as directed**, construction.
 - ii. Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
 - iii. Drain opening for units with drain connection.

- iv. Access doors with locking devices.
 - v. Anchoring devices for attaching housing to concrete base.
 - 3. Expanded-Metal Enclosures:
 - a. Description: Enclosure designed to protect aboveground water piping, equipment, or specialties from damage.
 - 1) Material: ASTM F 1267, expanded metal side and top panels, of weight and with reinforcement of same metal at edges as required for rigidity.
 - 2) Type: Type I, expanded **OR** II, expanded and flattened, **as directed**.
 - 3) Class: Class 1, uncoated carbon steel **OR** 2, hot-dip, zinc-coated carbon steel **OR** 3, corrosion-resisting steel, **as directed**.
 - 4) Finish: Manufacturer's enamel paint.
 - 5) Size: Of dimensions indicated, but not less than those required for access and service of protected unit.
 - 6) Locking device.
 - 7) Lugs or devices for securing enclosure to base.
 - 4. Enclosure Bases:
 - a. Description: **4-inch- (100-mm-)** **OR** **6-inch- (150-mm-)**, **as directed**, minimum thickness precast concrete, of dimensions required to extend at least **6 inches (150 mm)** beyond edges of enclosure housings. Include openings for piping.
- Z. Fire Hydrants
- 1. Dry-Barrel Fire Hydrants:
 - a. Description (for AWWA dry-barrel fire hydrants): Freestanding, with one **NPS 4-1/2 (DN 115)** and two **NPS 2-1/2 (DN 65)** outlets, **5-1/4-inch (133-mm)** main valve, drain valve, and **NPS 6 (DN 150)** mechanical-joint inlet. Include interior coating according to AWWA C550. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
 - 1) Standard: AWWA C502.
 - 2) Pressure Rating: **150 psig (1035 kPa)** minimum **OR** **250 psig (1725 kPa)**, **as directed**.
 - 3) Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - 4) Operating and Cap Nuts: Pentagon, **1-1/2 inches (38 mm)** point to flat.
 - 5) Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
 - 6) Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
 - b. Description (for UL/FMG, dry-barrel fire hydrants): Freestanding, with one **NPS 4-1/2 (DN 115)** and two **NPS 2-1/2 (DN 65)** outlets, **5-1/4-inch (133-mm)** main valve, drain valve, and **NPS 6 (DN 150)** mechanical-joint inlet. Hydrant shall have cast-iron body, compression-type valve opening against pressure and closing with pressure.
 - 1) Standards: UL 246, FMG approved.
 - 2) Pressure Rating: **150 psig (1035 kPa)** minimum **OR** **250 psig (1725 kPa)**, **as directed**.
 - 3) Outlet Threads: NFPA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - 4) Operating and Cap Nuts: Pentagon, **1-1/2 inches (38 mm)** point to flat.
 - 5) Direction of Opening: Open hydrant valve by turning operating nut to left or counterclockwise.
 - 6) Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
 - 2. Wet-Barrel Fire Hydrants:
 - a. Description (for AWWA wet-barrel fire hydrants): Freestanding, with one **NPS 4-1/2 (DN 115)** and two **NPS 2-1/2 (DN 65)** outlets, **NPS 6 (DN 150)** threaded or flanged inlet, and base section with **NPS 6 (DN 150)** mechanical-joint inlet. Include interior coating according to AWWA C550.
 - 1) Standard: AWWA C503.

- 2) Pressure Rating: **150 psig (1035 kPa)** minimum.
 - 3) Outlet Threads: NFWA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - 4) Operating and Cap Nuts: Pentagon, **1-1/2 inches (38 mm)** point to flat.
 - 5) Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
 - 6) Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
 - b. Description (for UL/FMG, wet-barrel fire hydrants): Freestanding, with one **NPS 4-1/2 (DN 115)** and two **NPS 2-1/2 (DN 65)** outlets, **NPS 6 (DN 150)** threaded or flanged inlet, and base section with **NPS 6 (DN 150)** mechanical-joint inlet.
 - 1) Standards: UL 246 and FMG approved.
 - 2) Pressure Rating: **150 psig (1035 kPa)** minimum.
 - 3) Outlet Threads: NFWA 1963, with external hose thread used by local fire department. Include cast-iron caps with steel chains.
 - 4) Operating and Cap Nuts: Pentagon, **1-1/2 inches (38 mm)** point to flat.
 - 5) Direction of Opening: Open hydrant valves by turning operating nut to left or counterclockwise.
 - 6) Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
- AA. Flushing Hydrants
1. Post-Type Flushing Hydrants:
 - a. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum.
 - 2) Outlet: One, with horizontal discharge.
 - 3) Hose Thread: **NPS 2-1/2 (DN 65)**, with NFWA 1963 external hose thread for use by local fire department, and with cast-iron cap with brass chain.
 - 4) Barrel: Cast-iron or steel pipe with breakaway feature.
 - 5) Valve: Bronze body with bronze-ball or plunger closure, and automatic draining.
 - 6) Security: Locking device for padlock.
 - 7) Exterior Finish: Red alkyd-gloss enamel paint, unless otherwise indicated.
 - 8) Inlet: **NPS 2 (DN 50)** minimum.
 - 9) Operating Wrench: One for each unit.
 2. Ground-Type Flushing Hydrants:
 - a. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - 1) Pressure Rating: **150 psig (1035 kPa)** minimum.
 - 2) Outlet: One, with vertical **OR** angle, **as directed**, discharge.
 - 3) Hose Thread: **NPS 2-1/2 (DN 65)**, with NFWA 1963 external hose thread for use by local fire department, and with cast-iron cap with brass chain.
 - 4) Barrel: Cast-iron or steel pipe.
 - 5) Valve: Bronze body with bronze-ball or plunger closure, and automatic draining.
 - 6) Inlet: **NPS 2 (DN 50)** minimum.
 - 7) Hydrant Box: Cast iron with cover, for ground mounting.
 - 8) Operating Wrench: One for each unit.
 3. Post-Type Sampling Station:
 - a. Description: Nonfreeze and drainable, of length required for shutoff valve installation below frost line.
 - 1) Pressure Rating: **100 psig (690 kPa)** minimum.
 - 2) Sampling Outlet: One unthreaded nozzle with handle.
 - 3) Valve: Bronze body with bronze-ball or plunger closure. Include operating handle.
 - 4) Drain: Tubing with separate manual vacuum pump.
 - 5) Inlet: **NPS 3/4 (DN 20)** minimum.
 - 6) Housing: Weatherproof material with locking device. Include anchor device.
 - 7) Operating Wrench: One for each unit.

BB. Fire Department Connections

1. Fire Department Connections:
 - a. Description: Freestanding, with cast-bronze body, thread inlets according to NFPA 1963 and matching local fire department hose threads, and threaded bottom outlet. Include lugged caps, gaskets, and chains; lugged swivel connection and drop clapper for each hose-connection inlet; **18-inch- (460-mm-)** high brass sleeve; and round escutcheon plate.
 - 1) Standard: UL 405.
 - 2) Connections: Two **NPS 2-1/2 (DN 65)** inlets and one **NPS 4 (DN 100) OR NPS 6 (DN 150), as directed**, outlet.
 - 3) Connections: Three **OR Four, as directed, NPS 2-1/2 (DN 65)** inlets and one **NPS 6 (DN 150)** outlet.
 - 4) Connections: Six **NPS 2-1/2 (DN 65)** inlets and one **NPS 6 (DN 150) OR NPS 8 (DN 200), as directed**, outlet.
 - 5) Inlet Alignment: Inline, horizontal **OR Square, as directed**.
 - 6) Finish Including Sleeve: Polished chrome-plated **OR** Rough chrome-plated **OR** Polished bronze, **as directed**.
 - 7) Escutcheon Plate Marking: "AUTO SPKR" **OR** "STANDPIPE" **OR** "AUTO SPKR & STANDPIPE."

CC. Alarm Devices

1. Alarm Devices, General: UL 753 and FMG approved, of types and sizes to mate and match piping and equipment.
2. Water-Flow Indicators (can be used with wet-barrel fire hydrants): Vane-type water-flow detector, rated for **250-psig (1725-kPa)** working pressure; designed for horizontal or vertical installation; with 2 single-pole, double-throw circuit switches to provide isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal when cover is removed.
3. Supervisory Switches: Single pole, double throw; designed to signal valve in other than fully open position. Mount on stem of OS&Y gate valves and on indicator posts.
4. Pressure Switches: Single pole, double throw; designed to signal increase in pressure. Mount on barrel of dry-barrel fire hydrants.

1.3 EXECUTION

A. Earthwork

1. Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

B. Piping Applications

1. General: Use pipe, fittings, and joining methods for piping systems according to the following applications.
2. Transition couplings and special fittings with pressure ratings at least equal to piping pressure rating may be used, unless otherwise indicated.
3. Do not use flanges or unions for underground piping.
4. Flanges, unions, grooved-end-pipe couplings, and special fittings may be used, instead of joints indicated, on aboveground piping and piping in vaults.
5. Underground water-service piping **NPS 3/4 to NPS 3 (DN 20 to DN 80), as directed**, shall be selected from the following, **as directed**:
 - a. Soft copper tube, **ASTM B 88, Type K (ASTM B 88M, Type A) OR ASTM B 88, Type L (ASTM B 88M, Type B), as directed**; wrought-copper, solder-joint fittings; and brazed **OR** copper, pressure-seal fittings; and pressure-sealed, **as directed**, joints.
 - b. PE, ASTM pipe; insert fittings for PE pipe; and clamped **OR** molded PE fittings; and heat-fusion, **as directed**, joints.
 - c. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.

- d. **NPS 1 to NPS 3 (DN 25 to DN 80)** fiberglass, AWWA RTRP, Class 150 **OR** 200 **OR** 250, **as directed**; RTRF; and bonded joints.
- e. Fiberglass, AWWA RTRP, Class 150 **OR** 200 **OR** 250, **as directed**; RTRF; and bonded joints.
- 6. Underground water-service piping **NPS 4 to NPS 8 (DN 100 to DN 200)**, **as directed**, shall be selected from the following, **as directed**:
 - a. Soft copper tube, **ASTM B 88, Type K (ASTM B 88M, Type A)** **OR** **ASTM B 88, Type L (ASTM B 88M, Type B)**, **as directed**; wrought-copper, solder-joint fittings; and brazed joints.
 - b. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed **OR** mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical **OR** grooved-end pipe; ductile-iron-pipe appurtenances; and grooved, **as directed**, joints.
 - c. PE, AWWA pipe; PE, AWWA fittings; and heat-fusion joints.
 - d. PVC, Schedule 40 pipe; PVC, Schedule 40 **OR** Schedule 80 pipe; PVC, Schedule 80, **as directed**, socket fittings; and solvent-cemented joints.
 - e. **NPS 4 and NPS 6 (DN 100 and DN 150)**: **NPS 6 (DN 150)** PVC, AWWA Class 150 pipe; PVC, AWWA Class 150 fabricated **OR** molded, **as directed**, fittings; and gasketed joints.
 - f. **NPS 8 (DN 200)**: PVC, AWWA Class 200 pipe; PVC, AWWA Class 200 fabricated **OR** push-on-joint, ductile-iron **OR** mechanical-joint, ductile-iron, **as directed**, fittings; and gasketed joints.
 - g. Fiberglass, AWWA RTRP, Class 150 **OR** 200 **OR** 250, **as directed**; RTRF; and bonded joints.
- 7. Water Meter Box Water-Service Piping **NPS 3/4 to NPS 2 (DN 20 to DN 50)**, **as directed**, shall be same as underground water-service piping.
- 8. Aboveground and Vault, **as directed**, Water-Service Piping **NPS 3/4 to NPS 3 (DN 20 to DN 80)**, **as directed**, shall be selected from the following:

NOTE: Water-service piping materials listed in subparagraphs below are for potable-water service. They may not be suitable for fire-service mains.

- a. Hard copper tube, **ASTM B 88, Type K (ASTM B 88M, Type A)** **OR** **ASTM B 88, Type L (ASTM B 88M, Type B)**, **as directed**; wrought-copper, solder-joint fittings; and brazed **OR** copper, pressure-seal fittings; and pressure-sealed, **as directed**, joints.
- b. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented **OR** threaded fittings; and threaded, **as directed**, joints.
- c. **NPS 1 to NPS 2 (DN 25 to DN 50)** fiberglass, AWWA RTRP, Class 150 **OR** 200 **OR** 250, **as directed**; RTRF; and bonded joints.
- 9. Aboveground and vault, **as directed**, water-service piping **NPS 4 to NPS 8 (DN 100 to DN 200)**, **as directed**, shall be selected from the following:
 - a. Hard copper tube, **ASTM B 88, Type K (ASTM B 88M, Type A)** **OR** **ASTM B 88, Type L (ASTM B 88M, Type B)**, **as directed**; wrought-copper, solder-joint fittings; and brazed joints.
 - b. Ductile-iron, grooved-end pipe; ductile-iron, grooved-end appurtenances; and grooved joints.
 - c. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented **OR** threaded fittings; and threaded, **as directed**, joints.
 - d. Fiberglass, AWWA RTRP, Class 150 **OR** 200 **OR** 250, **as directed**; RTRF; and bonded joints.
- 10. Underground Fire-Service-Main Piping **NPS 4 to NPS 12 (DN 100 to DN 300)**, **as directed**, shall be selected from the following:

NOTE: Fire-service-main piping materials listed in subparagraphs below are for fire-protection water service. They may not be suitable for potable-water service.

- a. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed **OR** mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical **OR** grooved-end pipe; ductile-iron-pipe appurtenances; and grooved, **as directed**, joints.
- b. PE, Class 150 **OR** 200, **as directed**, fire-service pipe; molded PE fittings; and heat-fusion joints.

- c. PVC, AWWA Class 150 pipe listed for fire-protection service; PVC Class 150 fabricated or molded fittings; and gasketed joints.
 - d. PVC, AWWA Class 200 pipe listed for fire-protection service; PVC Class 200 fabricated fittings; and gasketed joints.
 - e. Fiberglass, AWWA, FMG-approved RTRP, Class 150 **OR** 200, **as directed**; RTRF; and gasketed joints.
 - f. Fiberglass, UL RTRP, Class 150 **OR** 200 **OR** 250, **as directed**; RTRF; and gasketed joints.
11. Aboveground and Vault, **as directed**, Fire-Service-Main Piping **NPS 4 to NPS 12 (DN 100 to DN 300)**, **as directed**, shall be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.
 12. Underground Combined Water-Service and Fire-Service-Main Piping **NPS 6 to NPS 12 (DN 150 to DN 300)**, **as directed**, shall be selected from the following:
 - a. Ductile-iron, push-on-joint pipe; ductile-iron, push-on-joint fittings; and gasketed **OR** mechanical-joint pipe; ductile-iron, mechanical-joint fittings; and mechanical **OR** grooved-end pipe; ductile-iron-pipe appurtenances; and grooved, **as directed**, joints.
 - b. PVC, AWWA Class 150 **OR** 200, **as directed**, pipe listed for fire-protection service; PVC fabricated or molded fittings of same class as pipe; and gasketed joints.
 - c. Fiberglass, AWWA, FMG-approved RTRP, Class 150 **OR** 200, **as directed**; RTRF; and gasketed joints.
 13. Aboveground and Vault, **as directed**, Combined Water Service and Fire-Service-Main Piping **NPS 6 to NPS 12 (DN 150 to DN 300)**, **as directed**, shall be ductile-iron, grooved-end pipe; ductile-iron-pipe appurtenances; and grooved joints.

C. Valve Applications

1. General Application: Use mechanical-joint-end valves for **NPS 3 (DN 80)** and larger underground installation. Use threaded- or flanged-end valves for installation in vaults. Use UL/FMG, nonrising-stem gate valves for installation with indicator posts. Use corporation valves and curb valves with ends compatible with piping, for **NPS 2 (DN 50)** and smaller installation.
2. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:
 - a. Underground Valves, **NPS 3 (DN 80)** and Larger: AWWA, cast-iron, nonrising-stem, metal **OR** resilient **OR** high-pressure, resilient, **as directed**,-seated gate valves with valve box.
 - b. Underground Valves, **NPS 4 (DN 100)** and Larger, for Indicator Posts: UL/FMG, cast-iron, nonrising-stem gate valves with indicator post.
 - c. Use the following for valves in vaults and aboveground:
 - 1) Gate Valves, **NPS 2 (DN 50)** and Smaller: Bronze, nonrising **OR** rising, **as directed**, stem.
 - 2) Gate Valves, **NPS 3 (DN 80)** and Larger: AWWA, cast iron, OS&Y rising stem, metal seated **OR** AWWA, cast iron, OS&Y rising stem, resilient seated **OR** UL/FMG, cast iron, OS&Y rising stem, **as directed**.
 - 3) Check Valves: AWWA C508 **OR** UL/FMG, **as directed**, swing type.
 - d. Pressure-Reducing Valves: Use for water-service piping in vaults and aboveground to control water pressure.
 - e. Relief Valves: Use for water-service piping in vaults and aboveground.
 - 1) Air-Release Valves: To release accumulated air.
 - 2) Air/Vacuum Valves: To release or admit large volume of air during filling of piping.
 - 3) Combination Air Valves: To release or admit air.
 - f. Detector Check Valves: Use for water-service piping in vaults and aboveground to detect unauthorized use of water.

D. Piping Systems - Common Requirements

1. See Division 22 Section "Common Work Results For Plumbing" for piping-system common requirements.

E. Piping Installation

1. Water-Main Connection (if tap is made by utility company): Arrange with utility company for tap of size and in location indicated in water main.
2. Water-Main Connection (if tap is made by Contractor): Tap water main according to requirements of water utility company and of size and in location indicated.
3. Make connections larger than **NPS 2 (DN 50)** with tapping machine according to the following:
 - a. Install tapping sleeve and tapping valve according to MSS SP-60.
 - b. Install tapping sleeve on pipe to be tapped. Position flanged outlet for gate valve.
 - c. Use tapping machine compatible with valve and tapping sleeve; cut hole in main. Remove tapping machine and connect water-service piping.
 - d. Install gate valve onto tapping sleeve. Comply with MSS SP-60. Install valve with stem pointing up and with valve box.
4. Make connections **NPS 2 (DN 50)** and smaller with drilling machine according to the following:
 - a. Install service-saddle assemblies and corporation valves in size, quantity, and arrangement required by utility company standards.
 - b. Install service-saddle assemblies on water-service pipe to be tapped. Position outlets for corporation valves.
 - c. Use drilling machine compatible with service-saddle assemblies and corporation valves. Drill hole in main. Remove drilling machine and connect water-service piping.
 - d. Install corporation valves into service-saddle assemblies.
 - e. Install manifold for multiple taps in water main.
 - f. Install curb valve in water-service piping with head pointing up and with service box.
5. Comply with NFPA 24 for fire-service-main piping materials and installation.
 - a. Install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
 - b. Install copper tube and fittings according to CDA's "Copper Tube Handbook."
6. Install ductile-iron, water-service piping according to AWWA C600 and AWWA M41.
 - a. If required, install PE corrosion-protection encasement according to ASTM A 674 or AWWA C105.
7. Install PE pipe according to ASTM D 2774 and ASTM F 645.
8. Install PVC, AWWA pipe according to ASTM F 645 and AWWA M23.
9. Install fiberglass AWWA pipe according to AWWA M45.
10. Bury piping with depth of cover over top at least **30 inches (750 mm)**, **as directed**, with top at least **12 inches (300 mm)**, **as directed**, below level of maximum frost penetration, and according to the following:
 - a. Under Driveways: With at least **36 inches (910 mm)**, **as directed**, cover over top.
 - b. Under Railroad Tracks: With at least **48 inches (1220 mm)**, **as directed**, cover over top.
 - c. In Loose Gravelly Soil and Rock: With at least **12 inches (300 mm)**, **as directed**, additional cover.
11. Install piping by tunneling or jacking, or combination of both, under streets and other obstructions that cannot be disturbed.
12. Extend water-service piping and connect to water-supply source and building-water-piping systems at outside face of building wall in locations and pipe sizes indicated.
 - a. Terminate water-service piping at building wall until building-water-piping systems are installed. Terminate piping with caps, plugs, or flanges as required for piping material. Make connections to building-water-piping systems when those systems are installed.
13. Sleeves are specified in Division 22 Section "Common Work Results For Plumbing".
14. Mechanical sleeve seals are specified in Division 22 Section "Common Work Results For Plumbing".
15. For piping with gasketed joints: Install underground piping with restrained joints at horizontal and vertical changes in direction. Use restrained-joint piping, thrust blocks, anchors, tie-rods and clamps, and other supports.
16. See Division 21 Section "Common Work Results For Fire Suppression" for fire-suppression-water piping inside the building.
17. See Division 22 Section "Common Work Results For Plumbing" for potable-water piping inside the building.

- F. Joint Construction
1. See Division 22 Section "Common Work Results For Plumbing" for basic piping joint construction.
 2. Make pipe joints according to the following:
 - a. Copper-Tubing, Pressure-Sealed Joints: Use proprietary crimping tool and procedure recommended by copper, pressure-seal-fitting manufacturer.
 - b. Ductile-Iron Piping, Gasketed Joints for Water-Service Piping: AWWA C600 and AWWA M41.
 - c. Ductile-Iron Piping, Gasketed Joints for Fire-Service-Main Piping: UL 194.
 - d. Ductile-Iron Piping, Grooved Joints: Cut-groove pipe. Assemble joints with grooved-end, ductile-iron-piping couplings, gaskets, lubricant, and bolts according to coupling manufacturer's written instructions.
 - e. PE Piping Insert-Fitting Joints: Use plastic insert fittings and fasteners according to fitting manufacturer's written instructions.
 - f. PVC Piping Gasketed Joints: Use joining materials according to AWWA C900. Construct joints with elastomeric seals and lubricant according to ASTM D 2774 or ASTM D 3139 and pipe manufacturer's written instructions.
 - g. Fiberglass Piping Bonded Joints: Use adhesive and procedure recommended by piping manufacturer.
 - h. Dissimilar Materials Piping Joints: Use adapters compatible with both piping materials, with OD, and with system working pressure. Refer to Division 22 Section "Common Work Results For Plumbing" for joining piping of dissimilar metals.
- G. Anchorage Installation
1. Anchorage, General: Install water-distribution piping with restrained joints. Anchorages and restrained-joint types that may be used include the following:
 - a. Concrete thrust blocks.
 - b. Locking mechanical joints.
 - c. Set-screw mechanical retainer glands.
 - d. Bolted flanged joints.
 - e. Heat-fused joints.
 - f. Pipe clamps and tie rods.
 2. Install anchorages for tees, plugs and caps, bends, crosses, valves, and hydrant branches. Include anchorages for the following piping systems:
 - a. Gasketed-Joint, Ductile-Iron, Water-Service Piping: According to AWWA C600.
 - b. Gasketed-Joint, PVC Water-Service Piping: According to AWWA M23.
 - c. Bonded-Joint Fiberglass, Water-Service Piping: According to AWWA M45.
 - d. Fire-Service-Main Piping: According to NFPA 24.
 3. Apply full coat of asphalt or other acceptable corrosion-resistant material to surfaces of installed ferrous anchorage devices.
- H. Valve Installation
1. AWWA Gate Valves: Comply with AWWA C600 and AWWA M44. Install each underground valve with stem pointing up and with valve box.
 2. AWWA Valves Other Than Gate Valves: Comply with AWWA C600 and AWWA M44.
 3. UL/FMG, Gate Valves: Comply with NFPA 24. Install each underground valve and valves in vaults with stem pointing up and with vertical cast-iron indicator post.
 4. UL/FMG, Valves Other Than Gate Valves: Comply with NFPA 24.
 5. MSS Valves: Install as component of connected piping system.
 6. Corporation Valves and Curb Valves: Install each underground curb valve with head pointed up and with service box.
 7. Pressure-Reducing Valves: Install in vault or aboveground between shutoff valves. Install full-size valved bypass, **as directed**.
 8. Relief Valves: Comply with AWWA C512. Install aboveground with shutoff valve on inlet.
- I. Detector-Check Valve Installation

1. Install in vault or aboveground.
 2. Install for proper direction of flow. Install bypass with water meter, gate valves on each side of meter, and check valve downstream from meter.
 3. Support detector check valves, meters, shutoff valves, and piping on brick or concrete piers.
- J. Water Meter Installation
1. If water meters are provided by the Contractor: Install water meters, piping, and specialties according to utility company's written instructions.
 2. Water Meters: Install displacement **OR** turbine, **as directed**,-type water meters, **NPS 2 (DN 50)** and smaller, in meter boxes with shutoff valves on water meter inlets. Include valves on water meter outlets and valved bypass around meters unless prohibited by authorities having jurisdiction.
 3. Water Meters: Install compound **OR** turbine, **as directed**,-type water meters, **NPS 3 (DN 80)** and larger, in meter vaults. Include shutoff valves on water meter inlets and outlets and valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.
 4. Water Meters: Install detector-type water meters in meter vault according to AWWA M6. Include shutoff valves on water meter inlets and outlets and full-size valved bypass around meters. Support meters, valves, and piping on brick or concrete piers.
- K. Roughing-In For Water Meters
1. If Contractor is to rough-in for water meters to be installed by utility company: Rough-in piping and specialties for water meter installation according to utility company's written instructions.
- L. Vacuum Breaker Assembly Installation
1. Install pressure vacuum breaker assemblies of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
 2. Do not install pressure vacuum breaker assemblies in vault or other space subject to flooding.
- M. Backflow Preventer Installation
1. Install backflow preventers of type, size, and capacity indicated. Include valves and test cocks. Install according to requirements of plumbing and health department and authorities having jurisdiction.
 2. Do not install backflow preventers that have relief drain in vault or in other spaces subject to flooding.
 3. Do not install bypass piping around backflow preventers.
 4. Support **NPS 2-1/2 (DN 65)** and larger backflow preventers, valves, and piping near floor and on brick or concrete piers.
- N. Water Meter Box Installation
1. Install water meter boxes in paved areas flush with surface.
 2. Install water meter boxes in grass or earth areas with top **2 inches (50 mm)**, **as directed**, above surface.
- O. Concrete Vault Installation
1. Install precast concrete vaults according to ASTM C 891.
- P. Protective Enclosure Installation
1. Install concrete base level and with top approximately **2 inches (50 mm)**, **as directed**, above grade.
 2. Install protective enclosure over valves and equipment.
 3. Anchor protective enclosure to concrete base.
- Q. Fire Hydrant Installation
1. General: Install each fire hydrant with separate gate valve in supply pipe, anchor with restrained joints or thrust blocks, and support in upright position.

2. Wet-Barrel Fire Hydrants: Install with valve below frost line. Provide for drainage.
3. AWWA Fire Hydrants: Comply with AWWA M17.
4. UL/FMG Fire Hydrants: Comply with NFPA 24.

R. Flushing Hydrant Installation

1. Install post-type flushing hydrants with valve below frost line and provide for drainage. Support in upright position. Include separate gate valve or curb valve and restrained joints in supply piping.
2. Install ground-type flushing hydrants with valve below frost line and provide for drainage. Install hydrant box flush with grade. Include separate gate valve or curb valve and restrained joints in supply piping.
3. Install sampling stations with valve below frost line and provide for drainage. Attach weather-resistant housing and support in upright position. Include separate curb valve in supply piping.

S. Fire Department Connection Installation

1. Install ball drip valves at each check valve for fire department connection to mains.
2. Install protective pipe bollards on two sides of **OR** on three sides of, **as directed**, each fire department connection. Pipe bollards are specified in Division 05 Section "Metal Fabrications".

T. Alarm Device Installation

1. General: Comply with NFPA 24 for devices and methods of valve supervision. Underground valves with valve box do not require supervision.
2. Supervisory Switches: Supervise valves in open position.
 - a. Valves: Grind away portion of exposed valve stem. Bolt switch, with plunger in stem depression, to OS&Y gate-valve yoke.
 - b. Indicator Posts: Drill and thread hole in upper-barrel section at target plate. Install switch, with toggle against target plate, on barrel of indicator post.
3. Locking and Sealing: Secure unsupervised valves as follows:
 - a. Valves: Install chain and padlock on open OS&Y gate valve.
 - b. Post Indicators: Install padlock on wrench on indicator post.
4. Pressure Switches: Drill and thread hole in exposed barrel of fire hydrant. Install switch.
5. Water-Flow Indicators: Install in water-service piping in vault. Select indicator with saddle and vane matching pipe size. Drill hole in pipe, insert vane, and bolt saddle to pipe.
6. Connect alarm devices to building fire alarm system. Wiring and fire-alarm devices are specified in Division 28.

U. Connections

1. Piping installation requirements are specified in other Division 22. Drawings indicate general arrangement of piping, fittings, and specialties.
2. See Division 22 Section "Common Work Results For Plumbing" for piping connections to valves and equipment.
3. Connect water-distribution piping to utility water main **OR** existing water main, **as directed**. Use tapping sleeve and tapping valve **OR** service clamp and corporation valve, **as directed**.
4. Connect water-distribution piping to interior domestic water **OR** fire-suppression, **as directed**, piping.
5. Connect waste piping from concrete vault drains to sanitary sewerage system. See Division 22 for connection to sanitary-sewer **OR** storm-drainage system. See Division 23 for connection to storm-sewer, **as directed**, piping.
6. Ground equipment according to Division 26 Section "Grounding And Bonding For Electrical Systems".
7. Connect wiring according to Division 26 Section "Low-voltage Electrical Power Conductors And Cables".

V. Field Quality Control

1. Piping Tests: Conduct piping tests before joints are covered and after concrete thrust blocks have hardened sufficiently. Fill pipeline 24 hours before testing and apply test pressure to stabilize system. Use only potable water.
2. Hydrostatic Tests: Test at not less than one-and-one-half times working pressure for two hours.
 - a. Increase pressure in **50-psig (350-kPa)** increments and inspect each joint between increments. Hold at test pressure for 1 hour; decrease to **0 psig (0 kPa)**. Slowly increase again to test pressure and hold for 1 more hour. Maximum allowable leakage is **2 quarts (1.89 L)** per hour per 100 joints. Remake leaking joints with new materials and repeat test until leakage is within allowed limits.
3. Prepare reports of testing activities.

W. Identification

1. Install continuous underground detectable, **as directed**, warning tape during backfilling of trench for underground water-distribution piping. Locate below finished grade, directly over piping. Underground warning tapes are specified in Division 31 Section "Earth Moving".
2. Permanently attach equipment nameplate or marker indicating plastic water-service piping, on main electrical meter panel. See Division 22 Section "Common Work Results For Plumbing" for identifying devices.

NOTE: Delete paragraph above if metallic water-service piping without electrically insulated fittings will be used.

X. Cleaning

1. Clean and disinfect water-distribution piping as follows:
 - a. Purge new water-distribution piping systems and parts of existing systems that have been altered, extended, or repaired before use.
 - b. If fire-protection-water piping is not connected to potable-water supply, use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in NFPA 24 for flushing of piping. Flush piping system with clean, potable water until dirty water does not appear at points of outlet.
 - c. If fire-protection-water piping is connected to potable-water supply, use purging and disinfecting procedure prescribed by authorities having jurisdiction or, if method is not prescribed by authorities having jurisdiction, use procedure described in AWWA C651 or do as follows:
 - 1) Fill system or part of system with water/chlorine solution containing at least 50 ppm of chlorine; isolate and allow to stand for 24 hours **OR** Drain system or part of system of previous solution and refill with water/chlorine solution containing at least 200 ppm of chlorine; isolate and allow to stand for 3 hours, **as directed**.
 - 2) After standing time, flush system with clean, potable water until no chlorine remains in water coming from system.
 - 3) Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedure if biological examination shows evidence of contamination.
2. Prepare reports of purging and disinfecting activities.

END OF SECTION 33 14 00 00

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Task	Specification	Specification Description
33 14 11 00	33 14 00 00	Water Distribution
33 14 13 00	33 14 00 00	Water Distribution
33 14 13 13	31 62 23 00	Concrete-Filled Steel Piles
33 14 13 13	33 14 00 00	Water Distribution
33 14 13 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 14 13 13	33 31 11 00	Sanitary Sewerage
33 14 13 13	33 42 11 00	Storm Drainage

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SECTION 33 14 13 23 - SAND DRAINS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of sand drains. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

- A. Galvanized Perforated Corrugated Metal Pipe: AASHTO M36.

- B. Perforated Polyvinyl Chloride (PVC) Plastic Pipe: ASTM D 1784.

- C. Aggregate shall be sand, gravel, crushed rock, or chat that is clean, sound, and of a good quality. Gradation shall conform to the following table:

Retained on the 1-inch sieve	0%
Retained on the 3/8-inch sieve	0-15%
Retained on the No. 8 sieve	40-60%
Retained on the No. 30 sieve	70-95%
Retained on the No. 100 sieve	98-100%

1.3 EXECUTION

- A. Pipe Bedding: Aggregate shall be placed in uniform layers on level excavation.

- B. Perforated Pipe shall be installed with securely aligned joints to lines and grades, which will allow proper drainage.

- C. Perforated Pipe shall be embedded with a minimum coverage of two feet of aggregate or as directed.

END OF SECTION 33 14 13 23

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SECTION 33 14 13 23a - HYDRONIC DISTRIBUTION

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for hydronic distribution. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. This Section includes underground piping outside the building for distribution of heating hot and chilled water.

C. Performance Requirements

1. Provide components and installation capable of producing hydronic piping systems with the following minimum working-pressure ratings:
 - a. Hot-Water Piping: **100 psig (690 kPa) OR 150 psig (1035 kPa), as directed.**
 - b. Chilled-Water Piping: **100 psig (690 kPa) OR 150 psig (1035 kPa), as directed.**
 - c. Condenser-Water Piping: **100 psig (690 kPa) OR 150 psig (1035 kPa), as directed.**

D. Submittals

1. Product Data
2. Shop Drawings
3. Welding certificates.
4. Source quality-control test reports.
5. Field quality-control test reports.

E. Quality Assurance

1. Welding: Qualify procedures and personnel according to ASME Boiler and Pressure Vessel Code: Section IX.
2. ASME Compliance: Comply with ASME B31.9, "Building Services Piping," for materials, products, and installation.

F. Project Conditions

1. Existing Utilities: Do not interrupt utilities serving facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed utility interruptions.
 - b. Do not proceed with utility interruptions without the Owner's written permission.

1.2 PRODUCTS

A. Piping Materials

1. Refer to Part 1.3 "Piping Application" Article for applications of pipes, tubes, fittings, and joining methods.
2. Refer to Division 33 Section "Common Work Results For Utilities" for commonly used joining materials.

B. Steel Pipes And Fittings

1. Steel Pipe: ASTM A 53/A 53M, Type E, Grade B, Standard Weight; with plain ends.
2. Nipples: ASTM A 733, Standard Weight, seamless, carbon-steel pipe complying with ASTM A 53/A 53M.

3. Malleable-Iron, Threaded Fittings: ASME B16.3, Classes 150 **OR** 300, **as directed**, with threads according to ASME B1.20.1.
4. Cast-Iron, Threaded Fittings: ASME B16.4, Classes 125 **OR** 250, **as directed**, standard pattern, with threads according to ASME B1.20.1.
5. Steel Welding Fittings: ASME B16.9 **OR** ASTM A 234/A 234M, **as directed**, seamless or welded.
6. Ductile-Iron, Grooved-End Fittings: ASTM A 536, ductile-iron casting with dimensions matching piping.
7. Steel-Pipe, Keyed Couplings: AWWA C606 for steel-pipe dimensions. Include ferrous housing sections, gasket suitable for hot water, and bolts and nuts.

C. Conduit Piping

1. Description: Factory-fabricated and -assembled, airtight and watertight, drainable, pressure-tested piping with conduit, inner pipe supports, and insulated carrier piping. Fabricate so insulation can be dried in place by forcing dry air through conduit.
2. Carrier Pipe: Steel pipe complying with ASTM A 53/A 53M, Type E, Grade B with beveled **OR** socket, **as directed**, ends for welded joints.
3. Carrier Pipe Insulation:
 - a. Mineral-Wool Pipe Insulation: ASTM C 547, Type I, molded.
 - 1) Apparent Thermal Conductivity (k-Value): **0.31 at 200 deg F (0.044 at 93 deg C)** mean temperature.
 - 2) Density: Maximum **10 lb/cu. ft. (160 kg/cu. m)** average.
 - 3) Compressive Strength: **10 psig (69 kPa)** minimum at 5 percent deformation.
 - 4) Bands: ASTM A 666, Type 304, stainless steel, **3/4 inch (19 mm)** wide, **0.020 inch (0.5 mm)** thick.
 - b. Calcium Silicate Pipe Insulation: ASTM C 533, Type I; preformed, incombustible, inorganic, with non-asbestos fibrous reinforcement.
 - 1) Thermal Conductivity (k-Value): **0.60 at 500 deg F (0.087 at 260 deg C)**.
 - 2) Dry Density: **15 lb/cu. ft. (240 kg/cu. m)** maximum.
 - 3) Compressive Strength: **60 psig (414 kPa)** minimum at 5 percent deformation.
 - 4) Bands: ASTM A 666, Type 304, stainless steel, **3/4 inch (19 mm)** wide, **0.020 inch (0.5 mm)** thick.
 - c. Polyisocyanurate Foam Pipe Insulation: ASTM C 591, preformed, rigid, cellular.
 - 1) Thermal Conductivity (k-Value): **0.14 at 75 deg F (0.020 at 24 deg C)**.
 - 2) Service Temperature: **Minus 250 to plus 400 deg F (Minus 156 to plus 204 deg C)**.
 - 3) Moisture Absorption: ASTM D 2842, maximum 0.054 percent by volume.
 - 4) Minimum 90 percent closed cell.
 - 5) Dry Density: **2 lb/cu. ft. (32 kg/cu. m)** maximum.
 - 6) Compressive Strength: **35 psig (242 kPa)** minimum at 5 percent deformation.
 - 7) Water-Vapor Transmission: **1.26 perm inches (1.83 ng/Pa x s x m)** according to ASTM E 96.
 - d. Polyurethane Foam Pipe Insulation: ASTM C 591, preformed, rigid, cellular.
 - 1) Thermal Conductivity (k-Value): **0.13 at 75 deg F (0.019 at 24 deg C)**.
 - 2) Service Temperature: **Minus 250 to plus 200 deg F (Minus 156 to plus 93 deg C)**.
 - 3) Moisture Absorption: ASTM D 2842, maximum 0.054 percent by volume.
 - 4) Minimum 90 percent closed cell.
 - 5) Dry Density: **2 lb/cu. ft. (32 kg/cu. m)** maximum.
 - 6) Compressive Strength: **35 psig (242 kPa)** minimum at 5 percent deformation.
 - 7) Water-Vapor Transmission: **1.26 perm inches (1.83 ng/Pa x s x m)** according to ASTM E 96.
4. Minimum Clearance:
 - a. Between Carrier Pipe Insulation and Conduit: **1 inch (25 mm)**.
 - b. Between Insulation of Multiple Carrier Pipes: **3/16 inch (4.75 mm)**.
 - c. Between Bottom of Carrier Pipe Insulation and Conduit: **1 inch (25 mm)**.
 - d. Between Bottom of Bare, Carrier Pipe and Casing: **1-3/8 inches (35 mm)**.

5. Conduit: Spiral wound, steel. Finish conduit with 2 coats of fusion-bonded epoxy, minimum **20 mils (0.50 mm)** thick. Cover with polyurethane foam insulation with a high-density polyethylene jacket; thickness indicated in Part 1.3 "Piping Application" Article, **as directed**.
OR
Conduit: Spiral wound, bare steel. Cover with polyurethane foam insulation with a high-density polyethylene jacket; thickness indicated in Part 1.3 "Piping Application" Article.
6. Carrier Piping Supports within Conduit: Corrugated galvanized steel with a maximum spacing of **10 feet (3 m)**.
7. Fittings: Factory-fabricated and -insulated elbows and tees. Elbows may be bent pipe equal to carrier pipe. Tees shall be factory fabricated and insulated, and shall be compatible with the carrier pipe.
8. Expansion Offsets and Loops: Size casing to contain piping expansion.
9. Conduit accessories include the following:
 - a. Water Shed: Terminal end protector for carrier pipes entering building through floor, **3 inches (75 mm)** deep and **2 inches (50 mm)** larger than casing; terminate casing **20 inches (500 mm)** above the floor level.
 - b. Guides and Anchors: Steel plate welded to carrier pipes and to casing, complete with vent and drainage openings inside casing.
 - c. End Seals: Steel plate welded to carrier pipes and to casing, complete with drain and vent openings on vertical centerline.
 - d. Gland Seals: Packed stuffing box and gland follower mounted on steel plate, welded to end of casing, permitting axial movement of carrier piping, with drain and vent connections on vertical centerline.
 - e. Joint Kit: Half-shell, pourable or split insulation and shrink-wrap sleeve.
10. Source Quality Control: Factory test the conduit to **15 psig (105 kPa)** for a minimum of 2 minutes with no change in pressure. Factory test the carrier pipe to 150 percent of the operating pressure of system. Furnish test certificates.

D. Cased Piping

1. Description: Factory-fabricated piping with carrier pipe, insulation, and casing.
2. Carrier Pipe: Steel pipe complying with ASTM A 53/A 53M, Type E, Grade B with beveled **OR** socket, **as directed**, ends for welded joints.
3. Carrier Pipe Insulation:
 - a. Polyurethane Foam Pipe Insulation: ASTM C 591, preformed, rigid, cellular.
 - 1) Thermal Conductivity (k-Value): **0.13 at 75 deg F (0.019 at 24 deg C)**.
 - 2) Service Temperature: **Minus 250 to plus 200 deg F (Minus 156 to plus 93 deg C)**.
 - 3) Moisture Absorption: ASTM D 2842, maximum 0.054 percent by volume.
 - 4) Minimum 90 percent closed cell.
 - 5) Dry Density: **2 lb/cu. ft. (32 kg/cu. m)** maximum.
 - 6) Compressive Strength: **35 psig (242 kPa)** minimum at 5 percent deformation.
 - 7) Water-Vapor Transmission: **1.26 perm inches (1.83 ng/Pa x s x m)** according to ASTM E 96.
4. Casing: High-density polyethylene **OR** Filament-wound, fiberglass-reinforced polyester resin **OR** PVC, **as directed**.
5. Casing accessories include the following:
 - a. Joint Kit: Half-shell, pourable or split insulation, casing sleeve, and shrink-wrap sleeve.
 - b. Expansion Blanket: Elastomeric foam, formed to fit over piping.
 - c. End Seals: Shrink wrap the casing material to seal watertight around casing and carrier pipe.
6. Source Quality Control: Factory test the carrier pipe to 150 percent of the operating pressure of system. Furnish test certificates.

E. Loose-Fill Insulation

1. Granular, Loose-Fill Insulation: Inorganic, nontoxic, nonflammable, sodium potassium aluminum silicate with calcium carbonate filler. Include chemical treatment that renders insulation hydrophobic.

- a. Thermal Conductivity (k-Value): 0.60 at 175 deg F (0.087 at 79 deg C) and 0.65 at 300 deg F (0.094 at 149 deg C).
 - b. Application Temperature Range: 35 to 800 deg F (2 to 426 deg C).
 - c. Dry Density: 40 to 42 lb/cu. ft. (640 to 672 kg/cu. m).
 - d. Strength: 12,000 lb/sq. ft. (58 600 kg/sq. m).
2. Powder, Loose-Fill Insulation: Inert, nontoxic, nonflammable, calcium carbonate particles. Include chemical treatment that renders insulation hydrophobic.
- a. Thermal Conductivity (k-Value): ASTM C 177, 0.58 at 100 deg F (0.084 at 37 deg C) and 0.68 at 300 deg F (0.098 at 149 deg C).
 - b. Application Temperature Range: Minus 273 to plus 480 deg F (Minus 169 to plus 250 deg C).
 - c. Dry Density: Approximately 60 lb/cu. ft. (960 kg/cu. m).
 - d. Strength: 12,000 lb/sq. ft. (58 600 kg/sq. m).

1.3 EXECUTION

- A. Earthwork: Refer to Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.
- B. Piping Application
1. Hot-Water Piping: Schedule 40 **OR** Schedule 80, **as directed**, steel pipe with cast-iron, threaded fittings and threaded **OR** steel fittings and welded **OR** ductile-iron, grooved-end fittings and mechanical, **as directed**, joints; granular **OR** powder, loose-fill insulation.
OR
Hot-Water Piping: Conduit piping with mineral-wool **OR** calcium silicate **OR** polyisocyanurate **OR** polyurethane, **as directed**, carrier-pipe insulation and with coated **OR** coated and insulated, **as directed**, conduit.
 - a. Insulation Thickness: 1 inch (25 mm) **OR** 2 inches (50 mm), **as directed**.
OR
Hot-Water Piping: Cased piping with polyurethane carrier-pipe insulation.
 2. Chilled-Water Piping: Schedule 40 **OR** Schedule 80, **as directed**, steel pipe with cast-iron, threaded fittings and threaded **OR** steel welding fittings and welded **OR** ductile-iron, grooved-end fittings and mechanical, **as directed**, joints; granular **OR** powder, **as directed**, loose-fill insulation.
OR
Chilled-Water Piping: Conduit piping with mineral-wool **OR** calcium silicate **OR** polyisocyanurate **OR** polyurethane, **as directed**, carrier-pipe insulation and with coated **OR** coated and insulated, **as directed**, conduit.
 - a. Insulation Thickness: 1 inch (25 mm) **OR** 2 inches (50 mm), **as directed**.
OR
Chilled-Water Piping: Cased piping with polyurethane carrier-pipe insulation.
 3. Condenser-Water Piping: Schedule 40 **OR** Schedule 80, **as directed**, steel pipe with cast-iron, threaded fittings and threaded **OR** steel welding fittings and welded **OR** ductile-iron, grooved-end fittings and mechanical, **as directed**, joints; granular **OR** powder, **as directed**, loose-fill insulation.
OR
Condenser-Water Piping: Conduit piping with mineral-wool **OR** calcium silicate **OR** polyisocyanurate **OR** polyurethane, **as directed**, carrier-pipe insulation and with coated **OR** coated and insulated, **as directed**, conduit.
 - a. Insulation Thickness: 1 inch (25 mm) **OR** 2 inches (50 mm), **as directed**.
OR
Condenser-Water Piping: Cased piping with polyurethane carrier-pipe insulation.
- C. Piping Installation

1. General Locations and Arrangements: Drawings indicate general location and arrangement of piping. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated, unless deviations to layout are approved.
 2. Remove any standing water in the bottom of trench.
 3. Bed the pipe on a minimum **6-inch (150-mm)** layer of granular fill material with a minimum **6-inch (150-mm)** clearance between the pipes.
 4. Do not insulate piping or backfill piping trench until field quality-control testing has been completed and results approved.
 5. Install piping at uniform grade of 0.2 percent upward in direction of flow or as indicated.
 6. Install components with pressure rating equal to or greater than system operating pressure.
 7. Install piping free of sags and bends.
 8. Install fittings for changes in direction and branch connections.
 9. Refer to Division 23 Section "Common Work Results For Hvac" for sleeves and mechanical sleeve seals through exterior building walls.
 10. Secure anchors with concrete thrust blocks. Concrete is specified in Division 03 Section "Cast-in-place Concrete".
 11. Connect to hydronic piping where it passes through the building wall. Hydronic piping inside the building is specified in Division 23 Section "Hydronic Piping".
- D. Loose-Fill Insulation Installation
1. Do not disturb the bottom of trench, or compact and stabilize it to ensure proper support.
 2. Remove any standing water in the bottom of trench.
 3. Form insulation trench by excavation or by installing drywall side forms to establish required height and width of the insulation.
 4. Support piping with proper pitch, separation, and clearance to backfill or side forms using temporary supporting devices that can be removed after back filling with insulation.
 5. Place insulation and backfill after field quality-control testing has been completed and results approved.
 6. Apply bitumastic coating to carbon-steel anchors and guides. Pour concrete thrust blocks and anchors. Refer to Division 03 Section "Cast-in-place Concrete" for concrete and reinforcement.
 7. Wrap piping at expansion loops and offsets with mineral-wool insulation of thickness appropriate for calculated expansion amount.
 8. Pour loose-fill insulation to required dimension agitating insulation to eliminate voids around piping.
 9. Remove temporary hangers and supports.
 10. Cover loose-fill insulation with polyethylene sheet a minimum of **4 mils (0.10 mm)** thick, and empty loose-fill insulation bags on top.
 11. Manually backfill **6 inches (150 mm)** of clean backfill. If mechanical compaction is required, manually backfill to **12 inches (300 mm)** before using mechanical-compaction equipment.
- E. Joint Construction
1. Refer to Division 33 Section "Common Work Results For Utilities" for basic piping joint construction.
 2. Keyed-Coupling Joints: Cut- or roll-groove pipes. Assemble joints with keyed couplings, gaskets, lubricant, and bolts.
 3. Conduit and Cased Piping Joints: Assemble sections and finish joints with pourable or split insulation, exterior jacket sleeve, and apply shrink-wrap seals as required by manufacturer's written installation instructions.
- F. Identification: Install continuous plastic underground warning tapes during back filling of trenches for underground hydronic distribution piping. Locate **6 to 8 inches (150 to 200 mm)** below finished grade, directly over piping. Refer to Division 31 Section "Earth Moving" for warning-tape materials and devices and their installation.
- G. Field Quality Control

1. Prepare hydronic piping for testing according to ASME B31.9 and as follows:
 - a. Leave joints, including welds, uninsulated and exposed for examination during test.
 - b. Isolate equipment. Do not subject equipment to test pressure.
 - c. Install relief valve set at pressure no more than one-third higher than test pressure.
 - d. Fill system with water. Where there is risk of freezing, air or a safe, compatible liquid may be used.
 - e. Use vents installed at high points to release trapped air while filling system.
2. Test hydronic piping as follows:
 - a. Subject hydronic piping to hydrostatic test pressure that is not less than 1.5 times the design pressure.
 - b. After hydrostatic test pressure has been applied for 10 minutes, examine joints for leakage. Remake leaking joints using new materials and repeat hydrostatic test until no leaks exist.
3. Test conduit as follows:
 - a. Seal vents and drains and subject conduit to 15 psig (105 kPa) for 4 hours with no loss of pressure. Repair leaks and retest as required.
4. Prepare a written report of testing.

END OF SECTION 33 14 13 23a

Task	Specification	Specification Description
33 14 13 23	01 22 16 00	No Specification Required
33 14 13 23	32 91 19 13a	Septic Tank Systems
33 14 13 23	01 95 99 99h	Water Supply Wells
33 14 13 23	23 11 23 00b	Monitoring Wells
33 14 13 23	33 14 00 00	Water Distribution
33 14 13 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 14 13 23	33 31 11 00	Sanitary Sewerage
33 14 13 23	33 42 11 00	Storm Drainage
33 14 13 23	31 05 13 00a	Subdrainage
33 14 13 36	01 95 99 99h	Water Supply Wells
33 14 13 36	33 14 13 23a	Hydronic Distribution
33 14 13 36	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 14 13 36	23 05 29 00b	Steam Distribution
33 14 13 39	33 14 00 00	Water Distribution
33 14 13 39	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 14 13 43	01 95 99 99h	Water Supply Wells
33 14 13 43	33 14 00 00	Water Distribution
33 14 13 43	33 14 13 23a	Hydronic Distribution
33 14 13 43	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 14 13 43	33 31 11 00	Sanitary Sewerage
33 14 13 43	23 05 29 00b	Steam Distribution
33 14 13 53	01 22 16 00	No Specification Required
33 14 13 53	01 95 99 99a	Common Work Results for Fire Suppression
33 14 13 53	01 95 99 99b	Common Work Results for Plumbing
33 14 13 53	22 11 16 00	Domestic Water Piping
33 14 13 53	22 13 16 00	Sanitary Waste And Vent Piping
33 14 13 53	01 95 99 99c	Storm Drainage Piping
33 14 13 53	22 11 16 00a	General-Service Compressed-Air Piping
33 14 13 53	01 95 99 99g	Common Work Results for HVAC
33 14 13 53	23 21 13 23a	Hydronic Piping
33 14 13 53	22 11 16 00b	Steam And Condensate Piping
33 14 13 53	22 11 16 00c	Refrigerant Piping
33 14 19 00	01 22 16 00	No Specification Required
33 14 19 00	33 14 00 00	Water Distribution
33 14 19 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 14 23 00	01 22 16 00	No Specification Required
33 14 23 00	33 14 00 00	Water Distribution
33 14 23 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 19 13 23	22 05 19 00	Meters and Gages for Plumbing Piping
33 19 13 23	23 05 19 00	Meters and Gages for HVAC Piping
33 19 13 23	33 14 00 00	Water Distribution
33 19 16 23	01 22 16 00	No Specification Required
33 19 16 23	22 05 19 00	Meters and Gages for Plumbing Piping
33 19 16 23	23 05 19 00	Meters and Gages for HVAC Piping
33 19 16 23	33 14 00 00	Water Distribution
33 19 19 00	01 22 16 00	No Specification Required
33 19 19 00	22 05 19 00	Meters and Gages for Plumbing Piping
33 19 19 00	23 05 19 00	Meters and Gages for HVAC Piping
33 19 19 00	33 14 00 00	Water Distribution

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SECTION 33 31 11 00 - SANITARY SEWERAGE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for sanitary sewerage. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pipe and fittings.
 - b. Nonpressure and pressure couplings.
 - c. Expansion joints and deflection fittings.
 - d. Backwater valves.
 - e. Cleanouts.
 - f. Encasement for piping.
 - g. Manholes.

C. Definitions

1. FRP: Fiberglass-reinforced plastic.

D. Submittals

1. Product Data: For the following:
 - a. Expansion joints and deflection fittings.
 - b. Backwater valves.
2. Shop Drawings: For manholes. Include plans, elevations, sections, details, and frames and covers.
3. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from sewer system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
4. Profile Drawings: Show system piping in elevation. Draw profiles to horizontal scale of not less than **1 inch equals 50 feet (1:500)** and to vertical scale of not less than **1 inch equals 5 feet (1:50)**. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
5. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
6. Field quality-control reports.

E. Delivery, Storage, And Handling

1. Do not store plastic manholes, pipe, and fittings in direct sunlight.
2. Protect pipe, pipe fittings, and seals from dirt and damage.
3. Handle manholes according to manufacturer's written rigging instructions.

F. Project Conditions

1. Interruption of Existing Sanitary Sewerage Service: Do not interrupt service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of service.
 - b. Do not proceed with interruption of service without the Owner written permission.

1.2 PRODUCTS

- A. Hub-And-Spigot, Cast-Iron Soil Pipe And Fittings
1. Pipe and Fittings: ASTM A 74, Service class **OR** Service and Extra-Heavy classes **OR** Extra-Heavy class, **as directed**.
 2. Gaskets: ASTM C 564, rubber.
 3. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.
- B. Hubless Cast-Iron Soil Pipe And Fittings
1. Pipe and Fittings: ASTM A 888 or CISPI 301.
 2. CISPI-Trademark, Shielded Couplings:
 - a. Description: ASTM C 1277 and CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
 3. Heavy-Duty, Shielded Couplings:
 - a. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
 4. Cast-Iron, Shielded Couplings:
 - a. Description: ASTM C 1277 with ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.
 5. Unshielded Couplings:
 - a. Description: ASTM C 1277 and ASTM C 1461, rigid, sleeve-type, reducing- or transition-type mechanical coupling, with integral, center pipe stop, molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.
- C. Ductile-Iron, Gravity Sewer Pipe And Fittings
1. Pipe: ASTM A 746, for push-on joints.
 2. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
 3. Compact Fittings: AWWA C153, ductile iron, for push-on joints.
 4. Gaskets: AWWA C111, rubber.
- D. Ductile-Iron, Pressure Pipe And Fittings
1. Push-on-Joint Piping:
 - a. Pipe: AWWA C151.
 - b. Standard Fittings: AWWA C110, ductile or gray iron.
 - c. Compact Fittings: AWWA C153.
 - d. Gaskets: AWWA C111, rubber, of shape matching pipe and fittings.
 2. Mechanical-Joint Piping:
 - a. Pipe: AWWA C151, with bolt holes in bell.
 - b. Standard Fittings: AWWA C110, ductile or gray iron, with bolt holes in bell.
 - c. Compact Fittings: AWWA C153, with bolt holes in bells.
 - d. Glands: Cast or ductile iron; with bolt holes and high-strength, cast-iron or high-strength, low-alloy steel bolts and nuts.
 - e. Gaskets: AWWA C111, rubber, of shape matching pipe, fittings, and glands.
- E. ABS Pipe And Fittings
1. ABS Sewer Pipe and Fittings: ASTM D 2751, with bell-and-spigot ends for gasketed joints.
 - a. **NPS 3 to NPS 6 (DN 80 to DN 150):** SDR 35.
 - b. **NPS 8 to NPS 12 (DN 200 to DN 300):** SDR 42.
 2. Gaskets: ASTM F 477, elastomeric seals.
- F. PVC Pipe And Fittings

1. PVC Cellular-Core Sewer Piping:
 - a. Pipe: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, PVC cellular-core pipe with plain ends for solvent-cemented joints.
 - b. Fittings: ASTM D 3034, SDR 35, PVC socket-type fittings.
 2. PVC Corrugated Sewer Piping:
 - a. Pipe: ASTM F 949, PVC corrugated pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 3. PVC Profile Sewer Piping:
 - a. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: ASTM D 3034, PVC with bell ends.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 4. PVC Type PSM Sewer Piping:
 - a. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: ASTM D 3034, PVC with bell ends.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 5. PVC Gravity Sewer Piping:
 - a. Pipe and Fittings: ASTM F 679, T-1 **OR** T-2, **as directed**, wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.
 6. PVC Pressure Piping:
 - a. Pipe: AWWA C900, Class 100 **OR** Class 150 **OR** Class 200, **as directed**, PVC pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: AWWA C900, Class 100 **OR** Class 150 **OR** Class 200, **as directed**, PVC pipe with bell ends.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 7. PVC Water-Service Piping:
 - a. Pipe: ASTM D 1785, Schedule 40 **OR** Schedule 80, **as directed**, PVC, with plain ends for solvent-cemented joints.
 - b. Fittings: ASTM D 2466, Schedule 40 **OR** ASTM D 2467, Schedule 80, **as directed**, PVC, socket type.
- G. Fiberglass Pipe And Fittings
1. Fiberglass Sewer Pipe: ASTM D 3262, RTRP, for gasketed joints fabricated with Type 2, polyester **OR** Type 4, epoxy, **as directed**, resin.
 - a. Liner: Reinforced thermoset **OR** Nonreinforced thermoset **OR** Thermoplastic **OR** No liner, **as directed**.
 - b. Grade: Reinforced, surface layer matching pipe resin **OR** Nonreinforced, surface layer matching pipe resin **OR** No surface layer, **as directed**.
 - c. Stiffness: **9 psig (62 kPa) OR 18 psig (124 kPa) OR 36 psig (248 kPa) OR 72 psig (496 kPa), as directed.**
 2. Fiberglass Nonpressure Fittings: ASTM D 3840, RTRF, for gasketed joints.
 - a. Laminating Resin: Type 1, polyester **OR** Type 2, epoxy, **as directed**, resin.
 - b. Reinforcement: Grade with finish compatible with resin.
 3. Gaskets: ASTM F 477, elastomeric seals.
- H. Concrete Pipe And Fittings
1. Nonreinforced-Concrete Sewer Pipe and Fittings: **ASTM C 14 (ASTM C 14M)**, Class 1 **OR** Class 2 **OR** Class 3, **as directed**, with bell-and-spigot **OR** tongue-and-groove, **as directed**, ends for gasketed joints with **ASTM C 443 (ASTM C 443M)**, rubber gaskets.
 2. Reinforced-Concrete Sewer Pipe and Fittings: **ASTM C 76 (ASTM C 76M)**.
 - a. Bell-and-spigot **OR** tongue-and-groove, **as directed**, ends for gasketed joints, with **ASTM C 443 (ASTM C 443M)**, rubber gaskets.
 - b. Class II, Wall A **OR** Wall B **OR** Wall C, **as directed**.

- c. Class III, Wall A **OR** Wall B **OR** Wall C, **as directed**.
 - d. Class IV, Wall A **OR** Wall B **OR** Wall C, **as directed**.
 - e. Class V, Wall A **OR** Wall B, **as directed**.
- I. Nonpressure-Type Transition Couplings
1. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined and corrosion-resistant-metal tension band and tightening mechanism on each end.
 2. Sleeve Materials:
 - a. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - b. For Concrete Pipes: **ASTM C 443 (ASTM C 443M)**, rubber.
 - c. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - d. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - e. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
 3. Unshielded, Flexible Couplings:
 - a. Description: Elastomeric sleeve, with stainless-steel shear ring, **as directed**, and corrosion-resistant-metal tension band and tightening mechanism on each end.
 4. Shielded, Flexible Couplings:
 - a. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 5. Ring-Type, Flexible Couplings:
 - a. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
 6. Nonpressure-Type, Rigid Couplings:
 - a. Description: ASTM C 1461, sleeve-type, reducing- or transition-type mechanical coupling, molded from ASTM C 1440, TPE material; with corrosion-resistant-metal tension band and tightening mechanism on each end.
- J. Pressure-Type Pipe Couplings
1. Tubular-Sleeve Couplings: AWWA C219, with center sleeve, gaskets, end rings, and bolt fasteners.
 2. Metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include **150-psig (1035-kPa) OR 200-psig (1380-kPa)**, **as directed**, minimum pressure rating and ends of same sizes as piping to be joined.
 3. Center-Sleeve Material: Manufacturer's standard **OR** Carbon steel **OR** Stainless steel **OR** Ductile iron **OR** Malleable iron, **as directed**.
 4. Gasket Material: Natural or synthetic rubber.
 5. Metal Component Finish: Corrosion-resistant coating or material.
- K. Expansion Joints And Deflection Fittings
1. Ductile-Iron, Flexible Expansion Joints:
 - a. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for **250-psig (1725-kPa)** minimum working pressure and for offset and expansion indicated.
 2. Ductile-Iron Expansion Joints:
 - a. Description: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for **250-psig (1725-kPa)** minimum working pressure and for expansion indicated.
 3. Ductile-Iron Deflection Fittings:

- a. Description: Compound coupling fitting with ball joint, flexing section, gaskets, and restrained-joint ends complying with AWWA C110 or AWWA C153. Include rating for **250-psi** (1725-kPa) minimum working pressure and for up to 15 degrees of deflection.
- L. Backwater Valves
1. Cast-Iron Backwater Valves:
 - a. Description: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
 - b. Horizontal type; with swing check valve and hub-and-spigot ends.
 - c. Combination horizontal and manual gate-valve type; with swing check valve, integral gate valve, and hub-and-spigot ends.
 - d. Terminal type; with bronze seat, swing check valve, and hub inlet.
 2. PVC Backwater Valves:
 - a. Description: Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.
- M. Cleanouts
1. Cast-Iron Cleanouts:
 - a. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - b. Top-Loading Classification(s): Light Duty **OR** Medium Duty **OR** Heavy Duty **OR** Extra-Heavy Duty, **as directed**.
 - c. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
 2. PVC Cleanouts:
 - a. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.
- N. Encasement For Piping
1. Standard: ASTM A 674 or AWWA C105.
 2. Material: Linear low-density polyethylene film of 0.008-inch (0.20-mm) **OR** high-density, cross-laminated polyethylene film of 0.004-inch (0.10-mm), **as directed**, minimum thickness.
 3. Form: Sheet **OR** Tube, **as directed**.
 4. Color: Black **OR** Natural, **as directed**.
- O. Manholes
1. Standard Precast Concrete Manholes:
 - a. Description: **ASTM C 478 (ASTM C 478M)**, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - b. Diameter: **48 inches (1200 mm)** minimum unless otherwise indicated.
 - c. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.
 - d. Base Section: **6-inch (150-mm)** minimum thickness for floor slab and **4-inch (100-mm)** minimum thickness for walls and base riser section; with separate base slab or base section with integral floor.
 - e. Riser Sections: **4-inch (100-mm)** minimum thickness, of length to provide depth indicated.
 - f. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated; with top of cone of size that matches grade rings.
 - g. Joint Sealant: **ASTM C 990 (ASTM C 990M)**, bitumen or butyl rubber.
 - h. Resilient Pipe Connectors: **ASTM C 923 (ASTM C 923M)**, cast or fitted into manhole walls, for each pipe connection.
 - i. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor

- steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
- j. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
OR
Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
2. Designed Precast Concrete Manholes:
 - a. Description: ASTM C 913; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
 - b. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole as required to prevent flotation.
 - c. Joint Sealant: ASTM C 990 (ASTM 990M), bitumen or butyl rubber.
 - d. Resilient Pipe Connectors: ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
 - e. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps, FRP ladder, or ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, 1/2-inch (13-mm) steel reinforcing rods encased in ASTM D 4101, PP, **as directed**; wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
 - f. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
OR
Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
 3. Fiberglass Manholes:
 - a. Description: ASTM D 3753.
 - b. Diameter: 48 inches (1200 mm) minimum unless otherwise indicated.
 - c. Ballast: Increase thickness of concrete base as required to prevent flotation.
 - d. Base Section: Concrete, 6-inch (150-mm) minimum thickness.
 - e. Resilient Pipe Connectors (if required): ASTM C 923 (ASTM C 923M), cast or fitted into manhole walls, for each pipe connection.
 - f. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at 12- to 16-inch (300- to 400-mm) intervals. Omit steps if total depth from floor of manhole to finished grade is less than 60 inches (1500 mm).
 - g. Adjusting Rings: Interlocking HDPE rings, with level or sloped edge in thickness and diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
OR
Grade Rings: Reinforced-concrete rings, 6- to 9-inch (150- to 225-mm) total thickness, with diameter matching manhole frame and cover, and with height as required to adjust manhole frame and cover to indicated elevation and slope.
 4. Manhole Frames and Covers:

- a. Description: Ferrous; **24-inch (610-mm)** ID by **7- to 9-inch (175- to 225-mm)** riser, with **4-inch- (100-mm-)** minimum-width flange and **26-inch- (660-mm-)** diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "SANITARY SEWER."
 - b. Material: ASTM A 536, Grade 60-40-18 ductile **OR** ASTM A 48/A 48M, Class 35 gray, **as directed**, iron unless otherwise indicated.
5. Manhole-Cover Inserts:
- a. Description: Manufactured, plastic form, of size to fit between manhole frame and cover and designed to prevent stormwater inflow. Include handle for removal and gasket for gastight sealing.
 - b. Type: Solid **OR** Drainage with vent holes **OR** Valve, **as directed**.

P. Concrete

1. General: Cast-in-place concrete complying with ACI 318, **ACI 350/350R (ACI 350M/350RM)**, and the following:
 - a. Cement: ASTM C 150, Type II.
 - b. Fine Aggregate: ASTM C 33, sand.
 - c. Coarse Aggregate: ASTM C 33, crushed gravel.
 - d. Water: Potable.
2. Portland Cement Design Mix: **4000 psi (27.6 MPa)** minimum, with 0.45 maximum water/cementitious materials ratio.
 - a. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 - b. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
3. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, **4000 psi (27.6 MPa)** minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 - a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - 1) Invert Slope: **1 OR 2, as directed**, percent through manhole.
 - b. Benches: Concrete, sloped to drain into channel.
 - 1) Slope: **4 OR 8, as directed**, percent.
4. Ballast and Pipe Supports: Portland cement design mix, **3000 psi (20.7 MPa)** minimum, with 0.58 maximum water/cementitious materials ratio.
 - a. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 - b. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

1.3 EXECUTION

A. Earthwork

1. Excavating, trenching, and backfilling are specified in Division 31 Section "Earth Moving".

B. Piping Installation

1. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground sanitary sewer piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
2. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for using lubricants, cements, and other installation requirements.
3. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
4. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.

5. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
6. Install gravity-flow, nonpressure, drainage piping according to the following:
 - a. Install piping pitched down in direction of flow, at minimum slope of 1 OR 2, **as directed**, percent unless otherwise indicated.
 - b. Install piping **NPS 6 (DN 150)** and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - c. Install piping with **36-inch (915-mm) OR 48-inch (1220-mm) OR 60-inch (1520-mm) OR 72-inch (1830-mm)**, **as directed**, minimum cover.
 - d. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - e. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - f. Install ductile-iron, gravity sewer piping according to ASTM A 746.
 - g. Install ABS sewer piping according to ASTM D 2321 and ASTM F 1668.
 - h. Install PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 1668.
 - i. Install PVC corrugated sewer piping according to ASTM D 2321 and ASTM F 1668.
 - j. Install PVC profile sewer piping according to ASTM D 2321 and ASTM F 1668.
 - k. Install PVC Type PSM sewer piping according to ASTM D 2321 and ASTM F 1668.
 - l. Install PVC gravity sewer piping according to ASTM D 2321 and ASTM F 1668.
 - m. Install fiberglass sewer piping according to ASTM D 3839 and ASTM F 1668.
 - n. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
 - o. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
7. Install force-main, pressure piping according to the following:
 - a. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place-concrete supports or anchors.
 - b. Install piping with **36-inch (915-mm) OR 48-inch (1220-mm) OR 60-inch (1520-mm) OR 72-inch (1830-mm)**, **as directed**, minimum cover.
 - c. Install ductile-iron pressure piping according to AWWA C600 or AWWA M41.
 - d. Install ductile-iron special fittings according to AWWA C600.
 - e. Install PVC pressure piping according to AWWA M23 or to ASTM D 2774 and ASTM F 1668.
 - f. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.
8. If required to provide protection for metal piping, install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
 - a. Hub-and-spigot, cast-iron soil pipe.
 - b. Hubless cast-iron soil pipe and fittings.
 - c. Ductile-iron pipe and fittings.
 - d. Expansion joints and deflection fittings.
9. Clear interior of piping and manholes of dirt and superfluous material as work progresses. Maintain swab or drag in piping, and pull past each joint as it is completed. Place plug in end of incomplete piping at end of day and when work stops.

C. Pipe Joint Construction

1. Join gravity-flow, nonpressure, drainage piping according to the following:
 - a. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 - b. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
 - c. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.

- d. Join ductile-iron, gravity sewer piping according to AWWA C600 for push-on joints.
 - e. Join ABS sewer piping according to ASTM D 2321 and ASTM D 2751 for elastomeric-seal joints.
 - f. Join PVC cellular-core sewer piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 - g. Join PVC corrugated sewer piping according to ASTM D 2321.
 - h. Join PVC profile sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - i. Join PVC Type PSM sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 - j. Join PVC gravity sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasket joints.
 - k. Join fiberglass sewer piping according to ASTM D 4161 for elastomeric-seal joints.
 - l. Join nonreinforced-concrete sewer piping according to **ASTM C 14 (ASTM C 14M)** and ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - m. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasket joints.
 - n. Join dissimilar pipe materials with nonpressure-type, flexible **OR** rigid, **as directed**, couplings.
2. Join force-main, pressure piping according to the following:
 - a. Join ductile-iron pressure piping according to AWWA C600 or AWWA M41 for push-on joints.
 - b. Join ductile-iron special fittings according to AWWA C600 or AWWA M41 for push-on joints.
 - c. Join PVC pressure piping according to AWWA M23 for gasketed joints.
 - d. Join PVC water-service piping according to ASTM D 2855.
 - e. Join dissimilar pipe materials with pressure-type couplings.
 3. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - a. Use nonpressure flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - 1) Unshielded **OR** Shielded, **as directed**, flexible **OR** rigid, **as directed**, couplings for pipes of same or slightly different OD.
 - 2) Unshielded, increaser/reducer-pattern, flexible **OR** rigid, **as directed**, couplings for pipes with different OD.
 - 3) Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 - b. Use pressure pipe couplings for force-main joints.
- D. Manhole Installation
1. General: Install manholes complete with appurtenances and accessories indicated.
 2. Install precast concrete manhole sections with sealants according to ASTM C 891.
 3. Install FRP manholes according to manufacturer's written instructions.
 4. Form continuous concrete channels and benches between inlets and outlet.
 5. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops **3 inches (76 mm)** above finished surface elsewhere unless otherwise indicated.
 6. Install manhole-cover inserts in frame and immediately below cover.
- E. Concrete Placement
1. Place cast-in-place concrete according to ACI 318.
- F. Backwater Valve Installation
1. Install horizontal-type backwater valves in piping manholes or pits.
 2. Install combination horizontal and manual gate valves in piping and in manholes.
 3. Install terminal-type backwater valves on end of piping and in manholes. Secure units to sidewalls.

G. Cleanout Installation

1. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts, and use cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - a. Use Light-Duty, top-loading classification cleanouts in earth **OR** unpaved foot-traffic, **as directed**, areas.
 - b. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - c. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - d. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
2. Set cleanout frames and covers in earth in cast-in-place-concrete block, **18 by 18 by 12 inches (450 by 450 by 300 mm)** deep. Set with tops **1 inch (25 mm)** above surrounding grade.
3. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.

H. Connections

1. Connect nonpressure, gravity-flow drainage piping to building's sanitary building drains specified in Division 22 Section "Sanitary Waste And Vent Piping".
2. Connect force-main piping to building's sanitary force mains specified in Division 22 Section "Sanitary Waste And Vent Piping". Terminate piping where indicated.
3. Make connections to existing piping and underground manholes.
 - a. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye fitting plus **6-inch (150-mm)** overlap with not less than **6 inches (150 mm)** of concrete with 28-day compressive strength of **3000 psi (20.7 MPa)**.
 - b. Make branch connections from side into existing piping, **NPS 4 to NPS 20 (DN 100 to DN 500)**. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than **6 inches (150 mm)** of concrete with 28-day compressive strength of **3000 psi (20.7 MPa)**.
 - c. Make branch connections from side into existing piping, **NPS 21 (DN 525)** or larger, or to underground manholes by cutting opening into existing unit large enough to allow **3 inches (76 mm)** of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe or manhole wall, encase entering connection in **6 inches (150 mm)** of concrete for minimum length of **12 inches (300 mm)** to provide additional support of collar from connection to undisturbed ground.
 - 1) Use concrete that will attain a minimum 28-day compressive strength of **3000 psi (20.7 MPa)** unless otherwise indicated.
 - 2) Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - d. Protect existing piping and manholes to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
4. Connect to grease **OR** oil **OR** sand, **as directed**, interceptors specified in Division 22 Section "Sanitary Waste Interceptors".

I. Closing Abandoned Sanitary Sewer Systems

1. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - a. Close open ends of piping with at least **8-inch- (203-mm-)** thick, brick masonry bulkheads.
 - b. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
2. Abandoned Manholes: Excavate around manhole as required and use either procedure below:
 - a. Remove manhole and close open ends of remaining piping.

- b. Remove top of manhole down to at least **36 inches (915 mm)** below final grade. Fill to within **12 inches (300 mm)** of top with stone, rubble, gravel, or compacted dirt. Fill to top with concrete.
3. Backfill to grade according to Division 31 Section "Earth Moving".

J. Identification

1. Materials and their installation are specified in Division 31 Section "Earth Moving". Arrange for installation of green warning tapes directly over piping and at outside edges of underground manholes.
 - a. Use warning tape **OR** detectable warning tape, **as directed**, over ferrous piping.
 - b. Use detectable warning tape over nonferrous piping and over edges of underground manholes.

K. Field Quality Control

1. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately **24 inches (600 mm)** of backfill is in place, and again at completion of Project.
 - a. Submit separate report for each system inspection.
 - b. Defects requiring correction include the following:
 - 1) Alignment: Less than full diameter of inside of pipe is visible between structures.
 - 2) Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.
 - 3) Damage: Crushed, broken, cracked, or otherwise damaged piping.
 - 4) Infiltration: Water leakage into piping.
 - 5) Exfiltration: Water leakage from or around piping.
 - c. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - d. Reinspect and repeat procedure until results are satisfactory.
2. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.
 - a. Do not enclose, cover, or put into service before inspection and approval.
 - b. Test completed piping systems according to requirements of authorities having jurisdiction.
 - c. Schedule tests and inspections by authorities having jurisdiction with at least 24 hours' advance notice.
 - d. Submit separate report for each test.
 - e. Hydrostatic Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction and the following:
 - 1) Fill sewer piping with water. Test with pressure of at least **10-foot (3-m)** head of water, and maintain such pressure without leakage for at least 15 minutes.
 - 2) Close openings in system and fill with water.
 - 3) Purge air and refill with water.
 - 4) Disconnect water supply.
 - 5) Test and inspect joints for leaks.

OR

Air Tests: Test sanitary sewerage according to requirements of authorities having jurisdiction, UNI-B-6, and the following:

 - 6) Option: Test plastic gravity sewer piping according to ASTM F 1417.
 - 7) Option: Test concrete gravity sewer piping according to **ASTM C 924 (ASTM C 924M)**.
 - f. Force Main: Perform hydrostatic test after thrust blocks, supports, and anchors have hardened. Test at pressure not less than 1-1/2 times the maximum system operating pressure, but not less than **150 psig (1035 kPa)**.
 - 1) Ductile-Iron Piping: Test according to AWWA C600, "Hydraulic Testing" Section.
 - 2) PVC Piping: Test according to AWWA M23, "Testing and Maintenance" Chapter.
 - g. Manholes: Perform hydraulic test according to **ASTM C 969 (ASTM C 969M)**.
3. Leaks and loss in test pressure constitute defects that must be repaired.

33 - Utilities



4. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

L. Cleaning

1. Clean dirt and superfluous material from interior of piping. Flush with potable water.

END OF SECTION 33 31 11 00

Task	Specification	Specification Description
33 31 11 00	01 22 16 00	No Specification Required
33 31 11 00	33 14 13 23	Sand Drains
33 31 11 00	32 91 19 13a	Septic Tank Systems
33 31 11 00	01 95 99 99h	Water Supply Wells
33 31 11 00	23 11 23 00b	Monitoring Wells
33 31 11 00	33 14 00 00	Water Distribution
33 31 11 00	33 14 13 23a	Hydronic Distribution
33 31 11 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 31 11 00	33 42 11 00	Storm Drainage
33 31 11 00	31 05 13 00a	Subdrainage
33 32 16 00	01 22 16 00	No Specification Required
33 41 16 13	01 22 16 00	No Specification Required
33 41 16 13	32 91 19 13a	Septic Tank Systems
33 41 16 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 41 16 13	33 31 11 00	Sanitary Sewerage
33 41 16 13	33 42 11 00	Storm Drainage
33 41 16 13	31 05 13 00a	Subdrainage
33 41 19 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 41 19 13	31 05 13 00a	Subdrainage

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SECTION 33 42 11 00 - STORM DRAINAGE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for storm drainage. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Summary

1. Section Includes:
 - a. Pipe and fittings.
 - b. Nonpressure transition couplings.
 - c. Pressure pipe couplings.
 - d. Expansion joints and deflection fittings.
 - e. Backwater valves.
 - f. Cleanouts.
 - g. Drains.
 - h. Encasement for piping.
 - i. Manholes.
 - j. Channel drainage systems.
 - k. Catch basins.
 - l. Stormwater inlets.
 - m. Stormwater detention structures.
 - n. Pipe outlets.
 - o. Dry wells.
 - p. Stormwater disposal systems.

C. Definitions

1. FRP: Fiberglass-reinforced plastic.

D. Submittals

1. Product Data: For each type of product indicated.
2. Shop Drawings:
 - a. Manholes: Include plans, elevations, sections, details, frames, and covers.
 - b. Catch basins, stormwater inlets, and dry wells. Include plans, elevations, sections, details, frames, covers, and grates.
 - c. Stormwater Detention Structures: Include plans, elevations, sections, details, frames, covers, design calculations, and concrete design-mix reports.
3. Coordination Drawings: Show pipe sizes, locations, and elevations. Show other piping in same trench and clearances from storm drainage system piping. Indicate interface and spatial relationship between manholes, piping, and proximate structures.
4. Profile Drawings: Show system piping in elevation. Draw profiles at horizontal scale of not less than **1 inch equals 50 feet (1:500)** and vertical scale of not less than **1 inch equals 5 feet (1:50)**. Indicate manholes and piping. Show types, sizes, materials, and elevations of other utilities crossing system piping.
5. Product Certificates: For each type of cast-iron soil pipe and fitting, from manufacturer.
6. Field quality-control reports.

E. Delivery, Storage, And Handling

1. Do not store plastic manholes, pipe, and fittings in direct sunlight.
2. Protect pipe, pipe fittings, and seals from dirt and damage.
3. Handle manholes according to manufacturer's written rigging instructions.

4. Handle catch basins and stormwater inlets according to manufacturer's written rigging instructions.

F. Project Conditions

1. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by the Owner or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:
 - a. Notify the Owner no fewer than two days in advance of proposed interruption of service.
 - b. Do not proceed with interruption of service without the Owner written permission.

1.2 PRODUCTS

A. Hub-And-Spigot, Cast-Iron Soil Pipe And Fittings

1. Pipe and Fittings: ASTM A 74, Service class **OR** Extra-Heavy class, **as directed**.
2. Gaskets: ASTM C 564, rubber.
3. Calking Materials: ASTM B 29, pure lead and oakum or hemp fiber.

B. Hubless Cast-Iron Soil Pipe And Fittings

1. Pipe and Fittings: ASTM A 888 or CISPI 301.
2. CISPI-Trademarked, Shielded Couplings:
 - a. Description: ASTM C 1277 and CISPI 310, with stainless-steel corrugated shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
3. Heavy-Duty, Shielded Couplings:
 - a. Description: ASTM C 1277 and ASTM C 1540, with stainless-steel shield; stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.
4. Cast-Iron, Shielded Couplings:
 - a. Description: ASTM C 1277 and ASTM A 48/A 48M, two-piece, cast-iron housing; stainless-steel bolts and nuts; and ASTM C 564, rubber sleeve with integral, center pipe stop.

C. Ductile-Iron, Culvert Pipe And Fittings

1. Pipe: ASTM A 716, for push-on joints.
2. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
3. Compact Fittings: AWWA C153, for push-on joints.
4. Gaskets: AWWA C111, rubber.

D. Ductile-Iron, Pressure Pipe And Fittings

1. Push-on-Joint Piping:
 - a. Pipe: AWWA C151, for push-on joints.
 - b. Standard Fittings: AWWA C110, ductile or gray iron, for push-on joints.
 - c. Compact Fittings: AWWA C153, for push-on joints.
 - d. Gaskets: AWWA C111, rubber, of shape matching pipe and fittings.
2. Mechanical-Joint Piping:
 - a. Pipe: AWWA C151, with bolt holes in bell.
 - b. Standard Fittings: AWWA C110, ductile or gray iron, with bolt holes in bell.
 - c. Compact Fittings: AWWA C153, with bolt holes in bells.
 - d. Glands: Cast or ductile iron, with bolt holes and high-strength, cast-iron or high-strength, low-alloy steel bolts and nuts.
 - e. Gaskets: AWWA C111, rubber, of shape matching pipe, fittings, and glands.

E. Steel Pipe And Fittings

1. Corrugated-Steel Pipe and Fittings: ASTM A 760/A 760M, Type I with fittings of similar form and construction as pipe.
 - a. Special-Joint Bands: Corrugated steel with O-ring seals.
 - b. Standard-Joint Bands: Corrugated steel.
 - c. Coating: Aluminum **OR** Zinc, **as directed**.

- F. Aluminum Pipe And Fittings
 1. Corrugated Aluminum Pipe and Fittings: ASTM B 745/B 745M, Type I with fittings of similar form and construction as pipe.
 - a. Special-Joint Bands: Corrugated steel with O-ring seals.
 - b. Standard-Joint Bands: Corrugated steel.

- G. ABS Pipe And Fittings
 1. ABS Sewer Pipe and Fittings: ASTM D 2751, with bell-and-spigot ends for gasketed joints.
 - a. **NPS 3 to NPS 6 (DN 80 to DN 150)**: SDR 35.
 - b. **NPS 8 to NPS 12 (DN 200 to DN 300)**: SDR 42.
 2. Gaskets: ASTM F 477, elastomeric seals.

- H. PE Pipe And Fittings
 1. Corrugated PE Drainage Pipe and Fittings **NPS 3 to NPS 10 (DN 80 to DN 250)**: AASHTO M 252M, Type S, with smooth waterway for coupling joints.
 - a. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with tube and fittings.
 - b. Soiltight Couplings: AASHTO M 252M, corrugated, matching tube and fittings.
 2. Corrugated PE Pipe and Fittings **NPS 12 to NPS 60 (DN 300 to DN 1500)**: AASHTO M 294M, Type S, with smooth waterway for coupling joints.
 - a. Silttight Couplings: PE sleeve with ASTM D 1056, Type 2, Class A, Grade 2 gasket material that mates with pipe and fittings.
 - b. Soiltight Couplings: AASHTO M 294M, corrugated, matching pipe and fittings.

- I. PVC Pipe And Fittings
 1. PVC Cellular-Core Piping:
 - a. PVC Cellular-Core Pipe and Fittings: ASTM F 891, Sewer and Drain Series, PS 50 minimum stiffness, PVC cellular-core pipe with plain ends for solvent-cemented joints.
 - b. Fittings: ASTM D 3034, SDR 35, PVC socket-type fittings.
 2. PVC Corrugated Sewer Piping:
 - a. Pipe: ASTM F 949, PVC, corrugated pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: ASTM F 949, PVC molded or fabricated, socket type.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 3. PVC Profile Sewer Piping:
 - a. Pipe: ASTM F 794, PVC profile, gravity sewer pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: ASTM D 3034, PVC with bell ends.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 4. PVC Type PSM Sewer Piping:
 - a. Pipe: ASTM D 3034, SDR 35, PVC Type PSM sewer pipe with bell-and-spigot ends for gasketed joints.
 - b. Fittings: ASTM D 3034, PVC with bell ends.
 - c. Gaskets: ASTM F 477, elastomeric seals.
 5. PVC Gravity Sewer Piping:
 - a. Pipe and Fittings: ASTM F 679, T-1 **OR** T-2, **as directed**, wall thickness, PVC gravity sewer pipe with bell-and-spigot ends and with integral ASTM F 477, elastomeric seals for gasketed joints.
 6. PVC Pressure Piping:
 - a. Pipe: AWWA C900, Class 100 **OR** Class 150 **OR** Class 200, **as directed**, PVC pipe with bell-and-spigot ends for gasketed joints.

- b. Fittings: AWWA C900, Class 100 **OR** Class 150 **OR** Class 200, **as directed**, PVC pipe with bell ends
- c. Gaskets: ASTM F 477, elastomeric seals.
- 7. PVC Water-Service Piping:
 - a. Pipe: ASTM D 1785, Schedule 40 **OR** Schedule 80, **as directed**, PVC, with plain ends for solvent-cemented joints.
 - b. Fittings: ASTM D 2466, Schedule 40 **OR** ASTM D 2467, Schedule 80, **as directed**, PVC, socket type.
- J. Fiberglass Pipe And Fittings
 - 1. Fiberglass Sewer Pipe: ASTM D 3262, RTRP for gasketed joints fabricated with Type 2, polyester **OR** Type 4, epoxy, **as directed**, resin.
 - a. Liner: Reinforced thermoset **OR** Nonreinforced thermoset **OR** Thermoplastic **OR** No liner, **as directed**.
 - b. Grade: Reinforced, surface layer matching pipe resin **OR** Nonreinforced, surface layer matching pipe resin **OR** No surface layer, **as directed**.
 - c. Stiffness: 9 psig (62 kPa) **OR** 18 psig (124 kPa) **OR** 36 psig (248 kPa) **OR** 72 psig (496 kPa), **as directed**.
 - 2. Fiberglass Nonpressure Fittings: ASTM D 3840, RTRF for gasketed joints.
 - a. Laminating Resin: Type 1, polyester **OR** Type 2, epoxy, **as directed**, resin.
 - b. Reinforcement: Grade with finish compatible with resin.
 - 3. Gaskets: ASTM F 477, elastomeric seals.
- K. Concrete Pipe And Fittings
 - 1. Nonreinforced-Concrete Sewer Pipe and Fittings: ASTM C 14 (ASTM C 14M), Class 1 **OR** Class 2 **OR** Class 3, **as directed**, with bell-and-spigot **OR** tongue-and-groove, **as directed** ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets **OR** sealant joints with ASTM C 990 (ASTM C 990M), bitumen or butyl-rubber sealant, **as directed**.
 - 2. Reinforced-Concrete Sewer Pipe and Fittings: ASTM C 76 (ASTM C 76M).
 - a. Bell-and-spigot **OR** Tongue-and-groove, **as directed**, ends and gasketed joints with ASTM C 443 (ASTM C 443M), rubber gaskets **OR** sealant joints with ASTM C 990 (ASTM C 990M), bitumen or butyl-rubber sealant, **as directed**.
 - b. Class I, Wall A **OR** Wall B, **as directed**.
 - c. Class II, Wall A **OR** Wall B **OR** Wall C, **as directed**.
 - d. Class III, Wall A **OR** Wall B **OR** Wall C, **as directed**.
 - e. Class IV, Wall A **OR** Wall B **OR** Wall C, **as directed**.
 - f. Class V, Wall B **OR** Wall C, **as directed**.
- L. Nonpressure Transition Couplings
 - 1. Comply with ASTM C 1173, elastomeric, sleeve-type, reducing or transition coupling, for joining underground nonpressure piping. Include ends of same sizes as piping to be joined, and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 2. Sleeve Materials:
 - a. For Concrete Pipes: ASTM C 443 (ASTM C 443M), rubber.
 - b. For Cast-Iron Soil Pipes: ASTM C 564, rubber.
 - c. For Fiberglass Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - d. For Plastic Pipes: ASTM F 477, elastomeric seal or ASTM D 5926, PVC.
 - e. For Dissimilar Pipes: ASTM D 5926, PVC or other material compatible with pipe materials being joined.
 - 3. Unshielded, Flexible Couplings:
 - a. Description: Elastomeric sleeve, with stainless-steel shear ring, **as directed**, and corrosion-resistant-metal tension band and tightening mechanism on each end.
 - 4. Shielded, Flexible Couplings:

- a. Description: ASTM C 1460, elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.
 5. Ring-Type, Flexible Couplings:
 - a. Description: Elastomeric compression seal with dimensions to fit inside bell of larger pipe and for spigot of smaller pipe to fit inside ring.
- M. Pressure Pipe Couplings
 1. Description: AWWA C219, tubular-sleeve coupling, with center sleeve, gaskets, end rings, and bolt fasteners.
 2. Metal, bolted, sleeve-type, reducing or transition coupling, for joining underground pressure piping. Include **150-psig (1035-kPa) OR 200-psig (1380-kPa), as directed**, minimum pressure rating and ends sized to fit adjoining pipes.
 3. Center-Sleeve Material: Manufacturer's standard **OR** Carbon steel **OR** Stainless steel **OR** Ductile iron **OR** Malleable iron, **as directed**.
 4. Gasket Material: Natural or synthetic rubber.
 5. Metal Component Finish: Corrosion-resistant coating or material.
- N. Expansion Joints And Deflection Fittings
 1. Ductile-Iron Flexible Expansion Joints:
 - a. Description: Compound fitting with combination of flanged and mechanical-joint ends complying with AWWA C110 or AWWA C153. Include two gasketed ball-joint sections and one or more gasketed sleeve sections, rated for **250-psig (1725-kPa)** minimum working pressure and for offset and expansion indicated.
 2. Ductile-Iron Expansion Joints:
 - a. Description: Three-piece assembly of telescoping sleeve with gaskets and restrained-type, ductile-iron or steel with protective coating, bell-and-spigot end sections complying with AWWA C110 or AWWA C153. Include rating for **250-psig (1725-kPa)** minimum working pressure and for expansion indicated.
 3. Ductile-Iron Deflection Fittings:
 - a. Description: Compound-coupling fitting, with ball joint, flexing section, gaskets, and restrained-joint ends, complying with AWWA C110 or AWWA C153. Include rating for **250-psig (1725-kPa)** minimum working pressure and for up to 15 degrees of deflection.
- O. Backwater Valves
 1. Cast-Iron Backwater Valves:
 - a. Description: ASME A112.14.1, gray-iron body and bolted cover, with bronze seat.
 - b. Horizontal type; with swing check valve and hub-and-spigot ends.
 - c. Combination horizontal and manual gate-valve type; with swing check valve, integral gate valve, and hub-and-spigot ends.
 - d. Terminal type; with bronze seat, swing check valve, and hub inlet.
 2. Plastic Backwater Valves:
 - a. Description: Horizontal type; with PVC body, PVC removable cover, and PVC swing check valve.
- P. Cleanouts
 1. Cast-Iron Cleanouts:
 - a. Description: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-iron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.
 - b. Top-Loading Classification(s): Light Duty **OR** Medium Duty **OR** Heavy Duty **OR** Extra-Heavy Duty, **as directed**.
 - c. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.
 2. Plastic Cleanouts:

- a. Description: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

Q. Drains

1. Cast-Iron Area Drains:
 - a. Description: ASME A112.6.3 gray-iron round body with anchor flange and round secured **OR** non-secured, **as directed**, grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.
 - b. Top-Loading Classification(s): Medium Duty **OR** Heavy Duty, **as directed**.
2. Cast-Iron Trench Drains:
 - a. Description: ASME A112.6.3, **6-inch- (150-mm-)** wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular secured **OR** non-secured, **as directed**, grate. Include units of total length indicated and quantity of bottom outlets with inside calk or spigot connections, of sizes indicated.
 - b. Top-Loading Classification(s): Medium Duty **OR** Heavy Duty **OR** Extra-Heavy Duty **OR** Medium and Heavy Duty **OR** Medium and Extra-Heavy Duty **OR** Heavy and Extra-Heavy Duty **OR** Medium, Heavy, and Extra-Heavy Duty, **as directed**.
3. Steel Trench Drains:
 - a. Description: Factory fabricated from ASTM A 242/A 242M, welded steel plate, to form rectangular body with uniform bottom downward slope of 2 percent toward outlet, anchor flange, and grate. Include units of total length indicated, bottom outlet of size indicated, outlet strainer, acid-resistant enamel coating on inside and outside surfaces, and grate with openings of total free area at least two times cross-sectional area of outlet.
 - b. Plate Thicknesses: **1/8 inch (3.2 mm) OR 1/4 inch (6.4 mm)**, **as directed**.
 - c. Overall Widths: **7-1/2 inches (190 mm) OR 12-1/3 inches (313 mm)**, **as directed**.
 - 1) Grate Openings: **1/4 inch (6.4 mm) circular OR 3/8 inch (9.5 mm) circular OR 3/8-by-3-inch (9.5-by-76-mm) slots**, **as directed**.

R. Encasement For Piping

1. Standard: ASTM A 674 or AWWA C105.
2. Material: Linear low-density polyethylene film of **0.008-inch (0.20-mm) OR** high-density, cross-laminated polyethylene film of **0.004-inch (0.10-mm)**, **as directed**, minimum thickness.
3. Form: Sheet **OR** Tube, **as directed**.
4. Color: Black **OR** Natural, **as directed**.

S. Manholes

1. Standard Precast Concrete Manholes:
 - a. Description: **ASTM C 478 (ASTM C 478M)**, precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - b. Diameter: **48 inches (1200 mm)** minimum unless otherwise indicated.
 - c. Ballast: Increase thickness of precast concrete sections or add concrete to base section as required to prevent flotation.
 - d. Base Section: **6-inch (150-mm)** minimum thickness for floor slab and **4-inch (102-mm)** minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
 - e. Riser Sections: **4-inch (102-mm)** minimum thickness, and lengths to provide depth indicated.
 - f. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated, and top of cone of size that matches grade rings.
 - g. Joint Sealant: **ASTM C 990 (ASTM C 990M)**, bitumen or butyl rubber.
 - h. Resilient Pipe Connectors: **ASTM C 923 (ASTM C 923M)**, cast or fitted into manhole walls, for each pipe connection.
 - i. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing

- rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of manhole to finished grade is less than **60 inches (1500 mm)**.
- j. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
- OR**
- Grade Rings: Reinforced-concrete rings, **6- to 9-inch (150- to 225-mm)** total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.
2. Designed Precast Concrete Manholes:
- a. Description: ASTM C 913; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.
- b. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole as required to prevent flotation.
- c. Joint Sealant: **ASTM C 990 (ASTM C 990M)**, bitumen or butyl rubber.
- d. Resilient Pipe Connectors: **ASTM C 923 (ASTM C 923M)**, cast or fitted into manhole walls, for each pipe connection.
- e. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of manhole to finished grade is less than **60 inches (1500 mm)**.
- f. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
- OR**
- Grade Rings: Reinforced-concrete rings, **6- to 9-inch (150- to 225-mm)** total thickness, to match diameter of manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope.
3. Fiberglass Manholes:
- a. Description: ASTM D 3753.
- b. Diameter: **48 inches (1200 mm)** minimum unless otherwise indicated.
- c. Ballast: Increase thickness of concrete base as required to prevent flotation.
- d. Base Section: Concrete, **6-inch (150-mm)** minimum thickness.
- e. Resilient Pipe Connectors (if required): **ASTM C 923 (ASTM C 923M)**, cast or fitted into manhole walls, for each pipe connection.
- f. Steps: Individual FRP steps or FRP ladder, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of manhole to finished grade is less than **60 inches (1500 mm)**.
- g. Adjusting Rings: Interlocking HDPE rings with level or sloped edge in thickness and diameter matching manhole frame and cover, and of height required to adjust manhole frame and cover to indicated elevation and slope. Include sealant recommended by ring manufacturer.
- OR**
- Grade Rings: Reinforced-concrete rings, **6- to 9-inch (150- to 225-mm)** total thickness, to match diameter of manhole frame and cover, and height as required to adjust manhole frame and cover to indicated elevation and slope.
4. Manhole Frames and Covers:

- a. Description: Ferrous; 24-inch (610-mm) ID by 7- to 9-inch (175- to 225-mm) riser with 4-inch- (102-mm-) minimum width flange and 26-inch- (660-mm-) diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."
- b. Material: ASTM A 536, Grade 60-40-18 ductile **OR** ASTM A 48/A 48M, Class 35 gray, **as directed**, iron unless otherwise indicated.

T. Concrete

1. General: Cast-in-place concrete according to ACI 318, ACI 350/350R (ACI 350M/350RM), and the following:
 - a. Cement: ASTM C 150, Type II.
 - b. Fine Aggregate: ASTM C 33, sand.
 - c. Coarse Aggregate: ASTM C 33, crushed gravel.
 - d. Water: Potable.
2. Portland Cement Design Mix: 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio.
 - a. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 - b. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.
3. Manhole Channels and Benches: Factory or field formed from concrete. Portland cement design mix, 4000 psi (27.6 MPa) minimum, with 0.45 maximum water/cementitious materials ratio. Include channels and benches in manholes.
 - a. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope.
 - 1) Invert Slope: 1 **OR** 2, **as directed**, percent through manhole.
 - b. Benches: Concrete, sloped to drain into channel.
 - 1) Slope: 4 **OR** 8, **as directed**, percent.
4. Ballast and Pipe Supports: Portland cement design mix, 3000 psi (20.7 MPa) minimum, with 0.58 maximum water/cementitious materials ratio.
 - a. Reinforcing Fabric: ASTM A 1064/A 1064M, steel, welded wire fabric, plain.
 - b. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (420 MPa) deformed steel.

U. Polymer-Concrete, Channel Drainage Systems

1. General Requirements for Polymer-Concrete, Channel Drainage Systems: Modular system of precast, polymer-concrete channel sections, grates, and appurtenances; designed so grates fit into channel recesses without rocking or rattling. Include quantity of units required to form total lengths indicated.
2. Sloped-Invert, Polymer-Concrete Systems:
 - a. Channel Sections:
 - 1) Interlocking-joint, precast, modular units with end caps.
 - 2) 4-inch (102-mm) inside width and deep, rounded bottom, with built-in invert slope of 0.6 percent and with outlets in quantities, sizes, and locations indicated.
 - 3) Extension sections necessary for required depth.
 - 4) Frame: Include gray-iron or steel frame for grate.
 - b. Grates:
 - 1) Manufacturer's designation "Heavy **OR** "Medium, **as directed**, Duty," with slots or perforations that fit recesses in channels.
 - 2) Material: Fiberglass **OR** Galvanized steel **OR** Gray iron **OR** Stainless steel, **as directed**.
 - c. Covers: Solid gray iron if indicated.
 - d. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
3. Narrow-Width, Level-Invert, Polymer-Concrete Systems:
 - a. Channel Sections:
 - 1) Interlocking-joint, precast, modular units with end caps.

- 2) **5-inch (127-mm)** inside width and **9-3/4-inch- (248-mm-)** deep, rounded bottom, with level invert and with **NPS 4 (DN 100)** outlets in quantities, sizes, and locations indicated.
 - b. Grates:
 - 1) Slots or perforations that fit recesses in channels.
 - 2) Material: Fiberglass **OR** Galvanized steel **OR** Gray iron **OR** Stainless steel, **as directed**.
 - c. Covers: Solid gray iron if indicated.
 - d. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
 4. Wide-Width, Level-Invert, Polymer-Concrete Systems:
 - a. Channel Sections:
 - 1) Interlocking-joint, precast, modular units with end caps.
 - 2) **8-inch (203-mm)** inside width and **13-3/4-inch- (350-mm-)** deep, rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
 - b. Grates:
 - 1) Slots or other openings that fit recesses in channels.
 - 2) Material: Fiberglass **OR** Gray iron, **as directed**.
 - c. Covers: Solid gray iron if indicated.
 - d. Locking Mechanism: Manufacturer's standard device for securing grates to channel sections.
 5. Drainage Specialties: Precast, polymer-concrete units.
 - a. Large Catch Basins:
 - 1) **24-by-12-inch (610-by-305-mm)** polymer-concrete body, with outlets in quantities and sizes indicated.
 - 2) Gray-iron slotted grate.
 - 3) Frame: Include gray-iron or steel frame for grate.
 - b. Small Catch Basins:
 - 1) **19- to 24-inch by approximately 6-inch (483- to 610-mm by approximately 150-mm)** polymer-concrete body, with outlets in quantities and sizes indicated.
 - 2) Gray-iron slotted grate.
 - 3) Frame: Include gray-iron or steel frame for grate.
 - c. Oil Interceptors:
 - 1) Polymer-concrete body with interior baffle and four steel support channels and two **1/4-inch- (6.4-mm-)** thick, steel-plate covers.
 - 2) Steel-plate covers.
 - 3) Capacity: **140 gal. (530 L) OR 200 gal. (757 L) OR 260 gal. (984 L), as directed**.
 - 4) Inlet and Outlet: **NPS 4 (DN 100) OR NPS 6 (DN 150), as directed**.
 - d. Sediment Interceptors:
 - 1) **27-inch- (686-mm-)** square, polymer-concrete body, with outlets in quantities and sizes indicated.
 - 2) **24-inch- (610-mm-)** square, gray-iron frame and slotted grate.
 6. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
 7. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.
- V. Plastic, Channel Drainage Systems
1. General Requirements for Plastic, Channel Drainage Systems:
 - a. Modular system of plastic channel sections, grates, and appurtenances.
 - b. Designed so grates fit into frames without rocking or rattling.
 - c. Number of units required to form total lengths indicated.
 2. Fiberglass Systems:
 - a. Channel Sections:
 - 1) Interlocking-joint, fiberglass modular units, with built-in invert slope of approximately 1 percent and with end caps.
 - 2) Rounded or inclined inside bottom surface, with outlets in quantities, sizes, and locations indicated.

- 3) Width: 6 inches (150 mm) OR 6 or 8 inches (150 or 203 mm) OR 8 inches (203 mm), as directed.
 - b. Factory- or field-attached frames that fit channel sections and grates.
 - 1) Material: Galvanized steel OR Stainless steel OR Manufacturer's standard metal, as directed.
 - c. Grates with slots or perforations that fit frames.
 - 1) Material: Fiberglass OR Galvanized steel OR Gray iron OR Stainless steel, as directed.
 - d. Covers: Solid gray iron if indicated.
 - e. Drainage Specialties:
 - 1) Large Catch Basins: 24-inch- (610-mm-) square plastic body, with outlets in quantities and sizes indicated. Include gray-iron frame and slotted grate.
 - 2) Small Catch Basins: 12-by-24-inch (305-by-610-mm) plastic body, with outlets in quantities and sizes indicated. Include gray-iron frame and slotted grate.
3. PE Systems:
- a. Channel Sections: Interlocking-joint, PE modular units, 4 inches (102 mm) wide, with end caps. Include rounded bottom, with level invert and with outlets in quantities, sizes, and locations indicated.
 - b. Grates: PE, ladder shaped; with stainless-steel screws.
 - c. Color: Gray unless otherwise indicated.
 - d. Drainage Specialties: Include the following PE components:
 - 1) Drains: 4-inch- (102-mm-) diameter, round, slotted top; with NPS 4 (DN 100) bottom outlet.
OR
Drains: 8-inch- (203-mm-) diameter, round, slotted top; with NPS 6 (DN 150) bottom outlet.
OR
Drains: 4-inch- (102-mm-) square, slotted top; with NPS 3 (DN 80) bottom outlet.
OR
Drains: 8-inch- (203-mm-) square, slotted top; with NPS 6 (DN 150) bottom outlet.
OR
Catch Basins: 12-inch- (305-mm-) square plastic body, with outlets in quantities and sizes indicated. Include PE slotted grate 11-3/4 inches (298 mm) square by 1-1/8 inches (28.6 mm) thick.
4. Supports, Anchors, and Setting Devices: Manufacturer's standard unless otherwise indicated.
 5. Channel-Section Joining and Fastening Materials: As recommended by system manufacturer.

W. Catch Basins

1. Standard Precast Concrete Catch Basins:
 - a. Description: ASTM C 478 (ASTM C 478M), precast, reinforced concrete, of depth indicated, with provision for sealant joints.
 - b. Base Section: 6-inch (150-mm) minimum thickness for floor slab and 4-inch (102-mm) minimum thickness for walls and base riser section, and separate base slab or base section with integral floor.
 - c. Riser Sections: 4-inch (102-mm) minimum thickness, 48-inch (1200-mm) diameter, and lengths to provide depth indicated.
 - d. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
 - e. Joint Sealant: ASTM C 990 (ASTM C 990M), bitumen or butyl rubber.
 - f. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
OR
Grade Rings: Include two or three reinforced-concrete rings, of 6- to 9-inch (150- to 225-mm) total thickness, that match 24-inch- (610-mm-) diameter frame and grate.

- g. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of catch basin to finished grade is less than **60 inches (1500 mm)**.
- h. Pipe Connectors: **ASTM C 923 (ASTM C 923M)**, resilient, of size required, for each pipe connecting to base section.
- 2. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for joint sealants.
 - a. Joint Sealants: **ASTM C 990 (ASTM C 990M)**, bitumen or butyl rubber.
 - b. Adjusting Rings: Interlocking rings with level or sloped edge in thickness and shape matching catch basin frame and grate. Include sealant recommended by ring manufacturer.
OR
Grade Rings: Include two or three reinforced-concrete rings, of **6- to 9-inch (150- to 225-mm)** total thickness, that match **24-inch- (610-mm-)** diameter frame and grate.
 - c. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of catch basin to finished grade is less than **60 inches (1500 mm)**.
 - d. Pipe Connectors: **ASTM C 923 (ASTM C 923M)**, resilient, of size required, for each pipe connecting to base section.
- 3. Frames and Grates (for rectangular structures): ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.
 - a. Size: **24 by 24 inches (610 by 610 mm)** minimum unless otherwise indicated.
 - b. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- 4. Frames and Grates (for round, manhole-type structures): ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include **24-inch (610-mm)** ID by **7- to 9-inch (175- to 225-mm)** riser with **4-inch (102-mm)** minimum width flange, and **26-inch- (660-mm-)** diameter flat grate with small square or short-slotted drainage openings.
 - a. Grate Free Area: Approximately 50 percent unless otherwise indicated.
- X. Stormwater Inlets
 - 1. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to utility standards.
 - 2. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
 - 3. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to utility standards. Include heavy-duty frames and grates.
 - 4. Frames and Grates: Heavy duty, according to utility standards.
- Y. Stormwater Detention Structures
 - 1. Cast-in-Place Concrete, Stormwater Detention Structures: Constructed of reinforced-concrete bottom, walls, and top; designed according to ASTM C 890 for A-16 (AASHTO HS20-44), heavy-traffic, structural loading; of depth, shape, dimensions, and appurtenances indicated.
 - a. Ballast: Increase thickness of concrete as required to prevent flotation.
 - b. Grade Rings (if required): Include two or three reinforced-concrete rings, of **6- to 9-inch (150- to 229-mm)** total thickness, that match **24-inch- (610-mm-)** diameter frame and cover.

- c. Steps: Individual FRP steps or FRP ladder **OR** Individual FRP steps; FRP ladder; or ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP **OR** ASTM A 615/A 615M, deformed, **1/2-inch (13-mm)** steel reinforcing rods encased in ASTM D 4101, PP, **as directed**, wide enough to allow worker to place both feet on one step and designed to prevent lateral slippage off step. Cast or anchor steps into sidewalls at **12- to 16-inch (300- to 400-mm)** intervals. Omit steps if total depth from floor of structure to finished grade is less than **60 inches (1500 mm)**.
2. Manhole Frames and Covers: ASTM A 536, Grade 60-40-18, ductile-iron castings designed for heavy-duty service. Include **24-inch (610-mm)** ID by **7- to 9-inch (175- to 225-mm)** riser with **4-inch (102-mm)** minimum width flange, and **26-inch- (660-mm-)** diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "STORM SEWER."

Z. Pipe Outlets

1. Head Walls: Cast-in-place reinforced concrete, with apron and tapered sides.
2. Riprap Basins: Broken, irregularly sized and shaped, graded stone according to NSSGA's "Quarried Stone for Erosion and Sediment Control."
 - a. Average Size: NSSGA No. R-3, screen opening **2 inches (51 mm)**.
 - b. Average Size: NSSGA No. R-4, screen opening **3 inches (76 mm)**.
 - c. Average Size: NSSGA No. R-5, screen opening **5 inches (127 mm)**.
3. Filter Stone: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. FS-2, No. 4 screen opening, average-size graded stone.
4. Energy Dissipaters: According to NSSGA's "Quarried Stone for Erosion and Sediment Control," No. A-1, **3-ton (2721-kg)** average weight armor stone, unless otherwise indicated.

AA. Dry Wells

1. Description: ASTM C 913, precast, reinforced, perforated concrete rings. Include the following:
 - a. Floor: Cast-in-place concrete.
 - b. Cover: Liff-off-type concrete cover with cast-in lift rings.
 - c. Wall Thickness: **4 inches (102 mm)** minimum with **1-inch (25-mm)** diameter or **1-by-3-inch- (25-by-76-mm-)** maximum slotted perforations arranged in rows parallel to axis of ring.
 - 1) Total Free Area of Perforations: Approximately 15 percent of ring interior surface.
 - 2) Ring Construction: Designed to be self-aligning.
 - d. Filtering Material: ASTM D 448, Size No. 24, **3/4- to 2-1/2-inch (19- to 63-mm)** washed, crushed stone or gravel.

OR

Description: Manufactured PE side panels and top cover that assemble into **50-gal. (190-L)** storage capacity units.

- a. Side Panels: With knockout ports for piping and seepage holes.
- b. Top Cover: With knockout port for drain.
- c. Filter Fabric: As recommended by unit manufacturer.
- d. Filtering Material: ASTM D 448, Size No. 24, **3/4- to 2-1/2-inch (19- to 63-mm)** washed, crushed stone or gravel.

OR

Description: Constructed-in-place aggregate type. Include the following:

- a. Lining: Clay or concrete bricks.

OR

Lining: Concrete blocks or precast concrete rings with notches or weep holes.
- b. Filtering Material: ASTM D 448, Size No. 24, **3/4- to 2-1/2-inch (19- to 63-mm)** washed, crushed stone or gravel.
- c. Cover: Precast, reinforced-concrete slab, designed for structural loading according to ASTM C 890 and made according to ASTM C 913. Include slab dimensions that will extend **12 inches (300 mm)** minimum beyond edge of excavation, with bituminous coating over entire surface. Cast cover with opening for manhole in center.
- d. Manhole: **24-inch- (610-mm-)** diameter, reinforced-concrete access lid with steel lift rings. Include bituminous coating over entire surface.

BB. Stormwater Disposal Systems

1. Chamber Systems:

- a. Storage and Leaching Chambers: Molded PE with perforated sides and open bottom. Include number of chambers, distribution piping, end plates, and other standard components as required for system total capacity.
- b. Filtering Material: ASTM D 448, Size No. 24, 3/4- to 2-1/2-inch (19- to 63-mm) washed, crushed stone or gravel.
- c. Filter Mat: Geotextile woven or spun filter fabric, in one or more layers, for minimum total unit weight of 4 oz./sq. yd. (135 g/sq. m).

OR

Pipe Systems: Perforated manifold, header, and lateral piping complying with AASHTO M 252M for NPS 10 (DN 250) and smaller, AASHTO M 294M for NPS 12 to NPS 60 (DN 300 to DN 1500). Include proprietary fittings, couplings, seals, and filter fabric.

1.3 EXECUTION

1.4 EARTHWORK

A. Excavation, trenching, and backfilling are specified in Division 31 Section "Earth Moving".

B. Piping Installation

- 1. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take into account design considerations. Install piping as indicated, to extent practical. Where specific installation is not indicated, follow piping manufacturer's written instructions.
- 2. Install piping beginning at low point, true to grades and alignment indicated with unbroken continuity of invert. Place bell ends of piping facing upstream. Install gaskets, seals, sleeves, and couplings according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements.
- 3. Install manholes for changes in direction unless fittings are indicated. Use fittings for branch connections unless direct tap into existing sewer is indicated.
- 4. Install proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- 5. When installing pipe under streets or other obstructions that cannot be disturbed, use pipe-jacking process of microtunneling.
- 6. Install gravity-flow, nonpressure drainage piping according to the following:
 - a. Install piping pitched down in direction of flow.
 - b. Install piping NPS 6 (DN 150) and larger with restrained joints at tee fittings and at changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - c. Install piping with 36-inch (915-mm) OR 48-inch (1220-mm) OR 60-inch (1520-mm) OR 72-inch (1830-mm), as directed, minimum cover.
 - d. Install hub-and-spigot, cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - e. Install hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook."
 - f. Install ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 - g. Install corrugated steel piping according to ASTM A 798/A 798M.
 - h. Install corrugated aluminum piping according to ASTM B 788/B 788M.
 - i. Install ABS sewer piping according to ASTM D 2321 and ASTM F 1668.
 - j. Install PE corrugated sewer piping according to ASTM D 2321.
 - k. Install PVC cellular-core piping according to ASTM D 2321 and ASTM F 1668.
 - l. Install PVC sewer piping according to ASTM D 2321 and ASTM F 1668.
 - m. Install PVC profile gravity sewer piping according to ASTM D 2321 and ASTM F 1668.

- n. Install PVC water-service piping according to ASTM D 2321 and ASTM F 1668.
 - o. Install fiberglass sewer piping according to ASTM D 3839 and ASTM F 1668.
 - p. Install nonreinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
 - q. Install reinforced-concrete sewer piping according to ASTM C 1479 and ACPA's "Concrete Pipe Installation Manual."
7. Install force-main pressure piping according to the following:
- a. Install piping with restrained joints at tee fittings and at horizontal and vertical changes in direction. Use corrosion-resistant rods, pipe or fitting manufacturer's proprietary restraint system, or cast-in-place concrete supports or anchors.
 - b. Install piping with **36-inch (915-mm) OR 48-inch (1220-mm) OR 60-inch (1520-mm) OR 72-inch (1830-mm)**, **as directed**, minimum cover.
 - c. Install **ductile**-iron pressure piping according to AWWA C600 or AWWA M41.
 - d. Install ductile-iron special fittings according to AWWA C600.
 - e. Install PVC pressure piping according to AWWA M23, or ASTM D 2774 and ASTM F 1668.
 - f. Install PVC water-service piping according to ASTM D 2774 and ASTM F 1668.
8. Install corrosion-protection piping encasement over the following underground metal piping according to ASTM A 674 or AWWA C105:
- a. Hub-and-spigot, cast-iron soil pipe and fittings.
 - b. Hubless cast-iron soil pipe and fittings.
 - c. Ductile-iron pipe and fittings.
 - d. Expansion joints and deflection fittings.

C. Pipe Joint Construction

1. Join gravity-flow, nonpressure drainage piping according to the following:
- a. Join hub-and-spigot, cast-iron soil piping with gasketed joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.
 - b. Join hub-and-spigot, cast-iron soil piping with calked joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for lead and oakum calked joints.
 - c. Join hubless cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-coupling joints.
 - d. Join ductile-iron culvert piping according to AWWA C600 for push-on joints.
 - e. Join ductile-iron piping and special fittings according to AWWA C600 or AWWA M41.
 - f. Join corrugated steel sewer piping according to ASTM A 798/A 798M.
 - g. Join corrugated aluminum sewer piping according to ASTM B 788/B 788M.
 - h. Join ABS sewer piping according to ASTM D 2321 and ASTM D 2751 for elastomeric-seal joints.
 - i. Join corrugated PE piping according to ASTM D 3212 for push-on joints.
 - j. Join PVC cellular-core piping according to ASTM D 2321 and ASTM F 891 for solvent-cemented joints.
 - k. Join PVC corrugated sewer piping according to ASTM D 2321 for elastomeric-seal joints.
 - l. Join PVC sewer piping according to ASTM D 2321 and ASTM D 3034 for elastomeric-seal joints or ASTM D 3034 for elastomeric-gasketed joints.
 - m. Join PVC profile gravity sewer piping according to ASTM D 2321 for elastomeric-seal joints or ASTM F 794 for gasketed joints.
 - n. Join fiberglass sewer piping according to ASTM D 3839 for elastomeric-seal joints.
 - o. Join nonreinforced-concrete sewer piping according to **ASTM C 14 (ASTM C 14M)** and ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 - p. Join reinforced-concrete sewer piping according to ACPA's "Concrete Pipe Installation Manual" for rubber-gasketed joints.
 - q. Join dissimilar pipe materials with nonpressure-type flexible couplings.
2. Join force-main pressure piping according to the following:
- a. Join ductile-iron pressure piping according to AWWA C600 or AWWA M41 for push-on joints.

- b. Join ductile-iron special fittings according to AWWA C600 or AWWA M41 for push-on joints.
 - c. Join PVC pressure piping according to AWWA M23 for gasketed joints.
 - d. Join PVC water-service piping according to ASTM D 2855 for solvent-cemented joints.
 - e. Join dissimilar pipe materials with pressure-type couplings.
- D. Backwater Valve Installation
1. Install horizontal-type backwater valves in piping where indicated.
 2. Install combination horizontal and manual gate-valve type in piping and in manholes where indicated.
 3. Install terminal-type backwater valves on end of piping and in manholes where indicated.
- E. Cleanout Installation
1. Install cleanouts and riser extensions from sewer pipes to cleanouts at grade. Use cast-iron soil pipe fittings in sewer pipes at branches for cleanouts and cast-iron soil pipe for riser extensions to cleanouts. Install piping so cleanouts open in direction of flow in sewer pipe.
 - a. Use Light-Duty, top-loading classification cleanouts in earth or unpaved foot-traffic areas.
 - b. Use Medium-Duty, top-loading classification cleanouts in paved foot-traffic areas.
 - c. Use Heavy-Duty, top-loading classification cleanouts in vehicle-traffic service areas.
 - d. Use Extra-Heavy-Duty, top-loading classification cleanouts in roads.
 - e. Set cleanout frames and covers in earth in cast-in-place concrete block, **18 by 18 by 12 inches (450 by 450 by 300 mm)** deep. Set with tops **1 inch (25 mm)** above surrounding earth grade.
 - f. Set cleanout frames and covers in concrete pavement and roads with tops flush with pavement surface.
- F. Drain Installation
1. Install type of drains in locations indicated.
 - a. Use Light-Duty, top-loading classification drains in earth or unpaved foot-traffic areas.
 - b. Use Medium-Duty, top-loading classification drains in paved foot-traffic areas.
 - c. Use Heavy-Duty, top-loading classification drains in vehicle-traffic service areas.
 - d. Use Extra-Heavy-Duty, top-loading classification drains in roads.
 2. Embed drains in **4-inch (102-mm)** minimum concrete around bottom and sides.
 3. Fasten grates to drains if indicated.
 4. Set drain frames and covers with tops flush with pavement surface.
 5. Assemble trench sections with flanged joints.
 6. Embed trench sections in **4-inch (102-mm)** minimum concrete around bottom and sides.
- G. Manhole Installation
1. General: Install manholes, complete with appurtenances and accessories indicated.
 2. Install precast concrete manhole sections with sealants according to ASTM C 891.
 3. Where specific manhole construction is not indicated, follow manhole manufacturer's written instructions.
 4. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops **3 inches (76 mm)** above finished surface elsewhere unless otherwise indicated.
- H. Catch Basin Installation
1. Construct catch basins to sizes and shapes indicated.
 2. Set frames and grates to elevations indicated.
- I. Stormwater Inlet And Outlet Installation
1. Construct inlet head walls, aprons, and sides of reinforced concrete, as indicated.
 2. Construct riprap of broken stone, as indicated.
 3. Install outlets that spill onto grade, anchored with concrete, where indicated.
 4. Install outlets that spill onto grade, with flared end sections that match pipe, where indicated.
 5. Construct energy dissipaters at outlets, as indicated.

- J. Dry Well Installation
1. Excavate hole to diameter of at least **6 inches (150 mm)** greater than outside of dry well. Do not extend excavation into ground-water table.
 2. Install precast, concrete-ring dry wells according to the following:
 - a. Assemble rings to depth indicated.
 - b. Extend rings to height where top of cover will be approximately **8 inches (203 mm)** below finished grade.
 - c. Backfill bottom of inside of rings with filtering material to level at least **12 inches (300 mm)** above bottom.
 - d. Extend effluent inlet pipe **12 inches (300 mm)** into rings and terminate into side of tee fitting.
 - e. Backfill around outside of rings with filtering material to top level of rings.
 - f. Install cover over top of rings.
 3. Install manufactured, PE dry wells according to manufacturer's written instructions and the following:
 - a. Assemble and install panels and cover.
 - b. Backfill bottom of inside of unit with filtering material to level at least **12 inches (300 mm)** above bottom.
 - c. Extend effluent inlet pipe **12 inches (300 mm)** into unit and terminate into side of tee fitting.
 - d. Install filter fabric around outside of unit.
 - e. Install filtering material around outside of unit.
 4. Install constructed-in-place dry wells according to the following:
 - a. Install brick lining material dry and laid flat, with staggered joints for seepage. Build to diameter and depth indicated.
 - b. Install block lining material dry, with staggered joints and 20 percent minimum of blocks on side for seepage. Install precast concrete rings with notches or weep holes for seepage. Build to diameter and depth indicated.
 - c. Extend lining material to height where top of manhole will be approximately **8 inches (203 mm)** below finished grade.
 - d. Backfill bottom of inside of lining with filtering material to level at least **12 inches (300 mm)** above bottom.
 - e. Extend effluent inlet pipe **12 inches (300 mm)** into lining and terminate into side of tee fitting.
 - f. Backfill around outside of lining with filtering material to top level of lining.
 - g. Install manhole over top of dry well. Support cover on undisturbed soil. Do not support cover on lining.
- K. Concrete Placement
1. Place cast-in-place concrete according to ACI 318.
- L. Channel Drainage System Installation
1. Install with top surfaces of components, except piping, flush with finished surface.
 2. Assemble channel sections to form slope down toward drain outlets. Use sealants, adhesives, fasteners, and other materials recommended by system manufacturer.
 3. Embed channel sections and drainage specialties in **4-inch (102-mm)** minimum concrete around bottom and sides.
 4. Fasten grates to channel sections if indicated.
 5. Assemble channel sections with flanged or interlocking joints.
 6. Embed channel sections in **4-inch (102-mm)** minimum concrete around bottom and sides.
- M. Stormwater Disposal System Installation
1. Chamber Systems: Excavate trenches of width and depth, and install system and backfill according to chamber manufacturer's written instructions. Include storage and leaching chambers, filtering material, and filter mat.
- OR**

Piping Systems: Excavate trenches of width and depth, and install piping system, filter fabric, and backfill, according to piping manufacturer's written instructions.

N. Connections

1. Connect nonpressure, gravity-flow drainage piping in building's storm building drains specified in Division 22 Section "Facility Storm Drainage Piping".
2. Connect force-main piping to building's storm drainage force mains specified in Division 22 Section "Facility Storm Drainage Piping". Terminate piping where indicated.
3. Make connections to existing piping and underground manholes.
 - a. Use commercially manufactured wye fittings for piping branch connections. Remove section of existing pipe; install wye fitting into existing piping; and encase entire wye fitting, plus **6-inch (150-mm)** overlap, with not less than **6 inches (150 mm)** of concrete with 28-day compressive strength of **3000 psi (20.7 MPa)**.
 - b. Make branch connections from side into existing piping, **NPS 4 to NPS 20 (DN 100 to DN 500)**. Remove section of existing pipe, install wye fitting into existing piping, and encase entire wye with not less than **6 inches (150 mm)** of concrete with 28-day compressive strength of **3000 psi (20.7 MPa)**.
 - c. Make branch connections from side into existing piping, **NPS 21 (DN 525)** or larger, or to underground manholes and structures by cutting into existing unit and creating an opening large enough to allow **3 inches (76 mm)** of concrete to be packed around entering connection. Cut end of connection pipe passing through pipe or structure wall to conform to shape of and be flush with inside wall unless otherwise indicated. On outside of pipe, manhole, or structure wall, encase entering connection in **6 inches (150 mm)** of concrete for minimum length of **12 inches (300 mm)** to provide additional support of collar from connection to undisturbed ground.
 - 1) Use concrete that will attain a minimum 28-day compressive strength of **3000 psi (20.7 MPa)** unless otherwise indicated.
 - 2) Use epoxy-bonding compound as interface between new and existing concrete and piping materials.
 - d. Protect existing piping, manholes, and structures to prevent concrete or debris from entering while making tap connections. Remove debris or other extraneous material that may accumulate.
4. Connect to sediment interceptors specified in Division 22 Section "Sanitary Waste Interceptors".
5. Pipe couplings, expansion joints, and deflection fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.
 - a. Use nonpressure-type flexible couplings where required to join gravity-flow, nonpressure sewer piping unless otherwise indicated.
 - 1) Unshielded **OR** Shielded, **as directed**, flexible couplings for same or minor difference OD pipes.
 - 2) Unshielded, increaser/reducer-pattern, flexible couplings for pipes with different OD.
 - 3) Ring-type flexible couplings for piping of different sizes where annular space between smaller piping's OD and larger piping's ID permits installation.
 - b. Use pressure-type pipe couplings for force-main joints.

O. Closing Abandoned Storm Drainage Systems

1. Abandoned Piping: Close open ends of abandoned underground piping indicated to remain in place. Include closures strong enough to withstand hydrostatic and earth pressures that may result after ends of abandoned piping have been closed. Use either procedure below:
 - a. Close open ends of piping with at least **8-inch- (203-mm-)** thick, brick masonry bulkheads.
 - b. Close open ends of piping with threaded metal caps, plastic plugs, or other acceptable methods suitable for size and type of material being closed. Do not use wood plugs.
2. Abandoned Manholes and Structures: Excavate around manholes and structures as required and use one procedure below:
 - a. Remove manhole or structure and close open ends of remaining piping.

END OF SECTION 33 42 11 00

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Task	Specification	Specification Description
33 42 11 00	01 95 99 99c	Storm Drainage Piping
33 42 11 00	22 05 76 00	Storm Drainage Piping Specialties
33 42 11 00	33 31 11 00	Sanitary Sewerage

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SECTION 33 42 13 13 - CULVERTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for culverts. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

C. Delivery, Storage, And Handling

1. Delivery and Storage: Materials delivered to site shall be inspected for damage, unloaded, and stored with a minimum of handling. Materials shall not be stored directly on the ground. The inside of pipes and fittings shall be kept free of dirt and debris. Before, during, and after installation, plastic pipe and fittings shall be protected from any environment that would result in damage or deterioration to the material. The Contractor shall have a copy of the manufacturer's instructions available at the construction site at all times and shall follow these instructions unless directed otherwise by the the Owner. Solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe shall be stored in accordance with the manufacturer's recommendations and shall be discarded if the storage period exceeds the recommended shelf life. Solvents in use shall be discarded when the recommended pot life is exceeded.
2. Handling: Materials shall be handled in a manner that ensures delivery to the trench in sound, undamaged condition. Pipe shall be carried to the trench, not dragged.

1.2 PRODUCTS

A. Pipe For Culverts

1. Pipe for culverts and storm drains shall be of the sizes indicated and shall conform to the requirements specified.
2. Concrete Pipe
 - a. ASTM C76/ASTM C76M, Class I **OR II OR III OR IV OR V, as directed**, or ASTM C655 D-Load. Note: D-load is defined as the minimum required three-edge test load on a pipe to produce a 0.01 inch crack and/or ultimate failure in pounds per linear foot per foot (no metric definition) of inside diameter.
 - b. Reinforced Arch Culvert and Storm Drainpipe: ASTM C506/ASTM C506M, Class A-II **OR A-III OR A-IV, as directed**.
 - c. Reinforced Elliptical Culvert and Storm Drainpipe: ASTM C507/ASTM C507M. Horizontal elliptical pipe shall be Class HE-A **OR HE-I OR HE-II OR HE-III OR HE-IV, as directed**. Vertical elliptical pipe shall be Class VE-II **OR VE-III OR VE-IV OR VE-V OR VE-VI, as directed**.
 - d. Nonreinforced Pipe: ASTM C14/ASTM C14M, Class 1 **OR 2 OR 3, as directed**.
 - 1) Cast-In-Place Nonreinforced Conduit: ACI 346, except that testing shall be the responsibility of and at the expense of the Contractor. In the case of other conflicts between ACI 346 and project specifications, requirements of ACI 346 shall govern.
NOTE: This type conduit should not be used beneath structures, for drain crossings, adjacent to paved areas, or under high fills.
3. Clay Pipe: Standard or extra strength, as indicated, conforming to ASTM C700.
NOTE: "Bell-and-spigot piping only" in areas where corrosion problems may be anticipated with the stainless steel parts of the couplings used for plain-end piping.

4. Corrugated Steel Pipe
 - a. ASTM A760/A760M, zinc or aluminum (Type 2) coated pipe of either:
 - 1) Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - 2) Type IR **OR** IIR, **as directed**, pipe with helical 3/4 by 3/4 by 7-1/2 inch (19 by 19 by 190 mm) corrugations.
 - b. Fully Bituminous Coated
 - 1) AASHTO M190 Type A and ASTM A760/A 760M zinc or aluminum (Type 2) coated pipe of either:
 - a) Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - b) Type IR **OR** IIR, **as directed**, pipe with helical 3/4 by 3/4 by 7-1/2 inch (19 by 19 by 190 mm) corrugations.
 - c. Half Bituminous Coated, Part Paved: AASHTO M190 Type B and ASTM A760/A 760M zinc or aluminum (Type 2) coated Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - d. Fully Bituminous Coated, Part Paved: AASHTO M190 Type C and ASTM A760/A 760M zinc or aluminum (Type 2) coated Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - e. Fully Bituminous Coated, Fully Paved: AASHTO M190 Type D and ASTM A760/A 760M zinc or aluminum (Type 2) coated Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - f. Concrete-Lined: ASTM A760/A760M zinc coated Type I corrugated steel pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations and a concrete lining in accordance with ASTM A849.
 - g. Polymer Precoated: ASTM A 762/A 762M corrugated steel pipe fabricated from ASTM A742/A742M Grade 250/250 10/10 polymer precoated sheet of either:
 - 1) Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - 2) Type IR **OR** IIR, **as directed**, pipe with helical 3/4 by 3/4 by 7-1/2 inch (19 by 19 by 190 mm) corrugations.
 - h. Polymer Precoated, Part Paved: ASTM A762/A762M Type I **OR** II, **as directed**, corrugated steel pipe and AASHTO M190 Type B (modified) paved invert only, fabricated from ASTM A742/A742M Grade 250/250 10/10 polymer precoated sheet with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 - i. Polymer Precoated, Fully Paved: ASTM A762/A762M Type I **OR** II, **as directed**, corrugated steel pipe and AASHTO M190 Type D (modified), fully paved only, fabricated from ASTM A 742/A 742M Grade 250/250 10/10 polymer precoated sheet with annular **OR** helical, **as directed**, 2-2/3 by 1/2 inch (68 by 13 mm) corrugations.
 5. Corrugated Aluminum Alloy Pipe: ASTM B745/B745M corrugated aluminum alloy pipe of either:
 - 1) Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, corrugations.
 - 2) Type IA **OR** IR **OR** IIA **OR** IIR, **as directed**, pipe with helical corrugations.
 - b. Aluminum Fully Bituminous Coated: Bituminous coating shall conform to ASTM A849. Piping shall conform to AASHTO M190 Type A and ASTM B745/B745M corrugated aluminum alloy pipe of either:
 - 1) Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, corrugations.
 - 2) Type IA **OR** IR **OR** IIA **OR** IIR, **as directed**, pipe with helical corrugations.
 - c. Aluminum Fully Bituminous Coated, Part Paved: Bituminous coating shall conform to ASTM A849. Piping shall conform to AASHTO M190 Type C and ASTM B 745/B 745M corrugated aluminum alloy pipe of either:
 - 1) Type I **OR** II, **as directed**, pipe with annular **OR** helical, **as directed**, corrugations.
 - 2) Type IR **OR** IIR, **as directed**, pipe with helical corrugations.
6. Structural Plate, Steel Pipe, Pipe Arches and Arches

- a. Assembled with galvanized steel nuts and bolts, from galvanized corrugated steel plates conforming to AASHTO M167. Pipe coating, when required, shall conform to the requirements of AASHTO M190 Type A **OR** AASHTO M243, **as directed**.
- b. Thickness of plates shall be as indicated.
- 7. Structural Plate, Aluminum Pipe, Pipe Arches and Arches
 - a. Assembled with either aluminum alloy, aluminum coated steel, stainless steel or zinc coated steel nuts and bolts. Nuts and bolts, and aluminum alloy plates shall conform to AASHTO M219. Pipe coating, when required, shall conform to the requirements of AASHTO M190, Type A **OR** AASHTO M 243, **as directed**.
 - b. Thickness of plates shall be as indicated.
- 8. Ductile Iron Culvert Pipe: ASTM A716.
- 9. Cast-Iron Soil Piping: Cast-Iron Soil Pipe shall conform to ASTM A74, service-weight; gaskets shall be compression-type rubber conforming to ASTM C564.
- 10. PVC Pipe
 - a. The pipe manufacturer's resin certification, indicating the cell classification of PVC used to manufacture the pipe, shall be submitted prior to installation of the pipe.
 - b. Type PSM PVC Pipe: ASTM D3034, Type PSM, maximum SDR 35, produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.
 - c. Profile PVC Pipe: ASTM F794, Series 46, produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.
 - d. Smooth Wall PVC Pipe: ASTM F679 produced from PVC certified by the compounder as meeting the requirements of ASTM D1784, minimum cell class 12454-B.
 - e. Corrugated PVC Pipe: ASTM F949 produced from PVC certified by the compounder as meeting the requirements of ASTM D 1784, minimum cell class 12454-B.
- 11. PE Pipe
 - a. The pipe manufacturer's resin certification indicating the cell classification of PE used to manufacture the pipe shall be submitted prior to installation of the pipe. The minimum cell classification for polyethylene plastic shall apply to each of the seven primary properties of the cell classification limits in accordance with ASTM D3350.
 - b. Smooth Wall PE Pipe: ASTM F714, maximum DR of 21 for pipes 3 to 24 inches (80 to 600 mm) in diameter and maximum DR of 26 for pipes 26 to 48 inches (650 to 1200 mm) in diameter. Pipe shall be produced from PE certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class 335434C.
 - c. Corrugated PE Pipe: AASHTO M294, Type S or D, for pipes 12 to 48 inches (300 to 1200 mm) and AASHTO MP 7, Type S or D, for pipes 54 to 60 inches (1350 to 1500 mm) produced from PE certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class in accordance with AASHTO M294. Pipe walls shall have the following properties:
 NOTE: Corrugated PE pipe culverts and storm drains shall not be installed beneath airfield pavements, Class A, B, or C roads, or road pavements with a design index of 6 or greater. Type S pipe has a full circular cross-section, with an outer corrugated pipe wall and a smooth inner liner. Type C pipe has a full circular cross-section, with a corrugated surface both inside and outside. Corrugations may be either annular or helical.

Nominal Size (in.)	Minimum Wall Area (square in/ft)	Minimum Moment of Inertia of Wall Section (in to the 4th/in)
12	1.50	0.024
15	1.91	0.053
18	2.34	0.062
24	3.14	0.116
30	3.92	0.163
36	4.50	0.222
42	4.69	0.543

Nominal Size (mm)	Minimum Wall Area (square mm/m)	Minimum Moment of Inertia of Wall Section (mm to the 4th/mm)
48	5.15	0.543
54	5.67	0.800
60	6.45	0.800
300	3200	390
375	4000	870
450	4900	1020
600	6600	1900
750	8300	2670
900	9500	3640
1050	9900	8900
1200	10900	8900
1350	12000	13110
1500	13650	13110

- d. Profile Wall PE Pipe: ASTM F894, RSC 160, produced from PE certified by the resin producer as meeting the requirements of ASTM D3350, minimum cell class 334433C. Pipe walls shall have the following properties:

Nominal Size (in.)	Minimum Wall Area (square in/ft)	Minimum Moment Of Inertia of Wall Section (in to the 4th/in)	
		Cell Class 334433C	Cell Class 335434C
18	2.96	0.052	0.038
21	4.15	0.070	0.051
24	4.66	0.081	0.059
27	5.91	0.125	0.091
30	5.91	0.125	0.091
33	6.99	0.161	0.132
36	8.08	0.202	0.165
42	7.81	0.277	0.227
48	8.82	0.338	0.277

Nominal Size (mm)	Minimum Wall Area (square mm/m)	Minimum Moment Of Inertia of Wall Section (mm to the 4th/mm)	
		Cell Class 334433C	Cell Class 335434C
450	6300	850	620
525	8800	1150	840
600	9900	1330	970
675	12500	2050	1490
750	12500	2050	1490

825	14800	2640	2160
900	17100	3310	2700
1050	16500	4540	3720
1200	18700	5540	4540

B. Drainage Structures

1. Flared End Sections: Sections shall be of a standard design fabricated from zinc coated steel sheets meeting requirements of ASTM A929/A929M.
2. Precast Reinforced Concrete Box: Four-sided box section with open ends to be monolithically cast of reinforced concrete, smooth inside surfaces. Each box section shall be manufactured with chamfered inside corners. Design and manufacture shall conform to ASTM C890.
 - a. Design References: ACI 318.
 - 1) Boxes subjected to highway loadings shall conform to requirements of AASHTO M259 or M273, as applicable, and ASTM C789, C850, C1433, and PS62.
 - 2) Boxes subjected to aircraft loadings shall conform to requirements of FAA specifications.
 - 3) Boxes subjected to railway loadings shall conform to requirements of AREMA specifications.
 - b. Concrete: 5,000 psi @ 30 days, unless otherwise directed.
 - c. Entrained Air: 5 to 9 percent.
 - d. Steel Reinforcing: ASTM A1064, A615, A616, Grade 60, 60 ksi.
 - e. Design Loading: AASHTO HS-20-44 or HS-25-44 with 30 percent impact and equivalent soil pressure of 130 psf. Floatation forces not accounted for.
 - f. Joints: Each section shall have a male and female end with no less than 1-1/2-inch of concrete overlap and shall include a 1-inch square neoprene gasket, cemented to male surface of section during manufacture.
 - g. End Sections: As required for the individual installation, provide:
 - 1) Doweled end for 1-inch diameter x 12-inch deep steel dowels, keyway slot.
 - 2) Keyway slot, a shear connection between the precast and field cast sections.
 - 3) Plain end, for use where wing and end walls act independently of precast box.
 - h. Lifting Pins: Each section shall be equipped with 4 OSHA approved lifting pins.
 - i. For multi-cell installations, fill 1-inch spacing between cells with granular material to assume proper load distribution.
3. Three-Sided Structures for Culverts or Short Span Bridge System
 - a. Structures shall conform to requirements of ASTM C1504 and ACI 318. For structures subjected to roadway loadings, conform to requirements of AASHTO specifications.

C. Miscellaneous Materials

1. Concrete
 - a. Unless otherwise specified, concrete and reinforced concrete shall conform to the requirements concrete under Division 03 Section "Cast-in-place Concrete". The concrete mixture shall have air content by volume of concrete, based on measurements made immediately after discharge from the mixer, of 5 to 7 percent when maximum size of coarse aggregate exceeds 1-1/2 inches (37.5 mm).
 - b. Air content shall be determined in accordance with ASTM C231. The concrete covering over steel reinforcing shall not be less than 1 inch (25 mm) thick for covers and not less than 1-1/2 inches (40 mm) thick for walls and flooring. Concrete covering deposited directly against the ground shall have a thickness of at least 3 inches (75 mm) between steel and ground.
 - c. Expansion-joint filler material shall conform to ASTM D1751, or ASTM D1752, or shall be resin-impregnated fiberboard conforming to the physical requirements of ASTM D1752.
2. Mortar: Mortar for pipe joints, connections to other drainage structures, and brick or block construction shall conform to ASTM C270, Type M, except that the maximum placement time shall be 1 hour. The quantity of water in the mixture shall be sufficient to produce a stiff workable mortar. Water shall be clean and free of harmful acids, alkalis, and organic impurities. The mortar shall be used within 30 minutes after the ingredients are mixed with water. The inside of

- the joint shall be wiped clean and finished smooth. The mortar head on the outside shall be protected from air and sun with a proper covering until satisfactorily cured.
3. Precast Concrete Segmental Blocks: Precast concrete segmental block shall conform to ASTM C139, not more than 8 inches (200 mm) thick, not less than 8 inches (200 mm) long, and of such shape that joints can be sealed effectively and bonded with cement mortar.
 4. Brick
 - a. Brick shall conform to ASTM C62, Grade SW; ASTM C55, Grade S-I or S-II; or ASTM C32, Grade MS. Mortar for jointing and plastering shall consist of one part portland cement and two parts fine sand. Lime may be added to the mortar in a quantity not more than 25 percent of the volume of cement.
 - b. The joints shall be filled completely and shall be smooth and free from surplus mortar on the inside of the structure. Brick structures shall be plastered with 1/2 inch (10 mm) of mortar over the entire outside surface of the walls. For square or rectangular structures, brick shall be laid in stretcher courses with a header course every sixth course. For round structures, brick shall be laid radially with every sixth course a stretcher course.
 5. Precast Reinforced Concrete Manholes
 - a. Precast reinforced concrete manholes shall conform to ASTM C478/ASTM C478M.
 - b. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall be smoothed to a uniform surface on both interior and exterior of the structure **OR** made with flexible watertight, rubber-type gaskets meeting the requirements of paragraph JOINTS, **as directed**.
 6. Prefabricated Corrugated Metal Manholes
 - a. Manholes shall be of the type and design recommended by the manufacturer.
 - b. Manholes shall be complete with frames and cover, or frames and gratings.
 7. Frame and Cover for Gratings
 - a. Frame and cover for gratings shall be cast gray iron, ASTM A48/A48M,
 - b. Class 35B; cast ductile iron, ASTM A536, Grade 65-45-12; or cast aluminum, ASTM B26M/B26, Alloy 356.OT6. Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the plans.
 8. Joints
 - a. Flexible Watertight Joints
 - 1) Materials: Flexible watertight joints shall be made with plastic or rubber-type gaskets for concrete pipe and with factory-fabricated resilient materials for clay pipe. The design of joints and the physical requirements for plastic gaskets shall conform to AASHTO M198, and rubber-type gaskets shall conform to ASTM C443/ASTM C443M. Factory-fabricated resilient joint materials shall conform to ASTM C425. Gaskets shall have not more than one factory-fabricated splice, except that two factory-fabricated splices of the rubber-type gasket are permitted if the nominal diameter of the pipe being gasketed exceeds 54 inches (1.35 m).
 - 2) Test Requirements: Watertight joints shall be tested and shall meet test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS. Rubber gaskets shall comply with the oil resistant gasket requirements of ASTM C443/ASTM C443M. Certified copies of test results shall be delivered to the the Owner before gaskets or jointing materials are installed. Alternate types of watertight joint may be furnished, if specifically approved.
 - b. External Sealing Bands: Requirements for external sealing bands shall conform to ASTM C877/ASTM C877M.
 - c. Flexible Watertight, Gasketed Joints
 - 1) Gaskets: When infiltration or exfiltration is a concern for pipe lines, the couplings may be required to have gaskets. The closed-cell expanded rubber gaskets shall be a continuous band approximately 7 inches (178 mm) wide and approximately 3/8 inch (10 mm) thick, meeting the requirements of ASTM D1056, Type 2 A1 **OR** B3, **as directed**, and shall have a quality retention rating of not less than 70 percent when tested for weather resistance by ozone chamber exposure, Method B of ASTM D1171. Rubber O-ring gaskets shall be 13/16 inch (21 mm) in diameter for pipe

diameters of 36 inches (914 mm) or smaller and 7/8 inch (22 mm) in diameter for larger pipe having 1/2 inch (13 mm) deep end corrugation. Rubber O-ring gaskets shall be 1-3/8 inches (35 mm) in diameter for pipe having 1 inch (25 mm) deep end corrugations. O-rings shall meet the requirements of AASHTO M198 or ASTM C443/ASTM C443M. Flexible plastic gaskets shall conform to requirements of AASHTO M198, Type B.

- 2) Connecting Bands: Connecting bands shall be of the type, size and sheet thickness of band, and the size of angles, bolts, rods and lugs as indicated or where not indicated as specified in the applicable standards or specifications for the pipe. Exterior rivet heads in the longitudinal seam under the connecting band shall be countersunk or the rivets shall be omitted and the seam welded. Watertight joints shall be tested and shall meet the test requirements of paragraph HYDROSTATIC TEST ON WATERTIGHT JOINTS.

- d. PVC Plastic Pipes: Joints shall be solvent cement or elastomeric gasket type in accordance with the specification for the pipe and as recommended by the pipe manufacturer.
- e. Smooth Wall PE Plastic Pipe: Pipe shall be joined using butt fusion method as recommended by the pipe manufacturer.
- f. Corrugated PE Plastic Pipe: Water tight joints shall be made using a PVC or PE coupling and rubber gaskets as recommended by the pipe manufacturer. Rubber gaskets shall conform to ASTM F477. Soil tight joints shall conform to the requirements in AASHTO HB-17, Division II, Section 26.4.2.4.(e) for soil tightness and shall be as recommended by the pipe manufacturer.
- g. Profile Wall PE Plastic Pipe: Joints shall be gasketed or thermal weld type with integral bell in accordance with ASTM F894.
- h. Ductile Iron Pipe: Couplings and fittings shall be as recommended by the pipe manufacturer.

D. Steel Ladder

1. Steel ladder shall be provided where the depth of the manhole exceeds 12 feet (3.66 m). These ladders shall be not less than 16 inches (406 mm) in width, with 3/4 inch (19 mm) diameter rungs spaced 12 inches (305 mm) apart. The two stringers shall be a minimum 3/8 inch (10 mm) thick and 2-1/2 inches (63 mm) wide. Ladders and inserts shall be galvanized after fabrication in conformance with ASTM A123/A123M.

E. Resilient Connectors

1. Flexible, watertight connectors used for connecting pipe to manholes and inlets shall conform to ASTM C923/ASTM C923M.

F. Hydrostatic Test On Watertight Joints

1. Concrete, Clay, PVC and PE Pipe: A hydrostatic test shall be made on the watertight joint types as proposed. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested. During the test period, gaskets or other jointing material shall be protected from extreme temperatures which might adversely affect the performance of such materials. Performance requirements for joints in reinforced and nonreinforced concrete pipe shall conform to AASHTO M198 or ASTM C443M ASTM C443. Test requirements for joints in clay pipe shall conform to ASTM C425. Test requirements for joints in PVC and PE plastic pipe shall conform to ASTM D3212.
2. Corrugated Steel and Aluminum Pipe: A hydrostatic test shall be made on the watertight joint system or coupling band type proposed. The moment strength required of the joint is expressed as 15 percent of the calculated moment capacity of the pipe on a transverse section remote from the joint by the AASHTO HB-17 (Division II, Section 26). The pipe shall be supported for the hydrostatic test with the joint located at the point which develops 15 percent of the moment capacity of the pipe based on the allowable span in meters feet for the pipe flowing full or 40,000 foot-pounds (54,233 Newton meters), whichever is less. Performance requirements shall be met

at an internal hydrostatic pressure of 10 psi (69 kPa) for a 10 minute period for both annular corrugated metal pipe and helical corrugated metal pipe with factory reformed ends.

- G. Erosion Control Riprap
 - 1. Provide nonerodible rock not exceeding 15 inches (375 mm) in its greatest dimension and choked with sufficient small rocks to provide a dense mass with a minimum thickness of 8 inches (200 mm) or as indicated.

1.3 EXECUTION

- A. Excavation for Pipe Culverts and Drainage Structures
 - 1. Excavation of trenches, and for appurtenances and backfilling for culverts and storm drains, shall be in accordance with the applicable portions of Division 31 Section "Earth Moving" and the requirements specified below.
 - 2. Trenching: The width of trenches at any point below the top of the pipe shall be not greater than the outside diameter of the pipe plus 12-inches (300 mm) each side of pipe to permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Sheet piling and bracing, where required, shall be placed within the trench width as specified. Contractor shall not overexcavate. Where trench widths are exceeded, redesign with a resultant increase in cost of stronger pipe or special installation procedures will be necessary. Cost of this redesign and increased cost of pipe or installation shall be borne by the Contractor without additional cost to the Owner.
 - 3. Removal of Rock: Rock in either ledge or boulder formation shall be replaced with suitable materials to provide a compacted earth cushion having a thickness between unremoved rock and the pipe of at least 8 inches (200 mm) or 1/2 inch (13 mm) for each meter foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Where bell-and-spigot pipe is used, the cushion shall be maintained under the bell as well as under the straight portion of the pipe. Rock excavation shall be as specified and defined in Division 31 Section "Earth Moving".
 - 4. Removal of Unstable Material: Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the the Owner, is unexpectedly encountered in the bottom of a trench, such material shall be removed to the depth required and replaced to the proper grade with select granular material, compacted as provided in paragraph BACKFILLING. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheet piling, water removal, or other specified requirements, such removal and replacement shall be performed at no additional cost to the Owner.
- B. Bedding
 - 1. The bedding surface for the pipe shall provide a firm foundation of uniform density throughout the entire length of the pipe.
 - 2. Concrete Pipe Requirements: When no bedding class is specified or detailed on the drawings, concrete pipe shall be bedded in a soil foundation accurately shaped and rounded to conform to the lowest one-fourth of the outside portion of circular pipe or to the lower curved portion of pipe arch for the entire length of the pipe or pipe arch. When necessary, the bedding shall be tamped. Bell holes and depressions for joints shall be not more than the length, depth, and width required for properly making the particular type of joint.
 - 3. Clay Pipe Requirements: Bedding for clay pipe shall be as specified by ASTM C12.
 - 4. Corrugated Metal Pipe: Bedding for corrugated metal pipe and pipe arch shall be in accordance with ASTM A798/A798M. It is not required to shape the bedding to the pipe geometry. However, for pipe arches, the Contractor shall either shape the bedding to the relatively flat bottom arc or fine grade the foundation to a shallow v-shape. Bedding for corrugated structural plate pipe shall meet requirements of ASTM A807/A807M.
 - 5. Ductile Iron and Cast-Iron Pipe: Bedding for ductile iron and cast-iron pipe shall be as shown on the drawings.

6. Plastic Pipe: Bedding for PVC and PE pipe shall meet the requirements of ASTM D2321. Bedding, haunching, and initial backfill shall be either Class IB or II material.

C. Placing Pipe

1. Each pipe shall be thoroughly examined before being laid; defective or damaged pipe shall not be used. Plastic pipe shall be protected from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Pipelines shall be laid to the grades and alignment indicated. Proper facilities shall be provided for lowering sections of pipe into trenches. Lifting lugs in vertically elongated metal pipe shall be placed in the same vertical plane as the major axis of the pipe. Pipe shall not be laid in water, and pipe shall not be laid when trench conditions or weather are unsuitable for such work. Diversion of drainage or dewatering of trenches during construction shall be provided as necessary. Deflection of installed flexible pipe shall not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (%)
Corrugated Steel and Aluminum Alloy	5
Concrete-Lined Corrugated Steel	3
Ductile Iron Culvert	3
Plastic	7.5

Not less than 30 days after the completion of backfilling, the Owner may perform a deflection test on the entire length of installed flexible pipe using a mandrel or other suitable device. Installed flexible pipe showing deflections greater than those indicated above shall be retested by a run from the opposite direction. If the retest also fails, the suspect pipe shall be replaced.

2. Concrete, Clay, PVC, Ribbed PVC, Ductile Iron and Cast-Iron Pipe: Laying shall proceed upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.
3. Elliptical and Elliptical Reinforced Concrete Pipe: The manufacturer's reference lines, designating the top of the pipe, shall be within 5 degrees of a vertical plane through the longitudinal axis of the pipe, during placement. Damage to or misalignment of the pipe shall be prevented in all backfilling operations.
4. Corrugated PE Pipe: Laying shall be with the separate sections joined firmly on a bed shaped to line and grade and shall follow manufacturer's recommendations.
5. Corrugated Metal Pipe and Pipe Arch: Laying shall be with the separate sections joined firmly together, with the outside laps of circumferential joints pointing upstream, and with longitudinal laps on the sides. Part paved pipe shall be installed so that the centerline of bituminous pavement in the pipe, indicated by suitable markings on the top at each end of the pipe sections, coincides with the specified alignment of pipe. Fully paved steel pipe or pipe arch shall have a painted or otherwise applied label inside the pipe or pipe arch indicating sheet thickness of pipe or pipe arch. Any unprotected metal in the joints shall be coated with bituminous material as specified in AASHTO M190 or AASHTO M243. Interior coating shall be protected against damage from insertion or removal of struts or tie wires. Lifting lugs shall be used to facilitate moving pipe without damage to exterior or interior coatings. During transportation and installation, pipe or pipe arch and coupling bands shall be handled with care to preclude damage to the coating, paving or lining. Damaged coatings, pavings and linings shall be repaired in accordance with the manufacturer's recommendations prior to placing backfill. Pipe on which coating, paving or lining has been damaged to such an extent that satisfactory field repairs cannot be made shall be removed and replaced. Vertical elongation, where indicated, shall be accomplished by factory elongation. Suitable markings or properly placed lifting lugs shall be provided to ensure placement of factory elongated pipe in a vertical plane.
6. Structural-Plate Steel: Structural plate shall be installed in accordance with ASTM A807/A807M. Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all bolts are tightened to meet the torque requirements of 200 foot-pounds (270 Newton meters) plus or minus 50 foot-pounds (68 Newton meters). Any power wrenches used shall be checked by the use of hand torque

wrenches or long-handled socket or structural wrenches for amount of torque produced. Power wrenches shall be checked and adjusted frequently as needed, according to type or condition, to ensure proper adjustment to supply the required torque.

7. Structural-Plate Aluminum: Structural plate shall be assembled in accordance with instructions furnished by the manufacturer. Instructions shall show the position of each plate and the order of assembly. Bolts shall be tightened progressively and uniformly, starting at one end of the structure after all plates are in place. The operation shall be repeated to ensure that all bolts are torqued to a minimum of 100 foot-pounds (136 Newton meters) on aluminum alloy bolts and a minimum of 150 foot-pounds (203 Newton meters) on galvanized steel bolts. Any power wrenches used shall be checked by the use of hand torque wrenches or long-handled socket or structural wrenches for the amount of torque produced. Power wrenches shall be checked and adjusted as frequently as needed, according to type or condition, to ensure that they are in proper adjustment to supply the required torque.
8. Multiple Culverts: Where multiple lines of pipe are installed, adjacent sides of pipe shall be at least half the nominal pipe diameter or 1 meter 3 feet apart, whichever is less.
9. Jacking Pipe Through Fills: Methods of operation and installation for jacking pipe through fills shall conform to requirements specified in Volume 1, Chapter 1, Part 4 of AREMA Manual.

D. Jointing

1. Concrete and Clay Pipe

- a. Cement-Mortar Bell-and-Spigot Joint: The first pipe shall be bedded to the established gradeline, with the bell end placed upstream. The interior surface of the bell shall be thoroughly cleaned with a wet brush and the lower portion of the bell filled with mortar as required to bring inner surfaces of abutting pipes flush and even. The spigot end of each subsequent pipe shall be cleaned with a wet brush and uniformly matched into a bell so that sections are closely fitted. After each section is laid, the remainder of the joint shall be filled with mortar, and a bead shall be formed around the outside of the joint with sufficient additional mortar. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint shall be wrapped or bandaged with cheesecloth to hold mortar in place.
- b. Cement-Mortar Oakum Joint for Bell-and-Spigot Pipe: A closely twisted gasket shall be made of jute or oakum of the diameter required to support the spigot end of the pipe at the proper grade and to make the joint concentric. Joint packing shall be in one piece of sufficient length to pass around the pipe and lap at top. This gasket shall be thoroughly saturated with neat cement grout. The bell of the pipe shall be thoroughly cleaned with a wet brush, and the gasket shall be laid in the bell for the lower third of the circumference and covered with mortar. The spigot of the pipe shall be thoroughly cleaned with a wet brush, inserted in the bell, and carefully driven home. A small amount of mortar shall be inserted in the annular space for the upper two-thirds of the circumference. The gasket shall be lapped at the top of the pipe and driven home in the annular space with a caulking tool. The remainder of the annular space shall be filled completely with mortar and beveled at an angle of approximately 45 degrees with the outside of the bell. If mortar is not sufficiently stiff to prevent appreciable slump before setting, the outside of the joint thus made shall be wrapped with cheesecloth. Placing of this type of joint shall be kept at least five joints behind laying operations.
- c. Cement-Mortar Diaper Joint for Bell-and-Spigot Pipe: The pipe shall be centered so that the annular space is uniform. The annular space shall be caulked with jute or oakum. Before caulking, the inside of the bell and the outside of the spigot shall be cleaned.
 - 1) Diaper Bands: Diaper bands shall consist of heavy cloth fabric to hold grout in place at joints and shall be cut in lengths that extend one-eighth of the circumference of pipe above the spring line on one side of the pipe and up to the spring line on the other side of the pipe. Longitudinal edges of fabric bands shall be rolled and stitched around two pieces of wire. Width of fabric bands shall be such that after fabric has been securely stitched around both edges on wires, the wires will be uniformly spaced not less than 200 mm 8 inches apart. Wires shall be cut into

- lengths to pass around pipe with sufficient extra length for the ends to be twisted at top of pipe to hold the band securely in place; bands shall be accurately centered around lower portion of joint.
- 2) Grout: Grout shall be poured between band and pipe from the high side of band only, until grout rises to the top of band at the spring line of pipe, or as nearly so as possible, on the opposite side of pipe, to ensure a thorough sealing of joint around the portion of pipe covered by the band. Silt, slush, water, or polluted mortar grout forced up on the lower side shall be forced out by pouring, and removed.
 - 3) Remainder of Joint: The remaining unfilled upper portion of the joint shall be filled with mortar and a bead formed around the outside of this upper portion of the joint with a sufficient amount of additional mortar. The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind actual laying of pipe. No backfilling around joints shall be done until joints have been fully inspected and approved.
- d. Cement-Mortar Tongue-and-Groove Joint: The first pipe shall be bedded carefully to the established gradeline with the groove upstream. A shallow excavation shall be made underneath the pipe at the joint and filled with mortar to provide a bed for the pipe. The grooved end of the first pipe shall be thoroughly cleaned with a wet brush, and a layer of soft mortar applied to the lower half of the groove. The tongue of the second pipe shall be cleaned with a wet brush; while in horizontal position, a layer of soft mortar shall be applied to the upper half of the tongue. The tongue end of the second pipe shall be inserted in the grooved end of the first pipe until mortar is squeezed out on interior and exterior surfaces. Sufficient mortar shall be used to fill the joint completely and to form a bead on the outside.
 - e. Cement-Mortar Diaper Joint for Tongue-and-Groove Pipe: The joint shall be of the type described for cement-mortar tongue-and-groove joint in this paragraph, except that the shallow excavation directly beneath the joint shall not be filled with mortar until after a gauze or cheesecloth band dipped in cement mortar has been wrapped around the outside of the joint. The cement-mortar bead at the joint shall be at least 1/2 inch (15 mm), thick and the width of the diaper band shall be at least 8 inches (200 mm). The diaper shall be left in place. Placing of this type of joint shall be kept at least five joints behind the actual laying of the pipe. Backfilling around the joints shall not be done until the joints have been fully inspected and approved.
 - f. Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe: Sealing compounds shall follow the recommendation of the particular manufacturer in regard to special installation requirements. Surfaces to receive lubricants, primers, or adhesives shall be dry and clean. Sealing compounds shall be affixed to the pipe not more than 3 hours prior to installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Sealing compounds shall be inspected before installation of the pipe, and any loose or improperly affixed sealing compound shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pulled together. If, while making the joint with mastic-type sealant, a slight protrusion of the material is not visible along the entire inner and outer circumference of the joint when the joint is pulled up, the pipe shall be removed and the joint remade. After the joint is made, all inner protrusions shall be cut off flush with the inner surface of the pipe. If nonmastic-type sealant material is used, the "Squeeze-Out" requirement above will be waived.
 - g. Flexible Watertight Joints: Gaskets and jointing materials shall be as recommended by the particular manufacturer in regard to use of lubricants, cements, adhesives, and other special installation requirements. Surfaces to receive lubricants, cements, or adhesives shall be clean and dry. Gaskets and jointing materials shall be affixed to the pipe not more than 24 hours prior to the installation of the pipe, and shall be protected from the sun, blowing dust, and other deleterious agents at all times. Gaskets and jointing materials shall be inspected before installing the pipe; any loose or improperly affixed gaskets and jointing materials shall be removed and replaced. The pipe shall be aligned with the previously installed pipe, and the joint pushed home. If, while the joint is being made the gasket becomes visibly dislocated the pipe shall be removed and the joint remade.

H. Backfilling

1. **Backfilling Pipe in Trenches:** After the pipe has been properly bedded, selected material from excavation or borrow, at a moisture content that will facilitate compaction, shall be placed along both sides of pipe in layers not exceeding 6 inches (150 mm) in compacted depth. The backfill shall be brought up evenly on both sides of pipe for the full length of pipe. The fill shall be thoroughly compacted under the haunches of the pipe. Each layer shall be thoroughly compacted with mechanical tampers or rammers. This method of filling and compacting shall continue until the fill has reached an elevation of at least 12 inches (300 mm) above the top of the pipe. The remainder of the trench shall be backfilled and compacted by spreading and rolling or compacted by mechanical rammers or tampers in layers not exceeding 8 inches (200 mm). Tests for density shall be made as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the the Owner, that sheeting or portions of bracing used be left in place, the contract will be adjusted accordingly. Untreated sheeting shall not be left in place beneath structures or pavements.
2. **Backfilling Pipe in Fill Sections:** For pipe placed in fill sections, backfill material and the placement and compaction procedures shall be as specified below. The fill material shall be uniformly spread in layers longitudinally on both sides of the pipe, not exceeding 6 inches (150 mm) in compacted depth, and shall be compacted by rolling parallel with pipe or by mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches (300 mm) above the top of the pipe shall extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet (4 m), whichever is less. After the backfill has reached at least 12 inches (300 mm) above the top of the pipe, the remainder of the fill shall be placed and thoroughly compacted in layers not exceeding 8 inches (200 mm).
3. **Movement of Construction Machinery:** When compacting by rolling or operating heavy equipment parallel with the pipe, displacement of or injury to the pipe shall be avoided. Movement of construction machinery over a culvert or storm drain at any stage of construction shall be at the Contractor's risk. Any damaged pipe shall be repaired or replaced.
4. **Compaction**
 - a. **General Requirements:** Cohesionless materials include gravels, gravel-sand mixtures, sands, and gravelly sands. Cohesive materials include clayey and silty gravels, gravel-silt mixtures, clayey and silty sands, sand-clay mixtures, clays, silts, and very fine sands. When results of compaction tests for moisture-density relations are recorded on graphs, cohesionless soils will show straight lines or reverse-shaped moisture-density curves, and cohesive soils will show normal moisture-density curves.
 - b. **Minimum Density:** Backfill over and around the pipe and backfill around and adjacent to drainage structures shall be compacted at the approved moisture content to the following applicable minimum density, which will be determined as specified below.
 - 1) Under airfield and heliport pavements, paved roads, streets, parking areas, and similar-use pavements including adjacent shoulder areas, the density shall be not less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material, up to the elevation where requirements for pavement subgrade materials and compaction shall control.
 - 2) Under unpaved or turfed traffic areas, density shall not be less than 90 percent of maximum density for cohesive material and 95 percent of maximum density for cohesionless material.
 - 3) Under nontraffic areas, density shall be not less than that of the surrounding material.
5. **Determination of Density:** Testing shall be the responsibility of the Contractor and performed at no additional cost to the Owner. Testing shall be performed by an approved commercial testing laboratory or by the Contractor subject to approval. Tests shall be performed in sufficient number to ensure that specified density is being obtained. Laboratory tests for moisture-density relations shall be made in accordance with ASTM D1557 except that mechanical tampers may be used provided the results are correlated with those obtained with the specified hand tamper. Field density tests shall be determined in accordance with ASTM D2167 or ASTM D2922. When ASTM D2922 is used, the calibration curves shall be checked and adjusted, if necessary, using the sand cone method as described in paragraph Calibration of the referenced publications.

ASTM D2922 results in a wet unit weight of soil and when using this method ASTM D3017 shall be used to determine the moisture content of the soil. The calibration curves furnished with the moisture gauges shall be checked along with density calibration checks as described in ASTM D3017 or ASTM D2922. Test results shall be furnished to the Owner. The calibration checks of both the density and moisture gauges shall be made at the beginning of a job on each different type of material encountered and at intervals as directed.

I. Pipeline Testing

1. Leakage Tests: Lines shall be tested for leakage by low pressure air or water testing or exfiltration tests, as appropriate. Low pressure air testing for vitrified clay pipes shall conform to ASTM C828. Low pressure air testing for concrete pipes shall conform to ASTM C924/ASTM C924M. Low pressure air testing for plastic pipe shall conform to ASTM F1417. Low pressure air testing procedures for other pipe materials shall use the pressures and testing times prescribed in ASTM C828 or ASTM C924/ASTM C924M, after consultation with the pipe manufacturer. Testing of individual joints for leakage by low pressure air or water shall conform to ASTM C1103/ASTM C1103M. Prior to exfiltration tests, the trench shall be backfilled up to at least the lower half of the pipe. If required, sufficient additional backfill shall be placed to prevent pipe movement during testing, leaving the joints uncovered to permit inspection. Visible leaks encountered shall be corrected regardless of leakage test results. When the water table is 600 mm 2 feet or more above the top of the pipe at the upper end of the pipeline section to be tested, infiltration shall be measured using a suitable weir or other device acceptable to the Owner. An exfiltration test shall be made by filling the line to be tested with water so that a head of at least 2 feet (600 mm) is provided above both the water table and the top of the pipe at the upper end of the pipeline to be tested. The filled line shall be allowed to stand until the pipe has reached its maximum absorption, but not less than 4 hours. After absorption, the head shall be reestablished. The amount of water required to maintain this water level during a 2-hour test period shall be measured. Leakage as measured by the exfiltration test shall not exceed 250 gallons per inch in diameter per mile (60 liters per mm in diameter per kilometer) of pipeline per day **OR** 0.2 gallons per inch in diameter per 100 feet (9 mL per mm in diameter per 100 meters), **as directed**, of pipeline per hour. When leakage exceeds the maximum amount specified, satisfactory correction shall be made and retesting accomplished.
2. Deflection Testing: Perform a deflection test on entire length of installed plastic pipeline on completion of work adjacent to and over the pipeline, including leakage tests, backfilling, placement of fill, grading, paving, concreting, and any other superimposed loads. Deflection of pipe in the installed pipeline under external loads shall not exceed 4.5 percent of the average inside diameter of pipe. Determine whether the allowable deflection has been exceeded by use of a pull-through device or a deflection measuring device.
 - a. Pull-through device: This device shall be a spherical, spheroidal, or elliptical ball, a cylinder, or circular sections fused to a common shaft. Circular sections shall be so spaced on the shaft that distance from external faces of front and back sections will equal or exceed diameter of the circular section. Pull-through device may also be of a design promulgated by the Uni-Bell Plastic Pipe Association, provided that the device meets the applicable requirements specified in this paragraph, including those for diameter of the device. Ball, cylinder, or circular sections shall conform to the following:
 - 1) A diameter, or minor diameter as applicable, of 95 percent of the average inside diameter of the pipe; tolerance of plus 0.5 percent will be permitted.
 - 2) A homogeneous material throughout, with a density greater than 1.0 as related to water at 39.2 degrees F (4 degrees C), and a surface Brinell hardness of not less than 150.
 - 3) Center bored and through bolted with a 1/4 inch (6 mm) minimum diameter steel shaft having a yield strength of not less than 70,000 psi (483 MPa), with eyes or loops at each end for attaching pulling cables.
 - 4) Each eye or loop shall be suitably backed with a flange or heavy washer such that a pull exerted on opposite end of shaft will produce compression throughout remote end.

- b. Deflection measuring device: Sensitive to 1.0 percent of the diameter of the pipe being tested and accurate to 1.0 percent of the indicated dimension. Deflection measuring device shall be approved by the the Owner prior to use.
- c. Pull-through device: Pass the pull-through device through each run of pipe, either by pulling it through or flushing it through with water. If the device fails to pass freely through a pipe run, replace pipe which has the excessive deflection and completely retest in same manner and under same conditions as specified.
- d. Deflection measuring device procedure: Measure deflections through each run of installed pipe. If deflection readings in excess of 4.5 percent of average inside diameter of pipe are obtained, retest pipe by a run from the opposite direction. If retest continues to show a deflection in excess of 4.5 percent of average inside diameter of pipe, remove pipe which has excessive deflection, replace with new pipe, and completely retest in same manner and under same conditions.
- e. Warranty period test: Pipe found to have a deflection of greater than 5 percent of average inside diameter when deflection test is performed just prior to end of one-year warranty period shall be replaced with new pipe and tested as specified for leakage and deflection.

J. Field Painting

- 1. After installation, clean cast-iron frames, covers, gratings, and steps not buried in masonry or concrete to bare metal of mortar, rust, grease, dirt, and other deleterious materials and apply a coat of bituminous paint **OR** After installation, clean steel covers and steel or concrete frames not buried in masonry or concrete to bare metal of mortar, dirt, grease, and other deleterious materials. Apply a coat of primer and apply a top coat as specified in Division 09 Section "Exterior Painting", **as directed**. Do not paint surfaces subject to abrasion.

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Task	Specification	Specification Description
33 42 13 13	01 22 16 00	No Specification Required
33 42 13 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 42 13 13	33 31 11 00	Sanitary Sewerage
33 42 13 13	33 42 11 00	Storm Drainage
33 42 23 00	31 32 19 16	Sewage Treatment Lagoons
33 42 23 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 42 23 00	33 42 11 00	Storm Drainage
33 42 26 23	33 42 11 00	Storm Drainage
33 42 31 00	31 32 19 16	Sewage Treatment Lagoons
33 42 31 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 42 31 00	33 42 11 00	Storm Drainage
33 42 33 00	31 32 19 16	Sewage Treatment Lagoons
33 42 33 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 42 33 00	33 42 11 00	Storm Drainage
33 42 36 00	31 32 19 16	Sewage Treatment Lagoons
33 42 36 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 42 36 00	33 42 11 00	Storm Drainage

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SECTION 33 44 36 00 - OIL/WATER SEPARATOR

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for oil/water separator. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Scope

1. The separator shall be designed for gravity separation of sand, grit, settleable solids, or semisolids, and free oils (hydrocarbons and other petroleum products) from wastewater. Separator shall be installed belowground with top access at or above grade level. The source of the influent to the separator shall be gravity flow from storm water runoff, hydrocarbon spills, and/or cleaning/maintenance operations.

C. Performance

1. Influent Characteristics

- a. Provide separator designed for intermittent and variable flows of water, oil, or any combination of non-emulsified oil-water mixtures. Minimum separator retention time shall be 10 minutes. Operating temperatures of the influent oil in water mixture shall range from 40 degrees F. to 80 degrees F. The specific gravity of the oils at operating temperatures shall range from 0.71 to 0.92. The specific gravity of the fresh water at operating temperatures shall range from 1.00 to 1.03.

2. Effluent Characteristics

- a. The free oil and grease concentration in the effluent from the separator shall not exceed 10 mg/l (10 PPM) to satisfy requirements of the NPDES stormwater discharge permit. To achieve this goal, it will be necessary to remove all free oil droplets equal to and greater than 20 microns.

D. Design Criteria

1. The separator shall be listed to Underwriters' Laboratories UL-SU2215. Construction and performance of the oil/water separators shall be in accordance with UL-SU2215. Provide certification documentation detailing criteria under which the system was tested. UL-SU2215 label shall be prominently displayed on manway covers.
2. Separator shall be designed in accordance with Stokes Law and the American Petroleum Institute Publication 421, "Monographs on Refinery Environmental Control - Management of Water Discharges; Design and Operation of Oil/Water Separators." Effective surface area calculations, signed and stamped by a Registered Professional Engineer shall be submitted to document specified effluent quality based on complete removal of the specified oil globule at design flow. A separator with lower effective surface area than required is not permissible.
3. Separator capacities, dimensions, construction, and thickness shall be in strict accordance with Underwriters' Laboratories, Subject UL-58 Standard for Safety, Steel Underground Tanks for Flammable and Combustible Liquids, September 30, 1997, Double Wall construction with 360 degree Steel Secondary Containment. The inner steel tank shall be completely contained within the outer steel tank, enclosing 100% of the tank volume. The tank shall have a double steel shell with a space between the layers. The space between the inner and outer steel walls shall be monitored with an approved electronic leak detection device through a pipe that extends vertically to the top of the tank from a small sump at the bottom. Tank construction using thin walled primary tank with external fiberglass jacket shall not be permissible.
4. Separator Corrosion Control System shall be in strict accordance with Underwriters' Laboratories Inc. Subject UL-1746 Standard for External Corrosion Protection Systems for Steel Underground Storage Tanks and the HighGuard® External Corrosion Protection Specifications.

5. Oil/water separator shall comply with National Fire Protection Association NFPA 30 Flammable and Combustible Liquids Code, 2003 Edition.
6. Separator vessel volume shall allow for a hydraulic retention time of ten (10) minutes to ensure laminar flow conditions which result in hydraulic uniformity and high effluent quality. Volume reduction will adversely affect separator performance by increasing horizontal velocity and turbulence, therefore a separator of smaller volume is not permissible.
7. Separator shall be the standard patented product of a steel tank manufacturer regularly engaged in the production of such equipment. Manufacturer shall have at least 20 years experience in manufacturing similar units for identical applications. No subcontracting of tank fabrication shall be permitted.
8. Separator shall be fabricated, inspected, and tested for leakage before shipment from the factory by manufacturer as a completely assembled vessel ready for installation.
9. Separator shall be cylindrical, horizontal, atmospheric-type steel vessel intended for the separation and storage of flammable and combustible liquids. The separator shall have the structural strength to withstand static and dynamic hydraulic loading while empty and during operating conditions. The Oil/Water Separator's dimensions and thickness shall be in strict compliance with Roark's Formulas for Stress and Strain as presented in UL 58, September 30, 1997. Calculations, signed and stamped by a Registered Professional Engineer shall be submitted to document structural strength under specified overbearing or external pressure. A separator with a reduced shell thickness is not permissible.
10. Separator shall have an oil storage capacity equal to about 43% of the total vessel volume and an emergency oil spill capacity equal to 80% of the total vessel volume.
11. To prevent extensive shutdown and maintenance, the separator design must allow solids to fall unhindered by turbulence, and oil droplets to rise without risk of re-emulsifying due to collisions with interfering solids. The use of plastic perforated tubes, spherical balls, or irregular shaped media will increase the facility's maintenance costs and shall not be permitted.
12. Separator shall consist of inlet and outlet connections, integral sand interceptor compartment, non-clogging flow distributor and energy dissipater device, stationary under flow baffle, presettling chamber for solids, sludge baffle, oil coalescing chamber with removable parallel flat/corrugated plate coalescer, with removable plates, and sectionalized removable polypropylene impingement coalescers to optimize separation of free oil from water, effluent downcomer positioned to prevent discharge of free oil that has been separated from the water, access ways for coalescers and each chamber, fittings for vent, oil pump-out, sampling, gauging, leak detection, and lifting lugs.

E. Submittals:

1. Shop Drawings: shop drawings for oil water separators shall show principal dimensions and location of all fittings.
2. Instructions: provide three complete sets of installation, operation, and maintenance instructions with separator.
3. Quality Control: Quality control, inspection procedures, and reports shall be considered part of the submittal package.

F. Warranty

1. The manufacturer shall warrant its products to be free from defects in material and workmanship for a period of one year from the date of shipment. The warranty shall be limited to repair or replacement of the defective part(s).
2. The manufacturer's warranty shall be standard limited warranty in effect at time of purchase.

1.2 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Highland Tank, One Highland Road, Box 338, Stoystown, PA 15563, Phone 814-893-5701, FAX 893-6126, E-mail ows.info@highlandtank.com, Website <http://www.highlandtank.com>

B. Product

1. Provide and install Highland Tank Model HTC Series "G" UL-SU2215 approved Belowground Double Wall Parallel Flat/Corrugated Plate Gravity Displacement Oil/Water Separator with Integral Sand Interceptor Compartment. Separator shall be furnished with oil level alarm and leak detection systems. Oil/Water Separator shall be of capacity to comply with Spill Prevention Control and Countermeasures (SPCC) plan requirements at the facility. The sizing of this oil/water separator is consistent with industry protocols for complying with the minimum federal spill and discharge regulations therefore a separator of smaller volume is not permissible.
2. Separator shall be furnished with a Corella™ inclined parallel flat/corrugated plate coalescer to simultaneously separate free oil droplets and settleable or suspended solids particles from water without clogging of the coalescer.

C. Description

1. Separator shall be standard prefabricated inclined parallel flat/corrugated plate, gravity displacement type unit.
2. Separator shall be cylindrical with capacities, dimensions, construction, and thickness in strict accordance with Underwriters' Laboratories Subject 58, Double Wall construction using flat-flanged heads. Separator shall comply with National Fire Protection Association NFPA 30 Flammable and Combustible Liquids Code, 2003 Edition.
3. The separator shall be a pre-packaged, pre-engineered, ready to install unit consisting of:
 - a. An influent connection, flanged. An internal influent nozzle at the inlet end of the separator. Nozzle discharge to be located at the furthest diagonal point from the effluent discharge opening.
 - b. An integral sand interceptor compartment containing one (1) manhole, UL approved, complete with extension, cover, gasket, and bolts. A heavy-duty bulkhead shall retain sand, grit, settleable solids or semisolids and prevent them from entering the separation chamber. Bulkhead shall have a transfer pipe.
 - c. A velocity head diffusion baffle at the inlet to:
 - 1) reduce horizontal velocity and flow turbulence.
 - 2) distribute the flow equally over the separator's cross-sectional area.
 - 3) direct the flow in a serpentine path in order to enhance hydraulic characteristics and fully utilize all separator volume.
 - 4) completely isolate all inlet turbulence from the separation chamber.
 - d. A sediment chamber to disperse flow and collect oily solids and sediments.
 - e. A sludge baffle to retain settleable solids and sediment and prevent them from entering the separation chamber.
 - f. An Oil/Water Separation Chamber containing a removable Corella™ inclined parallel flat/corrugated plate coalescer. The coalescer shall have individual removable plates, sloped towards the sediment chamber. Each coalescing plate shall be flat on the top and corrugated on the bottom. The flat top plate shall resist clogging and clotting with solids. The corrugations of each of the plate bottoms shall be shaped and positioned to enhance collisions between the rising oil droplets and coalesce between them thereby improving separator efficiency. The coalescer shall:
 - 1) effect separation of oil and solids from all strata of the wastewater stream.
 - 2) shorten the vertical distance that an oil globule or solid particle has to rise or sink, respectively, for effective removal. Minimum plate gap to be 3/4".
 - 3) enhance coalescence and agglomeration by causing the smaller globules and particles (those possessing smaller rising/settling rates) to coalesce and collect on the plates thereby forming larger globules and particles that separate rapidly in water.
 - 4) direct the flow paths of the separated oil to the surface of the separator and separated solids to the bottom of the separator.
 - 5) allow solids to fall unhindered by turbulence, and oil droplets to rise without risk of re-emulsifying due to collisions with interfering solids.
 - g. The Oil/Water Separation Chamber shall also contain a sectionalized removable "Petro-Screen"™ polypropylene impingement coalescer designed to intercept oil globules of less

than 20 microns in diameter. Heavy, one-piece impingement coalescers are not permissible.

- h. An internal effluent downcomer at the outlet end of the separator, to allow for discharge from the bottom of the separation chamber only.
- i. An effluent connection, flanged.
- j. Fittings for vent, interface/level sensor, leak detection, waste oil pump-out, sampling, and gauge.
- k. Two (2) manholes, UL approved, complete with extension, cover, gasket, and bolts. One manway shall be placed between the inlet and the parallel flat/corrugated plate coalescer to facilitate access into sediment chamber for solids removal. One manway shall be placed between the parallel flat/corrugated plate coalescer and outlet to facilitate access into the oil water separation chamber for oil removal.
- l. Lifting lugs at balancing points for handling and installation.
- m. Identification plates: Plates shall be affixed in prominent location and be durable and legible throughout equipment life.
- n. HighGuard® Corrosion Protection System consisting of:
 - 1) Isolation Spool Pieces
 - 2) Dielectric Isolation Gaskets and Bushings
 - 3) External surfaces commercial grit blast, coated 75 mils DFT Self-Reinforcing Polyurethane.
- o. Internal surfaces commercial grit blast and coated with 10 mils DFT heavy duty Polyurethane.

D. Accessories

- 1. Separator shall be supplied with an audible and visual alarm system that indicates hi oil level (visual only) and hi hi oil level (audible and visual) of oil storage in the oil/water separator and an audible and visual leak detection alarm system that indicates hydrocarbon and/or water in the interstice. A silence control shall be provided for the audible alarms. Level sensor(s) shall be intrinsically safe. Level sensor floats shall be made of stainless steel. The control panel shall contain both level sensor and detection control. The control panel shall be NEMA 4. Power to the control panel shall be as directed by the Owner.
- 2. Separator shall be supplied with Polyester Hold-down straps.
- 3. Separator shall be supplied with prefabricated Concrete Deadman Anchors.
- 4. Separator shall be supplied with cylindrical and/or rectangular steel Grade Level Manways designed to AASHTO H20 requirements.

1.3 EXECUTION

A. Installation

- 1. Installation shall be in strict compliance with manufacturer's instructions and shall comply with all applicable local, state, and federal requirements.

END OF SECTION 33 44 36 00

Task	Specification	Specification Description
33 44 36 00	22 13 19 26	Interceptors
33 46 53 00	33 14 13 23	Sand Drains
33 46 53 00	01 95 99 99	Relief Wells
33 46 53 00	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 52 16 13	01 22 16 00	No Specification Required
33 52 16 13	01 95 99 99a	Common Work Results for Fire Suppression
33 52 16 13	01 95 99 99b	Common Work Results for Plumbing
33 52 16 13	01 95 99 99g	Common Work Results for HVAC
33 52 16 13	23 11 23 00	Facility Natural-Gas Piping
33 52 16 13	23 11 23 00a	Facility Liquefied-Petroleum Gas Piping
33 52 16 13	22 05 23 00b	Piped Utilities Basic Materials And Methods
33 52 16 23	23 11 23 00	Facility Natural-Gas Piping
33 52 16 23	23 11 23 00a	Facility Liquefied-Petroleum Gas Piping
33 52 16 26	23 11 23 00	Facility Natural-Gas Piping
33 52 16 26	23 11 23 00a	Facility Liquefied-Petroleum Gas Piping
33 61 13 00	33 14 13 23a	Hydronic Distribution
33 71 19 23	26 05 00 00	Common Work Results for Electrical
33 71 19 23	26 05 19 16a	Conductors And Cables
33 71 19 23	26 05 19 16b	Common Work Results for Communications
33 71 19 23	26 05 19 16c	Communications Equipment Room Fittings
33 71 19 23	26 05 19 16d	Communications Backbone Cabling
33 71 19 23	26 05 19 16e	Communications Horizontal Cabling
33 71 19 23	26 05 19 16f	Common Work Results for Electronic Safety and Security
33 71 19 23	26 05 19 16g	Conductors and Cables for Electronic Safety and Security

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Task	Specification	Specification Description
34 71 13 13	34 71 13 26	Beam-Type Guardrail

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SECTION 34 71 13 16 - ACTIVE VEHICLE BARRIERS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for active vehicle barriers. Products shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Shop Drawings: Installation, Equipment, and Electrical Work
 - a. Detail drawings containing complete wiring and schematic diagrams, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit. Drawings shall show proposed layout and anchorage of equipment and appurtenances, and equipment relationship to other parts of the work including foundation and clearances for maintenance and operation. For Federal work, detail drawings shall include a copy of the Department of State certificate of barrier performance.
2. Product Data:
 - a. Vehicle Barriers: A complete list of equipment, materials, including industrial standards used and how they apply to the applicable component and manufacturer's descriptive data and technical literature, catalog cuts, and installation instructions. Information necessary to document a minimum 1-year successful field operation performance history for each type of vehicle barrier installed.
 - b. Spare Parts: Spare parts data for each different item of material and equipment used, after approval of the detail drawings. The data shall include a complete list of parts and supplies, with current unit prices and source of supply.
3. Test Reports
 - a. Field Testing: Test reports in booklet form showing all field tests, including component adjustments and demonstration of compliance with the specified performance criteria, upon completion and testing of the installed system. Each test report shall indicate the final position of controls.
4. Operation and Maintenance Data
 - a. Vehicle Barriers: Operating and Maintenance Instructions
 - 1) Six copies of operation and maintenance manuals, a minimum of 2 weeks prior to field training. One complete set prior to performance testing and the remainder upon acceptance. Manuals shall be approved prior to acceptance. Operation manuals shall outline the step-by-step procedures required for system startup, operation, and shutdown. The manuals shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Maintenance manuals shall include routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guide. The manuals shall include piping layout, equipment layout, and simplified wiring and control diagrams of the system as installed. The manuals shall also include synthetic biodegradable hydraulic oil types to be used for ambient temperature ranges of minus 30 degrees F (minus 34 degrees C) to 150 degrees F (plus 66 degrees C) to cover winter operation, summer operation, and ambient temperature ranges in between.

C. General Requirements

1. Performance levels shall be based on the following:
 - a. The Department of State (DOS) publication SD-SDT-02.01 Specification for Vehicle Crash Testing of Perimeter Barriers and Gates (April 1985) in which:
 - 1) Impact Conditions:

Condition Designation	Vehicle Weight	Impact Speed	Kinetic Energy
K4	15,000 lb (6,800 kg)	30 mph (48 km/h)	450,000 ft-lb (610 kJ)
K8	15,000 lb (6,800 kg)	40 mph (65 km/h)	800,000 ft-lb (1084 kJ)
K12	15,000 lb (6,800 kg)	50 mph (80 km/h)	1,250,000 ft-lb (1695 kJ)

2) Performance Levels:

- a) L 3.0 Vehicle and cargo are to be stopped although vehicle partial penetration and/or barrier deflection of up to 3 feet (1 m) permitted.
- b) L 2.0 Vehicle and cargo are to be stopped although vehicle partial penetration and/or barrier deflection of up to 20 feet (6 m) is permitted.
- c) L 1.0 Vehicle is disabled and does not travel more than 50 feet (15 m) after impact.

2. Vehicle Barriers furnished shall in all respects be identical to the unit tested and certified except for the width of the vehicle barrier, which is as indicated and except for bollards which have a diameter based on a required crash rating. Crash test shall be performed and data compiled by an approved independent testing agency. Test vehicle shall not vault or penetrate the barrier during the test. The design and structural materials of the vehicle barrier furnished shall be the same as those used in the crash tested barrier.

D. Nameplates

- 1. Nameplate data shall be permanently attached to each vehicle barrier. The data shall be legibly marked on corrosion-resistant metal plates and shall consist of at least the following:
 - a. Manufacturer's name.
 - b. Model number.
 - c. Serial number.
 - d. Date of manufacture.

E. Delivery And Storage

- 1. Components placed in storage shall be protected from the weather, humidity, and temperature variation, dirt and dust, or other contaminants. Structural materials shall be stored on sleepers or pallets and shall be protected from rust and objectionable materials such as dirt, grease, or oil.

F. Spare Parts

- 1. A manufacturer's standard recommended spare parts package, with current unit prices and source of supply complete with detailed manuals on parts replacement, shall be provided with each barrier to facilitate 1 year of normal operation. Particular consideration shall be given to system components which are not readily available from local or commercial sources and which are critical to the operation of the system.

G. Manufacturer's Services

- 1. Services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment supplied shall be available. The representative shall supervise the installation, adjustment, and testing of the equipment.

1.2 PRODUCT

A. Retractable Barriers: When in the raised position, the total retractable barrier heights shall be no less than 28 inches (711 mm) above the roadway surface and shall be 144 inches (3.66 m) wide. When in the lowered position, the retractable barrier shall extend no more than 5/8 inch (16 mm) above the roadway surface. Retractable barriers in the lowered position shall be capable of supporting a 32,000 pound (142 kN) axle load or a 16,000 (71 kN) wheel load. Design for this load shall be in accordance with AASHTO HB-17.

- 1. Powered Retractable Barrier: The retractable barrier shall be capable of 300 complete up/down cycles per hour. The retractable barrier motion shall be instantly reversible and shall be capable

of raising the barrier from the lowered position to the raised position within 8 seconds during normal use, and within 2 seconds during an emergency. Also, the barrier shall be capable of being lowered from the raised position to the lowered position in not more than 3 seconds. Retractable barrier shall withstand a K4 **OR** K8 **OR** K12, **as directed**, impact condition with Performance Level of L1.0 **OR** L2.0 **OR** L3.0, **as directed**.

- a. Failure Modes of Operation: The system shall be designed to remain in the last commanded position in the event of hydraulic, electrical, or mechanical failure. A manual pump, or other system, shall be included for operation of hydraulic barriers without power.
 - b. Electric Motors: Unless otherwise indicated, electric motors shall have drip-proof **OR** totally enclosed **OR** totally enclosed fan cooled, **as directed**, enclosures. All couplings, motor shafts, gears, and other moving parts shall be fully guarded in accordance with 29 CFR 1910 Subpart O. Guards shall be removable without disassembling the guarded unit. For multiple barriers operated from a single hydraulic unit it is highly recommended that the electric motor be 3-phase.
 - c. System: The system shall be designed to maintain the barriers in the raised position, without inspection, for periods of time of up to 1 week. If a hydraulic system is used, it shall be equipped with pressure relief valves to prevent overpressure. The system shall not require continuous running of the motor to stay in the raised position, excluding the use of manual pinning to do so.
 - d. Hydraulic Power Unit: The hydraulic power unit shall contain synthetic biodegradable hydraulic fluid which maintains its viscosity operating range, even at constant heaviest use rate, for an ambient temperature range of 20 to 150 degrees F (minus 7 to plus 66 degrees C). A hydraulic fluid heater shall be provided so that the viscosity remains within its operating range if ambient temperatures below 20 degrees F (minus 7 degrees C) are expected. Buried hydraulic lines for the connection of the hydraulic power unit to the barrier shall be flexible or carbon steel pipe, or a combination of flexible and carbon steel pipe. Flexible and rigid hydraulic line working pressures shall exceed the maximum system relief pressure. PVC pipe and fittings for burial of hydraulic lines shall be in accordance with ASTM D 3034 Type PS 46 with minimum pipe stiffness of 46.
 - 1) Flexible hydraulic lines shall be in accordance with SAE J517.
 - 2) Rigid hydraulic lines shall be seamless carbon steel pipe in accordance with ASTM A 106.
 - e. Hydraulic Power Unit Enclosure: A NEMA Type 3R enclosure as specified in NEMA 250 shall be provided to enclose the hydraulic power unit. The enclosure shall be designed for easy removal of the hydraulic power unit and other accessories without complete removal of the enclosure. An access door with hinges and an inside and outside operable/lockable (exterior) door latch shall be provided. Equipment within the enclosure shall be placed and configured so that all periodic maintenance can be performed through the access door without removal of the equipment. The enclosure shall be equipped with weatherproof louver vents appropriately sized and located to dissipate internal heat generation.
2. Manual Retractable Barriers: The manual barrier shall be capable of being raised and lowered by manual means such as levers or hydraulics requiring a maximum 60 pounds (267 N) of force. The manual mechanism shall contain a locking pin which accepts a padlock for securing the barrier when it is in the "UP" position. Retractable barrier shall withstand a K4 **OR** K8 **OR** K12, **as directed**, impact condition with Performance Level of L1.0 **OR** L2.0 **OR** L3.0, **as directed**. Barrier should be capable of being locked in the down position.
- B. Retractable Bollards: The total bollard height when in the raised position shall be no less than 30 inches (750 mm) above the roadway surface and shall have an outside diameter of no less than 8 inches (200 mm). A bollard system shall consist of a minimum of 3 bollards spaced no more than 36 inches (915 mm) from centerline to centerline of bollards across a 10 foot (3.0 m) roadway. Bollards in the lowered position shall be capable of supporting a 16,000 pound (71 kN) wheel load each. Design for this load shall be in accordance with AASHTO HB-17. Retractable bollards shall withstand a K4 **OR** K8 **OR** K12, **as directed**, Impact Condition with Performance Level of L1.0 **OR** L2.0 **OR** L3.0, **as directed**.

1. Powered Retractable Bollards: The retractable bollard shall be capable of 300 complete up/down cycles per hour. Bollards shall be capable of being raised or lowered within a 3 to 15-second range during normal use and within 2.5 seconds for emergency operations.
 - a. Failure Modes of Operation: The system shall be designed to prevent lowering of the barrier in the event of hydraulic, electrical, or mechanical failure. A manual pump, or other system, shall be included for operation of hydraulic and/or mechanical barriers without power.
 - b. Electric Motors: Unless otherwise indicated, electric motors shall have drip-proof **OR** totally enclosed, **as directed**, enclosures. For multiple barriers being operated from a hydraulic power unit it is highly recommended that the electric motor be 3-phase.
 - c. System: The system shall be designed to maintain the barriers in the raised position, without inspection, for period of time of up to 1 week. If a hydraulic system is used, it shall be equipped with pressure relief valves to prevent overpressure.
 - d. Hydraulic Power Unit: The hydraulic power unit shall contain synthetic biodegradable hydraulic fluid which maintains its viscosity operating range, even at constant heaviest use rate, for an ambient temperature range of 20 to 150 degrees F (minus 7 to plus 66 degrees C). A hydraulic fluid heater shall be provided so that the viscosity remains within its operating range, if ambient temperatures below 20 degrees F (minus 7 degrees C) are expected. Buried hydraulic lines for the connection of the hydraulic power unit to the barrier shall be flexible or carbon steel pipe, or a combination of flexible and carbon steel pipe. Flexible and rigid hydraulic line working pressures shall exceed the maximum system relief pressure. PVC pipe and fittings for burial of hydraulic lines shall be in accordance with ASTM D 3034 Type PS 46 with minimum pipe stiffness of 46.
 - 1) Flexible hydraulic lines shall be in accordance with SAE J517.
 - 2) Rigid hydraulic lines shall be seamless carbon steel pipe in accordance with ASTM A 106.
 - e. Hydraulic Power Unit Enclosure: A NEMA Type 3R enclosure as specified in NEMA 250 shall be provided to enclose the hydraulic power unit. The enclosure shall be designed for easy removal of the hydraulic power unit and other accessories without complete removal of the enclosure. An access door with hinges and an inside and outside operable/lockable (exterior) door latch shall be provided. Equipment within the enclosure shall be placed and configured so that all periodic maintenance can be performed through the access door without removal of the equipment. The enclosure shall be equipped with weatherproof louver vents appropriately sized and located to dissipate internal heat generation.
 2. Manual Retractable Bollards: Manual bollards shall be capable of being raised and lowered utilizing a recessed handle on the top surface of the bollard or a manual hydraulic pump, either requiring a maximum 60 pounds (267 N) of force. A mechanism, that is lockable, shall be provided to secure the bollard in either the full "UP" or full "DOWN" position.
- C. Crash Gate: The crash gate shall consist of steel buttresses anchored into the ground and an above grade assembly consisting of a heavy steel structure or a combination of heavy steel and structural aluminum capable of being opened and closed. The height of the gate shall be a minimum of 84 inches (2.1 m) from the road surface to the top of the gate frame. The length shall close and protect a minimum 120 inch (3.0 m) clear opening. The maximum clear opening between the gate frame and end posts, between the bottom of the gate and finished grade, and between any grill work shall be 3 inches (75 mm).
1. Powered Crash Gate: The gate movement shall be controlled by an electro-mechanical gate operator **OR** a hydraulic gate operator, **as directed**, consisting of an operator unit with required control circuits and operator station. The control and operating voltage shall be 24 vac (nominal) or, as an option 24 vdc. A remote control master station shall be capable of driving the gate at minimum 48 fpm (14.6 m per minute) for a slide gate or 6 degrees per second for a swing gate. Unless otherwise indicated, motors shall have drip-proof **OR** totally enclosed, **as directed**, enclosures. Crash gate shall withstand a 15,000 pound (6804 kg) vehicle at impact speed of 30 **OR** 40 **OR** 50, **as directed**, mph (48 **OR** 64 **OR** 80, **as directed**, km/hour), with maximum barrier deflection or vehicle penetration of 3 feet (1 m).

- a. Failure Mode of Operation: The system shall be designed to prevent opening of the crash gate in the event of electrical or mechanical failure. A disconnect system for the gate drive shall be provided to allow manual operation of the barrier in the event of a power outage.
 - b. Hydraulic Power Unit: The hydraulic power unit shall contain synthetic biodegradable hydraulic fluid which maintains its viscosity within its operating range, even at constant heaviest use rate, for an ambient temperature range of 20 to 150 degrees F (minus 7 to plus 66 degrees C). A hydraulic fluid heater shall be provided so that the viscosity remains within its operating range if ambient temperatures below 20 degrees F (minus 7 degrees C) are expected. Buried hydraulic lines for the connection of the hydraulic power unit to the barrier shall be flexible or carbon steel pipe, or a combination of flexible and carbon steel. Flexible and rigid hydraulic line working pressures shall exceed the maximum system relief pressure. PVC pipe and fittings for burial of hydraulic lines shall be in accordance with ASTM D 3034 Type PS 46 with minimum pipe stiffness of 46.
 - 1) Flexible hydraulic lines shall be in accordance with SAE J517.
 - 2) Rigid hydraulic lines shall be seamless carbon steel pipe in accordance with ASTM A 106.
 - c. Hydraulic Power Unit Enclosure: A NEMA Type 3R enclosure as specified in NEMA 250 shall be provided to enclose the hydraulic power unit. The enclosure shall be designed for easy removal of the hydraulic power unit and other accessories without complete removal of the enclosure. An access door with hinges and an inside and outside operable/lockable (exterior) door latch shall be provided. Equipment within the enclosure shall be placed and configured so that all periodic maintenance can be performed through the access door without removal of the equipment. The enclosure shall be equipped with weatherproof louver vents appropriately sized and located to dissipate internal heat generation.
2. Manual Crash Gate: The manual crash gate shall be capable of being hinged from either side. Hinge points of both buttresses shall each contain a locking pin with padlock acceptance for securing the crash gate in the closed position. The crash gate shall withstand a 10,000 pound (4535 kg) vehicle at impact speed of 50 mph (80 km/hour), with maximum gate deflection or vehicle penetration of 10 feet (3 m) 15,000 pound (6804 kg) vehicle traveling at impact speed of 30 **OR** 40 **OR** 50, **as directed**, mph (48 **OR** 64 **OR** 80, **as directed**, km/hour), with a maximum gate deflection or vehicle penetration of up to 3 feet (1 m).
- D. Crash Beam: The crash beam shall be an above-grade assembly that, in the "DOWN" position, shall present a visible obstacle to approaching vehicles. The height of the barrier shall be a minimum of 30 inches (750 mm) as measured from the roadway surface to the centerline of the crash beam. The crash beam shall be capable of blocking a minimum road width of 120 inches (3.0 m). The crash beam end shall contain a locking pin with padlock acceptance for securing the crash beam when it is in the "DOWN" position. Crash beam shall withstand a 15,000 pound (6804 kg) vehicle traveling at 30 **OR** 40 **OR** 50, **as directed**, mph (48 **OR** 64 **OR** 80, **as directed**, km/hour), with maximum vehicle penetration of 20 feet (6 m) 10,000 pound (4535 kg) vehicle at impact speed of 15 mph (24 km/hour), with a maximum vehicle penetration of 10 feet (3 m).
1. Powered Crash Beam: The crash beam shall be operated by means of a hydraulic power system. The crash beam shall be capable of being raised or lowered within an 8 to 15 second time range.
 - a. Failure Mode of Operation: A disconnect system for the crash beam shall be provided to allow manual operation of the barrier in the event of an electrical or mechanical failure.
 - b. Hydraulic Power Unit: The hydraulic power unit shall contain synthetic biodegradable hydraulic fluid which maintains its viscosity operating range, even at constant heaviest use rate, for an ambient temperature range of 20 to 150 degrees F (minus 7 to plus 66 degrees C). A hydraulic fluid heater shall be provided so that the viscosity remains within its operating range if ambient temperatures below 20 degrees F (minus 7 degrees C) are expected. Buried hydraulic lines for the connection of the hydraulic power unit to the barrier shall be flexible or carbon steel pipe or a combination of flexible and carbon steel pipe. Flexible and rigid hydraulic line working pressures shall exceed the maximum system relief pressure. PVC pipe and fittings for burial of hydraulic lines shall be in accordance with ASTM D 3034 Type PS 46 with minimum pipe stiffness of 46.

- 1) Flexible hydraulic lines shall be in accordance with SAE J517.
 - 2) Rigid hydraulic lines shall be seamless carbon steel pipe in accordance with ASTM A 106.
- c. Hydraulic Power Unit Enclosure: A NEMA Type 3R enclosure as specified in NEMA 250 shall be provided to enclose the hydraulic power unit. The enclosure shall be designed for easy removal of the hydraulic power unit components and other accessories without complete removal of the enclosure. An access door with hinges and an inside and outside operable/lockable exterior door latch shall be provided. Equipment within the enclosure shall be placed and configured so that all periodic maintenance can be performed through the access door without removal of the equipment. The enclosure shall be equipped with weatherproof louver vents appropriately sized and located to dissipate internal heat generation.
2. Manual Crash Beam: The crash beam shall be manually raised and lowered with the aid of a counterbalanced end requiring approximately 60 pounds (267 N) of force.
- E. Portable Retractable Barrier: The portable retractable barrier shall be transportable and capable of manual and/or electro-mechanical operation. When in the raised position, the total barrier heights shall be no less than 28 inches (711 mm) above the roadway surface and shall be up to 144 inches (3.66 m wide). The barrier shall be equipped with entrance/exit ramps when the barrier extends more than 5/8 inch (16 mm) above the roadway surface. Retractable barriers in the lowered position shall be capable of supporting a 32,000 pound (142 kN) axle load or a 16,000 (71 kN) pound wheel load. Design for this load shall be in accordance with AASHTO HB-17.
1. Powered Portable Retractable Barrier: The portable retractable barrier shall be capable of 300 complete up/down cycles per hour. The retractable barrier motion shall be instantly reversible and shall be capable of raising the barrier from the lowered position to the raised position within 8 seconds during normal use, and within 2 seconds during an emergency. Also, the barrier shall be capable of being closed from the raised position to the lowered position in not more than 3 seconds. Retractable barrier shall withstand a K4 **OR** K8 **OR** K12, **as directed**, impact condition with Performance Level of L1.0 **OR** L2.0 **OR** L3.0, **as directed**. Portable retractable barrier, when impacted by a 15,000 pound (6,800 kg) vehicle at impact speed of 50 mph (80 km/hour) shall disable the vehicle and allow it to travel no more than 50 feet (15.2 m) after impact. Portable power assisted retractable barriers shall be equipped with on and off ramps for smooth transition between surfaces when the barrier extends more than 5/8 inch (16 mm) above the roadway surface.
 - a. Failure Modes of Operation: The system shall be designed to prevent lowering of the barrier in the event of hydraulic, electric, or mechanical failure. A manual pump shall be included for operation of hydraulic and/or mechanical barriers without power.
 - b. Electric Motors: Unless otherwise indicated, electric motors shall have drip-proof **OR** totally enclosed, **as directed**, enclosures.
 - c. System: The system shall be designed to maintain the barriers in the raised position, without inspection, for periods of time of up to 1 week. If a hydraulic system is used, it shall be equipped with pressure relief valves to prevent overpressure.
 - d. Hydraulic Power Unit: The hydraulic power unit shall contain synthetic biodegradable hydraulic fluid which maintains its viscosity operating range, even at constant heaviest use rate, for an ambient temperature range of 20 to 150 degrees F (minus 7 to plus 66 degrees C). A hydraulic fluid heater shall be provided so that the viscosity remains within its operating range if ambient temperatures below 20 degrees F (minus 7 degrees C) are expected. Flexible hydraulic lines shall be used for the connection of the hydraulic power unit to the barrier. Flexible hydraulic line working pressures shall exceed the maximum system relief pressure; flexible hydraulic lines shall be in accordance with SAE J517.
 2. Manual Retractable Portable Barriers: The manual barrier shall be capable of being raised and lowered by manual means such as levers or hydraulics requiring a maximum 60 pounds (267 N) of force. The manual mechanism shall contain a locking pin which accepts a padlock for securing the barrier when it is in the "UP" position and shall also be capable of being locked in the

"DOWN" position. Retractable barrier shall withstand a K4 **OR** K8 **OR** K12, **as directed**, impact condition with Performance Level of L1.0 **OR** L2.0 **OR** L3.0, **as directed**

- F. Portable Crash Beam: The portable crash beam shall be an above-grade assembly that, in the "DOWN" position, shall present a visible obstacle to approaching vehicles. The height of the barrier shall be a minimum of 30 inches (750 mm) as measured from the roadway surface to the centerline of the crash beam. The crash beam shall be capable of blocking a minimum road width of 120 inches (3.0 m). The crash beam end shall contain a locking pin with padlock acceptance for securing the crash beam when it is in the "DOWN" position. Crash beam shall withstand a 15,000 pound (6804 kg) vehicle traveling at 30 mph (48 km/hour), with maximum vehicle penetration and/or barrier deflection of 20 feet (6 m).
1. Powered Portable Crash Beam: The portable crash beam shall be operated by means of a hydraulic power system. The crash beam shall be capable of being raised or lowered within an 8 to 15 second time range.
 - a. Failure Mode of Operation: A disconnect system for the portable crash beam shall be provided to allow manual operation of the barrier in the event of an electrical or mechanical failure.
 - b. Hydraulic Power Unit: The hydraulic power unit shall contain synthetic biodegradable hydraulic fluid which maintains its viscosity operating range, even at constant heaviest use rate, for an ambient temperature range of 20 to 150 degrees F (minus 7 to plus 66 degrees C). A hydraulic fluid heater shall be provided so that the viscosity remains within its operating range if ambient temperatures below 20 degrees F (minus 7 degrees C) are expected. Flexible hydraulic lines shall be used for the connection of the hydraulic power unit to the barrier. Flexible hydraulic line working pressures shall exceed the maximum system relief pressure; flexible hydraulic lines shall be in accordance with SAE J517.
 - c. Hydraulic Power Unit Enclosure: A weather resistant enclosure shall be provided to enclose the hydraulic power unit. The enclosure shall be designed for easy removal of the hydraulic power unit components and other accessories without complete removal of the enclosure. An access door with hinges and an inside and outside operable lockable (exterior) door latch shall be provided. Equipment within the enclosure shall be placed and configured so that all periodic maintenance can be performed through the access door without removal of the equipment. The enclosure shall be equipped with weatherproof louver vents appropriately sized and located to dissipate internal heat generation.
 2. Manual Portable Crash Beam: The crash beam shall be manually operated by means of a counter balanced system requiring approximately 60 pounds (267 N) of force.
- G. Electrical Work: Motors, manual or automatic motor control equipment except where installed in motor control centers and protective or signal devices required for the operation specified herein shall be provided in accordance with Division 22. All field wiring for loop detectors, communication lines, and power circuits shall have surge protection. Any wiring required for the operation specified herein, but not shown on the electrical plans, shall be provided under this section in accordance with Division 22.
- H. Control Panel: A control panel and control circuit shall be provided to interface between all barrier control stations and the power unit. A control panel shall be provided for the inbound lanes and a separate one for the outbound lanes where the barriers are located. The control station is defined as the main control panel and the remote control panel as shown. The control circuit shall contain all relays, timers, and other devices or an industrial programmable controller programmed as necessary for the barrier operation. The control panel shall allow direct interface with auxiliary equipment such as card readers, remote switches, loop detectors, infrared sensors, and sliding **OR** swinging, **as directed**, gate limit switches. Loop controllers shall not cause an automatic barrier raise following power loss or restoration. The enclosure shall be as indicated on the drawings. All device interconnect lines shall be run to terminal strips.
1. Voltage: The control circuit shall operate from a 120 volt 60 **OR** 50, **as directed**, Hz supply. The control circuit voltage shall be 12 **OR** 24, **as directed**, ac **OR** dc, **as directed**, for all external control panels.

2. Main Control Panel: A main control panel shall be supplied to control barrier function. This panel shall have a key-lockable main switch with main power "ON" and panel "ON" lights. Buttons to raise and lower each barrier **OR** set of barriers, **as directed**, shall be provided. Barrier "UP" and "DOWN" indicator lights shall be included for each barrier **OR** set of barriers, **as directed**. An emergency fast operate circuit (EFO) shall be operated from a push button larger than the normal controls and have a flip safety cover installed over the push button or toggle switch. The EFO shall also be furnished with an EFO-active light and reset button. The main control panel shall have a key lockable switch to arm or disable the remote control panel. An indicator light shall show if the remote control panel is enabled.
 3. Remote Control Panel: A remote control panel, one panel for the inbound lane(s) and a separate panel for the outbound lane(s), shall have a panel "ON" light that is lit when enabled by a key lockable switch on the main control panel. Buttons to raise and lower each barrier shall be provided. Barrier "UP" and "DOWN" indicator lights shall be included for each barrier. The EFO shall be operated from a push button larger than the normal controls and have a flip safety cover installed over the push button or toggle switch. Activation of either EFO will operate all barriers. The EFO shall be interconnected with an EFO-active light. When the remote control panel EFO is pushed, operation of the barrier will not be possible from this panel until reset at the main control panel.
- I. Miscellaneous Equipment
1. Safety Equipment
 - a. Barrier Systems Sensors: The sensors shall be compatible with the barrier controller and shall function as part of a complete barrier control system. The barrier system sensors shall consist of the following:
 - 1) Suppression Loops - Two inductive loops whose outputs shall be used to prevent barriers raising when a vehicle is within a prescribed distance of the barrier. The output of the loops shall override all barrier rise signals until one second after a vehicle clears the suppression loop.
 - 2) Speed Loops - Two inductive loops whose output shall be used to signal the barrier controller of a vehicle approaching at a speed greater than the posted speed (25 mph (11.2 m/sec) or less (recommended)). The speed loops shall cause the barrier control panel to annunciate a warning sound alerting the guard to make a decision as to whether the barrier should be raised or not.
 - 3) Wrong Way Loops - Two inductive loops whose output shall be used to signal the barrier control panel to enunciate a warning sound if a vehicle is attempting to enter the facility through the exit lane. The warning sound will alert the guard to make a decision as to whether the barrier should be raised or not.
 - b. Traffic Lights: Red/yellow 8 inch (200 mm) traffic lights shall be supplied for each entrance and exit to alert motorists of the barrier position. Traffic lights are not required for manual barriers. The yellow flashing light shall indicate that the barrier is fully open. All other positions shall cause the light to show red. Brackets shall be supplied to allow the light to be mounted a minimum 4.5 feet (1.4 m) above the roadway pavement on a 3.5 inch (90 mm) outside diameter metal post or mounted directly on the crash gate.
 2. Warning Annunciator: Provide a warning annunciator built into the barrier control panel that produces a pulsing audible sound when the speed loop detects a vehicle entering the facility with excess speed. Provide a warning annunciator built into the barrier control panel that produces a continuous sound whenever a wrong way loop detects a vehicle entering from the exit. The warning annunciator shall sound until a warning annunciator silence reset button is pressed.
 3. Heater: A waterproof barrier heater with a thermostat control and NEMA 4 junction box connection point shall be provided for de-icing and snow melting. The heater shall provide barrier operation to an ambient temperature of minus 40 degrees F (minus 40 degrees C). For retractable bollards, a 250-watt heater shall be provided for each bollard.
 4. Signage: Signage shall read "Axle Weight Limit 9 Tons" and shall conform to FHWA SA-89-006 sign (R12.2).

5. Vertical Arm Gates (Traffic Arms): Vertical arm gates shall have an opening and closing time of less than or equal to 5 seconds. The gates shall be capable of 500 duty cycles per hour as a minimum. Gate shall operate the arm through 90 degrees. Gate operators shall be supplied with single phase 120 volt motors. Each entry lane shall be provided with a vertical arm gate. Each gate shall be capable of being operated from a remote open-close push button station in each guard booth and the gatehouse for the respective entry lane. Gates shall have a hand-crank, or other means, which will allow manual operation during power failures. Gate arms shall be constructed out of wood, steel, fiberglass, or aluminum, as specified by the manufacturer for the given lengths as shown on the drawings. Gate arms shall be covered with 16 inch (406 mm) wide reflectorized red and white sheeting. Each gate shall be furnished with a spare gate arm. Gate operator cabinets shall be constructed of galvanized steel, or aluminum and shall be painted manufacturers standard color as approved. Each gate operator shall be provided with an obstruction detector that will automatically reverse the gate motor when an obstruction is detected. The obstruction detector shall be any of the following 3 types: An electronic loop vehicle detector buried in the road, a photocell electric eye mounted on the gate operator, or a safety strip mounted on the lower edge of the arm. The detector system shall be automatically deactivated when the arm reaches the fully lowered position. Slab size and anchorage for gate operator shall be per manufacturer requirements.
 6. Vehicle Barrier Vertical Arm Gate (Traffic Arm): A traffic arm, as a separate piece of equipment, will be included with each non-portable active vehicle barrier as part of the barrier safety operating system. This traffic arm shall automatically deploy (close) when the emergency up button is activated and open when the vehicle barrier is reset. This traffic arm will not be equipped with an automatic obstruction detector.
- J. Finish: Surfaces shall be painted in accordance with requirements of Division 09 Section(s) "Exterior Painting" OR "Interior Painting", as applicable. The roadway plate shall have a nonskid surface painted white with reflective red 4 **OR 6, as directed**, inch (100 **OR 150, as directed**, mm) wide red reflective stripes 4 inches (100 mm) apart. The barrier front shall be painted white and have 4 **OR 6, as directed**, inch (100 **OR 150, as directed**, mm) wide reflective red stripes 4 inches (100 mm) apart. The diagonal striping should point down and outward from the center of the device. Bollards shall be painted white with 2 **OR 3, as directed**, inch (50 **OR 75, as directed**, mm) wide reflective red diagonal stripes. The barrier crash gate shall be painted as specified by purchaser and the crash beam shall be painted white with 3 inch (75 mm) wide reflective red diagonal stripes.
 - K. Concrete: The concrete shall conform to Division 03 Section "Cast-in-place Concrete".
 - L. Welding: Welding shall be in accordance with AWS D1.1/D1.1M.
 - M. Pavement: After placement of the vehicle barrier, the pavement sections shall be replaced to match the section and depth of the surrounding pavement. Pavement shall be warped to match the elevations of existing pavement. Positive surface drainage, away from the vehicle barrier, shall be provided by pavement slope.
- 1.3 EXECUTION
- A. Installation: Installation shall be in accordance with manufacturer's instructions and in the presence of a representative of the manufacturer. Manufacturer's representative shall be experienced in the installation, adjustment, and operation of the equipment provided. The representative shall also be present during adjustment and testing of the equipment.
 - B. Hydraulic Lines: Buried hydraulic lines shall be placed in polyvinyl chloride (PVC) sleeves. Positive drainage shall be provided from the hydraulic power unit to the barrier for drainage of condensation within the PVC sleeve.

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- C. Pit Drainage: A drain connection and oil/water separator, **as directed**, shall be provided in each barrier that requires pit/vault type construction. Hookups between the storm drains shall be made. The self-priming sump pump shall have the capacity to remove minimum 150 gallons per minute (34 cubic meters per hour).
- D. Electrical: All control power wiring requiring compression terminals shall use ring-style terminals. Terminals and compression tools shall conform to UL 486A. Roundhead screws and lockwashers shall be used to provide vibration-resistant connections. Connections between any printed circuit cards and the chassis shall be made with screw connections or other locking means to prevent shock or vibration separation of the card from its chassis. The electrical power supply breaker for the hydraulic power unit shall be capable of being locked in the power on and power off positions.
- E. Field Testing: Upon completion of construction, a field test shall be performed for each vehicle barrier. The test shall include raising and lowering the barrier, both electrically and manually, through its complete range of operation. Each vehicle barrier shall then be continuously cycled for not less than 30 minutes to test for heat build-up in the hydraulic system. The Owner shall be notified at least 7 days prior to the beginning of the field test. The Contractor shall furnish all equipment and make all necessary corrections and adjustments prior to tests witnessed by the Owner. Any conditions that interfere with the proper operation of the barrier disclosed by the test shall be corrected at no additional cost to the Owner. Adjustments and repairs shall be done by the Contractor under the direction of the Owner. After adjustments are made to assure correct functioning of components, applicable tests shall be completed.
- F. Field Training: A field training course shall be provided for designated operating staff members. Training shall be provided for a total period of not less than 8 hours (for electrical/hydraulic operated units) or 1 hour (for manually operated units) of normal working time and shall start after the system is functionally complete but prior to final acceptance tests. Field training shall cover all of the items contained in the operating and maintenance instructions.

END OF SECTION 34 71 13 16

Task	Specification	Specification Description
34 71 13 16	34 71 13 26	Beam-Type Guardrail

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SECTION 34 71 13 26 - BEAM-TYPE GUARDRAIL

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for beam-type guardrail. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.
2. Shop drawings shall be submitted for approval.

1.2 PRODUCTS

A. Rail Elements, End Sections, and Fasteners

1. ARTBA technical bulletin No. 268-B.
2. Provide galvanized steel W-beam in accordance with AASHTO M-180, class A, type 1.
3. Shop curve rail elements when required radius of installation on horizontal curve is **150 ft (46 m)** or less. Provide W-beam rail (ARTBA RE-3) with a flared end section (ARTBA RE-5), rounded end section (ARTBA RE-6) at each end of installations.
4. Provide standard back-up plates behind rail elements at all intermediate, non-splice posts when steel posts and blocks are used.
5. Galvanize the rail sections, including end sections, in accordance with ASTM A 525, coating G-210.

B. Posts

1. Wood: Provide wood posts with blocks, size as required by State DOT. Rough sawn or S4S timber of Douglas Fir or any other locally approved species that is either No. 1 grade or Select Structural grade when graded in accordance with the requirements for Timber and Posts as set forth in WWPA-01 may be used. Give all wood posts and blocks a preservative treatment in accordance with the requirements of AASHTO M-133. Cut to length and bore posts and blocks for bolt holes before treatment.
2. Steel: Provide steel posts with blocks. Fabricate posts and blocks from W6X9 structural steel shapes complying with the requirements of ASTM A 36. Fabricate in the shop, grind smooth all corners and edges, galvanize posts and blocks after fabrication in accordance with ASTM A 123.

C. Bolts, Nuts, and Washers

1. Provide galvanized bolts, nuts, and washers that meet common ARTBA standards, designed to develop the required joint strength. Provide bolts with rounded heads to provide minimum obstruction.
2. Provide galvanized steel bolts conforming to the requirements of ASTM A 307, nuts conforming to the requirements of ASTM A 563, Grade A or better and galvanized steel washers, all galvanized in accordance with the requirements of ASTM A 153. Provide high strength bolts conforming to the requirements of ASTM A 325 where needed.

D. Reflectors: Provide guardrail reflectors as indicated. Place the galvanized steel tabs with reflective sheeting at every post except no reflectors are to be placed along the guardrail end flares.

E. Breakaway Cable Terminal (BCT) Assemblies: Provide BCT assemblies in accordance with the ARTBA details and standards referenced on the details.

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- F. Concrete and Reinforcement for the Post Footings: In accordance with applicable sections of Division 03 Section "Cast-in-place Concrete".

1.3 EXECUTION

- A. Guardrail: Erect steel beam-type guardrail in locations and to lines and grades as directed and in accordance with details indicated.
- B. Erection
 1. Firmly set posts spaced at **6 ft. 3 in. (1.9 m)** centers to the required depth. Set posts by placing in hand or mechanically dug holes or by driving, with or without pilot holes. Backfill gaps around posts with approved material that is moistened and thoroughly compacted. Repair damaged roadway surfacing where pavement is disturbed.
 2. Position the top of W-beam rail at **27 in. (0.69 m)** above the finished roadway surface. Align rail both vertically and horizontally within **1/4-in. (6 mm)** from the theoretical alignments. Lap the rail sections at posts, in the direction of traffic in the adjacent lane, and lap end sections on the face of the rail.
 3. Exercise care to avoid damage to treated wood and galvanized steel parts. Repair or replace damaged parts at the Contractor's expense. Securely tighten all bolts in the finished guardrail. Toenail the wood blocks to wood posts with two 16 penny galvanized nails, one on each side of the top of the block.

END OF SECTION 34 71 13 26

Task	Specification	Specification Description
34 71 13 26	01 22 16 00	No Specification Required
34 71 16 00	01 22 16 00	No Specification Required
34 71 16 00	34 71 13 26	Beam-Type Guardrail
34 71 16 00	34 71 13 16	Active Vehicle Barriers
34 71 19 16	11 12 16 00	Parking Control Equipment
34 71 19 16	13 34 23 16	Prefabricated Control Booths

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35 - Waterway and Marine Construction

Task	Specification	Specification Description
35 05 70 00	01 22 16 00	No Specification Required

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SECTION 35 22 26 00 - SLUICE GATE

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of sluice gate. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 PRODUCTS

A. Sluice Gates: The sluice gate shall conform to the latest edition of AWWA 501 Sluice Gate Standards. Gate and accessories shall be as manufactured by Rodney Hunt Company or Hydrogate, or approved equal.

1. Sluice gates shall be cast iron, fully bronze mounted, and will have side wedges for seating head conditions and side, top and bottom wedges for unseating head conditions, where scheduled.
2. Liberal safety factors shall be used in the design of all the equipment. Working stresses shall not exceed the lower value of one-third (1/3) of the yield strength or one-fifth (1/5) of the ultimate strength of the material. The slide or disc shall be designed with a minimum safety factor of six (6). The sluice gates and operators shall be completely shop-assembled, inspected and tested to ensure proper fit and adjustment of all parts.
3. The sluice gate shall be substantially watertight under the design head conditions. The leakage shall not exceed 0.10 gallons per minute per foot of periphery for either the rated seating or unseating of the gate. The gate shall be rated for 60 feet of seating head and 35 feet of unseating head.
4. All materials used in the construction of the gates and appurtenances shall be designed for the application and shall conform to the following specifications.
5. Iron casting for wall thimbles, frame, disc, and guides, stem guides, floor stands and other items - ASTM A 126, Class B.
6. Bronze castings for wedges, thrust nut, and lift nut - ASTM B 584, Alloy 86500 or 87200.
7. Bronze for seat facings in frame and disc - ASTM B 21, Alloy 48200, extruded or ASTM B 139, Alloy 510, extruded.
8. Stainless steel for stems, stem couplings and fasteners - ASTM A 276, Type 304.
9. Silicon bronze for fasteners - ASTM B 98, Alloy 651, or 661.
10. Rubber for flush bottom seal - ASTM D 2000, grade AA625.

B. Frame: The frame shall be of cast iron, one-piece construction, flanged with rectangular or circular. All contact surfaces of the frame shall be machined. The frame shall have machined dovetailed grooves on the front face into which bronze seat facings shall be driven and machined to a 63 micro-inch finish. The back flange of the frame shall be machined to bolt directly to the machined face of the "F" type wall thimble. Frames for the sluice gates subject to unseating heads shall have integrally cast pads machined with keyways to receive top and bottom wedge seats.

C. Disc: The disc shall be of cast iron, one-piece construction rectangular with integrally cast vertical and horizontal ribs. The disc shall have a minimum thickness of 3/4 inch on gates which are 18 inches in diameter or larger. A heavy vertical reinforcing rib along each side shall be provided to ensure rigidity between the side wedges. All interior vertical ribs shall be of equal depth and shall not have any horizontal jogs along their entire length. Spacing of horizontal ribs shall not exceed 12 inches. The maximum deflection of horizontal ribs based on a working stress of 6,000 pounds per square inch for cast iron shall not exceed 0.07 inch under design pressure. The disc shall have machined dovetailed grooves on the seating face into which bronze seat facings shall be driven and machined to a 63 micro-inch finish. A tongue on each side, extending the full length of the disc, shall be machined on all sides

with a 1/8 inch clearance maintained between the disc tongue and the gate guide groove. Wedge pads for side wedges and for top and bottom wedges when required, shall be cast integrally on the disc and machined to receive the adjustable bronze wedges. A heavily reinforced nut pocket shall be cast integrally on the vertical centerline and above the horizontal center and be of such shape as to receive the square backed bronze thrust nut.

- D. Guides: The guides shall be one piece, integrally cast type, designed to withstand the total thrust due to the water pressure and the wedging action. The guides shall be either bolted onto or integrally cast with the frame. The guides shall be machined on all contact surfaces and a groove shall be machined along the entire length of the guide to allow not more than 1/8 inch clearance between the disc tongue and the guide groove. The guides shall be of such length as to retain and support at least one-half (1/2) of the disc in the full open position. The bolt-on guides shall be attached to the frame with silicon bronze or stainless steel studs and nuts and shall be doweled to prevent any relative motion between the guides and the frame. The integrally cast guides shall have wedge blocks which are attached to the guide with silicon bronze fasteners. Gates having integrally cast frames, guides and wedge blocks shall be unacceptable. Both the integrally cast and bolt-on blocks shall have machined dove-tailed grooves in which the bronze wedge seats shall be driven and machined. Wedge seats which are bolted onto the wedge block or guide shall be unacceptable.
- E. Wedges: Each gate shall be provided with a sufficient number of wedging devices to assure its compliance with the leakage requirements. Side wedges shall be designed to make full metal-to-metal contact with the wedge seats mounted on the guide wedge blocks. The wedges shall be solid cast bronze, machined on all contact surfaces, and keyed to the cast iron pads on the disc to prevent rotation and lateral motion. The wedges shall be attached to the disc with silicon bronze studs and nuts to lock them securely in position after they have been adjusted.
1. Adjustable top and bottom wedges, where applicable, shall be attached to the disc either by tongue-and-groove arrangement with a signal fastener or by two fasteners. All mating and contact surfaces on the wedging devices shall be fully machined.
- F. Seat Facings: The extruded seat facings shall be of a special shape to fill and permanently lock in the machined dovetail grooves on the frame and disc when pneumatically impacted into place. Attaching pins and screws shall not be acceptable. The installed seat facings shall be machined to a 63 micro-inch finish or better. Maximum clearance between seating faces shall not exceed 0.004 inch when the disc is in the fully closed position.
- G. Stem
1. The operating stem shall be of a size to safely withstand the stresses induced by normal operating forces without buckling or permanent distortion. The stem shall be designed to transmit in compression at least two (2) times the rated output of the floorstand or benchstand with a 40-pound effort on the crank or handwheel. The sluice gate manufacturer shall submit these calculations, if required by the Owner. The threaded portion of the stem shall have machined cut or rolled threads.
 2. Acme type. The contact surfaces of the threads shall have a maximum 16 micro-inch finish. Stems of more than one (1) section shall be jointed by stainless steel couplings threaded and keyed or bored and pinned to the stems. All threaded and keyed couplings of the same size shall be interchangeable. Manually operated, rising stem gates shall be provided with an adjustable bronze stop collar on the stem above the floorstand lift nut.
- H. Stem Guides: Stem guides shall be cast iron, bronze brushed, mounted on cast iron brackets. They shall be adjustable in two (2) directions and shall be spaced at sufficient intervals to adequately support the stem. Stem guide spacing shall not exceed 10 feet, or an L/R ratio of 200.
- I. Pipe Covers: Provide fabricated galvanized steel stem cover w/position indication on all rising stems.

- J. Crank Operators: All gates shall have crank-operated floorstands or benchstands. Crank handle shall be removable. Crank operated type shall be geared and shall have a weatherproof housing with a solid bronze operating nut mounted on high-strength cast iron pedestals or base plates. The operating nut shall be internally threaded with threads corresponding to stem threading. Tapered roller or ball bearings shall be provided above and below a flange on the operating nut to support both opening and closing thrusts. All gears shall be constructed of steel and shall be accurately machine cut and of proper design to provide smooth operation and to support load conditions. Lubrication fittings shall be provided in the gear housing to permit lubrication of all gears and bearings. All reduction gear cases shall be precision machined and equipped with tapered rolled or needle bearings and sealed about all reduction shafts. Geared hoists shall have a 4:1 ratio. Each hoist shall be supplied with a 2-inch square operating nut, and a removable cast iron crank arm with revolving brass grip. Floorstands shall include a cast iron pedestal designed to position the input shaft approximately 36 inches above the operating floor. Where called for, the floorstand shall be mounted on a cast iron wall bracket which is specifically designed for the particular operator being used. An arrow with the word "Open" will be permanently attached or cast in the floorstand indicating the direction of rotation to open the gate.
- K. All geared and handwheel floorstands shall operate with a maximum effort not to exceed 40 pounds on the crank or handwheel.
- L. Painting - All submerged ferrous metal components (i.e., gate and frame, thimble, stem guides) shall be shop painted as follows: prepare surfaces to SSPC-SP-6; Primer - Amer Lock 400 by Ameron International Inc. Performance Coatings and Finishes Group, or approved equal, 5.0 mil dry film thickness; Top Coat - Amer Lock 400, or approved equal, 5.0 mil dry film thickness.
- M. All exposed ferrous metal components (i.e., crank operator and floor stand) shall be shop painted as follows: prepare surfaces to SSPC-SP-3; Primer - Amer Lock 400, or approved equal, 5.0 mil dry film thickness, Top Coat - Amer Lock 450 HS, or approved equal, 2.0 mil dry film thickness
- N. All bolts, studs and nuts required for setting the sluice gates, frames and operating stands shall be stainless steel and shall be supplied by the manufacturer.

1.3 EXECUTION

- A. Provide and deliver cast iron thimble to be cast into wall as per manufacturer's recommendations and as specified herein. Install the sluice gate with all appurtenances in strict conformance with manufacturer's instructions.

END OF SECTION 35 22 26 00

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Task	Specification	Specification Description
35 22 59 00	35 22 26 00	Sluice Gate
35 22 63 00	35 22 26 00	Sluice Gate

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Task	Specification	Specification Description
40 05 23 23	01 95 99 99	Relief Wells
40 05 23 23	01 95 99 99a	Common Work Results for Fire Suppression
40 05 23 23	01 95 99 99b	Common Work Results for Plumbing
40 05 23 23	01 95 99 99g	Common Work Results for HVAC
40 05 23 23	01 95 99 99h	Water Supply Wells
40 05 23 23	23 11 23 00b	Monitoring Wells
40 05 23 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
40 05 23 23	33 31 11 00	Sanitary Sewerage

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SECTION 41 22 23 13 - MATERIAL HANDLING HOISTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of material handling hoists. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Submittals

1. Product Data: For each type of product indicated.

1.2 PRODUCTS

A. Electric Chain Hoists

1. Hoist motors shall be H4 duty classification. Class F insulation shall be used in hoist motor for 30 minute operation. Load chain shall be grade 80 alloy, case hardened and zinc plated sized for the intended load. Hoists shall employ AC motor brakes employing single or multiple all-steel disks. Controls shall be hand-held, low voltage electrical, with emergency shut off and enclosed in NEMA 3R rated weatherproof enclosure. Hoist shall include fail safe limit switches in the hoist enclosure. Hoist shall meet requirements of ANSI B30.16 standard. Load hook shall be heavy-duty drop forged with safety latch. Hoist shall have swivel top and bottom hooks.

B. Manual Chain Hoists

1. Load capacity of hoist shall be as specified. Load chain shall be grade 80 alloy, case hardened and zinc plated sized for the intended load. Load hook shall be heavy-duty drop forged with safety latch. Hoist mechanism shall be double pawl ratchet system with Weston type brake using a non-asbestos friction disk. Hoist shall have swivel top and bottom hooks. Hoist shall require between 50 and 80 pounds effort to move load.

C. Electric Wire Rope Hoists

1. Hoist motors shall be H4 duty classification. Class F insulation shall be used in hoist motor for 30 minute operation. Lift range shall be between 20 and 150 feet. Lifting cable shall be pre-formed wire rope, of hoisting service construction, made of extra improved steel (XIP) with an independent wire rope center. Load hook shall be heavy-duty drop forged with safety latch. Hoist shall have swivel top and bottom hooks. Controls shall be hand held, low voltage electrical, with emergency shut off and enclosed in NEMA 3R rated weatherproof enclosure. Hoist shall include fail-safe limit switches in the hoist enclosure. Hoist shall meet requirements of ANSI B30.16 standard.

1.3 EXECUTION

A. Installation

1. The Contractor shall complete the assembly of any equipment furnished partially assembled and place the items in position as directed. The hoists shall be assembled and securely bolted in position, hoisting chain or wire rope installed, and the hoist made ready for regular operation. The Contractor shall furnish all miscellaneous hardware items required to complete the installation of all equipment and components. Equipment shall be primed and finish painted with a suitable corrosion-resistant paint on all parts and components not made of corrosion-resistant materials or otherwise protected.

41 - Material Processing and Handling Equipment



END OF SECTION 41 22 23 13

SECTION 41 22 23 13a - MONORAILS WITH ELECTRIC POWERED HOISTS

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for monorails with electric powered hoists. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. System Description

1. Provide a monorail system with electric powered hoist(s) and plain type (hand operated) **OR** hand chain operated **OR** electric powered, **as directed**, trolley(s) complete, tested and ready for operation. Monorails, hoist(s), trolley(s), equipment, materials, installation, examination, inspection, and workmanship shall be in accordance with the applicable requirements of NFPA 70, ASME/ANSI B30.11, ASME/ANSI B30.16, ASME HST-1M, ANSI/ASME HST-4M, and MMA MH27.1, with modifications specified herein. Reference in these publications to the "authority having jurisdiction" shall be interpreted to mean the "the Owner."

C. Submittals

1. Shop Drawings: Monorail system
2. Product Data: Monorail track system including switches, suspension system and other components; Electric wire rope hoist; Electric chain hoist; Trolley; Pendant pushbutton station; Electrification.
3. Design Data: Load and sizing calculations.
4. Test Reports
5. Certificates
6. Operation and Maintenance Data

D. Delivery, Storage, and Handling

1. Delivery and Storage: Inspect materials delivered to site for damage; unload and store with minimum handling. Store materials on-site in enclosures or under protective coverings. Protect materials not suitable for outdoor storage to prevent damage during periods of inclement weather, including subfreezing temperatures, precipitation, and high winds. Store materials susceptible to deterioration by direct sunlight under cover and avoid damage due to high temperatures. Do not store materials directly on ground. When special precautions are required, prominently and legibly stencil instructions for such precautions on outside of equipment or its crating.
2. Handling: Handle materials in such a manner as to ensure delivery to final location in undamaged condition. Make repairs to damaged materials at no cost to the Owner.

E. Quality Assurance

1. Certificates: Overload Test Certificate: Submit a statement that the monorail system can be periodically load tested to 125 percent (plus 5 minus 0) of rated load.
2. Drawings: Monorail System: Show the general arrangement of all components, clearances and principal dimensions, assemblies of hoist, trolley, track, track suspension system, and electrical schematic drawings.
3. Design Data: Load and Sizing Calculations: Submit calculations verifying the sizing of any track, track suspension device and additional supports which are not the monorail system manufacturer's standard cataloged product.

1.2 PRODUCTS

- A. Overhead Monorail System: Provide overhead monorail system conforming to MMA MH27.1, Class C, for indoor **OR** outdoor, **as directed**, service, with an electric wire rope or chain hoist mounted on a movable trolley. Trolley shall be plain type (hand operated) **OR** hand chain operated **OR** motor operated, **as directed**. Monorail system shall operate on AC voltage as required to meet project requirements, 60 Hz, single **OR** three, **as directed**, phase power source.
1. Capacity: The monorail system shall have a minimum rated capacity as required to meet project requirements. Mark the hoist capacity in **pounds (kg)** on both sides of the hoist or load block.
 2. Speeds: The hoist shall have two operating speeds, **unless directed otherwise**, and shall be capable of hoisting and lowering the rated load at a high speed of **20 feet per minute (fpm) (100 mm/s)**. The trolley shall have two operating speeds, **unless directed otherwise**, and shall be capable of moving the rated load at a high speed of **50 fpm OR 100 fpm, as directed, (250 mm/s OR 500 mm/s, as directed,)**. Low speed(s) shall be one quarter to one third of high speed(s). Actual speed(s) shall be within plus or minus 15 percent of those specified.
 3. Material Limitations: Shafts, keys, couplings, sprockets, and chains shall be steel. All gears shall be steel except for worm gears, which shall be bronze or steel. Cast iron and aluminum used to support components of the hoist power transmission train shall be ductile.
 4. Safety: Comply with the mandatory and advisory safety requirements of ASME/ANSI B30.11, ASME/ANSI B30.16, and 29 CFR 1910.179.
- B. Monorail Track System: MMA MH27.1. Track beams shall be patented track sections fabricated by a manufacturer regularly engaged in production of this type of beam.
1. Track Suspension System: Monorail suspension shall be flexible **OR** rigid, **as directed**, type. Make bolted connections to supporting structure, excluding hanger rods, with ASTM A 325/A 325M bolts, ASTM A 563/A 563M nuts, and ASTM F 959/F 959M load indicator washers. ASTM A 325/A 325M bolts shall be fully pre-tensioned in accordance with AISC S329. Support monorail track system from the structural members shown. Provide additional supports as required to carry monorail track system loads to the structural members shown. Materials for additional supports shall conform to the material requirements contained in Division 05 Section "Structural Steel Framing".
- C. Electric Wire Rope Hoist: ANSI/ASME HST-4M, Class H3, except as modified herein. Hoist shall be double reeved, **unless directed otherwise**.
1. Hoisting Ropes: FS RR-W-410, improved or extra improved plow steel, regular lay, uncoated, 6 by 37 class construction, with an independent wire rope core. Provide proof of wire rope breaking strength test report.
 2. Sheaves: Sheaves shall be steel or ductile cast iron. Pitch diameter of running sheaves shall not be less than 16 times the rope diameter. Pitch diameter of non running sheaves shall not be less than 12 times the rope diameter.
 3. Drum: Drum shall be steel or ductile cast iron. Pitch diameter of the drum shall not be less than 18 times the rope diameter. Not less than two dead wraps of the hoisting rope shall remain on each anchorage when the hook is in its extreme low position.
- D. Electric Chain Hoist: ASME HST-1M, Class H3, except as modified herein. Provide load chain proof test.
- E. Trolley: Trolley shall meet all applicable requirements of MMA MH27.1, ASME HST-1M and ANSI/ASME HST-4M. Trolley shall have elastomeric bumpers to engage runway stops.
- F. Motors: NEMA MG 1. Hoist motor shall be single **OR** two, **as directed**, speed AC squirrel cage induction type. Trolley motor shall be single **OR** two, **as directed**, speed AC squirrel cage induction type. Motor insulation shall be Class B minimum. Provide totally enclosed non-ventilated (TENV) motor enclosures. Maximum motor speed shall not exceed 1800 RPM.

- G. Controls: Provide single **OR** two, **as directed**, speed magnetic control for the hoist. Provide single **OR** two, **as directed**, speed magnetic controls for the trolley. Provide reduced voltage starting, acceleration and deceleration for the trolley drive.
- H. Limit Switches: Provide upper and lower limit switches which de-energize the hoist motor.
- I. Brakes: Provide hoist with an electro-mechanical holding brake and a mechanical load brake, each capable of holding 130 percent of the rated hoist capacity. Hoist holding brake shall be capable of being released to test the load brake. Provide trolley with an electro-mechanical brake. Provide trolley brake with a minimum torque rating of 100 percent (for outdoor monorails) or 50 percent (for indoor monorails) of the drive motor rated torque. Trolley brake torque shall be adjustable down to 85 percent of its torque rating.
- J. Load Block And Hook: Construct load blocks of steel. Provide forged steel, swivel type hook, with hook nut keyed to hook shank by means of a setscrew installed in a plane parallel to the longitudinal axis of the hook shank, or other similar easily removable securing device. Hook throat opening shall not be less than as required to meet project requirements. Provide hook with spring loaded steel safety latch for closing the hook throat opening. The hook and hook nut shall be unpainted. Permanently mark hook and hook nut with an identification number.
1. Hook and Hook Nut Magnetic Particle Inspection: Magnetic particle inspect the hook and nut over the entire area in accordance with ASTM A 275/A 275M. Acceptance standard shall be no defects. A defect is defined as a linear indication that is greater than **1/8 inch (3 mm)** long whose length is equal to or greater than three times its width.
- K. Bearings: All bearings except those subject to a small rocker motion shall be anti-friction type. Bearings not considered lifetime lubricated by the manufacturer shall be provided with a means for lubrication.
- L. Pendant Pushbutton Station: Hoist and trolley, **unless directed otherwise**, shall be controlled from a pendant pushbutton station. Arrange pushbuttons in accordance with ASME/ANSI B30.11 recommendations. Locate station **4 feet (1.2 m)** above the finished floor
- M. Electrification: Runway electrification shall be of the flat festooned type **OR** enclosed safety bar type, **as directed**, with four continuous copper conductors. Provide electrical work for the monorail system in accordance with NFPA 70.
- N. Identification Plates: Provide identification plates of noncorrosive metal with clearly legible permanent lettering giving the manufacturer's name, model number, capacity in pounds, and other essential information or identification.
- O. Painting System: Painting shall be manufacturer's standard. Provide a primer and a finish coat. For outdoor monorail systems, blast clean all components prior to painting and prime with inorganic zinc type primer; finish coat shall be an epoxy formulated for marine environments. Paint coats shall be smooth and even, free of runs, sags, orange peel, or other defects.
- 1.3 EXECUTION:
- A. Erection And Installation: Erect and install the monorail system, complete in accordance with the approved submittals and in condition to perform the operational and acceptance tests.
- B. Erection Services: Provide supervisory erection services from the monorail system manufacturer.
- C. Field Quality Control
1. Post-Erection Inspection: After erection, the Contractor and the the Owner shall jointly inspect the monorail and hoist systems and components to determine compliance with specifications and

- approved submittals. The Contractor shall notify the the Owner 3 days before the inspection. Provide a report of the inspection indicating the monorail system is considered ready for operational tests
2. Operational Tests: After erection and inspection, test the hoist, and trolley as specified herein. Test the systems in service to determine that each component of the system operates as specified, is properly installed and adjusted, and is free from defects in material, manufacturer, installation, and workmanship. Rectify all deficiencies disclosed by testing and retest the system or component to prove the monorail system is operational. The Contractor shall furnish loads for testing, operating personnel, instruments, and all other necessary apparatus. The the Owner will furnish loads for testing; the Contractor shall receive and transport the loads from a location not more than **100 miles (161 km)** from the job site and shall return them to that location after the tests have been completed.
 3. Test Data: Record test data on appropriate test record forms suitable for retention for the life of the monorail system. Record operating and startup current measurements for electrical equipment (motors and coils) using appropriate instrumentation (i.e., clamp-on ammeters). Compare recorded values with design specifications or manufacturer's recommended values; abnormal differences (i.e., greater than 10 percent from manufacturer's or design values) shall be justified or appropriate adjustments performed. In addition, high temperatures or abnormal operation of any equipment or machinery shall be noted, investigated, and corrected. Record hoist and trolley speeds during each test cycle.
 4. Hook Test: Measure hook for hook throat spread before and after load test. Establish a throat dimension base measurement by installing two tram points and measuring the distance between these tram points (plus or minus **1/64 inch (0.4 mm)**). Record this base dimension. Measure the distance between tram points before and after load test. An increase in the throat opening by more than 5 percent from the base measurement shall be cause for rejection.
 5. No-Load Test
 - a. Hoist: Raise the load hook the full operating lift distance and verify satisfactory operation of hoist, upper limit switch, lower limit switch, and the hoisting and lowering speeds. Operate the hoist at low and high speed in both directions.
 - b. Trolley: Operate trolley assembly the full length of the monorail in both directions. Operate trolley at low and high speed in each direction. Verify satisfactory operation and verify trolley speed. Operate all rail switches.
 6. Load Test: 125 Percent (plus 5 percent minus 0) of rated capacity
 - a. Hoist Static Test: Raise test load approximately one foot above the floor and hold for 10 minutes. Observe load lowering that may occur which will indicate malfunction of hoisting component or brake. Lower the test load to the floor until the hoist line is slack.
 - b. Hoist Dynamic Test: Raise the test load to approximately **5 feet (1.5 m)** above the floor using both speed points in the process. Lower the load back to the floor using both speed points. Stop the test load at least once while lowering at high speed and observe proper brake operation. Wait 5 minutes, then repeat the above cycle.
 - c. Load Brake Test: Raise test load approximately **5 feet (1.5 m)**. With the hoist controller in the neutral position, release the holding brake. The load brake should hold the test load. Again with the holding brake in the released position, start the test load down at low speed and return the controller to off position as the test load lowers. The load brake should prevent the test load from accelerating. NOTE: It is not necessary for the load brake to halt the downward motion of the test load.
 - d. Loss of Power Test: Raise the test load approximately **3 feet (1 m)** and while lowering test load at low speed, cut main power to hoist. Load should stop.
 - e. Trolley Test: With test load hoisted to a height of **one foot (300 mm)** above the floor, operate trolley the full distance of the monorail in both directions using both speed points in the process. Observe for any malfunctioning of the trolley assembly and monorail system. Operate all rail switches.
 - f. Rated Load Speed Test: With the hoist loaded to rated capacity, raise and lower the load verifying that the hoisting and lowering speeds are provided as specified. With the hoist loaded to rated capacity, operate trolley along the monorail beam verifying that the trolley

speed is provided as specified. Further, verify that the trolley stops in each direction within a distance (in feet) equal to 10 percent of rated capacity high speed (in feet per minute) when initially travelling at high speed and carrying the rated capacity load. Record voltage, amperage, hoisting and lowering speeds, trolley travel speed, and motor speed for each motor.

END OF SECTION 41 22 23 13a

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SECTION 41 22 23 13b - MONORAILS WITH MANUAL HOIST

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for monorails with manual hoist. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Verification Of Dimensions:

1. The Contractor shall verify all building dimensions that relate to fabrication of the monorail system, and shall notify the Owner of any discrepancy before the order to the monorail manufacturer is finalized.

C. Submittals

1. Shop Drawings: Submit drawings showing the general arrangement of the track beam system, including curves and switches, clearances, principal dimensions, details of structural connections, and all component details. Manufacturer's catalog data will suffice for items of standard manufacturer.
2. Design Data: Structural design calculations.
3. Test Reports
 - a. Hook and hook nut magnetic-particle tests.
 - b. Monorail system load tests
4. Certificates: Manual hoist load chain
5. Operation and Maintenance Data
 - a. Track beam system
 - b. Hoist and trolley

D. Quality Assurance

1. Certifications: Submit factory certification of load chain rated capacity.
2. Design Data: Submit design calculations verifying the size of structural members, structural support fittings, rods, brackets, components, and lifting beams for the track beam system. The calculations shall include stress and loading diagrams. Submit calculations with monorail drawings.

1.2 PRODUCTS

- A. Fabrication And Construction: Provide manual hoist and trolley, ANSI/ASME HST-2M, ANSI/ASME HST-3M, trolley suspension. Trolley and wheels shall be suitable for operation on the steel monorail track beam provided, and shall have not less than four wheels.

1. Capacity: The hoist shall have a minimum rated capacity as required to meet project requirements. The monorail system shall have a minimum rated capacity as required to meet project requirements.
2. Hook Lift: Shall be the manufacturer's standard. The hoist lift shall be at its highest point a minimum of **8 feet (2400 mm)** above the finished floor and at its lowest point a minimum of **2 feet (600 mm)** below the finished floor.
3. Hooks: Shall be of the safety type with hook nuts keyed to hook shanks by means of a setscrew installed in a plane parallel to the longitudinal axis of the hook shank, or by any other similar easily removable securing device. All hook components shall be magnetic-particle inspected over the entire area in accordance with ASTM A 275/A 275M. The acceptance standard shall be one of no defects. A defect is defined as a linear indication revealed by magnetic-particle

inspection that is greater than **1/8 inch (3 mm)** long whose length is equal to or is greater than three times its width.

4. Trolley: Shall be designed to operate from track beam section. Where two or more hoists are located on the same monorail beam, the trolleys shall be equipped with rubber bumper devices designed to prevent contact of any part or parts of the hoists.
5. Load Chain: High strength steel links, flexible; minimum safety factor of 5 to 1 based on ratio of minimum chain breaking load to the calculated load on the chain when the hoist is assumed loaded to rated capacity. Certification from hoist manufacturer of provided chain's breaking strength shall be submitted to the Owner and approved prior to final acceptance of hoist. Do not paint or coat the load chain.
6. Load Hooks and Load Hook Components
 - a. Hook: Forged steel; complete with spring-loaded steel throat opening safety device. The hook shall be carried on suitably sealed or shielded anti-friction thrust bearings and shall swivel freely through 360 degrees rotation with full load without twisting chain.
 - 1) Disassembly. Hook and hook nut shall be capable of complete disassembly that enables access to all surfaces of the hook, including shank and hook nut for inspection purposes. Provision shall be made for the hook nut, or other hook-to-block fastener, to be keyed to hook shank by means of a set screw or similar, easily removable, securing device.
 - 2) Hook Non-Destructive Test. Each hook, including shank and hook nut, shall be inspected over the entire surface areas by magnetic particle inspection. If hook nut is not used, any device that functions the same as the hook nut shall be inspected by magnetic particle inspection.
 - a) Procedure: Magnetic particle inspection shall be conducted in accordance with ASTM A 275/A 275M. This inspection shall be conducted at the factory of the hook manufacturer or hoist manufacturer. Alternately, a recognized independent testing lab may conduct the inspections if equipped and competent to perform such a service, and if approved by the the Owner.
 - b) Acceptance Criteria: Defects found on the hook or hook nut shall result in rejection of defective items for use on furnished hoist. For this inspection, a defect is defined as a linear or non-linear indication for which the largest dimension is greater than **1/8 inch (3 mm)**. Weld repairs for defects on hook or hook nut will not be permitted.
 - c) Test Report: A test report of the magnetic particle inspection of each hook and hook nut provided shall be submitted to and approved by the the Owner prior to final acceptance of hoist installation. Test reports shall be certified by the testing organization.

B. Monorail Track Beam System: Comply with MMA MH27.1 except as modified and supplemented herein.

1. Patented Track: Provide specially designed trackage, e.g., patented track beam, curves, and switches constructed from welded steel components. The lower flange of the track section shall have flat wheel treads; minimum lower flange width of **3.25 inches (80 mm)**; chemical composition of 0.45 to 0.60 percent carbon content, 0.60 to 1.1 percent manganese content; and wheel treads shall be hardened to a minimum Brinell Hardness Number of 225. Upper flange and web of the track section shall be steel, continuously welded together or provided as one monolithic piece.
2. Track Suspension: Provide means of suspending the monorail track system, including curves and switches from the structural supports. The suspension system shall be the sole responsibility of the track supplier; however, design shall be subject to the requirements specified herein.
 - a. Cataloged Products: If possible, provide track manufacturer's standard cataloged devices for connection of the track to the indicated supporting structures. If track manufacturer's cataloged devices are not provided for this suspension system, complete shop drawings and calculations for the custom suspension device shall be submitted for review and approval by the the Owner. Track suspension devices which are not the track

- manufacturer's cataloged products shall meet the additional requirements specified in Division 05 Section "Metal Fabrications".
- b. Design: The suspension system shall be designed and constructed to ensure no impairment of the strength of track or the structural support. A hanger or suspension shall be located at each rack splice joint. Provide bracing to hold track sections in rigid alignment at all joints.
 - c. Suspension of Curves and Switches: Provide steel framing (structural supports), in addition to that indicated, as required by monorail curve and switch manufacturer to support curves and switches. The additional steel framing shall be the sole responsibility of the monorail supplier. Submit shop drawings and framing design calculations to the the Owner for approval.
 - d. Sway Bracing: Where the track is suspended from hanger rods, track shall be braced laterally and longitudinally to prevent sway.
 - e. Lock Nuts: Where the track is suspended from hanger rods, lock nuts or other means shall be provided to prevent the nuts from backing off the rods.
 - f. Multiple Suspension Devices: Where more than one suspension device attached to the track at a single point, the suspension devices shall be provided so that the loads shall be induced in each in proportion to the device's size.
3. Identification Plates: Provide identification plates of noncorrosive metal. Information and data on the plates shall include, in clearly legible permanent lettering, the manufacturer's name, model number, capacity rating, and other essential information. In addition, the monorail track beam system shall be furnished with identification plates showing the capacity of the system, which shall be legible from the floor and from either side of the monorail track beam.
- C. Painting Of System: Provide manufacturer's standard painting or shop painting of components specified in this section; comply with the requirements specified in Division 07. Do not paint, coat, or galvanize load chain, load, hook nut, or load chain sheave.

1.3 EXECUTION

- A. Erection And Installation: The Contractor shall erect and install the hoist trolley and monorail system in accordance with manufacturers written instructions, MMA MH27.1, and the contract drawings. The monorail supplier shall provide supervisory erection services. Welding new sections of monorail track to existing shall conform to AWS D1.1.
- B. Field Inspection And Tests
1. Pre-Erection Inspection: Before erection, the Contractor and the manufacturer's representative shall jointly inspect the monorail and hoist systems and components at the job site to determine compliance with specifications and manufacturer's data and shop drawings as approved. The Contractor shall notify the the Owner 3 days before the inspection.
 2. Operational Inspection and Load Tests: Upon completion, and before final acceptance, the hoist, trolley, and monorail shall be given the rated load test specified in ASME/ANSI B30.11, carrying 125 percent (plus 5 percent, minus 0 percent) of the rated capacity, and with the units spaced to obtain maximum possible loads in the monorail track beam systems. Hoists shall hold a static, as well as control a dynamic, 125 percent rated load. The systems shall be thoroughly tested in service to determine that each component of the system operates as specified, is properly installed and adjusted, and is free from defects in material, manufacture, installation, and workmanship. The Contractor shall furnish test loads, operating personnel, instruments, and all other necessary apparatus at no additional cost to the Owner. The test and final adjustments of the equipment will be under the supervision of the Owner. The Contractor shall rectify any deficiencies found and completely retest work affected by such deficiencies.

END OF SECTION 41 22 23 13b

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SECTION 14623 - MONORAILS WITH MANUAL HOIST

1.1 GENERAL

A. Description Of Work

1. This specification covers the furnishing and installation of materials for monorails with manual hoist. Products shall match existing materials and/or shall be as follows or as directed by the Owner. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

B. Verification Of Dimensions:

1. The Contractor shall verify all building dimensions that relate to fabrication of the monorail system, and shall notify the Owner of any discrepancy before the order to the monorail manufacturer is finalized.

C. Submittals

1. Shop Drawings: Submit drawings showing the general arrangement of the track beam system, including curves and switches, clearances, principal dimensions, details of structural connections, and all component details. Manufacturer's catalog data will suffice for items of standard manufacturer.
2. Design Data: Structural design calculations.
3. Test Reports
 - a. Hook and hook nut magnetic-particle tests.
 - b. Monorail system load tests
4. Certificates: Manual hoist load chain
5. Operation and Maintenance Data
 - a. Track beam system
 - b. Hoist and trolley

D. Quality Assurance

1. Certifications: Submit factory certification of load chain rated capacity.
2. Design Data: Submit design calculations verifying the size of structural members, structural support fittings, rods, brackets, components, and lifting beams for the track beam system. The calculations shall include stress and loading diagrams. Submit calculations with monorail drawings.

1.2 PRODUCTS

- A. Fabrication And Construction: Provide manual hoist and trolley, ANSI/ASME HST-2M, ANSI/ASME HST-3M, trolley suspension. Trolley and wheels shall be suitable for operation on the steel monorail track beam provided, and shall have not less than four wheels.

1. Capacity: The hoist shall have a minimum rated capacity as required to meet project requirements. The monorail system shall have a minimum rated capacity as required to meet project requirements.
2. Hook Lift: Shall be the manufacturer's standard. The hoist lift shall be at its highest point a minimum of **8 feet (2400 mm)** above the finished floor and at its lowest point a minimum of **2 feet (600 mm)** below the finished floor.
3. Hooks: Shall be of the safety type with hook nuts keyed to hook shanks by means of a setscrew installed in a plane parallel to the longitudinal axis of the hook shank, or by any other similar easily removable securing device. All hook components shall be magnetic-particle inspected over the entire area in accordance with ASTM A 275/A 275M. The acceptance standard shall be one of no defects. A defect is defined as a linear indication revealed by magnetic-particle

inspection that is greater than **1/8 inch (3 mm)** long whose length is equal to or is greater than three times its width.

4. Trolley: Shall be designed to operate from track beam section. Where two or more hoists are located on the same monorail beam, the trolleys shall be equipped with rubber bumper devices designed to prevent contact of any part or parts of the hoists.
5. Load Chain: High strength steel links, flexible; minimum safety factor of 5 to 1 based on ratio of minimum chain breaking load to the calculated load on the chain when the hoist is assumed loaded to rated capacity. Certification from hoist manufacturer of provided chain's breaking strength shall be submitted to the Owner and approved prior to final acceptance of hoist. Do not paint or coat the load chain.
6. Load Hooks and Load Hook Components
 - a. Hook: Forged steel; complete with spring-loaded steel throat opening safety device. The hook shall be carried on suitably sealed or shielded anti-friction thrust bearings and shall swivel freely through 360 degrees rotation with full load without twisting chain.
 - 1) Disassembly. Hook and hook nut shall be capable of complete disassembly that enables access to all surfaces of the hook, including shank and hook nut for inspection purposes. Provision shall be made for the hook nut, or other hook-to-block fastener, to be keyed to hook shank by means of a set screw or similar, easily removable, securing device.
 - 2) Hook Non-Destructive Test. Each hook, including shank and hook nut, shall be inspected over the entire surface areas by magnetic particle inspection. If hook nut is not used, any device that functions the same as the hook nut shall be inspected by magnetic particle inspection.
 - a) Procedure: Magnetic particle inspection shall be conducted in accordance with ASTM A 275/A 275M. This inspection shall be conducted at the factory of the hook manufacturer or hoist manufacturer. Alternately, a recognized independent testing lab may conduct the inspections if equipped and competent to perform such a service, and if approved by the the Owner.
 - b) Acceptance Criteria: Defects found on the hook or hook nut shall result in rejection of defective items for use on furnished hoist. For this inspection, a defect is defined as a linear or non-linear indication for which the largest dimension is greater than **1/8 inch (3 mm)**. Weld repairs for defects on hook or hook nut will not be permitted.
 - c) Test Report: A test report of the magnetic particle inspection of each hook and hook nut provided shall be submitted to and approved by the the Owner prior to final acceptance of hoist installation. Test reports shall be certified by the testing organization.

B. Monorail Track Beam System: Comply with MMA MH27.1 except as modified and supplemented herein.

1. Patented Track: Provide specially designed trackage, e.g., patented track beam, curves, and switches constructed from welded steel components. The lower flange of the track section shall have flat wheel treads; minimum lower flange width of **3.25 inches (80 mm)**; chemical composition of 0.45 to 0.60 percent carbon content, 0.60 to 1.1 percent manganese content; and wheel treads shall be hardened to a minimum Brinell Hardness Number of 225. Upper flange and web of the track section shall be steel, continuously welded together or provided as one monolithic piece.
2. Track Suspension: Provide means of suspending the monorail track system, including curves and switches from the structural supports. The suspension system shall be the sole responsibility of the track supplier; however, design shall be subject to the requirements specified herein.
 - a. Cataloged Products: If possible, provide track manufacturer's standard cataloged devices for connection of the track to the indicated supporting structures. If track manufacturer's cataloged devices are not provided for this suspension system, complete shop drawings and calculations for the custom suspension device shall be submitted for review and approval by the the Owner. Track suspension devices which are not the track

- manufacturer's cataloged products shall meet the additional requirements specified in Division 05 Section "Metal Fabrications".
- b. Design: The suspension system shall be designed and constructed to ensure no impairment of the strength of track or the structural support. A hanger or suspension shall be located at each rack splice joint. Provide bracing to hold track sections in rigid alignment at all joints.
 - c. Suspension of Curves and Switches: Provide steel framing (structural supports), in addition to that indicated, as required by monorail curve and switch manufacturer to support curves and switches. The additional steel framing shall be the sole responsibility of the monorail supplier. Submit shop drawings and framing design calculations to the the Owner for approval.
 - d. Sway Bracing: Where the track is suspended from hanger rods, track shall be braced laterally and longitudinally to prevent sway.
 - e. Lock Nuts: Where the track is suspended from hanger rods, lock nuts or other means shall be provided to prevent the nuts from backing off the rods.
 - f. Multiple Suspension Devices: Where more than one suspension device attached to the track at a single point, the suspension devices shall be provided so that the loads shall be induced in each in proportion to the device's size.
3. Identification Plates: Provide identification plates of noncorrosive metal. Information and data on the plates shall include, in clearly legible permanent lettering, the manufacturer's name, model number, capacity rating, and other essential information. In addition, the monorail track beam system shall be furnished with identification plates showing the capacity of the system, which shall be legible from the floor and from either side of the monorail track beam.
- C. Painting Of System: Provide manufacturer's standard painting or shop painting of components specified in this section; comply with the requirements specified in Division 07. Do not paint, coat, or galvanize load chain, load, hook nut, or load chain sheave.

1.3 EXECUTION

- A. Erection And Installation: The Contractor shall erect and install the hoist trolley and monorail system in accordance with manufacturers written instructions, MMA MH27.1, and the contract drawings. The monorail supplier shall provide supervisory erection services. Welding new sections of monorail track to existing shall conform to AWS D1.1.
- B. Field Inspection And Tests
1. Pre-Erection Inspection: Before erection, the Contractor and the manufacturer's representative shall jointly inspect the monorail and hoist systems and components at the job site to determine compliance with specifications and manufacturer's data and shop drawings as approved. The Contractor shall notify the the Owner 3 days before the inspection.
 2. Operational Inspection and Load Tests: Upon completion, and before final acceptance, the hoist, trolley, and monorail shall be given the rated load test specified in ASME/ANSI B30.11, carrying 125 percent (plus 5 percent, minus 0 percent) of the rated capacity, and with the units spaced to obtain maximum possible loads in the monorail track beam systems. Hoists shall hold a static, as well as control a dynamic, 125 percent rated load. The systems shall be thoroughly tested in service to determine that each component of the system operates as specified, is properly installed and adjusted, and is free from defects in material, manufacture, installation, and workmanship. The Contractor shall furnish test loads, operating personnel, instruments, and all other necessary apparatus at no additional cost to the Owner. The test and final adjustments of the equipment will be under the supervision of the Owner. The Contractor shall rectify any deficiencies found and completely retest work affected by such deficiencies.

END OF SECTION 14623

PART 2 -

2.1

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B.



43 - Process Gas and Liquid Handling, Purification, and Storage Equipment

Task	Specification	Specification Description
43 23 78 31	22 05 23 00b	Piped Utilities Basic Materials And Methods
43 24 41 23	22 05 23 00b	Piped Utilities Basic Materials And Methods
43 42 41 00	01 22 16 00	No Specification Required

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Task	Specification(s)
01 00 00 00	01 00 00 00
01 20 00 00	01 00 00 00
01 22 00 00	01 00 00 00
01 22 16 00	01 22 16 00, 01 00 00 00
01 22 20 00	01 00 00 00, 01 22 16 00
01 22 23 00	01 00 00 00, 01 22 16 00
01 30 00 00	01 00 00 00
01 35 00 00	01 00 00 00
01 35 29 00	01 00 00 00
01 35 33 00	01 00 00 00
01 40 00 00	01 00 00 00
01 41 00 00	01 00 00 00
01 41 26 00	01 00 00 00
01 42 00 00	01 00 00 00
01 42 13 00	01 42 13 00, 01 00 00 00
01 42 16 00	01 00 00 00, 01 42 13 00
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